

# AASHTOWare Bridge Update



**Todd Thompson, PE. Chair**

**August 15, 2017**

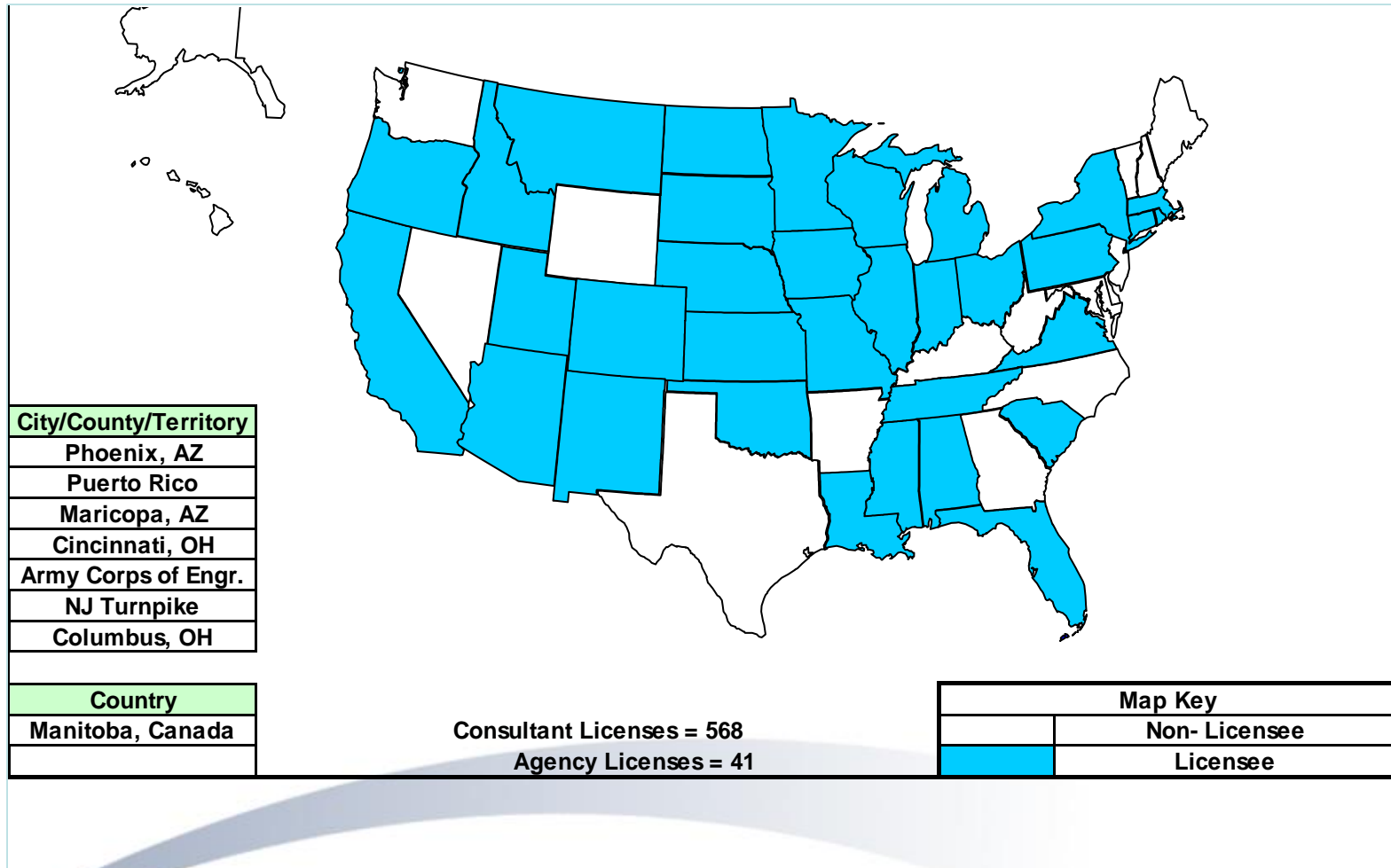
**Kansas City, KS**

# Agenda

- Bridge Rating and Design Update
- Modernization Update – later this morning
- Task Force Membership

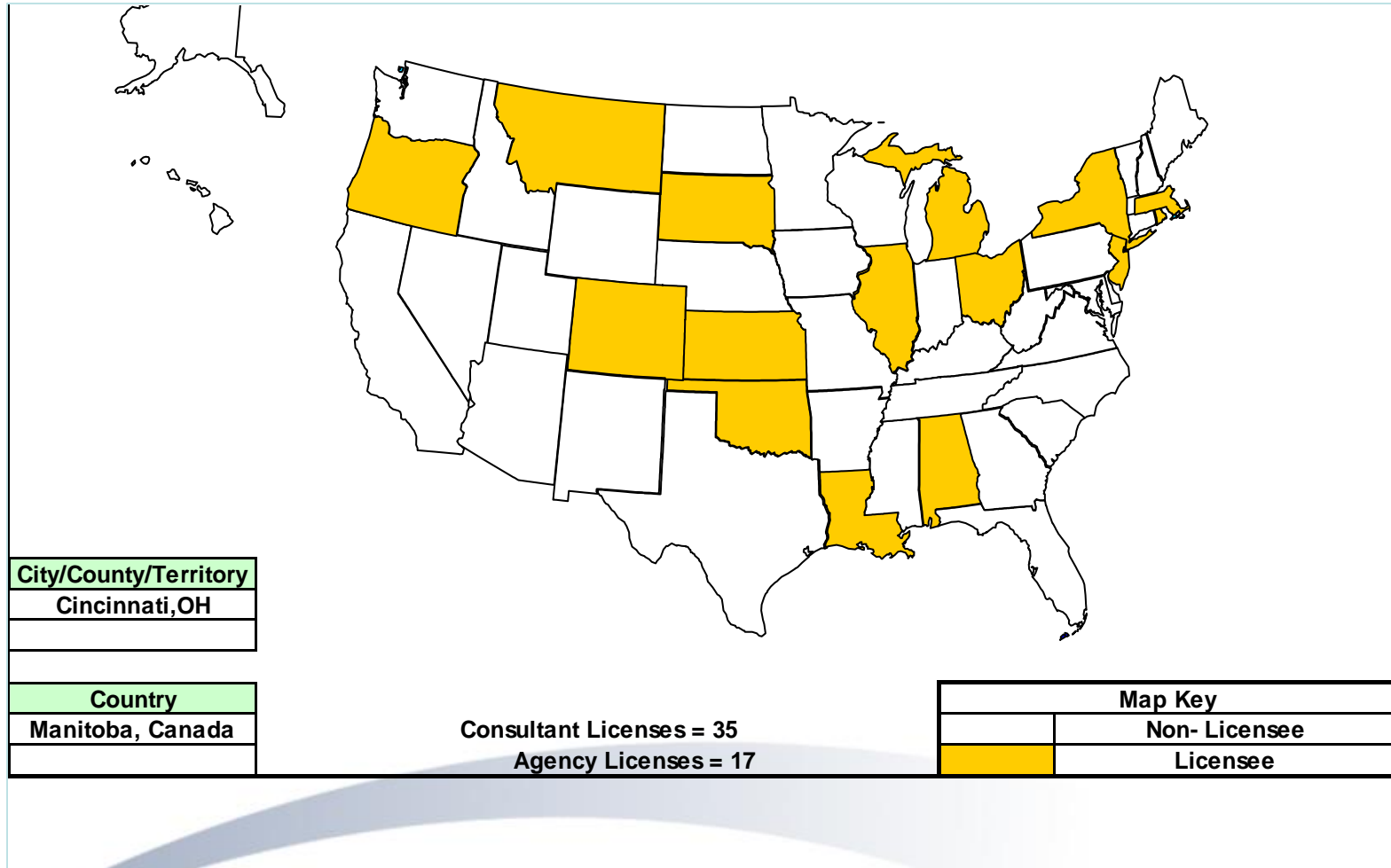
# AASHTOWare Bridge Rating

## Current Participation (FY 2017 ending June 30)



# AASHTOWare Bridge Design

## Current Participation (FY 2017 ending June 30)



# Releases since last year

- 6.8.1 – October 2016
  - Load Rating Tool
  - Bridge Copy/Delete/Replace utility
  - Regression Comparison Tool

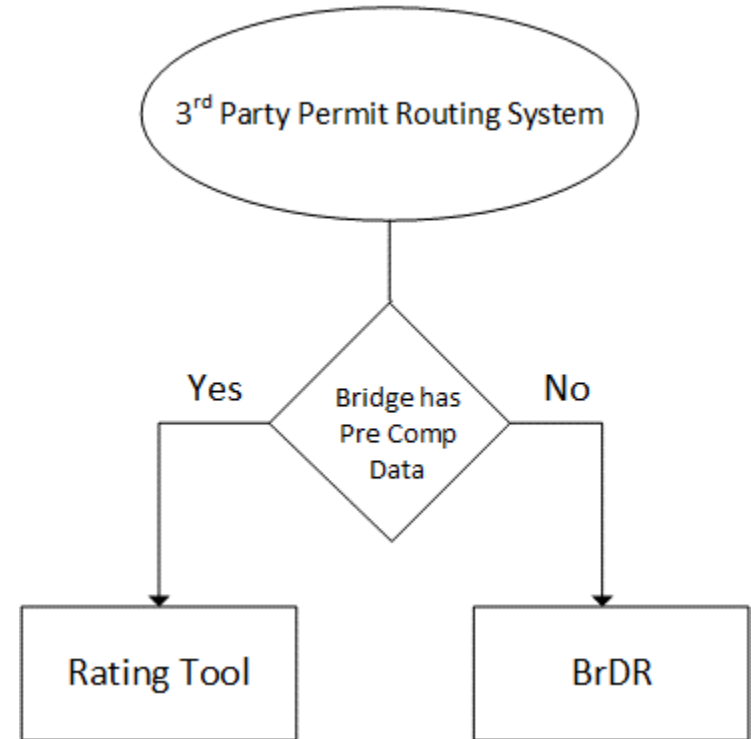
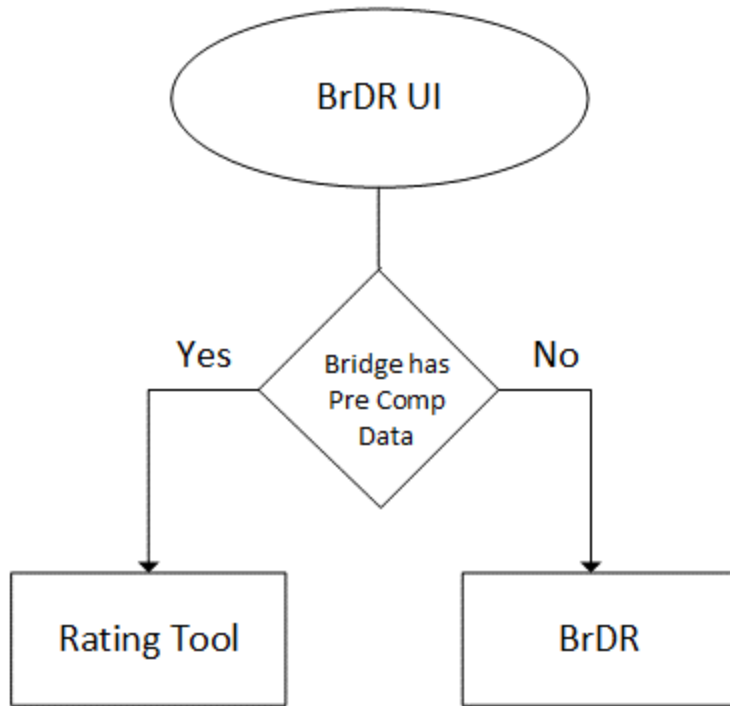
# Rating Tool – Phase 1

- Highlights of the tool:
  - Very fast computation of rating factors using precomputed data and hardware improvements
  - The Tool can be used by permitting systems using a REST API or the Analysis API
  - BrR within the application can use the tool to compute ratings for a list of bridges and vehicles

# Rating Tool – Phase 1

- Highlights of the tool (continued):
  - LFR capability
  - Steel and concrete multi-girder straight superstructures
  - LRFR, floor systems, concrete multi-cell boxes, culverts and trusses in subsequent phases (TBD)
  - Rating results exactly match the BrR results (i.e. no approximations or simplifications)
  - Customizable configuration options and pass conditions

# Rating Tool – Phase 1





# Rating Tool – Phase 1

## Generate pre-computed data:

Precomputed Data

Generate Maintain

Analysis Type: Line Girder

Rating Method: LFD

Points of Interest

Override bridge points of interest

Steel Member

- Generate at tenth points
- Generate at section change points
- Generate at user-defined points

Concrete Member

- Generate at tenth points except supports
- Generate at support points
- Generate at support face & critical shear points
- Generate at section change points
- Generate at user-defined points

Overwrite existing precomputed data

Stop on first error

Save as System Defaults Generate

Close

# Rating Tool – Phase 1

Maintain pre-computed data:

Precomputed Data

Generate Maintain

BID	Precomputed Data				Bridge Database				Select
	Bridge ID	NBI Structure ID	Date Generated	Generated By	Bridge ID	NBI Structure ID	Date Last Modified	Last Modified By	
1	TrainingBridge1	TrainingBridge1	05/25/17	Bridge Bridge	TrainingB	TrainingBridge1	10/12/09	BrR BrR	<input type="checkbox"/>
10	Example7	Example7	05/25/17	Bridge Bridge	Example7	Example7	10/12/09	BrR BrR	<input type="checkbox"/>
11	RCTrainingBridge1	RCTrainBridge1	05/25/17	Bridge Bridge	RCTrainin	RCTrainBridge1	10/12/09	BrR BrR	<input type="checkbox"/>

Select All    Select Outdated    Select Not Found    Clear Selected    Update Selected    Delete Selected

Close

# Rating Tool – Phase 1

Perform the analysis:

Load Rating Tool

Permit application number:

Application date:

Requested by:

Minimum allowable rating factor:

Comment:

Bridges Vehicles Rating Results

Analysis Settings:  View...

BID	Bridge Database				Has Precomputed Data	Travel Direction
	Bridge ID	Route Number	Number of Structures	Completely Defined		
1	TrainingBridge1	0051	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Both directions <input type="text"/>
10	Example7	-1	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Both directions <input type="text"/>
11	RCTrainingBridge1	-1	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Both directions <input type="text"/>

Process Permit

Close

# Rating Tool – Phase 1

Review the rating results:

Load Rating Tool

Permit application number:

Application date:

Requested by:

Minimum allowable rating factor:

Comment:

Bridges Vehicles **Rating Results**

Filter results:  Pass  Fail  Exceptions

Vehicle	Rating Level	BID	Bridge ID	Route Number	Code	Description	Inventory Rating Factor	Operating Rating Factor	Controlling Impact	Pass Conditions	Analysis Warnings
Type 3	Inventory	1	TrainingBridge1	0051	1	Pass, no restrictions	1.320	2.204	1.000		
Type 3	Inventory	10	Example7	-1	X	Denied	0.881	1.471	1.000		
Type 3	Inventory	10	Example7	-1	2	Pass with conditions	1.063	1.775	0.000	10 - Truck speed restriction to 5 mph	
Type 3	Inventory	11	RCTrainingBridge1	-1	1	Pass, no restrictions	1.286	2.148	1.000		

Create Rating Results File... View Rating Results File...

Close

# Bridge Copy/Delete/Replace Utility

Standalone utility that enables a user to do the following activities:

1. Copy bridge definitions from one database to another database
2. Delete bridge definitions from one database
3. Replace a bridge definition in one database with a bridge definition from another database

# Bridge Copy/Delete/Replace Utility

**BrDR Data Source 1 ( 6.8.2 (Build 2002) )**

Username:

Password:

Data Source:

Include Bridges in Deleted Bridges Folder

BID	Bridge ID	Bridge Name	NBI Structure ID	Deleted	Checked C
1	TrainingBridge1	Training Bridge 1(	TrainingBridge1	<input type="checkbox"/>	<input type="checkbox"/>
2	TrainingBridge2	Training Bridge 2(	TrainingBridge2	<input type="checkbox"/>	<input type="checkbox"/>
3	TrainingBridge3	Training Bridge 3(	TrainingBridge3	<input type="checkbox"/>	<input type="checkbox"/>
4	PCITrainingBridge	PCI TrainingBridg	PCITrainBridge1	<input type="checkbox"/>	<input type="checkbox"/>
5	PCITrainingBridge	PCI TrainingBridg	PCITrainBridge2	<input type="checkbox"/>	<input type="checkbox"/>
6	PCITrainingBridge	PCI TrainingBridg	PCITrainBridge3	<input type="checkbox"/>	<input type="checkbox"/>
7	PCITrainingBridge	PCI TrainingBridg	PCITrainBridge4	<input type="checkbox"/>	<input type="checkbox"/>
8	PCITrainingBridge	PCI TrainingBridg	PCITrainBridge5	<input type="checkbox"/>	<input type="checkbox"/>
9	PCITrainingBridge	PCI TrainingBridg	PCITrainBridge6	<input type="checkbox"/>	<input type="checkbox"/>
10	Example7	Example 7 PS (LFI	Example7	<input type="checkbox"/>	<input type="checkbox"/>
11	RCTrainingBridge	RC Training Bridg	RCTrainBridge1	<input type="checkbox"/>	<input type="checkbox"/>
12	TimberTrainingBri	Timber Tr. Bridge	TimberTrBridge1	<input type="checkbox"/>	<input type="checkbox"/>
13	FSys GFS Training	FloorSystem GFS	FS1TrainingBrdg	<input type="checkbox"/>	<input type="checkbox"/>
14	FSys FS TrainingB	FloorSystem FS Tr	FS2TraingBrdg	<input type="checkbox"/>	<input type="checkbox"/>
15	FSys GF TrainingB	FloorSystem GF Tr	FS3TraingBrdg	<input type="checkbox"/>	<input type="checkbox"/>
16	FLine GFS Training	FloorLine GFS Trai	FLine GFS Train	<input type="checkbox"/>	<input type="checkbox"/>

**BrDR Data Source 2 ( 6.8.2 (Build 2002) )**

Username:

Password:

Data Source:

Include Bridges in Deleted Bridges Folder

BID	Bridge ID	Bridge Name	NBI Structure ID	Deleted	Checked C
1	TrainingBridge1	Training Bridge 1(	TrainingBridge1	<input type="checkbox"/>	<input type="checkbox"/>
2	TrainingBridge2	Training Bridge 2(	TrainingBridge2	<input type="checkbox"/>	<input type="checkbox"/>
3	TrainingBridge3	Training Bridge 3(	TrainingBridge3	<input type="checkbox"/>	<input type="checkbox"/>
4	PCITrainingBridge	PCI TrainingBridg	PCITrainBridge1	<input type="checkbox"/>	<input type="checkbox"/>
5	PCITrainingBridge	PCI TrainingBridg	PCITrainBridge2	<input type="checkbox"/>	<input type="checkbox"/>
6	PCITrainingBridge	PCI TrainingBridg	PCITrainBridge3	<input type="checkbox"/>	<input type="checkbox"/>
7	PCITrainingBridge	PCI TrainingBridg	PCITrainBridge4	<input type="checkbox"/>	<input type="checkbox"/>
8	PCITrainingBridge	PCI TrainingBridg	PCITrainBridge5	<input type="checkbox"/>	<input type="checkbox"/>
9	PCITrainingBridge	PCI TrainingBridg	PCITrainBridge6	<input type="checkbox"/>	<input type="checkbox"/>
10	Example7	Example 7 PS (LFI	Example7	<input type="checkbox"/>	<input type="checkbox"/>
11	RCTrainingBridge	RC Training Bridg	RCTrainBridge1	<input type="checkbox"/>	<input type="checkbox"/>
12	TimberTrainingBri	Timber Tr. Bridge	TimberTrBridge1	<input type="checkbox"/>	<input type="checkbox"/>
13	FSys GFS Training	FloorSystem GFS	FS1TrainingBrdg	<input type="checkbox"/>	<input type="checkbox"/>
14	FSys FS TrainingB	FloorSystem FS Tr	FS2TraingBrdg	<input type="checkbox"/>	<input type="checkbox"/>
15	FSys GF TrainingB	FloorSystem GF Tr	FS3TraingBrdg	<input type="checkbox"/>	<input type="checkbox"/>
16	FLine GFS Training	FloorLine GFS Trai	FLine GFS Train	<input type="checkbox"/>	<input type="checkbox"/>

Copy to Right >>

<< Copy to Left

Replace Right >>

<< Replace Left

Delete Right >

< Delete Left



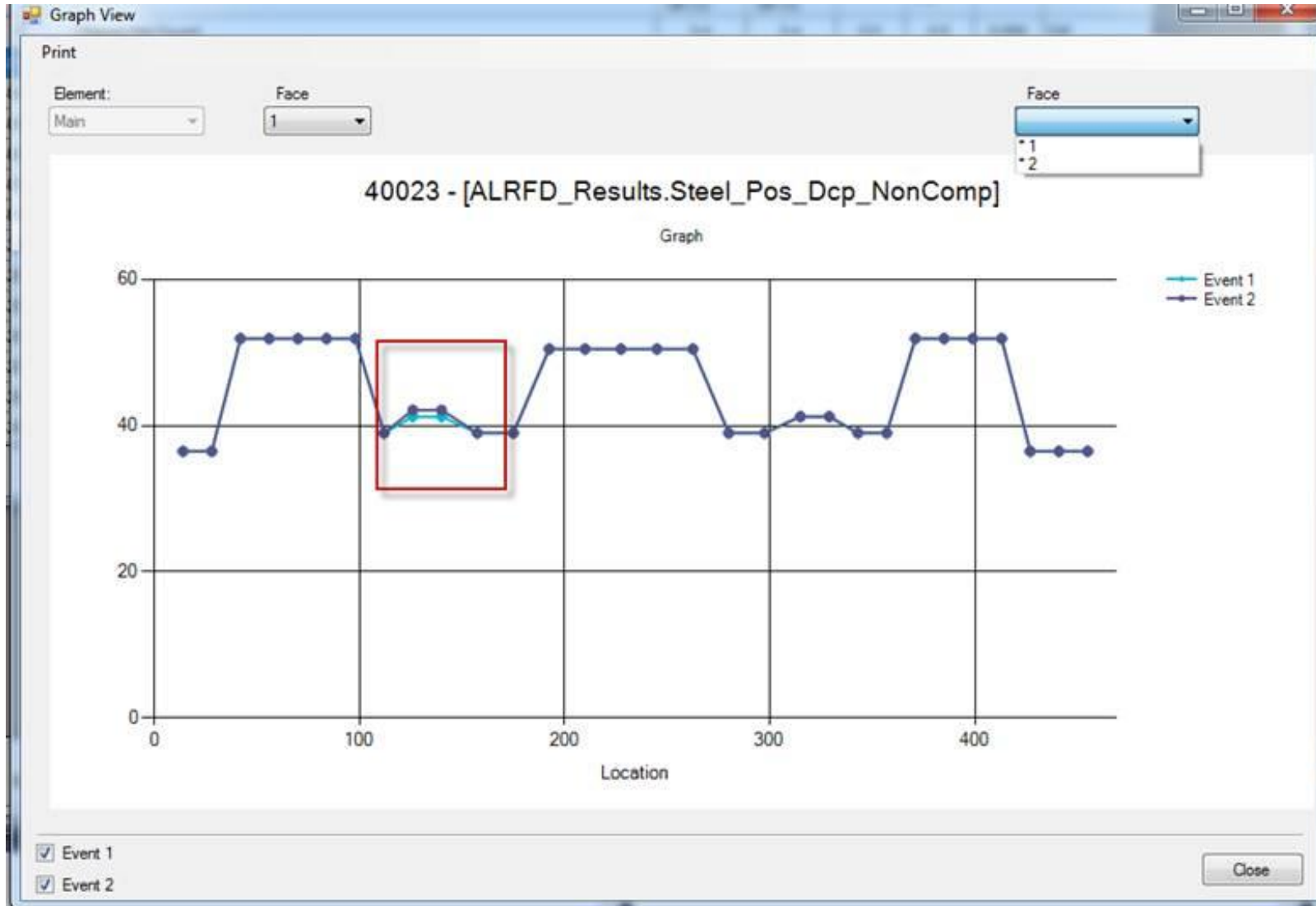
# Regression Comparison Tool

- New tool to assist with regression testing of BrDR

*Regression testing is a form of testing that verifies that the work performed to add new features and capabilities did not break or inappropriately alter the existing code causing incorrect results or behavior.*

- A large part of the testing of the modernized analysis module will be regression testing
- Based on NCHRP Report 485 – Bridge Software – Validation Guidelines and Examples

# Regression Comparison Tool





# Latest Release

- 6.8.2 – early July 2017
  - Numerous Maintenance Issues
  - Updates for the latest AASHTO specifications
  - Legacy software

# Specification Updates

- Updates for the latest AASHTO specifications
  - LRFD 8<sup>th</sup> Edition
  - MBE 3<sup>rd</sup> Edition

The screenshot displays the 'Member Alternative Description' window. The 'Member Alternative' is set to 'Plate Girder'. The 'Specs' tab is active, showing a table of analysis methods and their associated specifications. A dropdown menu is open for the 'LRFD' row, showing options from 'LRFD 4th 2008i' to 'LRFD 8th'. Another dropdown menu is open for the 'MBE 3rd, LRFD 8th' row, showing options from 'MBE 1st 2010i, LRFD 5th' to 'MBE 3rd, LRFD 8th'. A red box highlights the 'LRFD 8th' and 'MBE 3rd, LRFD 8th' rows in the table, with arrows pointing to the corresponding dropdown menus.

Analysis Method Type	Analysis Module	Selection Type	Spec	Version
ASD	AASHTO ASD	System Default	MBE 3rd	17th
LFD	AASHTO LFD	System Default	MBE 3rd	17th
LRFD	AASHTO LRFD	Override	LRFD 8th	
LRFR	AASHTO LRFR	Override	MBE 3rd, LRFD 8th	

# AASHTOWare Bridge Task Force

<b>Chair</b>	<b>Todd Thompson</b>	<b>South Dakota</b>
<b>Vice Chair</b>	<b>Eric Christie</b>	<b>Alabama</b>
<b>Member – BrM</b>	<b>Bruce Novakovich</b>	<b>Oregon</b>
<b>Member – BrM</b>	<b>Craig Nazereth</b>	<b>Rhode Island</b>
<b>Member – BrM</b>	<b>Mark Faulhaber</b>	<b>Kentucky</b>
<b>Member – BrM</b>	<b>Beckie Curtis</b>	<b>Michigan</b>
<b>FHWA Liaison – BrM</b>	<b>Derek Constable</b>	<b>FHWA</b>
<b>Member – BrR</b>	<b>Joshua Dietsche</b>	<b>Wisconsin</b>
<b>Member – BrD</b>	<b>Jeff Olsen</b>	<b>Montana</b>
<b>Member – BrD</b>	<b>Dean Teal</b>	<b>Kansas</b>
<b>Member – BrR</b>	<b>Ping Liu</b>	<b>Iowa</b>
<b>FHWA Liaison – BrDR</b>	<b>Tom Saad</b>	<b>FHWA</b>

# Survey Results – Random

- Training Pages are outdated
  - They were all updated in 2016
- Share TF quarterly meeting minutes
  - They are posted on website
  - [http://aashtobr.org/?page\\_id=91](http://aashtobr.org/?page_id=91)
- Work with other software vendors to share data
  - Working with T-19 in their effort for BIM (Bridge Information Modeling) – looking at using IFC (Industry Foundation Class) for data exchange standards

# Survey Results – Random

- Reporting needs to be improved
  - Will be working on improved output and reporting.
  - Will need user support in the form of a TAG

# Questions?

Thank you