

# AASHTOWare Bridge Management User Manual



Version 5.2.3

Prepared for

AMERICAN ASSOCIATION  
OF STATE HIGHWAY AND  
TRANSPORTATION OFFICIALS

**AASHTO**

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# Revision History

Change Date	Description

# Getting Started

- The Getting Started section of the manual provides an overview of the AASHTOWare Bridge Management software and its available documentation.

# What is AASHTOWare Bridge Management?

## Overview

AASHTOWare Bridge Management System (BrM - previously called Pontis) is a comprehensive bridge management system originally developed in 1989 for the Federal Highway Administration (FHWA). The software is currently licensed through the American Association of State Highway and Transportation Officials (AASHTO) to over 50 State Departments of Transportation and other agencies.

BrM is merely one product in the AASHTO BRIDGEWare product suite. BrM specializes in:

- Allocating scarce resources to protect infrastructure investments, ensuring safety and maintaining mobility.
- Storing inventory and inspection information about an agency's bridges and other structures.
- Supplying a rich set of modeling and analysis tools to support project development, budgeting, and program development.
- Formulating network-wide preservation and improvement policies for evaluation of each structure in a network, making recommendations for the projects an agency should include in their capital plan.
- Providing the capability to analyze the impact of different project alternatives on the performance of individual structures or of an entire network of structures.
- Defining and scheduling projects for individual structures or for groups of structures.

## Software Characteristics

BrM is a web software that can be installed on a web server using Microsoft Internet Information Services (IIS). BrM can be configured in the following ways:

- **Workstation** - This configuration, sometimes referred to as "stand-alone," has both the database and the software on a local computer. BrM uses the Cassini web server to allow BrM to run locally and to look and feel like a desktop software.
- **Client-Server** - This configuration is a multi-user configuration with the database installed on a server and the software installed on client computers. Separate installations of BrM Workstation on different computers speak to the same database on a separate server. This configuration uses the same installation as the Workstation configuration.
- **Server (Enterprise)** - This configuration, sometimes known as a "thin-client," consists of BrM installed on a web server with users connecting to BrM via Internet Explorer. The database is usually on a separate database server that communicates with the web server. This configuration uses a different installation than the Workstation configuration.

## BrM Modules


BrM is organized into eight modules:

- **Inspection Module** - Used to maintain inventory and inspection information about structures.
- **Reports Module** - Allows the user to select, view, and print various reports for structures in the database.
- **Admin Module** - Contains the administrative functions of BrM that create flexibility within the software by allowing the administrator to configure various settings to meet agency needs.
- **Gateway Module** - Provides the tools to import and export data between BrM and other systems.
- **Analysis Module** - Provides a detailed analysis of a selected bridge and its work candidates.
- **Projects Module** - Create and manage projects for work on specific bridges.
- **Programs Module** - Create and manage programs containing projects.
- **Tunnels Module** - Used exclusively for tunnel inventory and inspection.



# Documentation Guide

BrM documentation consists of this user manual, an installation guide, the online help system, and examples documents.

- **User Manual** - The *BrM User Manual* provides instructions on using each of the BrM tasks. It is intended to serve as a self-contained reference for most BrM users.
- **Installation Guide** - The *BrM Installation Guide* provides instructions on installing the BrM system and properly setting up the server.
- **Online Help System** - The *BrM Online Help System* includes the same material as the *BrM User Manual* but it is accessible through the software for easy access to necessary information. Clicking on a page's  icon within the application will send the user directly to that page's help section.
- **Examples Documents** - The *BrM Examples* documents provide real-world examples to help users understand how to use specific tasks in BrM and how multiple tasks work together to accomplish specific goals.

# System Basics

- The System Basics section of the manual describes the process of logging in to BrM and explains BrM's layout and navigation.

# Logging In

In order to log in to your agency's BrM software, your system administrator must first:

- Set up the ODBC profiles for the BrM databases you will be using.
- Establish user names, passwords, and user privileges for each database.

**\*Note:** The standard installation of BrM with the SQL Server sample databases sets up default profiles with a user under the user name and password "pontis."

1. Select the BrM software from the Window applications.

BrM AASHTOware Bridge Management AASHTO

Login

User ID:

Password:

Database: Connecticut\_SQL ▾

Login

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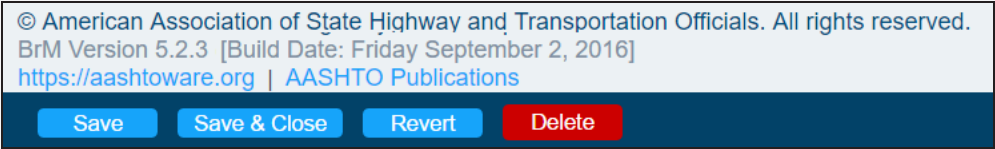
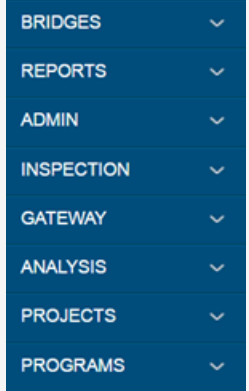
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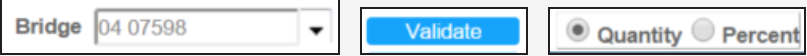
2. Select the desired database from the **Database** dropdown. This dropdown is only displayed if your agency has more than one database defined in BrM.
3. Enter your login credentials.
4. Click the **Login** button.

**\*Note:** Contact your administrator if you consistently receive a database error.

# BrM Navigation

While each page within the software is different, the basic format the user will see is always the same. On any given page, the user will see the BrM header, footer, tabs, tasks, groupings, and controls.

BrM Navigation	
Object	Description
<b>Header</b>	<p>The header contains the AASHTOWare BrM logo (click to return to the Bridge List), displays the current user and database, and has buttons to take the user to the home page (Bridge List), the help system, account information, or to log the user out of the software.</p> 
	<p>The top of each page also contains a "breadcrumb" representation of exactly which page the user is currently on and the path to get there, such as <i>Inspection &gt; Inventory &gt; Roads</i>.</p> <p>Some tasks will also contain headers specific to the content of the page.</p> 
<b>Footer</b>	<p>The footer displays the current version of BrM and the build date and time for the latest version.</p> <p>Most tasks also contain a footer with page controls such as save, cancel, delete, etc.</p>
	
<b>Tab</b>	<p>The tab is the main module that houses tasks, groups, and controls. The standard software contains 8 tabs that run vertically along the left of the software: Bridges, Reports, Admin, Inspection, Gateway, Analysis, Projects, and Programs.</p> 

BrM Navigation	
Object	Description
Task	<p>The tasks make up the menu options for each of the tabs. The tasks run vertically along the left side of the software. Tasks can contain subtasks which are listed underneath the tasks and only visible when the task is selected or expanded.</p> 
Grouping	<p>The groupings are the sectioned-off parts of each of the task pages. The groupings typically have display names and their content is often wrapped in a grey outline.</p> 
Control	<p>The controls are the fields within the groups: checkboxes, text fields, radio buttons, etc.</p> 

# User Profile

After clicking on the user name in the header to reveal the header options, select the *User Profile* link to open the *User Profile* page:

The screenshot shows a form titled "My Account Information" with the following fields and values:

First Name:	Pontis
Last Name:	User
User ID:	Pontis
Agency:	Bentley
Phone:	877-913-1550
Email:	pontis@bentley.com

At the bottom of the form are three buttons: **Apply**, **Change Password**, and **Cancel**.

To change the login password, select the *Change Password* button to reveal additional controls:

The screenshot shows the same "My Account Information" form, but with the "Change Password" section expanded. The fields and values are:

First Name:	Pontis
Last Name:	User
User ID:	Pontis
Agency:	Bentley
Phone:	877-913-1550
Email:	pontis@bentley.com
Old Password:	
New Password:	
Confirm New Password:	

Below the password fields, the "Password Rules" section states: "Password must contain at least 5 total characters."

At the bottom of the form are two buttons: **Apply** and **Cancel**.

By default, all BrM passwords must contain at least 5 characters. When new password restrictions have been set by the administrator on the *Admin > Security > Password Rules* subtask, the rules will be different.

When the desired changes have been made, click the *Apply* button to save them.

To reject the changes, click the *Cancel* button.

# Message Containers

Message containers are a new feature in BrM version 5.2.3 that display important save, error, or informational messages on specific pages throughout the software. Message containers will typically appear on a page after changes have been made and saved, a save has been attempted, or a required item is not currently completed.

The green message container will appear from the header if the page was saved successfully:

Bridge Facility Carried (007): US 2 Inspection: 2

**The changes were successfully saved!**

**Condition Ratings**

Deck (058): 6 Satisfactory  
 Superstructure (059): 6 Satisfactory  
 Substructure (060): 6 Satisfactory

Channel (061): 8 Protected  
 Culvert (062): N N/A (NBI)  
 Waterway (071): 8 Equal Desirable  
 Unrepaired Spalls: (SF)

Validate Calculate SR Calculate NBI NBI Converter Profile: Agency Test Profile

**Element Conditions**

- All Structures - Quantity Percent Show Last CoRe Insp Add New Element

Elem	Str. Unit	Env	Description	Quantity	Units	Qty. 1	Qty. 2	Qty. 3	Qty. 4
12	0	Sev. (4)	Re Concrete Deck	87949.996	sq.ft	85658.0	2292.00	0.000	0.000
107	0	Low (2)	Steel Opn Girder/Beam	8610	ft	8608.99	1.001	0.000	0.000
210	0	Low (2)	Re Conc Pier Wall	157.999	ft	156.001	2.001	0.000	0.000
215	0	Low (2)	Re Conc Abutment	148.999	ft	115.000	32.999	1.001	0.000
220	0	Sev. (4)	Re Conc Sub Pile Cap/Ftg	7.001	ft	0.000	7.001	0.000	0.000

If the page does not save successfully or there is some other message the user needs to see, a message container will appear from the footer:

AASHTO Bridge Elements Add New Element

Elem	Str. Unit	Env	Description	Quantity	Units	Qty. 1	Qty. 2	Qty. 3	Qty. 4
16	1	Mod. (3)	Re Conc Top Flange	0	sq.ft	588.000	12.000	0.000	0.000
1081	1	⚡	Soffit Spalls/Delams/Patches	0	sq.ft	0.000	6.000	0.000	0.000
1120	1	⚡	Efflorescence/Rust Staining	6	sq.ft	0.000	6.000	0.000	0.000
511	1	🛡️	Asphalt Overlay	600	sq.ft	0.000	600.000	0.000	0.000
39	1	Mod. (3)	Prestressed Slab	896	(SF)	886.000	8.000	2.000	0.000
110	1	Mod. (3)	Re Conc Opn Girder/Beam	112	ft	109.000	3.000	0.000	0.000
215	1	Mod. (3)	Re Conc Abutment	108	ft	98.000	6.000	4.000	0.000
310	1	Mod. (3)	Elastomeric Bearing	16	each	16.000	0.000	0.000	0.000
330	1	Mod. (3)	Metal Bridge Railing	100	ft	0.000	100.000	0.000	0.000

**Inspection Notes**

**Error (2)** Warning (0) Information (0)

- ✖ Element total quantity must be greater than zero.
- ✖ Element total quantity must be greater than zero.

Status: New Review Needed Approved By: Cancel Save Save & Close Delete Inspection

# Bridges

- The Bridges section of the manual addresses each of the tasks in BrM's *Bridges* tab. The *Bridges* tab contains several options to manage the structures within the database.



# View List

The *Bridges > View List* task serves as the BrM homepage. The *View List* task is a complete list of all of the bridges in the system that can be filtered and customized in various ways and allows for the selection of bridges prior to performing other actions in the system.

Bridge ID	District	County	Facility Carried	Feature Intersected	Own	Maint	Built
00001	District 5	Lane	SOUTH 2ND STREET	MILL RACE CANAL	City/Municipal Hwy Agenc	CTY/MUN Hwy AGCY	1914
00002	District 5	Lane	5TH ST	DITCH	City/Municipal Hwy Agenc	CTY/MUN Hwy AGCY	1970
00003	District 5	Lane	NORTH 8TH STREET	SCS CANAL	26 Private(nonRailroad)	26 Private(nonRailroad)	1971
00004	District 5	Lane	BOOTH KELLY/SO.5TH	MILL RACE CANAL	City/Municipal Hwy Agenc	CTY/MUN Hwy AGCY	1936
00051	District 2C	Multnomah	Hwy 100 Trail	TANNER CREEK	State Highway Agency	State Highway Agency	1915
000602	District 13	Wallowa	HWY 61 CONN 1	FARMERS DITCH	City/Municipal Hwy Agenc	CTY/MUN Hwy AGCY	1960
000604	District 13	Wallowa	WEST WALLOWA AVE	BIG BEND DITCH	City/Municipal Hwy Agenc	CTY/MUN Hwy AGCY	1935
000607	Atest72616	Wallowa	NORTH 8TH STREET	WALLOWA RIVER	City/Municipal Hwy Agenc	CTY/MUN Hwy AGCY	1956
000622	District 4	Linn	OLD SALEM RD	MURDER CREEK	County Hwy Agency	County Hwy Agency	1955
00071	District 8	Jackson	OR 99 (HWY 060)	OWL CREEK	State Highway Agency	State Highway Agency	1915
00072A	District 8	Jackson	OR 99 (HWY 060)	SAVAGE CREEK	State Highway Agency	State Highway Agency	1916
001088	District 9	Gilliam	I-84 (HWY 002)	JOHN DAY RIVER	State Highway Agency	State Highway Agency	1963
00109	District 9	Wasco	HWY 292	THREE MILE CREEK	State Highway Agency	State Highway Agency	1947

Total Bridges: 11644      Matching Filter: 11644      Selected: 0

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## Selecting a Bridge

The *View List* task's main function is bridge selection. Most functions in BrM require a bridge to be selected, and the *View List* task is the main location for this action.

There are two different ways to select a single bridge on the bridge grid:

1. **Checkbox Select** - Clicking the checkbox of the desired bridge will select it.
2. **Highlight Select** - When hovering the mouse's cursor over a bridge in the bridge grid, the bridge's row will be highlighted blue. Clicking anywhere on that row will darken and solidify that highlight and select the bridge, checking its box. The highlight select differentiates itself from the checkbox select because it reveals an inspection summary for the highlight selected bridge:


Bridges > View List

Filter: BrM - None    Layout: Default    Jump to Bridge: 00007

Bridge ID	District	County	Facility Carried	Feature Intersected	Own	Maint	Built
<input checked="" type="checkbox"/> 00001	03	Fairfield	INTERSTATE-95	BYRAM RIVER'S WATER ST	State Highway Agency	State Highway Agency	1958
<input type="checkbox"/> 00002	03	Fairfield	INTERSTATE-95	RIVER AVENUE	State Highway Agency	State Highway Agency	1958
<input type="checkbox"/> 00003	03	Fairfield	JAMES STREET	INTERSTATE-95	State Highway Agency	State Highway Agency	1958
<input type="checkbox"/> 00004	03	Fairfield	INTERSTATE-95	DELANAV AVENUE	State Highway Agency	State Highway Agency	1958
<input type="checkbox"/> 00005	03	Fairfield	INTERSTATE-95	RITCH AVENUE	State Highway Agency	State Highway Agency	1958
<input type="checkbox"/> 00006	03	Fairfield	INTERSTATE-95	FIELD POINT ROAD	State Highway Agency	State Highway Agency	1958
<input checked="" type="checkbox"/> 00007	03	Fairfield	INTERSTATE-95	SHORE ROAD # 1	State Highway Agency	State Highway Agency	1958
<input type="checkbox"/> 00008	03	Fairfield	INTERSTATE-95	HORSENECK CREEK	State Highway Agency	State Highway Agency	1958
<input type="checkbox"/> 00009	03	Fairfield	INTERSTATE-95	ARCH STREET	State Highway Agency	State Highway Agency	1958
<input type="checkbox"/> 00010	03	Fairfield	INTERSTATE-95	STEAMBOAT ROAD	State Highway Agency	State Highway Agency	1958
<input type="checkbox"/> 00011	03	Fairfield	INTERSTATE-95	DAVIS STREET	State Highway Agency	State Highway Agency	1958
<input type="checkbox"/> 00012	03	Fairfield	INTERSTATE-95	DAVIS MILL POND	State Highway Agency	State Highway Agency	1958

Total Bridges: 5470    Matching Filter: 5470    Selected: 2

Context: Bridge Level    Image 1 of 1    Zoom In



Inspection - 11/19/2011 (CKFO)

Condition	Load Rating	Inventory	Roadway On	Schedule
Health Index:				
Sufficiency Rating:	81.1			
SD / FQ Status:	Not Deficient			
Deck (58):	6 Satisfactory			
Superstructure (59):	7 Good			
Substructure (60):	6 Satisfactory			
Channel (61):	N N/A (NBI)			
Culvert (62):	N N/A (NBI)			

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**\*Note:** Regardless of how a bridge is selected, all selected bridges will remain selected until unselected. This is important because many of the functions in BrM take into account all of the currently selected bridges. Users must ensure that before they perform an action, such as generating a report, only the desired bridges are selected.

### Highlighted Bridge Images

When a bridge is highlighted, the *Context* dropdown in the *Images* grouping can be used to determine which images to display. Selecting "Bridge Level" will display the images that have been added to the bridge, not a specific inspection. Selecting a specific inspection will display only the images for that inspection.

### Highlighted Bridge Inspection Summary

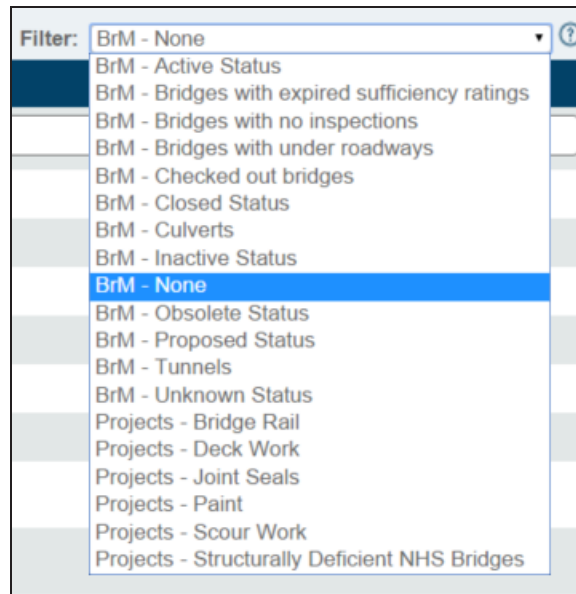
When a bridge is highlighted, the *Inspection Summary* grouping will display information about the selected bridge's most recent inspection. The various tabs - Condition, Load Rating, Inventory, Roadway On, and Schedule - can be selected to view inspection information.


## Filter

Due to the vast size of some users' systems, filters are necessary to sort and locate bridges based on specified criteria. Filters are created on the *Bridges > Manage Filters* and *Projects > Manage Filters* tasks.

There are two main ways to filter bridges:

1. **Filter Dropdown** - The *Filter* dropdown lists all of the relevant filters that have been created and edited on the *Manage Filters* task. By default, BrM comes with a set of various filters (labeled "BrM" in the dropdown), but new filters can be created. When a filter is selected from the dropdown, the bridge grid will automatically update with the filtered bridges.



2. **Quick Filters** - Each column in the Bridge List has a quick filter that enables the user to filter the grid based on a condition. The user types into the **Quick Filter** textbox and then clicks the  symbol to select a condition. Once the condition is selected, the grid will automatically be updated with the filtered bridges.

**\*Note:** By default, filling in the **Quick Filter** textbox and then pressing Enter on the keyboard will automatically make use of the "Contains" quick filter condition.

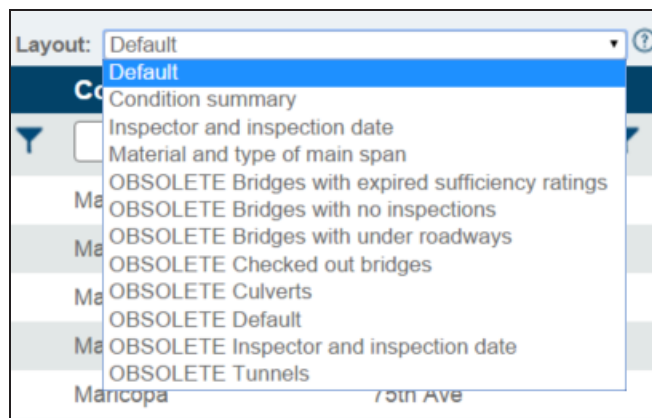
The following table explains the various selectable quick filter conditions:

Quick Filter Conditions	
Condition	Description
NoFilter	No filter is applied - filter controls are cleared.
Contains	Returns results that contain the entered value. Same as: dataField LIKE '%value%'
DoesNotContain	Returns results that do not contain the entered value. Same as dataField NOT LIKE '%value%'
StartsWith	Returns results that start with the entered value. Same as: dataField LIKE 'value%'
EndsWith	Returns results that end with the entered value. Same as: dataField LIKE '%value'
EqualTo	Returns results that exactly match the entered value. Same as: dataField = value
NotEqualTo	Returns results that do not exactly match the entered value. Same as: dataField != value
GreaterThan	Returns results with a value greater than the entered value. Same as: dataField > value
LessThan	Returns results with a value less than the entered value. Same as: dataField < value
GreaterThanOrEqualTo	Returns results with a value greater than or exactly matching the entered value.

Quick Filter Conditions	
Condition	Description
	Same as: dataField >= value
LessThanOrEqualTo	Returns results with a value less than or exactly matching the entered value. Same as: dataField <= value
Between	Returns results with a value that falls between the two entered values. Same as: value1 <= dataField <= value2 <b>*Note:</b> Value1 and value2 should be separated by a space when entered into the quick filter.
NotBetween	Returns results with a value that does not fall between the two entered values. Same as: dataField <= value1 & dataField >= value2 <b>*Note:</b> Value1 and value2 should be separated by a space when entered into the quick filter.
IsEmpty	Returns results where the specific field is empty. Same as: dataField = "
NotIsEmpty	Returns results where the specific field is not empty. Same as: dataField != "
IsNull	Returns only null values.
NotNull	Returns only non-null values.

## Layout

The **Layout** dropdown determines the bridge grid's columns. There is a default layout on the *View List* task, but new layouts can be created on the *Manage Layouts* task.



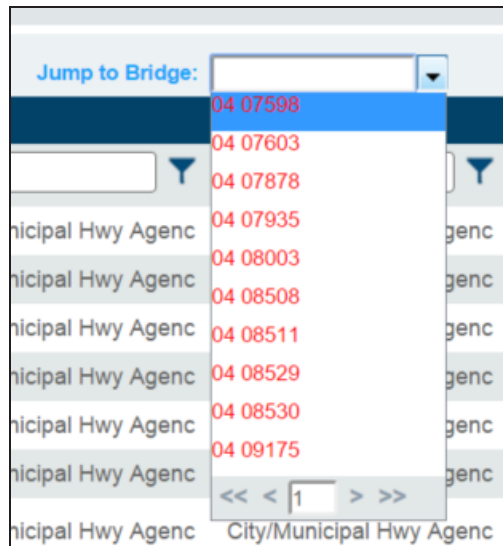
**\*Note:** The **Layout** dropdown will not be available when certain custom filters (those that are either created or edited using the *Manage Filters > Edit SQL* subtask) are selected from the **Filter** dropdown.

## Jump to Bridge

The **Jump to Bridge** control allows the user to search for and locate a specific bridge. The user can type the Bridge ID into the textbox or use the dropdown to find the bridge by clicking through the pages.

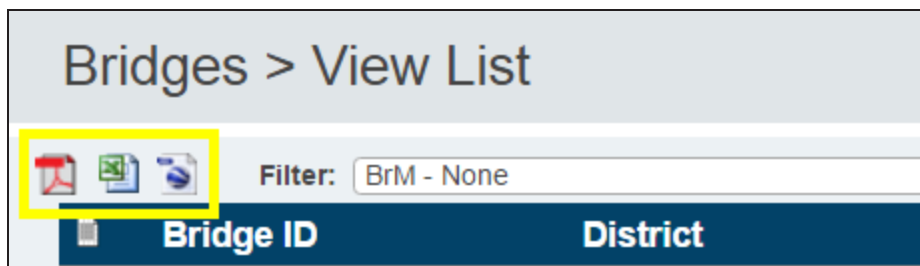
When typing into the textbox, the search will operate using either the "Contains" or "Starts With" function. The function used is determined by the BRIDGE\_SELECTOR\_SEARCH\_TYPE option on the *Admin > General Config > Options* task.

When the bridge is selected, it will be highlighted and selected.



## Export Options

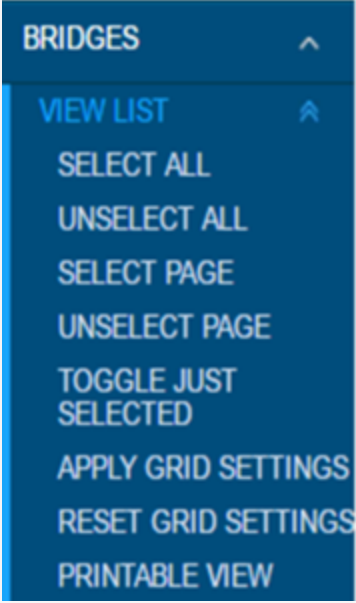
There are three export options located at the top left corner of the bridge grid: Adobe Acrobat Portable Document Format (PDF), Microsoft Excel Spreadsheet (XLS), and Google Keyhole Markup Language (KML). If one or more bridges are selected, only the information from the selected bridges will export. If no bridges are selected, all of the bridges in the current filter will be exported.



## Side Menu Options

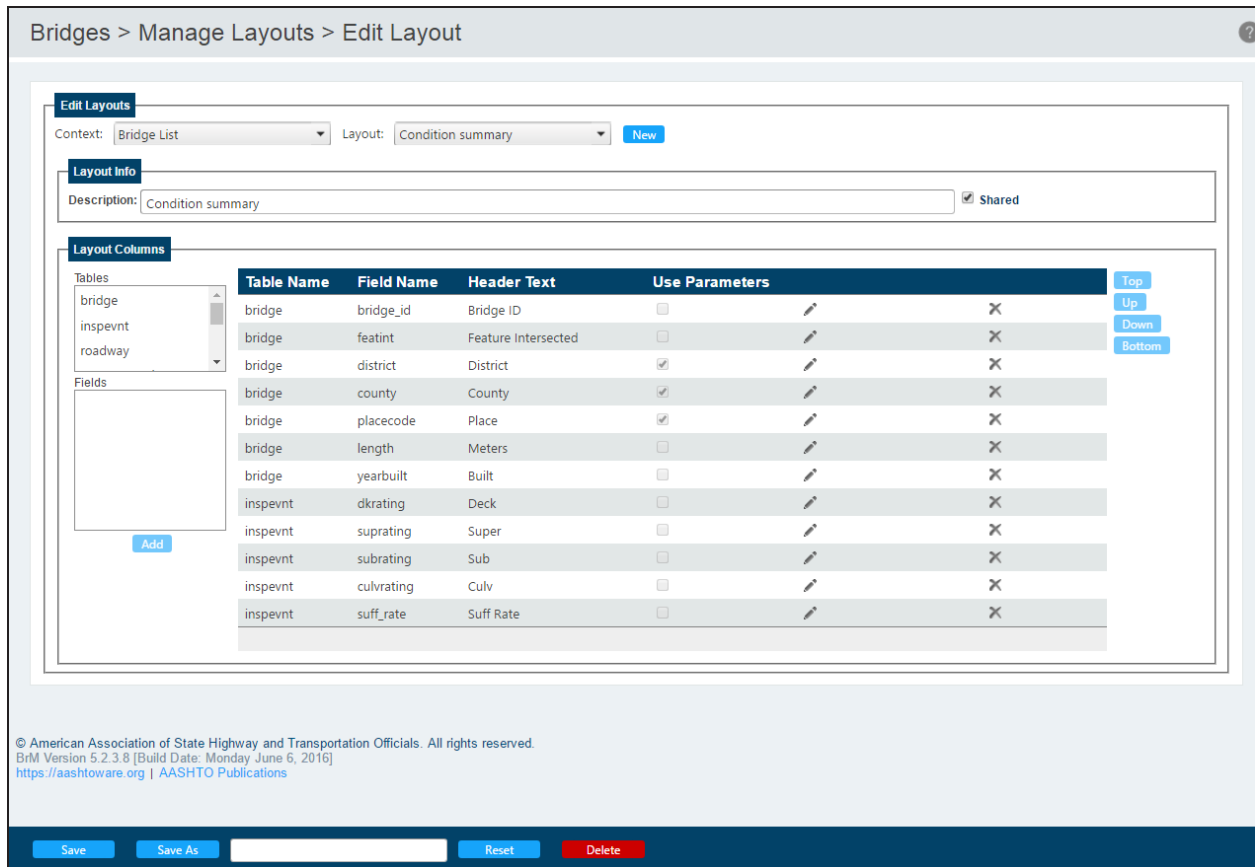
The side menu for a certain Tab > Task will typically contain subtasks, but for the *Bridge > View List* task the side menu contains various options that perform actions.

## View List Options

	Option	Description
	<b>Select All</b>	Selects all of the bridges within the current filter.
	<b>Unselect All</b>	Unselects all of the bridges currently selected.
	<b>Select Page</b>	Selects all bridges on the current page, regardless of how many bridges are in the current filter. <b>Example:</b> If there are 30 bridges in the current filter but only 10 bridges per page, only the 10 bridges shown on the current page will be selected.
	<b>Unselect Page</b>	Unselects all bridges on the current page, regardless of how many bridges are in the current filter.
	<b>Toggle Just Selected</b>	Toggles between showing all of the bridges in the current filter to showing only the bridges that have been selected. <b>Example:</b> If a user has 4 bridges selected, clicking <i>Toggle Just Selected</i> will display only the 4 selected bridges, regardless of the total number of bridges in the filter.
	<b>Apply Grid Settings</b>	The column headings of the bridge grid can be arranged in any order. The user can click and hold then drag and drop the column headings into any order desired. If the column headings order is changed and the user wants to permanently save it, <i>Apply Grid Settings</i> can be selected.
	<b>Reset Grid Settings</b>	As discussed above, the grid's column headings order can be changed. If the column headings order is changed and the user wants to revert back to the default column heading order, <i>Reset Grid Settings</i> can be selected.
	<b>Printable View</b>	The <i>Printable View</i> option opens a new web page with a printable view of all of the bridges in the current filter.

# Manage Layouts

The *Bridges > Manage Layouts* task allows the user to create and edit layouts for the Bridge List as well as several other grids throughout the software. The selections made for the layout will determine the column headings for a given grid. This task is also accessible from the *Projects* tab with the same functionality.



## Context

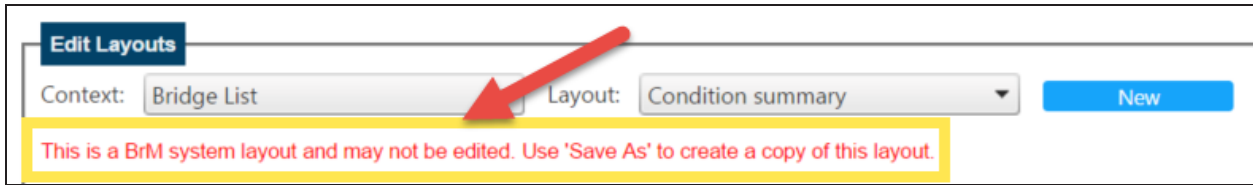
The **Context** dropdown determines the grid for which the layout is being created. When the *Manage Layouts* task is opened from the *Bridges* tab, the default context will be the Bridge List, however there are several other context selections:

- **Bridge Group Roadways** - The grid on the *Bridges > Manage Bridge Groups > Add/Remove Roadways* subtask.
- **Bridge Groups** - The grid on the *Bridges > Manage Bridge Groups > Bridge Groups* subtask.
- **Bridge List** - The grid on the *Bridges > View List* task.
- **Funding** - The grid on the *Projects > Manage Funding > Funding List* subtask.
- **Needs List** - The grid on the *Analysis > Work Candidates > Needs List* subtask.
- **Programs** - The grid on the *Projects > Manage Programs > Program List* subtask.
- **Project Bridge Needs** - The Bridge Needs grid on the *Projects > Create/Edit Project > Query* subtask.
- **Projects** - The grid on the *Projects > Project List* task.
- **Tunnels** - The grid on the *Tunnels > Tunnel List* task.

## Layout

The **Layout** dropdown lists all of the layouts that have been created or that automatically come with the system. The available options depend on the selection made:

- **BrM System Layout** - If the layout selected is a BrM system layout, it cannot be edited or deleted. A note will appear in red text under the dropdown indicating that the layout is a BrM system layout and may not be edited:



However, the user can copy the BrM system layout's settings by typing a new layout name into the textbox next to the *Save As* button and then clicking *Save As*. Once the copy is made, the newly created layout can be edited.

- **Non-BrM System Layout** - Any layout that, when selected, does not cause the red BrM system layout note to appear can be edited or deleted freely.
- **New** - Clicking the *New* button creates a new layout that can be edited or deleted freely. The new layout can be named by entering a name into the textbox next to the *Save As* button and then clicking *Save*.

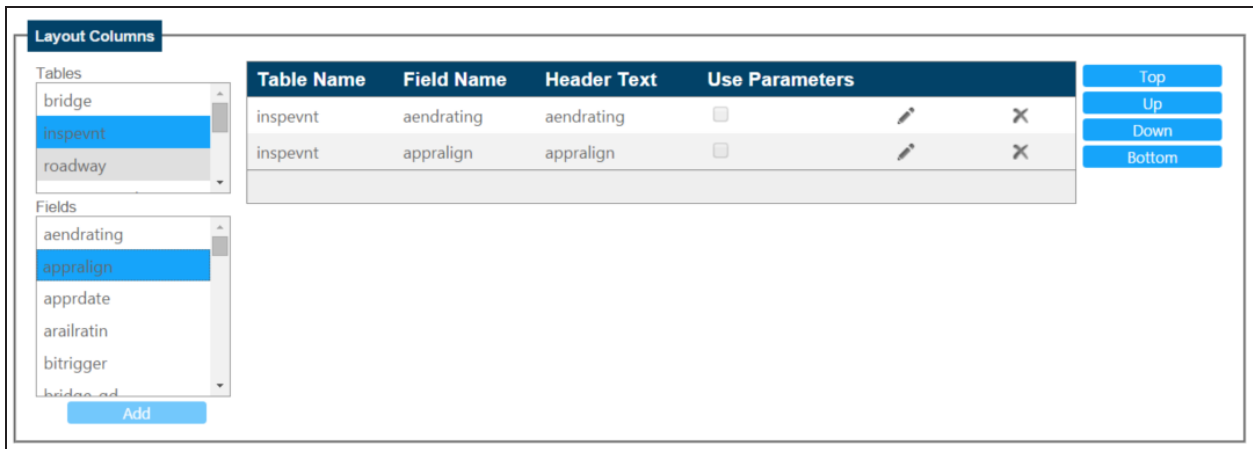
## Layout Info

The *Layout Info* grouping allows the user to enter a description of the currently selected layout. The user can also check the *Shared* checkbox if the layout should be available to other users.

## Layout Columns

The *Layout Columns* grouping is where the user configures the selected layout. A selection must be made from the *Tables* listbox and, based on that selection, the *Fields* listbox will populate with options.

The options in the *Fields* listbox will be the column headings for the layout. An option can be added to the layout by selecting it from the *Fields* listbox and clicking the *Add* button. The multiple select ability of the CTRL and Shift keyboard keys is applicable.



The grid formed from the selection contains the table name, field name, heading text, and:

- **Use Parameters** - The *Use Parameters* checkbox indicates whether or not parameters will be used for the selected field. Parameters for the fields are set up in the *Admin > General Config > Parameters* task and designate text to a specific value.

**Example:** A parameter may be established for a certain field so that any row within that column with the value "1" would present the text "District 1," any row within that column with the value "2" would present the text "District 2," etc.

- **Edit** - Clicking the symbol allows the user to edit the heading text and check/uncheck the *Use Parameters*



checkbox. To save the changes, click the  symbol. To cancel changes, click the  symbol.

- **Delete** - Clicking the  symbol deletes the field from the layout.

The buttons to the right of the table - *Top, Up, Down, Bottom* - control the positioning of the fields in the layout. Because tables read left to right, the top field in the layout corresponds to the leftmost column of the table. Once an item is selected, The *Top* and *Bottom* buttons move it to the top and bottom of the layout grid, respectively. The *Up* and *Down* buttons move the selected item up and down by one increment, respectively.

## Manage Layouts Page Controls



The *Save* button saves the current layout.

The *Save As* button acts as a copier and copies the current layout's settings into a new layout that uses the name entered into the textbox next to the *Save As* button.

The *Reset* button resets any changes that were made to the current layout back to the last save.

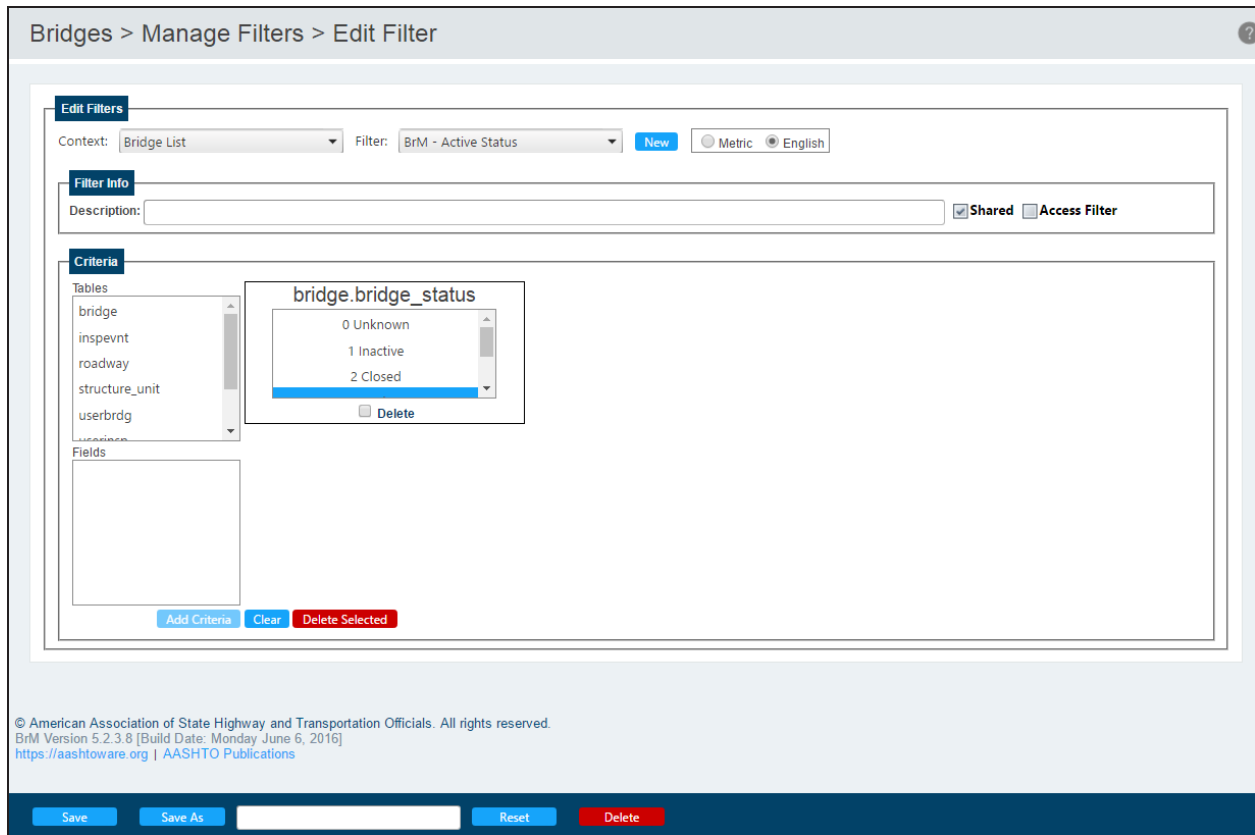
The *Delete* button deletes the current layout.

# Manage Filters

The *Bridges > Manage Filters* task allows the user to create and edit filters for the Bridge List as well as several other grids throughout the software. The selections made for the filter will determine the bridges listed in the Bridge List upon filter use. This task is also accessible from the *Projects* tab with the same functionality.

## Edit Filter

The *Bridges > Manage Filters > Edit Filter* subtask uses the BrM interface to create and edit filters for various grids within the system.



## Context

The *Context* dropdown determines the grid for which the filter is being created. When the *Manage Filters* task is opened from the *Bridges* tab, the default context will be the Bridge List, however there are several other context selections:

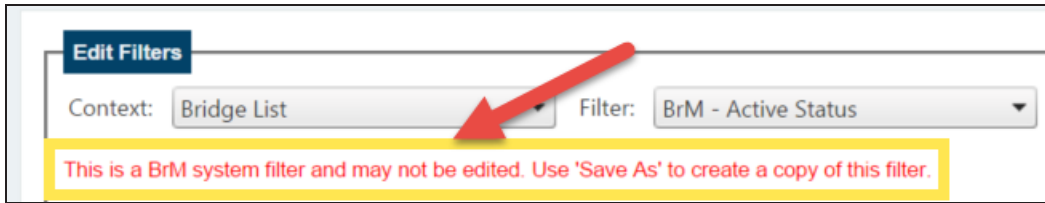
- **Bridge Group Roadways** - The grid on the *Bridges > Manage Bridge Groups > Add/Remove Roadways* subtask.
- **Bridge Groups** - The grid on the *Bridges > Manage Bridge Groups > Bridge Groups* subtask.
- **Bridge List** - The grid on the *Bridges > View List* task.
- **Funding** - The grid on the *Projects > Manage Funding > Funding List* subtask.
- **Needs List** - The grid on the *Analysis > Work Candidates > Needs List* subtask.
- **Programs** - The grid on the *Projects > Manage Programs > Program List* subtask.
- **Projects** - The grid on the *Projects > Project List* task.
- **Tunnels** - The grid on the *Tunnels > Tunnel List* task.

## Filter

The *Filter* dropdown lists all of the filters that have been created or that automatically come with the system. The context must be selected before the filter because the context determines what filters are available. Below are the filter

options:

- **BrM System Filter** - If the filter selected is a BrM system filter, it cannot be edited or deleted. A note will appear in red text under the dropdown indicating that the filter is a BrM system filter and may not be edited:



However, the user can copy the BrM system filter's settings by typing a new filter name into the textbox next to the *Save As* button and then clicking *Save As*. Once the copy is made, the newly created filter can be edited.

- **Customized Filter**- Any filter created by the user can be edited or deleted freely.
- **New** - Clicking the *New* button creates a new filter that can be edited or deleted freely. The new filter can be named by entering a name into the textbox next to the *Save As* button and then clicking *Save*.

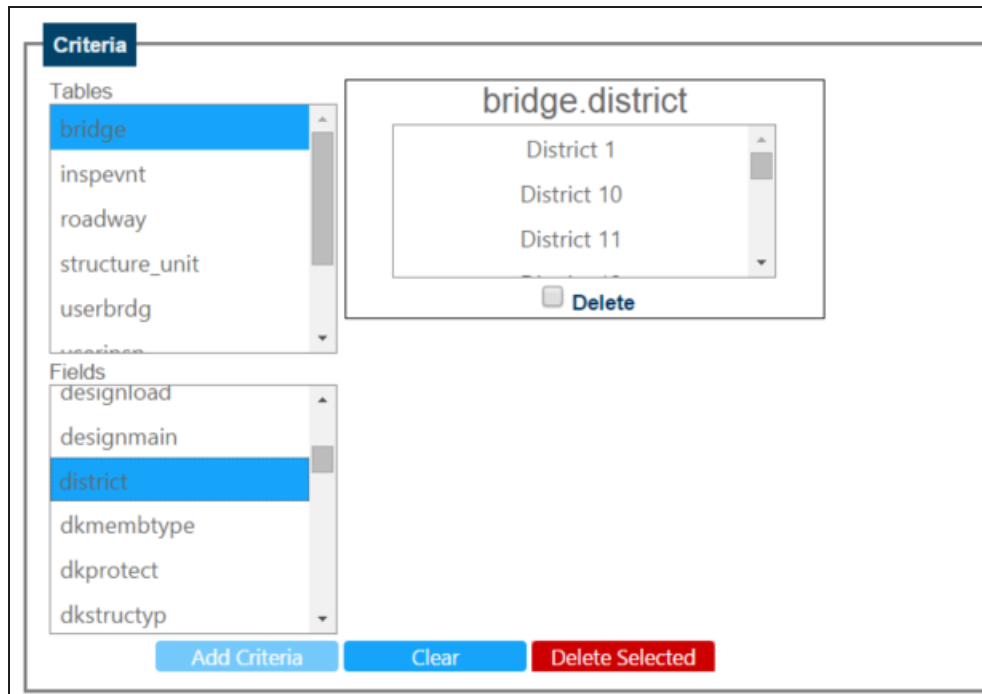
## Filter Info

The *Filter Info* grouping allows the user to enter a description of the currently selected filter. The user can also check the *Shared* checkbox if the filter should be available to other users.

If the *Access Filter* checkbox is checked, the admin can use the current filter as an access filter for specified roles, displaying that filter as the users' default filter for the applicable context.

## Criteria

The *Criteria* grouping is where the user configures the selected filter. A selection must be made from the *Tables* listbox and, based on that selection, the *Fields* listbox will populate with options.



Options can be added to the filter by selecting it from the *Fields* listbox and clicking the *Add Criteria* button. Multiple options can be added at once by holding down the CTRL key while selecting all of the desired options, then clicking the *Add Criteria* button.

Each field added to the filter will have additional options that must be determined.

Clicking the *Clear* button will clear the filter of all fields that have been added. Clicking the *Delete Selected* button will clear the filter of only the fields that have the *Delete* checkbox checked.

## Edit Filter Page Controls



The *Save* button saves the current filter.

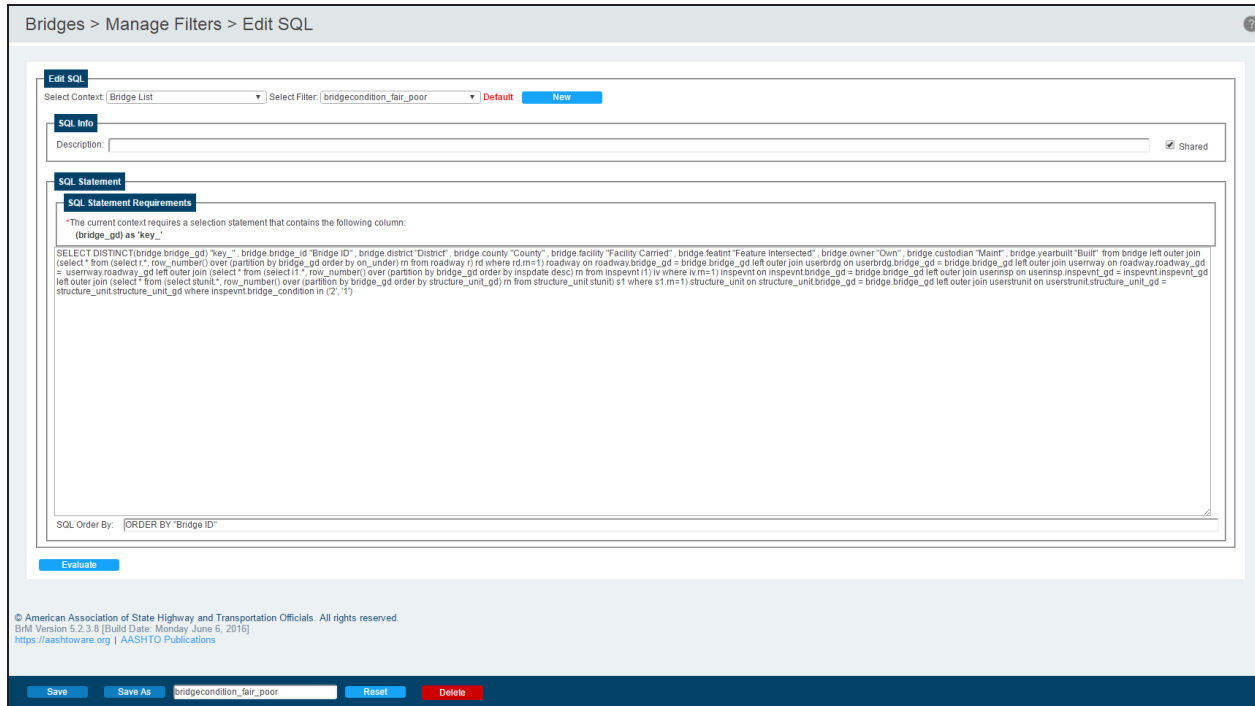
The *Save As* button copies the current filter's settings into a new filter that uses the name entered into the textbox next to the *Save As* button.

The *Reset* button resets any changes that were made to the current filter back to the last save.

The *Delete* button deletes the current filter.

# Edit SQL

The *Bridges > Manage Filters > Edit SQL* subtask does not use the BrM interface to create and edit filters. It requires the user to write the SQL manually to create a custom filter.



There are several aspects that differentiate the filters in the *Edit SQL* subtask from the filters in the *Edit Filter* subtask:

1. The SQL filters must be written manually.
2. The SQL filters can only be edited within the *Edit SQL* subtask. They will not show up in the *Filter* dropdown of the *Edit Filter* subtask.
3. When an SQL filter is used on a page that has alternate layouts via a *Layout* dropdown, such as the Bridge List, the *Layout* dropdown will not be visible.

## Select Context

The *Context* dropdown determines the grid for which the filter is being created. When the *Manage Filters* task is opened from the *Bridges* tab, the default context will be the Bridge List, however there are several other context selections:

- **Bridge Group Roadways** - The grid on the *Bridges > Manage Bridge Groups > Add/Remove Roadways* subtask.
- **Bridge Groups** - The grid on the *Bridges > Manage Bridge Groups > Bridge Groups* subtask.
- **Bridge List** - The grid on the *Bridges > View List* task.
- **Funding** - The grid on the *Projects > Manage Funding > Funding List* subtask.
- **Needs List** - The grid on the *Analysis > Work Candidates > Needs List* subtask.
- **Programs** - The grid on the *Projects > Manage Programs > Program List* subtask.
- **Projects** - The grid on the *Projects > Project List* task.
- **Tunnels** - The grid on the *Tunnels > Tunnel List* task.

## Select Filter

The *Filter* dropdown lists all of the filters that have been created or that automatically come with the system. The context must be selected before the filter because the context determines what filters are available.

## SQL Info

The *SQL Info* grouping allows the user to enter a description of the currently selected filter. The user can also check the *Shared* checkbox if the filter should be available to other users.

## SQL Statement

The user can use the large textbox to enter the SQL for the custom filter.

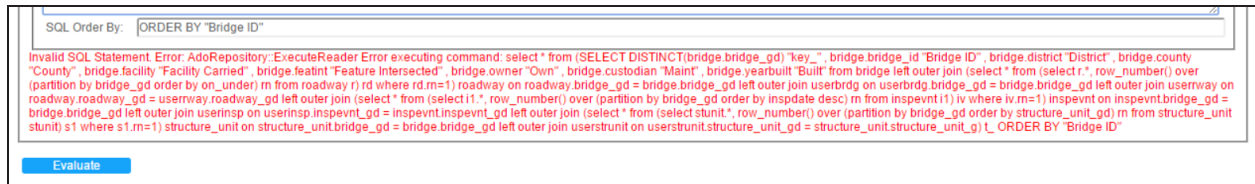
Important things to note:

1. The correct use of `key_` within the statement is to use double quotes - "key\_" - and this column will not actually display when the filter is run.
2. Use the identifying table name in the statement. For example, write "BRIDGE.BRIDGE\_GD" not "BRIDGE\_GD."
3. Beginning with version 5.2.2, GUIDs took the place of primary keys. Filters written prior to version 5.2.2 should be reviewed for compliance.

The *SQL Order By* textbox allows the user to determine how the filter will be ordered, such as "Order By 'Bridge ID.'"

**\*Note:** The *SQL Order By* textbox must contain "Order By" in order for the evaluation to operate successfully.

Once the SQL is entered, click the *Evaluate* button to view the filter results. If the SQL is invalid, an error will appear in place of the results:



## Edit SQL Page Controls



The *Save* button saves the current filter.

The *Save As* button copies the current filter's settings into a new filter that uses the name entered into the textbox next to the *Save As* button.

**\*Note:** If changes have been made to a new or existing SQL Filter, the *Save* and *Save As* buttons will not be available until the SQL statement passes an evaluation using the *Evaluate* button.

The *Reset* button resets any changes that were made to the current filter back to the last save.

The *Delete* button deletes the current filter.

# New Inspection

The *Bridges > New Inspection* task allows the user to enter basic information for a new inspection of the currently selected bridge. If more than one bridge is selected on the Bridge List, the new inspection will be for the bridge selected most recently unless one of the bridges is highlighted.

The screenshot shows a web application window titled "Bridges > New Inspection". Inside, there is a form with the following fields and options:


- Bridge:** A dropdown menu showing "00136".
- Inspection Date:** A date input field showing "6/6/2016" with a calendar icon to its right.
- Primary Type:** A dropdown menu showing "Regular NBI".
- Inspector:** A dropdown menu showing "USER, Pontis".
- Entered By:** A dropdown menu showing "USER, Pontis".
- Engineer of Record:** An empty text input field.
- Types of Inspection Performed:** A section with five checkboxes:
  - Routine:
  - Element:
  - Fracture Critical:
  - Underwater:
  - Other Special:

At the bottom of the form, there are two buttons: "Cancel" and "Create". Below the form, there is a footer with the following text:

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## Create New Inspection

### Inspection Date

The *Inspection Date* field defaults to the current date. To change the date, enter a new date in the MM/DD/YYYY format or click the  symbol and select a date.

### Primary Type

The *Primary Type* dropdown lists the primary type of inspection that will be performed. If a previous inspection was performed on the selected bridge, the primary type will automatically populate with the option used in the previous inspection but can be changed if desired.

### Inspector

The *Inspector* dropdown will default to the current user. This can be changed, however the users available in the dropdown will depend on user roles and permissions.

### Entered By

The *Entered By* dropdown will default to the current user. This can be changed, however the users available in the dropdown will depend on user roles and permissions.

### Engineer of Record

The user can enter an engineer in the *Engineer of Record* textbox for internal use. This is an optional field.

If the textbox is left blank, the field will be populated with the engineer of record from the previous inspection on the next page. If the previous inspection did not have an Engineer of Record listed or if no previous inspection exists, the field will be blank on the *Inspection > Schedule* task.

### Types of Inspection Performed

The user should check the boxes of the inspections that were performed on the bridge on the selected inspection date. The selected inspections will be assigned the selected inspection date on the *Inspection > Schedule* task. If necessary, this information can be edited later on the *Inspection > Schedule* task.

### New Inspection Page Controls

Click the **Create** button to create the new inspection and automatically be taken to the *Inspection > Schedule* task to continue filling out the inspection information.

Click the **Cancel** button to cancel the new inspection and return to the *Bridges > View List* task.

<i>Inspection &gt; New Inspection Control Information</i>			
<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
Bridge	inspevnt	bridge_gd	The ID of the bridge being inspected.
Inspection Date	inspevnt	inspdate	The date the new inspection is created. By default, this will be the current date.
Primary Type	inspevnt	insptype	The primary type of inspection being performed.
Inspector	inspevnt	inspusrguid	The user performing the inspection.
Entered By	inspevnt	entered_by_gd	The user that enters the inspection into the system.
Engineer of Record	inspevnt	engineer_of_record	The engineer of record for the inspection.
<i>Types of Inspection Performed Grouping</i>			
Routine	inspevnt	nbinspdone	Checked if a routine inspection was performed.
Element	inspevnt	elinspdone	Checked if an element inspection was performed.
Fracture Critical	inspevnt	fcinspdone	Checked if a fracture critical inspection was performed.
Underwater	inspevnt	uwinspdone	Checked if an underwater inspection was performed.
Other Special	inspevnt	osinspdone	Checked if an other special inspection was performed.



# Suff Rate

The *Bridges > Suff Rate* task is used to view and calculate bridge sufficiency ratings.

## Sufficiency Rating Results

When the *Bridges > Suff Rate* task is selected, the sufficiency rating of all of the bridges currently selected on the Bridge List is calculated and displayed. If no bridges are selected, a bridge must be selected from the dropdown before the *Suff Rate* task can be viewed.

Bridges > Suff Rate

Sufficiency Rating Results

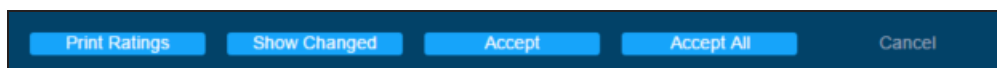
Bridge ID	Inspection Date		Structure Rating	Deck Geometry	Under Clearance	SR Prefix	Suff Rating	SD/FO Status
00136	9/17/2004 12:00:00 AM	Previous Ratings:	4	3	N		34.6	2
<input type="checkbox"/> Accept		Calculated Ratings:	4	3	N		34.5	2

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Cancel

The Sufficiency Rating grid reveals the bridges' previous ratings and the newly calculated ratings based on the most recent inspection. Yellow highlights in the Sufficiency Rating grid columns reveal changes that have occurred between a bridge's previous and currently calculated ratings.

## Sufficiency Rating Page Controls



### Accept Changes

Click the *Show Changed* button to show only the bridges with changes between the previous and currently calculated ratings. To accept the currently calculated ratings, check the *Accept* checkboxes for the desired bridges or use the *Select Page* button to select an entire page of bridges.

Once the desired bridges are selected from the grid, click the *Accept* button to accept the changes and return to the Bridge List. To accept all of the changes (with or without their *Accept* checkboxes checked), click the *Accept All* button.

### Sufficiency Rating Controls

Use the *Print Ratings* button to print the Sufficiency Rating grid.

Click the *Cancel* button to return to the *Bridges > View List* task.

*Bridges > Suff Rate Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
Brkey	inspevnt	brkey	One of the structure identifiers used in BrM.
Inspection Date	inspevnt	inspdate	The bridge's most recent inspection date.
Structure Rating	inspevnt	strating	NBI Item 67: This is the structural evaluation rating of the bridge. This item is calculated by the specifications used in the NBI Coding Guide.
Deck Geometry	inspevnt	deckgeom	NBI Item 68: The overall rating for deck geometry includes two evaluations: the curb-to-curb or face-to-face of rail bridge width and the minimum vertical clearance over the bridge roadway. When an individual table lists several deck geometry rating codes for the same roadway width under a specific ADT, the lower code is used.
Under Clearance	inspevnt	underclr	NBI Item 69: This is the underclearance of the bridge. This item is calculated by the specifications used in the NBI Coding Guide.
Suff Prefix	inspevnt	suff_prefix	The sufficiency rating prefix.
Suff Rating	inspevnt	suff_rate	The sufficiency rating of the structure.
SD/FO Status	inspevnt	nbi_rating	The NBI rating (structurally deficient/functionally obsolete status).

# Validate

The *Bridges > Validate* task is used to validate the accuracy and acceptability of many of the values recorded for a specific bridge.

## Validate Bridges

The *Bridges > Validate* task will display all of the bridges currently selected on the Bridge List. If no bridges are selected, a bridge must be selected from the dropdown before the *Validate* task can be viewed.

The screenshot shows the 'Bridges > Validate' interface. At the top, there is a breadcrumb 'Bridges > Validate' and a help icon. Below this is a 'Validate' tab. The main content area contains a table with three columns: 'Bridge ID', 'District', and 'County'. The table has three rows of data. Below the table are three buttons: 'Validate selected bridges', 'Validate all bridges', and 'Cancel'. At the bottom of the interface, there is a copyright notice: '© American Association of State Highway and Transportation Officials. All rights reserved. BrM Version 5.2.3.8 [Build Date: Monday June 6, 2016] https://aashtoware.org | AASHTO Publications'.

Bridge ID	District	County
00002	05	039
00051	23	051
00136	22	009

To validate only the bridges currently selected, click the *Validate Selected Bridges* button. To validate all bridges in the database, click the *Validate All Bridges* button.

**\*Note:** Validating bridges can take an extended period of time depending on the amount of bridges. Validating an entire system of bridges will likely take 5+ minutes to complete.

Click the *Cancel* button to return to the Bridge List.

## Validation Results

Once the bridges are validated, the NBI and NBE validation results can be viewed. Use the *NBI Results* and *NBE Results* tabs to switch back and forth.

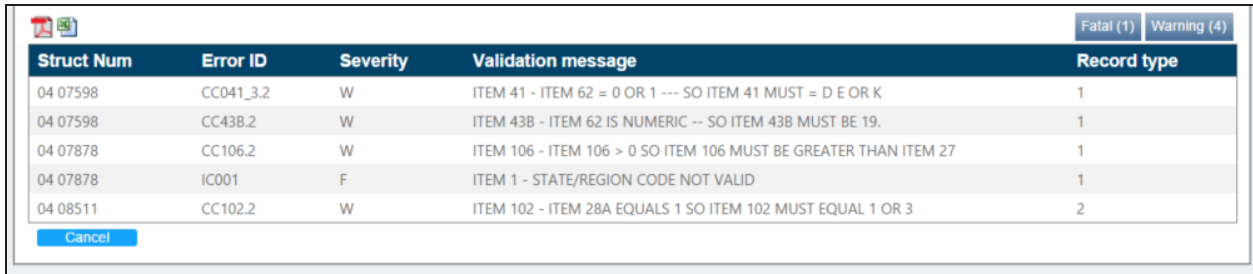
The screenshot shows the 'Bridges > Validate' interface with the 'Validate' tab selected. There are two sub-tabs: 'NBI Results' and 'NBE Results'. The 'NBI Results' tab is active, displaying a table with four columns: 'Bridge ID', 'District', 'County', and 'Warning'. The table has three rows of data, each with a checkmark in the first column. A total of 7 warnings is shown at the bottom right of the table.

<input checked="" type="checkbox"/>	Bridge ID	District	County	Warning
<input checked="" type="checkbox"/>	00002	05	039	7
<input checked="" type="checkbox"/>	00051	23	051	0
<input checked="" type="checkbox"/>	00136	22	009	0

To view the validation results, click the checkboxes of the desired bridges in the selected grid (all checkboxes will be checked initially). Any errors for the selected bridge(s) will be revealed in the Validation Results grid.

### Severity

Once the selected bridges are validated, the results will be labeled as "Fatal" or "Warning."





Struct Num	Error ID	Severity	Validation message	Record type
04 07598	CC041_3.2	W	ITEM 41 - ITEM 62 = 0 OR 1 --- SO ITEM 41 MUST = D E OR K	1
04 07598	CC438.2	W	ITEM 43B - ITEM 62 IS NUMERIC -- SO ITEM 43B MUST BE 19.	1
04 07878	CC106.2	W	ITEM 106 - ITEM 106 > 0 SO ITEM 106 MUST BE GREATER THAN ITEM 27	1
04 07878	IC001	F	ITEM 1 - STATE/REGION CODE NOT VALID	1
04 08511	CC102.2	W	ITEM 102 - ITEM 28A EQUALS 1 SO ITEM 102 MUST EQUAL 1 OR 3	2

Buttons: Fatal (1) Warning (4) Cancel

The buttons for each severity level can be used to filter the validation results.

### Export Results

Use the   symbols to create a PDF or XLS of the current grid.

# Create Structure

The *Bridges > Create Structure* task is used to create a new bridge in the system.

	Req: (Y/N)	Frequency (months)
Routine (090):	(091):	24
Element:		24
Fracture Critical (092AA):	<input type="checkbox"/>	(092AB): 24
Underwater (092BA):	<input type="checkbox"/>	(092BB): 24
Other Special (092CA):	<input type="checkbox"/>	(092CB): 24

Bridge entered 6/6/2016 1:12:32 PM by userid Pontis

Created: 6/6/2016 1:12 PM Entered By: PUser (Pontis) Build Several Structures At Once Cancel Initial Inspection Save

## Create Structure Groupings

When completing the *Create Struct* task, it is recommended that the NBI items (fields containing red numbers in parenthesis - "(002)") be filled out. However, these items are not mandatory to save the new structure. If not filled out, the fields can be completed later using the *Inspection > Inventory* task.

### Structural Identification

The *Structural Identification* grouping contains the only mandatory controls on the task. Trying to save or proceed without entering an NBI Structure No., BRKEY, and/or Agency Bridge ID will activate an error message. By default, the text that is entered into the *NBI Structure No* textbox will populate in the *BRKEY* and *Agency Bridge ID* textboxes. It is recommended that the BRKEY be the same as the NBI Structure No. to ensure that NBI data imports correctly.

- **NBI Structure No.** - Required by FHWA to be a unique bridge identifier that remains constant over time.
- **BRKEY** - Field that links the bridge table with other related tables for roadways, structure units, inspections, etc.
- **Agency Bridge ID** - The ID shown on the default Bridge List and standard BrM reports.

### Location and Administration

While not mandatory for the page, the structure's name, location, length, and other details can be added.

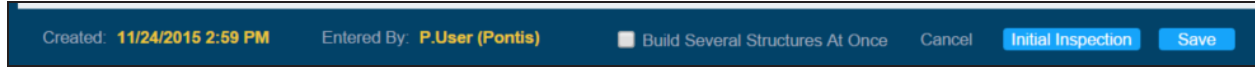
### Spans

The bridge's span information does not need to be included to save the page or proceed, but as with the location and administration information it is recommended that the span information NBI items be included.

## Inspection

The setup for a new inspection can be established in the *Inspection* grouping, but the structure's elements will still need to be added on the *Inspection > Condition* task.

## Create Structure Page Controls



The *Save* button saves the new structure and sends the user back to the *Bridges > View List* task. The *Initial Inspection* button saves the new structure and sends the user to the *Inspection > Condition* task where the structure's elements can be added.

The *Build Several Structures At Once* checkbox ensures that once the current new structure is saved, the *Create Struct* task will refresh instead of sending the user to the *Bridges > View List* task.

# Copy Structure

The *Bridges > Copy Structure* task is used to copy the structure information for the bridge currently selected in the Bridge List. If no bridge is selected, the user will be prompted to select a bridge.

When a bridge is selected, the following screen will appear:

**Bridges > Copy Struct**

Copied New Structure from: 00136

**Structural Identification**

NBI Structure No (008):  BRKEY:   
Agency Bridge ID:

**Location and Administration**

Name:  Beaver Creek, Old Hwy 30 at MP 7.32  
Feature Intersected (006A):  BEAVER CREEK  
Facility Carried (007):  OLD HWY 30  
FIPS State (001A):  41 Oregon FHWA Regn (001B):  Region 10-Portland  
District (002):  District 2B Maint. Resp. (021):  County Hwy Agency  
Administration Area:  RETIRED Owner (022):  County Hwy Agency  
Bridge Group:  Region 1 On System:  Off System  
Latitude (016):  46d 06' 23.90" Longitude (017):  123d 06' 41.44"  
Structure Length (049):  70.000 ft Total Length:  70.000 ft

**Spans**

**Main**

Spans (045):  2  
Material (043A):  2 Concrete Continu  
Design (043B):  04 Tee Beam  
Maximum Span (048):  35.000 ft

**Approach**

Spans (046):  0  
Material (044A):  0 Not Applicable  
Design (044B):  00 Not Applicable

00136 OLD - 20057 NEW

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Created: 6/6/2016 1:27 PM Entered By: PUser (Pontis) Cancel Save

Copying a structure copies the *Location and Administration* and *Spans* groupings of the selected structure. This includes the bridge record and the roadway record data tied to the bridge. As inspection and structure unit records will be unique to the new structure, they will not be copied but will be created anew for the new structure.

# Remove Struct

The *Bridges > Remove Struct* task is used to remove all bridges currently selected in the Bridge List from the system. Once removed, the structures will no longer be available for new inspection reports, analysis, etc.

Bridges > Remove Struct

Selected Bridges

Bridge ID	District	County
00001	District: 05	039
00144	District: 22	009
00072A	District: 08	029

Page size: 100 3 items in 1 pages

Selected: 3

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Cancel Remove

When the *Remove* button is clicked a warning message will appear. If *OK* is clicked on the warning message, all bridges shown in the Selected Bridges grid will be removed.

Click the *Cancel* button to return to the Bridge List.



# Manage Bridge Groups

The *Bridges > Manage Bridge Groups* task allows the user to create and manage bridge groups for grouping together bridges by a certain criteria to be used in the *Projects* tab. The bridge groups can be created manually via the *Bridge Groups* subtask or automatically via the *Setup Bridge Groups* subtask.

## Bridge Groups

The *Bridge Groups* subtask lists all of the groups for a specific filter, allows the user to edit the selected group from the grid, and starts the manual creation of a group.

Bridges > Manage Bridge Groups > Bridge Groups

Filter: BrM - None    Layout: Bridge Group Default    Apply

Bridge Group Quick Filter Editor +

Edit   Add   Delete Selected

Bridge_Groups	Bridge_Count	Roadway_Count	Description
<input type="checkbox"/> BridgeGroup1	0	0	
<input type="checkbox"/> BridgeGroup2	0	0	
<input type="checkbox"/> BridgeGroup3	0	0	

3 items in 1 pages

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## Filter and Layout

The *Filter* and *Layout* dropdowns contain all of the filters and layouts created in the *Manage Filters* and *Manage Layouts* tasks relevant to the *Bridge Groups* task. The dropdowns are not dynamic, so the *Apply* button must be clicked once the desired selections are made.

## Quick Filter Editor

The screenshot shows the 'Bridges > Manage Bridge Groups > Bridge Groups' page. At the top, there is a breadcrumb trail and a search icon. Below this, a 'Filter: BrM - None' dropdown and a 'Layout: Bridge Group Default' dropdown are visible, along with an 'Apply' button. The main area is titled 'Bridge Group Quick Filter Editor' and contains two columns of filter fields. The left column, 'Roadway Characteristics', includes: Roadway On (005A), Kind of Highway (005B), Level of Service (005C), Rte# (005D), Directional Suffix (005E), Roadway Name, Kilometer Post (011) with a 'km' unit, Average Daily Traffic (029), Truck Percentage (109), Number of Lanes (028A), NHS Status (104), and Functional Class (026). The right column, 'Bridge Characteristics', includes: District (002), Admin. Area, County (003), Owner (022), Custodian (021), On/Off State System, and Bridge Group. At the top right of the filter area, there is a 'Save As:' text box, a 'Save Filter' button, and a 'Share' checkbox. A 'Filter Results' button is located at the top left of the filter area.

Additional filters can quickly be created by expanding the *Bridge Group Quick Filter Editor*. Once the desired selections have been made, the results of the filter can be shown by clicking the *Filter Results* button. To save the filter, enter a name into the *Save As* textbox and click the *Save Filter* button. Check the *Share* checkbox if the filter should be made available to other users.

## Bridge Groups Page Controls



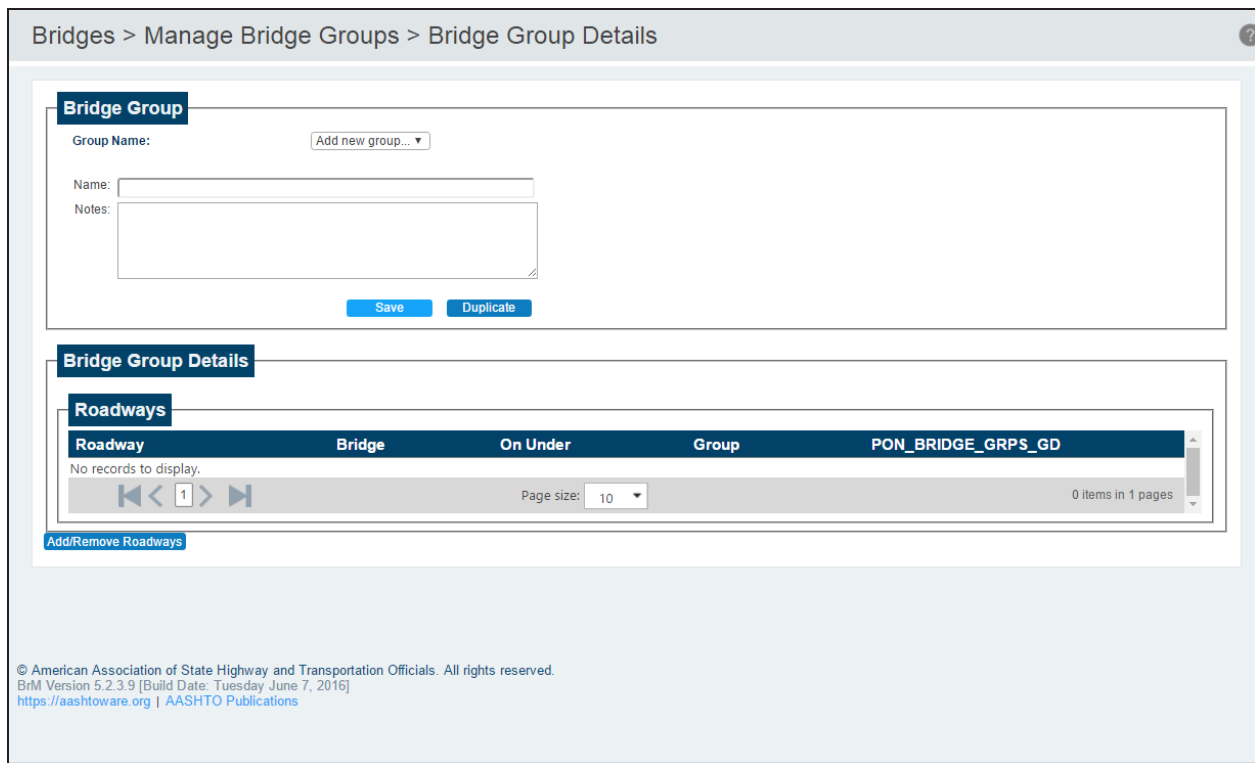
The *Edit* button indicates that the most recently selected group in the grid will be edited and takes the user to the *Bridge Group Details* subtask.

The *Add* button indicates that a new group will be created and takes the user to the *Bridge Group Details* subtask.

The *Delete Selected* button deletes all of the selected groups.

# Bridge Group Details

The *Bridge Group Details* subtask allows the user to view the details of a specific group and make changes.



## Bridge Group

The *Bridge Group* grouping contains the name and notes for the group currently selected in the *Group Name* dropdown. The name of the group can be changed at any time by typing a new name into the *Name* textbox and clicking *Save*.

A new group can be created from the *Bridge Group Details* subtask by selecting "Add new group..." from the *Group Name* dropdown, entering a name into the *Name* textbox, and clicking *Save*.

The *Duplicate* button makes a copy of whatever group is currently selected in the *Group Name* dropdown and adds a "\_dp" to its name.

**Example:** If a group named "BrM" was duplicated, the duplicate would be named "BrM\_dp."

## Bridge Group Details

The *Bridge Group Details* grouping lists all of the roadways for the currently selected group. The *Add/Remove Roadways* button takes the user to the *Add/Remove Roadways* subtask to manage the roadways for the currently selected group.

## Add/Remove Roadways

The *Add/Remove Roadways* subtask allows the user to add and/or remove roadways from the currently selected group. A new group can also be created from this page.

The screenshot shows the 'Bridges > Manage Bridge Groups > Add/Remove Roadways' interface. At the top, there are dropdowns for 'Filter: BrM - None' and 'Layout: Roadway Default', along with an 'Apply' button. Below this is a 'Roadway Quick Filter Editor' section with buttons for 'Add new group...', 'Update Roadways', and 'Add New Group'. The main area is a table with the following columns: Bridge ID, On Under, Kind of Highway, Level of Service, Route, Dir, and Functional Class. The table contains 10 rows of data. At the bottom of the table, there is a pagination control showing 'Page size: 10' and '13367 items in 1337 pages'. A copyright notice is visible at the bottom left of the interface.

Bridge ID	On Under	Kind of Highway	Level of Service	Route	Dir	Functional Class
00001	1	5	1	U1035	0	17
00002	1	5	6	01205	0	16
00003	1	5	0	C0000	0	19
00004	1	5	1	C0000	0	19
00051	1	8	1	100	0	09
000602	1	5	6	00000	0	17
000604	1	5	6	00000	0	17
000607	1	5	6	00000	0	19
000622	1	4	1	A0500	0	07
00071	1	3	1	00099	0	06

### Filter and Layout

Similar to the *Bridge Analysis Groups* subtask, the *Add/Remove Roadways* subtask has *Filter* and *Layout* dropdowns that contain all of the filters and layouts created in the *Manage Filters* and *Manage Layouts* tasks relevant to the *Add/Remove Roadways* subtask. The dropdowns are not dynamic, so the *Apply* button must be clicked once the desired selections are made.

### Quick Filter Editor

The screenshot shows the 'Bridges > Manage Bridge Groups > Add/Remove Roadways' interface with the 'Quick Filter Editor' subtask active. It features dropdowns for 'Filter: BrM - None' and 'Layout: Roadway Default', and an 'Apply' button. The editor is divided into two sections: 'Roadway Characteristics' and 'Bridge Characteristics'. The 'Roadway Characteristics' section includes fields for Roadway On (005A), Kind of Highway (005B), Level of Service (005C), Rte# (005D), Directional Suffix (005E), Roadway Name, Kilometer Post (011), Average Daily Traffic (029), Truck Percentage (109), Number of Lanes (028A), NHS Status (104), and Functional Class (026). The 'Bridge Characteristics' section includes fields for District (002), Admin. Area, County (003), Owner (022), Custodian (021), On/Off State System, and Bridge Group. There are also 'Save As:', 'Save Filter', and 'Share' options at the top right of the editor.

Additional filters can quickly be created by expanding the *Roadway Quick Filter Editor*. Once the desired selections have been made, the results of the filter can be shown by clicking the *Filter Results* button. To save the filter, enter a name into the *Save As* textbox and click the *Save Filter* button. Check the *Share* checkbox if the filter should be made available to other users.

## Update Roadways

Roadways can be added to or removed from the currently selected group by checking/unchecking the checkbox of the desired bridges in the grid and then clicking the *Update Roadways* button. The group can be changed by using the drop-down to the left of the *Update Roadways* button. A new group can be added by entering a name in the textbox to the right of the *Add New Group* button, then clicking *Add New Group*.

# Setup Bridge Groups

Unlike the 3-task combination of the *Bridge Groups*, *Bridge Group Details*, and *Add/Remove Roadways* subtasks to manually create groups, the *Setup Bridge Groups* subtask uses filter selections to automatically generate groups.

Bridges > Manage Bridge Groups > Setup Bridge Groups

**All Roadway Filters**

On/under     District     On/off state system     Kind of highway  
 Action Defs     Admin area     NHS status     Level of service  
 County     Bridge group     Route     Owner  
 Functional class     Directional suffix     Custodian     Roadway name

Stem of new bridge groups names:  **Start grouping**

**Bridge Groups**

Bridge Groups	Bridge_Count	Roadway_Count	Description
BridgeGroup1	0	0	
BridgeGroup2	0	0	
BridgeGroup3	0	0	

3 items in 1 pages

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## All Roadway Filters

The *All Roadway Filters* grouping lists all of the filters that can be used to create a group. The selected filters will filter the system's entire list of bridges. When the desired filter selections have been made, enter a name into the textbox to the left of the **Start Grouping** button, then click **Start Grouping**. Every possible version of the selected filters will be created as a group.

**Example:** If an agency containing 10 districts selects the District filter, 10 new groups will be created.

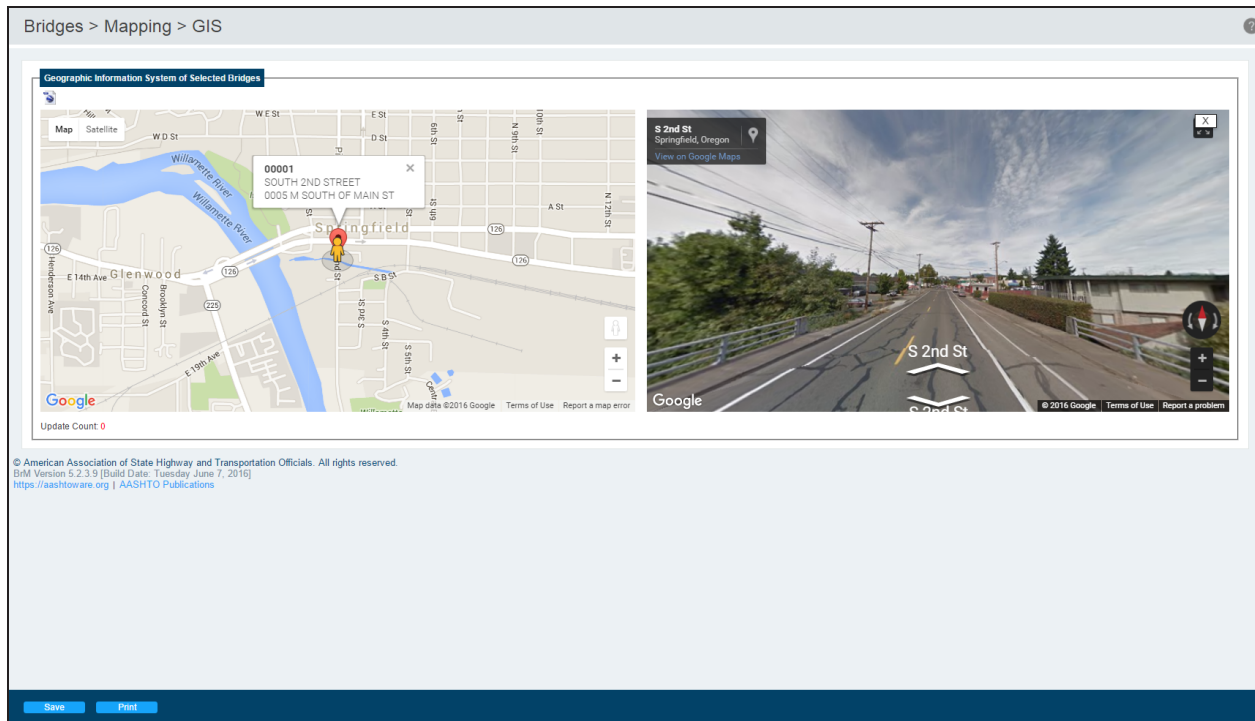
**\*Note:** The max number of groups that can be created at one time from the *Setup Bridge Groups* subtask is 250.

## Bridge Groups

The *Bridge Groups* grouping lists all of the current groups and their bridge counts, roadway counts, and descriptions.

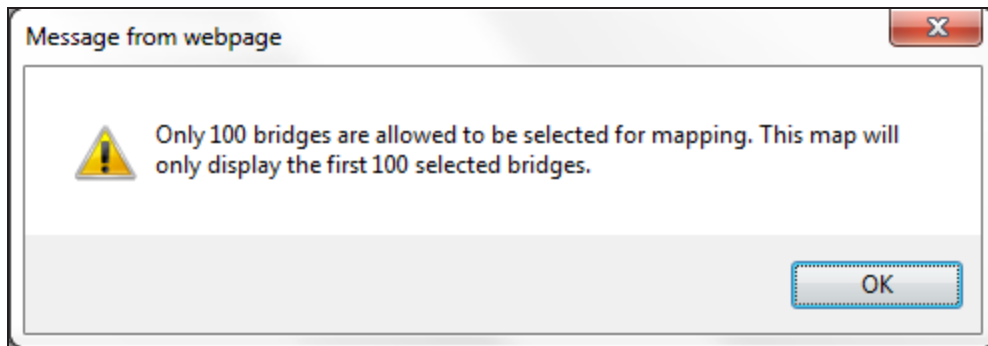
# Mapping

The *Bridges > Mapping* task allows users to view the positioning of selected bridges in Google Maps as well as map selected bridges that are currently unmapped.



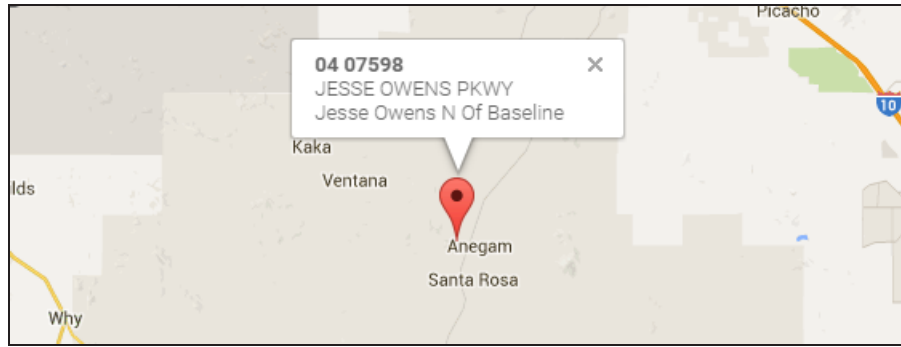
**\*Note:** Google Maps is a product of Google and therefore BrM cannot control potential browser issues with its use.

**\*Note:** No more than 100 bridges can be mapped at a time. If more than 100 bridges are selected, the following message will appear:



## Mapped Bridges

All selected bridges with an established latitude and longitude (the values were entered on the *Bridges > Create Struct* or *Inspection > Inventory* tasks) or that have previously been mapped will be indicated with a red pin on the map. Clicking on the pin will activate a box with the structure's identifying information and a split view of the map and the structure's street view:



## Unmapped Bridges

UNMAPPED BRIDGES		
Bridge ID	Facility	Location
000602	HWY 61 CONN 1	SOUTH MAIN JOSEPH
000607	NORTH 8TH STREET	BARTON HEIGHTS/JOSEPH

Update Count: 0

All selected bridges without an established latitude and longitude (the values were not entered on the *Bridges > Create Struct* or *Inspection > Inventory* tasks) will appear in a grid in the *Unmapped Bridges* grouping. The *Unmapped Bridges* grouping will only appear if a selected bridge is unmapped. Selecting a bridge from the grid in the *Unmapped Bridges* grouping (clicking on the bridge's row in the grid) changes the map's cursor from a white hand to a black crosshair that, when clicking on the map, pins the unmapped bridge to the map at the selected location. This will then update the bridge's latitude and longitude on the *Inspection > Inventory* task. Unlike the mapped bridges, this unmapped bridge's pin will be yellow until the *Save* button is clicked, at which point the pin will turn red. The Update Count number underneath the map will indicate how many map positions have been updated without being saved.

## Changing a Mapped Bridge Location

To change the map location of a bridge with an established latitude and longitude or previously determined map location, the user can click and hold the bridge's map pin and then drag and drop it at a new location. As with plotting unmapped bridges, this will change the bridge's pin color to yellow until the *Save* button is clicked. The Update Count number underneath the map will indicate how many map positions have been updated without being saved.

## Sync Mapping

Bridges that are plotted via the *Bridges > Mapping* task and not via the latitude and longitude fields of the *Bridges > Create Struct* or *Inspection > Inventory* tasks will not have their latitude and longitudes recorded/updated with the new map plot point.

In order for the latitude and longitude fields (NBI items 016 and 017) to record/update any changes made on the *Bridges > Mapping* task, the user must use the sync mapping feature of the *Admin > Mapping > Sync Mapping* task.



# Reports

- The Reports section of the manual addresses each of the tasks in BrM's *Reports* tab. The *Reports* tab allows the user to select, view, and print various reports for all or selected structures in the database.

# Generate

The *Reports > Generate* task allows the user to generate a selected report and view the results in a variety of formats. BrM comes with a default set of reports, but custom reports can be created on the *Reports > Register* task.

Reports > Generate

**Report Generation**

Report: config001\_elem\_states\_actions (Crystal) ?

Format:  PDF  Text  Excel  RTF  Word  HTML

**Arguments**

Element Number: <select>

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Generate Report

## Report Generation

No options are available upon initial entry to the *Reports > Generate* task. Options do not become available until a report is selected from the *Report* dropdown. The available options will vary depending on the selected report.

**Report Generation**

Report: config001\_elem\_states\_actions (Crystal) ?

Format:  PDF  Text  Excel  RTF  Word  HTML

**Arguments**

Element Number: <select>

### Format

The *Format* radio buttons will be the same for every report. The selected report will be generated in the selected format once the *Generate Report* button is clicked.

### Arguments

The controls that appear in the *Arguments* grouping will depend on the report selected in the *Report* dropdown. Most of the "insp" selections will have the following controls:

**Arguments**

Batch Key

All structures  
 11525 structure(s) in the list  
 10 selected structures  
 Structure '00072A'  
 Another structure (enter its **Bridge ID**)

The radio buttons allow the user to determine exactly which structures to include in the report: all structures, the number of structures in the list, the selected structures, the one highlighted and selected structure (if one is), or a specific structure that can be indicated.

**\*Note:** If the mouse is hovered over the [#] *Selected Structures* radio button, a tooltip will appear displaying all of the Bridge IDs for the selected structures (up to 200):

**Arguments**

Batch Key

All structures  
 11525 structure(s) in the list  
 10 selected structures  
 Structure '00072A'  
 Another structure (ent

00003, 00004, 000602, 000607, 000604, 00071, 00072A, 00001, 000622, 00002

Once the desired selections have been made, click the **Generate Report** button at the bottom of the screen to generate the selected report.

### Recently Generated

Once at least one report has been generated, the Recently Generated list will appear next to the *Report Generation* grouping. This provides easy access to reports that were recently generated.

**Reports > Generate**

**Report Generation**

Report:

Format:  PDF  Text  Excel  RTF  Word  HTML

**Arguments**

Element Number:

Recently Generated Reports	Type	Created
config001_elem_states_actions (Crystal)	PDF	8:58:34 AM

[Clear](#)

### Report Types

Below are BrM's default reports and what is included in them:

**BrM Default Reports**

<b>Report</b>	<b>Description</b>
<b>23 Metrics Report v1.4</b>	Reviews the selected bridges against the FHWA's list of 23 metrics and determines the level of compliance for each.
<b>config001_elem_states_actions</b>	The Elements, States & Actions sheet for the selected element.
<b>config002_config_options_list</b>	The User Configuration Options Listing including: <ul style="list-style-type: none"> <li>• Configuration options</li> <li>• Option values/default values</li> <li>• Descriptions</li> <li>• Help IDs</li> </ul>
<b>config003_parameter_report</b>	The Parameter Report listing all of the parameters the user can modify.
<b>config004_data_dictionary</b>	The Pontis Data Dictionary lists and describes all of the columns available for the selected table.
<b>config006_user_list</b>	The User List displays all of the system's users including their ID, name, group, role, agency, and phone/email.
<b>config007_misc_sys_param</b>	The Miscellaneous System Parameters listing.
<b>config008_actions</b>	The Actions sheet provides a list of all of the actions in the system that are used for the work candidates as well as in the Analysis and Projects tabs.
<b>config009_ui_navigation</b>	The User Interface Navigation sheet provides a navigation breakdown of every task for the selected tab.
<b>config010_app_security</b>	The Application Security report lists all of the selected role's permissions throughout the system.
<b>insp001_inspection_sia_metric</b>	The Structure Inventory and Appraisal (SI&A) sheet in metric units. It contains: <ul style="list-style-type: none"> <li>• All NBI SI&amp;A information</li> <li>• Element-level condition data</li> <li>• Past inspection comments</li> </ul>
<b>insp002_inspect_report_metric</b>	The expanded SI&A sheet in metric units, including: <ul style="list-style-type: none"> <li>• Notes about the bridge, inspection, and each element</li> <li>• Inspector work candidates</li> <li>• Summary information on past inspections</li> </ul>
<b>insp003_inspection_schedule</b>	The Inspection Scheduling Information report including: <ul style="list-style-type: none"> <li>• Date and inspector for the most recent regular and special inspections</li> <li>• Scheduled frequency of regular and special inspections</li> <li>• Planned dates for the next inspections</li> </ul>
<b>insp004_inspection_resource_req</b>	The Inspection Resource Requirements report is used to plan resources for new inspections of bridges with special resource requirements. It contains: <ul style="list-style-type: none"> <li>• Dates of the previous and next inspections</li> <li>• Hours for crew, flaggers, helpers, snoopers, special crews, and special equipment</li> </ul>
<b>insp005_bridge_</b>	The Bridge Health Index Detail sheet displays the health index for the selected bridges

**BrM Default Reports**

<b>Report</b>	<b>Description</b>
<b>health_index_det</b>	and provides detailed information about the element condition distributions used to calculate the health index.
<b>insp006_network_elem_sum</b>	The Network Element Summary Distribution report in metric showing the network-wide distribution of elements by environment and condition state.
<b>insp007_inspection_sia_english</b>	The English unit version of insp001_sia_metric.
<b>insp008_inspect_report_english</b>	The English unit version of insp002_inspect_report_metric.
<b>insp009_network_elem_sum_english</b>	The English unit version of insp006_network_elem_sum.
<b>insp010_bridge_condition_summary</b>	The Bridge Condition Summary report includes the facility carried, last inspection date, SD/FO status, sufficiency rating, and NBI condition ratings for deck, superstructure, substructure, culvert, and channel.
<b>insp011_inspect_report_metric</b>	Contains the same data as "insp002_inspect_report_metric" but the element inspection notes do not have their own grid. Instead, they sit below each element in the Element Inspection grid.
<b>insp012_inspection_sia_english</b>	Contains only SI&A information and element condition state data in English units.
<b>insp014_inspect_report_english</b>	The expanded SI&A sheet in English units, including: <ul style="list-style-type: none"> <li>• Notes about the bridge, inspection, and each element</li> <li>• Inspector work candidates</li> <li>• Summary information on past inspections</li> </ul>
<b>insp015_inspect_report_metric</b>	Contains the same data as "insp002_inspect_report_metric" as well as a section with any photographs attached to the selected bridge(s).
<b>insp016_inspect_report_english</b>	The English unit version of "insp015_inspect_report_metric."
<b>insp017_inspect_element_report_english</b>	Contains only a grid for element condition state data in English units.
<b>insp018_inspection_sia_eng (Crystal)</b>	Similar to the insp016_inspect_report_english report but additionally allows the user to select a specific inspection report if only one structure is selected.
<b>Tunnel report v1</b>	Contain the inventory, inspection, and element data from the last inspection of the selected tunnels.

# Register

The *Reports > Register* task allows the user to create, edit, and delete the reports that will be generated on the *Reports > Generate* task.

BrM uses Crystal Reports as its reporting engine. BrM 5.2.3 is using Crystal Reports 2013. This allows users to run any of the predefined reports that come packaged with BrM or the flexibility to write their own custom reports to suit their needs. All BrM licensees are entitled to one (1) developer license of Crystal Reports. If you wish to receive your Crystal Reports developer license, please send a request to [brm@bentley.com](mailto:brm@bentley.com).

The screenshot shows the 'Reports > Register > DataWindow .Net' window. The main form is titled 'Crystal Report Registration' and contains the following fields:

- Report Name: config001\_elem\_states\_actions (Crystal)
- RPT File: config001\_elem\_states\_actions.rpt
- Save As: config001\_elem\_states\_actions (Crystal)
- Context: All
- Description: Elements, States & Actions

Below these fields is a table with the following columns: 'Argument Prompt', 'Tool Tip (optional)', and 'Argument Control Type and Construction Logic'. The table contains one row with the following data:

Argument Prompt	Tool Tip (optional)	Argument Control Type and Construction Logic
Element Number	Enter ELEMNUM.	Single Selection List   Build list using: Commonly Used List   Element Numbers

At the bottom right of the form are four buttons: 'New Report', 'Delete', 'Clear', and 'Save'. At the bottom left, there is a copyright notice: '© American Association of State Highway and Transportation Officials. All rights reserved. BrM Version 5.2.3.9 [Build Date: Tuesday June 7, 2016] https://aashtoware.org | AASHTO Publications'.

The available options will depend on the report selected, but the basics are the same for the registration of all reports. The following information will describe the creation of a new report, but the process of editing an existing report is very similar.

**\*Note:** As of version 5.2.2, BrM utilizes globally unique identifiers (GUIDs) in place of many of the keys in the database, such as the INSPKEY. For non-GUID versions of the BRIDGE, INSPEVNT, PON\_ELEM\_INSP, ROADWAY, or STRUCTUNIT tables, use the View tables within the database. The View tables are read-only non-GUID tables that replicate and display the information as it would have existed prior to the switch to GUIDs.

To create a new report, click the *New Report* button:

The screenshot shows two forms. The top form is titled 'Add RPT File' and contains the following elements:

- 'Choose File' button with the text 'No file chosen' next to it.
- 'Upload File' button.

The bottom form is titled 'Crystal Report Registration' and contains the following fields:

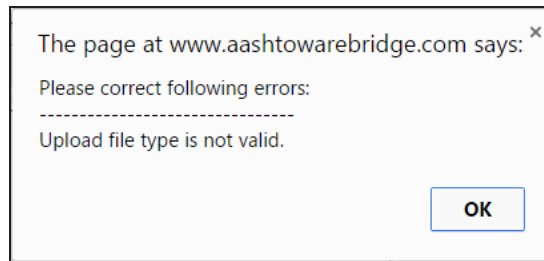
- Report Name: new report
- RPT File: <choose RPT file>

At the bottom right of the form are four buttons: 'New Report', 'Delete', 'Clear', and 'Save'.

## Add RPT File

The *Add RPT File* grouping is used to upload new RPT files. The RPT files are Crystal Reports files that serve as the layout for the report.

To upload an RPT file, click the *Choose File* button and locate the file. Once the file has been selected, click the *Upload File* button to add the RPT file to the system. If the selected file is not valid, an error message will appear:



## Crystal Report Registration

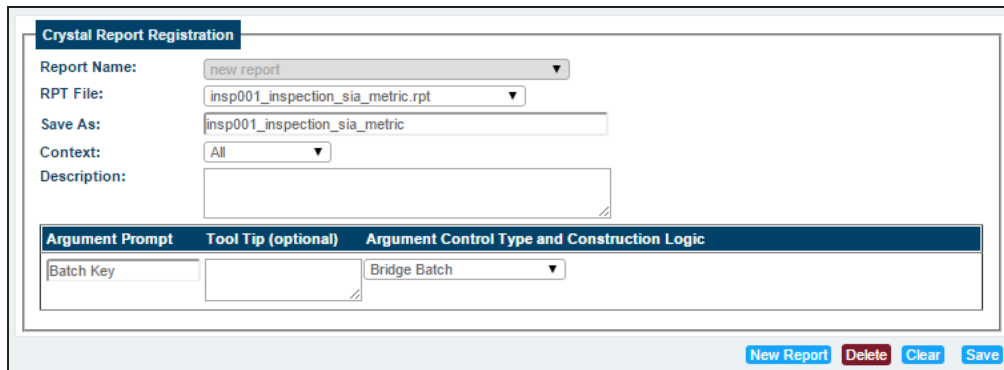
The *Crystal Report Registration* grouping determines the type of report that will be created.

### Report Name

For a new report, the *Report Name* dropdown will read "new report" and will be greyed out because the report has not yet been created.

### RPT File

The *RPT File* dropdown determines the rest of the options in the *Crystal Report Registration* grouping. When a selection is made, the grouping will expand with new options:

A screenshot of the "Crystal Report Registration" form. It includes fields for "Report Name" (dropdown with "new report"), "RPT File" (dropdown with "insp001\_inspection\_sia\_metric.rpt"), "Save As" (textbox with "insp001\_inspection\_sia\_metric"), "Context" (dropdown with "All"), and "Description" (textarea). Below these is a table with columns "Argument Prompt", "Tool Tip (optional)", and "Argument Control Type and Construction Logic". The table has one row with "Batch Key", an empty tool tip, and "Bridge Batch" in a dropdown. At the bottom right are buttons for "New Report", "Delete", "Clear", and "Save".

### Crystal Report Registration Fields

The *Save As* textbox determines the name of the new report.

The *Context* dropdown is used to classify the report. The selection should be representative of the report.

The *Description* textbox allows the user to provide more information about the report.

### Argument Options

The various argument options depend on the *RPT File* dropdown selection. The selections made here will be represented in the *Arguments* grouping of a selected report on the *Reports > Generate* task.

**\*Note:** Not all *RPT File* dropdown selections will present argument options.

### Argument Prompt

The *Argument Prompt* textbox is represented as a heading/identifier in the *Arguments* grouping of a selected report on the *Reports > Generate* task, and therefore should be indicative of the selections the user must make in the *Arguments* grouping.

**Example:** When the user must select the batch of bridges to include in the report, the *Argument Prompt* textbox typically reads "Batch Key."

### Tool Tip (Optional)

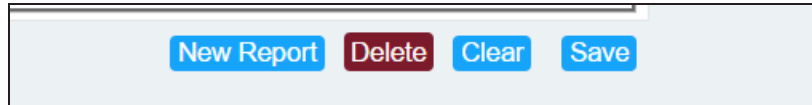
The *Tool Tip* textbox is an optional field for entering helpful information about the selections being made in the *Arguments* grouping of a selected report on the *Reports > Generate* task. When the user hovers their mouse over the options, a message box will appear with the tip.

**Example:** When the user must select the batch of bridges to include in the report, hovering their mouse over the options could reveal a message such as "Choose the batch of bridges to include in the report."

### Argument Control Type and Construction Logic

The options for the *Argument Control Type and Construction Logic* grouping are dependent upon the *RPT File* dropdown selection. These selections determine what options will be available to the user in the *Arguments* grouping of a selected report on the *Reports > Generate* task.

## Register Page Controls



The *New Report* button creates a new report to be registered.

The *Delete* button deletes the currently selected report.

The *Clear* button clears any changes that have been made since a report's last save and takes the user back to the initial page of the *Reports > Register* task.

The *Save* button saves any changes that have been made to the currently selected report.



# Tunnels

- The Tunnels section of the manual addresses each of the tasks in BrM's *Tunnels* tab. The *Tunnels* tab contains several options to manage the tunnels within the database.

# Tunnel List

The *Tunnels > Tunnel List* task is a complete list of all of the tunnels in the system that allows for the selection of tunnels prior to performing other actions in the *Tunnels* tab.

Tunnels > Tunnel List

Tunnel List

Filter: [BrM - None] Layout: [Default] [Create](#)

Actions	Tunnel Num	District	County	Facility	Own	Built
<input checked="" type="checkbox"/>	0001	1	Butler		State Highway Agency	1950
<input checked="" type="checkbox"/>	0023	2	Allegheny		State Highway Agency	1978
<input checked="" type="checkbox"/>	04	3	Chester		State Highway Agency	1963
<input checked="" type="checkbox"/>	0V 55	6	Beaver	SR-12	State Highway Agency	1941
<input checked="" type="checkbox"/>	0V 56	6	Beaver	SR-12	State Highway Agency	1941
<input checked="" type="checkbox"/>	1V1668	3	Cumberland	US-189	State Highway Agency	1997
<input checked="" type="checkbox"/>	3V1668	3	Cumberland	US-189	State Highway Agency	1997

Total Records: 7 Selected Records: 7 Items per page: 100 Records Matching Search: 7

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To create a new tunnel, click the **Create** button at the top of the Tunnel List. A popup will appear:

BrM Add New Tunnel

New Tunnel

TUNNEL\_NUM:

[Create](#) [Cancel](#)

Use the **Tunnel Number** textbox to enter a unique number identifier for the tunnel.

Click the **Create** button to complete the tunnel creation.

Click the **Cancel** button to cancel the tunnel creation.

The tunnel number is the only detail determined on the *Tunnel List* task. The rest of the tunnel's details are completed on the *Tunnels > Tunnel Inventory* task.

## Filters

Due to the vast size of some users' systems, filters are necessary to sort and locate tunnels based on specified criteria.

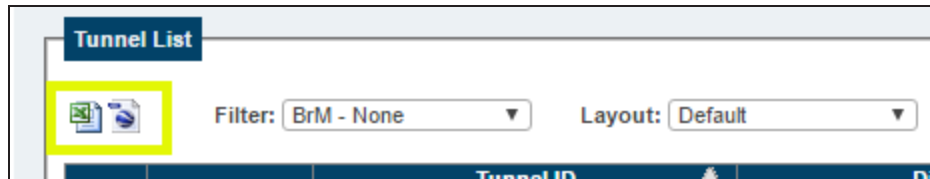
The **Filter** dropdown lists all of the relevant filters that have been created/edited on the *Bridges > Manage Filters* task (this can also be done on the *Projects > Manage Filters* task). The Tunnel List uses the "Tunnels" context on the *Manage Filters* task. When a filter is selected from the dropdown, the Tunnel List will automatically update with the filtered tunnels.

## Layout

The **Layout** dropdown determines the Tunnel List's columns. There is a default layout on the *Tunnel List* task, but new layouts can be created on the *Bridges > Manage Layouts* task (this can also be done on the *Projects > Manage Layouts* task). The Tunnel List uses the "Tunnels" context on the *Manage Layouts* task.

## Export Options

There are two export options located at the top left corner of the Tunnel List: XLS and KML. If one or more tunnels are selected, only the information from the selected tunnels will export. If no tunnels are selected, all of the tunnels in the current filter will be exported.




## Selecting Tunnels

To select a tunnel, check the box in the Tunnel List for the desired tunnel. Multiple tunnels can be selected at once, but the last selected tunnel will be the one displayed when navigating to the other *Tunnels* tasks.

## Tunnel List Controls

Within the Tunnel List are controls to edit, copy, and delete tunnels.

The  icon takes the user to the *Tunnels > Tunnel Inventory* page to edit the details of the tunnel.

The  icon makes a copy of the tunnel and all of its details. A popup will appear so that the user can give the copy a unique number identifier.

The  icon deletes the tunnel.

# Tunnel Inspection

The *Tunnels > Tunnel Inspection* task is used to record the tunnel inspection's schedule, general inspection data, and element conditions. The Specifications for the National Tunnel Inventory (SNTI) are marked by their item IDs with red text wrapped in parenthesis.

Tunnel: 0023 Tunnel Name (L.2): Inspection: 10/13/2016 Metric: English

Tunnels > Tunnel Inspection

**First Routine Inspection**

Routine Inspection Target Date: [Date Picker]

**Summary**

Inspection Date: 10/13/2016 Inspector: USER, Pontis

**Types of Inspection Performed**

Routine:  In Depth:  Special:  Mechanical:  Electrical:  Fire Suppression:

**Inspection Schedule**

Scheduled	Inspector	Current Date	Frequency
Routine Inspection: <input type="checkbox"/> (D.4)	USER, Pontis	10/13/2016 (D.2)	24 Months (D.3)
In-Depth Inspection: <input type="checkbox"/> (D.4)		10/13/2016	Months
Damage Inspection: <input type="checkbox"/> (D.6)	Type: [Dropdown]		Months
Mechanical: <input type="checkbox"/>			Months
Electrical: <input type="checkbox"/>			Months
Fire Suppression: <input type="checkbox"/>			Months
Damage Inspection performed since last reported inspection (D.5): [Dropdown]			

**General Inspection Data**

Tunnel Load Posting Status (L.4): [Dropdown]  
Hazardous Material Restriction (L.11): [Dropdown]  
Other Restrictions (L.12): [Dropdown]  
Tunnel or Portal Island Protection from Navigation (N.3): [Dropdown]

**Inspection Notes**

[Text Area]

**Element Condition**

- All Structure - [Dropdown] [Quantity] [Percent]

AASHTO Tunnel Elements [Add New Element]

Elem	Str	Unit	Description	Quantity	Units	Qty. 1	Qty. 2	Qty. 3	Qty. 4
No records to display.									

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Cancel Save Create New Inspection Delete Inspection

The header at the top of the page indicates the currently selected tunnel and inspection.

The *Tunnel* dropdown allows the user to select which tunnel's inspection to view. The user can also click the *Create* button next to the *Tunnel* dropdown to create a new tunnel.

The *Inspection* dropdown allows the user to change which inspection to view for the currently selected tunnel. The user can also click the *Create* button next to the *Inspection* dropdown to create a new inspection.

## First Routine Inspection

The *First Routine Inspection* grouping only appears on the initial inspection of a tunnel in BrM. This grouping will be hidden for all subsequent inspection.

The *Routine Inspection Target Date* textbox is used to indicate the date on which the tunnel's first routine inspection in BrM is planned to be completed.

## Summary

The *Summary* grouping contains the information established on the *Tunnels > New Tunnel Inspection* task. This information can be edited if desired.

## Inspection Schedule

The *Inspection Schedule* grouping contains information about the various inspection for the tunnel.

	Scheduled	Inspector	Current Date	Frequency
Routine Inspection:	<input checked="" type="checkbox"/>	USER, Pontis	(D.2) 10/18/2016	(D.3) 24 Months
In-Depth Inspection:	<input type="checkbox"/>	(D.4)		Months
Damage Inspection:				Months
Special Inspection:	<input type="checkbox"/>	(D.6) Type: [dropdown]		Months
Mechanical:		[text]		Months
Electrical:		[text]		Months
Fire Suppression:		[text]		Months
Damage Inspection performed since last reported inspection (D.5):		[dropdown]		

The *Scheduled* checkboxes indicate a specific SNTI that must be recorded. The NTI requires that the user indicate whether an in-depth and/or special inspection is scheduled. The *Special Inspection* dropdown can be configured using the `pon_tunnel_insp.SPECIAL_TYPE` option in the *Admin > General Config > Parameters* task.

The *Inspector* dropdown/textboxes indicate the person who performed the specific inspection type. Mechanical, electrical, and fire suppression inspection types contain textboxes rather than dropdowns because these inspections are not typically done by BrM users but still need to be recorded.

The *Current Date* textbox displays the date of the most recent inspection for the selected tunnel based on type of inspection. This can be the inspection that is currently being performed or the last inspection that was performed, all depending on whether or not the inspection type is selected for the current inspection.

The *Frequency* textbox is used to determine the number of months between inspections based on type of inspection. The routine inspection will default to 24 months.

The *Damage Inspection* dropdown is an SNTI option necessary to indicate whether a damage inspection was performed since the last recorded inspection.

## General Inspection Data

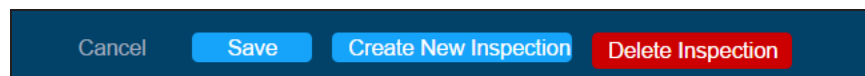
The *General Inspection Data* grouping contains general SNTI information specific to the current inspection.

## Element Condition

The *Element Conditions* grouping is used to select which elements will be included in the inspection and then determine the condition states of each element.

This grouping works almost exactly like the *Inspection > Condition* task's *Element Conditions* grouping. For in-depth information about the controls, read the *Inspection > Condition* section of the user manual.

## Tunnel Inspection Page Controls



The *Save* button saves the changes made to the current inspection.

The *Create New Inspection* button creates a new inspection for the selected tunnel and takes the user to the *Tunnels > New Tunnel Inspection* task.

The *Cancel* button cancels the changes made to the current inspection and returns the user to the *Tunnels > Tunnel List* task.

The *Delete Inspection* button deletes the current inspection for the selected tunnel.

# Tunnel Inventory

The *Tunnels > Tunnel Inventory* task contains all of the specific details for the selected tunnel as well as its structure units.

The screenshot shows the 'Tunnels > Tunnel Inventory' form. At the top, there is a 'Tunnel' dropdown menu set to '0011' and a 'Tunnel Name (L.2):' field. The form is organized into several sections:

- Location Data:** Fields for Tunnel Number (I.1), Tunnel Name (L.2), Place Code (L.5), County Code (L.4), State Code (L.3), Highway Agency District (L.6), Tunnel Portal's Latitude (L.13), Tunnel Portal's Longitude (L.14), Owner (C.1), Operator (C.2), and Urban Code (C.8).
- Geometry & Restriction Data:** Fields for Number of Bores (S.1), Tunnel Shape (S.2), Portal Shape (S.3), Ground Conditions (S.4), Complex (S.5), Tunnel Length (G.1), Minimum Vert Clearance (G.2), Roadway Width, C to C (G.3), Left Sidewalk Width (G.4), Right Sidewalk Width (G.5), Height Restriction (L.10), Under Navigable Waterway (N.1), and Navigable Waterway Clearance (N.2).
- Border Tunnel:** Fields for State or Country Code (L.15), Financial Responsibility (L.16), Border Number (L.17), and Inspection Responsibility (L.18).
- Tunnel Age:** Fields for Year Built (A.1) and Year Rehabilitated (A.2).
- Route Data:** Fields for Route Number (I.7), Facility Carried (I.10), LRS Route ID (I.11), LRS Milepost (I.12), Route Direction (I.8), Direction of Traffic (C.3), Total Number of Lanes (A.3), AADT (A.4), ADTT (A.5), Year of AADT (A.6), and Detour Length (A.7).
- Route Classification:** Fields for Route Type (I.9), Service in Tunnel (A.8), Toll (C.4), NHS Designation (C.5), STRAHNET Designation (C.6), and Functional Classification (C.7).
- Load:** Fields for Load Rating Method (L.1), Inventory Load Rating (L.2), Operating Load Rating (L.3), Posting Load - Gross (L.5), Posting Load - Axel (L.6), Posting Load - Type 3 (L.7), Posting Load - Type 3S2 (L.8), and Posting Load - Type 3-3 (L.9).
- Structure Units:** A table with columns 'Key', 'Structure Unit Name', 'Default', and 'Active'. It contains one entry: '1' for 'Structure Unit 1', with both 'Default' and 'Active' checked. An 'Add New' button is located to the right of the table.
- Tunnel Notes:** A text area for entering notes.

At the bottom of the form, there are buttons for 'Cancel', 'Save', and 'Save & Close'.

The *Tunnel* dropdown in the header allows the user to select which tunnel's details to edit.

The top portion of the task has several groupings to indicate the tunnel's location, age, route information, and more.

## Structure Units

The *Structure Units* grouping allows the user to create/modify the selected tunnel's structure units. Structure units are groups of structures typically based on structural design and material. It is not necessary to have multiple structure units, but it can be helpful for inspections.

This close-up shows the 'Structure Units' section of the form. It features a table with the following data:

Key	Structure Unit Name	Default	Active	
1	Structure Unit 1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="button" value="X"/>

An 'Add New' button is located to the right of the table.

Click the *Add New* button to create a new structure unit:



The **Key** textbox is a simplified identifier for the structure unit that's displayed in the Str. Unit column of the Elements grid on the *Tunnel Inspection* task.

The **Structure Unit Name** textbox is used to indicate the name of the structure unit and should include specific information that clearly explains which area of the tunnel it covers.

The **Default** checkbox determines the default structure unit selected when a new element is added to a tunnel inspection on the *Tunnels > Tunnel Inspection* task. Only one structure unit can be the default.

The **Active** checkbox determines whether or not the structure unit is active and available to be utilized on the *Tunnels > Tunnel Inspection* task.

## Tunnel Inventory Page Control

The **Save** button saves the changes made on the *Tunnels > Tunnel Inventory* task.

The **Save & Close** button saves the changes made on the *Tunnels > Tunnel Inventory* task and returns the user to the *Tunnels > Tunnel List* task.

The **Cancel** button cancels the changes made on the *Tunnels > Tunnel Inventory* task and returns the user to the *Tunnels > Tunnel List* task.

# New Tunnel Inspection

The *Tunnels > New Tunnel Inspection* task is used to create a new inspection for the selected tunnel. This page is only accessible by selecting the **Create New Inspection** button on the *Tunnels > Tunnel Inspection* task.

Tunnels > New Tunnel Inspection

**Inspection Schedule**

Routine Inspection: Team Leader: Inspection Date (D.2):

USER, Pontis 10/18/2016

**Types of Inspection Performed**

Routine:

In Depth:

Damage:

Special:  [dropdown]

Mechanical:

Electrical:

Fire Suppression:

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Cancel Create

The **Team Leader** dropdown defaults to the current user but can be changed.

The **Inspection Date** textbox defaults to the current date but can be changed.

The *Types of Inspection Performed* grouping contains checkboxes to indicate specifically which inspection types will be performed during the newly created inspection.

## New Tunnel Inspection Page Controls

The **Create** button creates a new inspection based on the selections made on the page and sends the user to the *Tunnels > Tunnel Inspection* task.

The **Cancel** button cancels the new inspection creation and returns the user to the *Tunnels > Tunnel List* task.



# Admin

- The *Admin* section of the manual addresses each of the tasks in BrM's *Admin* tab. The *Admin* tab contains the administrative functions of BrM that create flexibility within the software by allowing the administrator to configure various settings to meet agency needs.

# Security

The *Admin > Security* task allows the admin to set up the system's security structure. The admin can create and edit users, user groups, and user roles, as well as determine basic permissions for user roles, manage database setups, and determine user role report access.

BrM User Security	
Security Component	Description
User	Every person who uses BrM will have a user account to log in to the software using a user name and password. The user account is then tied to groups and roles to determine what a user can see and do within BrM.
Group	A user's group determines which structures are visible and accessible to the user in the system. <b>Example:</b> If a user works on bridges in district 1 and the admin only wants them to see district 1 structures, the user will be assigned to a group with an access filter that only permits access to district 1 structures.
Role	A user's role is typically designed around that person's function within their agency. Separate roles usually exist for inspectors, planners, admins, etc. The role determines a user's module access and permissions within each module. <b>Example:</b> If a user is an inspector, that user will mostly likely be assigned to an inspector role that grants both read and write access to the <i>Inspection</i> tab. However, that inspector role will probably be limited to read-only access for the <i>Analysis</i> tab.

# Users

The *Users* subtask is used to create and edit users. The user's account information, user groups, user roles, and user status can all be changed.

Admin > Security > Users

**User Account Info**

Select existing user: USER, Pontis (Pontis) OR [Add new user](#)  
LASTNAME, FirstName (USERID)

**Edit Account Info**

Initials:

First Name:

Middle Name:

Last Name:

User ID:

Title:

Agency:

District:

Address Line 1:

Address Line 2:

City:

State:

Zip:

Phone:

Fax:

Email:

Password:

Confirm Password:

[Reset Password](#)

[Change dbadmin Password](#) [Import Pontis 5.1 Passwords](#)

**User Groups**

Default Group

[Edit](#)

**User Roles**

Admin, Default

[Edit](#)

**User Status**

Account Disabled

[Save](#) [Save & Close](#) [Revert](#) [Delete](#)

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## User Account Info

In the *User Account Info* grouping, an existing user can be selected to edit from the *Select existing user* dropdown, or a new user can be created by clicking the *Add new user* button.

## Edit Account Info

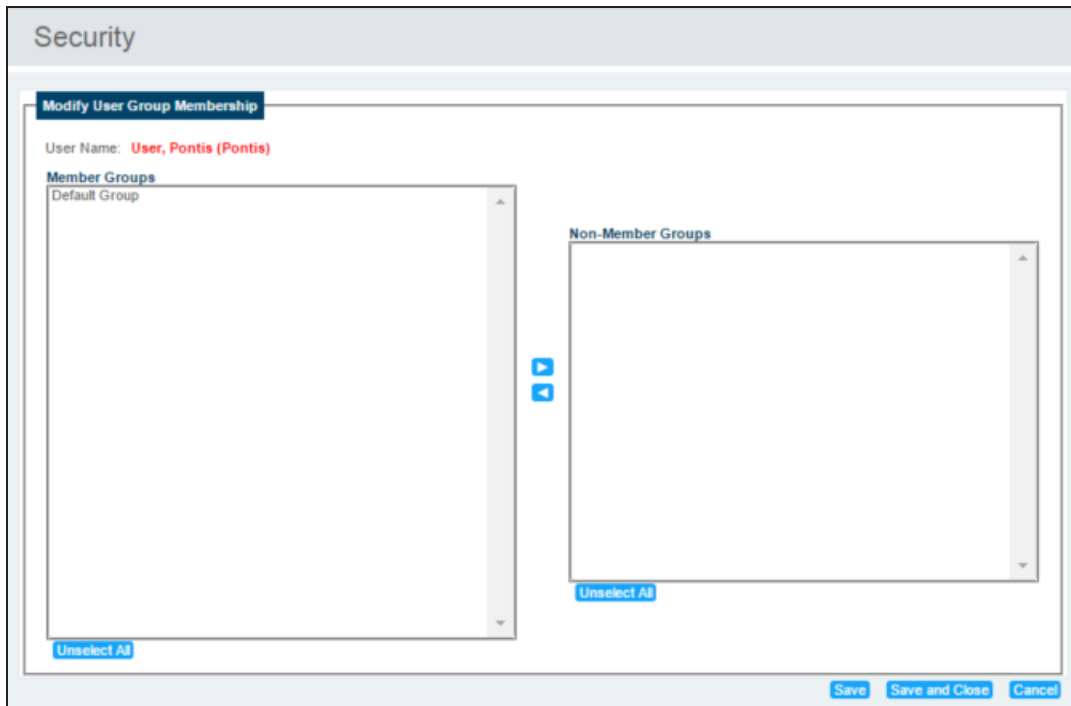
The *Edit Account Info* grouping contains all of the user's basic information. The mandatory fields are marked by a red asterisk (\*). These fields must be completed in order to save the user.

**\*Note:** Unlike other fields, the *User ID* cannot be edited after the initial creation. Be sure to verify the User ID is entered exactly as desired before saving the new user.



A password field may or may not be visible depending on the agency's database.

## User Groups

All users must have at least one user group. To edit the user's user groups, click the *Edit* button in the *User Groups* grouping.



The user's current user groups are on the left in the *Members Groups* list, and the other existing user groups that the user is not a part of are on the right in the *Non-Member Groups* list.

To move one or more user groups from one list to the other, select all of the desired user groups and then click the right or left arrow -   - to move the selections to the desired list.

The *Unselect All* buttons below each list can be used to unselect all user groups currently selected.

### Users - User Groups - Page Controls

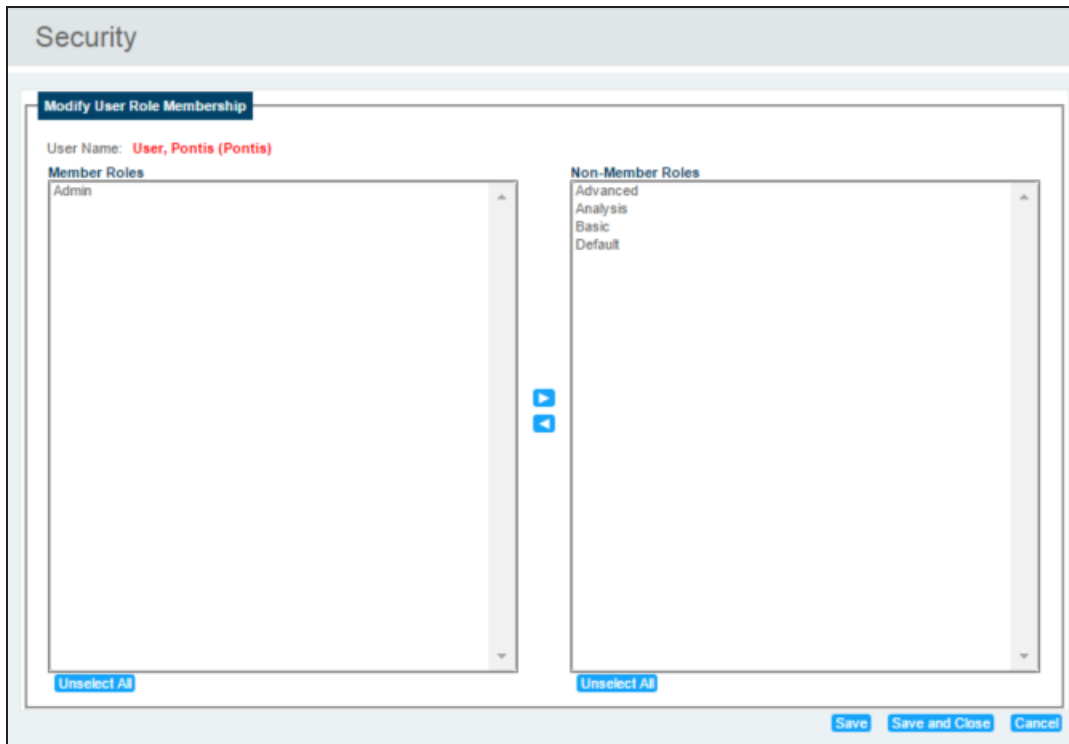
The *Save* button saves the changes that have been made to the user's user groups and keeps the user on the page.

The *Save and Close* button saves the changes that have been made to the user's user groups and exits back to the *Users* subtask.



The *Cancel* button cancels the changes that have been made to the user's user groups and exits back to the *Users* subtask.

## User Roles

All users must have at least one user role. To edit the user's user roles, click the *Edit* button in the *User Roles* grouping.



The user's current user roles are on the left in the *Members Roles* list, and the other existing user roles that the user is not a part of are on the right in the *Non-Member Roles* list.

To move one or more user roles from one list to the other, select all of the desired user roles and then click the right or left arrow -   - to move the selections to the desired list.

The *Unselect All* buttons below each list can be used to unselect all user roles currently selected.

### Users - User Roles - Page Controls

The *Save* button saves the changes that have been made to the user's user roles and keeps the user on the page.

The *Save and Close* button saves the changes that have been made to the user's user roles and exits back to the *Users* subtask.

The *Cancel* button cancels the changes that have been made to the user's user roles and exits back to the *Users* subtask.

### User Status

The *User Status* grouping contains the *Account Disabled* checkbox that determines whether or not an account is accessible. If the box is checked, the currently selected user will not be able to log in to BrM.

Disabled user accounts are greyed out in the *Select Existing User* dropdown in the *User Account Info* grouping.

### Change .dbadmin Password

The .dbadmin account controls the database. Clicking the *Change .dbadmin Password* button will allow the admin to change the .dbadmin password.

It is recommended that the .dbadmin password be changed from the initial password to ensure system security.

## Import Pontis 5.1 Passwords

The *Import Pontis 5.1 Passwords* button allows the admin to import passwords from the previous version of BrM. By default, migrating to a new system resets all passwords.

Click the *Import Pontis 5.1 Passwords* button to proceed to the following page:

Click the *Choose File* button to locate the file containing the old passwords, then click the *Import* button.

Click the *Close* button to return to the *Admin > Security > Users* subtask.

## Users Page Controls



The *Save* button saves the changes to the selected user.

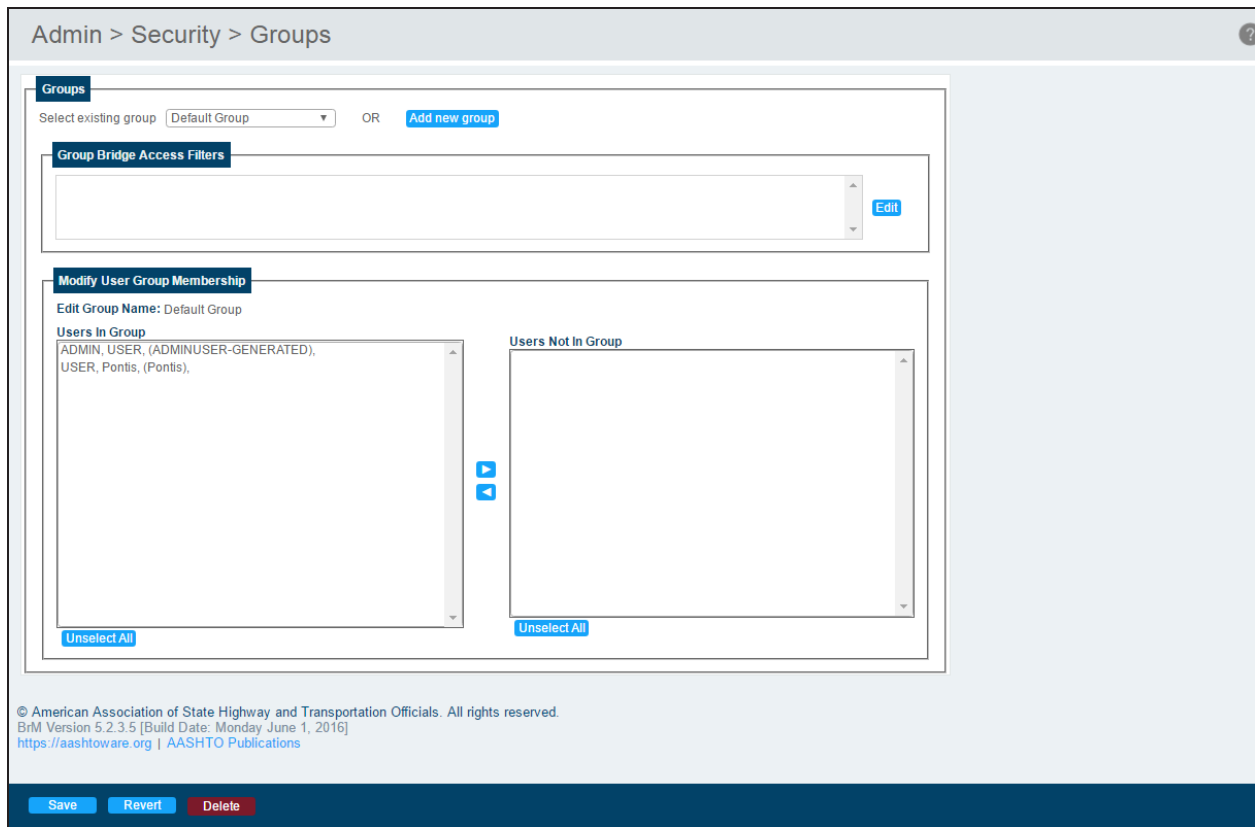
The *Save and Close* button saves the changes to the selected user and returns the admin to the *Bridges > View List* task.

The *Revert* button cancels any unsaved changes to the selected user.

The *Delete* button deletes the selected user from the system. However, this is not a permanent deletion from the database. This marks the user as "inactive" in the Pon\_App\_Users database table.

# Groups

The *Groups* subtask is used to create and edit groups. The admin can control the access filters for each group and the users within each group. The access filters created on the *Manage Filters* task determine to which structures the users in the group have access. Only the structures that meet the criteria established in the group's access filters will be visible and accessible to the users in the group.



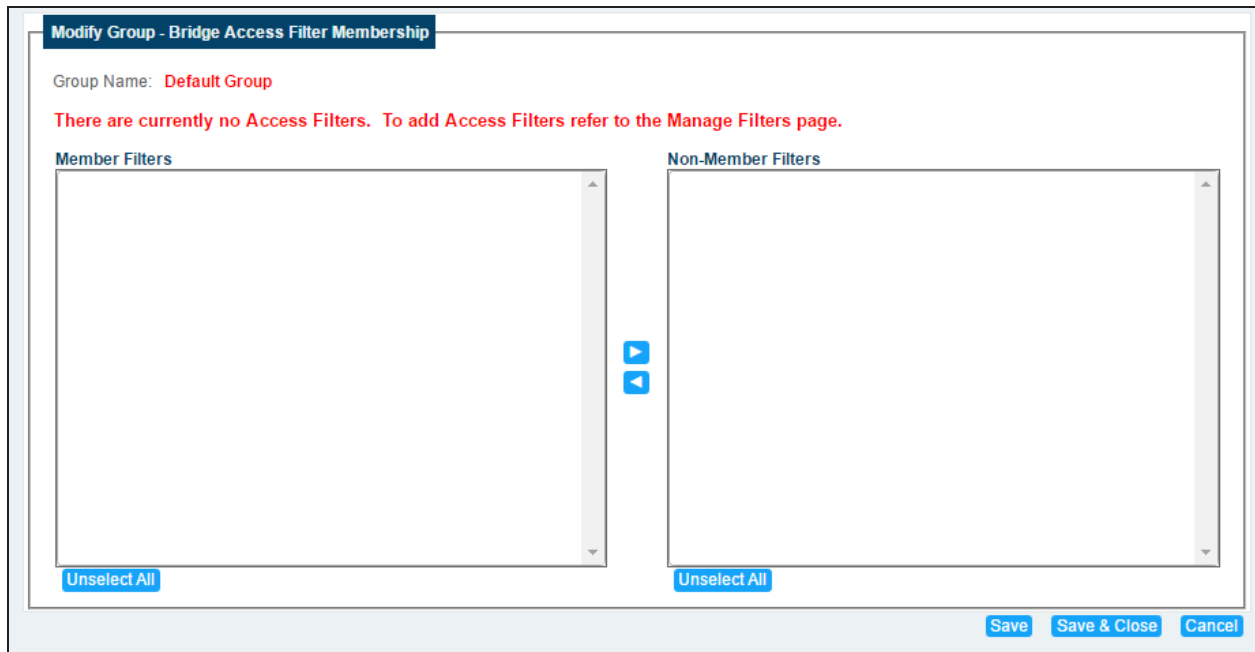
## Existing and New User Groups

The *Select Existing Group* dropdown allows for the selection of an existing user group.



The *Add New Group* button creates a new user group.

## Group Bridge Access Filters

The *Group Bridge Access Filters* grouping determines the access filters for the selected user group. Clicking the *Edit* button takes the admin to the following page:



The user group's current access filters are on the left in the *Members Filters* list, and the other existing access filters are on the right in the *Non-Member Filters* list.

To move one or more access filters from one list to the other, select all of the desired access filters and then click the right or left arrow -   - to move the selections to the desired list.

The *Unselect All* buttons below each list can be used to unselect all access filters currently selected for that list.

### Groups - Access Filters - Save and Cancel Controls

The *Save* button saves the changes that have been made to the user group's access filters and keeps the user on the page.

The *Save and Close* button saves the changes that have been made to the user group's access filters and exits back to the *Groups* subtask.



The *Cancel* button cancels the changes that have been made to the user group's access filters and exits back to the *Groups* subtask.

## Modify User Group Membership

The *Modify User Group Membership* grouping controls which users belong to the selected user group.

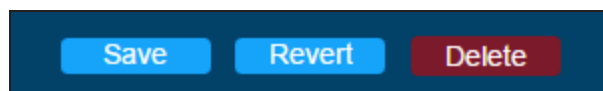
The *Edit Group Name* textbox is used to update the name of the existing user group or to name the new user group. User group names that are greyed out in the textbox cannot be edited.

The user group's current users are on the left in the *Users in Group* list, and the other existing users not in the user group are on the right in the *Users Not in Group* list.

To move one or more users from one list to the other, select all of the desired users and then click the right or left arrow -   - to move the selections to the desired list.

The *Unselect All* buttons below each list can be used to unselect all users currently selected for that list.

## Groups Page Controls





The *Save* button saves the changes made to the selected user group.

The *Revert* button cancels any unsaved changes made to the selected user group.

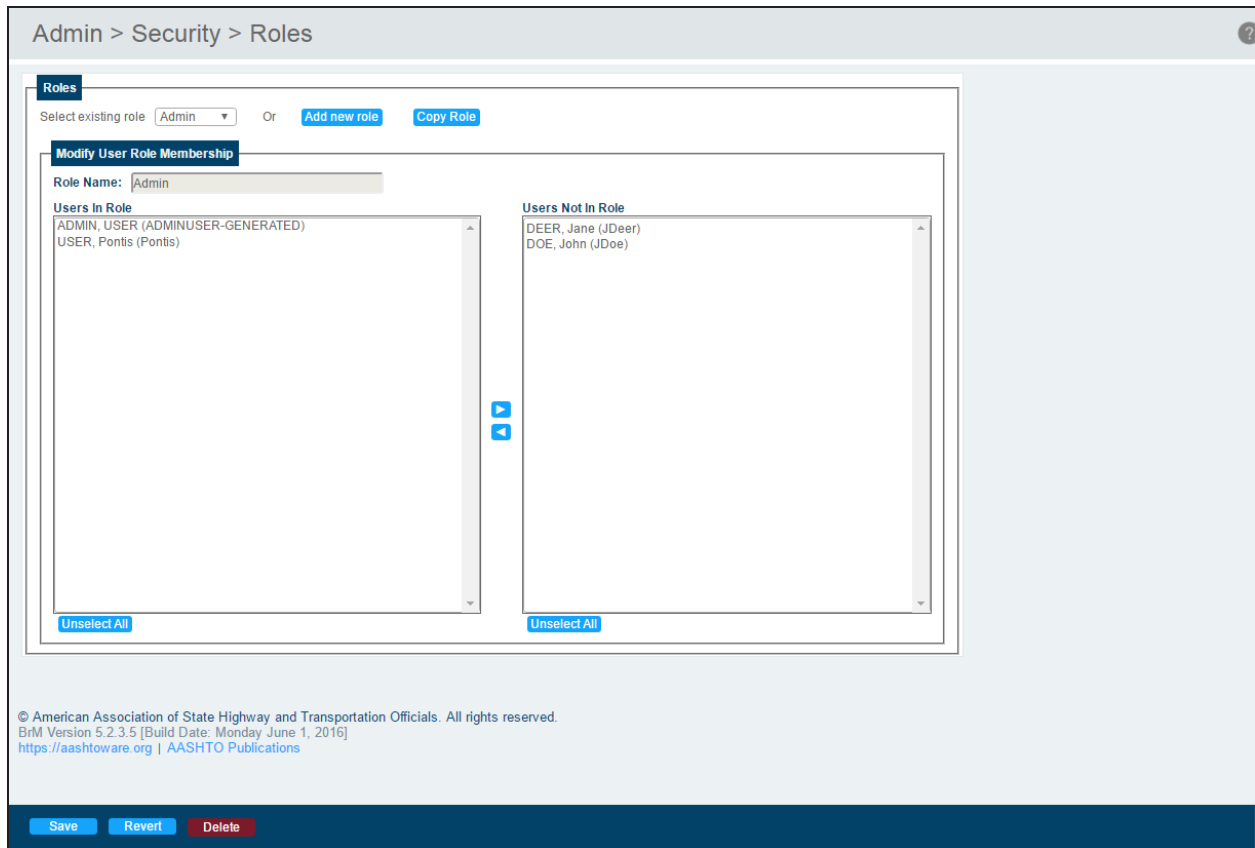
The *Delete Group* button deletes the selected user group from the system.

**\*Note:** User groups can only be deleted if they do not contain users. Attempting to delete a user group that contains users will prompt the following message:

"Group cannot be deleted. Please remove all users from the group first."

# Roles

The *Roles* subtask is used to create and edit user roles and determine which users will be in each role. Once the roles are created, the *Admin > Security > Permissions* subtask and the *Navigation and Field Security* tasks can be used to establish the role's access and permissions within the system.



BrM comes with default roles available to the user with varying degrees of security permissions and access. Those roles include:

- **Default** - The lowest access level of all default roles. Users in this role have read-only access to only the *Bridge* and *Inspection* tabs.
- **Basic** - This role grants users access to the *Bridge*, *Reports*, *Inspection*, and *Gateway* tabs in a limited capacity. They can view inspections, run reports, export data, and make changes to NBI fields, but cannot create new inspections or modify element data in existing inspections.
- **Analysis** - This role is for users working on the analytical side of BrM. Users assigned to this role have access to the *Bridge* and *Analysis* tabs in BrM and read-only access to *Inspection* tab.
- **Advanced** - This role grants access to all non-admin functionality. This role removes access to the *Admin* tab and admin functions (such as filter and layout creation). This is the role an average user entering inspection data would be assigned to in BrM.
- **Admin** - Top level user access role. Users in this role have access to every page and function in BrM. This is the only role with access to the *Admin* tab.
- **AdminAnalysis** - A planner role that has read-only access to the *Inspection* tab, full access to the *Analysis*, *Projects*, and *Programs* tabs, and access to modify certain *Admin* tasks.

The following table displays the default BrM roles and the access to each task in the system:

**\*Note:** "X" indicates full access to the task. "RO" indicates read-only access to the task.

BrM Default Roles and Permissions						
	Default	Basic	Analysis	Advanced	Admin	AdminAnalysis
<b>Bridges</b>						
View List	X	X	RO	X	X	X
Manage Layouts					X	
Manage Filters > Edit Filter					X	
Manage Filters > Edit SQL					X	
New Inspection				X	X	
Suff Rate		X		X	X	
Validate		X		X	X	
Create Struct				X	X	
Copy Struct				X	X	
Remove Struct				X	X	
Manage Bridge Groups > Bridge Groups					X	X
Manage Bridge Groups > Bridge Group Details					X	
Manage Bridge Groups - Add/Remove Roadways					X	
Manage Bridge Groups > Setup Bridge Groups					X	
Mapping					X	
<b>Reports</b>						
Generate		X		X	X	X
Register				X	X	X
<b>Tunnels</b>						
Tunnel List	By default, all roles have full access to the <i>Tunnels</i> tasks. The admin can establish permissions for the tasks on the <i>Admin &gt; Security &gt; Permissions</i> subtask.					
Tunnel Inspection						
Tunnel Inventory						
<b>Admin</b>						
Security > Users					X	
Security > Groups					X	
Security > Roles					X	
Security > Permissions					X	
Security > Databases					X	

### BrM Default Roles and Permissions

	Default	Basic	Analysis	Advanced	Admin	AdminAnalysis
Security > Reports					X	
Security > Password Rules					X	
General Config > Parameters					X	
General Config > Options					X	X
General Config > Export Options					X	X
General Config > Data Dict					X	X
General Config > Checked Out Bridges					X	X
General Config > Logging					X	X
General Config > Standard					X	X
General Config > Agency					X	X
General Config > Visual Form Editor					X	X
General Config > Page Export					X	
General Config > Equation Editor					X	
General Config > Set Editor					X	
General Config > Validation Editor					X	
Mapping > Sync Mapping					X	X
Mapping > Map Options					X	
Modeling Config > Element Spec					X	X
Modeling Config > Element-Child Linking					X	
Modeling Config > Project Categories					X	
Modeling Config > Deterioration Profiles					X	

BrM Default Roles and Permissions						
	Default	Basic	Analysis	Advanced	Admin	AdminAnalysis
Modeling Config > Elements					X	X
Modeling Config > Assessment					X	X
Modeling Config > Benefit Groups					X	X
Modeling Config > Action Defs					X	X
Modeling Config > Cost Index					X	X
Modeling Config > Network Policies					X	X
Modeling Config > Advanced Formulas					X	X
Modeling Config > Utility					X	X
Modeling Config > Weights Profile					X	X
Modeling Config > Sub-division Profiles					X	X
Modeling Config > Executive Summary					X	X
Modeling Config > NBI Deterioration Models					X	X
Modeling Config > NBI Conversion Profiles					X	X
Modeling Config > Preservation and Replacement Policy					X	X
Modeling Config > LCCA Policy Rules					X	X
Modeling Config > LCCA Assign Policies					X	X
Tunnels > Asset Element Definitions					X	X
Tunnels > Asset Element-Child Linking					X	X
Inspection						
Condition	RO	RO	X	X	X	RO

BrM Default Roles and Permissions						
	Default	Basic	Analysis	Advanced	Admin	AdminAnalysis
Appraisal	RO	RO	X	X	X	RO
Inventory > Admin	RO	RO	X	X	X	RO
Inventory > Design	RO	RO	X	X	X	RO
Inventory > Roads	RO	RO	X	X	X	RO
Inventory > Agency Items	RO	RO	X	X	X	RO
Schedule	RO	RO	X	X	X	RO
Work > Work Candidates	RO	RO	X	X	X	RO
Work > Project Information	RO	RO	X	X	X	RO
Multimedia	RO	RO	X	X	X	RO
Assessments	RO	RO	X	X	X	RO
Element Condition Ratings	RO	RO	X	X	X	RO
Gateway						
Export		X		X	X	X
Import		X		X	X	X
Check Out				X	X	X
Check In				X	X	X
Override				X	X	X
Analysis						
Work Candidates > Bridge Analysis				X	X	X
Work Candidates > Reverse Calculation				X	X	X
Work Candidates > Needs List				X	X	X
Work Candidates > Comparison Groups				X	X	X
Utility Value				X	X	X
LCCA					X	X
Projects						
Project List					X	X
Manage Layouts					X	X
Manage Filters > Edit Filter					X	X

BrM Default Roles and Permissions						
	Default	Basic	Analysis	Advanced	Admin	AdminAnalysis
Manage Filters > Edit SQL					X	X
Create/Edit Project > Query					X	X
Create/Edit Project > Summary					X	X
Create/Edit Project > Analysis					X	X
Create/Edit Project > Management					X	X
Upload Project					X	X
Combine Projects					X	X
Split Project					X	X
Manage Funding > Funding List					X	X
Manage Funding > Create/Edit Funding Sources					X	X
Programs						
Program List					X	X
Create/Edit Programs					X	X
Assign Projects					X	X
Performance Measures					X	X
Funding Allocation					X	X
Program Planning					X	X
Program Results					X	X
Executive Summary					X	X
Create/Edit Scenarios					X	X
Scenario Explorer					X	X

## Existing and New User Roles

The *Select Existing Role* dropdown allows for the selection of an existing user role.

The *Add New Role* button creates a new user role.



A role can also be copied using the *Copy Role* button. This creates a copy of the currently selected role and adds all of the selected role's users to the copy.

## Modify User Role Membership

The *Modify User Role Membership* grouping controls which users belong to the selected user role.

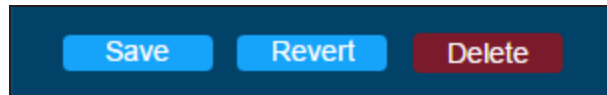
The *Role Name* textbox is used to update the name of the existing user role or to name the new user role. User role names that are greyed out in the textbox cannot be edited.

The user role's current users are on the left in the *Users in Role* list, and the other existing users not in the user role are on the right in the *Users Not in Role* list.

To move one or more users from one list to the other, select all of the desired users and then click the right or left arrow -   - to move the selections to the desired list.

The *Unselect All* buttons below each list can be used to unselect all users currently selected for that list.

## Roles Page Controls



The *Save* button saves the changes made to the selected user role.

The *Revert* button cancels any unsaved changes made to the selected user role.

The *Delete Role* button deletes the selected user role from the system.



# Permissions

The *Permissions* subtask allows the admin to determine the basic site permissions for user roles, including permissions related to bridges, tunnels, elements, and inspections.

Admin > Security > Permissions

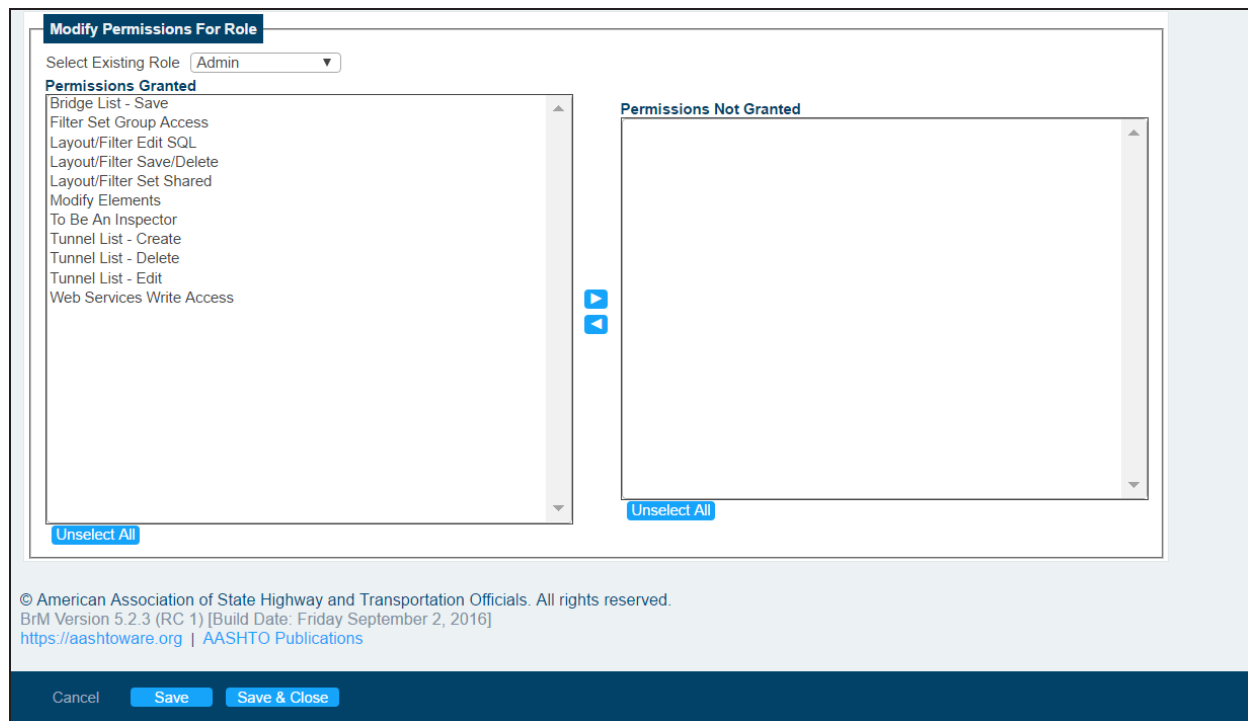
Permissions

Bridge List Layout & Filter Permissions	Granted to Roles
<b>Layout/Filter Save/Delete</b> Gives a role the permission to save and delete bridge list layouts and filters.	<ul style="list-style-type: none"><li>Advanced</li><li>Admin</li></ul>
<b>Layout/Filter Edit SQL</b> Gives a role the permission to modify the bridge list layouts and filter SQL script.	<ul style="list-style-type: none"><li>Advanced</li><li>Admin</li></ul>
<b>Layout/Filter Set Shared</b> Gives a role the permission to modify the shared attribute of bridge list layouts and filters.	<ul style="list-style-type: none"><li>Advanced</li><li>Admin</li></ul>
Bridge List Filter Permissions	Granted to Roles
<b>Filter Set Group Access</b> Gives a role the permission to modify the group access attribute of the bridge list layouts and filters.	<ul style="list-style-type: none"><li>Admin</li></ul>
Inspection Permissions	Granted to Roles
<b>To Be An Inspector</b> Gives a role the permission to appear in Inspector drop down lists that appear in the inspection module.	<ul style="list-style-type: none"><li>Advanced</li><li>Admin</li><li>Default</li></ul>
Element Permissions	Granted to Roles
<b>Modify Elements</b> Gives a role the permission to modify AASHTOWare Bridge Management CoRe element definitions.	<ul style="list-style-type: none"><li>Admin</li></ul>
Web Services Write Access Permissions	Granted to Roles
<b>Web Services Write Access</b> Gives a role the permission to add or modify data via remote access web services.	<ul style="list-style-type: none"><li>Admin</li></ul>
Tunnel List Create/Copy Access Permissions	Granted to Roles
<b>Tunnel List - Create/Copy</b> Gives a role the permission to create/copy a tunnel via the tunnel listing page.	<ul style="list-style-type: none"><li>Advanced</li><li>Admin</li></ul>
Tunnel List Edit Access Permissions	Granted to Roles
<b>Tunnel List - Edit</b> Gives a role the permission to edit a tunnel via the tunnel listing page.	<ul style="list-style-type: none"><li>Admin</li><li>Advanced</li></ul>
Tunnel List Delete Access Permissions	Granted to Roles
<b>Tunnel List - Delete</b> Gives a role the permission to delete a tunnel via the tunnel listing page.	<ul style="list-style-type: none"><li>Advanced</li><li>Admin</li></ul>

[Modify Role Permissions](#)



## Modify Role Permissions

To modify the permissions granted to each user role, click the *Modify Role Permissions* button to be taken to the following page:



Choose the desired user role from the *Select Existing Role* dropdown.

The user role's current permissions are on the left in the *Permissions Granted* list, and the other available permissions are on the right in the *Permissions Not Granted* list.

To move one or more permissions from one list to the other, select all of the desired permissions and then click the right or left arrow -   - to move the selections to the desired list.

The *Unselect All* buttons below each list can be used to unselect all permissions currently selected for that list.

## Permissions Page Controls

The *Save* button saves the changes to the selected user role.

The *Save and Close* button saves the changes to the selected user role and returns the admin to the *Admin > Permissions* task.

The *Cancel* button cancels any changes made to the selected user role and returns the admin to the *Admin > Permissions* task.

# Databases

The *Databases* subtask is used to set up and edit system databases. It is recommended that only the .dbadmin account user access this task.

**\*Note:** Database creation and management is discussed in greater detail in the *BrM Installation Guide*.

The screenshot displays the 'Admin > Security > Databases' interface. The main section is titled 'Database Administration' and contains the following elements:

- Select existing database:** A dropdown menu with 'BrM' selected, followed by 'Or [Add new database](#)'.
- Configure Database Connection:**
  - Vendor:** A dropdown menu with 'Microsoft SQL Server' selected.
  - ODBC Data Source:** A dropdown menu with 'BrM' selected.
  - Description:** A text input field containing 'BrM'.
  - Authentication Method:** Three radio buttons: 'Specify Proxy User ID and Password' (selected), 'Each Application User has a Matching DB User', and 'Use Windows Authentication'.
  - Proxy Login ID:** A text input field containing 'pontis'.
  - Proxy Password:** A password input field with six asterisks.
  - Confirm Proxy Password:** A password input field with six asterisks.
  - DB Connection String:** A text area containing 'DSN=BrM,UID=pontis;'. Below it are 'Edit Connection String' and 'Verify Connection' buttons.
  - Save As:** A text input field containing 'BrM'.
- Update optimizer configuration file:** A checked checkbox.

At the bottom of the page, there is a footer with copyright information: '© American Association of State Highway and Transportation Officials. All rights reserved. BrM Version 5.2.3 (RC 2) [Build Date: Friday October 14, 2016] https://aashtoware.org | AASHTO Publications'. The bottom navigation bar contains 'Save', 'Revert', and 'Delete Database' buttons.

The *Select existing database* dropdown is used to select an existing database, or a new database can be added by clicking the *Add new database* text link.

## Configure Database Connection

The *Configure Database Connection* grouping enables the admin to set up the database and verify the connection.

### Vendor

The *Vendor* dropdown is used to select the proper database vendor. Oracle and Microsoft SQL Server are the only options.

### ODBC Data Source

The *ODBC Data Source* dropdown is for selecting the desired data source.

The data source should have been created during your agency's initial installation of BrM. For more information, consult the *BrM Installation Guide*.

### Description

The *Description* textbox will automatically populate with the *ODBC Data Source* dropdown selection, but it can be changed as desired.

### Authentication Method

Select one of the three *Authentication Method* radio button options based on your agency's needs and/or policies.

The selection made will determine whether or not the *ID* and *Password* textboxes are present below the radio buttons.

### Connection

A connection string will form based on the authentication method selected. That string can be edited using the *Edit Connection String* button.

To verify the connection, click the *Verify Connection* button. If approved, a message will appear in green text that reads "Connection string is valid!" If the verification fails, a red error message will appear explaining why the verification failed.

### Save As

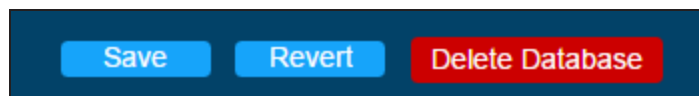
The *Save As* textbox names the database connection. By default, the name will be the same as the *ODBC Date Source* dropdown selection, but it can be changed as desired.

### Update Optimizer Configuration File

The *Update Optimizer Configuration File* checkbox determines whether or not to update the optimizer's configuration file when a database connection is saved. This process is described in detail in the Program Optimizer section of the *BrM Installation Guide*.

**\*Note:** The *Update Optimizer Configuration File* checkbox is always checked by default upon visiting the *Databases* subtask. Therefore, be sure to uncheck it if the configuration file should not be updated when the database connection is saved.

## Databases Page Controls



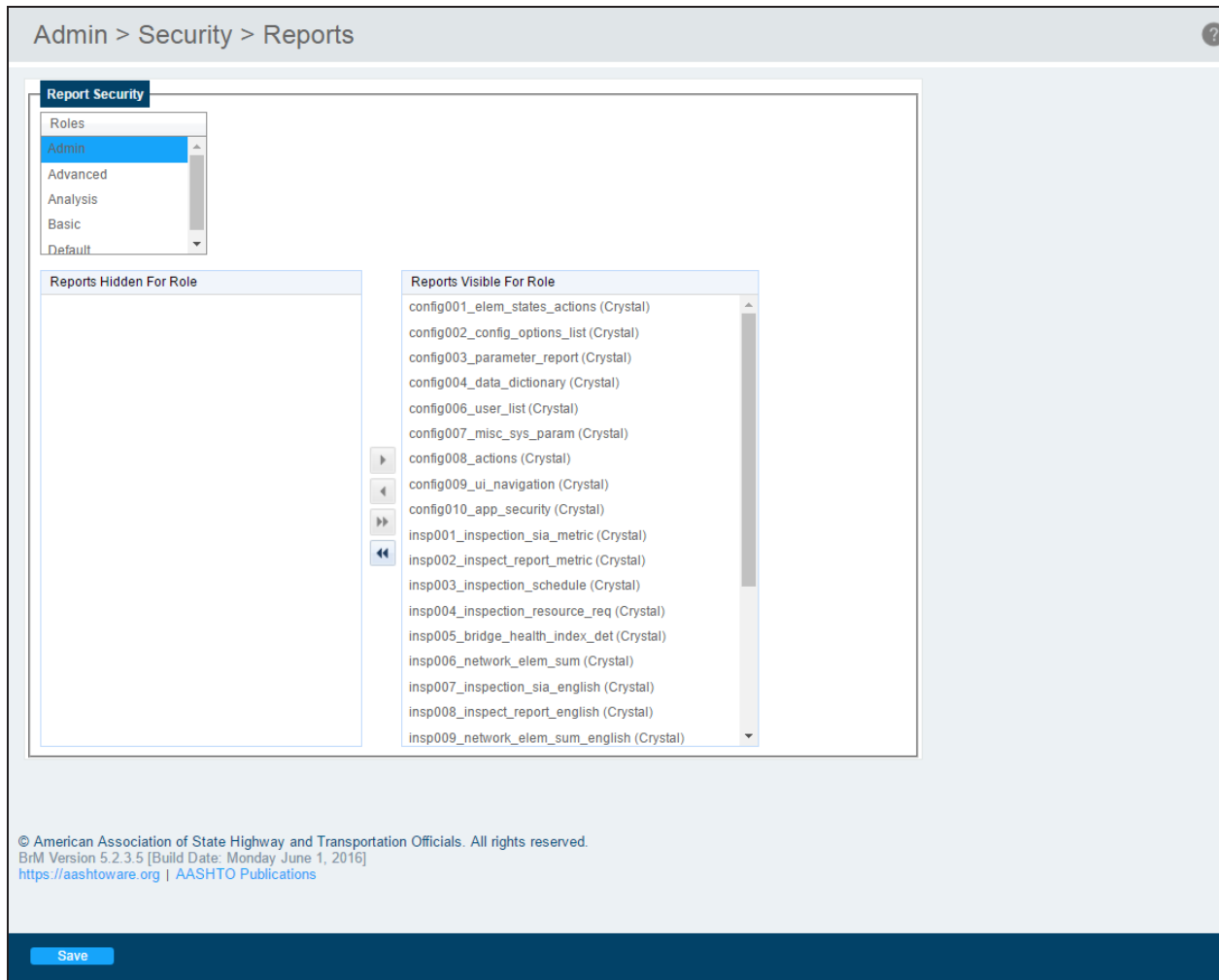
The *Save* button is used to save new databases and apply the changes that have been made to existing databases.

The *Revert* button cancels the unsaved changes that have been made to the selected database.

The *Delete Database* button deletes the currently selected database.

# Reports



The *Reports* subtask is used to determine which reports are visible for each user role.





## Report Security

Use the *Roles* listbox to select the role to be edited.

The *Reports Hidden For Role* list displays the reports that the role cannot see. The *Reports Visible For Role* list displays the reports that the role can view.

To move one or more reports from one list to the other, select all of the desired reports and then click the single right or left arrow -   - to move the selections to the desired list.

To move all of the reports from one list to the other, click the double right or left arrow -   - to move all of the reports to the desired list.

**\*Note:** Regardless of the reports made available to a specific role, only the bridges available to a user based on their groups' access will appear in the reports.

## Reports Page Controls

The *Save* button saves the changes made to the report security for the selected role.

# Password Rules

The *Password Rules* subtask is used to set the complexity rules for an agency's BrM login passwords.

Admin > Security > Password Rules

Enable password complexity rules

Password Complexity Rules

Rule name	Required	Minimum
Total characters	<input type="checkbox"/>	8
Lower-case letters	<input type="checkbox"/>	1
Upper-case letters	<input type="checkbox"/>	1
Numbers	<input type="checkbox"/>	1
Special characters (_!@#%&.)	<input type="checkbox"/>	1
Password may not contain user ID	<input type="checkbox"/>	
Expiration window (in days)	<input type="checkbox"/>	90

[Reset the password expiration window for all users](#)

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BrM Version 5.2.3.5 [Build Date: Monday June 1, 2016]  
<https://aashtoware.org> | AASHTO Publications

[Save](#)

The *Enable Password Complexity Rules* checkbox applies the password rules to the system's users. If left unchecked, the checkboxes in the *Password Validation Rules* grouping will be read-only and the default password rule - **minimum of 5 characters** - will take effect.

## Password Validation Rules

Use the *Required* checkbox to determine which of the settings are required for user passwords, then determine the specifics of those settings using the *Minimum* textbox.

If the password expiration window (in days) is being utilized, all users will have different expiration dates depending on when their user accounts were created. To align all of the user accounts to have a "Password Last Updated" date of the current date, click the *Reset the Password Expiration Window for All Users*.

Click *Save* to ensure that the updated settings take effect.

# General Config

## Parameters

The *Admin > General Config > Parameters* task allows the admin to manipulate the values for the various controls throughout the system including dropdowns, grids, and other data-bound value controls. The admin can also add new parameters from this task.

Admin > General Config > Parameters

**Parameters:**

Table Name	Field Name
agencyroute	agencyroute
agencyroute	threshold_state
bridge	adminarea
bridge	adtolass
bridge	altimeth
bridge	altarmeth
bridge	bridge_lifecycle_phase
bridge	bridge_status
bridge	bridgegroup
bridge	bridgemed
bridge	county
bridge	County
bridge	oustodian
bridge	designappr
bridge	designload
bridge	designmain
bridge	district

Table Name: \_\_\_\_\_ Field Name: \_\_\_\_\_ **Add New Parameter**

**Parameter Values and Labels:**

Value	Short Label	Description	is Active
X 0	Do Nothing	Do Nothing	<input checked="" type="checkbox"/>
X 1	Structure Replacement	Structure Replacement	<input checked="" type="checkbox"/>
X 2	Improvement	Improvement	<input checked="" type="checkbox"/>
X 3	Rehabilitation	Rehabilitation	<input checked="" type="checkbox"/>
X 4	Maint&Repair	Maint&Repair	<input checked="" type="checkbox"/>
X 5	Emergency	Emergency	<input checked="" type="checkbox"/>
X 6	Other	Other	<input checked="" type="checkbox"/>
X 7	Painting	Painting	<input checked="" type="checkbox"/>

**Add New Value**

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Brid Version 3.2.3.57 [Build Date: Wednesday August 24, 2016]  
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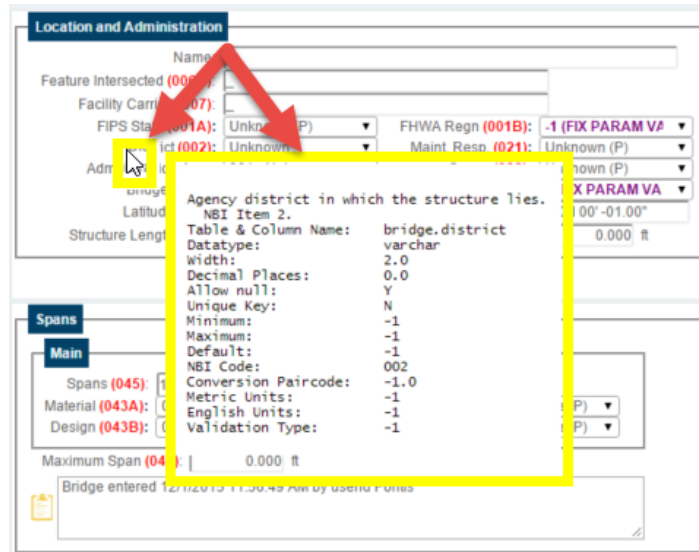
**Save**

## Parameters

The *Parameters* grouping lists all of the controls available to be manipulated. The combination of the Table Name and Field Name columns determines where the parameter is located within the system.

If tooltips are enabled, a control's table and field name can be found throughout the software by hovering the mouse over the desired control and viewing the Table & Column Name line.

**Example:** In the following screenshot, the mouse is hovering over the *District* field on the *Bridges > Create Struct* task and the Table & Column Name line can be seen:



The Table & Column Name line corresponds to the Table Name and Field Name columns within the *Parameters* grouping of the *Admin > General Config > Parameters* task.

### Add New Parameter

To add a new parameter, fill in the *Table Name* and *Field Name* textboxes and click the *Add New Parameter* button.

**\*Note:** In order for a new parameter to be added, the Table Name and Field Name must already exist in the *Admin > General Config > Data Dict.* task.

### Parameter Values and Labels

The *Parameter Values and Labels* grouping lists the values and their labels and descriptions for the selected parameter.

The *Value* field is the number or key that appears in the field called by the Field Name. The *Short Label* field is what will be visible to the user when making a selection from the control. The *Description* field is used mainly as an explanation of the value.

### Delete

The **X** symbol deletes the value. If a value is deleted, it will no longer appear in the parameter control where it is located in the system.

**\*Note:** For previous selections of the deleted value, the value will contain "(FIX PARAM VALUES)" to indicate that it was previously selected but is no longer defined.

**Example:** If the *inspevnt.dkrating* value "6 - Satisfactory" is deleted, all previous inspection reports that had a deck rating of "6 - Satisfactory" will read as "6 (FIX PARAM VALUES)." For all future inspections, the deck rating of "6 - Satisfactory" will not be present.

### isActive

The *isActive* checkbox is similar to deleting a value, but deactivating a value is not permanent and can be changed back at any time.

If the *isActive* checkbox is checked, the value will be visible in the parameter control where it is located in the system. If the *isActive* checkbox is unchecked, the value will no longer appear in the parameter control.

**\*Note:** For previous selections of the deactivated value, the value will be greyed out and contain "[Inactive]" to indicate that it was previously selected but is no longer active.



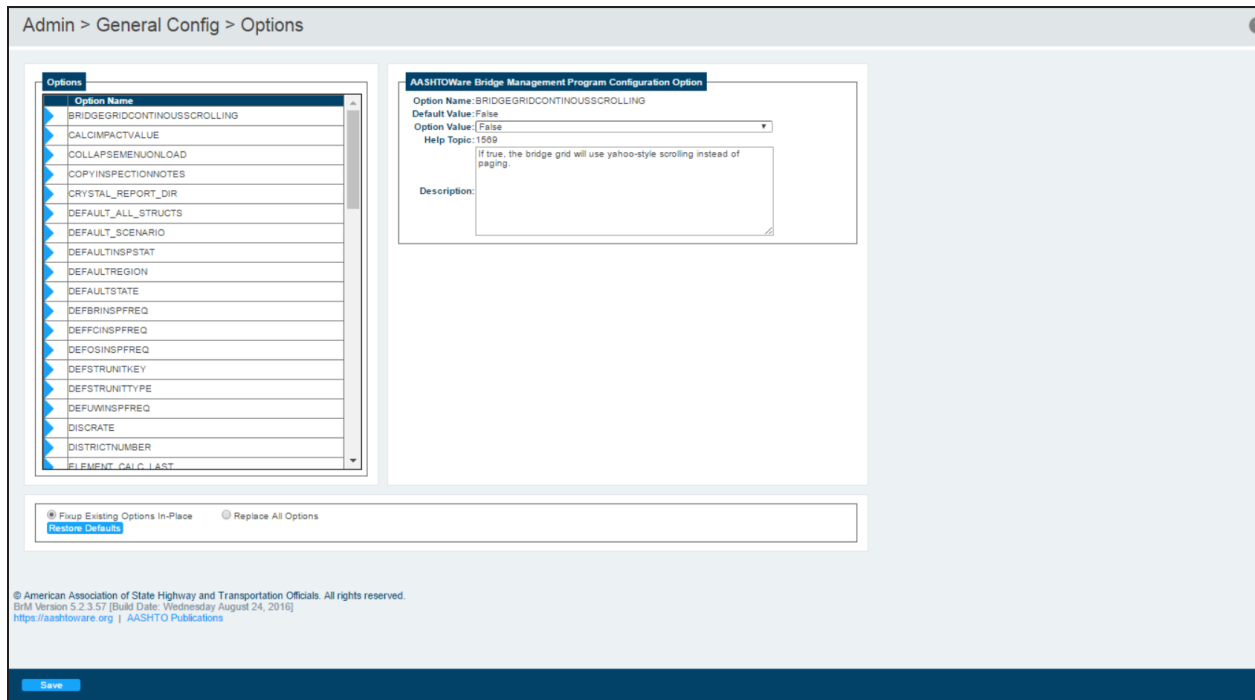
**Example:** If the `inspevnt.dkrating` value "6 - Satisfactory" is deleted, all previous inspection reports that had a deck rating of "6 - Satisfactory" will read as "6 - Satisfactory [Inactive]." For all future inspections, the deck rating of "6 - Satisfactory" will not be present.

## Parameters Page Controls


The *Save* button saves all of the changes that have been made on the *Admin > General Config > Parameters* task. Changes can be made to multiple parameters before the *Save* button is clicked and all of the changes will be saved.

# Options

The *Admin > General Config > Options* task allows the admin to configure various options throughout BrM.

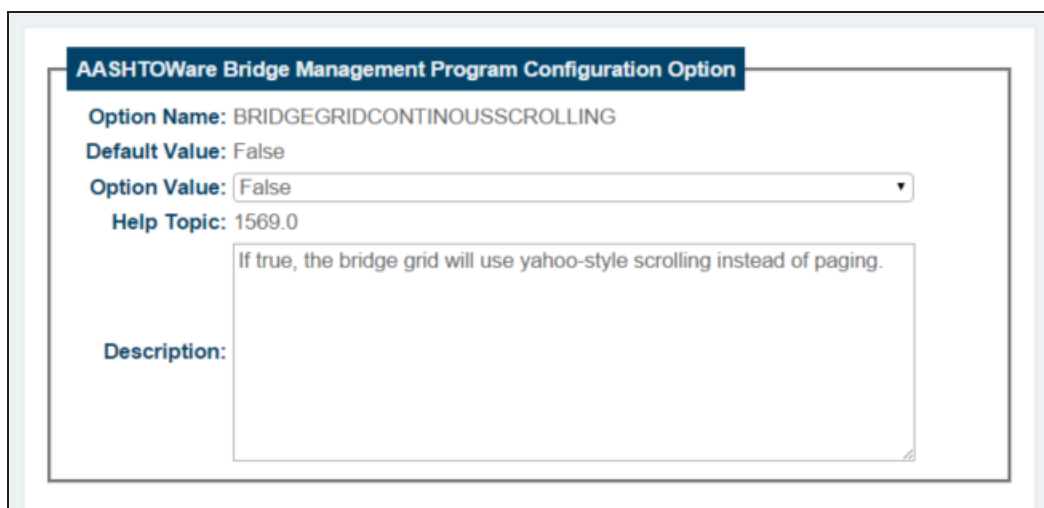


## Options

The *Options* grouping contains the Options list with all of the configuration options. To select an option, click the desired  icon.

## Configuration Option

The *Configuration Option* grouping contains the information and configurable values for the option selected from the Options list. The Options table at the end of this section provides an explanation of each of the available options.



## Restore Defaults

The *Restore Defaults* grouping contains the *Restore Defaults* button that can perform two functions based on the radio button selected:

- If the *Fixup Existing Options In-Place* radio button is selected, clicking the *Restore Defaults* button will restore any *Option Value* text fields that have been left blank back to their default value.
- If the *Replace All Options* radio button is selected, clicking the *Restore Defaults* button will restore all options back to their default values.

## Options Page Controls

Click the *Save* button to save the changes made to the selected option.

## Description of Options

Options		
Option	Description	Default Value
BRIDGEGRIDCONTINUOUSSCROLLING	Distinguishes the Bridge List as either a paging or scrolling list.  If "True," all of the structures in the Bridge List will be viewable in one continuous scroll. If "False," only a certain number of structures will be viewable per page of the Bridge List.	False
CALCIMPACTVALUE	Determines the calculation used for the impact value of assessments.	$1 / (1 + 0.00223732 * e^{-1 * (1.16588 * \log_e(\text{roadway.BYPASSLEN} * \text{roadway.ADTTOTAL} * .00000006))) * 100$
COLLAPSEMENUONLOAD	Determines if the tab menu bar is collapsed by default upon logging in to the system.	False
COPYINSPECTIONNOTES	Determines if the inspection notes from the INSPVNT and ELEMINSPTABLES tables will be copied.  If "Yes" is selected, a structure's old inspection notes will be copied over to the new inspection.	Yes
CRYSTAL_REPORT_DIR	Determines the location on the user's computer where the Crystal Reports files are saved.	~/pontismodules/crystal_reports/
DEFAULT_ALL_STRUCTS	Determines the default setting of the <i>Structure</i> dropdown on the <i>Inspection &gt; Condition</i> task.	True

Options		
Option	Description	Default Value
	If "True" is selected, the dropdown will default to "All Structures."	
DEFAULT_SCENARIO	This was used in older versions of BrM but is no longer used in version 5.2.3.	
DEFAULTINSPSTAT	Determines the default status of the structure. It is used for new structures created in the inspection module (not by file import).  The value pulls from the "inspevnt.inspstat" parameter in the <i>Admin &gt; General Config &gt; Parameters</i> task. A value of "1" indicates that the sufficiency rating needs to be recalculated.	1
DEFAULTREGION	Determines the default region for newly created structures.  The value pulls from the "bridge.fhwa_reg" parameter in the <i>Admin &gt; General Config &gt; Parameters</i> task.	-1
DEFAULTSTATE	The option selected will be the default state for newly created structures.	-1
DEFBRINSPFREQ	Determines the default NBI inspection frequency (in months) for scheduling future inspections.	24
DEFFCINSPFREQ	Determines the default fracture critical inspection frequency (in months) for scheduling future inspections.	24
DEFOSINSPFREQ	Determines the default other/special inspection frequency (in months) for scheduling future inspections.	24
DEFSTRUNITKEY	Determines the default structure unit key. Must be an integer. Keys will increment by one from this starting number for additional structure units on a bridge.	1
DEFSTRUNITTYPE	Determines the default structure unit used when a new structure is created. Once created, the structure unit can be changed on the <i>Inspection &gt; Inventory &gt; Design</i> subtask, if desired.  The value pulls from the "structure_unit.strunit-type" parameter in the <i>Admin &gt; General Config &gt; Parameters</i> task.	M
DEFUWINSPFREQ	Determines the default underwater inspection frequency (in months) for scheduling future inspections.	24
DISCRATE	This was used in older versions of BrM but is no	

Options		
Option	Description	Default Value
	longer used in version 5.2.3.	
DISTRICTNUMBER	Determines the default district for new structures.  The value pulls from the "bridge.district" parameter in the <i>Admin &gt; General Config &gt; Parameters</i> task.	-1
ELEMENT_CALC_LAST	Used to override default functionality of calculating last element insp date. To override, enter a SQL statement that returns a date. To substitute values from current report to be used in SQL statement use \$ColumnName.	Last_insp
ELEMENTMANUALPATH	Determines the file path for the element manuals in the application.	~/elemguidemanuals/
ELEMINSPDEFAULTENV	Determines the default environment value (1 through 4) when adding a new element on the <i>Inspection &gt; Condition</i> task.	1
ELEMINSPGRIDEXPANDALL	Determines how the element inspection grid is displayed on the <i>Inspection &gt; Condition</i> task.  If "True" is selected, all of the elements in the grid will be expanded to reveal their protective systems and defects. If "False" is selected, only the parent elements will be shown and will need to be expanded to reveal the protective system and defect child elements.	False
EXPORT_BUFFER	Determines the amount of memory that BrM uses while exporting via the <i>Gateway &gt; Export</i> task. The amount will determine the speed of the export (in MB).	10
EXPORT_NBI_008_PAD_LEFT	Determines whether or not NBI item 08 is left padded for NBI/NBE exports.	False
GATEWAY_USE_SYNC	Determines whether or not to include a "_sync" file in the <i>Gateway &gt; Export</i> task that allows an agency to export/import between multiple databases (same version on different computers/environments).  Selecting "Y" will include the "_sync" file in exports, selecting "N" will exclude the "_sync" file.	Y
GOOGLE_MAPS_CLIENT_ID	If an agency has purchased their own license for Google Maps it can be entered here. The default Option Value of -1 will use a Client ID shared by all BrM users. A Client ID can be acquired from Google. If the Client ID specified is not	-1

Options		
Option	Description	Default Value
	valid Google will disable Maps.	
IMPORTCHUNKSIZE	Determines the amount of memory that BrM uses while importing via the <i>Gateway &gt; Import</i> task. The amount will determine the speed of the import.	20000
INSPECTIONOUTOFDATE	BrM issues a warning if the user attempts to set an inspection date that is X amount of days prior to the current date.  X = the value entered into the <i>Option Value</i> text-box (in days).	90
INSPEVNT_INSPSTAT_- LOCK_KEY	Determines whether an inspection can be locked or not.	Locked
INSPTABLE1	Determines whether or not the inspevnt table in the database contains inspection data.  This would be changed if an agency is not using the default, out of the box inspevnt table.	Inspevnt
INSPTABLE2	Defines whether or not the userinsp table in the database contains inspection data.  This would be changed if an agency is not using the default, out of the box userinsp table.	Userinsp
INSPUSERDFLT	Determines the default user inspection report. This report is selected in the report selection field when the user views the user reports from the Inspection Module.	Insp003_inspection_schedule
JUMP_TO_BRIDGE_- SEARCH_TYPE	Determines the type of search used by the <i>Jump to Bridge</i> control on the Bridge List when text is entered.  "Contains" checks all bridges to find those that contain what was typed into the <i>Jump to Bridge</i> control.  "Starts With" checks all bridges to find those that start with what was typed into the <i>Jump to Bridge</i> control and is therefore a more limiting option than "Contains."	Contains
LOADTASKONTABCLICK	Determines if the default task for a tab will be loaded upon clicking the tab in the tab menu bar.	True
LOGCALCULATIONS	Determines whether or not to log intermediate sufficiency rating and NBI-translator calculations.	N
MAXBRIDGEGROUPS	Determines the maximum number of bridge	250

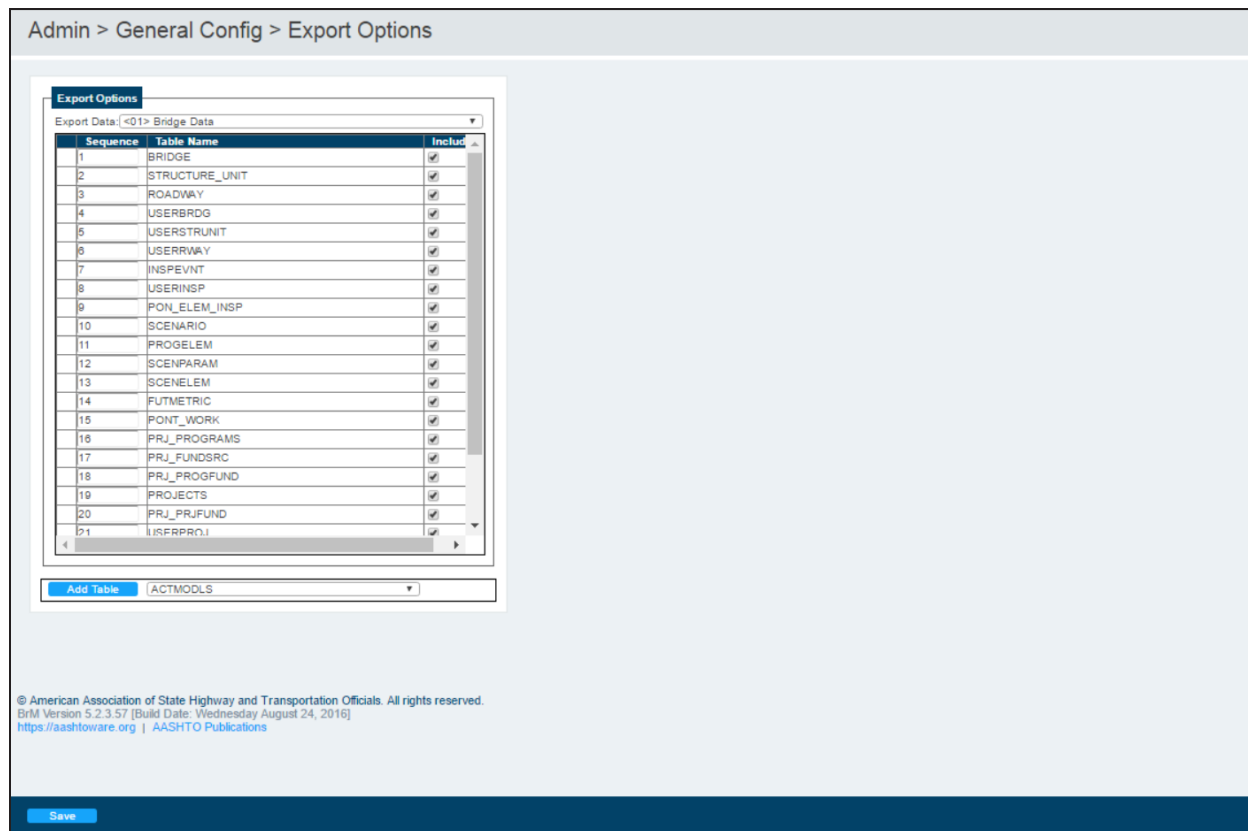
Options		
Option	Description	Default Value
	<p>groups that a user may generate at one time on the <i>Bridges &gt; Manage Bridge Analysis Groups</i> task.</p> <p>The larger the number, the more likely that it may cause performance issues on the <i>Setup Bridge Analysis Groups</i> subtask.</p>	
MAXMRRACTIONS	Determines the maximum number of actions allowed for each state of an element.	4
MULTISERVER	This was used in older versions of BrM but is no longer used in version 5.2.3.	
MULTISERVER5	Specifies the root directory path to multimedia documents on the server. Specify either a qualified http address (i.e. http://server/virtualdir) or as relative to the webserver using tilda (~) as a placeholder for the root directory of the web site.	C:\
NBI_CALC_LAST	Used to override default functionality of calculating last NBI date. To override, enter a SQL statement that returns a date. To substitute values from current report to be used in SQL statement use \$ColumnName.	Last_insp
OTHER_SPECIAL_CALC_LAST	Used to override default functionality of calculating last OS date. To override, enter a SQL statement that returns a date. To substantiate values from current report to be used in SQL statement use \$ColumnName.	Last_insp
PON_UNITS	The application-wide unit of measurement for BrM. It is "metric" by default, but "English" can be selected.	Metric
PON5_APP_LOGGING_LEVEL	<p>Determines the amount of log detail to be written in the logs.</p> <p>0 = Turned off - nothing will be logged            1 = Only Fatal messages logged            2 = Fatal and Error messages logged            3 = Fatal, Error, and Warning messages logged            4 = Fatal, Error, Warning, and Info messages logged            5 = All messages - Fatal, Error, Warning, Info, and Debug - logged</p>	5
PON5_DEFAULT_SHOW_QUANTITY	Determines whether the Element Conditions grid on the <i>Inspection &gt; Condition</i> task will default to displaying element conditions as quantities or percentages.	N

Options		
Option	Description	Default Value
	Selecting "Y" is for quantity, and selecting "N" is for percentage.	
PROJECTGRIDCONTINUOUS-SCROLLING	Distinguishes the Project List as either a paging or scrolling list.  If "True," all of the structures in the Project List will be viewable in one continuous scroll. If "False," only a certain number of structures will be viewable per page of the Project List.	False
SYNC_BRIDGEWARE	Determines the database's ability to sync with BrD and BrR.  Selecting "Y" allows this sync, selecting "N" prevents it.	N
TEMP_FILE_AGE_IN_DAYS	Defines how many days a file will stay in the temporary folder before it is deleted.	30
TOOLTIPDELAY	Determines the time (in seconds) before a tooltip will appear when the mouse cursor is hovering over an item.  "0" will display the tooltip immediately. "-1" will disable tooltips.	0
UPDATEKEYINPLACE	Determines whether or not changes to the value of a primary key can be made without using an insert/delete on the affected row.	Yes
WARNONEDITFORCHECKED-OUTBRIDGE	Determines whether or not a warning message will be displayed if a user tries to edit a checked out bridge. This also controls whether or not the checked out bridge symbol will appear in the <i>Inspection</i> module header.	N
XTRNBRDGTABLE	Defines the user bridge table.	userbrdg
XTRNBRDGTABLEKEY	Defines the key in the user bridge table.	bridge_gd
XTRNINSPTABLE	Defines the user roadway table.	userinsp
XTRNINSPTABLEKEY	Defines the key in the user inspection table.	inspevnt_gd
XTRNRWAYTABLE	Defines the user roadway table.	userway
XTRNRWAYTABLEKEY	Defines the key in the user roadway table.	roadway_gd
XTRNSTRUNITTABLE	Defines the structure unit table.	userstrunit
XTRNSTRUNITTABLEKEY	Defines the key in the structure unit table.	structure_unit_gd



## Export Options

The *Admin > General Config > Export Options* task allows the admin to control the various options for the exports that are performed on the *Gateway > Export* task.



## Export Options

The *Export Options* grouping contains the *Export Data* dropdown with all of the export options. When a selection is made from the dropdown, the list will update with the tables that are included in the selected export option.

The *Sequence* field determines the order in which the information will be presented in the export.

The *Include* checkbox determines whether or not the table will be included in the export. The  icon is used to delete a table from the export option, but the default tables included in each of the export options cannot be deleted and will not have  icons. Only additional tables not in the default export can be deleted. However, default tables do not necessarily need to be included in the export because the *Include* checkbox can be unchecked.

## Add Table

The *Add Table* grouping contains the *Add Table* button and dropdown. This control adds the selected table to the export option currently selected in the *Export Data* dropdown.

**\*Note:** Altering preset exports is only recommended for experienced admins due to possible foreign key violations during the import. There are no restrictions built-in to the software to prevent invalid key combinations.

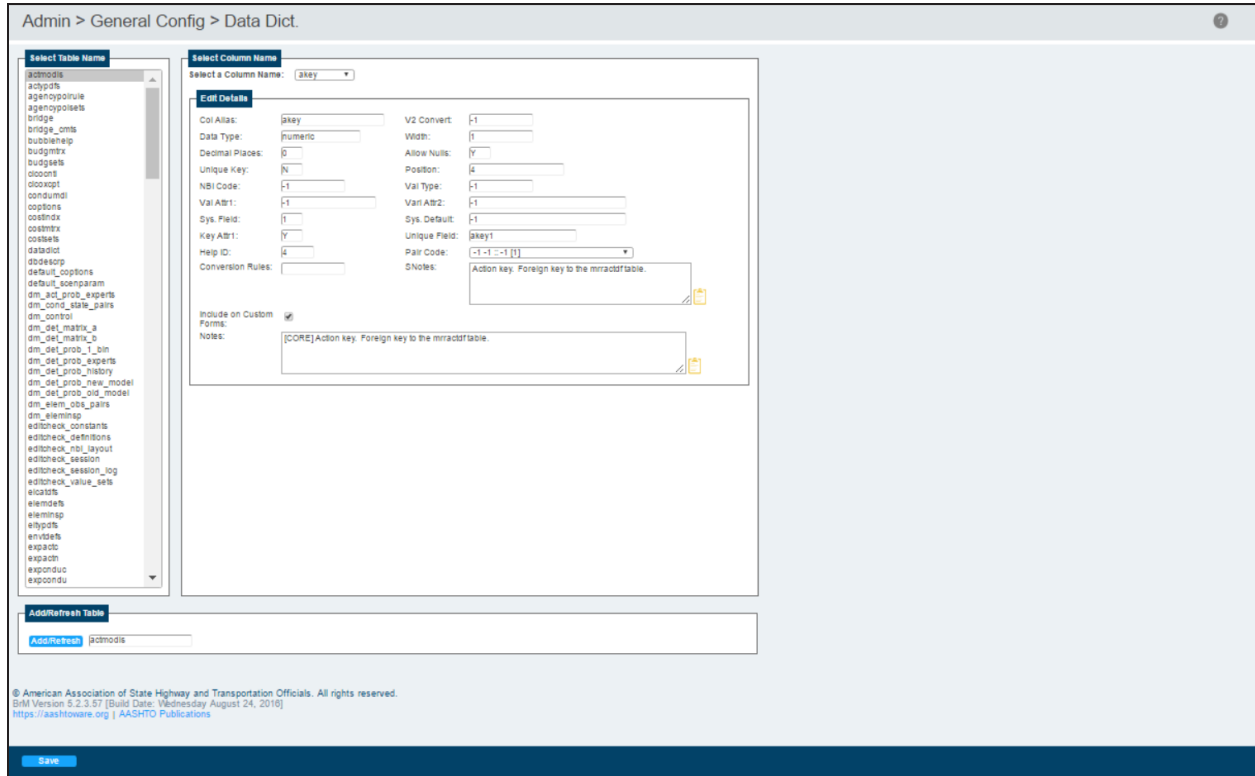
## Export Options Page Controls

Click the *Save* button to save the changes made to the selected export option.

# Data Dict.

The *Admin > General Config > Data Dict* task allows the admin to modify various rules for the columns of all of the tables in the database.

**\*Note:** Modifying a table's column rules is only recommended for experienced administrators due to the major changes that can occur in the system.



The *Select Table Name* grouping contains a list of all of the tables in the system. Select a table to modify its columns' rules.

## Select a Column Name

The *Select a Column Name* dropdown contains all of the columns in the currently selected table. Selecting a column will present that column's rules in the *Edit Details* grouping.

## Edit Details

The *Edit Details* grouping contains all of the rules for the selected column.

Column Rules	
Field Name	Description
Col Alias	The alias of the selected column. This does not change the column name.
V2 Convert	The .Net data type.
Data Type	The SQL data type.
Width	The available field length for storage and display.
Decimal Places	The maximum number of decimal places - if applicable.

Column Rules	
Field Name	Description
Allow Nulls	Y or N - Indicates whether nulls (field left blank) are allowed.
Unique Key	Y or N - Indicates whether or not the field must be unique.
Position	The column's position in the database.
NBI Code	The NBI code or "-1" if not applicable.
Val Type	Indicates whether there will be a range (such as 1-9) or list of values (such as steel bridge, wood bridge, concrete bridge, etc.) for the field.
Val Attr1	If there is a range, this is the minimum value permitted.
Val Attr2	If there is a range, this is the maximum value permitted.
Sys. Field	Indicates whether the field is a default system field or a custom agency field.
Sys. Default	The default entry for the column if nulls aren't allowed and the column is left blank.
Key Attr1	Y or N - Indicates whether or not the column is a primary key.
Unique Field	Gives the field a distinct alias.
Help ID	This was used in older versions of BrM but is no longer used in version 5.2.3.
Pair Code	The metric/English unit conversion factor.
Conversion Rules	Defines the rule used to perform metric/English conversions.
SNotes	Short notes limited to 255 characters.
Include on Custom Forms	If checked, the column will be available for custom forms on the <i>Admin &gt; Navigation &amp; Field Security</i> task.
Notes	Notes limited to 3999 characters.

## Add/Refresh Table

The *Admin > General Config > Data Dict.* task does not update automatically, therefore the *Add/Refresh Table* grouping is used to update the data dictionary with new tables or table updates.

To add a new table, enter the table's name into the textbox and then click the *Add/Refresh* button.

To update an existing table, select the table from the *Select Table Name* grouping and click the *Add/Refresh* button.

## Data Dict. Page Controls

Changes can be made to multiple tables and columns before saving. All changes will be saved as long as the *Save* button is clicked before exiting the *Admin > General Config > Data Dict.* task.

## Checked Out Bridges

The *Admin > General Config > Checked Out Bridges* task allows the admin to view and remove the bridges that have been checked out on the *Gateway > Check Out* task.


Bridge GUID	Bridge ID	IO Flag	IO Moment	CICO ID	User ID	User GD	ATrigger	Notes
0F6EDDF3A76453D9C69DAE9125D4D6E	00123G	O	8/30/2016 7:58:26 AM	SAWX	Pontis	B330B38925654E468AE8E883F62A0EB2	0	
5EFEAECE7E1C64CCB85E7AFFBD095BEC1	000604	O	8/30/2016 7:58:26 AM	SAWX	Pontis	B330B38925654E468AE8E883F62A0EB2	0	
6DCBD9381F57455E8C380964EDCCDC8E	000602	O	8/30/2016 7:58:26 AM	SAWX	Pontis	B330B38925654E468AE8E883F62A0EB2	0	
B77FB065851C4F6A848D38618CE61B9	00109	O	8/30/2016 7:58:26 AM	SAWX	Pontis	B330B38925654E468AE8E883F62A0EB2	0	
DA9E6D621477421C9FDD46E99835363D	001229	O	8/30/2016 7:58:26 AM	SAWX	Pontis	B330B38925654E468AE8E883F62A0EB2	0	
FOF5E1853CEFA425B3EABD49E809925A	00072A	O	8/30/2016 7:58:26 AM	SAWX	Pontis	B330B38925654E468AE8E883F62A0EB2	0	

Remove

Cancel

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BRM Version 5.2.3.57 [Build Date: Wednesday August 24, 2016]  
<https://aashtoware.org> | AASHTO Publications

All of the bridges listed in the Checked Out Bridges grid can be considered to be in a locked state. Changes can still be made to those bridges in the software, but those changes must then be approved when the bridge is checked in on the *Gateway > Check In* task. This can help to ensure that no unwanted changes are made.

**\*Note:** If `WARNONEDITFORCHECKEDOUTBRIDGE` is set to "Y" on the *Admin > General Config > Options* task: When entering the *Inspection* module with a checked out bridge selected, a popup message will notify the user of the bridge's status and a  symbol will appear next to the bridge's ID in the *Inspection* module header.

### Ioflag column

The Ioflag column indicates whether or not that particular entry of the bridge is in a checked out or checked in state. Rather than automatically be removed when a bridge is checked back in, the checked out entry remains until removed. A checked out bridge will have an Ioflag value of "O". A checked in bridge will have an Ioflag value of "I."

As long as the PDI is retained for each entry, the bridge can be reverted back to the state it was in for any entry.

### ATrigger column

The Atrigger column indicates whether or not the bridge has been modified since it was checked out. The original check out of the bridge will have an Atrigger value of "0." If the bridge is modified while checked out, the grid will automatically create another entry for the bridge with an Atrigger value of "1." This indicates the bridge has been modified.

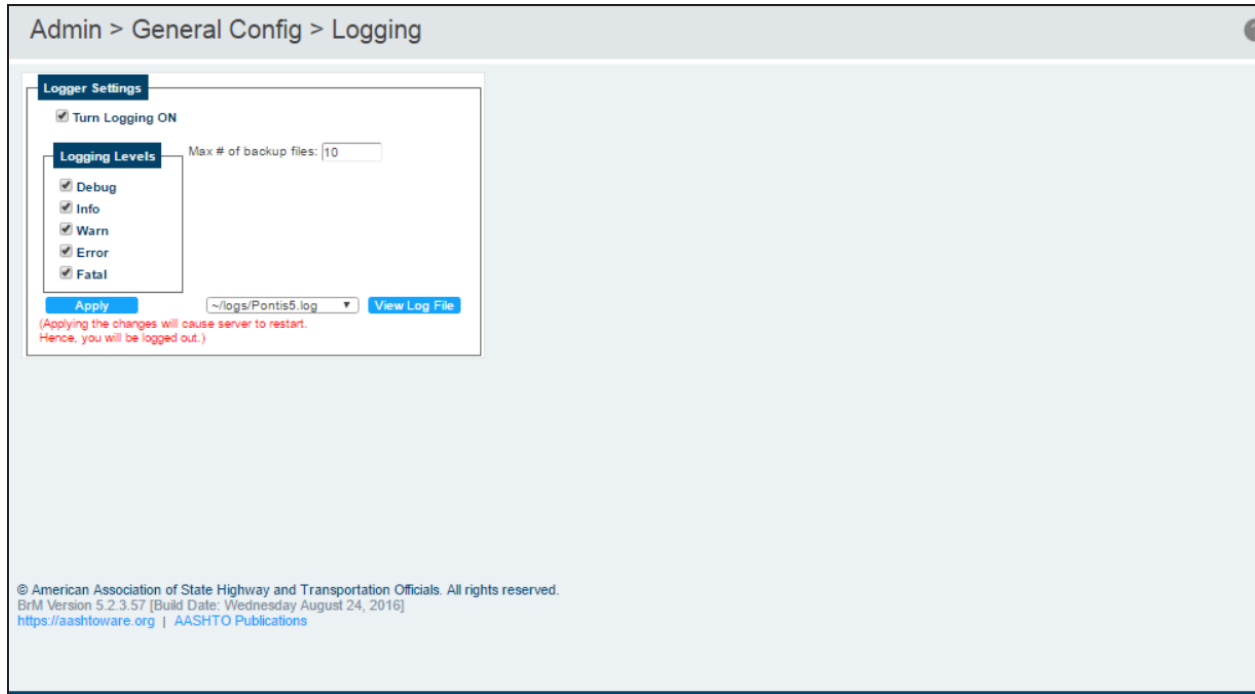
### Checked Out Bridges Controls

The *Remove* button removes the selected bridges from the Checked Out Bridges grid. This is meant to be used in cases where the user wants to remove the read-only status of the checked out bridge without having to check it back in.

The *Cancel* button returns the user to the *Bridges > View List* task.

# Logging

The *Admin > General Config > Logging* task allows the admin to generate logs to investigate errors, bugs, etc. that are difficult to understand or reproduce.



## Logger Settings

The *Turn Logging On* checkbox determines whether or not the system will create a log while in use. In some cases, unchecking the box to turn logging off may improve the software's performance, however there will no longer be logs available for use in examining issues within the software.

The *Max # of Backup Files* textbox determines the maximum number of backup logs that are kept on file before the oldest is deleted.

## Logging Levels

The *Logging Level* checkboxes determine what information will be included in the logs. The levels move from least critical - **Debug** - to most critical - **Fatal**. When a level is checked, all levels more critical than the selected level will automatically be checked to ensure that the most important information is included in the logs. Similarly, when a level is unchecked, all levels less critical than the unchecked level will automatically be unchecked.

**Example:** If the *Warn* checkbox is checked, the *Error* and *Fatal* checkboxes will automatically be checked because they are more critical than - *Warn*.

## Logging Page Controls

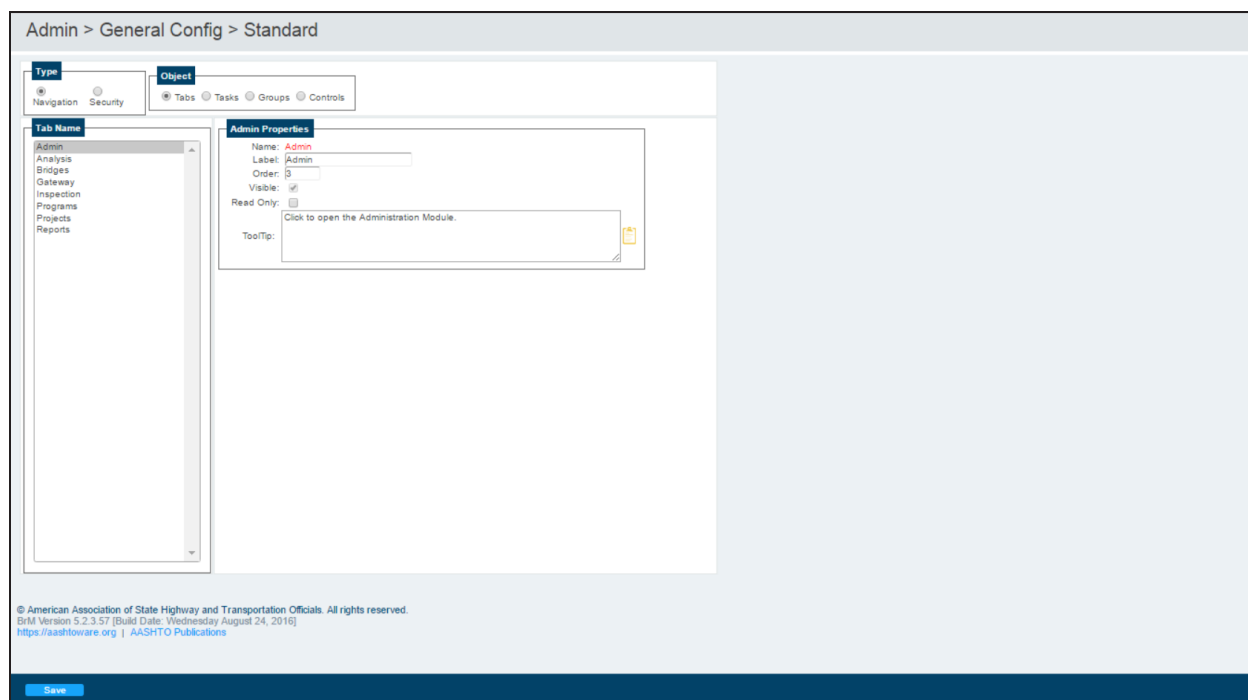
The *Apply* button saves any of the changes that have been made to the logger settings.

As the message below the *Apply* button indicates, clicking the *Apply* button will cause the server to restart and log the admin out of the software.

The *View Log File* dropdown and button are used to select a log file and view it. The dropdown will include the current log file as well as all of the existing back up files.

# Standard

The *Admin > General Config > Standard* task allows the admin to modify the navigation and security options for the tabs, tasks, groupings, and controls within the out-of-the-box version of BrM. Limits have been placed on the editing possibilities to maintain the core of the software.



Selecting the *Navigation* radio button allows the admin to make changes to the way the software looks and operates.

Selecting the *Security* radio button allows the admin to make changes to the visibility and access that each role has to the objects.

**\*Note:** In some cases, the *Navigation* radio button will not be accessible. This is to ensure that the core of the software is maintained.

## Navigation

When *Navigation* is selected, an object must also be selected. The selection will determine what options will be available to modify. The selectable objects are: *Tabs*, *Tasks*, *Groups*, and *Controls*.

### Tabs

When *Tabs* is selected, the available groupings will be *Tab Name* and *[Tab] Properties*.

The screenshot shows a configuration window with the following sections:

- Type:** Radio buttons for 'Navigation' (selected) and 'Security'.
- Object:** Radio buttons for 'Tabs' (selected), 'Tasks', 'Groups', and 'Controls'.
- Tab Name:** A list box containing 'Admin', 'Analysis', 'Bridges', 'Gateway', 'Inspection', 'Projects', and 'Reports'. 'Admin' is selected.
- Admin Properties:**
  - Name: Admin
  - Label: Admin
  - Order: 3
  - Visible:
  - Read Only:
  - ToolTip: Click to open the Administration Module.
- Save:** A blue button at the bottom left.

### **Tab Name**

The *Tab Name* grouping is used to select the tab navigation to modify.

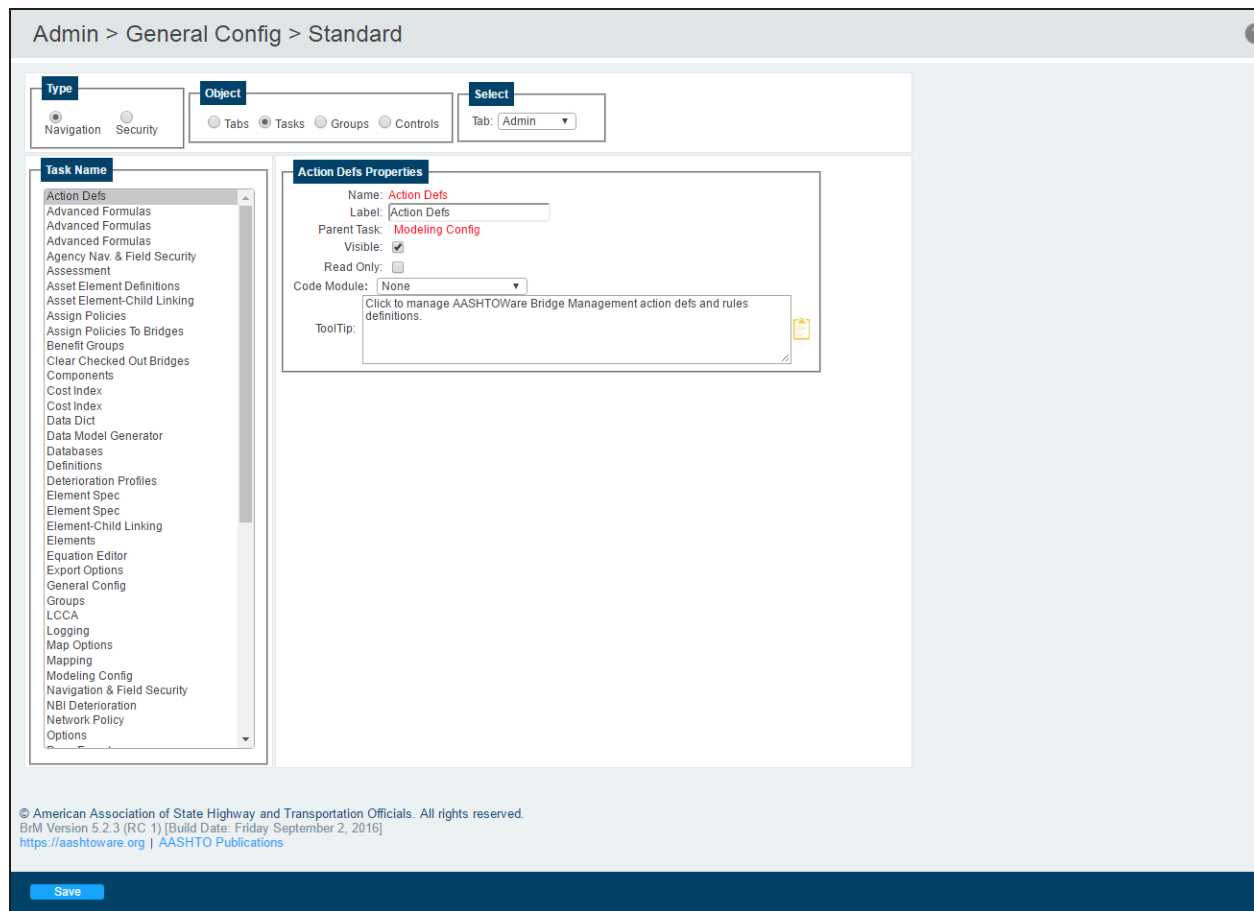
### **[Tab] Properties**

The *[Tab] Properties* grouping is used to modify the navigation details of the selected tab.

- **Label:** The name of the tab cannot be changed for internal database purposes, but the *Label* textbox allows the admin to change the name that the users see.
- **Order:** Determines what order the tab will appear in on the tab bar, with the top-most tab being "1."
- **Visible:** Determines if the tab is visible or hidden.
- **Read Only:** Determines whether or not everything contained in the tab will be read only.
- **Tool Tip:** The text entered into the *Tool Tip* textbox will be shown when the user hovers the mouse over the selected tab.

### **Tasks**

When *Tasks* is selected, the available groupings will be *Task Name* and *[Task] Properties*. The admin will also have to select a tab in the *Select* grouping.



## Task Name

The *Task Name* grouping is used to select the task navigation to modify. Only the tasks of the tab selected in the *Select* grouping will be shown.

## [Task] Properties

The *[Task] Properties* grouping is used to modify the navigation details of the selected task.

- **Label:** The name of the task cannot be changed for internal database purposes, but the *Label* textbox allows the admin to change the name that the users see.
- **Visible:** Determines if the task is visible or hidden.
- **Read Only:** Determines whether or not everything contained in the task will be read only.
- **Code Module:** Code modules allow a certain level of programmatic extensibility to tasks created with the form builder without having to create agency custom forms. If desired, select an available code module from the *Code Module* dropdown.
- **Tool Tip:** The text entered into the *Tool Tip* textbox will be shown when the user hovers the mouse over the selected task.

## Groups

When *Groups* is selected, the available groupings will be *Group Name* and *[Group] Properties*. The admin will also have to select a tab and task in the *Select* grouping.

**\*Note:** Only certain tabs can have their group navigations modified. If the tab's group navigations cannot be modified, the tabs either will not appear in the dropdown of the *Select* grouping or the *Navigation* radio button will no longer be accessible in the *Type* grouping for the selected tab.



### Group Name

The *Group Name* grouping is used to select the group navigation to modify. Only the groups within the tab-task combo selected in the *Select* grouping will be shown.

### [Group] Properties

The *[Group] Properties* grouping is used to modify the navigation details of the selected group. The available options may vary depending on the selection.

- **Visible:** The *Visible* checkbox determines if the task is visible or hidden.
- **Read Only:** The *Read Only* checkbox determines whether or not everything contained in the task will be read only.

### Controls

When *Controls* is selected, the available groupings will be *Control Name* and *[Control] Properties*. The admin will also have to select a tab, task, and group in the *Select* grouping.

**\*Note:** Only certain tabs can have their control navigations modified. If the tab's control navigations cannot be modified, the tabs either will not appear in the *Tab* dropdown of the *Select* grouping or the *Navigation* radio button will no longer be accessible in the *Type* grouping for the selected tab.

### Control Name

The *Control Name* grouping is used to select the control navigation to modify. Only the controls within the tab/task/-group combo selected in the *Select* grouping will be shown.

### [Control] Properties

The *[Control] Properties* grouping is used to modify the navigation details of the selected control. The available options may vary depending on the selection.

- **Label:** The name of the task cannot be changed for internal database purposes, but the *Label* textbox allows the admin to change the name that the users see.
- **Visible:** The *Visible* checkbox determines if the task is visible or hidden.
- **Read Only:** The *Read Only* checkbox determines whether or not everything contained in the task will be read only.
- **Height in Rows:** The value selected in the *Height in Rows* dropdown determines the size of the control.
- **Tool Tip:** The text entered into the *Tool Tip* textbox will be shown when the user hovers the mouse over the selected task.

## Security

When *Security* is selected, an object must also be selected. The selection will determine what options will be available to modify. The selectable objects are: *Tabs*, *Tasks*, *Groups*, and *Controls*.

Regardless of the object selected, the *Roles* grouping will always be present. A role must be selected and then that role's security will be determined for the selected object.

### Tabs

When *Tabs* is selected, role security for tabs can be determined.

**Type**  
 Navigation  Security

**Object**  
 Tabs  Tasks  Groups  Controls

**Roles**  

Admin  
 Advanced  
 Analysis  
 Basic  
 Default

**Tab Security**  
 Selected Role: Admin  

Name	Visible	Read Only
	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Admin	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Analysis	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Bridges	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Gateway	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Inspection	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Projects	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Reports	<input checked="" type="checkbox"/>	<input type="checkbox"/>

### Tab Security

The *Tab Security* grouping is used to determine the security of the selected tab-role combo.

- **Visible:** The *Visible* checkbox determines if the tab is visible or hidden.
- **Read Only:** The *Read Only* checkbox determines whether or not everything contained in the tab will be read only.

### Tasks

When *Tasks* is selected, role security for specific tasks can be determined. The admin will also have to select a tab in the *Select* grouping.

**Type**  
 Navigation  Security

**Object**  
 Tabs  Tasks  Groups  Controls

**Select**  
 Tab: Inspection ▼

**Roles**  
 Admin  
 Advanced  
 Analysis  
 Basic  
 Default

**Task Security**  
 Selected Role: Admin
 

Name	Visible	Read Only
Accomplishments	<input checked="" type="checkbox"/>	<input type="checkbox"/>
AddNewAsmt	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Appraisal	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Assessments	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Brdg Notes	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Calendar	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Calendar	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Element Condition Add New PopUp	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Element Condition Edit PopUp	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Inv. Admin	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Inv. Agency Bridge Items	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Inv. Design	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Inv. Roads	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Inventory	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Multimedia	<input checked="" type="checkbox"/>	<input type="checkbox"/>
New Inspection	<input checked="" type="checkbox"/>	<input type="checkbox"/>
No Caption	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Notes	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Project Information	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Roads Notes	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Roadway Create	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Schedule	<input checked="" type="checkbox"/>	<input type="checkbox"/>
StructUnit Notes	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Suff Rate	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Translate	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Validate	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Work	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Work Candidates	<input checked="" type="checkbox"/>	<input type="checkbox"/>

### Task Security

The *Task Security* grouping is used to determine the security of the selected task within the tab-role combo.

- **Visible:** The *Visible* checkbox determines if the task is visible or hidden.
- **Read Only:** The *Read Only* checkbox determines whether or not everything contained in the task will be read only.

### Groups

When *Groups* is selected, role security for specific groups can be determined. The admin will also have to select a tab and task in the *Select* grouping.

**Type**  
 Navigation  Security

**Object**  
 Tabs  Tasks  Groups  Controls

**Select**  
 Tab: Inspection ▼ Task: Condition ▼

**Roles**  

Admin  
 Advanced  
 Analysis  
 Basic  
 Default

**Group Security**  
 Selected Role: Admin  

Name	Visible	Read Only
Agency Group	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Condition Ratings	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Condition Ratings -Subgroup 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Condition Ratings -Subgroup 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Condition Ratings -Subgroup 3	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Condition Ratings -Subgroup 4	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Element Conditions	<input checked="" type="checkbox"/>	<input type="checkbox"/>
FooterSub1 - status	<input checked="" type="checkbox"/>	<input type="checkbox"/>
FooterSub2 Save Btns	<input checked="" type="checkbox"/>	<input type="checkbox"/>
FooterSub3 - Ex key lock	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HeaderSub1 - brkey	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HeaderSub2 Eng.Metric	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HeaderSub3 - Report Btn	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Inspection Footer	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Inspection Header	<input checked="" type="checkbox"/>	<input type="checkbox"/>
No Caption	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Notes	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Save

## Group Security

The *Group Security* grouping is used to determine the security of the selected group within the task-tab-role combo.

- **Visible:** The *Visible* checkbox determines if the group is visible or hidden.
- **Read Only:** The *Read Only* checkbox determines whether or not everything contained in the group will be read only.

## Controls

When *Controls* is selected, role security for specific controls can be determined. The admin will also have to select a tab, task, and group in the *Select* grouping.

**Type**

Navigation  Security

**Object**

Tabs  Tasks  Groups  Controls

**Select**

Tab: Inspection ▼ Task: Condition ▼ Group: Condition Ratings -Subgr ▼

**Roles**

- Admin
- Advanced
- Analysis
- Basic
- Default

**Control Security**

Selected Role: Admin

Name	Visible	Read Only
Deck (58)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Future Critical Details	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Substructure (60)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Superstructure (59)	<input checked="" type="checkbox"/>	<input type="checkbox"/>

[Save](#)

### Control Security

The *Control Security* grouping is used to determine the security of the selected control within the group-task-tab-role combo.

- **Visible:** The *Visible* checkbox determines if the control is visible or hidden.
- **Read Only:** The *Read Only* checkbox determines whether or not the control will be read only.

### Standard Page Controls

Click the *Save* button to save the changes made to the navigation and field security.

# Agency

The *Admin > General Config > Agency* task allows the admin to create and edit custom agency tabs and tasks. BrM version 5.2.3 now allows administrators to visually create and edit custom agency tabs and tasks using the *Visual Form Editor*, but the *Agency* task can still be used if desired.

Admin > General Config > Agency

Type:  Navigation  Security

Object:  Tabs  Tasks  Groups  Controls

Tab Name: AgencyTab

AgencyTab Properties

Name: AgencyTab  
Label: AgencyTab  
Order: 0  
Visible:   
Read Only:   
Enabled:   
ToolTip:

Delete Delete All

Add New Tab

Tab Name:

Add New & Save

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BrM Version 5.2.3.57 [Build Date: Wednesday August 24, 2016]  
<https://aaasthsoftware.org> | AASHTO Publications

Save

Selecting the *Navigation* radio button from the *Type* grouping allows the admin to make changes to the way the software looks and operates.

Selecting the *Security* radio button from the *Type* grouping allows the admin to make changes to the visibility and access that each role has to the objects.

## Navigation

When *Navigation* is selected, an object must also be selected. The selection will determine what options will be available to modify. The selectable objects are: *Tabs*, *Tasks*, *Groups*, and *Controls*.

## Tabs

When *Tabs* is selected, the available groupings will be *Add New Tab*, *Tab Name*, and *[Tab] Properties*.

### Add New Tab

If no custom agency tabs exist or to create an additional custom agency tab, type the name of the new tab into the **Tab Name** textbox and click the **Add New & Save** button.

### Tab Name

The **Tab Name** grouping is used to select the tab navigation to modify.

### [Tab] Properties

The **[Tab] Properties** grouping is used to modify the navigation details of the selected tab.

- **Label:** The name of the tab cannot be changed for internal database purposes, but the **Label** textbox allows the admin to change the name that the users see.
- **Order:** Determines what order the tab will appear in on the tab bar, with the top-most tab being "1."
- **Visible:** Determines if the tab is visible or hidden.
- **Read Only:** Determines whether or not everything contained in the tab will be read only.
- **Tool Tip:** The text entered into the **Tool Tip** textbox will be shown when the user hovers the mouse over the selected tab.

Click the **Save** button to save the changes made to the tab properties.

### Tasks

When **Tasks** is selected, the available groupings will be **Add New Task**, **Task Name** and **[Task] Properties**. The admin will also have to select a tab in the **Select** grouping.



### Add New Task

If no custom agency tasks exist for the tab or to create an additional custom agency task, type the name of the new task into the *Task Name* textbox, use the *Parent Task* dropdown to select a parent task for the created task (if applicable and desired), and click the *Add New & Save* button.

### Task Name

The *Task Name* grouping is used to select the task navigation to modify. Only the tasks of the tab selected in the *Select* grouping will be shown.

### [Task] Properties

The *[Task] Properties* grouping is used to modify the navigation details of the selected task.

- **Label:** The name of the task cannot be changed for internal database purposes, but the *Label* textbox allows the admin to change the name that the users see.
- **Visible:** Determines if the task is visible or hidden.
- **Read Only:** Determines whether or not everything contained in the task will be read only.
- **Code Module:** Code modules allow a certain level of programmatic extensibility to tasks created with the form builder without having to create agency custom forms. If desired, select an available code module from the *Code Module* dropdown.
- **Tool Tip:** The text entered into the *Tool Tip* textbox will be shown when the user hovers the mouse over the selected task.

Click the *Save* button to save the changes made to the task properties.

### Groups

When *Groups* is selected, the available groupings will be *Add New Group*, *Group Name*, and *[Group] Properties*. The admin will also have to select a tab and task in the *Select* grouping.

### Add New Group

If no custom agency groupings exist for the tab and task combo or to create an additional custom agency grouping, the *Add New Group* grouping can be used.

Use the *Group Name* textbox to enter the name of the grouping.

The *Parent Group* dropdown is used to nest the created grouping inside an existing grouping within the task.

The *Group Type* dropdown determines what type of grouping is being created. In most cases, newly created groupings will use the "Content Group" group type.

The *Desktop URL* dropdown is used to select a custom control to be included in the grouping.

Click the *Add New & Save* button once the desired selections have been made.

### Group Name

The *Group Name* grouping is used to select the group navigation to modify. Only the groups within the tab-task combo selected in the *Select* grouping will be shown.

### [Group] Properties

The *[Group] Properties* grouping is used to modify the navigation details of the selected group. The available options may vary depending on the selection.

[Group] Properties	
Control	Description
Label	The text that appears within the grouping label on the form.
Hide Label	If checked, all of the controls within the grouping remain contained but are no longer surrounded by an outline with a label.

[Group] Properties	
Control	Description
<b>Visible</b>	Determines if the grouping is visible or hidden.
<b>Read Only</b>	Determines whether or not everything contained in the grouping will be read only.
<b>Span Across</b>	If checked, the grouping will span across the entire page. If unchecked, the grouping will only span as far as the controls inside require.
<b>Collapsible</b>	If checked, the grouping's label changes and adds a minimize symbol so that it can be collapsed.
<b>Horizontal Alignment</b>	Determines how the grouping will be horizontally aligned.
<b>Vertical Alignment</b>	Determines how the grouping will be vertically aligned.
<b>Repeat Direction</b>	Indicates whether the items in the grouping will repeat horizontally or vertically.
<b>Repeat Count</b>	Used to repeat the items in the grouping the entered number of times in the selected direction. This is a method used to help organize the grouping a specific way.
<b>SkinID</b>	A pre-defined style applied to the grouping.
<b>Height</b>	Determines the height of the grouping. If not set, the grouping will conform to the overall height of its inner controls. The dropdown is used to select the units for the height.
<b>Width</b>	Determines the width of the grouping. If not set, the grouping will conform to the overall width of its inner controls (except for the main grouping, which spans the width of the page). The dropdown is used to select the units for the width.
<b>Cell Spacing</b>	Determines the space between the groupings on the form.
<b>Cell Padding</b>	Determines the space between the controls in the grouping.

Click the *Save* button to save the changes made to the group properties.

### Controls

When *Controls* is selected, the available groupings will be *Add New Control*, *Control Name*, and *[Control] Properties*. The admin will also have to select a tab, task, and group in the *Select* grouping.

### Add New Control

If no custom agency controls exist for the tab, task, and group combo or to create an additional custom agency control, the *Add New Control* grouping can be used.

Use the *Control Name* textbox to enter the name of the control.

The *Control Type* dropdown is used to determine what type of control is being created.

The *Table Name* dropdown indicates the table in the database associated with the control.

The *Column Name* dropdown indicates the column within the selected table in the database associated with the control.

Click the *Add New & Save* button once the desired selections have been made.

### Control Name

The *Control Name* grouping is used to select the control navigation to modify. Only the controls within the tab-task-group combo selected in the *Select* grouping will be shown.

### [Control] Properties

The *[Control] Properties* grouping is used to modify the navigation details of the selected control. The available options may vary depending on the selection.

[Control] Properties	
Control	Description
Order	Determines the location of the control on the form. Changing the order will move the control left or right within its grouping. "1" represents the left-most position within the containing grouping.

[Control] Properties	
Control	Description
<b>Label</b>	The label that sits to the left of the control and indicates its purpose.
<b>PostBack Event ID</b>	Used in custom code modules. Identifies the control when a postback event is occurring.
<b>Control GUI ID</b>	Used in custom code modules. The name used to search for the control in a custom code module.
<b>Show Label Colon</b>	Determines whether or not to include the colon ":" between the label and the control.
<b>Visible</b>	Determines if the control is visible or hidden.
<b>Read Only</b>	Determines whether or not the control will be read only.
<b>ValueBoldInd</b>	If checked, the value within the control will be bold.
<b>Text Alignment</b>	Determines how the text of the control is aligned.
<b>Value Color</b>	Determines the color of the control's value.
<b>Field Width</b>	Determines the width of the field. The dropdown is used to select the units for the field width.
<b>Label Width</b>	Determines the width of the label. The dropdown is used to select the units for the label width.

Click the *Save* button to save the changes made to the control properties.

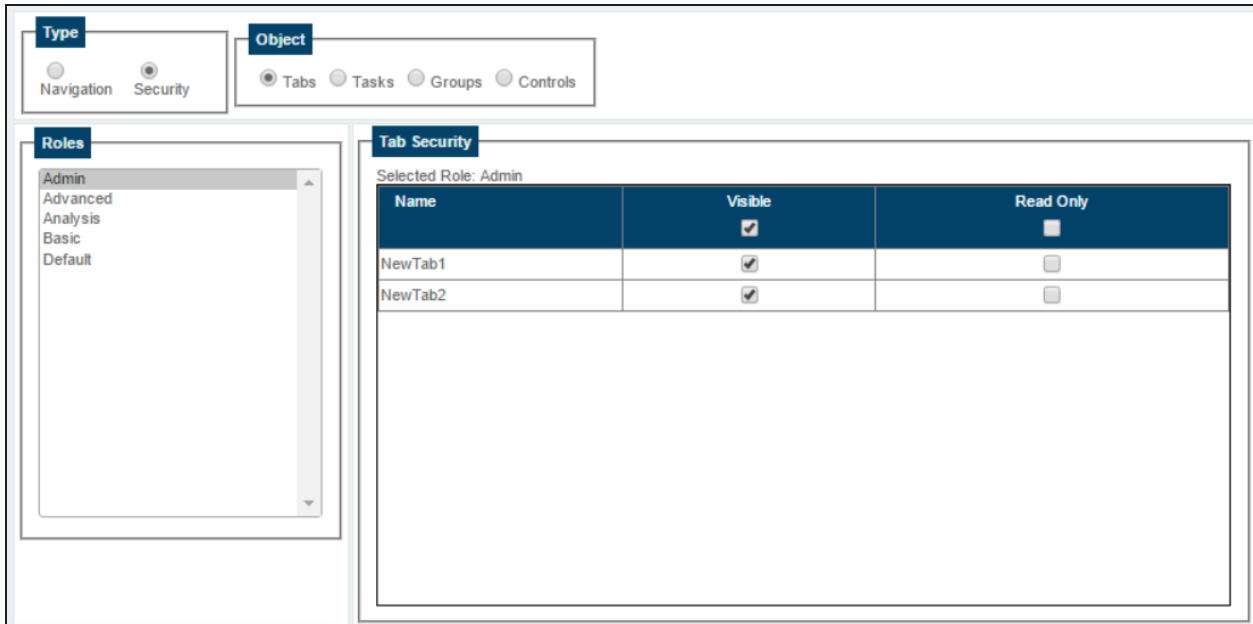
## Security

When *Security* is selected, an object must also be selected. The selection will determine what options will be available to modify. The selectable objects are: *Tabs*, *Tasks*, *Groups*, and *Controls*.

Regardless of the object selected, the *Roles* grouping will always be present. A role must be selected and then that role's security will be determined for the selected object.

### Tabs

When *Tabs* is selected, role security for tabs can be determined.



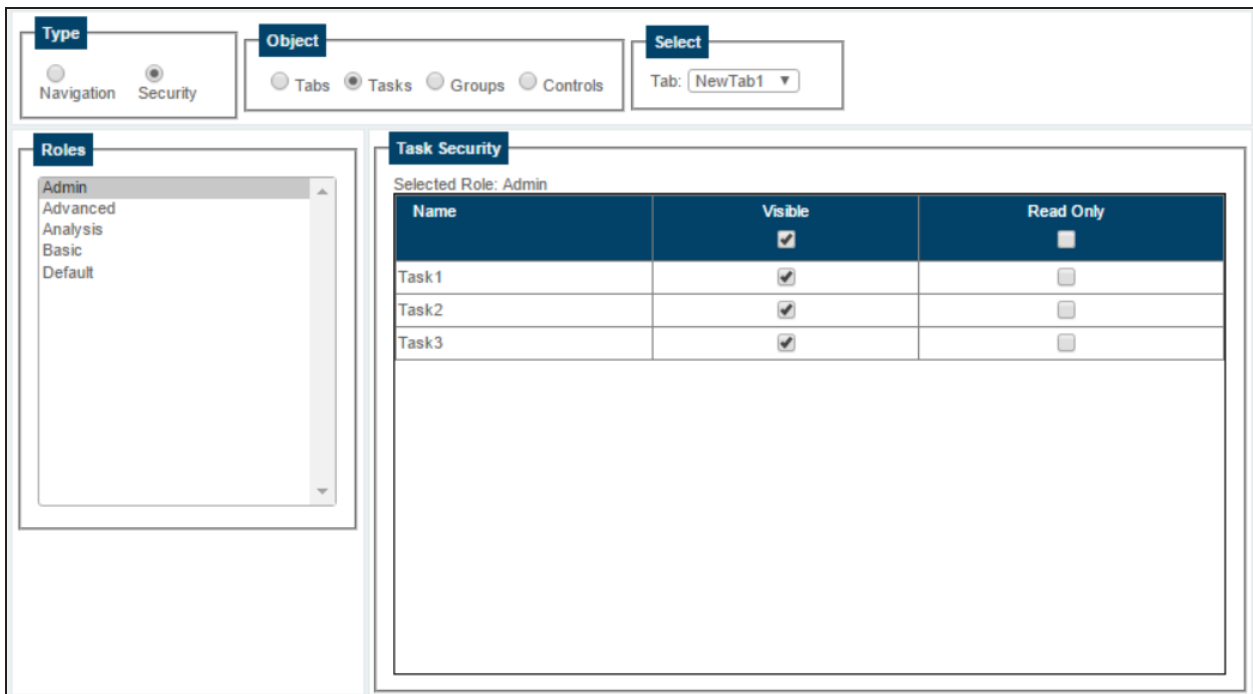
### Tab Security

The *Tab Security* grouping is used to determine the security of the selected tab-role combo.

- **Visible:** The *Visible* checkbox determines if the tab is visible or hidden.
- **Read Only:** The *Read Only* checkbox determines whether or not everything contained in the tab will be read only.

### Tasks

When *Tasks* is selected, role security for specific tasks can be determined. The admin will also have to select a tab in the *Select* grouping.



### Task Security

The *Task Security* grouping is used to determine the security of the selected task within the tab-role combo.

- **Visible:** The *Visible* checkbox determines if the task is visible or hidden.
- **Read Only:** The *Read Only* checkbox determines whether or not everything contained in the task will be read only.

## Groups

When *Groups* is selected, role security for specific groups can be determined. The admin will also have to select a tab and task in the *Select* grouping.

The screenshot displays a configuration window for 'Group Security'. At the top, there are three main sections: 'Type', 'Object', and 'Select'. Under 'Type', 'Navigation' and 'Security' are radio buttons, with 'Security' selected. Under 'Object', 'Tabs', 'Tasks', 'Groups', and 'Controls' are radio buttons, with 'Groups' selected. Under 'Select', there are two dropdown menus: 'Tab: NewTab1' and 'Task: Task3'. On the left, a 'Roles' list contains 'Admin', 'Advanced', 'Analysis', 'Basic', and 'Default'. The main area is titled 'Group Security' and shows 'Selected Role: Admin'. Below this is a table with columns 'Name', 'Visible', and 'Read Only'.

Name	Visible	Read Only
Group1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Group2	<input checked="" type="checkbox"/>	<input type="checkbox"/>

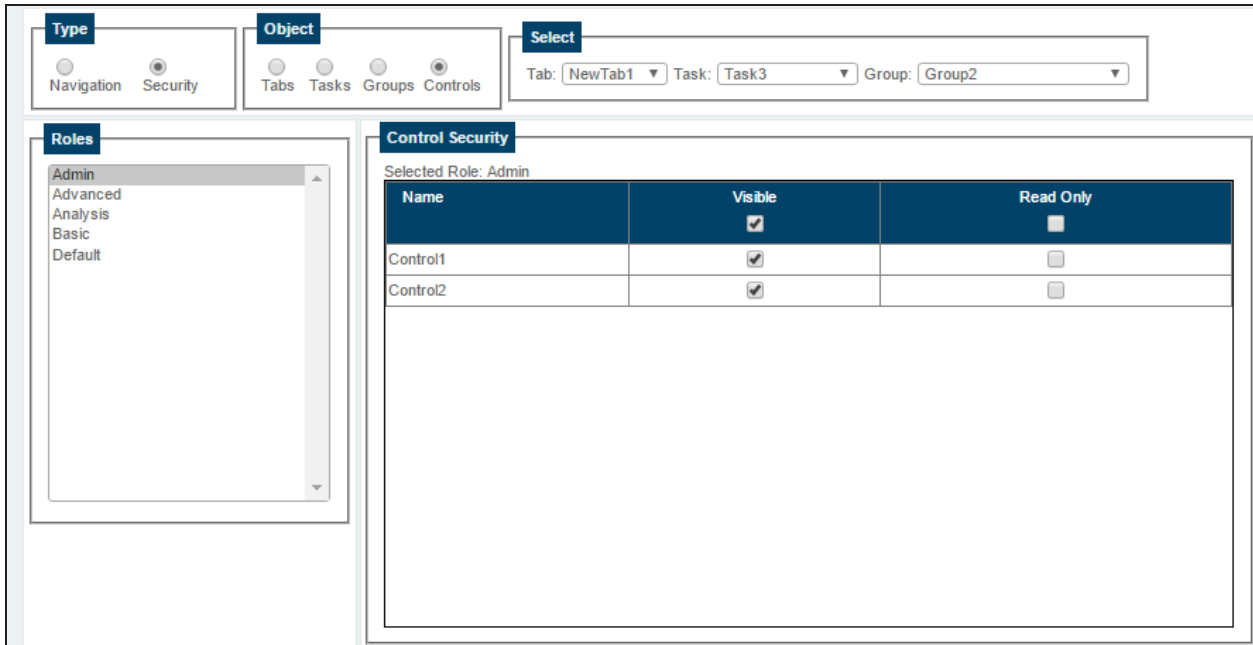
### Group Security

The *Group Security* grouping is used to determine the security of the selected group within the task-tab-role combo.

- **Visible:** The *Visible* checkbox determines if the group is visible or hidden.
- **Read Only:** The *Read Only* checkbox determines whether or not everything contained in the group will be read only.

## Controls

When *Controls* is selected, role security for specific controls can be determined. The admin will also have to select a tab, task, and group in the *Select* grouping.



### Control Security

The *Control Security* grouping is used to determine the security of the selected control within the group-task-tab-role combo.

- **Visible:** The *Visible* checkbox determines if the control is visible or hidden.
- **Read Only:** The *Read Only* checkbox determines whether or not the control will be read only.

### Agency Page Controls

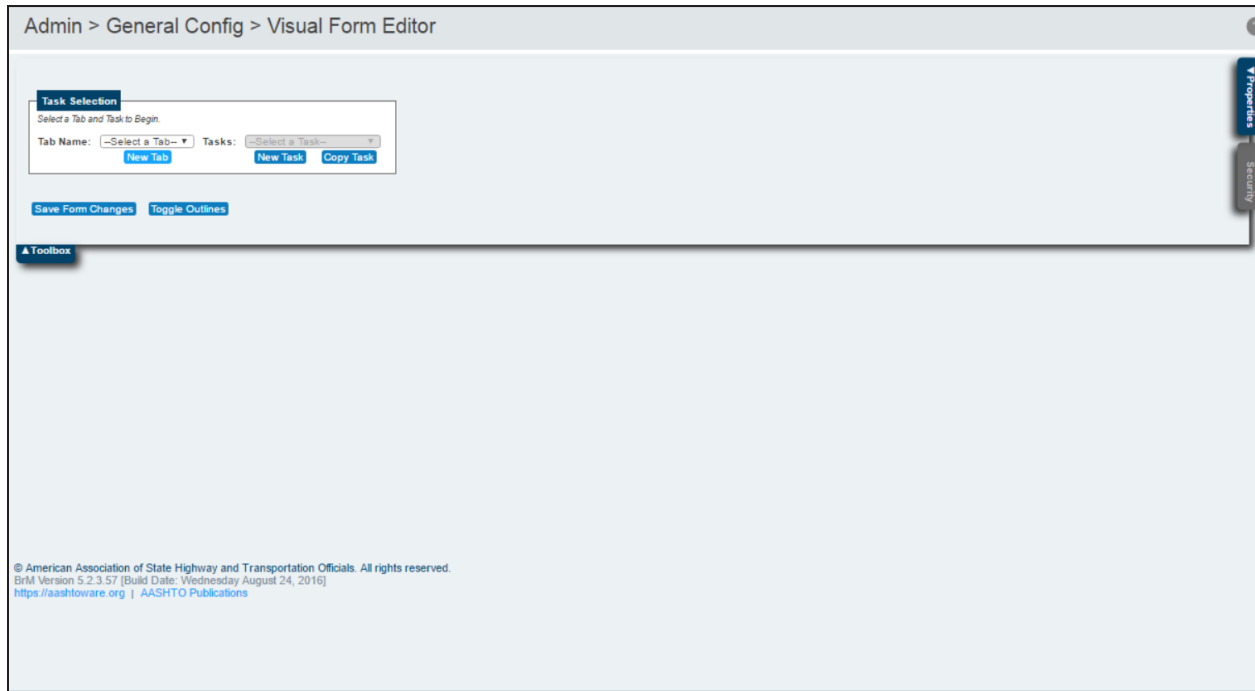
Click the *Save* button to save the changes made to the navigation and field security.



# Visual Form Editor

The *Admin > General Config > Visual Form Editor* task is a way to visually make new forms and edit existing forms. The Visual Form Editor makes form editing significantly easier by allowing the admin to see in real time exactly what the form looks like and how changes affect it.

There are five main components that make up the Visual Form Editor: Toolbox, Properties, Security, Parameters, and the form itself.



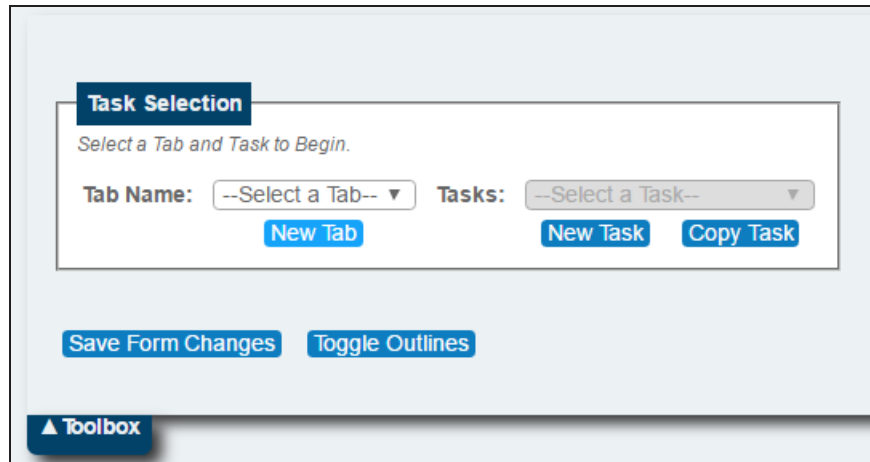
## Toolbox

The Toolbox tab is used to determine which form to edit and contains all of the available controls for the form.

**\*Note:** BrM version 5.2.3 only allows existing tasks within the Inspection, Projects, and Programs modules to be edited. In addition, the standard forms for those modules cannot currently be edited. For instance, to make a change to the *Inspection > Condition* task, the task must be copied and then changes can be made to the copied version of the form.

## Task Selection

The *Task Selection* grouping allows the admin to select which form to edit within the software using the *Tab Name* and *Tasks* dropdowns.



## New Tab

To create an entirely new tab, click the *New Tab* button:



The *Name* textbox is the label used to display the new tab in the tab/task menu panel on the left side of the software

**\*Note:** The *Label* textbox is not currently utilized in BrM version 5.2.3.

Use the *Visible* checkbox to determine whether the new tab will be visible.

Use the *Read Only* checkbox to determine whether the new tab's forms will be read only.

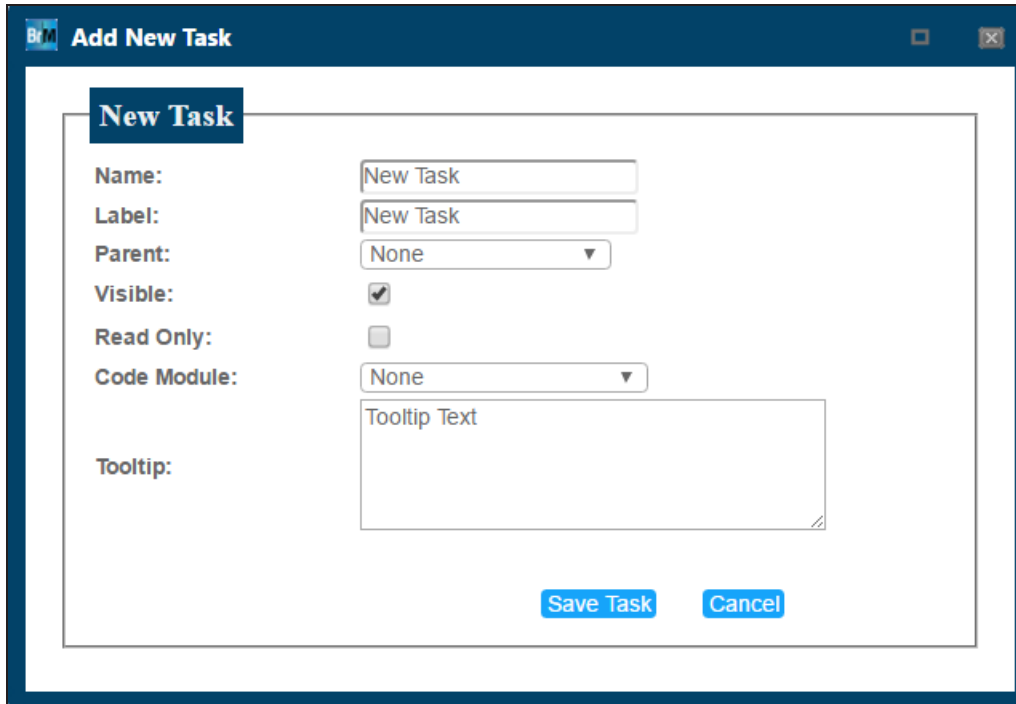
**\*Note:** The *Enabled* checkbox is not currently utilized in BrM version 5.2.3.

The *Tooltip* textbox allows the admin to enter the tooltip message that will appear when the user hovers their mouse over the tab's name in BrM's tab/task panel (if tooltips are enabled).

Click *Save Tab* to save the newly created tab or click *Cancel* to cancel the tab creation.

## New Task

To create a new task, select the tab from the *Tab Name* dropdown where the new task will be contained and then click the *New Task* button:



The *Name* textbox is the name of the task that will appear in the header at the top of the page when the task is selected in the system.

The *Label* textbox is the label used to display the task in the tab/task menu panel on the left side of the software.

The *Parent* dropdown allows the admin to indicate whether the new task will be a subtask of an existing task.

Use the *Visible* checkbox to determine whether the new task will be visible.

Use the *Read Only* checkbox to determine whether the new task's forms will be read only.

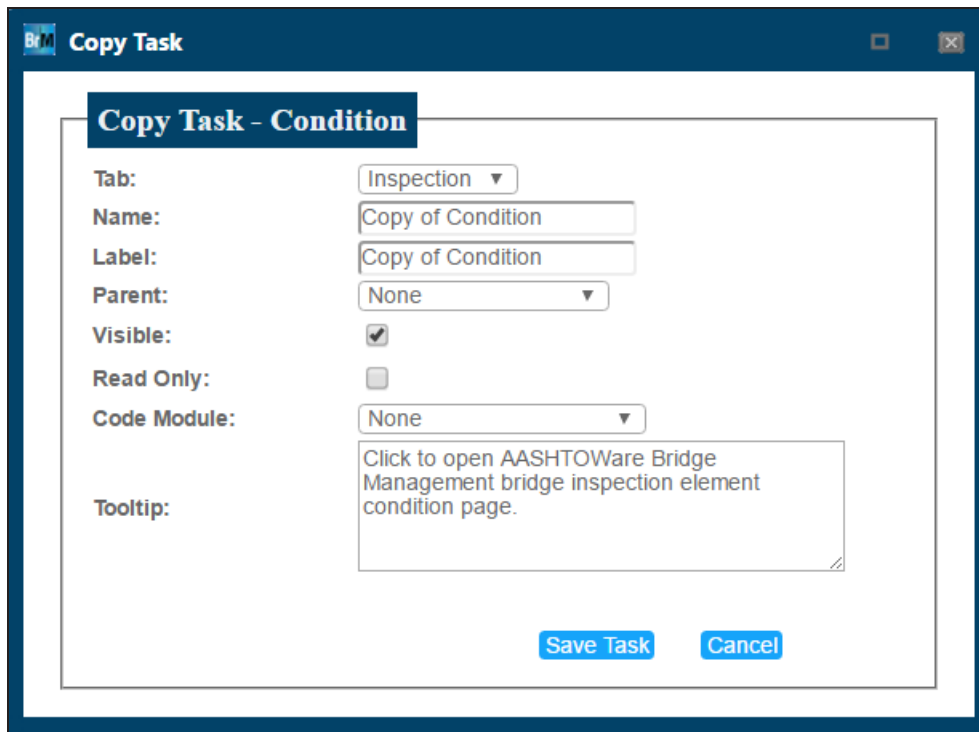
The *Code Module* dropdown lists the pieces of custom C# code that have been created to allow for capabilities outside of the scope of the Visual Form Editor. Code modules can be made available in the *Code Module* dropdown by deriving a class from *DynamicFormModuleBase* and adding it to the *APP\_CODE/DynamicFormModules/* folder in the web application.

The *Tooltip* textbox allows the admin to enter the tooltip message that will appear when the user hovers their mouse over the task's name in BrM's tab/task panel (if tooltips are enabled).

Click *Save Task* to save the newly created task or click *Cancel* to cancel the task creation.

## Copy Task

Another way of creating a new task is to copy an existing task. To copy a task, select the desired tab and task from the *Tab Name* and *Tasks* dropdowns. The task that is selected will be copied when the *Copy Task* button is clicked:



The screenshot shows a 'Copy Task' dialog box with the following fields and values:

- Tab:** Inspection
- Name:** Copy of Condition
- Label:** Copy of Condition
- Parent:** None
- Visible:**
- Read Only:**
- Code Module:** None
- Tooltip:** Click to open AASHTOWare Bridge Management bridge inspection element condition page.

Buttons at the bottom: Save Task, Cancel

The *Tab* dropdown indicates in which tab the newly copied task will exist. The copied task does not have to have the same tab as the original task.

The *Name* textbox is the name of the task that will appear in the header at the top of the page when the task is selected in the system.

The *Label* textbox is the label used to display the task in the tab/task menu panel on the left side of the software.

The *Parent* dropdown allows the admin to indicate whether the copied task will be a subtask of an existing task.

Use the *Visible* checkbox to determine whether the new task will be visible.

Use the *Read Only* checkbox to determine whether the new task's forms will be read only.

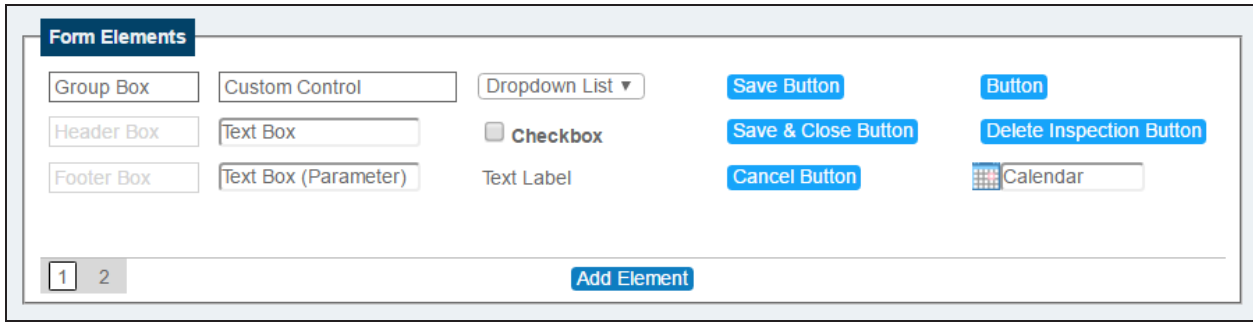
The *Code Module* dropdown lists the pieces of custom C# code that have been created to allow for capabilities outside of the scope of the Visual Form Editor. Code modules can be made available in the *Code Module* dropdown by deriving a class from *DynamicFormModuleBase* and adding it to the *APP\_CODE/DynamicFormModules/* folder in the web application.

The *Tooltip* textbox allows the admin to enter the tooltip message that will appear when the user hovers their mouse over the task's name in BrM's tab/task panel (if tooltips are enabled).

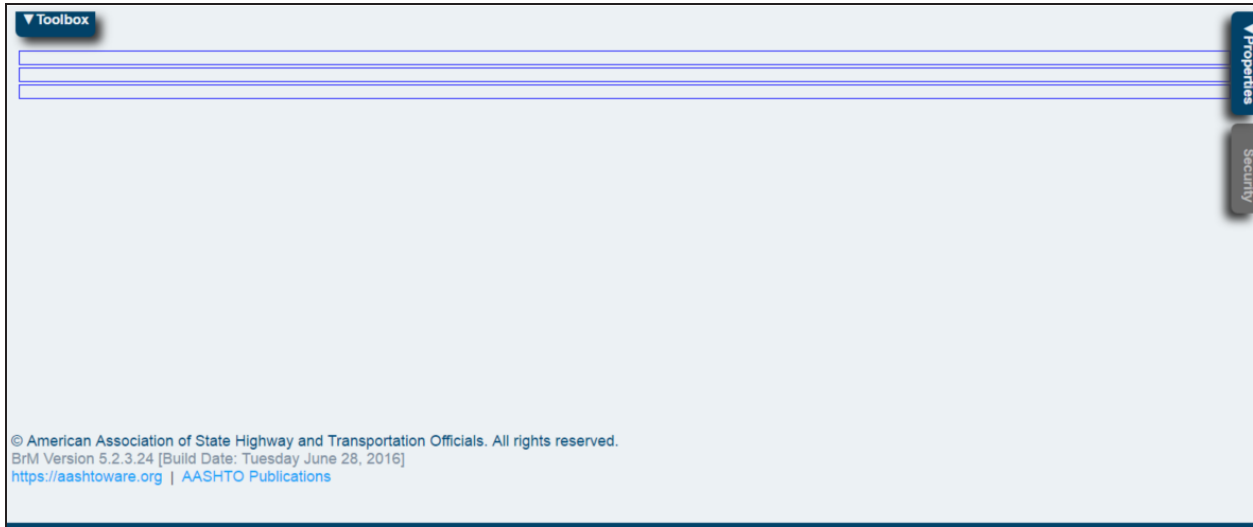
Click *Save Task* to save the newly created task or click *Cancel* to cancel the task creation.

## Form Elements

The *Form Elements* grouping contains all of the controls and elements that the admin can add to a form.



To add an element, first select the location on the form where the element will be placed. To do so, click the *Toggle Outlines* button within the Toolbox component. This will display blue outlines around each of the available areas in the form:



A new, empty form will look like the above screenshot with a header box, body box, and footer box. Copies of existing tasks will have much more complex outlines with boxes nested within other boxes:

▼ Toolbox

Bridge Bridge

Facility Carried (000) Facility Carried

Inspection (00 Inspection Date Se

Type (000)pe

Metric English

Agency Bridge Items

1 (000)	Agency Bridge Item 1
2 (000)	Agency Bridge Item 2
3 (000)	Agency Bridge Item 3
4 (000)	Agency Bridge Item 4
5 (000)	Agency Bridge Item 5
6 (000)	Agency Bridge Item 6
7 (000)	Agency Bridge Item 7
8 (000)	Agency Bridge Item 8
9 (000)	Agency Bridge Item 9
10 (000)	Agency Bridge Item 10
11 (000)	Agency Bridge Item 11
12 (000)	Agency Bridge Item 12
13 (000)	Agency Bridge Item 13
14 (000)	Agency Bridge Item 14
15 (000)	Agency Bridge Item 15

Created on (000) Created

Created by (000)

Last Updated (000) Last Updated

Updated by (000) Updated By

Agency Group

State (000) State

Inspected (000) Inspected

Approved by (000) Approved By

Cancel Save Save & Close

Properties Security

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 BrM Version 5.2.3.24 [Build Date: Tuesday June 28, 2016]  
<https://aashtoware.org> | AASHTO Publications

Using the blue outlines, click within the area that the control will be placed. This will highlight that area blue. Then, select the desired control from the *Form Elements* grouping and click the *Add Element* button to add the element to the selected location on the form.

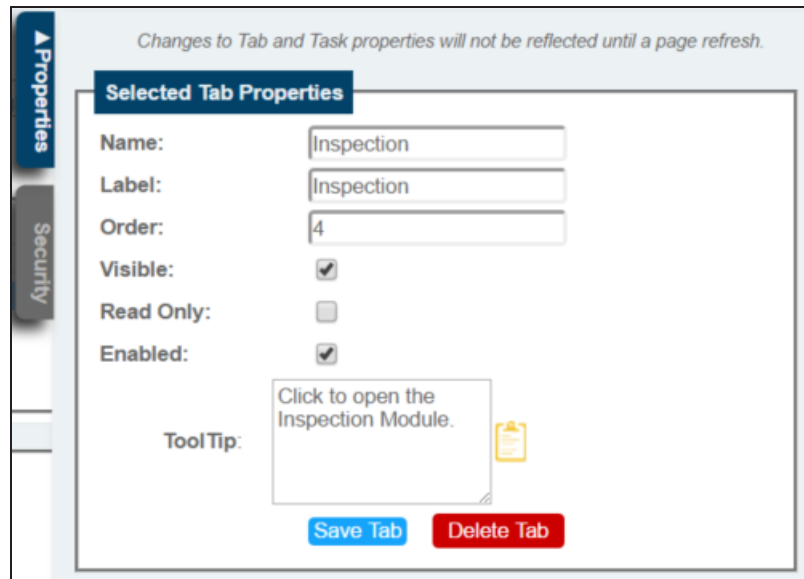
## Properties

Every item on the form, be it a single control or an entire grouping, has properties that can be edited in the Properties tab. The Properties tab can also edit the properties of the overall tab and task/subtask selected.

### Tab and Task Properties

Before an individual item is selected from the form, the Properties tab will populate with the properties for the selected tab and task/subtask:

#### *Selected Tab Properties*



Changes to Tab and Task properties will not be reflected until a page refresh.

**Selected Tab Properties**

Name:

Label:

Order:

Visible:

Read Only:

Enabled:

ToolTip:

The *Name* textbox is the label used to display the tab in the tab/task menu panel on the left side of the software

**\*Note:** The *Label* textbox is not currently utilized in BrM version 5.2.3.

Use the *Visible* checkbox to determine whether the tab will be visible.

Use the *Read Only* checkbox to determine whether the tab's forms will be read only.

**\*Note:** The *Enabled* checkbox is not currently utilized in BrM version 5.2.3.

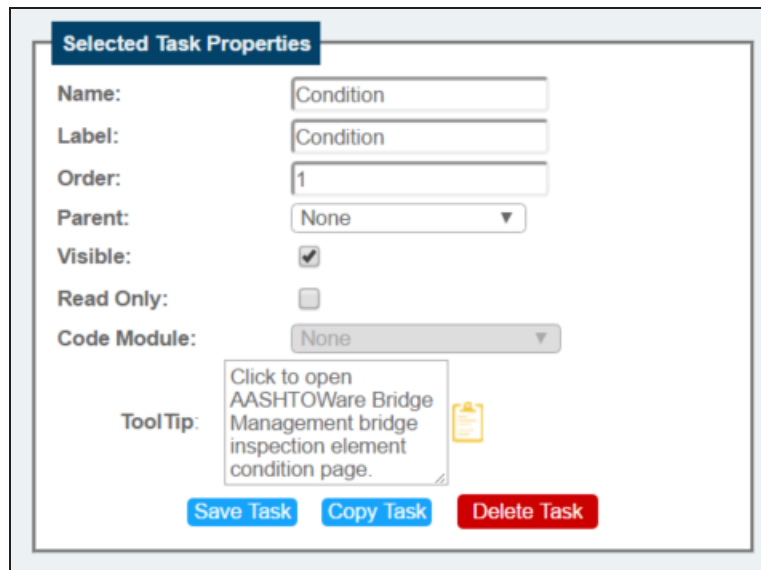
The *Tooltip* textbox allows the admin to enter the tooltip message that will appear when the user hovers their mouse over the tab's name in BrM's tab/task panel (if tooltips are enabled).

Click *Save Tab* to save the changes to the tab's properties.

Click *Delete Tab* to delete the tab.

**\*Note:** The *Delete Tab* button will not be functional for standard tabs. Only custom tabs can be deleted.

## Selected Task Properties



The **Name** textbox is the name of the task that will appear in the header at the top of the page when the task is selected in the system.

The **Label** textbox is the label used to display the task in the tab/task menu panel on the left side of the software.

The **Parent** dropdown allows the admin to indicate whether the task is a subtask of another existing task within the tab.

Use the **Visible** checkbox to determine whether the task will be visible.

Use the **Read Only** checkbox to determine whether the task's forms will be read only.

The **Code Module** dropdown lists the pieces of custom C# code that have been created to allow for capabilities outside of the scope of the Visual Form Editor. Code modules can be made available in the **Code Module** dropdown by deriving a class from `DynamicFormModuleBase` and adding it to the `APP_CODE/DynamicFormModules/` folder in the web application.

The **Tooltip** textbox allows the admin to enter the tooltip message that will appear when the user hovers their mouse over the task's name in BrM's tab/task panel (if tooltips are enabled).

Click **Save Task** to save the changes to the task's properties.

Click **Copy Task** to make a copy of the currently selected task.

Click **Delete Task** to delete the task.

**\*Note:** The **Delete Task** button will not be functional for standard tasks. Only custom tasks can be deleted.

## Group Properties

When a grouping within the form is selected, the grouping's properties can be edited:



Selected Group Properties

**Name:**

**Group Type:** Group Box

**Desktop Url:**

**Label:**

**Hide Label:**

**Visible:**

**Read Only:**

**Span Across:**

**Collapsible:**

**Order:**

**Horizontal Alignment:**

**Vertical Alignment:**

**Repeat Direction:**

**Repeat Count:**

**Height:**

**Width:**

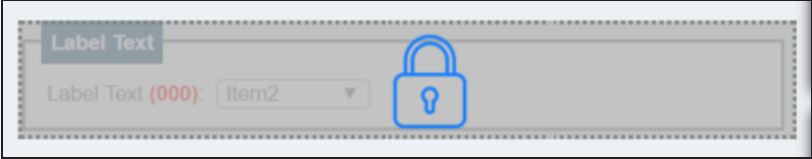
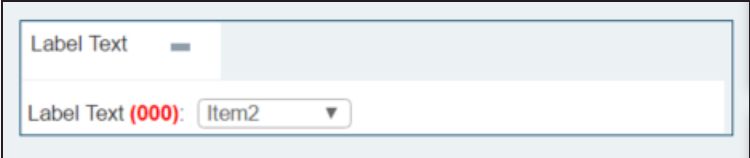
**Cell Spacing:**

**Cell Padding:**

**Skin:**

Delete Group

Controls for Selected Group Properties	
Control	Description
<b>Name</b>	The name of the grouping. This is not the grouping's label.
<b>Group Type</b>	Determines what type of grouping is being created. In most cases, newly created groupings will use the "Content Group" group type.
<b>Desktop URL</b>	Used to select a custom control to be included in the grouping.
<b>Label</b>	The text that appears within the grouping label on the form.
<b>Hide Label</b>	If checked, all of the controls within the grouping remain contained but are no longer surrounded by an outline with a label.
<b>Visible</b>	<p>If unchecked, the entire grouping will not be visible on the form. Invisible items on the form have the following appearance in the Visual Form Editor:</p> <div style="border: 1px dashed gray; padding: 5px; width: fit-content; margin: 5px auto;"> <div style="background-color: #a0c4ff; padding: 2px; display: inline-block;">Label Text</div>  <div style="display: flex; align-items: center; gap: 10px;"> <span style="color: red;">Label Text (000):</span> <input type="text" value="Item2"/> <input type="text" value="Item2"/> </div> </div>
<b>Read Only</b>	If checked, the entire grouping will be read only on the form. Read-only items on the form have the following appearance in the Visual Form Editor:

Controls for Selected Group Properties	
Control	Description
	
<b>Span Across</b>	If checked, the grouping will span across the entire page. If unchecked, the grouping will only span as far as the controls inside require.
<b>Collapsible</b>	If checked, the grouping's label changes and adds a minimize symbol so that it can be collapsed: 
<b>Order</b>	Determines the location of the grouping on the form. If it is the main grouping (the body of the form), changing the order will not change the location. However, if it is a grouping within a grouping, changing the order will move it up or down within the main grouping. "1" represents the top of the main grouping.
<b>Horizontal Alignment</b>	Determines how the grouping will be horizontally aligned.
<b>Vertical Alignment</b>	Determines how the grouping will be vertically aligned.
<b>Repeat Direction</b>	Indicates whether the items in the grouping will repeat horizontally or vertically.
<b>Repeat Count</b>	Used to repeat the items in the grouping the entered number of times in the selected direction. This is a method used to help organize the grouping a specific way.
<b>Height</b>	Determines the height of the grouping. If not set, the grouping will conform to the overall height of its inner controls. The dropdown is used to select the units for the height.
<b>Width</b>	Determines the width of the grouping. If not set, the grouping will conform to the overall width of its inner controls (except for the main grouping, which spans the width of the page). The dropdown is used to select the units for the width.
<b>Cell Spacing</b>	Determines the space between the groupings on the form.
<b>Cell Padding</b>	Determines the space between the controls in the grouping.
<b>Skin</b>	A pre-defined style applied to the grouping.
<b>Delete Group</b>	Deletes the selected group from the form.

## Control Properties

When a control within the form is selected, the control's properties can be edited:

Selected Control Properties

▲ Properties

Security

Parameters

Name:

Label:

Tooltip Label:

Table Name:  ▼

Column Name:  ▼

Order:

Default Value:

Postback Event ID:

Control GUI ID:

Show Label Colon:

Show NBI Code:

Visible:

Read Only:

Bold Value:

Label Color:  ▼

Value Color:  ▼



Field Width:   ▼

Label Width:   ▼

Delete Control

Controls for Selected Control Properties	
Control	Description
<b>Name</b>	The name of the control. This name will display inside of the control on the Visual Form Editor form to make it easily identifiable.
<b>Label</b>	The label that sits to the left of the control and indicates its purpose.
<b>Tooltip Label</b>	The tooltip message that will appear when the user hovers their mouse over the control in the software.
<b>Table Name</b>	Indicates the table in the database associated with the control.
<b>Column Name</b>	Indicates the column within the selected table in the database associated with the control.
<b>Order</b>	Determines the location of the control on the form. Changing the order will move the control left or right within its grouping. "1" represents the left-most position within the containing grouping.
<b>Default Value</b>	If entered, this value will be the default value for the control upon opening the form in the software.

### Controls for Selected Control Properties

Control	Description
<b>Postback Event ID</b>	Used in custom code modules. Identifies the control when a postback event is occurring.
<b>Control GUI ID</b>	Used in custom code modules. The name used to search for the control in a custom code module.
<b>Show Label Colon</b>	Determines whether or not to include the colon ":" between the label and the control.
<b>Show NBI Code</b>	Determines whether or not to show the NBI code (in red parenthesis) next to the control's label.  <b>*Note:</b> If the control is not an NBI field, this checkbox has no function and no NBI code will be displayed regardless of whether the checkbox is checked.
<b>Visible</b>	If unchecked, the entire grouping will not be visible on the form. Invisible items on the form have the following appearance in the Visual Form Editor:  
<b>Read-Only</b>	If checked, the entire grouping will be read only on the form. Read-only items on the form have the following appearance in the Visual Form Editor:  
<b>Bold Value</b>	If checked, the value within the control will be bold.
<b>Label Color</b>	Determines the color of the control's label.
<b>Value Color</b>	Determines the color of the control's value.
<b>Field Width</b>	Determines the width of the field. The dropdown is used to select the units for the field width.
<b>Label Width</b>	Determines the width of the label. The dropdown is used to select the units for the label width.
<b>Delete Control</b>	Deletes the selected control from the form.

## Security

The Security tab allows the admin to specify the role-based security for the tab, task, grouping, or control. Each role in the system (including non-default roles) can have its security set for each item.

### Tab and Task Security

The tab and task security is available when first selecting a form in the Visual Form Editor or when no specific item is selected on the form. If an item is selected on the form, such as a dropdown control, simply clicking on that item will unselect it and allow the tab and task security to be edited.

The screenshot shows the Security tab interface. On the left, there is a vertical sidebar with 'Properties' and 'Security' (indicated by a triangle icon). The main area is divided into two sections: 'Tab Security' and 'Task Security'. Each section contains a table with columns for 'Role', 'Visible', and 'Read Only'. The 'Visible' column has checkboxes, and the 'Read Only' column has checkboxes. A 'Save' button is located at the bottom of each table.

Role	Visible	Read Only
Admin	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Advanced	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Analysis	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Basic	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Default	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Save

Role	Visible	Read Only
Admin	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Advanced	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Analysis	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Basic	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Default	<input checked="" type="checkbox"/>	<input type="checkbox"/>

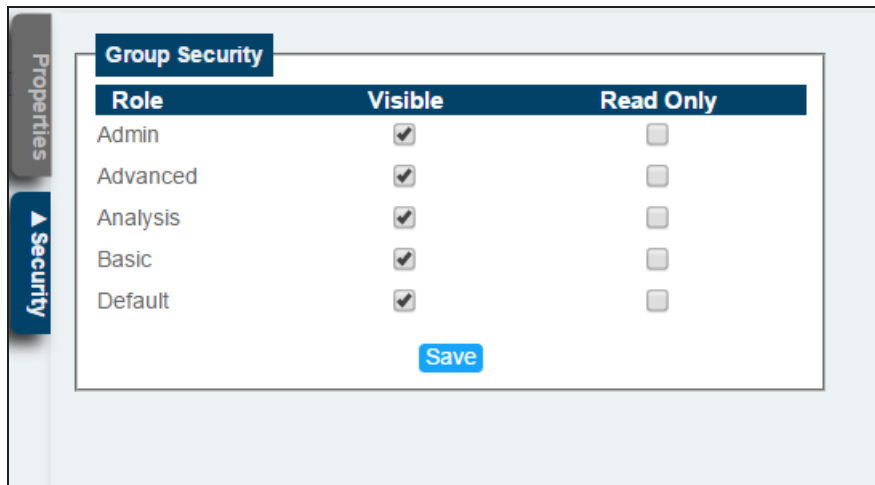
Save

If the **Visible** checkbox is unchecked for a role, users of that role will not be able to see the tab and/or task.

If the **Read Only** checkbox is checked for a role, users of that role will not be able to make changes to any of the information in the tab or task.

### Group Security

When a grouping is selected on the form, the grouping's security can be edited in the Security tab.

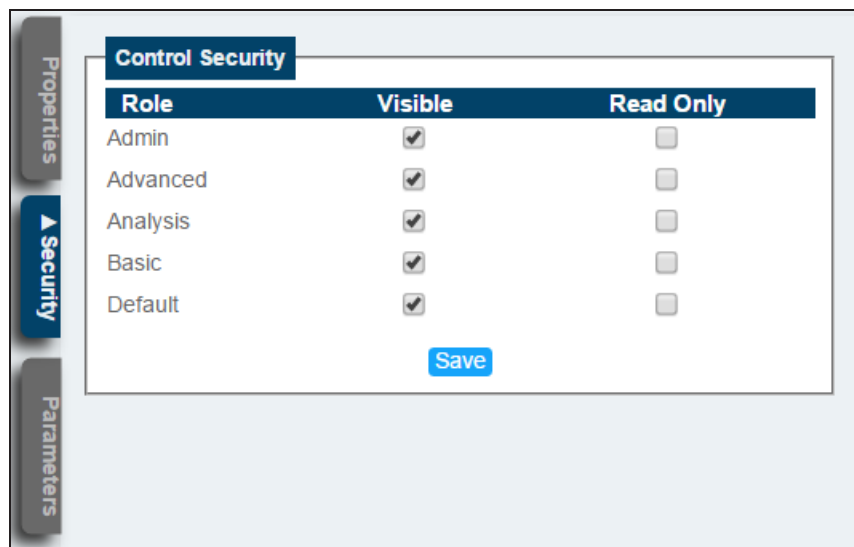


If the *Visible* checkbox is unchecked for a role, users of that role will not be able to see the grouping or anything within it when accessing the form.

If the *Read Only* checkbox is checked for a role, users of that role will not be able to make changes to any of the information in the grouping.

### Control Security

When a control is selected on the form, the control's security can be edited in the Security tab.



If the *Visible* checkbox is unchecked for a role, users of that role will not be able to see the control when accessing the form.

If the *Read Only* checkbox is checked for a role, users of that role will not be able to make changes to the control.

## Parameters

Any of a form's controls that have information stored on the *Admin > General Config > Parameters* task can be selected on the Visual Form Editor and have its parameters edited from the Parameters tab.

The screenshot shows the 'Parameters' tab in the Visual Form Editor. On the left, there are tabs for 'Properties', 'Security', and 'Parameters'. The main area displays a table of parameters for 'Table: inspevnt' and 'Column: dkrating'. The table has four columns: 'Value', 'Short Label', 'Description', and 'Active'. Each row represents a parameter value, with a checkbox in the 'Active' column. Below the table is an 'Add Parameter' section with input fields for 'Value', 'Short Label', and 'Description', and an 'Add' button. At the bottom are 'Save' and 'Reset' buttons.

Value	Short Label	Description	Active
0	0 Failed		<input checked="" type="checkbox"/>
1	1 Imminent failure		<input checked="" type="checkbox"/>
2	2 Critical		<input checked="" type="checkbox"/>
3	3 Serious		<input checked="" type="checkbox"/>
4	4 Poor		<input checked="" type="checkbox"/>
5	5 Fair		<input checked="" type="checkbox"/>
6	6 Satisfactory		<input checked="" type="checkbox"/>
7	7 Good		<input checked="" type="checkbox"/>
8	8 Very Good		<input checked="" type="checkbox"/>
9	9 Excellent		<input checked="" type="checkbox"/>
N	N N/A (NBI)		<input checked="" type="checkbox"/>
_	Unknown (NBI)		<input checked="" type="checkbox"/>

**Add Parameter**

Value	Short Label	Description
<input type="text"/>	<input type="text"/>	<input type="text"/>

Any of the controls can be edited for the existing parameters:

The **Value** textbox is the number or key that appears in the field called by the Field Name.

The **Short Label** textbox is what will be visible to the user when making a selection from the control.

The **Description** field is used mainly as an explanation of the value.

The **Active** checkbox indicates whether the specific parameter value will be available as a selectable option in the control on the form.

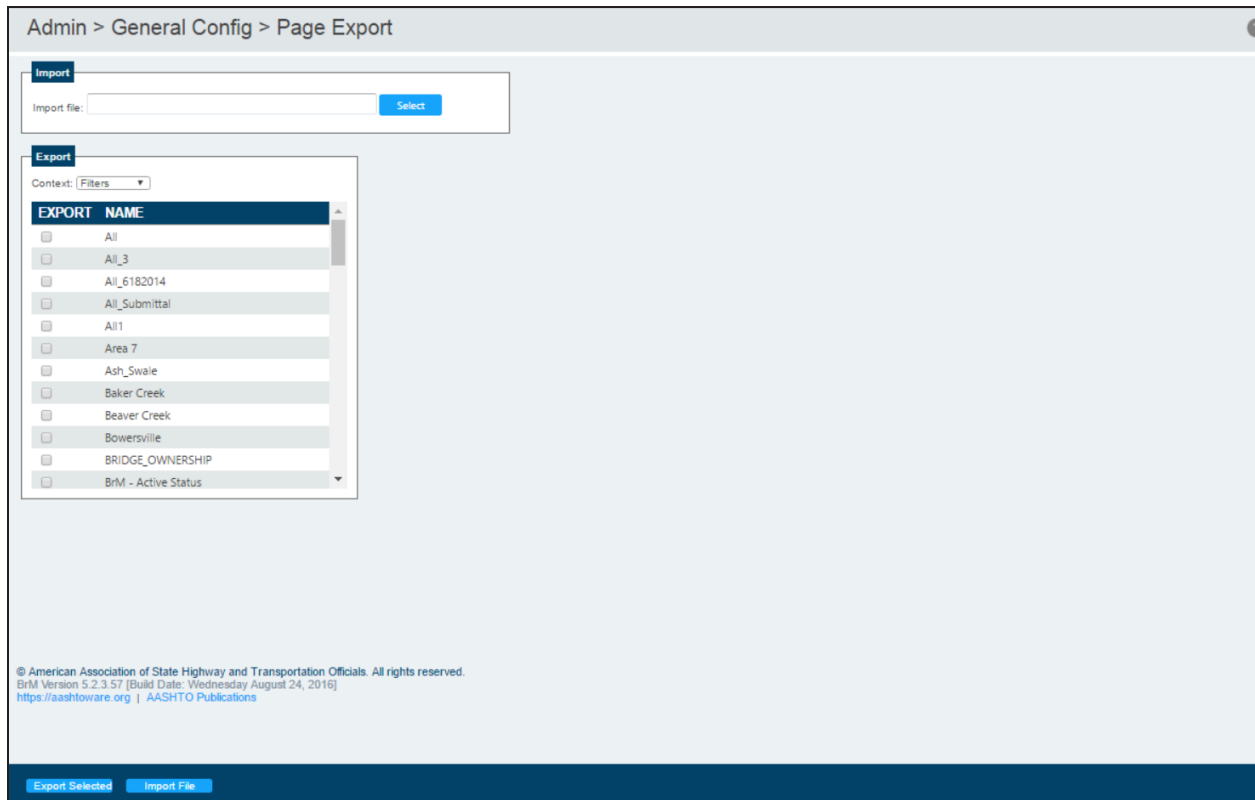
To add a new parameter, complete the controls in the *Add Parameter* grouping and click the **Add** button.

Click the **Save** button to save any changes made to the parameters.

Click the **Reset** button to cancel any changes made to the parameters. Only items changed since the last save will be reverted.

# Page Export

The *Admin > General Config > Page Export* task is used to import/export certain components of the BrM software. This allows agencies to share items they've created amongst each other, including custom filters, layouts, and forms.



The available components come from the following database tables:

- Filters: Pon\_Filters
- Layouts: Pon\_Layouts
- Forms: Various Pon\_Nav tables

## Import Component Package

To import a component package, click the *Select* button in the *Import* grouping to locate the .JSON file within the computer's files. Once the file is located, click the *Import File* button in the footer to import the selected file. Once imported, the new components should be present in their various locations in the software.

## Export Component Package

To export a component package, use the *Context* dropdown in the *Export* grouping to switch between "Filters," "Layouts," and "Navigation." All custom filters, layouts, and forms will appear in the list to be selected.



**Export**

Context:

EXPORT	NAME
<input type="checkbox"/>	BrM - Active Status
<input type="checkbox"/>	DeckWidth
<input type="checkbox"/>	NBI
<input type="checkbox"/>	NBI Bridges
<input type="checkbox"/>	ProgramBridgeFilter
<input type="checkbox"/>	ScourCritFilter

Check the boxes of all of the desired components to include, then click the *Export Selected* button. This will create a .JSON file that can then be shared with other agencies.

# Equation Editor

The *Admin > General Config > Equation Editor* task allows the administrator to create the specific conditions for a validation rule. Validation rules are used to impose additional NBI and NBE rules when validating bridges. Default validation rule equations can be viewed but cannot be changed.

The screenshot shows the 'Equation Editor' interface. At the top, the breadcrumb 'Admin > General Config > Equation Editor' is visible. Below this, there are two main sections: 'Equation Editor' and 'Rule Builder'. The 'Equation Editor' section contains a 'Summary' box with the text: '(Length Of Field 'Element' Must Be Less Than Or Equal To Number Value 4 AND (Field 'Element' Is Numeric AND Field 'Element' As Number Must Be Greater Than Or Equal To Number Value 1))'. The 'Rule Builder' section contains two conditions. The first condition is: 'Type: Length', 'Length of Field: Element', 'Must Be: Less Than or Equal To', 'Type: Number Value', 'Number Value: 4'. Below this is an 'AND' connector. The second condition is: 'Type: Is Numeric', 'Field: Element', 'Is: Numeric'. Below this is another 'AND' connector. The third condition is: 'Type: Num', 'Field: Element', 'As Number', 'Must Be: Greater Than or Equal To', 'Type: Number Value', 'Number Value: 1'. At the bottom left, there is a copyright notice: '© American Association of State Highway and Transportation Officials. All rights reserved. BRM Version 5.2.3.57 [Build Date: Wednesday August 24, 2016] https://aashtowe.org | AASHTO Publications'. At the bottom right, there are dropdown menus for 'Type: NBE' and 'Rule: CELEM\_1'.

## Equation Summary

The *Summary* grouping displays an English representation of the equation established for the validation rule. This can be very useful in helping the admin understand exactly what the equation he/she has created will search for when the validation is run.

The screenshot shows the 'Equation Summary' box. It contains the text: '(Length Of Field 'Element' Must Be Less Than Or Equal To Number Value 4 AND (Field 'Element' Is Numeric AND Field 'Element' As Number Must Be Greater Than Or Equal To Number Value 1))'.

## Establish Equation for New Validation Rule

For new validation rules, the *Equation Editor* subtask will start with the following screen:

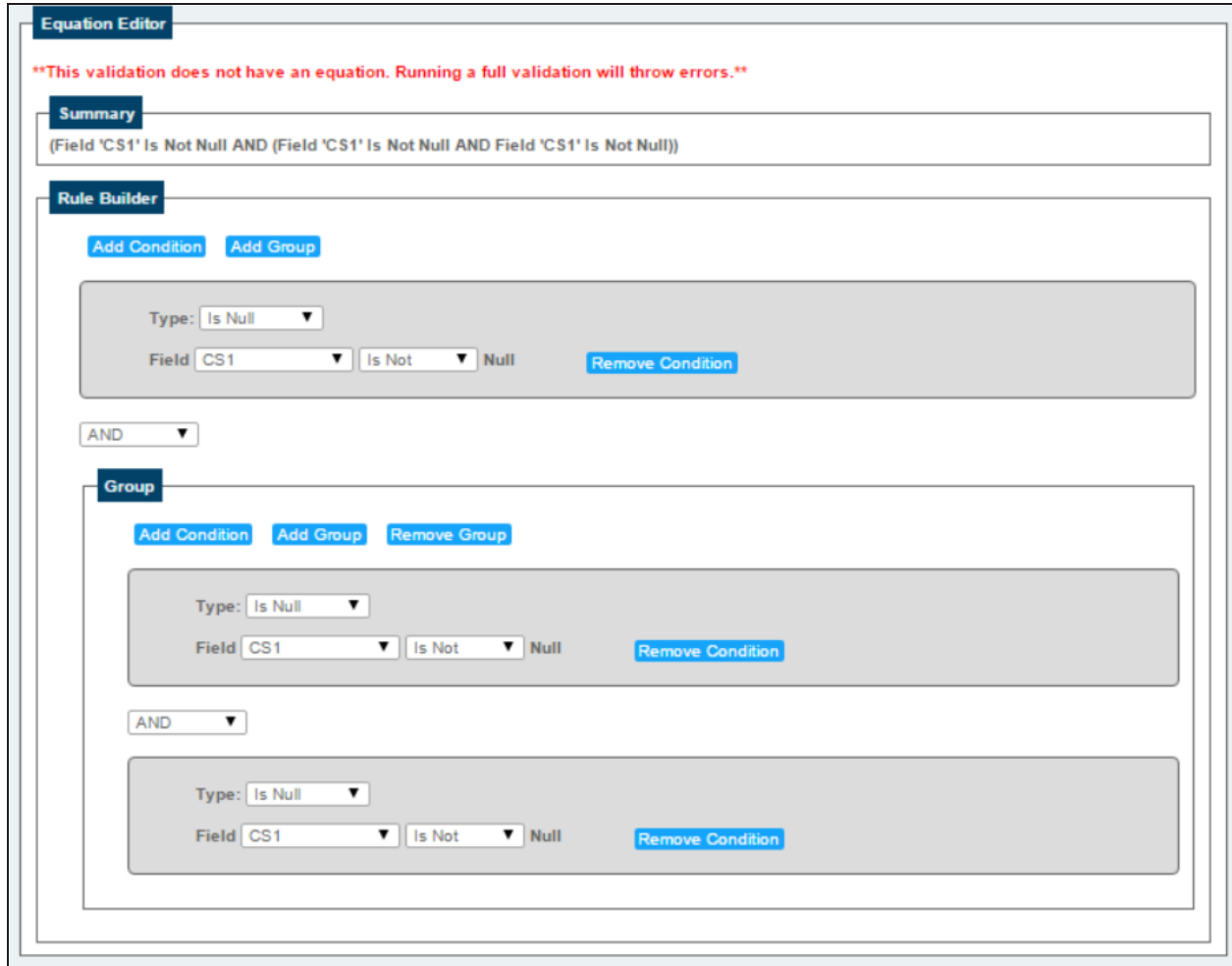
The screenshot shows the 'Equation Editor' interface for a new validation rule. At the top, there is a red warning message: '\*\*This validation does not have an equation. Running a full validation will throw errors.\*\*'. Below this, there is a 'Rule Builder' section with two buttons: 'Add Condition' and 'Add Group'.

The same note from the *Validation Editor* subtask will be present at the top of the *Equation Editor* grouping until at least one condition is added to the validation rule.

Conditions are the individual equations that make up the overall validation rule.

Groups are containers for multiple related conditions. Groups can exist within other groups.

Click the *Add Condition* button to begin creating the validation rule's equation. Click the *Add Group* button if more than one condition will be grouped together. The following screenshot displays a lone condition and conditions within a group.



Use the *Type* dropdown to establish the type of equation:

Type	Description
<b>Is Null</b>	Equations indicating whether or not the condition has a value.
<b>Is Numeric</b>	Equations indicating whether or not the condition is a numerical value.
<b>In Set</b>	Equations indicating whether or not the condition's value exists within the boundaries of a specific set. The set is established on the <i>Set Editor</i> subtask.
<b>Num</b>	Equations indicating specific rules for numerical values, including greater than, less than, equal to, etc.
<b>Length</b>	Equations comparing the length (in characters) of two fields.
<b>Min</b>	Equations comparing the minimum value between two fields with another field.

The available controls will be dependent on the selection made from the *Type* dropdown. The following screenshots indicate the possibilities:

Type:

Type:

Type:

Type:

Type:

Type:

**\*Note:** Fields that have been established as numeric only will not appear in the *Field* dropdown. Users cannot enter anything other than a numerical value in those fields, therefore no numerical validation check is needed on those fields.

When multiple conditions are added to the equation, whether inside a group or not, the equation conditions operate under an "And/Or" system. This means that equation conditions can work in tandem with each other or as alternatives to each other, but it cannot be a mixture. Once a selection is made from the *And/Or* dropdown, all other conditions added will operate under the same selection. The only exception is that individual groups of conditions can have a different selection than the overall equation. The following screenshots display the possibilities:

**Summary**  
(Field 'CS1' Is Not Null AND Field 'ElemConvert' Is Numeric)

**Rule Builder**

[Add Condition](#) [Add Group](#)

Type:  ▼  
Field:  ▼  ▼ Null [Remove Condition](#)

▼  
 ▼  
 ▼

Type:  ▼  
Field:  ▼  ▼ Numeric [Remove Condition](#)

**Summary**  
(Field 'CS1' Is Not Null AND Field 'ElemConvert' Is Numeric AND Field 'CS2' Is Not Null)

**Rule Builder**

[Add Condition](#) [Add Group](#)

Type:  ▼  
Field:  ▼  ▼ Null [Remove Condition](#)

▼

Type:  ▼  
Field:  ▼  ▼ Numeric [Remove Condition](#)

▼

Type:  ▼  
Field:  ▼  ▼ Null [Remove Condition](#)

The screenshot shows the 'Rule Builder' interface. At the top, there are buttons for 'Add Condition' and 'Add Group'. Below this, there are several condition rows. The first row has 'Type: Is Null', 'Field: CS1', and 'Is Not Null'. The second row has 'Type: Numeric', 'Field: ElemConvert', and 'Is Numeric'. The third row has 'Type: Is Null', 'Field: CS2', and 'Is Not Null'. These three rows are grouped under an 'AND' operator, which is highlighted with a yellow box. Below this is a 'Group' section with buttons for 'Add Condition', 'Add Group', and 'Remove Group'. The first condition in the group has 'Type: Is Null', 'Field: CS3', and 'Is Not Null'. A red arrow points to the 'Remove Condition' button for this condition. Below this condition is another 'OR' operator, highlighted with a yellow box, followed by two more conditions: one with 'Type: Numeric', 'Field: Element', and 'Is Numeric'; and another with 'Type: In Set', 'Field: ElemConvert', 'Is In Set', and 'Element510 allowed parents'.

To remove a condition, click the *Remove Condition* button for the desired condition.

To remove a group, click the *Remove Group* button for the desired group. All conditions within the group will also be removed.

Once the desired selections have been made, click the *Save* button at the bottom of the screen to save the validation rule's equation.

# Set Editor

The *Admin > General Config > Set Editor* task allows the admin to create sets of values to be used in the validation equations on the *Equation Editor* task. When the "In Set" type is selected for a condition on the *Equation Editor* task, the admin can then establish a validation that checks whether or not a value matches one of the values included in the set.

The screenshot shows the 'Set Editor' interface with the following components:

- Navigation:** Admin > General Config > Set Editor
- Validation Set Editor:**
  - Validation Sets:** Type: NBE (dropdown), Add Set, Copy
  - Table:**

Name
Element 510 allowed parents
Element 515 allowed parents
Element 521 allowed parents
- Values:** Set Name: Element 510 allowed pare
  - Table:**


Value
112
242
05
28
31
243
29
13
245
244
15
241
16
54
30
38
60
240

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Save


## Create a New Set

To create a new set, select "NBI" or "NBE" from the *Type* dropdown and then click the *Add Set* button.

To create a new set based on a copy of an existing set, click the  icon for the desired set and then click the *Copy* button.

Use the *Set Name* textbox to provide a name for the set. This is the name that will be displayed when selecting a set on the *Equation Editor* subtask.

Click the *Add Set Value* button as many times as desired to generate new entries for the set:

Enter the desired values into the new textboxes, or click the  icon next to an entry to delete it.

To remove all of the entries from the set, click the *Clear* button.

When the desired entries have been added to the set, click the *Save* button at the bottom of the page to save the set.



# Validation Editor

The *Admin > General Config > Validation Editor* task is used to create and/or modify the basic information for a validation rule as well as determine its dependency rules. Validation rules are used to impose additional NBI and NBE rules when validating bridges. The default rules cannot be changed, deleted, or disabled.

The screenshot shows the 'Validation Editor' interface. At the top, the breadcrumb navigation reads 'Admin > General Config > Validation Editor'. The main content area is divided into three sections: 'Summary', 'Validation Details', and 'Validation Dependencies'. The 'Summary' section contains the text: '(Length Of Field 'Element' Must Be Less Than Or Equal To Number Value 4 AND (Field 'Element' Is Numeric AND Field 'Element' As Number Must Be Greater Than Or Equal To Number Value 1))'. The 'Validation Details' section includes a 'Name' field with the value 'ICELEM\_1', a 'Severity' dropdown set to 'Error', and two checked checkboxes: 'Enabled' and 'Include In Results'. Below these is a 'Description' field with the text 'Element number on bridge is not a valid entry.' and a 'Notes' field. The 'Validation Dependencies' section shows 'No Dependencies Mapped.'. At the bottom of the interface, there is a footer with the text: '© American Association of State Highway and Transportation Officials. All rights reserved. BRM Version 5.2.3.57 [Build Date: Wednesday August 24, 2016] https://aashtoware.org | AASHTO Publications'. The bottom navigation bar includes a 'Type' dropdown set to 'NBE', a 'Rule' dropdown set to 'ICELEM\_1', and two buttons: 'Create New' and 'Copy >>'.

If an existing validation rule is selected, the *Summary* grouping will be visible. The *Summary* grouping displays an English representation of the equation established for the validation rule.

This is a close-up of the 'Summary' section from the screenshot above. It shows a blue header with the word 'Summary' in white. Below the header, the text reads: '(Length Of Field 'Element' Must Be Less Than Or Equal To Number Value 4 AND (Field 'Element' Is Numeric AND Field 'Element' As Number Must Be Greater Than Or Equal To Number Value 1))'.

## Create New Validation Rule

To create a new validation rule, click the *Create New* button in the footer at the bottom of the screen.

The screenshot shows the 'Validation Editor' interface. It is divided into two main sections: 'Validation Details' and 'Validation Dependencies'.  
 In the 'Validation Details' section:  
 - There is a 'Name' text box.  
 - A 'Type' dropdown menu is set to 'NBE'.  
 - A 'Severity' dropdown menu is set to 'Error'.  
 - Two checkboxes are checked: 'Enabled' and 'Include In Results'.  
 - Below the checkboxes are two text areas: 'Description' and 'Notes'.  
 In the 'Validation Dependencies' section:  
 - A 'Dependency' dropdown menu is set to 'ICELEM\_1'.  
 - There is a blue 'Add Dependency' button.  
 - Below the button, it says 'No Dependencies Mapped.'

## Validation Details

The *Validation Details* grouping allows the admin to establish the basic information for the validation rule.

The *Name* textbox determines the name for the validation rule that will be used when selecting the rule later.

The *Type* dropdown is used to indicate whether the rule is for NBI or NBE elements.

The *Severity* dropdown determines at what level of severity the rule will return results.

### Checkboxes

The *Enabled* checkbox determines whether or not the validation rule is active. The validation process will only check the rule if the *Enabled* checkbox is checked.

The *Include in Results* checkbox determines whether the validation results will display the currently selected rule's failures after a validation is performed on the *Bridges > Validation* task. If left unchecked, a structure can fail the validation rule but the result will not be displayed on the *Bridges > Validation*.

Use the *Description* and *Notes* textboxes to provide additional information on the validation rule. The *Description* textbox is a mandatory entry because it is the message that displays on the *Bridges > Validation* task if the validation rule is failed.

## Validation Dependencies

The *Validation Dependencies* grouping allows the admin to select rules for which the currently selected rule is dependent. By establishing dependencies, admins can greatly reduce the time necessary to perform a validation.

**Example:** If the validation rule being established only deals with numerical values, a dependency could be added that checks whether the value is numeric before running the selected validation rule. If the dependency rule passes, the selected validation rule will run. If it fails, the selected validation rule will not run. The establishment of a dependency like this could save significant time for large validations.

Use the *Dependency* dropdown to select a rule, then click the *Add Dependency* button.

Use the *Run Selected If* dropdown to determine how the currently selected rule will be dependent on the dependency:

Ruling	Description
<b>Passes</b>	The validation rule will run if the structure passes the dependency's rule.
<b>Fails</b>	The validation rule will run if the structure fails the dependency's rule.
<b>Doesn't Run</b>	The validation rule will run if the dependency's rule does not run. This would most likely occur if the dependency validation rule has its own dependencies that cause it not to run.
<b>Passes or Doesn't Run</b>	The validation rule will run if the structure passes the dependency's rule or the dependency's rule does not run.
<b>Fails or Doesn't Run</b>	The validation rule will run if the structure fails the dependency's rule or the dependency's rule does not run.

To delete the dependency from the validation rule, click the icon for the desired dependency.

## Validation Editor Page Controls

For validation rules being newly created:

- Click the *Save* button to save the new validation rule.
- Click the *Cancel* button to cancel the creation of the new validation rule.

Once the new validation rule has been saved, the following note will display at the top of the grouping:

At least one condition must be applied to the validation rule on the *Equation Editor* subtask in order for the validation rule to run properly.

For existing validation rules:

- Use the *Type* dropdown to determine whether the validation rule being selected is for NBI or NBE items.
- The *Create New* button is used to create a new validation rule.
- Click the *Copy>>* button to copy the selected validation rule. This will reveal the *Copy Name* textbox. Enter a name and click the *Copy* button to complete the copy, or click the *<<* button to cancel the copy.

# Mapping

## Sync Mapping

The *Admin > Mapping > Sync Mapping* task allows the admin to sync the unmatched official and geographic information systems (GIS) coordinates of selected bridges. If the official and GIS coordinates of a bridge are unmatched, it is typically because the bridge's map pin has been moved from its official location.

**Official Coordinates:** The official latitude and longitude of the structure as indicated when the structure was created on the *Bridges > Create Struct* task, *Bridges > Copy Struct* task, or imported through the *Gateway* tab.

**GIS Coordinates:** The latitude and longitude of the structure's pin location on the *Bridges > Mapping* task.

The screenshot displays the 'Admin > Mapping > Sync Mapping' interface. At the top, it shows the breadcrumb 'Admin > Mapping > Sync Mapping'. Below this is a header 'Geographic Information System of Bridges with Unmatched Coordinates' and a sub-header 'Unmatched Coordinates Bridges'. The main content is a table with the following columns: Bridge ID, Bridge Label, Facility, Location, Official Latitude, GIS Latitude, Official Longitude, and GIS Longitude. The table lists 18 bridges with their respective coordinates. At the bottom of the table, there is a 'Compound range' dropdown set to '0.0001', a 'Page size' dropdown set to '50', and 'Sync' and 'Revert' buttons. A footer contains copyright information for the American Association of State Highway and Transportation Officials.

Bridge ID	Bridge Label	Facility	Location	Official Latitude	GIS Latitude	Official Longitude	GIS Longitude
90000	90000 001 30311	SIGN CANTILEVER	101 AND CALIFORNIA AVE	0.0003	-1	-1	-1
22448	22448 048 00623	Hwy 048	6.23 MI S JCT US 26	44.3353	44.3494	118.9509	118.9472
22449	22449 048 01100	Hwy 048	11.00 MI S JCT US 26	44.288	44.3494	118.9772	118.9472
22470	22470 000 00000	Park Rd.	Willamette Miss Park	45.0772	44.0603	123.0535	123.0194
22049	22049 041 00000	WIPPER ROAD	00.5 SOUTH OF TURNER	44.8417	44.8414	122.9564	122.9579
22445	22445 000 00000	Lower Creek Ped	Bates State Park	44.5939	45.6289	118.5161	121.9644
22471	22471 000 00067	Meda Loop	Mp 0.67 Meda Loop Rd	45.1425	45.2017	123.9203	123.9249
000602	0006020000000000	HWY 61 CONN 1	SOUTH MAIN JOSEPH	0.0003	-1	0.0003	-1
000607	0006070000000000	NORTH 8TH STREET	BARTON HEIGHTS/JOSEPH	0.0003	51.3901	0.0003	121.3685
22162	22162 000 00000	Foss Rd.	1.2 MI EAST OF MOHLER	45.7031	45.6999	123.8377	123.8438
22452	22452 000 00000	Pier 2	Pier 2 Astoria	46.1885	46.1945	123.8609	123.803
yy	-	-	-	0.1864	0.0031	111.5593	0.0197
22453	22453 000 00000	Newport Pier	Pier 2 Astoria	44.6262	46.1945	124.049	123.803
22446	22446 000 00000	Lower Creek Ped	Bates State Park	44.86	45.6289	122.65	121.9644

## Compound Range

The **Compound Range** dropdown is used to determine which bridges will be displayed in the grid. It compares the official and GIS coordinates based on the selection made in the **Compound Range** dropdown. The selected compound range is the allowed difference between the official and GIS coordinates.

**Example:** If a bridge's official latitude is 100.005, and the GIS latitude is 100, the difference is .005. If the selected compound range is .001, the bridge will appear in the grid. If the selected compound range is .01 or .1, the bridge will not appear because the difference between the official and GIS latitude is less than the selected compound range.

The more decimal places selected in the compound range, the more bridges that will appear in the grid. However, these small differences are typically unrecognizable on the GIS map.

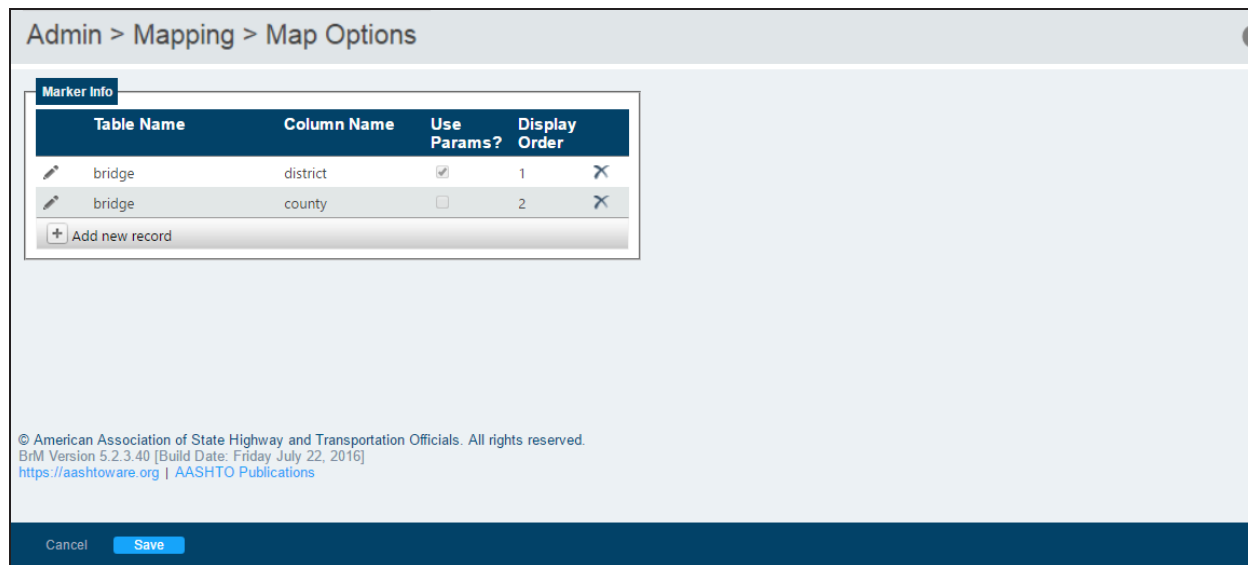
## Sync and Revert Controls


The **Sync** button changes the official coordinates to match the GIS coordinates. This might need to be done if the official coordinates were never entered or were entered incorrectly.

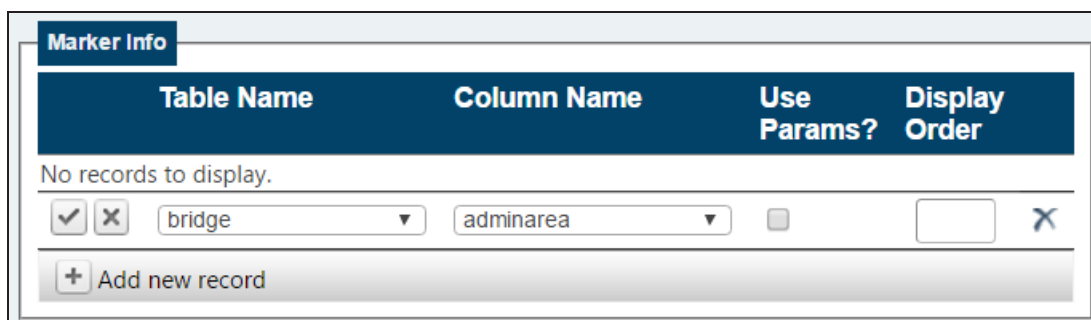
The **Revert** button changes the GIS coordinates to match the official coordinates. This might need to be done if the GIS pin on the *Bridges > Mapping* task was moved from its official location.

## Map Options

The *Admin > Mapping > Map Options* task allows the admin to determine what information will be displayed when a user selects a structure's map pin when viewing a map:




Click the  symbol to add a new option:



Use the *Table Name* and *Column Name* dropdowns to select the field.



Check the *Use Parameters* checkbox if the marker should display information pulled from the *Admin > General Config > Parameters* task for the selected table-column. Otherwise the marker will simply use the value in the database.

The *Display Order* textbox is used to determine where in the map pin's information box the field information will be displayed. "1" will be the topmost setting for the information.

Click the  symbol to complete the addition of the new map option.

Click either the  or  symbol to cancel the addition of the new map option.

**\*Note:** Up to 10 map options can be added. Once 10 are added, the admin will be unable to make new additions until an existing option is deleted.

Existing map options can be edited by clicking the  symbol or deleted by clicking the  symbol.

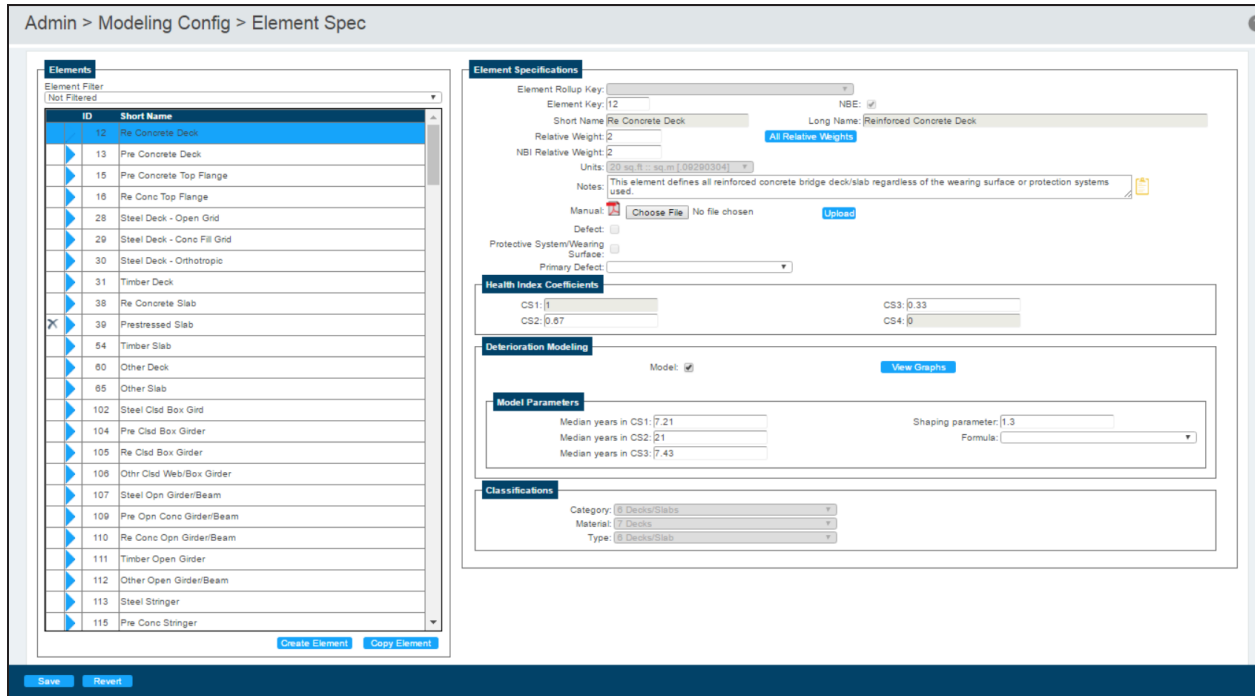
Click the *Save* button in the footer to accept the changes made on the page.

Click the *Cancel* button in the footer to cancel the changes made on the page.


# Modeling Config

## Element Specifications



The *Admin > Modeling Config > Element Specifications* task is used to create elements and define the specifications for existing elements.



## Elements

The *Elements* grouping contains the Element list. In order to view and edit an element's specifications, it must be selected from the Element list. To select an element, click the  symbol. The selected element's information will then appear in the *Element Specifications* grouping.

The National Bridge Elements (NBEs) determined by the Federal Highway Administration (FHWA) are mandatory in the system and cannot be deleted. Much of the basic information and classifications of the NBEs will also be read only for all users.

If the element has an  next to the  in the Element list, the element is not an NBE and can be edited and deleted freely.

### Create or Copy Element

The *Create Element* button creates a new element with blank specifications that must be completed.

The *Copy Element* button creates a copy of the currently selected element with matching specifications other than the Element Key, Short Name, and Long Name.

By default, the element key progresses in sequential order. Therefore, if the Element List's last element has an element key of 1000, a newly created or copied element will have an element key of 1001. The key can be changed once created, but only one element key is permitted per number.

## Element Specifications

The *Element Specifications* grouping includes the specifications of the selected element, its deterioration modeling, and its classifications.

### Element Rollup Key

The *Element Rollup Key* dropdown is used for non-NBEs. The Federal Government only requires the information from NBEs, but non NBE information can be "rolled up" into the NBEs. Therefore, the currently selected element's information will be included in the information from whatever NBE is selected from the dropdown.

When an NBE is selected from the Element List, the *Element Rollup Key* dropdown is read only.

### Element Key and Name

The *Element Key* textbox is the element's ID. For NBEs the element key is determined by the FHWA, however it can be changed in the system as long as it is changed to a unique number. For non-NBEs, the element key can be any number as long as it is unique.

The *Short Name* and *Long Name* textboxes provide a description of the element. NBE short and long names are read only.

### Relative Weights

The *Relative Weight* textbox is used for a bridge's health index. Because elements have varying degrees of impact on the overall structure of a bridge, the relative weight determines how vital an element is to the bridge and therefore how it should be weighted. The higher the relative weight, the greater the impact of the element on the bridge.

The *All Relative Weights* button provides a grid of the recommended relative weight for a given element:



Element Key	Short Name	Relative Weight
12.0	Re Concrete Deck	6.0
13.0	Pre Concrete Deck	6.0
15.0	Pre Concrete Top Flange	6.0
16.0	Re Conc Top Flange	6.0
28.0	Steel Deck - Open Grid	6.0
29.0	Steel Deck - Conc Fill Grid	6.0
30.0	Steel Deck - Orthotropic	6.0
31.0	Timber Deck	6.0
38.0	Re Concrete Slab	9.0
39.0	Prestressed Slab	6.0
54.0	Timber Slab	9.0
60.0	Other Deck	6.0
65.0	Other Slab	9.0
102.0	Steel Clsd Box Gird	10.0
104.0	Pre Clsd Box Girder	10.0
105.0	Re Clsd Box Girder	10.0
106.0	Othr Clsd Web/Box Girder	10.0
107.0	Steel Opn Girder/Beam	10.0
109.0	Pre Opn Conc Girder/Beam	10.0
110.0	Re Conc Opn Girder/Beam	10.0

The *NBI Relative Weight* textbox is used in conjunction with the NBI converter on the *Inspection > Condition* task. It determines how the selected element is weighted in the average when an NBI converter profile is used.

## Units

The *Units* dropdown determines how the element is measured. NBE units are read only.

## Notes

The *Notes* textbox can be used to enter a description of the element. This is particularly useful when creating new elements that may not be universally recognized by their short and long names.

## Manual

A PDF can be added for any element to provide more information. To add a PDF, click the *Choose File* button and locate the desired file. Once selected, click the *Upload* button to add the PDF to the element.

**\*Note:** When upgrading to a new version of BrM, previously uploaded custom agency element manuals will be lost during the uninstall of the old version. In order to ensure the manuals are maintained and added into the new version, the ElemGuideManuals subdirectory must be copied prior to uninstalling the old version. Then, after installing the new version, the ElemGuideManuals subdirectory can be returned to its folder location. **When completing this process, only copy over the custom agency element files. The new install of BrM will contain the latest manuals for the standard elements.**

## Defect and Protective System

The *Defect* and *Protective System* checkboxes are used to indicate whether or not the selected element is a defect or a protective system.

If the *Defect* checkbox is selected, the *Condition State Definitions* grouping will appear below the *Classifications* grouping.

Condition State Definitions			
ID	State Short	State Description	
1	Good - Cracking (Hairline)	Cracking - None; to hairline Spalls/Delaminations/Patched Areas	
2	Fair - Cracking (Narrow)	Cracking - Narrow size and/or density; Spalls/Delaminations/Patched Areas	
3	Poor - Cracking (Medium)	Cracking - Medium size and/or density; Spalls/Delaminations/Patched Areas	
4	Severe - Impacting Load Capacity	The condition is beyond the limits established in condition state definitions	

The *Condition State Definitions* grouping allows the admin to specify the name and description of the 4 condition state levels.

## Primary Defect

**\*Note:** BrM 5.2.3 does not currently utilize the *Primary Defect* dropdown. This control's functionality may be implemented in future versions of the software. If used, it would help the system determine the rate of an element's deterioration.

## Health Index Coefficient

Health Index Coefficients	
CS1: <input type="text" value="1"/>	CS3: <input type="text" value="0.33"/>
CS2: <input type="text" value="0.67"/>	CS4: <input type="text" value="0"/>

The *Health Index Coefficient* grouping allows the admin to change the weight of the condition states to better represent the selected element's deterioration. By default, the health index coefficient uses the following equation:



$$HI_e = \frac{3}{3}y_1 + \frac{2}{3}y_2 + \frac{1}{3}y_3$$

$y_i$  is the forecasted percentage of element  $e$  in state  $i$

CS1 is always equal to "1" in the equation, so the **CS1** textbox is read only. CS4 is always equal to 0 (therefore not shown in the equation), so the **CS4** textbox is read only.

The **CS2** and **CS3** textboxes can be changed from their default values to any value between "1" and "0."

## Deterioration Modeling

Due to its complexity, an extended user manual section has been created to explain deterioration modeling at length. This portion can be found at the *Admin > Modeling Config > Deterioration Modeling* section of the *BrM User Manual*.

However, if a defect is selected, there is only one available control:

If the **Exclude Defect from Deterioration** checkbox is checked, the selected defect will not be included in the deterioration modeling on the *Analysis* tab.

## Classifications

The *Classifications* grouping is used to classify the selected element. Only non-default elements can have their classifications edited.

Use the **Category**, **Material**, and **Type** dropdowns to classify the element.

## Element Spec Page Controls

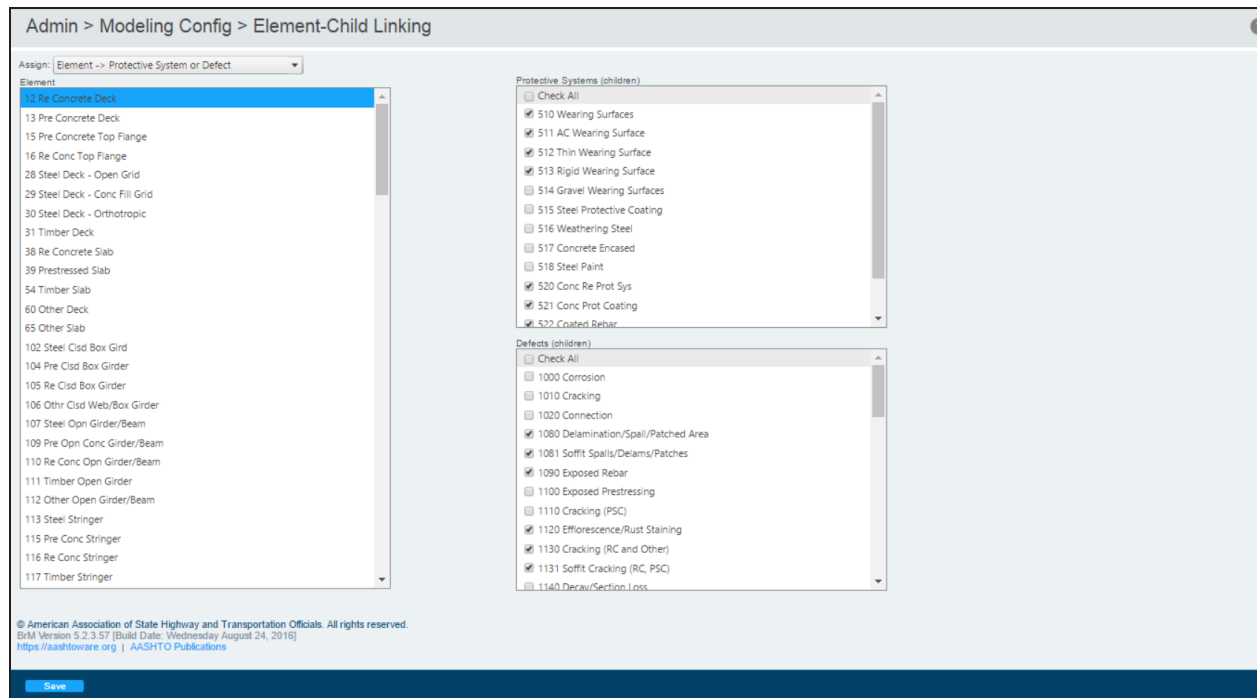
Click the **Save** button to save the changes made to the selected element.

Click the **Revert** button to cancel the changes made to the selected element.

# Element-Child Linking

The *Admin > Modeling Config > Element-Child Linking* task is used to link elements, defects, and protective systems. The elements must be linked together in order to be used together throughout the software on pages such as the *Inspection > Condition* task.

By default, links have been established based on the AASHTO Manual for Bridge Element Inspection. Additional links for the existing elements as well as links for custom elements must be performed by the admin.



## Assigning Element Relationships

The *Assign* dropdown is the key to the element relationships. When a selection is made using the *Assign* dropdown, the links are for that type of element only.

Elements can have:

- Protective Systems (children)
- Defects (children)

Protective Systems can have:

- Elements (parents)
- Defects (children)

Defects can have:

- Elements (parents)
- Protective Systems (parents)

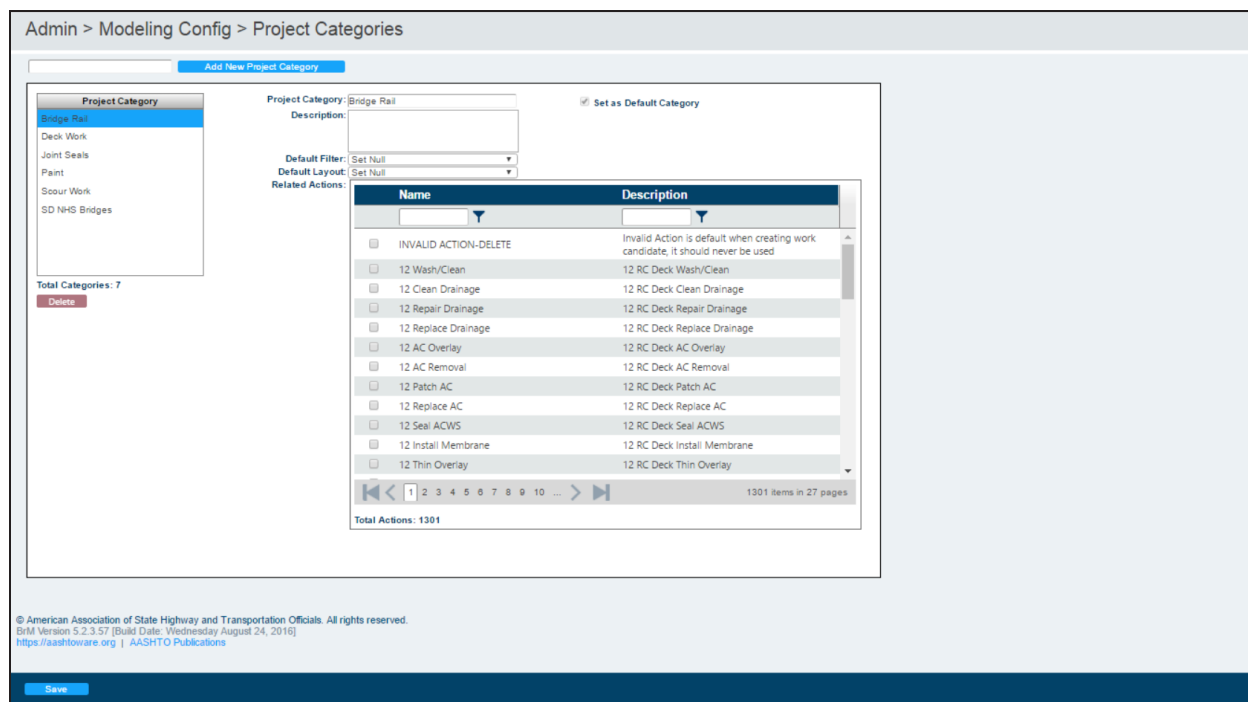
## Element-Child Linking Page Controls

Click the *Save* button to save the changes made to the assigned element.

# Project Categories

The *Admin > Modeling Config > Project Categories* task is used to create project categories for use in the *Projects* tab. Project categories are linked to specific actions, filters, and layouts that help the users identify bridges with various needs. There are six project categories by default: Bridge Rail, Deck Work, Joint Seals, Paint, Scour Work, and Structurally Deficient NHS Bridges. However, these categories can be modified and additional categories can be created.

**\*Note:** Project categories are not mandatory, as "No Category" is a selectable option on the *Projects > Create/Edit Project > Query* subtask, but they are recommended to help the user narrow down search results to specific needs.



## Project Category Selection

To choose a project category to manage, select one from the *Project Category* listbox or create a new one by typing a name into the textbox next to the *Add New Project Category* button and then click the button.

To set the selected category as the default category, click the *Set as Default Category* checkbox. This determines which project category will be the default selection in the *Project Category* dropdown on the *Projects > Create/Edit Project > Query, Summary, and Management* subtasks.

## Default Filter and Layout

Use the *Default Filter* and *Default Layout* dropdowns to select the project category's default filter and layout. These settings will be used on the *Create/Edit Project* task of the *Projects* module.

**\*Note:** In order for filters and layouts to appear in the above dropdowns, the following must be true:

**Filters** - The filter's context on the *Manage Filters* task must be set to "Bridge List" and the filter must be set to "Shared."

**Layouts** - The layout's context on the *Manage Layouts* task must be set to "Project Bridge Needs" and the layout must be set to "Shared."

## Related Actions

The Related Actions grid shows all of the actions that can be associated with the selected project category.

Related Actions:

Name	Description
<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Paint Sub - Network	First Painting
<input type="checkbox"/> Paint Super - Network	First Painting
<input type="checkbox"/> Place Wearing Surface - Network	First Wearing Surface
<input type="checkbox"/> Preserve Deck - Network	Thin-Bonded / Repair Joints
<input type="checkbox"/> Rehab Culvert - Network	Rehab culvert, parapets, approaches
<input type="checkbox"/> Rehab Deck - Network	Repair deck, joints and parapets
<input type="checkbox"/> Rehab Sub - Network	Repair Columns, Piers, Abutments, Piles, Walls
<input type="checkbox"/> Rehab Super - Network	Repair beams, paint and bearings
<input type="checkbox"/> Repaint Super/Sub - Network	Repair Paint
<input type="checkbox"/> Replace Deck - Network	Replace Deck
<input type="checkbox"/> Replace Structure - Network	Replace Structure
<input type="checkbox"/> Replace Super - Network	Replace Super Elements

Total Actions: 22

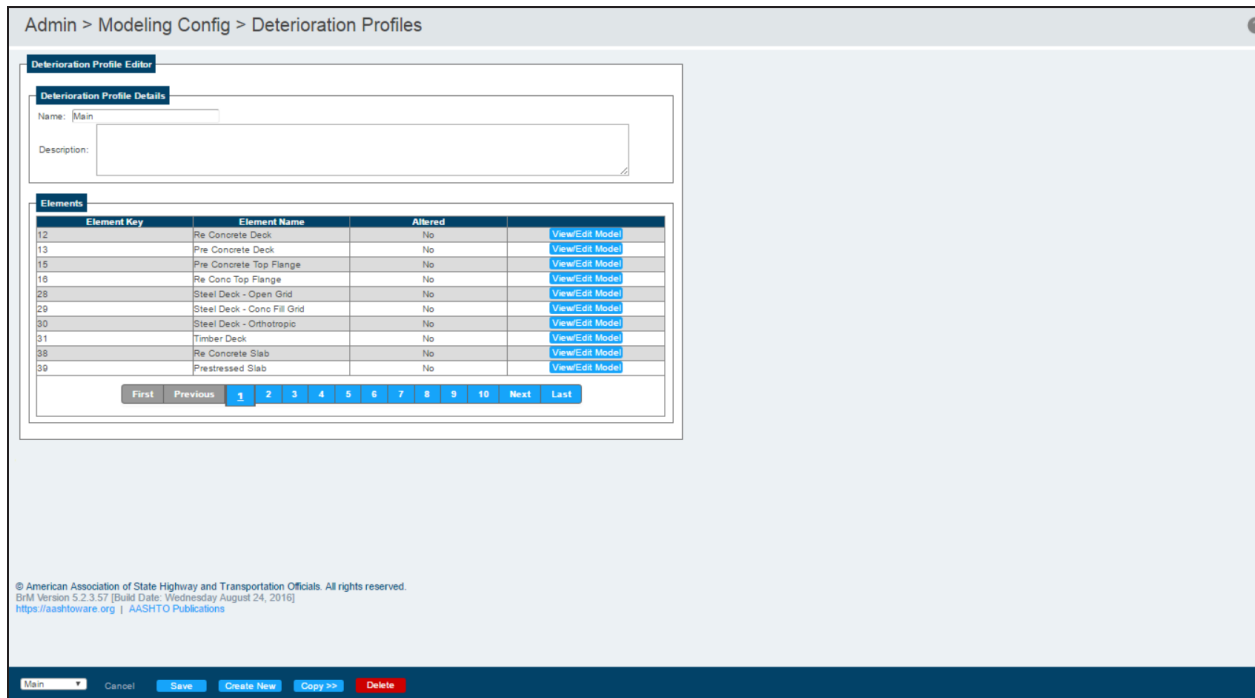
Check the boxes of the actions that should be linked to the project category, and use the *Name* and *Description* filters to search for specific actions.

## Project Category Page Controls

Click the *Save* button to save the changes made to the selected project category.

# Deterioration Profiles

The *Admin > Modeling Config > Deterioration Profiles* task allows the admin to create deterioration profiles that make changes to the default deterioration parameters. The deterioration profiles are then used within program scenarios to compare program performance with different deterioration circumstances.



Use the dropdown in the footer to select the desired deterioration profile to view, or click the *Create New* button to create a new deterioration profile.

## Deterioration Profile Details

The *Deterioration Profile Details* grouping is used to establish the basic information for the deterioration profile.

The *Name* textbox indicates the name of the deterioration profile and is used in the *Deterioration Profile* dropdown of the *Programs > Create/Edit Scenarios* task.

The *Description* textbox can be used to add notes and information on the specific settings of the deterioration profile.

## Elements

The Elements grouping displays a grid of the National Bridge Elements (NBEs). Each element has its own default deterioration curve based on the four condition states. To edit the deterioration parameters of an element, click the *View/Edit Model* button of the desired element.

Elements			
Element Key	Element Name	Altered	
12	Re Concrete Deck	No	<a href="#">View/Edit Model</a>
13	Pre Concrete Deck	No	<a href="#">View/Edit Model</a>
15	Pre Concrete Top Flange	No	<a href="#">View/Edit Model</a>
16	Re Conc Top Flange	No	<a href="#">View/Edit Model</a>
28	Steel Deck - Open Grid	No	<a href="#">View/Edit Model</a>
29	Steel Deck - Conc Fill Grid	No	<a href="#">View/Edit Model</a>
30	Steel Deck - Orthotropic	No	<a href="#">View/Edit Model</a>
31	Timber Deck	No	<a href="#">View/Edit Model</a>
38	Re Concrete Slab	No	<a href="#">View/Edit Model</a>
54	Timber Slab	No	<a href="#">View/Edit Model</a>

First Previous **1** 2 3 4 5 6 7 8 9 10 Next Last

The *Model Parameters* and *Element Assumptions* groupings can be used to modify the deterioration parameters of the selected element. For more information on how to make changes to the deterioration parameters, read the *Deterioration Modeling* section of the user manual that directly follows this section.

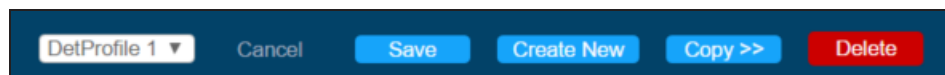
Once a change has been made and the admin returns to the main *Deterioration Profiles* page, that element's line will be red in the grid and the Altered column will read "Yes."

Elements			
Element Key	Element Name	Altered	
12	Re Concrete Deck	Yes (Use Default)	<a href="#">View/Edit Model</a>
13	Pre Concrete Deck	No	<a href="#">View/Edit Model</a>
15	Pre Concrete Top Flange	No	<a href="#">View/Edit Model</a>
16	Re Conc Top Flange	No	<a href="#">View/Edit Model</a>
28	Steel Deck - Open Grid	No	<a href="#">View/Edit Model</a>
29	Steel Deck - Conc Fill Grid	No	<a href="#">View/Edit Model</a>
30	Steel Deck - Orthotropic	No	<a href="#">View/Edit Model</a>
31	Timber Deck	No	<a href="#">View/Edit Model</a>
38	Re Concrete Slab	No	<a href="#">View/Edit Model</a>
54	Timber Slab	No	<a href="#">View/Edit Model</a>

First Previous **1** 2 3 4 5 6 7 8 9 10 Next Last

To revert the parameter changes back to the default settings, click the *(Use Default)* link in the Altered column for the desired element.

## Deterioration Profile Page Controls



The dropdown allows the user to select an existing deterioration profile to view and edit.

The *Save* button saves the changes made to the selected deterioration profile.

The *Create New* button creates a new deterioration profile.

The *Copy>>* button copies the selected deterioration profile. This will reveal the *Copy Name* textbox. Enter a name and click the *Copy* button to complete the copy, or click the *<<* button to cancel the copy.

The *Delete* button deletes the selected deterioration profile.

# Deterioration Modeling

Bridge deterioration modeling is designed to forecast the future conditions of bridges and aid the user in developing optimal actions to take on the bridge in a given period of time.

The element deterioration models are managed on the *Admin > Modeling Config > Element Spec* task. BrM includes the default model definitions for the standard AASHTOWare Bridge Elements. The parameters for the elements can be modified and the parameters for new elements can be specified, but all elements (excluding defect elements) must have a deterioration model defined.

Admin > Modeling Config > Element Spec

Elements

ID	Short Name
12	Re Concrete Deck
13	Pre Concrete Deck
15	Pre Concrete Top Flange
16	Re Conc Top Flange
28	Steel Deck - Open Grid
29	Steel Deck - Conc Fill Grid
30	Steel Deck - Orthotropic
31	Timber Deck
38	Re Concrete Slab
54	Timber Slab
60	Other Deck
65	Other Slab
102	Steel Clsd Box Gird
104	Pie Clsd Box Girder
105	Re Clsd Box Girder
106	Othr Clsd Web/Box Girder
107	Steel Opn Girder/Beam
109	Pre Opn Conc Girder/Beam
110	Re Conc Opn Girder/Beam
111	Timber Open Girder
112	Other Open Girder/Beam
113	Steel Stringer
115	Pre Conc Stringer

Element Specifications

Element Rollup Key: [dropdown]  
Element Key: 12 NBE   
Short Name: Re Concrete Deck Long Name: Reinforced Concrete Deck  
Relative Weight: 2 [All Relative Weights](#)  
NBI Relative Weight: 2  
Units: 2.0 sq ft sq m (0.9290304)  
Notes: This element defines all reinforced concrete bridge deck/slab regardless of the wearing surface or protection systems used.  
Manual:  Choose File No file chosen Upload  
Defect:   
Protective System/Wearing Surface:   
Primary Defect: [dropdown]

Health Index Coefficient

CS1: 1 CS2: 0.67 CS3: 0.33 CS4: 0

Deterioration Modeling

Model:  [View Graphs](#)

Model Parameters

Median years in CS1: 7.21 Median years in CS2: 21 Median years in CS3: 7.43  
Shaping parameter: 1.3  
Formula: [dropdown]

Classifications

Category: [dropdown] Material: [dropdown] Type: [dropdown]

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BrM Version 5.2.3.8 [Build Date: Monday June 6, 2016]  
<https://aashtoware.org> | AASHTO Publications

Save Revert

## Modify Element's Deterioration Model Parameters

To modify an element's deterioration model parameters, select an element from the element list to reveal the selected element's parameters.

Deterioration Modeling

Model:  [View Graphs](#)

Model Parameters

Median years in CS1: 7.21 Median years in CS2: 21 Median years in CS3: 7.43  
Shaping parameter: 1.3  
Formula: [dropdown]

The parameters can then be modified using the controls in the *Model Parameters* grouping or by using the element's deterioration model graphs:

- Use the *Model Parameters* grouping:
  1. **Median Years in CS1, CS2, CS3** - The median number of years in which a unit of element stays respectively in state 1, state 2, and state 3.

2. **Shaping Parameter** - Specifies how quickly an element begins to deteriorate.
3. **Formula** - Additional formula defined on the *Admin > Modeling Config > Advanced Formula* subtask.

**\*Note:** If a protective system is the selected element, the *Protection Factors* grouping will appear within the *Deterioration Modeling* grouping.

The screenshot shows the 'Deterioration Modeling' interface. The 'Protection Factors' section is highlighted with a red box. It contains the following fields:

- Max. protection parameter: 1.16
- CS1: 1
- CS2: 0.666666667
- CS3: 0.333333333
- CS4: 0

The protection factors model the effect that the protective system has on the deterioration of a base element.

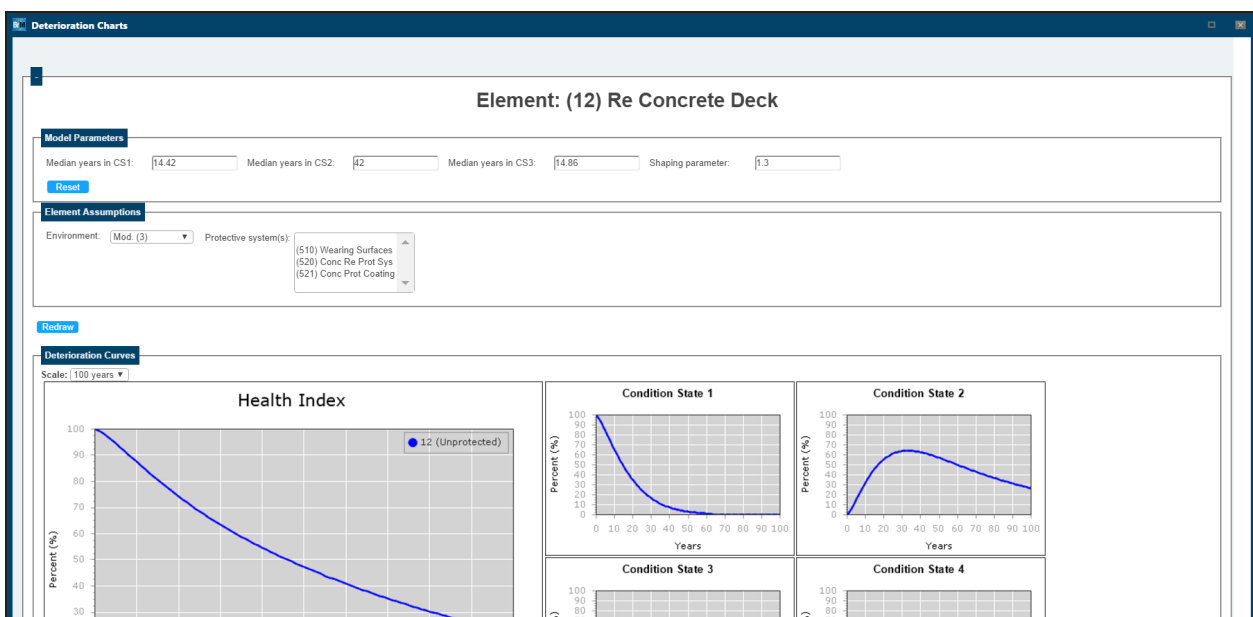
The *Max. Protection Parameter* textbox indicates the factor by which the protective system effects the transition state of the base element.

**Example:** If the *Max. Protection Parameter* textbox is set to "2," the transition times from one condition state to the next for the base element will be doubled. However, the max. protection parameter only applies when the protective system is in perfect condition. As the protective system deteriorates, so does its influence on the transition times of the base element.

Once the protective system is no longer in perfect condition and cannot utilize the max. protection parameter, the *CS1* through *CS4* textboxes indicate the effectiveness of the protective system on the base element when the protective system is in that condition state. The *CS1* and *CS4* textboxes are read-only controls and will always be set to "1" and "0" respectively.

OR

- Use the element's deterioration model graph page:
  1. Select *View Graphs* to proceed to the following page:





2. **Median Years in CS1, CS2, CS3** - The median number of years in which a unit of element stays respectively in state 1, state 2, and state 3.
3. **Shaping Parameter** - Specifies how quickly an element begins to deteriorate.
4. If desired, adjust the *Environment* dropdown and *Protective Systems* listbox.
5. Click *Redraw*. The Deterioration Curves and Deterioration Forecasts will update. The Deterioration Curves will reveal a dotted line based on the changes made in steps 2-4:

The Health Index graph displays the element's forecast health index over time.

The four Condition State graphs display the percentage of the element in that particular condition state over time.

**\*Note:** While using the *Environment* and *Protective System* controls can be helpful, it is important to note that the model parameters only have one setting. It is not possible to have a different model parameter setting for different environments or protective systems. For example, the model parameters for the "Low" environment setting will be the same as the model parameters for the "Severe" environment setting.

## Copy Existing Element's Deterioration Model Parameters

The screenshot shows a user interface for 'Deterioration Modeling'. At the top left is a dark blue header with the text 'Deterioration Modeling' in white. Below this, there is a 'Model:' label followed by a small square checkbox. To the right of the checkbox is a blue button labeled 'View Graphs'. Below the checkbox is a 'Copy From:' label followed by a white dropdown menu with a downward arrow. To the right of the dropdown menu is another blue button labeled 'Copy Model'.

To copy the existing deterioration model parameters of an element, begin by selecting the element that will have its parameters updated, then:

Uncheck the *Model* checkbox. The *Deterioration Modeling* grouping will update.

Select an element from the *Copy From* dropdown. The deterioration model parameters of this element will be copied to the element currently selected on the *Admin > Modeling Config > Element Spec* task. To copy the element, click *Copy Model*.

Deterioration modeling is discussed further in the *Analysis* tab section of the manual.

# Elements

The *Admin > Modeling Config > Elements* task is used to manage the environments, materials, categories, and types for elements.

The screenshot displays the 'Admin > Modeling Config > Elements' interface. It contains four tables:

- A - Environments:** A table with columns ID, Name, Notes, and Factor. It lists four environments: Beh. (Factor 2), Low (Factor 1.5), Mod. (Factor 1), and Sev. (Factor 0.7).
- B - Element Materials:** A table with columns ID, Name, and Sort. It lists ten materials from Unspecified to Missing.
- C - Element Categories:** A table with columns ID, Name, Sort, and a delete icon (X). It lists ten categories from Missing to Wearing Surface.
- D - Element Types:** A table with columns ID, Category, Name, Sort, and a delete icon (X). It lists 24 types, including Missing, Unspecified, Superstructure, and Substructure.

Each table has an 'Add New' button below it. At the bottom of the interface, there is a 'Save' button and a copyright notice: '© American Association of State Highway and Transportation Officials. All rights reserved. BLM Version 5.2.3.57 (Build Date: Wednesday August 24, 2016) https://aashtowe.org | AASHTO Publications'.

## Environments

The environments in the *Environments* grouping are used primarily for deterioration modeling because the environment can play a large role in a bridge's deterioration. New environment levels cannot be added, but the *Name* and *Factor* textboxes can be changed.

The *Factor* textboxes indicate the impact that the environment will have on the deterioration of the elements of a bridge. The transition times of an element are multiplied by the environment factor, therefore a beneficial environment should have a value greater than 1 and the factors should regress in order all the way to a severe environment which should have a value less than 1.

## Materials

The materials in the *Element Materials* grouping are used to classify the elements. No new materials can be added, but the names of the materials can be changed in the *Name* textboxes and the order in which they appear can be changed in the *Sort* textboxes.

## Categories

The categories in the *Element Categories* grouping are used to classify the elements. New categories can be added by clicking the *Add New* button. The names of the categories can be changed in the *Name* textboxes and the order in which they appear can be changed in the *Sort* textboxes.

Categories can be deleted using the **X** symbol as long as they are not being used by an element definition or element type. If at least one element definition or type is using the category, a message will appear when the mouse is hovered over the **X** symbol:

### C - Element Categories

ID	Name	Sort	
6	Decks/Slabs	1	✕
3	Joints	2	⬆
5	Other Elements	3	✕
1	Superstructure	4	✕
4	Bearings	5	✕
2	Substructure	6	✕
7	Smart Flags	7	✕
0	Unspecified	8	✕
-1	Missing	9	✕
8	Culvert	10	✕

Add New

### D - Element Types

ID	Category	Name	S
-1	Missing	Missing	-1
			0
			1
			2
12	Superstructure	Girders/Stringers/Be	3
13	Superstructure	Pin and Hangers	4
14	Superstructure	Truss Components	5
15	Superstructure	Arches	6
16	Superstructure	Cable	7
21	Substructure	Piers/Columns	8
22	Substructure	Footings and Pilings	9
23	Substructure	Caps	10
24	Substructure	Wingwalls/Abutments	11
25	Substructure	Culvert	12
3	Joints	Joints	13
4	Bearings	Bearings	14
5	Other Elements	Other Elements	15

Add New

You cannot delete this record without removing all Element Definitions and Element Types from the database that are associated with this Category.

However, admins who do not wish to remove the element definitions and element types associated with the element category can instead reassign those definitions and types to a different category. The category can then be deleted without having to delete the definitions and types.

## Types

The types in the *Element Types* grouping are used to classify the elements. The *Category* dropdown determines the category to which the type belongs. The names of the types can be changed in the *Name* textboxes and the order in which they appear can be changed in the *Sort* textboxes. New types can be added by clicking the *Add New* button.

Types can be deleted using the ✕ symbol as long as no element is currently classified as that type. If at least one element is classified as that type, a message will appear when the mouse is hovered over the ✕ symbol:

**D - Element Types**

ID	Category	Name	Sort	
-1	Missing	Missing	-1	X
0	Unspecified	Unspecified	0	X
10	Superstructure	Superstructure Unspe	1	X
11	Superstructure	Railings/Barriers	2	X
12	Superstructure	Girders/Stringers/Be	3	X
13	Superstructure	Pin and Hangers	4	X
14	Superstructure	Truss Components	5	X
15	Superstructure	Arches	6	X
16	Superstructure	Cable	7	X
21	Substructure	Piers/Columns	8	X
22	Substructure	Footings and Pilings	9	X
23	Substructure	Caps	10	X
24	Substructure	Wingwalls/Abutments	11	X
25	Substructure	Culvert	12	X
3	Joints	Joints	13	X
4	Bearings	Bearings	14	X
5	Other Elements	Other Elements	15	X

**Add New**

You cannot delete this record without removing all elements from the database that are associated with this Type.

## Element Page Controls

Click the *Save* button to save the changes made on the *Element* subtask.

# Assessment

The *Admin > Modeling Config > Assessment* subtask is used to define risk assessment types and their impact on a bridge.

To begin, select an assessment from the *Assessment* listbox or click the *Add New Assessment Definition* button.

## Assessment Details

### Candidate ID and Label

The *Candidate ID* and *Label* textboxes are used as name and description fields, respectively.

### Auto Generation and Manual Generation

The *Auto Generation* and *Manual Generation* dropdowns determine how an assessment is recorded for an inspection.

The *Auto Generation* dropdown allows the admin to have an assessment created automatically upon inspection creation, set based upon the calendar, or turned off with the "Not automatic" setting.

The *Manual Generation* dropdown allows users to create their own assessments on the *Inspection > Assessments* task or can be turned off with the "Not allowed" setting.

### Checking

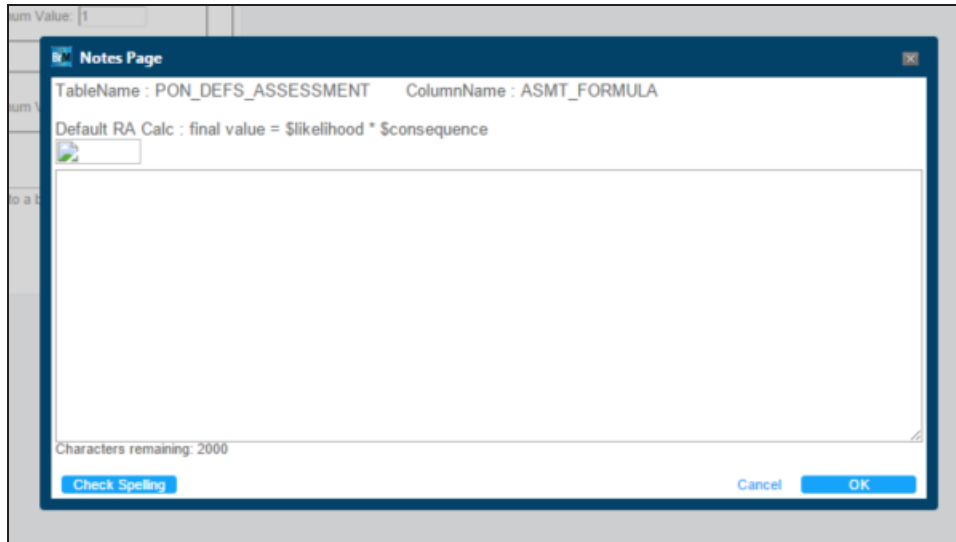
The *Checking* dropdown determines whether or not a review of the assessment is required.

### Interval

The *Interval* textbox works directly with the *Auto Generation* dropdown when it is set to "Calendar" to determine the interval (in months) that new assessments will be generated.

### Edit Formula

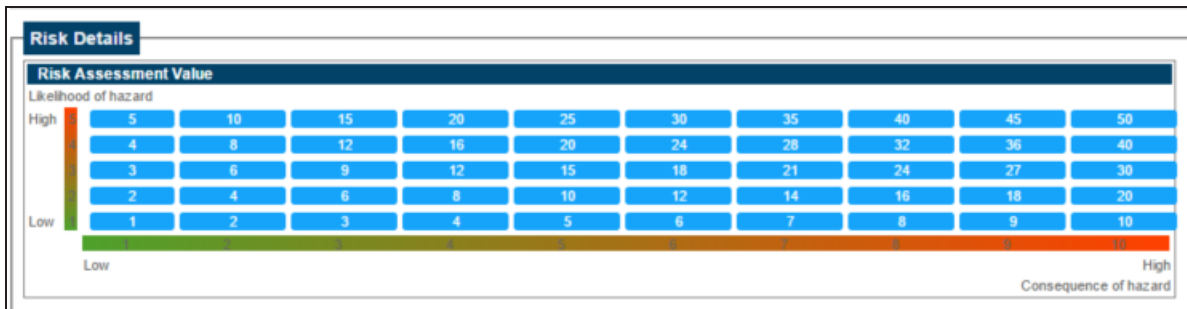
The *Edit Formula* button allows the admin to edit the formula used to determine the final risk value for the assessment.



## Likelihood, Consequence, and Final Risk Groupings

The default assessment formula multiplies the *Likelihood* and *Consequence to Structure* entries to determine the *Final Risk Value* on the *Inspection > Assessments* task.

The admin can set the maximum and minimum values for each based on agency standards. The set values will be reflected in the Risk Assessment Value grid on the *Inspection > Assessments* task:



Once on the *Inspection > Assessment* task, each of the numbered boxes on the Risk Assessment Value grid can be selected to indicate the values for the *Likelihood*, *Consequence to Structure*, and *Final Risk Value* fields.

## Assessment Page Controls

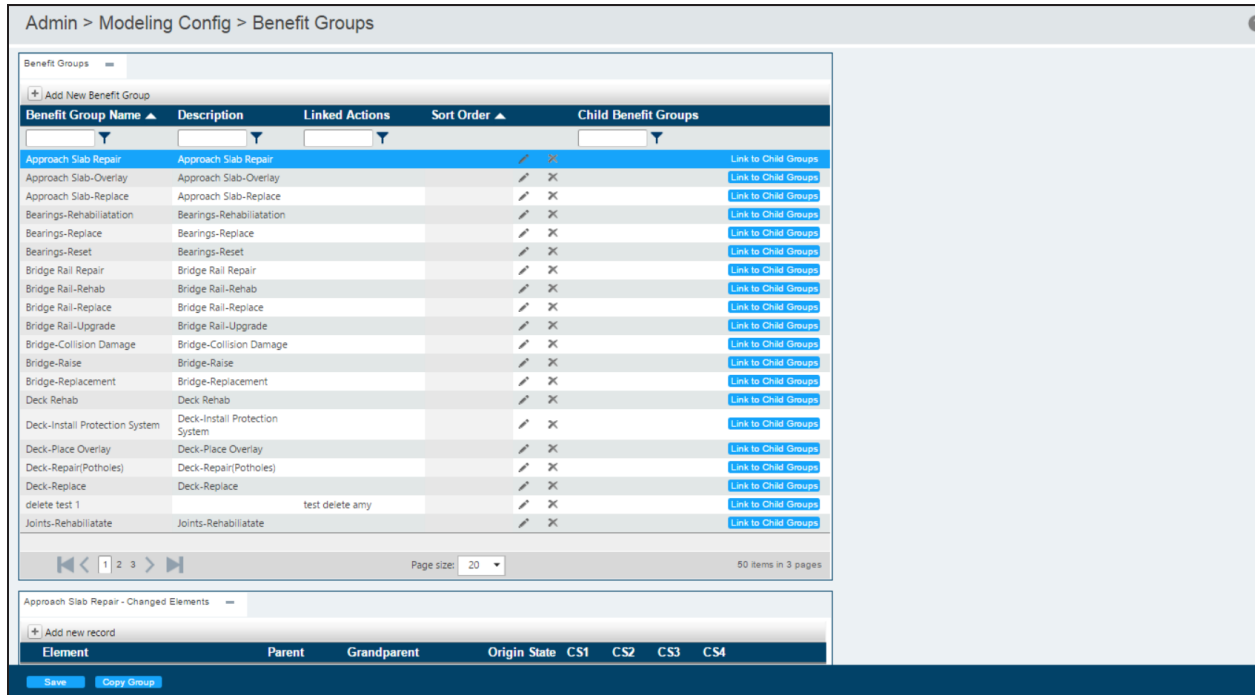
Click the *Save* button to save the changes for the selected assessment.


Click the *Delete* button underneath the *Assessment* listbox to delete the selected assessment.

# Benefit Groups

The *Admin > Modeling Config > Benefit Groups* task is used to determine the impact of a specific action or actions on a structure. This is shown through an action's effects on elements, specific fields, and risk assessments.

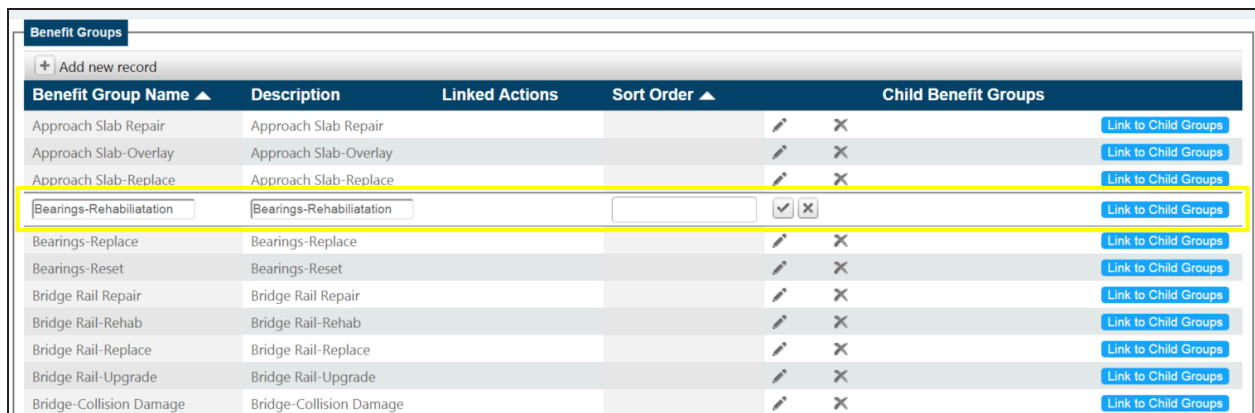
## Benefit Groups



The *Benefit Groups* grouping displays the groups for specific actions. Clicking on a benefit group will select it. A new benefit group can be created by clicking the  icon at the top of the Benefit Groups grid.

The Linked Actions column of the Benefit Groups grid is determined by the linking of the benefit groups to actions on the *Admin > Modeling Config > Action Defs* subtask.

The  icon allows the user to change the name and description of the selected benefit group.



Click the  icon to accept the changes or the  icon to cancel the changes.

The ✕ icon deletes the selected benefit group.

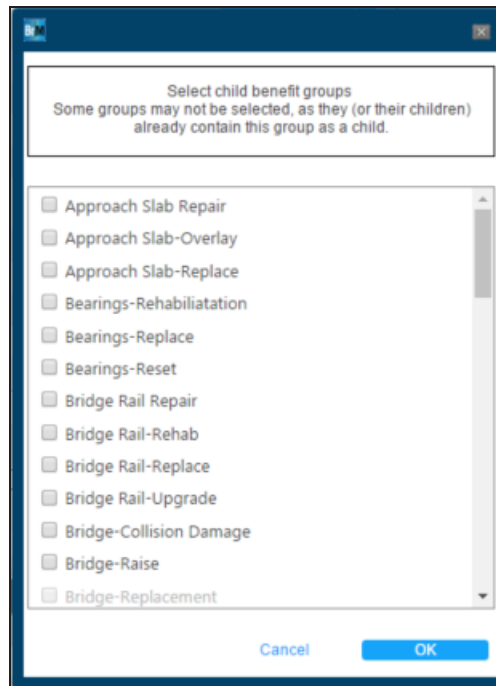
The selected benefit group will determine what appears in the *Benefit Group* task's other groupings.

## Child Groups

Administrators can now establish child groups for benefit groups to tie in work that is commonly performed together. Once a benefit group has child benefit groups, adding it to an action will include all of the child benefit groups as well.

**Example:** An admin may create a Rehab Bridge benefit group with Rehab Deck, Rehab Super, and Rehab Sub as child benefit groups. Then, each of those child benefit groups can have child groups of their own.

To add or remove child groups, click the *Link to Child Groups* button for the desired benefit group to open a popup with all of the benefit groups in the system:



Checking the boxes of the benefit groups will make them child benefit groups of the currently selected benefit group. To remove child groups, simply uncheck the desired boxes.

Click *OK* to accept the changes or *Cancel* to cancel the changes.

Child benefit groups will then be listed in the Child Benefit Groups column of the Benefit Groups grid.


## Changed Elements

The *Changed Elements* grouping displays the elements that have their condition states impacted by the selected benefit group's actions.



Approach Slab Repair - Changed Elements							
+ Add new record							
Element	Parent	Grandparent	Origin State ▲	CS1	CS2	CS3	CS4
320 Pre Conc Appr Slab							
320 Pre Conc Appr Slab	None	None	CS3		100%		
320 Pre Conc Appr Slab	None	None	CS4		100%		
321 Re Conc Approach Slab							
321 Re Conc Approach Slab	None	None	CS3		100%		
321 Re Conc Approach Slab	None	None	CS4		100%		

A new record can be added by clicking the  icon at the top of the Changed Elements grid.

The purpose of the *Changed Elements* grouping is to determine what effect the benefit group's actions will have on the selected element. Clicking the  icon allows the admin to indicate how the actions will improve the element's condition state.



Approach Slab Repair - Changed Elements							
+ Add new record							
Element	Parent	Grandparent	Origin State ▲	CS1	CS2	CS3	CS4
320 Pre Conc Appr Slab							
(320) Pre Conc Appr Slab	None	None	CS3		100		
320 Pre Conc Appr Slab	None	None	CS4		100%		
321 Re Conc Approach Slab							
321 Re Conc Approach Slab	None	None	CS3		100%		
321 Re Conc Approach Slab	None	None	CS4		100%		

Parent and grandparent combinations can be added using the *Parent* and *Grandparent* column dropdowns. These allow the admin to be specific about exactly how a benefit is applied.

**Example:** There is an element with a protective system applied. That protective system has a defect. Therefore, the grandparent > parent > child relationship would be element > protective system > defect. A benefit group can impact a specific part of that relationship without impacting the rest. So, perhaps a benefit group removes or improves the defect on the protective system without affecting any other part of the bridge.

To declare the impact the benefit group's actions have on the element, first use the *Origin State* dropdown to set the original condition state, then change the percentages in the *CS1*, *CS2*, *CS3*, and *CS4* column textboxes to add up to 100%.

**Example:** An element with an origin state of CS3 might change to 100% CS1 after being repaired by the benefit group's actions.

Click the  icon to accept the changes or the  icon to cancel the changes.

The  icon deletes the selected element from the selected benefit group.


## Removed Elements

The *Removed Elements* grouping displays the elements that are fully removed by the selected benefit group's actions.

**\*Note:** Benefit groups that perform replacement actions automatically remove defects, therefore those benefit groups do not need to include defects in the *Removed Elements* grouping.


Approach Slab Repair - Removed Elements		
+ Add new record		
Element	Parent	Grandparent
1000 Corrosion	None	None
7000 Damage	300 Strip Seal Exp Joint	None

Page size: 20 | 2 items in 1 pages

A new removed element can be added by clicking the  icon at the top of the Removed Elements grid. The *Element*, *Parent*, and *Grandparent* dropdowns allow the admin to select specifically which element is being removed.

Clicking the  icon allows the admin to edit the *Element*, *Parent*, and *Grandparent* dropdowns of existing entries.

Click the  icon to accept the changes or the  icon to cancel the changes.


The  icon deletes the selected removed element from the selected benefit group.

## Replaced Elements



The *Replaced Elements* grouping displays the existing elements and protective systems that are replaced by new elements and protective systems as a result of the selected benefit group's actions.


Deck Rehab - Replaced Elements			
+ Add new record			
Orig. Element	Orig. Parent	New Element	Percent Replaced
12 Re Concrete Deck	None	31 Timber Deck	100
510 Wearing Surfaces	16 Re Conc Top Flange	521 Conc Prot Coating	100

Page size: 20 | 2 items in 1 pages

A new replaced element can be added by clicking the  icon at the top of the Replaced Element grid. The *Orig. Element* and *Orig. Parent* dropdowns are used to determine which element or protective system will be replaced. The *New Element* dropdown determines which new element or protective system will take the place of the old one.

Clicking the  icon allows the admin to edit the *Orig. Element*, *Orig. Parent*, and *New Element* dropdowns of existing entries.





Click the  icon to accept the changes or the  icon to cancel the changes.

The  icon deletes the selected replaced element from the selected benefit group.


**\*Note:** Element replacement is only applicable to elements and protective systems.

## Created Protective Systems

The *Created Protective Systems* grouping displays the protective systems that are added as a result of the selected benefit group's actions.

Deck Rehab - Created Protecting Systems		
+ Add new record		
Element	Parent	Percent Coverage
521 Conc Prot Coating	321 Re Conc Approach Slab	70  
510 Wearing Surfaces	31 Timber Deck	100  

Page size: 20 2 items in 1 pages



A new created protective system can be added by clicking the  icon at the top of the Created Protective Systems grid. The *Element* and *Parent* dropdowns are used to determine which protective system will be added to which element. The *Percent Coverage* textbox determines how much of the element the new protective system covers.

Clicking the  icon allows the admin to edit the *Element* and *Parent* dropdowns and *Percent Coverage* textbox of existing entries.


Click the  icon to accept the changes or the  icon to cancel the changes.

The  icon deletes the selected created protective system from the selected benefit group.


## Fields

Approach Slab Repair Fields			
+ Add new record			
Table Name ▲	Column Name ▲	New Value	Increment
inspevnt	dkrating	8 	

Page size: 20 1 items in 1 pages

The *Fields* grouping displays the fields that are impacted by the selected benefit group's actions. A new field can be added by clicking the  at the top of the Fields grid.

The *Fields* grouping contains specific columns of specific tables within the system that are changing due to the action.

Clicking the  icon allows the admin to indicate how the action will change the field's value or increment. The *Value* textbox is used if the admin wants to specify the exact number the field will change to because of the action. The *Increment* textbox is used if the admin wants to specify how much of an increase or decrease will occur to the number in the field. Only one option - Value or Increment - can be used for one field.


**\*Note:** To locate a specific table or column name, use the tooltips feature and hover the mouse over the desired location in the system to discover the table and column name.


Click the  icon to accept the changes or the  icon to cancel the changes.

The  icon deletes the selected field from the selected benefit group.

## Risks

Deck Rehab Risks- to reduce risk, use negative values		
Assessment Name ▲	New Value	Increment
Accident	NULL	-5

The *Risks* grouping displays the risk assessments that are impacted by the selected benefit group's actions. A new assessment benefit can be added by clicking the  at the top of the Risks grid.

Clicking the  icon allows the admin to indicate how the action will change the assessment's risk level. The *Value* textbox is used if the admin wants to specify the exact risk level the assessment will change to because of the actions. The *Increment* textbox is used if the admin wants to specify how much of an increase or decrease will occur to the risk level of the assessment. Only one option - Value or Increment - can be used for one assessment.

**\*Note:** As shown in the grouping title, use negative values to reduce risks.

Click the  icon to accept the changes or the  icon to cancel the changes.

The  icon deletes the selected assessment from the selected benefit group.

## Benefit Groups Page Controls

Click the *Save* button to save the changes for the selected benefit group.

Click the *Copy Group* button to make a copy of the selected benefit group. The copy will include all of the elements, risks, and fields for the benefit group, but it will not include the child group links.

# Actions Defs

The *Admin > Modeling Config > Action Defs* task is used to create and define actions, link actions with benefit groups, and determine the cost per unit of the elements associated.

Admin > Modeling Config > Action Defs

Action Defs

Search

Name	Description	Notes	Order	Network Level	Bridge Replace	Required Minimum Cost	Action Type	
INVALID ACTION-DELETE	Invalid Action is default w/	This was created because	0	<input type="checkbox"/>	<input type="checkbox"/>	\$	Joins	<span style="color: red;">✕</span>
▶ 12 Wash/Clean	12 RC Deck Wash/Clean		50	<input type="checkbox"/>	<input type="checkbox"/>			<span style="color: red;">✕</span>
▶ 12 Clean Drainage	12 RC Deck Clean Drainage		60	<input type="checkbox"/>	<input type="checkbox"/>			<span style="color: red;">✕</span>
▶ 12 Repair Drainage	12 RC Deck Repair Drainage		70	<input type="checkbox"/>	<input type="checkbox"/>			<span style="color: red;">✕</span>
▶ 12 Replace Drainage	12 RC Deck Replace Drainage		80	<input type="checkbox"/>	<input type="checkbox"/>			<span style="color: red;">✕</span>
▶ 12 AC Overlay	12 RC Deck AC Overlay		90	<input type="checkbox"/>	<input type="checkbox"/>		Approach	<span style="color: red;">✕</span>
▶ 12 AC Removal	12 RC Deck AC Removal		100	<input type="checkbox"/>	<input type="checkbox"/>			<span style="color: red;">✕</span>
▶ 12 Patch AC	12 RC Deck Patch AC		110	<input type="checkbox"/>	<input type="checkbox"/>			<span style="color: red;">✕</span>
▶ 12 Replace AC	12 RC Deck Replace AC		120	<input type="checkbox"/>	<input type="checkbox"/>		Other	<span style="color: red;">✕</span>
▶ 12 Seal ACWS	12 RC Deck Seal ACWS		130	<input type="checkbox"/>	<input type="checkbox"/>			<span style="color: red;">✕</span>
▶ 12 Install Membrane	12 RC Deck Install Membrane		140	<input type="checkbox"/>	<input type="checkbox"/>			<span style="color: red;">✕</span>
▶ 12 Thin Overlay	12 RC Deck Thin Overlay		150	<input type="checkbox"/>	<input type="checkbox"/>			<span style="color: red;">✕</span>
▶ 12 Rigid Overlay	12 RC Deck Rigid Overlay		160	<input type="checkbox"/>	<input type="checkbox"/>			<span style="color: red;">✕</span>
▶ 12 Fill Wheel Ruts	12 RC Deck Fill Wheel Ruts		170	<input type="checkbox"/>	<input type="checkbox"/>			<span style="color: red;">✕</span>
▶ 12 Seal Concrete	12 RC Deck Seal Concrete		180	<input type="checkbox"/>	<input type="checkbox"/>			<span style="color: red;">✕</span>

First Previous 1 2 3 4 5 6 7 8 9 10 Next Last

Associated Benefit Groups for Action INVALID ACTION-DELETE

Metric  English

Benefit Groups		Overriding Direct Cost (overrides unit-costs)											
<div style="border: 1px solid #ccc; padding: 2px;">           Please Select <span style="float: right; border: 1px solid #ccc; padding: 2px 5px;">Add</span> </div> No records		<input type="checkbox"/> Deck Area <span style="float: right;">\$ <input type="text"/></span>											
Unit Costs <input type="text"/>		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #003366; color: white;"> <th>ID</th> <th>Element Name</th> <th>Cost Per Unit</th> <th>Unit</th> <th>?</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>		ID	Element Name	Cost Per Unit	Unit	?					
ID	Element Name	Cost Per Unit	Unit	?									

Save

## Action Defs

The *Action Defs* grouping contains the Action grid with all of the actions in the system. To search for a specific action, type the action into the textbox next to the *Search* button and then click the button. The search operates under a partial match, therefore anything containing the words typed into the textbox (in that exact order) will be displayed in the search results. To select an action, click the ▶ icon for that action.

The *Sort Order* column textboxes are used to designate a particular order for the actions in the Action grid. By default, the actions are in alphabetical order. However, numerical values (starting with 1) can be entered into the *Sort Order* column textboxes to place the selected action to the top of the Action grid.

### Add New Action Def

To add a new action def, use the empty entries at the top of the Action grid. Complete the *Name*, *Description*, and *Notes* textboxes for the action.

The *Order* textbox is used to designate a particular order for the actions in the Action grid. The actions that do not have an order number are sorted alphabetically. Actions with a number order, starting with "1," will appear ahead of the unnumbered actions in the Action grid.

The **Network Level** checkbox indicates whether or not the action is a network-level action. If this box is checked, the action can then be added to a network policy on the *Admin > Modeling Config > Network Policies* subtask to then be used in the *Program* tab to automatically generate projects for the program.

The **Bridge Replace** checkbox indicates that the selected action is part of a bridge replacement. It is a marker used in LCCA policies and does not have an actual function associated with it.

The **Required Minimum Cost** field indicates the minimum cost an action must meet (cost per unit \* total units) in order to appear as an option within a program's generated work items. This threshold ensures that BrM does not recommend actions that have improbably low costs for which agencies would not perform work.

**\*Note:** The required minimum cost can be set for both an entire program (in the *Programs* tab) as well as for individual actions. Undesirable results can occur if an inexperienced user incorrectly sets these values. It is highly recommended that the required minimum cost only be set at the overall program level until users become more familiar with how the values can change the program generation process.

The **Action Type** dropdown is used to group together specific actions by type so that they can be filtered on the *Inspection > Work > Work Candidates* subtask. New action types can be created on the *Admin > General Config > Parameters* task using the `pon_flexactions_sets - flex_type` parameter.

When the desired selections have been made for the new action, click the **Add** button.

To delete an action, click the **X** icon for the desired action.

## Associated Benefit Groups for Action

The *Associated Benefit Groups for Action* grouping ties the selected action in the Action grid with one or more benefit groups and then allows the admin to estimate the cost of the action.

**\*Note:** Benefit groups can be shared between actions.

The screenshot shows the 'Associated Benefit Groups for Action Preserve Deck - Network' configuration window. It features a 'Benefit Groups' dropdown menu on the left with 'Seal Joints' and 'Thin Bonded Overlay' selected, and an 'Add' button. The main area is divided into several sections:

- Overriding Direct Cost (overrides unit-costs):** A table with columns 'Enabled', 'Field Name', 'Cost Per Unit', and 'Unit'. It shows 'Deck Area' with a cost of \$5 and unit of sq.ft.
- Unit Costs:** A table with columns 'ID', 'Element Name', 'Cost Per Unit', 'Unit', and a delete icon. It lists elements like 'Strip Seal Exp Joint' (ID 300, \$18/ft), 'Pourable Joint Seal' (ID 301, \$5/ft), 'Compressn Joint Seal' (ID 302, \$65/ft), and 'Thin Bonded Polymer' (ID 512, \$5/sq.ft).
- Indirect Cost:** A table with columns 'Enabled', 'Component', and 'Estimation Method'. It shows 'Total Indirect Cost' with a 'Percentage' estimation method.
- Deferment Rules:** A table with columns 'Action Name' and 'Deferment Interval (Years)'. It shows 'Preserve Deck - Network' with a 5-year interval.

To add a benefit group to the selected action, use the **Add a Benefit Group** dropdown to make a selection and then click the **Add** button. Once a benefit group is linked to the action, the benefit group's associated elements will appear in the Unit Cost feature.

To remove a benefit group from the action, click the  icon for the desired benefit group.

**\*Note:** If changes have been made to a benefit group on the *Admin > Modeling Config > Benefit Groups* subtask after the benefit group has been added to the action, those changes will be reflected. The benefit group does NOT need to be removed and re-added to the action in order for those changes to be present.

Before making changes to the various cost sections, use the radio buttons in the top right corner of the *Associated Benefit Groups for Action* grouping to determine whether units will be in "Metric" or "English."

### Overriding Direct Cost





The Overriding Direct Cost feature allows the admin to override unit costs by basing the overall direct cost of the action off of deck area square footage.

Overriding Direct Cost (overrides unit-costs) 			
Enabled	Field Name	Cost Per Unit	Unit
<input type="checkbox"/>	Deck Area	\$ 5 <input type="text"/>	sq.ft

To use the Overriding Direct Cost feature, check the *Enable* checkbox. This will make the Overriding Direct Cost's *Cost Per Unit* textbox available for a cost per unit to be entered. This feature will then override the information entered into the Unit Costs feature.



### Unit Costs


The Unit Costs feature is used to estimate an action's direct cost based on the cost per unit of the associated benefit group's elements.

Unit Costs 					
ID	Element Name	Cost Per Unit	Unit	?	
300	Strip Seal Exp Joint (Replacing Strip Seal Exp Joint)	\$ 18 <input type="text"/>	ft	<input checked="" type="checkbox"/>	
301	Pourable Joint Seal (Replacing Pourable Joint Seal)	\$ 5 <input type="text"/>	ft	<input checked="" type="checkbox"/>	
302	Compressn Joint Seal (Replacing Compressn Joint Seal)	\$ 65 <input type="text"/>	ft	<input checked="" type="checkbox"/>	
512	Thin Bonded Polymer (Created on Re Concrete Deck)	\$ 5 <input type="text"/>	sq.ft	<input checked="" type="checkbox"/>	

All of the elements tied to the benefit groups that have been linked to the action will appear in the Unit Costs feature. Use the *Cost Per Unit* textbox to add an element's cost. The unit cost is calculated based on the portion of an element that changes due to the action, not the entire size of the element.

**Example:** 200 square feet of a 500 square foot deck is in CS3 and will be repaired. The other 300 square feet are in CS1. If the cost per unit of the deck is \$100, the direct cost would calculate to be \$20,000, not \$50,000, because only the repaired portion factors into the calculation.

The ? column will contain a green box -  - for elements tied to one of the action's benefit groups. However, when a benefit group is deleted from the action, the elements from that benefit group remain in the Cost Per Unit grid and the ? column box turns red -  - for those elements. The red box indicates that the element is still tied to the action but is no longer tied to a benefit group.

To remove an element from the action, click the  icon for the desired element.

**\*Note:** An element can be removed from the action even if that element's benefit group is still associated with the action. Deleting the element from the action does not remove the element's tie to the benefit group on the *Admin > Modeling Config > Benefit Groups* subtask.

## Indirect Cost

The Indirect Cost feature allows the admin to estimate an indirect cost in addition to the direct cost. The indirect cost is based on a percentage of the direct cost or a custom agency formula.

Indirect Cost		
Enabled	Component	Estimation Method
<input type="checkbox"/>	Total Indirect Cost	Percentage

To use the Indirect Cost feature, check the **Enable** checkbox. This will make the dropdown available to select "Percentage," "Flat Indirect Cost," or a custom agency formula. The custom agency formulas are created on the *Admin > Modeling Config > Advanced Formulas* task using the "IndirectCostFormula" context.

If "Percent" is selected from the dropdown, use the textbox to enter a value. This value will be a percentage of the direct cost.

If "Flat Indirect Cost" is selected from the dropdown, use the textbox to enter a flat cost for the action. This ensures that benefit groups that change a field instead of an element, such as changing the deck NBI rating, will still have a cost reflected in the analysis.

**Example:** If the direct cost is \$10,000 and the admin enters "25" as the indirect cost percentage value, the indirect cost will be 25% of \$10,000 = \$2,500.

If a custom agency formula is chosen from the dropdown, the textbox will become read only and display the formula being used.

## Deferment Rules

The Deferment Rules feature allows the admin to establish rules that defer specific actions for a period of time based on the application of the current action.

Deferment Rules		
Action Name	Deferment Interval (Years)	
Please Select		Add
Preserve Deck - Network	5	X

Use the **Action Name** dropdown to select an action to defer. Once an action is selected, use the **Deferment Interval** textbox to enter a value (in years) of how long the action will be deferred after the application of the current action. When the desired selections have been made, click the **Add** button to add the deferment rule.

To remove a deferment rule from the action, click the **X** icon for the desired deferment rule.

## Action Defs Page Controls

Click the **Save** button to save the changes made to the selected action. Multiple actions can have their details changed prior to saving.



# Cost Index

The *Admin > Modeling Config > Cost Index* task allows the admin to normalize all future costs to a base year to adjust for inflation, material costs, etc. Each cost index created is tied to a specific year and its value represents how costs are expected to change in that year. The cost index value is typically a projection of the cost of specific materials an agency needs for bridge construction.

The cost indexes established can then be used on the *Analysis > LCCA* task to ensure inflation is taken into account throughout the life-cycle cost analysis.

However, agencies do not need to use the cost index. The analysis includes an option for a flat 4% inflation that can be used in place of the cost index.

Effective Year	Value	
Please Select	\$	Add
2015	\$141.63	X
2016	\$146.21	X

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BrM Version 5.2.3 (RC 1) [Build Date: Friday September 2, 2016]  
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Save

Select a year from the *Effective Year* dropdown and then use the *Value* textbox to enter the desired value for that year.

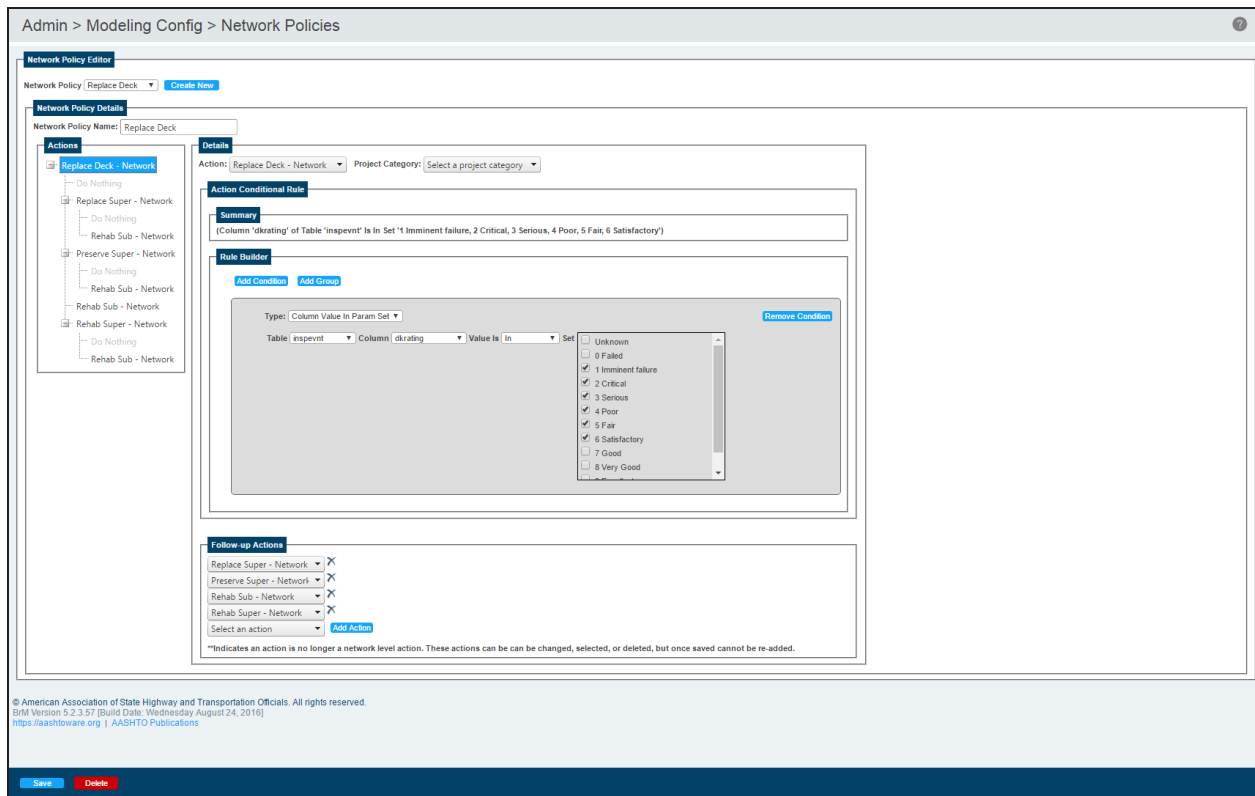
Once the information is entered, select the *Add* button to add the cost index.

To delete a cost index, click the *X* icon next to the cost index.

Select the *Save* button at the bottom of the screen to save the new cost indexes.

# Network Policies

The *Admin > Modeling Config > Network Policies* task is used to establish and manage an agency's network policies. Network policies consist of a main network-level action and a series of follow-up network-level actions. Network-level actions are set on the *Admin > Modeling Config > Action Defs* subtask. Network policies are used within the *Programs* tab to automatically generate projects for the program.

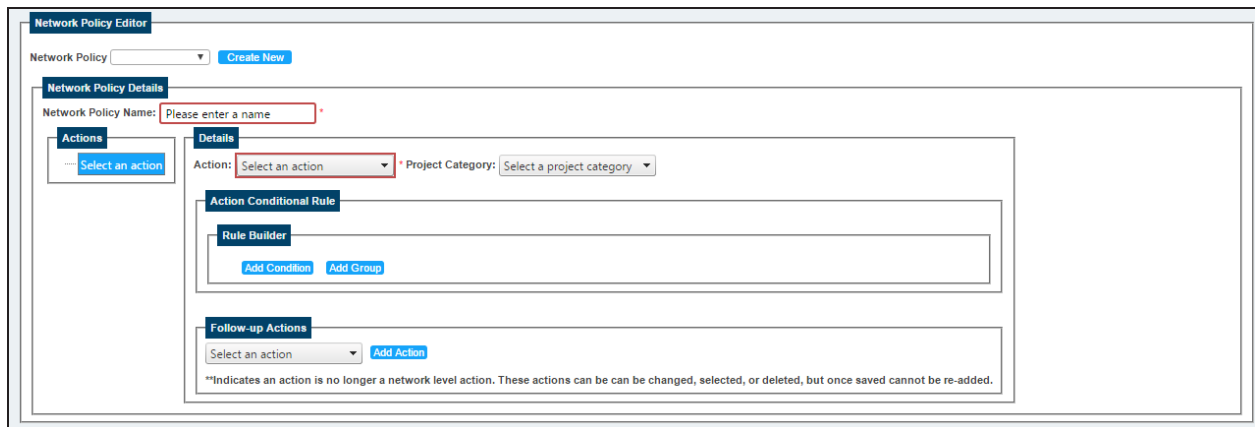


The *Network Policy* dropdown is used to select which existing network policy to view and edit.

The *Create New* button creates a new network policy.

## Create a New Network Policy

If no network policies have been created, the *Network Policies* subtask will default to the creation screen. If there are existing network policies, select the *Create New* button from the footer.



Use the **Policy Name** textbox to name the network policy. This will be used in the *Network Policies* grouping of the *Programs > Create/Edit Programs* task.

## Actions

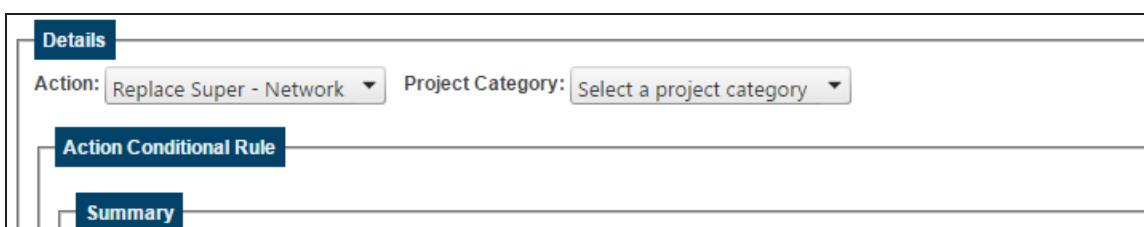
The *Actions* grouping contains a tree that displays the network policy's main action and the follow-up actions nested within. When it reads "Select an action," no main network-level action has been chosen yet. This must be done in the *Details* grouping.

Actions can be nested up to three levels deep, meaning the main action can have follow-up actions nested within, and those follow-up actions can have their own follow-up actions nested within.

Use the +/- icons in the tree to expand/minimize the various actions in the tree. To view and edit the selections for a specific action within the tree, select the action. That action's nesting information will appear in the *Details* grouping and can be edited.

## Details

The *Details* grouping is used to assign the main network-level action and follow-up network-level actions to the network policy.



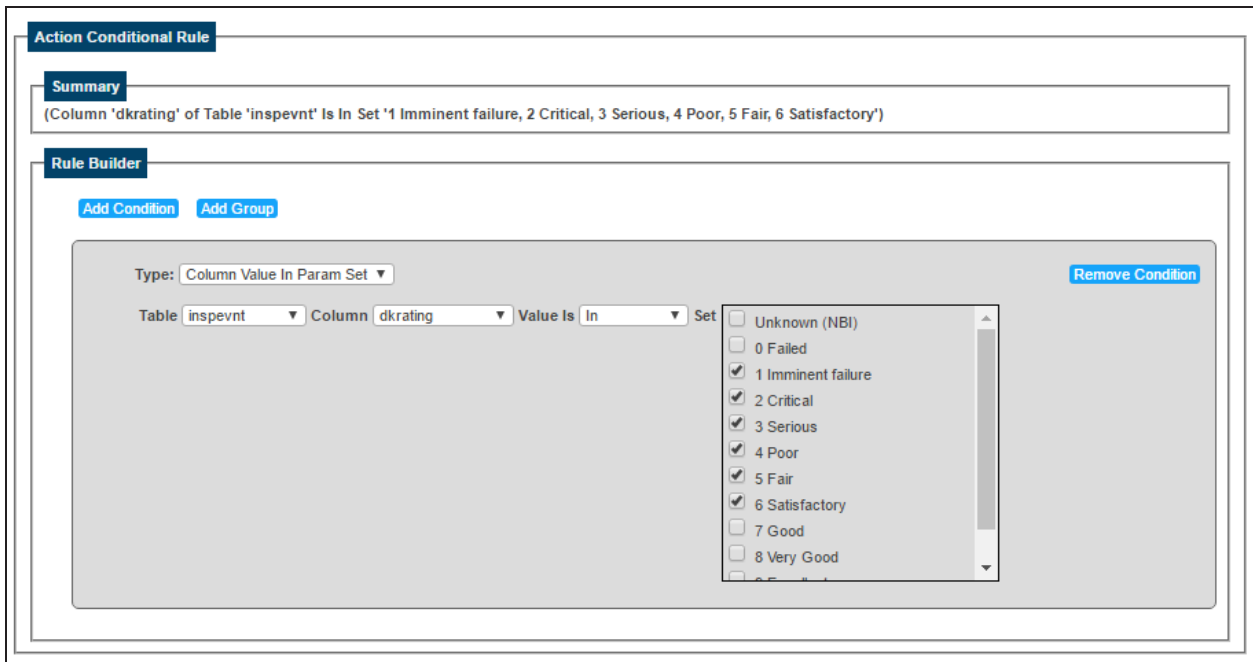
The screenshot shows a software interface with a tabbed layout. The top tab is labeled 'Details' and is currently selected. Below the tab, there are two dropdown menus. The first is labeled 'Action:' and has 'Replace Super - Network' selected. The second is labeled 'Project Category:' and has 'Select a project category' selected. Below these are two more tabs: 'Action Conditional Rule' and 'Summary', both of which are currently collapsed.

The **Action** dropdown is for the action currently selected in the *Actions* grouping. When creating a new network policy, this control will be for the main action because no actions will yet be present to select in the *Actions* grouping. Only actions that have been designated as network-level actions on the *Admin > Modeling Config > Action Defs* subtask will appear in the dropdown list. Once an action is selected and the network policy is saved, the action will appear in the *Actions* grouping.

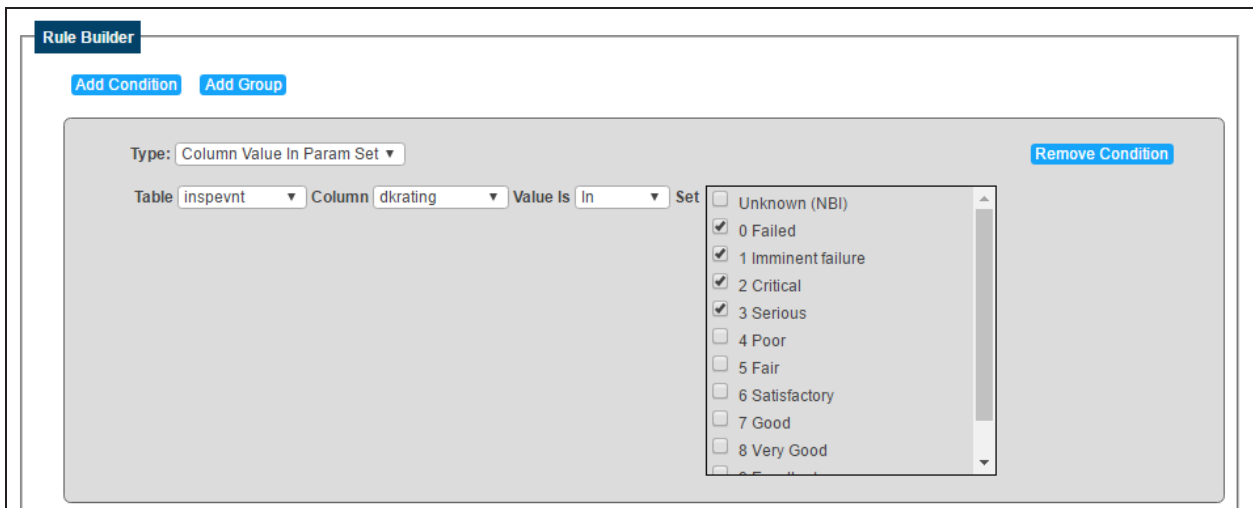
The **Project Category** dropdown allows the admin to link the specific action to a project category. This ensures that when a program is optimized, each project included in the program can have a project category.

### Action Conditional Rule

The *Action Conditional Rule* grouping is used to build the rule that determines whether or not the selected action will be activated.



The *Add Condition* button adds a condition to the rule. The *Add Group* button groups together multiple conditions. The following screenshots displays a lone condition and conditions within a group:



**Group**

[Add Condition](#) [Add Group](#) [Remove Group](#)

Type: Column Value In Param Set Remove Condition

Table: inspevnt Column: dkrating Value Is: In Set:

- Unknown (NBI)
- 0 Failed
- 1 Imminent failure
- 2 Critical
- 3 Serious
- 4 Poor
- 5 Fair
- 6 Satisfactory
- 7 Good
- 8 Very Good

AND

Type: Column Value In Param Set Remove Condition

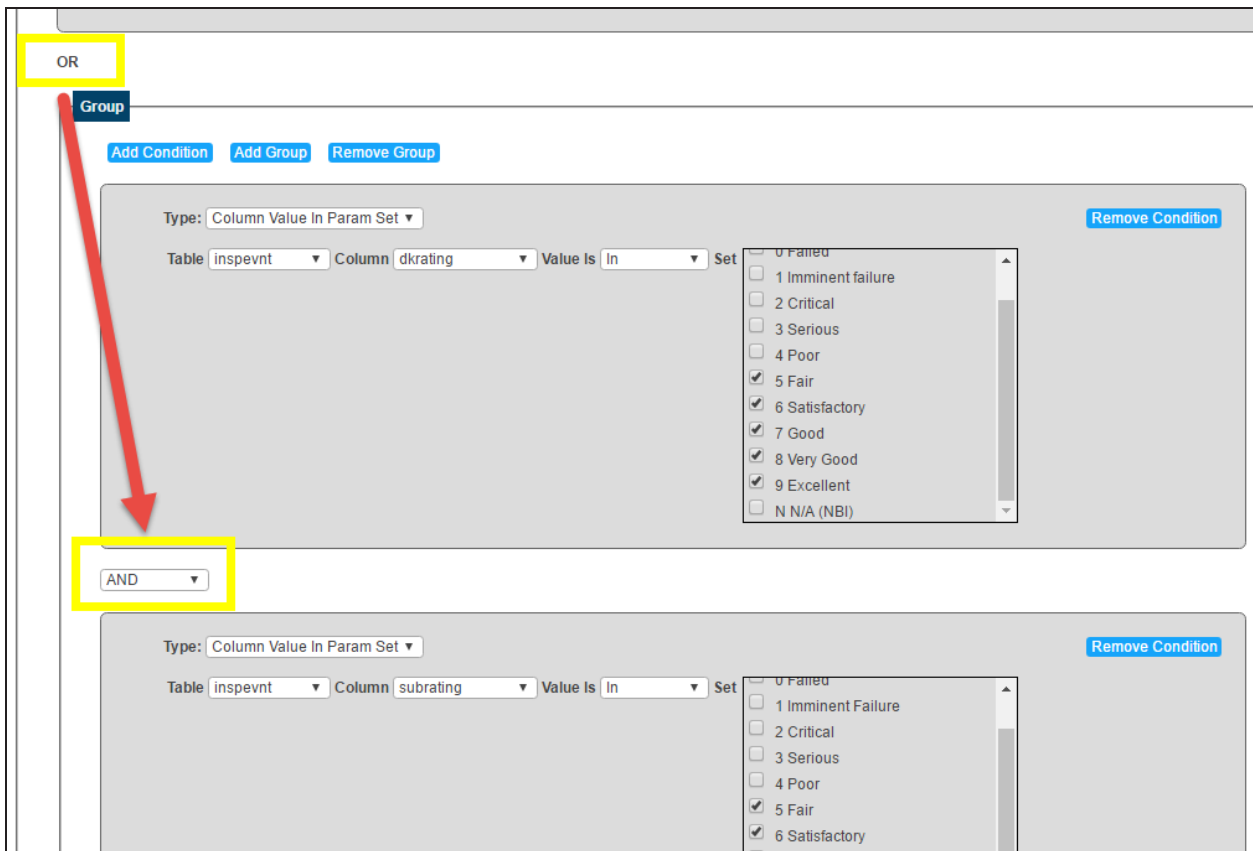
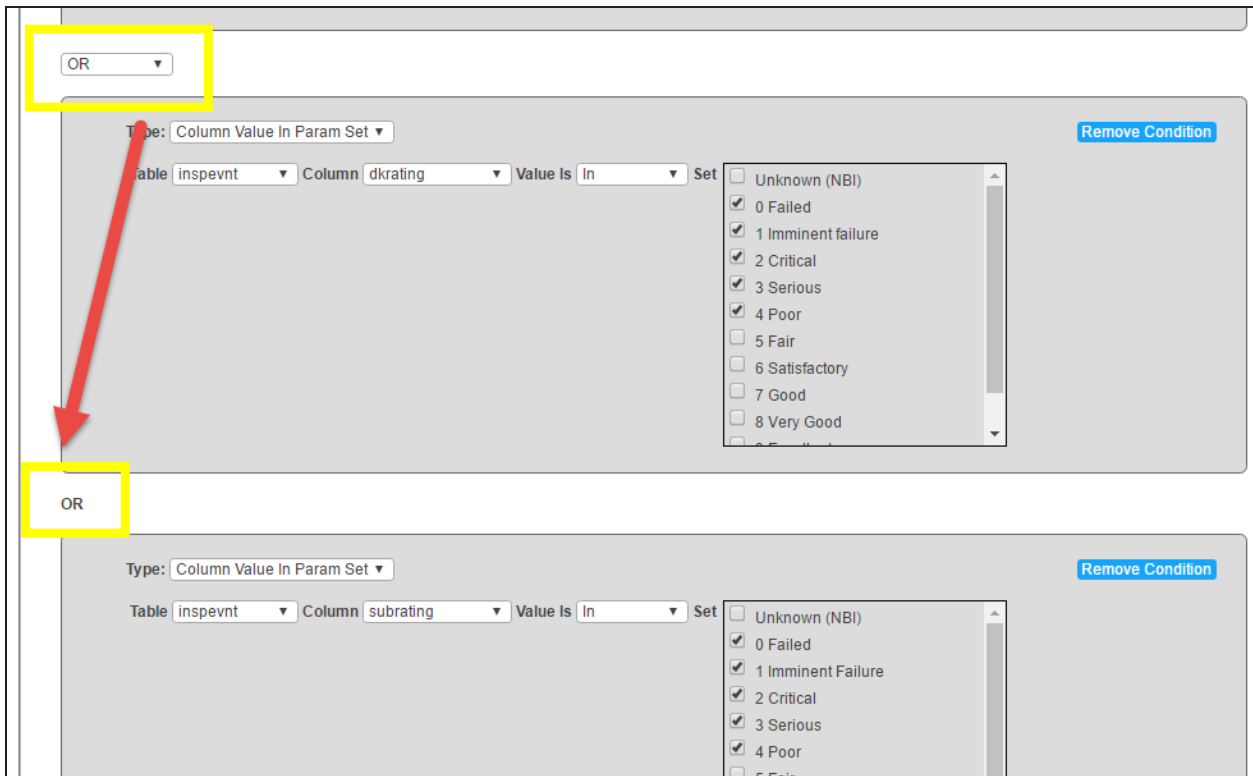
Table: inspevnt Column: subrating Value Is: In Set:

- Unknown (NBI)
- 0 Failed
- 1 Imminent Failure
- 2 Critical
- 3 Serious
- 4 Poor
- 5 Fair
- 6 Satisfactory
- 7 Good
- 8 Very Good

Use the *Type* dropdown to establish the type of condition:

- **Column Value in Param Set** - The table column's value is compared to a set of possible values.
- **Column Value** - The table column's value is compared to one value.

When multiple conditions are added to the rule, whether inside a group or not, the conditions operate under an "And/Or" system. This means that conditions can work in tandem with each other or as alternatives to each other, but it cannot be a mixture. Once a selection is made from the *And/Or* dropdown, all other conditions added will operate under the same selection. The only exception is that individual groups of conditions can have a different selection than the overall policy rule. The following screenshots display these concepts:



The *Remove Condition* button removes the condition from the rule.

The *Remove Group* button removes the group, and all conditions within, from the rule.

## Follow-Up Actions

The *Follow-up Actions* dropdown allows the admin to add follow-up actions to the action currently selected in the *Actions* grouping.

Again, when creating a new network policy, this control will be for the main action's follow-up actions because no actions will yet be present to select in the *Actions* grouping. Only actions that have been designated as network-level actions on the *Admin > Modeling Config > Action Defs* subtask will appear in the dropdown list. Once an action is selected, click the *Add Action* button next to the dropdown to nest the selected follow-up action into the main action in the *Actions* grouping. To delete a follow-up action, click the **X** next to the action.

**\*Note:** The note at the bottom of the *Follow-up Actions* grouping states that network-level actions that have since lost their network-level permission (this would be removed on the *Admin > Modeling Config > Action Defs* subtask) will be marked with a "\*\*." Therefore, if the action is removed and the network policy is saved, that cannot be re-added to the policy unless the network-level permissions are granted again.

## Network Policies Page Controls

The *Save* button saves any changes made to the selected network policy.

The *Delete* button deletes the selected network policy.

# Advanced Formulas

The *Admin > Modeling Config > Advanced Formulas* task allows the admin to create and/or modify formulas used for various calculations, including: utility, deterioration modeling, protective systems, and more.

## Select Formula/Context

The *Select Formula/Context* grouping is used to determine which existing formula will be modified or where the new formula will be utilized.

The *Context* dropdown distinguishes where the formula will be used:

- **Deterioration** - The formula will be used for the deterioration modeling calculations. These formulas are selectable on the *Admin > Modeling Config > Element Spec* task. These formulas are for additional effects and do not override the default deterioration model formulas.
- **ProtSystem** - The formula will be used for the protective systems calculations. These formulas are automatic and therefore not selectable. These formulas estimate the overall protective factor of an element's protective systems.
- **Custom** - The formula will be used for the utility scaling calculations on the *Admin > Modeling Config > Utility* task.
- **IndirectCostFormula** - The formula will be used for the indirect cost calculation on the *Admin > Modeling Config > Action Defs* subtask.
- **LCCA** - The formula will be used for the LCCA user cost calculation on the *Admin > Modeling Config > Preservation and Replacement Policy* subtask.
- **UtilBaseValue** - The formula will be used for estimating the base values of utility criteria on the *Admin > Modeling Config > Utility* task.
- **StructureWeights** - The formula will be used for determining structure weights for programs on the *Programs > Create/Edit Programs* task.

The *Formula* dropdown is dependent upon the selection made in the *Context* dropdown. The selected context's formulas will appear in the *Formula* dropdown, as well as a "<New Formula>" option for the Deterioration and Custom contexts. New formulas cannot be created for the ProtSystem context.



The **New** button is an additional way to create a new formula in the Deterioration and Custom contexts. The **New** button will be read only if the ProtSystem context is selected.

## Formula Detail

The *Formula Detail* grouping is used to specify the details of the selected context/formula.

The **Formula Name** textbox contains the formula's unique name that is used in other areas of the software.

The **Formula** textbox houses the actual formula. The formula can be typed manually or the *Expressions* grouping can be used to insert specific expressions. If the formula is not valid, an error will appear upon attempting to save.

The **Formula's Description** textbox allows the admin to include any relevant notes about the formula.

## Expressions



The *Expressions* grouping houses the expressions necessary to create a formula. Using the *Expressions* grouping is not mandatory. Expressions can be entered into the formula manually, but using the *Expressions* grouping ensures that all expressions are accurate. Below are the available types of expressions:

- **Advanced Functions** - The Advanced Functions branch contains advanced mathematical functions.
- **Basic Arithmetic** - The Basic Arithmetic branch contains basic mathematical functions.
- **Database Fields** - The Database Fields branch contains all of the calculable fields throughout the system.
- **Prot\_sys** - The Prot\_sys branch contains the 4 protective system slots available for elements.

Once the expression is selected, click the **Insert** button to insert it into the **Formula** textbox.

The **Replace** button replaces a portion of the formula with the selected expression by highlighting the desired portion of the formula and clicking **Replace**.

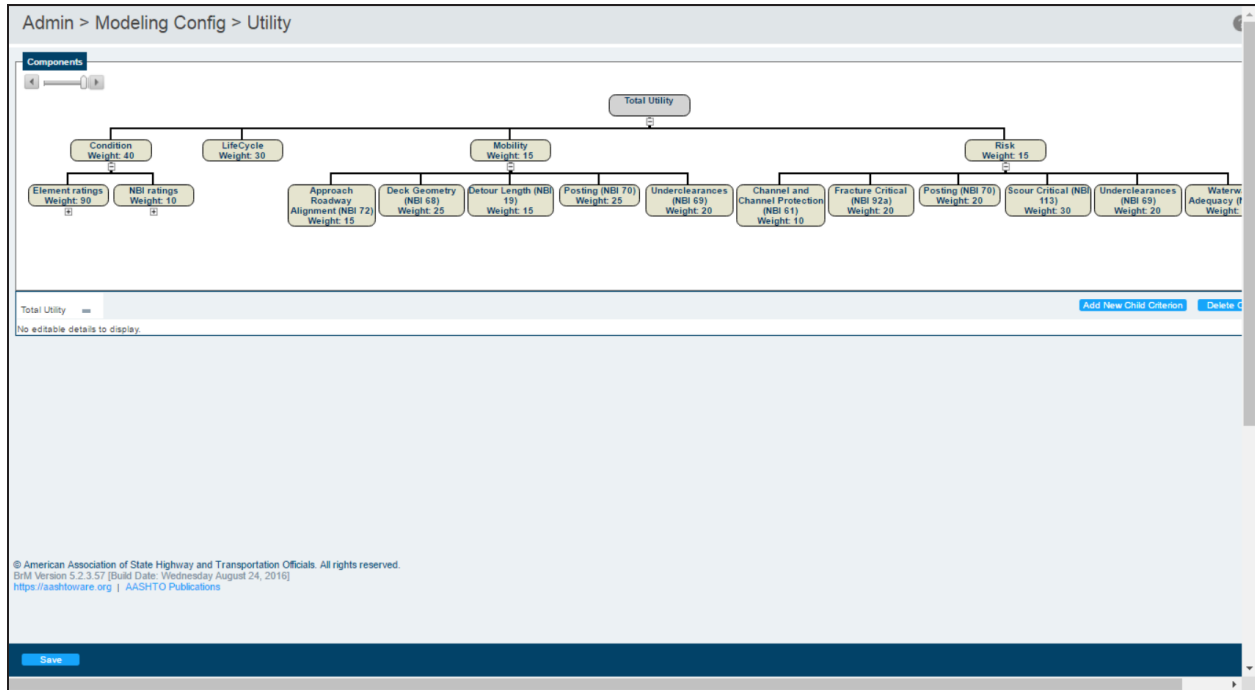
## Advanced Formula Page Controls

Click the **Save** button to save the currently selected formula.

Click the **Delete** button to delete the currently selected formula. The ProtSystem context formulas cannot be deleted.

# Utility

The *Admin > Modeling Config > Utility* task allows the admin to establish the scaling and weight of the criteria used to evaluate the performance of a bridge. The utility values are used in the *Analysis* and *Projects* tabs.



## Create/Edit Criterion

To create a new criterion, select the desired parent criterion in the utility tree and click the *Add New Child Criterion* button. To edit an existing criterion, select the desired criterion. Whether creating a new criterion or editing an existing criterion, the following settings will appear:

### Criterion Properties

The *Criterion Properties* grouping is used to determine from where in the software the value will be pulled and the weight of the criterion as compared to the other criteria that make up the parent criterion.

The screenshot shows the 'Criterion Properties' form for a criterion named 'Culverts'. The form has a title bar 'Culverts' and a sub-header 'Criterion Properties'. It contains four input fields: 'Name' with the value 'Culverts', 'Weight' with the value '1', 'Type' with a dropdown menu set to 'Field', and 'Table' with a dropdown menu set to 'inspevnt'. There is also a 'Column' dropdown menu set to 'culvrating'.

#### Name

The *Name* textbox determines the name of the criterion as it will be displayed in the utility tree and throughout the software.

#### Weight

The *Weight* textbox determines the importance or significance of the criterion to the parent criterion. The value of the parent criterion is the weighted average of all of the child criteria, therefore if child A has a weight of 10 and child B

has a weight of 1, child A will have a much greater impact on the parent criterion's value.

### Type

The **Type** dropdown determines from where the base value of the criterion will come. The type can be a field, assessment, element, or element group. Additional controls will appear on the page based on which type is selected.

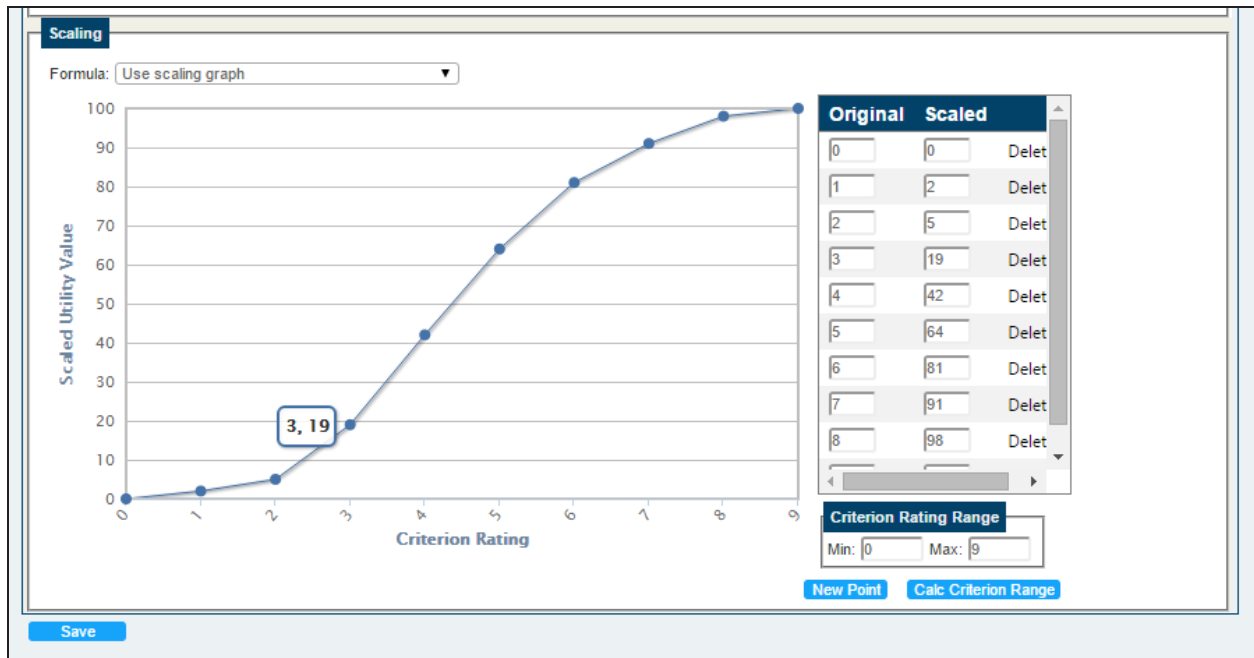
### Scaling

The **Scaling** grouping is used to determine how the criterion will be scaled. The different types of criteria that can be added to the utility tree have various rating systems. For instance, NBI condition ratings are 0-9, whereas element ratings are 0-100.

The **Scaling** grouping uses either the scaling graph or a selected formula to map all of the criteria within a node to a single scale. Therefore, when all of the nodes meet to make-up the Total Utility node, they will be on the same scale.

### Scaling Graph

To use the Scaling Graph, select it from the **Formula** dropdown.

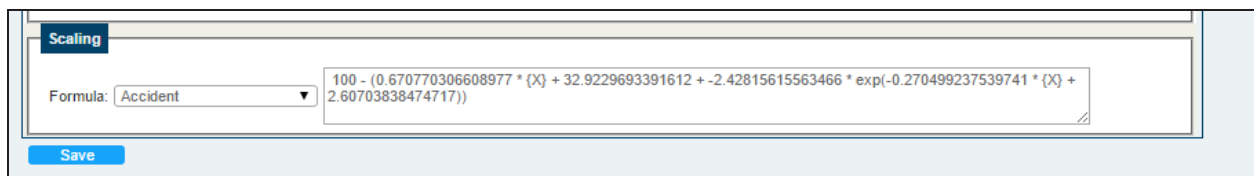


The **Criterion Rating Range** grouping determines the original minimum and maximum ratings for the criterion. New points can be added by either clicking on the desired location of the graph or clicking the **New Point** button and entering the desired values into the table.

If the selected type is "Field," there will also be an additional button - **Calc Criterion Range** - that provides a recommended scale breakdown based on the minimum and maximum rating range.

### Formula

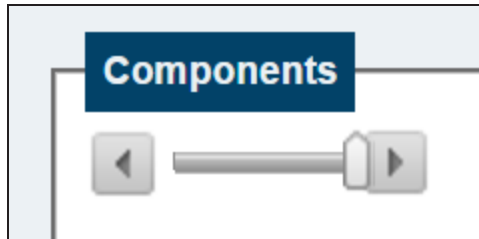
To use a formula, select the desired formula from the **Formula** dropdown. Administrators can create custom formulas on the *Admin > Modeling Config > Advanced Formulas* task.



## Utility Page Controls

### Zoom In/Out

Depending on the size of the utility tree and the parent criteria that are expanded, it may be necessary to zoom out or zoom in on the utility tree.



Use the left and right arrow buttons or click, hold, and drag the bar to get the desired view.

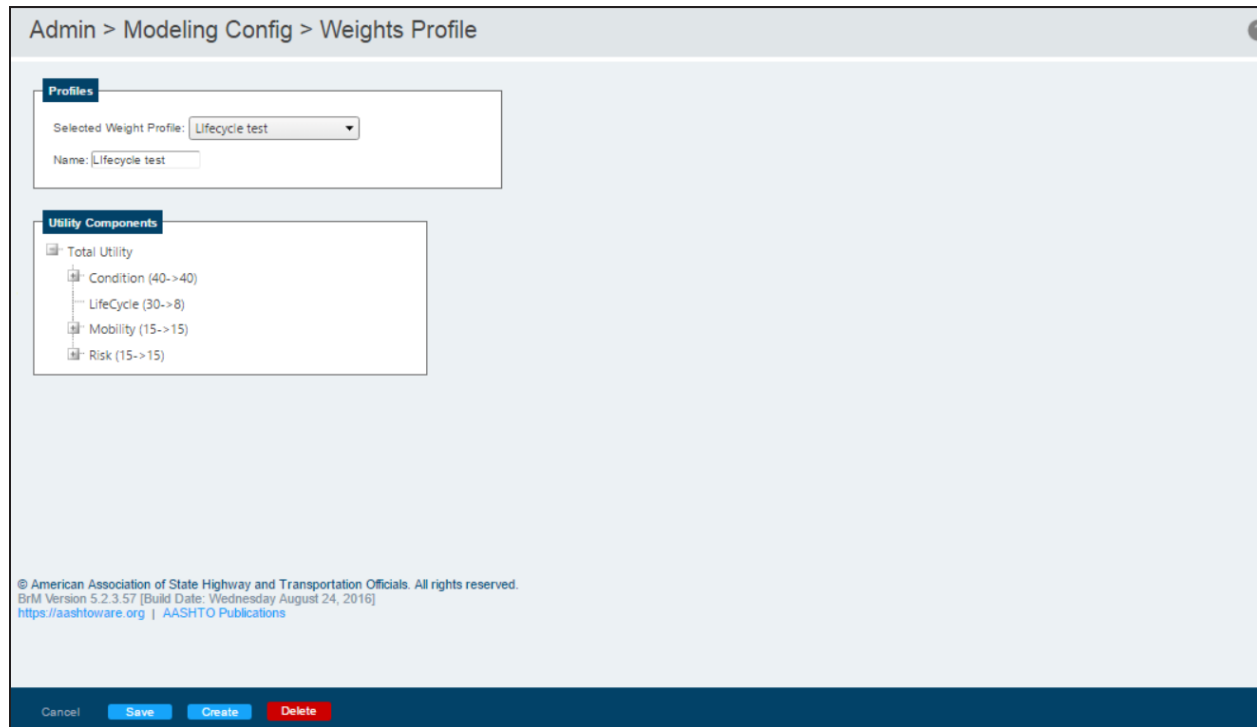
### Save and Delete Controls

To save the new or modified criterion, click the *Save* button.

To delete a criterion, select the desired criterion and click the *Delete Criterion* button.

# Weights Profile

The *Admin > Modeling Config > Weights Profile* task is used to create new utility profiles. The profiles allow the admin to override the default utility weights determined on the *Admin > Modeling Config > Utility* task.



## Profiles

To create a new weights profile, select the *Create New* button.

If desired, use the *Name* textbox to establish a unique name for the weights profile.

## Utility Components

The *Utility Components* grouping contains a tree view with contents identical to the *Admin > Modeling Config > Utility* task's graphic display. When an item in the tree is selected, the *Criterion's Details* grouping will appear:

The screenshot displays two panels. The left panel, titled "Utility Components", shows a tree structure under "Total Utility". The tree includes "Condition (40->40)", "Element ratings (90->90)", "NBI ratings (10->10)", "LifeCycle (30->30)", "Mobility (15->0)", and "Risk (15->0)". Under "NBI ratings", there are "Culverts (33->33)", "Deck (33->40)", "Substructure (33->33)", and "Superstructure (33->33)". The "Deck (33->40)" item is highlighted with a blue box. The right panel, titled "Deck Criterion's Details", shows "Default Sibling Total Weight: 132", "Default Weight: 33 25%", "Override Sibling Total Weight: 139", and "Override Weight: 40 28%". The "Override Weight" value "40" is in a yellow-bordered text box. A blue "Reset to Default" button is located below the details.

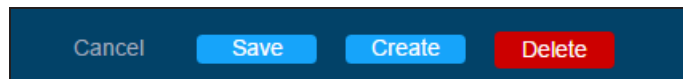
## Criterion's Details

The **Override Weight** textbox allows the admin to change the weight of the selected criterion. Once changed, the displayed "Override Sibling Total Weight" value and the override weight's percentage will change to display the updated information.

The change in a criterion's utility weight will be used on the *Programs > Create/Edit Program* task. When a program is assigned a utility weights profile, that profile aids the optimization process in determining which projects to assign to the program.

The **Reset to Default** button resets the changed value back to the default value from the *Admin > Modeling Config > Utility* task. The value can be reset at any time, even after the new value has been saved.

## Weights Profile Page Controls



Click **Create** to create a new weights profile.

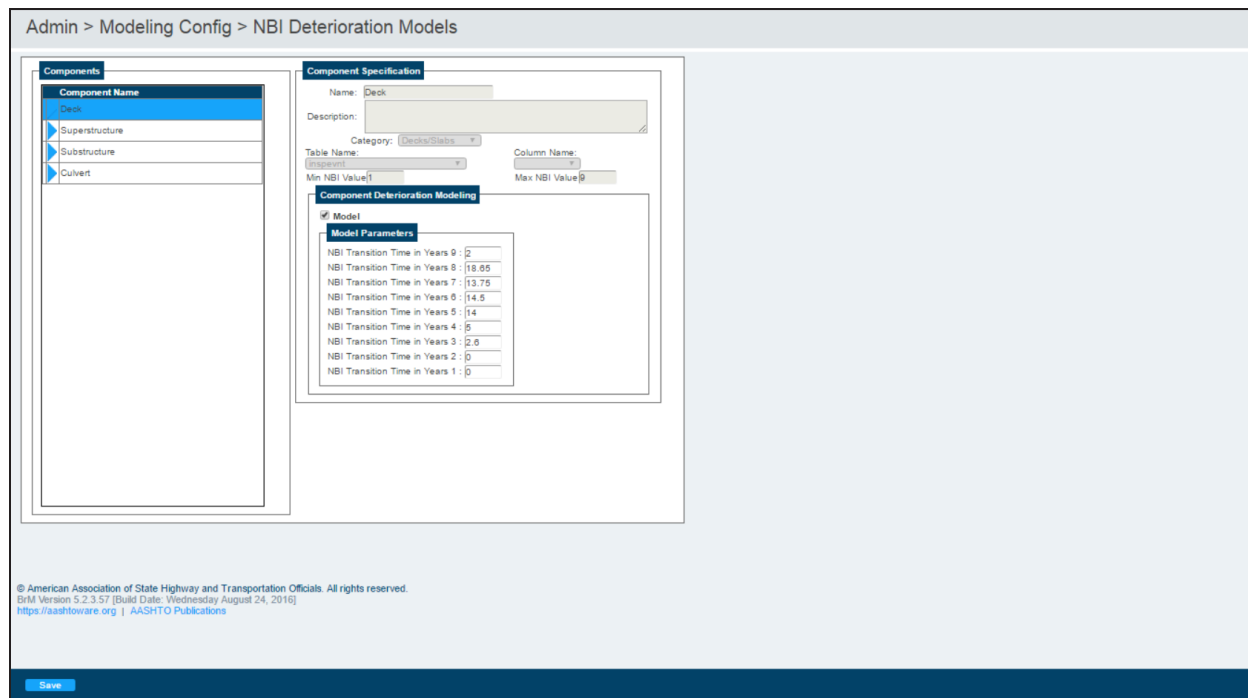
Click **Save** to save the changes made to the currently selected weights profile.

Click **Cancel** to cancel any changes made to the selected weights profile and refresh the page.

Click **Delete** to delete the selected weights profile.

# NBI Deterioration Models

The *Admin > Modeling Config > NBI Deterioration Models* task is used to establish the deterioration modeling parameters for the default components in the system. New components cannot be added.



## Components

The *Components* grouping lists all of the NBI components. Click the ▶ icon to view the component's details in the *Component Specification* grouping.

## Component Specification

The *Component Specification* grouping displays basic, read-only information about the selected component. The only information that can be edited is within the *Component Deterioration Modeling* grouping.

## Component Deterioration Modeling

**Component Deterioration Modeling:**  
 **Model**  
**Model Parameters**  
NBI Transition Time in Years 9 :   
NBI Transition Time in Years 8 :   
NBI Transition Time in Years 7 :   
NBI Transition Time in Years 6 :   
NBI Transition Time in Years 5 :   
NBI Transition Time in Years 4 :   
NBI Transition Time in Years 3 :   
NBI Transition Time in Years 2 :   
NBI Transition Time in Years 1 :

The *Model* checkbox indicates whether deterioration modeling is enabled for the selected component. If checked, the deterioration modeling will reflect the transition times shown in the *Model Parameters* grouping. If unchecked, the transition times will not be applied to the component and therefore its deterioration will not be modeled.

The *Model Parameters* grouping is used to determine the NBI transition time (in years) from one NBI rating to the next.

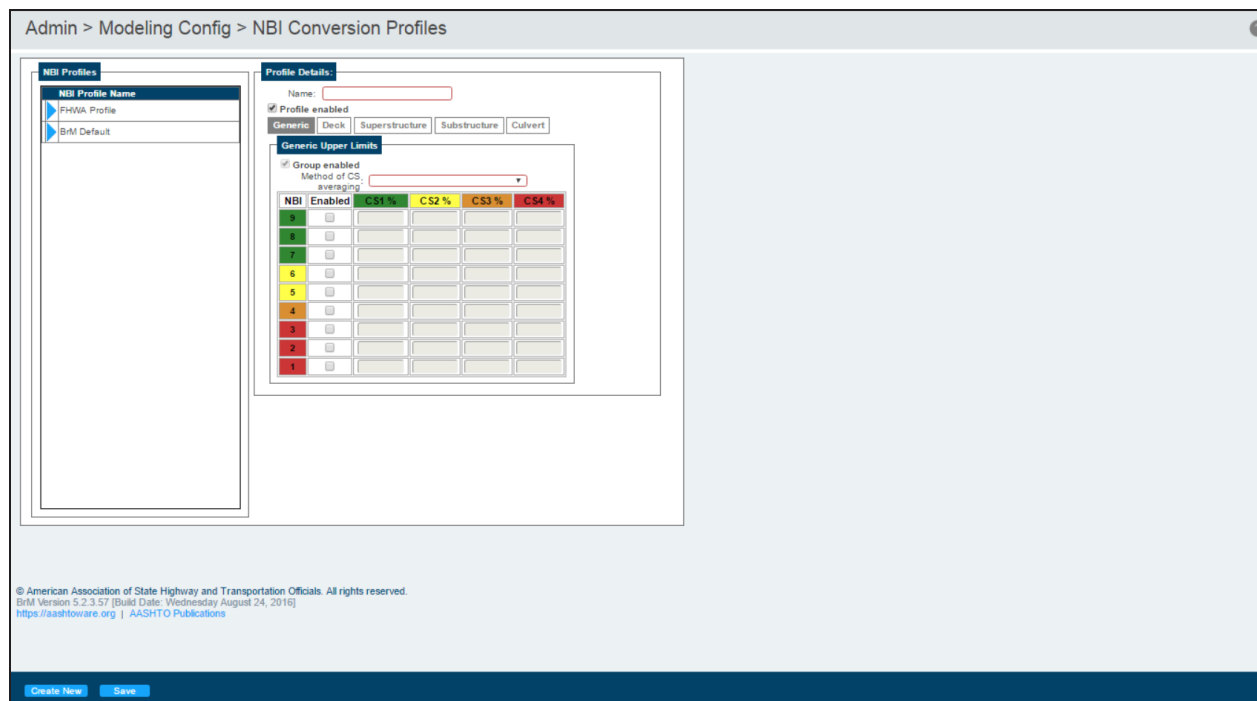
**Example:** If NBI transition time 9 is set to 2, the selected component is expected to deteriorate from NBI rating 9 to NBI rating 8 in 2 years.

The *Save* button at the bottom of the page saves the changes made to the entire subtask. Saving is not required in between switching NBI components.



# NBI Conversion Profiles

The *Admin > Modeling Config > NBI Conversion Profiles* task is used to create and modify the NBI profiles that can then be used on the *Inspection > Condition* task. By default, BrM comes with the FHWA Profile that uses the FHWA's recommended condition state upper limits.



## NBI Profiles

The *NBI Profiles* grouping lists all of the NBI profiles. Click the ▶ icon to view the profile's details in the *Profile Details* grouping.

To create a new profile, click the *Create New* button at the bottom of the page.

## Profile Details

The *Profile Details* grouping allows the admin to determine the upper condition state limits of each NBI rating for the overall profile (generic) or individual components.

**Profile Details:**

Name:

Profile enabled

Generic Deck Superstructure Substructure Culvert

**Generic Upper Limits**

Group enabled  
Method of CS averaging:

NBI	Enabled	CS1 %	CS2 %	CS3 %	CS4 %
9	<input type="checkbox"/>				
8	<input checked="" type="checkbox"/>	100	0	0	0
7	<input checked="" type="checkbox"/>		20	0	0
6	<input checked="" type="checkbox"/>			5	0
5	<input checked="" type="checkbox"/>			20	0
4	<input checked="" type="checkbox"/>				20
3	<input checked="" type="checkbox"/>				100
2	<input type="checkbox"/>				
1	<input type="checkbox"/>				

The *Name* textbox names the profile and will be the name visible in the *NBI Converter Profile* dropdown on the *Inspection > Condition* task.

The *Profile Enabled* checkbox determines whether the NBI profile selected is enabled and available to select in the *NBI Converter Profile* on the *Inspection > Condition* task.

### [Component] Upper Limits

The *Upper Limits* grouping is used to establish the maximum condition state percentages allowed for each NBI value. The tabs above the grouping indicate which component's upper limits are being modified.

**\*Note:** Only the default components have tabs. No user-added components will have a tab.

**\*Note:** The FHWA Profile cannot be edited and does not contain upper limits for the specific components.

The *Generic* tab applies the upper limits to all of the components in the profile. However, each individual component can override the generic upper limits if the component's tab is selected and its *Group Enabled* checkbox is checked.

The *Method of CS Averaging* dropdown determines how the component's elements will be condensed into a single NBI value. The options are:

- **Group by Measurement Unit Type** - Groups together all of the component's elements and averages their quantities in each condition state, then averages those unit averages into a single component average to be converted to an NBI value.

**\*Note:** This selection ensures that an element with a very large quantity does not overshadow and have more influence than an element with a low quantity.

- **Element Weighting** - Averages all of the elements in a component and weights them by element weight, then uses that value for the NBI value conversion.

To establish upper limits, use the **Enabled** checkbox within the grid to determine which NBI values (1-9) will be available. If the **Enabled** checkbox is not checked, the component(s) will not be able to achieve that value when the NBI converter is run on the *Inspection > Condition* task.

The values entered into the CS1% through CS4% columns for each NBI value indicate the maximum percentage that can exist for that NBI value in that condition state before the grade drops down to the next NBI value.

**Example:** Assume the following generic upper limits are being used for all components:

Generic Upper Limits					
<input checked="" type="checkbox"/> Group enabled					
Method of CS: averaging: <span>Group by Measurement Unit type ▾</span>					
NBI	Enabled	CS1 %	CS2 %	CS3 %	CS4 %
9	<input type="checkbox"/>				
8	<input checked="" type="checkbox"/>	100	0	0	0
7	<input checked="" type="checkbox"/>		20	0	0
6	<input checked="" type="checkbox"/>			5	0
5	<input checked="" type="checkbox"/>			20	0
4	<input checked="" type="checkbox"/>				20
3	<input checked="" type="checkbox"/>				100
2	<input type="checkbox"/>				
1	<input type="checkbox"/>				

In order for a bridge's component to receive an NBI rating of 8, it must be 100% in CS1. Similarly, in order for a bridge's component to receive an NBI rating of 3, it must be 100% in CS4.

If a bridge contains Element 12 - Re Concrete Deck with 85% in CS1 and 15% in CS2, the deck component will receive an NBI rating of 7. This is because CS1 is not 100%, so the bridge cannot receive a rating of 8. CS2 is within the 20% maximum, so the bridge cannot receive a rating of 6. Therefore, the bridge receives a rating of 7.

As the bridge deteriorates, Element 12's condition becomes 70% CS1, 25% CS2, and 5% CS3. CS2 is now over the 20% maximum, so the bridge cannot receive a rating of 7. CS3 is at the 5% maximum but not over it, so the bridge cannot receive a rating of 5. Therefore, the new rating for the bridge's deck component is 6.

## Conversion Profiles Page Controls



The **Create New** button creates a new NBI profile.

The **Save** button saves the changes made to the entire subtask. Saving is not required in between switching NBI profiles.

The **Delete** button deletes the selected NBI profile. The **Delete** button is not present when default NBI profiles are selected because they cannot be deleted.

The **Copy** button makes a copy of the currently selected NBI profile and all of its details.

# Preservation and Replacement Policy

The *Admin > Modeling Config > Preservation and Replacement Policy* task is used to create the life-cycle cost analysis (LCCA) policies and add rules to them. These policies are used by the LCCA to determine preservation actions.

The screenshot shows the 'Policy Editor' interface. At the top, the breadcrumb is 'Admin > Modeling Config > Preservation and Replacement Policy'. Below this, there's a 'Policy Editor' header with a dropdown menu set to 'Culvert policy' and two buttons: 'Create New' and 'Copy >>'. The main area is divided into two sections: 'Policy Details' and 'Policy Rules'. The 'Policy Details' section includes fields for 'Name' (Culvert policy), 'Description', 'Notes', 'User Cost Calculation' (a dropdown), and 'User Cost Formula String'. The 'Policy Rules' section contains a table with columns for 'Name', 'Condition', and 'Action'. One rule is visible: 'Rehab Culvert' with a condition 'Health Index of Category 'Culvert' Must Be Less Than Or Equal To Number Value 70 AND Health Index of Category 'Culvert' Must Be Greater Than Number Value 50 AND Repeat every 30 or more years' and an action 'Rehab Culvert - Network'. There are also 'Add Rule', 'Save', and 'Delete' buttons at the bottom.

Name	Condition	Action
Rehab Culvert	Health Index of Category 'Culvert' Must Be Less Than Or Equal To Number Value 70 AND Health Index of Category 'Culvert' Must Be Greater Than Number Value 50 AND Repeat every 30 or more years	Rehab Culvert - Network

The *Create New* button creates a new policy.

The *Policy* dropdown is used to select an existing policy to edit.

The *Copy >>* button copies the selected policy. This will reveal the *Copy Name* textbox. Enter a name and click the *Copy* button to complete the copy, or click the *<<* button to cancel the copy.

## Create New Policy

Click the *Create New* button to create a new policy:

This screenshot shows the 'Policy Editor' interface with the 'Policy Details' section highlighted. The 'Name' field is highlighted with a red border, indicating it is the focus for creating a new policy. The other fields (Description, Notes, User Cost Calculation, and User Cost Formula String) are also visible but not highlighted.

### Policy Details

The *Policy Details* grouping allows the admin to establish the basic information for the policy.

The *Name* textbox determines the name for the policy that will be used when attaching the policy to a bridge.

The *User-Cost Calculation* dropdown is used to indicate how user costs are estimated per year of the LCCA. Custom formulas, created on the *Admin > Modeling Config > Advanced Formulas* task, can be selected. The *User-Cost Formula String* textbox will then display the selected formula.

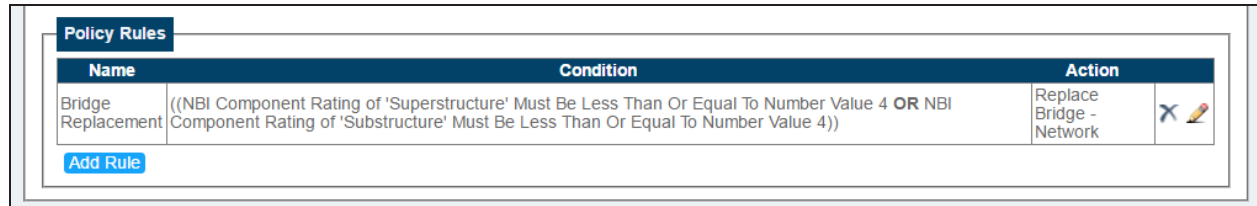
Once the basic information has been added, click the *Save* button at the bottom of the page. Saving the new policy will reveal the *Policy Rules* grouping.

Once saved, the *Policy Rules* grouping will appear at the bottom of the page.

**\*Note:** When a policy is deleted, all records of the policy and its association with bridges are removed from the database.

## Policy Rules


The *Policy Rules* grouping allows the admin to add rules to the policy.




Name	Condition	Action
Bridge Replacement	((NBI Component Rating of 'Superstructure' Must Be Less Than Or Equal To Number Value 4 OR NBI Component Rating of 'Substructure' Must Be Less Than Or Equal To Number Value 4))	Replace Bridge - Network

[Add Rule](#)

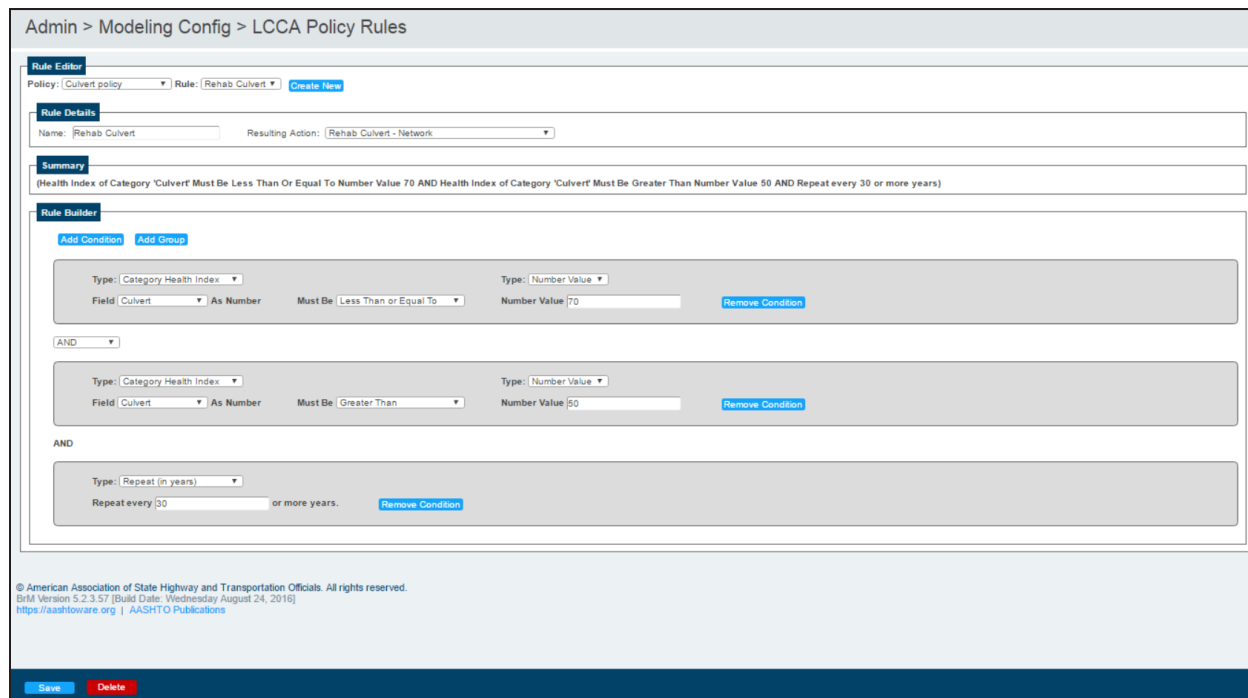
To add a new rule to the policy, select the *Add Rule* button. This will open the *LCCA Policy Rules* task.

To edit an existing rule, select the  button for the desired rule. This will open the *LCCA Policy Rules* task.

To delete an existing rule, select the  button for the desired rule.

# LCCA Policy Rules

The *Admin > Modeling Config > LCCA Policy Rules* task is very similar to the *Equation Editor* task. The specific conditions for the LCCA policy rule are established here.



The *Policy* and *Rule* dropdowns are used to select which policy rule to edit.

The *Create New* button creates a new policy.

## Rule Details

In the *Rule Details* grouping, use the *Name* textbox to name the new rule.

The *Resulting Action* dropdown determines what action will take effect if the conditions established in the *Rule Builder* grouping are met during the LCCA process.

**Example:** The admin may select "**Replace**" as the resulting action and establish an element health index condition: **12 - Re Concrete Deck** must be **Equal To** value "**1**" in the rule builder.

So, when the policy is linked to a bridge and that bridge has an LCCA performed, the LCCA will replace the deck any time the deck's health index reaches "1."

## Rule Summary

The *Summary* grouping displays an English representation of the rule. This can be useful in helping the admin understand exactly what criteria are established in the rule.

## Establish New Policy Rule

Conditions are the individual rules that make up the overall policy rule.

Groups are containers for multiple related conditions. Groups can exist within other groups.

Click the *Add Condition* button to begin creating the policy rule. Click the *Add Group* button if more than one condition will be grouped together. The following screenshots display a lone condition and conditions within a group.

Use the *Type* dropdown to establish the equation to use for the rule:

Type	Description
<b>Is Null</b>	Equations indicating whether or not the condition has a value.
<b>Bridge Health Index</b>	Equations indicating the value of the bridge health index.
<b>Element Health Index</b>	Equations indicating the value of the element health index.
<b>Category Health Index</b>	Equations indicating the value of the category health index.
<b>Material Health Index</b>	Equations indicating the value of the material health index.
<b>Type Health Index</b>	Equations indicating the value of the type health index.
<b>NBI Component Rating</b>	Equations indicating the value of the NBI component rating.
<b>Repeat (in years)</b>	Equations indicating the repeat frequency.
<b>Element Condition State</b>	Equations indicating the value of a percentage of an element condition state.

The available controls will be dependent on the selection made from the *Type* dropdown. The following screenshots indicate the control possibilities based on the selection made in the *Type* dropdown:

**\*Note:** Screenshots for *Type* dropdown selections - "Category Health Index," "Material Health Index," "Type Health Index," and "NBI Component Rating" - have been excluded because the controls (not the selections within the controls) are identical to "Element Health Index."

Type: Bridge Health Index      Type: Number Value

Bridge Health Index      Must Be Equal To      Number Value 1      Remove Condition

Type: Element Health Index      Type: Number Value

Field 12 - Re Concrete Deck As Number      Must Be Equal To      Number Value 1      Remove Condition

Type: Element Condition State      Type: Number Value

Condition State 1 of Element 12 - Re Concrete Deck      Must Be Equal To      Number Value 1      Remove Condition

Type: Repeat (in years)

Repeat every 1 or more years.      Remove Condition

When multiple conditions are added to the policy rule, whether inside a group or not, the conditions operate under an "And/Or" system. This means that conditions can work in tandem with each other or as alternatives to each other, but it cannot be a mixture. Once a selection is made from the *And/Or* dropdown, all other conditions added will operate under the same selection. The only exception is that individual groups of conditions can have a different selection than the overall policy rule. The following screenshots display these concepts:

**Summary**  
(Bridge Health Index Must Equal Number Value 1 AND Repeat every 1 or more years)

**Rule Builder**  
Add Condition    Add Group

Type: Bridge Health Index      Type: Number Value

Bridge Health Index      Must Be Equal To      Number Value 1      Remove Condition

AND  
AND  
OR

Type: Repeat (in years)

Repeat every 1 or more years.      Remove Condition



**Summary**  
 (Bridge Health Index Must Equal Number Value 1 AND Repeat every 1 or more years AND Health Index of Material 'Decks' Must Equal Number Value 1)

**Rule Builder**

[Add Condition](#) [Add Group](#)

Type: Bridge Health Index      Type: Number Value  
 Bridge Health Index      Must Be Equal To      Number Value 1      [Remove Condition](#)

AND

Type: Repeat (in years)  
 Repeat every 1 or more years.      [Remove Condition](#)

AND

Type: Material Health Index      Type: Number Value  
 Field Decks As Number      Must Be Equal To      Number Value 1      [Remove Condition](#)

**Rule Builder**

[Add Condition](#) [Add Group](#)

Type: Bridge Health Index      Type: Number Value  
 Bridge Health Index      Must Be Equal To      Number Value 1      [Remove Condition](#)

AND

Type: Repeat (in years)  
 Repeat every 1 or more years.      [Remove Condition](#)

AND

Type: Material Health Index      Type: Number Value  
 Field Decks As Number      Must Be Equal To      Number Value 1      [Remove Condition](#)

AND

**Group**

[Add Condition](#) [Add Group](#) [Remove Group](#)

Type: Element Health Index      Type: Number Value  
 12 - Re Concrete Deck As Number      Must Be Equal To      Number Value 1      [Remove Condition](#)

OR

Type: Category Health Index      Type: Number Value  
 Barings As Number      Must Be Equal To      Number Value 1      [Remove Condition](#)

OR

Type: Element Condition State      Type: Number Value  
 Condition State 1 of Element 12 - Re Concrete Deck      Must Be Equal To      Number Value 1      [Remove Condition](#)

To remove a condition, click the *Remove Condition* button for the desired condition.

To remove a group, click the *Remove Group* button for the desired group. All conditions within the group will also be removed.

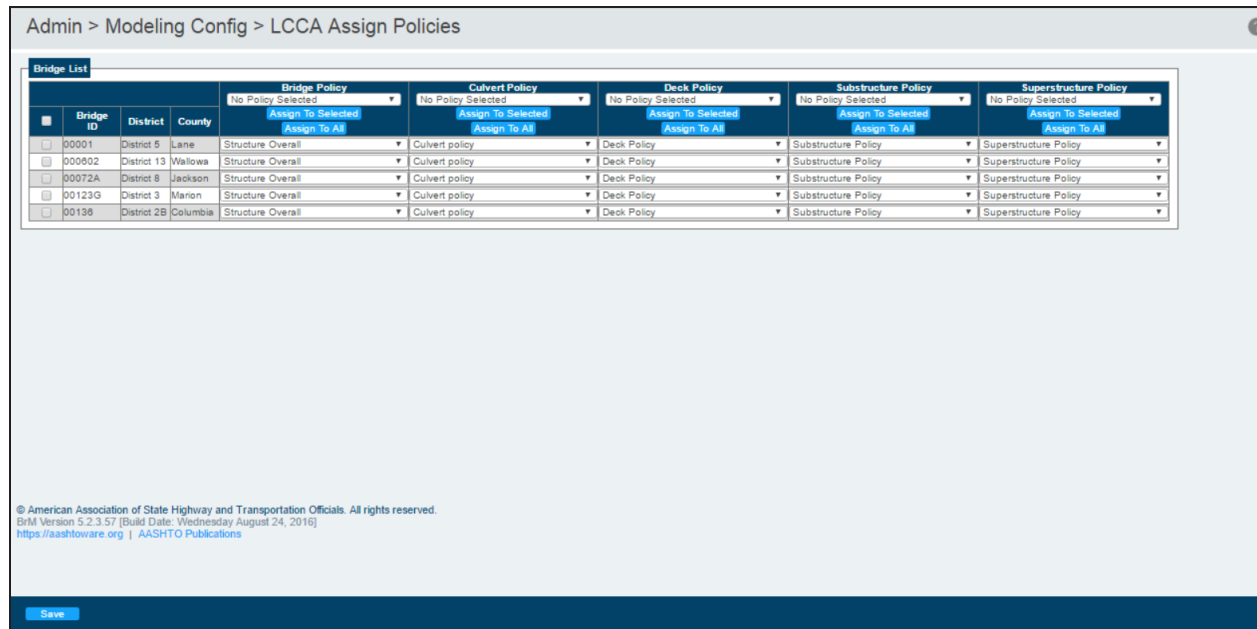
## Policy Rule Page Controls

Once the desired selections have been made, click the *Save* button at the bottom of the screen to save the policy rule.

Click the *Delete* button to delete the selected policy rule.

# LCCA Assign Policies

The *Admin > Modeling Config > LCCA Assign Policies* task allows the admin to attach the LCCA policies to bridges and/or components within the system. This link can then be analyzed on the *Analysis > LCCA* task.



Only bridges that are currently selected on the Bridge List will appear in the grid. If no bridges are present in the grid, no bridges are selected on the Bridge List.

There are multiple ways of assigning policies to the bridges and components:

1. Each bridge row in the grid has a **Policy** dropdown for each of the policy columns in the grid. Each of the bridge's **Policy** dropdowns can be used to determine what policy will be used for the overall bridge or specific component.

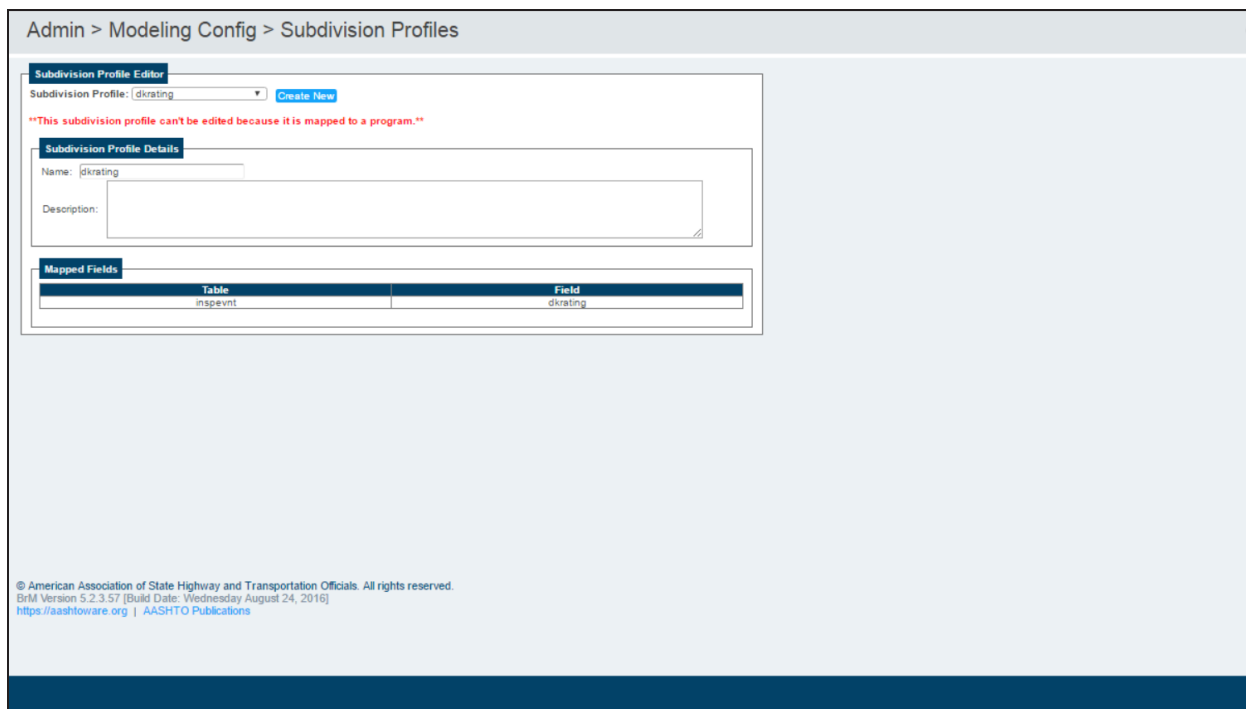
**\*Note:** Any policy can be selected for any component. For example, the Deck Policy does not have to be assigned to the Deck Component column.

2. Check the boxes of all of the bridges in the grid that will have the same policy for a specific column, then select that policy from the **Column Header Policy** dropdown for the desired column. Click the **Assign to Selected** button to link all of the selected bridges to the selected policy for that column.
3. If all of the bridges in the grid will have the same policy for a specific column, select that policy from the **Column Header Policy** dropdown for the desired column and click the **Assign to All** button to link all of the bridges in the grid to the selected policy for that column.

Use the **Save** button at the bottom of the page to save any changes to the assignments.

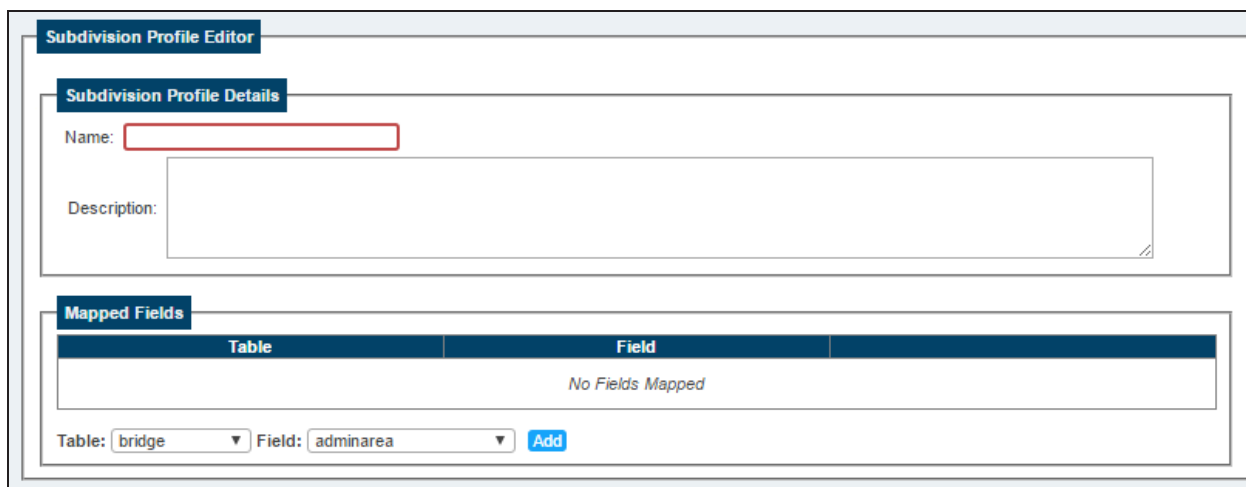
# Subdivision Profiles

The *Admin > Modeling Config > Subdivision Profiles* task is used to create and define subdivision profiles that can be used on the *Programs > Create/Edit Programs* task. A subdivision profile is a list of database fields that are used to subdivide a program into segments. Throughout the *Program* tab, program segments can have their own performance constraints and optimization run separate from the rest of the program.



Use the *Subdivision Profile* dropdown to switch between the existing subdivision profiles.

Select the *Create New* button to create a new subdivision profile:



## Subdivision Profile Details

Use the *Name* textbox to provide a unique name for the subdivision profile. This is the name that will appear in the *Subdivision Profile* dropdown on the *Programs > Create/Edit Programs* task.

**\*Note:** When a subdivision profile is linked to a program on the *Programs > Create/Edit Programs* task, it will become read-only on the *Admin > Modeling Config > Subdivision Profiles* subtask. Only subdivision profiles not currently linked to a program can be edited.

## Mapped Fields

The *Mapped Fields* grouping allows the admin to add up to five fields to the subdivision profile. Locate the desired field using the *Table* and *Field* dropdowns, then click the *Add* button to add the field to the subdivision profile.

The field will then appear in the Mapped Fields grid. It can be removed by clicking the field's  symbol.

**\*Note:** If five fields have been mapped to the subdivision profile, the *Table* and *Field* dropdowns and the *Add* button will disappear and will not return unless one of the five currently mapped fields is deleted from the subdivision profile.

## Subdivision Profile Page Controls

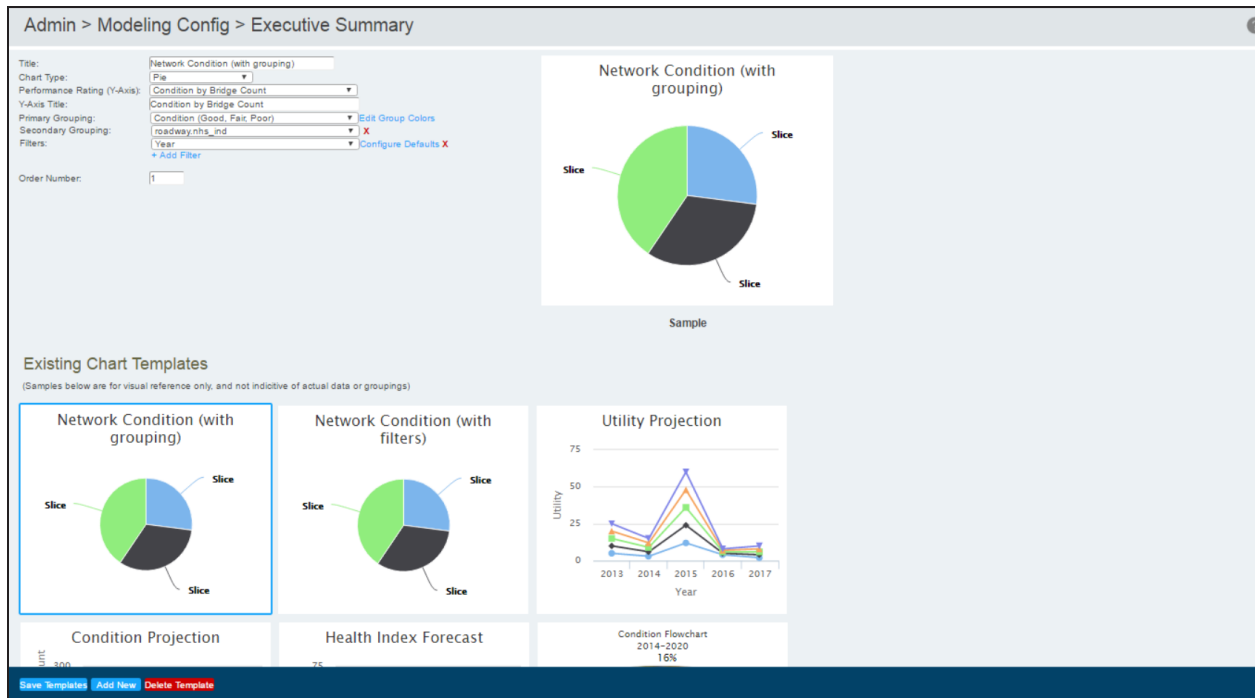
Use the *Save* button to save the changes made to the selected subdivision profile.

Use the *Delete* button to delete the selected subdivision profile.

**\*Note:** The *Save* and *Delete* controls become unavailable if the selected subdivision profile is mapped to a program.

# Executive Summary

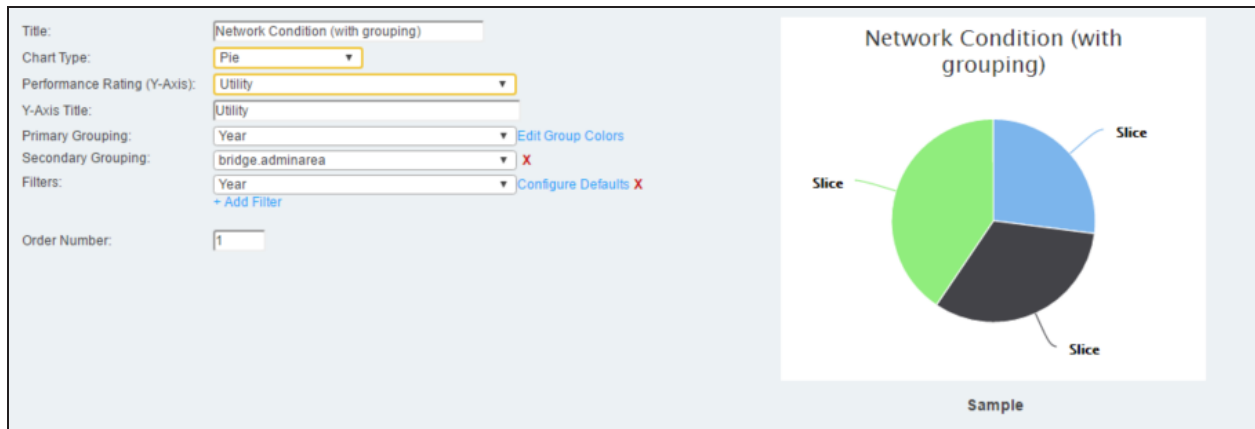
The *Admin > Modeling Config > Executive Summary* task allows the admin to configure new and existing chart templates to be used on the *Programs > Executive Summary* task. These templates allow for the creation of custom graphs that display specific information that may not be displayed in BrM's standard graphs.



## Create New Executive Summary Template

Click the *Add New* button in the footer to create a new executive summary template. The controls for editing an existing executive summary template will be very similar to creating a new one.

**\*Note:** The available controls are dependent on the *Chart Type* dropdown selection.



Control	Description
<b>Title</b>	Indicates the title of the template and is displayed at the top of the chart.
<b>Chart Type</b>	Determines what type of chart will be used to display the information, including:

Control	Description
	Bar, Column, Line, Pie, Stacked Column, Condition Flowchart
<b>Performance Rating (Y-Axis)</b>	Determines the performance rating on the Y-axis that will be plotted against the X-axis.
<b>Y-Axis Title</b>	The title displayed on the Y-axis.
<b>X-Axis Field</b>	Determines the field on the X-axis that will be plotted against the Y-axis. The available fields are dependent upon the Y-axis selection.
<b>X-Axis Title</b>	The title displayed on the X-axis.
<b>Groupings</b>	<p>Groupings are applicable to bar, column, line and pie graphs. They separate the data into segments based on a database field.</p> <p><b>Example:</b> On a line graph, the roadway.NHS_IND field grouping would have a line for NHS bridges and a line for non-NHS bridges.</p> <p>The individual items within the grouping can then have their colors set using the <i>Edit Group Colors</i> link.</p> <p><b>*Note:</b> Pie charts allow for a secondary grouping to be included.</p>
<b>Filters</b>	<p>Filters are the specific pools of data used for the templates. They are the parameters that can be used to change what information the user sees on the graph. For example, a common filter will be "Year."</p> <p><b>*Note:</b> Multiple filters can be added for each chart type.</p>
<b>Order Number</b>	Determines where the template appears in the list of selectable executive summary templates.

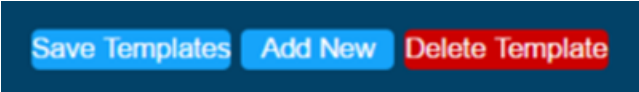
While creating a new template is always an option, BrM has six default Executive Summary templates that can be used, including:

Executive Summary Default Templates						
Title	Type	Y-Axis	X-Axis	Primary Grouping	Secondary Grouping	Filter
<b>Network Condition (with grouping)</b>	Pie	Condition by Bridge Count	N/A	Condition	roadway.nhs_ind	Year
<b>Network Condition (with filters)</b>	Pie	Condition by Bridge Count	N/A	Condition	None	Year, roadway.nhs_ind
<b>Utility Projection</b>	Line	Utility	Year	roadway.nhs	N/A	None
<b>Condition Projection</b>	Stacked Column	Condition by Bridge Count	Year	N/A	N/A	None
<b>Health Index</b>	Column	Health	roadway.nhs_	Year	N/A	None

Executive Summary Default Templates						
Title	Type	Y-Axis	X-Axis	Primary Grouping	Secondary Grouping	Filter
Forecast		Index	ind			
Condition	Flowchart	N/A	N/A	N/A	N/A	None

These templates can be used as is or can be tweaked to meet the admin's needs. They can also be deleted if desired.

### Executive Summary Page Controls



The *Save Templates* button saves the changes to all of the templates. Multiple templates can be changed before saving.

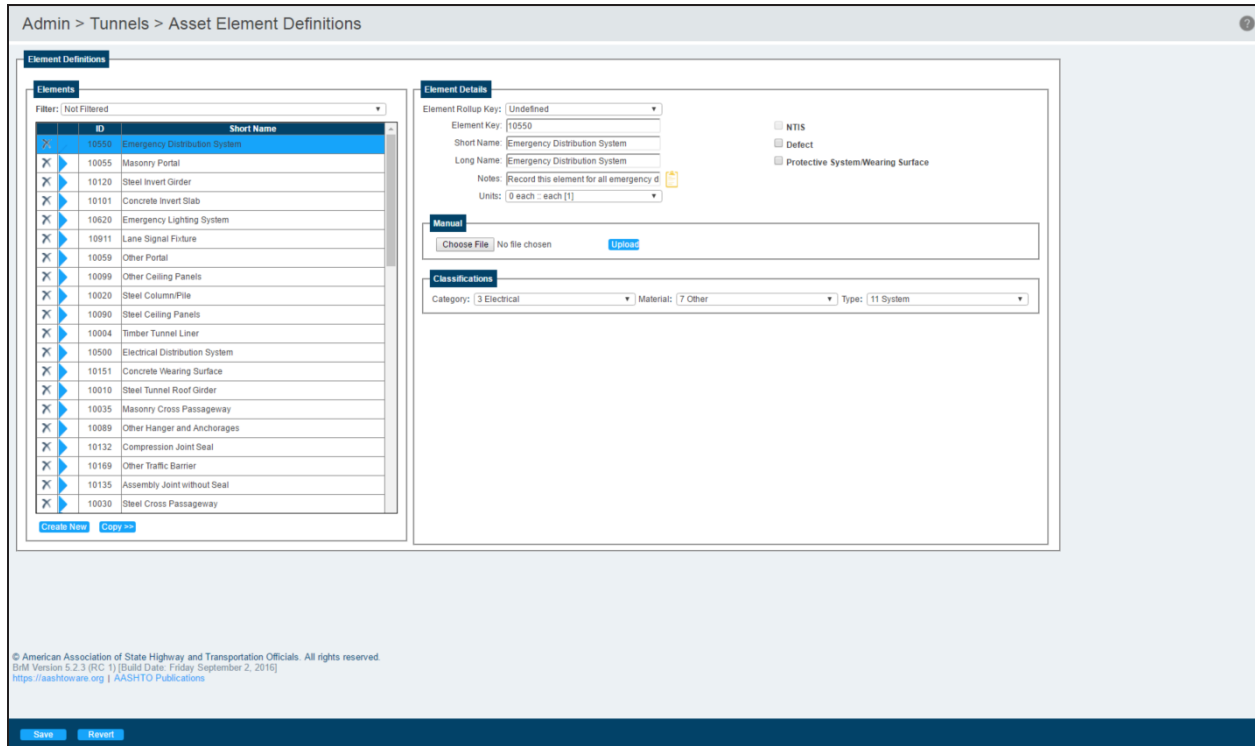
The *Add New* button creates a new Executive Summary template.

The *Delete Template* button deletes the currently selected template.


# Tunnels

## Asset Element Definitions

The *Admin > Tunnels > Asset Element Definitions* task is used to create tunnel elements and define the specifications for existing tunnel elements.





## Elements

The *Elements* grouping contains the Element list. In order to view and edit an element's specifications, it must be selected from the Element list. To select an element, click the  symbol. The selected element's information will then appear in the *Element Details* grouping.

The *Filter* dropdown can be used to filter the Element list based on a specific tunnel element category.

Elements that have been marked as National Tunnel Inspection Standards (NTIS) elements in the *Element Details* grouping cannot be edited or deleted unless the NTIS element status is removed.

If the element has an  next to the  in the Element list, the element is not an NTIS element and can be edited and deleted freely.

## Create or Copy Element

The *Create New* button creates a new element with blank specifications that must be completed.

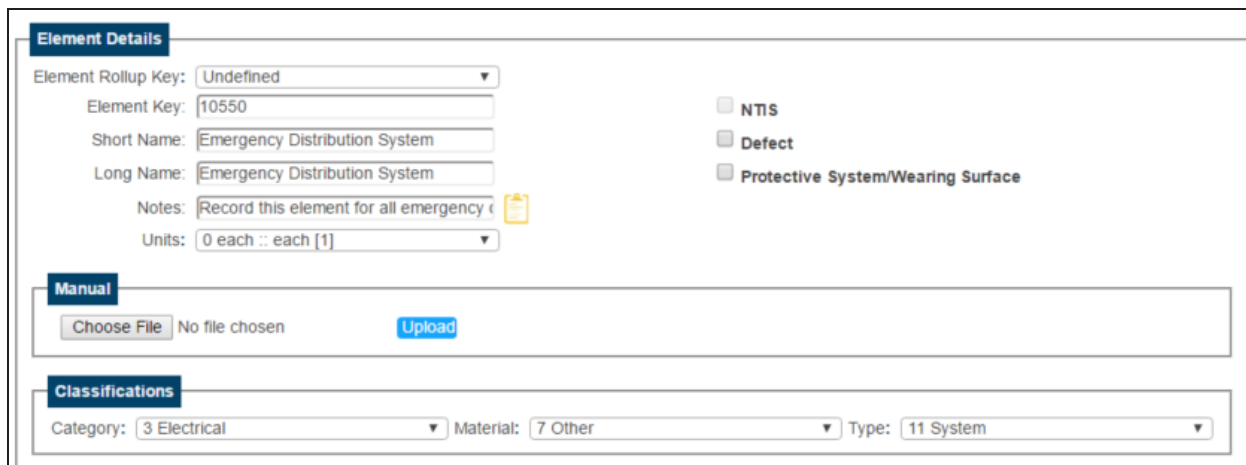
The *Copy>>* button creates a copy of the currently selected element with matching specifications other than the Element Key, Short Name, and Long Name. Clicking the *Copy>>* button reveals the *Copy Name* textbox. Enter a name and click the *Copy* button to complete the copy, or click the *<<* button to cancel the copy.

By default, the ID column (element key) progresses in sequential order. Therefore, if the element list's last element has an element key of 1000, a newly created or copied element will have an element key of 1001. The key can be changed once created, but only one element key is permitted per number.



## Element Details

The *Element Details* grouping includes the specifications of the selected element and allows the admin to add reference manuals to the element.



The screenshot shows the 'Element Details' form with the following fields and values:

- Element Rollup Key: Undefined
- Element Key: 10550
- Short Name: Emergency Distribution System
- Long Name: Emergency Distribution System
- Notes: Record this element for all emergency
- Units: 0 each :: each [1]
- NTIS:
- Defect:
- Protective System/Wearing Surface:
- Manual: Choose File, No file chosen, Upload
- Classifications: Category: 3 Electrical, Material: 7 Other, Type: 11 System

### Element Rollup Key

The *Element Rollup Key* dropdown is used for non-NTIS elements. Information for non-NTIS elements can be "rolled up" into the NTIS elements. Therefore, the currently selected element's information will be included in the reports of the NTIS element selected from the dropdown.

When an NTIS element is selected from the Element list, the *Element Rollup Key* dropdown is read only.

### Element Key and Name

The *Element Key* textbox is the element's ID. The element can be any number as long as it is unique.

The *Short Name* and *Long Name* textboxes provide a description of the element. NTIS element short and long names cannot be edited and are greyed out and inaccessible.

### Notes

The *Notes* textbox can be used to enter a description of the element. This is particularly useful when creating new elements that may not be universally recognized by their short and long names.

### Units

The *Units* dropdown determines how the element is measured. NTIS element units are read only.

### Manual

A PDF can be added to any element as reference material for the users. To add a PDF, click the *Choose File* button and locate the desired file. Once selected, click the *Upload* button to add the PDF to the element.

**\*Note:** When upgrading to a new version of BrM, previously uploaded custom agency element manuals will be lost during the uninstall of the old version. In order to ensure the manuals are maintained and added into the new version, the ElemGuideManuals subdirectory must be copied prior to uninstalling the old version. Then, after installing the new version, the ElemGuideManuals subdirectory can be returned to its folder location. **When completing this process, only copy over the custom agency element files. The new install of BrM will contain the latest manuals for the standard elements.**

### Classifications

The *Classifications* grouping is used to classify the selected element. The classifications of NTIS elements cannot be edited.

**Classifications**

Category: 4 Fire/Life Safety    Material: 7 Other    Type: 13 Other

Use the *Category*, *Material*, and *Type* dropdowns to classify the element.

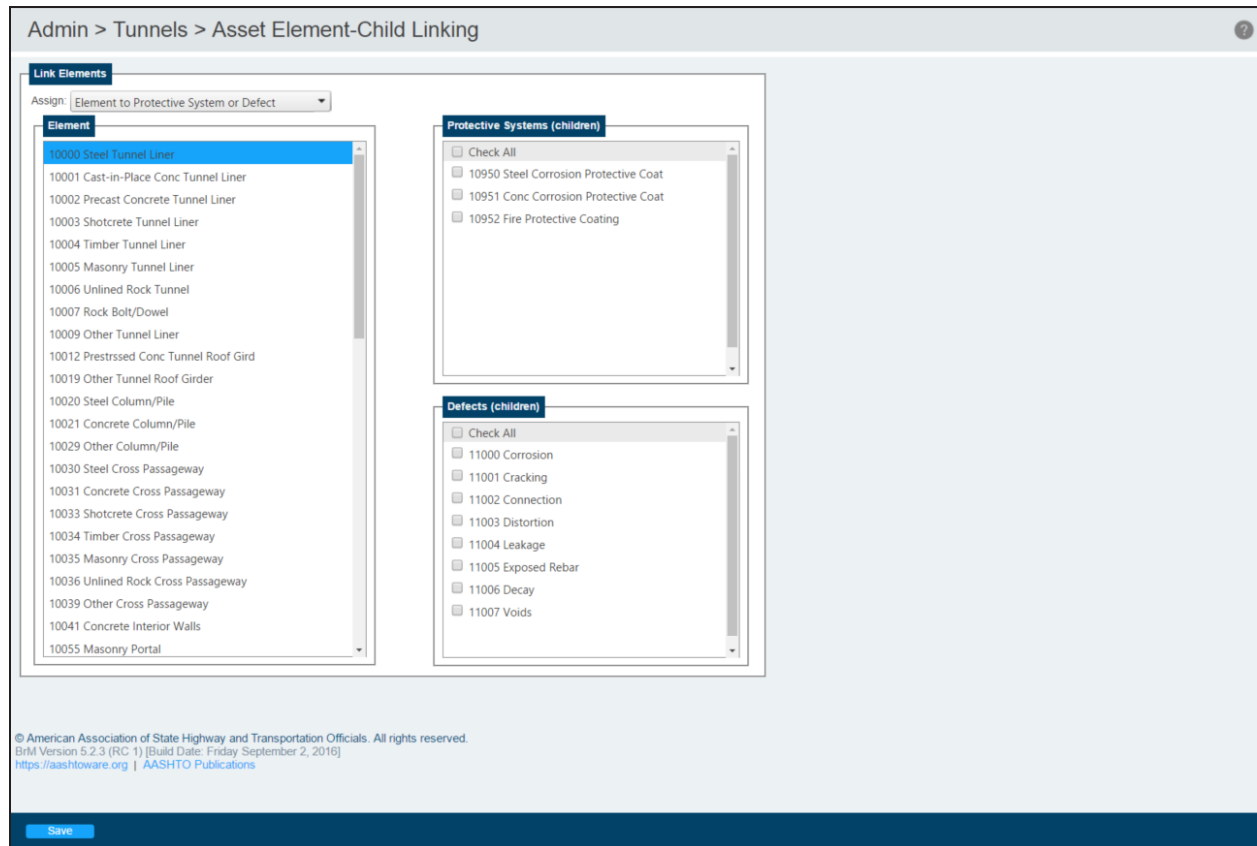
## Element Spec Page Controls

Click the *Save* button to save the changes made to the selected element.

Click the *Revert* button to cancel the changes made to the selected element.

# Asset Element-Child Linking

The *Admin > Tunnels > Asset Element-Child Linking* task is used to link tunnel elements, defects, and protective systems. The elements must be linked together in order to be used together throughout the software.



## Assigning Element Relationships

The *Assign* dropdown is the key to the element relationships. When a selection is made using the *Assign* dropdown, the links are for that type of element only.

Elements can have:

- Protective Systems (children)
- Defects (children)

Protective Systems can have:

- Elements (parents)
- Defects (children)

Defects can have:

- Elements (parents)
- Protective Systems (parents)

## Asset Element-Child Linking Page Controls

Click the *Save* button to save the changes made to the assigned element.

# Inspection

- The Inspection section of the manual addresses each of the tasks in BrM's *Inspection* tab. The *Inspection* tab allows for the creation and management of inspections, work candidates, assessments, and more for a selected structure.

# Condition

The *Inspection > Condition* task allows the user to manage both the NBI condition ratings and the individual element conditions for a specific inspection report.

The screenshot displays the 'Inspection > Condition' interface. At the top, it shows 'Bridge: 000005', 'Facility Carried (007): RAILROAD STREET', 'Inspection: 2015-06-27 (UWTZ)', and 'Type: Regular NBI'. There are radio buttons for 'Metric' and 'English'. Below this is the 'Inspection > Condition' header. The 'Condition Ratings' section includes dropdowns for Deck (058): 5 Fair, Superstructure (059): 4 Poor, Substructure (060): 4 Poor, Channel (061): 5 Bank Prot Eroded, Culvert (062): N N/A (NBI), and Waterway (071): 4 Tolerable. There are buttons for 'Validate', 'Calculate SR', and 'Calculate NBI'. The 'Element Conditions' section shows a table of AASHTO Bridge Elements with columns for Elem, Str. Unit, Env, Description, Quantity, Units, Qty. 1, Qty. 2, Qty. 3, and Qty. 4. The table lists elements like Timber Deck, Steel Stringer, Timber Stringer, Steel Truss, Steel Floor Beam, Timber Abutment, Steel Pile, and Steel Pier Cap. The 'Inspection Notes' section contains text about deck runners, superstructure sandblasting, and substructure decay. At the bottom, there is a status bar with 'Status: New' and buttons for 'Cancel', 'Save', 'Save & Close', and 'Delete Inspection'.

The *Bridge* dropdown allows the user to select a bridge to be inspected.

The *Inspection* dropdown allows the user to select the inspection to be modified.

The *Metric/English* radio buttons switch between metric and English units on the page.

## Condition Ratings

The *Condition Ratings* grouping is used to determine the NBI condition ratings, perform a validation of the selected bridge, and calculate the bridge's sufficiency rating.

This close-up shows the 'Condition Ratings' section. It features dropdowns for Deck (058): N N/A (NBI), Superstructure (059): N N/A (NBI), Substructure (060): N N/A (NBI), Channel (061): 9 No Deficiencies, Culvert (062): 7 Minor Deterioration, and Waterway (071): 8 Equal Desirable. There is a text input for 'Unrepaired Spalls: (SF)'. Buttons for 'Validate', 'Calculate SR', and 'Calculate NBI' are present. The 'NBI Converter Profile' is set to 'FHWA Profile'.

There are two ways of setting the bridge's NBI condition ratings. One is to manually complete each of the NBI submission item (NBI numbers are in red parentheses) dropdowns - *Deck*, *Superstructure*, *Substructure*, etc. The other method is to use the NBI Converter Profile as discussed below.

## Validate

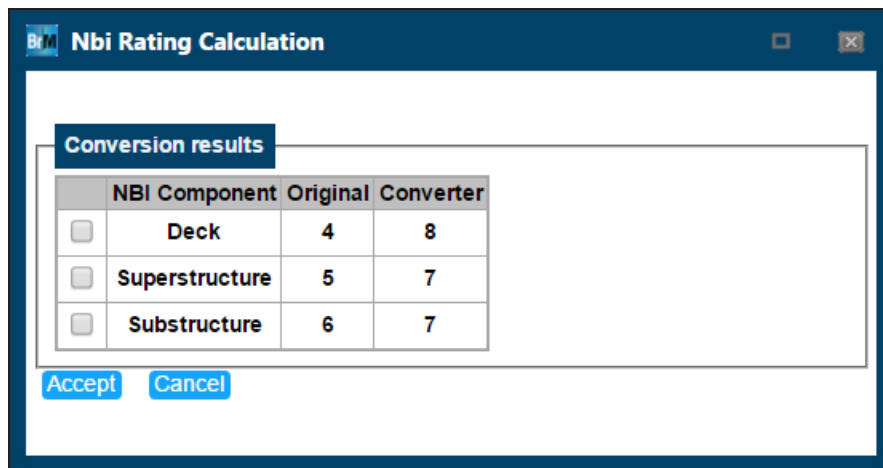
The **Validate** button takes the user to the *Bridges > Validate* task to find FHWA discrepancies with the selected bridge.

## Sufficiency Rating

The **Calculate SR** button takes the user to the *Bridges > Suff Rate* task to calculate the selected bridge's sufficiency rating.

## NBI Converter Profile

An alternative option to the user manually determining the NBI component ratings is to use the **NBI Converter Profile** dropdown to estimate the NBI component ratings based on the bridge's element ratings. The **NBI Converter Profile** dropdown uses the NBI profiles created on the *Admin > Modeling Config > NBI Conversion Profiles* subtask. Once a selection is made, click the **Calculate NBI** button to view the results of the calculation:



	NBI Component	Original	Converter
<input type="checkbox"/>	Deck	4	8
<input type="checkbox"/>	Superstructure	5	7
<input type="checkbox"/>	Substructure	6	7

The table shows the original NBI component ratings (the current ratings) and the converted NBI component ratings. To accept the conversion of any of the NBI components, select the desired components' checkboxes and then click the **Accept** button. To cancel and not accept any of the conversions, click the **Cancel** button.

**\*Note:** The **NBI Converter Profile** dropdown and **Calculate NBI** button are unavailable when the inspection status is locked, under review, or archived.

## Element Conditions

The *Element Conditions* grouping is used to select which elements will be included in the inspection and then determine the condition states of each element.

Element Conditions											
- All Structures -		Quantity		Percent		Show Last CoRe Insp					
AASHTO Bridge Elements										Add New Element	
Elem	Str. Unit	Env	Description	Quantity	Units	Qty. 1	Qty. 2	Qty. 3	Qty. 4		
>	16	1	Mod. (3)	Re Conc Top Flange	600	sq.ft	588.000	12.000	0.000	0.000	X
>	39	1	Mod. (3)	Prestressed Slab	896	(SF)	886.000	8.000	2.000	0.000	X
▼	110	1	Mod. (3)	Re Conc Opn Girder/Beam	112	ft	109.000	3.000	0.000	0.000	X
	1080	1	⚡	Delamination/Spall/Patched Area	3	ft	0.000	3.000	0.000	0.000	X
>	215	1	Mod. (3)	Re Conc Abutment	108	ft	98.000	6.000	4.000	0.000	X
	310	1	Mod. (3)	Elastomeric Bearing	16	each	16.000	0.000	0.000	0.000	X
>	330	1	Mod. (3)	Metal Bridge Railing	100	ft	0.000	100.000	0.000	0.000	X
	980	1	Mod. (3)	Approach Roadway Embank	1	(EA)	1.000	0.000	0.000	0.000	X
	990	1	Ben. (1)	Miscellaneous Elements	1	(EA)	1.000	0.000	0.000	0.000	X
	999	1	Ben. (1)	Roadway Impact	1	(EA)	1.000	0.000	0.000	0.000	X

## Structure Unit

The *Structure Unit* dropdown is used to select which structure unit's elements to view in the Bridge Elements grid. If "All Structures" is selected, the elements from all of the structure units will be visible in the grid. If a specific structure unit is selected, only that structure unit's elements will be visible.

**\*Note:** If an element is expected to be visible in the Bridge Elements grid but is not, the element may have been assigned the wrong structure unit. View the Bridge Elements grid with the other structure units selected to find the element in question, select it, and then click the *Edit Element* button to change its structure unit.

## Show Last CoRe Inspection

The *Show Last CoRe Insp* button allows the user to view the last inspection for the selected bridge that used the CoRe inspection that contained a five quantity condition state rating. If an inspection is available, it will appear in a pop-up window and be read-only.

## AASHTO Bridge Elements grid

The Bridge Elements grid contains all of the elements included in the inspection of the selected bridge (filtered based on structure type with the *Select Structure Unit* dropdown). For a new structure that has not had a previous inspection there will be no pre-existing elements and all of the desired elements will need to be added. For structures that have pre-existing inspections, the information from the most recent inspection will automatically be loaded into the new inspection.

AASHTO Bridge Elements							Add New Element			
Elem	Str. Unit	Env	Description	Quantity	Units	Qty. 1	Qty. 2	Qty. 3	Qty. 4	
16	1	Mod. (3)	Re Conc Top Flange	600	sq.ft	588.000	12.000	0.000	0.000	X
1081	1	⚡	Soffit Spalls/Delams/Patches	6	sq.ft	0.000	6.000	0.000	0.000	X
1120	1	⚡	Efflorescence/Rust Staining	6	sq.ft	0.000	6.000	0.000	0.000	X
511	1	🛡️	Asphalt Overlay	600	sq.ft	0.000	600.000	0.000	0.000	X
39	1	Mod. (3)	Prestressed Slab	896	(SF)	886.000	8.000	2.000	0.000	X
110	1	Mod. (3)	Re Conc Opn Girder/Beam	112	ft	109.000	3.000	0.000	0.000	X
1080	1	⚡	Delamination/Spall/Patched Area	3	ft	0.000	3.000	0.000	0.000	X
215	1	Mod. (3)	Re Conc Abutment	108	ft	98.000	6.000	4.000	0.000	X
310	1	Mod. (3)	Elastomeric Bearing	16	each	16.000	0.000	0.000	0.000	X
330	1	Mod. (3)	Metal Bridge Railing	100	ft	0.000	100.000	0.000	0.000	X

**\*Note:** By default, the Bridge Elements grid is sorted first by structure unit, then element ID, and finally by environment.

### Quantity Columns

The Quantity columns can be viewed based on quantity or percent by using the *Quantity/Percent* radio buttons at the top of the *Element Conditions* grouping.

The *Quantity* and condition state *Qty. 2*, *Qty. 3*, and *Qty. 4* columns can all be modified. The condition state Qty. 1 column cannot be modified. It is updated based on the difference between the *Quantity* and combined *Qty. 2*, *Qty. 3*, and *Qty. 4* columns.

If the total quantity is increased, the additional quantity is added to CS1 and the user must manually distribute it amongst the other condition state quantities as needed.

If the total quantity is decreased, none of the condition state quantities will change automatically. The user must manually update the quantities to equal the total quantity.

The user will receive an error when saving if condition state quantities 1-4 do not match the total quantity.

The available options in the Bridge Elements grid, including *Add New Element*, *Edit Element*, *Add Defect*, and *Add Protective Sys*, appear depending on the element currently selected in the grid.

### Add New Element

The *Add New Element* button is available regardless of whether or not an element is selected because it is used to add new NBEs or agency elements to the grid. When clicked, the button reveals the following popup window:



Complete the *Element ID*, *Structure Unit*, and *Environment* dropdown selections.

**\*Note:** When adding a new element, the *Structure Unit* dropdown will always default to the agency's default structure unit regardless of what structure unit is selected for the Bridge Elements grid on the *Inspection > Condition* main page. If the user is expecting the new element to appear in the Bridge Elements grid for the selected structure unit, they must ensure that the selection in the *Structure Unit* dropdown matches what is selected for the Bridge Elements grid.

### Quantity

The *Quantity* field determines the total quantity of the element. This can be changed in the Bridge Elements grid once the element is added.

### Add and Cancel Controls

Click *Add* to add the element to the Bridge Elements grid.

Click *Cancel* to cancel the element addition and return to the Bridge Elements grid.

### Edit Element

The *Edit Element* button is available when an element is selected, including defects and protective systems. Click the *Edit Element* button to reveal the same popup as the *Add New Element* button:

The only field that cannot be edited is the *Element ID* dropdown.

If the *Structure Unit* dropdown is changed, the element will no longer appear in the Bridge Elements grid for the selected structure unit (unless "All Structures" is selected).

If the parent element is selected and either the structure unit or the environment is changed, the parent element will remain linked with its relative defect and protective system elements to ensure that the child elements are not orphaned by the change.

If the defect or protective system is selected and either the structure unit or environment is changed, an error will appear and the change will not be applied. The only way to avoid this error is for the selected structure unit and environment to match an existing applicable parent element, at which point the *Parent Element* dropdown will reappear and the change can be applied. However, this change would not be recommended unless it was preconceived.

### Add Defect and Protective System

The *Add Defect* and *Add Protective Sys* buttons become available when an element is selected. The *Add Defect* button is also available when a protective system is selected.

When clicked, the buttons reveal the same popup as the *Add New Element* and *Edit Element* buttons:

Complete the *Element ID*, *Structure Unit*, and *Environment* dropdown selections.

**\*Note:** Only elements that have been linked to the currently selected element in the *Admin > Modeling Config > Element-Child Linking* subtask will appear in the *Element ID* dropdown.

Once a selection is made in the *Element ID* dropdown, the *Parent Element* and *Grandparent Element* (if applicable) dropdowns will appear above it. The currently selected element will be the parent element, but this can be changed.

**\*Note:** Only certain elements will appear in the *Parent Element* dropdown. In order for an element to appear in the *Parent Element* dropdown, it must meet the following criteria (the same rules apply for the grandparent > parent relationship):

1. The parent element must be linked to the defect or protective system (as applicable) selected in the *Element ID* dropdown in the *Admin > Modeling Config > Element-Child Linking* subtask.
2. The parent element must exist under the selected structure unit.
3. The parent element must exist under the selected environment.

If the desired element does not meet all three qualifications, it will not appear in the *Parent Element* dropdown.

The remaining selections operate in the same way as the *Add New Element* button.

## Highlighted Orphan

A highlighted orphan is a protective system or defect that is displayed in the Bridge Elements grid but is not connected to a specific element:

The screenshot shows the AASHTO Bridge Elements grid. Two rows are highlighted in yellow, indicating they are orphans. The first row is for 'Concrete Cracking' (Elem 7358) and the second is for 'Concrete Efflorescence' (Elem 7359). Both have a lightning bolt icon in the 'Env' column. The grid includes columns for Elem, Str. Unit, Env, Description, Quantity, Units, Qty. 1, Qty. 2, Qty. 3, and Qty. 4. Buttons for 'Add Defect', 'Add Protective Sys', 'Add New Element', and 'Edit Element' are visible at the top.

Elem	Str. Unit	Env	Description	Quantity	Units	Qty. 1	Qty. 2	Qty. 3	Qty. 4
7358	101	⚡	Concrete Cracking	358599.67	sq. ft	0.000	358599.	0.000	0.000
7359	101	⚡	Concrete Efflorescence	10.764	sq. ft	0.000	10.764	0.000	0.000
12	101	Low (2)	Re Concrete Deck	358599.67	sq. ft	0.000	358599.	0.000	0.000
1080	101	⚡	Delamination/Spall/Patched Area	1	sq. ft	1.000	0.000	0.000	0.000
107	101	Low (2)	Steel Opn Girder/Beam	14330.709	ft	7165.35	7165.35	0.000	0.000
515	101	🛡️	Steel Protective Coating	10753.147	sq. ft	10753.1	0.000	0.000	0.000
110	101	Mod. (3)	Re Conc Opn Girder/Beam	406.824	ft	406.824	0.000	0.000	0.000
113	101	Mod. (3)	Steel Stringer	20104.987	ft	4229.00	11646.9	4229.00	0.000

Highlighted orphans can occur for various reasons. The most common scenarios that cause highlighted orphans will be listed below. When attempting to resolve a highlighted orphan, users can select the orphan from the grid and click the **Edit Element** button to reveal the message container with an error explaining why the defect/protective system is a highlighted orphan:

The screenshot shows the 'Edit Protective System Detail' dialog box. The dialog title is 'Edit detail for Protective System: 511 AC Wearing Surface (511)'. It shows the current configuration: Structure Unit: 1 / Type = M (1), Environment: 3 Mod., and New Values: Parent Element: 16 Re Conc Top Flange, Element ID: 511 AC Wearing Surface, Structure Unit: 1 / Type = M (1), Environment: 3 Mod., Quantity/Count: 600 (SF), and Element Description: Migrated Element. At the bottom, there is a red error message: 'Error (1) This element inspection (511 AC Wearing Surface) is currently a child of 16 Re Conc Top Flange, which is an invalid relationship. Please choose an Element ID that is a valid child, or add the proper relationship via the Element-Child Admin Page.'

- 1. Lack of element-child link** - A highlighted orphan can occur if the defect/protective system is not linked to the element on the *Admin > Modeling Config > Element-Child Linking* task. The admin should be notified of this issue so that they can fix the link.
- 2. Correct element, incorrect defect/protective system** - If after selecting the highlighted orphan and clicking the **Edit Element** button the user sees that the element-child link contains the correct element but the incorrect defect/protective system, the user can use the **Element ID** dropdown to select the correct defect/protective system. All of the selections in the dropdown, aside from the incorrect orphan, are linked to the element and can be selected to remove the highlighted orphan status.

**\*Note:** Using this method moves all of the defect/protective system's quantities to CSI. The values will need to be redistributed.


**3. Correct defect/protective system, incorrect element** - If after selecting the highlighted orphan and clicking the *Edit Element* button the user sees that the element-child link contains the correct defect/protective system but the incorrect element, the *Parent Element* dropdown can be used to change the element. Only elements linked to the selected defect/protective system will be present in the list of parent elements.

**\*Note:** Be sure that the structure unit and environment are correct.

Using this method moves all of the defect/protective system's quantities to CSI. The values will need to be redistributed.

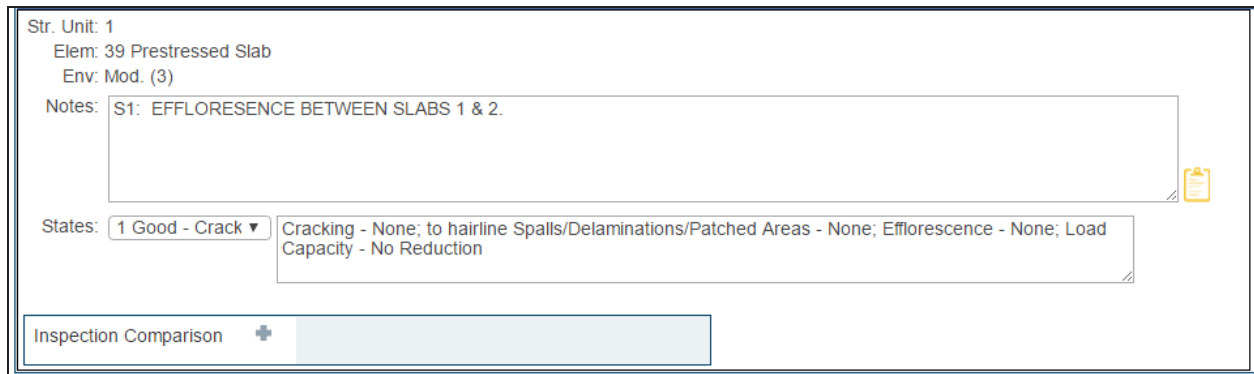
**4. User cannot determine orphan's origin** - If the user cannot determine how to resolve the highlighted orphan or if it is too complicated, the orphan can simply be deleted.

### Delete Element

To delete an element, click the  symbol for the desired element. Deleting an element that has child elements will delete all of the elements.

### Element Information

When an element is selected, a new section appears at the bottom of the Bridge Elements grid:



The screenshot shows a panel with the following content:

- Str. Unit: 1
- Elem: 39 Prestressed Slab
- Env: Mod. (3)
- Notes: S1: EFFLORESENCE BETWEEN SLABS 1 & 2.
- States: 1 Good - Crack (dropdown menu)
- Cracking - None; to hairline Spalls/Delaminations/Patched Areas - None; Efflorescence - None; Load Capacity - No Reduction
- Inspection Comparison + (button)

At the top of this section is the basic element information, as well as parent and grandparent element information, if applicable.

Individual element notes can be entered and the *States* dropdown can be used to view or provide notes on each of the condition state levels for the selected element.

## Condition Page Controls



The screenshot shows a dark blue bar with the following controls:

- Status: New (dropdown menu)
- Review Needed
- Approved By: (text field)
- Cancel (button)
- Save (button)
- Save & Close (button)
- Delete Inspection (button)

### Status

The *Status* dropdown allows the user to change the status of the current inspection report. By default, the available statuses are: New, Under Review, Approved, Locked, and Archived.

Admins can edit these statuses and create new ones by using the `inspevnt.inspstat` parameter on the *Admin > General Config > Parameters* task.

### Review Needed

The *Review Needed* checkbox allows the user to indicate whether or not the current inspection needs reviewed.

## Approved By

The *Approved By* label displays the name of the user who approved the inspection report.

## Save/Delete Controls

The *Save* button saves the changes made to the current inspection.

The *Save & Close* button saves the changes made to the current inspection and returns the user to the *Bridges > View List* task.

The *Cancel* button cancels the changes made to the current inspection and returns the user to the *Bridges > View List* task.

The *Delete Inspection* button deletes the current inspection for the selected bridge.

<i>Inspection &gt; Condition Control Information</i>			
<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
<b><i>Condition Ratings Grouping</i></b>			
Deck (58)	inspevnt	dkrating	NBI Item 58 - This item describes the overall condition rating of the deck. Concrete decks should be inspected for cracking, scaling, spalling, leaching, chloride contamination, potholing, delamination, and full or partial depth failures. Steel grid decks should be inspected for broken welds, broken grids, section loss, and growth of filled grids from corrosion. Timber decks should be inspected for splitting, crushing, fastener failure, and deterioration from rot.
Superstructure (59)	inspevnt	suprating	NBI Item 59 - This item describes the physical condition of all structural members. The structural members should be inspected for signs of distress which may include cracking, deterioration, section loss, and malfunction and misalignment of bearings.
Substructure (60)	inspevnt	subrating	NBI Item 60 - This item describes the physical condition of piers, abutments, piles, fenders, footings, or other components. All substructure elements should be inspected for visible signs of distress including evidence of cracking, section loss, settlement, misalignment, scour, collision damage, and corrosion.
Future Critical Details	bridge	fc_detail	This is an optional non-NBI field used to characterize the fracture-critical details on the structure. By definition, fracture critical members are steel elements sustaining tensile stresses whose failure will probably cause a portion of or the entire bridge to collapse. This field will not be used to identify fracture critical bridges - NBI Item 92A can be used for that purpose. This field will be used to identify the reason a bridge is fracture critical as well as identifying fatigue prone details which are not necessarily fracture critical.

*Inspection > Condition Control Information*

Control Name	Table Name	Column Name	Notes
Channel (61)	inspevnt	chanrating	NBI Item 61 - This item describes the physical conditions associated with the flow of water through the bridge such as stream stability and the condition of the channel, riprap, slope protection, or stream control devices including spur dikes.
Culvert (62)	inspevnt	culvrating	NBI Item 62 - This item evaluates alignment, settlement, joints, structural condition, scour, and other items associated with culverts. The rating code is intended to be overall condition evaluation of the culvert. Integral wingwalls to first construction or expansion joint shall be included in evaluation. NBI Items 58, 59, and 60 shall be coded N for all culverts.
Waterway (71)	inspevnt	wateradeq	NBI Item 71 - This item appraises the waterway opening with respect to passage of flow through the bridge. Site conditions may warrant somewhat higher or lower ratings.
Unrepaired Spalls	inspevnt	deckdistr	The actual distressed deck area in square meters. Non-NBI field.

**Bridge Elements Grid**

Quantity	PON_ ELEM_ INSP	ELEM_ QUANTITY	The total quantity of the selected element.
Qty. 1	PON_ ELEM_ INSP	ELEM_ QTYSTATE1	The quantity of the selected element that is in condition state 1.
Qty. 2	PON_ ELEM_ INSP	ELEM_ QTYSTATE2	The quantity of the selected element that is in condition state 2.
Qty. 3	PON_ ELEM_ INSP	ELEM_ QTYSTATE3	The quantity of the selected element that is in condition state 3.
Qty. 4	PON_ ELEM_ INSP	ELEM_ QTYSTATE4	The quantity of the selected element that is in condition state 4.
Pct. 1	PON_ ELEM_ INSP	ELEM_ PCTSTATE1	The percentage of the selected element that is in condition state 1.
Pct. 2	PON_ ELEM_ INSP	ELEM_ PCTSTATE2	The percentage of the selected element that is in condition state 2.
Pct. 3	PON_ ELEM_ INSP	ELEM_ PCTSTATE3	The percentage of the selected element that is in condition state 3.
Pct. 4	PON_ ELEM_ INSP	ELEM_ PCTSTATE4	The percentage of the selected element that is in condition state 4.

*Inspection > Condition Control Information*

Control Name	Table Name	Column Name	Notes
	INSP		
<b>Add Element Popup</b>			
Grandparent Element	PON_ELEM_INSP	PARENT_PON_ELEM_INSP_GD	The grandparent element exists when there is an element with a protective system and that protective system has a defect. Therefore, element > protective system > defect.  <i>*Note: While the grandparent is shown, there is no longer a database field for it. So, in the element &gt; protective system &gt; defect family, the grandparent only exists in the database as the parent of the protective system and not as the grandparent of the defect.</i>
Parent Element	PON_ELEM_INSP	PARENT_PON_ELEM_INSP_GD	The parent element can be either an element with a protective system or defect, or a protective system in the element > protective system > defect hierarchy.
Element ID	PON_ELEM_INSP	PON_ELEM_DEFS_GD	The element currently selected.
Structure Unit	PON_ELEM_INSP	STRUCTURE_UNIT_GD	Determines to which structure unit within the bridge that the element belongs.
Environment	PON_ELEM_INSP	PON_ENVT_DEFS_GD	The environment in which the element exists.
Quantity/Count	PON_ELEM_INSP	ELEM_QUANTITY	The size/amount of the element.
Element Description	PON_ELEM_INSP	ELEM_NOTES	A description or notes about the element.
<b>Inspection Notes Grouping</b>			
Insp Level Notes	inspevnt	notes	Notes for the current inspection.
<b>Inspection Header</b>			
Bridge	bridge	bridge_id	The agency bridge identification number that is used to identify structures on most screens and reports.
Facility Carried	bridge	facility	NBI Item 7: The facility carried by the structure.
Inspection Date Selection	inspevnt	inspkey	The inspection key. A unique identifier for the inspections on a particular structure that includes the date of the inspection.
Type	inspevnt	insptype	The primary type of inspection performed.
<b>Inspection Footer</b>			



*Inspection > Condition Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
Status	inspevnt	inspstat	The current status of the selected inspection.
Review Needed	inspevnt	rev_req	Indicates whether or not a review of the inspection is required.
Approved By	inspevnt	inspname	The name of the user that approved the inspection report.

# Appraisal

The *Inspection > Appraisal* task allows the user to enter a bridge's NBI structure appraisal information, including clearances, NBI load ratings, and more. The user can also view the calculated appraisal ratings for the selected bridge, operating and inventory ratings, and the structure's posting status.

Bridge: 00001 Facility Carried (007): SOUTH 2ND STREET Inspection: 2014-08-13 (XPHZ) Type: Regular NBI Metric English

Inspection > Appraisal

**Structural Appraisal**

- Open/Posted/Closed (041): A Open, no restriction
- Approach Alignment (072): 8 Equal Desirable Crit
- Bridge Railings (036A): N N/A or not required
- Transitions (036B): N N/A or not required
- Approach Guardrail (036C): N N/A or not required
- Approach Guardrail Ends (036D): N N/A or not required
- Pier Protection (111): Not Applicable
- Scour Critical (113): 8 Stable Above Footing
- Fracture Critical Details: Missing

**Calculated Appraisal Ratings**

- Structural Evaluation (067): 6 Equal Min Criteria
- Deck Geometry (068): 7 Above Min Criteria
- Underclearances (069): N Not applicable (NBI)
- SDIFQ Status: Not Deficient
- Sufficiency Rating (SRB): 97.7
- Sufficiency Rating Calculate Status: SAVED / 0
- Health Index: 95.29%
- Bridge Condition: Fair

**Clearances**

**Minimum Vertical Clearances**

- Over Structure (053): 99.990 ft
- Under (Reference) (054A): N Feature not hwy or RR
- Under Clearance (054B): 0.000 ft

**Minimum Lateral Clearances**

- Reference Feature (055A): N Feature not hwy or RR
- Right Side (055B): 0.000 ft
- Left Side (056): 0.000 ft

**Navigation Data**

- Navigation Control Exists (038): Permit Not Required
- Navigation Vertical Clearances (039): 0.000 ft
- Navigation Horizontal Clearances (040): 0.000 ft
- Minimum Vertical Lift Clearances (116):

**NBI Load Ratings**

Load Rating Review Recommended:

Rating Date: 8/16/1993

Initials:

Design Load (031): 2 M 13.5 (H 15)

Posting (070): 5 AB/Above Legal Loads

Operating Type (063): 2 AS Allowable Stress

Operating Rating (064): 43.0 ton

Inventory type (065): 2 AS Allowable Stress

Inventory Rating (066): 32.0 ton

Alternate Operating Rating Type: (FIX PARAM VALUES)

Alternate Operating Rating: ton

Alternate Inventory Rating Type: (FIX PARAM VALUES)

Alternate Inventory Rating: ton

**Posting Loads**

**Inventory**

- Type 1: 0.0 ton
- Type 2: 0.0 ton
- Type 3: 0.0 ton

**Operating**

- Type 1: 38.8 ton
- Type 2: 55.6 ton
- Type 3: 60.8 ton

**SIVs**

- SU4: ton
- SU5: ton
- SU6: ton
- SU7: ton
- NRL: ton

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Status: New Review Needed Approved By: Cancel Save & Close Save Delete Inspection

## Appraisal Groupings

### Structural Appraisal

The *Structural Appraisal* grouping contains several structural NBI fields to be completed.

**Structural Appraisal**

- Open/Posted/Closed (041): A Open, no restriction
- Approach Alignment (072): 8 Equal Desirable Crit
- Bridge Railings (036A): N N/A or not required
- Transitions (036B): N N/A or not required
- Approach Guardrail (036C): N N/A or not required
- Approach Guardrail Ends (036D): N N/A or not required
- Pier Protection (111): Not Applicable (P)
- Scour Critical (113): 8 Stable Above Footing
- Fracture Critical Details: No FC Details

### Calculated Appraisal Ratings

The *Calculated Appraisal Ratings* grouping contains information that is calculated on the database level, including NBI fields such as structural evaluation and sufficiency rating. The *Bridges > Suff Rate* task can be used to override the calculated values in this section.

Calculated Appraisal Ratings	
Structural Evaluation (067):	6 Equal Min Criteria
Deck Geometry (068):	7 Above Min Criteria
Underclearances (069):	N Not applicable (NBI)
SD/FO Status:	Not Deficient
Sufficiency Rating (SRB):	97.7
Sufficiency Rating Calculate Status:	SAVED / 0
Health Index:	95.29%
Bridge Condition:	Fair

The Bridge Condition rating has been added to the *Calculated Appraisal Ratings* grouping in BrM version 5.2.3. This displays a bridge status of Good/Fair/Poor and stores it in the database at `inspevnt.bridge_condition`. This status is determined by the lowest rating of the NBI condition ratings for deck, superstructure, substructure, and culvert. The status is as follows:

- **Good** - 9, 8, 7
- **Fair** - 6, 5
- **Poor** - 4, 3, 2, 1

**Example:** An inspection is completed with the following values:

Deck: 7

Superstructure: 6

Substructure: 5

Culvert : Null

Because substructure is the lowest NBI condition rating, it will be used to determine the Good/Fair/Poor status. With "5" as its rating, the bridge status will be set to Fair.

### Clearances

The *Clearances* grouping contains vertical and lateral clearances and navigation data NBI fields to be completed.

Clearances	
<b>Minimum Vertical Clearances</b>	
Over Structure (053):	<input type="text" value="99.990"/> ft
Under (Reference) (054A):	<input type="text" value="N Feature not hwy or RR"/>
Under Clearance (054B):	<input type="text" value="0.000"/> ft
<b>Minimum Lateral Clearances</b>	
Reference Feature (055A):	<input type="text" value="N Feature not hwy or RR"/>
Right Side (055B):	<input type="text" value="99.900"/> ft
Left Side (056):	<input type="text" value="0.000"/> ft
<b>Navigation Data</b>	
Navigation Control Exists (038):	<input type="text" value="Permit Not Require"/>
Navigation Vertical Clearances (039):	<input type="text" value="0.000"/> ft
Navigation Horizontal Clearances (040):	<input type="text" value="0.000"/> ft
Minimum Vertical Lift Clearances (116):	<input type="text" value=""/> ft

### NBI Load Ratings

The *NBI Load Ratings* grouping contains load rating NBI fields and alternate fields to be completed.

**\*Note:** In previous versions of BrM, the *Rating Date* textbox value defaulted to the structure's creation date. This no longer occurs in BrM version 5.2.3. Instead, the field is left blank upon creation of a new structure.

## Appraisal Page Controls



The *Save* button saves the changes made to the selected bridge's appraisal page.

The *Save & Close* button saves the changes made to the selected bridge's appraisal page and returns the user to the *Bridges > View List* task.

The *Cancel* button cancels the changes made to the selected bridge's appraisal page and returns the user to the *Bridges > View List* task.

The *Delete Inspection* button deletes the current inspection for the selected bridge.

<i>Inspection &gt; Appraisal Control Information</i>			
Control Name	Table Name	Column Name	Notes
<b><i>Structural Appraisal Grouping</i></b>			
Open/Posted/Closed	inspevnt	oppostel	NBI Item 41: This item provides information about the actual operational status of a structure. The field review could show that a structure is posted, but Item 70 - Bridge Posting may indicate that posting is not required. This is possible and acceptable coding since Item 70 is based on the operating stress level and the governing agency's posting procedures may specify posting at some stress level less than the operating rating.

*Inspection > Appraisal Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
Approach Alignment	inspevnt	appralign	NBI Item 72: This item identifies those bridges which do not function properly or adequately due to the alignment of the approaches. It is not intended that the approach roadway alignment be compared to current standards but rather to the existing highway alignment. This concept differs from other appraisal evaluations. The establishment of set criteria to be used at all bridge sites is not appropriate for this item. The basic criteria is how the alignment of the roadway approaches to the bridge relate to the general highway alignment for the section of highway the bridge is on.
Bridge Railings	inspevnt	railrating	NBI Item 36A: Bridge railings should be evaluated using the current AASHTO Standard Specifications for Highway Bridges, which calls for railings to meet specific geometric criteria and to resist specified static loads without exceeding the allowable stresses in their elements.
Transitions	inspevnt	transratin	NBI Item 36B: The transition from approach guardrail to bridge railing requires that the approach guardrail be firmly attached to the bridge railing. It also requires that the approach guardrail be gradually stiffened as it comes closer to the bridge railing. The ends of curbs and safety walks need to be gradually tapered out or shielded. The data collected shall apply only to the route on the bridge. Collision damage or deterioration of the elements are not considered when coding this item.
Approach Guardrail	inspevnt	arailratin	NBI Item 36C: The structural adequacy and compatibility of approach guardrail with transition designs should be determined. Rarely does the need for a barrier stop at the end of a bridge. Acceptable guardrail design suggestions are contained in the AASHTO Roadside Design Guide and subsequent FHWA or AASHTO guidelines. The data collected shall apply only to the route on the bridge. Collision damage or deterioration of the elements are not considered when coding this item.
Approach Guardrail Ends	inspevnt	aendrating	NBI Item 36D: As with guardrail ends in general, the ends of approach guardrails to bridges should be flared, buried, made breakaway, or shielded. Design treatment of guardrail ends is given in the AASHTO Roadside Design Guide. The data collected shall apply only to the route on the bridge. Collision damage or deterioration of the elements are not considered when coding this item.
Pier Protection	inspevnt	pierprot	NBI Item 111: Code the whether pier protection is present and the status of the protection.
Scour Critical	inspevnt	scourcrit	NBI Item 113: Identify current status of bridge regarding vulnerability to scour. Scour analyses to be made by hydraulic/geotechnical/structural engineers. A scour critical bridge is one with abutment or pier foundations which are rated as unstable due to observed scour at bridge site or scour potential

*Inspection > Appraisal Control Information*

Control Name	Table Name	Column Name	Notes
			as determined from scour evaluation study.
Fracture Critical Details	inspevnt	fc_detail	This is an optional non-NBI field used to characterize the fracture-critical details on the structure. This field will not be used to identify fracture critical bridges; NBI Item 92A can be used for that purpose. This field will be used to identify the reason a bridge is fracture critical as well as identifying fatigue prone details which are not necessarily fracture critical.
<b><i>Clearances - Minimum Vertical Clearances Grouping</i></b>			
Over Structure	bridge	vclover	NBI Item 53: The information to be recorded for this item is the actual minimum vertical clearance over the bridge roadway, including shoulders, to any superstructure restriction, rounded down to the nearest hundredth of a meter. For double decked structures code the minimum, regardless whether it is pertaining to the top or bottom deck. When no superstructure restriction exists above the bridge roadway, or when a restriction is 30 meters or greater, code 9999. Coding of actual clearances between 30 meters and 99.99 meters to an exact measurement is optional.
Vertical Under Reference	bridge	refvuc	NBI Item 54A: The feature under the structure used to measure the vertical clearance. Coded as H = highway, R = railroad, N = not a highway or railroad.
Vertical Under Clearance	bridge	vcunder	NBI Item 54B: Code a 4-digit number to represent the minimum vertical clearance from that feature to the structure, truncated to the hundredth of a meter--with an assumed decimal point. When a restriction is 30 meters or greater, code 9999. Coding of actual clearances between 30 meters and 99.99 meters to an exact measurement is optional. If the feature is not a highway or railroad, code the minimum vertical clearance 0000.
<b><i>Clearances - Minimum Lateral Clearances Grouping</i></b>			
Lateral Reference Feature	bridge	refhuc	NBI Item 55A - The feature under the structure used to measure the lateral clearance. Coded as H = highway, R = railroad, N = not a highway or railroad.
Right Side	bridge	helrurt	NBI Item 55B: Using a 3-digit number, record and code the minimum lateral underclearance on the right to the nearest tenth of a meter--with an assumed decimal point. The lateral clearance should be measured from the right edge of the roadway--excluding shoulders--to the nearest substructure unit, to a rigid barrier, or to the toe of slope steeper than 1 to 3. In the case of a dual highway, the median side clearances of both roadways should be measured and the smaller distance recorded and coded. If there is no obstruction in the median area, a notation of open should be recorded and 999 should be coded. For clearances greater than 30 meters, code 998. Coding of actual clearances greater than 30 meters to an exact measurement is optional. Code 000 to indicate not applicable.

*Inspection > Appraisal Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
Left Side	bridge	hclrult	NBI Item 56: Using a 3-digit number, record and code the minimum lateral underclearance on the left--median side for divided highways--to the nearest tenth of a meter--with an assumed decimal point. The lateral clearance should be measured from the left edge of the roadway--excluding shoulders--to the nearest substructure unit, to a rigid barrier, or to the toe of slope steeper than 1 to 3. In the case of a dual highway, the median side clearances of both roadways should be measured and the smaller distance recorded and coded. If there is no obstruction in the median area, a notation of open should be recorded and 999 should be coded. For clearances greater than 30 meters, code 998. Coding of actual clearances greater than 30 meters to an exact measurement is optional. Code 000 to indicate not applicable.
<b>Navigation Data Grouping</b>			
Navigation Control Exists	bridge	navcontrol	NBI Item 38: Indicates whether or not a bridge permit is necessary for navigation, if applicable.
Navigation Vertical Clearances	bridge	navvc	NBI Item 39: If navigation of the waterway requires a permit, this is the minimum vertical clearance of the navigation.
Navigation Horizontal Clearances	bridge	navhc	NBI Item 40: If navigation of the waterway requires a permit, this is the minimum horizontal clearance of the navigation.
Navigation Vertical Lift Clearances	bridge	lftbmvcl	NBI Item 116: The minimum vertical lift clearance for the lift bridge in the dropped/closed position.
<b>Calculated Appraisal Ratings Grouping</b>			
Structural Evaluation	inspevnt	strating	NBI Item 67: This is the structural evaluation rating of the bridge. This item is calculated by the specifications used in the NBI Coding Guide.
Deck Geometry	inspevnt	deckgeom	NBI Item 68: The overall rating for deck geometry includes two evaluations: the curb-to-curb or face-to-face of rail bridge width and the minimum vertical clearance over the bridge roadway. When an individual table lists several deck geometry rating codes for the same roadway width under a specific ADT, the lower code is used.
Underclearances	inspevnt	underclr	NBI Item 69: This is the underclearance of the bridge. This item is calculated by the specifications used in the NBI Coding Guide.
SD/FO Status	inspevnt	nbi_rating	The NBI rating (structurally deficient/functionally obsolete status).
Sufficiency Rating	inspevnt	suff_rate	The calculated sufficiency rating of the bridge.
SRCS	bridge	srstatus	Indicates whether the sufficiency rating is current or needs updated.
Health Index			The health index is a calculated value that comes from database

*Inspection > Appraisal Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
			view: v_hix.hix.
<b><i>NBI Load Ratings Grouping</i></b>			
Load Rating Review Recommended	bridge	req_op_rat	This control indicates whether review of the load ratings is recommended.
Rating Date	bridge	ratingdate	The date the load rating calculation was made. Non-NBI field.
Initials	bridge	rater_ini	The initials of the load rater/engineer responsible for performing the load rating. Non-NBI field.
Design Load	bridge	designload	NBI Item 31: Use the codes below to indicate the live load for which the structure was designed. The numerical value of the railroad loading should be recorded on the form.
Posting	bridge	posting	NBI Item 70: The National Bridge Inspection Standards require the posting of load limits only if the maximum legal load configurations in the state exceeds the load permitted under the operating rating. If the load capacity at the operating rating is such that posting is required, this item shall be coded 4 or less. If no posting is required at the operating rating, this item shall be coded 5.
Operating Type	bridge	ortype	NBI Item 63: Use one of the codes below to indicate which load rating method was used to determine the Operating Rating coded in Item 64 for this structure.
Operating Rating	bridge	orload	NBI Item 64: This capacity rating, referred to as the operating rating, will result in the absolute maximum permissible load level to which the structure may be subjected for the vehicle type used in the rating. Code the operating rating as a 3-digit number to represent the total mass in metric tons of the entire vehicle measured to the nearest tenth of a metric ton--with an assumed decimal point. It should be emphasized that only MS loading shall be used to determine the operating rating.
Inventory Type	bridge	irtype	NBI Item 65: Use one of the codes below to indicate which load rating method was used to determine the Inventory Rating coded in Item 66 for this structure.
Inventory Rating	bridge	irload	NBI Item 66: This capacity rating, referred to as the inventory rating, will result in a load level which can safely utilize an existing structure for an indefinite period of time. Only the MS loading shall be used to determine the inventory rating. Code the Inventory Rating as a 3-digit number to represent the total mass in metric tons of the entire vehicle measured to the nearest tenth of a metric ton--with an assumed decimal point. Code 999 for a structure under sufficient fill such that, according to AASHTO design, the live load is insignificant in the structure load capacity.
Alternate Operating	bridge	altormeth	The alternate operating rating method. Optional non-NBI field



*Inspection > Appraisal Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
Rating Type			to indicate the method used in developing the alternate operating load rating fields.
Alternate Operating Rating	bridge	altorload	The alternate operating load rating. Optional non-NBI field to hold a load rating by some alternative method aside from the one used in the NBI load rating fields.
Alternate Inventory Rating Type	bridge	altirmeth	The alternate inventory rating method. Optional non-NBI field to indicate the method used in developing the alternate operating load rating fields.
Alternate Inventory Rating	bridge	altirload	The alternate inventory load rating. Optional non-NBI field to hold a load rating by some alternative method aside from the one used in the NBI load rating fields.
<b>Posting Loads - Inventory Grouping</b>			
Inventory - Type 1	bridge	truck1or	The operating rating for truck type 1. This is an optional non-NBI field to provide for a load rating specific to a particular type of truck.
Inventory - Type 2	bridge	truck2or	The operating rating for truck type 2. This is an optional non-NBI field to provide for a load rating specific to a particular type of truck.
Inventory - Type 3	bridge	truck3or	The operating rating for truck type 3. This is an optional non-NBI field to provide for a load rating specific to a particular type of truck.
<b>Posting Loads - Operating Grouping</b>			
Operating - Type 1	bridge	truck1ir	The inventory rating for truck type 1. Optional non-NBI field to provide for a load rating specific to a particular type of truck.
Operating - Type 2	bridge	truck2ir	The inventory rating for truck type 2. Optional non-NBI field to provide for a load rating specific to a particular type of truck.
Operating - Type 3	bridge	truck3ir	The inventory rating for truck type 3. Optional non-NBI field to provide for a load rating specific to a particular type of truck.
<b>Posting Loads - SHVs Grouping</b>			
SU4	bridge	su4	Single unit SHV load model - 4 axle SHV.
SU5	bridge	su5	Single unit SHV load model - 5 axle SHV.
SU6	bridge	su6	Single unit SHV load model - 6 axle SHV.
SU7	bridge	su7	Single unit SHV load model - 7 axle SHV.
NRL	bridge	nrl	Notational rating load model.
<b>Inspection Header</b>			
Bridge	bridge	bridge_id	The agency bridge identification number that is used to identify structures on most screens and reports.
Facility Carried	bridge	facility	NBI Item 7: The facility carried by the structure.

*Inspection > Appraisal Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
Inspection Date Selection	inspevnt	inspkey	The inspection key. A unique identifier for the inspections on a particular structure that includes the date of the inspection.
Type	inspevnt	insptype	The primary type of inspection performed.
<b>Inspection Footer</b>			
Status	inspevnt	inspstat	The current status of the selected inspection.
Review Needed	inspevnt	rev_req	Indicates whether or not a review of the inspection is required.
Approved By	inspevnt	inspname	The name of the user that approved the inspection report.

# Inventory

The *Inspection > Inventory* task allows the user to modify a bridge's information through four subtasks: *Admin*, *Design*, *Roads*, and *Agency Items*.

**\*Note:** User permissions may limit the fields available to be modified.

## Admin

The *Inspection > Inventory > Admin* subtask is used to modify a bridge's structure identification, location, age and service, and more.

Bridge: 000005 Facility Carried (007): RAILROAD STREET Inspection: 2015-06-27 (UWTZ) Type: Regular NBI Metric English

Inspection > Inventory > Admin

**Structural Identification**

Agency Bridge ID: 000005 BRKEY: 000005  
NBI Structure No (008): 000005 Name: ??????????????????????

**Location**

FIPS State (001A): 01 Alabama  
FHWA Region (001B): Region 4-Atlanta  
Division (002): Division 10  
County (003): Lamar  
City/Town/Placecode (004): MILLPORT  
Feature Intersected (006A): STREAM  
Facility Carried (007): RAILROAD STREET  
Location (009): 0.5 MI E SR#17  
Latitude (016): 33d 33' 57.21" Longitude (017): 088d 04' 25.78"  
Border State (098AA): Not Applicable (P) Share(%) (098B): 0  
Border FHWA Region (098AB): Not Applicable  
Border Struct No (099):

**Age and Service**

Year Built (027): 1900 Year Reconstruct (106): 0  
Type of Service on (042A): 1 Highway  
Under (042B): 5 Waterway  
Lanes Under (028B): 0

**Operation**

Maint. Resp. (021): City/Municipal Hwy Agenc  
Owner (022): City/Municipal Hwy Agenc  
District: District 1

**Classification Information**

NBIS Bridge Length (112): Long Enough  
Parallel Structure (1011): No || bridge exists  
Temporary Structure (103): Not Applicable (P)  
Historic Significance (037): 5 Not eligible for NRHP

**Programming**

SR Calculate Status: SR Recalc Required

**Structure Notes**

Imported with XML on 01/12/2015 00:00:00.

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BrM Version 5.2.3.18 [Build Date: Monday, June 20, 2016]  
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Status: New Cancel Save Save & Close Delete Inspection

## Admin Page Groupings

### Location

The *Location* grouping determines the location details of the selected bridge, including the latitude and longitude values used in BrM's matching features.

### Programming

The *Programming* grouping contains the sufficiency rating calculation status for the selected bridge. The *SR Calculate Status* dropdown sets the status.

### Age and Service

The *Age and Service* grouping provides information about the age of the bridge and how it is used.

### Operation

The *Operation* grouping is used to indicate who owns the bridge and who is responsible for the maintenance of the bridge.

### Classification Information

The *Classification Information* grouping contains information about the how the structure is classified.

## Admin Page Controls

If changes have been made to the subtask, those changes must be saved before leaving the current page in order for the changes to be maintained.



The *Save* button saves the changes made on the current subtask.

The *Save & Close* button saves the changes made on the current subtask and returns the user to the *Bridges > View List* task.

The *Cancel* button cancels the changes made on the current subtask and returns the user to the *Bridges > View List* task.

The *Delete Inspection* button deletes the current inspection for the selected bridge.

<i>Inspection &gt; Inventory &gt; Admin Control Information</i>			
Control Name	Table Name	Column Name	Notes
<b><i>Structural Identification Grouping</i></b>			
Agency Bridge ID	bridge	bridge_id	Agency bridge identification number. Used to identify structures on most screens and reports.
NBI Structure No.	bridge	struct_num	NBI Item 8 - The NBI structure number. Note that regardless of whether Item 8 is mapped only to struct_num or also to additional fields, if a user changes the value stored and exports then imports an NBI file, the result may be the creation of a new brkey.
Brkey	bridge	brkey	The bridge key. One of the structure identifiers in BrM.
Name	bridge	strucname	The agency's structure name. Non-NBI field.
<b><i>Location Grouping</i></b>			
FIPS State	bridge	fips_state	NBI Item 1A - The state the structure is located within.
FHWA Region	bridge	fhwa_regn	NBI Item 1B - The region the structure is located within.
District	bridge	district	NBI Item 2 - The highway agency district in which the bridge is located. Existing district numbers shall be used where districts are identified by number. Where districts are identified by name, a code number shall be assigned based on an alphabetical or organizational listing of the districts.
County	bridge	county	NBI Item 3 - The county the structure is located within.
City/Town/Placecode	bridge	placecode	NBI Item 4 - The city, town, township, village, or other census-designated place the structure is located within.
Feature Intersected	bridge	featint	NBI Item 6 - This item contains a description of the features intersected by the structure and a critical facility indicator.

*Inspection > Inventory > Admin Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
			When Item 5A indicates an under record, this item describes the inventory route and/or features under the structure.
Facility Carried	bridge	facility	NBI Item 7 - The facility being carried by the structure shall be recorded and coded. In all situations this item describes the use on the structure.
Location	bridge	location	NBI Item 9 - This item contains a narrative description of the bridge location. It is recommended that the location be keyed to a distinguishable feature on an official highway department map such as road junctions and topographical features.
Latitude	bridge	latitude	NBI Item 16 - For bridges on STRAHNET and STRAHNET Connector highways and on the NHS, record and code the latitude of each in degrees, minutes and seconds to the nearest hundredth of a second--with an assumed decimal point. The point of the coordinate may be the beginning of the bridge in the direction of the inventory or any other consistent point of reference on the bridge which is compatible with the LRS.
Longitude	bridge	longitude	NBI Item 17 - For bridges on STRAHNET and STRAHNET Connector highways and on the NHS, record and code the longitude of each in degrees, minutes and seconds to the nearest hundredth of a second--with an assumed decimal point. The point of the coordinate may be the beginning of the bridge in the direction of the inventory or any other consistent point of reference on the bridge which is compatible with the LRS.
Border State	bridge	nstatecode	NBI Item 98AA - The neighboring state of the structure. For the special case of a structure on the border with Canada or Mexico, code the State code "CAN" or "MEX" respectively. If structure is not on a border, leave blank.
Share%	bridge	bb_pct	NBI Item 98B - It is for specifying the percent responsibility for improvements to the existing structure when it is on a border with a neighboring state. Code it with the percentage of total deck area of the existing bridge that the neighboring state is responsible for funding.
Border FHWA Region	bridge	n_fhwa_reg	NBI Item 98AB - Indicate the FHWA region of the neighboring state. For the special case of a structure on the border with Canada or Mexico, leave blank.
Border Struct No.	bridge	bb_brdgeid	NBI Item 99 - Code the neighboring state's 15-digit NBI structure number for any structure noted in Item 98. This number must match exactly the neighboring state's submitted NBI structure number. The entire 15-digit field must be accounted for including zeros and blank spaces whether they are leading, trailing, or embedded in the 15-digit field. If Item 98 is blank, this item is blank.

*Inspection > Inventory > Admin Control Information*

Control Name	Table Name	Column Name	Notes
<b>Programming Grouping</b>			
SR Calculate Status	bridge	srstatus	Tracks whether sufficiency rating (SR) needs to be recalculated. This field is set to 1 when a new roadway or inspection is created (and in response to other circumstances that may trigger a need to recalculate SR), and set to 0 when SR is recalculated.
<b>Age and Service Grouping</b>			
Year Built	bridge	yearbuilt	NBI Item 27 - Record and code the year of construction of the structure. Code all 4 digits of the year in which construction of the structure was completed. If the year built is unknown, provide a best estimate.
Year Reconstruct	bridge	yearrecon	NBI Item 106 - Record and code the year of most recent reconstruction of the structure. Code all 4 digits of the latest year in which reconstruction of the structure was completed. If there has been no reconstruction code 0000.
Type of Service On	bridge	servtypon	NBI Item 42A - Indicates the type of service on the bridge.
Under	bridge	servtypund	NBI Item 42B - Indicates the type of service under the bridge.
Lane Under	bridge	sumlanes	NBI Item 28B - The sum of the number of lanes under the structure.
<b>Operation Grouping</b>			
Maintenance Resp.	bridge	custodian	NBI Item 21 - The name of the agency responsible for the maintenance of the structure.
Owner	bridge	owner	NBI Item 22 - The name of the owner of the structure.
Agency Admin Area	bridge	adminarea	This is used in subsetting and sorting of bridge data as a convenience feature. Non-NBI field.
On/Off Agency System	bridge	on_off_sys	Specifies whether the structure is on or off the agency system. Typically based on the value for either structure ownership (NBI Item 22) or custodian (NBI Item 21). Used for determining applicable policies and costs, and for reporting results.
Bridge Group	bridge	bridgegroup	Agency-defined group for the bridge. Intended for use in grouping together bridges for inspection purposes. Non-NBI field.
<b>Classification Information Grouping</b>			
NBIS Bridge Length	bridge	nbislen	NBI Item 112 - Indicate whether this structure meets or exceeds the minimum length specified to be designated as a bridge by NBI standards.
Parallel Structure	bridge	paralstruc	NBI Item 101 - Code this item to indicate situations where separate structures carry the inventory route in opposite directions of travel over the same feature.

*Inspection > Inventory > Admin Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
Temporary Structure	bridge	tempstruc	NBI Item 103 - Code this item to indicate situations where temporary structures or conditions exist. Temporary structures or conditions are those which are required to facilitate traffic flow. This may occur either before or during the modification or replacement of a structure found to be deficient.
Historic Significance	bridge	histsign	NBI Item 37 - The historical significance of a bridge involves a variety of characteristics: the bridge may be a particularly unique example of the history of engineering; the crossing itself might be significant; the bridge might be associated with a historical property or area; or historical significance could be derived from the fact the bridge was associated with significant events or circumstances.
<b><i>Structure Notes Grouping</i></b>			
Structure Notes	bridge	notes	Notes about the structure.
<b>Inspection Header</b>			
Bridge	bridge	bridge_id	The agency bridge identification number that is used to identify structures on most screens and reports.
Facility Carried	bridge	facility	NBI Item 7: The facility carried by the structure.
Inspection Date Selection	inspevnt	inspkey	The inspection key. A unique identifier for the inspections on a particular structure that includes the date of the inspection.
Type	inspevnt	insptype	The primary type of inspection performed.
<b>Inspection Footer</b>			
Status	inspevnt	inspstat	The current status of the selected inspection.
Review Needed	inspevnt	rev_req	Indicates whether or not a review of the inspection is required.
Approved By	inspevnt	inspname	The name of the user that approved the inspection report.

# Design

The *Inspection > Inventory > Design* subtask is used to modify a bridge's deck, span, length, and more. New structure units can also be created on this page.

Bridge: 000005 Facility Carried (007): RAILROAD STREET Inspection: 2015-06-27 (UWTZ) Type: Regular NBI Metric English

Inspection > Inventory > Design

**Deck**

Deck Structure Type (107): 8 Wood or Timber  
 Deck Surface Type (108A): 7 Wood or Timber  
 Deck Membrane Type (108B): 0 None  
 Deck Protection (108C): None  
 Curb Sidewalk width/Left (050A): 0.000 ft  
 Curb Sidewalk width/Right (050B): 0.000 ft  
 Deck Width (052): 15.700 ft  
 Bridge Median (033): 0 No median  
 Deck Area: 799.136 (SF)

**Structure Status**

Bridge Status: 3 Active  
 Bridge Lifecycle Phase: 1 Service

**Spans**

Number of Main Spans (045): 2  
 Main Spans Material (043A): 4 Steel Continuous  
 Main Spans Design (043B): 10 Truss-Thru  
 Number of Approach Spans (046): 0  
 Approach Span Material (044A): Not Applicable (P)  
 Approach Span Design (044B): Not Applicable (P)  
 Skew (034): 0  
 Structure Flared (035): 0 No flare

**Length**

Maximum Span Length (048): 25.900 ft  
 Structure Length (049): 50.900 ft  
 Total Length: 50.900 ft

**Structure Units**

Key	Unit	Type	Default	Elements (#)	Description	Notes
X	1	M Main	<input checked="" type="checkbox"/>	16	Default unit	

Add New

Status: Now Cancel Save Save & Close Delete Inspection

## Structure Units

The *Structure Units* grouping allows the user to create/modify structure units. Structure units are groups of structures typically based on structural design and material. It is not necessary to have multiple structure units, but it can be helpful for inspections.

**Structure Units**

Key	Unit	Type	Default	Elements (#)	Description	Notes
X	0	M Main	<input checked="" type="checkbox"/>	6	ELI Frame	
X	1	A Approach	<input type="checkbox"/>	0	ELI Frame	

Add New

Click the *Add New* button to create a new structure unit.

- **Type:** The structure unit type options can be defined in the *Admin > General Config > Parameters* task.
- **Default:** Only one structure unit may be the default. When a structure unit is the default, it will be the default structure unit selected when a new element is added to a bridge inspection on the *Inspection > Condition* task.



## Design Page Controls

If changes have been made to the subtask, those changes must be saved before leaving the current page in order for the changes to be maintained.



The **Save** button saves the changes made on the current subtask.

The **Save & Close** button saves the changes made on the current subtask and returns the user to the *Bridges > View List* task.

The **Cancel** button cancels the changes made on the current subtask and returns the user to the *Bridges > View List* task.

The **Delete Inspection** button deletes the current inspection for the selected bridge.

<i>Inspection &gt; Inventory &gt; Design Control Information</i>			
<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
<b>Deck Grouping</b>			
Deck Structure Type	bridge	dkstructyp	NBI Item 107: The deck structure type.
Deck Surface Type	bridge	dksurftype	NBI Item 108A: The deck wearing surface type.
Deck Membrane Type	bridge	dkmembtype	NBI Item 108B: The deck membrane type.
Deck Protection	bridge	dkprotect	NBI Item 108C: The protection being used on the deck.
Curb Sidewalk Width/Left	bridge	lftcurbsw	NBI Item 50A: The left curb or sidewalk width. Record and code a 3-digit number to represent the width of the left curb or sidewalk to the nearest tenth of a meter (with assumed decimal points). "Left" and "Right" should be determined on the basis of direction of the inventory.
Curb Sidewalk Width/Right	bridge	rtcurbsw	NBI Item 50B: The right curb or sidewalk width. Record and code a 3-digit number to represent the width of the right curb or sidewalk to the nearest tenth of a meter (with assumed decimal points). "Left" and "Right" should be determined on the basis of direction of the inventory.
Deck Width	bridge	deckwidth	NBI Item 52: The deck width, out-to-out.
Bridge Median	bridge	bridgemed	NBI Item 33: The structure median indicator.
Deck Area	bridge	deck_area	The structure deck area. This is a non-NBI field used as the basis for area-based replacement and improvement cost estim-

*Inspection > Inventory > Design Control Information*

Control Name	Table Name	Column Name	Notes
			ates.
<b>Structure Status Grouping</b>			
Bridge Status	bridge	bridge_status	The current status of the bridge, such as active, inactive, or closed.
Bridge Lifecycle Phase	bridge	bridge_lifecycle_phase	Indicates the current lifecycle phase of the bridge, such as design or preconstruction.
<b>Spans Grouping</b>			
Number of Main Spans	bridge	mainspans	NBI Item 45: Record the number and indicate with a 3-digit code the number of spans in the main or major unit. This item will include all spans of most bridges, the major unit only of a sizable structure, or a unit of material or design different from that of the approach spans.
Main Span Material	bridge	materialmain	NBI Item 43A: The kind of material and/or design for the main span.
Main Span Design	bridge	designmain	NBI Item 43B: The type of design and/or construction for the main span.
Number of Approach Spans	bridge	appspans	NBI Item 46: Record the number and indicate with a 4-digit number the number of spans in the approach spans to the major unit. This item will include all spans of most bridges, the major unit only of a sizable structure, or a unit of material or design different from that of the approach spans.
Approach Span Material	bridge	materialappr	NBI Item 44A: The kind of material and/or design for the approach span.
Approach Span Design	bridge	designappr	NBI Item 44B: The type of design and/or construction for the approach span.
Structure Flared	bridge	strflared	NBI Item 35: Code this item to indicate if the structure is flared, meaning the width of the structure varies. Generally, such variance will result from ramps converging with or diverging from the through lanes on the structure, but there may be other causes. Minor flares at ends of structures should be ignored.
<b>Length Grouping</b>			
Maximum Span Length	bridge	maxspan	NBI Item 48: The length of the maximum span shall be recorded. It shall be noted whether the measurement is center to center of bearing points or clear open distance between piers, bents, or abutments. The measurement shall be along the centerline of the bridge. For this item, code a 5-digit number to represent the measurement to the nearest tenth of a meter with an assumed decimal point.
Structure Length	bridge	length	NBI Item 49: Record and code a 6-digit number to represent the

*Inspection > Inventory > Design Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
			length of the structure to the nearest tenth of a meter--with an assumed decimal point. This shall be the length of roadway that is supported on the bridge structure. The length should be measured back to back of backwalls of abutments or from paving notch to paving notch. Culvert lengths should be measured along the center line of roadway regardless of their depth below grade. Measurement should be made between inside faces of exterior walls. Tunnel length should be measured along the centerline of the roadway.
Total Length	bridge	tot_length	The total length of the structure, including approach roadways. It is always greater than or equal to the structure length.
<b>Structure Units Grouping</b>			
Key	structure_unit	strunitkey	The structure unit's primary identifier.
Unit	structure_unit	strunitlabel	A secondary identifier for the structure unit.
Type	structure_unit	strunittype	The type of structure unit (main, approach, etc.).
Default Unit	structure_unit	defaultflag	Default flag that indicates whether or not this is the default structure unit for the structure. If it is the default, then new elements are assigned to this unit.
Description	structure_unit	strunitdescription	A description of the structure unit.
<b>Inspection Header</b>			
Bridge	bridge	bridge_id	The agency bridge identification number that is used to identify structures on most screens and reports.
Facility Carried	bridge	facility	NBI Item 7: The facility carried by the structure.
Inspection Date Selection	inspevnt	inspkey	The inspection key. A unique identifier for the inspections on a particular structure that includes the date of the inspection.
Type	inspevnt	insptype	The primary type of inspection performed.
<b>Inspection Footer</b>			
Status	inspevnt	inspstat	The current status of the selected inspection.
Review Needed	inspevnt	rev_req	Indicates whether or not a review of the inspection is required.
Approved By	inspevnt	inspname	The name of the user that approved the inspection report.

# Roads

The *Inspection > Inventory > Roads* subtask is used to modify the information for roadways on or under the structure including classification data, traffic, clearance, and more.

Bridge: 000005 Facility Carried (007): RAILROAD STREET Inspection: 2015-06-27 (UWTZ) Type: Regular NBI Metric: English

### Inspection > Inventory > Roads

Roadway (005A): Route On Structure **Create**

**Identification**  
Road/Route name: RAILROAD STREET  
Position/Prefix (005A): Route On Structure  
Kind Hwy (Rt prefix) (005B): 5 City Street  
Desig. level service (005C): 0 None of the below  
Rte# (005D): 00000 Suffix (005E): 0 N/A (NBI)  
Critical Facility (006B): Not Applicable

**Highway Networks & Service Classification**  
Kilometer/Mile Point (011): 0.310002 mi  
National Base Net (012): Not on Base Network  
LRS Inventory Rte (013A): 000MU00040 Sub# (013B): 00  
Toll Facility (020): 3 On free road  
Functional Class (026): 09 Rural Local  
Traffic Direction (102): 3 1-lane Br for 2-way

**Traffic**  
Lanes (28A): 1 Medians: Speed: 0 mph  
ADT Class: (FIX PARAM VALUES)  
Recent ADT (029): 15 Year (030): 2007 Truck % (109): 0  
Future ADT (114): 59 Fut. Year (115): 2032

**Alternate Classifications**  
Defense Highway (100): 0 Not a STRAHNET hwy  School Bus Rte  
Nat. Hwy System (104): 0 Not on NHS  Transit Rte  
Fed. Lands Hwy (105): 0 N/A (NBI)  Emergency Rte  
Nat. Truck Network (110): 0 Not part of natl netwo  NBI Rte

**Clearances**  
Vertical (010): 99.990 ft  
Horizontal (047): 14.500 ft

**Widths**  
Approach Road (032): 9.800 ft  
Roadway (051): 14.400 ft

**Detours**  
Length (019): 97.999992 mi

**Accidents**

**Roadway Notes**

**Agency Roadway Fields**

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BrM Version 5.2.3.18 [Build Date: Monday June 20, 2016]  
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Status: New Cancel **Save** **Save & Close** **Delete Inspection**

## Adding Records

To add an "On" or "Under" structure record, select the *Create* button.

**\*Note:** The option to add an "On" structure record will only be available if the roadway information that was automatically generated when the structure was created was deleted at some point on the *Inspection > Inventory > Roads* subtask.

Select	On/Under
<input type="checkbox"/>	One Route Under
<input type="checkbox"/>	1st Route Under
<input type="checkbox"/>	2nd Route Under
<input type="checkbox"/>	3rd Route Under
<input type="checkbox"/>	4th Route Under
<input type="checkbox"/>	5th Route Under
<input type="checkbox"/>	6th Route Under
<input type="checkbox"/>	7th Route Under

**Create** **Cancel**

In most cases, the roadways being added will be under records. If "One Route Under" is checked, all other options will become read only. This selection indicates that only one under record exists for the bridge.

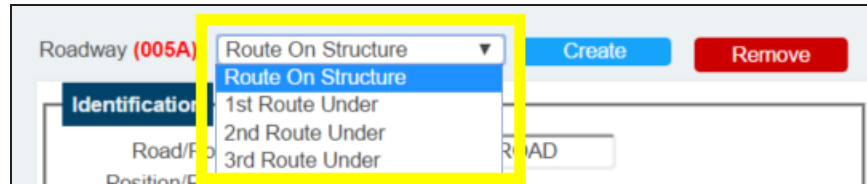
Checking the box of multiple selections starting with "1st Route Under" allows the user to add more than one under record for the bridge.

When the desired selections have been made, click the *Create* button to add the under records to the bridge.

Click the *Cancel* button to cancel the addition of the under records.

## Editing Records

Once the under records are added, the user can switch between the on record and under records using the *Roadway* dropdown:



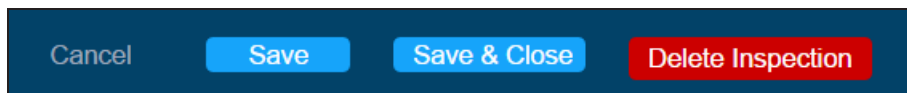
Once a record is selected, the user can fill in the basic information for the record in each of the groupings.

## Agency Roadway Fields

The *Agency Roadway Fields* grouping contains blank fields that the agency can define and use as needed. These fields can be defined/changed using the *Admin > Navigation and Field Security* task. Within the database, these fields are listed in the Roadway table as "userwkey1," "userwkey2," etc.

## Roads Page Controls

If changes have been made to the subtask, those changes must be saved before leaving the current page in order for the changes to be maintained.



The *Save* button saves the changes made on the current subtask.

The *Save & Close* button saves the changes made on the current subtask and returns the user to the *Bridges > View List* task.

The *Cancel* button cancels the changes made on the current subtask and returns the user to the *Bridges > View List* task.

The *Delete Inspection* button deletes the current inspection for the selected bridge.

Inspection > Inventory > Roads Control Information			
Control Name	Table Name	Column Name	Notes
Roadway	roadway	on_under	NBI Item 5A - Used to select the route to view/edit. The route will be either on or under the structure.

*Inspection > Inventory > Roads Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
<b>Identification Grouping</b>			
Road/Route Name	roadway	roadway_name	Non-NBI field indicating the name of the roadway.
Position/Prefix	roadway	on_under	NBI Item 5A - Indicates whether the route is on or under the structure.
Kind Hwy (Rt. Prefix)	roadway	kind_hwy	NBI Item 5B - Identify the route signing prefix for the inventory route.
Desig. Level Service	roadway	levl_srvc	NBI Item 5C - Identify the designated level of service for the inventory route.
Rte#	roadway	routenum	NBI Item 5D - Code the route number of the inventory route in the next 5 positions. If concurrent routes are of the same hierarchy level, denoted by the route signing prefix, the lowest numbered route shall be coded. Code 00000 for bridges on roads without route numbers.
Suffix	roadway	dirsuffix	NBI Item 5E - Code the directional suffix to the route number of the inventory route when it is part of the route number.
Critical Facility	roadway	crit_feat	NBI Item 6B - Critical Facility Indicator will no longer be coded.
<b>Traffic Grouping</b>			
Lanes	roadway	lanes	NBI Item 28A - Indicate the number of lanes on the structure.
Medians	roadway	num_median	Indicates the number of medians on the structure.
Speed	roadway	road_speed	Indicates the speed limit of the roadway.
ADT Class	roadway	adtclass	The traffic volume class of the roadway.
Recent ADT	roadway	adttotal	NBI Item 29 - Code a 6-digit number that shows the average daily traffic (ADT) volume for the inventory route identified in Item 5. The ADT coded should be the most recent ADT counts available. Included in this item are the trucks referred to in Item 109. If the bridge is closed, code the actual ADT from before the closure occurred.
Year	roadway	adtyear	NBI Item 30 - Record the year represented by the ADT in Item 29. Code all four digits of the year.
Truck%	roadway	truckpct	NBI Item 109 - Code a 2-digit percentage that shows the percentage of Item 29 that is truck traffic. Do not include vans, pickup trucks, and other light delivery trucks in this percentage. If this information is not available, an estimate which represents the average percentage for the category of road carried by the bridge may be used.
Future ADT	roadway	adtfuture	NBI Item 114 - Code for all bridges the forecasted average daily traffic (ADT) for the inventory route identified in Item 5. This shall be projected at least 17 years but no more than 22 years from the year of inspection. The intent is to provide a basis for a

*Inspection > Inventory > Roads Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
			20-year forecast. This item may be updated anytime, but must be updated when the forecast falls below the 17-year limit.
Future Year	roadway	adtfutyear	NBI Item 115 - Record and code the year represented by the future ADT in Item 114. The projected year of future ADT shall be at least 17 years but no more than 22 years from the year of inspection.
<b><i>Highway Network &amp; Service Classification Grouping</i></b>			
Kilometer/Mile Point	roadway	kmpost	NBI Item 11 - The linear referencing system (LRS) mile-point/kilometer point is used to establish the location of the bridge on the Base Highway Network--see Item 12. The kilometer point coded in this item directly relates to Item 13. This item must be coded for all structures located on or overpassing the Base Highway Network. Code a 7-digit number to represent the LRS kilometer point distance in kilometers to the nearest thousandth with an assumed decimal point.
National Base Net	roadway	onbasenet	NBI Item 12 - This item is to be coded for all records in the inventory. The Base Highway Network includes the through lane - mainline - portions of the NHS, rural/urban principal arterial system, and rural minor arterial system. Ramps, frontage roads, and other roadways are not included in the Base Network. For the inventory route identified in Item 5, indicate whether the inventory route is on the Base Highway Network or not on that network.
LRS Inventory Rte	roadway	lrsinvrt	NBI Item 13A - If Item 12 has been coded 1, the information to be recorded for this item is inventory route for the State's linear referencing system (LRS). If Item 12 has been coded 0, this entire item should be left blank.
Sub#	roadway	subrtnum	NBI Item 13B - The subroute number is a number that uniquely identifies portions of an inventory route section where duplicate kilometer points occur. These subroute numbers, if they exist, are identified in the State's HPMS-LRS records. If there is no subroute number, code 00 in this segment.
Toll Facility	roadway	tollfac	NBI Item 20 - The toll status of the structure is indicated by this item. Interstate toll segments under Secretarial Agreement shall be identified separately.
Functional Class	roadway	funcclass	NBI Item 26 - Indicates the functional classification of the roadway.
Traffic Direction	roadway	traffidir	NBI Item 102 - Code the direction of traffic of the inventory route identified in Item 5.
<b><i>Alternate Classifications Grouping</i></b>			
Defense Highway	roadway	defhwy	NBI Item 100 - This item shall be coded for all records in the inventory. For the purposes of this item, the STRAHNET Connectors are considered included in the term STRAHNET.

*Inspection > Inventory > Roads Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
Nat. Hwy System	roadway	nhs_ind	NBI Item 104 - This item is to be coded for all records in the inventory. For the inventory route identified in Item 5, indicate whether the inventory route is on the NHS or not.
Fed. Lands Hwy	roadway	fedlandhwy	NBI Item 105 - Structures owned by State and local jurisdictions on roads which lead to and traverse through federal lands sometimes require special coded unique identification because they are eligible to receive funding from the Federal Lands Highway Program.
Nat. Truck Network	roadway	trucknet	NBI Item 110 - The national network for trucks includes most of the Interstate System and those portions of Federal-Aid highways identified in the Code of Federal Regulations--23 CFR 658. The national network for trucks is available for use by commercial motor vehicles of the dimensions and configurations described in these regulations.
School Bus Rte	roadway	school_bus	School bus route indicator. This flag should be set to 1 if the roadway is on a designated school bus route.
Transit Rte	roadway	transit_rt	Transit bus route indicator. This flag should be set to 1 if the roadway is on a designated transit bus route.
Emergency Rte	roadway	crit_trav	Critical travel route indicator. This flag should be set to 1 if the roadway is on a designated critical travel route (e.g., designated for use during emergency evacuations).
NBI Rte	roadway	nbi_rw_flag	Specifies whether the roadway should be included in NBI file exports.
<b>Clearances Grouping</b>			
Vertical Clearance	roadway	velrinv	NBI Item 10 - Code the minimum vertical clearance over the inventory route identified in Item 5, whether the route is on the structure or under the structure. For structures having multiple openings, clearance for each opening shall be recorded, but only the greatest of the minimum clearances for the two or more openings shall be coded regardless of the direction of travel. This would be the practical maximum clearance. When no restriction exists or when the restriction is 30 meters or greater, code 9999.
Horizontal Clearance	roadway	helrinv	NBI Item 47 - The total horizontal clearance for the inventory route identified in Item 5 should be measured and recorded. The clearance should be the available clearance measured between the restrictive features and shoulders. When the restriction is 100 meters or greater, code 999. The purpose of this item is to give the largest available clearance for the movement of wide loads. Flush and mountable medians are not considered to be restrictions.
<b>Widths Grouping</b>			
Approach Road	roadway	aroadwidth	NBI Item 32 - Code a 4-digit number to represent the normal width of usable roadway approaching the structure measured to



*Inspection > Inventory > Roads Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
			the nearest tenth of a meter. Usable roadway width will include the width of traffic lanes and the widths of shoulders. For structures with medians of any type and double-decked structures, this item should be coded as the sum of the usable roadway widths for the approach roadways. When there is a variation between the approaches at either end of the structure, record and code the most restrictive of the approach conditions.
Roadway	roadway	roadwidth	NBI Item 51 - Represents the most restrictive minimum distance between curbs or rails on the structure roadway.
<b><i>Detours Grouping</i></b>			
Length	roadway	bypasslen	NBI Item 19 - Indicate the actual length to the nearest kilometer of the detour length. The detour length should represent the total additional travel for a vehicle which would result from closing of the bridge.
Speed	roadway	det_speed	The speed limit for detouring vehicles.
<b><i>Accidents Grouping</i></b>			
Count	roadway	acc_count	Average annual accident count for the roadway.
Rate	roadway	acc_rate	Accident rate in number of accidents per 100m VMT. Currently not used, but future safety management system interfaces could provide this information and lead to improved user cost models.
<b><i>Roadway Notes Grouping</i></b>			
Roadway Notes	roadway	notes	Roadway notes.
<b><i>Agency Roadway Fields Grouping</i></b>			
Agency Roadway Field 1	roadway	userwkey1	Agency-defined field 1.
Agency Roadway Field 2	roadway	userwkey2	Agency-defined field 2.
Agency Roadway Field 3	roadway	userwkey3	Agency-defined field 3.
Agency Roadway Field 4	roadway	userwkey4	Agency-defined field 4.
Agency Roadway Field 5	roadway	userwkey5	Agency-defined field 5.
<b><i>Inspection Header</i></b>			
Bridge	bridge	bridge_id	The agency bridge identification number that is used to identify structures on most screens and reports.
Facility Carried	bridge	facility	NBI Item 7: The facility carried by the structure.
Inspection Date Selection	inspevnt	inspkey	The inspection key. A unique identifier for the inspections on a particular structure that includes the date of the inspection.

*Inspection > Inventory > Roads Control Information*

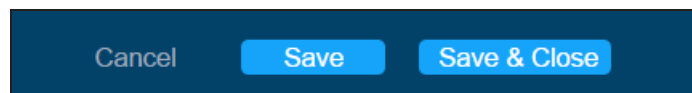
<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
Type	inspevnt	insptype	The primary type of inspection performed.
<b>Inspection Footer</b>			
Status	inspevnt	inspstat	The current status of the selected inspection.
Review Needed	inspevnt	rev_req	Indicates whether or not a review of the inspection is required.
Approved By	inspevnt	inspname	The name of the user that approved the inspection report.

# Agency Bridge Items

The *Inspection > Inventory > Agency Bridge Items* subtask is an entire page of blank fields that the agency can define and use for any purpose.

## Agency Bridge Items Page Controls

If changes have been made to the subtask, those changes must be saved before leaving the current page in order for the changes to be maintained.



The *Save* button saves the changes made on the current subtask.

The *Save & Close* button saves the changes made on the current subtask and returns the user to the *Bridges > View List* task.

The *Cancel* button cancels the changes made on the current subtask and returns the user to the *Bridges > View List* task.

<i>Inspection &gt; Inventory &gt; Agency Items Control Information</i>			
Control Name	Table Name	Column Name	Notes
Agency Bridge Item (1 through 15)	bridge	userkey1 (replace "1" with 2-15)	This field is available for agencies to define and use for any purpose.

*Inspection > Inventory > Agency Items Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
Created On	bridge	createdatetime	The date and time the original record was made on the form.
Created By	bridge	createuserkey	The user who made the original record.
Last Updated	bridge	modtime	The date and time of the last update to the record on the form.
Updated By	bridge	userkey	The user who made the last update to the record.
<b>Inspection Header</b>			
Bridge	bridge	bridge_id	The agency bridge identification number that is used to identify structures on most screens and reports.
Facility Carried	bridge	facility	NBI Item 7: The facility carried by the structure.
Inspection Date Selection	inspevnt	inspkey	The inspection key. A unique identifier for the inspections on a particular structure that includes the date of the inspection.
Type	inspevnt	insptype	The primary type of inspection performed.
<b>Inspection Footer</b>			
Status	inspevnt	inspstat	The current status of the selected inspection.
Review Needed	inspevnt	rev_req	Indicates whether or not a review of the inspection is required.
Approved By	inspevnt	inspname	The name of the user that approved the inspection report.

# Schedule

The *Inspection > Schedule* task allows the user to schedule the upcoming inspections for the selected bridge.

**\*Note:** The *Inspection > Schedule* task has changed from previous versions of BrM. In the past, the *Current Date* textboxes displayed the previous inspection date, not the date of the inspection that was just performed/is being performed. In BrM 5.2.3, the *Current Date* textboxes display the inspection that was just performed/is being performed, therefore making it easier to utilize the *Current Date* and *Frequency* textboxes to calculate the *Next Date* inspection.

Bridge: 00002 Facility Carried (007): 5TH ST Inspection: 2016-09-07 (WRWW) Type: Regular NBI Metric English

### Inspection > Schedule

**Summary**

Date Entered: 9/7/2016  
Inspection Date: 9/7/2016  
Inspector: USER, Pontis  
Primary Type: Regular NBI  
Inspection Group: Unknown  
Entered By: PUser (Pontis)  
Engineer of Record:

**Types of Inspection Performed**

Routine:   
Element:   
Fracture Critical:   
Underwater:   
Other Special:

**Schedule**

Required (Y/N)	Current Date	Frequency (months)	Next Date
Routine: (090):	9/7/2016	(091): 24	9/7/2018
Element:	9/7/2016	24	9/7/2018
Fracture Critical (092AA): <input type="checkbox"/>	(093A):	(092AB):	
Underwater (092BA): <input checked="" type="checkbox"/>	(093B): 7/2/2015	(092BB): 24	7/2/2017
Other Special (092CA): <input type="checkbox"/>	(093C):	(092CB):	

**Inspection Resources**

Next Inspector: USER, Pontis  
Bridge Group: Region 2  
Crew Hours:  Snoopers Hours:   
Flagger Hours:  Special Crew Hours:   
Helper Hours:  Special Equip. Hours:

**Schedule Notes**

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Status: New  Review Needed Approved By: Cancel Save Save & Close Delete Inspection

## Summary

The *Summary* grouping contains the information that was entered when the new inspection was created. All of the information in the *Summary* grouping can be modified except for the read-only checkboxes in the *Types of Inspection Performed* grouping.


## Schedule

The *Schedule* grouping is used to determine the selected bridge's upcoming inspection schedules based on inspection type.

### Required

Check the *Required* checkboxes of the inspections that are required for the selected bridge. Routine and element inspections are required NBI inspections and therefore do not have checkboxes.

### Current Date

The *Current Date* textbox displays the date of the most recent inspection for the selected bridge based on type of inspection. The date can be entered manually or the  icon can be used to select a date. Inspection types that have not been performed on the selected bridge will default to "01/01/1901."


**\*Note:** As stated earlier, BrM 5.2.3's *Current Date* textboxes display the inspection that was just performed/is being performed.

If the inspection that was just performed/is being performed does not include all of the inspection types, those inspection types' *Current Date* textboxes will populate with their most recent inspection, if applicable.

## Frequency

The *Frequency* textbox is used to determine the number of months between inspections based on type of inspection.

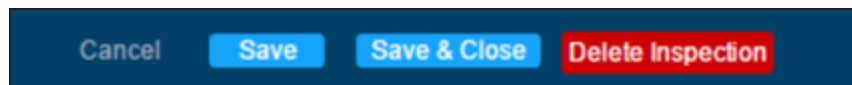
## Next Date

The *Next Date* textbox displays the calculated next inspection date based on the *Current Date* and *Frequency* information. If the calculated date is not the desired date, the date can be entered manually or the  icon can be used to select a date.

## Inspection Resources

The *Inspection Resources* grouping is used to indicate the next inspector for the bridge, the bridge group, and the crew hours necessary to complete the inspection.

## Schedule Page Controls



The *Save* button saves the changes made to the schedule.

The *Save & Close* button saves the changes made to the schedule and returns the user to the *Bridges > View List* task.

The *Cancel* button cancels the changes made to the schedule and returns the user to the *Bridges > View List* task.

The *Delete Inspection* button deletes the current inspection for the selected bridge.

<i>Inspection &gt; Schedule Control Information</i>			
Control Name	Table Name	Column Name	Notes
<i>Summary Grouping</i>			
Date Entered	inspevnt	date_entered	The date the record was entered.
Inspection Date	inspevnt	inspdate	The date of the inspection.
Inspector	inspevnt	inspusrguid	The user that performed the inspection.
Primary Type	inspevnt	insptype	Indicates the primary type of inspection that was performed.
Inspection Group	inspevnt	inspectcontrolid	An agency-defined group for the bridge inspection. Intended for use in grouping together inspections. Non-NBI field.

*Inspection > Schedule Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
Entered By	inspevnt	entered_by_gd	The user that entered the inspection into the system.
Engineer of Record	inspevnt	engineer_of_record	The engineer of record for the inspection.
<b><i>Types of Inspection Performed Grouping</i></b>			
Routine	inspevnt	nbinspdone	Checked if a routine inspection was performed.
Element	inspevnt	elinspdone	Checked if an element inspection was performed.
Fracture Critical	inspevnt	fcinspdone	Checked if a fracture critical inspection was performed.
Underwater	inspevnt	uwinspdone	Checked if an underwater inspection was performed.
Other Special	inspevnt	osinspdone	Checked if an other special inspection was performed.
<b><i>Schedule Grouping</i></b>			
Routine Current Date	inspevnt	lastinsp	NBI Item 90: Record the month and year that the last routine inspection of the structure was performed. This inspection date may be different from those recorded in Item 93.
Routine Frequency	inspevnt	brinspfreq	NBI Item 91: The routine inspection frequency (in months).
Routine Next Date	inspevnt	nextinsp	The date of the next scheduled routine inspection. This will automatically populate based on the current date and frequency.
Element Current Date	inspevnt	elinspdate	Record the month and year that the last element inspection of the structure was performed.
Element Frequency	inspevnt	elinspfreq	The element inspection frequency (in months).
Element Next Date	inspevnt	elnextdate	The date of the next scheduled element inspection. This will automatically populate based on the current date and frequency.
FC Required	inspevnt	fcinspreq	Specifies whether fracture critical inspections are required for the structure.
FC Current Date	inspevnt	fclastinsp	NBI Item 93A: Record the month and year that the last fracture critical inspection of the structure was performed. This inspection date may be different from that recorded in Item 90.
FC Frequency	inspevnt	fcinspfreq	NBI Item 92AB: The fracture critical inspection frequency (in months).
FC Next Date	inspevnt	fcnextdate	The date of the next scheduled fracture critical inspection. This will automatically populate based on the current date and frequency.
UW Required	inspevnt	uwinspreq	Specifies whether underwater inspections are required for the structure.
UW Current Date	inspevnt	uwlastinsp	NBI Item 93B: Record the month and year that the last underwater inspection of the structure was performed. This inspection date may

*Inspection > Schedule Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
			be different from that recorded in Item 90.
UW Frequency	inspevnt	uwinspfreq	NBI Item 92AB: The underwater inspection frequency (in months).
UW Next Date	inspevnt	uwnextdate	The date of the next scheduled underwater inspection. This will automatically populate based on the current date and frequency.
OS Required	inspevnt	osinspreq	Specifies whether other special inspections are required for the structure.
OS Current Date	inspevnt	oslastinsp	NBI Item 93C: Record the month and year that the last other special inspection of the structure was performed. This inspection date may be different from that recorded in Item 90.
OS Frequency	inspevnt	osinspfreq	NBI Item 92AB: The other special inspection frequency (in months).
OS Next Date	inspevnt	osnextdate	The date of the next scheduled other special inspection. This will automatically populate based on the current date and frequency.
<b><i>Inspection Resources Grouping</i></b>			
Next Inspector	bridge	nextinspid	Non-NBI field maintained by the system by default. BrM automatically fills in this field by copying the user key of the person doing the current inspection. An inspector may change this assignment if desired.
Bridge Group	bridge	bridgegroup	An agency-defined group for the bridge. Intended for use in grouping together bridges for inspection purposes. Non-NBI field.
Crew Hours	bridge	crewhrs	The number of crew hours required for a regular inspection for the structure.
Flagger Hours	bridge	flaggerhrs	The number of flagger hours required for a regular inspection for the structure.
Helper Hours	bridge	helperhrs	The number of helper hours required for a regular inspection for the structure.
Snooper Hours	bridge	snooperhrs	The number of snooper hours required for a regular inspection for the structure.
Special Crew Hours	bridge	spcrewhrs	The number of special crew hours required for a regular inspection for the structure.
Special Equipment Hours	bridge	spequiphrs	The number of special equipment hours required for a regular inspection for the structure.
<b><i>Schedule Notes Grouping</i></b>			
Inspection Schedule Notes	inspevnt	schedule_notes	Notes relating to the current inspection's scheduling.



*Inspection > Schedule Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
<b>Inspection Header</b>			
Bridge	bridge	bridge_id	The agency bridge identification number that is used to identify structures on most screens and reports.
Facility Carried	bridge	facility	NBI Item 7: The facility carried by the structure.
Inspection Date Selection	inspevnt	inspkey	The inspection key. A unique identifier for the inspections on a particular structure that includes the date of the inspection.
Type	inspevnt	insptype	The primary type of inspection performed.
<b>Inspection Footer</b>			
Status	inspevnt	inspstat	The current status of the selected inspection.
Review Needed	inspevnt	rev_req	Indicates whether or not a review of the inspection is required.
Approved By	inspevnt	inspname	The name of the user that approved the inspection report.

# Work

The *Inspection > Work* task allows the user to set up and track work candidates for the selected bridge. The work candidates can then be viewed and utilized in the *Analysis* and *Projects* tabs.


## Work Candidates

The *Inspection > Work > Work Candidates* subtask is used to create work candidates for the selected bridge.

Candidate ID	Action	Date Recommended	Target Year	Estimated Cost	Status	Work Assignment	Priority	Structure Unit	Date Completed	Description	Source
1000-89130	990 Other	9/27/2004	2004	\$0.00	Unknown	0	Monitor	1 / Type = M		Misc Element Other	
1000-89129	990 Other	9/27/2004	2004	\$500.00	Crew Completed	0	Routine/Schedule	1 / Type = M	7/17/2013	Misc Element Other	
1000-89128	992 Replace pile	9/27/2004	2004	\$500.00	Completed	4	Monitor	1 / Type = M		992 Replace Pile Timber Fender System	
A-DOT001-00328185-00000135	990 Other	8/4/2006	2006	\$100.00	Completed	0	Routine/Schedule	1 / Type = M		Misc Element Other	
A-DOT001-14891817-00000017	104 Patch Concrete	11/5/2010	2010	\$999.00	Unknown	0	Routine/Schedule	1 / Type = M		104 PS&PT Con Closed Web-Box Order Patch Concrete	
1197D16-F8FF-090716-830CA2E222	INVALID ACTION-DELETE	9/2/2016	2016	\$0.00	Unknown	8	High	1 / Type = M		Invalid Action is default when creating work candidate, it should never be used	
1197D16-F8FF-090716-7148973616	Replace Deck - Network	9/7/2016	2016	\$7,588.56	Unknown	0	High	1 / Type = M		Replace Deck	Inspector Recommended
1197D16-										Renov beams	

The Work Candidates grid displays all of the work candidates that have been entered for the selected bridge. The *Show All* and *Show Open* radio buttons toggle between showing all of the bridge's work candidates and only the work candidates that have not been completed. The *Source* dropdown allows the user to filter the Work Candidates grid based on the source of the work candidate.

**\*Note:** The Work Candidates grid was not sortable in previous versions of BrM, but version 5.2.3 allows the user to sort the grid by clicking on any of the grid columns.

Selecting a work candidate from the grid by clicking the  icon will reveal the *Type of Work* grouping where the specifications for the work candidate can be changed.

Click the  icon to delete the work candidate.

To add a new work candidate for the selected bridge, click the *Add New* button.

## Type of Work

The *Type of Work* grouping is used to determine the details for the selected or new work candidate.

## Candidate ID

The **Candidate ID** textbox indicates the name or ID of the work candidate. When a new work candidate is created, this textbox will automatically populate. It can be helpful to change the automated name to something more recognizable because the work candidate will be viewable on other pages, such as the *Analysis > Work Candidates > Bridge Analysis* subtask.

## Structure Unit

The **Structure Unit** dropdown allows the user to determine whether the current work candidate is for a specific structure unit within the bridge or if it is for all structure units.

## Action Type

The **Action Type** dropdown is an optional field used to filter the available selections in the **Action** dropdown to only include actions within the selected action type. By default, the **Action Type** dropdown will display "None" upon opening the *Work Candidates* subtask.

New action types can be created on the *Admin > General Config > Parameters* task using the `pon_flexactions_sets - flex_type` parameter, and then those action types can be linked to actions on the *Admin > Modeling Config > Action Defs* task.

**\*Note:** Default action types are included in the `pon_flexactions_sets - flex_type` parameter, but they will not show up in the **Action Type** dropdown on the *Work Candidates* subtask unless they are linked to at least one action.

## Action

The **Action** dropdown is used to determine what action will be performed when completing the work candidate.

## Date Recommended

The **Date Recommended** textbox indicates the date that the user recommended the work to be performed on the bridge. This will, in most cases, be the same date as the inspection. Because of this, the textbox will default to the currently selected inspection's date.

## Priority

The **Priority** dropdown allows the user to determine the priority level of the work candidate so that the higher priority candidates can be recognized.

The priority levels can be edited using the `pon_insp_workcand.iwc_agency_priority` parameter on the *Admin > General Config > Parameters* task.

## Date Completed

The **Date Completed** textbox indicates the date that the work candidate was completed.

**\*Note:** If a work candidate has been completed, the *Date Completed* textbox must be filled out in order for the work candidate not to show up in the Work Candidates grid when the *Show Open* radio button is selected.

## Target Year

The *Target Year* textbox is used to indicate the year in which the work candidate is planned to be completed.

## Assigned

The *Assigned* dropdown is used to indicate the status of the work candidate by selecting whether or not the work has been assigned.

## Work Assignment

The *Work Assignment* dropdown allows the user to select whether the work will be completed by the agency or by a contractor.

## Status

The *Status* dropdown is used to determine the current status of the work candidate.

The statuses can be edited using the `pon_insp_workcand.iwc_status` parameter on the *Admin > General Config > Parameters* task.

## Source

The *Source* dropdown is used to indicate the source of the work candidate or who requested it.

The sources can be edited using the `pon_insp_workcand.source` parameter on the *Admin > General Config > Parameters* task. The default entry for the field will be the default parameter value.

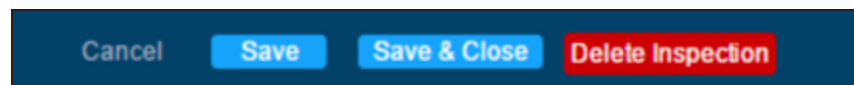
## Work Estimates

The *Work Estimates* grouping is used to estimate the cost of the work. The estimate can be calculated by completing the *Estimated Quantity* and *Cost Per Unit* textboxes, then clicking the *Calculate* button. This calculated total will then appear in the *Estimated Cost* textbox.

**\*Note:** In previous versions of BrM, the *Cost Per Unit* textbox did not allow for decimals to be entered. This had the potential to create significant miscalculations for very large estimated quantities. The ability to add decimals has been included in version 5.2.3 to help ensure more accurate calculations.

While the calculation can be used, the *Estimated Cost* textbox can also be modified without a calculation.

## Work Candidate Page Controls



The *Save* button saves the changes made to the work candidates.

The *Save & Close* button saves the changes made to the work candidates and returns the user to the *Bridges > View List* task.

The *Cancel* button cancels the changes made to the work candidates and returns the user to the *Bridges > View List* task.

The *Delete Inspection* button deletes the current inspection for the selected bridge.

*Inspection > Work > Work Candidates Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
<b><i>Type of Work Grouping</i></b>			
Candidate ID	pon_insp_workcand	iwc_workcand_name	The name/ID of the work candidate.
Structure Unit	pon_insp_workcand	structure_unit_gd	The structure unit of the selected structure relevant to the work candidate. "AllStrUnits" can be selected if the work candidate applies to the entire structure.
Action	pon_insp_workcand	pon_flexactions_sets_gd	Indicates the action associated with the work candidate.
Date Recommended	pon_insp_workcand	iwc_work_rec_date	By default, the date that the user creates the work candidate.
Priority	pon_insp_workcand	iwc_agency_priority	Used to determine the priority level of the work candidate.
Date Completed	pon_insp_workcand	iwc_work_comp_date	The date that the work candidate was completed.
Target Year	pon_insp_workcand	iwc_target_year	The year in which the work candidate is planned to be completed.
Assigned	pon_insp_workcand	iwc_assigned	Determines whether or not the work candidate has been assigned.
Work Assignment	pon_insp_workcand	iwc_work_assigned	Determines to whom the work candidate will be assigned.
Status	pon_insp_workcand	iwc_status	Determines the current status of the work candidate.
Source	pon_insp_workcand	source	Indicates the source of the work candidate.
Notes	pon_insp_workcand	iwc_notes	Notes for the work candidate.
<b><i>Work Estimates Grouping</i></b>			
Estimated Quantity	pon_insp_workcand	iwc_est_qty	The estimated quantity of units needed to perform the work.
Cost Per Unit	pon_insp_workcand	iwc_cost_per_unit	The estimated cost per unit of performing the work.
Estimated Cost	pon_insp_workcand	iwc_est_cost	The entered or calculated estimated cost to complete the work candidate.
<b><i>Inspection Header</i></b>			
Bridge	bridge	bridge_id	The agency bridge identification number that is used to identify structures on most screens and reports.
Facility Carried	bridge	facility	NBI Item 7: The facility carried by the structure.
Inspection Date	inspevnt	inspkey	The inspection key. A unique identifier for the inspections

*Inspection > Work > Work Candidates Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
Selection			on a particular structure that includes the date of the inspection.
Type	inspevnt	insptype	The primary type of inspection performed.
<b>Inspection Footer</b>			
Status	inspevnt	inspstat	The current status of the selected inspection.
Review Needed	inspevnt	rev_req	Indicates whether or not a review of the inspection is required.
Approved By	inspevnt	inspname	The name of the user that approved the inspection report.

# Project Information

The *Inspection > Work > Project Information* subtask is used to enter NBI project data for the selected bridge. The NBI items include 75A, 75B, 76 and 94-97.

## Project Information Page Controls

The **Save & Close** button saves the changes made to the project information and returns the user to the *Bridges > View List* task.

The **Cancel** button cancels the changes made to the project information and returns the user to the *Bridges > View List* task.

The **Delete Inspection** button deletes the current inspection for the selected bridge.

<i>Inspection &gt; Work &gt; Project Information Control Information</i>			
Control Name	Table Name	Column Name	Notes
Proposed Work	bridge	propwork	NBI Item 75A - The information to be recorded for this item will be the type of work proposed to be accomplished on the structure to improve it to the point that it will provide the type of service needed.
Work to be Done By	bridge	workby	NBI Item 75B - Determines who will be responsible for performing the project work.
Improvement Length	bridge	implen	NBI Item 76 - Code a 6-digit number that represents the length of the proposed bridge improvement to the nearest tenth of a meter--with an assumed decimal point. For replacement or rehabilitation

*Inspection > Work > Project Information Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
			of the entire bridge, the length should be back to back of back-walls of abutments or from pavement notch to pavement notch. For replacement or rehabilitation of only part of the structure, use the length of the portion to be improved.
Improvement Cost	bridge	nbiimpcost	NBI Item 94 - The estimated cost of the proposed bridge or major structure improvements in dollars. This cost shall include only bridge construction costs, excluding roadway, right of way, detour, demolition, preliminary engineering, etc.
Roadway Improvement Cost	bridge	nbirwcost	NBI Item 95 - The cost of the proposed roadway improvement in dollars. This shall include only roadway construction costs, excluding bridge, right-of-way, detour, extensive roadway realignment costs, preliminary engineering, etc.
Total Cost	bridge	nbitotcost	NBI Item 96 - The total project cost in dollars, including incidental costs not included in Items 94 and 95. This item should include all costs normally associated with the proposed bridge improvement project. The Total Project Cost will therefore usually be greater than the sum of Items 94 and 95. Do not use this item for coding maintenance costs.
Year of Estimate	bridge	nbiyrcost	NBI Item 97 - Record and code the year that the costs of work estimated in Items 94, 95, and 96 were based upon.
<b>Inspection Header</b>			
Bridge	bridge	bridge_id	The agency bridge identification number that is used to identify structures on most screens and reports.
Facility Carried	bridge	facility	NBI Item 7: The facility carried by the structure.
Inspection Date Selection	inspevnt	inspkey	The inspection key. A unique identifier for the inspections on a particular structure that includes the date of the inspection.
Type	inspevnt	insptype	The primary type of inspection performed.
<b>Inspection Footer</b>			
Status	inspevnt	inspstat	The current status of the selected inspection.
Review Needed	inspevnt	rev_req	Indicates whether or not a review of the inspection is required.
Approved By	inspevnt	inspname	The name of the user that approved the inspection report.



# Multimedia

The *Inspection > Multimedia* task allows the user to upload any file type to the selected bridge or bridge inspection. There are no restrictions on the type of file that can be uploaded.

Bridge: 04 07603 Facility Carried (007): 7TH STREET Inspection: 2005-12-15 (UVLI) Type: Regular NBI Metric English

Inspection > Multimedia

Multimedia

Context: INSPECTION Root Dir - 5:\[MULTISERVERS]\bentley\shares\Temp\BtM\Sample Photos\ Root Dir - 4:\[MULTISERVER]: \bentley\shares\Temp\BtM\Sample Photos\

Name	Type	Agency Type	Report Flag	Sort Order	Location	Agency Item 1	Agency Item 2	Agency Item 3	Agency Item 4
04 07603G12	JPG	Design D (FIX PARAM V)	<input checked="" type="checkbox"/>	-1	[MULTISERVER]04 07603\	06	-1	-1	-1
04 07603G13	JPG	Design D (FIX PARAM V)	<input checked="" type="checkbox"/>	-1	[MULTISERVER]04 07603\	04	-1	-1	-1
04 07603G07	JPG	Design D (FIX PARAM V)	<input type="checkbox"/>	-1	[MULTISERVER]04 07603\	-1	-1	-1	-1
04 07603G03	JPG	Design D (FIX PARAM V)	<input checked="" type="checkbox"/>	-1	[MULTISERVER]04 07603\	07	-1	-1	-1
04 07603G04	JPG	Design D (FIX PARAM V)	<input type="checkbox"/>	-1	[MULTISERVER]04 07603\	-1	-1	-1	-1
04 07603G01	JPG	Design D (FIX PARAM V)	<input type="checkbox"/>	-1	[MULTISERVER]04 07603\	-1	-1	-1	-1
04 07603G10	JPG	Design D (FIX PARAM V)	<input checked="" type="checkbox"/>	-1	[MULTISERVER]04 07603\	08	-1	-1	-1
04 07603G03	JPG	Design D (FIX PARAM V)	<input checked="" type="checkbox"/>	-1	[MULTISERVER]04 07603\	07	-1	-1	-1
04 07603G05	JPG	Design D (FIX PARAM V)	<input type="checkbox"/>	-1	[MULTISERVER]04 07603\	-1	-1	-1	-1

Notes

West concrete bridge rail base has spill at south end

Document Information

File: 04 07603G07.jpg Location: [MULTISERVER]04 07603\ Created: 12/15/2005 3:27:37 PM Size: 135129 bytes Accessed: 10/11/2016 10:40:55 AM Status: Available Modified: 3/21/2006 3:27:37 PM Unlink

Link and Upload Documents

Copy File to Server:  Add File Destination Path:  Select Multiple Files

Status: New Review Needed Approved By: T.J.P.P. Cancel Save Save & Close Delete Inspection

## Multimedia Grid

The Multimedia grid contains all of the files that have been uploaded for the selected bridge or inspection report - determined by the *Context* dropdown.

### Context

The *Context* dropdown has two purposes:

1. It toggles the Multimedia grid between displaying the overarching files for the selected bridge and files that are specifically for the bridge's currently selected inspection report.
2. It determines the purpose of newly uploaded files. If "BRIDGE" is selected in the dropdown, uploading a new file will be for the bridge overall. If "INSPECTION" is selected in the dropdown, uploading a new file will be for the bridge's currently selected inspection report only.

### Root Directory

The root directory is the server location for the multimedia files and is displayed next to the *Context* dropdown.

## Grid Description

Multimedia									
Context: [INSPECTION]		Root Dir - 5.x[MULTISERVER5]: \\bentley\shares\Temp\BrM\Sample Photos\							
		Root Dir - 4.x[MULTISERVER]: \\bentley\shares\Temp\BrM\Sample Photos\							
Name	Type	Agency Type	Report Flag	Sort Order	Location	Agency Item 1	Agency Item 2	Agency Item 3	Agency Item 4
04 07603G12	JPG	Design D (FIX PARAM V/)	<input checked="" type="checkbox"/>	-1	[MULTISERVER]04 07603\	06	-1	-1	-1
04 07603G13	JPG	Design D (FIX PARAM V/)	<input checked="" type="checkbox"/>	-1	[MULTISERVER]04 07603\	04	-1	-1	-1
04 07603G07	JPG	Design D (FIX PARAM V/)	<input type="checkbox"/>	-1	[MULTISERVER]04 07603\	-1	-1	-1	-1
04 07603G03	JPG	Design D (FIX PARAM V/)	<input checked="" type="checkbox"/>	-1	[MULTISERVER]04 07603\	07	-1	-1	-1
04 07603G04	JPG	Design D (FIX PARAM V/)	<input type="checkbox"/>	-1	[MULTISERVER]04 07603\	-1	-1	-1	-1
04 07603G01	JPG	Design D (FIX PARAM V/)	<input type="checkbox"/>	-1	[MULTISERVER]04 07603\	-1	-1	-1	-1
04 07603G10	JPG	Design D (FIX PARAM V/)	<input checked="" type="checkbox"/>	-1	[MULTISERVER]04 07603\	08	-1	-1	-1
04 07603G03	JPG	Design D (FIX PARAM V/)	<input checked="" type="checkbox"/>	-1	[MULTISERVER]04 07603\	07	-1	-1	-1
04 07603G05	JPG	Design D (FIX PARAM V/)	<input type="checkbox"/>	-1	[MULTISERVER]04 07603\	-1	-1	-1	-1

### Agency Type

The **Agency Type** dropdown is used to indicate the type of file. The available options can be modified on the *Admin > General Config > Parameters* task.

### Report Flag

The **Report Flag** checkbox is currently used only for agency customizations to the database.

### Sort Order

The **Sort Order** textbox determines the order in which the files are listed. If there are images, the first image in the grid will appear as the first image when the bridge is highlighted on the Bridge List.

### Location

The **Location** textbox determines the file's location on the server and can be modified.

### Agency Items

The **Agency Item** textboxes are agency specific fields to be used as desired.

### Unlink


The **X** icon unlinks the file from the bridge or inspection report. However, it does not delete the file from the server.

## Notes

The **Notes** grouping can be used to enter notes for the selected file.

## Document Information

The **Document Information** grouping is hidden until a file is selected from the Multimedia grid. It displays details about the file including the file name, location, size, and more.

Document Information	
	File: 04 07603G07.jpg Location: [MULTISERVER]04 07603\ Created: 12/15/2005 3:27:37 PM Accessed: 10/11/2016 10:40:55 AM Modified: 3/21/2006 3:27:37 PM Size: 135129 bytes Status: Available <input type="button" value="Unlink"/>

For image files, an image preview will be displayed. If the file name cannot be found at the file location, an "Image not found" notice will appear in place of the image preview.

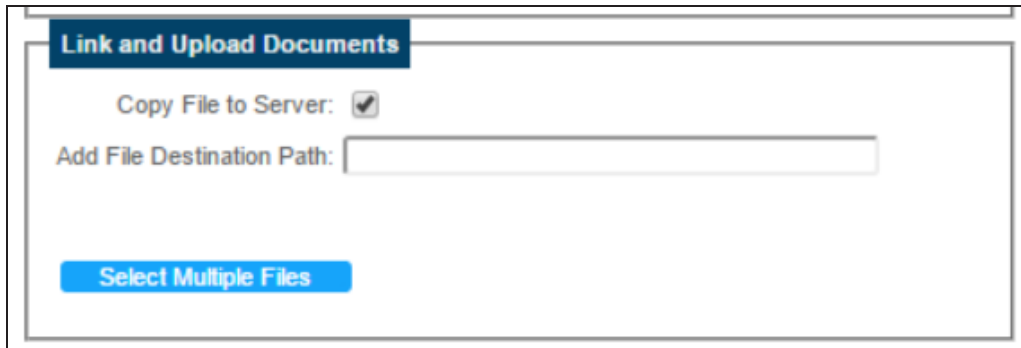
Text files, such as PDF or doc, will not display previews.

## Unlink

The **Unlink** button acts in the same way as the **X** icon in the Multimedia grid. It unlinks the selected file from the bridge or inspection report but does not delete the file from the server.

## Link and Upload Documents

The *Link and Upload Documents* grouping is used to select the files to upload for the bridge or inspection report.



The screenshot shows a window titled "Link and Upload Documents". Inside the window, there is a checkbox labeled "Copy File to Server" which is checked. Below it is a text input field labeled "Add File Destination Path:". At the bottom of the window, there is a blue button labeled "Select Multiple Files".

### Copy File to Server

The **Copy File to Server** checkbox determines whether or not the file(s) being uploaded will be copied to the server. It is highly recommended that all files be copied to the server.

### Add File Destination Path

The **Add File Destination Path** textbox is used to enter the server location for the files being uploaded.

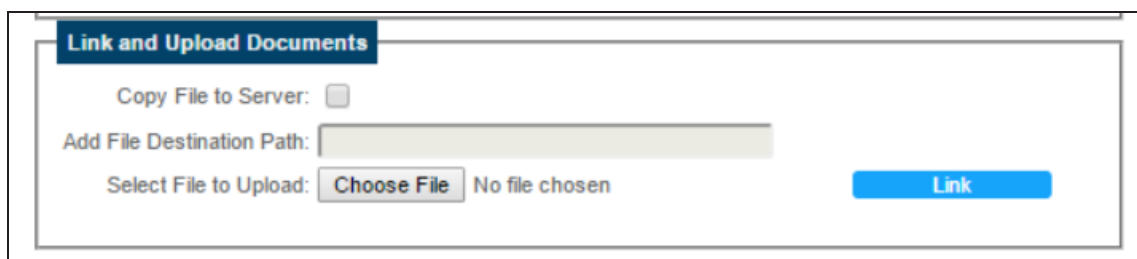
### Select Multiple Files

The **Select Multiple Files** button is used to select the files to be uploaded. Clicking the button allows the user to search through the files on their computer. Multiple files can be selected at once.

## Local Files

Uploading local files has been disabled in BrM for security purposes. If the functionality is restored, the process is as follows:

Uncheck the **Copy File to Server** checkbox.

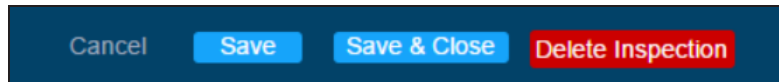


The screenshot shows the same window as before, but with the "Copy File to Server" checkbox unchecked. The "Add File Destination Path" text box is now greyed out. Below it, there is a label "Select File to Upload:" followed by a "Choose File" button and the text "No file chosen". To the right of these elements is a blue button labeled "Link".

The **Add File Destination Path** textbox will then be greyed out, the **Select Multiple Files** button will be replaced with a **Choose File** button, and the **Link** button will appear.

To select a file, click the **Choose File** button and navigate the computer's files to locate the desired file. Once a file is selected, that file can be linked to the selected bridge or inspection report by clicking the **Link** button.

## Multimedia Page Controls



The *Save* button saves the changes made to the files.

The *Save & Close* button saves the changes made to the files and returns the user to the *Bridges > View List* task.

The *Cancel* button cancels the changes made to the files and returns the user to the *Bridges > View List* task.

The *Delete Inspection* button deletes the current inspection for the selected bridge.

<i>Inspection &gt; Multimedia Control Information</i>			
Control Name	Table Name	Column Name	Notes
<b>Multimedia Grid</b>			
Agency Type	MULTIMEDIA	AGENCYTYPE	Indicates the type of file uploaded.
Sort Order	MULTIMEDIA	USERKEY5	Determines the order in which the files are listed in the grid.
Agency Item 1	MULTIMEDIA	USERKEY1	This field is available for agencies to define and use for any purpose.
Agency Item 2	MULTIMEDIA	USERKEY2	This field is available for agencies to define and use for any purpose.
Agency Item 3	MULTIMEDIA	USERKEY3	This field is available for agencies to define and use for any purpose.
Agency Item 4	MULTIMEDIA	USERKEY4	This field is available for agencies to define and use for any purpose.
<b>Notes Grouping</b>			
Notes	MULTIMEDIA	NOTES	Notes for the selected image.
<b>Document Information Grouping</b>			
File	MULTIMEDIA	FILEREF	The file name of the selected file.
Location	MULTIMEDIA	FILELOC	Indicates where the file is being stored.
Created	MULTIMEDIA	CREATEDATETIME	The date and time the file was uploaded.
Size	MULTIMEDIA	SIZE	The size of the uploaded file.
Status	MULTIMEDIA	STATUS	The availability status of the file.
Modified	MULTIMEDIA	MODTIME	The date and time the file was modified.
<b>Inspection Header</b>			
Bridge	bridge	bridge_id	The agency bridge identification number that is used to identify structures on most screens and reports.

*Inspection > Multimedia Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
Facility Carried	bridge	facility	NBI Item 7: The facility being carried by the structure shall be recorded and coded. In all situations this item describes the use on the structure.
Inspection Date Selection	inspevnt	inspkey	The inspection key. A unique identifier for the inspections on a particular structure that includes the date of the inspection.
Type	inspevnt	insptype	The primary type of inspection performed.
<b>Inspection Footer</b>			
Status	inspevnt	inspstat	The current status of the selected inspection.
Review Needed	inspevnt	rev_req	Indicates whether or not a review of the inspection is required.
Approved By	inspevnt	inspname	The name of the user that approved the inspection report.

# Assessments

The *Inspection > Assessments* task allows the user to create risk assessments for the selected bridge.

Bridge: 02102011000B010 Facility Carried (007): US-41 Metric English

Inspection > Assessments

**Identified Risks**

Add New Assessment System Impact

Assessment	Date	Status	Likelihood	Conseq	Value	Next
Accident	6/20/2016					6/20/2016

1 assessments (1 active)

Selected Assessment: **Delete**

**Risk Details**

**Risk Assessment Value**

Likelihood of hazard

High	5	10	15	20	25	30	35	40	45	50
	4	8	12	16	20	24	28	32	36	40
	3	6	9	12	15	18	21	24	27	30
	2	4	6	8	10	12	14	16	18	20
Low	1	2	3	4	5	6	7	8	9	10

Low High  
Consequence of hazard

Vulnerability Type: Accident Likelihood of Hazard:

Assessment Date: 6/20/2016 Consequences to Structure:

Assessment Key/Date: 2015-05-04 (LGOT) Assessment Final Value:

Workflow Status:  Next Assessment Date: 6/20/2016

Affected Deck Area:  sq.ft

Affected AADT:

Hazard Class:

Description

**Save**

## Identified Risks

The *Identified Risks* grouping contains a grid with all of the risks that have been identified for the selected bridge.

## Add New Assessment

To add a new assessment, click the *Add New Assessment* button. The following popup will appear:

Add New Assessment - 04 09704

Add New Assessment for 04 09704

Assessment Type: Accident

Assessment Date: 12/8/2015

Inspection Key: 2005-02-05 (ECSS)

Workflow status:

Affected deck area:

Affected AADT:

Hazard class:

Likelihood of extreme event:

Consequences to structure:

Assessment Final Value:

Next assessment date: 12/8/2015

**Save** **Close**

## Assessment Type

Select the desired risk assessment from the *Assessment Type* dropdown.

### Assessment Date

The *Assessment Date* textbox indicates the date the assessment was performed. By default, the field will populate with the current date.

### Inspection Key

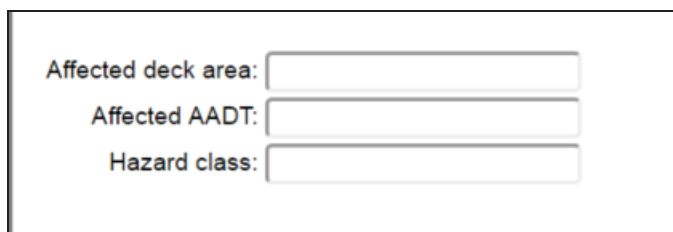
The *Inspection Key* dropdown indicates the inspection report to which the assessment is tied. By default, the dropdown will populate with the currently selected inspection report.

### Workflow Status

The *Workflow Status* dropdown indicates how the assessment is entered/the status of the assessment:

- **Manual** - The assessment was entered manually.
- **Calculated** - The assessment was calculated by a formula.
- **Verification Pending** - The assessment was entered manually and needs verified.
- **Obsolete** - The assessment is obsolete.

### Affected Deck Area - Affected AADT - Hazard Class



A screenshot of a form with three input fields. The first field is labeled "Affected deck area:", the second is labeled "Affected AADT:", and the third is labeled "Hazard class:". Each label is followed by a rectangular input box.

**\*Note:** These fields are for informational purposes. They add additional data to the assessment but do not currently serve a function or impact any other areas of the software.

### Likelihood of Extreme Event

The *Likelihood of Extreme Event* textbox allows the user to enter a value indicating the likelihood that an extreme event will occur.

The *Admin > Modeling Config > Assessment* subtask determines the maximum and minimum values for the scale. However, the textbox does not restrict the user to the maximum and minimum values established by the admin.

**\*Note:** While the textbox can be used, the best practice is to leave it blank until the assessment is saved. This will allow the user to use the Risk Assessment Value grid to determine the Likelihood of Extreme Event value.

### Consequences to Structure

The *Consequences to Structure* textbox allows the user to enter a value indicating the level of consequence to the structure if the event occurs.

The *Admin > Modeling Config > Assessment* subtask determines the maximum and minimum values for the scale. However, the textbox does not restrict the user to the maximum and minimum values established by the admin.

**\*Note:** While the textbox can be used, the best practice is to leave it blank until the assessment is saved. This will allow the user to use the Risk Assessment Value grid to determine the Consequences to Structure value.

### Assessment Final Value

The Assessment Final Value is the result of multiplying the Likelihood of Extreme Event by the Consequences to Structure. The *Assessment Final Value* textbox will not, however, automatically populate if a value is entered into both the *Likelihood of Extreme Event* and *Consequences to Structure* textboxes.

The *Admin > Modeling Config > Assessment* subtask determines the maximum and minimum values for the scale. However, the textbox does not restrict the user to the maximum and minimum values established by the admin.

**\*Note:** While the textbox can be used, the best practice is to leave it blank until the assessment is saved. This will allow the user to use the Risk Assessment Value grid to select the Likelihood of Extreme Event and Consequences to Structure values, which will automatically calculate the Assessment Final Value.

### Next Assessment Date

The *Next Assessment Date* textbox indicates the date the next assessment is scheduled to be performed.

### Save/Cancel

Click the *Save* button to add the new assessment. This will take the user to the main page where they can use the Risk Assessment Value grid.

Click the *Cancel* button to cancel the addition of the new assessment.

### Delete Assessment

To delete an assessment, select it from the grid in the *Identified Risks* grouping and click the *Delete* button.

### Risk Details

The *Risk Details* grouping reveals all of the assessment's details once it is created. It contains all of the same fields as the Add New Assessment popup, but allows the user to utilize the Risk Assessment Value grid to complete the calculation.

The screenshot shows the 'Risk Details' form. At the top is a 'Risk Assessment Value' grid. The grid has 'Likelihood of hazard' on the y-axis (High to Low) and 'Consequence of hazard' on the x-axis (Low to High). The grid contains numerical values from 1 to 50. Below the grid are several input fields: 'Vulnerability Type' (dropdown menu), 'Assessment Date' (calendar icon), 'Assessment Key/Date' (dropdown menu), 'Workflow Status' (dropdown menu), 'Affected Deck Area' (text input with 'sq.ft' unit), 'Affected AADT' (text input), 'Hazard Class' (text input), 'Description' (text area with copy icon), 'Likelihood of Hazard' (text input), 'Consequences to Structure' (text input), 'Assessment Final Value' (text input), and 'Next Assessment Date' (calendar icon). A 'Save' button is located at the bottom left of the form.

### Risk Assessment Value

The *Risk Assessment Value* grid can be used to calculate the assessment's final value by determining the Likelihood of Hazard and Consequences of Hazard then locating and selecting where they meet on the grid.

This selection will automatically populate the *Likelihood of Hazard*, *Consequences to Structure*, and *Assessment Final Value* textboxes below the grid.

### Risk Details

All of the risk details are the same as those entered in the popup window when adding a new assessment. These details can all be changed.



For the *Affected Deck Area* textbox, using the *Metric* and *English* radio buttons at the top of the page will convert the entered value to square meters or square feet.

The only additional control is the *Description* textbox to be used for entering notes for the assessment.

### Save

To save any changes made to the assessment, click the *Save* button.

<i>Inspection &gt; Assessments Control Information</i>			
<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
<b><i>Risk Details Grouping</i></b>			
Vulnerability Type	pon_defs_assessment	asmtdefkey	The type of risk assessment being performed.
Assessment Date	pon_assessment	asmtdate	The date of the assessment. The database can store the entire history of assessments on the bridge, but only the most recent is used in the analysis.
Assessment Key/Date	inspevnt	inspdate	The key and date for the inspection the assessment is attached to.
Workflow Status	pon_assessment	workflow_status	The workflow status of the assessment. Currently an information-only field. <u>Verified</u> - Entered or checked manually. <u>Calculated</u> - Record was calculated by a formula. <u>Verification Pending</u> - A manual check is pending (required but not completed). <u>Obsolete</u> - The assessment is obsolete.
Affected Deck Area	pon_assessment	affected_deck_area	The percent of deck area affected. This allows for hazards to affect only a portion of the structure. Currently an information-only field.
Affected AADT	pon_assessment	affected_aadt	The percent of AADT exposed to the hazard. Allows for hazards to affect only a portion of traffic flow. Currently an information-only field.
Hazard class	pon_assessment	hazard_class	The classification of the structure into hazard zones or classes for the type of risk assessment represented.
Likelihood of Hazard	pon_assessment	likelihood	A quantitative estimate or score for the likelihood of an extreme event. Display and editing are governed by pon_defs_assessment.flag_likelihood.
Consequences to Structure	pon_assessment	consequences	A quantitative estimate or score for the consequences to the structure of an extreme event. Display and editing are governed by pon_defs_assessment.flag_consq.
Assessment Final Value	pon_assessment	asmt_value	A quantitative estimate or score for the overall assessment. Display and editing are governed by pon_defs_assessment.flag_value.

*Inspection > Assessments Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
Next Assessment Date	pon_assessment	next_asmt_date	The date when the next assessment is to be undertaken. Currently an information-only field.
Description	pon_assessment	description	A description of the assessment.
<b>Inspection Header</b>			
Bridge	bridge	bridge_id	The agency bridge identification number that is used to identify structures on most screens and reports.
Facility Carried	bridge	facility	NBI Item 7: The facility carried by the structure.

# Element Condition Ratings

The *Inspection > Element Condition Ratings* task displays a read-only history of both the NBI ratings and element conditions for the selected bridge. Users can utilize this page to view how a bridge's NBI ratings or element conditions have changed over time.

Bridge: 00001 Facility Carried (007): SOUTH 2ND STREET Inspection: 2014-08-13 (XPHZ) Type: Regular NBI Metric English

Inspection > Element Condition Ratings

**NBI RATING HISTORY**

Inspection Date	Inspection Type	Inspections Performed	Deck (58)	Super (59)	Sub (60)	Channel (61)	Culvert Rating (62)
8/13/2014	Regular NBI	NBI ELEM	4	5	6	6	N
8/30/2012	Regular NBI	NBI ELEM	6	6	6	6	N
11/5/2010	Regular NBI	NBI ELEM	6	6	6	6	N
12/8/2008	Regular NBI	NBI ELEM	6	6	6	6	N
8/4/2006	Regular NBI	NBI ELEM	7	6	6	6	N
9/27/2004	Regular NBI	NBI ELEM	7	6	6	6	N
8/17/2002	Regular NBI	NBI ELEM	7	7	7	7	N
6/22/2000	Regular NBI	NBI ELEM	7	7	7	8	N
2/1/1999	Regular NBI	NBI ELEM	7	7	7	8	N
2/1/1992	Regular NBI	NBI	-	-	-	-	-

**ELEMENT CONDITION HISTORY**

Elem	Str. Unit	Env	Description	Inspection	Quantity	Units	Qty. 1	Qty. 2	Qty. 3	Qty. 4
1		Ben.		2/1/1999	1	each	1	0	0	0
7361	1	Mod.	Scour Carr. 361-6000	11/5/2010	1	each	0	1	0	0
1		Mod.		12/8/2008	1	each	0	1	0	0
1		Mod.		8/4/2006	1	each	0	1	0	0
1		Mod.		9/27/2004	1	each	0	1	0	0
1		Mod.		8/17/2002	1	each	0	1	0	0
1		Mod.		6/22/2000	1	each	0	1	0	0
1		Mod.		2/1/1999	1	each	0	1	0	0

Page size: 10 78 items in 8 pages

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# Gateway

- The Gateway section of the manual addresses each of the tasks in BrM's *Gateway* tab. The *Gateway* tab provides the tools to import and export data between BrM and other systems.

# Export

The *Gateway > Export* task allows the user to export the data determined on the *Admin > General Config > Export Options* task to various export files.

The screenshot shows the 'Gateway > Export' interface. At the top, there is a header 'Gateway > Export' with a help icon. Below this is a section titled 'Selected Bridges' containing a table with columns 'Bridge ID', 'District', and 'County'. The table has one row with the following data: Bridge ID: 02102011000B010, District: 01, County: 003. Below the table are navigation controls (back, forward, page 1 of 1) and a 'Page size: 100' dropdown. Below the table is a 'Selected: 0' indicator. Below the table are two dropdown menus: 'Export what?' set to 'Extensible Markup Language (XML)' and 'Include:' set to '<01> Bridge Data'. Below these is a section titled 'Export which bridges?' with two radio buttons: 'Selected Bridges' (selected) and 'All Bridges in the Database'. At the bottom of the interface is a blue 'Export' button. The footer contains copyright information: '© American Association of State Highway and Transportation Officials. All rights reserved. BrM Version 5.2.3.18 [Build Date: Monday June 20, 2016] https://aashtoware.org | AASHTO Publications'.

## Export Controls

### Selected Bridges

The Selected Bridges grid displays all of the bridges currently selected on the Bridge List. It is only visible when at least one bridge is selected.

### Export What?

The *Export What?* dropdown is used to pick the type of export file that will be created. The options include: XML, non-compressed XML, PDI, custom PDI, a metric NBI file, and an NBE file.

The inputs for the NBI and NBE files are set, therefore the *Include:* dropdown is read only for those exports because no selection needs to be made from it.

If the NBE file is selected, a new option will appear in the *Export Which Bridges?* grouping.

Export what? NBE XML

Include: <01> Bridge Data

Validate Data

Export which bridges?

- Selected Bridges
- All Bridges in the Database
- Only Bridges on the NHS

### **Include:**

The *Include:* dropdown is used to select one of the export options determined on the *Admin > General Config > Export Options* task. This is the information that will be exported from the selected bridges.

### **Validate Data**

When "NBE XML" is selected from the *Export What?* dropdown, the *Validate Data* button will appear so the user can validate the selected bridges.

*\*Note:* The *Validate Data* button will not appear for any selections other than "NBE XML."

### **Export Which Bridges?**

The *Export Which Bridges?* radio buttons determine whether the exported file will include only the selected bridges or all of the bridges in the database.

If no bridges are currently selected on the Bridge List, the *Selected Bridges* radio button will be read only.

*\*Note:* An additional radio button - "Only Bridges on the NHS" - appears when "NBE XML" is selected from the *Export What?* dropdown.

### **Export**

Once the desired selections have been made, click the *Export* button to create the exported file.

# Import

The *Gateway > Import* task allows the user to import various file types to the database.

Gateway > Import

Import what? AASHTOWare Bridge Management Data Interchange File (PDI) ▼

Input File:

**Options**

Update Only

Create New Inspections

**Import UOM**

Metric  English

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## Import Controls

### Import What?

The *Import what?* dropdown allows the user to choose the type of file that will be imported. The options include PDI, NBI, and XML files.

### Input File:

The *Input File:* field displays the file that has been selected. To select a file, click the *Select* button and locate the desired file.

### Options

The *Options* grouping contains the options available for the import of an NBI File. It will be read only for PDI and XML files.

The *Update Only* checkbox will update the database based on the imported NBI file.

The *Create New Inspections* checkbox will create new inspections based on the imported NBI file.

The *Import UOM* radio buttons allow the user to choose which units to use for the import.

### Import

Once the desired selections have been made, click the *Import* button to import the selected file.

# Check Out

The *Gateway > Check Out* task allows the user to check out bridges from the system. Checking out a bridge can be thought of as locking the bridge. It does not mean that updates cannot be made to the bridge once it's checked out, but rather that any updates made will have to be accepted once the bridge is checked back in.

Gateway > Check Out

Selected Bridges

Bridge ID	District	County
02102011000B010	District: 01	003

Page size: 100 0 items in 1 pages

Selected: 0

Check-Out what? [AASHTOWare Bridge Management Data Interchange File]

Include: [<02> Bridge Inspection Data]

Check-out which bridges?

Selected Bridges

All Bridges in the Database

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Check-Out

## Check Out Controls

### Selected Bridges

The *Selected Bridges* grouping displays all of the bridges currently selected on the Bridge List. It is only visible when at least one bridge is selected.

### Check Out What?

The *Check Out What?* dropdown is used to determine the file type that will be created with the check out.

### Include:

The *Include:* dropdown is used to determine what information about the selected bridges will be checked out for the PDI file. This option is read only for custom PDI files.


### Check Out Which Bridges?

The *Check Out Which Bridges?* radio buttons determine which bridges will be checked out. If no bridges are currently selected on the Bridge List, the *Selected Bridges* radio button will be read only.

### Check Out

Once the desired selections have been made, click the *Check Out* button to check out the selected bridges.

**\*Note:** The following will occur if `WARNONEDITFORCHECKEDOUTBRIDGE` is set to "Y" on the *Admin > General Config > Options* task:

When entering the *Inspection* module with a checked out bridge selected, a popup message will notify the user of the bridge's status and a  symbol will appear next to the bridge's ID in the *Inspection* module header.



# Check In

The *Gateway > Check In* task allows the user to check bridges back into the system. If a bridge has been modified while checked out, checking the bridge back in will take the user to the *Gateway > Override* task to determine if the changes to the bridge should be accepted.

The screenshot shows a web application window titled "Gateway > Check In". Inside the window, there is a "Check-in Data" section with a dropdown menu labeled "Check-In What?" set to "AASHTOWare Bridge Management Data Interchange File (PDI)". Below this is an "Input File:" section with a "Choose File" button and the text "No file chosen". At the bottom of the window, there is a "Check-In" button. In the bottom left corner of the window, there is a copyright notice: "© American Association of State Highway and Transportation Officials. All rights reserved. BrM Version 5.2.3.18 [Build Date: Monday June 20, 2016] https://aashtoware.org | AASHTO Publications".

## Check-In Controls

### Check-In Data

The *Check In What?* dropdown determines the type of file that will be checked in.

The Input File: *Choose File* button is used to select the check in file. This is the same file that was obtained when the bridge was checked out. If the file has been lost, there will be no way to override the changes that have occurred to the bridge since it was checked out.

### Check In and Re-Check In

The *Check In* button is used to perform the initial check in of a checked out bridge.

The *Re-Check In* button is used to check in a bridge after the changes have been accepted on the *Gateway > Override* task, as indicated by the note under the button that reads: "Only check-in accepted conflicts."

# Override

The *Gateway > Override* task allows the user to decide whether or not to accept the changes that have been made to a bridge since it's been checked out.

The screenshot shows the 'Gateway > Override' interface. At the top, there is a dropdown menu for 'PDI' set to 'AREA2 AUG 26 A.', a 'Display' button, and radio buttons for 'All Rows' (selected) and 'Unaccepted Rows'. A blue button labeled 'Delete All Rows for this PDI File' is also present. Below this is a table with the following columns: 'Accept', 'Bridge Key', 'PDI File', 'CICO ID', 'IO Flag', 'Date - Time', and 'Notes'. The table contains 10 rows, each with a checked 'Accept' checkbox and a note stating 'Bridge was never checked out'. At the bottom of the interface are three buttons: 'Accept', 'Accept All', and 'Cancel'. A copyright notice at the bottom reads: '© American Association of State Highway and Transportation Officials. All rights reserved. BrM Version 5.2.3 (RC 1) [Build Date: Friday September 2, 2016] https://aashtoware.org | AASHTO Publications'.

Accept	Bridge Key	PDI File	CICO ID	IO Flag	Date - Time	Notes
<input checked="" type="checkbox"/>	9047A909F17E4A8CA2B9E6911D0FA6CF	AREA2 AUG 26 A.	UNHT	-	8/27/2002 7:22:13 AM	Bridge was never checked out
<input checked="" type="checkbox"/>	E6CF51AB42D4482889B09105D80ECFA8	AREA2 AUG 26 A.	UNHT	-	8/27/2002 7:22:13 AM	Bridge was never checked out
<input checked="" type="checkbox"/>	424F77186D704451B68AE43D5241E81A	AREA2 AUG 26 A.	UNHT	-	8/27/2002 7:22:13 AM	Bridge was never checked out
<input checked="" type="checkbox"/>	653F937BB71745F487AC0568211BB4B6	AREA2 AUG 26 A.	UNHT	-	8/27/2002 7:22:13 AM	Bridge was never checked out
<input checked="" type="checkbox"/>	E3E0F82B148C4D439375DE25DB5F8A9E	AREA2 AUG 26 A.	UNHT	-	8/27/2002 7:22:13 AM	Bridge was never checked out
<input checked="" type="checkbox"/>	637A3BC1DD684914834B546AA4EE65E7	AREA2 AUG 26 A.	UNHT	-	8/27/2002 7:22:13 AM	Bridge was never checked out
<input checked="" type="checkbox"/>	A8312DB0933A4DD19DAF9E229E31FEE5	AREA2 AUG 26 A.	UNHT	-	8/27/2002 7:22:13 AM	Bridge was never checked out
<input checked="" type="checkbox"/>	E9C6DA8315D04E93B523FDE9D0FA576E	AREA2 AUG 26 A.	UNHT	-	8/27/2002 7:22:13 AM	Bridge was never checked out
<input checked="" type="checkbox"/>	ECE7AD676F11416EAA820A4CE9712C5C	AREA2 AUG 26 A.	UNHT	-	8/27/2002 7:22:13 AM	Bridge was never checked out
<input checked="" type="checkbox"/>	EAC7B8A9FD3A4C87A1E01C2731D4CA6C	AREA2 AUG 26 A.	UNHT	-	8/27/2002 7:22:13 AM	Bridge was never checked out

## Override Controls

### PDI Selection

Use the *PDI* dropdown to select the PDI to view. The name of the PDI will match that of the PDI that was checked in.

### Display

Use the *Display* radio buttons to show either all of the rows or only the rows with changes that have been unaccepted. The table will indicate if there is nothing to display for the selected radio button.

### Delete All Rows

The *Delete All Rows for this PDI File* button will delete all of the displayed rows in the list for the selected radio button.

- If the *Delete* button is clicked when the *All Rows* radio button is selected, all of the rows within the All Rows list will be transferred to the Unaccepted Rows list.
- If the *Delete* button is clicked when the *Unaccepted Rows* radio button is selected, all of the rows within the Unaccepted Rows list will be deleted.

If there are no more rows listed in both the All Rows list and the Unaccepted Rows list, the PDI will automatically be removed from the *Gateway > Override* task.

## **Accept, Accept All, and Close**

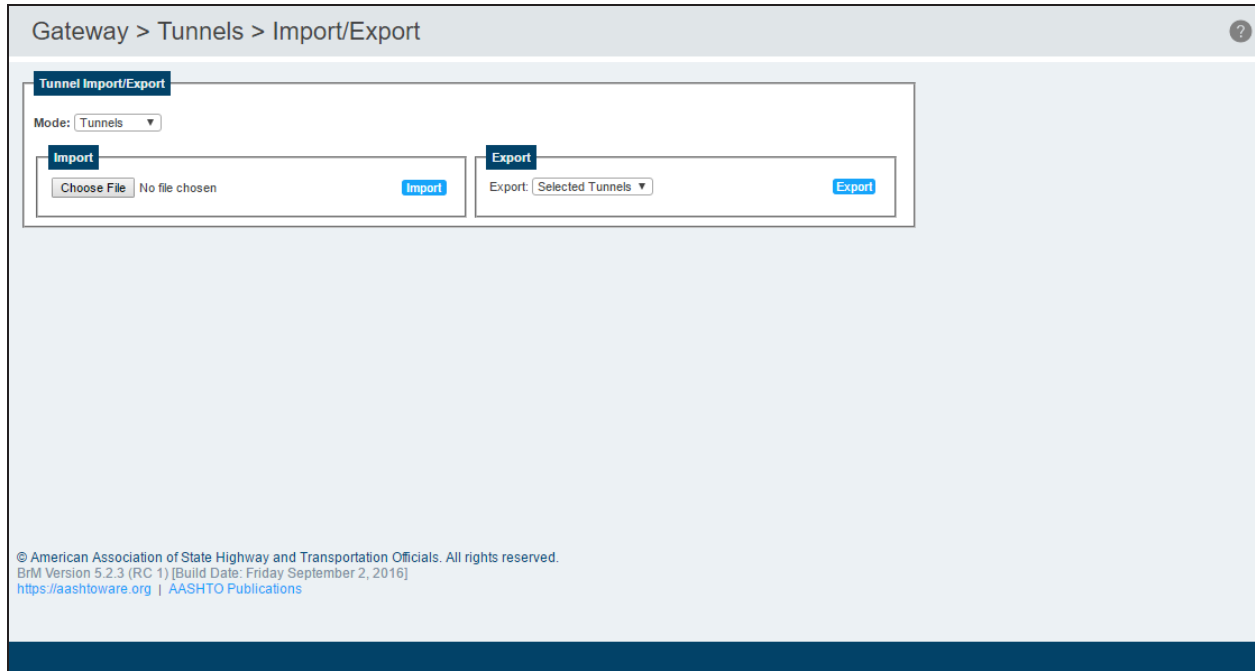
The **Accept** button accepts all of the checked rows for the selected PDI. The changes that occurred to the bridge while checked out will be made permanent when the bridge is re-checked in to the system on the *Gateway > Check In* task.

The **Accept All** button accepts all of the displayed rows, regardless of check status, for the selected PDI. The changes that occurred to the bridge while checked out will be made permanent when the bridge is re-checked in to the system on the *Gateway > Check In* task.

Selecting the **Cancel** button cancels the currently selected PDI's changes (prior to being accepted) and returns the user to the All Rows list of the first PDI listed in the **PDI** dropdown.

## Import/Export

The *Gateway > Tunnels > Import/Export* task allows the user to import and export tunnel data as well as to create new asset types.



### Tunnel Import/Export

The *Mode* dropdown determines whether the user will be importing/exporting tunnel data or whether they intend to work with new asset types.

For tunnel data using "NTIS XML":

#### Import

The *Import* grouping is used to import a file from the user's computer to the system. The import will accept XLS and XML files.

The XLS import option is meant mainly to simplify an agency's initial tunnel inventory import by allowing them to use the tunnel inventory data XLS file that was distributed to agencies in 2015.

The XML import option is for importing the generated XML file after it has been exported and needs imported to the system again.

To import a file, click the *Choose File* button to locate the desired file from the computer and then click the *Import* button.

#### Export

The *Export* grouping is used to export National Tunnel Inventory (NTI) data from the system into an XML file.

To export a file, begin by choosing which files to export using the *Export* dropdown. If "Selected Tunnels" is selected, only the tunnels selected on the *Tunnels > Tunnel List* task will be included in the data export.

Click the *Export* button to create the XML file.

## Mode: Multi-Asset XML

The "Multi-Asset XML" selection in the *Mode* dropdown exists for users to create new asset types in the system.

However, creating a new asset type requires more than performing an import. Outside of this task, the user must create new database tables and web forms to support the new asset type.

There are two types of multi-asset import/export to select:

- **Definition** - This is the blueprint for the asset type that determines what data will be collected.
- **Data** - This is the actual data for the asset type.

**\*Note:** Additional information will be provided on this topic as the scope of its abilities expand.

# Analysis

- The *Analysis* section of the manual addresses each of the tasks in BrM's *Analysis* tab. The *Analysis* tab allows for an in-depth view of a structure's current condition and how it will be changed through deterioration and work candidates.

# Work Candidates

The *Analysis > Work Candidates* task allows the user to analyze a bridge's deterioration and utility values before and after work candidates are performed.

## Bridge Analysis

The *Analysis > Work Candidates > Bridge Analysis* subtask analyzes the effect of work candidates on the selected bridge. Only work candidates that have been added to the selected bridge on the *Inspection > Work > Work Candidates* subtask can be used on the *Bridge Analysis* subtask.

Bridge: [0123K] Name: **Willamette River, Hwy 3** Facility Carried (007): **OR 22 (HWY 30) EB** Feature Intersected (006A): **WILLAMETTE RIVER** Metric: English

Analysis > Work Candidates > Bridge Analysis

**Description**

Route: 072 Milepoint: 4.36 mi  
 District: District 13 County: Marion  
 Owner: State Highway Agency Area: Region 2 Bridge Inspector  
 Material: 4 Steel Continuous Resp: State Highway Agency  
 Scour: 3 SC - Unstable Design: 02 Stringer/Girder

**Current Scaled Performance**

Condition: 53.79 Risk: 49.22  
 Lifecycle: 86.45 Mobility: 71.88

**Sufficiency**

Rating: 17.9 SDF/O: Functionally Obsolete

**Utility**

Utility Profile: [Sample]

**NBI Modeling**

NBI Deterioration Method: [NBI Converter] NBI Converter Profile: [BIM Default]

**Conditions**

Deck: 5 Fair Superstr: 5 Fair  
 Substr: 5 Fair Culvert: N/A (NBI)  
 Structure: 7 Minor Damage Deck Index: 75.60  
 Superstr Index: 74.92 Substr Index: 91.33  
 Culvert Index: Structure HI: 76.18

Range: 5 years

Recent Completed Work	Notes	Year	Cost (\$k)
1018-77743	UNPLUG AND CLEAN ALL DECK DRAINS. Completed 11/14 RTS.	2014	\$1,000.00

Work Candidates Existing For Selected Bridge

Sel.	Work Candidate	Action	Base Utility	Utility (Change)	Condition (Change)	LifeCycle (Change)	Mobility (Change)	Risk (Change)	Cost	Benefit / Cost (\$k)	Cost (\$k) / Benefit	Target Year	Repeat Interval
	Last inspection		65.62	65.62 (0.00)	53.79 (0.00)	86.45 (0.00)	86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$0		2013	
<input type="checkbox"/>	1018-77739	300 Patch Header	65.62	65.62 (0.00)	53.79 (0.00)	86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$2,500			2004	<input type="checkbox"/>
<input type="checkbox"/>	1018-77738	300 Patch Header	65.62	65.62 (0.00)	53.79 (0.00)	86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$5,000			2004	<input type="checkbox"/>
<input type="checkbox"/>	1018-77746	300 Patch Header	65.62	65.62 (0.00)	53.79 (0.00)	86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$2,500			2004	<input type="checkbox"/>
<input type="checkbox"/>	1018-77751	12 Other	65.62	65.62 (0.00)	53.79 (0.00)	86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$2,500			2004	<input type="checkbox"/>
<input type="checkbox"/>	47DFCAS-E896-072216-67E830D17C	205 Patch Concrete	63.76	64.53 (0.77)	50.54 (1.39)	87.17 (0.72)	71.88 (0.00)	49.22 (0.00)	\$68	11.167	\$0	2016	<input type="checkbox"/>
<input type="checkbox"/>	A-DOT001-0E8CDE3D-00000029	306 Joint Replace	65.62	65.62 (0.00)	53.79 (0.00)	86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$1,000			2007	<input type="checkbox"/>
<input type="checkbox"/>	47DFCAS-E896-072216-E18A28E810	215 Crack Injection	63.76	63.76 (0.00)	49.15 (0.00)	86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$0			2016	<input type="checkbox"/>
<input type="checkbox"/>	A-DOT001-1073A073-00000006	205 Other	65.62	65.62 (0.00)	53.79 (0.00)	86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$0			2008	<input type="checkbox"/>
<input type="checkbox"/>	1018-77748	12 Other	65.62	65.62 (0.00)	53.79 (0.00)	86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$500			2004	<input type="checkbox"/>
<input type="checkbox"/>	1018-77745	311 Coat Bearings	65.62	65.62 (0.00)	53.79 (0.00)	86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$2,000			2004	<input type="checkbox"/>

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[Add to New Project](#) [Add New Group](#)

Cancel [Save](#) [Save & Close](#)

## Bridge Summary

The top portion of the *Bridge Analysis* subtask contains a summary of the selected bridge including descriptive information, the scaled performance, sufficiency, conditions, and recently completed work.

**Description**

Route: 0 Milepoint: mi  
 District: District 2 County: Maricopa  
 Owner: City/Municipal Hwy Agenc Area: 01B - Matt Hunter  
 Material: 2 Concrete Continuous Resp: City/Municipal Hwy Agenc  
 Scour: 8 Stable Above Footing Design: 19 Culvert

**Current Scaled Performance**

Condition: 95.8 Risk: 37.61  
 Lifecycle: Mobility:

**Sufficiency**

Rating: 72.5 SDF/O: Not Deficient

**Conditions**

Deck: N/A (NBI) Superstr: N/A (NBI)  
 Substr: N/A (NBI) Culvert: 7 Minor Deterioration  
 Structure: 8 Protected Deck Index:  
 Superstr Index: 100.00 Substr Index: 99.64  
 Culvert Index: Structure HI: 99.75

Range: 5 years

Recent Completed Work	Notes	Year	Cost (\$k)
No recently completed work found.			

## Utility

The *Utility* grouping allows the user to change the utility weights profile used in the bridge analysis. Utility weights are created and edited on the *Admin > Modeling Config > Weights Profile*. The utility weights profiles can change both the performance of the overall bridge and the performance of the work candidates.

Use the *Utility Profile* dropdown to select the desired utility weights profile for the bridge analysis.

## NBI Modeling

The *Bridge Analysis* task can estimate the bridge's future NBI component ratings. The *NBI Modeling* grouping allows the user to select how that estimate will be determined, either using an NBI converter profile or component level deterioration.

The *NBI Deterioration Method* dropdown allows the user to model the NBI component deterioration in two different ways:

- **NBI Converter** - This option allows the user to select an NBI converter profile (created on the *Admin > Modeling Config > NBI Conversion Profiles* task) to forecast the element ratings.
- **Component-Level Deterioration** - This option uses the component-level deterioration models established on the *Admin > Modeling Config > NBI Deterioration Models* subtask.

The difference between the two NBI deterioration method types can be viewed in the *Deterioration Charts and Effects on Each Utility Criterion* groupings.

## Work Candidates Grid

The Work Candidates grid contains all of the work candidates that have been added to the selected bridge. In order for work candidates to appear on the *Bridge Analysis* subtask, the following steps must be taken on other pages throughout the software:

1. Add a benefit group via *Admin > Modeling Config > Benefit Group*.
2. Link the benefit group to specific actions via *Admin > Modeling Config > Action Defs*.
3. Add work candidates and assign them to actions for a specific bridge via *Inspection > Work > Work Candidates*.

Sel.	Work Candidate	Action	Base Utility	Utility (Change)	Condition (Change)	LifeCycle (Change)	Mobility (Change)	Risk (Change)	Cost	Benefit / Cost (\$k)	Cost (\$k) / Benefit	Target Year	Repeat Interval
	Work Candidates Existing For Selected Bridge												
	Last inspection												
<input type="checkbox"/>	1018-77739	300 Patch Header	63.25	63.02 (-0.23)	47.87 (0.00)	53.79 (0.00)	86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$2,500	-.092	-11	2017
<input type="checkbox"/>	1018-77738	300 Patch Header	63.76	63.76 (0.00)	49.15 (0.00)		86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$5,000			2016
<input type="checkbox"/>	1018-77746	300 Patch Header	62.75	62.30 (-0.45)	46.63 (0.00)		84.93 (-1.52)	71.88 (0.00)	49.22 (0.00)	\$2,500	-.18	-\$6	2018
<input type="checkbox"/>	1018-77751	12 Other	63.25	63.02 (-0.23)	47.87 (0.00)		85.70 (-0.75)	71.88 (0.00)	49.22 (0.00)	\$2,500	-.092	-\$11	2017
<input type="checkbox"/>	47DFCA5-E896-072216-67EB30D17C	205 Patch Concrete	63.76	64.53 (0.77)	50.54 (1.39)		87.17 (0.72)	71.88 (0.00)	49.22 (0.00)	\$69	11.167	\$0	2016
<input type="checkbox"/>	A-DOT001-068CDE3D-00000029	306 Joint Replace	62.75	62.30 (-0.45)	46.63 (0.00)		84.93 (-1.52)	71.88 (0.00)	49.22 (0.00)	\$1,000	-.45	-\$2	2016
<input type="checkbox"/>	47DFCA5-E896-072216-E18A28E810	215 Crack Injection	63.76	63.76 (0.00)	49.15 (0.00)		86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$0			2016
<input type="checkbox"/>	A-DOT001-1073A073-00000006	205 Other	62.75	62.30 (-0.45)	46.63 (0.00)		84.93 (-1.52)	71.88 (0.00)	49.22 (0.00)	\$0			2016
<input type="checkbox"/>	1018-77748	12 Other	63.25	63.02 (-0.23)	47.87 (0.00)		85.70 (-0.75)	71.88 (0.00)	49.22 (0.00)	\$500	-.46	-\$2	2017
<input type="checkbox"/>	1018-77745	311 Coat Bearings	63.76	63.76 (0.00)	49.15 (0.00)		86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$2,000			2016

The Work Candidates grid shows the bridge's base utility and current values for utility, condition, mobility, and risk with the difference between the current and predicted values shown in parenthesis. It also reveals the estimated cost to complete the work candidate, the estimated benefit of the action for the cost, the year targeted to complete the work candidate, and the interval (in years) to repeat the work candidate.

The only editable fields in the Work Candidates grid are the *Cost*, *Target Year*, and *Repeat Interval* textboxes:



- **Cost** - The estimated cost of completing the work candidate.
- **Target Year** - The year in which the work candidate is planned to be completed.
- **Repeat Interval** - The recommended interval of time for repeating the work candidate in the future.

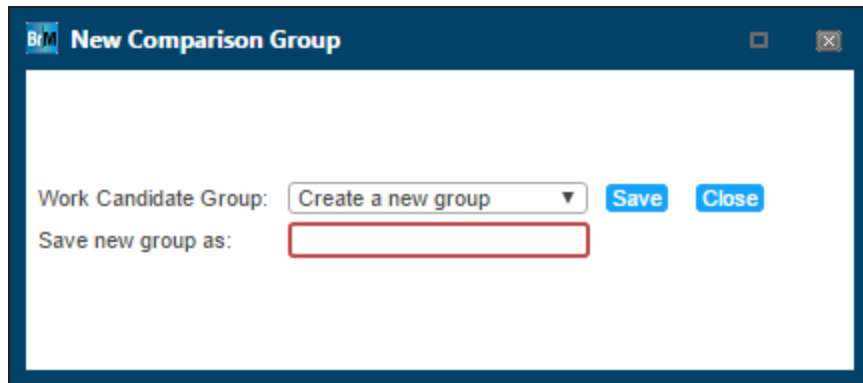
Checking the **Select** checkbox for one or more candidates in the grid updates the *Effects on Each Element*, *Deterioration Charts*, *Effects on Each Utility Criterion*, and *Deterioration Results* groupings. The groupings will update each time a work candidate is selected/unselected.

### Add to New Project

The **Add to New Project** button can be used to create a new project by checking the desired work candidates from the grid and then clicking the button. This will take the user to the *Projects > Create/Edit Project* task. Projects are a way for agencies to organize and plan related work on specific bridges.

### Add New Group

The **Add New Group** button can be used to create a new work candidate comparison group or add work candidates to an existing work candidate comparison group by checking the desired work candidates from the grid and then clicking the button. Work candidate groups are used to group together work candidates that represent a work plan and then compare the different work plans for the selected bridge. With one or more work candidates selected, clicking the **Add New Group** button will reveal the following popup:



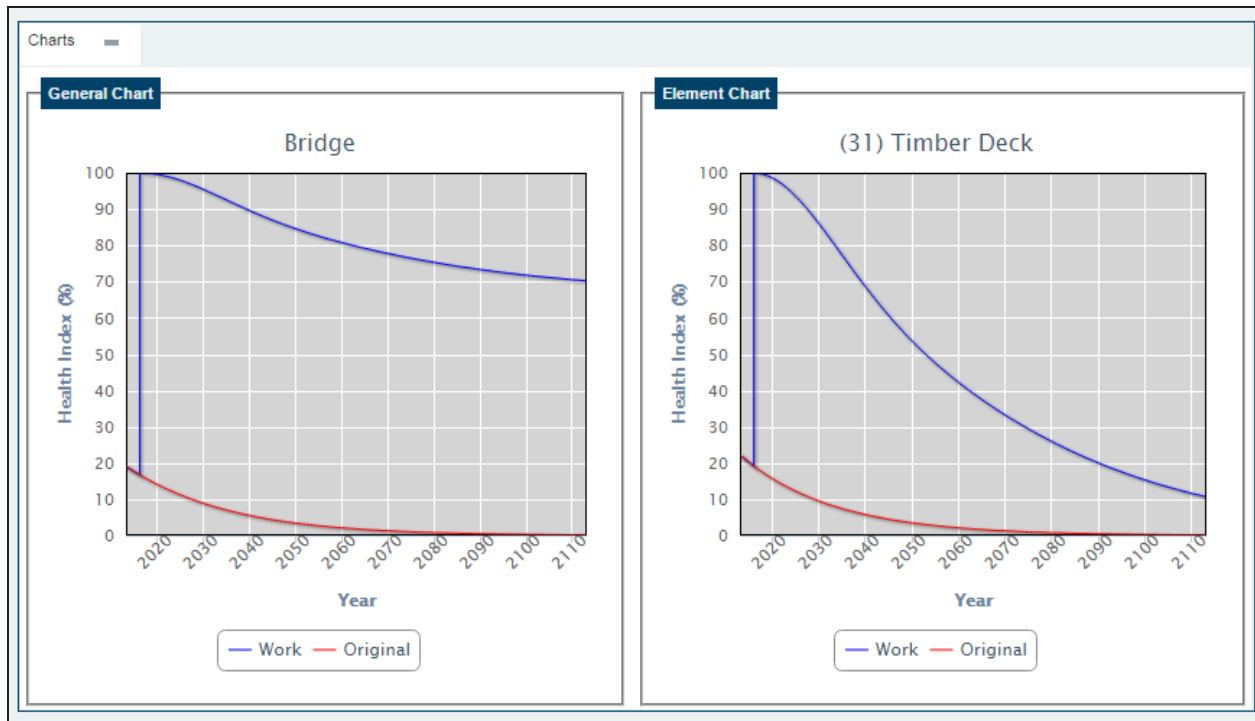
To add the selected work candidates to an existing comparison group, select the comparison group from the **Work Candidate Group** dropdown, then click the **Save** button.

To create a new comparison group, leave "Create a new group" selected and use the **Save New Group As** textbox to name the new comparison group, then click the **Save** button.

The work candidate comparison groups can then be compared on the *Analysis > Work Candidates > Comparison Groups* subtask.

## Deterioration Charts

The *Deterioration Charts* grouping contains bridge and element graphs that display the deterioration modeling with and without the selected work candidates.



Each graph will have two curves:

- **Red** - The original deterioration
- **Blue** - The deterioration with the selected work candidates being performed at the designated intervals

Depending on the effect of the work candidate and the interval at which it is being performed, the blue curve should deteriorate at a slower rate than the red curve and should have periodic spikes of improvement. Clicking on the name of the curve within the key - Work or Original - will remove that curve from the graph until the name is clicked again.

## Effects on Each Element

The *Effects on Each Element* grouping contains a grid that displays the effects of the selected work candidates on individual elements. The grid uses a color-coded system to display the elements' current conditions and then the effect of the selected work candidates on them.

- **Green** - Condition State 1
- **Yellow** - Condition State 2
- **Orange** - Condition State 3
- **Red** - Condition State 4

Element	Str. Unit	Env.	Quantity	Units	Condition	Effect
(12) Re Concrete Deck	0	Ben.(1)	1,000.00	sq.ft		
(31) Timber Deck	0	Ben.(1)	750.00	sq.ft		
(38) Re Concrete Slab	0	Ben.(1)	1,000.00	sq.ft		

Checking the *Show Changed* checkbox updates the grid to show only the elements that have changed due to the work candidates.

Elements with a ">" next to them can be expanded to reveal the protective systems and defects associated with them. Selecting an element or protective system will display the expected deterioration of the element in the Element graph in the *Deterioration Charts* grouping. Defects are not currently incorporated into deterioration calculations.

## Effects on Each Utility Criterion

The *Effects on Each Utility Criterion* grouping contains a grid that displays the effect the selected work candidates have on the bridge's utility criteria. The Before WC and After WC columns allow the user to compare the before and after effects of the work candidate. The hierarchy displayed under Total Utility is determined by the criteria entered in the *Admin > Modeling Config > Utility* task.

Effects on Each Utility Criterion		
Year: 2016 (3 years after inspection)		
Show Changed: <input type="checkbox"/>		
Category name	Before WC	After WC
Total Utility	66.96	72.71
Condition	73.01	80.33
Deck	91	91
Element ratings	19.04	48.3
(12) Reinforced Concrete Deck	9.51	9.51
(31) Timber Deck - Wood Deck	12.23	100
(520) Deck/Slab Protection Systems	35.39	35.39
Substructure	91	91
Superstructure	91	91
Mobility	60.72	60.72
ADT	23.2	23.2
Bridge Posting	100	100
Percent of truck detoured.	34.2	34.2

Checking the *Show Changed* checkbox updates the grid to show only the criteria that have changed due to the work candidates.

## Deterioration Results

The *Deterioration Results* grouping contains a grid to compliment the *Deterioration Charts* grouping by providing the deterioration values for every point on the deterioration chart.

Deterioration Results				
Year	Bridge Age	Original H.I.	Work H.I.	H.I. Diff.
2013	7	19.05	19.05	0.00
2014	8	18.23	18.23	0.00
2015	9	17.45	17.45	0.00
2016	10	16.69	100.00	83.31
2017	11	15.97	99.97	84.00
2018	12	15.27	99.87	84.60
2019	13	14.60	99.72	85.12
2020	14	13.96	99.52	85.56
2021	15	13.34	99.27	85.93
2022	16	12.75	98.97	86.23
2023	17	12.18	98.63	86.45

Navigation: 1 2 3 4 5 6 7 8 9 10 Page size: 10 100 items in 10 pages

The calculated values are shown through the following columns:

- **Original H.I** - The original health index
- **Work H.I.** - The health index after the performance of the selected work candidates
- **H.I. Diff.** - The difference between the work and original health index

## Bridge Analysis Page Controls

Even though the *Bridge Analysis* subtask is primarily for viewing purposes, the *Save*, *Save & Close*, and *Cancel* buttons exist because the *Cost*, *Target Year*, and *Repeat Interval* textboxes can be edited in the Work Candidates grid.

Clicking the *Save* button saves the changes made to the above-mentioned fields.

Clicking the *Save & Close* button saves the changes made to the above-mentioned fields and takes the user to the *Projects > Project List* task.

Clicking the *Cancel* button cancels the changes made to the above-mentioned fields and takes the user to the *Projects > Project List* task.

# Reverse Calculation

The *Analysis > Work Candidates > Reverse Calculation* subtask provides nearly the same functionality as the *Bridge Analysis* subtask but operates differently. The *Bridge Analysis* subtask analyzes only the work candidates that have been added to the selected bridge, while the *Reverse Calculation* subtask analyzes all of the possible actions that will positively affect the performance of the selected bridge based on its components and elements.

Bridge: 00123K Name: Willamette River, Hwy 2 Facility Carried (007) OR 22 (HWY 30) EB Feature Intersected (006A) WILLAMETTE RIVER Metric: Englist

**Analysis > Work Candidates > Reverse Calculation**

**Description**

Route:	072	Milepoint:	4.36 mi
District:	District 3	County:	Marion
Owner:	State Highway Agency	Area:	Region 2 Bridge Inspecto
Material:	4 Steel Continuous	Resp:	State Highway Agency
Scour:	3 SC - Unstable	Design:	02 Stringer/Garder

**Current Scaled Performance**

Condition:	53.79	Risk:	49.22
Lifecycle:	86.45	Mobility:	71.88

**Sufficiency**

Rating:	17.9	SD/FO:	Functionally Obsolete
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**Conditions**

Deck:	5 Fair	Superstr:	5 Fair
Substr:	5 Fair	Culvert:	N N/A (NBI)
Structure:	7 Minor Damage	Deck Index:	75.60
Superstr Index:	74.92	Substr Index:	91.33
Culvert Index:		Structure HI:	76.18

**Recent Completed Work**

Notes	Year	Cost (\$k)
UNPLUG AND CLEAN ALL DECK DRAINS. Completed 11/14 RTS.	2014	\$1,000.00

**Actions Existing For Selected Bridge**

Show all defined actions:

Sel.	Action	Base Utility	Utility (Change)	Condition (Change)	LifeCycle (Change)	Mobility (Change)	Risk (Change)	Cost	Benefit / Cost (\$k)	Cost (\$k) / Benefit	Target Year	Repeat Interval
<input type="checkbox"/>	Last Inspection	65.62	65.62 (0.00)	49.15 (0.00)	53.79 (0.00)	86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$0		2013	
<input type="checkbox"/>	Preserve Super - Network	63.76	63.76 (0.00)	49.15 (0.00)	86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$3			2016	
<input type="checkbox"/>	Rehab Deck - Network	63.76	66.07 (2.31)	60.91 (11.76)	78.46 (-7.99)	71.88 (0.00)	49.22 (0.00)	\$1,822,092	.0013	\$789	2016	
<input type="checkbox"/>	Rehab Super - Network	63.76	60.85 (-2.91)	51.40 (2.25)	73.74 (-12.71)	71.88 (0.00)	49.22 (0.00)	\$8,240,284	-0.004	-\$2,832	2016	
<input type="checkbox"/>	Rehab Sub - Network	63.76	64.62 (0.86)	50.77 (1.62)	87.17 (0.72)	71.88 (0.00)	49.22 (0.00)	\$383,586	.0022	\$446	2016	
<input type="checkbox"/>	Replace Deck - Network	63.76	66.98 (3.22)	73.19 (24.04)	65.13 (-21.32)	71.88 (0.00)	49.22 (0.00)	\$869,000	.0037	\$270	2016	
<input type="checkbox"/>	Rehab Culvert - Network	63.76	63.76 (0.00)	49.15 (0.00)	86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$3,022			2016	
<input type="checkbox"/>	Replace Super - Network	63.76	69.45 (5.69)	62.26 (13.11)	87.93 (1.48)	71.88 (0.00)	49.22 (0.00)	\$11,988,090	.0005	\$2,107	2016	
<input type="checkbox"/>	Replace Structure - Network	63.76	84.37 (20.61)	95.14 (45.99)	93.82 (7.37)	71.88 (0.00)	49.22 (0.00)	\$52,140,002	.0004	\$2,530	2016	
<input type="checkbox"/>	Preserve Deck - Network	63.76	64.72 (0.96)	51.55 (2.40)	86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$10,044	.0956	\$10	2016	
<input type="checkbox"/>	205 Patch Concrete	63.76	64.53 (0.77)	50.54 (1.39)	87.17 (0.72)	71.88 (0.00)	49.22 (0.00)	\$1,350	.5703	\$2	2016	

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Buttons: Cancel Save Save & Close

## Bridge Summary

The top portion of the *Reverse Calculation* subtask contains a summary of the selected bridge including descriptive information, the scaled performance, sufficiency, conditions, and recently completed work.

**Description**

Route:	072	Milepoint:	4.36 mi
District:	District 3	County:	Marion
Owner:	State Highway Agency	Area:	Region 2 Bridge Inspecto
Material:	4 Steel Continuous	Resp:	State Highway Agency
Scour:	3 SC - Unstable	Design:	02 Stringer/Garder

**Current Scaled Performance**

Condition:	53.79	Risk:	49.22
Lifecycle:	86.45	Mobility:	71.88

**Sufficiency**

Rating:	17.9	SD/FO:	Functionally Obsolete
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**Conditions**

Deck:	5 Fair	Superstr:	5 Fair
Substr:	5 Fair	Culvert:	N N/A (NBI)
Structure:	7 Minor Damage	Deck Index:	75.60
Superstr Index:	74.92	Substr Index:	91.33
Culvert Index:		Structure HI:	76.18

**Recent Completed Work**

Notes	Year	Cost (\$k)
UNPLUG AND CLEAN ALL DECK DRAINS. Completed 11/14 RTS.	2014	\$1,000.00

## NBI Modeling

The *Reverse Calculation* task can estimate the bridge's future NBI component ratings. The *NBI Modeling* grouping allows the user to select how that estimate will be determined, either using an NBI converter profile or component level deterioration.

NBI Modeling

NBI Deterioration Method: **NBI Converter** NBI Converter Profile: **BrM Default**

The **NBI Deterioration Method** dropdown allows the user to model the NBI component deterioration in two different ways:

- **NBI Converter** - This option allows the user to select an NBI converter profile (created on the *Admin > Modeling Config > NBI Conversion Profiles* task) to forecast the element ratings.
- **Component-Level Deterioration** - This option uses the component-level deterioration models established on the *Admin > Modeling Config > NBI Deterioration Models* subtask.

The difference between the two NBI deterioration method types can be viewed in the *Deterioration Charts* and *Effects on Each Utility Criterion* groupings.

## Actions Existing for Selected Bridge

The Actions Existing for Selected Bridge grid displays all of the actions that will positively affect the performance of the selected bridge based on its components and elements.

Sel.	Action	Base Utility	Utility (Change)	Condition (Change)	LifeCycle (Change)	Mobility (Change)	Risk (Change)	Cost	Benefit / Cost (\$k)	Cost (\$k) / Benefit	Target Year	Repeat Interval
	Last inspection	65.62	65.62 (0.00)	53.79 (0.00)	86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$0			2013	
<input type="checkbox"/>	Preserve Super - Network	63.76	63.76 (0.00)	49.15 (0.00)	86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$3	\$1,822,092 .0013	\$789	2016	
<input type="checkbox"/>	Rehab Deck - Network	63.76	66.07 (2.31)	60.91 (11.76)	78.46 (-7.99)	71.88 (0.00)	49.22 (0.00)	\$8,240,264	-0.004	-\$2,832	2016	
<input type="checkbox"/>	Rehab Super - Network	63.76	60.85 (-2.91)	51.40 (2.25)	73.74 (-12.71)	71.88 (0.00)	49.22 (0.00)	\$383,586	.0022	\$446	2016	
<input type="checkbox"/>	Rehab Sub - Network	63.76	64.62 (0.86)	50.77 (1.62)	87.17 (0.72)	71.88 (0.00)	49.22 (0.00)	\$869,000	.0037	\$270	2016	
<input type="checkbox"/>	Replace Deck - Network	63.76	66.98 (3.22)	73.19 (24.04)	65.13 (-21.32)	71.88 (0.00)	49.22 (0.00)	\$3,022			2016	
<input type="checkbox"/>	Rehab Culvert - Network	63.76	63.76 (0.00)	49.15 (0.00)	86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$3,022			2016	
<input type="checkbox"/>	Replace Super - Network	63.76	69.45 (5.69)	62.26 (13.11)	87.93 (1.48)	71.88 (0.00)	49.22 (0.00)	\$11,988,090	.0005	\$2,107	2016	
<input type="checkbox"/>	Replace Structure - Network	63.76	84.37 (20.61)	95.14 (45.99)	93.82 (7.37)	71.88 (0.00)	49.22 (0.00)	\$52,140,002	.0004	\$2,530	2016	
<input type="checkbox"/>	Preserve Deck - Network	63.76	64.72 (0.96)	51.55 (2.40)	86.45 (0.00)	71.88 (0.00)	49.22 (0.00)	\$10,044	.0956	\$10	2016	
<input type="checkbox"/>	205 Patch Concrete	63.76	64.53 (0.77)	50.54 (1.39)	87.17 (0.72)	71.88 (0.00)	49.22 (0.00)	\$1,350	.5703	\$2	2016	

Checking the **Show All Defined Actions** checkbox will reveal all actions relevant to the bridge regardless of whether or not the action will have a positive impact.

The Actions Existing for Selected Bridge grid shows the bridge's base utility and current values for utility, condition, mobility, and risk with the difference between the current and predicted values shown in parenthesis. It also reveals the estimated cost to complete the action, the estimated benefit of the action for the cost, the year targeted to complete the action, and the interval (in years) to repeat the action.

The only editable fields in the Actions Existing for Selected Bridge grid are the **Cost**, **Target Year**, and **Repeat Interval** textboxes:

- **Cost** - The estimated cost of completing the action.
- **Target Year** - The year in which the action is planned to be completed.
- **Repeat Interval** - The recommended interval of time for repeating the action in the future.

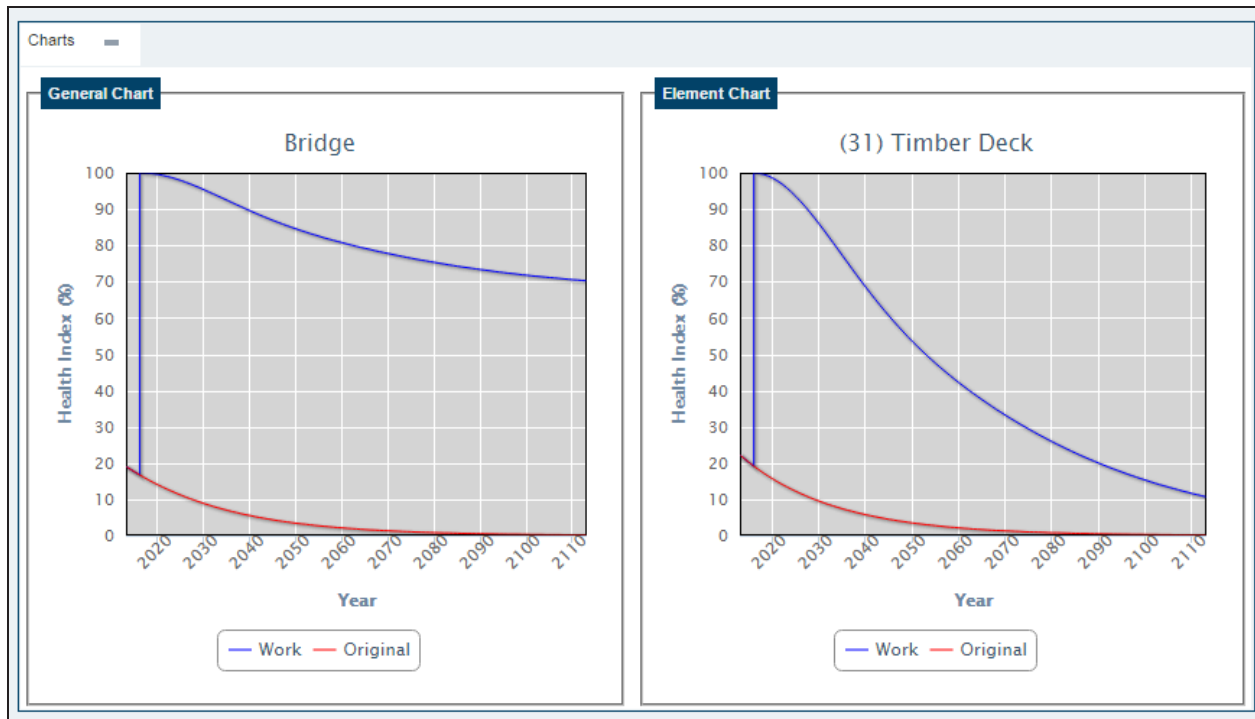
Checking the **Select** checkbox for one or more action in the grid updates the *Effects on Each Element*, *Deterioration Charts*, *Effects on Each Utility Criterion*, and *Deterioration Results* groupings. The groupings will update each time an action is selected/unselected.

### Add to New Project

The **Add to New Project** button can be used to create a new project by checking the desired actions from the grid and then clicking the button. This will take the user to the *Projects > Create/Edit Project* task. Projects are a way for agencies to organize and plan related work on specific bridges.

## Deterioration Charts

The *Deterioration Charts* grouping contains bridge and element graphs that display the deterioration modeling with and without the selected actions.



Each graph will have two curves:

- **Red** - The original deterioration
- **Blue** - The deterioration with the actions being performed at the designated intervals

Depending on the effect of the action and the interval at which it is being performed, the blue curve should deteriorate at a slower rate than the red curve and should have periodic spikes of improvement. Clicking on the name of the curve within the key - Work or Original - will remove that curve from the graph until the name is clicked again.

## Effects on Each Element

The *Effects on Each Element* grouping contains a grid that displays the effects of the selected actions on individual elements. The grid uses a color-coded system to display the elements' current conditions and then the effect of the selected actions on them.

- **Green** - Condition State 1
- **Yellow** - Condition State 2
- **Orange** - Condition State 3
- **Red** - Condition State 4

Effects on Each Element

Year: 2016 (3 years after inspection)

Show Changed:

Element	Str. Unit	Env.	Quantity	Units	Condition	Effect
(12) Re Concrete Deck	0	Ben.(1)	1,000.00	sq.ft		
(31) Timber Deck	0	Ben.(1)	750.00	sq.ft		
(38) Re Concrete Slab	0	Ben.(1)	1,000.00	sq.ft		

Checking the *Show Changed* checkbox updates the grid to show only the elements that have changed due to the actions.

Elements with a ">" next to them can be expanded to reveal the protective systems and defects associated with them. Selecting an element or protective system will display the expected deterioration of the element in the Element graph in the *Deterioration Charts* grouping. Defects are not currently incorporated into deterioration calculations.

## Effects on Each Utility Criterion

The *Effects on Each Utility Criterion* grouping contains a grid that displays the effect the selected actions have on the bridge's utility criteria. The Before WC and After WC columns allow the user to compare the before and after effects of the action. The hierarchy displayed under Total Utility is determined by the criteria entered in the *Admin > Modeling Config > Utility* task.

Effects on Each Utility Criterion		
Year: 2016 (3 years after inspection)		
Show Changed: <input type="checkbox"/>		
Category name	Before WC	After WC
<b>Total Utility</b>	<b>66.96</b>	<b>72.71</b>
Condition	73.01	80.33
Deck	91	91
Element ratings	19.04	48.3
(12) Reinforced Concrete Deck	9.51	9.51
(31) Timber Deck - Wood Deck	12.23	100
(520) Deck/Slab Protection Systems	35.39	35.39
Substructure	91	91
Superstructure	91	91
Mobility	60.72	60.72
ADT	23.2	23.2
Bridge Posting	100	100
Percent of truck detoured.	34.2	34.2

Checking the *Show Changed* checkbox updates the grid to show only the criteria that have changed due to the actions.

## Deterioration Results

The *Deterioration Results* grouping contains a grid to compliment the *Deterioration Charts* grouping by providing the deterioration values for every point on the deterioration chart.



Deterioration Results				
Year	Bridge Age	Original H.I.	Work H.I.	H.I. Diff.
2013	7	19.05	19.05	0.00
2014	8	18.23	18.23	0.00
2015	9	17.45	17.45	0.00
2016	10	16.69	100.00	83.31
2017	11	15.97	99.97	84.00
2018	12	15.27	99.87	84.60
2019	13	14.60	99.72	85.12
2020	14	13.96	99.52	85.56
2021	15	13.34	99.27	85.93
2022	16	12.75	98.97	86.23
2023	17	12.18	98.63	86.45

Navigation: << 1 2 3 4 5 6 7 8 9 10 >> Page size: 10 100 items in 10 pages

The calculated values are shown through the following columns:

- **Original H.I** - The original health index
- **Work H.I.** - The health index after the performance of the selected actions
- **H.I. Diff.** - The difference between the work and original health index

## Reverse Calculation Page Controls

Even though the *Reverse Calculation* subtask is primarily for viewing purposes, the *Save*, *Save & Close*, and *Cancel* buttons exist because the *Cost*, *Target Year*, and *Repeat Interval* textboxes can be edited in the actions grid.

Clicking the *Save* button saves the changes made to the above-mentioned fields.

Clicking the *Save & Close* button saves the changes made to the above-mentioned fields and takes the user to the *Projects > Project List* task.

Clicking the *Cancel* button cancels the changes made to the above-mentioned fields and takes the user to the *Projects > Project List* task.

# Needs List

The *Analysis > Work Candidates > Needs List* subtask is used to view and filter the work candidates in the database.

Work Candidate Name	Bridge ID	Facility Carried	Action Name	Est. Cost	Year	Delete
5628-94315	11798F	BERRY CREEK ROAD	216 Scour Repair	2000	2012	Delete
A-DOT001-16217044-00000000	53C009	CLOW CORNER ROAD	215 Replace	2000	2014	Delete
1572-92638	01327A	TIMBER ROAD	12 Patch Concrete	1000	2011	Delete
55C003D-E8F-092814-FCE6194856	55C002	HAY CANYON ROAD	Bridge Other	500	2014	Delete
9469-72283	02163A	103ND AVE	205 Crack Injection	1500	2007	Delete
165-87771	04681	OR 22 (HWY 32)	216 Other	100	2004	Delete
A-DOT001-0CD12568-0000003D	14135	MC FARLAND RD	216 Strengthen	4000	2012	Delete
589-82992	06516A	OR 42 (HWY 035) WB	204 Patch Concrete	2004	2004	Delete
2037-79622	87026A	I-84 (HWY 002) CON	990 Other	1500	2006	Delete
A-DOT001-0E8SD210-000011ED	59C421	SAMS ROAD	120 Strengthen	3000	2007	Delete
1887-85725	01850A	US 20 (HWY 007)	241 Other	500	2004	Delete
A-DOT001-0A7B45AE-00000004	29C178	COUNTY RD 820	306 Reseal Joint	2000	2007	Delete
594-84129	06524	US 26 (HWY 47)	205 Scour Repair	150	2004	Delete
A-DOT001-0C7664ED-000000E5	69C48	FIVEMILE ROAD	215 Other	-1	2006	Delete
4626-79999	08638	HWY 69 (WB)	12 Other	2004	2004	Delete
A-DOT001-0DACCBCF-00000005	02592	TOLL BR	304 Repair Armored Corner	-1	2007	Delete
4450-98548	08366	HWY 222	234 Other	1200	2004	Delete
2963-72817	02165	US 26 (HWY 47)	990 Other	2500	2004	Delete
A-DOT001-0A2EE882-00000006	13482	OR 212 (HWY 174)	308 Reseal Joint	2500	2007	Delete
A-DOT001-1098E5E9-00000000	12205B	OR 34 (HWY 210)	38 Seal Concrete	25000	2008	Delete
A-DOT001-0E46F01-0000007C	12723A	TENNESSEE RD	104 Other	1500	2007	Delete

## Filter and Layout

The *Filter* and *Layout* dropdowns determine which work candidates will be displayed and the information that will be included. Filters can be created using the "Needs List" context on the *Manage Filters* task. Layouts can be created using the "Needs List" context on the *Manage Layouts* task. Filters can also be created using the *Work Candidates Quick Filter* below the dropdowns.

When the desired selections have been made, click the *Apply* button to update the grid.

## Work Candidates Quick Filter

The *Work Candidates Quick Filter* allows the user to create custom filters for the grid by entering specific information.

Work Candidates Quick Filter

Filter Results Save As: Save Share

Work Candidate Characteristics Bridge Characteristics

Review Status: Action Defs: Cost at least (\$K):

District (002): Admin. Area: County (003): Owner (022): Maint. Resp. (021): On/Off State System: NHS Status (104): Bridge Group: Functional Class (026):

The *Filter Results* button allows the user to view the filtered results before saving to ensure the desired selections have been made. Once satisfied, enter a name into the *Save As* textbox and click the *Save* button to save the filter. If the filter should be made available for other users, check the *Share* checkbox before saving.

## Work Candidates Information Grid

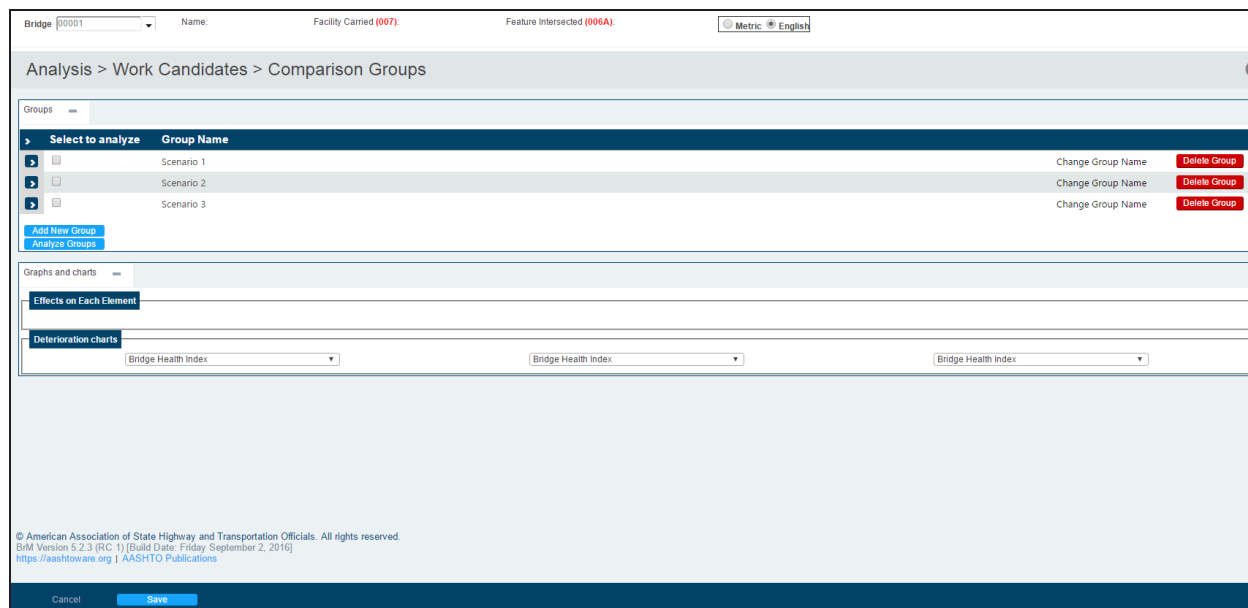
The Work Candidates Information grid will display the applied filter and layout. Depending on the filter, the grid will contain all of the work candidates in the database.

The *Delete* button for each work candidate listed allows the user to delete the work candidate from the database.

# Comparison Groups

Work candidate comparison groups are a collection of work candidates designed to be a work plan for a bridge. The *Analysis > Work Candidates > Comparison Groups* subtask allows the user to compare the performance of these work candidate groups to determine the best course of action for a particular bridge.

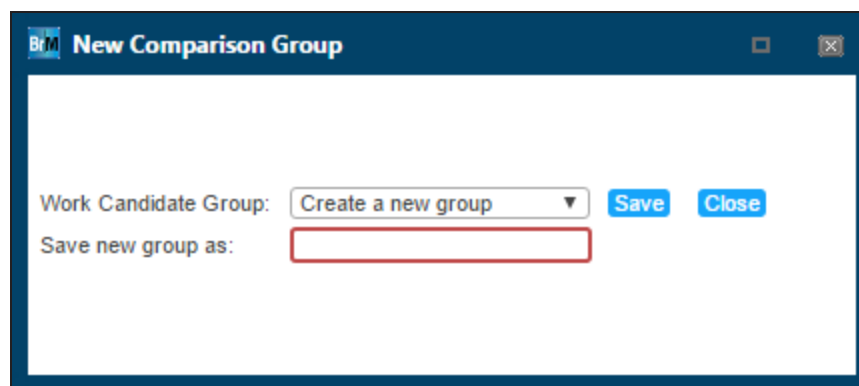
**\*Note:** Comparison groups only exist in memory, not in the database. The comparison groups will be lost when the user logs out of BrM.



## Groups


The *Groups* grouping displays all of the work candidate comparison groups created either on the *Analysis > Work Candidates > Bridge Analysis* subtask or directly from the *Comparison Groups* subtask.

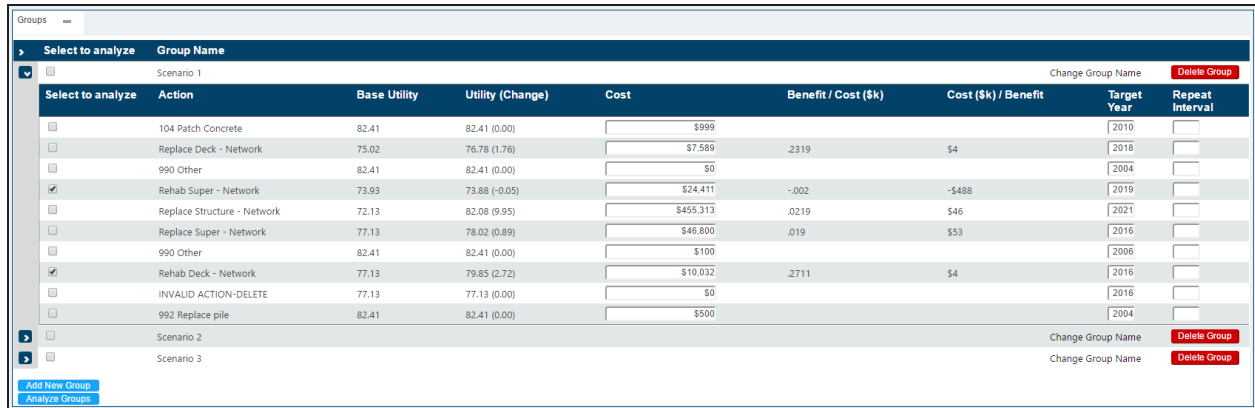
Additional groups can be created using the *Add New Group* button:



To add the selected work candidates to an existing comparison group, select the comparison group from the *Work Candidate Group* dropdown, then click the *Save* button.

To create a new comparison group, leave "Create a new group" selected and use the *Save New Group As* textbox to name the new comparison group, then click the *Save* button.

To edit an existing comparison group, click the  icon to expand the comparison group to display all of the available work candidates for the selected bridge:



Select to analyze	Action	Base Utility	Utility (Change)	Cost	Benefit / Cost (\$k)	Cost (\$k) / Benefit	Target Year	Repeat Interval
<input type="checkbox"/>	104 Patch Concrete	82.41	82.41 (0.00)	\$999			2010	<input type="checkbox"/>
<input type="checkbox"/>	Replace Deck - Network	75.02	76.78 (1.76)	\$7,589	.2319	\$4	2018	<input type="checkbox"/>
<input type="checkbox"/>	990 Other	82.41	82.41 (0.00)	\$0			2004	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Rehab Super - Network	73.93	73.88 (-0.05)	\$24,411	-.002	-\$488	2019	<input type="checkbox"/>
<input type="checkbox"/>	Replace Structure - Network	72.13	82.08 (9.95)	\$455,313	.0219	\$46	2021	<input type="checkbox"/>
<input type="checkbox"/>	Replace Super - Network	77.13	78.02 (0.89)	\$46,800	.019	\$53	2016	<input type="checkbox"/>
<input type="checkbox"/>	990 Other	82.41	82.41 (0.00)	\$100			2006	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Rehab Deck - Network	77.13	79.85 (2.72)	\$10,032	.2711	\$4	2016	<input type="checkbox"/>
<input type="checkbox"/>	INVALID ACTION-DELETE	77.13	77.13 (0.00)	\$0			2016	<input type="checkbox"/>
<input type="checkbox"/>	992 Replace pile	82.41	82.41 (0.00)	\$500			2004	<input type="checkbox"/>

Use the work candidates' checkboxes to select/unselect work candidates for the expanded comparison group. The *Cost*, *Target Year*, and *Repeat Interval* textboxes can be edited if desired.

Once ready to analyze, check the boxes of the comparison groups to analyze and click the Analyze Groups button.

**\*Note:** Only three groups can be analyzed at a time.

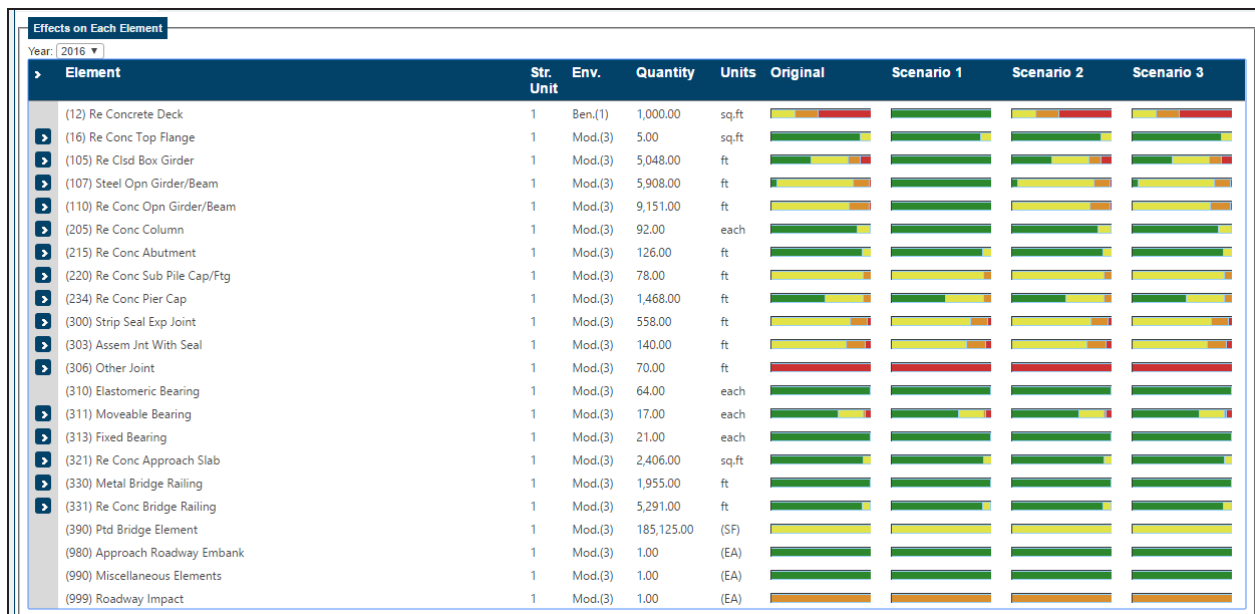
## Graphs and Charts

The *Graphs and Charts* grouping contains various tools to compare the selected comparison groups.

### Effects on Each Element

The *Effects on Each Element* grouping contains a grid that displays the effects of the comparison groups on individual elements. The grid uses a color-coded system to display the elements' current conditions and then the effect of the work.

- **Green** - Condition State 1
- **Yellow** - Condition State 2
- **Orange** - Condition State 3
- **Red** - Condition State 4



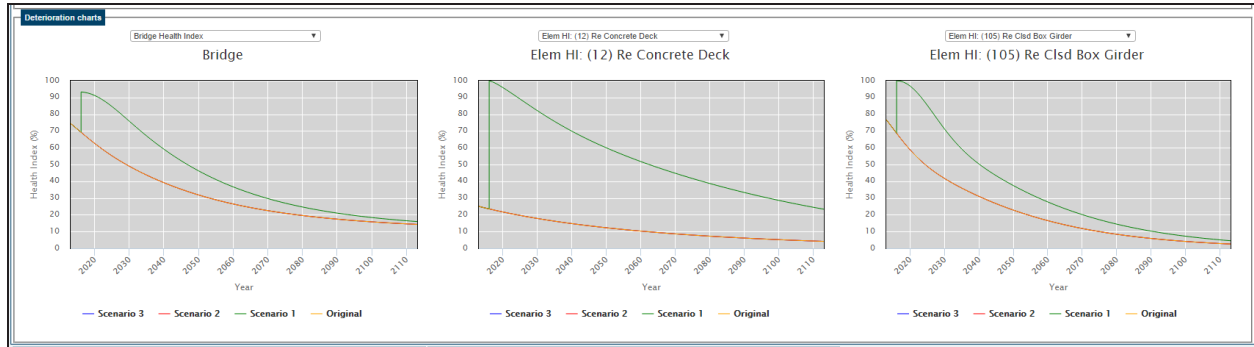
Element	Str. Unit	Env.	Quantity	Units	Original	Scenario 1	Scenario 2	Scenario 3
(12) Re Concrete Deck	1	Ben.(1)	1,000.00	sq.ft				
(16) Re Conc Top Flange	1	Mod.(3)	5.00	sq.ft				
(105) Re Clsd Box Girder	1	Mod.(3)	5,048.00	ft				
(107) Steel Opn Girder/Beam	1	Mod.(3)	5,908.00	ft				
(110) Re Conc Opn Girder/Beam	1	Mod.(3)	9,151.00	ft				
(205) Re Conc Column	1	Mod.(3)	92.00	each				
(215) Re Conc Abutment	1	Mod.(3)	126.00	ft				
(220) Re Conc Sub Pile Cap/Ftg	1	Mod.(3)	78.00	ft				
(234) Re Conc Pier Cap	1	Mod.(3)	1,468.00	ft				
(300) Strip Seal Exp Joint	1	Mod.(3)	558.00	ft				
(303) Assem Jnt With Seal	1	Mod.(3)	140.00	ft				
(306) Other Joint	1	Mod.(3)	70.00	ft				
(310) Elastomeric Bearing	1	Mod.(3)	64.00	each				
(311) Moveable Bearing	1	Mod.(3)	17.00	each				
(313) Fixed Bearing	1	Mod.(3)	21.00	each				
(321) Re Conc Approach Slab	1	Mod.(3)	2,406.00	sq.ft				
(330) Metal Bridge Railing	1	Mod.(3)	1,955.00	ft				
(331) Re Conc Bridge Railing	1	Mod.(3)	5,291.00	ft				
(390) Ptd Bridge Element	1	Mod.(3)	185,125.00	(SF)				
(980) Approach Roadway Embank	1	Mod.(3)	1.00	(EA)				
(990) Miscellaneous Elements	1	Mod.(3)	1.00	(EA)				
(999) Roadway Impact	1	Mod.(3)	1.00	(EA)				

The **Year** dropdown is used to select the specific year of the bridge to compare results. The target year of the work candidates assigned to the comparison groups will determine a bridge's element effects for a given year.

Elements with a ">" next to them can be expanded to reveal the protective systems and defects associated with them.

### Deterioration Charts

The *Deterioration Charts* grouping contains various graphs that display the original deterioration modeling and the effects of the selected comparison groups.



The dropdown above each graph allows the user to select which graph to display. Each of the three graphs can display information independently of the others.

### Effects on Each Utility Criterion

The *Effects on Each Utility Criterion* grouping contains a grid that displays the effect the selected comparison groups have on the bridge's utility criteria. The hierarchy displayed under Total Utility is determined by the criteria entered in the *Admin > Modeling Config > Utility* task.

Effects on Each Utility Criterion				
2016				
Category name	Original	Scenario 1	Scenario 2	Scenario 3
<b>Total Utility</b>	<b>56.68</b>	<b>73.54</b>	<b>56.68</b>	<b>56.68</b>
Condition	42.79	79.22	42.79	42.79
Element ratings	42.29	77.24	42.29	42.29
Bearings Elements	62.21	62.21	62.21	62.21
Deck/Slabs Elements	15.26	99.86	15.26	15.26
Joints Elements	34.34	34.34	34.34	34.34
Substructure Elements	62.36	67.29	62.36	62.36
Superstructure Elements	42.06	99.31	42.06	42.06
NBI ratings	47.33	97	47.33	47.33
Deck	19	100	19	19
Substructure	81	91	81	81
Superstructure	42	100	42	42
LifeCycle	80.69	88.32	80.69	80.69
Mobility	59.9	59.9	59.9	59.9
Approach Roadway Alignment (NBI 72)	75	75	75	75
Deck Geometry (NBI 68)	25	25	25	25

The **Year** dropdown is used to select the specific year of the bridge to compare results. The target year of the work candidates assigned to the comparison groups will determine the effects on each utility criterion.

## Deterioration Results

The *Deterioration Results* grouping contains a grid to compliment the health index graph in the *Deterioration Charts* grouping by providing the deterioration values for every point on the deterioration chart.

Year	Bridge Age	Original	Scenario 1	Scenario 2	Scenario 3
2013	29	74.44	74.44	74.44	74.44
2014	30	72.72	72.72	72.72	72.72
2015	31	70.98	70.98	70.98	70.98
2016	32	69.23	93.31	69.23	69.23
2017	33	67.49	93.07	67.49	67.49
2018	34	65.78	92.62	65.78	65.78
2019	35	64.10	91.97	64.10	64.10
2020	36	62.47	91.12	62.47	62.47
2021	37	60.89	90.08	60.89	60.89
2022	38	59.35	88.88	59.35	59.35
2023	39	57.87	87.53	57.87	57.87

Navigation controls: Page 1 of 10, Page size: 10, 100 items in 10 pages.

## Comparison Group Page Controls

Clicking the *Save* button saves the changes made to the comparison groups.

**\*Note:** Comparison groups are only saved during the user's current session. The comparison groups will be lost when the user logs out of BrM.

Clicking the *Cancel* button cancels the changes made to the comparison groups.

# Utility Value

The *Analysis > Utility Value* task allows the user to view the selected bridge's utility value and provides a breakdown of the criteria from the *Admin > Modeling Config > Utility* task.

Bridge: 021020110000010    Name:    Facility Carried (007): US-41    Feature Intersected (006A): WBR WHITEFISH RIVE

Analysis > Utility Value

**Utility Value: 37.12**

Risk Value ==    Base Risk Value: 95.43 Scaled Value: 95.43 x Weight: 15 = Adjusted Risk Value: 1431.45

Risk Item	Base Value	Scaled Value	Weight	Adjusted Value
Channel and Channel Protection (NBI 61)	7.00	81	10.00	810.00
Fracture Critical (NBI 92a)			20.00	
Posting (NBI 70)	5.00	100	20.00	2,000.00
Scour Critical (NBI 113)	8.00	100	30.00	3,000.00
Scour Risk Assessment			50.00	
Underclearances (NBI 69)			20.00	
Waterway Adequacy (NBI 71)	8.00	87	10.00	870.00

Condition Value ==    Base Condition Value: 7.79 Scaled Value: 7.79 x Weight: 40 = Adjusted Condition Value: 311.60

Condition Item	Base Value	Scaled Value	Weight	Adjusted Value
Element ratings	0.54	0.54	90.00	48.60
NBI ratings	73.00	73	10.00	730.00

LifeCycle Value ==    Base LifeCycle Value: N/A Scaled Value: N/A x Weight: 30 = Adjusted LifeCycle Value: N/A

LifeCycle Item	Base Value	Scaled Value	Weight	Adjusted Value
No records to display.				

Mobility Value ==    Base Mobility Value: 57.03 Scaled Value: 57.03 x Weight: 15 = Adjusted Mobility Value: 855.45

Mobility Item	Base Value	Scaled Value	Weight	Adjusted Value
Approach Roadway Alignment (NBI 72)	8.00	75	15.00	1,125.00
Deck Geometry (NBI 68)	5.00	37.5	25.00	937.50
Detour Length (NBI 19)	39.15	0	15.00	0.00
Posting (NBI 70)	5.00	100	25.00	2,500.00
Underclearances (NBI 69)			20.00	

The *Analysis > LCCA* task allows the user to run a life-cycle cost analysis (LCCA) on the selected bridge. The user can develop work plans and compare the life-cycle cost differences between the various plans.

The screenshot shows the 'Analysis > LCCA' interface. It includes sections for 'Description', 'Conditions', 'Current Scaled Performance', 'Sufficiency', 'LCCA Configuration', 'NBI Modeling', and 'Cost Indexing'. A 'Run Analysis' button is present. Below these sections is a table titled 'Short-Term Work Items Existing For Selected Bridge' with columns for 'Sel.', 'Short-Term Work Item', 'Action', 'Base Utility', 'Utility (Change)', 'Condition (Change)', 'LifeCycle (Change)', 'Mobility (Change)', 'Risk (Change)', 'Cost', 'Benefit / Cost (\$)', 'Cost (\$) / Benefit', and 'Target Year'.

Sel.	Short-Term Work Item	Action	Base Utility	Utility (Change)	Condition (Change)	LifeCycle (Change)	Mobility (Change)	Risk (Change)	Cost	Benefit / Cost (\$)	Cost (\$) / Benefit	Target Year
	Last inspection		79.3	79.30 (0.00)	69.66 (0.00)	95.23 (0.00)	57.03 (0.00)	95.43 (0.00)		\$0		2015
<input type="checkbox"/>	System Generated	Protect - Full Paint MDOT	78.96	78.96 (0.00)	68.81 (0.00)	95.23 (0.00)	57.03 (0.00)	95.43 (0.00)		\$0		2016
<input type="checkbox"/>	System Generated	PM - Full Pnt and Rehab MDOT	78.96	79.05 (0.09)	69.03 (0.22)	95.24 (0.01)	57.03 (0.00)	95.43 (0.00)		\$0		2016
<input type="checkbox"/>	System Generated	Rehab - Approach Slab MDOT	78.96	78.96 (0.00)	68.81 (0.00)	95.23 (0.00)	57.03 (0.00)	95.43 (0.00)	\$148			2016

Detailed information for the selected bridge is displayed in the *Description*, *Conditions*, *Current Scaled Performance*, and *Sufficiency* groupings and Recent Completed Work grid in the top half of the task.

## Setting up the LCCA

### LCCA Configuration

The *LCCA Configuration* grouping specifies the parameters for the LCCA.

The screenshot shows the 'LCCA Configuration' section with the following fields: Discount Rate (%) set to 4, Analysis Start Year set to 2016, Short-Term Analysis Length (Years) set to 5, and Long-Term Analysis Length (Years) set to 50. There is also a checkbox for 'Estimate User Life-Cycle Cost'.

The *Discount Rate* textbox indicates the cost discount percentage for the LCCA. The discount rate suggests that the further in the future an action/event occurs, the less it will cost. The default value is 4 percent.

The *Short-Term Analysis Length* and *Long-Term Analysis Length* textboxes determine the short and long term lengths of time in which the LCCA will be run. By default, the values are 5 years and 50 years.

The *Estimate User Life-Cycle Cost* checkbox allows the user to estimate the user cost of the LCCA. Selecting this option takes the place of the user cost calculation that was selected on the *Admin > Modeling Config > Preservation and Replacement Policy* task.

### NBI Modeling

The *NBI Modeling* grouping determines the modeling of the NBI component deterioration.

The screenshot shows the 'NBI Modeling' section with two dropdown menus: 'NBI Deterioration Method' set to 'NBI Converter' and 'NBI Converter Profile' set to 'BrM Default'.

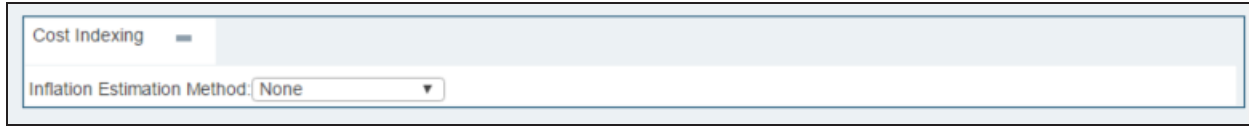


The NBI Deterioration Method dropdown allows the user to model the NBI component deterioration in two different ways:

- **NBI Converter** - This option allows the user to select an NBI converter profile (created on the *Admin > Modeling Config > NBI Conversion Profiles* task) to forecast the element ratings.
- **Component-Level Deterioration** - This option uses the component-level deterioration models established on the *Admin > Modeling Config > NBI Deterioration Models* task.

## Cost Indexing

The *Cost Indexing* grouping allows the user to determine how future inflation rates will be modeled.



The screenshot shows a software interface for 'Cost Indexing'. It features a header bar with the text 'Cost Indexing' and a minus sign. Below the header is a dropdown menu labeled 'Inflation Estimation Method:' with the value 'None' selected.

The *Inflation Estimation Method* dropdown has three options to choose:

- **None** - Future inflation rates will be ignored so that future costs are not inflated.
- **Cost Indexing** - Future costs will be inflated based on the specifications set on the *Admin > Modeling Config > Cost Index* task.
- **Fixed Inflation Rate** - Future costs will be inflated based on a fixed inflation rate. When selected, the *Inflation Rate* textbox will appear to allow the user to enter the fixed inflation rate percentage.

## Short-Term Work Items

Long-term work items will be determined by the LCCA automatically using the preservation and replacement policies assigned to the bridge through the *LCCA* tasks in the *Admin* tab. Short-term work items, on the other hand, can be added by the user by selecting them from the grid.

The *Display System Recommendations* checkbox will show all work recommendations that will positively affect the bridge regardless of whether a work candidate exists for the action.

The *Display Work Candidates* checkbox will show the work candidates that have been created for the selected bridge.

The *Display Zero Cost Recommendations* checkbox will recommend possible actions based on the bridge's elements.

The *Display Zero Cost Work Candidates* checkbox will show the work candidates created for the selected bridge that do not have a cost associated.

**\*Note:** If multiple checkboxes are selected, their effects will be combined.

The *Profile* dropdown and *Add Profile* button are used if the user wants to compare LCCA results with different work candidates selected.

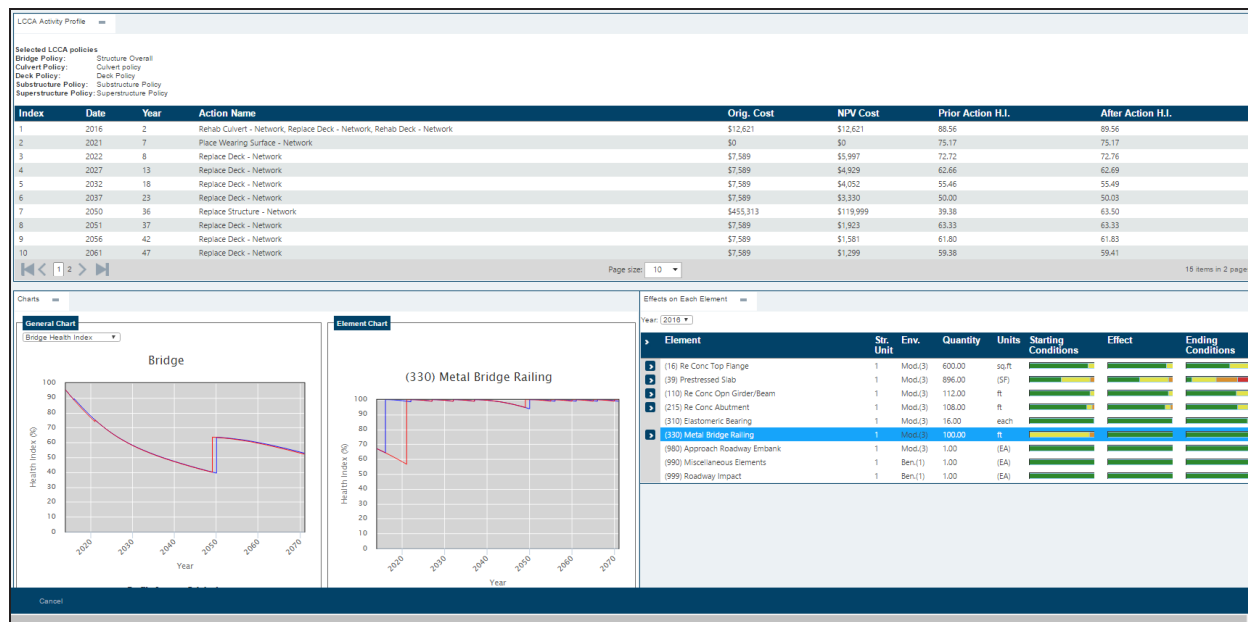
**\*Note:** The *Cost* field within the grid cannot be edited for system generated work items.

If desired, the user can create a new project with the bridge's selected work candidates by clicking the *Add to New Project* button.

**\*Note:** While short-term work items typically span 0-20 years in planning, there is no restriction on how far out the short-term work items can be planned.

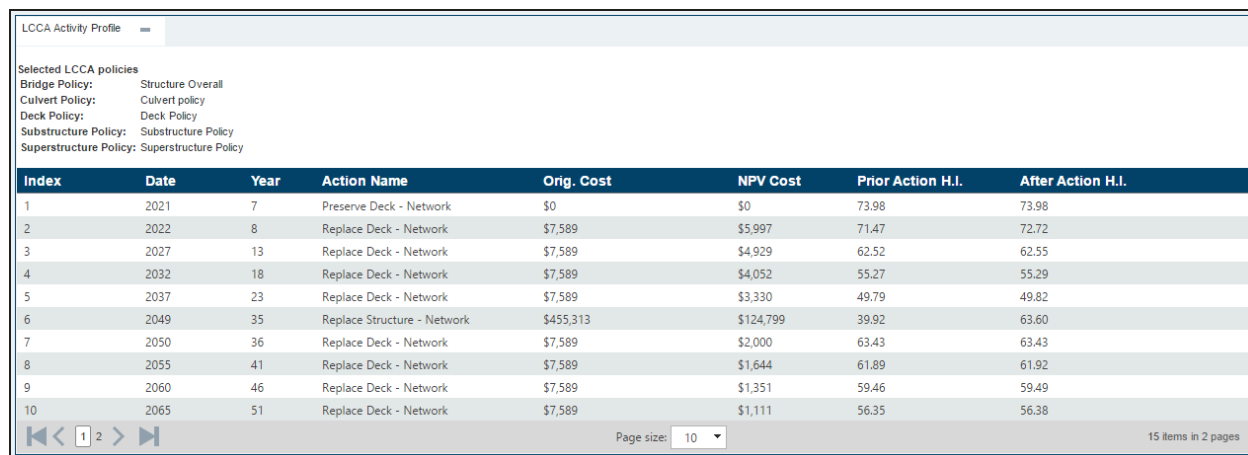
## Running the LCCA

Once the desired selection have been made to set up the LCCA, click the *Run Analysis* button to run the analysis and view the results.



## LCCA Activity Profile

The *LCCA Activity Profile* grouping lists all of the actions (both user-selected and automatically generated) applied to the bridge throughout the analysis period and is sorted by the order the actions occur. For each action, the grid displays important information such as the original estimated cost of the action, the net present value (NPV) cost of the action, and the bridge's health index before and after the action.

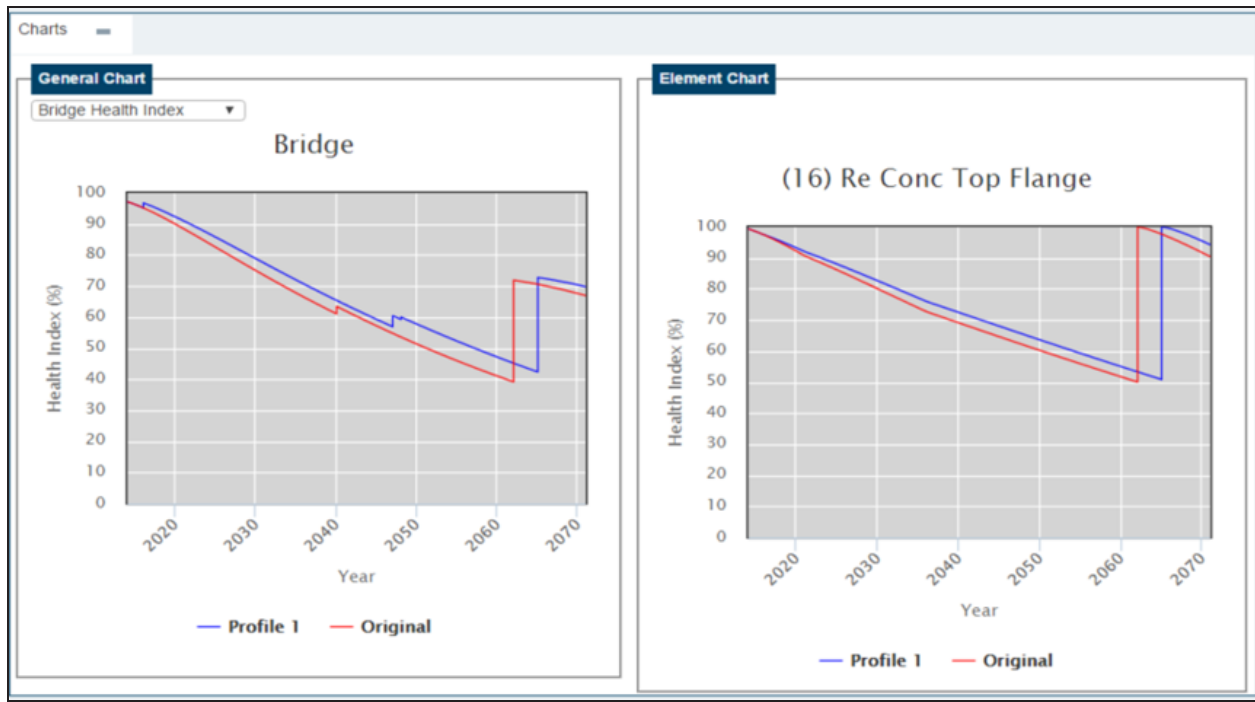


The rows after the action listings contain summaries of the LCCA:

- **Remaining Life** - The number of years remaining from the end of the analysis to the next replacement of the bridge.
- **Residual Value** - The economic value of the bridge's remaining service life.
- **Agency Life-Cycle Cost** - The sum of the NPVs of the actions applied in the analysis minus the residual net value.
- **User Life-Cycle Cost** - The sum of all user net costs throughout the analysis.
- **Life-Cycle Cost** - The final result of the analysis: the sum of the agency and user life-cycle costs.

## Charts

The *Charts* grouping contains bridge and element graphs that provide a visual display of various information related to the analysis. Only two graphs can be displayed at a time, but the dropdown in the top left corner of the grouping contains more graph selections.



Each graph will have two curves:

- **Red** - The original deterioration
- **Blue** - The deterioration with the work candidates being performed at the designated intervals

### Effects on Each Element

The *Effects on Each Element* grouping contains a grid that displays the starting and ending conditions of the elements in the LCCA process. The grid uses a color-coded system to display the elements' conditions:

- **Green** - Condition State 1
- **Yellow** - Condition State 2
- **Orange** - Condition State 3
- **Red** - Condition State 4

Effects on Each Element							
Year: 2016							
Element	Str. Unit	Env.	Quantity	Units	Starting Conditions	Effect	Ending Conditions
(16) Re Conc Top Flange	1	Mod.(3)	600.00	sq.ft			
(39) Prestressed Slab	1	Mod.(3)	896.00	(SF)			
(110) Re Conc Opn Girder/Beam	1	Mod.(3)	112.00	ft			
(215) Re Conc Abutment	1	Mod.(3)	108.00	ft			
(310) Elastomeric Bearing	1	Mod.(3)	16.00	each			
(330) Metal Bridge Railing	1	Mod.(3)	100.00	ft			
(980) Approach Roadway Embank	1	Mod.(3)	1.00	(EA)			
(990) Miscellaneous Elements	1	Ben.(1)	1.00	(EA)			
(999) Roadway Impact	1	Ben.(1)	1.00	(EA)			

The *Year* dropdown is used to select the specific year of the bridge to view results. The target year of the work candidates assigned to the bridge will determine a bridge's element effects for a given year.

Elements with a ">" next to them can be expanded to reveal the protective systems and defects associated with them. Selecting an element or protective system will display the expected deterioration of the element in the Element graph in the *Charts* grouping. Defects are not currently incorporated into deterioration calculations.

### Effects on Each Utility Criterion

The *Effects on Each Utility Criterion* grouping contains a grid that displays the starting and ending conditions of the bridge's utility criteria in the LCCA process.

The hierarchy displayed under Total Utility is determined by the criteria entered in the *Admin > Utility* task.

Effects on Each Utility Criterion				
Year: 2016				
Category name	Starting Utility	Effect	Ending Utility	Total Utility Change
<b>Total Utility</b>	<b>83.51</b>	<b>86.27</b>	<b>80.44</b>	<b>2.76</b>
Condition	79.21	86.12	71.55	2.76
Element ratings	78.27	85.58	69.76	2.63
Bearings Elements	98.64	98.64	87.35	
Deck/Slabs Elements	80.73	80.73	60.33	
Substructure Elements	74.24	79.11	68.48	0.49
Superstructure Elements	67.61	89.08	69.93	2.15
NBI ratings	87.67	91	87.67	0.13
Deck	91	91	81	
Substructure	91	91	91	
Superstructure	81	91	91	0.13
LifeCycle	88.89	88.89	88.89	
Mobility	87.5	87.5	87.5	
Approach Roadway Alignment (NBI 72)	75	75	75	
Deck Geometry (NBI 68)	75	75	75	

The *Year* dropdown is used to select the specific year of the bridge to view results. The target year of the work candidates assigned to the bridge will determine a bridge's utility for a given year.

### Deterioration Results

The *Deterioration Results* grouping contains a grid to compliment the health index graph in the *Charts* grouping by providing the deterioration values for every point on the graph.

Deterioration Results				
Year	Bridge Age	Original H.I.	Work H.I.	H.I. Diff.
2014	40	97.13	97.13	0.00
2015	41	96.23	96.23	0.00
2016	42	95.15	96.76	1.61
2017	43	93.95	95.74	1.79
2018	44	92.66	94.64	1.98
2019	45	91.30	93.47	2.17
2020	46	89.89	92.25	2.37
2021	47	88.43	90.99	2.56
2022	48	86.96	89.71	2.75
2023	49	85.47	88.39	2.92
2024	50	83.96	87.05	3.09

Navigation: 1 2 3 4 5 6 >> Page size: 10 57 items in 6 pages

# Projects

- The Projects section of the manual addresses each of the tasks in BrM's *Projects* tab. The *Projects* tab allows for the creation and management of agency projects.

# Project List

The *Projects > Project List* task is a complete list of all of the projects in the system that can be filtered and customized in various ways and allows for the selection of projects prior to performing other actions in the system.

Projects > Project List

Alt ID	Name	Start Date	Add Cost	Create Date	Status	First Name	Project Category
021020310008030	Replace Bridge	1/1/2016	0	7/20/2016	Proposed	Pontis	No Category
21121022000010	Replace Bridge	1/1/2021	0	7/26/2016	Proposed	Pontis	No Category
21121022000010	Replace Bridge	1/1/2021	0	7/26/2016	Proposed	Pontis	No Category
21121022000010	Replace Bridge	1/1/2021	0	7/26/2016	Proposed	Pontis	No Category
21121022000020	Rehab Sub	1/1/2023	0	7/26/2016	Proposed	Pontis	No Category
21121022000020	Rehab Sub	1/1/2022	0	7/26/2016	Proposed	Pontis	No Category
21121022000020	Rehab Super	1/1/2022	0	7/26/2016	Proposed	Pontis	No Category
21121022000020	Rehab Super	1/1/2026	0	7/26/2016	Proposed	Pontis	No Category
21121022000020	Rehab Super	1/1/2022	0	7/26/2016	Proposed	Pontis	No Category
21121022000020	Rehab Super, Rehab Sub	1/1/2021	0	7/26/2016	Proposed	Pontis	No Category
21121022000020	Rehab Super, Rehab Sub	1/1/2021	0	7/26/2016	Proposed	Pontis	No Category
21121022000020	Rehab Super, Rehab Sub	1/1/2021	0	7/26/2016	Proposed	Pontis	No Category
331330210008010	Replace Bridge	1/1/2016	0	7/20/2016	Proposed	Pontis	No Category
33133041000010	Rehab Sub	1/1/2021	0	7/26/2016	Proposed	Pontis	No Category
33133041000010	Rehab Sub	1/1/2021	0	7/26/2016	Proposed	Pontis	No Category
33133041000010	Rehab Sub	1/1/2021	0	7/26/2016	Proposed	Pontis	No Category
33133041000010	Rehab Super	1/1/2027	0	7/26/2016	Proposed	Pontis	No Category
33133041000010	Rehab Super	1/1/2023	0	7/26/2016	Proposed	Pontis	No Category
33133041000010	Rehab Super	1/1/2023	0	7/26/2016	Proposed	Pontis	No Category
33133041000010	Rehab Super, Rehab Sub	1/1/2022	0	7/26/2016	Proposed	Pontis	No Category
33133041000010	Rehab Super, Rehab Sub	1/1/2022	0	7/26/2016	Proposed	Pontis	No Category
33133041000010	Rehab Super, Rehab Sub	1/1/2022	0	7/26/2016	Proposed	Pontis	No Category
33133041000010	Rehab Super, Rehab Sub	1/1/2022	0	7/26/2016	Proposed	Pontis	No Category

Total Projects: 44  
Page size: 36  
Matching Filter: 44  
44 items in 2 pages

## Selecting a Project

The *Project List* task's main function is project selection. There are two different ways to select a single project:

1. **Checkbox Select** - Clicking the checkbox of the desired project will select it.
2. **Highlight Select** - When hovering the mouse's cursor over a project in the Project List, the project's row will be highlighted blue. Clicking anywhere on that row will darken and solidify that highlight and select the project. The highlight select differentiates itself from the checkbox select because it reveals additional project details for the highlight selected project including bridge information, a map view of the bridge, and work information.

Projects > Project List

Alt ID	Name	Start Date	Add Cost	Create Date	Status	First Name	Project Category
01004	Preserve Deck	1/1/2016	0	6/15/2016	Proposed	Pontis	No Category
01005	Preserve Deck	1/1/2026	0	6/20/2016	Proposed	Thomas	No Category
01005	Preserve Deck, Preserve Super	1/1/2025	0	6/20/2016	Proposed	Thomas	No Category
01005	Rehab Deck, Preserve Super, Rehab Sub	1/1/2028	0	6/21/2016	Proposed	Thomas	No Category
01000	Rehab Deck, Rehab Sub	1/1/2028	0	6/20/2016	Proposed	Thomas	No Category
01006	Preserve Deck	1/1/2034	0	6/20/2016	Proposed	Thomas	No Category
01006	Preserve Deck, Preserve Super	1/1/2033	0	6/20/2016	Proposed	Thomas	No Category
01007	Preserve Deck	1/1/2016	0	6/14/2016	Proposed	Pontis	No Category
02003	Preserve Deck	1/1/2016	0	6/14/2016	Proposed	Pontis	No Category
02003	Preserve Deck, Preserve Super	1/1/2019	0	6/14/2016	Proposed	Pontis	No Category
02004	Preserve Deck	1/1/2016	0	6/14/2016	Proposed	Pontis	No Category
02004	Preserve Deck, Preserve Super	1/1/2019	0	6/14/2016	Proposed	Pontis	No Category
02010	Preserve Deck	1/1/2017	0	6/14/2016	Proposed	Pontis	No Category
02010	Rehab Deck, Rehab Sub	1/1/2029	0	6/20/2016	Proposed	Thomas	No Category
02015	Rehab Deck	1/1/2030	0	6/20/2016	Proposed	Thomas	No Category
02015	Rehab Deck, Preserve Super	1/1/2025	0	6/20/2016	Proposed	Thomas	No Category
02022	Preserve Deck, Preserve Super	1/1/2026	0	6/20/2016	Proposed	Thomas	No Category
02022	Replace Deck	1/1/2036	0	6/20/2016	Proposed	Thomas	No Category

Total Projects: 4435  
Page size: 10  
Matching Filter: 4435  
4435 items in 247 pages


Bridge ID	District	County	Facility Carried	Feature Intersected	Deck	Superstructure	Substructure	Culvert	Health Index
01005	03	1	TH 210	RIPPLE RIVER	7 Good	7 Good	7 Good	N/A (NBI)	94.36

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## Filters

Due to the vast size of some users' systems, filters are necessary to sort and locate projects based on specified criteria.

There are two main ways to filter projects:

1. **Filter Dropdown** - The **Filter** dropdown lists all of the relevant filters that have been created/edited on the *Projects > Manage Filters* task (this can also be done on the *Bridges > Manage Filters* task). When a filter is selected from the dropdown, the Project List will automatically update with the filtered projects.
2. **Quick Filters** - Each column in the Project List has a quick filter textbox that enables the user to filter the grid based on a condition, such as "Contains" or "StartsWith." The user types into the **Quick Filter** textbox and then clicks the  symbol to select a condition. Once the condition is selected, the grid will automatically be updated with the filtered projects.

**\*Note:** By default, filling in the **Quick Filter** textbox and then pressing Enter on the keyboard will automatically make use of the "Contains" quick filter condition.

The following table explains the various selectable quick filter conditions:

Quick Filter Conditions	
Condition	Description
NoFilter	No filter is applied - filter controls are cleared.
Contains	Returns results that contain the entered value. Same as: dataField LIKE '%value%'
DoesNotContain	Returns results that do not contain the entered value. Same as dataField NOT LIKE '%value%'
StartsWith	Returns results that start with the entered value. Same as: dataField LIKE 'value%'
EndsWith	Returns results that end with the entered value. Same as: dataField LIKE '%value'
EqualTo	Returns results that exactly match the entered value. Same as: dataField = value
NotEqualTo	Returns results that do not exactly match the entered value. Same as: dataField != value
GreaterThan	Returns results with a value greater than the entered value. Same as: dataField > value
LessThan	Returns results with a value less than the entered value. Same as: dataField < value
GreaterThanOrEqualTo	Returns results with a value greater than or exactly matching the entered value. Same as: dataField >= value
LessThanOrEqualTo	Returns results with a value less than or exactly matching the entered value. Same as: dataField <= value
Between	Returns results with a value that falls between the two entered values. Same as: value1 <= dataField <= value2 <b>*Note:</b> Value1 and value2 should be separated by a space when entered into the quick filter.
NotBetween	Returns results with a value that does not fall between the two entered values. Same as: dataField <= value1 && dataField >= value2 <b>*Note:</b> Value1 and value2 should be separated by a space when entered into the quick filter.
IsEmpty	Returns results where the specific field is empty.

Quick Filter Conditions	
Condition	Description
	Same as: dataField = "
NotIsEmpty	Returns results where the specific field is not empty. Same as: dataField != "
IsNull	Returns only null values.
NotNull	Returns only non-null values.

## Layout

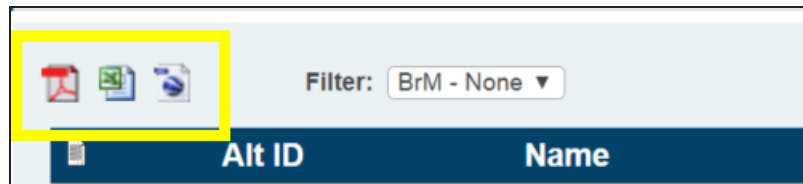
The **Layout** dropdown determines the Project List's columns. There is a default layout on the *Project List* task, but new layouts can be created on the *Projects > Manage Layouts* task (this can also be done on the *Bridges > Manage Layouts* task).

## Jump to Project

The **Jump to Project** textbox/dropdown allows the user to search for and locate a specific project. The user can type the project name into the textbox or use the dropdown to find the project by clicking through the pages. When the project is selected, it will be highlight selected.

## Export Options

There are three export options located at the top left corner of the Project List: PDF, XLS, and KML. If one or more projects are selected, only the information from the selected projects will export. If no projects are selected, all of the projects in the current filter will be exported.



## Side Menu Options

The side menu for a certain Tab > Task will typically contain subtasks, but for the *Projects > Project List* task the side menu contains various options that perform actions.

View List Options		
	Option	Description
<div style="background-color: #004a7c; color: white; padding: 5px;"> <b>PROJECTS</b> ^         </div> <div style="background-color: #004a7c; color: white; padding: 5px;"> <b>PROJECT LIST</b> </div> <div style="background-color: #004a7c; color: white; padding: 5px;">           SELECT ALL         </div> <div style="background-color: #004a7c; color: white; padding: 5px;">           UNSELECT ALL         </div> <div style="background-color: #004a7c; color: white; padding: 5px;">           SELECT PAGE         </div> <div style="background-color: #004a7c; color: white; padding: 5px;">           UNSELECT PAGE         </div> <div style="background-color: #004a7c; color: white; padding: 5px;">           TOGGLE JUST SELECTED         </div> <div style="background-color: #004a7c; color: white; padding: 5px;">           RESET GRID SETTINGS         </div>	Select All	Selects all of the projects within the current filter.
	Unselect All	Unselects all of the projects currently selected.
	Select Page	Selects all projects on the current page, regardless of how many projects are in the current filter. <b>Example:</b> If there are 25 projects in the current filter but only 10 projects per page, only the 10 projects shown on the current page will be selected.
	Unselect Page	Unselects all projects on the current page, regardless of how many projects are selected in the current filter.

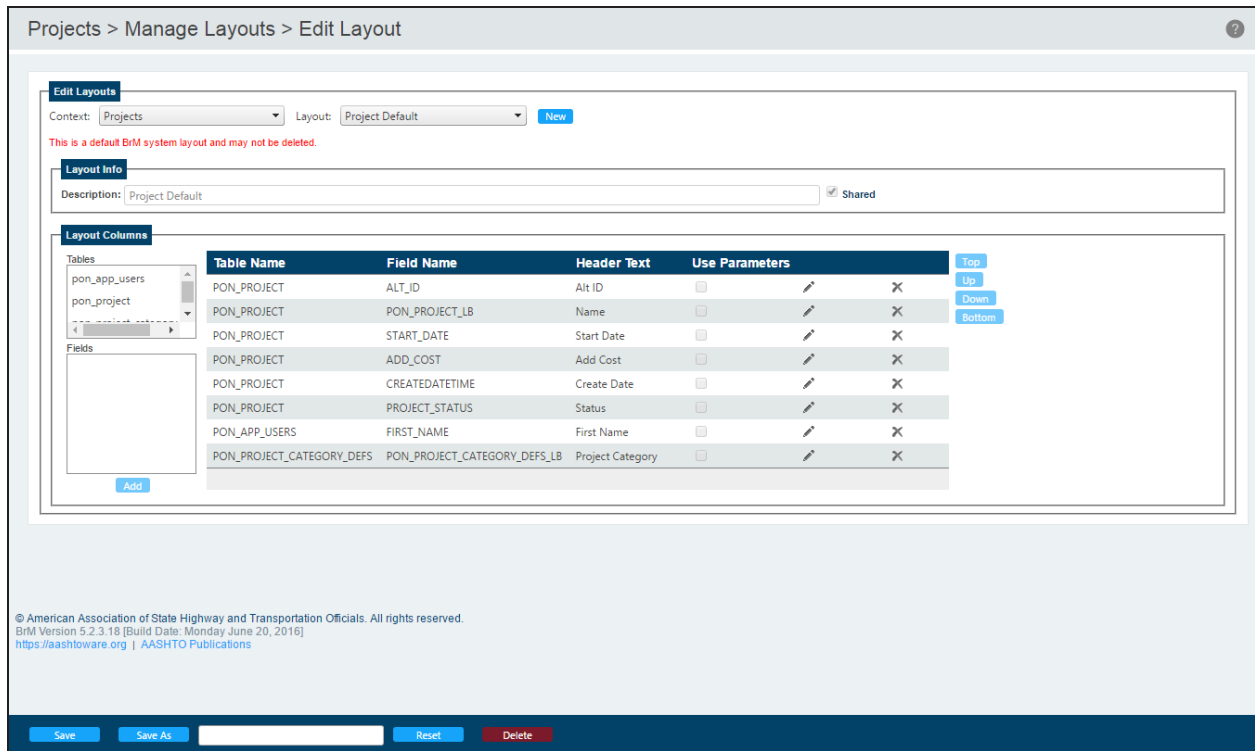


## View List Options

	Option	Description
	<b>Toggle Just Selected</b>	Toggles between showing all of the projects in the current filter to showing only the projects that have been selected. <b>Example:</b> If a user has 5 projects selected, clicking <i>Toggle Just Selected</i> will display only the 5 selected projects, regardless of the total number of projects in the filter.
	<b>Reset Grid Settings</b>	The column headings of the Project List can be arranged in any order. The user can click and hold then drag and drop the column headings into any order desired. If the user wants to revert back to the default column heading order, <i>Reset Grid Settings</i> can be selected to reset the layout.

# Manage Layouts

The *Projects > Manage Layouts* task allows the user to create and edit layouts for the Project List as well as several other grids throughout the software. The selections made for the layout will determine the column headings for a given grid. This task is also accessible from the *Bridges* tab with the same functionality.



## Context

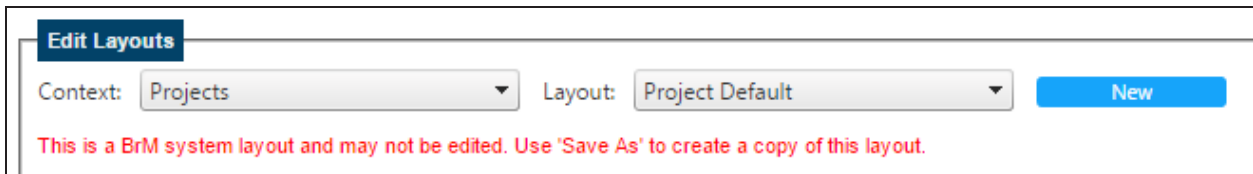
The *Context* dropdown determines the grid for which the layout is being created. When the *Manage Layouts* task is opened from the *Projects* tab, the default context will be the Project List, however there are several other context selections:

- **Bridge Group Roadways** - The grid on the *Bridges > Manage Bridge Groups > Add/Remove Roadways* subtask.
- **Bridge Groups** - The grid on the *Bridges > Manage Bridge Groups > Bridge Groups* subtask.
- **Bridge List** - The grid on the *Bridges > View List* task.
- **Funding** - The grid on the *Projects > Manage Funding > Funding List* subtask.
- **Needs List** - The grid on the *Analysis > Work Candidates > Needs List* subtask.
- **Programs** - The grid on the *Projects > Manage Programs > Program List* subtask.
- **Project Bridge Needs** - The Bridge Needs grid on the *Projects > Create/Edit Project > Query* subtask.
- **Projects** - The grid on the *Projects > Project List* task.
- **Tunnels** - The grid on the *Tunnels > Tunnel List* task.

## Layout

The *Layout* dropdown lists all of the layouts that have been created or that automatically come with the system. The available options depend on the selection made:

- **BrM System Layout** - If the layout selected is a BrM system layout, it cannot be edited or deleted. A note will appear in red text under the dropdown indicating that the layout is a BrM system layout and may not be edited:



However, the user can copy the BrM system layout's settings by typing a new layout name into the textbox next to the *Save As* button and then clicking *Save As*. Once the copy is made, the newly created layout can be edited.

- **Non-BrM System Layout** - Any layout that, when selected, does not cause the red BrM system layout note to appear can be edited or deleted freely.
- **New** - Clicking the *New* button creates a new layout that can be edited or deleted freely. The new layout can be named by entering a name into the textbox next to the *Save As* button and then clicking *Save*.

## Manage Layouts Groupings

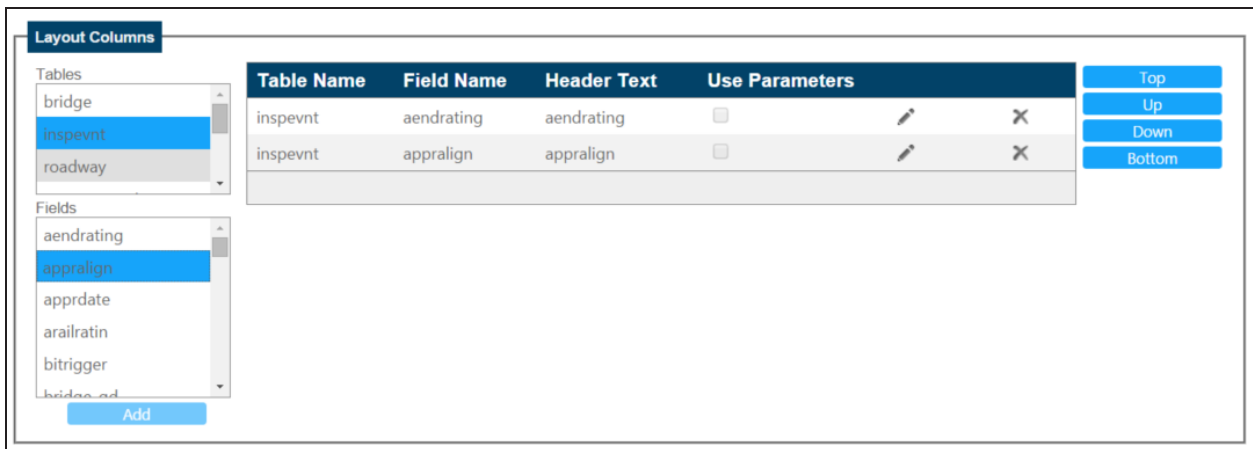
### Layout Info

The *Layout Info* grouping allows the user to enter a description of the currently selected layout. The user can also check the *Shared* checkbox if the layout should be available to other users.

### Layout Columns

The *Layout Columns* grouping is where the user configures the selected layout. A selection must be made from the *Tables* listbox and, based on that selection, the *Fields* listbox will populate with options.

The options in the *Fields* listbox will be the column headings for the layout. An option can be added to the layout by selecting it from the *Fields* listbox and clicking the *Add* button. The multiple select ability of the CTRL and Shift keyboard keys is applicable.



The grid formed from the selection contains the table name, field name, heading text, and:

- **Use Parameters** - The *Use Parameters* checkbox indicates whether or not parameters will be used for the selected field. Parameters for the fields are set up in the *Admin > General Config > Parameters* task and designate text to a specific value.

**Example:** A parameter may be established for a certain field so that any row within that column with the value "1" would present the text "District 1," any row within that column with the value "2" would present the text "District 2," etc.

- **Edit** - Clicking the symbol allows the user to edit the heading text and check/uncheck the *Use Parameters*

checkbox. To save the changes, click the . To cancel changes, click the  symbol.

- **Delete** - Clicking the  symbol deletes the field from the layout.

The buttons to the right of the table - *Top, Up, Down, Bottom* - control the positioning of the fields in the layout. Because tables read left to right, the top field in the layout corresponds to the leftmost column of the table. Once an item is selected, The *Top* and *Bottom* buttons move it to the top and bottom of the layout grid, respectively. The *Up* and *Down* buttons move the selected item up and down by one increment, respectively.

## Manage Layouts Page Controls



The *Save* button saves the current layout.

The *Save As* button acts as a copier and copies the current layout's settings into a new layout that uses the name entered into the textbox next to the *Save As* button.

The *Reset* button resets any changes that were made to the current layout back to the last save.

The *Delete* button deletes the current layout.

# Manage Filters

The *Projects > Manage Filters* task allows the user to create and edit filters for the Project List as well as several other grids throughout the software. The selections made for the filter will determine the projects listed in the Project List upon filter use. This task is also accessible from the *Bridges* tab with the same functionality.

## Edit Filter

The *Projects > Manage Filters > Edit Filter* subtask uses the BrM interface to create and edit filters for various grids within the system.

Projects > Manage Filters > Edit Filter

Context: Projects Filter: No filters defined New Metric English

Filter Info

Description:  Shared Access Filter

Criteria

Tables

- pon\_app\_users
- pon\_project
- pon\_project\_category\_defs

Fields

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BrM Version 5.2.3.18 [Build Date: Monday June 20, 2016]  
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## Context

The *Context* dropdown determines the grid for which the filter is being created. When the *Manage Filters* task is opened from the *Projects* tab, the default context will be the Project List, however there are several other context selections:

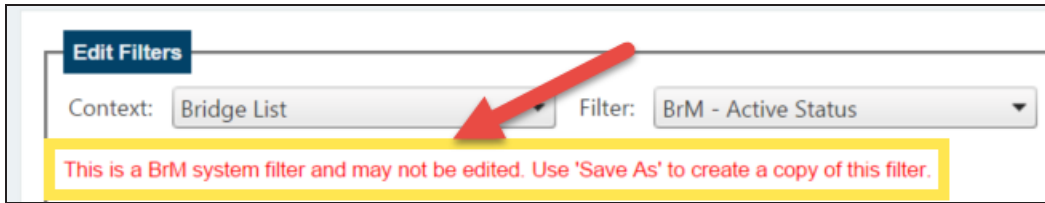
- **Bridge Analysis Group Roadways** - The grid on the *Bridges > Manage Bridge Analysis Groups > Add/Remove Roadways* subtask.
- **Bridge Analysis Groups** - The grid on the *Bridges > Manage Bridge Analysis Groups > Bridge Analysis Groups* subtask.
- **Bridge List** - The grid on the *Bridges > View List* task.
- **Funding** - The grid on the *Projects > Manage Funding > Funding List* subtask.
- **Needs List** - The grid on the *Analysis > Work Candidates > Needs List* subtask.
- **Programs** - The grid on the *Projects > Manage Programs > Program List* subtask.
- **Projects** - The grid on the *Projects > Project List* task.
- **Tunnels** - The grid on the *Tunnels > Tunnel List* task.

## Filter

The *Filter* dropdown lists all of the filters that have been created or that automatically come with the system. The context must be selected before the filter because the context determines what filters are available. Below are the filter

options:

- **BrM System Filter** - If the filter selected is a BrM system filter, it cannot be edited or deleted. A note will appear in red text under the dropdown indicating that the filter is a BrM system filter and may not be edited:



However, the user can copy the BrM system filter's settings by typing a new filter name into the textbox next to the *Save As* button and then clicking *Save As*. Once the copy is made, the newly created filter can be edited.

- **Customized Filter**- Any filter created by the user can be edited or deleted freely.
- **New** - Clicking the *New* button creates a new filter that can be edited or deleted freely. The new filter can be named by entering a name into the textbox next to the *Save As* button and then clicking *Save*.

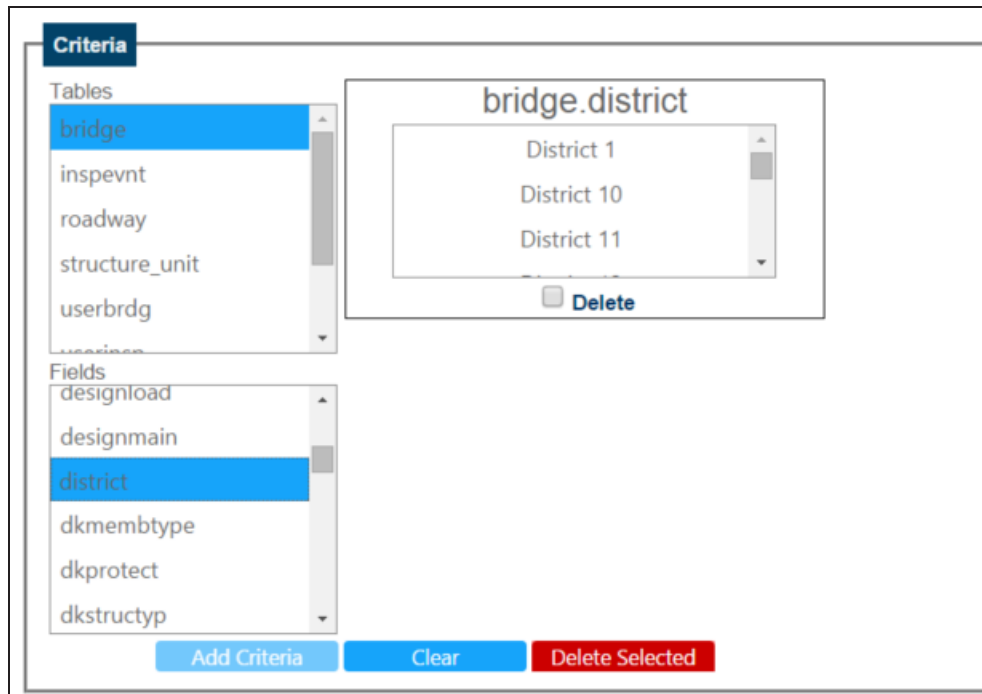
## Filter Info

The *Filter Info* grouping allows the user to enter a description of the currently selected filter. The user can also check the *Shared* checkbox if the filter should be available to other users.

If the *Access Filter* checkbox is checked, the admin can use the current filter as an access filter for specified roles, displaying that filter as the users' default filter for the applicable context.

## Criteria

The *Criteria* grouping is where the user configures the selected filter. A selection must be made from the *Tables* listbox and, based on that selection, the *Fields* listbox will populate with options.



Options can be added to the filter by selecting it from the *Fields* listbox and clicking the *Add Criteria* button. Multiple options can be added at once by holding down the CTRL key while selecting all of the desired options, then clicking the *Add Criteria* button.

Each field added to the filter will have additional options that must be determined.

Clicking the *Clear* button will clear the filter of all fields that have been added. Clicking the *Delete Selected* button will clear the filter of only the fields that have the *Delete* checkbox checked.

## Edit Filter Page Controls



The *Save* button saves the current filter.

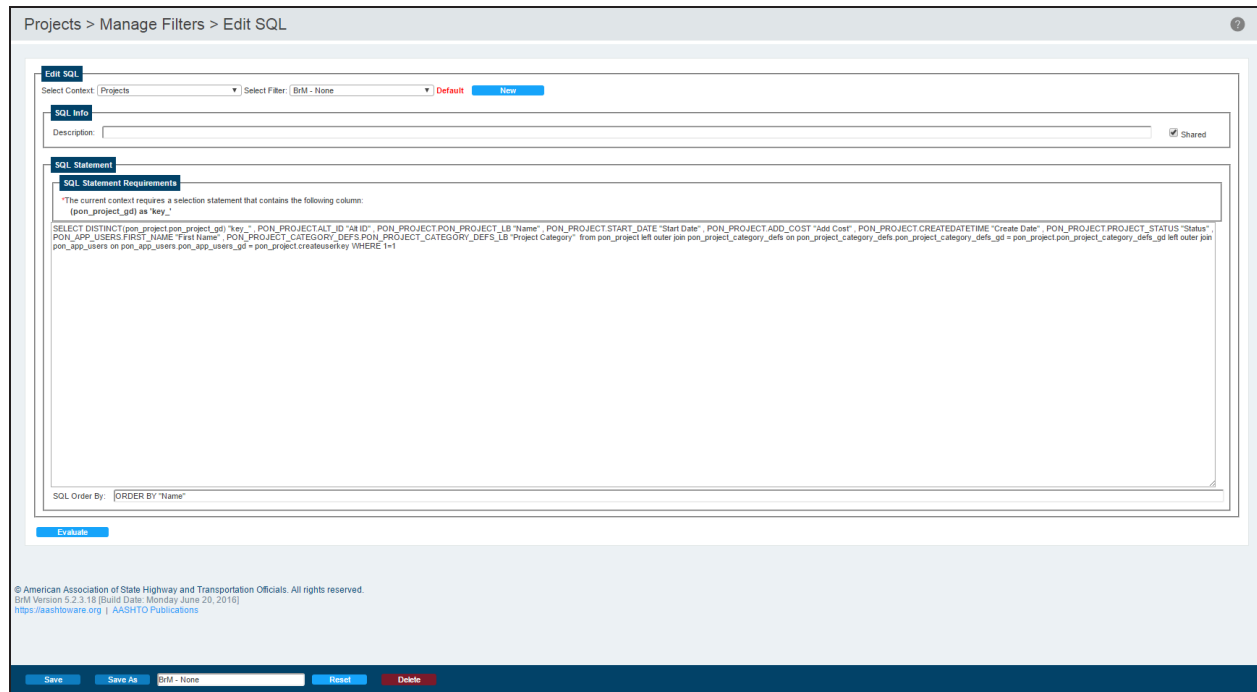
The *Save As* button copies the current filter's settings into a new filter that uses the name entered into the textbox next to the *Save As* button.

The *Reset* button resets any changes that were made to the current filter back to the last save.

The *Delete* button deletes the current filter.

# Edit SQL

The *Projects > Manage Filters > Edit SQL* subtask does not use the BrM interface to create and edit filters. It requires the user to write the SQL manually to create a custom filter.



There are several aspects that differentiate the filters in the *Edit SQL* subtask from the filters in the *Edit Filter* subtask:

1. The SQL filters must be written manually.
2. The SQL filters can only be edited within the *Edit SQL* subtask. They will not show up in the *Filter* dropdown of the *Edit Filter* subtask.
3. When an SQL filter is used on a page that has alternate layouts via a *Layout* dropdown, such as the Bridge List, the *Layout* dropdown will not be visible.

## Select Context

The *Context* dropdown determines the grid for which the filter is being created. When the *Manage Filters* task is opened from the *Bridges* tab, the default context will be the Bridge List, however there are several other context selections:

- **Bridge Group Roadways** - The grid on the *Bridges > Manage Bridge Groups > Add/Remove Roadways* subtask.
- **Bridge Groups** - The grid on the *Bridges > Manage Bridge Groups > Bridge Groups* subtask.
- **Bridge List** - The grid on the *Bridges > View List* task.
- **Funding** - The grid on the *Projects > Manage Funding > Funding List* subtask.
- **Needs List** - The grid on the *Analysis > Work Candidates > Needs List* subtask.
- **Programs** - The grid on the *Projects > Manage Programs > Program List* subtask.
- **Projects** - The grid on the *Projects > Project List* task.
- **Tunnels** - The grid on the *Tunnels > Tunnel List* task.

## Select Filter

The *Filter* dropdown lists all of the filters that have been created or that automatically come with the system. The context must be selected before the filter because the context determines what filters are available.



## SQL Info

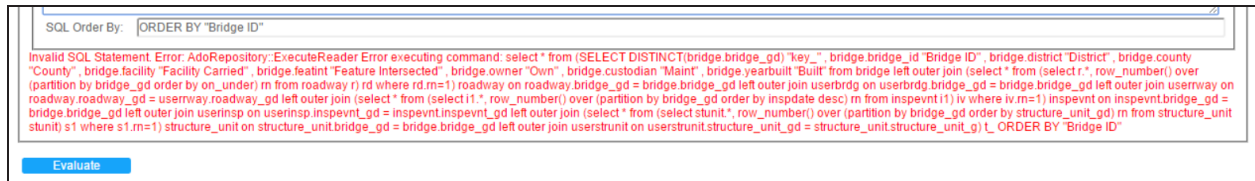
The *SQL Info* grouping allows the user to enter a description of the currently selected filter. The user can also check the *Shared* checkbox if the filter should be available to other users.

## SQL Statement

The user can use the large textbox to enter the SQL for the custom filter.

The *SQL Order By* textbox allows the user to determine how the filter will be ordered, such as "ORDER BY 'Bridge ID.'"

Once the SQL is entered, click the *Evaluate* button to view the filter results. If the SQL is invalid, an error will appear in place of the results:



## Edit SQL Page Controls



The *Save* button saves the current filter.

The *Save As* button copies the current filter's settings into a new filter that uses the name entered into the textbox next to the *Save As* button.

**\*Note:** If changes have been made to a new or existing SQL Filter, the *Save* and *Save As* buttons will not be available until the SQL statement passes an evaluation using the *Evaluate* button.

The *Reset* button resets any changes that were made to the current filter back to the last save.

The *Delete* button deletes the current filter.

# Create/Edit Project

The *Projects > Create/Edit Project* task allows the user to create a new project or edit an existing project. There are four subtasks: *Query*, *Summary*, *Analysis*, and *Management*.

## Query

The *Projects > Create/Edit Project > Query* subtask is used to determine which bridges will be added to the project and what work will be performed on those bridges.

Selected Project: \*\*\* New Project \*\*\*

Projects > Create / Edit Project > Query

Bridges

Project Name:

Project Category: Bridge Rail Filter: B/M - Active Status Bridge Group:

Bridge View Bridge Map View Filter 1 to 100 Bridges to Display Needs for All Bridges

Bridge ID	District	County	Facility Carried	Feature Intersected	Owner	On/Off System	Hwy System	Funct Class	Admin Area	Bridge Grp	Deck	Super	Sub	Culvert	Health Index
000007	Division 1	DeKalb	CO RT 10	COAL CREEK	County Hwy Agency	On System	4 County Hwy	08 Rural min Collector	District 3	Do Nothing	7 Good	6 Satisfactory	7 Good	N N/A (NBI)	95.33
000008	Division 5	Bibb	COUNTY 27	VIADUCT OVER SO.RR	County Hwy Agency	On System	4 County Hwy	09 Rural Local	District 4	Do Nothing	7 Good	7 Good	7 Good	N N/A (NBI)	97.46
000012	Division 1	Jackson	JC91	SOUTHERNLNRAILROAD	County Hwy Agency	On System	4 County Hwy	09 Rural Local	District 3	Do Nothing	5 Fair	6 Satisfactory	6 Satisfactory	N N/A (NBI)	66.67
000073	Division 4	Calhoun	WEST 11TH	DRAINAGE DITCH	City/Municipal Hwy Agenc	On System	5 City Street	19 Urban Local	District 2	Do Nothing	6 Satisfactory	6 Satisfactory	6 Satisfactory	N N/A (NBI)	97.47
000085	Division 6	Dallas	CR # 438	TRIB TO CEDAR CREEK	County Hwy Agency	On System	4 County Hwy	09 Rural Local	District 5	Do Nothing	4 Poor	4 Poor	4 Poor	N N/A (NBI)	94.23
000095	Division 2	Morgan	SPARKMAN ST	SHOAL CREEK	City/Municipal Hwy Agenc	On System	5 City Street	16 Urban Minor Arterial	District 4	Do Nothing	4 Poor	5 Fair	5 Fair	N N/A (NBI)	98.90
000105	Division 4	Calhoun	Century Rd. 1915	TALLAHATCHEE CREEK	County Hwy Agency	On System	4 County Hwy	09 Rural Local	District 2	Do Nothing	6 Satisfactory	6 Satisfactory	6 Satisfactory	N N/A (NBI)	98.34
000136	Division 4	Chambers	CO. 2	SOUTH SANDY CREEK	County Hwy Agency	On System	4 County Hwy	09 Rural Local	District 3	Do Nothing	4 Poor	5 Fair	4 Poor	N N/A (NBI)	39.28
000157	Division 3	Jefferson	KOPPERS STREET	VALLEY CREEK	County Hwy Agency	On System	4 County Hwy	09 Rural Local	District 1	Do Nothing	N N/A (NBI)	N N/A (NBI)	N N/A (NBI)	7 Minor Deterioration	89.56
000160	Division 4	Tallapoosa	484	TOWN CREEK	County Hwy Agency	On System	4 County Hwy	09 Rural Local	District 1	Do Nothing	5 Fair	6 Satisfactory	6 Satisfactory	N N/A (NBI)	66.67

Page size: 10 6320 Items in 632 pages

Selected Bridges and Work

Bridge ID	District	County	Facility Carried	Feature Intersected	Deck	Superstructure	Substructure	Culvert	Health Index
No records to display.									

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Cancel Save Save & Close

## Selected Project

If a project is currently selected, the *Selected Project* dropdown will show that project's name. A different project can be selected from the dropdown if desired. To create a new project, click the *Create New* button.


**\*Note:** This dropdown is available on all four subtasks.

If no project is currently selected, the *Selected Project* dropdown will default to "\*\*\* New Project \*\*\*" and the *Create New* button will not be present. An existing project can be selected from the dropdown if desired.

## Bridges

The *Bridges* grouping contains a *Bridge View* and *Bridge Map View* of all of the bridges in the database.

Bridge ID	District	County	Facility Carried	Feature Intersected	Owner	On/Off System	Hwy System	Funcnt Class	Admin Area	Bridge Grp	Deck	Super	Sub	Culvert	Health Index
04 07598	District 2	Maricopa	JESSE OWENS PKWY	WESTERN CANAL	City/Municipal Hwy Agenc	Off System	5 City Street	17 Urban Collector	02B - Paul Goldsmith		Unknown (NB)	Unknown (NB)	Unknown (NB)	Unknown (NB)	100
04 07603	District 2	Maricopa	7TH STREET	DRY WASH	City/Municipal Hwy Agenc	Off System	5 City Street	14 Urban Other Princ	01B - Matt Hunter		N N/A (NB)	N N/A (NB)	N N/A (NB)	7 Minor Deterioration	94.17
04 07878	District 2	Maricopa	DESERT FOOTHILLS	WASH	City/Municipal Hwy Agenc	Off System	5 City Street	16 Urban Minor Arterial	02B - Paul Goldsmith		N N/A (NB)	N N/A (NB)	N N/A (NB)	7 Minor Deterioration	
04 07935	District 2	Maricopa	ELLIOT ROAD & 48TH	WASH	City/Municipal Hwy Agenc	Off System	5 City Street	16 Urban Minor Arterial	02B - Paul Goldsmith		N N/A (NB)	N N/A (NB)	N N/A (NB)	7 Minor Deterioration	100
04 08003	District 2	Maricopa	75th Ave	RID Canal	City/Municipal Hwy Agenc	Off System	5 City Street	16 Urban Minor Arterial	02A - Gary Gauthier		5 Fair	7 Good	7 Good	N N/A (NB)	
04 08508	District 2	Maricopa	25TH AVENUE	ARIZONA CANAL	City/Municipal Hwy Agenc	Off System	5 City Street	17 Urban Collector	01B - Matt Hunter		7 Good	7 Good	7 Good	N N/A (NB)	
04 08511	District 2	Maricopa	CENTER FLYOVER	SKY HARBOR BLVD E & W	City/Municipal Hwy Agenc	Off System	5 City Street	19 Urban Local	03A - Anthony Fernandes		5 Fair	6 Satisfactory	7 Good	N N/A (NB)	
04 08529	District 2	Maricopa	PARKING ENT&EXIT	SKY HARBOR BLVD EAST	City/Municipal Hwy Agenc	Off System	5 City Street	19 Urban Local	03A - Anthony Fernandes		7 Good	7 Good	7 Good	N N/A (NB)	
04 08530	District 2	Maricopa	PARKING ENT&EXIT	Sky Harbor Blvd West	City/Municipal Hwy Agenc	Off System	5 City Street	19 Urban Local	03A - Anthony Fernandes		6 Satisfactory	7 Good	7 Good	N N/A (NB)	
04 08975	District 2	Maricopa	19TH AVE	GRAND CANAL	City/Municipal Hwy Agenc	Off System	5 City Street	14 Urban Other Princ	02A - Gary Gauthier		6 Satisfactory	5 Fair	6 Satisfactory	N N/A (NB)	

The **Project Category**, **Filter**, and **Bridge Analysis Group** dropdowns all work to filter the grid/map of bridges based on the selections. Additional filters can be created for the **Filter** dropdown on the **Projects > Manage Filters** task (or the **Bridges > Manage Filters** task). The quick filters can also be used to filter the grid. To cancel the current quick filters, click the  icon next to the **Bridge Map View** tab.

### Filter 1 to 100 Bridges

If the grid/map contains more than 100 bridges, a message will appear in the top right corner of the **Bridges** grouping:



When a bridge is selected from the grid/map, a new grouping called **Bridge Needs** appears below the **Bridges** grouping. This grouping allows the user to select which work will be performed for the selected bridge. Normally, only one bridge's needs can be selected at a time. However, if 100 bridges or less are filtered in the grid/map, the message in the top right corner is replaced by the **Display Needs for All Bridges in Filter** checkbox. If checked, the **Bridge Needs** grouping will display work that can be added for all of the selected bridges.

### Bridge Needs

When a bridge is selected or all bridges in the filter are selected with the **Display Needs for All Bridges in Filter** checkbox, the **Bridge Needs** grouping will appear beneath the **Bridges** grouping and allow the user to select work for the bridge(s).

Bridge ID	Action	Work Candidate	Unit Label	B District	Kind Hwy	Base Utility	Utility	Utility Change	Estimated Cost	BenefitCost(\$k)	Cost(\$k)/Benefit	Target Year	Existing Project
<input type="checkbox"/> 01001	Preserve Super - Network	Generated 07/13/2016	0	03-DISTRICT 3	3 State Hwy	70.86	72.88	2.02	\$36,890	0.0548	\$18	2016	
<input type="checkbox"/> 01001	Rehab Culvert - Network	Generated 07/13/2016	0	03-DISTRICT 3	3 State Hwy	70.86	68.24	-2.62	\$2,950	-0.8881	-\$1	2016	
<input type="checkbox"/> 01001	Rehab Deck - Network	Generated 07/13/2016	0	03-DISTRICT 3	3 State Hwy	70.86	68.37	-2.49	\$11,550	-0.2156	-\$5	2016	
<input type="checkbox"/> 01001	Rehab Sub - Network	Generated 07/13/2016	0	03-DISTRICT 3	3 State Hwy	70.86	71.17	0.31	\$102,500	0.003	\$331	2016	
<input type="checkbox"/> 01001	Rehab Super - Network	Generated 07/13/2016	0	03-DISTRICT 3	3 State Hwy	70.86	71.47	0.61	\$121,928	0.005	\$200	2016	
<input type="checkbox"/> 01001	Replace Deck - Network	Generated 07/13/2016	0	03-DISTRICT 3	3 State Hwy	70.86	69.3	-1.56	\$39,765	-0.0392	-\$25	2016	
<input type="checkbox"/> 01001	Replace Structure - Network	Generated 07/13/2016	0	03-DISTRICT 3	3 State Hwy	70.86	90.16	19.3	\$353,400	0.0546	\$18	2016	
<input type="checkbox"/> 01001	Replace Super - Network	Generated 07/13/2016	0	03-DISTRICT 3	3 State Hwy	70.86	80.17	9.31	\$200,222	0.0465	\$22	2016	

### Layout

Additional layouts can be created for the **Layout** dropdown on the **Projects > Manage Layouts** task (or the **Bridges > Manage Layouts** task).

## Checkboxes

The *Display Category Actions Only* checkbox will show the work candidates that have been created for the selected bridge that are associated with the category selected in the *Project Category* dropdown, as well as recommendations of possible actions based on the category selected in the *Project Category* dropdown.

The *Display Work Candidates Only* checkbox will show only the work candidates that have been created for the selected bridge.

The *Display Zero Cost Recommendations* checkbox will recommend possible actions based on the bridge's elements.

The *Display Zero Cost Work Candidates* checkbox will show only the work candidates created for the selected bridge that do not have a cost associated.

**\*Note:** If multiple checkboxes are selected, their effects will be combined.

Select the desired actions/work candidates from the grid and click the *Add to Project* button to add the bridge's selections to the current project.

## Selected Bridges and Work

The *Selected Bridges and Work* grouping displays all of the bridges that have been added to the project and reveals a breakdown of exactly what actions will be performed on the bridges for the project.

## Query Page Controls

The *Save* button saves the changes made to the selected project.

The *Save and Close* button saves the changes made to the selected project and returns the user to the *Projects > Project List* task.

The *Cancel* button cancels the changes made to the selected project and refreshes the page.

---

<i>Projects &gt; Create/Edit Project &gt; Query Control Information</i>			
<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
Project Name	PON_PROJECT	PON_PROJECT_LB	The name of the project being created.
Project Category	PON_PROJECT	PON_PROJECT_CATEGORY_DEFS_GD	The project category of the project that then filters the list of bridges available to add.

# Summary

The *Projects > Create/Edit Project > Summary* subtask provides a summary of the project and allows the user to add additional costs and calculate the benefits of the project.

Selected Project: 000005(Replace Bridge)

Projects > Create / Edit Project > Summary

**Project Details**

Project ID: EB2178EE5F6046E19357EF4C767900CA  
Project Name: 000005(Replace Bridge)  
Created By: (Pontis) User, Pontis  
Alternate ID:   
Project Type: Bridge Rail  
Create Time: 5/13/2016 3:47 PM  
Project Status: Proposed  
Start Date: 1/1/2016  
End Date:   
Project URL:

Project Description:

**Project Notes**

Project Notes:

**Project Costs and Benefits**

Indirect Cost: Entered: 0.00 %  
Project Cost: Direct Cost: \$239,741 Other Costs: 0  
Indirect Cost: 50 Total Cost: \$239,741

Performance Measure	Average Benefit	Median Benefit	Total Benefit
Condition			
Health Index			
LifeCycle			
Mobility			
Risk			
TOTAL BENEFIT			

Last Calculation: None

**Bridge and Work Summary**

Bridge View | Bridge Map View | Work View

Bridge ID	District	County	Facility Carried	Feature Intersected	Deck	Superstructure	Substructure	Culvert	Health Index
000005	10	075	RAILROAD STREET	STREAM	5 Fair	4 Poor	4 Poor	N N/A (NBI)	41.39

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## Project Details

The *Project Details* grouping contains the basic details for the project and has options for setting the project type, project status, and start and end dates.

## Project Notes

The *Project Notes* grouping can be used to enter notes for the project.

## Project Costs and Benefits

The *Project Costs and Benefits* grouping allows the user to add additional costs to the project and calculate the benefits of the project.

When changing the *Project Status* dropdown, there are limitations based on various details within the project. The statuses are Planned, Proposed, and Programmed. The current status cannot be changed to the next status if:

1. A closed funding source is attached to the project.
2. A closed program is attached to the project.
3. Added work candidates/recommendations are already mapped to an approved project.

**Project Costs and Benefits**

Indirect Cost: Entered: 20.00 %  
Project Cost: Direct Cost: \$3,500 Other Costs: 0  
Indirect Cost: \$700 Total Cost: \$4,200

Performance Measure	Average Benefit	Median Benefit	Total Benefit
Condition			
Health Index			
LifeCycle			
Mobility			
Risk			
test			
TOTAL BENEFIT			

Last Calculation: None

## Costs

The *Indirect Cost* textbox is an additional project cost determined as a percentage of the direct cost.

**Example:** If the direct cost is \$10000 and the percentage entered into the *Indirect Cost* textbox is 25, the indirect cost will be \$2500.

The *Other Costs* textbox is for additional costs to be entered.

Clicking the *Recalculate* button will recalculate and display the total cost.

## Benefit

The Benefit grid displays the project's benefits for various criteria. If changes have been made to the project since the last calculation, click the *Calculate Benefit* button to view the up-to-date benefit information.

## Bridge and Work Summary

The *Bridge and Work Summary* grouping is the same as the *Selected Bridges and Work* grouping from the *Query* subtask. It displays all of the bridges that have been added to the project and reveals a breakdown of exactly what actions will be performed on the bridges for the project.

## Summary Page Controls

The *Save* button saves the changes made to the selected project.

The *Save and Close* button saves the changes made to the selected project and returns the user to the *Projects > Project List* task.

The *Cancel* button cancels the changes made to the selected project and refreshes the page.

---

<i>Projects &gt; Create/Edit Project &gt; Summary Control Information</i>			
Control Name	Table Name	Column Name	Notes
<i>Project Details Grouping</i>			
Project ID	PON_PROJECT	PON_PROJECT_GD	The main identifier for the project.
Alternate ID	PON_PROJECT	ALT_ID	An additional identifier for the project.
Project Status	PON_PROJECT	PROJECT_STATUS	The current status of the project.
Project URL	PON_PROJECT	URL	The agency's project website, if applicable.
Project Name	PON_PROJECT	PON_PROJECT_LB	The name of the selected project.
Project Type	PON_PROJECT	PON_PROJECT_CATEGORY_DEFS_GD	The project category of the project that then filters the list of bridges available to add on the <i>Query</i> subtask.
Start Date	PON_	START_DATE	The start date of the project.

*Projects > Create/Edit Project > Summary Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
	PROJECT		
End Date	PON_PROJECT	END_DATE	The end date of the project.
Created By	PON_PROJECT	CREATEUSERKEY	The user who created the project.
Create Date	PON_PROJECT	CREATEDATETIME	The date the project was created.
Project Description	PON_PROJECT	DESCRIPTION	A description of the project.
Project Notes	PON_PROJECT	NOTES	Additional notes about the project.
<b><i>Project Costs Grouping</i></b>			
Entered	PON_PROJECT	IND_COST	Determines the indirect cost by entering a percentage of the direct cost.
Other Costs	PON_PROJECT	ADD_COST	Additional costs that should be included in the total cost calculation.

# Analysis

The *Projects > Create/Edit Project > Analysis* subtask is used to help an agency determine what work to perform on a bridge within the project by viewing how a specific work candidate affects the bridge. This page provides the same information as the *Analysis > Work Candidates > Bridge Analysis* subtask but allows the user to switch between bridges within the selected project and analyze the project within the context of the program/scenario it belongs to, if applicable.

If the project is within a program, the **Program** and **Scenario** dropdowns can be used to analyze the project's bridges using the parameters of the selected program and scenario.

The **Selected Bridge** dropdown is used to select a bridge to analyze. Only bridges within the project will be selectable.

For more information on the *Analysis* subtask, read the *Analysis > Work Candidates > Bridge Analysis* section of the user manual.

The screenshot displays the 'Analysis' subtask interface. At the top, it shows the breadcrumb 'Projects > Create / Edit Project > Analysis'. Below this, there are dropdowns for 'Selected Project' (000005/Replace Bridge) and 'Selected Bridge' (000005). A text field for 'Bridge Work Description' is present. The interface is divided into several sections: 'Description' with fields for Route, District, Owner, Material, Scour, Milepoint, County, Area, Resp, and Design; 'Conditions' with fields for Deck, Substr, Structure, Superstr Index, Culvert, Deck Index, Substr Index, and Structure HI; 'Current Scaled Performance' with Condition and Lifecycle; 'Sufficiency' with Rating and SDFO; 'NBI Modeling' with NBI Deterioration Method and NBI Converter Profile; and a table of 'Work Items Existing For Selected Bridge'. The table has columns for Sel, Work Item, Action, Base Utility, Utility (Change), Condition (Change), LifeCycle (Change), Mobility (Change), Risk (Change), Cost, Benefit / Cost (\$k), Cost (\$k) / Benefit, Target Year, and Repeat Interval. The table shows two rows: 'Last Inspection' and 'Optimize Generated 9/13/2016'. At the bottom, there are 'Charts' and 'Effects on Each Element' sections, and a footer with 'Cancel', 'Save', and 'Save & Close' buttons.

## Projects > Create/Edit Project > Analysis Control Information

Control Name	Table Name	Column Name	Notes
Selected Bridge	PON_PROJECT_BRIDGE	BRIDGE_GD	The currently selected bridge within the project.
Bridge Work Description	PON_PROJECT_BRIDGE	WORK_DESCRIPTION	Used to enter a description of the work being performed on the bridge.



Projects > Create/Edit Project > Analysis Control Information

Control Name	Table Name	Column Name	Notes
Work Item Cost	PON_PROJECT_WORKITEM	EST_COST	Determines the cost of the work item for the selected bridge within the project. This control is found in the <i>Work Items Existing for Selected Bridge</i> grouping on the page.
Work Item Target Year	PON_PROJECT_WORKITEM	TARGET_YEAR	The target year for the selected bridge's work item to be completed. This control is found in the <i>Work Items Existing for Selected Bridge</i> grouping on the page.
Work Item Repeat Interval	PON_PROJECT_WORKITEM	REPEAT_INTERVAL	The interval of time in which to repeat the work item for the selected bridge. This control is found in the <i>Work Items Existing for Selected Bridge</i> grouping on the page.

# Management

The *Projects > Create/Edit Project > Management* subtask contains some of the same information as the *Summary* subtask but also allows the user to add programs, funding sources, and milestones.

Selected Project: [000005/Replace Bridge]

Projects > Create / Edit Project > Management

**Project Details**

Project ID: EB2178EESF6046E19357EF4C767900CA  
Project Name: [000005/Replace Bridge]  
Created By: (Pontis) User, Pontis  
Project Description:

Alternate ID:   
Project Type: Bridge Rail  
Create Time: 5/13/2016 3:47 PM  
Project URL:   
Start Date: 1/1/2016  
End Date:

**Project Costs**

Indirect Cost: Entered: 0.00 %  
Direct Cost: \$239,741  
Other Costs: 0  
Indirect Cost: 0  
Total Cost: \$239,741  
[Recalculate]

**Programs**  
No Programs Mapped. [Add New]

**Funding Sources**  
No Funding Sources Mapped. [Add New]

**Milestones**  
No Milestones Mapped. [Add New]

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Cancel [Save] [Save & Close]

## Project Details

The *Project Details* grouping is the same as on the *Summary* subtask. It contains the basic details for the project and has options for setting the project type, project status, and start and end dates.

## Project Cost

The *Project Cost* grouping contains the same cost information and controls as the *Project Cost and Benefits* grouping on the *Summary* subtask. For more information on this grouping, review the *Projects > Create/Edit Project > Summary* section of the user manual.

## Programs

The *Programs* grouping is used to add the selected project to one or more programs.

**\*Note:** The *Programs* grouping is not available for projects in the "Planned" status.

Program Name	Program ID	Program's Start Date	Program's End Date	Description	Scenario Name	Target Year	Program Frozen	Year Frozen
X p1	6E5AFBFA6B314F0CBEDBDCA3E65AC308	07/20/2016	12/31/2017		Default	2016	<input type="checkbox"/>	<input type="checkbox"/>
X p2	A43BAE3465E746E3AF321A64016E41BF	01/01/2018	12/31/2036		Default	2017	<input type="checkbox"/>	<input type="checkbox"/>

[Add New]

Click the *Add New* button to reveal the following popup:

Program:   
Scenario:   
Target year:   
Is Program Frozen:   
Is Year Frozen:   
Cancel [Add New]

The *Program* dropdown determines to which program the project will be added.

The **Scenario** dropdown determines to which scenario the project will be added.

The **Target Year** dropdown indicates which year within the select program's time range the selected project is expected to be completed.

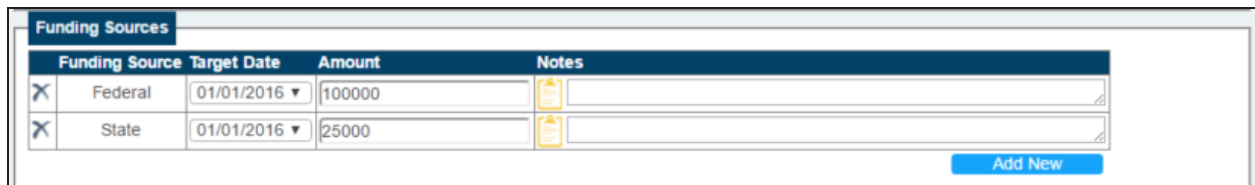
The **Frozen** checkboxes determine whether the project will be frozen to the program and/or year, respectively. If the project is frozen to a program, the optimizer will never remove it from that program even if the optimizer determines it to be ineffective for the program. If the project is frozen to the selected target year, it will never be changed to a different year in the program optimizer meaning it cannot be selected to be completed in a different year.

Click the **Add New** button to add the project to the selected program.

Click the **Cancel** button to cancel the project-program link.

## Funding Sources

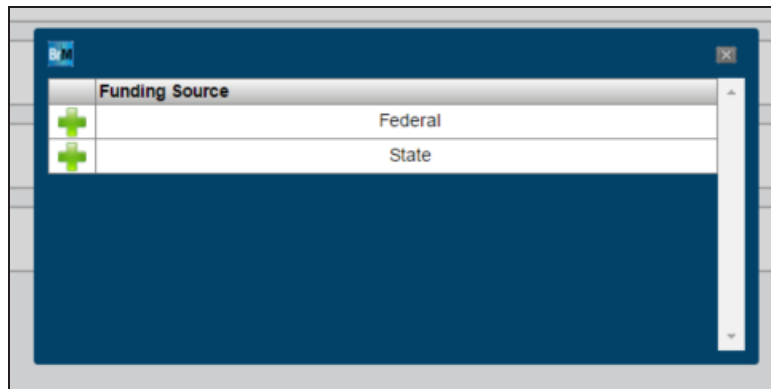
The **Funding Sources** grouping is used to add one or more funding sources to the selected project. Funding sources are created on the *Projects > Manage Funding* task.




Funding Source	Target Date	Amount	Notes
<input type="checkbox"/> Federal	01/01/2016 ▼	100000	
<input type="checkbox"/> State	01/01/2016 ▼	25000	

[Add New](#)

Click the **Add New** button to reveal a popup with the available funding sources:



To add a funding source to the project, click the  icon.

Once the funding source is added to the project, its specific information can be entered.

The **Target Date** dropdown indicates when the funding is expected to be available.

The **Amount** textbox indicates the expected amount of funding.

To remove a funding source from the project, click the  icon for the desired funding source.

## Milestones

The **Milestones** grouping is used to set milestones for the project.

Click the *Add New* button to add a milestone to the project.

The milestones are only used on the *Management* subtask and the controls are agency defined.

## Management Page Controls

The *Save* button saves the changes made to the selected project.

The *Save and Close* button saves the changes made to the selected project and returns the user to the *Projects > Project List* task.

The *Cancel* button cancels the changes made to the selected project and refreshes the page.

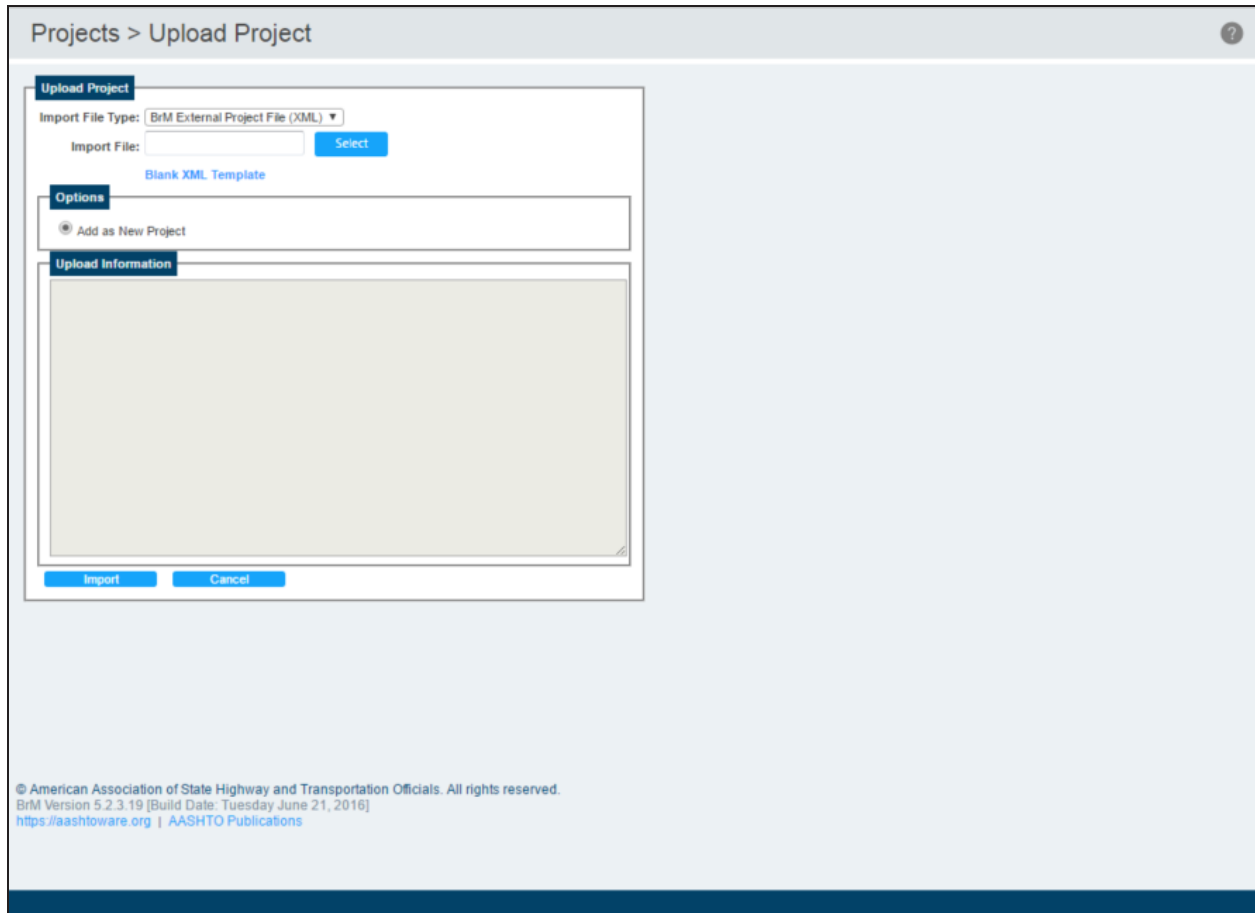
<i>Projects &gt; Create/Edit Project &gt; Management Control Information</i>			
Control Name	Table Name	Column Name	Notes
<b><i>Project Details Grouping</i></b>			
Project ID	PON_PROJECT	PON_PROJECT_GD	The main identifier for the project.
Alternate ID	PON_PROJECT	ALT_ID	An additional identifier for the project.
Create Time	PON_PROJECT	CREATEDATETIME	The date the project was created.
Project URL	PON_PROJECT	URL	The agency's URL for the project.
Project Name	PON_PROJECT	PON_PROJECT_LB	The name of the selected project.
Project Type	PON_PROJECT	PON_PROJECT_CATEGORY_DEFS_GD	The project category of the project that then filters the list of bridges available to add on the <i>Query</i> subtask.
Start Date	PON_PROJECT	START_DATE	The start date of the project.
End Date	PON_PROJECT	END_DATE	The end date of the project.
Created By	PON_PROJECT	CREATEUSERKEY	The user who created the project.
Project Description	PON_PROJECT	DESCRIPTION	A description of the project.

*Projects > Create/Edit Project > Management Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
<b><i>Project Costs Grouping</i></b>			
Entered	PON_ PROJECT	IND_COST	Determines the indirect cost by entering a percentage of the direct cost.
Other Costs	PON_ PROJECT	ADD_COST	Additional costs that should be included in the total cost calculation.
<b><i>Programs Grouping</i></b>			
Freeze to Program	PON_ PROJECT	FROZEN_ PROGRAM_GD	Freezes the project to the selected program.
Freeze to Year	PON_ PROJECT	FROZEN_YEAR	Freezes the project to the target year.
<b><i>Funding Sources Grouping</i></b>			
Target Date	PON_ PROJECT_ FUNDING	TARGET_DATE	The date the funds from the selected funding source are expected to be available.
Amount	PON_ PROJECT_ FUNDING	AMOUNT	The amount of funding from the selected funding source.
Notes	PON_ PROJECT_ FUNDING	NOTES	Notes about the selected funding source.
<b><i>Milestones Grouping</i></b>			
Name	PON_ PROJECT_ MILESTONE	PON_PROJECT_ MILESTONE_LB	The name of the milestone. Indicates the standing of the project.
Status	PON_ PROJECT_ MILESTONE	MILESTONE_ STATUS	The status of the selected milestone.
Original Date	PON_ PROJECT_ MILESTONE	ORIGINAL_DATE	The original date the milestone was to be reached.
Revised Date	PON_ PROJECT_ MILESTONE	REVISED_DATE	The revised date for the milestone.
Notes	PON_ PROJECT_ MILESTONE	NOTES	Notes about the selected milestone.

# Upload Project

The *Projects > Upload Project* task allows the user to use the XML project template to upload a project.



## Using the XML Template

To use the XML project template, right click on the *Blank XML Template* link and save the file. Once saved, open the file and edit the fields:

```
<?xml version="1.0" encoding="UTF-8"?>
- <Project xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <Name/>
  <AlternateID/>
  <Category/>
  <Description/>
  <Notes/>
  <URL/>
  <StartDate/>
  <EndDate/>
  <IndirectCost/>
  <AdditionalCost/>
</Project>
```

**\*Note:** Template entries must match database information exactly in order for the template to function correctly.

When the template is complete, ensure the *Import File Type* dropdown is set to "BrM External Project File (XML)" and click the *Select* button to locate the newly created template file.

## Options

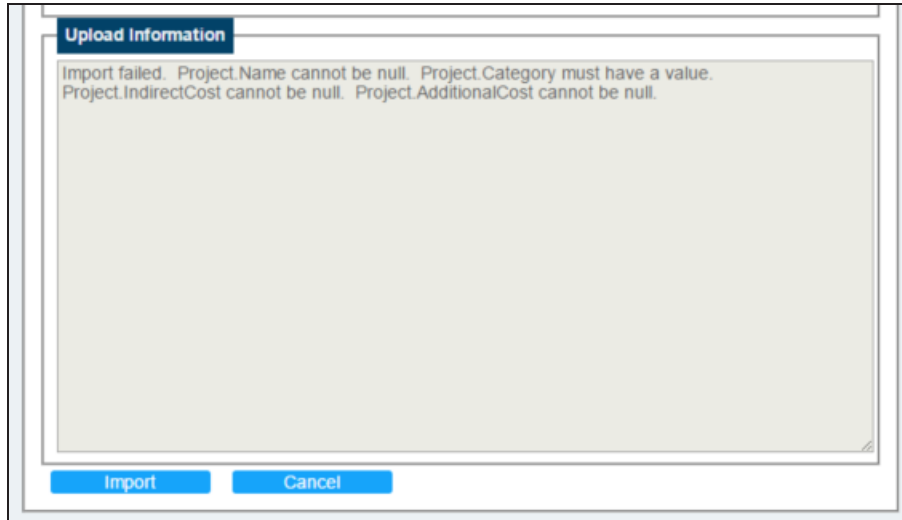
Determine how the import file will be used by selecting either the *Update Existing Project* or *Add as New Project* radio button. If the *Update Existing Project* radio button is selected, use the *Update Existing Project* dropdown to determine which project will be updated.

## Uploading

When the file has been selected and the desired options made, click the *Import* button to import the file. To clear all of the selections made on the *Upload Project* task and refresh the page, click *Cancel*.

### Upload Information

The *Upload Information* grouping informs the user of the import file's upload status. Messages will notify the user of the success or failure of the upload:



# Combine Projects

The *Projects > Combine Projects* task allows the user to combine two or more projects into one.

Projects > Combine Projects

Combine Projects

Selected Projects

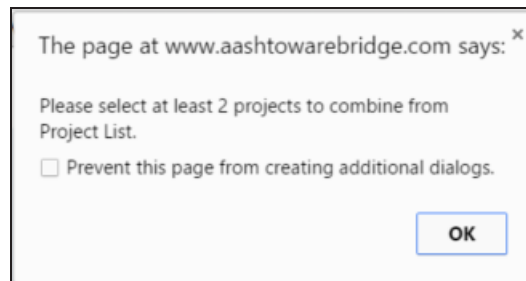
Project Name	Project ID	Category	Status
02102011000B010(PM - Epoxy and Deck PM MDOT)			Proposed
02102011000B010(PM - Epoxy and Deck PM MDOT, PM -			Proposed
02102011000B010(PM - Epoxy and Deck PM MDOT, PM -			Proposed
02102011000B010(Replace - Bridge MDOT)			Proposed

Combined Project Name:

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## Stipulations:

1. At least two projects must be selected from the Project List. If less than two projects are selected, the following message will appear when the *Combine Projects* task is selected.



2. In order to combine projects, the selected projects must have the same status. Also, only projects with a "Planned" or "Proposed" status can be combined.

## Combining the Projects

All of the projects that will be combined are listed in the Selected Projects grid. To combine the projects, enter a name for the new combined project in the *Combined Project Name* textbox and click the *Combine* button.

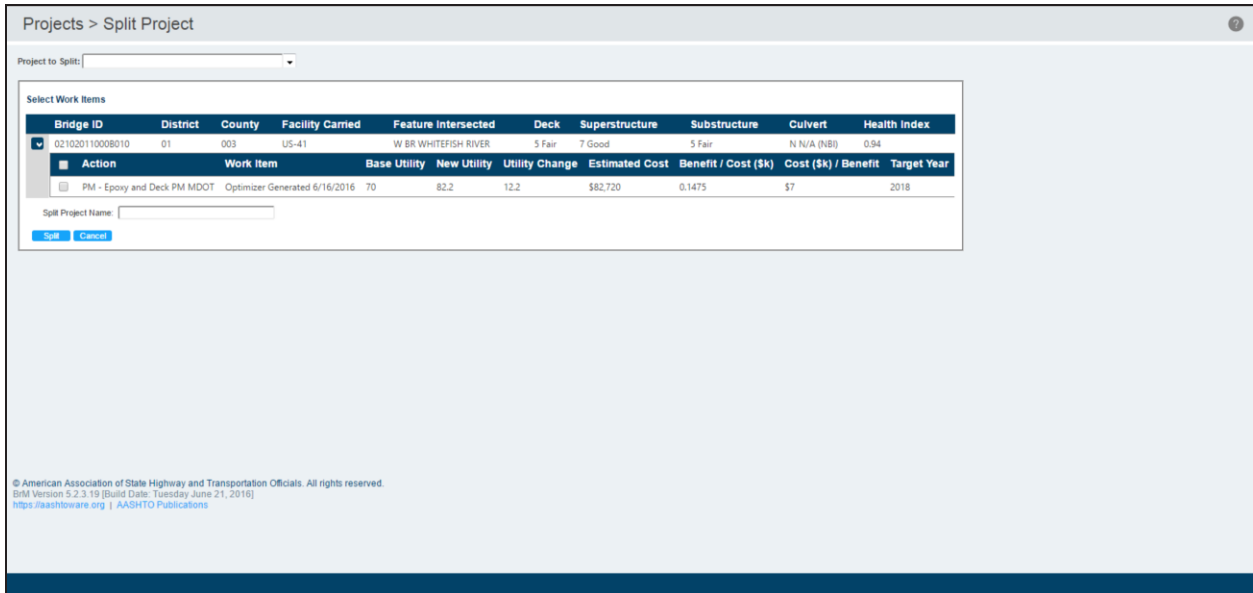
When the projects are combined, the user will be taken to the Project List. The new combined project will be present on the grid and the old singular projects will be deleted.

The *Cancel* button cancels the combining of the projects and returns the user to the *Projects > Project List* task.



# Split Project

The *Projects > Split Project* task is used to split the selected project into two projects by creating a new split project that takes one or more of the work items from the selected project. Only projects with a "Planned" or "Proposed" status can be split.



**\*Note:** In order to split a project, the selected project must have at least one work item associated with a bridge.

**\*Note:** It is not possible to select bridges (which would include all of the work items for that bridge within the project). If all of the work items related to a specific bridge are to be moved by splitting the project, each work item must be selected individually.

## Select a Project

If a project is highlight selected in the Project List, that project will be displayed as the project to be split. If no project is highlight selected, a project must be selected from the *Project to Split* dropdown.

## Bridges and Work Items

The grid will populate with the bridges that have been added to the project and can be expanded to reveal the work items for the bridges.

Select Work Items

Bridge ID	District	County	Facility Carried	Feature Intersected	Deck	Superstructure	Substructure	Culvert	Health Index
04 07598	02	013	JESSE OWENS PKWY	WESTERN CANAL	Unknown (NBI)	Unknown (NBI)	Unknown (NBI)	Unknown (NBI)	100
<input type="checkbox"/> Action      Work Item      Base Utility      New Utility      Utility Change      Estimated Cost      Benefit / Cost (\$k)      Cost (\$k) / Benefit									
<input type="checkbox"/>	Converted Work Candidates		A	74.1	74.1	0	\$100	0	
<input type="checkbox"/>	Converted Work Candidates		A	74.1	74.1	0	\$500	0	
<input type="checkbox"/>	Converted Work Candidates		B	74.1	74.1	0	\$200	0	
04 07878	02	013	DESERT FOOTHILLS	WASH	N N/A (NBI)	N N/A (NBI)	N N/A (NBI)	7 Minor Deterioration	
04 08511	02	013	CENTER FLYOVER	SKY HARBOR BLVD E & W	5 Fair	6 Satisfactory	7 Good	N N/A (NBI)	
<input type="checkbox"/> Action      Work Item      Base Utility      New Utility      Utility Change      Estimated Cost      Benefit / Cost (\$k)      Cost (\$k) / Benefit									
<input type="checkbox"/>	Converted Work Candidates		C	60.21	60.21	0	\$1,000	0	
<input type="checkbox"/>	Converted Work Candidates		C	60.21	60.21	0	\$2,000	0	
<input type="checkbox"/>	Converted Work Candidates		D	60.21	60.21	0	\$500	0	
04 08530	02	013	PARKING ENT&EXIT	Sky Harbor Blvd West	6 Satisfactory	7 Good	7 Good	N N/A (NBI)	

Split Project Name:

Check the *Work Item* checkboxes of all of the work items that should be moved to the split project.

## Splitting the Project

When all of the desired work items have been selected, enter a name for the new split project in the *Split Project Name* textbox and click the *Split* button.

Click the *Cancel* button to cancel the selections and return to the Project List.

# Manage Funding

The *Projects > Manage Funding* task allows the user to view and create/edit funding sources. Funding sources can then be added to projects and programs.

## Funding List

The *Projects > Manage Funding > Funding List* subtask is a grid containing all of the funding sources. It operates in the same way as the Project List and Bridge List.

Projects > Manage Funding > Funding List

Filter: [v]      Layout: Funding Default      Jump to Funding: [v]

Funding Source Name	Status	Type	Description
X Federal	Active	Federal	
X Scour Fund	Active	State	
X State	Active	State	

Total Fundings: 3      Matching Filter: 3

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Filters and layouts can be created on the *Manage Filters* and *Manage Layouts* tasks, and funding sources can be deleted by clicking the **X** icon for the desired funding source in the Funding List.

The major difference for the *Funding List* subtask compared to the Bridge List and Project List is that selecting a funding source from the grid takes the user directly to the *Create/Edit Funding Sources* subtask.

# Create/Edit Funding Sources

The *Projects > Manage Funding > Create/Edit Funding Sources* subtask controls all of the settings for new or selected funding sources.

Use the *Selected Funding* dropdown to change the currently selected funding source or click the *Add New* button to add a new funding source.

## Funding Source Details

The *Funding Source Details* grouping is used to determine all of the basic information for the funding source.

The most important control in the grouping is the *Funding Source Status* dropdown. There are three funding source status stages: Planned, Active, and Closed. The funding source must be in at least the "Active" status in order for other users to view the funding source.

## Funding Source Notes

The *Funding Source Notes* grouping can be used to enter notes for the funding source.

## Funding Source Targets

The *Funding Source Targets* grouping allows for the creation of funding source targets. Funding source targets are used when funding is added to a project or program. This allows projects and programs to add the same funding source more than once because the target dates are different.

Funding Source Targets					
Target Date	Target Amount	Current Plan	Remaining	Notes	
X 01/01/2019	45000000	\$46,000,000.00	-\$1,000,000.00	Auto created from Program Funding Source - Program: Delete Me.	
X 01/01/2018	1000000	\$1,000,000.00	\$0.00	Auto created from Program Funding Source - Program:	
X 01/01/2016	5000000	\$1,000,000.00	\$4,000,000.00		
X 01/01/2015	5000000	\$0.00	\$5,000,000.00		
Total Funding Source Amount: \$56,000,000.00					
					Add New

Click the *Add New* button within the grouping to add a new funding source target.

If a funding source target is currently being used, the amount will show up in the Current Plan column of the grid. The Remaining column of the grid will then display how much money is remaining for the funding source target.

Below the grid of funding source targets is listed the total funding source amount for all of the funding source targets combined.

## Associated Programs and Projects

The *Associated Programs and Projects* grouping displays all of the programs and projects that are associated with the funding source target date selected in the dropdown at the top of the grouping.

Associated Programs and Projects								
01/01/2019								
Target Year Programs								
Program Name	Program ID	Alternate ID	Description	Start Date	End Date	Status	Funding Amount	
X Preservation	7A3CF0D99B6A4378B9A837F76AD4782C					Active	\$1,000,000.00	
Total Program Cost (All Requests): \$1,000,000.00								
Total Program Cost (Approved): \$1,000,000.00								
Target Year Projects								
Project Name	Project ID	Category	Cost	Date	Project Status			
No Projects Associated To The Funding Source								
Total Cost (All Requests): \$1,000,000.00								
Total Cost (Approved): \$1,000,000.00								

## Target Year

There is a grouping for the programs - *Target Year Programs* - and a grouping for the projects - *Target Year Projects*. To remove a program or project from the selected funding source target date, click the X icon for that program/project.

## Create/Edit Funding Sources Page Controls

The *Save* button saves the changes made to the selected program.

The *Cancel* button cancels the changes made to the selected program and refreshes the page.

Projects > Manage Funding > Create/Edit Funding Sources Control Information			
Control Name	Table Name	Column Name	Notes
<i>Funding Source Details Grouping</i>			
Funding Source ID	PON_FUNDING	PON_FUNDING_GD	Database ID for the funding source.

*Projects > Manage Funding > Create/Edit Funding Sources Control Information*

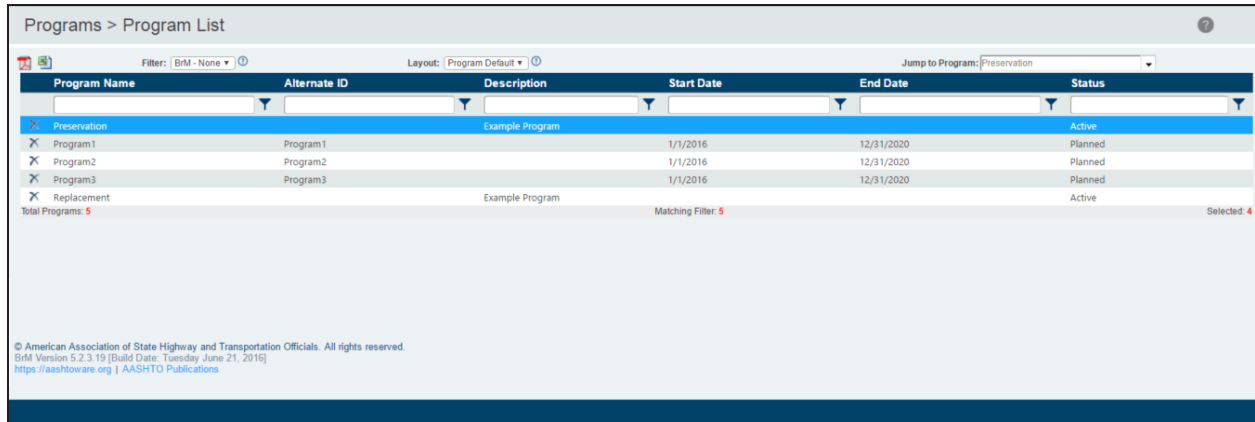
<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
Funding Source Status	PON_FUNDING	FUNDING_STATUS	The current status of the funding source.
Funding Source URL	PON_FUNDING	URL	The agency's URL for the funding source.
Funding Source Name	PON_FUNDING	PON_FUNDING_LB	The name of the funding source.
Funding Source Type	PON_FUNDING	FUNDING_TYPE	The type of funding or from where the funding comes.
Funding Source Description	PON_FUNDING	DESCRIPTION	A description of the funding source.
Funding Sources Notes	PON_FUNDING	NOTES	Additional notes about the funding source.
<b><i>Funding Source Targets Grouping</i></b>			
Target Date	PON_FUNDING_TARGETS	TARGET_DATE	The date the funds from selected funding source are expected to be available.
Target Amount	PON_FUNDING_TARGETS	AMOUNT	The amount of funding from the selected funding source.
Notes	PON_FUNDING_TARGETS	NOTES	Notes about the selected funding source.

# Programs

- The Programs section of the manual addresses each of the tasks in BrM's *Programs* tab. The *Programs* tab allows for the creation and management of agency programs.

# Program List

The *Programs > Program List* task is a complete list of all of the programs in the system that can be filtered and customized in various ways and allows for the selection of programs prior to performing other actions in the system.




## Selecting a Program

The *Program List* task's main function is program selection. To select a program, simply click on that program's row within the list. The major difference for the Program List compared to the Bridge List and Project List is that selecting a program from the grid takes the user directly to the *Create/Edit Program* task.

## Filters

Due to the vast size of some users' systems, filters are necessary to sort and locate programs based on specified criteria.

There are two main ways to filter programs:

1. **Filter Dropdown** - The **Filter** dropdown lists all of the relevant filters that have been created/edited on the *Manage Filters* task (found in both the *Bridges* and *Projects* tabs). When a filter is selected from the dropdown, the Program List will automatically update with the filtered programs.
2. **Quick Filters** - Each column in the Program List has a quick filter textbox that enables the user to filter the grid based on a condition, such as "Contains" or "StartsWith." The user types into the **Quick Filter** textbox and then clicks the  symbol to select a condition. Once the condition is selected, the grid will automatically be updated with the filtered programs.

**\*Note:** By default, filling in the **Quick Filter** textbox and then pressing Enter on the keyboard will automatically make use of the "Contains" quick filter condition.

The following table explains the various selectable quick filter conditions:

Quick Filter Conditions	
Condition	Description
NoFilter	No filter is applied - filter controls are cleared.
Contains	Returns results that contain the entered value. Same as: dataField LIKE '%value%'
DoesNotContain	Returns results that do not contain the entered value. Same as dataField NOT LIKE '%value%'
StartsWith	Returns results that start with the entered value. Same as: dataField LIKE 'value%'



Quick Filter Conditions	
Condition	Description
EndsWith	Returns results that end with the entered value. Same as: dataField LIKE '%value'
EqualTo	Returns results that exactly match the entered value. Same as: dataField = value
NotEqualTo	Returns results that do not exactly match the entered value. Same as: dataField != value
GreaterThan	Returns results with a value greater than the entered value. Same as: dataField > value
LessThan	Returns results with a value less than the entered value. Same as: dataField < value
GreaterThanOrEqualTo	Returns results with a value greater than or exactly matching the entered value. Same as: dataField >= value
LessThanOrEqualTo	Returns results with a value less than or exactly matching the entered value. Same as: dataField <= value
Between	Returns results with a value that falls between the two entered values. Same as: value1 <= dataField <= value2 <b>*Note: Value1 and value2 should be separated by a space when entered into the quick filter.</b>
NotBetween	Returns results with a value that does not fall between the two entered values. Same as: dataField <= value1 && dataField >= value2 <b>*Note: Value1 and value2 should be separated by a space when entered into the quick filter.</b>
IsEmpty	Returns results where the specific field is empty. Same as: dataField = "
NotIsEmpty	Returns results where the specific field is not empty. Same as: dataField != "
IsNull	Returns only null values.
NotNull	Returns only non-null values.

## Layout

The **Layout** dropdown determines the Program List's columns. There is a default layout on the *Program List* task, but new layouts can be created on the *Manage Layouts* task (found in both the *Bridges* and *Projects* tabs).

## Jump to Program

The **Jump to Program** textbox/dropdown allows the user to search for and locate a specific program. The user can type the program name into the textbox or use the dropdown to find the program by clicking through the pages. When the program is selected from the **Jump to Program** textbox/dropdown, the user will automatically be taken to the *Create/Edit Programs* task.

## Export Options

There are two export options located at the top left corner of the Program List: PDF and XLS. The export options will export all of the programs currently shown in the list.

# Create-Edit Programs

The *Programs > Create/Edit Program* task is used to create or edit a program. A program is a collection of specific projects with specific constraints (budget, performance, etc.) that operates for a predetermined period of time.

## Program Details

The *Program Details* grouping contains the basic information that defines the program.

Program Details Fields	
Field	Description
<b>Program Alternate ID</b>	An alternative ID to make the program easily identifiable.
<b>Program Status</b>	Determines the status of the program: Planned, Active, or Closed.
<b>Program Start Year</b>	The year that the program will begin.
<b>Program Name</b>	The main identifier for the program.
<b>Program URL</b>	The agency website for the program, if applicable.
<b>Program End Year</b>	The year that the program will end.
<b>Program Objectives</b>	Indicates the specific objective of the program. This is an agency defined field that can be set using the pon_program - program_objective setting on the <i>Admin &gt; General Config &gt; Parameters</i> task.
<b>Structure</b>	Determines the priority and importance of bridges in the same network using a formula established

Program Details Fields	
Field	Description
<b>Weights Formula</b>	on the <i>Admin &gt; Modeling Config &gt; Advanced Formulas</i> task.
<b>Required Minimum Cost</b>	The minimum cost of a program's work. This threshold ensures that BrM does not recommend programs that have improbably low costs for which agencies would not perform work.  <b>*Note:</b> The minimum cost applies to each individual project generated for the program, not the sum of all of the projects.
<b>Bridge Filter</b>	Determines which bridges are available to be added to the program. Bridge filters can be created on the <i>Manage Filters</i> tasks. Only filters with an "Inspection" context will appear in the dropdown.  <b>*Note:</b> The "Share" feature of filters is ignored for this dropdown. All filters with the "Inspection" context, regardless of share status, will appear in the dropdown.
<b>Program Description</b>	An overall description of the program and what it entails.
<b>Program Notes</b>	Notes related to the program.

## Configuration Data

The *Configuration Data* grouping allows the user to establish the program's configuration data for the LCCA.

The screenshot shows a form titled "Configuration Data" with the following fields and values:

- NBI Deterioration Method: NbiConverter
- NBI Converter Profile: BrM Default
- Long-Term Analysis Period: 50
- Inflation Estimation Method: None
- Discount Rate: 4
- Residual HiX Approximation:

The **NBI Deterioration Method** dropdown determines whether the program's deterioration method will use a specific NBI converter profile or component level deterioration. If "NbiConverter" is chosen, the **NBI Converter Profile** dropdown will be available to select a specific NBI converter profile that was created on the *Admin > Modeling Config > NBI Conversion Profiles* task.

The **Long-Term Analysis Period** textbox determines the length of time in years for the LCCA. The default value is 50 years.

The **Discount Rate** textbox indicates the cost discount percentage for the LCCA. The discount rate suggests that the further in the future an action/event occurs, the less it will cost. The default value is 4 percent.

The **Inflation Estimation Method** dropdown allows the user to determine if inflation will be considered for the program and, if so, which method will be used:

- **None** - No inflation used.
- **Undefined** - Currently undefined rate.
- **CostIndexing** - Uses the inflation rates established on the *Admin > Modeling Config > Cost Index* task.
- **FixedInflationRate** - Causes the **Inflation Rate** textbox to appear to allow the user to enter a fixed inflation percentage rate.

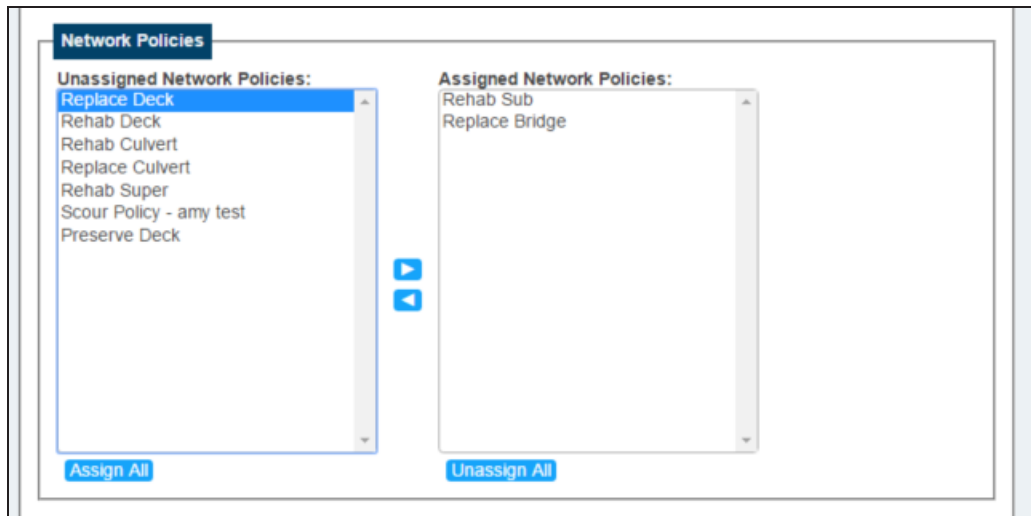
**\*Note:** When viewing results it must be remembered that discount rate and inflation rate directly oppose each other. For instance, a discount rate of 4 percent and a fixed inflation rate of 4 percent will end up causing the rate to stay the same.



At the end of the LCCA, the system estimates the remaining value of the bridge. The *Residual HiX Approximation* checkbox determines whether that estimation will be simple or complex. If checked, the simplified residual estimation is used and the remaining value of the bridge is estimated based on the bridge's health index at the end of the LCCA. If unchecked, the complex residual estimation is used and the simulation continues until bridge replacement.

**\*Note:** The *Residual HiX Approximation* checkbox is checked by default. It is less accurate than the complex method, but it is significantly faster.

## Network Policies

The *Network Policies* grouping allows the user to determine which network policies will be included in the program. Network policies determine which projects are automatically generated for the program during optimization based on the actions included in the network policy.

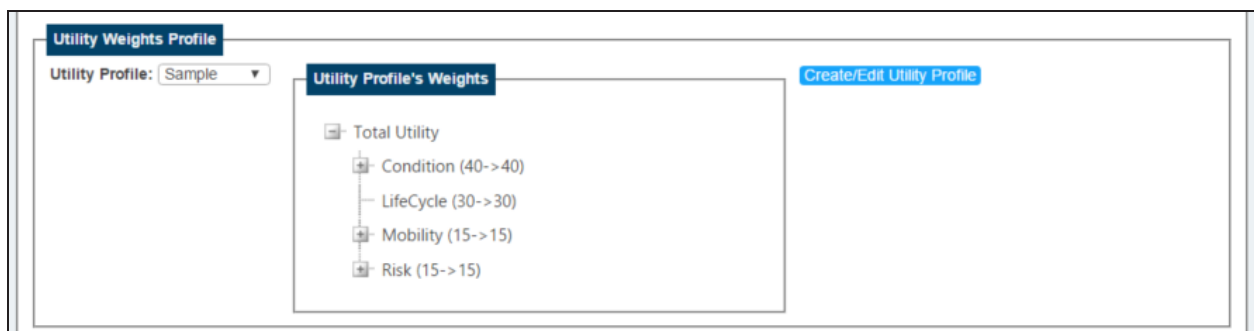


To move one or more network policies from one list to the other, select all of the desired network policies and then click the right or left arrow -   - to move the selections to the desired list.

## Utility Weights Profile

The *Utility Profile* dropdown is used to select a utility weights profile for the program. Utility weights profiles are created on the *Admin > Modeling Config > Weights Profile* task and are used to override aspects of the default utility weights in the system.

When a utility weight profile is selected, the *Utility Profile's Weights* grouping will appear:



The utility tree displays the default utility weights and to what weight they have changed.

**Example:** If the Condition utility reads "Condition (31->50)", the default weight was 31 and the utility weights profile has changed it to 50.

Clicking the **Create/Edit Utility Profile** button will open the *Admin > Modeling Config > Weights Profile* task so that the utility weights profiles can be created/edited.

## Subdivision Profile

The **Subdivision Profile** dropdown is used to select a subdivision profile for the program. The subdivision profiles are created on the *Admin > Modeling Config > Subdivision Profiles* task and determine how the program will be subdivided based on a specific table and field name within the database. For instance, a subdivision profile could subdivide the program by district.

When a subdivision profile is selected, the *Subdivision Profile Segments* and *Filter Segments* groupings will appear:

Table Name	Field Name
inspevnt	dkrating

Index	Combinations	# of Bridges	
1	0 Failed	8	X
2	1 Imminent failure	2	X
3	2 Critical	22	X
Total:		32	

The *Subdivision Profile Segments* grouping displays the table and field names subdividing the program. Clicking the **Create/Edit Subdivision Profile** button will open the *Admin > Modeling Config > Subdivision Profiles* task so that the subdivision profiles can be created/edited.

The *Filter Segments* grouping allows the user to create filters based on selections from the available subdivision segments. The user can use each segment's dropdown to make a selection, then click the **Add** button. The results will then be displayed in a grid.

**Example:** If the selected subdivision profile uses `inspevnt.dkrating` as a segment, the filter segments available to add will be values 0-9 because the deck rating must be a value between 0-9. The program will then only include bridges that meet those filter segments.

Click the **X** icon to delete a filter segment. If the user deletes a filter segment that has data tied to it, the user will receive a popup notification when trying to save the changes to the program:

**Additional Action Required!**

This Program has Filter Segments that are marked to be deleted. Deleting a Filter Segment will also delete any associated data tied to the Filter Segment. Do you wish to continue?

OK Cancel

## Create/Edit Programs Page Controls

Program: Preservation Create New Copy >>

Use the **Program** dropdown to select an existing program to edit.

Click the *Create New* button to create a new program.

Click the *Copy>>* button to create a copy of the selected program. This will reveal the *Copy Name* textbox and the *Only Copy Frozen* checkbox.

If the *Only Copy Frozen* checkbox is checked, the new program will only include projects that are frozen to the copied program.

When the desired selections are made and a name is entered into the *Copy Name* textbox, click the *Copy* button to complete the copy or click the << button to cancel the copy.



Click the *Save* button to save changes to the selected program.

Click the *Delete* button to delete the selected program.

<i>Programs &gt; Create/Edit Program Control Information</i>			
<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
Program Alternate ID	PON_PROGRAM	ALT_ID	An alternative ID to make the program easily identifiable.
Program Start Date	PON_PROGRAM	START_DATE	The year that the program will begin.
Program Name	PON_PROGRAM	PON_PROGRAM_GD	The main identifier for the program.
Program Status	PON_PROGRAM	PROGRAM_STATUS	Determines the status of the program: Planned, Active, or Closed.
Program End Date	PON_PROGRAM	END_DATE	The year that the program will end.
Program Objective	PON_PROGRAM	PROGRAM_OBJECTIVE	Indicates the objective of the program. This is an agency defined field that can be set using the pon_program - program_objective setting on the <i>Admin &gt; General Config &gt; Parameters</i> task.
Program URL	PON_PROGRAM	URL	The agency website for the program, if applicable.
Program Description	PON_PROGRAM	DESCRIPTION	An overall description of the program and what it entails.
Program Notes	PON_PROGRAM	NOTES	Notes related to the program.

# Assign Projects

The *Programs > Assign Projects* task allows the user to assign/unassign projects to programs, delete projects, and freeze/unfreeze projects.

Programs > Assign Projects

Assign Projects

Projects List

Filter: BrM - None Program: All

	Alt ID	Name	Start Date	Add Cost	Create Date	Status	First Name	Project Category
<input type="checkbox"/>	02793A	(Replace Deck)	1/1/2016 12:00:00 AM	0	7/26/2016 3:56:11 AM	Proposed	Pontis	Deck Work
<input type="checkbox"/>	25A57	(Replace Deck)	1/1/2016 12:00:00 AM	0	7/26/2016 3:09:55 AM	Proposed	Pontis	Deck Work
<input type="checkbox"/>	19C497	(Replace Deck, Replace Super)	1/1/2017 12:00:00 AM	0	7/26/2016 3:10:07 AM	Proposed	Pontis	No Category
<input type="checkbox"/>	471106	(Replace Deck)	1/1/2016 12:00:00 AM	0	7/26/2016 3:57:08 AM	Proposed	Pontis	Deck Work
<input type="checkbox"/>	08676B	(Replace Deck)	1/1/2016 12:00:00 AM	0	7/26/2016 3:09:57 AM	Proposed	Pontis	Deck Work
<input type="checkbox"/>	04728	(Replace Deck)	1/1/2016 12:00:00 AM	0	7/26/2016 3:57:08 AM	Proposed	Pontis	Deck Work
<input type="checkbox"/>	01767	(Replace Structure)	1/1/2016 12:00:00 AM	0	7/26/2016 3:09:55 AM	Proposed	Pontis	Deck Work
<input type="checkbox"/>	03977	(Replace Structure)	1/1/2016 12:00:00 AM	0	7/20/2016 10:35:28 AM	Proposed	Pontis	No Category
<input type="checkbox"/>	03092A	(Replace Structure)	1/1/2016 12:00:00 AM	0	7/20/2016 10:45:05 AM	Proposed	Pontis	No Category
<input type="checkbox"/>	04939	(Replace Structure)	1/1/2016 12:00:00 AM	0	7/20/2016 10:35:28 AM	Proposed	Pontis	No Category
<input type="checkbox"/>	61C40	(Replace Deck)	1/1/2016 12:00:00 AM	0	7/26/2016 3:09:55 AM	Proposed	Pontis	Deck Work
<input type="checkbox"/>	02147	(Replace Deck)	1/1/2016 12:00:00 AM	0	7/26/2016 3:56:12 AM	Proposed	Pontis	Deck Work
<input type="checkbox"/>	63B013	(Replace Deck)	1/1/2016 12:00:00 AM	0	7/26/2016 3:56:10 AM	Proposed	Pontis	Deck Work
<input type="checkbox"/>	Optimizer Generated 7/26/2016		1/1/2016 12:00:00 AM	0	7/26/2016 3:56:05 AM	Proposed	Pontis	No Category
<input type="checkbox"/>	59C213	(Replace Deck, Rehab Sub)	1/1/2016 12:00:00 AM	0	7/26/2016 3:09:57 AM	Proposed	Pontis	No Category

First Previous 1 2 3 Next Last

Total Projects: 2679 Selected Projects: 0

Items per page: 15

Projects Matching Search: 344

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## Projects List

The *Projects List* grouping displays all of the projects in the system and can be filtered based on a Project List filter or based on a program's existing projects.

No actions can be performed on the page until at least one project's checkbox is selected in the *Projects List* grouping. Once selected, the *Choose an Action* grouping will appear.

## Choose an Action

Choose an Action

Assign Selected Projects to program(s): Program4 Program1 Program3 Preservation Program2 Replacement

and Freeze to selected program(s) Program

The *Choose an Action* grouping is used to perform an action on the selected projects. The available actions include:

## Assign Selected Projects

To assign the selected projects to a program, select "Assign Selected Projects" from the *Action* dropdown and use the *Programs* listbox to select one or more (hold down the CTRL key to select multiple) programs to which to assign the projects.

Use the *Freeze* dropdown to determine if the selected projects will be frozen or not. If "Freeze" is selected, use the second dropdown to determine whether it will freeze to the program, the year, or both. If "Year" or "Program and Year" is selected, another dropdown will appear so that a year can be chosen.

Freezing a project to a program and/or year means that regardless of the program optimization's recommendations, the link between the project-program and/or project-year cannot be broken.

**\*Note:** The same project can be assigned and frozen to multiple programs.

## Unassign Selected Projects

To unassign the selected projects from a program, select "Unassign Selected Projects" from the *Action* dropdown.

The user can then determine whether the project should be removed from "All Programs" or the "Selected Programs." If "Selected Programs" is chosen, the *Programs* listbox will reappear and the user can select one or more (hold down the CTRL key to select multiple) programs from which to remove the projects.

**\*Note:** Users do not need to verify that a project is within the selected program in order to delete it. If the project is not within the selected program, no change will occur.

## Delete Selected Projects

To delete the selected projects, select "Delete Selected Projects" from the *Action* dropdown. Choosing to delete the selected projects will remove them from the system completely once the page is saved.

## Assign Projects Page Controls

Once the desired action has been chosen, click the *Save* button to perform the action.



# Performance Measures


The *Programs > Performance Measures* task is used to include additional performance measures (utility value is automatically included in program optimization) to the selected program. The performance measures are used to evaluate the selected program.

The *Program* dropdown is used to select the program for which the performance measures are being established.

The *Scenario* dropdown is used to select the scenario of the selected program for which the performance measures are being established.

## Select Performance Measures

The *Select Performance Measures* grouping allows the user to determine which performance measures to use on the selected program.


To add a performance measure, click the *Add New Record* symbol -  - to make the *Performance Measures* dropdown appear.

The available performance measures are:

Performance Measures	
Measure	Description
Pct. Good (Count-Based)	The percentage of bridges included in the program analysis with an overall NBI rating greater than or equal to 7. <b>*Note:</b> This is count-based, meaning the size of the bridge is NOT considered. With this method, a 1000 ft. bridge is equal to a 100 ft. bridge. It's a 1:1 ratio.
Pct. Good (Surface-Based)	The percentage of deck area of bridges included in the program analysis with an overall NBI rating greater than or equal to 7. <b>*Note:</b> This is surface-based, meaning the size of the bridge IS considered. With this method, a 1000 ft. bridge affects the overall per-



Performance Measures	
Measure	Description
	centage much more than a 100 ft. bridge.
Pct. Good/Fair (Count-Based)	The percentage of bridges included in the program analysis with an overall NBI rating of 6 or 5. <b>*Note:</b> This is count-based, meaning the size of the bridge is NOT considered. With this method, a 1000 ft. bridge is equal to a 100 ft. bridge. It's a 1:1 ratio.
Pct. Good/Fair (Surface-Based)	The percentage of deck area of bridges included in the program analysis with an overall NBI rating of 6 or 5. <b>*Note:</b> This is surface-based, meaning the size of the bridge IS considered. With this method, a 1000 ft. bridge affects the overall percentage much more than a 100 ft. bridge.
Pct. Poor (Count-Based)	The percentage of bridges included in the program analysis with an overall NBI rating less than 5. <b>*Note:</b> This is count-based, meaning the size of the bridge is NOT considered. With this method, a 1000 ft. bridge is equal to a 100 ft. bridge. It's a 1:1 ratio.
Pct. Poor (Surface-Based)	The percentage of deck area of bridges included in the program analysis with an overall NBI rating less than 5. <b>*Note:</b> This is surface-based, meaning the size of the bridge IS considered. With this method, a 1000 ft. bridge affects the overall percentage much more than a 100 ft. bridge.
Deck NBI Rating	The average of all of the deck NBI ratings for the bridges included in the program analysis.
Substructure NBI Rating	The average of all of the substructure NBI ratings for the bridges included in the program analysis.
Superstructure NBI Rating	The average of all of the superstructure NBI ratings for the bridges included in the program analysis.
Culvert NBI Rating	The average of all of the culvert NBI ratings for the bridges included in the program analysis.
Health Index	The average of all of the health indexes for the bridges included in the program analysis.
Database Field Performance	The user can select the table and column of the desired field in the database and determine the best and worst values.

Select the desired performance measure, then click the **Insert** button to add the performance measure. Click the **Cancel** button to cancel the addition of the performance measure.

Each performance measure added will populate default values into the Best Value and Worst Value columns. These values cannot be edited. Clicking the  icon only allows the user to change the selected performance measure, not the best and worst values.

If "Database Field Performance" is selected, the user can use the **Table** and **Field** dropdowns to select the specific field in the database to use.

**Select Performance Measures**

Performance Measures	Best Value	Worst Value		
Utility (Sample)	100.00	0.00		
Health Index	100.00	0.00		

Database Field Performance:


Table:


Field:

Best Value:

Worst Value:

Min value in database: 0  
Max value in database: 9

Unlike the other performance measures, the database field selections don't have default best and worst values. The **Best Value** and **Worst Value** textboxes allow the user to determine what those values will be. The minimum and maximum values in the database are listed below the textboxes to aid the user in determining the values. These are the only performance measure values that can be edited using the  icon.

The performance measure can be edited using the **Edit** link or deleted using the  symbol.

## Performance Constraints by Segment

The *Performance Constraints by Segment* grouping allows the user to specify constraints (if desired) on the performance measures added in the *Select Performance Measures* grouping. The constraints are separated by the selected program's segments which are set in the *Subdivision Profile* grouping on the *Programs > Create/Edit Programs* task.

**Performance Constraints by Segment**

Segment	Utility (Sample)	Health Index
4 Poor	Min: <input type="text"/> Target: <input type="text"/>	Min: <input type="text"/> Target: <input type="text"/>
1 Imminent failure	Min: <input type="text"/> Target: <input type="text"/>	Min: <input type="text"/> Target: <input type="text"/>
2 Critical	Min: <input type="text"/> Target: <input type="text"/>	Min: <input type="text"/> Target: <input type="text"/>
3 Serious	Min: <input type="text"/> Target: <input type="text"/>	Min: <input type="text"/> Target: <input type="text"/>
0 Failed	Min: <input type="text"/> Target: <input type="text"/>	Min: <input type="text"/> Target: <input type="text"/>

**\*Note:** If no program segments exist, the grid will not be displayed and a link to the *Create/Edit Programs* task will be available so that the user can create segments from the *Subdivision Profiles* grouping.

The performance constraints are used to further specify the optimization process. In addition to maximizing utility, the optimization will attempt to adhere to the specified performance (and budget) constraints.

The available constraints, depending on the type of performance measure, are:

Performance Constraints	
Constraint	Description
Minimum	The performance measure should be greater than or equal to the value.
Maximum	The performance measure should be less than or equal to the value.
Target	Represents the performance level the program is attempting to achieve.

**Example:** The Superstructure NBI Rating measure has the following constraints: Min: 6 and Target:  $\geq 7$ . This means that the optimization process will attempt to create a program in which each bridge's individual superstructure NBI rating is greater than or equal to 6 and the overall average of the bridge's superstructure NBI rating is at least 7.

## Performance Measure Page Controls

Click the *Save* button to save the changes made to the performance measures.

Click the *Cancel* button to cancel the changes made to the performance measures.

Programs > Performance Measures Control Information			
Control Name	Table Name	Column Name	Notes
<i>Select Performance Measures Grouping</i>			
Measure	PON_PROG_PERFORMANCE	PON_PERFORM_MEASURE_GD	The selected performance measure.
Table	PON_PROG_PERFORMANCE	TABLE_NAME	The database table used for the "Database Field Performance" performance measure.
Field	PON_PROG_PERFORMANCE	FIELD_NAME	The database field used for the "Database Field Performance" performance measure.
Best Value	PON_PROG_PERFORMANCE	BEST_FIELD_VALUE	The best possible value for the selected "Database Field Performance" performance measure.
Worst Value	PON_PROG_PERFORMANCE	WORST_FIELD_VALUE	The worst possible value for the selected "Database Field Performance" performance measure.
<b>Constraints Grid</b>			
Min	PON_PROG_CONSTRAINT	MINIMUM	The minimum value performance constraint for the segment.
Max	PON_PROG_CONSTRAINT	MAXIMUM	The maximum value performance constraint for the segment.
Target	PON_PROG_CONSTRAINT	TARGET	The target value performance constraint for the segment.

# Funding Allocation

The *Funding Allocation* task is used to specify the selected program's funding sources and amounts as well as to distribute the funds between the program's segments.

Program: p3 Scenario: Default

**Funding Allocation**

Funding Source	Amount	Date	Notes
State	\$5,000,000	01/01/2021	
Federal	\$12,000,000	01/01/2023	
Federal	\$8,000,000	01/01/2022	
Federal	\$10,000,000	01/01/2021	
State	\$3,000,000	01/01/2022	
State	\$7,000,000	01/01/2023	

A new Funding Source Target in Projects > Funding Sources may be created for new Funding Allocations

Add New

**Budget Distribution**

Total budget: \$107,999,998  
Total allocated funds: \$0

	2021	2022	2023	2024	2025	2026	2027
Identified annual funds:	\$15,000,000	\$9,000,000	\$19,000,000	\$0	\$0	\$0	\$0
Additional funds:	\$9,285,714	\$9,285,714	\$9,285,714	\$9,285,714	\$9,285,714	\$9,285,714	\$9,285,714
Total annual budget:	\$24,285,714	\$18,285,714	\$28,285,714	\$9,285,714	\$9,285,714	\$9,285,714	\$9,285,714
Allocated funds:	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Available Funds:	\$24,285,714	\$18,285,714	\$28,285,714	\$9,285,714	\$9,285,714	\$9,285,714	\$9,285,714

Distribute Get Performances

Budget distribution by program's segments:

Segment	Utility	Health Index	Total Budget per segment	Pct. overall budget	2021	2022	2023	2024	2025	2026	2027
27 Railroad	0	0	\$64,999,998	60.18%	\$9,285,714	\$9,285,714	\$9,285,714	\$9,285,714	\$9,285,714	\$9,285,714	\$9,285,714
Total			\$64,999,998		\$9,285,714	\$9,285,714	\$9,285,714	\$9,285,714	\$9,285,714	\$9,285,714	\$9,285,714

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Cancel Save Save & Close

Use the *Program* and *Scenario* dropdowns to determine for which programs to allocate funding.

## Funding Allocation

The *Funding Allocation* grouping displays the program's funding sources and the amounts from each source.

To add a new funding source, click the *Add New* button.

Program: brantest Scenario: Default

**Funding Allocation**

Funding Source	Amount	Date	Notes
State	\$500,000	01/01/2016	
Federal	\$500,000	01/01/2016	
Federal	\$500,000	01/01/2015	
State	\$2,000,000	01/01/2015	

A new Funding Source Target in Projects > Funding Sources may be created for new Funding Allocations

Add New

The *Funding Source* dropdown determines from where the funding comes. To create new funding sources, use the *Projects > Manage Funding > Create/Edit Funding Sources* subtask.

The *Amount* textbox is used to indicate the amount of funds allocated to the program from the source.

The *Date* dropdown indicates the date that the selected funding source's funds were allocated. The funding source dates are determined on the *Projects > Manage Funding > Create/Edit Funding Sources* subtask.

To delete a funding source from the program, click that funding source's **X** symbol.

**\*Note:** The *Funding Allocation* grouping will be unavailable if a non-default scenario is selected from the *Scenario* drop-down at the top of the page.

## Budget Distribution

The *Budget Distribution* grouping aids users in distributing the program's funding.

**Budget Distribution**

Total budget: \$295,000  
Total allocated funds: \$0

	2016	2017
Identified annual funds:	\$150,000	\$145,000
Additional funds:	\$0	\$0
Total annual budget:	\$150,000	\$145,000
Allocated funds:	\$0	\$0
Available Funds:	\$150,000	\$145,000

Budget distribution by program's segments: Input method:  Actual Budget Value  Percentage of Annual Budget

Segment	Utility Health Index	Total Budget per segment	Pct. overall budget	2016	2017
0 Failed	0 0	\$0	0%	<input type="text" value=""/>	<input type="text" value=""/>
1 Imminent failure	0 0	\$0	0%	<input type="text" value=""/>	<input type="text" value=""/>
2 Critical	0 0	\$0	0%	<input type="text" value=""/>	<input type="text" value=""/>
<b>Total</b>		\$0		\$0	\$0

## Quick Distribution

If no funding sources have been chosen for the program in the *Funding Allocation* grouping, the *Quick Distribution* grouping will be present.

**Budget Distribution**

**Quick Distribution**

Override budget

Total budget: \$0  
Total allocated funds: \$0

The *Override Budget* textbox allows the user to enter a budget that will be distributed evenly among the program years.

To distribute the funds, click the *Distribute Evenly* button and the funds will then be split and appear in the *Additional Funds* textbox for each program year in the first funding chart.

**\*Note:** The *Distribute Evenly* button rounds the distributed funds to the nearest integer, therefore the sum of all of the *Additional Funds* textboxes may be slightly different than the amount entered into the *Override Budget* textbox.

## Funding Grids

The first grid displays the total annual budget for each year represented in the *Funding Allocation* grouping:

Total budget: \$295,000		
Total allocated funds: \$0		
	2016	2017
Identified annual funds:	\$150,000	\$145,000
Additional funds:	\$0	\$0
Total annual budget:	\$150,000	\$145,000
Allocated funds:	\$0	\$0
Available Funds:	\$150,000	\$145,000

Each year also has an **Additional Funds** textbox that can be used to enter additional funds not listed in the *Funding Allocation* grouping or where the distributed funds go if the *Quick Distribution* grouping was available and used.

The second grid allows the user to distribute the program's annual budget between the program's segments. The **Input Method** radio buttons beside the grid determine if the entered values will be actual budget values or a percentage of the annual budget.

**\*Note:** The second grid and **Distribute** and **Get Performances** buttons will not appear unless the program has filter segments (determined from the subdivision profile).

Segment	Utility	Total Budget per segment	Pct. overall budget	2016	2017
0 Failed	0	\$0	0%		
1 Imminent failure	0	\$0	0%		
2 Critical	0	\$0	0%		
<b>Total</b>		\$0		\$0	\$0

One method of distributing the funds is to do so manually by using the textboxes for each year of each segment and entering a dollar amount or percentage in each. In order to make a more informed decision on how to distribute funds, the user can click the **Get Performances** button to reveal the performance levels of each segment at the beginning of the program. The performance measures shown are determined on the *Programs > Performance Measures* task:

Segment	Utility	Total Budget per segment	Pct. overall budget	2016	2017
0 Failed	27.94	\$0	0%		
1 Imminent failure	46.35	\$0	0%		
2 Critical	41.32	\$0	0%		
<b>Total</b>		\$0		\$0	\$0

The second method of distributing the funds is to do so automatically using the **Distribute** button. Clicking the **Distribute** button takes the budget provided for each year of the program and distributes it amongst the program's segments based on the performance of the segments.

The **Year** checkboxes for each column of the grid allow the user to freeze the funding for that year. This ensures that when the funds are distributed using the **Distribute** button, the checked years are skipped and do not have funds distributed to them.

The **X** symbol in each textbox of the grid allows the user to delete the "\$" and value in the textbox and leave a null value instead of a "\$0" value. The difference between "\$0" and null becomes important when optimizing the program. If "\$0" is in the textbox, the optimizer will not distribute any funds to that specific segment/year combination. If the textbox is null when the program is optimized, that specific segment/year combination will have its funding determined in an effort to find the best cost to benefit ratio. Regardless of the number of null fields, the optimizer will never distribute more funding than has been allocated.

## Funding Allocation Page Controls

Click the **Cancel** button to cancel the changes made to the funding allocation and return to the Program List.

Click the **Save** button to save the changes made to the funding allocation and remain on the page.

Click the **Save & Close** button to save the changes made to the funding allocation and return to the Program List.

*Programs > Funding Allocation Control Information*

<b>Control Name</b>	<b>Table Name</b>	<b>Column Name</b>	<b>Notes</b>
Funding Source	PON_FUNDING_TARGETS	PON_FUNDING_GD	The selected funding source in the <i>Funding Allocation</i> grouping.
Amount	PON_FUNDING_TARGETS	TARGET_DATE	The expected date the funding will be received.
Year	PON_FUNDING_TARGETS	AMOUNT	The amount of funding that will be received.
Notes	PON_FUNDING_TARGETS	NOTES	Notes about the selected funding source.



# Program Planning

The *Programs > Program Planning* task is used to run the optimization process for the selected program and assign and manage the projects within the program.

As its name suggests, the purpose of the program optimizer is to develop optimal programs. The optimizer conducts a benefit cost analysis on a pool of project alternatives and then selects a set of projects that best meet the program's goals under its specified constraints. The pool of project alternatives includes the following projects:

- a. Automatic projects generated from network policies.
- b. Projects generated from open work candidates.
- c. Projects manually assigned to the program.

The current optimization algorithm can consider only manual projects that affect a single bridge. Manual projects affecting multiple bridges will not be considered as alternatives for optimization.

The optimization will run on a separate executable from the web application. Specifically, a Windows Service is responsible for running the program optimization.

While the optimization is running, users can monitor the status of the optimization on this page. Once the optimization is completed, users can view all of the projects assigned to the program by the optimization process.

Only one optimization process can be run for a given database. While the optimization is running for a program, users cannot start the optimization on other programs.

The status of the optimization process is stored in PON\_PROG\_OPTIMIZATION. A new record is created in this table when users start running the optimization process for a program. The record contains the configuration parameters determined by users. The service continuously polls this table to check if a new optimization process is started. Once detecting a new entry, the executable retrieves the parameters provided by users and then runs the process under the given parameters.

The screenshot shows the 'Programs > Program Planning' interface. It features a 'Run Optimization' button and several configuration options: Program (Program4), Scenario (Scenario1), Optimization Method (Maximize Utility), Keep assigned projects (No), Run on all scenarios (No), and Respect external frozen projects (Yes). Below these are 'Program Information' fields: Start Year (2016), End Year (2020), Utility Weight Profile (Sample), Assigned Network (Replace Deck), Subdivision Profile (dkrating), NBI Deterioration Method (NBConverter), and NBI Converter Profile (BRM Default). At the bottom, there is an 'Assigned Projects' table with columns: Project Name, Category, Automatic, Cost, Utility, Utility Benefit, Benefit/Cost (\$k), Cost (\$k) / Benefit, Year, Frozen, and Status. The table currently shows 'No records' and has 'Items per page: 15' at the bottom right. A footer contains copyright information for the American Association of State Highway and Transportation Officials.

## Optimize Program

The *Optimize Program* grouping is used to run the optimization process for the selected program/scenario combination.

The *Program* dropdown is used to select the program for which the optimization will be performed.

The *Scenario* dropdown is used to select the scenario of the selected program for which the optimization will be performed.

The *Optimization Method* dropdown determines what method the optimization process will use:

- **Maximize Utility** - The optimization tries to maximize the overall utility of the program within the specified performance constraints. The program's utility weights are established on the *Programs > Create/Edit Programs* task. Constraints on the program can be established on the *Programs > Funding Allocation* and *Programs > Performance Measures* tasks.
- **Minimize Cost** - The optimization generates a program with the minimum possible cost that meets the specified performance constraints. Utility is not factored into minimizing the cost. This method will consider increasingly expensive project alternatives until the performance constraints are met.

With either selection, the user will be notified if optimization cannot produce a feasible solution that meets the specified program criteria. In that case, users may consider changing some of the program specifics, such as increasing the budget or loosening the performance constraints. If that's not possible or desired, users can still accept the proposed solution even if it doesn't meet the program's goals.

The **Keep Assigned Projects** dropdown determines whether the optimization will include all of the program's currently assigned projects (while potentially adding more) or ignore the projects currently assigned to the program and assign all new projects.

The **Run on All Scenarios** dropdown indicates whether the optimization will run for a specific scenario (the scenario currently selected in the **Scenario** dropdown) or for all of the program's scenarios. If "Yes" is selected, the results of the optimization will still be separated by each scenario and the overall time to perform the optimization will increase.

The **Respect External Frozen Projects** dropdown determines whether the optimization will adhere to the rules established for projects frozen to other programs. If "No" is selected, the program optimizer will ignore the freeze settings of projects. If "Yes" is selected:

- Program frozen projects will not be added.
- Program and year frozen projects' target years will be avoided by the optimizer. The deferment rules for the projects (based on the actions in each project) will also be respected.

## Program Information

The *Program Information* grouping indicates the parameters and information specific to the selected program:

Program Information

<p>Start Year: 2016 End Year: 2020 Utility Weight Profile: Sample Assigned Network Policies: <input type="text" value="Replace Deck"/></p>	<p>Subdivision Profile: dkrating NBI Deterioration Method: NbiConverter NBI Converter Profile: BrM Default</p>
--	--

## Optimization Progress

When the desired selections are made, click the **Run Optimization** button. A status bar will then appear:

Optimization Progress

Optimizing Program... Abort Optimization

82%

Progress Messages

Initializing Program Optimization...	7/27/2016 10:02:20 AM
Processing Scenario 'Default'.	7/27/2016 10:02:50 AM
Getting Action Sequences	7/27/2016 10:02:50 AM
Getting Utility Tree	7/27/2016 10:02:53 AM
Processing Segments...	7/27/2016 10:02:55 AM
Retrieving Budgets	7/27/2016 10:02:55 AM
Estimating initial conditions of all segments	7/27/2016 10:02:56 AM

Once the optimization process begins, the status bar will display one of the following colors:

- **Green with moving lines:** the optimization is processing
- **Solid green:** the optimization is complete
- **Red:** the optimization failed or was aborted

The optimization processing time will vary depending on various factors including the size of the network, number of projects, number of constraints, and more. As stated earlier, only one program optimization can be run at a time. Users can view other areas of the software while the optimization runs.

Once the optimization begins, the *Run Optimization* button will change to the *Abort Optimization* button and the *Progress Messages* grouping will appear to display the progress of the optimization. If for any reason the optimization needs to be stopped prior to completion, click the *Abort Optimization* button.

Once the optimization is complete, the *Assigned Projects* grouping will update:

**Optimization Progress**

Complete!

**Progress Messages**

Initializing Program Optimization...	7/27/2016 10:12:01 AM
Processing Scenario 'Default'.	7/27/2016 10:12:49 AM
Getting Action Sequences	7/27/2016 10:12:49 AM
Getting Utility Tree	7/27/2016 10:13:36 AM
Processing Segments...	7/27/2016 10:13:37 AM
Retrieving Budgets	7/27/2016 10:13:37 AM
Estimating initial conditions of all segments	7/27/2016 10:13:37 AM

**Assigned Projects**

Segment:  Year:

Project Name	Category	Automatic	Cost	Utility	Utility Benefit	Benefit/Cost (\$k)	Cost (\$k) / Benefit	Year	Frozen	Status
81181073000X010(Rehab Super, Rehab Sub)	No Category	Yes	\$14,685,413	62.41	6.12	0.0004	\$2,399.58	2035	No	Proposed
81181073000X010(Rehab Sub)	No Category	Yes	\$15,553	57.09	0.47	0.0302	\$33.09	2033	No	Proposed
80200033000X010(Rehab Super, Rehab Sub)	No Category	Yes	\$1,787,408	60.38	10.29	0.0058	\$173.70	2031	No	Proposed
80200033000X010(Rehab Super)	No Category	Yes	\$319,512	59.99	1.06	0.0033	\$301.43	2036	No	Proposed
80200033000X010(Rehab Sub)	No Category	Yes	\$29,104	60	0.11	0.0034	\$291.04	2033	No	Proposed
73173101000X010(Rehab Super)	No Category	Yes	\$7,625,828	50.15	2.46	0.0003	\$3,099.93	2035	No	Proposed
52152081000X040(Rehab Super, Rehab Sub)	No Category	Yes	\$35,993	64.93	1.07	0.0297	\$33.64	2034	No	Proposed
52152081000X040(Rehab Sub)	No Category	Yes	\$50,070	65.99	1.35	0.0229	\$43.76	2031	No	Proposed
33133041000X010(Rehab Super, Rehab Sub)	No Category	Yes	\$6,690,065	60.91	10.01	0.0015	\$668.34	2034	No	Proposed
33133041000X010(Rehab Sub)	No Category	Yes	\$359,089	51.4	4.22	0.0118	\$85.09	2031	No	Proposed
21121022000X020(Rehab Super, Rehab Sub)	No Category	Yes	\$763,469	62.31	19.09	0.025	\$39.99	2031	No	Proposed
21121022000X020(Rehab Super)	No Category	Yes	\$216,157	62.16	2.95	0.0136	\$73.27	2036	No	Proposed
21121022000X010(Replace Bridge)	No Category	Yes	\$1,314,683	82.79	19.98	0.0152	\$65.80	2031	No	Proposed

Items per page: 15

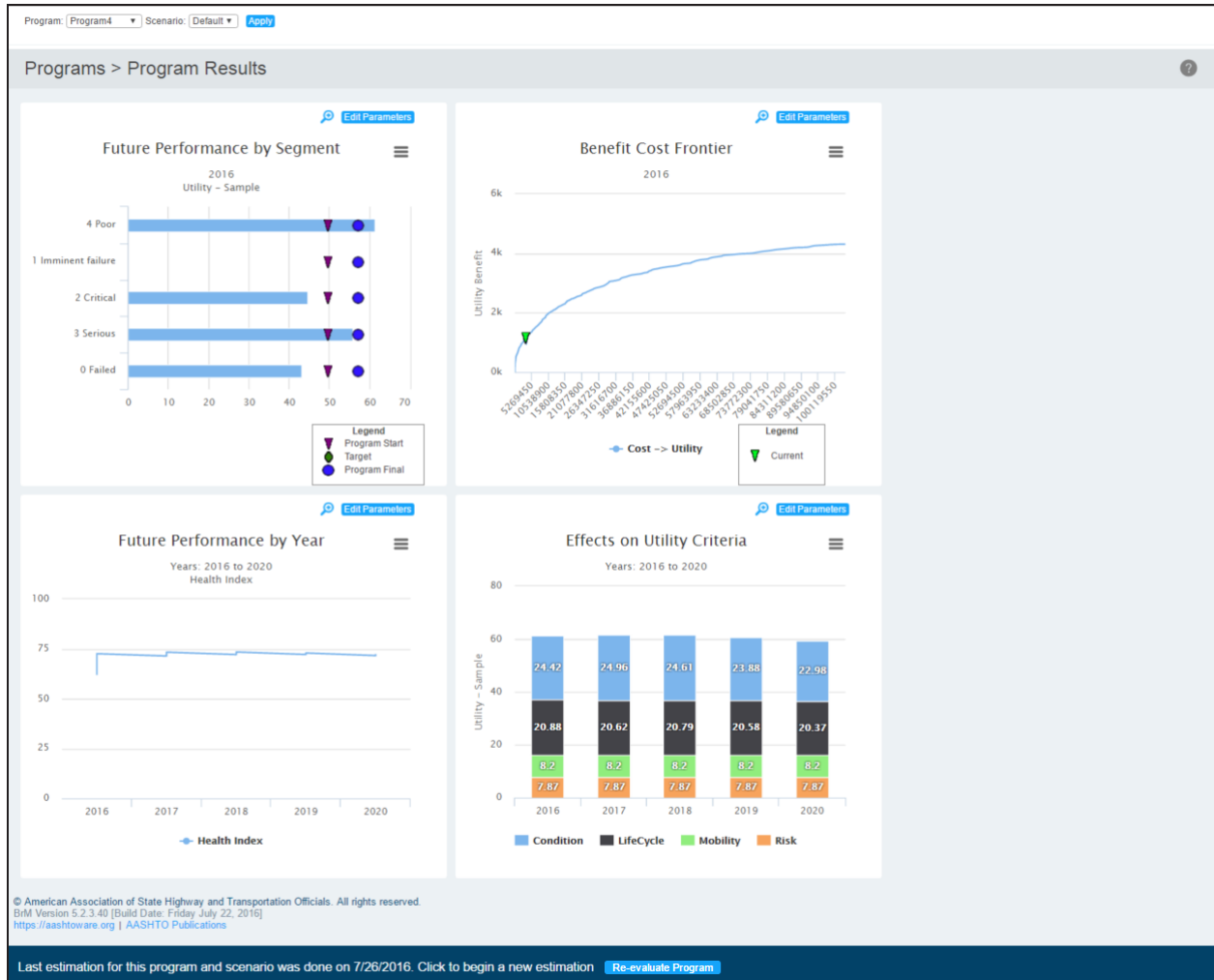
## Assigned Projects

Prior to running the program optimization, the *Assigned Projects* grouping displays the projects that have been manually assigned to the program on the *Programs > Assign Projects* task. Once the optimization is run, the *Assigned Projects* grouping updates with the projects automatically generated by the optimization (the old projects will remain if "Yes" was selected from the *Keep Assigned Projects* dropdown.)

The *Assigned Projects* grouping displays the basic information for each project, including cost, utility, year, and status. The *Segment* and *Year* dropdowns allow the user to filter the assigned projects based on the program segment they relate to or the year they've been assigned, respectively. Clicking the icon for a specific project will open the *Projects > Create/Edit Project > Management* subtask for that project. From there the project can be removed from the program, if desired.

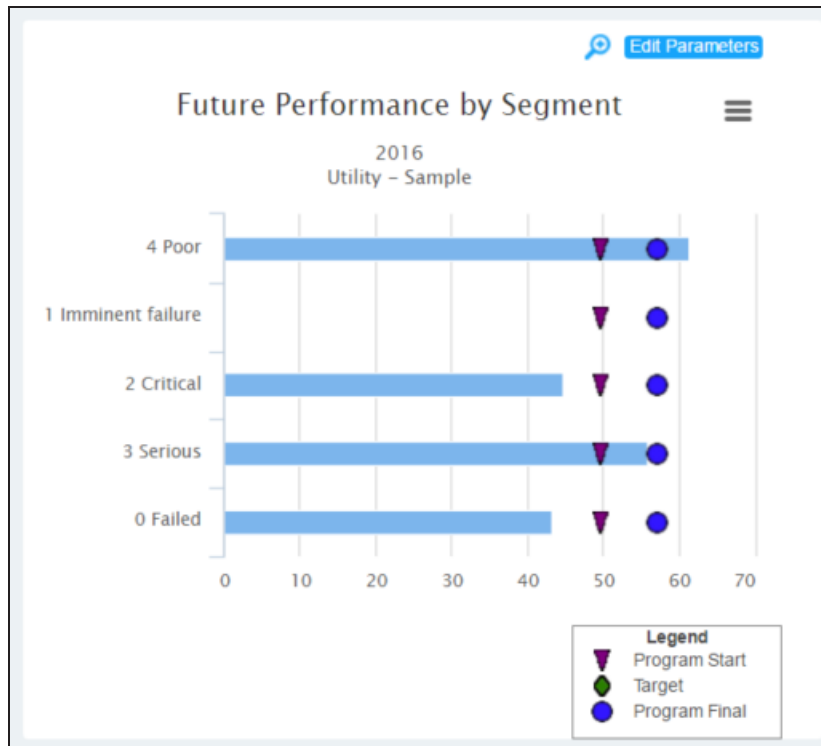
# Program Results

The *Programs > Program Results* task displays the performance results of the selected program and scenario. The charts evaluate the program based on the performance measures set on the *Programs > Performance Measures* task.



## Future Performance by Segment

The Future Performance by Segment chart compares the performance of each program segment in a given year:



The Legend indicates the various points on the chart: Program Start, Target, and Program Final. The *Edit Parameters* button allows the user to select which performance measure and year to display:

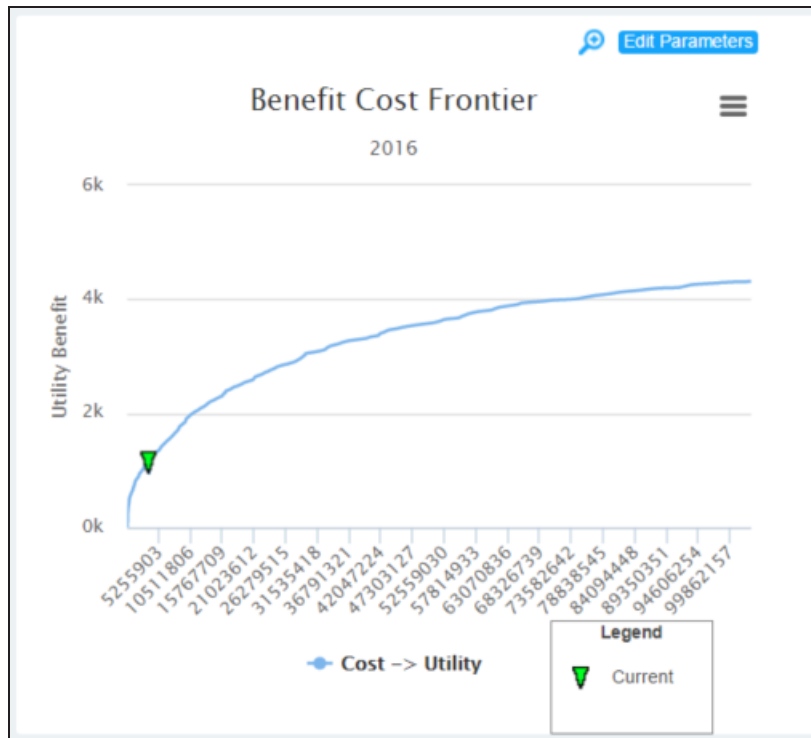
Performance	Year
Health Index	2016
Utility	2017
	2018
	2019
	2020

Click the *Apply* button to accept the parameter change.

Click the *Cancel* button to cancel the parameter change.

## Benefit Cost Frontier

The Benefit Cost Frontier chart displays the maximum utility level the selected program segment can achieve in the selected year for a certain level of funding.



The Legend indicates the single point on the chart: Current. This is the current position of the program in the overall benefit cost frontier.

The *Edit Parameters* button allows the user to select which program segment and year to display:

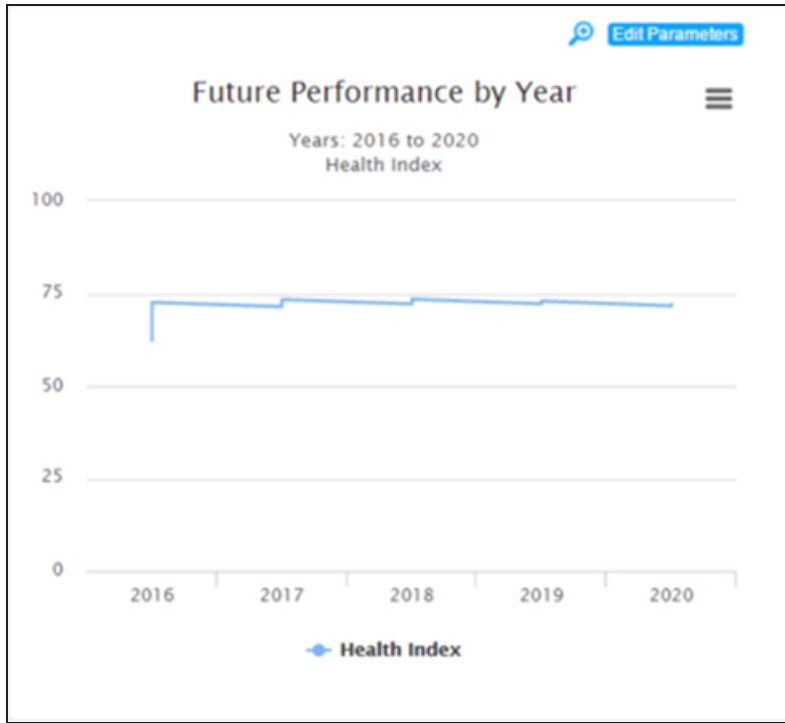
The dialog box titled "Edit Chart Parameters" contains two selection tables. The "Segment" table lists five options: 0 Failed, 1 Imminent failure, 2 Critical, 3 Serious, and 4 Poor. The "Year" table lists five options: 2016, 2017, 2018, 2019, and 2020. Both tables have a blue highlight on the first row. At the bottom of the dialog are "Cancel" and "Apply" buttons.

Click the *Apply* button to accept the parameter change.

Click the *Cancel* button to cancel the parameter change.

## Future Performance by Year

The Future Performance by Year chart displays how the program's performance changes throughout the years of the program.



The blue line indicates the selected program segment's performance for the selected performance measure over the span of the program. The red line indicates the target value (if available) for the segment and performance measure selection.

The *Edit Parameters* button allows the user to select which performance measure and program segment to display:

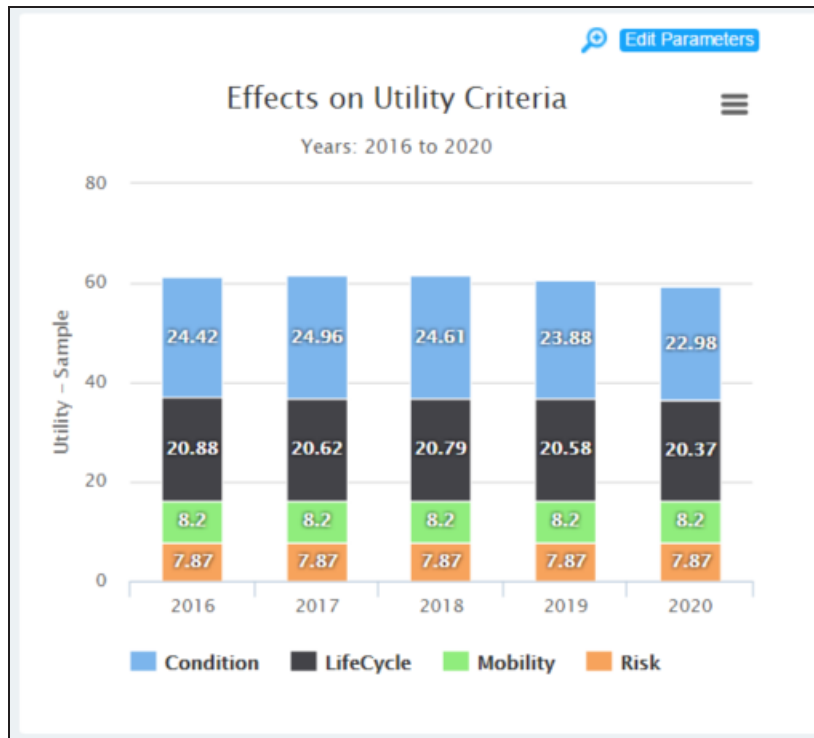
Performance	Segment
Health Index	0 Failed
Utility	1 Imminent failure
	2 Critical
	3 Serious
	4 Poor

Click the *Apply* button to accept the parameter change.

Click the *Cancel* button to cancel the parameter change.

## Effects on Utility Criteria

The Effects on Utility Criteria chart displays the estimated utility of the selected program segment throughout the span of the program.



The Condition, LifeCycle, Mobility, and Risk utility values are each displayed and color coded.


The *Edit Parameters* button allows the user to select which program segment to display:


Click the *Apply* button to accept the parameter change.

Click the *Cancel* button to cancel the parameter change.

## Program Results Page Controls

The *Re-evaluate Program* button re-evaluates the projects that are within the selected program without re-optimizing the program. This ensures that the program's projects don't change, but any updates made to the individual projects or their work candidates are represented in the graphs.

The  icon found on each chart displays a popped out, magnified version of the chart for easier viewing.

The  icon found on each chart open a menu of options that allows the user to print the chart, download it in various formats, or open a data table to more easily view the specific data points on the chart.



# Executive Summary

The *Programs > Executive Summary* task displays high-level visual charts specific to the selected program and scenario. These are performance charts that can be used by executives as overviews to various programs in an effort to choose which programs to implement and how to fund them.



All of the charts will populate upon opening the task. If they do not populate or need updated, click the *Re-evaluate Program* button in the footer.

The displayed charts are determined by the administrator using the *Admin > Modeling Config > Executive Summary* task. Contact the administrator to request a new chart.

Some charts may indicate that there is no data to display given the current program and scenario selected combined with the parameters selected for each chart. The program and scenario can be changed in the header. To change the parameters of a given chart, click the chart's *Edit Parameters* button, if applicable. A popup will appear to allow the user to change the parameters of the chart:

The 'Edit Chart Parameters' popup window shows the following parameters:

- Year:** Select All, Unselect All. The selected year is 2018.
- roadway.nhs\_ind:** Select All, Unselect All. The selected value is 1 On the NHS.

At the bottom of the popup, there are 'Cancel' and 'Apply' buttons.


Once the desired selections have been made, click the *Apply* button to accept the parameter change.


Click the *Cancel* button to cancel the parameter change.

**\*Note:** Not all charts will have the same parameters. The type and selectability of the parameters is dependent on the specifics of the chart.

## Executive Summary Page Controls

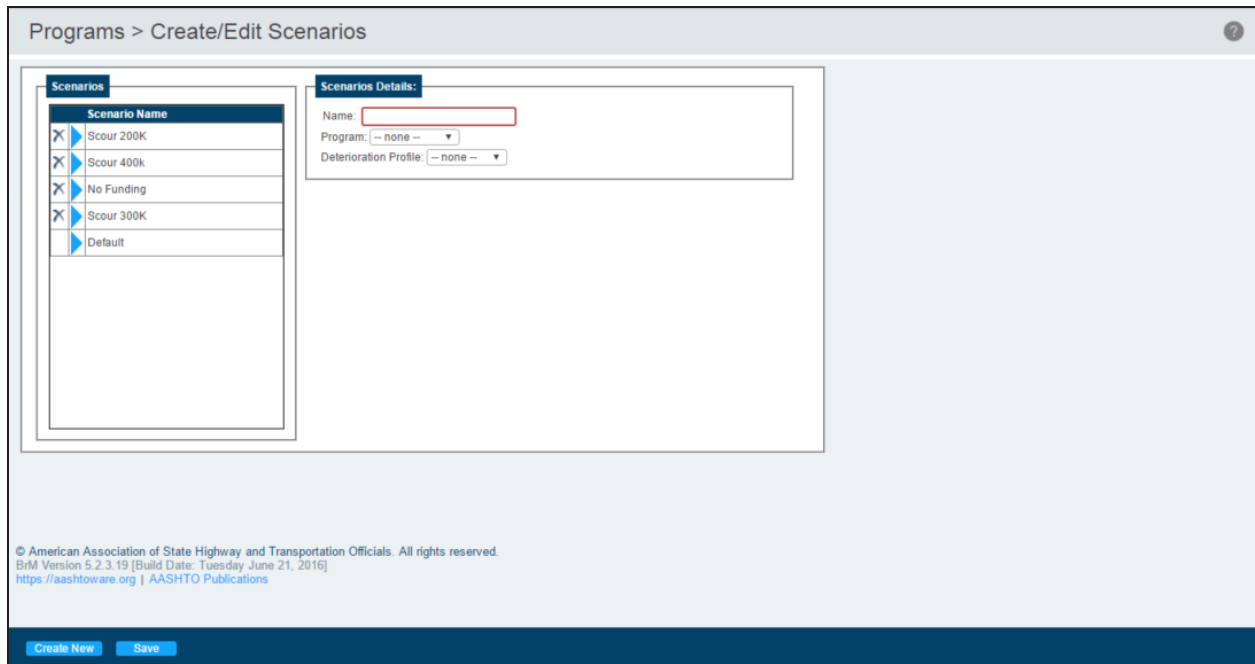
The *Re-evaluate Program* button re-evaluates the projects that are within the selected program without re-optimizing the program. This ensures that the program's projects don't change, but any updates made to the individual projects or their work candidates are represented in the graphs.

The  icon found on each chart displays a popped out, magnified version of the chart for easier viewing.


The  icon found on each chart open a menu of options that allows the user to print the chart, download it in various formats, or open a data table to more easily view the specific data points on the chart.

# Create-Edit Scenarios


The *Create/Edit Scenarios* task allows the user to establish scenarios for specific programs. Scenarios allow the user to compare the performance results of a program under different deterioration circumstances and are utilized on various *Programs* tasks.



## Scenarios

To view and edit the details of a scenario, click its  icon in the *Scenarios* grouping.

To create a new scenario, click the *Create New* button in the page footer.

The "Default" scenario cannot be deleted (though its name and details can be changed), but other created scenarios can be deleted by clicking the  icon for the desired scenario.

**\*Note:** Scenarios can only be deleted when they are not tied to any data in the system.

## Scenarios Details

The *Scenarios Details* grouping is used to specify the details of the selected or new scenario.

The *Name* textbox indicates the name of the scenario.

The *Program* dropdown is used to select the program to which the scenario will be applied.

The *Deterioration Profile* dropdown indicates which deterioration profile will be used in the scenario. Deterioration profiles are created on the *Admin > Modeling Config > Deterioration Profiles* task.

## Create/Edit Scenarios Page Controls

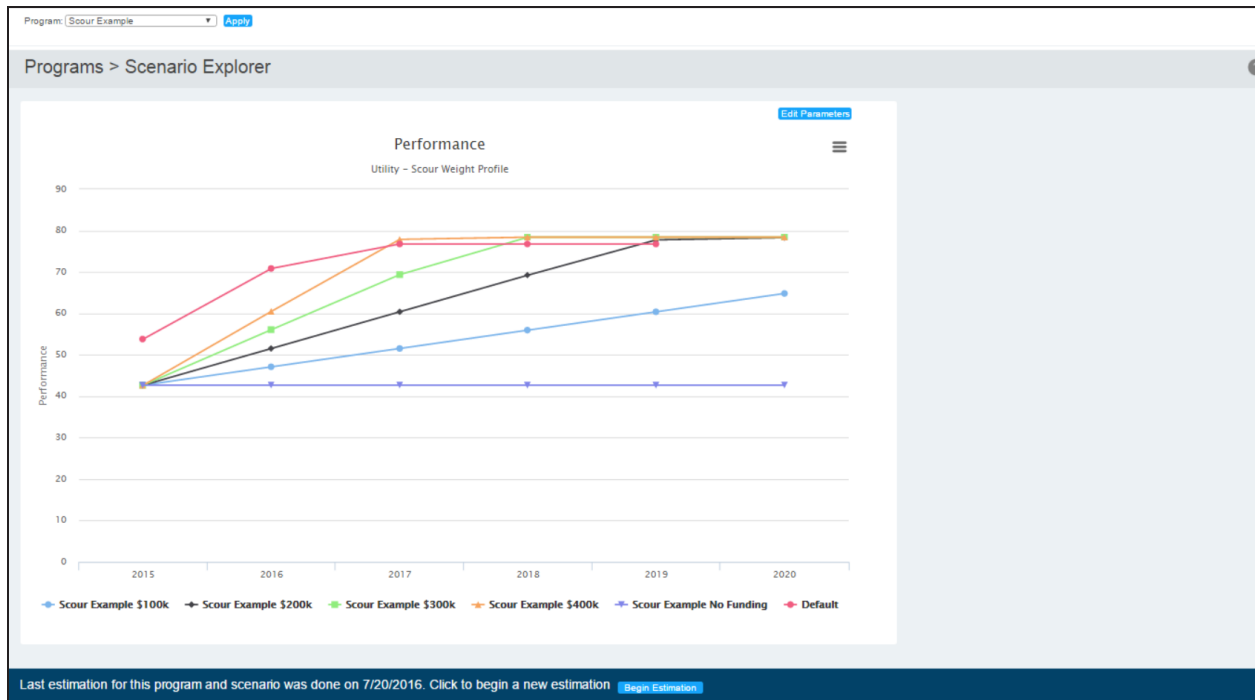
The *Create New* button creates a new scenario.

The *Save* button saves the changes made to the new or existing scenario.

The *Copy* button creates a copy of the currently selected scenario.

# Scenario Explorer

The *Programs > Scenario Explorer* task is used to visually compare the performance of a program's various scenarios. Scenarios within a program can differ based on funding, distribution of funding, performance measures, and deterioration models.



Use the *Program* dropdown in the header to select which program's scenarios to compare. Once selected, click the *Apply* button to generate the graph.

## Parameters

The graph results are dependent upon the parameters selected. The parameters available to examine are dependent upon the selected program's performance measures that have been assigned on the *Programs > Performance Measures* task and the subdivision profile filter segments determined on the *Programs > Create/Edit Programs* task.

To specify the graph's parameters, click the *Edit Parameters* button:

Performance	Segments
Health Index	3 Active, State Highway Agency, 2 SC - Extensive Scour
Utility	3 Active, State Highway Agency, 3 SC - Unstable

The Performance section lists all of the available performance measures. Only one performance measure can be selected.

The Segments section lists all of the available filter segments. Multiple filter segments can be selected.

Click the *Apply* button to accept the selections and apply them to the graph.

Click the *Cancel* button to cancel the selections.

## Viewing the Graph


The graph will display results based on the parameter selections. However, it does not automatically update. If, for instance, the specifics of the scenario or performance measure were changed, the graph will need regenerated.

The footer of the page will notify the user of the last time an estimation was done for the selected program:

Last estimation for this program and scenario was done on 9/26/2016. Click to begin a new estimation [Re-evaluate Program](#)

The *Re-evaluate Program* button re-evaluates the projects that are within the selected program without re-optimizing the program. This ensures that the program's projects don't change, but any updates made to the individual projects or their work candidates are represented in the graph.

**\*Note:** The estimation can take a long time to run depending on the specifics of the program.

Click the  button to view the printing and downloading options for the graph.

# Appendix A

- A BrM 5.2.3 User Group PowerPoint training that outlines the new features of the software and how they work together.



## BrM 5.2.3 Training

User Group Walkthrough Example

September 20-21, 2016

San Antonio, Texas

1

This walkthrough was originally a PowerPoint presentation. It has been included here so that users may continue to benefit from it.



BrM Help Desk  
[AASHTOWareBridge.com](http://AASHTOWareBridge.com)  
[BrM@Bentley.com](mailto:BrM@Bentley.com)  
JIRA tickets: [bridgework.atlassian.net](https://bridgework.atlassian.net)

Zachary Boyle, PE  
BrM Solutions Consultant  
[Zac.Boyle@Bentley.com](mailto:Zac.Boyle@Bentley.com)  
Or add '@ZacBoyle' to your JIRA tickets

2

Before we start, let's make sure you have my contact info.

- Today
- 3:30 5.2.3 Walk Through
- User Interface
  - Visual Forms Editor
  - Actions and Benefits
  - Network Policies

- Tomorrow
- 8:10 5.2.3 Walk Through (continued)
- Performance Measures
  - Funding Allocation
  - Program Results
- 9:30 Break
- Executive Summary
  - Scenario Explorer

3

This walkthrough will discuss the 5.2.3 User Interface, the *Visual Forms Editor*, optimization, and the *Scenario Explorer*.

## 5.2.3 User Interface

The New User Interface

User ID:

Password:

Database:

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A Proprietary Computer Software Product  
<https://aashtoware.org> | AASHTO Publications  
444 North Capital Street, N.W. Suite 249  
Washington, D.C. 20001 U.S.A.  
Phone: (202) 624-5800 Fax: (202) 624-5806

4

We'll begin with the new user interface. Nothing has changed about the login screen.



## The New User Interface

The screenshot shows the 'Bridges > View List' application. The left sidebar contains a navigation menu with categories like 'Bridges', 'Reports', 'Admin', 'Inspection', 'Gateway', 'Analysis', 'Projects', and 'Programs'. The main content area is a table with columns: Bridge ID, District, County, Facility Carried, Feature Intersected, Own, Maint, and Built. A large blue number '5' is overlaid on the bottom right of the screenshot.

First things to notice:

- The nice blue interface.
- Tabs, tasks, and subtasks run down the left side of the application.

## The New User Interface

This screenshot is similar to the previous one but includes a red box highlighting the user profile area in the top left. A text overlay reads: 'Click up here to get out or here to change your password.' A large blue number '6' is overlaid on the bottom right of the screenshot.

Click on the top left, where your name is, to change your password or to log out.

The New User Interface

Admin > Security > Password Rules

Enable password complexity rules

Rule name	Required	Minimum
Total characters	<input type="checkbox"/>	8
Lower-case letters	<input type="checkbox"/>	1
Upper-case letters	<input type="checkbox"/>	1
Numbers	<input type="checkbox"/>	1
Special characters ([!@#%&])	<input type="checkbox"/>	1
Password may not contain user ID	<input type="checkbox"/>	
Expiration window (in days)	<input type="checkbox"/>	90

The "Bread Crumb" heading should help you to find your way to any screen from the screenshots.

The Admin menu has been reorganized so planners can have access to modeling configurations, but admins can still secure the central configuration settings.

5.2.3 includes password policy rules, so you can enforce your agency's password policy.

7

The new *Admin* menu.

We will get into more of the screens as we continue with the rest of the training.

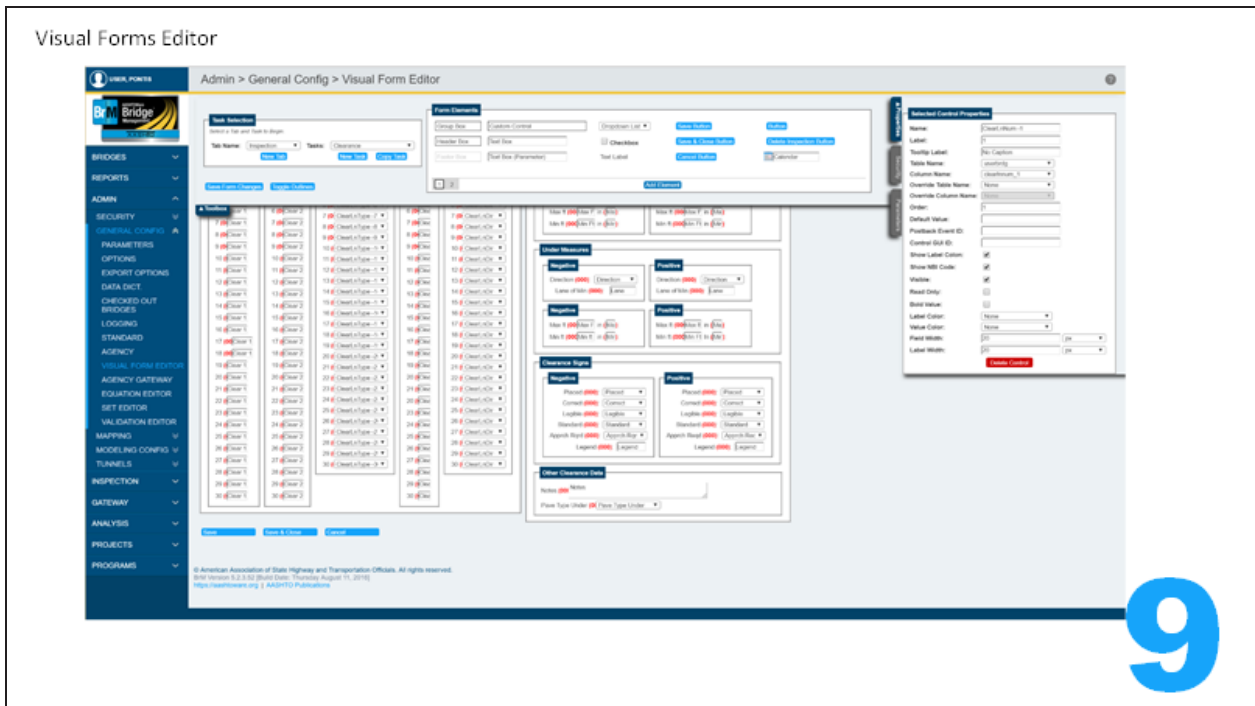
## Visual Forms Editor

BrM 5.2.3 Training

Visual Forms Editor

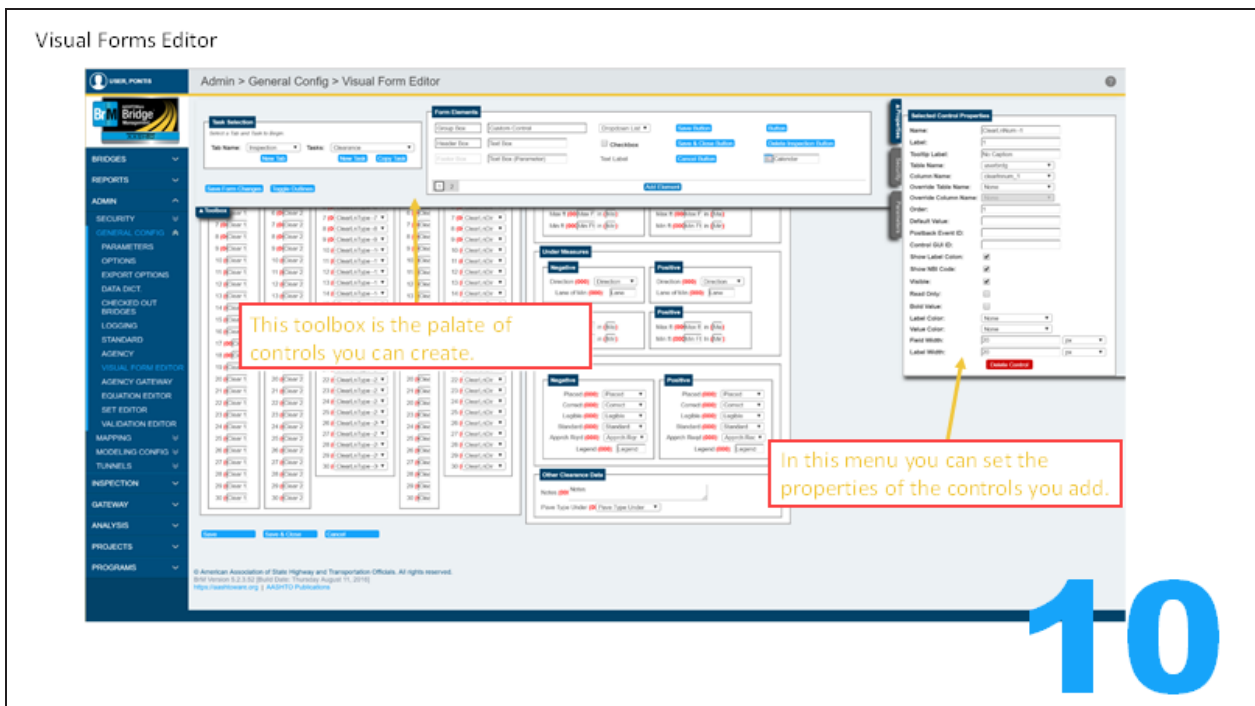
8

Now let's talk about the *Visual Forms Editor*. If you ever tried to create your own screens in 5.2.1 or 5.2.2, I think you will find the new editor to be a great improvement.



The new visual forms editor is WYSIWYG (“What you see is what you get.”)

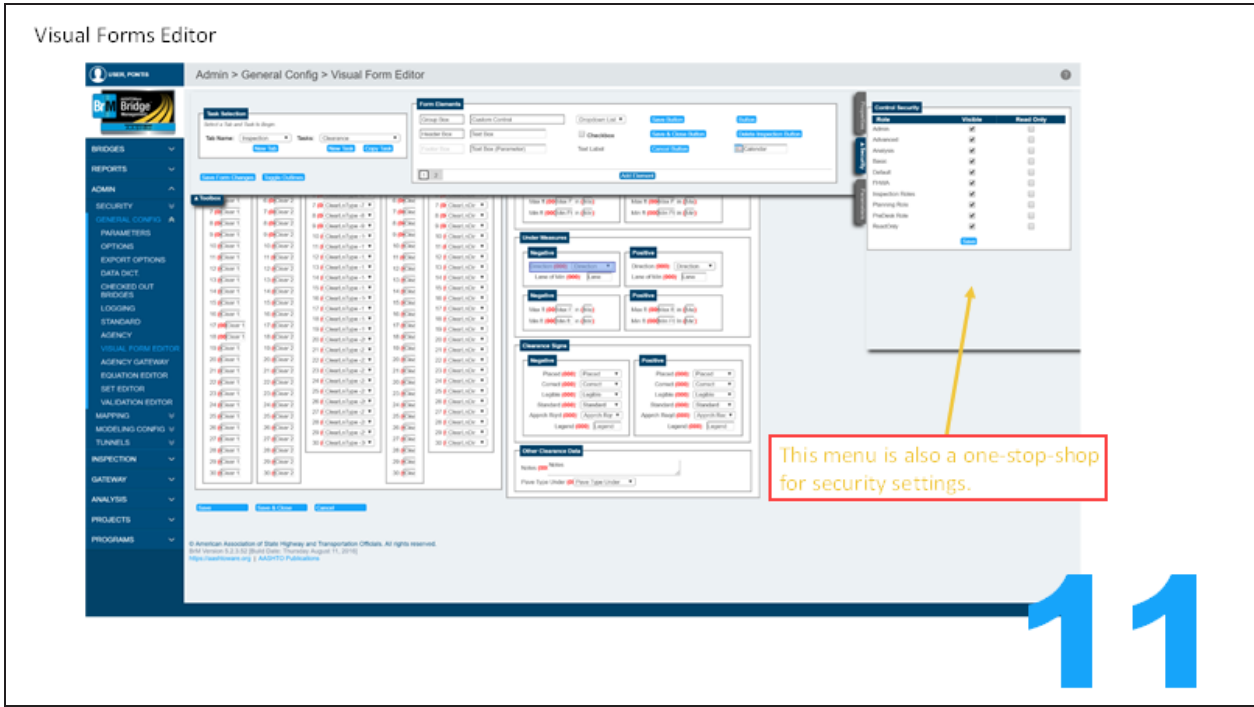
You can see the effects of your options right away.



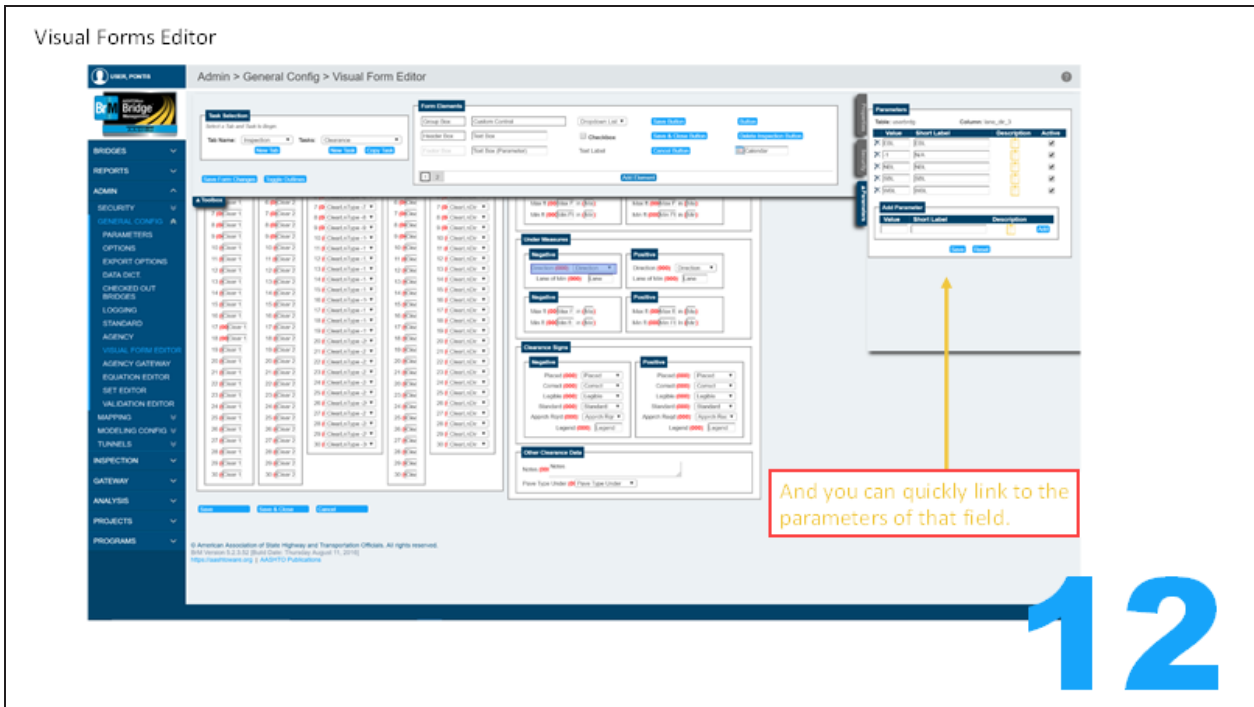
In the menu on the top, you can select the page you wish to edit (or create new pages).

Then from that toolbox you can add groups (the organizational boxes), buttons and fields.

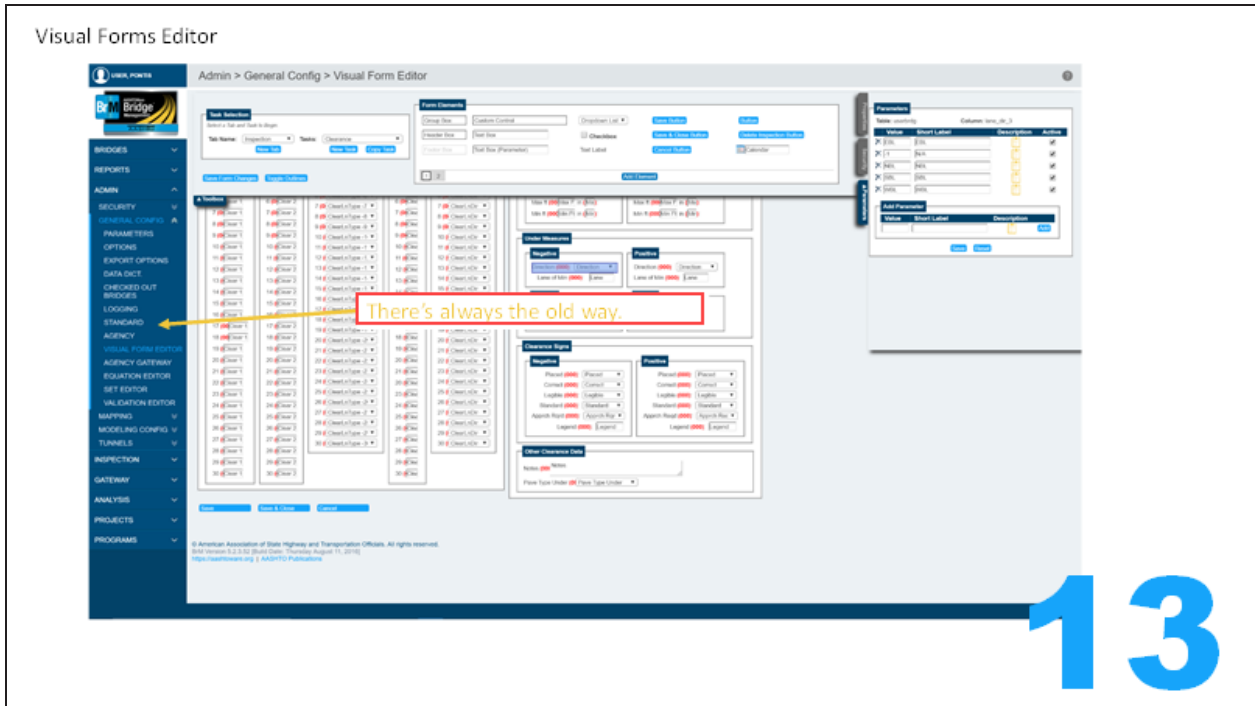
In the menu on the side, you can configure the properties of the control or group you have selected (like attaching the data to a field of your userbrdg table, for example).



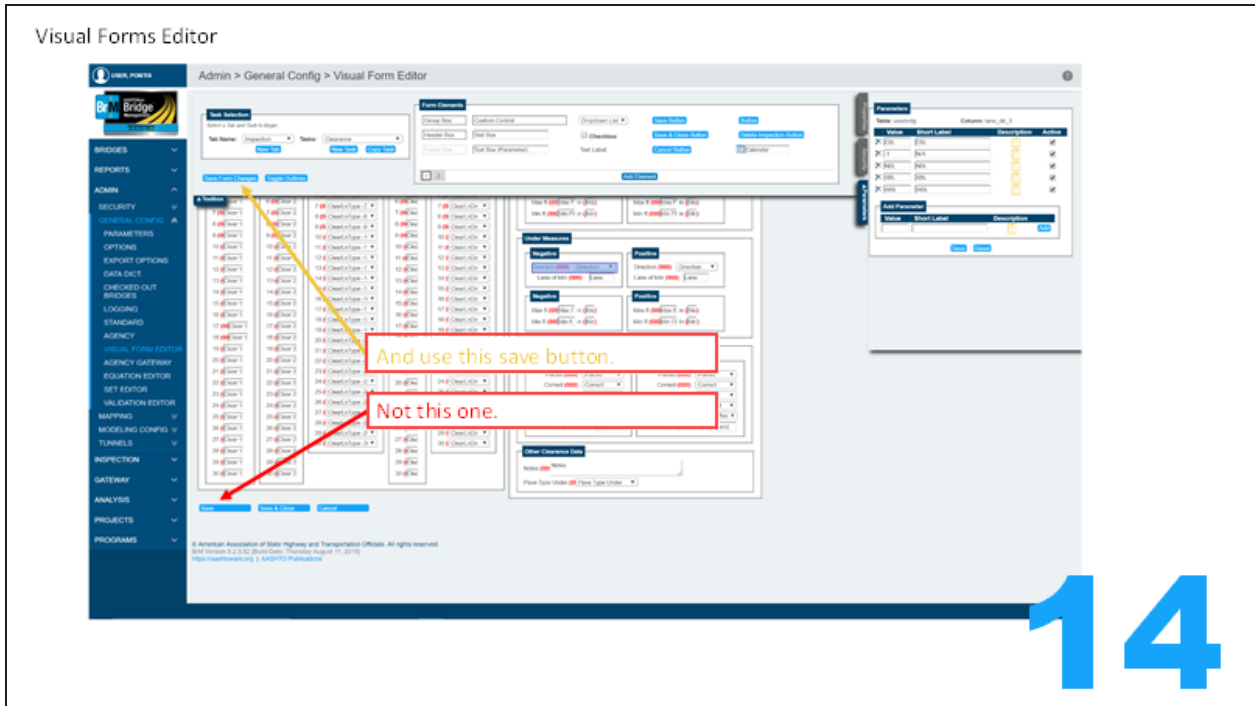
You can also access the security settings from the same menu.  
Here you can set this control to read-only for inspectors, or totally hidden.



The only thing you can't do from this screen is parameter overrides (where you use the parameter set of one control on another control).

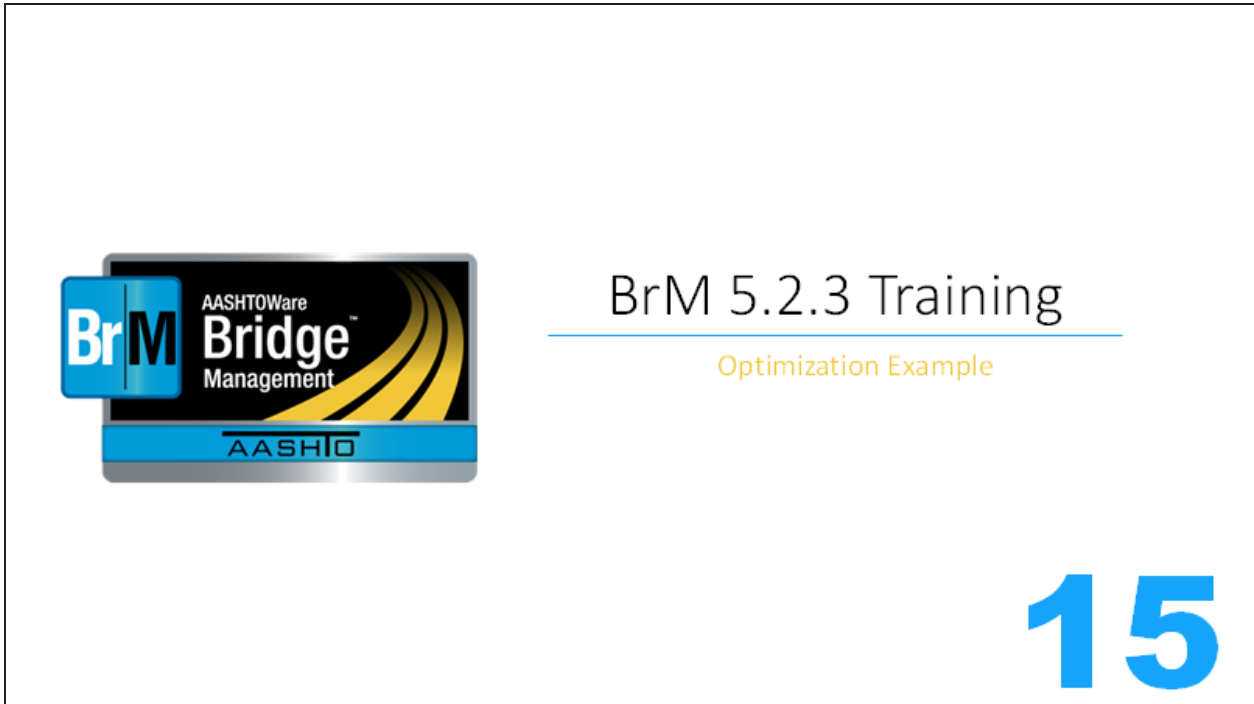


And if you prefer, there's still the old way of doing things.



And another hint...

# Optimization



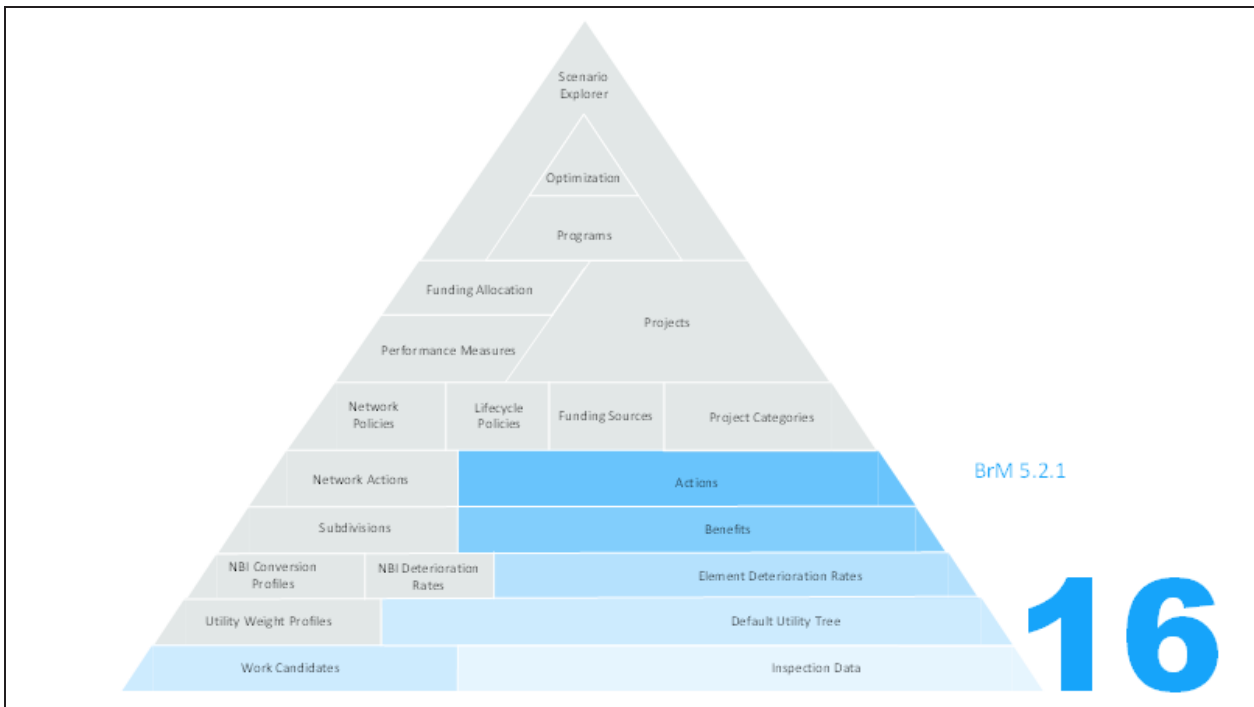
BrM AASHTOWare Bridge Management AASHTO

## BrM 5.2.3 Training

Optimization Example

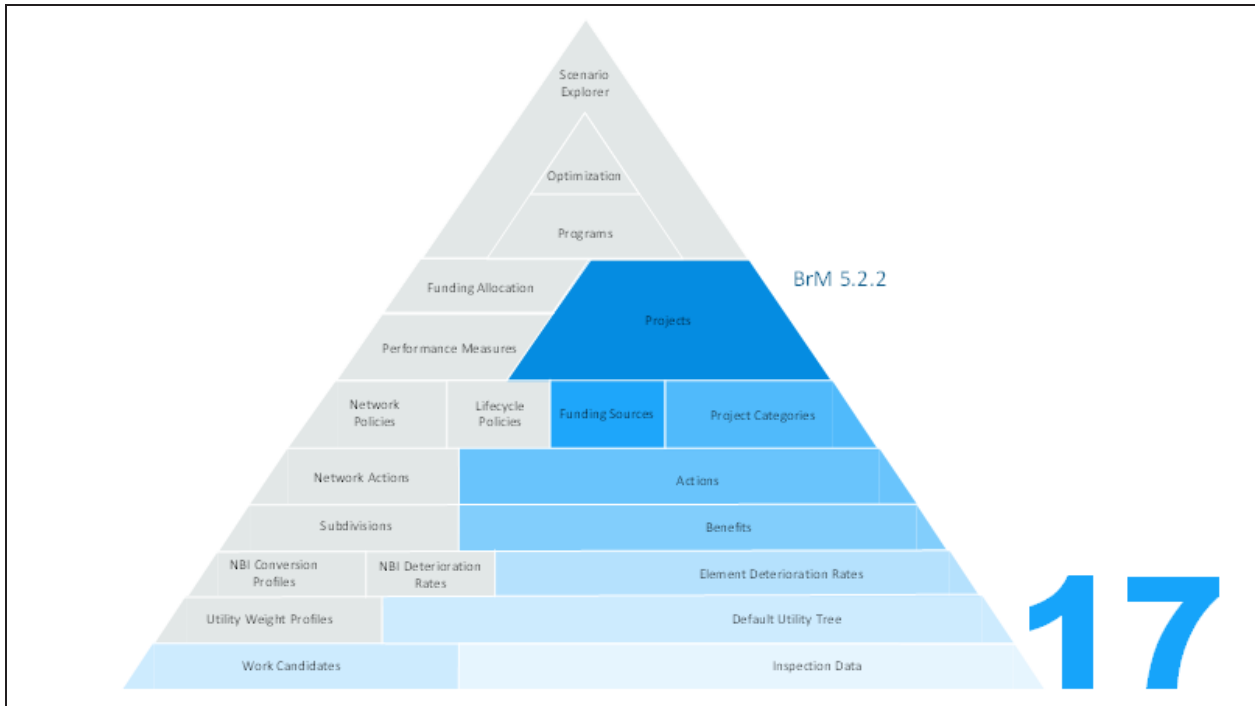
# 15

Now let's get started on the optimization example.

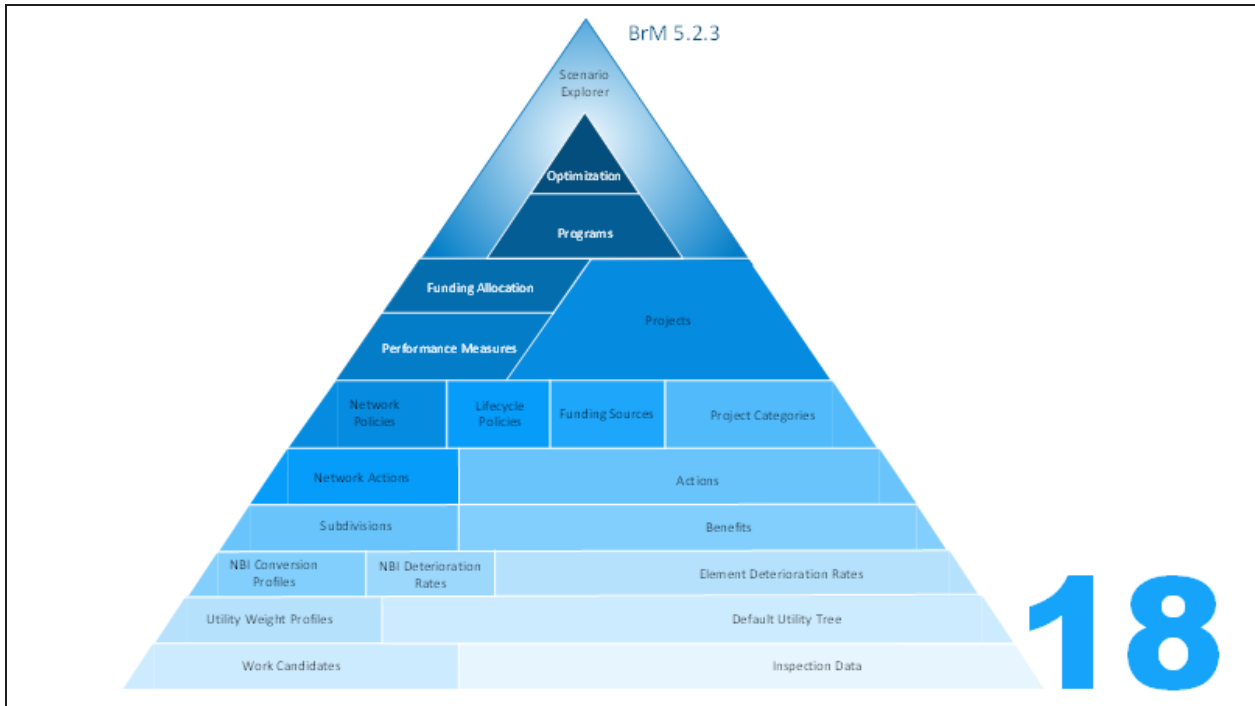


A little perspective.

The first phase of the 5.2.1 overhaul to BrM focused primarily on inspection and work candidates.

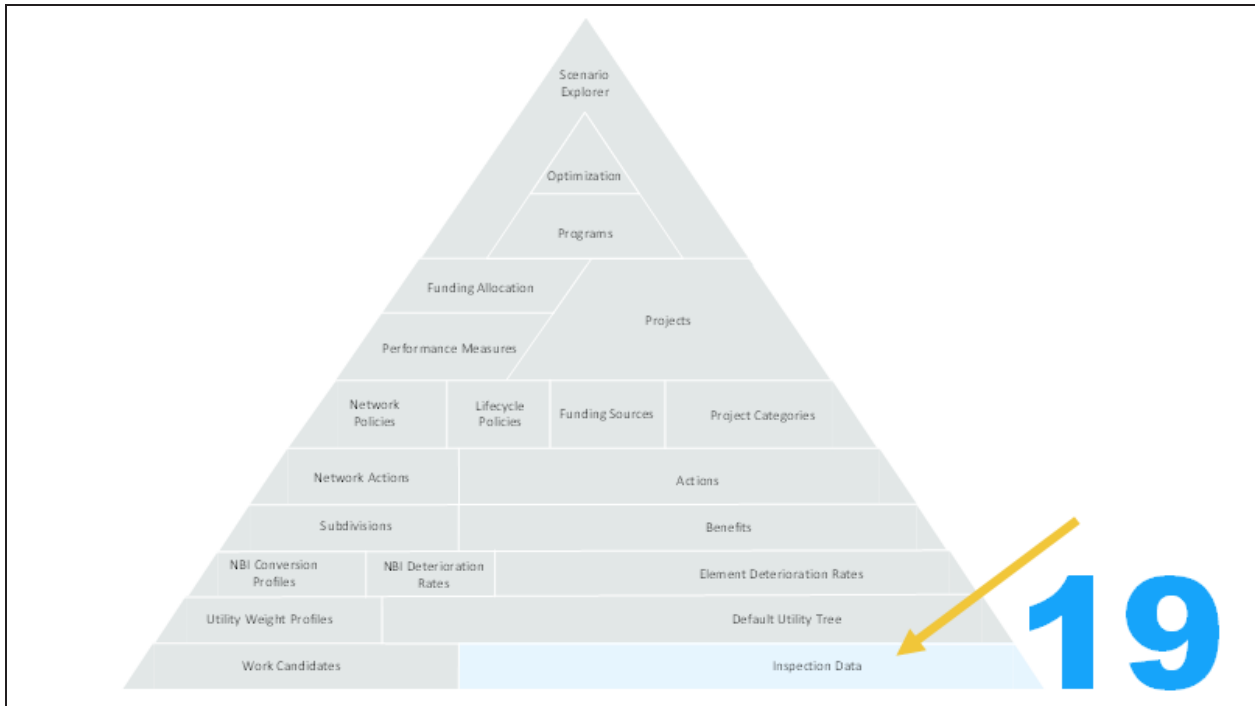


In 5.2.2, we added the ability to create and track projects.



Finally, in 5.2.3, we've added the parts needed to help the software make recommendations for a new program or to complete one you've already started.

These are the pieces we will discuss in the rest of this training.



First, we will begin discussing: **Inspection Data**.

The objective of optimization is to create a data-driven program. So Inspection Data really is the foundation.

Elem	Env	Description	Quantity	Units	Qty. 1	Qty. 2	Qty. 3	Qty. 4
12	101	Rc Concrete Deck	574	sq ft	574	0	0	0
127	101	Steel Open Girders/Beam	766	sq ft	766	0	0	0
205	101	Rc Conc Columns	4	each	2,000	2,000	0	0
215	101	Rc Conc Abutment	69	sq ft	34,500	34,500	0	0
224	101	Rc Conc Pier Cap	98	sq ft	0	0	0	0
311	101	Movable Bearing	15	each	15,000	0	0	0
313	101	Fixed Bearing	15	each	15,000	0	0	0
321	101	Rc Conc Approach Slab	138	sq ft	138	0	0	0
331	101	Rc Conc Bridge Rating	391	sq ft	0	0	0	0
5103	101	Asphalt Overlay w/ Membrane	5473	sq ft	5473	0	0	0
5203	101	Steel Protective Coating (S-15)	8755	sq ft	8755	0	0	0
5300	101	Reinforced Concrete Wingwalls	47	sq ft	0	0	0	0
5000	200	General Notes	1	each	1,000	0	0	0
5001	200	Roadway / Channel / Drainage	3	each	3,000	0	0	0
5002	200	Maintenance Recommendations	3	each	3,000	0	0	0

You will need data for your decisions to be based on.

If you want detailed cost data and element deterioration, then you will need element inspection data.

If you want to perform beam-end repairs when more than 3 beam ends are CS4, you will need Beam-Ends as an Agency Defined Element (ADE).



Inspection Data

Inspection > Condition

Condition Package

Deck (040) S Satisfactory Channel (041) N N/A (N/A) NBI Consider Profile (Std Default) **Validate**

Superstructure (040) 2 Good Culvert (042) N N/A (N/A) Calculate NBI

Substructure (040) S Satisfactory Waterway (043) N Not applicable Unspanned Spalls (044)  Calculate NBI

Element Conditions

AKAHTO Bridge Elements

Elem	Str	Env	Description	Quantity	Units	Qty 1	Qty 2	Qty 3	Qty 4
107	101	Mid (2)	Steel Open Girders	756.421	sq ft	756.421	0.000	0.000	0.000
205	101	Mid (2)	R/C Conc Columns	4	each	2.000	2.000	0.000	0.000
215	101	Mid (2)	R/C Conc Abutment	69.4	sq ft	34.700	34.700	0.000	0.000
234	101	Mid (2)	R/C Conc Pier Cap	88.021	sq ft	0.000	88.021	0.000	0.000
311	101	Mid (2)	Movable Bearing	10	each	10.000	0.000	0.000	0.000
313	101	Mid (2)	Fixed Bearing	75	each	15.000	0.000	0.000	0.000
321	101	Mid (2)	R/C Conc Approach Slab	1334.321	sq ft	1334.321	0.000	0.000	0.000
331	101	Mid (2)	R/C Conc Bridge Rating	281.021	sq ft	0.000	281.021	0.000	0.000
5103	101	Mid (2)	Asphalt Overlay w/ Membrane	2471.92	sq ft	2471.92	0.000	0.000	0.000
5203	101	Mid (2)	Steel Protective Coating (S15)	8194.324	sq ft	8194.324	0.000	0.000	0.000
5300	101	Mid (2)	Reinforced Concrete Wingwalls	47.300	sq ft	0.000	47.300	0.000	0.000
5000	200	Str	General Notes	1	each	1.000	0.000	0.000	0.000
5001	200	Str (1)	Roadway / Channel / Drainage	3	each	3.000	0.000	0.000	0.000
5002	200	Str (1)	Maintenance Recommendations	3	each	3.000	0.000	0.000	0.000

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Also note the *Validate* button. This has been available since 5.2.2, but you can press this button to run a submittal check on this structure's inspection data.

There is also the *Calculate NBI* button.

Inspection Data

Inspection > Assessments

Identified Risks

Assessment	Date	Status	Likelihood	Conseq	Value	Next
Scour	9/7/2016	2	3	6	18	9/7/2016

1 assessments (1 active)

Selected Assessment: **Scour**

Risk Details

Risk Assessment Value

Likelihood of hazard	5	10	15	20	25	30	35	40	45	50
High	5	8	12	15	20	25	30	35	40	45
Medium	3	4	6	8	10	12	14	16	18	20
Low	1	2	3	4	5	6	7	8	9	10

Low Consequence of hazard High

Vulnerability Type:  Likelihood of Hazard:

Assessment Date:  Consequences to Structure:

Assessment Key Date:  Assessment Final Value:

Workflow Status:  Next Assessment Date:

Affected Deck Area:  sq ft

Affected AADT:

Hazard Class:

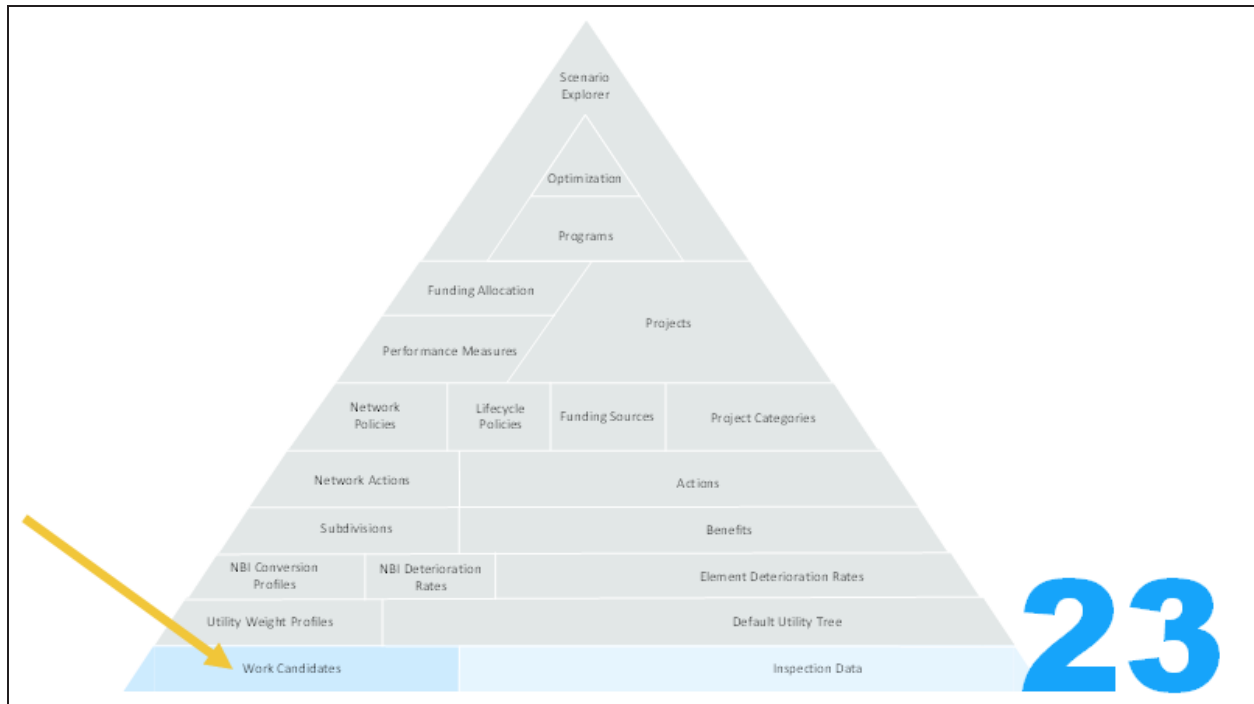
Description:

22

Included in inspection data are the risk assessments. For many of you, this may be your first time seeing the risk assessment screen.

The risk, expressed as a %, is arrived at by multiplying the likelihood of a hazard occurring and the consequence if the hazard does.

Risk categories and properties can be edited on the *Admin > Modeling Config > Assessment* task.



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Let's also talk about **Work Candidates**.

Work Candidates

Inspection > Work > Work Candidates

Candidate ID	Action	Date Recommended	Target Year	Estimated Cost	Status	Work Assignment	Priority	Structure Unit	Date Completed	Description	Source
IC 700-FTXK-121514-CB880378PSP	Other	12/9/2014	2014		Inspector Recommended	0	Medium	2 / Type = F			
IC 700-FTXK-081515-D4804270814	Remove Debris from Joints	12/9/2014	2015		Inspector Recommended	1	Medium	2 / Type = F		Remove Debris from Expansion Joints	
WorkCandidate1385	Remove Debris from Joints	12/9/2014			Inspector Recommended	1		2 / Type = F		Remove Debris from Expansion Joints	
IC 700-FTXK-121514-72C8C366C52	Column Repair	12/9/2014	2014		Inspector Recommended	0	Medium	2 / Type = F		Column Repair	
remove test	test remove deck action	8/16/2016	2016	\$10,000.00	Planned	0	Medium	2 / Type = F		action made	Inspector Recommended

**Type of Work**

Candidate ID: IC 700-FTXK-121514-CB880378PSP

Structure Unit: 2 / Type = F

Action: Other

Date Recommended: 12/9/2014

Priority: Medium - 1 to 3 years

Date Completed: [ ]

Target Year: 2014

Assigned: No

Work Assignment: UDOT Structures

Status: Inspector Recommended

Source: [ ]

**Work Estimates**

Estimated Quantity: [ ]

Cost per unit: [ ]

Estimated Cost (\$): [ ]

Generated by user "jadin pa" on 12/15/2014  
Clean and remove debris at slip seal expansion joints over pan and hanger total 4 locations.

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Different agencies use work candidates in different ways.

- Some agencies use work candidates as a way for the inspection teams to notify the planners of bridge needs.
- Others use them as a way for the planners to track requests from the district or local owners.
- Some use work candidates so that the planners can show the inspectors what work is anticipated on a structure and the inspectors can make recommendations based on that knowledge.
- Work candidates can also hold historical information, a work history with dates completed and costs.
- One agency syncs work candidates to the maintenance crew task list, and then closes out the work when the task is done.

In the *Analysis* pages, there are tools to help you use work candidates to create projects.

This focuses more on a bridge-level analysis so we will only briefly discuss it here.

The *Bridge Analysis* page lets you compare the future effects of performing those work candidates.

Work Candidates

Analysis > Work Candidates > Needs List

Filter: ERM: None Layout: Work Candidate Default Apply

Work Candidates Quick Filter

Filter Results Save As Save Share

Work Candidate Characteristics Bridge Characteristics

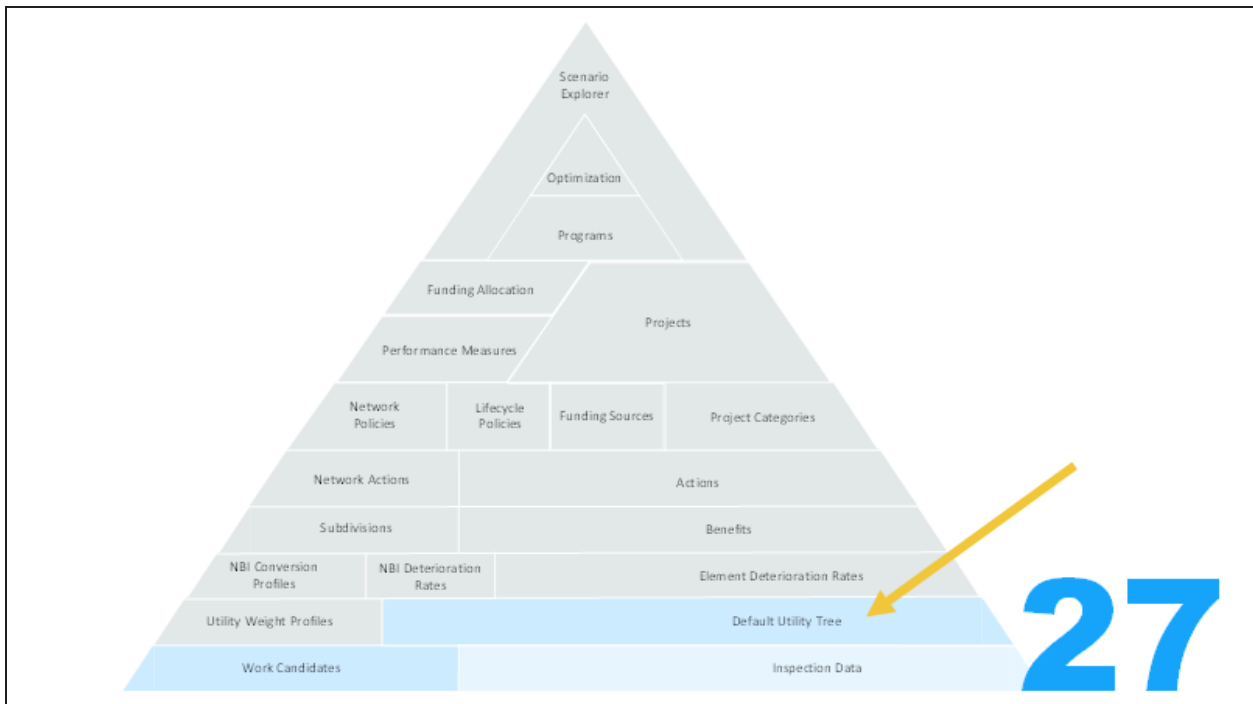
Reverse Status: Action Defn: 1512 - Repair Spalls / Pot Cost at least (\$K): District (R02): Admin Area: County (R03): Charter (R02): Maint. Temp. (R01): OutOf State System: NHS Status (R04): Bridge Group: Functional Class (R06):

Work Candidate Name	Bridge ID	Facility Carried	Action Name	Est. Cost	Year
WorkCandidate1302	0P 11	CO RD. INT. X. ROAD	Repair Spalls / Potholes		
DC 337-RHDN-070914-E3024375072	DC 337	US-89 (SR-89)	Repair Spalls / Potholes	19350	2014
WorkCandidate341	DC 518	I-215 (SR-215)	Repair Spalls / Potholes		
WorkCandidate1322	0F 255	600 SOUTH STREET	Repair Spalls / Potholes		
WorkCandidate1899	2F 496	I-70 (SR-70) EBL	Repair Spalls / Potholes		
WorkCandidate126	DC 757	I-215 (SR-215)	Repair Spalls / Potholes		
WorkCandidate123	035106F	1000 NORTH STREET	Repair Spalls / Potholes		
04K000-ENJ2-102015-7917801ABC	04K000	400 SOUTH STREET	Repair Spalls / Potholes	-1	2019
DC 337-RHDN-070914-7AA26E91358	DC 337	US-89 (SR-89)	Repair Spalls / Potholes	4500	2014
DC 751-ERDC-080614-6FA91969078	DC 751	SR-248	Repair Spalls / Potholes	-1	2014
WorkCandidate1663	1F 747	I-215NB (SR-215)	Repair Spalls / Potholes		
WorkCandidate1309	DC 472	CO. RD NW KANARRAV	Repair Spalls / Potholes		
0D 668-MOGR-083115-6462DC7978D	0D 668	US-191 (SR-191)	Repair Spalls / Potholes		2015
0D 595-ZQ0V-072214-5191202CADD	0D 595	US-40 (SR-40)	Repair Spalls / Potholes		2014
WorkCandidate2379	4D 652	I-80 (SR-80) WBL	Repair Spalls / Potholes		
WorkCandidate369	DC 560	US-40 (SR-40)	Repair Spalls / Potholes		
WorkCandidate2397	4D 667	I-84 (SR-84) WBL	Repair Spalls / Potholes		

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The *Needs List* lets you filter down bridges in the same area or on the same route which need similar work.

For example, if you are putting together a paint program, you can find all the bridges which have an identified paint need.



Next step: **Utility.**



The Utility Tree has been available since 5.2.1, but we will now lean on it much more heavily.

The Utility Value is a score for the value of a bridge. As we model deterioration into the future, the score will deteriorate. And as we model repairs to the bridge, the utility should improve. The benefit part of cost/benefit will be calculated from the benefit to utility.

Each utility node has 2 parts: the base value and the scaler. The base value can be from any field of your database, any element or group of elements, any specific type of risk assessment or even derived from a formula. The scaler will then dictate how intermediate values are weighted: this can be done by the graphs or scaling formulas.

Utility

Analysis > Utility Value

Utility Value: 77.36

Condition Item	Base Value	Scaled Value	Weight	Adjusted Value
Element ratings	72.65	72.65	90.00	6,538.50
NBI ratings	84.33	84.33	10.00	843.30

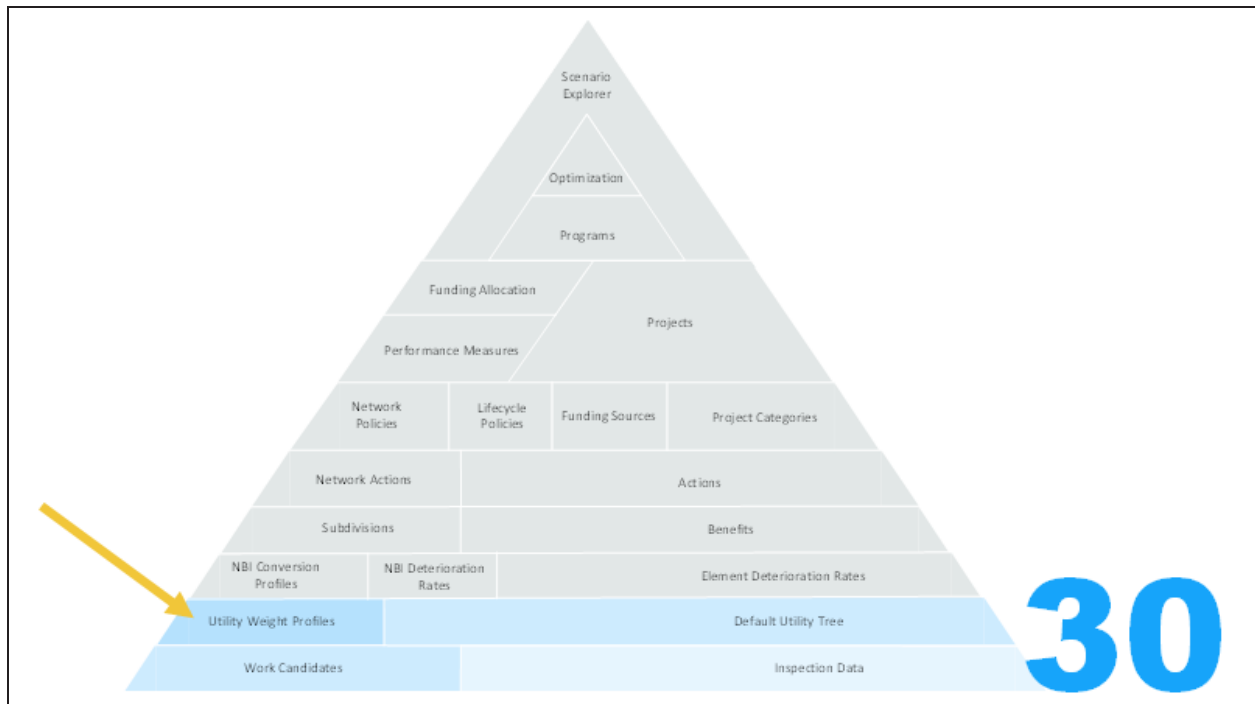
Risk Item	Base Value	Scaled Value	Weight	Adjusted Value
Channel and Channel Protection (NBI 61)			10.00	
Fracture Critical (NBI 92a)		100	20.00	2,000.00
Fluting (NBI 70)	5.00	100	20.00	2,000.00
Scour Critical (NBI 113)			30.00	
Underclearances (NBI 69)	6.00	50	20.00	1,000.00
Waterway Adequacy (NBI 71)			10.00	

Mobility Item	Base Value	Scaled Value	Weight	Adjusted Value
Approach Roadway Alignment (NBI 72)	6.00	50	15.00	750.00
Deck Geometry (NBI 68)	9.00	100	25.00	2,500.00
Detour Length (NBI 15)	3.11	88.90	15.00	1,333.50
Fluting (NBI 70)	5.00	100	25.00	2,500.00
Underclearances (NBI 69)	6.00	50	20.00	1,000.00

LifeCycle Item	Base Value	Scaled Value	Weight	Adjusted Value
No records to display.				

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You can see the math going into a bridge's current Utility Value in the *Analysis* tab.



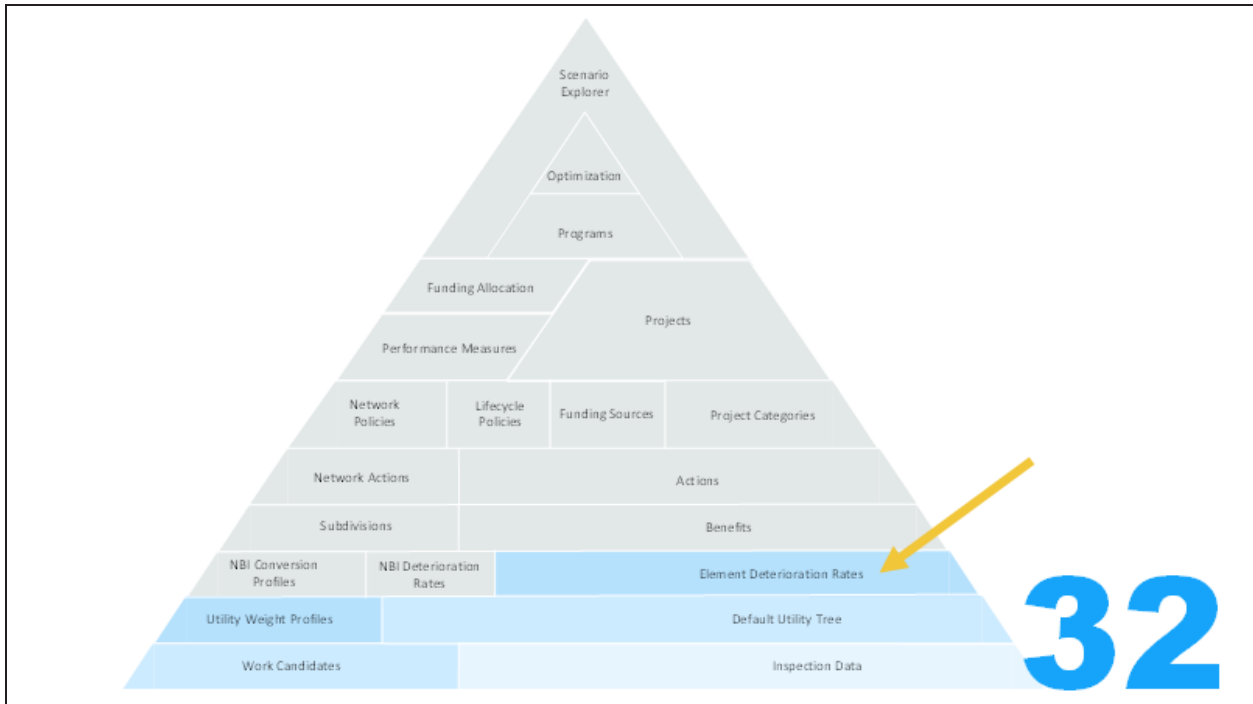
And now we will get to the first purely 5.2.3 feature: **Utility Weight Profiles**.

The screenshot shows the 'Utility Weight Profiles' configuration interface. The page title is 'Admin > Modeling Config > Weights Profile'. It features a 'Profiles' section with a dropdown menu for 'Selected Weight Profile' set to 'Scour' and a text input for 'Name' containing 'Scour'. Below this is a 'Utility Components' tree view showing a hierarchy: Total Utility (40->20) -> Lifecycle (30->0) -> Risk (15->30). Under Risk, several sub-components are listed with their weights: Channel and Channel Protection (NBI 61) (10->10), Fracture Critical (NBI 92a) (20->0), Posting (NBI 70) (20->0), Scour Critical (NBI 113) (30->30), Underclearances (NBI 69) (20->0), and Waterway Adequacy (NBI 71) (10->10). To the right is a 'Risk Criterion's Details' panel with input fields for 'Default Sibling Total Weight' (100), 'Default Weight' (15, 15%), 'Override Sibling Total Weight' (50), and 'Override Weight' (30, 60%), along with a 'Reset to Default' button. A large blue number '31' is positioned to the right of the screenshot.

For different optimization runs, you can temporarily re-weight the Utility Tree to focus in on certain nodes.

For example:

- For rehab & replacement programs, consider leaning more heavily on condition and lifecycle nodes.
- For preservation work, lean almost exclusively on the lifecycle node.
- For scour, you will probably lean mostly on risk.



## Element Deterioration Rates

ID	Short Name
12	Re Concrete Deck
13	Pre Concrete Deck
15	Pre Concrete Top Flange
16	Re Conc Top Flange
28	Steel Deck - Open Grid
29	Steel Deck - Conc Fill Grid
30	Steel Deck - Orthotropic
31	Timber Deck
38	Re Concrete Slab
54	Timber Slab
60	Other Deck
65	Other Slab
102	Steel Clad Box Girder
104	Pre Clad Box Girder
105	Re Clad Box Girder
106	Other Clad Web/Box Girder
107	Steel Open Girder/Beam
109	Pre Open Conc Girder/Beam
110	Re Conc Open Girder/Beam
111	Timber Open Girder
112	Other Open Girder/Beam
113	Steel Stringer

The element deterioration rates can be accessed in two ways:

Admin > Modeling Config > Element Specs > View Graphs

-Or-

Admin > Modeling Config > Deterioration Profiles



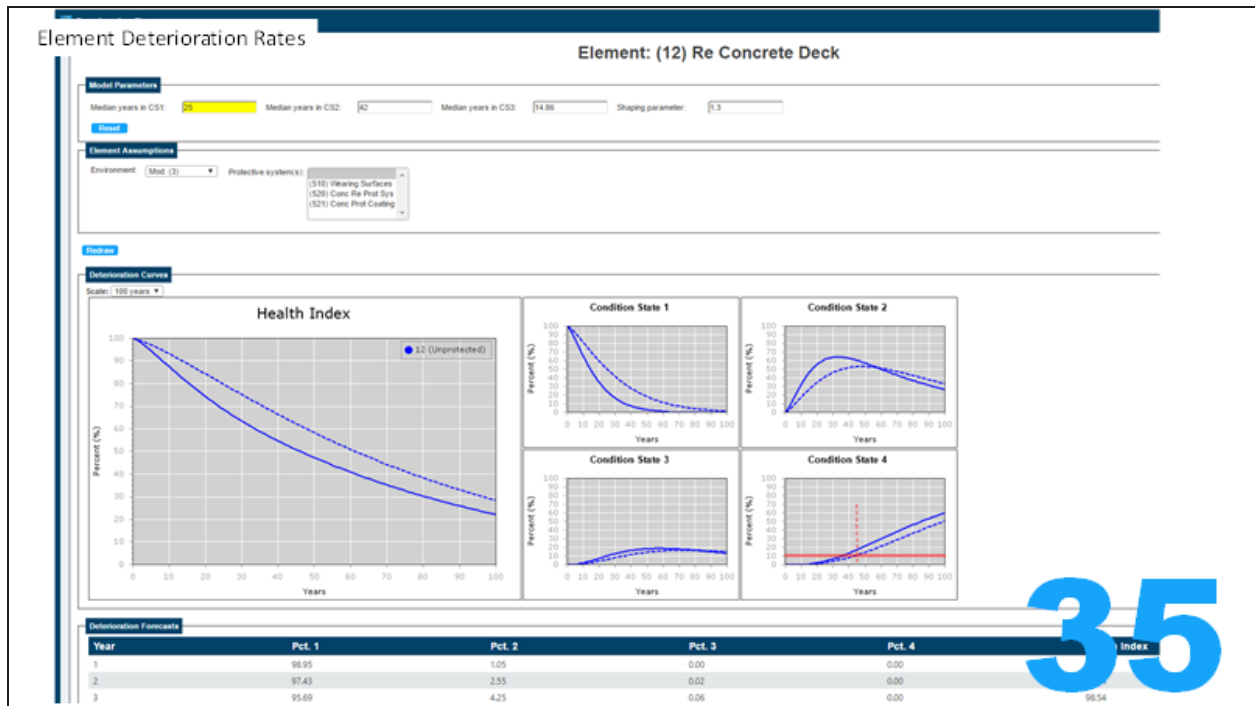
In this example, I have changed the median years from 12.5 to 25 (see in yellow at the top left).

The solid blue line shows the deterioration of the currently saved values, and the dashed line shows the rate for the values entered above.

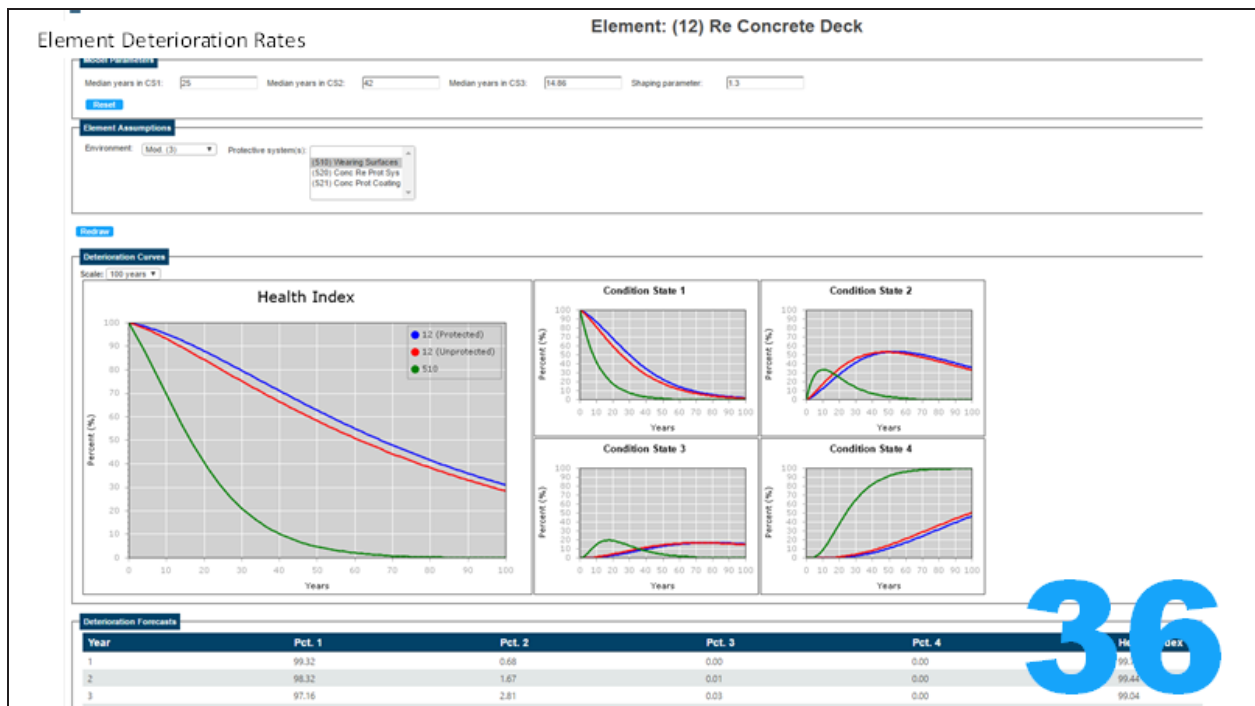
Your agency will need to set these deterioration rates for all of your elements: we've done our best to pick defaults, but as an example: steel protective paint last about 15 years in Alabama's marshes vs 45 years in Utah's arid desert. The deterioration rates should match your environment and experience.

(Some states have used service units to have Bentley help determine what their deterioration rates should be.)

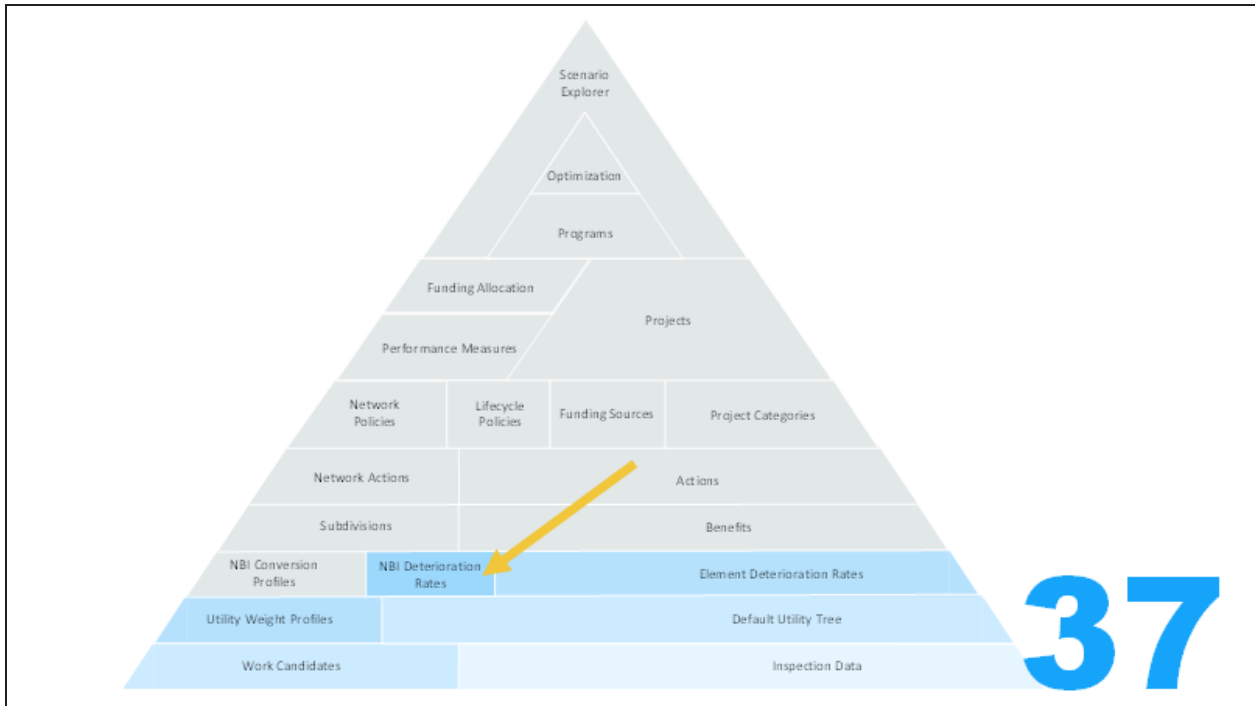




A good intuitive rule of thumb to look at when setting these rates is when the element reaches 10% in CS4. In your mind, when you say a bare concrete deck ‘lasts about 45 years,’ this is about the point you’re thinking of.



You can also see how protective systems would affect that deterioration. In this case, a 10-year wearing surface (approximately an asphalt treatment) is applied, and you can see that it extends the life of the deck 5 years.



**NBI Deterioration Rates**

At later points in the configuration process, we will set some triggers for actions based on the NBI value. There are two ways to determine those future NBI values: based on the time in condition state (NBI Deterioration) or converting the deteriorated elements to an approximate NBI value (NBI Conversion).

Here we can set a time in NBI state. The optimizer can use your inspection history to determine how long the bridge deck has been an NBI of 5, and therefore make a guess as to how long it will remain this way.

If you do not use element inspections on local bridges, you will only be able to use NBI deterioration.

NBI Deterioration Rates

Admin > Modeling Config > NBI Deterioration Models

**Components**

Component Name

- Deck
- Superstructure
- Substructure
- Convent

**Component Specification**

Name: Deck

Description:

Category: Deck/State

Table Name: Inspect

Column Name:

Min NBI Value: 0

Max NBI Value: 0

**Component Deterioration Modeling**

Model

**Model Parameters**

NBI Transition Time in Years 9: 2

NBI Transition Time in Years 8: 18.65

NBI Transition Time in Years 7: 13.75

NBI Transition Time in Years 6: 14.5

NBI Transition Time in Years 5: 14

NBI Transition Time in Years 4: 5

NBI Transition Time in Years 3: 2.6

NBI Transition Time in Years 2: 5

NBI Transition Time in Years 1: 5

**Network NBI Rating distributions**

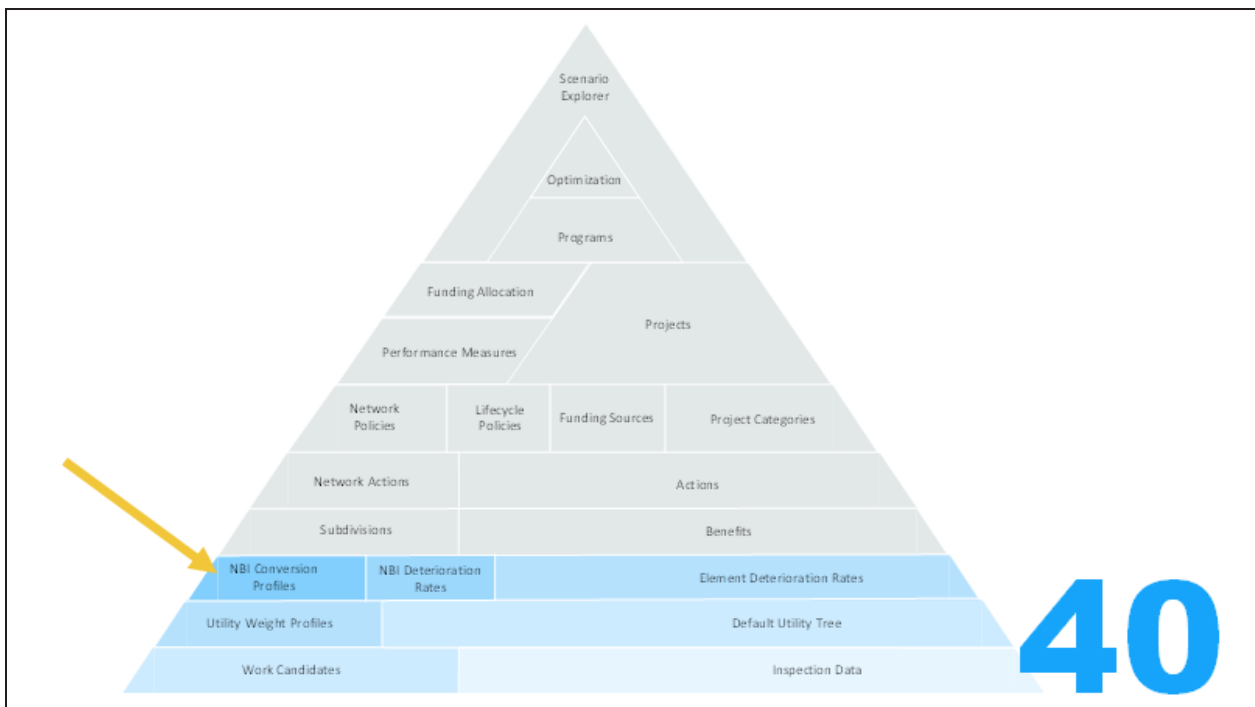
Bridge Filter: BrM - Active Status No estimate results

Component: Deck

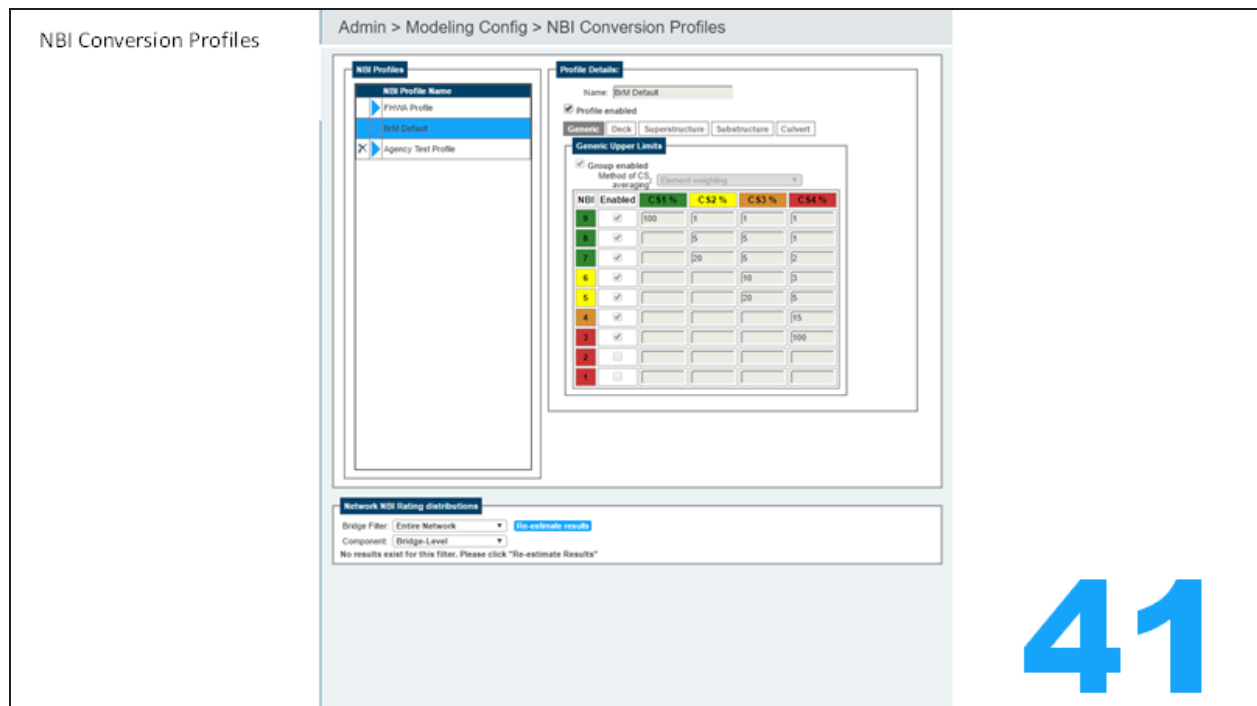
	Latest Inspection Reported	Current	+5 Years	+10 Years
NBI Rating 9	273	69	0	0
NBI Rating 8	1007	1006	960	727
NBI Rating 7	2183	1367	1158	928
NBI Rating 6	2299	2419	2415	2439
NBI Rating 5	1200	1695	1777	1972
NBI Rating 4	88	482	604	265
NBI Rating 3	23	64	119	225
NBI Rating 2	0	11	15	328
NBI Rating 1	1	0	52	192

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At the bottom of the page, you can pick a filter of bridges and see about how many of those bridges would be “good, fair or poor” based on the values you have set above. This should help you to calibrate these settings.



**NBI Conversion Profiles**



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The other way to generate future NBI values is to convert them from the elements. This is done with the NBI Conversion Profiles.

These same profiles are used to recommend NBI values from element inspection data on the condition page (see slide 20).

The values in the cells are the upper limit for CS values; so if your deck element has 21% in CS2, the highest possible NBI is an NBI of 6.

If you have 21% in CS3, an NBI of 4 is the highest you will get.

In our experience, the FHWA Profile is very aggressive because it has no tolerance for anything in CS4. But within two or three years of element deterioration, there is 0.001% of the deck in CS4, which forces the NBI value to a 4.

NBI Conversion Profiles

Admin > Modeling Config > NBI Conversion Profiles

**NBI Profiles**

- NBI Profile Name
- BrM Default - Copy
- FHWA Profile
- BrM Default

**Profile Details**

Name: BrM Default

Profile enabled

Generic:  Deck  Superstructure  Substructure  Culvert

**Generic Upper Limits**

Group enabled  
Method of CS:  (Element weights)

NBI	Enabled	CS1 %	CS2 %	CS3 %	CS4 %
1	<input checked="" type="checkbox"/>	100	0	0	0
2	<input checked="" type="checkbox"/>	0	0	0	0
3	<input checked="" type="checkbox"/>	0	0	0	0
4	<input checked="" type="checkbox"/>	0	0	0	0
5	<input checked="" type="checkbox"/>	0	0	0	0
6	<input checked="" type="checkbox"/>	0	0	0	0
7	<input checked="" type="checkbox"/>	0	0	0	0
8	<input checked="" type="checkbox"/>	0	0	0	0
9	<input checked="" type="checkbox"/>	0	0	0	0
10	<input checked="" type="checkbox"/>	0	0	0	0
11	<input type="checkbox"/>	0	0	0	100

**Network NBI Rating distributions**

Bridge Filter: Entire Network Go estimate results

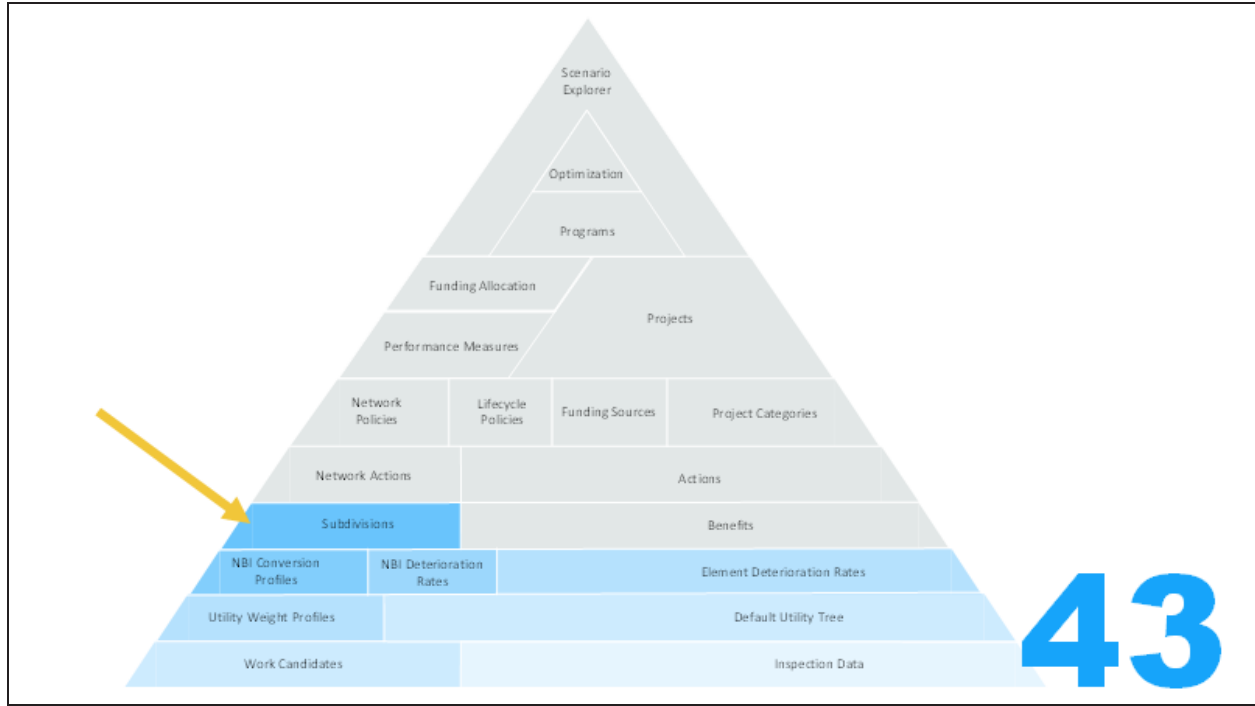
Component: Bridge-Level

	Latest Inspection Reported	Latest Inspection Converted	Current +5 Years	+10 Years
NBI Rating 9	2157		1818	67
NBI Rating 8	1225		1053	845
NBI Rating 7	1535		2044	2502
NBI Rating 6	3889		3872	4915
NBI Rating 5	678		728	1684
NBI Rating 4	1419		1433	1262
NBI Rating 3	131		135	461
NBI Rating 2	0		0	0
NBI Rating 1	0		0	0

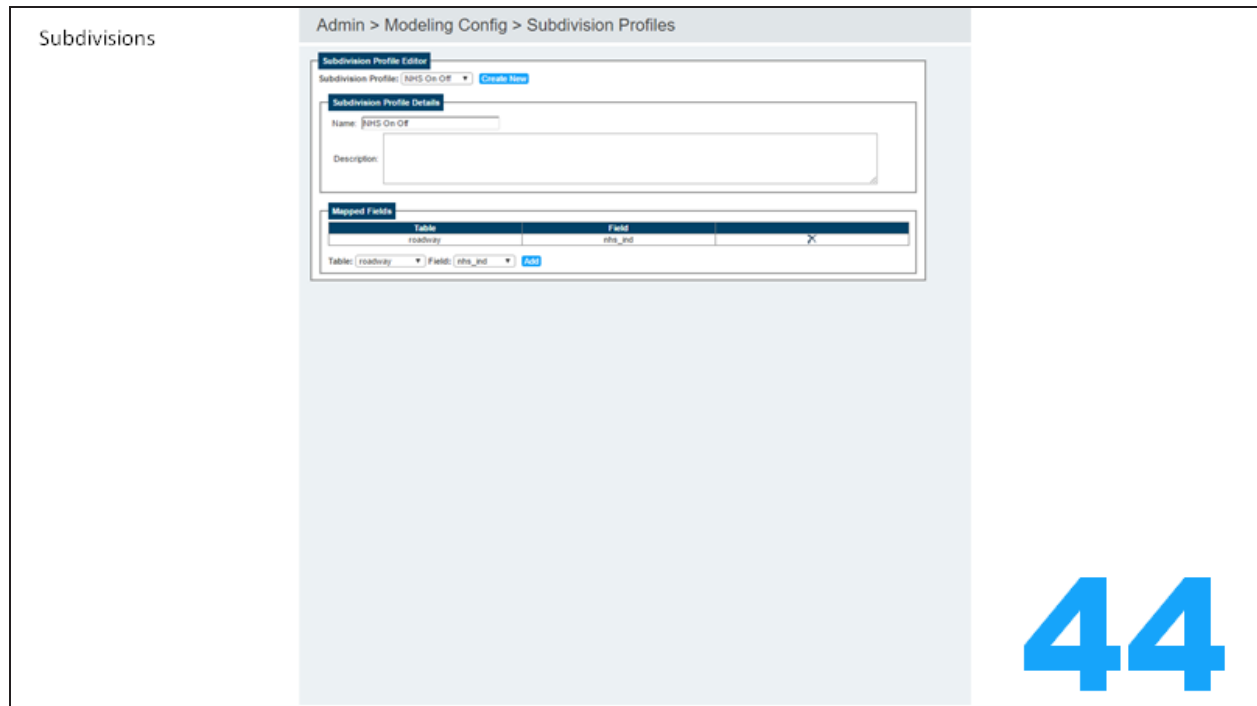
# 42

There is also a Good / Fair / Poor guide at the bottom, to help you find the appropriate settings for your state.

In testing we came across some states that allow 100% in CS3 to have an NBI of 5, and some which only tolerated 10% in CS3 before dropping to an NBI of 4. These limits will need to be configured to your agency's practices.



Let's briefly discuss **Subdivisions** before moving on to the main pieces of Actions and Benefits.

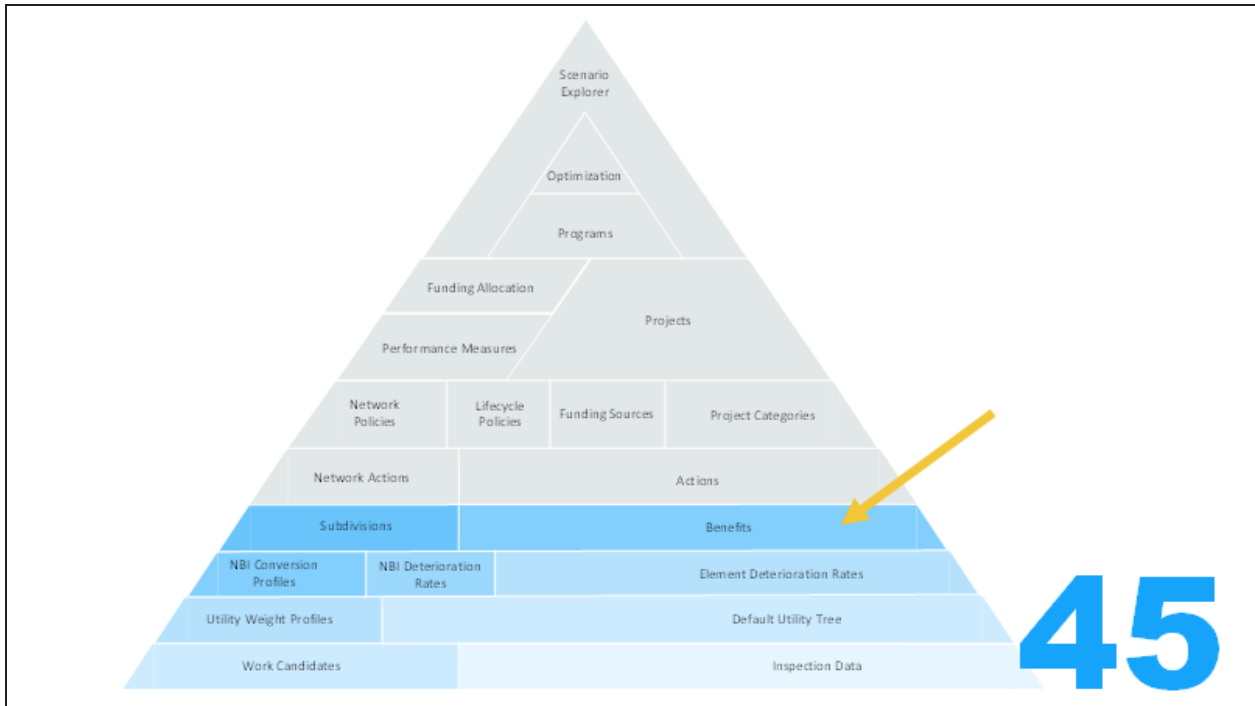


Subdivisions are used to break the analysis group up into different pieces for tracking results. You will see them play a larger role in the end.

You can create subdivisions based on any database field.

Some common examples would be:

- On and Off the NHS (shown here).
- Subdivision by District
- Subdivision by Owner.



**Benefits:** in a lot of ways this is the main event.

Benefits

Admin > Modeling Config > Benefit Groups

Benefit Group Name	Description	Linked Actions	Sort Order	Child Benefit Groups
Repair Piers & Caps	Repair Pier & Cap Elements		9999	<a href="#">Link to CHM Groups</a>
Repair Railings	Repair Concrete, Replace Others	Approach Slab Jacking, Rehab Culvert - Network	9999	<a href="#">Link to CHM Groups</a>
Replace Approach Slabs	Replace Approach Elms	Profile Rotomilling, Replace Structure - Network	9999	<a href="#">Link to CHM Groups</a>
Replace Culvert	Replace Culvert	Replace Structure - Network	9999	<a href="#">Link to CHM Groups</a>
Replace Deck	Replace Decks	Profile Rotomilling, Replace Structure - Network	9999	<a href="#">Link to CHM Groups</a>
Replace Deck Sections	Replace Steel and Timber sections	Approach Slab Jacking	9999	<a href="#">Link to CHM Groups</a>
Replace Joint Seals	Replace Joint Seals	Approach Slab Jacking	9999	<a href="#">Link to CHM Groups</a>
Replace Railings	Replace Railings	Profile Rotomilling, Replace Structure - Network	9999	<a href="#">Link to CHM Groups</a>
Replace Sub	Replace Sub Elements	Replace Structure - Network	9999	<a href="#">Link to CHM Groups</a>
Replace Super	Replace Super	Replace Super - Network, Replace Structure - Network	9999	<a href="#">Link to CHM Groups</a>
Seal Joints	Replace Joint seals	Preserve Deck - Network	9999	<a href="#">Link to CHM Groups</a>
Thin Bonded Overlay	Thin Bonded Overlay - Replace / place new	Preserve Deck - Network	9999	<a href="#">Link to CHM Groups</a>

Page size: 20 | 52 items in 3 pages

- Approach Slab Repair - Changed Elements
- Approach Slab Repair - Removed Elements
- Approach Slab Repair - Replaced Elements
- Approach Slab Repair - Created Protecting Systems
- Approach Slab Repair - Fields
- Approach Slab Repair - Risks: to reduce risk, use negative values

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The Benefits are the changes to a structure as a result of work. There are some defaults out-of-the-box, but you should look at these as an example and then model your agency's typical work.

Benefits

Benefit Group Name	Description	Linked Actions	Sort Order	Child Benefit Groups
Repair Piers & Caps	Repair Pier & Cap Elements		9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Repair Railings	Repair Concrete, Replace Others	Approach Slab Jacking, Rehab Culvert - Network	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Replace Approach Slabs	Replace Approach Elems	Profile Rotomilling, Replace Structure - Network	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Replace Culvert	Replace Culvert	Replace Structure - Network	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Replace Deck	Replace Decks	Profile Rotomilling, Replace Structure - Network	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Replace Deck Sections	Replace Steel and Timber sections	Approach Slab Jacking	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Replace Joint Seals	Replace Joint Seals	Approach Slab Jacking	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Replace Railings	Replace Railings	Profile Rotomilling, Replace Structure - Network	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Replace Sub	Replace Sub Elements	Replace Structure - Network	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Replace Super	Replace Super	Replace Super - Network, Replace Structure - Network	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Seal Joints	Replace Joint seals	Preserve Deck - Network	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Thin Bonded Overlay	Thin Bonded Overlay - Replace / place new	Preserve Deck - Network	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>

# 47

A Benefit can be connected to multiple Actions, and an Action can have multiple Benefits. This means you can define something like 'Replace Super' and use the same benefit for a 'Replace Super' Action and as part of a 'Replace Structure' Action.

Benefits

- Changed Elements
- Removed Elements
- Replaced Elements
- Created Protective Sys
- Fields
- Risks

Benefit Group Name	Description	Linked Actions	Sort Order	Child Benefit Groups
Repair Piers & Caps	Repair Pier & Cap Elements		9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Repair Railings	Repair Concrete, Replace Others	Approach Slab Jacking, Rehab Culvert - Network	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Replace Approach Slabs	Replace Approach Elems	Profile Rotomilling, Replace Structure - Network	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Replace Culvert	Replace Culvert	Replace Structure - Network	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Replace Deck	Replace Decks	Profile Rotomilling, Replace Structure - Network	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Replace Deck Sections	Replace Steel and Timber sections	Approach Slab Jacking	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Replace Joint Seals	Replace Joint Seals	Approach Slab Jacking	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Replace Railings	Replace Railings	Profile Rotomilling, Replace Structure - Network	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Replace Sub	Replace Sub Elements	Replace Structure - Network	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Replace Super	Replace Super	Replace Super - Network, Replace Structure - Network	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Seal Joints	Replace Joint seals	Preserve Deck - Network	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Thin Bonded Overlay	Thin Bonded Overlay - Replace / place new	Preserve Deck - Network	9999	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>

# 48

Let's now go through the possible ways to define benefits and talk about the details of each. Some of these have been added in 5.2.2 and some in 5.2.3 to better model the kinds of work an agency does to a structure.



**Benefits**

- Changed Elements
- Removed Elements
- Replaced Elements
- Created Protective Sys
- Fields
- Risks

Admin > Modeling Config > Benefit Groups

Benefit Group	Parent	Grandparent	Cost	Unit	Link
Replace Culvert	Replace Culvert	Profile Rotomilling, Replace Structure - Network	9999	/ X	<a href="#">Link to Child Groups</a>
Replace Deck	Replace Decks	Profile Rotomilling, Replace Structure - Network	9999	/ X	<a href="#">Link to Child Groups</a>
Replace Deck Sections	Replace Steel and Timber sections	Approach Slab Jacking	9999	/ X	<a href="#">Link to Child Groups</a>
Replace Joint Seals	Replace Joint Seals	Approach Slab Jacking	9999	/ X	<a href="#">Link to Child Groups</a>
Replace Railings	Replace Railings	Profile Rotomilling, Replace Structure - Network	9999	/ X	<a href="#">Link to Child Groups</a>
Replace Sub	Replace Sub Elements	Replace Structure - Network	9999	/ X	<a href="#">Link to Child Groups</a>
Replace Super	Replace Super	Replace Super - Network, Replace Structure - Network	9999	/ X	<a href="#">Link to Child Groups</a>
Seal Joints	Replace Joint seals	Preserve Deck - Network	9999	/ X	<a href="#">Link to Child Groups</a>
Thin Bonded Overlay	Thin Bonded Overlay - Replace / place new	Preserve Deck - Network	9999	/ X	<a href="#">Link to Child Groups</a>

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Approach Slab Repair - Changed Elements

Element	Parent	Grandparent	Origin State	CS1	CS2	CS3	CS4
320 Pre Conc Appr Slab							
320 Pre Conc Appr Slab	None	None	CS3	100%		/ X	
320 Pre Conc Appr Slab	None	None	CS4	100%		/ X	
321 Re Conc Approach Slab							
321 Re Conc Approach Slab	None	None	CS3	100%		/ X	
321 Re Conc Approach Slab	None	None	CS4	100%		/ X	

Page size: 20 | 4 items in 1 pages

Approach Slab Repair - Removed Elements

Approach Slab Repair - Replaced Elements

Approach Slab Repair - Created Protecting Systems

Approach Slab Repair - Fields

Approach Slab Repair - Risks - to reduce risk, use negative values

49

The *Changed Elements* grouping defines a benefit where all or part of an element in a certain condition state is moved to another condition state. The costs will be modeled as \$ per unit fixed.

In this example, pothole patching a concrete approach slab moves all of CS3 and CS4 quantities to CS2.

**Benefits**

- Changed Elements
- Removed Elements
- Replaced Elements
- Created Protective Sys
- Fields
- Risks

Admin > Modeling Config > Benefit Groups

Benefit Group	Parent	Grandparent	Cost	Unit	Link
Replace Approach Slabs	Replace Approach Elems	Replace Structure - Network	9999	/ X	<a href="#">Link to Child Groups</a>
Replace Culvert	Replace Culvert	Replace Structure - Network	9999	/ X	<a href="#">Link to Child Groups</a>
Replace Deck	Replace Decks	Profile Rotomilling, Replace Structure - Network	9999	/ X	<a href="#">Link to Child Groups</a>
Replace Deck Sections	Replace Steel and Timber sections	Approach Slab Jacking	9999	/ X	<a href="#">Link to Child Groups</a>
Replace Joint Seals	Replace Joint Seals	Approach Slab Jacking	9999	/ X	<a href="#">Link to Child Groups</a>
Replace Railings	Replace Railings	Profile Rotomilling, Replace Structure - Network	9999	/ X	<a href="#">Link to Child Groups</a>
Replace Sub	Replace Sub Elements	Replace Structure - Network	9999	/ X	<a href="#">Link to Child Groups</a>
Replace Super	Replace Super	Replace Super - Network, Replace Structure - Network	9999	/ X	<a href="#">Link to Child Groups</a>
Seal Joints	Replace Joint seals	Preserve Deck - Network	9999	/ X	<a href="#">Link to Child Groups</a>
Thin Bonded Overlay	Thin Bonded Overlay - Replace / place new	Preserve Deck - Network	9999	/ X	<a href="#">Link to Child Groups</a>

Page size: 20 | 52 items in 3 pages

Approach Slab Repair - Changed Elements

Approach Slab Repair - Removed Elements

Element	Parent	Grandparent	Unit
(200) Timber Column	None	None	/ X

No records to display.

Page size: 20 | 0 items in 1 pages

Approach Slab Repair - Replaced Elements

Approach Slab Repair - Created Protecting Systems

Approach Slab Repair - Fields

Approach Slab Repair - Risks - to reduce risk, use negative values

50

The *Removed Elements* grouping defines a benefit which removes an element. This can be for record-cleanup and remove defects, or this could be for removing elements like temporary shoring or asphalt overlays to exclude them from further deterioration analysis. The costs will be modeled as \$ / total quantity of units.

**Benefits**

- Changed Elements
- Removed Elements
- Replaced Elements
- Created Protective Sys
- Fields
- Risks

Admin > Modeling Config > Benefit Groups

Seal Joints	Replace Joint seals	Preserve Deck - Network	9999	✎ ✕	<a href="#">Link to Child Groups</a>
Thin Bonded Overlay	Thin Bonded Overlay - Replace / place new	Preserve Deck - Network	9999	✎ ✕	<a href="#">Link to Child Groups</a>

Page size: 20 52 items in 3 pages

Replace Deck - Changed Elements +

Replace Deck - Removed Elements +

Replace Deck - Replaced Elements -

+ Add new record

Orig. Element	Orig. Parent	New Element	Percent Replaced	✎	✕
304 Open Expansion Joint	None	304 Open Expansion Joint	100	✎	✕
302 Compress Joint Seal	None	302 Compress Joint Seal	100	✎	✕
60 Other Deck	None	60 Other Deck	100	✎	✕
31 Timber Deck	None	31 Timber Deck	100	✎	✕
306 Other Joint	None	306 Other Joint	100	✎	✕
38 Re Concrete Slab	None	38 Re Concrete Slab	100	✎	✕
30 Steel Deck - Orthotropic	None	30 Steel Deck - Orthotropic	100	✎	✕
305 Assem Jnt With Seal	None	305 Assem Jnt With Seal	100	✎	✕
303 Assem Jnt With Seal	None	303 Assem Jnt With Seal	100	✎	✕
300 Strip Seal Exp Joint	None	300 Strip Seal Exp Joint	100	✎	✕
65 Other Slab	None	65 Other Slab	100	✎	✕
12 Re Concrete Deck	None	12 Re Concrete Deck	100	✎	✕
29 Steel Deck - Conc Fill Grid	None	29 Steel Deck - Conc Fill Grid	100	✎	✕
301 Pourable Joint Seal	None	301 Pourable Joint Seal	100	✎	✕
13 Pre Concrete Deck	None	13 Pre Concrete Deck	100	✎	✕
54 Timber Slab	None	54 Timber Slab	100	✎	✕
28 Steel Deck - Open Grid	None	28 Steel Deck - Open Grid	100	✎	✕

Page size: 20 17 items in 1 pages

Replace Deck - Created Protecting Systems +

Replace Deck - Fields +

Replace Deck - Risks - to reduce risk, use negative values +

51

The *Replaced Elements* grouping defines a benefit in which one element is replaced (and not necessarily in kind or completely). Costs will be estimated in terms of \$ / unit replaced.

---

**Benefits**

- Changed Elements
- Removed Elements
- Replaced Elements
- Created Protective Sys
- Fields
- Risks

Admin > Modeling Config > Benefit Groups

Rehab Deck Steel	Replace Steel & Timber sections	Rehab Deck - Network	9999	✎ ✕	<a href="#">Link to Child Groups</a>
Rehab Railings	Repair Concrete, Replace Others	Rehab Deck - Network, Rehab Culvert - Network	9999	✎ ✕	<a href="#">Link to Child Groups</a>

Page size: 20 56 items in 3 pages

Create Super Paint - Changed Elements +

Create Super Paint - Removed Elements +

Create Super Paint - Replaced Elements +

Create Super Paint - Created Protecting Systems -

+ Add new record

Element	Parent	Percent Coverage	✎	✕
515 Steel Protective Coating	120 Steel Truss	100	✎	✕
515 Steel Protective Coating	149 Or Secondary Cable	100	✎	✕
515 Steel Protective Coating	314 Pot Bearing	100	✎	✕
515 Steel Protective Coating	107 Steel Opn Girder/Beam	100	✎	✕
515 Steel Protective Coating	152 Steel Floor Beam	100	✎	✕
515 Steel Protective Coating	102 Steel Clsd Box Grid	100	✎	✕
515 Steel Protective Coating	311 Moveable Bearing	100	✎	✕
515 Steel Protective Coating	312 Enclosed Bearing	100	✎	✕
515 Steel Protective Coating	113 Steel Stringer	100	✎	✕
515 Steel Protective Coating	141 St Arch	100	✎	✕
515 Steel Protective Coating	147 St Main Cables	100	✎	✕
515 Steel Protective Coating	315 Disk Bearing	100	✎	✕
515 Steel Protective Coating	163 St Pin Pin/Man both	100	✎	✕
515 Steel Protective Coating	313 Fixed Bearing	100	✎	✕
515 Steel Protective Coating	162 St Gus Plate	100	✎	✕
515 Steel Protective Coating	148 Sec Steel Cables	100	✎	✕

Page size: 20 16 items in 1 pages

Create Super Paint - Fields +

Create Super Paint - Risks - to reduce risk, use negative values +

52

The *Create Protective Systems* grouping lets you add elements to the structure. But due to the complexity of new quantities, in this version we are limiting the new elements to just protective systems. The cost is modeled as \$ / Unit Added.

- 402 -

Benefits

- Changed Elements
- Removed Elements
- Replaced Elements
- Created Protective Sys
- Fields
- Risks

Admin > Modeling Config > Benefit Groups

Table Name	Column Name	New Value	Increment
inspervnt	suprating	9	

53

The *Fields* grouping lets you model changes to other fields. NBI fields, scour ratings ... all tables and columns of bridge data can be modified. The cost is not modeled by elements, so you will need to use other methods. We will discuss this in Actions.

Benefits

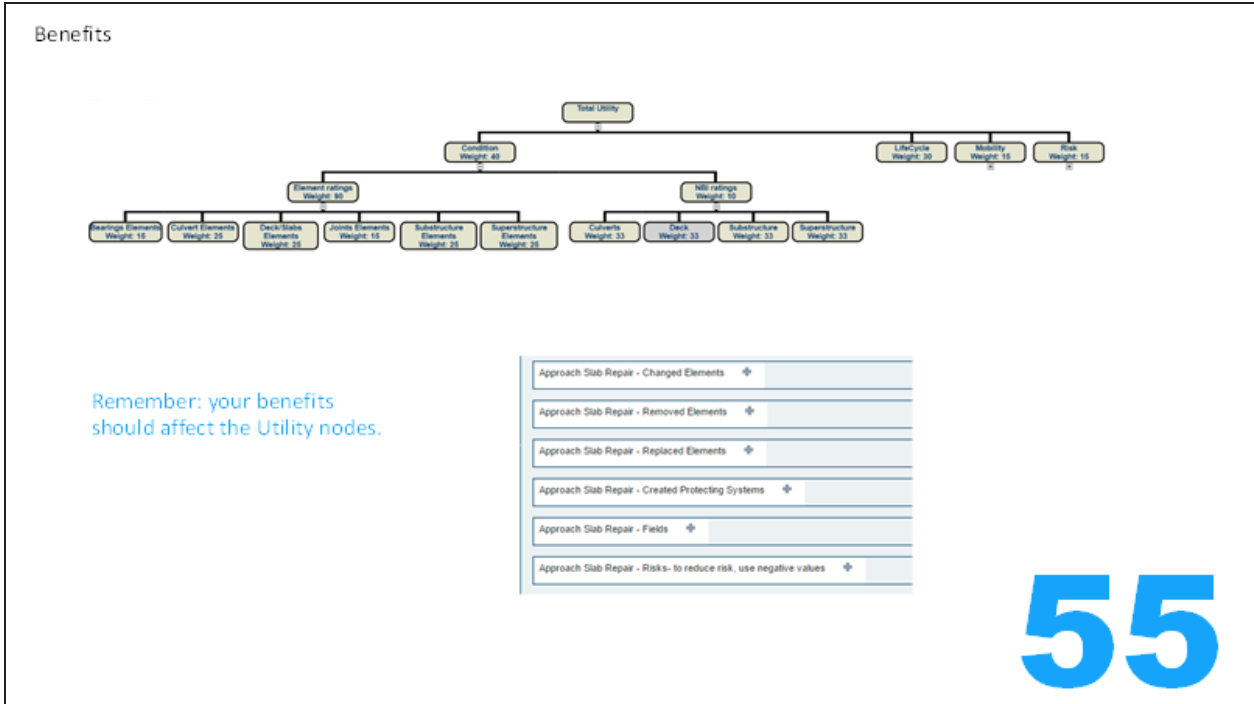
- Changed Elements
- Removed Elements
- Replaced Elements
- Created Protective Sys
- Fields
- Risks

Admin > Modeling Config > Benefit Groups

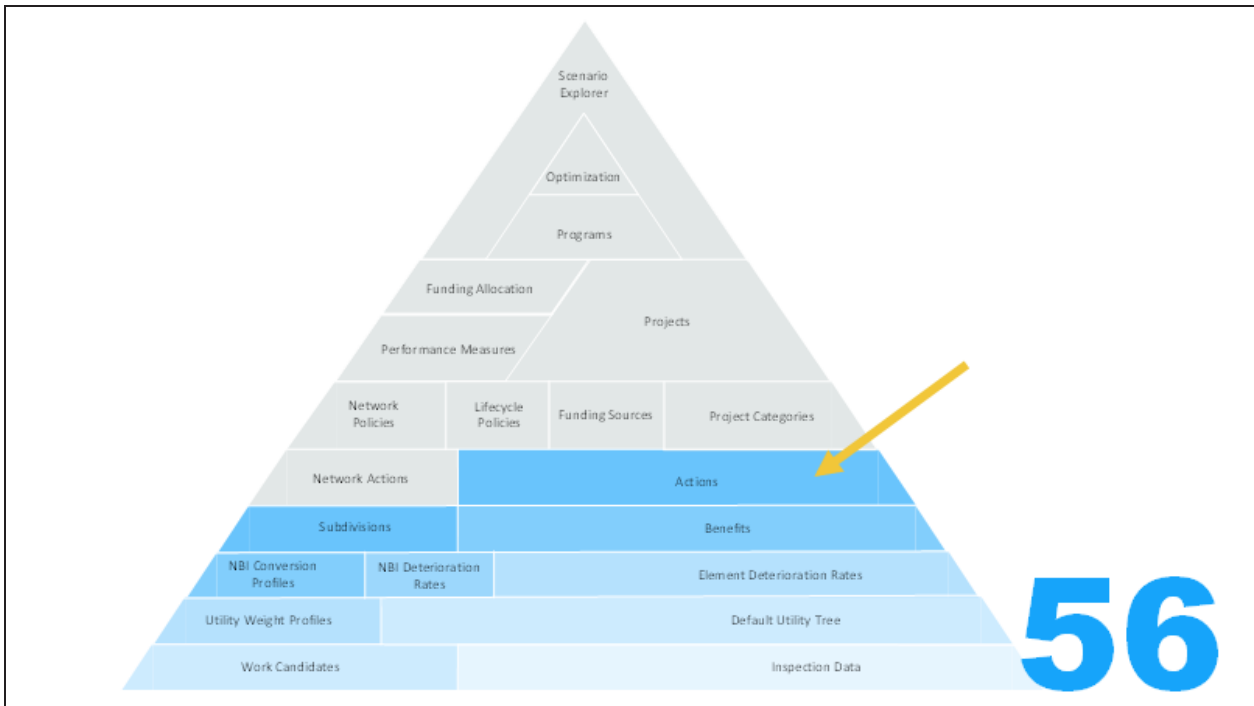
Assessment Name	New Value	Increment
Scour		-10

54

The *Risk* grouping lets you model changes to the risk assessments. Seismic or scour countermeasures can be modeled. There are no direct costs associated with these benefits, we will discuss ways to model costs soon.



Remember: your benefits should affect the Utility nodes. Actions (with their associated benefits) will be weighed in terms of their cost to benefit – and the benefit is calculated as the  $\Delta$  Utility. So it is critical that your benefits affect the nodes present in your utility tree.



**Actions:** the other side of the coin from Benefits.

Actions

Admin > Modeling Config > Action Defs

Category	Action Name	Description	Example	999	Unit	Network
Network	Preserve Deck - Network	Wearing Surface / Repair	Example	999	✓	Network
Network	Rehab Culvert - Network	Rehab culvert, parapets, approaches	Example	999	✓	Network
Network	Rehab Deck - Network	Repair deck, joints and parapets	Example	999	✓	Network
Network	Rehab Sub - Network	Repair Columns, Piers, Abutments, Flow Walls	Example	999	✓	Network
Network	Rehab Super - Network	Repair beams, paint and bearings	Example	999	✓	Network
Network	Repair Super/Sub - Network	Repair Pier	Example	999	✓	Network
Network	Replace Deck - Network	Replace Deck	Example	999	✓	Network
Network	Replace Structure - Network	Replace Structure	Example	999	✓	Network
Network	Replace Super - Network	Replace Super Elements	Example	999	✓	Network
Approach	Appro Roadway-MB Approach/Shoulder		-1			Approach
Approach	Approach Railing		-1			Approach
Approach	Approach Railing-Repair		-1			Approach

Associated Benefit Groups for Action Preserve Deck - Network

Benefit Group	Enabled	Field Name	Cost Per Unit	Unit
Deck Area	<input type="checkbox"/>	Deck Area	5.5	sq.R

Unit Costs

ID	Element Name	Cost Per Unit	Unit	7
300	Strip Seal Exp Joint (Replace)	5.14	ft	✓
301	Pourable Joint Seal (Replace)	5.5	ft	✓
302	Compress Joint Seal (Replace)	5.65	ft	✓
510	Wearing Surfaces (Replace)	5.50	sq.R	✓

Indirect Cost

Enabled	Component	Estimation Method
<input type="checkbox"/>	Total Indirect Cost	Please Select

Deformation Rules

Action Name	Deformation Interval (Years)
Preserve Deck - Network	5

57

There are lots of changes on this screen, and this will impact both the Actions and the Network Actions, with wider impacts to the rest of the software. First we will focus on the parts at the bottom of the screen.

Actions

Admin > Modeling Config > Action Defs

Category	Action Name	Description	Example	999	Unit	Network
Network	Preserve Deck - Network	Wearing Surface / Repair	Example	999	✓	Network
Network	Rehab Culvert - Network	Rehab culvert, parapets, approaches	Example	999	✓	Network
Network	Rehab Deck - Network	Repair deck, joints and parapets	Example	999	✓	Network
Network	Rehab Sub - Network	Repair Columns, Piers, Abutments, Flow Walls	Example	999	✓	Network
Network	Rehab Super - Network	Repair beams, paint and bearings	Example	999	✓	Network
Network	Repair Super/Sub - Network	Repair Pier	Example	999	✓	Network
Network	Replace Deck - Network	Replace Deck	Example	999	✓	Network
Network	Replace Structure - Network	Replace Structure	Example	999	✓	Network
Network	Replace Super - Network	Replace Super Elements	Example	999	✓	Network
Approach	Appro Roadway-MB Approach/Shoulder		-1			Approach
Approach	Approach Railing		-1			Approach
Approach	Approach Railing-Repair		-1			Approach

Associated Benefit Groups for Action Preserve Deck - Network

Benefit Group	Enabled	Field Name	Cost Per Unit	Unit
Deck Area	<input checked="" type="checkbox"/>	Deck Area	5.5	sq.R

Unit Costs

ID	Element Name	Cost Per Unit	Unit	7
300	Strip Seal Exp Joint (Replace)	5.14	ft	✓
301	Pourable Joint Seal (Replace)	5.5	ft	✓
302	Compress Joint Seal (Replace)	5.65	ft	✓
510	Wearing Surfaces (Replace)	5.50	sq.R	✓

Indirect Cost

Enabled	Component	Estimation Method
<input type="checkbox"/>	Total Indirect Cost	Please Select

Deformation Rules

Action Name	Deformation Interval (Years)
Preserve Deck - Network	5

58

On the left, this is where you attach the benefits to an action. You can attach multiple benefits to an action (for example, you can re-use a deck replacement benefit as part of a deck replacement action, and a bridge replacement action).

Actions

Admin > Modeling Config > Action Defs

Action Name	Description	Example	Cost	Unit	Deferment	Network
Preserve Deck - Network	Wearing Surface / Repair	Example	999	sqft	0	Network
Rehab Culvert - Network	Rehab culvert, parapets, approaches	Example	999	sqft	0	Network
Rehab Deck - Network	Repair deck, joints and parapets	Example	999	sqft	0	Network
Rehab Sub - Network	Repair Columns, Piers, Abutments, Piers, Walls	Example	999	sqft	0	Network
Rehab Super - Network	Repair beams, paint and bearings	Example	999	sqft	0	Network
Repaint Super/Sub - Network	Repair Paint	Example	999	sqft	0	Network
Replace Deck - Network	Replace Deck	Example	999	sqft	0	Network
Replace Structure - Network	Replace Structure	Example	999	sqft	0	Network
Replace Super - Network	Replace Super Elements	Example	999	sqft	0	Network
Approach Roadway-MM	Approach Roadway-MM	-1				Approach
Approach Rating	Approach Rating	-1				Approach
Approach Rating-Repair	Approach Rating-Repair	-1				Approach

Associated Benefit Groups for Action Preserve Deck - Network

Benefit Groups

- Replace Wearing Surface
- Seal Joints
- Thin Bonded Overlay

Overriding Direct Cost (overrides unit-costs) ==

Enabled	Field Name	Cost Per Unit	Unit
<input type="checkbox"/>	Deck Area	\$ 5	sqft

Unit Costs ==

ID	Element Name	Cost Per Unit	Unit	T
300	Strip Seal Exp Joint (Replace)	\$ 14	sqft	Green
301	Pourable Joint Seal (Replace)	\$ 5	sqft	Green
302	Compress Joint Seal (Replace)	\$ 65	sqft	Green
510	Wearing Surfaces (Replace)	\$ 20	sqft	Green

Indirect Cost ==

Enabled	Component	Estimation Method
<input type="checkbox"/>	Total Indirect Cost	Please Select

Deferment Rules ==

Action Name	Deferment Interval (Years)
Preserve Deck - Network	5

59

The costs can be modeled in a few ways. First, you have the option to override the costs on a per-element basis with a cost per-sqft of deck. This can be useful if your agency has a sqft cost estimate for structure replacement or standard collections of deck work.

Actions

Admin > Modeling Config > Action Defs

Action Name	Description	Example	Cost	Unit	Deferment	Network
Preserve Deck - Network	Wearing Surface / Repair	Example	999	sqft	0	Network
Rehab Culvert - Network	Rehab culvert, parapets, approaches	Example	999	sqft	0	Network
Rehab Deck - Network	Repair deck, joints and parapets	Example	999	sqft	0	Network
Rehab Sub - Network	Repair Columns, Piers, Abutments, Piers, Walls	Example	999	sqft	0	Network
Rehab Super - Network	Repair beams, paint and bearings	Example	999	sqft	0	Network
Repaint Super/Sub - Network	Repair Paint	Example	999	sqft	0	Network
Replace Deck - Network	Replace Deck	Example	999	sqft	0	Network
Replace Structure - Network	Replace Structure	Example	999	sqft	0	Network
Replace Super - Network	Replace Super Elements	Example	999	sqft	0	Network
Approach Roadway-MM	Approach Roadway-MM	-1				Approach
Approach Rating	Approach Rating	-1				Approach
Approach Rating-Repair	Approach Rating-Repair	-1				Approach

Associated Benefit Groups for Action Preserve Deck - Network

Benefit Groups

- Replace Wearing Surface
- Seal Joints
- Thin Bonded Overlay

Overriding Direct Cost (overrides unit-costs) ==

Enabled	Field Name	Cost Per Unit	Unit
<input type="checkbox"/>	Deck Area	\$ 5	sqft

Unit Costs ==

ID	Element Name	Cost Per Unit	Unit	T
300	Strip Seal Exp Joint (Replace)	\$ 14	sqft	Green
301	Pourable Joint Seal (Replace)	\$ 5	sqft	Green
302	Compress Joint Seal (Replace)	\$ 65	sqft	Green
510	Wearing Surfaces (Replace)	\$ 20	sqft	Green

Indirect Cost ==

Enabled	Component	Estimation Method
<input type="checkbox"/>	Total Indirect Cost	Please Select

Deferment Rules ==

Action Name	Deferment Interval (Years)
Preserve Deck - Network	5

60

Next we have the Element per-unit costs. As you add benefits to the action, the elements affected will be added to this list. In parenthesis you will see if it's a removal, improvement, replacement, or creation. As you remove benefits from the action, you will see elements be removed. And if for some reason they become unlinked, the green square will turn red.

Admin > Modeling Config > Action Defs

Actions

Action Name	Description	Example	999	Unit	Network
Preserve Deck - Network	Wearing Surface / Repair	Example	999	✓	Network
Rehab Culvert - Network	Rehab culvert, parapets, approaches	Example	999	✓	Network
Rehab Deck - Network	Repair deck, joints and parapets	Example	999	✓	Network
Rehab Sub - Network	Repair Columns, Piers, Abutments, Piers, Walls	Example	999	✓	Network
Rehab Super - Network	Repair beams, paint and bearings	Example	999	✓	Network
Repair Super/Sub - Network	Repair Pier	Example	999	✓	Network
Replace Deck - Network	Replace Deck	Example	999	✓	Network
Replace Structure - Network	Replace Structure	Example	999	✓	Network
Replace Super - Network	Replace Super Elements	Example	999	✓	Network
Approch Ribway-MB	Approach Roadway-MB	-1			Approach
Approach-Railing	Approach-Railing	-1			Approach
Approach-Railing-Repair	Approach-Railing-Repair	-1			Approach

Associated Benefit Groups for Action Preserve Deck - Network

Benefit Groups

- Replace Wearing Surface
- Seal Joints
- Thin Bonded Overlay

Overriding Direct Cost (overrides unit-costs) ==

Enabled	Field Name	Cost Per Unit	Unit
<input type="checkbox"/>	Deck Area	0.5	sq.R

Unit Costs ==

ID	Element Name	Cost Per Unit	Unit	?
300	Strip Seal Exp Joint (Replace)	5.14	R	✓
301	Pourable Joint Seal (Replace)	5.5	R	✓
302	Compress Joint Seal (Replace)	5.65	R	✓
510	Wearing Surfaces (Replace)	5.20	sq.R	✓

Indirect Cost ==

Enabled	Component	Estimation Method
<input type="checkbox"/>	Total Indirect Cost	Please Select

Deferment Rules ==

Action Name	Deferment Interval (Years)
Preserve Deck - Network	5

61

You also have the option to add indirect costs, either as a fixed amount or a percentage of the total project. For risk or field changes, this is probably the best option to reflect costs.

Admin > Modeling Config > Action Defs

Actions

Action Name	Description	Example	999	Unit	Network
Preserve Deck - Network	Wearing Surface / Repair	Example	999	✓	Network
Rehab Culvert - Network	Rehab culvert, parapets, approaches	Example	999	✓	Network
Rehab Deck - Network	Repair deck, joints and parapets	Example	999	✓	Network
Rehab Sub - Network	Repair Columns, Piers, Abutments, Piers, Walls	Example	999	✓	Network
Rehab Super - Network	Repair beams, paint and bearings	Example	999	✓	Network
Repair Super/Sub - Network	Repair Pier	Example	999	✓	Network
Replace Deck - Network	Replace Deck	Example	999	✓	Network
Replace Structure - Network	Replace Structure	Example	999	✓	Network
Replace Super - Network	Replace Super Elements	Example	999	✓	Network
Approch Ribway-MB	Approach Roadway-MB	-1			Approach
Approach-Railing	Approach-Railing	-1			Approach
Approach-Railing-Repair	Approach-Railing-Repair	-1			Approach

Associated Benefit Groups for Action Preserve Deck - Network

Benefit Groups

- Replace Wearing Surface
- Seal Joints
- Thin Bonded Overlay

Overriding Direct Cost (overrides unit-costs) ==

Enabled	Field Name	Cost Per Unit	Unit
<input type="checkbox"/>	Deck Area	0.5	sq.R

Unit Costs ==

ID	Element Name	Cost Per Unit	Unit	?
300	Strip Seal Exp Joint (Replace)	5.14	R	✓
301	Pourable Joint Seal (Replace)	5.5	R	✓
302	Compress Joint Seal (Replace)	5.65	R	✓
510	Wearing Surfaces (Replace)	5.20	sq.R	✓

Indirect Cost ==

Enabled	Component	Estimation Method
<input type="checkbox"/>	Total Indirect Cost	Please Select

Deferment Rules ==

Action Name	Deferment Interval (Years)
Preserve Deck - Network	5

62

Deferment rules are used primarily by the LCCA modules, and are helpful for modeling how work would actually be performed. An action can have deferment effects on many actions, for example replacing the bridge can defer any other actions for several years.

Admin > Modeling Config > Action Defs

Actions

Associated Benefit Groups for Action Preserve Deck - Network

ID	Element Name	Cost Per Unit	Unit	T
300	Strip Seal Exp. Joint (Replace)	5.75	ft	✓
301	Pourable Joint Seal (Replace)	5.50	ft	✓
302	Compression Joint Seal (Replace)	5.95	ft	✓
510	Wearing Surfaces (Replace)	5.20	sq ft	✓

63

You have the option to define a minimum cost – which will keep the optimizer from recommending that work until the cost reaches a minimum threshold. We recommend that you keep these thresholds low or nonexistent until you become familiar with the project-thresholds we will discuss later on.

Admin > Modeling Config > Action Defs

Actions

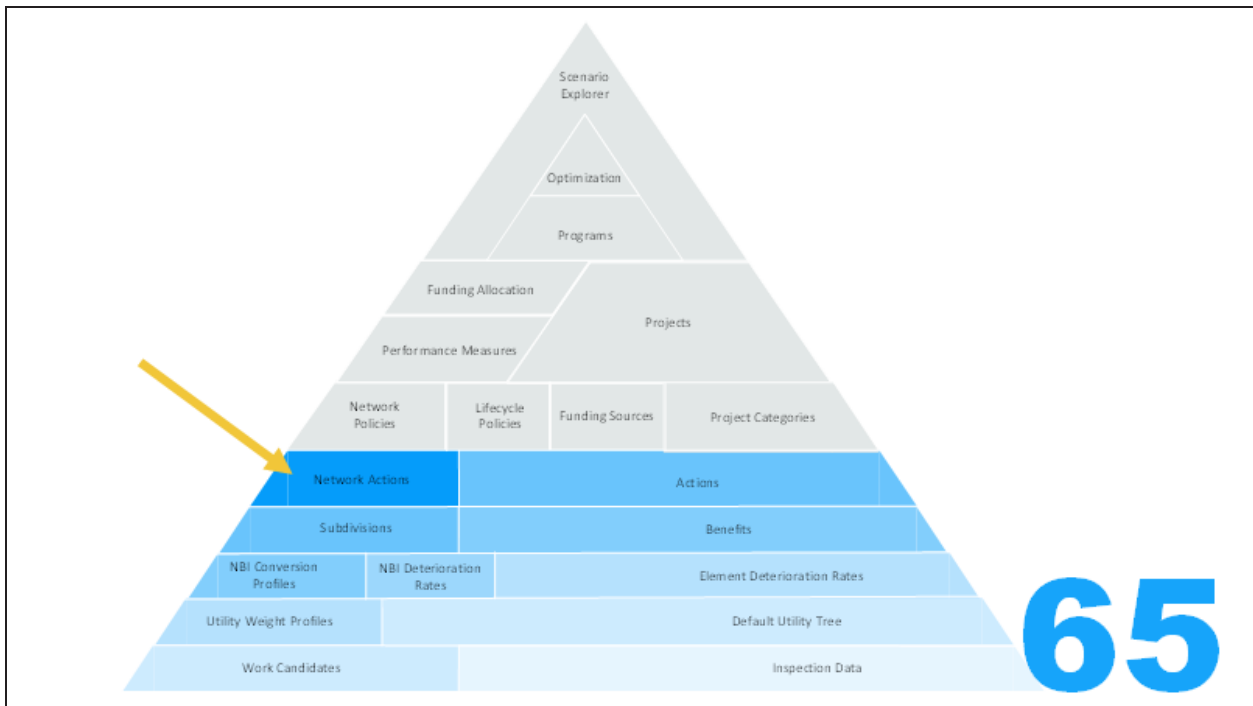
Associated Benefit Groups for Action Preserve Deck - Network

ID	Element Name	Cost Per Unit	Unit	T
300	Strip Seal Exp. Joint (Replace)	5.75	ft	✓
301	Pourable Joint Seal (Replace)	5.50	ft	✓
302	Compression Joint Seal (Replace)	5.95	ft	✓
510	Wearing Surfaces (Replace)	5.20	sq ft	✓

64

To help you keep your many actions straight (note this example has more than 10 pages of them), an action type has been added, allowing you to filter down your actions to specific types.





## Network Actions

Network Actions

Crash Course in Modeling

Top Down Approach:  
Use an average project and apply it to all bridges in the network.

Bottom Up Approach:  
Find the optimal approach for each bridge individually, then add up to a network program.

66

To understand the difference between Actions and Network Actions, let's give you a quick crash course in Modeling. There are two general approaches to network optimization: these are generally referred to as "Top Down" and "Bottom Up".

Network Actions  
Crash Course in Modeling

**Bottom Up Approach:**  
Find the optimal approach for each bridge individually, then add up to a network program.

<u>Wearing Surface</u>	<u>Deck</u>	<u>Ancillary</u>	<u>Superstructure</u>	<u>Substructure</u>
Do Nothing	Do Nothing	Do Nothing	Do Nothing	Do Nothing
Healer Sealer	Pothole Patching	Parapet Seal	Spot Paint Repair	Backwall repair
Thin Bonded Polymer Overlay	Hydro-Demo	Parapet Repair	Clean & Overcoat	Column repair
Asphalt Overlay w/ Membrane	Deck Replacement	Replace parapets	Repaint Beams	Column Wrap
Polyester Concrete Overlay		Clean joints	Beam Repair	Bent Repair
		Seal Joints	Bearing Replacement	Bent Wrap
		Replace Joint Seal		
		Close Joint		

$2^{29} = 536,870,912$  combinations/bridge

For a network of 5,000 bridges it was estimated this would take about 4,256 years to calculate.

# 67

The fundamental challenge with the bottom up approach is the number of possible combinations of actions. In this case, I listed out the common work items UDOT normally performs, and as you can see, the bridges would be gone long before I could arrive at my best answer – unless I was willing to use a supercomputer or make some assumptions.

Network Actions  
Crash Course in Modeling

**Top Down Approach:**  
Use an average project and apply it to all bridges in the network.

<u>Wearing Surface</u>	<u>Deck</u>	<u>Superstructure</u>	<u>Substructure</u>
<b>Preserve Deck</b> Thin Bonded Polymer Pothole Patching Parapet Sealing Seal Joints	Do Nothing Preserve Deck Rehab Deck Replace Deck	Do Nothing Preserve Super Rehab Super Replace Super	Do Nothing Preserve Sub Rehab Sub Replace Sub
<b>Rehab Deck</b> Asphalt w/ membrane Hydro-Demo Parapet repair Close Joints			
Replace Deck			

4 × 4 × 4

$64$  combinations/bridge

# 68

For the Top-Down approach, using a single average project is probably too simplistic. So instead consider where we chose an action from each of these columns. We define “Preserve Deck” as our generic deck preservation treatment. This calculation can be completed in a more reasonable amount of time.

Network Actions

Admin > Modeling Config > Action Defs

Action Defs

Name	Description	Notes	Order	Network Level	Design Replace	Required Minimum Cost	Action Type
Paint Sub - Network	First Painting	Example	999	<input type="checkbox"/>	<input type="checkbox"/>		Network
Paint Super - Network	First Painting	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network
Place Wearing Surface - Network	First Wearing Surface	Example	999	<input type="checkbox"/>	<input type="checkbox"/>		Network
Preserve Deck - Network	Sealing Surface / Repair	Example	999	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Network
Rehab Culvert - Network	Rehab culvert, joints, approaches	Example	999	<input type="checkbox"/>	<input type="checkbox"/>		Network
Rehab Deck - Network	Rehab deck, joints and parapets	Example	999	<input type="checkbox"/>	<input type="checkbox"/>		Network
Rehab Sub - Network	Repair Columns, Piers, Abutments, Piles, Walls	Example	999	<input type="checkbox"/>	<input type="checkbox"/>		Network
Rehab Super - Network	Repair beams, paint and bearings	Example	999	<input type="checkbox"/>	<input type="checkbox"/>		Network
Repair Super/Sub - Network	Repair Pier	Example	999	<input type="checkbox"/>	<input type="checkbox"/>		Network
Replace Deck - Network	Replace Deck	Example	999	<input type="checkbox"/>	<input type="checkbox"/>		Network
Replace Structure - Network	Replace Structure	Example	999	<input type="checkbox"/>	<input type="checkbox"/>		Network
Replace Super - Network	Replace Super Elements	Example	999	<input type="checkbox"/>	<input type="checkbox"/>		Network
Approx Roadway/MB	Approach Roadway/MB	-1		<input type="checkbox"/>	<input type="checkbox"/>		Approach
Approach/Shoulder	Approach / Shoulder	-1		<input type="checkbox"/>	<input type="checkbox"/>		Approach
Approach Paving	Approach Paving	-1		<input type="checkbox"/>	<input type="checkbox"/>		Approach
Approach Paving-Repair	Approach Paving-Repair	-1		<input type="checkbox"/>	<input type="checkbox"/>		Approach

Associated Benefit Groups for Action Preserve Deck - Network

Benefit Groups

Overriding Direct Cost (overrides unit-costs)

Enabled	Field Name	Cost Per Unit	Unit
<input type="checkbox"/>	Deck Area		sq ft

Unit Costs

ID	Element Name	Cost Per Unit	Unit
300	Strip Seal Exp Joint (Replace)	0.50	ft
301	Precast Joint Seal (Replace)	0.50	ft
302	Compression Joint Seal (Replace)	0.50	ft
510	Wearing Surfaces (Replace)	0.50	sq ft

Indirect Cost

Enabled	Component	Estimation Method
<input type="checkbox"/>	Total Indirect Cost	Percent Direct

Deferment Rules

Metric English

Please Select

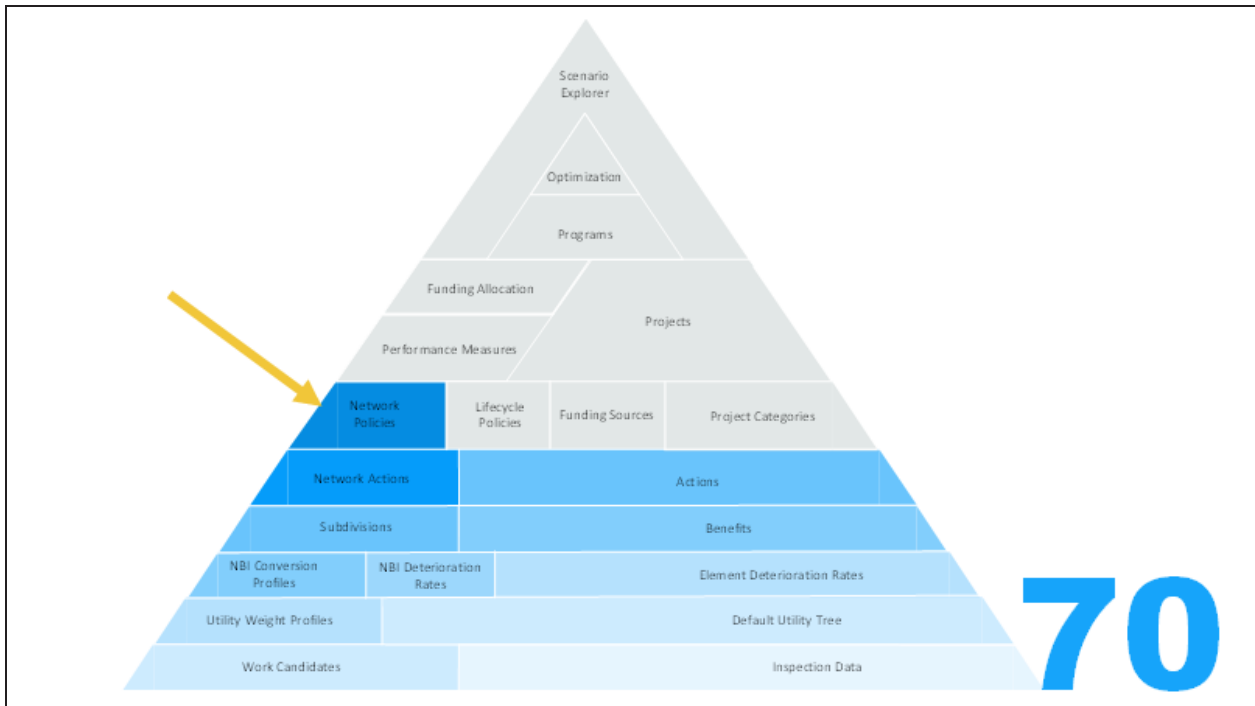
Replace Wearing Surface

Deck Joints

Then Bonded Overlay

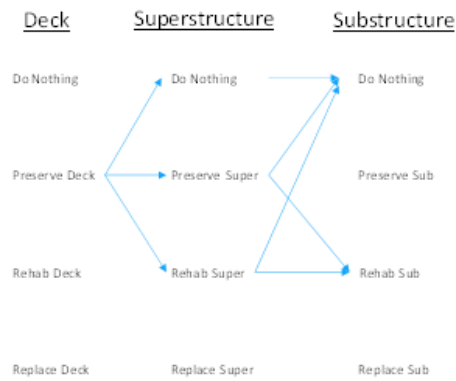
69

So Actions which are built to be used for the top-down network analysis can be distinguished from bottom-up (work candidate) Actions by checking the **Network Level** box. This will enable this Action to be used in Network Policies (where we're going next).



## Network Policies

## Network Policies



# 71

These are the same 4 generic actions in each category that we were discussing on slide 68. Notice that we can reduce the number of combinations (and thus computation time) further by ruling out combinations we would never consider. We would never pair a deck rehab or deck preservation with a superstructure replacement. In this example, in my state there are no substructure preservation treatments we would consider.

Admin > Modeling Config > Network Policies

Network Policy Editor

Network Policy (Preserve Deck)    Create New

Network Policy Details

Network Policy Name: Preserve Deck

Actions

- Preserve Deck - Network
  - Do Nothing
- Rehab Super - Network
  - Do Nothing
- Rehab Sub - Network
  - Do Nothing
- Repaint Super/Sub - Network
  - Do Nothing
- Paint Super - Network
  - Do Nothing
- Paint Sub - Network
  - Do Nothing

Details

Action: Preserve Deck - Network    Project Category: Select a project category

Action Conditional Rule

Summary

(Column 'dcrating' of Table 'inspervnt' is in Set '0 Satisfactory, 7 Good, 8 Very Good, 9 Excellent')

Rule Builder

Add Condition    Add Group

Type: Column Value In Param Set    Remove Condition

Table: inspervnt    Column: dcrating    Value is: In    Set

- 0 Fails
- 1 Imminent failure
- 2 Critical
- 3 Serious
- 4 Poor
- 5 Fair
- 6 Satisfactory
- 7 Good
- 8 Very Good
- 9 Excellent
- N N/A (NBI)

Follow-up Actions

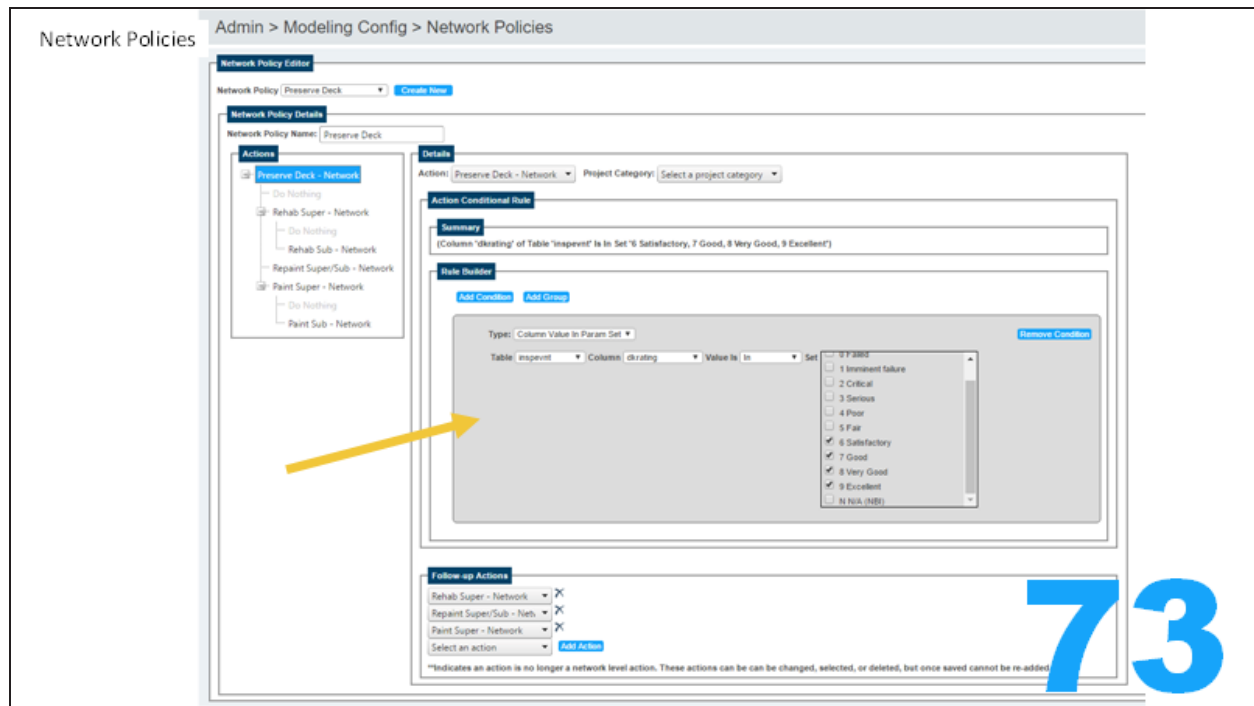
- Rehab Super - Network
- Repaint Super/Sub - Netb
- Paint Super - Network
- Select an action

Indicates an action is no longer a network level action. These actions can be changed, selected, or deleted, but once saved cannot be re-added.

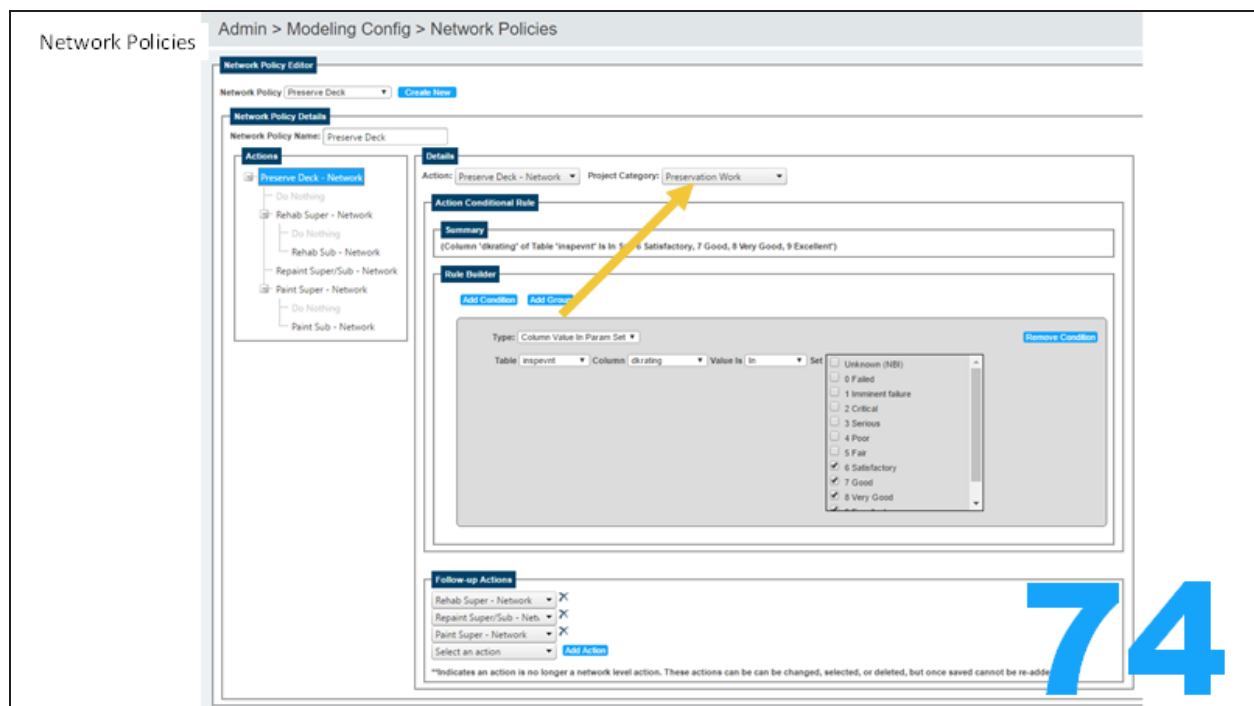
# 72

The Network Policies allow us to define the combinations of actions to be used in optimization. You can go up to 3 levels deep, and there's no limit to how many treatments you put on each branch of the tree (but remember everything you add will add run-time to the analysis). You add branches through the menu at the bottom.

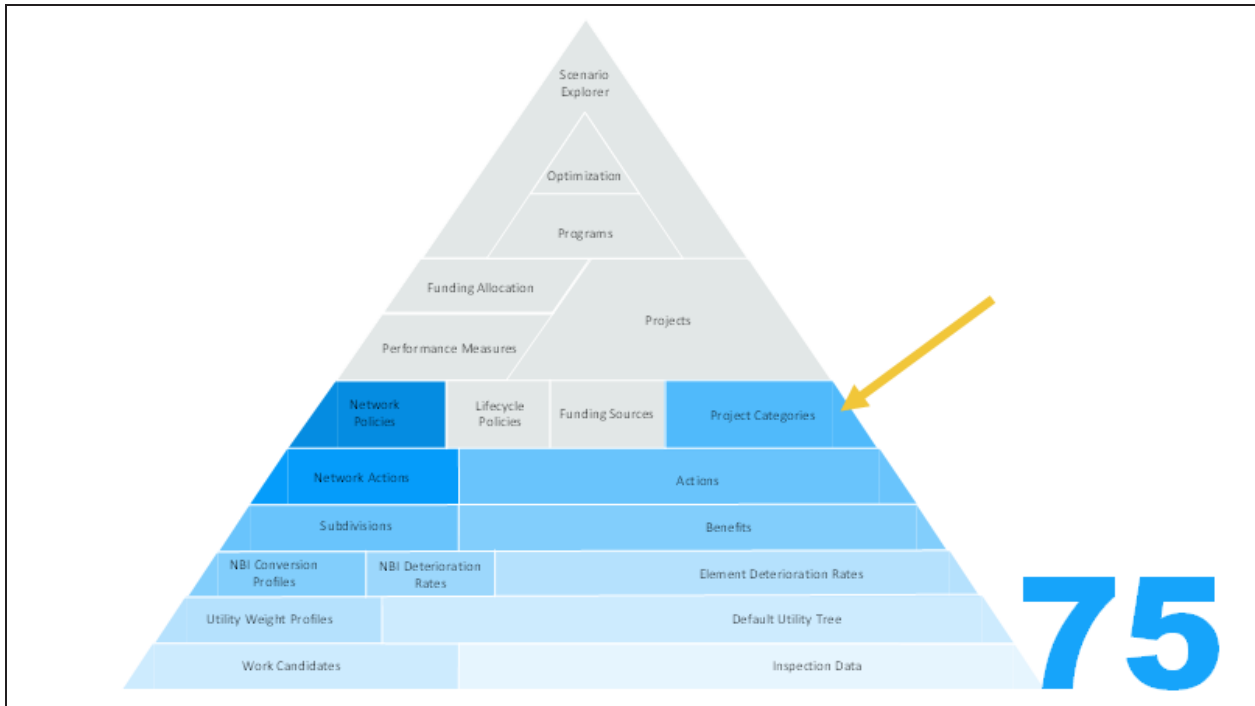
It's typically good practice to name a tree after the root action, but this is not required.



To limit the numbers of conditions even further, you can add conditions based on any database fields of when this work should be considered. This way the optimizer does not recommend preservation work on a bridge with a deck rating of 3.



Because the optimizer will recommend a lot of projects, you have the option to define a project category that you would consider this work to be in. For example: Preservation, Rehab, Replacement. So you can sort these projects out by categories later.



## Project Categories

Project Categories

Admin > Modeling Config > Project Categories

Add New Project Category

Project Category: Preservation Work  Set as Default Category

Description:

Default Filter: Set Null

Default Layout: Set Null

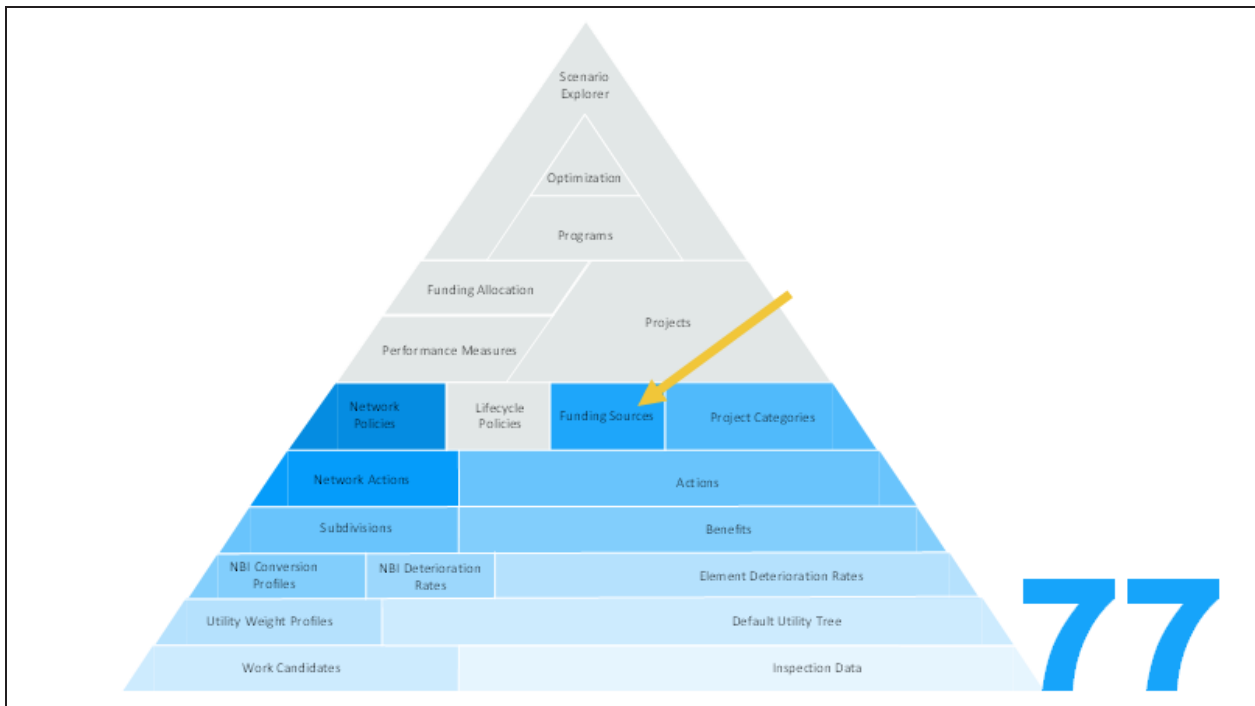
Related Actions:

Name	Description
<input checked="" type="checkbox"/> Paint Sub - Network	First Painting
<input checked="" type="checkbox"/> Paint Super - Network	First Painting
<input checked="" type="checkbox"/> Place Wearing Surface - Network	First Wearing Surface
<input checked="" type="checkbox"/> Preserve Deck - Network	Wearing Surface / Repair Joints
<input type="checkbox"/> Rehab Culvert - Network	Rehab culvert, parapets, approaches
<input type="checkbox"/> Rehab Deck - Network	Repair deck, joints and parapets
<input type="checkbox"/> Rehab Sub - Network	Repair Columns, Piers, Abutments, Piles, Walls
<input type="checkbox"/> Rehab Super - Network	Repair beams, paint and bearings
<input checked="" type="checkbox"/> Repaint Super/Sub - Network	Repair Paint
<input type="checkbox"/> Replace Deck - Network	Replace Deck
<input type="checkbox"/> Replace Structure - Network	Replace Structure
<input type="checkbox"/> Restore Concrete Network	Restore Concrete Elements

Total Actions: 143

76

Speaking of Project Categories, here is where you can define them. Project Categories can help you to both filter projects in a program by their category and filter out bridges which are candidates for this work in the needs list.



## Funding Sources

Funding Sources

Projects > Manage Funding > Create/Edit Funding Sources

**Funding Source Details**

Funding Source Status:  Funding Source URL:  Funding Source Name:

Funding Source Type:

Funding Source Description:

**Funding Source Notes**

**Funding Source Targets**

Target Date	Target Amount	Current Plan	Remaining	Notes
X <input type="text" value="01/01/2016"/>	<input type="text" value="\$500000"/>	\$0.00	\$2,500,000.00	<input type="text"/>
X <input type="text" value="01/01/2015"/>	<input type="text" value="\$500000"/>	\$10,000.00	\$2,490,000.00	<input type="text"/>

Total Funding Source Amount: \$5,000,000.00

**Associated Programs and Projects**

**Target Year Programs**

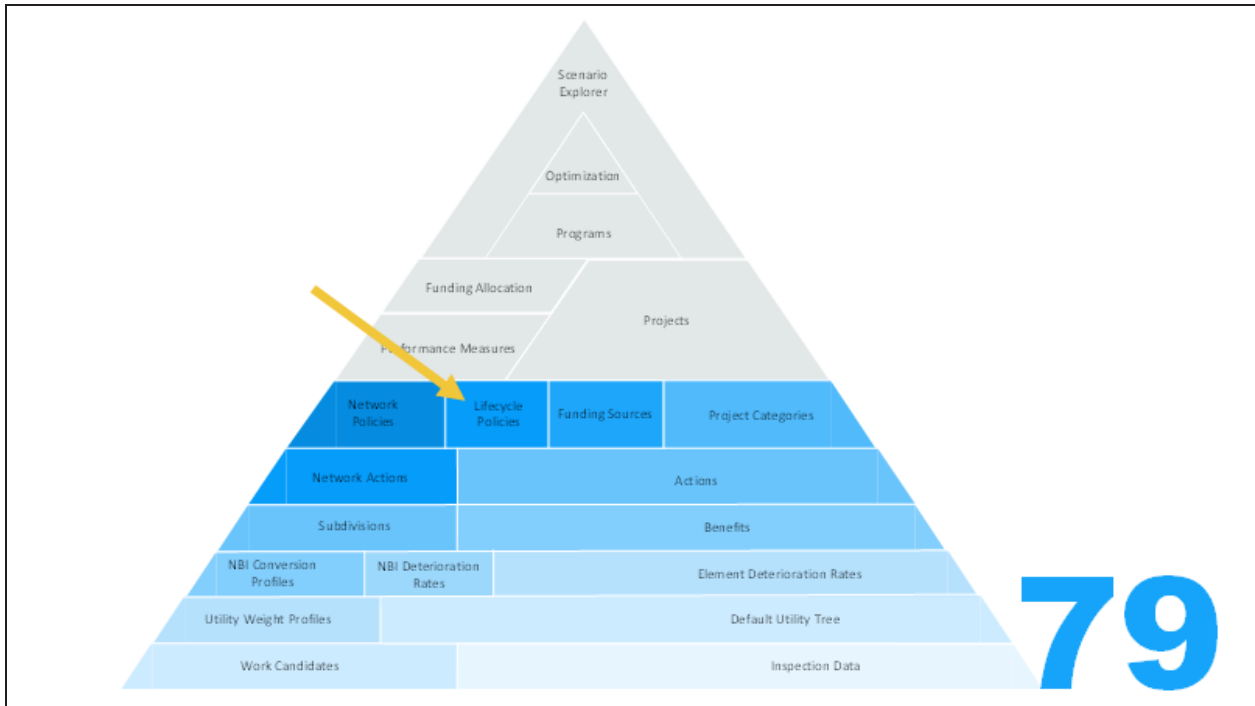
Program Name	Program ID	Alternate ID	Description	Start Date	End Date	Status	Funding Amount
No Programs Associated To The Funding Source							

**Target Year Projects**

Project Name	Project ID	Category	Cost	Date	Project Status
No Projects Associated To The Funding Source					

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Since this has been available since 5.2.2, I will only briefly mention funding sources here. Here you can create and edit funding sources, attach projects or programs to them and see how much of the funds have been allocated from each source to a project or program. This piece is not necessary for optimization, but some agencies will find it useful.



## Lifecycle Policies

The next piece of the optimization logic is going to require some thought on your part: we're going to be dealing with the Life Cycle Cost Analysis (LCCA). Life Cycle Cost can be summarized as 'what is the value of doing the work now instead of later?' And in order for the software to answer that question, it needs to know what the typical 'later' scenario would look like.

For this reason, you need to codify your state's usual behavior for preservation, rehab, and replacement. You need to set up rules for what actions you would perform and when you would use them.



Lifecycle Policies

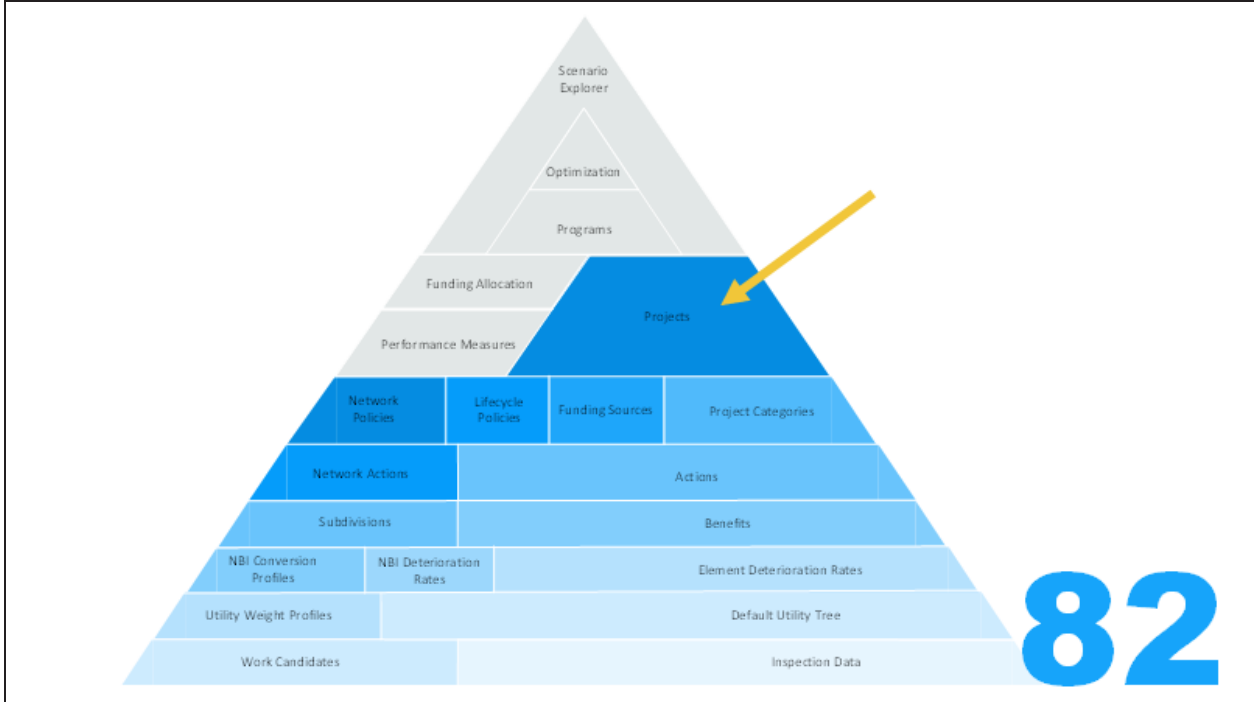
Admin > Modeling Config > LCCA Assign Policies

Bridge List			Bridge Policy	Culvert Policy	Deck Policy	Substructure Policy	Superstructure Policy
Bridge ID	District	County	No Policy Selected Assign To Selected Assign To All	No Policy Selected Assign To Selected Assign To All	No Policy Selected Assign To Selected Assign To All	No Policy Selected Assign To Selected Assign To All	No Policy Selected Assign To Selected Assign To All
000002	Division 10	Walker	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000003	Division 10	Walker	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000004	Division 10	Walker	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000005	Division 10	Lamar	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000006	Division 6	Lee	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000007	Division 1	DeKalb	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000008	Division 5	Bibb	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000009	Division 2	Morgan	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000010	Division 5	Sumter	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000011	Division 6	Autauga	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000012	Division 1	Jackson	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000013	Division 1	Jackson	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000014	Division 1	Madison	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000015	Division 1	Jackson	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000016	Division 1	Madison	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000017	Division 3	Jefferson	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000018	Division 1	Madison	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000019	Division 1	Madison	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000020	Division 1	DeKalb	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000021	Division 1	DeKalb	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000022	Division 1	DeKalb	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000023	Division 1	DeKalb	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000024	Division 3	Shelby	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000025	Division 3	Shelby	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy
000026	Division 3	Jefferson	Structure Overall	Culvert policy	Deck Policy	Substructure Policy	Superstructure Policy

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You then need to specify which structures use which policy. If you only have one policy for all your structures, this could be relatively straight forward.

But this also gives you the flexibility to define different policies for State vs. Locally owned bridges, or NHS vs. non-NHS, or differing strategies by District.



Projects

Projects

LCCA  
Reverse Calculation  
Bridge Analysis  
Needs List

Bridge: IC 700 Name: I-215 Fly over Ramp Br Facility Carried (007) RP(2)IND to INWD Feature Intersected (006A) I-215J-80 & 4 INT.RAMP Metric: English

Analysis > LCCA

Index	Date	Year	Action Name	Orig. Cost	NPV Cost	Prior Action H.I.
1				\$40,000	\$34,192	95.87
Residual	2020	5	Column Repair, Profile Rotomilling	\$9,027,183	\$1,044,043	
Agency Life-Cycle Cost					\$34,192	
User Life-Cycle Cost					\$0	
Total Life-Cycle Cost					(\$1,009,851)	

Charts

General Chart (Bridge Health Index)

Element Chart (12) Re Concrete Deck

Effects on Each Element

Element	Str. Unit	Env.	Quantity	Units
(12) Re Concrete Deck	101	Sev(4)	43,129.70	sq ft
(107) Steel Open Girder/Beam	101	Low(2)	5,687.30	ft
(161) Set Pin Pin/Man both	101	Sev(4)	16.00	each
(205) Re Conc Column	101	Mod(3)	7.00	each
(215) Re Conc Abutment	101	Low(2)	60.00	ft
(231) Steel Pier Cap	101	Low(2)	22.50	ft
(234) Re Conc Pier Cap	101	Low(2)	172.00	ft
(300) Strip Seal Exp Joint	101	Sev(4)	120.00	ft
(311) Moveable Bearing	101	Low(2)	16.00	each
(313) Fixed Bearing	101	Low(2)	12.00	each
(321) Re Conc Approach Slab	101	Sev(4)	900.00	sq ft
(331) Re Conc Bridge Railing	101	Sev(4)	3,301.10	ft
(500) General Notes	200	Ben(1)	1.00	each
(5001) Roadway / Channel / Drainage	200	Ben(1)	3.00	each
(5002) Maintenance Recommendations	200	Ben(1)	1.00	each
(5103) Asphalt Overlay w/ Membrane	101	Sev(4)	73.10	sq ft
(5203) Steel Protective Coating (S15)	101	Low(2)	96.00	sq ft
(5300) Reinforced Concrete Wingwalls	101	Sev(4)	60.30	ft

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You can analyze work candidates and work recommendations for a structure, including their LCCA effects, and decide what you would like to add to a project from this page.

Projects

LCCA  
Reverse Calculation  
Bridge Analysis  
Needs List

Analysis > Work Candidates > Reverse Calculation

Sel. Action	Base Utility	Utility (Change)	Condition (Change)	LifeCycle (Change)	Mobility (Change)	Risk (Change)	Cost	Benefit / Cost (\$k)	Cost (\$k)
Selected Actions	82.42	92.29 (9.87)	94.16 (24.67)	100.00 (0.00)	80.84 (0.00)	83.33 (0.00)	\$12,938,909	.0008	
test remove deck action	83.84	83.84 (0.00)	73.04 (0.00)	100.00 (0.00)	80.84 (0.00)	83.33 (0.00)	\$0		
Replace Structure - Network	82.42	92.29 (9.87)	94.16 (24.67)	100.00 (0.00)	80.84 (0.00)	83.33 (0.00)	\$12,938,909	.0008	\$1,311

Charts

General Chart (Bridge Health Index)

Element Chart (12) Re Concrete Deck

Effects on Each Element

Element	Str. Unit	Env.	Quantity	Units
(12) Re Concrete Deck	101	Sev(4)	43,129.70	sq ft
(107) Steel Open Girder/Beam	101	Low(2)	5,687.30	ft
(161) Set Pin Pin/Man both	101	Sev(4)	16.00	each
(205) Re Conc Column	101	Mod(3)	7.00	each
(215) Re Conc Abutment	101	Low(2)	60.00	ft
(231) Steel Pier Cap	101	Low(2)	22.50	ft
(234) Re Conc Pier Cap	101	Low(2)	172.00	ft
(300) Strip Seal Exp Joint	101	Sev(4)	120.00	ft
(311) Moveable Bearing	101	Low(2)	16.00	each
(313) Fixed Bearing	101	Low(2)	12.00	each
(321) Re Conc Approach Slab	101	Sev(4)	900.00	sq ft
(331) Re Conc Bridge Railing	101	Sev(4)	3,301.10	ft
(500) General Notes	200	Ben(1)	1.00	each
(5001) Roadway / Channel / Drainage	200	Ben(1)	3.00	each
(5002) Maintenance Recommendations	200	Ben(1)	1.00	each
(5103) Asphalt Overlay w/ Membrane	101	Sev(4)	73.10	sq ft
(5203) Steel Protective Coating (S15)	101	Low(2)	96.00	sq ft
(5300) Reinforced Concrete Wingwalls	101	Sev(4)	60.30	ft

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The *Reverse Calculation* page is similar (and available in 5.2.2) to *LCCA*, but does not include the future analysis. On this page, the system can try to apply different benefits, see their costs, and recommend to you certain actions based on their cost/benefit ratio. Once you select the actions you want, you click on the *Add to New Project* button to create a project with those actions.

Projects

LCCA  
Reverse Calculation  
Bridge Analysis  
Needs List

Sel.	Work Candidate	Action	Base Utility	Utility (Change)	Condition (Change)	Life Cycle (Change)	Mobility (Change)	Risk (Change)	Cost	Benefit / Cost (\$)	Cost (\$M) / Benefit (\$)	Target Year	Request Interval
<input checked="" type="checkbox"/>	1C 700-FTM-121514-72CR666C32	Column Repair	80.32	81.05 (0.73)	66.05 (1.82)	100.00 (0.00)	80.84 (0.00)	83.33 (0.00)	\$40,000	2183	\$55	2025	
<input type="checkbox"/>	WorkCandidate1385	Remove Debris from Joints	83.74	83.74 (0.00)	72.78 (0.00)	100.00 (0.00)	80.84 (0.00)	83.33 (0.00)	\$0			2016	
<input type="checkbox"/>	1C 700-FTM-091515-D4R0427084	Remove Debris from Joints	84.19	84.19 (0.00)	73.92 (0.00)	100.00 (0.00)	80.84 (0.00)	83.33 (0.00)	\$0			2016	
<input type="checkbox"/>	1C 700-FTM-121514-C8R001815F	Other	83.74	83.74 (0.00)	72.78 (0.00)	100.00 (0.00)	80.84 (0.00)	83.33 (0.00)	\$0			2016	
<input type="checkbox"/>	remove test	test remove deck action	83.74	83.74 (0.00)	72.78 (0.00)	100.00 (0.00)	80.84 (0.00)	83.33 (0.00)	\$10,000			2016	

Also previously mentioned, Projects can be made from the *Bridge Analysis* task: which lets you review the work candidates which have already been identified for that bridge.

Projects

LCCA  
Reverse Calculation  
Bridge Analysis  
Needs List

Work Candidate Name	Bridge ID	Facility Carried	Action Name	Est. Cost	Year
WorkCandidate1302	0F 11	CO RD. INT. X ROAD	Repair Spalls / Potholes		
0C 337-RHON-070914-E3824575072	0C 337	US-89 (SR-89)	Repair Spalls / Potholes	19350	2014
WorkCandidate341	0C 518	I-215 (SR-215)	Repair Spalls / Potholes		
WorkCandidate1322	0F 255	600 SOUTH STREET	Repair Spalls / Potholes		
WorkCandidate1899	2F 496	1-70 (SR-70) EBL	Repair Spalls / Potholes		
WorkCandidate526	0C 757	I-215 (SR-215)	Repair Spalls / Potholes		
WorkCandidate123	035106F	1000 NORTH STREET	Repair Spalls / Potholes		
049020D-E6E2Z-102015-7937801ABC	049020D	400 SOUTH STREET	Repair Spalls / Potholes	-1	2019
0C 337-RHON-070914-TA2NE91358	0C 337	US-89 (SR-89)	Repair Spalls / Potholes	4500	2014
0C 751-EBDC-080614-68A3190078	0C 751	SR-348	Repair Spalls / Potholes	-1	2014
WorkCandidate1963	1F 347	I-215NB (SR-215)	Repair Spalls / Potholes		
WorkCandidate309	0C 472	CO. RD NW KANARRAV	Repair Spalls / Potholes		
0D 668-MOOR-083115-E4Q2DC7970D	0D 668	US-191 (SR-191)	Repair Spalls / Potholes		2015
0D 595-ZQOQ-072214-S191302CAD0	0D 595	US-40 (SR-40)	Repair Spalls / Potholes		2014
WorkCandidate2379	4D 652	1-80 (SR-80) WBL	Repair Spalls / Potholes		
WorkCandidate389	0C 560	US-40 (SR-40)	Repair Spalls / Potholes		
WorkCandidate2397	4D 667	1-84 (SR-84) WBL	Repair Spalls / Potholes		

And Projects can be made from the *Needs List*, where you can filter for work candidates of a similar type across many or all the bridges in your inventory.

Projects

Projects > Create / Edit Project > Query

**Bridges**

Project Category: No Category Filter: B/M - None Bridge Group:

Bridge View Bridge Map View

Bridge ID	District	County	Facility Carried	Feature Intersected	Owner	On/Off System	Hwy System	Funct Class	Admin Area	Bridge Grp	Deck	Super	Sub
1C 700	Region 2	Salt Lake	RP:1215NB TO 1B0WB	I-215J-80 & 4 INT.RAMPS	State Highway Agency	On System	1 Interstate Hwy	11 Urban Interstate	2430	R2: 180 215 Interchange	6 Satisfactory	7 Good	6 Satisfactory

**Bridge Needs**

Layout: Project Bridge Needs Default Display Category Actions Only Display Work Candidates Only Display Zero Cost Recommendations

Bridge ID	Action	Work Candidate	Unit Label	Kind Hwy	B District	Base Utility	Utility	Utility Change	Estimated Cost	Benefit/Cost(\$k)	Cost(\$k)/B
<input checked="" type="checkbox"/> 1C 700	Column Repair	1C 700-FTXX-121514-72CBD366C52	2	1 Interstate Hwy	Region 2	72.39	81.27	8.88	\$40,000	0.222	\$5
<input type="checkbox"/> 1C 700	Replace Structure - Network	Generated 09/12/2016	2	1 Interstate Hwy	Region 2	76.92	92.39	15.47	\$12,938,909	0.0012	\$836
<input type="checkbox"/> 1C 700	test remove deck action	remove test	2	1 Interstate Hwy	Region 2	76.92	83.84	6.92	\$10,000	0.692	\$1

Add to Project

**Selected Bridges and Work**

Bridge ID	District	County	Facility Carried	Feature Intersected	Deck	Superstructure	Substructure	Culvert
1C 700	G2	035	RP:1215NB TO 1B0WB	I-215J-80 & 4 INT.RAMPS	6 Satisfactory	7 Good	6 Satisfactory	N N/A (NB)

Action	Work Item	Base Utility	Utility	Utility Change	Estimated Cost	Benefit/Cost(\$k)	Cost(\$k)/Be
Column Repair	1C 700-FTXX-121514-72CBD366C52	72.39	81.27	8.88	\$40,000	0.222	\$5

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On the Projects page, you can also create projects directly, selecting bridges by project category, by name, or by proximity on a map. Here you can also merge projects into one or split them up. These tools are also available in 5.2.2.

Projects

Programs > Assign Projects

**Assign Projects**

Projects List

Filter: B/M - None Program: All

Alt ID	Name	Start Date	Add Cost	Create Date	Status	First Name	Project Category
<input checked="" type="checkbox"/> 14100	Test Project	8/12/2016 12:00:00 AM	0	8/29/2016 11:54:29 AM	Planned	Portis	No Category

Total Projects: 1 Selected Projects: 1

Items per page: 15 Projects Matching Search: 1

**Choose an Action**

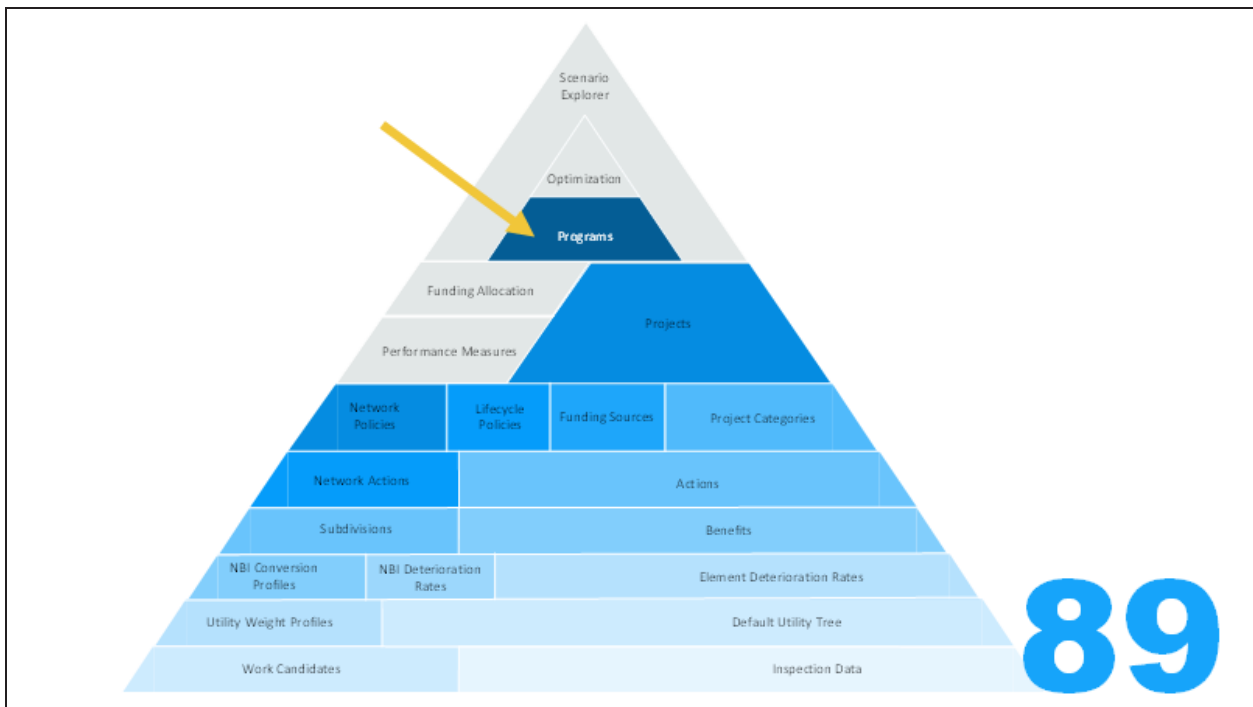
Assign Selected Projects to program(s): Replacement Preservation Test and Freeze to selected program(s) Program and Year: 2018

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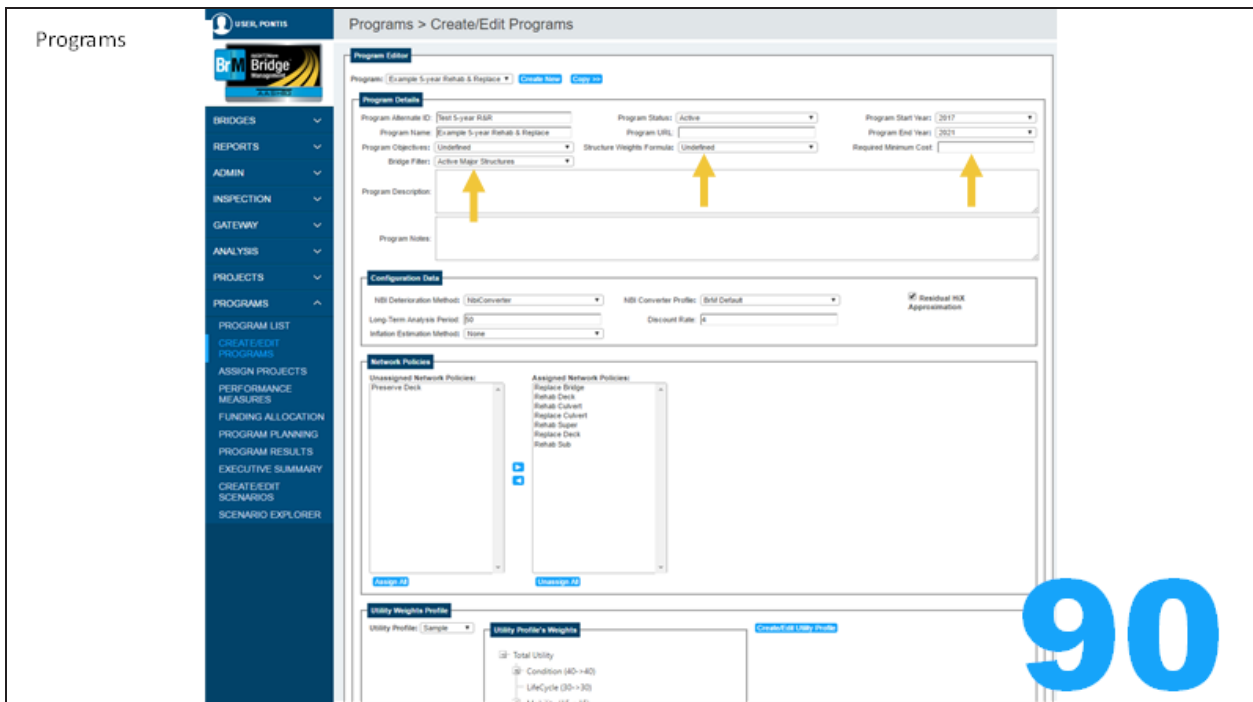
While not required, you can assign projects to a program. This way the optimizer will work with the projects you have already defined.

You can choose to:

- Freeze the projects to a program – the optimizer will include your projects as they fit in the cost/benefit rank.
- Freeze to a year: Any programs which respect frozen work will model this project as having been created.
- Freeze to a program and year – the optimizer will model this work as done and find other projects to fill out the budget (like recommending the rest of your STIP).



**Programs:** time to start pulling it all together.



We're going to skip ahead to programs for a minute because this is the order you will use in the software to set up a program.

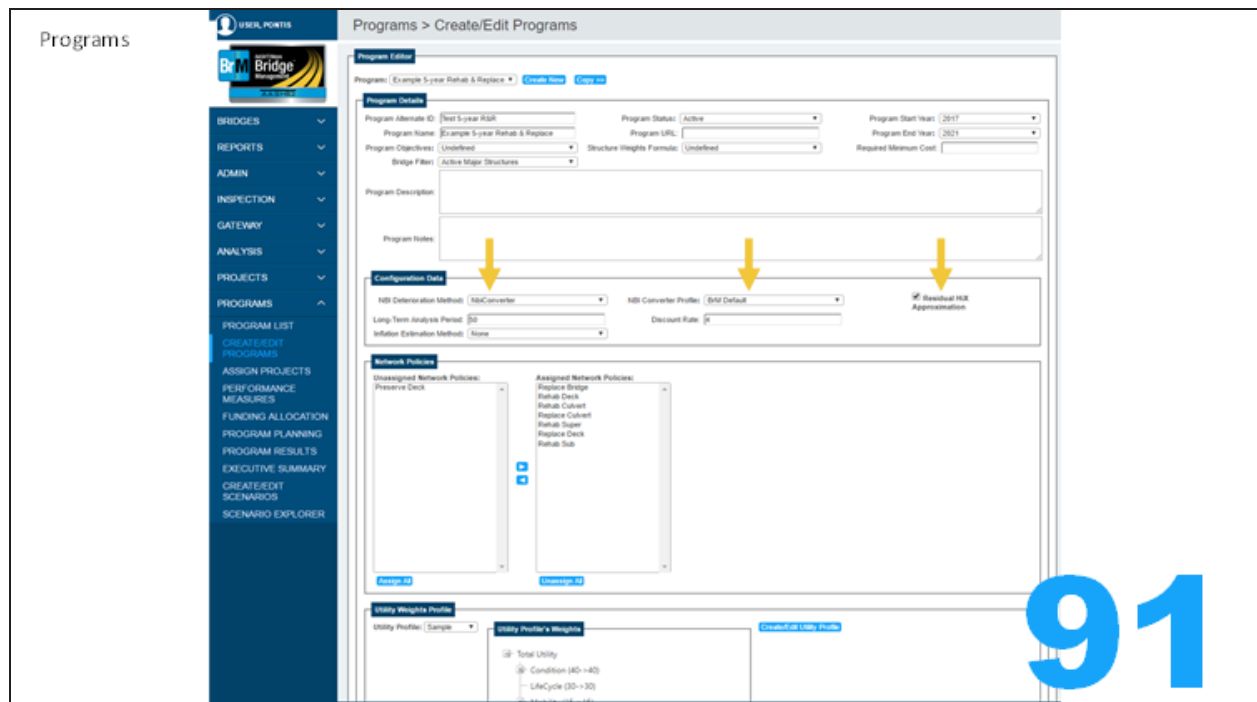
Let's talk about some of the program details first:

You can use any bridge filter from the bridge list to limit the bridges which you will be considering.

You have the option to apply a structure weight formula. There is an example one based on deck areas, but you can write a formula based on distance to the legislature, if you'd like.

You will need to set the years of your program on this screen.

And finally, we have here the Required Minimum Cost. We recommend that you start by setting a value in here before playing with action minimums. If you set a threshold of \$50k, then projects less than \$50k will not be recommended by the optimizer.

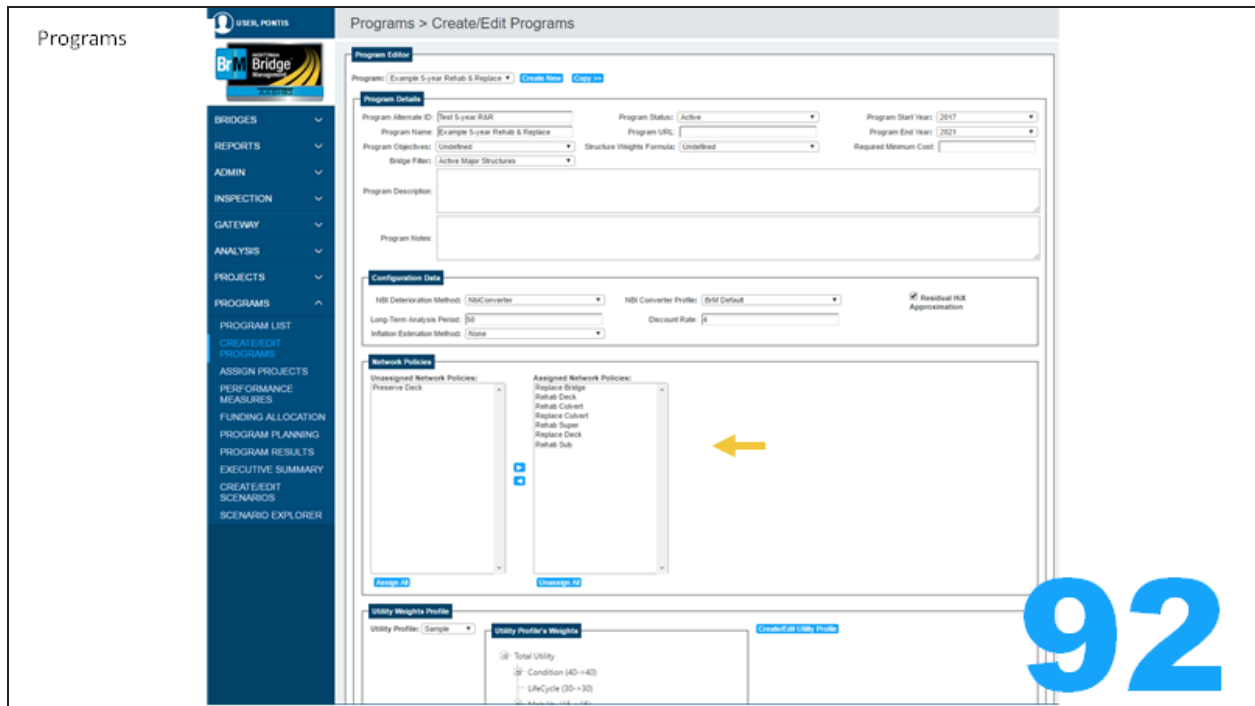


#### Configuration Data:

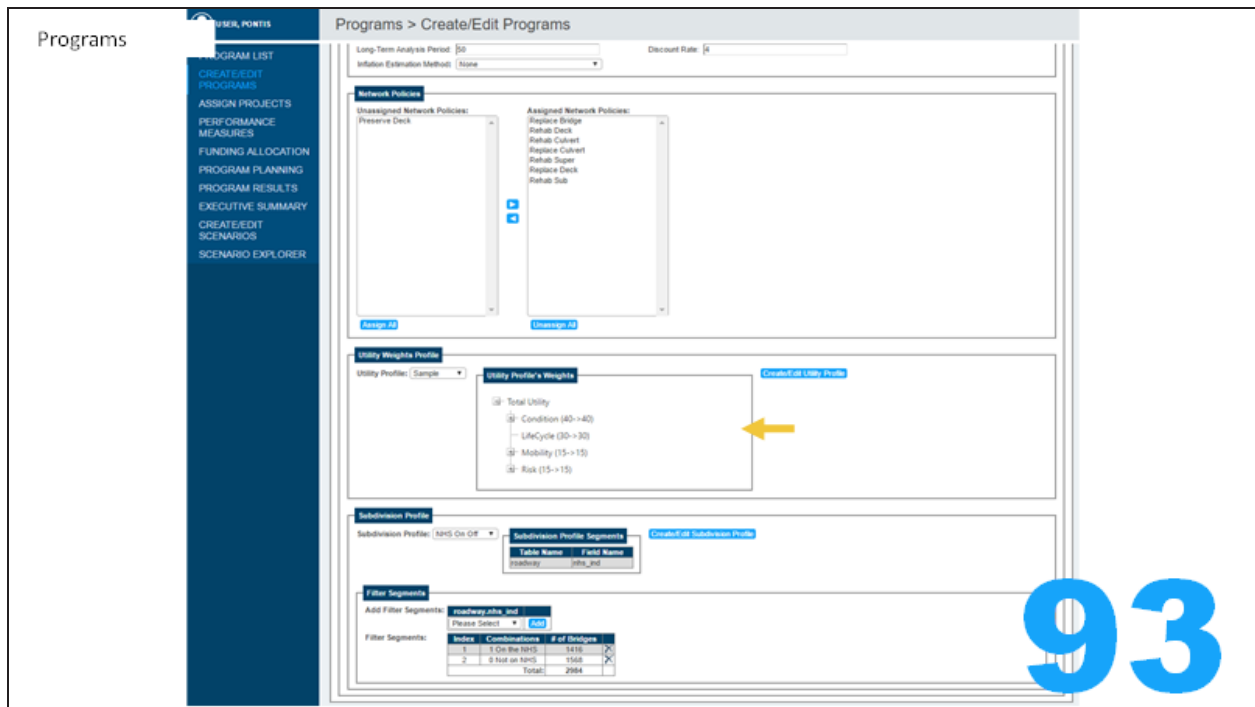
The NBI deterioration method is where you will choose if future NBI values should be based off the element deterioration plus NBI conversion, or on NBI deterioration curves. If you choose to use the converter, you will need to pick the conversion profile. Remember, we find the FHWA standard to be very aggressive.

Using the Residual Health Index Approximation can significantly reduce calculation time (in some cases up to 40%) but comes with a 5% to 10% loss in accuracy for LCCA values.

The Long Term Analysis Period is the single largest influencing factor on the runtimes. How long do you want to include in the LCCA calculation. Less than 30 years can give you wildly different answers, and more than 75 years results in almost imperceptible changes in accuracy.



Pick which Network Policies to include in your analysis.



Then connect your Utility Weight Profile.

Programs > Create/Edit Programs

Long-Term Analysis Period: 50      Discount Rate: 4

Inflation Estimation Method: None

**Network Policies**

Unassigned Network Policies: Preserve Deck

Assigned Network Policies: Replace Bridge, Rehab Deck, Rehab Culvert, Replace Culvert, Rehab Super, Replace Deck, Rehab Sub

**Utility Weights Profile**

Utility Profiles: Sample

Utility Profile's Weights:
 

- Total Utility
- Condition (40->40)
- LifeCycle (30->30)
- Mobility (15->15)
- Risk (15->15)

**Subdivision Profile**

Subdivision Profile: NHS On Off

Subdivision Profile Segments:
 

Table Name	Field Name
Subdivision	OnOff

**Filter Segments**

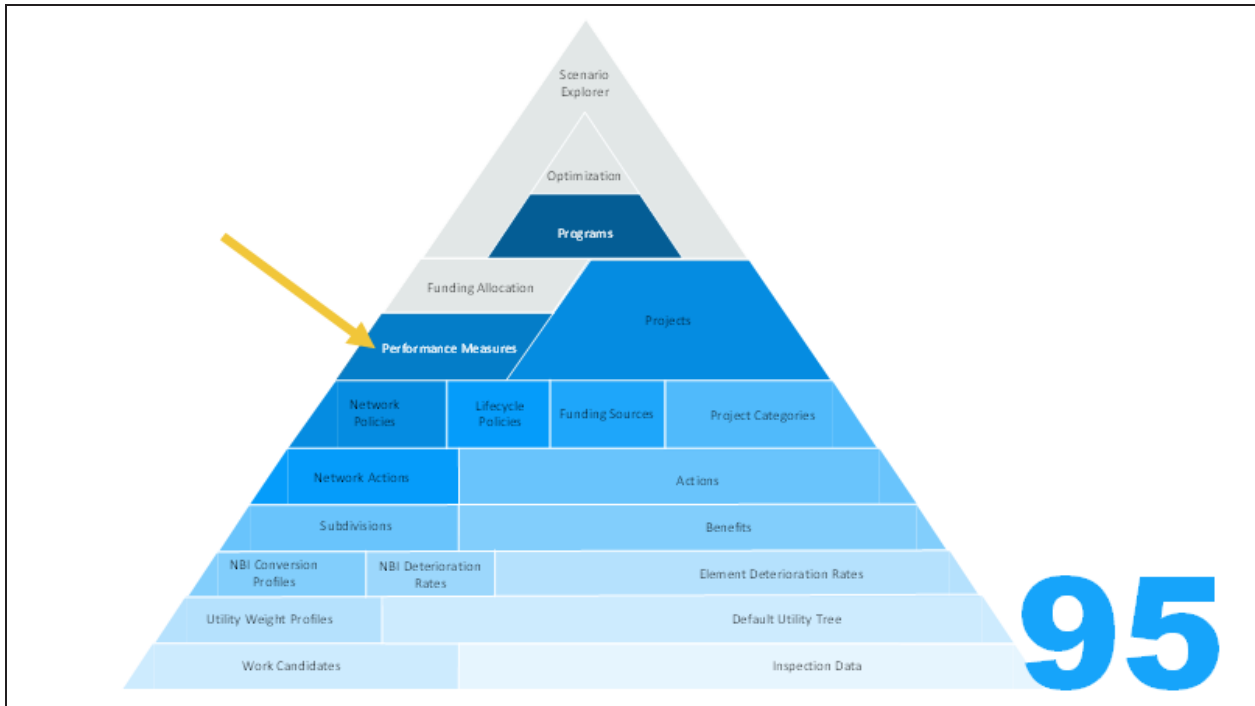
Add Filter Segments: roadway\_ahs\_ind

Filter Segments:
 

Index	Combinations	# of Bridges
1	1 On One 1043	1416
2	2 Not on Hand	516
Total:		1984

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Finally, attach your subdivision profile and pick which segments to include.



**Performance Measures**



Performance Measures

Programs > Performance Measures

Performance Measures

Program: Example 5-year Rehab & Replace Scenario: Default

Select Performance Measures

Performance Measures	Best Value	Worst Value	
Utility (Sample)	100.00	0.00	
Health Index	100.00	0.00	✎ ✕
Pct. Deficient (Surface-Based)	0.00	100.00	✎ ✕

+ Add new record

Performance Constraints by Segment

Segment	Utility (Sample)	Health Index	Pct. Deficient (Surface-Based)
0 Not on NHS	Min: <input type="text"/> Target: <input type="text"/>	Min: <input type="text"/> Target: <input type="text"/>	Target: <input type="text"/>
1 On the NHS	Min: <input type="text"/> Target: <input type="text"/>	Min: <input type="text"/> Target: <input type="text"/>	Target: <input type="text"/>

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Performance Measures are the types of data that we would like to track through the course of the optimization for analysis after. Utility is the only fixed performance measure since all optimization is done in terms of Utility.

Performance Measures

Programs > Performance Measures

Performance Measures

Program: Example 5-year Rehab & Replace Scenario: Default

Select Performance Measures

Performance Measures	Best Value	Worst Value	
Utility (Sample)	100.00	0.00	
Health Index	100.00	0.00	✎ ✕
Pct. Deficient (Surface-Based)	0.00	100.00	✎ ✕

Deck NBI Rating

- Deck NBI Rating
- Superstructure NBI Rating
- Substructure NBI Rating
- Culvert NBI Rating

	Utility (Sample)	Health Index	Pct. Deficient (Surface-Based)
Pct. Good/Fair (Surface-Based)	Min: <input type="text"/> Target: <input type="text"/>	Min: <input type="text"/> Target: <input type="text"/>	Target: <input type="text"/>
Pct. Good/Fair (Count-Based)	Min: <input type="text"/> Target: <input type="text"/>	Min: <input type="text"/> Target: <input type="text"/>	Target: <input type="text"/>
Pct. Deficient (Count-Based)	Min: <input type="text"/> Target: <input type="text"/>	Min: <input type="text"/> Target: <input type="text"/>	Target: <input type="text"/>
Database Field Performance	Min: <input type="text"/> Target: <input type="text"/>	Min: <input type="text"/> Target: <input type="text"/>	Target: <input type="text"/>
1 On the NHS	Min: <input type="text"/> Target: <input type="text"/>	Min: <input type="text"/> Target: <input type="text"/>	Target: <input type="text"/>

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You'll notice that there are these default performance measures built into the software and then you have the option to track other database fields if you would like (though you will only see changes to them if the benefits affect them).

Performance Measures

Programs > Performance Measures

Performance Measures

Program: Example 5-year Rehab & Replace Scenario: Default


Select Performance Measures

Performance Measures	Best Value	Worst Value		
Utility (Sample)	100.00	0.00		
Pct. Deficient (Surface-Based)	0.00	100.00		
Health Index	100.00	0.00		

+ Add new record

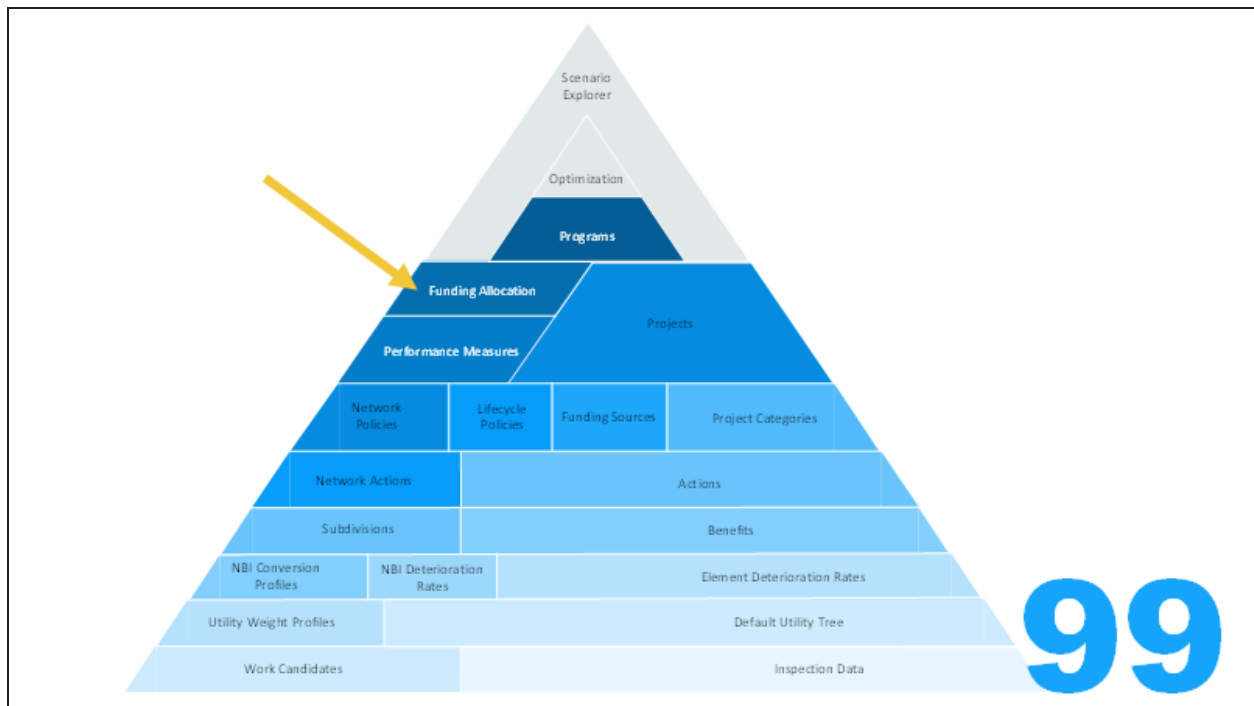
Performance Constraints by Segment

Segment	Utility (Sample)	Pct. Deficient (Surface-Based)	Health Index
0 Not on NHS	Min: <input type="text"/> Target: <input type="text"/>	Target: <input type="text" value="10"/>	Min: <input type="text"/> Target: <input type="text"/>
1 On the NHS	Min: <input type="text"/> Target: <input type="text"/>	Target: <input type="text" value="4"/>	Min: <input type="text"/> Target: <input type="text"/>



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You can add targets, which the Optimizer will strive to meet, or you can add minimum thresholds. For example, you can say ‘don’t return a solution that has a HI less than 50.’



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**Funding Allocation**

Funding Allocation

Programs > Funding Allocation

Program: Example 5-year Rehab & Replace Scenario: Default

**Funding Allocation**  
 A new Funding Source Target in Projects > Funding Sources may be created for new Funding Allocations  
 No Funding Sources  
 Add New

**Budget Distribution**

**Quick Distribution**  
 Override budget:   
 Distribute Evenly

Total budget: \$0  
 Total allocated funds: \$0

	2017	2018	2019	2020	2021
Identified annual funds:	\$0	\$0	\$0	\$0	\$0
Additional funds:	\$0	\$0	\$0	\$0	\$0
Total annual budget:	\$0	\$0	\$0	\$0	\$0
Allocated funds:	\$0	\$0	\$0	\$0	\$0
Available Funds:	\$0	\$0	\$0	\$0	\$0

**Distribute** **Get Performances**

Budget distribution by program's segments: Input method:  Actual Budget Value  Percentage of Annual Budget

Segment	Utility	Pct. Deficient (Surface-based)	Health Index	Total Budget per segment	Pct. overall budget	2017	2018	2019	2020	2021
0 Not on NHS	0	0	0	\$0	0%	<input type="text"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1 On the NHS	0	0	0	\$0	0%	<input type="text"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Total</b>				\$0		\$0	\$0	\$0	\$0	\$0

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You can tie a program's funding to the funding sources mentioned earlier, though this is not required (and for hypothetical programs, probably not recommended).

Funding Allocation

Programs > Funding Allocation

Program: Example 5-year Rehab & Replace Scenario: Default

**Funding Allocation**  
 A new Funding Source Target in Projects > Funding Sources may be created for new Funding Allocations  
 No Funding Sources  
 Add New

**Budget Distribution**

**Quick Distribution**  
 Override budget: \$10,000,000  
 Distribute Evenly

Total budget: \$0  
 Total allocated funds: \$0

	2017	2018	2019	2020	2021
Identified annual funds:	\$0	\$0	\$0	\$0	\$0
Additional funds:	\$0	\$0	\$0	\$0	\$0
Total annual budget:	\$0	\$0	\$0	\$0	\$0
Allocated funds:	\$0	\$0	\$0	\$0	\$0
Available Funds:	\$0	\$0	\$0	\$0	\$0

**Distribute** **Get Performances**

Budget distribution by program's segments: Input method:  Actual Budget Value  Percentage of Annual Budget

Segment	Utility	Pct. Deficient (Surface-based)	Health Index	Total Budget per segment	Pct. overall budget	2017	2018	2019	2020	2021
0 Not on NHS	0	0	0	\$0	0%	<input type="text"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1 On the NHS	0	0	0	\$0	0%	<input type="text"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Total</b>				\$0		\$0	\$0	\$0	\$0	\$0

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For quick setups, you can enter an amount and distribute them evenly across all the years.

Funding Allocation

Programs > Funding Allocation

Program: Example 5-year Rehab & Replace Scenario: Default

**Funding Allocation**  
 A new Funding Source Target in Projects > Funding Sources may be created for new Funding Allocations  
 No Funding Sources  
 Add New

**Budget Distribution**

**Quick Distribution**  
 Override budget \$10,000,000  
 Distribute Evenly

Total budget: \$10,000,000  
 Total allocated funds: \$0

	2017	2018	2019	2020	2021
Identified annual funds:	\$0	\$0	\$0	\$0	\$0
Additional funds:	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000
Total annual budget:	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000
Allocated funds:	\$0	\$0	\$0	\$0	\$0
Available Funds:	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000

Distribute Get Performances

Budget distribution by program's segments: Input method:  Actual Budget Value  Percentage of Annual Budget

Segment	Utility	Pct. Deficient (Surface-based)	Health Index	Total Budget per segment	Pct. overall budget	2017	2018	2019	2020	2021
0 Not on NHS	0	0	0	\$0	0%		X	X	X	X
1 On the NHS	0	0	0	\$0	0%	X	X	X	X	X
Total				\$0	0%	\$0	\$0	\$0	\$0	\$0

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Or you can enter funds specifically setting a funding each year.

Programs > Funding Allocation

Program: Example 5-year Rehab & Replace Scenario: Default

**Funding Allocation**  
 A new Funding Source Target in Projects > Funding Sources may be created for new Funding Allocations  
 No Funding Sources  
 Add New

**Budget Distribution**

**Quick Distribution**  
 Override budget \$10,000,000  
 Distribute Evenly

Total budget: \$10,000,000  
 Total allocated funds: \$0

	2017	2018	2019	2020	2021
Identified annual funds:	\$0	\$0	\$0	\$0	\$0
Additional funds:	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000
Total annual budget:	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000
Allocated funds:	\$0	\$0	\$0	\$0	\$0
Available Funds:	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000

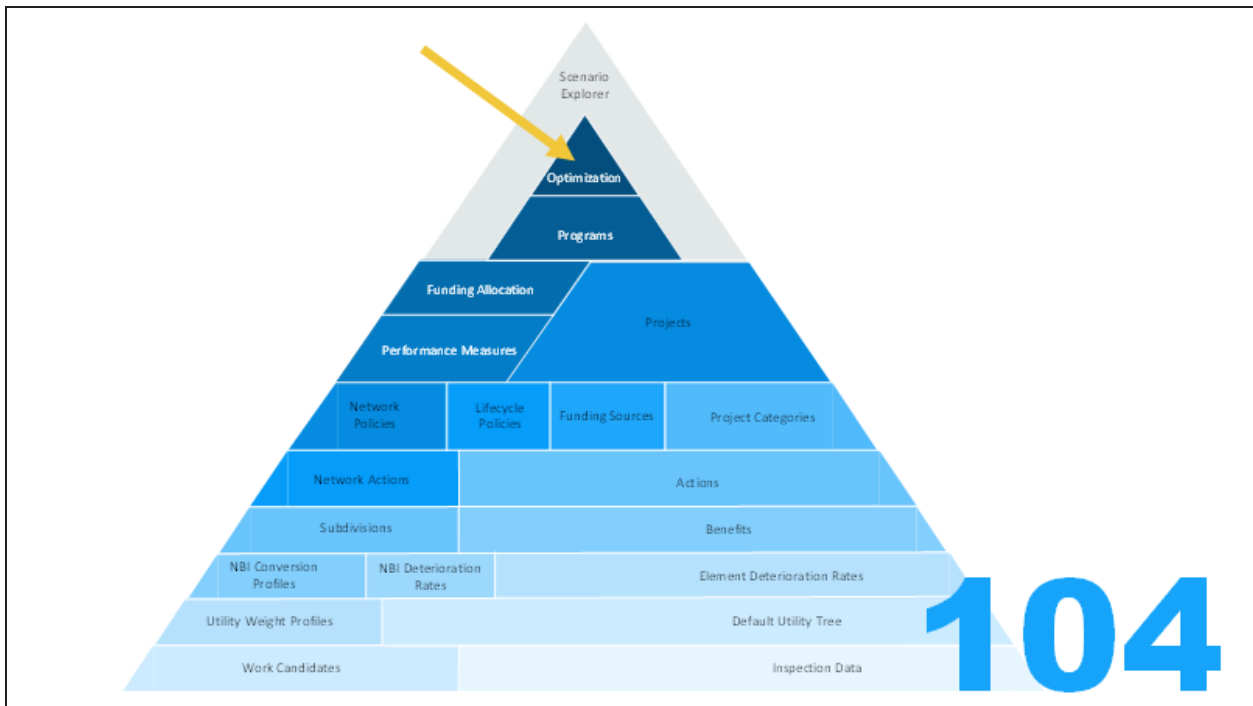
Distribute Get Performances

Budget distribution by program's segments: Input method:  Actual Budget Value  Percentage of Annual Budget

Segment	Utility	Pct. Deficient (Surface-based)	Health Index	Total Budget per segment	Pct. overall budget	2017	2018	2019	2020	2021
0 Not on NHS	0	0	0	\$0	0%		X	X	X	X
1 On the NHS	0	0	0	\$0	0%	X	X	X	X	X
Total				\$0	0%	\$0	\$0	\$0	\$0	\$0

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You can also get the current performance of each segment of your subdivision and distribute the funding based on their initial performance. In this case, if the non-NHS is further from its targets, it would get more funding.



## Optimization

Funding Allocation

Programs > Program Planning

**Optimize Program**

Program: Example 5-year Rehab & Replace [Run Optimization](#)

Scenario: Default

Optimization Method: Maximize Utility

Keep assigned projects: No

Run on all scenarios: No

Respect external frozen projects: Yes

**Program Information**

Start Year: 2017  
End Year: 2021

Subdivision Profile: NHS status  
NBI Deterioration Method: NBIConverter  
NBI Converter Profile: BM Default

Utility Weight Profile: Sample

Assigned Network Policies:

- Rehab Culvert
- Replace Bridge
- Replace Culvert
- Rehab Super
- Replace Deck
- Rehab Sub
- Rehab Deck

**Assigned Projects**

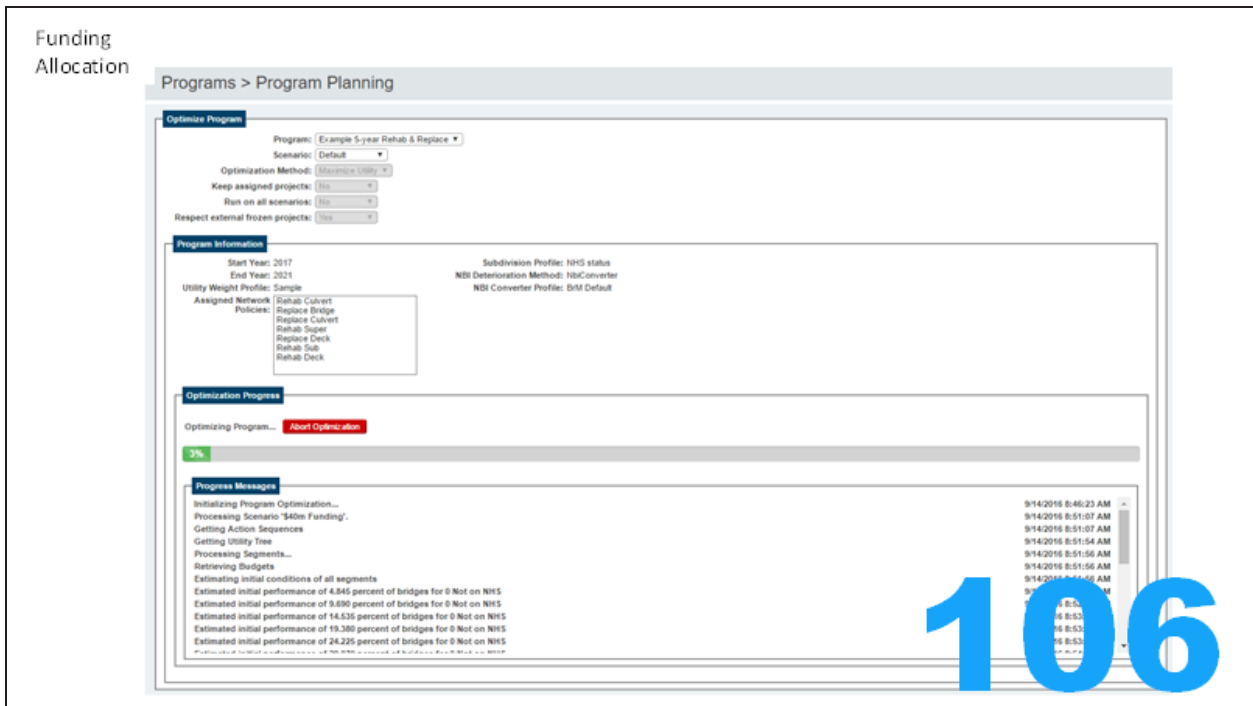
Segments: All Year: All

Project Name	Category	Automatic	Cost	Utility	Utility Benefit	Benefit/Cost (\$k)	Cost (\$k) / Benefit	Year	Frozen	Status
No records										

Items 15

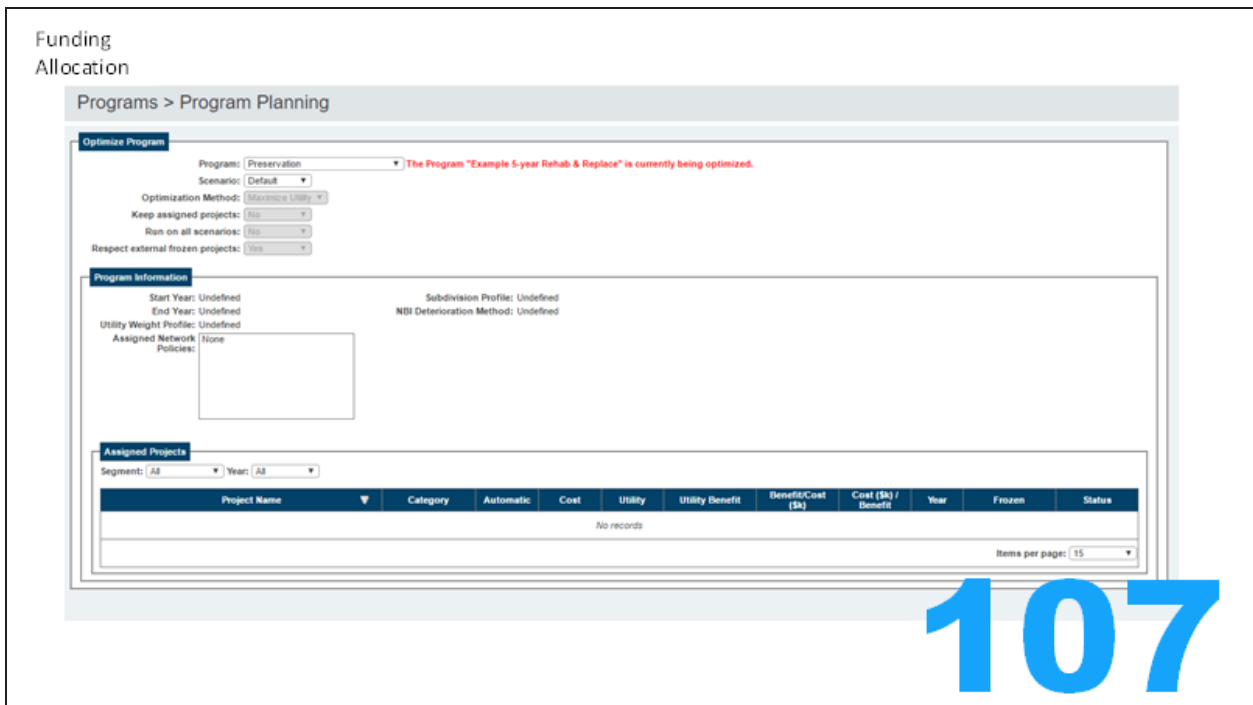
105

You have arrived at your destination. The *Run Optimization* button. We will discuss the scenario options in the last section. Notice also the summary of our previous selections.

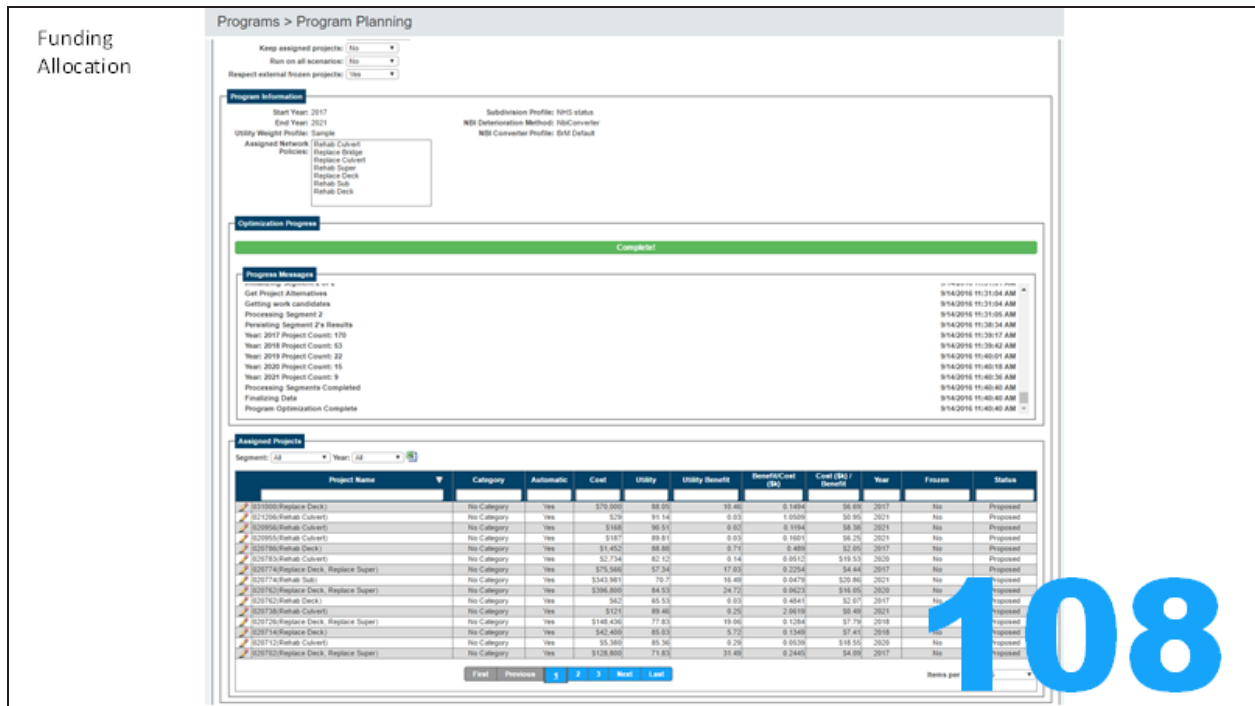


Once you click **Run Optimization**, the process will run in the background on the server. If you log out and come back, the process will still be running. This way it can run for hours, days or (if you go really crazy) weeks without you needing to keep the app logged in.

Should you need to abort the process, you can do so with the red **Abort Optimization** button.



Only one optimization can be run at a time. This is what you would see if you went to a different program, or if you were another user accessing this page.



Once completed, the projects would be listed below. Notice a few things here:

- As all the low hanging fruit are caught in the first few years, the optimizer recommends more replacements in later years, leading to less projects recommended with each year.
- I did not set a minimum project amount, so the optimizer recommended a \$62 project. Set a minimum to avoid seeing these.

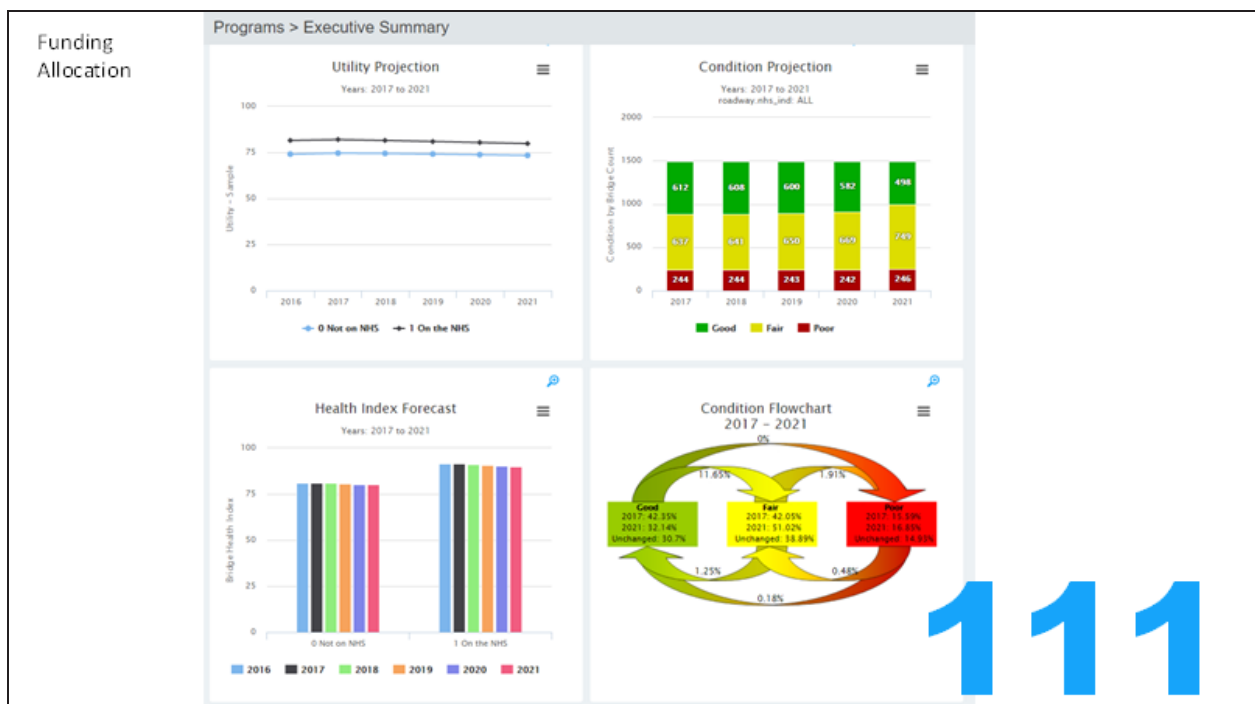


The *Program Results* page has a few fixed graphs to give you information about the performance of your program.

- Notice that this program focused on NHS bridges in the first year, then moved on to non-NHS.
- Notice that the program is on the horizon for most-optimal. If we had applied minimum constraints to performance measures, this could have moved down and to the right.
- The overall slope of the future performance is very slightly downward: we should compare this to including preservation but we are probably not spending enough to counter the deterioration of the system – and that is visible.

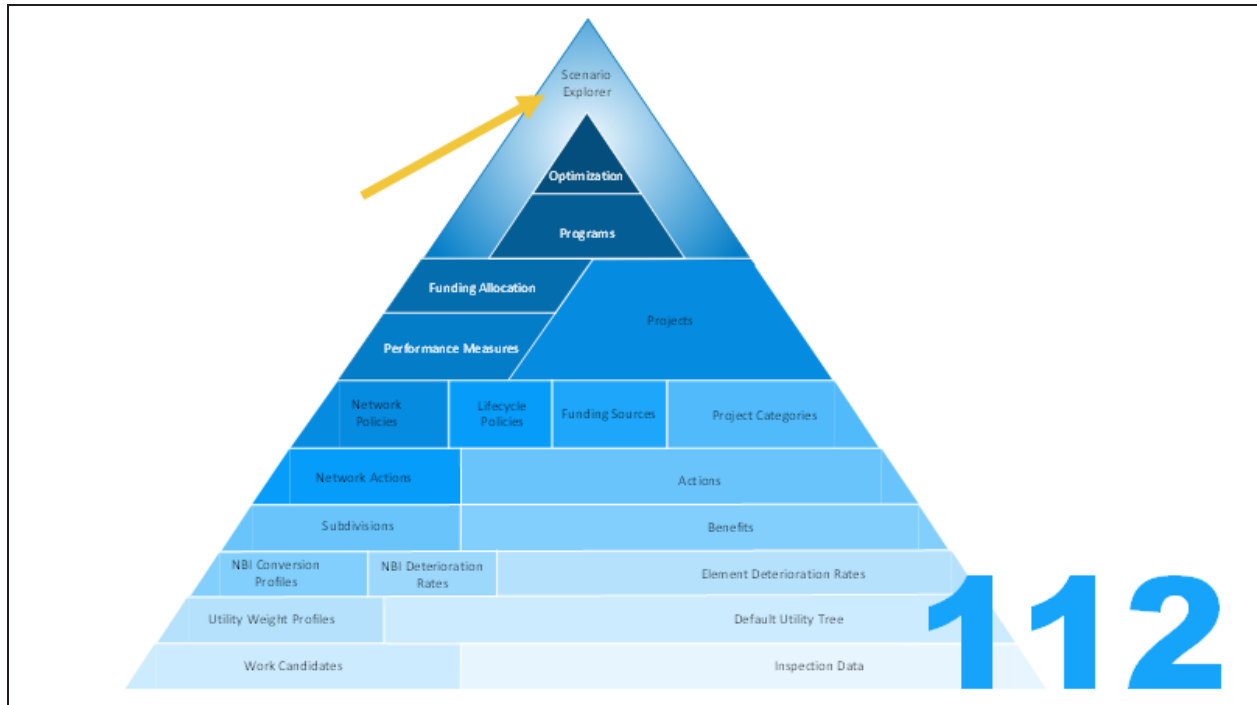


The *Executive Summary* includes charts that you can configure to your agency's practice.

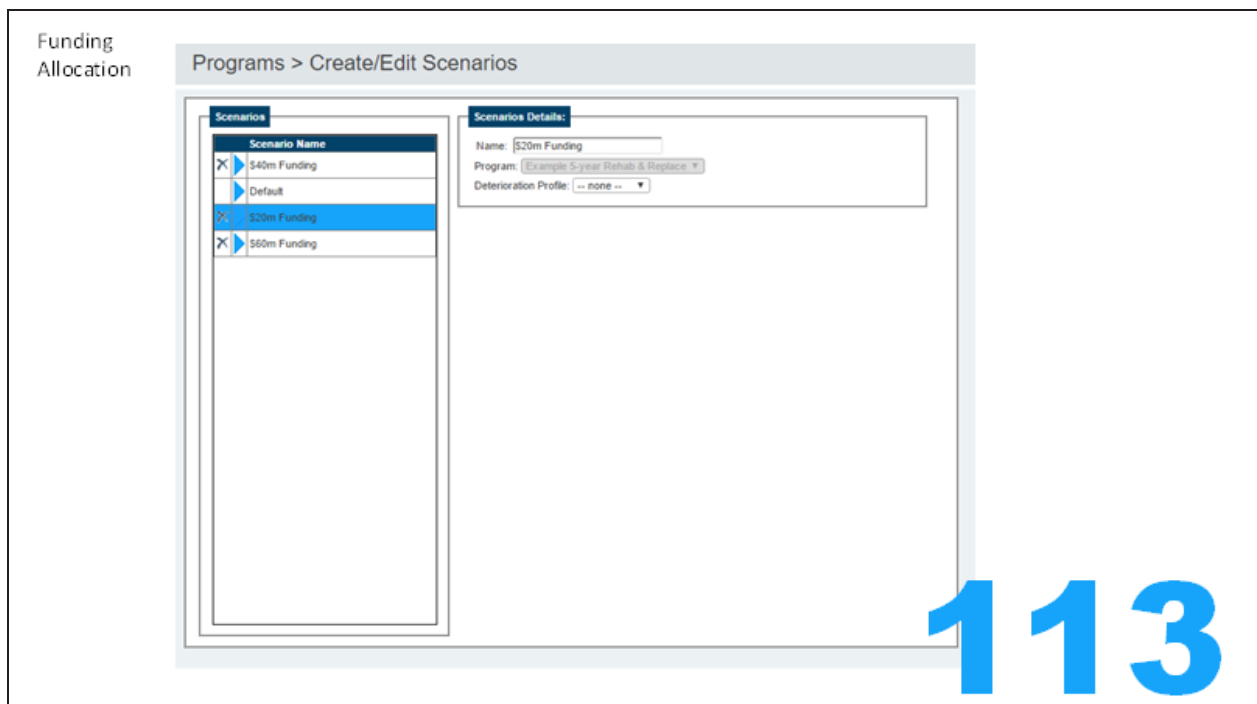




Lower on the same page, you can see on the “spider graph” that the percents moving from good to fair or fair to poor are higher than the program can restore. We’re likely not spending enough on these structures.



## Scenario Explorer



So we will create some scenarios where we will look at increased funding levels – for comparison.

Funding Allocation

Programs > Funding Allocation

Program: Example 5-year Rehab & Replace Scenario: Default

**Funding Allocation**  
 A new Funding Source Target in Projects > Funding Sources may be created for new Funding Allocations  
 No Funding Sources  
 Add New

**Budget Distribution**  
 Quick Distribution  
 Override budget \$10,000,000  
 Distribute Evenly  
 Total budget: \$10,000,000  
 Total allocated funds: \$0

	2017	2018	2019	2020	2021
Identified annual funds:	\$0	\$0	\$0	\$0	\$0
Additional funds:	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000
Total annual budget:	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000
Allocated funds:	\$0	\$0	\$0	\$0	\$0
Available Funds:	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000

**Distribute** **Get Performances**

Budget distribution by program's segments: Input method:  Actual Budget Value  Percentage of Annual Budget

Segment	Utility	Pct. Deficient (Surface)	Health Index	Total Budget per segment	Pct. overall budget	2017	2018	2019	2020	2021
0 Not on NHS	0	0	0	\$0	0%					
1 On the NHS	0	0	0	\$0	0%					
<b>Total</b>				\$0		\$0	\$0	\$0	\$0	\$0

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On each scenario, we can set different funding levels.

Funding Allocation

Programs > Program Planning

**Optimize Program**  
 Program: Example 5-year Rehab & Replace **Run Optimization**  
 Scenario: Default  
 Optimization Method: Maximize Utility  
 Keep assigned projects: No  
 Run on all scenarios: Yes  
 Respect external frozen projects: Yes

**Program Information**  
 Start Year: 2017 End Year: 2021  
 Utility Weight Profile: Sample  
 Assigned Network: (Suball Culvert, Replace Bridge, Replace Culvert, Rehab Super, Replace Deck, Rehab Sub, Rehab Deck)  
 Subdivision Profile: NHS status  
 NB Determination Method: MaxConnector  
 NB Connector Profile: Std Default

**Optimization Progress**  
 Completed

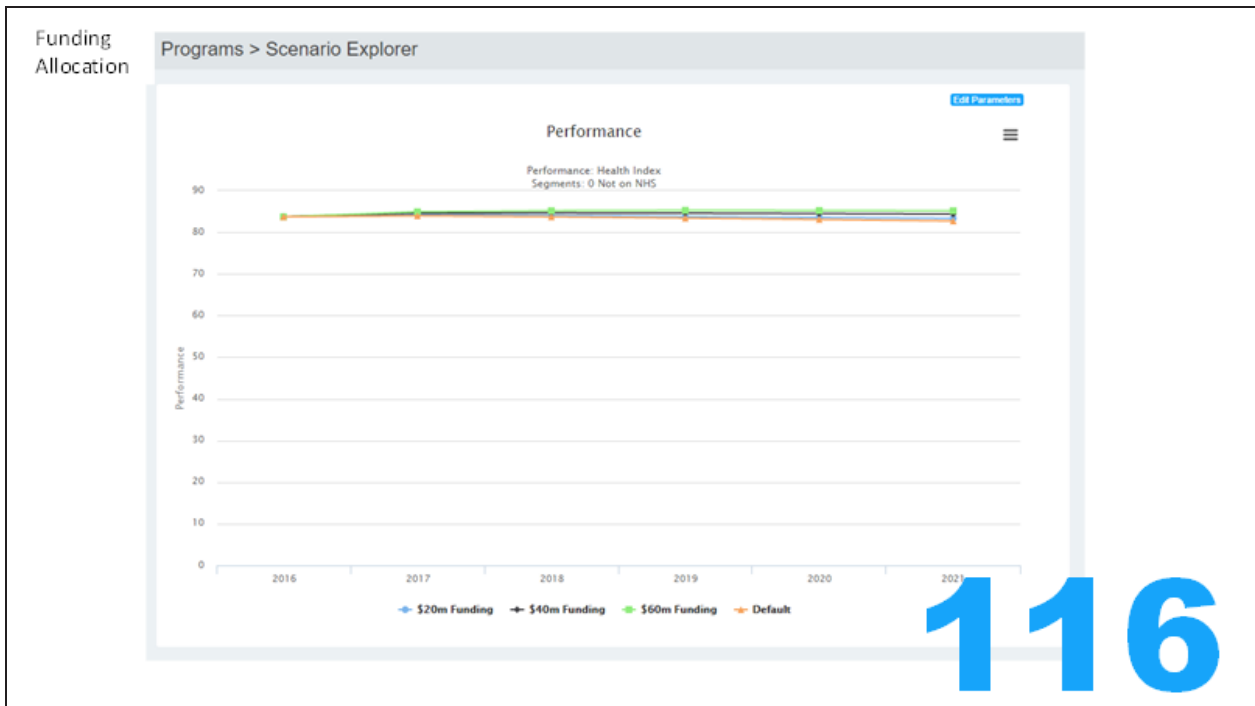
**Program Messages**  
 Get Project Alternatives 9/14/2016 11:31:04 AM  
 Getting work candidates 9/14/2016 11:31:05 AM  
 Processing Segment 2 9/14/2016 11:36:34 AM  
 Processing Segment 7a Benefits 9/14/2016 11:36:17 AM  
 Year: 2017 Project Count: 179 9/14/2016 11:40:01 AM  
 Year: 2018 Project Count: 53 9/14/2016 11:40:18 AM  
 Year: 2019 Project Count: 22 9/14/2016 11:40:36 AM  
 Year: 2020 Project Count: 15 9/14/2016 11:40:40 AM  
 Year: 2021 Project Count: 9 9/14/2016 11:40:40 AM  
 Processing Segments Completed 9/14/2016 11:40:40 AM  
 Finalizing Data 9/14/2016 11:40:40 AM  
 Program Optimization Complete 9/14/2016 11:40:40 AM

**Assigned Projects**  
 Segment: 02 Year: 2017

Project Name	Category	Automatic	Cost	Utility	Utility Benefit	Benefit/Cost (\$)	Cost (\$)/Benefit	Year	Frozen	Status
0201701 Rehab Culvert	No Category	Yes	575	31.14	8.95	1.596	0.627	2021	No	Proposed
0201702 Rehab Culvert	No Category	Yes	1168	50.51	8.02	0.1934	51.58	2021	No	Proposed
0201703 Rehab Culvert	No Category	Yes	1187	69.81	8.83	0.9811	16.29	2021	No	Proposed
0201704 Rehab Deck	No Category	Yes	31,402	68.68	8.71	8.409	12.59	2017	No	Proposed
0201705 Rehab Deck - Replace Super	No Category	Yes	375,566	57.64	14.76	6.9922	35.53	2018	No	Proposed
0201706 Rehab Deck	No Category	Yes	562	65.53	8.83	8.4841	12.87	2017	No	Proposed
0201707 Rehab Culvert	No Category	Yes	1223	66.48	8.26	2.0616	38.48	2021	No	Proposed
0201708 Rehab Deck - Replace Super	No Category	Yes	1148,436	77.57	20.42	6.1399	37.26	2020	No	Proposed
0201709 Rehab Deck	No Category	Yes	542,400	84.9	6.54	8.1542	38.48	2020	No	Proposed
0201710 Rehab Deck - Replace Super	No Category	Yes	1528,800	71.73	21.56	6.2481	54.53	2018	No	Proposed
0201711 Rehab Deck	No Category	Yes	32,795	90.71	1.93	8.7193	31.48	2017	No	Proposed
0201712 Rehab Culvert	No Category	Yes	360	65.37	8.83	8.4836	12.29	2021	No	Proposed
0201713 Rehab Deck	No Category	Yes	18,442	66.36	1.36	8.1334	37.48	2020	No	Proposed
0201714 Rehab Deck	No Category	Yes	644	16.49	6.07	6.2572	31.19	2018	No	Proposed

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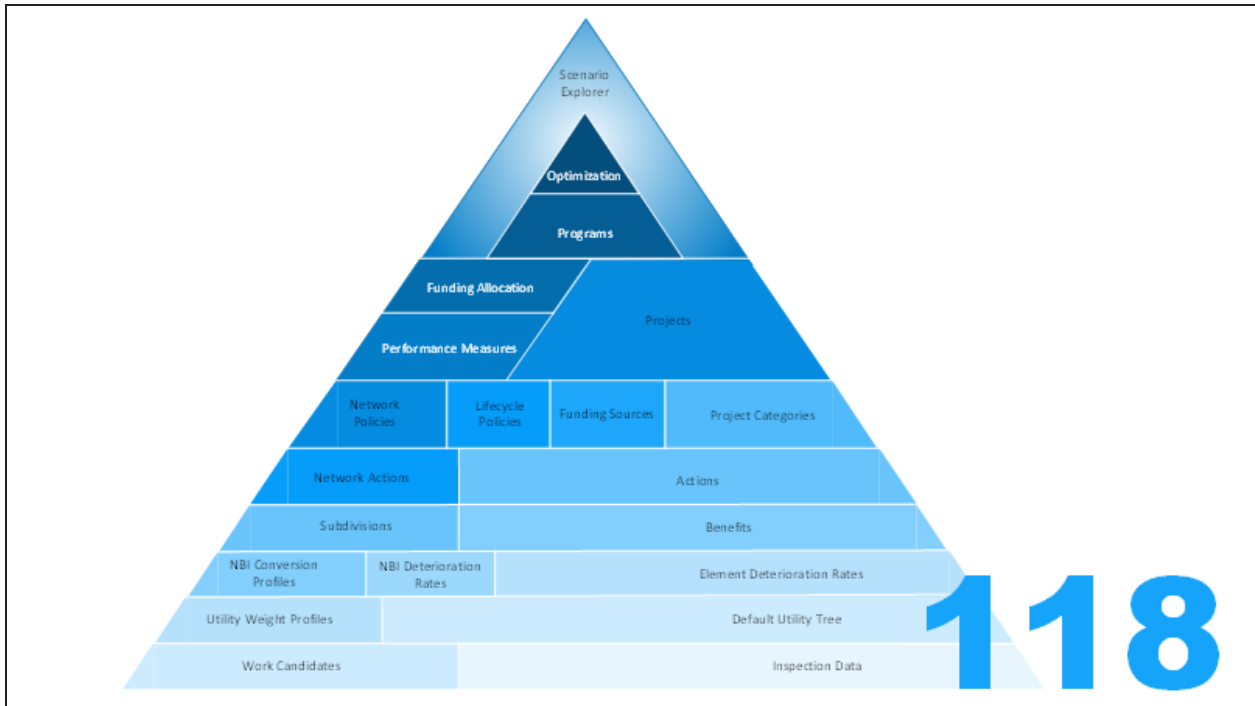
Then at the optimization level, we analyze all the scenarios at the same time.



Then in the scenario explorer, we can see how each plan fares based on the performance measures we set initially. In this case, spending \$10m would result in an average HI of 81.3 and \$60m would accomplish an HI of 85.4. Your legislature would love to have this level of information.



Looking at our other performance measure: notice how much of a difference the extra money makes in reducing the percent of structurally deficient bridges per year.



So this concludes our tour of the features of BrM. The goal has been to create a data-driven process to help you manage your inventory, giving you the tools to model the decisions you've made, the effects those decisions will have, and to recommend some courses of action you should consider.

# Appendix B

- BrM Basic Use Case Example 1 - Scour Mitigation Program

# Scour Mitigation Program

This example will guide you through the steps to configure and run the BrM Program Optimization. It will guide you through some features which were released in 5.2.1 and 5.2.2 which influence the optimizer released in 5.2.3.

In this example, we will develop a scour mitigation program for state-owned bridges in a BrM database. This will take us through all the pages of configuration that your agency will need to consider in order to get realistic and reliable results from the Program Optimizer.

This example assumes that the user has BrM admin rights in order to configure the agency's policies.

*BrM update scripts routinely update or reset example data. This guide will include notes like this to help you learn how to set up your data in a way that minimizes disruptions during future updates.*

## Inspection Data

The BrM Program Optimization is meant to assist states in developing a data-driven program for structure preservation, repair and replacement. Therefore, the first step is data quality.

The more detailed data your agency collects, the more fine-tuned the results will be. For example, if your agency only collects NBI data and not element data, your deterioration modeling will be limited to NBI deterioration, NBI-only benefit groups, and NBI-only lifecycle calculations.

In this example, scour will be evaluated in terms of the Scour Critical rating (NBI Item 113) and scour assessments. The bridges being analyzed will need to have NBI Item 113 filled out and/or risk assessments completed for the bridges.

**Step 1: Verify that the structures to be programmed have ratings for NBI Item 113 and/or risk assessments.**

Bridge: 6-6-5 Cont Conc 3sp Facility Carried (007): SR-162 Metric English

Inspection > Assessments

**Identified Risks**

Add New Assessment System Impact: 16

Assessment	Date	Status	Likelihood	Conseq	Value	Next
Scour	10/3/2016	Verified	4	4	16	10/3/2016

1 assessments (1 active)  
Selected Assessment: [Delete](#)

**Risk Details**

**Risk Assessment Value**

Likelihood of hazard

High	5	10	15	20	25	30	35	40	45	50
	4	8	12	16	20	24	28	32	36	40
	3	6	9	12	15	18	21	24	27	30
	2	4	6	8	10	12	14	16	18	20
Low	1	2	3	4	5	6	7	8	9	10

Low Consequence of hazard High

Vulnerability Type: Scour Likelihood of Hazard: 4  
Assessment Date: 10/3/2016 Consequences to Structure: 4  
Assessment Key/Date: 2015-08-12 (SMDO) Assessment Final Value: 16  
Workflow Status: Verified Next Assessment Date: 10/3/2016

Affected Deck Area: sq.ft  
Affected AADT:  
Hazard Class:

Description

# Utility

Optimization will be primarily performed on the metric of Incremental Benefit per Cost as outlined in NCHRP 590. The “Benefit” part of that metric is the  $\Delta$  Utility score. So we will now set up the Utility functions according to our agency’s policies.

## Default Utility Tree

Admin > Modeling Config > Utility

The default utility tree will need to include nodes which will reflect the benefits from the actions performed. If your agency does not want them to be part of the Utility score used elsewhere, you can give them a weight of zero for now and they will not affect the other utility scores.

**Step 1: Create a Utility node for scour risk assessment. Give it a weight of 50, scale the graph so that 1 is worth 100 and 50 is worth 0.**

Admin > Modeling Config > Utility

**Components**

- Total Utility
  - Condition (Weight: 40)
    - Element ratings (Weight: 90)
    - NBI ratings (Weight: 10)
  - Lifecycle (Weight: 30)
  - Mobility (Weight: 15)
  - Risk (Weight: 15)
    - Channel and Channel Protection (NBI 61) (Weight: 10)
    - Fracture Critical (NBI 92a) (Weight: 20)
    - Posting (NBI 70) (Weight: 20)
    - Scour Critical (NBI 113) (Weight: 30)
    - Underclearances (NBI 69) (Weight: 20)
    - Waterway Adequacy (NBI 71) (Weight: 10)
    - Scour Risk Assessment (Weight: 50)

**Criterion Properties**

Name: Scour Risk Assessment Weight: 50  
Type: Assessment  
Assessment: Scour

**Scaling**

Formula: Use scaling graph

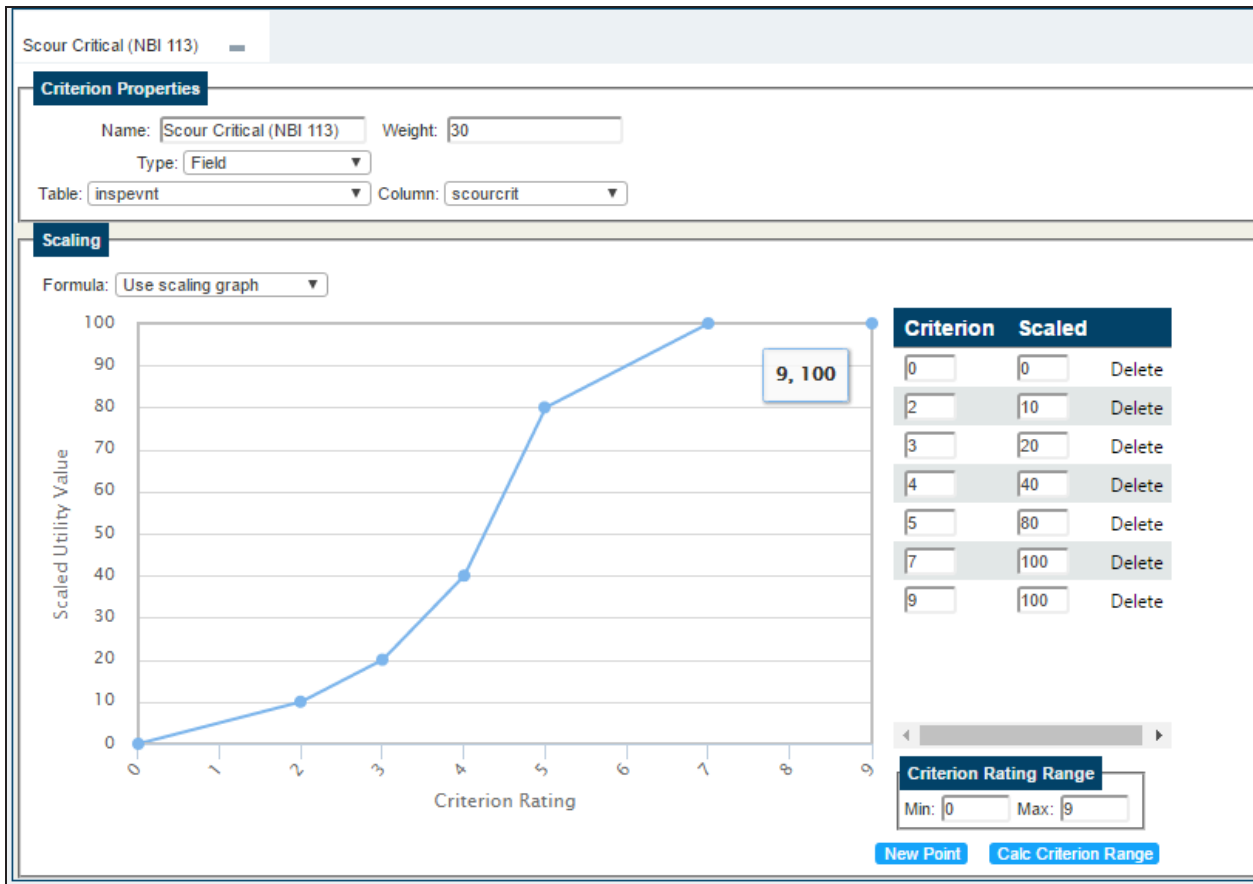
Scaled Utility Value

Criterion Rating

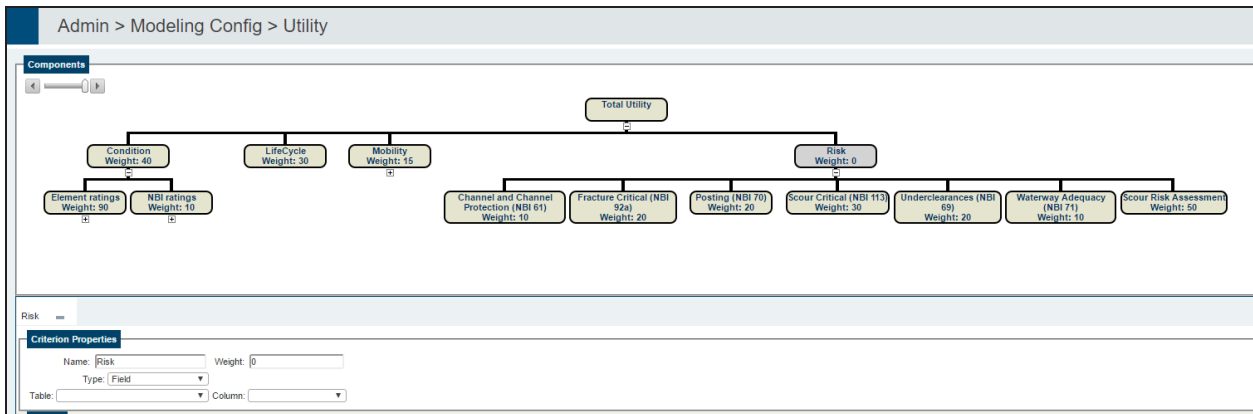
Criterion	Scaled
0	100
50	0

Criterion Rating Range: Min: 0 Max: 50

**Step 2: Review the Utility Node for NBI 113 Scour Critical Rating. It should have a weight of 50 (or appropriate to your agency’s policy), it should be mapped to the inspevnt.scourcrit field of the database, and map the NBI ratings to a score. Notice: in this example, bridges with a rating of a 6 (Scour uncalculated) shouldn’t be included in the program – we will filter them out shortly.**



**Step 3: Give the risk parent-node a weight of 0, or a weight according to your agency’s policy.**



## Utility Weight Profiles

*Admin > Modeling Config > Weights Profile*

The Utility Weight Profile allows you to temporarily change the weights of the different nodes in the Utility tree for use in specific programs. For example: your agency may use the utility score primarily as an indicator of condition, but for the purposes of this program you want the utility to focus on scour only. Rather than change the default utility weights and disrupt other users of the program, we will create a weight profile which leans exclusively on the risk node for this program only.

**Step 1: Create a new Utility Weight Profile and name it “Scour Weight Profile.”**



Admin > Modeling Config > Weights Profile

**Profiles**

Selected Weight Profile: Scour Weight Profile ▼

Name: Scour Weight Profile

**Utility Components**

- Total Utility
  - Condition (40->40)
  - LifeCycle (30->30)
  - Mobility (15->15)
  - Risk (0->0)

**Step 2: Re-weight the parent nodes of condition, lifecycle and mobility to 0 and risk to 1. Focus the weights on the Scour Rating (Item 113) and the Scour Risk Assessments.**

## Admin > Modeling Config > Weights Profile

### Profiles

Selected Weight Profile:

Name:

### Utility Components

- Total Utility
  - Condition (40->0)
  - LifeCycle (30->0)
  - Mobility (15->0)
  - Risk (0->1)
    - Channel and Channel Protection (NBI 61) (10->0)
    - Fracture Critical (NBI 92a) (20->0)
    - Posting (NBI 70) (20->0)
    - Scour Critical (NBI 113) (30->50)
    - Scour Risk Assessment (50->50)
    - Underclearances (NBI 69) (20->0)
    - Waterway Adequacy (NBI 71) (10->0)

### Scour Risk Assessment Criterion's Details

Default Sibling Total Weight: 160

Default Weight: 50 31%

Override Sibling Total Weight: 100

Override Weight:  50%

[Reset to Default](#)

**Step 3: Save the profile.**

# Deterioration

Even in the dry deserts of southern Utah, bridges deteriorate. And their deterioration rates are different from bridges in the humid river deltas along the Gulf of Mexico. The default values in BrM are a good average starting point, but you should plan on spending some time to customize these to the environment of your agency.

The deterioration modeling comes in two forms: element-level deterioration and NBI-rating-level deterioration. Element-level rating analysis the deterioration of the individual elements and can provide more detailed future estimates, like distinguishing between the need to replace pins and hangers vs the need to replace entire beams. NBI-level deterioration is more generic and may be better suited for bridge-groups which do not have element-level inspection.

In either case, it is a good practice to check the default deterioration rates and adjust them to the deterioration you experience in your inventory.

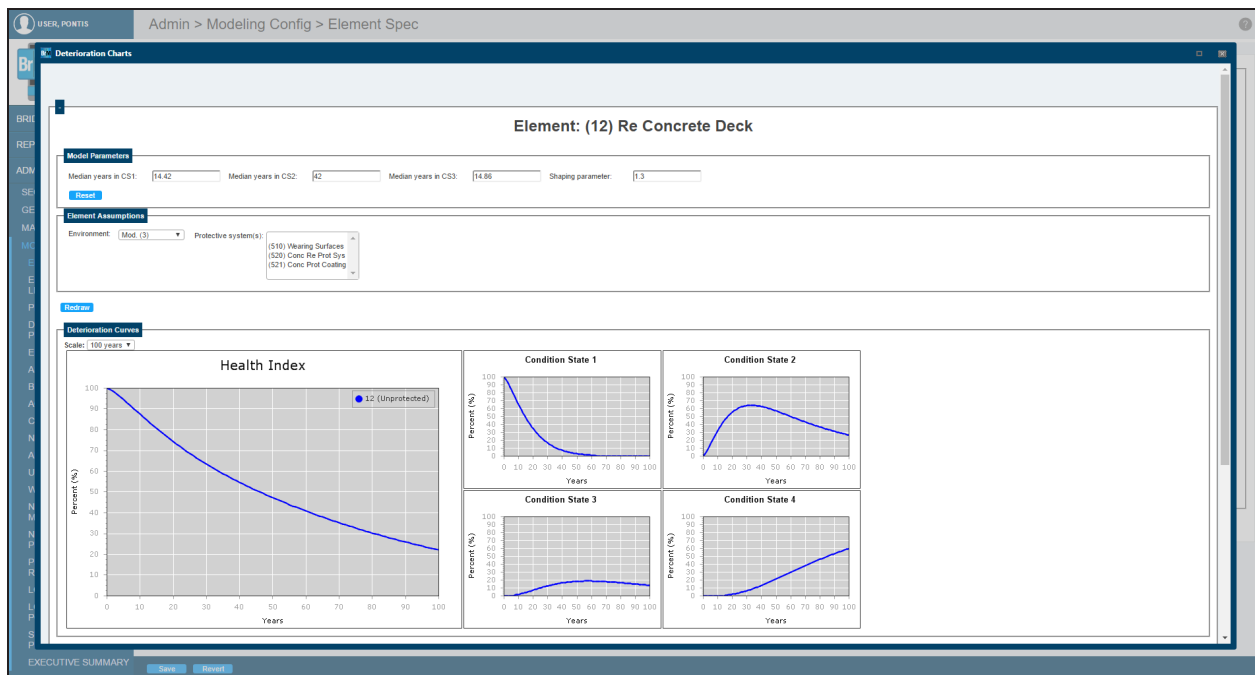
We should also note that BrM does not currently have the ability to deteriorate other database fields at this time. So for this example, the scour assessment and scour criticality will not be worsening with time.

## Element Deterioration Rates

*Admin > Modeling Config > Element Spec*

Review the deterioration rates of all the elements in your inventory, including your Agency Defined Elements (ADE's). ADE's do not come with a default deterioration value, so you may need to create a deterioration curve either from copying the values of a similar default element or figuring out the deterioration on your own.

A good 'gut' check of your deterioration rate is to look at the graph and see when the amount in CS4 passes 10%. In this example, Elem 12 Reinforced Concrete Deck crosses the 10% CS4 range at 35 years. This is close to Utah's experience, but how does it compare to your area?



**Step 1: Look over your element deterioration rates to reflect conditions in your agency.**

**\*Note:** Some agencies have chosen to use service units to have Bentley analyze their element data and recommend deterioration rates for their elements.

## NBI Deterioration Rates

Admin > Modeling Config > NBI Deterioration Models

To set the proper rate of deterioration for your NBI ratings, you will want to set the transition times of the NBI Components. If your agency has been conducting inspections with NBI ratings since the 90's, the average transition times should be data easier to come by.

In this example, an average bridge would spend 2 years at a deck NBI of 9, 18 1/5 years at NBI of 8 and then 13.75 years at a 7. Meaning the average deck for this agency would take 35 years to reach a deck NBI of 6. If this feels too long for your experience, you should consult your data and make your own component deterioration rates.

Admin > Modeling Config > NBI Deterioration Models

**Components**

Component Name
Deck
Superstructure
Substructure
Culvert

**Component Specification**

Name: Deck

Description:

Category: Decks/Slabs

Table Name: inspevnt

Column Name:

Min NBI Value: 1

Max NBI Value: 9

**Component Deterioration Modeling**

Model

**Model Parameters**

NBI Transition Time in Years 9 :	2
NBI Transition Time in Years 8 :	18.65
NBI Transition Time in Years 7 :	13.75
NBI Transition Time in Years 6 :	14.5
NBI Transition Time in Years 5 :	14
NBI Transition Time in Years 4 :	5
NBI Transition Time in Years 3 :	2.6
NBI Transition Time in Years 2 :	0
NBI Transition Time in Years 1 :	0

For this example, we will now set up our own deterioration rate for decks. It's important to change the values to reflect your agency's experience.

This step is to help educate you on the behavior of the NBI deterioration rates. It is not necessary to run the optimization.

**Step 1: Readjust the years to sum up to 40 years to reach an NBI of 4 (or if you have a good feel for what your agency experiences, go ahead and put it in).**

Admin > Modeling Config > NBI Deterioration Models

**Components**

Component Name
Deck
Superstructure
Substructure
Culvert

**Component Specification**

Name:

Description:

Category:

Table Name:  Column Name:

Min NBI Value:  Max NBI Value:

**Component Deterioration Modeling**

Model

**Model Parameters**

NBI Transition Time in Years 9 :

NBI Transition Time in Years 8 :

NBI Transition Time in Years 7 :

NBI Transition Time in Years 6 :

NBI Transition Time in Years 5 :

NBI Transition Time in Years 4 :

NBI Transition Time in Years 3 :

NBI Transition Time in Years 2 :

NBI Transition Time in Years 1 :

**Step 2: Save your NBI deterioration rate.**

**Step 3: Re-estimate the results for the entire network. Compare the number of good / fair and poor bridges with what you would expect. Also watch for significant drops over the next 5 years. Seeing changes of thousands of structures could indicate improper configurations.**

**Network NBI Rating distributions**

Bridge Filter:

Component:

	Latest Inspection Reported	Current	+5 Years	+10 Years
NBI Rating 9	4	4	0	0
NBI Rating 8	1	0	3	0
NBI Rating 7	5	5	5	8
NBI Rating 6	8	7	5	2
NBI Rating 5	2	3	6	8
NBI Rating 4	4	4	1	1
NBI Rating 3	0	1	2	0
NBI Rating 2	0	0	1	1
NBI Rating 1	0	0	1	1

**\*Note:** Some agencies have chosen to use service units to have Bentley analyze their NBI rating histories to refine their NBI deterioration curves.

## NBI Conversion Profiles

Admin > Modeling Config > NBI Conversion Profiles

Because it's sometimes more convenient to do preservation policies in terms of NBI or network policies based on NBI ratings, but to use element deterioration. To help the computer convert between the two, we have NBI Conversion Profiles.

The Profile is a little counter-intuitive to populate, so consider this example of the BrM Default profile:

The screenshot shows the 'Admin > Modeling Config > NBI Conversion Profiles' window. On the left, a list of 'NBI Profile Name' includes 'FHWA Profile' and 'BrM Default'. The 'BrM Default' profile is selected. The 'Profile Details' section shows the profile name 'BrM Default', 'Profile enabled' checked, and tabs for 'Generic', 'Deck', 'Superstructure', 'Substructure', and 'Culvert'. The 'Generic Upper Limits' section is expanded, showing 'Group enabled' checked and 'Method of CS averaging' set to 'Element weighting'. Below this is a table with columns for NBI, Enabled, CS1 %, CS2 %, CS3 %, and CS4 %.

NBI	Enabled	CS1 %	CS2 %	CS3 %	CS4 %
9	<input checked="" type="checkbox"/>	100	1	1	1
8	<input checked="" type="checkbox"/>		5	5	1
7	<input checked="" type="checkbox"/>		20	5	2
6	<input checked="" type="checkbox"/>			10	3
5	<input checked="" type="checkbox"/>			20	5
4	<input checked="" type="checkbox"/>				15
3	<input checked="" type="checkbox"/>				100
2	<input type="checkbox"/>				
1	<input type="checkbox"/>				

The value typed in is the 'upper limit.' So if I have a deck with 1.1% of its deck area in CS2, it has to have an NBI rating of 8 or lower. If it had 2% in CS3 and 3% in CS4, the more restrictive (in this case the CS4 percentage) will govern and give us an NBI of 6 for the deck.

When using these conversion profiles as part of deterioration modeling, you will want to be careful of the small percentages. For example, a pristine deck will have 0.001% of its surface area in CS4 after 4 years, and that tiny amount will take a long time to develop into a sizeable amount. But if you put 0 tolerance for CS4 in the NBI conversion profile – it will convert that tiny amount to an NBI of 4. That is why it is recommended to leave the fields blank or with a nominal percentage when using them in deterioration curves.

---

*The default NBI profiles (FHWA and BrM Default) also get updated in upgrades, create a copy to keep your agency ones.*

---

This example is not necessary to run the optimization, but is valuable for learning how the conversion process works.

**Step 1: Copy the BrM Default NBI Profile. Name your example ‘Agency Test.’**

**Step 2: Modify the conversion profile to be more generous on NBI’s of 7 by increasing the CS2 tolerance to 30%.**

Admin > Modeling Config > NBI Conversion Profiles

**NBI Profiles**

NBI Profile Name	
<input checked="" type="checkbox"/>	BrM Default - Copy
<input type="checkbox"/>	FHWA Profile
<input type="checkbox"/>	BrM Default

**Profile Details:**

Name:

Profile enabled

**Generic Upper Limits**

Group enabled  
Method of CS, averaging:

NBI	Enabled	CS1 %	CS2 %	CS3 %	CS4 %
9	<input checked="" type="checkbox"/>	100	1	1	1
8	<input checked="" type="checkbox"/>		5	5	1
7	<input checked="" type="checkbox"/>		30	5	2
6	<input checked="" type="checkbox"/>			10	3
5	<input checked="" type="checkbox"/>			20	5
4	<input checked="" type="checkbox"/>				15
3	<input checked="" type="checkbox"/>				100
2	<input type="checkbox"/>				
1	<input type="checkbox"/>				

**Step 3: Save your profile.**

**Step 4: Re-Estimate the “Good / Fair / Poor” distributions. Notice the distribution of the latest inspection and the Current (deterioration modeled between the inspection dates and today). Large movements could indicate that you need to reconsider your settings.**

### Network NBI Rating distributions

Bridge Filter:  [Re-estimate results](#)

Component:

	Latest Inspection Reported	Latest Inspection Converted	Current	+5 Years	+10 Years
NBI Rating 9	4	6	0	0	0
NBI Rating 8	2	2	6	0	0
NBI Rating 7	2	1	3	9	8
NBI Rating 6	6	7	6	4	4
NBI Rating 5	4	0	1	3	2
NBI Rating 4	8	10	9	9	10
NBI Rating 3	1	1	2	2	3
NBI Rating 2	0	0	0	0	0
NBI Rating 1	0	0	0	0	0



# Network Policies

In this next section, we will define the work that your agency would perform on bridges. There are three principle pieces of this section, the benefits, the actions, the network policies, and the project and program categories. In rough summary:

**The Benefits** define for the computer what the effects of your work are, and how it should model the bridge after the work is completed.

**The Actions** define what benefits should be grouped together, and then what costs should be associated with that work. There are bridge-level actions, which are intended to be very specific for individual projects and work candidates, and then there are network-level actions, which are intended to be very generic and high level to reduce optimization runtime.

**The Policies** then define what combinations of actions your agency would consider together.

## Benefits

*Admin > Modeling Config > Benefit Groups*

The benefits should reflect the changes that the bridge will experience with your work. They should affect the various nodes of your utility tree – if a benefit does not affect your utility score, the software will see no benefit to performing that work.

In my experience, it is good practice to break up the benefits into many smaller ones so that their definitions can be re-used with many separate actions. For example: repairing concrete parapet to CS2 should be its own benefit, which can then be associated with network actions like ‘rehabbing a deck’ and ‘rehabbing a culvert,’ and bridge level actions like ‘concrete parapet repair.’ A few days’ practice in creating and customizing benefits will help you to see where you can recycle definitions, which will make maintaining and adjusting the configuration easier.

Admin > Modeling Config > Benefit Groups

Deck Rehab	Deck Rehab								<a href="#">Link to Child Groups</a>
Deck-Install Protection System	Deck-Install Protection System								<a href="#">Link to Child Groups</a>
Deck-Place Overlay	Deck-Place Overlay								<a href="#">Link to Child Groups</a>
Deck-Repair(Potholes)	Deck-Repair(Potholes)								<a href="#">Link to Child Groups</a>
Deck-Replace	Deck-Replace								<a href="#">Link to Child Groups</a>
Joints-Rehabilitate	Joints-Rehabilitate								<a href="#">Link to Child Groups</a>
Joints-Repair	Joints-Repair								<a href="#">Link to Child Groups</a>

Page size: 20 54 items in 3 pages

Approach Slab Repair - Changed Elements

+ Add new record

Element	Parent	Grandparent	Origin State	CS1	CS2	CS3	CS4
320 Pre Conc Appr Slab							
320 Pre Conc Appr Slab	None	None	CS3		100%		
320 Pre Conc Appr Slab	None	None	CS4		100%		
321 Re Conc Approach Slab							
321 Re Conc Approach Slab	None	None	CS3		100%		
321 Re Conc Approach Slab	None	None	CS4		100%		

Page size: 20 4 items in 1 page

Approach Slab Repair - Removed Elements

Approach Slab Repair - Replaced Elements

Approach Slab Repair - Created Protecting Systems

Approach Slab Repair - Fields

Approach Slab Repair - Risks- to reduce risk, use negative values

Let's first discuss the benefit title block. The benefit can be named after the action it is intended to model, or it can be named exactly what benefit it contains. The default examples are given a sort order in the 9990's to help separate them from your agency-defined benefits. Some states sort their deck work together, others like to group their replacement work together.

A benefit can also be made a parent benefit with many child elements. For example: you may have a benefit which moves concrete parapet elements back to CS2, and one that moves metal railings back to CS1, but to make referencing both of them easier in the actions you might create a parent-benefit called railing-repair. This is not required.

A benefit can have any combination of 6 effects:

**Changed Elements** – here you can specify how a repair moves units of bridge elements from one condition state to another. You can specify if the repair moves the unit to CS2 or CS1, and you can model the effectiveness of a repair (maybe only 90% is really fixed with a pothole patch). If no parent element is specified, every instance of that protective element will be modified. Costs for these benefits are calculated as cost per unit changed.

**Remove Defects** – This allows you to remove defects from a bridge as part of a benefit. Note that this will not affect your utility scores, it exists only to clean up the book-keeping in your future hypothetical conditions.

**Replaced Elements** – This does exactly what it sounds like it does, and again you can model the effectiveness of a replacement. You also have the option to replace with a different element, so you could remove a thin-bonded polymer overlay and replace with an asphalt surface treatment. Costs for these benefits are calculated as cost per unit with the whole element changed.

**Created Protective Systems** – This allows you to add a protective system to a bridge that did not already exist. Again, if a parent is named, it will only add the protective system to that parent element. Cost is per unit of new system, with the quantity inherited from its parent element.

**Change** – This is where you can change the values of any numeric database field (NBI ratings for deck, super, sub, culvert for example). No direct costs are reflected with these changes at the action level – you will need to make sure the action includes indirect costs where appropriate. Make sure fields you are changing are reflected in your utility tree. If you decide to increment the improvement, say add 2 to your NBI rating, pay attention that this will only add to numeric values and not to letters like “N.”

**Risk** – This is where you can change the assessment risk, either incrementally or to a set value. Like the field changes, no direct costs are reflected with these changes – you will need to include indirect costs for these.

For this example, we will be making 4 actions:

- Repair the scour hole
- Repair the scour hole and place rip-rap
- Repair the scour hole and place ajax
- Repair the scour hole and pave the channel

To model this, we will create benefits which change the scour-critical rating and some which modify the risk.

**Step 1: Create a new benefit. Name it “Scour Rating to 4,” and change its sort order to 900, and check the “insert” checkbox.**

**Step 2: Add a record to the Fields portion. The table name is ‘inspevnt’ and the column name is ‘scourcrit’. The new value will be ‘4’ and check the insert checkbox. Then save your benefit.**

**Step 3: Add second benefit, name it “Scour Rating to 7,” and change its sort order to 900, and check the “insert” checkbox. Add a record to the Fields portion. The table name is ‘inspevnt’ and the column name is ‘scourcrit’. The new value will be ‘7’ and check the insert checkbox. Then save your benefit.**

Admin > Modeling Config > Benefit Groups

Benefit Groups

+ Add New Benefit Group

Benefit Group Name ▲	Description	Linked Actions	Sort Order ▲
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Scour Rating to 7			900

Scour Rating to 7 - Fields

+ Add new record

Table Name ▲	Column Name ▲	New Value	Increment
inspevnt	scourcrit	7	<input type="text"/>

No records to display.

**Step 4: Add third benefit, name it “Scour Risk -2,” and change its sort order to 998, and check the “insert” checkbox. Add a record to the Risk portion. The assessment type will be ‘scour’. The increment will be ‘-2’and check the insert checkbox. Then save your benefit.**

Admin > Modeling Config > Benefit Groups

Benefit Groups

+ Add New Benefit Group

Benefit Group Name ▲	Description	Linked Actions	Sort Order ▲
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Scour Risk -2			900

Scour Risk -2 - Risks- to reduce risk, use negative values

+ Add new record

Assessment Name	New Value	Increment
Scour	<input type="text"/>	-2

No records to display.

**Step 5: Repeat step 4 twice more, once to reduce the scour risk by 3 and once to reduce it by 4.**

Admin > Modeling Config > Benefit Groups

Benefit Groups

+ Add New Benefit Group

Benefit Group Name ▲	Description	Linked Actions	Sort Order ▲
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Scour Risk -3			900

Scour Risk -3 - Risks- to reduce risk, use negative values

+ Add new record

Assessment Name	New Value	Increment
Scour		-3

Assessment Name	New Value	Increment
Scour		-4

*Example benefits get reset by upgrade scripts. To minimize upgrade disruptions, it is recommended that you copy the example benefits and then customize your own.*

## Action Definitions

Admin > Modeling Config > Action Definitions

The actions are where we will now tie together the benefits and give them an associated cost. There are two types of actions: bridge-level actions and network level actions.

**Bridge-level actions** – These actions are intended to be very specific, to represent a single work item or a small group. These can be called out by inspectors as work candidates and can be part of the LCCA of a bridge, where the software makes a very detailed recommendation for work to be performed.

**Network-level actions** – These actions are designed to be rather generic, a top-down approach to an entire network of bridges. Instead of detailing if parapet work should or should not be included with the deck rehab, these actions are more intended to answer questions like if this should be a deck rehab or a replacement.

Having the software correctly model the costs is a large part of getting proper results. The costs should be based off your agency’s experience where possible.

The ‘Required Minimum Cost’ will prevent this action from being considered a viable action by the program optimization until the work reaches this value. So for example you could prevent deck rehab from being recommended until there’s at least \$10,000 worth of pothole patching and joint work to be done. We recommend that you only use this field when you consider yourself a more advanced user and are fine-tuning your system.

The deferment rules will set the amount of time in a life-cycle analysis before the named follow-up action can be performed.

We will now create the actions for our 4 types of scour work:

- Repair the scour hole
- Repair the scour hole and place rip-rap
- Repair the scour hole and place ajax
- Repair the scour hole and pave the channel

### Step 1: Add an action with the following properties:

- Name:** Scour Hole Repair
- Description:** Fill in a scour hole
- Notes:** Scour Example
- Order:** 900
- Network Level:** True

Admin > Modeling Config > Action Defs								
Action Defs								
Search <input type="text"/> <input type="button" value="Search"/>								
Name	Description	Notes	Order	Network Level	Bridge Replace	Required Minimum Cost	Action Type	
Scour Hole Repair	Fill in a scour hole	Scour Example	900	<input checked="" type="checkbox"/>	<input type="checkbox"/>	\$ <input type="text"/>	<input type="text"/>	<input type="button" value="Add"/>

**Step 2: Assign the benefit ‘Scour Rating to 4.’ Enable the indirect cost, set the estimation method to flat indirect cost, and give it a cost of \$2,000. Save the action.**

Associated Benefit Groups for Action Scour Hole Repair

Metric  English

Benefit Groups	
Please Select	<input type="button" value="Add"/>
Scour Rating to 4	<input type="button" value="X"/>

Overriding Direct Cost (overrides unit-costs) =

Enabled	Field Name	Cost Per Unit	Unit
<input type="checkbox"/>	Deck Area	\$	sq.ft

Unit Costs =

ID	Element Name	Cost Per Unit	Unit	?
No records				

Indirect Cost =

Enabled	Component	Estimation Method
<input checked="" type="checkbox"/>	Total Indirect Cost	Flat Indirect Cost
		2000

Deferment Rules =

Action Name	Deferment Interval (Years)
Please Select	<input type="text"/>
No records	

**Step 3: Add an action with the following properties:**

- Name:** Scour – Place Riprap
- Description:** Place riprap to address scour
- Notes:** Scour Example
- Order:** 900
- Network Level:** True

Admin > Modeling Config > Action Defs

Action Defs

Search

Name	Description	Notes	Order	Network Level	Bridge Replace	Required Minimum Cost	Action Type
Scour - Place Riprap	Place riprap to address s	Scour Example	900	<input checked="" type="checkbox"/>	<input type="checkbox"/>	\$	<input type="text"/> <input type="button" value="Add"/>

**Step 4: Assign the benefits: ‘Scour Rating to 7’ and ‘Scour Risk -2.’ Enable the indirect cost, set the estimation method to flat indirect cost, and give it a cost of \$5,000. Save the action.**

**Associated Benefit Groups for Action Scour - Place Riprap**

Metric  English

Benefit Groups	
Please Select	<input type="button" value="Add"/>
Scour Rating to 7	<input type="checkbox"/>
Scour Risk -2	<input type="checkbox"/>

Overriding Direct Cost (overrides unit-costs)			
Enabled	Field Name	Cost Per Unit	Unit
<input type="checkbox"/>	Deck Area	\$	sq.ft

Unit Costs				
ID	Element Name	Cost Per Unit	Unit	?
No records				

Indirect Cost			
Enabled	Component	Estimation Method	
<input checked="" type="checkbox"/>	Total Indirect Cost	Flat Indirect Cost	5000

Deferment Rules		
Action Name	Deferment Interval (Years)	
Please Select		<input type="button" value="Add"/>
No records		

**Step 5: Add an action with the following properties:**

- Name:** Scour – Place Ajax
- Description:** Place concrete ajax
- Notes:** Scour Example
- Order:** 998
- Network Level:** True

Admin > Modeling Config > Action Defs

Action Defs									
Search <input type="text"/> <input type="button" value="Search"/>									
Name	Description	Notes	Order	Network Level	Bridge Replace	Required Minimum Cost	Action Type		
Scour - Place Ajax	Place concrete ajax	Scour Example	900	<input checked="" type="checkbox"/>	<input type="checkbox"/>	\$			<input type="button" value="Add"/>

**Step 6: Assign the benefits: ‘Scour Rating to 7’ and ‘Scour Risk -3.’ Enable the indirect cost, set the estimation method to flat indirect cost, and give it a cost of \$25,000. Save the action.**

**Associated Benefit Groups for Action Scour - Place Ajax**

Metric  English

Benefit Groups	
Please Select	<a href="#">Add</a>
Scour Rating to 7	<a href="#">X</a>
Scour Risk -3	<a href="#">X</a>

Overriding Direct Cost (overrides unit-costs)			
Enabled	Field Name	Cost Per Unit	Unit
<input type="checkbox"/>	Deck Area	\$	sq.ft

Unit Costs				
ID	Element Name	Cost Per Unit	Unit	?
No records				

Indirect Cost			
Enabled	Component	Estimation Method	
<input checked="" type="checkbox"/>	Total Indirect Cost	Flat Indirect Cost	25000

Deferment Rules		
Action Name	Deferment Interval (Years)	
Please Select		<a href="#">Add</a>
No records		

**Step 7: Add an action with the following properties:**

**Name:** Scour – Concrete Floor

**Description:** Pave the channel floor

**Notes:** Scour Example

**Order:** 998

**Network Level:** True

Admin > Modeling Config > Action Defs

Action Defs									
Search <input type="text"/> <a href="#">Search</a>									
Name	Description	Notes	Order	Network Level	Bridge Replace	Required Minimum Cost	Action Type		
Scour - Concrete Floor	Pave the Channel Floor	Scour Example	900	<input checked="" type="checkbox"/>	<input type="checkbox"/>	\$			<a href="#">Add</a>

**Step 8: Assign the benefits: ‘Scour Rating to 7’ and ‘Scour Risk -4.’ Enable the indirect cost, set the estimation method to fixed price, and give it a cost of \$75,000. Save the action.**



**Associated Benefit Groups for Action Scour - Concrete Floor**

Metric  English

Benefit Groups	
Please Select	Add
Scour Rating to 7	X
Scour Risk -4	X

Overriding Direct Cost (overrides unit-costs)			
Enabled	Field Name	Cost Per Unit	Unit
<input type="checkbox"/>	Deck Area	\$	sq.ft

Unit Costs				
ID	Element Name	Cost Per Unit	Unit	?
No records				

Indirect Cost			
Enabled	Component	Estimation Method	
<input checked="" type="checkbox"/>	Total Indirect Cost	Flat Indirect Cost	75000

Deferment Rules		
Action Name	Deferment Interval (Years)	
Please Select		Add
No records		

*Example actions can be reset by update scripts, or updated to improve the quality of the example. This may cause your agency to lose configurations. This is why we recommend that you create your own for custom configuration.*

## Network Policies

Admin > Modeling Config > Network Policies

The network policies are where we tie the various actions together into possible combinations that we would be willing to consider. Without this piece, the software would have no way of knowing that a superstructure replacement is only really an option if the deck has been removed. This saves you from having to make an action for ‘deck replacement,’ another for ‘deck & super replacement,’ and yet another for ‘deck replacement and super rehab’ and so on. With network policies you can make one action for deck replacement, and then define that possible additional actions would be super rehab or replacement.

Crucially, you can also define when a combination is valid. Your agency probably would never consider a superstructure replacement when it has an NBI super rating of 7. To keep the computer from making such outlandish recommendations (and to save you the calculation time it would take to consider such a combination), you can add conditions to say when a combination should be considered.

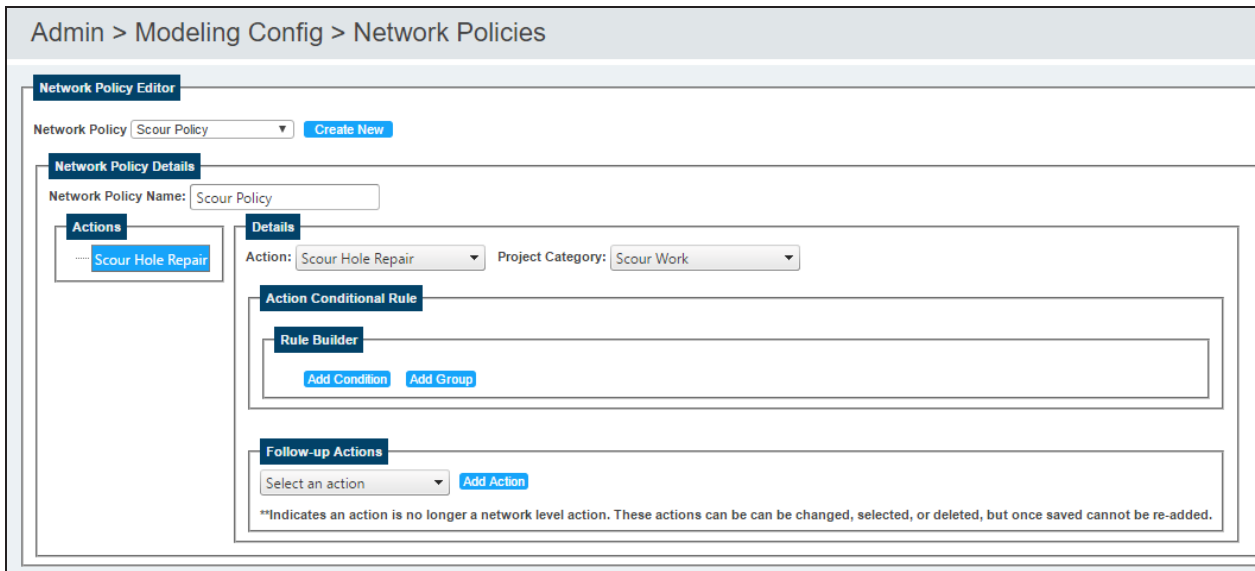
When designing your network policies, it’s best to think of them in terms of the root action and then the additional actions. For this example, the scour repair will be our root action, and then the various countermeasures will be possible follow-up actions.

You will also notice the Project Category field. By giving your work project categories at this stage, you can filter through long lists of optimization recommendations. For example, a wearing surface replacement might be “preservation work,” but adding pothole patching would move it into a “rehab work” category. Each node of the policy can have a different category.

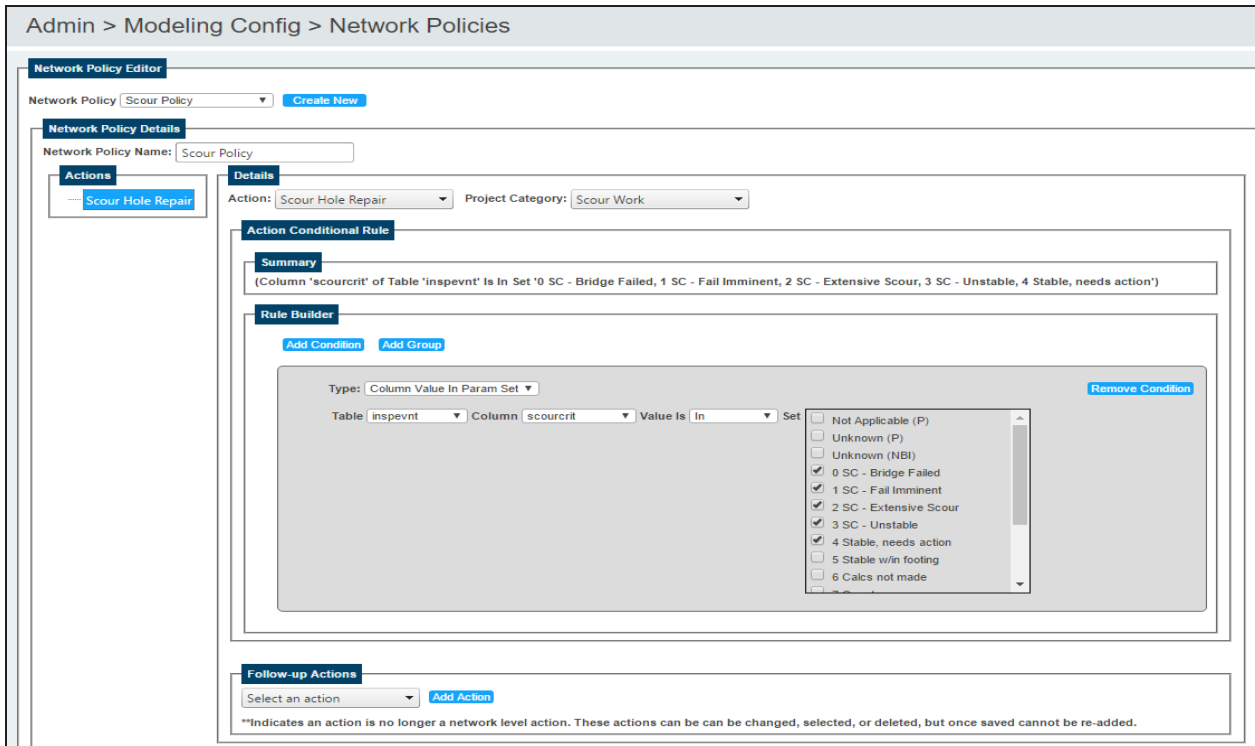
**Step 1: Create a new network policy by clicking on the “Create New” button.**

**Step 2: Name the policy ‘Scour Policy’**

**Step 3: Set the root action as “Scour Hole Repair,” assign the project category of “Scour Work” and save.**



**Step 4: Add a condition to the root action. The type will be 'Column Value in Param Set,' the table is inspevnt and the column is scourcrit. Select the values of 0 , 1, 2, 3, and 4.**



**Step 5: Add additional actions for the placing of riprap, ajax and concrete floor. Save the policy.**



---

*The example network policies can be updated routinely by BrM update scripts; it is therefore good practice to make your own copies of the examples.*

---

# Lifecycle

When making decisions about bridge treatments, your primary concern is doing what is right for the bridge now. But part of your thinking is also considering what's the best thing for the future. In the software, that future consideration part is called the Lifecycle Cost Analysis (LCCA).

In order to assess how a project will alter the future, the software needs to know how you generally treat bridges, and if you treat separate groups differently, which approach do you apply to each bridge. The information of how your agency treats bridges will be described in Lifecycle Policies, and then we will assign those policies to bridges.

Because the scour rating does not deteriorate and the risk does not increase year-upon-year, we will not be creating life-cycle policies as part of this example. If you are interested in trying to model scour deterioration, consider creating a scour Agency Defined Element (ADE), and then including that ADE in your utility tree.

## Lifecycle Policies

*Admin > Modeling Config > LCCA Policy Rules*

The lifecycle policies are the part where you tell the software when you would treat a group of elements (like a deck rehab), or when you would replace a structure. Does your agency normally replace a bridge when it gets two NBI ratings of 4? This is where you would set up that modeling.

*Examples get reset, create your own.*

## Assign Lifecycle Policies

*Admin > Modeling Config > LCCA Assign Policies*

**If your agency replaces non-NHS or local agency bridges at different stages from your NHS bridges, you can define which policies apply to which structures.**

Admin > LCCA > Assign Policies

Bridge List				Bridge Policy		Culvert Policy		Deck Policy		Substructure Policy		Superstructure Policy			
Bridge ID	District	County	Structure Overall	No Policy Selected	Assign To Selected	Assign To All	No Policy Selected	Assign To Selected	Assign To All	No Policy Selected	Assign To Selected	Assign To All	No Policy Selected	Assign To Selected	Assign To All
<input type="checkbox"/>	000009	Division 2	Morgan	Structure Overall	No Policy Selected		No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000046	Division 2	Limestone	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000061	Division 2	Lauderdale	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000093	Division 2	Franklin	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000095	Division 2	Morgan	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000110	Division 2	Franklin	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000111	Division 2	Lauderdale	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000112	Division 2	Lauderdale	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000124	Division 2	Franklin	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000144	Division 2	Franklin	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000158	Division 2	Morgan	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000173	Division 2	Lawrence	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000195	Division 2	Morgan	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000199	Division 2	Morgan	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000209	Division 2	Morgan	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000224	Division 2	Colbert	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000233	Division 2	Lauderdale	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000262	Division 2	Lauderdale	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000315	Division 2	Lauderdale	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000348	Division 2	Lawrence	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000349	Division 2	Lawrence	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000350	Division 2	Lawrence	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000368	Division 2	Colbert	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000372	Division 2	Limestone	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy
<input type="checkbox"/>	000374	Division 2	Lauderdale	Structure Overall			No Policy Selected			Deck Policy			Substructure Policy		Superstructure Policy

First Previous 1 2 3 4 5 6 7 8 9 10 Next Last

*Examples get reset, create your own.*

# Funding Sources

Next the software needs to know how much money you have, or at least how much you think you will have, so it can recommend what is the best projects for this year, and which should be held onto until next year. The funding section can also help your planning group identify how much has been allocated, and how much remains to be spent, from each of your sources.

It's worth mentioning that only active funding sources can have projects assigned to them.

## Create Funding Sources

Projects > Manage Funding > Funding List

BrM has two example funding sources out of the box: a federal and a state fund. Here your agency will likely want to create funds for the actual funding, and then separate funds for hypothetical future funding.

So we will now create a funding source for our scour projects.

**Step 1: Go to Projects > Manage Funding > Create/Edit Funding Sources. Name the new source “Scour Fund” and save it.**

**Step 2: Change the status to “active.”**

**Step 3: Add 5 new Funding Source Targets, set their Target Date to September 1<sup>st</sup> for the next 5 years, and set the target fund amount to \$10,000 (\$500,000 if you're not using the sample database). Save the Funding Source.**

	Target Date	Target Amount	Current Plan	Remaining	Notes
X	09/01/2021	10000	\$0.00	\$10,000.00	
X	09/01/2020	10000	\$0.00	\$10,000.00	
X	09/01/2019	10000	\$0.00	\$10,000.00	
X	09/01/2018	10000	\$0.00	\$10,000.00	
X	09/01/2017	10000	\$0.00	\$10,000.00	
<b>Total Funding Source Amount: \$50,000.00</b>					

---

*The example funding sources can be reset by upgrades; we recommend that you delete these or copy them as you set up your funding.*

---

# Segments

Program segments, as you will see below in the example, are used to divide out subsets of the bridges we will be analyzing in the optimization. You can add more than one segment to a program, and you can give each segment different performance measure goals and differing levels of funding.

## Create Segments

*Admin > Modeling Config > Subdivision Profiles*

For this example, we will want to specify that we're only analyzing scour critical bridges, and we're going to want to break up the metrics and funding for State-owned and locally-owned.

**Step 1: Create a new subdivision profile. Name it "Scour"**

**Step 2: Map the field `inspevnt.scourcrit`.**

**Step 3: Save the subdivision profile.**

The screenshot shows the 'Subdivision Profile Editor' interface. At the top, the breadcrumb navigation reads 'Admin > Modeling Config > Subdivision Profiles'. Below this, the 'Subdivision Profile Editor' section contains a dropdown menu for 'Subdivision Profile' set to 'Scour' and a 'Create New' button. The 'Subdivision Profile Details' section has a 'Name' field containing 'Scour' and a larger 'Description' text area. The 'Mapped Fields' section features a table with two columns: 'Table' and 'Field'. The table contains one row with 'inspevnt' in the 'Table' column and 'scourcrit' in the 'Field' column. Below the table, there are dropdown menus for 'Table' (set to 'inspevnt') and 'Field' (set to 'scourcrit'), along with an 'Add' button.

Table	Field	
inspevnt	scourcrit	X

Table: inspevnt Field: scourcrit Add

# Programs

Congratulations, you are now ready to use the *Programs* tab. Just a few more pieces to go before we can optimize the scour program, but we will now be dealing with the program itself.

It is highly recommended that for the first few iterations of a program, you limit your optimization to a discrete subset of structures, like a single district, where there are enough bridges to exemplify optimization with a realistic funding amount, but that is small enough to allow several iterations as you check the results and calibrate all of the pieces.

## Create Program

*Programs > Create/Edit Programs*

In this example, we have set the actions associated with the Scour Network Policy to use fixed costs, so the Required Minimum Cost will not help to achieve more meaningful results. If we were to use actions which incorporate per-element-unit costs, setting a minimum project cost to the smallest amount of work your agency would consider in a project helps eliminate very small projects from the results.

Some agencies have pool-contracts to address very small sums of work and may set this value as low as \$2,000. Others may not use this contract method and so it is not cost-effective for their agency to bid projects for less than \$100,000. Also consider that projects can be combined (manually after the fact) if the bridges are nearby, so perhaps recommendations of \$50,000 and higher would be more appropriate. Every agency will be unique.

At this stage of defining the program, we also have the ability to filter down our bridges that we will consider based on any of the filters you use on the bridge list.

**Step 1: Create a new program. Name it “Scour Example,” set the Program Status to ‘Planned.’**

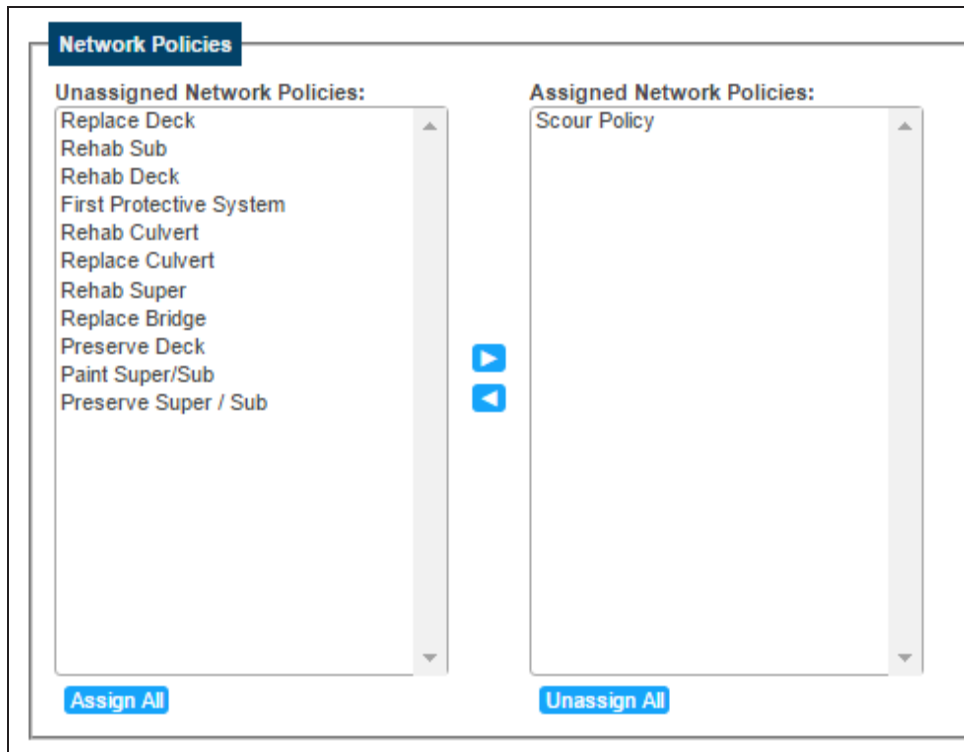
**Step 2: Give the program a start-year for the current year, and an end year 5 years from now, matching our scour funds we set up earlier. Also set the Bridge Filter to the “BrM – Active Status” or your agency’s equivalent.**

The screenshot shows the 'Programs > Create/Edit Programs' interface. The 'Program Editor' section includes a dropdown menu for 'Program' set to 'Scour Example', with 'Create New' and 'Copy >>' buttons. The 'Program Details' section contains several input fields: 'Program Alternate ID' (Scour Example), 'Program Name' (Scour Example), 'Program Objectives' (Undefined), 'Bridge Filter' (BrM - Active Status), 'Program Status' (Planned), 'Program URL' (empty), 'Structure Weights Formula' (Undefined), 'Program Start Year' (2017), 'Program End Year' (2021), and 'Required Minimum Cost' (empty).

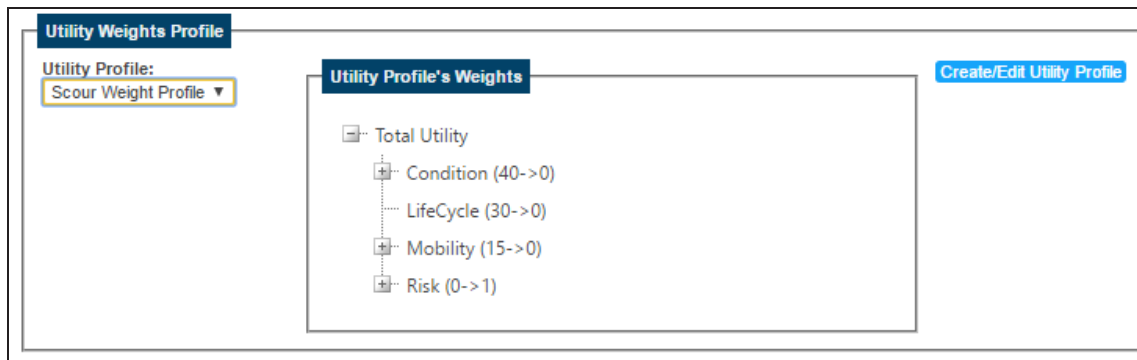
**Step 3: For your NBI estimation, use the NBI Converter and select the BrM Default conversion profile. Select the HiX approximation (to save time), give the Long-Term analysis 50 years.**

The screenshot shows the 'Configuration Data' section. It includes: 'NBI Deterioration Method' (NbiConverter), 'NBI Converter Profile' (BrM Default), 'Long-Term Analysis Period' (50), 'Discount Rate' (4), 'Inflation Estimation Method' (None), and a checked checkbox for 'Residual HiX Approximation'.

**Step 4: Select the Scour Network Policy we created earlier.**



**Step 5: Set the Utility Weight Profile to the “Scour Weight Profile” we created earlier.**



**Step 6: Set the Subdivision Profile to “Active + Scour + Owner” that we created earlier.**

**Step 7: Add subdivision segments for “Active” “State-owned” structures with scour ratings between 0 and 3. Our goal is to get about 100 bridges in this category. If your agency inventory has less than 100 state owned scour critical structures, add county-owned segments (or even city- and town-owned structures) until you get about 100 bridges.**



**Subdivision Profile**

Subdivision Profile: Scour ▼

**Subdivision Profile Segments**

Table Name	Field Name
inspevnt	scourcrit

Create/Edit Subdivision Profile

**Filter Segments**

Add Filter Segments: inspevnt.scourcrit

Please Select ▼ Add

Filter Segments:

Index	Combinations	# of Bridges	
1	1 SC - Fail Imminent	0	✕
2	2 SC - Extensive Scour	0	✕
3	3 SC - Unstable	4	✕
4	4 Stable, needs action	2	✕
<b>Total:</b>		6	

**Step 8: Delete segments which have 0 bridges. Save the program.**

## Assign Projects

*Programs > Assign Projects*

If the program you are optimizing already has some projects defined (perhaps you just want it to fill out the remainder of your STIP), you can freeze projects to the program. If the year is fixed, freeze them to both the program and the year.

In this example, we will not be working with pre-existing projects.

## Assign Performance Measures

*Programs > Performance Measures*

Optimization is done primarily in terms of benefit ( $\Delta$  Utility) per cost, but the software has the ability to take into account additional goals, or at least measure the effects a program will have on other metrics. The Performance Measures are how you define those metrics you want to track or try to meet. And the two pieces are exactly that: you define the performance measures above, and then if there is a constraint that the optimization needs to meet, you can define that below.

For this example, we have limited our utility tree to just return the scour criticality and scour risk – but if we had been including element condition, perhaps we would like to see how the optimized program improved the health index of the system. Or how it reduced the % of structurally deficient bridges. To do that, we would add those performance measures here.

To tell the software to attempt to eliminate all structurally deficient bridges with the program (even if it is not the most optimal thing to do with our money), you could set a target value of 0 for that performance measure. And you can tell it to use different targets for each segment.

Programs > Performance Measures

**Performance Measures**

Program:  Scenario:

**Select Performance Measures**

Performance Measures	Best Value	Worst Value		
Utility (Scour Weight Profile)	100.00	0.00		
Health Index	100.00	0.00		

Database Field Performance

Table:

Field:

Best Value:

Worst Value:

Min value in database: 2  
Max value in database: 9

**Step 1: Add a new performance measure based on a database field.**

**Step 2: Set that field to inspevnt and scourcrit.**

**Step 3: Define the best value for scour ratings is 9 and the worst value is 0.**

**Step 4: Insert this performance measure.**

We will not set targets or minimums at this time.

**Performance Constraints by Segment**

Segment	Utility (Scour Weight Profile)	Health Index	inspevnt.scourcrit
4 Stable, needs action	Min: <input type="text"/> Target: <input type="text"/>	Min: <input type="text"/> Target: <input type="text"/>	Min: <input type="text"/> Target: <input type="text"/>
3 SC - Unstable	Min: <input type="text"/> Target: <input type="text"/>	Min: <input type="text"/> Target: <input type="text"/>	Min: <input type="text"/> Target: <input type="text"/>

## Funding Allocation

*Programs > Funding Allocation*

Now we will tie the funds from our Scour Fund to this optimization program.

Then we will have the opportunity to add additional, hypothetical funds to the program. If some projects are already associated with the program, you would see their funding summed up on the "allocated funds" line.

Finally, we will distribute the funds to the different segments of the program. When you click on “get performances” the software will analyze the current performance of your segments compared to the performance measures you have defined. The results will color-code the different segments.

If you do not specify quantities to a segment, then the funds can be used as needed between the segments. If you define a quantity to a segment, the money will be dedicated for use on that segment and projects on that segment will not exceed the amount allocated. The remaining funds will be used by the unallocated segments.

**Step 1: Add 5 funding sources. Set all of them to draw from the Scour Fund, for the amount of \$10,000 (try \$500,000 if you’re not using the sample db) and set the years to be every year of the scour fund we established earlier. Save the Funding Allocation.**

Programs > Funding Allocation

Program: Scour Example Scenario: Default

**Funding Allocation**

Funding Source	Amount	Date	Notes
Scour Fund	\$10,000	01/01/2021	
Scour Fund	\$10,000	01/01/2020	
Scour Fund	\$10,000	01/01/2019	
Scour Fund	\$10,000	01/01/2017	
Scour Fund	\$10,000	01/01/2018	

A new Funding Source Target in Projects > Funding Sources may be created for new Funding Allocations

Add New

**Step 2: If you would like to model a hypothetical funding surge, type the funds into the Additional Funds line. For this example, add \$10k, \$30k, \$50k, \$100k.**

**Budget Distribution**

Total budget: \$240,000  
Total allocated funds: \$0

	2017	2018	2019	2020	2021
Identified annual funds:	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Additional funds:	\$10,000	\$30,000	\$50,000	\$100,000	\$0
Total annual budget:	\$20,000	\$40,000	\$60,000	\$110,000	\$10,000
Allocated funds:	\$0	\$0	\$0	\$0	\$0
Available Funds:	\$20,000	\$40,000	\$60,000	\$110,000	\$10,000

**Step 3: Press the button “Get Performances” (This could take more than 10 minutes. Don’t worry, the page won’t time out.)**

Distribute Get Performances

Budget distribution by program's segments: Input method: Actual Budget Value Percentage of Annual Budget

Segment	Utility	inspevnt.scour	Health Index	Total Budget per segment	Pct. overall budget	2017	2018	2019	2020	2021
4 Stable, needs action	40	4	91.18	\$0	0%					
3 SC - Unstable	37.5	3	71.02	\$0	0%					
Total				\$0		\$0	\$0	\$0	\$0	\$0

We will not distribute the funds at this time because we want the funds to be used on either the Scour ratings of 3 or 4 – wherever they may be used to best effect.

**Step 4: Save the funding allocation.**

## Program Planning

Programs > Programs Planning

You have arrived at your destination.

This is the last step of our example: to run the optimization. You have the choice to either have the optimization recommend the cheapest program which would meet the performance measure constraints, or to spend all of the funds to get as close to the highest utility as is possible. If you have previously-created projects assigned to the program already, you can tell the optimizer to honor them and work with the remaining funds and bridges.

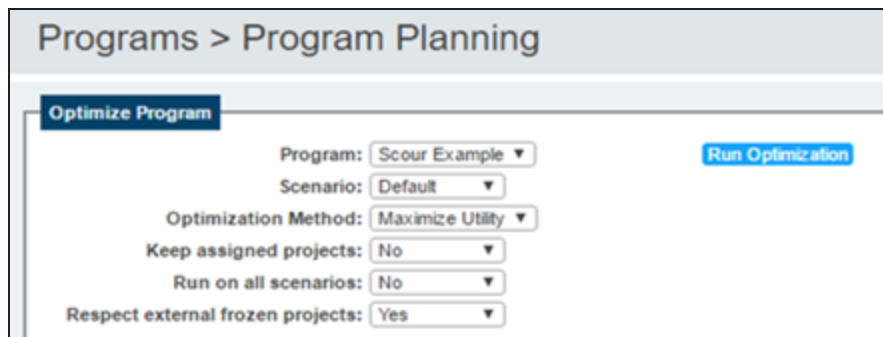
The speed with which the optimization will run will depend largely on the available application server resources. If there are a lot of crystal reports running, or your enterprise version shares a server with other resource-heavy programs, then a full analysis of your entire inventory could take many days.

Only one optimization can be run at a time – if the optimization calculator is in use, this page will tell you which program is being optimized at the time and the progress of that optimization. When the optimization is complete, a list of proposed projects will be listed below. Review these results: if they do not recommend projects your agency would consider, some of the previously discussed settings here may need to be customized more to what your agency would do.

This is why we recommend that you start out your first iterations with a few (around 100) bridges to allow your first iterations to hone in on the largest problems quickly. As the results look more reasonable, up the number of bridges you are analyzing to a full district, and then up to a full system when your agency requires it.

And so now, your reward for persevering this far into this example:

**Step 1: Select “Maximize Utility” and opt not to keep assigned projects. Don’t worry about running all scenarios in this example. And keep frozen projects if you assigned any.**



The screenshot shows the 'Programs > Program Planning' interface. It features a 'Run Optimization' button and several dropdown menus for configuration:

- Program: Scour Example
- Scenario: Default
- Optimization Method: Maximize Utility
- Keep assigned projects: No
- Run on all scenarios: No
- Respect external frozen projects: Yes

**Step 2:** Run Optimization

**Step 3:** Go get a drink of water, it’s going to be a few minutes.



The screenshot shows the 'Optimization Progress' interface. It displays a progress bar at 2% and a list of progress messages:

- Optimizing Program... Abort Optimization
- 2%
- Progress Messages
- Initializing Program Optimization...
- Processing Scenario 'Default'.
- Getting Action Sequences

# Program Results

After your optimization has run, there will be 3 places to see your results: the individual projects returned by the optimization, the *Program Results* task, and the executive summary. Each will give you varying levels of detail for you to drill down into your results.

## Returned Projects

*Programs > Program Planning*

Once the optimizer has run, the bottom of the page will populate with the projects selected by the optimizer. You can select each of these individual projects and look at them in the *Projects > Create/Edit Project > Analysis* subtask. This will give you the best feedback on what about your program needs to be tweaked.

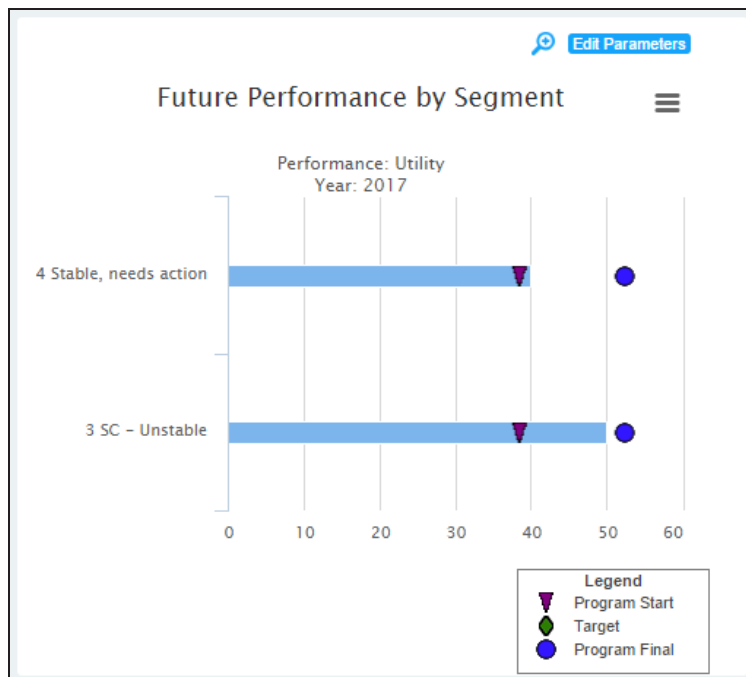
Project Name	Category	Automatic	Cost	Utility	Utility Benefit	Benefit/Cost (\$k)	Cost (\$k) / Benefit	Year	Frozen	Status
4 Culv 2barrel/Scour Hole Repair	Scour Work	Yes	\$2,000	45	10	5	\$0.20	2017	No	Proposed
6-3-6 PS T-Beam/Scour Hole Repair	Scour Work	Yes	\$2,000	40	20	10	\$0.10	2017	No	Proposed
6-6-5 Cont Conc 3span/Scour Hole Repair	Scour Work	Yes	\$2,000	54	10	5	\$0.20	2017	No	Proposed
6 Conc Culvert/Scour Hole Repair	Scour Work	Yes	\$2,000	61	10	5	\$0.20	2017	No	Proposed
6-6-5 Cont Conc 3span/Scour Hole Repair, Scour - P	No Category	Yes	\$27,000	57	3	0.1111	\$9.00	2018	No	Proposed
6 Conc Culvert/Scour Hole Repair, Scour - Place Aj	No Category	Yes	\$27,000	64	3	0.1111	\$9.00	2019	No	Proposed
4 Culv 2barrel/Scour Hole Repair, Scour - Place Aj	No Category	Yes	\$27,000	48	3	0.1111	\$9.00	2020	No	Proposed

Items per page: 15

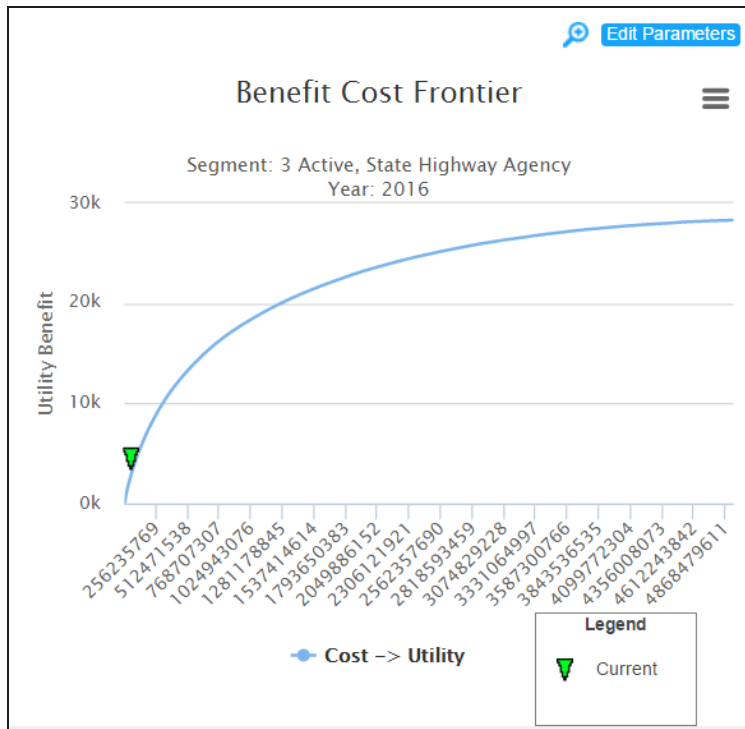
## Program Results

*Programs > Program Results*

In order to get an aggregate view of how the program performs in terms of Utility and the performance measures, the *Program Results* task gives a good overview. There are 4 hard-coded graphs on this page:

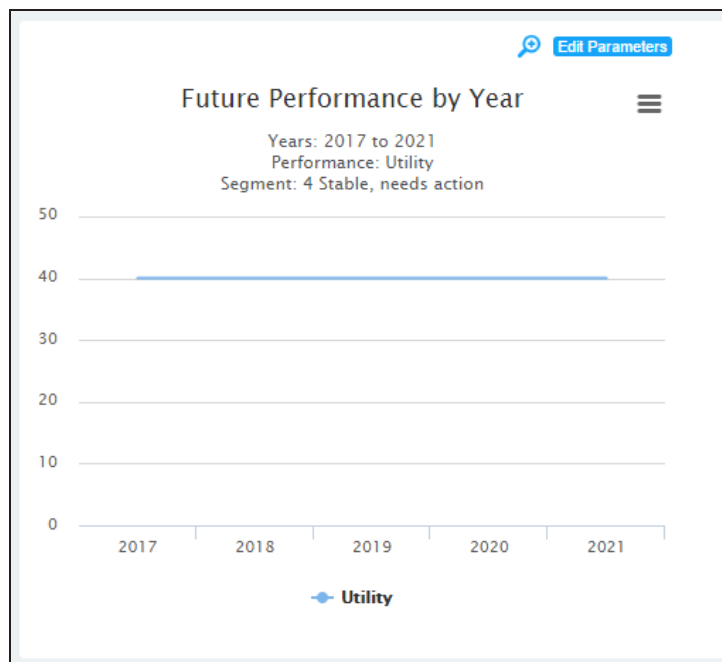


**Performance by Segment:** This graph shows you how each segment does toward reaching the performance measures of your choice. It shows where your program started and how close it got to the target for each year.

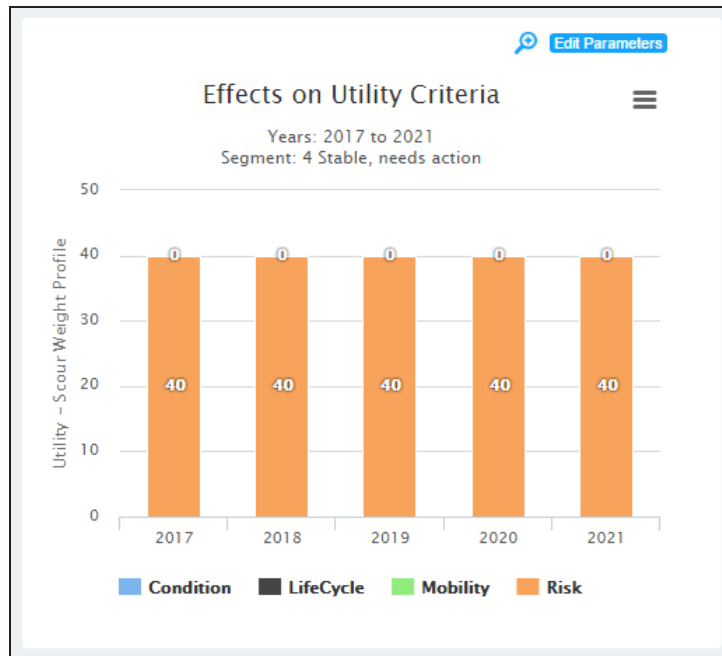


**Benefit Cost Frontier:** (The graph shown here is from a different example with a larger set of structures and options, to explain the graph.) If you are accustomed to looking at ‘Pareto Horizons’ of multivariable optimization graphs, that is exactly what this graph shows.

For those who have not wandered across the Wikipedia articles on Vilfredo Pareto: this graph shows the line of ‘most optimal’ possible combinations. If your current program is on the line, it is one of the most optimal combinations of plans possible. As you apply constraints to the performance measures, your program could become less optimal since you are chasing additional targets. This graph will tell you how far from optimal your choices take you.



**Future Performance by Year:** Allowing you to make a year-by-year comparison of your network.

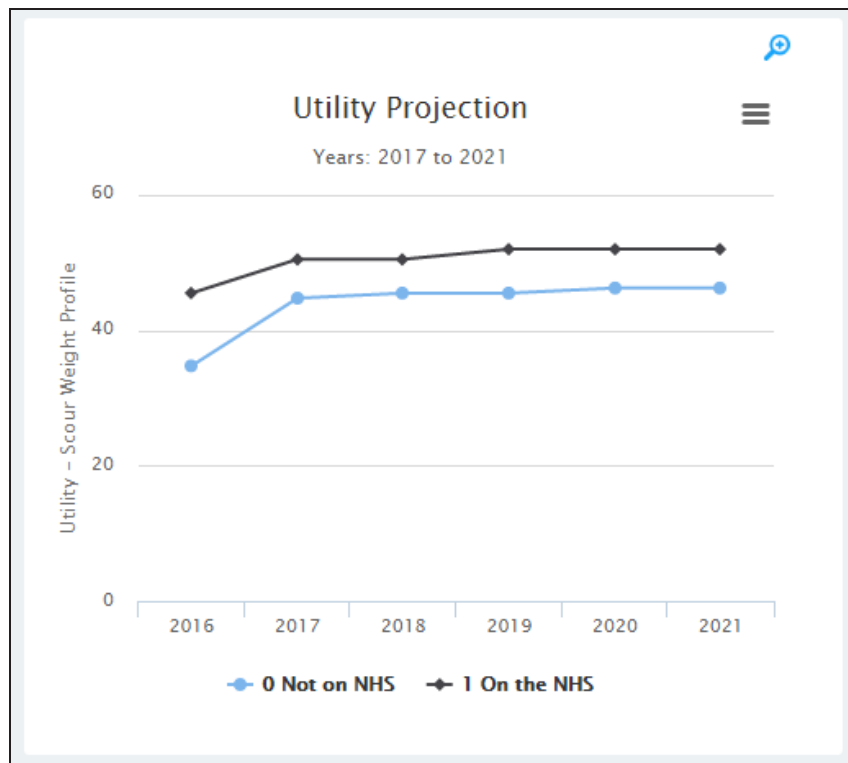


**Effects on Utility Criteria:** Breaking down the Utility score into its first-tier components, you can see which node is most affected by the benefits we’re applying. For this example, if you zeroed out the other nodes as part of your utility weight profile, then only the risk node should remain. If your benefits affect NBI values, element condition, risk, mobility and lifecycle, then this graph becomes more important for seeing potential issues.

## Executive Summary

*Programs > Executive Summary*

and *Admin > Modeling Config > Executive Summary*



You also have the ability to create additional graphs to view the projections of your program. On the Admin tab you can set up these charts, and on the Programs tab you can view them. Your Agency can break the data down by the measures that are important to you, and color them the way your agency is accustomed to seeing them. Think of this page as a dynamic infographic page.

We will now demonstrate how to use BrM to run a set of scenarios. In particular, we will demonstrate how more or less money could change your agency's scour ratings in the future. We will be using the scour program from above with different funding scenarios.



# Scenario Setup

Scenarios are essentially the ability to rerun a program optimization with tweaks, allowing you to compare the results. The principle example of this would be to create a graph for your state legislature, demonstrating the cost-to-benefit relationship between your current funding and what you could do with more (or even less) funding. Perhaps removing funding from your organization would significantly increase the need for bridge replacements – in which case BrM can help you to provide those answers.

In the first part of the example, we ran the scenario with 6 bridges and \$10,000 to \$100k / year of funding. Let’s demonstrate what would happen if we ran the same bridges for no funding, \$10k, \$30k, \$50k and \$100k each year.

## Create/Edit Scenarios

Programs > Create/Edit Scenarios

We’ll begin by creating the scenarios of the scour program.

**Step 1: Create a new scenario named “Scour Example No Funding.” Assign it to the Scour Example and save.**

The screenshot shows the 'Programs > Create/Edit Scenarios' interface. On the left, under the 'Scenarios' tab, there is a table with one row: 'Default'. On the right, under the 'Scenarios Details:' tab, the 'Name' field is 'Scour Example No Funding', the 'Program' dropdown is 'Scour Example', and the 'Deterioration Profile' dropdown is '-- none --'.

**Step 2: Copy the program we just created, renaming it “Scour Example \$10k.”**

The screenshot shows the 'Programs > Create/Edit Scenarios' interface. On the left, under the 'Scenarios' tab, there is a table with three rows: 'Default', 'Scour Example No Funding', and 'Scour Example \$10k'. The 'Scour Example \$10k' row is highlighted in blue. On the right, under the 'Scenarios Details:' tab, the 'Name' field is 'Scour Example \$10k', the 'Program' dropdown is 'Scour Example', and the 'Deterioration Profile' dropdown is '-- none --'.

**Step 3: Repeat for \$30k, \$50k and \$100k (remember, the surged funding is the default scenario).**

Programs > Create/Edit Scenarios

Scenarios	
Scenario Name	
<input type="checkbox"/>	Default
<input checked="" type="checkbox"/>	Scour Example No Funding
<input checked="" type="checkbox"/>	Scour Example \$10k
<input checked="" type="checkbox"/>	Scour Example \$30k
<input checked="" type="checkbox"/>	Scour Example \$50k
<input checked="" type="checkbox"/>	Scour Example \$100k

**Scenarios Details:**

Name:

Program:

Deterioration Profile:

For the next sections, we will review the data associated with our program and see some of the options we have for editing our scenarios.

### Performance Measures

*Programs > Performance Measures*

Trying to hit additional targets can have an impact on optimization. Say you would like to compare the difference between trying to spend your money to reduce the number of structurally deficient bridges vs. preservation work on a larger number of bridges.

On this screen you could define different performance measures for your program for each scenario you want to model.

Program:  Scenario:

### Funding Allocation

*Programs > Funding Allocation*

This is where we will make the changes to our funding for each scenario. The funding in the “default” scenario

**Step 1: Verify that the “Default” Scenario includes the surge funding from the first part of the example.**

Programs > Funding Allocation

Program: Scour Example Scenario: Default

**Funding Allocation**

Funding Source	Amount	Date	Notes
X Scour Fund	\$10,000	01/01/2021	
X Scour Fund	\$10,000	01/01/2020	
X Scour Fund	\$10,000	01/01/2019	
X Scour Fund	\$10,000	01/01/2017	
X Scour Fund	\$10,000	01/01/2018	

A new Funding Source Target in Projects > Funding Sources may be created for new Funding Allocations

Add New

**Budget Distribution**

Total budget: \$240,000  
Total allocated funds: \$0

	2017	2018	2019	2020	2021
Identified annual funds:	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Additional funds:	\$10,000	\$30,000	\$50,000	\$100,000	\$0
Total annual budget:	\$20,000	\$40,000	\$60,000	\$110,000	\$10,000
Allocated funds:	\$0	\$0	\$0	\$0	\$0
Available Funds:	\$20,000	\$40,000	\$60,000	\$110,000	\$10,000

**Step 2: For the “No Funding” scenario, remove all the funding by making the allocated funding -\$10,000. Make sure there are no funds distributed to the segments.**

Programs > Funding Allocation

Program: Scour Example Scenario: Scour Example No Funding

**Budget Distribution**

Total budget: \$0  
Total allocated funds: \$0

	2017	2018	2019	2020	2021
Identified annual funds:	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Additional funds:	-\$10,000	-\$10,000	-\$10,000	-\$10,000	-\$10,000
Total annual budget:	\$0	\$0	\$0	\$0	\$0
Allocated funds:	\$0	\$0	\$0	\$0	\$0
Available Funds:	\$0	\$0	\$0	\$0	\$0

**Step 3: For the “\$10k” scenario, change the funding to \$0 per year.**

**Budget Distribution**

Total budget: \$50,000  
Total allocated funds: \$0

	2017	2018	2019	2020	2021
Identified annual funds:	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Additional funds:	\$0	\$0	\$0	\$0	\$0
Total annual budget:	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Allocated funds:	\$0	\$0	\$0	\$0	\$0
Available Funds:	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000

**Step 4: Repeat for \$30k, \$50k and \$100k scenarios.**

## Run Optimization

Programs > Program Planning

We will now run the optimization for the many scenarios. It is possible to run just one scenario if you only want to update one of them.

**Step 1: Select the Scour Example Program.**

**Step 2: Select to run all scenarios for the program**

Programs > Program Planning

**Optimize Program**

Program: Scour Example ▼ Run Optimization

Scenario: Scour Example \$30k ▼

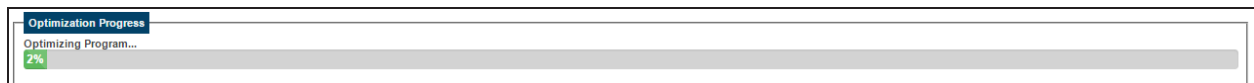
Optimization Method: Maximize Utility ▼

Keep assigned projects: No ▼

Run on all scenarios: Yes ▼

Respect external frozen projects: Yes ▼

**Step 3: Run the Optimization – this is going to take a while. Expect it to take around 3x as long as the default optimization only.**



**Step 4: Check that each scenario at the bottom has results, except for the “No Funding” one – we would expect no work on that one.**

Assigned Projects

Segment: All Year: All

Project Name	Category	Automatic	Cost	Utility	Utility Benefit	Benefit/Cost (\$k)	Cost (\$k) / Benefit	Year	Frozen	Status
6-6-5 Cont Conc 3span(Scour Hole Repair)	Scour Work	Yes	\$2,000	52.75	6.25	3.125	\$0.32	2017	No	Proposed
6-3-6 PS T-Beam(Scour Hole Repair)	Scour Work	Yes	\$2,000	37.5	12.5	6.25	\$0.16	2017	No	Proposed
6 Conc Culvert(Scour Hole Repair)	Scour Work	Yes	\$2,000	59.75	6.25	3.125	\$0.32	2017	No	Proposed
4 Culv Zbarrel(Scour Hole Repair)	Scour Work	Yes	\$2,000	43.75	6.25	3.125	\$0.32	2017	No	Proposed

Items per page: 15

**Begin Estimation**

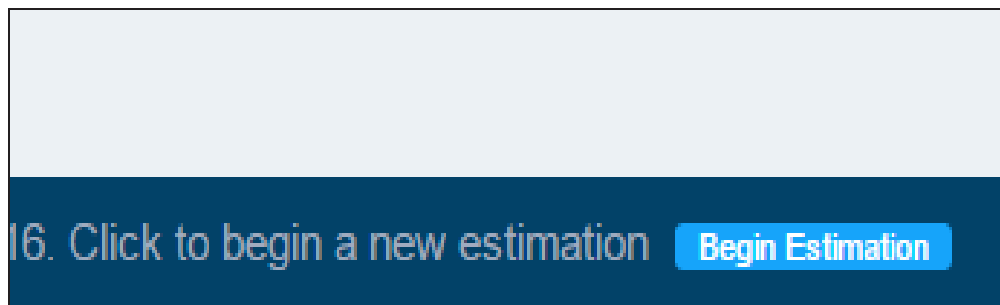
Programs > Scenario Explorer

After the optimization has run, we can now go see the overall results in a single graph on the *Scenario Explorer* task. If we had run the scenarios with multiple performance measures, we can see how the network performed in regards to each performance measure by editing the preferences at the top right.

You should be able to see that depending on how quickly we dedicate funding to our network will change how quickly our agency meets its goal. This will help your agency choose, or present to politicians who chose, which scenario to follow.



If you change something at one of the base levels, like the utility profile, you can get a very rough estimation of how that would change the results by clicking on the “estimation” button at the bottom of the page. This would estimate using the currently-identified projects as a rough base for how the results would change.



As you change base data, the graphs on the scenario explorer will not be updated. This is to make the data from the last run available until you update the scenarios because of how time and resource intensive the scenario explorer can be. To update the graphs fully, you will need to optimize the scenarios again.

# Appendix C

- BrM Use Case Example 2 - Preservation Program

# Preservation Program

In this example, we will build on the concepts established in *Appendix B - Example 1 – Scour Mitigation Program*. This example will give less explanation of the various pieces of the optimization and focus more on the configurations for this example. For more explanation, see *Appendix B - Example 1*.

For this example, we will exemplify the use of BrM to create a preservation program, spending \$1.5m for the next three years on state-owned NHS bridges. We will be using element inspection data with protective systems to model deterioration.

## Element Data

### Protective Systems

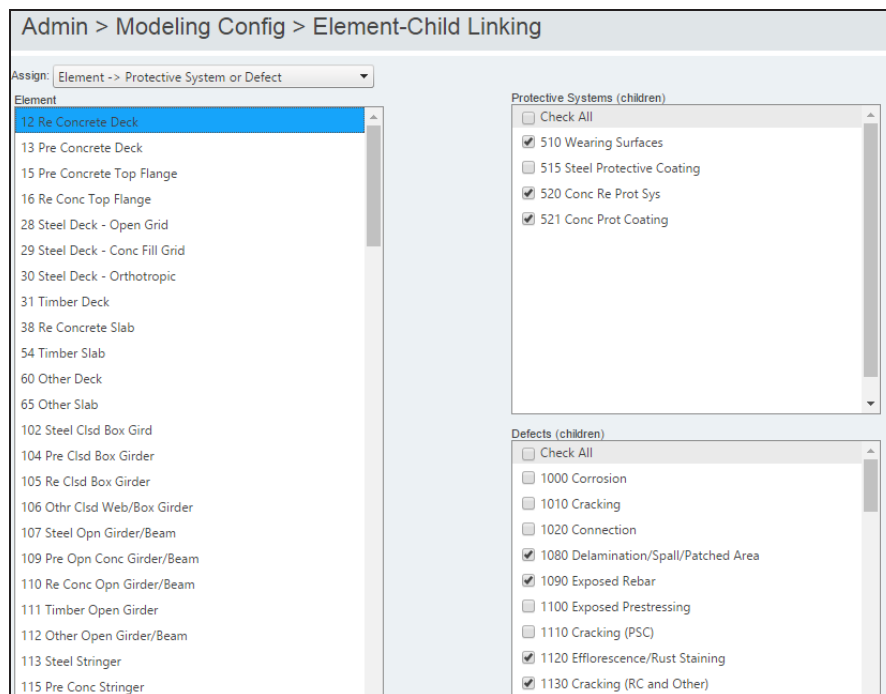
You will want to verify that the protective systems you intend to use in this example are listed as options for protective systems on the elements we will be considering. In this example, we will be using the default protective systems:

510 – Wearing Surfaces

515 – Steel Protective Coating

You may use any protective systems your agency has defined for your preservation program.

**Step 1: For each deck element in your inventory, verify that the correct protective systems are checked as options to use with that element.**



A sign that this step has not been properly performed would be for the protective systems to show up as ‘orphaned’ elements when looking at the *Inspection > Condition* task – they will be highlighted in yellow and typically will be listed first among the elements. These are child elements which have not been properly connected to their parent element.

Element Conditions									
- All Structures -									
<input checked="" type="radio"/> Quantity <input type="radio"/> Percent									
AASHTO Bridge Elements <span style="float: right;">Add New Element</span>									
Elem	Str. Unit	Env	Description	Quantity	Units	Qty. 1	Qty. 2	Qty. 3	Qty. 4
2370	1	⚡	Metal Deterioration or Damage	31	ft	0.000	0.000	0.000	31.000
2370	1	⚡	Metal Deterioration or Damage	109	ft	0.000	55.000	15.000	39.000
12	1	Low (2)	Re Concrete Deck	9793	sq.ft	0.000	5915.000	3878.000	0.000
1080	1	⚡	Delamination/Spall/Patched Area	14	sq.ft	0.000	0.000	14.000	0.000

**Step 2: Repeat the process for all steel superstructure and substructure elements that you have in your inventory.**

## Element Categories

Because we are going to use the wearing surfaces heavily in the lifecycle node (which we will discuss in a minute), it is very handy to make sure that your wearing surface elements are in an element category (and likewise your other protective systems if you have more than just element 515.) So we will create an element category to put our wearing surfaces in.

**Step 1: Verify the existence of the Element Categories called “Wearing Surfaces” and “Steel Protection”.**

Admin > Modeling Config > Elements			
C - Element Categories			
ID	Name	Sort	
6	Decks/Slabs	1	✕
3	Joints	2	✕
5	Other Elements	3	✕
1	Superstructure	4	✕
4	Bearings	5	✕
2	Substructure	6	✕
7	Smart Flags	7	✕
0	Unspecified	8	✕
-1	Missing	9	✕
8	Culvert	10	✕
9	Wearing Surface	11	✕
10	Steel Protection	12	✕

[Add New](#)



**Step 2: Make sure your wearing surface and protective system elements (510 and 515) are assigned to the appropriate Element Category.**

Admin > Modeling Config > Element Spec

**Elements**

Element Filter  
Not Filtered

<input checked="" type="checkbox"/>	510	Wearing Surfaces
<input checked="" type="checkbox"/>	515	Steel Protective Coating
<input checked="" type="checkbox"/>	520	Conc Re Prot Sys
<input checked="" type="checkbox"/>	521	Conc Prot Coating
<input checked="" type="checkbox"/>	1000	Corrosion
<input checked="" type="checkbox"/>	1010	Cracking
<input checked="" type="checkbox"/>	1020	Connection
<input checked="" type="checkbox"/>	1080	Delamination/Spall/Patched Area
<input checked="" type="checkbox"/>	1090	Exposed Rebar
<input checked="" type="checkbox"/>	1100	Exposed Prestressing
<input checked="" type="checkbox"/>	1110	Cracking (PSC)
<input checked="" type="checkbox"/>	1120	Efflorescence/Rust Staining
<input checked="" type="checkbox"/>	1130	Cracking (RC and Other)
<input checked="" type="checkbox"/>	1140	Decay/Section Loss
<input checked="" type="checkbox"/>	1150	Check/Shake
<input checked="" type="checkbox"/>	1160	Crack (Timber)
<input checked="" type="checkbox"/>	1170	Spill/Delamination (Timber)
<input checked="" type="checkbox"/>	1180	Abrasion
<input checked="" type="checkbox"/>	1190	Abrasion(PSC/RC)
<input checked="" type="checkbox"/>	1220	Deterioration (Other)
<input checked="" type="checkbox"/>	1610	Mortar Breakdown (Masonry)
<input checked="" type="checkbox"/>	1620	Spill/Spall (Masonry)
<input checked="" type="checkbox"/>	1630	Patched Area (Masonry)
<input checked="" type="checkbox"/>	1640	Masonry Displacement

[Create Element](#) [Copy Element](#)

**Element Specifications**

Element Rollup Key:   
 Element Key: 515 NBE:   
 Short Name: Steel Protective Coating Long Name: Steel Protective Coating  
 Relative Weight: 0 [All Relative Weights](#)  
 NBI Relative Weight: 0  
 Units: 20 sq.ft.:sq.m [0.929030]  
 Notes: The element is for steel elements that have a protective coating such as paint, galvanization or other top coat steel corrosion inhibitor.  
 Manual:  Choose File No file chosen [Upload](#)  
 Defect:   
 Protective System/Wearing Surface:   
 Primary Defect:

**Health Index Coefficients**

CS1: 1 CS2: 0.67 CS3: 0.33 CS4: 0

**Deterioration Modeling**

Model:  [View Graphs](#)

**Model Parameters**

Median years in CS1: 24 Shaping parameter: 1.8  
 Median years in CS2: 16 Formula:   
 Median years in CS3: 10

**Protection Factors**

Max. protection parameter: 1.52  
 CS1: 1 CS2: 0.67 CS3: 0.33 CS4: 0

**Classifications**

Category: 10 Steel Protection  
 Material: 8 Other  
 Type: 5 Other Elements

## Inspection Data

In this example, we will be using protective systems to model the impact to lifecycle of preservation treatments. Therefore, in order to use this example, the data set you are using needs to include NBE element data. For best results, your starting inspection data should also include current protective systems and their conditions.

**Step 1: Verify that your state NHS bridges have NBE elements and protective systems reflecting their current condition.**

Inspection > Condition

**Element Conditions**

- All Structures -  Quantity  Percent [Show Last CoRe Insp](#)

AASHTO Bridge Elements [Add New Element](#)

>	Elem	Str. Unit	Env	Description	Quantity	Units	Qty. 1	Qty. 2	Qty. 3	Qty. 4	
▼	12	101	Mod. (3)	Re Concrete Deck	16008	sq.ft	4642.32	7523.76	3841.92	0.000	✕
	510	101	🛡️	Wearing Surfaces	15350.76	sq.ft	15350.7	0.000	0.000	0.000	✕
▼	107	101	Low (2)	Steel Opn Girder/Beam	2478.7	ft	0.000	2106.89	371.805	0.000	✕
	515	101	🛡️	Steel Protective Coating	23053.6	sq.ft	5993.93	922.144	16137.5	0.000	✕

# Utility

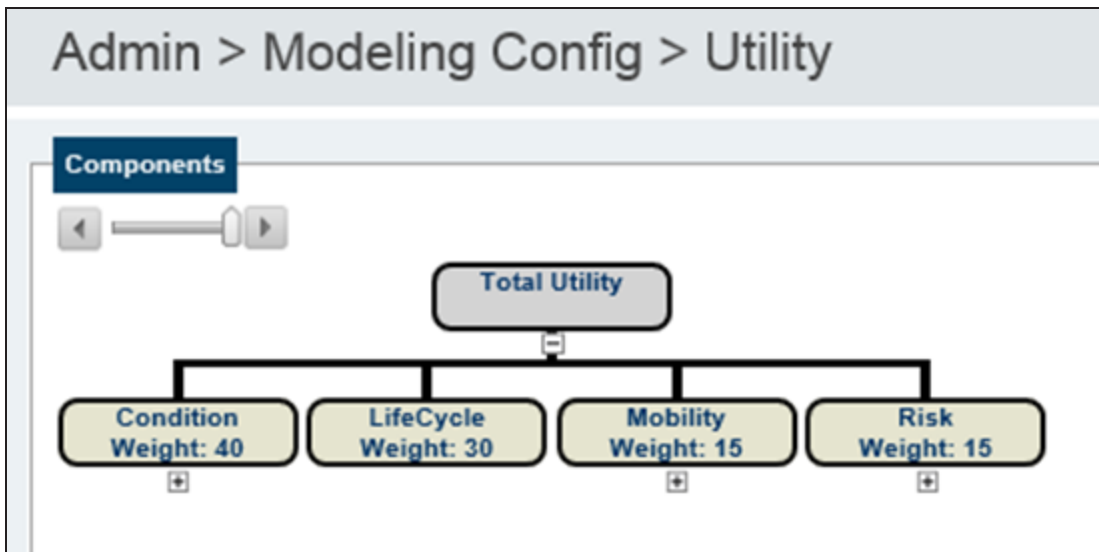
BrM optimizes actions on a structure by maximizing the incremental benefit per cost as outlined in the NCHRP Report 590. The “incremental benefit” is the change in the utility value achieved by performing an action. How an agency defines the structure of the utility tree as well as the relative weights and scaling functions will directly impact the incremental benefit. Therefore, an agency needs to ensure that the utility and related attributes are setup functions according to its policies.

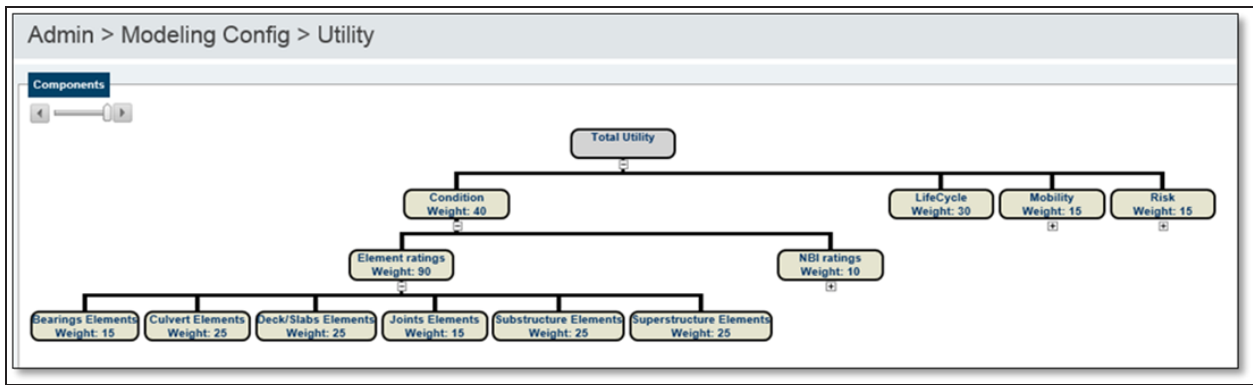
Preservation projects typically have very little to do with improving the condition of a bridge and more to do with keeping the condition high over a long time. Therefore, in this program the Lifecycle node will be very important to us. Because the Utility tree can be modified freely by your agency, this node could have been deleted (it wasn't used in 5.2.2 or 5.2.1 – it could have been deleted by your agency at that time).

## Utility Tree Setup

As previously mentioned in order for an attribute to affect the utility and provide a ‘benefit’ the utility tree needs to include criterion (nodes) which will reflect the benefits from the actions performed. The first level of the utility tree are the primary criteria to determine the utility value based on the multi-criteria analysis. Subsequent levels of criterion can be added as sub-criteria or child criterion that affect the primary criteria. The relative weight determines how impact each criterion has on the overall utility. The higher the relative weight the greater the effect on the change in the utility value. Additionally, the magnitude of the effect of any and all criterion, for a specific objective/goal, can be modified by changing the relative weights through the Utility Weight Profile. The Utility Weight Profiles will be discussed in further detail in subsequent sections.

**Step 1: Verify that the LifeCycle node exists for your agency. If you have to add such a node, giving it a default weight of 0 will keep it from affecting other work in your agency.**





In addition to relative weights all of the criterion need to be converted to a common 0-100 scale. This is done through a scaling function. This can be done through a function or a scaling graph. For example, Deck/Slab Elements are on a 0-4 scale while the Deck component is on a 0-9 scale. In order to combine these criteria that have different scales they need to be converted to a common scale. The following images illustrate the different scaling functions for each criterion.

Element ratings  
Weight: 90

NBI ratings  
Weight: 10

Bearings Elements  
Weight: 15

Culvert Elements  
Weight: 25

Deck/Slabs Elements  
Weight: 25

Joints Elements  
Weight: 15

Substructure Elements  
Weight: 25

Superstructure Elements  
Weight: 25

Deck/Slabs Elements

**Criterion Properties**

Name: Deck/Slabs Elements      Weight: 25

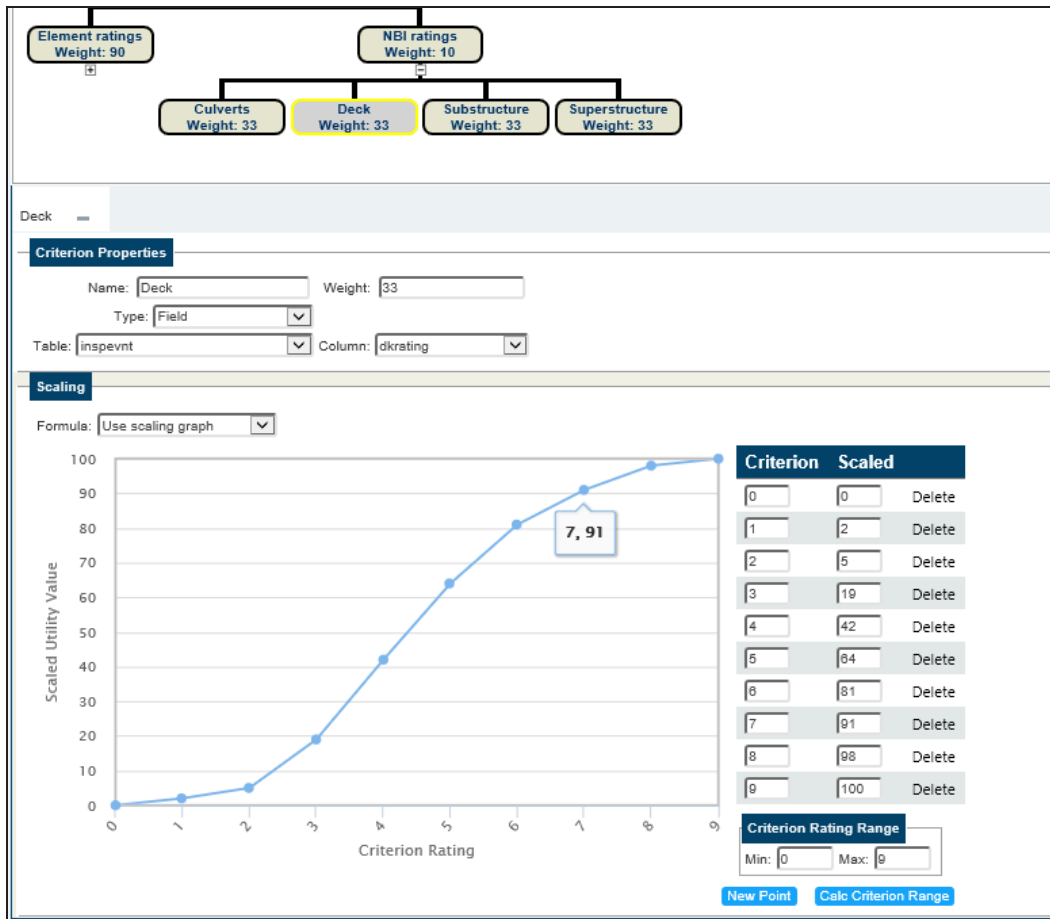
Type: Element Group

Element Group: Category      Category Key: 8 Decks/Slabs

**Scaling**

Formula: Condition HI

$$0.63949237880642 * \{X\} + 0 + .000000957659751653726 * \exp(0.174436987045692 * \{X\} + 0)$$



## Utility Weight Profile

Utility weight profiles allow the user to define utility weights that correspond to the objectives/goals of a specific program without changing the relative weights in the actual utility tree, for any of the criterion defined in the utility tree. This feature is critical in the development of projects and programs with specific objectives/goals. For example, an agency may use the utility score primarily as an indicator of condition, but for the purposes of something such as a scour improvement program the incremental benefit of the utility needs to emphasize the Risk criterion. The example creates a utility weight profile that focuses on the condition and life cycle criteria with the relative ratio changing from approximately 40% of the weight on condition criteria and 30% on the life cycle criteria to 25% and 75% respectively.

**Step 1: Create a new Weight Profile and Save the profile.**

**Step 2: Change the Override Weight for each node to 0, except for the Lifecycle Node. Save the profile.**

## Admin > Modeling Config > Weights Profile

### Profiles

Selected Weight Profile:

Name:

### Utility Components

- Total Utility
  - Condition (40->25)**
  - LifeCycle (30->75)
  - Mobility (15->0)
  - Risk (15->0)

### Condition Criterion's Details

Default Sibling Total Weight: 100

Default Weight: 40 40%

Override Sibling Total Weight: 100

Override Weight:  25%

[Reset to Default](#)

# Deterioration

We will now check that the element deterioration, and the interaction between the protective system and the parent elements closely resembles what you experience in your area.

Since we will be using the element deterioration exclusively, we will not be dealing with NBI deterioration in this example nor will we get into details of NBI deterioration rates or NBI Conversion Rates. We will, however, leave the conditional NBI condition on the Network Policy, so it might be worth reviewing the NBI Conversion Rate if you are unfamiliar with it.

## Element Deterioration Rates

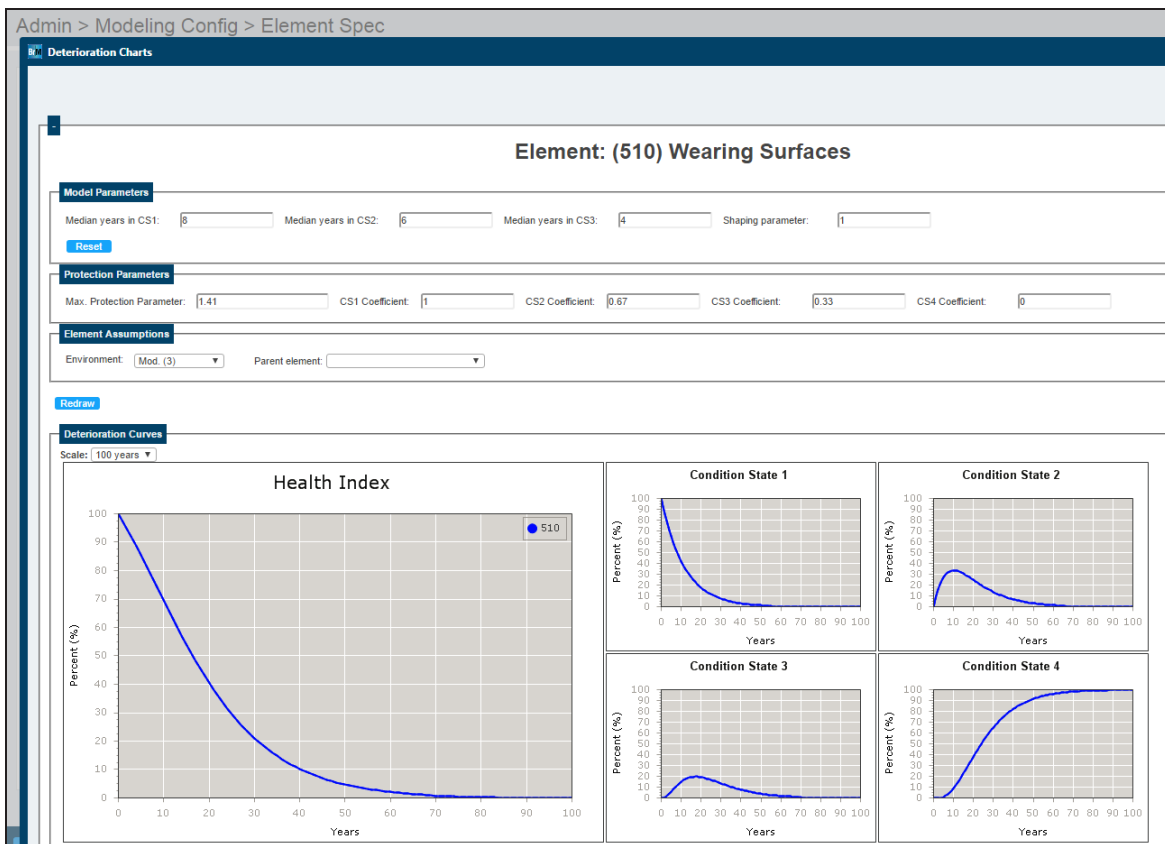
Check the deterioration rates of your elements. More detail on how to do this is given in *Appendix B - Example 1*.

**Step 1: Evaluate your element deterioration rates.**

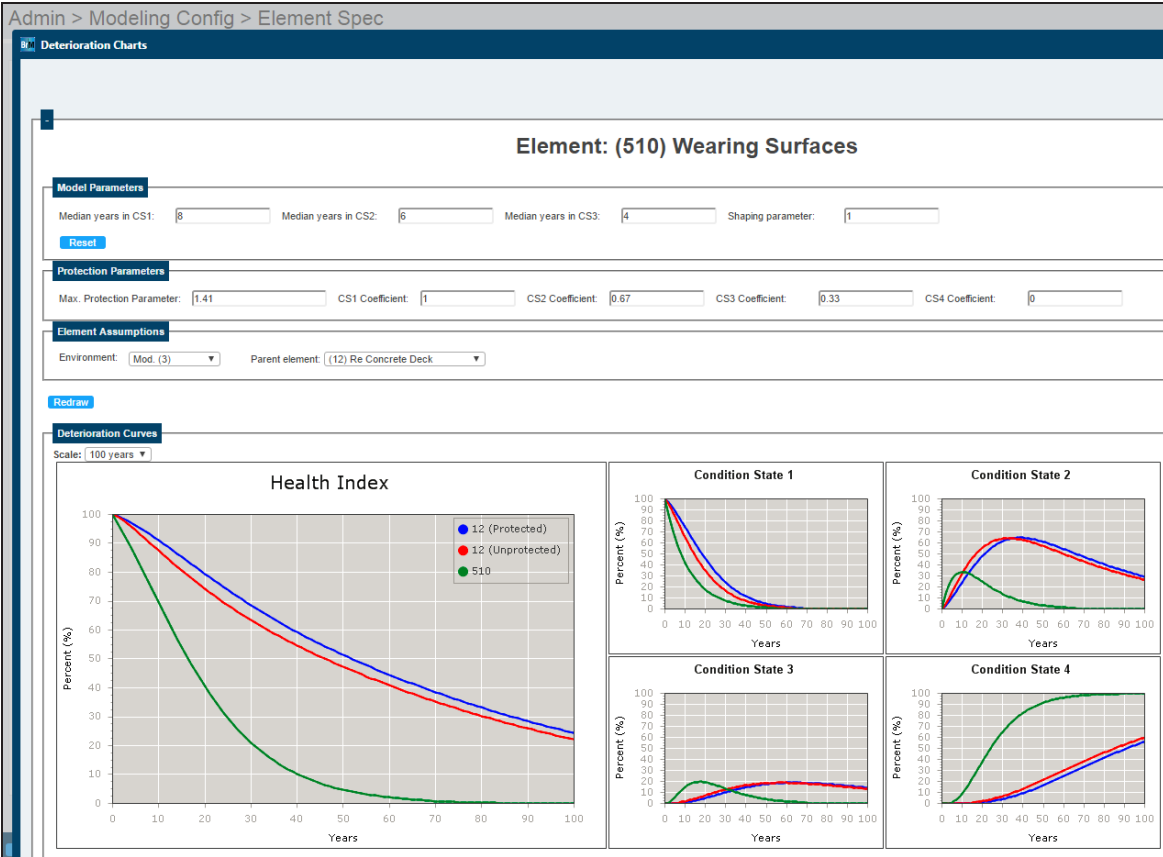
## Protective Coating Deterioration Rates

You will also want to more carefully consider how the protective systems change the standard deterioration rate. We will now walk through how to see how your protective system changes the parent element's rate.

**Step 1: Select a protective element and view its deterioration modeling graphs. (Shown here: 510)**



**Step 2: Under Element Assumptions, select a parent element. Redraw the graphs. (Shown here: 12 – Re Concrete Deck)**



The graphs will then display the deterioration of the wearing surface (the green line), the unprotected parent element (the red line) and the protected element (the blue line)

# Network Policies

For this example, the work we will want to consider will be creating a preservation program. In particular wearing surface on the deck and protective systems for steel elements.

## Benefits

**Step 1: Review the benefit ‘Wearing Surface Overlay’ (Sort Order: 9999). This should include replacing a wearing surface if it exists or adding a new one if it does not.**

Admin > Modeling Config > Benefit Groups

Benefit Groups

+ Add New Benefit Group

Benefit Group Name	Description	Linked Actions	Sort Order	Child Benefit Groups
Replace Paint	Replace Elem 515	Preserve Super - Network, Rehab Super - Network	9999	<a href="#">Link to Child Groups</a>
Replace Railings	Replace Railings	Replace Deck - Network, Replace Structure - Network	9999	<a href="#">Link to Child Groups</a>
Replace Sub	Replace Sub Elements	Replace Structure - Network	9999	<a href="#">Link to Child Groups</a>
Replace Super	Replace Super	Replace Super - Network, Replace Structure - Network	9999	<a href="#">Link to Child Groups</a>
Replace Wearing Surface	Replace Elem 510	Rehab Deck - Network, Replace Structure - Network, Preserve Deck - Network	9999	<a href="#">Link to Child Groups</a>
Seal Joints	Replace Joint seals	Preserve Deck - Network	9999	<a href="#">Link to Child Groups</a>
Thin Bonded Overlay	Thin Bonded Overlay - Replace / place new	Preserve Deck - Network	9999	<a href="#">Link to Child Groups</a>
<b>Wearing Surface Overlay</b>	<b>Wearing Surface Overlay - Replace / Place New</b>		<b>9999</b>	<a href="#">Link to Child Groups</a>

Wearing Surface Overlay - Removed Elements

Wearing Surface Overlay - Replaced Elements

+ Add new record

Orig. Element	Orig. Parent	New Element	Percent Replaced
510 Wearing Surfaces	13 Pre Concrete Deck	510 Wearing Surfaces	100
510 Wearing Surfaces	16 Re Conc Top Flange	510 Wearing Surfaces	100
510 Wearing Surfaces	38 Re Concrete Slab	510 Wearing Surfaces	100
510 Wearing Surfaces	15 Pre Concrete Top Flange	510 Wearing Surfaces	100
510 Wearing Surfaces	12 Re Concrete Deck	510 Wearing Surfaces	100
510 Wearing Surfaces	320 Pre Conc Appr Slab	510 Wearing Surfaces	100
510 Wearing Surfaces	321 Re Conc Approach Slab	510 Wearing Surfaces	100

Page size: 20 7 items in 1 pages

Wearing Surface Overlay - Created Protecting Systems

+ Add new record

Element	Parent	Percent Coverage
510 Wearing Surfaces	320 Pre Conc Appr Slab	100
510 Wearing Surfaces	12 Re Concrete Deck	100
510 Wearing Surfaces	13 Pre Concrete Deck	100
510 Wearing Surfaces	15 Pre Concrete Top Flange	100
510 Wearing Surfaces	38 Re Concrete Slab	100
510 Wearing Surfaces	321 Re Conc Approach Slab	100
510 Wearing Surfaces	16 Re Conc Top Flange	100

Page size: 20 7 items in 1 pages

**Step 2: Review the benefit ‘Seal Joints’ (Sort Order: 9999). It should include a replacement of joint seals.**



Seal Joints - Replaced Elements				
+ Add new record				
Orig. Element	Orig. Parent	New Element	Percent Replaced	
302 Compressn Joint Seal	None	302 Compressn Joint Seal	100	
300 Strip Seal Exp Joint	None	300 Strip Seal Exp Joint	100	
301 Pourable Joint Seal	None	301 Pourable Joint Seal	100	

Page size: 20 3 items in 1 pages

**Step 3: Review the benefit ‘Repair Paint’ (Sort Order: 9999). This should consist of repairs to all steel protective coatings.**

Repair Paint - Changed Elements								
+ Add new record								
Element	Parent	Grandparent	Origin State ▲	CS1	CS2	CS3	CS4	
515 Steel Protective Coating	None	None	CS2	100%	0%	0%	0%	
515 Steel Protective Coating	None	None	CS3	100%	0%	0%	0%	
515 Steel Protective Coating	None	None	CS4	100%	0%	0%	0%	

Page size: 20 3 items in 1 pages

## Actions

**Step 1: Review the action ‘Preserve Deck – Network.’ Verify that both benefits (‘Seal Joints’ and ‘Wearing Surface Overlay’) are associated with the action. Verify that the costs are reflective of your agency’s experience and that the action defers itself for the number of years based on your agency’s experience, and set the indirect costs to an appropriate percentage.**

Admin > Modeling Config > Action Defs

Replace Wearing Surface - Network	First Wearing Surface	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	X
Preserve Deck - Network	Wearing Surface / Repair	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>	\$	Network	X
Preserve Super - Network	Repair Paint	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	X
Rehab Culvert - Network	Rehab culvert, parapets, approaches	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	X
Rehab Deck - Network	Repair deck, joints and parapets	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	X
Rehab Sub - Network	Repair Columns, Piers, Abutments, Piles, Walls	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	X
Rehab Super - Network	Repair beams, paint and bearings	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	X
Replace Deck - Network	Replace Deck	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	X
Replace Structure - Network	Replace Structure	Example	999	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Network	X

First Previous **1** 2 Next Last

Associated Benefit Groups for Action Preserve Deck - Network

Metric  English

Benefit Groups	
Please Select	Add
Seal Joints	X
Wearing Surface Overlay	X

Overriding Direct Cost (overrides unit-costs) =

Enabled	Field Name	Cost Per Unit	Unit
<input type="checkbox"/>	Deck Area	\$ 5	sq.ft

Unit Costs =

ID	Element Name	Cost Per Unit	Unit	?
300	Strip Seal Exp Joint (Replace)	\$ 18	ft	<input checked="" type="checkbox"/>
301	Pourable Joint Seal (Replace)	\$ 5	ft	<input checked="" type="checkbox"/>
302	Compressn Joint Seal (Replace)	\$ 65	ft	<input checked="" type="checkbox"/>
510	Wearing Surfaces (Create)	\$ 5	sq.ft	<input checked="" type="checkbox"/>
510	Wearing Surfaces (Replace)	\$ 5	sq.ft	<input checked="" type="checkbox"/>

Indirect Cost =

Enabled	Component	Estimation Method
<input checked="" type="checkbox"/>	Total Indirect Cost	Percentage   10

Deferment Rules =

Action Name	Deferment Interval (Years)	
Please Select		Add
Preserve Deck - Network	10	X

**Step 2: Review the action ‘Preserve Super – Network.’ Verify that the benefit ‘Repair Paint’ and ‘Replace Paint’ are associated with the action (notice that paint repair will also cover substructure elements that are linked to element 515 because the paint was not specified to any particular parent elements). Verify that the costs are reflective of your agency’s experience and that the action defers itself for the number of years based on your agency’s experience, and set the indirect costs to an appropriate percentage.**

Admin > Modeling Config > Action Defs

Action Name	Description	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>	\$	Network	X
First Wearing Surface - Network	First Wearing Surface	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	X
Preserve Deck - Network	Wearing Surface / Repair Joints	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	X
Preserve Super - Network	Repair Paint	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>	\$	Network	X
Rehab Culvert - Network	Rehab culvert, parapets, approaches	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	X
Rehab Deck - Network	Repair deck, joints and parapets	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	X
Rehab Sub - Network	Repair Columns, Piers, Abutments, Piles, Walls	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	X
Rehab Super - Network	Repair beams, paint and bearings	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	X
Replace Deck - Network	Replace Deck	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	X
Replace Structure - Network	Replace Structure	Example	999	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Network	X

Associated Benefit Groups for Action Preserve Super - Network

Metric  English

Benefit Groups		Overriding Direct Cost (overrides unit-costs)			
Please Select	<input type="button" value="Add"/>	<input type="checkbox"/>	Field Name	Cost Per Unit	Unit
Repair Paint	<input type="button" value="X"/>	<input type="checkbox"/>	Deck Area	\$ 0	sq.ft
Replace Paint	<input type="button" value="X"/>	Unit Costs			
		ID	Element Name	Cost Per Unit	Unit ?
		515	Steel Protective Coating (Condition improved)	\$ 18	sq.ft <input checked="" type="checkbox"/>
		515	Steel Protective Coating (Replace)	\$ 25	sq.ft <input checked="" type="checkbox"/>
		Indirect Cost			
<input checked="" type="checkbox"/>	Component	Estimation Method			
<input checked="" type="checkbox"/>	Total Indirect Cost	Percentage 10			
Deferment Rules					
Action Name		Deferment Interval (Years)			
Please Select		<input type="button" value="Add"/>			
Preserve Super - Network		5 <input type="button" value="X"/>			

## Network Policies

**Step 1: Review the 'Preserve Deck' network policy. Verify that the actions reviewed earlier are referenced here. If your agency would not "preserve" a bridge with a deck NBI of 5, copy this policy and change your custom one here. (Example policies can be overwritten in update scripts).**

Network Policy Editor

Network Policy | Preserve Deck [Create New](#)

Network Policy Details

Network Policy Name: Preserve Deck

Actions

- Preserve Deck - Network
- Do Nothing
- Preserve Super - Network

Details

Action: Preserve Deck - Network Project Category: Preservation Work

Action Conditional Rule

Summary

(Column 'dkrating' of Table 'inspevnt' Is In Set '5 Fair, 6 Satisfactory, 7 Good, 8 Very Good, 9 Excellent')

Rule Builder

[Add Condition](#) [Add Group](#)

Type: Column Value In Param Set [Remove Condition](#)

Table: inspevnt Column: dkrating Value Is: In Set:

- Unknown (NBI)
- 0 Failed
- 1 Imminent failure
- 2 Critical
- 3 Serious
- 4 Poor
- 5 Fair
- 6 Satisfactory
- 7 Good
- 8 Very Good
- 9 Excellent

Follow-up Actions

Preserve Super - Network [X](#)  
Select an action [Add Action](#)

\*\*Indicates an action is no longer a network level action. These actions can be changed, selected, or deleted, but once saved cannot be re-added.

# Lifecycle & Funding Sources

This example will lean heavily on the Lifecycle criteria of the utility tree, so it is worth spending some time reviewing the Life cycle policies to make sure they reflect your agency's policies. For more details on this, see the Lifecycle section of *Appendix B - Example 1*. The LCCA Policy Rules used for this program are as follows.

Admin > Modeling Config > LCCA Policy Rules

**Rule Editor**  
 Policy: Deck Policy Rule: Preserve Deck [Create New](#)

**Rule Details**  
 Name: Preserve Deck Resulting Action: Preserve Deck - Network

**Summary**  
 ((Health Index of Category 'Decks/Slabs' Must Be Greater Than Or Equal To Number Value 50 AND Health Index of Category 'Decks/Slabs' Must Be Less Than Or Equal To Number Value 90) AND (Health Index of Element '510 - Wearing Surfaces' Must Be Less Than Or Equal To Number Value 50))

**Rule Builder**

[Add Condition](#) [Add Group](#)

**Group**

[Add Condition](#) [Add Group](#) [Remove Group](#)

Type: Category Health Index Type: Number Value  
 Field Decks/Slabs As Number Must Be Greater Than or Equal To Number Value 50 [Remove Condition](#)

AND

Type: Category Health Index Type: Number Value  
 Field Decks/Slabs As Number Must Be Less Than or Equal To Number Value 90 [Remove Condition](#)

AND

**Group**

[Add Condition](#) [Add Group](#) [Remove Group](#)

Type: Element Health Index Type: Number Value  
 Field 510 - Wearing Surfaces As Number Must Be Less Than or Equal To Number Value 50 [Remove Condition](#)

Admin > Modeling Config > LCCA Policy Rules

**Rule Editor**  
 Policy: Superstructure Policy Rule: Preserve Super [Create New](#)

**Rule Details**  
 Name: Preserve Super Resulting Action: Preserve Super - Network

**Summary**  
 (Health Index of Element '515 - Steel Protective Coating' Must Be Less Than Or Equal To Number Value 50 AND Health Index of Material 'Painted Steel' Must Be Greater Than Number Value 60)

**Rule Builder**

[Add Condition](#) [Add Group](#)

Type: Element Health Index Type: Number Value  
 Field 515 - Steel Protective Coating As Number Must Be Less Than or Equal To Number Value 50 [Remove Condition](#)

AND

Type: Material Health Index Type: Number Value  
 Field Painted Steel As Number Must Be Greater Than Number Value 60 [Remove Condition](#)

## Funding Sources

Next the software needs to know how much money you have, or at least how much you think you will have, so it can recommend what are the best projects for this year, and which should be held onto until next year. The funding section can also help your planning group identify how much has been allocated, and how much remains to be spent, from each of your sources. However, for speed and simplicity's sake, we will just use the 'Additional Funds' section of the *Programs > Funding Allocation* task in a few steps. If you would like to set up a funding source, refer to *Appendix B - Example 1*.

# Segments

We will now create the program segments which will allow us to filter the structures down into state owned and NHS bridges.

## Subdivision Profiles

**Step 1: Create a new Subdivision Profile. Name it ‘Owner + NHS + District.’**

**Step 2: Add division fields for Bridge.Owner, Roadway.NHS\_ind and Bridge.District**

Admin > Modeling Config > Subdivision Profiles

**Subdivision Profile Editor**

Subdivision Profile:  [Create New](#)

**Subdivision Profile Details**

Name:

Description:

**Mapped Fields**

Table	Field	
bridge	district	X
bridge	owner	X
roadway	nhs_ind	X

Table:  Field:  [Add](#)

# Programs

Okay, you are now ready to set up your program.

## Create Program

**Step 1: Create a new Program. Name it “Example Preservation Program”**

**Step 2: Give the start year of this year and the end year two years later (three years total). Save the Program.**

**Step 3: Use the NBI Converter Method and choose the BrM Default profile. Check on the HiX Approximation, give a long-term analysis period of 50 years, a discount rate of 0%, and an inflation rate of 2%.**

The screenshot displays the 'Programs > Create/Edit Programs' interface. At the top, there is a 'Program Editor' section with a dropdown menu for 'Program' set to 'Example Preservation' and buttons for 'Create New' and 'Copy >>'. Below this is the 'Program Details' section, which includes fields for 'Program Alternate ID' (Example Preservation Program), 'Program Name' (Example Preservation), 'Program Objectives' (Agency defined), 'Bridge Filter' (Undefined), 'Program Status' (Active), 'Program URL' (empty), 'Structure Weights Formula' (Undefined), 'Program Start Year' (2016), 'Program End Year' (2018), and 'Required Minimum Cost' (empty). There are also text areas for 'Program Description' and 'Program Notes'. The 'Configuration Data' section at the bottom includes 'NBI Deterioration Method' (NbiConverter), 'NBI Converter Profile' (BrM Default), 'Long-Term Analysis Period' (50), 'Discount Rate' (0), 'Inflation Estimation Method' (FixedInflationRate), 'Inflation Rate' (2), and a checked checkbox for 'Residual HiX Approximation'.

**Step 4: Select the Preserve Deck network policy.**

**Step 5: Select your “Preservation Ex” utility weight profile.**

**Step 6: Select the ‘Network-Wide’ subdivision profile and it will include all 27 bridges of the sample database.**



Programs > Create/Edit Programs

---

**Network Policies**

Unassigned Network Policies:

- Replace Deck
- Rehab Sub
- Rehab Deck
- Scour Policy
- First Protective System
- Rehab Culvert
- Replace Culvert
- Rehab Super
- Replace Bridge
- Paint Super/Sub
- Preserve Super / Sub

Assigned Network Policies:

- Preserve Deck

[Assign All](#) [Unassign All](#)

---

**Utility Weights Profile**

Utility Profile:  [Create/Edit Utility Profile](#)

**Utility Profile's Weights**

- Total Utility
  - Condition (40->25)
  - LifeCycle (30->75)
  - Mobility (15->0)
  - Risk (15->0)

---

**Subdivision Profile**

Subdivision Profile:  [Create/Edit Subdivision Profile](#)

---

**Filter Segments**

Add Filter Segments:

Filter Segments:

Index	Combinations	# of Bridges	
1	ALL	27	X
Total:		27	

## Assign Projects

If the program you are optimizing already has some projects defined (perhaps you just want it to fill out the remainder of your STIP), you can freeze projects to the program. If the year is fixed, freeze them to both the program and the year.

In this example, we will not be working with pre-existing projects.

## Performance Measures

For this program, we will add two performance measures to track how effective our work is. We will track the percent of Good and Fair bridges by both their fraction of surface area and their structure count. We will not set targets or minimums at this time.

**Step 1: Add a new performance measure for 'Pct. Good/Fair (Surface-Based)'**

**Step 2: Add a new performance measure for 'Pct. Good/Fair (Count-Based)'**

Programs > Performance Measures

Performance Measures

Program: Example Preservation Scenario: Default

Select Performance Measures

Performance Measures	Best Value	Worst Value		
Utility (Preservation Ex)	100.00	0.00		
Pct. Good/Fair (Surface-Based)	100.00	0.00		
Pct. Good/Fair (Count-Based)	100.00	0.00		

+ Add new record

Performance Constraints by Segment

Segment	Utility (Preservation Ex)	Pct. Good/Fair (Surface-Based)	Pct. Good/Fair (Count-Based)
ALL	Min: <input type="text"/> Target: <input type="text"/>	Target: <input type="text"/>	Target: <input type="text"/>

## Funding Allocation

For this example, we did not guide you through the setup of specified funding sources. But if you did this step, you can now allocate those funding sources to this program. If you did not, we will now add the \$1.5m/year to the additional funds.

**Step 1: Insert \$1,500,000 per year to the three years of the program.**

Programs > Funding Allocation

Program: Example Preservation Scenario: Default

Funding Allocation

A new Funding Source Target in Projects > Funding Sources may be created for new Funding Allocations  
No Funding Sources  
[Add New](#)

Budget Distribution

Quick Distribution

Override budget \$4,500,000  
[Distribute Evenly](#)

Total budget: \$4,500,000  
Total allocated funds: \$0

	2016	2017	2018
Identified annual funds:	\$0	\$0	\$0
Additional funds:	\$1,500,000	\$1,500,000	\$1,500,000
Total annual budget:	\$1,500,000	\$1,500,000	\$1,500,000
Allocated funds:	\$0	\$0	\$0
Available Funds:	\$1,500,000	\$1,500,000	\$1,500,000

**Step 2: Distribute the funds to your segments: where there is only one segment, it may be faster to just type it in by hand. And press the button “Get Performances” (This could take more than 10 minutes. Don’t worry, the page won’t time out.)**

**Distribute** **Get Performances**

Budget distribution by program's segments: Input method:  Actual Budget Value  Percentage of Annual Budget

Segment	Pct. Good/Fair (Surface-Based)	Pct. Good/Fair (Count-Based)	Utility	Total Budget per segment	Pct. overall budget	2016	2017	2018
ALL	56.79	59.26	72.42	\$4,500,000	100%	\$1,500,000	\$1,500,000	\$1,500,000
Total				\$4,500,000		\$1,500,000	\$1,500,000	\$1,500,000

## Optimization

We are now ready to run the optimization.

### Step 1a: Run Optimization.

**Programs > Program Planning**

**Optimize Program**

Program:  **Run Optimization**

Scenario:

Optimization Method:

Keep assigned projects:

Run on all scenarios:

Respect external frozen projects:

---

**Program Information**

Start Year: 2016  
End Year: 2018

Subdivision Profile: Network-Wide  
NBI Deterioration Method: NbiConverter  
NBI Converter Profile: BrM Default

Utility Weight Profile: Preservation Ex

Assigned Network Policies:

### Step 1b: Good time for a bathroom break.

**Optimization Progress**

Optimizing Program... **Abort Optimization**

2%

---

**Progress Messages**

Initializing Program Optimization...  
Processing Scenario 'Default'.  
Getting Action Sequences

# Program Results

After your optimization has run, there will be three places to see your results: the individual projects returned by the optimization, the *Program Results* task, and the *Executive Summary* task. Each will give you varying levels of detail for you to drill down into your results.

## Returned Projects

Once the optimizer has run, the bottom of the page will populate with the projects selected by the optimizer. You can select each of these individual projects and look at them in the *Projects > Create/Edit Project > Analysis* subtask. This will give you the best feedback on what about your program needs to be tweaked.

Assigned Projects											
Segment: All Year: All											
Project Name	Category	Automatic	Cost	Utility	Utility Benefit	Benefit/Cost (\$k)	Cost (\$k) / Benefit	Year	Frozen	Status	
7-7-6 PS Conc 4span(Preserve Deck)	Preservation Work	Yes	\$497,698	93.85	1.88	0.0038	\$264.73	2017	No	Proposed	
6-6-6 Steel 1span(Preserve Deck, Preserve Super)	No Category	Yes	\$400,871	77.83	11.29	0.0282	\$35.51	2018	No	Proposed	
6-6-5 PS Conc 1span(Preserve Deck)	Preservation Work	Yes	\$536,864	68.49	10.02	0.0187	\$53.58	2016	No	Proposed	
6-6-5 Cont Conc 3span(Preserve Deck)	Preservation Work	Yes	\$178,431	93.61	4.56	0.0256	\$39.13	2016	No	Proposed	
6-6-4 Cont Conc 3span(Preserve Deck)	Preservation Work	Yes	\$507,949	76.32	9.96	0.0196	\$51.00	2017	No	Proposed	
6-5-6 Steel Arch(Preserve Deck)	Preservation Work	Yes	\$279,111	87.37	6.26	0.0224	\$44.59	2016	No	Proposed	
4-6-6 Steel 5span(Preserve Deck)	Preservation Work	Yes	\$275,646	91.42	2.81	0.0102	\$98.09	2016	No	Proposed	

## Program Results

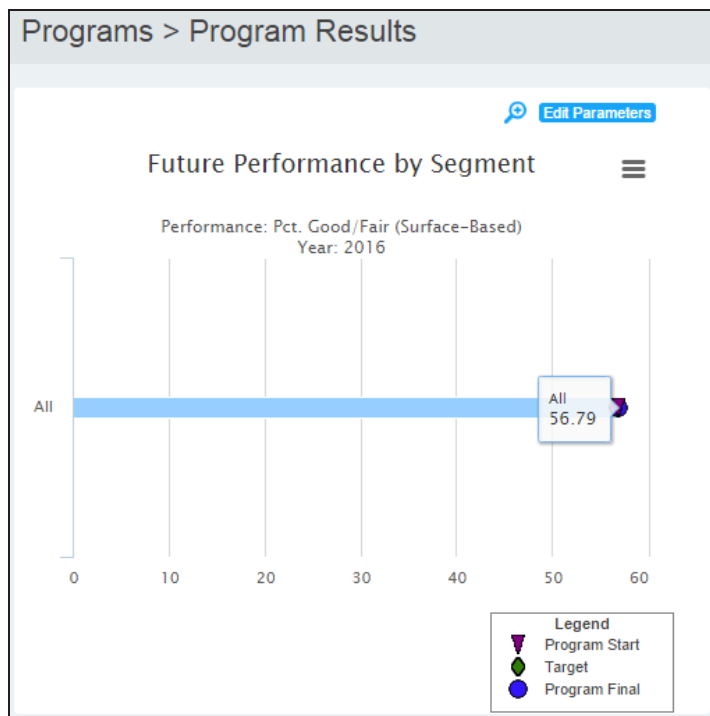
In order to get an aggregate view of how the program performs in terms of Utility and the performance measures, the *Program Results* task gives a good overview. There are 4 hard-coded graphs on this page:

### Performance by Segment

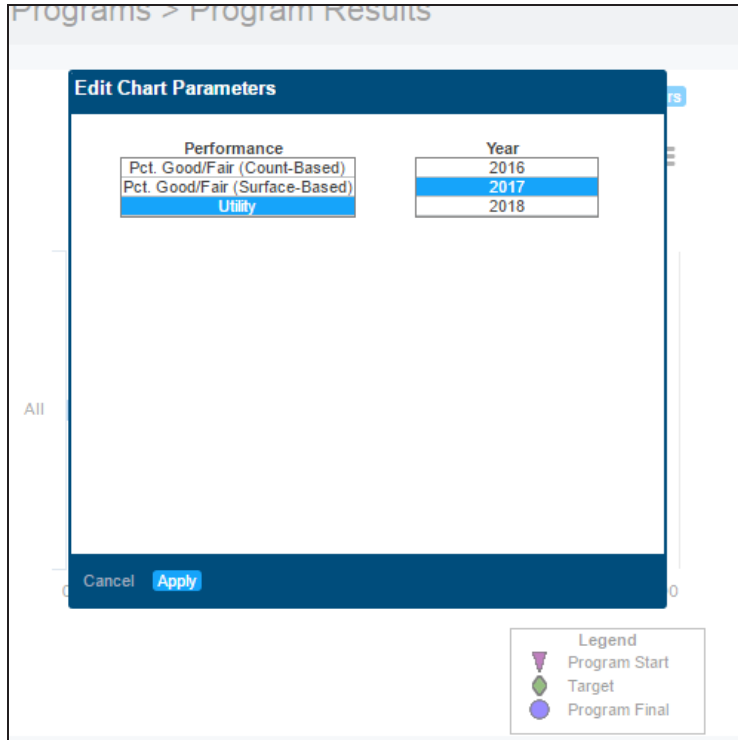
The chart on the top left will show the performance of your segments for each year. If we had set targets for our performance measures, it would show us how each segment performed against the target.

Let's take a look at the data for the different years.

**Step 1: mouse over the segment and note the utility performance of the segment.**



**Step 2: click on “Edit Parameters” and select the next year of the program.**

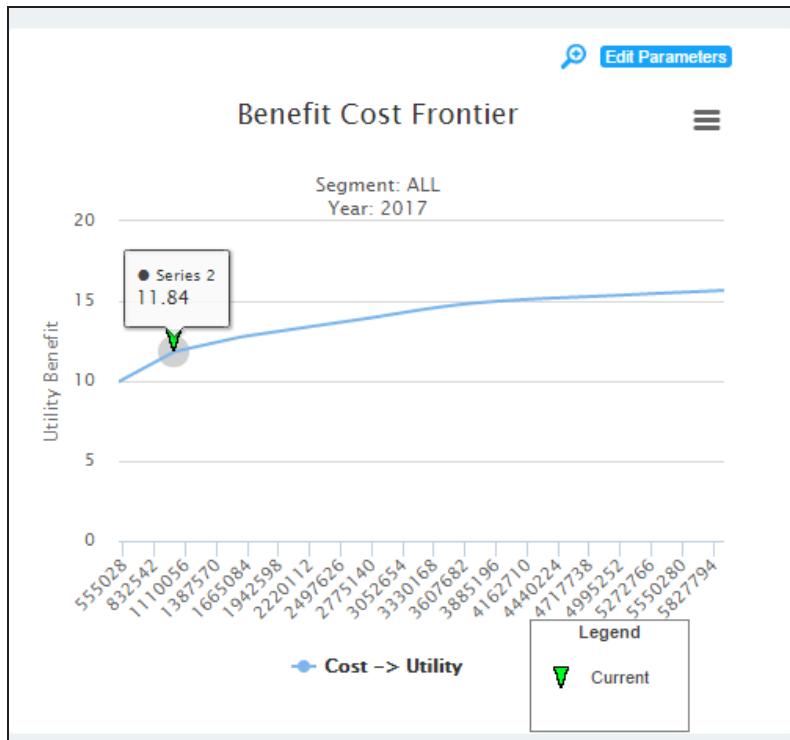


**Step 3: Note the hover performance for the next year.**

## Benefit Cost Frontier

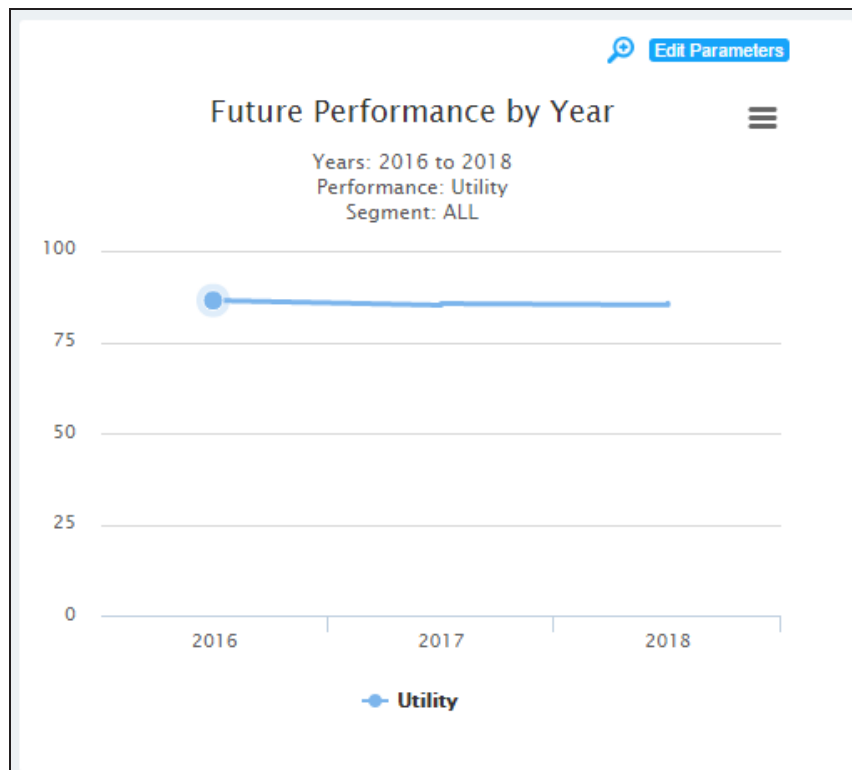
The graph on the top-right is a Pareto Horizon graph. If you are not familiar with Vilfredo Pareto’s work on multi-objective optimization, Wikipedia can provide some in-depth information (see the articles both on ‘Multiple-criteria Decision Analysis’ and ‘Multi-objective Optimization’ – and be sure to pick up your honorary math degree before leaving).

If you don’t feel like reading that much, here’s the summary version: vertically you have the most utility benefit possible and horizontally you have how much that would cost (these are the two objectives of our multi-objective analysis). The horizon line represents the very most optimal program possible for that funding. As you add performance measure targets or boundary conditions, the software will depart from the very most optimal to try to meet your other criteria. The distance between the plan and the line is how far from optimal your proposed program is.



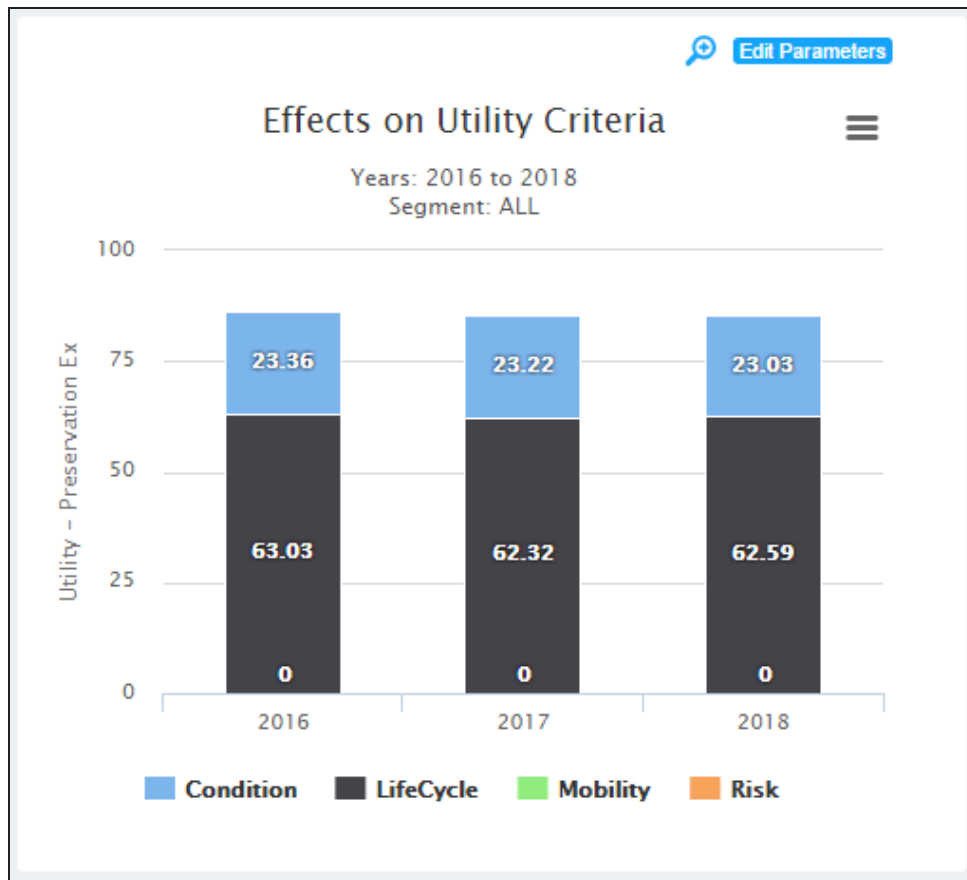
## Future Performance by Year

In the bottom left is Future Performance by Year. This graph will show you how your network improves (or decays) by year. Editing the preferences, you can see different segments or different performance measures. For large networks, the delta utility can be very small sometimes.



## Effects on Utility Criteria

The last chart helps you to determine which node of your utility tree is causing most of the utility benefits. In this example, we zeroed out all but the lifecycle node. So, as expected, all of the benefit is coming from the lifecycle node. When you reach out with your models to examine more situations, for example a widening could impact mobility, life-cycle and condition – this graph will tell you which benefits are driving the results and in what proportion.



## Executive Summary

If there are other graphs your agency would like to pull from the data, the *Executive Summary* task can be configured to your agency's needs. To set up the dashboard, use the configuration tools on the *Admin > Programs > Executive Summary* task.

You also have the ability to create additional graphs to view the projections of your program. On the *Admin* tab you can set up these charts, and on the *Programs* tab you can view them. Your agency can break the data down by the measures that are important to you, and color them the way your agency is accustomed to seeing them. Think of this page as a dynamic infographic page.

We will now demonstrate how to use BrM to run a set of scenarios. In particular, we will demonstrate how more or less money could change your agency's scour ratings in the future. We will be using the scour program from above with different funding scenarios.

## Scenario Setup

Scenarios are essentially the ability to rerun a program optimization with tweaks, allowing you to compare the results. The principle example of this would be to create a graph for your state legislature, demonstrating the cost-to-benefit relationship between your current funding and what you could do with more (or even less) funding. Perhaps removing funding from your organization would significantly increase the need for bridge replacements – in which case BrM can help you to provide those answers.

In the first part of the example, we ran the scenario with 27 bridges and \$1,500,000/ year of funding. Let's demonstrate what would happen if we ran the same bridges for no funding, \$500k, and \$1m and each year.

### Create/Edit Scenarios

We'll begin by creating the scenarios of the scour program.

**Step 1: Create a new scenario named "Preservation Example No Funding." Assign it to the Preservation Example and save.**

Scenarios	
Scenario Name	
X	Scour Example \$30k
X	Scour Example \$50k
X	Scour Example No Funding
X	Scour Example \$100k
X	Scour Example \$10k
	Default
X	Preservation Example No Funding

Scenarios Details:	
Name:	Preservation Example No Func
Program:	Example Preservation
Deterioration Profile:	-- none --

**Step 2: Copy the program we just created, renaming it "Preservation Example \$500k."**

Scenarios	
Scenario Name	
X	Scour Example \$30k
X	Scour Example \$50k
X	Scour Example No Funding
X	Scour Example \$100k
X	Scour Example \$10k
	Default
X	Preservation Example No Funding
X	Preservation Example \$500k

Scenarios Details:	
Name:	Preservation Example \$500k
Program:	Example Preservation
Deterioration Profile:	-- none --

**Step 3: Repeat for \$1m (remember, the \$1.5m per year funding is the default scenario).**



For the next sections, we will review the data associated with our program and see some of the options we have for editing our scenarios.

## Performance Measures

Trying to hit additional targets can have an impact on optimization. Say you would like to compare the difference between trying to spend your money to reduce the number of structurally deficient bridges vs. preservation work on a larger number of bridges.

On this screen you could define different performance measures for your program for each scenario you want to model.

## Funding Allocation

This is where we will make the changes to our funding for each scenario. The funding in the “default” scenario

**Step 1: For the “No Funding” scenario, remove all the funding. Make sure there are no funds distributed to the segments.**

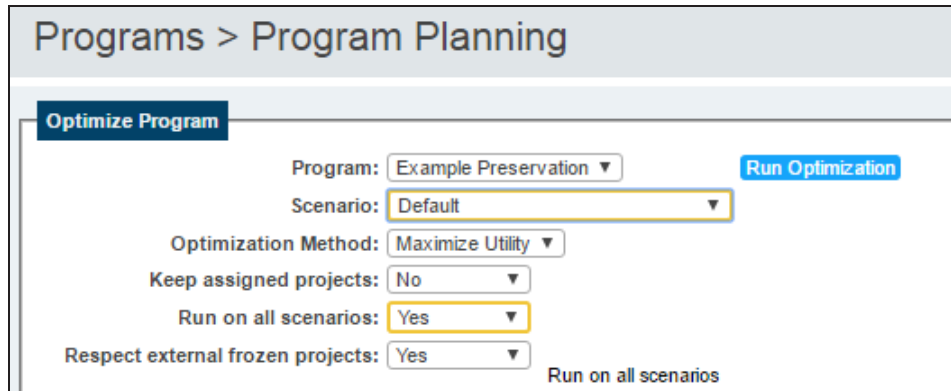
**Step 2: Repeat for \$500k and \$1m scenarios.**

## Run Optimization

We will now run the optimization for the many scenarios. It is possible to run just one scenario if you only want to update one of them.

**Step 1: Select the Preservation Example Program.**

**Step 2: Select to run all scenarios for the program**



The screenshot shows the 'Programs > Program Planning' interface. A dark blue button labeled 'Optimize Program' is at the top left. Below it, the 'Program' dropdown is set to 'Example Preservation', and a blue 'Run Optimization' button is to its right. The 'Scenario' dropdown is set to 'Default'. The 'Optimization Method' dropdown is set to 'Maximize Utility'. The 'Keep assigned projects' dropdown is set to 'No'. The 'Run on all scenarios' dropdown is set to 'Yes' and is highlighted with a yellow border. The 'Respect external frozen projects' dropdown is set to 'Yes'. A 'Run on all scenarios' label is located at the bottom right of the form area.

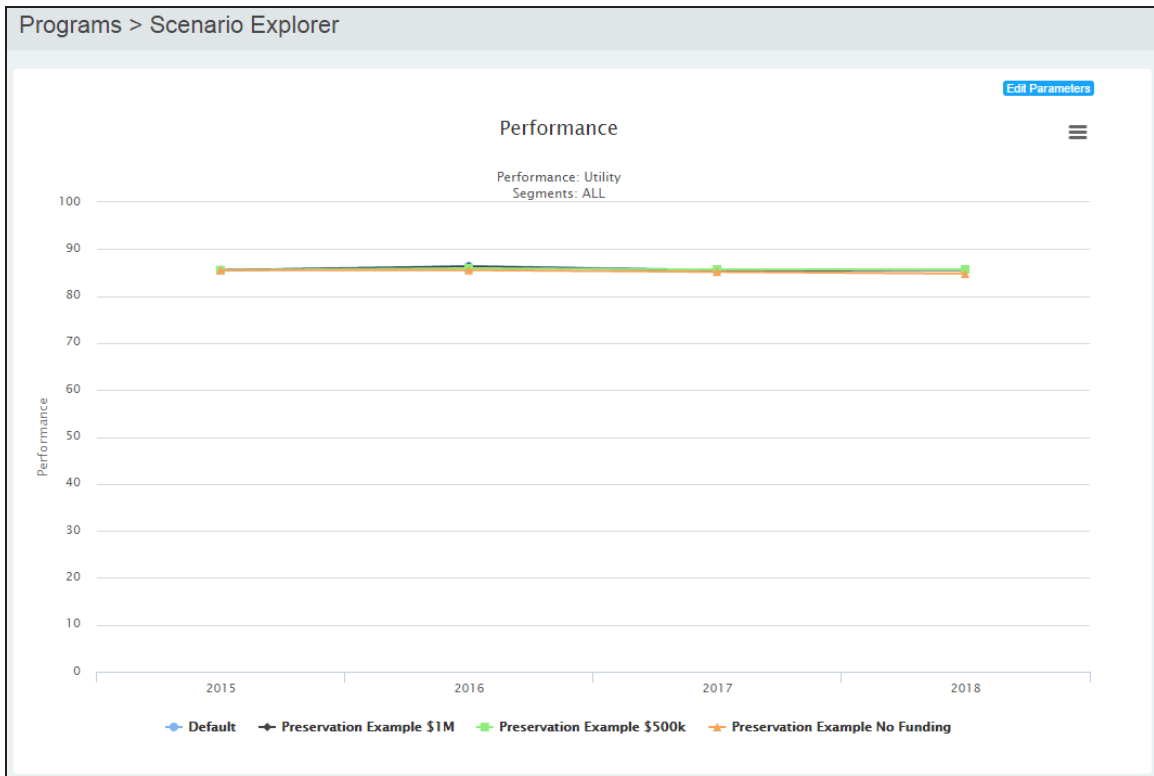
**Step 3: Run the Optimization – this is going to take a while. Expect it to take around 3x as long as the default optimization only.**

**Step 4: Check that each scenario at the bottom has results, except for the “No Funding” one – we would expect no work on that one.**

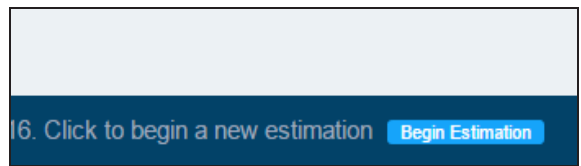
## Begin Estimation

After the optimization has run, we can now go see the overall results in a single graph on the *Scenario Explorer* task. If we had run the scenarios with multiple performance measures, we can see how the network performed in regards to each performance measure by editing the preferences at the top right.

You should be able to see that depending on how quickly we dedicate funding to our network will change how quickly our agency meets its goal. This will help your agency choose, or present to politicians who chose, which scenario to follow.



If you change something at one of the base levels, like the utility profile, you can get a very rough estimation of how that would change the results by clicking on the “estimation” button at the bottom of the page. This would estimate using the currently-identified projects as a rough base for how the results would change.



As you change base data, the graphs on the scenario explorer will not be updated. This is to make the data from the last run available until you update the scenarios because of how time and resource intensive the scenario explorer can be. To update the graphs fully, you will need to optimize the scenarios again. So for example the variation in the previous image is very small. So by going back to the actions and reducing the costs and the deferment period, as show in the following images, the variation in the scenario explorer graph, shown below, become greater because more work can be done.

Admin > Modeling Config > Action Defs

Action Name	Description	Example	Code	Enabled	Visible	Cost	Unit	Network	Delete
First Wearing Surface - Network	First Wearing Surface	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>			Network	X
Preserve Deck - Network	Wearing Surface / Repair	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>	\$		Network	X
Preserve Super - Network	Repair Paint	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>			Network	X
Rehab Culvert - Network	Rehab culvert, parapets, approaches	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>			Network	X
Rehab Deck - Network	Repair deck, joints and parapets	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>			Network	X
Rehab Sub - Network	Repair Columns, Piers, Abutments, Piles, Walls	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>			Network	X
Rehab Super - Network	Repair beams, paint and bearings	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>			Network	X
Replace Deck - Network	Replace Deck	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>			Network	X
Replace Structure - Network	Replace Structure	Example	999	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			Network	X

First Previous **1** 2 Next Last

Associated Benefit Groups for Action Preserve Deck - Network

Metric  English

Benefit Groups	
Please Select	Add
Seal Joints	X
Wearing Surface Overlay	X

Overriding Direct Cost (overrides unit-costs) =

Enabled	Field Name	Cost Per Unit	Unit
<input type="checkbox"/>	Deck Area	\$ 5	sq.ft

Unit Costs =

ID	Element Name	Cost Per Unit	Unit	?
300	Strip Seal Exp Joint (Replace)	\$ 18	ft	<input checked="" type="checkbox"/>
301	Pourable Joint Seal (Replace)	\$ 5	ft	<input checked="" type="checkbox"/>
302	Compressn Joint Seal (Replace)	\$ 65	ft	<input checked="" type="checkbox"/>
510	Wearing Surfaces (Create)	\$ 5	sq.ft	<input checked="" type="checkbox"/>
510	Wearing Surfaces (Replace)	\$ 5	sq.ft	<input checked="" type="checkbox"/>

Indirect Cost =

Enabled	Component	Estimation Method
<input checked="" type="checkbox"/>	Total Indirect Cost	Percentage 10

Deferment Rules =

Action Name	Deferment Interval (Years)	Add
Please Select		Add
Preserve Deck - Network	5	X

Admin > Modeling Config > Action Defs

▶ Replace Wearing Surface - Network	First Wearing Surface	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	✕
▶ Preserve Deck - Network	Wearing Surface / Repair Joints	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	✕
▶ Preserve Super - Network	Repair Paint	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>	\$	Network	✕
▶ Rehab Culvert - Network	Rehab culvert, parapets, approaches	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	✕
▶ Rehab Deck - Network	Repair deck, joints and parapets	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	✕
▶ Rehab Sub - Network	Repair Columns, Piers, Abutments, Piles, Walls	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	✕
▶ Rehab Super - Network	Repair beams, paint and bearings	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	✕
▶ Replace Deck - Network	Replace Deck	Example	999	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Network	✕
▶ Replace Structure - Network	Replace Structure	Example	999	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Network	✕

First Previous **1** 2 Next Last

Associated Benefit Groups for Action Preserve Super - Network

Metric  English

Benefit Groups	
Please Select	Add
Repair Paint	✕
Replace Paint	✕

Overriding Direct Cost (overrides unit-costs) =

Enabled	Field Name	Cost Per Unit	Unit
<input type="checkbox"/>	Deck Area	\$ 0	sq.ft

Unit Costs =

ID	Element Name	Cost Per Unit	Unit	?
515	Steel Protective Coating (Condition improved)	\$ 5	sq.ft	<input checked="" type="checkbox"/>
515	Steel Protective Coating (Replace)	\$ 10	sq.ft	<input checked="" type="checkbox"/>

Indirect Cost =

Enabled	Component	Estimation Method
<input checked="" type="checkbox"/>	Total Indirect Cost	Percentage   10

Deferment Rules =

Action Name	Deferment Interval (Years)
Please Select	
Preserve Super - Network	5

## Programs > Scenario Explorer

