

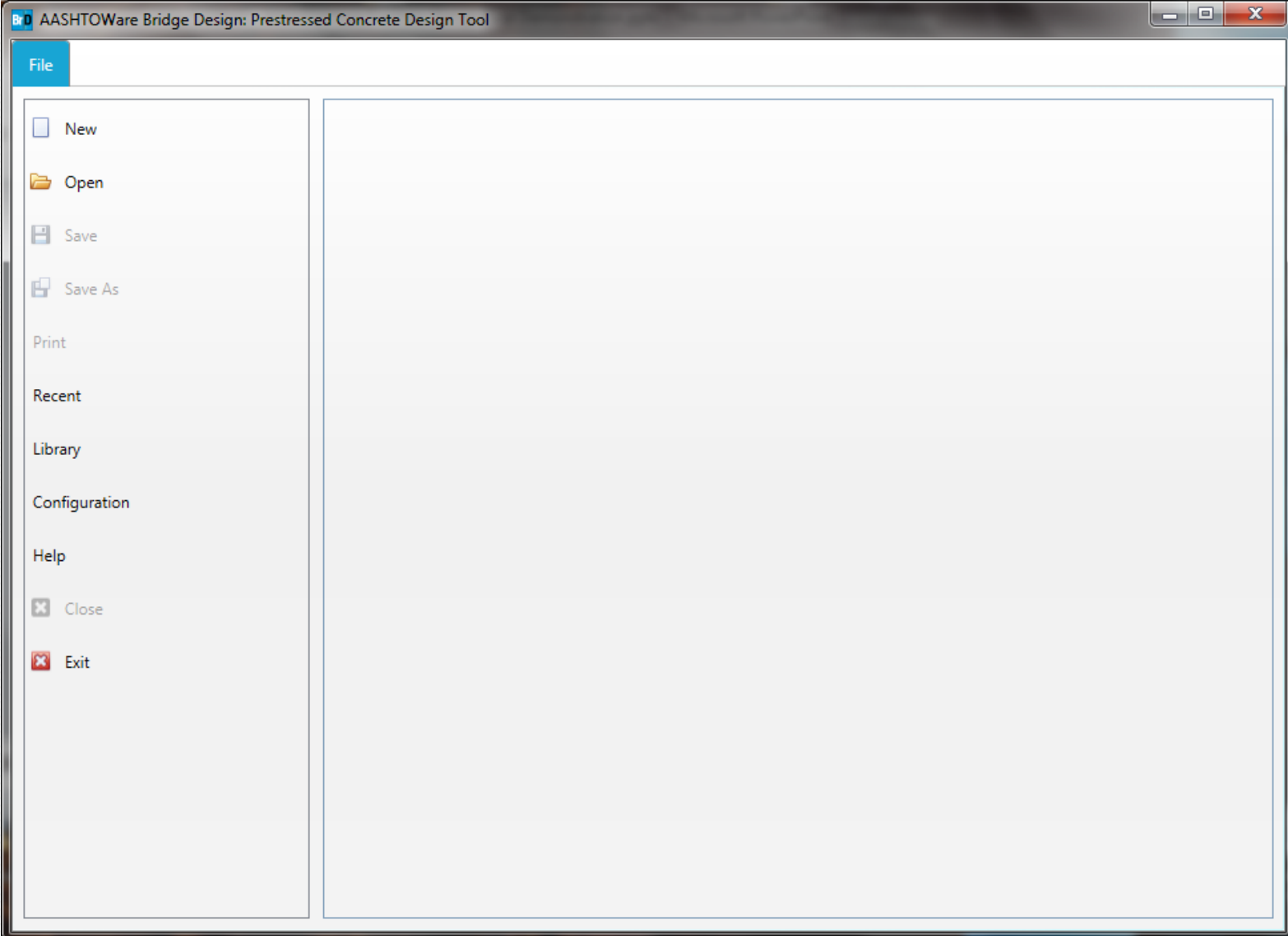
AASHTOWare Prestress Design Tool Demonstration

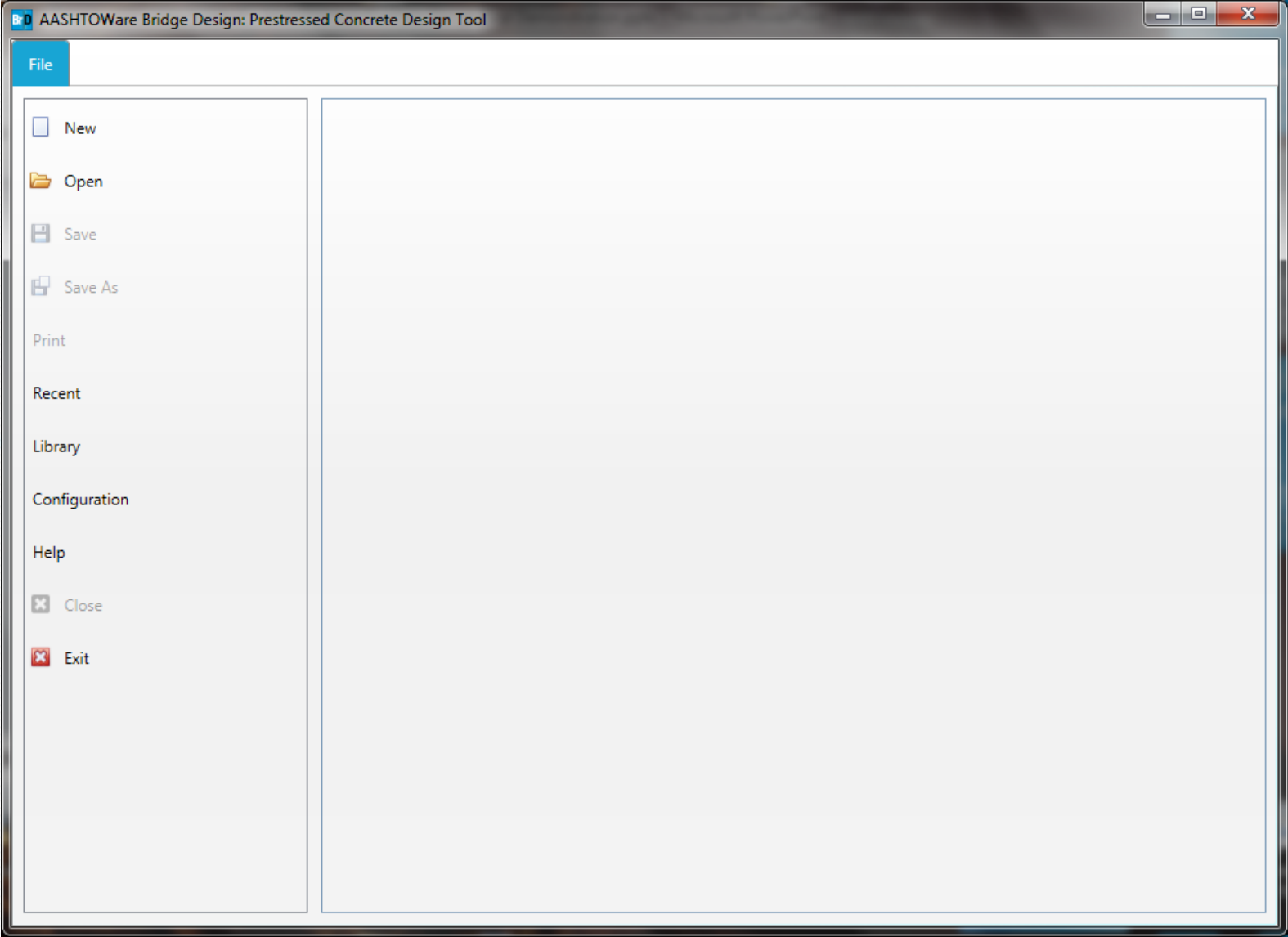
AASHTOWare Rating and Design Bridge User Group
Chicago, IL – August 2016

Jeff Ruby, P.E.
Kansas DOT

Design Tool Available

- Phase I included with Release 6.8 AASHTOWare BrDR
- Standalone App (New Icon on your Desktop)
- BrDR not needed to run it
- Tomorrow Afternoon BrD Training Session





File

New

Open

Save

Save As

Print

Recent

Library

Configuration

Help

Close

Exit



Bridge Design/Rating - [Library Explorer]

File Edit View Window Help

New Ctrl+N
Open Ctrl+O
Close
Save Ctrl+S
Database Information
Export...
Import...
Print... Ctrl+P
Print Preview
Print Setup...
Exit

Name Description

2	HP 10x42 Imported from AISC Tables (1994)
2	HP 10x42 Imported from AISC Tables (2011)
7	HP 10x57 Imported from AISC Tables (2011)
7	HP 10x57 Imported from AISC Tables (1994)
8	HP 12x53 Imported from AISC Tables (1994)
8	HP 12x53 Imported from AISC Tables (2011)
8	HP 12x63 Imported from AISC Tables (2011)
8	HP 12x63 Imported from AISC Tables (1994)
4	HP 12x74 Imported from AISC Tables (1994)
4	HP 12x74 Imported from AISC Tables (2011)
4	HP 12x84 Imported from AISC Tables (2011)
4	HP 12x84 Imported from AISC Tables (1994)
02	HP 14x102 Imported from AISC Tables (1994)
02	HP 14x102 Imported from AISC Tables (2011)
	HP 14x117
	HP 14x117 Imported from AISC Tables (2011)
	HP 14x117 Imported from AISC Tables (1994)
	HP 14x73
	HP 14x73 Imported from AISC Tables (1994)
	HP 14x73
	HP 14x73 Imported from AISC Tables (2011)
	HP 14x89
	HP 14x89 Imported from AISC Tables (2011)
	HP 14x89
	HP 14x89 Imported from AISC Tables (1994)
	HP 16x101
	HP 16x101 Imported from AISC Tables (2011)
	HP 16x121
	HP 16x121 Imported from AISC Tables (2011)
	HP 16x141
	HP 16x141 Imported from AISC Tables (2011)
	HP 16x162
	HP 16x162 Imported from AISC Tables (2011)
	HP 16x183
	HP 16x183 Imported from AISC Tables (2011)
	HP 16x88
	HP 16x88 Imported from AISC Tables (2011)
	HP 18x135
	HP 18x135 Imported from AISC Tables (2011)
	HP 18x157
	HP 18x157 Imported from AISC Tables (2011)

Timber Shapes
Rectangular
Factors
LRFD
LFD
LRFR
Vehicles
Standard Gage
Non-Standard Gage
LRFD DF Applicability Range
LRFD Substructure Design Se

Export Library Items

Library Export

Library Items:

- Steel Shapes
 - Rolled Beam
 - Standard
 - Agency
 - Channel
 - Angle
 - Tee
- PS Shapes
 - I Beams
 - Wide top flange
 - Narrow top flange
 - Box Beams
 - Rectangular void
 - Circular void
 - Tee Beams
 - U Beams
- Timber Shapes
 - Rectangular
- Factors
 - LRFD
 - LFD
 - LRFR
- Vehicles
 - Standard Gage

Details:

Name	Description
W 18 x 70	W 18 x 70 Imported from AISC Table Se
W 18x45	W18x45 Imported From AISC Table Sev
W 18x50	W18x50 Imported From AISC Table Sev
W 20x64C	AISC Tables 1964
W 24x74A	
W 24x80	W24x80 Imported From AISC Table, 196
W 27x91A	W27x91 Imported from AISC Table (195
W 27x91B	W27x91 Imported from AISC Table (195
W 27x91C	W27x91 Imported from AISC Table (195
W 27x91D	W27x91 Imported from AISC Table (195
W 27x98	W27x98 Imported From AISC Table 196
W 30x115 (C	W30x115 Importes from AISC Table (19
W 33x125A	W 33x125A Imported from AISC Table(1
W 33x125B	W 33x125B Imported from AISC Table(1
W 33x125C	W 33x125C Imported from AISC Table(1
WF22x58A	WF22x58A Imported from AISC Table 1
WF22x58B	WF22x58B Imported from AISC Table 1
WF22x58C	WF22x58C Imported from AISC Table 1

Selected to Export:

>

<

>>

<<



Export Close

Library Export

Library Items:

- Steel Shapes
 - Rolled Beam
 - Standard
 - Agency
 - Channel
 - Angle
 - Tee
- PS Shapes
 - I Beams
 - Wide top flange
 - Narrow top flange
 - Box Beams
 - Rectangular void
 - Circular void
 - Tee Beams
 - U Beams
- Timber Shapes
 - Rectangular
- Factors
 - LRFD
 - LFD
 - LRFR
- Vehicles
 - Standard Gage

Details:

Name	Description
------	-------------

Selected to Export:

- Steel Shapes
 - Rolled Beam
 - W 18 x 70
 - W 18x45
 - W 18x50
 - W 20x64C
 - W 24x74A
 - W 24x80
 - W 27x91A
 - W 27x91B
 - W 27x91C
 - W 27x91D
 - W 27x98
 - W 30x115 (CB30x115) Built 1931
 - W 33x125A
 - W 33x125B
 - W 33x125C
 - WF22x58A
 - WF22x58B
 - WF22x58C

Export Close



AASHTOWare Bridge Design: Prestressed Concrete Design Tool

File

- New
- Open
- Save
- Save As
- Print
- Recent
- Library**
- Configuration
- Help
- Close
- Exit

Import

Appurtenance | Material | Prestress beam shape | Vehicle

Type: Generic

Distance from edge to centroid

Reference line

Barrier load

Width

Effective wind height

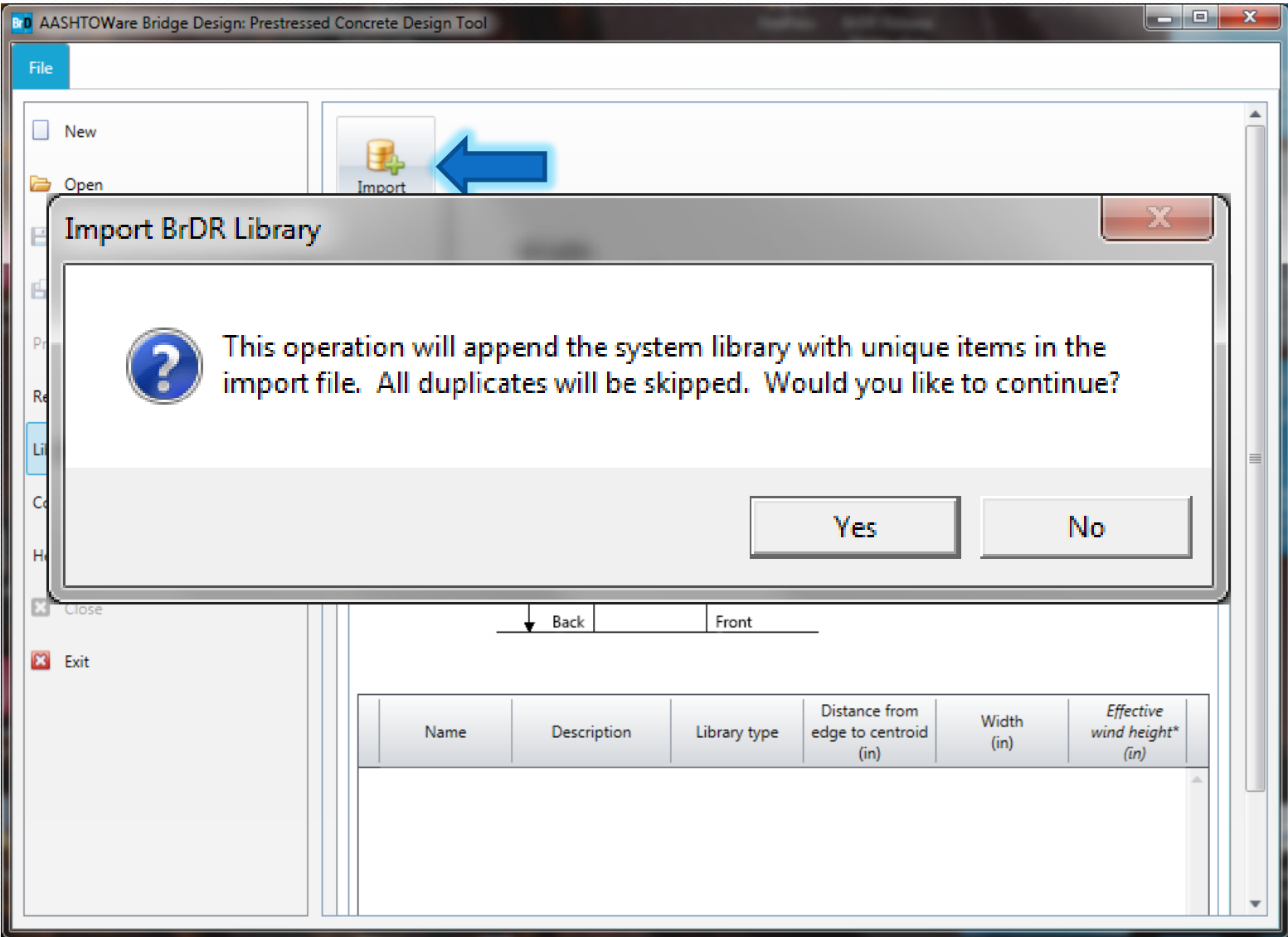
Back

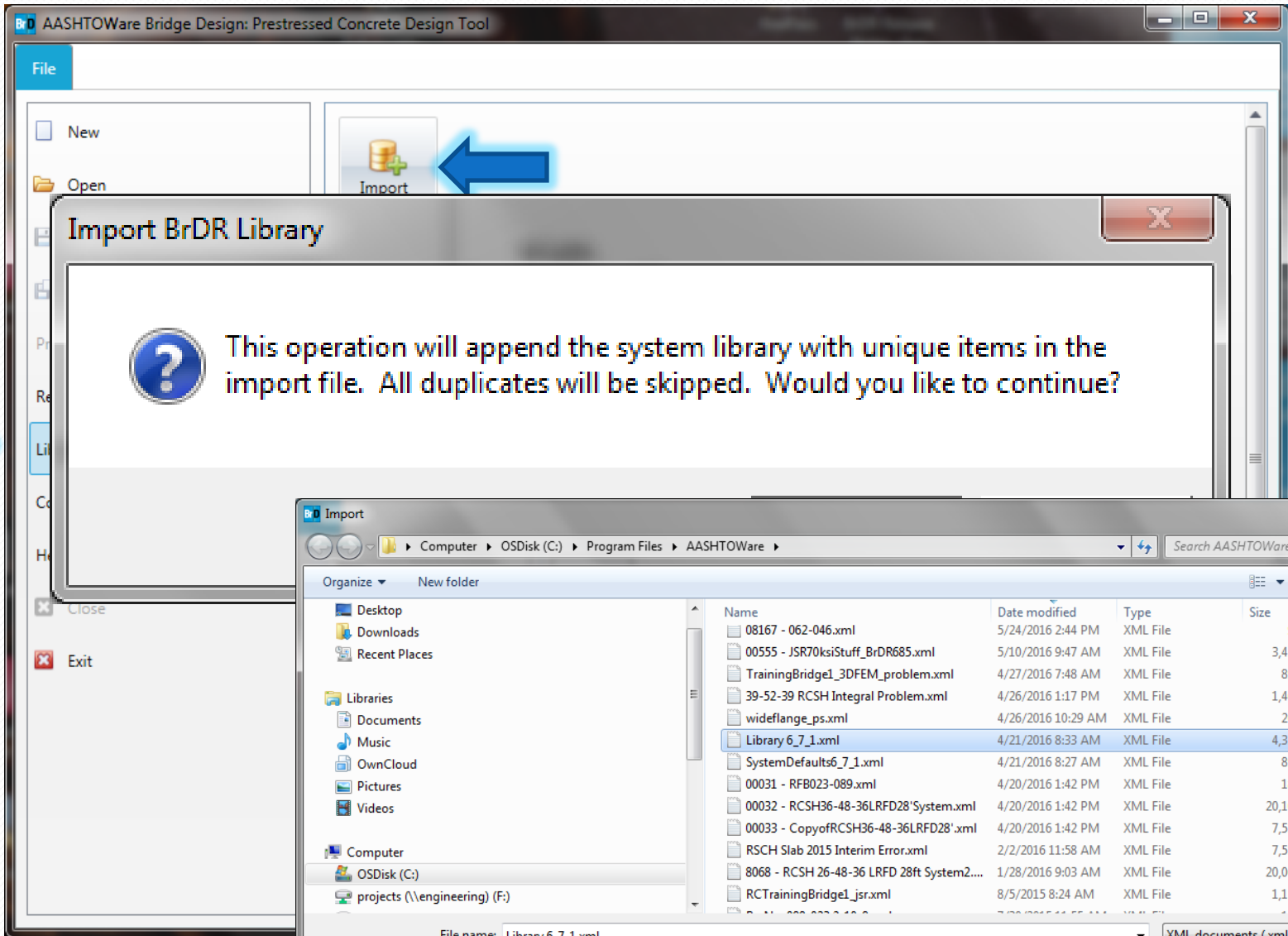
Front

Generic shape

Name	Description	Library type	Distance from edge to centroid (in)	Width (in)	Effective wind height* (in)





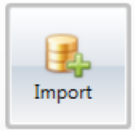


This operation will append the system library with unique items in the import file. All duplicates will be skipped. Would you like to continue?

Name	Date modified	Type	Size
08167 - 062-046.xml	5/24/2016 2:44 PM	XML File	93 KB
00555 - JSR70ksiStuff_BrDR685.xml	5/10/2016 9:47 AM	XML File	3,421 KB
TrainingBridge1_3DFEM_problem.xml	4/27/2016 7:48 AM	XML File	890 KB
39-52-39 RCSH Integral Problem.xml	4/26/2016 1:17 PM	XML File	1,463 KB
wideflange_ps.xml	4/26/2016 10:29 AM	XML File	208 KB
Library 6_7_1.xml	4/21/2016 8:33 AM	XML File	4,330 KB
SystemDefaults6_7_1.xml	4/21/2016 8:27 AM	XML File	894 KB
00031 - RFB023-089.xml	4/20/2016 1:42 PM	XML File	187 KB
00032 - RCSH36-48-36LRFD28\System.xml	4/20/2016 1:42 PM	XML File	20,104 KB
00033 - CopyofRCSH36-48-36LRFD28'\.xml	4/20/2016 1:42 PM	XML File	7,518 KB
RSCH Slab 2015 Interim Error.xml	2/2/2016 11:58 AM	XML File	7,519 KB
8068 - RCSH 26-48-36 LRFD 28ft System2...	1/28/2016 9:03 AM	XML File	20,067 KB
RCTrainingBridge1_jsr.xml	8/5/2015 8:24 AM	XML File	1,157 KB

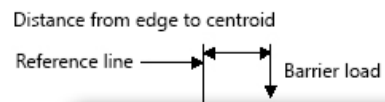
File

- New
- Open
- Save
- Save As
- Print
- Recent
- Library**
- Configuration
- Help
- Close
- Exit



Apurtenance | Material | Prestress beam shape | Vehicle

Type: Generic



Import BrDR Library

183 library items successfully imported.

OK

Effective wind h

Name	Description	Library type	Distance from edge to centroid (in)	Width (in)	Effective wind height* (in)
1070 mm F-Sh...	Sloping Face	Agency Defi...	4.9606	14.7638	42.126
1070 mm F-Sh...	Vertical Face	Agency Defi...	5.0000	14.7638	42.126
1070 mm F-Sh...	Sloping Face, 40 m...	Agency Defi...	5.0787	14.7638	43.700
1070 mm F-Sh...	Vertical Face, 40 m...	Agency Defi...	5.1181	14.7638	43.700
1300 mm F-Sh...	Sloping Face	Agency Defi...	4.7244	14.7638	51.181

File

- New
- Open
- Save
- Save As
- Print
- Recent
- Library
- Configuration
- Help
- Close
- Exit



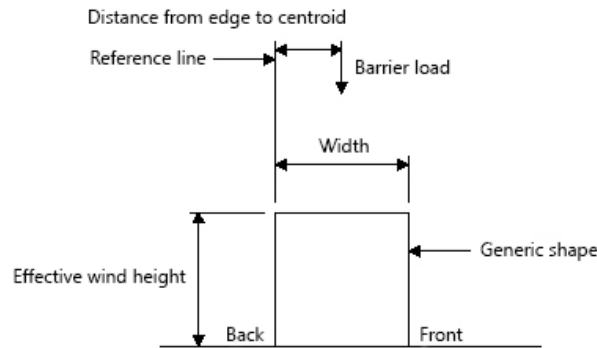
Appurtenance

Material

Prestress beam shape

Vehicle

Type: Generic



Name	Description	Library type	Distance from edge to centroid (in)	Width (in)	Effective wind height* (in)
▶ 1070 mm F-Sh...	Sloping Face	Agency Defi...	4.9606	14.7638	42.126 ▲
1070 mm F-Sh...	Vertical Face	Agency Defi...	5.0000	14.7638	42.126
1070 mm F-Sh...	Sloping Face, 40 m...	Agency Defi...	5.0787	14.7638	43.700
1070 mm F-Sh...	Vertical Face, 40 m...	Agency Defi...	5.1181	14.7638	43.700
1300 mm F-Sh...	Sloping Face	Agency Defi...	4.7244	14.7638	51.181

Project

- Project Library
- Geometry
- Deck
- Typical Section Loads
- Beam Parameters
- Material Parameters
- Member Loads
- Control Options
- Input Report

Project:

Description:

Designer:

Date:

LRFD specifications

Edition:

- Limit states:
- Strength-I Strength-II
 - Service-I Service-III
 - Fatigue-I

Design vehicles

Design load:

Permit load:


Fatigue load:

Validation Off

Forward


Project


Project Library

Geometry 

Deck 

Typical Section Loads

Beam Parameters 

Material Parameters 

Member Loads

Control Options

Input Report

Project:

Description:

Designer:


Date: 


LRFD specifications


Edition:

- Limit states:
- Strength-I Strength-II
 - Service-I Service-III
 - Fatigue-I

Design vehicles

Design load: 

Permit load: 

Fatigue load: 

Validation

On

Forward 



Project

Project Library

Geometry

Deck

Typical Section Loads

Beam Parameters

Material Parameters

Member Loads

Control Options

Input Report

Appurtenance

Material

Prestress beam shape

Vehicle

Type: Generic

The diagram illustrates a rectangular appurtenance shape. A vertical line on the left is labeled 'Reference line'. A horizontal double-headed arrow from the reference line to the center of the rectangle is labeled 'Distance from edge to centroid'. A vertical double-headed arrow on the right side of the rectangle is labeled 'Effective wind height'. A horizontal double-headed arrow across the top of the rectangle is labeled 'Width'. A vertical arrow pointing down from the top edge to the top of the rectangle is labeled 'Barrier load'. The left and right vertical edges of the rectangle are labeled 'Back' and 'Front' respectively. The entire shape is labeled 'Generic shape'.

Name	Description	Distance from edge to centroid (in)	Width (in)	Effective wind height* (in)	Barrier load (kip/ft)
------	-------------	-------------------------------------	------------	-----------------------------	-----------------------

Validation

On

Back

Forward

Project

Project Library

Geometry

Deck

Typical Section Loads

Beam Parameters

Material Parameters

Member Loads

Control Options

Input Report

Type: Concrete ▾

Name	Description	Compressiv... at 28 days f...	Initial compre strength Fci	Coefficient thermal expai (1/F)	Density for DL (kcf)	Density + modulus of e (kcf)	Mc ell
------	-------------	----------------------------------	--------------------------------	---------------------------------------	----------------------------	------------------------------------	-----------

Copy from library...



Select Item

Name	Description
Class A	Class A cement concrete
Class A (US)	Class A cement concrete
Class B	Class B cement concrete
Class B (US)	Class B cement concrete
Class C	Class C cement concrete
Class C (US)	Class C cement concrete
▾ 8 KSI	NU Sections Only
Class 4A Concr...	6 Ksi Concrete
Class 4A Concr...	5 Ksi Concrete

OK Cancel

Duplicate Delete

Validation On

Back Forward

Project

Project Library

Geometry ✖

Deck ✖

Typical Section Loads

Beam Parameters ✖

Material Parameters ✖

Member Loads

Control Options

Input Report

Structure definition type: System definition

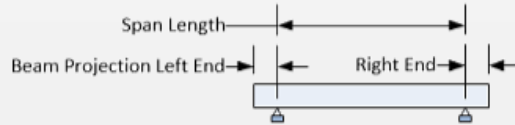
Number of spans: 1

Number of beams: 4

Girder spacing: ft ✖

Support skew: 0 Degrees

Number of design lanes: 1



Spans:

Span	Length (ft)	Beam projection (in)	
		Left end	Right end
1	✖	✖	✖

Validation

On

Back

Forward

Project

Project Library

Geometry

Deck

Typical Section Loads

Beam Parameters

Material Parameters

Member Loads

Control Options

Input Report

Structure definition type: System definition

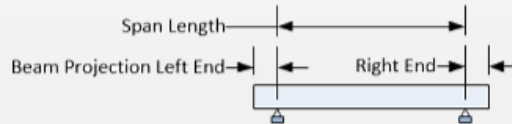
Number of spans:

Number of beams:

Girder spacing: ft

Support skew: Degrees

Number of design lanes:



Spans:

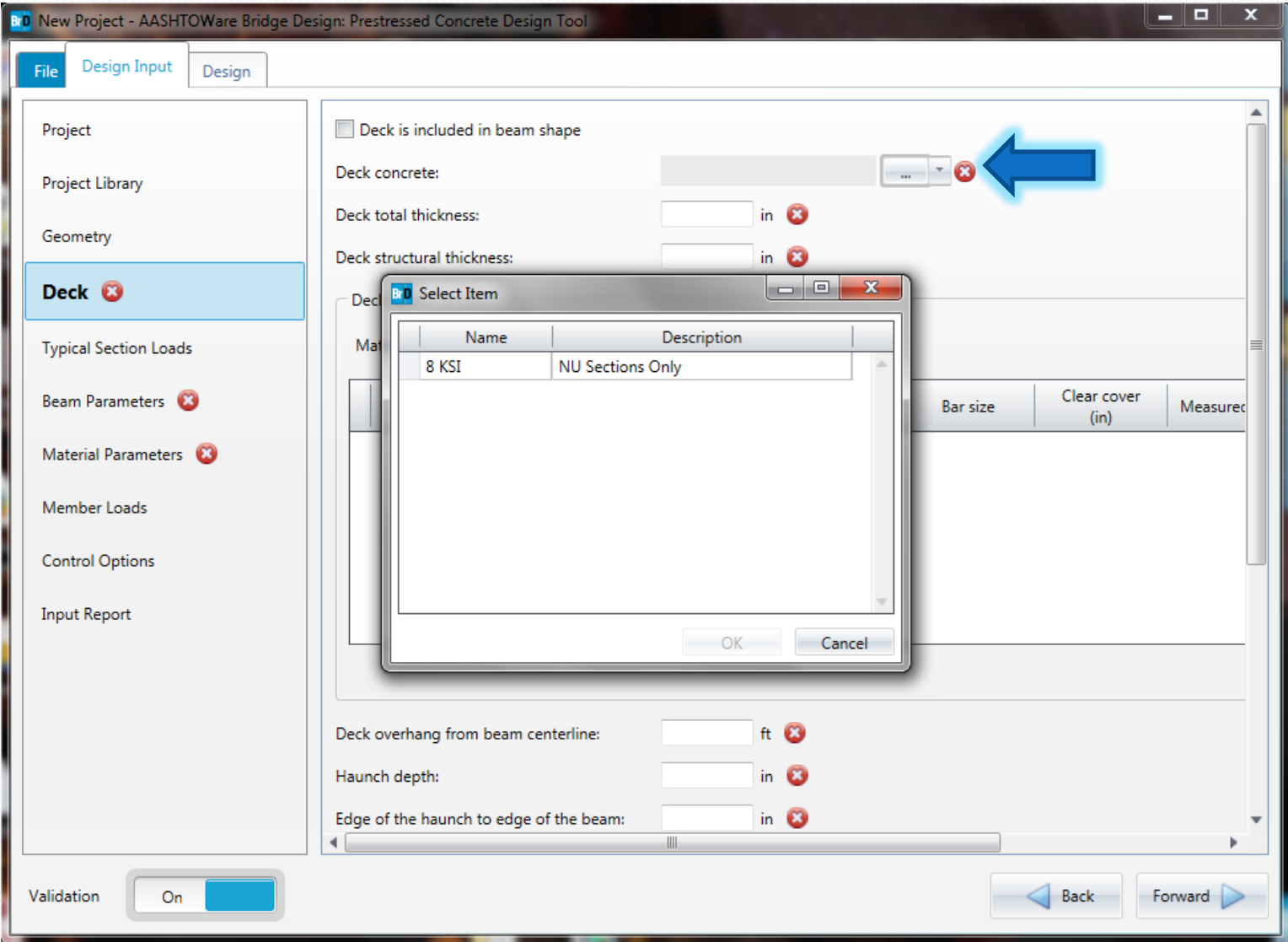
Span	Length (ft)	Beam projection (in)	
		Left end	Right end
1	90.00	12.00	12.00

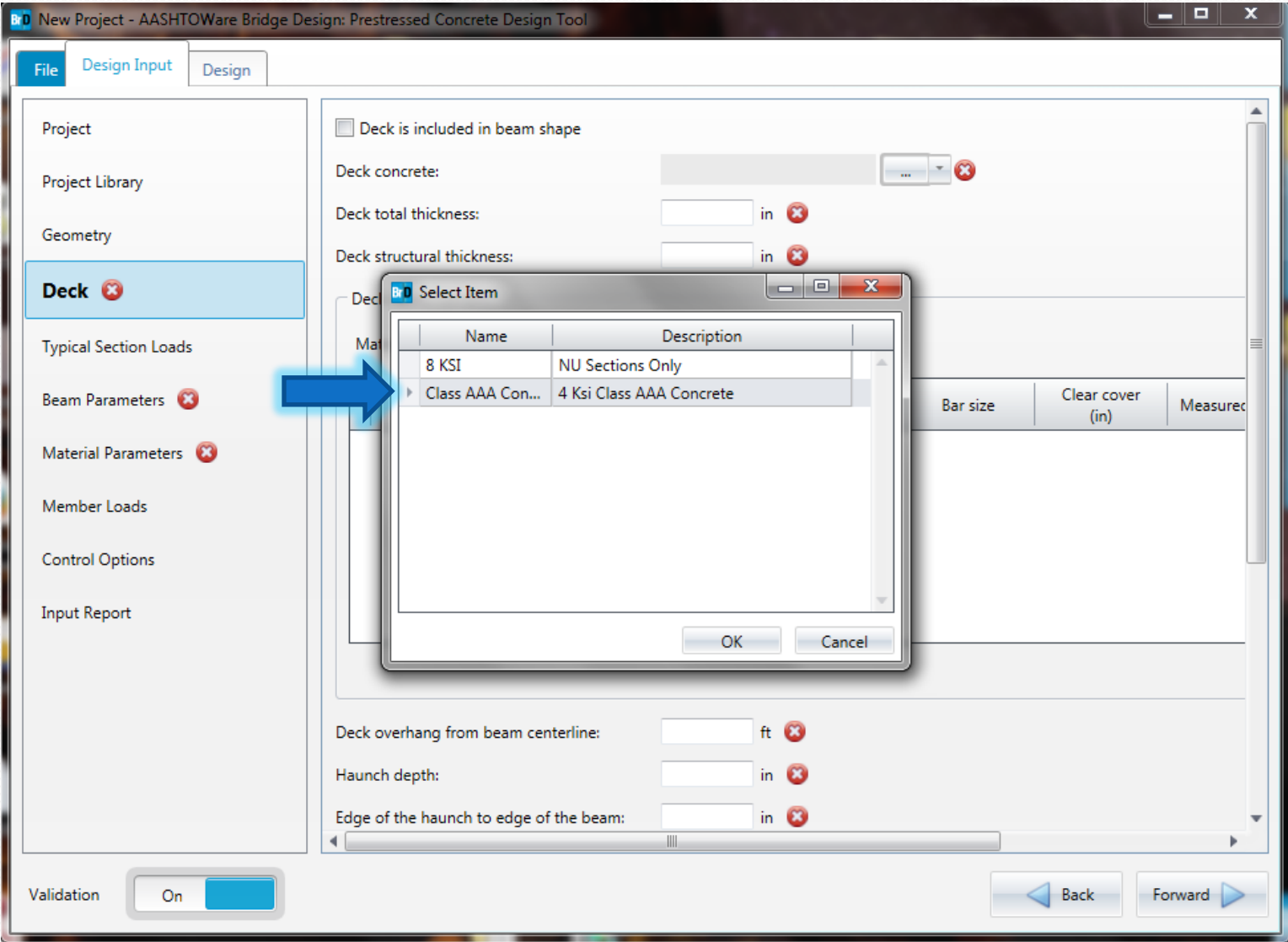
Validation

On

Back

Forward





- Project
- Project Library
- Geometry
- Deck**
- Typical Section Loads
- Beam Parameters
- Material Parameters
- Member Loads
- Control Options
- Input Report

Deck is included in beam shape

Deck concrete: Class AAA Concrete 4

Deck total thickness: 8.5 in

Deck structural thickness: 8 in

Deck reinforcement

Material: Grade 60

Support	Start distance (ft)	Length (ft)	End distance (ft)	Bar size	Clear cover (in)	Measured

Deck overhang from beam centerline: 3 ft

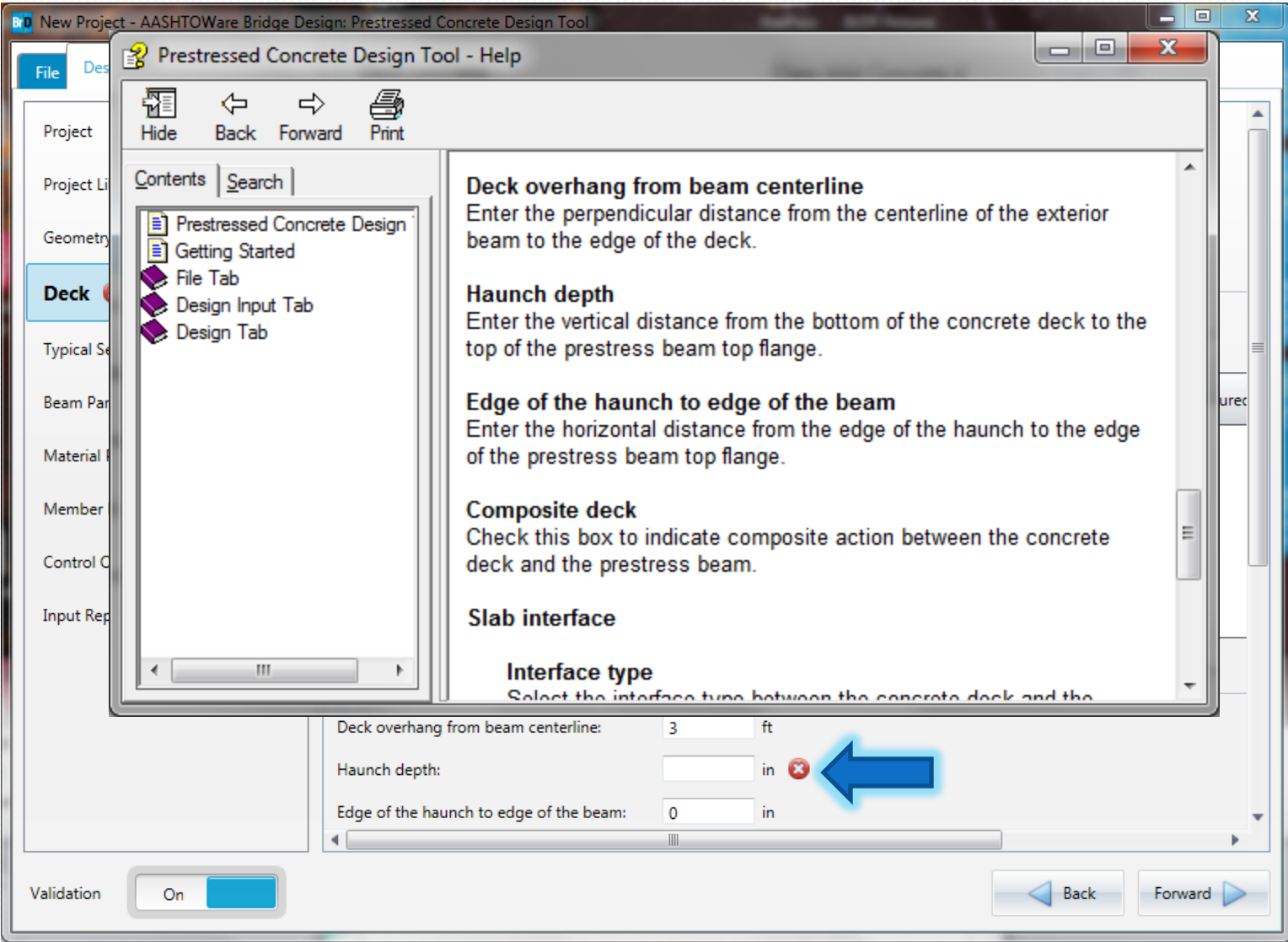
Haunch depth: in

Edge of the haunch to edge of the beam: 0 in



Validation On

Back Forward



New Project - AASHTOWare Bridge Design: Prestressed Concrete Design Tool

Prestressed Concrete Design Tool - Help

Hide Back Forward Print

Contents Search

- Prestressed Concrete Design
- Getting Started
- File Tab
- Design Input Tab
- Design Tab

Deck overhang from beam centerline

Enter the perpendicular distance from the centerline of the exterior beam to the edge of the deck.

Haunch depth

Enter the vertical distance from the bottom of the concrete deck to the top of the prestress beam top flange.

Edge of the haunch to edge of the beam

Enter the horizontal distance from the edge of the haunch to the edge of the prestress beam top flange.

Composite deck

Check this box to indicate composite action between the concrete deck and the prestress beam.

Slab interface

Interface type

Select the interface type between the concrete deck and the

Deck overhang from beam centerline: 3 ft

Haunch depth: in

Edge of the haunch to edge of the beam: 0 in



Validation On

Back

Forward

Project

Project Library

Geometry

Deck

Typical Section Loads ✕

Beam Parameters ✕

Material Parameters ✕

Member Loads

Control Options

Input Report

Stage 2 load distribution: Uniformly to all girders

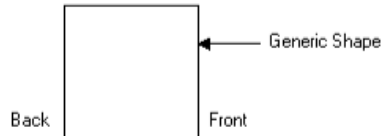
By tributary area

By percentage: Exterior: % First interior: %

Wearing surface: Thickness: in Density: pcf

Appurtenance loads:

Parapet Median Railing **Generic** ✕ Sidewalk



Name	Stage	Load type	Measure to	Edge of deck distance measure from	Distance at start (ft)	Distance at end (ft)	Front fac orientatic
32" Kan...	Stage 1	DC	Back	Left Edge	0.00	0.00	Right
✕	Stage 1	DC	Front	Right Edge	0.00	0.00	Left

Validation

On

Back

Forward


Project


Project Library

Geometry

Deck

Typical Section Loads

Beam Parameters 

Material Parameters 

Member Loads

Control Options

Input Report

Beam shape selection

Beam type: I Beam - Wide Top Flange

Sufficiently connected to act as a unit

Depth range

Specific shape

NU 35.4

Min depth: in

Max depth: in

Strand configuration

Straight / Debonded

Harped

Max total debonded strands percentage: 25 %

Min distance from harped strand to beam top:


Max debonded strands percentage per row: 40 %

Max number of harped strands:

Max number of debonding locations: 2

Harp point locations:

Vertical shear reinforcement

Distance to first reinforcement: in 

Use 2 ranges - min range 1 length: ft

Range 1

Material: 

Reinforcement:

Range 2

Material:

Reinforcement:

Validation

On

Back

Forward

- Project
- Project Library
- Geometry
- Deck
- Typical Section Loads
- Beam Parameters
- Material Parameters** ✖
- Member Loads
- Control Options
- Input Report

Beam curing method: Moist cured Steam cured

Exposure factor: Top: Bottom:

PS strand:

PS loss method:

Consider creep

Consider deck differential shrinkage loads

Average humidity: %

Transfer time: Hours

Deck placement age: Days

Final age: Days

Beam concrete compressive strength

Concrete composition:

f'c: ksi

f'ci: ksi ✖

Stress limit factors

Corrosion condition:

Initial allowable compression:

Initial allowable tension:

Final allowable compression:

Final allowable tension:

Validation

On

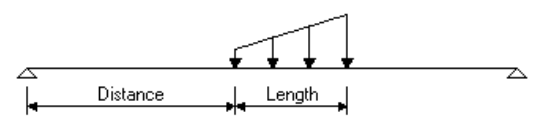
Back

Forward



- Project
- Project Library
- Geometry
- Deck
- Typical Section Loads
- Beam Parameters
- Material Parameters
- Member Loads**
- Control Options
- Input Report

Distributed Concentrated Pedestrian



Beam	Name	Stage	Load type	Support	Start distance (ft)	Len (ft)
------	------	-------	-----------	---------	---------------------	----------

New Duplicate Delete

Validation On

Back Forward



New Project - AASHTOWare Bridge Design: Prestressed Concrete Design Tool

File Design Input Design

Project

Project Library

Geometry

Deck

Typical Section Loads

Beam Parameters

Material Parameters

Member Loads

Control Options

Input Report

Shear computation method:

- General procedure
- Simplified procedure

Loss & stress calculations:

- Use gross section properties
- Use transformed section properties

Consider splitting resistance article

Validation On

Back Forward



- Project
- Project Library
- Geometry
- Deck
- Typical Section Loads
- Beam Parameters
- Material Parameters
- Member Loads
- Control Options

Input Report

Project

Project: New Project
Description:
Designer: JSR
Date: 07/26/2016

LRFD specifications

Edition: AASHTO LRFD 7th 2015i
Limit states: Strength-I, Service-I, Service-II, Fatigue-I

Design vehicles

Design load: HL-93 (US)
Permit load:
Fatigue load: LRFD Fatigue Truck (US)

Project Library

Appurtenance

Generic

Name	Description	Distance from edge to centroid (in)	Width (in)	Effective wind height (in)
32" Kansas Corral Rail W/O Curb	32" Kansas Corral Rail W/O Curb	5.8500	12.0000	32.1875

Validation

On

Back



BrD RADBUG_demo.brdx - AASHTOWare Bridge Design: Prestressed Concrete Design Tool

File Design Input **Design**



Design input

Design review

Beam 1
Minimum strand design stress ratio

1

Design run

Specification checks

Tabular results

Result graphs

Engine outputs

View results

Delete

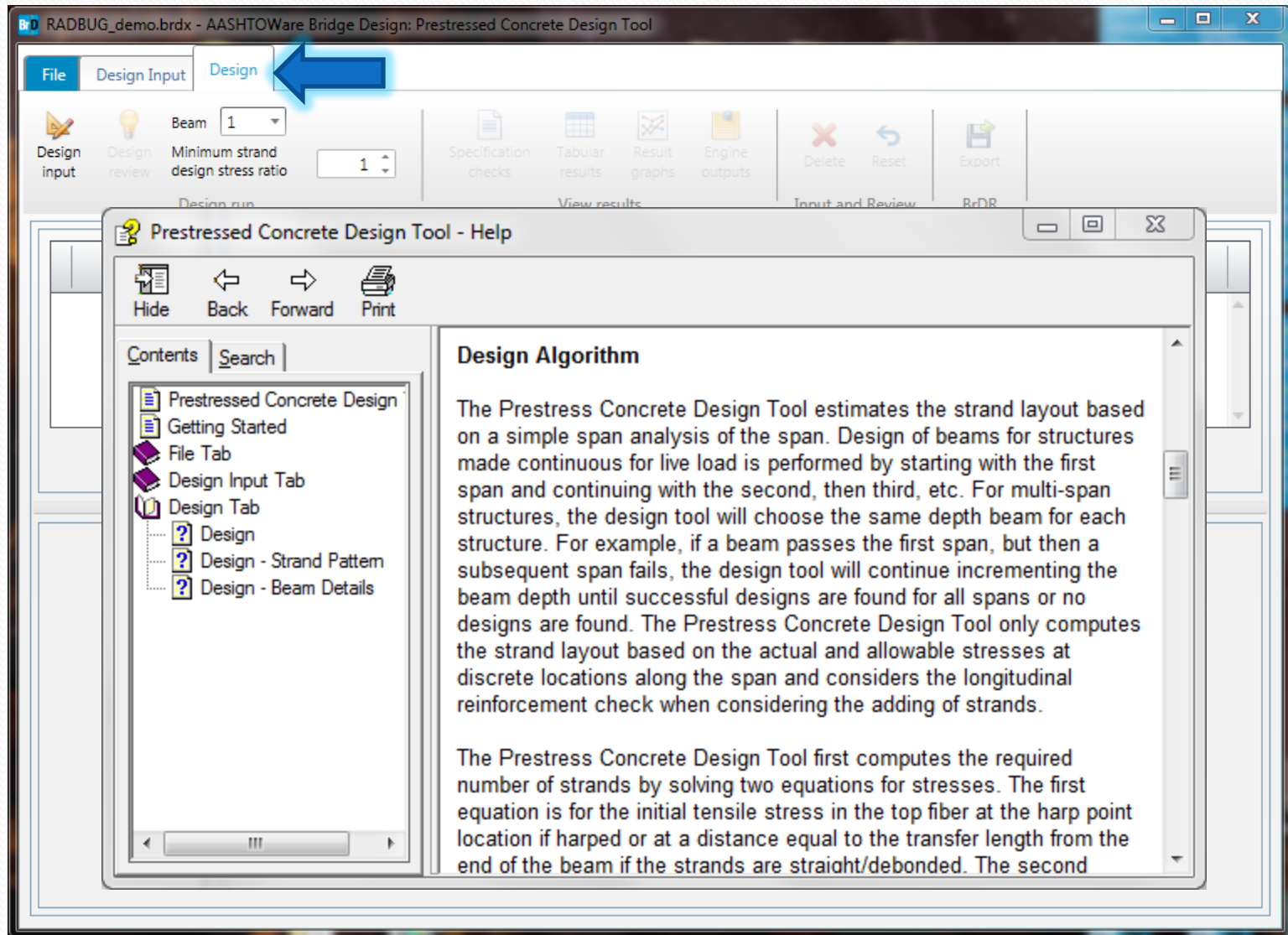
Reset

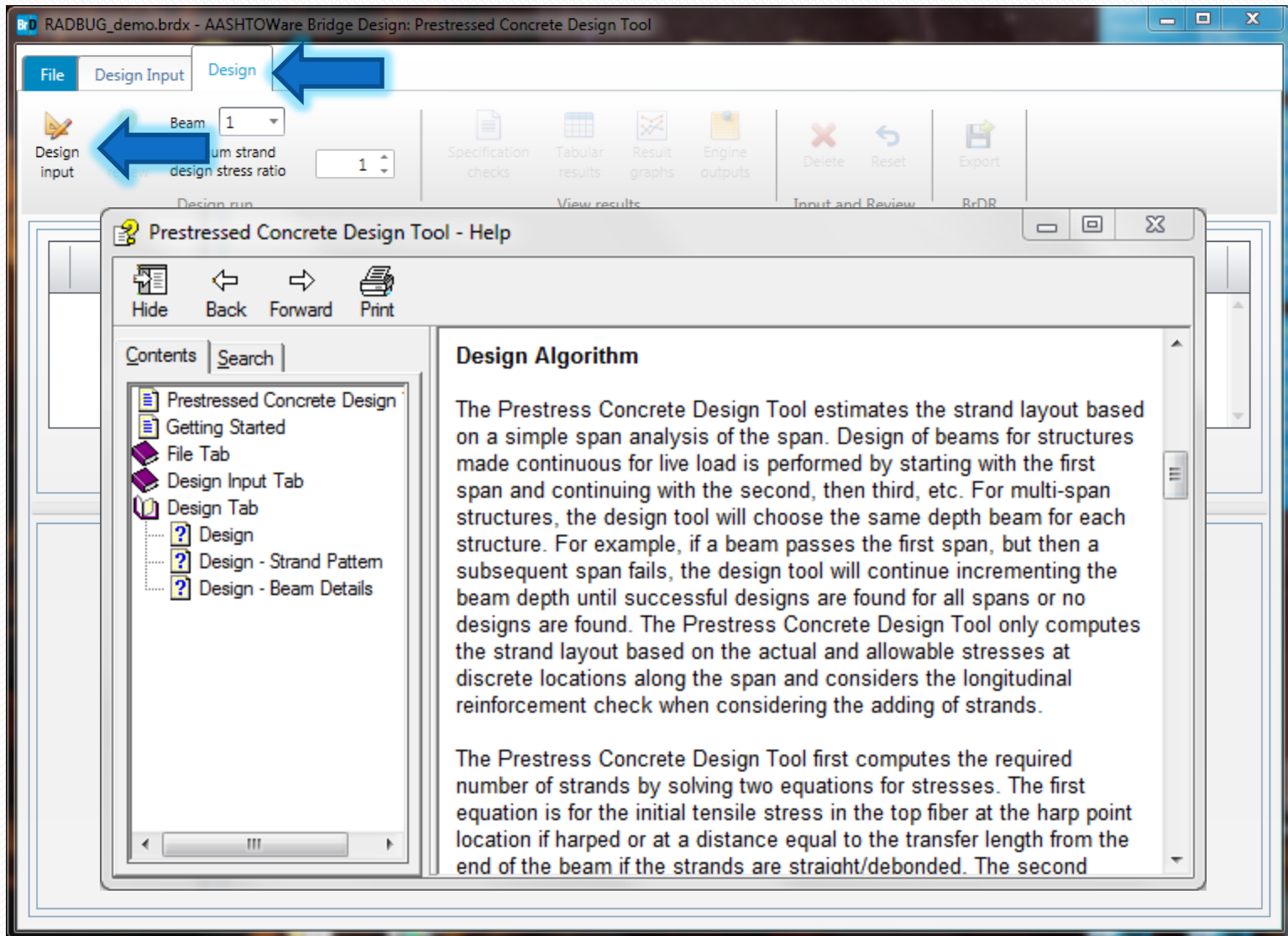
Input and Review

Export

BrDR

Design run	Description	Critical design ratio	Pin





RADBUG_demo.brdx - AASHTOWare Bridge Design: Prestressed Concrete Design Tool

File Design Input Design



Design Input



Design review

Beam 1
Minimum strand design stress ratio

1

Design run



Specification checks



Tabular results



Result graphs



Engine outputs

View results



Delete



Reset

Input and Review



Export

BrDR

Design run	Description	Critical design ratio	Pin

1-I1



40%

Cancel

Br D RADBUG_demo.brdx - AASHTOWare Bridge Design: Prestressed Concrete Design Tool

File Design Input Design

Design input Design review Minimum strand design stress ratio

Specification checks Tabular results Result graphs Engine outputs

Delete Reset Export

Design run View results Input and Review BrDR

Design run	Description	Critical design ratio	Pin
1-I1.1	NU 35.4. 34 strands. CG at left end = 15.74 in	✓ 1.04	

Symmetry

Mid span

Left

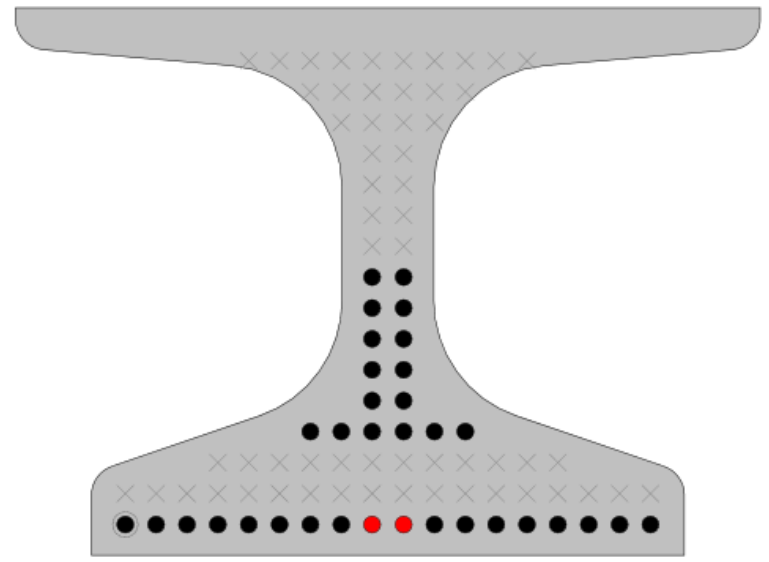
Section location (in)
48.00

New Modify Delete

Right

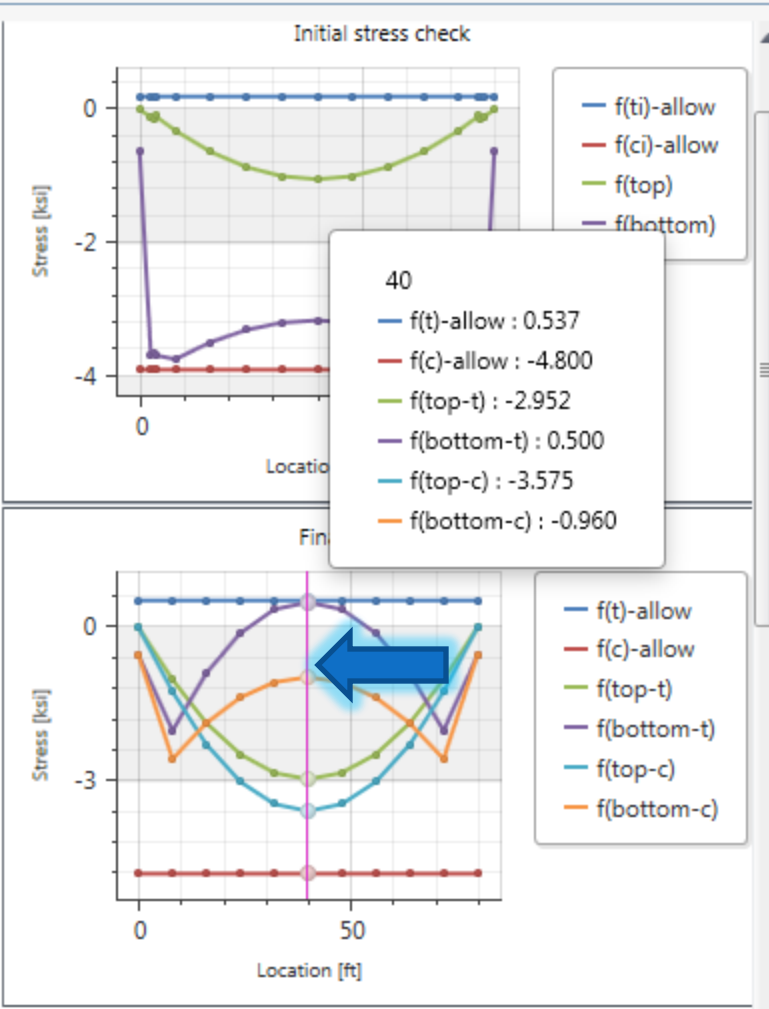
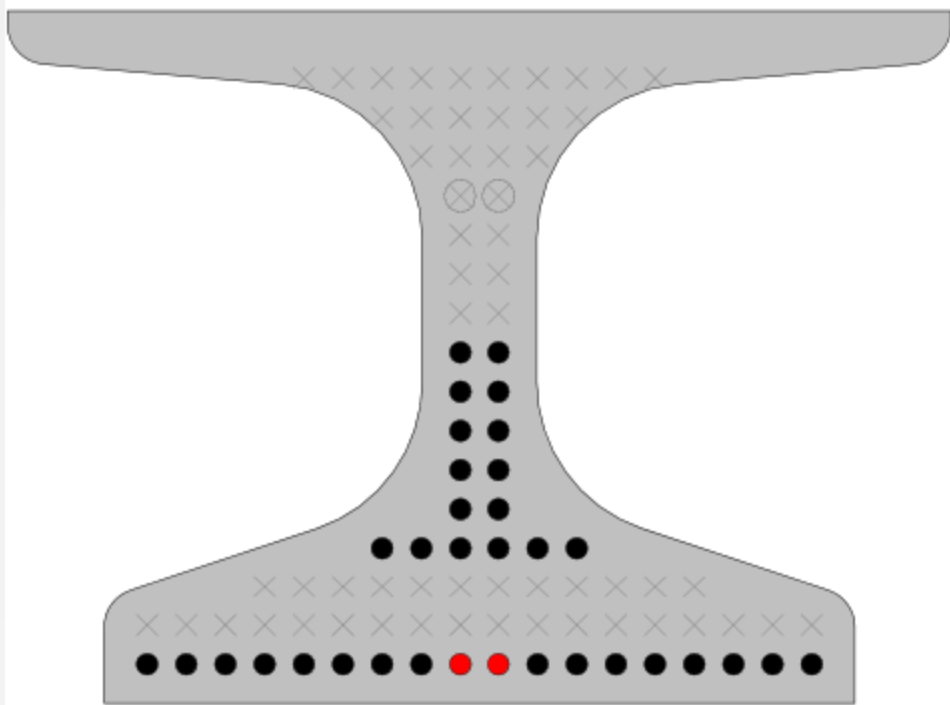
Section location (in)
48.00

New Modify Delete



Beam shape: NU 35.4
Location = 40.000

Number of strands = 34



Br RADBUG_demo.brdx - AASHTOWare Bridge Design: Prestressed Concrete Design Tool

File Design Input Design

Design input Design review **Design stress ratio** 1

Specification checks Tabular results Result graphs Engine outputs

Delete Reset Export

Design run View results Input and Review BrDR

Design run	Description	Critical design ratio	Pin
1-I1.1	NU 35.4, 34 strands, CG at left end = 15.74 in	✓ 1.04	•
1-R1.1	NU 35.4, 34 strands, CG at left end = 15.74 in	✗ 0.48	•

Symmetry

Mid span

Left

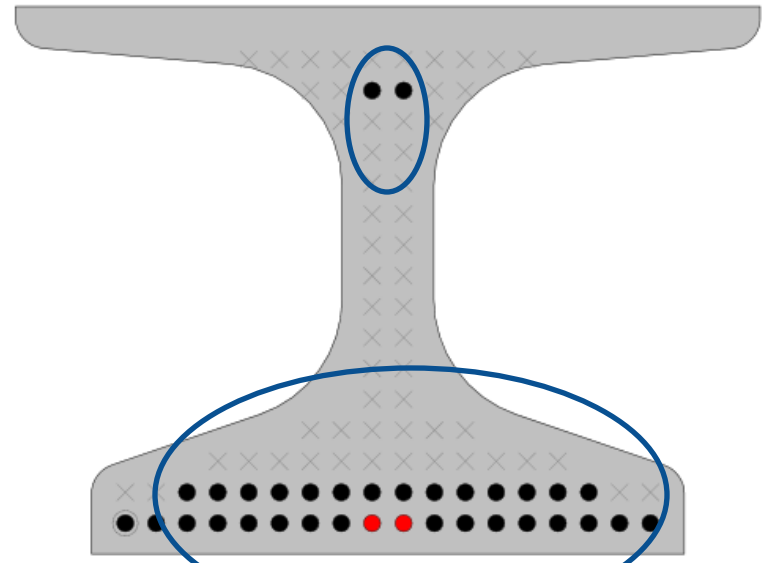
Section location (in)
48.00

New Modify Delete

Right

Section location (in)
48.00

New Modify Delete



Beam shape: NU 35.4

Br RADBUG_demo.brdx - AASHTOWare Bridge Design: Prestressed Concrete Design Tool

File Design Input Design

Design input Design review design stress ratio 1

Specification checks Tabular results Result graphs Engine outputs

Delete Reset Export BrDR

Design run	Description	Critical design ratio	Pin
1-I1.1	NU 35.4, 34 strands, CG at left end = 15.74 in	✓ 1.04	
1-R1.1	NU 35.4, 34 strands, CG at left end = 15.74 in	✗ 0.48	

Symmetry

Mid span

Left

Section location (in)

48.00

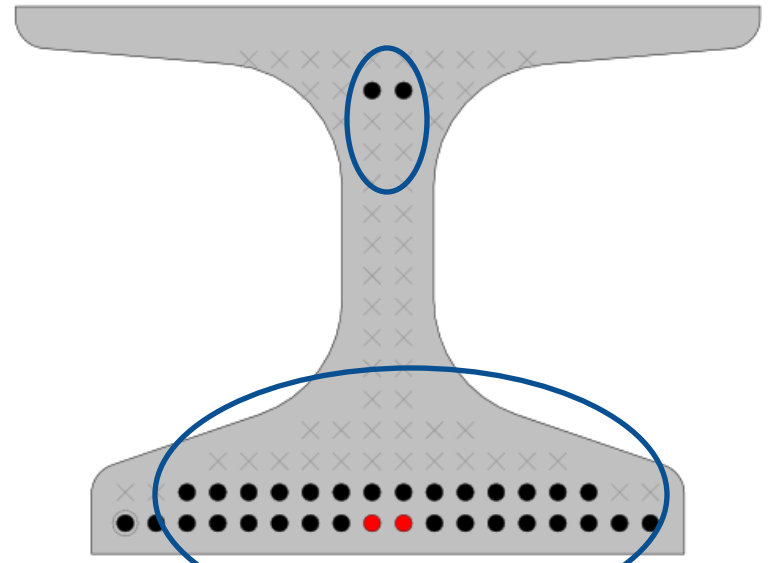
New Modify Delete

Right

Section location (in)

48.00

New Modify Delete



Beam shape: NU 35.4

Specification Check Summary

Article	Status
Initial Stress at Transfer (5.9.4.1.1, 5.9.4.1.2)	Fail
Final Stress due to Permanent and Transient Loads (5.9.4.2.1, 5.9.4.2.2)	Pass
Flexure (5.7.3.2, 5.7.3.3.2)	Pass
Shear (5.8.3.3, 5.8.2.5, 5.8.2.7, 5.8.3.5)	Pass
Deflection (5.7.3.6.2)	Pass

Initial Compression Stress At Transfer of Prestress

Location (ft)	Allowable Stress (ksi)	Actual Stress Top of Beam (ksi)	Actual Stress Bot of Beam (ksi)	Ratio	Code
0.000	-3.90	0.09	-0.69	5.64	Pass
2.500	-3.90	0.42	-4.04	0.97	Fail
3.389	-3.90	0.37	-4.01	0.97	Fail
6.500	-3.90	0.29	-4.17	0.94	Fail
8.000	-3.90	0.22	-4.11	0.95	Fail
16.000	-3.90	-0.10	-3.86	1.01	Pass
24.000	-3.90	-0.33	-3.68	1.06	Pass
32.000	-3.90	-0.47	-3.57	1.09	Pass
40.000	-3.90	-0.51	-3.53	1.10	Pass
48.000	-3.90	-0.47	-3.57	1.09	Pass
56.000	-3.90	-0.33	-3.68	1.06	Pass
64.000	-3.90	-0.10	-3.86	1.01	Pass
72.000	-3.90	0.22	-4.11	0.95	Fail
73.500	-3.90	0.29	-4.17	0.94	Fail
76.611	-3.90	0.37	-4.01	0.97	Fail
77.500	-3.90	0.42	-4.04	0.97	Fail

Br RADBUG_demo.brdx - AASHTOWare Bridge Design: Prestressed Concrete Design Tool

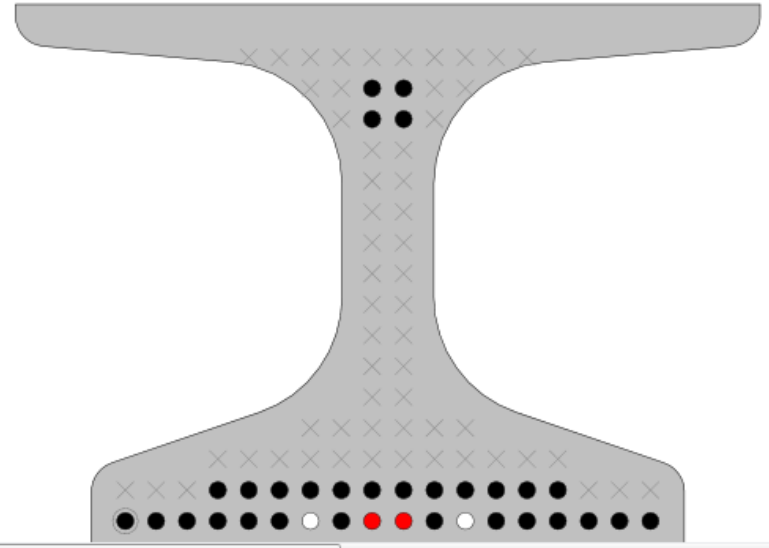
File Design Input Design

Design input Design review **Minimum strand design stress ratio** 1

Specification checks Tabular results Result graphs Engine outputs Delete Reset Export

Design run	Description	Critical design ratio	Pin
1-I1.1	NU 35.4, 34 strands, CG at left end = 15.74 in	✓ 1.04	
1-R2.1	NU 35.4, 34 strands, CG at left end = 15.74 in	✗ 0.58	
1-R5.1	NU 35.4, 34 strands, CG at left end = 15.74 in	✓ 1.05	

Mid span Left Section location (in) 48.00 120.00 New Modify Delete Right Section location (in) 48.00 120.00 New Modify Delete



File Design Input Design

Design input Design review **Minimum strand design stress ratio** 1 Specification checks **Results** result graphs Engine outputs Delete Reset Export

Design run View results Input and Review BrDR

Design run	Description	Critical design ratio	Pin
1-I1.1	NU 35.4, 34 strands, CG at left end = 15.74 in	✓ 1.04	
1-R2.1	NU 35.4, 34 strands, CG at left end = 15.74 in	✗ 0.58	
1-R5.1	NU 35.4, 34 strands, CG at left end = 15.74 in	✓ 1.05	

Mid span

Left

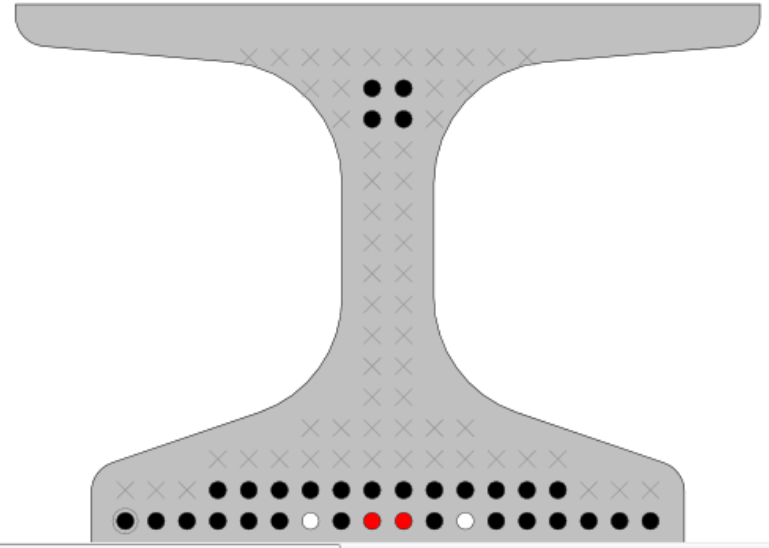
Section location (in)
48.00
120.00

New Modify Delete

Right

Section location (in)
48.00
120.00

New Modify Delete



BrD - Design Run 1-R5.1

Specification checks

Properties Apply Generate

Articles: All articles

Format: Bullet list

Specification filter

Report

- Superstructure Component
 - Prestress Calculations
 - Stage 1
 - Stage 2
 - Stage 3
 - 1
 - Span 1 - 0.00 ft.
 - Span 1 - 3.39 ft.
 - Span 1 - 8.00 ft.
 - Span 1 - 16.00 ft.
 - Span 1 - 24.00 ft.
 - Span 1 - 32.00 ft.
 - Span 1 - 40.00 ft.
 - Span 1 - 48.00 ft.
 - Span 1 - 56.00 ft.
 - Span 1 - 64.00 ft.
 - Span 1 - 72.00 ft.
 - Span 1 - 76.61 ft.
 - Span 1 - 80.00 ft.

Specification reference	Pass/Fail
NA 5.5.3.2 Reinforcing Bars	Not Required
5.5.4.2 PS Strength Limit State - Resistance Factors	General Comp.
5.7.2.2 Rectangular Stress Distribution	General Comp.
✓ 5.7.3.2 Flexural Resistance (Prestressed Concrete)	Passed
✓ 5.7.3.3.2 Minimum Reinforcement	Passed
✓ 5.8.2.5 Minimum Transverse Reinforcement	Passed
✓ 5.8.2.7 Maximum Spacing of Transverse Reinforcement	Passed
✓ 5.8.3.3 Nominal Shear Resistance	Passed
5.8.3.4 Procedures for Determining Shear Resistance	General Comp.
✓ 5.8.3.5 Longitudinal Reinforcement	Passed
✓ 5.8.4.4 Minimum Area of Interface Shear Reinforcement	Passed
✓ 5.8.4 Interface Shear Transfer	Passed
✓ 5.9.4.2.1 Compression Stresses	Passed
✓ 5.9.4.2.2 Tension Stresses	Passed
5. Computation of Vp	General Comp.
5. Cracked_Moment_of_Inertia Section Property Calculations	General Comp.
5. PS_Basic_Properties Calculation	General Comp.
5. PS_Gross_Composite_Section_Properties PS Gross Composite S	General Comp.

Spec Check Detail for 5.9.4.2.2 Tension Stresses

5 Concrete Structures
5.9 Prestressing and Partial Prestressing
5.9.4 Stress Limits for Concrete
5.9.4.2 For Stresses at Service Limit State After Losses - Fully Prestressed Components
5.9.4.2.2 Tension Stresses
(AASHTO LRFD Bridge Design Specifications, Seventh Edition - 2014, with 2015 Interims)

PS I Wide - At Location = 40.0000 (ft) - Left Stage 3

Input:

f'c = 8.00 (ksi)

Section Properties: Gross

Ag	=	617.19 (in ²)	epg	=	9.86 (in)
St	=	5406.60 (in ³)	Sb	=	6763.26 (in ³)
Stc	=	29656.68 (in ³)	Sbc	=	10133.03 (in ³)
Pe	=	1158.86 (kip)			

Service III Loads:

Max MDL1	=	1352.14 (kip-ft)	Min MDL1	=	1352.14 (kip-ft)
Max MDL2	=	87.00 (kip-ft)	Min MDL2	=	87.00 (kip-ft)
Pos MCS	=	0.00 (kip-ft)	Neg MCS	=	0.00 (kip-ft)
Pos MLL+I	=	1232.88 (kip-ft)	(Vehicle: HL-93 (US) - Truck + Lane)		
Neg MLL+I	=	0.00 (kip-ft)	(Vehicle: LRFD Fatigue Truck (US) - Fatigue Truck)		

Summary:

Final Tension Stresses Due to Permanent and Transient Loads:
(Service III: PS + DL + LL)

OK

BrD RADBUG_demo.brdx - AASHTOWare Bridge Design: Prestressed Concrete Design Tool

File Design Input Design

Design input Design review Minimum strand design stress ratio 1

Specification checks Tabular results graphs engine outputs

Delete Reset Export

Design run View results Input and Review BrDR

Design run	Description	Critical design ratio	Pin
1-I1.1	NU 35.4, 34 strands, CG at left end = 15.74 in	✓ 1.04	📌
1-R2.1	NU 35.4, 34 strands, CG at left end = 15.74 in	✗ 0.58	📌
1-R5.1	NU 35.4, 34 strands, CG at left end = 15.74 in	✓ 1.05	📌

Mid span

Left

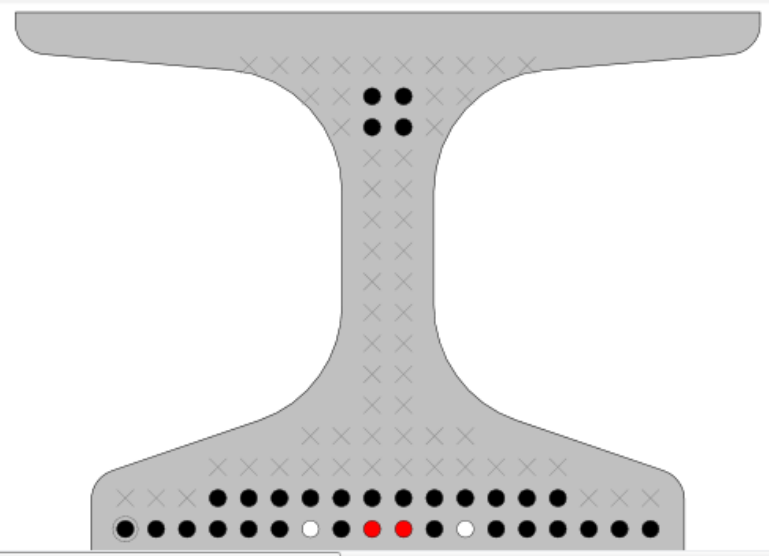
Section location (in)
48.00
120.00

New Modify Delete

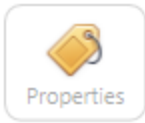
Right

Section location (in)
48.00
120.00

New Modify Delete



Tabular results Result graphs



Properties

Table



Apply



Print

Print

Report type

Dead Load Actions

Stage

Stage 1

Dead load case

Load Case 1 - Self Load (Stage 1:D,DC)

Span	Location	Moment (kip-ft)	Shear (kip)	Axial (kip)	Reaction (kip)	X deflection (in)	Y deflection (in)
1	0.00	0.00	25.72	0.00	25.72	0.0000	0.0000
1	2.50	62.28	24.11	0.00		0.0000	-0.1078
1	8.00	185.16	20.57	0.00		0.0000	-0.3390
1	16.00	329.17	15.43	0.00		0.0000	-0.6414
1	24.00	432.03	10.29	0.00		0.0000	-0.8781
1	32.00	493.75	5.14	0.00		0.0000	-1.0284
1	40.00	514.33	0.00	0.00		0.0000	-1.0799
1	48.00	493.75	-5.14	0.00		0.0000	-1.0284
1	56.00	432.03	-10.29	0.00		0.0000	-0.8781
1	64.00	329.17	-15.43	0.00		0.0000	-0.6414
1	72.00	185.16	-20.57	0.00		0.0000	-0.3390
1	77.50	62.28	-24.11	0.00		0.0000	-0.1078
1	80.00	0.00	-25.72	0.00	25.72	0.0000	0.0000

Br RADBUG_demo.brdx - AASHTOWare Bridge Design: Prestressed Concrete Design Tool

File Design Input Design

Design input Design review Minimum strand design stress ratio 1 Specification checks Tabular results Result graphs **Generate outputs** Delete Reset Export

Design run View results Input and Review BrDR

Design run	Description	Critical design ratio	Pin
1-I1.1	NU 35.4, 34 strands, CG at left end = 15.74 in	✓ 1.04	🔗
1-R2.1	NU 35.4, 34 strands, CG at left end = 15.74 in	✗ 0.58	🔗
▶ 1-R5.1	NU 35.4, 34 strands, CG at left end = 15.74 in	✓ 1.05	🔗

Mid span

Left

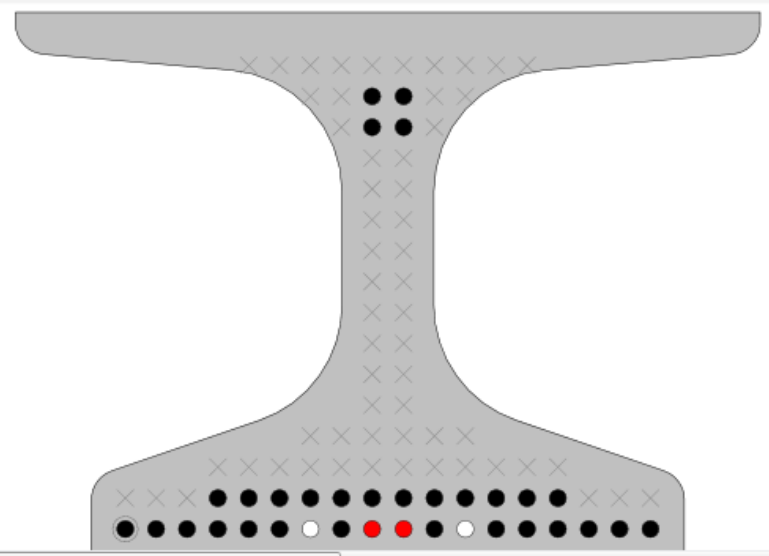
Section location (in)
48.00
120.00

New Modify Delete

Right

Section location (in)
48.00
120.00

New Modify Delete



Tabular results **Result graphs**



Properties



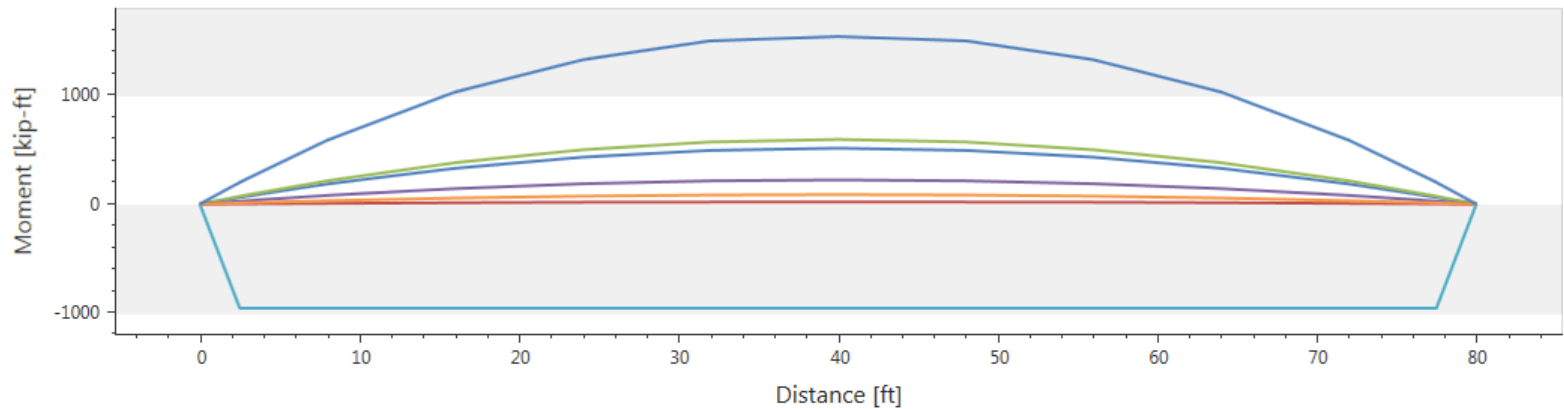
Apply



Print

Graph

Print



— MDL-s1-Load Case 1 - Self Load (Stage 1:D,DC)
 — MDL-s1-Load Case 2 - Haunch Load (Stage 1:D,DC)
 — MDL-s1-Load Case 3 - Concrete Deck Load (Stage 1:D,DC)
 — MDL-s1-Load Case 4 - Generic Loads (Generic Concrete Appurtenance:Sta~)
 — MDL-s1-Load Case 5 - PS Transfer Forces (Stage 1)
 — MDL-s2-Load Case 1 - Wearing surface load Loads (Stage 2:D,DW)
 — MLL(+)-s3-HL-93 (US)-Truck + Lane

Load Case 1 - wearing surface load Loads (Stage 2:D,DW)

- Live Load
- Stage 3
 - HL-93 (US)
 - Axle Load
 - Truck + Lane
 - Positive
 - Negative

	Span	Location	Distance	MDL-s1- Load Case...	MDL-s1- Load Cas...	MDL-s1- Load Ca...	MDL-s1- Load C...	MDL-s1- Load Cas...	MDL-s... Load...	MLL(+)... HL-93 (... Truck +...
	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1	2.50	2.50	62.28	2.43	72.05	26.97	-957.49	10.54	199.49
	1	3.06	3.06							
	1	8.00	8.00	185.16	7.23	214.20	80.18	-957.49	31.32	588.31
	1	16.00	16.00	329.17	12.86	380.80	142.54	-957.49	55.68	1030.99

Br RADBUG_demo.brdx - AASHTOWare Bridge Design: Prestressed Concrete Design Tool

File Design Input Design

Design input Design review Minimum strand design stress ratio

1

Specification checks Tabular results Result graphs Engine outputs

Delete Reset

Export



Design run View results Input and Review BrDR

Design run	Description	Critical design ratio	Pin
1-I1.1	NU 35.4, 34 strands, CG at left end = 15.74 in	✓ 1.04	📌
1-R2.1	NU 35.4, 34 strands, CG at left end = 15.74 in	✗ 0.58	📌
1-R5.1	NU 35.4, 34 strands, CG at left end = 15.74 in	✓ 1.05	📌

Mid span

Left

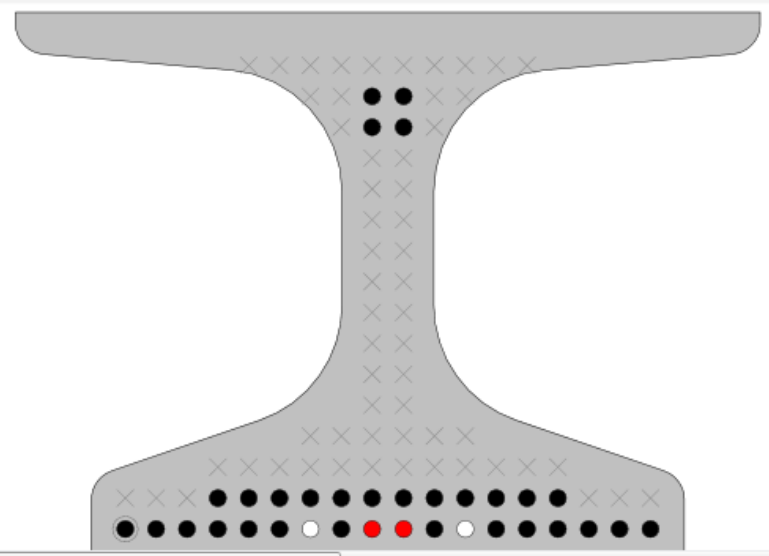
Section location (in)
48.00
120.00

New Modify Delete

Right

Section location (in)
48.00
120.00

New Modify Delete



RADBUG_demo.brdx - AASHTOWare Bridge Design: Prestressed Concrete Design Tool

Export

Computer > OSDisk (C:) > Program Files > AASHTOWare

Search AASHTOWare

Organize New folder

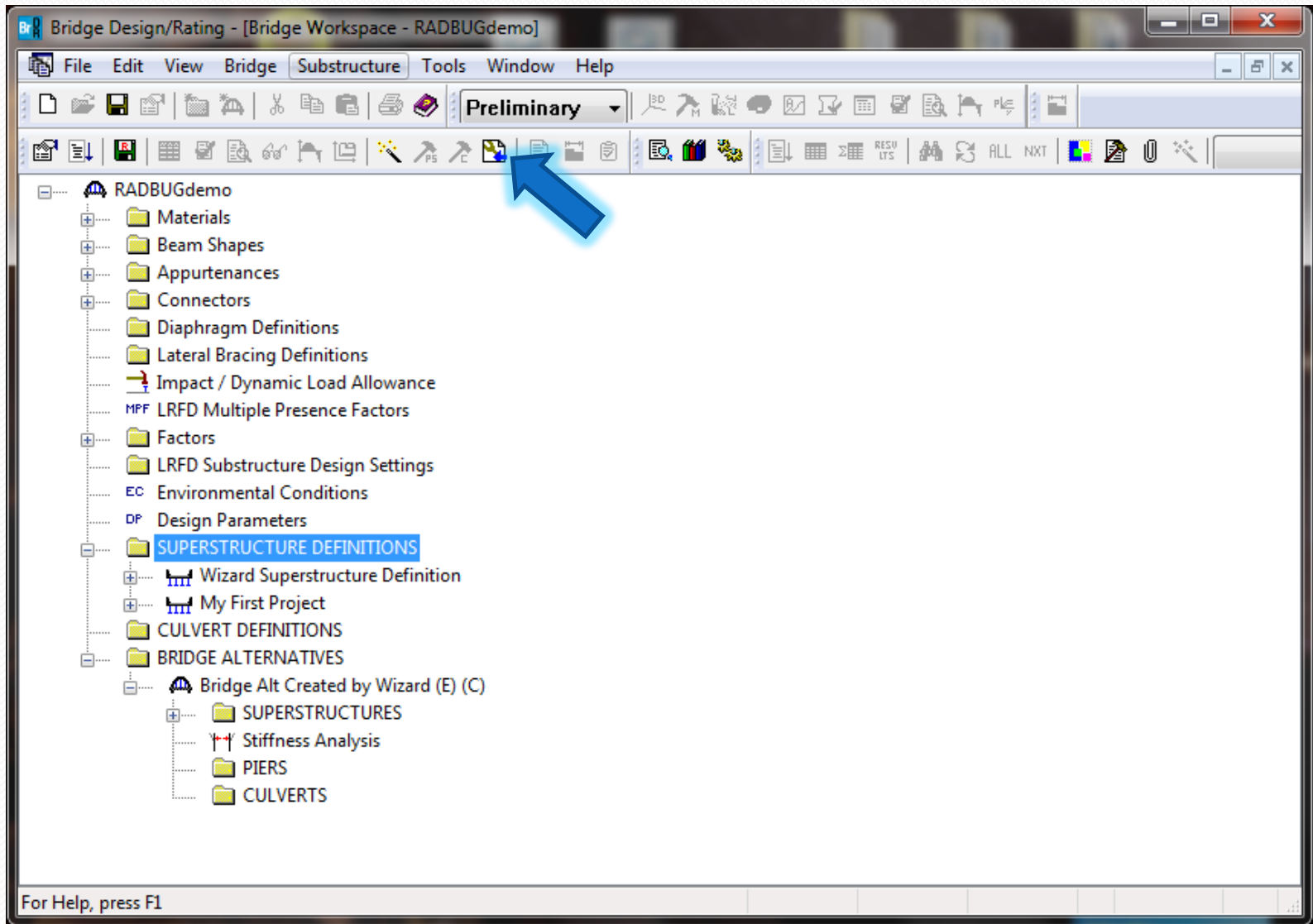
Name	Date modified	Type	Size
New Project_Export_harped.brdi	7/27/2016 1:29 PM	BRDI File	234 KB
New Project_Export.brdi	7/27/2016 9:05 AM	BRDI File	236 KB
New Project Test JSR_Export.brdi	4/26/2016 1:29 PM	BRDI File	1,198 KB
BrDR68	7/27/2016 9:07 AM	File folder	
Beta4.exports	7/15/2016 10:37 AM	File folder	
BrDR671.exports	5/10/2016 8:50 AM	File folder	
BrDR67	4/21/2016 3:16 PM	File folder	
beta3.exports	7/2/2015 12:24 PM	File folder	
Beta2.exports	5/21/2015 8:15 AM	File folder	

File name:

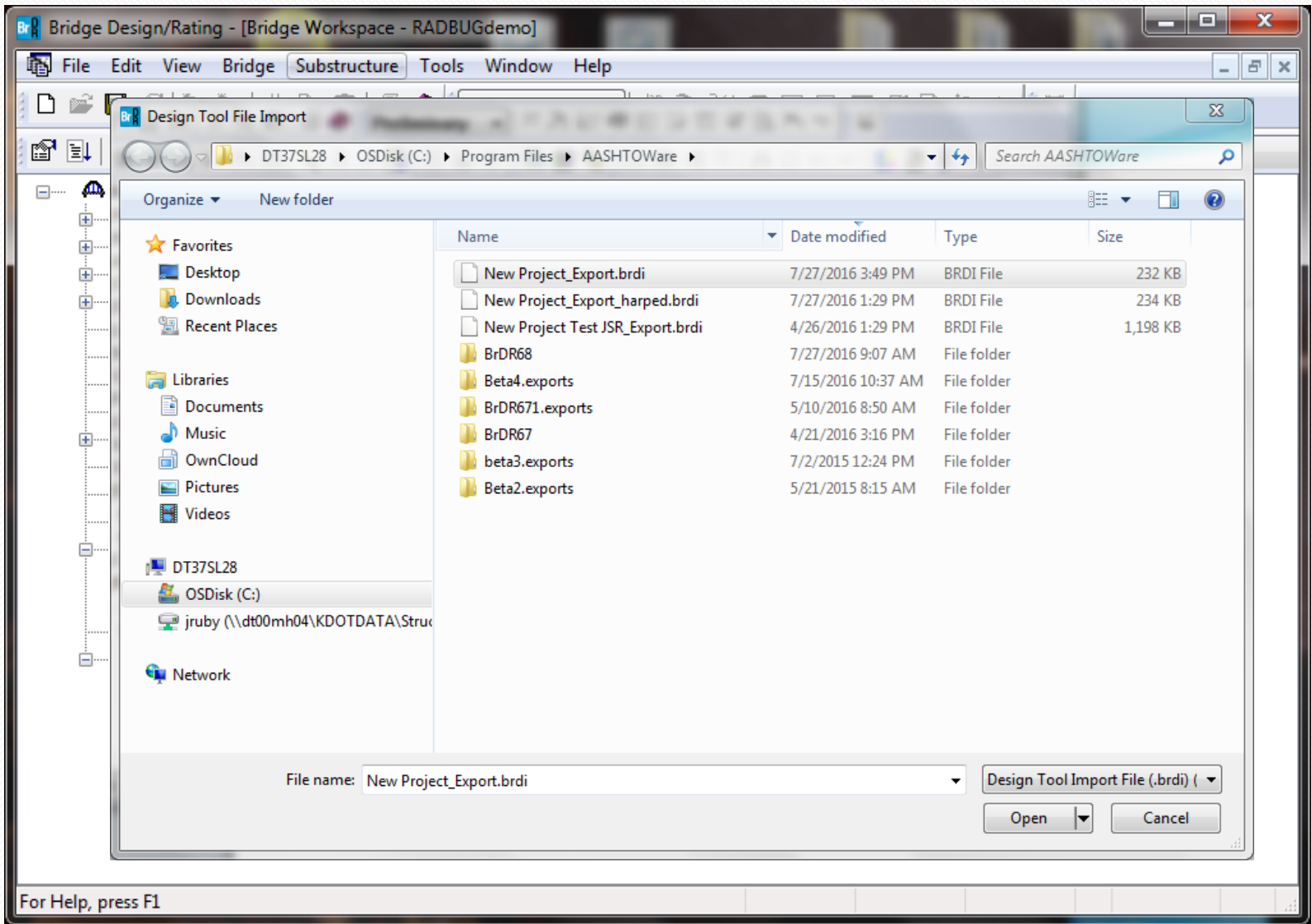
Save as type:

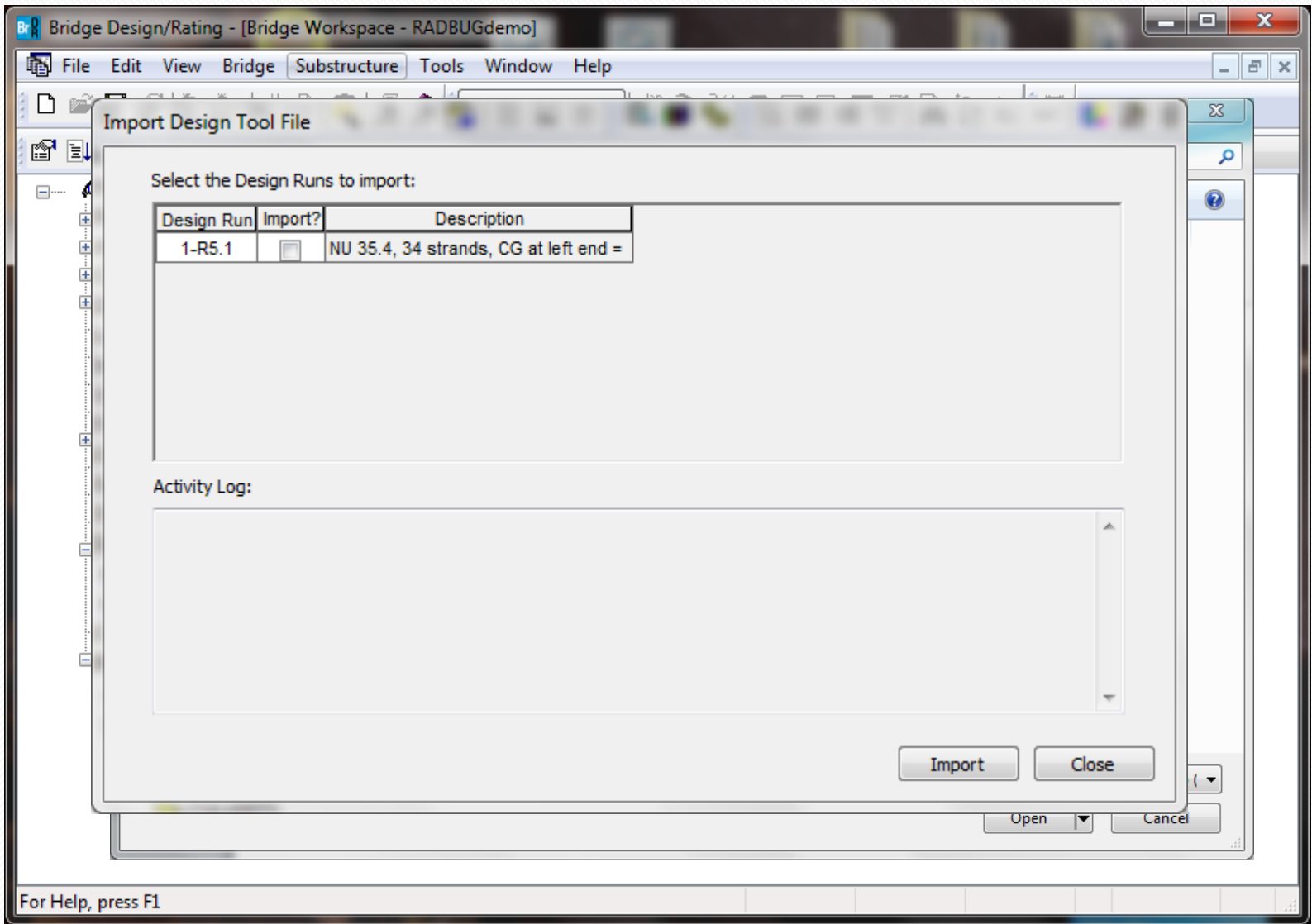
Hide Folders

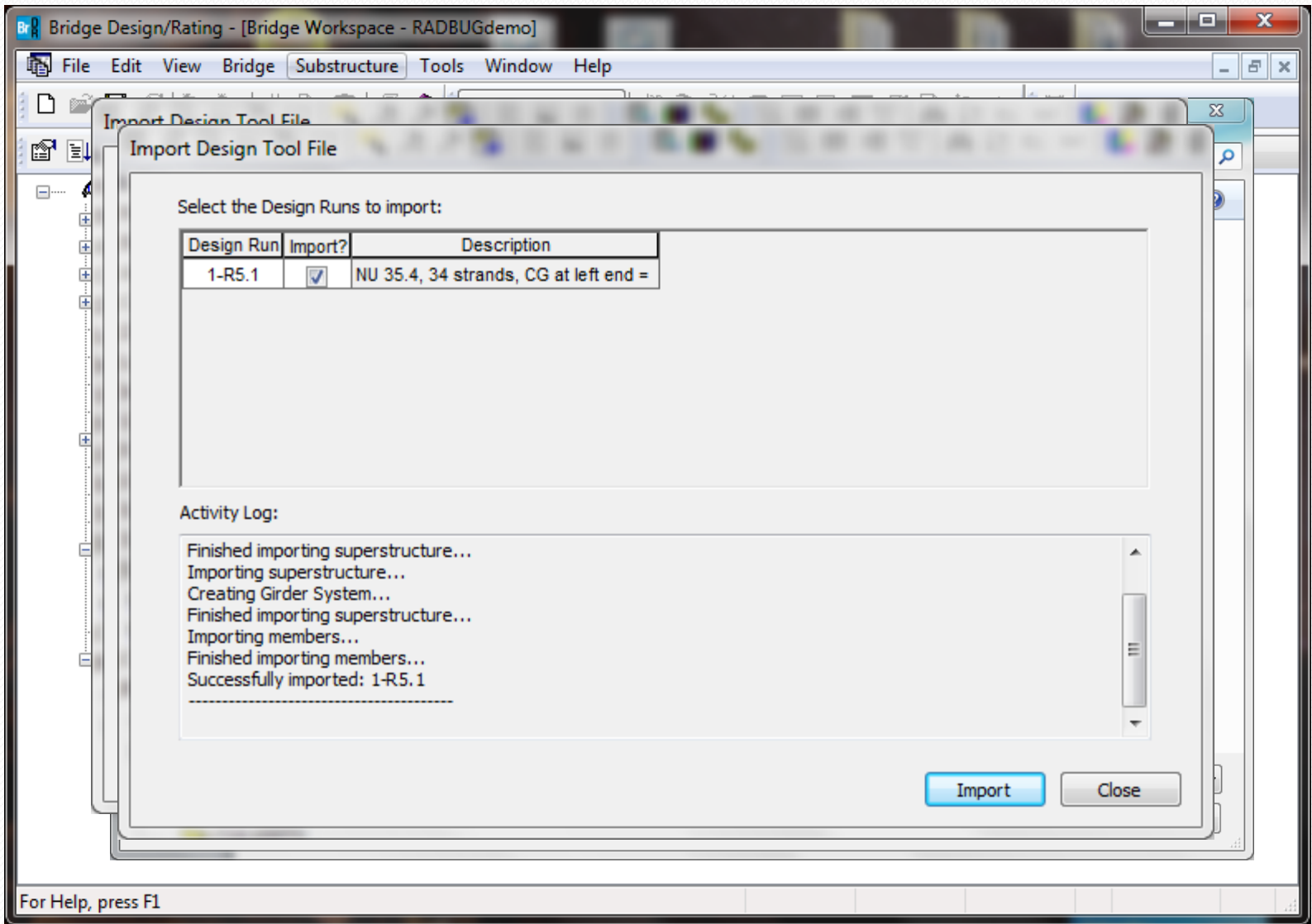
Save Cancel

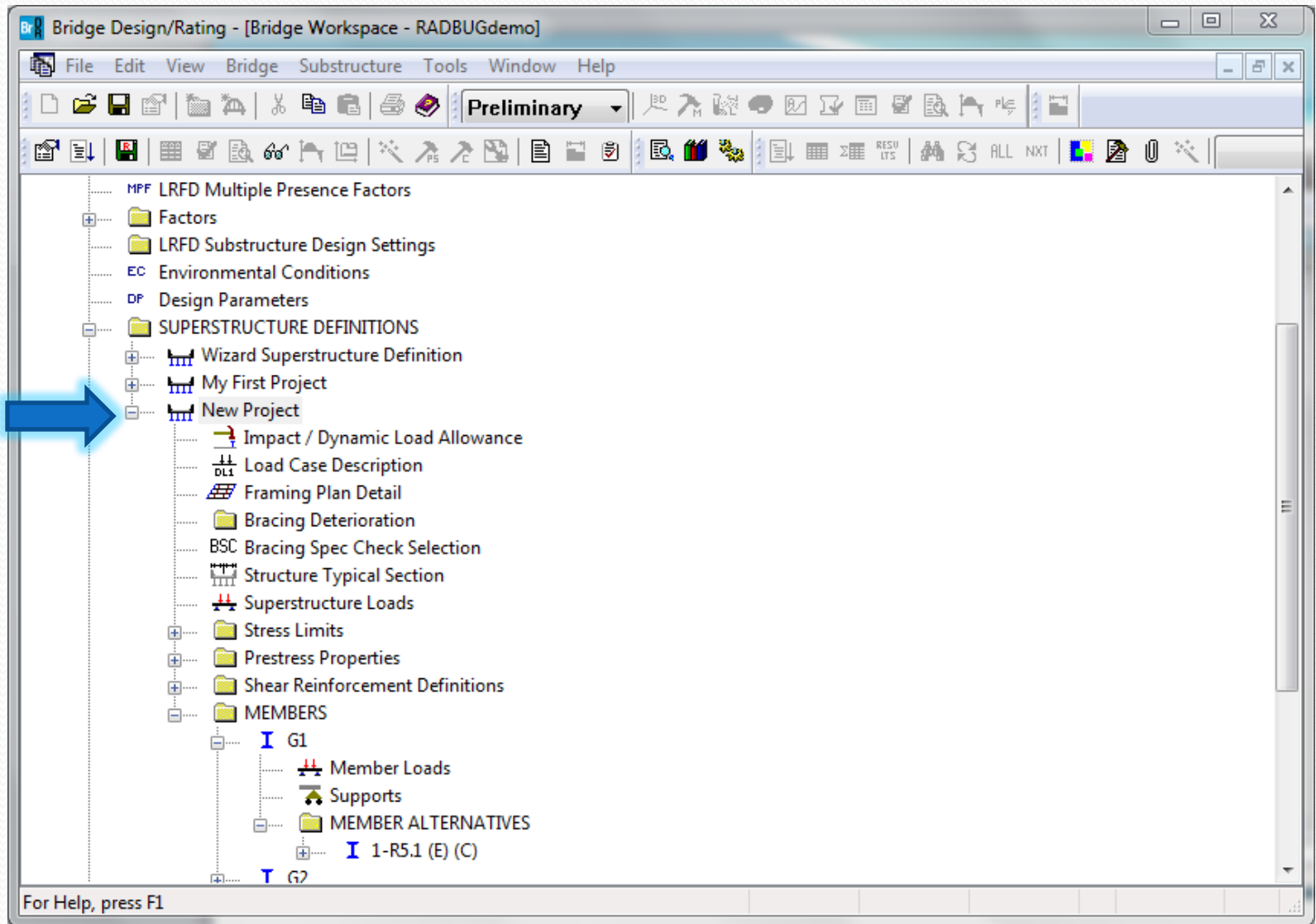


For Help, press F1









RADBUGdemo
New Bridge - New Project - G1
07/27/16

Beam Lengths

81'-0"

Horz. Shear Reinf. Spacing

Vert. Shear Reinf. Spacing 10 SPA.@ 6"=3'-0" 12 SPA.@ 1'-0"=12'-0" 1'-0"

22 SPA.@ 2'-0"=44'-0"

Debonded Strands

4 for 4'-0" 2 for 6'-0"

61'-0"

NU 35.4

Beam Projections

6"

Bearing Offsets

Span Lengths

80'-0"

Notes:

* All beam length dimensions are horiz.

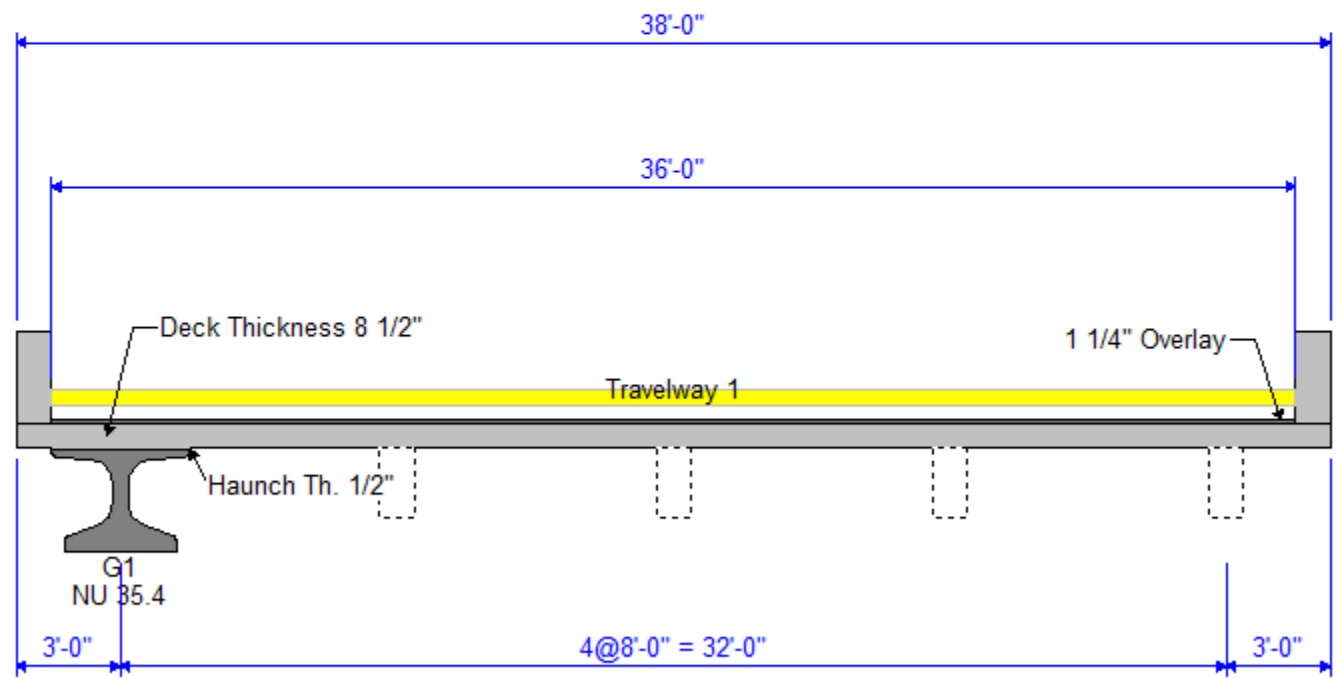
File Edit View Bridge Substructure Tools Window Help

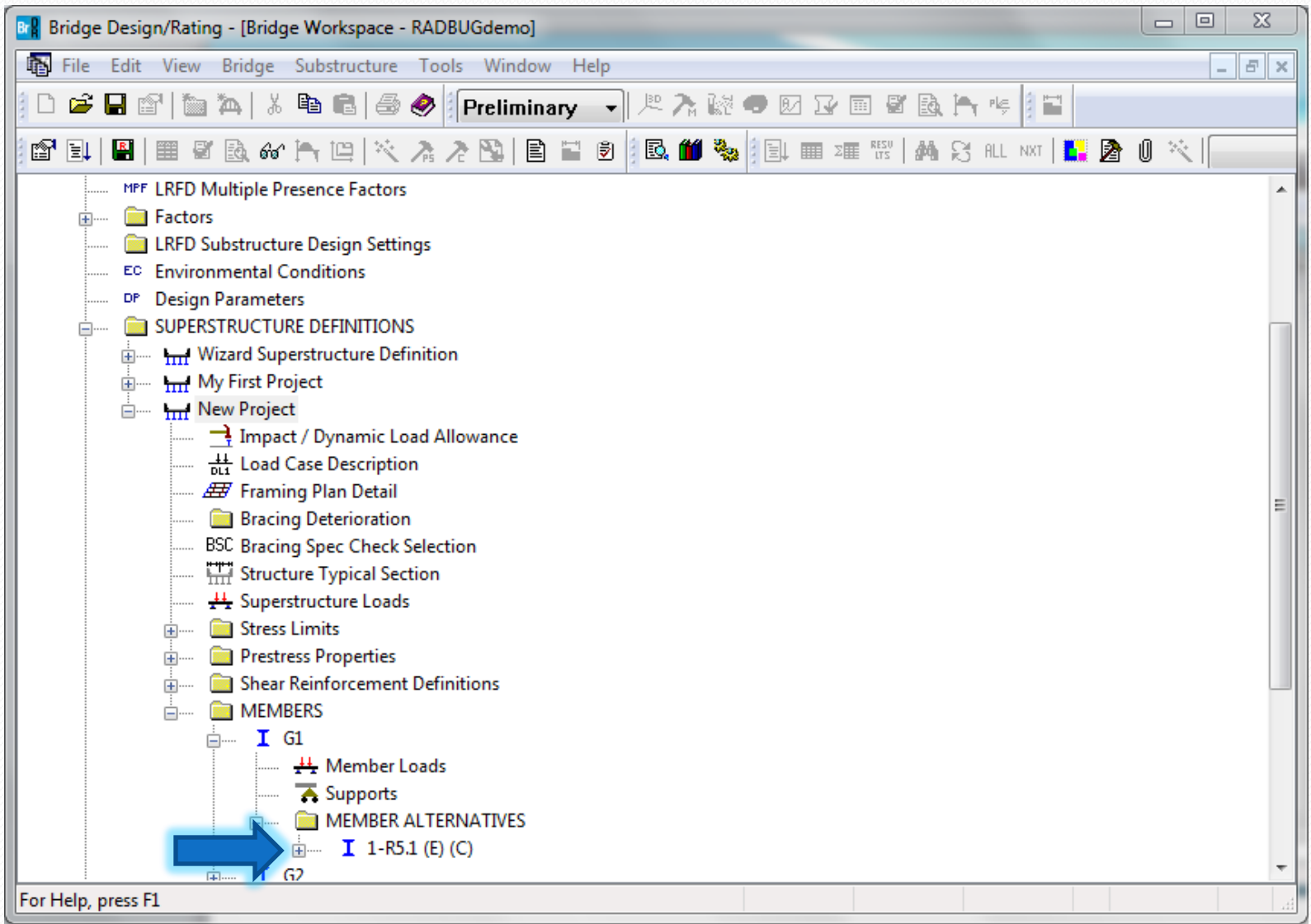
Preliminary

US Customary

125%

RADBUGdemo
New Bridge - New Project
07/27/16





Analysis Progress

- Analysis Event
 - 1-R5.1

- Location - 64.0000 (ft)
- Location - 72.0000 (ft)
- STAGE 3
- Support Location - 0.0000 (ft)
- Support Location - 80.0000 (ft)
- Location - 8.0000 (ft)
- Location - 16.0000 (ft)
- Location - 24.0000 (ft)
- Location - 32.0000 (ft)
- Location - 40.0000 (ft)
- Location - 48.0000 (ft)
- Location - 56.0000 (ft)
- Location - 64.0000 (ft)
- Location - 72.0000 (ft)
- STAGE 1 - Final Round
- STAGE 2 - Final Round
- STAGE 3 - Final Round
Completed Specification Check.
Info - Finished LRFR specification checking...
Info - Populating specification checking results...
Info - Finished populating specification checking results...

Info - Analysis completed!

View Rating Log

Print

OK

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	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
HL-93 (US)	Truck + Lane	LRFR	Inventory	39.12	1.087	40.00	1 - (50.0)	SERVICE-III PS Tensile Stress	As Requested	As Requested
HL-93 (US)	Truck + Lane	LRFR	Operating	63.07	1.752	40.00	1 - (50.0)	STRENGTH-I Concrete Flexure	As Requested	As Requested
HL-93 (US)	Tandem + Lane	LRFR	Inventory	45.27	1.258	40.00	1 - (50.0)	SERVICE-III PS Tensile Stress	As Requested	As Requested
HL-93 (US)	Tandem + Lane	LRFR	Operating	72.99	2.027	40.00	1 - (50.0)	STRENGTH-I Concrete Flexure	As Requested	As Requested

AASHTO LRFR Engine Version 6.8.0.3001

Analysis Preference Setting: None

Close

Two Phase Release Plan

- Phase I – Released with BrDR 6.8
 - Wanted to get in the users hands
 - Gather feedback for Phase II

Two Phase Release Plan

- Phase II – Release early in 2017
 - Additional iterations in design algorithm
 - Design all beams or interior and exterior only
 - Improved capabilities
 - Harped and debonded strands
 - Cut top strands
 - Include stability checks for transport
 - Call tool from BrD
 - Others based on feedback from users

Licensing

- Phase I was released with BrDR 6.8
 - Included with both BrD and BrR for the first year.
- Phase II
 - Included with BrD 6.8.1 and all future BrD releases
 - Available as a stand alone product



Thank You

Questions?