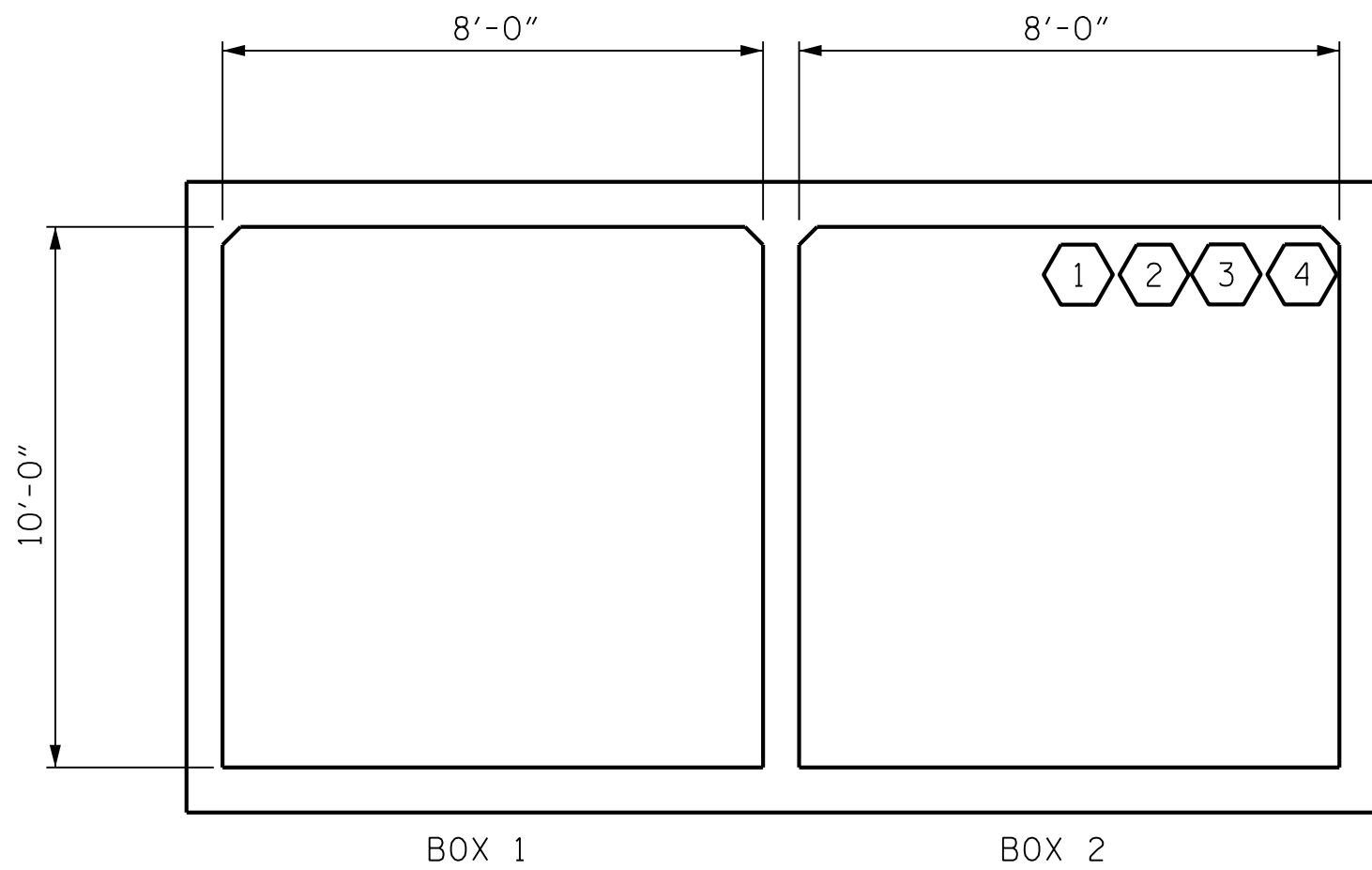


bgonfa 4/14/2026 R:\Structures\DON\Final_Culvert\U-5810_CU_02.dgn

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	2.37	--	1.75	2.37	2	EXT. WALL	0.1	2.40	1	EXT. WALL	9.9	
	HL-93 (OPERATING)	N/A		3.08	--	1.35	3.08	2	EXT. WALL	0.1	3.11	1	EXT. WALL	9.9	
	HS-20 (INVENTORY)	36,000	⬡2	2.37	85,320	1.75	2.37	2	EXT. WALL	0.1	2.40	1	EXT. WALL	9.9	
	HS-20 (OPERATING)	36,000		3.08	110,880	1.35	3.08	2	EXT. WALL	0.1	3.11	1	EXT. WALL	9.9	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SN5H		2.98	40,230	1.40	3.12	1	EXT. WALL	9.9	2.98	1	EXT. WALL	9.9	
		SN5GRBS2		2.98	59,600	1.40	3.10	1	EXT. WALL	9.9	2.98	1	EXT. WALL	9.9	
		SN5GRIS2		2.98	65,560	1.40	3.11	1	EXT. WALL	9.9	2.98	1	EXT. WALL	9.9	
		SN5COTTS3		2.79	76,028	1.40	2.79	2	EXT. WALL	0.1	3.04	1	EXT. WALL	9.9	
		SN5AGGRS4		2.78	97,092	1.40	2.78	2	EXT. WALL	0.1	3.04	1	EXT. WALL	9.9	
		SN55A	⬡3	2.76	98,118	1.40	2.76	2	EXT. WALL	0.1	3.04	1	EXT. WALL	9.9	
		SN56A	⬡3	2.76	110,262	1.40	2.76	2	EXT. WALL	0.1	3.04	1	EXT. WALL	9.9	
		SN57B	⬡3	2.76	115,920	1.40	2.76	2	EXT. WALL	0.1	3.04	1	EXT. WALL	9.9	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TN5AGRIT3		2.99	98,670	1.40	2.99	2	EXT. WALL	0.1	3.01	1	EXT. WALL	9.9	
		TN5T4A		2.91	96,248	1.40	2.91	2	EXT. WALL	0.1	3.02	1	EXT. WALL	9.9	
		TN5T6A		2.82	117,312	1.40	2.82	2	EXT. WALL	0.1	3.03	1	EXT. WALL	9.9	
		TN5T7A		2.87	120,540	1.40	2.87	2	EXT. WALL	0.1	3.02	1	EXT. WALL	9.9	
		TN5T7B		2.80	117,600	1.40	2.80	2	EXT. WALL	0.1	3.03	1	EXT. WALL	9.9	
		TN5AGRIT4		2.90	124,700	1.40	2.90	2	EXT. WALL	0.1	3.01	1	EXT. WALL	9.9	
TN5AGT5A			2.90	130,500	1.40	2.90	2	EXT. WALL	0.1	3.02	1	EXT. WALL	9.9		
TN5AGT5B			2.91	130,950	1.40	2.91	2	EXT. WALL	0.1	3.01	1	EXT. WALL	9.9		
EMERGENCY VEHICLE (EV)	EV2	28,750		3.00	86,250	1.30	3.05	1	EXT. WALL	9.9	3.00	1	EXT. WALL	9.9	
	EV3	43,000	⬡4	2.63	113,090	1.30	2.63	2	EXT. WALL	0.1	3.06	1	EXT. WALL	9.9	



LRFR SUMMARY
(LOOKING DOWNSTREAM)

DRAWN BY : T. K. BOYD DATE : MAR. 2026
CHECKED BY : R. V. KEITH DATE : MAR. 2026
DESIGN ENGINEER OF RECORD : O. J. PAITEL DATE : MAR. 2026

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. MAXIMUM FILL CONTROLS.
2. "LEFT END" OF VERTICAL ELEMENTS ARE ASSUMED TO BE AT TOP OF WALL.
3.
4.

⬡ CONTROLLING LOAD RATING
⬡1 DESIGN LOAD RATING (HL-93)
⬡2 DESIGN LOAD RATING (HS-20)
⬡3 LEGAL LOAD RATING **
⬡4 EMERGENCY VEHICLE LOAD RATING **
** SEE CHART FOR VEHICLE TYPE

PROJECT NO. U-5810
WATAUGA COUNTY
STATION: 52+14.00 -L-

RK&K
P: (919) 878-9560
8601 Six Forks Road, Forum 1 Suite 700
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UNLESS ALL SIGNATURES COMPLETED**

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SEAL
Engineer
49850
OJ. PAITEL
Professional Engineer

4/16/2026

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH						REVISIONS			SHEET NO.
LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERT (NON-INTERSTATE TRAFFIC)						NO.	BY:	DATE:	C-2
						1			TOTAL SHEETS
						2			13