AASHTOWare BrDR 7.5.0 Feature Tutorial Analysis Results Comparison (ARC) Tool Tutorial

This example describes the use of the Analysis Results Comparison (ARC) Tool feature in BrDR. *Note: The ARC Tool will be included in BrDR for versions 7.1 and later. At the time of this writing, the ARC Tool supports BrDR version 7.0 and later.*

Topics covered:

- Getting started
- Creating and appending to datasets
- Operation of the ARC Tool comparison feature

Getting Started

When installing BrDR, ensure that the ARC Tool is selected as a feature (see below).

	Br R Select pr	oducts to install	
Core Products	Tools	Utilities	Database
BrDR	PS Design Tool	Admin Utility	Migration Wizard
BrD	Steel Design Tool	Bridge Copy Utility	BrDR Databases
BrR	ARC Tool		_

Export Bridge XML Files

The ARC Tool analyzes bridges directly from AASHTOWare BridgeXML files rather than connecting to a database like BrDR. Bridge XML files can be generated by exporting bridges from a particular version of BrDR. Please note, version conversion is available in the ARC Tool for forward compatibility but not backward compatibility. For example, bridges exported from BrDR version 7.0 can be used to generate datasets for versions 7.0 and later, but bridges exported from BrDR version 7.1 cannot be used to generate datasets for BrDR version 7.0.

Data Explorer Window

Run the ARC Tool executable file to open the **Dataset Explorer** window (this is 'ArcToolUi.exe' located in the folder {BrDR installation folder}\ArcTool). This is the ARC Tool's main window and can be used to access the features in the ARC Tool. Below is a quick description of the features available for the ARC Tool.

Analysis Resul	-		Х								
Dataset Explo	Dataset Explorer Scan BrDR										
ID	ID Dataset name			Dataset name BrDR version Benchmark					Description		
Create	Append to	Create from	Set benchmark	Manage	Compare	Delete					

Settings

Opens the Settings Window to allow the user to update connection details for installed versions of BrDR.

Scan BrDR

Scans the user's computer for installed versions of BrDR (7.0.0 and later) and imports analysis setting templates.

Create

Allows the user to generate a new dataset.

Append to

Allows the user to generate new data and add it to an existing dataset.

Create From

Allows the user to generate a new dataset from an existing dataset using a different version of BrDR.

Set benchmark

Sets the selected the dataset as the benchmark. A benchmark is an accepted dataset that will be used to compare to future datasets.

Manage

Allows the user to view and delete the items within the selected dataset.

Compare

Runs a Level 1 comparison on 2 selected datasets or 1 selected dataset against the benchmark dataset.

Level 1 is a comparison of controlling rating factors at the bridge level.

Delete

Deletes the selected dataset(s).

Setup BrDR Connection Details

The first step in using the ARC Tool is to update the BrDR connection details information. Click on Settings in the **Dataset Explorer** window to open the **Settings** Window.

ARC Settings			_		×
Version —	Connection details				
7.2	Username	bridge]	
7.3	Password	•••••	\bigcirc]	
7.4	Profile	AASHTOWareBr75is	~		
7.5	Analysis output folder path				
7.0					
			ОК	Cance	el l

The list on the left will populate automatically with all the versions of BrDR installed on the user's machine. Select a BrDR version from the list and update the connection details with the correct database connection details information. The user can also update the location of the output files from a BrDR analysis by selecting a new folder path for the **Analysis output folder path** field. If nothing is specified, the **Analysis output folder path** will default to the BrDR settings.

The Username, Password, and Profile should be the same login information that is used to access BrDR on the login page:

Connect	Bridge Design & Rating Version 7.5.0.1 Build date Oct 12 2022 This license expires in 16 days.
Username	bridge
Password	•••••
Connect to	AASHTOWareBr75is ~
OK	Cancel Help License

If the Profiles dropdown is empty, first confirm that the profiles exist by opening BrDR and clicking '…' on the login window to open the **Manage Connections** window:

R Manage Connections		-		×
Connection details				
AASHTOWareBr75is	Profile name: AASHTOWareBr75is			
AASHTOWareBr75i	Connection type: Microsoft SQL Server SQL Server connection details Host address: localhost Database: AASHTOWareBr75is Windows Authentication SQL Encrypt	Refresh		
New Delet	e OK Car	ncel Te	st conne	ction

The Profiles dropdown should contain the connection profiles shown listed on the left side of this window. Also note, a user must login to BrDR at least once before using the ARC Tool to activate the license.

Register Installed Versions of BrDR and Import Analysis Settings Templates

The first step in using the ARC Tool is to register the installed versions of BrDR and import the existing Analysis Settings Templates. Click on Scan BrDR in the Dataset Explorer window to run this process. If any versions of BrDR are installed or uninstalled or if Analysis Settings Templates are created or removed, this step should be repeated.

Creating and Appending to a Dataset

The ARC Tool can be used to generate and store rating data for different versions of BrDR in a local ARC Tool database to be used in comparison analyses. This section describes the different ways to create and update rating datasets.

Create a Dataset

The next step in using the ARC Tool is to generate rating data from the different BrDR versions. Click **Create** in the **Dataset Explorer** window to open the **Create Dataset** window. Type in a name and description for the dataset. The BrDR version and Analysis Settings dropdown menus will be automatically populated after running **Scan BrDR** in the previous section. Select a BrDR version and Analysis Settings Template from the dropdown menus. Click **Browse** and select the folder where the exported bridge XML files are stored. To generate analysis data at the point of interest level, select the **Generate Level 3 Analysis** checkbox. Click **Generate** to connect to the selected version of BrDR and generate the new dataset.

Note: Generate Level 3 Analysis is not selected by default because it will produce large amounts of data. The database has an upper limit of 4gb. The tool will not function if the database is filled to the maximum amount. It is recommended that for large datasets, users run the tool without generating level 3 data. If a discrepancy is found in the level 1 or level 2 data, a new dataset can be created to generate level 3 data for only the bridges of interest.

Create Dataset	_		×
Name:	testBridges74		
Description:	A sample dataset of version 7.4.0 bridges		
BrDR version:	7.4.0.3001 ~	Ĵ.	
Analysis setting:	LRFR Design Load Rating \sim		
Bridge model xml folder:	Z:\Temp\TestBridges	B	rowse
	Generate Level 3 Analysis		
	Generate	C	ancel

Append to a Dataset

New data can also be added to an existing dataset by using the **Append to** option. Select the dataset to be updated and click **Append to** in the **Dataset Explorer** window to open the **Append to Dataset** window. The name and BrDR version will be read-only and are automatically populated with the information from the existing dataset. Select an analysis setting template from the dropdown menu. Click **Browse** and select the folder where the exported bridge XML files are stored. To generate analysis data at the point of interest level, select the **Generate Level 3 Analysis** checkbox. Click **Append** to generate new data for the selected bridge models and append it to the specified dataset.

Note: Generate Level 3 Analysis is not selected by default because it will produce large amounts of data. The database has an upper limit of 4gb. The tool will not function if the database is filled to the maximum amount. It is recommended that for large datasets, users run the tool without generating level 3 data. If a discrepancy is found in the level 1 or level 2 data, a new dataset can be created to generate level 3 data for only the bridges of interest.

Append to Dataset		_			×				
Name:	testBridges74								
BrDR version:	7.4.0.3001								
Analysis setting:	Ilysis setting: HL 93 Design Review 🗸								
Bridge model xml folder:	Z:\Temp\BESD-12430			Brov	vse				
	Generate Level 3 Analysis								
		Append		Can	cel				

Create Dataset From

A new dataset can also be created for another version of BrDR using the same inputs as an existing dataset. Select a dataset in the **Dataset Explorer** window and click **Create From** to open the **Create Dataset From** window. Enter the name and description of the new dataset and select the version of BrDR to use. To generate analysis data at the Point of Interest level, select the **Generate Level 3 Analysis** checkbox. Click **Generate** to create the new dataset. *Note: Generate Level 3 Analysis is not selected by default because it will produce large amounts of data. The database has an upper limit of 4gb. The tool will not function if the database is filled to the maximum amount. It is recommended that for large datasets, users run the tool without generating level 3 data. If a discrepancy is found in the level 1 or level 2 data, a new dataset can be created to generate level 3 data for only the bridges of interest.*

Create Dataset From		_		×			
Name:	testBridges75						
Description:	A sample dataset of version 7.5.0 bridges						
From dataset name:	testBridges74						
BrDR version:	7.5.0.1			~			
Analysis setting:	LRFR Design Load Rating			•			
Bridge IDs:	M0349-RCSS-0864-RCTB M1251RCMS-1251-RCSL			Î			
Bridge model XML folder(s):	Z:\Temp\TestBridges			•			
	Generate level 3 analysis						
	Gene	erate	Can	icel			

Set Benchmark

To set or change the existing Benchmark dataset, select a row, and click **Set Benchmark**. The Benchmark will be the default comparison dataset when only one dataset is selected in the **Dataset Explorer** window.

Manage Datasets

To view the bridge data within a dataset, select a row and click **Manage**. This will open the **Manage Dataset** window which displays a list of all the data items within a dataset by Bridge ID, BrDR version, and Analysis setting. Items can be deleted from a dataset by selecting rows and clicking **Delete**.

And	Manag	ge Dataset				-		×
M	anage (Dataset						
	ID	Bridge ID	BrDR version	Analysis setting	Level 3 analysis generated	Bridge model folder		
>	1	20725	7.4.0.3001	LRFR Design Load Rating		Z:\Temp\TestBridges		
	2	24540	7.4.0.3001	LRFR Design Load Rating		Z:\Temp\TestBridges		
	3	3 24600 7.4.0.3001 LRFR Design Load Rating Z:\Temp\TestBridges						
	4	28795	7.4.0.3001	LRFR Design Load Rating		Z:\Temp\TestBridges		
	5	30151	7.4.0.3001	LRFR Design Load Rating		Z:\Temp\TestBridges		
	6	M0349-RCSS-0864-RCTB	7.4.0.3001	LRFR Design Load Rating		Z:\Temp\TestBridges		
	7	M1251RCMS-1251-RCSL	7.4.0.3001	LRFR Design Load Rating		Z:\Temp\TestBridges		
								_
							Delete	
							<u></u>	_

Delete

The user can delete entire datasets from the ARC Tool by selecting rows in the **Dataset Explorer** window and clicking **Delete**.

Operation of the ARC Tool Comparison Feature

Once at least 2 rating datasets have been generated in the ARC tool, the user can run dataset comparison analyses. The following section describes how to generate comparison data in the ARC tool.

Compare Datasets

To compare two datasets, select the two rows in the **Dataset Explorer** window or to compare one dataset against the benchmark, select one row in the **Dataset Explorer** window. Click **Compare** to open the **Dataset Comparison Setting** window. The **Dataset Comparison Setting** window will display the name, BrDR version, analysis settings template, and Bridge IDs for the datasets to be compared. The display tolerances and exclude comparison ratios can also be updated in this window. Please note, only the RF or DR tolerance is used for level 1 and level 2 comparisons. The capacity, dead load, and live load percent changes are only shown for level 3 comparisons.

Dataset Comparison	Setting			_		×			
Dataset 1			Dataset 2						
Name			Name						
TestDataset74			TestDataset75						
BrDR version			BrDR version						
7.4.0.3001			7.5.0.1						
Analysis settings			Analysis settings						
LRFR Design Load Rating			LRFR Design Load R	ating					
Bridge IDs			Bridge IDs						
9-9-9 Steel 3span		î	9-9-9 Steel 3span						
TrainingBridge2			TrainingBridge2						
TrainingBridge3			TrainingBridge3						
PCITrainingBridge1			PCITrainingBridge1						
PCITrainingBridge2			PCITrainingBridge2			_			
Benchmark			Benchmark						
Capacity tolerance (%):	1.0]	Exclude comparison for r	atio of					
DL tolerance (%):	1.0] (Capacity/DL >	99.0					
LL tolerance (%):	1.0	ĵ I	RF > 99.0						
RF or DR tolerance (%): 1.0									
			Run level 1	compare	Can	cel			

Level 1 Comparison

Click **Run level 1 compare** in the **Dataset Comparison Setting** window to run a level 1 comparison on the selected datasets. This will open the **Level 1 Comparison** window which displays the results of the comparison by the controlling rating factor for each bridge. If the location or limit state is different between the two datasets, the value for that column will be shown in red. If the rating/design factor percent change between the two datasets is greater

than the RF or DR tolerance specified in the **Dataset Comparison Setting** window, the value for that column will be shown in red.

The **Level 1 Comparison** window also includes the Dataset 1 and Dataset 2 runtimes and a percent change between the two values. The runtimes are the total time in seconds it takes to run the analysis in BrDR.

To view the settings for this comparison, click **View comparison setting** in the top right corner of the window. This will open the **Dataset Comparison Setting** window in read-only mode.

To export the results to a CSV file, click Export to CSV and select a location to save the file.

The **Comparison Summary** shown at the bottom left of the window provides a summary of the level 1 results. If either dataset 1 or dataset 2 does not have a rating/design factor, the comparison will be counted as a failure. If the limit state or controlling location are different between dataset 1 and dataset 2 or the rating/design factor percent change is not within the specified tolerance, the comparison will be counted as unacceptable. If the limit state and location are both the same and the rating/design factor percent change is within the specified tolerance, the comparison will be counted as a comparison will be counted as a comparison will be counted as a comparison will be counted as acceptable.

The Show all within tolerance, Show all outside tolerance, Show comparison failure, and Show all buttons at the bottom of the Level 1 Comparison window can be used to filter the data grid by rating/design factor percent change tolerance.

E Level 1 Comparison – 🗆 X													
										View comparison settin	ng Exp	ort to CSV	
RF or DR Tolerance(%): 1.0													
ID	Bridge ID	Vehicle	Rating or design	Dataset 1 RF or DR	Dataset 2 RF or DR	Percent change (%)	Location same?	Limit state same?	Dataset 1 run time	Dataset 2 run time	Run time p	ercent	
42	PCITrainingBridge5	HL-93 (US)	Operating	0.000	0.000	-0.000	Yes	Yes	6.1	6.3		2.041	٠
43	PCITrainingBridge6	HL-93 (US)	Inventory	0.000	0.000	-0.000	Yes	Yes	7.2	8.1		13.102	
44	PCITrainingBridge6	HL-93 (US)	Operating	0.000	0.000	-0.000	Yes	Yes	7.2	8.1		13.102	
45	RCTrainingBridge1	HL-93 (US)	Inventory	0.811	0.811	-0.000	Yes	Yes	5.4	5.7		5.178	
46	RCTrainingBridge1	HL-93 (US)	Operating	1.052	1.052	-0.000	Yes	Yes	5.4	5.7		5.178	
47	Simple DL-Cont LL	HL-93 (US)	Inventory	0.262	0.298	13.852	No	Yes	8.2	8.9		8.555	
48	Simple DL-Cont LL	HL-93 (US)	Operating	0.340	0.387	13.921	No	Yes	8.2	8.9		8.555	
49	Splice Example	HL-93 (US)	Inventory	0.617	0.617	0.000	Yes	Yes	17.0	17.8		4.786	
50	Splice Example	HL-93 (US)	Operating	0.798	0.798	0.000	Yes	Yes	17.0	17.8		4.786	
51	TimberTrainingBrid	. HL-93 (US)	Inventory	0.600	0.600	0.000	Yes	Yes	8.3	8.1		-3.177	
52	TimberTrainingBrid	. HL-93 (US)	Operating	0.777	0.777	0.000	Yes	Yes	8.3	8.1		-3.177	
53	TrainingBridge2	HL-93 (US)	Inventory	0.548	0.548	0.000	Yes	Yes	5.2	5.4		3.890	
54	TrainingBridge2	HL-93 (US)	Operating	0.710	0.710	0.000	Yes	Yes	5.2	5.4		3.890	
55	TrainingBridge3	HL-93 (US)	Inventory	0.388	0.388	0.000	Yes	Yes	7.0	7.4		6.245	L
56	TrainingBridge3	HL-93 (US)	Operating	0.504	0.504	0.000	Yes	Yes	7.0	7.4		6.245	L
57	TrussTrainingExam	HL-93 (US)	Inventory	0.495	0.495	0.000	Yes	Yes	10.5	10.3		-2.071	L
58	TrussTrainingExam	HL-93 (US)	Operating	0.641	0.641	0.000	Yes	Yes	10.5	10.3		-2.071	L
59	Visual Reference 1	HL-93 (US)	Inventory	0.794	0.794	0.000	Yes	Yes	6.0	6.5		8.104	L
60	Visual Reference 1	HL-93 (US)	Operating	1.029	1.029	0.000	Yes	Yes	6.0	6.5		8.104	Į.
Comparise Acceptabl Unaccepta Comparise	Looparison failures = 0 of 60 (0%)												
tole	erance to	blerance	failure	Show all						Run level 2 co	ompare	Close	

Level 2 Comparison

Click **Run level 2 compare** in the **Level 1 Comparison** window to run a level 2 comparison on the selected bridges. This will open the **Level 2 Comparison** window which displays the results of the comparison at the controlling location of each member in a bridge. If the controlling location or limit state is different between the two datasets, the value for that column will be shown in red. If the rating/design factor percent change between the two datasets is

greater than the RF/DR tolerance specified in the **Dataset Comparison Setting** window, the value for that column will be shown in red.

To view the settings for this comparison, click the **View comparison setting** button in the top right corner of the window. This will open the **Dataset Comparison Setting** window in read-only mode.

To export the results to a CSV file, click the **Export to CSV** button and select a location to save the file. The **Comparison Summary** located at in the bottom left of the window shows a summary of the level 2 results. If either dataset 1 or dataset 2 does not have a rating/design factor, the comparison will be counted as a failure. If the limit state or controlling location are different between dataset 1 and dataset 2 or the rating/design factor percent change is not within the specified tolerance, the comparison will be counted as unacceptable. If the limit state and location are both the same and the rating/design factor percent change is within the specified tolerance, the comparison will be counted as acceptable.

The Show all within tolerance, Show all outside tolerance, Show comparison failure, and Show all buttons at the bottom of the Level 2 Comparison window can be used to filter the data grid by rating/design factor percent change tolerance.

Evel 2 Comparison – 🗆 X											
										View comparison	setting Export to CSV
RF or I	RF or DR Tolerance(%): 1.0										
	ID	Bridge ID	Super structure de	Member	Vehicle	Rating or design	Dataset 1 RF or DR	Dataset 2 RF or DR	Percent change (%)	Location same?	Limit state same?
1	59	RCTrainingBridge1	Structure Definitio	G3	HL-93 (US)	Inventory	0.890	0.890	0.000	Yes	Yes
1	60	RCTrainingBridge1	Structure Definitio	G3	HL-93 (US)	Operating	1.154	1.154	0.000	Yes	Yes
1	61	RCTrainingBridge1	Structure Definitio	G4	HL-93 (US)	Inventory	0.890	0.890	0.000	Yes	Yes
1	62	RCTrainingBridge1	Structure Definitio	G4	HL-93 (US)	Operating	1.154	1.154	0.000	Yes	Yes
1	63	RCTrainingBridge1	Structure Definitio	G5	HL-93 (US)	Inventory	0.811	0.811	0.000	Yes	Yes
1	64	RCTrainingBridge1	Structure Definitio	G5	HL-93 (US)	Operating	1.052	1.052	0.000	Yes	Yes
1	65	Simple DL-Cont LL	GirderLine Superst	Splices At Piers	HL-93 (US)	Inventory	0.262	0.298	13.852	No	Yes
1	66	Simple DL-Cont LL	GirderLine Superst	Splices At Piers	HL-93 (US)	Operating	0.340	0.387	13.921	No	Yes
1	67	Splice Example	Superstructure 1-S	G1	HL-93 (US)	Inventory	0.617	0.617	0.000	Yes	Yes
1	68	Splice Example	Superstructure 1-S	G1	HL-93 (US)	Operating	0.798	0.798	0.000	Yes	Yes
1	69	Splice Example	Superstructure 1-S	G2	HL-93 (US)	Inventory	1.213	1.213	0.000	Yes	Yes
1	70	Splice Example	Superstructure 1-S	G2	HL-93 (US)	Operating	1.573	1.573	0.000	Yes	Yes
1	71	TimberTrainingBrid	Structure Definitio	DECK	HL-93 (US)	Inventory	0.600	0.600	0.000	Yes	Yes
1	72	TimberTrainingBrid	Structure Definitio	DECK	HL-93 (US)	Operating	0.777	0.777	0.000	Yes	Yes
1	73	TimberTrainingBrid	Structure Definitio	G2	HL-93 (US)	Inventory	0.716	0.716	0.000	Yes	Yes
1	74	TimberTrainingBrid	Structure Definitio	G2	HL-93 (US)	Operating	0.928	0.928	0.000	Yes	Yes
1	75	TrainingBridge2	HDR Girder Line	Interior Member	HL-93 (US)	Inventory	0.548	0.548	0.000	Yes	Yes
1	76	TrainingBridge2	HDR Girder Line	Interior Member	HL-93 (US)	Operating	0.710	0.710	0.000	Yes	Yes
Comp	ariso	n summary:									v
Accep Unaco	table eptat	row data = 185 of 194 ple row data = 9 of 194	(95%) (5%)								
Comp	ariso	n failures = 0 of 194 (09	36)								
Sh	ow a toler	ance tol	all outside Shov lerance	r comparison failure	Show all					Run leve	I 3 compare Close

Level 3 Comparison

If the **Generate Level 3 Analysis** checkbox was selected for both dataset 1 and dataset 2, a level 3 comparison can be generated. Click **Run level 3 compare** in the **Level 2 Comparison** window to run a level 3 comparison on the selected members. This will open the **Level 3 Comparison** window which displays the results of the comparison at the point of interest level. If the capacity, dead load, live load, or rating/design factor percent change between

dataset 1 and dataset 2 are greater than the respective tolerances specified in the **Dataset Comparison Setting** window, the value for that column will be shown in red.

To view the settings for this comparison, click the **View comparison setting** button in the top right corner of the window. This will open the **Dataset Comparison Setting** window in read-only mode.

To export the results to a CSV file, click the **Export to CSV** button and select a location to save the file.

The **Show data at** radio buttons can be used to toggle the level 3 data to show comparisons of the controlling rating/design factor of the bridge, superstructure def. or member.

The **Comparison Summary** located at the bottom left of the window shows a summary of the level 3 results. If either dataset 1 or dataset 2 does not have a rating/design factor, the comparison will be counted as a failure. If the rating/design factor percent change is not within the specified tolerance, the comparison will be counted as unacceptable. If the rating/design factor percent change is within the specified tolerance, the comparison will be counted as counted as acceptable.

The **Show all within tolerance**, **Show comparison failure**, and **Show all** buttons at the bottom of the Level 3 Comparison window can be used to filter the data grid by rating/design factor percent change tolerance.

Now data at Show data at O Bridge level Superstructure def level O Member level O Member level O Member level O Member level O Member level O Member level Operating Span -% of span/ Action - unit Unfact. Ll. change Unfact. capacity ch RF or DI 7682 GirderLine Superst Splices At Piers HU-93 (US) Operating 2-500% Resure - 81.873 - 22.20 6.0049 7682 GirderLine Superst Splices At Piers HU-93 (US) Operating 2-700% Resure - 81.873 - 22.20 6.0049 7685 GirderLine Superst Splices At Piers HU-93 (US) Operating	View Comparison setting Export to CSV L change Unfact. capacity ch RF or DR change (-2250 6.049 -0.000 -2250 6.049 13.921 -2250 6.049 13.921 -2250 6.049 13.921 -2250 6.049 13.921 -2250 6.049 13.921	Unfact. LL change -2.250 -2.250 -2.250	Unfact. DL change -81.873	Action - unit	Span - % of span/	Rating or design	IR Tolerance(%): 1.0	ance(%): 1.0 RF or Di	erance(%): 1.0 LL Tolera	ilerance(%): 1.0 DL Tol ta at	pacity Ti Show di Bri
Capacity Tolerance(%): 1.0 LI Tolerance(%): 1.0 LI Tolerance(%): 1.0 RF or DR Tolerance(%): 1.0 Superstructure def. level Superstructure def. level Member Vehicle Rating or design Span - % of span/. Action - unit Unfact. DL change Unfact. LL change Unfact. capacity ch RF or DI Free Simple DL-Cont LL Girderline Superst. Splices At Piers HL-93 (US) Operating 2-50.0% Flexure - 81.873 - 2220 - 60.49 Free - 81.873 - 2250 - 60.49 Free - 91.8127 - 2250 - 60.49 Free - 91.8127 - 2250 - 60.49 Free - 91.8128 - 2250	L change Unfact. capacity ch RF or DR change (-2250 6.049 -0.000 -2250 6.049 113921 -2250 6.049 113921 -2250 6.049 113921	Unfact. LL change -2.250 -2.250 -2.250	Unfact. DL change -81.873	Action - unit	Span - % of span/	Rating or design	IR Tolerance(%): 1.0	ance(%): 1.0 RF or DI	erance(%): 1.0 LL Tolera	lerance(%): 1.0 DL Tol ta at dge level Supe	pacity Ti Show di Bri
Show data at Bridge level Superstructure def. level Member Vehicle Rating or design Span -% of span/ Action - unit Unfact. DL change Unfact. LL change Unfact. Capacity ch RF or DI 7682 Simple DL-Cont LL GirderLine Superst. Splices At Piers HL-93 (US) Operating 2-60.0% Flexure -81.873 -2.220 60.49 0 7683 Simple DL-Cont LL GirderLine Superst. Splices At Piers HL-93 (US) Operating 2-60.0% Flexure -81.873 -2.220 60.49 0 7684 Simple DL-Cont LL GirderLine Superst. Splices At Piers HL-93 (US) Operating 2-60.0% Flexure -81.873 -2.220 60.49 0 7685 Simple DL-Cont LL GirderLine Superst. Splices At Piers HL-93 (US) Operating 2-80.0% Flexure -81.873 -2.220 60.49 0 7686 Simple DL-Cont LL GirderLine Superst. Splices At Piers HL-93 (US) Operating 2-90.0% Flexure -81.873 -2.220 60.49 0	Lchange Unfact. capacity ch RF or DR change (-2250 6.049 -0.000 -2250 6.049 13.921 -2250 6.049 13.921 -2250 6.049 13.921 -2250 6.049 13.921	Unfact. LL change -2250 -2250 -2250	Unfact. DL change -81.873	Action - unit	Span - % of span/	Rating or design		Member level	structure def. level	ta at Supe	Show da
Bridge level Superstructure def. level Member level Bridge level Superstructure def. level Member level Viron Usia all Bridge lob Superstructure def. level Member level Viron Usia all Bridge lob Superstructure def. level Member level Viron Usia all Bridge lob Superstructure def. level Member level Viron Usia Simple DL-Cont LLL Girderline Supersta Splices At Piers HL-93 (US) Operating 2-50.0% Flexure -81.873 -2.220 66.049 7683 Simple DL-Cont LLL Girderline Supersta Splices At Piers HL-93 (US) Operating 2-60.0% Flexure -81.873 -2.220 66.049 7685 Simple DL-Cont LLL Girderline Supersta Splices At Piers HL-93 (US) Operating 2-80.0% Flexure -81.873 -2.220 66.049 0 7686 Simple DL-Cont LLL Girderline Supersta Splices At Piers HL-93 (US) Operating 2-90.0% Flexure -81.873 -2.220 66.049 0 7686 Simple DL-Cont LLL Girderline Supersta Splice	Lchange Unfact. capacity ch RF or DR change (Image: Change (<thimage: cha<="" td=""><td>Unfact. LL change -2.250 -2.250 -2.250</td><td>Unfact. DL change -81.873</td><td>Action - unit</td><td>Span - % of span/</td><td>Rating or design</td><td></td><td>O Member level</td><td>structure def. level</td><td>dge level Supe</td><td>Bri</td></thimage:>	Unfact. LL change -2.250 -2.250 -2.250	Unfact. DL change -81.873	Action - unit	Span - % of span/	Rating or design		O Member level	structure def. level	dge level Supe	Bri
Bridge level Superstructure def. level Member level ID Bridge ID Super structure def. level Member level 7682 Simple DL-Cont LL. GirderLine Superst. Splices At Piers HL-93 (US) Operating 2-50.0% Flexure -81.873 -2.250 66.49 7683 Simple DL-Cont LL. GirderLine Superst. Splices At Piers HL-93 (US) Operating 2-60.0% Flexure -81.873 -2.250 66.49 7683 Simple DL-Cont LL. GirderLine Superst. Splices At Piers HL-93 (US) Operating 2-60.0% Flexure -81.873 -2.250 66.49 7685 Simple DL-Cont LL. GirderLine Superst. Splices At Piers HL-93 (US) Operating 2-70.0% Flexure -81.873 -2.250 66.49 7685 Simple DL-Cont LL. GirderLine Superst. Splices At Piers HL-93 (US) Operating 2-90.0% Flexure -81.873 -2.250 66.49 7686 Simple DL-Cont LL. GirderLine Superst. Splices At Piers HL-93 (US) Operating 2-99.0% Flexure 4.81.873 -2.250 <td>L change Unfact. capacity ch RF or DR change (Image: Change (<thimage: ch<="" td=""><td>Unfact. LL change -2.250 -2.250 -2.250</td><td>Unfact. DL change -81.873</td><td>Action - unit</td><td>Span - % of span/</td><td>Rating or design</td><td></td><td>Member level</td><td>structure def. level</td><td>lge level 🕖 Supe</td><td>🕖 Bri</td></thimage:></td>	L change Unfact. capacity ch RF or DR change (Image: Change (<thimage: ch<="" td=""><td>Unfact. LL change -2.250 -2.250 -2.250</td><td>Unfact. DL change -81.873</td><td>Action - unit</td><td>Span - % of span/</td><td>Rating or design</td><td></td><td>Member level</td><td>structure def. level</td><td>lge level 🕖 Supe</td><td>🕖 Bri</td></thimage:>	Unfact. LL change -2.250 -2.250 -2.250	Unfact. DL change -81.873	Action - unit	Span - % of span/	Rating or design		Member level	structure def. level	lge level 🕖 Supe	🕖 Bri
ID Bridge ID Super structure de. Member Vehicle Rating or design Span - % of span/. Action - unit Unfact. L1 change Unfact. L2 change Each change Each change Each change Unfact. L2 change Each change	L change Unfact. capacity ch RF or DR change (Provide -2250 6.049 -0.000 -0.000 -2250 6.049 13.921 -2250 6.049 13.921 -2250 6.049 13.921	Unfact. LL change -2.250 -2.250 -2.250	Unfact. DL change -81.873	Action - unit	Span - % of span/	Rating or design					
7682 Simple DL-Cont LL Girder Line Superst. Splices At Piers HL-93 (US) Operating 2-500% Flexure -8-81373 -2-250 66.04 7683 Simple DL-Cont LL Girder Line Superst. Splices At Piers HL-93 (US) Operating 2-600% Flexure -8-81373 -2-250 66.04 7684 Simple DL-Cont LL Girder Line Superst. Splices At Piers HL-93 (US) Operating 2-700% Flexure -8-81373 -2-250 66.049 7685 Simple DL-Cont LL Girder Line Superst. Splices At Piers HL-93 (US) Operating 2-80.0% Flexure -8-81373 -2-250 66.049 7685 Simple DL-Cont LL Girder Line Superst. Splices At Piers HL-93 (US) Operating 2-90.0% Flexure -8-81373 -2-250 6.049 7685 Simple DL-Cont LL Girder Line Superst. Splices At Piers HL-93 (US) Operating 2-90.0% Flexure 45.96 2.306 157.225 7685 Simple DL-Cont LL Girder Line S	-2250 6.049 -0.000 -2250 6.049 13.921 -2250 6.049 13.921 -2250 6.049 13.921 -2250 6.049 13.921	-2.250 -2.250 -2.250	-81.873			nating of design	Vehicle	Member	Super structure de	Bridge ID	ID
7683 Simple DL-Cort LL GirderLine Superst. Splices At Piers HL-93 (US) Operating 2-600% Flexure -8.1873 -2.250 6.644 7684 Simple DL-Cort LL GirderLine Superst. Splices At Piers HL-93 (US) Operating 2-70.0% Flexure -8.1873 -2.250 6.649 7685 Simple DL-Cort LL GirderLine Superst. Splices At Piers HL-93 (US) Operating 2-80.0% Flexure -8.1873 -2.250 6.649 7685 Simple DL-Cont LL GirderLine Superst. Splices At Piers HL-93 (US) Operating 2-90.0% Flexure -8.1873 -2.250 6.649 7685 Simple DL-Cont LL GirderLine Superst. Splices At Piers HL-93 (US) Operating 2-90.0% Flexure -8.1873 -2.250 6.649 7685 Simple DL-Cont LL GirderLine Superst. Splices At Piers HL-93 (US) Operating 3-0.9% Flexure -9.90.761 -4.130 3.106 7685 Simple DL-Cont LL GirderLine Superst. <td>-2250 6.049 13.921 -2250 6.049 13.921 -2250 6.049 13.921 -2250 6.049 13.921</td> <td>-2.250</td> <td></td> <td>Flexure</td> <td>2-50.0%</td> <td>Operating</td> <td>HL-93 (US)</td> <td>Splices At Piers</td> <td>GirderLine Superst</td> <td>Simple DL-Cont LL</td> <td>7682</td>	-2250 6.049 13.921 -2250 6.049 13.921 -2250 6.049 13.921 -2250 6.049 13.921	-2.250		Flexure	2-50.0%	Operating	HL-93 (US)	Splices At Piers	GirderLine Superst	Simple DL-Cont LL	7682
Profe Simple DL-Cort LL Girder Line Superst. Splices At Piers H-93 (US) Operating 2-70% Flexure -8.1873 -2.250 6.649 7685 Simple DL-Cort LL Girder Line Superst. Splices At Piers H-93 (US) Operating 2-80.0% Flexure -8.1873 -2.250 6.649 7686 Simple DL-Cort LL Girder Line Superst. Splices At Piers H-93 (US) Operating 2-90.0% Flexure -8.1873 -2.250 6.649 7687 Simple DL-Cort LL Girder Line Superst. Splices At Piers H-93 (US) Operating 2-90.0% Flexure -8.1873 -2.250 6.649 7687 Simple DL-Cort LL Girder Line Superst. Splices At Piers H-93 (US) Operating 3-0.9% Flexure 5.002 7.015 310.750 310.750 7689 Simple DL-Cort LL Girder Line Superst. Splices At Piers H-93 (US) Operating 3-10% Flexure -9.9071 -4.133 3.166 7689 Simple DL-Cort LL Gi	-2250 6.049 13.921 -2250 6.049 13.921 -2250 6.049 13.921	-2.250	-81.873	Flexure	2-60.0%	Operating	HL-93 (US)	Splices At Piers	GirderLine Superst	Simple DL-Cont LL	7683
Nome Simple DL-ConttLL GirderLine Superst. Splices At Piers HL-93 (US) Operating 2-800% Flexure -8.1873 -2.250 6.049 768 Simple DL-ConttLL GirderLine Superst. Splices At Piers HL-93 (US) Operating 2-900% Flexure -8.1873 -2.250 6.049 768 Simple DL-ConttLL GirderLine Superst. Splices At Piers HL-93 (US) Operating 2-900% Flexure -8.1873 -2.250 6.049 768 Simple DL-ConttLL GirderLine Superst. Splices At Piers HL-93 (US) Operating 3-09% Flexure 4.50 30.050 310.750 768 Simple DL-ConttLL GirderLine Superst. Splices At Piers HJ-93 (US) Operating 3-10.756 Flexure -9.9761 -4.133 3.196 768 Simple DL-ConttLL GirderLine Superst. Splices At Piers HJ-93 (US) Operating 3-100% Flexure -9.9761 -4.133 3.196 769 Simple DL-ConttLL GirderLine Superst. <	-2.250 6.049 13.921 -2.250 6.049 13.921		-81.873	Flexure	2-70.0%	Operating	HL-93 (US)	Splices At Piers	GirderLine Superst	Simple DL-Cont LL	7684
Nome Simple DL-Cont LL Girder Line Superst. Splices At Piers H-93 (US) Operating 2900% Flexure -81873 -2.250 66.04 768 Simple DL-Cont LL Girder Line Superst. Splices At Piers H-93 (US) Operating 2900% Flexure 4.505 2.200 510.075 768 Simple DL-Cont LL Girder Line Superst. Splices At Piers H-93 (US) Operating 3.09% Flexure 4.505 2.200 510.075 768 Simple DL-Cont LL Girder Line Superst. Splices At Piers H-93 (US) Operating 3.09% Flexure 4.505 3.105 769 Simple DL-Cont LL Girder Line Superst. Splices At Piers H-93 (US) Operating 3.10% Flexure -4.90.71 3.108 769 Simple DL-Cont LL Girder Line Superst. Splices At Piers H-93 (US) Operating 3-200% Flexure -4.90.71 -4.133 3.196 769 Simple DL-Cont LL Girder Line Superst. H-93 (US) Operating <t< td=""><td>-2.250 6.049 13.921</td><td>-2.250</td><td>-81.873</td><td>Flexure</td><td>2-80.0%</td><td>Operating</td><td>HL-93 (US)</td><td>Splices At Piers</td><td>GirderLine Superst</td><td>Simple DL-Cont LL</td><td>7685</td></t<>	-2.250 6.049 13.921	-2.250	-81.873	Flexure	2-80.0%	Operating	HL-93 (US)	Splices At Piers	GirderLine Superst	Simple DL-Cont LL	7685
767 Simple DL-Cont LL Girder Line Superst. Splices At Piers HL-93 (US) Operating 2-990% Flexure 44.56 2.306 310.750 768 Simple DL-Cont LL Girder Line Superst. Splices At Piers HL-93 (US) Operating 3-0.9% Flexure 5.802 7.500 157.235 769 Simple DL-Cont LL Girder Line Superst. Splices At Piers HL-93 (US) Operating 3-1.7% Flexure -990.761 -4.1330 3.196 769 Simple DL-Cont LL Girder Line Superst. Splices At Piers HL-93 (US) Operating 3-10.0% Flexure -990.761 -4.1330 3.196 769 Simple DL-Cont LL Girder Line Superst. Splices At Piers HL-93 (US) Operating 3-10.0% Flexure -990.761 -4.1330 3.196 769 Simple DL-Cont LL Girder Line Superst. Splices At Piers HL-93 (US) Operating 3-20.0% Flexure -990.761 -4.1330 3.196		-2.250	-81.873	Flexure	2-90.0%	Operating	HL-93 (US)	Splices At Piers	GirderLine Superst	Simple DL-Cont LL	7686
768 Simple DL-Cont LL Girder Line Superst. Splices At Piers HL-93 (US) Operating 3-03% Flexure 5.802 7.500 157.235 769 Simple DL-Cont LL Girder Line Superst. Splices At Piers HL-93 (US) Operating 3-17% Flexure -997.61 -41.330 3.196 769 Simple DL-Cont LL Girder Line Superst. Splices At Piers HL-93 (US) Operating 3-10.0% Flexure -997.61 -41.330 3.196 769 Simple DL-Cont LL Girder Line Superst. Splices At Piers HL-93 (US) Operating 3-10.0% Flexure -997.61 -41.330 3.196 769 Simple DL-Cont LL Girder Line Superst. Splices At Piers H-93 (US) Operating 3-20.0% Flexure -997.61 -41.330 3.196	2.306 310.750 319.138	2.306	4.596	Flexure	2-99.0%	Operating	HL-93 (US)	Splices At Piers	GirderLine Superst	Simple DL-Cont LL	7687
769 Simple DL-Cont LL. Girder Line Superst Splices At Piers HL-93 (US) Operating 3-1.7% Flexure -997.61 -41.330 3.196 769 Simple DL-Cont LL Girder Line Superst Splices At Piers HL-93 (US) Operating 3-10.0% Flexure -997.61 -41.330 3.196 769 Simple DL-Cont LL Girder Line Superst Splices At Piers HL-93 (US) Operating 3-20.0% Flexure -997.61 -41.330 3.196	7.560 157.235 143.724	7.560	5.802	Flexure	3-0.9%	Operating	HL-93 (US)	Splices At Piers	GirderLine Superst	Simple DL-Cont LL	7688
7690 Simple DL-Cont LL Girder Line Superst Splices At Piers HL-93 (US) Operating 3-100% Flexure -997.61 -41.330 3.196 7691 Simple DL-Cont LL Girder Line Superst Splices At Piers HL-93 (US) Operating 3-200% Flexure -997.61 -41.330 3.196	-41.330 3.196 84.898	-41.330	-99.761	Flexure	3-1.7%	Operating	HL-93 (US)	Splices At Piers	GirderLine Superst	Simple DL-Cont LL	7689
7691 Simple DL-Cont LL_ GirderLine Superst Splices At Piers HL-93 (US) Operating 3-200% Flexure -99,761 -41.330 3.196	-41.330 3.196 84.898	-41.330	-99.761	Flexure	3-10.0%	Operating	HL-93 (US)	Splices At Piers	GirderLine Superst	Simple DL-Cont LL	7690
	-41.330 3.196 84.898	-41.330	-99.761	Flexure	3-20.0%	Operating	HL-93 (US)	Splices At Piers	GirderLine Superst	Simple DL-Cont LL	7691
7692 Simple DL-Cont LL GirderLine Superst Splices At Piers HL-93 (US) Operating 3-30.0% Flexure -99.761 -41.330 3.196	-41.330 3.196 -0.000	-41.330	-99.761	Flexure	3-30.0%	Operating	HL-93 (US)	Splices At Piers	GirderLine Superst	Simple DL-Cont LL	7692
769 Simple DL-Cont LL GirderLine Supersta Splices At Piers HL-93 (US) Operating 3-40.0% Flexure -0.000 0.000 0.000	0.000 -0.000	0.000	-0.000	Flexure	3-40.0%	Operating	HL-93 (US)	Splices At Piers	GirderLine Superst	Simple DL-Cont LL	7693
7694 Simple DL-Cont LL GirderLine Superst Splices At Piers HL-93 (US) Operating 3-50.0% Flexure -0.000 0.000	0.000 0.000 -0.000	0.000	-0.000	Flexure	3-50.0%	Operating	HL-93 (US)	Splices At Piers	GirderLine Superst	Simple DL-Cont LL	7694
769 Simple DL-Cont LL GirderLine Supersta Splices At Piers HL-93 (US) Operating 3-60.0% Flexure -0.000 0.000 0.000	0.000 -0.000	0.000	-0.000	Flexure	3-60.0%	Operating	HL-93 (US)	Splices At Piers	GirderLine Superst	Simple DL-Cont LL	7695
7696 Simple DL-Cont LL GirderLine Superst Splices At Piers HL-93 (US) Operating 3-70.0% Flexure -0.000 0.000 0.000	0.000 -0.000	0.000	-0.000	Flexure	3-70.0%	Operating	HL-93 (US)	Splices At Piers	GirderLine Superst	Simple DL-Cont LL	7696
7697 Simple DL-Cont LL GirderLine Superst Splices At Piers HL-93 (US) Operating 3-80.0% Flexure 0.000 0.000			0.000	Flexure	3-80.0%	Operating	HL-93 (US)	Splices At Piers	GirderLine Superst	Simple DL-Cont LL	7697
	0.000 0.000 -0.000	0.000									
7697 Simple DL-Cont LL GirderLine Supersta Splices AF Piers HL-93 (US) Operating 3-80.0% Flexure 0.000 0.000 0.000			0.000	Flexure	3-80.0%	Operating	HL-93 (US)	Splices At Piers	GirderLine Superst	Simple DL-Cont LL	7697