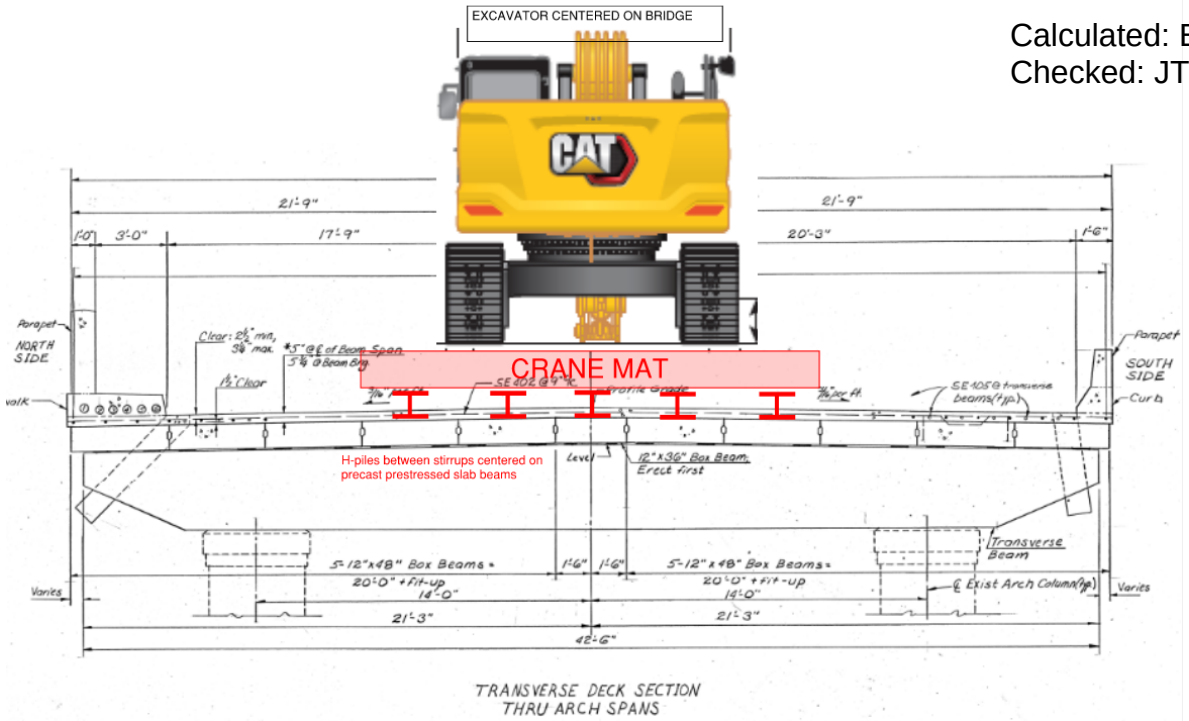
Belmont 40 Slab Span, Slab Beam, and Box Beam Constructability Analysis

Calculated: ETB 3/6/25
Checked: JTB 3/7/25



BrR is self-computing slab beam LLDF's around 0.6 (Shear and Flexure), box beam LLDF's around 0.3. (Flexure) and 0.6 (shear) What should we be using? Initial thoughts was 0.75 for slab beams, reflecting the excavator turning and positioning slab beams. Might be too much (see results below). These ratings are governed by Service III. We need to be avoiding cracking during construction, so Service III and Strength I are the checks I'm doing. Results below are for Strength I (1.50 LL factor) and Service III assuming LLDF's automatically calculated for box beams and a 0.75 LLDF for slab beams.

Structure Rating Results

System of units: (●) US customary ( ) SI / metric
Lane/impact loading type: (●) As requested ( ) Detailed
Display format: Multiple rating levels per row

Bridge id	Structure	Vehicle	Inventory rating factor	Operating rating factor	Legal operating rating factor	Legal rating factor
0701599-Stage 2 Co...	BEL-40-23.38-Arch Span A, 16'-3	336+SU4				0.585
0701599-Stage 2 Co...	BEL-40-23.38-Beam Span B, 45'-6	336+SU4				0.569
0701599-Stage 2 Co...	BEL-40-23.38-Arch Span D, 20'-3	336+SU4				0.521
0701599-Stage 2 Co...	BEL-40-23.38-Beam Span E, 37'-9	336+SU4				1.018
0701599-Stage 2 Co...	BEL-40-23.38-Beam Span F, 46'-0	336+SU4				0.787
0701599-Stage 2 Co...	BEL-40-2338 (Arch Span B, 14'-0"	336+SU4				0.665
0701599-Stage 2 Co...	BEL-40-23.38 (Beam Span D, 33'-9	336+SU4				1.327
0701599-Stage 2 Co...	BEL-40-23.38 (Beam Span G, 44'-6	336+SU4				0.857
0701599-Stage 2 Co...	BEL-40-23.38 (Beam Span C, 29'-9	336+SU4				1.559

SERVICE III

Structure Rating Results

System of units: (●) US customary ( ) SI / metric
Lane/impact loading type: (●) As requested ( ) Detailed
Display format: Multiple rating levels per row

Bridge id	Structure	Vehicle	Inventory rating factor	Operating rating factor	Legal operating rating factor	Legal rating factor
0701599-Stage 2 Co...	BEL-40-23.38-Arch Span A, 16'-3	336+SU4				0.970
0701599-Stage 2 Co...	BEL-40-23.38-Beam Span B, 45'-6	336+SU4				0.982
0701599-Stage 2 Co...	BEL-40-23.38-Arch Span D, 20'-3	336+SU4				0.921
0701599-Stage 2 Co...	BEL-40-23.38-Beam Span E, 37'-9	336+SU4				1.341
0701599-Stage 2 Co...	BEL-40-23.38-Beam Span F, 46'-0	336+SU4				1.055
0701599-Stage 2 Co...	BEL-40-2338 (Arch Span B, 14'-0"	336+SU4				1.075
0701599-Stage 2 Co...	BEL-40-23.38 (Beam Span D, 33'-9	336+SU4				1.536
0701599-Stage 2 Co...	BEL-40-23.38 (Beam Span G, 44'-6	336+SU4				1.090
0701599-Stage 2 Co...	BEL-40-23.38 (Beam Span C, 29'-9	336+SU4				1.679

STRENGTH I

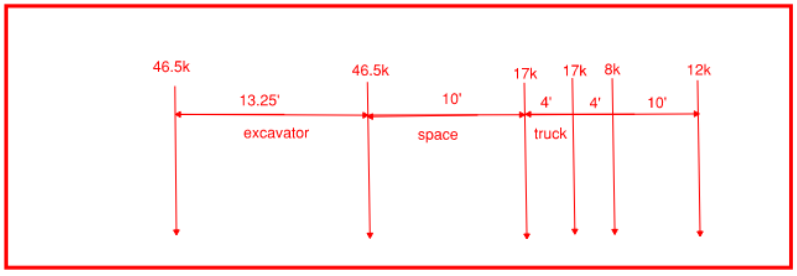
Box Beam Chart in Plans for Identifying Strand Patterns

BOX BEAM SPAN	BEAM NUMBER	STRAND PATTERN	L	A	B	C	D
B	B1	1F	46'-2"	O AND R BARS SPA. @ 4" MAX.	O AND R BARS SPA. @ 12" MAX.	Y BARS SPA. @ 12" MAX.	7.00%
	B2-B5	1	46'-2"				
	B6	5	46'-2"	G AND E BARS SPA. @ 4" MAX	G AND E BARS SPA. @ 12" MAX	YY BARS SPA. @ 12" MAX.	
	B7-B10	1	46'-2"	O AND R BARS SPA. @ 4" MAX.	O AND R BARS SPA. @ 12" MAX.	Y BARS SPA. @ 12" MAX.	
	B11	1F	46'-2"				
C	B386	3F	23'-6"	O AND R BARS SPA. @ 3" MAX.	O AND R BARS SPA. @ 12" MAX.	Y BARS SPA. @ 12" MAX.	7.00%
	B387	3	24'-2"				
	B388	3	25'-11 7/8"				
	B389	3	27'-9 3/4"				
	B390	3	29'-7 5/8"				
	B391	6	31'-2 3/4"	G AND E BARS SPA. @ 3" MAX	G AND E BARS SPA. @ 12" MAX	YY BARS SPA. @ 12" MAX.	
	B392	1	32'-9 7/8"	O AND R BARS SPA. @ 3" MAX.	O AND R BARS SPA. @ 12" MAX.	Y BARS SPA. @ 12" MAX.	
	B393	1	34'-7 3/4"				
	B394	1	36'-5 5/8"				
	B395	1	38'-3 1/2"				
	B396	1F	39'-0"				
D	B397	3F	29'-3"	O AND R BARS SPA. @ 3" MAX.	O AND R BARS SPA. @ 12" MAX.	Y BARS SPA. @ 12" MAX.	7.00%
	B398	3	29'-6 1/4"				
	B399	3	30'-5 5/8"				
	B400	3	31'-4 7/8"				
	B401	3	32'-4 1/8"				
	B402	6	33'-2"	G AND E BARS SPA. @ 3" MAX	G AND E BARS SPA. @ 12" MAX	YY BARS SPA. @ 12" MAX.	
	B403	2	34'-0"	O AND R BARS SPA. @ 3" MAX.	O AND R BARS SPA. @ 12" MAX.	Y BARS SPA. @ 12" MAX.	
	B404	2	34'-11 1/4"				
	B405	2	35'-10 1/2"				
	B406	2	36'-9 7/8"				
	B407	2F	37'-3"				
E	B408	4F	37'-3"	O AND R BARS SPA. @ 4" MAX.	O AND R BARS SPA. @ 12" MAX.	Y BARS SPA. @ 12" MAX.	7.00%
	B409-B412	4	37'-13/4"				
	B413	7	37'-13/4"	G AND E BARS SPA. @ 4" MAX	G AND E BARS SPA. @ 12" MAX	YY BARS SPA. @ 12" MAX.	
	B414-B417	4	37'-13/4"	O AND R BARS SPA. @ 4" MAX.	O AND R BARS SPA. @ 12" MAX.	Y BARS SPA. @ 12" MAX.	
	B418	4F	37'-3"				
F	B419	2F	45'-6"	O AND R BARS SPA. @ 4" MAX.	O AND R BARS SPA. @ 12" MAX.	Y BARS SPA. @ 12" MAX.	7.00%
	B420-B423	2	45'-4 3/4"				
	B424	5	45'-4 3/4"	G AND E BARS SPA. @ 4" MAX	G AND E BARS SPA. @ 12" MAX	YY BARS SPA. @ 12" MAX.	
	B425-B428	2	45'-4 3/4"	O AND R BARS SPA. @ 4" MAX.	O AND R BARS SPA. @ 12" MAX.	Y BARS SPA. @ 12" MAX.	
	B429	2F	45'-6"				
G	B430	2F	44'-2"	O AND R BARS SPA. @ 4" MAX.	O AND R BARS SPA. @ 12" MAX.	Y BARS SPA. @ 12" MAX.	7.00%
	B431-B434	2	44'-11 1/8"				
	B435	6	44'-11 1/8"	G AND E BARS SPA. @ 4" MAX	G AND E BARS SPA. @ 12" MAX	YY BARS SPA. @ 12" MAX.	
	B436-B439	2	44'-11 1/8"	O AND R BARS SPA. @ 4" MAX.	O AND R BARS SPA. @ 12" MAX.	Y BARS SPA. @ 12" MAX.	
	B440	2F	44'-2"				

For reference only, live load definitions from arch rib and spandrel column constructability analysis. Loads will be the same for the BrR models

-Assume excavator weight is 81k + slab beam pick (20'x4'x1' = 12k) and has an axle spacing of 13.25'. Total axle load is 46.5k. SU4 truck is 54k (including slab beam loads) and follows the traditional AASHTO axle weights and spacings. Keep a minimum distance of 10' between excavator and SU4 truck

REPRESENTATIVE TRUCK DEFINED IN MIDAS FOR EXCAVATOR PLUS SU4 TRUCK



Assume Excavator is confined to the center of the crane mats, for design purposes assume it moves within a 13' width at the center of the crane mat. What is worst case LLDF? Still consider 75% of the load on a single tread. Tie rods installed before steel beams and crane mat placed. No different than a noncomposite slab beam/box beam bridge from a LLDF perspective.

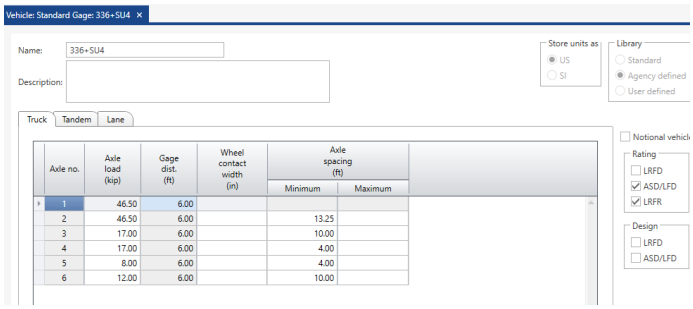
336 GC Hydraulic Excavator Specifications

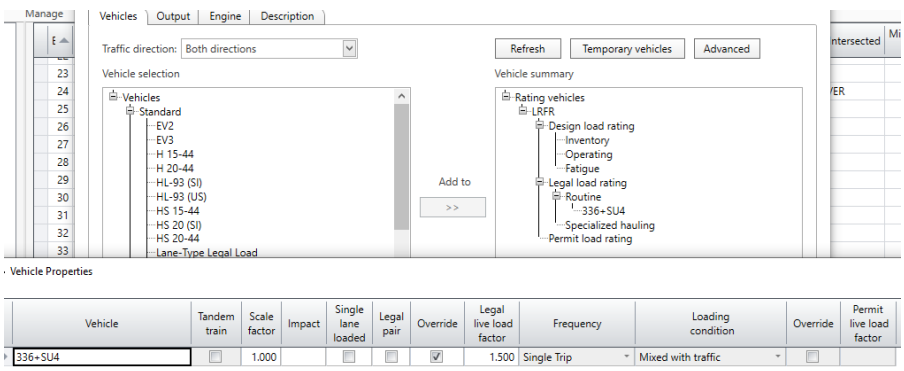
Dimensions

All dimensions are approximate and may vary depending on bucket selection.

Boom Option	Reach Boom 6.5 m (21'4")			
Stick Options	Reach Stick			
	R3.9DB (12'10")		R3.2DB (10'6")	
1 Machine Height:				
Cab Height	3170 mm	10.4 ft	3170 mm	10.4 ft
FOGS Height	3310 mm	10.9 ft	3310 mm	10.9 ft
Handrails Height	3160 mm	10.4 ft	3160 mm	10.4 ft
With Boom/Stick/Bucket Installed	3670 mm	12.0 ft	3490 mm	11.5 ft
With Boom/Stick Installed	3560 mm	11.7 ft	3330 mm	10.9 ft
With Boom Installed	2880 mm	9.4 ft	2880 mm	9.4 ft
With Boom/Stick/Bucket Installed (with auxiliary lines)	3720 mm	12.2 ft	3530 mm	11.6 ft
With Boom/Stick Installed (with auxiliary lines)	3620 mm	11.9 ft	3400 mm	11.2 ft
With Boom Installed (with auxiliary lines)	2970 mm	9.7 ft	2970 mm	9.7 ft
2 Machine Length:				
With Boom/Stick/Bucket Installed	11 200 mm	36.7 ft	11 180 mm	36.7 ft
With Boom/Stick Installed	11 180 mm	36.7 ft	11 140 mm	36.5 ft
With Boom Installed	9960 mm	32.7 ft	9960 mm	32.7 ft
With Boom/Stick/Bucket Installed (with auxiliary lines)	11 200 mm	36.7 ft	11 180 mm	36.7 ft
With Boom/Stick Installed (with auxiliary lines)	11 180 mm	36.7 ft	11 140 mm	36.5 ft
With Boom Installed (with auxiliary lines)	10 010 mm	32.8 ft	10 010 mm	32.8 ft
3 Upperframe Width without Walkways	3030 mm	9.9 ft	3030 mm	9.9 ft
4 Tail Swing Radius	3530 mm	11.6 ft	3530 mm	11.6 ft
5 Counterweight Clearance	1250 mm	4.1 ft	1250 mm	4.1 ft
6 Ground Clearance	510 mm	1.7 ft	510 mm	1.7 ft
7 Length to Center of Rollers	4040 mm	13.3 ft	4040 mm	13.3 ft
8 Track Length	5030 mm	16.5 ft	5030 mm	16.5 ft
9 Track Gauge – Extended	2590 mm	8.5 ft	2590 mm	8.5 ft
10 Track Width/Undercarriage Width (with steps/without steps):				
600 mm (24") Shoes	3190 mm	10.5 ft	3190 mm	10.5 ft
700 mm (28") Shoes	3290 mm	10.8 ft	3290 mm	10.8 ft
800 mm (31") Shoes	3390 mm	11.1 ft	3390 mm	11.1 ft
850 mm (33") Shoes	3440 mm	11.3 ft	3440 mm	11.3 ft
Bucket Type	HD		HD	
Bucket Capacity	1.88 m³	2.46 yd³	1.88 m³	2.46 yd³
Bucket Tip Radius	1790 mm	5.9 ft	1790 mm	5.9 ft

BrR Settings for Running 336 Excavator + SU4 Truck

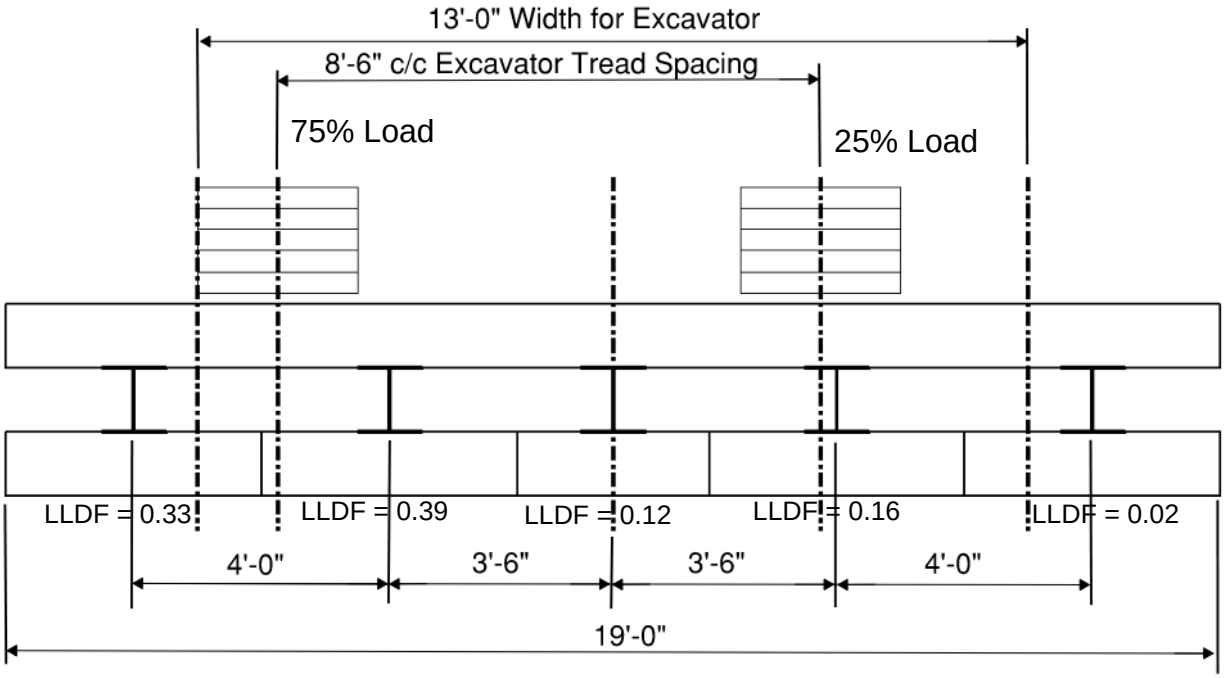




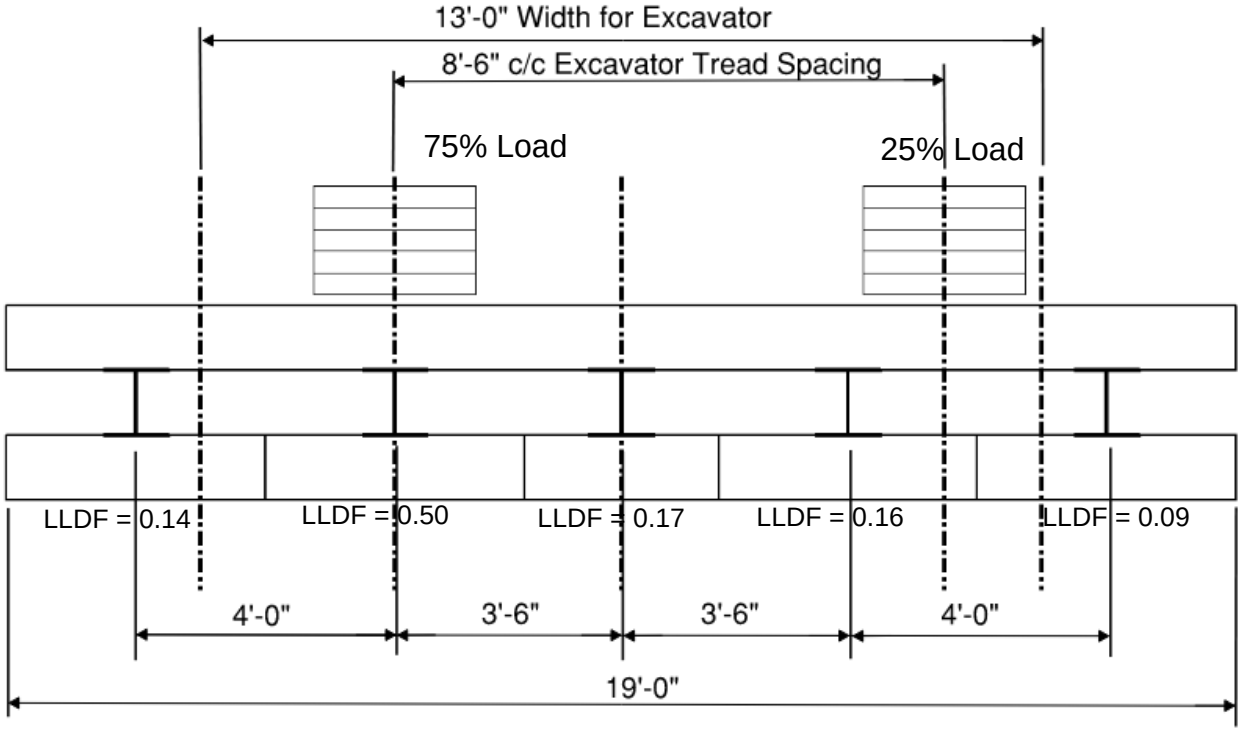
Assumptions:
-Crane Mat is Timber, u = 0.35, MOE = 1.5x10^3 ksi
-Take 0.75k and divide it along length of span to represent position and load of more heavily loaded tread. Use 0.25k for the other tread. Results in klf tread unit load.
-No tying of the beams together is modeled, even though the beams will have tie rods installed before the excavator drives over them.
-Compression only spring support defined in vertical direction to avoid potential bearing uplift. Generic stiffness assigned

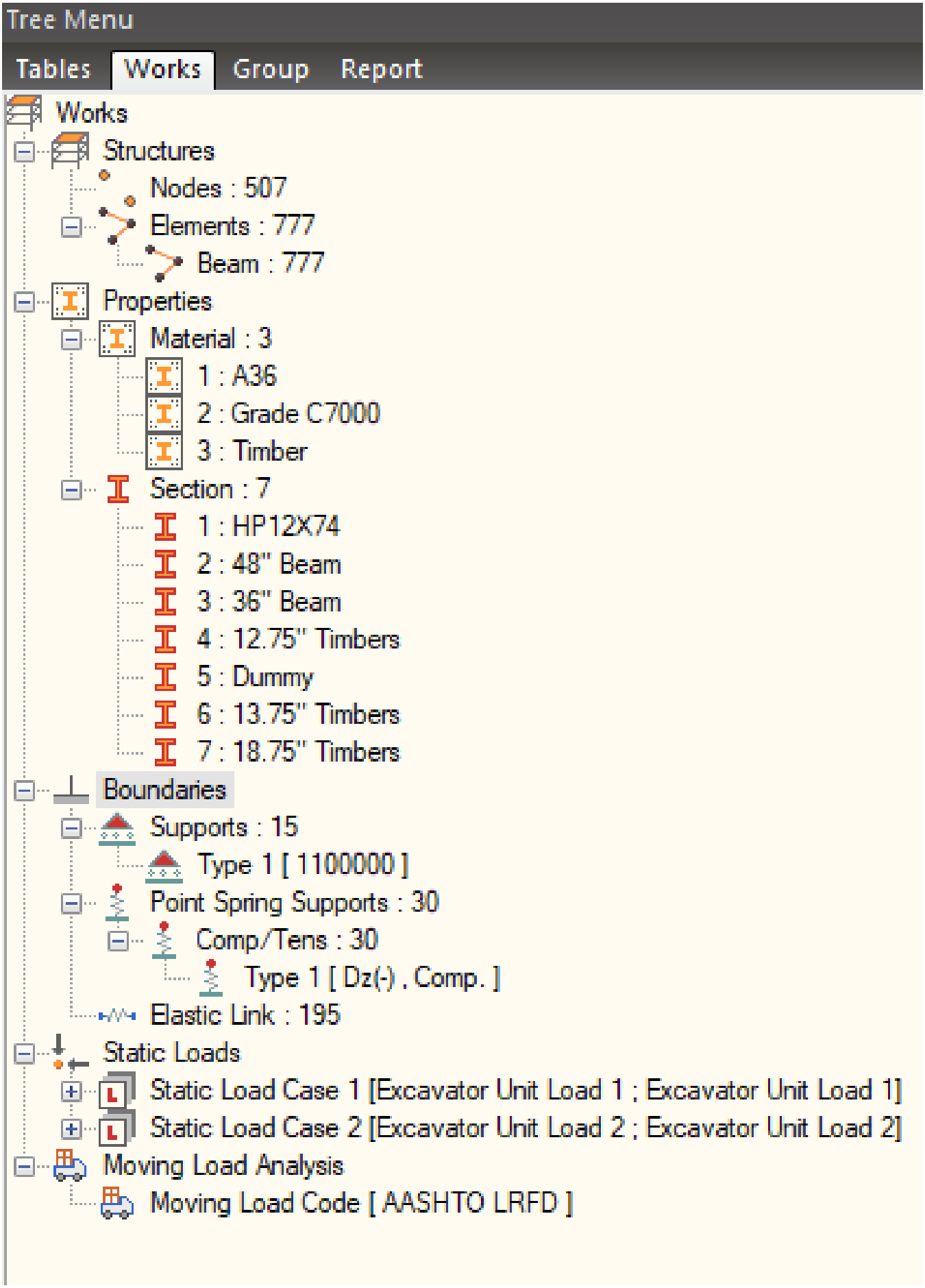
Conclusion: The 0.61 LLDFs in the BrR model, used for the 48" wide slab beams, are conservative.

Case 1: Excavator Tread Pushed Left. Max LLDF's Shown



Case 2: Excavator Tread Centered on Beam. Max LLDF's Shown




Tree Menu
Tables
Works
Group
Report
Works
Structures
Nodes : 507
Elements : 777
Beam : 777
Properties
Material : 3
1 : A36
2 : Grade C7000
3 : Timber
Section : 7
1 : HP12X74
2 : 48" Beam
3 : 36" Beam
4 : 12.75" Timbers
5 : Dummy
6 : 13.75" Timbers
7 : 18.75" Timbers
Boundaries
Supports : 15
Type 1 [1100000]
Point Spring Supports : 30
Comp/Tens : 30
Type 1 [Dz(-) , Comp.]
Elastic Link : 195
Static Loads
Static Load Case 1 [Excavator Unit Load 1 ; Excavator Unit Load 1]
Static Load Case 2 [Excavator Unit Load 2 ; Excavator Unit Load 2]
Moving Load Analysis
Moving Load Code [AASHTO LRFD]

The maximum shift within the 13' allowable width is analyzed considering 75% of the excavator + slab beam pick on the left tread centered over the 48" wide slab beam left adjacent to the center 36" wide slab beam. A case where the right tread has 75% of the load seems less likely since the excavator would likely not be reaching out as far from this position with the excavator shifted to the left.

Dead loads during this construction stage consist of the self weight of the beams, HP sections, and crane mats. From previous constructability checks, the crane mats plus HP sections can be assumed to weigh 70psf. This is applied as a DW load in the model under Member Loads.

The load combination for this construction check, at the Strength Limit State, is:

1.25(Permanent Dead Load) + 1.50(Construction Dead Load) + 1.50(Construction Live Load)

An impact factor of 10% is applied to the live load.

From these two load placements, the worst case LLDF is 0.54, leave the previously calculated 0.61 LLDF in BrR to be conservative. To compare with AASHTO calculated LLDF, slab beam Moment and Shear distribution factors for a single lane loaded are all 0.600. If we divide out the multiple presence factor of 1.20, the AASHTO LLDF for these slab beam spans would be 0.500. So using the maximum LLDF of 0.61 from the Midas analysis is not undercutting the AASHTO LLDF.

Looking at the results from running the above described LLDF's, all slab beam spans are failing and three of the box beam spans are also failing. Since the box beam spans are using LLDF's for single lane including multiple presence factors, divide their BrR computed LLDF's by 1.20 and see if they pass. Cannot divide slab beam LLDF's by 1.2 since those are generated by Midas instead of BrR.

It is worth noting that that the AASHTO LLDF equations are not applicable for the slab beams due to beam span length. BrR is defaulting to lever rule because of this, resulting in the 0.5 axle going to a beam. We can use the prevoously estimated 0.61 LLDF (vs 0.75) since 0.61 is still greater than the max distribution going into the slab beams as a result of load distribution through the timber crane mat and steel beams. Thus, the 0.61 is still the result of using the lever rule for the slab beam.

Structure Rating Results

System of units: (•) US customary ( ) SI / metric

Lane/impact loading type: (•) As requested ( ) Detailed

Display format: Multiple rating levels per row

Bridge id	Structure	Vehicle	Inventory rating factor	Operating rating factor	Legal operating rating factor	Legal rating factor
0701599-Stage 2 Co...	BEL-40-23.38-Arch Span A, 16'-3	336+SU4				0.731
0701599-Stage 2 Co...	BEL-40-23.38-Beam Span B, 45'-6	336+SU4				0.569
0701599-Stage 2 Co...	BEL-40-23.38-Arch Span D, 20'-3	336+SU4				0.651
0701599-Stage 2 Co...	BEL-40-23.38-Beam Span E, 37'-9	336+SU4				1.018
0701599-Stage 2 Co...	BEL-40-23.38-Beam Span F, 46'-0	336+SU4				0.787
0701599-Stage 2 Co...	BEL-40-2338 (Arch Span B, 14'-0"	336+SU4				0.831
0701599-Stage 2 Co...	BEL-40-23.38 (Beam Span D, 33'-9	336+SU4				1.327
0701599-Stage 2 Co...	BEL-40-23.38 (Beam Span G, 44'-6	336+SU4				0.857
0701599-Stage 2 Co...	BEL-40-23.38 (Beam Span C, 29'-9	336+SU4				1.559

slab beam ratings

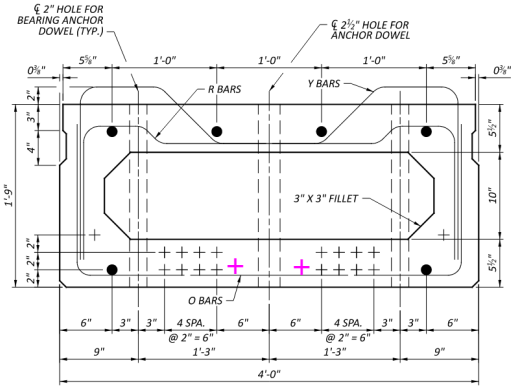
box beam ratings

After dividing out multiple presence factors from the single lane LLDF's, it was also decided to set the multi lane LLDF's to a low number so that those do not govern the load rating. Additionally, looking at the excavator track gauge width, the middle 36" wide beam can never see the 75% loading that the outer 48" wide beams will see. Therefore, the middle beam's distribution factors were set to 0.5 for Moment and Shear, which reflects the AASHTO-calculated LLDF divided by 1.20 to remove the multiple presence factor.

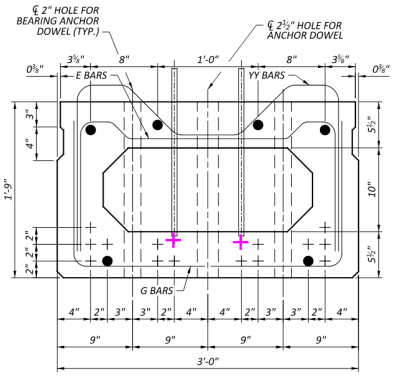
In discussions with Chris Cummings and Jeff Broadwater, options included using a smaller excavator or adding strands to the beams. From a couple quick iterations, smaller excavators improved ratings but not enough to get all beams to pass. Therefore it was decided to add strands to the beams to get them to pass. Goal is to add as few strands as possible so that changes to the beam designs (and camber, etc.) are minimal. Strands added as shown below; screen shots taken from plans and new strands shown in magenta.

The only box beams that required adjusted strand patterns were in Box Beam Span B, Patterns 1 and 5. All three slab spans required additional strands.

Box Beam Span B Strand Adjustments

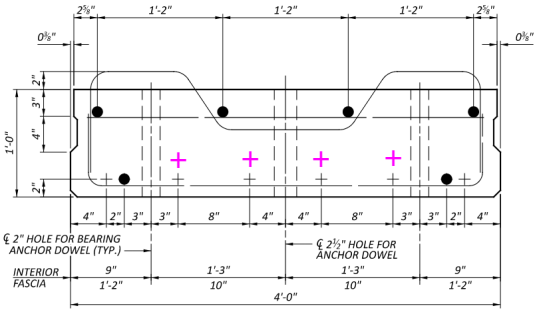


PATTERN 1

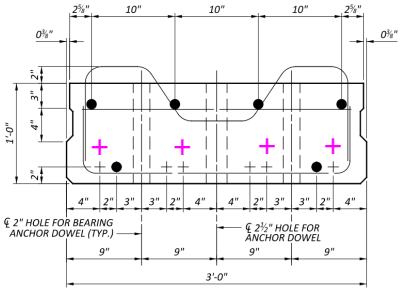


PATTERN 5

Arch Span A 16'-3" & Arch Span B 14'-0" Strand Adjustments

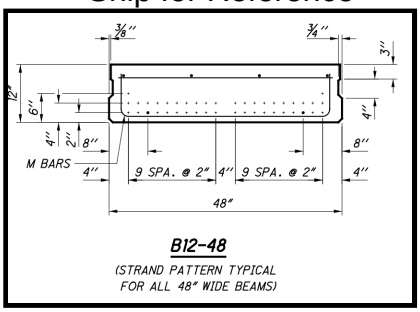


PATTERN 1

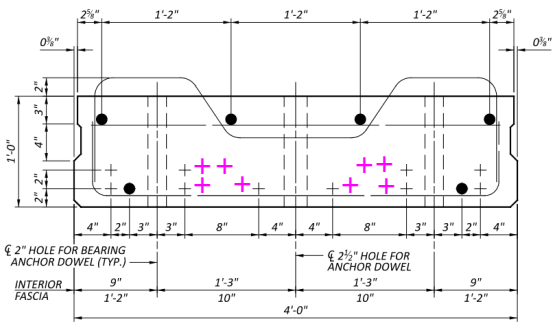


PATTERN 3

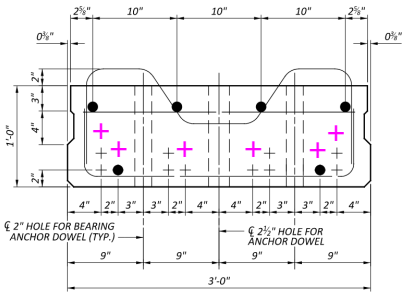
ODOT B12-48 Standard Drawing Snip for Reference



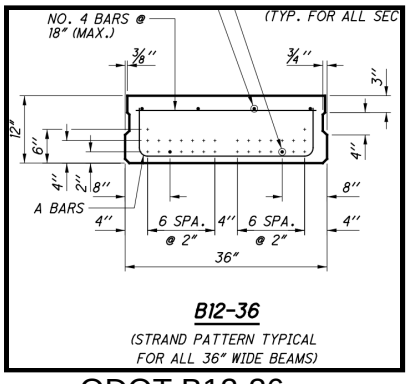
Arch Span D 20'-3" Strand Adjustments



PATTERN 2



PATTERN 4



ODOT B12-36 Standard Drawing Snip for Reference

Box Beam and Slab Span Results after Additional Strands Added

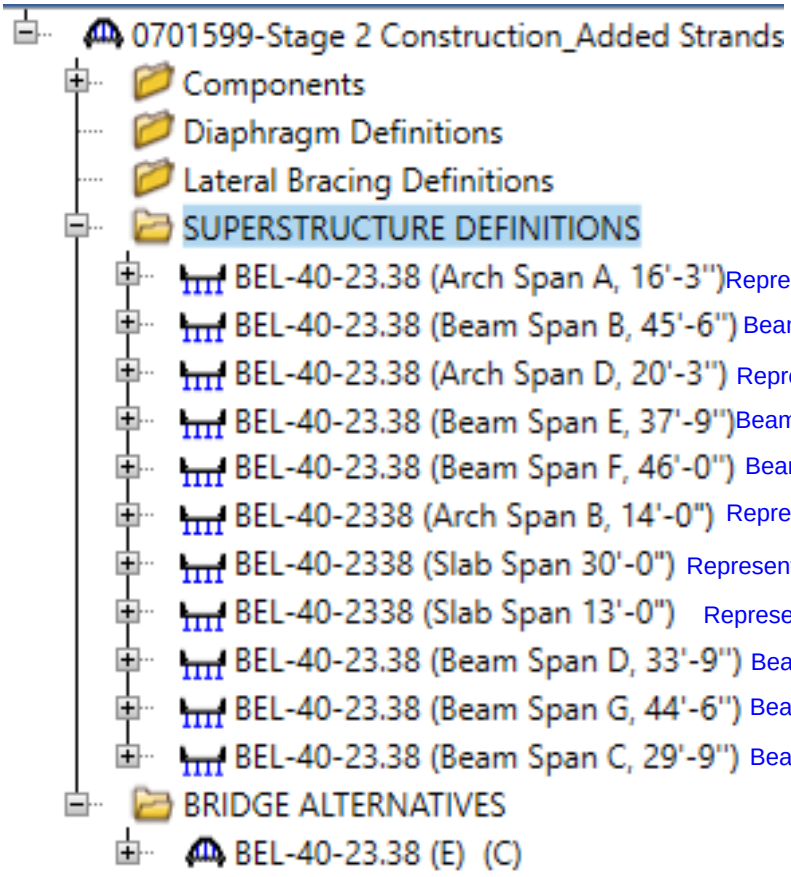
Structure Rating Results

System of units: (●) US customary ( ) SI / metric

Lane/impact loading type: (●) As requested ( ) Detailed

Display format: Multiple rating levels per row

Bridge id	Structure	Vehicle	Inventory rating factor	Operating rating factor	Legal operating rating factor	Legal rating factor
0701599-Stage 2 Co...	BEL-40-23.38-Arch Span A, 16'-3	336+SU4				1.171
0701599-Stage 2 Co...	BEL-40-23.38-Beam Span B, 45'-6	336+SU4				1.172
0701599-Stage 2 Co...	BEL-40-23.38-Arch Span D, 20'-3	336+SU4				1.092
0701599-Stage 2 Co...	BEL-40-23.38-Beam Span E, 37'-9	336+SU4				1.410
0701599-Stage 2 Co...	BEL-40-23.38-Beam Span F, 46'-0	336+SU4				1.159
0701599-Stage 2 Co...	BEL-40-2338 (Arch Span B, 14'-0"	336+SU4				1.323
0701599-Stage 2 Co...	BEL-40-23.38 (Beam Span D, 33'-9	336+SU4				1.710
0701599-Stage 2 Co...	BEL-40-23.38 (Beam Span G, 44'-6	336+SU4				1.205
0701599-Stage 2 Co...	BEL-40-23.38 (Beam Span C, 29'-9	336+SU4				2.014



Represents all 16'-3" spans over the arch spans. Excavator swings; 0.61 LLDF

Beam Span B. BrR computed LLDF's with MPF divided out

Represents all 20'-3" spans over the arch spans. Excavator swings; 0.61 LLDF

Beam Span E. BrR computed LLDF's with MPF divided out

Beam Span F. BrR computed LLDF's with MPF divided out

Represents all 14'-0" spans over the arch spans. Excavator swings; 0.61 LLDF

Represents longer portion of triangular slab span with MPF divided out

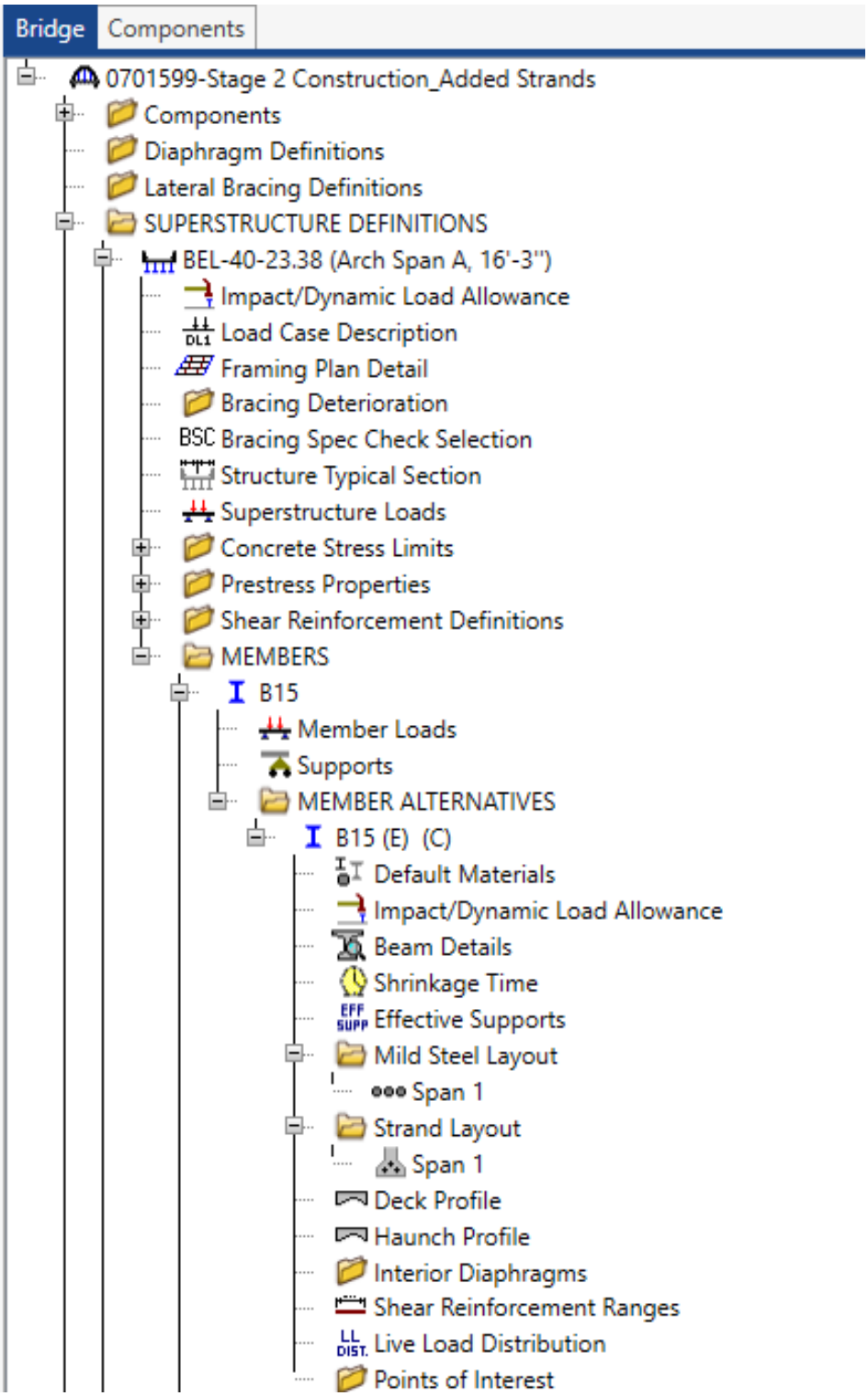
Represents shorter portion of triangular slab span with MPF divided out

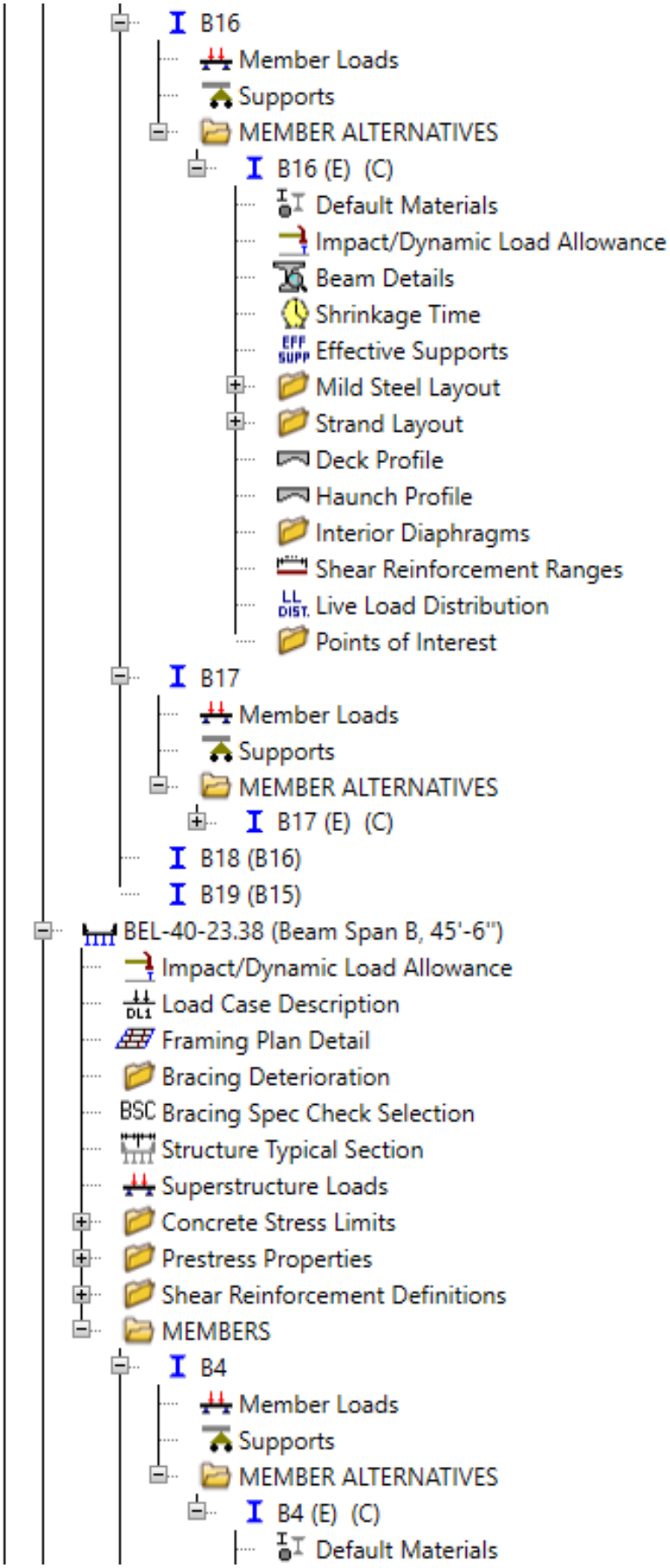
Beam Span D. BrR computed LLDF's with MPF divided out

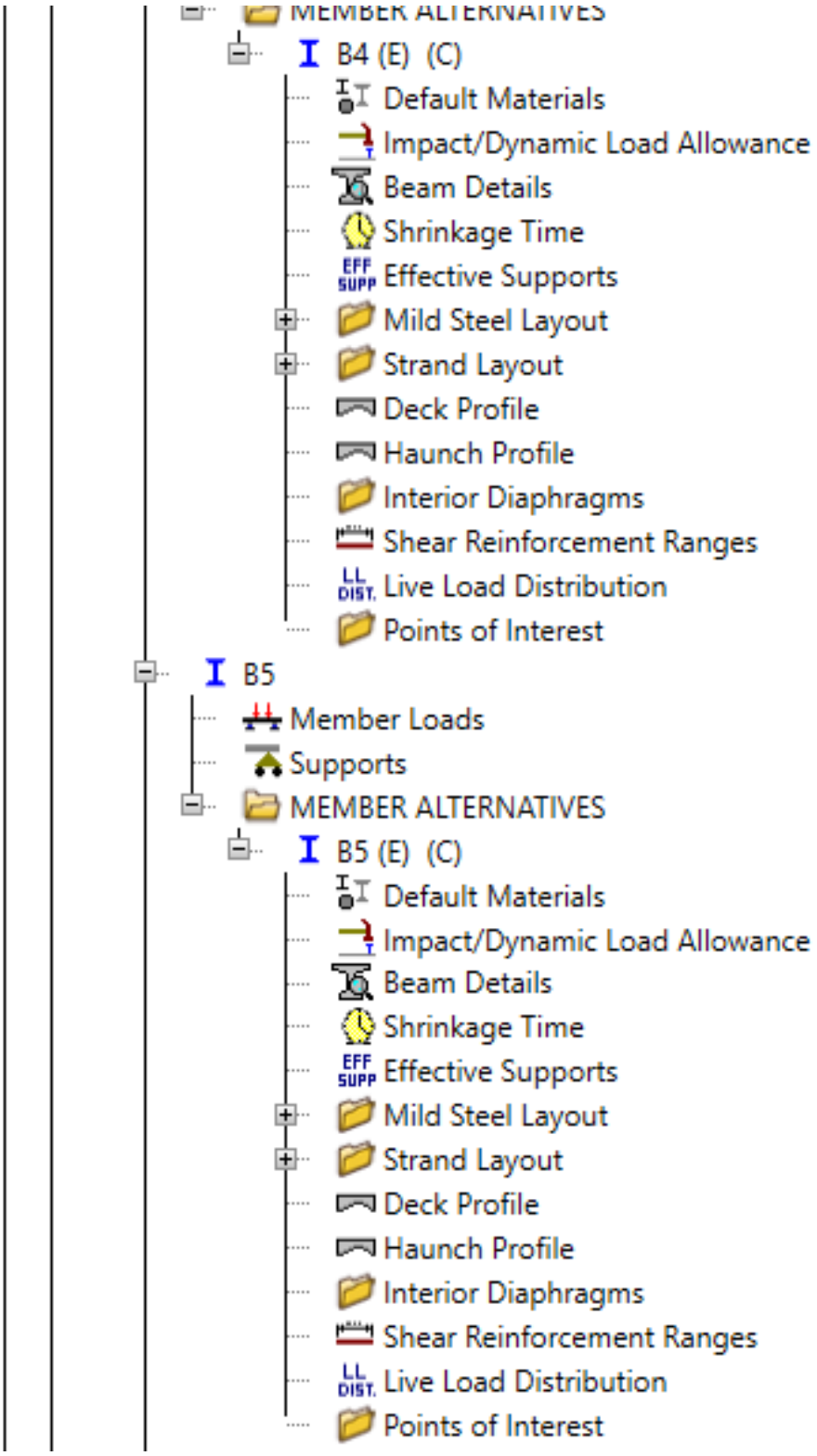
Beam Span G. BrR computed LLDF's with MPF divided out

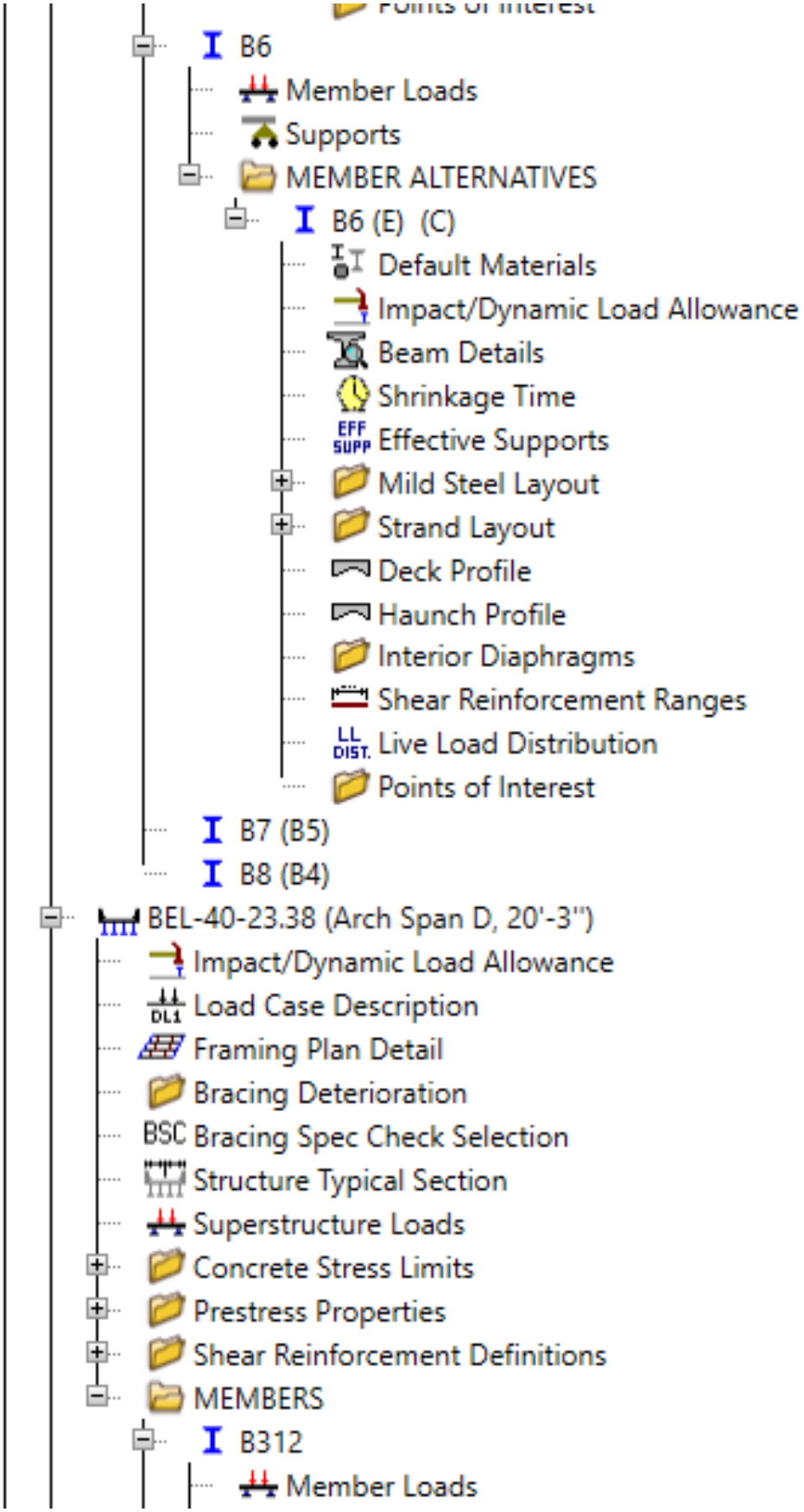
Beam Span C. BrR computed LLDF's with MPF divided out

Below is the BrR QC Checkprint. Everything needs checked; material properties can be found in the plans Bluebeam pdf. Remember that Impact is 10% and has been overriden in each member definition.




B16
Member Loads
Supports
MEMBER ALTERNATIVES
B16 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
EFF SUPP
Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
LL DIST.
Live Load Distribution
Points of Interest
B17
Member Loads
Supports
MEMBER ALTERNATIVES
B17 (E) (C)
B18 (B16)
B19 (B15)
BEL-40-23.38 (Beam Span B, 45'-6")
Impact/Dynamic Load Allowance
DL1
Load Case Description
Framing Plan Detail
Bracing Deterioration
BSC
Bracing Spec Check Selection
Structure Typical Section
Superstructure Loads
Concrete Stress Limits
Prestress Properties
Shear Reinforcement Definitions
MEMBERS
B4
Member Loads
Supports
MEMBER ALTERNATIVES
B4 (E) (C)
Default Materials


MEMBER ALTERNATIVES
B4 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
EFF SUPP
Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
LL DIST.
Live Load Distribution
Points of Interest
B5
Member Loads
Supports
MEMBER ALTERNATIVES
B5 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
EFF SUPP
Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
LL DIST.
Live Load Distribution
Points of Interest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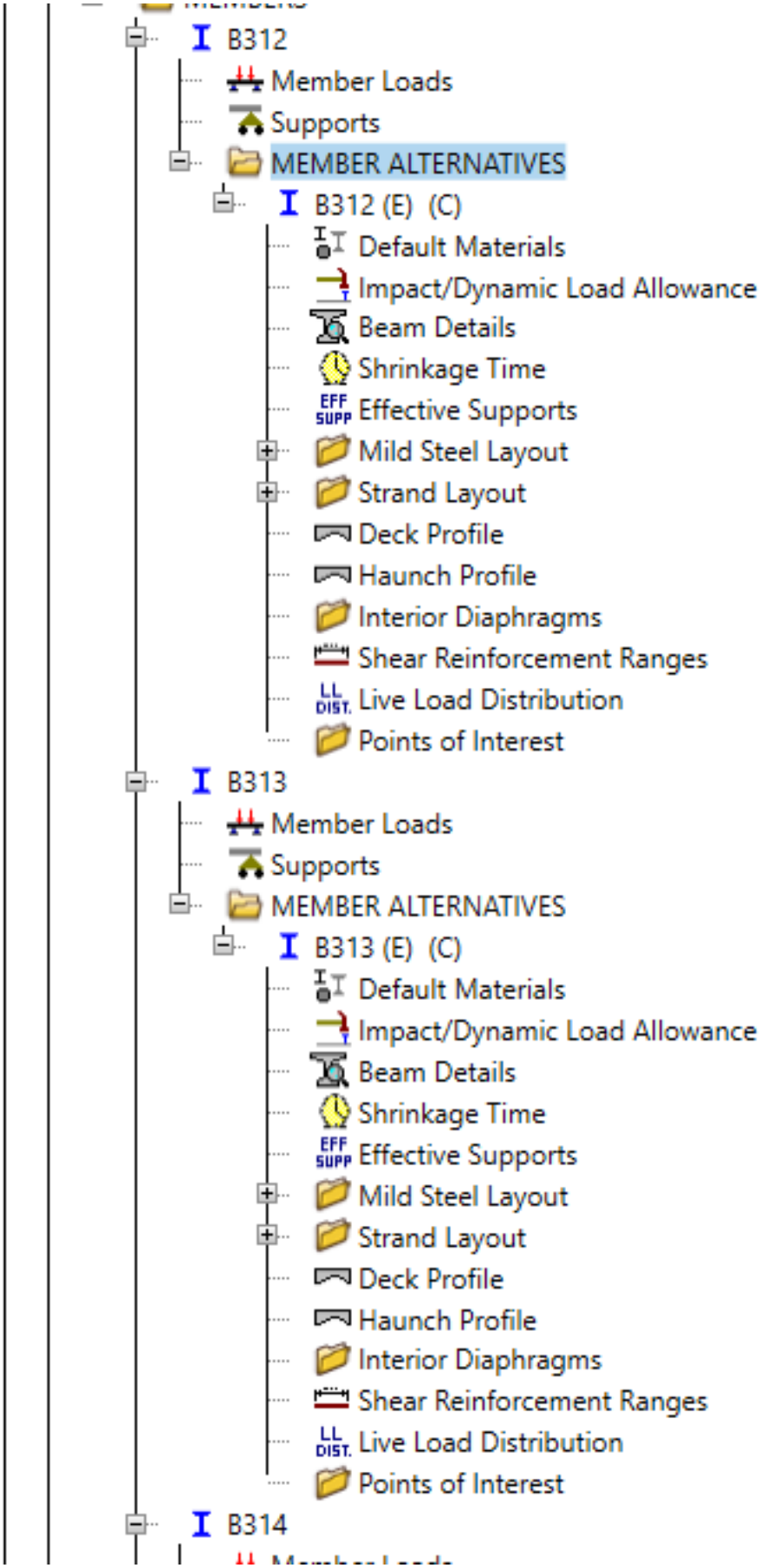
Member Loads
Supports
MEMBER ALTERNATIVES
B6 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
EFF SUPP Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
LL DIST. Live Load Distribution
Points of Interest
B7 (B5)
B8 (B4)
BEL-40-23.38 (Arch Span D, 20'-3")
Impact/Dynamic Load Allowance
DLI Load Case Description
Framing Plan Detail
Bracing Deterioration
BSC Bracing Spec Check Selection
Structure Typical Section
Superstructure Loads
Concrete Stress Limits
Prestress Properties
Shear Reinforcement Definitions
MEMBERS
B312
Member Loads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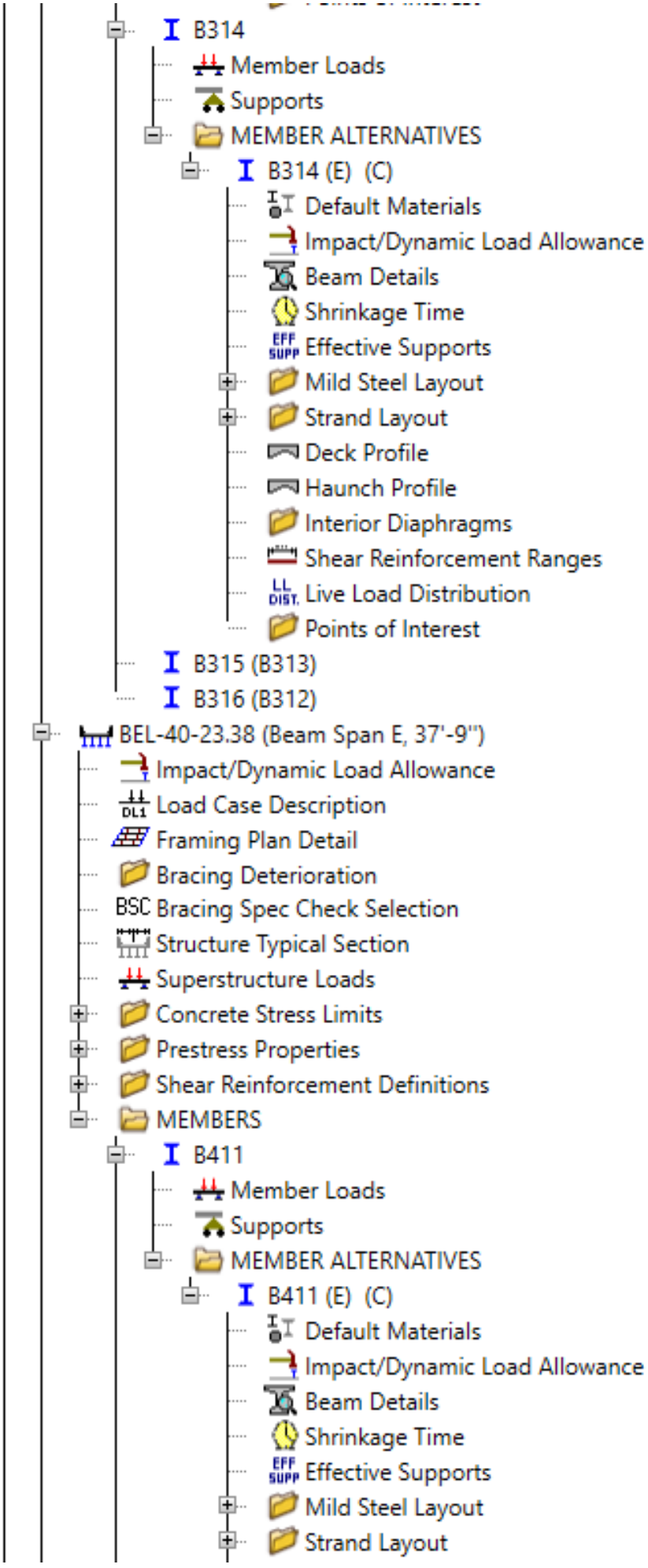
Member Loads
Supports
MEMBER ALTERNATIVES
B312 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
EFF SUPP Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
LL DIST. Live Load Distribution
Points of Interest
B313
Member Loads
Supports
MEMBER ALTERNATIVES
B313 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
EFF SUPP Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
LL DIST. Live Load Distribution
Points of Interest
B314


B314
Member Loads
Supports
MEMBER ALTERNATIVES
B314 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
EFF SUPP Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
LL DIST. Live Load Distribution
Points of Interest
B315 (B313)
B316 (B312)
BEL-40-23.38 (Beam Span E, 37'-9")
Impact/Dynamic Load Allowance
DL1 Load Case Description
Framing Plan Detail
Bracing Deterioration
BSC Bracing Spec Check Selection
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Superstructure Loads
Concrete Stress Limits
Prestress Properties
Shear Reinforcement Definitions
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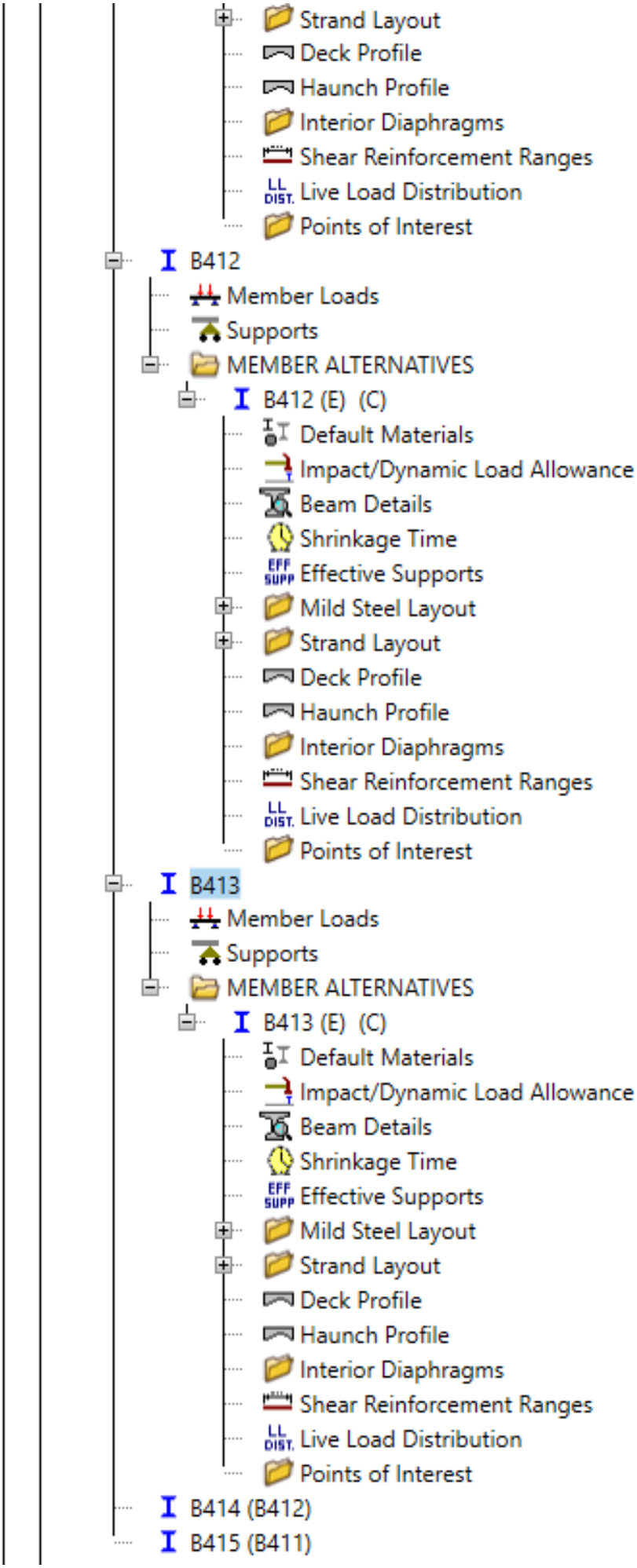
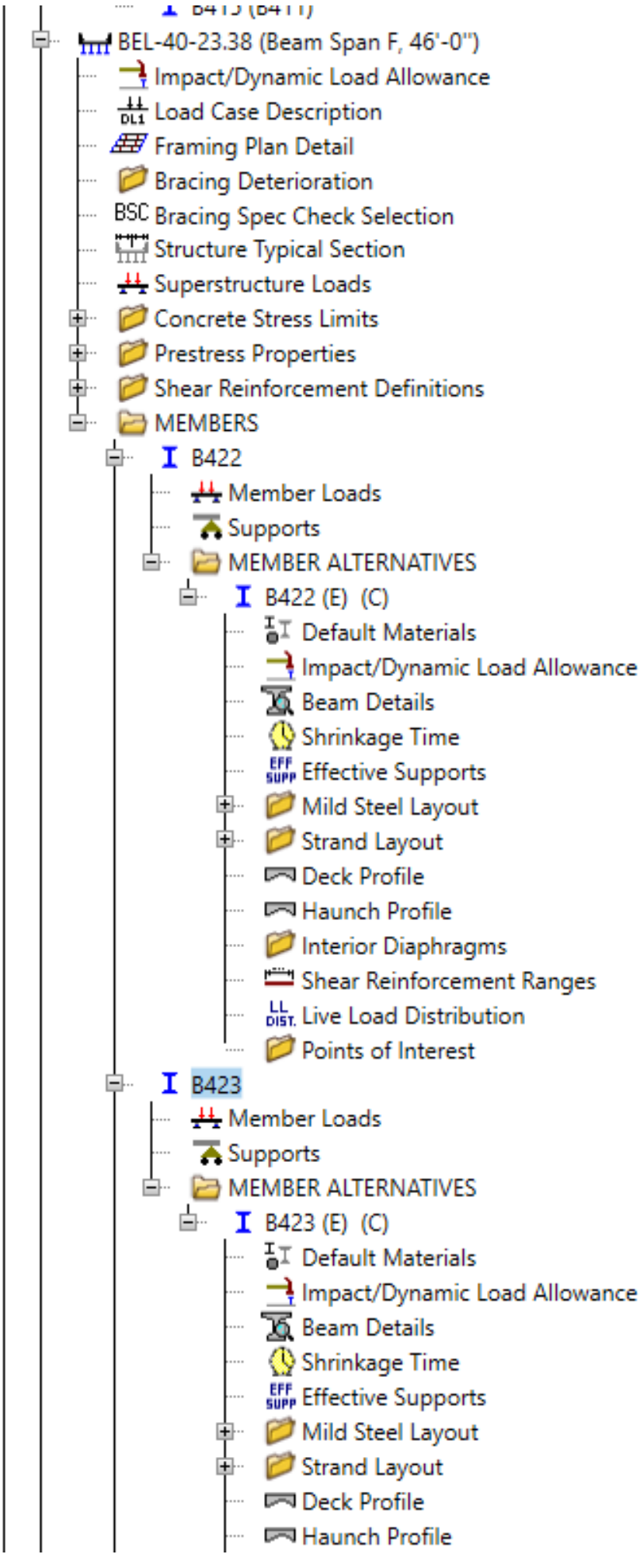
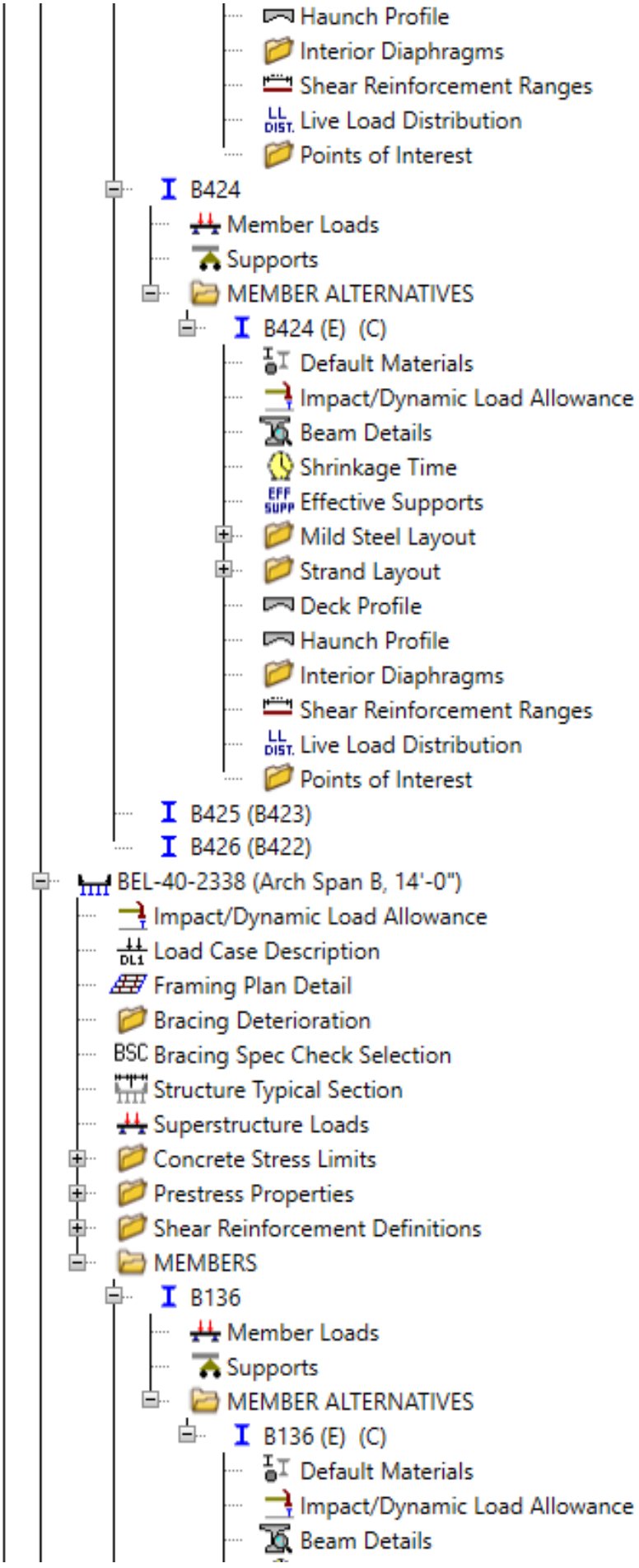
B411
Member Loads
Supports
MEMBER ALTERNATIVES
B411 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
EFF SUPP Effective Supports
Mild Steel Layout
Strand Layout

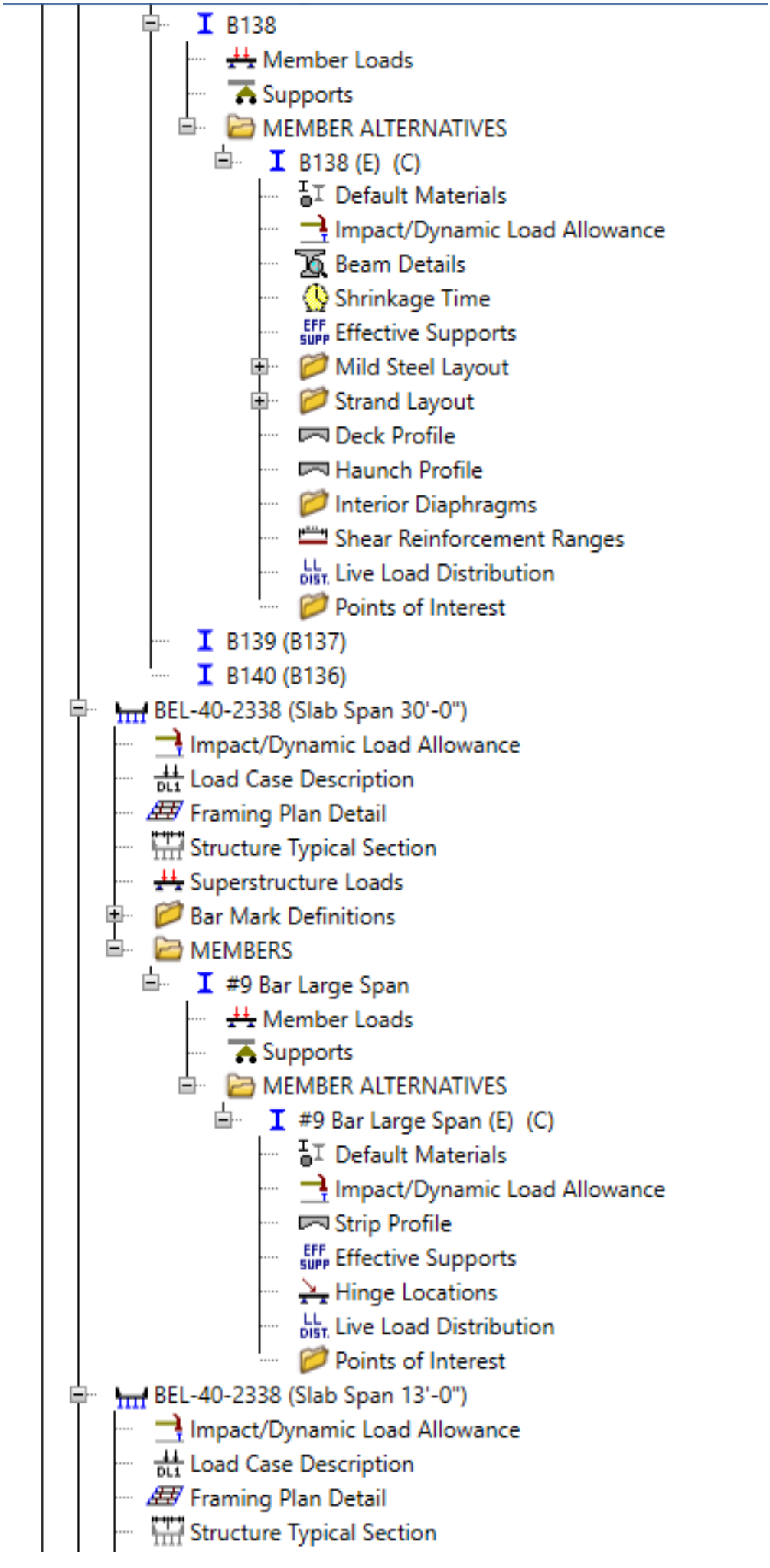

Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
Live Load Distribution
Points of Interest
B412
Member Loads
Supports
MEMBER ALTERNATIVES
B412 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
Live Load Distribution
Points of Interest
B413
Member Loads
Supports
MEMBER ALTERNATIVES
B413 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
Live Load Distribution
Points of Interest
B414 (B412)
B415 (B411)

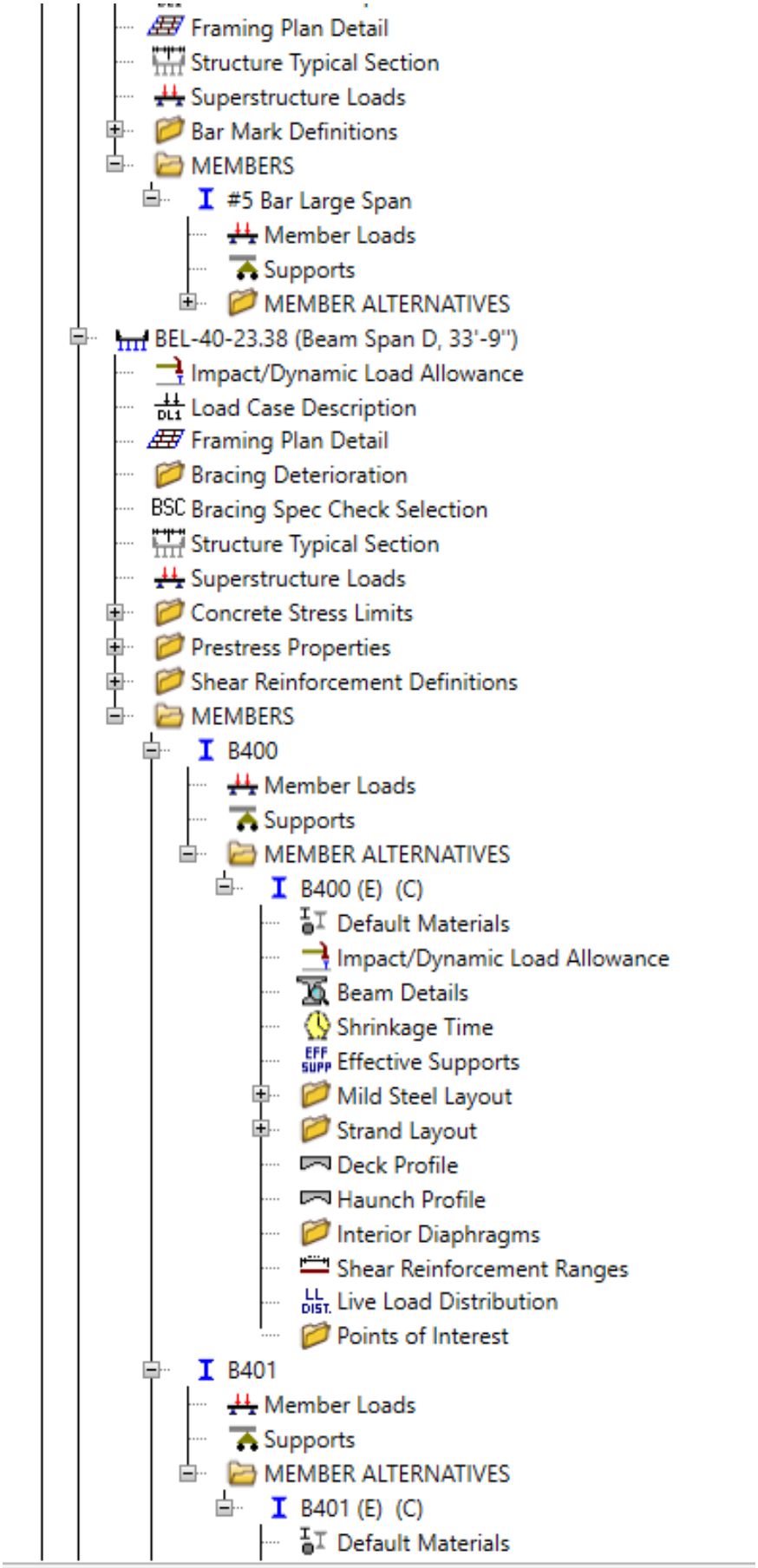

B413 (B411)
BEL-40-23.38 (Beam Span F, 46'-0")
Impact/Dynamic Load Allowance
Load Case Description
Framing Plan Detail
Bracing Deterioration
Bracing Spec Check Selection
Structure Typical Section
Superstructure Loads
Concrete Stress Limits
Prestress Properties
Shear Reinforcement Definitions
MEMBERS
B422
Member Loads
Supports
MEMBER ALTERNATIVES
B422 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
Live Load Distribution
Points of Interest
B423
Member Loads
Supports
MEMBER ALTERNATIVES
B423 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile

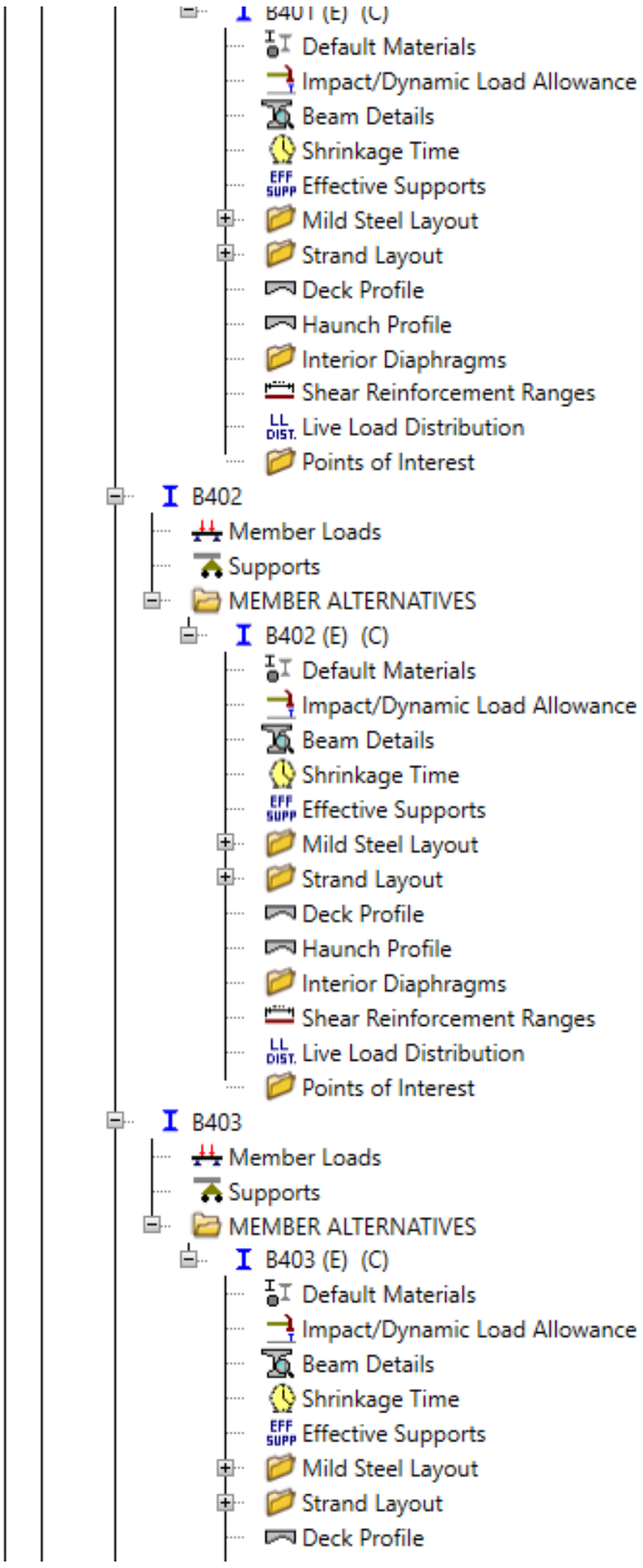

Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
LL DIST. Live Load Distribution
Points of Interest
B424
Member Loads
Supports
MEMBER ALTERNATIVES
B424 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
EFF SUPP Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
LL DIST. Live Load Distribution
Points of Interest
B425 (B423)
B426 (B422)
BEL-40-2338 (Arch Span B, 14'-0")
Impact/Dynamic Load Allowance
DL1 Load Case Description
Framing Plan Detail
Bracing Deterioration
BSC Bracing Spec Check Selection
Structure Typical Section
Superstructure Loads
Concrete Stress Limits
Prestress Properties
Shear Reinforcement Definitions
MEMBERS
B136
Member Loads
Supports
MEMBER ALTERNATIVES
B136 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details

- Beam Details
- Shrinkage Time
- Effective Supports
- Mild Steel Layout
- Strand Layout
- Deck Profile
- Haunch Profile
- Interior Diaphragms
- Shear Reinforcement Ranges
- Live Load Distribution
- Points of Interest

- B137
  - Member Loads
  - Supports
  - MEMBER ALTERNATIVES
    - B137 (E) (C)
      - Default Materials
      - Impact/Dynamic Load Allowance
      - Beam Details
      - Shrinkage Time
      - Effective Supports
      - Mild Steel Layout
      - Strand Layout
      - Deck Profile
      - Haunch Profile
      - Interior Diaphragms
      - Shear Reinforcement Ranges
      - Live Load Distribution
      - Points of Interest
- B138
  - Member Loads
  - Supports
  - MEMBER ALTERNATIVES
    - B138 (E) (C)
      - Default Materials
      - Impact/Dynamic Load Allowance
      - Beam Details
      - Shrinkage Time
      - Effective Supports
      - Mild Steel Layout
      - Strand Layout
      - Deck Profile
      - Haunch Profile
      - Interior Diaphragms
      - Shear Reinforcement Ranges


B138
Member Loads
Supports
MEMBER ALTERNATIVES
B138 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
EFF SUPP Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
LL DIST. Live Load Distribution
Points of Interest
B139 (B137)
B140 (B136)
BEL-40-2338 (Slab Span 30'-0")
Impact/Dynamic Load Allowance
DL1 Load Case Description
Framing Plan Detail
Structure Typical Section
Superstructure Loads
Bar Mark Definitions
MEMBERS
#9 Bar Large Span
Member Loads
Supports
MEMBER ALTERNATIVES
#9 Bar Large Span (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Strip Profile
EFF SUPP Effective Supports
Hinge Locations
LL DIST. Live Load Distribution
Points of Interest
BEL-40-2338 (Slab Span 13'-0")
Impact/Dynamic Load Allowance
DL1 Load Case Description
Framing Plan Detail
Structure Typical Section

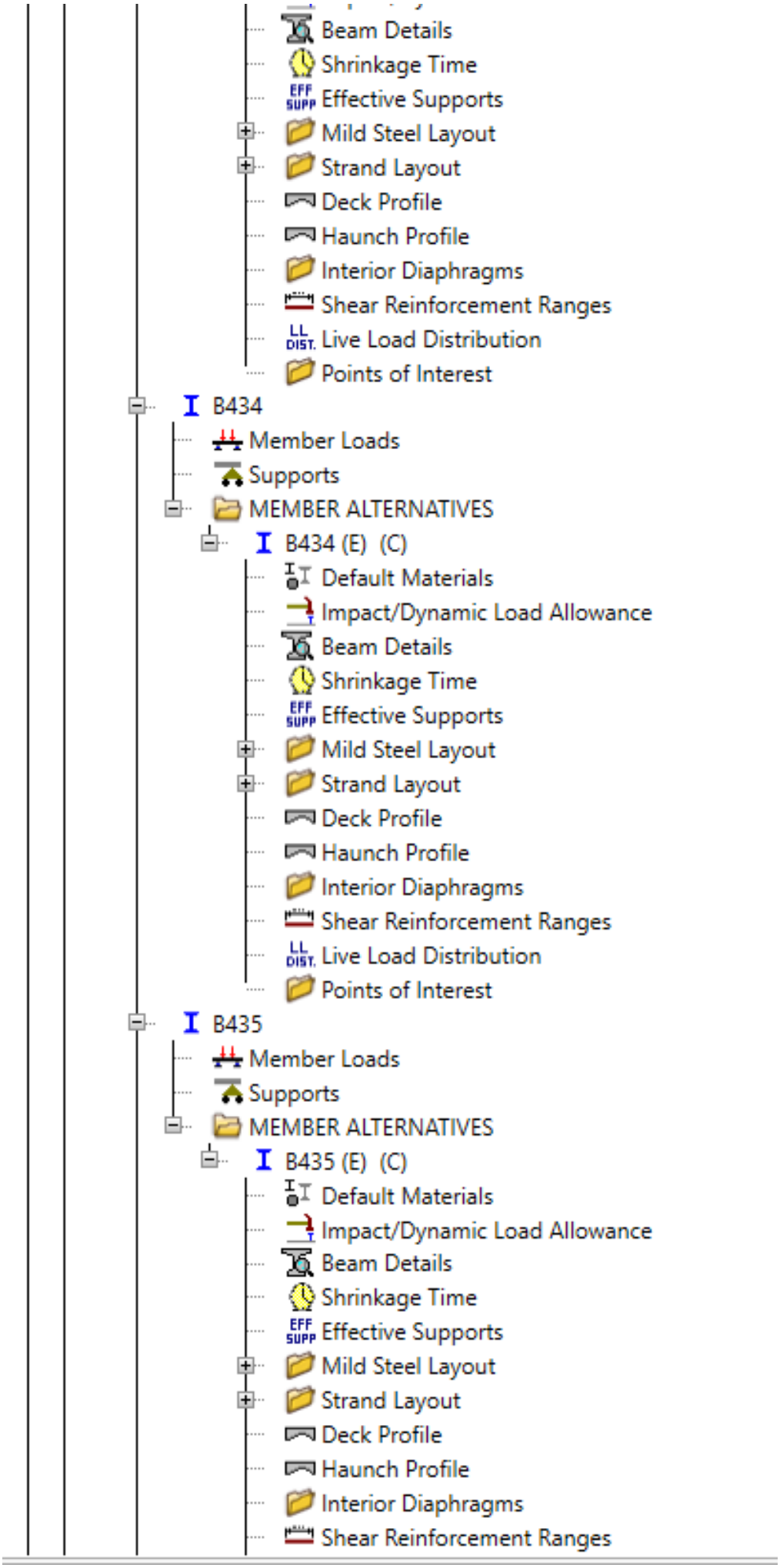

Framing Plan Detail
Structure Typical Section
Superstructure Loads
Bar Mark Definitions
MEMBERS
#5 Bar Large Span
Member Loads
Supports
MEMBER ALTERNATIVES
BEL-40-23.38 (Beam Span D, 33'-9")
Impact/Dynamic Load Allowance
Load Case Description
Framing Plan Detail
Bracing Deterioration
Bracing Spec Check Selection
Structure Typical Section
Superstructure Loads
Concrete Stress Limits
Prestress Properties
Shear Reinforcement Definitions
MEMBERS
B400
Member Loads
Supports
MEMBER ALTERNATIVES
B400 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
Live Load Distribution
Points of Interest
B401
Member Loads
Supports
MEMBER ALTERNATIVES
B401 (E) (C)
Default Materials

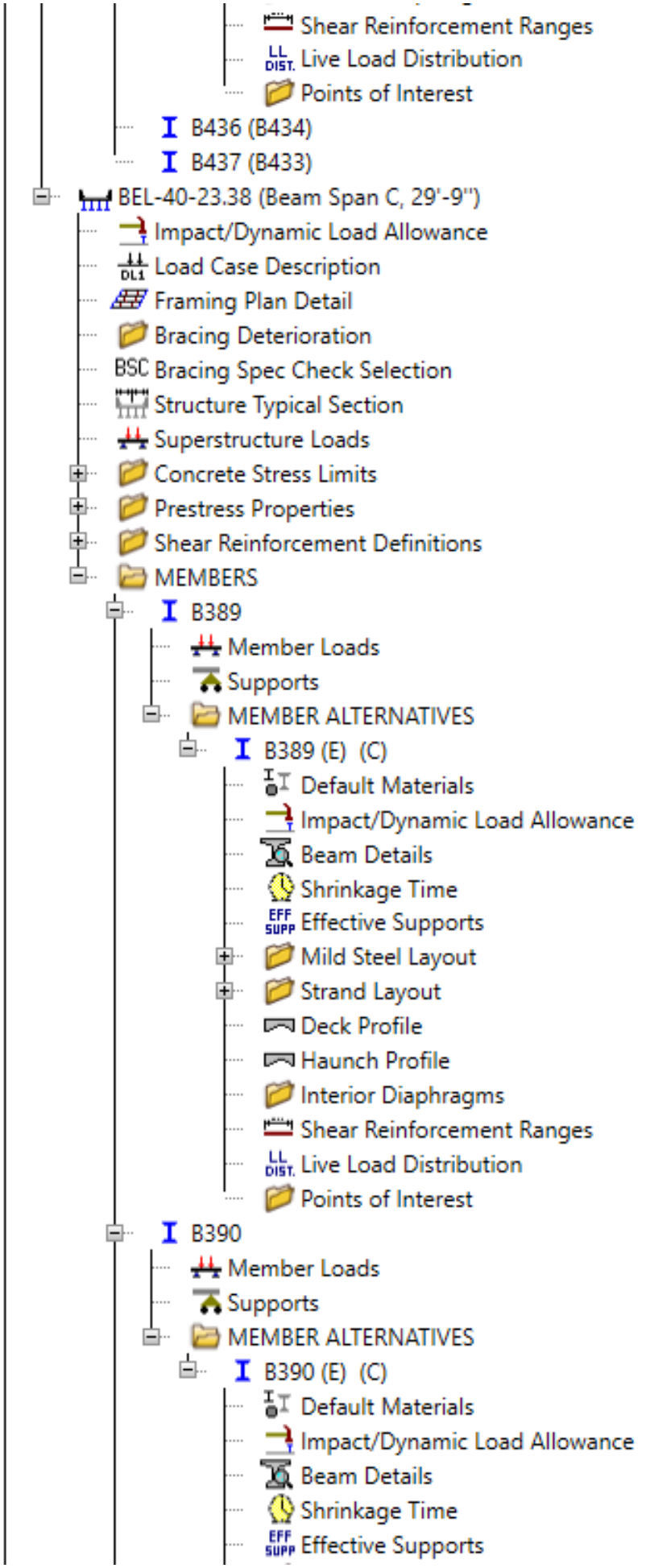

B401 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
Live Load Distribution
Points of Interest
B402
Member Loads
Supports
MEMBER ALTERNATIVES
B402 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
Live Load Distribution
Points of Interest
B403
Member Loads
Supports
MEMBER ALTERNATIVES
B403 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile

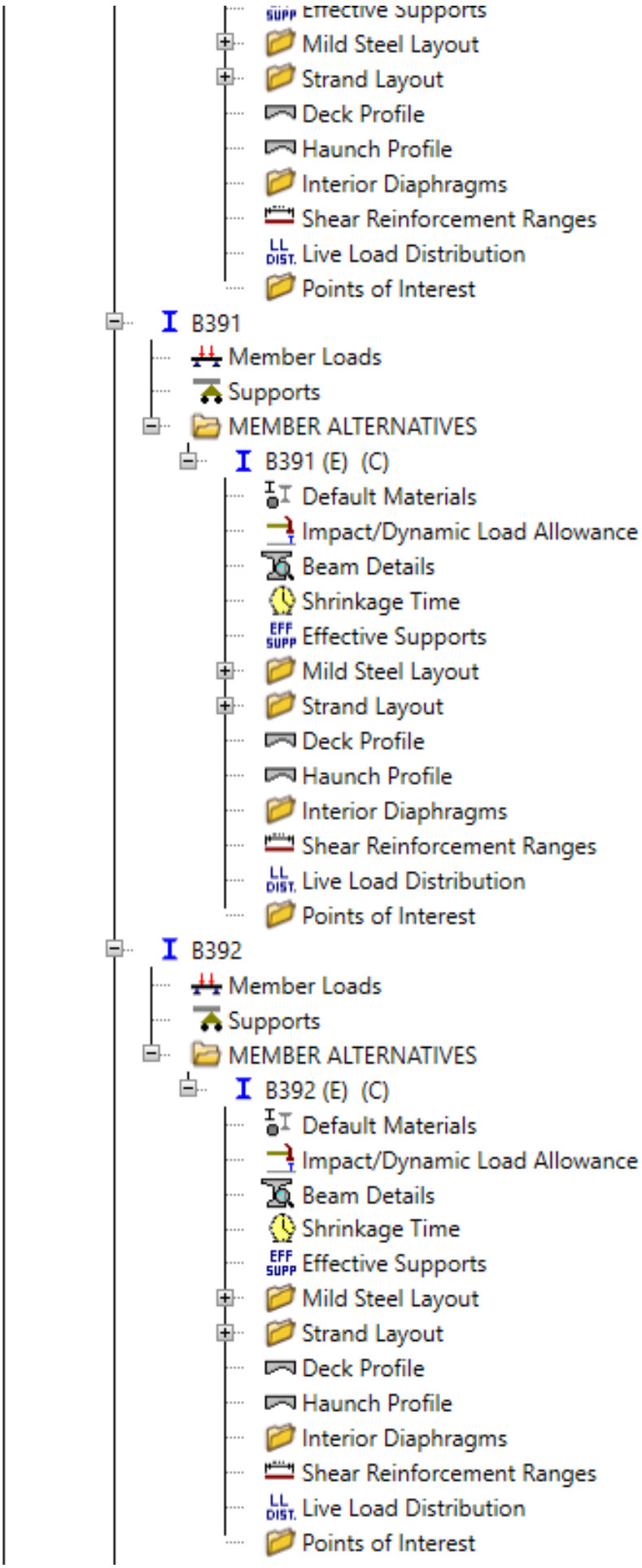
- Deck Profile
- Haunch Profile
- Interior Diaphragms
- Shear Reinforcement Ranges
- Live Load Distribution
- Points of Interest

B404
- Member Loads
- Supports
- MEMBER ALTERNATIVES
  - B404 (E) (C)
    - Default Materials
    - Impact/Dynamic Load Allowance
    - Beam Details
    - Shrinkage Time
    - Effective Supports
    - Mild Steel Layout
    - Strand Layout
    - Deck Profile
    - Haunch Profile
    - Interior Diaphragms
    - Shear Reinforcement Ranges
    - Live Load Distribution
    - Points of Interest

BEL-40-23.38 (Beam Span G, 44'-6")
- Impact/Dynamic Load Allowance
- Load Case Description
- Framing Plan Detail
- Bracing Deterioration
- Bracing Spec Check Selection
- Structure Typical Section
- Superstructure Loads
- Concrete Stress Limits
- Prestress Properties
- Shear Reinforcement Definitions
- MEMBERS
  - B433
    - Member Loads
    - Supports
    - MEMBER ALTERNATIVES
      - B433 (E) (C)
        - Default Materials
        - Impact/Dynamic Load Allowance
        - Beam Details
        - Shrinkage Time


Beam Details
Shrinkage Time
Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
Live Load Distribution
Points of Interest
B434
Member Loads
Supports
MEMBER ALTERNATIVES
B434 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
Live Load Distribution
Points of Interest
B435
Member Loads
Supports
MEMBER ALTERNATIVES
B435 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges


Shear Reinforcement Ranges
Live Load Distribution
Points of Interest
B436 (B434)
B437 (B433)
BEL-40-23.38 (Beam Span C, 29'-9")
Impact/Dynamic Load Allowance
Load Case Description
Framing Plan Detail
Bracing Deterioration
Bracing Spec Check Selection
Structure Typical Section
Superstructure Loads
Concrete Stress Limits
Prestress Properties
Shear Reinforcement Definitions
MEMBERS
B389
Member Loads
Supports
MEMBER ALTERNATIVES
B389 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
Live Load Distribution
Points of Interest
B390
Member Loads
Supports
MEMBER ALTERNATIVES
B390 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
Effective Supports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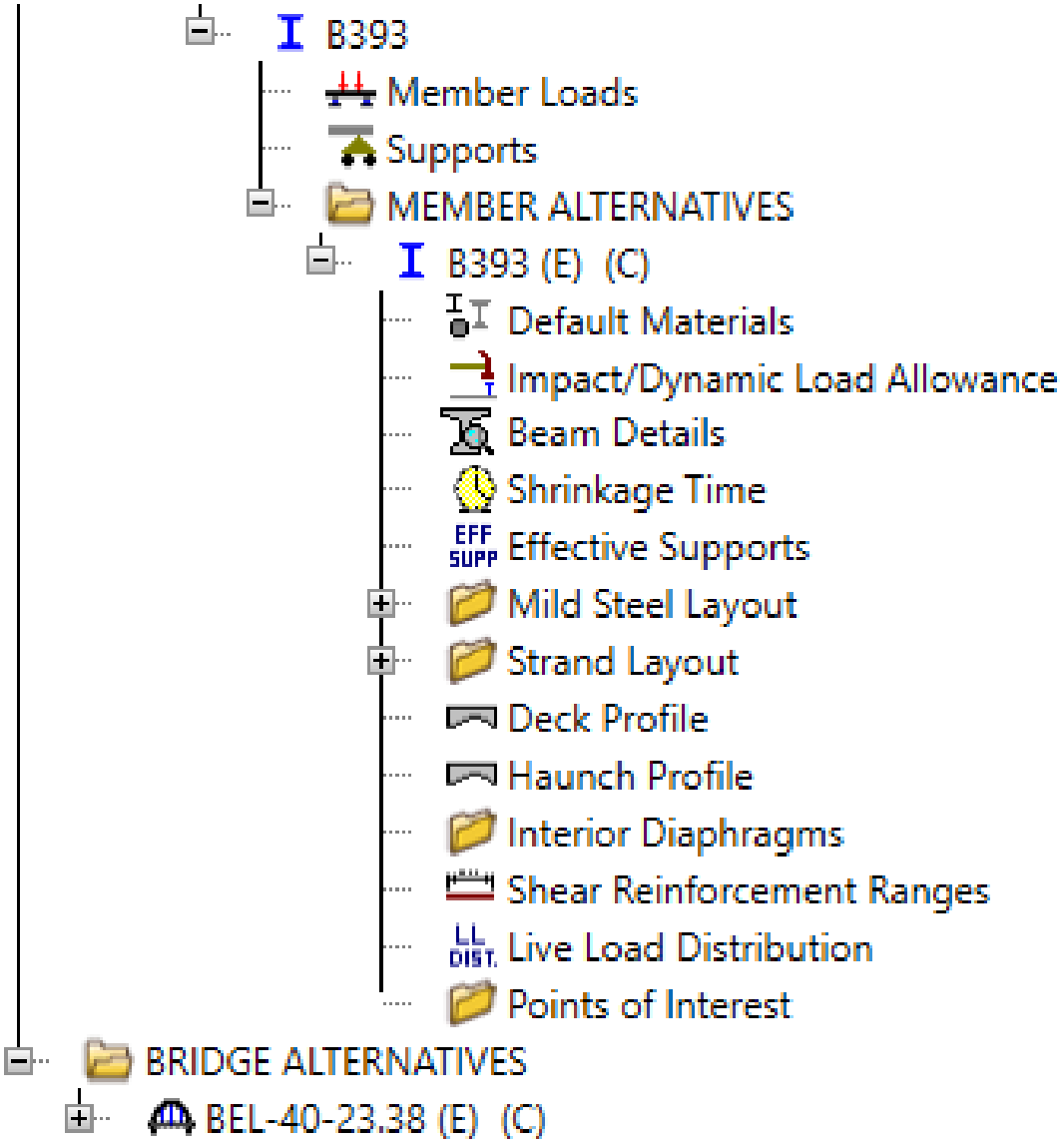
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
Live Load Distribution
Points of Interest
B391
Member Loads
Supports
MEMBER ALTERNATIVES
B391 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
Live Load Distribution
Points of Interest
B392
Member Loads
Supports
MEMBER ALTERNATIVES
B392 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
Live Load Distribution
Points of Interest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Member Loads
Supports
MEMBER ALTERNATIVES
B393 (E) (C)
Default Materials
Impact/Dynamic Load Allowance
Beam Details
Shrinkage Time
EFF SUPP
Effective Supports
Mild Steel Layout
Strand Layout
Deck Profile
Haunch Profile
Interior Diaphragms
Shear Reinforcement Ranges
LL DIST.
Live Load Distribution
Points of Interest
BRIDGE ALTERNATIVES
BEL-40-23.38 (E) (C)