Bolton Perez & Associates
Consulting Engineers

Serving Florida Since 1997

Florida Department of Transportation
District 6

Load Rating Evaluation

Bridge [redacted]

FDOT FM No. [redacted]

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Bridge No.	[redacted]	**Analysis Method:**	**LRFR-LRFD**
Location	[redacted]		
Description	**Twin Concrete Segmental Boxes - 3-Spans: 111'-174'-111'**		**FDOT Bridge Load Rating Summary Form (Page 1 of 2)**

Rating Type	Rating Type	Gross Axle Weight (tons)	Moment/Shear/Service		Dead Load Factor	Live Load Factor	Live Load Distrib. Factor (axles)	Rating Factor	Span No. - Girder No., Interior/Exterior, %Span Length	RF·Weight (tons)
Level	**Vehicle**	**Weight**	**Member Type**	**Limit**	**DC**	**LL**	**LLDF**	**RF**	**Governing Location**	**RATING**
Inventory	HL93	36	Longitudinal, Segmental	Service	1.00	1.00	RA	0.500	Span 1 (North Box, at 4 ft. backstation of P2)	18.0
Operating	HL93	36	Longitudinal, Segmental	Service	1.00	0.90 SL	RA	0.560	Span 1 (North Box, at 4 ft. backstation of P2)	20.2
Permit	FL120	60	Longitudinal, Segmental	Service	1.00	0.90 SL	RA	0.650	Span 1 (North Box, at 4 ft. backstation of P2)	39.0
Permit Max Span	FL120	60	Longitudinal, Segmental	Service	1.00	0.90 SL	RA	0.650	Span 1 (North Box, at 4 ft. backstation of P2)	39.0
Legal	SU2	17	Longitudinal, Segmental	Service	1.00	0.90 SL	RA	2.210	Span 1 (North Box, at 4 ft. backstation of P2)	37.6
	SU3	33	Longitudinal, Segmental	Service	1.00	0.90 SL	RA	1.150	Span 1 (North Box, at 4 ft. backstation of P2)	38.0
	SU4	35	Longitudinal, Segmental	Service	1.00	0.90 SL	RA	1.090	Span 1 (North Box, at 4 ft. backstation of P2)	38.2
	C3	28	Longitudinal, Segmental	Service	1.00	0.90 SL	RA	1.440	Span 1 (North Box, at 4 ft. backstation of P2)	40.3
	C4	36.7	Longitudinal, Segmental	Service	1.00	0.90 SL	RA	1.090	Span 1 (North Box, at 4 ft. backstation of P2)	39.9
	C5	40	Longitudinal, Segmental	Service	1.00	0.90 SL	RA	1.030	Span 1 (North Box, at 4 ft. backstation of P2)	41.2
	ST5	40	Longitudinal, Segmental	Service	1.00	0.90 SL	RA	1.090	Span 1 (North Box, at 4 ft. backstation of P2)	43.6
Emergency Vehicle (EV)	EV2	28.75	Longitudinal, Segmental	Service	1.00	0.90 SL	RA	1.320	Span 1 (North Box, at 4 ft. backstation of P2)	38.0
	EV3	43	Longitudinal, Segmental	Service	1.00	0.90 SL	RA	1.000	Span 1 (North Box, at 5.5 ft. backstation of P2)	43.0

*RA = Refined Analysis

***Principal Stresses Controlling at Service Limit State**

Original Design Load	HS20 or HS20-S16-44		Performed by:	David Rojas	Date: 04/01/19
Rating Type, *Analysis*	LRFR-LRFD		Checked by:	Luis M. Vargas	Date: 04/01/19
Distribution Method	Refined analysis		Sealed By:	Luis M. Vargas	Date: 04/01/19
Impact Factor	20.0%	(axle loading)	FL P.E. No.:	46962	
FL120 Gov. Span Length	174.0	(feet)	Cert. Auth. No.:	7904	
Minimum Span Length	109.0	(feet)	Phone & email:	305-392-3190	
Recommended Posting	At/Above legal loads. Posting Not Required.		Company:	Bolton Perez & Associates	
Recommended SU Posting*	99	(tons)	Address:	7205 Corporate Center Dr. # 201	
Recommended C Posting	99	(tons)	P.E. Seal, Comments by the Engineer		
Recommended ST5 Posting	99	(tons)	LUIS MIGUEL VARGAS LICENSE No. 46962 STATE OF FLORIDA PROFESSIONAL ENGINEER 4/25/19		
Owner	01 State Highway Agency				
Location	Within 1 roadway driving mile of an interstate interchange				
EV Posting	No. EV posting is not recommended. RF.EV2 >1.00 & RF.EV3 > 1.00				
Floor Beam Present?	No				
Segmental Bridge?	Yes; see page 2 for details.				
Project No. & Reason	[redacted]	Update			
Plans Status	Built				

This 01-02-2019 summary follows the FDOT Bridge Load Rating Manual (BLRM), and the FDOT BMS Coding Guide.

*Recommended SU Posting levels for Florida SU trucks adequately restricts AASHTO SU trucks; see BLRM Chapter 7.

fdot.gov/maintenance/LoadRating.shtm

Bridge No.	[redacted]	**Analysis Method:**	**LRFR-LRFD**
Location	[redacted]		
Description	**Twin Concrete Segmental Boxes - 3-Spans: 111'-174'-111'**		

FDOT Bridge Load Rating Summary Form (Page 2 of 2)

FLOOR BEAM (FB)

FB Span Length	0	(feet)
FB Spacing	0	(feet)
FB Operating Rating	0	(tons)
FB SU4 Rating	0	(tons)
FB FL120 Permit Rating	0	(tons)

SEGMENTAL (SEG)

SEG Wing-Span	9.65	(feet)
SEG Web-to-Web Span	12.00	(feet)
SEG Transverse HL93 Operating*	61.90	(tons)

*Tandem Controls. Permisible weight in tons based on BLRM 6A.4.2.1.

POSTING IS NOT RECOMMENDED FOR THE FLORIDA LEGAL LOADS

POSTING IS NOT RECOMMENDED FOR THE EV, OR THE FAST ACT DOES NOT APPLY TO THIS BRIDGE

This 01-02-2019 summary follows the FDOT Bridge Load Rating Manual (BLRM), and the FDOT BMS Coding Guide.
*Recommended SU Posting levels for Florida SU trucks adequately restricts AASHTO SU trucks; see BLRM Chapter 7.

fdot.gov/maintenance/LoadRating.shtm

BPA

Job: [redacted] Computed by: DAR Date: 3/19

Desc: **Load Rating Summary** Checked by: Lmv Date: 3/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # [redacted] Calculations\Longitudinal Rating\Final\[Rating Summary Table.xlsx]Summary Table

Rating Factors Summary

Longitudinal Rating Factors

Level	Limit State	Vehicle	Flexure Rating Factor	Shear Rating Factor	Principal Stresses Rating Factor
Design	Strength I (Inv)	HL93	1.18	0.63	-
	Strength I (Op)	HL93	1.53	0.82	-
	Service III (Inv)	HL93	0.61	-	0.5
	Service III (Op)	HL93	0.68	-	0.56
Legal	Strength I (Op)	SU2	4.82	2.8	-
		SU3	2.53	1.46	-
		SU4	2.38	1.38	-
		C3	3.19	1.81	-
		C4	2.43	1.37	-
		C5	2.23	1.29	-
		ST5	2.41	1.4	-
	Service III (Op)	SU2	2.4	-	2.21
		SU3	1.25	-	1.15
		SU4	1.18	-	1.09
		C3	1.56	-	1.44
		C4	1.19	-	1.09
		C5	1.10	-	1.03
		ST5	1.17	-	1.09
Permit	Strength II (Op)	FL120	1.43	0.82	-
	Service III (Op)	FL120	0.71	-	0.65
Emergency Vehicle	Strength II (Op)	EV2	3.01	1.74	-
		EV3	2.02	1.17	-
	Service III (Op)	EV2	1.44	-	1.32
		EV3	1.04*	-	1.0*

*Employed Posting Avoidance Techniques, see report.

BPA

Job: **Br 870646 over SR-826 LR 18.17.01** Computed by: DAR Date: 3/19

Desc: **Load Rating Summary** Checked by: Lmv Date: 3/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # [redacted] Calculations\Longitudinal Rating\Final\[Rating Summary Table.xlsx]Summary Table

Rating Factors Summary

Transverse Rating Factors

Level	Limit State	Vehicle	Flexure Rating Factor
Design	Strength I (Inv)	Truck	1.97
		Tandem	1.67
	Strength I (Op)	Truck	3.06
		Tandem	2.6
	Service I (Inv)	Truck	1.24
		Tandem	1.05
	Service I (Op)	Truck	2.02
		Tandem	1.72
Legal	Strength I (Op)	SU4	2.52
		C5	3.1
		ST5	3.37
	Service III (Op)	SU4	1.66
		C5	2.05
		ST5	2.22
Permit	Strength II (Op)	FL120	1.83
	Service I (Op)	FL120	1.21
Emergency Vehicle	Strength II (Op)	EV2	3.31
		EV3	2.1
	Service I (Op)	EV2	2.11
		EV3	1.34

SECTION 1 – EXECUTIVE SUMMARY

The Load Rating of Bridge [redacted] was completed in accordance with the AASHTO Manual for Bridge Evaluation (MBE), 3rd Edition., FDOT Bridge Load Rating Manual (BLRM), January 2019, and the 2018 AASHTO LRFD Bridge Design Specifications, 8th Edition.

The objective of this evaluation is to complete the load rating analysis of Bridge No. [redacted] in its current condition. The segmental bridge is located on the north side of the [redacted] The load rating was performed using the LRFR methodology and was performed using FEM software CSi Bridge, Version 21.0.2. The segmental bridge characteristics, materials, and construction stages are based on the available information from the design drawings, included in Appendix A. The bridge condition was derived from our field visit and the inspection reports located in Appendix B.

The load rating analysis of the superstructure for the design load (HL 93) was found to be controlled by positive bending of the North Box, at 44 ft. backstation of Pier 3, Span 2. The LRFR Service III inventory and operating rating factors are 0.61 and 0.68, respectively. The Service III principal stresses rating in inventory and operating rating are 0.50 and 0.56, respectively; they occur at the web on the North Box, 4 ft. backstation of Pier 3. The HL 93 bending Strength Inventory and Operating rating factors are 1.18 and1.53, respectively. HL 93 shear Strength Inventory and Operating rating factors are 0.63 and 0.82, respectively. All legal loads rating factors are above one, with the C5 truck controlling the rating with a rating factor of 1.29.

Since the rating factor of the EV3 Emergency vehicle did not rate with all striped lanes loaded, a refined analysis was performed for mixed traffic, composed of the EV3 truck in one lane combined with C5 trucks, position in 3 adjacent lanes. Truck C5 was selected because it governs bending with the lowest rating factor of the legal trucks. The Service III Flexure Operating rating factor resulted in 1.04, and Principal Stress rating factor is 1.0; hence, the bridge does not need to be posted for the EV trucks.

Transverse rating is satisfactory with all vehicles, with a Service III inventory rating factor of 1.05 and Strength I inventory rating factor of 1.67. In both cases the Tandem controlled; however, per BLRM the permissible weight in tons is based on a gross vehicle weight of 36 tons. The details of the load rating analysis are presented in Appendix C.

The rating factors for longitudinal web principal stresses are generally low; however, the shear strength rating is satisfactory for all vehicles. According to MBE 6.1.4, this structure does not need to be posted for restricted loading as it has been carrying normal traffic for over 35 years, and the webs do not show any sign of distress. Thus, we recommend an increase inspection cycle of the webs to verify its satisfactory performance.

SECTION 2 – BRIDGE DESCRIPTION

Bridge D ([redacted] is composed of twin, three-span segmental box girders in a curved alignment with radii of curvature of 1909.86 ft. and 1861.86 ft. for the north and south boxes, respectively. The segmental bridge is located on the north side of the [redacted] ([redacted] intersection. This bridge carries vehicular traffic traveling southbound on [redacted] over [redacted] it is striped for four-12 ft. lanes of traffic with 6 ft. and 10 ft. shoulders. The structure is approximately 396 feet long with spans of 111 ft., 174 ft., and 111 ft. Each bridge deck is 31'-9¼" wide; when the box girders are placed together with the 3'-6" longitudinal closure pour the, deck becomes 67'-0½". The Bridge was built in 1989 and the inspection report performed in 10/2/2018 lists the sufficiency rating of 92.6. Figures 2.1 and 2.2 illustrate the bridge location.

Each segmental bridge is made of 43 segments: 36 typical segments, 2 pier segments, 2 abutment segments and 3 cast-in-place (CIP) segments. Segments were precast with match-cast joints. The bridges were erected using the balanced cantilever method with temporary towers to stabilize the cantilevers. Bridge erection started with Pier 2, where the segments were connected to previously erected segments using epoxy between the segment joints and temporary PT bars, before being permanently post-tensioned. Once the cantilever of Pier 2 was completed, it was connected to the segments of Abutment 1 with a CIP segment closure. Similarly, cantilever of Pier 3 was connected to the segments of Abutment 4. Continuity tendons were then installed on each partially completed structure. Then, the cantilever of Pier 2 and 3 were connected with a CIP segment, completing one structure. The same procedure was done for the other box girder. Finally, these two box girders were joined using a longitudinal CIP slab of 3'-6". The tendons were grouted before end of construction (bonded tendons).

Note that during erection, the statical system of the structure changes as temporary supports are placed and later removed until the bridge's final conditions is achieved. The construction sequence with multiple statical systems, produced locked-in stresses that shall be considered in the rating of this bridge. Additionally, the time-dependent effects of materials take place from beginning of casting, and continuing with construction. These effects and are considered during the load rating calculations.

SECTION 3 – LOAD RATING PARAMETERS AND CRITERIA

Standards and Specifications

- AASHTO Manual for Bridge Evaluation, 3rd Edition w. 2019 Interims.
- FDOT Structures Manual, January 2019.
- FDOT Bridge Load Rating Manual, January 2019.
- AASHTO LRFD Bridge Design Specifications, 8th Edition (2018).

Load Rating Method

- Load and Resistance Factor Rating (LRFR).

Load Rating Software

- CSi Bridge v. 21.0.2 Advanced with Rating
- CSiBridge is a Finite Element computer software with the ability to model complex structures, components, construction staging, load and time dependent effects such as prestressing, creep, shrinkage, relaxation, and temperature.

Environment

- Source: [redacted] from [redacted] to [redacted] project adjacent to bridge site.
- Superstructure: Slightly aggressive
- Substructure: Moderately aggressive

Loads

- Dead Loads (DC):

SW Concrete, PT Structural	0.155 kcf
SW Concrete, RC Structural	0.150 kcf

- Superimposed Dead Loads (DC):

Cast-In-Place Traffic Barriers:	0.305 klf (on ea. bridge)

- Live Load (LL):

Design Loads	HL-93, Tandem
Legal Loads	SU2, SU3, SU4, C3, C4, C5, & ST5
Permit Loads	FL-120
Emergency Vehicles	EV2, EV3

- Dynamic Allowance — 20% (riding surface is smooth with minor surface deviations or depressions) (*MBE C6A.4.4.3-1*)

- Post-tensioning (PT):
  Longitudinal and transverse post-tensioning including primary and secondary effects, losses due to friction, seating, elastic shortening, and relaxation are accounted for in the model.

- Creep and Shrinkage (CR, SH):
  Effects due to creep and shrinkage are accounted for by the software using the CEB-FIP 90 model.

- Uniform Temperature Change (TU): (*AASHTO 8th 5.4.2.2*)
  Coefficient of Thermal Expansion for Concrete: 0.000006/°F
  Uniform temperature variation of ±35°F applied to structure.

- Temperature Gradient (TG):
  Per AASHTO 3.12.3, Zone 3 (Florida)

Material Properties

Material properties shown below are based on values listed in existing plans, unless otherwise noted.

- Concrete:
  f'_c Structural (PT): 5.5 ksi (Precast box girders)
  f'_c Structural (RC): 5.5 ksi (CIP closure)

  Allowable Stresses (Precast box girders) (Inv. / Op.) (*FDOT T. 6A.5.4*)
  -Max Compressive Stress
  DC + PT $0.45\ f'_c$
  Service $0.60\ f'_c$ (ϕ_w=1.0)

  -Max Tensile Stress (Inv. / Op.) (*FDOT T. 6A.5.11-2*)
  Type A Joints
  Longitudinal $6\sqrt{f'_c}$ / $6\sqrt{f'_c}$
  Transverse $3\sqrt{f'_c}$ / $6\sqrt{f'_c}$

  -Principal Stresses (Inv. / Op.) (*FDOT T. 6A.5.11-2*)
  Web $3.5\sqrt{f'_c}$ / $3.5\sqrt{f'_c}$

- Prestressing Strands:
  Type: 0.6" diam, 7-wire strand, Low-Lax
  Grade: Gr. 270
  f_{pu}: 270 ksi
  E_{ps}: 28,500 ksi
  K: 0.0002 rad/ft
  μ: 0.25 (internal tendons)
  Anchor set: 3/8"

Allowable Stress
At strand after anchor set: 0.70 f_{pu}
Jacking at anchorage: 0.80 f_{pu}

- Reinforcing Steel:
  Grade 60
  f_y: 60 ksi
  E_s: 29,000 ksi

Boundary Conditions

The bridge is a continuous three span twin structure. Each structure is made of a single cell segmental post-tensioned box girder. The bridge structure has a fixed pier at the first interior support, P2, where all displacement directions are prescribed, but rotations are allowed. The support conditions of the abutments and pier are guided allowing displacements along the tangential bridge alignment.

Structural Modeling

Longitudinal Modeling:

The longitudinal load rating of Bridge [redacted] was determined using the CSi Bridge as the curvature of the bridge required a true tri-dimensional model where all relevant deformations are considered. The bridge is modeled with shell elements within the finite element environment of CSi Bridge. This method allows us to account for couple stresses due to bending (strong and weak axes), axial loads, shear and torsion. Bridge curvature is rigorously accounted for and the model captures all torsional effects, those of permanent and transient loads. Also, prestress losses are all accounted for, including global curvature effects. The tri-dimensional model is able to replicate accurately the boundary conditions, which used both fixed and tangentially guided supports.

Erection sequence is considered as ground mounted, as shown in design plans; as-built records are not available. There are no records of any camber issues or major corrections during segment erection. Likewise, there is no evidence of deflection issues, thus, the model used for predicting long-term deformation seems adequate.

Segments were erected and connected using epoxy between joint; there is no evidence of water intrusion inside the boxes, so it is assumed the epoxy is providing the adequate seal between segments. Reasonable casting and erection schedules were developed to account for the construction activities.

Inspection reports do not show any issues with tendon grouting or any evidence of corrosion, hence, tendons are considered fully grouted (bonded). Therefore, the bridge is considered to have the post-tensioned tendons fully bonded with Type A joints.

For the HL 93 Truck, axles have their wheels spaced transversely at six feet. For the HL 93 Tandem the two axles are spaced four feet longitudinally with each axle having two wheels spaced transversely at six feet. In addition, Permit, Legal, and Emergency vehicles have their wheels spaced at six feet. Because the deck riding surface is

smooth with minor surface deviations or depressions, a dynamic allowance of 20% is applied to each vehicle. The corresponding multiple presence factors are applied to each vehicle loading case depending on the number of lanes being loaded.

The CSi System follows the following approach to determine live load responses. First, we specify the lane location, transversely and longitudinally, and then the vehicle features traversing the bridge. i.e. load per axle, axle and wheel spacing variables. We also specify the appropriate multi-presence factors per vehicle type based on the number of traffic lanes being loaded. For the analysis, we define HL 93, FL 120, legal loads, and emergency vehicles. For the design and legal vehicles, we also characterize the loading requirements for negative moments only, such as the combination of uniformly distributed and truck loads as required by the MBE and BLRM.

The moving-load analysis in the bridge object generates influence surfaces for response quantities at all significant locations within the specified traffic lanes of the bridge. The program first generates lane-load points along and across each pre-established lane pattern. Deflected shapes are obtained by placing a unit vertical load at each lane-load point. These unit loads are then transferred from the lane surface to joints within the structural system according to their tributary distribution. The model will generate as many deflected shapes as lane-load point from which response quantities (axial load, shear, moment, torsion and stresses) can be obtained. For each response quantity, the influence surface is then derived from the deflected shapes previously calculated as vehicle loads move along the structure. Once the influence surface is generated, the program locates vehicular loading such that minimum and maximum effects are induced. Response is enveloped to obtain the maximum and minimum absolute values. Various trucks along/across the bridge can be specified and then combined and enveloped.

This methodology allows the program to place as many combinations and permutations of loaded lanes as needed to obtain the desired maximum response. It is noted that in the bridge modeling, we used a dynamic allowance of 20% as a posting avoidance technique. Detailed calculations are located in Appendix C of this document.

Transverse Modeling:

The transverse load rating for Bridge [redacted] was determined using the CSi Bridge software using two computer models. A two-dimensional frame time-dependent model and a three-dimensional time-dependent finite element model. Considering the plain strain conditions of the self-weight, creep and shrinkage, and prestress effects in the bridge transverse direction, a two-dimensional frame model using one-foot thick members is adequate. However, a tri-dimensional finite element model is used to properly capture the tri-dimensionality effects of the truck loading. For the FEM model, we use the same bridge model of the longitudinal analysis.

Sequence of construction considered that the segments are cast and prestressed across the deck (casting yard) prior to erection. After the north and south boxes are erected the longitudinal CIP closure is installed. In the model this CIP closure is installed after the boxes are individually prestressed. Barrier loading is applied after the two box girders are joined together. Truck loading application is determined from

the analysis of influence lines (similar to influence surfaces) from a two-dimensional frame model. The resulting influence lines cannot be used to determine the live-load moments; however, 12 ft. lanes location are established and then wheel loads are placed in the tri-dimensional model to obtain the maximize live load effects in the desired sections. The critical sections on the prestressed deck are the root of overhang (1), inside web face (2 & 4), midspan between webs (3), outside web face between boxes (5), and at CIP longitudinal closure (6). Live-load moments are derived and combined with other load case conditions.

For the transverse analysis, the truck axles locations in the longitudinal and transverse directions, as well as load magnitudes, are considered and captured by our model. Detailed calculations are presented in Appendix C of this document.

Condition Factors (φ_c)

A Condition Factor is included to account for corrosion, section loss and deterioration observed during field visits or inspection reports. The latest inspection report of 10/2/2018, indicates a Sufficient Rating of 92.6 and NBIS Item (59) value of 7, Good. Based on these values and considering MBE Tb. 6A.4.2.3-1, this bridge will have a Condition Factor, φ_c, of 1.0.

System Factors (φ_s)

The System Factor is related to the degree of redundancy in the total structural system. For segmental bridges, the level of redundancy is quantified and provided in MBE Tb. 6A.5.11.6-1. In balanced cantilever segmental bridges, the number of tendons per web changes practically in every segment, making the utilization of the system factor very onerous. We follow a more holistic approach, but safe, where we based this system factor on the number of hinges to develop a mechanism. In that regard, we differentiate between end span and interior span, where the ability to redistribute load is greater in an interior span. For Precast balanced Cantilever with Type A Joints, we adopt

Spans 1 and 3 (end spans), $\varphi_s = 1.0$
Spans 2 (interior spans), $\varphi_s = 1.05$

These values are only applied to the capacity of the longitudinal stresses and flexure; for shear strength a system factor of one is used.

Bridge Plans

The design plans relevant to the load rating of this bridge are provided in Appendix A.

Summary of Load Rating

The controlling box for the load rating is the North box in all cases. The critical location occurs at the North Box, 44 ft. downstation of Pier 3 in Span 2, for all limit states, except principal stresses at the web. The LRFR Service III inventory and operating rating factors are 0.61 and 0.68, respectively. The Service III principal

stresses rating in inventory and operating rating are 0.50 and 0.56 and take place at 4 ft. downstation of Pier 3 (Span 2).

The HL93 bending Strength Inventory and Operating rating factors are 1.18 and 1.53, respectively. HL 93 shear Strength Inventory and Operating rating factors are 0.61and 0.82, respectively.

Because the design truck operating rating is smaller than 1.3, we rated all legal loads; rating factors for these trucks are all above one, with the C5 truck controlling the rating.

Since the rating factor for Service III tensile bending stresses and principal stresses of the EV3 Emergency vehicle did not rate with all striped lanes loaded, refined analysis was performed for mixed traffic, one-lane loaded with EV3 truck and three lanes loaded with C5 trucks. Trucks C5 were selected for mixed traffic because it is the most critical legal truck, with the lowest Service III rating factor. CSi performed lane permutation to consider all possible combinations, selecting appropriate multiple presence values based on the number of lanes being loaded. The Service III Operating rating resulted in satisfactory results as the rating factor is 1.04, and the rating factor for principal stresses yields 1.0.

SECTION 4 – RECOMMENDATIONS

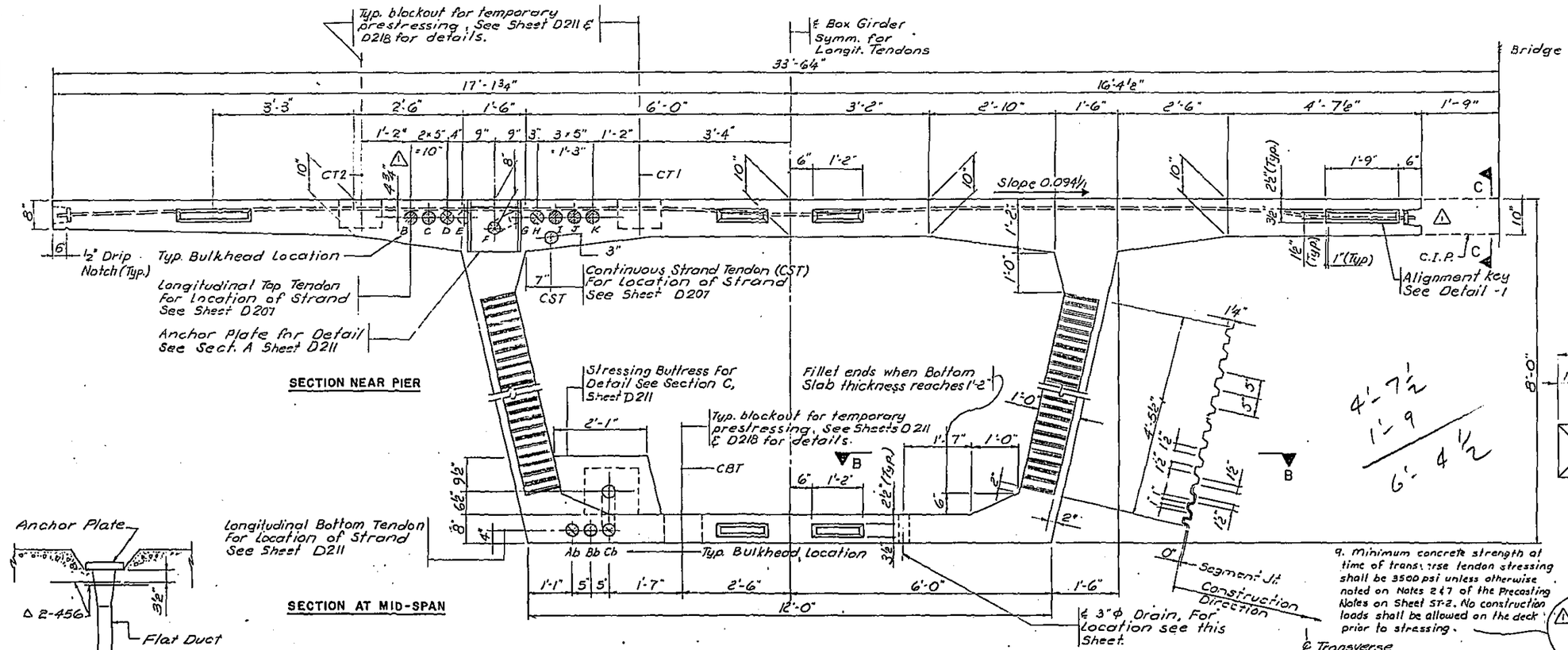
The load rating evaluation and load rating update show that the bridge can support the existing legal and emergency vehicle loads, as the load rating factors are greater than 1.0. It has been determined that principal stresses on the webs (service limit state) yield low rating factors that may be of concern; however, the webs shear strength capacity is satisfactory to carry the loads specified in the FL BLRM. Even though, we have limited information about the bridge as shown in the design plans, we actually do not have sufficient information (as-built plans, construction records or shop drawings) to precisely determine the material properties; hence, according to MBE 6.1.4, this structure does not need to be posted for restricted loading as it has been carrying normal traffic for over 35 years, and the webs do not show any sign of distress. We recommend an increase inspection cycle to verify the webs satisfactory performance.

Appendix A

Existing Plans

Revised 11-1-83

FED. ROAD DIST. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.			D-208



POST-TENSIONING NOTES:

1. All strand tendons as shown shall be Seven wire low relaxation 0.6" dia. strand with f_s^1 = 270 ksi.
2. All tendons in top and bottom slab shall be stressed & anchored after anchor set, such that an average stress of 0.66 f_s^1 is provided in each tendon and the maximum stress in the tendon shall not exceed 0.70 f_s^1.
3. Maximum tendon jacking force shall not exceed 0.80 f_s^1 for a short period of time.
4. Number of tendons as shown on plans are minimum and have included losses due to creep, shrinkage and relaxation. Contractor shall calculate and account for losses due to friction, anchor slippage, etc.
5. Tendon stressed and anchored in a previous segment shall be grouted as soon as practical.
6. All empty conduits shall have mandrels so as to avoid misalignment of the tendon profile during concreting. Prestressing tendons shall be properly secured to reinforcing steel cages or supports so that the correct profile is always assumed.
7. Minimum bending radius for strand to be 20' & 64' for 12-0.6 & 9-0.6 tendons.
8. Maximum jacking force shall not be greater than 500 kips for 12-0.6 Strand, 422 kips for 9-0.6 Strand & 187 kips for 4-0.6 Strand.
9. Minimum concrete strength at time of transverse tendon stressing shall be 3500 psi unless otherwise noted on Notes 2 & 7 of the Precasting Notes on Sheet ST-2. No construction loads shall be allowed on the deck prior to stressing.

△ Post-Tensioning Notes:
9. Minimum concrete strength at time of Transverse Tendon stressing shall be 3500 psi. No construction load shall be allowed on the deck prior to stressing.

△ (C.I.P. Strip) ESTIMATED QUANTITIES (Entire Bridge)

ITEM	UNIT	QUANTITY
Class IV Concrete (Superstruct, cast-in-place)	Cu.Yd.	46.4
Reinf. Steel	LB	2,352

Note: For C.I.P. Strip
Concrete Pay Item 400-4-4
Reinf. Steel Pay Item 415-1-4

ALTERNATE B
TENDON ARRANGEMENT & DIMENSION OF TYPICAL SECTION

REVISIONS	
Date	Description
11-1-83	△ Add Transverse Pt. & Rev Note 8
12-15-83 JAO	Replaced Note 9

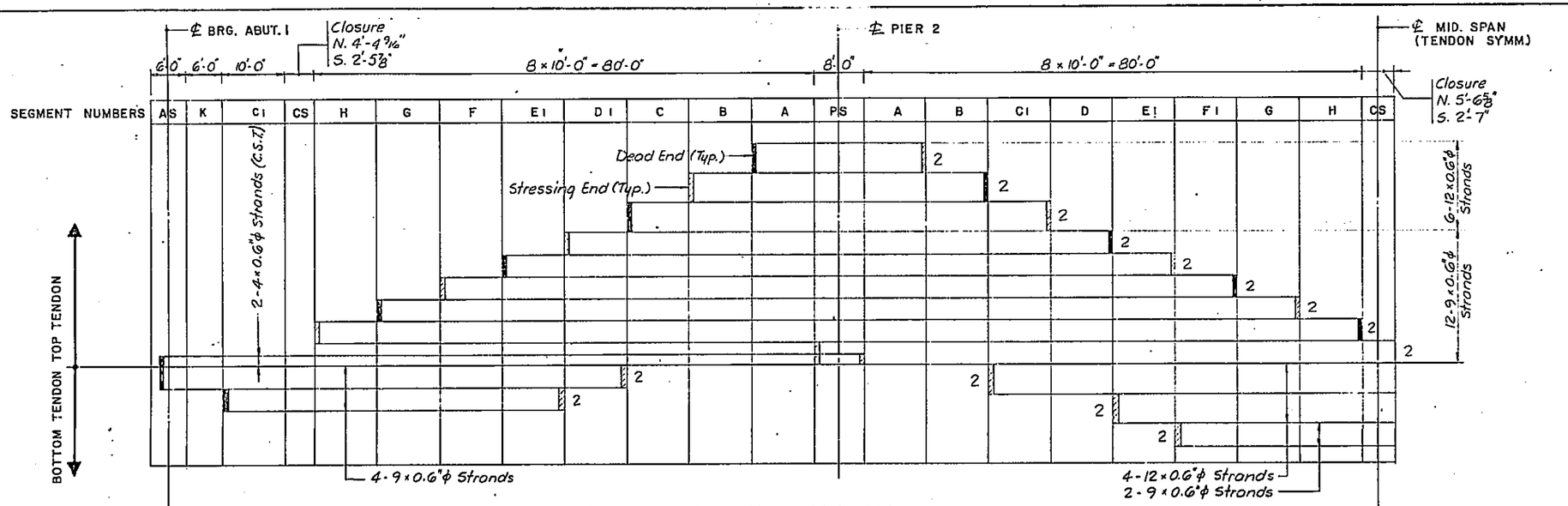
Designed by	E.L.P.	12-81
Checked by	J.B.L.	12-81
Quantities by	M.P.L.	12-81
Checked by	J.B.L.	12-81
Supervised by	K.S.	

[redacted]

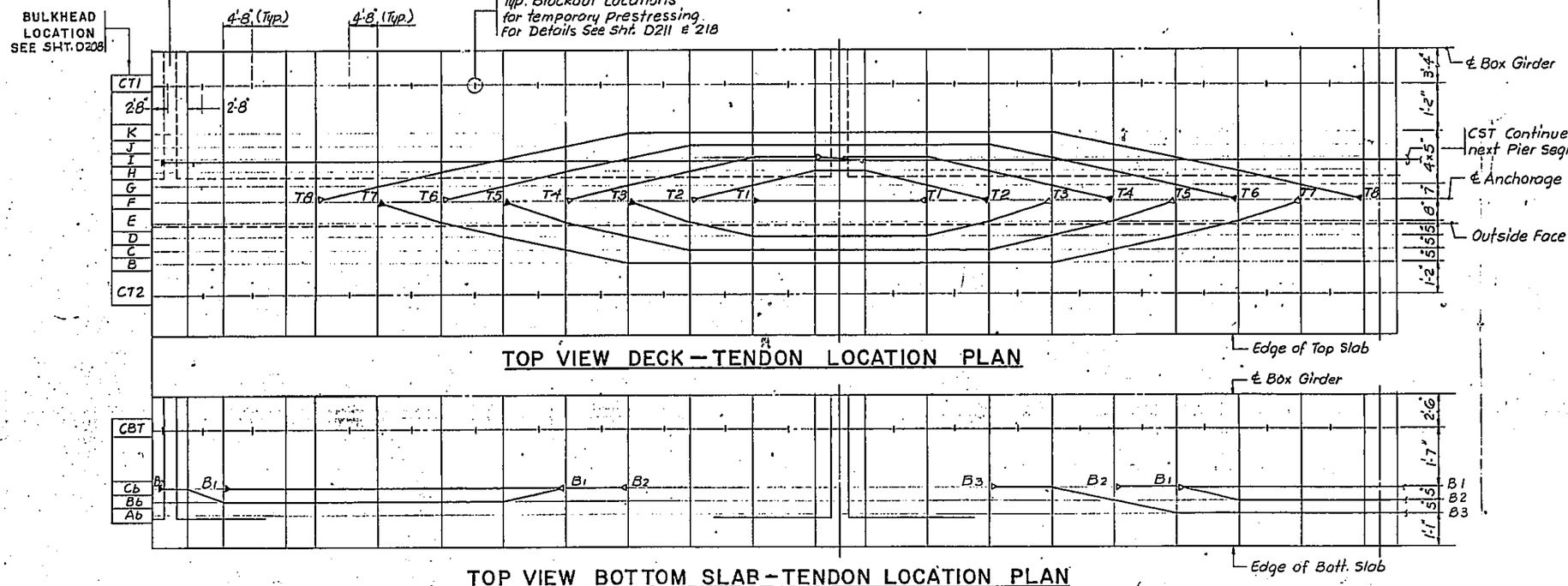
POST, BUCKLEY, SCHUH & JERNIGAN, INC.
ENGINEERS, ARCHITECTS AND PLANNERS

Drawing No. 306 of 407
Index No. 13454

FED. ROAD DIV. NO.	STATE	PROJECT NO	FISCAL YEARS	SHEET NO.
3	FLA.			D-207



TENDON DIAGRAM



NOTES:
1. For tendon arrangement see Sht. D206
2. For Post-tensioning Notes see Sht. D206
3. Min. bending radius of Strand Tendon is 20'-0"
4. All tendons marked CST are permanent strand tendons.

LEGEND
- Stressing End-Strand Tendon
- Dead End-Strand Tendon
- Stressing End-Bar Tendon
- Dead End-Bar Tendon
- Coupler-Bar Tendon

ESTIMATED QUANTITIES (Entire Bridge)

ITEM	UNIT	QUANTITY	
Posttensioning Tendon 4×0.6"ϕ	LB	2,705	69,017
Posttensioning Tendon 9×0.6"ϕ	LB	48,337	69,017
Posttensioning Tendon 12×0.6"ϕ	LB	17,975	69,017
*Anchorage 4×0.6"ϕ		16	208
*Anchorage 9×0.6"ϕ		128	208
*Anchorage 12×0.6"ϕ		64	208

*Anchorage shall be under pay item 460-99 "Post tensioning Tendons"

ALTERNATE B
TENDON DIAGRAM &
TENDON LOCATION PLAN

[redacted]

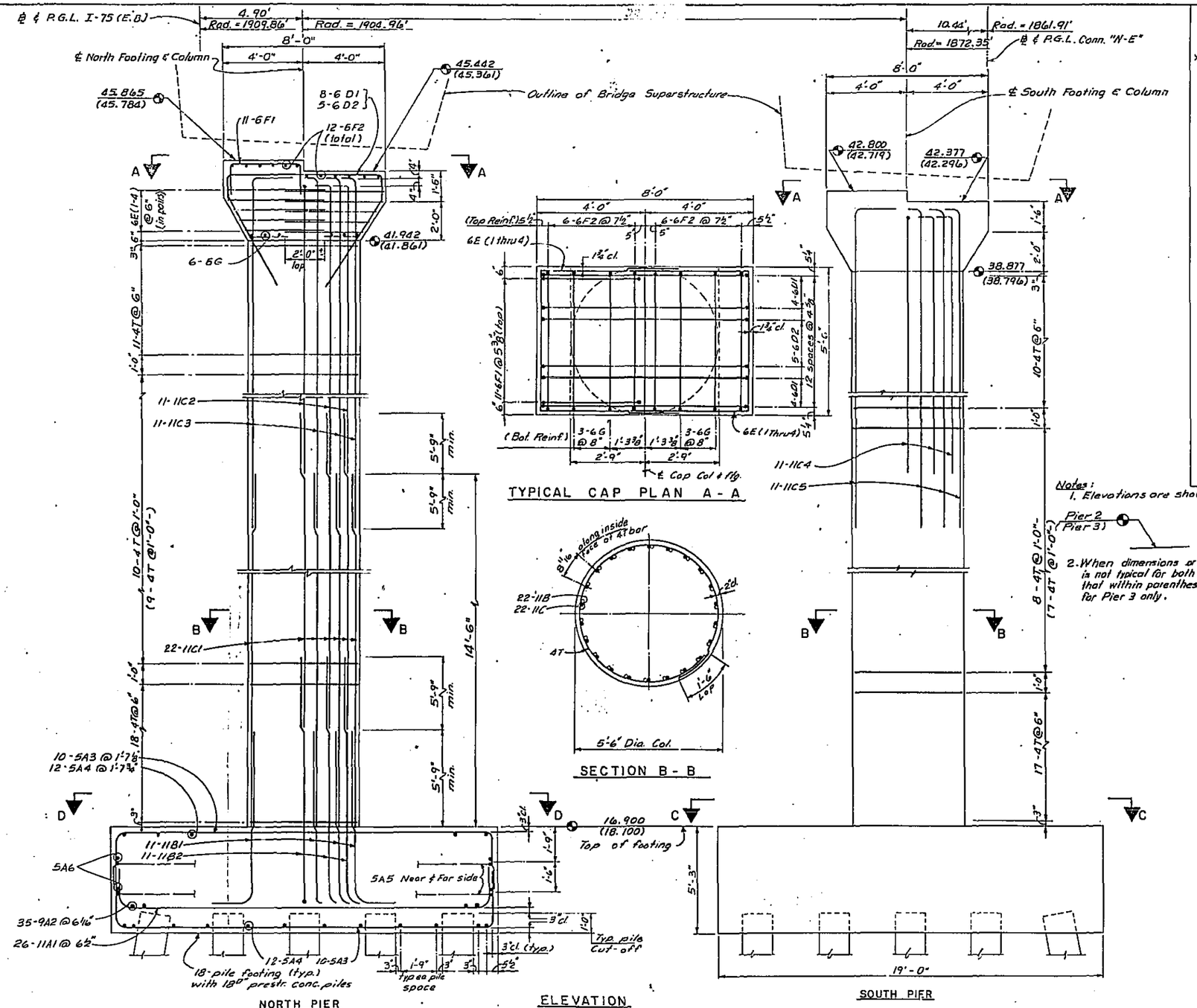
REVISIONS	
Dates	Descriptions

Designed by	P.L.	12-81
Checked by	J.B.L.	12-81
Quantities by	M P L	12-81
Checked by	J B.L.	12-81
Supervised by	K.S.	

POST, BUCKLEY, SCHUH & JERNIGAN, INC.
ENGINEERS, ARCHITECTS AND PLANNERS

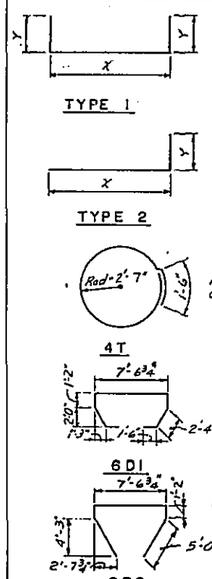
Drawing No. 305 of 407
Index No. 13454

FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.			D-206



Notes:
1. Elevations are shown thus: Pier 2 (Pier 3)
2. When dimensions or reinf. is not typical for both Piers, that within parentheses is for Pier 3 only.

BENDING DIAGRAMS



Note: Dimensions are out to out

Bending Schedule

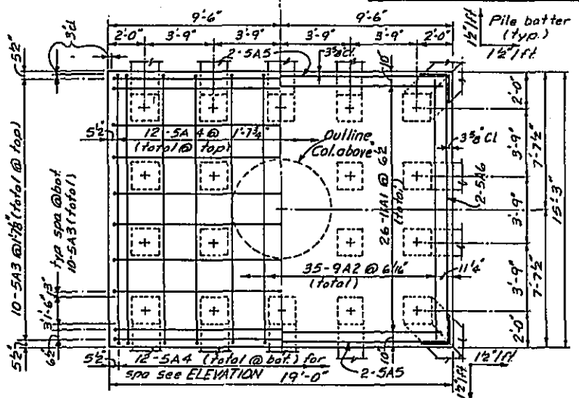
Mark Size	Mark Des.	TYPE	X	Y
11	A1	1	18'-3"	2'-0"
9	A2	1	14'-6"	1'-7"
5	A3	1	18'-6"	2'-9"
5	A4	1	14'-9"	2'-9"
5	A5	1	18'-4½"	1'-6"
5	A6	1	14'-7½"	1'-6"
11	B1	2	9'-7"	2'-0"
11	B2	2	15'-4"	2'-0"
11	C2	2	13'-5"	2'-0"
11	C3	2	19'-6"	2'-0"
11	C4	2	10'-4"	2'-0"
11	C5	2	16'-5"	2'-0"
6	E1	1	5'-2½"	3'-11"
6	E2	1	5'-2½"	4'-3"
6	E3	1	5'-2½"	4'-7"
6	E4	1	5'-2½"	4'-10"
6	F1	1	3'-7"	1'-6"
6	F2	1	5'-0"	2'-0"
6	G	1	5'-0"	2'-0"
11	C2	2	12'-2"	2'-0"
11	C3	2	18'-3"	2'-0"
11	C4	2	9'-1"	2'-0"
11	C5	2	15'-2"	2'-0"

† Quantities shown are for one Pier (N & S) only, two required.

† BILL OF REINFORCING

MARK	NO.	LENGTH	BENT	STR.
11A1	52	22'-3"	•	
9A2	70	17'-8"	•	
5A3	20	24'-0"	•	
5A4	24	20'-3"	•	
5A5	8	21'-5"	•	
5A6	8	17'-8"	•	
11B1	22	11'-7"	•	
11B2	22	17'-4"	•	
11C1	44	14'-6"		•
11C2	11	✳	•	
11C3	11	✳	•	
11C4	11	✳	•	
11C5	11	✳	•	
4T	✳	17'-9"	•	
6D1	16	17'-7"	•	
6D2	10	19'-11"	•	
6E1	4	13'-1"	•	
6E2	4	13'-9"	•	
6E3	4	14'-5"	•	
6E4	8	14'-11"	•	
6F1	22	6'-7"	•	
6F2	24	9'-0"	•	
6G	12	9'-0"	•	

✳ 9	Length				No.
	11C2	11C3	11C4	11C5	4T
2	13'-5"	21'-6"	12'-4"	18'-5"	74
3	14'-2"	20'-3"	11'-1"	17'-2"	72



PLAN C-C as shown
PLAN D-D opp. hand

ALTERNATE B
PIERS 2 (N & S) & 3 (N & S)

[redacted]

✳✳ See Summary of Bridge Pay Items.

ESTIMATED QUANTITIES

ITEM	UNIT	PIER 2	PIER 3
Class II Conc. (Substructure), 3400 PSI (Pile cap)	CY	109.7	109.7
Class III Conc. (Substructure), 5000 PSI (Pier Shaft)	CY	52.5	50.2
Reinf Steel (Substruct)	LB	25140	24824
Prest Conc. Piling (18"SQ)	LF	✳✳	✳✳

POST, BUCKLEY, SCHUH & JERNIGAN, INC.
ENGINEERS, ARCHITECTS AND PLANNERS

REVISIONS	
Dates	Descriptions

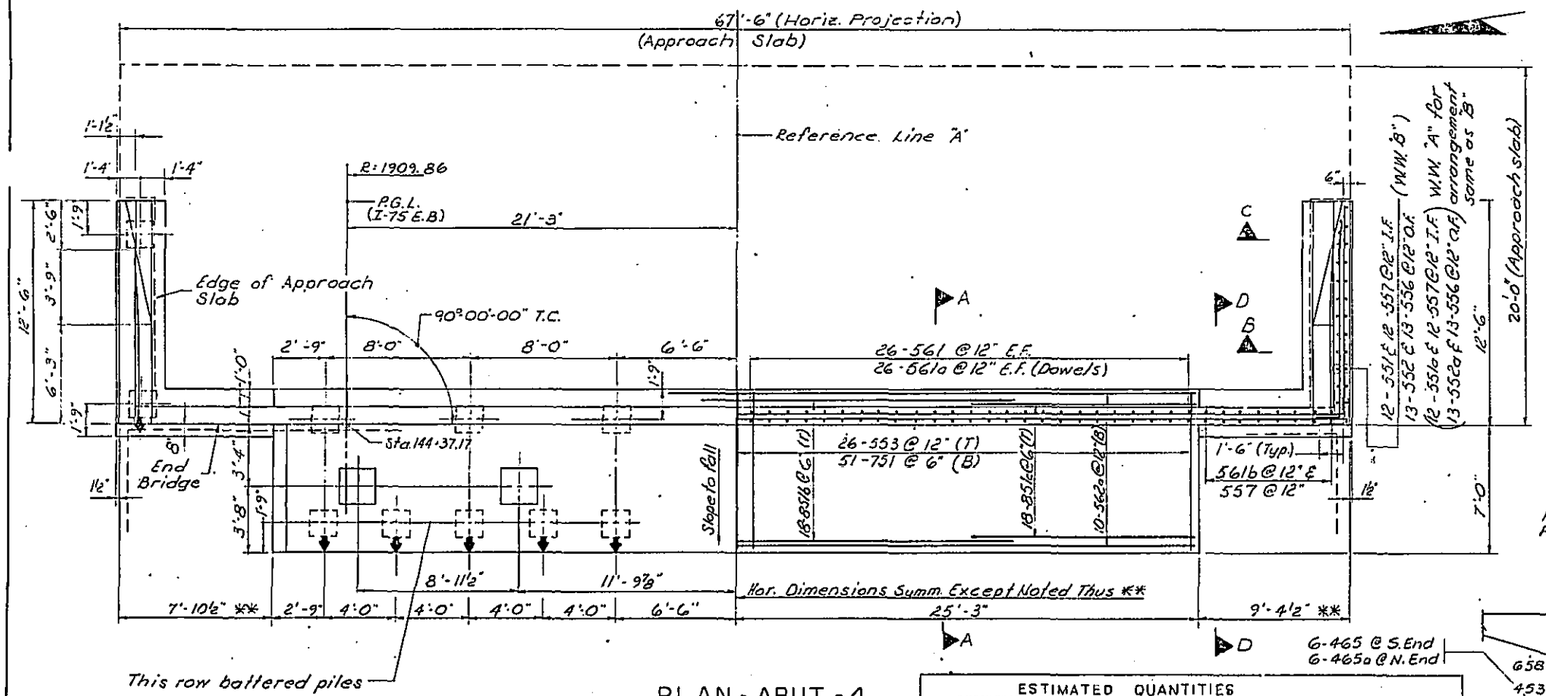
	Names	Dates
Designed by	J.E.G./A.B.	12 - 81
Checked by	M.R.T./J.E.G.	12 - 81
Quantities by	J.E.G./A.B.	12 - 81
Checked by	F.C.	12 - 81
Supervised by	K.S.	

APPROVED BY: David O. Kasten

Drawing No. 304 of 407

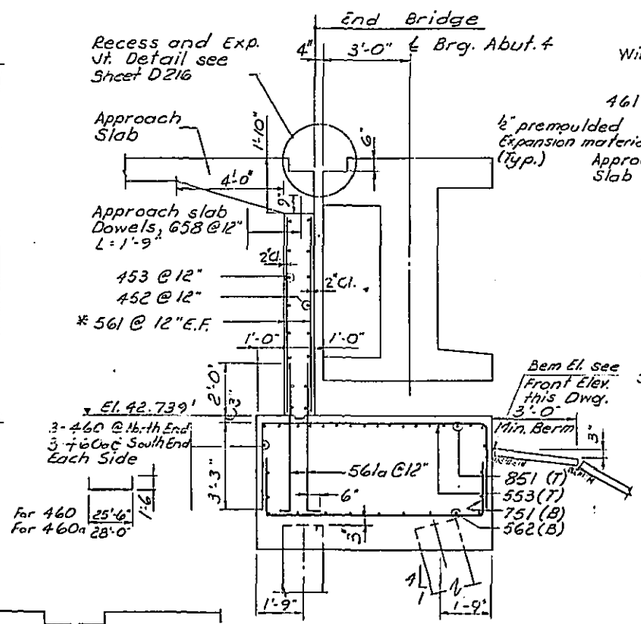
Index No. 13454

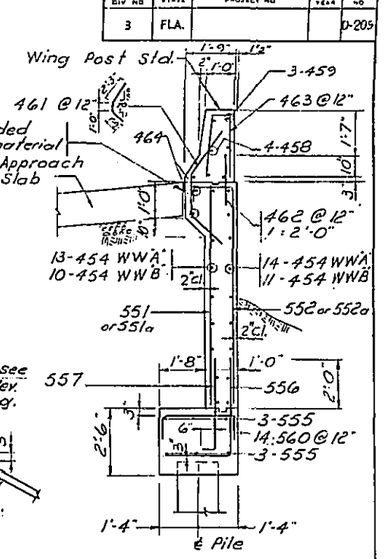
FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.			D-205



PLAN - ABUT - 4

* Bar height taken at Reference Line A and just for purpose of quantities only.

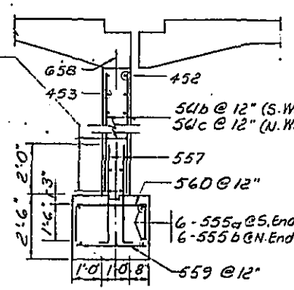




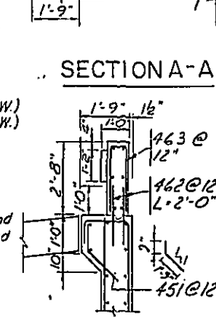
SECTION B-B

ESTIMATED QUANTITIES				
ITEM		UNIT	QUANTITY Abutment 1	QUANTITY Abutment 4
Class II Concrete (Substruct.)	Pile Caps	Cu.Yd	104.4	104.4
	Walls		32.7	32.7
	Wing Posts		2.8	2.8
			139.9	139.9
Reinf. Steel (Substruct.)		Lb	13,657	13,655
Prest. Concrete Piling (18" Sq)		LF	(*)	(*)

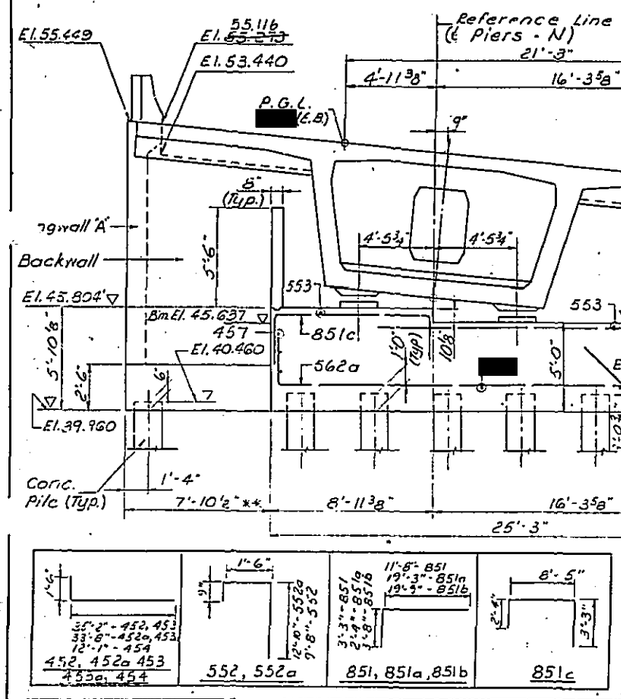
(*) See Summary of Bridge Pay Items.



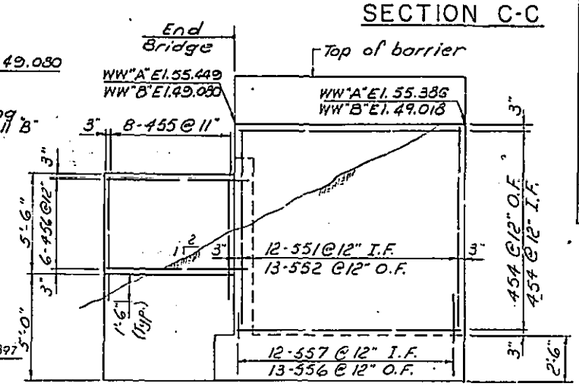
SECTION D-D



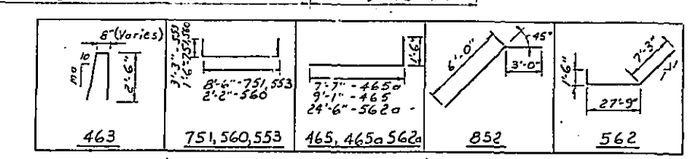
SECTION C-C



FRONT ELEVATION



SIDE ELEVATION



BILL OF REINFORCING				
MARK	NO.	LENGTH	BENT	STR.
555	12	12'-8"		•
555a	6	10'-1"		•
555b	6	8'-7"		•
556	26	6'-0"	•	
557	54	4'-3"	•	
658	67	1'-9"		•
559	15	2'-2"		•
560	43	5'-2"	•	
*561	102	7'-6"		•
561a	102	6'-2"	•	
561b	14	8'-0"		•
561c	16	7'-3"		•
562	10	36'-6"	•	
562a	10	26'-0"	•	
751	101	11'-6"	•	
851	18	14'-11"	•	
851a	18	21'-7"	•	
851b	18	23'-5"	•	
851c	18	14'-0"	•	
852	18	9'-0"	•	

BILL OF REINFORCING				
MARK	NO.	LENGTH	BENT	STR.
451	6	2'-6"	•	
452	9	36'-8"	•	
452a	9	35'-2"	•	
453	9	36'-8"	•	
453a	9	35'-2"	•	
454	48	13'-7"	•	
455	16	6'-10"		•
456	12	7'-8"		•
457	6	11'-6"	•	
458	8	12'-2"	•	
459	6	12'-2"		•
460	6	28'-6"	•	
460a	6	31'-0"	•	
461	20	5'-0"	•	
462	32	2'-0"		•
463	26	5'-8"	•	
464	4	12'-2"		•
465	6	10'-7"	•	
465a	6	9'-1"	•	
551	12	9'-8"		•
551a	12	12'-10"		•
552	13	11'-11"	•	
552a	13	15'-1"	•	
553	52	15'-0"	•	

For notes see Sht D204.

ALTERNATE B

ABUTMENT 4 DETAILS

[redacted]

REVISIONS	
Dates	Descriptions

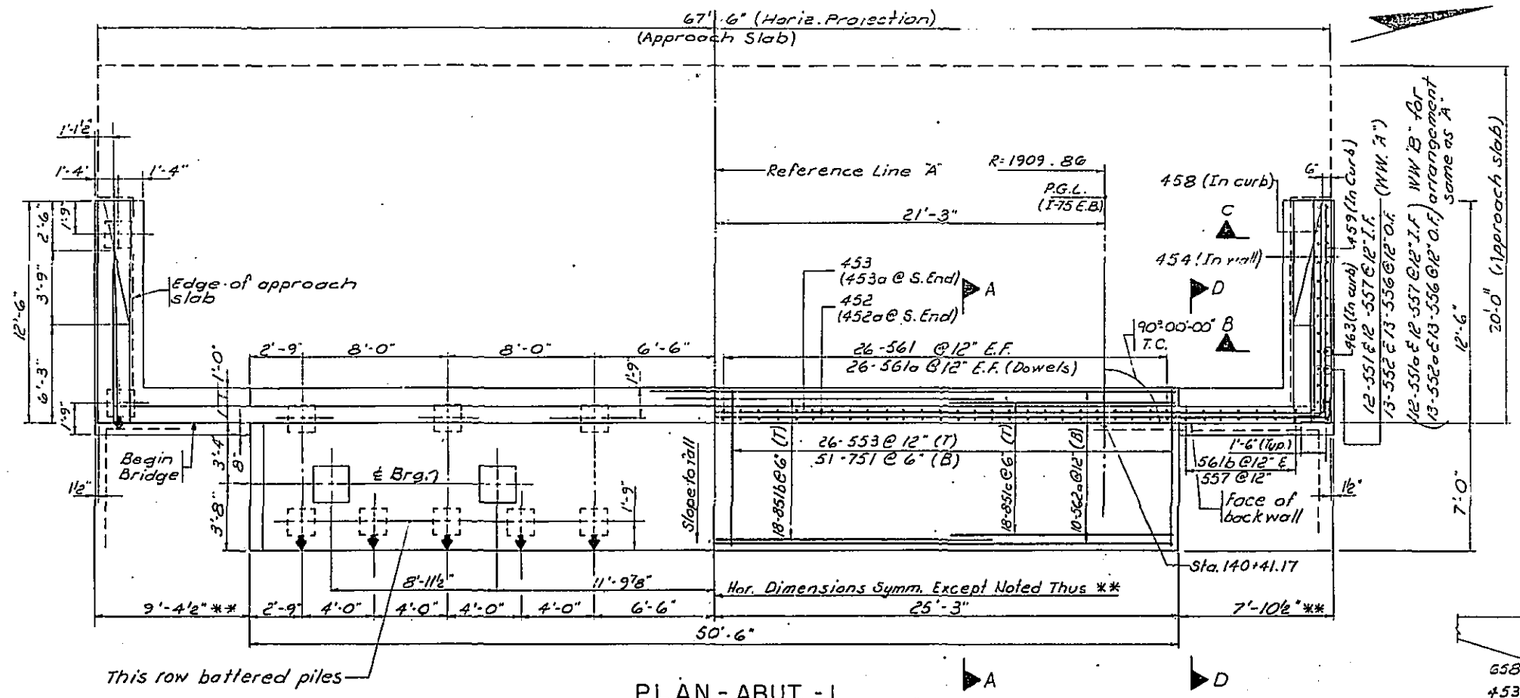
POST, BUCKLEY, SCHUH & JERNIGAN, INC.
ENGINEERS, ARCHITECTS AND PLANNERS

	Names	Dates
Designed by	E.L.P.	12-81
Checked by	M.P.L.	12-81
Quantities by	M.P.L.	12-81
Checked by	J.B.L.	12-81
Supervised by	K.S.	

APPROVED BY

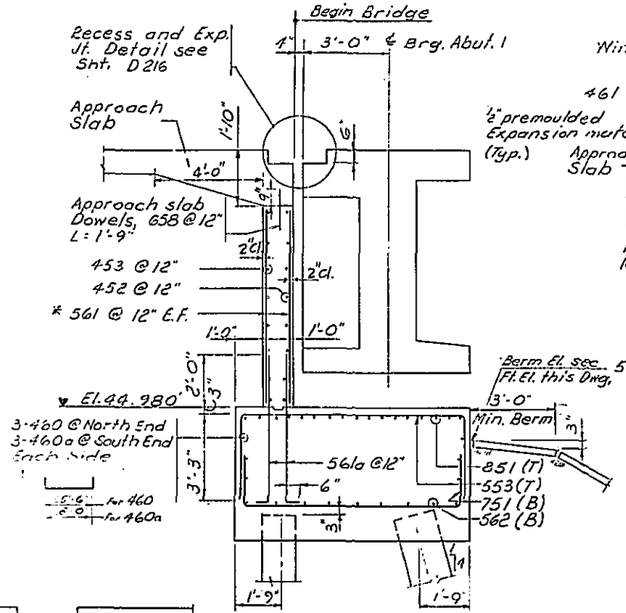
Drawing No. 303 of 407

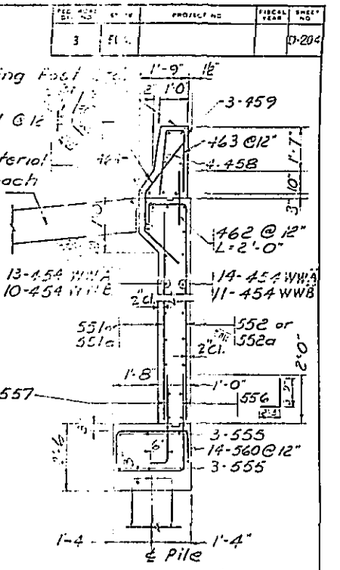
Index No. 13454



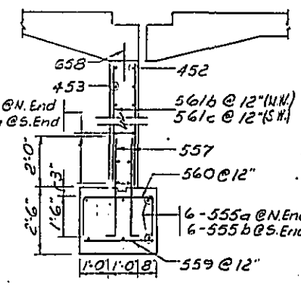
PLAN - ABUT. - 1

* Bor height taken at Reference Line "A" and just for purpose of quantities only

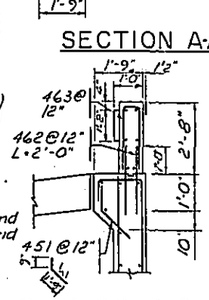




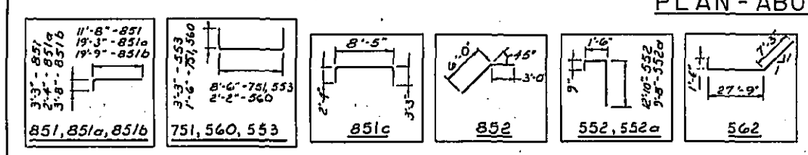
SECTION B-B

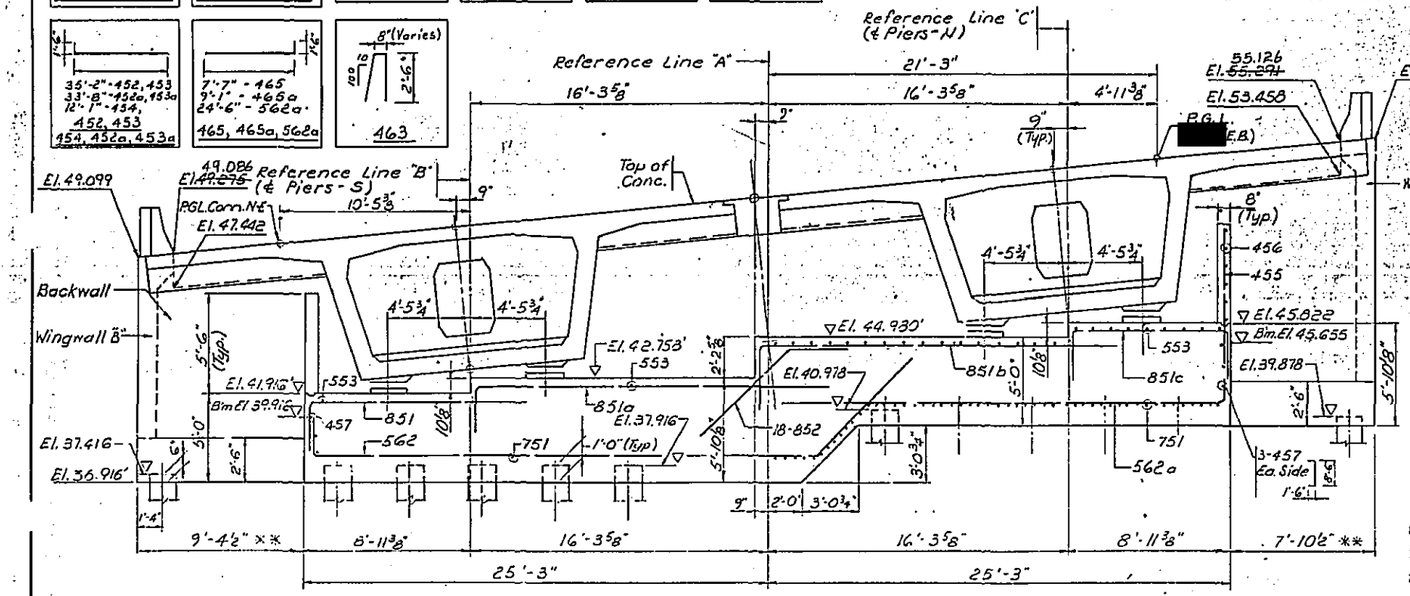


SECTION D-D

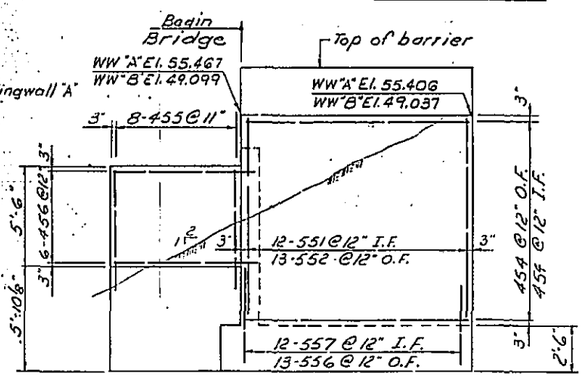


SECTION C-C





FRONT ELEVATION



SIDE ELEVATION

SECTION A-A

BILL OF REINFORCING				
MARK	NO.	LENGTH	BENT	STR
555	12	12'-8"		•
555a	6	6'-7"		
555b	6	10'-1"		
556	26	6'-0"	•	
557	54	4'-3"		
658	67	1'-9"		
559	15	2'-2"		
560	43	5'-2"	•	
* 561	102	7'-6"		
561a	102	6'-2"	•	
561b	14	7'-3"		•
561c	16	8'-0"		•
562	10	36'-6"	•	
562a	10	66'-0"	•	
751	101	11'-6"	•	
851	18	14'-11"	•	
851a	18	21'-7"	•	
851b	18	23'-5"	•	
851c	18	14'-0"	•	
852	18	9'-0"	•	

BILL OF REINFORCING			
	LENGTH	BENT	STR
		•	
		•	
		•	
		•	
		•	
		•	
	10"		•
	2'-8"		•
	11'-6"	•	
	12'-8"	•	
	13'-2"		•
4[illegible]	26'-6"	•	
464a	31'-0"	•	
464	5'-0"	•	
462	2'-0"		•
463	5'-8"	•	
464	12'-2"	•	
465	9'-1"	•	
465a	10'-7"	•	
551	12'-10"		•
551a	9'-8"		•
552	15'-1"	•	
552a	11'-11"	•	
553	15'-0"	•	

NOTE: The first digit in Mark denotes Bar Size.

NOTES:

1. For quantities see Sht. D-205.
2. For piling details see Sht. D-202
3. For approach slab details see Roadway Drawings.
4. Typical details for Wing Post, Guardrail Attachment, Date, Name, Elevation marker, Placement, etc., are shown on Std. Dwg. Concrete Handrail Barrier, Index No. 11407, Sht. ST-5.

REVISIONS	
Date	Descriptions

ALTERNATE B

POST, BUCKLEY, SCHUH & JERNIGAN, INC.
ENGINEERS, ARCHITECTS AND PLANNERS

ABUTMENT I DETAILS

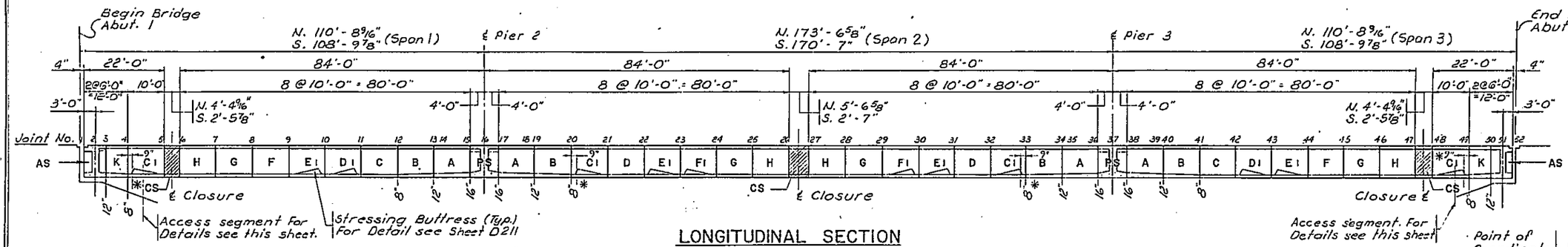
[redacted]

	Name	Date
Designed by	E.L.P.	12-'8
Checked by	M.P.L.	12-'8
Quantities by		
Checked by		
Supervised by	K.S.	

Drawing No. 302 of 407

Index No. 13454

FED. ROAD DIV. NO.	STATE	PROJECT NO.	FINCL. YEAR	SHEET NO.
3	FLA.			D-203



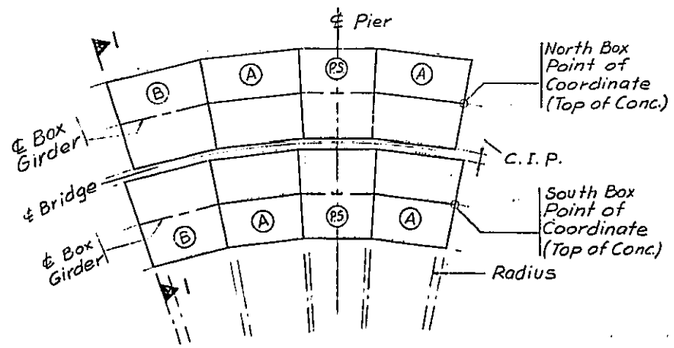
LONGITUDINAL SECTION

NORTH BOX

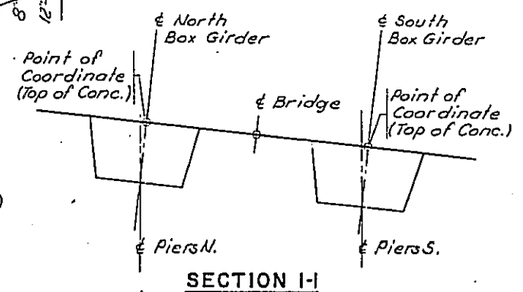
SPAN	SECTION NUMBER	COORDINATE N	COORDINATE E	ELEVATION	SUPER-ELEVATION
1	1	569840.706	721838.075	53.917	.094
	3	569841.311	721844.044	53.845	.094
	4	569841.898	721850.016	53.873	.094
	5	569842.834	721859.972	53.917	.094
	6	569843.827	721869.329	53.935	.094
	7	569844.888	721874.292	53.975	.094
	8	569844.697	721884.259	54.013	.094
	9	569845.653	721894.231	54.048	.094
	10	569846.357	721904.206	54.081	.094
	11	569847.008	721914.184	54.111	.094
	12	569847.607	721924.167	54.139	.094
	13	569846.154	721934.152	54.165	.094
	15	569848.648	721944.139	54.188	.094
2	17	569849.005	721952.131	54.204	.094
	19	569849.485	721962.123	54.223	.094
	20	569849.752	721972.117	54.239	.094
	21	569850.047	721982.113	54.253	.094
	22	569850.289	721992.110	54.264	.094
	23	569850.479	722002.109	54.273	.094
	24	569850.616	722012.107	54.279	.094
	25	569850.701	722022.107	54.283	.094
	26	569850.733	722032.107	54.284	.094
	27	569850.728	722037.659	54.284	.094
	28	569850.679	722047.659	54.282	.094
	29	569850.577	722057.658	54.277	.094
	30	569850.422	722067.657	54.270	.094
	31	569850.215	722077.655	54.260	.094
	32	569849.956	722087.651	54.248	.094
	33	569849.644	722097.647	54.233	.094
	34	569849.279	722107.640	54.216	.094
	36	569848.862	722117.631	54.196	.094
3	38	569848.491	722125.623	54.179	.094
	40	569847.979	722135.609	54.155	.094
	41	569847.415	722145.594	54.128	.094
	42	569846.799	722155.575	54.100	.094
	43	569846.130	722165.552	54.068	.094
	44	569845.409	722175.526	54.034	.094
	45	569844.636	722185.496	53.998	.094
	46	569843.810	722195.462	53.959	.094
	47	569842.932	722205.423	53.918	.094
	48	569842.531	722209.780	53.900	.094
	49	569841.578	722219.734	53.855	.094
	50	569840.981	722225.765	53.827	.094
	52	569840.365	722231.673	53.798	.094

SOUTH BOX

SPAN	SECTION NUMBER	COORDINATE N	COORDINATE E	ELEVATION	SUPER-ELEVATION
1	1	569808.272	721841.417	50.752	.094
	3	569808.877	721847.386	50.791	.094
	4	569809.463	721853.358	50.809	.094
	5	569810.398	721863.314	50.853	.094
	6	569810.622	721865.793	50.864	.094
	7	569811.490	721875.755	50.905	.094
	8	569812.305	721885.722	50.944	.094
	9	569813.066	721895.693	50.980	.094
	10	569813.775	721905.668	51.014	.094
	11	569814.430	721915.647	51.045	.094
	12	569815.031	721925.628	51.073	.094
	13	569815.580	721935.613	51.099	.094
	15	569816.075	721945.601	51.123	.094
2	17	569816.432	721953.593	51.140	.094
	19	569816.831	721963.585	51.158	.094
	20	569817.176	721973.579	51.175	.094
	21	569817.468	721983.575	51.189	.094
	22	569817.707	721993.572	51.200	.094
	23	569817.892	722003.570	51.209	.094
	24	569818.024	722013.569	51.215	.094
	25	569818.102	722023.569	51.218	.094
	26	569818.127	722033.569	51.220	.094
	27	569818.125	722036.152	51.219	.094
	28	569818.093	722046.152	51.217	.094
	29	569817.987	722056.152	51.213	.094
	30	569817.838	722066.151	51.205	.094
	31	569817.635	722076.149	51.196	.094
	32	569817.379	722086.145	51.184	.094
	33	569817.070	722096.141	51.169	.094
	34	569816.707	722106.134	51.151	.094
	36	569816.291	722116.125	51.131	.094
3	38	569815.919	722124.117	51.114	.094
	40	569815.407	722134.103	51.089	.094
	41	569814.842	722144.087	51.062	.094
	42	569814.223	722154.068	51.033	.094
	43	569813.550	722164.046	51.001	.094
	44	569812.825	722174.019	50.966	.094
	45	569812.046	722183.989	50.929	.094
	46	569811.214	722193.954	50.889	.094
	47	569810.328	722203.915	50.847	.094
	48	569810.108	722206.394	50.836	.094
	49	569809.148	722216.349	50.791	.094
	50	569808.551	722222.319	50.762	.094
	52	569807.935	722228.287	50.733	.094

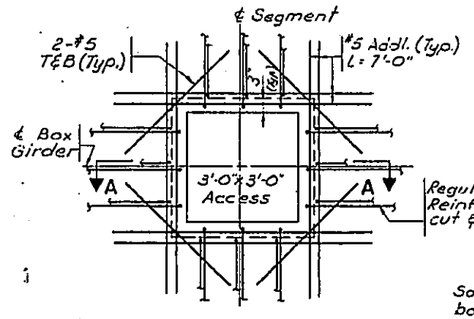


PLAN

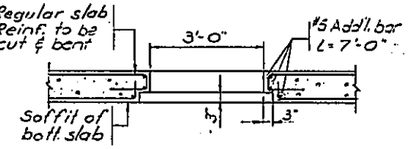


SECTION I-I
(Looking Stations Ahead)

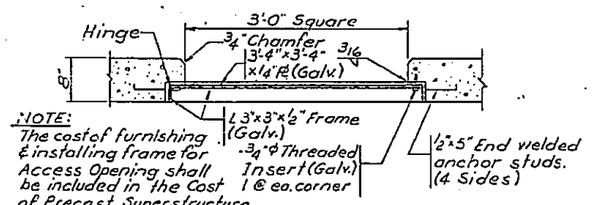
NOTES:
1. Dimensions taken along ℄ Box Girders. (arc measure)
2. For dimension of typical segment see Sht. D206 for dimension of pier segment see Sht. D209 for dimension of abutment segment see Sht. D210
3. Elevations in the table are in feet.
4. * Indicates ℄ 3" ϕ drain at bottom slab. For detail see Sht. D208



PART PLAN - BOTT. SLAB



SECTION A-A (FOR REINF.)



NOTE: The cost of furnishing & installing frame for Access Opening shall be included in the Cost of Precast Superstructure Segments.

SECTION A-A (FOR STEEL)

ACCESS OPENING DETAILS

ALTERNATE B

SEGMENT LAYOUT, BRIDGE DECK ELEVATIONS & COORDINATES

[redacted]

REVISIONS					
Dates	Descriptions				

	Names	Dates
Designed by	E.L.P.	12-81
Checked by	S.L.L.	12-81
Quantities by	—	—
Checked by	—	—
Supervised by	K.S.	

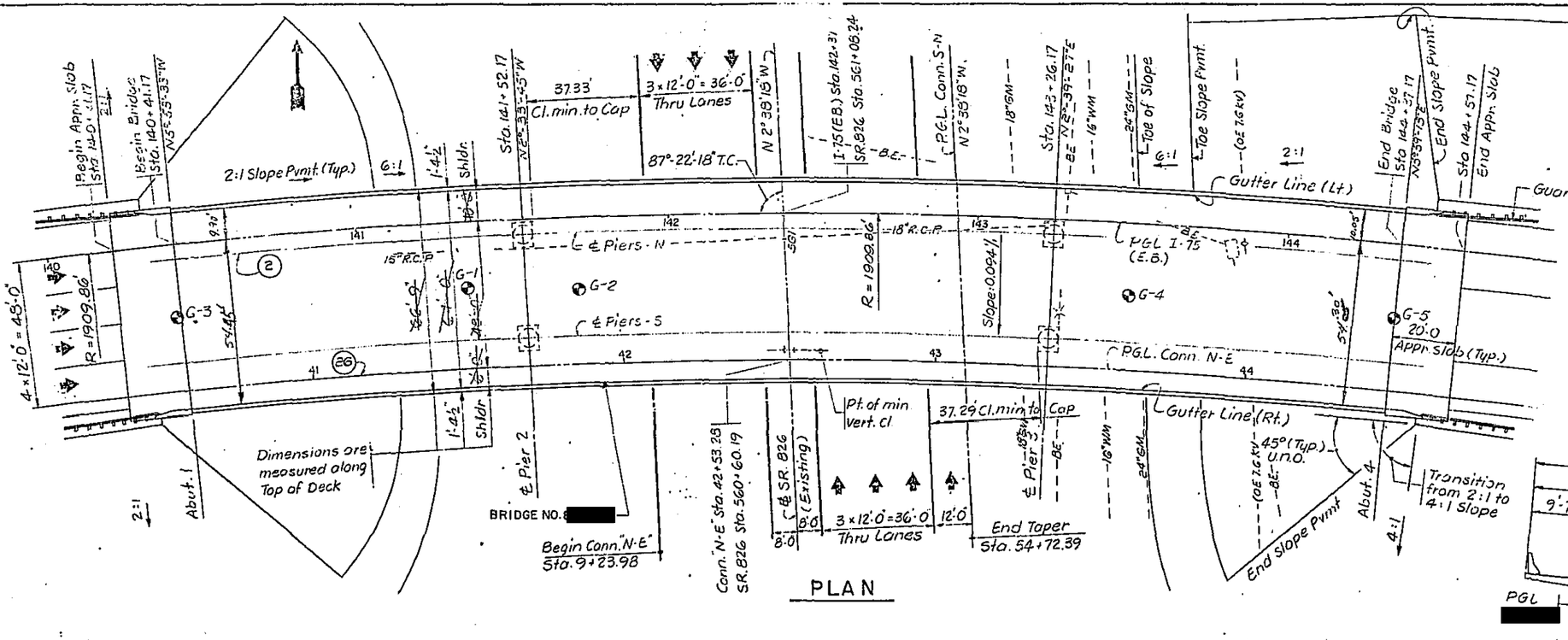
APPROVED BY

Drawing No. 301 of 407

Index No. 13454

POST, BUCKLEY, SCHUH & JERNIGAN, INC.
ENGINEERS, ARCHITECTS AND PLANNERS

FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEARS	SHEET NO.
3	FLA.			D-201



PLAN

CURVE DATA

[redacted] (E.B.) Cv. (2)

P.I	= 141+76.40
Δ	= 41°-04'-40"
D	= 3°-00'-00"
T	= 715.55'
L	= 1369.26'
R	= 1909.86'
P.C.	= 134+60.85
P.T.	= 148+30.11
e	= 0.094½

CONNECTOR N-E Cv. (26)

P.I	= 42+21.78
Δ	= 20°-06'-28"
D	= 3°-09'-38"
T	= 330.10'
L	= 653.42'
R	= 1861.86'
P.C.C.	= 38+91.68
P.C.C.	= 45+45.10
e	= 0.097½ (Matches I-75 E.B. on Bridge)

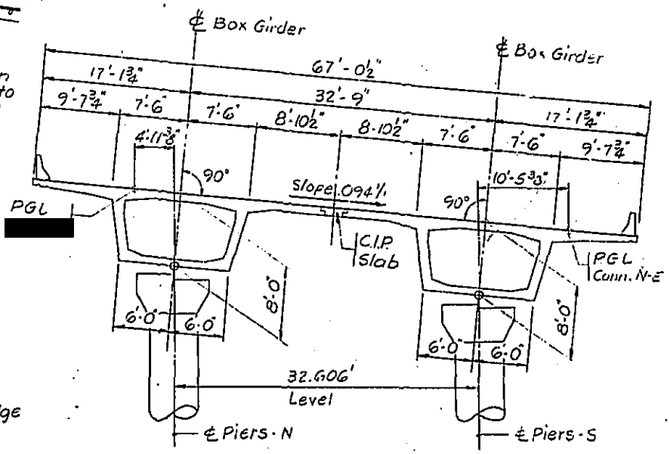
TRAFFIC DATA

[redacted] Eastbound

Est. 2000 1 way ADT = 21850
K = 10%, D = 55%, T = 4%
Design Speed = 70 m.p.h.

S. R. 826

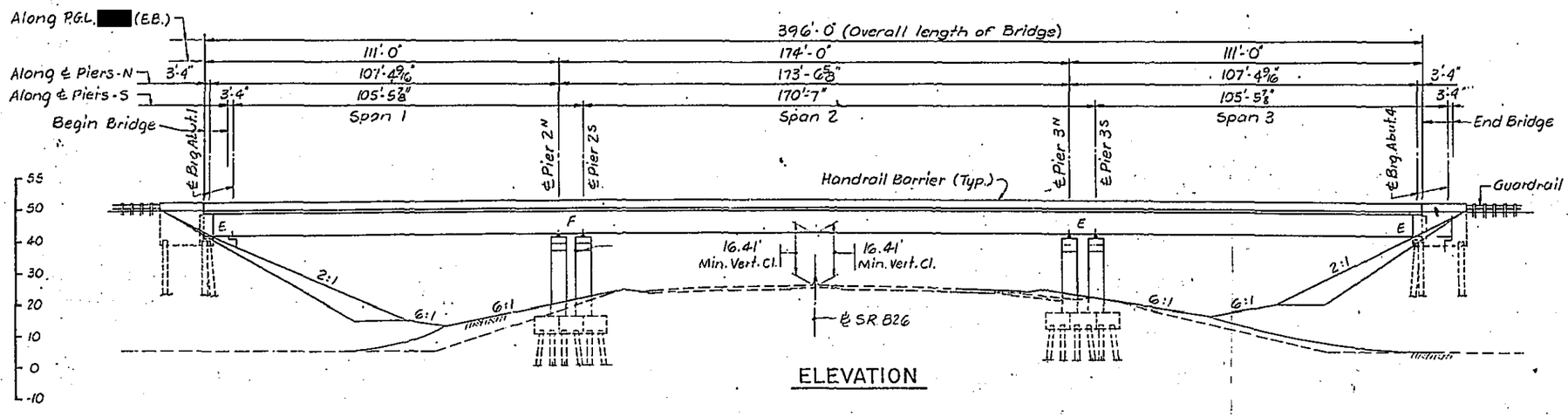
Est. 2000 2 way ADT = 55,900
K = 10%, D = 55%, T = 4%
Design Speed = 65 m.p.h.



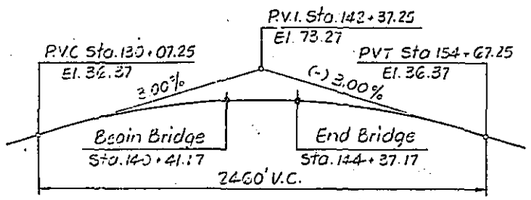
TYPICAL CROSS SECTION

(Superelevation)
Looking ahead on Stations

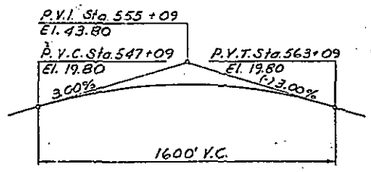
E: Indicates sliding bearing.
F: Indicates fixed bearing.
⊕ Indicates boring hole location
For Soils Data see Sht. BR-8.



ELEVATION



PROFILE ALONG P.G.L. [redacted] EAST BOUND



PROFILE ALONG P.G.L. S.R. [redacted]
(Existing Profile grade)

NOTES:

1. All existing utilities are to be relocated to clear substructures.
2. All substructure units shall be radial
3. For Slope Pavement Details, see Sht. ST-9.
4. For Location & Length of Test Piles, see Sht. D-202.
5. For Key Plan & General Notes, see Shts. ST-1 & ST-2.
6. For Index of Bridge Shts., see Sht. D-202.

POST, BUCKLEY, SCHUH & JERNIGAN, INC.
CONSULTING ENGINEERS MIAMI, FLA.

ALTERNATE B
BIN 641736

GENERAL PLAN, ELEVATION & TYP. SECTION

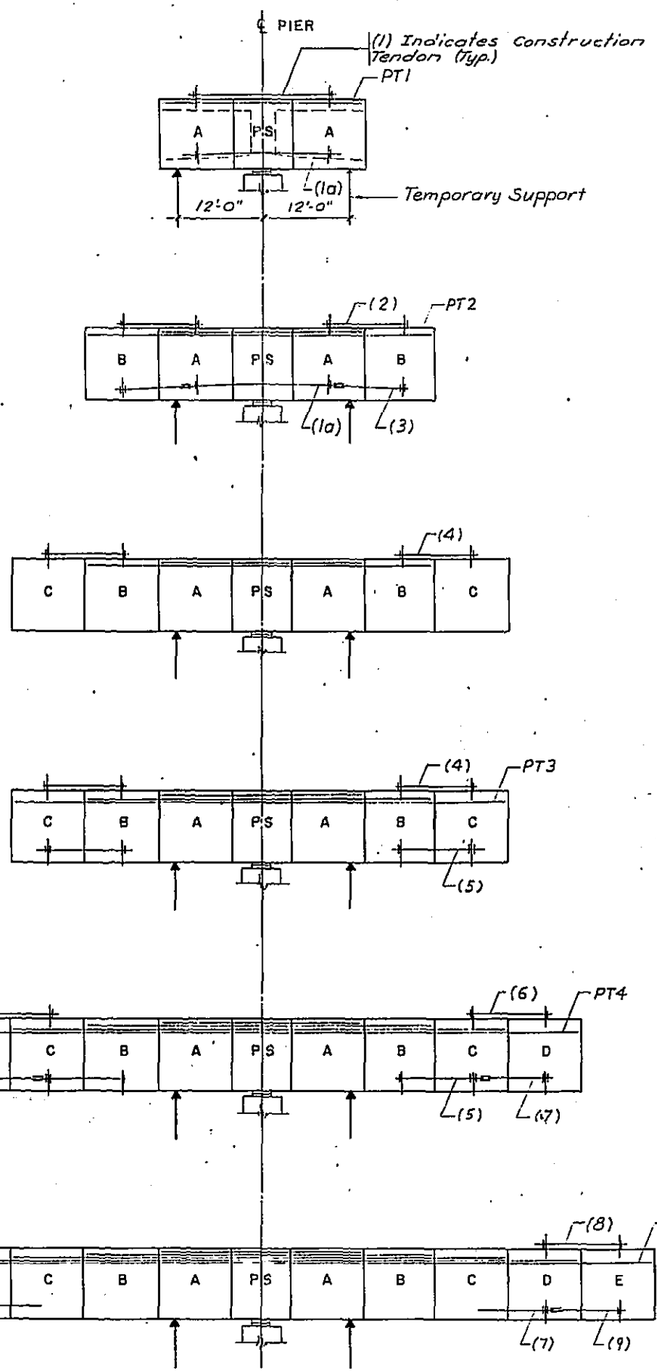
[redacted]

DRC CONSULTANTS, INC.
NEW YORK, N.Y.

REVISIONS	
Date	Description

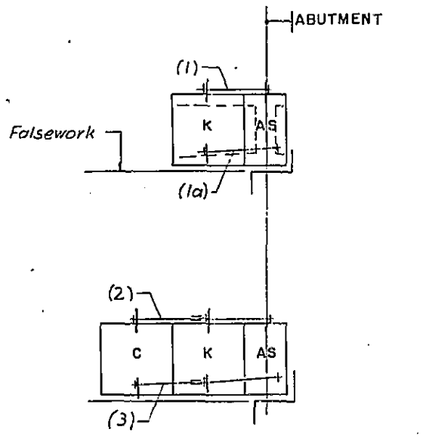
	Name	Date	APPROVED BY
Detailed by	P.L.	12-81	
Checked by	S.L.L.	12-81	
Quantities by	—	—	
Checked by	—	—	
Supervised by	K.S.		

Drawing No. 299 of 407 | Index No. 13454



SCHEMATIC ELEVATION - CANTILEVER CONSTRUCTION

N. T. S.



SCHEMATIC ELEVATION
CONSTRUCTION ON FALSEWORK

N. T. S.

PRESTRESSING PROCEDURE DURING CONSTRUCTION

A. CANTILEVER CONSTRUCTION

Stage 1 - Set up pier segment PS and Segment A. Posttension const. tendons 4 x (1) at 91k each in top deck and 2 x (1a) at 70k each in bottom slab. After stressing permanent tendon PT 1, detension 4 x (1).

Stage 2 - After hoisting segment B in place, install and stress tendons 4 x (2) at 60k each in top. Couple and stress tendon 2 x (3) at 70k each in bottom slab. Then place and stress permanent tendon PT2.

Stage 3 - Hoisting segment C in place, install and stress tendon 4 x (4) at 60k each. Detension and remove bottom tendons (3) and (1a).

Stage 4 - Install and stress tendon 2 x (5) at 60k each. Then place and stress permanent tendon PT3. Detension 4 x (4).

Stage 5 - After hoisting segment D in place, install and stress tendon 4 x (6) at 60k each. Couple and stress tendon 2 x (7) at 60k each. Install and stress permanent tendon PT4, then detension 4 x (6). Repeat stage 5 as a cycle for next segment.

Stage 6 - After all segments are in place and permanent tendon stressed, detension and remove top construction tendons only. After closure pour and permanent bottom tendons stressed, detension and then remove all bottom construction tendons. Patch all holes in top and bottom slab with normal concrete of same strength of the box.

B. CONSTRUCTION ON FALSEWORK

Stage 1 - Set up segment AS or ES and B in place. Install and stress construction tendon 4 x (1) and 2 x (1a) at 60k each.

Stage 2 - Place segment C, couple and stress tendon 4 x (2) and 2 x (3) at 60k each. Repeat stage 2 for all other segments on falsework.
After closure pour and stressing bottom tendons, detension and remove all these construction tendons. Patch all holes in top and bottom slab with normal concrete of same strength of the box.

NOTES:

1. For location of temporary prestressing block see tendon location plan, Sheet D207
2. For details of Temporary Prestressing Block see, Sheet D211
3. Joints between segments shall be sealed with epoxy for cantilever construction.

ALTERNATE B

TEMPORARY PRESTRESSING FOR ERECTION

[redacted]

REVISIONS	
Date	Description

	Name	Date
Designed by	S.H.	12-81
Checked by	J.B.L.	12-81
Quantities by	—	—
Checked by	—	—
Submitted by	K.S.	

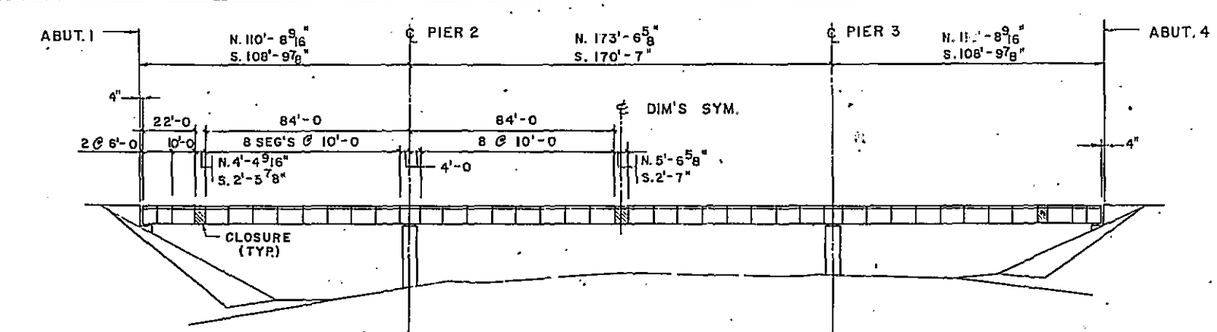
APPROVED BY

Drawing No. 316 of 407

Index No. 13454

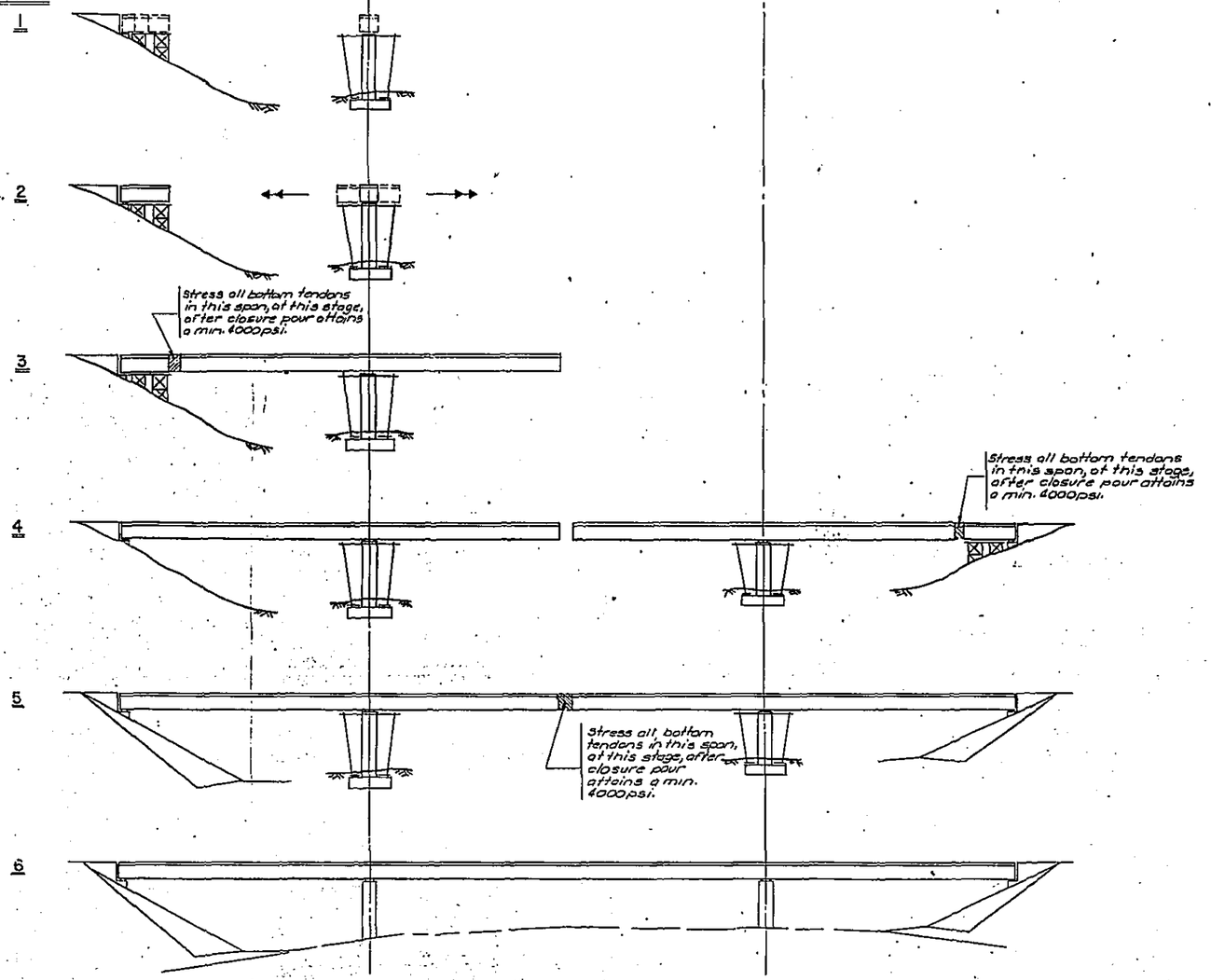
POST, BUCKLEY, SCHUH & JERNIGAN, INC.
ENGINEERS, ARCHITECTS AND PLANNERS

FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.			D-217



ELEVATION

STAGE



CONSTRUCTION SEQUENCE

1. SET UP FALSEWORK IN THE SIDE SPAN; INSTALL TEMPORARY SUPPORTS NEAR PIER 2 AND ERECT SEGMENTS.
2. STRESSING CONSTRUCTION TENDONS FOR SEGMENTS ON FALSEWORK AND CONTINUATION OF CANTILEVER CONSTRUCTION.
3. CAST IN PLACE THE CLOSURE SEGMENT AND POSTTENSIONING ALL BOTTOM TENDONS.
4. LOWERING FALSEWORK
   REPEAT STEPS 1 THRU 4 FOR OTHER SEGMENTS. NOTE THAT TEMPORARY SUPPORT NEAR PIER 2 STILL REMAINS.
5. CAST IN PLACE THE CLOSURE SEGMENT IN THE INTERIOR SPAN AND POSTTENSIONING ALL BOTTOM TENDONS.
6. LOWERING BOTH TEMPORARY SUPPORTS NEAR PIERS 2 & PIER 3.
7. REPEAT STEPS 1 THRU 6 FOR OTHER BOX. CAST IN PLACE TO CLOSE THE GAP BETWEEN TWO BOXES.

NOTES:

1. THE CONTRACTOR HAS THE OPTION TO START HIS CONSTRUCTION WORK FOR BOTH ABUTMENTS OR ABUTMENT 4, AS WELL AS BOTH BOXES CONCURRENTLY.
2. FOR CONSTRUCTION ON FALSEWORK, SEE SHEET D-218.
3. FOR CANTILEVER CONSTRUCTION. SEE SHEET D-218.
4. BEFORE CONSTRUCTION WORK BEGINS, THE CONTRACTOR SHALL SUBMIT HIS PROPOSED CONSTRUCTION METHOD AND CAMBER LINE CONTROL TO THE ENGINEER FOR APPROVAL.

ALTERNATE B

CONSTRUCTION METHOD

[redacted]

REVISIONS	
Date	Description

	Names	Dates
Designed by	S. H.	12-81
Checked by	J. B. L.	12-81
Quantities by	—	—
Checked by	—	—
Supervised by		—

APPROVED BY

[redacted]

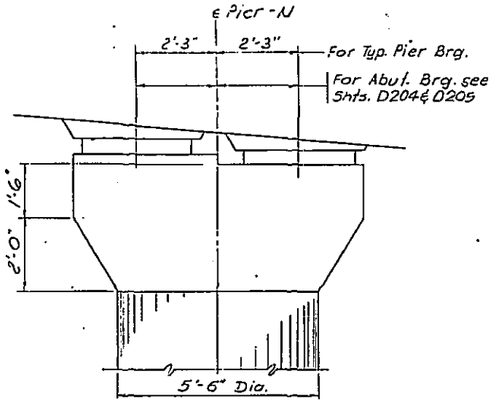
Drawing No. 315 of 407

Index No. 13454

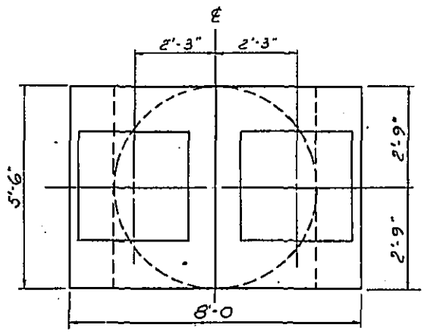
POST, BUCKLEY, SCHUH & JERNIGAN, INC.
ENGINEERS, ARCHITECTS AND PLANNERS

Revised 11-1-83

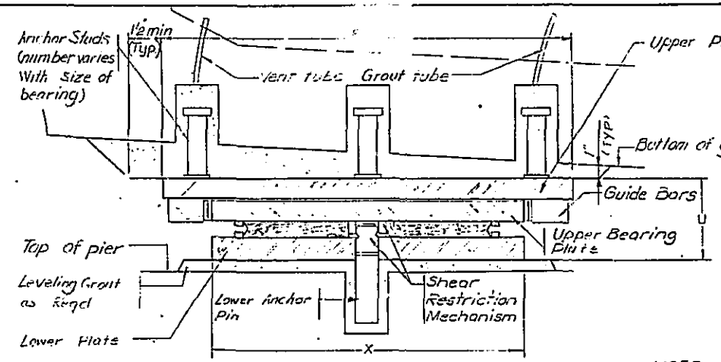
FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.			0-216



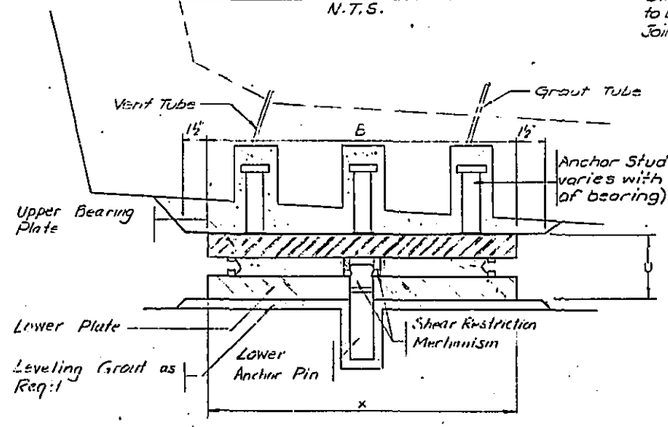
ELEVATION

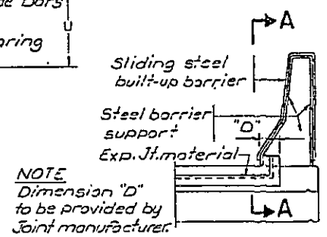


TYPICAL PIER PLAN



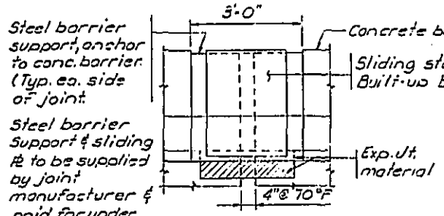
TYPICAL SLIDING BEARING
N.T.S.



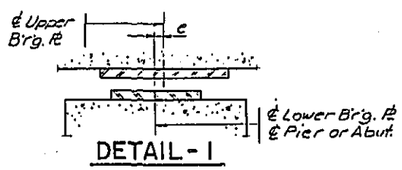


NOTE
Dimension "D" to be provided by Joint manufacturer.

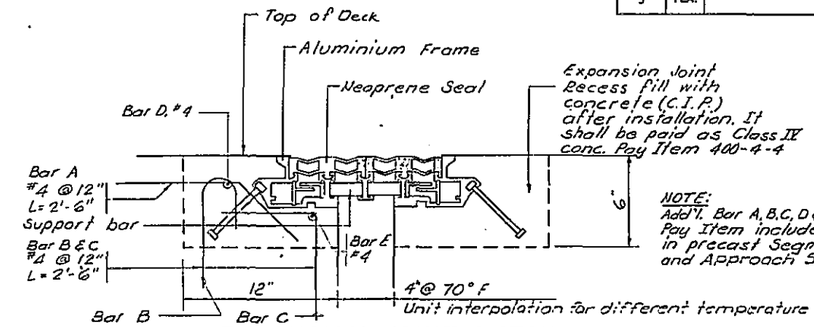
PART SECTION AT EXP. JOINT



SECTION A-A



DETAIL - 1



NOTE:
Add'l. Bar A, B, C, D & E Pay Item included in precast Segment and Approach Slabs.

EXPANSION JOINT DETAIL
N.T.S.

NOTE:
Expansion Joints shall be SL 450 at Abutments as manufactured by D.S. Brown Company, or WABO Maurer System manufactured by Watson Bowman Inc. Model No. D-Series or approved equal.

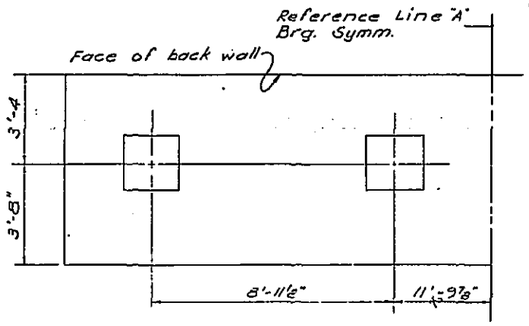
NOTE: The blockout dimensions shown for the expansion joint seal may be adjusted to accomodate the particular seal provided.

NOTES:
1. All bearings are designed for 2000 psi allowable pressure on concrete support.
2. All reactions are in kips (1000 lbs)
3. All dimensions of bearings are in inch.
4. MT indicates torsional moment (DL+LL) in ft. kip.
5. RMT indicates torsional reaction (DL+LL) in kips
6. Maximum allowable bearing stress for elastomer element = 3500 psi

ADDITIONAL NOTES ON BEARINGS:

1. All fixed bearings shall be capable of resisting a lateral force of 10% of the bearing load applied horizontally in any direction.
2. The design coefficient of friction of expansion bearings is 3% maximum.
3. The minimum lateral load capacity in the transverse direction shall be 10% of the vertical load capacity.
4. All bearings shall allow for up to 1° rotation.
5. Any adjustment in elevation necessary to accomodate the actual bearing that is supplied shall be made by changing the top of pier and abutment elevations. The profile grade of the superstructure shall remain.
6. Any change in elevation of top of piers and abutment shall not be allowed without written approval of the Engineer.

Additional cost due to any change by the Contractor shall be at his expense.



ABUTMENT PLAN
N.T.S.

TYPICAL FIXED BEARING

PIER BEARINGS

E-450 INDICATES EXP. 450 KIP MIN. CAP. EACH.
TYPE E UNIDIRECTIONAL (S)
TYPE F FIXED BEARING (F)

PIER NO.	REACTIONS D.L.	REACTIONS MAX.	TYPE 2 REQ'D.	MOVEMENT T	MOVEMENT CR+SH	MOVEMENT TOTAL	TORQUE ON PIER & ABUT. MT	TORQUE ON PIER & ABUT. RMT
Abut 1	248	354	E-225	+0.23 -0.31	0.67	1.21	42 K	± 5 K
2	1430	1754	F-1050	—	—	—	472 K	± 11.5 K
3	1430	1754	E-1050	+0.38 -0.50	1.07	1.95	472 K	± 10.5 K
Abut 4	248	354	E-225	+0.61 -0.81	1.74	3.16	42 K	± 5 K

Note: Values as shown in the table are for one box only. 2 boxes are required.

BEARING DIMENSIONS

PIER NO.	TYPE	B	Y	X	U	e
Abut 1	E-225	15.906	13.47	10.61	2.613	-0.61
2	F-1050	23.15	/	22.91	3.625	/
3	E-1050	23.70	27.45	22.91	4.228	+1.02
Abut 4	E-225	15.906	15.42	10.61	2.613	+1.98

Notes: 1. "Y" Indicates the dimension of upper Bearing Plate along the longitudinal direction of the Bridge.
2. Dimensions shown for reference only.

NOTE: Top plate is placed with an eccentricity "e" relative to ℄ of lower plate as shown in table.
(+) Indicates to the right of ℄ Lower plate.
(-) Indicates to the left of ℄ Lower plate.
The Contractor has the option to cast the top plates in the segment.

EXPANSION SEAL NOTE
The expansion seal shall be installed with the following amount of precompression:
Abut 4 = 0.30"

ALTERNATE B
BEARING & EXPANSION DETAILS

REVISIONS	
Dates	Descriptions
11-1-83 JAO	Added Note 6 & Exp Seal Note

	Names	Dates
Designed by	E.L.P.	12-81
Checked by	J.B.L.	12-81
Quantities by	—	—
Checked by	—	—
Supervised by	K.S.	

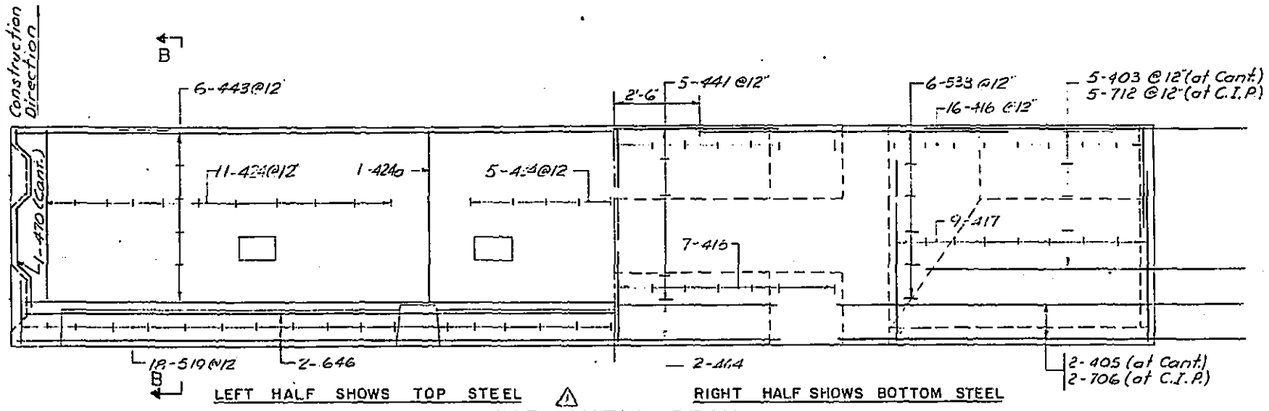
APPROVED BY

Drawing No. 314 of 407 | Index No. 13454

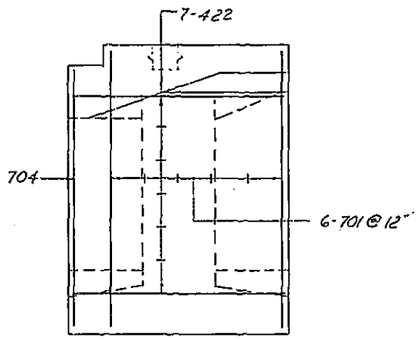
POST, BUCKLEY, SCHUH & JERNIGAN, INC.
ENGINEERS, ARCHITECTS AND PLANNERS

Revised 11-1-83

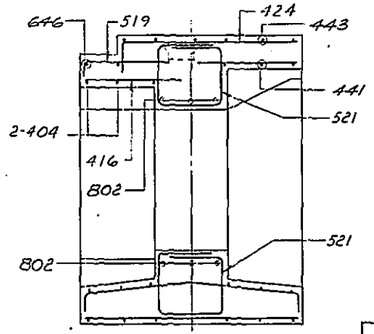
FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.			D-214



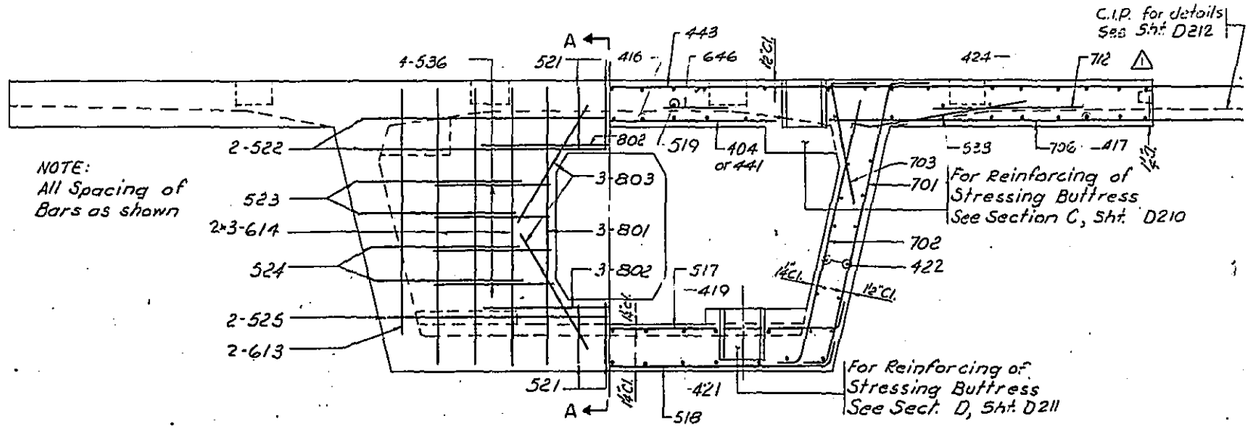
TOP VIEW DECK



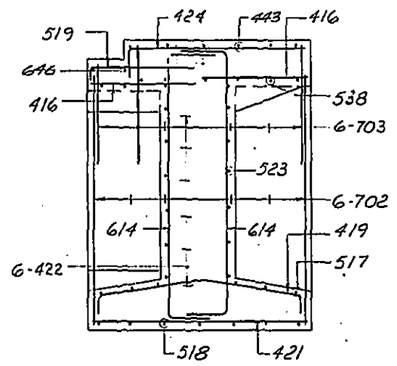
WEB ELEVATION
OUTSIDE FACE STEEL



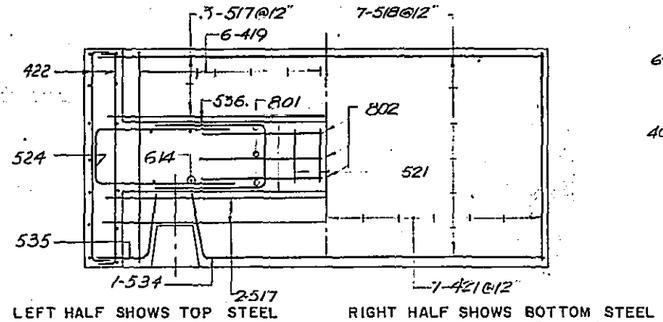
SECTION A-A



CROSS SECTION

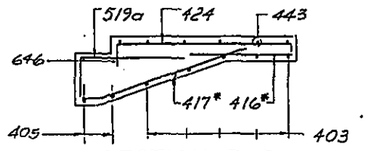


WEB ELEVATION
INSIDE FACE STEEL



LEFT HALF SHOWS TOP STEEL
RIGHT HALF SHOWS BOTTOM STEEL

TOP VIEW BOTTOM SLAB



SECTION B-B

* Field bend the cantilever edge bars to avoid transverse Tendon anchorage.

Notes:
1. For add'l bars A,B,C,D,E in Expansion Joint recess see Sht D216.
2. For notes and bending details see Sht. D215

ESTIMATED QUANTITIES (Per Seg.)		
ITEM	UNIT	QUANTITY
Class IV Concrete	Cu.yd	18.5
Reinf. Steel	LB	3,474
Pay Item		400-117-619
Nº Segments Req'd.		4

BILL OF REINFORCING

MARK	NO.	LENGHT	BENT	STR.
403	5	8'-8"		•
404	2	9'-3"		•
405	2	11'-0"		•
646	2	35'-1"		•
416	46	2'-11"		•
417	19	5'-0"	•	
419	11	7'-4"	•	
421	13	5'-10"		•
422	26	6'-8"	•	
424	30	6'-0"	•	
424a	2	5'-8"	•	
517	5	14'-3"	•	
518	7	13'-9"	•	
519	18	3'-0"	•	
521	6	7'-8"	•	
522	4	17'-0"	•	
523	4	10'-10"	•	
524	4	9'-10"	•	
525	2	15'-0"	•	
534	1	10'-2"	•	
535	2	8'-10"	•	
536	8	7'-10"	•	
538	12	11'-0"	•	
441	5	10'-6"		•
613	4	9'-3"	•	
614	12	10'-1"	•	
701	12	10'-5"	•	
702	12	8'-6"	•	
703	12	4'-11"	•	
704	2	9'-11"	•	
706	2	12'-0"		•
443	6	34'-6"		•
712	5	9'-4"		•
801	6	11'-7"	•	
802	6	7'-0"		•
803	12	4'-0"		•
519a	16	4'-6"	•	
470	1	4'-9"	•	
△ 456	8	2'-10"	•	

ALTERNATE B
REINFORCING, ABUTMENT SEGMENT

[redacted]

REVISIONS	
Dates	Descriptions
11-1-83	△ Add Transverse P/T

	Names	Dates
Designed by	E.L.P.	12-81
Checked by	M.P.L.	12-81
Quantities by	M.P.L.	12-81
Checked by	J.B.L.	12-81
Supervised by	K.S.	

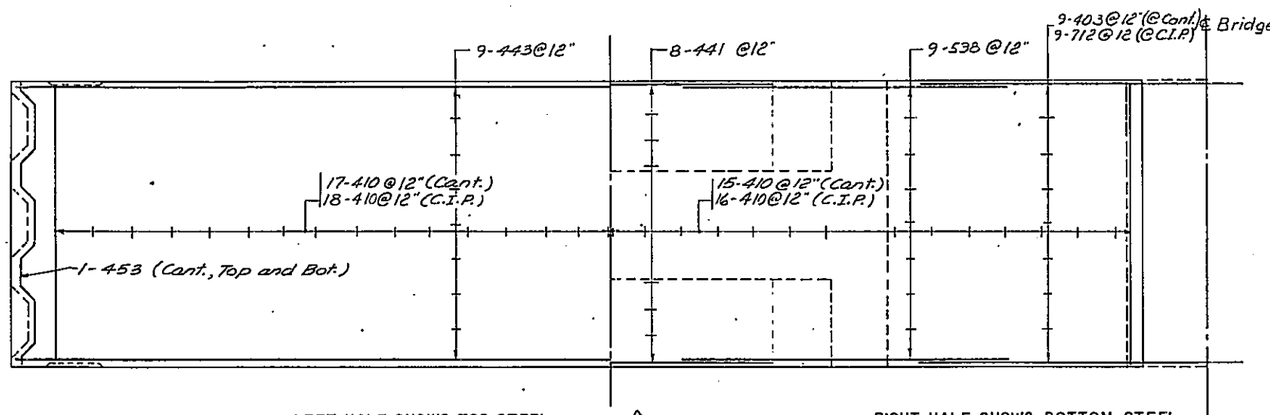
APPROVED BY

Drawing No. 312 of 407 | Index No. 13454

POST, BUCKLEY, SCHUH & JERNIGAN, INC.
ENGINEERS, ARCHITECTS AND PLANNERS

Revised 11-1-83

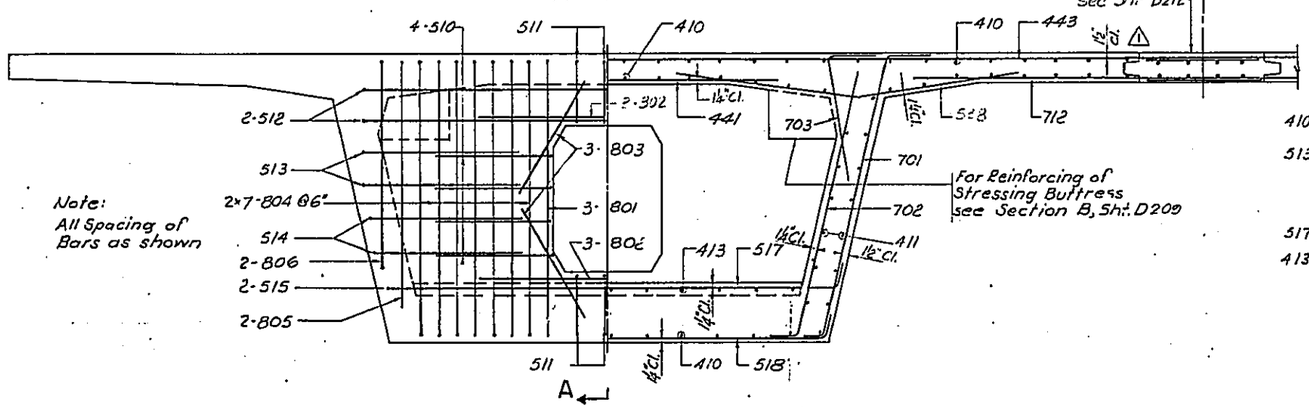
FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.			D-213



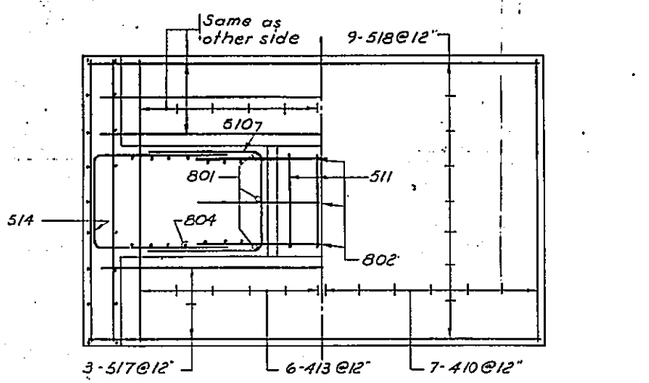
LEFT HALF SHOWS TOP STEEL

RIGHT HALF SHOWS BOTTOM STEEL

TOP VIEW DECK

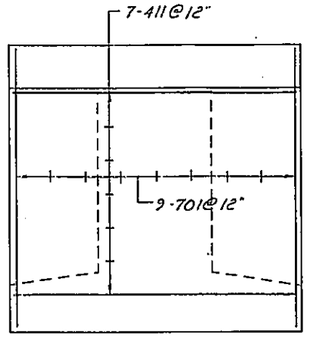


CROSS SECTION

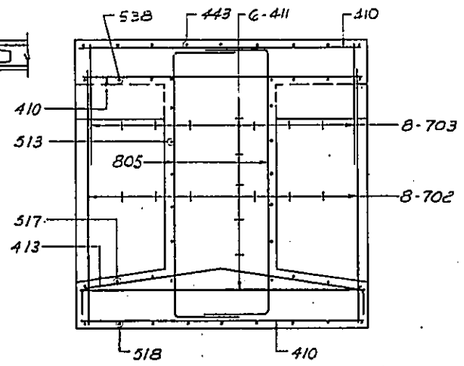


LEFT HALF SHOWS TOP STEEL RIGHT HALF SHOWS BOTTOM STEEL

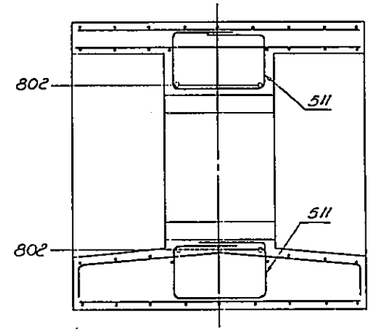
TOP VIEW BOTTOM SLAB



WEB ELEVATION
OUTSIDE FACE STEEL



WEB ELEVATION
INSIDE FACE STEEL



SECTION A-A

ESTIMATED QUANTITIES (Per Segment)		
ITEM	UNIT	QUANTITY
Class IV Concrete	Cu.Yd	24.4
Reinforcing Steel	LB	4,459
Pay Item		400-117-125
Nº Segments Req'd		4,

For notes and bending details see Sht. D215

BILL OF REINFORCING

MARK	NO.	LENGTH	BENT	STR.
403	9	8'-8"		•
410	75	7'-10"		•
411	26	8'-8"	•	
413	11	9'-4"	•	
510	6	8'-10"	•	
511	6	9'-8"	•	
512	4	17'-8"	•	
513	4	11'-10"	•	
514	4	10'-10"	•	
515	2	15'-9"	•	
517	6	14'-3"	•	
518	9	13'-9"	•	
538	16	11'-0"	•	
441	8	9'-4"		•
701	16	10'-5"	•	
702	16	8'-6"	•	
703	16	4'-11"	•	
443	9	34'-6"		•
712	9	9'-4"		•
801	6	11'-7"	•	
802	6	7'-0"		•
803	12	4'-0"		•
804	28	11'-7"	•	
805	4	10'-9"	•	
806	4	9'-9"	•	
453	2	8'-6"	•	
456	12	2'-10"	•	

ALTERNATE B

REINFORCING, PIER SEGMENT

REVISIONS	
Dates	Descriptions
11-1-83	Add Transverse P/T

	Names	Dates
Designed by	E.L.P.	12-81
Checked by	M.P.L.	12-81
Quantities by	M.P.L.	12-81
Checked by	J.B.L.	12-81
Supervised by	K.S.	

APPROVED BY

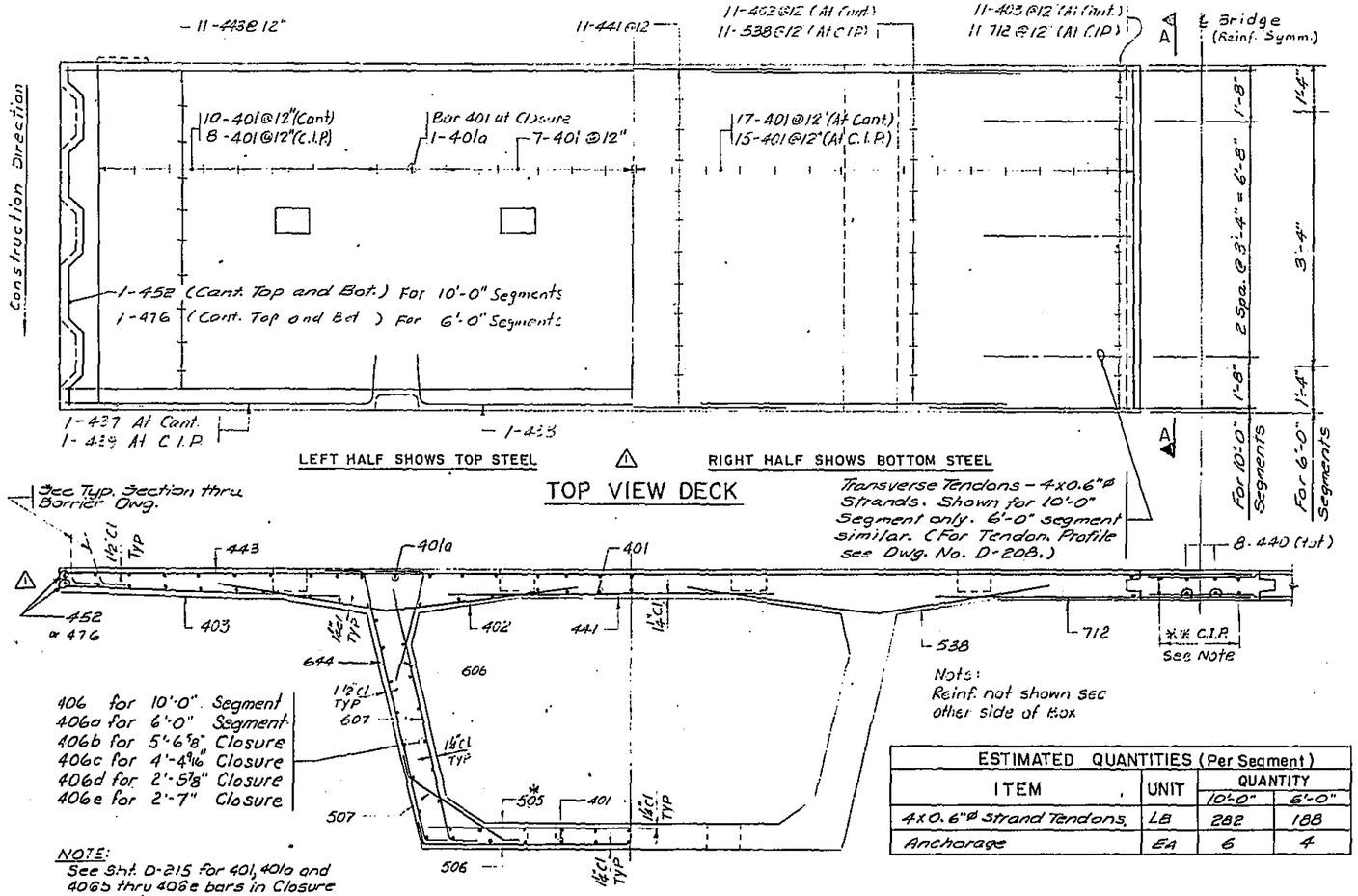
Drawing No. 311 of 407

Index No. 13454

POST, BUCKLEY, SCHUH & JERNIGAN, INC.
ENGINEERS, ARCHITECTS AND PLANNERS

Revised 11-1-83

FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.			D-212



LEFT HALF SHOWS TOP STEEL ⚠ RIGHT HALF SHOWS BOTTOM STEEL

TOP VIEW DECK

Transverse Tendons - 4x0.6"ø Strands. Shown for 10'-0" Segment only. 6'-0" segment similar. (For Tendon Profile see Dwg. No. D-208.)

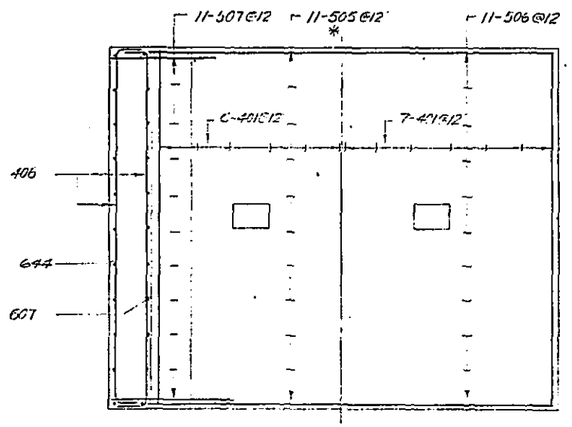
Notes:
Reinf. not shown see other side of Box

406 for 10'-0" Segment
406a for 6'-0" Segment
406b for 5'-6⅝" Closure
406c for 4'-4⅛" Closure
406d for 2'-5⅜" Closure
406e for 2'-7" Closure

NOTE:
See Sht. D-215 for 401, 401a and 406b thru 406e bars in Closure Segments.

ESTIMATED QUANTITIES (Per Segment)			
ITEM	UNIT	QUANTITY 10'-0"	QUANTITY 6'-0"
4x0.6"ø Strand Tendons.	LB	282	188
Anchorage	EA	6	4

CROSS SECTION



LEFT HALF SHOWS TOP STEEL RIGHT HALF SHOWS BOT. STEEL

TOP VIEW BOTTOM SLAB

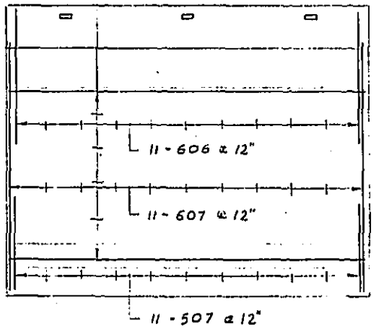
* Use 505a for Seg. A, B, K

** Note for C.I.P. Strip:
4 Longitudinal rebars 440 (T & B) x 40'-0" long each Lap length 2'-0"
Total piece of bar 440 req'd:-
8 x 11 = 88 nos.

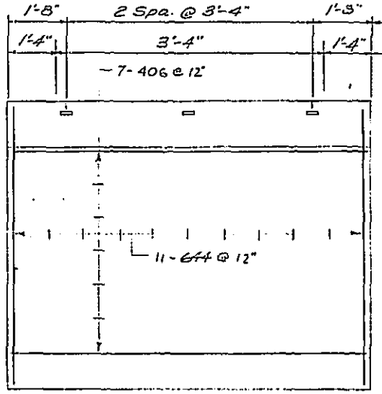
NOTE:
See Estimated Quantities, Sht. D-203. (C.I.P. Strip)

ESTIMATED QUANTITIES (Per Segment)							
ITEM	UNIT	Segment Type					
		C1, D1, E1, F1	C, D, F, G, H	A	B	K	
Class IV Concrete	CU.YD.	19.2	18.5	19.6	19.0	11.3	
⚠ Reinf. Steel	LB	3,079 3,147 (C1)	2,827 2,895 (H)	2,855	2955	1,799	
Pay Item 400-117-		3.17	3.19	3.20	3.19	3.11	
Nº Segments Req'd		2 C 4	2 E 8	6	6	4	

WEB ELEVATION
OUTSIDE FACE STEEL

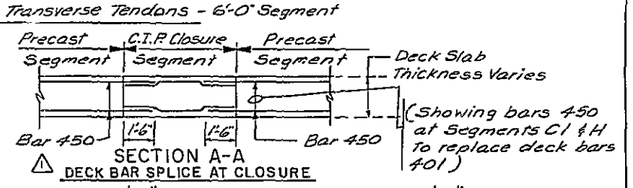


WEB ELEVATION
INSIDE FACE STEEL



Transverse Tendons - 10'-0" Segment

Transverse Tendons - 6'-0" Segment



⚠ SECTION A-A
DECK BAR SPLICE AT CLOSURE

For notes and bending details see Sht. D215

6'-0" SEGMENT

⚠ BILL OF REINFORCING

MARK	NO.	LENGTH	BENT	STR.
401	87	5'-10"		•
401a	2	5'-3"		•
402	7	10'-4"	•	
403	7	8'-8"		•
406a	26	6'-9"	•	
437	1	11'-1"	•	
438	1	15'-0"	•	
439	1	12'-1"	•	
644	14	10'-5"	•	
505a	7	13'-10"	•	
506	7	13'-9"	•	
507	14	5'-3"	•	
538	7	11'-0"	•	
606	14	4'-11"	•	
607	14	8'-6"	•	
441	7	9'-4"		•
443	7	34'-6"		•
712	7	9'-4"		•
476	2	6'-6"	•	
△ 456	8	2'-10"	•	

10'-0" SEGMENT

⚠ BILL OF REINFORCING

MARK	NO.	LENGTH	BENT	STR.
401	87	9'-10"		•
401a	2	9'-3"		•
402	11	10'-4"	•	
403	11	8'-8"		•
406	26	10'-9"	•	
437	1	11'-1"	•	
438	1	15'-0"	•	
439	1	12'-1"	•	
644	22	10'-5"	•	
505	11	11'-4"		•
505a	11	13'-10"	•	
506	11	13'-9"	•	
507	22	5'-3"	•	
538	11	11'-0"	•	
606	22	4'-11"	•	
607	22	8'-6"	•	
441	11	9'-4"		•
443	11	34'-6"		•
712	11	9'-4"		•
452	2	10'-8"	•	
450	64	11'-5"		•
△ 456	12	2'-10"	•	

⊛

SEG.	C1	D1	E1	F1	C	D	F	G	H
Nº Req'd	8	4	8	4	4	4	4	8	8

ALTERNATE B
REINFORCING, TYPICAL SEGMENT

[redacted]

REVISIONS	
Dates	Descriptions
11-1-83	⚠ Add Transverse P/T

	Names	Dates
Designed by	L K	12-81
Checked by	M P L	12-81
Quantities by	M P L	12-81
Checked by	J B L	12-81
Supervised by	K. S.	

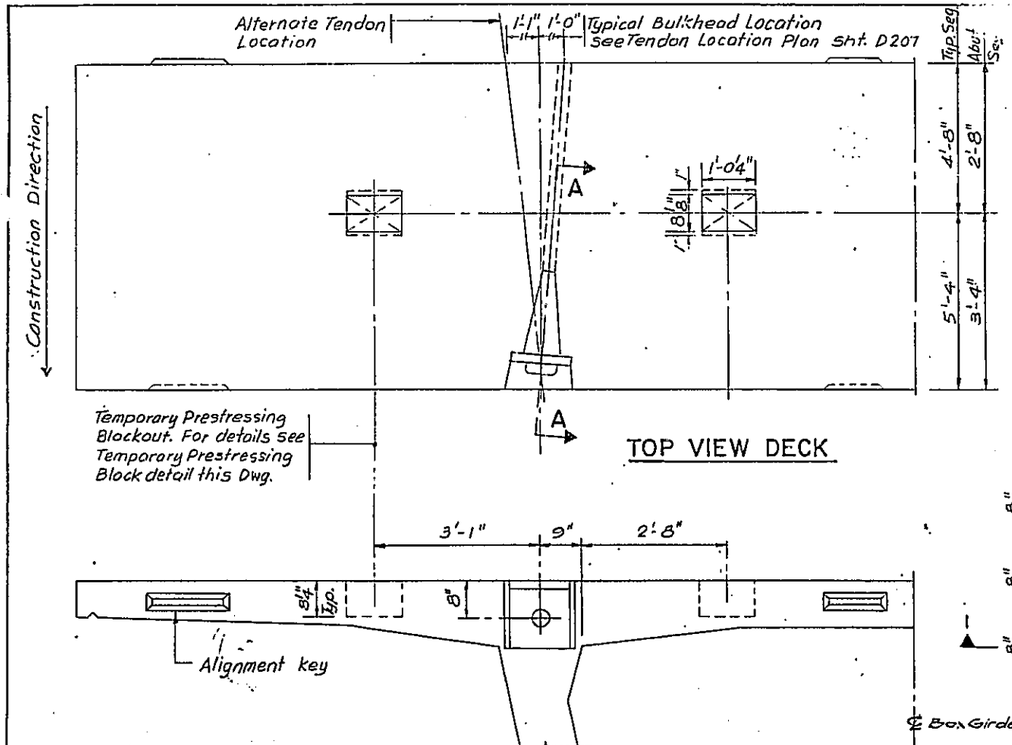
APPROVED BY

POST, BUCKLEY, SCHUH & JERNIGAN, INC.
ENGINEERS, ARCHITECTS AND PLANNERS

Drawing No. 310 of 407

Index No. 13454

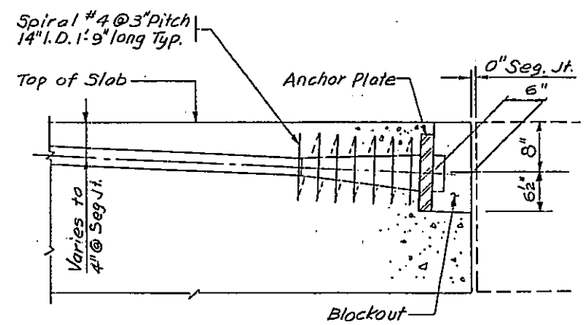
FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.			D-211



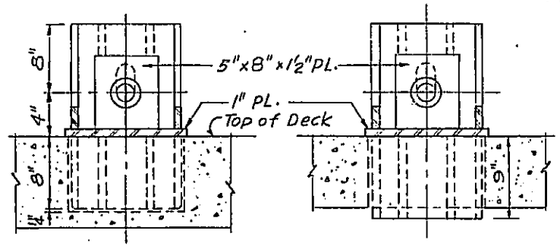
TOP VIEW DECK

CROSS SECTION

PLAN VIEW

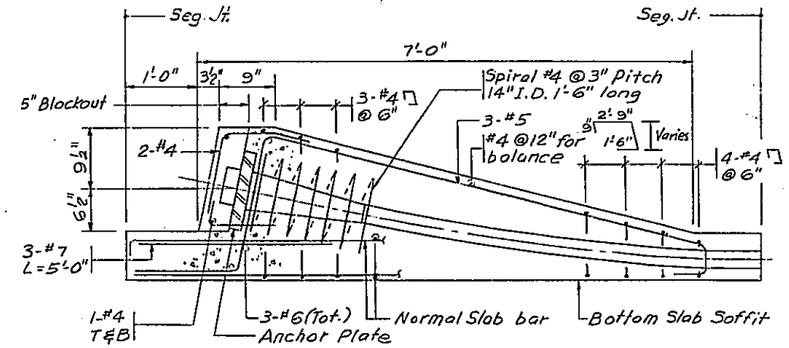


SECTION A-A
(Detail for Stressing End & Dead End)

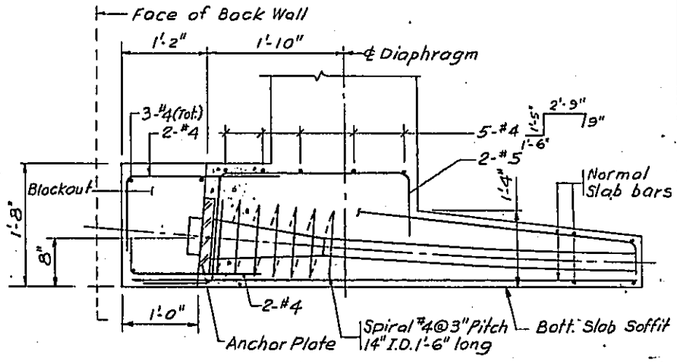


SECT. 1-1 AT TOP SLAB

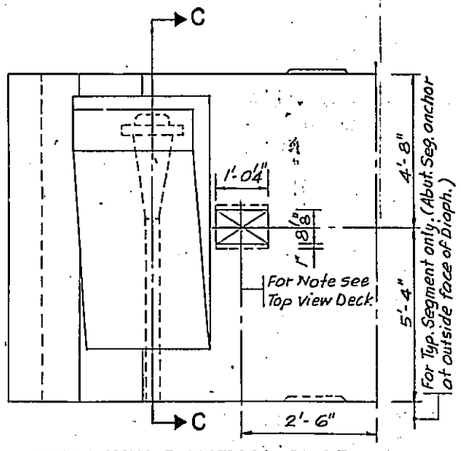
SECT. 1-1 AT BOTT. SLAB



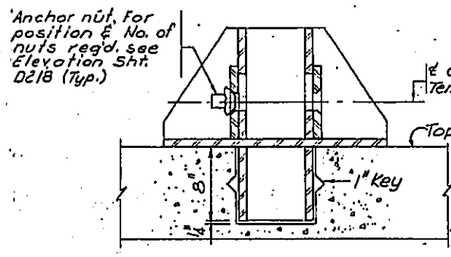
SECTION C-C
(Detail for Stressing End & Dead End)



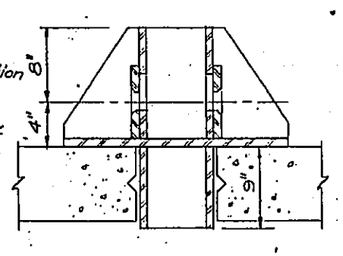
SECTION D-D/D210



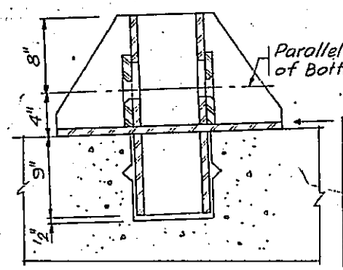
TOP VIEW BOTTOM SLAB



SECT. 2-2 AT TOP SLAB



SECT. 2-2 AT BOTT. SLAB



SECT. 2-2 AT BOTT. SLAB
(LOCATION NEAR PIER SEG.)

NOTES FOR T.P :

1. All Steel to be A36
2. All Weld shall be Full Penetration Weld.

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY (FOR INFORMATION ONLY)
Reinf. Steel	LB	①126 (Per Det. of Sect. (C-C) ②42 (Per Det. of Sect. D-D/D210)
Concrete		Incl. in Seg. Quantites

① Included in C1, D1, E1, F1 Sh D-212 (126 x 2 = 252 #)
② Included in Sh D-214 (42 x 2 = 84 #)

NOTES:

1) ALL BLOCKOUTS SHALL BE PATCHED WITH CONCRETE OF THE SAME STRENGTH AS THE BOX AFTER STRESSING OF STRAND TENDONS.
2) VENT TUBE AND GROUT TUBE OF TENDONS NOT SHOWN, CONTRACTOR SHALL CHECK AND ASSURE THAT THE DIMENSION OF THESE DETAILS FITS THE PRESTRESSING SYSTEM HE USES.
3) REINFORCING NEAR BLOCKOUT LOCATION, SEE REBAR DRAWINGS.
4) IF BAR REINFORCEMENT INTERFERES WITH PRESTRESSING TENDONS. MOVE THE BARS AS REQUIRED.
5) SIZES OF BLOCKOUT AND STRESSING BUTTRESS MAY VARY IN ACCORDANCE WITH THE PRESTRESSING SYSTEM WHICH THE CONTRACTOR CHOOSES TO USE.

ALTERNATE B

TENDON ANCHORAGE AND BLOCKOUT DETAILS

[redacted]

TEMPORARY PRESTRESSING BLOCK DETAIL

POST, BUCKLEY, SCHUH & JERNIGAN, INC.
ENGINEERS, ARCHITECTS AND PLANNERS

REVISIONS	
Dates	Descriptions

	Names	Dates
Designed by	L.K.	12-81
Checked by	J.B.L.	12-81
Quantities by	M.P.L.	12-81
Checked by	J.B.L.	12-81
Supervised by	K.S.	

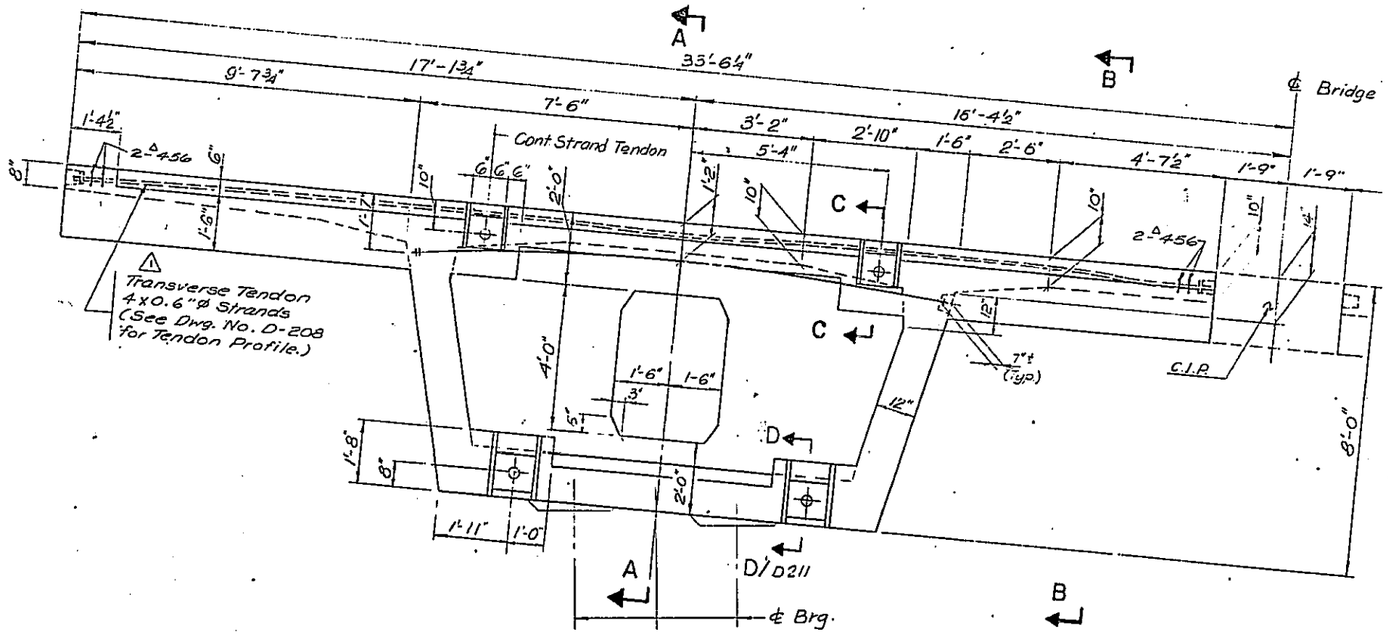
APPROVED BY

Drawing No. 309 of 407

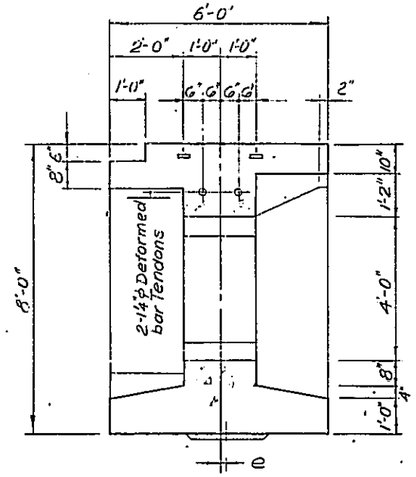
Index No. 13454

Revised 11-1-83

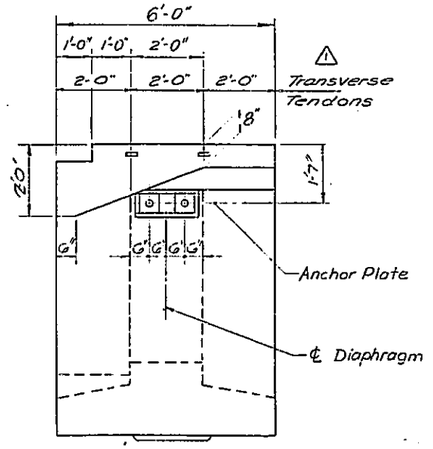
FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.			D-210



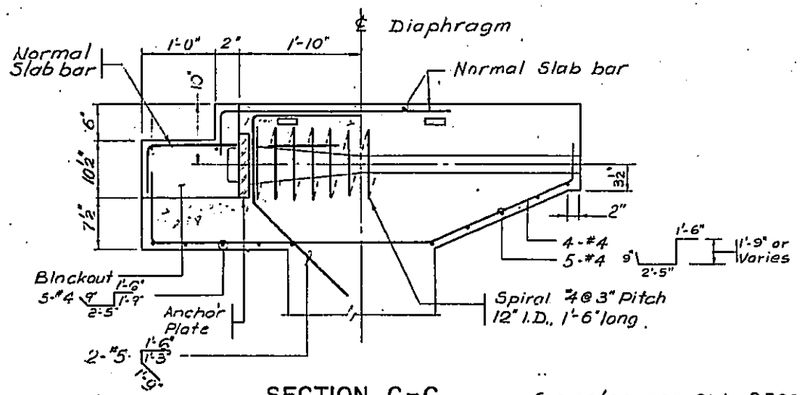
CROSS SECTION



SECTION A-A

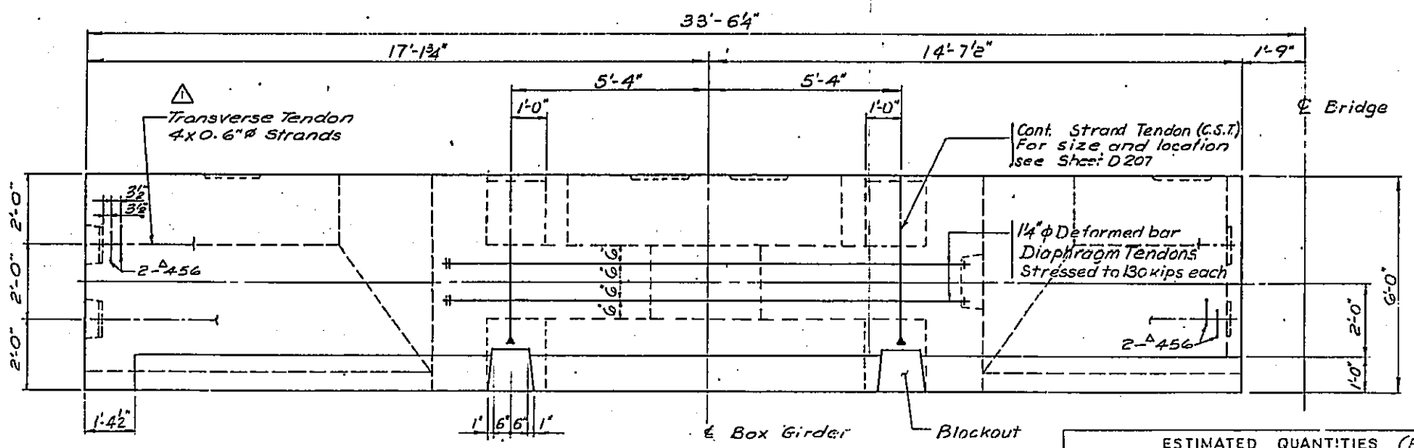


SECTION B-B



SECTION C-C

For notes see Sht. D209



PLAN

⚠

ESTIMATED QUANTITIES (Per Segment)		
ITEM	UNIT	QUANTITY
4x0.6"ϕ Strand Tendon	LB	188
Anchorage	EA	4

ESTIMATED QUANTITIES (Per Segment)		
ITEM	UNIT	QUANTITY
14"ϕ Deformed Bars	LB	273
Anchorage	EA	8
Reinf. Steel	LB	*73 (Per Det. of Sect. C-C)
Concrete		See Sheet D-214

* Included in Sh. D-212 (73 x 2 = 146 #)

ALTERNATE B

ABUTMENT SEGMENT, DIAPHRAGM & CONTINUOUS TENDONS

POST, BUCKLEY, SCHUH & JERNIGAN, INC.
ENGINEERS, ARCHITECTS AND PLANNERS

[redacted]

REVISIONS	
Date	Description
11-1-83	⚠ ADD TRANSVERSE P/T

	Names	Dates
Designed by	S.L.L./A.V.	12-81
Checked by	J.B.L.	12-81
Quantities by	M.P.L.	12-81
Checked by	J.B.L.	12-81
Supervised by	K.S.	

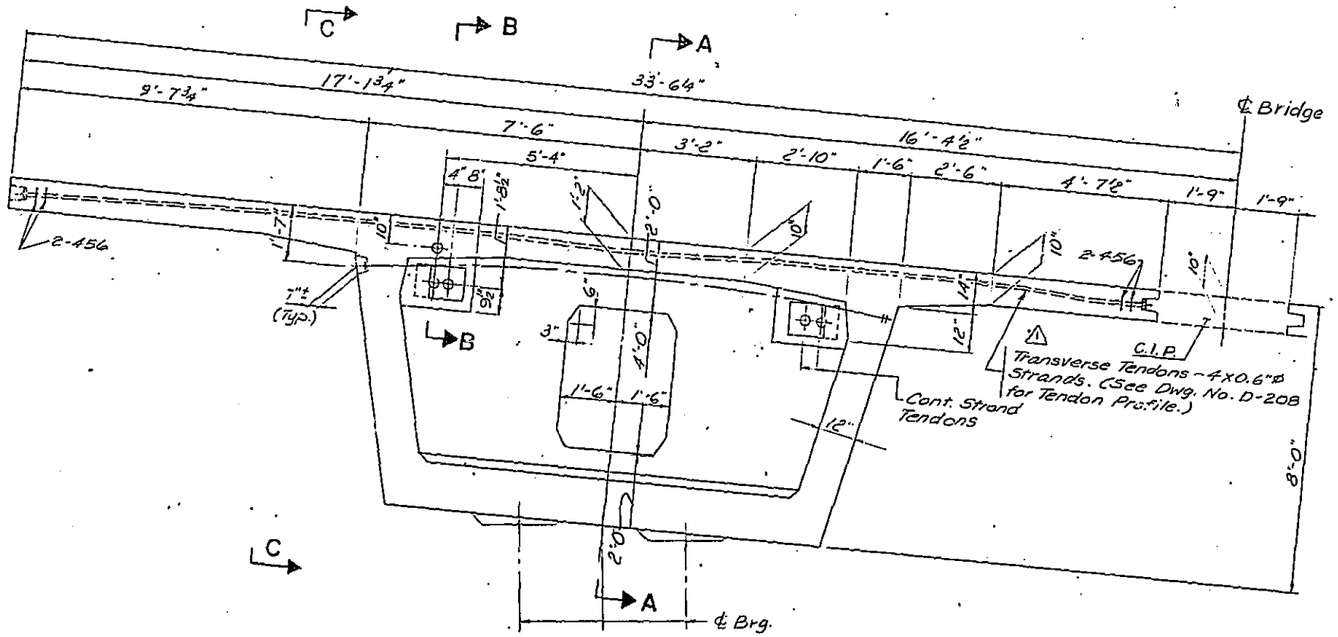
APPROVED BY

Drawing No. 308 of 407

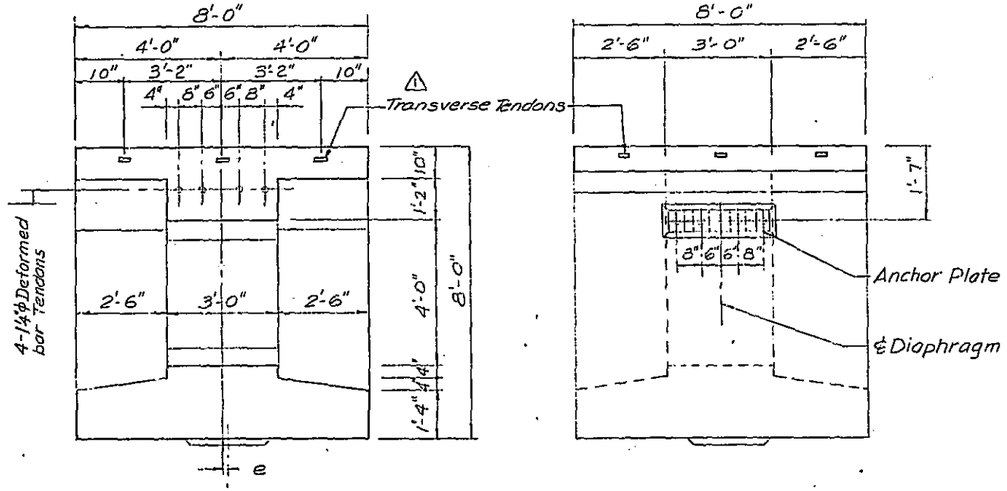
Index No. 13454

Revised 11-1-83

FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.			D-209

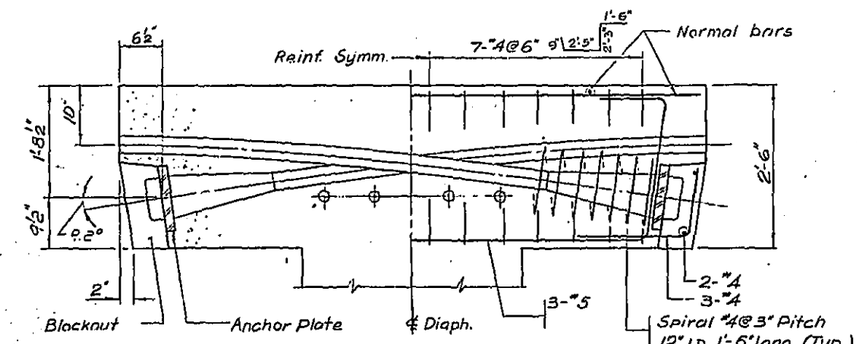


CROSS SECTION

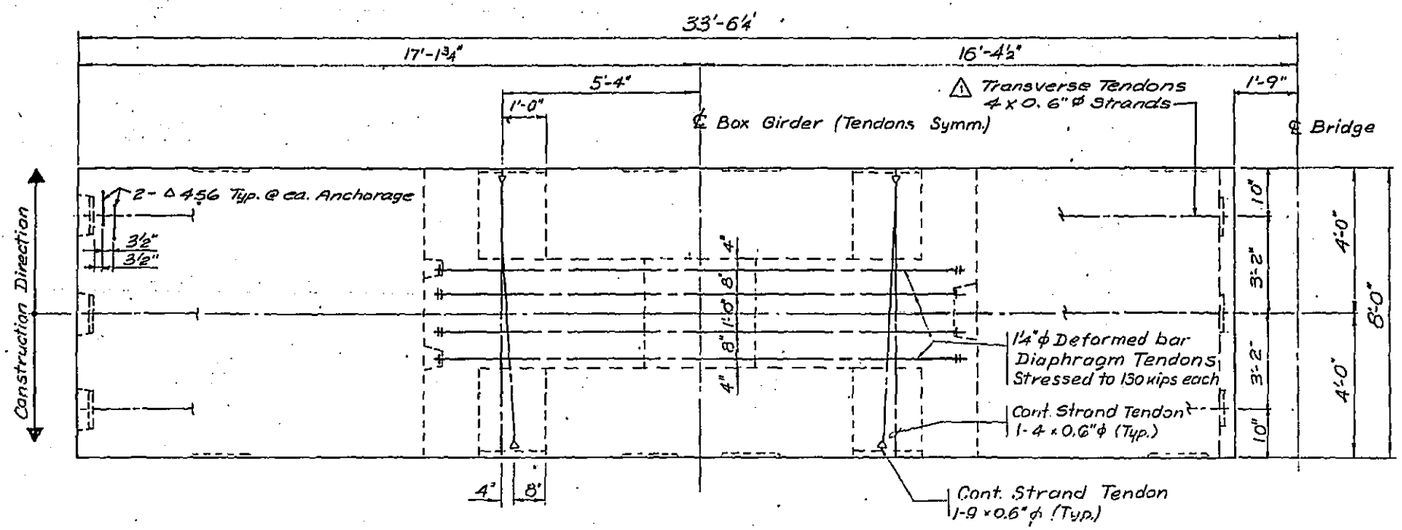


SECTION A-A

SECTION C-C



SECTION B-B



PLAN

ESTIMATED QUANTITIES (Per Segment)		
ITEM	UNIT	QUANTITY
4 x 0.6" ϕ Strand Tendon	LB	282
Anchorage	EA	6

NOTE:
Min. bending radius:
Bar Tendon 62'0"
Strand Tendon 20'0"

ESTIMATED QUANTITIES (Per Segment)		
ITEM	UNIT	QUANTITY
1¼" Deformed Bar	LB	546
Anchorage	EA	16
Reinf. Steel	LB	*121 (Per Det. of Sect. B-B)
Concrete		See Sheet D-215

* Included in Sh D-213 (121 x 2 = 242 #)

NOTES:

1. For bearing details see sheet #216.
2. All 1¾" ϕ deformed bar tendon shall be stressed to 130 kip each.
3. For legend of anchorage, see sheet #207.
4. All concrete in segments, shall be Class IV concrete, f'c = 5500 psi.
5. Min. bending radius: Bar tendon = 64'-0"
   Strand Tendon = 20'-0"

ALTERNATE B
PIER SEGMENT,
DIAPHRAGM & CONTINUOUS TENDONS

REVISIONS	
Date	Description
11-1-83	⚠ Add Transverse Pt

POST, BUCKLEY, SCHUH & JERNIGAN, INC.
ENGINEERS, ARCHITECTS AND PLANNERS

	Names	Dates
Designed by	S.L.L./A.V.	12-81
Checked by	J.B.L.	12-81
Quantities by	M.P.L.	12-81
Checked by	J.B.L.	12-81
Submitted by	K.S.	

APPROVED BY

Drawing No. 307 of 407

Index No. 13454

Appendix B

FDOT Inspection Report

This section was removed before publishing the load rating example.
NBI conditions were 7-Good, for the deck, superstructure, and substructure.

APPENDIX C

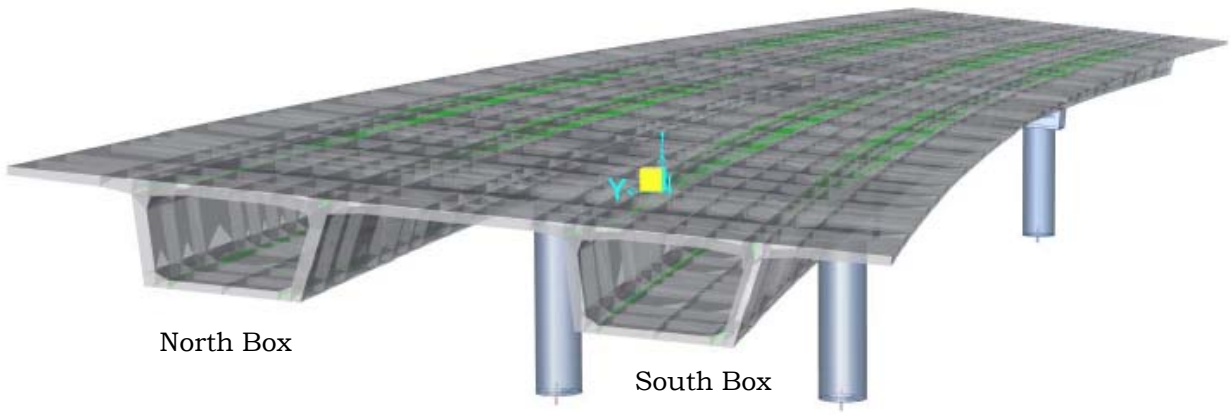
Load Rating Calculations

Table of Contents

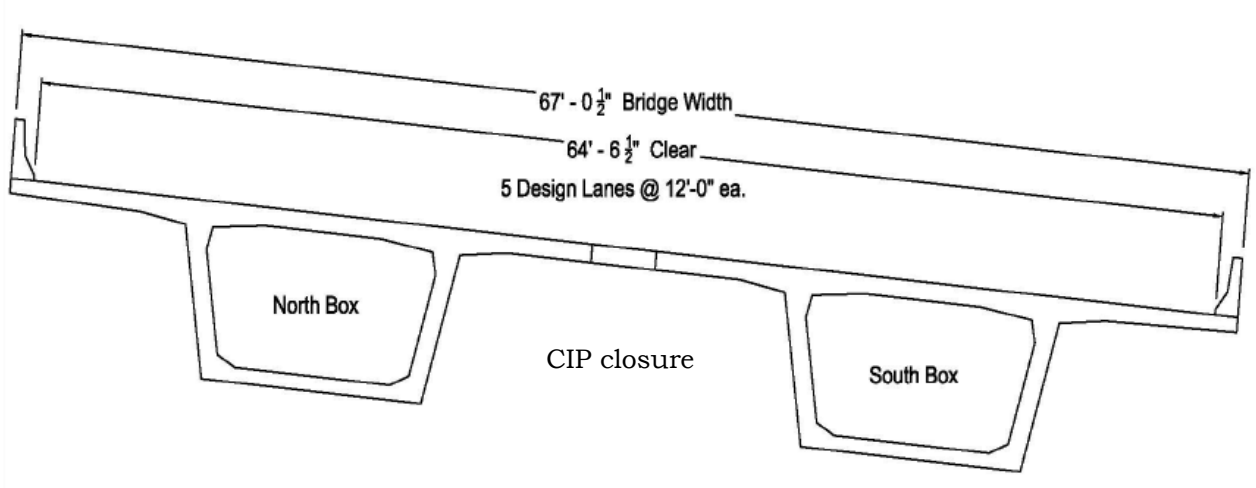
Introduction

Bridge [redacted] is a curved three-span twin segmental box girder structure with a total length of 396 ft. The segmental bridge is located on the south side of the [redacted] ([redacted] intersection. The bridge is composed of precast segments erected using the balanced cantilever method using ground mounted cranes. Each box girder is made of 40 precast segments and 3 CIP segments. We considered the North Box and South Box girders as being built sequentially, then connected with a longitudinal CIP closure. Details of the structural modelling are presented in the main body of this report. Calculations of the longitudinal and transverse rating are presented in this Appendix.

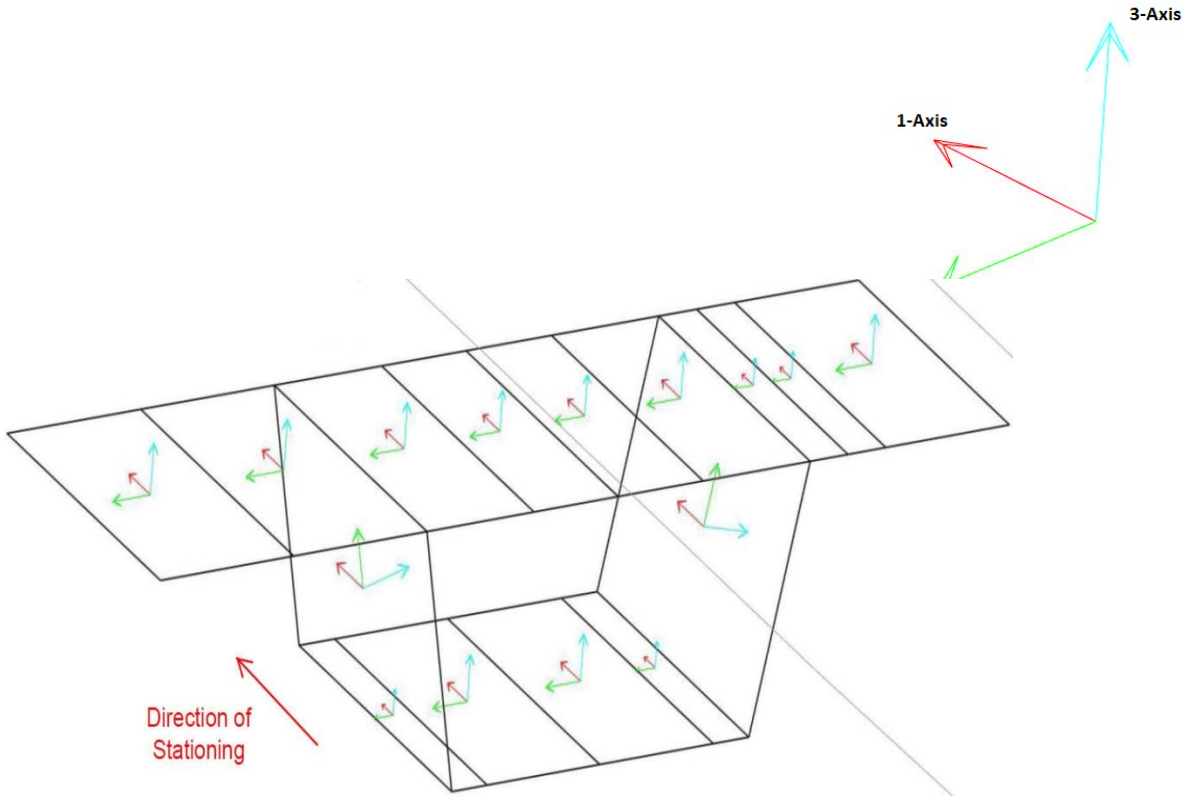
The plot below shows a rendering of the bridge model from CSi Bridge modeler and the bridge typical section.



Bridge [redacted] Model



Bridge [redacted] Typical Section



Sign convention in CSi Bridge

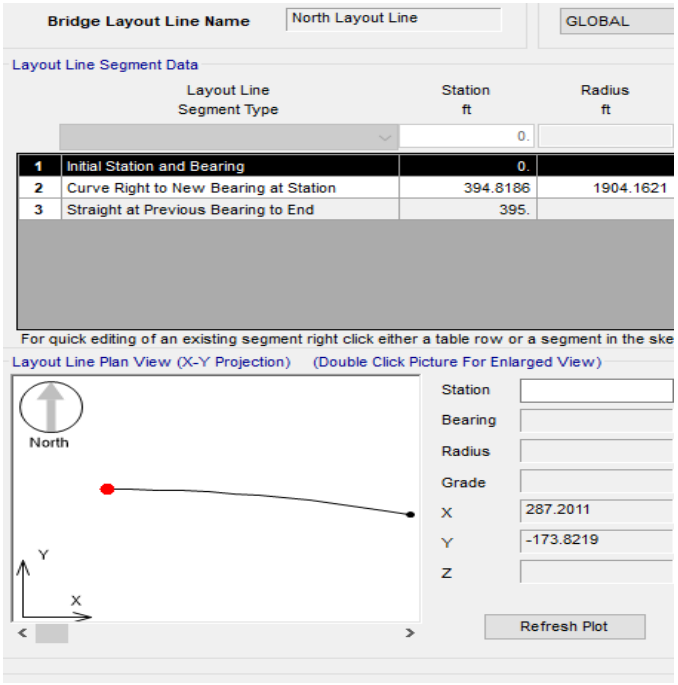
F22: Direct force per unit length acting at the mid-surface of the element on the positive and negative 2 faces in the 2-axis direction.

M22: Direct moment per unit length acting at the mid-surface of the element on the positive and negative 2 faces about the 1-axis.

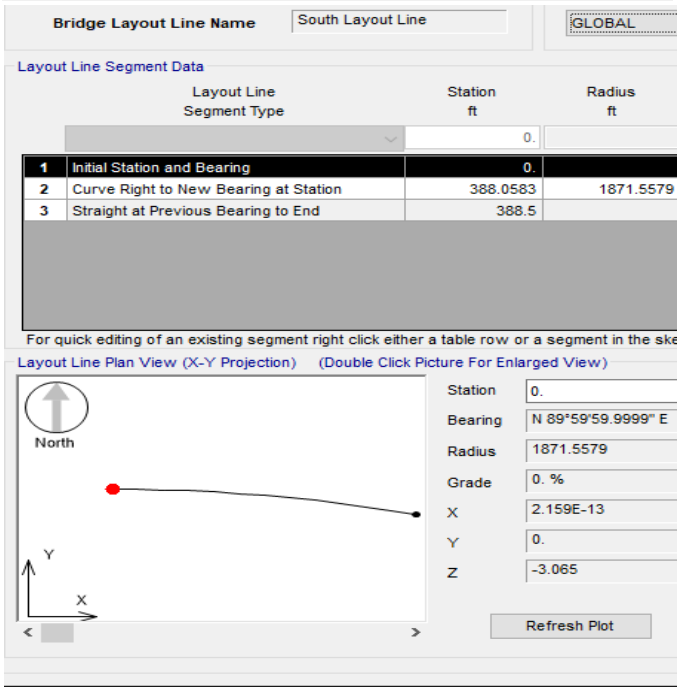
Longitudinal Load Rating

The longitudinal load rating was performed using the documents listed on the Load rating Parameters and Criteria section of the report.

Structural model geometry was generated from defined layout lines, which are located at the center of the box on the deck and are obtained from the plans.



North Box Layout Line



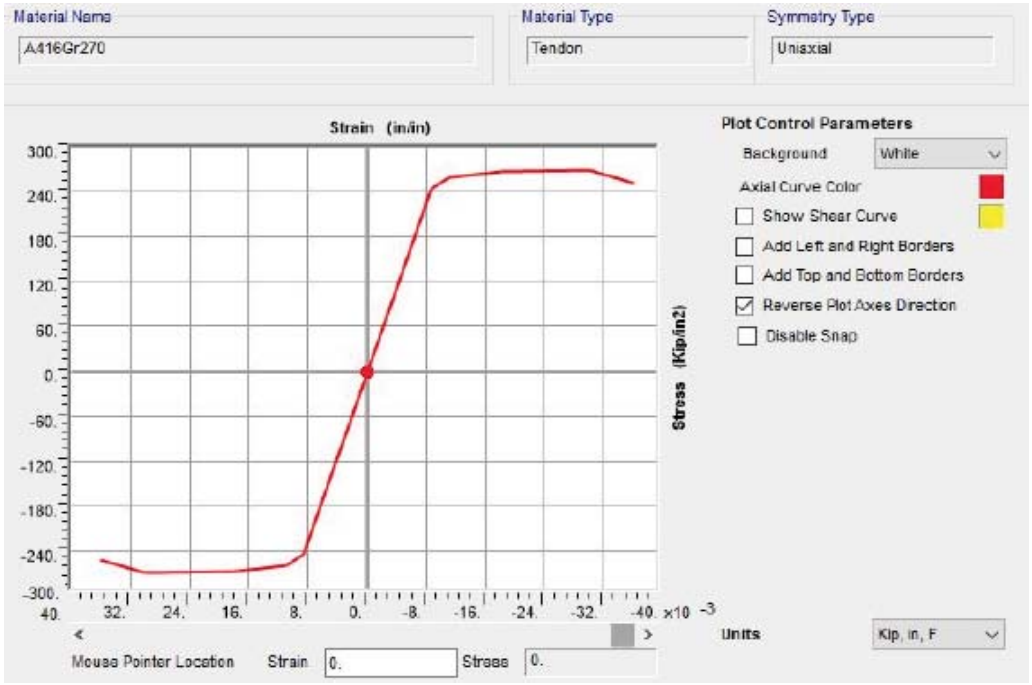
South Box Layout Line

Material Properties

Material properties plots of the longitudinal analysis model are presented in this section. Plots were generated from the CSi Bridge program. Below, we show the concrete stress-strain, prestressing steel strand and the mild reinforcing steel curves. Similarly, concrete strength, creep and shrinkage, and steel strand relaxation curves are presented.

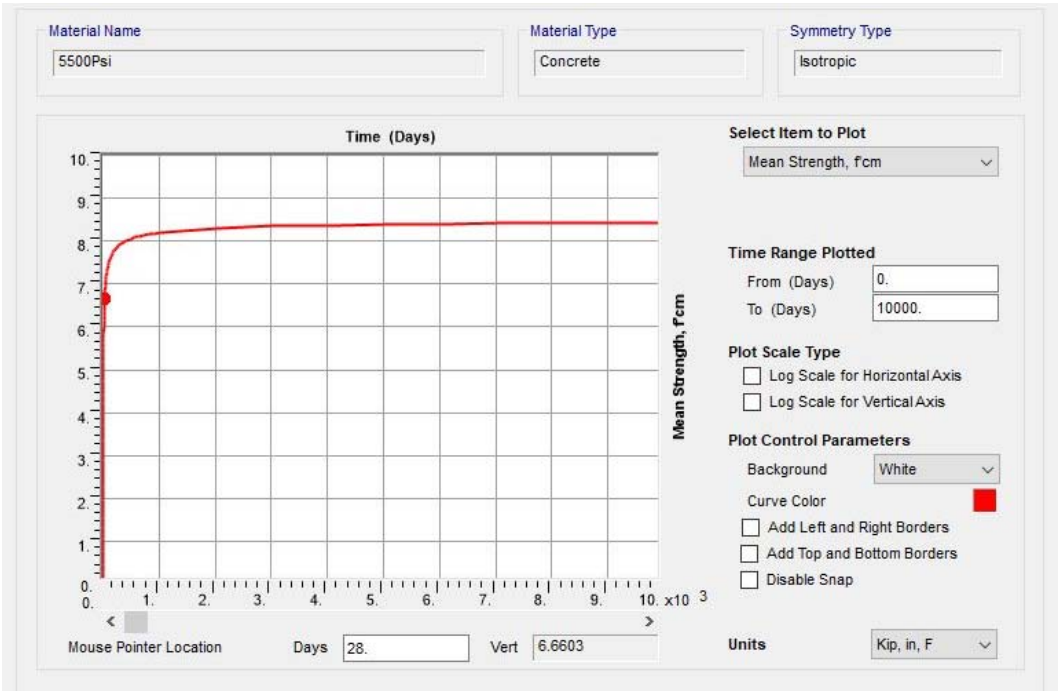
Concrete strength

Prestressing steel strands, 270 Gr. Low-Lax

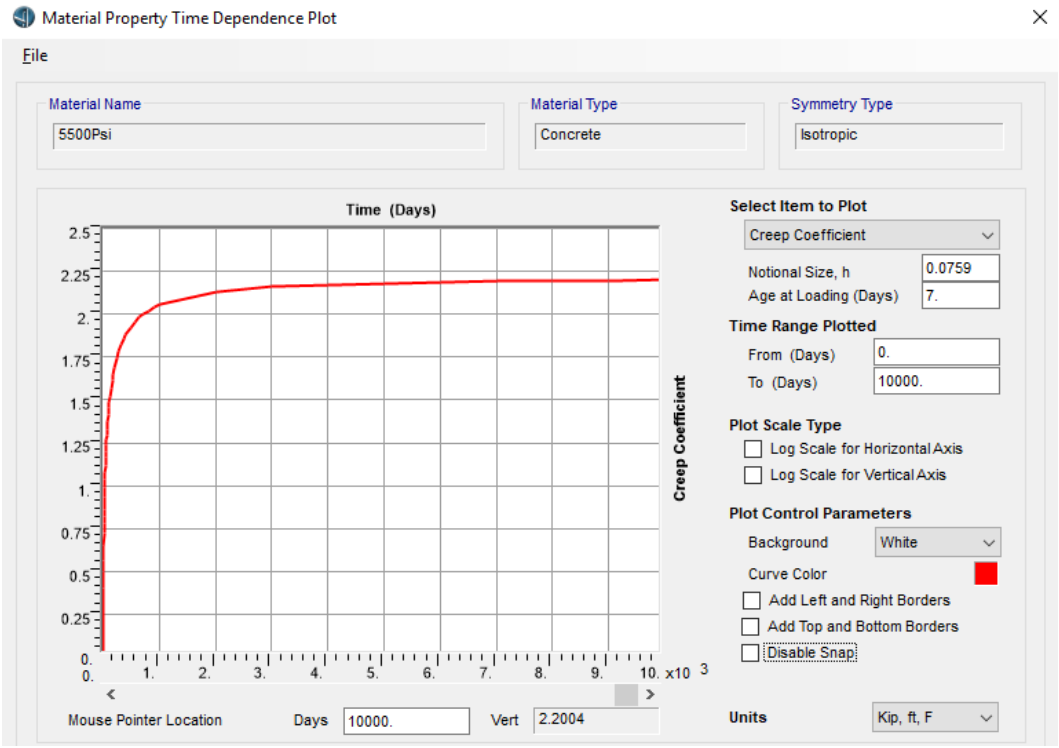


Reinforcing steel Gr. 60 steel

Time-dependent concrete strength given as mean compressive strength, f_{cm}. At 10,000 days, the compressive strength would be approximately 1.23 f_{cm} or 6.75 ksi.

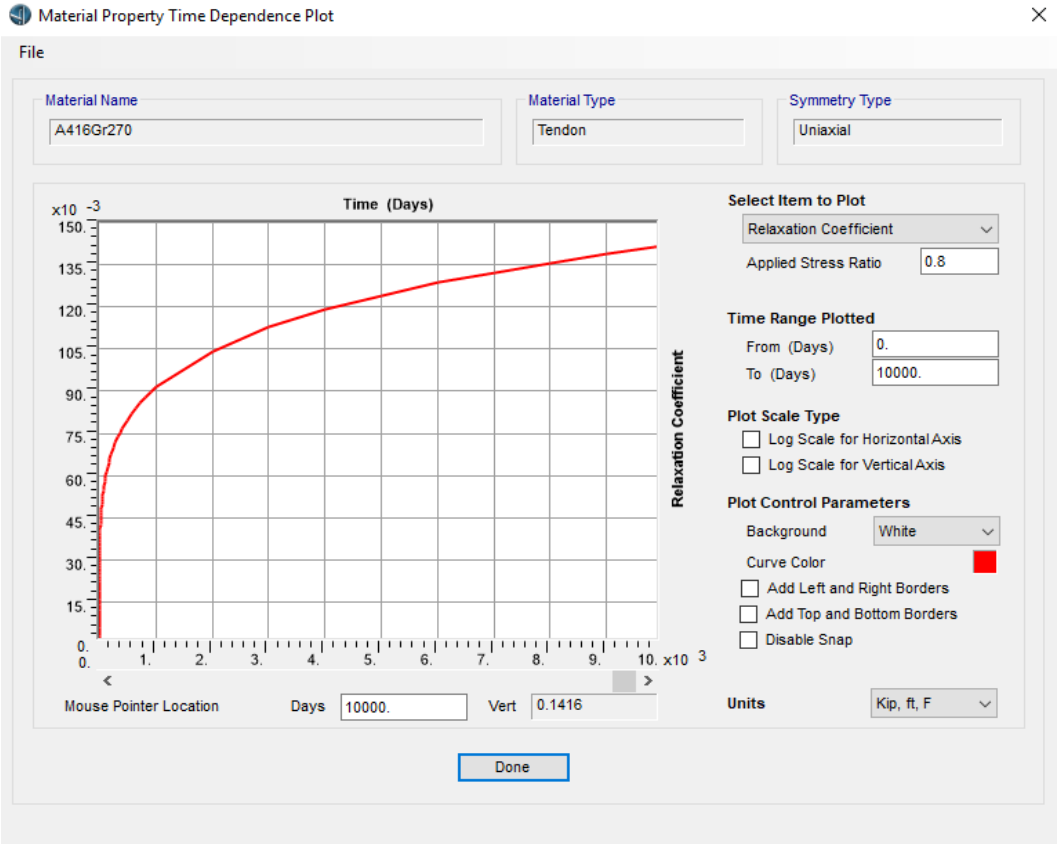


Time-dependent creep curve (CEB-FIP 90 model code)



Time-dependent shrinkage curve (CEB-FIP model code)

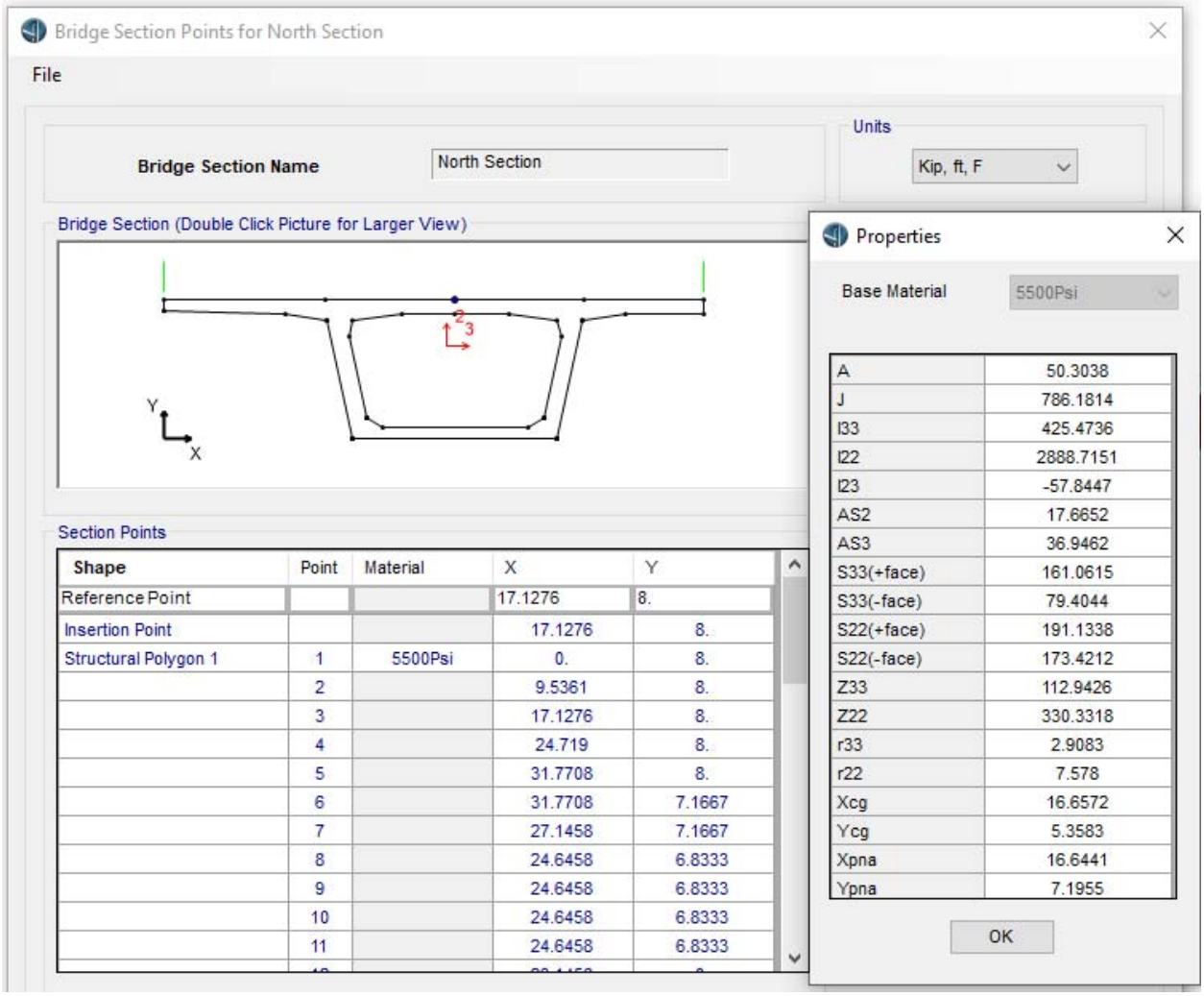
Time-dependent relaxation curve (CEB-FIP 90 model code)



Section Properties

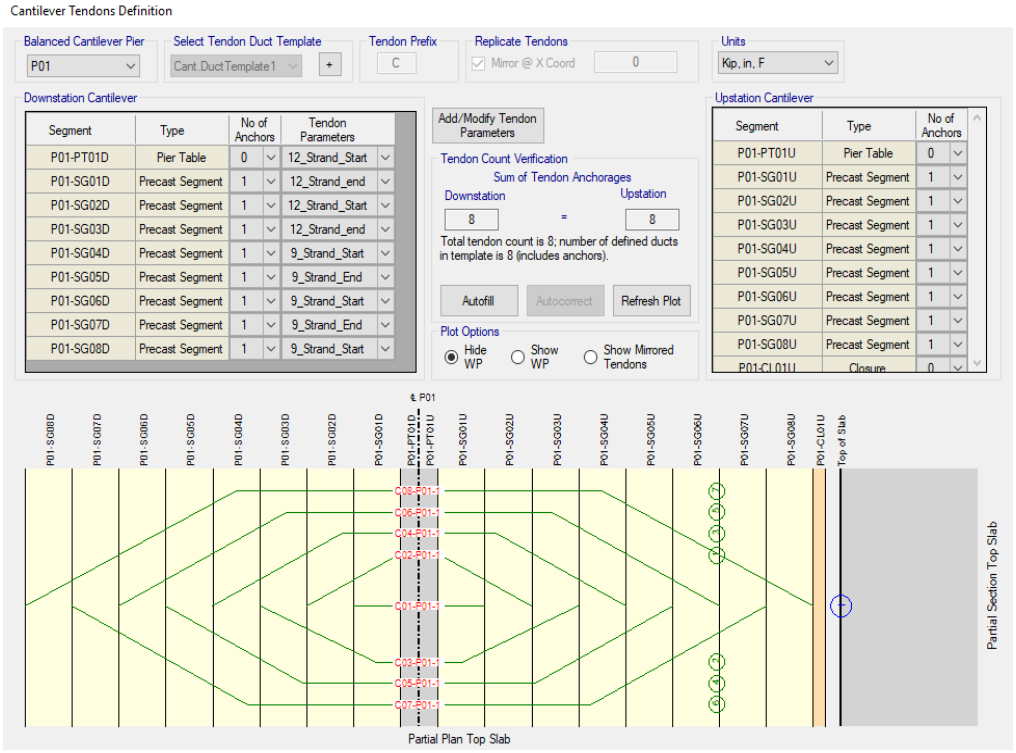
Section properties plots of the longitudinal analysis model are presented in this section. Plots are generated from the CSi Bridge program.

North box cross sections shown (South is similar). The dimensions to derive the section properties were taken from the information presented in the existing plans, Appendix A. These properties were verified using section properties from a design spreadsheet and from a MicroStation file. Note that all relevant section properties for a tri-dimensional analysis are shown below.

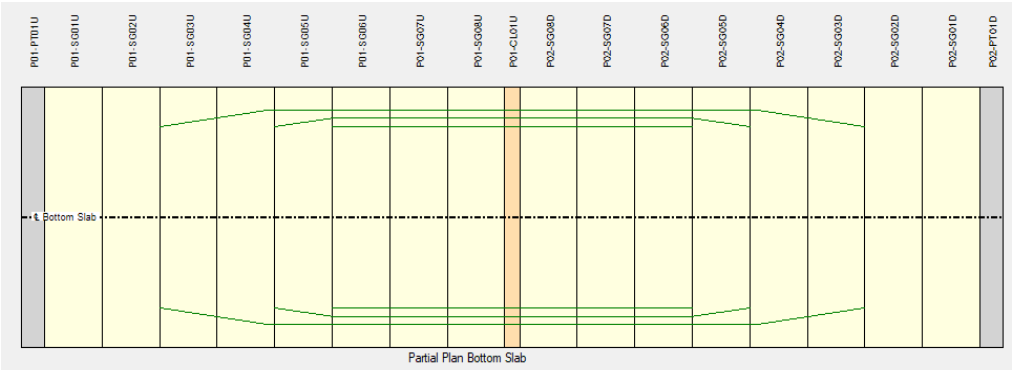


Tendon Layouts

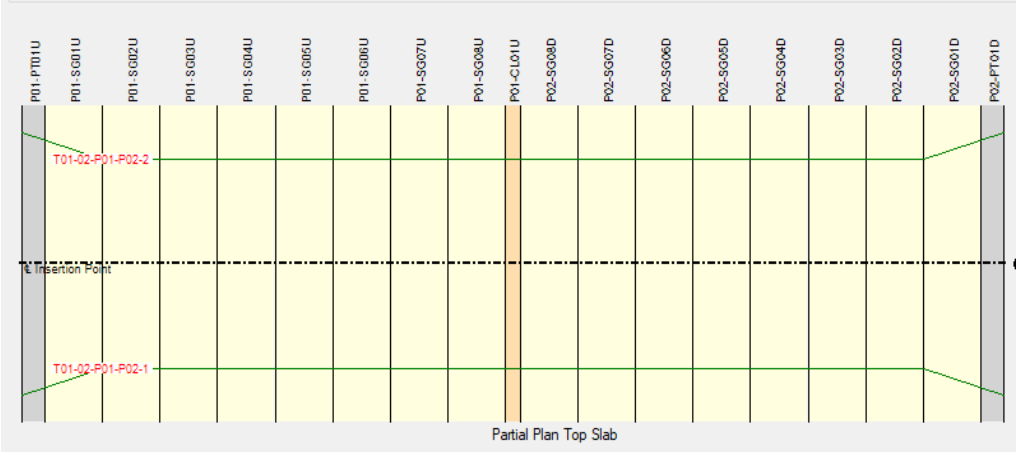
Tendon layouts in segments are provided from plots of CSi Bridge; plots below show tendon layout of Cantilever 1 (P2), bottom slab and top continuity tendons of Span 2.



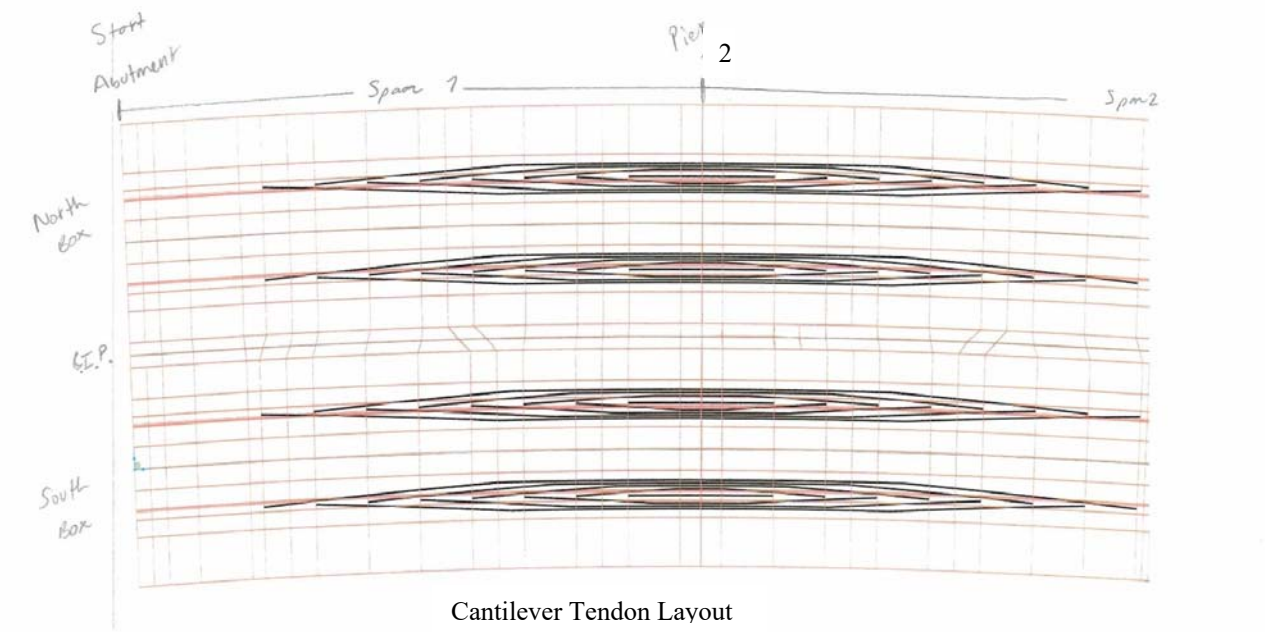
Cantilever tendons at P2



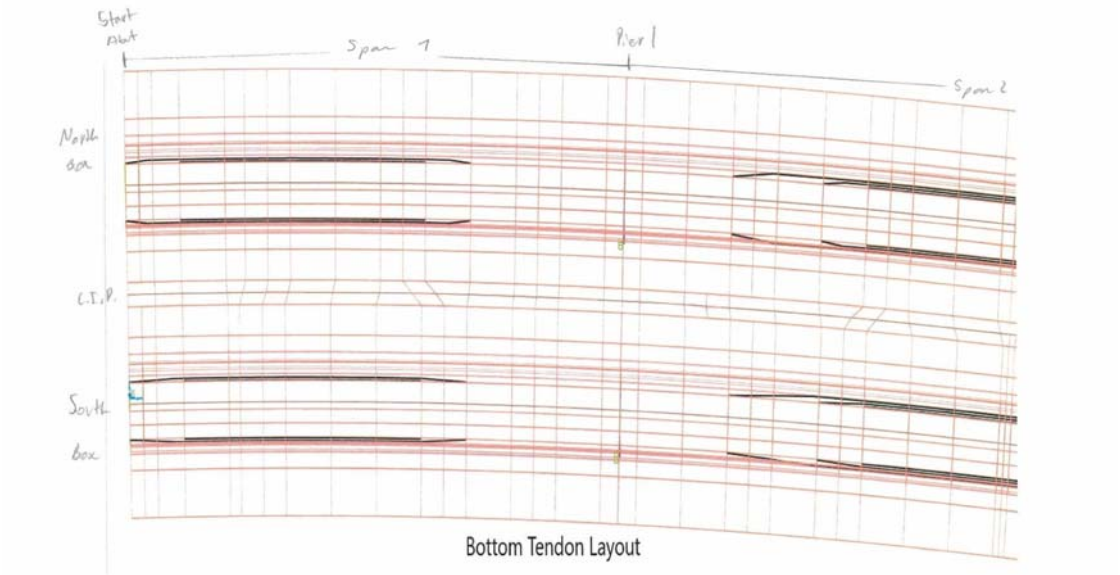
Bottom tendons at Span 2



Continuity top tendons at Span 2



Cantilever Tendon Layout

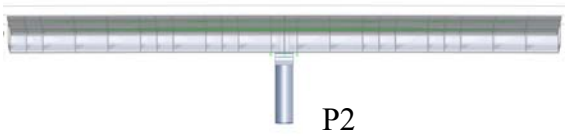


Bottom Tendon Layout

Staged Construction

The structures (North & South) were erected using the balanced cantilever method of construction. This methodology uses various types of temporary supporting systems; for these bridges we considered temporary towers around the pier that were used to setup the pier table and stabilize the cantilevers during erection. A simplified step by step procedure is shown below.

Step 1: Pier 2 segments are erected in balanced cantilever.



Step 2: The abutment segments are erected and supported on falsework.

Step 3: A CIP segment is then cast to connect the abutment with cantilever at P2. The same process (Steps 1 & 2) is performed for the cantilever at P3.

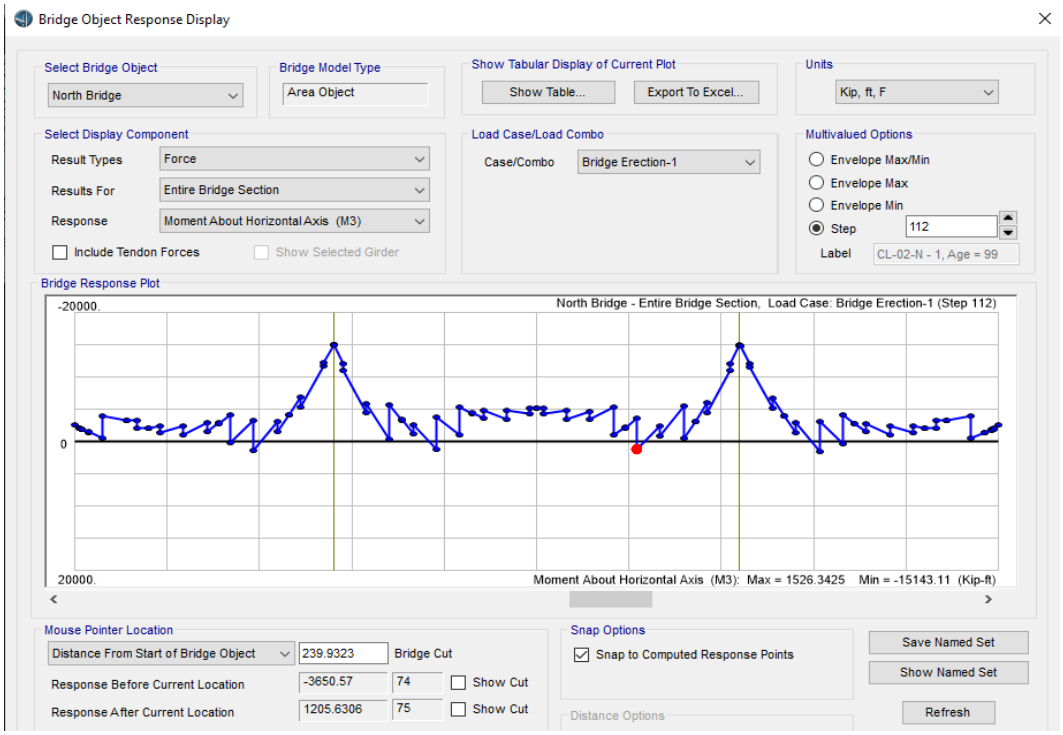
Step 4: This is the final step where the cantilevers at P2 and P3 are connected by a CIP segment. Bridge erection of the parallel bridge takes place in the same manner.

After both the North and South box bridges are erected, a 3.5 ft. wide longitudinal CIP connects the two boxes, making the twin structures a single bridge. It took 112 steps in the CSi bridge model until the two bridges were assembled. Beyond the end of bridge construction, the boxes work together longitudinally and transversely accommodating all long-term deformations, including relaxation of steel strands, and all other associated loadings during the run of the 10,000-day analysis.

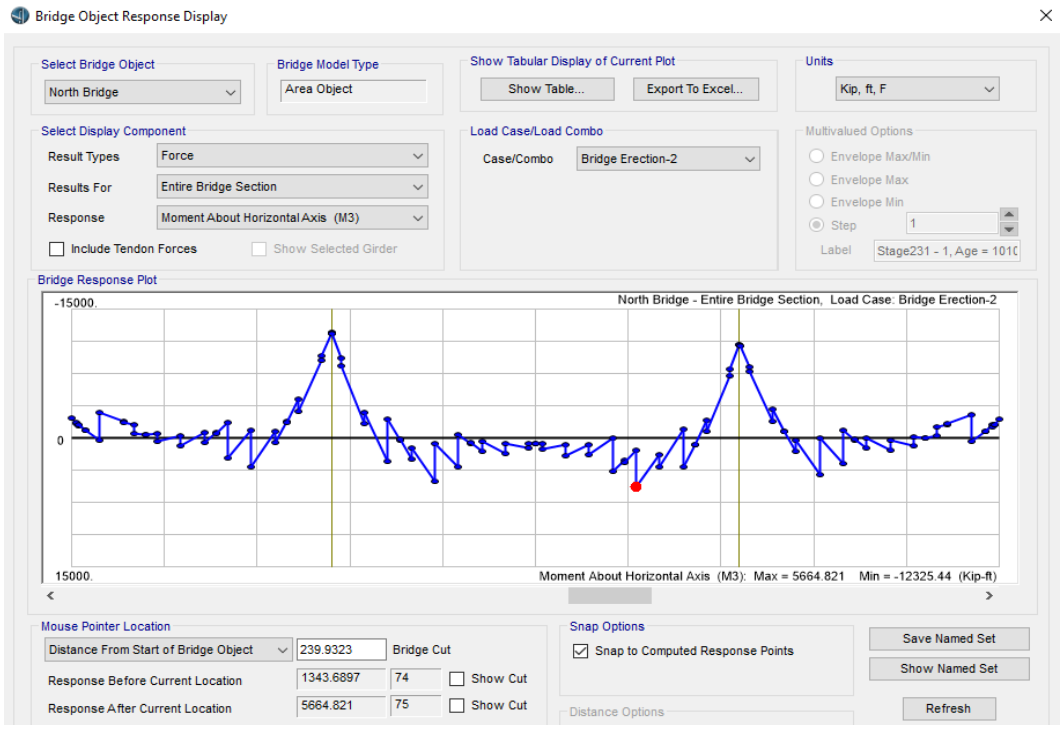
As we modeled the structures using shell elements, the software obtains membrane stresses, shear and bending stresses in each finite element. To get sectional forces (axial loads, shear, bending moments and torsion), typically used in structural engineering, the program integrates element stresses in the user predefined sections or cuts. Results from construction sequence, provided as sectional forces, at the end of bridge construction and at 10,000 days are shown below. Note that the DC results

in the Stage Construction model include construction sequence and associated locked-in forces (EL), prestressing (PT), and creep and shrinkage (CR+SH) effects.

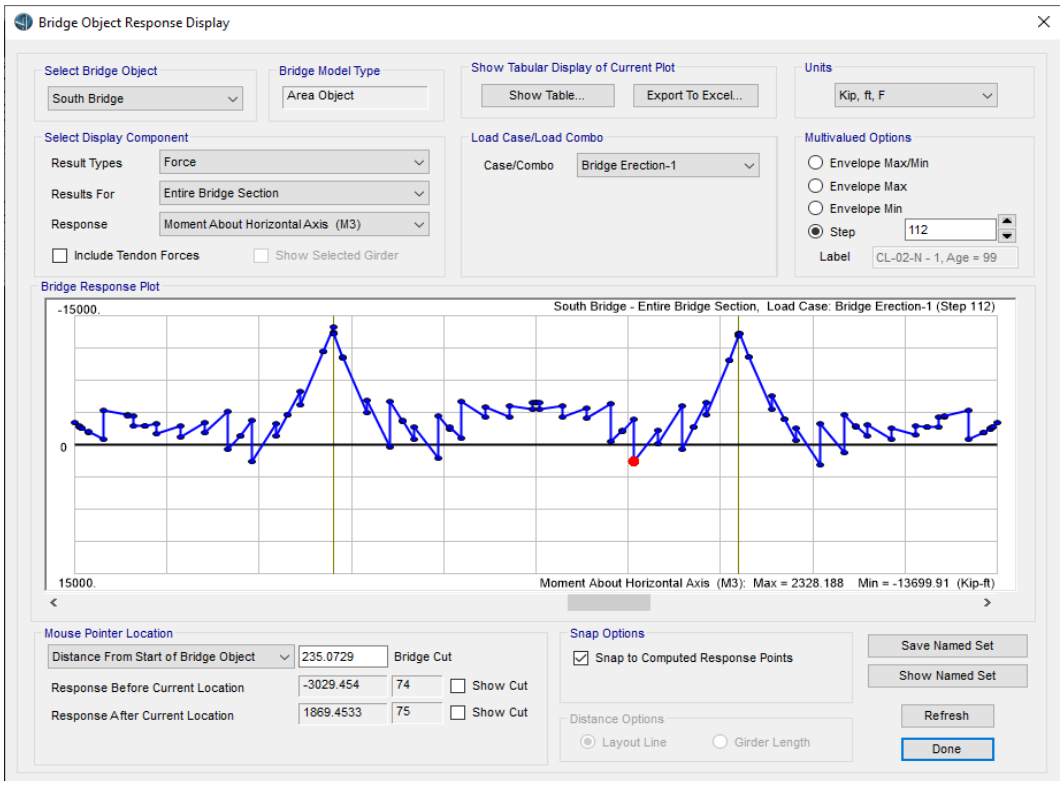
Moment diagram for DC at end of construction – North Box



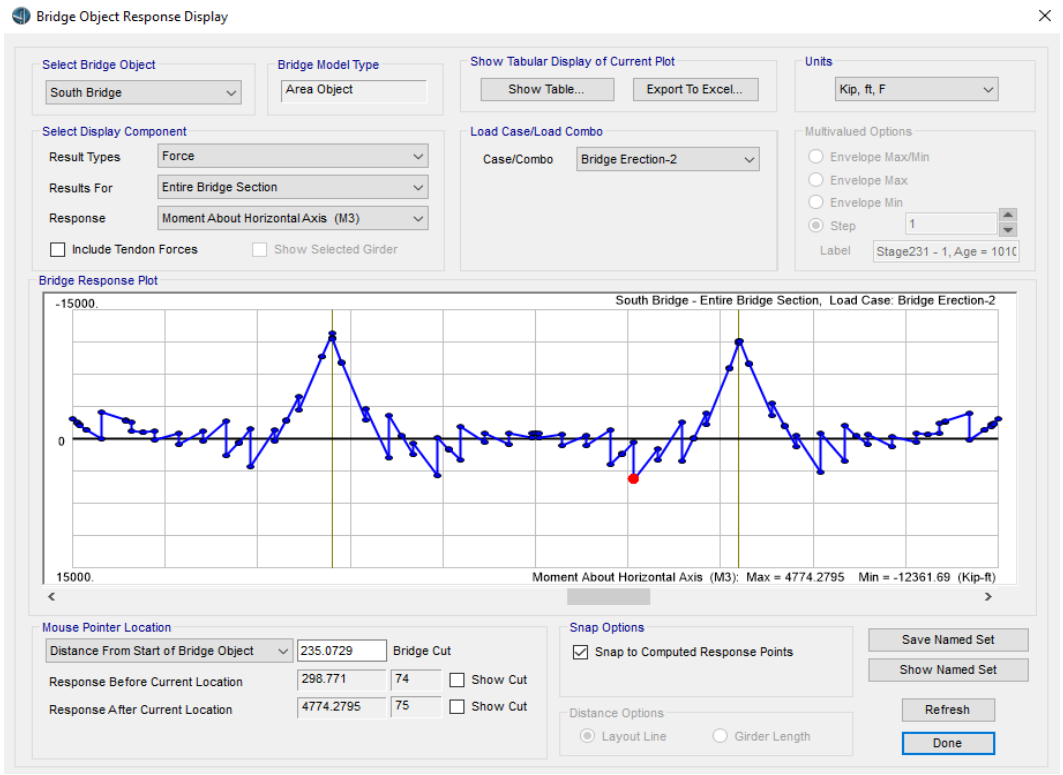
Moment diagram for DC at 10,000 days – North Box



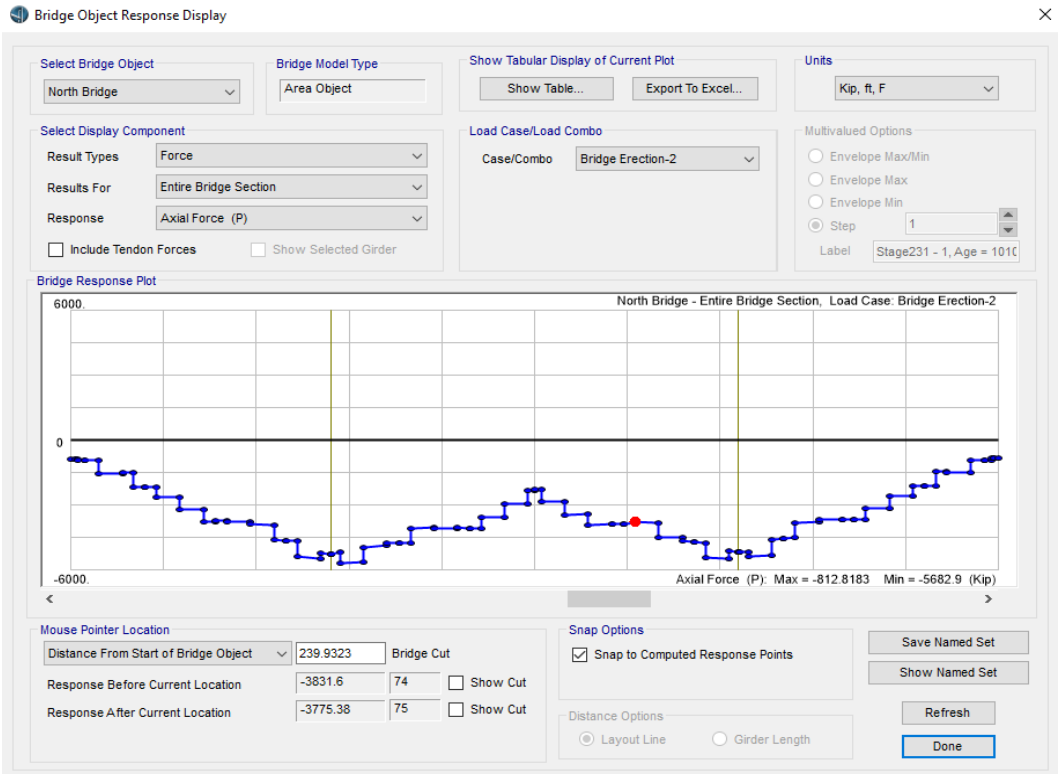
Moment diagram for DC at end of construction – South Box



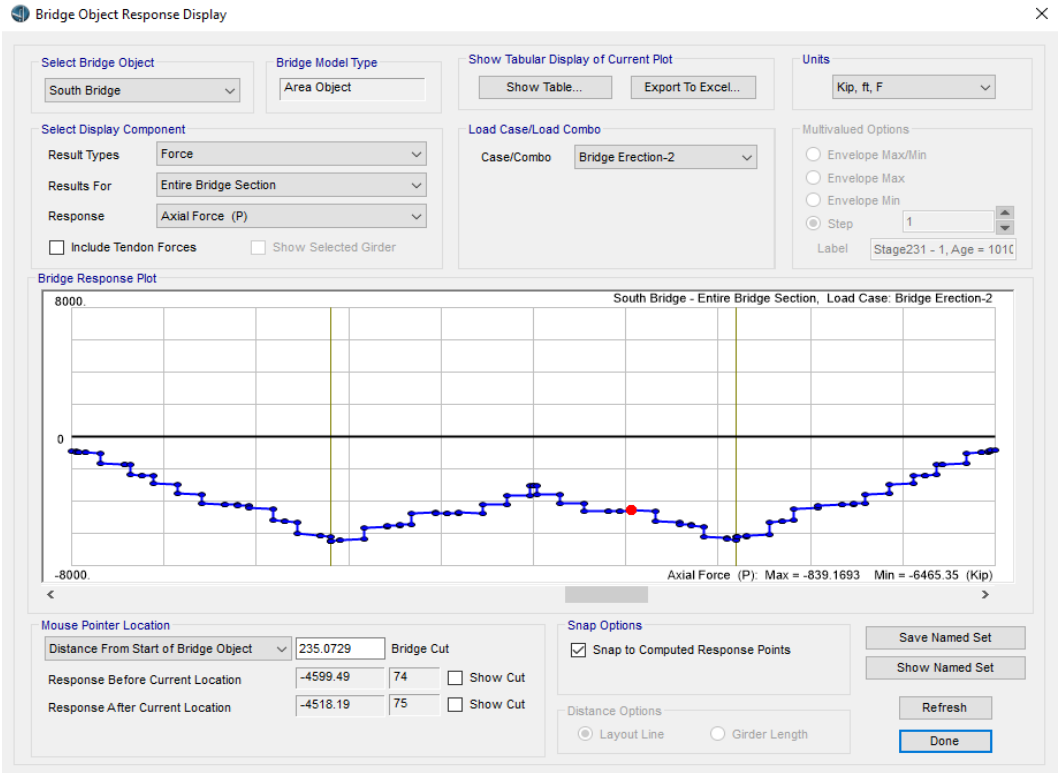
Moment diagram for DC at 10,000 days – South Box



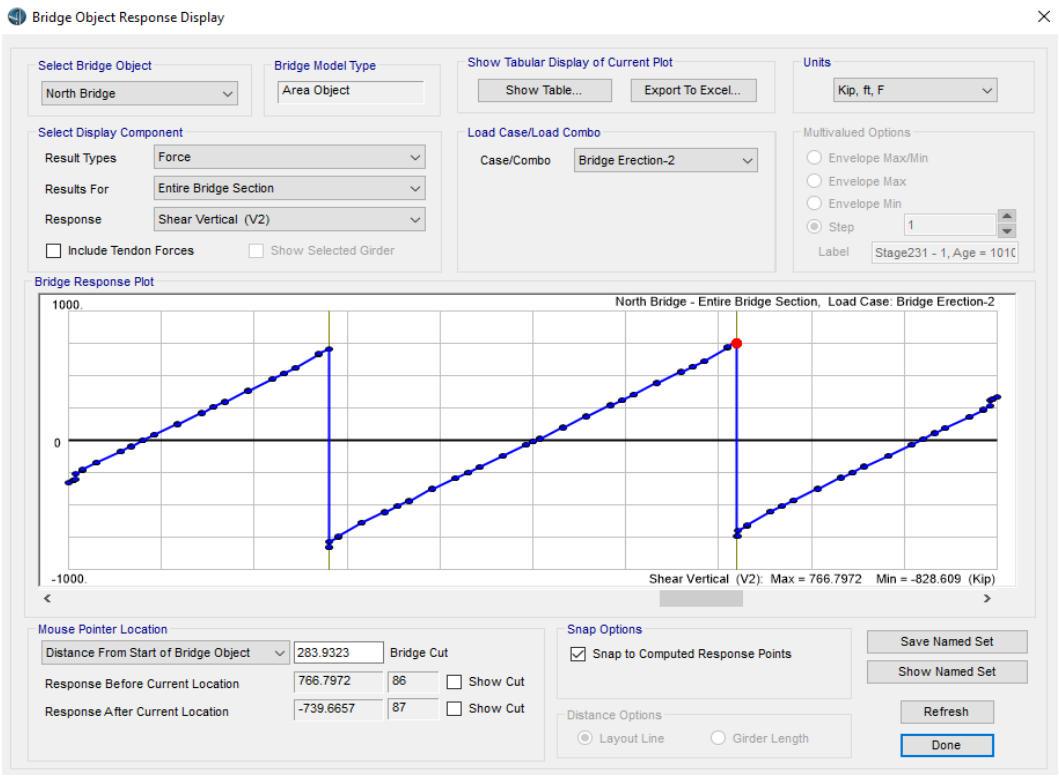
Axial Load diagram for DC at 10,000 days – North Box



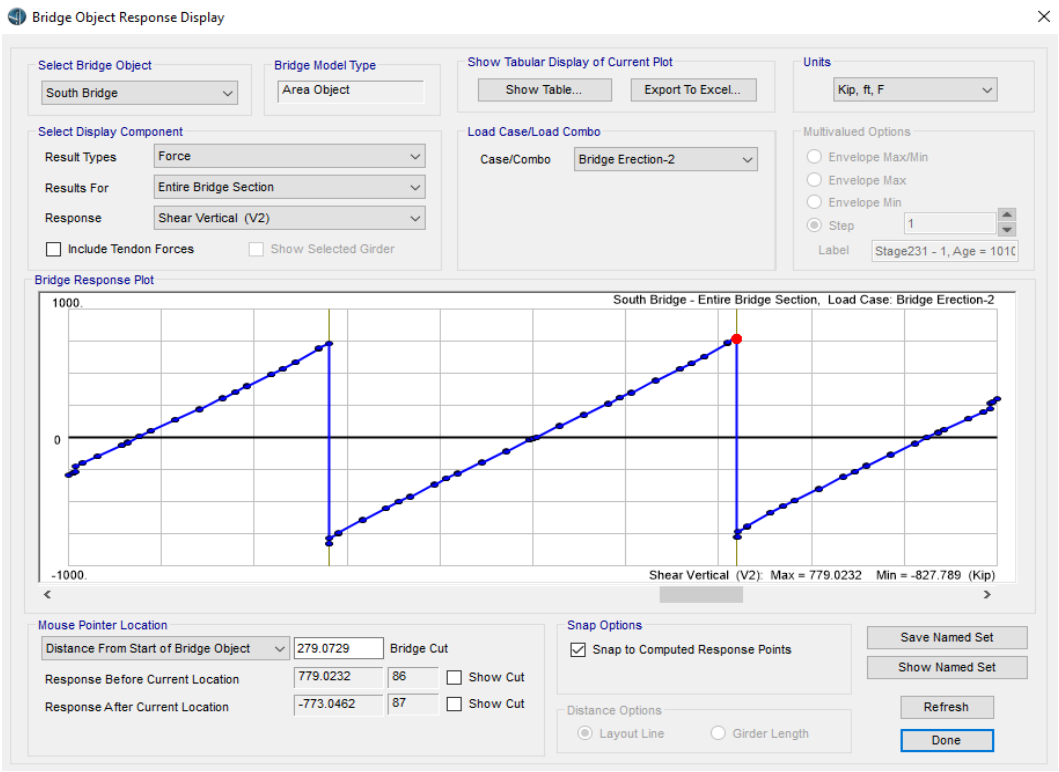
Axial Load diagram for DC at 10,000 days – South Box



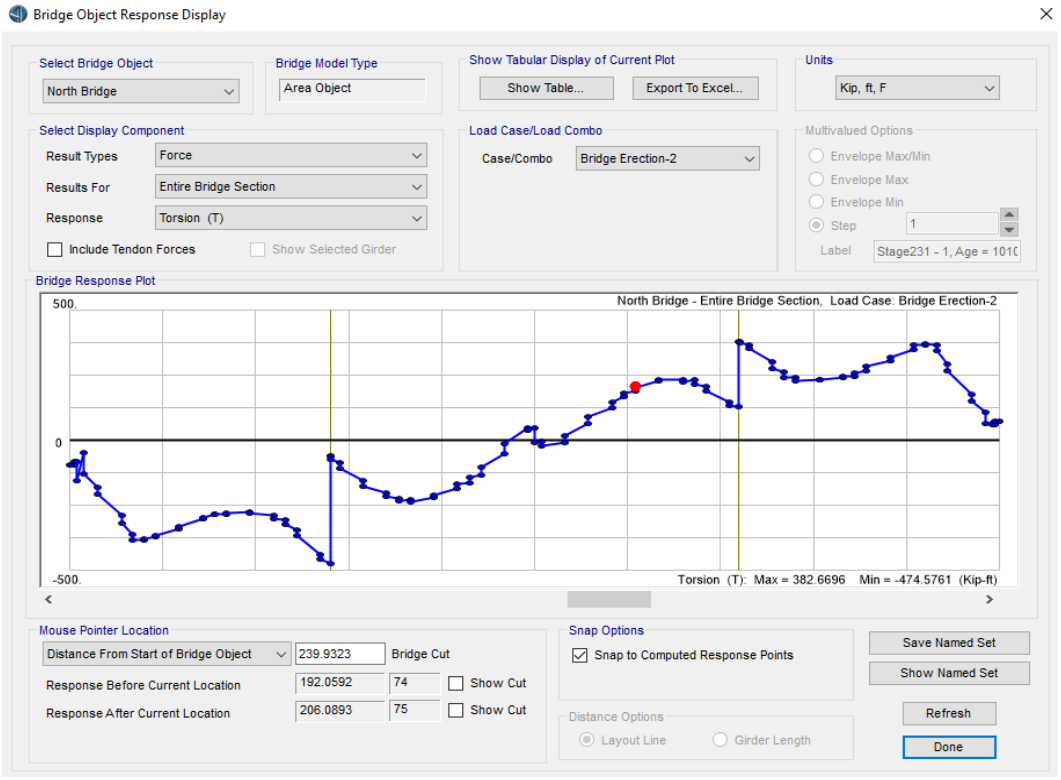
Shear diagram for DC at 10,000 days – North Box (CSi shows shear diagrams on the left face of member)



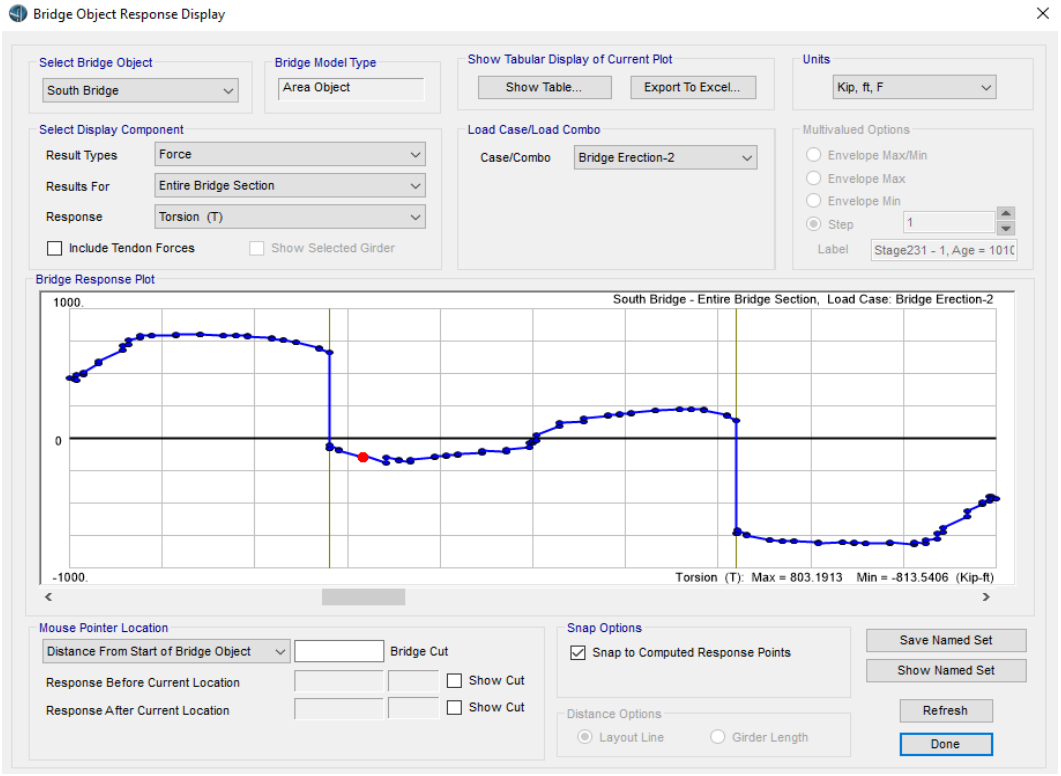
Shear diagram for DC at 10,000 days – South Box



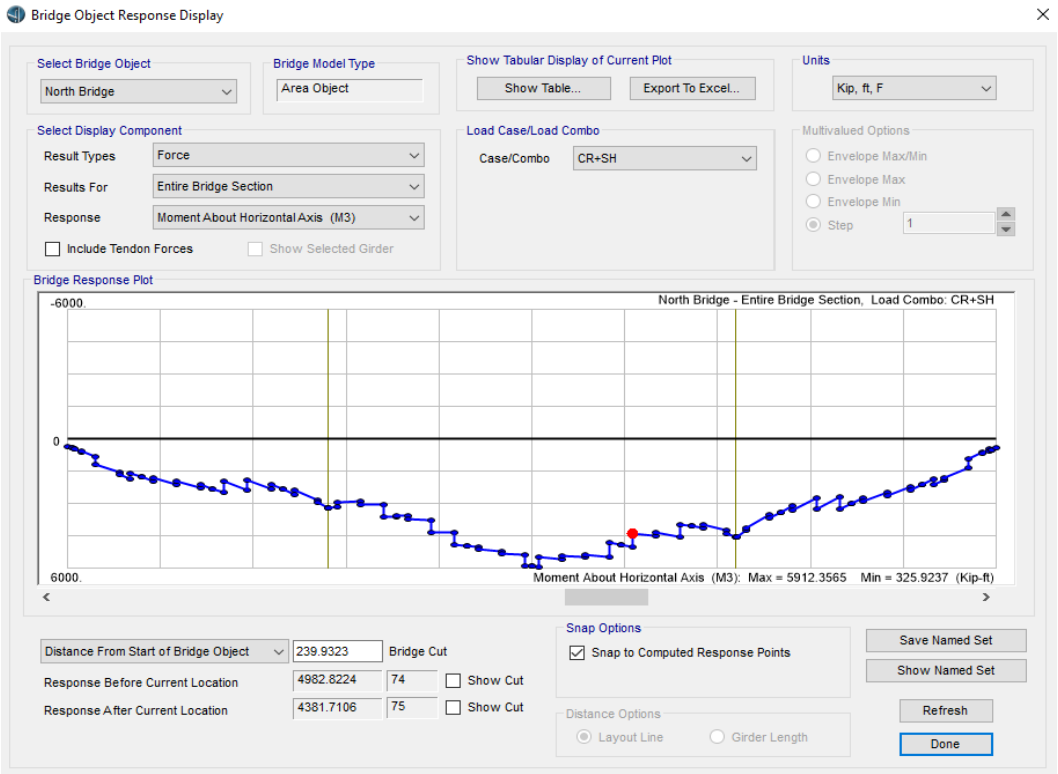
Torsion diagram for DC at 10,000 days – North Box



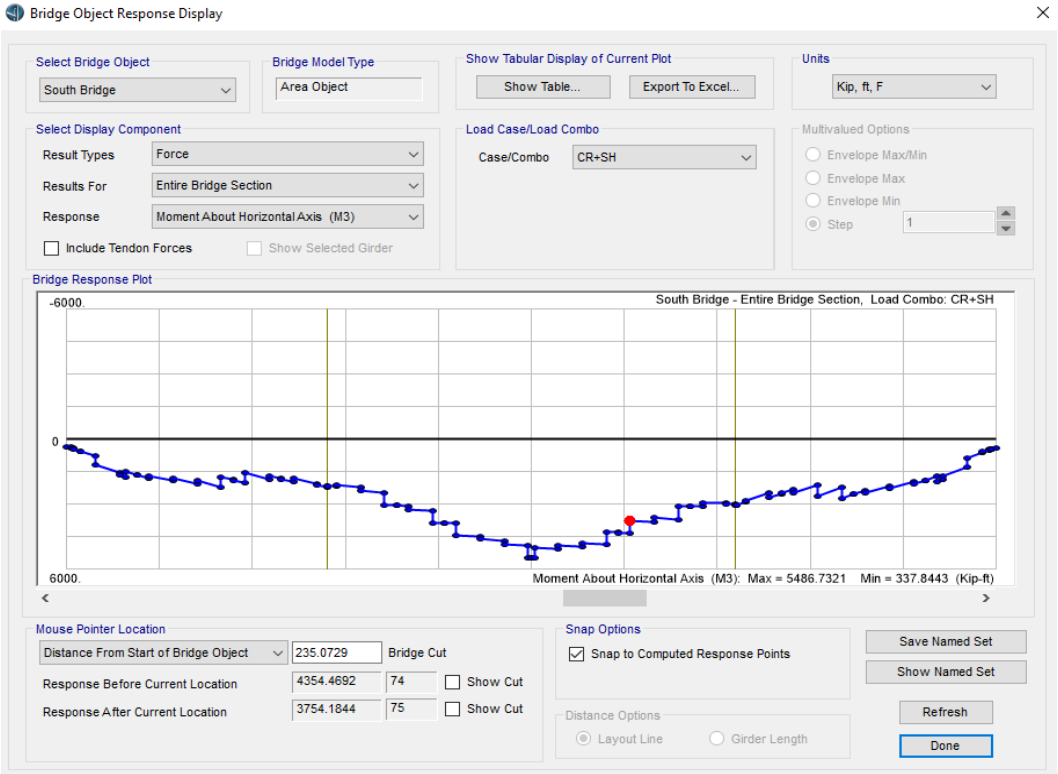
Torsion diagram for DC at 10,000 days – South Box



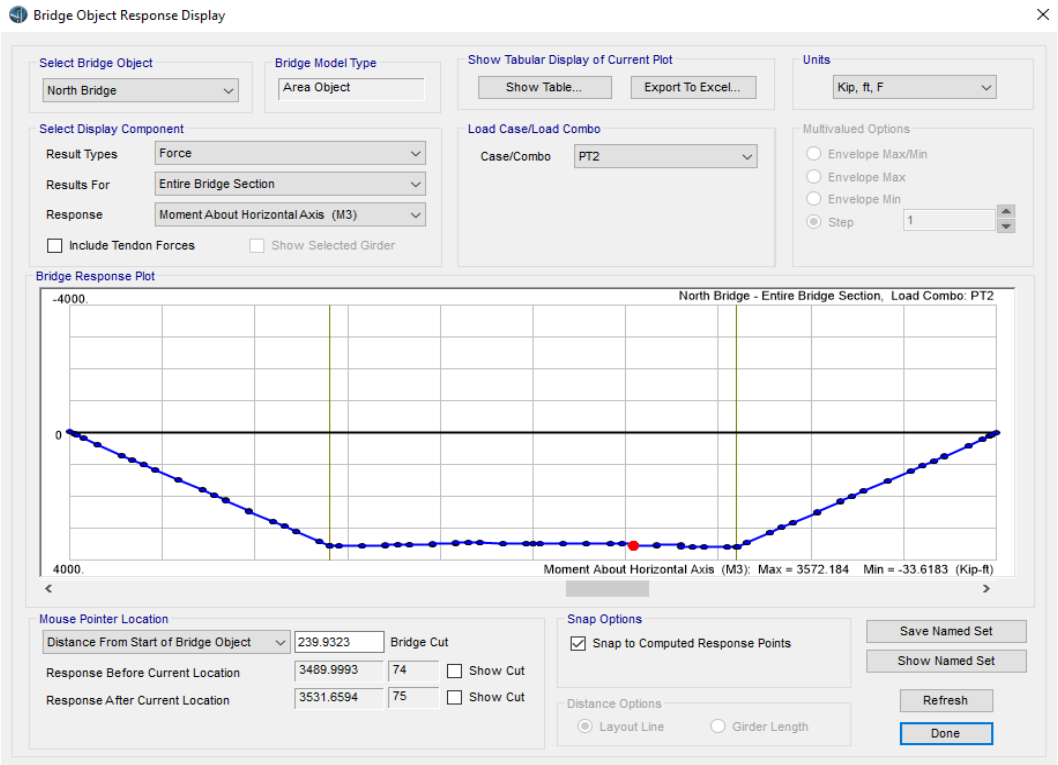
Moment diagram for Creep and Shrinkage (CR+SH) at 10,000 days – North Box



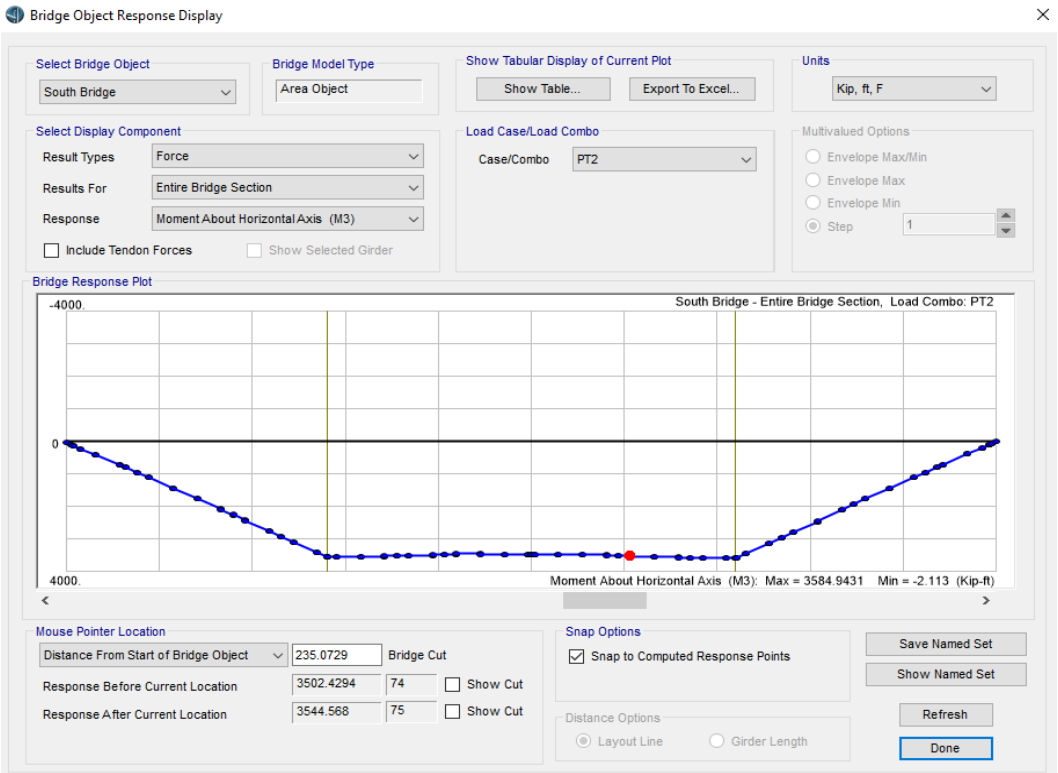
Moment diagram for Creep and Shrinkage (CR+SH) at 10,000 days – South Box



Moment diagram of secondary PT forces (PT2) at 10,000 days – North Box

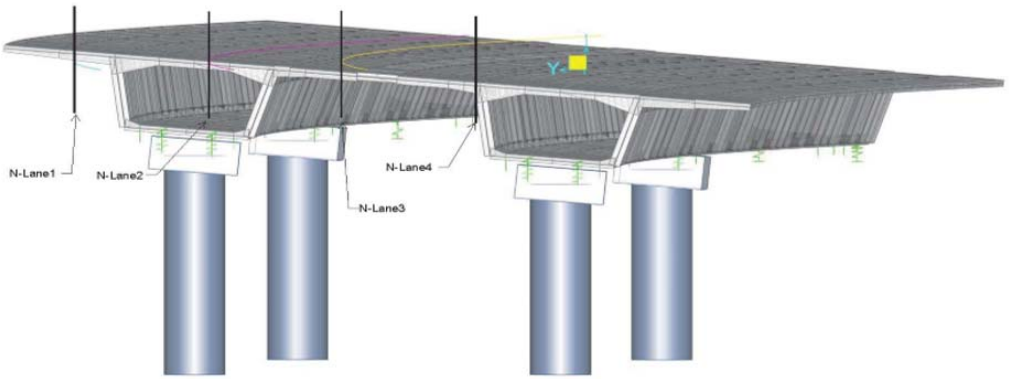


Moment diagram of secondary PT forces (PT2) at 10,000 days – South Box

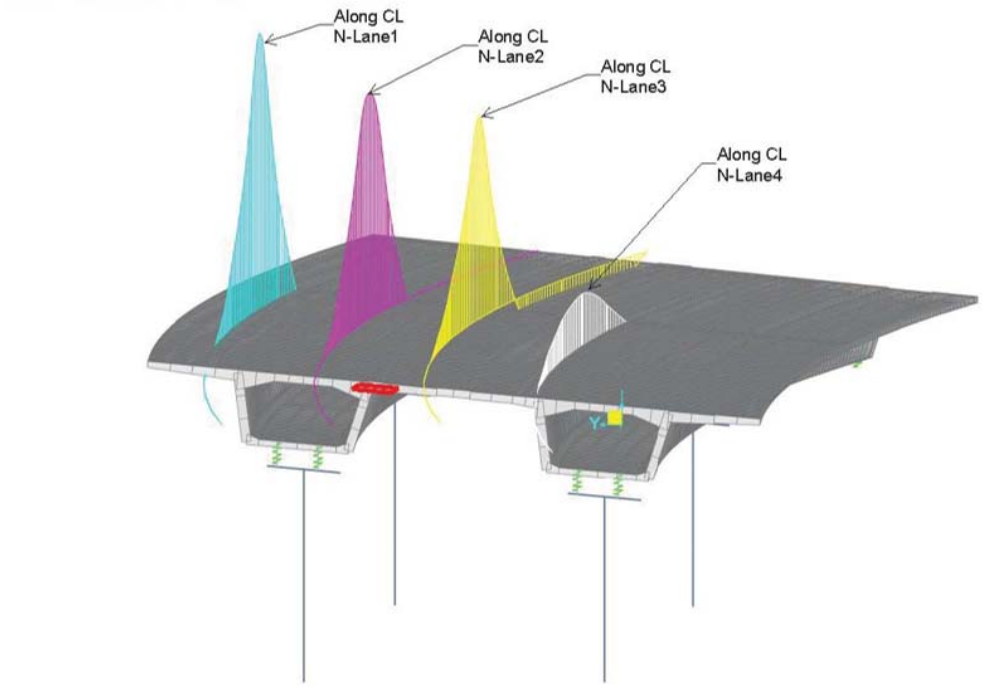


Live Load Models

Live load forces are generated using influence surfaces as described in the main body of the report. Design and striped lanes are defined in CSi bridge; in this case, five design and four striped lanes. These lanes are also defined with respect to the bridge transverse locations. The plot below shows the center of each of the four striped lanes where the lanes are all shifted to the north (left). Cuts along the bridge of the influence surface corresponding to bending tensile stress at the North box bottom flange, located at 44 ft. donwstation of Pier P3, are presented. For illustration purposes, we cut sections along the center of the four striped lanes, similar to influence lines. Because the model uses shell finite elements, it was easier, and in reality more accurate, to extract the influence surface for longitudinal stresses in the bottom flange, rather through moments influence surfaces.



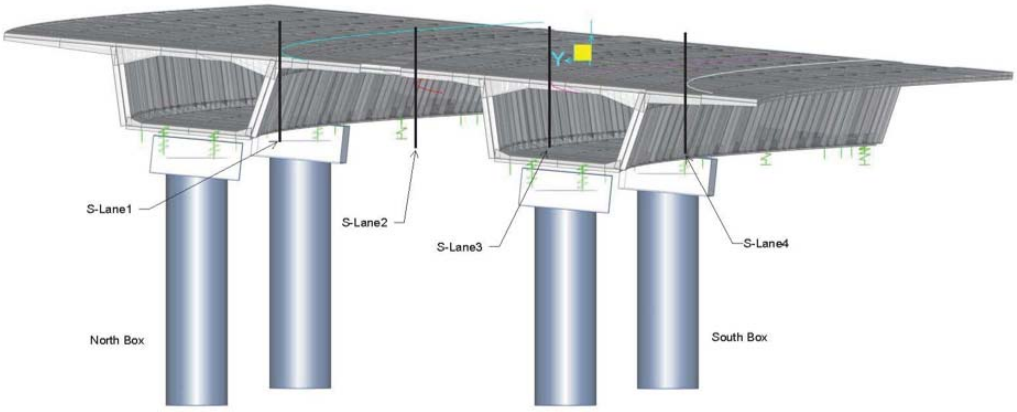
North Lanes¶



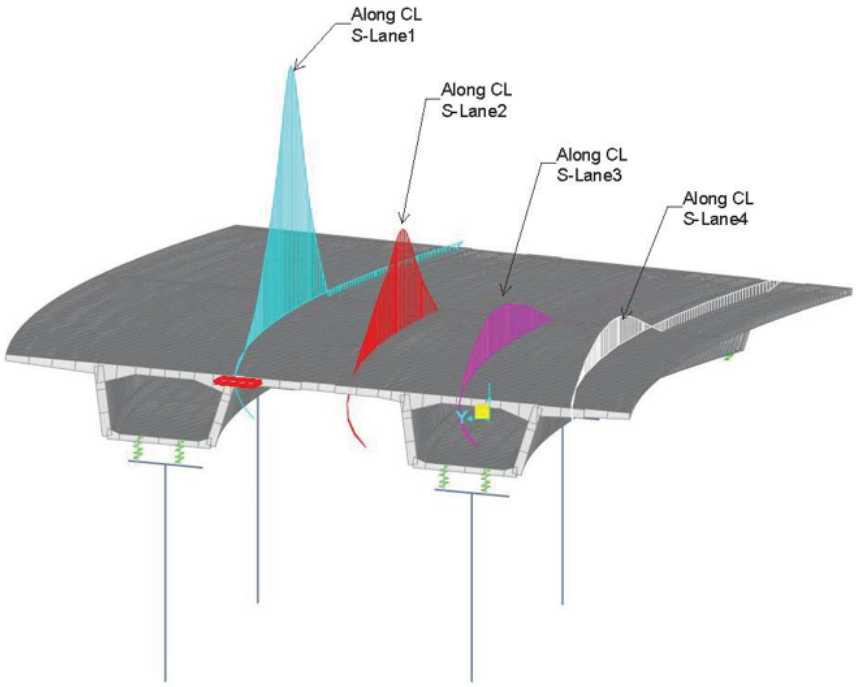
S11 (Longitudinal stress) Influence Line Along CL of North Lanes

Obtaining the maximum/minimum tensile stresses at the selected location is straight forward once the influence surfaces are developed. The truck wheel loads are positioned in the lanes to maximize the desired effect. As the influence surface is independent of loading, this scheme allows to position different trucks at the lanes or mixed traffic. It is noted; however, that the generation of the influence surface for each finite element is a computationally intensive process.

The plots below illustrate the lanes and influence surfaces with the four striped lanes shifted to the right.



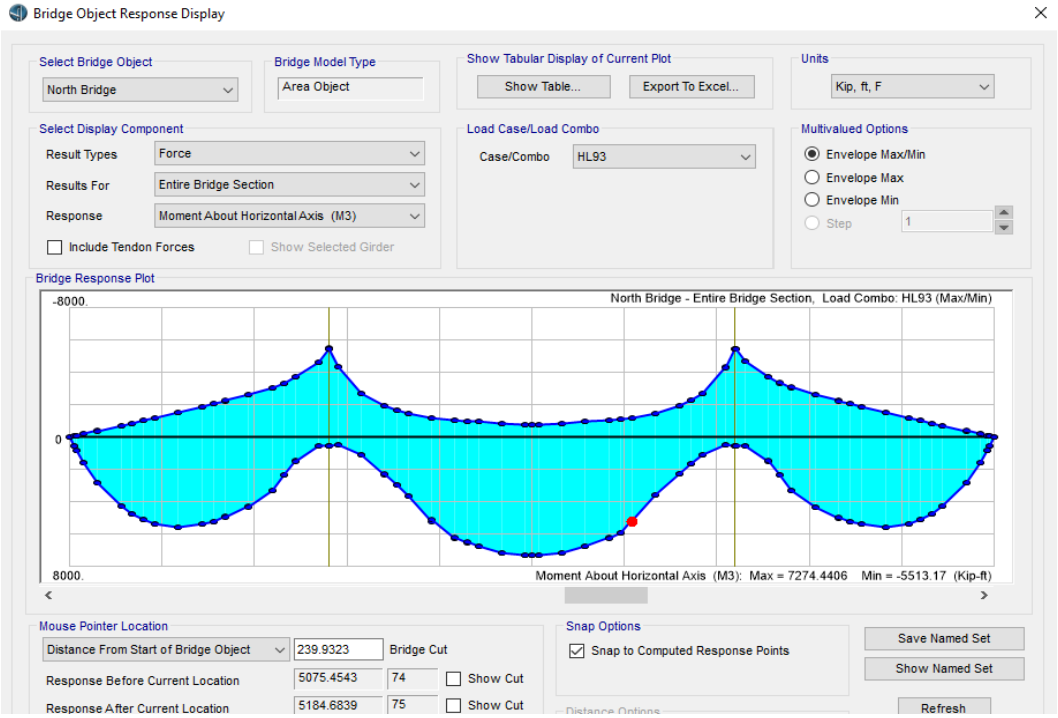
South Lanes



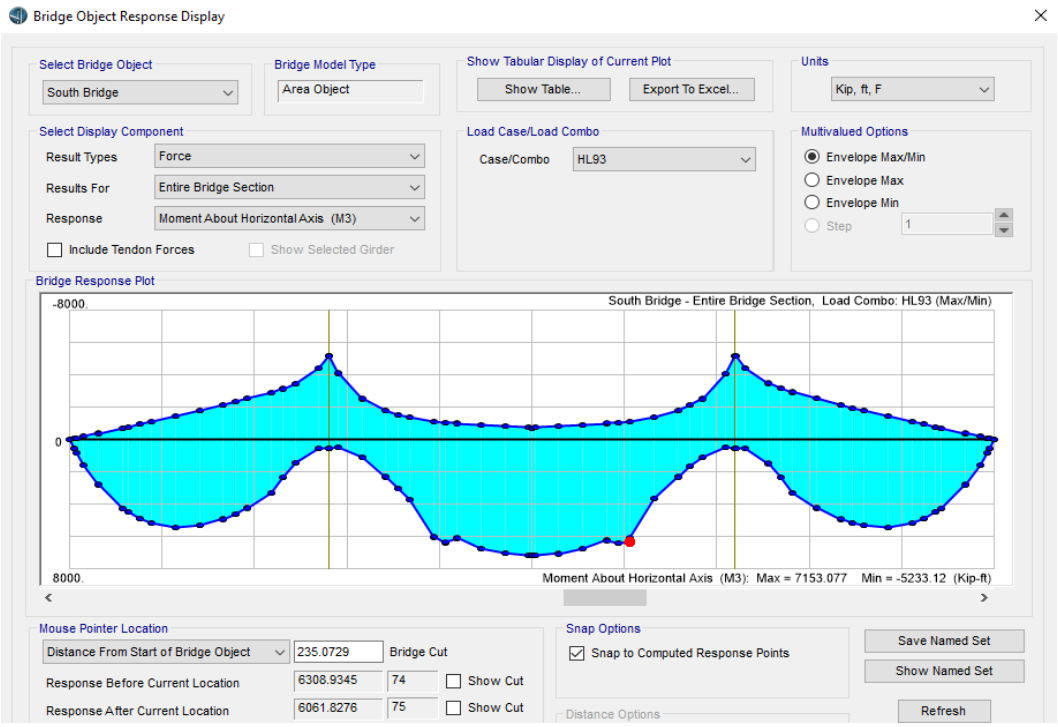
S11 (Longitudinal stress) Influence Line Along CL of South Lanes

Live load response envelopes of the design, permit, legal, and emergency vehicles are presented below. It is noted that the difference between 5 design lanes or 4 striped lanes is negligible; means that for the most part 3 or 4 loaded lanes would control the response.

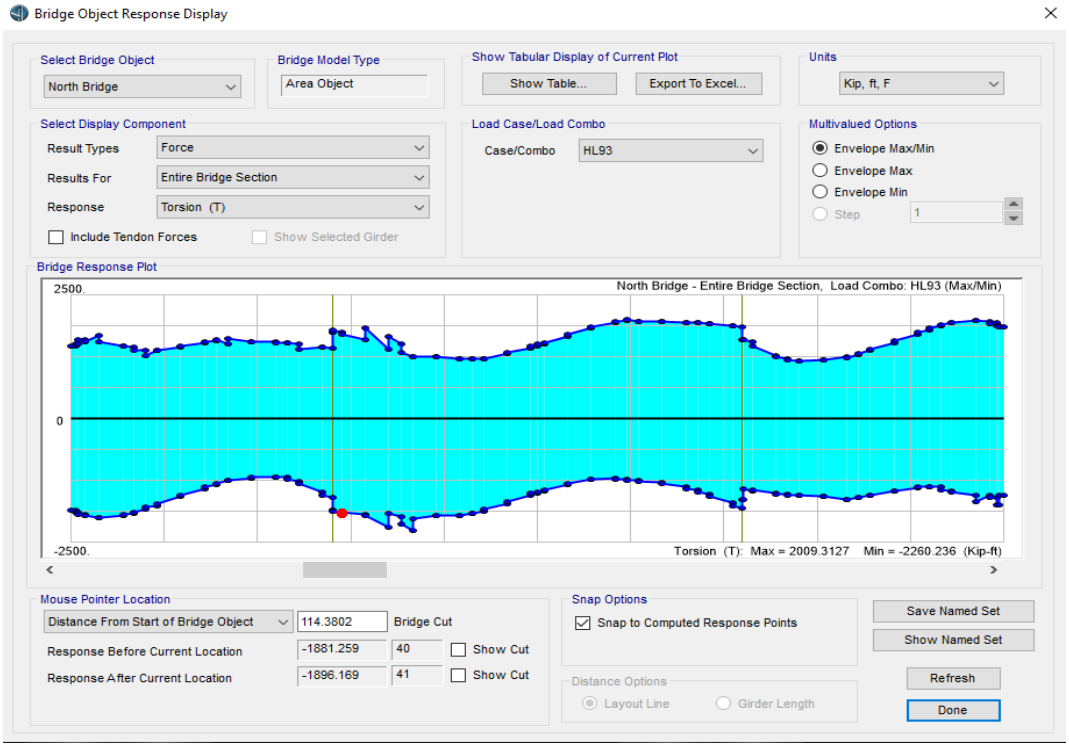
HL 93 Envelope of Live Load Moment – North Box



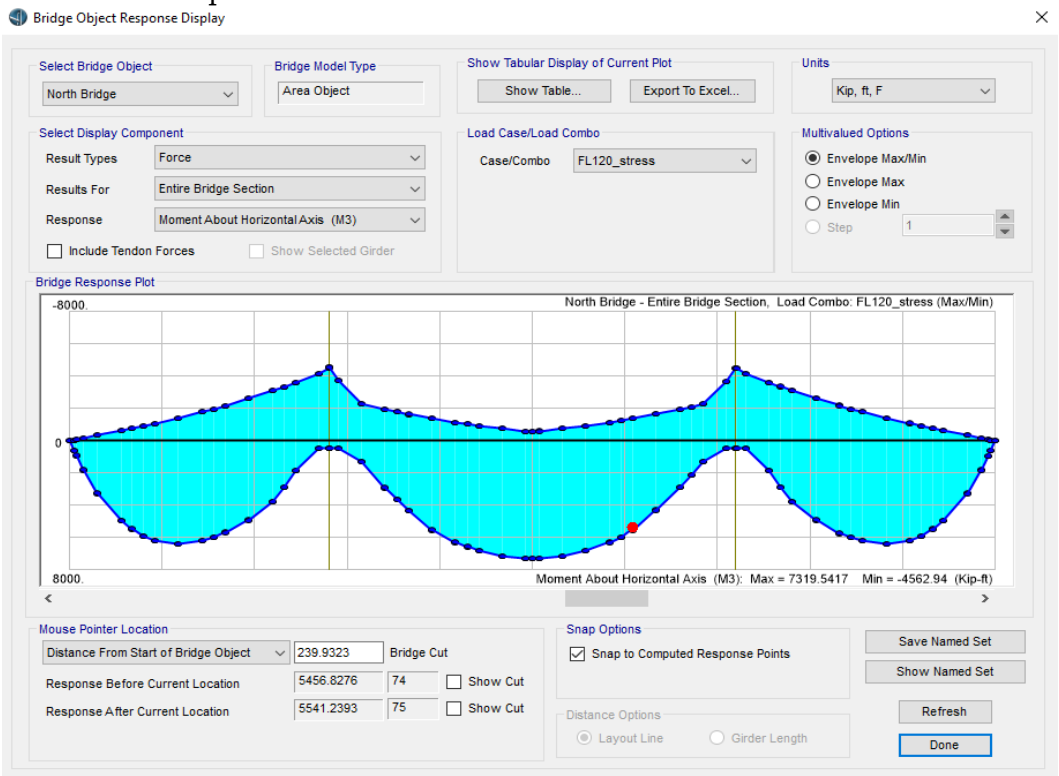
HL 93 Envelope of Live Load Moment – South Box



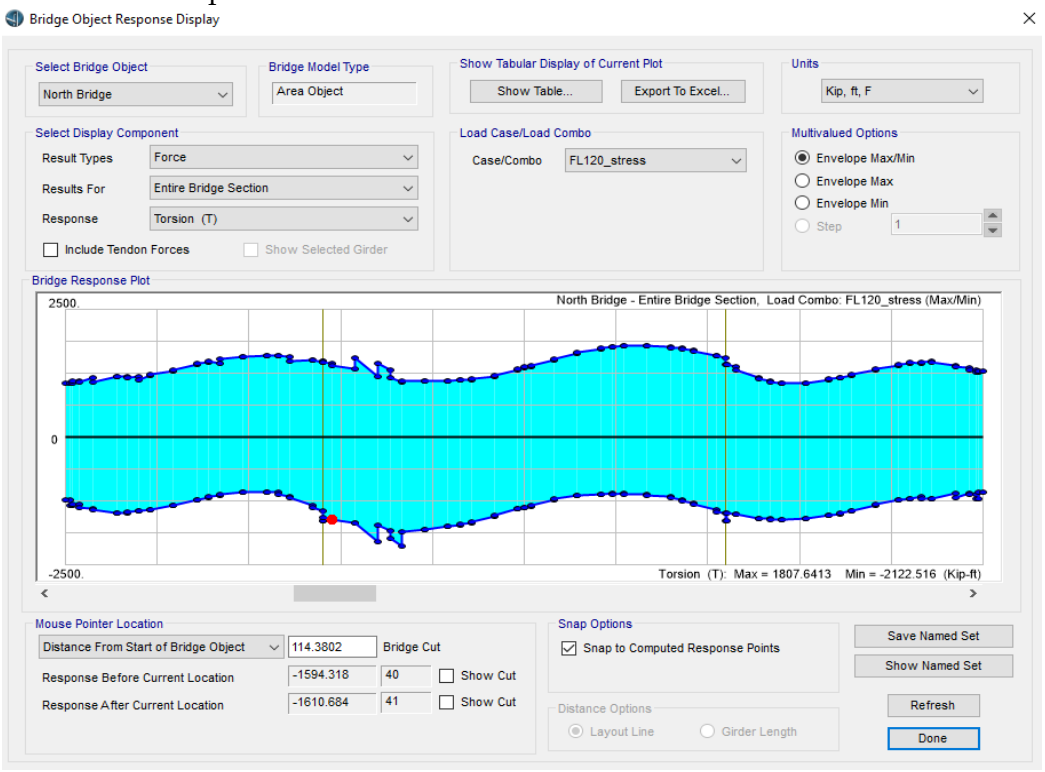
HL 93 Envelope of Live Load Torsion – North Box



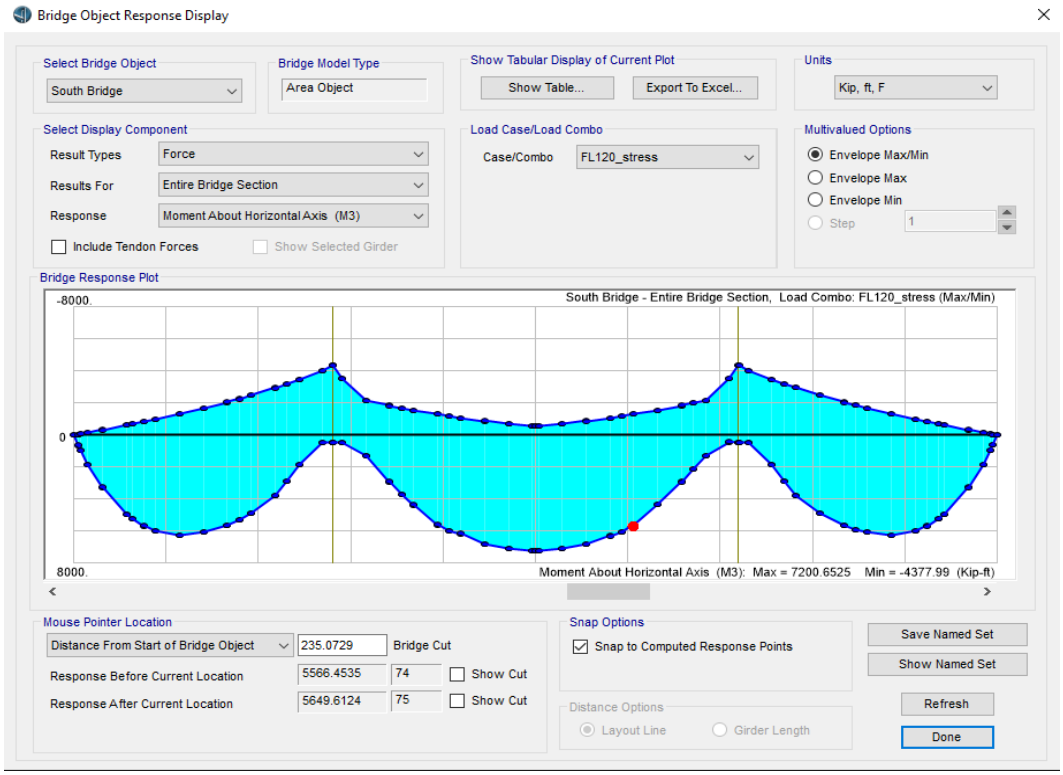
FL 120 Envelope of Live Load Moment – North Box



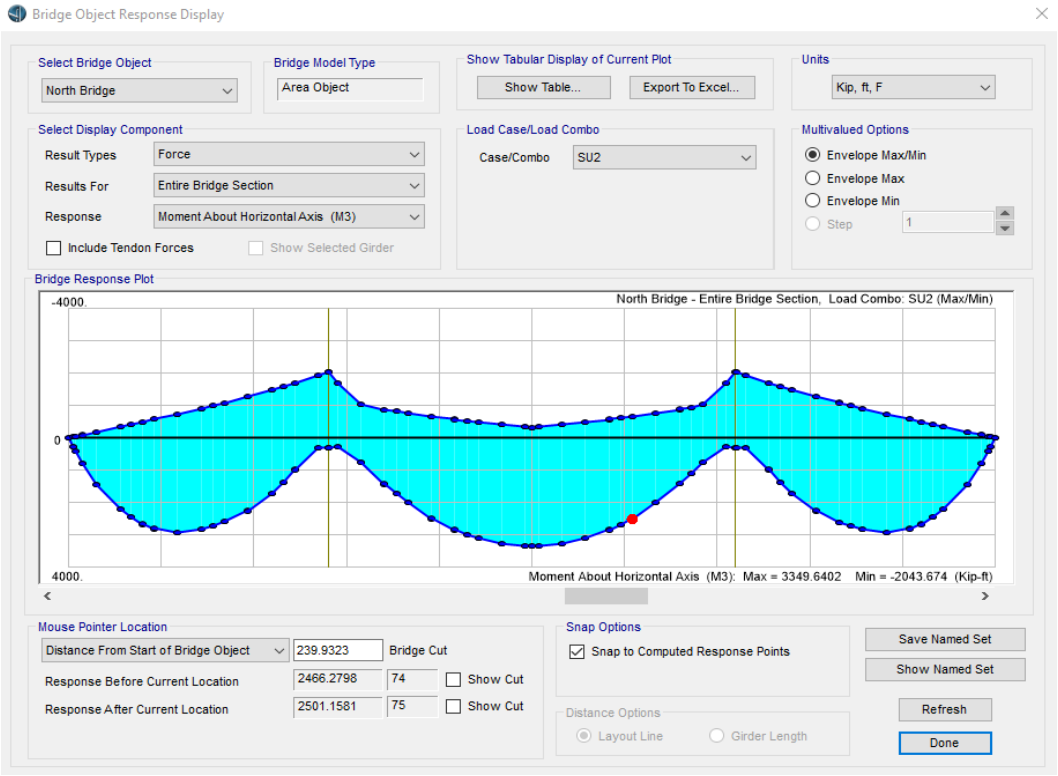
FL 120 Envelope of Live Load Torsion – North Box



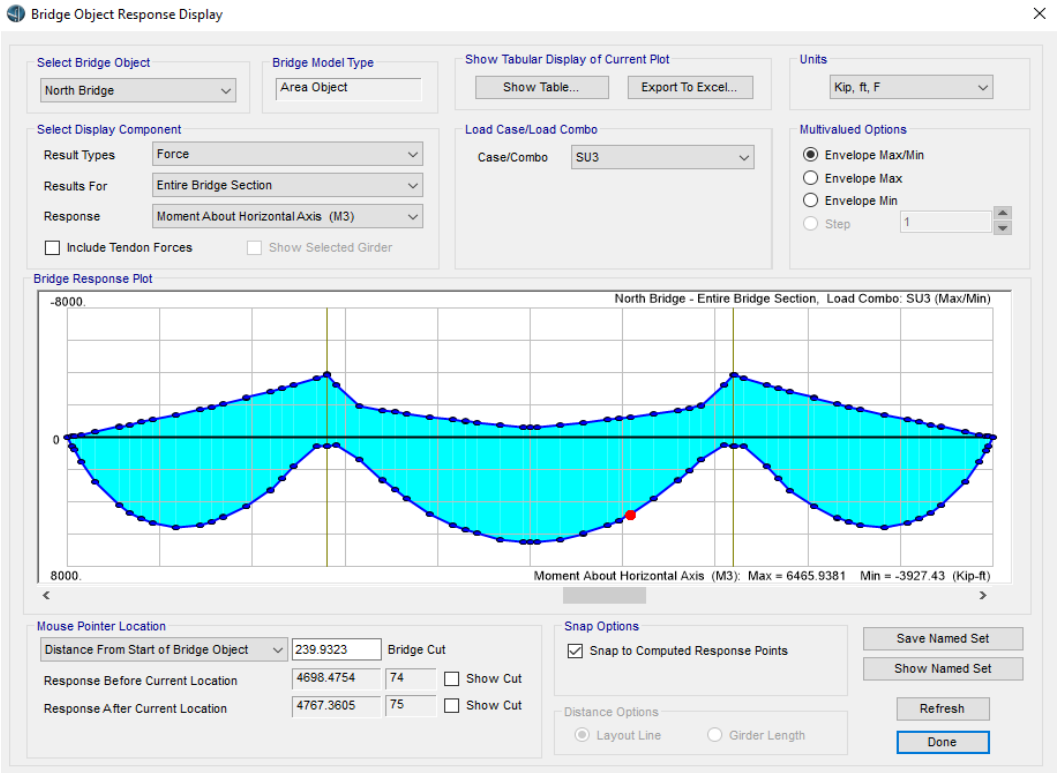
FL 120 Envelope of Live Load Moment – South Box



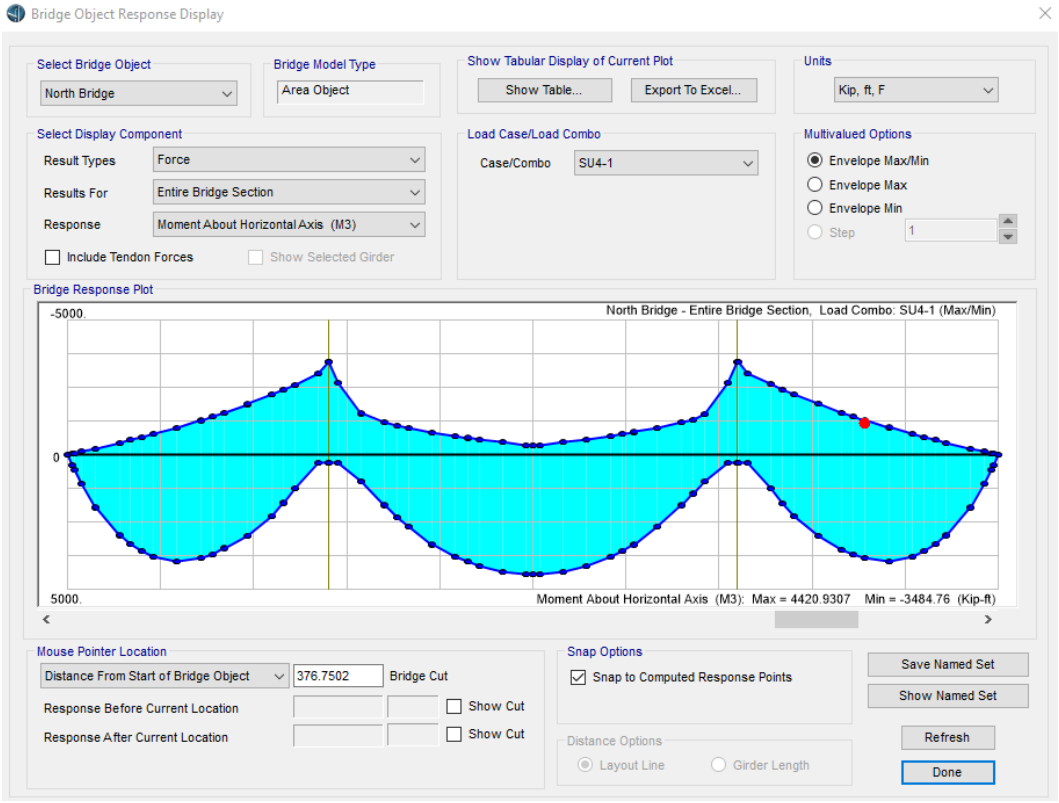
SU2 Envelope of Live Load Moment – North Box



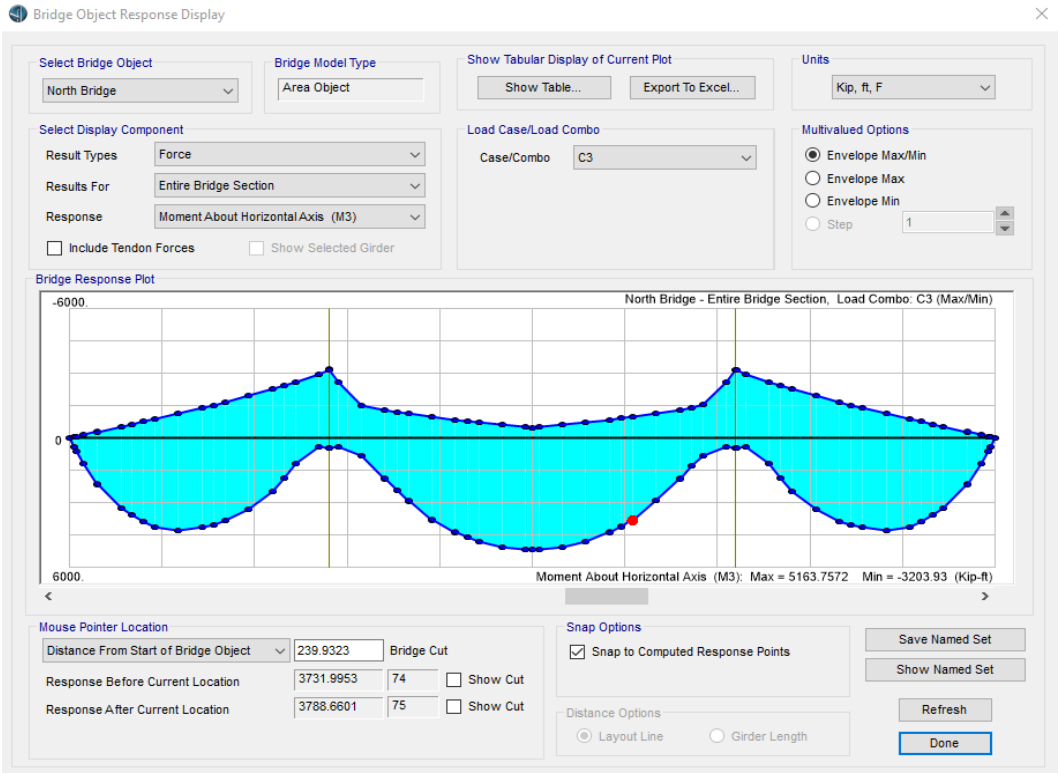
SU3 Envelope of Live Load Moment – North Box



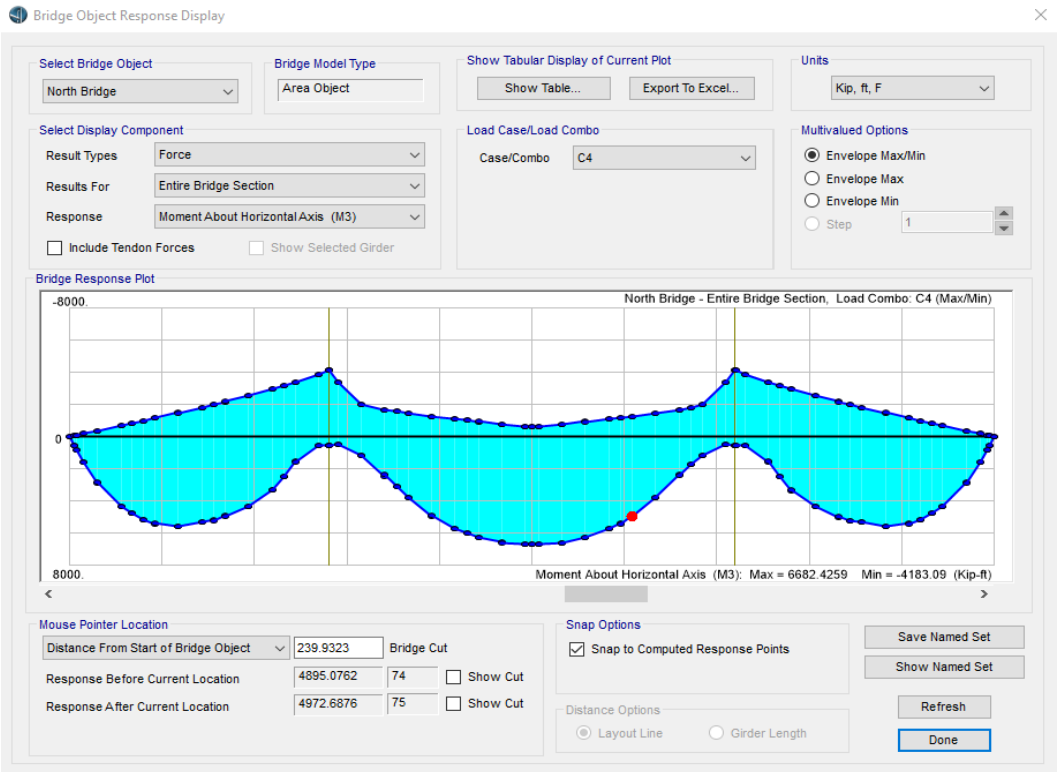
SU4 Envelope of Live Load Moment – North Box



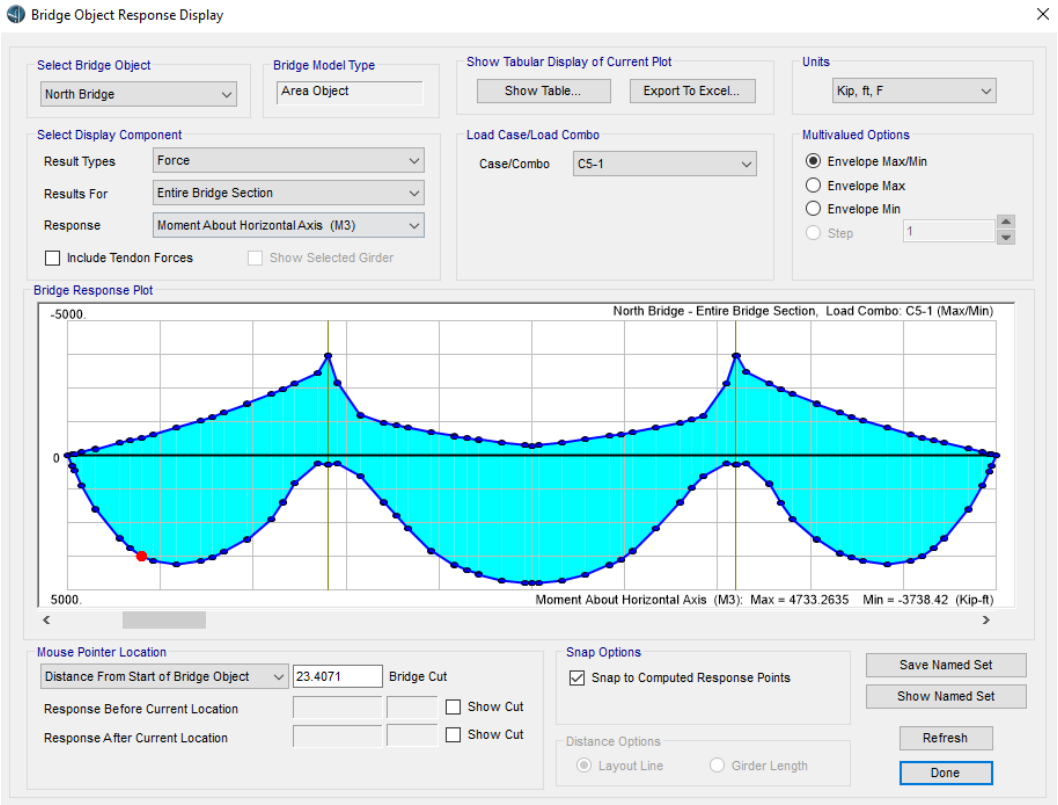
C3 Envelope of Live Load Moment – North Box



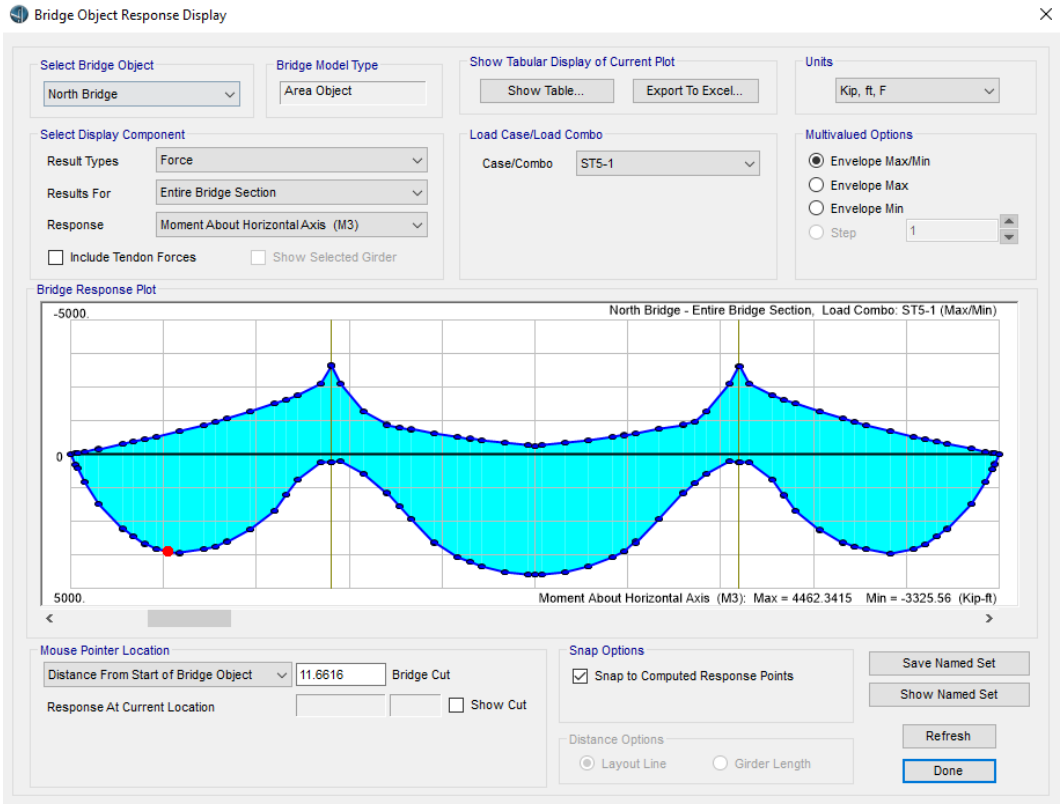
C4 Envelope of Live Load Moment – North Box



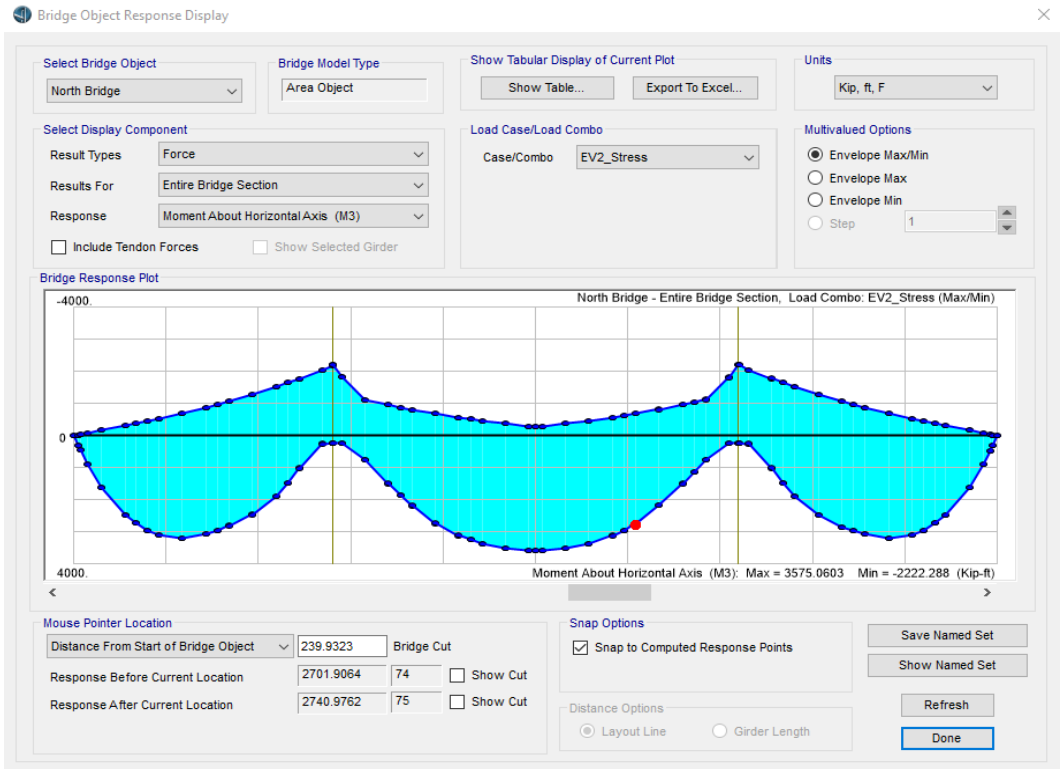
C5 Envelope of Live Load Moment – North Box



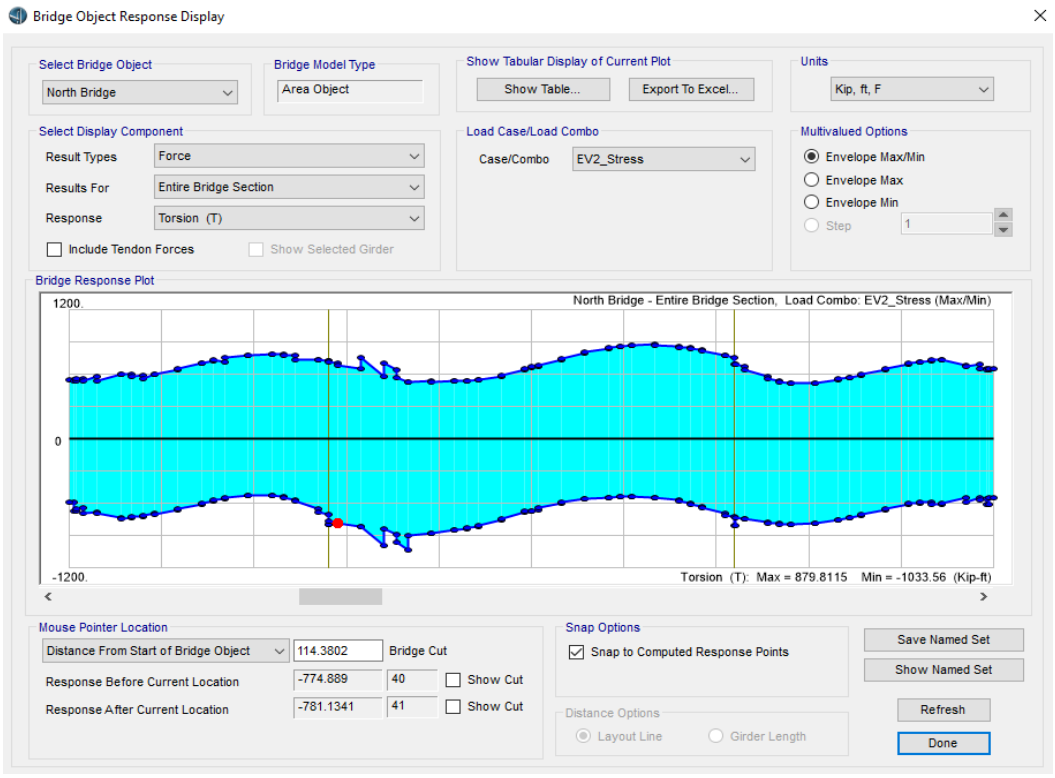
ST5 Envelope of Live Load Moment – North Box



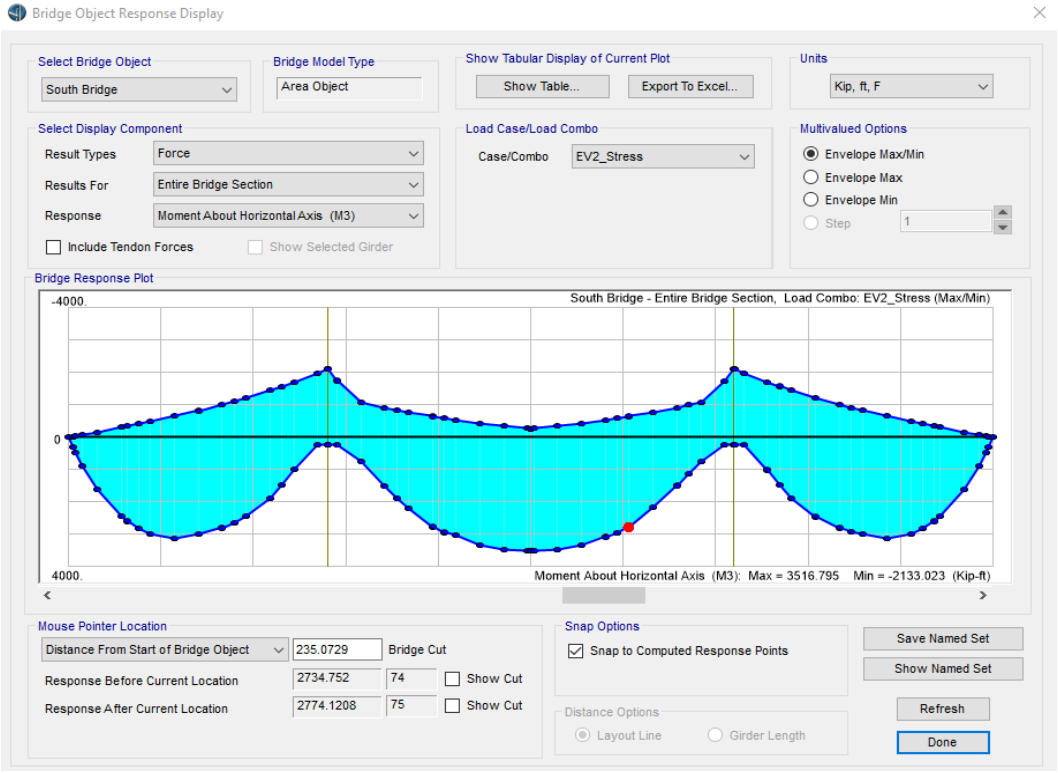
EV2 Envelope of Live Load Moment – North Box



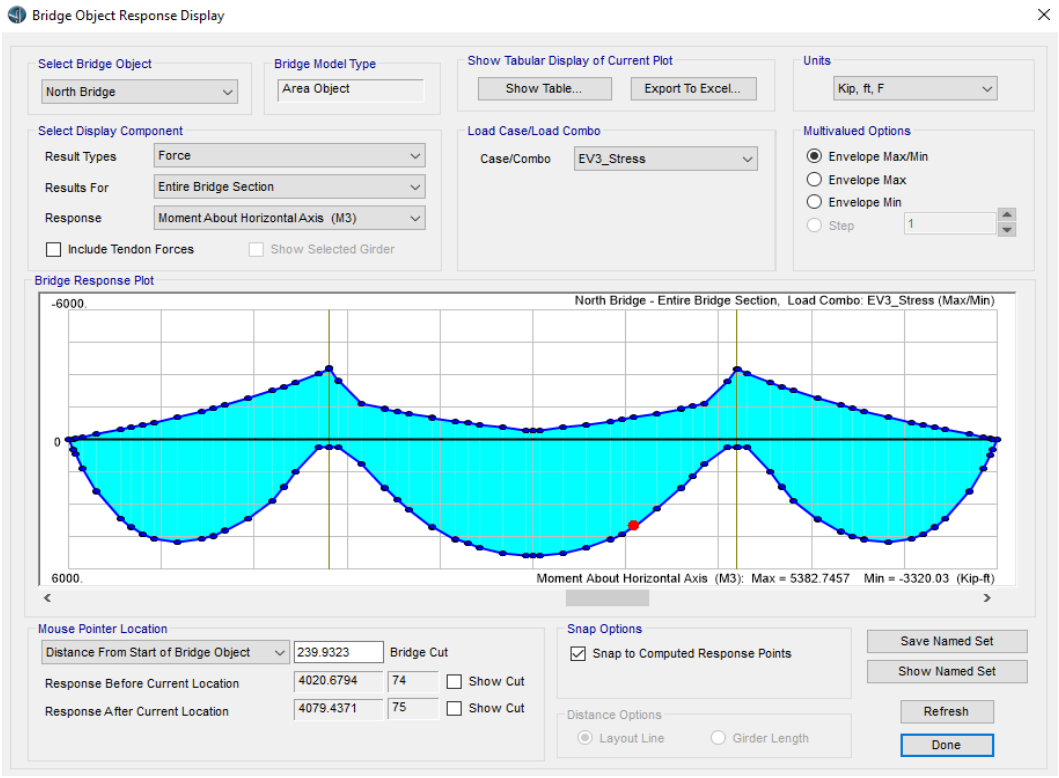
EV2 Envelope of Live Load Torsion – North Box



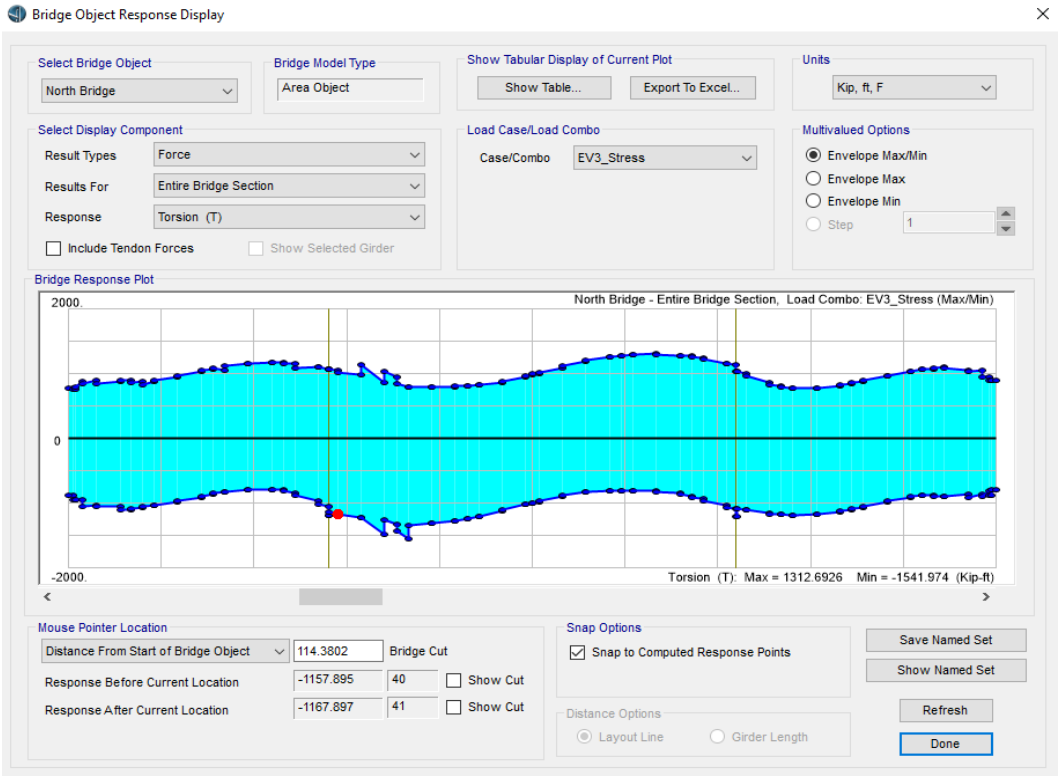
EV2 Envelope of Live Load Moment – South Box



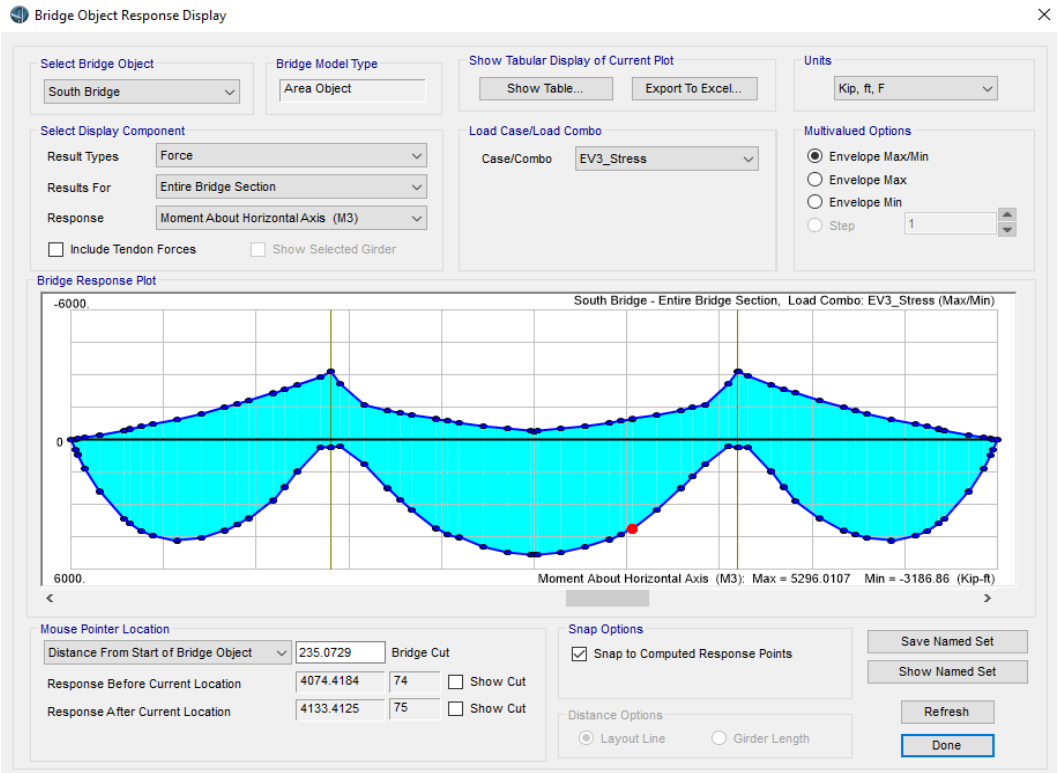
EV3 Envelope of Live Load Moment – North Box



EV3 Envelope of Live Load Torsion – North Box



EV3 Envelope of Live Load Moment – South Box



Limit States to Load Rate

Based on the MBE and Section 6A.5.11.2 of the FDOT BLRM, and considering that in Florida the Permit, Legal and Emergency trucks are only rated at the operating level (pp. 4 FL BLRM), the following are the limit states and live load factors that are used for load rating analysis.

LR Type	Loading	LR Type	LL Factor	
			Service III	Strength
Design	HL-93	Inventory	1.0	1.75
		Operating	0.9 SL	1.35
Permit	FL 120	Operating	0.9 SL*	1.35
Legal	7 Legal Trucks: SU2, SU3, SU4, C3, C4, C5, ST5	Operating	0.9 SL	1.35
Emergency	EV2 & EV3	Operating	0.9 SL*	1.3

(*) Multi-presence factor, m=1.0 for single-lane; SL = number of striped lanes

Load Rating Equation

The MBE (6A.4.2.1-1) load rating equation is shown below.

$$RF = \frac{C - \left[\gamma_{DC} \cdot DC + \gamma_{DW} \cdot DW + \gamma_{EL} \cdot EL + \gamma_{FR} \cdot FR + \gamma_{CR} \cdot (TU + CR + SH)\right]}{\gamma_{LL} \cdot (LL + IM)}$$

where,

RF	Rating factor
C	Factored capacity.
γ	Load factor
DC	Component dead load
DW	Wearing dead load
EL	Permanent locked-in erection forces
FR	Bearing friction, or frame action
TU	Uniform temperature
CR	Creep
SH	Shrinkage
LL	Live load
IM	Dynamic impact

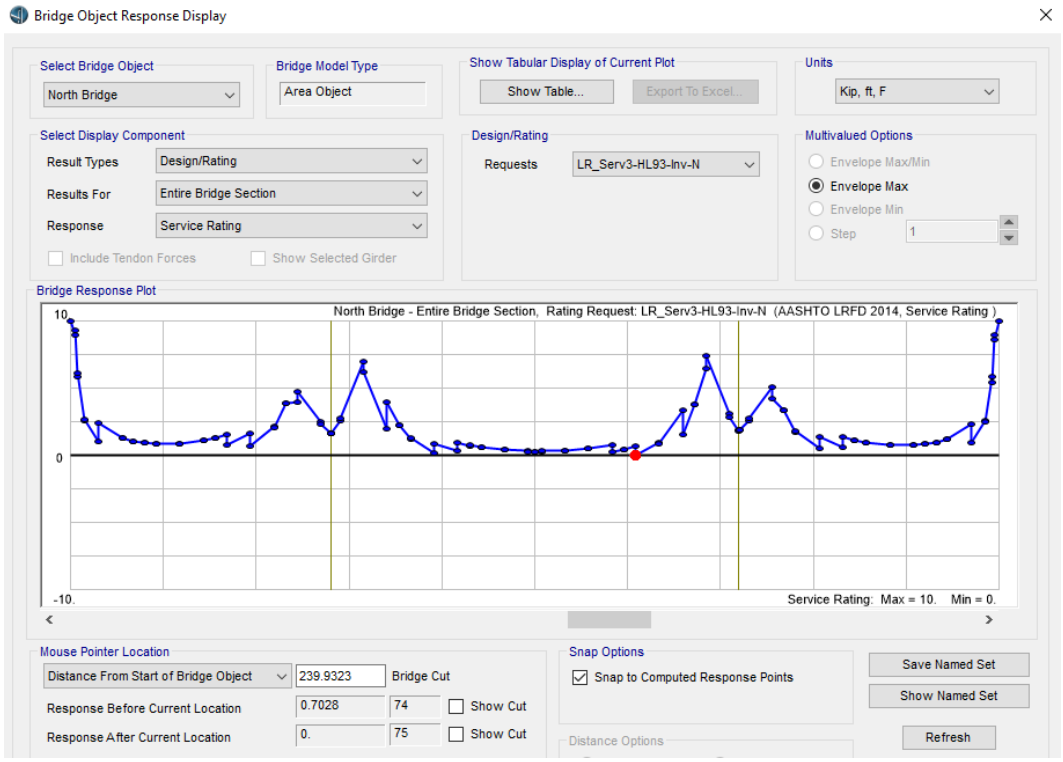
CSi allows internal combination of force effects with desired load factors. To simplify analysis, this was done for the combination of analysis cases into load cases and then using those load cases to create rating combinations. For service, a load case with the respective permanent load factors as prescribed AASHTO Tb. 3.4.1-1 was created. For strength, a similar combination case is created with the required permanent load factors. Both include the effects of self-weight of the structure, the weight of the barriers, and the time-dependent material effects such as CR, SH, PT, and relaxation, within the construction sequence. Then, rating cases including transient loads dependent of rating level and limit state are generated with its respective factors for different trucks. This allows for simple summarization and handling of output as shown in the tables below.

Service Rating

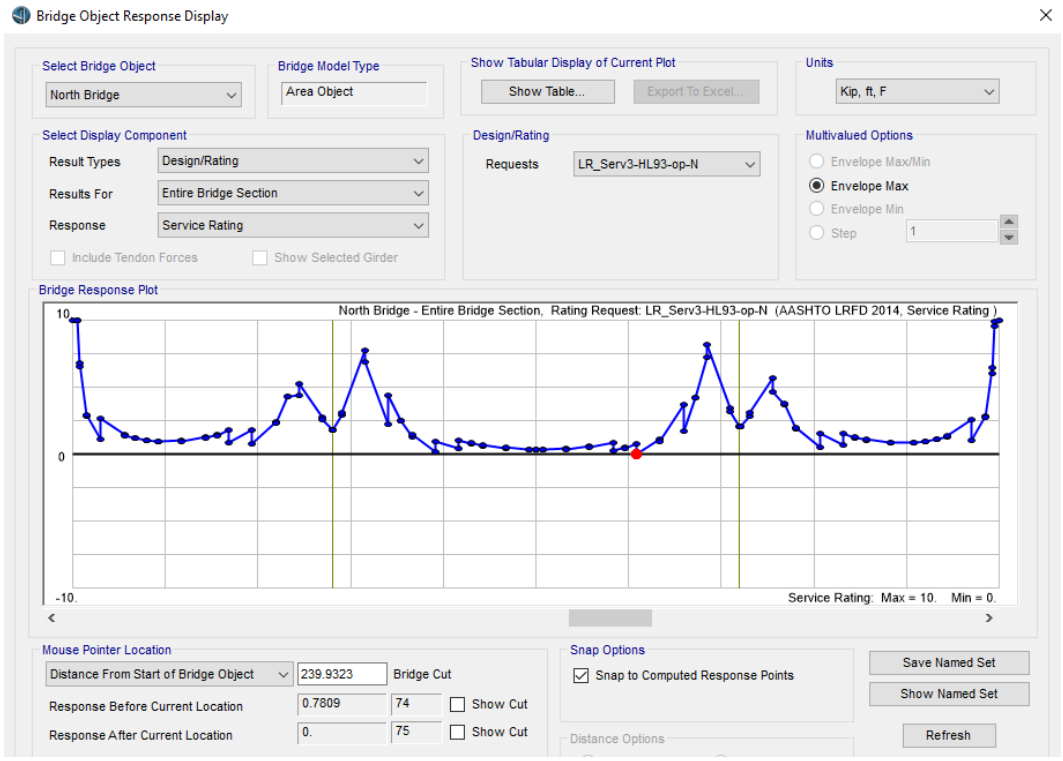
This section contains the LRFR ratings for longitudinal flexural stresses and principal web stresses under service level loading. Stress locations within the cross section are shown at top and bottom fibers of the segment.

Service level loads are calculated in accordance with the service load combinations provided in the FDOT BLRM, Section 6A.5.11.2, including Tbs. 6A.5.11.1 and 6A.5.11.2. In the analysis, the DC loading cases include locked-in forces (EL) resulting from staged construction, prestressing effects and creep and shrinkage. Where appropriate uniform temperature and temperature gradient may also be included. The results reported below show the plots for the HL-93 load rating factors, inventory and operating, along the bridge for the North and South boxes; in addition, tables showing only critical locations per span and per box are presented.

HL 93-N Inventory Rating Curves – Service III



HL 93-N Operating Rating Curves – Service III



The rating curves illustrate the rating factors along the bridge, and we noticed that the critical location is at 44 ft. downstation of Pier 3 at the North Box, or the joint of the 4th segment downstation. We will see in the limit states that this location always prevails, and it occurs in the North Box.

Based on these curves, we extract the numerical values in tables for the different limit states of the North Box. The tables that follows present only the most critical locations per span and per box.

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: DAR Date: 1/19

Desc: **Flexure Tensile Stress** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\100%\[Longitudinal Rating 20%IM.xlsx]Service Rating (North Box)

HL93 Inventory Service III (North Box) IM = 20% *LL factor = 1.20/1.33 = 0.9023*

TABLE: Bridge Super Rating AASHTORATE10 38 - CBoxService-Rating

Request	Bridge Obj	Station	Location	Cond. Fact	Syst. Fact	fc DC Top	fc DC Bott	fc TU Top	fc TU Bott	fc 0.5TG Top	fc 0.5TG Bott	fc LL+IM Top	fc LL+IM Bott	LL Step Type	fR Comp	fR Tens	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Text	Kip/in2	Kip/in2	Unitless	Text
Span 1																		
LR_Serv3-HL93-Inv-N	NB	76.38	Before	1	1	-0.473	-0.605	0.051	0.030	-0.056	0.103	0.113	0.348	Min	3.3	0.446	2.64	**Ext. span (φ_s = 1.00)**
LR_Serv3-HL93-Inv-N	NB	76.38	After	1	1	-0.680	-0.239	0.061	0.016	-0.057	0.104	0.113	0.352	Max	3.3	0.446	1.60	**Ext. span (φ_s = 1.00)**
Span 2																		
LR_Serv3-HL93-Inv-N	NB	154.38	Before	1	1.05	-0.770	-0.119	0.044	0.052	-0.078	0.148	0.052	0.478	Min	3.465	0.468	0.81	**Int. span (φ_s = 1.05)**
LR_Serv3-HL93-Inv-N	NB	154.38	After	1	1.05	-0.587	-0.508	0.037	0.069	-0.077	0.146	0.052	0.469	Max	3.465	0.468	1.62	**Int. span (φ_s = 1.05)**
LR_Serv3-HL93-Inv-N	NB	197.16	Before	1	1.05	-0.337	-0.267	0.016	0.087	-0.076	0.146	0.033	0.593	Min	3.465	0.468	0.85	**Int. span (φ_s = 1.05)**
LR_Serv3-HL93-Inv-N	NB	197.16	After	1	1.05	-0.335	-0.264	0.016	0.087	-0.076	0.146	0.033	0.593	Max	3.465	0.468	0.84	**Int. span (φ_s = 1.05)**
LR_Serv3-HL93-Inv-N	NB	239.93	Before	1	1.05	-0.584	-0.412	0.038	0.069	-0.077	0.146	0.052	0.471	Min	3.465	0.468	1.41	**Int. span (φ_s = 1.05)**
LR_Serv3-HL93-Inv-N	NB	239.93	After	1	1.05	-0.764	-0.026	0.045	0.052	-0.078	0.148	0.052	0.479	Max	3.465	0.468	0.61	**Int. span (φ_s = 1.05)**
Span 3																		
LR_Serv3-HL93-Inv-N	NB	317.93	Before	1	1	-0.706	-0.150	0.061	0.016	-0.057	0.104	0.113	0.353	Min	3.3	0.446	1.35	**Ext. span (φ_s = 1.00)**
LR_Serv3-HL93-Inv-N	NB	317.93	After	1	1	-0.500	-0.513	0.053	0.029	-0.057	0.103	0.113	0.349	Max	3.3	0.446	2.37	**Ext. span (φ_s = 1.00)**

HL93 Operating Service III (North Box) IM = 20% *LL factor = 1.20/1.33 = 0.9023*

TABLE: Bridge Super Rating AASHTORATE10 38 - CBoxService-Rating

Request	Bridge Obj	Station	Location	Cond. Fact	Syst. Fact	fc DC Top	fc DC Bott	fc TU Top	fc TU Bott	fc 0.5TG Top	fc 0.5TG Bott	fc LL+IM Top	fc LL+IM Bott	LL Step Type	fR Comp	fR Tens	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Text	Kip/in2	Kip/in2	Unitless	Text
Span 1																		
LR_Serv3-HL93-op-N	NB	76.38	Before	1	1	-0.473	-0.605	0.051	0.030	-0.056	0.103	0.099	0.313	Min	3.3	0.446	2.93	**Ext. span (φ_s = 1.00)**
LR_Serv3-HL93-op-N	NB	76.38	After	1	1	-0.680	-0.239	0.061	0.016	-0.057	0.104	0.099	0.317	Max	3.3	0.446	1.78	**Ext. span (φ_s = 1.00)**
Span 2																		
LR_Serv3-HL93-op-N	NB	154.38	Before	1	1.05	-0.770	-0.119	0.044	0.052	-0.078	0.148	0.045	0.430	Min	3.465	0.468	0.90	**Int. span (φ_s = 1.05)**
LR_Serv3-HL93-op-N	NB	154.38	After	1	1.05	-0.587	-0.508	0.037	0.069	-0.077	0.146	0.046	0.423	Max	3.465	0.468	1.80	**Int. span (φ_s = 1.05)**
LR_Serv3-HL93-op-N	NB	197.16	Before	1	1.05	-0.337	-0.267	0.016	0.087	-0.076	0.146	0.025	0.534	Min	3.465	0.468	0.94	**Int. span (φ_s = 1.05)**
LR_Serv3-HL93-op-N	NB	197.16	After	1	1.05	-0.335	-0.264	0.016	0.087	-0.076	0.146	0.025	0.534	Max	3.465	0.468	0.94	**Int. span (φ_s = 1.05)**
LR_Serv3-HL93-op-N	NB	239.93	Before	1	1.05	-0.584	-0.412	0.038	0.069	-0.077	0.146	0.046	0.424	Min	3.465	0.468	1.57	**Int. span (φ_s = 1.05)**
LR_Serv3-HL93-op-N	NB	239.93	After	1	1.05	-0.764	-0.026	0.045	0.052	-0.078	0.148	0.045	0.431	Max	3.465	0.468	0.68	**Int. span (φ_s = 1.05)**
Span 3																		
LR_Serv3-HL93-op-N	NB	317.93	Before	1	1	-0.706	-0.150	0.061	0.016	-0.057	0.104	0.099	0.318	Min	3.3	0.446	1.50	**Ext. span (φ_s = 1.00)**
LR_Serv3-HL93-op-N	NB	317.93	After	1	1	-0.500	-0.513	0.053	0.029	-0.057	0.103	0.099	0.314	Max	3.3	0.446	2.63	**Ext. span (φ_s = 1.00)**

HL93 Operating Service III Rating < 1.30, legal trucks rated below

BPA

Job: Br [redacted] over [redacted] LR 18.17.01 Computed by: DAR Date: 1/19

Desc: **Flexure Tensile Stress** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\100%\[Longitudinal Rating 20%IM.xlsx]Service Rating (North Box)

FL120 Operating Service III (North Box) IM = 20% *LL factor = 1.20/1.33 = 0.9023*

TABLE: Bridge Super Rating AASHTORATE10 38 - CBoxService-Rating

Request	Bridge Obj	Station	Location	Cond. Fact	Syst. Fact	fc DC Top	fc DC Bott	fc TU Top	fc TU Bott	fc 0.5TG Top	fc 0.5TG Bott	fc LL+IM Top	fc LL+IM Bott	LL Step Type	fR Comp	fR Tens	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Text	Kip/in2	Kip/in2	Unitless	Text
Span 1																		
LR_FL120_Stress_N	NB	76.38	Before	1	1	-0.473	-0.605	0.051	0.030	-0.056	0.103	0.100	0.358	Min	3.3	0.446	2.57	**Ext. span (φ_s = 1.00)**
LR_FL120_Stress_N	NB	76.38	After	1	1	-0.680	-0.239	0.061	0.016	-0.057	0.104	0.100	0.362	Max	3.3	0.446	1.56	**Ext. span (φ_s = 1.00)**
Span 2																		
LR_FL120_Stress_N	NB	154.38	Before	1	1.05	-0.770	-0.119	0.044	0.052	-0.078	0.148	0.051	0.417	Min	3.465	0.468	0.93	**Int. span (φ_s = 1.05)**
LR_FL120_Stress_N	NB	154.38	After	1	1.05	-0.587	-0.508	0.037	0.069	-0.077	0.146	0.052	0.410	Max	3.465	0.468	1.86	**Int. span (φ_s = 1.05)**
LR_FL120_Stress_N	NB	197.16	Before	1	1.05	-0.337	-0.267	0.016	0.087	-0.076	0.146	0.022	0.534	Min	3.465	0.468	0.94	**Int. span (φ_s = 1.05)**
LR_FL120_Stress_N	NB	197.16	After	1	1.05	-0.335	-0.264	0.016	0.087	-0.076	0.146	0.023	0.534	Max	3.465	0.468	0.94	**Int. span (φ_s = 1.05)**
LR_FL120_Stress_N	NB	239.93	Before	1	1.05	-0.584	-0.412	0.038	0.069	-0.077	0.146	0.051	0.410	Min	3.465	0.468	1.62	**Int. span (φ_s = 1.05)**
LR_FL120_Stress_N	NB	239.93	After	1	1.05	-0.764	-0.026	0.045	0.052	-0.078	0.148	0.051	0.417	Max	3.465	0.468	0.71	**Int. span (φ_s = 1.05)**
Span 3																		
LR_FL120_Stress_N	NB	317.93	Before	1	1	-0.706	-0.150	0.061	0.016	-0.057	0.104	0.100	0.363	Min	3.3	0.446	1.31	**Ext. span (φ_s = 1.00)**
LR_FL120_Stress_N	NB	317.93	After	1	1	-0.500	-0.513	0.053	0.029	-0.057	0.103	0.100	0.358	Max	3.3	0.446	2.30	**Ext. span (φ_s = 1.00)**

Since the rating factor for HL 93 Inventory and Operating for Service III are below 1.3, all legal trucks need to be rated. Also, since in all cases above, the North Box controls the rating, the FL Legal trucks and Emergency vehicles only show the results for the North Box. The following tables report the rating factors.

BPA

Job: Br [redacted] over [redacted] LR 18.17.01 Computed by: DAR Date: 1/19

Desc: **Flexure Tensile Stress** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\100%\[Longitudinal Rating 20%IM.xlsx]Service Rating (North Box)

SU2 Operating Service III (North Box) — IM = 20% *LL factor = 1.20/1.33 = 0.9023*

TABLE: Bridge Super Rating AASHTORATE10 38 - CBoxService-Rating

Request	Bridge Obj	Station	Location	Cond. Fact	Syst. Fact	fc DC Top	fc DC Bott	fc TU Top	fc TU Bott	fc 0.5TG Top	fc 0.5TG Bott	fc LL+IM Top	fc LL+IM Bott	LL Step Type	fR Comp	fR Tens	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Text	Kip/in2	Kip/in2	Unitless	Text
Span 1																		
LR_Serv3-SU2-op-N	NB	76.38	Before	1	1	-0.473	-0.605	0.051	0.030	-0.056	0.103	0.030	0.109	Min	3.3	0.446	8.46	**Ext. span (φ_s = 1.00)**
LR_Serv3-SU2-op-N	NB	76.38	After	1	1	-0.680	-0.239	0.061	0.016	-0.057	0.104	0.029	0.110	Max	3.3	0.446	5.14	**Ext. span (φ_s = 1.00)**
Span 2																		
LR_Serv3-SU2-op-N	NB	154.38	Before	1	1.05	-0.770	-0.119	0.044	0.052	-0.078	0.148	0.016	0.123	Min	3.465	0.468	3.16	**Int. span (φ_s = 1.05)**
LR_Serv3-SU2-op-N	NB	154.38	After	1	1.05	-0.587	-0.508	0.037	0.069	-0.077	0.146	0.016	0.121	Max	3.465	0.468	6.31	**Int. span (φ_s = 1.05)**
LR_Serv3-SU2-op-N	NB	197.16	Before	1	1.05	-0.337	-0.267	0.016	0.087	-0.076	0.146	0.007	0.157	Min	3.465	0.468	3.20	**Int. span (φ_s = 1.05)**
LR_Serv3-SU2-op-N	NB	197.16	After	1	1.05	-0.335	-0.264	0.016	0.087	-0.076	0.146	0.007	0.157	Max	3.465	0.468	3.18	**Int. span (φ_s = 1.05)**
LR_Serv3-SU2-op-N	NB	239.93	Before	1	1.05	-0.584	-0.412	0.038	0.069	-0.077	0.146	0.016	0.121	Min	3.465	0.468	5.51	**Int. span (φ_s = 1.05)**
LR_Serv3-SU2-op-N	NB	239.93	After	1	1.05	-0.764	-0.026	0.045	0.052	-0.078	0.148	0.015	0.123	Max	3.465	0.468	2.40	**Int. span (φ_s = 1.05)**
Span 3																		
LR_Serv3-SU2-op-N	NB	317.93	Before	1	1	-0.706	-0.150	0.061	0.016	-0.057	0.104	0.029	0.110	Min	3.3	0.446	4.33	**Ext. span (φ_s = 1.00)**
LR_Serv3-SU2-op-N	NB	317.93	After	1	1	-0.500	-0.513	0.053	0.029	-0.057	0.103	0.030	0.109	Max	3.3	0.446	7.60	**Ext. span (φ_s = 1.00)**

SU3 Operating Service III (North Box) — IM = 20% *LL factor = 1.20/1.33 = 0.9023*

TABLE: Bridge Super Rating AASHTORATE10 38 - CBoxService-Rating

Request	Bridge Obj	Station	Location	Cond. Fact	Syst. Fact	fc DC Top	fc DC Bott	fc TU Top	fc TU Bott	fc 0.5TG Top	fc 0.5TG Bott	fc LL+IM Top	fc LL+IM Bott	LL Step Type	fR Comp	fR Tens	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Text	Kip/in2	Kip/in2	Unitless	Text
Span 1																		
LR_Serv3-SU3-op-N	NB	76.38	Before	1	1	-0.473	-0.605	0.051	0.030	-0.056	0.103	0.057	0.205	Min	3.3	0.446	4.47	**Ext. span (φ_s = 1.00)**
LR_Serv3-SU3-op-N	NB	76.38	After	1	1	-0.680	-0.239	0.061	0.016	-0.057	0.104	0.056	0.208	Max	3.3	0.446	2.72	**Ext. span (φ_s = 1.00)**
Span 2																		
LR_Serv3-SU3-op-N	NB	154.38	Before	1	1.05	-0.770	-0.119	0.044	0.052	-0.078	0.148	0.030	0.235	Min	3.465	0.468	1.65	**Int. span (φ_s = 1.05)**
LR_Serv3-SU3-op-N	NB	154.38	After	1	1.05	-0.587	-0.508	0.037	0.069	-0.077	0.146	0.030	0.231	Max	3.465	0.468	3.30	**Int. span (φ_s = 1.05)**
LR_Serv3-SU3-op-N	NB	197.16	Before	1	1.05	-0.337	-0.267	0.016	0.087	-0.076	0.146	0.013	0.303	Min	3.465	0.468	1.66	**Int. span (φ_s = 1.05)**
LR_Serv3-SU3-op-N	NB	197.16	After	1	1.05	-0.335	-0.264	0.016	0.087	-0.076	0.146	0.013	0.303	Max	3.465	0.468	1.65	**Int. span (φ_s = 1.05)**
LR_Serv3-SU3-op-N	NB	239.93	Before	1	1.05	-0.584	-0.412	0.038	0.069	-0.077	0.146	0.030	0.231	Min	3.465	0.468	2.88	**Int. span (φ_s = 1.05)**
LR_Serv3-SU3-op-N	NB	239.93	After	1	1.05	-0.764	-0.026	0.045	0.052	-0.078	0.148	0.030	0.235	Max	3.465	0.468	1.25	**Int. span (φ_s = 1.05)**
Span 3																		
LR_Serv3-SU3-op-N	NB	317.93	Before	1	1	-0.706	-0.150	0.061	0.016	-0.057	0.104	0.056	0.208	Min	3.3	0.446	2.29	**Ext. span (φ_s = 1.00)**
LR_Serv3-SU3-op-N	NB	317.93	After	1	1	-0.500	-0.513	0.053	0.029	-0.057	0.103	0.057	0.206	Max	3.3	0.446	4.02	**Ext. span (φ_s = 1.00)**

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: DAR Date: 1/19

Desc: **Flexure Tensile Stress** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\100%\[Longitudinal Rating 20%IM.xlsx]Service Rating (North Box)

SU4 Operating Service III (North Box) IM = 20% *LL factor = 1.20/1.33 = 0.9023*

TABLE: Bridge Super Rating AASHTORATE10 38 - CBoxService-Rating

Request	Bridge Obj	Station	Location	Cond. Fact	Syst. Fact	fc DC Top	fc DC Bott	fc TU Top	fc TU Bott	fc 0.5TG Top	fc 0.5TG Bott	fc LL+IM Top	fc LL+IM Bott	LL Step Type	fR Comp	fR Tens	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Text	Kip/in2	Kip/in2	Unitless	Text
Span 1																		
LR_Serv3-SU4-op-N	NB	76.38	Before	1	1	-0.473	-0.605	0.051	0.030	-0.056	0.103	0.060	0.219	Min	3.3	0.446	4.20	**Ext. span (φ_s = 1.00)**
LR_Serv3-SU4-op-N	NB	76.38	After	1	1	-0.680	-0.239	0.061	0.016	-0.057	0.104	0.060	0.221	Max	3.3	0.446	2.55	**Ext. span (φ_s = 1.00)**
Span 2																		
LR_Serv3-SU4-op-N	NB	154.38	Before	1	1.05	-0.770	-0.119	0.044	0.052	-0.078	0.148	0.031	0.249	Min	3.465	0.468	1.56	**Int. span (φ_s = 1.05)**
LR_Serv3-SU4-op-N	NB	154.38	After	1	1.05	-0.587	-0.508	0.037	0.069	-0.077	0.146	0.032	0.245	Max	3.465	0.468	3.11	**Int. span (φ_s = 1.05)**
LR_Serv3-SU4-op-N	NB	197.16	Before	1	1.05	-0.337	-0.267	0.016	0.087	-0.076	0.146	0.014	0.322	Min	3.465	0.468	1.56	**Int. span (φ_s = 1.05)**
LR_Serv3-SU4-op-N	NB	197.16	After	1	1.05	-0.335	-0.264	0.016	0.087	-0.076	0.146	0.014	0.322	Max	3.465	0.468	1.55	**Int. span (φ_s = 1.05)**
LR_Serv3-SU4-op-N	NB	239.93	Before	1	1.05	-0.584	-0.412	0.038	0.069	-0.077	0.146	0.032	0.245	Min	3.465	0.468	2.72	**Int. span (φ_s = 1.05)**
LR_Serv3-SU4-op-N	NB	239.93	After	1	1.05	-0.764	-0.026	0.045	0.052	-0.078	0.148	0.031	0.249	Max	3.465	0.468	1.18	**Int. span (φ_s = 1.05)**
Span 3																		
LR_Serv3-SU4-op-N	NB	317.93	Before	1	1	-0.706	-0.150	0.061	0.016	-0.057	0.104	0.060	0.222	Min	3.3	0.446	2.15	**Ext. span (φ_s = 1.00)**
LR_Serv3-SU4-op-N	NB	317.93	After	1	1	-0.500	-0.513	0.053	0.029	-0.057	0.103	0.060	0.219	Max	3.3	0.446	3.77	**Ext. span (φ_s = 1.00)**

C3 Operating Service III (North Box) IM = 20% *LL factor = 1.20/1.33 = 0.9023*

TABLE: Bridge Super Rating AASHTORATE10 38 - CBoxService-Rating

Request	Bridge Obj	Station	Location	Cond. Fact	Syst. Fact	fc DC Top	fc DC Bott	fc TU Top	fc TU Bott	fc 0.5TG Top	fc 0.5TG Bott	fc LL+IM Top	fc LL+IM Bott	LL Step Type	fR Comp	fR Tens	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Text	Kip/in2	Kip/in2	Unitless	Text
Span 1																		
LR_Serv3-C3-op-N	NB	76.38	Before	1	1	-0.473	-0.605	0.051	0.030	-0.056	0.103	0.046	0.159	Min	3.3	0.446	5.76	**Ext. span (φ_s = 1.00)**
LR_Serv3-C3-op-N	NB	76.38	After	1	1	-0.680	-0.239	0.061	0.016	-0.057	0.104	0.045	0.161	Max	3.3	0.446	3.50	**Ext. span (φ_s = 1.00)**
Span 2																		
LR_Serv3-C3-op-N	NB	154.38	Before	1	1.05	-0.770	-0.119	0.044	0.052	-0.078	0.148	0.023	0.188	Min	3.465	0.468	2.05	**Int. span (φ_s = 1.05)**
LR_Serv3-C3-op-N	NB	154.38	After	1	1.05	-0.587	-0.508	0.037	0.069	-0.077	0.146	0.023	0.185	Max	3.465	0.468	4.11	**Int. span (φ_s = 1.05)**
LR_Serv3-C3-op-N	NB	197.16	Before	1	1.05	-0.337	-0.267	0.016	0.087	-0.076	0.146	0.010	0.242	Min	3.465	0.468	2.07	**Int. span (φ_s = 1.05)**
LR_Serv3-C3-op-N	NB	197.16	After	1	1.05	-0.335	-0.264	0.016	0.087	-0.076	0.146	0.010	0.242	Max	3.465	0.468	2.06	**Int. span (φ_s = 1.05)**
LR_Serv3-C3-op-N	NB	239.93	Before	1	1.05	-0.584	-0.412	0.038	0.069	-0.077	0.146	0.023	0.185	Min	3.465	0.468	3.59	**Int. span (φ_s = 1.05)**
LR_Serv3-C3-op-N	NB	239.93	After	1	1.05	-0.764	-0.026	0.045	0.052	-0.078	0.148	0.023	0.188	Max	3.465	0.468	1.56	**Int. span (φ_s = 1.05)**
Span 3																		
LR_Serv3-C3-op-N	NB	317.93	Before	1	1	-0.706	-0.150	0.061	0.016	-0.057	0.104	0.045	0.162	Min	3.3	0.446	2.95	**Ext. span (φ_s = 1.00)**
LR_Serv3-C3-op-N	NB	317.93	After	1	1	-0.500	-0.513	0.053	0.029	-0.057	0.103	0.046	0.160	Max	3.3	0.446	5.17	**Ext. span (φ_s = 1.00)**

BPA

Job: Br [redacted] over [redacted] LR 18.17.01 Computed by: DAR Date: 1/19

Desc: **Flexure Tensile Stress** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\100%\[Longitudinal Rating 20%IM.xlsx]Service Rating (North Box)

C4 Operating Service III (North Box) — IM = 20% *LL factor = 1.20/1.33 = 0.9023*

TABLE: Bridge Super Rating AASHTORATE10 38 - CBoxService-Rating

Request	Bridge Obj	Station	Location	Cond. Fact	Syst. Fact	fc DC Top	fc DC Bott	fc TU Top	fc TU Bott	fc 0.5TG Top	fc 0.5TG Bott	fc LL+IM Top	fc LL+IM Bott	LL Step Type	fR Comp	fR Tens	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Text	Kip/in2	Kip/in2	Unitless	Text
Span 1																		
LR_Serv3-C4-op-N	NB	76.38	Before	1	1	-0.473	-0.605	0.051	0.030	-0.056	0.103	0.059	0.209	Min	3.3	0.446	4.40	**Ext. span (φ_s = 1.00)**
LR_Serv3-C4-op-N	NB	76.38	After	1	1	-0.680	-0.239	0.061	0.016	-0.057	0.104	0.059	0.211	Max	3.3	0.446	2.68	**Ext. span (φ_s = 1.00)**
Span 2																		
LR_Serv3-C4-op-N	NB	154.38	Before	1	1.05	-0.770	-0.119	0.044	0.052	-0.078	0.148	0.030	0.248	Min	3.465	0.468	1.56	**Int. span (φ_s = 1.05)**
LR_Serv3-C4-op-N	NB	154.38	After	1	1.05	-0.587	-0.508	0.037	0.069	-0.077	0.146	0.030	0.244	Max	3.465	0.468	3.12	**Int. span (φ_s = 1.05)**
LR_Serv3-C4-op-N	NB	197.16	Before	1	1.05	-0.337	-0.267	0.016	0.087	-0.076	0.146	0.013	0.314	Min	3.465	0.468	1.60	**Int. span (φ_s = 1.05)**
LR_Serv3-C4-op-N	NB	197.16	After	1	1.05	-0.335	-0.264	0.016	0.087	-0.076	0.146	0.013	0.314	Max	3.465	0.468	1.59	**Int. span (φ_s = 1.05)**
LR_Serv3-C4-op-N	NB	239.93	Before	1	1.05	-0.584	-0.412	0.038	0.069	-0.077	0.146	0.030	0.244	Min	3.465	0.468	2.73	**Int. span (φ_s = 1.05)**
LR_Serv3-C4-op-N	NB	239.93	After	1	1.05	-0.764	-0.026	0.045	0.052	-0.078	0.148	0.030	0.248	Max	3.465	0.468	1.19	**Int. span (φ_s = 1.05)**
Span 3																		
LR_Serv3-C4-op-N	NB	317.93	Before	1	1	-0.706	-0.150	0.061	0.016	-0.057	0.104	0.059	0.212	Min	3.3	0.446	2.25	**Ext. span (φ_s = 1.00)**
LR_Serv3-C4-op-N	NB	317.93	After	1	1	-0.500	-0.513	0.053	0.029	-0.057	0.103	0.059	0.209	Max	3.3	0.446	3.95	**Ext. span (φ_s = 1.00)**

C5 Operating Service III (North Box) — IM = 20% *LL factor = 1.20/1.33 = 0.9023*

TABLE: Bridge Super Rating AASHTORATE10 38 - CBoxService-Rating

Request	Bridge Obj	Station	Location	Cond. Fact	Syst. Fact	fc DC Top	fc DC Bott	fc TU Top	fc TU Bott	fc 0.5TG Top	fc 0.5TG Bott	fc LL+IM Top	fc LL+IM Bott	LL Step Type	fR Comp	fR Tens	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Text	Kip/in2	Kip/in2	Unitless	Text
Span 1																		
LR_Serv3-C5-op-N	NB	76.38	Before	1	1	-0.473	-0.605	0.051	0.030	-0.056	0.103	0.065	0.227	Min	3.3	0.446	4.05	**Ext. span (φ_s = 1.00)**
LR_Serv3-C5-op-N	NB	76.38	After	1	1	-0.680	-0.239	0.061	0.016	-0.057	0.104	0.064	0.229	Max	3.3	0.446	2.46	**Ext. span (φ_s = 1.00)**
Span 2																		
LR_Serv3-C5-op-N	NB	154.38	Before	1	1.05	-0.770	-0.119	0.044	0.052	-0.078	0.148	0.032	0.268	Min	3.465	0.468	1.44	**Int. span (φ_s = 1.05)**
LR_Serv3-C5-op-N	NB	154.38	After	1	1.05	-0.587	-0.508	0.037	0.069	-0.077	0.146	0.033	0.264	Max	3.465	0.468	2.88	**Int. span (φ_s = 1.05)**
LR_Serv3-C5-op-N	NB	197.16	Before	1	1.05	-0.337	-0.267	0.016	0.087	-0.076	0.146	0.014	0.345	Min	3.465	0.468	1.45	**Int. span (φ_s = 1.05)**
LR_Serv3-C5-op-N	NB	197.16	After	1	1.05	-0.335	-0.264	0.016	0.087	-0.076	0.146	0.014	0.345	Max	3.465	0.468	1.45	**Int. span (φ_s = 1.05)**
LR_Serv3-C5-op-N	NB	239.93	Before	1	1.05	-0.584	-0.412	0.038	0.069	-0.077	0.146	0.033	0.264	Min	3.465	0.468	2.52	**Int. span (φ_s = 1.05)**
LR_Serv3-C5-op-N	NB	239.93	After	1	1.05	-0.764	-0.026	0.045	0.052	-0.078	0.148	0.032	0.268	Max	3.465	0.468	1.10	**Int. span (φ_s = 1.05)**
Span 3																		
LR_Serv3-C5-op-N	NB	317.93	Before	1	1	-0.706	-0.150	0.061	0.016	-0.057	0.104	0.064	0.230	Min	3.3	0.446	2.07	**Ext. span (φ_s = 1.00)**
LR_Serv3-C5-op-N	NB	317.93	After	1	1	-0.500	-0.513	0.053	0.029	-0.057	0.103	0.065	0.227	Max	3.3	0.446	3.64	**Ext. span (φ_s = 1.00)**

BPA

Job: Br [redacted] over [redacted] LR 18.17.01 Computed by: DAR Date: 1/19

Desc: **Flexure Tensile Stress** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\100%\[Longitudinal Rating 20%IM.xlsx]Service Rating (North Box)

ST5 Operating Service III (North Box) IM = 20% *LL factor = 1.20/1.33 = 0.9023*

TABLE: Bridge Super Rating AASHTORATE10 38 - CBoxService-Rating

Request	Bridge Obj	Station	Location	Cond. Fact	Syst. Fact	fc DC Top	fc DC Bott	fc TU Top	fc TU Bott	fc 0.5TG Top	fc 0.5TG Bott	fc LL+IM Top	fc LL+IM Bott	LL Step Type	fR Comp	fR Tens	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Text	Kip/in2	Kip/in2	Unitless	Text
Span 1																		
LR_Serv3-ST5-op-N	NB	76.38	Before	1	1	-0.473	-0.605	0.051	0.030	-0.056	0.103	0.061	0.203	Min	3.3	0.446	4.52	**Ext. span (φ_s = 1.00)**
LR_Serv3-ST5-op-N	NB	76.38	After	1	1	-0.680	-0.239	0.061	0.016	-0.057	0.104	0.061	0.206	Max	3.3	0.446	2.75	**Ext. span (φ_s = 1.00)**
Span 2																		
LR_Serv3-ST5-op-N	NB	154.38	Before	1	1.05	-0.770	-0.119	0.044	0.052	-0.078	0.148	0.029	0.251	Min	3.465	0.468	1.54	**Int. span (φ_s = 1.05)**
LR_Serv3-ST5-op-N	NB	154.38	After	1	1.05	-0.587	-0.508	0.037	0.069	-0.077	0.146	0.030	0.247	Max	3.465	0.468	3.08	**Int. span (φ_s = 1.05)**
LR_Serv3-ST5-op-N	NB	197.16	Before	1	1.05	-0.337	-0.267	0.016	0.087	-0.076	0.146	0.013	0.326	Min	3.465	0.468	1.54	**Int. span (φ_s = 1.05)**
LR_Serv3-ST5-op-N	NB	197.16	After	1	1.05	-0.335	-0.264	0.016	0.087	-0.076	0.146	0.013	0.326	Max	3.465	0.468	1.53	**Int. span (φ_s = 1.05)**
LR_Serv3-ST5-op-N	NB	239.93	Before	1	1.05	-0.584	-0.412	0.038	0.069	-0.077	0.146	0.030	0.247	Min	3.465	0.468	2.69	**Int. span (φ_s = 1.05)**
LR_Serv3-ST5-op-N	NB	239.93	After	1	1.05	-0.764	-0.026	0.045	0.052	-0.078	0.148	0.029	0.251	Max	3.465	0.468	1.17	**Int. span (φ_s = 1.05)**
Span 3																		
LR_Serv3-ST5-op-N	NB	317.93	Before	1	1	-0.706	-0.150	0.061	0.016	-0.057	0.104	0.061	0.206	Min	3.3	0.446	2.31	**Ext. span (φ_s = 1.00)**
LR_Serv3-ST5-op-N	NB	317.93	After	1	1	-0.500	-0.513	0.053	0.029	-0.057	0.103	0.061	0.204	Max	3.3	0.446	4.05	**Ext. span (φ_s = 1.00)**

BPA

Job: Br [redacted] over [redacted] LR 18.17.01 Computed by: DAR Date: 1/19

Desc: **Flexure Tensile Stress** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\100%\[Longitudinal Rating 20%IM.xlsx]Service Rating (North Box)

EV2 Operating Service III (North Box) IM = 20% *LL factor = 1.20/1.33 = 0.9023*

TABLE: Bridge Super Rating AASHTORATE10 38 - CBoxService-Rating

Request	Bridge Obj	Station	Location	Cond. Fact	Syst. Fact	fc DC Top	fc DC Bott	fc TU Top	fc TU Bott	fc 0.5TG Top	fc 0.5TG Bott	fc LL+IM Top	fc LL+IM Bott	LL Step Type	fR Comp	fR Tens	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Text	Kip/in2	Kip/in2	Unitless	Text
Span 1																		
LR_Serv3-EV2-op-N	NB	76.38	Before	1	1	-0.473	-0.605	0.051	0.030	-0.056	0.103	0.179	0.179	Min	3.3	0.446	5.12	**Ext. span (φ_s = 1.00)**
LR_Serv3-EV2-op-N	NB	76.38	After	1	1	-0.680	-0.239	0.061	0.016	-0.057	0.104	0.181	0.181	Max	3.3	0.446	3.11	**Ext. span (φ_s = 1.00)**
Span 2																		
LR_Serv3-EV2-op-N	NB	154.38	Before	1	1.05	-0.770	-0.119	0.044	0.052	-0.078	0.148	0.204	0.205	Min	3.465	0.468	1.89	**Int. span (φ_s = 1.05)**
LR_Serv3-EV2-op-N	NB	154.38	After	1	1.05	-0.587	-0.508	0.037	0.069	-0.077	0.146	0.201	0.201	Max	3.465	0.468	3.78	**Int. span (φ_s = 1.05)**
LR_Serv3-EV2-op-N	NB	197.16	Before	1	1.05	-0.337	-0.267	0.016	0.087	-0.076	0.146	0.260	0.261	Min	3.465	0.468	1.93	**Int. span (φ_s = 1.05)**
LR_Serv3-EV2-op-N	NB	197.16	After	1	1.05	-0.335	-0.264	0.016	0.087	-0.076	0.146	0.260	0.261	Max	3.465	0.468	1.92	**Int. span (φ_s = 1.05)**
LR_Serv3-EV2-op-N	NB	239.93	Before	1	1.05	-0.584	-0.412	0.038	0.069	-0.077	0.146	0.201	0.201	Min	3.465	0.468	3.30	**Int. span (φ_s = 1.05)**
LR_Serv3-EV2-op-N	NB	239.93	After	1	1.05	-0.764	-0.026	0.045	0.052	-0.078	0.148	0.204	0.205	Max	3.465	0.468	1.44	**Int. span (φ_s = 1.05)**
Span 3																		
LR_Serv3-EV2-op-N	NB	317.93	Before	1	1	-0.706	-0.150	0.061	0.016	-0.057	0.104	0.181	0.182	Min	3.3	0.446	2.62	**Ext. span (φ_s = 1.00)**
LR_Serv3-EV2-op-N	NB	317.93	After	1	1	-0.500	-0.513	0.053	0.029	-0.057	0.103	0.179	0.180	Max	3.3	0.446	4.60	**Ext. span (φ_s = 1.00)**

EV3 Operating Service III (North Box) IM = 20% *LL factor = 1.20/1.33 = 0.9023*

TABLE: Bridge Super Rating AASHTORATE10 38 - CBoxService-Rating

Request	Bridge Obj	Station	Location	Cond. Fact	Syst. Fact	fc DC Top	fc DC Bott	fc TU Top	fc TU Bott	fc 0.5TG Top	fc 0.5TG Bott	fc LL+IM Top	fc LL+IM Bott	LL Step Type	fR Comp	fR Tens	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Text	Kip/in2	Kip/in2	Unitless	Text
Span 1																		
LR_Serv3-EV3-op-N	NB	76.38	Before	1	1	-0.473	-0.605	0.051	0.030	-0.056	0.103	0.073	0.266	Min	3.3	0.446	3.45	**Ext. span (φ_s = 1.00)**
LR_Serv3-EV3-op-N	NB	76.38	After	1	1	-0.680	-0.239	0.061	0.016	-0.057	0.104	0.073	0.269	Max	3.3	0.446	2.10	**Ext. span (φ_s = 1.00)**
Span 2																		
LR_Serv3-EV3-op-N	NB	154.38	Before	1	1.05	-0.770	-0.119	0.044	0.052	-0.078	0.148	0.038	0.305	Min	3.465	0.468	1.27	**Int. span (φ_s = 1.05)**
LR_Serv3-EV3-op-N	NB	154.38	After	1	1.05	-0.587	-0.508	0.037	0.069	-0.077	0.146	0.038	0.300	Max	3.465	0.468	2.54	**Int. span (φ_s = 1.05)**
LR_Serv3-EV3-op-N	NB	197.16	Before	1	1.05	-0.337	-0.267	0.016	0.087	-0.076	0.146	0.017	0.393	Min	3.465	0.468	1.28	**Int. span (φ_s = 1.05)**
LR_Serv3-EV3-op-N	NB	197.16	After	1	1.05	-0.335	-0.264	0.016	0.087	-0.076	0.146	0.017	0.393	Max	3.465	0.468	1.27	**Int. span (φ_s = 1.05)**
LR_Serv3-EV3-op-N	NB	239.93	Before	1	1.05	-0.584	-0.412	0.038	0.069	-0.077	0.146	0.038	0.300	Min	3.465	0.468	2.22	**Int. span (φ_s = 1.05)**
LR_Serv3-EV3-op-N	NB	239.93	After	1	1.05	-0.764	-0.026	0.045	0.052	-0.078	0.148	0.038	0.305	Max	3.465	0.468	0.96	**Int. span (φ_s = 1.05)**
Span 3																		
LR_Serv3-EV3-op-N	NB	317.93	Before	1	1	-0.706	-0.150	0.061	0.016	-0.057	0.104	0.073	0.270	Min	3.3	0.446	1.77	**Ext. span (φ_s = 1.00)**
LR_Serv3-EV3-op-N	NB	317.93	After	1	1	-0.500	-0.513	0.053	0.029	-0.057	0.103	0.073	0.267	Max	3.3	0.446	3.10	**Ext. span (φ_s = 1.00)**

EV3 Operating Service III Rating < 1.00, will use posting avoidance

Strength Rating

Strength level loads are calculated in accordance with the Strength load combinations given in FDOT BLRM, Section 6A.5.11.2, including Tables 6A.5.11.1 and 6A.5.11.2. For strength limit states, it is necessary to extract separately from the model the dead load forces (DC), including locked-in forces (EL), creep and shrinkage effects (CR+SH), secondary prestressing effects (PT2), uniform temperature (TU) and temperature gradient (TG) as the AASHTO load combination assign different load factors.

The Flexural Strength load rating factor are all satisfactory. Even though the HL 93 Operating rating factor (1.53) is larger than 1.3, the results reported in the tables shown below consider HL 93, FL 120, FL legal and EV vehicles.

BPA

Job: Br [redacted] over [redacted] LR 18.17.01 Computed by: DAR Date: 1/19

Desc: **Flexure Strength** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\[Longitudinal Rating 20%IM.xlsx]Strength Rating (North Box)

HL93 Inventory Strength (North Box)											IM = 20%	*LL factor = 1.20/1.33 =*	*0.9023*	
TABLE: Bridge Super Rating AASHTORATE10 02 - CBoxFlexure-Rating														
Request	**BridgeObj**	**Station**	**Location**	**Cond Fact**	**Syst Fact**	**Resist Fact**	**M3DC+CR+ SH+PT2**	**M30.5TU**	**M3LLIM**	**LLStepType**	**Mr**	**φ_sMr**	**Rating**	**Modification**
Text	Text	ft	Text	Unitless	Unitless	Unitless	Kip-ft	Kip-ft	Kip-ft	Text	Kip-ft	Kip-ft	Unitless	Text
Span 1														
LR_Flex-HL93-Inv-N	NB	76.38	Before	1	1	1.00	-7338.8	-3.5	6896.0	Max	8045.2	8045.2	2.23	Ext span (φ_s = 1.00)
LR_Flex-HL93-Inv-N	NB	76.38	After	1	1	1.00	-7386.7	-7.5	6908.7	Max	8045.2	8045.2	2.23	Ext span (φ_s = 1.00)
Span 2														
LR_Flex-HL93-Inv-N	NB	154.38	Before	1	1.05	1.00	687.1	-97.7	8372.8	Max	21261.9	22325.0	2.60	Int span (φ_s = 1.05)
LR_Flex-HL93-Inv-N	NB	154.38	After	1	1.05	1.00	715.8	-96.5	8315.6	Max	21261.9	22325.0	2.61	Int span (φ_s = 1.05)
LR_Flex-HL93-Inv-N	NB	197.16	Before	1	1.05	1.00	11394.8	-98.0	11897.8	Max	29078.7	30532.6	1.62	Int span (φ_s = 1.05)
LR_Flex-HL93-Inv-N	NB	197.16	After	1	1.05	1.00	11387.0	-97.9	11897.5	Max	29078.7	30532.6	1.62	Int span (φ_s = 1.05)
LR_Flex-HL93-Inv-N	NB	239.93	Before	1	1.05	1.00	1494.9	-94.8	8295.8	Max	10707.5	11242.9	1.19	Int span (φ_s = 1.05)
LR_Flex-HL93-Inv-N	NB	239.93	After	1	1.05	1.00	1455.3	-95.9	8357.8	Max	10707.5	11242.9	1.18	Int span (φ_s = 1.05)
Span 3														
LR_Flex-HL93-Inv-N	NB	317.93	Before	1	1	1.00	-6229.1	-12.4	6928.1	Max	8045.2	8045.2	2.06	Ext span (φ_s = 1.00)
LR_Flex-HL93-Inv-N	NB	317.93	After	1	1	1.00	-6184.3	-13.9	6915.7	Max	8045.2	8045.2	2.06	Ext span (φ_s = 1.00)

HL93 Operating Strength (North Box)											IM = 20%	*LL factor = 1.20/1.33 =*	*0.9023*	
TABLE: Bridge Super Rating AASHTORATE10 02 - CBoxFlexure-Rating														
Request	**BridgeObj**	**Station**	**Location**	**Cond Fact**	**Syst Fact**	**Resist Fact**	**M3DC+CR+ SH+PT2**	**M30.5TU**	**M3LLIM**	**LLStepType**	**Mr**	**φ_sMr**	**Rating**	**Modification**
Text	Text	ft	Text	Unitless	Unitless	Unitless	Kip-ft	Kip-ft	Kip-ft	Text	Kip-ft	Kip-ft	Unitless	Text
Span 1														
LR_Flex-HL93-op-N	NB	76.38	Before	1	1	1.00	-7338.8	-3.5	5319.8	Max	8045.2	8045.2	2.89	Ext span (φ_s = 1.00)
LR_Flex-HL93-op-N	NB	76.38	After	1	1	1.00	-7386.7	-7.5	5329.6	Max	8045.2	8045.2	2.90	Ext span (φ_s = 1.00)
Span 2														
LR_Flex-HL93-op-N	NB	154.38	Before	1	1.05	1.00	687.1	-97.7	6459.0	Max	21261.9	22325.0	3.37	Int span (φ_s = 1.05)
LR_Flex-HL93-op-N	NB	154.38	After	1	1.05	1.00	715.8	-96.5	6414.9	Max	21261.9	22325.0	3.38	Int span (φ_s = 1.05)
LR_Flex-HL93-op-N	NB	197.16	Before	1	1.05	1.00	11394.8	-98.0	9178.3	Max	29078.7	30532.6	2.10	Int span (φ_s = 1.05)
LR_Flex-HL93-op-N	NB	197.16	After	1	1.05	1.00	11387.0	-97.9	9178.1	Max	29078.7	30532.6	2.10	Int span (φ_s = 1.05)
LR_Flex-HL93-op-N	NB	239.93	Before	1	1.05	1.00	1494.9	-94.8	6399.6	Max	10707.5	11242.9	1.54	Int span (φ_s = 1.05)
LR_Flex-HL93-op-N	NB	239.93	After	1	1.05	1.00	1455.3	-95.9	6447.5	Max	10707.5	11242.9	1.53	Int span (φ_s = 1.05)
Span 3														
LR_Flex-HL93-op-N	NB	317.93	Before	1	1	1.00	-6229.1	-12.4	5344.5	Max	8045.2	8045.2	2.67	Ext span (φ_s = 1.00)
LR_Flex-HL93-op-N	NB	317.93	After	1	1	1.00	-6184.3	-13.9	5335.0	Max	8045.2	8045.2	2.67	Ext span (φ_s = 1.00)

HL93 Operating Strength > 1.30, legal trucks not rated

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: DAR Date: 1/19

Desc: **Flexure Strength** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\[Longitudinal Rating 20%IM.xlsx]Strength Rating (North Box)

FL 120 Operating Strength (North Box) IM = 20% *LL factor = 1.20/1.33 =* *0.9023*

TABLE: Bridge Super Rating AASHTORATE10 02 - CBoxFlexure-Rating

Request	BridgeObj	Station	Location	Cond Fact	Syst Fact	Resist Fact	M3DC+CR+SH+PT2	M30.5TU	M3LLIM	LLStepType	Mr	φ_sMr	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Unitless	Kip-ft	Kip-ft	Kip-ft	Text	Kip-ft	Kip-ft	Unitless	Text
Span 1														
LR_FL120_Strength_N	NB	76.38	Before	1	1	1.00	-7338.8	-3.5	6073.1	Max	8041.9	8041.9	2.53	Ext span (φ_s = 1.00)
LR_FL120_Strength_N	NB	76.38	After	1	1	1.00	-7386.7	-7.5	6084.4	Max	8041.9	8041.9	2.54	Ext span (φ_s = 1.00)
Span 2														
LR_FL120_Strength_N	NB	154.38	Before	1	1.05	1.00	687.1	-97.7	6898.0	Max	21253.2	22315.9	3.15	Int span (φ_s = 1.05)
LR_FL120_Strength_N	NB	154.38	After	1	1.05	1.00	715.8	-96.5	6879.2	Max	21253.2	22315.9	3.15	Int span (φ_s = 1.05)
LR_FL120_Strength_N	NB	197.16	Before	1	1.05	1.00	11394.8	-98.0	9231.7	Max	29066.7	30520.1	2.08	Int span (φ_s = 1.05)
LR_FL120_Strength_N	NB	197.16	After	1	1.05	1.00	11387.0	-97.9	9231.6	Max	29066.7	30520.1	2.08	Int span (φ_s = 1.05)
LR_FL120_Strength_N	NB	239.93	Before	1	1.05	1.00	1494.9	-94.8	6865.2	Max	10703.1	11238.3	1.43	Int span (φ_s = 1.05)
LR_FL120_Strength_N	NB	239.93	After	1	1.05	1.00	1455.3	-95.9	6888.6	Max	10703.1	11238.3	1.43	Int span (φ_s = 1.05)
Span 3														
LR_FL120_Strength_N	NB	317.93	Before	1	1	1.00	-6229.1	-12.4	6096.6	Max	8041.9	8041.9	2.34	Ext span (φ_s = 1.00)
LR_FL120_Strength_N	NB	317.93	After	1	1	1.00	-6184.3	-13.9	6085.7	Max	8041.9	8041.9	2.34	Ext span (φ_s = 1.00)

SU2 Operating Strength (North Box) IM = 20% *LL factor = 1.20/1.33 =* *0.9023*

TABLE: Bridge Super Rating AASHTORATE10 02 - CBoxFlexure-Rating

Request	BridgeObj	Station	Location	Cond Fact	Syst Fact	Resist Fact	M3DC+CR+SH+PT2	M30.5TU	M3LLIM	LLStepType	Mr	φ_sMr	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Unitless	Kip-ft	Kip-ft	Kip-ft	Text	Kip-ft	Kip-ft	Unitless	Text
Span 1														
LR_Flex-SU2-op-N	NB	76.38	Before	1	1	1.00	-7338.8	-3.5	1843.2	Max	8041.9	8041.9	8.35	Ext span (φ_s = 1.00)
LR_Flex-SU2-op-N	NB	76.38	After	1	1	1.00	-7386.7	-7.5	1846.6	Max	8041.9	8041.9	8.36	Ext span (φ_s = 1.00)
Span 2														
LR_Flex-SU2-op-N	NB	154.38	Before	1	1.05	1.00	687.1	-97.7	2052.8	Max	21253.2	22315.9	10.58	Int span (φ_s = 1.05)
LR_Flex-SU2-op-N	NB	154.38	After	1	1.05	1.00	715.8	-96.5	2048.2	Max	21253.2	22315.9	10.59	Int span (φ_s = 1.05)
LR_Flex-SU2-op-N	NB	197.16	Before	1	1.05	1.00	11394.8	-98.0	2718.5	Max	29066.7	30520.1	7.07	Int span (φ_s = 1.05)
LR_Flex-SU2-op-N	NB	197.16	After	1	1.05	1.00	11387.0	-97.9	2718.5	Max	29066.7	30520.1	7.07	Int span (φ_s = 1.05)
LR_Flex-SU2-op-N	NB	239.93	Before	1	1.05	1.00	1494.9	-94.8	2045.2	Max	10703.1	11238.3	4.81	Int span (φ_s = 1.05)
LR_Flex-SU2-op-N	NB	239.93	After	1	1.05	1.00	1455.3	-95.9	2050.1	Max	10703.1	11238.3	4.82	Int span (φ_s = 1.05)
Span 3														
LR_Flex-SU2-op-N	NB	317.93	Before	1	1	1.00	-6229.1	-12.4	1849.4	Max	8041.9	8041.9	7.72	Ext span (φ_s = 1.00)
LR_Flex-SU2-op-N	NB	317.93	After	1	1	1.00	-6184.3	-13.9	1846.1	Max	8041.9	8041.9	7.71	Ext span (φ_s = 1.00)

BPA

Job: Br [redacted] over [redacted] LR 18.17.01 Computed by: DAR Date: 1/19

Desc: **Flexure Strength** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\[Longitudinal Rating 20%IM.xlsx]Strength Rating (North Box)

SU3 Operating Strength (North Box) IM = 20% *LL factor = 1.20/1.33 =* *0.9023*

TABLE: Bridge Super Rating AASHTORATE10 02 - CBoxFlexure-Rating

Request	BridgeObj	Station	Location	Cond Fact	Syst Fact	Resist Fact	M3DC+CR+SH+PT2	M30.5TU	M3LLIM	LLStepType	Mr	φ_sMr	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Unitless	Kip-ft	Kip-ft	Kip-ft	Text	Kip-ft	Kip-ft	Unitless	Text
Span 1														
LR_Flex-SU3-op-N	NB	76.38	Before	1	1	1.00	-7338.8	-3.5	3485.2	Max	8041.9	8041.9	4.41	Ext span (φ_s = 1.00)
LR_Flex-SU3-op-N	NB	76.38	After	1	1	1.00	-7386.7	-7.5	3491.7	Max	8041.9	8041.9	4.42	Ext span (φ_s = 1.00)
Span 2														
LR_Flex-SU3-op-N	NB	154.38	Before	1	1.05	1.00	687.1	-97.7	3910.4	Max	21253.2	22315.9	5.56	Int span (φ_s = 1.05)
LR_Flex-SU3-op-N	NB	154.38	After	1	1.05	1.00	715.8	-96.5	3900.9	Max	21253.2	22315.9	5.56	Int span (φ_s = 1.05)
LR_Flex-SU3-op-N	NB	197.16	Before	1	1.05	1.00	11394.8	-98.0	5247.9	Max	29066.7	30520.1	3.66	Int span (φ_s = 1.05)
LR_Flex-SU3-op-N	NB	197.16	After	1	1.05	1.00	11387.0	-97.9	5247.8	Max	29066.7	30520.1	3.66	Int span (φ_s = 1.05)
LR_Flex-SU3-op-N	NB	239.93	Before	1	1.05	1.00	1494.9	-94.8	3894.2	Max	10703.1	11238.3	2.53	Int span (φ_s = 1.05)
LR_Flex-SU3-op-N	NB	239.93	After	1	1.05	1.00	1455.3	-95.9	3905.1	Max	10703.1	11238.3	2.53	Int span (φ_s = 1.05)
Span 3														
LR_Flex-SU3-op-N	NB	317.93	Before	1	1	1.00	-6229.1	-12.4	3497.6	Max	8041.9	8041.9	4.08	Ext span (φ_s = 1.00)
LR_Flex-SU3-op-N	NB	317.93	After	1	1	1.00	-6184.3	-13.9	3491.3	Max	8041.9	8041.9	4.08	Ext span (φ_s = 1.00)

SU4 Operating Strength (North Box) IM = 20% *LL factor = 1.20/1.33 =* *0.9023*

TABLE: Bridge Super Rating AASHTORATE10 02 - CBoxFlexure-Rating

Request	BridgeObj	Station	Location	Cond Fact	Syst Fact	Resist Fact	M3DC+CR+SH+PT2	M30.5TU	M3LLIM	LLStepType	Mr	φ_sMr	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Unitless	Kip-ft	Kip-ft	Kip-ft	Text	Kip-ft	Kip-ft	Unitless	Text
Span 1														
LR_Flex-SU4-op-N	NB	76.38	Before	1	1	1.00	-7338.8	-3.5	3714.1	Max	8041.9	8041.9	4.14	Ext span (φ_s = 1.00)
LR_Flex-SU4-op-N	NB	76.38	After	1	1	1.00	-7386.7	-7.5	3720.9	Max	8041.9	8041.9	4.15	Ext span (φ_s = 1.00)
Span 2														
LR_Flex-SU4-op-N	NB	154.38	Before	1	1.05	1.00	687.1	-97.7	4154.7	Max	21253.2	22315.9	5.23	Int span (φ_s = 1.05)
LR_Flex-SU4-op-N	NB	154.38	After	1	1.05	1.00	715.8	-96.5	4145.6	Max	21253.2	22315.9	5.23	Int span (φ_s = 1.05)
LR_Flex-SU4-op-N	NB	197.16	Before	1	1.05	1.00	11394.8	-98.0	5578.0	Max	29066.7	30520.1	3.45	Int span (φ_s = 1.05)
LR_Flex-SU4-op-N	NB	197.16	After	1	1.05	1.00	11387.0	-97.9	5577.9	Max	29066.7	30520.1	3.45	Int span (φ_s = 1.05)
LR_Flex-SU4-op-N	NB	239.93	Before	1	1.05	1.00	1494.9	-94.8	4139.8	Max	10703.1	11238.3	2.38	Int span (φ_s = 1.05)
LR_Flex-SU4-op-N	NB	239.93	After	1	1.05	1.00	1455.3	-95.9	4149.2	Max	10703.1	11238.3	2.38	Int span (φ_s = 1.05)
Span 3														
LR_Flex-SU4-op-N	NB	317.93	Before	1	1	1.00	-6229.1	-12.4	3726.0	Max	8041.9	8041.9	3.83	Ext span (φ_s = 1.00)
LR_Flex-SU4-op-N	NB	317.93	After	1	1	1.00	-6184.3	-13.9	3719.4	Max	8041.9	8041.9	3.83	Ext span (φ_s = 1.00)

BPA

Job: Br [redacted] over [redacted] LR 18.17.01 Computed by: DAR Date: 1/19

Desc: **Flexure Strength** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\[Longitudinal Rating 20%IM.xlsx]Strength Rating (North Box)

C3 Operating Strength (North Box) IM = 20% *LL factor = 1.20/1.33 =* *0.9023*

TABLE: Bridge Super Rating AASHTORATE10 02 - CBoxFlexure-Rating

Request	BridgeObj	Station	Location	Cond Fact	Syst Fact	Resist Fact	M3DC+CR+SH+PT2	M30.5TU	M3LLIM	LLStepType	Mr	φ_sMr	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Unitless	Kip-ft	Kip-ft	Kip-ft	Text	Kip-ft	Kip-ft	Unitless	Text
Span 1														
LR_Flex-C3-op-N	NB	76.38	Before	1	1	1.00	-7338.8	-3.5	2705.2	Max	8041.9	8041.9	5.69	Ext span (φ_s = 1.00)
LR_Flex-C3-op-N	NB	76.38	After	1	1	1.00	-7386.7	-7.5	2710.2	Max	8041.9	8041.9	5.70	Ext span (φ_s = 1.00)
Span 2														
LR_Flex-C3-op-N	NB	154.38	Before	1	1.05	1.00	687.1	-97.7	3105.0	Max	21253.2	22315.9	7.00	Int span (φ_s = 1.05)
LR_Flex-C3-op-N	NB	154.38	After	1	1.05	1.00	715.8	-96.5	3096.9	Max	21253.2	22315.9	7.01	Int span (φ_s = 1.05)
LR_Flex-C3-op-N	NB	197.16	Before	1	1.05	1.00	11394.8	-98.0	4190.5	Max	29066.7	30520.1	4.59	Int span (φ_s = 1.05)
LR_Flex-C3-op-N	NB	197.16	After	1	1.05	1.00	11387.0	-97.9	4190.4	Max	29066.7	30520.1	4.59	Int span (φ_s = 1.05)
LR_Flex-C3-op-N	NB	239.93	Before	1	1.05	1.00	1494.9	-94.8	3091.1	Max	10703.1	11238.3	3.18	Int span (φ_s = 1.05)
LR_Flex-C3-op-N	NB	239.93	After	1	1.05	1.00	1455.3	-95.9	3100.9	Max	10703.1	11238.3	3.19	Int span (φ_s = 1.05)
Span 3														
LR_Flex-C3-op-N	NB	317.93	Before	1	1	1.00	-6229.1	-12.4	2715.1	Max	8041.9	8041.9	5.26	Ext span (φ_s = 1.00)
LR_Flex-C3-op-N	NB	317.93	After	1	1	1.00	-6184.3	-13.9	2710.2	Max	8041.9	8041.9	5.25	Ext span (φ_s = 1.00)

C4 Operating Strength (North Box) IM = 20% *LL factor = 1.20/1.33 =* *0.9023*

TABLE: Bridge Super Rating AASHTORATE10 02 - CBoxFlexure-Rating

Request	BridgeObj	Station	Location	Cond Fact	Syst Fact	Resist Fact	M3DC+CR+SH+PT2	M30.5TU	M3LLIM	LLStepType	Mr	φ_sMr	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Unitless	Kip-ft	Kip-ft	Kip-ft	Text	Kip-ft	Kip-ft	Unitless	Text
Span 1														
LR_Flex-C4-op-N	NB	76.38	Before	1	1	1.00	-7338.8	-3.5	3542.0	Max	8041.9	8041.9	4.34	Ext span (φ_s = 1.00)
LR_Flex-C4-op-N	NB	76.38	After	1	1	1.00	-7386.7	-7.5	3548.5	Max	8041.9	8041.9	4.35	Ext span (φ_s = 1.00)
Span 2														
LR_Flex-C4-op-N	NB	154.38	Before	1	1.05	1.00	687.1	-97.7	4073.1	Max	21253.2	22315.9	5.33	Int span (φ_s = 1.05)
LR_Flex-C4-op-N	NB	154.38	After	1	1.05	1.00	715.8	-96.5	4061.7	Max	21253.2	22315.9	5.34	Int span (φ_s = 1.05)
LR_Flex-C4-op-N	NB	197.16	Before	1	1.05	1.00	11394.8	-98.0	5417.4	Max	29066.7	30520.1	3.55	Int span (φ_s = 1.05)
LR_Flex-C4-op-N	NB	197.16	After	1	1.05	1.00	11387.0	-97.9	5417.3	Max	29066.7	30520.1	3.55	Int span (φ_s = 1.05)
LR_Flex-C4-op-N	NB	239.93	Before	1	1.05	1.00	1494.9	-94.8	4051.9	Max	10703.1	11238.3	2.43	Int span (φ_s = 1.05)
LR_Flex-C4-op-N	NB	239.93	After	1	1.05	1.00	1455.3	-95.9	4066.3	Max	10703.1	11238.3	2.43	Int span (φ_s = 1.05)
Span 3														
LR_Flex-C4-op-N	NB	317.93	Before	1	1	1.00	-6229.1	-12.4	3555.8	Max	8041.9	8041.9	4.02	Ext span (φ_s = 1.00)
LR_Flex-C4-op-N	NB	317.93	After	1	1	1.00	-6184.3	-13.9	3549.4	Max	8041.9	8041.9	4.01	Ext span (φ_s = 1.00)

BPA

Job: Br [redacted] over [redacted] LR 18.17.01 Computed by: DAR Date: 1/19

Desc: **Flexure Strength** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\[Longitudinal Rating 20%IM.xlsx]Strength Rating (North Box)

C5 Operating Strength (North Box) IM = 20% *LL factor = 1.20/1.33 =* *0.9023*

TABLE: Bridge Super Rating AASHTORATE10 02 - CBoxFlexure-Rating

Request	BridgeObj	Station	Location	Cond Fact	Syst Fact	Resist Fact	M3DC+CR+SH+PT2	M30.5TU	M3LLIM	LLStepType	Mr	φ_sMr	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Unitless	Kip-ft	Kip-ft	Kip-ft	Text	Kip-ft	Kip-ft	Unitless	Text
Span 1														
LR_Flex-C5-op-N	NB	76.38	Before	1	1	1.00	-7338.8	-3.5	3848.4	Max	8041.9	8041.9	4.00	Ext span (φ_s = 1.00)
LR_Flex-C5-op-N	NB	76.38	After	1	1	1.00	-7386.7	-7.5	3855.5	Max	8041.9	8041.9	4.00	Ext span (φ_s = 1.00)
Span 2														
LR_Flex-C5-op-N	NB	154.38	Before	1	1.05	1.00	687.1	-97.7	4429.0	Max	21253.2	22315.9	4.91	Int span (φ_s = 1.05)
LR_Flex-C5-op-N	NB	154.38	After	1	1.05	1.00	715.8	-96.5	4416.4	Max	21253.2	22315.9	4.91	Int span (φ_s = 1.05)
LR_Flex-C5-op-N	NB	197.16	Before	1	1.05	1.00	11394.8	-98.0	5969.8	Max	29066.7	30520.1	3.22	Int span (φ_s = 1.05)
LR_Flex-C5-op-N	NB	197.16	After	1	1.05	1.00	11387.0	-97.9	5969.7	Max	29066.7	30520.1	3.22	Int span (φ_s = 1.05)
LR_Flex-C5-op-N	NB	239.93	Before	1	1.05	1.00	1494.9	-94.8	4407.1	Max	10703.1	11238.3	2.23	Int span (φ_s = 1.05)
LR_Flex-C5-op-N	NB	239.93	After	1	1.05	1.00	1455.3	-95.9	4423.0	Max	10703.1	11238.3	2.23	Int span (φ_s = 1.05)
Span 3														
LR_Flex-C5-op-N	NB	317.93	Before	1	1	1.00	-6229.1	-12.4	3863.6	Max	8041.9	8041.9	3.70	Ext span (φ_s = 1.00)
LR_Flex-C5-op-N	NB	317.93	After	1	1	1.00	-6184.3	-13.9	3856.6	Max	8041.9	8041.9	3.69	Ext span (φ_s = 1.00)

ST5 Operating Strength (North Box) IM = 20% *LL factor = 1.20/1.33 =* *0.9023*

TABLE: Bridge Super Rating AASHTORATE10 02 - CBoxFlexure-Rating

Request	BridgeObj	Station	Location	Cond Fact	Syst Fact	Resist Fact	M3DC+CR+SH+PT2	M30.5TU	M3LLIM	LLStepType	Mr	φ_sMr	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Unitless	Kip-ft	Kip-ft	Kip-ft	Text	Kip-ft	Kip-ft	Unitless	Text
Span 1														
LR_Flex-ST5-op-N	NB	76.38	Before	1	1	1.00	-7338.8	-3.5	3451.5	Max	8041.9	8041.9	4.46	Ext span (φ_s = 1.00)
LR_Flex-ST5-op-N	NB	76.38	After	1	1	1.00	-7386.7	-7.5	3458.0	Max	8041.9	8041.9	4.46	Ext span (φ_s = 1.00)
Span 2														
LR_Flex-ST5-op-N	NB	154.38	Before	1	1.05	1.00	687.1	-97.7	4099.8	Max	21253.2	22315.9	5.30	Int span (φ_s = 1.05)
LR_Flex-ST5-op-N	NB	154.38	After	1	1.05	1.00	715.8	-96.5	4086.4	Max	21253.2	22315.9	5.31	Int span (φ_s = 1.05)
LR_Flex-ST5-op-N	NB	197.16	Before	1	1.05	1.00	11394.8	-98.0	5622.7	Max	29066.7	30520.1	3.42	Int span (φ_s = 1.05)
LR_Flex-ST5-op-N	NB	197.16	After	1	1.05	1.00	11387.0	-97.9	5622.6	Max	29066.7	30520.1	3.42	Int span (φ_s = 1.05)
LR_Flex-ST5-op-N	NB	239.93	Before	1	1.05	1.00	1494.9	-94.8	4075.8	Max	10703.1	11238.3	2.41	Int span (φ_s = 1.05)
LR_Flex-ST5-op-N	NB	239.93	After	1	1.05	1.00	1455.3	-95.9	4094.5	Max	10703.1	11238.3	2.41	Int span (φ_s = 1.05)
Span 3														
LR_Flex-ST5-op-N	NB	317.93	Before	1	1	1.00	-6229.1	-12.4	3466.6	Max	8041.9	8041.9	4.12	Ext span (φ_s = 1.00)
LR_Flex-ST5-op-N	NB	317.93	After	1	1	1.00	-6184.3	-13.9	3460.3	Max	8041.9	8041.9	4.12	Ext span (φ_s = 1.00)

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: DAR Date: 1/19

Desc: **Flexure Strength** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\[Longitudinal Rating 20%IM.xlsx]Strength Rating (North Box)

EV2 Operating Strength (North Box)											IM = 20%	LL factor = 1.20/1.33 =	0.9023	
TABLE: Bridge Super Rating AASHTORATE10 02 - CBoxFlexure-Rating														
Request	BridgeObj	Station	Location	Cond Fact	Syst Fact	Resist Fact	M3DC+CR+SH+PT2	M30.5TU	M3LLIM	LLStepType	Mr	φ_sMr	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Unitless	Kip-ft	Kip-ft	Kip-ft	Text	Kip-ft	Kip-ft	Unitless	Text
Span 1														
LR_Flex-EV2-op-N	NB	76.38	Before	1	1	1.00	-7338.8	-3.5	2931.6239	Max	8041.9	8041.9	5.25	Ext span (φ_s = 1.00)
LR_Flex-EV2-op-N	NB	76.38	After	1	1	1.00	-7386.7	-7.5	2937.0258	Max	8041.9	8041.9	5.26	Ext span (φ_s = 1.00)
Span 2														
LR_Flex-EV2-op-N	NB	154.38	Before	1	1.05	1.00	687.1	-97.7	3286.7861	Max	21253.2	22315.9	6.61	Int span (φ_s = 1.05)
LR_Flex-EV2-op-N	NB	154.38	After	1	1.05	1.00	715.8	-96.5	3278.8408	Max	21253.2	22315.9	6.62	Int span (φ_s = 1.05)
LR_Flex-EV2-op-N	NB	197.16	Before	1	1.05	1.00	11394.8	-98.0	4339.4682	Max	29066.7	30520.1	4.43	Int span (φ_s = 1.05)
LR_Flex-EV2-op-N	NB	197.16	After	1	1.05	1.00	11387.0	-97.9	4339.394	Max	29066.7	30520.1	4.43	Int span (φ_s = 1.05)
LR_Flex-EV2-op-N	NB	239.93	Before	1	1.05	1.00	1494.9	-94.8	3273.3378	Max	10703.1	11238.3	3.01	Int span (φ_s = 1.05)
LR_Flex-EV2-op-N	NB	239.93	After	1	1.05	1.00	1455.3	-95.9	3282.3146	Max	10703.1	11238.3	3.01	Int span (φ_s = 1.05)
Span 3														
LR_Flex-EV2-op-N	NB	317.93	Before	1	1	1.00	-6229.1	-12.4	2941.9309	Max	8041.9	8041.9	4.86	Ext span (φ_s = 1.00)
LR_Flex-EV2-op-N	NB	317.93	After	1	1	1.00	-6184.3	-13.9	2936.6524	Max	8041.9	8041.9	4.85	Ext span (φ_s = 1.00)

EV3 Operating Strength (North Box)											IM = 20%	LL factor = 1.20/1.33 =	0.9023	
TABLE: Bridge Super Rating AASHTORATE10 02 - CBoxFlexure-Rating														
Request	BridgeObj	Station	Location	Cond Fact	Syst Fact	Resist Fact	M3DC+CR+SH+PT2	M30.5TU	M3LLIM	LLStepType	Mr	φ_sMr	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Unitless	Kip-ft	Kip-ft	Kip-ft	Text	Kip-ft	Kip-ft	Unitless	Text
Span 1														
LR_Flex-EV3-op-N	NB	76.38	Before	1	1	1.00	-7338.8	-3.5	4354.4	Max	8041.9	8041.9	3.53	Ext span (φ_s = 1.00)
LR_Flex-EV3-op-N	NB	76.38	After	1	1	1.00	-7386.7	-7.5	4362.4	Max	8041.9	8041.9	3.54	Ext span (φ_s = 1.00)
Span 2														
LR_Flex-EV3-op-N	NB	154.38	Before	1	1.05	1.00	687.1	-97.7	4891.5	Max	21253.2	22315.9	4.44	Int span (φ_s = 1.05)
LR_Flex-EV3-op-N	NB	154.38	After	1	1.05	1.00	715.8	-96.5	4879.5	Max	21253.2	22315.9	4.45	Int span (φ_s = 1.05)
LR_Flex-EV3-op-N	NB	197.16	Before	1	1.05	1.00	11394.8	-98.0	6540.0	Max	29066.7	30520.1	2.94	Int span (φ_s = 1.05)
LR_Flex-EV3-op-N	NB	197.16	After	1	1.05	1.00	11387.0	-97.9	6539.8	Max	29066.7	30520.1	2.94	Int span (φ_s = 1.05)
LR_Flex-EV3-op-N	NB	239.93	Before	1	1.05	1.00	1494.9	-94.8	4871.0	Max	10703.1	11238.3	2.02	Int span (φ_s = 1.05)
LR_Flex-EV3-op-N	NB	239.93	After	1	1.05	1.00	1455.3	-95.9	4884.9	Max	10703.1	11238.3	2.02	Int span (φ_s = 1.05)
Span 3														
LR_Flex-EV3-op-N	NB	317.93	Before	1	1	1.00	-6229.1	-12.4	4369.9	Max	8041.9	8041.9	3.27	Ext span (φ_s = 1.00)
LR_Flex-EV3-op-N	NB	317.93	After	1	1	1.00	-6184.3	-13.9	4362.1	Max	8041.9	8041.9	3.26	Ext span (φ_s = 1.00)

CSi Bridge uses the modified compression field theory to estimate shear capacity; however, we prefer to use the AASHTO 5.8.6 approach to compute shear capacity in segmental bridges. Also, note that the program provides envelope responses rather that maximum effects with concurrent forces. As a result, shear forces were combined with a percentage of the shear produced by torsion. We extracted the pertinent forces from the model and performed the ratings using spreadsheets. It is noted that the HL 93 Operating rating factor for shear yields 0.82, so we performed the shear rating for all legal trucks and emergency vehicles. All these trucks rate satisfactorily. The following tables report the shear rating factors.

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Dar Date: 1/19

Desc: **Shear Rating** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

Section Properties for Shear Rating Calculations

8" Bottom Slab

A_o = 91.11 ft^2

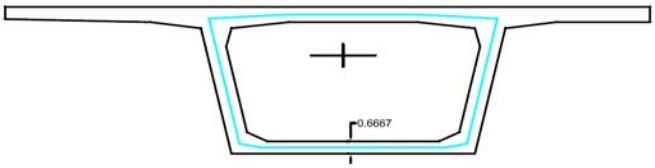
I_g = 424.12 ft^4

b_w = 1.00 ft

B_w = 2.00 ft

A_{tot} = 50.30 ft^2

Q_g = 65.23 ft^3



12" Bottom Slab

A_o = 89.23 ft^2

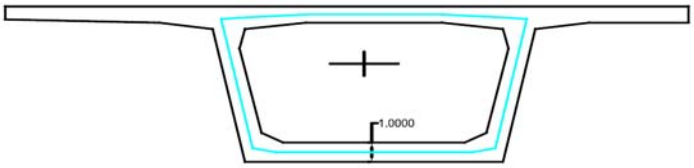
I_g = 491.27 ft^4

b_w = 1.00 ft

B_w = 2.00 ft

A_{tot} = 54.13 ft^2

Q_g = 75.11 ft^3



16" Bottom Slab

A_o = 87.34 ft^2

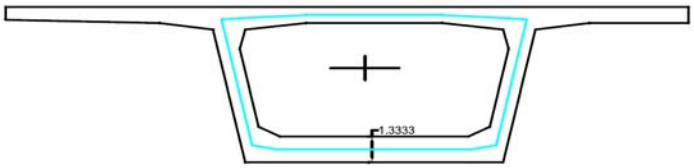
I_g = 537.06 ft^4

b_w = 1.00 ft

B_w = 2.00 ft

A_{tot} = 57.23 ft^2

Q_g = 82.30 ft^3



BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Strength Shear Rating** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

Summary of Rating

Strength Shear Rating

Vehicle	RF Inventory	RF Operating
HL 93 Inv	0.63	-
HL 93 Op	-	0.82
FL 120	-	0.82
SU2	-	2.80
SU3	-	1.46
SU4	-	1.38
C3	-	1.81
C4	-	1.37
C5	-	1.29
ST5	-	1.40
EV2	-	1.74
EV3	-	1.17

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Shear Rating** Checked by: Dar Date: 3/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

Staged Construction @ 10,000 (DC+PT+CR+SH)

	DC+PT+CR+SH			0.5TU			PT2			Permanent Forces			max Perm. Shear/Web		
Layout Line Distance	P	V2	T	P	V2	T	P	V2	T	P	Vper	Tper	Vper Dir-shear	Vper Shr-torsion	Vper
ft	kip	kip	kip-ft	kip	kip	kip-ft	kip	kip	kip-ft	kip	kip	kip-ft	kip	kip	kip
Span 1															
96.38	-4661.43	-567.42	-342.42	-179.55	-1.43	90.99	44.45	32.75	-71.98	-4796.53	-677.96	-409.01	-338.98	-15.585	354.57
96.38	-5383.88	-567.32	-365.16	-193.81	-1.34	101.99	48.22	32.77	-70.79	-5529.47	-677.72	-425.25	-338.86	-16.204	355.06
106.38	-5448.23	-666.78	-437.80	-195.17	-1.44	109.10	51.30	32.92	-49.64	-5592.10	-802.00	-487.79	-401.00	-18.989	419.99
106.38	-5212.96	-677.44	-457.25	-188.27	-1.56	91.18	51.33	33.01	-48.52	-5349.90	-815.35	-528.90	-407.68	-20.589	428.27
110.38	-5247.46	-713.46	-474.58	-180.51	-1.47	67.59	52.48	33.06	-40.33	-5375.49	-860.24	-565.96	-430.12	-1.924	432.05
110.38	-5243.46	828.61	-58.17	-178.99	-1.34	5.03	52.65	-0.01	-175.68	-5369.80	1034.41	-243.37	517.21	-0.827	518.03
Span 2															
110.46	-5243.46	827.86	-58.60	-178.99	-1.34	5.04	52.65	-0.01	-175.53	-5369.80	1033.48	-243.74	516.74	-0.829	517.57
110.46	-5241.21	785.79	-70.52	-179.25	-1.26	-8.60	52.80	0.01	-175.16	-5367.66	980.99	-271.91	490.50	-0.925	491.42
114.38	-5179.64	750.55	-86.48	-187.35	-1.18	-31.73	52.94	0.06	-166.96	-5314.05	937.08	-306.79	468.54	-11.943	480.48
114.38	-5682.90	735.47	-106.41	-200.14	-1.37	-49.44	55.46	0.17	-165.71	-5827.58	918.14	-348.16	459.07	-13.553	472.62
124.38	-5609.55	636.08	-152.79	-197.58	-1.50	-36.17	56.47	0.35	-142.14	-5750.65	793.95	-369.29	396.98	-14.071	411.05
124.38	-4947.33	635.62	-175.77	-183.67	-1.29	-17.01	53.85	0.42	-139.92	-5077.16	793.65	-376.64	396.83	-14.351	411.18
264.93	-4678.65	-574.60	232.57	-182.36	1.30	14.65	55.22	0.06	131.72	-4805.79	-716.89	437.07	-358.45	16.311	374.76
264.93	-4710.33	-570.37	217.74	-182.84	1.47	24.14	55.17	0.06	132.74	-4837.99	-711.44	429.05	-355.72	16.011	371.73
269.93	-4740.71	-618.28	210.54	-183.24	1.45	35.24	55.04	0.11	143.36	-4868.90	-771.29	441.77	-385.64	16.833	402.48
269.93	-5403.32	-618.09	192.10	-197.80	1.54	46.28	57.97	0.14	144.69	-5543.14	-770.93	431.09	-385.47	16.426	401.89
279.93	-5486.09	-717.35	148.58	-200.22	1.43	52.88	57.27	0.31	167.81	-5629.04	-894.95	406.41	-447.47	15.821	463.29
279.93	-5104.82	-730.86	135.06	-187.68	1.23	34.44	54.77	0.42	169.00	-5237.72	-911.92	372.26	-455.96	14.491	470.45
283.93	-5163.97	-766.80	130.04	-180.24	1.32	10.24	54.70	0.47	177.39	-5289.51	-956.70	350.18	-478.35	1.191	479.54
283.93	-5175.00	739.67	382.67	-179.00	1.35	-51.55	54.59	-33.19	38.08	-5299.42	892.74	464.87	446.37	1.581	447.95
Span 3															
382.31	-896.49	-185.53	152.45	-108.03	2.66	-85.66	2.09	-34.57	125.48	-1002.43	-263.83	230.39	-131.91	9.103	141.02
388.31	-897.93	-239.67	107.74	-96.65	2.40	-75.16	0.96	-34.88	119.97	-993.62	-332.07	179.49	-166.04	7.241	173.28
388.31	-896.04	-241.22	65.60	-82.04	2.26	-79.64	0.40	-35.07	115.61	-977.68	-334.33	117.98	-167.17	4.760	171.93

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Shear Rating** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

Design Inventory				Design Operating				Permit			
Max HL 93		Min HL 93		Max HL 93		Min HL 93		Max FL 120		Min FL 120	
V2	T	V2	T	V2	T	V2	T	V2	T	V2	T
kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft
233.12	274.24	-20.53	-227.72	233.12	274.24	-18.52	-227.72	260.23	286.37	-17.68	-207.33
241.00	255.74	-17.54	-235.92	241.00	255.74	-17.27	-235.92	266.95	271.34	-13.22	-214.23
305.19	260.49	-18.31	-266.07	305.19	260.49	-18.31	-266.07	291.01	272.54	-13.01	-238.25
349.88	261.43	-18.93	-278.48	349.88	261.43	-18.93	-278.48	298.20	272.33	-13.29	-249.67
359.49	257.03	-19.98	-287.43	359.49	257.03	-19.98	-287.43	307.94	267.76	-13.53	-257.80
20.61	317.58	-366.77	-334.92	20.61	311.44	-366.77	-334.92	18.95	268.17	-312.85	-294.23
20.61	317.57	-366.77	-334.93	20.61	311.44	-366.77	-334.93	18.95	268.15	-312.85	-294.24
20.03	323.92	-365.18	-335.91	20.03	319.98	-365.18	-335.91	18.69	267.72	-311.66	-283.37
19.49	317.91	-359.42	-339.48	19.49	312.94	-359.42	-339.48	18.18	262.51	-307.25	-287.70
18.82	307.42	-327.99	-342.17	18.82	299.74	-327.99	-342.17	17.59	253.18	-300.75	-290.65
18.61	290.94	-281.73	-350.09	18.61	282.50	-281.73	-350.09	17.80	244.02	-283.82	-301.54
18.76	332.41	-286.77	-352.58	17.80	332.41	-286.77	-352.58	17.20	283.11	-290.79	-303.14
260.29	351.86	-22.82	-261.27	260.29	351.86	-20.10	-250.29	266.15	316.66	-24.12	-221.88
265.91	350.06	-21.36	-268.30	265.91	350.06	-19.78	-254.89	270.41	313.62	-20.04	-225.81
273.19	349.44	-20.14	-275.16	273.19	349.44	-19.71	-261.12	276.34	309.97	-19.57	-231.21
280.43	348.72	-19.46	-284.06	280.43	348.72	-19.45	-271.58	282.26	305.71	-18.71	-236.55
327.84	341.65	-19.39	-307.28	327.84	341.65	-19.39	-298.03	300.49	290.21	-18.12	-253.81
359.94	339.12	-20.02	-317.73	359.94	339.12	-20.02	-311.28	307.07	287.93	-18.70	-262.90
365.23	335.58	-20.57	-324.02	365.23	335.58	-20.57	-318.70	311.63	283.36	-19.21	-268.29
20.94	289.50	-362.75	-292.90	20.94	289.50	-362.75	-292.90	14.12	259.22	-310.08	-296.20
214.43	360.65	-31.61	-304.15	214.43	360.65	-27.49	-304.15	255.91	251.78	-26.64	-212.83
224.67	354.44	-32.95	-279.64	224.67	354.44	-28.20	-279.64	265.87	247.97	-26.28	-195.62
236.75	347.05	-33.13	-287.37	236.75	347.05	-28.66	-287.37	276.67	236.87	-26.07	-200.58

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Shear Rating** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

Legal											
Max SU2		Min SU2		Max SU3		Min SU3		Max SU4		Min SU4	
V2	T	V2	T	V2	T	V2	T	V2	T	V2	T
kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft
77.82	84.15	-6.88	-60.70	147.97	161.07	-11.58	-116.35	156.28	170.35	-11.87	-123.16
79.71	79.77	-4.53	-62.70	151.65	152.66	-7.97	-120.19	160.18	161.45	-8.47	-127.24
85.73	80.00	-4.11	-69.64	163.95	153.19	-7.64	-133.58	173.63	162.03	-8.04	-141.44
87.77	79.88	-4.14	-72.97	167.92	153.00	-7.68	-139.98	177.84	161.84	-8.00	-148.22
89.83	78.50	-4.09	-75.32	172.56	150.39	-7.59	-144.52	183.13	159.08	-8.02	-153.03
5.79	77.95	-90.88	-85.29	10.83	149.83	-174.95	-164.10	11.53	158.59	-185.72	-173.74
5.79	77.95	-90.88	-85.29	10.83	149.82	-174.95	-164.11	11.53	158.58	-185.72	-173.75
5.58	77.82	-90.54	-81.96	10.68	149.58	-174.29	-158.05	11.37	158.33	-185.02	-167.49
5.43	76.32	-89.41	-83.42	10.38	146.68	-171.88	-160.68	11.06	155.26	-182.18	-170.22
5.25	73.62	-87.53	-84.01	10.06	141.49	-168.29	-162.05	10.71	149.76	-178.37	-171.74
5.82	70.99	-82.85	-87.41	10.65	136.40	-158.98	-168.38	11.20	144.45	-168.23	-178.39
5.75	82.26	-84.95	-87.67	10.36	158.13	-162.96	-169.05	10.88	167.53	-172.43	-179.16
77.82	91.83	-8.89	-64.59	149.24	176.85	-15.47	-124.08	157.89	187.35	-16.06	-131.54
79.02	90.95	-7.46	-65.73	151.57	175.15	-12.81	-126.27	160.38	185.56	-13.35	-133.81
80.70	89.88	-6.41	-67.30	154.84	173.11	-11.76	-129.29	163.84	183.40	-12.37	-136.97
82.39	88.63	-6.11	-68.85	158.11	170.72	-11.19	-132.26	167.30	180.87	-11.77	-140.07
87.46	83.97	-5.41	-73.85	168.14	161.83	-10.36	-141.89	178.21	171.51	-11.03	-150.18
89.35	83.48	-5.58	-76.44	171.78	160.79	-10.69	-146.90	182.07	170.35	-11.39	-155.49
90.53	81.96	-5.73	-78.00	174.27	158.04	-10.98	-149.91	185.00	167.49	-11.69	-158.68
4.20	75.71	-90.47	-86.65	7.88	145.27	-173.77	-166.14	8.37	153.83	-184.42	-175.77
76.22	73.82	-7.94	-64.02	145.14	142.60	-15.05	-123.97	153.34	151.93	-16.02	-136.59
79.07	75.98	-8.02	-60.02	150.65	143.23	-14.85	-116.36	159.18	147.60	-15.81	-117.01
82.17	71.10	-7.71	-61.80	156.65	136.06	-14.73	-119.93	165.54	144.17	-15.68	-120.48

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Shear Rating** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

Legal											
Max C3		Min C3		Max C4		Min C4		Max C5		Min C5	
V2	T	V2	T	V2	T	V2	T	V2	T	V2	T
kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft
114.44	128.48	-7.42	-93.56	152.85	170.42	-10.66	-123.74	157.51	179.14	-10.22	-131.53
117.61	121.67	-6.04	-96.72	156.98	161.42	-8.28	-127.90	162.06	169.59	-8.42	-135.97
130.77	122.42	-6.01	-107.75	172.98	162.32	-8.11	-142.37	182.97	170.82	-8.47	-151.50
134.11	122.43	-6.05	-112.93	177.35	162.29	-8.18	-149.20	187.73	170.93	-8.61	-158.70
140.39	120.44	-6.21	-116.64	184.30	159.62	-8.12	-154.08	198.56	168.21	-8.86	-163.89
8.54	121.82	-143.24	-134.02	11.08	160.86	-187.63	-176.85	12.12	172.82	-203.10	-188.65
8.54	121.81	-143.24	-134.02	11.08	160.85	-187.63	-176.86	12.12	172.81	-203.10	-188.65
8.43	121.59	-142.70	-129.64	10.93	160.60	-186.92	-170.29	11.95	172.52	-202.34	-183.35
8.19	119.26	-139.89	-131.43	10.63	157.45	-184.11	-172.64	11.62	169.32	-197.27	-185.91
7.92	114.96	-136.89	-133.07	10.28	151.83	-180.16	-174.75	11.24	163.40	-193.02	-188.29
7.70	111.08	-128.28	-137.59	10.28	146.30	-169.73	-180.97	10.84	157.87	-179.71	-194.38
7.39	129.07	-131.33	-138.72	9.91	169.88	-173.81	-182.22	10.39	183.17	-183.88	-196.21
120.08	144.41	-9.42	-101.14	158.97	190.22	-13.12	-133.01	168.02	203.78	-13.14	-143.65
122.07	143.04	-8.45	-102.86	161.58	188.20	-11.30	-135.34	170.86	201.84	-11.90	-146.15
124.84	141.38	-8.31	-105.25	165.20	185.99	-11.08	-138.55	174.83	199.54	-11.71	-149.59
127.58	139.47	-8.10	-107.63	168.80	183.46	-10.80	-141.77	178.72	196.87	-11.39	-153.02
136.77	132.84	-8.16	-115.17	180.00	174.44	-10.59	-152.14	192.85	187.95	-11.57	-163.90
139.81	131.39	-8.42	-119.38	184.00	172.78	-10.92	-157.67	197.15	185.84	-11.95	-169.52
142.69	129.64	-8.66	-121.83	186.90	170.29	-11.23	-160.92	202.33	183.35	-12.29	-172.85
6.49	117.34	-141.34	-133.55	8.48	154.98	-185.57	-176.85	9.24	164.91	-199.89	-186.80
113.08	118.51	-12.11	-100.91	150.78	155.80	-15.83	-132.72	156.13	167.96	-17.23	-138.80
117.68	115.79	-11.95	-90.04	156.83	154.00	-15.61	-124.28	162.66	164.12	-16.99	-128.85
122.64	113.11	-11.85	-92.34	163.35	148.70	-15.49	-128.05	169.67	160.33	-16.86	-132.68

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Shear Rating** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

Legal				Emergency							
Max ST5		Min ST5		Max EV2		Min EV2		Max EV3		Min EV3	
V2	T	V2	T	V2	T	V2	T	V2	T	V2	T
kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft
146.61	166.71	-9.36	-124.16	129.18	140.53	-10.32	-101.49	192.16	209.40	-15.25	-151.30
150.84	157.46	-7.92	-128.27	132.38	133.19	-7.00	-104.84	196.95	198.46	-10.77	-156.30
173.12	158.49	-8.14	-142.79	143.02	133.65	-6.71	-116.49	213.06	199.17	-10.18	-173.68
177.66	158.54	-8.31	-149.45	146.46	133.47	-6.79	-122.07	218.20	198.93	-10.19	-181.99
190.65	155.90	-8.57	-154.26	150.30	131.19	-6.75	-126.01	224.17	195.54	-10.03	-187.88
11.24	163.23	-194.41	-178.32	9.39	130.66	-152.22	-143.09	14.15	194.91	-227.28	-213.52
11.24	163.22	-194.41	-178.32	9.39	130.65	-152.22	-143.10	14.15	194.90	-227.28	-213.53
11.07	162.93	-193.70	-174.62	9.22	130.44	-151.64	-137.49	13.81	194.59	-226.41	-205.54
10.76	160.08	-185.60	-177.13	8.98	127.92	-149.73	-139.83	13.42	190.82	-223.43	-208.94
10.40	154.59	-181.46	-179.68	8.69	123.39	-146.58	-140.96	13.00	184.06	-218.75	-210.75
10.06	149.78	-165.39	-185.29	9.28	118.95	-138.66	-146.53	13.69	177.44	-206.77	-218.97
9.64	173.93	-168.97	-186.98	9.04	137.89	-142.14	-147.08	13.31	205.72	-211.94	-219.85
154.19	192.76	-12.48	-136.35	130.17	153.93	-13.63	-108.21	194.07	229.98	-20.01	-161.41
156.93	190.99	-11.15	-138.68	132.21	152.45	-11.31	-110.12	197.12	227.77	-16.76	-164.25
160.78	188.88	-10.95	-141.89	135.05	150.65	-10.25	-112.75	201.38	225.12	-15.12	-168.18
164.49	186.47	-10.57	-145.11	137.90	148.57	-9.75	-115.35	205.63	222.01	-14.38	-172.05
181.31	179.26	-10.71	-155.11	146.45	140.78	-8.95	-123.74	218.56	210.46	-13.39	-184.57
185.50	177.02	-11.05	-160.20	149.64	139.93	-9.23	-128.11	223.30	209.10	-13.82	-191.11
193.69	174.64	-11.38	-163.19	151.63	137.48	-9.48	-130.73	226.39	205.53	-14.19	-195.02
9.00	155.18	-191.91	-173.59	6.93	126.67	-151.37	-144.92	10.25	188.87	-225.76	-216.05
144.21	162.55	-16.23	-134.12	126.69	122.19	-13.12	-105.44	188.53	186.44	-19.53	-164.47
150.12	158.89	-16.02	-123.27	131.49	125.38	-12.99	-98.58	195.71	189.66	-19.26	-154.75
156.48	155.25	-15.87	-126.47	136.72	117.73	-12.84	-101.47	203.51	172.70	-19.12	-159.54

BPA

Job: Br [redacted] over [redacted] LR 18.17.01 Computed by: Lmv Date: 1/19

Desc: **Shear Rating** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

Shear Resistance

Section Properties							DC+PT+CR+SH			TU		0.5TG	Resistance		
Layout Line Distance	A	I	Q	dv	bw	A_o	As-web	Vs	σ_{cog}	K f'c=5.5	Vc	Vn	StrFac	SysFac	$V_{resistance}$
ft	ft^2	ft^4	ft^3	ft	ft	ft^2	in^2	kip	ksi		kip	kip			
Span 1									**37.378**	**ksf - Inventory**					
96.38	54.13	491.27	75.11	6.80	1.0	89.23	0.88	359.04	-0.62	2.00	290.27	649.31	0.90	1.00	584.38
96.38	54.13	491.27	75.11	6.80	1.0	89.23	0.88	359.04	-0.71	2.00	290.27	649.31	0.90	1.00	584.38
106.38	57.23	537.06	82.3	6.80	1.0	87.34	1.20	489.60	-0.68	2.00	290.27	779.87	0.90	1.00	701.88
106.38	57.23	537.06	82.3	6.80	1.0	87.34	1.20	489.60	-0.65	2.00	290.27	779.87	0.90	1.00	701.88
110.38	1000.00	1000	1	6.80	10.0	1000.00	1.20	489.60	-0.04	1.54	2241.48	2731.08	0.90	1.00	2457.97
110.38	1000.00	1000	1	6.80	10.0	1000.00	1.20	489.60	-0.04	1.54	2240.79	2730.39	0.90	1.00	2457.35
Span 2															
110.46	1000.00	1000	1	6.80	10.0	1000.00	1.20	489.60	-0.04	1.54	2240.79	2730.39	0.90	1.00	2457.35
110.46	1000.00	1000	1	6.80	10.0	1000.00	1.20	489.60	-0.04	1.54	2240.53	2730.13	0.90	1.00	2457.12
114.38	57.23	537.06	82.3	6.80	1.0	87.34	1.20	489.60	-0.64	2.00	290.27	779.87	0.90	1.00	701.88
114.38	57.23	537.06	82.3	6.80	1.0	87.34	1.20	489.60	-0.71	2.00	290.27	779.87	0.90	1.00	701.88
124.38	54.13	491.27	75.11	6.80	1.0	89.23	0.88	359.04	-0.74	2.00	290.27	649.31	0.90	1.00	584.38
124.38	54.13	491.27	75.11	6.80	1.0	89.23	0.88	359.04	-0.65	2.00	290.27	649.31	0.90	1.00	584.38
264.93	50.30	424.12	65.23	6.80	1.0	91.11	0.88	359.04	-0.66	2.00	290.27	649.31	0.90	1.00	584.38
264.93	50.30	424.12	65.23	6.80	1.0	91.11	0.88	359.04	-0.67	2.00	290.27	649.31	0.90	1.00	584.38
269.93	54.13	491.27	75.11	6.80	1.0	89.23	0.88	359.04	-0.62	2.00	290.27	649.31	0.90	1.00	584.38
269.93	54.13	491.27	75.11	6.80	1.0	89.23	0.88	359.04	-0.71	2.00	290.27	649.31	0.90	1.00	584.38
279.93	57.23	537.06	82.3	6.80	1.0	87.34	1.20	489.60	-0.68	2.00	290.27	779.87	0.90	1.00	701.88
279.93	57.23	537.06	82.3	6.80	1.0	87.34	1.20	489.60	-0.64	2.00	290.27	779.87	0.90	1.00	701.88
283.93	1000.00	1000	1	6.80	10.0	1000.00	1.20	489.60	-0.04	1.54	2231.04	2720.64	0.90	1.00	2448.58
283.93	1000.00	1000	1	6.80	10.0	1000.00	1.20	489.60	-0.04	1.54	2232.25	2721.85	0.90	1.00	2449.66
Span 3															
382.31	50.30	424.12	65.23	7.20	1.0	91.11	0.88	380.16	-0.14	2.00	307.34	687.50	0.90	1.00	618.75
388.31	54.13	491.27	75.11	7.20	1.0	89.23	0.88	380.16	-0.13	2.00	307.34	687.50	0.90	1.00	618.75
388.31	54.13	491.27	75.11	7.20	1.0	89.23	0.88	380.16	-0.13	2.00	307.34	687.50	0.90	1.00	618.75

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Shear Rating** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

HL 93 Inventory								
Layout Line Distance	V_{LLIM} Dir-shear	V_{LLIM} Shr-tor	V_{LLIM}	RF - LLmax	V_{LLIM} Dir-shear	V_{LLIM} Shr-tor	V_{LLIM}	RF - LLmin
ft	kip	kip	kip		kip	kip	kip	
Span 1								
96.38	116.56	10.45	127.01	1.03	-10.27	-8.68	-18.94	6.93
96.38	120.50	9.74	130.25	1.01	-8.77	-8.99	-17.76	7.38
106.38	152.60	10.14	162.74	0.99	-9.15	-10.36	-19.51	8.26
106.38	174.94	10.18	185.12	0.84	-9.47	-10.84	-20.31	7.70
110.38	179.75	0.87	180.62	6.41	-9.99	-0.98	-10.97	105.53
110.38	10.30	1.08	11.38	97.36	-183.38	-1.14	-184.52	6.01
Span 2								
110.46	10.30	1.08	11.38	97.38	-183.38	-1.14	-184.52	6.01
110.46	10.02	1.10	11.12	101.04	-182.59	-1.14	-183.73	6.11
114.38	9.75	12.38	22.12	5.72	-179.71	-13.22	-192.93	0.66
114.38	9.41	11.97	21.38	6.13	-163.99	-13.32	-177.31	0.74
124.38	9.31	11.09	20.39	4.86	-140.86	-13.34	-154.20	0.64
124.38	9.38	12.67	22.05	4.49	-143.39	-13.43	-156.82	0.63
264.93	130.14	13.13	143.27	0.84	-11.41	-9.75	-21.16	5.66
264.93	132.95	13.06	146.02	0.83	-10.68	-10.01	-20.69	5.87
269.93	136.60	13.31	149.91	0.69	-10.07	-10.48	-20.56	5.06
269.93	140.22	13.29	153.50	0.68	-9.73	-10.82	-20.55	5.07
279.93	163.92	13.30	177.22	0.77	-9.69	-11.96	-21.65	6.30
279.93	179.97	13.20	193.17	0.68	-10.01	-12.37	-22.38	5.91
283.93	182.62	1.14	183.76	6.12	-10.28	-1.10	-11.38	98.83
283.93	10.47	0.98	11.46	99.84	-181.37	-1.00	-182.37	6.27
Span 3								
382.31	107.22	14.25	121.47	2.25	-15.81	-12.02	-27.82	9.81
388.31	112.34	14.30	126.64	2.01	-16.48	-11.28	-27.76	9.17
388.31	118.38	14.00	132.38	1.93	-16.57	-11.59	-28.16	9.07

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Shear Rating** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

HL 93 Operating								
Layout Line Distance	V_{LLIM} Dir-shear	V_{LLIM} Shr-tor	V_{LLIM}	RF - LLmax	V_{LLIM} Dir-shear	V_{LLIM} Shr-tor	V_{LLIM}	RF - LLmin
ft	kip	kip	kip		kip	kip	kip	
Span 1								
96.38	116.56	10.45	127.01	1.34	-9.26	-8.68	-17.94	9.49
96.38	120.50	9.74	130.25	1.30	-8.63	-8.99	-17.62	9.64
106.38	152.60	10.14	162.74	1.28	-9.15	-10.36	-19.51	10.70
106.38	174.94	10.18	185.12	1.09	-9.47	-10.84	-20.31	9.98
110.38	179.75	0.87	180.62	8.31	-9.99	-0.98	-10.97	136.80
110.38	10.30	1.06	11.36	126.43	-183.38	-1.14	-184.52	7.79
Span 2								
110.46	10.30	1.06	11.36	126.46	-183.38	-1.14	-184.52	7.79
110.46	10.02	1.09	11.10	131.13	-182.59	-1.14	-183.73	7.92
114.38	9.75	12.18	21.93	7.48	-179.71	-13.22	-192.92	0.85
114.38	9.41	11.67	21.08	8.06	-163.99	-13.32	-177.31	0.96
124.38	9.31	10.76	20.07	6.40	-140.86	-13.34	-154.20	0.83
124.38	8.90	12.67	21.57	5.95	-143.39	-13.43	-156.82	0.82
264.93	130.14	13.13	143.27	1.08	-10.05	-9.34	-19.39	8.01
264.93	132.95	13.06	146.02	1.08	-9.89	-9.51	-19.40	8.12
269.93	136.60	13.31	149.91	0.90	-9.85	-9.95	-19.80	6.80
269.93	140.22	13.29	153.50	0.88	-9.73	-10.35	-20.08	6.73
279.93	163.92	13.30	177.22	1.00	-9.69	-11.60	-21.29	8.30
279.93	179.97	13.20	193.17	0.89	-10.01	-12.12	-22.13	7.75
283.93	182.62	1.14	183.76	7.94	-10.28	-1.08	-11.37	128.32
283.93	10.47	0.98	11.46	129.42	-181.37	-1.00	-182.37	8.13
Span 3								
382.31	107.22	14.25	121.47	2.91	-13.74	-12.02	-25.76	13.74
388.31	112.34	14.30	126.64	2.61	-14.10	-11.28	-25.38	13.00
388.31	118.38	14.00	132.38	2.50	-14.33	-11.59	-25.93	12.77

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Shear Rating** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

FL 120 Operating								
Layout Line Distance	V_{LLIM} Dir-shear	V_{LLIM} Shr-tor	V_{LLIM}	RF - LLmax	V_{LLIM} Dir-shear	V_{LLIM} Shr-tor	V_{LLIM}	RF - LLmin
ft	kip	kip	kip		kip	kip	kip	
Span 1								
96.38	130.12	10.91	141.03	1.21	-8.84	-7.90	-16.74	10.17
96.38	133.48	10.34	143.81	1.18	-6.61	-8.16	-14.77	11.50
106.38	145.51	10.61	156.12	1.34	-6.50	-9.27	-15.78	13.23
106.38	149.10	10.60	159.70	1.27	-6.64	-9.72	-16.36	12.39
110.38	153.97	0.91	154.88	9.69	-6.76	-0.88	-7.64	196.40
110.38	9.48	0.91	10.39	138.29	-156.42	-1.00	-157.42	9.13
Span 2								
110.46	9.48	0.91	10.39	138.33	-156.42	-1.00	-157.42	9.13
110.46	9.35	0.91	10.26	141.96	-155.83	-0.96	-156.79	9.29
114.38	9.09	10.22	19.31	8.49	-153.62	-11.20	-164.82	0.99
114.38	8.80	9.86	18.65	9.10	-150.38	-11.31	-161.69	1.05
124.38	8.90	9.30	18.20	7.06	-141.91	-11.49	-153.40	0.84
124.38	8.60	10.79	19.39	6.62	-145.40	-11.55	-156.95	0.82
264.93	133.07	11.82	144.89	1.07	-12.06	-8.28	-20.34	7.63
264.93	135.20	11.70	146.91	1.07	-10.02	-8.43	-18.44	8.54
269.93	138.17	11.81	149.98	0.90	-9.79	-8.81	-18.60	7.25
269.93	141.13	11.65	152.78	0.88	-9.36	-9.01	-18.37	7.36
279.93	150.24	11.30	161.54	1.09	-9.06	-9.88	-18.94	9.33
279.93	153.53	11.21	164.74	1.04	-9.35	-10.23	-19.58	8.75
283.93	155.81	0.96	156.78	9.30	-9.61	-0.91	-10.52	138.66
283.93	7.06	0.88	7.94	186.76	-155.04	-1.01	-156.05	9.50
Span 3								
382.31	127.96	9.95	137.90	2.57	-13.32	-8.41	-21.73	16.28
388.31	132.94	10.00	142.94	2.31	-13.14	-7.89	-21.03	15.69
388.31	138.34	9.56	147.89	2.24	-13.04	-8.09	-21.13	15.67

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Shear Rating** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

SU2 Operating								
Layout Line Distance	**V_{LLIM} Dir-shear**	**V_{LLIM} Shr-tor**	**V_{LLIM}**	**RF - LLmax**	**V_{LLIM} Dir-shear**	**V_{LLIM} Shr-tor**	**V_{LLIM}**	**RF - LLmin**
ft	kip	kip	kip		kip	kip	kip	
Span 1								
96.38	38.91	3.21	42.12	4.04	-3.44	-2.31	-5.75	29.59
96.38	39.86	3.04	42.89	3.96	-2.27	-2.39	-4.65	36.50
106.38	42.86	3.11	45.98	4.54	-2.06	-2.71	-4.77	43.81
106.38	43.88	3.11	46.99	4.31	-2.07	-2.84	-4.91	41.27
110.38	44.92	0.27	45.18	33.21	-2.05	-0.26	-2.30	651.66
110.38	2.90	0.27	3.16	454.54	-45.44	-0.29	-45.73	31.41
Span 2								
110.46	2.90	0.27	3.16	454.65	-45.44	-0.29	-45.73	31.42
110.46	2.79	0.26	3.05	476.86	-45.27	-0.28	-45.55	31.97
114.38	2.71	2.97	5.68	28.85	-44.70	-3.25	-47.95	3.42
114.38	2.63	2.87	5.49	30.91	-43.77	-3.27	-47.04	3.61
124.38	2.91	2.70	5.61	22.87	-41.42	-3.33	-44.75	2.87
124.38	2.88	3.13	6.01	21.34	-42.47	-3.34	-45.81	2.80
264.93	38.91	3.43	42.34	3.67	-4.45	-2.41	-6.86	22.65
264.93	39.51	3.39	42.91	3.67	-3.73	-2.45	-6.18	25.47
269.93	40.35	3.42	43.78	3.08	-3.21	-2.56	-5.77	23.35
269.93	41.20	3.38	44.57	3.03	-3.06	-2.62	-5.68	23.80
279.93	43.73	3.27	47.00	3.76	-2.71	-2.87	-5.58	31.67
279.93	44.68	3.25	47.93	3.58	-2.79	-2.98	-5.77	29.72
283.93	45.26	0.28	45.54	32.03	-2.87	-0.27	-3.13	465.74
283.93	2.10	0.26	2.36	629.58	-45.24	-0.29	-45.53	32.57
Span 3								
382.31	38.11	2.92	41.03	8.63	-3.97	-2.53	-6.50	54.45
388.31	39.53	3.07	42.60	7.75	-4.01	-2.42	-6.43	51.32
388.31	41.09	2.87	43.96	7.53	-3.85	-2.49	-6.35	52.14

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Shear Rating** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

SU3 Operating								
Layout Line Distance	V_{LLIM} Dir-shear	V_{LLIM} Shr-tor	V_{LLIM}	RF - LLmax	V_{LLIM} Dir-shear	V_{LLIM} Shr-tor	V_{LLIM}	RF - LLmin
ft	kip	kip	kip		kip	kip	kip	
Span 1								
96.38	73.99	6.14	80.12	2.12	-5.79	-4.43	-10.22	16.65
96.38	75.82	5.82	81.64	2.08	-3.98	-4.58	-8.56	19.84
106.38	81.97	5.96	87.94	2.37	-3.82	-5.20	-9.02	23.15
106.38	83.96	5.96	89.92	2.25	-3.84	-5.45	-9.29	21.82
110.38	86.28	0.51	86.79	17.29	-3.79	-0.49	-4.28	350.30
110.38	5.41	0.51	5.92	242.52	-87.48	-0.56	-88.03	16.32
Span 2								
110.46	5.41	0.51	5.92	242.58	-87.48	-0.56	-88.03	16.32
110.46	5.34	0.51	5.85	248.92	-87.14	-0.54	-87.68	16.61
114.38	5.19	5.71	10.90	15.04	-85.94	-6.25	-92.20	1.78
114.38	5.03	5.51	10.54	16.12	-84.14	-6.31	-90.45	1.88
124.38	5.32	5.20	10.52	12.20	-79.49	-6.42	-85.91	1.49
124.38	5.18	6.03	11.20	11.45	-81.48	-6.44	-87.92	1.46
264.93	74.62	6.60	81.22	1.91	-7.73	-4.63	-12.36	12.56
264.93	75.79	6.54	82.32	1.91	-6.41	-4.71	-11.12	14.17
269.93	77.42	6.60	84.02	1.60	-5.88	-4.93	-10.80	12.47
269.93	79.05	6.51	85.56	1.58	-5.59	-5.04	-10.63	12.71
279.93	84.07	6.30	90.37	1.96	-5.18	-5.52	-10.70	16.51
279.93	85.89	6.26	92.15	1.86	-5.35	-5.72	-11.07	15.49
283.93	87.13	0.54	87.67	16.64	-5.49	-0.51	-6.00	243.13
283.93	3.94	0.49	4.44	334.26	-86.88	-0.56	-87.45	16.96
Span 3								
382.31	72.57	5.63	78.21	4.52	-7.52	-4.90	-12.42	28.49
388.31	75.33	5.78	81.10	4.07	-7.42	-4.69	-12.12	27.23
388.31	78.32	5.49	83.81	3.95	-7.36	-4.84	-12.20	27.13

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Shear Rating** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

SU4 Operating								
Layout Line Distance	**V_{LLIM} Dir-shear**	**V_{LLIM} Shr-tor**	**V_{LLIM}**	**RF - LLmax**	**V_{LLIM} Dir-shear**	**V_{LLIM} Shr-tor**	**V_{LLIM}**	**RF - LLmin**
ft	kip	kip	kip		kip	kip	kip	
Span 1								
96.38	78.14	6.49	84.63	2.01	-5.93	-4.69	-10.63	16.02
96.38	80.09	6.15	86.24	1.97	-4.24	-4.85	-9.08	18.70
106.38	86.82	6.31	93.12	2.24	-4.02	-5.51	-9.53	21.92
106.38	88.92	6.30	95.22	2.13	-4.00	-5.77	-9.77	20.75
110.38	91.57	0.54	92.11	16.29	-4.01	-0.52	-4.53	331.18
110.38	5.76	0.54	6.30	227.92	-92.86	-0.59	-93.45	15.37
Span 2								
110.46	5.76	0.54	6.30	227.97	-92.86	-0.59	-93.45	15.38
110.46	5.69	0.54	6.23	233.90	-92.51	-0.57	-93.08	15.64
114.38	5.53	6.04	11.57	14.17	-91.09	-6.63	-97.72	1.68
114.38	5.36	5.83	11.19	15.18	-89.18	-6.69	-95.87	1.77
124.38	5.60	5.50	11.11	11.56	-84.11	-6.80	-90.91	1.41
124.38	5.44	6.38	11.82	10.85	-86.21	-6.83	-93.04	1.38
264.93	78.95	6.99	85.94	1.81	-8.03	-4.91	-12.94	12.00
264.93	80.19	6.92	87.11	1.81	-6.68	-4.99	-11.67	13.50
269.93	81.92	6.99	88.91	1.52	-6.19	-5.22	-11.40	11.81
269.93	83.65	6.89	90.54	1.49	-5.89	-5.34	-11.22	12.04
279.93	89.10	6.68	95.78	1.85	-5.51	-5.85	-11.36	15.56
279.93	91.04	6.63	97.67	1.76	-5.69	-6.05	-11.75	14.59
283.93	92.50	0.57	93.07	15.67	-5.84	-0.54	-6.38	228.46
283.93	4.19	0.52	4.71	314.93	-92.21	-0.60	-92.81	15.98
Span 3								
382.31	76.67	6.00	82.68	4.28	-8.01	-5.40	-13.41	26.39
388.31	79.59	5.95	85.55	3.86	-7.90	-4.72	-12.63	26.14
388.31	82.77	5.82	88.58	3.74	-7.84	-4.86	-12.70	26.06

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Shear Rating** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

C3 Operating								
Layout Line Distance	**V_{LLIM} Dir-shear**	**V_{LLIM} Shr-tor**	**V_{LLIM}**	**RF - LLmax**	**V_{LLIM} Dir-shear**	**V_{LLIM} Shr-tor**	**V_{LLIM}**	**RF - LLmin**
ft	kip	kip	kip		kip	kip	kip	
Span 1								
96.38	57.22	4.90	62.12	2.74	-3.71	-3.56	-7.27	23.41
96.38	58.80	4.64	63.44	2.68	-3.02	-3.69	-6.71	25.33
106.38	65.38	4.77	70.15	2.98	-3.00	-4.19	-7.20	29.01
106.38	67.06	4.77	71.82	2.82	-3.03	-4.40	-7.42	27.30
110.38	70.19	0.41	70.60	21.25	-3.11	-0.40	-3.50	428.28
110.38	4.27	0.41	4.69	306.53	-71.62	-0.46	-72.08	19.93
Span 2								
110.46	4.27	0.41	4.69	306.61	-71.62	-0.46	-72.08	19.94
110.46	4.21	0.41	4.63	314.75	-71.35	-0.44	-71.79	20.28
114.38	4.10	4.64	8.74	18.77	-69.95	-5.12	-75.06	2.18
114.38	3.96	4.48	8.44	20.13	-68.45	-5.18	-73.63	2.31
124.38	3.85	4.23	8.08	15.88	-64.14	-5.24	-69.39	1.85
124.38	3.70	4.92	8.61	14.89	-65.67	-5.29	-70.95	1.81
264.93	60.04	5.39	65.43	2.37	-4.71	-3.77	-8.48	18.30
264.93	61.03	5.34	66.37	2.37	-4.22	-3.84	-8.06	19.54
269.93	62.42	5.39	67.81	1.99	-4.15	-4.01	-8.16	16.51
269.93	63.79	5.31	69.11	1.96	-4.05	-4.10	-8.15	16.59
279.93	68.39	5.17	73.56	2.40	-4.08	-4.48	-8.56	20.64
279.93	69.90	5.11	75.02	2.29	-4.21	-4.65	-8.86	19.35
283.93	71.35	0.44	71.79	20.32	-4.33	-0.41	-4.74	307.44
283.93	3.24	0.40	3.64	407.16	-70.67	-0.45	-71.13	20.85
Span 3								
382.31	56.54	4.68	61.22	5.78	-6.06	-3.99	-10.04	35.23
388.31	58.84	4.67	63.51	5.20	-5.98	-3.63	-9.61	34.34
388.31	61.32	4.56	65.88	5.02	-5.93	-3.73	-9.65	34.29

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Shear Rating** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

C4 Operating								
Layout Line Distance	V_{LLIM} Dir-shear	V_{LLIM} Shr-tor	V_{LLIM}	RF - LLmax	V_{LLIM} Dir-shear	V_{LLIM} Shr-tor	V_{LLIM}	RF - LLmin
ft	kip	kip	kip		kip	kip	kip	
Span 1								
96.38	76.42	6.49	82.92	2.05	-5.33	-4.72	-10.04	16.95
96.38	78.49	6.15	84.64	2.01	-4.14	-4.87	-9.01	18.84
106.38	86.49	6.32	92.81	2.25	-4.06	-5.54	-9.60	21.75
106.38	88.67	6.32	94.99	2.13	-4.09	-5.81	-9.90	20.48
110.38	92.15	0.54	92.69	16.19	-4.06	-0.52	-4.59	327.24
110.38	5.54	0.55	6.09	235.97	-93.82	-0.60	-94.42	15.21
Span 2								
110.46	5.54	0.55	6.09	236.03	-93.82	-0.60	-94.42	15.22
110.46	5.46	0.55	6.01	242.23	-93.46	-0.58	-94.04	15.48
114.38	5.32	6.13	11.45	14.33	-92.05	-6.72	-98.77	1.66
114.38	5.14	5.91	11.05	15.37	-90.08	-6.80	-96.88	1.75
124.38	5.14	5.57	10.71	11.98	-84.87	-6.90	-91.76	1.40
124.38	4.95	6.47	11.43	11.23	-86.90	-6.94	-93.85	1.37
264.93	79.49	7.10	86.58	1.79	-6.56	-4.96	-11.52	13.48
264.93	80.79	7.02	87.81	1.79	-5.65	-5.05	-10.70	14.72
269.93	82.60	7.09	89.69	1.50	-5.54	-5.28	-10.82	12.45
269.93	84.40	6.99	91.39	1.48	-5.40	-5.40	-10.80	12.51
279.93	90.00	6.79	96.79	1.83	-5.29	-5.92	-11.22	15.76
279.93	92.00	6.73	98.73	1.74	-5.46	-6.14	-11.60	14.78
283.93	93.45	0.58	94.03	15.51	-5.62	-0.55	-6.16	236.64
283.93	4.24	0.53	4.76	311.19	-92.79	-0.60	-93.39	15.88
Span 3								
382.31	75.39	6.16	81.55	4.34	-7.92	-5.24	-13.16	26.89
388.31	78.41	6.21	84.63	3.90	-7.81	-5.01	-12.82	25.74
388.31	81.68	6.00	87.67	3.78	-7.75	-5.17	-12.91	25.63

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Shear Rating** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

C5 Operating								
Layout Line Distance	V_{LLIM} Dir-shear	V_{LLIM} Shr-tor	V_{LLIM}	RF - LLmax	V_{LLIM} Dir-shear	V_{LLIM} Shr-tor	V_{LLIM}	RF - LLmin
ft	kip	kip	kip		kip	kip	kip	
Span 1								
96.38	78.76	6.83	85.58	1.99	-5.11	-5.01	-10.12	16.82
96.38	81.03	6.46	87.49	1.94	-4.21	-5.18	-9.39	18.09
106.38	91.49	6.65	98.14	2.13	-4.24	-5.90	-10.13	20.61
106.38	93.87	6.65	100.52	2.02	-4.31	-6.18	-10.48	19.33
110.38	99.28	0.57	99.85	15.03	-4.43	-0.56	-4.99	300.98
110.38	6.06	0.59	6.65	216.02	-101.55	-0.64	-102.19	14.06
Span 2								
110.46	6.06	0.59	6.65	216.08	-101.55	-0.64	-102.19	14.06
110.46	5.98	0.59	6.56	221.87	-101.17	-0.62	-101.80	14.30
114.38	5.81	6.59	12.40	13.23	-98.63	-7.24	-105.87	1.55
114.38	5.62	6.36	11.98	14.18	-96.51	-7.33	-103.84	1.64
124.38	5.42	6.02	11.43	11.23	-89.85	-7.41	-97.26	1.32
124.38	5.19	6.98	12.17	10.54	-91.94	-7.48	-99.42	1.29
264.93	84.01	7.60	91.61	1.69	-6.57	-5.36	-11.93	13.02
264.93	85.43	7.53	92.96	1.69	-5.95	-5.45	-11.40	13.81
269.93	87.41	7.60	95.02	1.42	-5.85	-5.70	-11.55	11.66
269.93	89.36	7.50	96.86	1.40	-5.70	-5.83	-11.53	11.73
279.93	96.43	7.32	103.74	1.70	-5.79	-6.38	-12.17	14.53
279.93	98.58	7.23	105.81	1.62	-5.97	-6.60	-12.57	13.64
283.93	101.16	0.62	101.79	14.33	-6.14	-0.59	-6.73	216.71
283.93	4.62	0.56	5.18	286.11	-99.95	-0.64	-100.58	14.74
Span 3								
382.31	78.06	6.64	84.70	4.18	-8.62	-5.48	-14.10	25.10
388.31	81.33	6.62	87.95	3.75	-8.50	-5.20	-13.70	24.09
388.31	84.84	6.47	91.31	3.62	-8.43	-5.35	-13.78	24.01

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Shear Rating** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

ST5 Operating								
Layout Line Distance	**V_{LLIM} Dir-shear**	**V_{LLIM} Shr-tor**	**V_{LLIM}**	**RF - LLmax**	**V_{LLIM} Dir-shear**	**V_{LLIM} Shr-tor**	**V_{LLIM}**	**RF - LLmin**
ft	kip	kip	kip		kip	kip	kip	
Span 1								
96.38	73.30	6.35	79.66	2.14	-4.68	-4.73	-9.41	18.09
96.38	75.42	6.00	81.42	2.09	-3.96	-4.89	-8.85	19.20
106.38	86.56	6.17	92.73	2.25	-4.07	-5.56	-9.63	21.69
106.38	88.83	6.17	95.00	2.13	-4.15	-5.82	-9.97	20.33
110.38	95.33	0.53	95.86	15.66	-4.28	-0.52	-4.81	312.04
110.38	5.62	0.55	6.18	232.60	-97.20	-0.61	-97.81	14.69
Span 2								
110.46	5.62	0.55	6.18	232.66	-97.20	-0.61	-97.81	14.69
110.46	5.54	0.55	6.09	239.05	-96.85	-0.59	-97.44	14.94
114.38	5.38	6.23	11.61	14.12	-92.80	-6.90	-99.69	1.65
114.38	5.20	6.02	11.22	15.14	-90.73	-6.99	-97.72	1.74
124.38	5.03	5.71	10.73	11.96	-82.70	-7.06	-89.76	1.43
124.38	4.82	6.63	11.45	11.21	-84.48	-7.12	-91.61	1.40
264.93	77.10	7.19	84.29	1.84	-6.24	-5.09	-11.33	13.71
264.93	78.47	7.13	85.59	1.84	-5.57	-5.18	-10.75	14.65
269.93	80.39	7.20	87.59	1.54	-5.48	-5.41	-10.88	12.38
269.93	82.25	7.11	89.35	1.51	-5.28	-5.53	-10.81	12.50
279.93	90.65	6.98	97.63	1.81	-5.35	-6.04	-11.39	15.51
279.93	92.75	6.89	99.64	1.72	-5.53	-6.24	-11.76	14.57
283.93	96.85	0.59	97.44	14.97	-5.69	-0.55	-6.25	233.51
283.93	4.50	0.53	5.03	294.79	-95.95	-0.59	-96.54	15.36
Span 3								
382.31	72.11	6.42	78.53	4.51	-8.12	-5.30	-13.42	26.38
388.31	75.06	6.41	81.47	4.05	-8.01	-4.97	-12.98	25.42
388.31	78.24	6.26	84.50	3.92	-7.94	-5.10	-13.04	25.38

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Shear Rating** Checked by: Dar Date: 3/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

EV2 Operating								
Layout Line Distance	**V_{LLIM} Dir-shear**	**V_{LLIM} Shr-tor**	**V_{LLIM}**	**RF - LLmax**	**V_{LLIM} Dir-shear**	**V_{LLIM} Shr-tor**	**V_{LLIM}**	**RF - LLmin**
ft	kip	kip	kip		kip	kip	kip	
Span 1								
96.38	64.59	5.35	69.95	2.53	-5.16	-3.87	-9.03	19.58
96.38	66.19	5.07	71.27	2.48	-3.50	-3.99	-7.49	23.54
106.38	71.51	5.20	76.71	2.83	-3.36	-4.53	-7.89	27.47
106.38	73.23	5.20	78.43	2.68	-3.39	-4.75	-8.15	25.84
110.38	75.15	0.45	75.60	20.61	-3.37	-0.43	-3.80	409.96
110.38	4.70	0.44	5.14	290.23	-76.11	-0.49	-76.60	19.48
Span 2								
110.46	4.70	0.44	5.14	290.30	-76.11	-0.49	-76.60	19.48
110.46	4.61	0.44	5.06	299.09	-75.82	-0.47	-76.29	19.82
114.38	4.49	4.98	9.47	17.99	-74.87	-5.44	-80.31	2.12
114.38	4.34	4.80	9.15	19.28	-73.29	-5.49	-78.78	2.24
124.38	4.64	4.53	9.17	14.54	-69.33	-5.58	-74.92	1.78
124.38	4.52	5.25	9.77	13.63	-71.07	-5.60	-76.67	1.74
264.93	65.09	5.74	70.83	2.28	-6.82	-4.04	-10.85	14.86
264.93	66.11	5.69	71.79	2.28	-5.65	-4.11	-9.76	16.76
269.93	67.53	5.74	73.27	1.91	-5.13	-4.30	-9.42	14.85
269.93	68.95	5.66	74.61	1.88	-4.88	-4.40	-9.27	15.14
279.93	73.22	5.48	78.70	2.33	-4.47	-4.82	-9.29	19.76
279.93	74.82	5.45	80.27	2.22	-4.62	-4.99	-9.60	18.54
283.93	75.81	0.47	76.28	19.86	-4.74	-0.44	-5.18	292.13
283.93	3.46	0.43	3.89	395.39	-75.69	-0.49	-76.18	20.21
Span 3								
382.31	63.35	4.83	68.17	5.39	-6.56	-4.17	-10.72	34.27
388.31	65.75	5.06	70.80	4.84	-6.49	-3.98	-10.47	32.72
388.31	68.36	4.75	73.11	4.70	-6.42	-4.09	-10.51	32.69

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Shear Rating** Checked by: Dar Date: 3/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Longitudinal Rating\[Calculations.xlsx]Section Properties

EV3 Operating								
Layout Line Distance	V_{LLIM} Dir-shear	V_{LLIM} Shr-tor	V_{LLIM}	RF - LLmax	V_{LLIM} Dir-shear	V_{LLIM} Shr-tor	V_{LLIM}	RF - LLmin
ft	kip	kip	kip		kip	kip	kip	
Span 1								
96.38	96.08	7.98	104.06	1.70	-7.62	-5.76	-13.39	13.20
96.38	98.48	7.56	106.04	1.66	-5.38	-5.96	-11.34	15.56
106.38	106.53	7.75	114.28	1.90	-5.09	-6.76	-11.85	18.30
106.38	109.10	7.74	116.84	1.80	-5.10	-7.08	-12.18	17.28
110.38	112.09	0.66	112.75	13.82	-5.01	-0.64	-5.65	275.76
110.38	7.08	0.66	7.74	192.75	-113.64	-0.73	-114.36	13.04
Span 2								
110.46	7.08	0.66	7.74	192.80	-113.64	-0.73	-114.36	13.05
110.46	6.90	0.66	7.57	199.87	-113.21	-0.70	-113.91	13.27
114.38	6.71	7.43	14.14	12.04	-111.72	-8.13	-119.85	1.42
114.38	6.50	7.17	13.66	12.91	-109.38	-8.20	-117.58	1.50
124.38	6.84	6.76	13.60	9.80	-103.38	-8.34	-111.73	1.19
124.38	6.65	7.84	14.49	9.19	-105.97	-8.38	-114.35	1.17
264.93	97.04	8.58	105.62	1.53	-10.01	-6.02	-16.03	10.06
264.93	98.56	8.50	107.06	1.53	-8.38	-6.13	-14.51	11.27
269.93	100.69	8.58	109.27	1.28	-7.56	-6.41	-13.97	10.02
269.93	102.82	8.46	111.28	1.26	-7.19	-6.56	-13.75	10.21
279.93	109.28	8.19	117.47	1.56	-6.69	-7.19	-13.88	13.22
279.93	111.65	8.14	119.79	1.49	-6.91	-7.44	-14.35	12.41
283.93	113.19	0.70	113.89	13.30	-7.10	-0.66	-7.76	195.22
283.93	5.12	0.64	5.76	267.09	-112.88	-0.73	-113.62	13.55
Span 3								
382.31	94.27	7.37	101.63	3.62	-9.77	-6.50	-16.26	22.59
388.31	97.85	7.65	105.51	3.25	-9.63	-6.24	-15.87	21.59
388.31	101.76	6.97	108.72	3.16	-9.56	-6.44	-16.00	21.49

Principal Tensile Stresses in Webs

Since CSi Bridge does not directly provide the ratings following the recommended procedure outlined in the BLRM 6A.5.11.5, we extracted the forces from the model and performed the ratings using spreadsheets. As the rating factors are low for HL93 and FL 120, we performed the web principal stress rating for all FL Legal trucks and Emergency vehicles. The verification of principal stresses in the box webs is reported in the tables below.

Section Properties for Pricnipal Stress Calculations

8" Bottom Slab

A_o = 91.11 ft^2

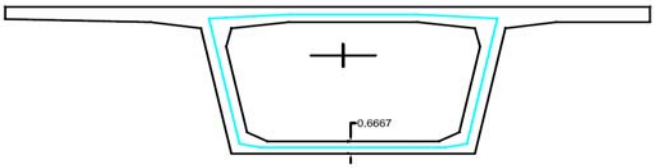
I_g = 424.12 ft^4

b_w = 1.00 ft

B_w = 2.00 ft

A_{tot} = 50.30 ft^2

Q_g = 65.23 ft^3



12" Bottom Slab

A_o = 89.23 ft^2

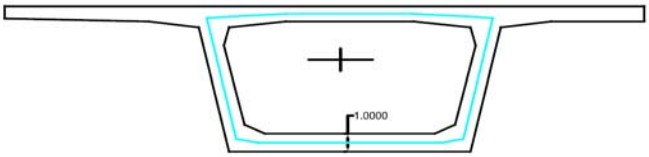
I_g = 491.27 ft^4

b_w = 1.00 ft

B_w = 2.00 ft

A_{tot} = 54.13 ft^2

Q_g = 75.11 ft^3



16" Bottom Slab

A_o = 87.34 ft^2

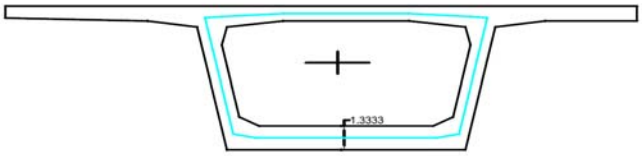
I_g = 537.06 ft^4

b_w = 1.00 ft

B_w = 2.00 ft

A_{tot} = 57.23 ft^2

Q_g = 82.30 ft^3



BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]LR-Summ

Summary of Rating

Principal Stress Rating

Vehicle	RF Inventory	RF Operating
HL 93 Inv	0.50	-
HL 93 Op	-	0.56
FL 120	-	0.65
SU2	-	2.21
SU3	-	1.15
SU4	-	1.09
C3	-	1.44
C4	-	1.09
C5	-	1.03
ST5	-	1.09
EV2	-	1.32
EV3	-	0.89
EV3/C5	-	1.00

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]Forces-10K

Staged Construction @ 10,000 (DC+PT+CR+SH)					TU				0.5TG			
	DC at 10,00Days				TU+		TU-		0.5TG+		0.5TG-	
Layout Line Distance	P	V2	T	M3	V2	T	V2	T	V2	T	V2	T
ft	kip	kip	kip-ft	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft
Span 1												
96.38	-4661.43	-567.42	-342.42	-4570.10	2.86	181.98	-2.86	-181.98	-20.47	38.31	6.14	-11.49
96.38	-5383.88	-567.32	-365.16	-3143.29	2.68	203.98	-2.68	-203.98	-20.40	41.36	6.12	-12.41
106.38	-5448.23	-666.78	-437.80	-9164.12	2.88	218.21	-2.88	-218.21	-20.09	53.78	6.03	-16.13
106.38	-5212.96	-677.44	-457.25	-9620.44	3.12	182.37	-3.12	-182.37	-19.98	47.03	5.99	-14.11
110.38	-5247.46	-713.46	-474.58	-12325.44	2.95	135.18	-2.95	-135.18	-19.91	43.14	5.97	-12.94
110.38	-5243.46	828.61	-58.17	-12303.07	2.69	10.06	-2.69	-10.06	-2.09	-98.18	0.63	29.45
Span 2												
269.93	-4740.71	-618.28	210.54	-2148.47	-2.90	70.48	2.90	-70.48	1.53	99.07	-0.46	-29.72
269.93	-5403.32	-618.09	192.10	-836.66	-3.08	92.55	3.08	-92.55	1.60	102.18	-0.48	-30.65
279.93	-5486.09	-717.35	148.58	-7331.36	-2.87	105.75	2.87	-105.75	1.90	115.67	-0.57	-34.70
279.93	-5104.82	-730.86	135.06	-8064.27	-2.47	68.88	2.47	-68.88	2.04	108.81	-0.61	-32.64
283.93	-5163.97	-766.80	130.04	-10931.23	-2.64	20.49	2.64	-20.49	2.10	104.85	-0.63	-31.45
283.93	-5175.00	739.67	382.67	-10907.88	-2.70	-103.10	2.70	103.10	19.89	-36.88	-5.97	11.06
Span 3												
382.31	-896.49	-185.53	152.45	292.71	-5.32	-171.32	5.32	171.32	22.42	-0.26	-6.73	0.08
388.31	-897.93	-239.67	107.74	-869.32	-4.80	-150.32	4.80	150.32	22.60	3.59	-6.78	-1.08
388.31	-896.04	-241.22	65.60	-804.12	-4.53	-159.27	4.53	159.27	22.73	1.55	-6.82	-0.47

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]Forces-10K

Inventory				Operating (0.9 SL)				Permit (0.9 SL)			
Max HL 93		Min HL 93		Max HL 93		Min HL 93		Max FL 120		Min FL 120	
V2	T	V2	T	V2	T	V2	T	V2	T	V2	T
kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft
233.12	274.24	-20.53	-227.72	209.81	246.82	-16.67	-204.95	234.21	257.73	-15.91	-186.60
241.00	255.74	-17.54	-235.92	216.90	230.16	-15.54	-212.33	240.26	244.20	-11.90	-192.81
305.19	260.49	-18.31	-266.07	274.67	234.44	-16.48	-239.46	261.91	245.29	-11.71	-214.42
349.88	261.43	-18.93	-278.48	314.89	235.29	-17.04	-250.63	268.38	245.10	-11.96	-224.71
359.49	257.03	-19.98	-287.43	323.54	231.33	-17.99	-258.69	277.14	240.98	-12.18	-232.02
20.61	317.58	-366.77	-334.92	18.55	280.30	-330.09	-301.43	17.06	241.35	-281.56	-264.81
273.19	349.44	-20.14	1.00	245.87	314.49	-17.73	-235.01	248.71	278.97	-17.61	-208.09
280.43	348.72	-19.46	1.00	252.39	313.85	-17.51	-244.42	254.04	275.14	-16.84	-212.89
327.84	341.65	-19.39	1.00	295.06	307.48	-17.45	-268.22	270.44	261.18	-16.30	-228.43
359.94	339.12	-20.02	1.00	323.95	305.21	-18.02	-280.15	276.36	259.13	-16.83	-236.61
365.23	335.58	-20.57	1.00	328.71	302.02	-18.51	-286.83	280.46	255.02	-17.29	-241.46
20.94	289.50	-362.75	1.00	18.85	260.55	-326.47	-263.61	12.70	233.30	-279.07	-266.58
214.43	360.65	-31.61	-304.15	192.99	324.59	-24.74	-273.73	230.32	226.60	-23.98	-191.55
224.67	354.44	-32.95	-279.64	202.21	319.00	-25.38	-251.68	239.28	223.17	-23.66	-176.05
236.75	347.05	-33.13	-287.37	213.08	312.35	-25.80	-258.63	249.01	213.18	-23.46	-180.52

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]Forces-10K

Legal (0.9 SL)											
Max SU2		Min SU2		Max SU3		Min SU3		Max SU4		Min SU4	
V2	T	V2	T	V2	T	V2	T	V2	T	V2	T
kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft
70.04	75.74	-6.19	-54.63	133.17	144.97	-10.42	-104.72	140.66	153.32	-10.68	-110.84
71.74	71.79	-4.08	-56.43	136.48	137.39	-7.17	-108.17	144.17	145.30	-7.62	-114.51
77.15	72.00	-3.70	-62.68	147.55	137.87	-6.87	-120.22	156.27	145.83	-7.24	-127.30
78.99	71.89	-3.73	-65.67	151.13	137.70	-6.91	-125.98	160.05	145.66	-7.20	-133.40
80.85	70.65	-3.68	-67.79	155.30	135.35	-6.83	-130.06	164.82	143.17	-7.22	-137.72
5.21	70.16	-81.79	-76.76	9.75	134.84	-157.46	-147.69	10.38	142.73	-167.15	-156.37
72.63	80.89	-5.77	-60.57	139.36	155.80	-10.58	-116.36	147.45	165.06	-11.13	-123.27
74.15	79.77	-5.50	-61.96	142.30	153.65	-10.07	-119.04	150.57	162.78	-10.60	-126.06
78.71	75.58	-4.87	-66.46	151.33	145.65	-9.32	-127.70	160.39	154.36	-9.93	-135.16
80.42	75.13	-5.03	-68.79	154.60	144.71	-9.62	-132.21	163.87	153.31	-10.25	-139.94
81.47	73.76	-5.16	-70.20	156.84	142.24	-9.88	-134.92	166.50	150.74	-10.52	-142.81
3.78	68.14	-81.42	-77.99	7.10	130.74	-156.39	-149.53	7.53	138.44	-165.97	-158.20
68.60	66.44	-7.14	-57.62	130.63	128.34	-13.54	-111.57	138.01	136.74	-14.42	-122.93
71.16	68.38	-7.21	-54.02	135.59	128.91	-13.36	-104.73	143.26	132.84	-14.23	-105.31
73.96	63.99	-6.94	-55.62	140.98	122.45	-13.25	-107.93	148.98	129.75	-14.11	-108.43

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]Forces-10K

Legal (0.9 SL)											
Max C3		Min C3		Max C4		Min C4		Max C5		Min C5	
V2	T	V2	T	V2	T	V2	T	V2	T	V2	T
kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft
103.00	115.63	-6.67	-84.20	137.56	153.38	-9.59	-111.37	141.76	161.23	-9.19	-118.38
105.85	109.51	-5.44	-87.05	141.28	145.28	-7.45	-115.11	145.85	152.63	-7.58	-122.37
117.69	110.18	-5.41	-96.98	155.69	146.09	-7.30	-128.14	164.68	153.74	-7.62	-136.35
120.70	110.19	-5.45	-101.64	159.61	146.06	-7.36	-134.28	168.96	153.84	-7.75	-142.83
126.35	108.40	-5.59	-104.98	165.87	143.66	-7.31	-138.67	178.71	151.39	-7.97	-147.50
7.69	109.64	-128.92	-120.62	9.97	144.77	-168.87	-159.17	10.91	155.54	-182.79	-169.78
112.36	127.25	-7.48	-94.73	148.68	167.39	-9.97	-124.70	157.34	179.58	-10.54	-134.63
114.82	125.53	-7.29	-96.87	151.92	165.11	-9.72	-127.59	160.85	177.18	-10.25	-137.72
123.10	119.55	-7.34	-103.65	162.00	156.99	-9.53	-136.93	173.57	169.15	-10.42	-147.51
125.83	118.25	-7.58	-107.44	165.60	155.50	-9.83	-141.91	177.44	167.26	-10.75	-152.56
128.42	116.67	-7.79	-109.65	168.21	153.26	-10.11	-144.83	182.09	165.02	-11.06	-155.57
5.84	105.60	-127.21	-120.20	7.63	139.49	-167.02	-159.17	8.32	148.42	-179.90	-168.12
101.77	106.66	-10.90	-90.82	135.70	140.22	-14.25	-119.45	140.51	151.17	-15.51	-124.92
105.91	104.21	-10.76	-81.04	141.14	138.60	-14.05	-111.85	146.40	147.71	-15.30	-115.96
110.38	101.80	-10.67	-83.11	147.02	133.83	-13.94	-115.25	152.71	144.30	-15.18	-119.41

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]Forces-10K

Legal (0.9 SL)				Emergency (0.9 SL)							
Max ST5		Min ST5		Max EV2		Min EV2		Max EV3		Min EV3	
V2	T	V2	T	V2	T	V2	T	V2	T	V2	T
kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft	kip	kip-ft
131.95	150.04	-8.42	-111.74	116.26	126.47	-9.29	-91.34	172.94	188.46	-13.72	-136.17
135.75	141.71	-7.13	-115.44	119.14	119.87	-6.30	-94.36	177.26	178.61	-9.69	-140.67
155.81	142.64	-7.33	-128.51	128.72	120.28	-6.04	-104.85	191.76	179.26	-9.16	-156.31
159.90	142.69	-7.48	-134.50	131.81	120.13	-6.11	-109.86	196.38	179.04	-9.17	-163.80
171.59	140.31	-7.71	-138.84	135.27	118.07	-6.07	-113.41	201.76	175.98	-9.02	-169.09
10.12	146.90	-174.97	-160.48	8.45	117.59	-137.00	-128.78	12.74	175.42	-204.55	-192.17
144.70	169.99	-9.86	-127.70	121.55	135.59	-9.23	-101.48	181.24	202.61	-13.61	-151.36
148.05	167.82	-9.51	-130.60	124.11	133.71	-8.78	-103.81	185.07	199.81	-12.95	-154.84
163.18	161.34	-9.64	-139.59	131.80	126.70	-8.05	-111.37	196.70	189.41	-12.05	-166.12
166.95	159.31	-9.95	-144.18	134.68	125.94	-8.31	-115.30	200.97	188.19	-12.44	-172.00
174.32	157.18	-10.25	-146.87	136.46	123.73	-8.53	-117.66	203.75	184.98	-12.77	-175.52
8.10	139.66	-172.72	-156.23	6.23	114.01	-136.23	-130.43	9.22	169.99	-203.19	-194.45
129.79	146.29	-14.61	-120.71	114.02	109.97	-11.81	-94.90	169.68	167.79	-17.58	-148.03
135.11	143.00	-14.42	-110.95	118.34	112.84	-11.69	-88.72	176.14	170.70	-17.34	-139.27
140.83	139.72	-14.29	-113.82	123.05	105.96	-11.56	-91.33	183.16	155.43	-17.21	-143.58

BPA

Job: Br [redacted] over [redacted] LR 18.17.01 Computed by: Lmv Date: 1/19

Desc: Principal Stresss Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]Perm. Stresses

Staged Construction @ 10,000																	
Section Properties							DC+PT+CR+SH			TU		0.5TG		Limiting Stresses			
Layout Line Distance	A	I	Q	Bw	bw	A_o	$f_{pc}(\sigma_x)$	τ - Shr	τ - Tor	τ - Shr	τ - Tor	τ - Shr	τ - Tor	Σ τ	R_{max}	SysFac	τ - allow
ft	ft^2	ft^4	ft^3	ft	ft	ft^2	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf		ksf
Span 1							$f_{t\ allow} = 3.5\sqrt{f'c} =$		37.378	ksf - Inventory							
96.38	54.13	491.27	75.11	2.0	1.0	89.23	-86.12	-43.38	-1.92	0.22	1.02	-1.56	0.21	-45.84	80.44	1.00	67.94
96.38	54.13	491.27	75.11	2.0	1.0	89.23	-99.46	-43.37	-2.05	0.20	1.14	-1.56	0.23	-45.86	87.11	1.00	71.52
106.38	57.23	537.06	82.3	2.0	1.0	87.34	-95.20	-51.09	-2.51	0.22	1.25	-1.54	0.31	-53.97	84.98	1.00	70.39
106.38	57.23	537.06	82.3	2.0	1.0	87.34	-91.09	-51.91	-2.62	0.24	1.04	-1.53	0.27	-55.04	82.92	1.00	69.29
110.38	1000.00	1000	1	10.0	10.0	1000.00	-5.25	-0.07	-0.02	0.00	0.01	0.00	0.00	-0.09	40.00	1.00	39.92
110.38	1000.00	1000	1	10.0	10.0	1000.00	-5.24	0.08	0.00	0.00	0.00	0.00	0.00	0.09	40.00	1.00	39.91
Span 2																	0.00
269.93	54.13	491.27	75.11	2.0	1.0	89.23	-87.58	-47.26	1.18	-0.22	0.39	0.12	0.56	-48.39	81.17	1.05	71.76
269.93	54.13	491.27	75.11	2.0	1.0	89.23	-99.82	-47.25	1.08	-0.24	0.52	0.12	0.57	-48.39	87.29	1.05	75.19
279.93	57.23	537.06	82.3	2.0	1.0	87.34	-95.86	-54.96	0.85	-0.22	0.61	0.15	0.66	-55.83	85.31	1.05	74.10
279.93	57.23	537.06	82.3	2.0	1.0	87.34	-89.20	-56.00	0.77	-0.19	0.39	0.16	0.62	-56.58	81.98	1.05	72.22
283.93	1000.00	1000	1	10.0	10.0	1000.00	-5.16	-0.08	0.01	0.00	0.00	0.00	0.01	-0.08	39.96	1.05	41.87
283.93	1000.00	1000	1	10.0	10.0	1000.00	-5.18	0.07	0.02	0.00	-0.01	0.00	0.00	0.09	39.97	1.05	41.88
Span 3																	
382.31	50.30	424.12	65.23	2.0	1.0	91.11	-17.82	-14.27	0.84	-0.41	-0.94	1.72	0.00	-14.73	46.29	1.00	45.42
388.31	54.13	491.27	75.11	2.0	1.0	89.23	-16.59	-18.32	0.60	-0.37	-0.84	1.73	0.02	-18.39	45.67	1.00	44.91
388.31	54.13	491.27	75.11	2.0	1.0	89.23	-16.55	-18.44	0.37	-0.35	-0.89	1.74	0.01	-18.30	45.65	1.00	44.90

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]LR-HL93In

HL 93 Inventory								
Layout Line Distance	τ - Shr VQ/I Bw	τ - Tor T/2Ao bw	τ-LLIM	RF - LLmax	τ - Shr	τ - Tor	τ-LLIM	RF - LLmin
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
Span 1								
96.38	17.82	1.54	19.36	1.14	-1.57	-1.28	-2.85	51.83
96.38	18.42	1.43	19.86	1.29	-1.34	-1.32	-2.66	54.30
106.38	23.38	1.49	24.88	0.66	-1.40	-1.52	-2.93	51.95
106.38	26.81	1.50	28.30	0.50	-1.45	-1.59	-3.04	51.22
110.38	0.04	0.01	0.05	99.00	0.00	-0.01	-0.02	99.00
110.38	0.00	0.02	0.02	99.00	-0.04	-0.02	-0.05	99.00
Span 2								
269.93	20.88	1.96	22.84	1.02	-1.54	0.01	-1.55	40.45
269.93	21.44	1.95	23.39	1.15	-1.49	0.01	-1.49	42.78
279.93	25.12	1.96	27.08	0.67	-1.49	0.01	-1.49	36.65
279.93	27.58	1.94	29.52	0.53	-1.53	0.01	-1.54	35.48
283.93	0.04	0.02	0.05	99.00	0.00	0.00	0.00	99.00
283.93	0.00	0.01	0.02	99.00	-0.04	0.00	-0.04	99.00
Span 3								
382.31	16.49	1.98	18.47	1.66	-2.43	-1.67	-4.10	41.83
388.31	17.18	1.99	19.16	1.38	-2.52	-1.57	-4.09	40.41
388.31	18.10	1.94	20.04	1.33	-2.53	-1.61	-4.14	40.48

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]LR-HL93Op

HL 93 Operating								
Layout Line Distance	**τ - Shr VQ/I Bw**	**τ - Tor T/2Ao bw**	**τ-LLIM**	**RF - LLmax**	**τ - Shr**	**τ - Tor**	**τ-LLIM**	**RF - LLmin**
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
Span 1								
96.38	16.04	1.38	17.42	1.27	-1.27	-1.15	-2.42	49.02
96.38	16.58	1.29	17.87	1.44	-1.19	-1.19	-2.38	52.23
106.38	21.05	1.34	22.39	0.73	-1.26	-1.37	-2.63	49.90
106.38	24.13	1.35	25.47	0.56	-1.31	-1.43	-2.74	49.21
110.38	0.03	0.01	0.04	99.00	0.00	-0.01	-0.01	99.00
110.38	0.00	0.01	0.02	99.00	-0.03	-0.02	-0.05	99.00
Span 2								
269.93	18.80	1.76	20.56	1.14	-1.36	-1.32	-2.67	53.65
269.93	19.29	1.76	21.05	1.27	-1.34	-1.37	-2.71	57.32
279.93	22.61	1.76	24.37	0.75	-1.34	-1.54	-2.87	54.66
279.93	24.82	1.75	26.57	0.59	-1.38	-1.60	-2.98	53.27
283.93	0.03	0.02	0.05	99.00	0.00	-0.01	-0.02	99.00
283.93	0.00	0.01	0.01	99.00	-0.03	-0.01	-0.05	99.00
Span 3								
382.31	14.84	1.78	16.62	1.85	-1.90	-1.50	-3.40	41.10
388.31	15.46	1.79	17.25	1.54	-1.94	-1.41	-3.35	39.42
388.31	16.29	1.75	18.04	1.47	-1.97	-1.45	-3.42	39.55

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]LR-FL120

FL120 Operating								
Layout Line Distance	τ - Shr VQ/I Bw	τ - Tor T/2Ao bw	τ-LLIM	RF - LLmax	τ - Shr	τ - Tor	τ-LLIM	RF - LLmin
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
Span 1								
96.38	17.90	1.44	19.35	1.14	-1.22	-1.05	-2.26	47.67
96.38	18.37	1.37	19.73	1.30	-0.91	-1.08	-1.99	48.47
106.38	20.07	1.40	21.47	0.76	-0.90	-1.23	-2.12	44.99
106.38	20.56	1.40	21.97	0.65	-0.92	-1.29	-2.20	44.31
110.38	0.03	0.01	0.04	99.00	0.00	-0.01	-0.01	99.00
110.38	0.00	0.01	0.01	99.00	-0.03	-0.01	-0.04	99.00
Span 2								
269.93	19.01	1.56	20.58	1.14	-1.35	-1.17	-2.51	52.50
269.93	19.42	1.54	20.96	1.28	-1.29	-1.19	-2.48	55.68
279.93	20.72	1.50	22.22	0.82	-1.25	-1.31	-2.56	52.26
279.93	21.17	1.48	22.66	0.69	-1.29	-1.35	-2.64	50.82
283.93	0.03	0.01	0.04	99.00	0.00	-0.01	-0.01	99.00
283.93	0.00	0.01	0.01	99.00	-0.03	-0.01	-0.04	99.00
Span 3								
382.31	17.71	1.24	18.96	1.62	-1.84	-1.05	-2.90	40.34
388.31	18.29	1.25	19.54	1.36	-1.81	-0.99	-2.79	38.33
388.31	19.04	1.19	20.23	1.31	-1.79	-1.01	-2.81	38.37

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]LR-SU2

SU2 Operating								
Layout Line Distance	**τ - Shr VQ/I Bw**	**τ - Tor T/2Ao bw**	**τ-LLIM**	**RF - LLmax**	**τ - Shr**	**τ - Tor**	**τ-LLIM**	**RF - LLmin**
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
Span 1								
96.38	5.35	0.42	5.78	3.83	-0.82	-0.62	-1.44	36.05
96.38	5.48	0.40	5.89	4.36	-0.58	-0.64	-1.22	34.06
106.38	5.91	0.41	6.32	2.60	-0.55	-0.73	-1.28	28.33
106.38	6.05	0.41	6.46	2.21	-0.55	-0.76	-1.32	27.44
110.38	0.01	0.00	0.01	99.00	0.00	-0.01	-0.01	99.00
110.38	0.00	0.00	0.00	99.00	-0.02	-0.01	-0.02	99.00
Span 2								
269.93	5.55	0.45	6.01	3.89	-0.85	-0.69	-1.54	40.38
269.93	5.67	0.45	6.12	4.38	-0.81	-0.71	-1.52	43.29
279.93	6.03	0.43	6.46	2.83	-0.76	-0.77	-1.53	37.71
279.93	6.16	0.43	6.59	2.37	-0.79	-0.80	-1.59	36.56
283.93	0.01	0.00	0.01	99.00	0.00	-0.01	-0.01	99.00
283.93	0.00	0.00	0.00	99.00	-0.02	-0.01	-0.02	99.00
Span 3								
382.31	5.28	0.36	5.64	5.44	-1.11	-0.67	-1.78	37.16
388.31	5.44	0.38	5.82	4.56	-1.09	-0.59	-1.68	33.95
388.31	5.65	0.36	6.01	4.42	-1.08	-0.61	-1.69	34.05

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]LR-SU3

SU3 Operating								
Layout Line Distance	τ - Shr VQ/I Bw	τ - Tor T/2Ao bw	τ-LLIM	RF - LLmax	τ - Shr	τ - Tor	τ-LLIM	RF - LLmin
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
Span 1								
96.38	10.18	0.81	10.99	2.01	-0.80	-0.59	-1.38	34.81
96.38	10.43	0.77	11.20	2.29	-0.55	-0.61	-1.15	31.79
106.38	11.31	0.79	12.10	1.36	-0.53	-0.69	-1.21	25.97
106.38	11.58	0.79	12.37	1.15	-0.53	-0.72	-1.25	25.28
110.38	0.02	0.01	0.02	99.00	0.00	-0.01	-0.01	99.00
110.38	0.00	0.01	0.01	99.00	-0.02	-0.01	-0.02	99.00
Span 2								
269.93	10.65	0.87	11.53	2.03	-0.81	-0.65	-1.46	38.63
269.93	10.88	0.86	11.74	2.28	-0.77	-0.67	-1.44	41.51
279.93	11.59	0.83	12.43	1.47	-0.71	-0.73	-1.45	35.47
279.93	11.85	0.83	12.67	1.23	-0.74	-0.76	-1.49	34.36
283.93	0.02	0.01	0.02	99.00	0.00	-0.01	-0.01	99.00
283.93	0.00	0.01	0.01	99.00	-0.02	-0.01	-0.02	99.00
Span 3								
382.31	10.05	0.70	10.75	2.86	-1.04	-0.61	-1.65	36.52
388.31	10.36	0.72	11.09	2.39	-1.02	-0.59	-1.61	33.48
388.31	10.78	0.69	11.46	2.32	-1.01	-0.60	-1.62	33.59

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]LR-SU4

SU4 Operating								
Layout Line Distance	**τ - Shr VQ/I Bw**	**τ - Tor T/2Ao bw**	**τ-LLIM**	**RF - LLmax**	**τ - Shr**	**τ - Tor**	**τ-LLIM**	**RF - LLmin**
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
Span 1								
96.38	10.75	0.86	11.61	1.90	-0.82	-0.62	-1.44	36.05
96.38	11.02	0.81	11.83	2.17	-0.58	-0.64	-1.22	34.06
106.38	11.97	0.83	12.81	1.28	-0.55	-0.73	-1.28	28.33
106.38	12.26	0.83	13.10	1.09	-0.55	-0.76	-1.32	27.44
110.38	0.02	0.01	0.02	99.00	0.00	-0.01	-0.01	99.00
110.38	0.00	0.01	0.01	99.00	-0.02	-0.01	-0.02	99.00
Span 2								
269.93	11.27	0.92	12.20	1.92	-0.85	-0.69	-1.54	40.38
269.93	11.51	0.91	12.42	2.16	-0.81	-0.71	-1.52	43.29
279.93	12.29	0.88	13.17	1.39	-0.76	-0.77	-1.53	37.71
279.93	12.56	0.88	13.43	1.16	-0.79	-0.80	-1.59	36.56
283.93	0.02	0.01	0.02	99.00	0.00	-0.01	-0.01	99.00
283.93	0.00	0.01	0.01	99.00	-0.02	-0.01	-0.02	99.00
Span 3								
382.31	10.61	0.75	11.36	2.70	-1.11	-0.67	-1.78	37.16
388.31	10.95	0.74	11.70	2.27	-1.09	-0.59	-1.68	33.95
388.31	11.39	0.73	12.12	2.20	-1.08	-0.61	-1.69	34.05

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]LR-C3

C3 Operating								
Layout Line Distance	**τ - Shr VQ/I Bw**	**τ - Tor T/2Ao bw**	**τ-LLIM**	**RF - LLmax**	**τ - Shr**	**τ - Tor**	**τ-LLIM**	**RF - LLmin**
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
Span 1								
96.38	7.87	0.65	8.52	2.59	-0.51	-0.47	-0.98	21.27
96.38	8.09	0.61	8.70	2.95	-0.42	-0.49	-0.90	20.76
106.38	9.02	0.63	9.65	1.70	-0.41	-0.56	-0.97	14.73
106.38	9.25	0.63	9.88	1.44	-0.42	-0.58	-1.00	14.22
110.38	0.01	0.01	0.02	99.00	0.00	-0.01	-0.01	99.00
110.38	0.00	0.01	0.01	99.00	-0.01	-0.01	-0.02	99.00
Span 2								
269.93	8.59	0.71	9.30	2.51	-0.57	-0.53	-1.10	27.86
269.93	8.78	0.70	9.48	2.83	-0.56	-0.54	-1.10	31.20
279.93	9.43	0.68	10.12	1.81	-0.56	-0.59	-1.16	25.81
279.93	9.64	0.68	10.32	1.52	-0.58	-0.62	-1.20	24.91
283.93	0.01	0.01	0.02	99.00	0.00	-0.01	-0.01	99.00
283.93	0.00	0.01	0.01	99.00	-0.01	-0.01	-0.02	99.00
Span 3								
382.31	7.83	0.59	8.41	3.65	-0.84	-0.50	-1.34	34.40
388.31	8.10	0.58	8.68	3.06	-0.82	-0.45	-1.28	30.51
388.31	8.44	0.57	9.01	2.95	-0.82	-0.47	-1.28	30.61

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]LR-C4

C4 Operating								
Layout Line Distance	τ - Shr VQ/I Bw	τ - Tor T/2Ao bw	τ-LLIM	RF - LLmax	τ - Shr	τ - Tor	τ-LLIM	RF - LLmin
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
Span 1								
96.38	10.52	0.86	11.38	1.94	-0.73	0.79	-1.53	37.93
96.38	10.80	0.81	11.61	2.21	-0.57	0.82	-1.39	38.46
106.38	11.93	0.84	12.77	1.29	-0.56	0.94	-1.50	34.47
106.38	12.23	0.84	13.07	1.09	-0.56	0.97	-1.53	33.35
110.38	0.02	0.01	0.02	99.00	0.00	0.01	-0.01	99.00
110.38	0.00	0.01	0.01	99.00	-0.02	0.00	-0.02	99.00
Span 2								
269.93	11.37	0.94	12.30	1.90	-0.76	0.88	-1.64	42.33
269.93	11.61	0.93	12.54	2.14	-0.74	0.90	-1.64	45.77
279.93	12.41	0.90	13.31	1.37	-0.73	0.99	-1.72	41.71
279.93	12.69	0.89	13.58	1.15	-0.75	1.02	-1.77	40.24
283.93	0.02	0.01	0.02	99.00	0.00	0.01	-0.01	99.00
283.93	0.00	0.01	0.01	99.00	-0.02	0.00	-0.02	99.00
Span 3								
382.31	10.44	0.77	11.21	2.74	-1.10	0.77	-1.87	37.53
388.31	10.79	0.78	11.57	2.29	-1.07	0.82	-1.89	35.21
388.31	11.24	0.75	11.99	2.22	-1.07	0.86	-1.92	35.37

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]LR-C5

C5 Operating								
Layout Line Distance	**τ - Shr VQ/I Bw**	**τ - Tor T/2Ao bw**	**τ-LLIM**	**RF - LLmax**	**τ - Shr**	**τ - Tor**	**τ-LLIM**	**RF - LLmin**
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
Span 1								
96.38	10.84	0.90	11.74	1.88	-0.70	-0.66	-1.37	34.39
96.38	11.15	0.86	12.00	2.14	-0.58	-0.69	-1.26	35.26
106.38	12.62	0.88	13.50	1.22	-0.58	-0.78	-1.36	30.85
106.38	12.95	0.88	13.83	1.03	-0.59	-0.82	-1.41	30.30
110.38	0.02	0.01	0.03	99.00	0.00	-0.01	-0.01	99.00
110.38	0.00	0.01	0.01	99.00	-0.02	-0.01	-0.03	99.00
Span 2								
269.93	12.03	1.01	13.03	1.79	-0.81	-0.75	-1.56	40.74
269.93	12.30	0.99	13.29	2.02	-0.78	-0.77	-1.56	44.09
279.93	13.30	0.97	14.27	1.28	-0.80	-0.84	-1.64	40.11
279.93	13.60	0.96	14.55	1.08	-0.82	-0.87	-1.70	38.89
283.93	0.02	0.01	0.03	99.00	0.00	-0.01	-0.01	99.00
283.93	0.00	0.01	0.01	99.00	-0.02	-0.01	-0.03	99.00
Span 3								
382.31	10.81	0.83	11.64	2.64	-1.19	-0.69	-1.88	37.58
388.31	11.19	0.83	12.02	2.21	-1.17	-0.65	-1.82	34.80
388.31	11.67	0.81	12.48	2.13	-1.16	-0.67	-1.83	34.89

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]LR-ST5

ST5 Operating								
Layout Line Distance	**τ - Shr VQ/I Bw**	**τ - Tor T/2Ao bw**	**τ-LLIM**	**RF - LLmax**	**τ - Shr**	**τ - Tor**	**τ-LLIM**	**RF - LLmin**
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
Span 1								
96.38	10.09	0.84	10.93	2.02	-0.64	-0.63	-1.27	31.84
96.38	10.38	0.79	11.17	2.30	-0.54	-0.65	-1.19	33.04
106.38	11.94	0.82	12.75	1.29	-0.56	-0.74	-1.30	28.78
106.38	12.25	0.82	13.07	1.09	-0.57	-0.77	-1.34	28.30
110.38	0.02	0.01	0.02	99.00	0.00	-0.01	-0.01	99.00
110.38	0.00	0.01	0.01	99.00	-0.02	-0.01	-0.03	99.00
Span 2								
269.93	11.06	0.95	12.01	1.95	-0.75	-0.72	-1.47	38.82
269.93	11.32	0.94	12.26	2.19	-0.73	-0.73	-1.46	42.03
279.93	12.50	0.92	13.43	1.36	-0.74	-0.80	-1.54	37.79
279.93	12.79	0.91	13.70	1.14	-0.76	-0.83	-1.59	36.59
283.93	0.02	0.01	0.03	99.00	0.00	-0.01	-0.01	99.00
283.93	0.00	0.01	0.01	99.00	-0.02	-0.01	-0.03	99.00
Span 3								
382.31	9.98	0.80	10.78	2.85	-1.12	-0.66	-1.79	37.17
388.31	10.33	0.80	11.13	2.38	-1.10	-0.62	-1.72	34.25
388.31	10.77	0.78	11.55	2.30	-1.09	-0.64	-1.73	34.32

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 3/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]LR-EV2

EV2 Operating								
Layout Line Distance	τ - Shr VQ/I Bw	τ - Tor T/2Ao bw	τ-LLIM	RF - LLmax	τ - Shr	τ - Tor	τ-LLIM	RF - LLmin
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
Span 1								
96.38	8.89	0.71	9.60	2.30	-0.71	-0.51	-1.22	30.43
96.38	9.11	0.67	9.78	2.62	-0.48	-0.53	-1.01	26.13
106.38	9.86	0.69	10.55	1.56	-0.46	-0.60	-1.06	19.63
106.38	10.10	0.69	10.79	1.32	-0.47	-0.63	-1.10	19.13
110.38	0.01	0.01	0.02	99.00	0.00	-0.01	-0.01	99.00
110.38	0.00	0.01	0.01	99.00	-0.01	-0.01	-0.02	99.00
Span 2								
269.93	9.29	0.76	10.05	2.33	-0.71	-0.57	-1.27	33.78
269.93	9.49	0.75	10.24	2.62	-0.67	-0.58	-1.25	36.57
279.93	10.10	0.73	10.82	1.69	-0.62	-0.64	-1.25	29.59
279.93	10.32	0.72	11.04	1.42	-0.64	-0.66	-1.30	28.59
283.93	0.01	0.01	0.02	99.00	0.00	-0.01	-0.01	99.00
283.93	0.00	0.01	0.01	99.00	-0.01	-0.01	-0.02	99.00
Span 3								
382.31	8.77	0.60	9.37	3.27	-0.91	-0.52	-1.43	35.11
388.31	9.05	0.63	9.68	2.74	-0.89	-0.50	-1.39	31.69
388.31	9.41	0.59	10.00	2.66	-0.88	-0.51	-1.40	31.78

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 3/19

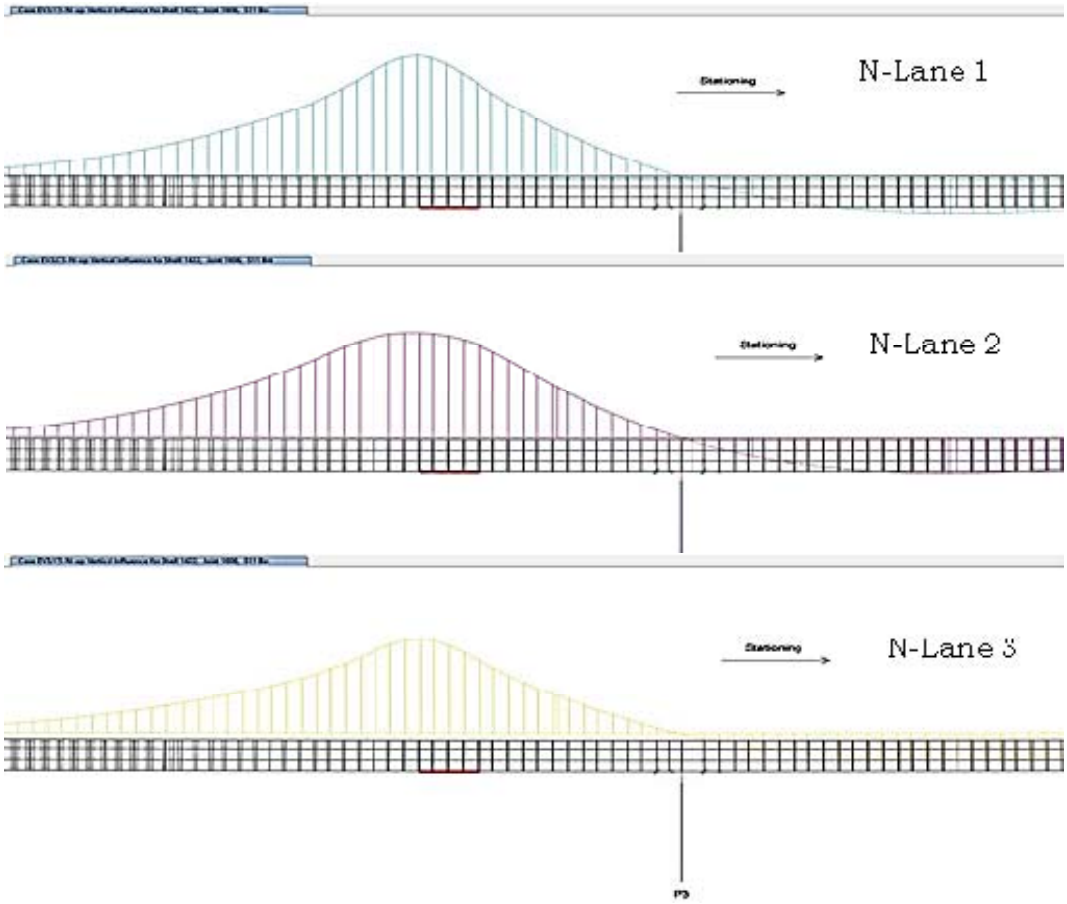
P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]LR-EV3

EV3 Operating								
Layout Line Distance	τ - Shr VQ/I Bw	τ - Tor T/2Ao bw	τ-LLIM	RF - LLmax	τ - Shr	τ - Tor	τ-LLIM	RF - LLmin
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
Span 1								
96.38	13.22	1.06	14.28	1.55	-1.05	-0.76	-1.81	42.65
96.38	13.55	1.00	14.55	1.76	-0.74	-0.79	-1.53	41.53
106.38	14.69	1.03	15.72	1.04	-0.70	-0.89	-1.60	36.59
106.38	15.05	1.02	16.07	0.89	-0.70	-0.94	-1.64	35.74
110.38	0.02	0.01	0.03	99.00	0.00	-0.01	-0.01	99.00
110.38	0.00	0.01	0.01	99.00	-0.02	-0.01	-0.03	99.00
Span 2								
269.93	13.85	1.14	14.99	1.56	-1.04	-0.85	-1.89	46.14
269.93	14.15	1.12	15.27	1.76	-0.99	-0.87	-1.86	49.14
279.93	15.07	1.08	16.16	1.13	-0.92	-0.95	-1.87	44.31
279.93	15.40	1.08	16.48	0.95	-0.95	-0.98	-1.94	43.02
283.93	0.02	0.01	0.03	99.00	0.00	-0.01	-0.01	99.00
283.93	0.00	0.01	0.01	99.00	-0.02	-0.01	-0.03	99.00
Span 3								
382.31	13.05	0.92	13.97	2.20	-1.35	-0.81	-2.16	38.62
388.31	13.46	0.96	14.42	1.84	-1.33	-0.78	-2.11	36.18
388.31	14.00	0.87	14.87	1.79	-1.32	-0.80	-2.12	36.27

Emergency Vehicles Posting Avoidance

The Emergency Vehicle EV3 truck yields an operating Service III rating factor of 0.96 in bending and an operating rating for principal stresses of 0.89, which are both smaller than 1; therefore, refined analysis using our finite element model will be used. The analysis covered in this section is for the Emergency vehicle, EV3, posting avoidance. It is noted that the dynamic allowance was reduced to 20% as the combination of the EV and C5 trucks was still non-satisfactory.

As suggested by FDOT BLRM, we apply 1-lane loaded with the EV3 truck combined with 3-lanes loaded with the legal truck that controls the bending rating, or the C5 truck (operating rating factor of 1.10). For the location of the trucks with mixed traffic, we extracted from the influence surfaces shown in the Live Load Model section of this report, the influence lines at the center of the first 3-striped lanes. These influence lines correspond to the critical location for tensile bending stresses at the bottom flange (shown in red), 44 ft. downstation of Pier 3. The trucks need to be positioned at the location of maximum ordinate to produce the most unfavorable response quantity.



As shown in the table below, the controlling Service III bending stress operating rating factor improved to 1.04 using mixed traffic. The principal stress operating rating improved to 1.00.

BPA

Job: Br [redacted] over [redacted] LR 18.17.01 Computed by: DAR Date: 1/19

Desc: **Flexure Tensile Stress** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\100%\[Longitudinal Rating 20%IM.xlsx]Service Rating (North Box)

EV3/C5 Operating Service III (North Box) - POSTING AVOIDANCE IM = 20% *LL factor = 1.20/1.33 = 0.9023*

TABLE: Bridge Super Rating AASHTORATE10 38 - CBoxService-Rating

Request	Bridge Obj	Station	Location	Cond. Fact	Syst. Fact	fc DC Top	fc DC Bott	fc TU Top	fc TU Bott	fc 0.5TG Top	fc 0.5TG Bott	fc LL+IM Top	fc LL+IM Bott	LL Step Type	fR Comp	fR Tens	Rating	Modification
Text	Text	ft	Text	Unitless	Unitless	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Kip/in2	Text	Kip/in2	Kip/in2	Unitless	Text
Span 1																		
LR_Serv3-EV3/C5-op-N	NB	76.38	Before	1	1	-0.473	-0.605	0.051	0.030	-0.056	0.103	0.068	0.241	Min	3.3	0.446	3.80	**Ext. span (φ_s = 1.00)**
LR_Serv3-EV3/C5-op-N	NB	76.38	After	1	1	-0.680	-0.239	0.061	0.016	-0.057	0.104	0.068	0.244	Max	3.3	0.446	2.31	**Ext. span (φ_s = 1.00)**
Span 2																		
LR_Serv3-EV3/C5-op-N	NB	154.38	Before	1	1.05	-0.770	-0.119	0.044	0.052	-0.078	0.148	0.035	0.282	Min	3.465	0.468	1.37	**Int. span (φ_s = 1.05)**
LR_Serv3-EV3/C5-op-N	NB	154.38	After	1	1.05	-0.587	-0.508	0.037	0.069	-0.077	0.146	0.035	0.278	Max	3.465	0.468	2.74	**Int. span (φ_s = 1.05)**
LR_Serv3-EV3/C5-op-N	NB	197.16	Before	1	1.05	-0.337	-0.267	0.016	0.087	-0.076	0.146	0.015	0.363	Min	3.465	0.468	1.38	**Int. span (φ_s = 1.05)**
LR_Serv3-EV3/C5-op-N	NB	197.16	After	1	1.05	-0.335	-0.264	0.016	0.087	-0.076	0.146	0.015	0.363	Max	3.465	0.468	1.38	**Int. span (φ_s = 1.05)**
LR_Serv3-EV3/C5-op-N	NB	239.93	Before	1	1.05	-0.584	-0.412	0.038	0.069	-0.077	0.146	0.035	0.278	Min	3.465	0.468	2.39	**Int. span (φ_s = 1.05)**
LR_Serv3-EV3/C5-op-N	NB	239.93	After	1	1.05	-0.764	-0.026	0.045	0.052	-0.078	0.148	0.035	0.282	Max	3.465	0.468	1.04	**Int. span (φ_s = 1.05)**
Span 3																		
LR_Serv3-EV3/C5-op-N	NB	317.93	Before	1	1	-0.706	-0.150	0.061	0.016	-0.057	0.104	0.068	0.245	Min	3.3	0.446	1.95	**Ext. span (φ_s = 1.00)**
LR_Serv3-EV3/C5-op-N	NB	317.93	After	1	1	-0.500	-0.513	0.053	0.029	-0.057	0.103	0.068	0.242	Max	3.3	0.446	3.41	**Ext. span (φ_s = 1.00)**

Mixed traffic: one-lane EV3 + three-lanes C5

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]Forces-10K

Emergency - Posting Avoidance (0.9 SL)			
Max EV3/C5		Min EV3/C5	
V2	T	V2	T
kip	kip-ft	kip	kip-ft
153.56	183.49	-11.24	-128.99
157.74	174.71	-9.30	-133.20
173.67	175.08	-8.68	-145.56
173.67	175.08	-8.68	-145.56
186.91	172.01	-8.48	-159.82
11.73	164.69	-190.51	-185.93
166.32	195.46	-12.59	-142.29
169.96	192.55	-11.87	-145.57
182.89	185.47	-11.20	-155.95
186.85	183.62	-11.57	-161.49
189.80	181.21	-11.90	-164.70
8.91	160.68	-188.29	-188.49
151.23	161.20	-16.27	-137.19
157.60	158.24	-16.04	-129.48
164.15	151.04	-15.92	-133.58

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Lmv Date: 1/19

Desc: **Principal Stresss** Checked by: Dar Date: 3/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\Shear & Principal\Trimmed Results\[Principal Stress Calculations_Trimmed.xlsx]LR-EV3-C5

EV3/C5 Operating								
Layout Line Distance	**τ - Shr VQ/I Bw**	**τ - Tor T/2Ao bw**	**τ-LLIM**	**RF - LLmax**	**τ - Shr**	**τ - Tor**	**τ-LLIM**	**RF - LLmin**
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
Span 1								
96.38	11.74	1.03	12.77	1.73	-0.86	-0.72	-1.58	38.96
96.38	12.06	0.98	13.04	1.97	-0.71	-0.75	-1.46	40.04
104.88	13.31	1.00	14.31	1.15	-0.67	-0.83	-1.50	34.38
104.88	13.31	1.00	14.31	1.00	-0.67	-0.83	-1.50	32.56
110.38	0.02	0.01	0.03	99.00	0.00	-0.01	-0.01	99.00
110.38	0.00	0.01	0.01	99.00	-0.02	-0.01	-0.03	99.00
Span 2								
269.93	12.71	1.10	13.81	1.69	-0.96	-0.80	-1.76	44.26
269.93	12.99	1.08	14.07	1.90	-0.91	-0.82	-1.72	47.11
279.93	14.01	1.06	15.08	1.21	-0.86	-0.89	-1.75	42.21
279.93	14.32	1.05	15.37	1.02	-0.89	-0.92	-1.81	40.99
283.93	0.02	0.01	0.03	99.00	0.00	-0.01	-0.01	99.00
283.93	0.00	0.01	0.01	99.00	-0.02	-0.01	-0.03	99.00
Span 3								
382.31	11.63	0.88	12.51	2.45	-1.25	-0.75	-2.00	38.07
388.31	12.05	0.89	12.93	2.05	-1.23	-0.73	-1.95	35.49
388.31	12.55	0.85	13.39	1.99	-1.22	-0.75	-1.97	35.59

Transverse Load Rating

Typical segments of 10 ft. width and 8 ft depth are analyzed at the midspan of the longest span, Span 2. The deck has a clear roadway distance of 64'–6½" when both the North and the South boxes are connected by a CIP closure. The existing deck is striped with 4 12'-lanes and 2 shoulders. Details of the structural modelling are presented in the main body of this report.

Loads on the bridge include the self-weight of the segments, the barrier load, and live loads located strategically to maximize effects. Long-term effects were modeled using the staged construction load case from CSi Bridge. The transverse model for permanent loads was derived form a two-dimensional frame analysis; however, live loads moments were derived from the tri-dimensional model used for the longitudinal analysis. Live loads, from the different trucks, were placed as wheel loads (point loads) within a strip of 85 ft. on the midspan of Span 2. Loads were placed across the deck to maximize effects in six predetermined locations, representative of the overall deck. Note that the distance from the first to the last axles of the trucks analyzed is limited to 19 ft. (EV3), as loads beyond 14 ft. from the critical sections have very little contribution. The centered 85 ft. of Span 2 provides an adequate representation the entire bridge.

Material Properties

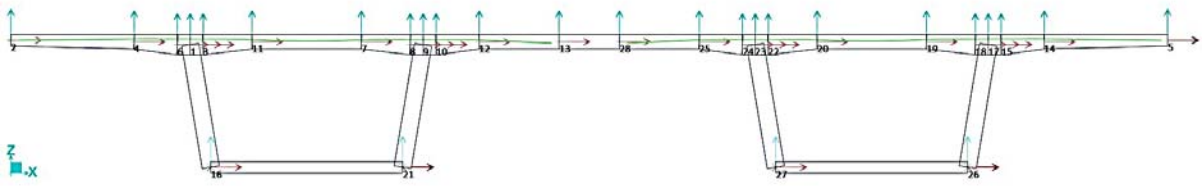
Material properties are the same as those used for the longitudinal analysis. Concrete, steel and prestressing curves were generated from CSi Bridge and shown in previous sections.

Section Properties

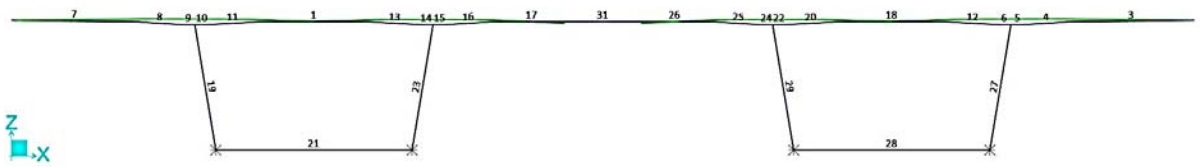
For transverse analysis, the section properties are relatively simple to derive. For permanent gravity loads, we selected a one-foot thick strip of deck, so the areas and inertias are those of a rectangular section. As we selected a strip, the live load moments used are those of the critical locations.

Tendon Layout

Transverse tendon layout geometry was taken from the existing bridge plans. Joint definition for the two-dimensional model is shown below.



Member definitions along with transverse tendon (green) are illustrated below.

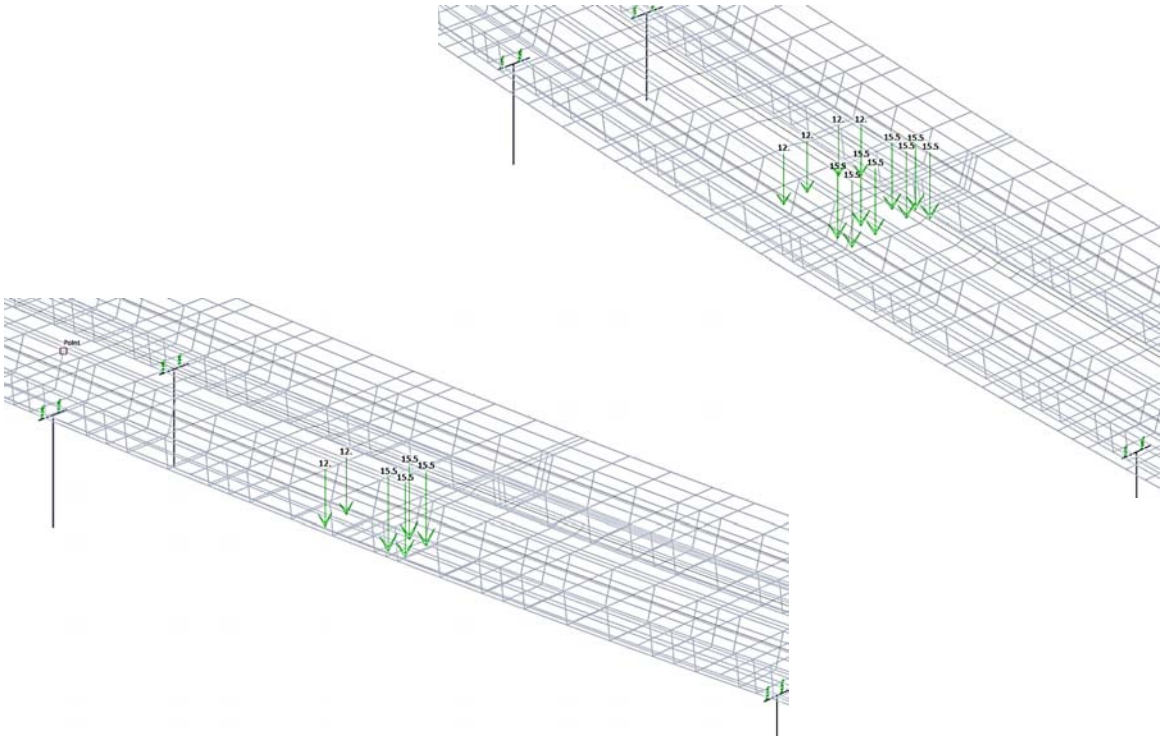


Transverse tendons are 4-0.6" diameter spaced at 3'-4", the strand areas were scaled accordingly for a 1 ft. thick deck. The region was selected to determine the live load moments for transverse analysis. The frame elements of interest include 1, 8, & 31.

Response of Permanent and Live Loads

Results from construction sequence for transverse analysis are presented in this section. The permanent loads are reported from the frame analysis where we included construction sequence and long-term effects reported at 10,000 days. The forces include DC (construction sequence and long-term effects), CR+SH, and PT. As mentioned in the longitudinal analysis, DC response also includes locked-in forces (EL). The plots shown below correspond to the application of live load in the tri-dimensional model, for one and two lanes loaded.

EV3 truck loading (point loads) for transverse analysis



Moments - DC+CR+SH+PT Loads

TABLE: Element Forces - Frames

Frame	Station	OutputCase	CaseType	StepType	P	M3	FrameElem	ElemStation	
Text	ft	Text	Text	Text	Kip	Kip-ft	Text	ft	
1	0	Transv. 1ft Strip	StagedConst	Last Step	-40.397	1.0159	1-1	0	
1	1.5833	Transv. 1ft Strip	StagedConst	Last Step	-40.397	-1.3388	1-1	1.5833	
1	1.5833	Transv. 1ft Strip	StagedConst	Last Step	-40.47	-1.3344	1-2	0	
1	3.1667	Transv. 1ft Strip	StagedConst	Last Step	-40.47	-2.5408	1-2	1.5833	
1	3.1667	Transv. 1ft Strip	StagedConst	Last Step	-40.489	-2.5401	1-3	0	
1	4.75	Transv. 1ft Strip	StagedConst	Last Step	-40.489	-2.2593	1-3	1.5833	
1	4.75	Transv. 1ft Strip	StagedConst	Last Step	-40.42	-2.2629	1-4	0	
1	6.3333	Transv. 1ft Strip	StagedConst	Last Step	-40.42	-0.8326	1-4	1.5833	Loc3
8	0	Transv. 1ft Strip	StagedConst	Last Step	-39.992	3.7539	8-1	0	
8	1.2528	Transv. 1ft Strip	StagedConst	Last Step	-40.004	5.9502	8-1	1.2528	
8	1.2528	Transv. 1ft Strip	StagedConst	Last Step	-40.112	5.978	8-2	0	
8	2.5055	Transv. 1ft Strip	StagedConst	Last Step	-40.126	7.8007	8-2	1.2528	Loc1
31	0	Transv. 1ft Strip	StagedConst	Last Step	-3E-11	-2.6769	31-1	0	
31	1.75	Transv. 1ft Strip	StagedConst	Last Step	-3E-11	-2.3418	31-1	1.75	Loc6
31	3.5	Transv. 1ft Strip	StagedConst	Last Step	-3E-11	-2.3894	31-1	3.5	

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: DAR Date: 1/19

Desc: **2D Frame Output** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\100%\[2D Frame Output.xlsx]CR + SH

Moments - CR + SH Loads

TABLE: Element Forces - Frames

Frame	Station	OutputCase	CaseType	StepType	P	M3	FrameElem	ElemStation	
Text	ft	Text	Text	Text	Kip	Kip-ft	Text	ft	
1	0	Cr + Sh	Combination		6.271	0.4064	1-1	0	
1	1.5833	Cr + Sh	Combination		6.271	0.2999	1-1	1.5833	
1	1.5833	Cr + Sh	Combination		6.236	0.302	1-2	0	
1	3.1667	Cr + Sh	Combination		6.236	-0.0107	1-2	1.5833	
1	3.1667	Cr + Sh	Combination		6.235	-0.0106	1-3	0	
1	4.75	Cr + Sh	Combination		6.235	-0.573	1-3	1.5833	
1	4.75	Cr + Sh	Combination		6.229	-0.5727	1-4	0	
1	6.3333	Cr + Sh	Combination		6.229	-1.3384	1-4	1.5833	Loc3
8	0	Cr + Sh	Combination		5.919	-0.9798	8-1	0	
8	1.2528	Cr + Sh	Combination		5.919	-1.4754	8-1	1.2528	
8	1.2528	Cr + Sh	Combination		5.919	-1.4755	8-2	0	
8	2.5055	Cr + Sh	Combination		5.919	-1.9502	8-2	1.2528	Loc1
31	0	Cr + Sh	Combination		-3.09E-11	-3.384	31-1	0	
31	1.75	Cr + Sh	Combination		-3.09E-11	-3.2403	31-1	1.75	Loc6
31	3.5	Cr + Sh	Combination		-3.09E-11	-3.0965	31-1	3.5	

Moments - PT Loads

TABLE: Element Forces - Frames

Frame	Station	OutputCase	CaseType	StepType	P	M3	FrameElem	ElemStation	
Text	ft	Text	Text	Text	Kip	Kip-ft	Text	ft	
1	0	Transv. 1ft Strip_w/o DC	StagedConst	Last Step	-47.39	1.5814	1-1	0	
1	1.5833	Transv. 1ft Strip_w/o DC	StagedConst	Last Step	-47.39	-1.2899	1-1	1.5833	
1	1.5833	Transv. 1ft Strip_w/o DC	StagedConst	Last Step	-47.425	-1.2877	1-2	0	
1	3.1667	Transv. 1ft Strip_w/o DC	StagedConst	Last Step	-47.425	-2.4805	1-2	1.5833	
1	3.1667	Transv. 1ft Strip_w/o DC	StagedConst	Last Step	-47.44	-2.48	1-3	0	
1	4.75	Transv. 1ft Strip_w/o DC	StagedConst	Last Step	-47.44	-1.6121	1-3	1.5833	
1	4.75	Transv. 1ft Strip_w/o DC	StagedConst	Last Step	-47.361	-1.6162	1-4	0	
1	6.3333	Transv. 1ft Strip_w/o DC	StagedConst	Last Step	-47.361	0.9279	1-4	1.5833	Loc3
8	0	Transv. 1ft Strip_w/o DC	StagedConst	Last Step	-45.856	7.5919	8-1	0	
8	1.2528	Transv. 1ft Strip_w/o DC	StagedConst	Last Step	-45.856	11.4301	8-1	1.2528	
8	1.2528	Transv. 1ft Strip_w/o DC	StagedConst	Last Step	-45.964	11.458	8-2	0	
8	2.5055	Transv. 1ft Strip_w/o DC	StagedConst	Last Step	-45.964	15.1444	8-2	1.2528	Loc1
31	0	Transv. 1ft Strip_w/o DC	StagedConst	Last Step	0	0	31-1	0	
31	1.75	Transv. 1ft Strip_w/o DC	StagedConst	Last Step	0	0	31-1	1.75	Loc6
31	3.5	Transv. 1ft Strip_w/o DC	StagedConst	Last Step	0	0	31-1	3.5	

Moments - Superimposed Loads

TABLE: Element Forces - Frames

Frame	Station	OutputCase	CaseType	StepType	P	M3	FrameElem	ElemStation	
Text	ft	Text	Text	Text	Kip	Kip-ft	Text	ft	
1	0	Transv. 1ft Strip_Superimp	StagedConst	Last Step	0.219	-1.0489	1-1	0	
1	1.5833	Transv. 1ft Strip_Superimp	StagedConst	Last Step	0.219	-0.6762	1-1	1.5833	
1	1.5833	Transv. 1ft Strip_Superimp	StagedConst	Last Step	0.219	-0.6762	1-2	0	
1	3.1667	Transv. 1ft Strip_Superimp	StagedConst	Last Step	0.219	-0.3035	1-2	1.5833	
1	3.1667	Transv. 1ft Strip_Superimp	StagedConst	Last Step	0.219	-0.3035	1-3	0	
1	4.75	Transv. 1ft Strip_Superimp	StagedConst	Last Step	0.219	0.0693	1-3	1.5833	
1	4.75	Transv. 1ft Strip_Superimp	StagedConst	Last Step	0.219	0.0693	1-4	0	
1	6.3333	Transv. 1ft Strip_Superimp	StagedConst	Last Step	0.219	0.442	1-4	1.5833	Loc3
8	0	Transv. 1ft Strip_Superimp	StagedConst	Last Step	-0.02	-2.1795	8-1	0	
8	1.2528	Transv. 1ft Strip_Superimp	StagedConst	Last Step	-0.02	-2.5607	8-1	1.2528	
8	1.2528	Transv. 1ft Strip_Superimp	StagedConst	Last Step	-0.02	-2.5607	8-2	0	
8	2.5055	Transv. 1ft Strip_Superimp	StagedConst	Last Step	-0.02	-2.942	8-2	1.2528	Loc1
31	0	Transv. 1ft Strip_Superimp	StagedConst	Last Step	1.02E-11	-0.0817	31-1	0	
31	1.75	Transv. 1ft Strip_Superimp	StagedConst	Last Step	1.02E-11	-0.081	31-1	1.75	Loc6
31	3.5	Transv. 1ft Strip_Superimp	StagedConst	Last Step	1.02E-11	-0.0803	31-1	3.5	

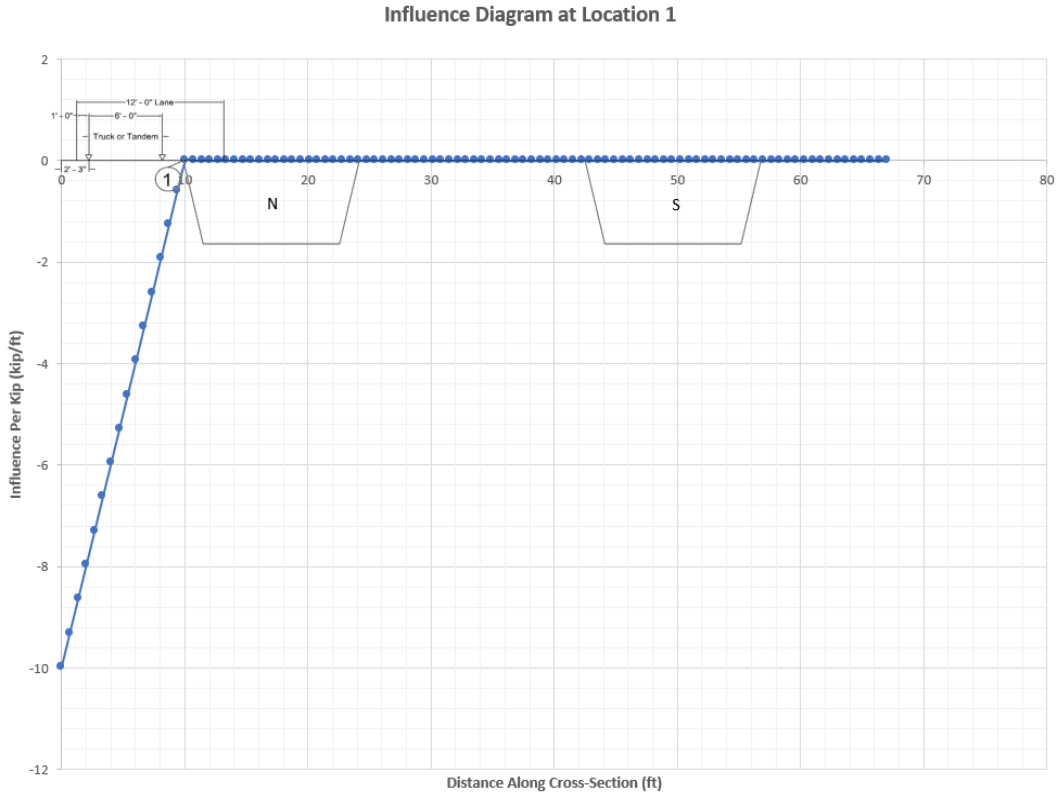
Moments - SW Loads

TABLE: Element Forces - Frames								
Frame	Station	OutputCase	CaseType	P	M3	FrameElem	ElemStation	
Text	ft	Text	Text	Kip	Kip-ft	Text	ft	
1	0	DC	Combination	0.722	-0.9718	1-1	0	
1	1.5833	DC	Combination	0.722	-0.3488	1-1	1.5833	
1	1.5833	DC	Combination	0.719	-0.3487	1-2	0	
1	3.1667	DC	Combination	0.719	-0.0497	1-2	1.5833	
1	3.1667	DC	Combination	0.717	-0.0495	1-3	0	
1	4.75	DC	Combination	0.717	-0.0743	1-3	1.5833	
1	4.75	DC	Combination	0.712	-0.074	1-4	0	
1	6.3333	DC	Combination	0.712	-0.4221	1-4	1.5833	Loc3
8	0	DC	Combination	-0.055	-2.8582	8-1	0	
8	1.2528	DC	Combination	-0.067	-4.0045	8-1	1.2528	
8	1.2528	DC	Combination	-0.067	-4.0045	8-2	0	
8	2.5055	DC	Combination	-0.081	-5.3935	8-2	1.2528	Loc1
31	0	DC	Combination	2.1E-13	0.7071	31-1	0	
31	1.75	DC	Combination	2.1E-13	0.8985	31-1	1.75	Loc6
31	3.5	DC	Combination	2.1E-13	0.7071	31-1	3.5	

For the live load analysis, there are six significant locations in the deck where we evaluated the rating. The live load wheel positioning for maximum effects in the tri-dimensional model is shown below. Plots from influence line analysis are shown for locations of interest 1, 3, and 6.

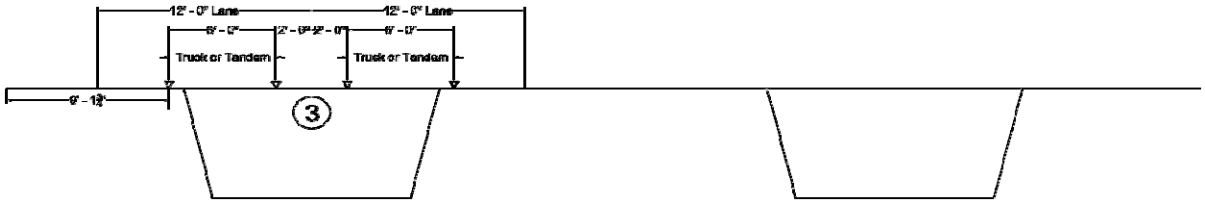
At root of cantilever (Loc 1):

Influence line for bending at root of cantilever (Loc 1):

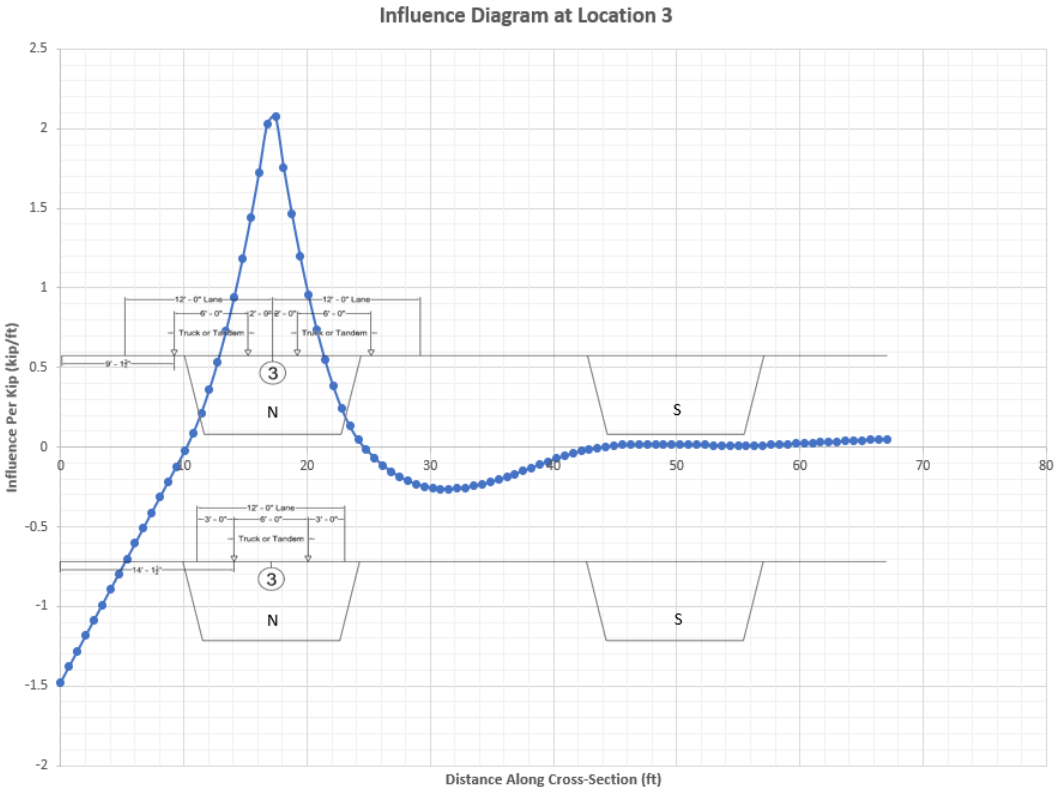


At inside face of left web (Loc 2)

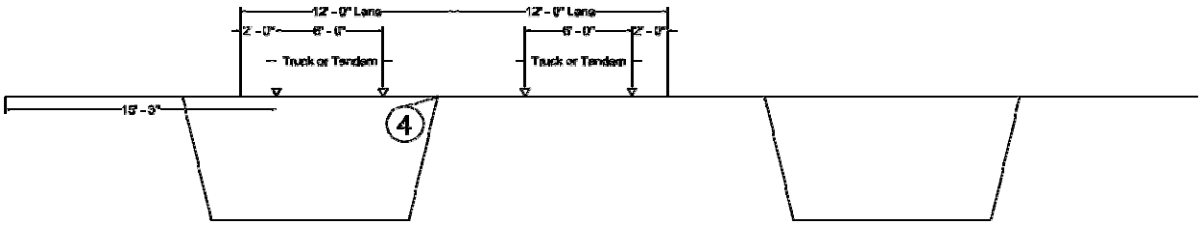
At mid-span of top slab cell (Loc 3)



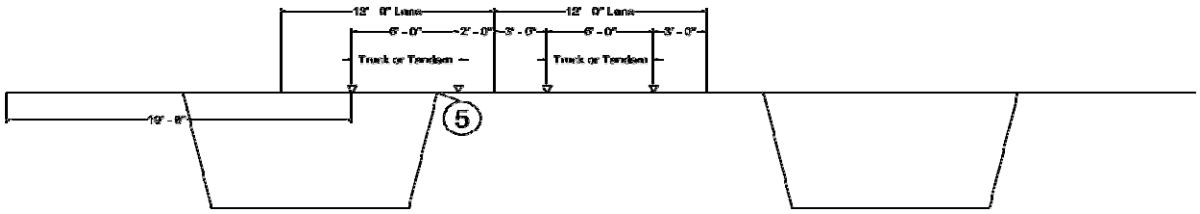
Influence line for bending at mid-span of top slab cell (Loc 3)



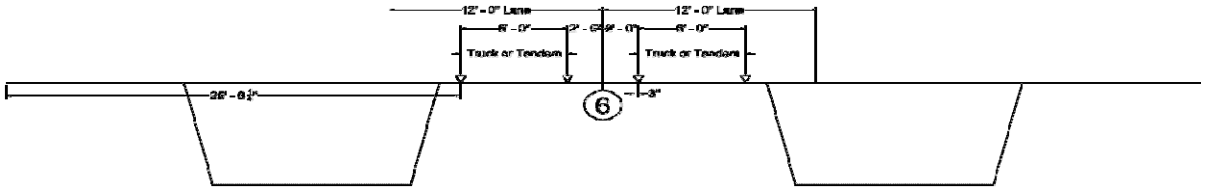
At inside face of right web (Loc 4)



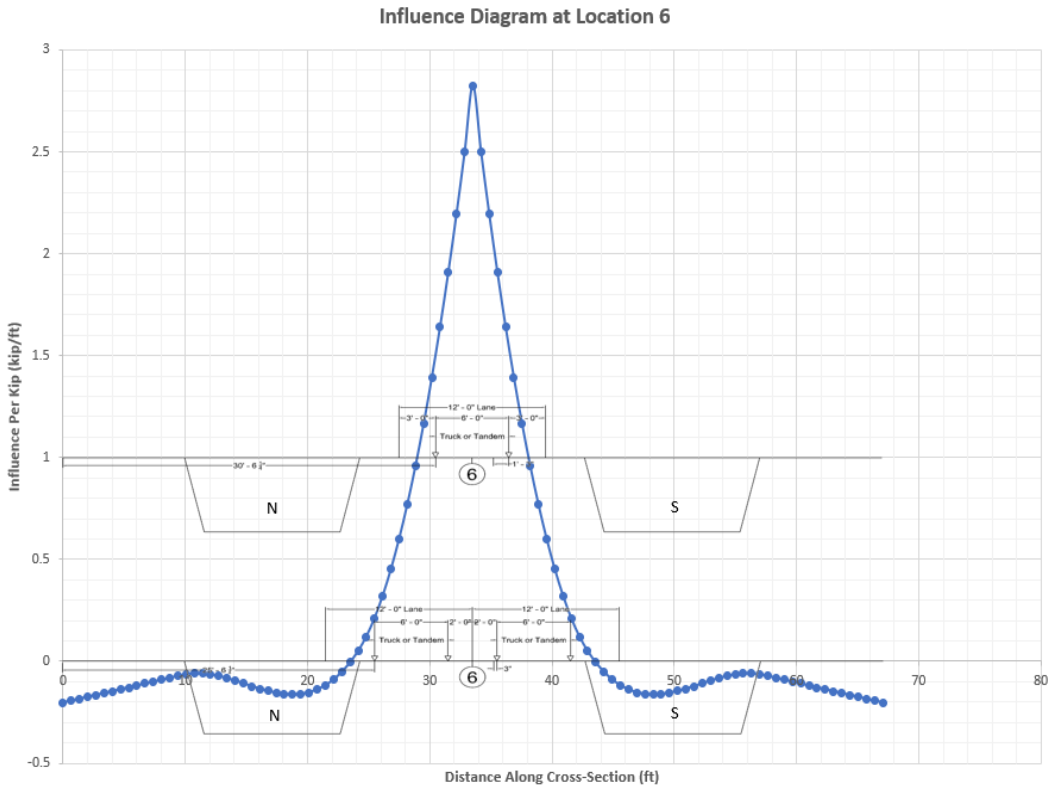
At outside face of right web (Loc 5)



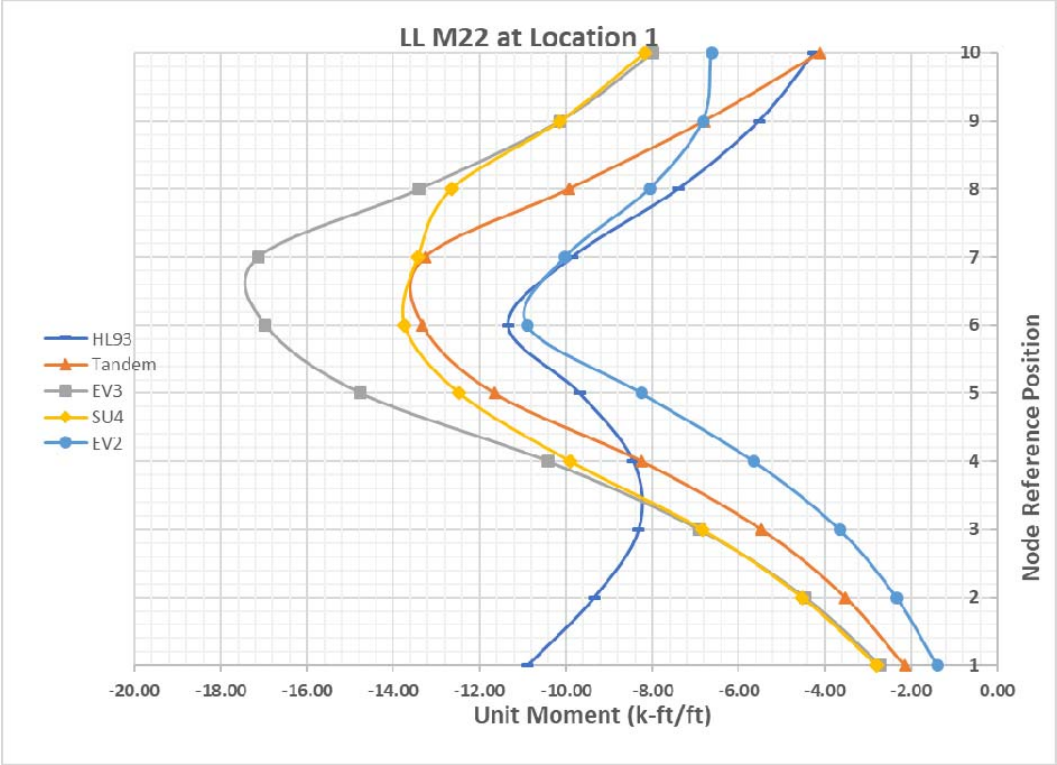
At CIP closure—non-prestressed (Loc 6)

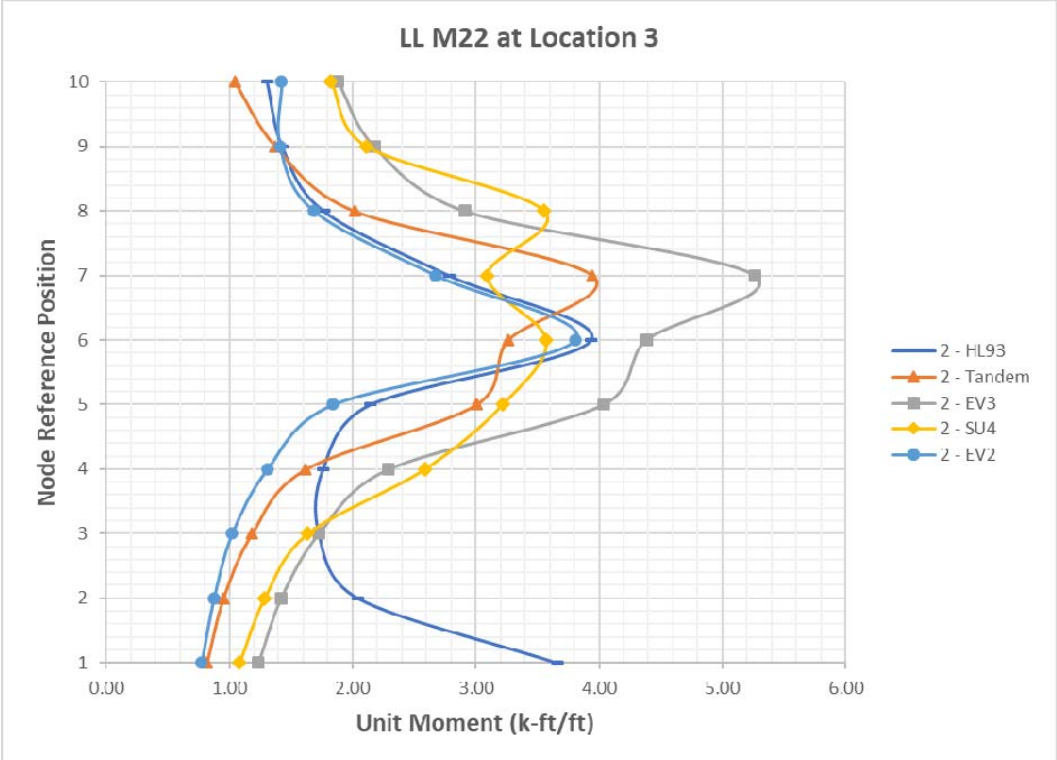


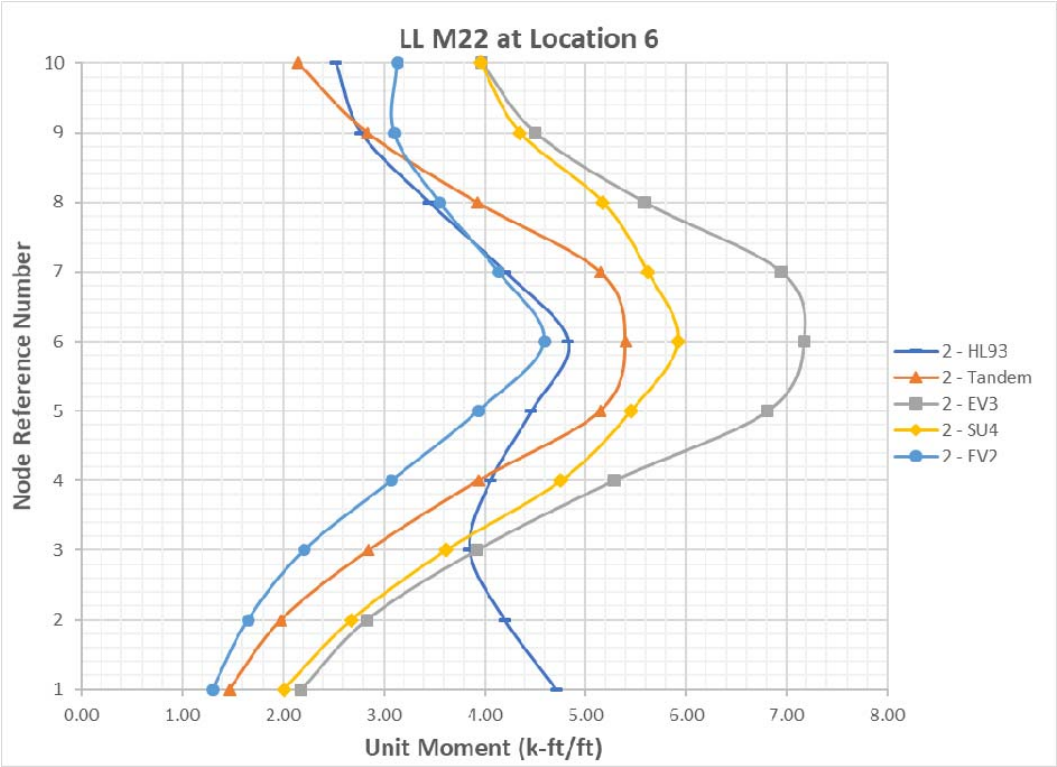
Influence line for bending at CIP closure (Loc 6)



The live load responses include the HL 93 Truck, HL 93 Tandem, SU4, EV2 and EV3 trucks as they have closely spaced axles generally governing the ratings. We further analyzed the locations and determined that Loc 1, 3 and 6 controlled the transverse load rating. The plots below show the live load moments for various trucks along the top slab at the selected locations.






LL M22 at Location 6
Node Reference Number
Unit Moment (k-ft/ft)
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
1
2
3
4
5
6
7
8
9
10
2 - HL93
2 - Tandem
2 - EV3
2 - SU4
2 - FV2

Limit States to Load Rate

Based on the MBE, Section 6A.5.11.2 of the FDOT BLRM, and wheel loading configuration, the critical trucks for transverse analysis are: HL 93 Tandem (two axles spaced at 4', with 25 k each) and the EV3 truck (two axles spaced at 4', with 31 k each). Our focus for the transvers rating is in these two trucks. The following are the limit states and live load factors that are used for the transverse load rating analysis.

LR Type	Loading	LR Type	LL Factor	
			Service I	Strength
Design	HL-93 Tandem	Inventory	1.0	1.75
		Operating	1.0	1.35
Emergency	EV3	Operating	1.0	1.3

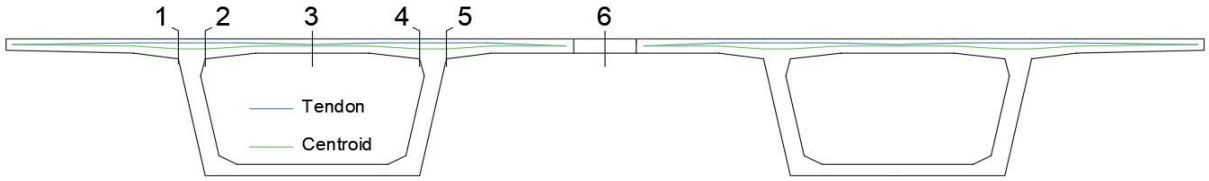
Service Rating

This section contains the LRFR ratings for transverse flexural stresses under Service I level loading. Based on the load responses of permanent and live loads the ratings factors are computed. The transverse rating factors with HL 93 Truck and Tandem are satisfactory and above 1.3. To further clarify and interpret the output that follows, we have added Quick Ck calculations for service.

Strength Rating

Strength level loads are calculated in accordance with the Strength I load combinations given in FDOT BLRM. The results reported in the tables considered for the transverse strength rating of HL 93 Truck and Tandem, along with EV2 and EV3 vehicles. To better interpret the rating results, we have added Quick Ck calculations for strength.

Moments and Forces - Design and Permit Truck Rating



	SW		Superim. (Barrier)		SW + PT + (CR + SH)		CR + SH		PTtot	
Loaction	**M_{SW} (k-ft)**	**P_{SW} (k)**	**M_{SI} (k-ft)**	**P_{SI} (k)**	**M_{tot} (k-ft)**	**P_{tot} (k)**	**M_{cr+sh} (k-ft)**	**P_{cr+sh} (k)**	**M_{PTtot} (k-ft)**	**P_{PTtot} (k)**
1	-5.39	-0.07	-2.94	-0.02	7.8	-40.13	-1.95	5.92	15.14	-47.36
3	-0.42	0.71	0.44	0.22	-0.83	-40.42	-1.34	6.23	0.93	-45.97
6	0.90	0.00	-0.08	0.00	-2.34	0.00	-3.24	0.00	0.00	0.00

* All Per Foot of Slab

* From 2D model

					IM = 1.2		$mpf_{Loc1,Inv}$ = 1.2		$mpf_{Loc3,6}$ = 1	
	HL93 Inv.		Tandem Inv.		HL93 Op.		Tandem Op.		FL120	
Loaction	**M_{LL} (k-ft)**	**P_{LL} (k)**	**M_{LL} (k-ft)**	**P_{LL} (k)**	**M_{LL} (k-ft)**	**P_{LL} (k)**	**M_{LL} (k-ft)**	**P_{LL} (k)**	**M_{LL} (k-ft)**	**P_{LL} (k)**
1	-16.33	-0.99	-19.18	-1.01	-13.61	-0.83	-15.98	-0.84	-22.73	-1.38
3	4.73	-1.33	4.74	-1.73	4.73	-1.33	4.74	-1.73	7.90	-2.22
6	5.80	-1.97	6.48	-3.58	5.80	-1.97	6.48	-3.58	9.68	-3.29

* All Per Foot of Slab

*From 3D Model

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: DAR Date: 1/19

Desc: **Transverse Load Rating** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\[Transverse Rating Final.xlsx]TRNSV Rating

Service Rating - Design and Permit Truck

A1 = 168.00 in^2 S1 = 392.00 in^3 s_{MAX_OP} ($6 f'_c^{1/2}$) = 0.44 ksi

A3 = 120.00 in^2 S3 = 200.00 in^3 s_{MAX_INV} ($3 f'_c^{1/2}$) = 0.22 ksi

A6 = 120.00 in^2 S6 = 200.00 in^3 f'_c = 5.5 ksi s_{MIN} ($0.6 f'_c$) = -3.3 ksi

Loaction	DC + PT + CR + SH		Live Load - s_{LL+IM} (ksf)									
			HL93 Inv.		Tandem Inv.		HL93 Op.		Tandem Op.		FL120	
	$s_{TOP, DL+PT}$	$s_{BOT, DL+PT}$	f_{TOP}	f_{BOTT}	f_{TOP}	f_{BOTT}	f_{TOP}	f_{BOTT}	f_{TOP}	f_{BOTT}	f_{TOP}	f_{BOTT}
1	-0.39	-0.09	0.49	-0.51	0.58	-0.59	0.41	-0.42	0.48	-0.49	0.69	-0.70
3	-0.31	-0.36	-0.29	0.27	-0.30	0.27	-0.29	0.27	-0.30	0.27	-0.49	0.46
6	0.15	-0.15	-0.36	0.33	-0.42	0.36	-0.36	0.33	-0.42	0.36	-0.61	0.55

	Rating Factor									
	HL93 Inv.		Tandem Inv.		HL93 Op.		Tandem Op.		FL120	
	TOP	BOTT	TOP	BOTT	TOP	BOTT	TOP	BOTT	TOP	BOTT
Location 1	1.24	6.35	1.05	5.41	2.02	7.62	1.72	6.49	1.21	4.56
Location 3	10.14	2.13	10.00	2.15	10.14	2.95	10.00	2.98	6.07	1.76

*HL93-Operating rating > 1.3, no legal truck rating required

Strength Rating - Design and Permit Truck

Loaction	M_{PT} (k-ft)	PT (k)	e_{cgs} (ft)	PT x e_{cgs} (k-ft)	M_{PT2} (k-ft)
1	15.14	-47.36	0.350	16.58	-1.44
3	0.93	-45.97	0.171	7.87	-6.95
6	-	-	-	-	-

* All Per Foot of Slab

* From 2D model and plans

* $M_{PT2} = M_{PT}$ - (PT x e_{cgs})

ΦM_n (k-ft)	M_{PT2} (k-ft)	Cr+Shr	DC	M_{LL+IM} (k-ft)				
		Mcr+sh (k-ft)	M_{DL} (k-ft)	HL93 Inv.	Tandem Inv.	HL93 Op.	Tandem Op.	FL120
-70.50	-1.44	-1.95	-8.33	-16.33	-19.18	-13.61	-15.98	-22.73
18.30	-6.95	-1.34	0.02	4.73	4.74	4.73	4.74	7.90
22.39	-	-3.24	0.82	5.80	6.48	5.80	6.48	9.68

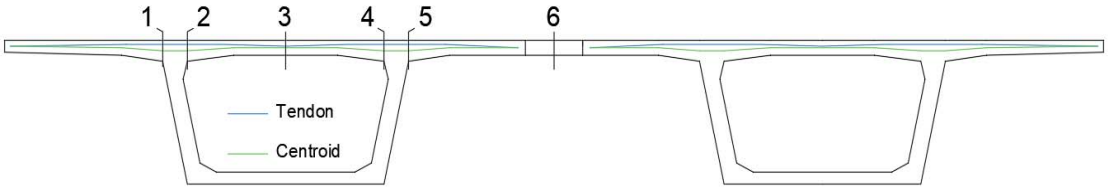
* All Per Foot of Slab

** LL is multiplied by IM and respective multiple presence factor in this sheet.

Loc 6: fM_n = 0.9(24.88) = 22.39 k-ft

	Rating Factor				
	HL93 Inv.	Tandem Inv.	HL93 Op.	Tandem Op.	FL120
Location 1	**1.97**	**1.67**	**3.06**	**2.60**	**1.83**
Location 3	**3.25**	**3.24**	**4.21**	**4.20**	**2.52**
Location 6	**2.51**	**2.24**	**3.25**	**2.91**	**1.95**

Moments and Forces - SU4, C5, ST5 Trucks Rating



	SW		Superim. (Barrier)		SW + PT + (CR + SH)		CR + SH		PTtot	
Loaction	M_{SW} (k-ft)	P_{SW} (k)	M_{SI} (k-ft)	P_{SI} (k)	M_{tot} (k-ft)	P_{tot} (k)	M_{cr+sh} (k-ft)	P_{cr+sh} (k)	M_{PTtot} (k-ft)	P_{PTtot} (k)
1	-5.39	-0.07	-2.94	-0.02	7.8	-40.13	-1.95	5.92	15.14	-47.36
3	-0.42	0.71	0.44	0.22	-0.83	-40.42	-1.34	6.23	0.93	-45.97
6	0.90	0.00	-0.08	0.00	-2.34	0.00	-3.24	0.00	0.00	0.00

* All Per Foot of Slab

* From 2D model

			IM = 1.2		mpf = 1	
	SU4		C5		ST5	
Loaction	M_{LL} (k-ft)	P_{LL} (k)	M_{LL} (k-ft)	P_{LL} (k)	M_{LL} (k-ft)	P_{LL} (k)
1	-16.50	-0.60	-13.45	-0.78	-12.37	-0.53
3	4.28	-1.12	3.96	-1.19	3.73	-1.14
6	7.10	-2.90	5.50	-2.69	5.09	-0.43

* All Per Foot of Slab

*From 3D Model

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: DAR Date: 1/19

Desc: **Transverse Load Rating** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\[Transverse Rating Final.xlsx]TRNSV Rating

Service Rating - SU4, C5, ST5 Trucks

A1 = 168.00 in^2 S1 = 392.00 in^3 s_{MAX_OP} ($6\ f'_c{}^{1/2}$) = 0.44 ksi

A3 = 120.00 in^2 S3 = 200.00 in^3 s_{MIN} ($0.6\ f'_c$) = -3.3 ksi

A6 = 120.00 in^2 S6 = 200.00 in^3 f'_c = 5.5 ksi

Loaction	DC + PT + CR + SH		Live Load - s_{LL+IM} (ksf)					
			SU4		C5		ST5	
	$s_{TOP, DL+PT}$	$s_{BOT, DL+PT}$	f_{TOP}	f_{BOTT}	f_{TOP}	f_{BOTT}	f_{TOP}	f_{BOTT}
1	-0.39	-0.09	0.50	-0.51	0.41	-0.42	0.38	-0.38
3	-0.23	-0.25	-0.27	0.25	-0.25	0.23	-0.23	0.21
6	0.07	-0.07	-0.45	0.40	-0.35	0.31	-0.31	0.30

	Rating Factor					
	SU4		C5		ST5	
	TOP	BOTT	TOP	BOTT	TOP	BOTT
Location 1	1.66	6.31	2.05	7.71	2.22	8.41
Location 3	11.54	2.81	12.41	3.06	13.16	3.25

Strength Rating - SU4, C5, ST5 Trucks

Loaction	M_{PT} (k-ft)	PT (k)	e_{cgs} (ft)	PT . e_{cgs} (k-ft)	M_{PT2} (k-ft)
1	15.14	-47.36	0.350	16.58	-1.44
3	0.93	-45.97	0.171	7.87	-6.95
6	-	-	-	-	-

* All Per Foot of Slab

* From 2D model and plans

* $M_{PT2} = M_{PT}$ - (PT x e_{cgs})

Loaction	ΦM_n (k-ft)	M_{PT2} (k-ft)	Cr+Shr	DC	M_{LL+IM} (k-ft)		
			Mcr+sh (k-ft)	M_{DL} (k-ft)	SU4	C5	ST5
1	-70.50	-1.44	-1.95	-8.33	-16.50	-13.45	-12.37
3	18.30	-6.95	-1.34	0.02	4.28	3.96	3.73
6	22.39	-	-3.24	0.82	7.10	5.50	5.09

* All Per Foot of Slab

** LL is multiplied by IM and respective multiple presence factor in this sheet.

Loc 6: ϕM_n = 0.9(24.88) = 22.39 k-ft

	Rating Factor		
	SU4	C5	ST5
Location 1	**2.52**	**3.10**	**3.37**
Location 3	**4.65**	**5.03**	**5.34**
Location 6	**2.65**	**3.43**	**3.70**

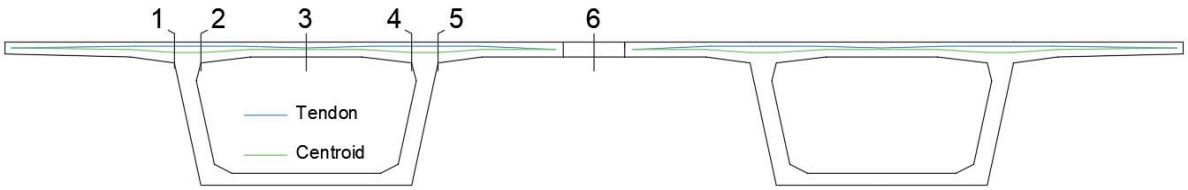
BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: DAR Date: 1/19

Desc: **Transverse Load Rating** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\[Transverse Rating Final.xlsx]TRNSV Rating

Moments and Forces - Emergency Vehicle Rating



	SW		Superim. (Barrier)		SW + PT + (CR + SH)		CR + SH		PTtot	
Loaction	M_{SW} (k-ft)	P_{SW} (k)	M_{SI} (k-ft)	P_{SI} (k)	M_{tot} (k-ft)	P_{tot} (k)	M_{cr+sh} (k-ft)	P_{cr+sh} (k)	M_{PTtot} (k-ft)	P_{PTtot} (k)
1	-5.39	-0.07	-2.94	-0.02	7.8	-40.13	-1.95	5.92	15.14	-47.36
3	-0.42	0.71	0.44	0.22	-0.83	-40.42	-1.34	6.23	0.93	-45.97
6	0.90	0.00	-0.08	0.00	-2.34	0.00	-3.24	0.00	0.00	0.00

* All Per Foot of Slab

* From 2D model

	IM = 1.2		mpf = 1	
	EV3		EV2	
Loaction	M_{LL} (k-ft)	P_{LL} (k)	M_{LL} (k-ft)	P_{LL} (k)
1	-20.57	-1.30	-13.08	-1.00
3	6.32	-1.98	4.57	-1.64
6	8.60	-4.06	5.52	-2.35

* All Per Foot of Slab

*From 3D Model

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: DAR Date: 1/19

Desc: **Transverse Load Rating** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\[Transverse Rating Final.xlsx]TRNSV Rating

Service Rating - Emergency Vehicles

A1 = 168.00 in^2 S1 = 392.00 in^3

A3 = 120.00 in^2 S3 = 200.00 in^3

A6 = 120.00 in^2 S6 = 200.00 in^3 f'_c = 5.5 ksi

s_{MAX_OP} ($6 f'_c{}^{1/2}$) = 0.44 ksi

s_{MIN} ($0.6 f'_c$) = -3.3 ksi

Loaction	DC + PT + CR + SH		Live Load - s_{LL+IM} (ksf)			
			EV3		EV2	
	$s_{TOP, DL+PT}$	$s_{BOT, DL+PT}$	f_{TOP}	f_{BOTT}	f_{TOP}	f_{BOTT}
1	-0.39	-0.09	0.62	-0.64	0.39	-0.41
3	-0.23	-0.25	-0.40	0.36	-0.29	0.26
6	0.07	-0.07	-0.55	0.48	-0.35	0.31

	Rating Factor			
	EV3		EV2	
	TOP	BOTT	TOP	BOTT
Location 1	1.34	5.04	2.11	7.90
Location 3	7.76	1.92	10.67	2.67

Strength Rating - Emergency Vehicles

Loaction	M_{PT} (k-ft)	PT (k)	e_{cgs} (ft)	PT . e_{cgs} (k-ft)	M_{PT2} (k-ft)
1	15.14	-47.36	0.350	16.58	-1.44
3	0.93	-45.97	0.171	7.87	-6.95
6	-	-	-	-	-

* All Per Foot of Slab

* From 2D model and plans

* $M_{PT2} = M_{PT}$ - (PT x e_{cgs})

Loaction	ΦM_n (k-ft)	M_{PT2} (k-ft)	Cr+Shr	DC	M_{LL+IM} (k-ft)	
			M_{cr+sh} (k-ft)	M_{DL} (k-ft)	EV3	EV2
1	-70.50	-1.44	-1.95	-8.33	-20.57	-13.08
3	18.30	-6.95	-1.34	0.02	6.32	4.57
6	22.39	-	-3.24	0.82	8.60	5.52

* All Per Foot of Slab

** LL is multiplied by IM and respective multiple presence factor in this sheet.

Loc 6: $fM_n = 0.9(24.88) = 22.39$ k-ft

	Rating Factor	
	EV3	EV2
Location 1	**2.10**	**3.31**
Location 3	**3.27**	**4.53**
Location 6	**2.27**	**3.54**

BPA

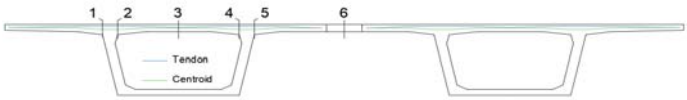
Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Dar Date: 3/19

Desc: **Quick Ck Service I** Checked by: Lmv Date: 3/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\[Quick-Ck_stresses_Trsnv.xls]quickCk

Quick Check Transverse Stresses

Service - Transverse



1. Materials & Geometry

Superstructure Environment, Slightly Aggressive

f'_c = 5.5 ksi

per 1 foot strip, rectangular cross sections

h_1 =	14 in	$A_1 = b \times h$	168 in^2	$S_1 = b \times h$	392 in^3
h_3 =	10 in	$A_3 = b \times h$	120 in^2	$S_3 = b \times h$	200 in^3

Stress Limits:

$\sigma_{max, Op}$ =	$6\sqrt{f'c}$ =	0.445	ksi
σ_{min} =	0.6f'c =	-3.3	ksi

2. Load Effects

Loaction	Superim. (Barrier)		SW + PT + (CR + SH)		Tandem Op.	
	M_{SI} (k-ft)	P_{SI} (k)	M_{tot} (k-ft)	P_{tot} (k)	M_{LL} (k-ft)	P_{LL} (k)
1	-2.94	-0.02	7.80	-40.13	-15.98	-0.84
3	0.44	0.22	-0.83	-40.42	4.74	-1.73

*Load Effects Per Foot of Slab

3. Rating

Permanent Stress Loc.1

M = $M_{SI} + M_{tot}$ = 4.86 k-ft positive moment -> compression @ top, tension @ bott

P = $P_{SI} + P_{tot}$ = -40.15 k compression

$\sigma_{top, DL} = P/A_1 - M/S_1$ = -0.388 ksi

$\sigma_{bott, DL} = P/A_1 + M/S_1$ = -0.090 ksi

Live Load Stress Loc.1

M_{LL} = -15.98 k-ft

P_{LL} = -0.84 k

$\sigma_{top, LL} = P_{LL}/A_1 - M_{LL}/S_1$ = 0.484 ksi

$\sigma_{bott, LL} = P_{LL}/A_1 + M_{LL}/S_1$ = -0.494 ksi

Rating Factor

$RF_{top} = (\sigma_{max, Inv} - \sigma_{top, DL})/\sigma_{top, DL}$ = **1.72** Ok!

$RF_{bott} = (\sigma_{min} - \sigma_{bott, DL})/\sigma_{bott, DL}$ = **6.50** Ok!

Quick Check Transverse Stresses

Permanent Stress Loc.3

M = $M_{SI} + M_{tot}$ = -0.39 k-ft negative moment -> tension @ top, compression @ bott

P = $P_{SI} + P_{tot}$ = -40.20 k compression

$\sigma_{top, DL} = P/A_3 - M/S_3$ = -0.312 ksi

$\sigma_{bott, DL} = P/A_3 + M/S_3$ = -0.358 ksi

Live Load Stress Loc.3

M_{LL} = 4.74 k-ft

P_{LL} = -1.73 k

$\sigma_{top, LL} = P_{LL}/A_3 - M_{LL}/S_3$ = -0.299 ksi

$\sigma_{bott, LL} = P_{LL}/A_3 + M_{LL}/S_3$ = 0.270 ksi

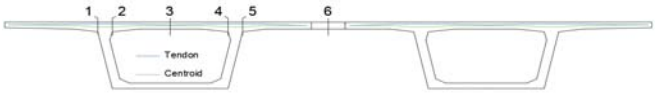
Rating Factor

$RF_{top} = (\sigma_{max, Inv} - \sigma_{top, DL})/\sigma_{top, DL}$ = **10.00** Ok!

$RF_{bott} = (\sigma_{min} - \sigma_{bott, DL})/\sigma_{bott, DL}$ = **2.98** Ok!

Quick Check Transverse Strength

Strength - Transverse



1. Materials & Geometry

Superstructure Environment, Slightly Aggressive

f'_c = 5.5 ksi

Capacity:

$\Phi M_{n,1}$ = -70.5 k-ft
$\Phi M_{n,3}$ = 18.3 k-ft
$\Phi M_{n,6}$ = 22.39 k-ft

2. Load Effects

Loaction	SW + Barrier	PT	Cr+Shr	Tandem Op.
	M_{DW} (k-ft)	M_{PT2} (k-ft)	M_{CR+SH} (k-ft)	M_{LL+IM} (k-ft)
1	-8.33	-1.44	-1.95	-15.98
3	0.02	-6.95	-1.34	4.74
6	0.82	-	-3.24	6.48

3. Rating

$$RF = \frac{C - \left[\gamma_{DC}\cdot DC + \gamma_{DW}\cdot DW + \gamma_{EL}\cdot EL + \gamma_{FR}\cdot FR + \gamma_{CR}\cdot(TU + CR + SH)\right]}{\gamma_{LL}\cdot(LL + IM)}$$

FDOT LRM 6A.5.11.2

Location 1

$\gamma_{DW}M_{DW}$ = $1.25M_{DW}$ = -10.41 k-ft
$\gamma_{EL}M_{EL}$ = $1.00M_{PT2}$ = -1.44 k-ft
$\gamma_{CR}M_{CR}$ = $1.25M_{CR+SH}$ = -2.44 k-ft
$\gamma_{LL}M_{LL}$ = $1.35M_{LL}$ = -21.57 k-ft

RF = $(\Phi M_{n,1} - \gamma_{DW}M_{DW} - \gamma_{EL}M_{EL} - \gamma_{CR}M_{CR})/\gamma_{LL}M_{LL}$ = **2.60** Ok!

Location 3

$\gamma_{DW}M_{DW}$ = $1.25M_{DW}$ = 0.03 k-ft
$\gamma_{EL}M_{EL}$ = $1.00M_{PT2}$ = -6.95 k-ft
$\gamma_{CR}M_{CR}$ = $1.25M_{CR+SH}$ = -1.68 k-ft
$\gamma_{LL}M_{LL}$ = $1.35M_{LL}$ = 6.40 k-ft

RF = $(\Phi M_{n,1} - \gamma_{DW}M_{DW} - \gamma_{EL}M_{EL} - \gamma_{CR}M_{CR})/\gamma_{LL}M_{LL}$ = **4.20** Ok!

Location 6

$\gamma_{DW}M_{DW}$ = $1.25M_{DW}$ = 1.03 k-ft
$\gamma_{EL}M_{EL}$ = $1.00M_{PT2}$ = 0.00 k-ft
$\gamma_{CR}M_{CR}$ = $1.25M_{CR+SH}$ = -4.05 k-ft
$\gamma_{LL}M_{LL}$ = $1.35M_{LL}$ = 8.75 k-ft

RF = $(\Phi M_{n,1} - \gamma_{DW}M_{DW} - \gamma_{EL}M_{EL} - \gamma_{CR}M_{CR})/\gamma_{LL}M_{LL}$ = **2.91** Ok!

BPA

Job: **Br [redacted] over [redacted] LR 18.17.01** Computed by: Dar Date: 3/19

Desc: **Quick Ck Service III** Checked by: Lmv Date: 3/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\Final\[Quick-Ck_Long_stresses.xls]quickCk

Quick Check Principal Stresses

Principal Stresses

1. Materials

Superstructure Environment, Slightly Aggressive

f'_c = 5.5 ksi

φ_s = 1.00 exterior span

Operating rating:

$\sigma_{t,\ allow}$ = 3.5 $\sqrt{f'c}$ = 37.378 ksf

Section properties - 16" Bottom Slab

A_o = 87.34 ft^2

I_g = 537.06 ft^4

b_w = 1.00 ft

B_w = 2.00 ft

A_{tot} = 57.23 ft^2

Q_g = 82.30 ft^3

2. Forces and Stresses

Check for tensile stresses (@ bottom)

Forces from CSi Bridge: HL 93 Op North Box output

Truck	Station	$V2_{LL}$	T_{LL}	$P_{DC+PT+CR+SH}$	$V2_{DC+PT+CR+SH}$	$T_{DC+PT+CR+SH}$	$M3_{DC+PT+CR+SH}$	$V2_{TU}$	T_{TU}	$V2_{0.5TG}$	$T_{0.5TG}$
Text	ft	kip	kip-ft	kip	kip	kip-ft	kip-ft	kip	kip-ft	kip	kip-ft
HL93-op-N (0.9SL)	106.38	314.890	235.290	-5212.960	-677.440	-457.25	-12325.440	3.120	182.370	-19.980	47.030

Stresses

$$\tau = \frac{VQ_g}{I_g B_w} + \frac{T}{2A_o b_w} \qquad (5.9.2.3.3\text{-}3)$$

DC+PT+CR+SH			TU		0.5TG		LL		Limiting Stresses		
f_{pc} (σ_x) (P/A)	τ - Shr	τ - Tor	τ - Shr	τ - Tor	τ - Shr	τ - Tor	τ - Shr	τ - Tor	$\Sigma\tau$	R_{max}	τ - allow
ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
-91.09	-51.91	-2.62	0.24	1.04	-1.53	0.27	24.13	1.35	-55.04	82.92	69.29

3. Rating

$$RF = \frac{C - \left[\gamma_{DC}\cdot DC + \gamma_{DW}\cdot DW + \gamma_{EL}\cdot EL + \gamma_{FR}\cdot FR + \gamma_{CR}\cdot(TU + CR + SH)\right]}{\gamma_{LL}\cdot(LL + IM)}$$

$\Sigma\tau$ = -55.04

τ_{LL} = 25.47

$RF = (\sigma_{Capacity} - \sigma_{(DC+CR+SH+PT)} - \sigma_{TU} - \sigma_{0.5TG}) / \sigma_{(LL+IM)}$

RF = 0.56 Ok!

Quick Check Strength

Strength - Flexure

1. Materials

Superstructure Environment, Slightly Aggressive

f'_c = 5.5 ksi
φ_s = 1.05 interior span

Inventory strength:

$M_{Capacity}$ = 10705.40 k-ft (see next sheet)
$\varphi_s M_{Capacity}$ = 11240.67 k-ft

2. Calculations

Check Flexure Strength Rating

Stresses from CSi Bridge: HL 93 Inv North Box output

M3* = 1.25DC+1.25(CR+SH)+1.0 PT2

Request	BridgeObj	Station	Location	Resist Fact	M3DC+CR+SH+PT2	M3-0.5TU	M3LLIM	Mr	φ_s Mr
Text	Text	ft	Text	Unitless	k-ft	k-ft	k-ft	k-ft	k-ft
LR_Flex-HL93-op-N	NB	239.932	Before Joint	1.000	1494.900	-94.800	6399.600	10705.400	11240.670
LR_Flex-HL93-op-N	NB	239.932	After Joint	1.000	1455.300	-95.900	6447.000	10705.400	11240.670

**Moments factored within CSi Software*

Before Joint.

M3* = 1494.900 k-ft
M3-0.5TU = -94.800 k-ft
M3LLIM = 6399.600 k-ft

Rating Factor

RF = $(M_{Capacity}$ - M3* - $M_{0.5TU}) / M_{(LL+IM)}$

RF = 1.54 OK!

After Joint.

M3 = 1455.300 k-ft
M30.5TU = -95.900 k-ft
M3LLIM = 6447.000 k-ft

Rating Factor

RF = $(M_{Capacity}$ - M3* - $M_{0.5TU}) / M_{(LL+IM)}$

RF = 1.53 Ok!

Positive Moment Capacity

1. INPUT VARIABLES

Materials Properties:

γ_{conc} =	145	pcf	E_{ps} =	28000	ksi
f'c =	5.5	ksi	f_{pu} =	270	ksi
K_1 =	1.00		k =	0.28	
E_{conc} =	4273.14	ksi			
α_1 =	0.85				
β_1 =	0.775				
n =	6.79				

Geometric Properties:

h =	96.00 in.	Section Height
b =	402.25 in.	Top Flange Width
h_f =	10.00 in.	Top Flange Thickness
t_w =	24.00 in.	Web Thickness

A_{ps} = 0.217 in^2

Type	Tendons	Str./tend	cg (in)
1	2	12	4
2	0	0	0
3			

Total Strands = 24 $A_{ps,tot}$ = 5.208 in^2

Dinst. from Bott. Fiber to C.G. of Tendons = 4.00 in
Dist. From Comp. face to CG of tendons = 92.00 in

2. CALCULATIONS (AASHTO 8th)

Neutral Axis Depth:

for rectangular section behavior:

$$c = \frac{A_{ps} f_{pu} + A_s f_s - A'_s f'_s}{\alpha_1 f'_c \beta_1 b + k A_{ps} \frac{f_{pu}}{d_p}} \qquad (5.6.3.1.1\text{-}4)$$

c_{rect} = 0.96 in.
a_{rect} = 0.75 in.

Consider T-Beam Behavior? (c > hf) **No** *Rectangular Section Behavior*

for T-section behavior:

$$c = \frac{A_{ps} f_{pu} + A_s f_s - A'_s f'_s - \alpha_1 f'_c (b - b_w) h_f}{\alpha_1 f'_c \beta_1 b_w + k A_{ps} \frac{f_{pu}}{d_p}} \qquad (5.6.3.1.1\text{-}3)$$

c_{tbeam} = NA
a_{tbeam} = NA

c_{used} = 0.96 in.
a_{used} = 0.75 in.

Average Prestressing Steel Stress:

$$f_{ps} = f_{pu}\left(1 - k\frac{c}{d_p}\right) \qquad (5.6.3.1.1\text{-}1)$$

f_{ps} = 269.21 ksi

Nominal Flexural Resistance:

$$M_n = A_{ps} f_{ps}\left(d_p - \frac{a}{2}\right) + A_s f_s\left(d_s - \frac{a}{2}\right) - A'_s f'_s\left(d'_s - \frac{a}{2}\right) + \alpha_1 f'_c (b - b_w) h_f \left(\frac{a}{2} - \frac{h_f}{2}\right) \qquad (5.6.3.2.2\text{-}1)$$

M_n = 10705.4 kip-ft.

Factored Flexural Resistance:

$$0.75 \le \phi = 0.75 + \frac{0.25(\varepsilon_t - \varepsilon_{cl})}{(\varepsilon_{tl} - \varepsilon_{cl})} \le 1.0 \qquad (5.5.4.2\text{-}1)$$

ε_{cl} = 0.002
ε_{tl} = 0.005
ε_t = 0.284

ϕ = 1.00

M_r = 10705.4 kip-ft.

BPA

Job: Br [redacted] over [redacted] LR 18.17.01 Computed by: DAR Date: 1/19

Desc: **Flexure Capacity - Prestressed** Checked by: Lmv Date: 2/19

P:_design projects\18.17.01 FDOT 6 DW Load Rating\Engineering\Structures\TWO # 1\Bridge [redacted] Calculations\Report\100%\[Flexure Seg Box Capacity.xls]M- Capacity

Negative Moment Capacity

1. INPUT VARIABLES

Materials Properties:

γ_{conc} =	145	pcf	E_{ps} =	28000	ksi
f'c =	5.5	ksi	f_{pu} =	270	ksi
K_1 =	1.00		k =	0.28	
E_{conc} =	4273.14	ksi			
α_1 =	0.85				
β_1 =	0.775				
n =	6.79				

A_{ps} = 0.217 in^2

Geometric Properties:

h =	96.00 in.	Section Height
b =	144.00 in.	Top Flange Width
h_f =	8.00 in.	Top Flange Thickness
t_w =	24.00 in.	Web Thickness

Type	Tendons	Str./tend	cg (in)
1	6	12	4.75
2	12	9	4.75
3	2	4	11

Total Strands = 188 $A_{ps,tot}$ = 40.796 in^2

Dinst. from Bott. Fiber to C.G. of Tendons = 5.02 in

Dist. From Comp. face to CG of tendons = 90.98 in

2. CALCULATIONS (AASHTO 8th)

Neutral Axis Depth:

for rectangular section behavior:

$$c = \frac{A_{ps} f_{pu} + A_s f_s - A'_s f'_s}{\alpha_1 f'_c \beta_1 b + k A_{ps} \frac{f_{pu}}{d_p}} \qquad (5.6.3.1.1\text{-}4)$$

c_{rect} = 19.82 in.

a_{rect} = 15.36 in.

Consider T-Beam Behavior? (c > hf) **Yes** *==> T-Section Behavior*

for T-section behavior:

$$c = \frac{A_{ps} f_{pu} + A_s f_s - A'_s f'_s - \alpha_1 f'_c (b - b_w) h_f}{\alpha_1 f'_c \beta_1 b_w + k A_{ps} \frac{f_{pu}}{d_p}} \qquad (5.6.3.1.1\text{-}3)$$

c_{tbeam} = 54.01 in.

a_{tbeam} = 41.86 in.

c_{used} = 54.01 in.

a_{used} = 41.86 in.

Average Prestressing Steel Stress:

$$f_{ps} = f_{pu}\left(1 - k\frac{c}{d_p}\right) \qquad (5.6.3.1.1\text{-}1)$$

f_{ps} = 225.12 ksi

Nominal Flexural Resistance:

$$M_n = A_{ps} f_{ps}\left(d_p - \frac{a}{2}\right) + A_s f_s\left(d_s - \frac{a}{2}\right) - A'_s f'_s\left(d'_s - \frac{a}{2}\right) + \alpha_1 f'_c (b - b_w) h_f \left(\frac{a}{2} - \frac{h_f}{2}\right) \qquad (5.6.3.2.2\text{-}1)$$

M_n = 59948.5 kip-ft.

Factored Flexural Resistance:

$$0.75 \le \phi = 0.75 + \frac{0.25(\varepsilon_t - \varepsilon_{cl})}{(\varepsilon_{tl} - \varepsilon_{cl})} \le 1.0 \qquad (5.5.4.2\text{-}1)$$

ε_{cl} = 0.002

ε_{tl} = 0.005

ε_t = 0.002

ϕ = 0.75

M_r = 45231.2 kip-ft.