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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 x RF	STRENGTH I LIMIT STATE: LIVE-LOAD FACTORS (γ_{LL})	MOMENT: RATING FACTOR	MOMENT: BOX NO.	MOMENT: ELEMENT TYPE	MOMENT: DISTANCE FROM LEFT END OF ELEMENT (ft)	SHEAR: RATING FACTOR	SHEAR: BOX NO.	SHEAR: ELEMENT TYPE	SHEAR: DISTANCE FROM LEFT END OF ELEMENT (ft)	COMMENT NUMBER
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.00	--	1.75	1.27	1	TOP SLAB	4.67	1.00	1	TOP SLAB	8.67	·
		HL-93 (OPERATING)	N/A	·	1.29	--	1.35	1.65	1	TOP SLAB	4.67	1.29	1	TOP SLAB	8.67	·
		HS-20 (INVENTORY)	36.000	2	1.26	45.36	1.75	1.27	1	TOP SLAB	4.67	1.26	1	TOP SLAB	8.67	·
		HS-20 (OPERATING)	36.000	·	1.63	58.68	1.35	1.65	1	TOP SLAB	4.67	1.63	1	TOP SLAB	8.67	·
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500	·	2.31	31.19	1.40	2.31	1	TOP SLAB	4.67	2.76	1	TOP SLAB	8.67	·
		SNGARBS2	20.000	·	2.16	43.20	1.40	2.16	1	TOP SLAB	4.67	2.51	1	TOP SLAB	8.67	·
		SNAGRIS2	22.000	·	2.31	50.82	1.40	2.31	1	TOP SLAB	4.67	2.76	1	TOP SLAB	8.67	·
		SNCOTTS3	27.250	3	1.25	34.06	1.40	1.92	1	TOP SLAB	4.67	1.25	1	TOP SLAB	8.67	·
		SNAGGRS4	34.925	·	1.67	58.32	1.40	1.67	1	BOTTOM SLAB	8.67	1.77	1	TOP SLAB	8.67	·
		SNS5A	35.550	·	1.58	56.17	1.40	1.85	1	BOTTOM SLAB	8.67	1.58	1	TOP SLAB	8.67	·
		SNS6A	39.950	·	1.58	63.12	1.40	1.72	1	BOTTOM SLAB	8.67	1.58	1	TOP SLAB	8.67	·
		SNS7B	42.000	·	1.58	66.36	1.40	1.72	1	BOTTOM SLAB	8.67	1.58	1	TOP SLAB	8.67	·
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000	·	2.25	74.25	1.40	2.25	1	TOP SLAB	8.67	2.60	1	TOP SLAB	8.67	·
		TNT4A	33.075	·	1.61	53.25	1.40	2.07	1	BOTTOM SLAB	8.67	1.61	1	TOP SLAB	8.67	·
		TNT6A	41.600	·	1.58	65.73	1.40	1.86	1	BOTTOM SLAB	8.67	1.58	1	TOP SLAB	8.67	·
		TNT7A	42.000	·	1.61	67.62	1.40	1.82	1	BOTTOM SLAB	8.67	1.61	1	TOP SLAB	8.67	·
		TNT7B	42.000	·	1.58	66.36	1.40	1.93	1	TOP SLAB	8.67	1.58	1	TOP SLAB	8.67	·
		TNAGRIT4	43.000	·	1.59	68.37	1.40	1.77	1	BOTTOM SLAB	8.67	1.59	1	TOP SLAB	8.67	·
		TNAGT5A	45.000	·	1.61	72.45	1.40	1.73	1	BOTTOM SLAB	8.67	1.61	1	TOP SLAB	8.67	·
		TNAGT5B	45.000	·	1.42	63.90	1.40	1.42	1	BOTTOM SLAB	8.67	1.59	1	TOP SLAB	8.67	·

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.
2.
3.
4.

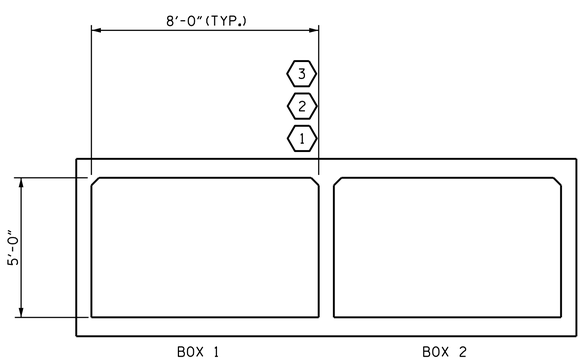
(#) CONTROLLING LOAD RATING

(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. 17BP.14.R.79

GRAHAM COUNTY

STATION: 11+53.30 -L-

SHEET 11 OF 11

DESIGN ENGINEER OF RECORD:

Thomas M. Harris

DATE: 12/14/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 19299 ENGINEER THOMAS M. HARRIS

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434 FAYETTEVILLE STREET
SUITE 1500
RALEIGH, NC 27601
TEL: 1.919.836.4040
LICENSE NO. F-0165

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-11
1			3			TOTAL SHEETS
2			4			11

STD. NO. LRFR5

ASSEMBLED BY : C. HOWARD		DATE : 10/2014	
CHECKED BY : M. MILLS		DATE : 10/2014	
DRAWN BY : WMC 7/11	REV. 10/1/11	MAA/GM	
CHECKED BY : GM 7/11	REV. 12/17	MAA/THC	

12/14/2018
$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
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