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

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	1.70	--	1.75	2.11	1	TOP SLAB	12.03	**1.70**	1	BOTTOM SLAB	**11.31**	
		HL-93 (OPERATING)	N/A		2.21	--	1.35	2.73	1	TOP SLAB	12.03	2.21	1	BOTTOM SLAB	11.31	
		HS-20 (INVENTORY)	36.000	2	1.70	61.26	1.75	2.11	1	TOP SLAB	12.03	**1.70**	1	BOTTOM SLAB	**11.31**	
		HS-20 (OPERATING)	36.000		2.21	79.42	1.35	2.73	1	TOP SLAB	12.03	2.21	1	BOTTOM SLAB	11.31	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.26	43.98	1.40	4.34	1	TOP CNR WALL	0.94	3.26	1	EXTERIOR WALL	8.21	
		SNGARBS2	20.000		3.26	65.15	1.40	4.10	1	TOP SLAB	12.03	3.26	1	EXTERIOR WALL	8.21	
		SNAGRIS2	22.000		3.11	68.41	1.40	3.84	1	TOP SLAB	12.03	3.11	1	BOTTOM SLAB	11.31	
		SNCOTTS3	27.250		2.19	59.55	1.40	2.63	1	TOP SLAB	12.03	2.19	1	BOTTOM SLAB	11.31	
		SNAGGRS4	34.925		1.87	65.41	1.40	2.29	1	TOP SLAB	12.03	1.87	1	BOTTOM SLAB	11.31	
		SNS5A	35.550		1.81	64.23	1.40	2.17	1	TOP SLAB	12.03	1.81	1	BOTTOM SLAB	11.31	
		SNS6A	39.950		1.71	68.17	1.40	2.07	1	TOP SLAB	12.03	1.71	1	BOTTOM SLAB	11.31	
		SNS7B	42.000		1.67	70.09	1.40	2.05	1	TOP SLAB	12.03	1.67	1	BOTTOM SLAB	11.31	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.16	71.16	1.40	2.48	1	TOP SLAB	12.03	2.16	1	BOTTOM SLAB	11.31	
		TNT4A	33.075		2.18	82.25	1.40	2.62	1	TOP SLAB	12.03	2.18	1	BOTTOM SLAB	11.31	
		TNT6A	41.600		1.87	77.99	1.40	2.32	1	TOP SLAB	12.03	1.87	1	BOTTOM SLAB	11.31	
		TNT7A	42.000		1.81	75.98	1.40	2.36	1	TOP SLAB	12.03	1.81	1	BOTTOM SLAB	11.31	
		TNT7B	42.000		1.96	82.41	1.40	2.40	1	TOP SLAB	12.03	1.96	1	BOTTOM SLAB	11.31	
		TNAGRIT4	43.000		1.71	73.33	1.40	2.05	1	TOP SLAB	12.03	1.71	1	BOTTOM SLAB	11.31	
		TNAGT5A	45.000		1.69	75.93	1.40	2.13	1	TOP SLAB	12.03	1.69	1	BOTTOM SLAB	11.31	
		TNAGT5B	45.000	3	1.57	70.61	1.40	1.97	1	TOP SLAB	12.03	**1.57**	1	BOTTOM SLAB	**11.31**	

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.

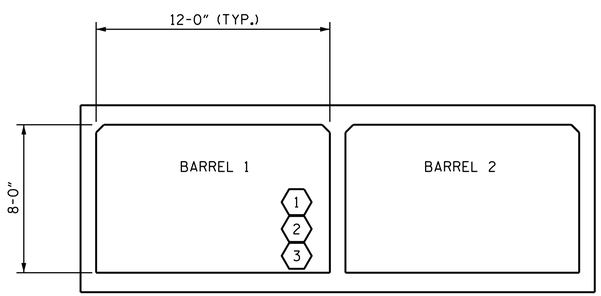
(#) CONTROLLING LOAD RATING

(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)

PROJECT NO. R-0623

MONTEGOMERY COUNTY

STATION: 204+38.00 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS
(NON-INTERSTATE TRAFFIC)

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING-HSIUNG FANG

9/29/2014

DocuSigned by: Ting H. Fang E72088400977435...

REVISIONS						
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			
2			4			

SHEET NO. C-24

TOTAL SHEETS 29

CULVERT #4

STD. NO. LRFR5

ASSEMBLED BY : T. KIRSCHBAUM DATE : 2/25/13
CHECKED BY : E. OMILE DATE : 2/26/13
DRAWN BY : WMC 7/11
CHECKED BY : GM 7/11
REV. 10/1/11 MAA/GM

29-SEP-2014 11:36
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tfang