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BrDR 6.8.3, 6.8.4 and 7.0

RADBUG Meeting, 2018

AASHTOWare Bridge Design & Rating
AASHTO

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BrDR 6.8.3, 6.8.4 and 7.0

- Release Roadmap
- Overview of BrDR 6.8.3
- Load Rating Tool Enhancements
- Testing Strategy for BrDR 6.8.4 and BrDR 7.0
- Overview of the Modernized BrDR User Interface

Bridge Design/Rating 3-Year Release Roadmap

	Legacy System	Modernized System	Notes
2018	**6.8.3** Legacy User Interface Legacy & Modernized AASHTO Engine (a)	Modernization Phase 1 release (a) Modernization Phase 2 release (b)	Software Requirements ✓ Windows 7, 8 and 10 ✓ SQL Server 2014 ✓ Oracle 10.2, 11.2 and 12.1 Upgrade Path ✓ 6.8.3 ⇒ 6.8.4 ✓ 6.8.3 ⇒ 7.0
2019	**6.8.4** (c) Legacy User Interface Legacy & Modernized AASHTO Engine	**7.0** (b) Modernized User Interface Modernized AASHTO Engine	Software Requirements ✓ Windows 7, 8 and 10 ✓ SQL Server 2017 ✓ Oracle 11.2 and 12.2 Upgrade Path ✓ 6.8.4 ⇒ 7.0 ✓ 6.8.4 ⇒ 7.1 ✓ 7.0 ⇒ 7.1
2020	Support for 6.8.4 and all earlier versions will cease effective June 30, 2021 (c)	**7.1** Modernized User Interface Modernized AASHTO Engine	Software Requirements ✓ Windows 8 and 10 ✓ SQL Server 2017 ✓ Oracle 11.2 and 12.2 Upgrade Path ✓ 7.1 ⇒ 7.2

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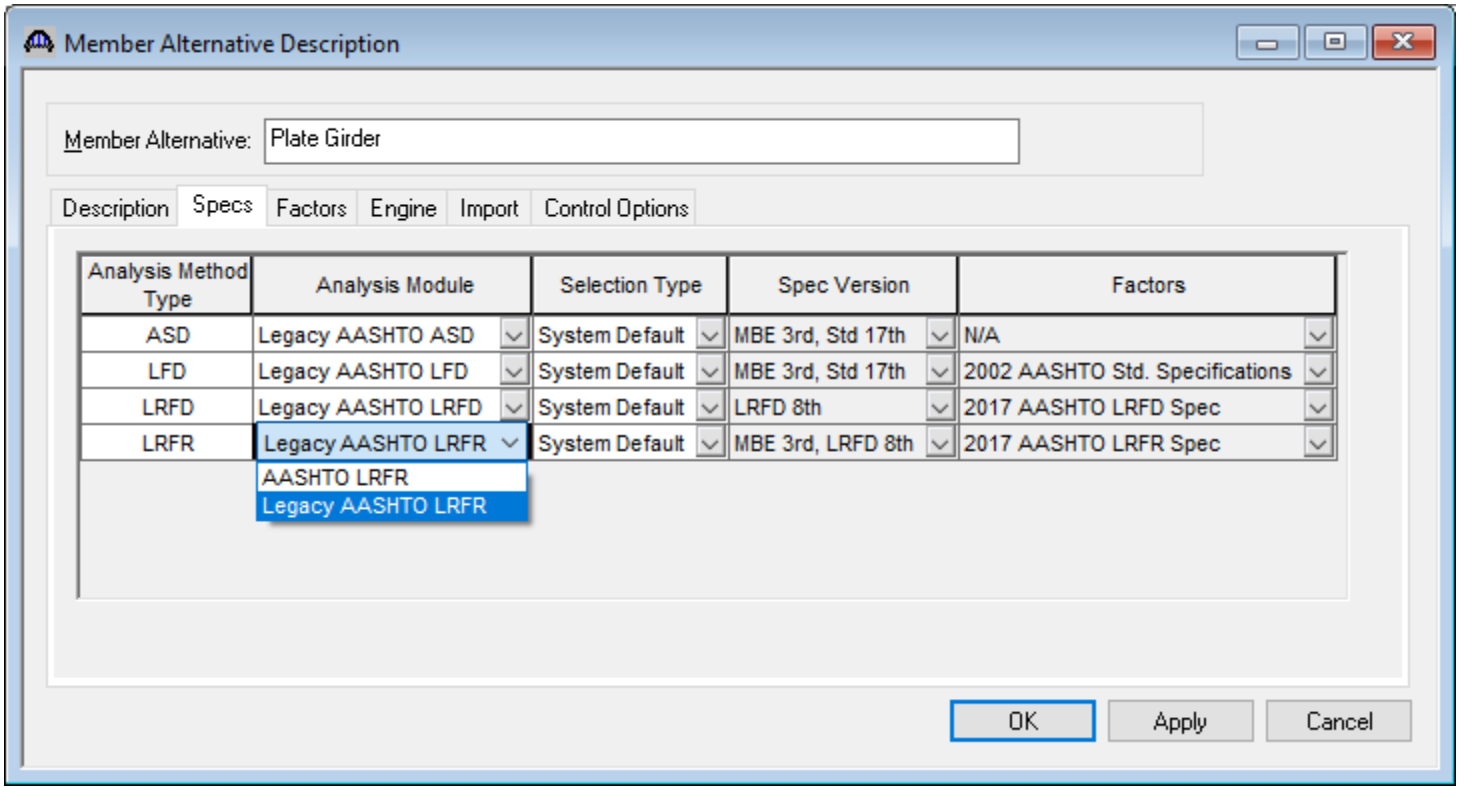
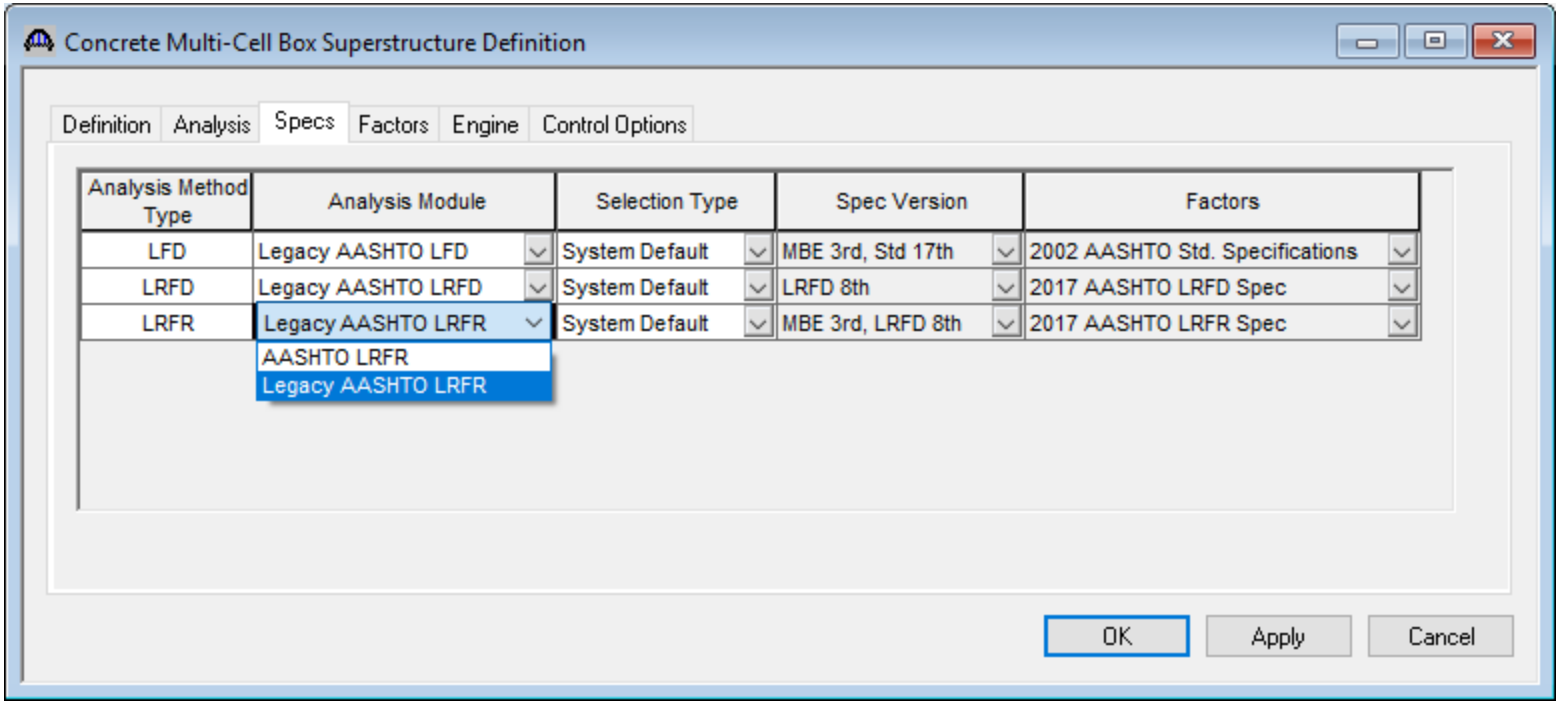
Overview of BrDR 6.8.3

- Modernized AASHTO Analytical Engine
- Errata for AASHTO LRFD Bridge Design Specifications, 8th Edition
- Live Demo

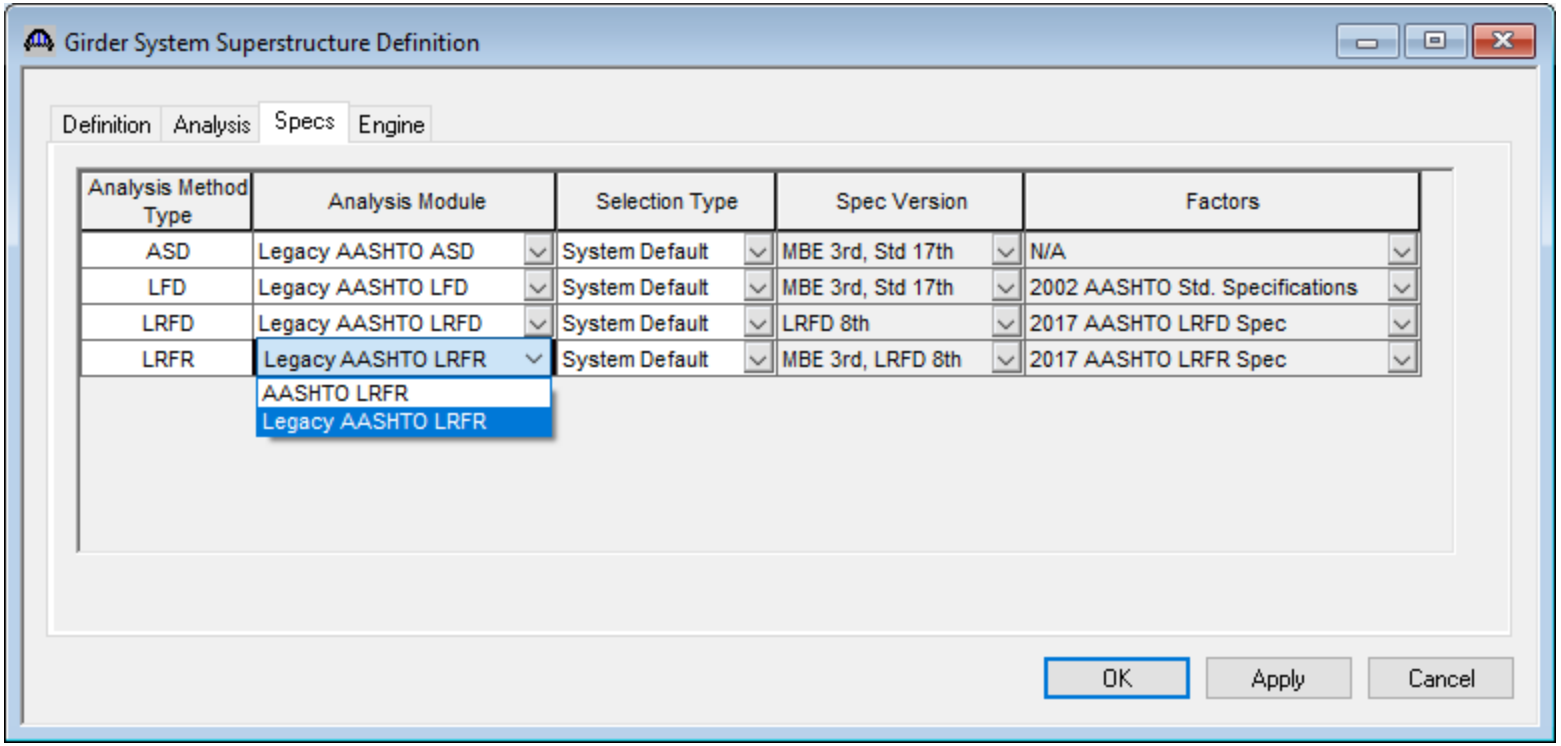
- Member Alternative and Member Definition



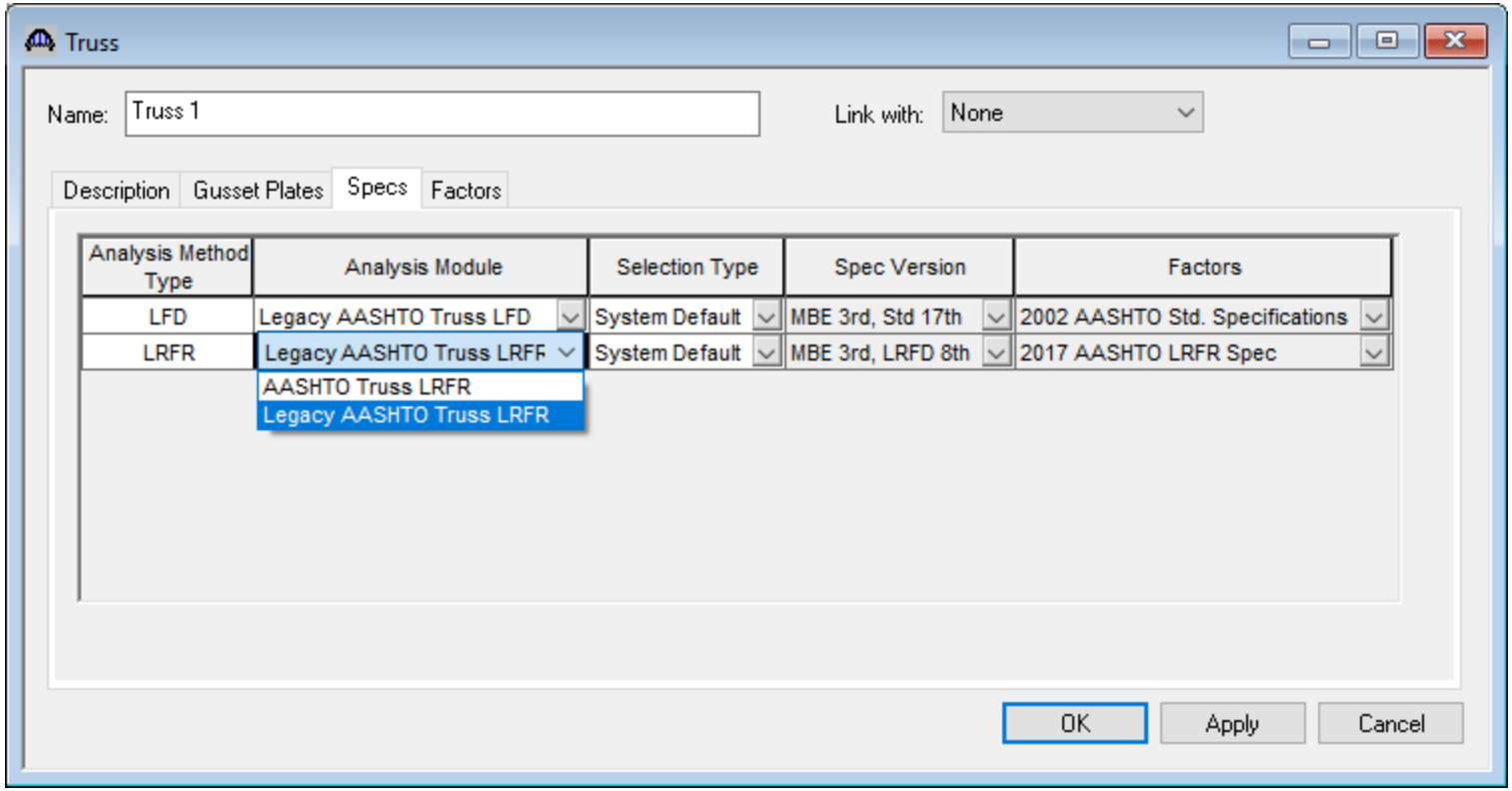
- Concrete Multi-Cell Box



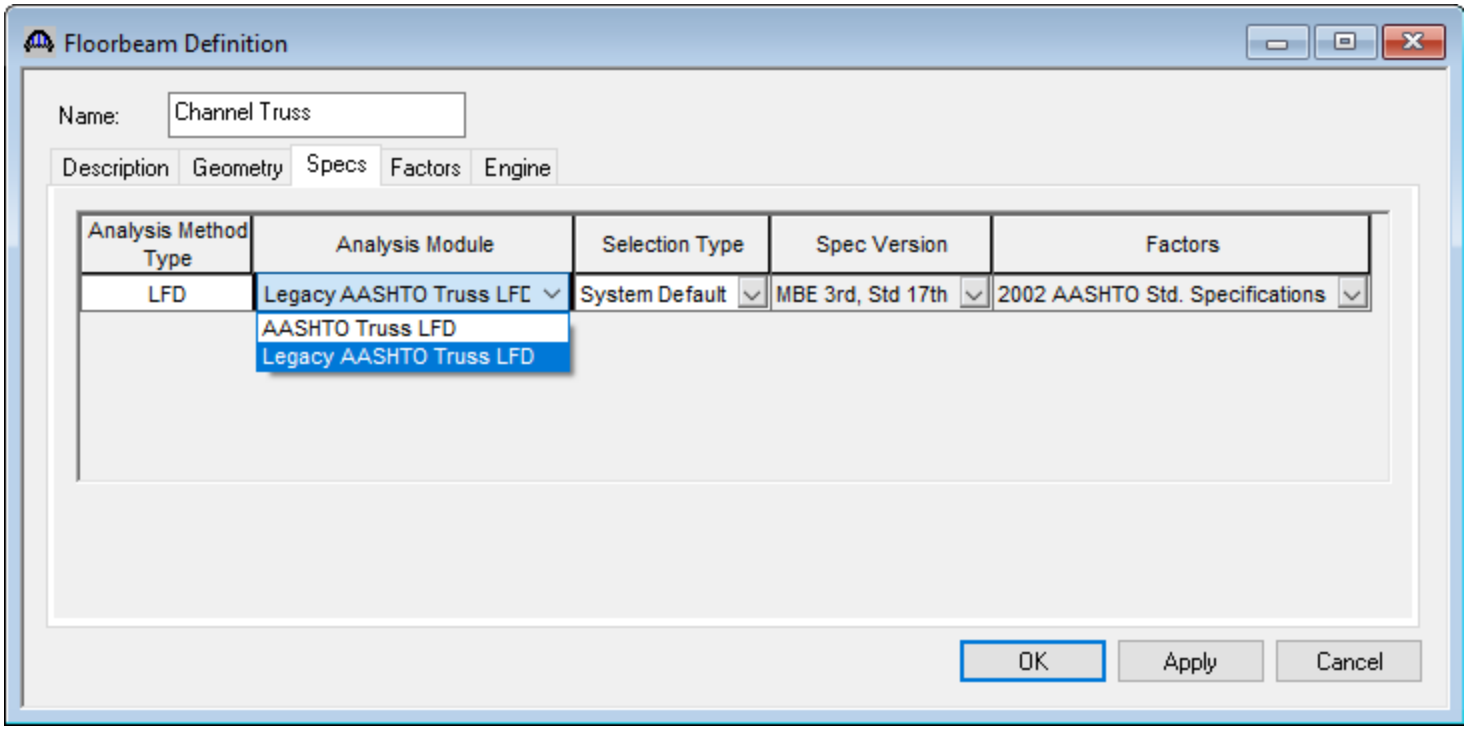
- 3D FEM analysis and 3D FEM-Vehicle Path analysis



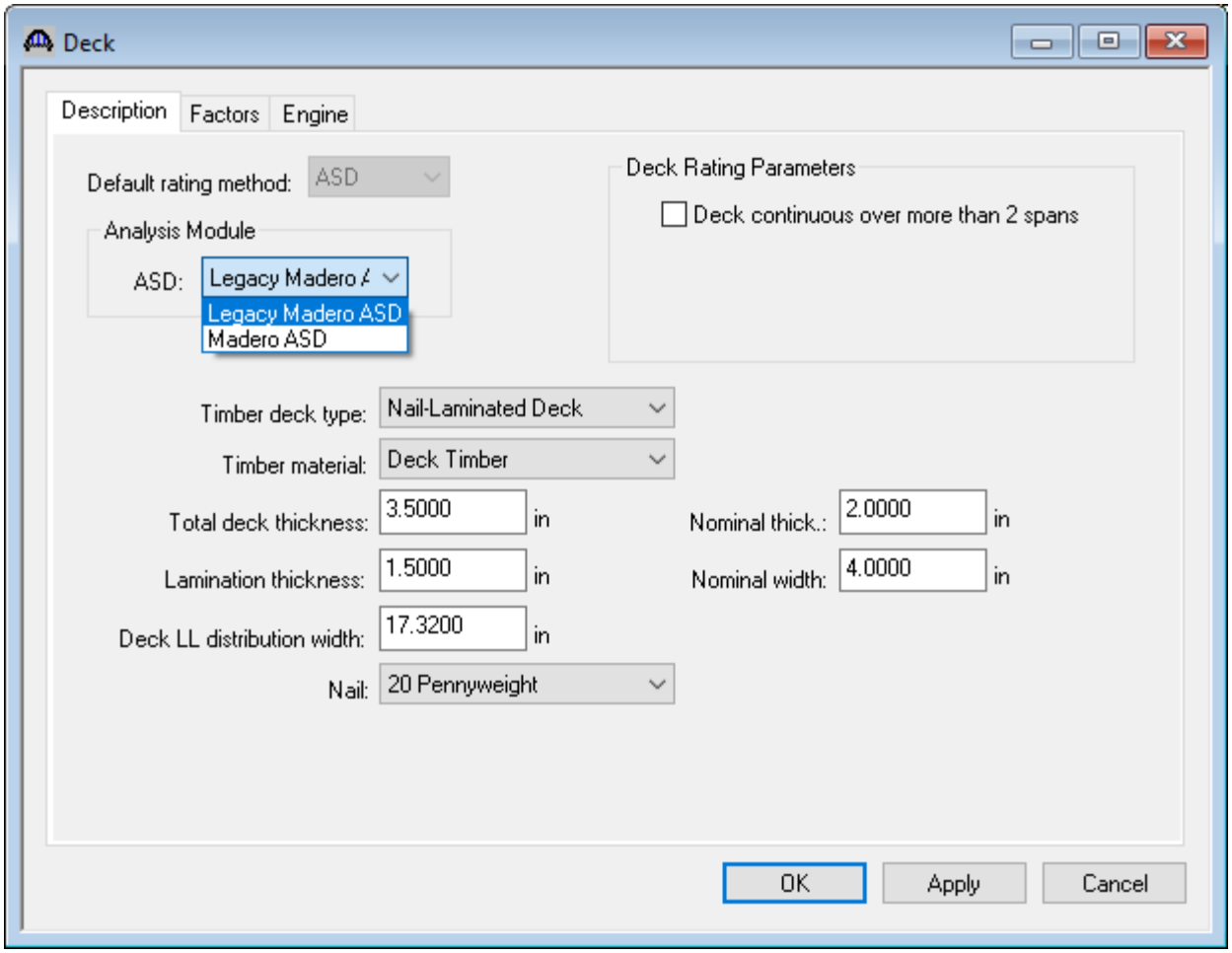
- Main Truss


Truss
Name: Truss 1
Link with: None
Description
Gusset Plates
Specs
Factors
Analysis Method Type
Analysis Module
Selection Type
Spec Version
Factors
LFD
Legacy AASHTO Truss LFD
System Default
MBE 3rd, Std 17th
2002 AASHTO Std. Specifications
LRFR
Legacy AASHTO Truss LRFR
System Default
MBE 3rd, LRFD 8th
2017 AASHTO LRFR Spec
AASHTO Truss LRFR
Legacy AASHTO Truss LRFR
OK
Apply
Cancel

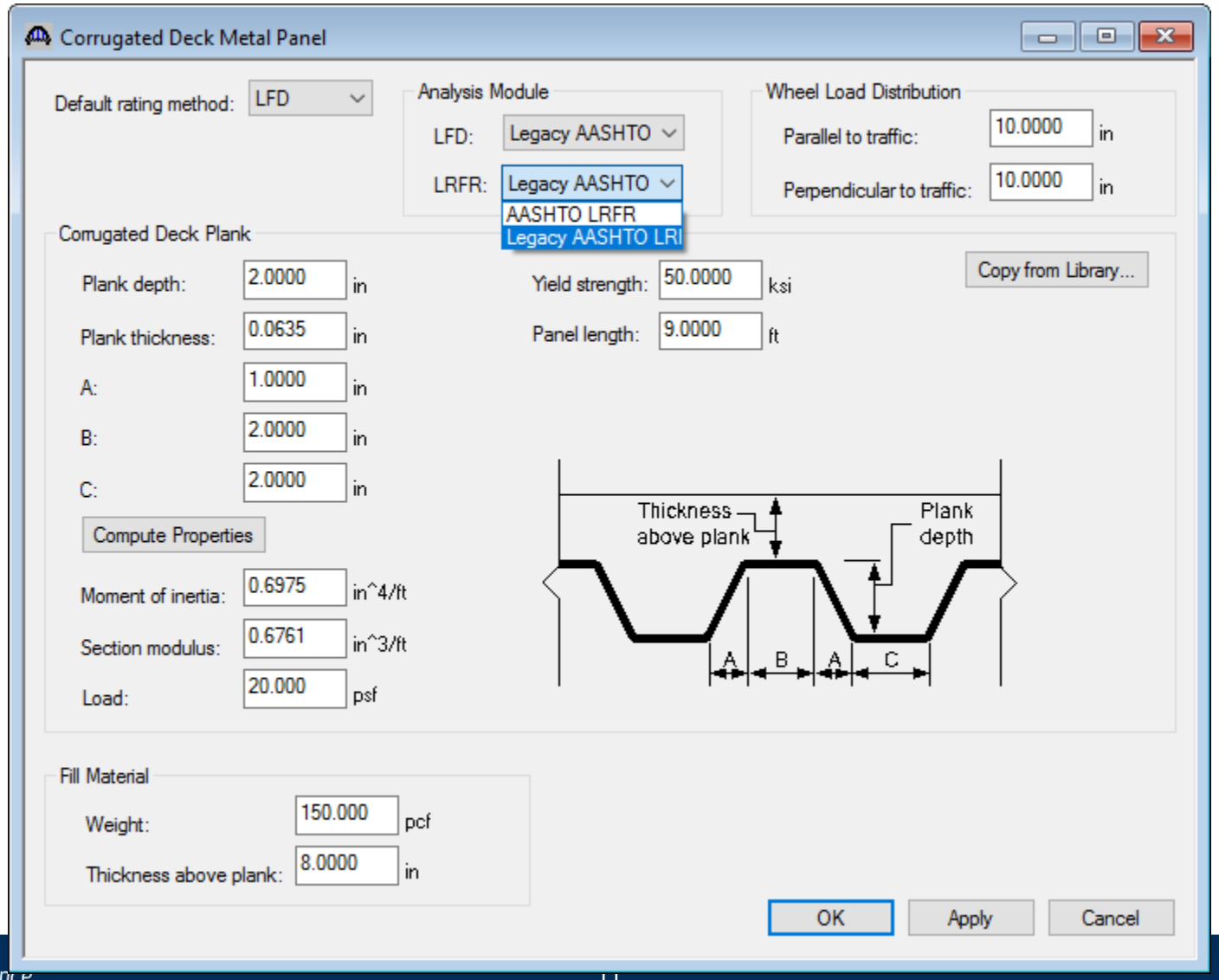
- Floor Truss


Floorbeam Definition
Name:
Channel Truss
Description
Geometry
Specs
Factors
Engine
Analysis Method Type
Analysis Module
Selection Type
Spec Version
Factors
LFD
Legacy AASHTO Truss LFD
System Default
MBE 3rd, Std 17th
2002 AASHTO Std. Specifications
AASHTO Truss LFD
Legacy AASHTO Truss LFD
OK
Apply
Cancel

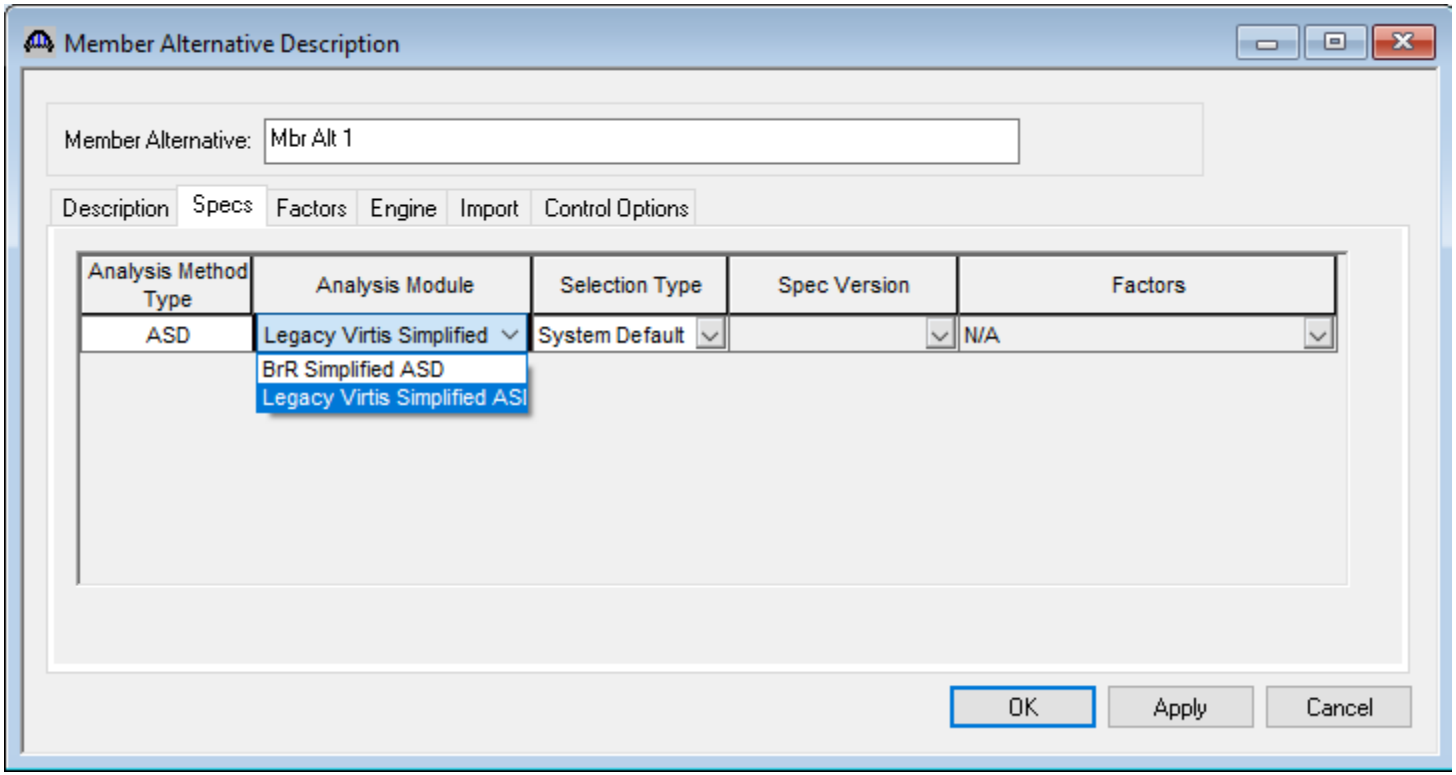
- Timber Deck


Deck
Description
Factors
Engine
Default rating method:
ASD
Deck Rating Parameters
Deck continuous over more than 2 spans
Analysis Module
ASD:
Legacy Madero A
Legacy Madero ASD
Madero ASD
Timber deck type:
Nail-Laminated Deck
Timber material:
Deck Timber
Total deck thickness:
3.5000
in
Nominal thick.:
2.0000
in
Lamination thickness:
1.5000
in
Nominal width:
4.0000
in
Deck LL distribution width:
17.3200
in
Nail:
20 Pennyweight
OK
Apply
Cancel

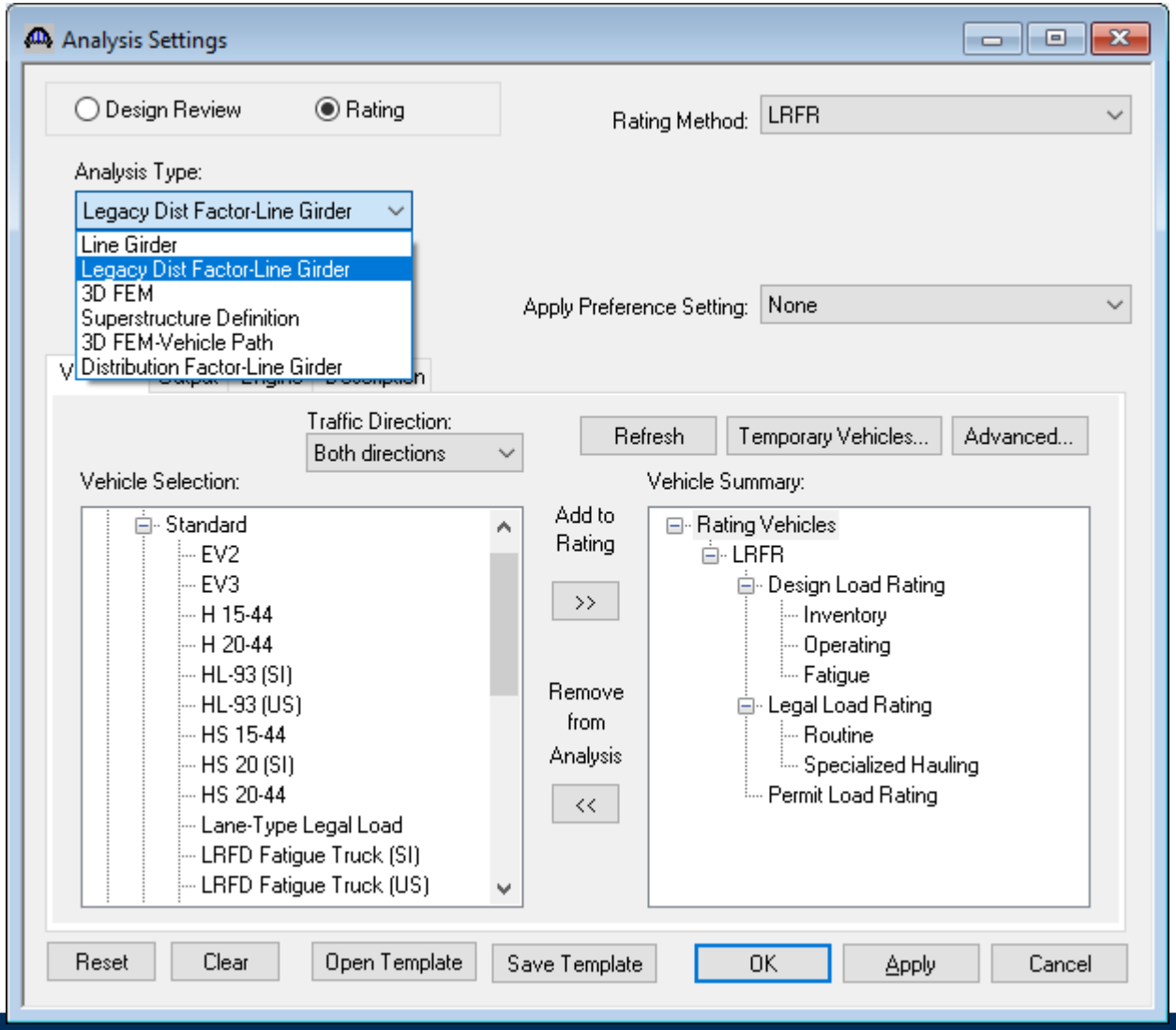
- Corrugated Deck



- Steel Non-Detailed Section

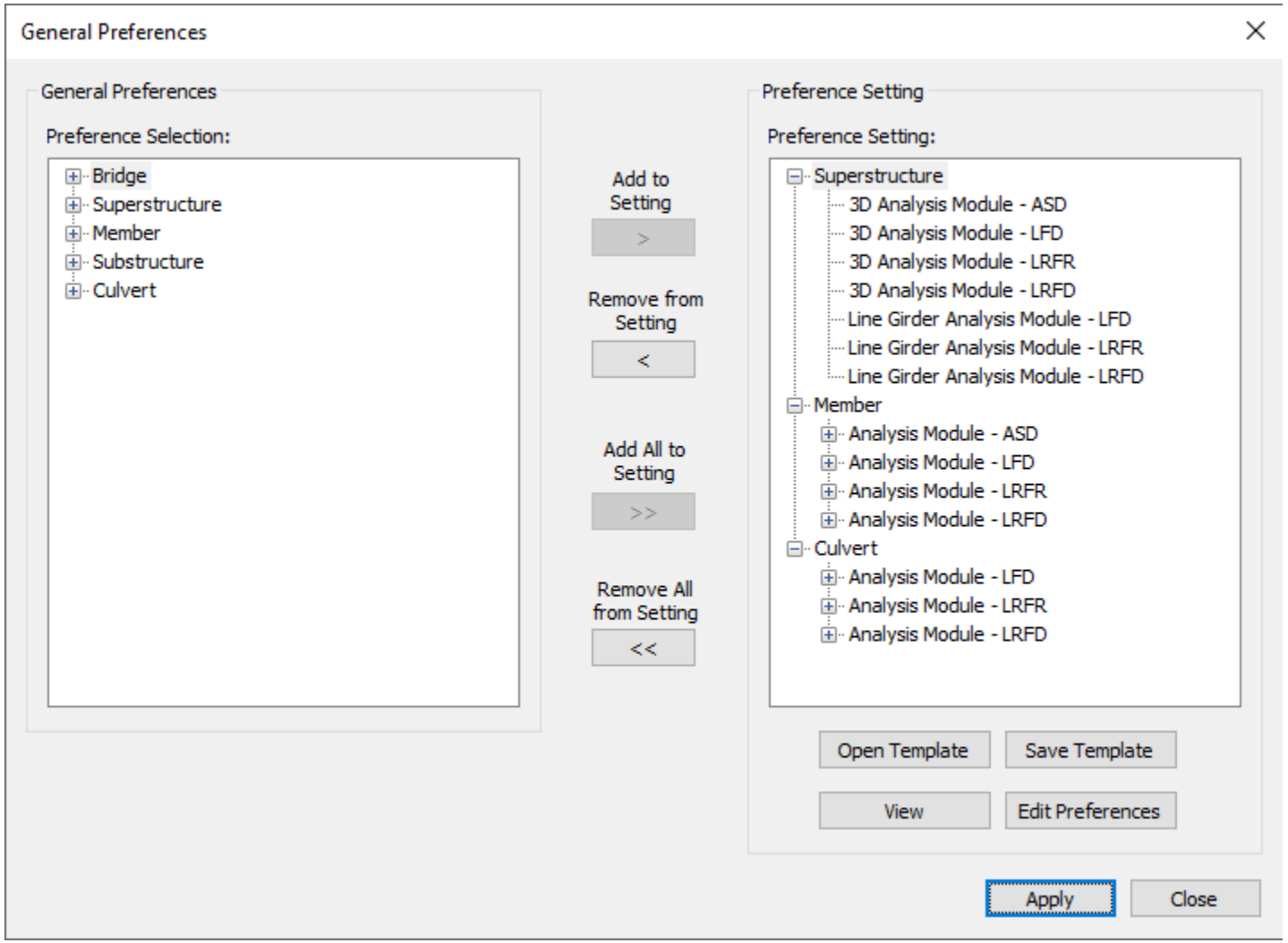


- Distribution Factor-Line Girder analysis

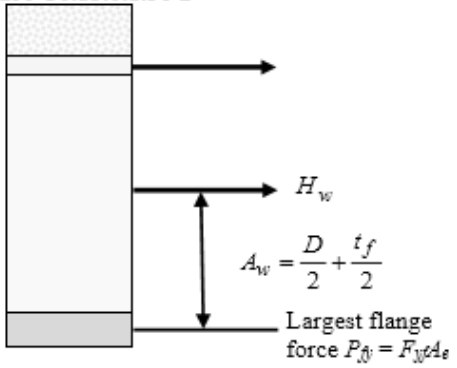
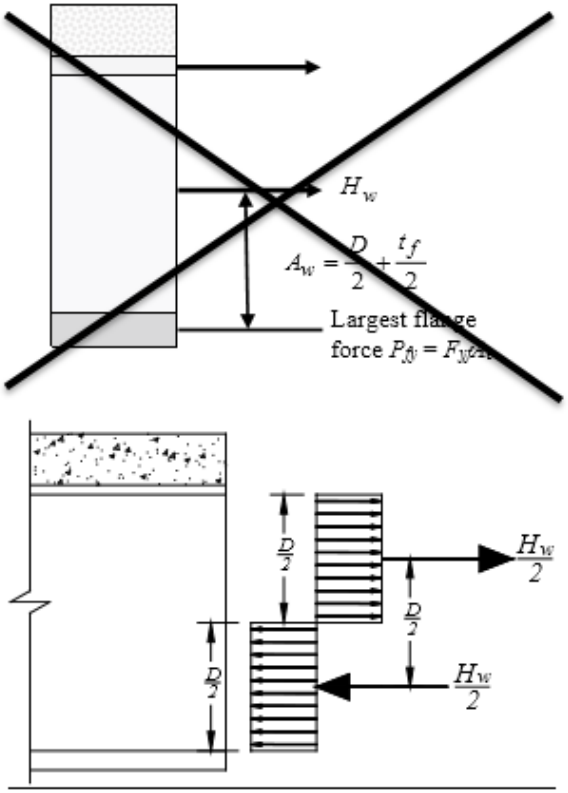


- How about the Pier analysis?
- How about the Design Tools?
  - Prestressed Concrete Design Tool
  - Shear Stirrup Design Tool
  - Shear Stud Design Tool
  - Culvert Design Tool

- Use General Preferences to switch analysis engine



- AASHTO LRFD 6.13.6.1.3c – Web Splices

Page	Existing Text	Corrected Text
6-259	**Figure C6.13.6.1.3c-2**  	**Figure C6.13.6.1.3c-2**  $Web\ Moment = \frac{Hw}{2}\left(\frac{D}{2}\right)$ $H_w = \frac{Web\ Moment}{D/4}$

Live Demo

Legacy vs. Modernized AASHTO Engine

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Load Rating Tool Enhancements

- Support LFR analysis of additional structure types
  - Floor Systems
  - Concrete Multi-Cell Boxes
  - Culverts
- For the Modernized AASHTO Engine in BrR 7.0

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Testing Strategy

- 2 main upgrade paths

- Effective regression testing approach
- Get organized, make a plan, and don't get left behind!

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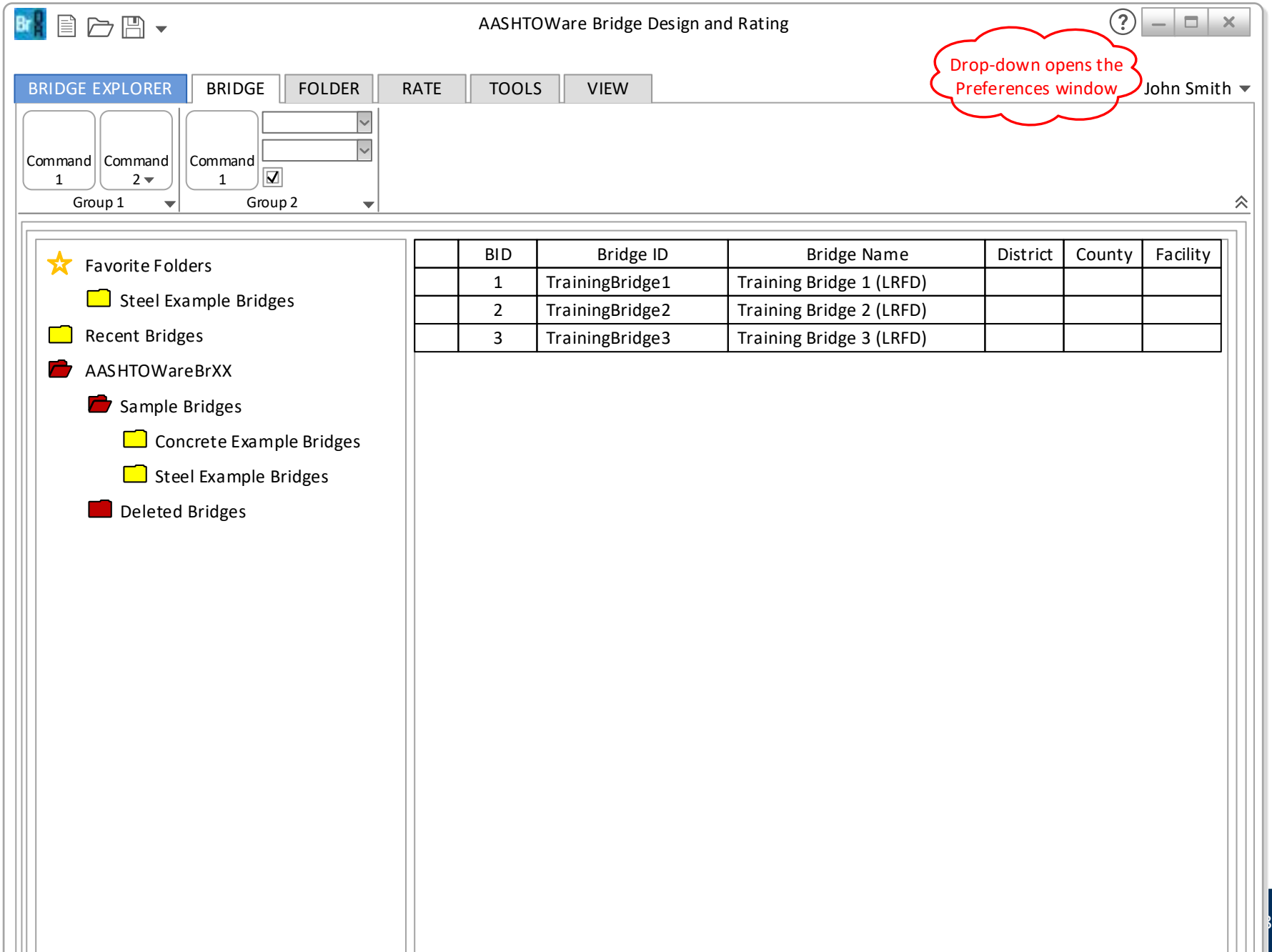
Overview of the Modernized BrDR User Interface

- Mockups
- User Interface Changes
- Discontinued Features
- Live Demo


AASHTOWare Bridge Design and Rating
Drop-down opens the Preferences window
John Smith
BRIDGE EXPLORER
BRIDGE
FOLDER
RATE
TOOLS
VIEW
Command 1
Command 2
Group 1
Command 1
Group 2
Favorite Folders
Steel Example Bridges
Recent Bridges
AASHTOWareBrXX
Sample Bridges
Concrete Example Bridges
Steel Example Bridges
Deleted Bridges
BID
Bridge ID
Bridge Name
District
County
Facility
1
TrainingBridge1
Training Bridge 1 (LRFD)
2
TrainingBridge2
Training Bridge 2 (LRFD)
3
TrainingBridge3
Training Bridge 3 (LRFD)

Core Tabs

BRIDGE

New	Authorization	Check Out	Open	Export	Find	Copy	Paste	Move To	Copy To	Delete	Lock	Check Out	Export	Cancel
		Check In		Import							Unlock	Check In	Import	Information
				Batch									Batch	
Bridge					Manage						Protection		Exchange	

FOLDER

New	Properties	Add To Favorite	Delete
Folder		Manage	

RATE

Rate	Update BrM Ratings	Rating Results	Recent Rating Results	Manage Analysis Events	Open	Precomputed Data	Load Rating Tool
Rate		Results			Routing	Load Rating Tool	

TOOLS

Simple Bridge Layout Wizard	Multimedia Attachments	General Preferences	Report Tool	BAR7	BARS	BRASS
Bridge				Import		

Library command opens the Library modal tab

VIEW

Refresh	Retrieve All	Select All	Sort By	Add Columns	System Units	Library	Configuration
	Retrieve Next	Select None					
		Invert Selection					
Bridge Explorer View							

Configuration command opens the Configuration modal tab

Modal Tabs

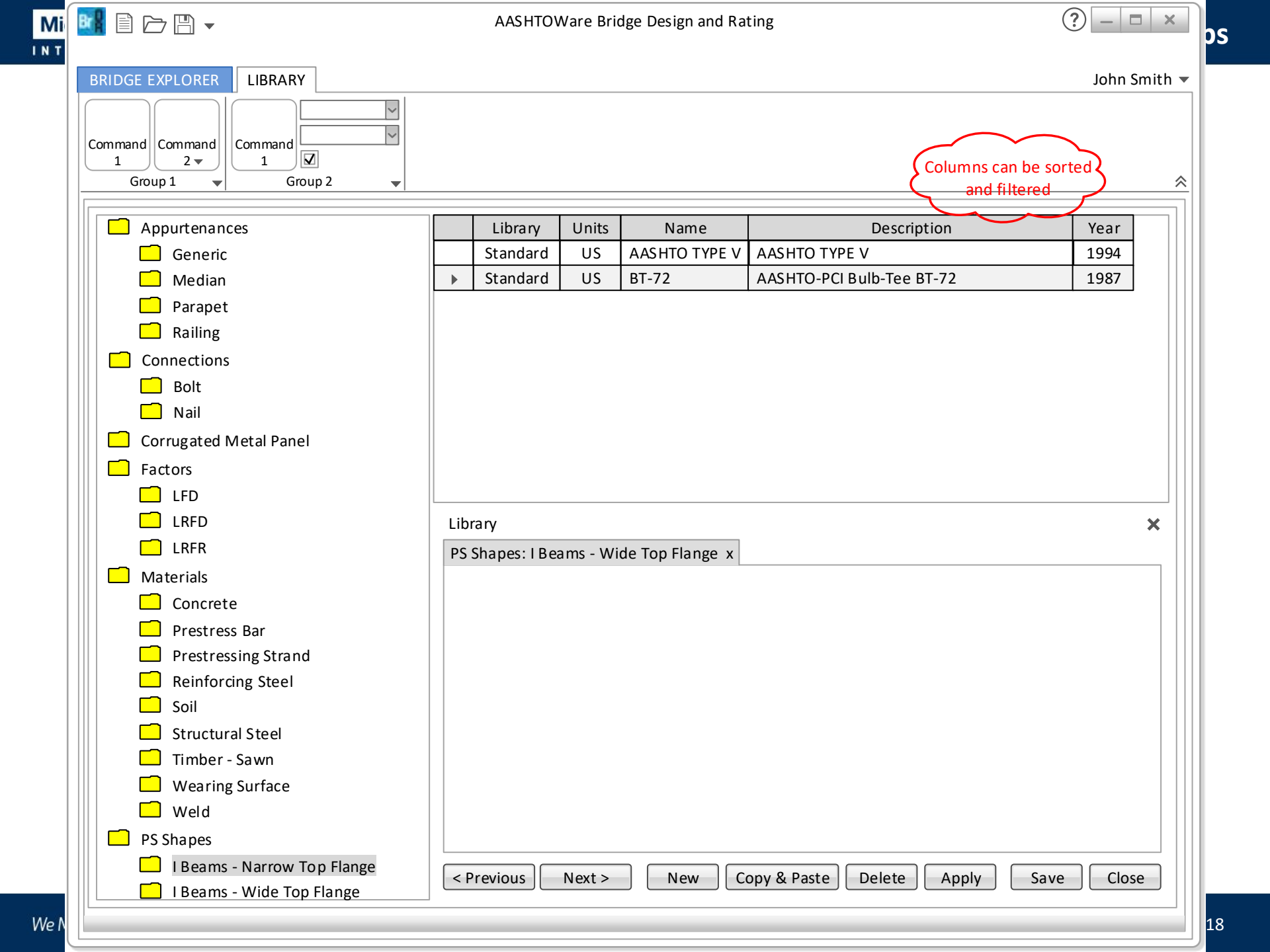
DELETED BRIDGES			
Empty Folder	Delete	Undelete	Close
Manage			

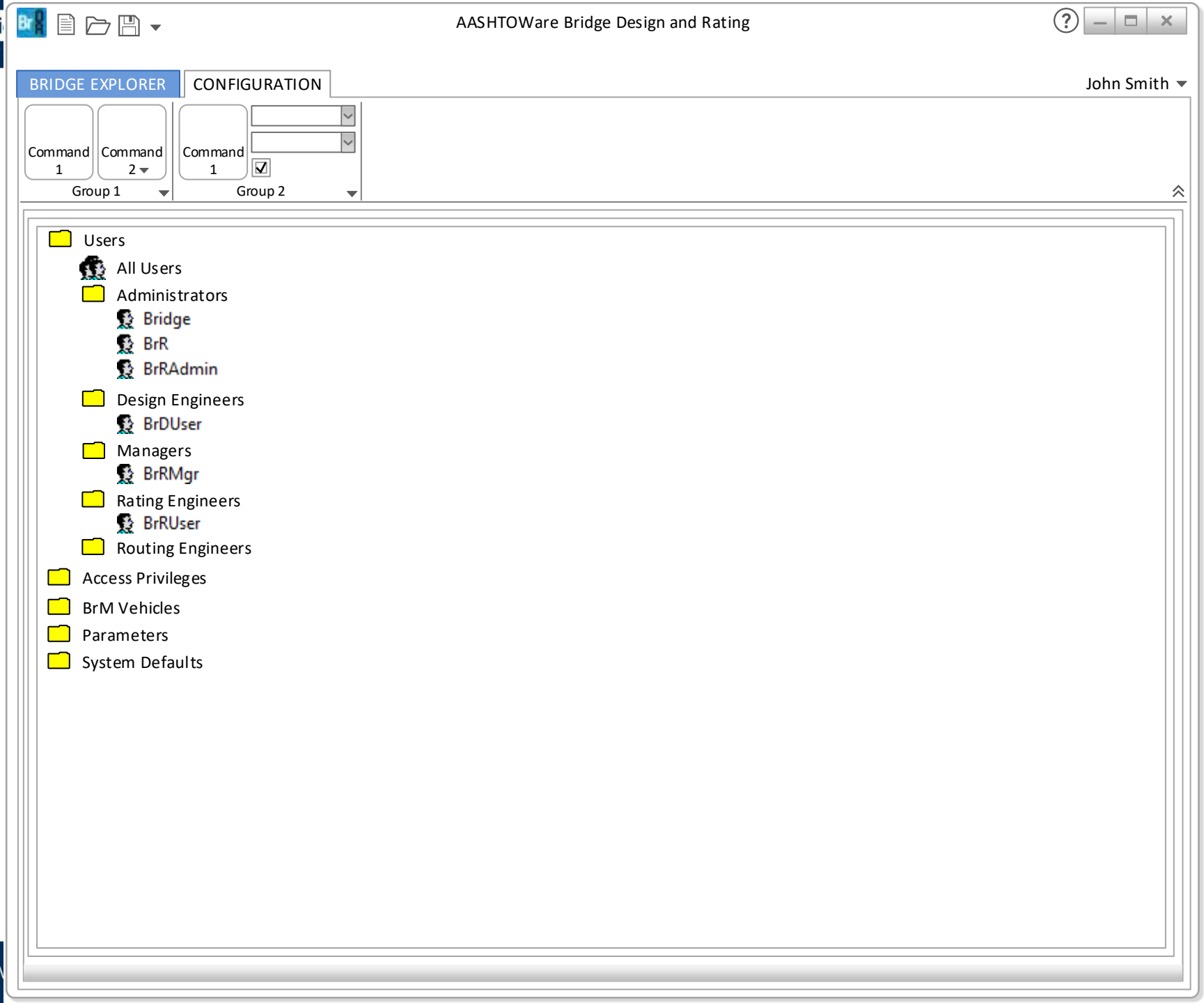
LIBRARY					
New	Copy & Paste	Open	Delete	Schematic	Close
Manage					

CONFIGURATION			
New User Group	Delete User Group	Open	Close
Manage			

BRIDGE EXPLORER Menu

- Database Information
- Export
  - Library Data
  - System Data
- Import
  - Library Data
  - System Data
- Print
- Help
- Exit


AASHTOWare Bridge Design and Rating
BRIDGE EXPLORER
LIBRARY
John Smith
Command 1
Command 2
Group 1
Command 1
Group 2
Columns can be sorted and filtered
Appurtenances
Generic
Median
Parapet
Railing
Connections
Bolt
Nail
Corrugated Metal Panel
Factors
LFD
LRFD
LRFR
Materials
Concrete
Prestress Bar
Prestressing Strand
Reinforcing Steel
Soil
Structural Steel
Timber - Sawn
Wearing Surface
Weld
PS Shapes
I Beams - Narrow Top Flange
I Beams - Wide Top Flange
Library
Units
Name
Description
Year
Standard US AASHTO TYPE V AASHTO TYPE V 1994
Standard US BT-72 AASHTO-PCI Bulb-Tee BT-72 1987
Library
PS Shapes: I Beams - Wide Top Flange x
< Previous
Next >
New
Copy & Paste
Delete
Apply
Save
Close


AASHTOWare Bridge Design and Rating
BRIDGE EXPLORER
CONFIGURATION
John Smith
Command 1
Command 2
Group 1
Command 1
Group 2
Users
All Users
Administrators
Bridge
BrR
BrRAdmin
Design Engineers
BrDUser
Managers
BrRMgr
Rating Engineers
BrRUser
Routing Engineers
Access Privileges
BrM Vehicles
Parameters
System Defaults

All Users

Columns can be sorted and filtered

	User ID	Active	First Name	Last Name	Prefix	Suffix	Title	Organization	Phone 1
	BrDUser	☑	BrDUser	BrDUser					
▶	Bridge	☑	Bridge	Bridge					
	BrR	☑	BrR	BrR					
	BrRAdmin	☑	BrRAdmin	BrRAdmin					
	BrRMgr	☑	BrRMgr	BrRMgr					
	BrRUser	☑	BrRUser	BrRUser					

Bridge is a member of:

Administrators

<- Add

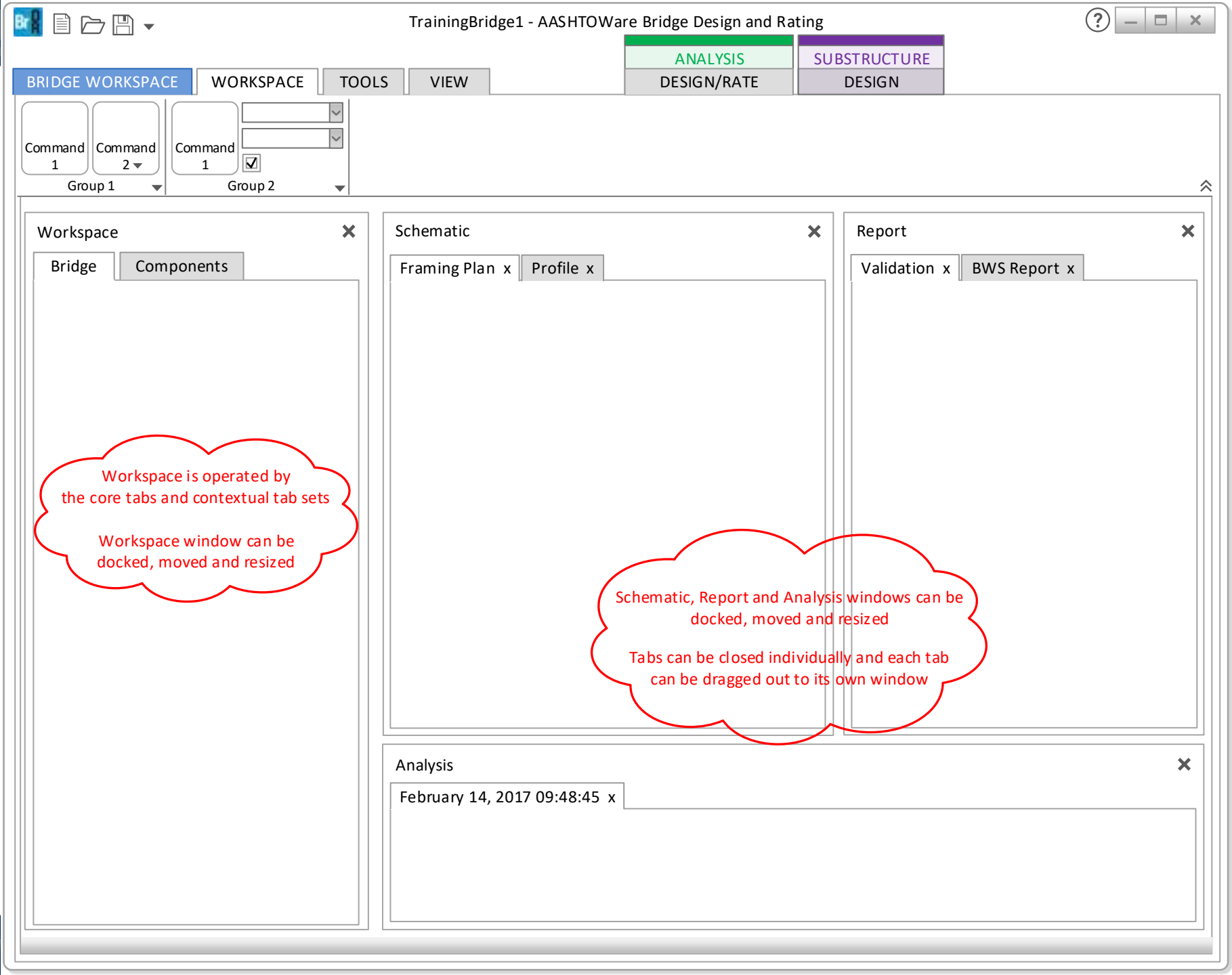
Remove ->

Bridge is not a member of:

Design Engineers
Managers
Rating Engineers
Routing Engineers

New | Duplicate | Delete

Save | Close


TrainingBridge1 - AASHTOWare Bridge Design and Rating
ANALYSIS
DESIGN/RATE
SUBSTRUCTURE
DESIGN
BRIDGE WORKSPACE
WORKSPACE
TOOLS
VIEW
Command 1
Command 2
Command 1
Group 1
Group 2
Workspace
Bridge
Components
Workspace is operated by the core tabs and contextual tab sets
Workspace window can be docked, moved and resized
Schematic
Framing Plan x
Profile x
Report
Validation x
BWS Report x
Schematic, Report and Analysis windows can be docked, moved and resized
Tabs can be closed individually and each tab can be dragged out to its own window
Analysis
February 14, 2017 09:48:45 x

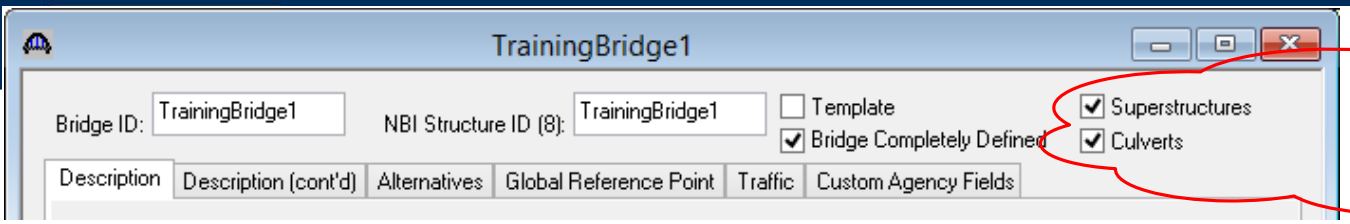
Modernized UI – Mockups

Core Tabs

WORKSPACE												
Check Out	Validate	Save	Restore	Close	Export	Open	New	Copy	Paste	Copy & Paste	Delete	Schematic
Check In			Revert									
Bridge						Manage						

TOOLS						
Multimedia Attachments	General Preferences	Report Tool	Superstructure Definition Wizard	Prestressed Concrete Design Tool	Culvert Design Tool	Import Design Tool File
Bridge						

VIEW				
Expand Branch	Superstructures	Compact	System Units	Switch Windows
Collapse Branch	Culverts			
	Substructures			
Bridge Workspace View				



A Substructures checkbox will be added to the Bridge Description window

Superstructures
Culverts
Substructures

Workspace

Bridge | Components

- TrainingBridge1
  - Components
    - 4500 psi Concrete
    - Grade 50W
    - Grade 60 - Epoxy
  - Diaphragm Definitions
  - Lateral Bracing Definitions
  - LRFD Multiple Presence Factors
  - Environmental Conditions
  - Design Parameters
  - SUPERSTRUCTURE DEFINITIONS
  - CULVERT DEFINITIONS
  - BRIDGE ALTERNATIVES
    - Bridge Alt1
      - SUPERSTRUCTURES
      - Stiffness Analysis
      - PIERS
      - CULVERTS

Superstructures
Culverts
Substructures

Workspace

Bridge | Components

- TrainingBridge1
  - Components
    - 4500 psi Concrete
    - Grade 50W
    - Grade 60 - Epoxy
  - Diaphragm Definitions
  - Lateral Bracing Definitions
  - SUPERSTRUCTURE DEFINITIONS
  - BRIDGE ALTERNATIVES
    - Bridge Alt1
      - SUPERSTRUCTURES

Superstructures
Culverts
Substructures

Workspace

Bridge | Components

- TrainingBridge1
  - Components
    - 4500 psi Concrete
    - Grade 50W
    - Grade 60 - Epoxy
  - CULVERT DEFINITIONS
  - BRIDGE ALTERNATIVES
    - Bridge Alt1
      - CULVERTS

Superstructures
Culverts
Substructures

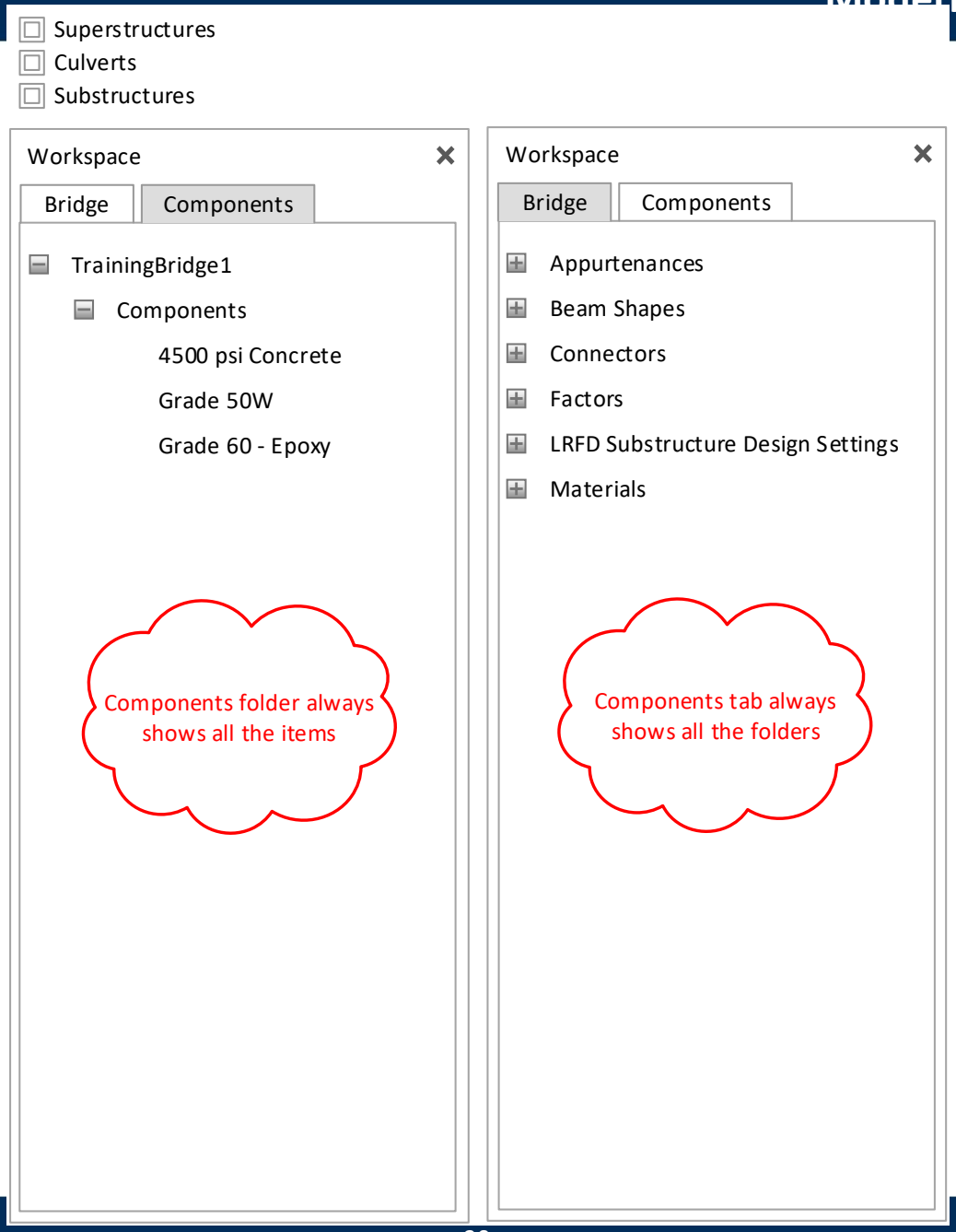
Workspace

Bridge | Components

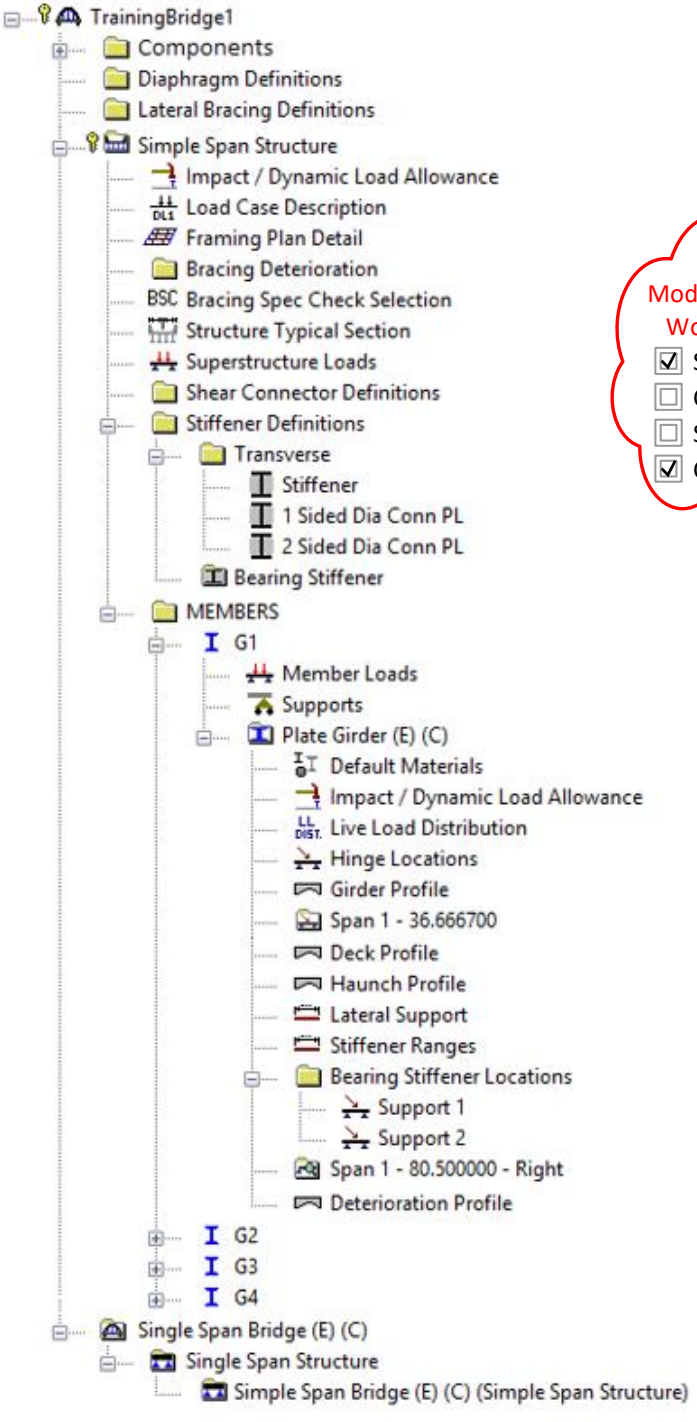
- TrainingBridge1
  - Components
    - 4500 psi Concrete
    - Grade 50W
    - Grade 60 - Epoxy
    - LRFD Multiple Presence Factors
    - Environmental Conditions
    - Design Parameters
  - BRIDGE ALTERNATIVES
    - Bridge Alt1
      - Stiffness Analysis
      - PIERS

Superstructures, Culverts and Substructures checkboxes are set to what specified in the Bridge Description window when the Bridge Workspace is opened

Modernized UI – Mockups



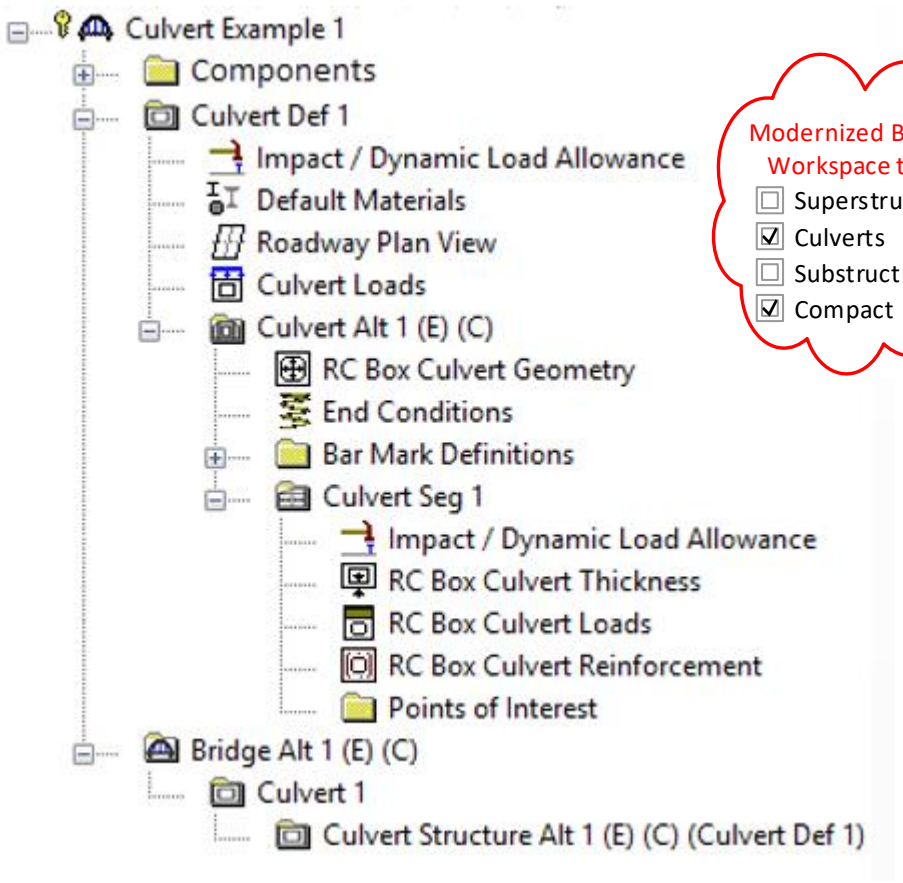
Modernized UI – Mockups



Modernized Bridge Workspace tree

- [x] Superstructures
- [ ] Culverts
- [ ] Substructures
- [x] Compact

Modernized UI – Mockups



Contextual Tab Sets

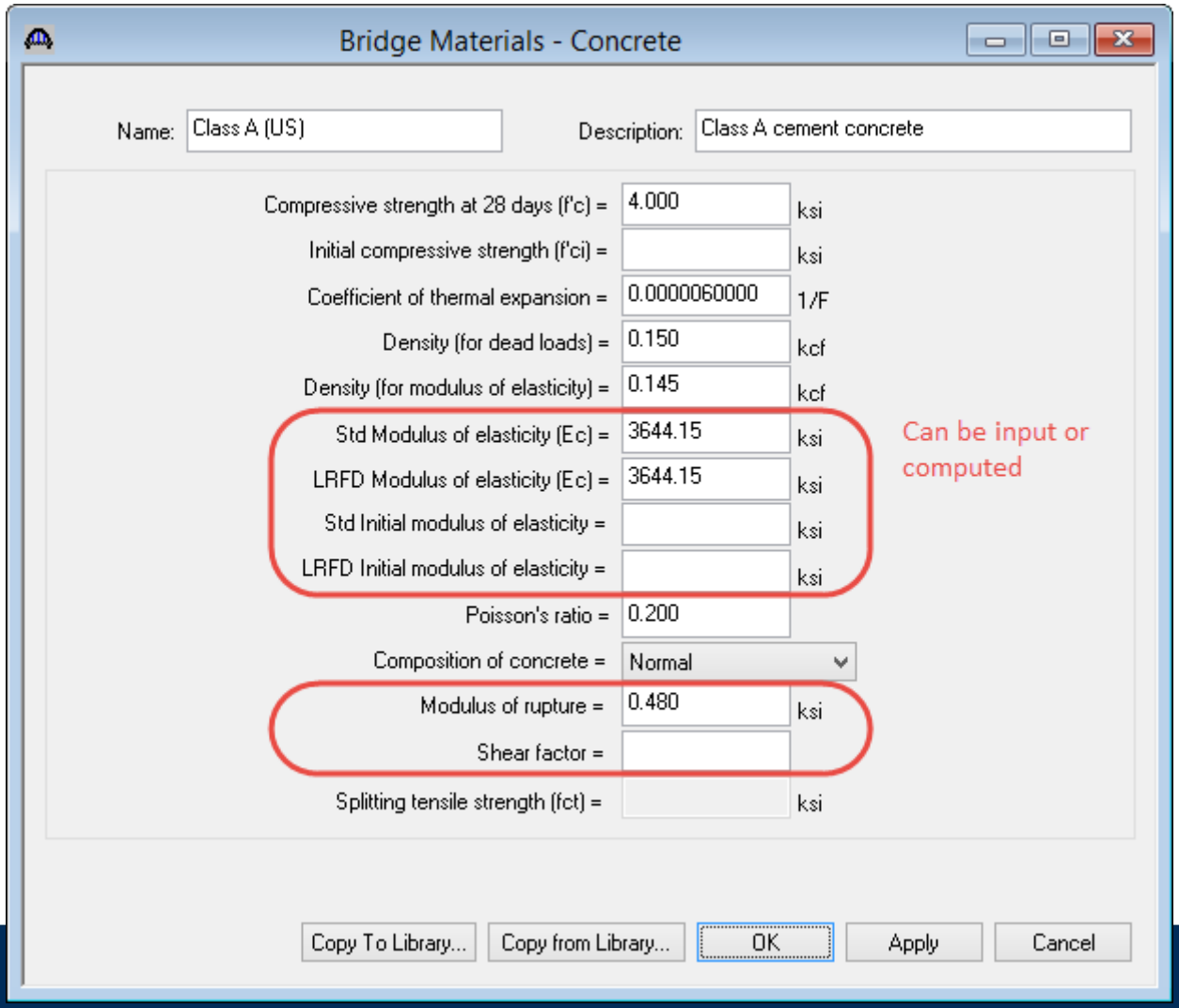
ANALYSIS								
DESIGN/RATE								
Analysis Settings	Analyze	Analysis Events	Tabular Results	Specification Checks	Engine Outputs	Result Graphs	Analysis Errors	Save Results
Analysis			Results					

SUBSTRUCTURE										
DESIGN										
Design Mode	Generate Model	Load Combinations	Load Palette	Analyze	Specification Check	Tabular Results	Specification Checks	Result Graphs	Soil Plot	3D Schematic
Analysis						Results				

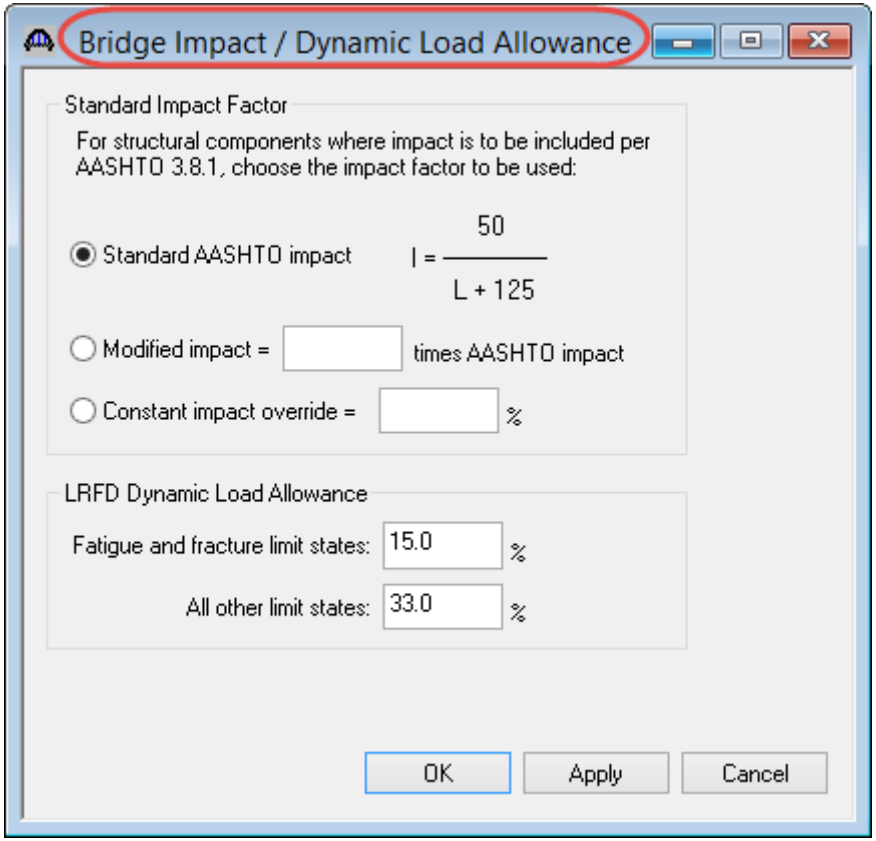
BRIDGE WORKSPACE Menu

- Print
- Help
- Close

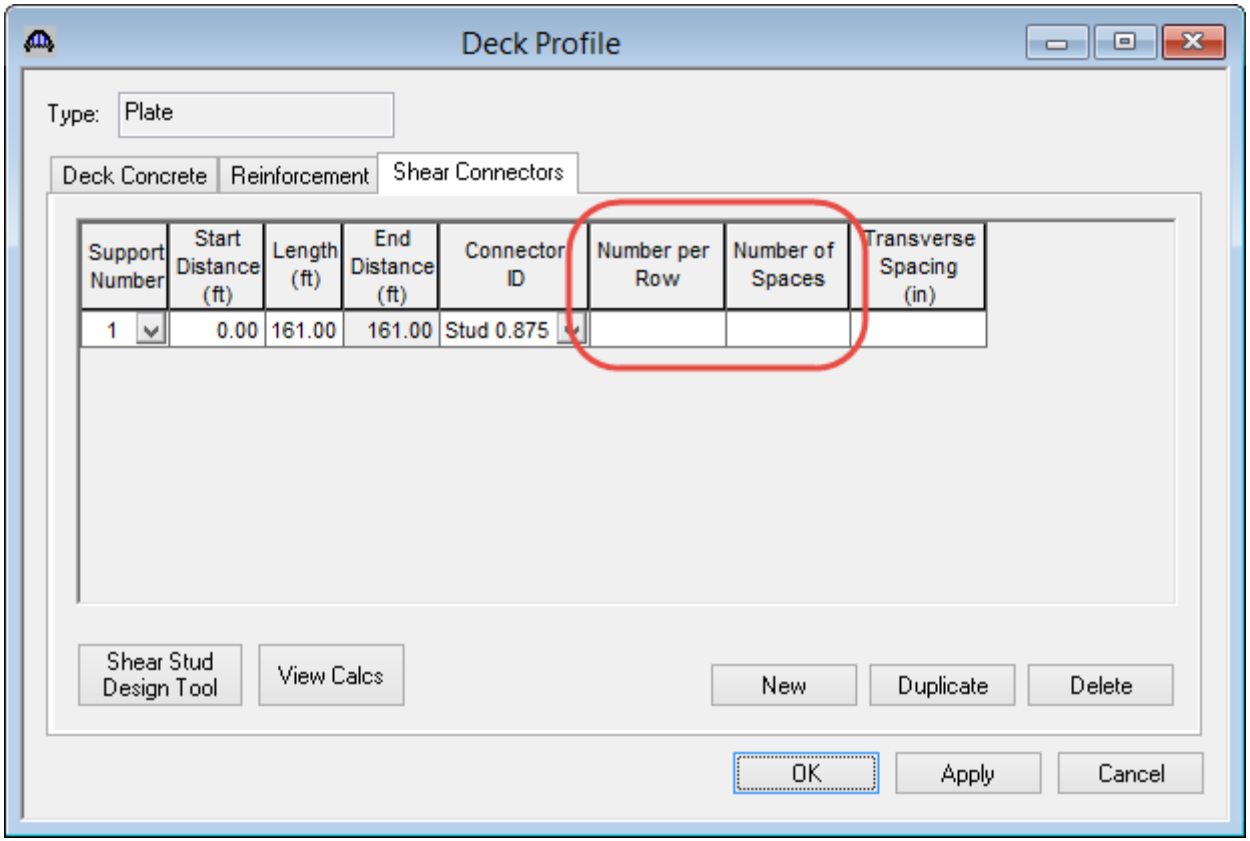
- Bridge and Library's Materials – Concrete windows
  - Rearrange the inputs and add a Compute button



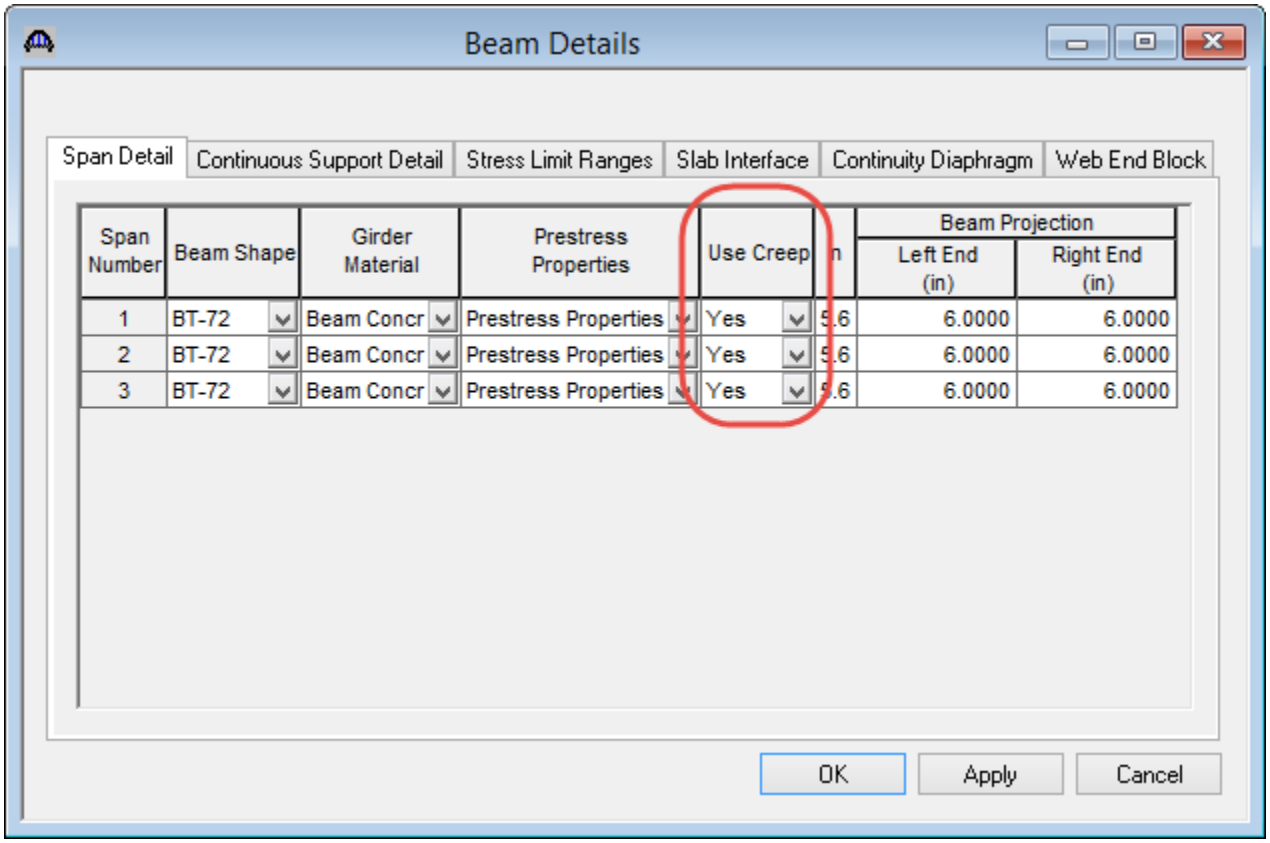
- Bridge Impact / Dynamic Load Allowance window
  - Remove the bridge level's Impact / Dynamic Load Allowance window



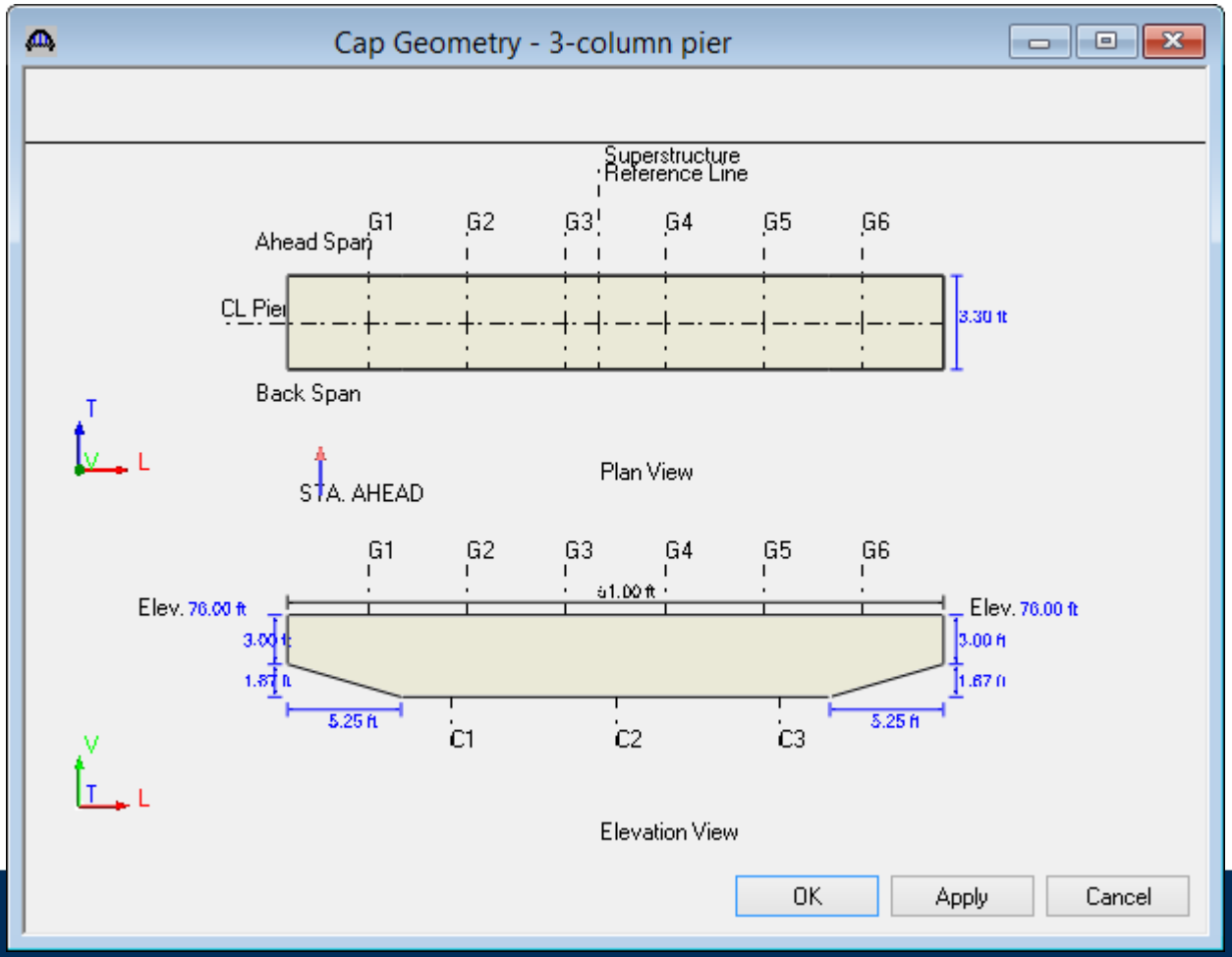
- Deck Profile window's Shear Connectors tab
  - Switch the order of the Number per Row and Number of Spaces columns



- Beam Details window's Span Detail tab
  - Move the Use Creep data to the Member Alternative window

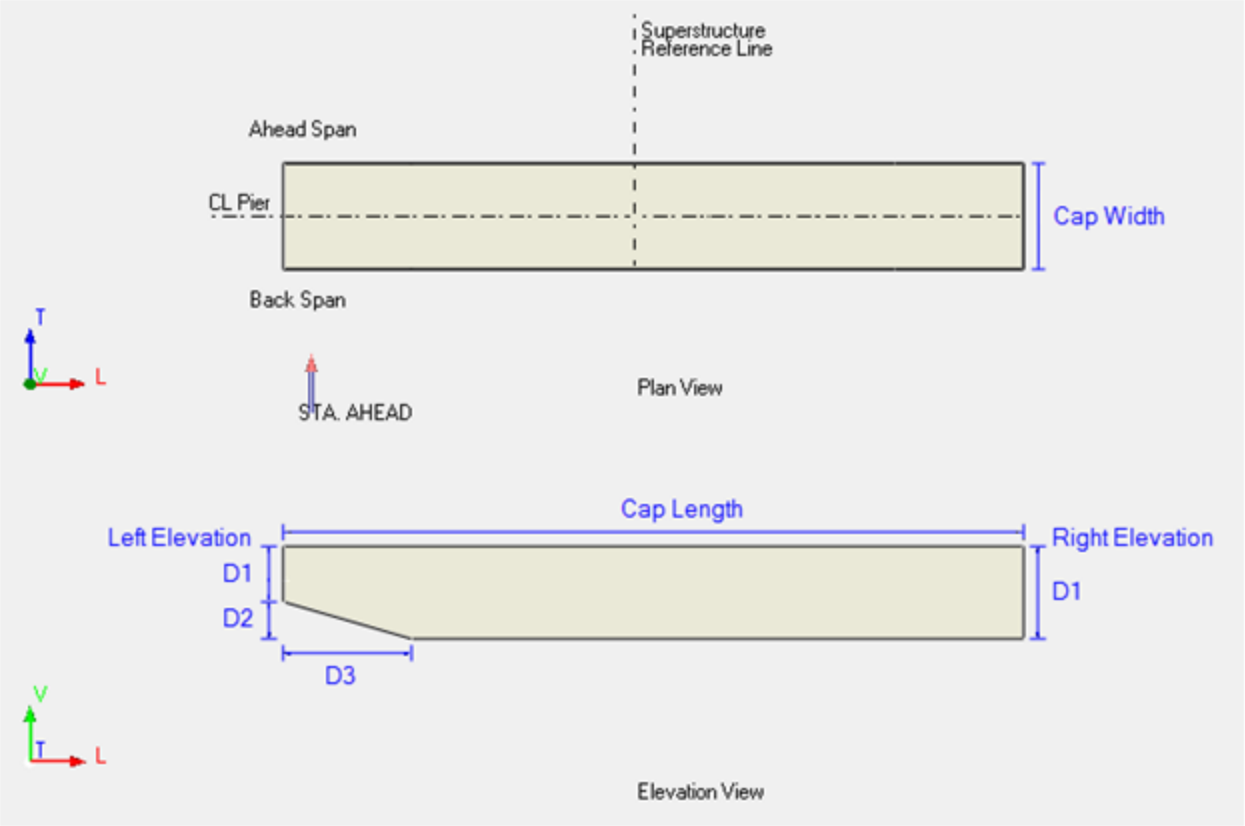


- Pier Alternative's Geometry windows
  - Replace the custom OpenGL view with static bitmap and labeled text boxes



Modernized Cap Geometry window

- The static schematic (not drawn to scale) reflects the left and right cantilever types.
- For Frame Pier and Solid Shaft Pier, Cap length is read-only.
- For Pile Bent Pier, Cap length is editable.

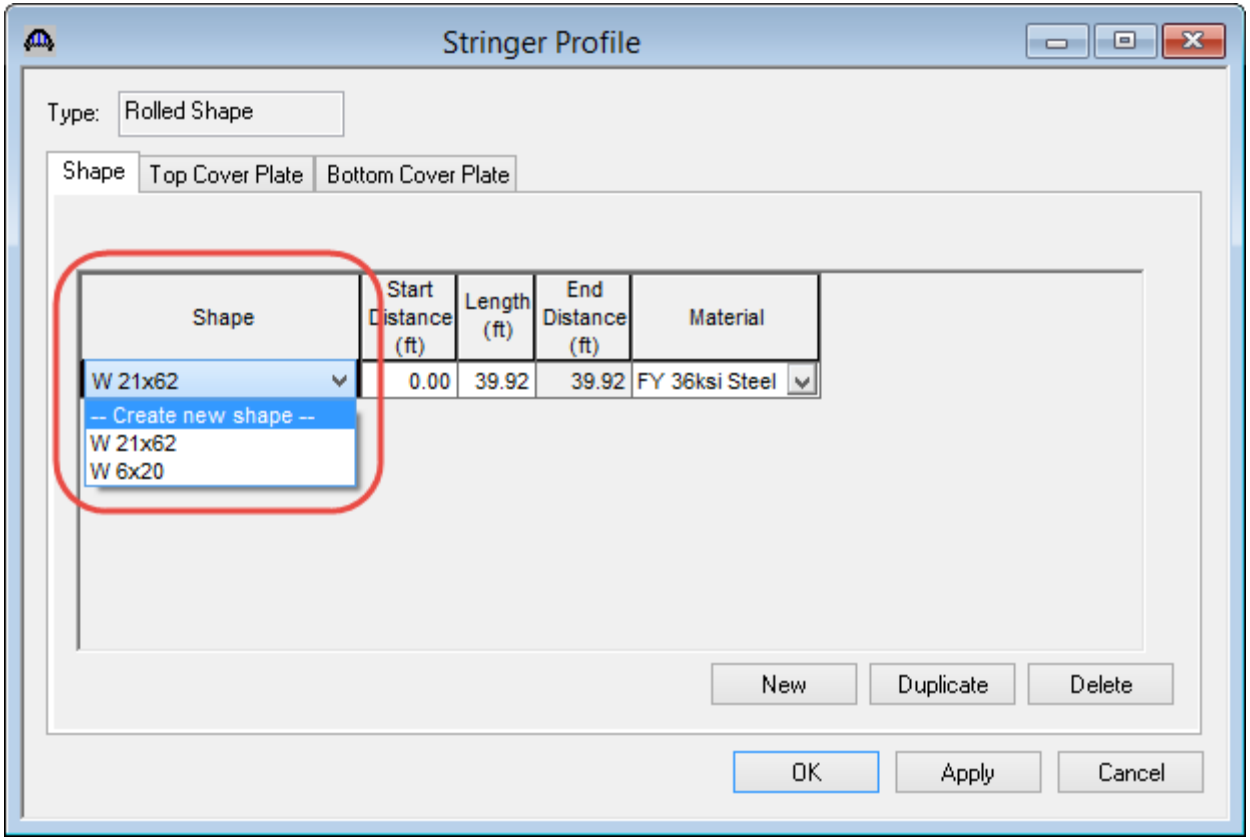


Cap width: 3.33 ft

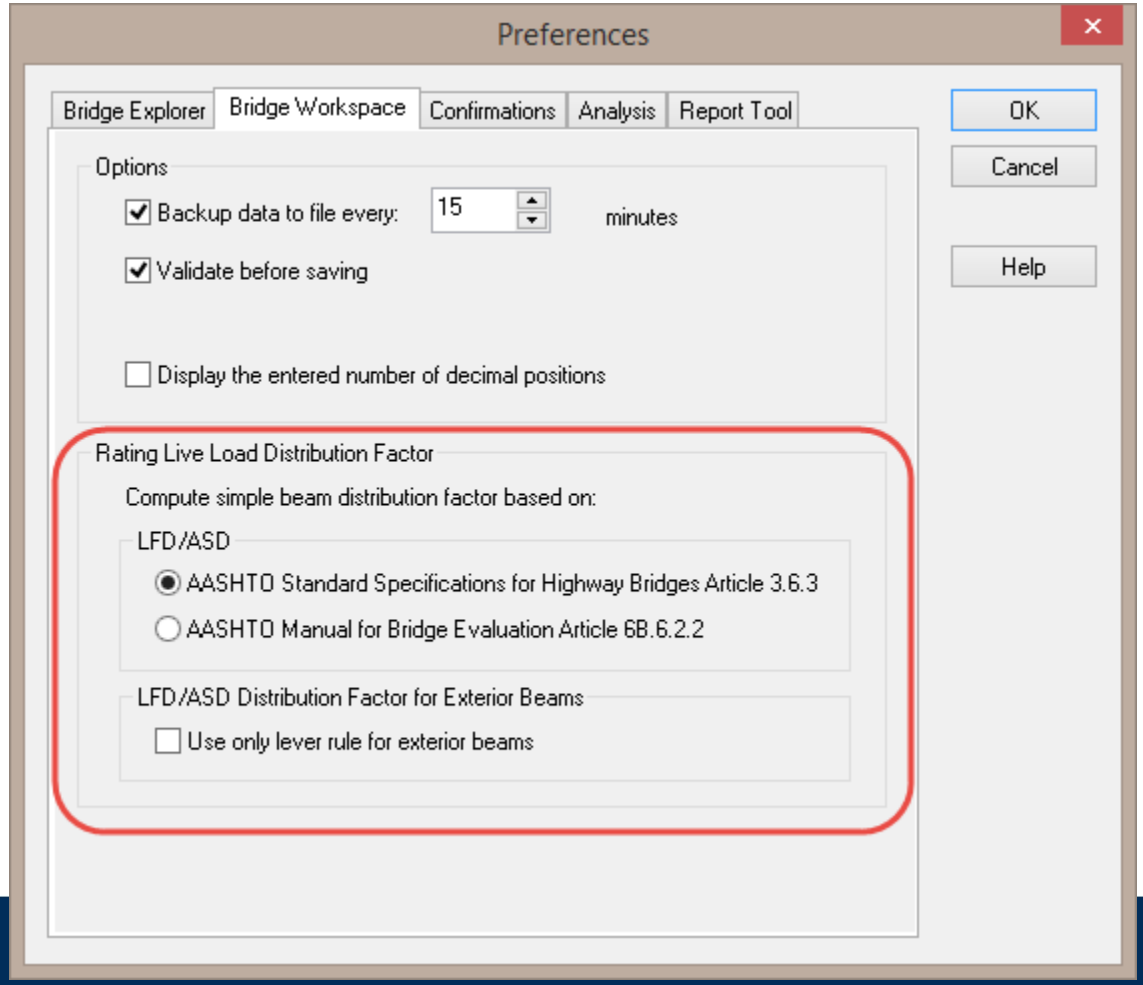
Cap length: 51.00 ft

	Location	Cantilever Type	Elevation (ft)	Dimension (ft)		
				D1	D2	D3
▶	Left	Sloped	76.00	3.00	1.67	5.25
	Right	Straight	76.00	4.67		

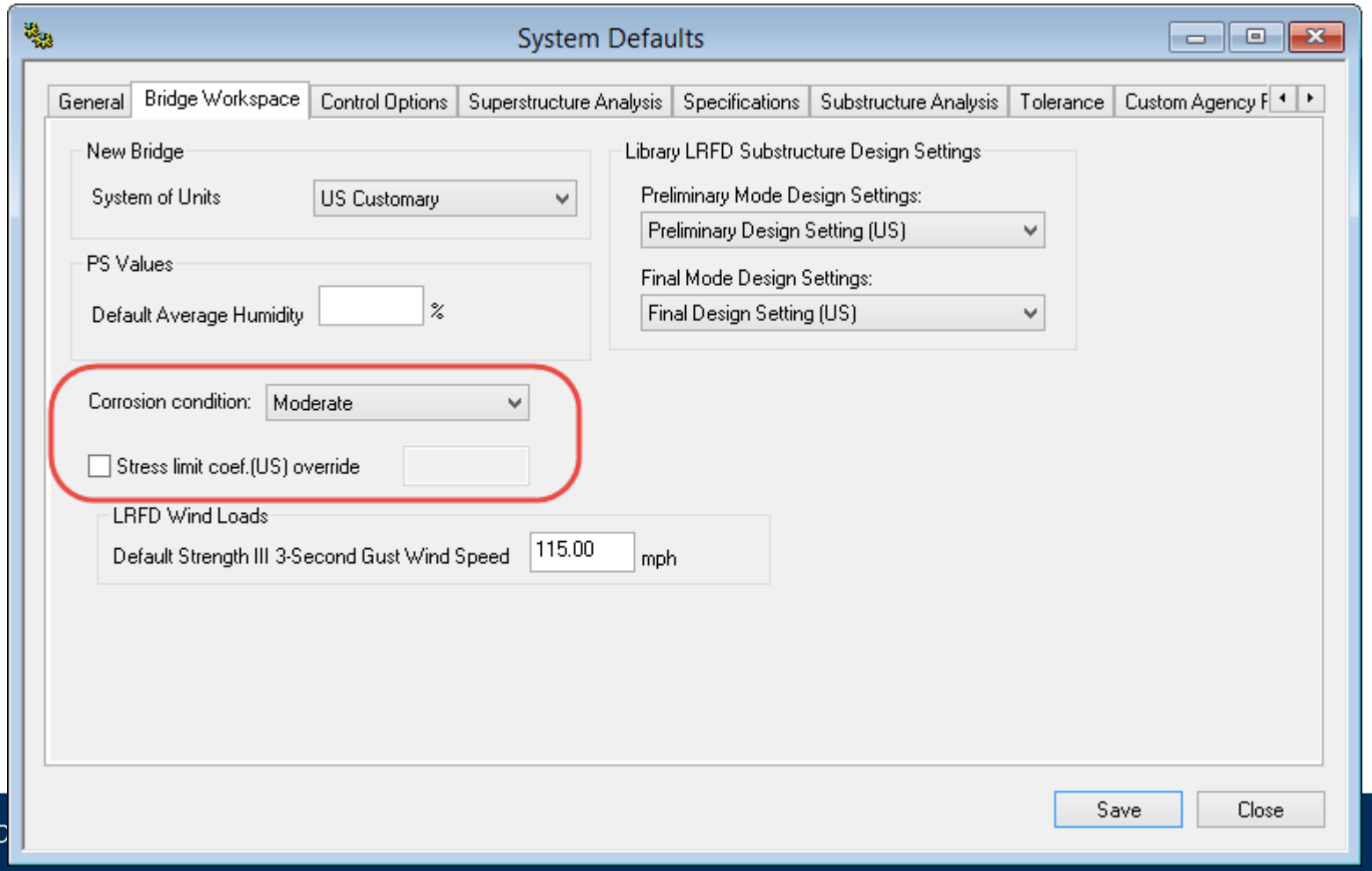
- Add Create New in the Dropdown List
  - Select Create New will open the window for the item and a new item can be input or select from the library



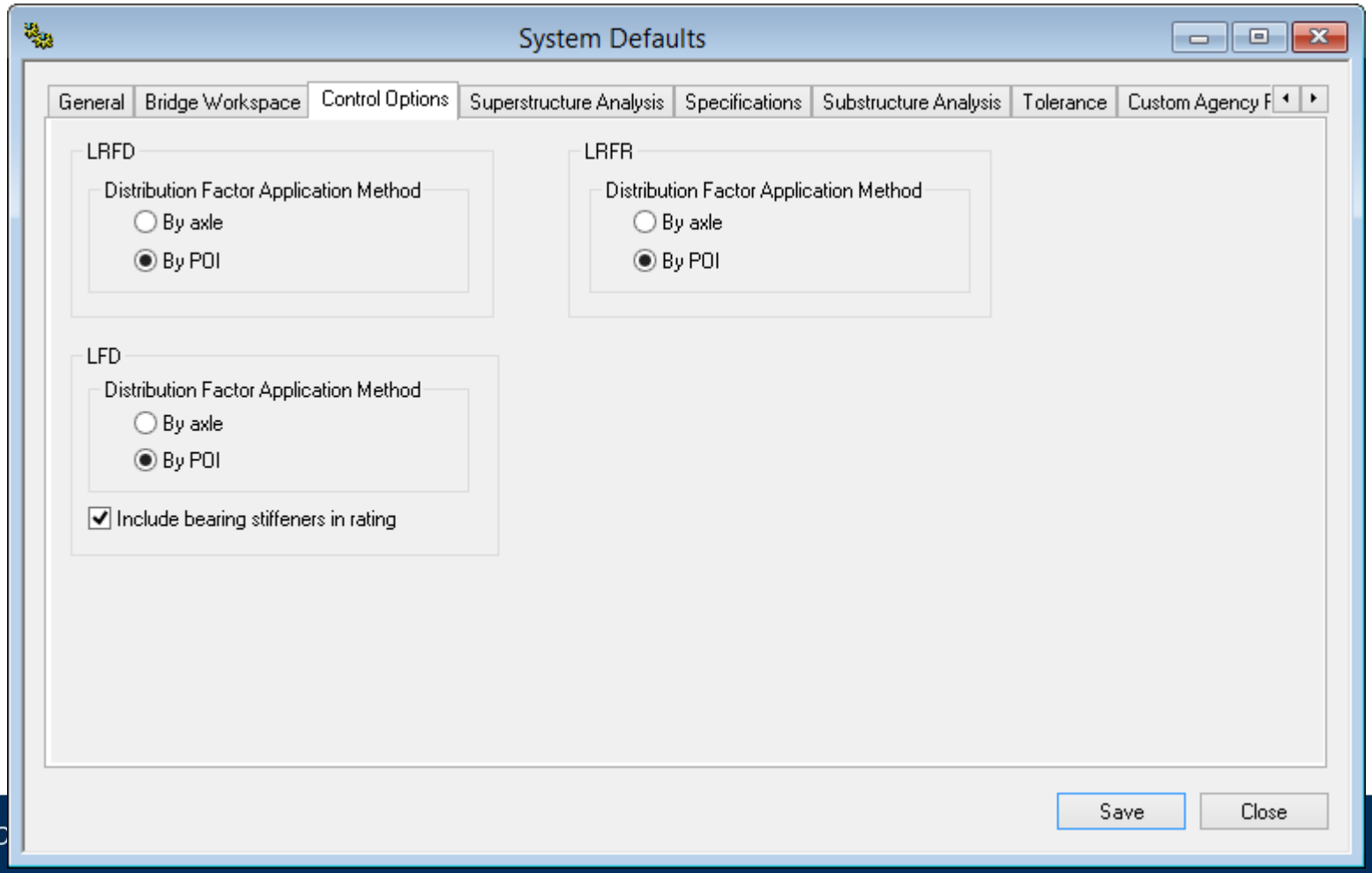
- Preferences window's Bridge Workspace tab
  - Move the Rating Live Load Distribution Factor data to the System Defaults window's Superstructure Analysis tab



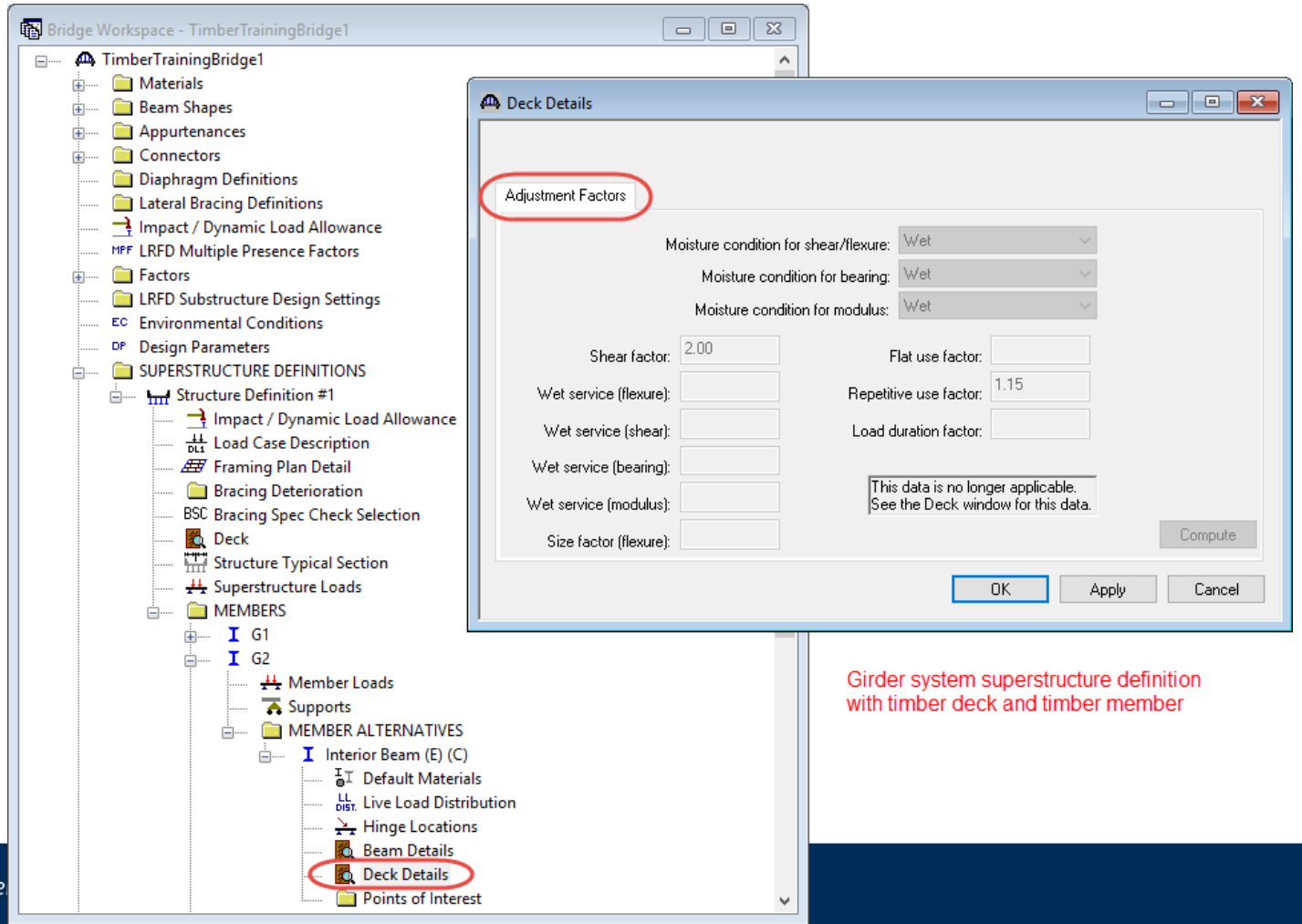
- System Defaults window's Bridge Workspace tab
  - Move the Corrosion condition and Stress limit coef. (US) override data to the Stress Limit Sets - Concrete window



- System Defaults window's Control Options tab
  - Remove the Control Options tab from the System Defaults window



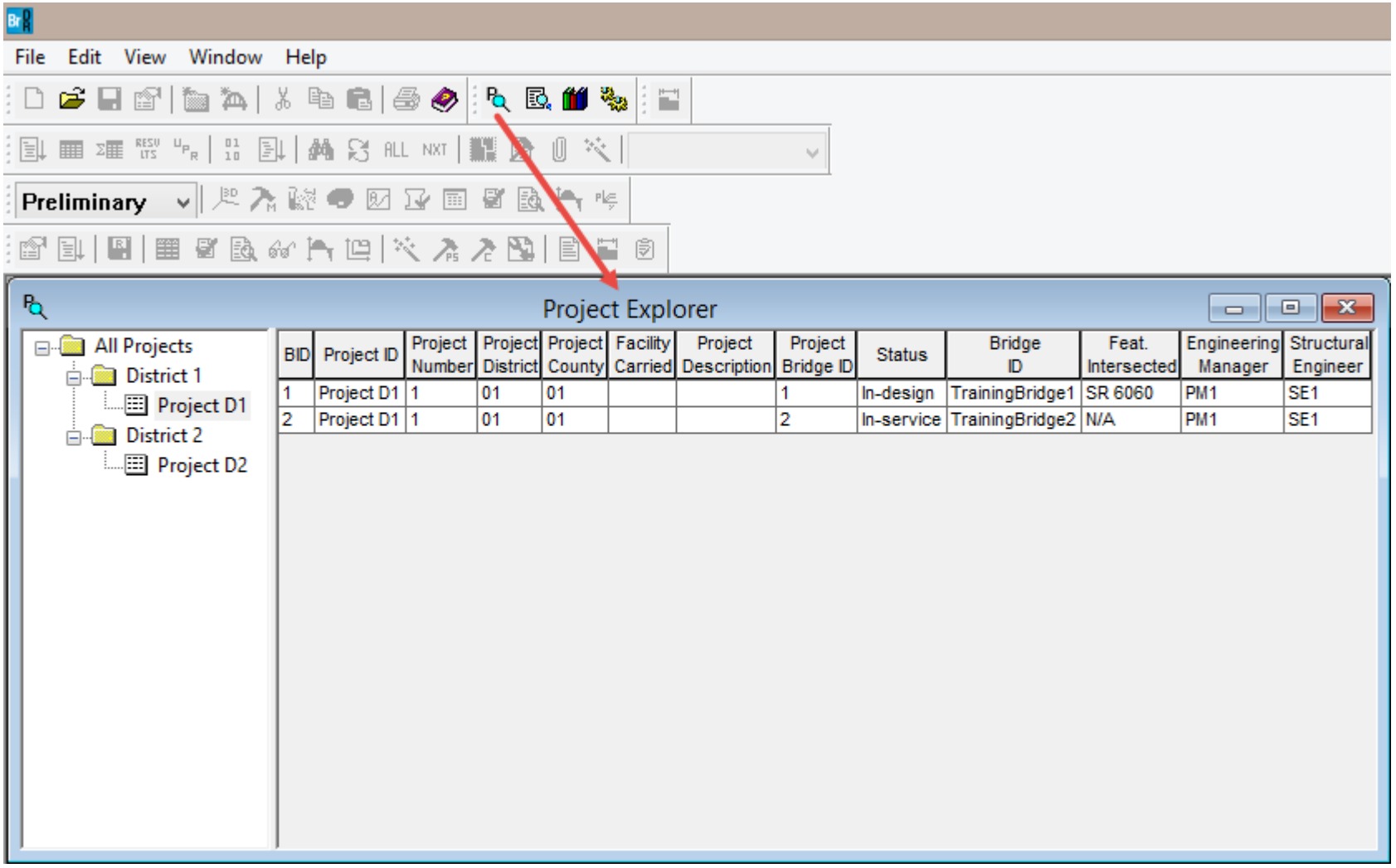
- Deck Details window's Adjustment Factors tab
  - Remove the Adjustment Factors tab from the Deck Details window



Girder system superstructure definition with timber deck and timber member

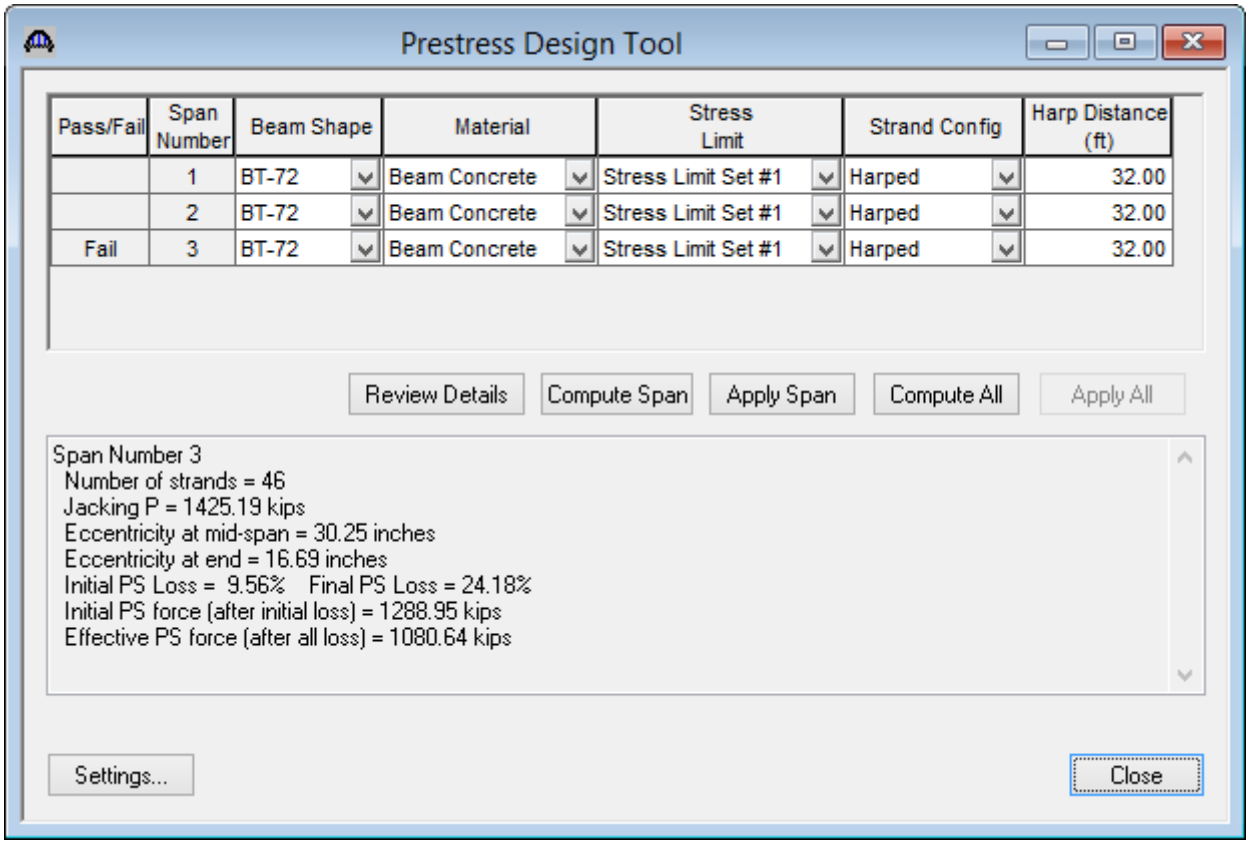
- Relocate the beam description items in the Bridge Workspace tree before the Live Load Distribution item or after the Impact item if the Live Load Distribution item is not there
  - Girder Profile
  - Floorbeam Profile
  - Stringer Profile
  - Cross Sections and Cross Section Ranges
  - Beam Details

- Project Explorer

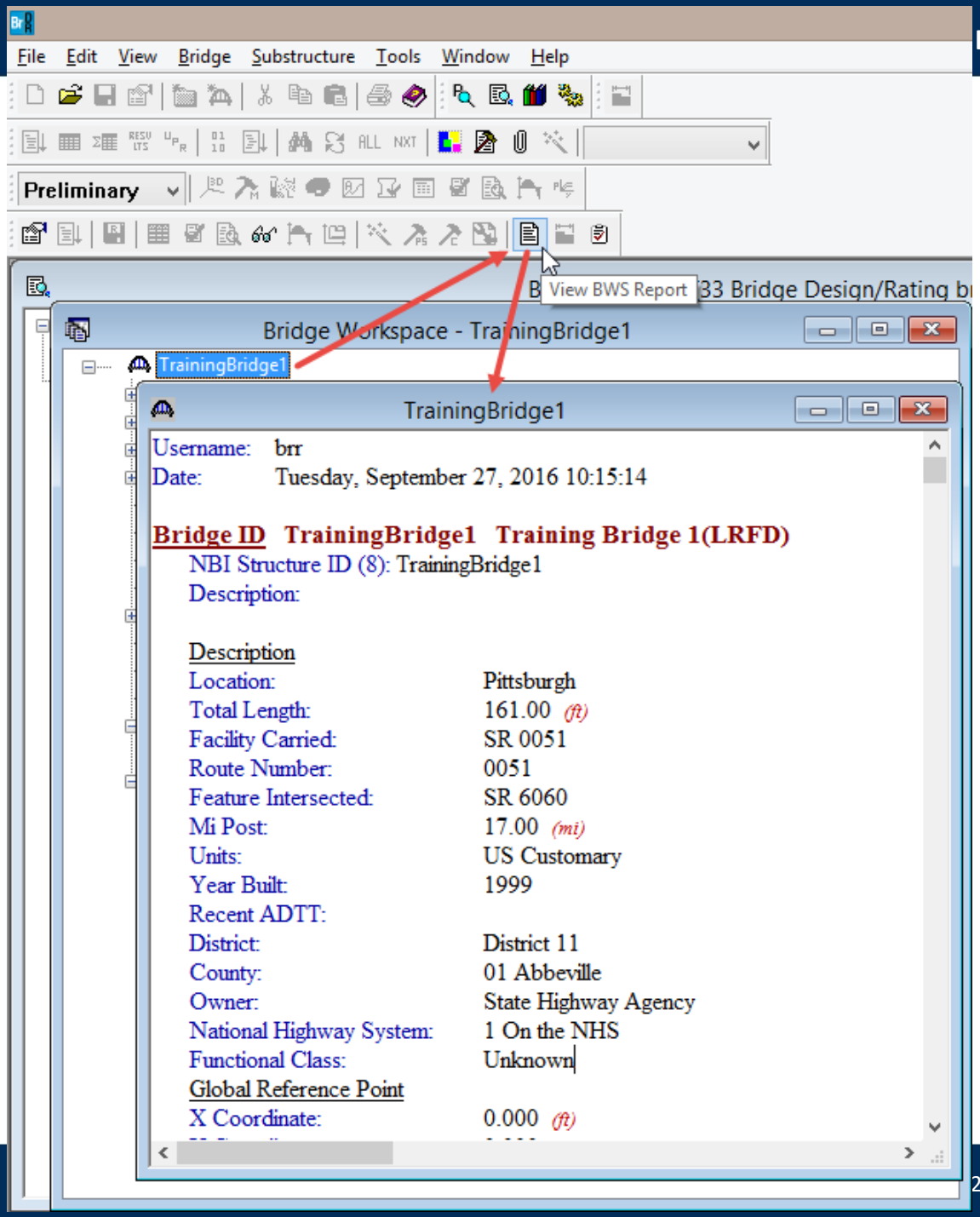


BID	Project ID	Project Number	Project District	Project County	Facility Carried	Project Description	Project Bridge ID	Status	Bridge ID	Feat. Intersected	Engineering Manager	Structural Engineer
1	Project D1	1	01	01			1	In-design	TrainingBridge1	SR 6060	PM1	SE1
2	Project D1	1	01	01			2	In-service	TrainingBridge2	N/A	PM1	SE1

- Prestress Design Tool



- BWS Report


File Edit View Bridge Substructure Tools Window Help
Preliminary
View BWS Report
Bridge Workspace - TrainingBridge1
TrainingBridge1
TrainingBridge1
Username: brr
Date: Tuesday, September 27, 2016 10:15:14
Bridge ID TrainingBridge1 Training Bridge 1(LRFD)
NBI Structure ID (8): TrainingBridge1
Description:
Description
Location: Pittsburgh
Total Length: 161.00 (ft)
Facility Carried: SR 0051
Route Number: 0051
Feature Intersected: SR 6060
Mi Post: 17.00 (mi)
Units: US Customary
Year Built: 1999
Recent ADTT:
District: District 11
County: 01 Abbeville
Owner: State Highway Agency
National Highway System: 1 On the NHS
Functional Class: Unknown
Global Reference Point
X Coordinate: 0.000 (ft)

Live Demo

Modernized User Interface

Michael Baker
INTERNATIONAL
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Got any questions?

RADBUG Meeting, 2018

AASHTOWare Bridge Design & Rating
AASHTO