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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	7.01	--	1.75	7.01	1	EXTERIOR WALL	0.00	99.0	1	EXTERIOR WALL	9.00	
		HL-93 (OPERATING)	N/A		9.09	--	1.35	9.09	1	EXTERIOR WALL	0.00	99.0	1	EXTERIOR WALL	9.00	
		HS-20 (INVENTORY)	36.000	2	7.01	252.36	1.75	7.01	1	EXTERIOR WALL	0.00	99.0	1	EXTERIOR WALL	9.00	
		HS-20 (OPERATING)	36.000		9.09	327.24	1.35	9.09	1	EXTERIOR WALL	0.00	99.0	1	EXTERIOR WALL	9.00	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500	3	3.92	52.92	1.40	8.76	1	EXTERIOR WALL	0.00	3.92	1	EXTERIOR WALL	9.00	
		SNGARBS2	20.000		3.92	78.40	1.40	8.76	1	EXTERIOR WALL	0.00	3.92	1	EXTERIOR WALL	9.00	
		SNAGRIS2	22.000		3.92	86.24	1.40	8.76	1	EXTERIOR WALL	0.00	3.92	1	EXTERIOR WALL	9.00	
		SNCOTTS3	27.250		3.92	106.82	1.40	8.76	1	EXTERIOR WALL	0.00	3.92	1	EXTERIOR WALL	9.00	
		SNAGGRS4	34.925		3.92	136.91	1.40	8.76	1	EXTERIOR WALL	0.00	3.92	1	EXTERIOR WALL	9.00	
		SNS5A	35.550		3.92	139.36	1.40	8.76	1	EXTERIOR WALL	0.00	3.92	1	EXTERIOR WALL	9.00	
		SNS6A	39.950		3.92	156.60	1.40	8.76	1	EXTERIOR WALL	0.00	3.92	1	EXTERIOR WALL	9.00	
		SNS7B	42.000		3.92	164.64	1.40	8.76	1	EXTERIOR WALL	0.00	3.92	1	EXTERIOR WALL	9.00	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		3.92	129.36	1.40	8.76	1	EXTERIOR WALL	0.00	3.92	1	EXTERIOR WALL	9.00	
		TNT4A	33.075		3.92	129.65	1.40	8.76	1	EXTERIOR WALL	0.00	3.92	1	EXTERIOR WALL	9.00	
		TNT6A	41.600		3.92	163.07	1.40	8.76	1	EXTERIOR WALL	0.00	3.92	1	EXTERIOR WALL	9.00	
		TNT7A	42.000		3.92	164.64	1.40	8.76	1	EXTERIOR WALL	0.00	3.92	1	EXTERIOR WALL	9.00	
		TNT7B	42.000		3.92	164.64	1.40	8.76	1	EXTERIOR WALL	0.00	3.92	1	EXTERIOR WALL	9.00	
		TNAGRIT4	43.000		3.92	168.56	1.40	8.76	1	EXTERIOR WALL	0.00	3.92	1	EXTERIOR WALL	9.00	
		TNAGT5A	45.000		3.92	176.40	1.40	8.76	1	EXTERIOR WALL	0.00	3.92	1	EXTERIOR WALL	9.00	
		TNAGT5B	45.000		3.92	176.40	1.40	8.76	1	EXTERIOR WALL	0.00	3.92	1	EXTERIOR WALL	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.

COMMENTS:

1. VERTICAL ELEMENTS ARE REFERENCED STARTING AT THE BOTTOM.
2.
3.
4.

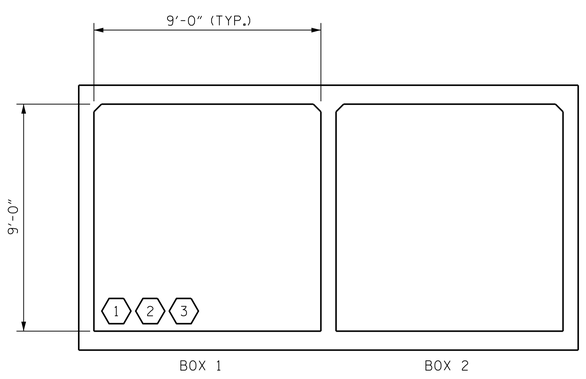
(#) CONTROLLING LOAD RATING

(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+21.25 -Y6-

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-30
1			3			TOTAL SHEETS
2			4			36

ASSEMBLED BY: J.S. ISRAELNAIM DATE: 03/14
CHECKED BY : P.A. de PAOLI DATE: 03/14
DESIGN ENGINEER OF RECORD: P.A. de PAOLI DATE: 03/14
DRAWN BY : WMC 7/11
CHECKED BY : GM 7/11
REV. 10/1/11 MAA/GM

11/20/2014
10:24:58 AM
User:blanning
Filename: P:\NC Bridges\MI2005 - W-5107 Johnston Co\MI2005_06_Culvert 4_New_Quincosin Swamp at -Y6-\Structures\413_035_C04_W5107_SMU_CU7.dgn