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	1.14	--	1.75	1.14	1	TOP SLAB	4.83	1.35	1	TOP SLAB	9.80	2
		HL-93 (OPERATING)	N/A		1.48	--	1.35	1.48	1	TOP SLAB	4.83	1.76	1	TOP SLAB	9.80	2
		HS-20 (INVENTORY)	36.000	2	1.30	46.63	1.75	1.30	1	BOT CORNER SLAB	0.27	1.40	1	BOTTOM SLAB	9.80	1
		HS-20 (OPERATING)	36.000		1.68	60.45	1.35	1.68	1	BOT CORNER SLAB	0.27	1.81	1	BOTTOM SLAB	9.80	1
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		1.74	23.54	1.40	1.74	1	BOT CORNER SLAB	0.27	2.51	1	EXTERIOR WALL	12.85	1
		SNGARBS2	20.000		1.70	34.02	1.40	1.70	1	BOT CORNER SLAB	0.27	2.46	1	EXTERIOR WALL	12.85	1
		SNAGRIS2	22.000		1.70	37.42	1.40	1.70	1	BOT CORNER SLAB	0.27	2.46	1	EXTERIOR WALL	12.85	1
		SNCOTTS3	27.250		1.43	38.86	1.40	1.43	1	TOP SLAB	4.83	1.68	1	TOP SLAB	9.80	2
		SNAGGRS4	34.925		1.55	54.31	1.40	1.55	1	BOT CORNER SLAB	0.27	1.71	1	BOTTOM SLAB	9.80	1
		SNS5A	35.550		1.51	53.57	1.40	1.51	1	BOT CORNER SLAB	0.27	1.67	1	BOTTOM SLAB	9.80	1
		SNS6A	39.950		1.49	59.55	1.40	1.49	1	BOT CORNER SLAB	0.27	1.52	1	BOTTOM SLAB	9.80	1
		SNS7B	42.000		1.48	61.97	1.40	1.48	1	BOT CORNER SLAB	0.27	1.50	1	BOTTOM SLAB	9.80	1
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.59	52.61	1.40	1.59	1	BOT CORNER SLAB	0.27	1.82	1	BOTTOM SLAB	9.80	1
		TNT4A	33.075		1.62	53.55	1.40	1.62	1	BOT CORNER SLAB	0.27	1.80	1	BOTTOM SLAB	9.80	1
		TNT6A	41.600		1.52	63.36	1.40	1.52	1	BOT CORNER SLAB	0.27	1.58	1	BOTTOM SLAB	9.80	1
		TNT7A	42.000		1.51	63.53	1.40	1.53	1	BOT CORNER SLAB	0.27	1.51	1	BOTTOM SLAB	9.80	1
		TNT7B	42.000		1.51	63.43	1.40	1.54	1	BOT CORNER SLAB	0.27	1.51	1	BOTTOM SLAB	9.80	1
		TNAGRIT4	43.000		1.39	59.75	1.40	1.57	1	BOT CORNER SLAB	0.27	1.39	1	BOTTOM SLAB	9.80	1
		TNAGT5A	45.000		1.36	61.23	1.40	1.53	1	BOT CORNER SLAB	0.27	1.36	1	BOTTOM SLAB	9.80	1
		TNAGT5B	45.000	3	1.34	60.29	1.40	1.48	1	BOT CORNER SLAB	0.27	1.34	1	BOTTOM SLAB	9.80	1

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. BOTH MOMENT AND SHEAR RATING FACTORS ARE CONTROLLED BY MAXIMUM FILL.
2. MOMENT RATING FACTOR IS CONTROLLED BY MINIMUM FILL, SHEAR RATING IS CONTROLLED BY MAXIMUM FILL.

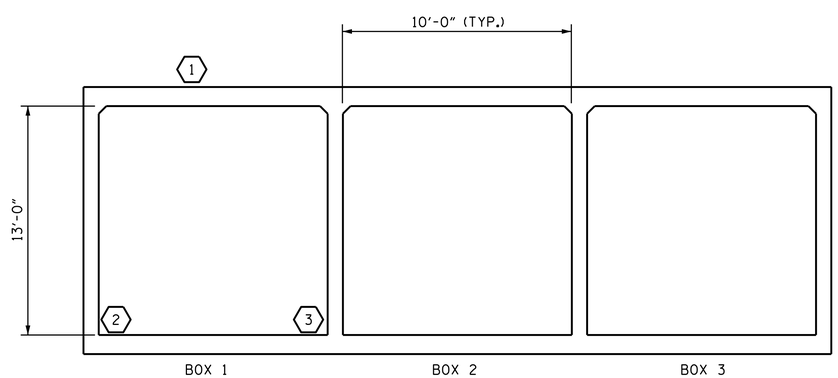
(#) CONTROLLING LOAD RATING

(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. B-5150

CATAWBA COUNTY

STATION: 14+73.60 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

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

NORTH CAROLINA PROFESSIONAL SEAL 23371 ENGINEER VIPUL A. PATEL

DocuSigned by: Vipul A. Patel 1C157DE15D464AA... 11/18/2014

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-5
1			3			TOTAL SHEETS
2			4			5

STD. NO. LRFR5

ASSEMBLED BY : H.A.LOCKLEAR DATE : 10-21-14
CHECKED BY : V.A. PATEL DATE : 10-21-14

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

REV. 10/1/11 MAA/GM

DESIGN ENGINEER OF RECORD:
H.A.LOCKLEAR DATE : 10-21-14

18-NOV-2014 09:19
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vpatel