
AASHTOWare BrD/BrR 7.0.0

Library Tutorial

LIB1 - Libraries

Library Concepts

The libraries of BrD/BrR allow for the description of items that are standardized or used frequently in the description of a bridge or by analysis events. The libraries of BrD/BrR currently define the following items:

- Steel Shapes
- PS Shapes
- Timber Shapes
- Factors (LFD, LRFD, LRFR)
- Vehicles
- LRFD DF Applicability Ranges
- LRFD Substructure Design Settings
- Materials (steel, concrete, etc.)
- Appurtenances (parapets, medians, railings, etc.)
- Connectors (bolts, nails)
- Corrugated Metal Panel

BrD/BrR is pre-loaded with library items selected by AASHTO. Details for these included items were obtained from various sources including the following:

- *AASHTO LRFD Bridge Design Specifications*
- *AASHTO Manual for Bridge Evaluation*
- *AASHTO Standard Specifications for Highway Bridges*
- *AASHTO Standard Specifications for Transportation Materials*
- *AISC Manual of Steel Construction*
- *PCI Precast Prestressed Concrete Bridge Design Manual*

Library Types

Three types of library items:

Standard Items added to database by AASHTO. Standard library items are not editable.

Agency All items added to the library by a user.

User Defined Only available for vehicles.

Using Library Data

Two methods to use library items:

Linking Library item is associated with a bridge component or analysis event. If the library item is modified then the updated data is used by the bridge component or analysis event. (Factors, Vehicles, LRFD DF Applicability Ranges)

Copying Data from library item copied from a library item to a bridge item. A change in a library item has no effect on bridge items that use data previously copied from that library item. (Steel Shapes, PS Shapes, Timber Shapes, Factors, LRFD Substructure Design Settings, Materials, Appurtenances, Connections, Corrugated Metal Panel)

Linking is used to reduce amount of data stored in database for items that are unlikely to be modified.

Library Security

- Library access can be restricted for read, write, create, and delete access.
- Access restrictions apply to all libraries for a given user or group of users.
- It is recommended to limit the number of users with write, create, and delete access.
 - Reduce possibility of incorrect data.
 - Reduce duplicate items and inappropriate items.

Library Explorer

The Library Explorer is used to navigate the various libraries. The tree control in the left pane organizes the libraries. The item selected in the tree control determines the library items to be listed in the upper portion of the right pane of the window.

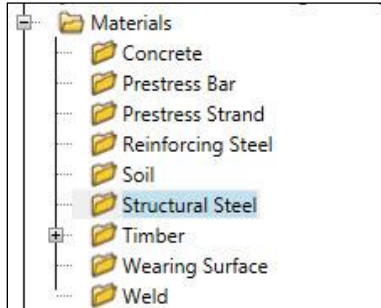
The screenshot shows the 'LIBRARY' window in AASHTOWare Bridge Design and Rating. The left pane, titled 'BRIDGE EXPLORER', contains a tree view of library categories. The right pane displays a table of library items.

Library	Units	Name	Description
Standard	US Customary	1905 to 1936	Built 1905 to 1936 - steel unknown
Standard	US Customary	1936 to 1963	Built 1936 to 1963 - steel unknown
Standard	US Customary	AASHTO M 94(1961)	AASHTO M 94(1961) or ASTM A 7(1967)
Standard	US Customary	AASHTO M 95(1961)	AASHTO M 95(1961) or ASTM A 94(1966)
Standard	US Customary	AASHTO M 96(1961)	AASHTO M 96(1961) or ASTM A 8(1961)
Standard	US Customary	AASHTO M188	AASHTO M 188 or ASTM A 441 - >4" to 8" thick, incl...
Standard	US Customary	After 1963	Built after 1963 - steel unknown
Standard	US Customary	ASTM A242 - <= 3/4"	ASTM A 242 - 3/4" thick and under
Standard	US Customary	ASTM A242 - > 1 1/2" to 4" incl.	ASTM A 242 - over 1 1/2" to 4" thick, inclusive
Standard	US Customary	ASTM A242 - > 3/4" to 1 1/2" incl.	ASTM A 242 - over 3/4" to 1 1/2" thick, inclusive
Standard	US Customary	ASTM A36	ASTM A 36
Standard	US Customary	ASTM A440 - <= 3/4"	ASTM A 440 - 3/4" thick and under
Standard	US Customary	ASTM A440 - > 1 1/2" to 4" incl.	ASTM A 440 - over 1 1/2" to 4" thick, inclusive
Standard	US Customary	ASTM A440 - > 3/4" to 1 1/2" incl.	ASTM A 440 - over 3/4" to 1 1/2" thick, inclusive
Standard	US Customary	ASTM A441 - > 3/4" to 1 1/2" incl.	ASTM A 441 - over 3/4" to 1 1/2" thick, inclusive
Standard	US Customary	ASTM A441 - <= 3/4"	ASTM A 441 - 3/4" thick and under
Standard	US Customary	ASTM A441 - > 1 1/2" to 4" incl.	ASTM A 441 - over 1 1/2" to 4" thick, inclusive
Standard	US Customary	ASTM A441 - > 4" to 8" incl.	ASTM A 441 - over 4" to 8" thick, inclusive
Standard	US Customary	ASTM A514 - over 2 1/2" to 4" incl.	ASTM A 514 - over 2 1/2" to 4" thick, inclusive
Standard	US Customary	ASTM A514 - to 2 1/2" incl.	ASTM A 514 - to 2 1/2" thick, inclusive
Standard	US Customary	ASTM A517	ASTM A 517 - all thicknesses

Exercise

Add Steel Material Library Item

1. Select the tree item Materials/Structural Steel/ in the Library Explorer as shown below.



2. Select New from the ribbon. A “Materials: Structural Steel: New Item” tab opens in the bottom portion of the right pane of the window. Notice that Agency defined is preselected and cannot be changed. Only Users with privileges can edit or create items for the Standard Library.
3. Select the system of units using the radio buttons and then fill in the structural steel information as shown below. Note that the name must be unique among all structural steel library items.

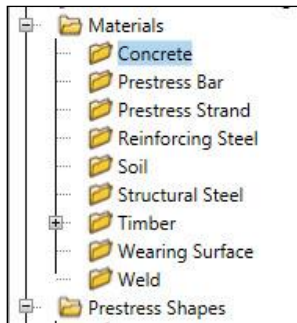
 A screenshot of a dialog box titled "Materials: Structural Steel: New Item". The dialog contains the following fields and options:

- Name: Steel 1
- Description: AASHTO M270 Grade 50W
- Store units as: Radio buttons for US (selected) and SI.
- Library: Radio buttons for Standard and Agency defined (selected).
- Material properties section:
 - Specified minimum yield strength (Fy): 50.000 ksi
 - Specified minimum tensile strength (Fu): 70.000 ksi
 - Coefficient of thermal expansion: 0.0000065000 1/F
 - Density: 0.4900 kcf
 - Modulus of elasticity (E): 29000.00 ksi
- Buttons: Save and Close.

4. Click Save. The new structural steel material will now be listed in the right pane of the Library Explorer for the tree item Materials/Structural Steel.

Add Concrete Material Library Item

1. Select the tree item Materials/Concrete in the Library Explorer as shown below.



5. Select New from the ribbon. A “Materials: Concrete: New Item” tab opens in the bottom portion of the right pane of the window. Notice that Agency defined is preselected and cannot be changed. Only Users with privileges can edit or create items for the Standard Library.
2. Select the system of units using the radio buttons and then fill in the concrete information as shown below. Note that the name must be unique among all concrete library items. Only the items in the top portion of the list need to be entered. Select the Compute button and the various values for modulus of elasticity and modulus of rupture are calculated. We do not need the modulus of rupture so it can be deleted.

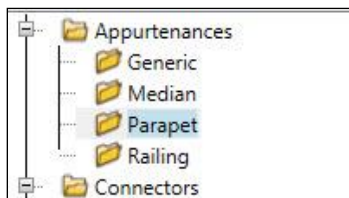
A screenshot of the 'Materials: Concrete: PS 6.5 ksi' dialog box. The window title bar shows two tabs: 'Materials: Structural Steel: New Item' and 'Materials: Concrete: PS 6.5 ksi'. The dialog contains the following fields and controls:

- Name:** PS 6.5 ksi
- Description:** PS 6.5 ksi (f'c = 5.5 ksi)
- Store units as:** Radio buttons for US (selected), SI, and Agency defined.
- Library:** Radio buttons for Standard and Agency defined (selected).
- Compressive strength at 28 days (f'c):** 6.500 ksi
- Initial compressive strength (f'ci):** 5.500 ksi
- Composition of concrete:** Normal (dropdown menu)
- Density (for dead loads):** 0.150 kcf
- Density (for modulus of elasticity):** 0.150 kcf
- Poisson's ratio:** 0.200
- Coefficient of thermal expansion:** 0.0000060000 1/F
- Splitting tensile strength (fct):** (empty field) ksi
- Compute** button
- Std modulus of elasticity (Ec):** 4887.73 ksi
- LRFD modulus of elasticity (Ec):** 5007.55 ksi
- Std initial modulus of elasticity:** 4496.06 ksi
- LRFD initial modulus of elasticity:** 4738.96 ksi
- Modulus of rupture:** (empty field) ksi
- Shear factor:** 1.000
- Save** and **Close** buttons at the bottom right.

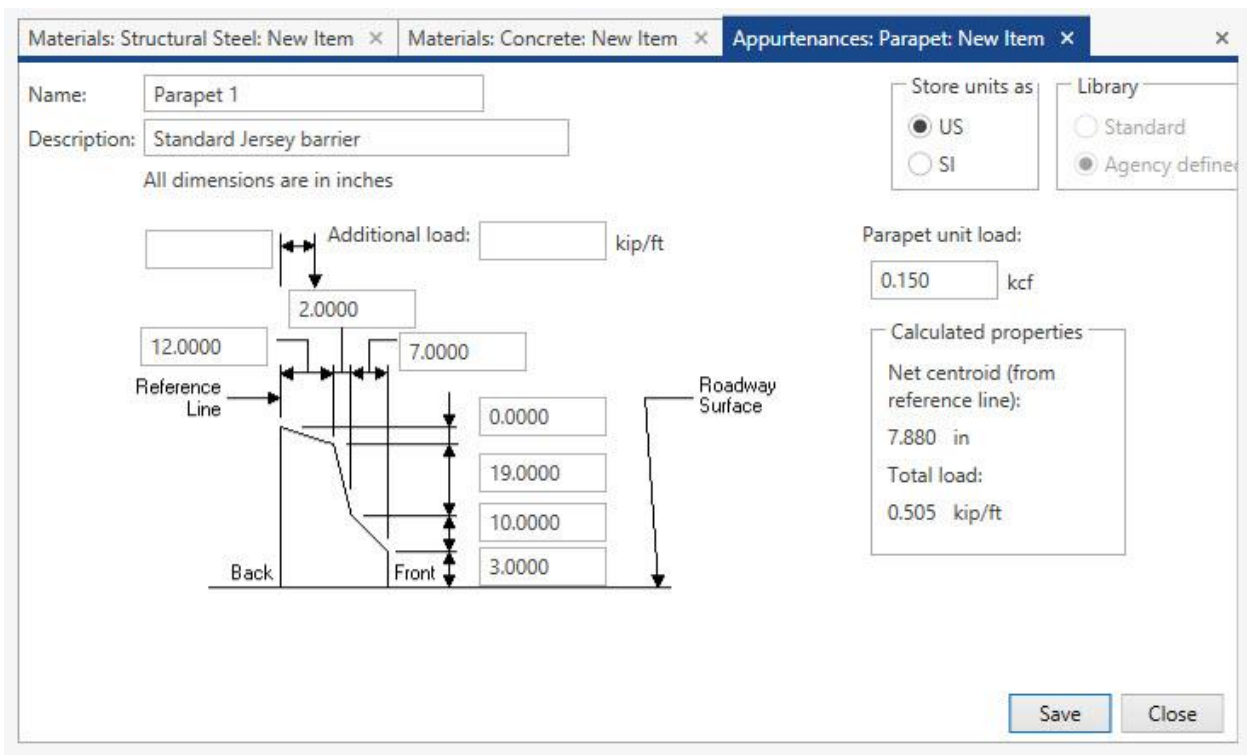
3. Click Save. The new concrete material will now be listed in the right pane of the Library Explorer for the tree item Materials/Concrete.

Add Parapet Library Item

1. Select the tree item Appurtenances/Parapet in the Library Explorer as shown below.



6. Select New from the ribbon. An “Appurtenances: Parapet: New Item” tab opens in the bottom portion of the right pane of the window. Notice that Agency defined is preselected and cannot be changed. Only Users with privileges can edit or create items for the Standard Library.
2. Select the system of units using the radio buttons and then fill in the parapet information as shown below. Note that the name must be unique among all parapet library items.



3. Click Save. The new parapet will now be listed in the right pane of the Library Explorer for the tree item Appurtenances/Parapet.

Add Vehicle Library Item

The Vehicle Library has a library type called 'User Defined'. This library allows users to add their own vehicles.

1. Select the tree item Vehicles/Standard Gage in the Library Explorer as shown below.



7. Select New from the ribbon. A Vehicle: Standard Gage: New Item tab opens in the bottom portion of the right pane of the window. On this window the user can choose between the Agency defined and User defined libraries. Only Users with privileges can edit or create items for the Standard Library.
2. Select the Library and system of units using the radio buttons and then fill in the vehicle information as shown below for all items not on the tab control. Note that the name must be unique among all vehicle library items. The checkboxes inside the Design and Rating groups are used to filter the vehicle during an analysis event based on the type of event and the type of analysis engine selected.

Vehicle: Standard gage: Vehicle 1

Name:

Description:

Store units as: US SI

Library: Standard Agency defined User defined

Truck **Tandem** Lane

Axle no.	Axle load (kip)	Gage dist. (ft)	Wheel contact width (in)	Axle spacing (ft)	
				Minimum	Maximum
1	8.00	6.00	10.0000		
2	32.00	6.00	20.0000	14.00	14.00
3	32.00	6.00	20.0000	14.00	30.00

Totals:

Notional vehicle

Rating: LRFD ASD/LFD LRFR

Design: LRFD ASD/LFD

3. Click the New button to add an axle to the vehicle.
4. Enter the first axle's dimensions. (Axle spacing is not applicable for the first axle.)

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- Repeat steps 4 and 5 for each additional axle.
- Select the Lane Tab.
- Enter data on the Lane tab as shown below.

Vehicle: Standard gage: Vehicle 1

Name:

Description:

Store units as:
 US
 SI

Library:
 Standard
 Agency defined
 User defined

Truck | Tandem | Lane

Load per axle line:

Uniform lane load: kip/ft

Concentrated load for moment: kip

Concentrated load for shear: kip

Add a second, equal magnitude concentrated load in one other span to determine maximum negative moment for continuous spans

Notional vehicle:

Rating:
 LRFD
 ASD/LFD
 LRFR

Design:
 LRFD
 ASD/LFD

Save Close

- Click Save. The new vehicle will now be listed in the right pane of the Library Explorer for the tree item Vehicles/Standard Gage.