

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								COMMENT NUMBER		
						MOMENT				SHEAR						
						LIVE-LOAD FACTORS (γ _{LL})	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	1.15	--	1.75	1.15	1	TOP SLAB	5.35	1.17	1	EXTERIOR WALL	1.04		
	HL-93 (OPERATING)	N/A		1.49	--	1.35	1.49	1	TOP SLAB	5.35	1.51	1	EXTERIOR WALL	1.04		
	HS-20 (INVENTORY)	36.000	②	1.17	42.12	1.75	1.29	1	TOP SLAB	5.35	1.17	1	EXTERIOR WALL	1.04		
	HS-20 (OPERATING)	36.000		1.51	54.36	1.35	1.68	1	TOP SLAB	5.35	1.51	1	EXTERIOR WALL	1.04		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		1.53	20.66	1.40	2.04	1	EXTERIOR WALL	6.48	1.53	1	EXTERIOR WALL	1.04	
		SNGARBS2	20.000		1.51	30.20	1.40	2.18	1	EXTERIOR WALL	6.48	1.51	1	EXTERIOR WALL	1.04	
		SNAGRIS2	22.000		1.51	33.22	1.40	2.35	1	TOP SLAB	5.35	1.51	1	EXTERIOR WALL	1.04	
		SNCOTTS3	27.250		1.50	40.88	1.40	2.38	1	EXTERIOR WALL	0.50	1.50	1	EXTERIOR WALL	1.04	
		SNAGGRS4	34.925		1.47	51.34	1.40	2.24	1	TOP SLAB	0.33	1.47	1	EXTERIOR WALL	1.04	
		SNS5A	35.550		1.48	52.61	1.40	2.24	1	EXTERIOR WALL	0.50	1.48	1	EXTERIOR WALL	1.04	
		SNS6A	39.950		1.48	59.13	1.40	2.22	1	EXTERIOR WALL	0.50	1.48	1	EXTERIOR WALL	1.04	
	SNS7B	42.000		1.49	62.58	1.40	2.23	1	EXTERIOR WALL	0.50	1.49	1	EXTERIOR WALL	1.04		
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.47	48.51	1.40	2.28	1	EXTERIOR WALL	0.50	1.47	1	EXTERIOR WALL	1.04	
		TNT4A	33.075		1.49	49.28	1.40	2.27	1	EXTERIOR WALL	0.50	1.49	1	EXTERIOR WALL	1.04	
		TNT6A	41.600		1.49	61.98	1.40	2.24	1	EXTERIOR WALL	0.50	1.49	1	EXTERIOR WALL	1.04	
		TNT7A	42.000		1.50	63.00	1.40	2.29	1	EXTERIOR WALL	0.50	1.50	1	EXTERIOR WALL	1.04	
		TNT7B	42.000		1.50	63.00	1.40	2.29	1	EXTERIOR WALL	0.50	1.50	1	EXTERIOR WALL	1.04	
		TNAGRIT4	43.000	③	1.45	62.35	1.40	2.16	1	EXTERIOR WALL	0.50	1.45	1	EXTERIOR WALL	1.04	
TNAGT5A		45.000		1.47	66.15	1.40	2.18	1	EXTERIOR WALL	0.50	1.47	1	EXTERIOR WALL	1.04		
TNAGT5B	45.000		1.47	66.15	1.40	2.18	1	EXTERIOR WALL	0.50	1.47	1	EXTERIOR WALL	1.04			

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	--

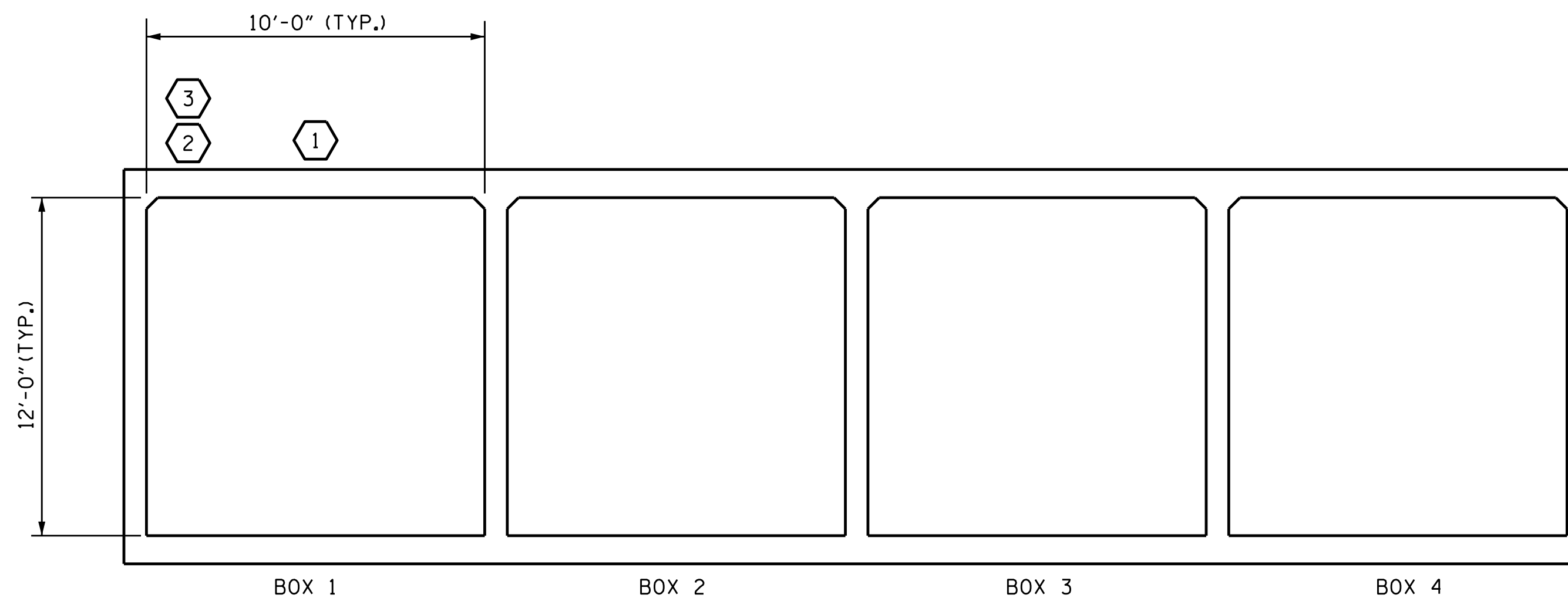
NOTE:

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. U-4405
CUMBERLAND COUNTY
 STATION: 137+99.59 -L-

SHEET 14 OF 18



Designed by:
Jacob H. Duke
6/12/2018 1:26:37 PM PDT

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:	
1			3			C1-14
2			4			TOTAL SHEETS 18

DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED

KCA 4800 SIX FORKS ROAD SUITE 120
 KISINGER CAMPO & ASSOCIATES RALEIGH, NC 27609
 (919) 882-7839

DRAWN BY : DIEGO A. AGUIRRE DATE : 5-18-18
 CHECKED BY : JACOB H. DUKE DATE : 5-22-18
 DESIGN ENGINEER OF RECORD : JACOB H. DUKE DATE : 5-25-18