AASHTOWare™ BRIDGE DESIGN AND RATING

Introduction to BrD (Design 101 for Raters)

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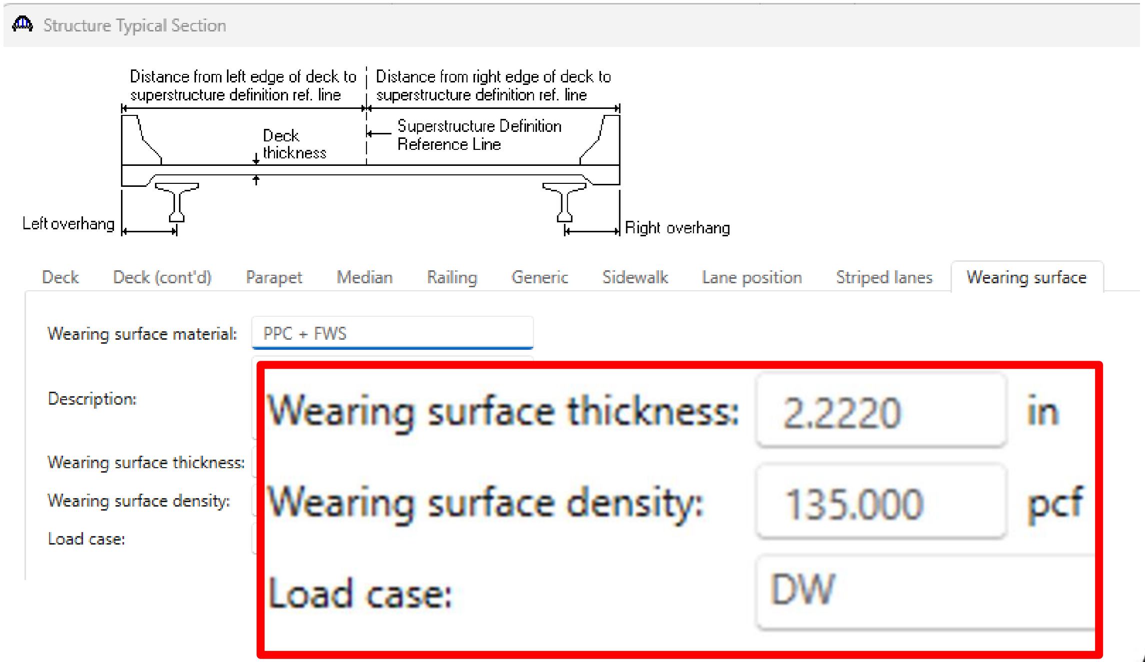
Prestressed Girders

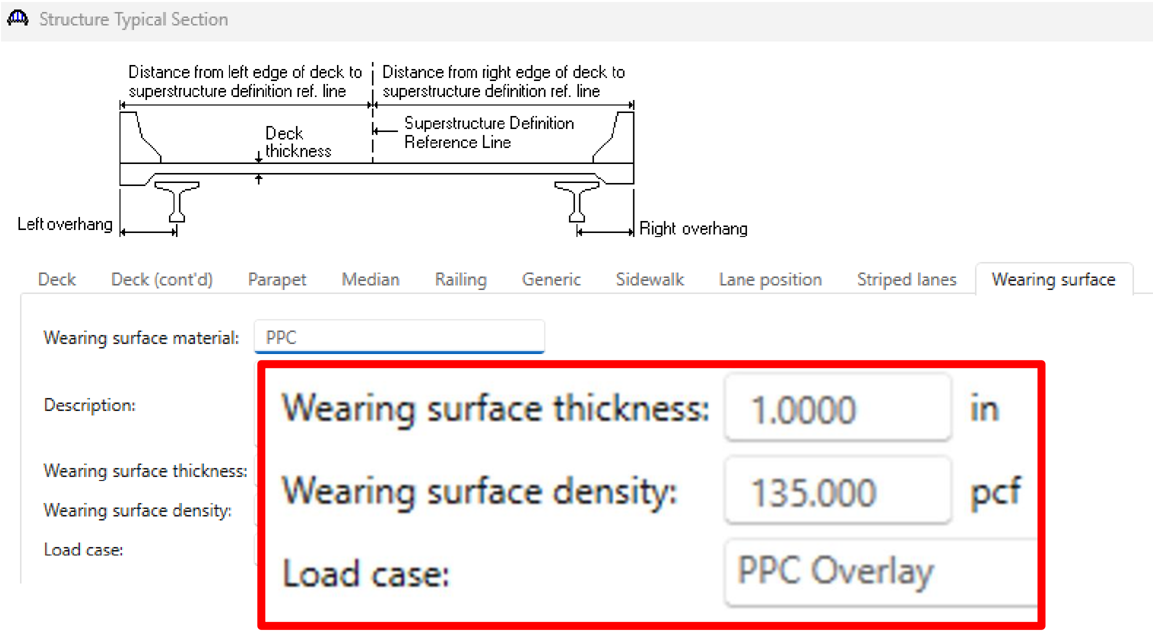
Modifications ITD does to create a BrD file instead of a BrR file

Prestressed Girder Loads

- For Design – Input future loads – including future wearing surface, future utilities

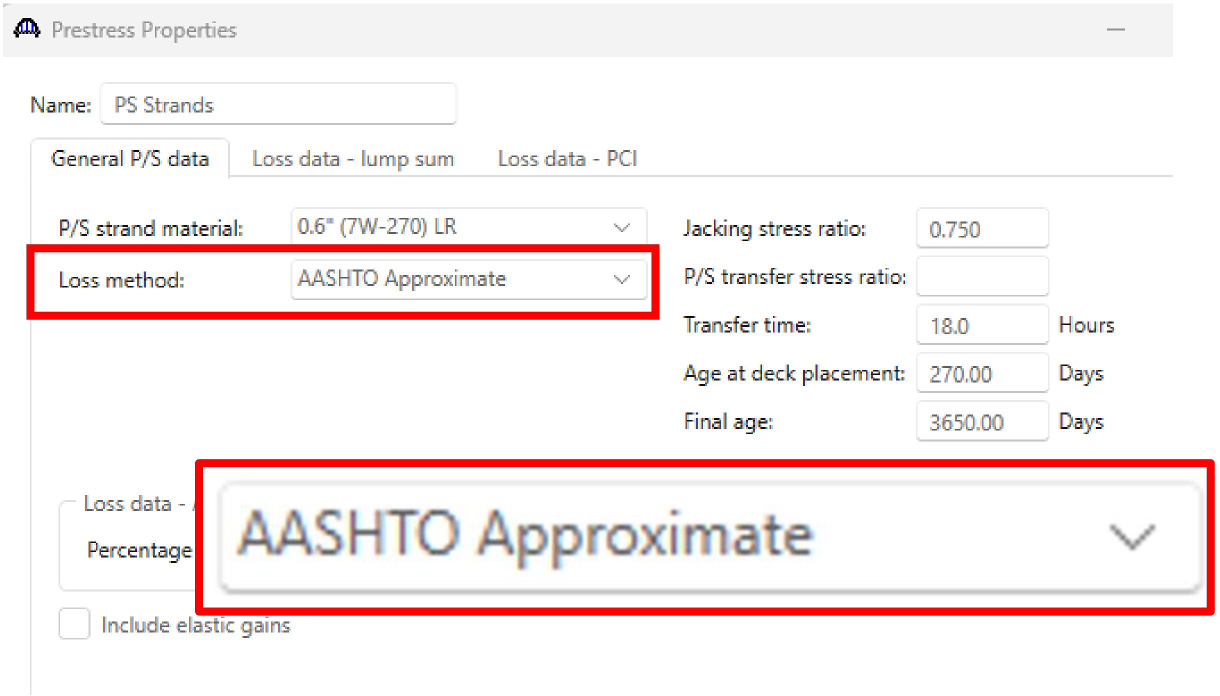


- For Rating – input actual loads on the structure wearing surface loads are from Inspection Data or as-built plans

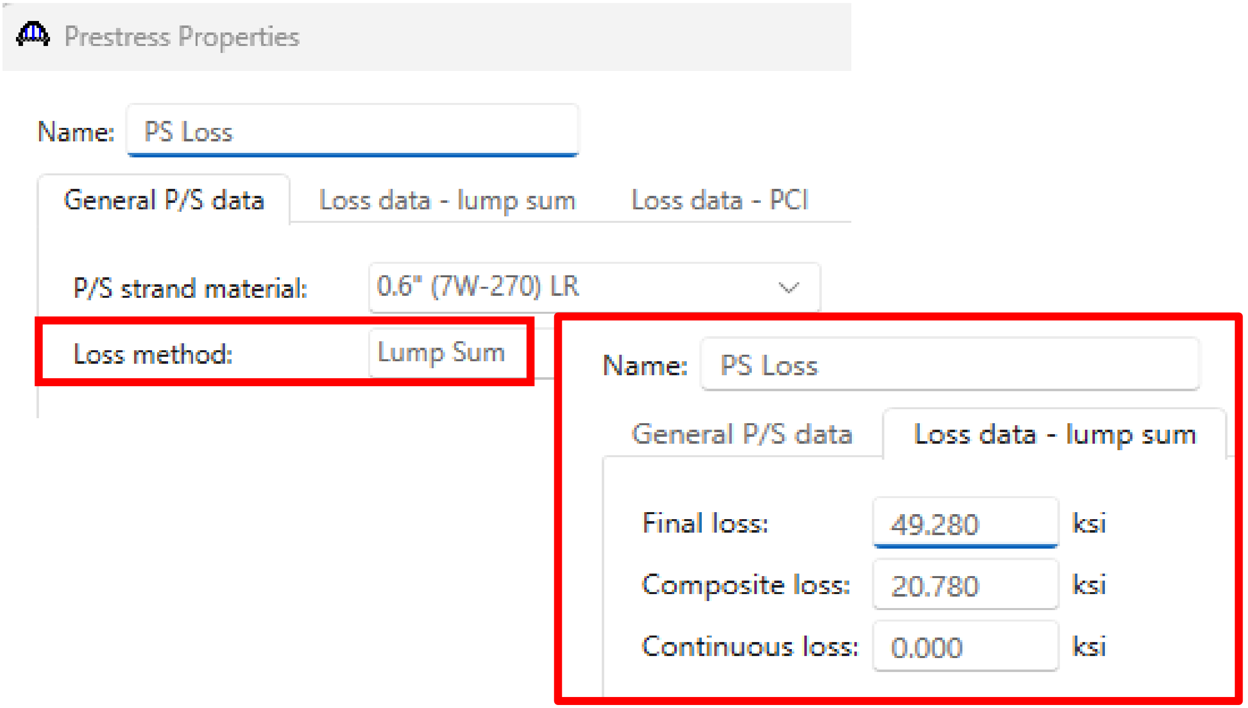


Prestressed Girder Losses

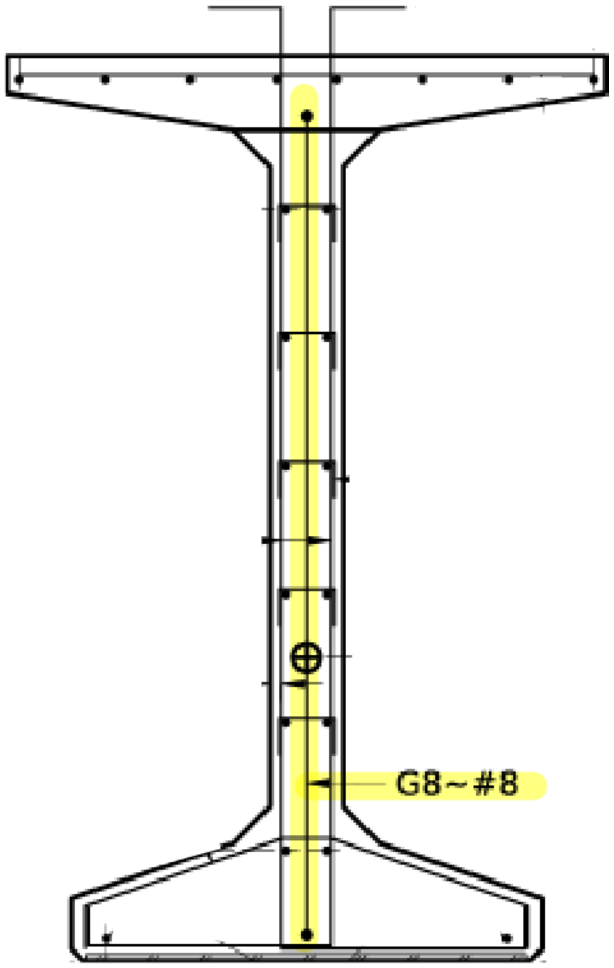
- For Design – Have BrD compute the losses

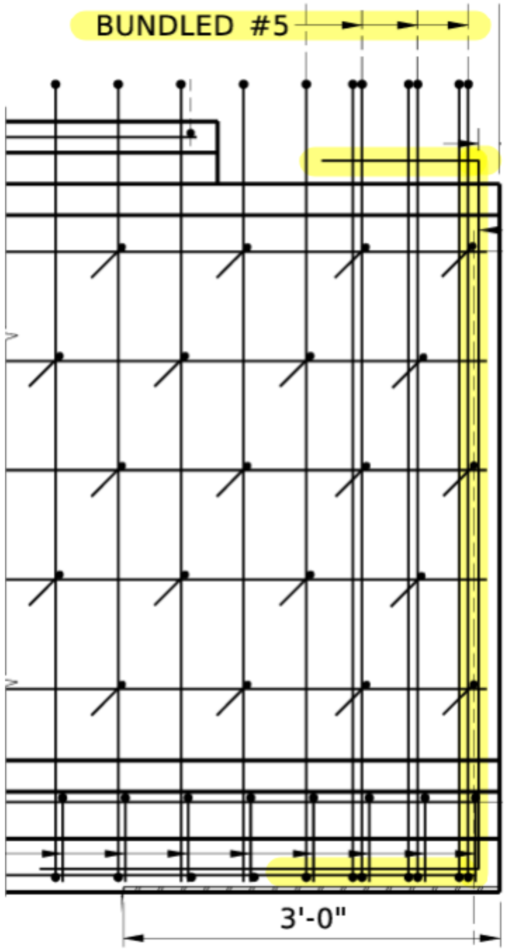


- For Rating – BrR uses lump sum losses from the design plans or shop drawings



Splitting Resistance (AASTHO 5.9.4.4.1)

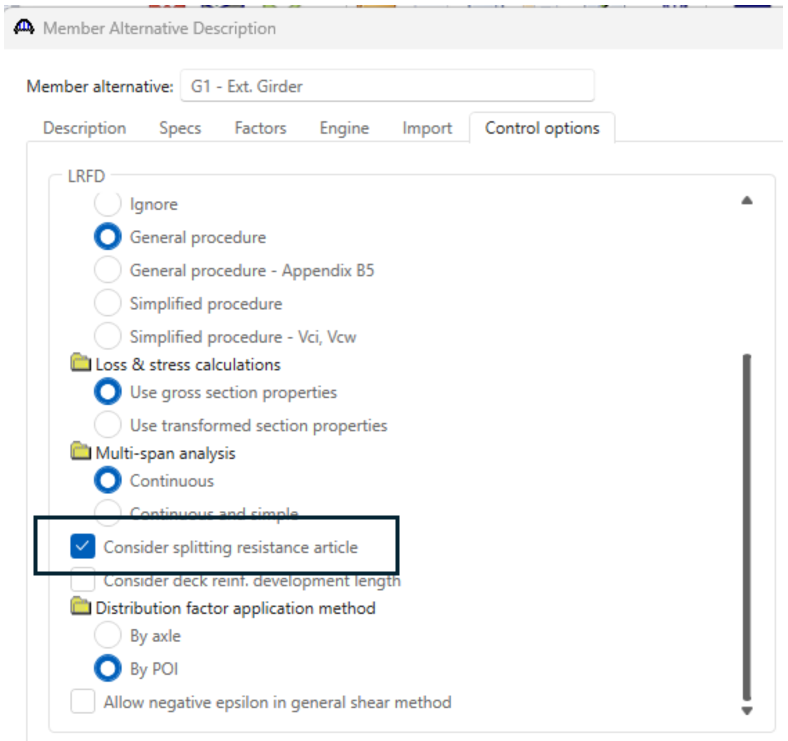




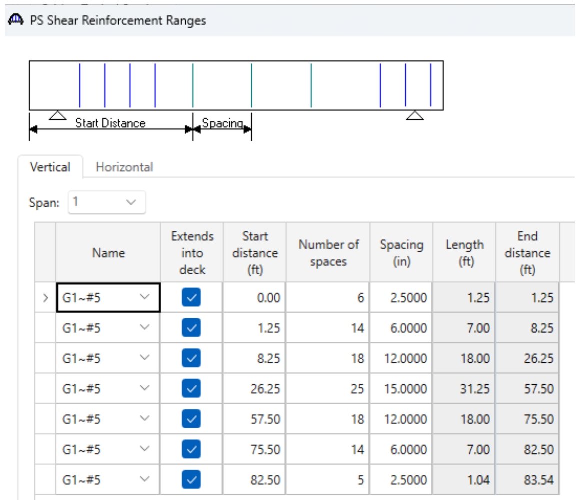
Splitting Resisted by Bundle #5 and a #8 U-Bar

Splitting Resistance (AASTHO 5.9.4.4.1)

- BrD will check the splitting resistance as long as the control option is checked



- You may need to add additional mild steel as a stirrup to get this to work



Name	Extends into deck	Start distance (ft)	Number of spaces	Spacing (in)	Length (ft)	End distance (ft)
G1~#5	☑	0.00	6	2.5000	1.25	1.25
G1~#5	☑	1.25	14	6.0000	7.00	8.25
G1~#5	☑	8.25	18	12.0000	18.00	26.25
G1~#5	☑	26.25	25	15.0000	31.25	57.50
G1~#5	☑	57.50	18	12.0000	18.00	75.50
G1~#5	☑	75.50	14	6.0000	7.00	82.50
G1~#5	☑	82.50	5	2.5000	1.04	83.54

Splitting Resistance in Anchorage Zones

Location (ft)	Resistance Available (kip)	Resistance Required (kip)	Design Ratio	Code
0.000	49.600	45.268	1.096	Pass
82.417	49.600	45.268	1.096	Pass

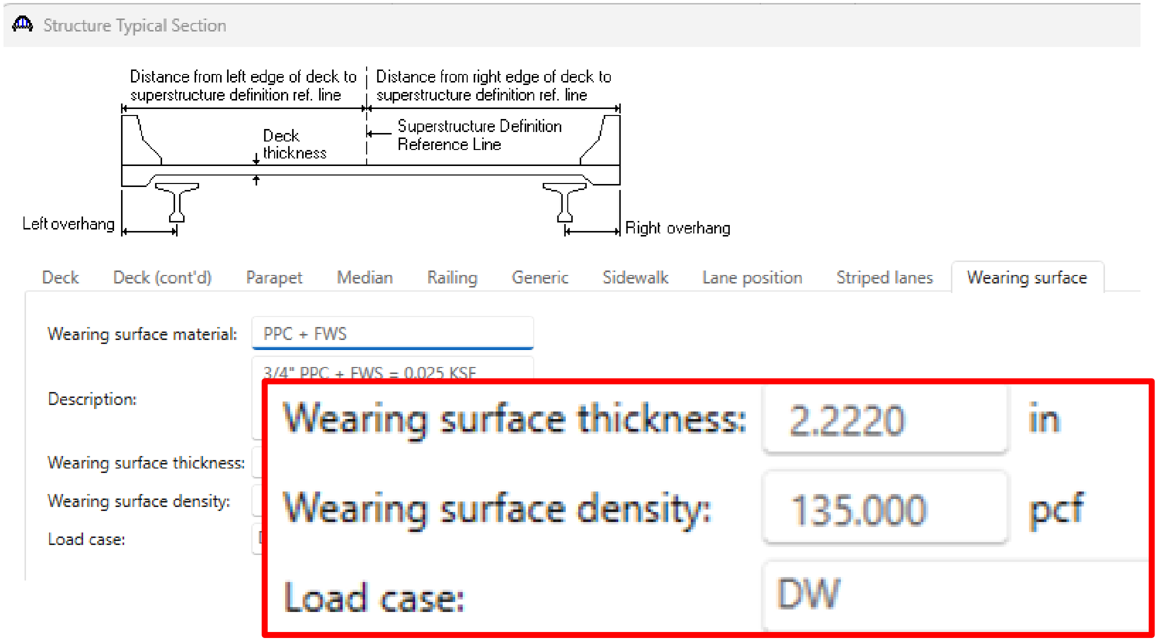
NR = Spec check not required at this location

Steel Girders

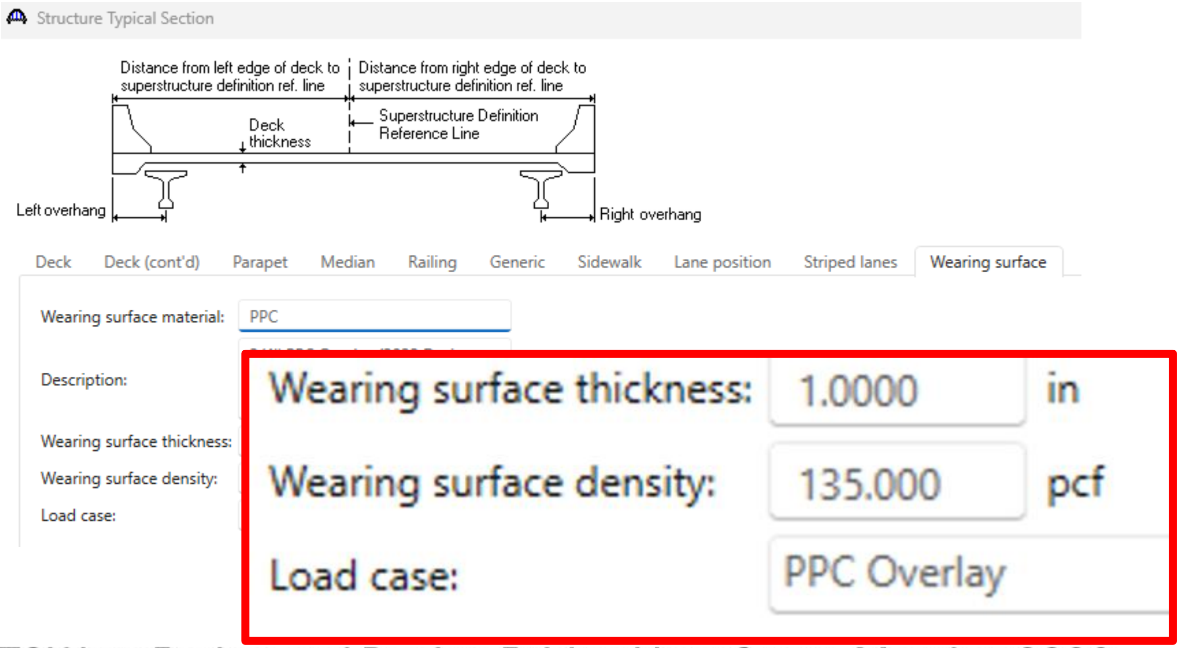
Modifications ITD does to create a BrD file instead of a BrR file

Steel Girder Loads

- For Design – Input future loads – including future wearing surface, future utilities



- For Rating – input actual loads on the structure wearing surface loads are from Inspection Data or as-built plans



Shear Studs

- For Design – Input Shear Studs and have BrD check the design

Deck Profile

Type: Plate

Deck concrete | Reinforcement | Shear connectors

	Support number	Start distance (ft)	Length (ft)	End distance (ft)	Connector ID	Number of spaces	Number per row	Transverse spacing (in)
>	1	0.00	16.00	16.00	Stud	32	4	3.5000
	1	16.00	39.00	55.00	Stud	52	4	3.5000
	1	55.00	16.00	71.00	Stud	32	4	3.5000

- For Rating – ITD assumes if shear studs are present, the girder is composite

Deck Profile

Type: Plate

Deck concrete | Reinforcement | Shear connectors

	Support number	Start distance (ft)	Length (ft)	End distance (ft)	Connector ID	Number of spaces	Number per row	Transverse spacing (in)
>	1	0.00	71.00	71.00	Composite			

Reinforcement | Shear connectors

Start distance (ft)	Length (ft)	End distance (ft)	Connector ID
0.00	71.00	71.00	Composite

Deck Reinforcement

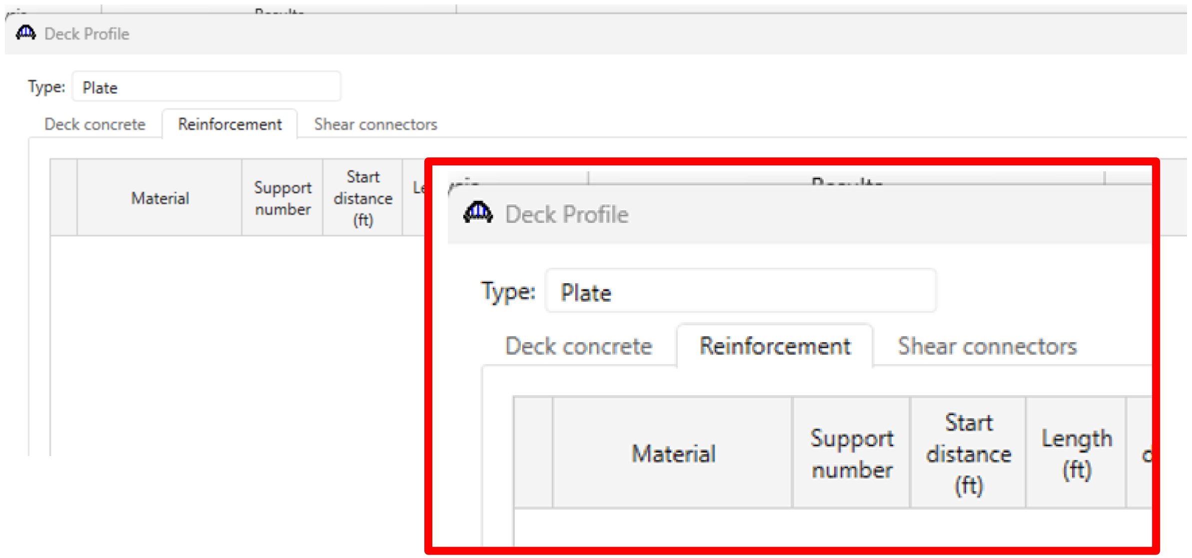
- For Design - BrD will check AASHTO 6.10.1.7 for minimum negative flexure concrete deck reinforcement
- Add longitudinal reinforcement in the deck to satisfy this requirement

Specification Check Summary

Article	Status
Flexure (6.10.7.1.1, 6.10.7.2.1, 6.10.8.1.1, 6.10.8.1.1, 6.10.8.1.1)	Pass
Shear (6.10.9)	Pass
Fatigue (6.10.5.3, 6.6.1.2.2)	NA
Serviceability (6.10.4.2.2)	Pass
Constructability (6.10.3.2.1, 6.10.3.2.2, 6.10.3.2.3)	Pass
Transverse Stiffeners (6.10.11.1.2, 6.10.11.1.3)	Pass
Longitudinal Stiffeners (6.10.11.3.1, 6.10.11.3.2, 6.10.11.3.3)	NA
Bearing Stiffeners (6.10.11.2.2, 6.10.11.2.3, 6.10.11.2.4)	Pass
Shear Connector (6.10.10.1, 6.10.10.4)	NA
Field Splice (6.13.2.6, 6.13.2.7, 6.13.5.3, 6.13.6.1.3a, 6.13.6.1.3b, 6.13.6.1.3c)	Pass
Minimum Negative Flexure Concrete Deck Reinforcement (6.10.1.7)	Fail
Deflection (2.5.2.6.2)	Pass

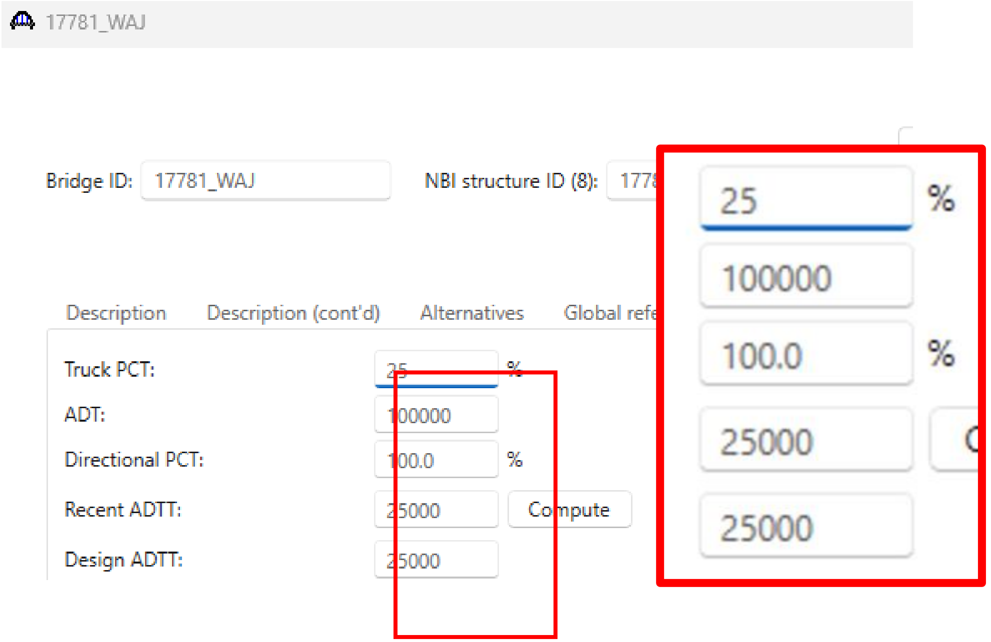
Minimum Negative Flexure Concrete Deck Reinforcement (6.10.1.7)	Fail

- For Rating – ignore longitudinal reinforcement in deck unless necessary for rating capacity



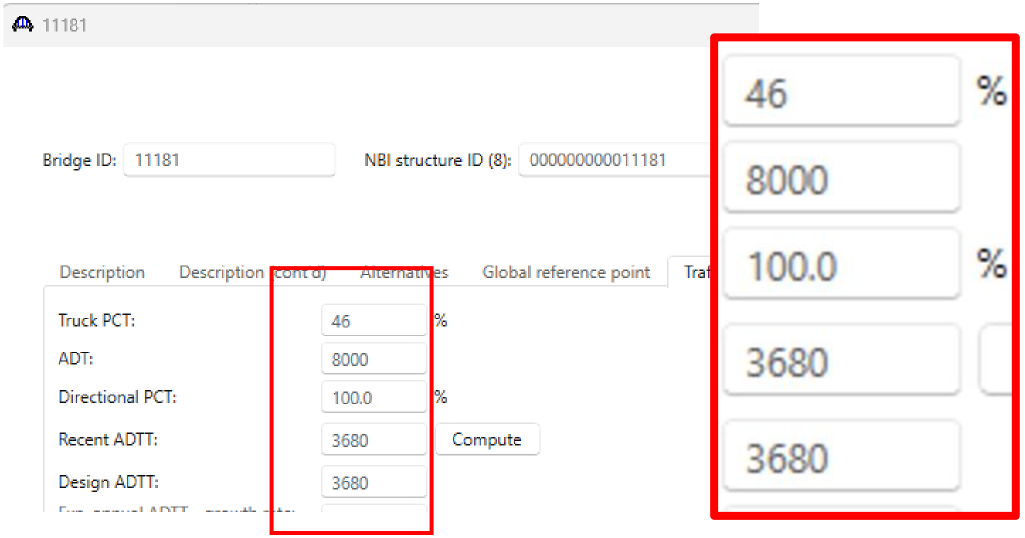
Fatigue

- For Design – Input very large ADTT
- This will force Fatigue I design – ITD’s policy is to design girders for the infinite life limit state unless impractical



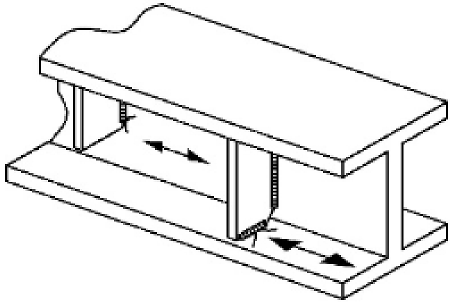
- For Rating – input ADTT per Inspection Report Data

AADT	
AADT (B.H.09):	8,000
ADTT (B.H.10):	3,700
Year of AADT (B.H.11):	2024
Percent Truck Traffic:	46 %



Welds

- Input flange-to-web fillet welds and stiffener welds
- BrD will check the weld capacity
- Input LRFD Fatigue category for flange-to-web fillet weld to be C'.
- Category C' is for the stiffener to flange weld

Section 4—Welded Stiffener Connections							
4.1 Base metal at the toe of transverse stiffener-to-flange fillet welds and transverse stiffener-to-web fillet welds. (Note: includes similar welds on bearing stiffeners and connection plates). Base metal adjacent to bearing stiffener-to-flange fillet welds or groove welds. (Note: see Condition 7.3 for obliquely oriented welded stiffeners or connection plates.)	C′	44×10^8	3	$\boxed{12}$	975	Initiating from the geometrical discontinuity at the toe of the fillet weld extending into the base metal	

Prestressed & Steel Girders

Additional Calculations and Checks ITD does outside of BrD

Rating Loads

- For Rating – Input actual loads on the structure (wearing surface loads are from the inspection report or as-built plans)
- Calculated within BrR but supplemented by hand calculations

Girder Member Window

Summary

Name: G1 - Exterior
Description: Bridge Key: 11181
PPC Wearing Surface (Round to 1" per IMBE) ==> (1")(0.135 kcf)(48.5')/6 girders = 0.091 klf
Concrete Parapet (Per ITD BDM for 42" Single Slope Parapet plus formliner) ==> (0.518 klf + (1.5")(30")(0.150 kcf))(2)/6 girders = 0.188 klf
Camber Strip ==> (2")(16")(0.150 kcf) = 0.033 klf
Intermediate Diaphragm (Increase weight 10% to account for misc. weight) ==> (1.1)[(31")(0.375")(8.48') + 2(28")(7")(0.5")](0.490 kcf)/2 = 0.215 kip
Effective Width (LFR) ==> min(71'/4 = 213"; min[(9')/2, (6)(8")] + min[3.167', (6)(8")] = 86"; 3.167' + 9'/2 = 92") = 86"
28" Deep Web Structural Steel Plate Girder

Design Loads

- Input design & future loads
- Calculate all loads that need to be input into BrD
  - Utilities
  - Future Wearing Surface
  - Stay in Place forms
  - Camber Strip/Haunch
  - Parapet/Rails
  - Diaphragms
  - Splices
  - Other external loads

Project: SH-75 over Yankee Fork
KN: 21900
Girder Design

Computed by: W. Johnson
Date: 5/2025

Bridge Loading Input

Parapet unit load: $W_{parapet} := 0.578\ klf$ 3 combo rails (load adjusted)

future utility load: $W_{utility} := 0.020\ klf$

wearing surface load: $W_{WS} := 0.025\ ksf$

Girder self weight: (use max) $w_{girder} := \max(A) \cdot w_s \cdot (1 + inc_{st}) = 0.51\ klf$

Diaphragm load:

$$P_{dia} := (1 + inc_{st.dia}) \cdot \left((6\ ft \cdot 2 + 9.4\ ft \cdot 2) \cdot 9.8\ plf + 1\ lbf \cdot 20 + \left(12\ in \cdot 10.5\ in \cdot 0.5\ in + 12\ in \cdot 7.5\ in \cdot 0.5\ in + 11\ in \cdot 6\ ft \cdot 0.75\ in \right) \cdot 2 \cdot w_s \right) = 0.734\ kip$$

$$w_{dia.int} := \frac{P_{dia} \cdot N_{dia}}{L} = 0.03\ klf \qquad w_{dia.ext} := w_{dia.int} \cdot 0.5 = 0.01\ klf$$

Lateral Bracing load:

$$P_{lat} := 1.02 \cdot \left(12\ ft \cdot 24.2\ plf + 2 \cdot \left(1.56\ ft^2 \cdot 0.5\ in + 3\ in \cdot 20\ in \cdot 1\ in \right) \cdot w_s \right) = 0.40\ kip$$

Deck weight (interior): $w_{deck.int} := S \cdot t_{s.wt} \cdot w_c = 1.29\ klf$

Deck weight (exterior): $w_{deck.ext} := \left(\frac{S}{2} + OH \right) \cdot t_{s.wt} \cdot w_c = 1.04\ klf$

Camber strip weight: (use max) $w_{CS} := \max(TF_w) \cdot \max(CS_L) \cdot w_c = 0.075\ klf$

Stay-in-place forms (interior): (use max) $w_{SIP.int} := (S - \min(TF_w)) \cdot 0\ ksf = 0.000\ klf$

Stay-in-place forms (exterior): (use max) $w_{SIP.ext} := 0.5 \cdot (S - \min(TF_w)) \cdot 0\ ksf = 0.000\ klf$

parapet girder load: $w_{par} := \frac{W_{parapet} \cdot 2}{N_b} = 0.289\ klf$

utility girder load: $w_{FDW} := W_{utility} = 0.020\ klf$

wearing surface girder load: $w_{WS} := \frac{W_{WS} \cdot 32\ ft}{N_b} = 0.200\ klf$

Non-Composite DC Load (interior): $w_{DC1.int} := w_{girder} + w_{deck.int} + w_{CS} + w_{SIP.int} + w_{dia.int} = 1.91\ klf$

(exterior): $w_{DC1.ext} := w_{girder} + w_{deck.ext} + w_{CS} + w_{SIP.ext} + w_{dia.ext} = 1.64\ klf$

Composite DC Load: $w_{DC2} := w_{par} = 0.29\ klf$

Composite DW Load: $w_{DW} := w_{FDW} + w_{WS} = 0.22\ klf$

Total Deck Load:

$$w_{deck.total} := (w_{deck.int} + w_{SIP.int}) \cdot (N_b - 2) + (w_{deck.ext} + w_{SIP.ext}) \cdot 2 + w_{CS} \cdot N_b = 4.97\ klf$$

Splice Load:

$$P_{splice} := \left(0.5\ in \cdot 24\ in \cdot 12\ in + 2 \cdot 0.75\ in \cdot 11\ in \cdot 24.25\ in + 0.75\ in \cdot 20\ in \cdot 24.25\ in + 0.75\ in \cdot 24\ in \cdot 18\ in + 2 \cdot 1\ in \cdot 11\ in \cdot 36.25\ in + 1\ in \cdot 24\ in \cdot 36.25\ in + 0.5\ in \cdot 14.75\ in \cdot 66\ in \right) \cdot w_s + 1\ lbf \cdot 180 = 1.14\ kip$$

Live Load Distribution Factors

- ITD validates LLDF calculated by BrD with independent calculations

Project: I-15 over Inkom Main
KN: 20547
Girder Design

Compu

Distribution Factor Summary

Exterior

Moment: One Lane Loaded

$$LLDF_{ext.M\_1} := \max\left(DF\_mom\_EXT\_one, skew\_reduction\_factor \cdot DF_{min_1}\right) = 0.739$$

Moment: Two or more Lanes Loaded

$$LLDF_{ext.M\_2} := \max\left(\left(DF\_mom\_EXT\_mult\right), skew\_reduction\_factor \cdot DF_{min.multi}\right) = 0.726$$

$$LLDF_{ext.M} := \max\left(LLDF_{ext.M\_1}, LLDF_{ext.M\_2}\right) = 0.74$$

Live Load Distribution

Standard | LRFD

Distribution factor input method

Use simplified method   Use advanced method

Allow distribution factors to be used to compute effects of permit loads with routine traffic

Action: Moment   Sufficiently connected to act as a unit

Support number	Start distance (ft)	Length (ft)	End distance (ft)	Distribution factor (lanes)	
				1 lane	Multi-lane
1	0.00	71.000	71.00	0.739	0.727

Deck Design

- BrD does not design the deck
- ITD’s standard method for deck design is the Empirical Design per AASHTO 9.7.2
- ITD has standard overhang designs in the Bridge Design Manual for MASH rails

Bearing Design

- BrD does not design elastomeric bearings
- ITD uses plain elastomeric bearings designed using Method A at integral abutments
- Steel reinforced elastomeric bearings designed using Method B are used for all other bearings
- For high axial loads – disk bearings are considered

Prestressed Girder Design

Additional Calculations and Checks ITD does outside of BrD

Prestressed Girder Lateral Stability

- ITD checks girder stresses and stability while picking the girders out of the bed
- Use Example calculation 6.6.1 from *PCI Recommend Practice for Lateral Stability of Precast, Prestressed Concrete Bridge Girders*
- Mathcad Spreadsheet

Girder Stability - PCI

Check girder stability when lifting girder out of the forms and in the yard per ITD BDM 5.5.4.3. The following calculations are based on example 6.6.1 from *PCI Recommended Practice for Lateral Stability of Precast, Prestressed Concrete Bridge Girders*

Girder Shape: ITD WF-42

Functions

Concrete Modulus of Elasticity: $E_{conc}(Km, wc, fc) := (120000ksi) \cdot Km \cdot \left[\left(\frac{wc}{kcf}\right)^2\right] \cdot \left(\frac{fc}{ksi}\right)^{0.33}$ LRFD Eqn. 5.4.2.4-1

where:
Km = Correction Factor for Source of Aggregate
wc = Unit Weight of Plain Concrete
fc = Specified Concrete Compressive Strength

Modulus of Rupture (Normal Weight Concrete): $f_r(fc) := -0.24 \cdot \sqrt{fc \cdot ksi}$ LRFD Sect. 5.4.2.6

where fc = Concrete Compressive Strength

Moment on Beam between Supports with Cantilever Ends, Subjected to Uniform Load: $M_{\mathcal{C}x}(w, L, a, x) := \frac{w \cdot L}{2} \cdot (x - a) - \frac{w \cdot x^2}{2}$

where:
a = Length of Cantilever (same both ends)
L = Overall Length of Beam
w = Applied Unit Load
x = Distance to Point under Consideration from Beam En

Center of Mass Eccentricity Due to Deflection: $\Delta_{cg}(w, L, a, E, I, L1) := \frac{w}{12 \cdot E \cdot I \cdot L} \cdot \left(\frac{1}{10} \cdot L1^5 - a^2 \cdot L1^3 + 3 \cdot a^4 \cdot L1 + \frac{6}{5} \cdot a^5\right)$

(Mast, Robert F., "Lateral Stability of Long Prestressed Beams - Part 2", PCI Journal, Jan-Feb 1993)

where:
a = Length of Cantilever (same both ends)
L = Overall Length of Beam
w = Applied Unit Load
E = modulus of elasticity
I = moment of inertia
L1 = Length between pick points

General Beam Geometry

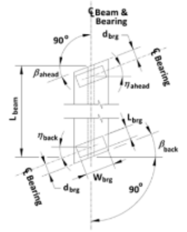
Overall beam Length: $L_{beam} := 83ft + 9in$

Number of beams in cross section: $n_{beam} := 6$

Beam End Skew - ahead station: $\beta_{ahead} := 0deg$

Beam End Skew - back station: $\beta_{back} := 0deg$

Note: Beam end skew is positive in the direction shown in the sketch



Summary

$Check\_f_c$ = "O.K."

$Check\_f_{t.lift.1}$ = "O.K."

$Check\_f_{b.lift.1}$ = "O.K."

$Check\_FS_{cr.lift.1}$ = "O.K." $FS_{cr.lift.1} = 10.33$

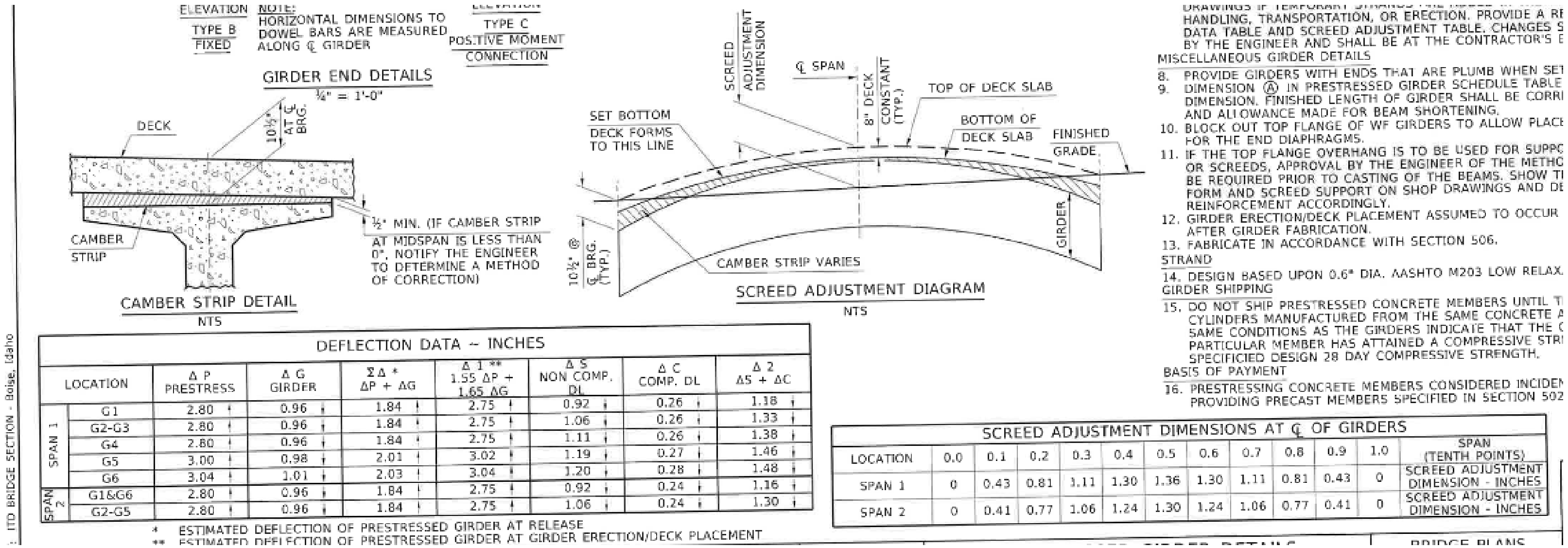
$Check\_angle_R$ = "O.K."

$Check\_angle_L$ = "O.K."

$Check\_FS_{ult.lift.1}$ = "O.K." $FS_{ult.lift.1} = 6.47$

Camber & Screed Adjustment

- Calculate the camber strip thickness and screed adjustments external to BrD
- This is based on prestressed girder deflections, deck profile, and ITD or PCI camber/deflection multipliers



HANDLING, TRANSPORTATION, OR ERECTION. PROVIDE A RE
DATA TABLE AND SCREED ADJUSTMENT TABLE. CHANGES S
BY THE ENGINEER AND SHALL BE AT THE CONTRACTOR'S E

MISCELLANEOUS GIRDER DETAILS

8. PROVIDE GIRDERS WITH ENDS THAT ARE PLUMB WHEN SET
9. DIMENSION Ⓐ IN PRESTRESSED GIRDER SCHEDULE TABLE DIMENSION. FINISHED LENGTH OF GIRDER SHALL BE CORR AND ALLOWANCE MADE FOR BEAM SHORTENING.
10. BLOCK OUT TOP FLANGE OF WF GIRDERS TO ALLOW PLACE FOR THE END DIAPHRAGMS.
11. IF THE TOP FLANGE OVERHANG IS TO BE USED FOR SUPPO OR SCREEDS, APPROVAL BY THE ENGINEER OF THE METHO BE REQUIRED PRIOR TO CASTING OF THE BEAMS. SHOW TI FORM AND SCREED SUPPORT ON SHOP DRAWINGS AND DE REINFORCEMENT ACCORDINGLY.
12. GIRDER ERECTION/DECK PLACEMENT ASSUMED TO OCCUR AFTER GIRDER FABRICATION.
13. FABRICATE IN ACCORDANCE WITH SECTION 506.

STRAND

14. DESIGN BASED UPON 0.6" DIA. AASHTO M203 LOW RELAX.

GIRDER SHIPPING

15. DO NOT SHIP PRESTRESSED CONCRETE MEMBERS UNTIL T CYLINDERS MANUFACTURED FROM THE SAME CONCRETE A SAME CONDITIONS AS THE GIRDERS INDICATE THAT THE C PARTICULAR MEMBER HAS ATTAINED A COMPRESSIVE STR SPECIFICIED DESIGN 28 DAY COMPRESSIVE STRENGTH.

BASIS OF PAYMENT

16. PRESTRESSING CONCRETE MEMBERS CONSIDERED INCIDEN PROVIDING PRECAST MEMBERS SPECIFIED IN SECTION 502

DEFLECTION DATA ~ INCHES

LOCATION		Δ P PRESTRESS	Δ G GIRDER	Σ Δ * ΔP + ΔG	Δ 1 ** 1.55 ΔP + 1.65 ΔG	Δ S NON COMP. DL	Δ C COMP. DL	Δ 2 ΔS + ΔC
SPAN 1	G1	2.80 ↑	0.96 ↓	1.84 ↑	2.75 ↑	0.92 ↓	0.26 ↓	1.18 ↓
	G2-G3	2.80 ↑	0.96 ↓	1.84 ↑	2.75 ↑	1.06 ↓	0.26 ↓	1.33 ↓
	G4	2.80 ↑	0.96 ↓	1.84 ↑	2.75 ↑	1.11 ↓	0.26 ↓	1.38 ↓
	G5	3.00 ↑	0.98 ↓	2.01 ↑	3.02 ↑	1.19 ↓	0.27 ↓	1.46 ↓
	G6	3.04 ↑	1.01 ↓	2.03 ↑	3.04 ↑	1.20 ↓	0.28 ↓	1.48 ↓
SPAN 2	G1&G6	2.80 ↑	0.96 ↓	1.84 ↑	2.75 ↑	0.92 ↓	0.24 ↓	1.16 ↓
	G2-G5	2.80 ↑	0.96 ↓	1.84 ↑	2.75 ↑	1.06 ↓	0.24 ↓	1.30 ↓

* ESTIMATED DEFLECTION OF PRESTRESSED GIRDER AT RELEASE
** ESTIMATED DEFLECTION OF PRESTRESSED GIRDER AT GIRDER ERECTION/DECK PLACEMENT

SCREED ADJUSTMENT DIMENSIONS AT ℄ OF GIRDERS

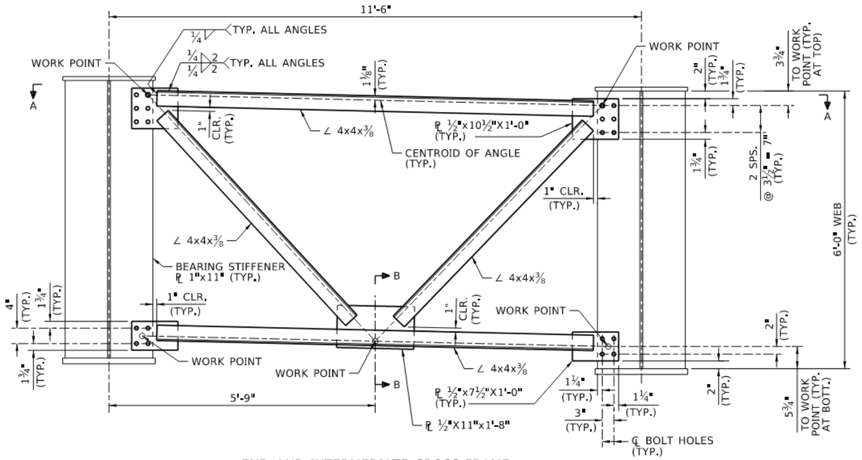
LOCATION	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	SPAN (TENTH POINTS)
SPAN 1	0	0.43	0.81	1.11	1.30	1.36	1.30	1.11	0.81	0.43	0	SCREED ADJUSTMENT DIMENSION - INCHES
SPAN 2	0	0.41	0.77	1.06	1.24	1.30	1.24	1.06	0.77	0.41	0	SCREED ADJUSTMENT DIMENSION - INCHES

Steel Girder Design

Additional Calculations and Checks ITD does outside of BrD

Cross Frame/Diaphragm Design

- Design Cross frames for construction, final, and fatigue loads outside of BrD
- BrD can calculate final cross frame demands if it is ran using 3DFEM analysis
- ITD has not validated BrD's cross frame design capabilities



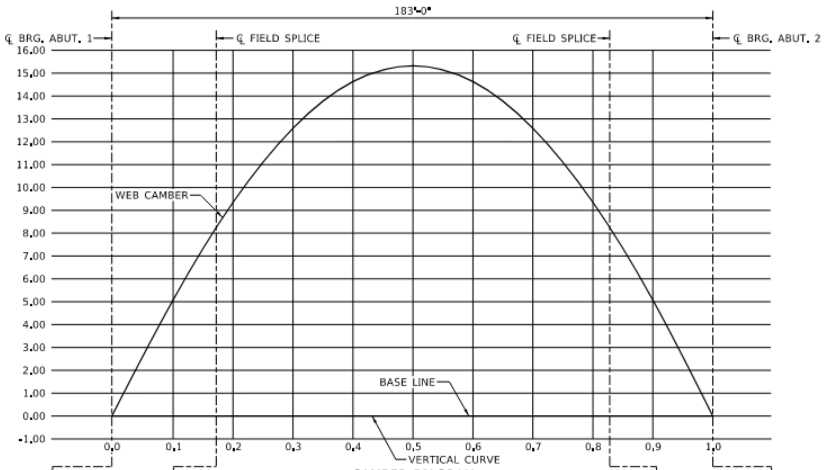
END AND INTERMEDIATE CROSS-FRAME
(END CROSS-FRAME SHOWN, INTERMEDIATE CROSS-FRAME SIMILAR)
½" = 1'-0"

Constructability (AASHTO 6.10.3)

- The following Constructability checks are done outside of BrD
  - Construction Checks
  - Steel Erection checks (wind on girders before deck placement)
  - Lateral Girder rotations (ITD BDM 6.10.3.4)
    - ITD has a limit on the amount an exterior girder is allowed to rotate during deck placement
  - Deck Pouring Sequence
    - Not for multi-span bridges with multiple deck pouring stages
  - Global Stability of Narrow Systems
    - AASHTO 6.10.3.4.2 – check global amplification of I-girder bridges (or stages) with 3 or fewer girders

Camber

- BrD provides deflection data that can be used for camber diagrams; however, for multi-span bridges with deck pouring sequencing this is not accurate
- ITD also includes deck shrinkage in the steel girder camber, which is not included in BrD



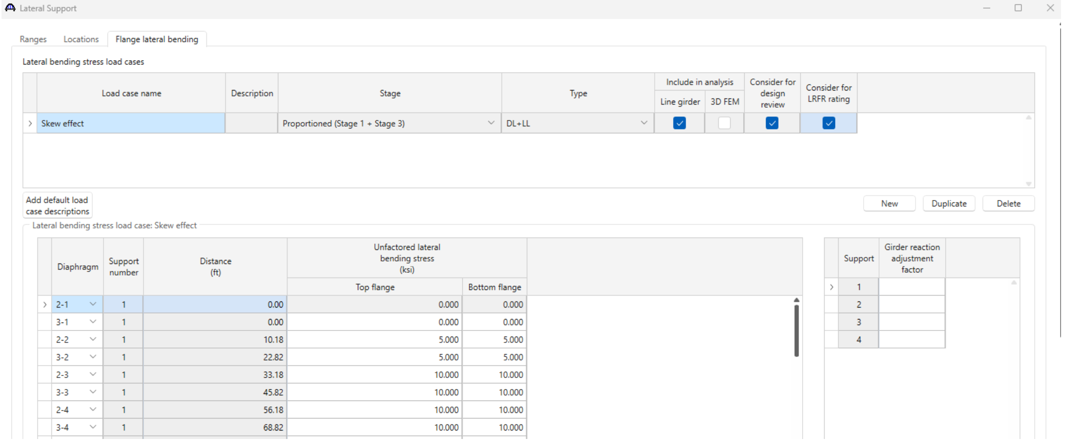
CAMBER DIAGRAM

	℄ BRG. ABUT. 1		℄ FIELD SPLICE								℄ FIELD SPLICE		℄ BRG. ABUT. 2
SPAN POINT	0.0	0.1	0.172	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.828	0.9	1.0
GIRDER DL	0.00	1.04	1.70	1.93	2.62	3.06	3.21	3.06	2.62	1.93	1.70	1.04	0.00
DECK DL	0.00	2.23	3.65	4.14	5.61	6.54	6.86	6.54	5.61	4.14	3.65	2.23	0.00
SHRINKAGE	0.00	1.00	1.58	1.76	2.30	2.62	2.72	2.62	2.30	1.76	1.58	1.00	0.00
COMPOSITE DL	0.00	0.81	1.34	1.52	2.06	2.41	2.53	2.41	2.06	1.52	1.34	0.81	0.00
TOTAL DL	0.00	5.08	8.27	9.35	12.59	14.63	15.32	14.63	12.59	9.35	8.27	5.08	0.00
VERTICAL CURVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL WEB CAMBER	0.00	5.08	8.27	9.35	12.59	14.63	15.32	14.63	12.59	9.35	8.27	5.08	0.00

CAMBER TABLE

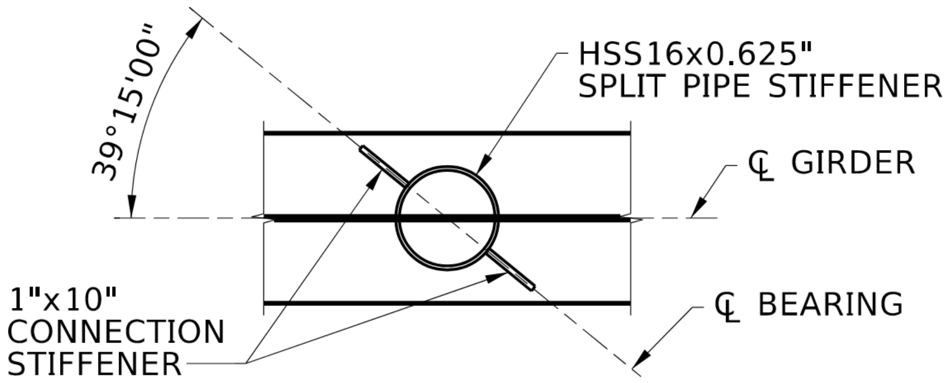
Lateral Flange Bending

- ITD requires lateral flange bending to be included in design if the bridge is skewed over 20 degrees or curved
- Lateral Flange bending can be input into BrD
- Note that BrD includes the maximum lateral flange bending with maximum vertical flange bending – this can be conservative
- Calculation of lateral flange bending stresses is done in external 3DFEM program



Split-Pipe Bearing Stiffener

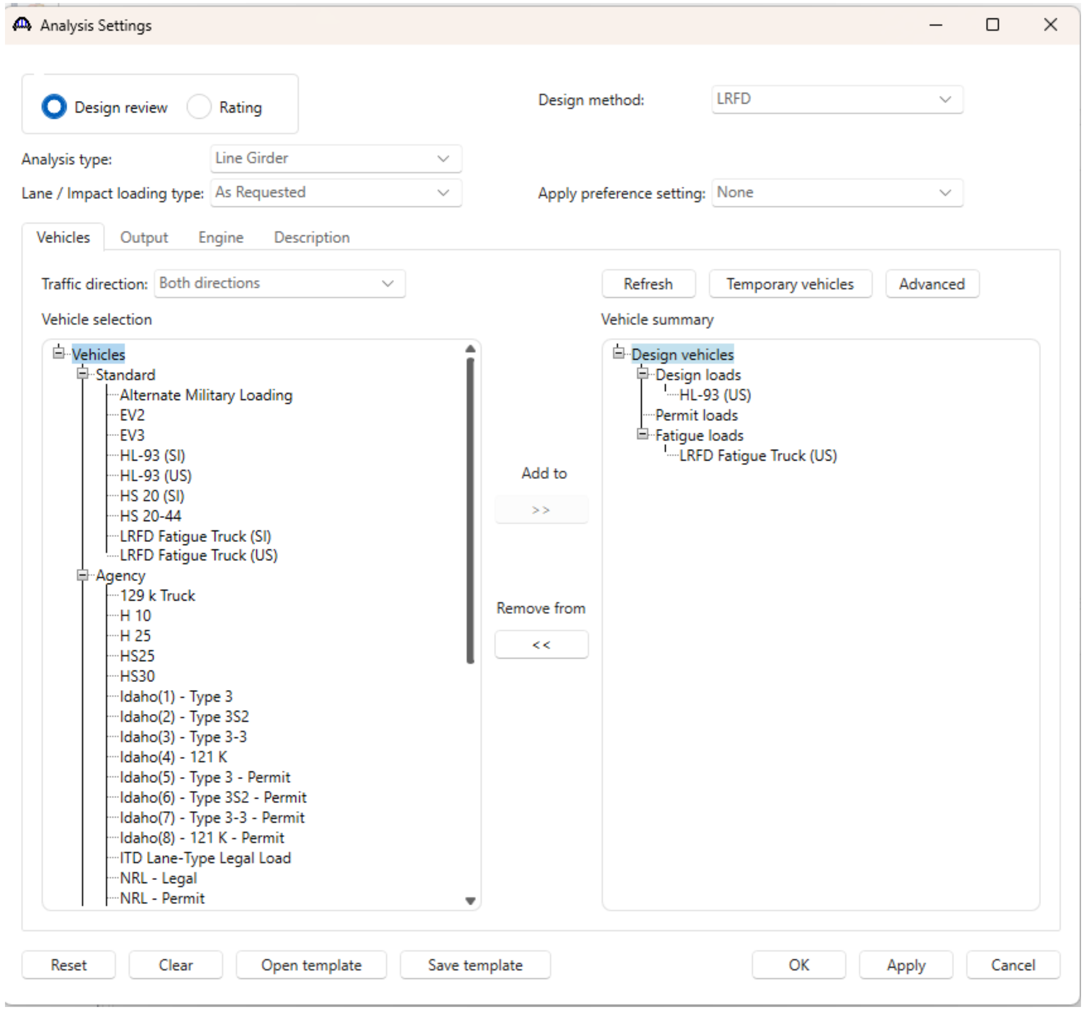
- BrD does not have capability to input split pipe stiffeners at this time
  - Used for high skews >45 degrees
- BrD does check plate stiffeners per AASHTO 6.10.11.2 for bearing and axial resistance

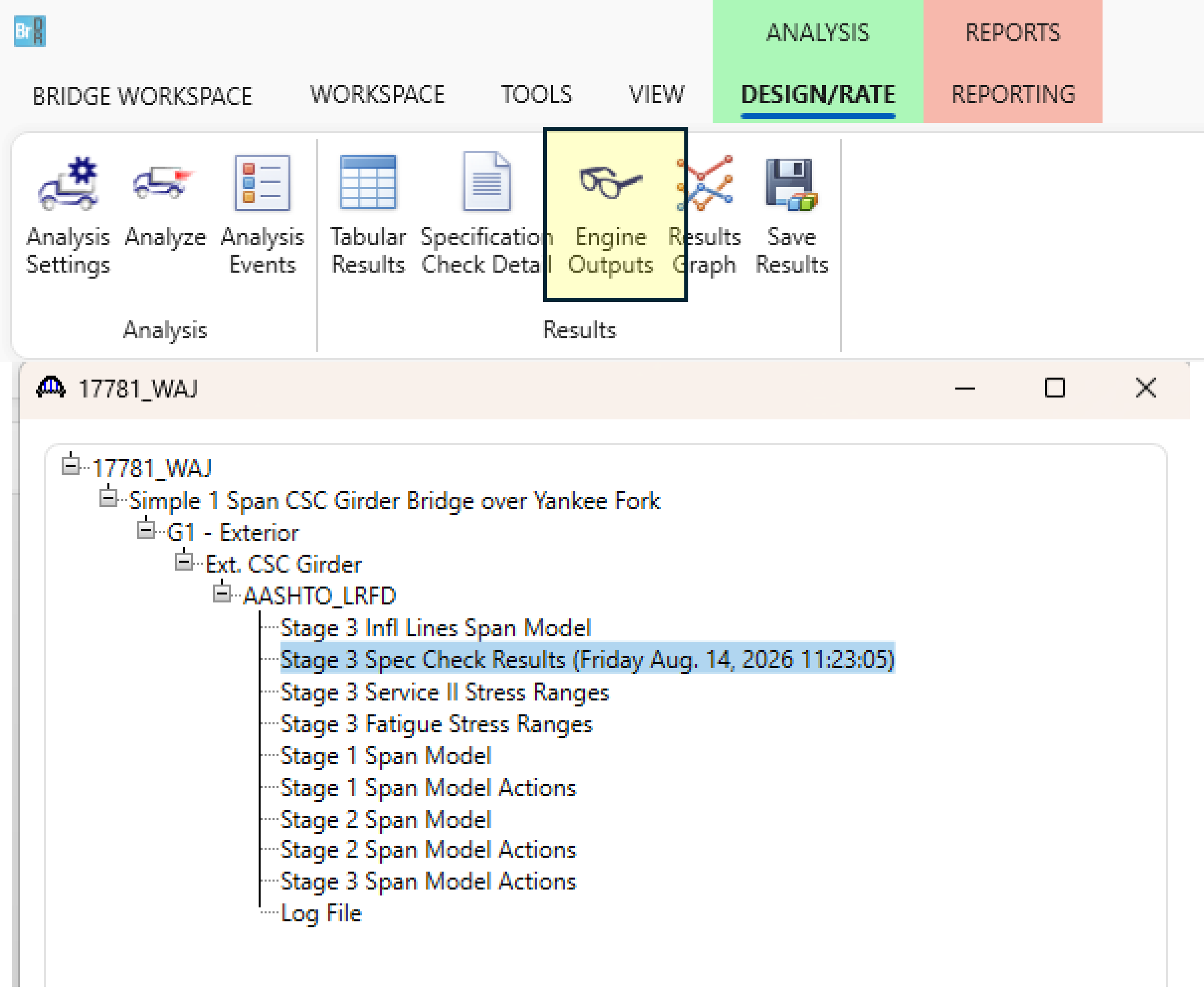


SPLIT-PIPE STIFFENER DETAIL
(TYPICAL AT ABUTMENT AND PIER)
1/4" = 1'-0"

Design Results

Getting to the Design Results





Stage 3 Spec Check Results

- Steel Girder

Bridge ID : 17781_WAJ
Bridge : Yankee Fork
Superstructure Def : Simple 1 Span CSC Girder Bridge over Yankee Fork
Member : G1 - Exterior
Analysis Preference Setting :

NBI Structure ID : 17781_WAJ
Bridge Alt :

Member Alt : Ext. CSC Girder

AASHTO LRFD Specification, Edition 9, Interim 0

Specification Check Summary

Article	Status
Flexure (6.10.7.1.1, 6.10.7.2.1)	Pass
Shear (6.10.9)	Pass
Fatigue (6.10.5.3, 6.6.1.2.2)	Pass
Serviceability (6.10.4.2.2)	Pass
Constructability (6.10.3.2.1, 6.10.3.2.2, 6.10.3.2.3)	Pass
Transverse Stiffeners (6.10.11.1.2, 6.10.11.1.3)	Pass
Longitudinal Stiffeners (6.10.11.3.1, 6.10.11.3.2, 6.10.11.3.3)	NA
Bearing Stiffeners (6.10.11.2.2, 6.10.11.2.3, 6.10.11.2.4)	Pass
Shear Connector (6.10.10.1, 6.10.10.4)	Pass
Field Splice (6.13.2.6, 6.13.2.7, 6.13.5.3, 6.13.6.1.3a, 6.13.6.1.3b, 6.13.6.1.3c)	NA
Minimum Negative Flexure Concrete Deck Reinforcement (6.10.1.7)	Pass
Deflection (2.5.2.6.2)	Pass

- Prestressed Girder

Bridge ID : S. Jerome IC_WAJ
Bridge : S. Jerome IC_WAJ Check
Superstructure Def : Simple 2 Span CPS Girder Bridge over I-84 - Span 1
Member : G1 - Exterior
Analysis Preference Setting :

NBI Structure ID : S. Jerome IC_WA
Bridge Alt :

Member Alt : G1 - Ext. Girder

AASHTO LRFD Specification, Edition 9, Interim 0

Specification Check Summary

Article	Status
Initial Stress at Transfer (5.9.2.3.1a, 5.9.2.3.1b)	Pass
Splitting Resistance in Anchorage Zones (5.9.4.4.1)	Pass
Final Stress due to Permanent and Transient Loads (5.9.2.3.2a, 5.9.2.3.2b)	Pass
Flexure (5.6.3.2, 5.6.3.3)	Pass
Shear (5.7.3.3, 5.7.2.5, 5.7.2.6, 5.7.3.5)	Pass
Deflection (5.6.3.5.2)	Pass