

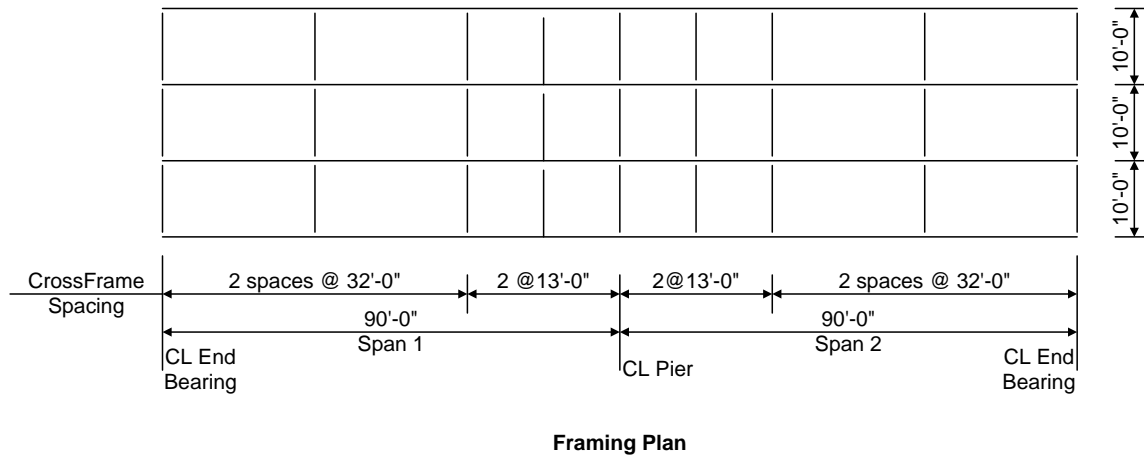
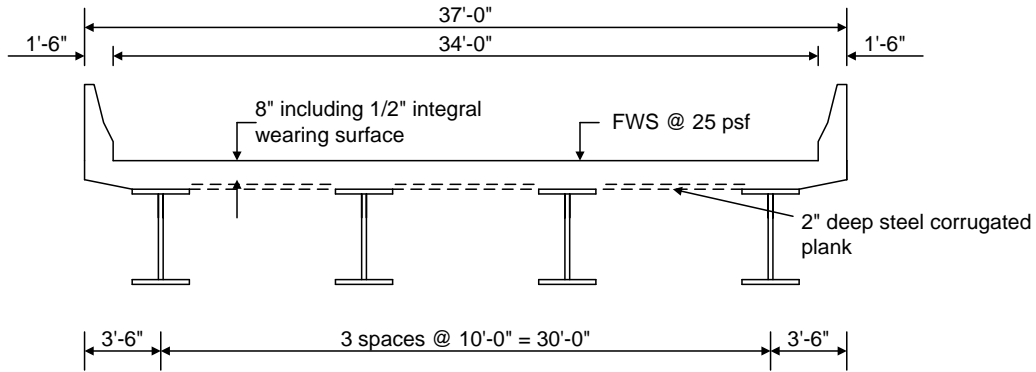
*AASHTOWare BrR/BrD 6.8*

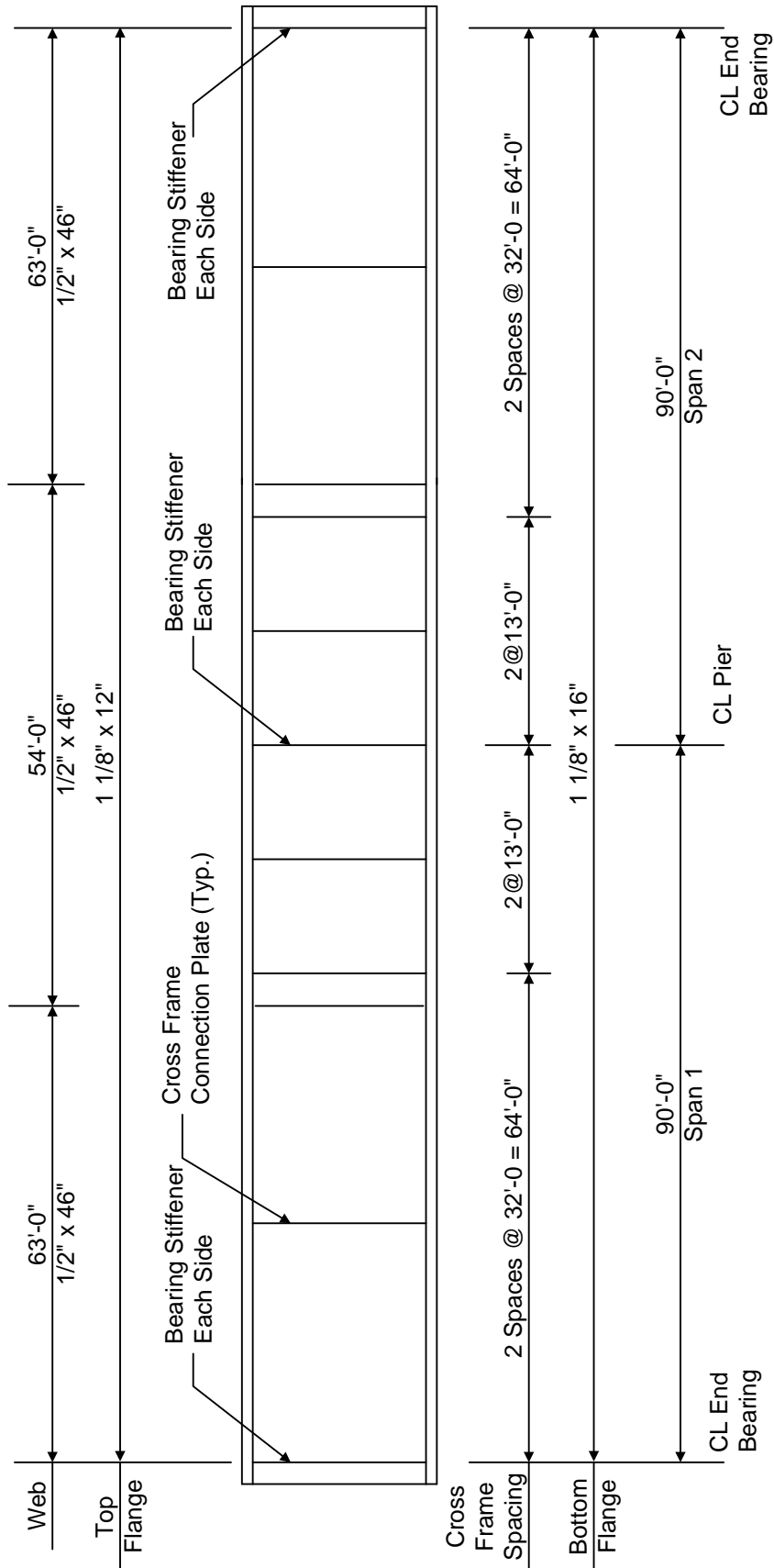
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*Steel Tutorial*

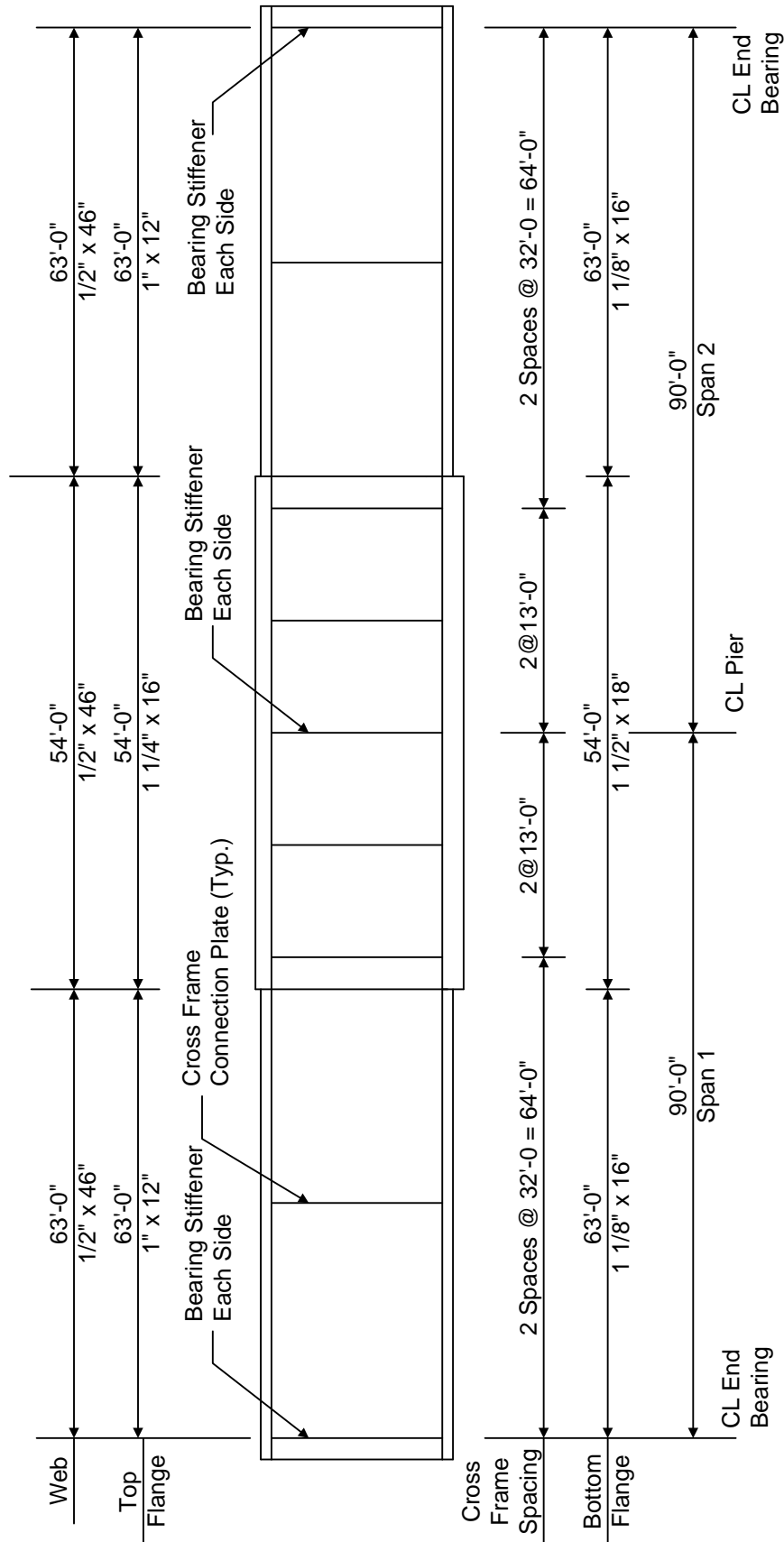
*Corrugated Deck Rating*

**STL6 - Two Span Plate Girder Example (VO 6.3)**



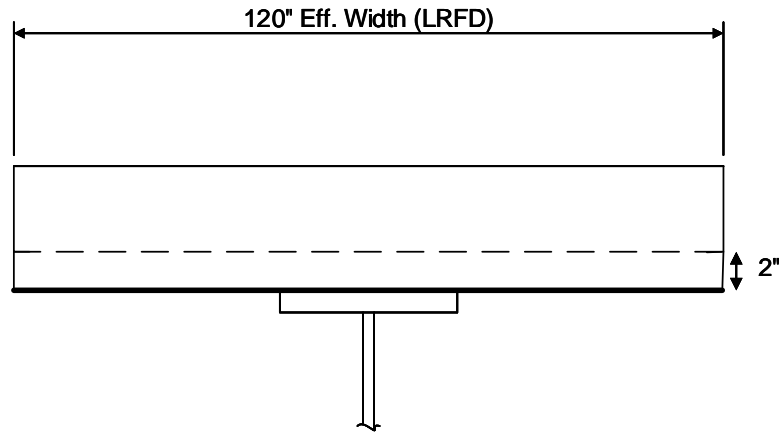


**Elevation of Allow Moment Redistribution Girder**

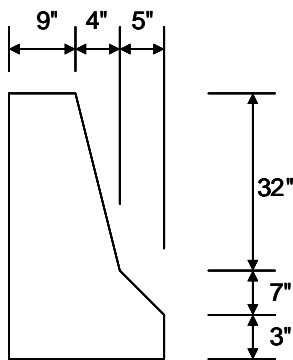


Elevation of Interior Girder

STL10 - Corrugated Deck Rating

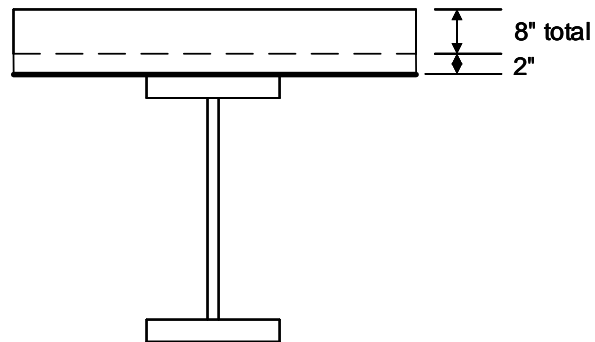


**Composite Section at Pier**



Weight = 536 plf

**Parapet Detail**



**Section Detail**

**Material Properties**

Structural Steel: AASHTO M270, Grade 50W uncoated weathering steel with  $F_y = 50$  ksi

Deck Concrete:  $f'_c = 4.0$  ksi, modular ratio  $n = 8$

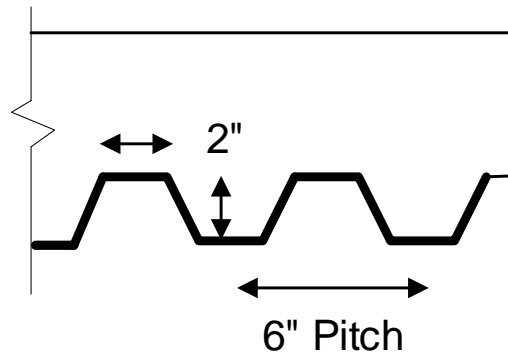
Slab Reinforcing Steel: AASHTO M31, Grade 60 with  $F_y = 60$  ksi

2" Corrugated steel plank: Grade 50 galvanized steel

Cross Frame Connection Plates:  $3/4$ " x 6"

Bearing Stiffener Plates:  $7/8$ " x 9"

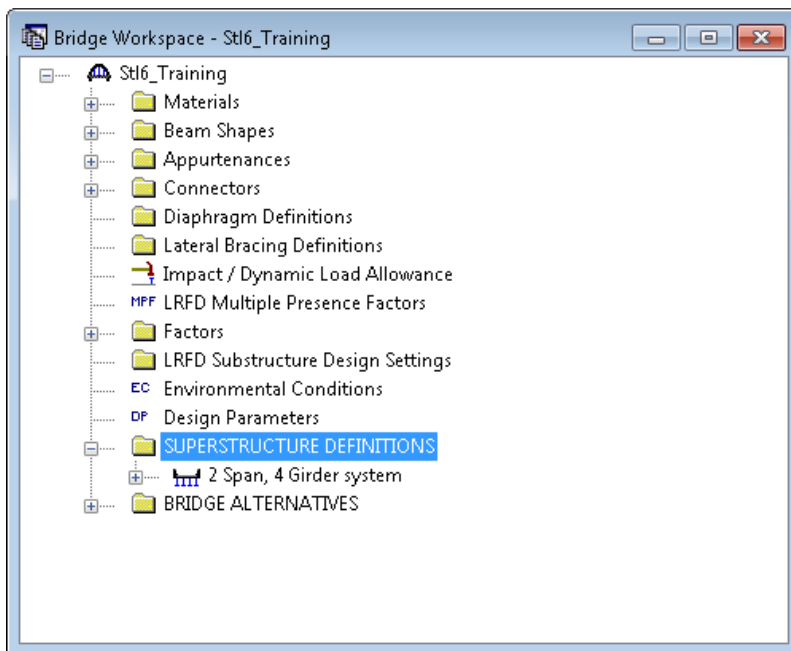
## STL10 - Corrugated Deck Rating



**Cross-Section of Corrugated Deck**

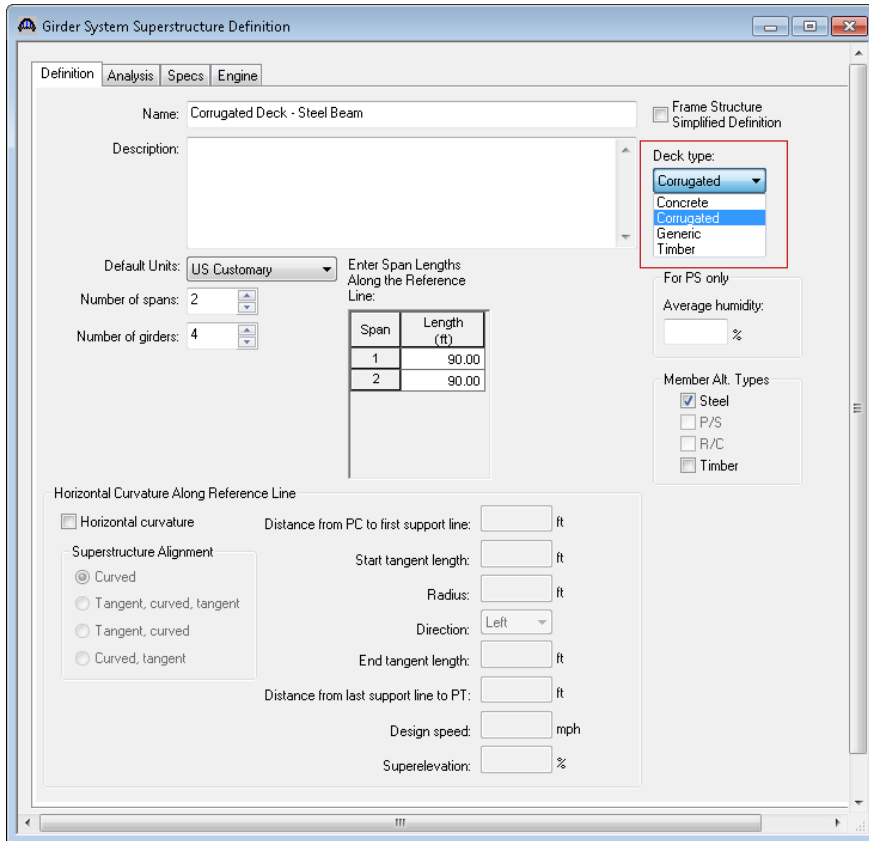
This example assumes you have worked through STL11 - Steel Plate Girder Using AASHTO LRFD Engine

Open the Bridge Workspace for 'Stl6\_Training' or import the *STL10 - Corrugated Deck Rating.xml* bridge file.



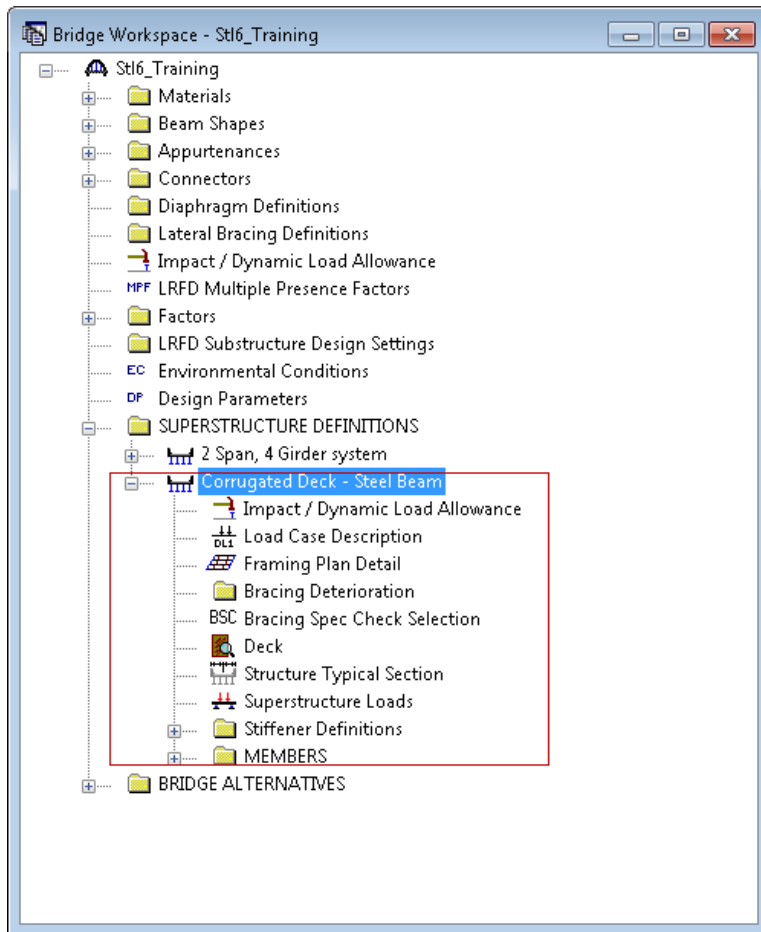
# STL10 - Corrugated Deck Rating

Begin a new SUPERSTRUCTURE DEFINITION for a steel girder corrugated deck system.



## STL10 - Corrugated Deck Rating

Expanding the branch for the Corrugated Deck – Steel Beam the Bridge Workspace will look like:



Much of the data entry will be the same as with the original STL6 example. Impact, Load Case Description, and framing plan will be set up the same as for the original STL6 example.



## STL10 - Corrugated Deck Rating

Go through:

- Impact/Dynamic Load Allowance
- Load Case Description
- Framing Plan Detail
- Structure Typical Section
- Superstructure Loads

Enter the data from the original bridge definition to the Corrugated Deck bridge definition.

The screenshot displays the Bridge Explorer interface with two 'Structure Framing Plan Details' dialog boxes open. The left dialog box is for an existing bridge definition, and the right dialog box is for a new 'Corrugated Deck - Steel Beam' definition. Red arrows indicate the transfer of data from the left dialog to the right one.

**Bridge Explorer (31 Bridge Design/Rating bridges retrieved for the current folder, all rows retrieved)**

**Bridge Workspace - STL6\_Training**

- Materials
- Beam Shapes
- Appurtenances
- Connectors
- Diaphragm Definitions
- Lateral Bracing Definitions
- Impact / Dynamic Load Allowance
- LRFD Multiple Presence Factors
- Factors
- LRFD Substructure Design Settings
- Environmental Conditions
- Design Parameters
- SUPERSTRUCTURE DEFINITIONS
  - 2 Span, 4 Girder system
    - Impact / Dynamic Load Allowance
    - Load Case Description
    - Framing Plan Detail
    - Bracing Deterioration
    - BSC Bracing Spec Check Selection
    - Structure Typical Section
    - Superstructure Loads
    - Shear Connector Definitions
    - Stiffener Definitions
    - MEMBERS
  - Corrugated Deck - Steel Beam
    - Impact / Dynamic Load Allowance
    - Load Case Description
    - Framing Plan Detail
    - Bracing Deterioration
    - BSC Bracing Spec Check Selection
    - Deck
    - Structure Typical Section
    - Superstructure Loads
    - Stiffener Definitions
    - MEMBERS
- BRIDGE ALTERNATIVES

**Structure Framing Plan Details (Top Dialog)**

Number of spans = 2    Number of girders = 4

Layout: Diaphragms | Lateral Bracing Ranges

Girder Spacing Orientation:  
 Perpendicular to girder  
 Along support

Support	Skew (Degrees)
1	0.0000
2	0.0000
3	0.0000

Girder Bay	Start of Girder	End of Girder
1	10.00	10.00
2	10.00	10.00
3	10.00	10.00

OK    Apply    Cancel

**Structure Framing Plan Details (Bottom Dialog)**

Number of spans = 2    Number of girders = 4

Layout: Diaphragms | Lateral Bracing Ranges

Girder Spacing Orientation:  
 Perpendicular to girder  
 Along support

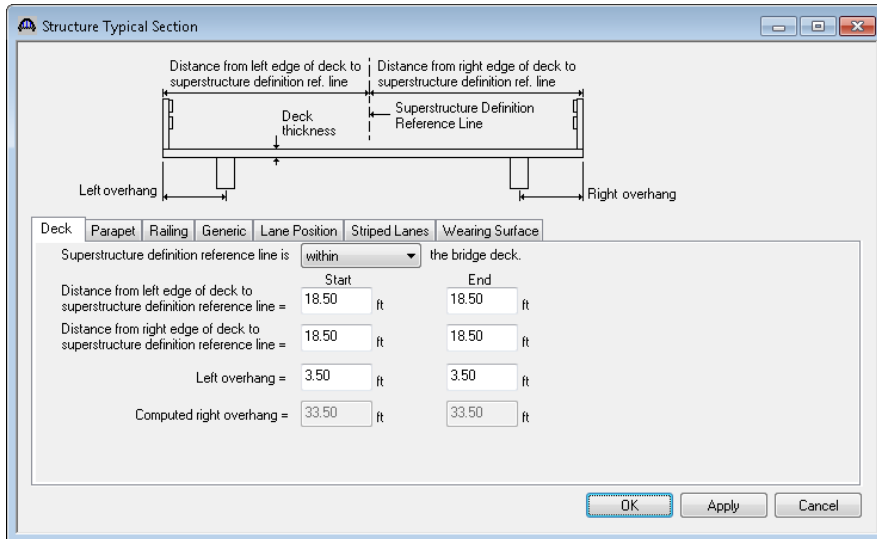
Support	Skew (Degrees)
1	0.0000
2	0.0000
3	0.0000

Girder Bay	Start of Girder	End of Girder
1	10.00	10.00
2	10.00	10.00
3	10.00	10.00

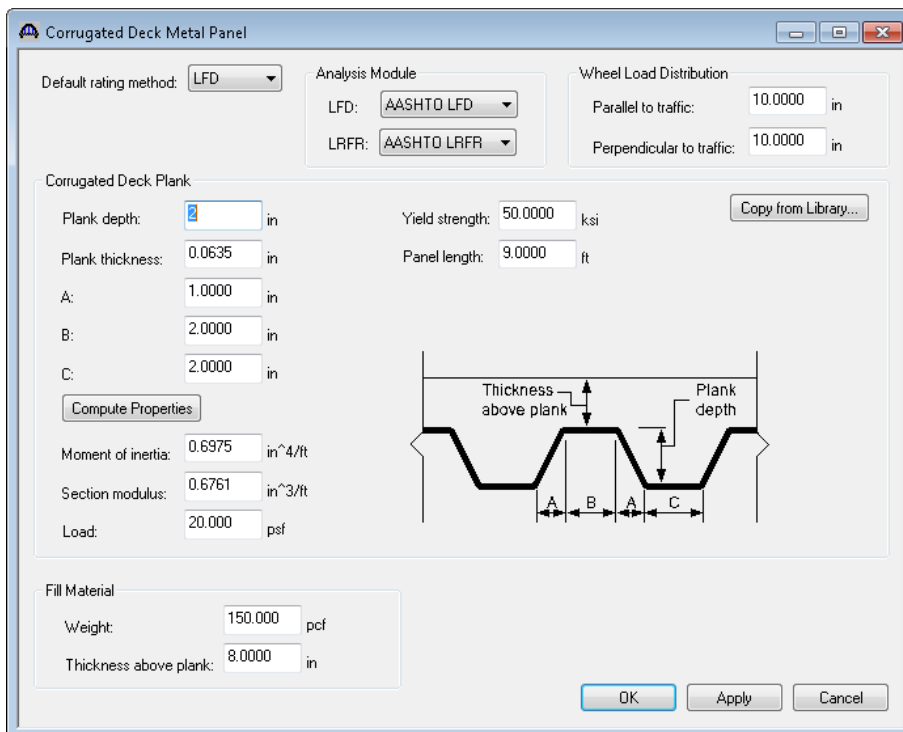
OK    Apply    Cancel

## STL10 - Corrugated Deck Rating

You will see that the Superstructure Typical Section lacks a few tabs. The remaining tabs are similar to the dialog for a common concrete deck/steel girder typical definition.



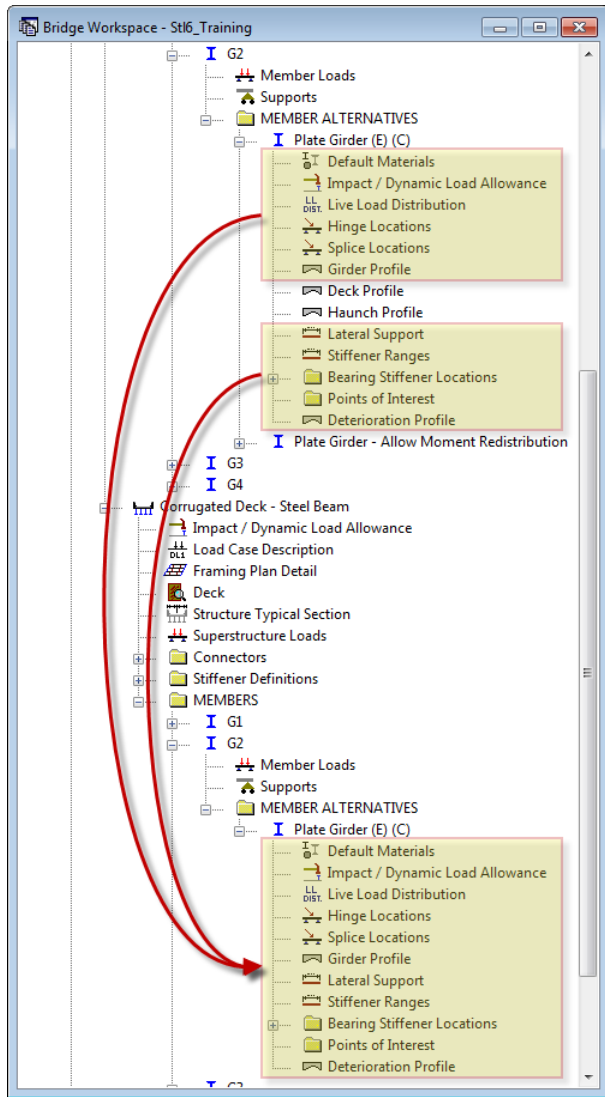
Once you have entered the above to define the Corrugated Deck definition you need to enter the details for the deck itself.



Copy the stiffener definitions from the original bridge definition to the Corrugated Deck definition. You will need to edit the titles of each to remove "Copy of" from the title.

## STL10 - Corrugated Deck Rating

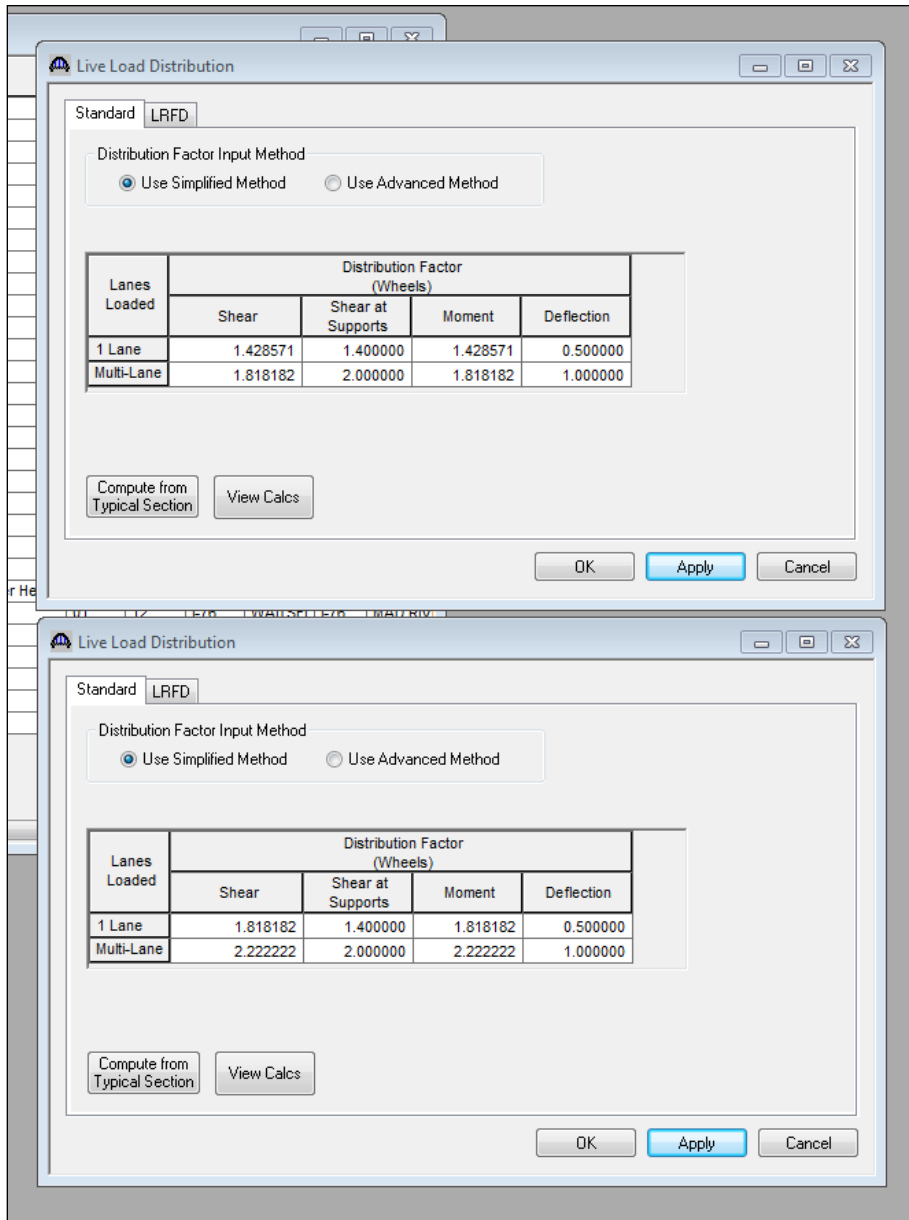
Open the MEMBER ALTERNATIVES for Girder G2 for the original bridge definition and the new Corrugated Deck definition. You will not be able to copy the member definition because there are small differences in the definitions. For example, the Corrugated Deck will not have haunches. Go through the original member definition and reenter the data in the new member definition where such data is similar.



BrR has the ability to compute the Standard Specification live load distribution factors for you based on the corrugated deck definition. You can click the 'Compute from Typical Section...' button and BrR will compute the distribution factors. If you leave these fields blank, the AASHTO LFD engine will compute the distribution factors for you at

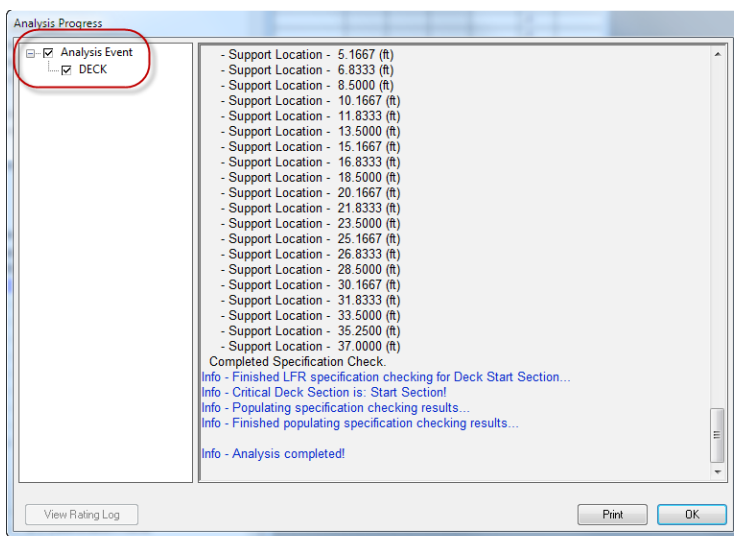
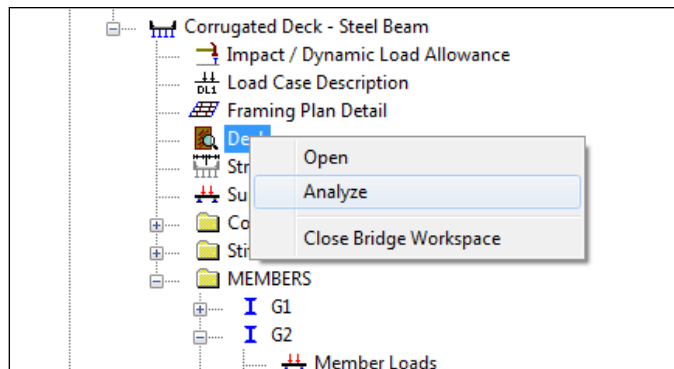
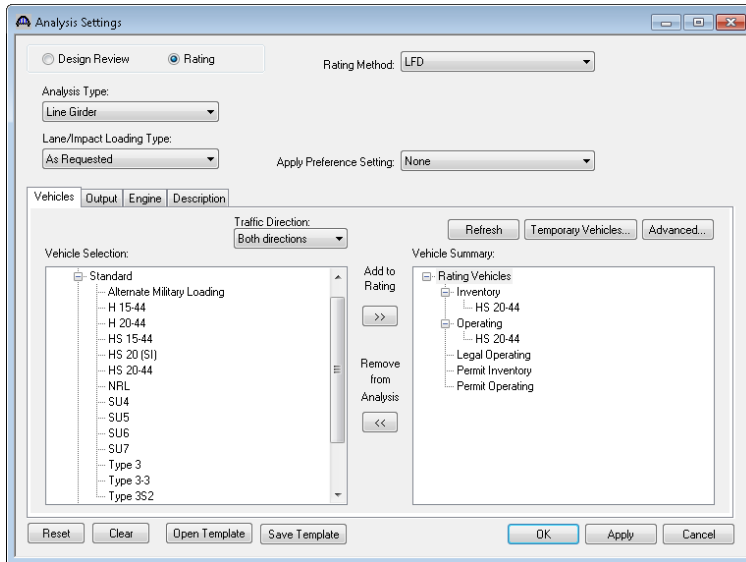
## STL10 - Corrugated Deck Rating

runtime. We will let the AASHTO LFD engine compute the live load distribution factors for us so we will not enter them. The following figure shows the differences in the LLDF for LFD.



## STL10 - Corrugated Deck Rating

At this point, run a LFD rating on the deck for the Corrugated Deck definition and the girder G2. Right click on the Deck line and select Analyze.



## STL10 - Corrugated Deck Rating

Open the analysis results to see the ratings.

Analysis Results - Deck

Report Type: Rating Results Summary  
Lane/Impact Loading Type:  As Requested  Detailed

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating	Rating Factor	Location	Limit State	Impact	Lane
HS 20-44	Axle Load	LFD	Inventory	0.00	0.000	3.500	Design Flexure - C	As Requested	As Requested
HS 20-44	Axle Load	LFD	Operating	0.00	0.000	3.500	Design Flexure - C	As Requested	As Requested
HS 20-44	Axle Load	LFD	Inventory	0.25	0.007	28.500	Design Flexure - Si	As Requested	As Requested
HS 20-44	Axle Load	LFD	Operating	0.42	0.012	28.500	Design Flexure - Si	As Requested	As Requested

AASHTO Deck LFR Engine Version 6.8.0.2004  
Analysis Preference Setting: None

Close

Then do a rating on the new girder.

Analysis Results - Plate Girder

Report Type: Rating Results Summary  
Lane/Impact Loading Type:  As Requested  Detailed  
Display Format: Multiple rating levels per row

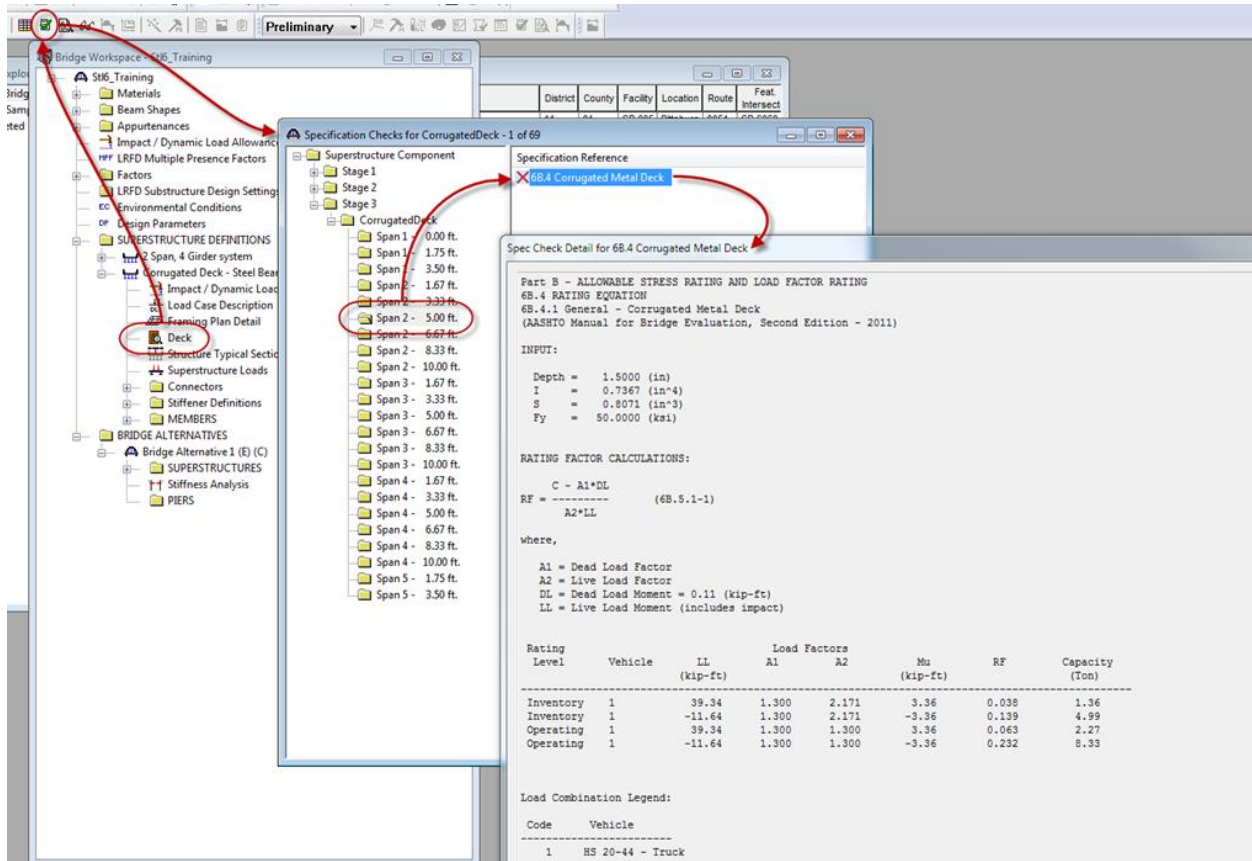
Live Load	Live Load Type	Rating Method	Inventory Load Rating (Ton)	Operating Load Rating (Ton)	Legal Operating Load Rating (Ton)	Permit Inventory Load Rating (Ton)	Permit Operating Load Rating (Ton)	Inventory Rating Factor	Operating Rating Factor	Legal Operating Rating Factor	Permit Inventory Rating Factor
HS 20-44	Lane	LFD	18.25	30.48				0.507	0.847		
HS 20-44	Axle Load	LFD	20.59	34.39				0.572	0.955		

AASHTO LFR Engine Version 6.8.0.2004  
Analysis Preference Setting: None

Close

**Corrugated Specifications Check**

Open the specifications checks for the corrugated deck.



The girder ratings will be similar to non-composite girder ratings.