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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	1.01	--	1.75	1.42	1	BOTTOM SLAB	8.42	1.01	1	TOP SLAB	7.64	
		HL-93 (OPERATING)	N/A		1.31	--	1.35	1.84	1	BOTTOM SLAB	8.42	1.31	1	TOP SLAB	7.64	·
		HS-20 (INVENTORY)	36.000	2	1.06	38.16	1.75	1.48	1	BOTTOM SLAB	8.42	1.06	1	TOP SLAB	7.64	·
		HS-20 (OPERATING)	36.000	·	1.37	49.32	1.35	1.92	1	BOTTOM SLAB	8.42	1.37	1	TOP SLAB	7.64	·
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500	·	2.64	35.64	1.40	3.82	1	BOTTOM SLAB	8.42	2.63	1	TOP SLAB	7.64	·
		SNGARBS2	20.000	·	2.47	49.40	1.40	3.58	1	BOTTOM SLAB	8.42	2.47	1	TOP SLAB	7.64	·
		SNAGRIS2	22.000	·	2.64	58.08	1.40	3.82	1	BOTTOM SLAB	8.42	2.63	1	TOP SLAB	7.64	·
		SNCOTTS3	27.250	·	1.16	31.61	1.40	1.69	1	BOTTOM SLAB	8.42	1.16	1	TOP SLAB	7.64	·
		SNAGGRS4	34.925	·	1.53	55.44	1.40	2.22	1	BOTTOM SLAB	8.42	1.52	1	TOP SLAB	7.64	·
		SNS5A	35.550	·	1.38	49.06	1.40	2.01	1	BOTTOM SLAB	8.42	1.38	1	TOP SLAB	7.64	·
		SNS6A	39.950	·	1.38	55.13	1.40	2.01	1	BOTTOM SLAB	8.42	1.38	1	TOP SLAB	7.64	·
		SNS7B	42.000	·	1.38	57.96	1.40	2.01	1	BOTTOM SLAB	8.42	1.38	1	TOP SLAB	7.64	·
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000	·	2.64	87.12	1.40	3.82	1	BOTTOM SLAB	8.42	2.63	1	TOP SLAB	7.64	·
		TNT4A	33.075	·	1.38	45.64	1.40	2.01	1	BOTTOM SLAB	8.42	1.38	1	TOP SLAB	7.64	·
		TNT6A	41.600	·	1.38	57.41	1.40	2.01	1	BOTTOM SLAB	8.42	1.38	1	TOP SLAB	7.64	·
		TNT7A	42.000	·	1.38	57.96	1.40	2.01	1	BOTTOM SLAB	8.42	1.38	1	TOP SLAB	7.64	·
		TNT7B	42.000	·	1.38	57.96	1.40	2.01	1	BOTTOM SLAB	8.42	1.38	1	TOP SLAB	7.64	·
		TNAGRIT4	43.000	·	1.38	59.34	1.40	2.01	1	BOTTOM SLAB	8.42	1.38	1	TOP SLAB	7.64	·
		TNAGT5A	45.000	·	1.38	62.10	1.40	2.01	1	BOTTOM SLAB	8.42	1.38	1	TOP SLAB	7.64	·
		TNAGT5B	45.000	3	1.38	62.10	1.40	2.01	1	BOTTOM SLAB	8.42	1.38	1	TOP SLAB	7.64	·

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.

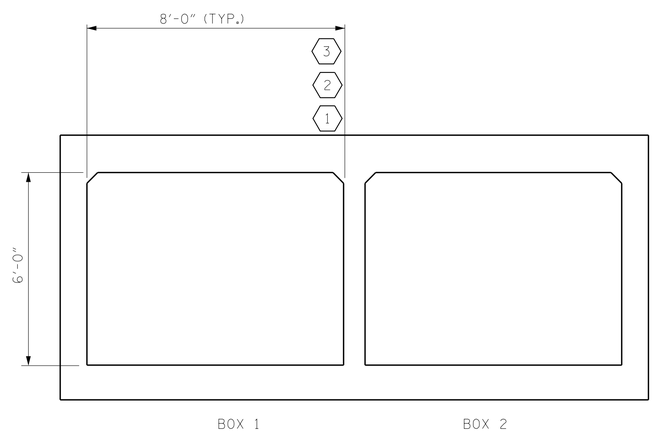
(#) CONTROLLING LOAD RATING

(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)

ENG. OF RECORD: RYAN T. SHIPMAN

ASSEMBLED BY : AW DATE : 10/14
CHECKED BY : HLW DATE : 10/14

DRAWN BY : WMC 7/11
CHECKED BY : GM 7/11

REV. 10/1/11 MAA/GM

V&M
Vaughn & Melton
Consulting Engineers
Asheville, North Carolina
828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
Tri-Cities, TN 423-467-8401
Knoxville, TN 865-546-5800
Spartanburg, SC 864-574-4775
Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Atlanta, GA 770-627-3509
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NORTH CAROLINA PROFESSIONAL SEAL 20978 ENGINEER HARRY L. WILLIS
7/20/2018 1:49:14 PM EDT

PROJECT NO. 14SP.20201.1

CHEROKEE COUNTY

STATION: 11+97.95 -L-

SHEET 11 OF 11

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