

*AASHTOWare BrDR 7.3.0*

---

***Culvert Tutorial***

*CVT3 – Metal Box Culvert Example*

## **Topics Covered**

- Metal Box Culvert Alternative
- LFD Rating
- LRFR Rating
- MBE 3<sup>rd</sup> edition, 2022 interims

## **Overview of Metal Box Culvert features:**

- Metal box culverts implemented in BrDR version 7.3.0 in October 2022.
- Metal box culverts support LFD and LRFR rating methods.

## CVT3 - Metal Box Culvert Example

### Metal Box Culvert Alternative:

From the Bridge Explorer create a new bridge and enter the following description data:

CVT3-Metal Box Culvert

Bridge ID: CVT3-Metal Box Culvert NBI structure ID (8): CVT3-Metal Box Culvert

Template  Superstructures  
 Bridge completely defined  Culverts  
 Substructures

Description Description (cont'd) Alternatives Global reference point Traffic Custom agency fields

Name: CVT3-Metal Box Culvert Example Year built:

Description: Example of metal box culvert structure

Location:  Length:  ft

Facility carried (7):  Route number: 1

Feat. intersected (6):  Mi. post:

Default units: US Customary

Bridge association...  BrR  BrD  BrM

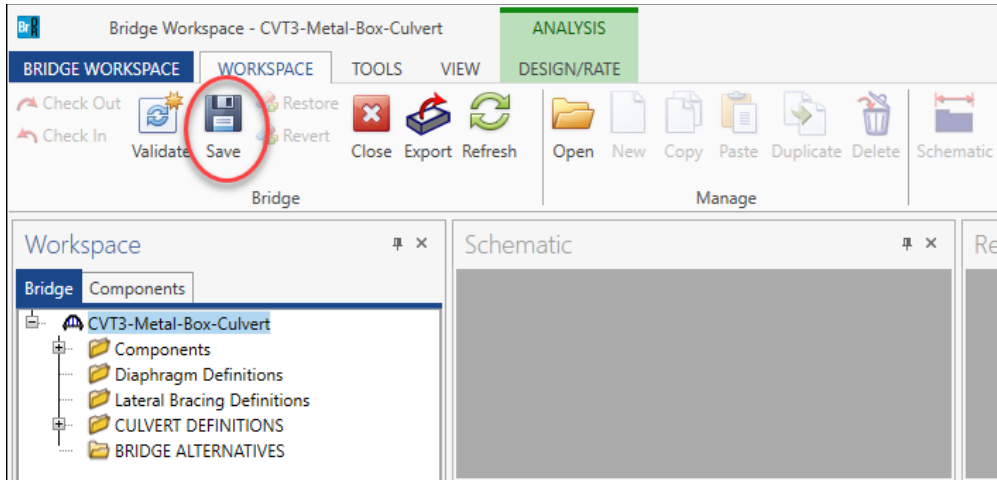
OK Apply Cancel

The Superstructures and Culverts checkboxes specify the types of structures the bridge contains. These checkboxes filter what to display in the Bridge Workspace tree. Since this bridge will only contain the metal box culvert, we only need to select culvert from the structure type check boxes.

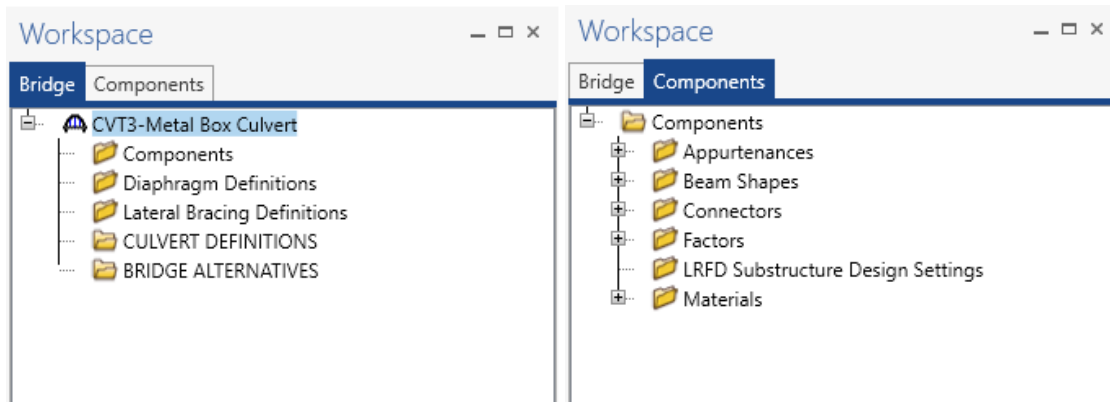
Close the window by clicking Ok. This saves the data to memory and closes the window.

## CVT3 - Metal Box Culvert Example

To save data to the database, click the Save button on the ribbon.



The Bridge Workspace tree and Components tree after the bridge is created is shown below.



The Bridge tree is organized according to the definition of a bridge with data shared by many of the bridge components shown in the Components tab. A bridge can be described by working from top to bottom within the tree.

To enter the materials for the metal box culvert, expand the tree for Materials in the Components tab.

To create a new structural steel material, double-click on the Structural Steel folder or select Structural Steel and click on “New” on the Manage group of the Workspace ribbon or right click on Structural steel and select New from the menu. Add the structural steel material from the library by clicking on “Copy from library” button and select “Steel – Corrugated” from the materials library.

### CVT3 - Metal Box Culvert Example

Library Data: Materials - Structural Steel

Name	Description	Library	Units	Fy	Fu	Coefficient of thermal expansion	Density/unit load	Modulus of elasticity
Grade 485W	AASHTO M270M Grade 485W	Standard	SI / Metric	485.00	620.00	0.0000117000	7849.0000	199948.00
Grade 50	AASHTO M270 Grade 50	Standard	US Customary	50.000	65.000	0.0000065000	0.4900	29000.00
Grade 50W	AASHTO M270 Grade 50W	Standard	US Customary	50.000	70.000	0.0000065000	0.4900	29000.00
Grade 690 > 65 to 100 incl.	AASHTO M270M - over 65 to 100 mm thick, inclusive	Standard	SI / Metric	620.00	690.00	0.0000117000	7849.0000	199947.95
Grade 690 <= 65 mm	AASHTO M270M Grade 690 up to 65 mm thick, inclusive	Standard	SI / Metric	690.00	760.00	0.0000117000	7849.0000	199948.00
Grade 690W > 65 to 100 incl.	AASHTO M270M - over 65 to 100 mm thick, inclusive	Standard	SI / Metric	620.00	690.00	0.0000117000	7849.0000	199947.95
Grade 690W <= 65 mm	AASHTO M270M Grade 690W up to 65 mm thick, inclusive	Standard	SI / Metric	690.00	760.00	0.0000117000	7849.0000	199948.00
Grade 70W	AASHTO M270 Grade 70W	Standard	US Customary	70.000	90.000	0.0000065000	0.4900	29000.00
Prior to 1905	Built prior to 1905 - steel unknown	Standard	US Customary	26.000	52.000	0.0000065000	0.4900	29000.00
Steel - Corrugated	Structural plate (thickness 0.176"-0.250")	Standard	US Customary	33.000	45.000	0.0000065000	0.4900	29000.00

OK Apply Cancel

Bridge Materials - Structural Steel

Name:

Description:

Material properties

Specified minimum yield strength (fy):  ksi

Specified minimum tensile strength (Fu):  ksi

Coefficient of thermal expansion:  1/F

Density:  kcf

Modulus of elasticity (E):  ksi

Copy to library... Copy from library... OK Apply Cancel

Click OK to save the new steel material to memory.

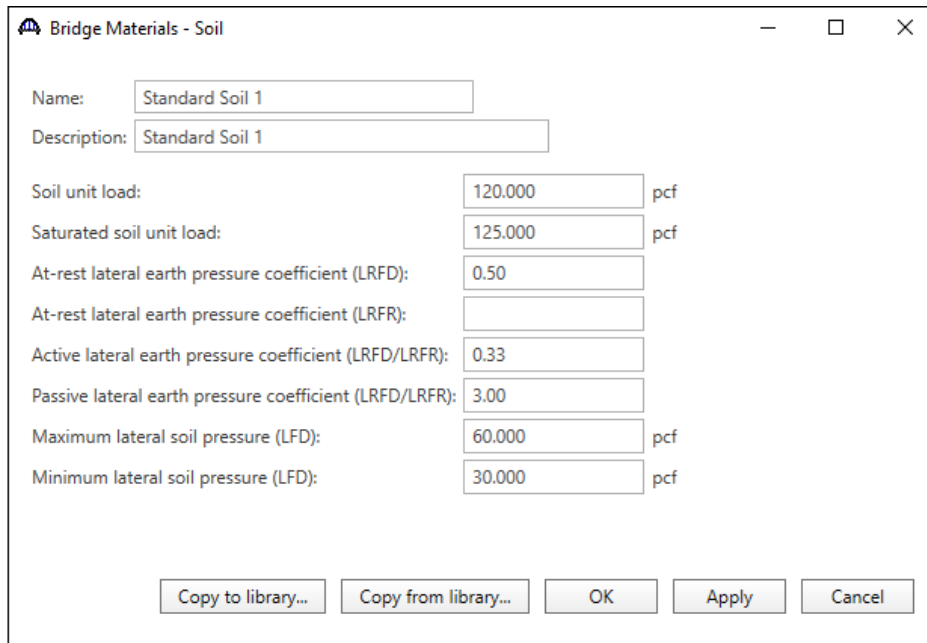
Similarly add a new soil material by double-clicking on the Soil folder or selecting Soil and clicking on “New” on the Manage group of the Workspace ribbon or right clicking on Soil and selecting New from the menu. Click on the Copy from Library button to copy the Standard Soil 1 material to the bridge.

Library Data: Materials - Soil

Name	Description	Library	Units	Soil unit load	At-rest lateral earth pressure coefficient (LRFD/LRFR)	Maximum lateral soil pressure (LFD)
Standard Soil 1	Standard Soil 1	Standard	US Customary	120.000	0.50	60.000
Standard Soil 2	Standard Soil 2	Standard	US Customary	120.000	0.50	30.000

OK Apply Cancel

## CVT3 - Metal Box Culvert Example



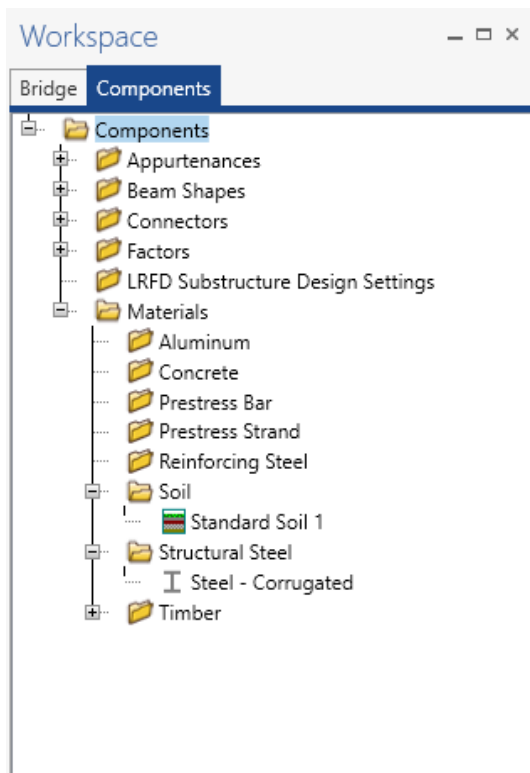
The dialog box titled "Bridge Materials - Soil" contains the following fields and values:

Name:	Standard Soil 1
Description:	Standard Soil 1
Soil unit load:	120.000 pcf
Saturated soil unit load:	125.000 pcf
At-rest lateral earth pressure coefficient (LRFD):	0.50
At-rest lateral earth pressure coefficient (LRFR):	
Active lateral earth pressure coefficient (LRFD/LRFR):	0.33
Passive lateral earth pressure coefficient (LRFD/LRFR):	3.00
Maximum lateral soil pressure (LFD):	60.000 pcf
Minimum lateral soil pressure (LFD):	30.000 pcf

Buttons at the bottom: Copy to library..., Copy from library..., OK, Apply, Cancel.

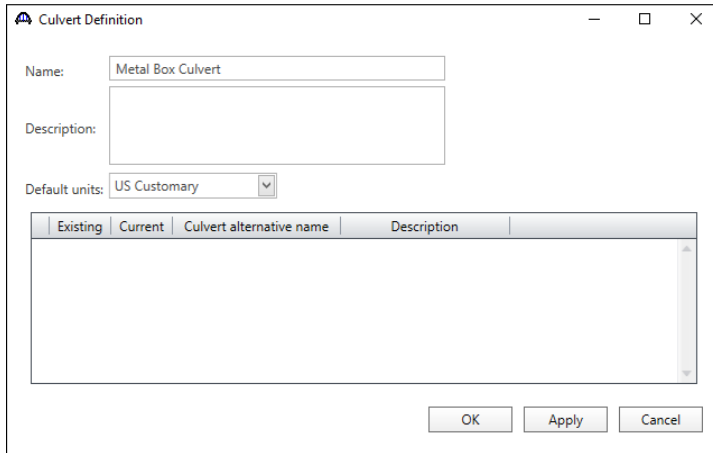
Click OK to save the new soil material to memory.

The Components tree with the materials to be used by the culvert is shown below.



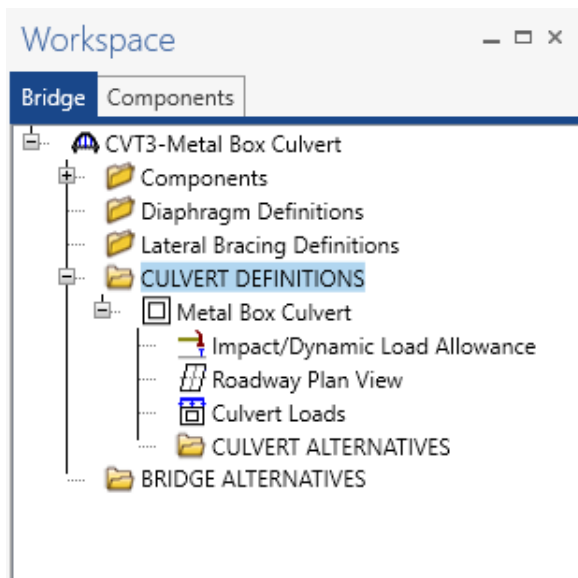
## CVT3 - Metal Box Culvert Example

Under the Bridge tab, double-click on the CULVERT DEFINITIONS folder or click on CULVERT DEFINITIONS and select New from Manage group of Workspace ribbon or right click on CULVERT DEFINITIONS and select New from the menu to create a new culvert definition. Enter the Culvert Definition name as show below. The first Culvert Alternative that we create will automatically be assigned as the Existing and Current Culvert Alternative for this Culvert Definition.



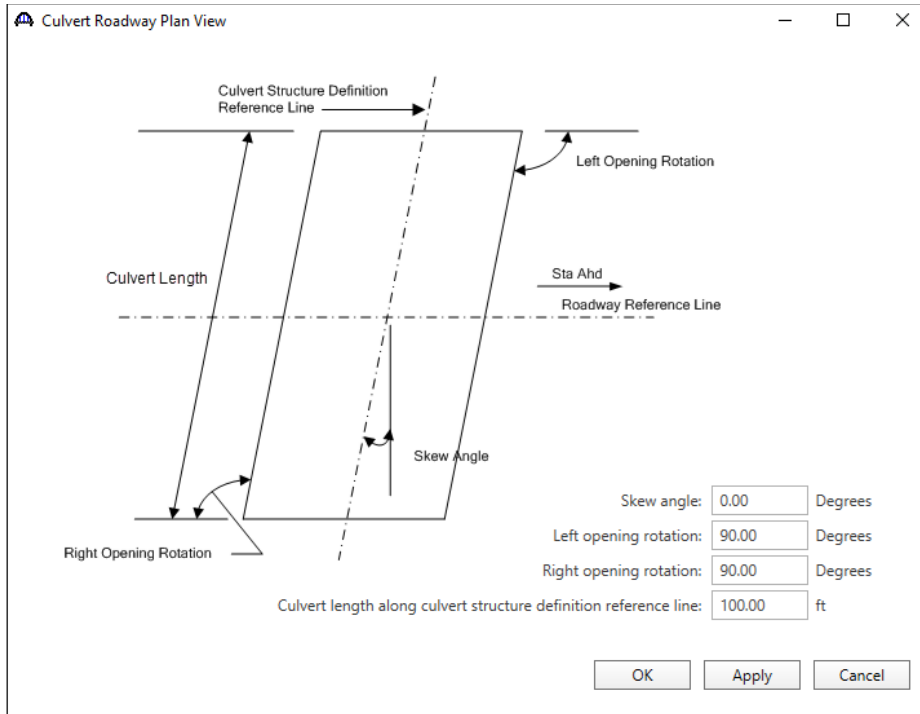
Existing	Current	Culvert alternative name	Description
----------	---------	--------------------------	-------------

Expand the tree for Metal Box Culvert.

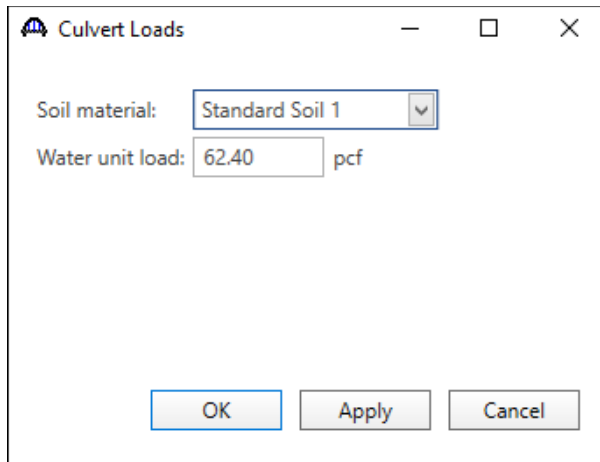


## CVT3 - Metal Box Culvert Example

Enter the culvert orientation details in the Culvert Roadway Plan View window as shown below:



Double-click on Culvert Loads in the tree to open the Culvert Loads window. Select the Soil material from the drop-down menu. Water unit load will be populated by default as 62.40 pcf.



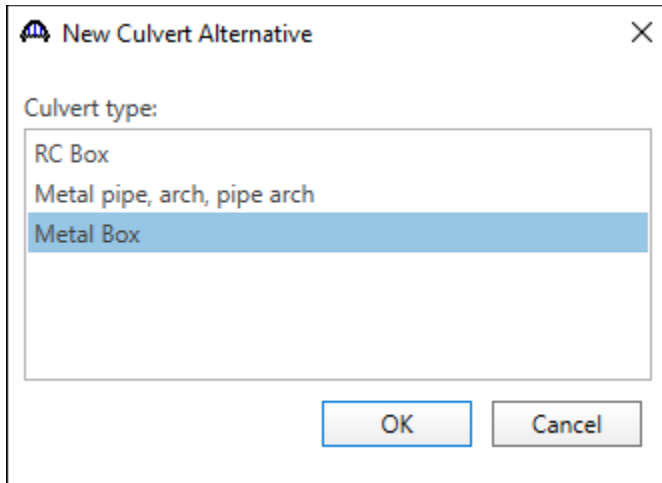
Click Ok to save the data to memory and close the window.



## CVT3 - Metal Box Culvert Example

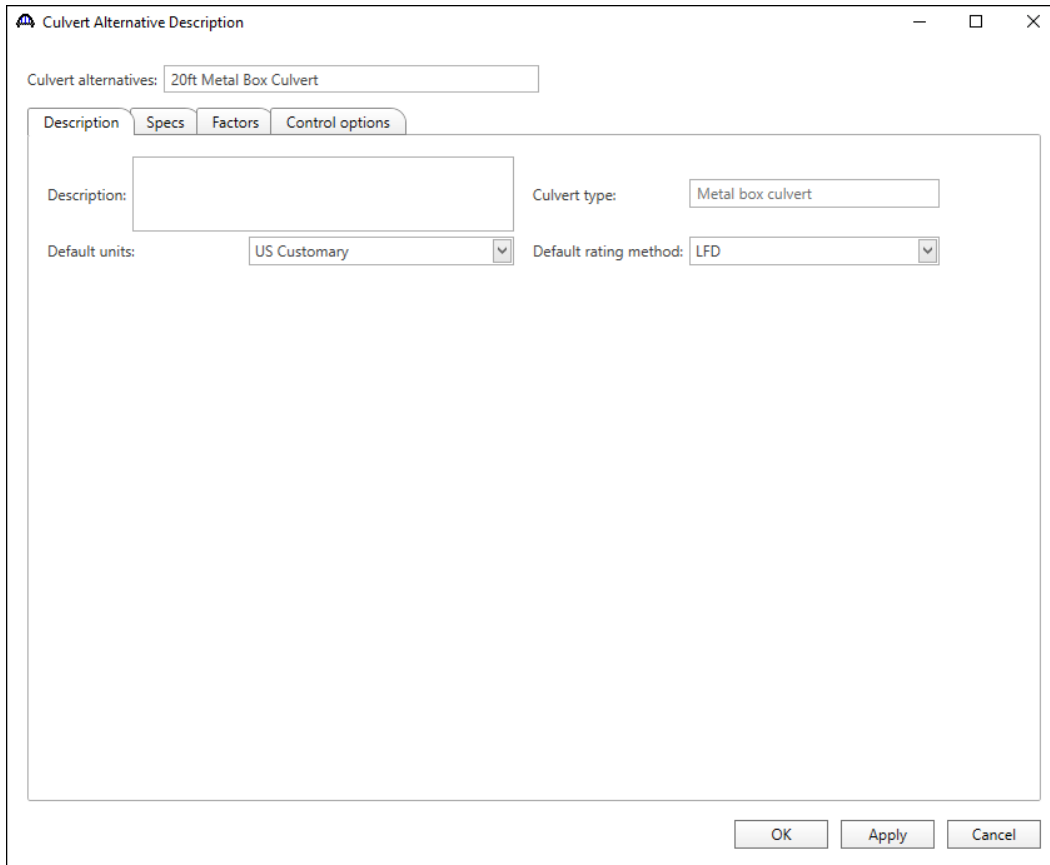
To define a new culvert alternative, double-click on the CULVERT ALTERNATIVES folder or click on CULVERT ALTERNATIVES and select New from the Manage group of the Workspace ribbon or right click on CULVERT ALTERNATIVES and select new from the menu.

Select Metal Box as the culvert type and click OK.



The image shows a dialog box titled "New Culvert Alternative". It has a close button (X) in the top right corner. Below the title bar, there is a label "Culvert type:" followed by a list box. The list box contains three items: "RC Box", "Metal pipe, arch, pipe arch", and "Metal Box". The "Metal Box" item is currently selected and highlighted with a blue background. At the bottom of the dialog box, there are two buttons: "OK" and "Cancel".

In the Culvert Alternative Description window enter the data as show below:



The image shows a dialog box titled "Culvert Alternative Description". It has standard window controls (minimize, maximize, close) in the top right corner. Below the title bar, there is a text field labeled "Culvert alternatives:" containing the text "20ft Metal Box Culvert". Below this, there are four tabs: "Description", "Specs", "Factors", and "Control options". The "Description" tab is currently selected. In the "Description" tab, there are four fields: a large text area labeled "Description:", a text field labeled "Culvert type:" containing "Metal box culvert", a dropdown menu labeled "Default units:" set to "US Customary", and another dropdown menu labeled "Default rating method:" set to "LFD". At the bottom right of the dialog box, there are three buttons: "OK", "Apply", and "Cancel".

## CVT3 - Metal Box Culvert Example

Select the Specs tab. AASHTO Metal Culvert Engine is selected as the analysis module for both LFD and LRFR analysis.

The screenshot shows the 'Culvert Alternative Description' dialog box with the 'Specs' tab selected. The 'Culvert alternatives' field contains '20ft Metal Box Culvert'. The table below lists the analysis methods and their associated specifications.

Analysis method type	Analysis module	Selection type	Spec version	Factors
LFD	AASHTO Metal Culvert LFD	System Default	MBE 3rd 2022i, Std 17th	2002 AASHTO Std. Specifications
LRFR	AASHTO Metal Culvert LRFR	System Default	MBE 3rd 2022i, LRFD 9th	2018 (2022 Interim) AASHTO LRFR Spec.

Buttons at the bottom: OK, Apply, Cancel.

Select the Factors tab and enter the factors for LRFR as shown below:

The screenshot shows the 'Culvert Alternative Description' dialog box with the 'Factors' tab selected. The 'Culvert alternatives' field contains '20ft Metal Box Culvert'. The 'LRFR' section contains the following settings:

- Field measured section properties
- Condition factor: Good or Satisfactory
- System factor: 1.000
- Vertical earth load modifier: 1.050
- Depth of fill and backfill density are known

Buttons at the bottom: OK, Apply, Cancel.

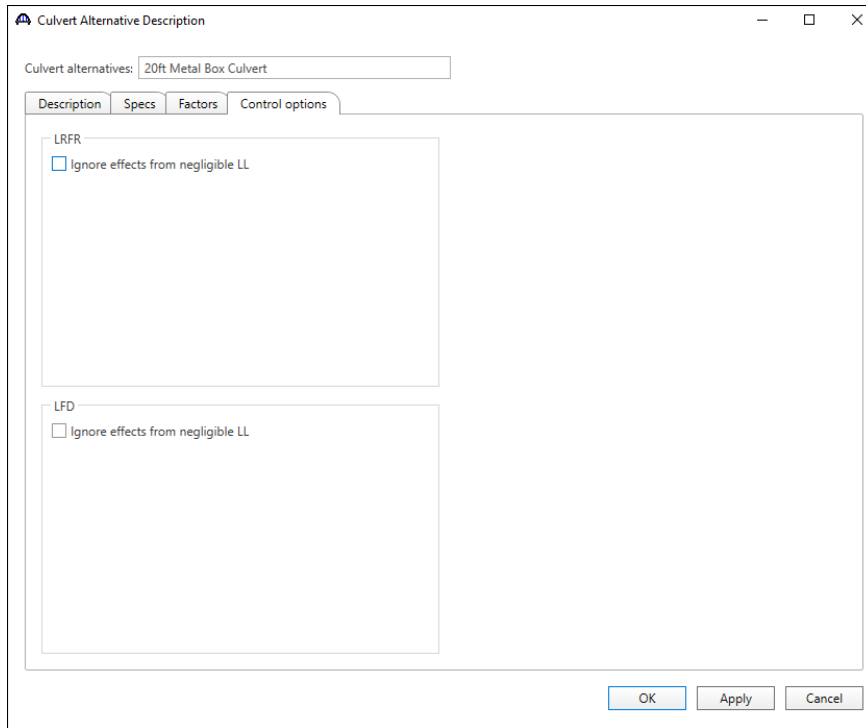
Click Ok to save the data to memory and close the window.

## CVT3 - Metal Box Culvert Example

The 'Control options' tab has advanced analysis options for LFD and LRFR analysis methods. By default, none of the options are selected.

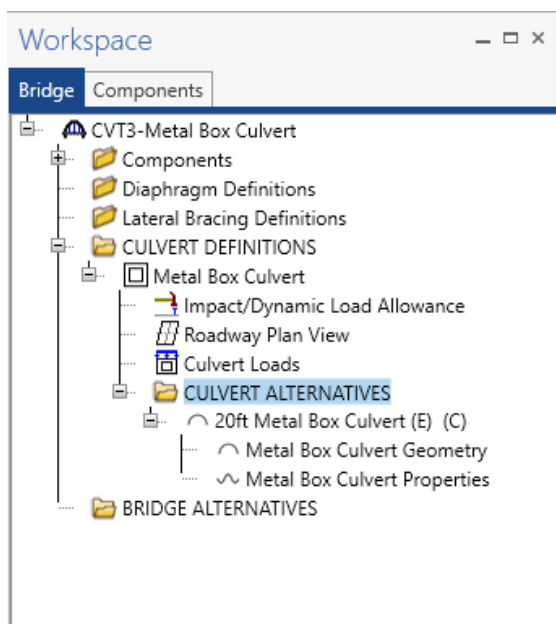
Description of Metal Box Culvert Alternative control options:

- Ignore effects from negligible live load – Use this control option to skip the rating when factored live load pressure at the depth of the culvert is less than 10% of the total factored pressure at the depth of the culvert.



Click Ok to save the data to memory and close the window.

Expand the tree for 20ft Metal Box Culvert.



### CVT3 - Metal Box Culvert Example

Double-click on Metal Box Culvert Geometry in the Bridge tree to enter the culvert geometry. Enter the data as shown below. Click Ok to save the data to memory and close the window.

**Metal Box Culvert Geometry**

Span (S):  ft      Delta:  Degrees  
Rise (R):  ft      D:  ft  
rc:  ft      L:  ft  
rh:  ft      Height of cover (H):  ft  
Pavement reduction factor:  %  
Comment:

## CVT3 - Metal Box Culvert Example

Double-click on Metal Box Culvert Properties in the Bridge tree to enter the culvert material, section properties and culvert condition.

Select the Material type as Steel. Select Material as “Steel – Corrugated” from its drop-down menu. For section properties, click on the Copy from library button and select “Stl 15” x 5 ¼” Corrugated Pipe No Rib” with shell thickness 0.250 and Mp 30.40 and click Ok

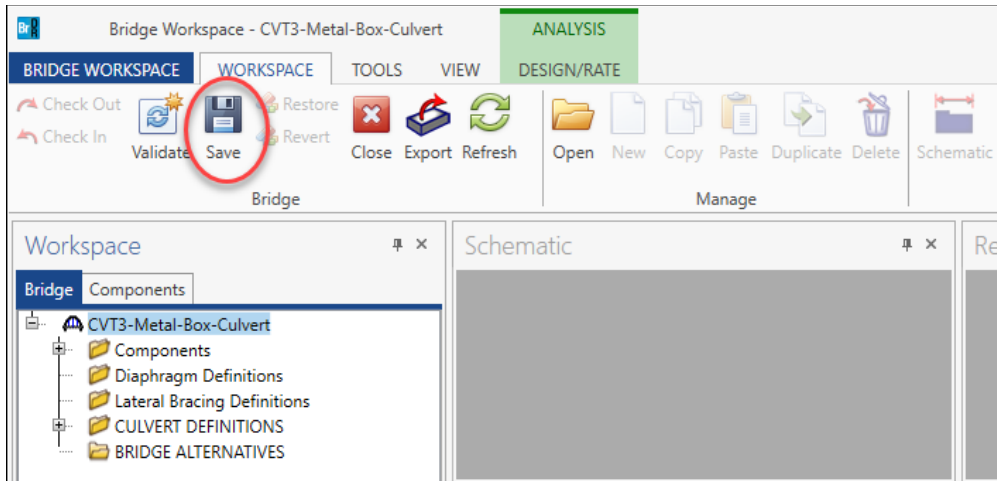
Name	Units	Rib Thickness	Rib Spacing	Shell thickness	Mp
Stl 15" x 5 1/4" Corrugated Pipe No Rib	US Customary			0.250	30.40
Stl 15" x 5 1/4" Corrugated Pipe No Rib	US Customary			0.111	
Stl 15" x 5 1/4" Corrugated Pipe No Rib	US Customary			0.150	10.80
Stl 15" x 5 1/4" Corrugated Pipe No Rib	US Customary			0.175	13.20
Stl 15" x 5 1/4" Corrugated Pipe No Rib	US Customary			0.225	25.30
Stl 15" x 5 1/4" Corrugated Pipe No Rib	US Customary			0.225	17.30
Stl 15" x 5 1/4" Corrugated Pipe No Rib	US Customary			0.250	19.80
Stl 15" x 5 1/4" Corrugated Pipe No Rib	US Customary			0.200	22.30
Stl 15" x 5 1/4" Corrugated Pipe No Rib	US Customary			0.200	14.80
Stl 6"x2" Corrugated Plate Angle Rib	US Customary	18"		0.150	18.80
Stl 6"x2" Corrugated Plate Angle Rib	US Customary	18"		0.250	
Stl 6"x2" Corrugated Plate Angle Rib	US Customary	18"		0.225	

## CVT3 - Metal Box Culvert Example

Enter the data for Condition as shown below and click Ok to save the data to memory and close the window.

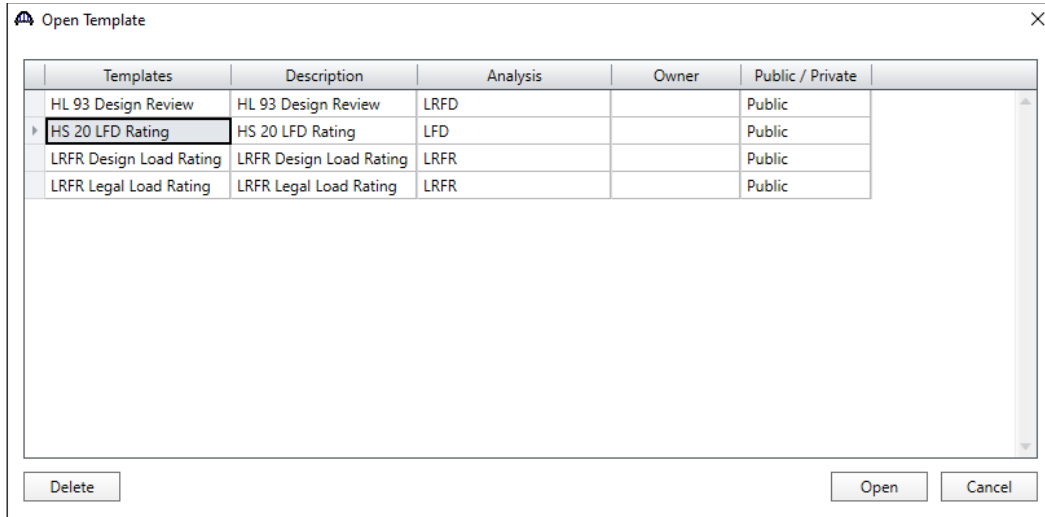
The screenshot shows the 'Metal Box Culvert Properties' dialog box. It has a title bar with a minimize, maximize, and close button. The 'Material type' section has radio buttons for 'Steel' (selected) and 'Aluminum'. The 'Material' dropdown menu is set to 'Steel - Corrugated'. The 'Section properties' section contains a 'Copy from library' button, a text box for 'Name' with the value 'Stl 15" x 5 1/4" Corrugated Pipe No Rib', and two input fields for 'Mp crown' and 'Mp haunch', both set to '30.40 kip-ft/ft'. The 'Condition' section has two input fields for 'Mp crown adjustment factor' and 'Mp haunch adjustment factor', both set to '100.00 %'. At the bottom right, there are three buttons: 'OK', 'Apply', and 'Cancel'.

The description of the metal box culvert is complete. To save the new culvert to the database, click the Save button on Workspace ribbon.

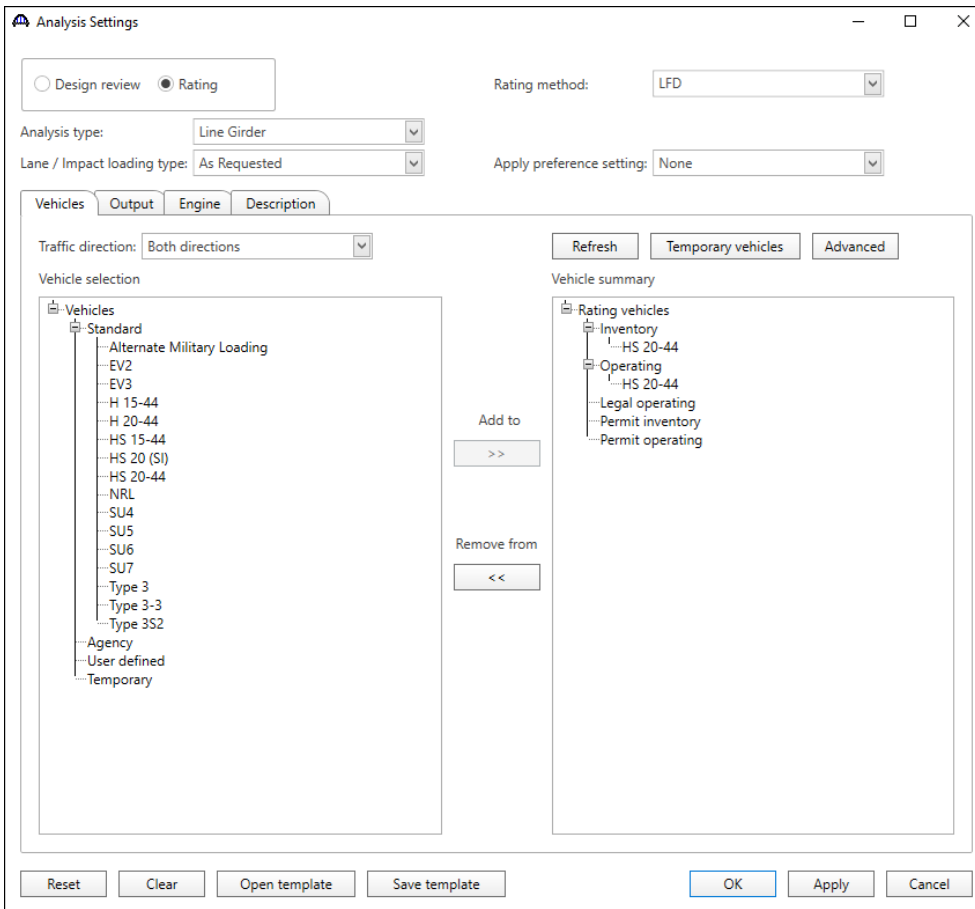


**LFD Rating:**

To perform LFR rating, open the Analysis Settings window under the DESIGN/RATE tab in the ribbon. Click on Open template button and select the HS 20 LFD Rating template and click Open.

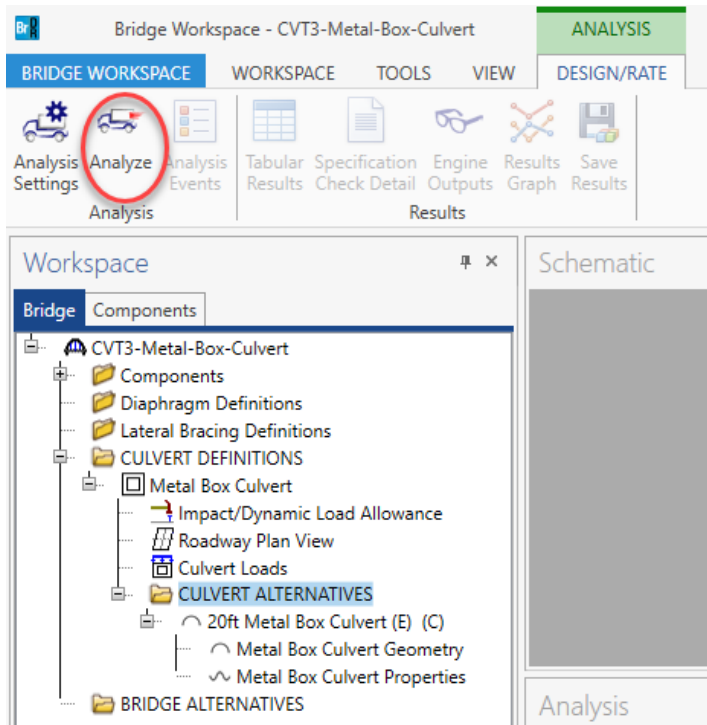


The Analysis Settings window will be populated as shown below. Click OK to save the analysis settings to memory and close the window.

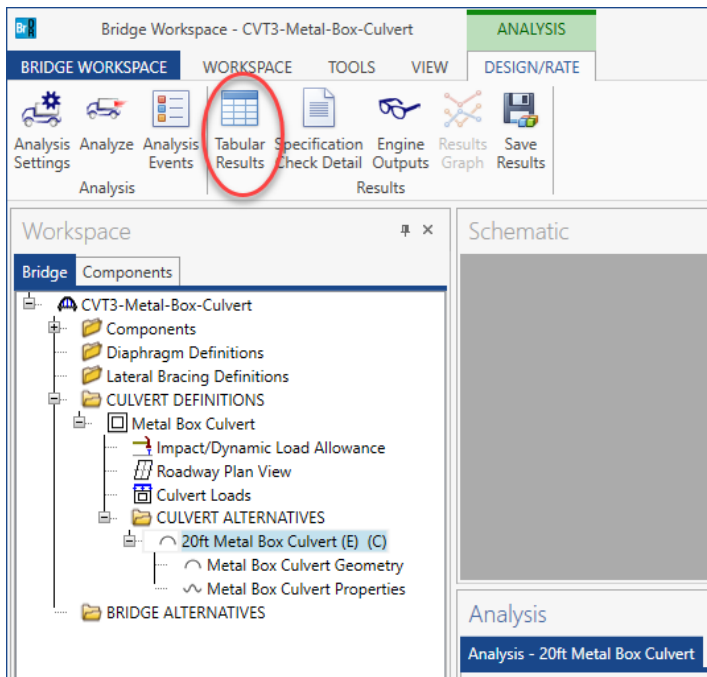


## CVT3 - Metal Box Culvert Example

Select “20ft Metal Box Culvert” culvert alternative in the Bridge tree and select Analyze on the Analysis group of the DESIGN/RATE ribbon to start the rating process.



Once the analysis is complete, click on Tabular Results on the Results group of the DESIGN/RATE ribbon to review the results.





## CVT3 - Metal Box Culvert Example

Analysis Results - 20ft Metal Box Culvert

Print

Report type: Rating Results Summary

Lane/Impact loading type:  As requested  Detailed

Display Format: Single rating level per row

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Limit State	Impact	Lane
HS 20-44	Axle Load	LFD	Inventory	64.36	1.788	Plastic Moment	As Requested	As Requested
HS 20-44	Axle Load	LFD	Operating	107.47	2.985	Plastic Moment	As Requested	As Requested

AASHTO Metal Culvert LFD Engine Version 7.3.0.3001  
Analysis preference setting: None

Close

To review detailed rating results at the controlling location, click the Specification Check Detail button on the Results group of the Design/Rate ribbon to open the Specification window.

Bridge Workspace - CVT3-Metal-Box-Culvert

ANALYSIS

BRIDGE WORKSPACE WORKSPACE TOOLS VIEW DESIGN/RATE

Analysis Settings Analyze Analysis Events Tabular Results **Specification Check Detail** Engine Outputs Results Graph Save Results

Workspace

- Bridge Components
  - CVT3-Metal-Box-Culvert
    - Components
    - Diaphragm Definitions
    - Lateral Bracing Definitions
    - CULVERT DEFINITIONS
      - Metal Box Culvert
        - Impact/Dynamic Load Allowance
        - Roadway Plan View
        - Culvert Loads
        - CULVERT ALTERNATIVES
          - 20ft Metal Box Culvert (E) (C)
            - Metal Box Culvert Geometry
            - Metal Box Culvert Properties
    - BRIDGE ALTERNATIVES

Schematic

Analysis

Analysis - 20ft Metal Box Culvert

## CVT3 - Metal Box Culvert Example

Specification Checks for 20ft Metal Box Culvert - 7 of 7

Articles: All articles  
Format: Bullet list  
Report

Specification filter

- Culvert Component
  - Stage 3
    - 20ft Metal Box Culvert
      - 20ft Metal Box Culvert

Specification reference	Limit State	Flex. Sense	Pass/Fail
12.8.4.3 Plastic Moment Requirements		N/A	General Comp.
12.8.4.3.C Plastic Moment Requirements - C Factors		N/A	General Comp.
12.8.4.3.DL Plastic Moment Requirements - Dead Load		N/A	General Comp.
12.8.4.3.K Plastic Moment Requirements - K Factors		N/A	General Comp.
12.8.4.3.LL Plastic Moment Requirements - Live Load		N/A	General Comp.
3.8.2.3 Culvert Impact Factor		N/A	General Comp.
✓ 6B.4.1 Metal Plate Box Culvert Rating - Plastic Moment		N/A	Passed

Double click on the 6B.4.1 Metal Plate Box Culvert Rating – Plastic Moment specification article to open the Spec Check Detail window.

Spec Check Detail for 6B.4.1 Metal Plate Box Culvert Rating - Plastic Moment

Part B - ALLOWABLE STRESS RATING AND LOAD FACTOR RATING  
6B.4 RATING EQUATION  
6B.4.1 General Plastic Moment  
(AASHTO Manual for Bridge Evaluation, Third Edition with 2022 Interims)

Metal Culvert - 20ft Metal Box Culvert - Center Stage 3

Input:  
Ignore negligible live load: No  
Resistance Factor (phi) = 1.00  
Crown Plastic Moment Capacity (MpC) = 30.40  
Haunch Plastic Moment Capacity (MpH) = 30.40

Plastic Moment Capacity

$$RF = \frac{\phi * Mp - A_{ev} * M_E}{A_2 * M_{LL+IM}} \quad (6B.4.1)$$

Load	Load Combo	M <sub>E</sub> (kip-ft/ft)	Crown M <sub>LL+IM</sub> (kip-ft/ft)	M <sub>p</sub> (kip-ft/ft)	M <sub>E</sub> (kip-ft/ft)	Haunch M <sub>LL+IM</sub> (kip-ft/ft)	M <sub>p</sub> (kip-ft/ft)	Load Factors A <sub>ev</sub>	A <sub>2</sub>	Crown RF	Haunch RF	RF	Capacity (kip)
Inventory	1	3.50	6.07	30.40	3.81	5.76	30.40	1.95	2.17	1.788	1.836	1.788	128.71
Operating	1	3.50	6.07	30.40	3.81	5.76	30.40	1.95	1.30	2.985	3.067	2.985	214.95

Load Combination Legend:

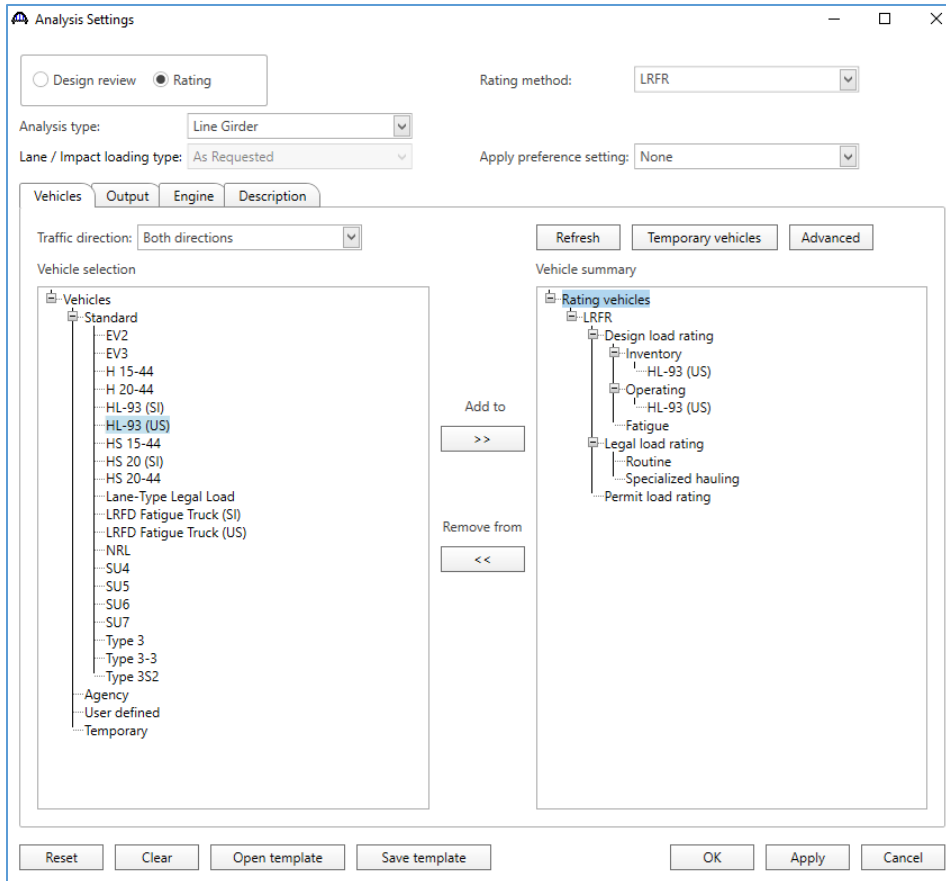
Code	Vehicle
1	HS 20-44 - Truck

OK

## CVT3 - Metal Box Culvert Example

### LRFR Rating:

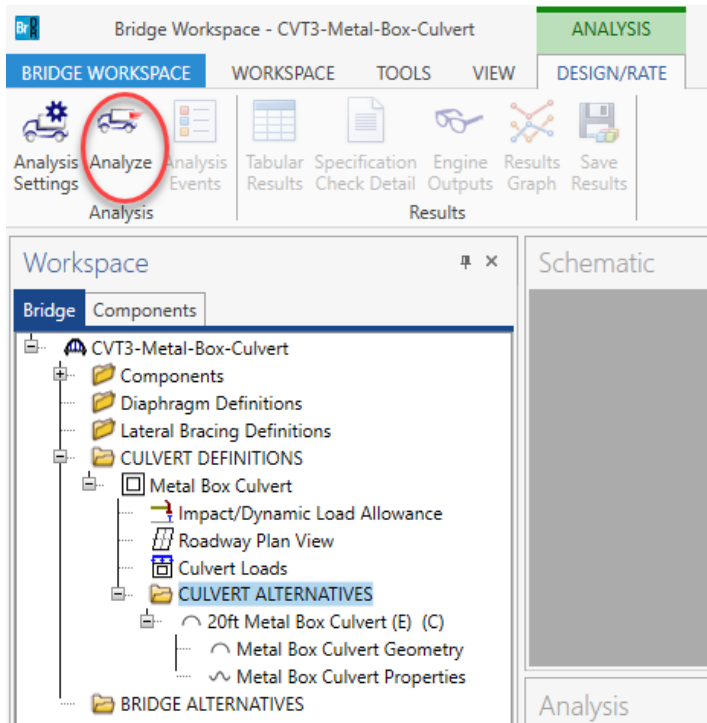
To perform LRFR Design Load Rating, open the Analysis Settings window under the DESIGN/RATE tab in the ribbon. Select LRFR as the Rating Method and specify the HL-93 (US) vehicle for LRFR Inventory and Operating Design Load Rating.



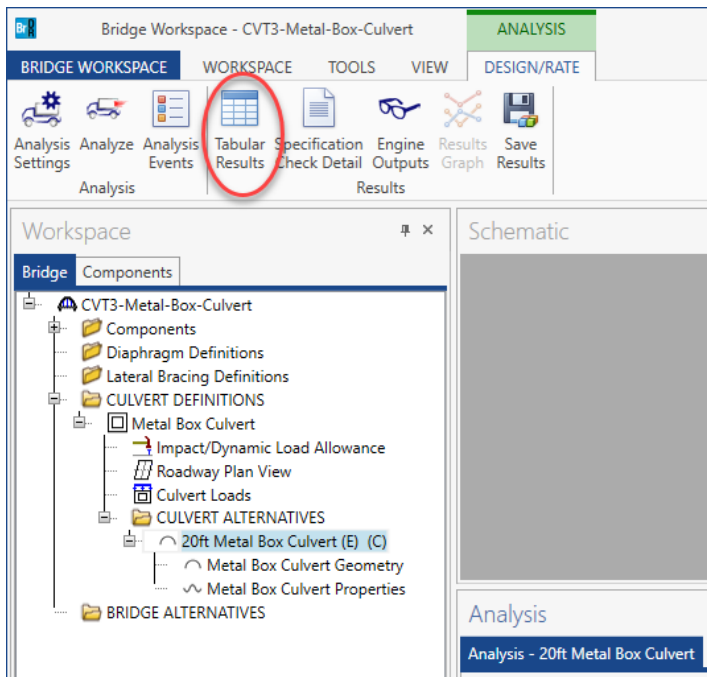
Click Ok to save the analysis settings to memory and close the window.

## CVT3 - Metal Box Culvert Example

Select “20ft Metal Box Culvert” member alternative in the bridge tree and select Analyze on the Manage group under the DESIGN/RATE ribbon to start the rating process.



Once the analysis is complete, click on Tabular Results on the Results group of the Design/Rate ribbon to review the results.



## CVT3 - Metal Box Culvert Example

Analysis Results - 20ft Metal Box Culvert

Print

Report type: Rating Results Summary

Lane/Impact loading type:  As requested  Detailed

Display Format: Single rating level per row

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Limit State	Impact	Lane
HL-93 (US)	Axle Load	LRFR	Inventory	49.17	1.366	STRENGTH-I Plastic Moment	As Requested	As Requested
HL-93 (US)	Axle Load	LRFR	Operating	72.84	2.023	STRENGTH-I Plastic Moment	As Requested	As Requested
HL-93 (US)	Tandem	LRFR	Inventory	62.63	1.740	STRENGTH-I Plastic Moment	As Requested	As Requested
HL-93 (US)	Tandem	LRFR	Operating	92.78	2.577	STRENGTH-I Plastic Moment	As Requested	As Requested

AASHTO Metal Culvert LRFR Engine Version 7.3.0.3001  
Analysis preference setting: None

Close

To review detailed rating results at the controlling location, click the Specification Check Detail button on the Results group of the Design/Rate ribbon to open the Specification window.

Bridge Workspace - CVT3-Metal-Box-Culvert

ANALYSIS

BRIDGE WORKSPACE WORKSPACE TOOLS VIEW DESIGN/RATE

Analysis Settings Analyze Analysis Events Tabular Results **Specification Check Detail** Engine Outputs Results Graph Save Results

Workspace

- Bridge Components
  - CVT3-Metal-Box-Culvert
    - Components
    - Diaphragm Definitions
    - Lateral Bracing Definitions
    - CULVERT DEFINITIONS
      - Metal Box Culvert
        - Impact/Dynamic Load Allowance
        - Roadway Plan View
        - Culvert Loads
        - CULVERT ALTERNATIVES
          - 20ft Metal Box Culvert (E) (C)
            - Metal Box Culvert Geometry
            - Metal Box Culvert Properties

Schematic

Analysis

Analysis - 20ft Metal Box Culvert

## CVT3 - Metal Box Culvert Example

Specification Checks for 20ft Metal Box Culvert - 8 of 8

Articles: All articles  
Format: Bullet list

Specification filter: Report

Specification reference	Limit State	Flex. Sense	Pass/Fail
12.9.4.2.C Moments due to Factored Loads - C Factors		N/A	General Comp.
12.9.4.2.DL Moments due to Factored Loads - Dead Load		N/A	General Comp.
12.9.4.2.K Moments due to Factored Loads - K Factors		N/A	General Comp.
12.9.4.2.LL Moments due to Factored Loads - Live Load		N/A	General Comp.
12.9.4.3 Plastic Moment Resistance		N/A	General Comp.
12.9.4.4 Crown Soil Cover Factor		N/A	General Comp.
3.6.2.2 Culvert Dynamic Load Allowance		N/A	General Comp.
✓ 6A.10.4 Culvert Load Rating Equation - Plastic Moment		N/A	Passed

Double-click on the 6A.10.4 Culvert Load Rating Equation – Plastic Moment specification article to open the Spec Check Detail window.

Spec Check Detail for 6A.10.4 Culvert Load Rating Equation - Plastic Moment

Part A - LOAD AND RESISTANCE FACTOR RATING  
6A.10 Rating of Culverts  
6A.10.4 Load Rating Equation for Culverts  
Plastic Moment  
(AASHTO Manual for Bridge Evaluation, Third Edition with 2022 Interims)

Metal Culvert - 20ft Metal Box Culvert - Center Stage 3

Input:

Ignore negligible live load: No  
Depth of fill and backfill density are known: No  
Condition Factor (phiC) = 1.00  
System Factor (phiS) = 1.00  
Resistance Factor (phi) = 1.00  
Vertical Earth Load Modifier (etaR) = 1.05  
Crown Plastic Moment Capacity (MpC) = 30.40  
Haunch Plastic Moment Capacity (MpH) = 30.40

Plastic Moment Capacity

$$RF = \frac{\phi C * \phi S * \phi * Mp - \eta R * \gamma_{EV} * M_E}{\gamma_{LL} * M_{LL+IM}} \quad (6A.10.4-1)$$

Load	Load Combo	Limit State	M_E (kip-ft/ft)	Crown M_LL+IM (kip-ft/ft)	Mp (kip-ft/ft)	M_E (kip-ft/ft)	Haunch M_LL+IM (kip-ft/ft)	Mp (kip-ft/ft)	Load Factors EV	Load Factors LL	Crown RF	Haunch RF	RF	Capacity (kip)
DesignInv	1	STR-I	3.60	9.05	30.40	3.97	8.68	30.40	1.50	2.00	1.366	1.390	1.366	98.33
DesignInv	1	STR-I	3.60	9.05	30.40	3.97	8.68	30.40	0.90	2.00	1.491	1.534	1.491	107.36
DesignOp	1	STR-I	3.60	9.05	30.40	3.97	8.68	30.40	1.50	1.35	2.023	2.060	2.023	145.68
DesignOp	1	STR-I	3.60	9.05	30.40	3.97	8.68	30.40	0.90	1.35	2.209	2.273	2.209	159.05
DesignInv	2	STR-I	3.62	7.10	30.40	3.96	6.76	30.40	1.50	2.00	1.740	1.788	1.740	125.25
DesignInv	2	STR-I	3.62	7.10	30.40	3.96	6.76	30.40	0.90	2.00	1.900	1.972	1.900	136.81
DesignOp	2	STR-I	3.62	7.10	30.40	3.96	6.76	30.40	1.50	1.35	2.577	2.648	2.577	185.56
DesignOp	2	STR-I	3.62	7.10	30.40	3.96	6.76	30.40	0.90	1.35	2.815	2.922	2.815	202.68

Load Combination Legend:

Code	Vehicle
1	HL-93 (US) - Truck
2	HL-93 (US) - Tandem

OK