



CombIS (Version 7.5) - Maintenance Recommendations

The upgrade to CombIS Version 7.5 includes some changes to the Priority Repair process used in the previous version of the software. As in the past, Priority Repairs will have an independent life outside of inspection reports, but may still be created within an inspection report. Priority Repairs will still consist of data sections for the inspector, the owner/engineer, and maintenance personnel, although not all owners will choose to use all sections available. While NJDOT will continue to use an existing external system to process and track Work Orders, some Counties may choose to use CombIS to assign and track maintenance work based on Priority Repair recommendations in the system. The main change in Version 7.5 is that we are now utilizing the features of the InspectTech Maintenance Module, which allows Priority Repairs to have an associated workflow. Some changes in terminology, functionality, and specific data fields are outlined below, as well as a basic introduction into how the new Priority Repair workflow will function.

I. Maintenance Recommendations:

A “Maintenance Recommendation” in CombIS is the term used to describe an individual work recommendation that can be created, passed through a workflow, and designated as complete within the system. A Priority Repair is one type of Maintenance Recommendation. Maintenance Recommendations in CombIS will eventually be exported into AASHTOWare Bridge Management Software (BrM) to aid in deterioration and preservation modeling of bridges. Version 7.5 of CombIS introduces many of the changes necessary to bring this concept to a reality, but additional changes in the future will likely be necessary.

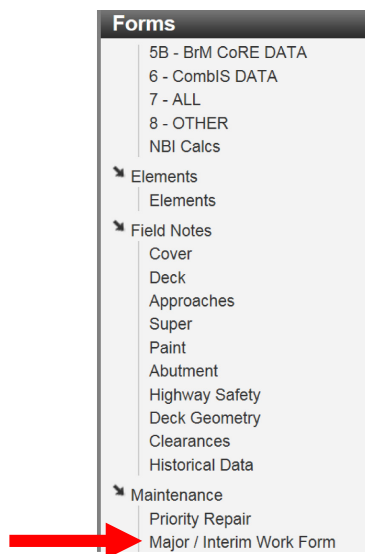
As of now, there are seven types of Maintenance Recommendations defined in CombIS, as shown below:

Priority Repair	
Maintenance Recommendation Item Number:	2016_03499
Current Work Spec.:	SE16_00
Original Work Spec. Identified In:	SE16_00
Date Originally Entered:	11/01/2016
Date Closed:	
Maintenance Recommendation Type:	PR - Priority Repair 1 (High)
Maintenance Recommendation Category:	<ul style="list-style-type: none"> PR - Priority Repair E (Critical) PR - Priority Repair 1 (High) PR - Priority Repair 2 (Medium) PR - Priority Repair 3 (Low) NPR - Priority Repair 4 (Maintenance) MW - Major Work MW - Interim Work
Maintenance Recommendation Activity:	
Originally Reported By:	John Smith
Closed By:	
Inspector	
Describe Deficiency:	

The two major types of Maintenance Recommendations in use at this time are Priority Repairs and Major/Interim Work. Note that only Maintenance Recommendation Types that are required as per a contract’s Scope of Work are required to be input for each asset. For example, if your project’s Scope of Work does not require the issuance of Priority 3 or Priority 4 Repairs, the inspector can disregard these Maintenance Recommendation Types for that project. As of the date of this guidance document, only Priority E, 1, and 2 as well as Major and Interim Work are required as per the current Scope of Work. Additional types of Maintenance Recommendations will likely be introduced in CombIS in the future, such as for bridge preservation or monitoring recommendations.

Most users are already familiar with the first Maintenance Recommendation Type, Priority Repairs, and the associated process that exists in CombIS. The Priority Repair form in CombIS has been modified and a workflow has been introduced, both of which are discussed below in more detail. Nevertheless, the Priority Repair process will,

in general, be quite familiar. A new concept, however, is the Maintenance Recommendation Types of Major and Interim Work. A new form (Major / Interim Work Form) has been created and is available in CombIS for inspection reports.



When a structure requires a major work statement (as per the Scope of Work) in the Conclusions and Recommendations, then it will also require that the Major / Interim Work Form be completed. More details on this new form are discussed below.

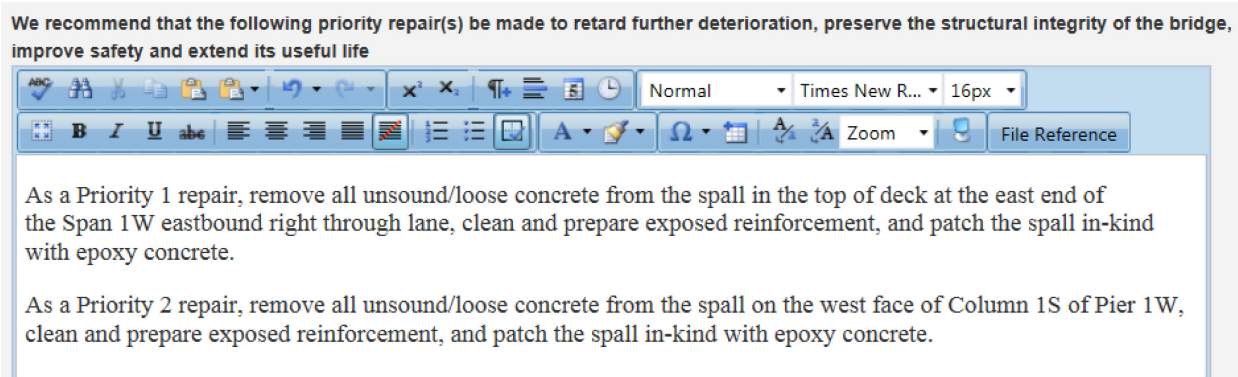
In order for Maintenance Recommendations to be properly assigned and tracked, it is important that each consists of a single granular repair recommendation. There are several reasons behind this. The first is that when multiple items are lumped together within a single Priority Repair, it is possible that all items will not be repaired at the same time, leaving that particular Maintenance Recommendation partially complete. It therefore cannot be closed, and it would be inappropriate to issue a new recommendation for the remaining work still pending. This causes obvious issues with tracking, assigning, and reporting on work. Single repair recommendations can be assigned and closed out without running into these issues. The second reason to keep recommendations granular is that it is an essential part to applying completed CombIS Maintenance Recommendations for BrM bridge modeling. Lumped repairs cannot be systematically applied to model a benefit to a bridge, whereas individual recommendations can be.

As an example, if there are multiple spalls in a bridge deck at various locations, they would appropriately be lumped into a single Maintenance Recommendation. The spalls will most likely be addressed all at once under the same maintenance effort, and the benefit of patching the different deck spalls applies in the same way to a single bridge element. If there is an additional recommendation to patch a spall on the same bridge's abutment, this is to be issued as a separate Maintenance Recommendation. The reason is that although the abutment repairs may (but not necessarily) take place at the same time as the deck repairs, the benefit is to a different bridge element and therefore needs to be reported separately to BrM for modeling purposes. Some cases will not be so black and white and will require discussion with the NJDOT Project Manager.

II. Priority Repair References in Conclusions and Recommendations:

Priority repairs that are input into CombIS will no longer be referenced automatically in the Conclusions and Recommendations section of an output report. There are several technical system-related reasons why this link has been removed. The most important reason is that all open Priority Repairs for an asset would appear in the Conclusions and Recommendations; there is currently no way to limit *only* those Priority Repairs that were recommended during the current inspection to appear. Furthermore, if a Priority Repair was designated complete in CombIS prior to finalizing the inspection report, it would no longer show up automatically in the Conclusions and

Recommendations section despite being recommended as part of that inspection. The last text field in the Conclusions/Recommendations input form now allows the inspector to type in a brief summary of each Priority Repair that they recommended as a result of their inspection.



Note that the statement “We recommend that the following priority repair(s) be made to retard further deterioration, preserve the structural integrity of the bridge, improve safety and extend its useful life” will appear in the output automatically and does not need to be typed into the text field. Text can be copied from the Priority Repair form and pasted to the Conclusions and Recommendations form if desired.

III. Modifications to the Priority Repair Form:

The Priority Repair form has had some revisions made, including the addition, revision, and deletion of certain data fields. E-mail functionality, the attachment of photos and other files, etc. remains essentially the same. The field changes are summarized in the tables on the following pages, with a portion of the new form shown below.

Priority Repair	
Maintenance Recommendation Item Number:	<input type="text" value="2016_03499"/>
Current Work Spec.:	<input type="text" value="SE16_00"/>
Original Work Spec. Identified In:	<input type="text" value="SE16_00"/>
Date Originally Entered:	<input type="text" value="11/01/2016"/>
Date Closed:	<input type="text"/>
Maintenance Recommendation Type:	<input type="text" value="PR - Priority Repair 1 (High)"/>
Maintenance Recommendation Category:	<input type="text" value="Deck"/>
Maintenance Recommendation Activity:	<input type="text" value="Deck - Repair deck spall"/>
Originally Reported By:	<input type="text" value="John Smith"/>
Closed By:	<input type="text"/>
Inspector	
Describe Deficiency:	<input type="text" value="There is a 2' by 2' spall with exposed reinforcement in the top of deck at the east end of the Span 1W eastbound right through lane."/>
Description of Proposed Work:	<input type="text" value="As a Priority 1 repair, remove all unsound/loose concrete from the spall in the top of deck at the east end of the Span 1W eastbound right through lane, clean and prepare exposed reinforcement, and patch the spall in-kind with epoxy concrete."/>
Is Interim Work Needed:	<input type="text" value="No"/>
Description of Interim Work Required to Maintain Structure Until Proposed Work Can Be Accomplished:	<input type="text"/>
Also include these E-Mail Addresses:	<input type="text"/>
<input type="button" value="Send Notification E-Mail 1"/>	Date E-Mail Sent: <input type="text"/>
	E-Mail Sent By: <input type="text"/>
	E-Mail Sent To: <input type="text"/>

The following new fields have been ADDED in the CombIS Priority Repair form:

Field Name	For use by	Description
Current Work Spec	Inspector	Designate the Work Spec associated with the current project, regardless of when the Priority Repair was initiated. If a Priority Repair goes unaddressed across multiple Work Specs but still applies as a recommendation, the Current Work Spec is to be updated each time.
Original Work Spec Identified In	Inspector	Designate the Work Spec associated with the original project that identified/created the Priority Repair. This is not to be changed or updated by future inspectors, even if the Priority Repair remains unaddressed across multiple Work Specs.
Maintenance Recommendation Category	Inspector	Select the most applicable repair category from the dropdown. This field is the first of two new fields intended to replace the original freeform text field Category of Work.
Maintenance Recommendation Activity	Inspector	Select the most applicable repair activity from the dropdown. The available choices are dependent on what was selected for Maintenance Recommendation Category. This field is the second of two new fields intended to replace the original freeform text field Category of Work.
Date closed	Inspector/Owner	The user designating a repair complete is to select the current date.
Closed by	Inspector/Owner	The user designating a repair complete is to input his or her name.
Quantity	Inspector/Owner	Input an estimated quantity for the recommended repair (if required by bridge owner).
Unit	Inspector/Owner	Input the unit associated with the Quantity above (if required by bridge owner).
Unit Cost	Inspector/Owner	Input the estimated cost per unit associated with the repair (if required by bridge owner).
Total Cost	Inspector/Owner	Input the estimated total cost associated with the repair (if required by bridge owner).
Man-Hours	Inspector/Owner	Input the estimated number of man-hours associated with the repair (if required by bridge owner).
Work Order # (NJDOT) Only	NJDOT	NJDOT staff are to input the tracking number from the Work Order System that corresponds to a Priority Repair created in CombIS.
Contract Number	Owner	Input maintenance tracking number to be input or assigned, if desired.
Date Work Assigned	Owner	Select a date that the work was assigned to a crew and/or contract.

The following fields have been REVISED AND/OR RENAMED in the CombIS Priority Repair form:

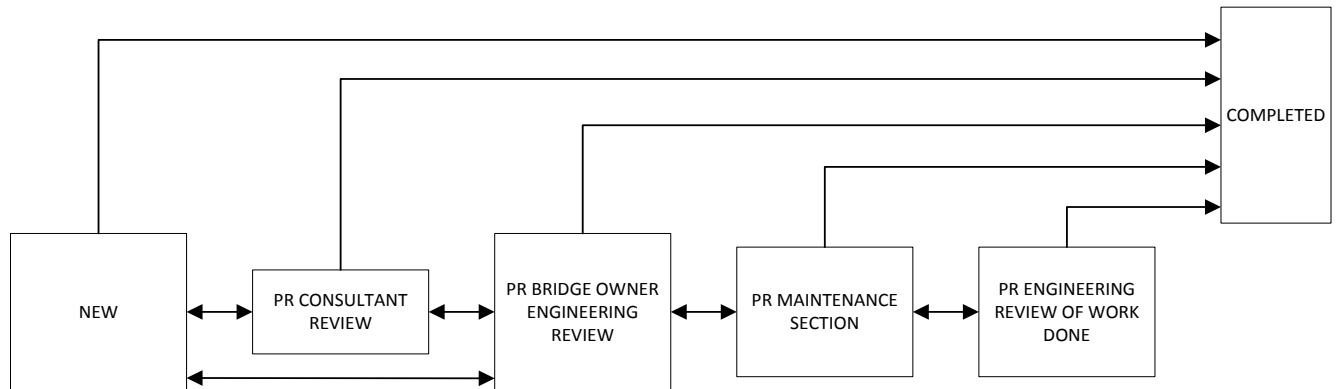
Revised Field Name	Original Field Name	Comments
Maintenance Recommendation Item Number	Item Number	Remains a system-generated unique number.
Maintenance Recommendation Type	Priority	Dropdown choices have been expanded. Not all types shown may be required as per the contract's Scope of Work.
Date Originally Entered	Date Report Entered	Remains a date selector field for the date the repair recommendation was first generated. This is not to be updated by future inspectors even if repairs have not been made.

The following fields have been DELETED in the CombIS Priority Repair form:

Original Field Name	Comments
Category of Work	Replaced by "Maintenance Recommendation Category" and "Maintenance Recommendation Activity".
Item Description (3 instances)	Deleted. Our intension is to make each Priority Repair as granular as practical, meaning one item per Priority Repair recommendation.

IV. Priority Repair Workflow:

Priority Repairs will now move through a workflow in CombIS. This is similar in concept as to how inspection reports currently move through a workflow. A schematic of the workflow is provided below.



This is the single Priority Repair workflow built into CombIS, but depending on the type of contract, there are three main paths:

<p>1. NJDOT In-house inspector for State-owned assets</p> <p style="text-align: center;">New > PR Bridge Owner Engineering Review > Complete</p>
<p>2. Consultant inspector for State-owned assets</p> <p style="text-align: center;">New > PR Consultant Review > PR Bridge Owner Engineering Review > Complete</p>
<p>3. Consultant inspector for County/Agency-owned assets</p> <p style="text-align: center;">New > PR Consultant Review > PR Bridge Owner Review > Complete</p> <p style="text-align: center;">-or-</p> <p style="text-align: center;">New > PR Consultant Review > PR Bridge Owner Engineering Review > PR Maintenance Section > Complete</p> <p style="text-align: center;">-or-</p> <p style="text-align: center;">New > PR Cons. Review > PR Br. Owner Eng. Review > PR Maint. Sect. > PR Eng. Review of Work Done > Complete</p>

Note that number three depends on how the County/Agency chooses to utilize the system. Owners may choose to use the PR Maintenance Section, the PR Engineering Review of Work Done Section, both, or neither. NJDOT will not be using these two sections, as Work Orders are processed/tracked in an external system.

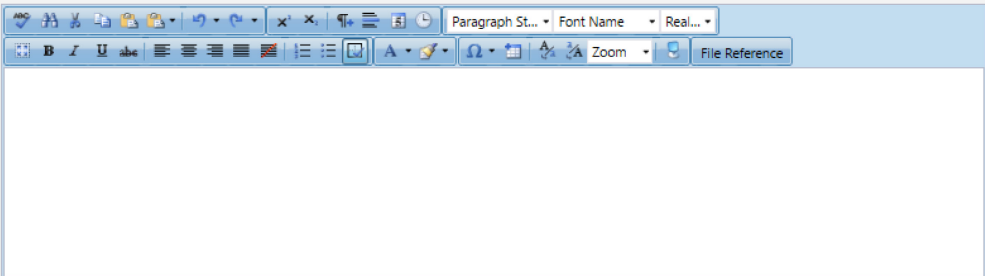
Additional guidance is being developed for the Priority Repair workflow. This will include direction as to the appropriate time to advance a Priority Repair workflow stage, as well as the specific user account roles in CombIS that are given permission to perform each change of workflow stage.

The important thing to know immediately is that the notification e-mail functionality is still active and required. Once the inspector has completed the “Priority Repair”, “Inspector”, and “Estimated Quantity/Costs” (if directed by owner) sections, he/she is to input the appropriate e-mail addresses and click the “Send Notification E-mail 1” button. If there is any doubt that the owner has been successfully notified of a Priority Repair, the inspector needs to reach out to the owner via other means for confirmation.

V. Major / Interim Work Form:

The newly-developed Major / Interim Work Form will be used to track bridges requiring Major / Interim work. Currently this data exists as text within each applicable inspection report in the Conclusions and Recommendations section. This format is useful when concerned with one particular structure, but not very useful when looking at the bridge inventory as a whole. This new form will allow work to be identified, classified, assigned, and tracked to give the owner better data for decision making. The form will also (eventually) provide a means for data transmission to BrM for bridge modeling.

Major / Interim Work	
Maintenance Recommendation Item Number: <input type="text"/>	Maintenance Recommendation Type: <input type="text" value="MW - MAJOR WORK"/>
Current Work Spec.: <input type="text"/>	
Original Work Spec. Identified In: <input type="text"/>	
Date Created: <input type="text"/>	Created By: <input type="text"/>
Date Closed: <input type="text"/>	Closed By: <input type="text"/>

Major / Interim Recommendation
(Once TP1 is issued, Modifications to this area is only to be done by NJDOT Asset Management)
Maintenance Recommendation Category: <input type="text" value="Major"/>
Maintenance Recommendation Activity: <input type="text"/>


Program for Rehabilitation/Replacement	
(The following Fields are Intended for NJDOT Asset Management use only)	
The Bridge has been Programed for Rehabilitation/Replacement: <input type="text"/>	
Status: <input type="text"/>	
UPC#: <input type="text"/>	
Date Last Updated: <input type="text"/>	Updated By: <input type="text"/>
Comments: <input type="text"/>	

Note that the bottom section “Program for Rehabilitation/Replacement” is for NJDOT Asset Management use only.

A workflow has not yet been assigned to the Major / Interim Work Form, but will most likely consist of a very simple two or three-step process (such as New > Work Pending > Complete). Additional guidance will be provided once

this has been developed. Below is a summary of the Major / Interim Work fields that are applicable to non-NJDOT users.

The following new fields exist in the CombIS Major / Interim Work Form:

Field Name	For use by	Description
Maintenance Recommendation Item Number	System-generated	System-generated unique number.
Maintenance Recommendation Type	Inspector	Only "MW – MAJOR WORK" or "MW – INTERIM WORK" are applicable. Other choices are not to be selected within this form.
Current Work Spec	Inspector	Designate the Work Spec associated with the current project, regardless of when the Major/Interim Work was initiated. If work goes unaddressed across multiple Work Specs but still applies as a recommendation, the Current Work Spec is to be updated each time.
Original Work Spec Identified In	Inspector	Designate the Work Spec associated with the original project that identified/created the Major/Interim Work. This is not to be changed or updated by future inspectors, even if the work remains unaddressed across multiple Work Specs.
Date Created	Inspector	Select the date the repair recommendation was first generated. This is not to be updated by future inspectors even if repairs have not been made.
Created By	Inspector	The user creating a repair is to input in his or her name. This is not to be updated by future inspectors even if repairs have not been made.
Date closed	Inspector/Owner	The user designating a repair complete is to select the current date.
Closed by	Inspector/Owner	The user designating a repair complete is to input in his or her name.
Maintenance Recommendation Category	Inspector	Only Major is applicable for use with this form.
Maintenance Recommendation Activity	Inspector	Select the most applicable repair activity from the dropdown.
Describe Major / Interim Work	Inspector	Define the recommended major work. This will be basically identical to the information already being supplied within the Conclusions and Recommendations section of an inspection report.

As an example of how to use the Major / Interim Work Form, consider a structurally deficient bridge that is scour critical and has top of deck spalls with exposed reinforcement. One instance of the Major / Interim Work Form would be used (with the Maintenance Recommendation Category defined as Major Work) to recommend replacing the bridge. A second instance of the Major / Interim Work Form would be used (with the Maintenance Recommendation Category defined as Interim Work) to recommend installing scour countermeasures. The Priority Repair Form would be used (with the Maintenance Recommendation Category defined as Priority 1) to recommend repairing the deck spalls.

For cases where Major Work has been identified using the Major / Interim Work Form, and the required Interim Work has the urgency of a Priority Repair, then the Priority Repair Form is the appropriate way to identify the Interim Work.

VI. Summary:

The Maintenance Recommendations available in CombIS Version 7.5 introduce some important new tools that are an integral part of the proactive asset management policy that NJDOT is moving towards. While the reasons behind some of the outlined changes may not be apparent to all users, these changes do present a significant benefit to bridge owners by enhancing the ability to track and assign maintenance needs across the entire bridge inventory more efficiently. The changes will allow for maintenance information to flow from CombIS to BrM systematically to create more accurate bridge deterioration models and allow for improved scheduling and budgeting decisions to be made.

Any questions or comments pertaining to policy are to be directed to your NJDOT Project Engineer.

Any technical questions or comments pertaining to CombIS are to be directed to County.CulvertInsp@dot.nj.gov.