

LOAD RATING TOOL

Ruben Boehler, PE, SE
Structure Ratings & Permits Unit Chief
Bureau of Bridges & Structures



Illinois Department of Transportation

AASHTOWare BrR
2019 RADBUG

OVERVIEW

- What is it?
- IDOT's Current Overweight Permit Process
- Load Rating Tool
 - How to set it up
 - How to use it

LOAD RATING TOOL

- What is it?
- Special tool
 - load rate multiple bridges quickly
 - BrR interface
 - manage precomputed data
 - analyze permit loads
 - third party truck routing software

ILLINOIS OVERWEIGHT PERMIT SYSTEM

- Illinois issued over 50,000 overweight permits last year (> 120,000lbs)
- Illinois Transportation Automated Permit system (ITAP)
 - Trucking Company fills out form on-line
 - ITAP identifies bridges, then sends them for analysis
 - ITAP issues permit to Trucking Company
- Completely Automated except:
 - Gross Vehicle Weights \geq 300,000 lbs
 - Bridges that Fail Analysis
 - Bridges with No Models

ILLINOIS OVERWEIGHT PERMIT SYSTEM

■ Example

- Permit GVW = 312,000 lb

Vehicle Library Details

Nickname: TEST - 312,000 lb

Method of Movement (Loaded, Towed, Own Power): Towed

Number of TRACTOR Axles: 3 Number of Towed Vehicle Axles: 12

Show Axle Weights

Make: Test Model: Test1

Serial: Description:

Vehicle License: xyz and State: IL

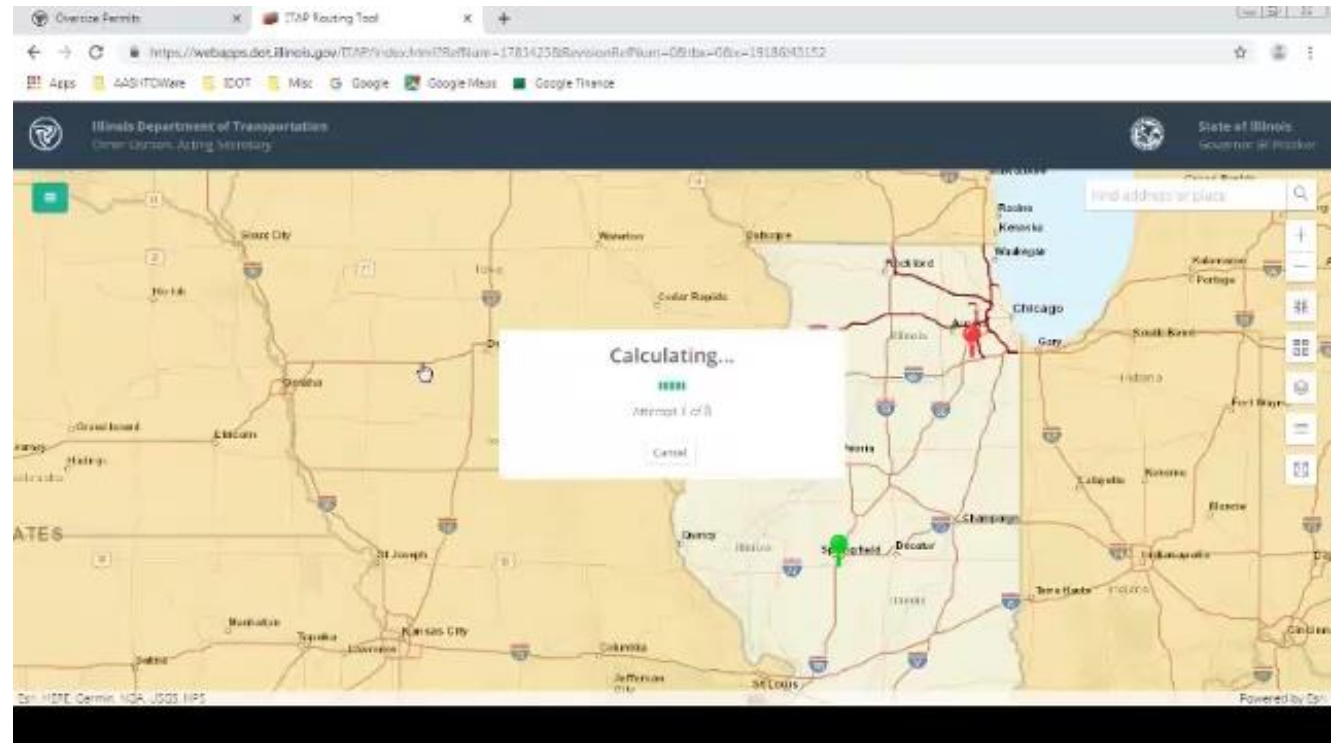
Gross Weight (pounds): 312000

Overall Width		Overall Length	Overall Height
Width Ft: 08	In: 00	Length Ft: 84 (Round Up)	Height Ft: 10
Axle Weight 1: 12000		Axle Weight 2: 24000	
Axle Weight 3: 24000		Axle Weight 4: 21000	
Axle Weight 5: 21000		Axle Weight 6: 21000	
Axle Weight 7: 21000		Axle Weight 8: 21000	
Axle Weight 9: 21000		Axle Weight 10: 21000	
Axle Weight 11: 21000		Axle Weight 12: 21000	
Axle Weight 13: 21000		Axle Weight 14: 21000	
Axle Weight 15: 21000			
Axle Spacing 1 Feet: 10	Inches: 0	Axle Spacing 2 Feet: 4	
Axle Spacing 3 Feet: 22	Inches: 0	Axle Spacing 4 Feet: 4	
Axle Spacing 5 Feet: 4	Inches: 0	Axle Spacing 6 Feet: 4	
Axle Spacing 7 Feet: 4	Inches: 0	Axle Spacing 8 Feet: 4	
Axle Spacing 9 Feet: 4	Inches: 0	Axle Spacing 10 Feet: 4	
Axle Spacing 11 Feet: 4	Inches: 0	Axle Spacing 12 Feet: 4	
Axle Spacing 13 Feet: 4	Inches: 0	Axle Spacing 14 Feet: 4	

ILLINOIS OVERWEIGHT PERMIT SYSTEM

■ Example

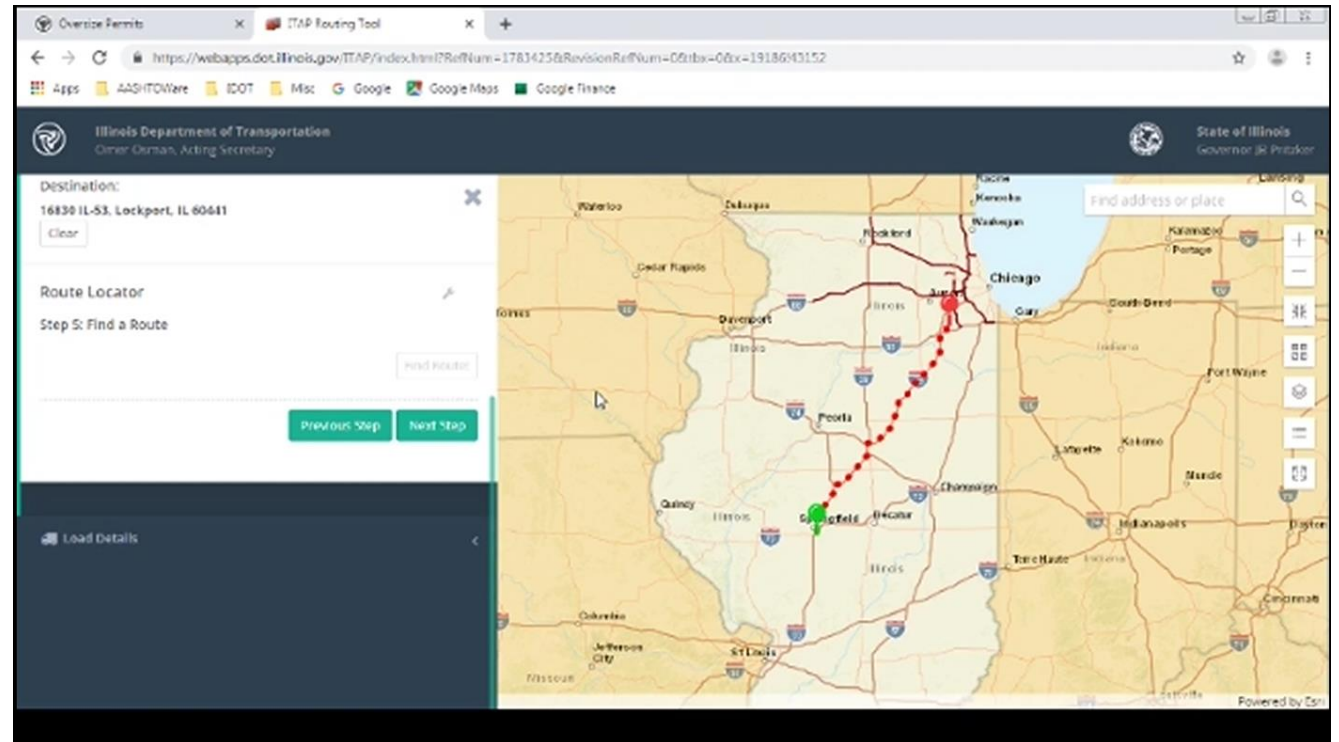
- Permit GVW = 312,000 lb
- Springfield to Joliet (170 miles)
 - trucker picks start & end point
 - ITAP
 - approx. 1 minute to create route
 - work zones
 - posted bridges
 - height/width restrictions



ILLINOIS OVERWEIGHT PERMIT SYSTEM

■ Example

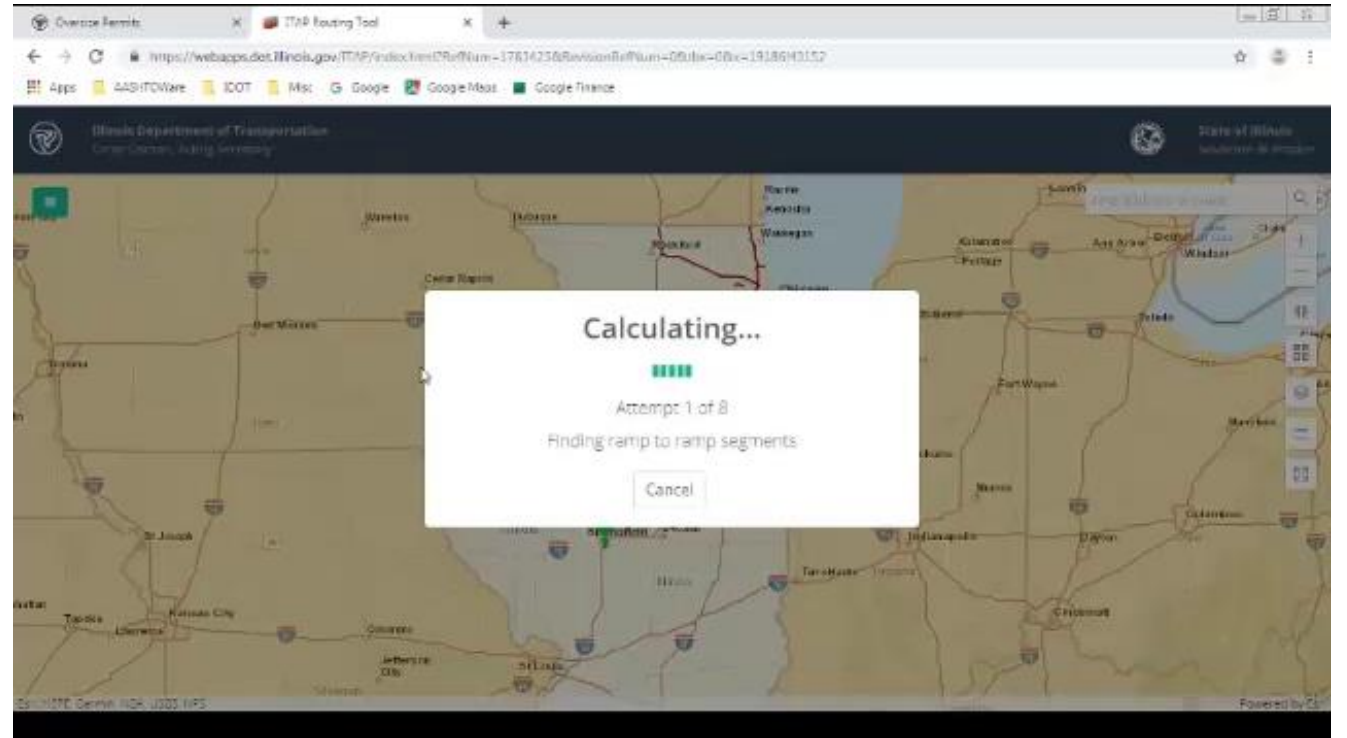
- Permit GVW = 312,000 lb
- Springfield to Joliet (170 miles)
 - trucker picks start & end point
 - ITAP
 - approx. 1 minute to create route
 - work zones
 - posted bridges
 - height/width restrictions
 - found 130 bridges to analyze



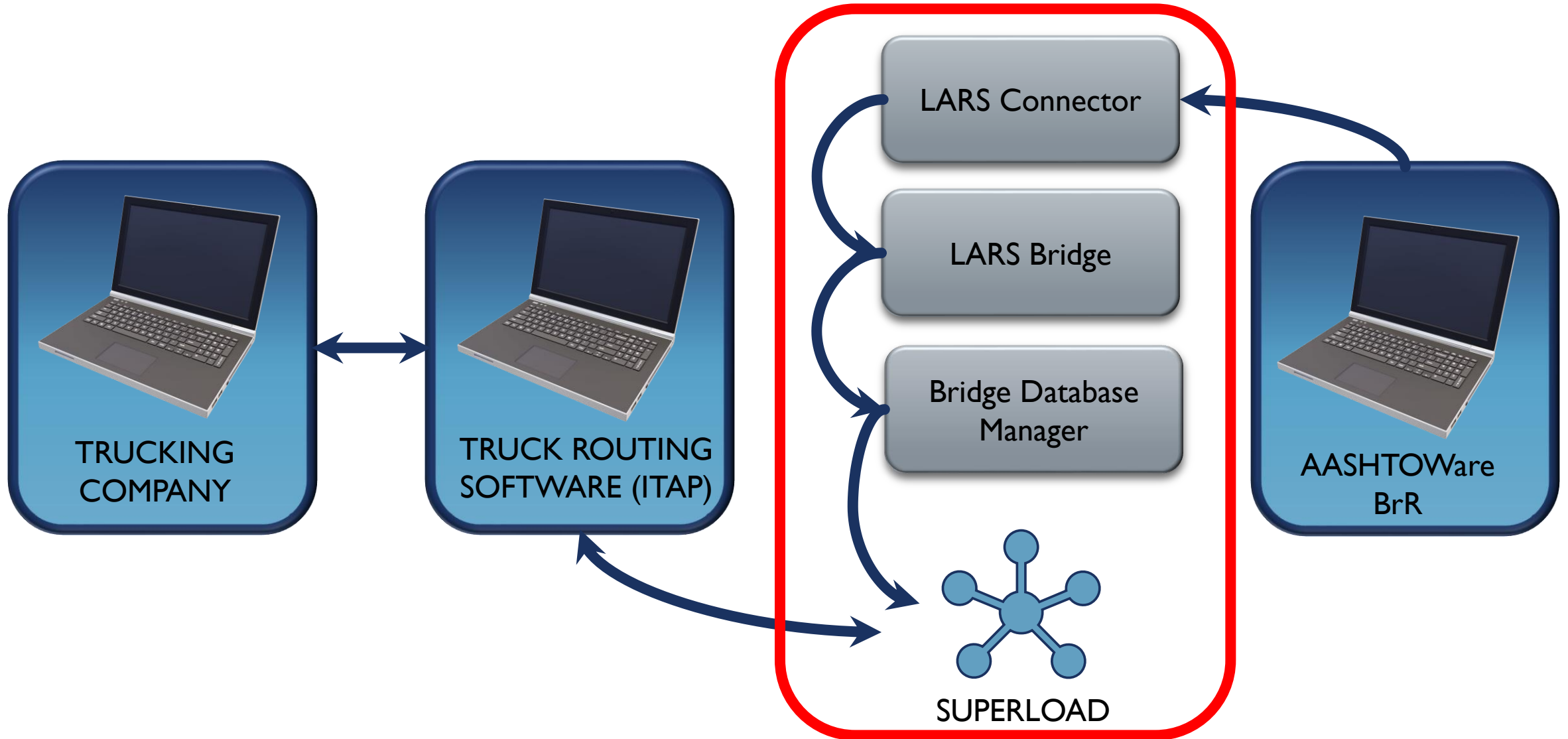
ILLINOIS OVERWEIGHT PERMIT SYSTEM

■ Example

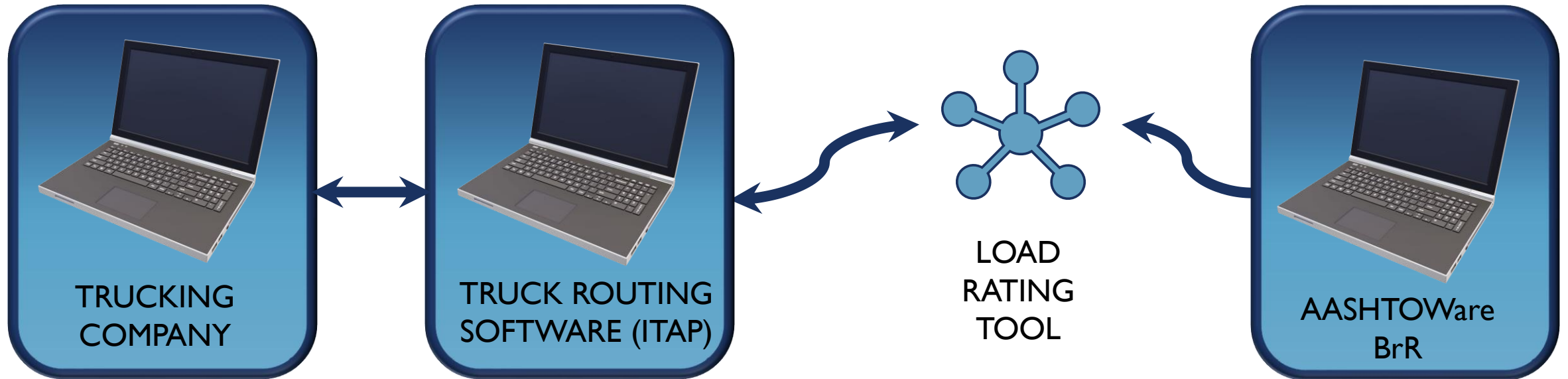
- Permit GVW = 312,000 lb
- Springfield to Joliet (170 miles)
- 130 bridges
 - approx. 15 seconds to analyze
 - 106 Passed w/45 mph restriction
 - 8 Passed w/Crawl speed restriction
 - 16 Failed



BEHIND THE CURTAIN



BEHIND THE CURTAIN



AASHTOWARE - WHERE TO START

Search this site...

Training

Tutorials

The Bridge As-Built Plans and corresponding BrDR Models are provided for example only and may not represent the modeling techniques used by your agency.

Type	Name	File Size	File Date
Category : Feature (24)			
<input type="checkbox"/>	ADJ1 - Analysis with Adjacent Lane Routine Traffic Example	717 KB	8/9/2016
<input type="checkbox"/>	Bridge X - Bridge Exchange Feature Example	641 KB	8/19/2016
<input type="checkbox"/>	Capacity Override	516 KB	7/27/2016
<input type="checkbox"/>	EI1 - Exporting/Importing Data	583 KB	8/29/2016
<input type="checkbox"/>	F1 - Flared Girder Example	798 KB	8/29/2016
<input type="checkbox"/>	Field Verified Wearing Surface Thickness	1147 KB	7/18/2016
<input type="checkbox"/>	General Preferences	1140 KB	6/21/2016
<input type="checkbox"/>	HLP1 - Help Features	723 KB	7/18/2018
<input checked="" type="checkbox"/>	LRT1 - Load Rating Tool	587 KB	7/30/2018
<input type="checkbox"/>	LS1 - Limit State Selection	438 KB	8/29/2016
<input type="checkbox"/>	PDT1 - Getting Started with PS Design Tool	1022 KB	7/30/2018

■ <https://aashto.mbakercorp.com/Pages/Training.aspx>

Type Name

Category : Feature (24)

ADJ1 - Analysis w...

HLP1 - Help Features

LRT1 - Load Rating Tool

LS1 - Limit State Selection

AASHTOWARE - WHERE TO START

- Concise & Easy to Follow (12 pages)
- Three Steps
 - Configuration
 - Generation of Precomputed Data
 - Permit Vehicle Analysis

LRT1 - Load Rating Tool

This example describes the use of the Load Rating Tool feature in BrR. *Note: At the time of this writing, the Load Rating Tool only supports high-speed ratings of multi-girder bridges which contain steel, reinforced concrete, and/or prestressed concrete members.*

Topics covered:

- Configuration of the Load Rating Tool
- Generation and maintenance of precomputed data
- Operation of the Load Rating Tool

Configuration

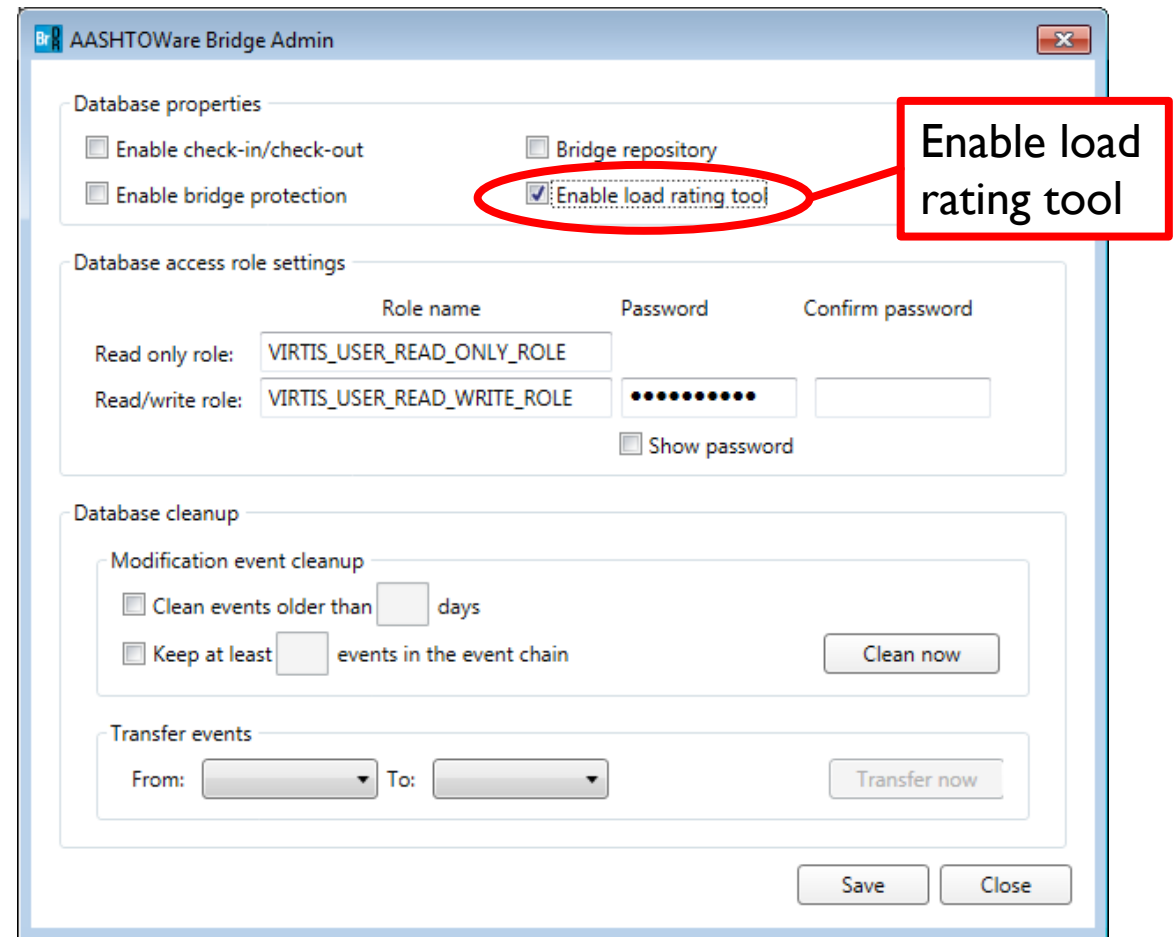
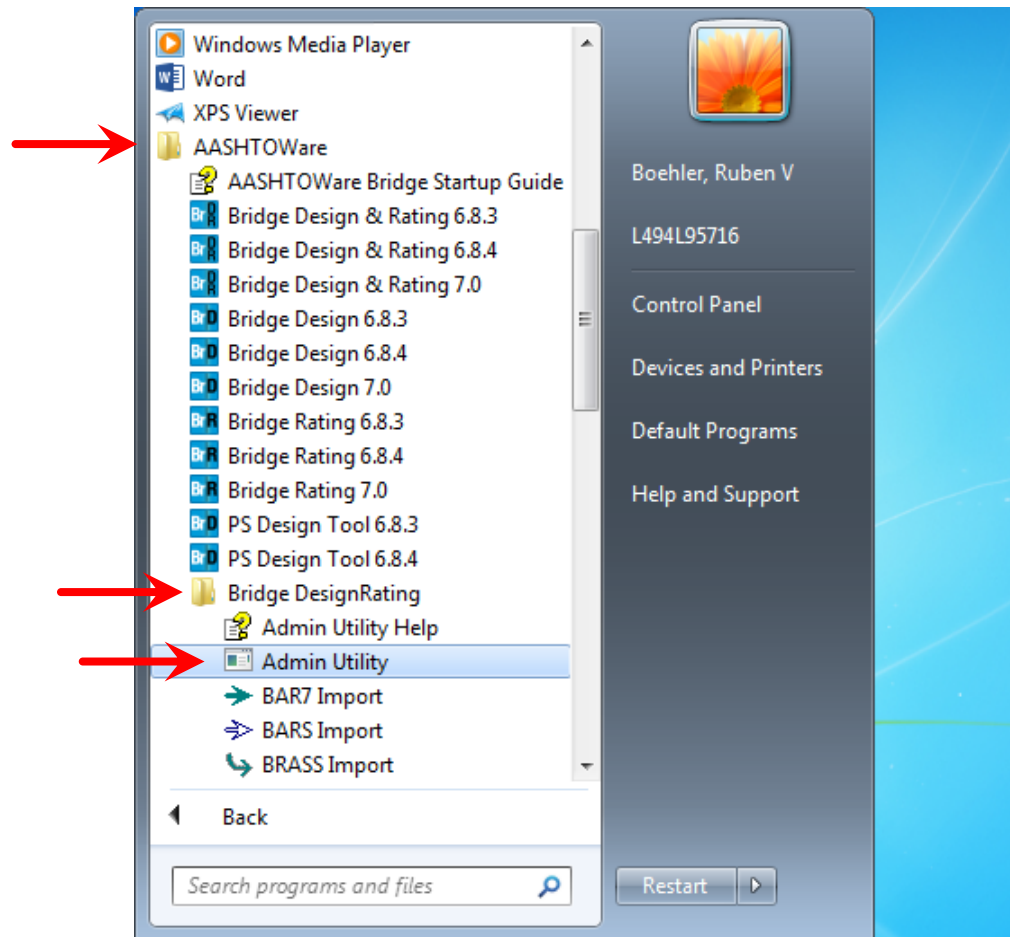
By default, the Load Rating Tool is disabled in the user interface. Before the Load Rating Tool can be used, it must be enabled through the AASHTOWare Bridge Admin Utility. *Note: The Bridge Admin Utility must have been selected for install while installing the BrR product.*

To enable the Load Rating Tool, open the AASHTOWare Bridge Admin Utility from the start menu shortcut, login with the appropriate credentials, and select "Enable Load Rating Tool". Press 'OK' or 'Apply' to accept the changes.

The screenshot shows the 'AASHTOWare Bridge Admin' window with the 'Database Properties' tab selected. The 'Database Properties' section contains several checkboxes: 'Enable check-in/check-out', 'Enable and EGR share this database', 'Enable Bridge Protection', 'Enable Project Explorer', 'Bridge Repository', and 'Enable Load Rating Tool'. The 'Enable Load Rating Tool' checkbox is checked, and a red arrow points to it. Below this section is the 'Database Access Role Settings' section, which includes fields for 'Role Name', 'Password', and 'Confirm Password'. The 'Read Only Role' is set to 'VRTS_USER_READ_ONLY_ROLE' and the 'Read/Write Role' is set to 'VRTS_USER_READ_WRITE_ROLE'. The 'Database Cleanup' section includes 'Empty Deleted Bridges' and 'Modification Event Cleanup' options. The 'Modification Event Cleanup' section has checkboxes for 'Clean over its older than' (with a field for days) and 'Keep at least' (with a field for events in the event chart). There are 'Save Settings' and 'Clean Now' buttons. The 'Transfer Events' section has 'From' and 'To' dropdown menus and a 'Transfer Now' button. At the bottom of the window are 'OK', 'Apply', and 'Cancel' buttons.

STEP I – CONFIGURE

■ AASHTOWare Bridge Admin. Utility



STEP I – CONFIGURE

System Defaults

General Bridge Workspace Control Options Superstructure Analysis Specifications Substructure Analysis Tolerance Custom Agency Fields Rating Tool

Load Rating Tool Repository:

C:\Users\boehlerrv\Documents\PrecomputedDataRepository\ \D29A4120-4157-45EC-A52D-6B3376B4BF5C-6.8.4.2003

Processing Order	Code	Description	Pass Condition	% Impact (%)	One Lane Restriction
1	2	Pass with no speed or lane restrictions		100	<input type="checkbox"/>
2	3	Pass with one lane restriction - No Other Vehicle on Bridge		100	<input checked="" type="checkbox"/>
3	4	Pass with reduced speed restriction (45 mph or less)		33	<input type="checkbox"/>
4	5	Pass with crawl speed restriction (5 mph or less)		0	<input type="checkbox"/>
5	6	Pass with one lane restriction & reduced speed restriction (45 mph or less)		33	<input checked="" type="checkbox"/>
6	7	Pass with one lane restriction & crawl speed restriction (5 mph or less)		0	<input checked="" type="checkbox"/>

Denied Code:

Not Rated Code:

Specify where to save
Precomputed Data Files

Specify:
Processing Order
Code to Return
Impact
Lane Restrictions

STEP 1 – CONFIGURE

- Configuration has been Completed
- Only need to do this once
- Ready to Create Precomputed Data Files

STEP 2 – GENERATE PRECOMPUTED DATA

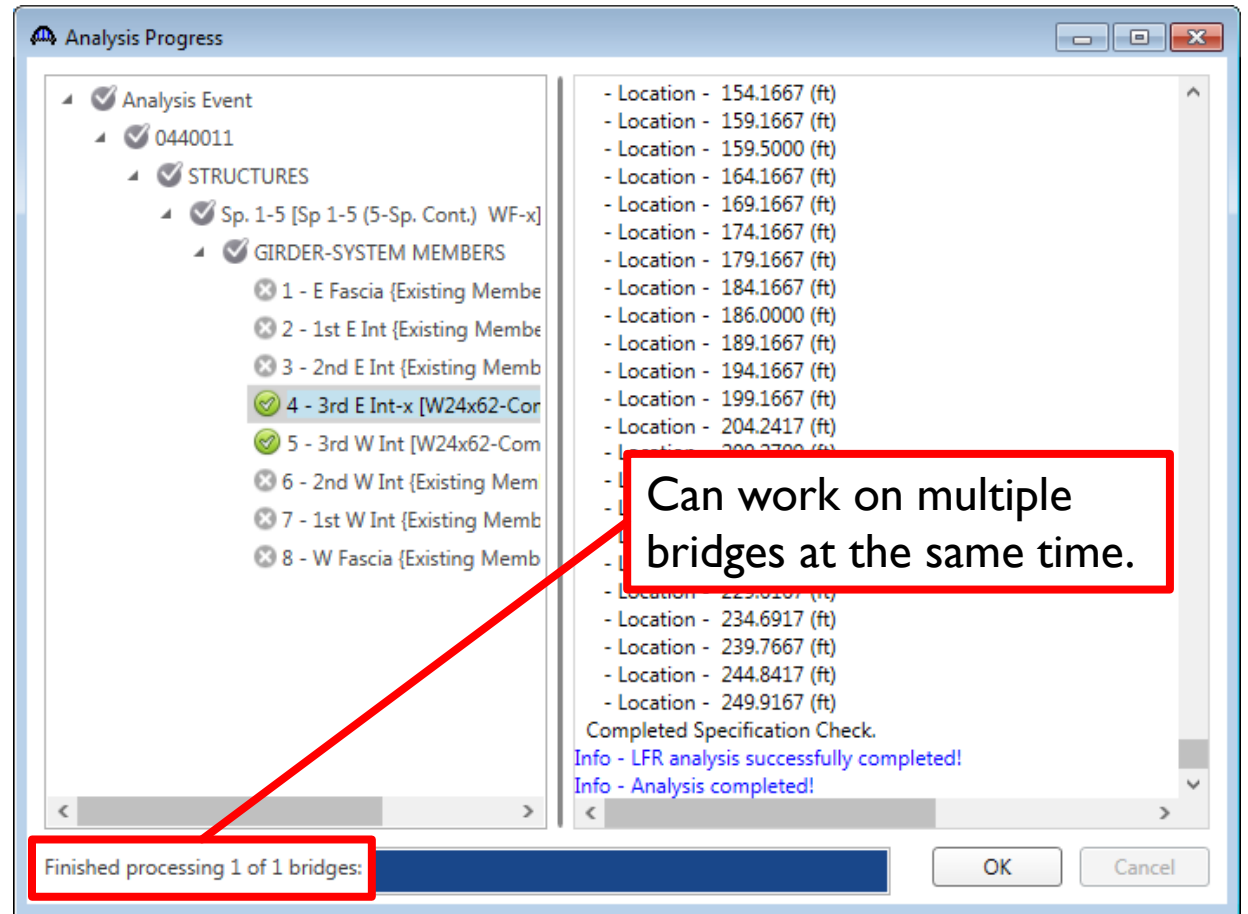
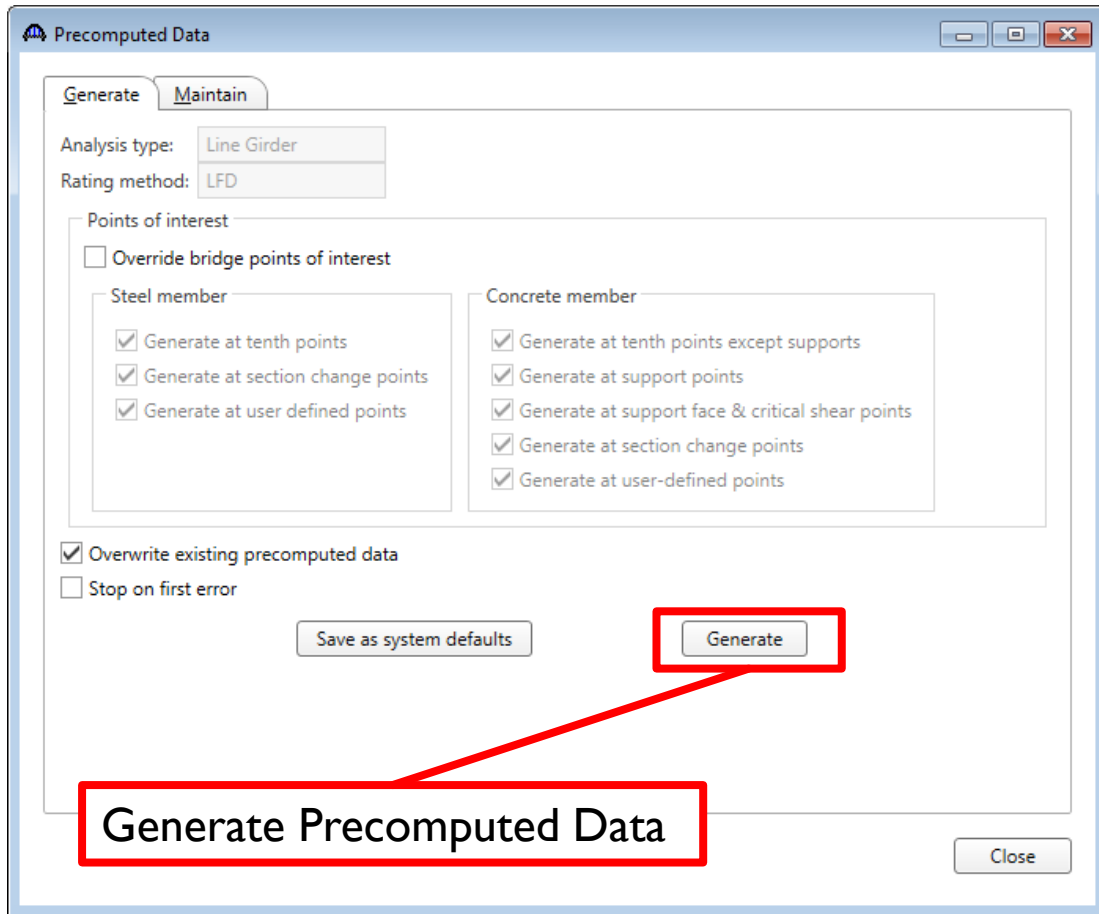
The screenshot shows the AASHTOWare Bridge Rating software interface. The 'RATE' tab is active, and the 'Precomputed Data' button is highlighted with a red box. A red callout box points to this button with the text 'Click Precomputed Data Button'. Another red callout box points to the selected row in the table with the text 'Select Model(s)'. The table contains the following data:

BID	Bridge ID	Bridge Name
7367	0431113	CFS/RPW (US 20/IL 84 over Creek)(PCBC)
6467	0432001	VPT/DWT/JGT (IL 84 over Trib of Apple River)
4225	0432006	JRT/ (US 20 over Yellow Creek Trib.) (CBC)
3400	0440001	TPL/MKT (US 45 over Pond Creek)(RCS)
7076	0440004	DLG/JTB (US 45 over L. Cache Cr.)(PSD)
3539	0440005	TPL/TES (US 45 over McCorkle Cr.)(PSD)
2272	0440010	TES/MKT(US 45 over Cave Cr.)(PSD)
2451	0440011	TPL/MKT/TES (IL 37 over Cache R.)(CWF)
2452	0440012	TPL/MKT/TES (IL 37 over Aband. RR)(CWF)
2485	0440014	CWC/TES (IL 146 over Cache R.)(SWF/PSD)
698	0440022	CWC/MKT(IL 146 over Bell Pond Cr.)(PSD)
2662	0440025	TPL/MKT/JRS(IL 147 over Cedar Creek)(CWF)

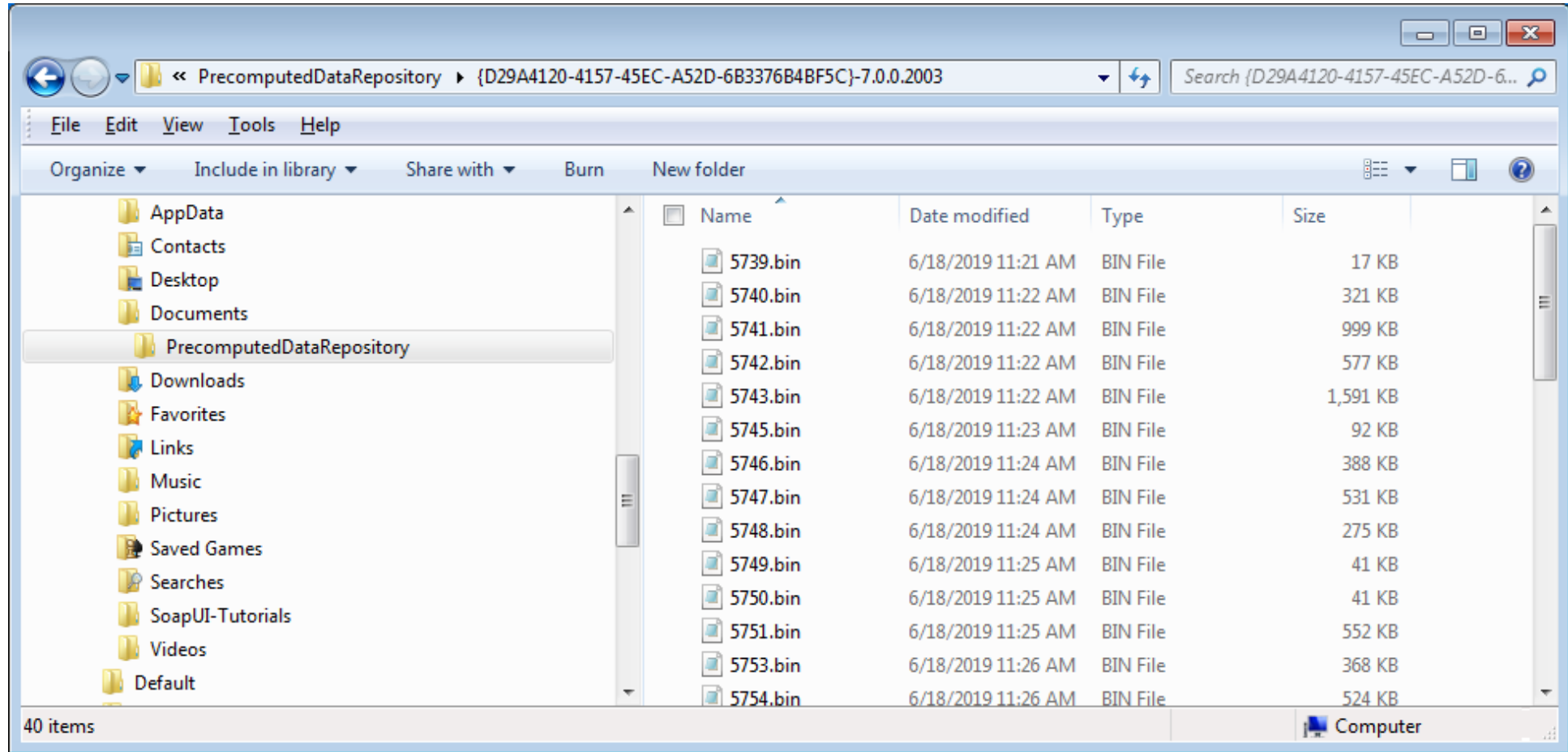
Click Precomputed Data Button

Select Model(s)

STEP 2 – GENERATE PRECOMPUTED DATA



STEP 2 – GENERATE PRECOMPUTED DATA



STEP 2 – GENERATE PRECOMPUTED DATA

- Precomputed Data has been Completed
- Need to do this each time a bridge is created or changed
- Ready to Analyze a Permit Vehicle

STEP 3 – ANALYZE PERMIT VEHICLE

- Create Permit Vehicle
- Standard Gage Only

Example Vehicle
Name: Load Rating Tool

Vehicle: Standard gage: Load Rating Tool

Name:

Description:

Store units as: US SI

Library: Standard Agency defined User defined

Truck **Tandem** Lane

Axle no.	Axle load (kip)	Gage dist. (ft)	Wheel contact width (in)	Axle spacing (ft)	
				Minimum	Maximum
1	8.00	6.00	10.0000		
2	32.00	6.00	20.0000	14.00	14.00
3	32.00	6.00	20.0000	14.00	14.00

Totals:

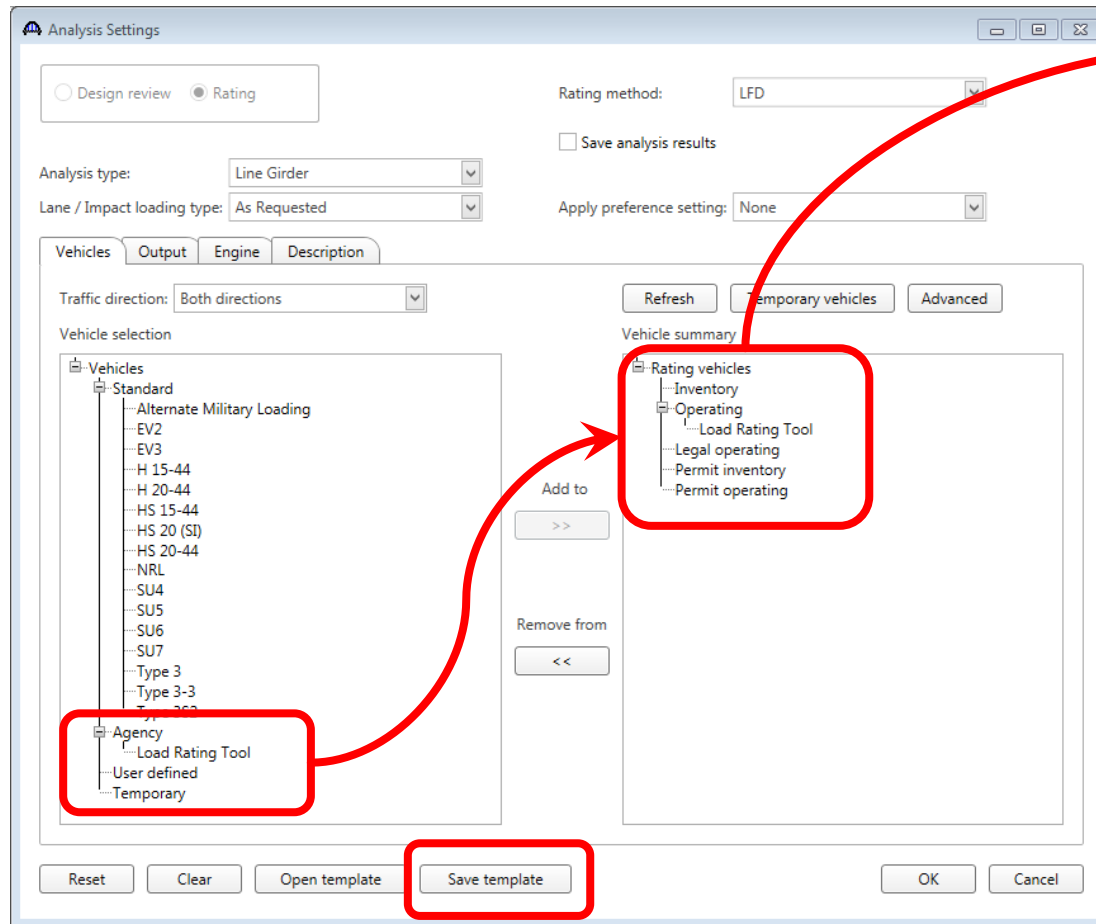
Notional vehicle

Rating: LRFD ASD/LFD LRFR

Design: LRFD ASD/LFD

STEP 3 – ANALYZE PERMIT VEHICLE

■ Create Analysis Template



Example Vehicle
Name: Load Rating Tool
Added to Operating Rating Category

STEP 3 – ANALYZE PERMIT VEHICLE

The screenshot shows the AASHTOWare Bridge Rating software interface. The 'RATE' tab is active, and the 'Load Rating Tool' button is highlighted with a red box and a callout. The 'All Bridges' folder is expanded in the left sidebar, and the '2451 0440011' bridge model is selected in the main table, also highlighted with a red box and a callout.

BID	Bridge ID	Bridge Name
7367	0431113	CFS/RPW (US 20/IL 84 over Creek)(PCBC)
6467	0432001	VPT/DWT/JGT (IL 84 over Trib of Apple River)
4225	0432006	JRT/ (US 20 over Yellow Creek Trib.) (CBC)
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7076	0440004	DLG/JTB (US 45 over L. Cache Cr.)(PSD)
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698	0440022	CWC/MKT(IL 146 over Bell Pond Cr.)(PSD)
2662	0440025	TPL/MKT/JRS(IL 147 over Cedar Creek)(CWF)

Click Load Rating Tool Button

Select Model(s)

STEP 3 – ANALYZE PERMIT VEHICLE

Minimum Allowable Rating Factor

Analysis Template

List of Bridges to be Analyzed

Load Rating Tool

Permit application number:

Application date: 6/27/2019

Requested by:

Minimum allowable rating factor: 1.00

Comment:

Bridges Vehicles Rating results

Analysis settings: rvb_test_LFD Template View

BID	Bridge database				Has precomputed data	Travel direction
	Bridge ID	Route number	Number of structures	Completely defined		
5772	1050034	20741	-1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Both directions
5770	1050032	20322	-1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Both directions
5768	1050030	20717	-1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Both directions
5766	1050028	F2869	-1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Both directions
5763	1050025	30705	-1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Both directions
5762	1050024	30042	-1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Both directions
5761	1050023	30919	-1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Both directions
5760	1050022	20322	-1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Both directions
5757	1050019	98357	-1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Both directions

Process permit

Close

STEP 3 – ANALYZE PERMIT VEHICLE

Permit application number:

Application date: 6/27/2019

Requested by:

Minimum allowable rating factor: 1

Comment:

Code set during Configuration

≈ 5 seconds

Operating Rating Factor

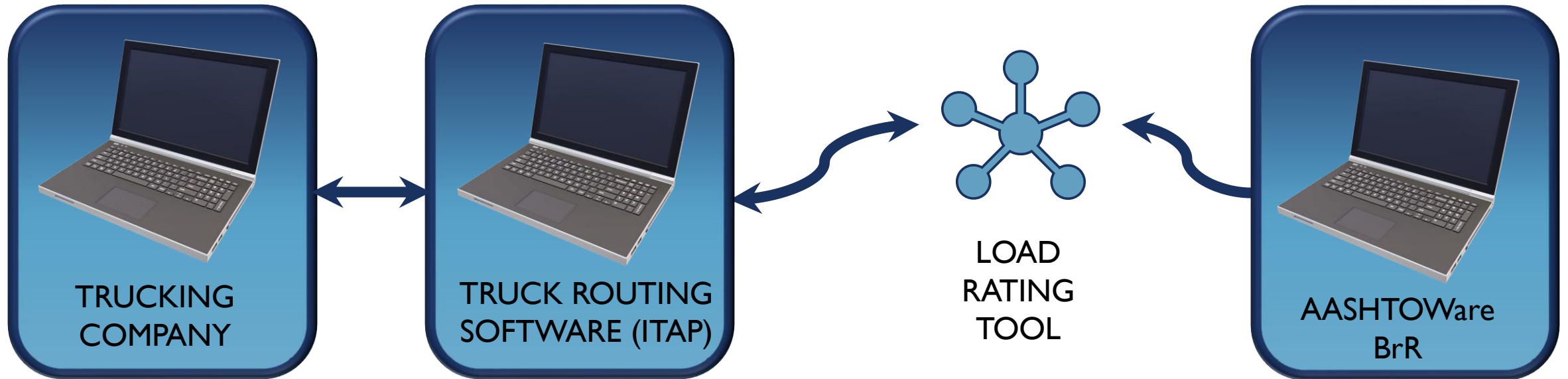
Filter results: Pass Fail Exceptions

Vehicle	Rating level	BID	Bridge ID	Route number	Code	Description	Inventory rating factor	Operator rating factor	Controlling impact	Pass conditions	Analysis warnings
Type 3	Operating	5772	1050034	20741	2	Pass with no speed or lane restrictions	1.973	3.295	1		
Type 3	Operating	5770	1050032	20322	2	Pass with no speed or lane restrictions	2.041	3.408	1		
Type 3	Operating	5768	1050030	20717	2	Pass with no speed or lane restrictions	1.764	2.946	1		
Type 3	Operating	5766	1050028	F2869	2	Pass with no speed or lane restrictions	1.285	2.146	1		
Type 3	Operating	5763	1050025	30705	2	Pass with no speed or lane restrictions	1.714	2.862	1		
Type 3	Operating	5762	1050024	30042	2	Pass with no speed or lane restrictions	2.794	4.666	1		
Type 3	Operating	5761	1050023	30919	2	Pass with no speed or lane restrictions	0.847	1.415	1		
Type 3	Operating	5760	1050022	20322	2	Pass with no speed or lane restrictions	1.192	1.99	1		
Type 3	Operating	5757	1050019	98357	2	Pass with no speed or lane restrictions	1.413	2.36	1		

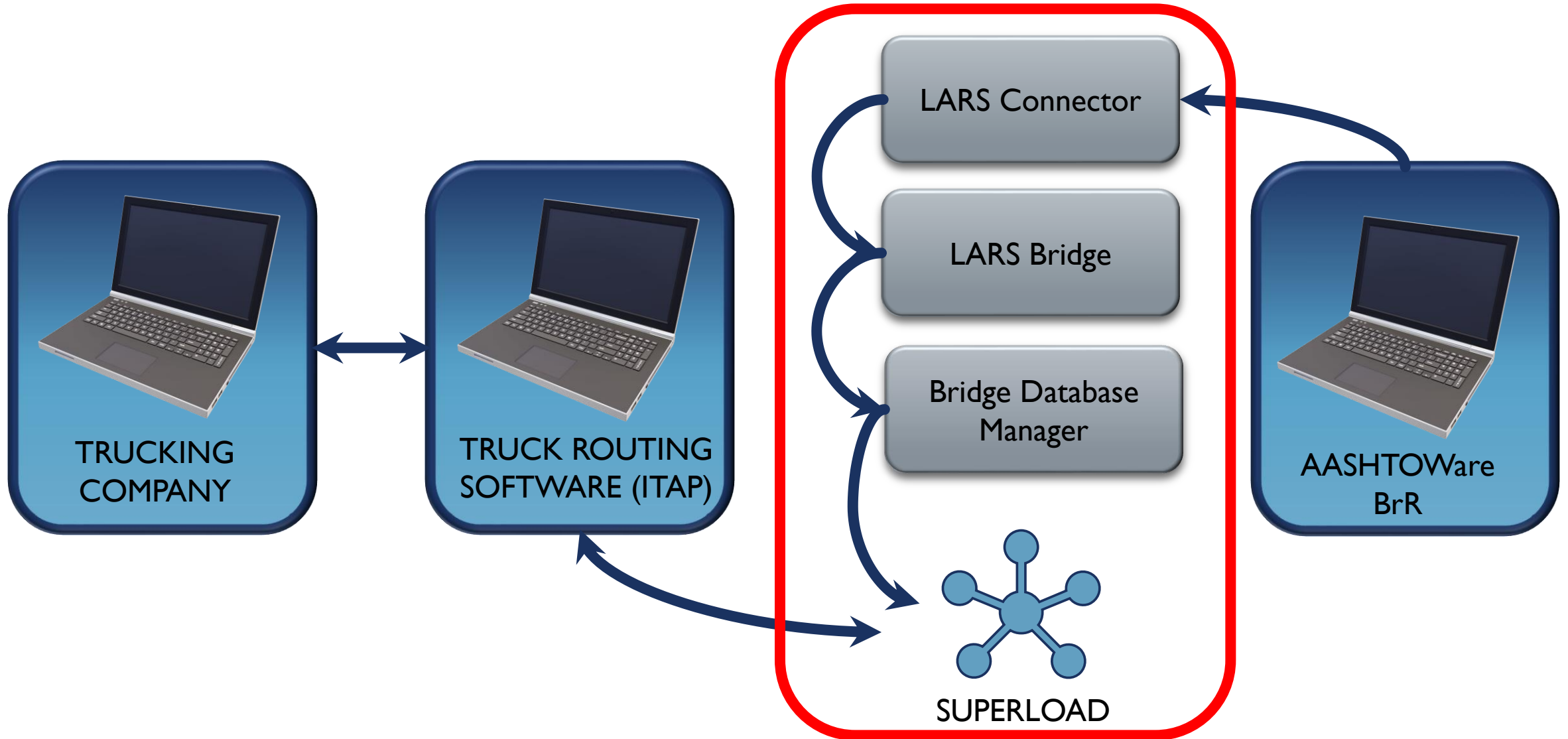
Create rating results file... View rating results file...

Close

STEP 3 – ANALYZE PERMIT VEHICLE

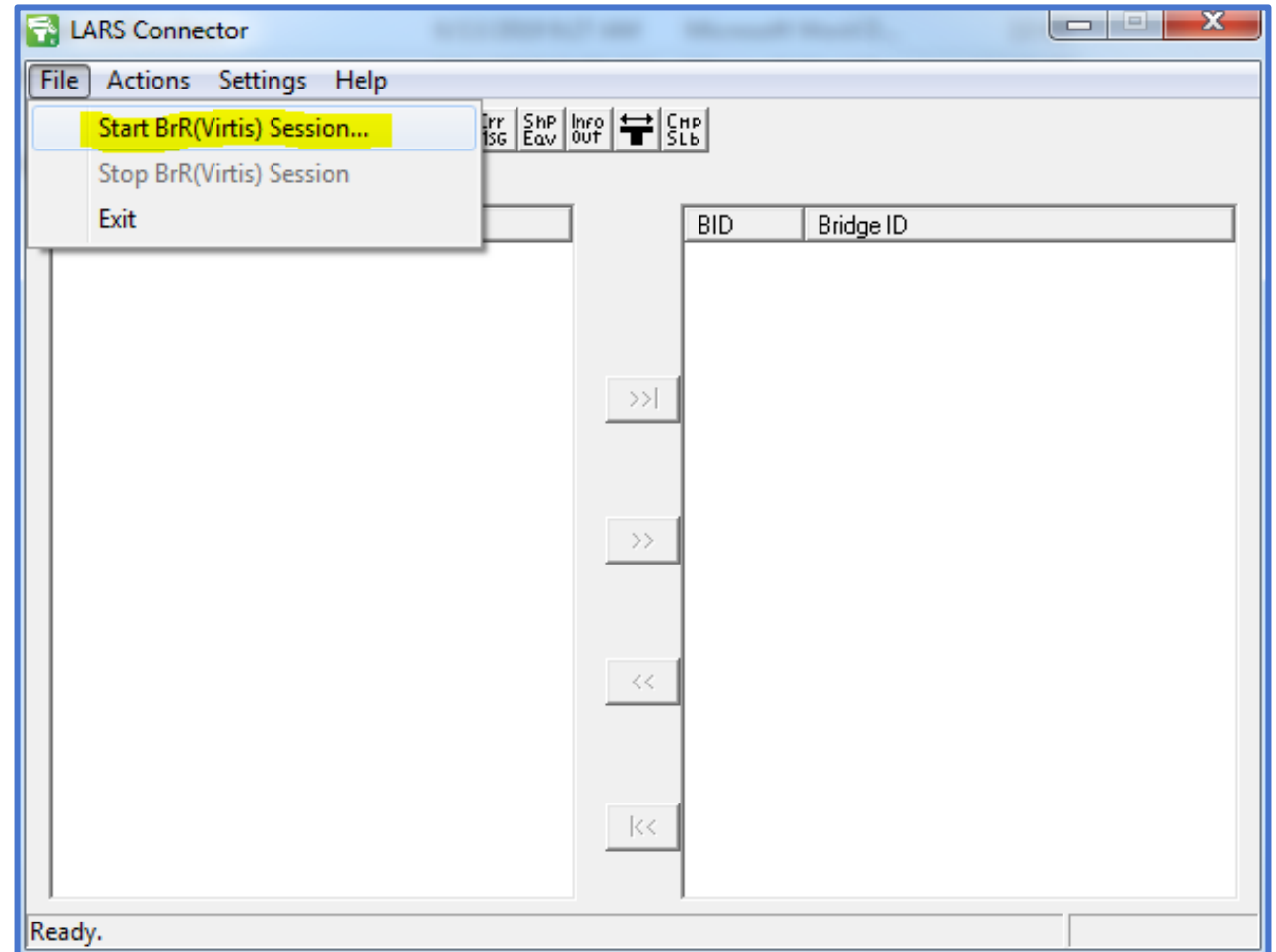
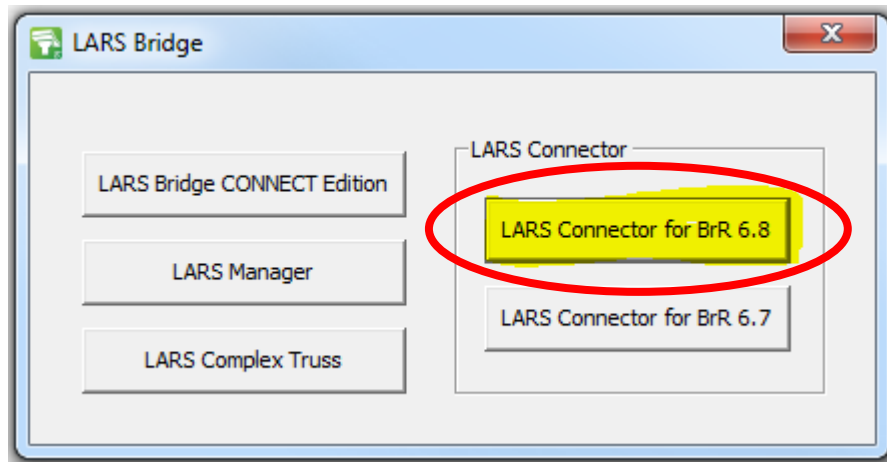


BENTLEY PROCESS



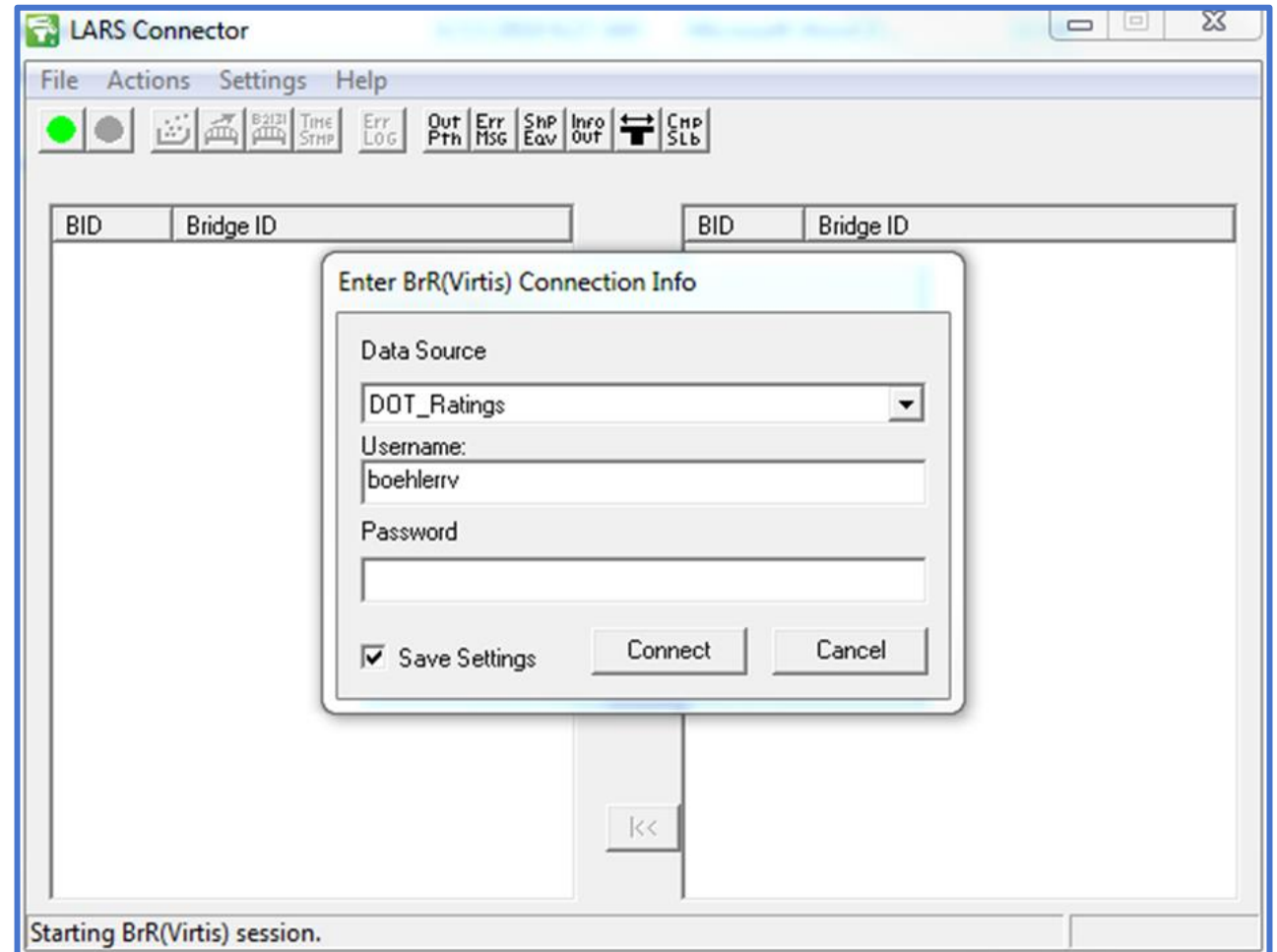
BENTLEY

- LARS Connector
- Convert AASHTOWare Bridge Model to LARS file (*.bmd)



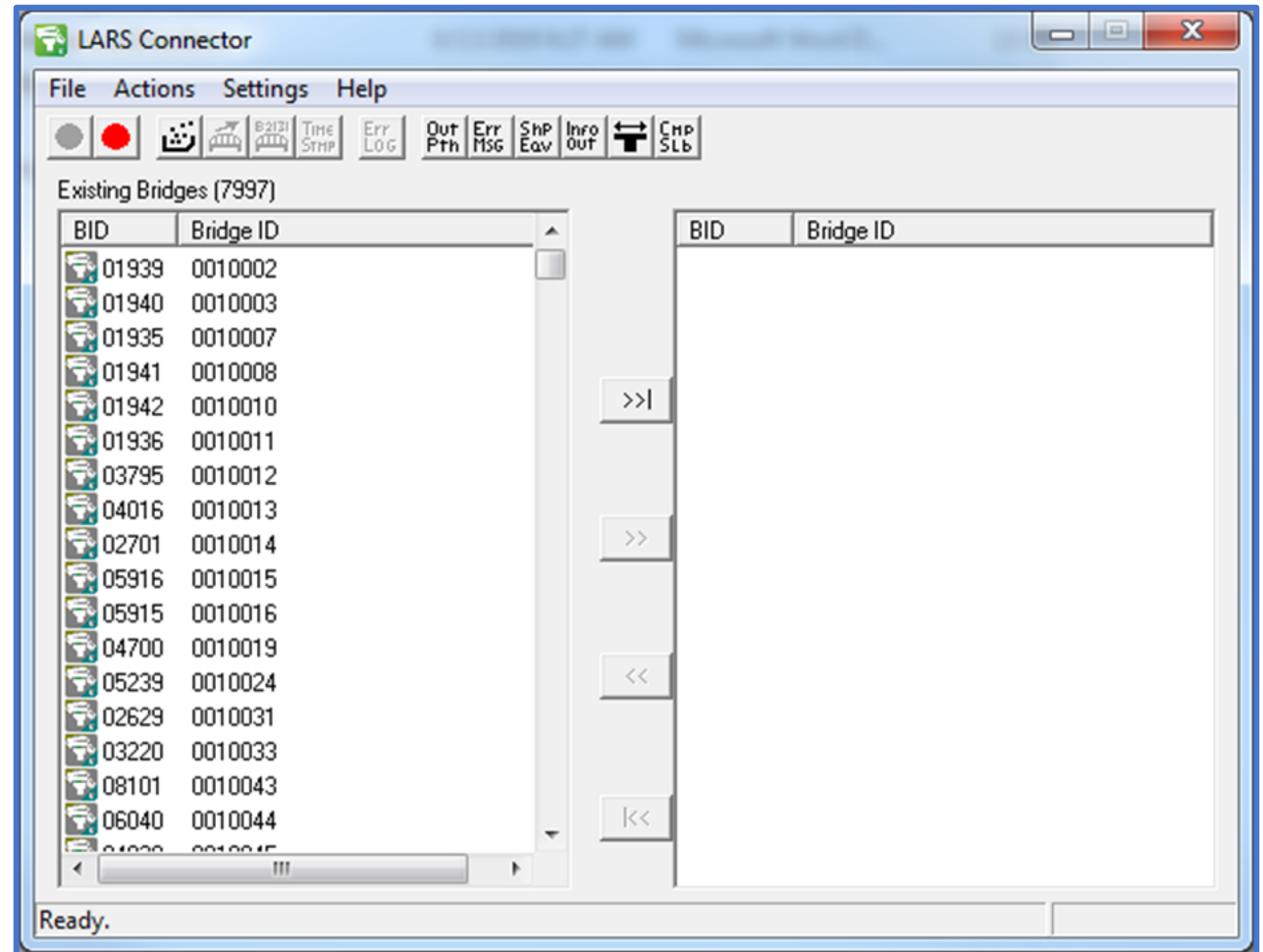
BENTLEY

- LARS Connector
- Convert AASHTOWare Bridge Model to LARS file (*.bmd)



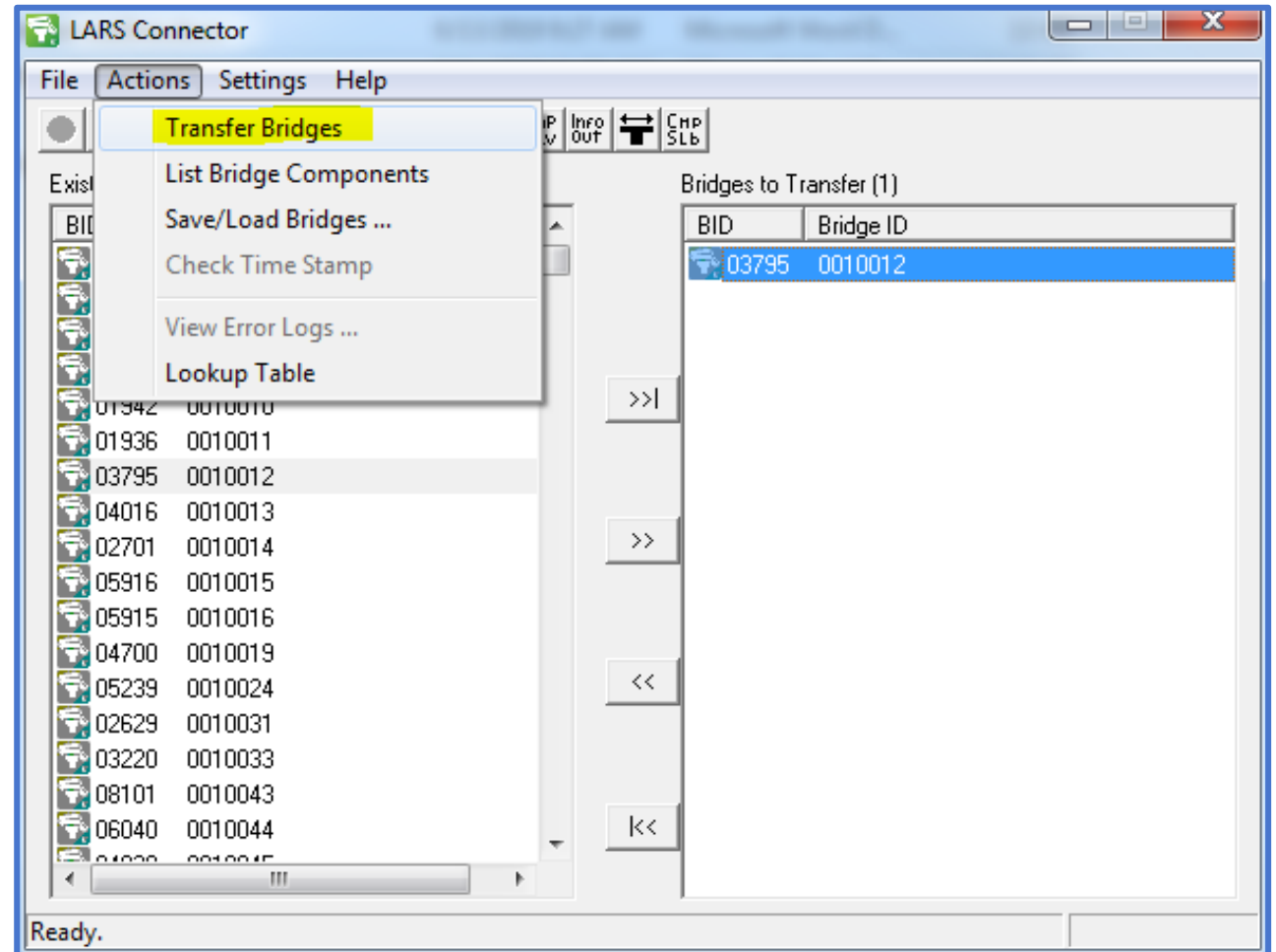
BENTLEY

- LARS Connector
- Convert AASHTOWare Bridge Model to LARS file (*.bmd)



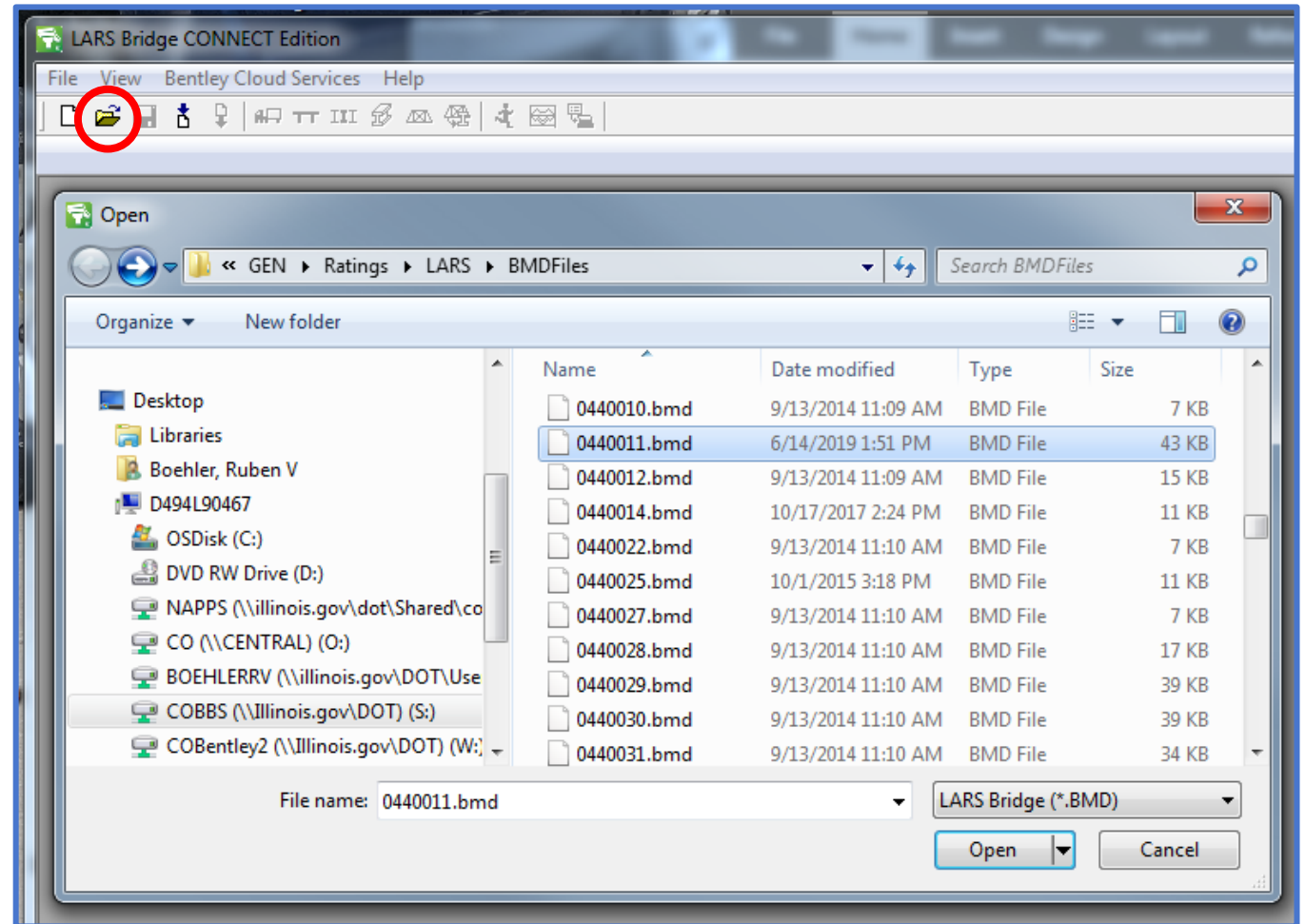
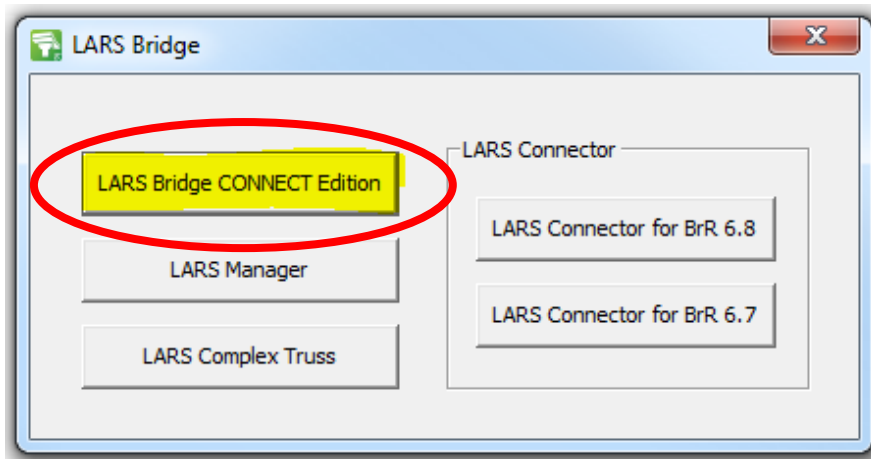
BENTLEY

- LARS Connector
- Convert AASHTOWare Bridge Model to LARS file (*.bmd)



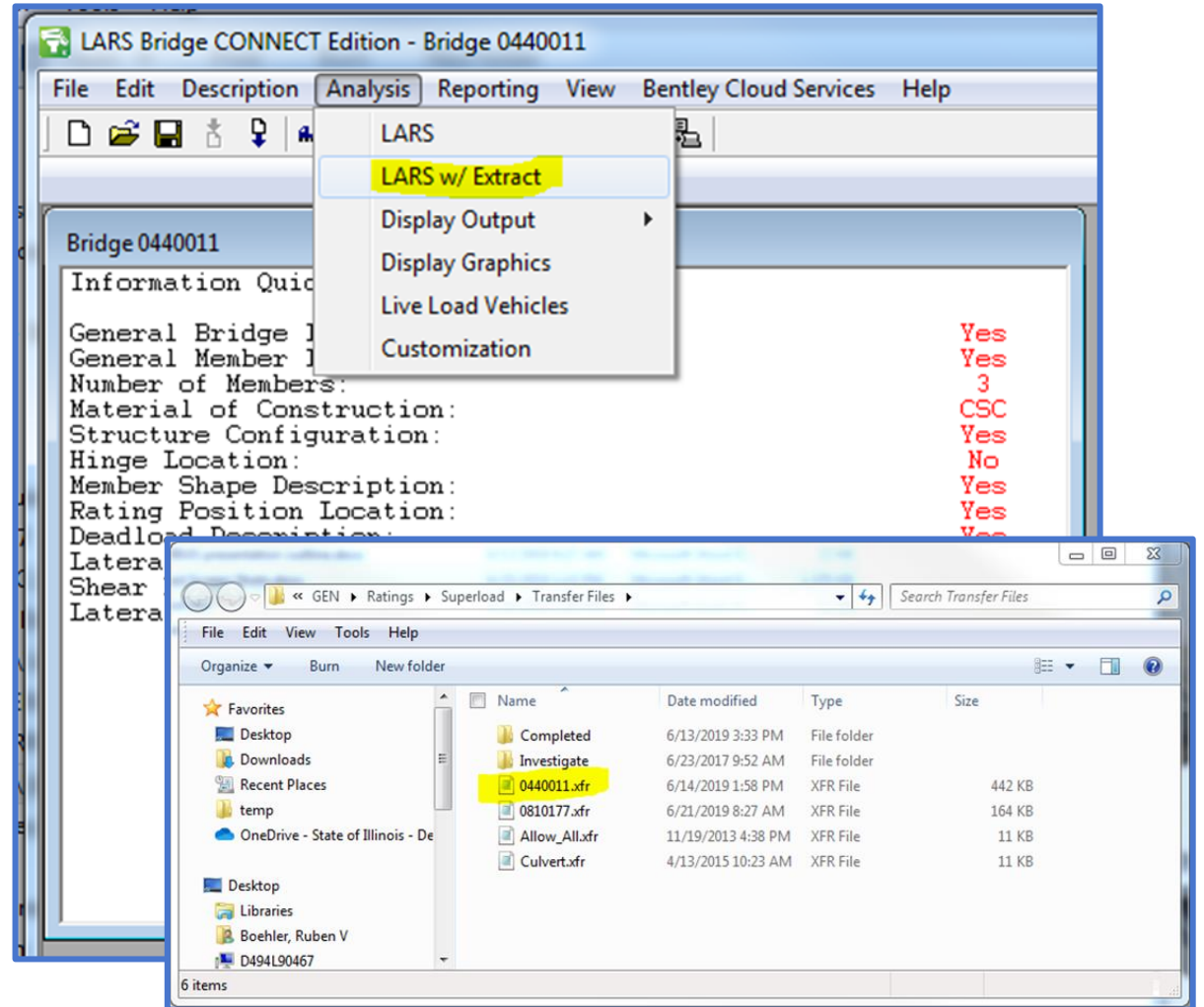
BENTLEY

- LARS Bridge CONNECT Edition
- Convert LARS file (*.bmd) to SUPERLOAD Transfer file (*.xfr)



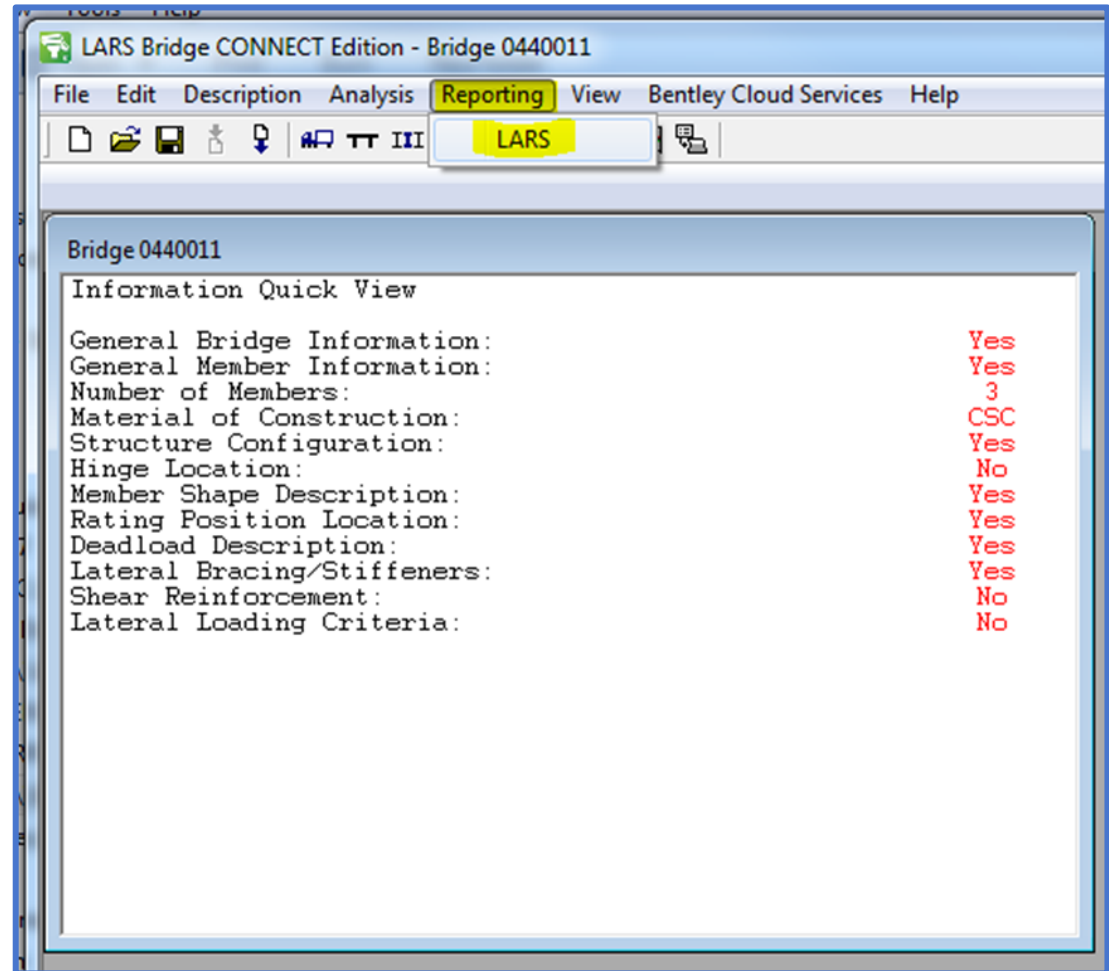
BENTLEY

- LARS Bridge CONNECT Edition
- Convert LARS file (*.bmd) to SUPERLOAD Transfer file (*.xfr)



BENTLEY

- LARS Bridge CONNECT Edition
- Verify Load Rating



BENTLEY

- LARS Bridge CONNECT Edition
- Verify Load Rating

LARS Reports

Member(s) To Report: All

Design Method:
 Allowable Stress
 Load Factor
 LRFD
 Critical Summary for All Methods

Analysis Type:
 Moment (with Service)
 Shear
 Both

Report Type:
 Tabular (All)
 Detail - Default Checkpoints
 Detail - All Checkpoints
 Detail - Select Checkpoint [] (sp.cp)

Buttons: OK, Cancel, Add, Remove

Selected Reports

Member(s)	Method	Analysis	Report	Checkpoint
All	LFD	B	Tabular (All)	

- LARS Bridge CONNECT Edition
- Verify Load Rating

The screenshot shows a software window titled "Reporter" with a "Member Summary" report. The report is divided into two sections: "Moment" and "Shear". Each section contains a table with columns for "C.P.", "Rating Factor", "Rating Value", and "Load Capacity (tons)". The "Rating Factor" and "Rating Value" columns are highlighted in yellow in the original image.

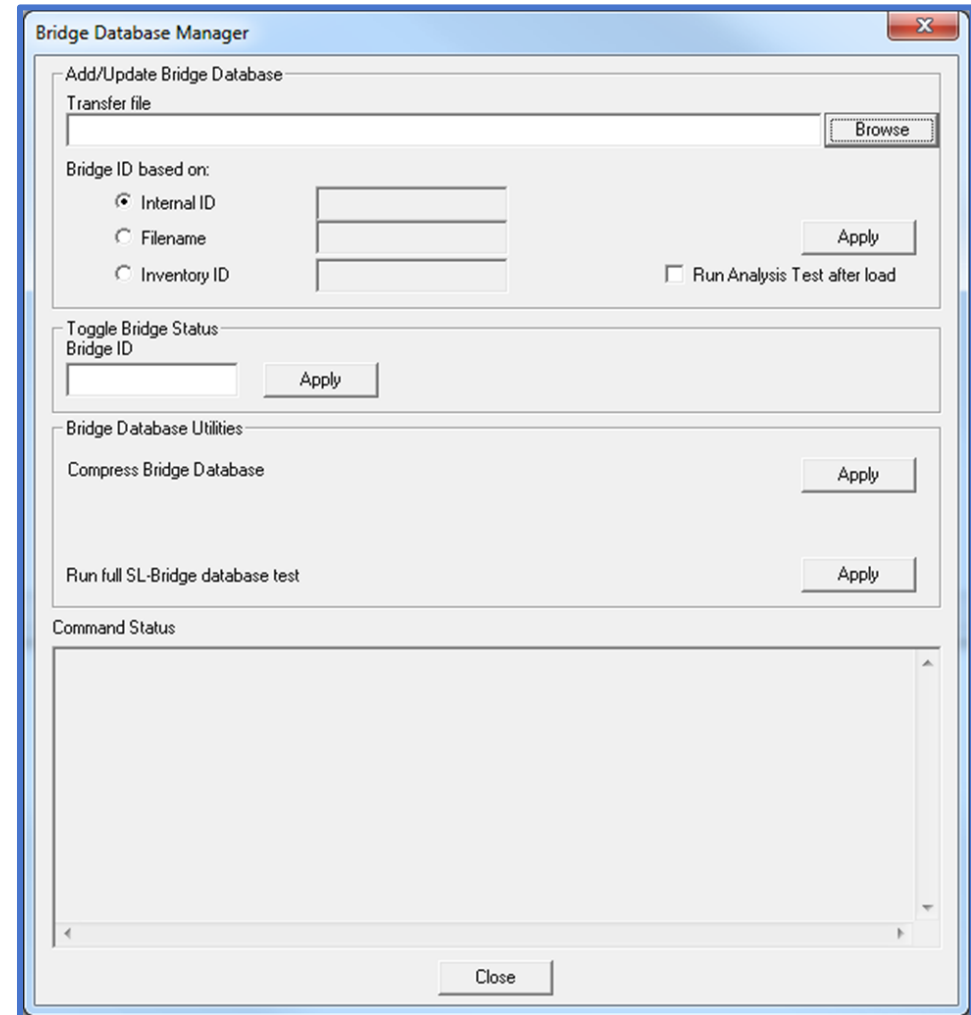
Moment			
C.P.	Rating Factor	Rating Value	Load Capacity (tons)
5.000	INV. Truck: HS20 1.38	HS 27.50	49.5
5.000	OPER. Truck: HS20 2.29	HS 45.83	82.5

Shear				
C.P.	Rating Factor (-)	Rating Factor (+)	Rating Value	Load Capacity
5.000	INV. Truck: HS20 3.73	3.59	HS 71.79	129.20
5.000	OPER. Truck: HS20 6.21	5.98	HS119.64	215.40

Buttons at the bottom: Print, QuickPrint, Close

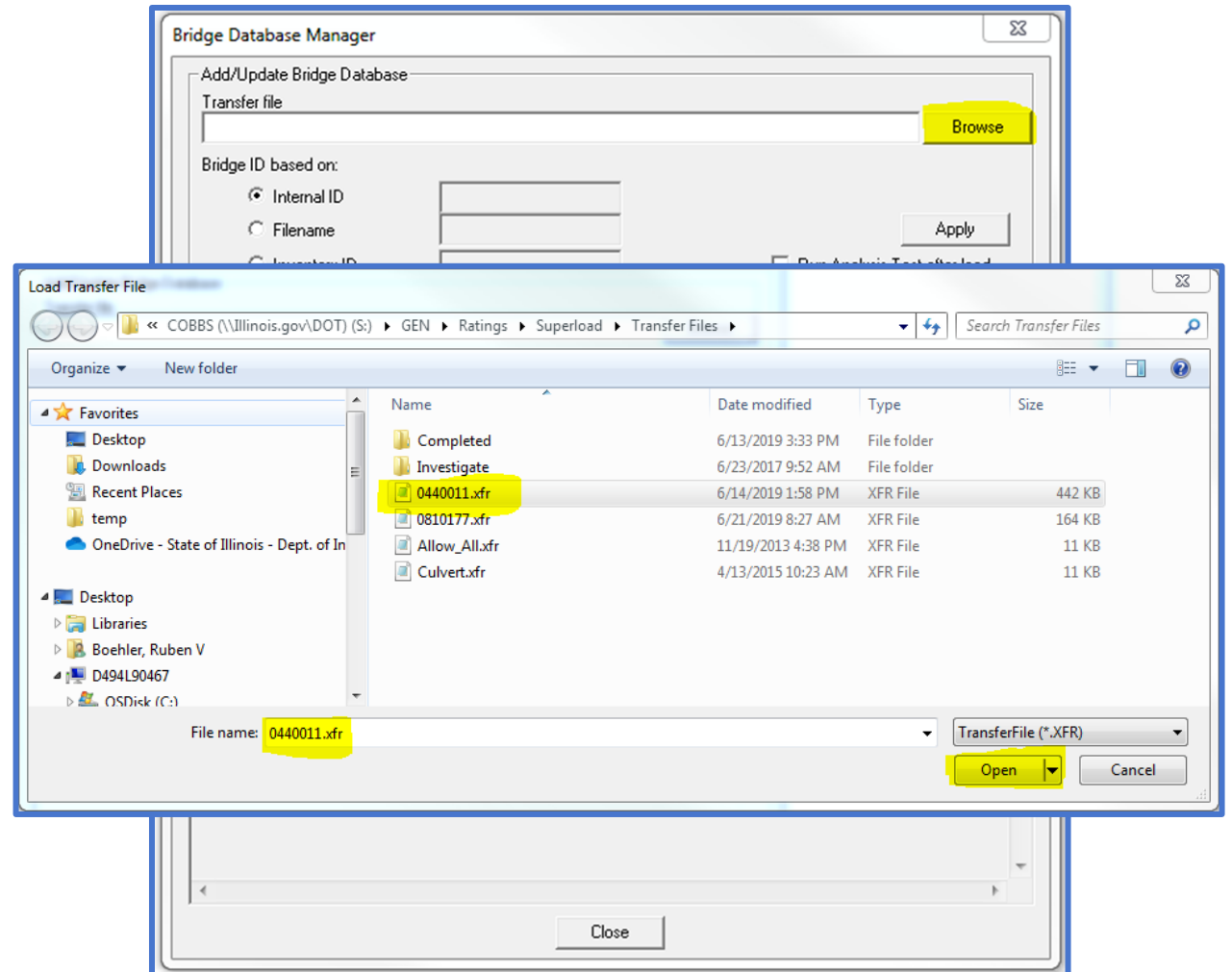
BENTLEY

- Bridge Database Manager
- Add SUPERLOAD Transfer file (*.xfr) to SUPERLOAD Bridge Database (*.ast, *.ddr & *.lib)



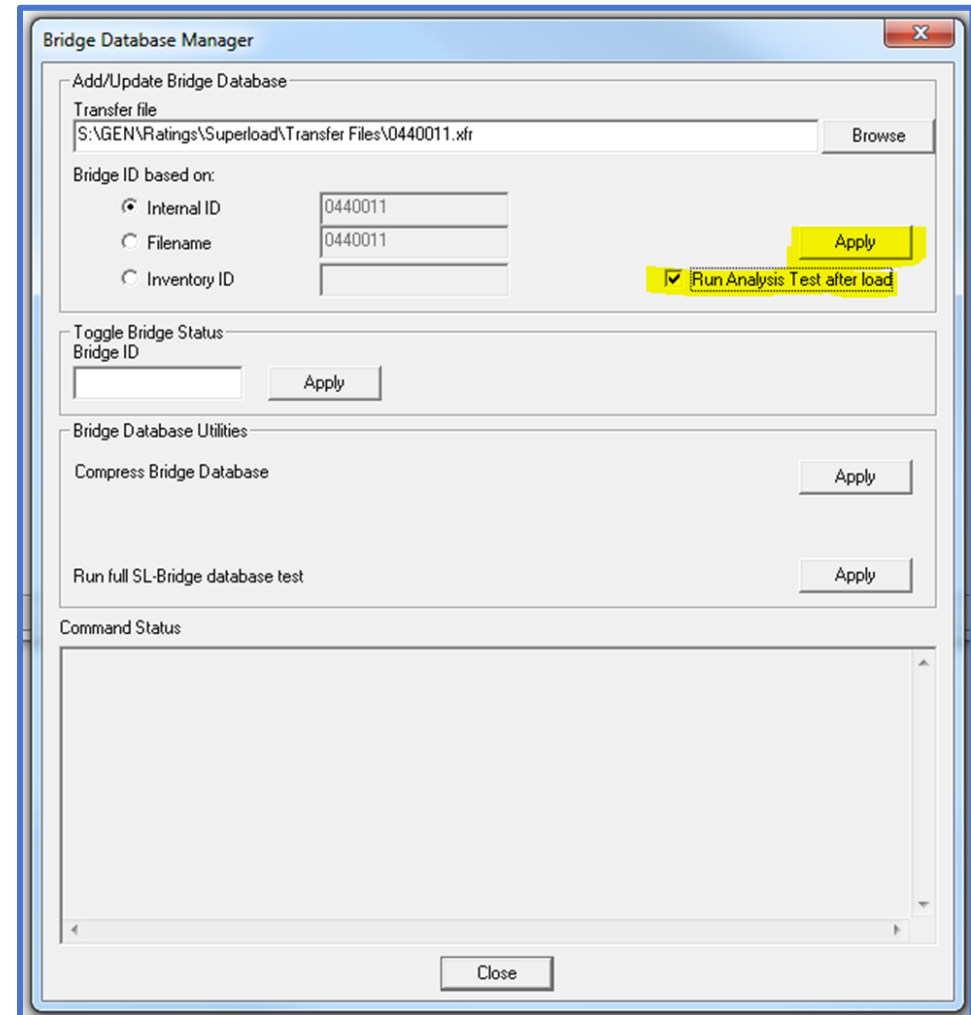
BENTLEY

- Bridge Database Manager
- Add SUPERLOAD Transfer file (*.xfr) to SUPERLOAD Bridge Database (*.ast, *.ddr & *.lib)
- Open file



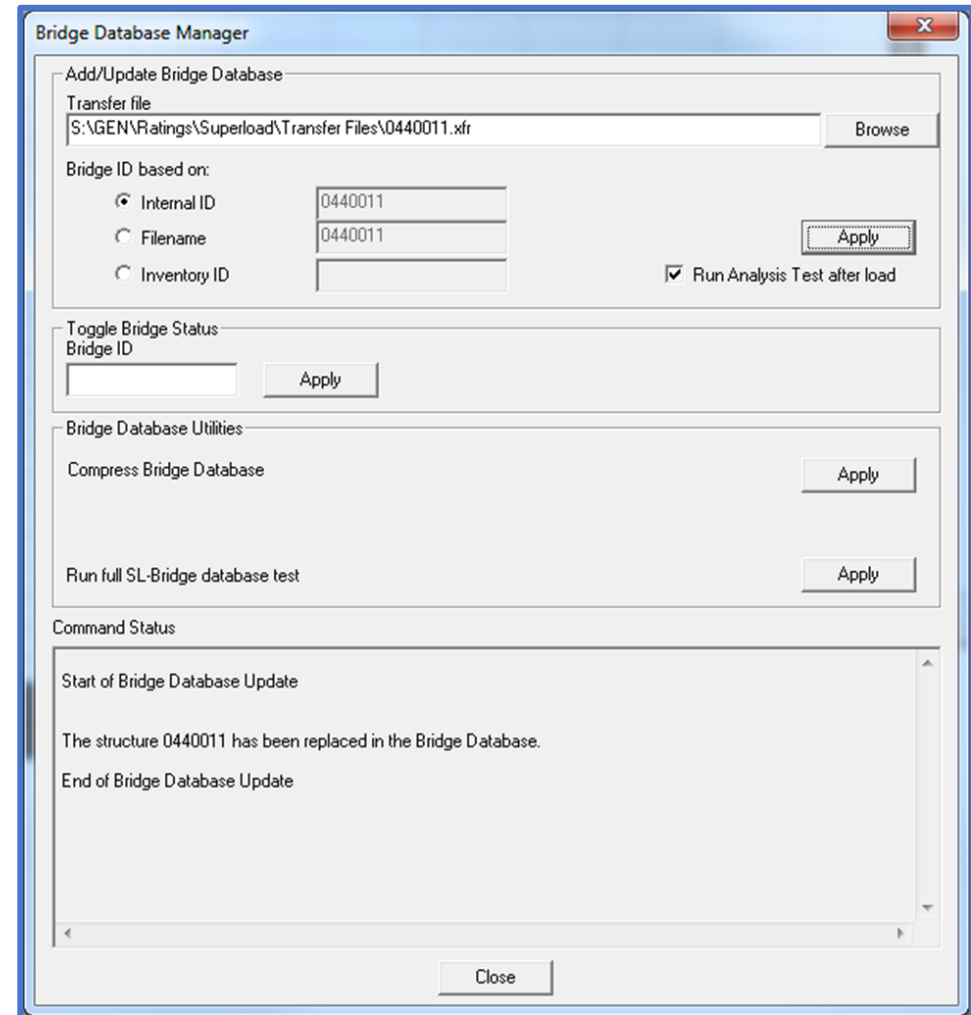
BENTLEY

- Bridge Database Manager
- Add SUPERLOAD Transfer file (*.xfr) to SUPERLOAD Bridge Database (*.ast, *.ddr & *.lib)
- Add file to database
- Test



BENTLEY

- Bridge Database Manager
- Add SUPERLOAD Transfer file (*.xfr) to SUPERLOAD Bridge Database (*.ast, *.ddr & *.lib)
- Local Database Updated



BENTLEY

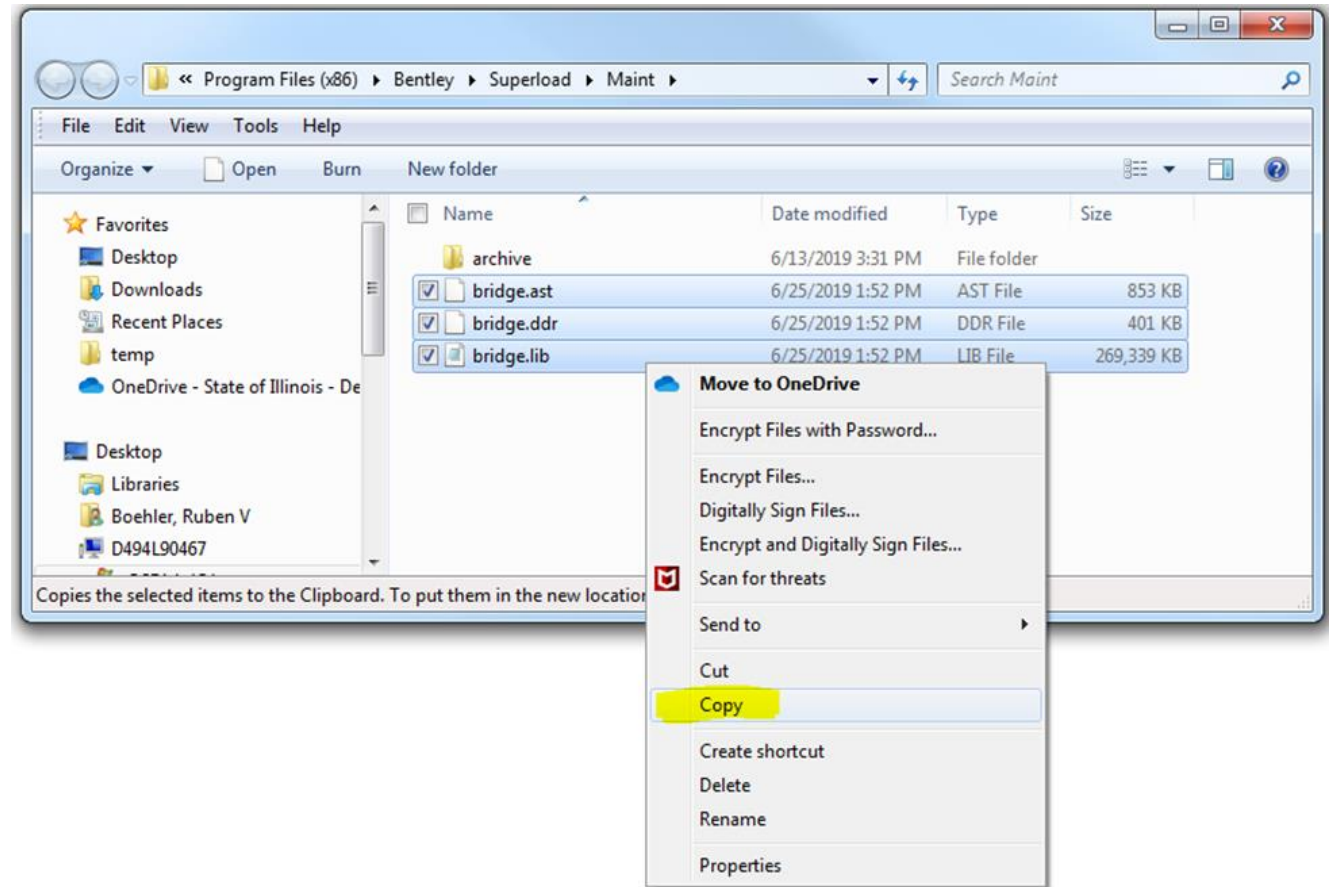
- Bridge Database Manager
- Verify Load Rating

The screenshot shows the Microsoft Excel interface with the 'Home' tab selected. The ribbon includes options for File, Home, Insert, Page Layout, Formulas, Data, Review, and View. The Font section shows 'Calibri' font and '11' size. The Alignment section shows 'Wrap Text' and 'Merge & Center' options. The formula bar shows 'A1' and 'Seq#'. The data table below has the following content:

	A	B	C	D	E	F	G
1	Seq#	Structure	Status	MultiFull	MultiFull	MultiLow	MultiLow
2		1 0440011	PASS	1.87	67.24	2.15	77.31
3							
4							


BENTLEY

- Copy SUPERLOAD Bridge Database (*.ast, *.ddr & *.lib)
- from Local PC
- to Web Deployment Location



PRECOMPUTED DATA MANAGEMENT SUMMARY

- Precomputed Data Experience:
 - AASHTOWare Process: 4 clicks
 - Bentley Process: 28 clicks
 - 6 clicks to convert AASHTOWare model to LARS model
 - 4 clicks to open LARS model
 - 4 clicks to analyze & create SUPERLOAD Transfer file
 - 5 clicks to verify LARS model
 - 4 clicks to create SUPERLOAD Database files
 - 5 clicks to copy from Local Drive to Web Deployment Location



One bridge at a time.
Batch analysis not
available.



THANK YOU