

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER		
						LIVE-LOAD FACTORS (γ _{L1})	MOMENT				SHEAR					
							RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (FT)	RATING FACTOR	BOX NO.	ELEMENT TYPE		DISTANCE FROM LEFT END OF ELEMENT (FT)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	①	1.99	--	1.75	3.83	1	EXTERIOR WALL	5.00	1.99	1	EXTERIOR WALL	9.17		
	HL-93 (OPERATING)	N/A		2.59	--	1.35	4.96	1	EXTERIOR WALL	5.00	2.59	1	EXTERIOR WALL	9.17		
	HS-20 (INVENTORY)	36,000	②	1.99	71.81	1.75	3.83	1	EXTERIOR WALL	5.00	1.99	1	EXTERIOR WALL	9.17		
	HS-20 (OPERATING)	36,000		2.59	93.08	1.35	4.96	1	EXTERIOR WALL	5.00	2.59	1	EXTERIOR WALL	9.17		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH		2.68	36.18	1.40	5.49	1	EXTERIOR WALL	5.00	2.68	1	EXTERIOR WALL	9.17		
		SNGARBS2	20,000		2.61	52.20	1.40	5.27	1	EXTERIOR WALL	5.00	2.61	1	EXTERIOR WALL	9.17	
		SNAGRIS2	22,000		2.59	56.89	1.40	5.23	1	EXTERIOR WALL	5.00	2.59	1	EXTERIOR WALL	9.17	
		SNCOTTS3	27,250		2.60	70.73	1.40	4.88	1	EXTERIOR WALL	5.00	2.60	1	EXTERIOR WALL	9.17	
		SNAGGRS4	34,925		2.50	87.41	1.40	4.77	1	EXTERIOR WALL	5.00	2.50	1	EXTERIOR WALL	9.17	
		SNS5A	35,550		2.53	89.78	1.40	4.77	1	EXTERIOR WALL	5.00	2.53	1	EXTERIOR WALL	9.17	
		SNS6A	39,950		2.52	100.71	1.40	4.75	1	EXTERIOR WALL	5.00	2.52	1	EXTERIOR WALL	9.17	
		SNS7B	42,000		2.52	105.69	1.40	4.68	1	EXTERIOR WALL	5.00	2.52	1	EXTERIOR WALL	9.17	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33,000		2.52	83.19	1.40	4.89	1	EXTERIOR WALL	5.00	2.52	1	EXTERIOR WALL	9.17	
		TNT4A	33,075		2.55	84.29	1.40	4.88	1	EXTERIOR WALL	5.00	2.55	1	EXTERIOR WALL	9.17	
		TNT6A	41,600		2.52	104.87	1.40	4.75	1	EXTERIOR WALL	5.00	2.52	1	EXTERIOR WALL	9.17	
		TNT7A	42,000		2.51	105.31	1.40	4.67	1	EXTERIOR WALL	5.00	2.51	1	EXTERIOR WALL	9.17	
		TNT7B	42,000		2.52	105.69	1.40	4.71	1	EXTERIOR WALL	5.00	2.52	1	EXTERIOR WALL	9.17	
		TNAGRIT4	43,000		2.47	106.29	1.40	4.68	1	EXTERIOR WALL	5.00	2.47	1	EXTERIOR WALL	9.17	
	TNAGT5A	45,000		2.46	110.65	1.40	4.60	1	EXTERIOR WALL	5.00	2.46	1	EXTERIOR WALL	9.17		
	TNAGT5B	45,000	③	2.44	109.88	1.40	4.55	1	EXTERIOR WALL	5.00	2.44	1	EXTERIOR WALL	9.17		

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

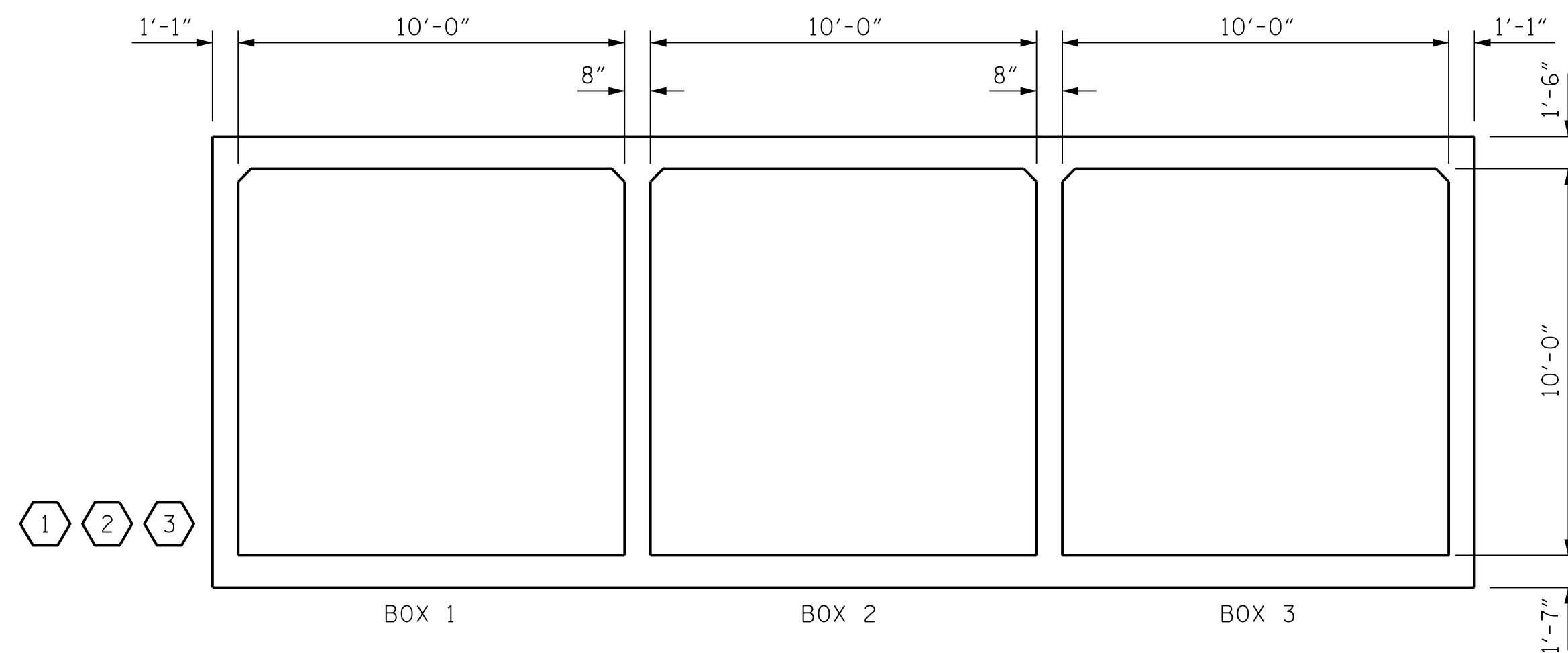
LOAD TYPE	MAX FACTOR	MIN FACTOR
DC	1.25	0.90
DW	1.50	0.65
EV	1.30	0.90
EH	1.35	0.50
ES	1.35	0.90
LS	1.75	--
WA	1.00	--

NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

DISTANCE ALONG EXTERIOR WALL MEASURED FROM BOTTOM OF TOP SLAB.

#	CONTROLLING LOAD RATING
①	DESIGN LOAD RATING (HL-93)
②	DESIGN LOAD RATING (HS-20)
③	LEGAL LOAD RATING **
	** SEE CHART FOR VEHICLE TYPE



LRFR SUMMARY
(LOOKING DOWNSTREAM)

PROJECT NO. R-2233BB
RUTHERFORD COUNTY
 STATION: 874+45.00 -L3-

SHEET 5 OF 5

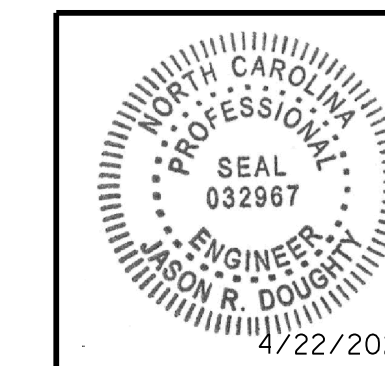
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD
**LRFR SUMMARY FOR
 REINFORCED CONCRETE
 BOX CULVERTS**
 (NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-5
1			3			TOTAL SHEETS
2			4			5



333 FAYETTEVILLE STREET, SUITE 500
 RALEIGH, NC 27601
 NC LICENSE NO. C-2979

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



DocuSigned by:
Jason R. Doughty
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DESIGNED BY: J. BORUTA DATE: MAY 2019
 DRAWN BY: K. WHITE DATE: MAY 2019
 CHECKED BY: B. LOFLIN DATE: AUG 2019
 DESIGN ENGINEER OF RECORD: J. DOUGHTY DATE: NOV 2019