AASHTOWare™ BRIDGE DESIGN AND RATING

AASHTOWare PS Design Tool v7.8

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ProMiles®

Outline

Presentation

- History
- Capabilities and Limitations
- UI and Features
- Future Direction

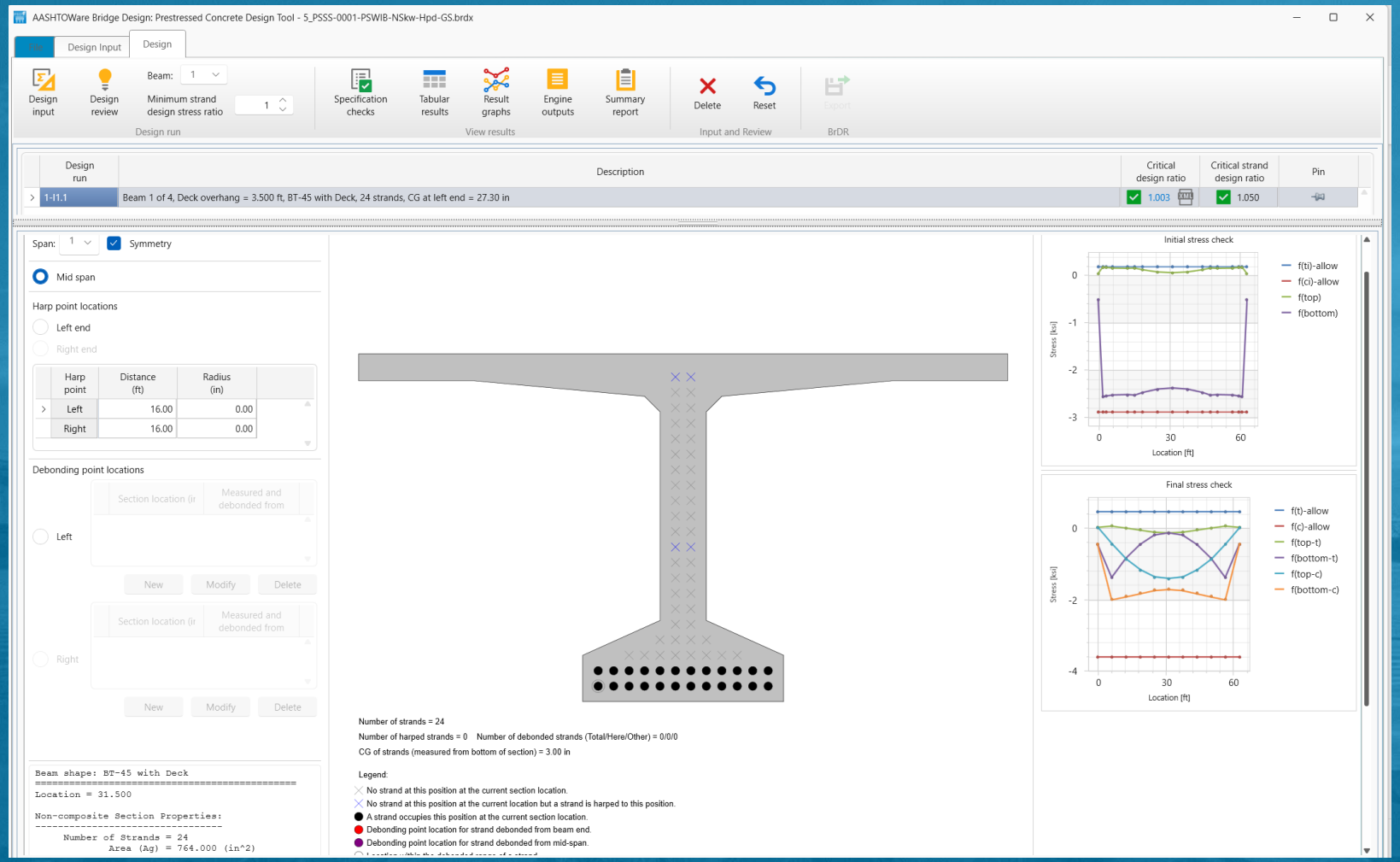
Live Demo

- Enter the project
- Perform design input run, review, and iterate

Questions

PS Design Tool

Analysis and design of prestressed concrete beams with harped and debonded strand patterns



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AASHTOWare Rating and Design Bridge User Group Meeting 2026

Capabilities and Limitations

Design Specification

- AASHTO LRFD, 6th through 10th editions
- Strength, Service, Fatigue Limit States, and Stability

Loads

Live Load

- Vehicular: Design, Permit, Fatigue
- Pedestrian

Dead Load

- Girder, Deck, Wearing Surface, Diaphragms
- Appurtenance: Median, Parapet, Railing, Sidewalk, Generic

Capabilities and Limitations

Structure Definition

- Girder System (constant girder spacing and one skew)
- Girder Line (can be used for variable beam spacing)

Beam Shapes

- Adjacent and Spread Box Beam
- Narrow and Wide Top Flange I Beam
- Tee Beam with 2 or 3 Stems

Capabilities and Limitations

Strand Configurations

- Initial Design: Straight, Straight and Debonded, Straight and Harped
- Final Design: Any Combination of Straight, Debonded, and Harped

Input

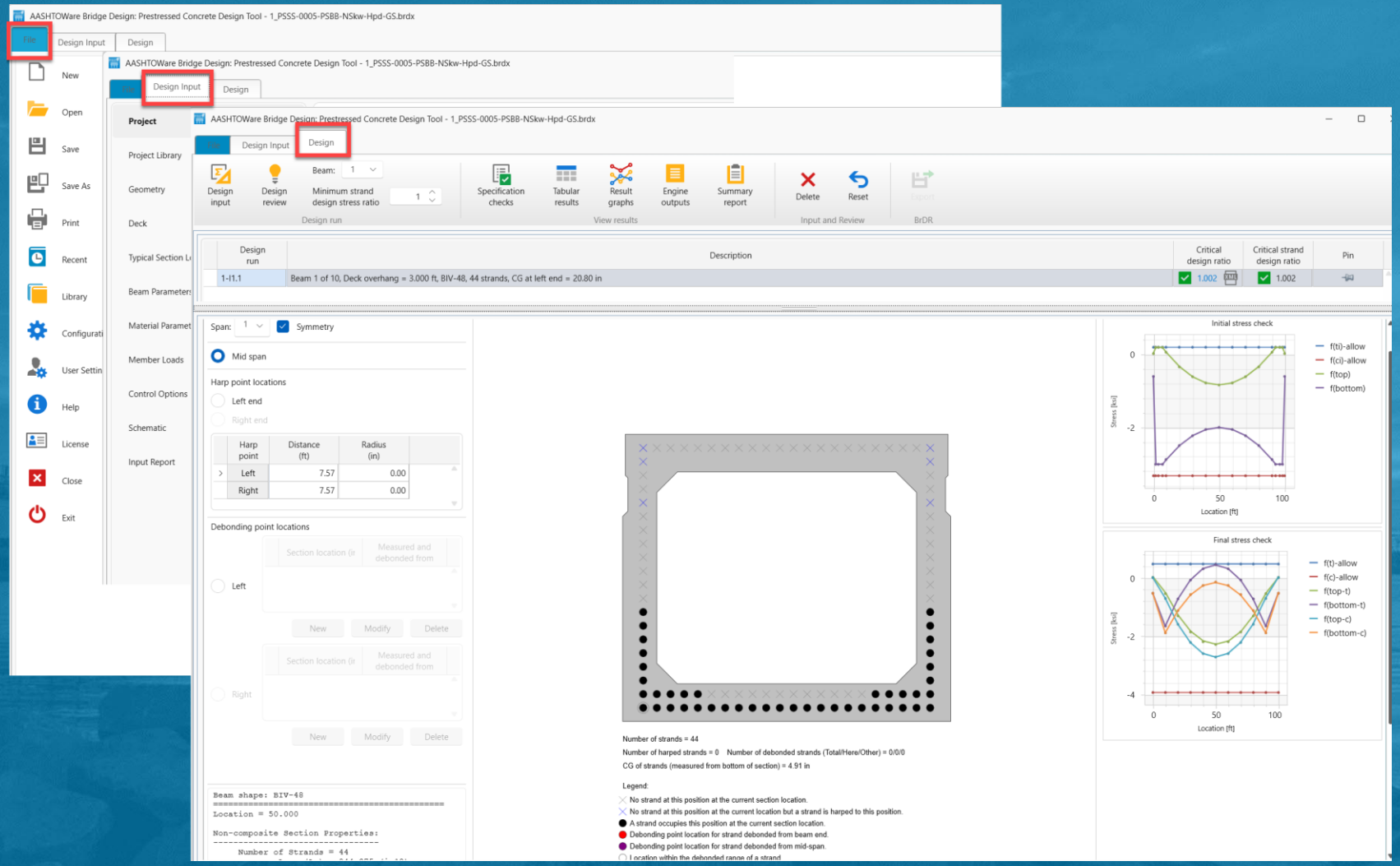
- Fixed
- Variable (Parametric)

Program Organization

File Tab: Common and PS Design Tool specific file operations

Design Input Tab: Data input for initial design

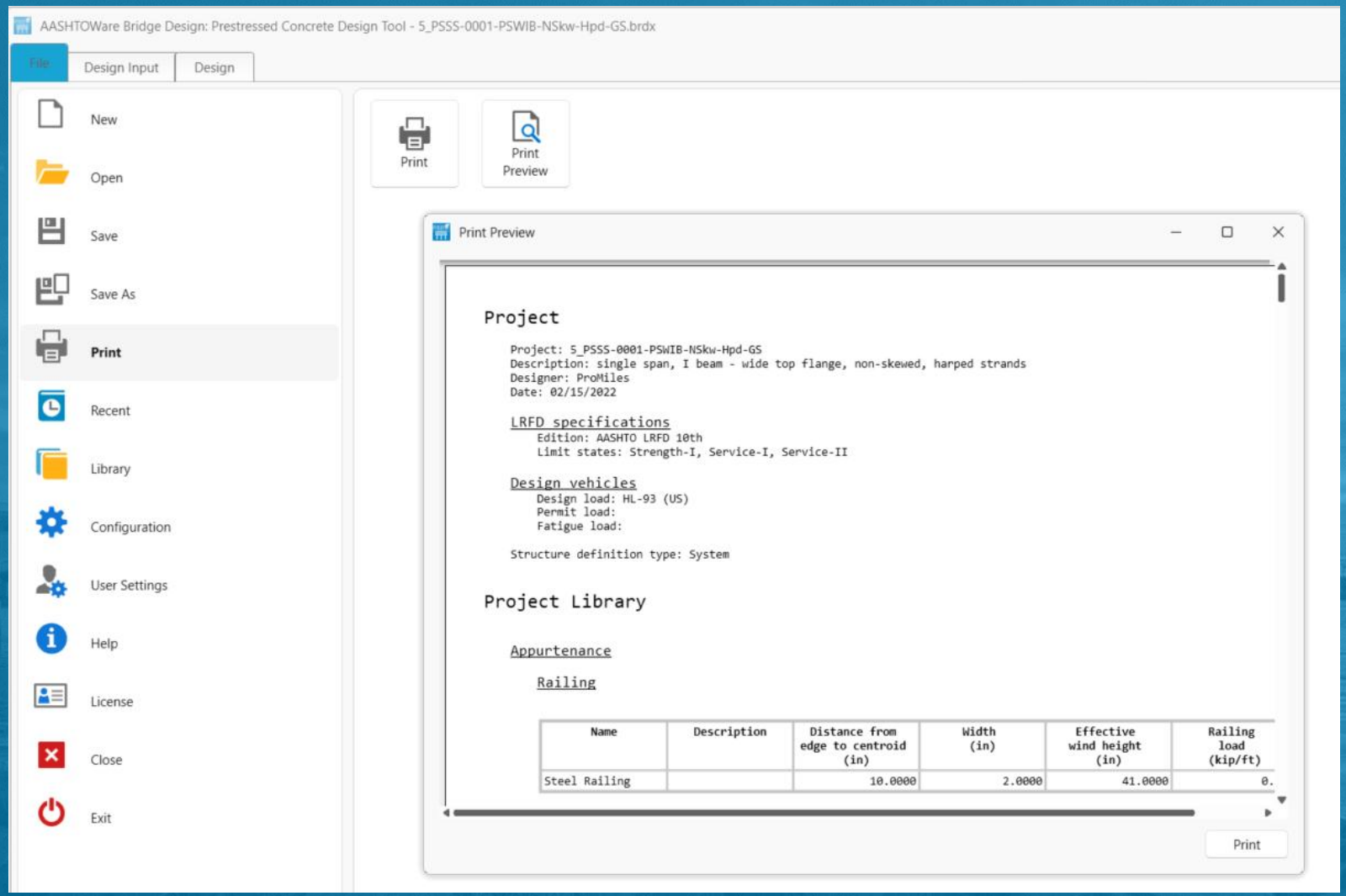
Design Tab: Results of initial design plus input tweaks and final design results



File | Print

- Print Preview and Print of Input Data

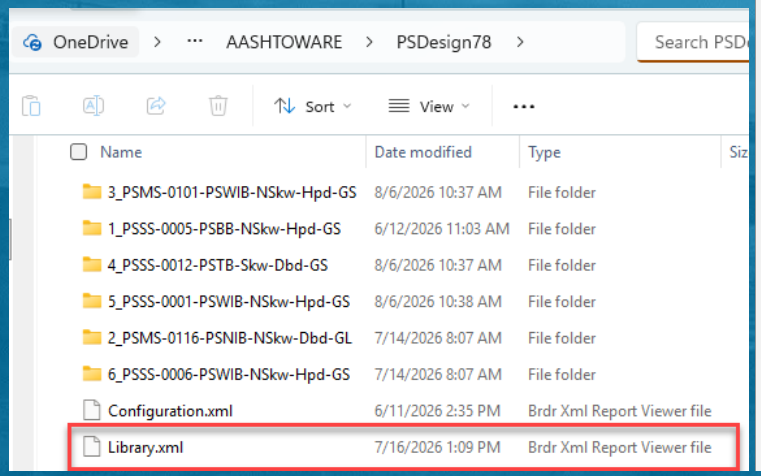
  (Output Data printout available in Design Summary Report)

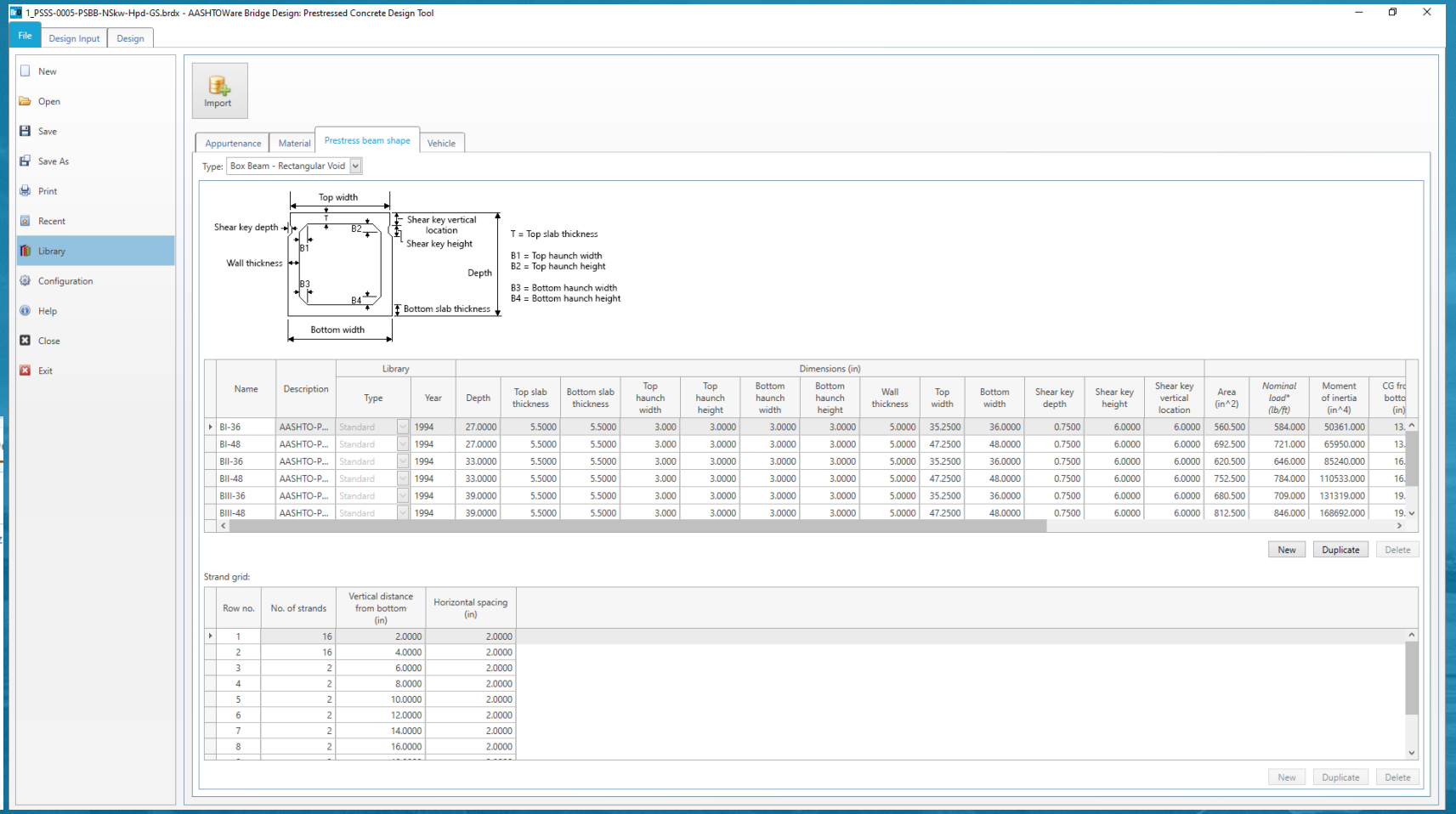


File | Library

Program Library

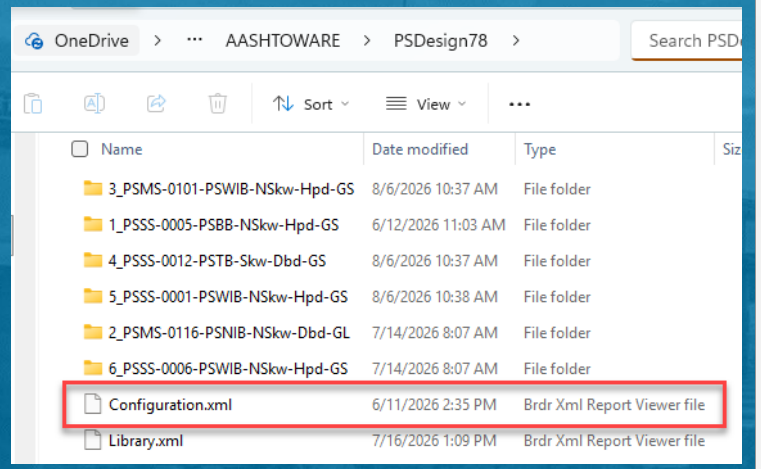
- Can be imported from BrDR
- Stored in XML file

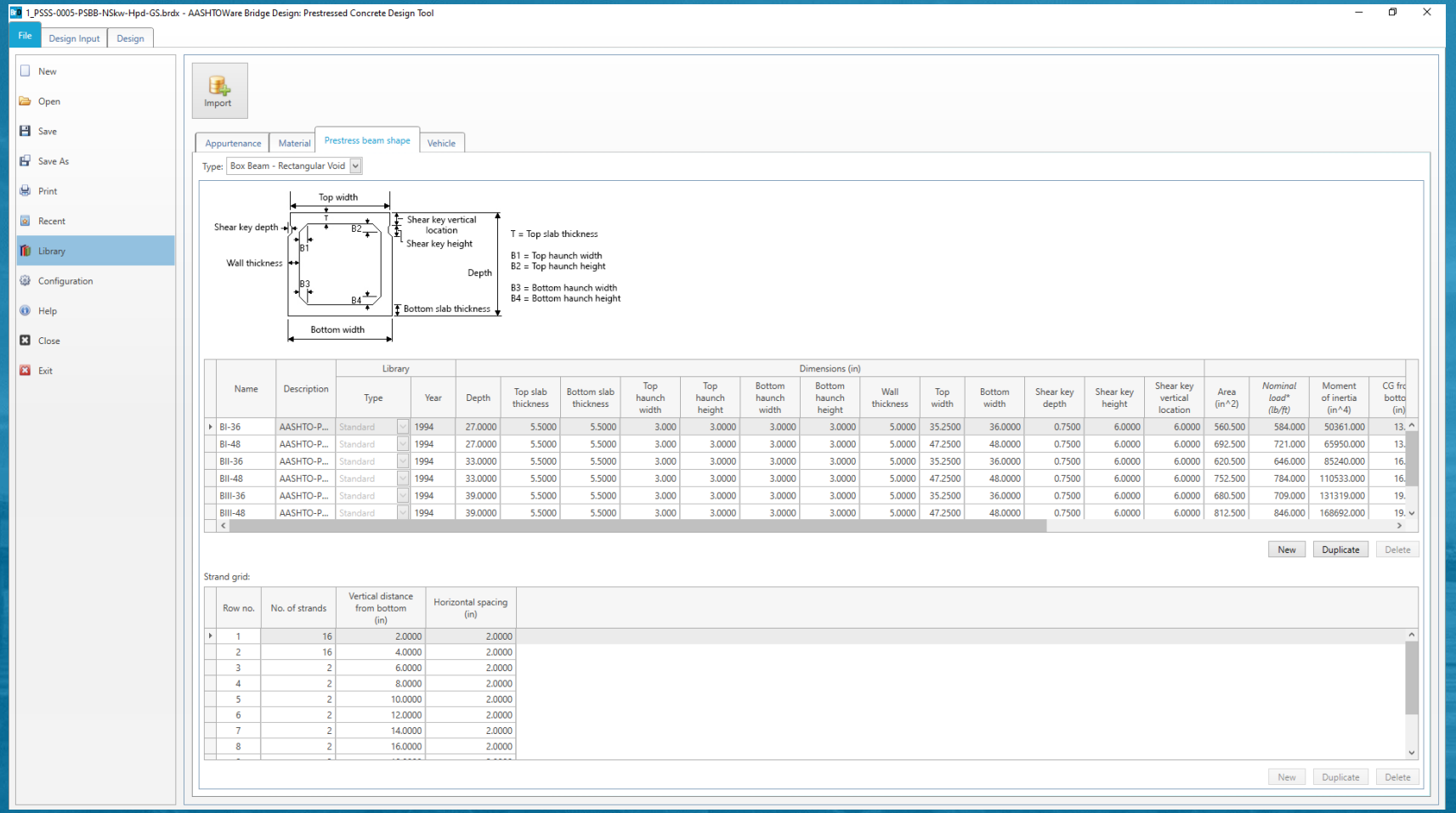




File | Configuration

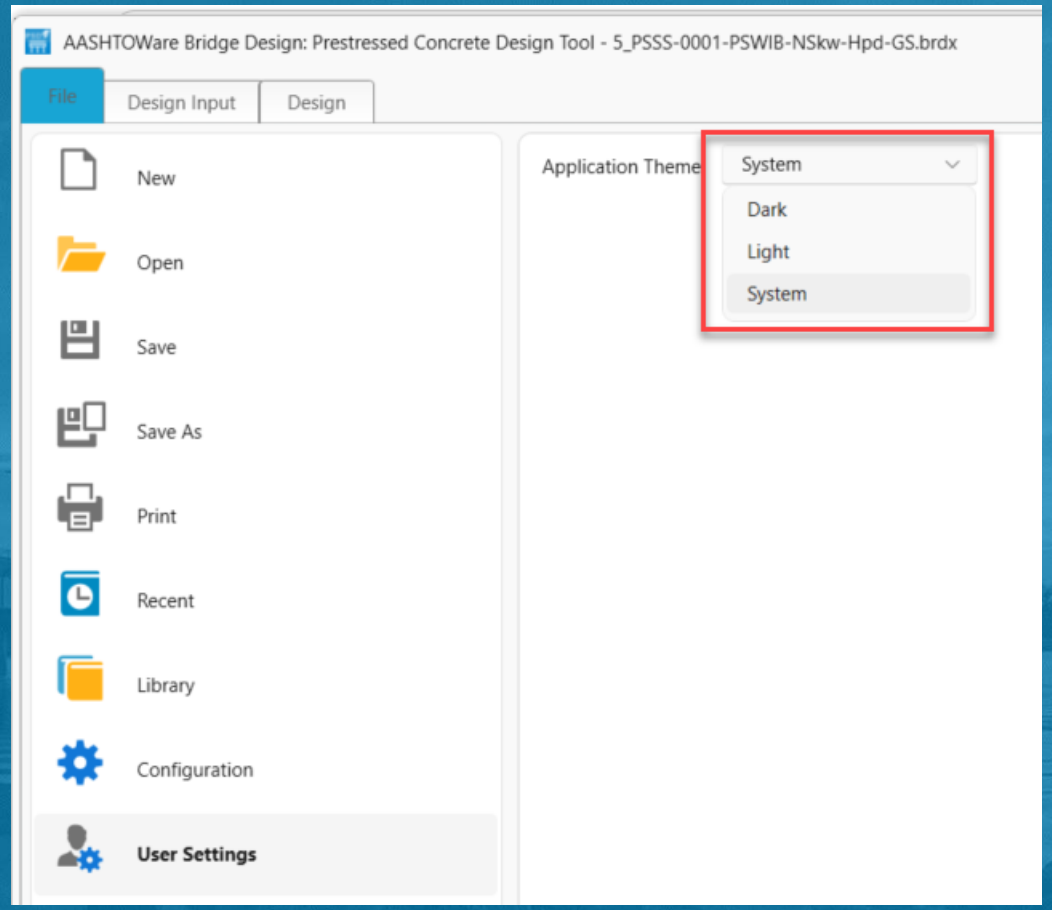
- Can be used like templates quickly create new bridge designs
- Stored in XML file





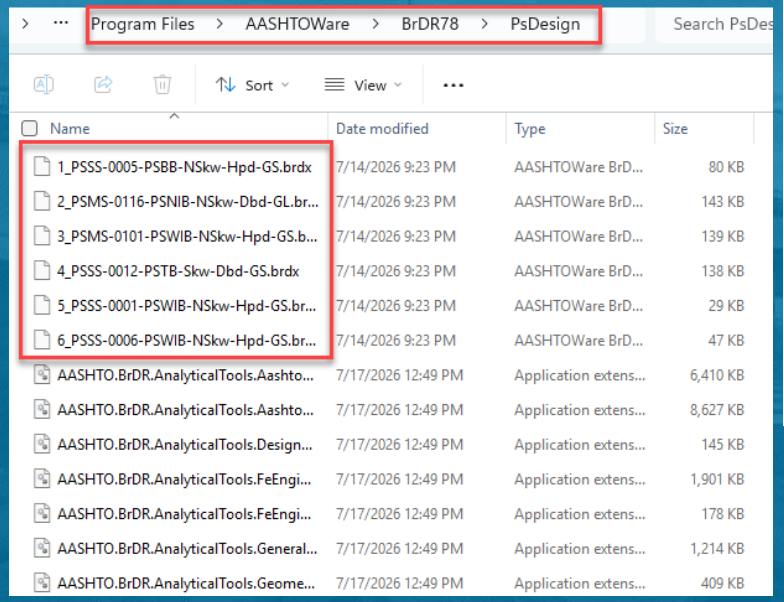
File | User Settings

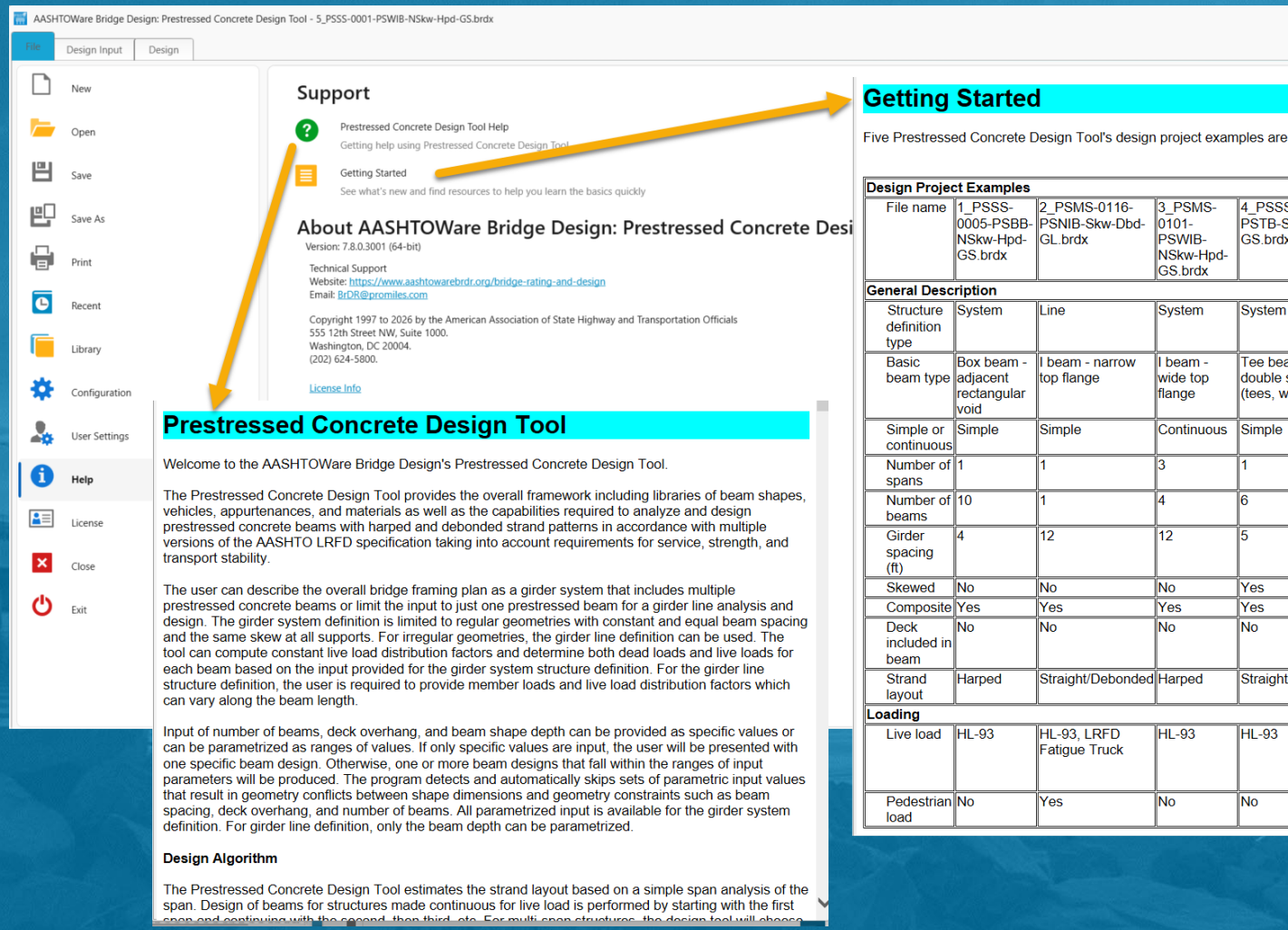
Set application theme



File | Help

- Program Help
- F1 Button
- Example Input Files Included with Install
- Input Stored in XML Files

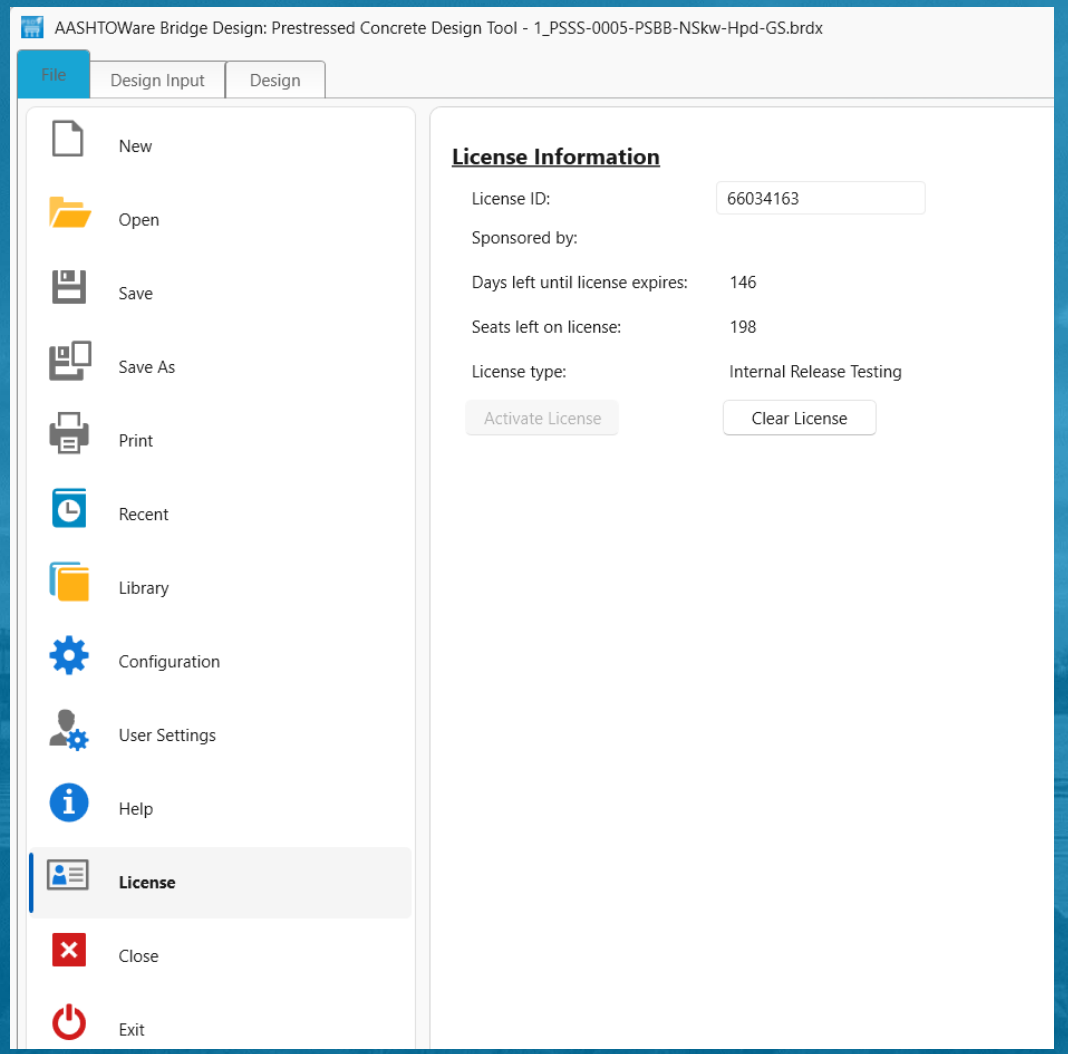




Design Project Examples						
File name	1_PSSS-0005-PSBB-NSkw-Hpd-GS.brdx	2_PSMS-0116-PSNIB-Skw-Dbd-GL.brdx	3_PSMS-0101-PSWIB-NSkw-Hpd-GS.brdx	4_PSSS-0012-PSTB-Skw-Dbd-GS.brdx	5_PSSS-0001-PSWIB-NSkw-Hpd-GS.brdx	6_PSSS-0006-PSWIB-NSkw-Hpd-GS.brdx
General Description						
Structure definition type	System	Line	System	System	System	System
Basic beam type	Box beam - adjacent rectangular void	I beam - narrow top flange	I beam - wide top flange	Tee beam - double stems (tees, webs)	I beam - wide top flange	I beam - wide top flange
Simple or continuous	Simple	Simple	Continuous	Simple	Simple	Simple
Number of spans	1	1	3	1	1	1
Number of beams	10	1	4	6	4	4 to 5
Girder spacing (ft)	4	12	12	5	7	8.5 to 11.67
Skewed	No	No	No	Yes	No	No
Composite	Yes	Yes	Yes	Yes	N/A	Yes
Deck included in beam	No	No	No	No	Yes	No
Strand layout	Harped	Straight/Debonded	Harped	Straight/Debonded	Harped	Harped
Loading						
Live load	HL-93	HL-93, LRFD Fatigue Truck	HL-93	HL-93	HL-93	HL-93, LRFD Fatigue Truck
Pedestrian load	No	Yes	No	No	No	No

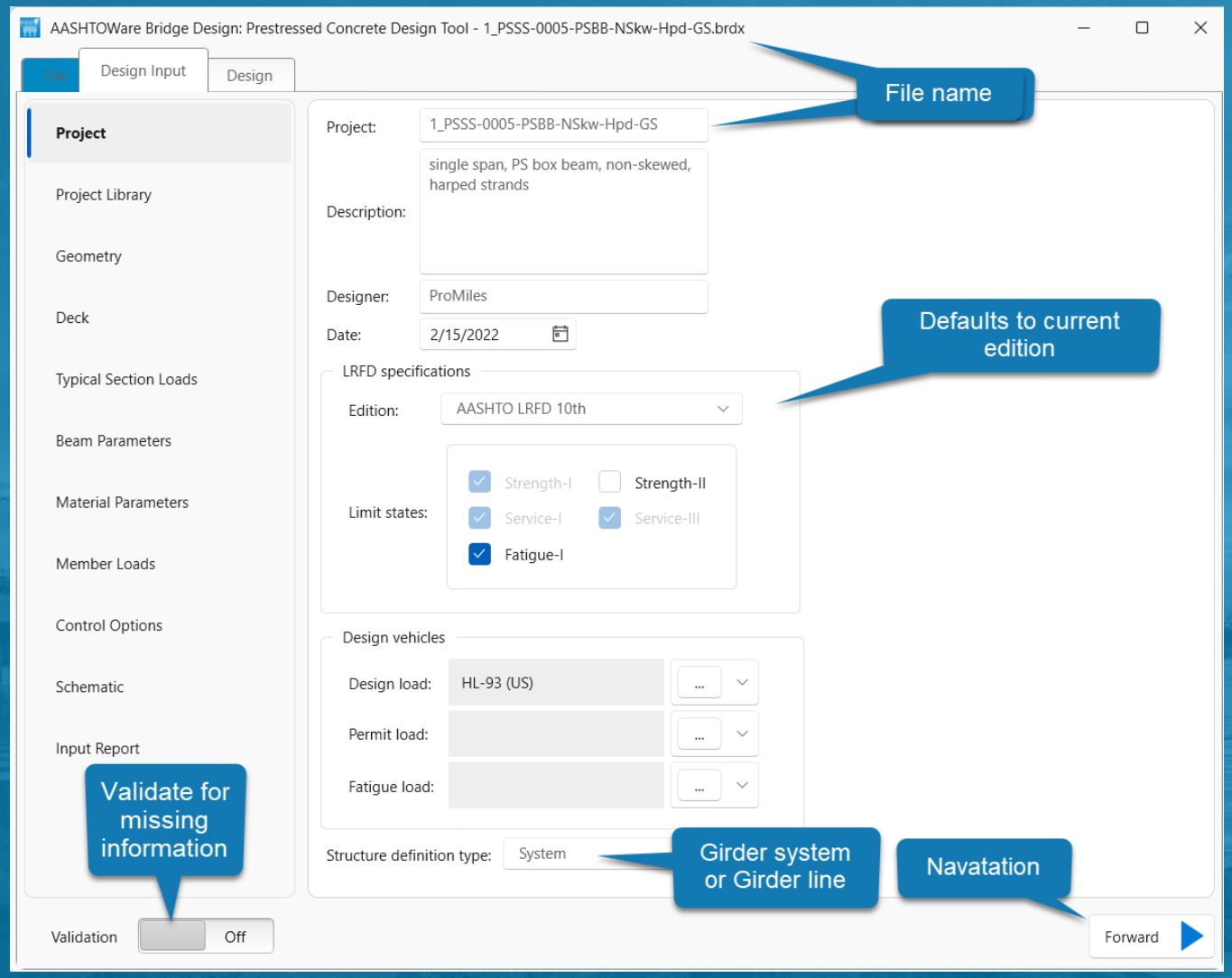
File | License

- General License information
- Activate and clear license



Design Input | Project

- General Info
- Design Specs
- Structure Definition Type
- Validate for missing information



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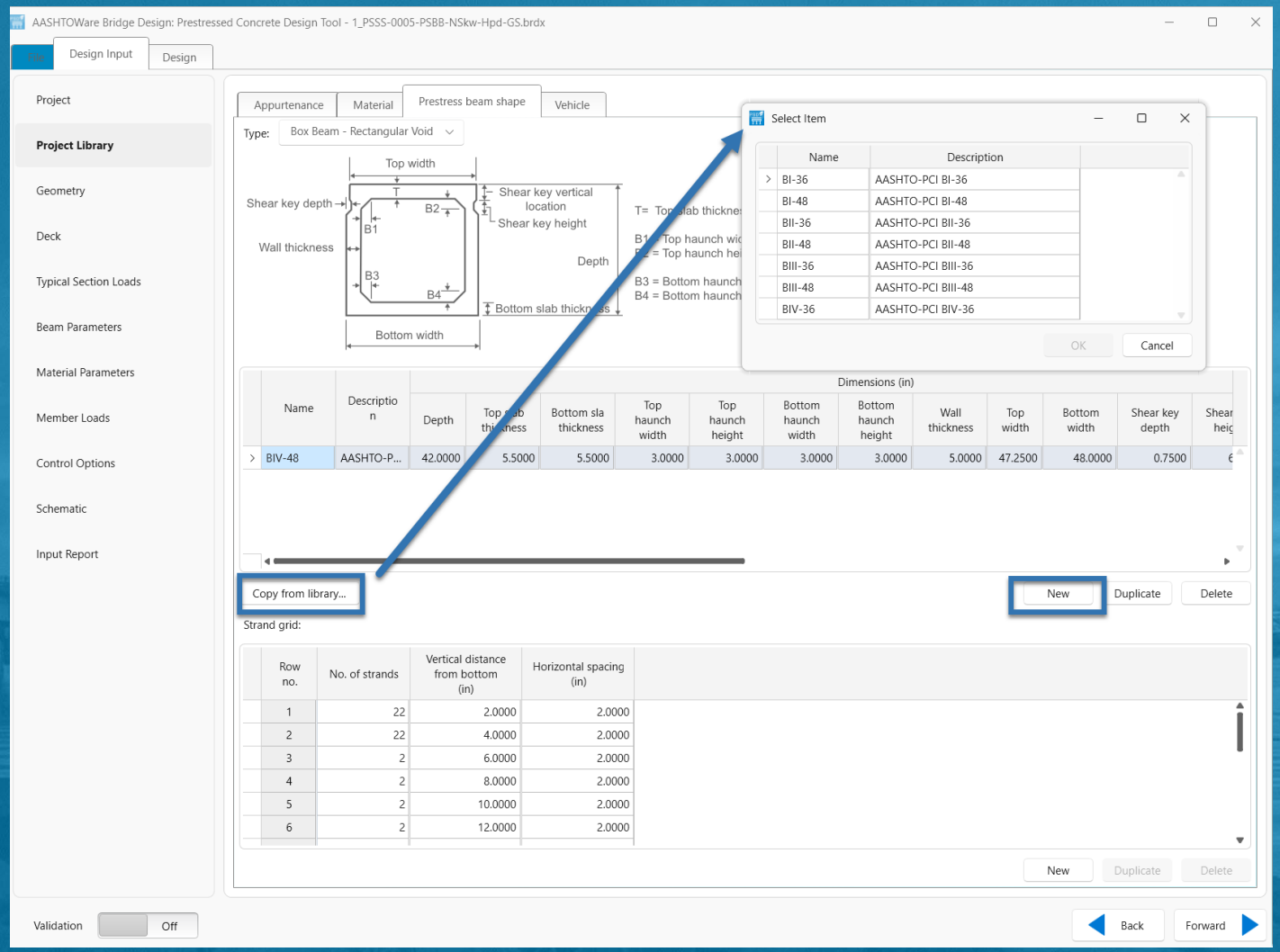
Design Input | Project Library

Library items available for project

Includes:

- Appurtenances
- Materials
- PS beam shapes
- Vehicles

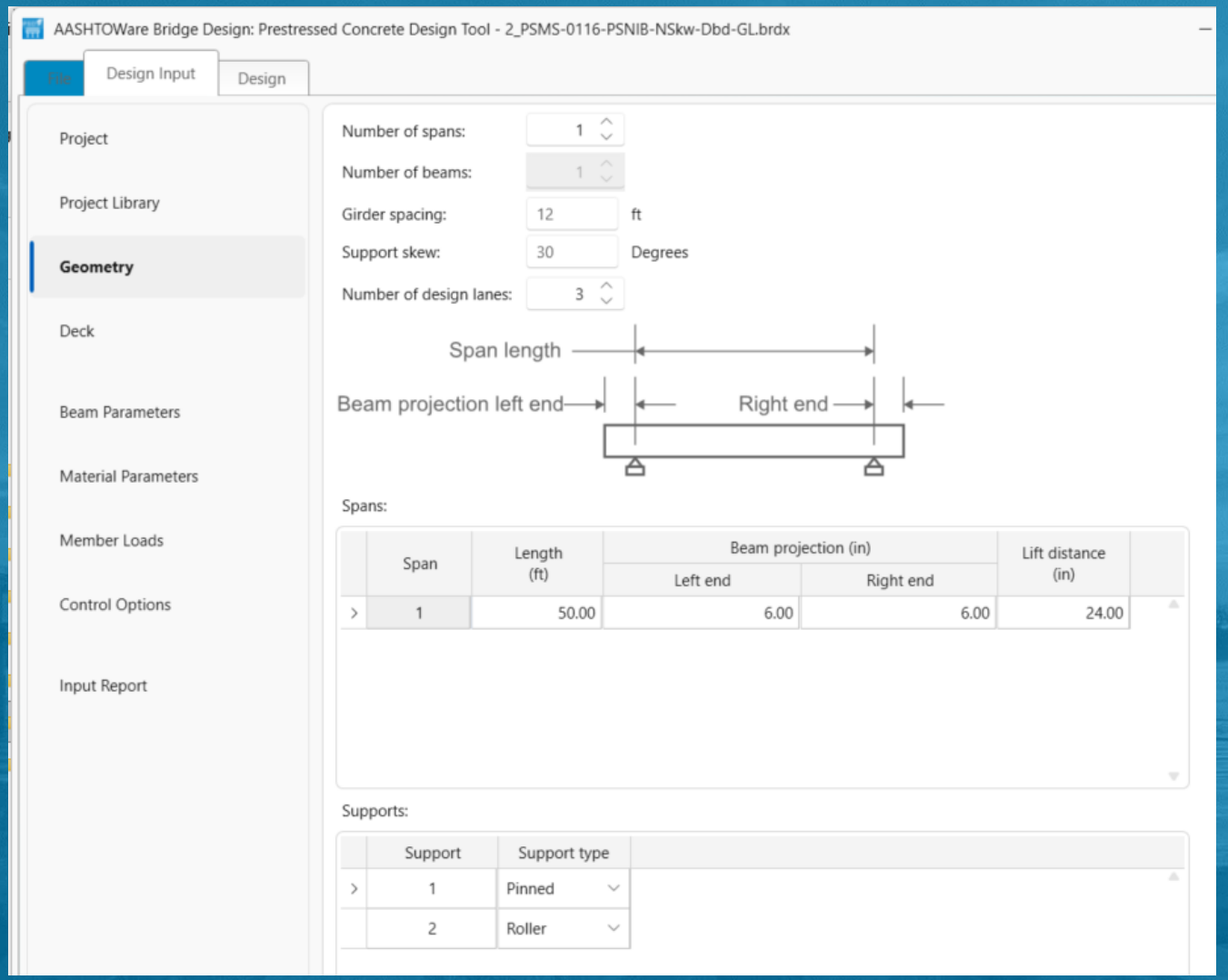
Create new or copy from Program Library



Design Input | Geometry

Girder Line

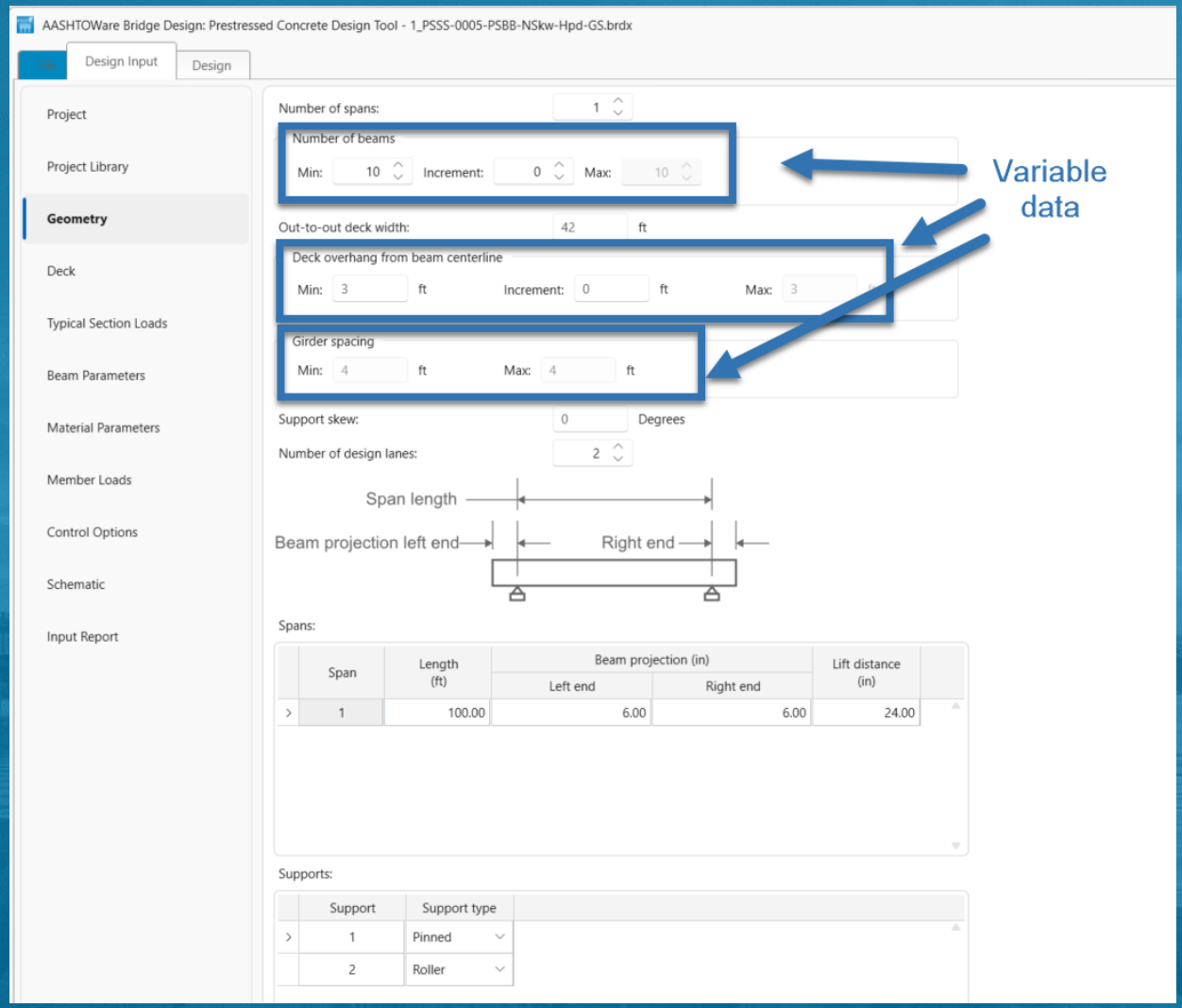
- Define single girder
- Dead load data and LLDFs must be entered



Design Input | Geometry

Girder System

- Define entire cross section
- DL and LLDFs are computed
- Allows variable (parametric) input



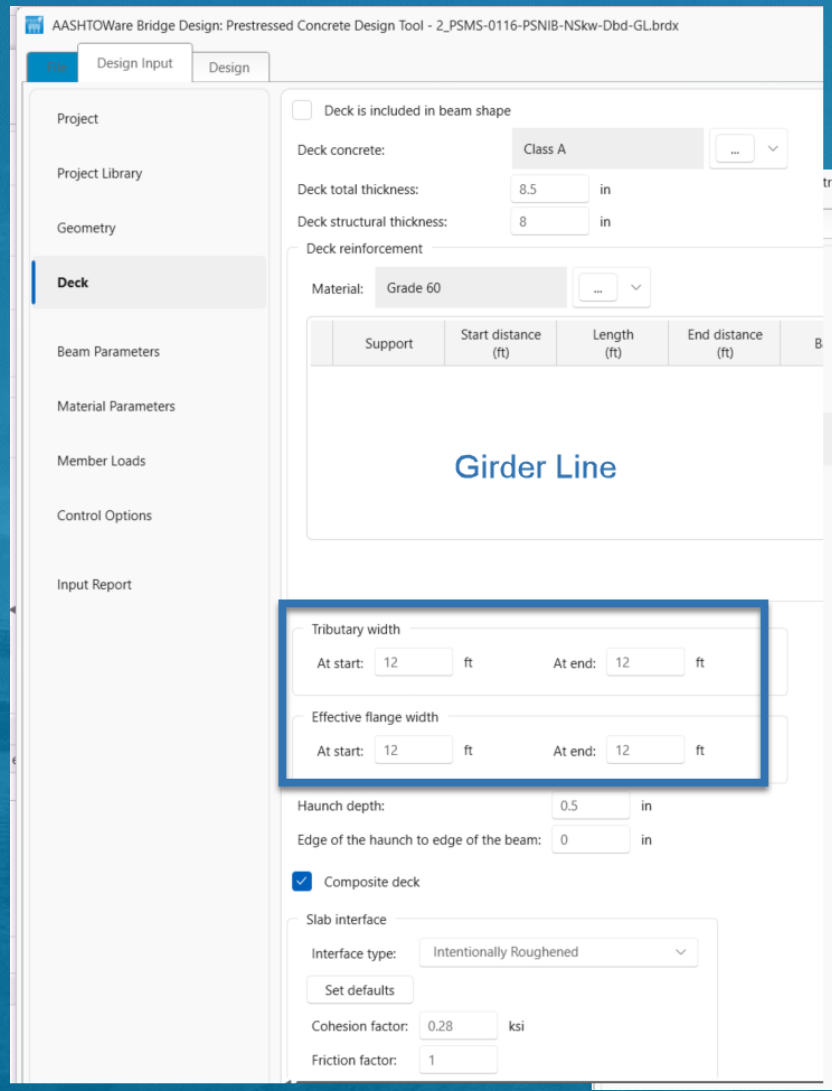
Design Input | Deck

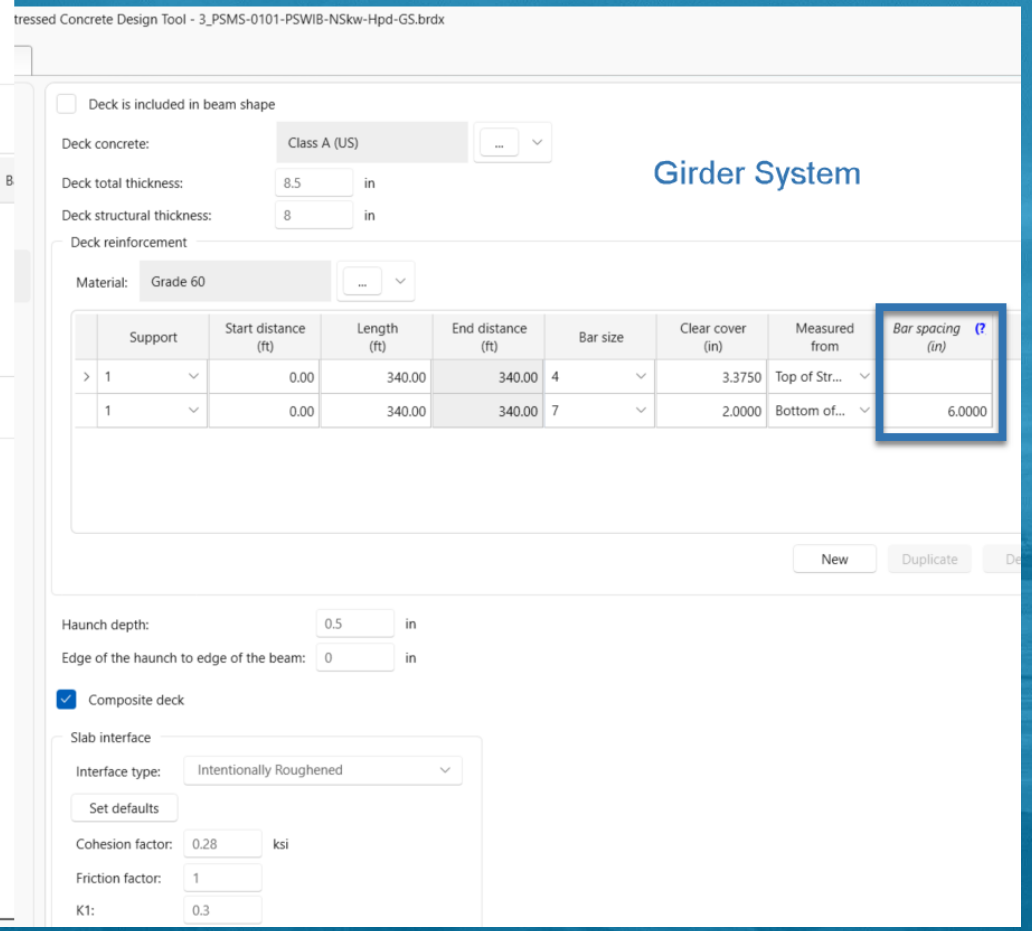
Girder Line

- Must enter tributary width and effective flange width

Girder System

- Bar spacing for continuous spans can be left blank and will be computed during analysis





Design Input | Typical Section Loads

Girder System Only

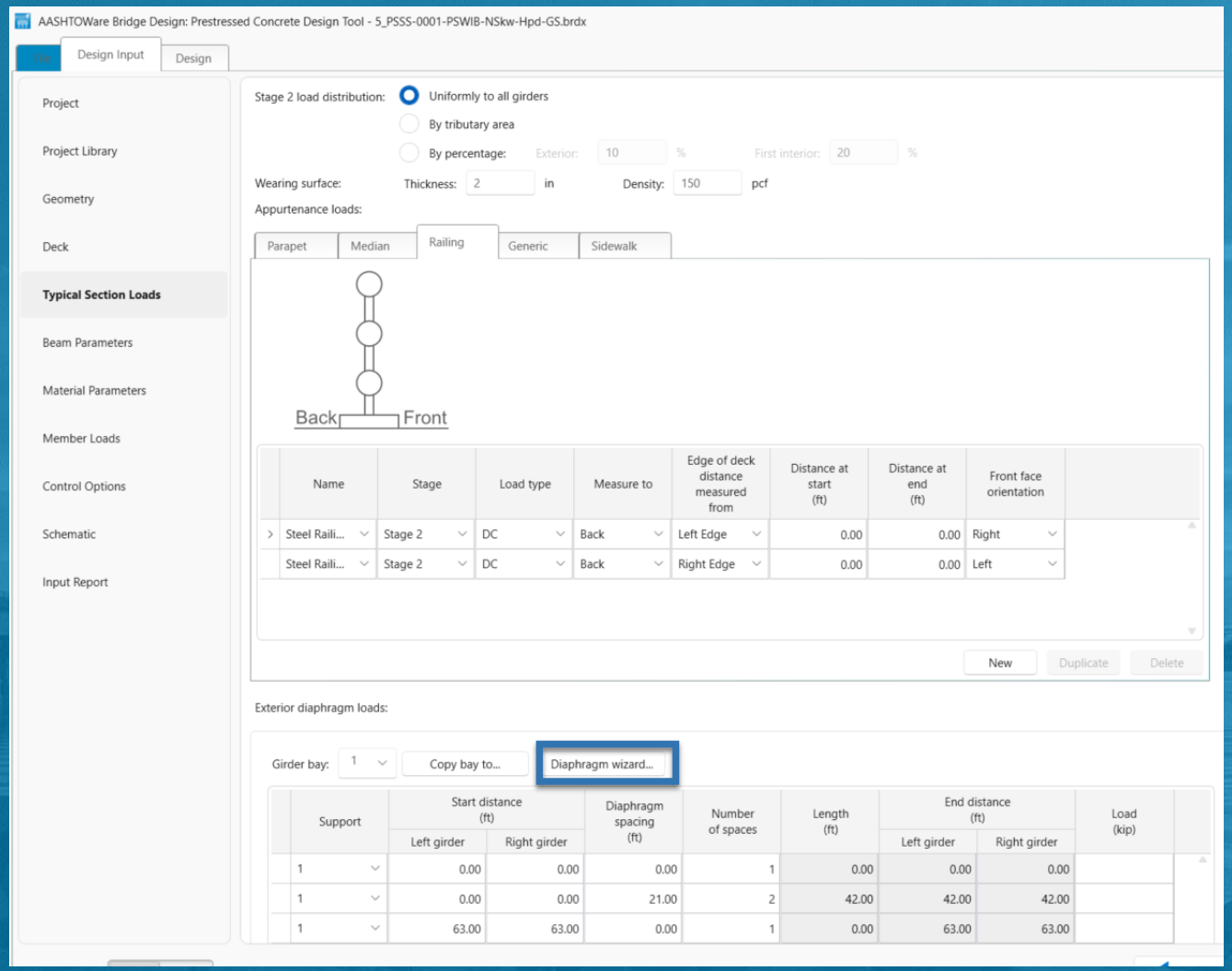
Stage 2 Load Distribution

- Uniform, by area, or by percentage

Load Types

- Wearing Surface
- Appurtenances
- Exterior Diaphragms

Diaphragm Wizard available only if geometry is fixed

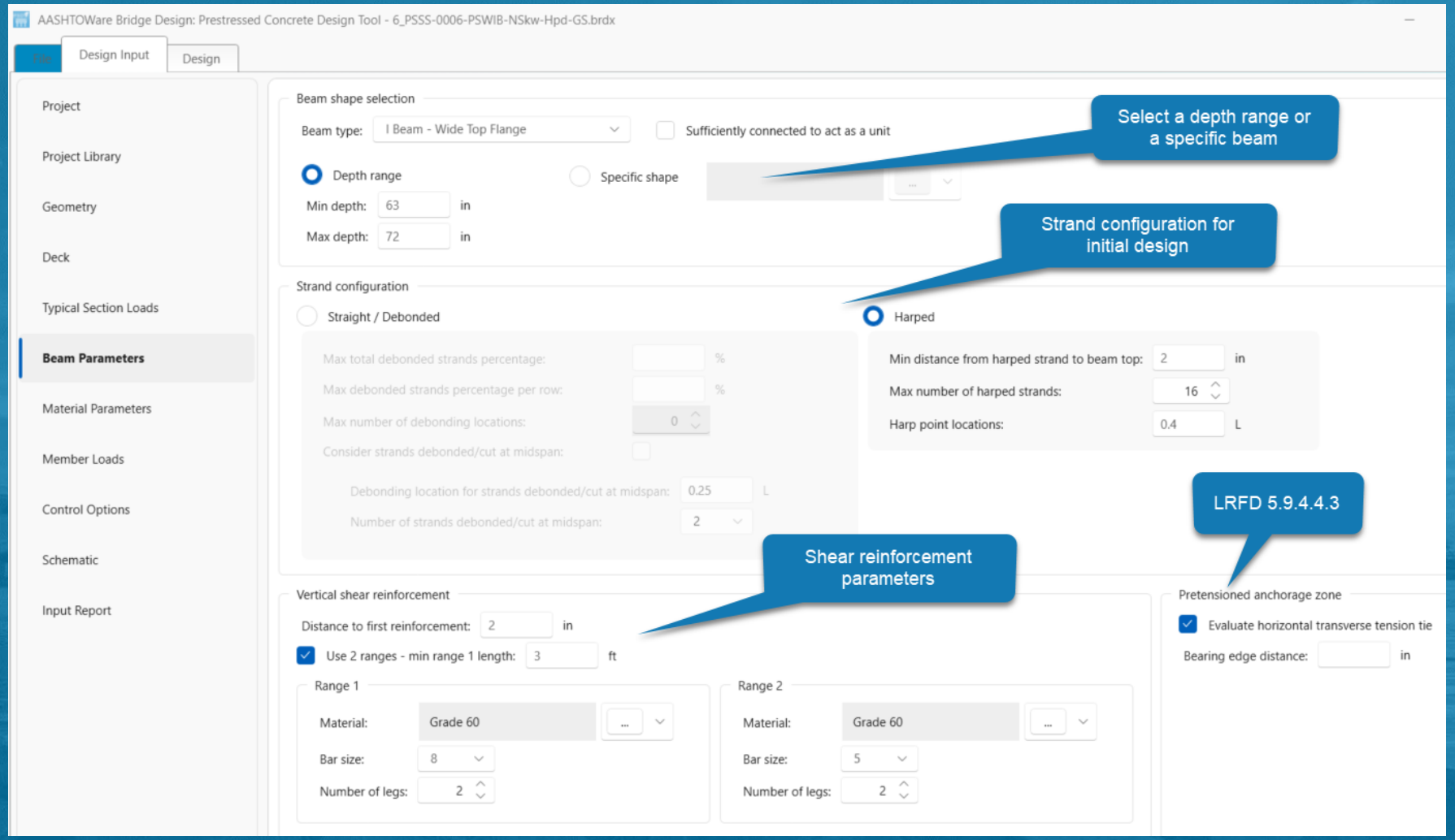


Design Input | Beam Parameters

Similar Input for Girder Line and Girder System

Parameters for

- Beam Shape Selection
- Initial Strand Configuration
- Vertical Shear (and Splitting) Reinforcement

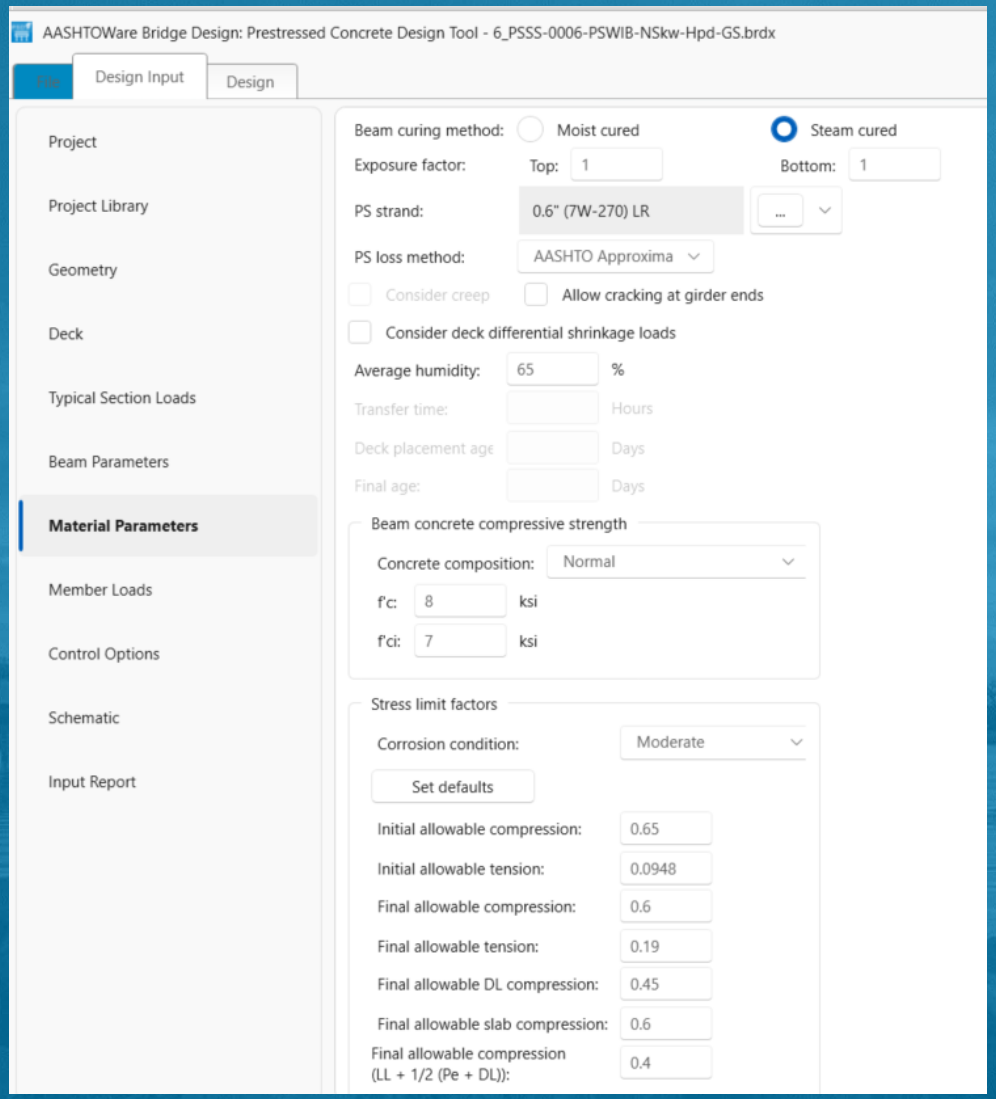


Design Input | Material Properties

Similar Input for Girder Line and Girder System

Input Data for:

- PS Loss Calculations
- Beam Concrete Strength (can be modified later)
- Stress Limit Factors



Design Input | Member Loads | LLDFs

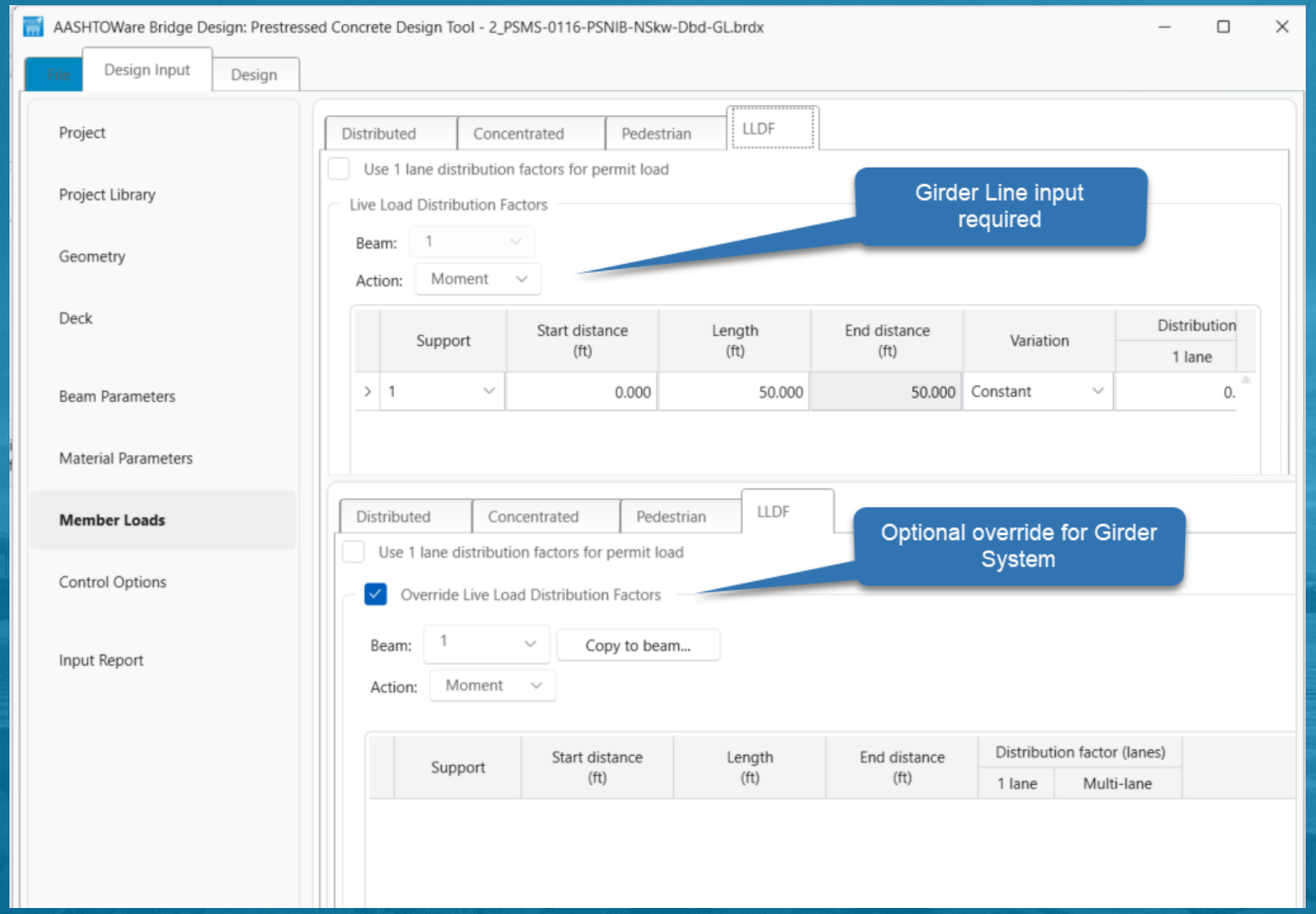
Different Input for Girder Line and Girder System

Girder Line LLDF:

- Required user input
- Allows Variation with within range

Girder System LLDF

- Calculated by program
- Can be overridden by user
- Constant within range

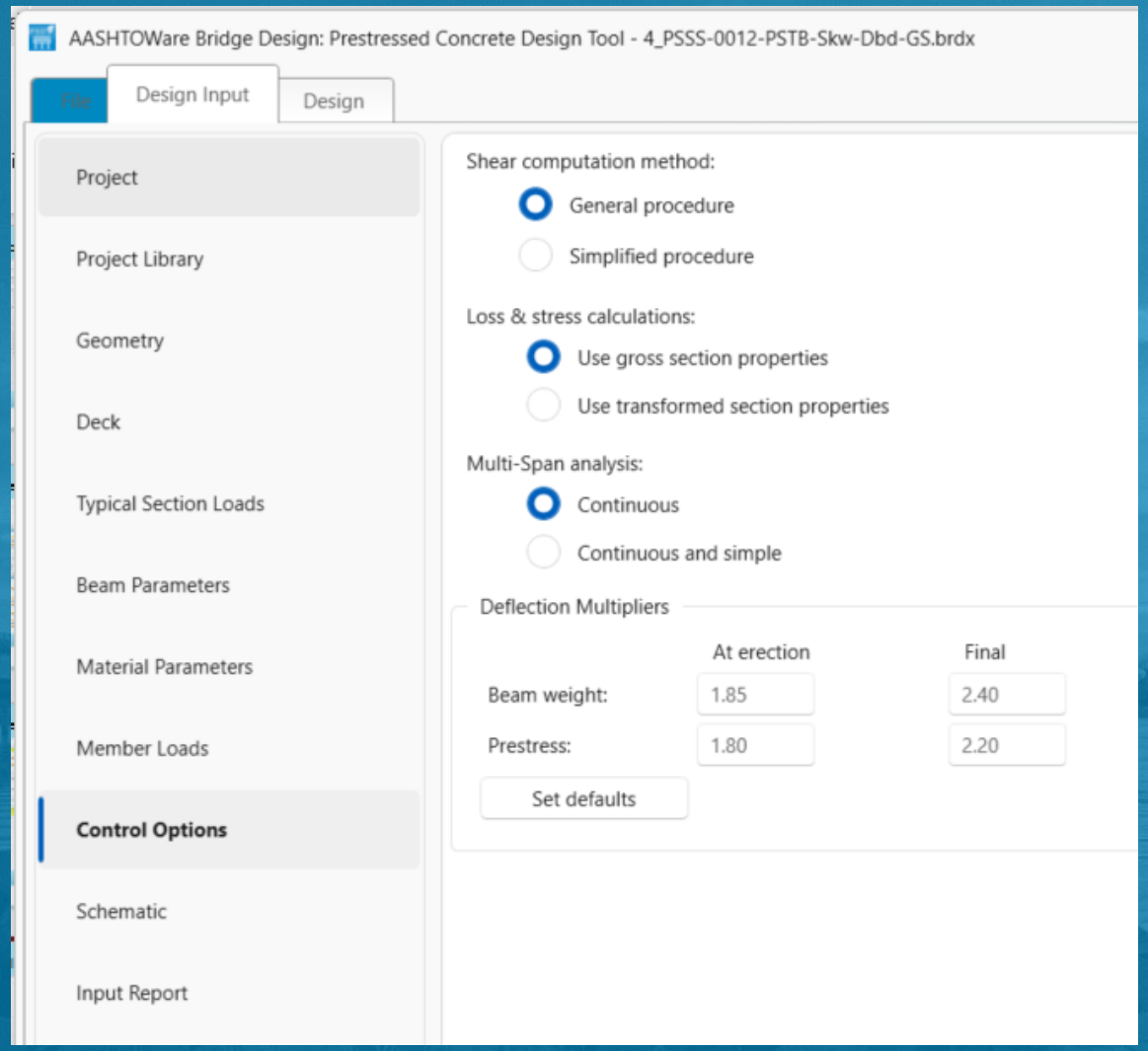


Design Input | Control Options

Similar Input for Girder Line and Girder System

Defines:

- Shear Computation Method
- Gross or Transformed Section Properties for PS Loss Calculations
- Stage 2 and 3 Analysis for Multi-span bridges
- Deflection Multipliers



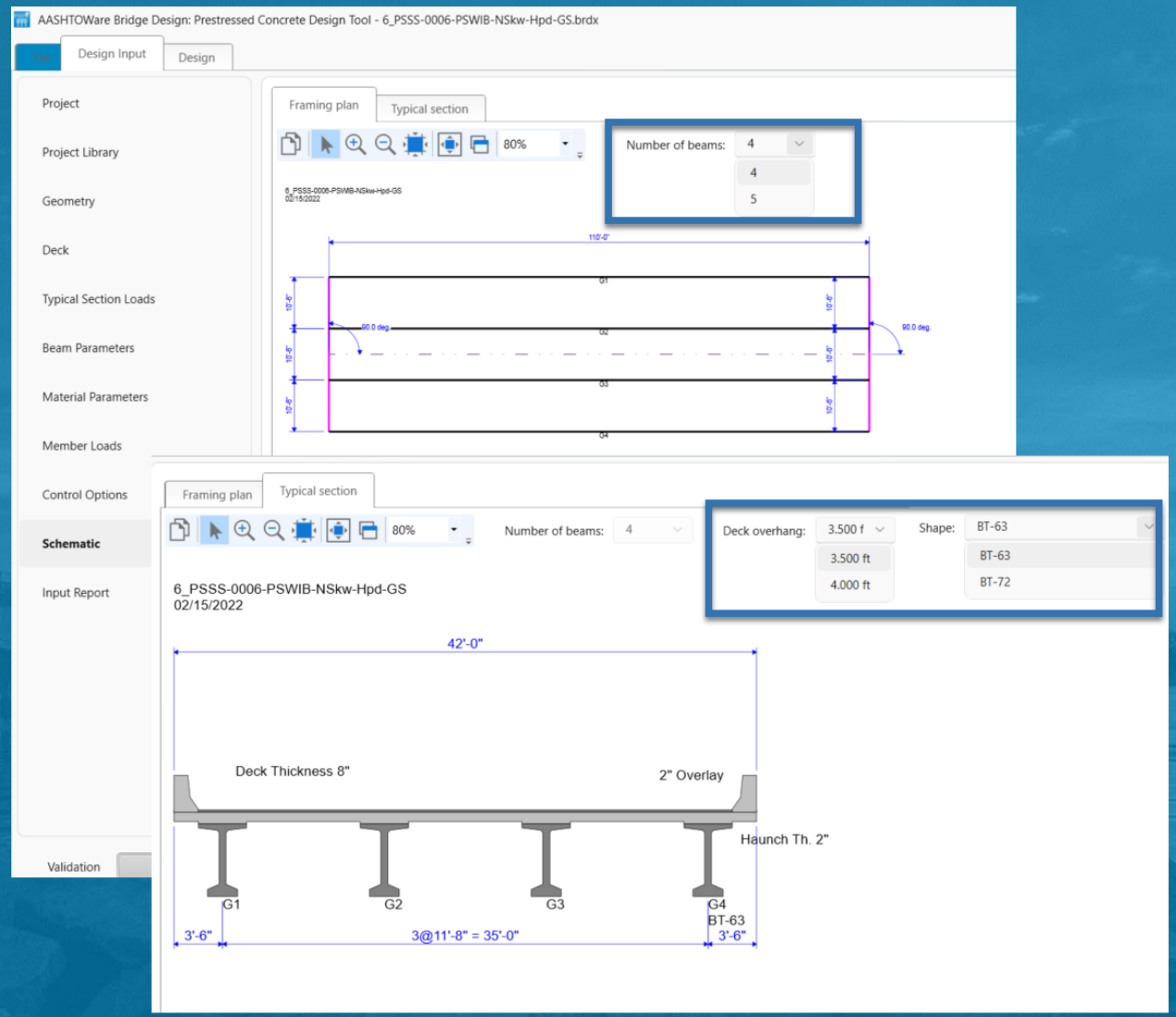
Design Input | Schematic

Girder System Only

Displays

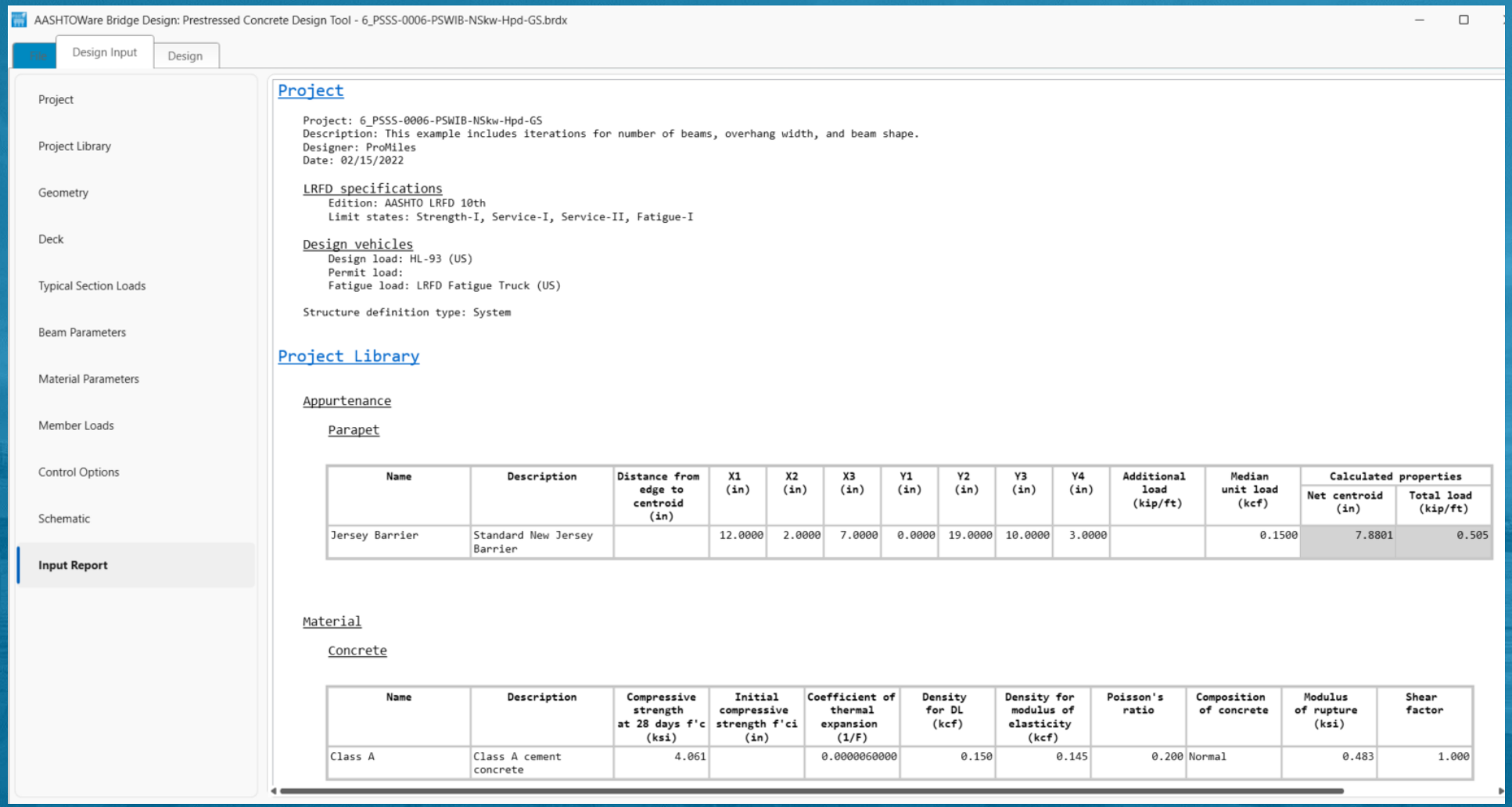
- Framing Plan
- Typical Section

Can view all scenarios when variable geometry and beam depth range input is used



Design Input | Input Report

- Available for Girder Line and Girder System
- Summary of Input Data
- Can be printed from the File tab



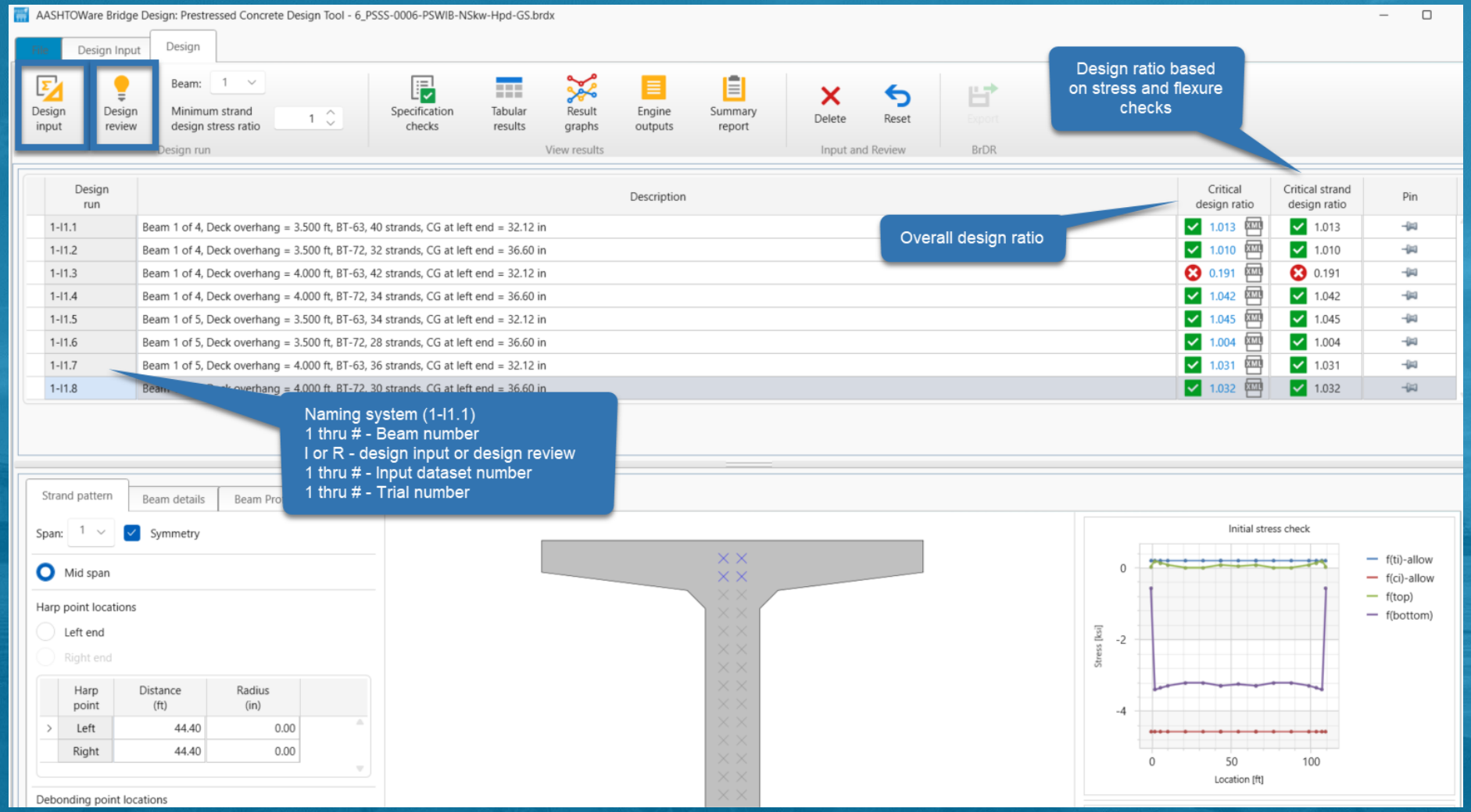
Design | Design Run

Design Input Run (I)

- Initial design
- Based on design input data

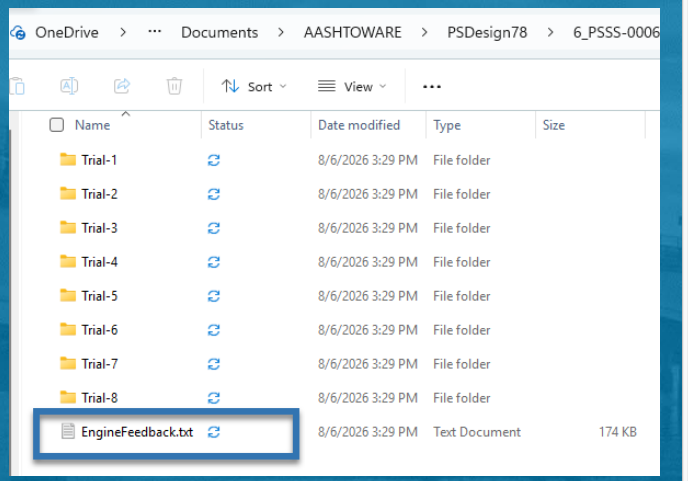
Design Review Run (R)

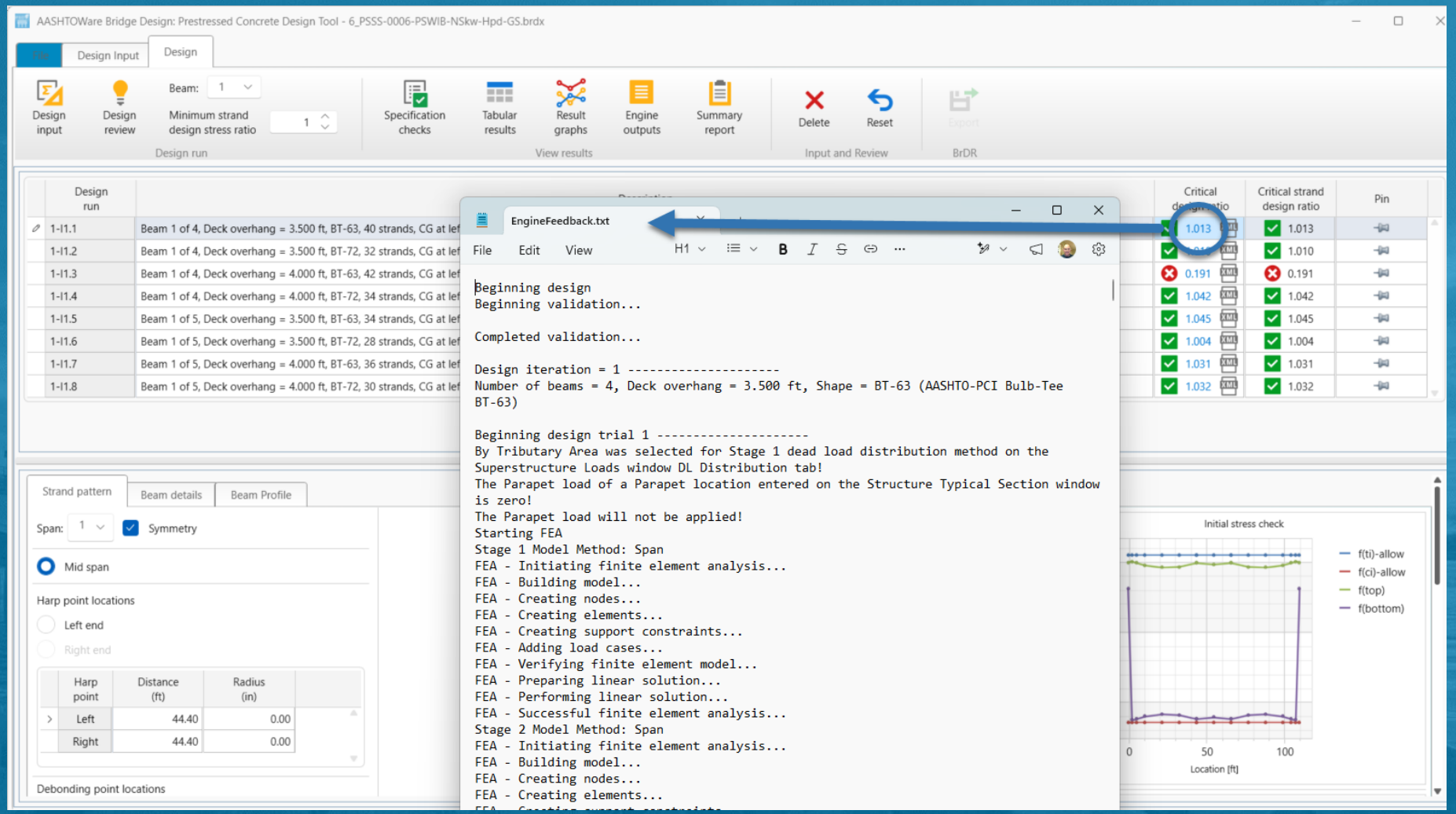
- Based on design input with user modifications



Design | Engine Feedback

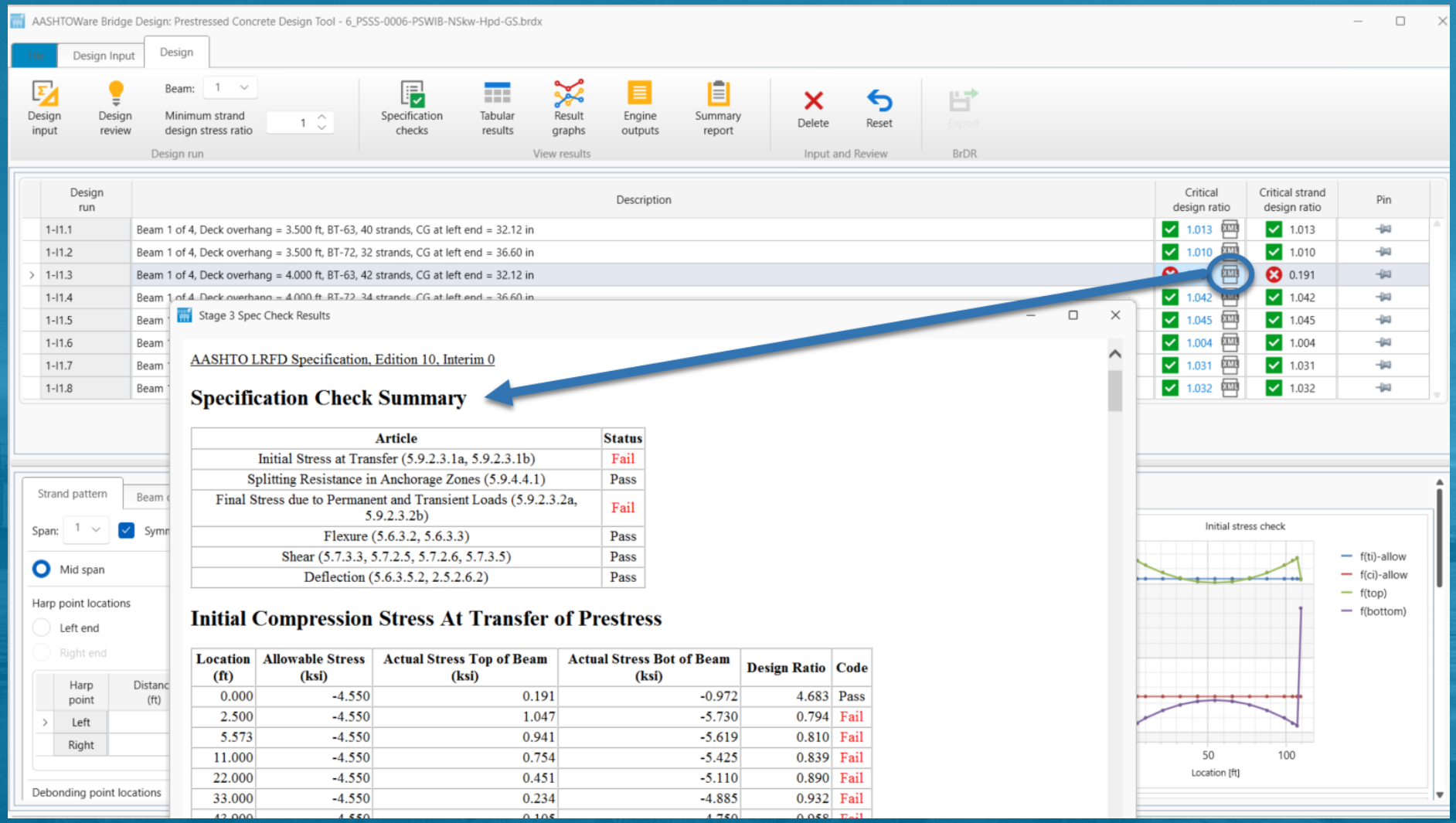
- Log of Engine Progress
- Contains Warnings and Error Messages





Design | Spec Sheck Summary

Also available in Engine Outputs



Design | Strand Pattern

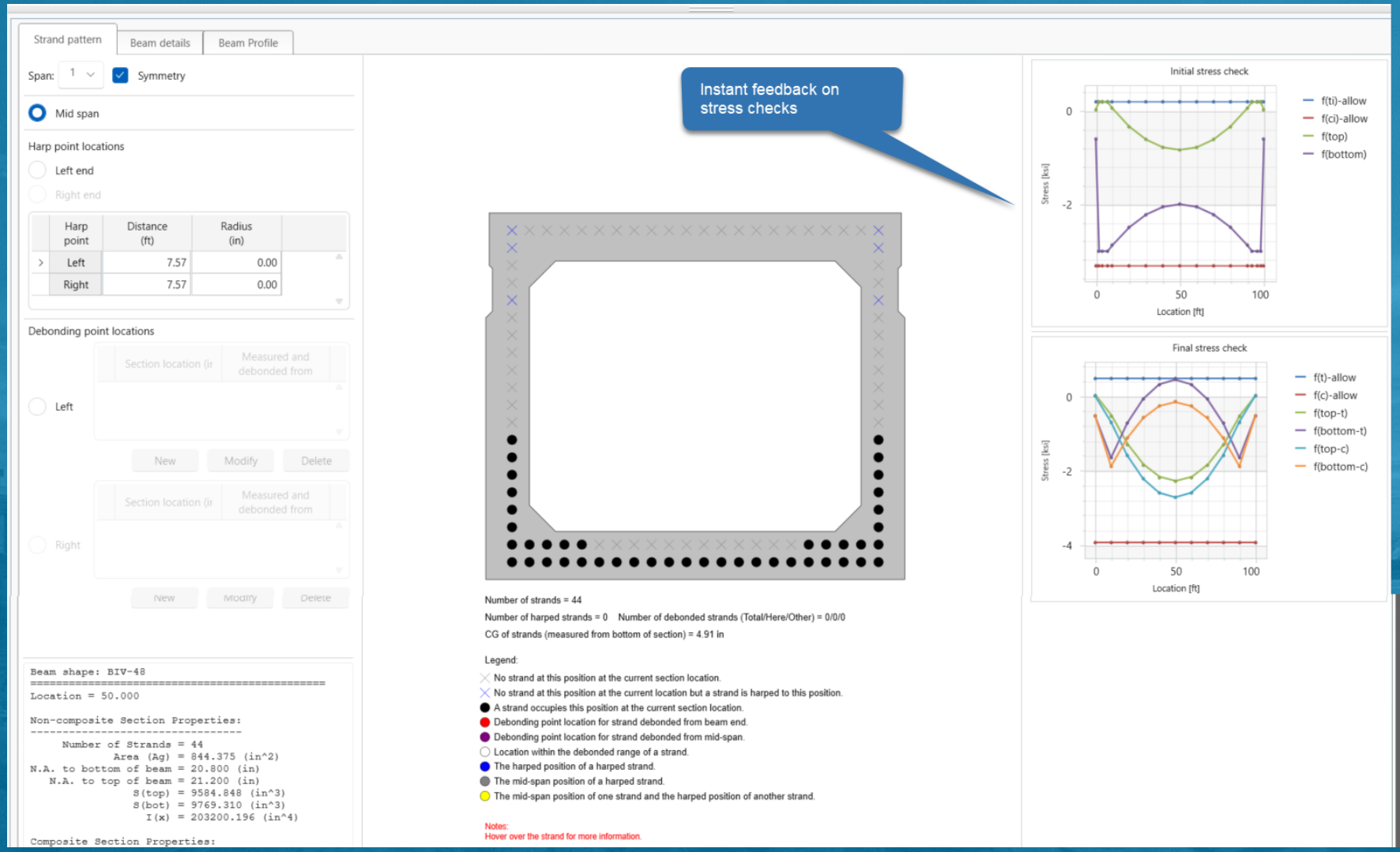
Displays Strand Pattern as Initially Designed at

- Mid-Span
- Harp Points
- Debonding Points

Displays Initial and Final Concrete Stress Diagrams

Allows Modification of Strand Patterns

Modified Patterns can be Design Reviewed



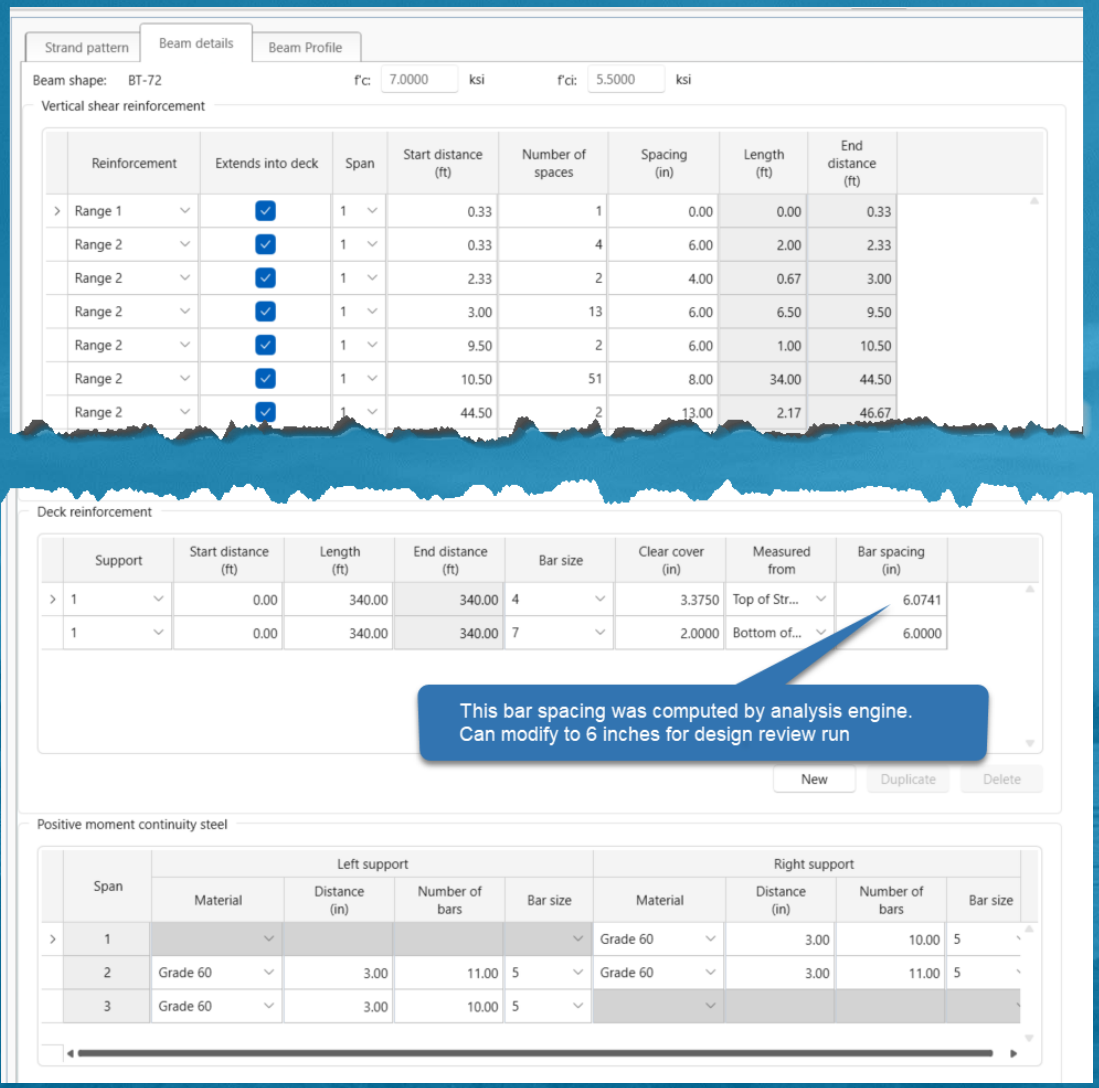
Design | Beam Details

Displays concrete strength and initial design of:

- Vertical shear reinforcement
- Deck reinforcement
- Positive moment continuity reinforcement

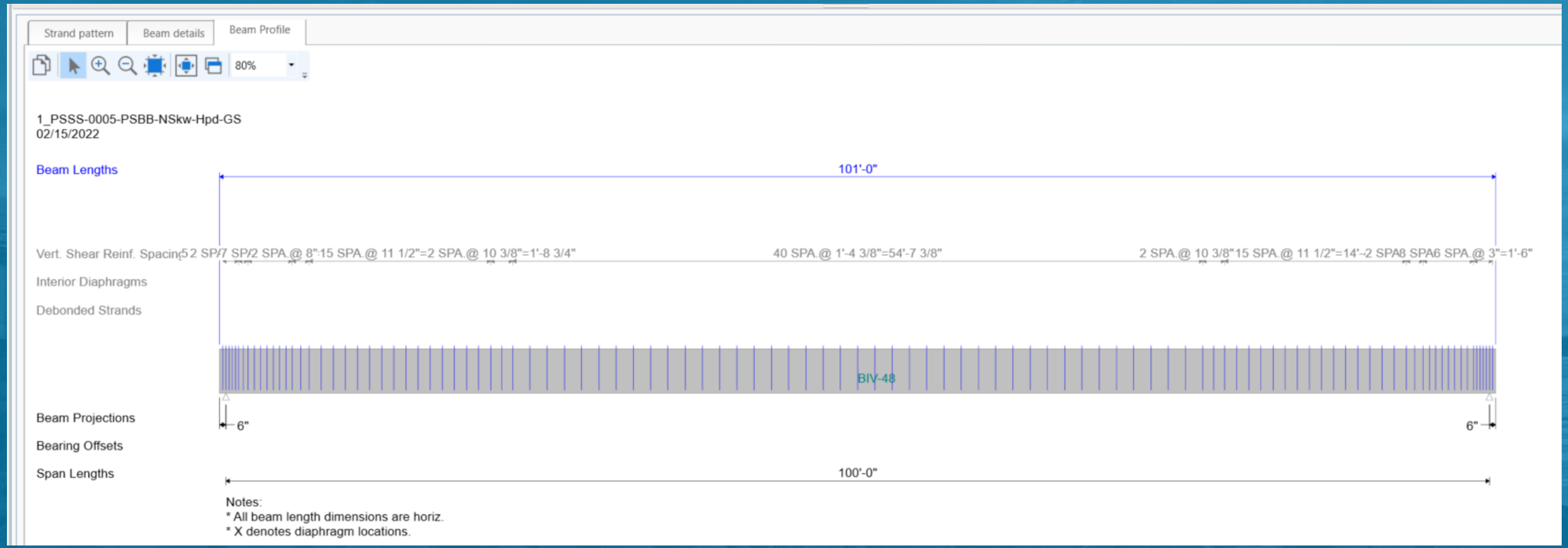
Allows modification of strength & reinforcement

Run Design Review to evaluate modifications



Design | Beam Profile

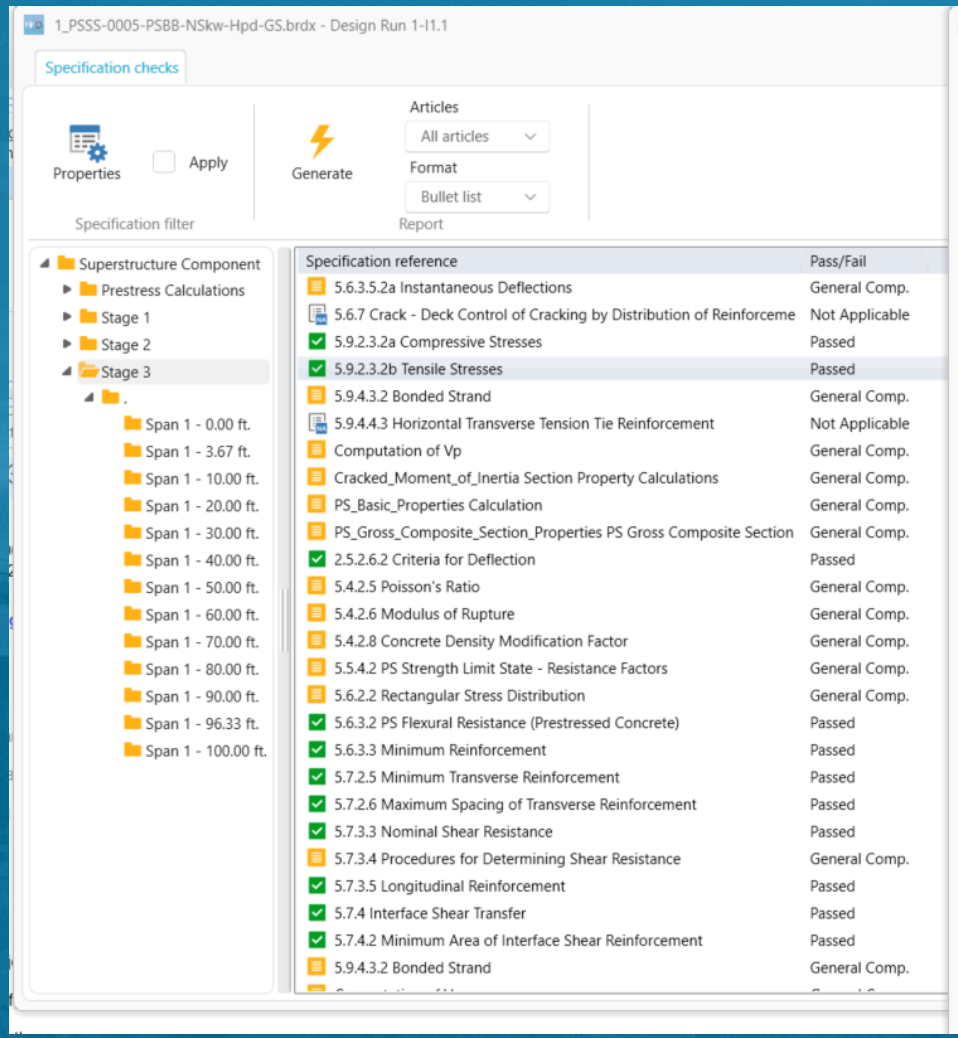
Displays Beam Schematic with Dimensions and Annotations

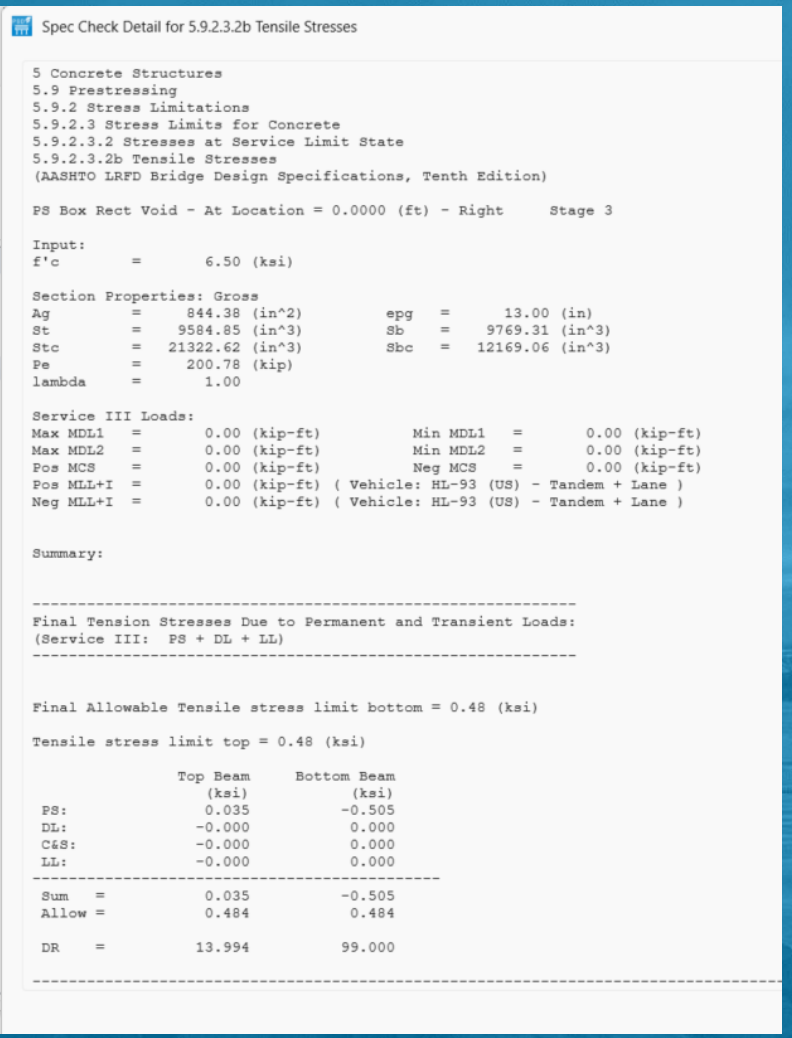


Design | View Results | Specification Checks

Detailed Spec Check Output

- Each stage
- Each POI
- Each article
- Detailed calculations



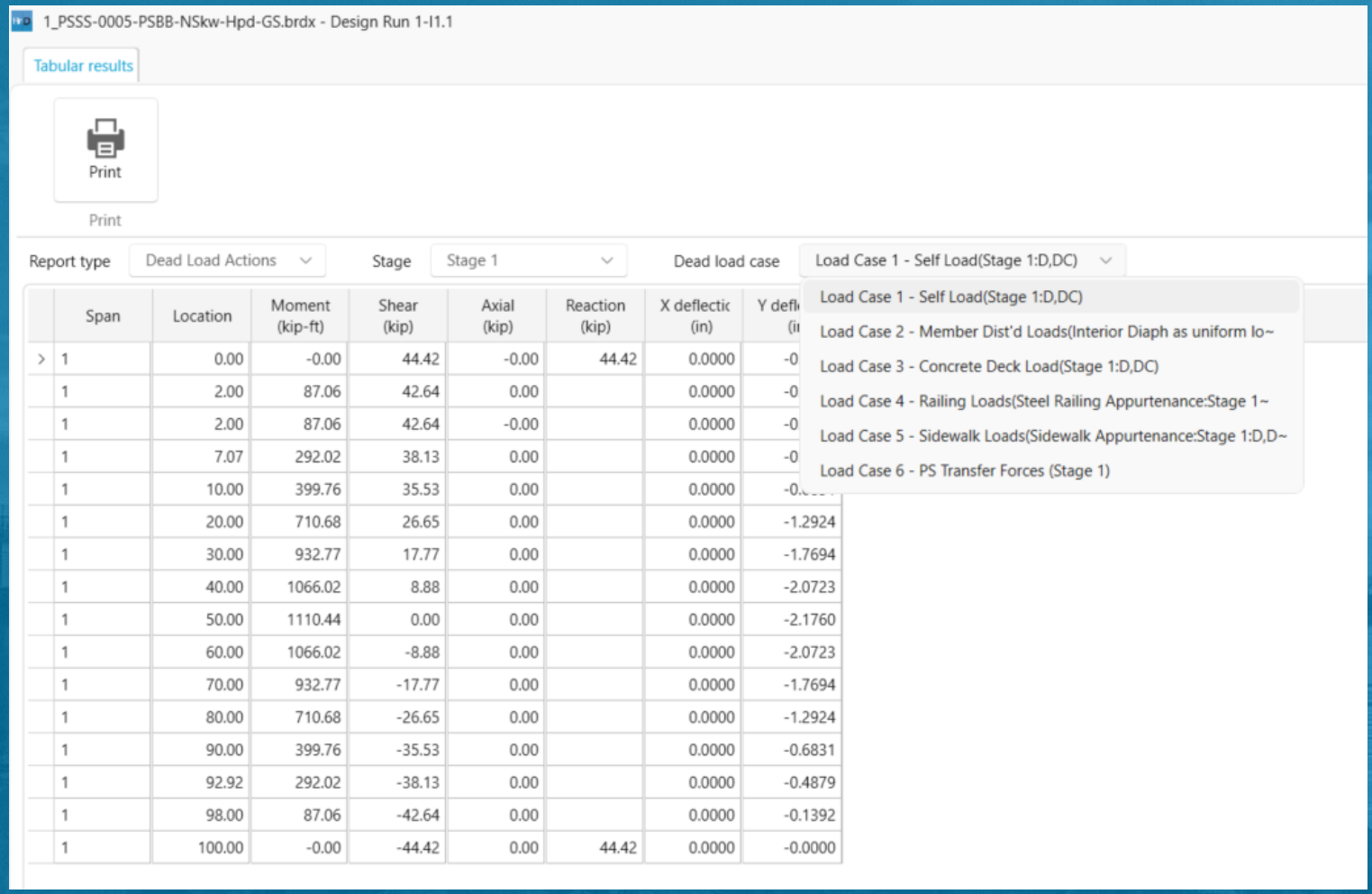


Design | View Results | Tabular Results

Detailed Tabular Results:

- Dead and Live Load Actions
- Each Stage
- Each Load Case
- Each POI

Can be viewed and printed

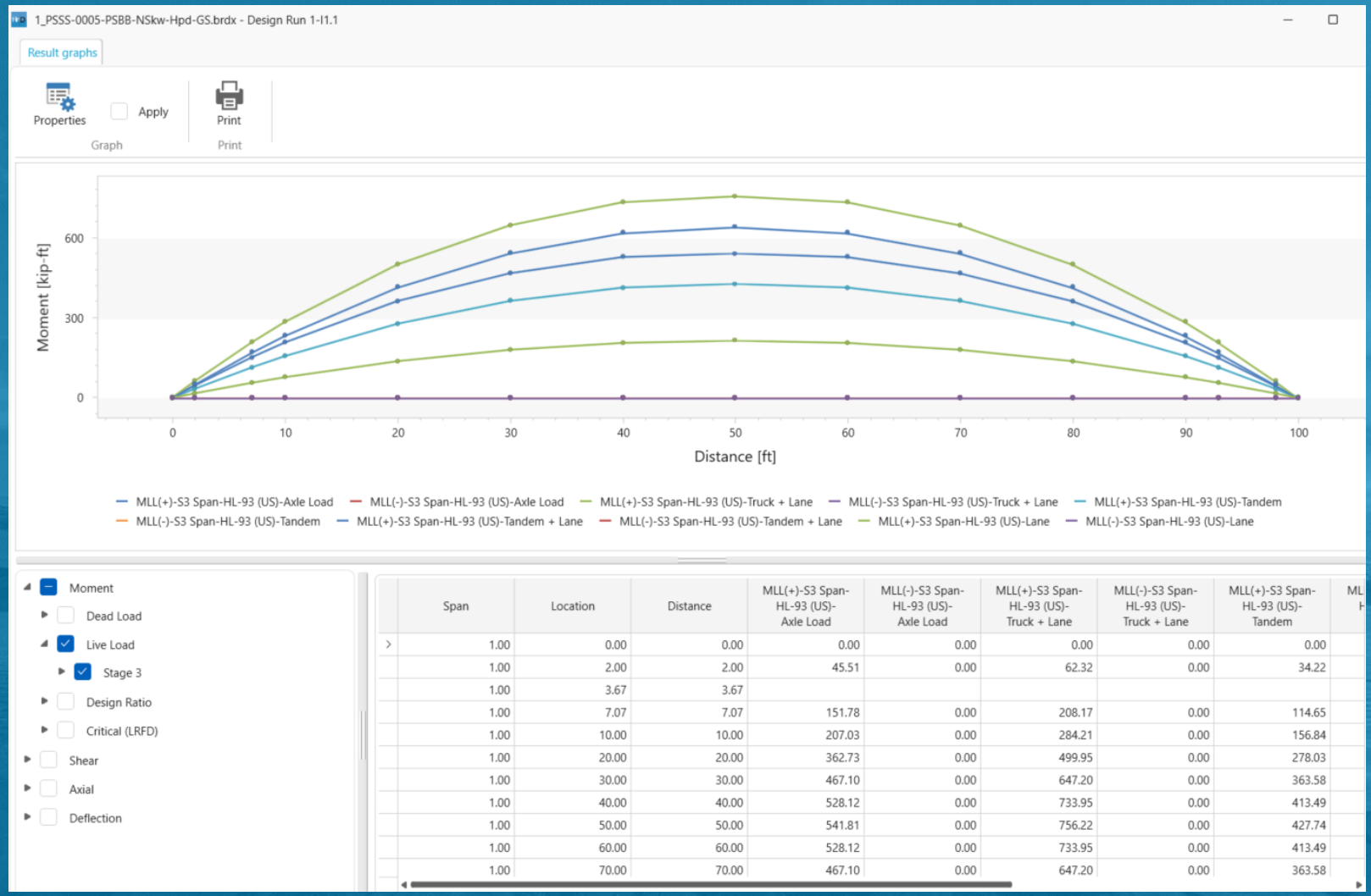


Span	Location	Moment (kip-ft)	Shear (kip)	Axial (kip)	Reaction (kip)	X deflectic (in)	Y defl (i
1	0.00	-0.00	44.42	-0.00	44.42	0.0000	-0
1	2.00	87.06	42.64	0.00		0.0000	-0
1	2.00	87.06	42.64	-0.00		0.0000	-0
1	7.07	292.02	38.13	0.00		0.0000	-0
1	10.00	399.76	35.53	0.00		0.0000	-0
1	20.00	710.68	26.65	0.00		0.0000	-1.2924
1	30.00	932.77	17.77	0.00		0.0000	-1.7694
1	40.00	1066.02	8.88	0.00		0.0000	-2.0723
1	50.00	1110.44	0.00	0.00		0.0000	-2.1760
1	60.00	1066.02	-8.88	0.00		0.0000	-2.0723
1	70.00	932.77	-17.77	0.00		0.0000	-1.7694
1	80.00	710.68	-26.65	0.00		0.0000	-1.2924
1	90.00	399.76	-35.53	0.00		0.0000	-0.6831
1	92.92	292.02	-38.13	0.00		0.0000	-0.4879
1	98.00	87.06	-42.64	0.00		0.0000	-0.1392
1	100.00	-0.00	-44.42	0.00	44.42	0.0000	-0.0000

Design | View Results | Results Graphs

Results Graphs with Corresponding Tabular Results:

- Dead and Live Load Actions and Deflections
- Each Stage
- Each Load Case
- Each POI
- Design Ratios
- Envelopes
- Can be viewed and printed



Span	Location	Distance	MLL(+)-S3 Span-HL-93 (US)-Axle Load	MLL(-)-S3 Span-HL-93 (US)-Axle Load	MLL(+)-S3 Span-HL-93 (US)-Truck + Lane	MLL(-)-S3 Span-HL-93 (US)-Truck + Lane	MLL(+)-S3 Span-HL-93 (US)-Tandem
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	2.00	2.00	45.51	0.00	62.32	0.00	34.22
1.00	3.67	3.67					
1.00	7.07	7.07	151.78	0.00	208.17	0.00	114.65
1.00	10.00	10.00	207.03	0.00	284.21	0.00	156.84
1.00	20.00	20.00	362.73	0.00	499.95	0.00	278.03
1.00	30.00	30.00	467.10	0.00	647.20	0.00	363.58
1.00	40.00	40.00	528.12	0.00	733.95	0.00	413.49
1.00	50.00	50.00	541.81	0.00	756.22	0.00	427.74
1.00	60.00	60.00	528.12	0.00	733.95	0.00	413.49
1.00	70.00	70.00	467.10	0.00	647.20	0.00	363.58

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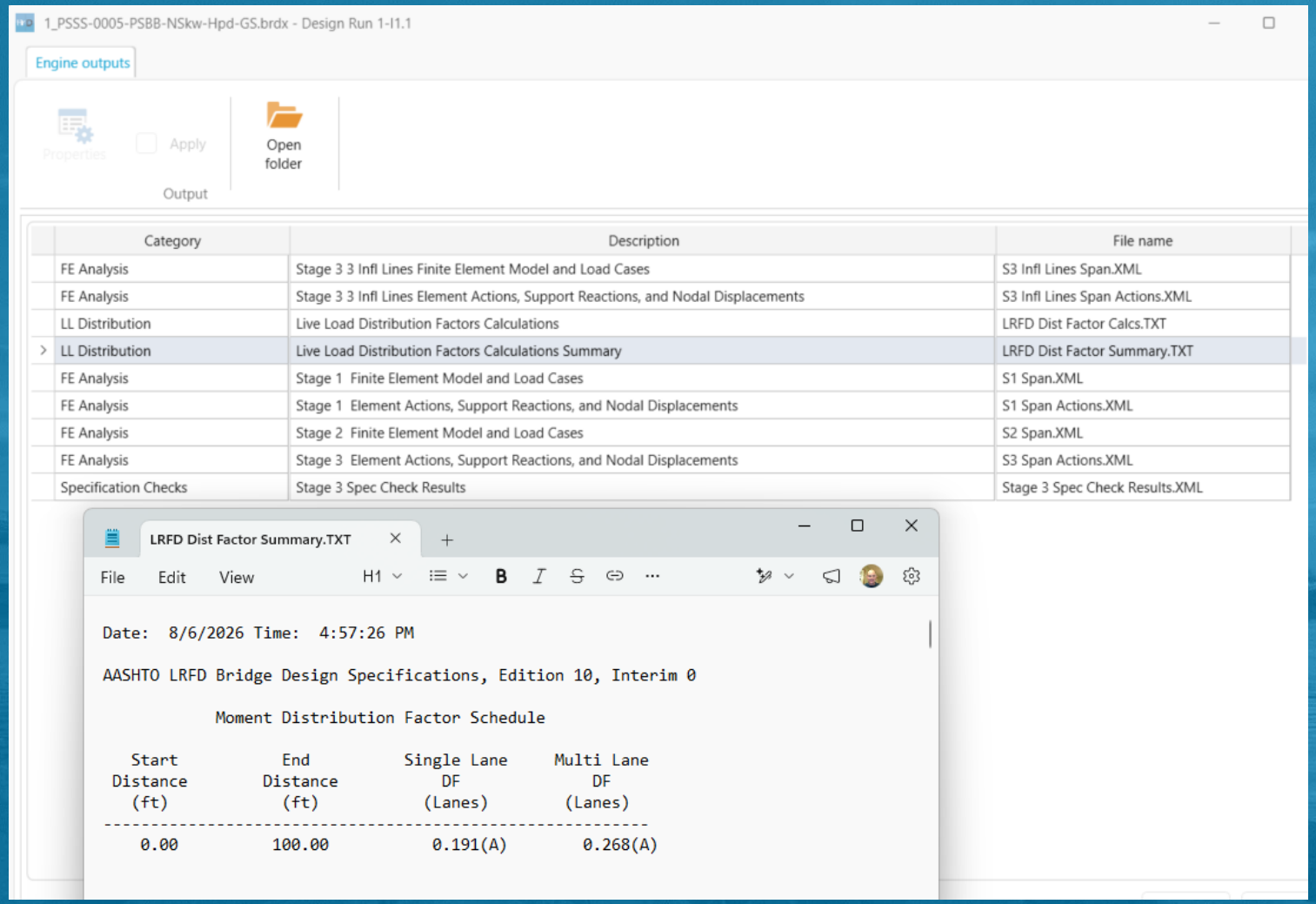
Design | View Results | Engine Outputs

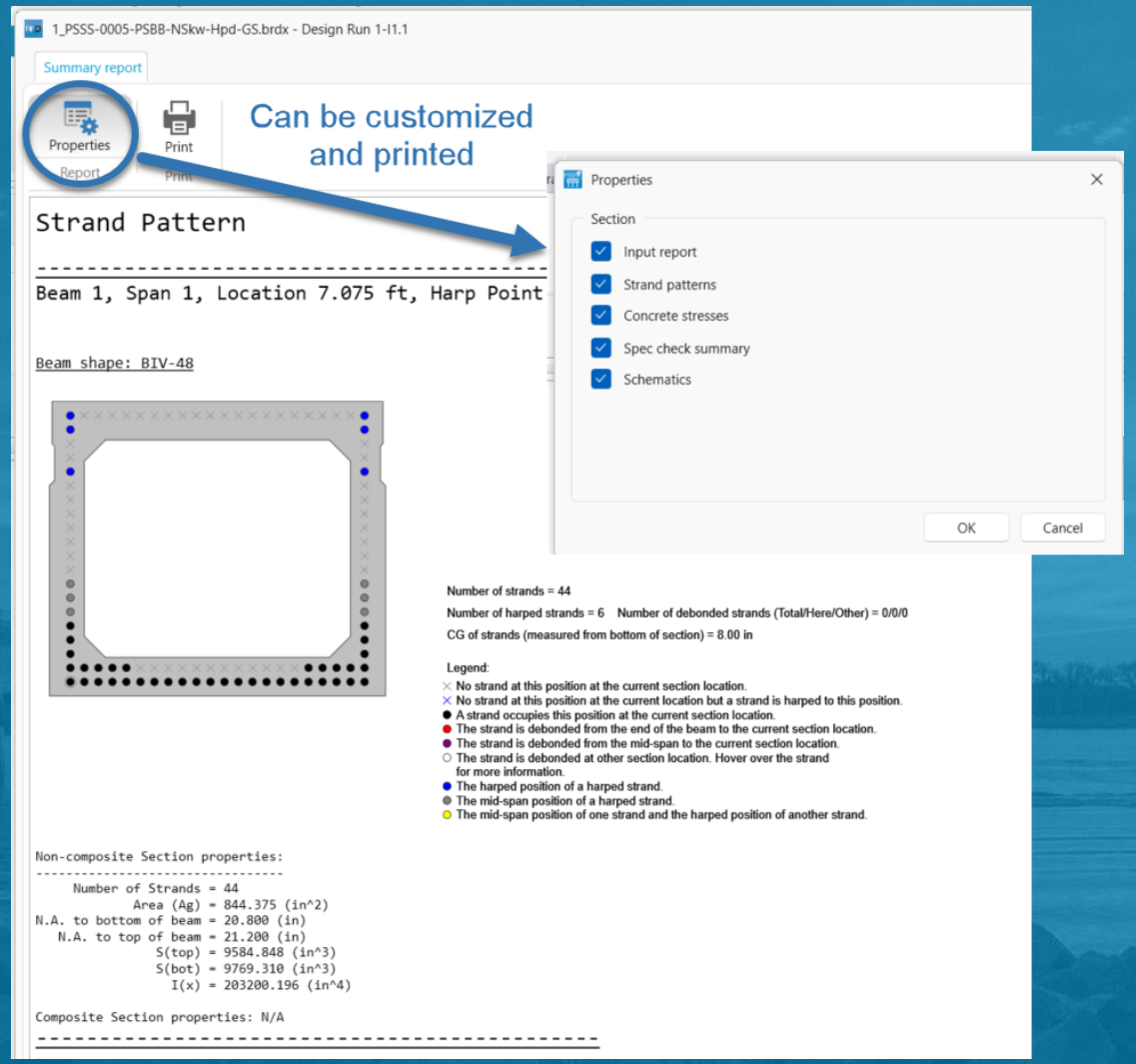
Various Output Files from Engine:

- Finite Element Analysis Models and Results
- Live Load Distribution Calculations
- Specification Check Summary



Design | View Results | Summary Report

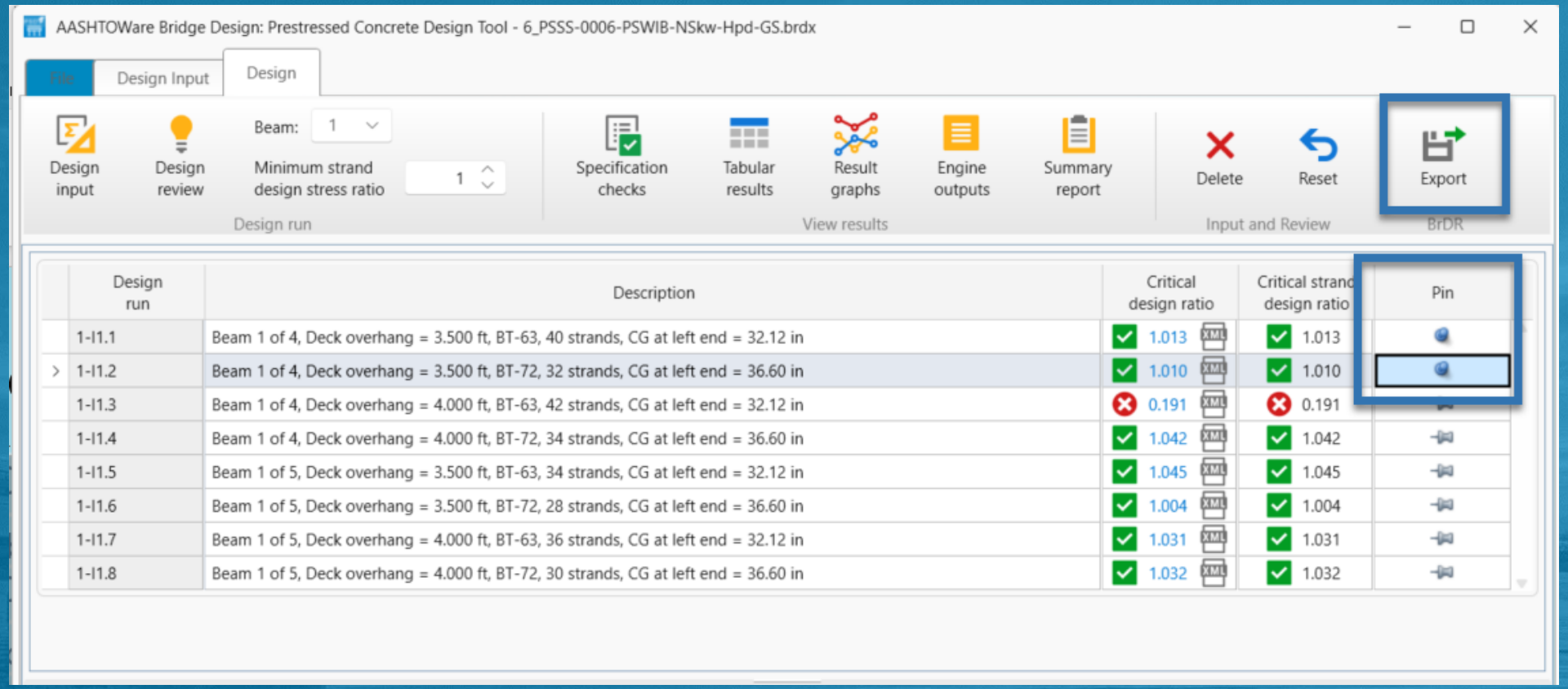
- Combines Multiple Section of Output
- Sections are selectable by User
- Can be viewed and printed



Design | Design Run Pinning

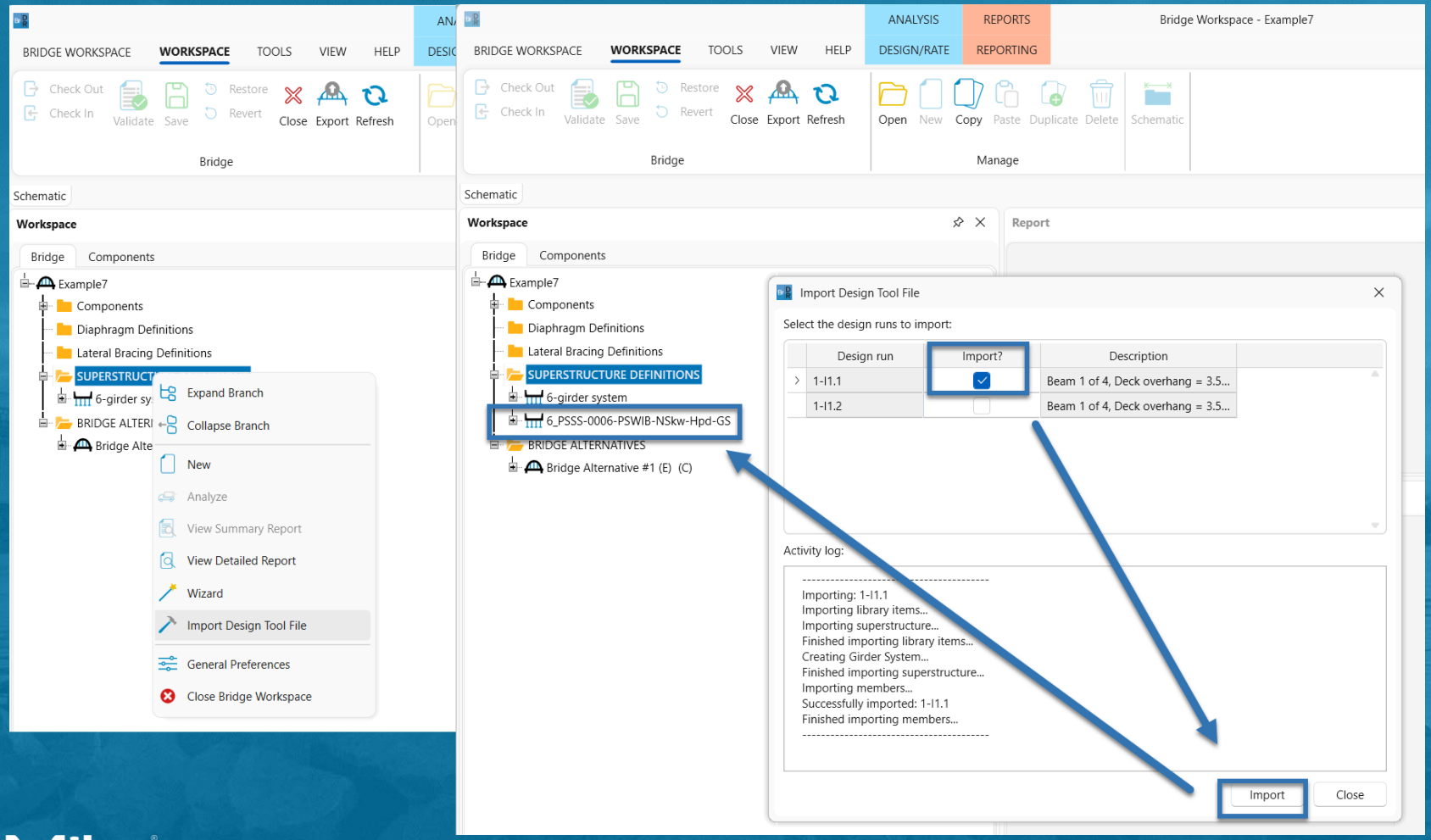
Pinned Design Runs

- Can be exported to BrDR
- Desing runs are saved with input file and will be reanalyzed when input file is reopened



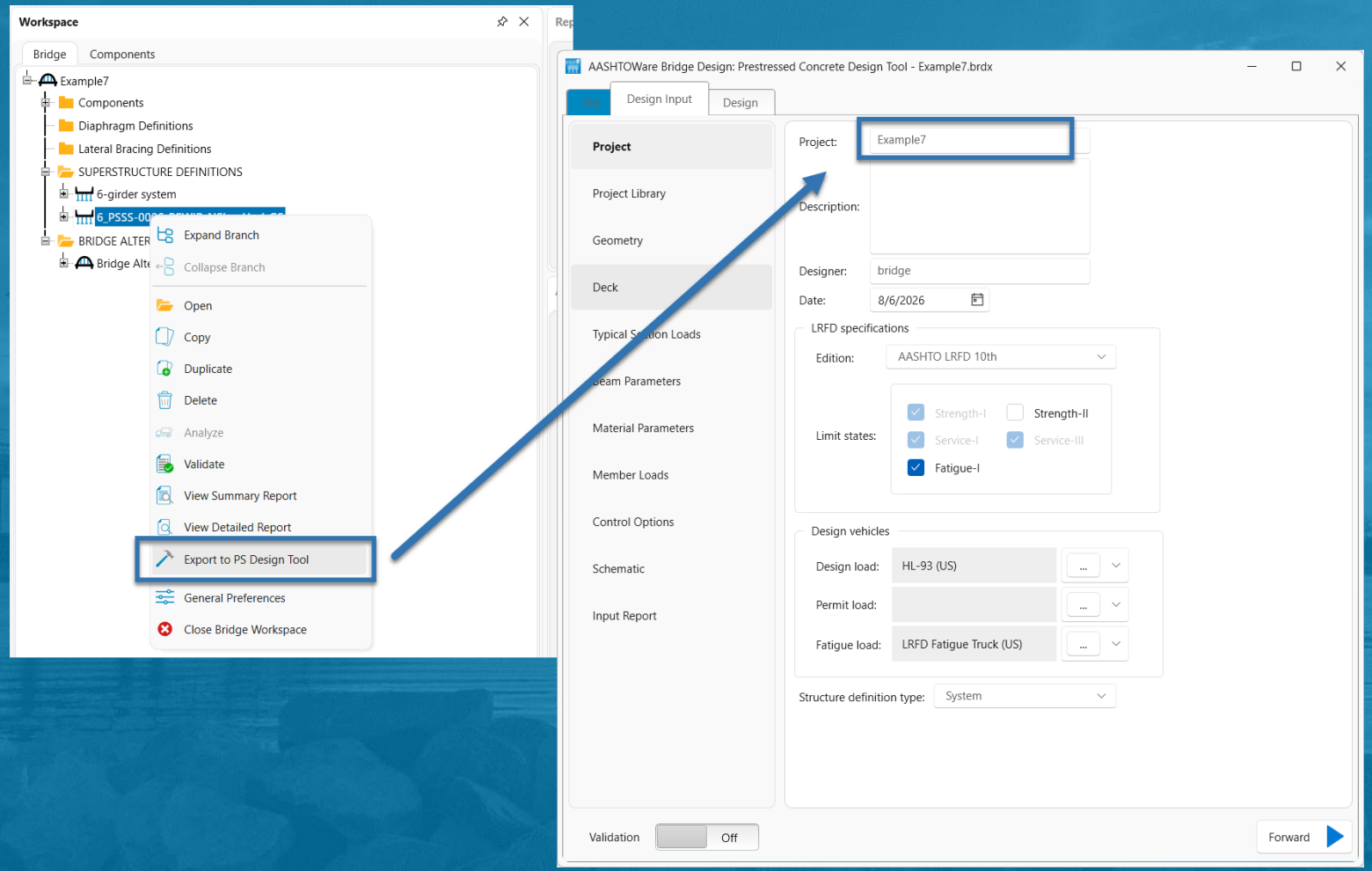
Design | BrDR Export/Import

From PS Design Tool to BrDR



Design | BrDR Export/Import

From BrDR to PS Design Tool



ProMiles

AASHTOWare Rating and Design Bridge User Group Meeting 2026

Future Direction

Integration with BrDR

Some other improvement ideas from BetaTAG Testing

- Improvements to strand design algorithm
- Strand editing in tabular format
- Strand and beam Visualization
- Design algorithm for mild steel in girder
- Dedicated stirrup range for splitting resistance


Questions / Comments