

# LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE						SERVICE III LIMIT STATE						COMMENT NUMBER						
						MOMENT			SHEAR			MOMENT			SHEAR									
						LIVE-LOAD FACTORS (LL)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (FH)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (FH)	LIVE-LOAD FACTORS (LL)		DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (FH)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	①	1.20	--	1.75	0.909	1.81	B/C	ER	46.0	1.055	1.20	C	I	18.0	0.80	0.909	1.81	B/C	ER	46.0	1, 2, 3	
	HL-93 (OPERATING)	N/A		1.58	--	1.35	0.909	2.35	B/C	ER	46.0	1.055	1.58	C	I	18.0	N/A	--	--	--	--	--	1, 2, 3	
	HS-20 (INVENTORY)	36.000	②	1.61	58.0	1.75	0.909	2.48	B/C	ER	46.0	1.055	1.61	C	I	18.0	0.80	0.909	2.48	B/C	ER	46.0	1, 2, 3	
	HS-20 (OPERATING)	36.000		2.11	76.0	1.35	0.909	3.22	B/C	ER	46.0	1.055	2.11	C	I	18.0	N/A	--	--	--	--	--	1, 2, 3	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		5.42	73.2	1.40	0.909	7.29	B/C	ER	46.0	1.055	5.42	C	I	18.0	0.80	0.909	5.81	B/C	ER	46.0	1, 2, 3
		SNGARBS2	20.000		3.78	75.6	1.40	0.909	5.31	B/C	ER	46.0	1.055	3.78	C	I	18.0	0.80	0.909	4.23	B/C	ER	46.0	1, 2, 3
		SNAGRIS2	22.000		3.48	76.6	1.40	0.909	4.98	B/C	ER	46.0	1.055	3.48	C	I	18.0	0.80	0.909	3.97	B/C	ER	46.0	1, 2, 3
		SNCOTTS3	27.250		2.62	71.4	1.40	0.909	3.62	B/C	ER	46.0	1.055	2.62	C	I	18.0	0.80	0.909	2.89	B/C	ER	46.0	1, 2, 3
		SNAGRS4	34.925		2.06	71.9	1.40	0.909	2.98	B/C	ER	46.0	1.055	2.06	C	I	18.0	0.80	0.909	2.38	B/C	ER	46.0	1, 2, 3
		SNS5A	35.550		2.07	73.6	1.40	0.909	2.92	B/C	ER	46.0	1.055	2.07	C	I	18.0	0.80	0.909	2.33	B/C	ER	46.0	1, 2, 3
		SNS6A	39.950		1.87	74.7	1.40	0.909	2.66	B/C	ER	46.0	1.055	1.87	C	I	18.0	0.80	0.909	2.12	B/C	ER	46.0	1, 2, 3
	SNS7B	42.000		1.82	76.4	1.40	0.909	2.53	B/C	ER	46.0	1.055	1.82	C	I	18.0	0.80	0.909	2.02	B/C	ER	46.0	1, 2, 3	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.22	73.3	1.40	0.909	3.24	B/C	ER	46.0	1.055	2.22	C	I	18.0	0.80	0.909	2.58	B/C	ER	46.0	1, 2, 3
		TNT4A	33.075		2.33	77.1	1.40	0.909	3.24	B/C	ER	46.0	1.055	2.33	C	I	18.0	0.80	0.909	2.59	B/C	ER	46.0	1, 2, 3
		TNT6A	41.600		1.91	79.5	1.40	0.909	2.63	B/C	ER	46.0	1.055	1.91	C	I	18.0	0.80	0.909	2.10	B/C	ER	46.0	1, 2, 3
		TNT7A	42.000		1.88	79.0	1.40	0.909	2.64	B/C	ER	46.0	1.055	1.88	C	I	18.0	0.80	0.909	2.10	B/C	ER	46.0	1, 2, 3
		TNT7B	42.000		1.79	75.2	1.40	0.909	2.71	B/C	ER	46.0	1.055	1.79	C	I	18.0	0.80	0.909	2.16	B/C	ER	46.0	1, 2, 3
		TNAGRIT4	43.000		1.76	75.7	1.40	0.909	2.59	B/C	ER	46.0	1.055	1.76	C	I	18.0	0.80	0.909	2.07	B/C	ER	46.0	1, 2, 3
TNAGT5A		45.000		1.68	75.6	1.40	0.909	2.45	B/C	ER	46.0	1.055	1.68	C	I	18.0	0.80	0.909	1.96	B/C	ER	46.0	1, 2, 3	
TNAGT5B	45.000		③	1.65	74.3	1.40	0.909	2.43	B/C	ER	46.0	1.055	1.65	C	I	18.0	0.80	0.909	1.94	B/C	ER	46.0	1, 2, 3	

### LOAD FACTORS:

DESIGN LOAD RATING FACTORS	LIMIT STATE	$\gamma_{DC}$	$\gamma_{DW}$
	STRENGTH I	1.25	1.50
	SERVICE III	1.00	1.00

### NOTES:

MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.

ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.

### COMMENTS:

- GIRDERS DESIGNED AS SIMPLE SPANS FOR FLEXURE, GIRDERS DESIGNED AS SIMPLE-MADE-CONTINUOUS (FOR LIVE LOAD AND SUPERIMPOSED DEAD LOAD) FOR SHEAR.
- 3/2" AVERAGE HAUNCH ASSUMED FOR ALL SPANS. HAUNCH CONCRETE IS NOT INCLUDED IN SECTION PROPERTIES.
- $E_c$ , GIRDER = 5,909 Ksi (FINAL, ALL SPANS)  
 $E_c$ , DECK = 3,834 Ksi  
 $E_{ps}$  = 28,500 Ksi

# CONTROLLING LOAD RATING

① DESIGN LOAD RATING (HL-93)

② DESIGN LOAD RATING (HS-20)

③ LEGAL LOAD RATING \*\*

\*\* SEE CHART FOR VEHICLE TYPE

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GIRDER LOCATION

I - INTERIOR GIRDER  
EL - EXTERIOR LEFT GIRDER  
ER - EXTERIOR RIGHT GIRDER

		CL BRG.	0.1L	0.2L	0.3L	0.4L	0.5L	0.6L	0.7L	0.8L	0.9L	CL BRG.
INTERIOR GIRDER (I)	$\phi V_n$ (KIPS)	789	402	318	323	332	320	337	332	332	409	977
	$\phi M_n$ (KIP-FT)	--	8843	10112	10445	10778	10932	10778	10445	10112	8843	--
EXTERIOR GIRDER (EL, ER)	$\phi V_n$ (KIPS)	788	401	317	321	330	318	336	331	334	411	976
	$\phi M_n$ (KIP-FT)	--	8766	9968	10301	10634	10788	10634	10301	9968	8766	--

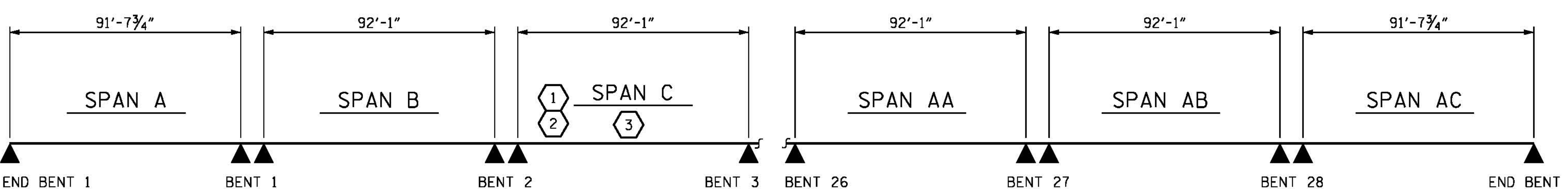
		CL BRG.	0.1L	0.2L	0.3L	0.4L	0.5L	0.6L	0.7L	0.8L	0.9L	CL BRG.
INTERIOR GIRDER (I)	$\phi V_n$ (KIPS)	976	410	333	334	341	325	341	334	333	410	976
	$\phi M_n$ (KIP-FT)	--	8860	10112	10445	10778	10932	10778	10445	10112	8860	--
EXTERIOR GIRDER (EL, ER)	$\phi V_n$ (KIPS)	975	412	334	334	340	324	340	334	335	412	975
	$\phi M_n$ (KIP-FT)	--	8783	9968	10301	10634	10789	10634	10301	9968	8783	--

		CL BRG.	0.1L	0.2L	0.3L	0.4L	0.5L	0.6L	0.7L	0.8L	0.9L	CL BRG.
INTERIOR GIRDER (I)	$\phi V_n$ (KIPS)	1007	408	331	331	336	318	335	322	318	401	814
	$\phi M_n$ (KIP-FT)	--	8860	10112	10445	10778	10932	10778	10445	10112	8860	--
EXTERIOR GIRDER (EL, ER)	$\phi V_n$ (KIPS)	1007	411	332	330	334	316	333	334	316	400	814
	$\phi M_n$ (KIP-FT)	--	8783	9968	10301	10634	10789	10634	10301	9968	8783	--

### SECTION DATA (ALL SPANS):

INTERIOR COMPOSITE  $I_{xx}$  = 727,479 IN<sup>4</sup>  
 INTERIOR COMPOSITE  $y_b$  = 41.97 IN.  
 EXTERIOR COMPOSITE  $I_{xx}$  = 679,470 IN<sup>4</sup>  
 EXTERIOR COMPOSITE  $y_b$  = 40.21 IN.  
 COMPOSITE SECTION PROPERTIES ARE TRANSFORMED TO EQUIVALENT GIRDER CONCRETE USING  $E_c$  = 5909 KSI  
 STRAND AREA NOT INCLUDED IN SECTION PROPERTIES.  
 $y_b$  MEASURED FROM BOTTOM OF GIRDER

PROJECT NO. B-4929  
PENDER COUNTY  
 STATION: 38+13.81 -L2-



## LRFR SUMMARY

DESIGNED BY: J. BORUTA DATE: JAN 2016  
 DRAWN BY: M. HOBBS DATE: JAN 2016  
 CHECKED BY: M. WAGNER DATE: FEB 2016  
 DESIGN ENGINEER OF RECORD: J. DOUGHTY DATE: MAY 2016

DRAWN BY: MAA 1/08  
 CHECKED BY: GM/DI 2/08  
 REV. 11/12/OBRR MAA/GM  
 REV. 10/11 MAA/GM

**PARSONS BRINCKERHOFF**  
 434 FAYETTEVILLE STREET  
 SUITE 1500  
 RALEIGH, NC 27601  
 LICENSE NO. F-0165

DocuSigned by:  
 Jason R. Doughty  
 5/12/16  
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STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

STANDARD  
 LRFR SUMMARY FOR  
 PRESTRESSED  
 CONCRETE GIRDERS  
 AASHTO TYPE IV GIRDERS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-28
1			3			TOTAL SHEETS 278
2			4			

**DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED**