

## 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		
						LIVE-LOAD FACTORS (γ <sub>LL</sub> )	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	1.11	--	1.75	1.11	1	BOTTOM SLAB	4.25	1.75	1	BOTTOM SLAB	0.75		
	HL-93 (OPERATING)	N/A		1.43	--	1.35	1.43	1	BOTTOM SLAB	4.25	2.27	1	BOTTOM SLAB	0.75		
	HS-20 (INVENTORY)	36.000	②	1.15	47.52	1.75	1.15	1	BOTTOM SLAB	4.25	1.83	1	BOTTOM SLAB	0.75		
	HS-20 (OPERATING)	36.000		1.50	61.56	1.35	1.50	1	BOTTOM SLAB	4.25	2.37	1	BOTTOM SLAB	0.75		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.06	23.22	1.40	2.06	1	TOP SLAB	4.25	4.01	1	TOP SLAB	0.75	
		SNGARBS2	20.000		1.92	33.40	1.40	1.92	1	TOP SLAB	4.25	3.75	1	TOP SLAB	0.75	
		SNAGRIS2	22.000		2.06	37.84	1.40	2.06	1	TOP SLAB	4.25	4.01	1	TOP SLAB	0.75	
		SNCOTTS3	27.250	③	1.39	44.15	1.40	1.39	1	BOTTOM SLAB	4.25	2.19	1	BOTTOM SLAB	0.75	
		SNAGGRS4	34.925		1.78	62.26	1.40	1.78	1	BOTTOM SLAB	4.25	2.82	1	BOTTOM SLAB	0.75	
		SNS5A	35.550		2.01	62.57	1.40	2.01	1	TOP SLAB	4.25	3.61	1	BOTTOM SLAB	0.75	
		SNS6A	39.950		1.63	70.31	1.40	1.63	1	BOTTOM SLAB	4.25	2.58	1	BOTTOM SLAB	0.75	
		SNS7B	42.000		1.63	73.92	1.40	1.63	1	BOTTOM SLAB	4.25	2.58	1	BOTTOM SLAB	0.75	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.05	56.76	1.40	2.05	1	TOP SLAB	4.25	4.01	1	TOP SLAB	0.75	
		TNT4A	33.075		1.65	58.21	1.40	1.65	1	BOTTOM SLAB	4.25	2.61	1	BOTTOM SLAB	0.75	
		TNT6A	41.600		1.63	73.22	1.40	1.63	1	BOTTOM SLAB	4.25	2.58	1	BOTTOM SLAB	0.75	
		TNT7A	42.000		1.64	73.92	1.40	1.64	1	BOTTOM SLAB	4.25	2.60	1	BOTTOM SLAB	0.75	
		TNT7B	42.000		1.63	73.92	1.40	1.63	1	BOTTOM SLAB	4.25	2.58	1	BOTTOM SLAB	0.75	
		TNAGRIT4	43.000		1.65	73.96	1.40	1.65	1	BOTTOM SLAB	4.25	2.61	1	BOTTOM SLAB	0.75	
TNAGT5A	45.000		1.65	74.40	1.40	1.65	1	BOTTOM SLAB	4.25	2.61	1	BOTTOM SLAB	0.75			
TNAGT5B	45.000		1.65	79.20	1.40	1.65	1	BOTTOM SLAB	4.25	2.61	1	BOTTOM SLAB	0.75			

**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.

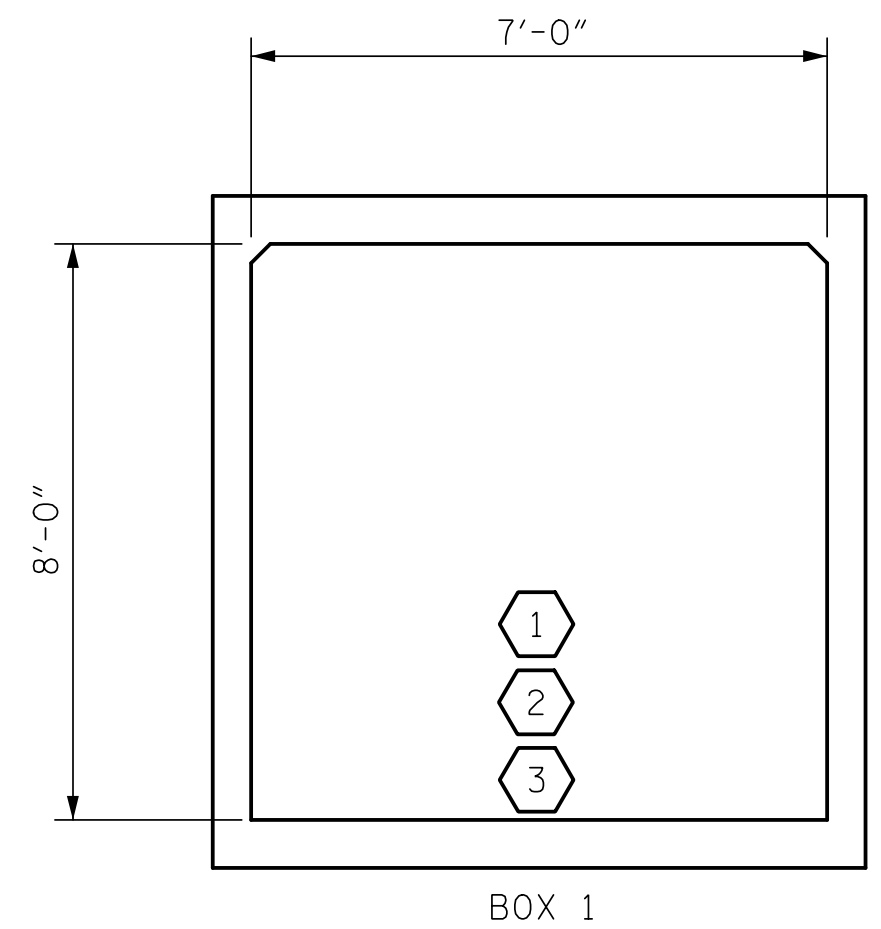
# CONTROLLING LOAD RATING

① DESIGN LOAD RATING (HL-93)

② DESIGN LOAD RATING (HS-20)

③ LEGAL LOAD RATING \*\*

\*\* SEE CHART FOR VEHICLE TYPE



**LRFR SUMMARY**

PROJECT NO. A-0009CA  
GRAHAM COUNTY  
 STATION: 108+27.00 -L-

SHEET 2 OF 6

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

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

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:	
1			3			C3-2
2			4			TOTAL SHEETS 6

ASSEMBLED BY : ZCS	DATE : 2/21
CHECKED BY : MGC	DATE : 4/21
DRAWN BY : WMC 7/11	REV. 10/1/11 MAA/GM
CHECKED BY : GM 7/11	REV. 12/17 MAA/THC