



LRFR BRIDGE LOAD RATING SUMMARY

Version 1.0

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SECTION 1 - GENERAL BRIDGE DATA					
(8) Asset ID 07934	Route Type Interstate		(27) Year Built 1985	(90) Date of Inspection 12/2019	(411) Date Rated 11/11/2020
(9) Bridge Location 4 MI NW OF COLUMBIA			(7) Facility Carried RAMP OFF I-126 WB		(6) Feature Intersected/Route Crossing SALUDA RIV & I-26 & I-126 & RR
(49) Length 2487 ft.	(11) Milepost 0.316	(2) District 1	(3) County RICHLAND	(22) Owner SCDOT	(418) Conditions During Rating (NBI Item 58, NBI Item 59, NBI Item 60) 6, 6, 7
(43, 44, 45, & 46) Bridge Description Continuous 18 Span SS Bridge			(31) Design Load HS-20+Mod		(108) Existing Wearing Surface Type & Depth MONOLITHIC CONCRETE
Rating Program & Version BrR 6.8.4 - AASHTO Engine		Rating Program & Version N/A		Rating Method LRFR	AASHTO Reference MBE 3rd Edition, w/ 2019 Interims
(58) Deck 6 Satisfactory	(59) Superstructure 6 Satisfactory	(60) Substructure 7 Good	(62) Culvert N N/A (NBI)	(113) Scour Critical 8 Stable Above Footing	

SECTION 2 - INVENTORY AND OPERATING LOAD RATINGS					
Rating Vehicle	Rating Level	Controlling Member	Controlling Location	Controlling Limit State	Rating Factor
HL-93 Truck + Lane	Inventory	G4	3.0	STRENGTH-I Steel Shear	0.575
HL-93 Truck Train + Lane (90%)	Inventory	G4	17.0	STRENGTH-I Steel Flexure Stress	0.948
HL-93 Tandem + Lane	Inventory	G3	3.0	STRENGTH-I Steel Shear	0.700
HL-93 Truck + Lane	Operating	G4	3.0	STRENGTH-I Steel Shear	0.746
HL-93 Truck Train + Lane (90%)	Operating	G4	17.0	STRENGTH-I Steel Flexure Stress	1.228
HL-93 Tandem + Lane	Operating	G3	3.0	STRENGTH-I Steel Shear	0.907

This LRFR Load Rating is based on:		
<input checked="" type="checkbox"/> Design Plans	<input type="checkbox"/> Design Plans & Approved Shop Drawings	<input type="checkbox"/> Other (Please explain in Remarks)
<input type="checkbox"/> As-Built Plans		
SECTION 3 - BRIDGE LOAD RATING SUMMARY		
Controlling Legal Truck EV3	Load Posting Required? If Yes, complete Signing/Posting Form. Yes	Controlling Legal Load Rating Factor 0.933

SECTION 4 - REMARKS & SIGN/SEAL			
Load Rating Engineer		Quality Control Engineer	
Name: Shovon Mukherjee		Name: T. Brian Query	
Company/Title: STV/ Engineering Specialist		Company/Title: STV /Project Manager	
Date: 3/5/2020		Date: 11/4/2020	
Remarks:		<input type="checkbox"/> Structure is part of QA sample set. Quality Assurance Engineer	
<p>1. As-Let plans 3240.378.7 dated 10/28/1983 were used for the rating.</p> <p>2. Based on the 12/2019 Inspection Report and 09/25/2019 Site Assessment, there is no measurable deterioration to warrant a deteriorated structure model in BrR.</p> <p>3. For all spans, the barrier load was evenly distributed to all girders.</p> <p>4. Traffic data was input into BrR using Directional % = 100% and Truck % = 12%.</p> <p>5. Asset 07934 has 4 continuous units: Unit A has 4 Spans, Unit B has 5 Spans, Unit C has 4 Spans and Unit D has 5 Spans. Units were labeled based on As-Let Plans.</p> <p>6. Sacrificial wearing surface = 0" per LRGD section 11.2.1.1.</p> <p>7. Condition factor of 1.00 was used based on the Site Assessment Report dated 09/25/2019 and 12/2019 Inspection Report.</p> <p>8. An additional 10% of self-load was applied to all steel girders to account for splice plates and transverse intermediate stiffeners as well as welds, bolts, etc.</p> <p>9. The controlling location represents the span number and controlling point (i.e. controlling location 1.X for span 1, 2.X for Span 2, etc.).</p> <p>10. As per TN01, Item #1, intermediate stiffeners that are partial height were not modeled in Unit A, B and D. Unit C generated unjustifiably low factors where shear was the controlling limit state. In this unit all intermediate stiffeners (including the stiffeners that are partial height) were modeled in attempt to avoid posting.</p>			

The ADTT value listed below is to be used to establish Legal and Permit γ_{LL} factors.							
SECTION 5A - LEGAL & PERMIT RATINGS - AASHTO Legal Trucks							
(30) ADT Year 2017	(29) ADT 2950	(109) Truck % ADT 12	ADTT (ADT x Truck % ADT) 354				
Rating Vehicle	Rating Level	Weight (Tons)	Controlling Member	Controlling Location	Controlling Limit State	Rating Factor	Rating (Tons)
Modified AASHTO SC - Type 3	Legal	25	G4	10.1	STRENGTH-I Steel Shear	1.611	40
Modified AASHTO SC - Type 3S2	Legal	36.6	G4	3.0	STRENGTH-I Steel Shear	1.240	45
AASHTO - Type 3-3	Legal	40	G4	3.0	STRENGTH-I Steel Shear	1.197	47
Lane Type Loading (Neg. M only)	Legal	40	-	-	-	-	N/A
Lane Type Loading (Span > 200 ft)	Legal	40	-	-	-	-	N/A
Modified AASHTO SC - Type 3	Permit	25	G4	10.1	STRENGTH-II Steel Shear	1.725	43
Modified AASHTO SC - Type 3S2	Permit	36.6	G4	3.0	STRENGTH-II Steel Shear	1.227	44
AASHTO - Type 3-3	Permit	40	G4	3.0	STRENGTH-II Steel Shear	1.184	47
Lane Type Loading (Neg. M only)	Permit	40	G4	3.0	STRENGTH-II Steel Shear	1.220	48
Lane Type Loading (Span > 200 ft)	Permit	40	-	-	-	-	N/A



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SECTION 5B - LEGAL RATINGS - SC Specialized Hauling Vehicles (SHV) - Legal on Non-Interstate Only (Permit on Interstate)							
Rating Vehicle	Rating Level	Weight (Tons)	Controlling Member	Controlling Location	Controlling Limit State	Rating Factor	Rating (Tons)
SC-SHV1A	Legal	32.5	G4	10.1	STRENGTH-I Steel Shear	1.202	39
SC-SHV1B	Legal	35	G4	10.1	STRENGTH-I Steel Shear	1.128	39
SC-SHV2A	Legal	33	G4	10.1	STRENGTH-I Steel Shear	1.204	39
SC-SHV2B	Legal	40	G4	10.1	STRENGTH-I Steel Shear	1.012	40
SC-SHV3A	Legal	42.5	G4	3.0	STRENGTH-I Steel Shear	1.073	45
SC-SHV3B	Legal	45	G4	3.0	STRENGTH-I Steel Shear	1.014	45

SECTION 5C - LEGAL RATINGS - Two Miscellaneous SHV & AASHTO SHV							
Rating Vehicle	Rating Level	Weight (Tons)	Controlling Member	Controlling Location	Controlling Limit State	Rating Factor	Rating (Tons)
SC Representative School Bus	Legal	17.525	G4	10.1	STRENGTH-I Steel Shear	2.281	39
SC-SU2	Legal	20	G4	10.1	STRENGTH-I Steel Shear	1.983	39
SU4	Legal	27	G4	10.1	STRENGTH-I Steel Shear	1.476	39
SU5	Legal	31	G4	10.1	STRENGTH-I Steel Shear	1.317	40
SU6	Legal	34.75	G4	10.1	STRENGTH-I Steel Shear	1.195	41
SU7	Legal	38.75	G4	10.1	STRENGTH-I Steel Shear	1.108	42

SECTION 5D - LEGAL RATINGS - Emergency Vehicles (EV)							
Rating Vehicle	Rating Level	Weight (Tons)	Controlling Member	Controlling Location	Controlling Limit State	Rating Factor	Rating (Tons)
EV2	Legal	28.75	G4	10.1	STRENGTH-I Steel Shear	1.378	39
EV3	Legal	43	G4	10.1	STRENGTH-I Steel Shear	0.933	40

SECTION 6 - PERMIT RATINGS - Specialized Hauling Vehicles (SHV), Standard Permit Vehicles & Typical Cranes							
Rating Vehicle	Rating Level	Weight (Tons)	Controlling Member	Controlling Location	Controlling Limit State	Rating Factor	Rating (Tons)
SC-SHV1A	Permit	32.5	G4	10.1	STRENGTH-II Steel Shear	1.342	43
SC-SHV1B	Permit	35	G4	10.1	STRENGTH-II Steel Shear	1.260	44
SC-SHV2A	Permit	33	G4	10.1	STRENGTH-II Steel Shear	1.344	44
SC-SHV2B	Permit	40	G4	10.1	STRENGTH-II Steel Shear	1.130	45
SC-SHV3A	Permit	42.5	G4	3.0	STRENGTH-II Steel Shear	1.149	48
SC-SHV3B	Permit	45	G4	3.0	STRENGTH-II Steel Shear	1.086	48
SC Representative School Bus	Permit	17.525	G4	10.1	STRENGTH-II Steel Shear	2.256	39
SC-SU2	Permit	20	G4	10.1	STRENGTH-II Steel Shear	2.123	42
SU4	Permit	27	G4	10.1	STRENGTH-II Steel Shear	1.649	44
SU5	Permit	31	G4	10.1	STRENGTH-II Steel Shear	1.411	43
SU6	Permit	34.75	G4	10.1	STRENGTH-II Steel Shear	1.280	44
SU7	Permit	38.75	G4	10.1	STRENGTH-II Steel Shear	1.187	45
SC - 100k	Permit	50	G4	3.0	STRENGTH-II Steel Shear	0.994	49
SC - 120k	Permit	60	G4	3.0	STRENGTH-II Steel Shear	0.823	49
SC - 130k	Permit	65	G4	3.0	STRENGTH-II Steel Shear	0.771	50
SC Crane #544726	Permit	80	G4	3.0	STRENGTH-II Steel Shear	0.668	53
SC Crane #527568	Permit	88.85	G4	3.0	STRENGTH-II Steel Shear	0.614	54

Remarks:

- All girders of this bridge are hybrid sections. Section 1.1 of 2003 AASHTO Guide for Horizontally Curved Steel Girder Highway Bridges states the following: "All components of each girder cross section shall be homogeneous with respect to steel grade". This makes it impossible to run a hybrid section using LFR methodology. For this reason, two Superstructure Definitions are created for each unit. One superstructure definition represents the hybrid section which was used to generate the LRFR rating factors, while the other represents a homogenous section with a A36 steel grade for all components, which was used to generate the LFR rating factors.
- Unit A and Unit C are supported on integral interior bents. Due to BrR limitations to model concrete bearing stiffeners, steel bearing stiffeners from the end bents were assumed at these integral bents as well. The following boundary conditions were assumed for the integral bents: Longitudinal, Transverse and Vertical Translation - fixed; Rotation along the Longitudinal and Transverse Axis – fixed; Rotation along the Vertical Axis - free.
- Also rated by LFR and results show that posting is required.