

BRIDGE MAINTENANCE MANUAL

CHAPTER 2

BRIDGE ASSET MANAGEMENT

Minnesota Department of Transportation
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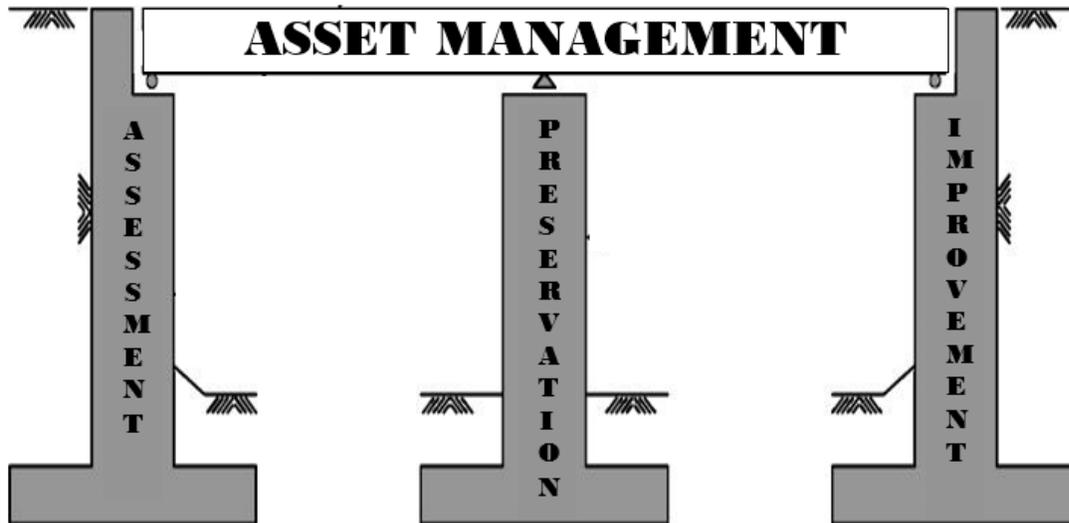


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2.1 BRIDGE ASSET MANAGEMENT

There are over 20,000 bridges in the Minnesota bridge inventory. Around 4,500 of these bridges are owned by the Minnesota Department of Transportation. These transportation assets are managed with a focus on increasing public safety and minimizing lifecycle costs. Bridge asset management consists of three components: *Assessment*, *Preservation*, and *Improvement*.

Assessment is the collection and maintenance of bridge data. This program provides a complete bridge inventory and detailed condition information on every bridge that carries or crosses a public roadway.

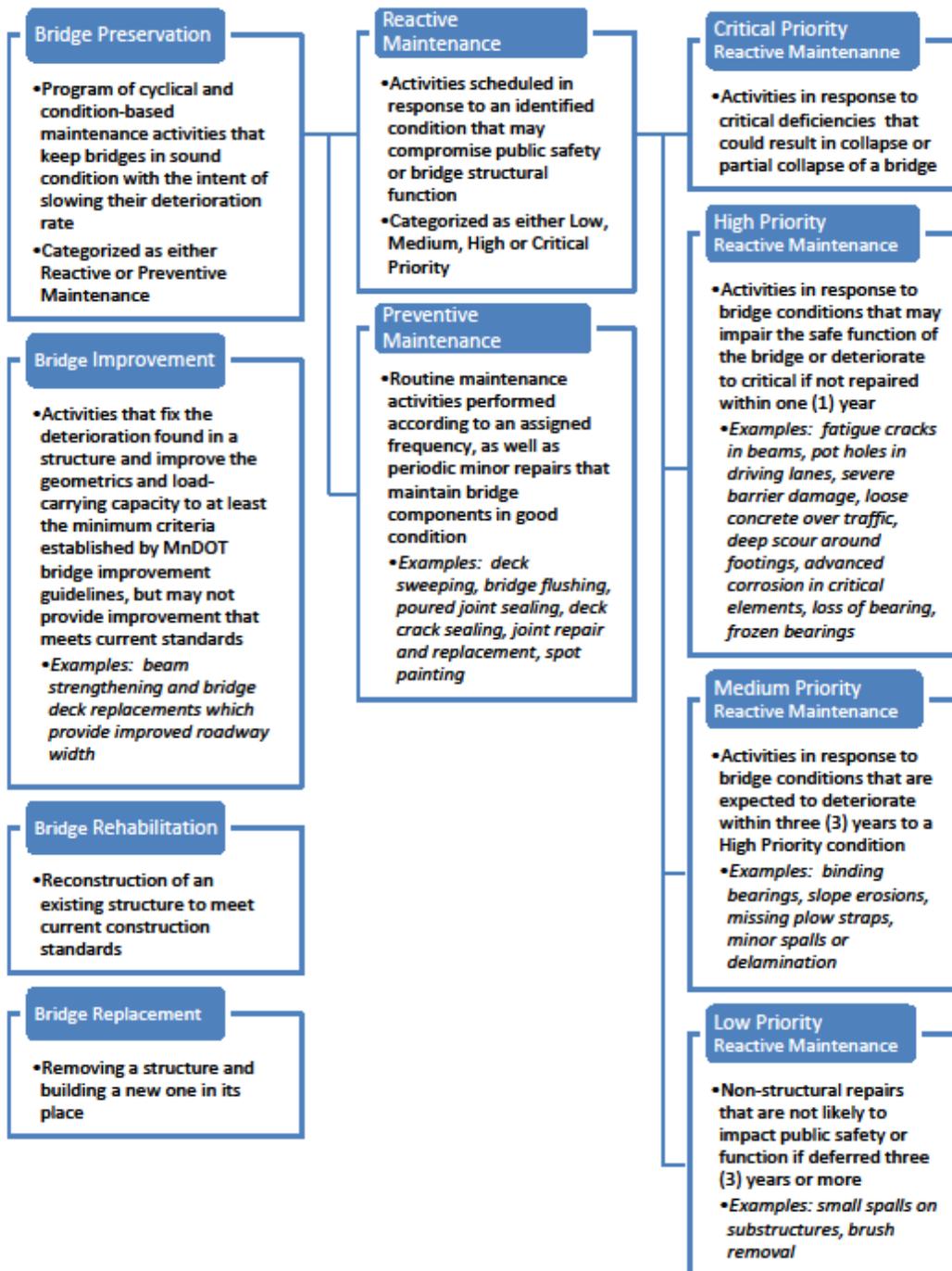
Each bridge is inspected in accordance with Federal and State laws and analyzed for safe load-carrying capacity based on current condition. This assures public safety and provides current data that is used to support sound asset management decisions. Bridge maintenance needs are identified from inspection findings, and both Preventive and Reactive Maintenance activities are then prioritized and scheduled.

Preservation is a program of cyclical and condition-based maintenance activities that slow bridge deterioration, restore a bridge's function, keep bridges in sound condition and extend their life. Bridge Maintenance is generally identified through the inspection and assessment process and can be divided into two categories: Preventive and Reactive.

- **Preventive Maintenance** includes routine maintenance activities performed according to an assigned frequency, as well as periodic minor repairs with the intent of preserving the bridge. These routine maintenance activities increase the lifespan of the bridge by slowing the deterioration caused by traffic and the environment.
- **Reactive Maintenance** is scheduled in response to an identified condition that may compromise public safety or bridge structural function.

Improvement includes major rehabilitation and replacement. When a bridge deteriorates to a condition in which preservation is not viable or cost-effective, a major capital improvement or complete bridge replacement must be performed.

Effective management of the bridge network requires that resources are allocated to the correct asset management component at the correct time. This ensures that service life is maximized, lifecycle costs are minimized and our bridges safely fulfill their transportation function.



2.1.1 MAINTENANCE TASK DOCUMENTATION

Maintenance needs are typically identified during routine safety inspections. Other assessments may be performed in conjunction with maintenance activities, such as Bridge Flushing, or in response to a complaint or incident. A **Bridge Maintenance Assessment Form** is used by the inspector to document any required maintenance that is identified during an inspection or assessment. Bridge Maintenance Supervisors are responsible for reviewing the inspection reports to assist with determining and prioritizing bridge maintenance needs as well as developing work plans for the bridges within their maintenance area.

Maintenance Field Note:

Bridge Maintenance Supervisors should review all of the inspection reports to assist with determining bridge maintenance needs.

2.1.1.1 SIMS Maintenance Module

Maintenance tasks are entered into the Maintenance Module within the Structure Information Management System (SIMS). Documenting inspection findings and maintenance needs in the same system allows for more efficient data collection, management and reporting.

For detailed instructions on using the SIMS Maintenance Module, refer to the SIMS Maintenance Module Manual. The manual is available from the SIMS help menu.

Open | None Assigned

Required Maintenance Task Information
**** NOTE: Please enter values in fields marked with an asterisk (*). These values are required to create a new Maintenance Task.****

Crew Information
 Agency * Maintenance Area * Crew *

Maintenance Task Information
 Step 1: Click the "Assign to National Bridge Element" button at the top of the form to link this maintenance task to an element. The element will be displayed in the upper right hand corner of the form.

Component * Element * Source Code * Work Code *
 PIR * Est. Quantity * Qty Units *
 Work Description *

Priority and Due Date
 Priority * How Soon (years)* Due Year* Prog Year* Season*

Other Maintenance Task Information **Completed Task Information (Actuals)**

Estimated Task Hours
 Crew Size Number of Days Hours Per Day Estimated Hours

Interval Maintenance
 Interval Maintenance Required Interval (years)

Source Code	Work Code	Interval (years)
2821	Paint, Spot Paint	5
2830	Clean and Lubricate	4
2836	Flood Seal	3-5
2838	Crack Seal	3-5
2844	Rail Seal	7
2847	Joint Seal	4

Work Order Information
 Work Order #

Unplanned/Emergency/Restitution Maintenance
 Unplanned/Emergency Work Restitution (Yellow Tag) Yellow Tag #
 Comments

Crew Maintenance is Not Required (i.e. Maintenance will be performed by another Section or by Contract)
 Maintenance Needed By Other Section Section
 Bridge Crew Maintenance Not Required Contract Work SP Number Project Year
 Comments

Required Information
 Actual Qty* Actual Qty Units*
 Start Date* Completed Date*
Note to MNDOT Users: Start Date and Completed Date should encompass the full date range that the project was charged to in RCA.
 New Product?
 Product Name

To complete a task, click the "Change Workflow Stage" button at the top of the form and submit after adding the completed task information.

Optional Information
 Completed By:
 Actual Hours
 Labor Cost
 Equip Cost
 Material Cost
 Total Cost
 Comments

Information needed to enter a maintenance task into the system includes the following:

- Bridge Number
- Crew
- Element
- Source Type Code
- Work Code
- Preventive/Reactive (P/R) Maintenance Designator
- Work Description
- Estimated Quantity
- Units
- Priority
- How Soon (or how many years before the task is due)

Refer to Section 2.1.1.2 for more detailed information on Source Type Codes. Refer to Section 2.1.1.3 for more detailed information on establishing priorities for maintenance tasks.

Additional information that is useful for planning bridge maintenance includes:

- Estimated hours
- Interval maintenance
- Restitution
- Work Order number
- Unplanned work

Estimated hours are important for quantifying bridge maintenance needs. Needs represented in terms of labor hours and/or dollars are much easier to describe than needs represented in terms of number of tasks. Estimated hours can also be totaled for all of the individual tasks that constitute an entire work plan and compared to the number of resource hours the crew actually has available. The SIMS Maintenance Module Resource Hours Management page will automatically perform these calculations if estimated hours are entered into each SIMS Maintenance task. This calculation can help to determine whether additional resources are needed or whether certain tasks need to be deferred or put into a Contract.

Certain types of preventive maintenance are considered **interval maintenance** because they need to be performed at specific intervals or cycles to be most effective. Recommended intervals for typical preventive maintenance activities are shown in the table below. A task can be designated as an interval maintenance task within the SIMS Maintenance Module.

Preventive Maintenance Activity	Typical Interval	Source Type Code
Flushing	Annually (or as often as constraints allow)	2837
Crack Sealing	3-5 years	2838
Deck Sealing	3-5 years	2836
Joint Sealing	3-5 years	2847
Clean and Lubricate Bearings	4 years	2830

Preventive Maintenance Activity	Typical Interval	Source Type Code
Rail Sealing	7 years	2844
Maintenance Painting	5 Years	2821

Restitution is a way of identifying maintenance tasks that are the result of damage. This designator can be used as a parameter for identifying those maintenance tasks that were the result of damage.

A **work order** is another way to group costs together for a bridge or bridge project. Creating a work order within the MnDOT Work Order Management System (WOMS) and entering the associated work order number within SIMS will allow the maintenance task to be tied to the labor, equipment and materials that were entered into both WOMS and the timesheet system (RCA) for that work order number. *NOTE: All timesheet entries associated with a work order need to have the work order number entered in the timesheet entry.*

Tracking a history of **unplanned work** or emergency work can be helpful to identify trends surrounding the type and extent of unplanned work that crews could expect to see each year, which will improve work planning and resource management.

2.1.1.2 Source Type Codes

Source type codes are used in SIMS to identify the type of work that is needed. MnDOT bridge maintenance workers also use these codes within the timesheet recording system (RCA) to document labor, equipment and materials for each bridge project. It is extremely important to identify the bridge and the type of work that is performed. In this manner, bridge life cycle costs can be documented and utilized within resource demand models.

Source type codes for bridge maintenance are shown in the table below with associated descriptions and a Preventive/Reactive designator. Activities associated with inventory and inspection are designated with an "I" in the P/R column.

Source Type Code	Source Type Name	Applicable Structure Type	Source Type Description	I/P/R*
1425	Bridge Data Entry and Reporting	Deck Bridges, Bridge Culverts	Bridge maintenance data entry and reporting for SIMS.	I
2120	Roadway Sweeping	Deck Bridges, Bridge Culverts	Only bridge sweeping associated with Flushing.	P
2208	Drainage Structures	Deck Bridges	All drainage structure work performed by bridge crews on drainage systems between the E-8 joints. Use with TS project number.	R
2210	Guardrail	Deck Bridges, Bridge Culverts	Guardrail repair and replacement.	R
2310	Spraying	Deck Bridges, Bridge Culverts	Machine or hand spraying noxious weeds, brush, or unwanted vegetation.	R

Source Type Code	Source Type Name	Applicable Structure Type	Source Type Description	I/P/R*
2316	Tree and Brush Removal	Deck Bridges, Bridge Culverts	Tree and brush trimming, maintenance and removal.	R
2403	Anti-icing	Deck Bridges	All tasks for managing stationary anti-icing systems for roads and bridges.	R
2819	Bridge Curb, Walk and Railing	Deck Bridges, Bridge Culverts	Maintenance of bridge curb, walk, rail, coping, fencing connected to the rail, glare screen and bridge median barriers.	R
2820	Bridge Deck	Deck Bridges	Bridge deck repair, overlays, replacements, and underside deck delamination. For joint spalls, use 2846. For approach panels, use 2840.	R
2821	Bridge Painting	Deck Bridges	Painting and preparation for painting of bridge structures.	P
2822	Miscellaneous Bridge Maintenance	Deck Bridges	Miscellaneous maintenance tasks performed on a specific structure. (stairways, fencing, light bases, access doors, transient guards and removal, ordering materials and picking up equipment).	R
2823	Bridge Culvert Inspection	Bridge Culverts	All tasks related to the inventory and inspection of culverts with a structure number done to meet requirements of the National Bridge Inspection System and/or Minnesota Bridge Safety Inspection Program for Trunk Highway bridges. Includes related inspection reports.	I
2824	Bridge Inspection – Non-Federally Funded	Deck Bridges	Trunk Highway Bridge Inspection (Non Federally Funded). Includes bridge hit/damage inspections and all related inspection reports.	I
2825	Scour Monitoring	Deck Bridges, Bridge Culverts	Scour monitoring of bridges and bridge culverts.	R
2826	Bridge Field Investigation	Deck Bridges, Bridge Culverts	Bridge field investigation tasks not associated with Bridge Safety Inspection Program requirements or project scoping. Includes deck delamination surveys, chloride testing and GPR/IR investigation to determine future work plans. <i>NOTE: For bridge hit/damage investigation, use the applicable bridge inspection source code (2824, 2828 or 2848); for scoping, use source code 1002 (Structure Study/Scoping) or 1003 (Project Scoping & Initiation) and</i>	

Source Type Code	Source Type Name	Applicable Structure Type	Source Type Description	I/P/R*
			<i>the construction project ID number, not the Bridge TS project ID number.</i>	
2827	Bridge Expansion Joints	Deck Bridges	Maintenance of bridge expansion joints. For concrete work or reestablishment use 2846. For resealing poured joints use 2847.	P
2828	Bridge Inspection – Federally Funded	Deck Bridges (funded by FC Bridge Program)	Non-MnDOT Bridge Inspection funded by the Fracture Critical Bridge Program (Project Number starts with "TSL"). Includes related inspection reports.	I
2829	Bridge Superstructure	Deck Bridges	Superstructure repair or replacement.	R
2830	Bridge Bearing Assemblies	Deck Bridges	Bearing assembly cleaning, greasing, repair, reset or replacement.	P/R
2831	Bridge Substructure	Deck Bridges	Substructure repair or replacement.	R
2832	Bridge Slope Protection	Deck Bridges, Bridge Culverts	Slope protection repair and replacement for deck bridges and bridge culverts. Also includes filling any voids, and maintaining top of slope joint.	R
2833	Bridge Graffiti and Vandalism	Deck Bridges, Bridge Culverts	Graffiti removal or cover up and vandalism repair on bridges and bridge culverts.	R
2834	Waterway Maintenance	Deck Bridges, Bridge Culverts	All waterway maintenance for deck bridges and bridge culverts, such as debris removal, waterway cleanup, channel repair and channel protection repair that is not part of slope protection.	R
2835	Bridge Culvert Maintenance	Bridge Culverts	All maintenance on culverts that have bridge numbers. Includes culvert structure maintenance, wingwall and headwall maintenance specific to bridge culverts.	R
2836	Bridge Deck Sealing	Deck Bridges	Flood sealing bridge decks, approaches and sidewalks.	P
2837	Bridge Flushing	Deck Bridges, Bridge Culverts	Flushing bearings, superstructure elements, joints, railings, and decks.	P
2838	Bridge Deck Crack Sealing	Deck Bridges	Crack sealing decks, approaches and sidewalks.	P
2839	Bridge Maintenance Activity Support	Overhead	Bridge maintenance tasks not associated with a specific structure	

Source Type Code	Source Type Name	Applicable Structure Type	Source Type Description	I/P/R*
			(small equipment repair, moving material, inventory and housekeeping).	
2840	Bridge Approach Panel	Deck Bridges	Bridge approach panel maintenance (not including joints or crack sealing).	R
2843	Plow Straps & Curb Plates	Deck Bridges	Maintenance of plow protection straps and curb plates.	R
2844	Bridge Rail Sealing	Deck Bridges	Applying sealing treatments to bridge concrete barriers and rails.	P
2845	Bridge Maintenance Program Support	Deck Bridges, Bridge Culverts, Overhead	Activities performed to support the Bridge Maintenance Program (work planning, manuals, task supervision, annual reporting and meetings).	R
2846	Joint Re-establishment	Deck Bridges	Joint reestablishment and adjacent concrete work. For expansion joint repair without concrete work, use 2827. For resealing poured joints, use 2847.	P
2847	Bridge Poured and Relief Joint Sealing	Deck Bridges	Resealing poured joints on decks, approaches and sidewalks. For expansion joint repair without concrete, use 2827. For concrete work or joint reestablishment use 2846.	P
2848	Bridge Inspection – Fracture Critical	Deck Bridges	Fracture critical and underwater bridge inspections for bridges that <u>border North Dakota</u> . Includes related inspection reports.	I
2849	Bridge Structural Evaluation	Deck Bridges	All tasks related to bridge structural evaluation.	I
2850	Bridge Load Capacity Rating	Deck Bridges, Bridge Culverts	All tasks related to load capacity rating work done on Trunk Highway bridges.	I
2855	Bridge Inspection Support	Deck Bridges, Bridge Culverts	Activities related to bridge inspection that is not covered by other source codes. Includes technical support, equipment purchase and maintenance, bridge inspection meetings, task planning and task supervision.	I

*Where I represents Inspection, P represents Preventive and R represents Reactive

The source type code that can be selected for a given maintenance task within SIMS is dependent on the element assigned to that specific maintenance task. For example, if the element Reinforced Concrete Deck (12) is assigned to the task, the source type code options will only include *2820 Bridge Deck* and *2826 Bridge Field Investigation*.

Work code, unit and the Preventive/Reactive (P/R) designator are dependent on the source type code selected for that maintenance task. Selecting the most representative source type code,

work code and unit for each task will allow the costs to be tracked and then compared to similar types of work performed around the state.

2.1.1.3 Establishing Priorities

Establishing priorities for reactive maintenance tasks is dependent on the amount of time that is anticipated before the element condition will deteriorate to critical. Low, Medium or High Priority is assigned to each reactive maintenance task that is entered into the SIMS Maintenance Module based on the following criteria.

- **High Priority Reactive Maintenance** is in response to bridge conditions that may impair the safe function of the bridge or deteriorate to critical if not repaired within one year.
- **Medium Priority Reactive Maintenance** is in response to bridge conditions that are expected to deteriorate within three years to a high priority condition.
- **Low Priority Reactive Maintenance** is in response to bridge conditions that are not likely to impact public safety or structural function if deferred three years or more.

Preventive Maintenance is automatically assigned a medium priority status. However, a Bridge Maintenance Supervisor can adjust the due year for those bridges that require preventive maintenance sooner than three years.

2.1.2 DOCUMENTING LABOR, EQUIPMENT AND MATERIALS

Documenting Labor, Equipment and Materials (LEM) for MnDOT crews is important in order to identify life cycle costs associated with the state's bridge assets.

2.1.2.1 Overall Tracking Requirements

In general, Labor, Equipment and Materials (LEM) should be distributed to each source type code and each bridge that is worked on during a specific day. Exceptions include:

- Bridge Sweeping and Flushing (2120 and 2837);
- Bridge Inspection Support (2855);
- Bridge Maintenance Support (2839 and 2845).

LEM for bridge sweeping and flushing, bridge inspection support and bridge maintenance support can be documented per structure or to general bridge project ID numbers associated with the district and bridge maintenance areas (i.e. TS09991A, TS09991B, TS09992A, etc).

Note:

Important data tracking reminders:

- Distribute LEM to each source type code and to each bridge
- SIMS Source Type Code needs to match RCA Source Type Code
- SIMS Bridge Number Needs to Match RCA Project ID Number assigned to that bridge
- SIMS Start Date and Completion Date range need to encompass all of the RCA timesheet entries that correspond to that project

The following table lists LEM tracking requirements for each MnDOT bridge maintenance source type code.

Source Type Code	Source Type Name	Tracking Labor, Equipment and Materials (LEM)
1425	Bridge Data Entry and Reporting	TASK: Not documented in SIMS LEM: Document either per structure or to a general bridge Project ID in RCA. Use to get total cost.
2120	Roadway Sweeping	TASK: See 2837 Flushing LEM: Document either per structure or to a general bridge Project ID in RCA in conjunction with 2837 Bridge Flushing. Use to get total cost.
2208	Drainage Structures	TASK: SIMS Maintenance Module LEM: Document per structure in RCA for work performed by bridge crews on drainage systems between the E-8 joints.
2210	Guardrail	TASK: SIMS Maintenance Module LEM: Document per structure in RCA for guardrail work performed on the bridge by bridge crews.
2310	Spraying	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2316	Tree and Brush Removal	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2403	Anti-icing	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2819	Bridge Curb, Walk and Railing	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2820	Bridge Deck	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2821	Bridge Painting	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2822	Miscellaneous Bridge Maintenance	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2823	Bridge Culvert Inspection	TASK: SIMS Collector Module LEM: Document either per structure or to a bridge general Project ID number in RCA. Use to get total cost.
2824	Bridge Inspection – Non-Federally Funded	TASK: SIMS Collector Module LEM: Document per structure in RCA
2825	Scour Monitoring	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2826	Bridge Field Investigation	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2827	Bridge Expansion Joints	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2828	Bridge Inspection – Federally Funded	TASK: SIMS Collector Module LEM: Document per structure in RCA
2829	Bridge Superstructure	TASK: SIMS Maintenance Module LEM: Document per structure in RCA

Source Type Code	Source Type Name	Tracking Labor, Equipment and Materials (LEM)
2830	Bridge Bearing Assemblies	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2831	Bridge Substructure	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2832	Bridge Slope Protection	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2833	Bridge Graffiti and Vandalism	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2834	Waterway Maintenance	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2835	Bridge Culvert Maintenance	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2836	Bridge Deck Sealing	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2837	Bridge Flushing	TASK: Document using SIMS Flushing tab LEM: Document either per structure or to a general bridge Project ID in RCA. Use to get total cost.
2838	Bridge Deck Crack Sealing	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2839	Bridge Maintenance Activity Support	TASK: Not documented in SIMS LEM: Document to a general maintenance Project ID in RCA
2840	Bridge Approach Panel	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2843	Plow Straps & Curb Plates	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2844	Bridge Rail Sealing	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2845	Bridge Maintenance Program Support	SIMS: Not documented in SIMS LEM: Document either per structure or to a general bridge Project ID in RCA. Use to get total cost.
2846	Joint Re-establishment	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2847	Bridge Poured and Relief Joint Sealing	TASK: SIMS Maintenance Module LEM: Document per structure in RCA
2848	Bridge Inspection – Fracture Critical	TASK: SIMS Inspection LEM: Document per structure in RCA
2849	Bridge Structural Evaluation	TASK: Not documented in SIMS LEM: Document per structure in RCA
2850	Bridge Load Capacity Rating	TASK: Not documented in SIMS LEM: Document either per structure, to a general bridge Project ID or to a bridge construction Project ID in RCA. Use to get total cost.

Source Type Code	Source Type Name	Tracking Labor, Equipment and Materials (LEM)
2855	Bridge Inspection Support	SIMS: Not documented in SIMS LEM: Document either per structure or to a general bridge Project ID in RCA. Use to get total cost.

Crews have found it useful to utilize a work tracking spreadsheet to document LEM in the field. Typically the sheet will have sections to record Name, Date, Bridge Number/Project ID, Source Type Code, Work Description, Labor Hours, Equipment Type and Mileage, and Material Type and Usage Quantities.

More specific data tracking requirements are shown in the following sections.

2.1.2.2 Labor

Distribute labor hours to each activity (source type code) and each bridge that is worked on per day.

Work Performed on Multiple Bridges

- If work is performed on multiple bridges in a work day, distribute the hours (and/or personnel) to all of the bridge project ID numbers based on the number of hours worked at each bridge.

Multiple Activities Performed on Each Bridge

- If multiple activities are performed on one bridge in a work day, distribute the hours (and/or personnel) to all of the applicable source type codes based on the number of hours worked for each activity.

2.1.2.3 Equipment

Document all equipment to each activity (source type code) and to each bridge that is worked on per day. All equipment, including trucks driven to the site need to be tracked.

Work Performed on Multiple Bridges

- If work is performed on multiple bridges, distribute the mileage equally to all of the bridge project ID numbers or document mileage separately to each bridge that is worked on that day.
- If a specific type of equipment is not used for all bridges, only charge that equipment to the applicable bridges.
- Distribute any equipment hours to each source type code and bridge project ID according to how long it was used for that bridge.

Multiple Activities Performed on Each Bridge

- If multiple activities are performed on one bridge, distribute the equipment and/or the mileage to each source type code.
- If a specific type of equipment is not used for all activities, only charge that equipment to the applicable activities.
- Distribute any equipment hours to each source type code and bridge project ID according to how long it was used for that activity.

2.1.2.4 Materials

Document all materials and usage for each activity and bridge that is worked on per day. Distribute materials and usage quantities in RCA or WOM to the applicable source type code and bridge Project ID. The Materials List is available at the following link: [Materials List](#).

2.1.2.5 Validation

MnDOT Bridge Maintenance Supervisors are responsible for validating their crews' timesheets to ensure that Labor, Equipment and Materials are charged appropriately to each source type code and bridge Project ID.

To validate, go to the [Timesheet Validation Reports](#), select Bridge and run the Bridge Project ID Charges report. The report parameters include District, Source Type Code, Work Order ID, Bridge Project ID, Employee, Supervisor, Pay Period End Date and Date Range. The report generated will list LEM charges from RCA and WOM for each Bridge Project ID and source type code identified within the selected filters.

It is recommended to run the timesheet validation reports prior to approving timesheets for the crew. When reviewing the validation report, verify the following:

- Bridge Project ID matches the bridge number where the work was performed;
- Source Type Code matches the activity performed;
- Equipment is documented for each bridge project ID, source type code and day listed; and
- Materials are documented for each bridge project ID and source type code where materials were used.

Exception reports are another useful tool for MnDOT Bridge Maintenance Supervisors when approving timesheets. Exception reports can be found within the [Business Intelligence Reporting Tool, Bridge Maintenance Portal \(BI Bridge Maintenance\)](#).

To view the exception reports, follow these steps:

1. Sign into BI using your AD account credentials
2. Select Bridge Portal
3. Select Bridge Maintenance Exception Reports
4. Enter filter criteria (District, Maintenance Area, Calendar Year and/or Date Range)
5. Select Apply
6. Click on "Click here for details" for each exception report to view the details

Exception reports include the following:

RCA Exceptions

- Culvert Source Type Codes Charged to Bridges
- Non-culvert Source Type Codes Charged to Culverts
- Bridge Source Type Codes Charged to General Projects
- Bridge Maintenance RCA Charges to Dead Bridges
- Bridge Flushing RCA Charges to Dead Bridges
- Bridge Maintenance Work Order Charges to Dead Bridges
- Bridge Maintenance Projects Without Any Equipment Charges in RCA
- Bridge Maintenance Projects Without Any Materials Charges in RCA

- Bridge Maintenance RCA Charges Outside the SIMS Start and Completion Date Range
- Bridge Project RCA Charges – But No Associated SIMS Tasks
- Bridge Flushing RCA Charges – But No Associated SIMS Flushing Checkbox for the Bridge

SIMS Exceptions

- Tasks in SIMS Without Any Associated Charges in RCA
- Possible Duplicate Maintenance Tasks Entered in SIMS
- Possible Duplicate Flushing Tasks Entered in SIMS

Work Order Exceptions

- Work Order Materials Without Labor Charges
- Work Order Other Expenses Without Labor Charges

2.1.3 REPORTING

Allowing access to bridge maintenance data in various report formats is useful when compiling bridge maintenance work plans and budgeting for upcoming work.

A variety of work planning reports are available within the SIMS Maintenance Module. Refer to [Section 2.1.3.1](#) for more information regarding reports available in SIMS.

Additional cost reports specific to MnDOT bridge maintenance work are available within the Business Intelligence (BI) reporting tool. Refer to [Section 2.1.3.2](#) for more information regarding reports available within BI.

2.1.3.1 SIMS Reporting

Maintenance tasks entered into SIMS are available in many different report formats within the SIMS Maintenance Module. Reports include:

- Maintenance Due
 - Bridge maintenance due by a specified year.
- Maintenance Completed
 - Bridge maintenance that was completed within a specified year.
- Coordinated Activities
 - All high priority maintenance due by a specified year PLUS all of the other maintenance that was entered into the system for that bridge. This report lists the high priority maintenance that needs to be accomplished, but also identifies other maintenance that may be coordinated while the crew is on the bridge.

- Programmed Repairs
 - Bridge maintenance programmed for a specific year. When maintenance tasks are entered into the system, the due year equals the programmed year. Tasks may need to be deferred (or assigned to others) by the Bridge Maintenance Supervisor or Engineer if there are insufficient bridge resources to perform the work. This is accomplished by changing the program year for the task within the SIMS Maintenance Module Bridge Programming page.
- Work By Others
 - Some maintenance work identified on a bridge may be assigned to another section (i.e. sign shop, guardrail crew or highway maintenance crews). This report identifies the work that was assigned to a specified section responsible for the work.

2.1.3.2 Business Intelligence (BI) Reporting

Multiple sources of MnDOT bridge maintenance data is pulled together in the [Business Intelligence Reporting Tool, BI Bridge Maintenance](#). Data sources include:

- Bridge inventory and inspection data from BrM;
- Bridge maintenance task data from SIMS;
- Labor, equipment and materials data from RCA;
- Work order data from WOM;
- Project full cost and expenditure data from SWIFT; and
- Employee/supervisor data from SEMA4.

By tying multiple sources of data together, more detailed costs analyses and resource demand models can be achieved. Within BI Bridge Maintenance, there are two costs areas: Estimated and Actual. Estimated costs are based on the methodology developed for snow and ice reporting. Actual costs are generated from the full project cost table in SWIFT. Reports available within BI include Resource Demand Models, Usage and Cost (Estimated and Actual) and Exception Reports.

2.1.4 PERFORMANCE MEASURES

Performance measures are a way to collect, analyze and report information regarding the performance within a specific area. These measures can tell us if we are meeting our goals and identify if and where improvements are necessary. The measures to evaluate MnDOT Bridge Preservation accomplishments and outcomes include:

- On-time completion of High Priority Reactive Maintenance
- Backlog of Medium Priority Reactive Maintenance
- Preventive Maintenance

Bridge management decisions cannot be based on individual performance measures. The network is managed with the recognition that the resources applied toward meeting one target are unavailable for meeting other bridge needs. For example, time spent on high priority maintenance can cause a backlog of lower priority maintenance tasks to accumulate, allowing these lower priority items to eventually deteriorate into conditions that are more extensive and costly to repair. Collectively evaluating the results of these performance measures enables a balanced approach toward bridge management decisions.

2.1.4.1 High Priority Reactive Maintenance

The **High Priority Reactive Maintenance** measure assesses if adequate resources have been applied toward addressing bridge conditions that may impact public safety or compromise bridge structural function. The target is 99 percent on-time completion of these tasks.

2.1.4.2 Backlog of Medium Priority Reactive Maintenance

Monitoring the **Medium Priority Reactive Maintenance** backlog indicates whether adequate resources have been applied toward managing items that were initially identified as a lower priority. This backlog is defined as medium priority tasks that were not addressed at the time they were due. A due date is determined based on the anticipated time it will take for this condition to deteriorate to a higher level. Even though these conditions were originally classified as medium priority, they may have already escalated to a higher concern by the time they are officially due.

2.1.4.3 Preventive Maintenance

Preventive Maintenance is a proven methodology that slows deterioration and extends the service life of bridges. To assess whether adequate resources are dedicated to bridge preventive maintenance, MnDOT has traditionally measured work accomplished versus work planned and monitored the condition of targeted bridge elements (strip seals, poured joints, deck crack sealing, and beam end/connection spot painting). Because this approach does not sufficiently define preventive maintenance requirements, MnDOT is in the process of developing a refined Preventive Maintenance measure. This refined measure will focus on element conditions and previous maintenance in order to evaluate whether the recommended Preventive Maintenance Program is applied consistently around the state.