

## 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 <sub>LL</sub> )	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	EXTERIOR WALL	0.75	2.20	1	EXTERIOR WALL	0.75		
	HL-93 (OPERATING)	N/A		1.48	--	1.35	1.48	1	EXTERIOR WALL	0.75	2.86	1	EXTERIOR WALL	0.75		
	HS-20 (INVENTORY)	36.000	②	1.16	41.76	1.75	1.16	1	EXTERIOR WALL	0.75	2.21	1	EXTERIOR WALL	0.75		
	HS-20 (OPERATING)	36.000		1.51	54.36	1.35	1.51	1	EXTERIOR WALL	0.75	2.87	1	EXTERIOR WALL	0.75		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		1.53	20.66	1.40	1.53	1	EXTERIOR WALL	0.75	2.89	1	EXTERIOR WALL	0.75	
		SNGARBS2	20.000		1.45	29.00	1.40	1.45	1	EXTERIOR WALL	0.75	2.86	1	EXTERIOR WALL	0.75	
		SNAGRIS2	22.000		1.42	31.24	1.40	1.42	1	EXTERIOR WALL	0.75	2.87	1	EXTERIOR WALL	0.75	
		SNCOTTS3	27.250		1.43	38.97	1.40	1.43	1	EXTERIOR WALL	0.75	2.75	1	EXTERIOR WALL	0.75	
		SNAGGRS4	34.925		1.44	50.29	1.40	1.44	1	EXTERIOR WALL	0.75	2.27	1	TOP SLAB	11.67	
		SNS5A	35.550		1.45	51.55	1.40	1.45	1	EXTERIOR WALL	0.75	2.38	1	TOP SLAB	11.67	
		SNS6A	39.950		1.43	57.13	1.40	1.43	1	EXTERIOR WALL	0.75	2.33	1	TOP SLAB	11.67	
	SNS7B	42.000		1.39	58.38	1.40	1.39	1	EXTERIOR WALL	0.75	2.26	1	TOP SLAB	11.67		
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.43	47.19	1.40	1.43	1	EXTERIOR WALL	0.75	2.82	1	EXTERIOR WALL	0.75	
		TNT4A	33.075		1.44	47.63	1.40	1.44	1	EXTERIOR WALL	0.75	2.70	1	TOP SLAB	11.67	
		TNT6A	41.600		1.43	59.49	1.40	1.43	1	EXTERIOR WALL	0.75	2.46	1	TOP SLAB	11.67	
		TNT7A	42.000		1.41	59.22	1.40	1.41	1	EXTERIOR WALL	0.75	2.66	1	TOP SLAB	11.67	
		TNT7B	42.000		1.44	60.48	1.40	1.44	1	EXTERIOR WALL	0.75	2.38	1	TOP SLAB	11.67	
		TNAGRIT4	43.000		1.43	61.49	1.40	1.43	1	EXTERIOR WALL	0.75	2.31	1	TOP SLAB	11.67	
TNAGT5A		45.000	③	1.38	62.10	1.40	1.38	1	EXTERIOR WALL	0.75	2.43	1	TOP SLAB	11.67		
TNAGT5B	45.000		1.42	63.90	1.40	1.42	1	EXTERIOR WALL	0.75	2.14	1	TOP SLAB	11.67			

**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.

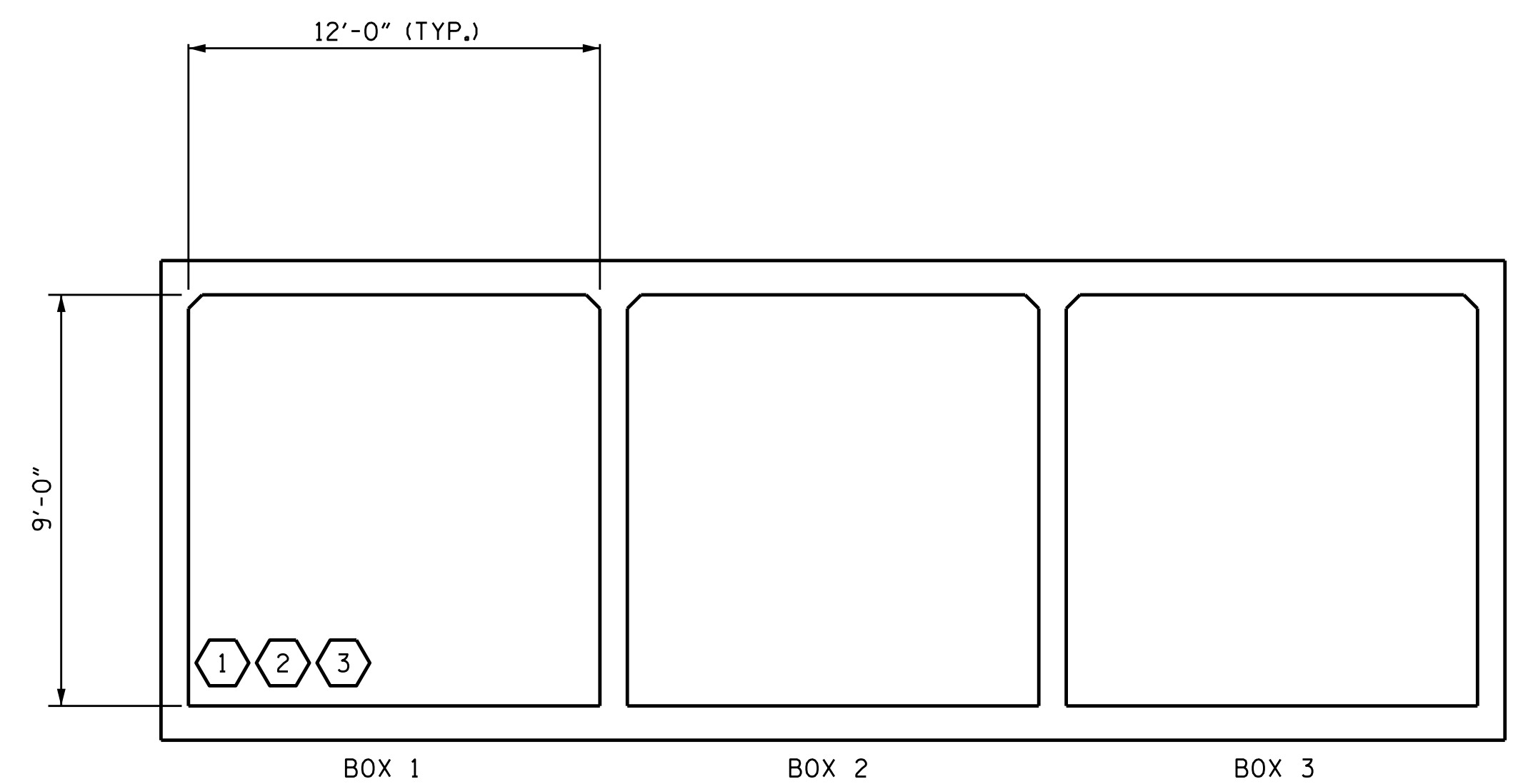
# CONTROLLING LOAD RATING

① DESIGN LOAD RATING (HL-93)

② DESIGN LOAD RATING (HS-20)

③ LEGAL LOAD RATING \*\*

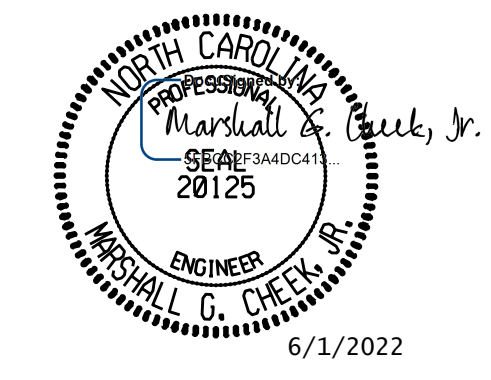
\*\* SEE CHART FOR VEHICLE TYPE



**LRFR SUMMARY**  
(LOOKING DOWNSTREAM)

PROJECT NO. A-0009CA  
GRAHAM COUNTY  
 STATION: 46+41.00 -L-

SHEET 2 OF 14



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 LRFR SUMMARY FOR  
 REINFORCED CONCRETE  
 BOX CULVERT

ASSEMBLED BY : STM	DATE : 12/21
CHECKED BY : MGC	DATE : 02/22
DRAWN BY : WMC	7/11
CHECKED BY : GM	7/11
REV. 10/1/11	MAA/GM
REV. 12/17	MAA/THC

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS  
 706 HILLSBOROUGH STREET  
 SUITE 200  
 RALEIGH, NC 27603  
 PH (919) 773-8887  
 CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-2
1			3			TOTAL SHEETS
2			4			14