



# LRFR BRIDGE LOAD RATING SUMMARY

Version 1.0

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SECTION 1 - GENERAL BRIDGE DATA					
(8) Asset ID 04407		(27) Year Built 1964		(90) Date of Inspection 12/2019	
(9) Bridge Location 5 MI NW OF COLUMBIA		(7) Facility Carried I-26		(6) Feature Intersected/Route Crossing I-20	
(49) Length 280 ft.	(11) Milepost 107.140	(2) District 1	(3) County RICHLAND	(22) Owner SCDOT	(418) Conditions During Rating (NBI Item 58, NBI Item 59, NBI Item 60) 7, 6, 6
(43, 44, 45, & 46) Bridge Description Simple 4 Span PSG Bridge			(31) Design Load HS-20		(108) Existing Wearing Surface Type & Depth BITUMINOUS
Rating Program & Version BrR 6.8.4 - AASHTO Engine		Rating Program & Version N/A		Rating Method LRFR	AASHTO Reference MBE 3rd Edition, 2018
(58) Deck 7 Good		(59) Superstructure 6 Satisfactory		(60) Substructure 6 Satisfactory	(62) Culvert N N/A (NBI)
				(113) Scour Critical N Not Over Waterway	

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	G3&G21	1.4	SERVICE-III PS Tensile Stress	0.874
HL-93 Truck Train + Lane (90%)	Inventory	-	-	-	-
HL-93 Tandem + Lane	Inventory	G3&G21	1.4	SERVICE-III PS Tensile Stress	1.002
HL-93 Truck + Lane	Operating	G3&G21	1.1	STRENGTH-I Concrete Shear	1.321
HL-93 Truck Train + Lane (90%)	Operating	-	-	-	-
HL-93 Tandem + Lane	Operating	G3&G21	1.1	STRENGTH-I Concrete Shear	1.586

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 checked="" type="checkbox"/> As-Built Plans		
SECTION 3 - BRIDGE LOAD RATING SUMMARY					
Controlling Legal Truck	Load Posting Required? If Yes, complete Signing/Posting Form.			Controlling Legal Load Rating Factor	
EV3	No			0.705	

SECTION 4 - REMARKS & SIGN/SEAL			
Load Rating Engineer		Quality Control Engineer	
Name: Malcolm Tencate		Name: Elsa Zimmerly	
Company/Title: HDR		Company/Title: HDR	
Date: 1/22/2020		Date: 3/11/2020	
Remarks:		<input type="checkbox"/> Structure is part of QA sample set. Quality Assurance Engineer	
<ol style="list-style-type: none"> <li>As-built plans 3240.378 and As-let plans 3240.289 &amp; 3240.408 were used for the rating.</li> <li>Traffic data was input into BrR using Directional % = 55% and Truck % = 12%.</li> <li>Condition factor of 1.0 was used based on the 12/2019 Inspection Report.</li> <li>Spans 1-4 are all linked together under one superstructure definition in BrR. Results shown on the LRSF for Span 1 (i.e. Controlling Location 1.X) apply to all four spans.</li> <li>Controlling Member G4-G9 also includes G15-G20.</li> <li>A load of 0.016 ksf was applied to account for the weight of SIP forms and the extra concrete.</li> <li>Utility was estimated to be 1" diameter std. wt. steel pipe.</li> <li>Parapet and Median dead loads were distributed to the 3 adjacent girders.</li> <li>The original bridge deck is 6.5" with 3" asphalt overlay. The widening bridge decks are 7" with 3" asphalt overlay and is used in BrR for deck thickness. 0.5" Extra deck thickness for the original bridge section was input as non-composite negative dead load.</li> <li>The original structure and widening structures were assumed to act as a unit because both layers of reinforcing are shown across the interface between the original and widened deck and because there are intermediate diaphragms between the original and widened girders.</li> <li>The maximum overhangs at midspan and girder spacings were used since the variation in these widths is not significant.</li> <li>Structure is on a curved alignment with chorded girders. The bridge was modeled as a straight bridge. The bridge supports were modeled using a consistent skew of 19.72 deg. (average skew between WB &amp; EB structures).</li> <li>Based on the August 27, 2019 Site Assessment, there is no measurable deterioration to warrant a Deteriorated structure model in BrR.</li> <li>Sacrificial wearing surface = 0" per LRGD section 10.2 and 11.2.1.1.</li> </ol>			
		3/13/2020	

The ADTT value listed below is to be used to establish Legal and Permit $\gamma_{LL}$ factors.							
SECTION 5A - LEGAL & PERMIT RATINGS - AASHTO Legal Trucks							
(30) ADT Year	(29) ADT	(109) Truck % ADT	ADTT (ADT x Truck % ADT)				
2017	144900	12	17388				
Rating Vehicle	Rating Level	Weight (Tons)	Controlling Member	Controlling Location	Controlling Limit State	Rating Factor	Rating (Tons)
Modified AASHTO SC - Type 3	Legal	25	G3&G21	1.4	SERVICE-III PS Tensile Stress	1.220	30
Modified AASHTO SC - Type 3S2	Legal	36.6	G3&G21	1.4	SERVICE-III PS Tensile Stress	1.116	40
AASHTO - Type 3-3	Legal	40	G3&G21	1.4	SERVICE-III PS Tensile Stress	1.235	49
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	G3&G21	1.1	STRENGTH-II Concrete Shear	2.261	56
Modified AASHTO SC - Type 3S2	Permit	36.6	G3&G21	1.1	STRENGTH-II Concrete Shear	1.822	66
AASHTO - Type 3-3	Permit	40	G3&G21	1.1	STRENGTH-II Concrete Shear	1.979	79
Lane Type Loading (Neg. M only)	Permit	40	-	-	-	-	N/A
Lane Type Loading (Span > 200 ft)	Permit	40	-	-	-	-	N/A



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(9) Bridge Location 5 MI NW OF COLUMBIA			(7) Facility Carried I-26		(6) Feature Intersected/Route Crossing I-20	
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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	G3&G21	1.5	SERVICE-III PS Tensile Stress	0.891	28
SC-SHV1B	Legal	35	G3&G21	1.4	SERVICE-III PS Tensile Stress	0.840	29
SC-SHV2A	Legal	33	G3&G21	1.4	SERVICE-III PS Tensile Stress	0.890	29
SC-SHV2B	Legal	40	G3&G21	1.4	SERVICE-III PS Tensile Stress	0.750	30
SC-SHV3A	Legal	42.5	G3&G21	1.4	SERVICE-III PS Tensile Stress	0.933	39
SC-SHV3B	Legal	45	G3&G21	1.4	SERVICE-III PS Tensile Stress	0.883	39

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	G3&G21	1.4	SERVICE-III PS Tensile Stress	1.772	31
SC-SU2	Legal	20	G3&G21	1.4	SERVICE-III PS Tensile Stress	1.514	30
SU4	Legal	27	G3&G21	1.4	SERVICE-III PS Tensile Stress	1.099	29
SU5	Legal	31	G3&G21	1.4	SERVICE-III PS Tensile Stress	0.988	30
SU6	Legal	34.75	G3&G21	1.4	SERVICE-III PS Tensile Stress	0.895	31
SU7	Legal	38.75	G3&G21	1.5	SERVICE-III PS Tensile Stress	0.823	31

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	G3&G21	1.4	SERVICE-III PS Tensile Stress	1.052	30
EV3	Legal	43	G3&G21	1.4	SERVICE-III PS Tensile Stress	0.705	30

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	G3&G21	1.1	STRENGTH-II Concrete Shear	1.741	56
SC-SHV1B	Permit	35	G3&G21	1.1	STRENGTH-II Concrete Shear	1.638	57
SC-SHV2A	Permit	33	G3&G21	1.1	STRENGTH-II Concrete Shear	1.752	57
SC-SHV2B	Permit	40	G3&G21	1.1	STRENGTH-II Concrete Shear	1.480	59
SC-SHV3A	Permit	42.5	G3&G21	1.1	STRENGTH-II Concrete Shear	1.658	70
SC-SHV3B	Permit	45	G3&G21	1.1	STRENGTH-II Concrete Shear	1.571	70
SC Representative School Bus	Permit	17.525	G3&G21	1.1	STRENGTH-II Concrete Shear	3.118	54
SC-SU2	Permit	20	G3&G21	1.1	STRENGTH-II Concrete Shear	2.789	55
SU4	Permit	27	G3&G21	1.1	STRENGTH-II Concrete Shear	2.151	58
SU5	Permit	31	G3&G21	1.1	STRENGTH-II Concrete Shear	1.855	57
SU6	Permit	34.75	G3&G21	1.1	STRENGTH-II Concrete Shear	1.737	60
SU7	Permit	38.75	G3&G21	1.1	STRENGTH-II Concrete Shear	1.638	63
SC - 100k	Permit	50	G3&G21	1.1	STRENGTH-II Concrete Shear	1.476	73
SC - 120k	Permit	60	G3&G21	1.1	STRENGTH-II Concrete Shear	1.215	72
SC - 130k	Permit	65	G3&G21	1.1	STRENGTH-II Concrete Shear	1.179	76
SC Crane #544726	Permit	80	G3&G21	1.1	STRENGTH-II Concrete Shear	1.076	86
SC Crane #527568	Permit	88.85	G3&G21	1.1	STRENGTH-II Concrete Shear	1.057	93

## Remarks:

15. An additional 5% of self-load was applied to all steel girders to account for materials such as welds, bolts, etc.
16. Diaphragm connection plates were not modeled because plates do not meet requirements of Std Specs Section 10.34.4.6.
17. Overhead sign not shown in plans. Dimensions and location based on the August 27, 2019 Site Assessment. Load input into BrR as a point load and applied to first three girders as composite load. Assumed 20 psf of sign area for weight.
18. Also rated by LFR and results show that posting is not required.