

Michael Baker

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BrDR Regression Comparison Tool

RADBUG Meeting, 2017



Topics

- What is regression testing?
- BrDR Regression Comparison Tool
- Test Utility User
- Test Utility Batch
- Demo

What is regression testing?

Regression testing is a type of software testing that seeks to uncover new software bugs, or regressions, in existing functional and non-functional areas of a system after changes such as enhancements, patches or configuration changes, have been made to them.

– Wikipedia

Expected regression



Unexpected regression

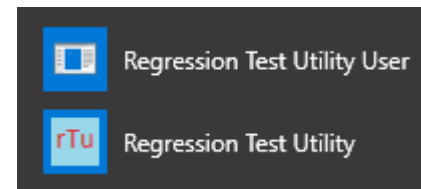


- Differences between two versions of BrDR can occur for different reasons
 - The software was changed intentionally to address a change in the AASHTO specification
 - The software was changed intentionally to address a coding defect
 - The software was changed intentionally to implement a user requested enhancement
 - The software was inappropriately changed thus introducing a defect

- Differences between two analytical engines can occur for different reasons
 - Differences can occur when the two engines produce different results because of differing assumptions
 - One engine is more rigorous or refined than the other
 - Differing interpretations of the AASHTO specifications
 - One or both engines have a defect

BrDR Regression Comparison Tool

- Funded by AASHTOWare RIPI Program
- 1st release: TN 50 in Dec 2016 for 6.8.1
- 2nd/Latest release comes with 6.8.2 installation
- 2 utility programs, 2 Getting Started guides
 - Test Utility User
 - Test Utility Batch
- Setup, Getting Started 2.1 Configuring Database
- Opening the utility programs



Test Utility User

Regression Test Utility (RTU)

Reports Configuration Help

BrDR Regression Test Utility (RTU)

Compare Any Two RTU Files Compare Any Two SCA Files Graph Multiple Files Key Data

Compare selected reports between any two .rtu files.

1. Select two different .rtu files.
2. Specify one or more reports to compare. "All" or a blank field will display all reports.

First .rtu File

C:\

Second .rtu File

C:\

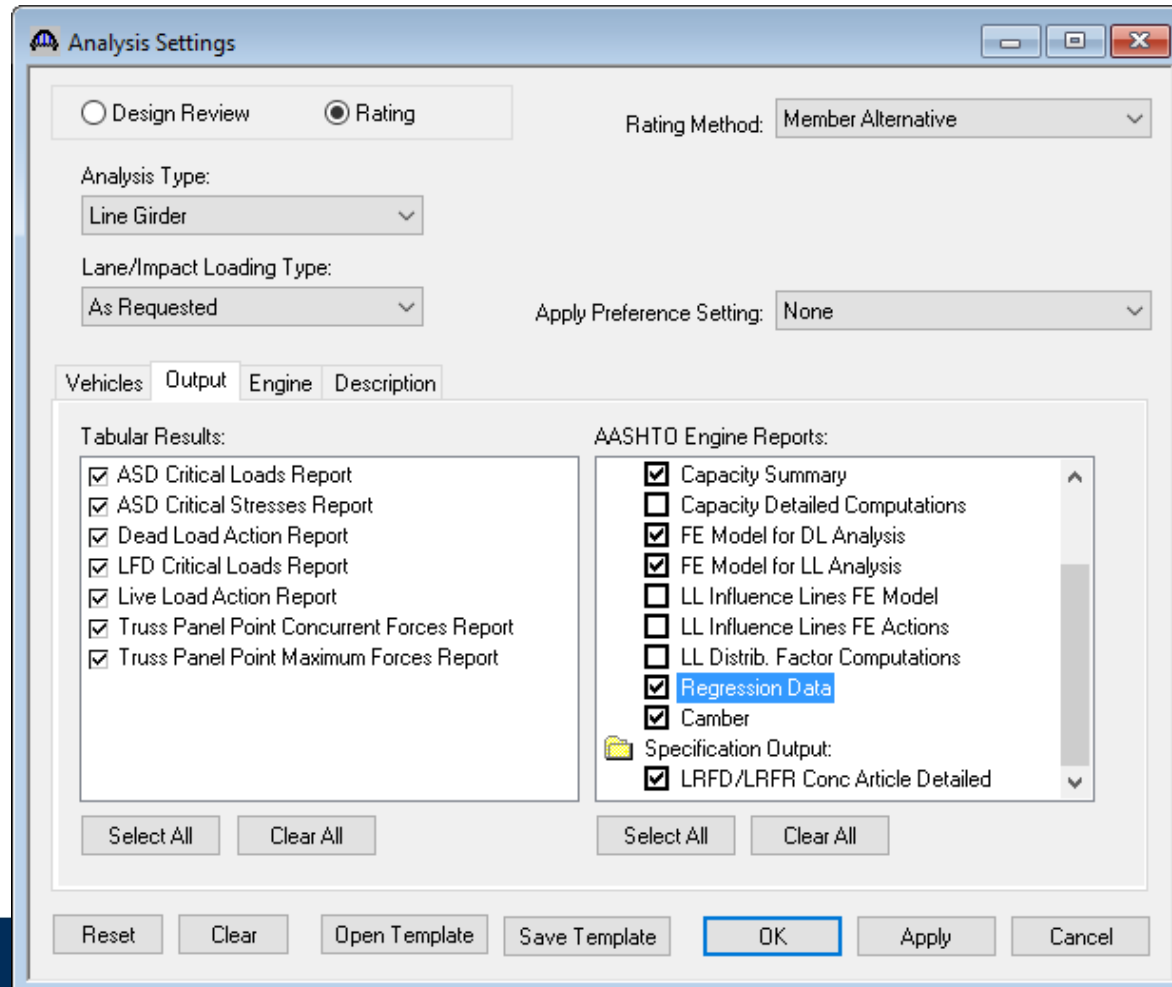
Reports to compare (separate with commas)

- Compare 2 RTU (Regression Testing Utility) files
 - Contains dead load, live load and other values calculated during spec checking
 - Report numbers are assigned to different types of values

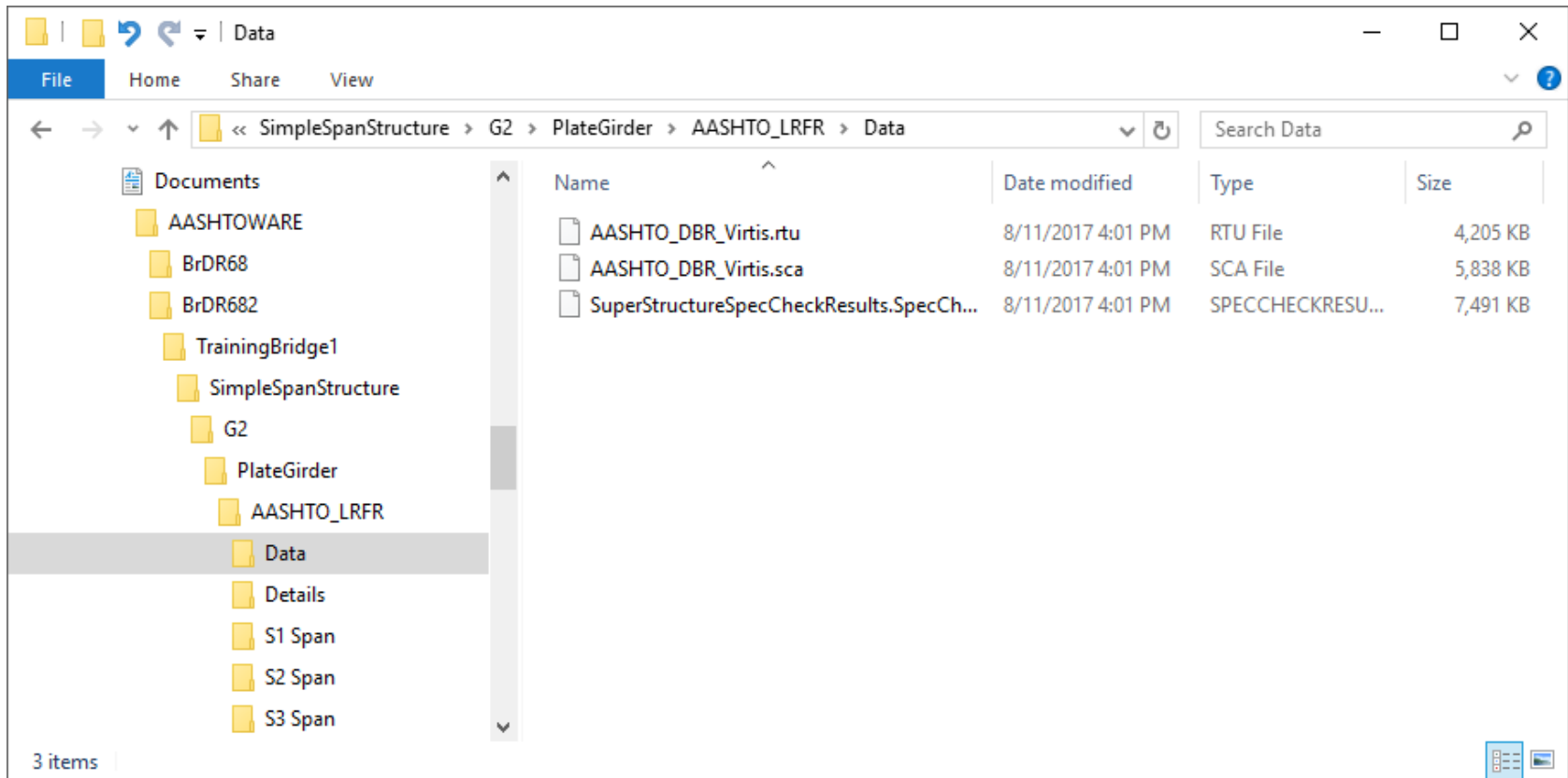
Report Number	Tolerance (%)	Description
50042		[ALRFD_Results.Shear_ResistanceTable] -> [ALRFD_IndexShearResistance.Vr]
50043		[ALRFD_Results.Shear_ResistanceTable] -> [ALRFD_IndexShearResistance.Vn]
50044		[ALRFD_Results.Shear_ResistanceTable] -> [ALRFD_IndexShearResistance.Vc]
50045		[ALRFD_Results.Shear_ResistanceTable] -> [ALRFD_IndexShearResistance.Vs]
50047		[ALRFD_Results.Shear_ResistanceTable] -> [ALRFD_IndexShearResistance.Bv]
50051		[ALRFD_Results.RCFlexResist_ResultsTable_5_7_3_2] -> [ALRFD_IndexRCFlexResistSpecCheck.Dv]
50101		[ALRFD_Results.Shear_ResistanceTable] -> [ALRFD_IndexShearResistance.Vu]

- Compare 2 SCA (Specification Check Articles) files
 - Contains the text output from each spec article as it appears in BrDR

- 1 RTU and 1 SCA file is generated for each member alternative when the Regression Data output option is selected



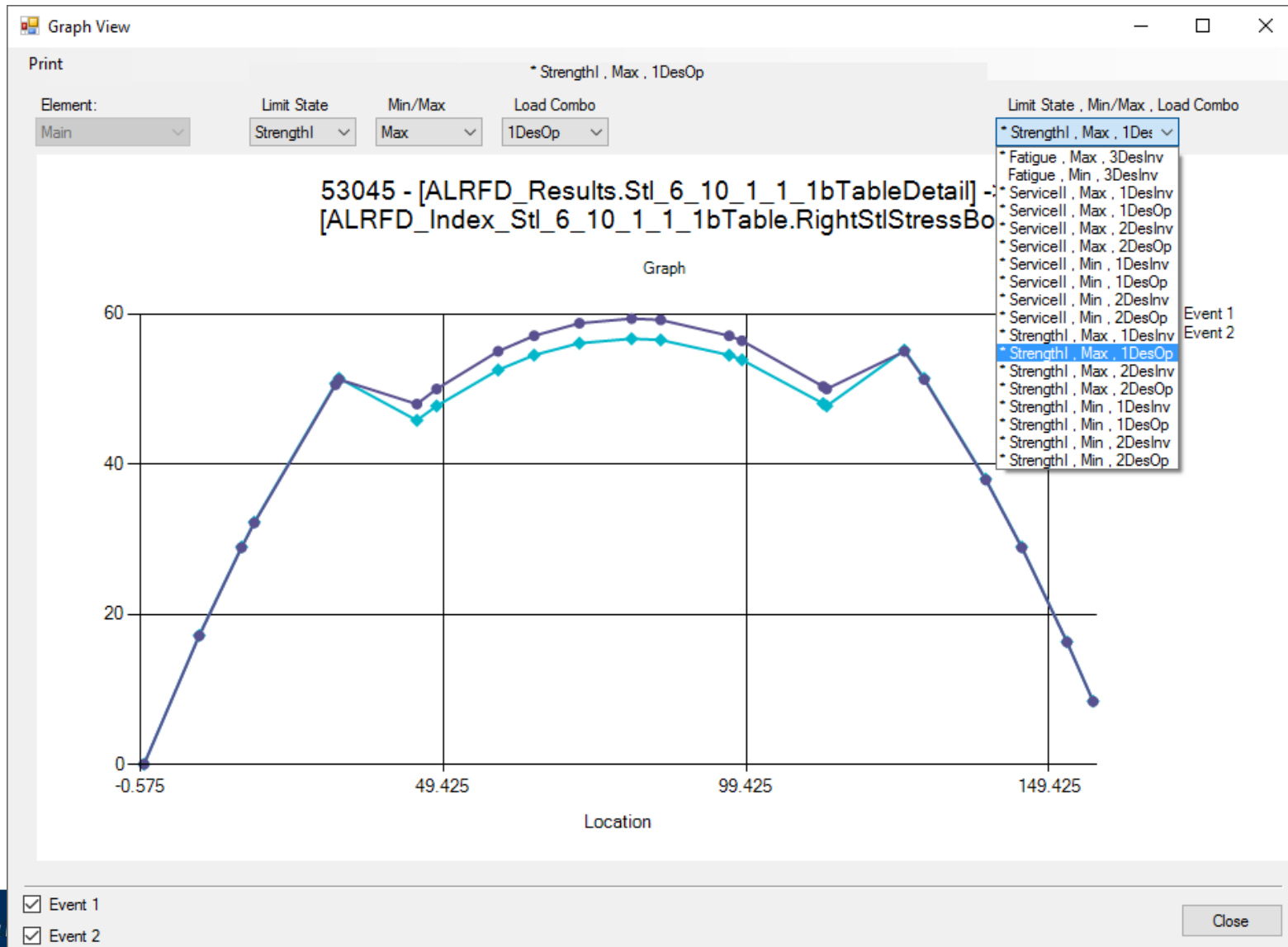
- The files are stored in the member alternative's Data folder



■ Comparison results of 2 RTU files

Report ID	Report Description	Text Compare Event 1 Dif (%)	Text Compare Event 2 Dif (%)	Area Dif (%)	Ord Dif (%)	Toler. (%)	Result
53008	[ALRFD_Results.Stl_6_10_1_6_section_TableDetail] -> [ALRFD_Index_6_10_1_6.botflangeDesignRatio]	0.0	0.0	0.0	0.0	0.000	OK
53010	[ALRFD_Results.Stl_6_10_1_6_unbracedlength_TableDetail] -> [ALRFD_Index_6_10_1_6.botflangeDesignRatio]	0.0	0.0	0.0	0.0	0.000	OK
53014	[ALRFD_Results.Stl_NoncompactPosResist_TableDetail] -> [ALRFD_Index_NonCompactPosFlexResistance.TensionFlangeAction]	85.7	85.7	6.8	4.6	0.000	DIF
53034	[ALRFD_Results.Stl_6_10_11_2_2TableDetail] -> [ALRFD_Index_Stl_6_10_11_2_2.CodeEnum]	0.0	0.0	0.0	0.0	0.000	OK
53041	[ALRFD_Results.Stl_6_10_11_1_2_TableDetail] -> [ALRFD_Index_Stl_6_10_11_1_2_Table.Trans_Stiff_Width]	0.0	0.0	0.0	0.0	0.000	OK
53042	[ALRFD_Results.Stl_6_10_11_1_3_TableDetail] -> [ALRFD_Index_Stl_6_10_11_1_2_Table.Trans_Stiff_Width]	0.0	0.0	0.0	0.0	0.000	OK
53045	[ALRFD_Results.Stl_6_10_1_1_1bTableDetail] -> [ALRFD_Index_Stl_6_10_1_1_1bTable.RightStlStressBot]	90.3	90.3	5.2	4.6	0.000	DIF
53106	[ALRFD_Results.Stl_Shear_06_10_09_TableDetail] -> [ALRFD_Index_Stl_Shear_06_10_09_Table.Vr]	0.0	0.0	0.0	0.0	0.000	OK
53108	[ALRFD_Results.Stl_6_10_1_6_section_TableDetail] -> [ALRFD_Index_6_10_1_6.botflangeCodeEnum]	0.0	0.0	0.0	0.0	0.000	OK
53110	[ALRFD_Results.Stl_6_10_1_6_unbracedlength_TableDetail] -> [ALRFD_Index_6_10_1_6.botflangeCodeEnum]	0.0	0.0	0.0	0.0	0.000	OK
53114	[ALRFD_Results.Stl_NoncompactPosResist_TableDetail] -> [ALRFD_Index_NonCompactPosFlexResistance.TensionFlangeResistan...]	0.0	0.0	0.0	0.0	0.000	OK
53115	[ALRFD_Results.Stl_GeneralFlexuralResultsTableDetail_Moment] -> [ALRFD_Index_GeneralFlexuralResultsTable_Moment.FlexureTy...]	0.0	0.0	0.0	0.0	0.000	OK
53116	[ALRFD_Results.Stl_GeneralFlexuralResultsTableDetail_Moment] -> [ALRFD_Index_GeneralFlexuralResultsTable_Moment.CodeEnum]	0.0	0.0	0.0	0.0	0.000	OK
53136	[ALRFD_Results.Stl_6_10_4_2_2Eq1_TableDetail] -> [ALRFD_Index_6_10_4_2_2Eq1.FlexureTypeEnum]	0.0	0.0	0.0	0.0	0.000	OK

Graphical view of Report ID comparison



- Comparison results of 2 SCA files

Regression Tool - Article Detail

Article	Stage	Element	Location	Compare
5.4.2.6	3	Plate Girder	80.5000	OK
5.4.2.8	3	Plate Girder	80.5000	OK
▶ 6.10.1.1.1b	3	Plate Girder	80.5000	Dif
6.10.1.10.1	3	Plate Girder	80.5000	OK
6.10.1.10.2	3	Plate Girder		
6.10.1.6	3	Plate Girder		
6.10.1.7	3	Plate Girder	80.5000	Dif
6.10.1.9.1	3	Plate Girder	80.5000	Dif
6.10.11.1.2	3	Plate Girder	80.5000	OK
6.10.11.1.3	3	Plate Girder	80.5000	Dif
6.10.2	3	Plate Girder	80.5000	OK
6.10.4.2.2	3	Plate Girder	80.5000	Dif
6.10.6.2.2	3	Plate Girder	80.5000	Dif
6.10.6.2.3	3	Plate Girder	80.5000	Dif
6.10.7.1.1	3	Plate Girder	80.5000	OK
6.10.7.1.2	3	Plate Girder	80.5000	Dif
6.10.7.2.1	3	Plate Girder	80.5000	Dif
6.10.7.2.2	3	Plate Girder	80.5000	OK

Context menu for 6.10.1.1.1b:
 Text Compare
 View article ▶
 Event1 article
 Event2 article

Close

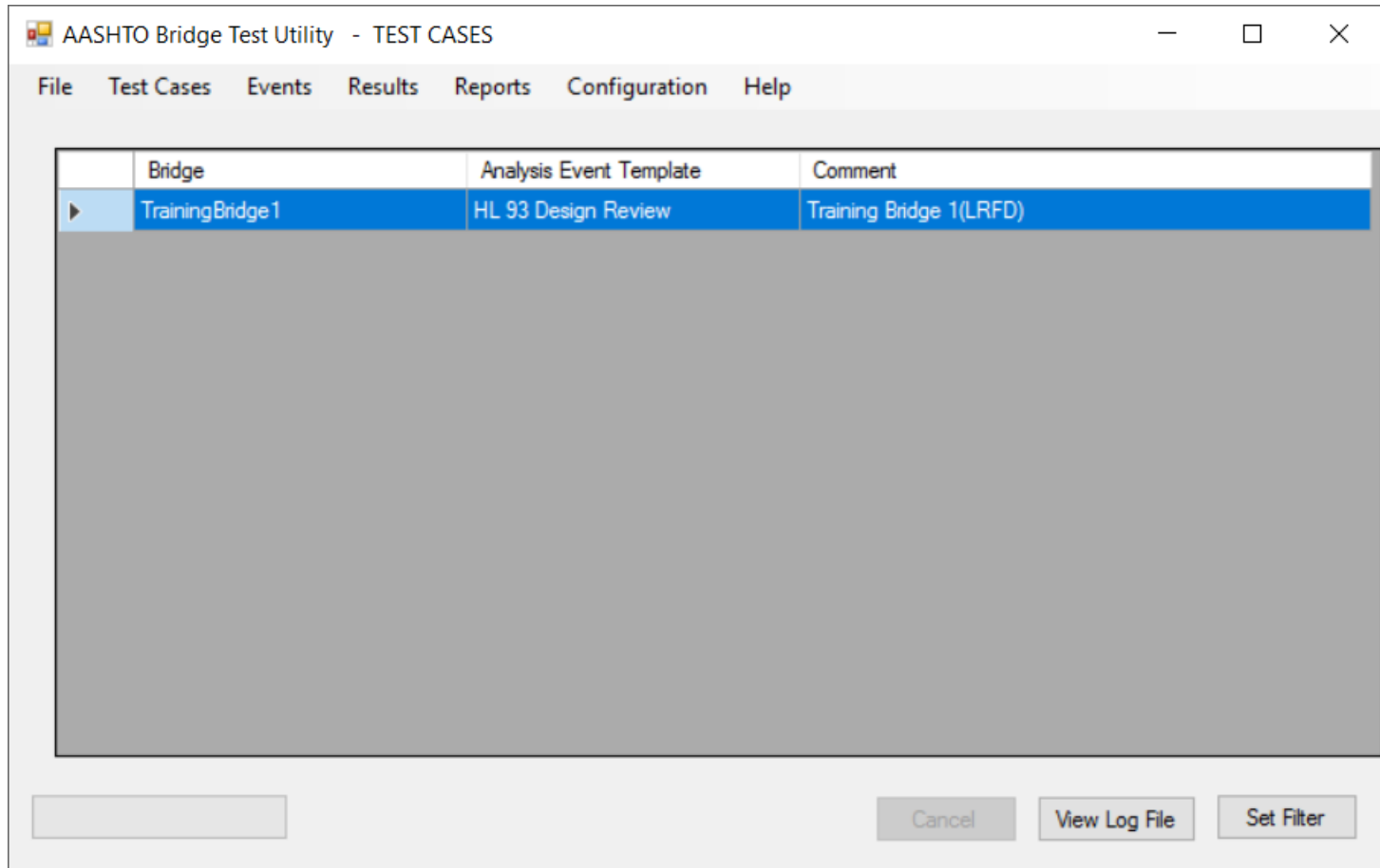
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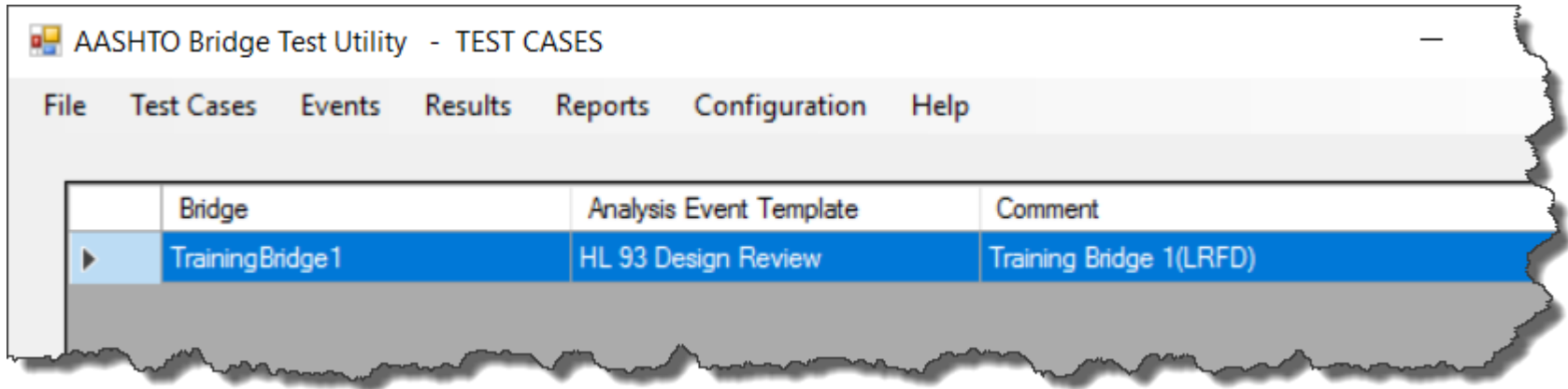
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Test Utility User Demo

Test Utility Batch

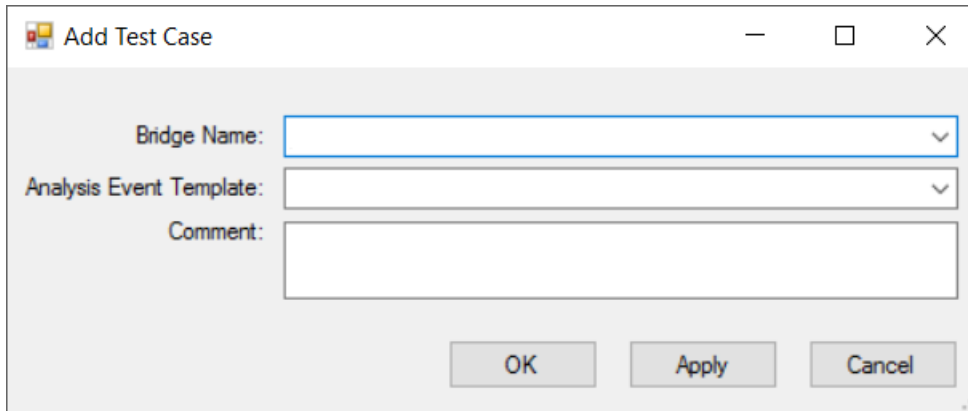


- A test case associates a bridge with an analysis event template



- From the Test Case window, the user can run one or a set of test cases on the current version of BrDR comparing current results to results created from an earlier version

- 3 ways to create test cases
 - Manually add a test case



The screenshot shows a standard Windows-style dialog box titled "Add Test Case". It features a title bar with a close button (X). The main area contains three input fields: "Bridge Name" (a dropdown menu), "Analysis Event Template" (a dropdown menu), and "Comment" (a text area). At the bottom, there are three buttons: "OK", "Apply", and "Cancel".

- Import a tab-delimited text file with the Bridge Name, Analysis Event Template and Comment
- Import a RTU or SCA file

- Run test cases
 - Location of the BrDR software for running the analysis
 - BrDR data source for the bridges and analysis event templates
 - Version label for uniquely identifying the run

Run Test Cases

Test Utility Configuration

Analysis Root Directory: C:\Rtu\BrDR\
Event Output Directory: C:\Rtu\EventFiles\

BrDR is in this directory

C:\Program Files\AASHTOWare\BrDR682\

BrDR ODBC Driver

Select the Odbc driver for the BrDR database
AASHTOWareBr682s

After Running Test Cases

Import spec check article text results (.sca)
 Import report results (.rtu)

Version label for this run
Test 682

Run Cancel

- Results of a test case are organized into events
 - An event identifies the test case, a member alternative, an event type and the version label
 - An event can be set as the benchmark for the test case

EVENTS

	Bridge	Analysis Event Template	Analysis Type	Member Alt Name	Run Date/Time	Event Type	Version Label	Benchmark
▶	TrainingBridge1	HL 93 Design Review	LRFD	Simple Span Structure:G1:Plate Girder:Plate Girder	11/16/2016 3:35:35 PM	Rtu	Test 1	<input checked="" type="checkbox"/>
	TrainingBridge1	HL 93 Design Review	LRFD	Simple Span Structure:G1:Plate Girder:Plate Girder	11/16/2016 3:36:15 PM	Sca	Test 1	<input type="checkbox"/>
	TrainingBridge1	HL 93 Design Review	LRFD	Simple Span Structure:G1:Plate Girder:Plate Girder	11/16/2016 3:40:12 PM	Rtu	Test 2	<input type="checkbox"/>
	TrainingBridge1	HL 93 Design Review	LRFD	Simple Span Structure:G1:Plate Girder:Plate Girder	11/16/2016 3:40:51 PM	Sca	Test 2	<input type="checkbox"/>

- Events can be compared between 2 Version Labels or Benchmark vs Most Recent

COMPARE RESULTS

	Bridge	Analysis Event Template	Member Alternative	Version Label 1	Version Label 2	Type	Items Matching	Items Not Matching (Event 1)	Items Not Matching (Event 2)	Comment
▶	TrainingBridge1	HL 93 Design Review	Simple Span Structure:G1:Plate Girder:Plate Girder	*Test 1	Test 2	Rtu	97676	0	0	OK
	TrainingBridge1	HL 93 Design Review	Simple Span Structure:G1:Plate Girder:Plate Girder	Test 1	Test 2	Sca	866	0	0	OK

- Comparison results are presented the same way as Test Utility User

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Test Utility Batch Demo