

ASSET VALUE CALCULATION IN INFOBRIDGE

The asset value tool in InfoBridge™ provides an estimate of the replacement value, existing value (EV), and remaining value of user-selected bridges.¹ Under Analytics, select the Asset Valuation tool. The tool can also be accessed from the Tools menu.

REPLACEMENT VALUE

The replacement value of a bridge is based on the deck area and the unit cost of replacement of the bridge. The deck area is calculated by multiplying the structure length with the out-to-out deck width or approach roadway width, as applicable. The replacement unit cost can be specified by the user. Alternatively, the cost can be selected from the [Bridge Replacement Unit Costs](#) web page, which is compiled by the Federal Highway Administration and is based on data submitted by the States.²

For the Asset Valuation of Selected Bridges, the Replacement Unit Cost for each State is calculated as the number shown in the column titled “Estimated 2022 Total Costs (dollars) Assuming Replacement of Total Number of POOR NHS and non-NHS Bridges” divided by the number shown in the column titled “Total Area of POOR NHS and non-NHS Bridges 2022 (ft²)” of the table for the combined Poor NHS and non-NHS Bridges.

For the Asset Valuation by State:

- For the Interstate and NHS bridges, the Replacement Unit Cost for each State is as shown in the column titled “Cost Used for 2022 Estimates” of the table for Poor NHS Bridges.
- For Non-NHS bridges, the Replacement Unit Cost for each State is as shown in the column titled “Cost Used for 2022 Estimates” of the table for Poor non-NHS Bridges.
- For All Bridges, the Replacement Unit Cost for each State is calculated as the number shown in the column titled “Estimated 2022 Total Costs (dollars) Assuming Replacement of Total Number of POOR NHS and non-NHS Bridges” divided by the number shown in the column titled “Total Area of POOR NHS and non-NHS Bridges 2022 (ft²)” of the table for the combined Poor NHS and non-NHS Bridges.

The default value used by the tool is the national average bridge replacement unit cost.

The replacement unit costs used for the estimates are determined by averaging the current and the previous 2 yr of submitted replacement unit costs of bridges. Exceptions occur as follows:

- When cost data are not submitted for a particular year in the 3-yr period, an average of the costs submitted is used.

¹Federal Highway Administration. n.d. “LTBP InfoBridge™” (web page). <https://infobridge.fhwa.dot.gov/>, last accessed November 21, 2023.

²Federal Highway Administration. 2023. “Bridge Replacement Unit Costs” (web page). <https://www.fhwa.dot.gov/bridge/nbi/sd.cfm>, last accessed December 18, 2023.

- When no cost data are submitted for the entire 3-yr period, the national average of the costs collected for the current year is used.
- To minimize variations in bridge construction costs, which may vary from year to year, an average unit cost is used because it is a good measure of central tendency.

As explained in the Bridge Replacement Cost Submittal Criteria, for the calculation of the average replacement unit cost, the States are advised to exclude culverts and bridges involving unusual circumstances or types of construction that are not routinely used by the State.³ The States are also advised to exclude culverts and bridges that can significantly raise or lower the unit cost. Generally, certain types of bridges can be identified as unusual movable, cable stayed, suspension, segmental, and other structures that have a clear, unsupported length longer than 500 ft. However, some States that have built numerous types of unusual bridges, such as segmental bridges, may no longer consider such bridges to be unusual. Therefore, the States are given some discretion in determining the definition of unusual. Unusual circumstances may include extremely difficult access conditions and the occurrence of extreme events during construction.

Please note, however, that it is the responsibility of the InfoBridge user to exclude culverts and unusual bridges, if so desired. The asset valuation tool applies the same average unit cost of construction specified by the user to all selected bridges.

EV

The EV calculation discounts the replacement value of a bridge based on the bridge condition utility value (BCUV) and the load condition (operating rating) utility value (LCUV). These two quantities are equally weighted: $BCUVWt = 0.5$ and $LCUVWt = 0.5$.

The BCUV depends on the condition values for its deck (DCV), superstructure (SupCV), and substructure (SubCV), and on the weights assigned to the bridge's components. All components of the bridge are assigned equal weights. As shown below, if a component of a bridge is absent, the weight is equally shared by its two components.

³Federal Highway Administration. 2017. "Bridges & Structures: Bridge Replacement Cost Submittal Criteria" (web page). https://www.fhwa.dot.gov/bridge/nbi/uc_criteria.cfm, last accessed November 21, 2023.

Weights for Bridge Components and Culverts			
Deck Weight	Superstructure Weight	Substructure Weights	Culvert Weights
0.34	0.33	0.33	
	0.50	0.50	
0.50		0.50	
0.50	0.50		
	1.00		

Source: FHWA.

Figure 1. Weights for bridge components and culverts.

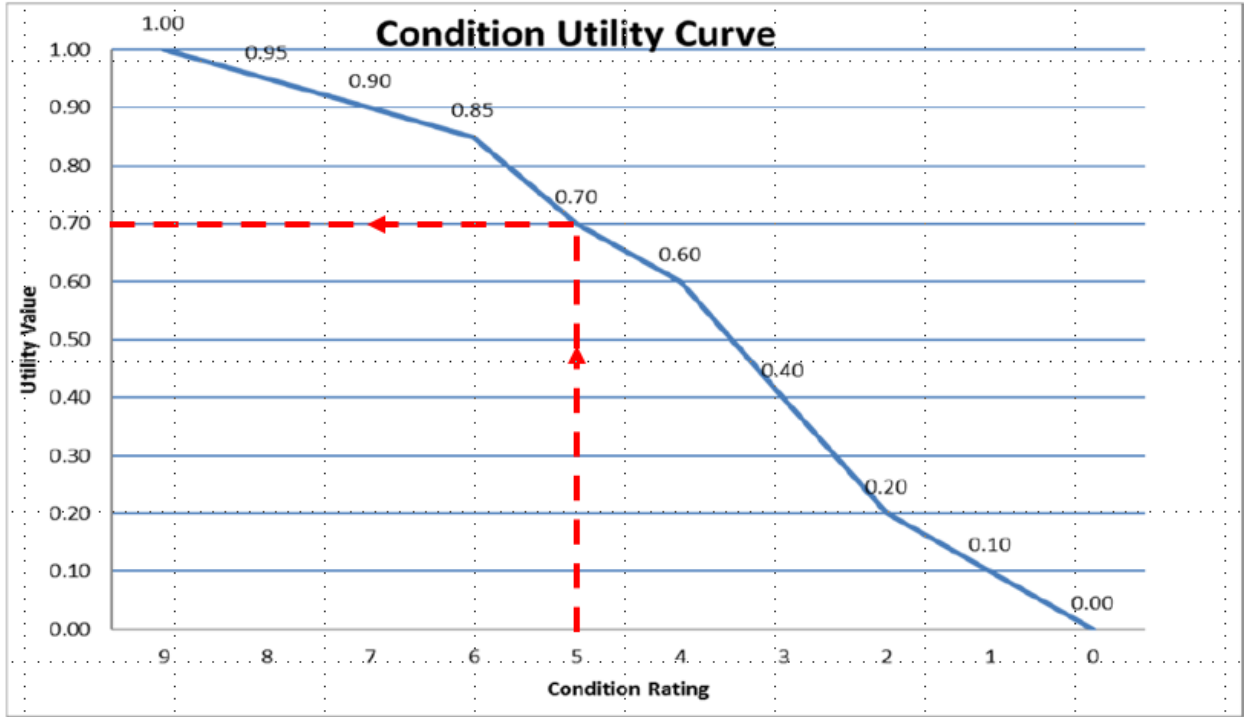
As an example, for a bridge with all three components (DCV, SupCV, and SubCV), the BCUV is calculated as follows:

$$BCUV = (DCV * 0.34) + (SupCV * 0.33) + (SubCV * 0.33)$$

The following curves are used to calculate the BCUV and the LCUV. For simplicity, instead of using interpolation, the lower bound value is used for computing the LCUV for a given operating rating in metric tons.

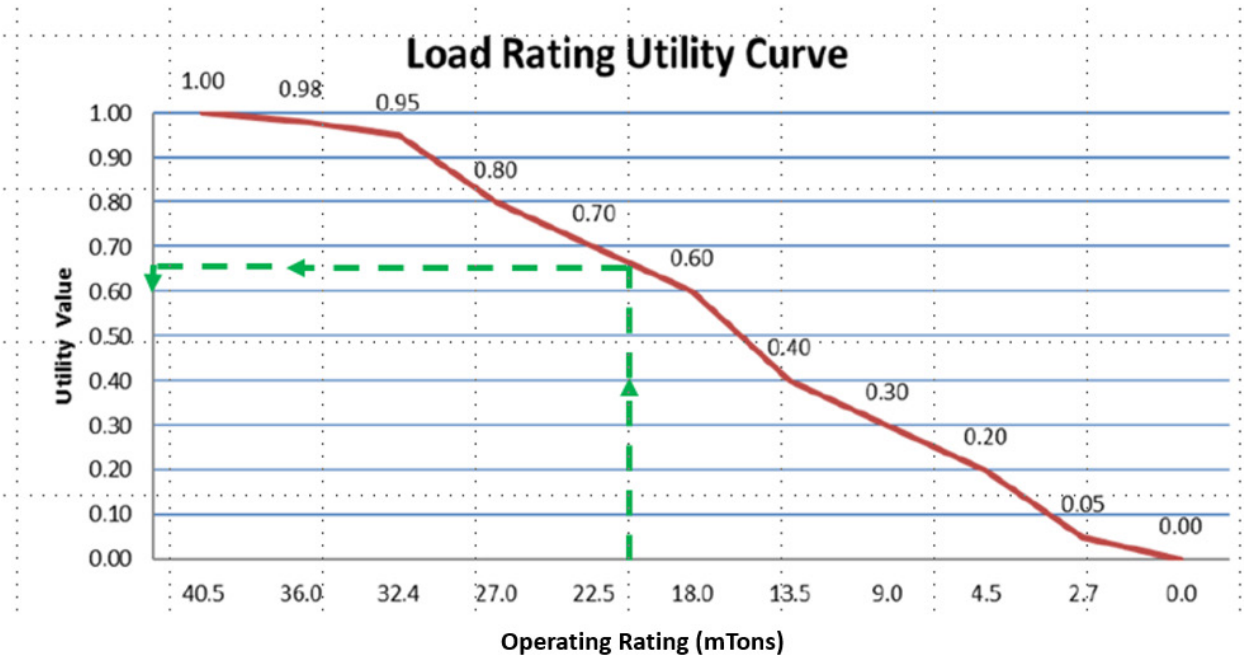
The EV is calculated using the following formula:

$$EV = (Replacement\ Value) * ((BCUV * BCUVWt) + (LCUV * LCUVWt))$$



Source: FHWA.

Figure 2. Condition utility curve.



Source: FHWA.
mTons = metric tons.

Figure 3. Load rating utility curve.

REMAINING VALUE (PERCENT)

The remaining value is calculated by dividing the EV by the replacement value.

ASSET VALUATION BY STATE

The asset value tool in InfoBridge provides the user with a State-wise summary of the replacement value, EV, and remaining value of bridges in each State. The bridges can be grouped by all bridges, interstate bridges, National Highway System (NHS) bridges, and non-NHS bridges. The information is shown in a tabular form and on the map.