AASHTOWare™ BRIDGE DESIGN AND RATING

# What's Coming in BrDR 7.7 and 7.8 & Beyond

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2025 RADBUG Meeting

Boise, ID | August 12-13, 2025

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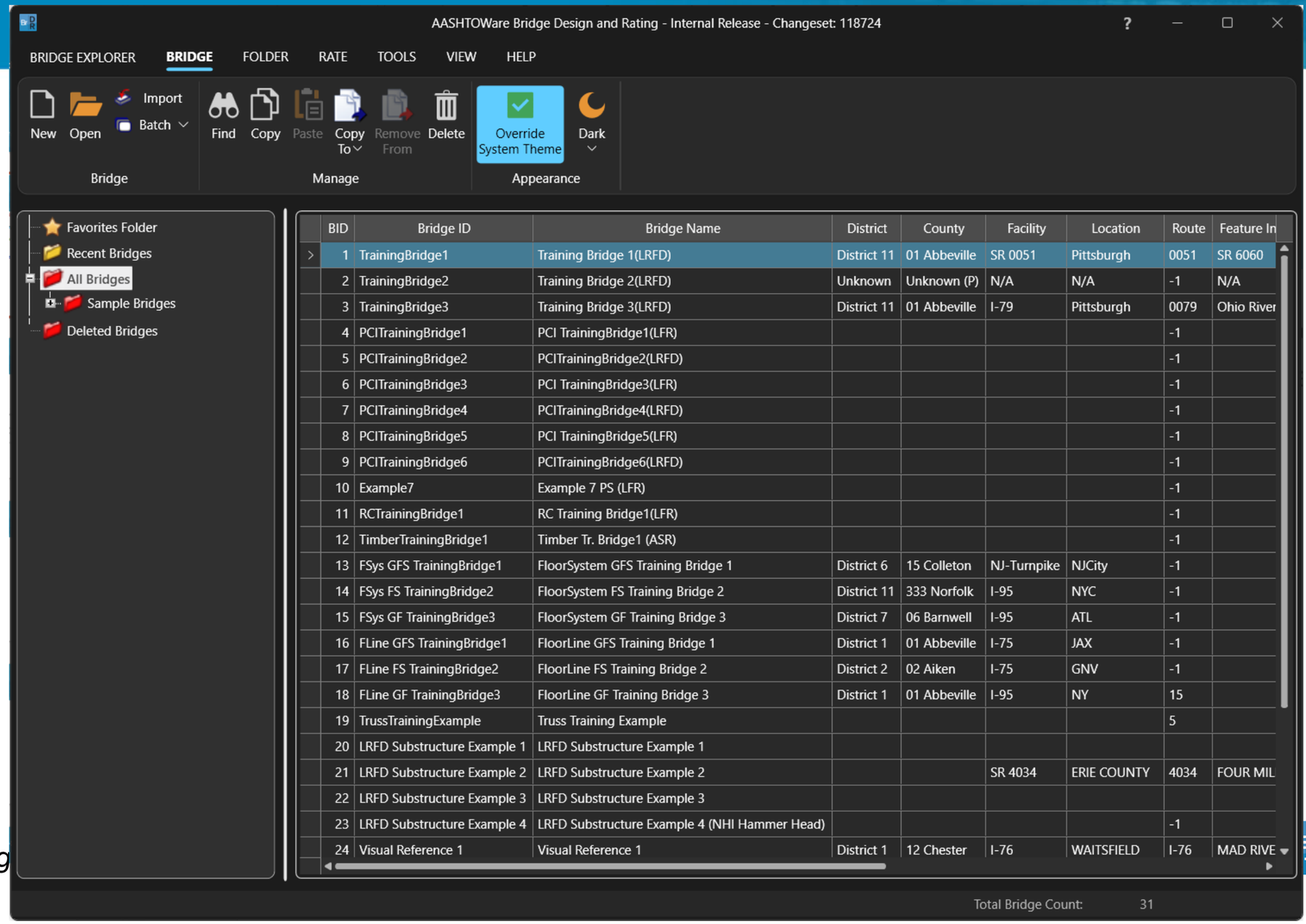
# BrDR 7.7 Section 508 Accessibility Compliance

- Accessibility compliance ensures individuals with disabilities have access to information and data comparable to those without disabilities, unless it creates an undue burden
- The goal is to provide equal access to information and services for all, including those who use assistive technologies
- BrDR 7.7 will provide high contrast mode, screen dictation support, and vector images to support lossless scaling and high contrast mode
- Some windows, e.g. Appurtenances and Shapes, needed to be reworked
- PS Design Tool, Steel Design Tool, and Migration Wizard will also be compliant

# BrDR 7.7 Section 508 Accessibility Compliance



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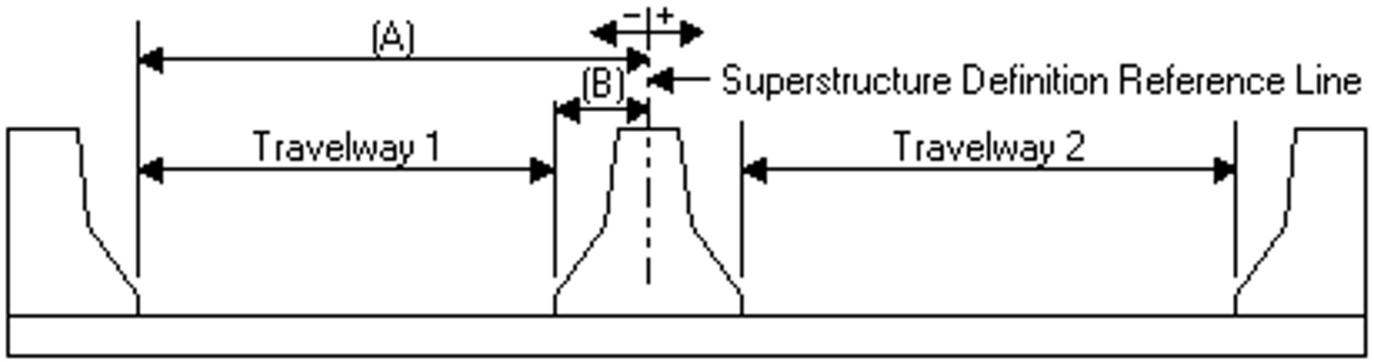
# BrDR 7.7 Section 508 Accessibility Compliance

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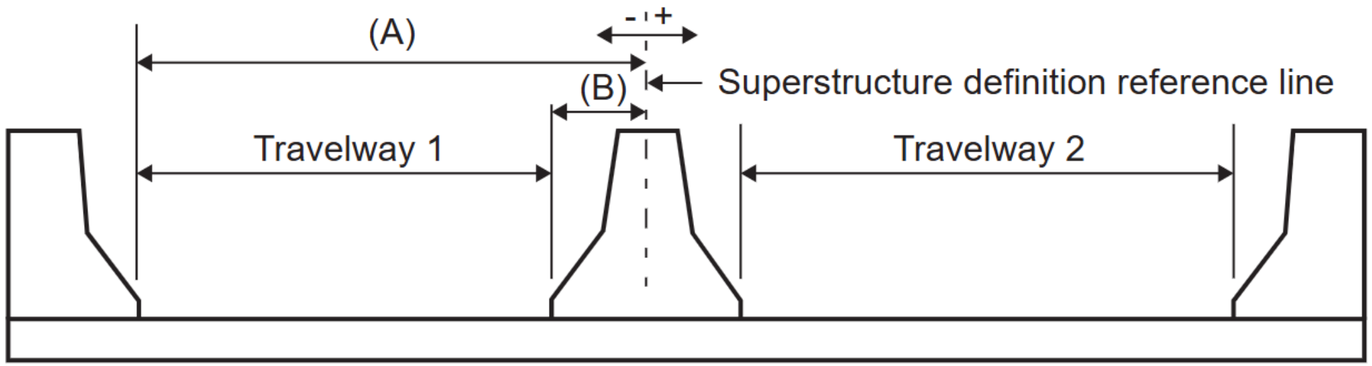


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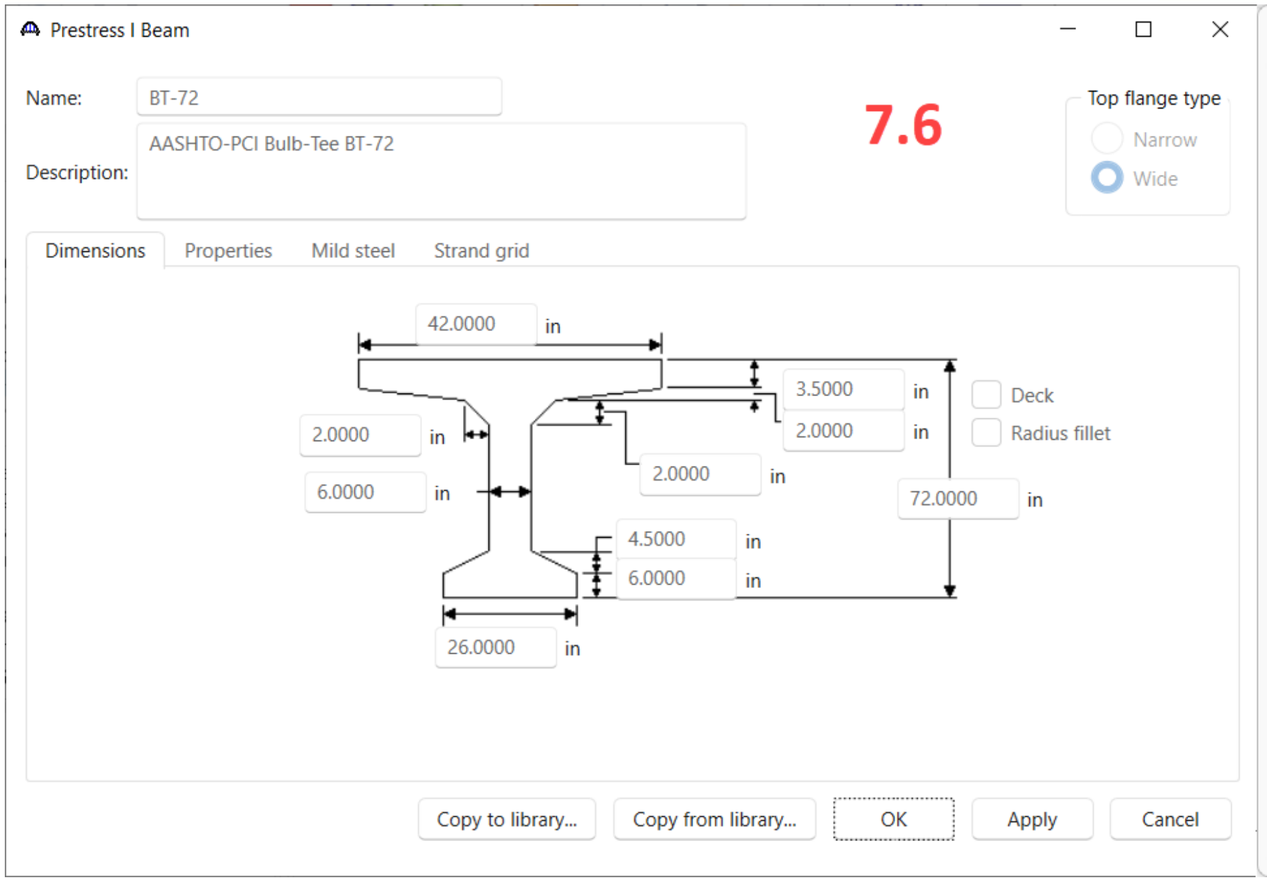


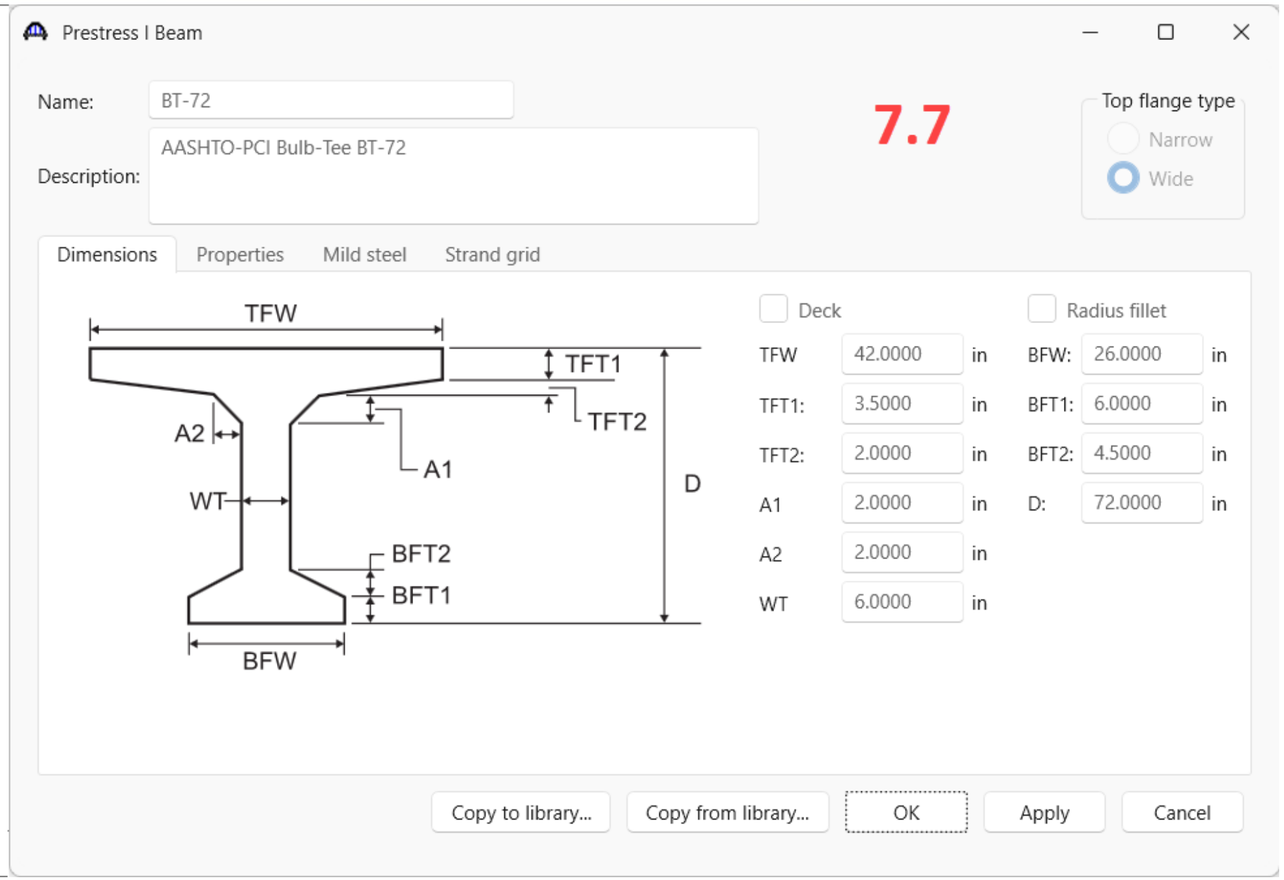




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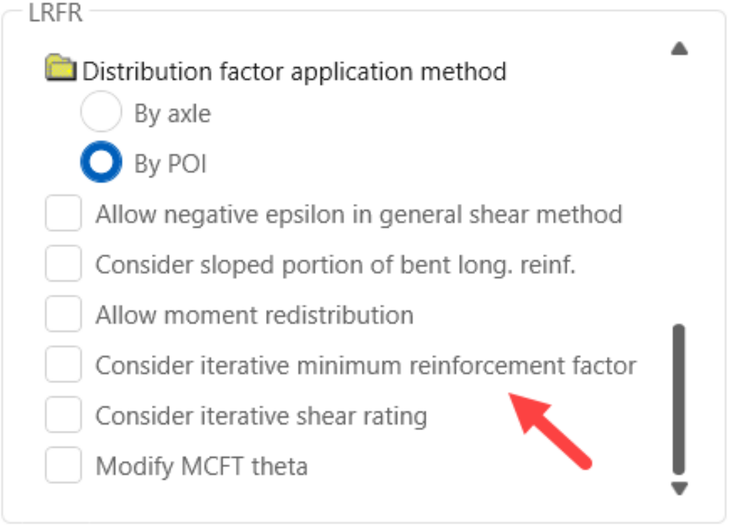
# BrDR 7.7 MBE 2025 Interim Specification Updates

- 2024 Agenda Item 6 – Article 6B.5.3.3
  - Item #1: PS Inventory allowable stress minor coefficient change
  - Item #3: PS Operating PS steel tension minor coefficient change
  - Item #4: PS Inventory concrete tension minor variable definition changes
- 2024 Agenda Item 8 – Article C6A.5.6
  - Optional iterative method to compute K factor
  - New LRFR control option for all concrete members
  - Can lead to higher posting tonnage or a less restricted permit truck
- MBE 3rd 2025i Spec version will implement the 2022, 2023, and 2024 approved ballots
- MBE 3rd 2024i Spec version will not be available in version 7.7



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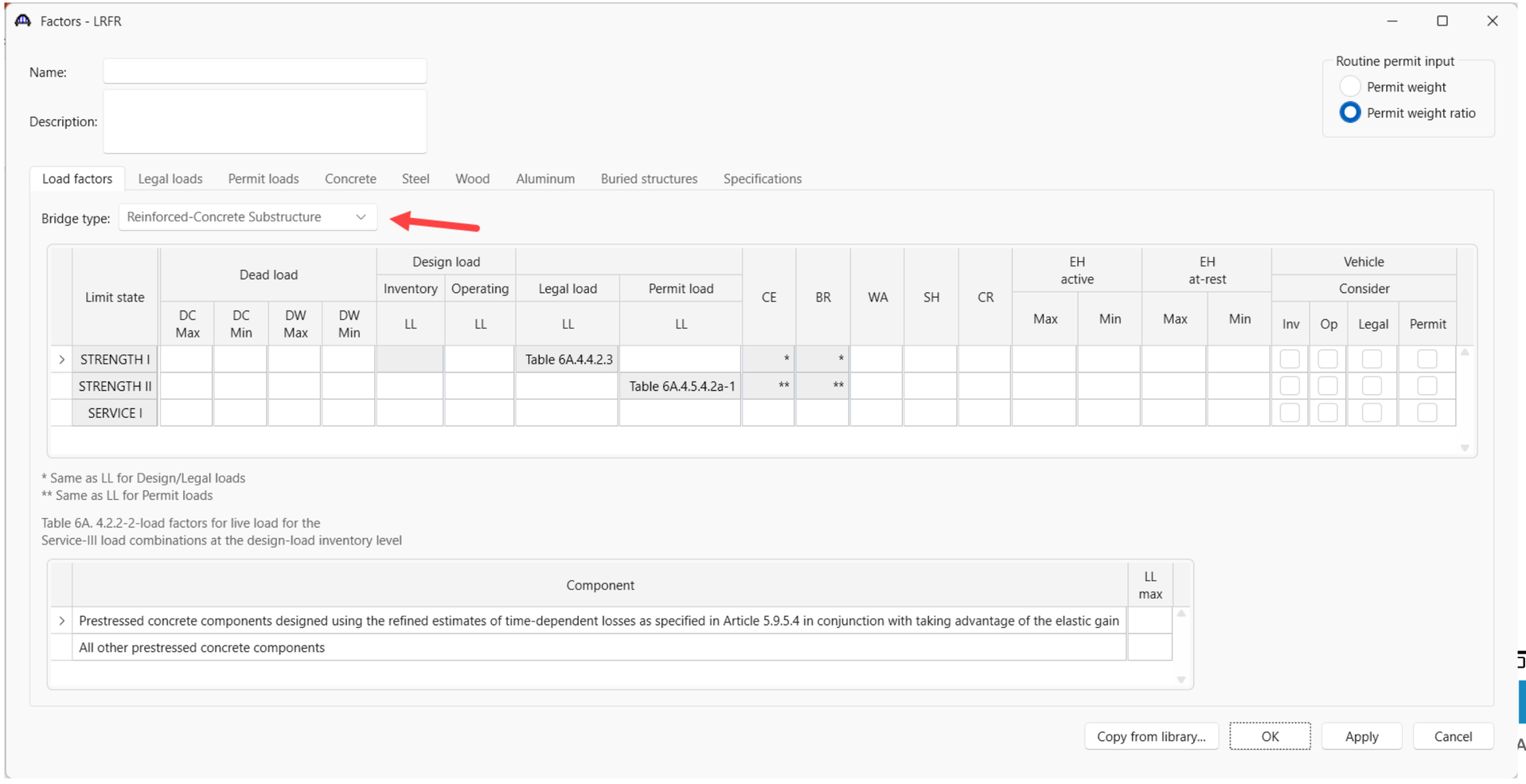
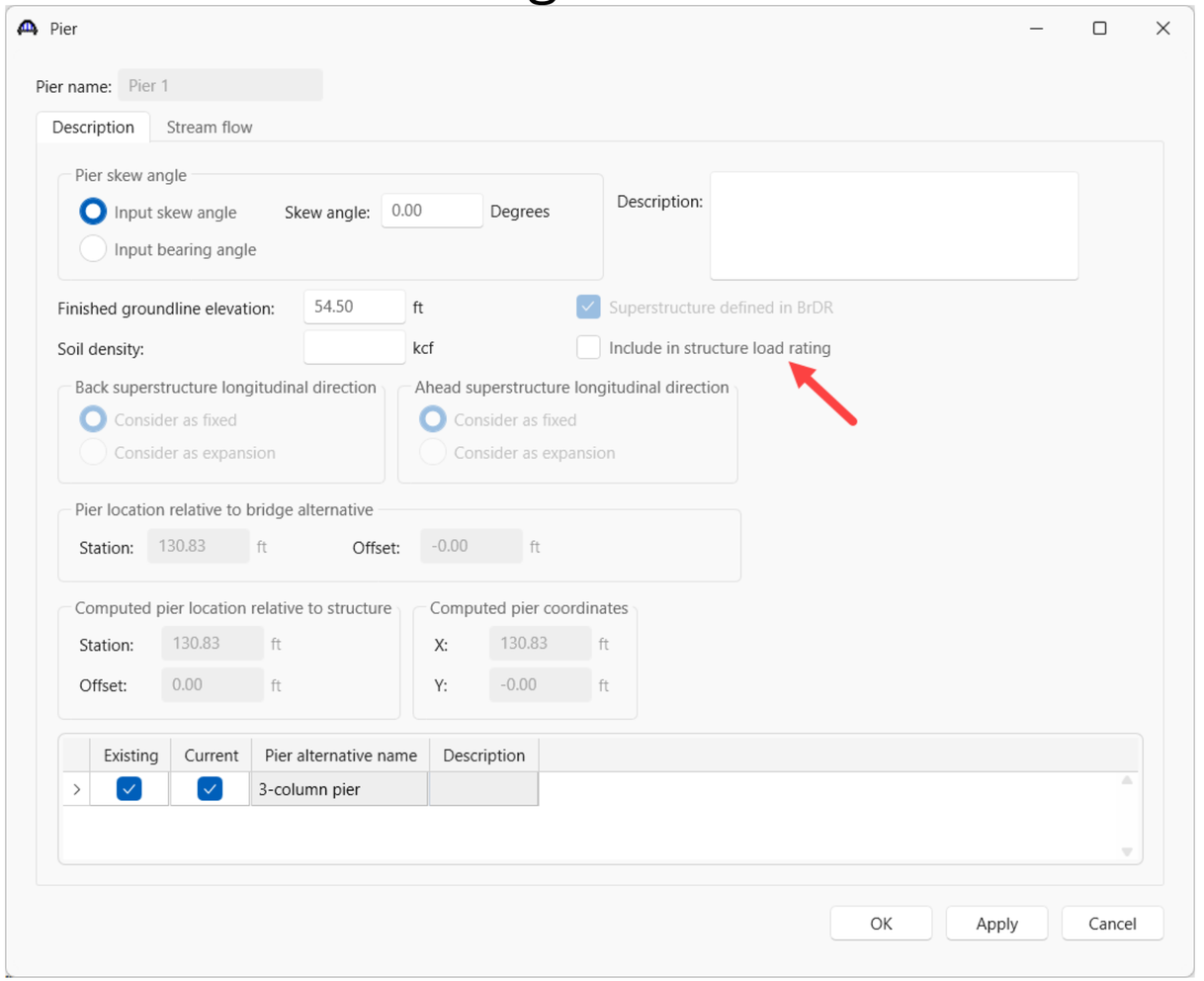
# BrDR 7.8 Substructure Reinforced Concrete Pier Cap LRFR

- Library and Bridge LRFR Factors for Reinforced Concrete Substructure



# BrDR 7.8 Substructure Reinforced Concrete Pier Cap LRFR

- Include the pier in a batch load rating



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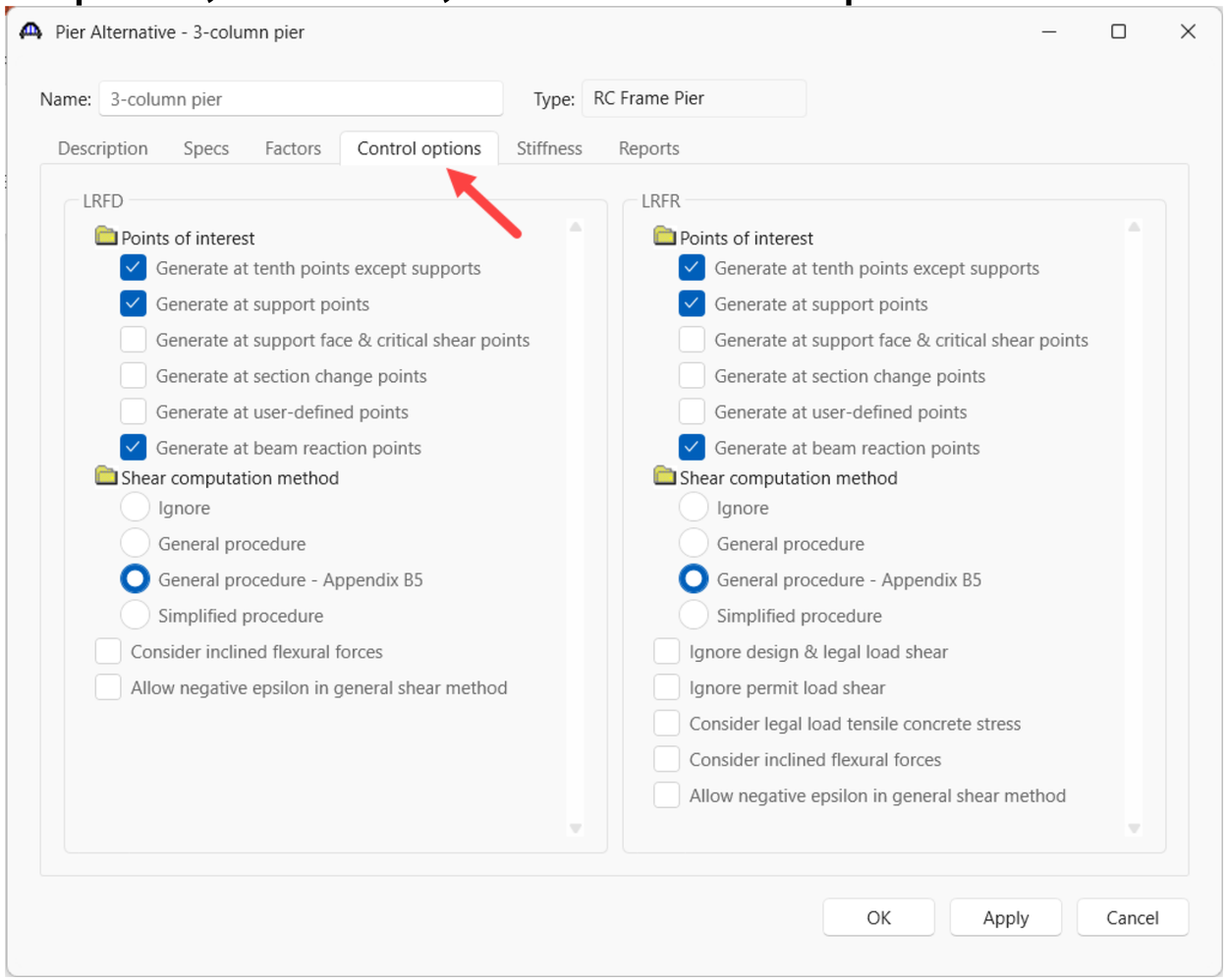
# BrDR 7.8 Substructure Reinforced Concrete Pier Cap LRFR

- Pier Alternative's Specs, Factors, and Control options tabs



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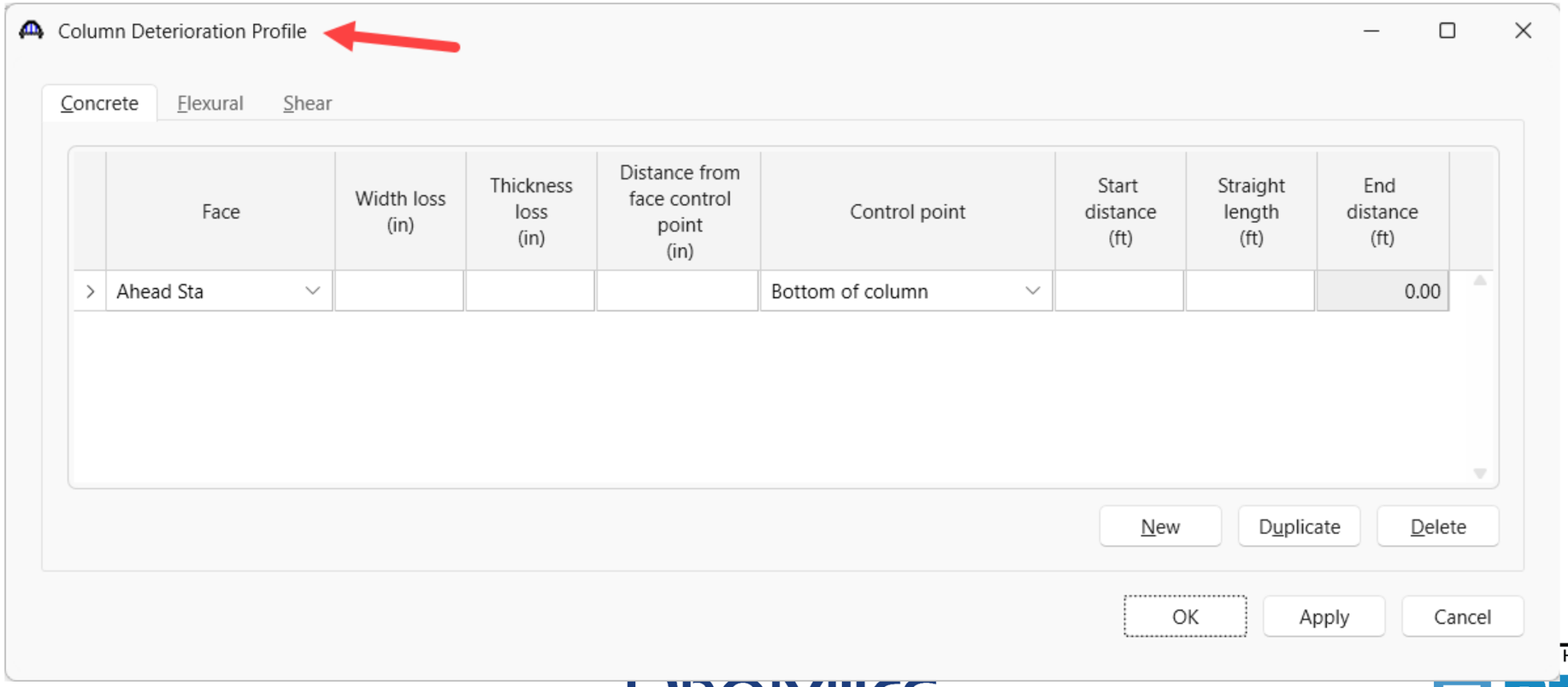
# BrDR 7.8 Substructure Reinforced Concrete Pier Cap LRFR

- Additional inputs for load rating purpose including points of interest and deterioration profiles






PROVILES

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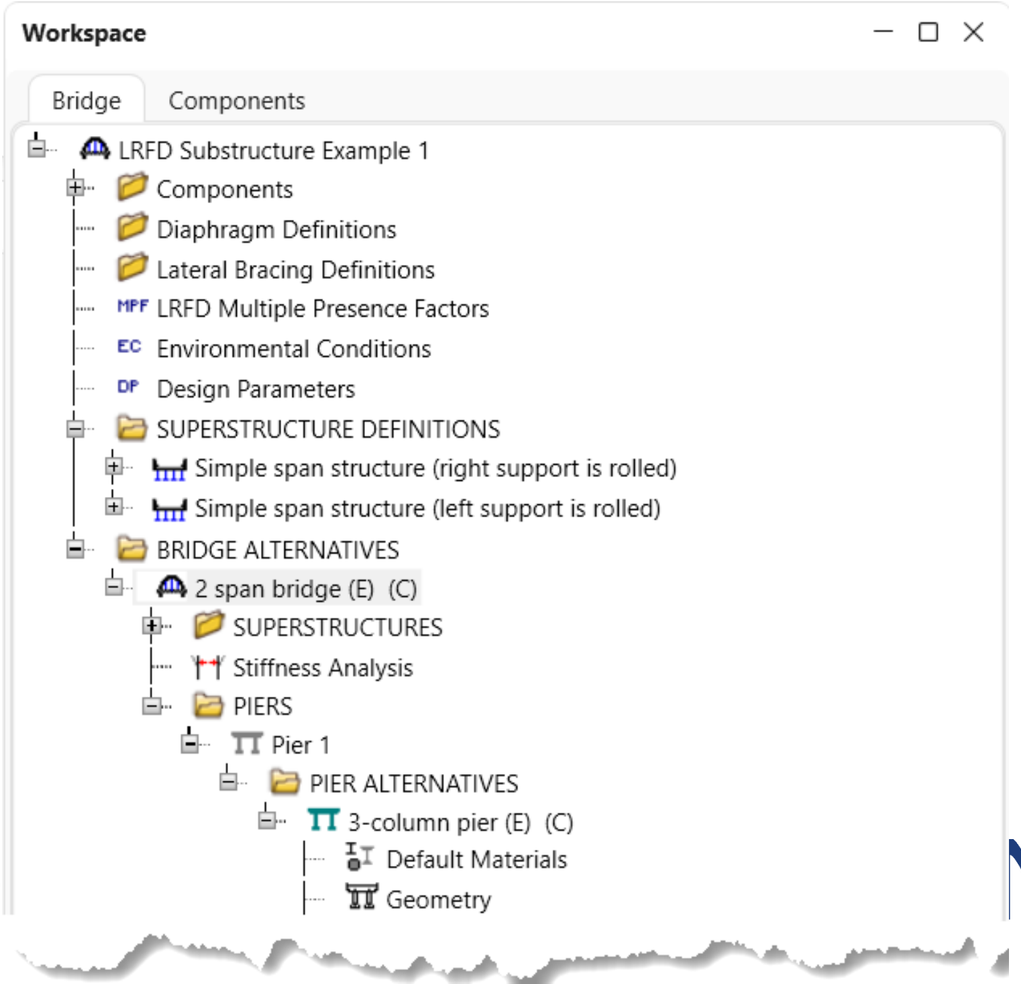
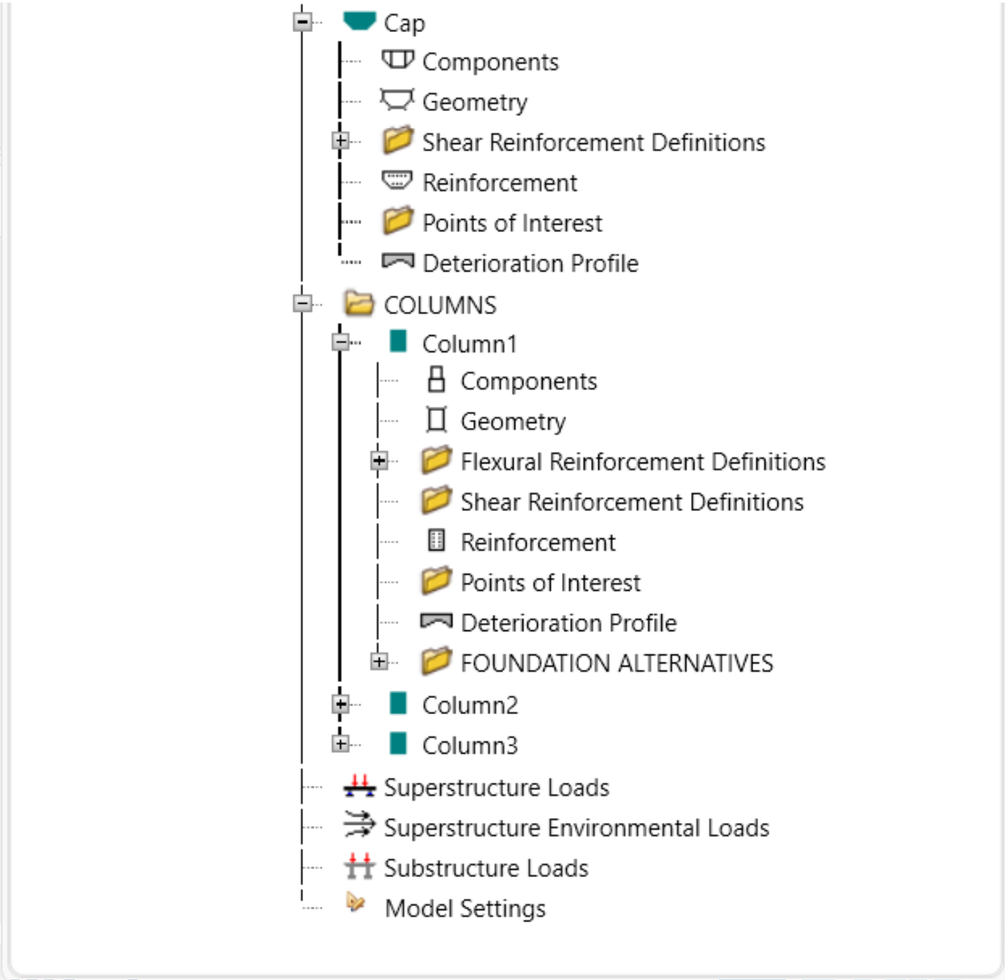
# BrDR 7.8 Substructure Reinforced Concrete Pier Cap LRFR

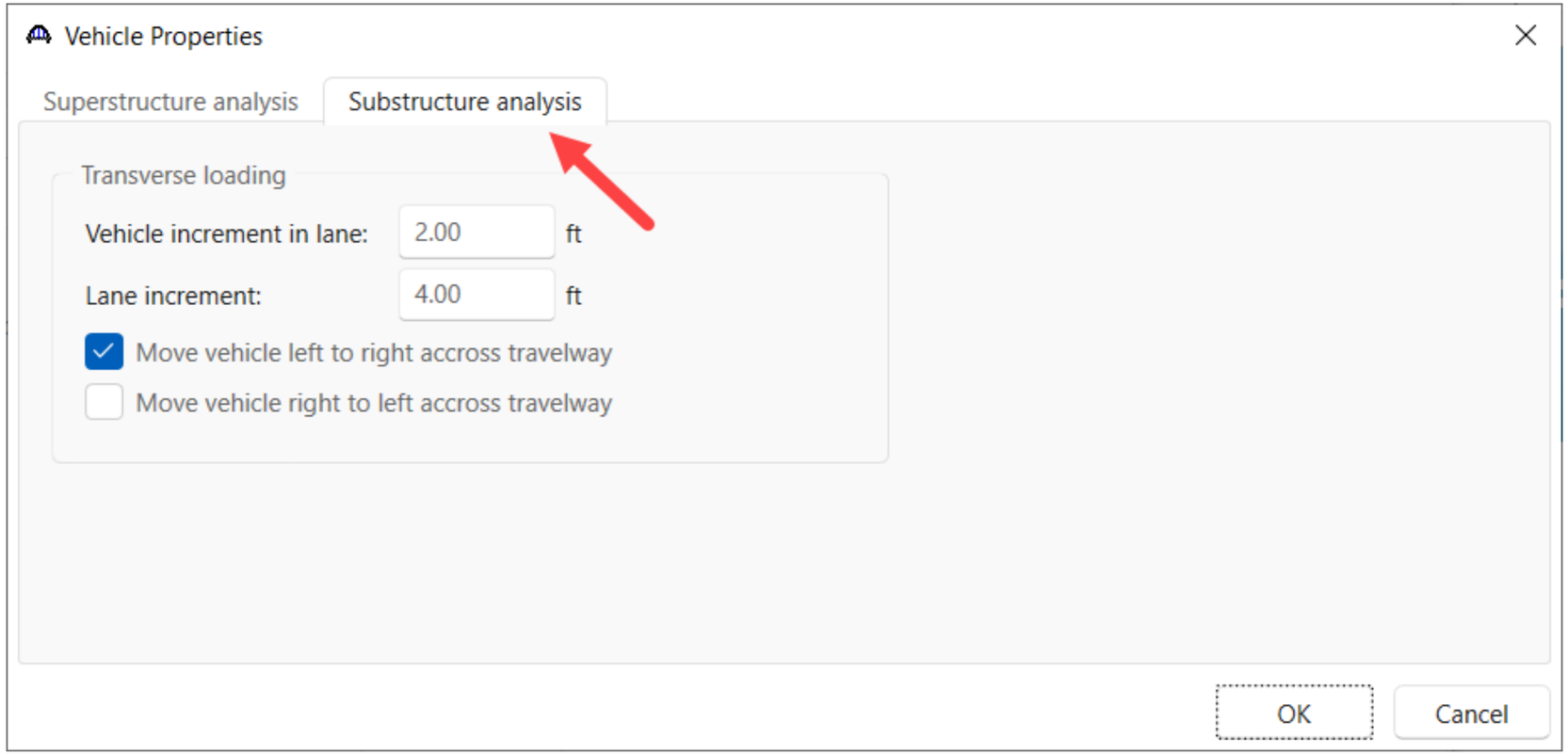
- Bridge workspace tree



# BrDR 7.8 Substructure Reinforced Concrete Pier Cap LRFR

- Support Adjacent vehicle analysis and NSG vehicle analysis



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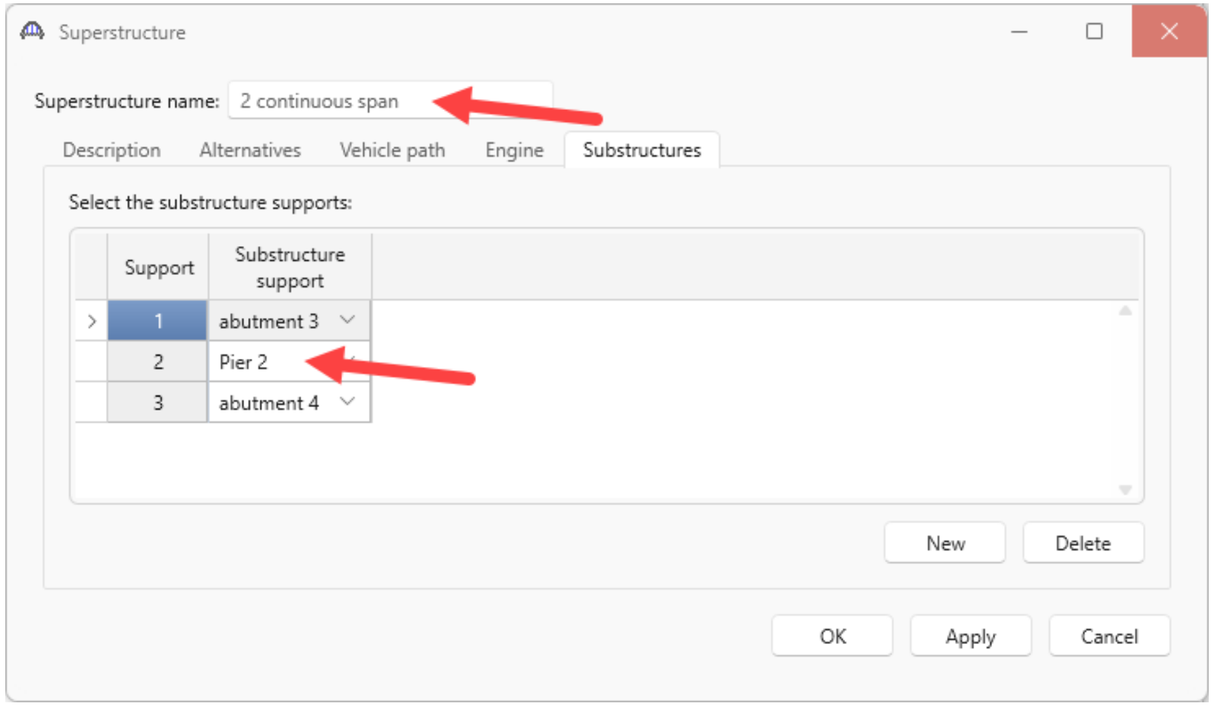
# BrDR 7.8 Substructure Reinforced Concrete Pier Cap LRFR

- Load Rating Use Case 1
  - **Select a Pier Alternative in the BWS tree** and click the Analyze button
  - The pier alternative will be load rated and the controlling component within the pier will be shown
  - Only Caps will be rated initially

# BrDR 7.8 Substructure Reinforced Concrete Pier Cap LRFR

- Load Rating Use Case 2
  - **Select a Superstructure Definition in the BWS tree** and click the Analyze button
  - Girder Member Alternatives marked as “Existing” in that Superstructure Definition will be rated
  - No Piers will be rated as Piers support Superstructures not Superstructure Definitions



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# BrDR 7.8 Substructure Reinforced Concrete Pier Cap LRFR

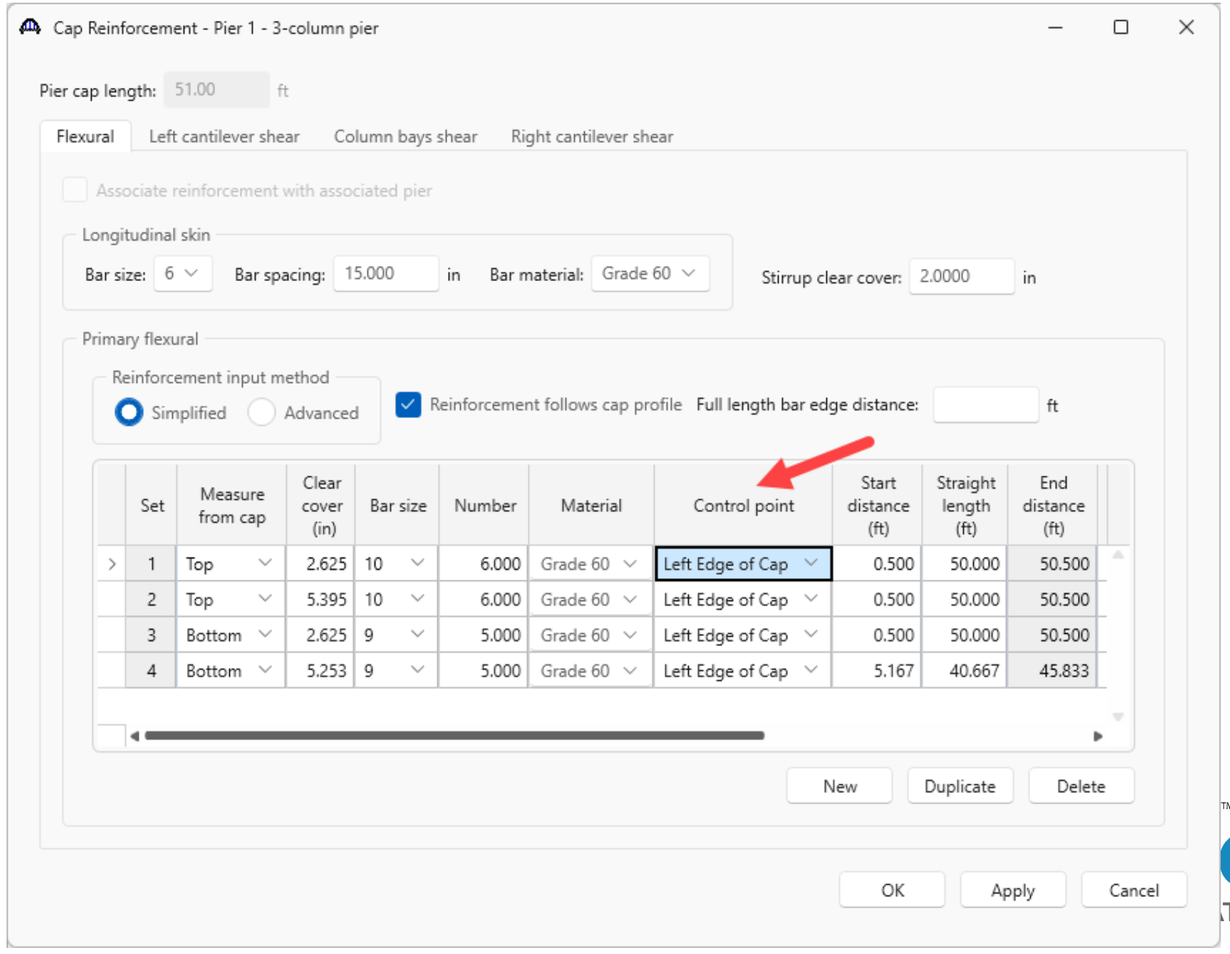
- Load Rating Use Case 3
  - **Select the Bridge in the BWS tree** and click the Analyze button
  - Girder Member Alternatives marked as “Existing” in the Superstructure Definition assigned to Superstructure Alternatives marked as “Existing” in the Bridge Alternative marked as “Existing” will be rated
  - The Pier Alternative marked as “Existing” for the Piers with “Include in structure load rating” checked that support the Superstructures will be load rated
- Load Rating Use Case 4
  - **Load rate a bridge from the Bridge Explorer**
  - Girder Member Alternatives marked as “Existing” in the Superstructure Definition assigned to Superstructure Alternatives marked as “Existing” in the Bridge Alternative marked as “Existing” will be rated
  - The Pier Alternative marked as “Existing” for the Piers with “Include in structure load rating” checked that support the Superstructures will be load rated

# BrDR 7.8 Substructure Reinforced Concrete Pier Cap LRFR

- Substructure Bridge Workspace architecture revisions
  - Associating pier alternatives to link certain pier geometry and data between alternatives
  - User fully enters a pier alternative for a pier. This pier alternative is considered as the control pier alternative.
  - For another pier within the same bridge alternative, user creates a new pier alternative of the same type and associates this new pier alternative with the control pier. This pier alternative is considered as the dependent pier alternative.

# BrDR 7.8 Substructure Reinforced Concrete Pier Cap LRFR

- Substructure reinforcement data entry revisions
  - Control point data entry method



# BrDR 7.8 Substructure Reinforced Concrete Pier Cap LRFR

- 10 Additional Substructure TAG enhancement requests
  - 3D Schematic - predefined plan view, show reinforcement
  - Copy/paste enhancement
  - Hexagon column shape

# BrDR 7.8 Next Generation of Report Tool Phase 2

- Bridge Workspace input data for all structure types
- Microsoft Word Report Writer
- General Preference Template Report
- Girder Member Alternative FE Model Report
- Phase 3 will be for reporting analysis results

# BrDR 7.8

# AASHTO FE Engine Non-Linear Formulation of Soil-Culvert Interaction

- Developing FE elements similar to CANDE
- Using modern programming techniques and practices
- Creating the analysis engine to run Level 3 models
- Validation with CANDE
  - Tools for comparing the results of existing CANDE models
- FE Engine included in version 7.8 of the BrDR software
  - Will not be available to users (no user interface)
  - User Interface will be provided in a later version (Phase II)

# BrDR 7.8 Analysis API 2.0

- Currently, all the analysis results are stored in an in-memory data structure, and all bridges and results are stored in-memory during a batch analysis
  - Results in poor runtime performance and memory usage during large batch analyses
- Changing that logic to retain data for a single bridge in memory at one time
  - Will greatly improve runtime performance and reduce processing complexity during large batch analyses
- Must be complete in conjunction with the Results API

# BrDR 7.8 Results API

- Currently, all the analysis results are stored in an in-memory data structure
  - There's code to iterate over the analysis results and determine critical ratings in various locations for different purposes
  - Created technical debt and inconsistency in processing analysis results
- Moving all this logic to a new Results API so analysis results can be saved, restored, and processed in a consistent manner
  - Will allow for post-processing of analysis results, even if the BrDR is closed and reopened
  - New Results API will be made available to 3rd-party developers

# BrDR 7.8 Data Exchange Through BrM 7.1 OpenAPI

- Update the existing BrDR/BrM data exchange features to support the BrM 7's SNBI implementation
- Utilize the BrM 7's AASHTOWare OpenAPI connection
- BrDR/BrM data exchange support for versions prior to BrM 7.1 will be dropped in BrDR 7.8

| BrM Version | BrDR Version |
|---|---|
| 6.4 | 7.1, 7.2, 7.3 and up to 7.6 |
| 6.5 | 7.1, 7.2, 7.3 and up to 7.6 |
| 6.6 | 7.3 and up to 7.6 |
| 6.7 | 7.3 and up to 7.6 |
| 7.0 | Not supported in 7.6 |

# BrDR 7.8 RADBUG Enhancement Requests

- BSSD-1891 Tabular Results Filter by Action and Limit State
  - Filter rating summary tabular results by action type (flexure, shear, bearing etc.) and limit state group (Strength/Service/Fatigue)
  - Available at the Bridge Workspace and all 3 Bridge Explorer levels
- BSSD-3361 Tabular Results Updates
  - Addition of a new column for displaying Safe Posting Load as per MBE 6A.8.3
  - Filter critical rating factor per vehicle per rating level instead of critical rating for each load combination per vehicle per rating level
  - Addition of rating summary tabular results per superstructure definition

# BrDR 7.8 Maintenance Items

- BSSD-1572 Use the average Kg to calculate the LLDF when Kg is different for the left side and right side of the node
- BSSD-1594 Additional Deck template for the Superstructure Definition Wizard
- BSSD-1595 Superstructure wizard does not set LRFR analysis module
- BSSD-1625 Add splice locations to the bridge schematic
- BSSD-1633 Shear reinforcement for Edge Beams in a slab system
- BSSD-3998 Effective Radius of Gyration for Flanges and Cover Plates of Different Widths
- BSSD-4008 Consider Lane Loading in the Load Rating Tool
- BSSD-4043 Application of Concentrated Member Loads in 3D FE models

# BrDR 7.8 Maintenance Items

- BSSD-4096 Consider LRFD Equation 6.10.4.2.2-4 for Load Ratings
- BSSD-4098 Consider Flange Lateral Bending Stress for MBE 6A.6.4.2.2 Service Limit State
- BSSD-4340 Consider revising 'Ignore long. reinf. in rating' LRFR control option
- BSSD-4371 Square Rebar Schematic
- BSSD-4458 Ability to Specify Allowable Stress Factors for Each Material

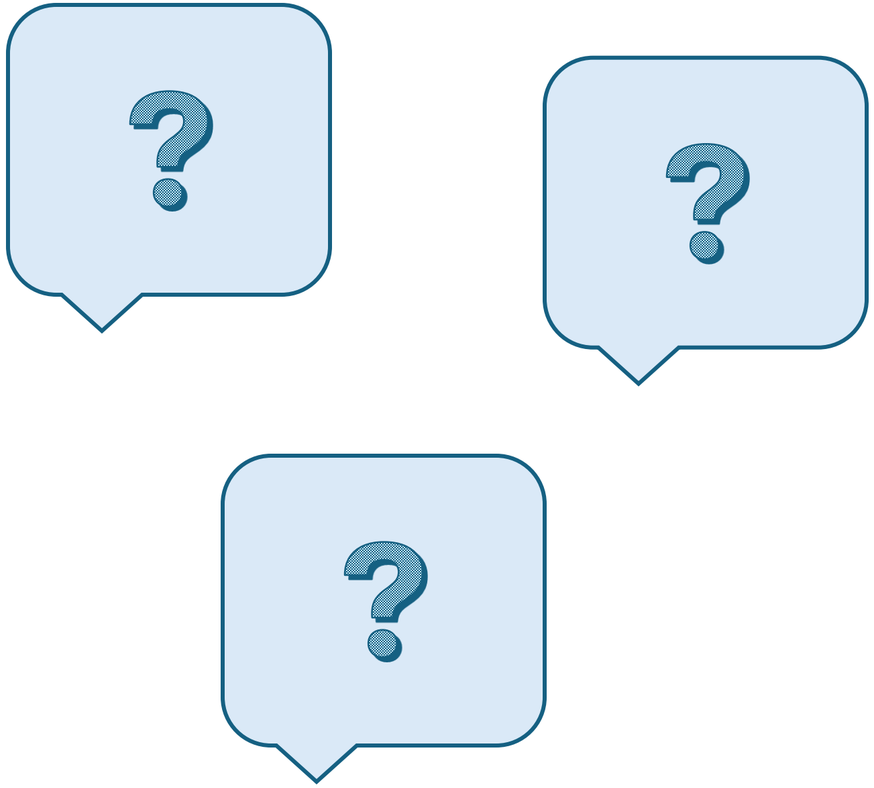
# Beyond

| 2024 Top 5 BrD RADBUG Large Enhancement Survey Results | |
|---|---|
| Rank | Description |
| 1 | Design: Steel Design Tool Enhancements |
| 2 | Design: PS Design Tool Enhancements |
| 3 | Analysis: Complex framing plans |
| 4 | Analysis: Complex curved girder layout |
| 5 | Member Types: Concrete - Frame/Arch structures |

| 2024 Top 5 BrR RADBUG Large Enhancement Survey Results | |
|---|---|
| Rank | Description |
| 1 | Rating: Enhanced deterioration modelling |
| 2 | Rating: Implement remaining structure types in LRT |
| 3 | Member Types: Steel - Tub/box girders |
| 4 | Member Types: Concrete - Frame/Arch structures |
| 5 | Member Types: Concrete - Channel beams |

# Thank You

## Any Questions





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