February 16, 2017

BrR County Rating Example

UNITED Consulting

BrR County Rating Example

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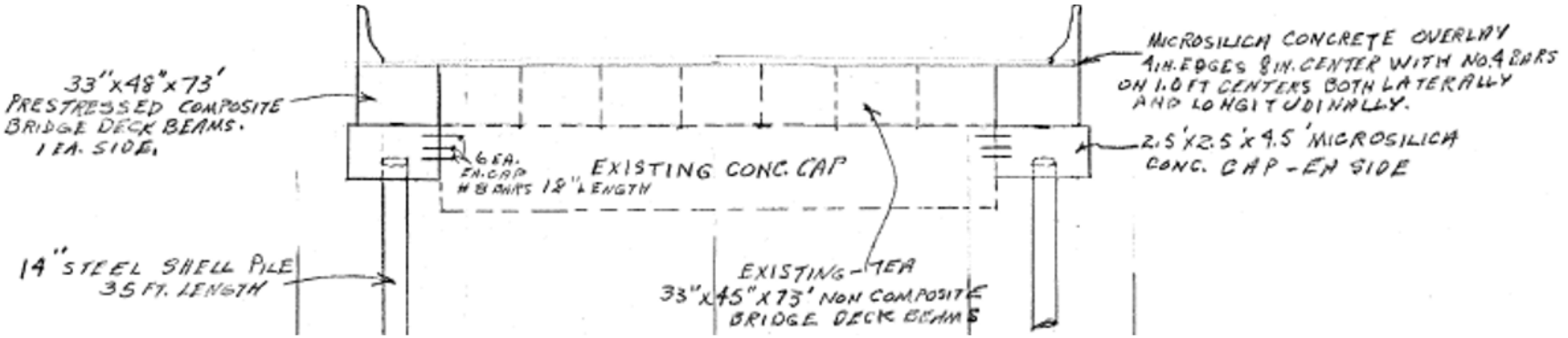
Collect Information

BrR County Rating Example

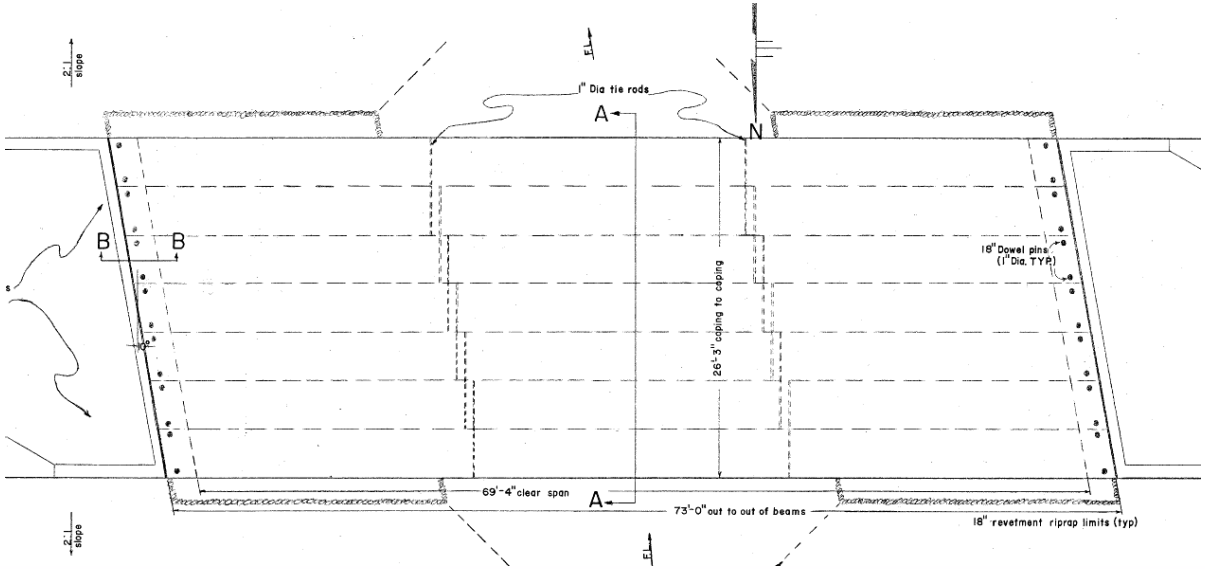
Existing Plans



Beam Size

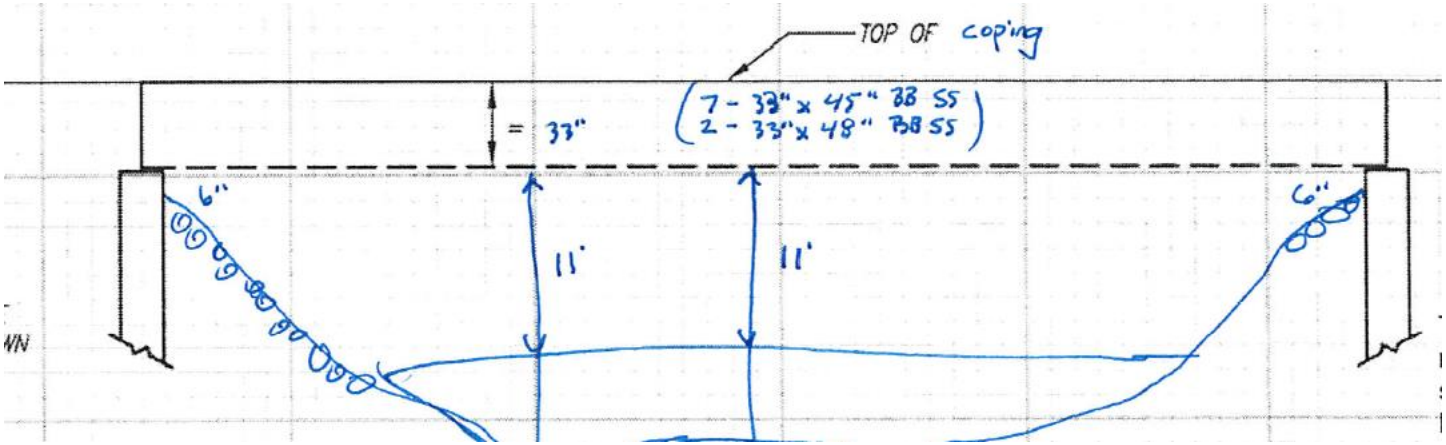
Span Length

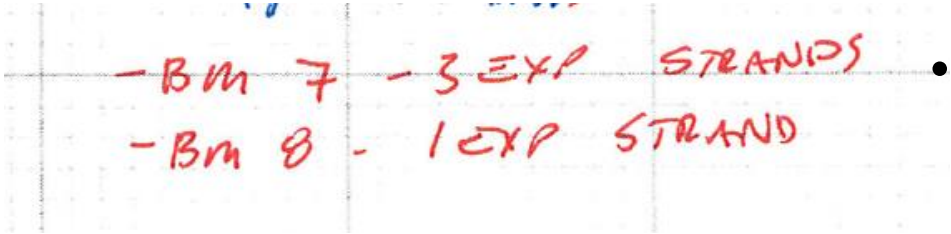
Out-to-Out Coping



BrR County Rating Example

Inspection Notes





- Confirm Plans
  - Beam Size
  - Span Length
  - Out-to-Out Coping
- Note Deterioration

BrR County Rating Example

BIAS Data

AGE OF SERVICE

27.	Year Built:	1972

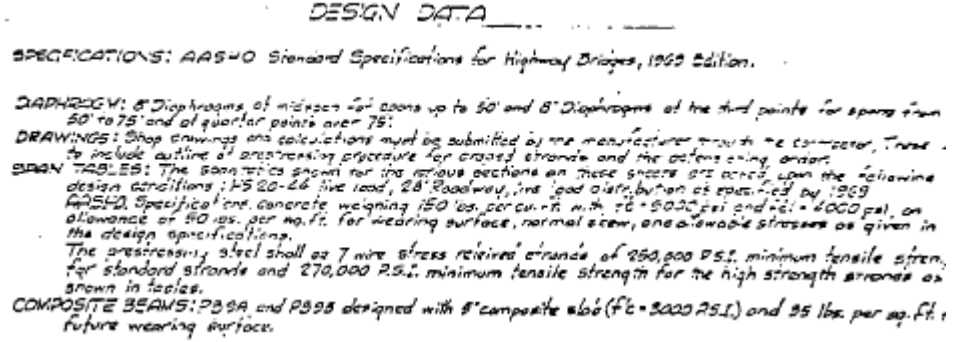
GEOMETIC DATA

48.	Maximum Span Length:	69.2 ft.
50A.	Sidewalk/Curb Left:	0 ft.
51.	Bridge Roadway Width:	31.8 ft.
32.	Approach Roadway Width:	22 ft.
34.	Skew:	10 Degree(s)

BrR County Rating Example

Box Beam Standard Drawings

- **Material Properties from Bridge Standard PB6**
  - **Prestressed Concrete**
    - **f'ci = 4000 psi**
    - **f'c = 5000 psi**
  - **Prestressing Strands**
    - **7 Wire Stress Relieved**
    - **250,000 psi or 270,000 psi**
  - **Interior Diaphragm Locations**



DESIGN DATA

SPECIFICATIONS: AASHO Standard Specifications for Highway Bridges, 1969 Edition.

DIAPHRAGM: 8" Diaphragms at midspan for spans up to 50' and 8" Diaphragms at the third points for spans from 50' to 75' and at quarter points over 75'.

DRAWINGS: Shop drawings and calculations must be submitted by the manufacturer through the contractor. These ... to include outline of prestressing procedure for draped strands and the patterning sequence.

SPAN TABLES: The geometrics shown for the various sections on these sheets are based upon the following design conditions: HS 20-44 live load, 28' Roadway, line load distribution as specified by 1969 AASHO Specifications, concrete weighing 150 lbs. per cu. ft. with f'_c = 5000 psi and f'_{ci} = 4000 psi, an allowance of 40 lbs. per sq. ft. for wearing surface, normal stress, and allowable stresses as given in the design specifications.

The prestressing steel shall be 7 wire stress relieved strands of 250,000 P.S.I. minimum tensile strength for standard strands and 270,000 P.S.I. minimum tensile strength for the high strength strands as shown in tables.

COMPOSITE BEAMS: PB9A and PB9B designed with 8" composite slab (f'_c = 3000 P.S.I.) and 35 lbs. per sq. ft. future wearing surface.

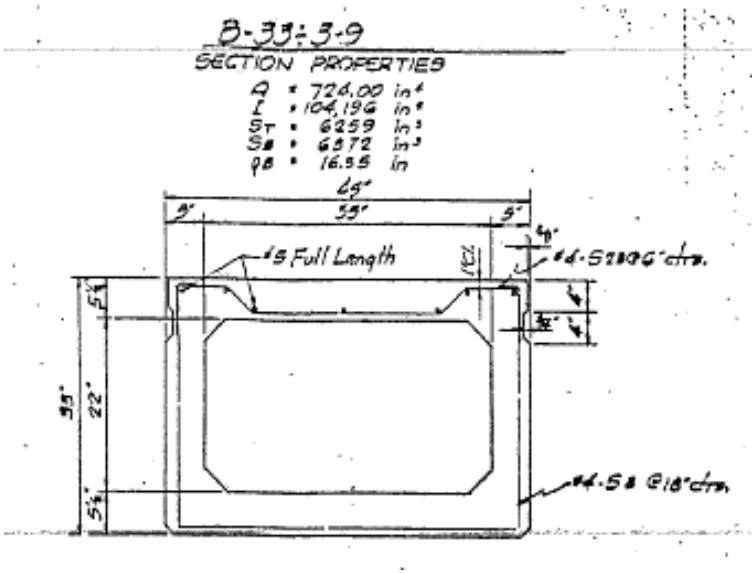
BrR County Rating Example

Interior Beams 33”x45”x73’ Non-Composite

Assume B-33 3-9

Prestressed Non-Composite Box Beam 3’-9” Wide

Bridge Standard PB 7A



HIGH STRENGTH STRAND 270 K

SPAN C.C. BRGS. (Feet)	Steel for temp. End Stress	1 ½" STRAND No.	1 ½" STRAND Row	2 # BOND BREAK	3 Extra ½" Strand	1 ½" STRAND No.	1 ½" STRAND Row	2 # BOND BREAK	3 Extra ½" Strand	WEIGHT (lbs.)
57	1.89	22	1		2	18	1			47,100
			2				2			
			3				3			
59	1.98	24	1		1	13	1			48,600
			2				2		1	
			3				3			
61	1.61	25	1			12	1		1	50,200
			2		1		2			
			3				3			
63	1.77	27	1			13	1			51,700
			2		1		2		2	
			3				3			
65	1.93	27	1			16	1			53,200
		2	2				2			
			3				3			
67	2.09	27	1			17	1			54,700
		4	2				2			
			3				3			
69	2.26	27	1			18	1			56,200
		6	2				2			
			3				3			
71	2.42	27	1			18	1	162'-9		57,700
		8	2				2			
			3				3			

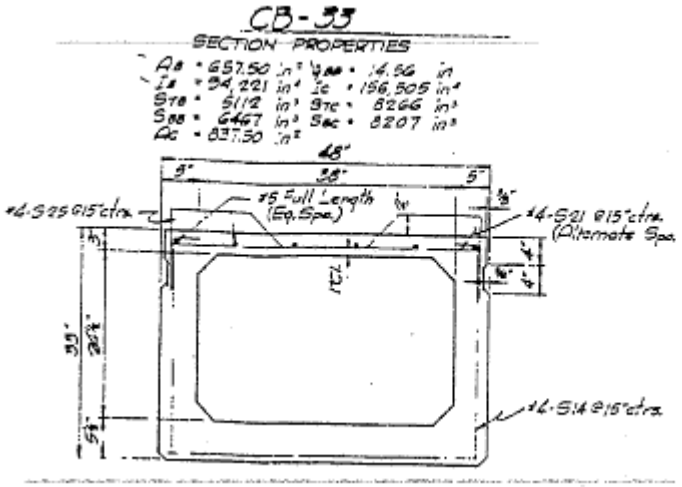
BrR County Rating Example

Exterior Beams 33”x48”x 73’ Composite

Assume CB-33

Prestressed Non-Composite Box Beam 4’-0” Wide

Bridge Standard PB 9A



HIGH STRENGTH STRAND 270K

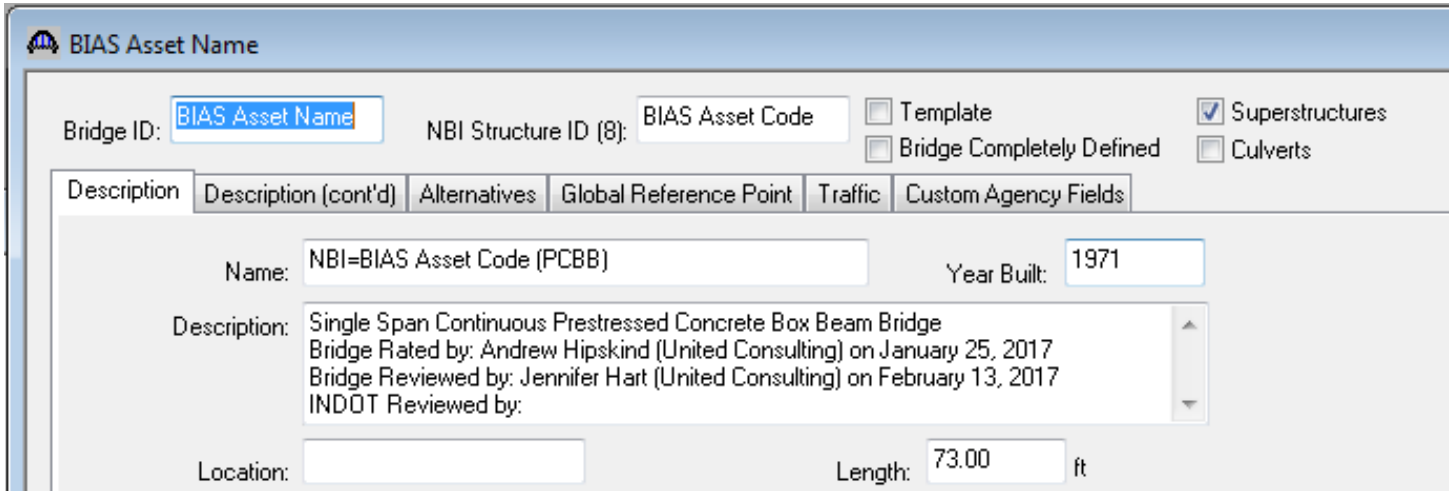
SPAN C.C. BRG. (Feet)	Slab Dead Load Δ	Steel for Temp. End Slab	1		2	3	1		2	3	
			0.6" STRAND No.	Row	# BOND BREAK	Extra 0.6" Strands	0.6" STRAND No.	Row	# BOND BREAK	Extra 0.6" Strands	WEIGHT (lbs.)
59	3/16"	1.85	25	1			12	1			45,200
				2				2			
				3				3			
61	3/16"	2.01	27	1			15	1			46,600
				2				2			
				3				3			
63	1/8"	2.20	28	1			16	1			48,000
				2				2			
				3				3			
65	1/8"	2.39	29	1			17	1			49,300
			1	2				2			
				3				3			
67	5/16"	2.57	29	1			18	1			50,700
			3	2				2			
				3				3			
69	5/16"	2.76	29	1			19	1	1@23'-9		52,100
			3	2				2			
				3				3			
71	3/8"	2.95	29	1			20	1	2@23'-9		53,400
			3	2				2			
				3				3			

Build BrR Model

BrR County Rating Example

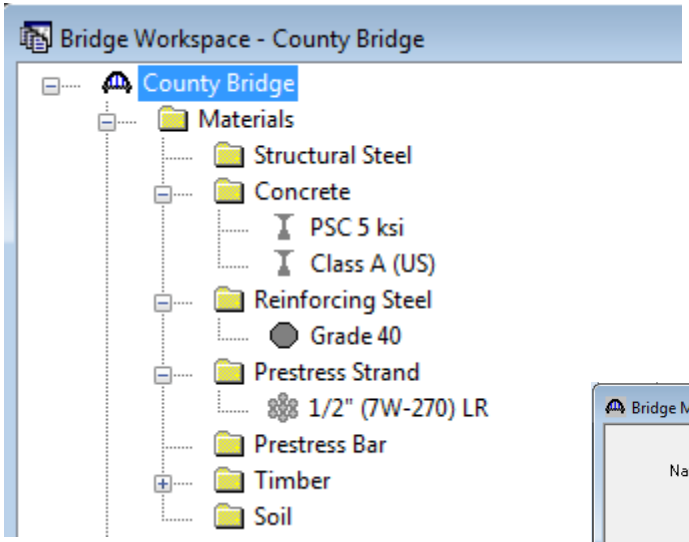
Bridge Description

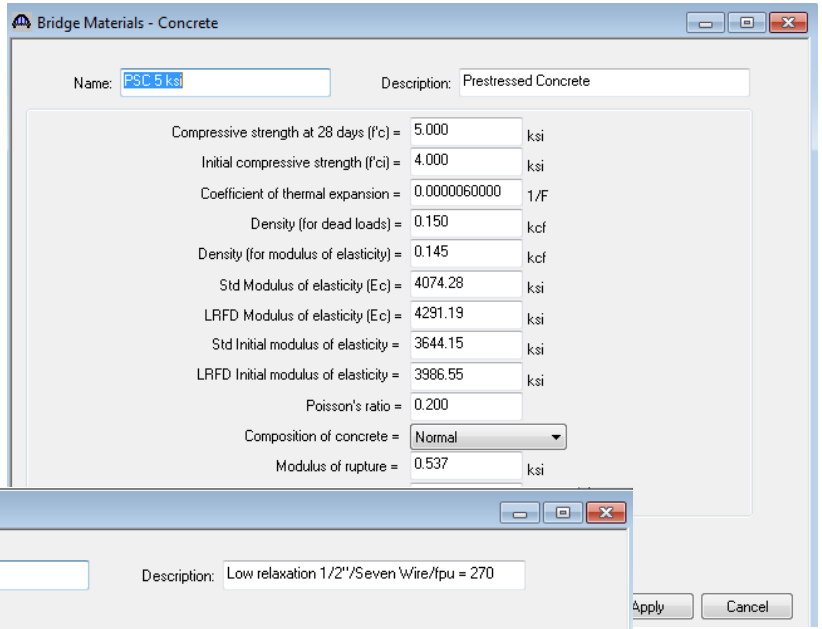
- **Bridge ID = BIAS Asset Name**
- **NBI = BIAS Asset Code**
- **Description should include:**
  - **- Name of individual responsible for the load rating**
  - **- Name of individual responsible for review**
  - **- Dates for each of the above**

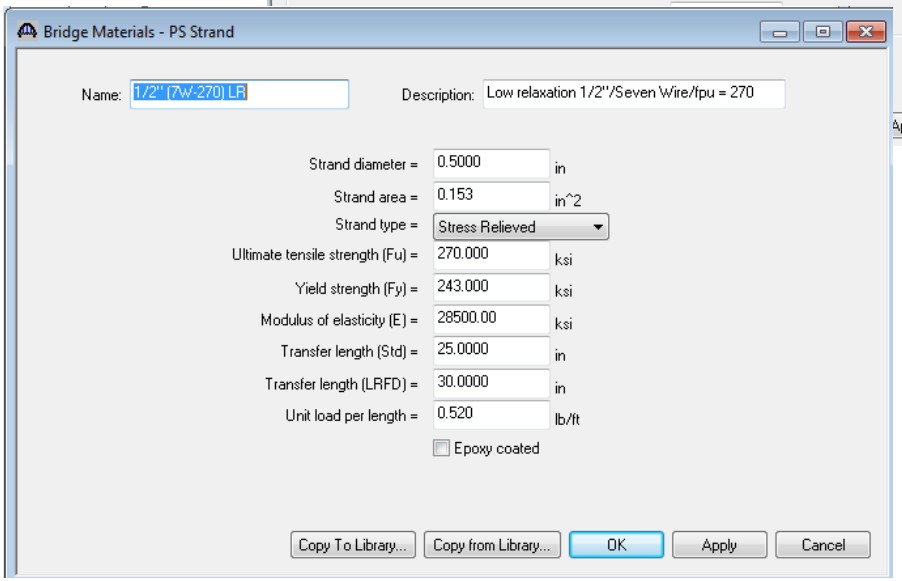


BrR County Rating Example

Define Materials



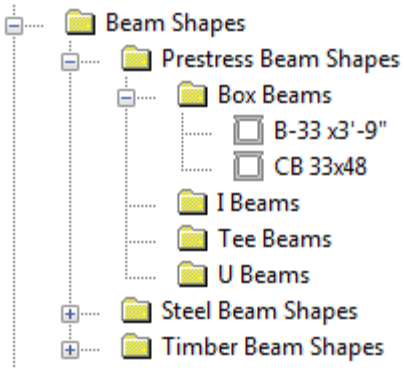


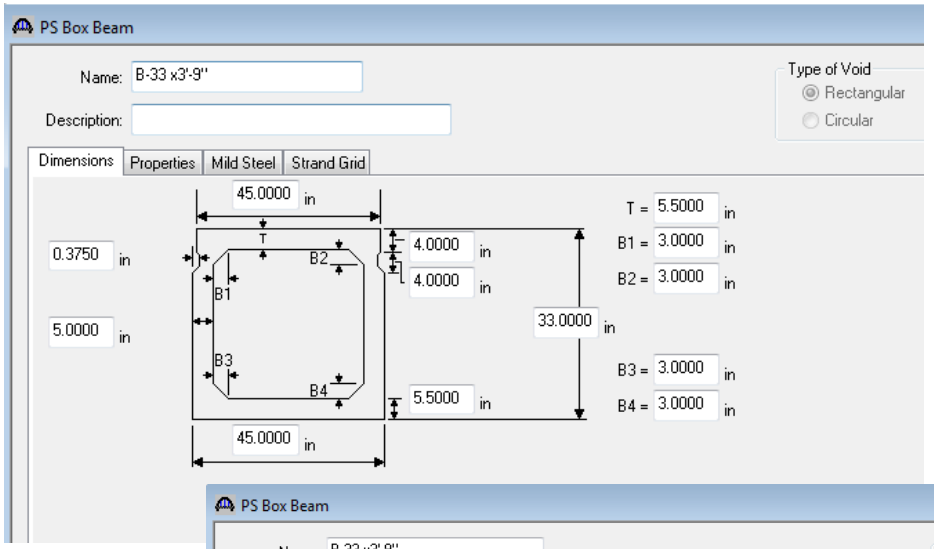


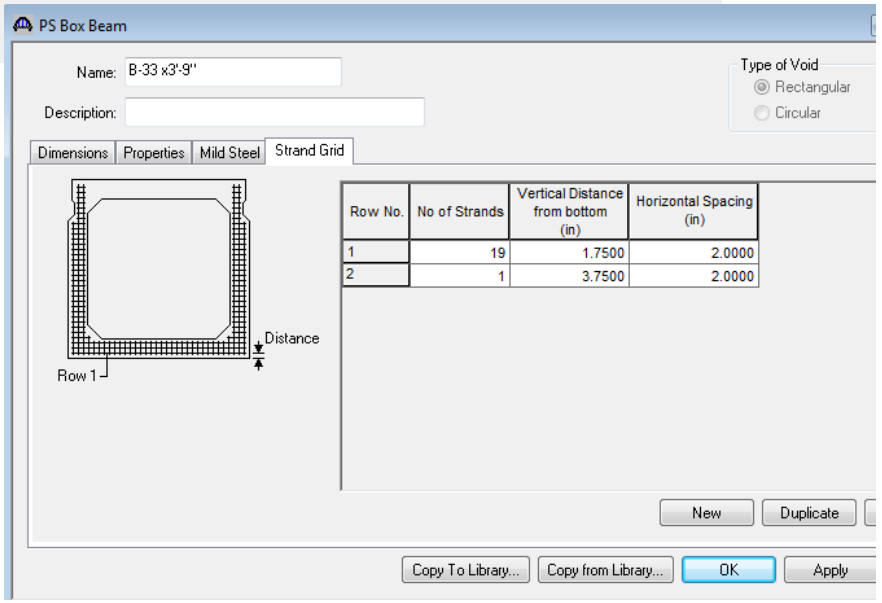
Start by copying materials from Library and make adjustments as needed.

BrR County Rating Example

Define Beam Shapes



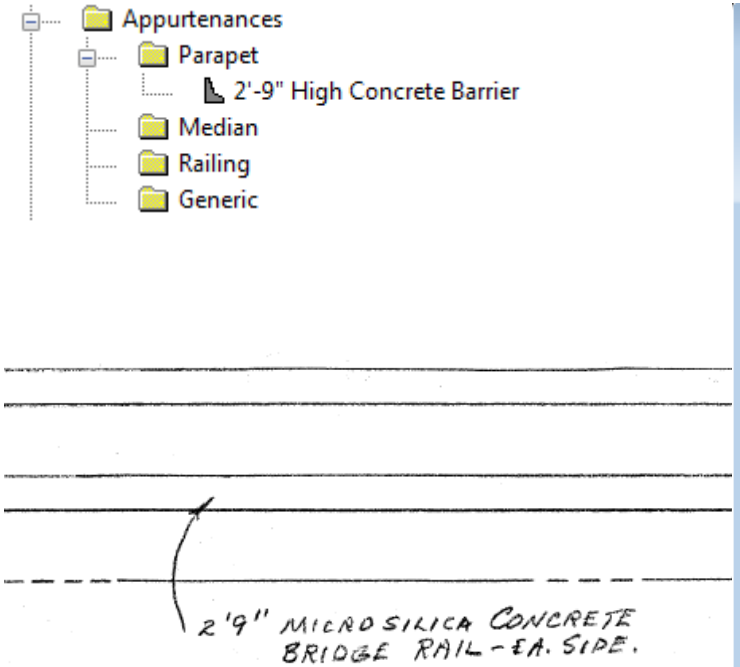


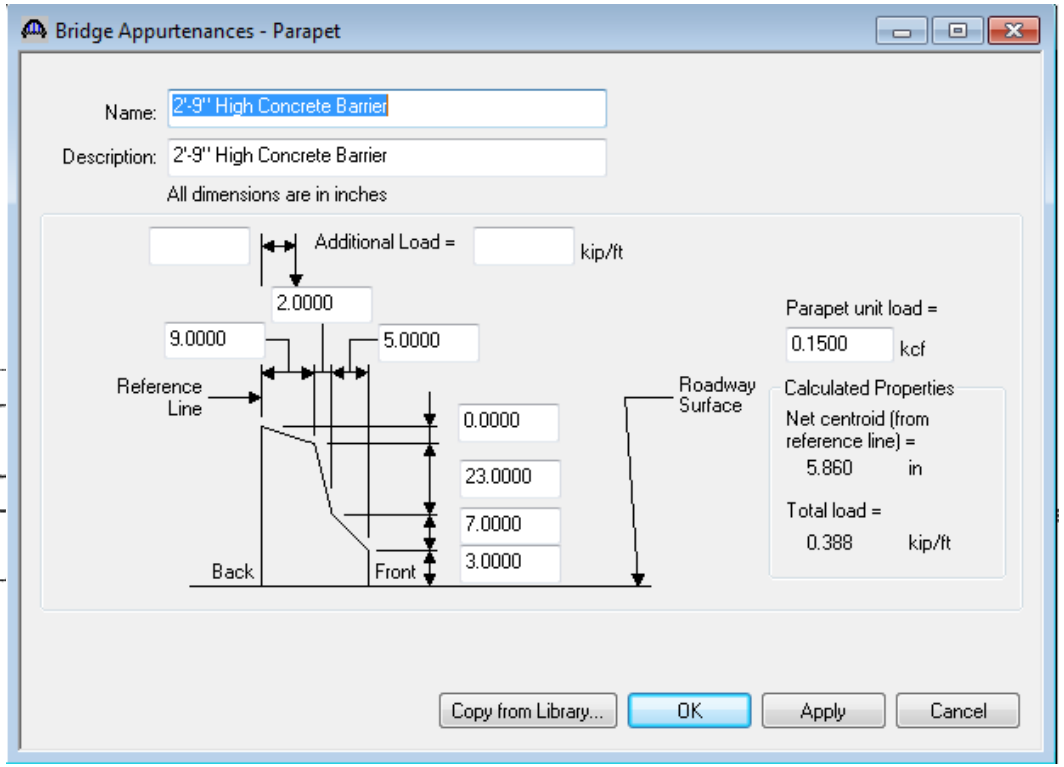


Build beams with dimensions that match the standard drawings

BrR County Rating Example

Define Railing / Appurtenances

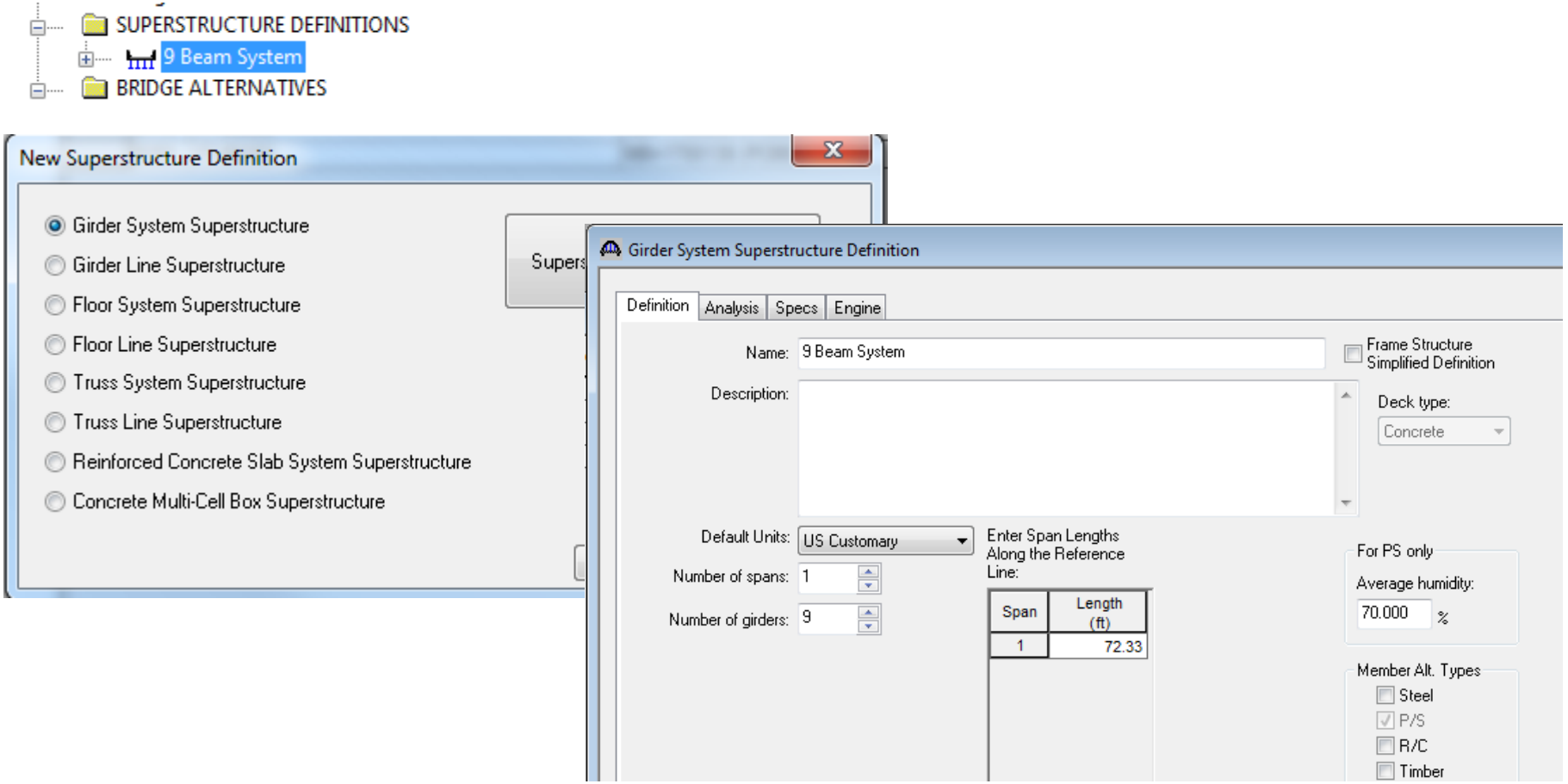




Rehab plans call out 2'-9" bridge rail each side.

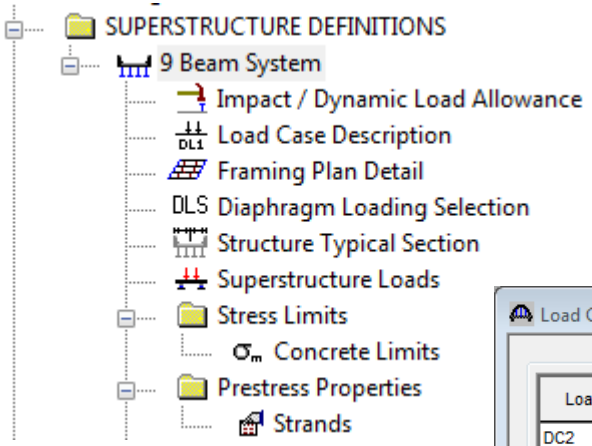
BrR County Rating Example

Create Superstructure Definition

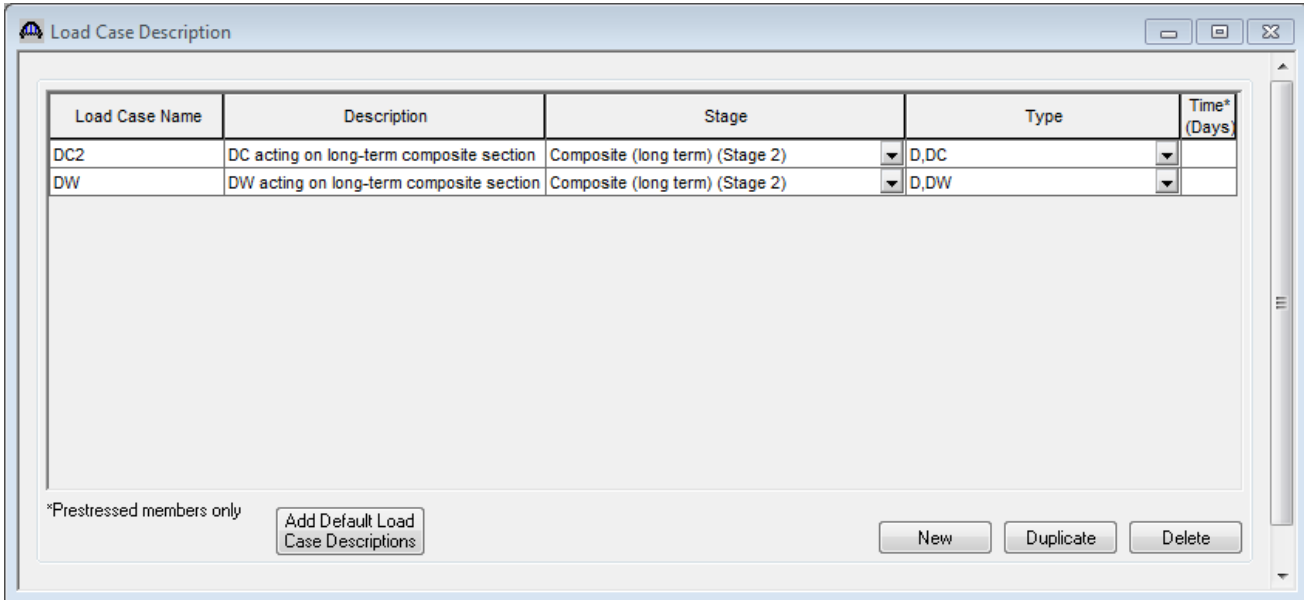


BrR County Rating Example

Create Load Cases

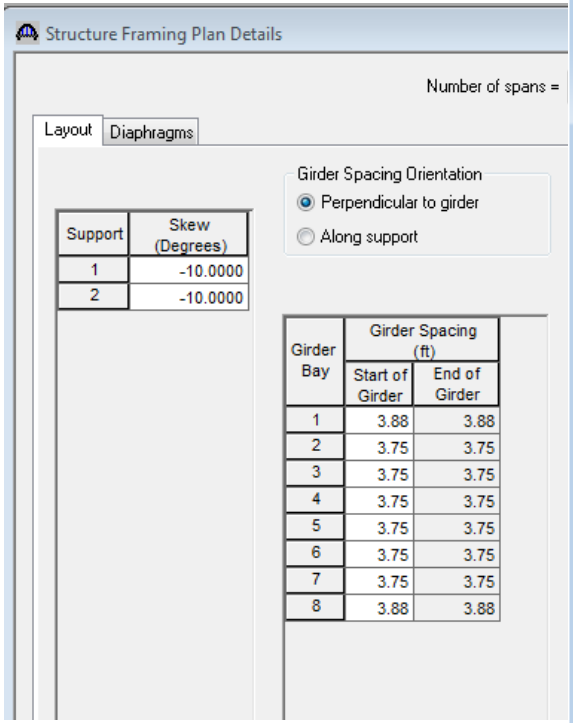


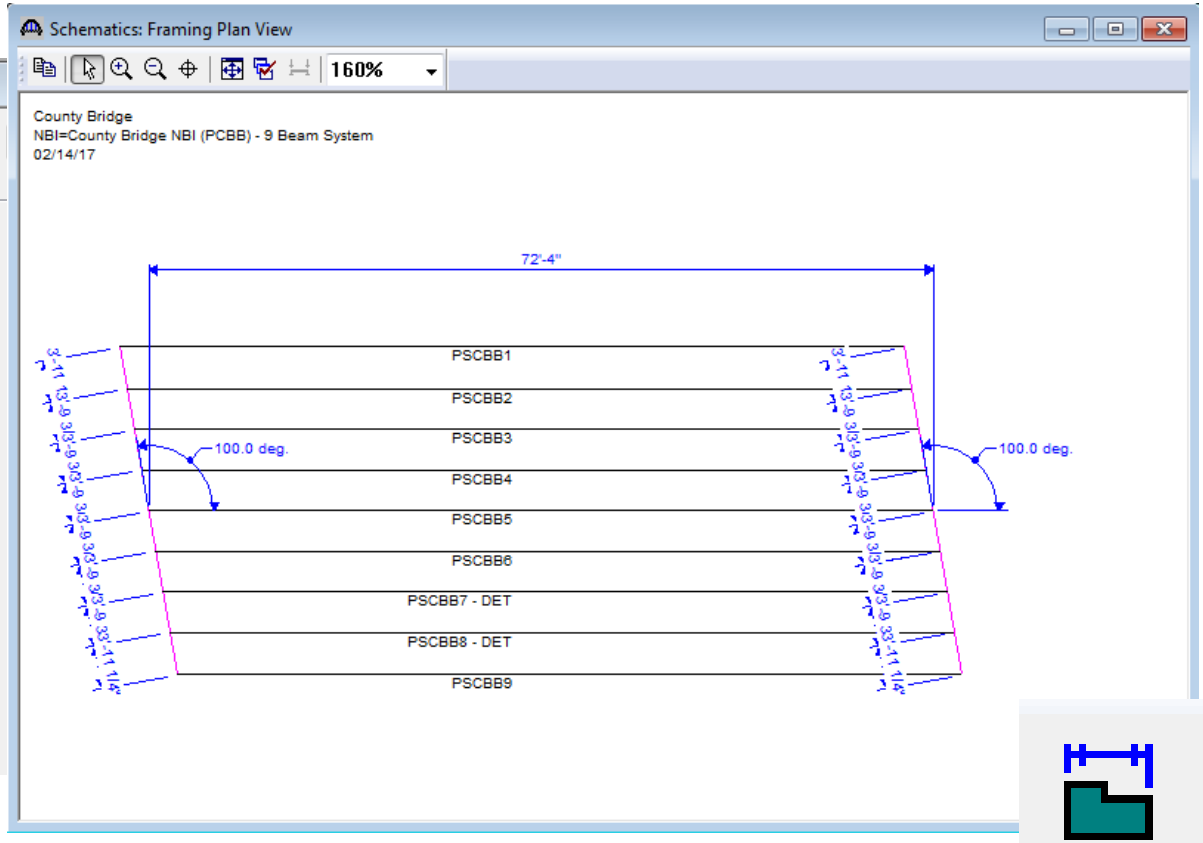
Start by adding Default Load Case Descriptions delete the ones not used.



BrR County Rating Example

Create Framing Plan

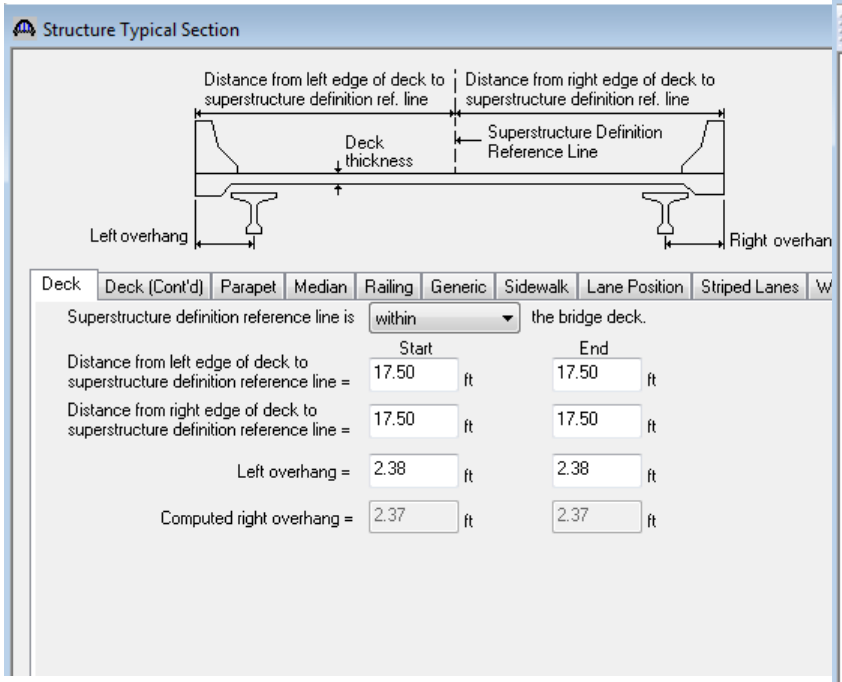


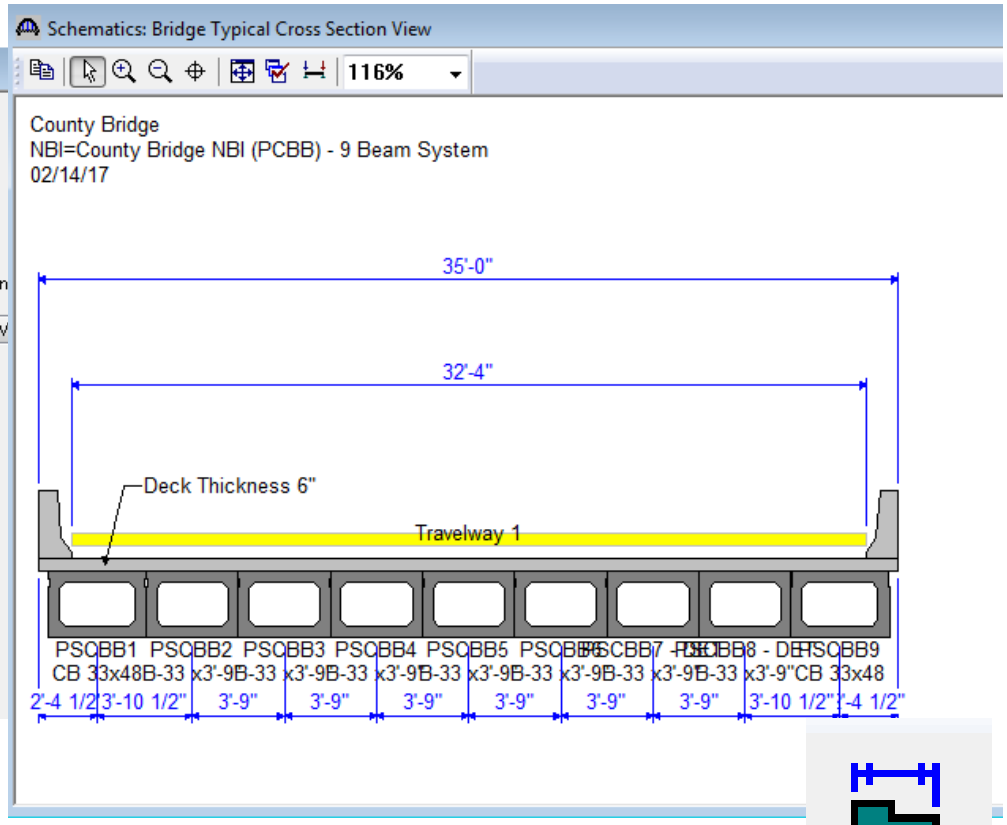


View Schematic icon provides a graphic of the structure to compare with plans/sketches

BrR County Rating Example

Create Structure Typical Section

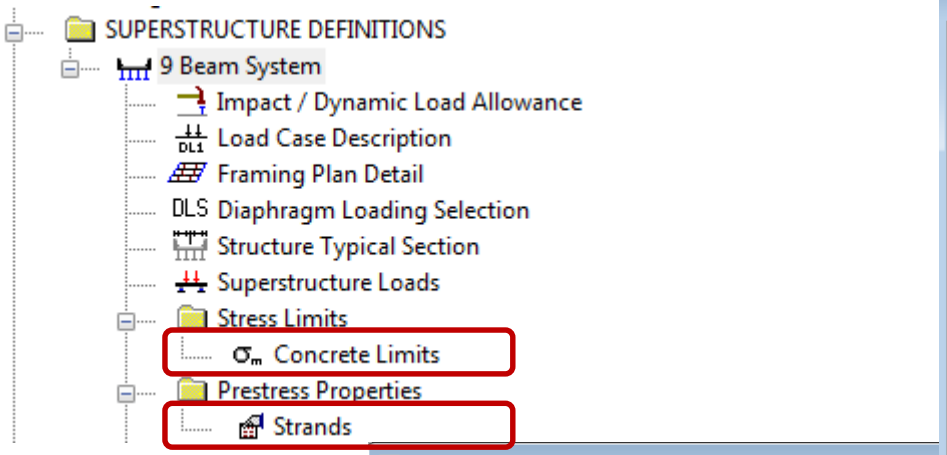


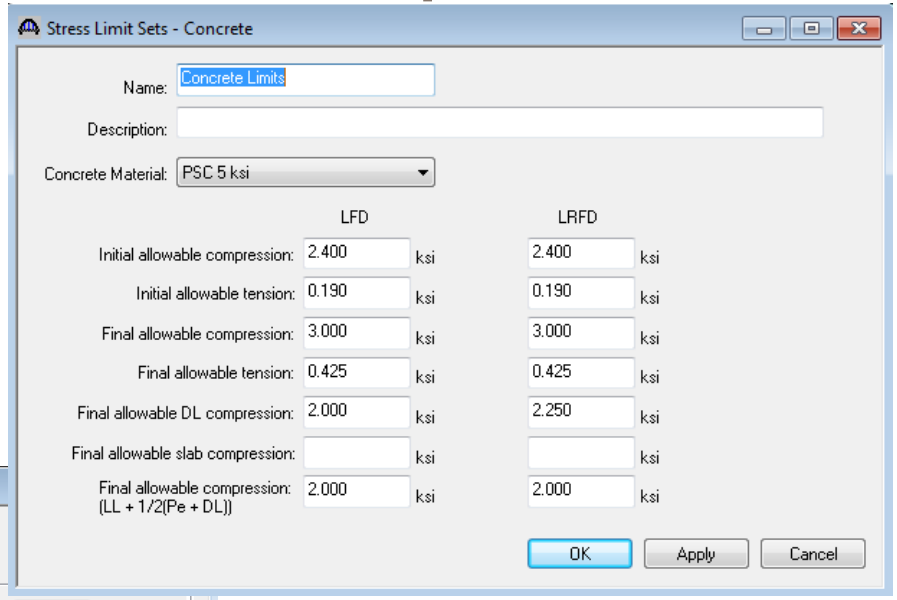


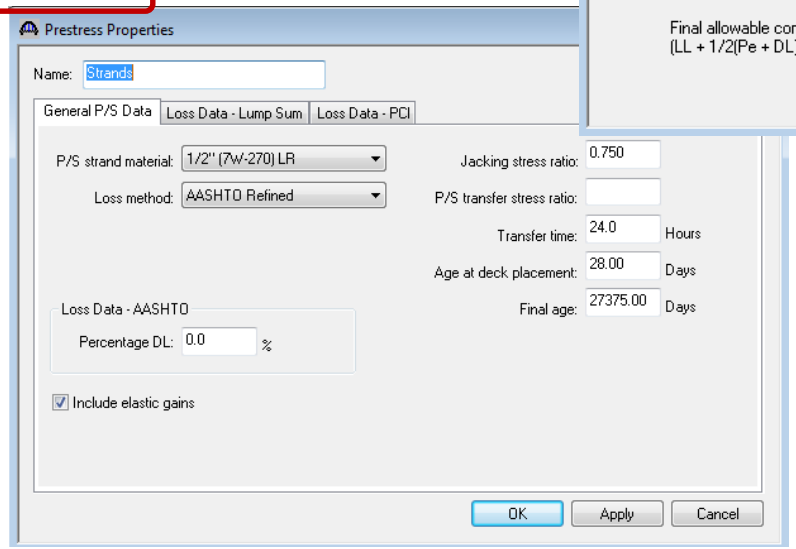
BrR uses information in this dialog box to calculate dead loads.

BrR County Rating Example

Define Concrete Stress Limits & Strand Properties







BrR County Rating Example

Build Individual Members

BrR County Rating Example

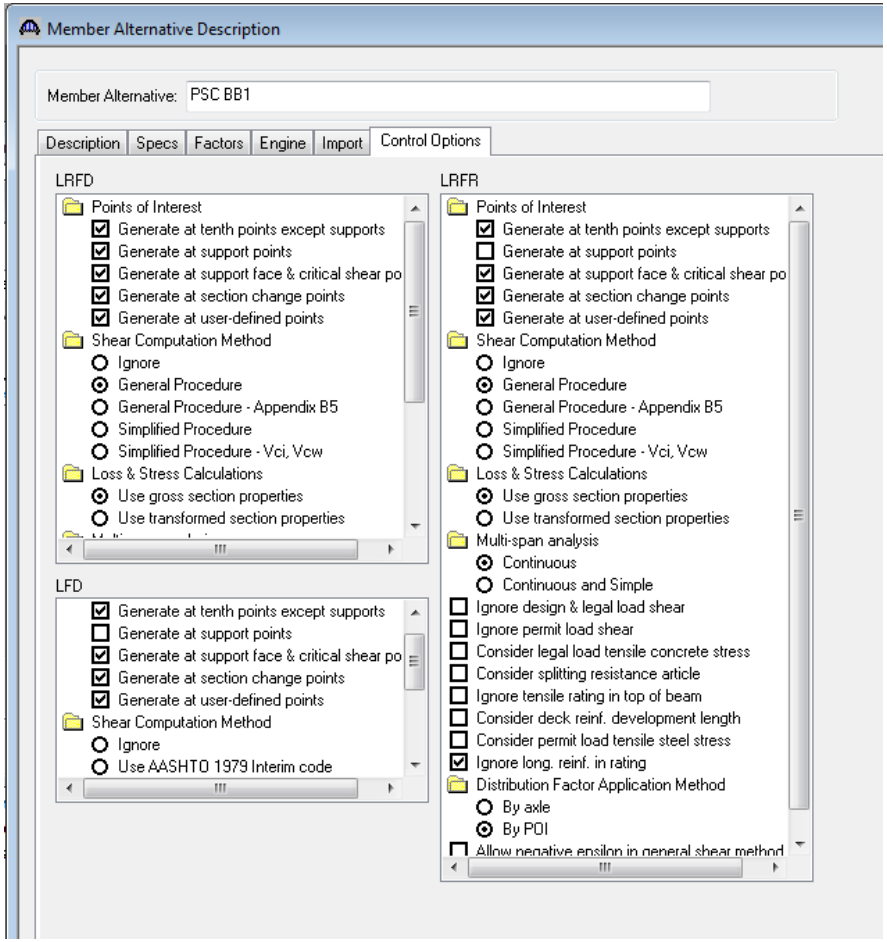
Select Control Options

Generate at 10th points except at supports

Generate at support face & critical shear points

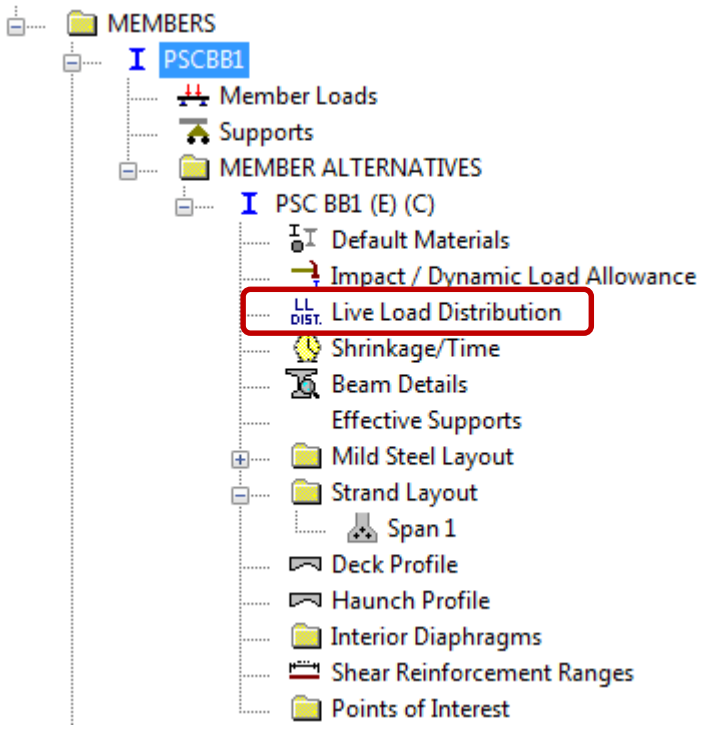
Provide information for Effective Supports within model

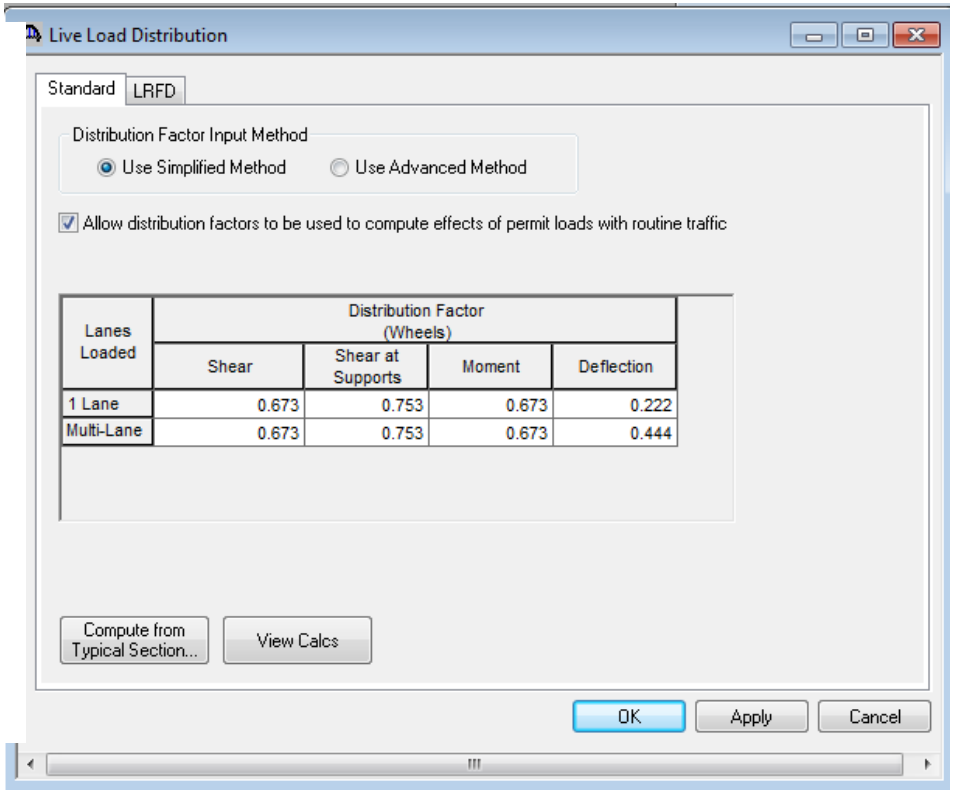
.



BrR County Rating Example

Calculate Live Load Distribution Factor

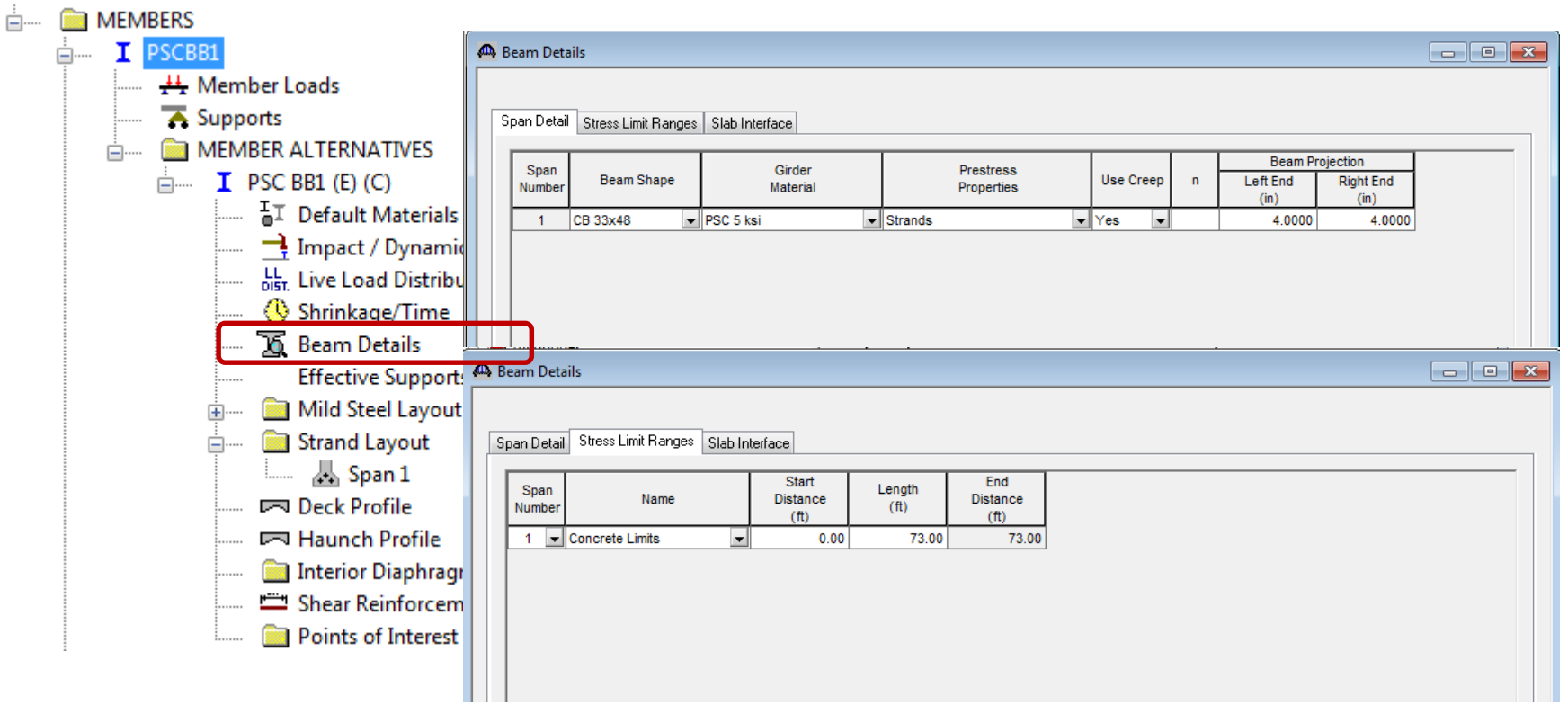




BrR uses beam information and bridge geometry to compute LLD factors. This does not automatically update when revisions are made to the model.

BrR County Rating Example

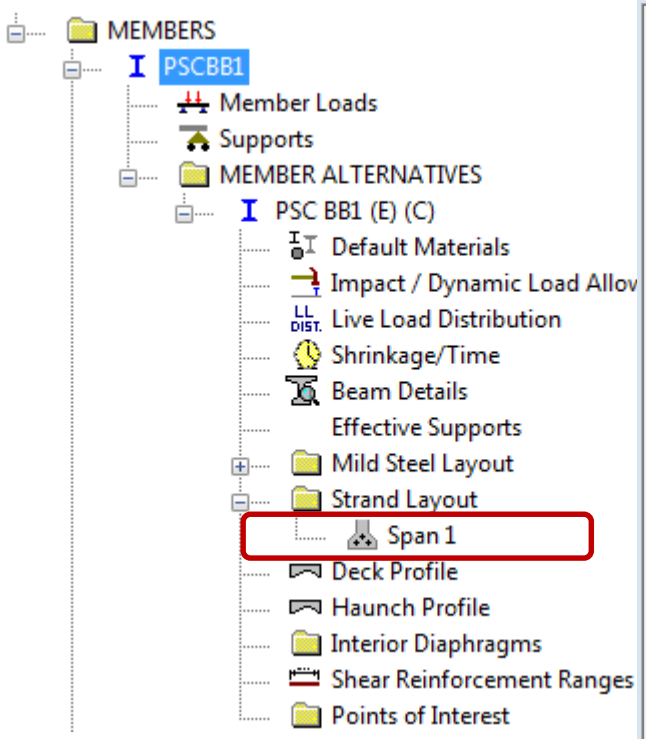
Assign Beam Details

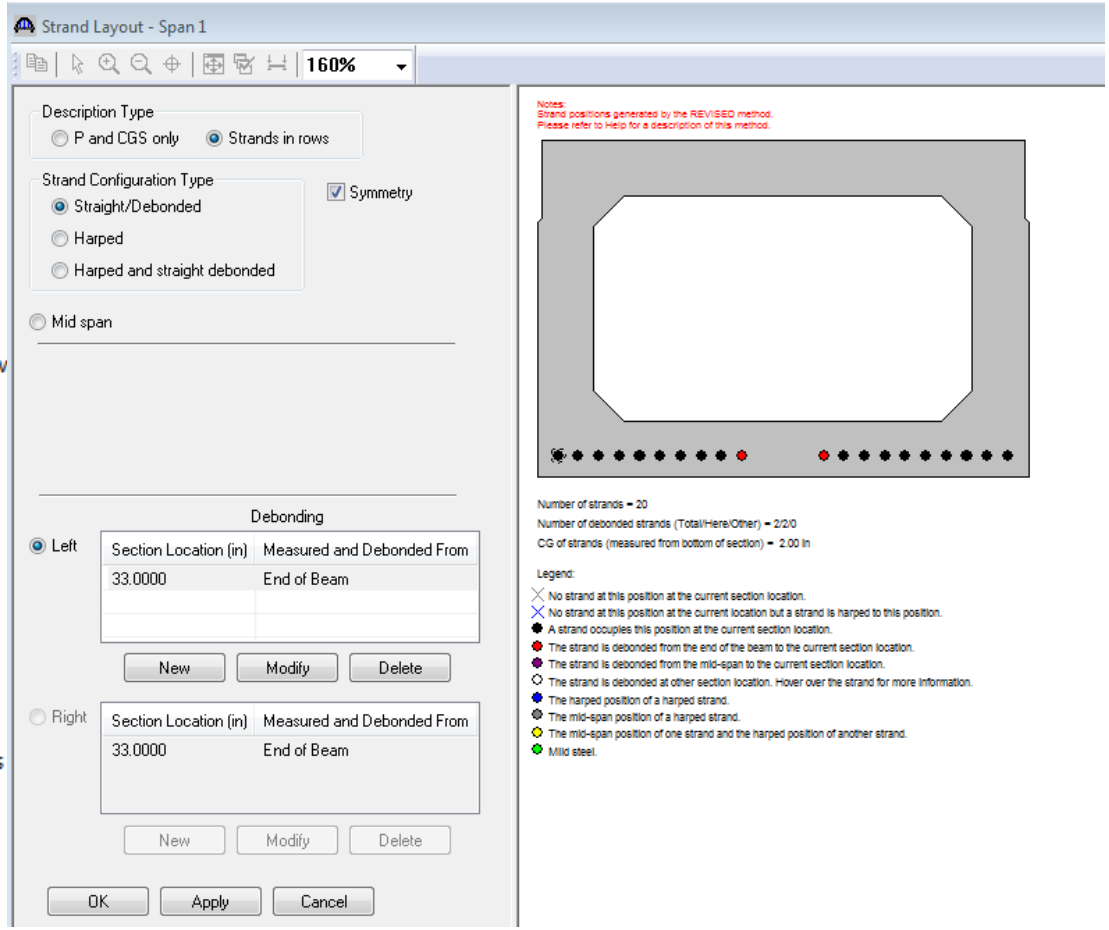


Assign previously defined materials to individual beams

BrR County Rating Example

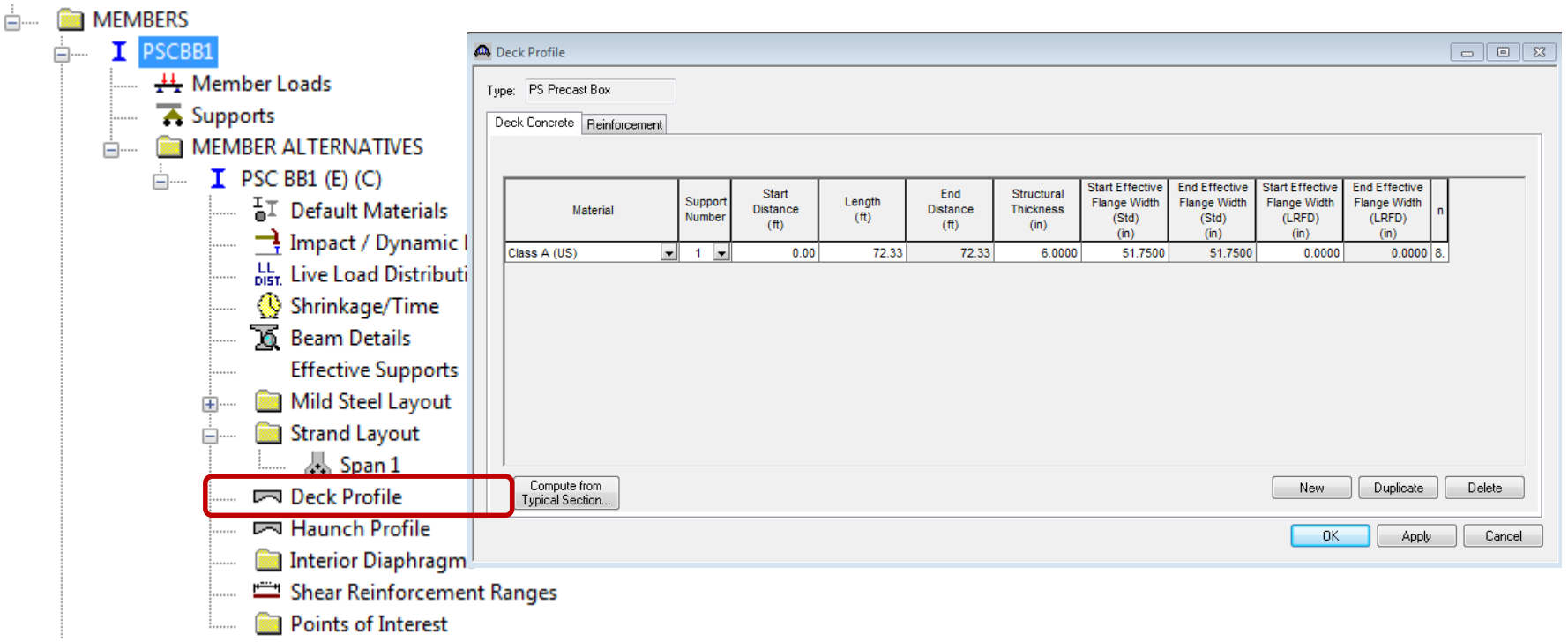
Layout Strands





BrR County Rating Example

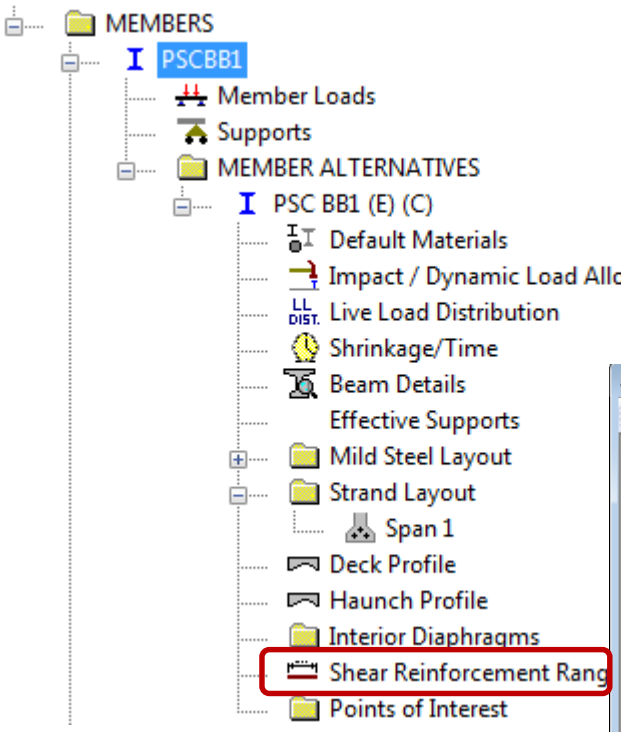
Define Deck Profile

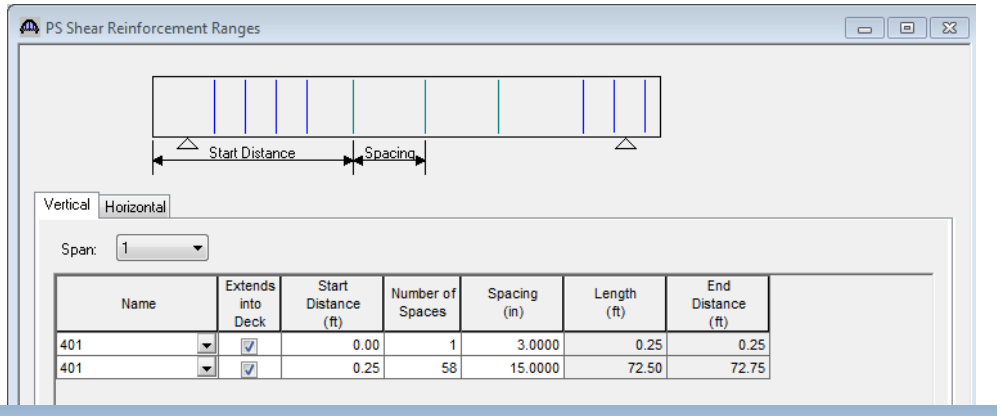


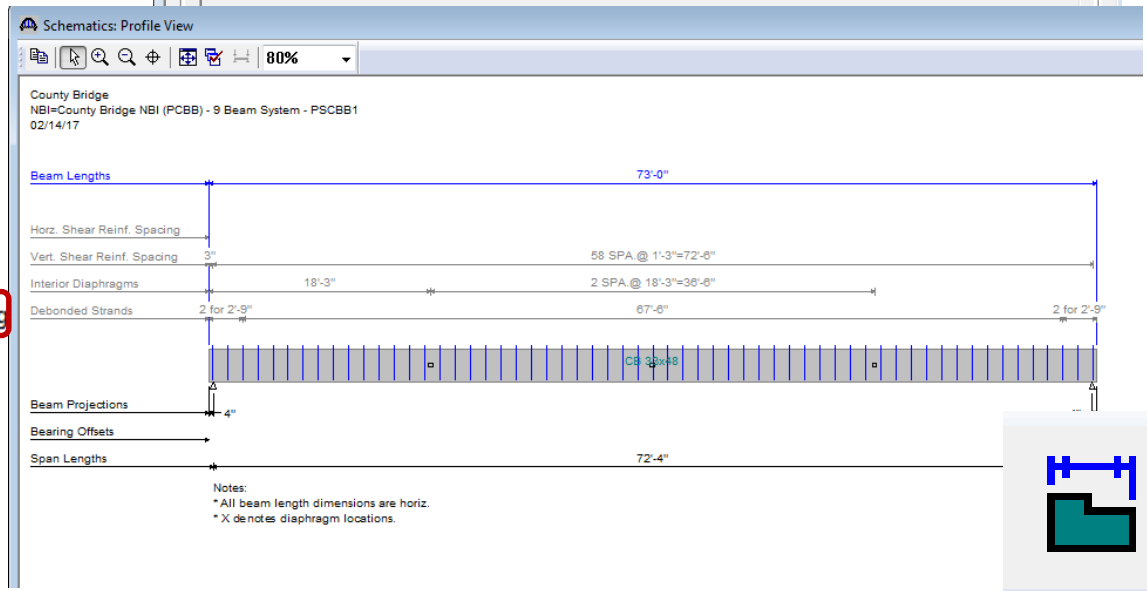
Deck profile is used to calculate effective flange width and not dead loads

BrR County Rating Example

Define Shear Reinforcement Ranges



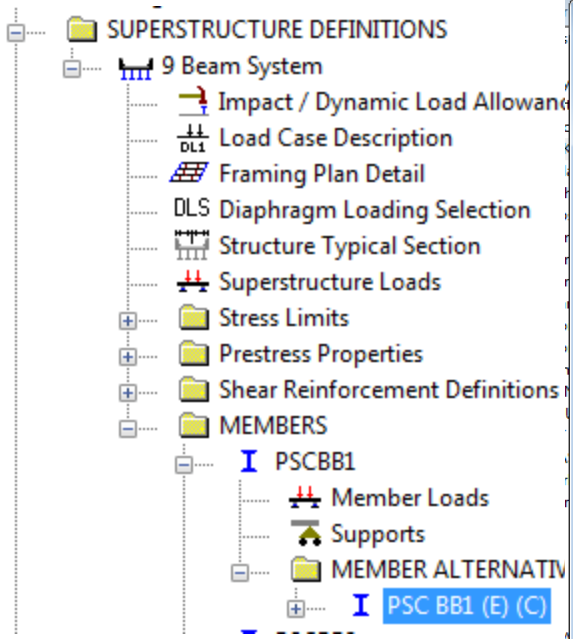


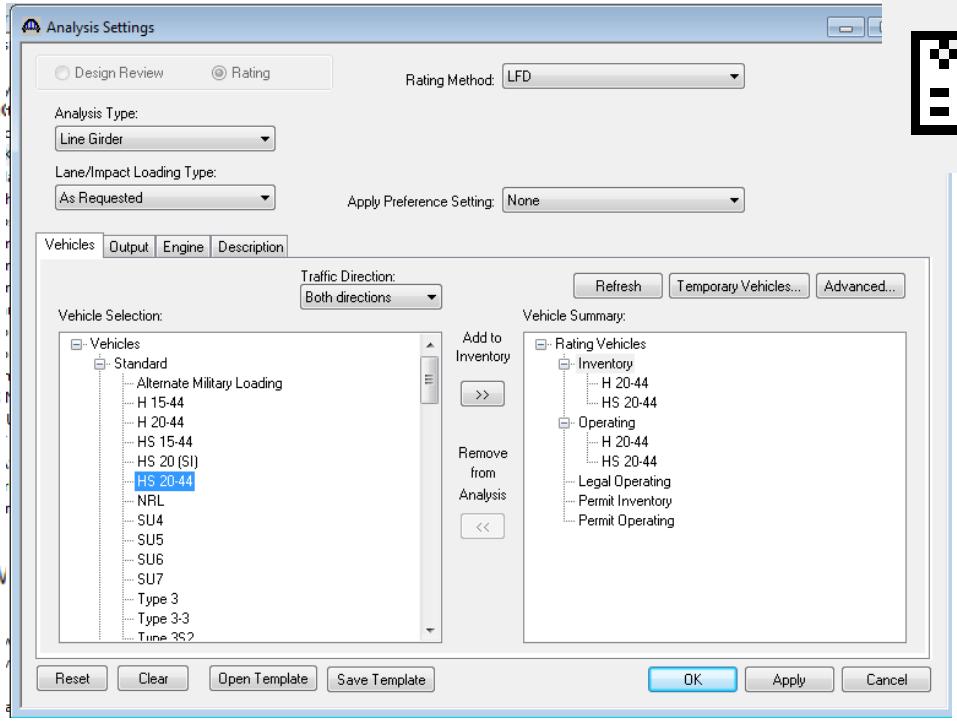


Perform Load Rating

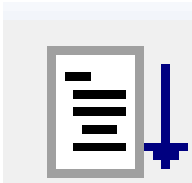
BrR County Rating Example

Define Analysis Settings and Perform Rating





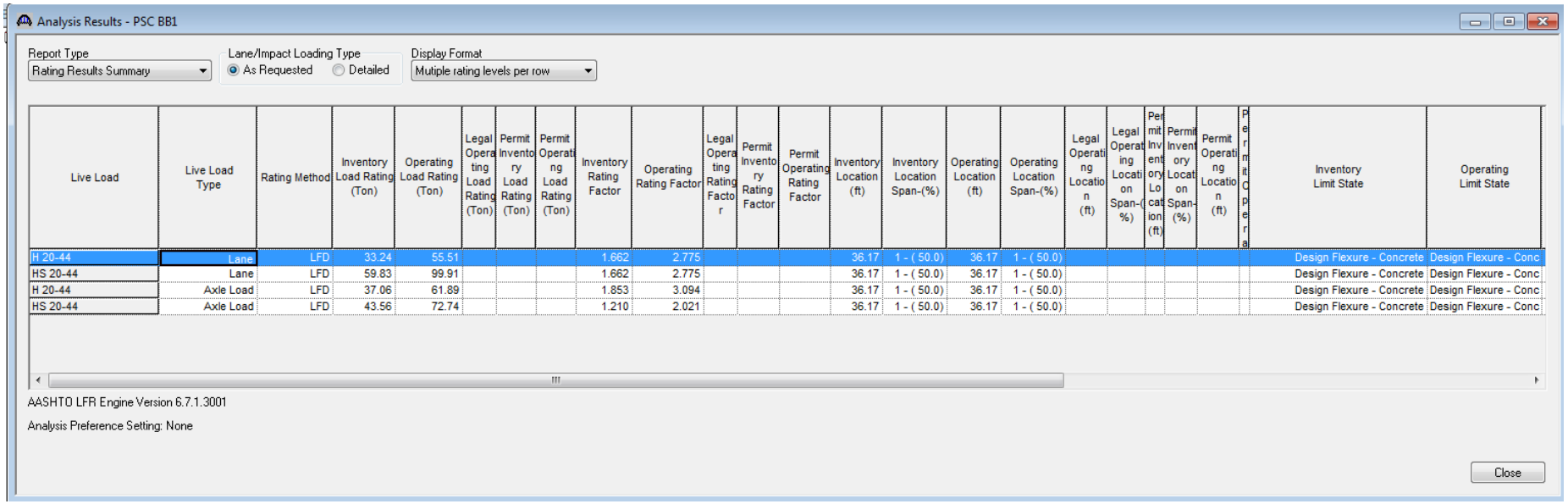
Select Analysis Settings icon to select rating method and vehicles to rate.



Highlight Beam (or System) and select Analyze Icon to perform load rating.

BrR County Rating Example

BrR View Analysis Results

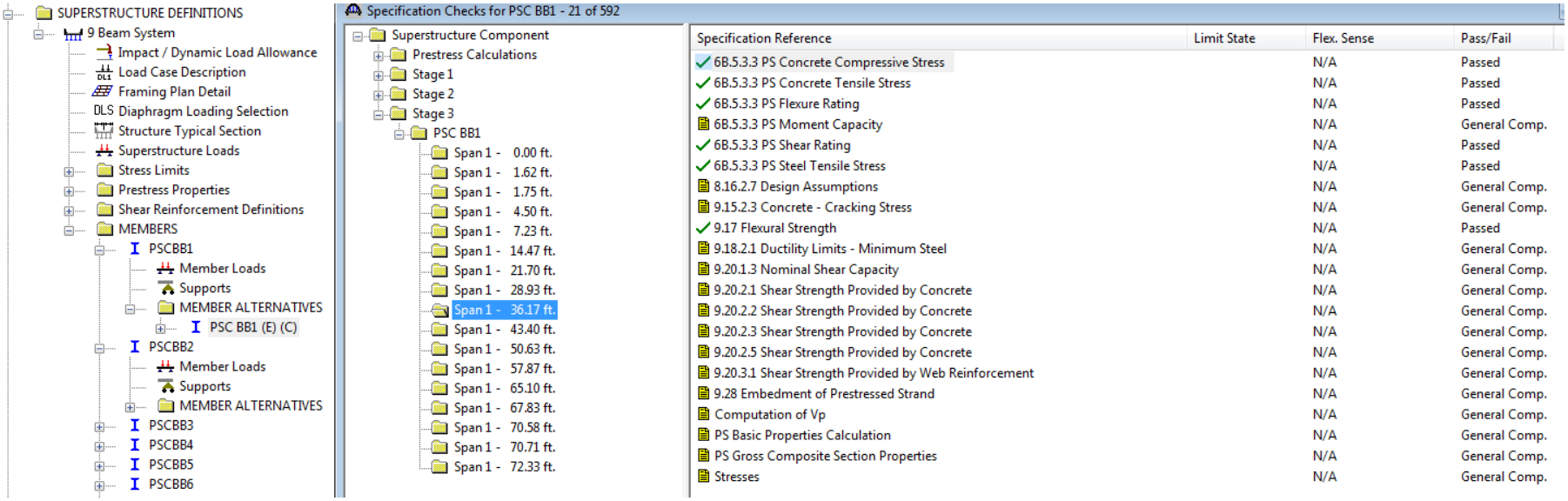


- **Controlling Rating** *(HS20 Inv = 1.210)*
- **Limiting Condition** *(Design Flexure - Concrete)*
- **Location** *(36.17 ft, or 50% of Span 1)*

BrR County Rating Example

BrR View Spec Check

After the controlling location and condition is identified, use the View Spec Check icon to identify the limiting AASHTO Code reference.



Tip: Select individual Specification References and dial in to additional detailed computations.

Thank You!

For additional questions, please contact:

Jennifer Hart
O: 317-895-2585
E: Jennifer.hart@ucindy.com

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Indianapolis, IN 46219
www.ucindy.com

UNITED Consulting