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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 (γ_{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	1.69	--	1.75	2.13	1	EXTERIOR WALL	8.00	1.69	1	TOP SLAB	10.00	
		HL-93 (OPERATING)	N/A		2.20	--	1.35	2.77	1	EXTERIOR WALL	8.00	2.20	1	TOP SLAB	10.00	
		HS-20 (INVENTORY)	36.000	2	1.69	60.84	1.75	2.13	1	EXTERIOR WALL	8.00	1.69	1	TOP SLAB	10.00	
		HS-20 (OPERATING)	36.000		2.20	79.20	1.35	2.77	1	EXTERIOR WALL	8.00	2.20	1	TOP SLAB	10.00	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.37	32.00	1.40	2.56	1	EXTERIOR WALL	8.00	2.37	1	TOP SLAB	10.00	
		SNGARBS2	20.000		2.09	41.80	1.40	2.43	1	EXTERIOR WALL	8.00	2.09	1	TOP SLAB	10.00	
		SNAGRIS2	22.000		2.15	47.30	1.40	2.56	1	EXTERIOR WALL	8.00	2.15	1	TOP SLAB	10.00	
		SNCOTTS3	27.250		1.09	29.70	1.40	1.32	1	EXTERIOR WALL	8.00	1.09	1	TOP SLAB	10.00	
		SNAGGRS4	34.925		1.12	39.12	1.40	1.40	1	EXTERIOR WALL	8.00	1.12	1	TOP SLAB	10.00	
		SNS5A	35.550		1.09	38.75	1.40	1.33	1	EXTERIOR WALL	8.00	1.09	1	TOP SLAB	10.00	
		SNS6A	39.950		1.07	42.75	1.40	1.32	1	EXTERIOR WALL	8.00	1.07	1	TOP SLAB	10.00	
		SNS7B	42.000	3	1.06	44.52	1.40	1.32	1	EXTERIOR WALL	8.00	1.06	1	TOP SLAB	10.00	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.56	51.48	1.40	2.04	1	EXTERIOR WALL	8.00	1.56	1	TOP SLAB	10.00	
		TNT4A	33.075		1.25	41.34	1.40	1.54	1	EXTERIOR WALL	8.00	1.25	1	TOP SLAB	10.00	
		TNT6A	41.600		1.15	47.84	1.40	1.42	1	EXTERIOR WALL	8.00	1.15	1	TOP SLAB	10.00	
		TNT7A	42.000		1.21	50.82	1.40	1.48	1	EXTERIOR WALL	8.00	1.21	1	TOP SLAB	10.00	
		TNT7B	42.000		1.13	47.46	1.40	1.40	1	EXTERIOR WALL	8.00	1.13	1	TOP SLAB	10.00	
		TNAGRIT4	43.000		1.21	52.03	1.40	1.54	1	EXTERIOR WALL	8.00	1.21	1	TOP SLAB	10.00	
		TNAGT5A	45.000		1.22	54.90	1.40	1.54	1	EXTERIOR WALL	8.00	1.22	1	TOP SLAB	10.00	
		TNAGT5B	45.000		1.16	52.20	1.40	1.54	1	EXTERIOR WALL	8.00	1.16	1	TOP SLAB	10.00	

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.

COMMENTS:

1. VERTICAL ELEMENTS ARE REFERENCED STARTING AT THE BOTTOM.
2. THIS LOAD RATING IS FOR THE CULVERT EXTENSION ONLY.

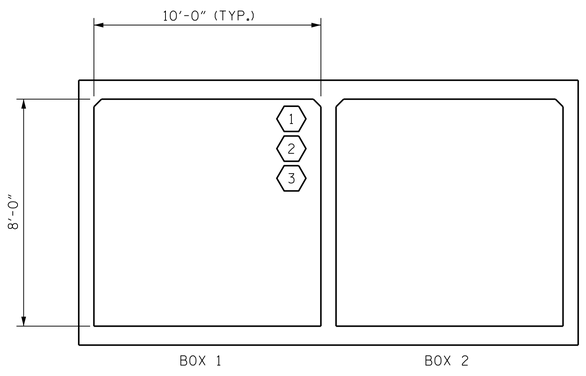
(#) CONTROLLING LOAD RATING

(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: 26+51.38 -L-

SHEET 7 OF 7

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-7
1			3			TOTAL SHEETS
2			4			36

ASSEMBLED BY: J.S. ISRAELNAIM DATE: 07/14
CHECKED BY : P.A. de PAOLI DATE: 07/14
DESIGN ENGINEER OF RECORD: P.A. de PAOLI DATE: 07/14
DRAWN BY : WMC 7/11
CHECKED BY : GM 7/11
REV. 10/1/11 MAA/GM

11/19/2014
4:55:49 PM
User: blanning
Filename: P:\NC Bridges\MI2005 - W-5107 Johnston Co\MI2005.03.Culvert 1.Ext.Bawdy Creek at US 70 Byp\Structures\410.035.C01.W5107.SMU.CU7.dgn