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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	1.38	--	1.75	1.38	1	TOP SLAB	4.50	2.32	1	TOP SLAB	9.00	
		HL-93 (OPERATING)	N/A		1.78	--	1.35	1.78	1	TOP SLAB	4.50	3.00	1	TOP SLAB	9.00	
		HS-20 (INVENTORY)	36.000	2	1.38	49.68	1.75	1.38	1	TOP SLAB	4.50	2.32	1	TOP SLAB	9.00	
		HS-20 (OPERATING)	36.000		1.78	64.08	1.35	1.78	1	TOP SLAB	4.50	3.00	1	TOP SLAB	9.00	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.50	33.75	1.40	2.50	1	TOP SLAB	4.50	4.80	1	TOP SLAB	9.00	
		SNGARBS2	20.000		2.34	46.80	1.40	2.34	1	TOP SLAB	4.50	4.38	1	TOP SLAB	9.00	
		SNAGRIS2	22.000		2.50	55.00	1.40	2.50	1	TOP SLAB	4.50	4.70	1	TOP SLAB	9.00	
		SNCOTTS3	27.250	3	1.92	52.32	1.40	1.92	1	TOP SLAB	4.50	2.40	1	TOP SLAB	9.00	
		SNAGGRS4	34.925		2.31	80.68	1.40	2.31	1	TOP SLAB	4.50	3.10	1	TOP SLAB	9.00	
		SNS5A	35.550		2.18	77.50	1.40	2.18	1	TOP SLAB	4.50	2.85	1	TOP SLAB	9.00	
		SNS6A	39.950		2.14	85.49	1.40	2.14	1	TOP SLAB	4.50	2.77	1	TOP SLAB	9.00	
		SNS7B	42.000		2.16	90.72	1.40	2.16	1	TOP SLAB	4.50	2.77	1	TOP SLAB	9.00	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.41	79.53	1.40	2.41	1	TOP SLAB	4.50	4.00	1	BOTTOM SLAB	9.00	
		TNT4A	33.075		2.24	74.09	1.40	2.24	1	TOP SLAB	4.50	2.84	1	TOP SLAB	9.00	
		TNT6A	41.600		2.19	91.10	1.40	2.19	1	TOP SLAB	4.50	2.80	1	TOP SLAB	9.00	
		TNT7A	42.000		2.16	90.72	1.40	2.16	1	TOP SLAB	4.50	2.83	1	TOP SLAB	9.00	
		TNT7B	42.000		2.11	88.62	1.40	2.11	1	TOP SLAB	4.50	2.82	1	TOP SLAB	9.00	
		TNAGRIT4	43.000		2.19	94.17	1.40	2.19	1	TOP SLAB	4.50	2.70	1	TOP SLAB	9.00	
		TNAGT5A	45.000		2.27	102.15	1.40	2.27	1	TOP SLAB	4.50	2.70	1	TOP SLAB	9.00	
		TNAGT5B	45.000		2.24	100.80	1.40	2.24	1	TOP SLAB	4.50	2.63	1	TOP SLAB	9.00	

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.

THE LIVE LOAD RATING FOR VEHICLES ON -Y1- AND -Y1RPD- WERE COMPUTED WITH A DESIGN FILL DEPTH OF 23.8 FT.

THE LIVE LOAD RATING FOR VEHICLES ON -SR1- WAS COMPUTED WITH A DESIGN FILL DEPTH OF 1.8 FT.

COMMENTS:

1. VERTICAL ELEMENTS ARE REFERENCED STARTING AT THE BOTTOM.

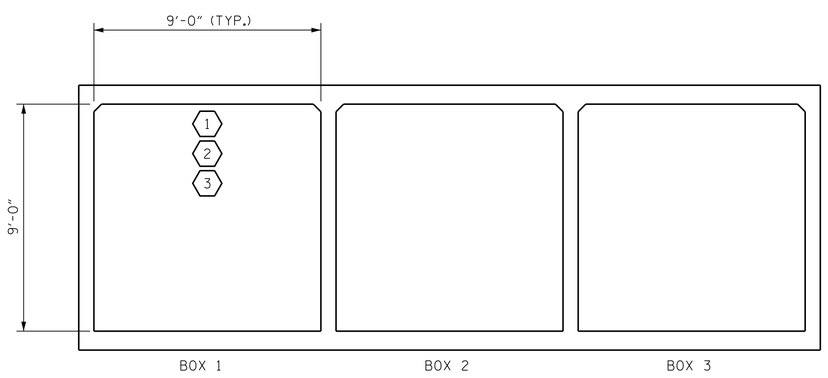
(#) CONTROLLING LOAD RATING

(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. W-5107
JOHNSTON COUNTY
STATION: 24+31.50 -Y1-

SHEET 8 OF 9

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

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

NORTH CAROLINA PROFESSIONAL SEAL 027799 ENGINEER PAUL A. de PAOLI
11/20/2014

MI ENGINEERING
1011 SCHAUB DRIVE, SUITE 100
RALEIGH, NC 27606
(919) 851-6606
FIRM PE NUMBER : P-0671

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-15
1			3			TOTAL SHEETS
2			4			36

ASSEMBLED BY: J.S. ISRAELNAIM DATE: 05/14
CHECKED BY : P.A. de PAOLI DATE: 06/14
DESIGN ENGINEER OF RECORD: P.A. de PAOLI DATE: 06/14
DRAWN BY : WMC 7/11
CHECKED BY : GM 7/11
REV. 10/1/11 MMA/GM

11/20/2014
10:13:33 AM
User:blanning
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