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 × RF	STRENGTH I LIMIT STATE									COMMENT NUMBER
							LIVE-LOAD FACTORS $\gamma_{(LL)}$	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	1.39	--	1.75	**1.39**	1	TOP SLAB	**4.96**	1.48	1	TOP SLAB	10.57	
		HL-93 (OPERATING)	N/A		1.80	--	1.35	1.80	1	TOP SLAB	4.96	1.92	1	TOP SLAB	10.57	
		HS-20 (INVENTORY)	36.000	2	1.49	53.63	1.75	**1.49**	1	TOP SLAB	**11.08**	1.59	1	BOTTOM SLAB	10.55	
		HS-20 (OPERATING)	36.000		1.93	69.52	1.35	1.93	1	TOP SLAB	11.08	2.07	1	BOTTOM SLAB	10.55	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.66	49.38	1.40	3.66	1	TOP SLAB	4.96	3.77	1	TOP SLAB	10.57	
		SNGARBS2	20.000		2.98	59.64	1.40	2.98	1	TOP SLAB	11.08	3.15	1	BOTTOM SLAB	10.55	
		SNAGRIS2	22.000		2.71	59.57	1.40	2.71	1	TOP SLAB	11.08	2.90	1	BOTTOM SLAB	10.55	
		SNCOTTS3	27.250		1.73	47.18	1.40	1.73	1	TOP SLAB	4.96	1.84	1	TOP SLAB	10.57	
		SNAGGRS4	34.925		1.83	64.08	1.40	1.83	1	TOP SLAB	4.96	1.90	1	BOTTOM SLAB	10.55	
		SNS5A	35.550		1.82	64.59	1.40	1.82	1	TOP SLAB	4.96	1.82	1	TOP SLAB	10.57	
		SNS6A	39.950		1.77	70.52	1.40	1.77	1	TOP SLAB	11.08	1.80	1	BOTTOM SLAB	10.55	
		SNS7B	42.000		1.71	71.68	1.40	1.71	1	BOTTOM SLAB	11.38	1.72	1	BOTTOM SLAB	10.55	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.14	70.70	1.40	2.14	1	TOP SLAB	11.08	2.18	1	BOTTOM SLAB	10.55	
		TNT4A	33.075		2.06	68.16	1.40	2.06	1	TOP SLAB	4.96	2.17	1	TOP SLAB	10.57	
		TNT6A	41.600		1.87	77.75	1.40	1.87	1	TOP SLAB	11.08	1.87	1	TOP SLAB	10.57	
		TNT7A	42.000		1.89	79.55	1.40	1.89	1	TOP SLAB	11.08	1.91	1	BOTTOM SLAB	10.55	
		TNT7B	42.000		1.87	78.63	1.40	1.87	1	TOP SLAB	4.96	2.00	1	TOP SLAB	10.57	
		TNAGRIT4	43.000		1.75	75.43	1.40	1.75	1	BOTTOM SLAB	11.38	1.79	1	BOTTOM SLAB	10.55	
		TNAGT5A	45.000		1.67	75.26	1.40	1.67	1	BOTTOM SLAB	11.38	1.69	1	BOTTOM SLAB	10.55	
		TNAGT5B	45.000	3	1.55	69.93	1.40	**1.55**	1	TOP SLAB	**11.08**	1.59	1	BOTTOM SLAB	10.55	

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	0.90
ES	1.35	0.90
LS	1.75	--
WA	1.00	--

NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

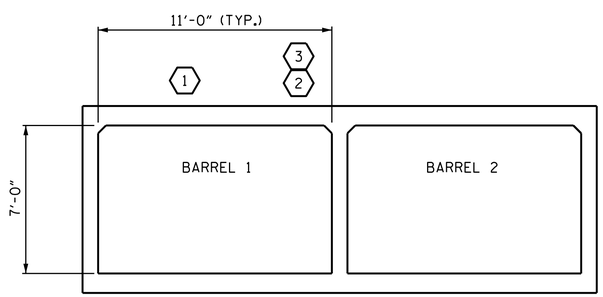
(#) CONTROLLING LOAD RATING

(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)

NORTH CAROLINA PROFESSIONAL SEAL 21545 ENGINEER STEVEN L. WANCE

9/29/2014

DocuSigned by: Steve L. Wance 986CB74EEDF1402...

PROJECT NO. R-0623

MONTGOMERY COUNTY

STATION: 283+62.00 -L-

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:	C-29
1			3			TOTAL SHEETS
2			4			29

ASSEMBLED BY : S. WANCE DATE : 12/12
CHECKED BY : F. LEA DATE : 12/12
DRAWN BY : WMC 7/11
CHECKED BY : GM 7/11
REV. 10/1/11 MAA/GM

29-SEP-2014 11:37
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tfang

CULVERT #5

STD. NO. LRFR5