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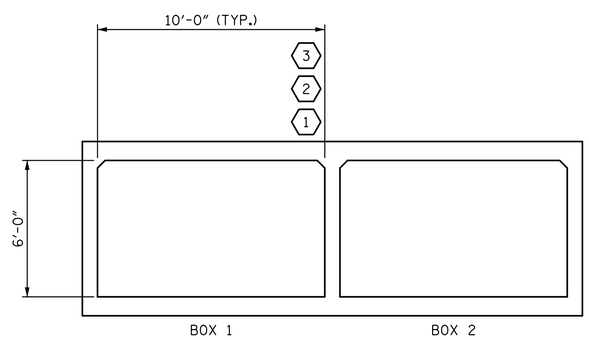
LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE									COMMENT NUMBER
								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	1.060	--	1.75	1.77	1 & 2	ROOF SLAB	4.68′	1.06	1 & 2	ROOF SLAB	9.85′	
		HL-93 (OPERATING)	N/A		1.380	--	1.35	2.29	1 & 2	ROOF SLAB	4.68′	1.38	1 & 2	ROOF SLAB	9.85′	
		HS-20 (INVENTORY)	36.000	2	1.280	46.080	1.75	1.85	1 & 2	ROOF SLAB	4.68′	1.28	1 & 2	ROOF SLAB	9.85′	
		HS-20 (OPERATING)	36.000		1.660	59.760	1.35	2.40	1 & 2	ROOF SLAB	4.68′	1.66	1 & 2	ROOF SLAB	9.85′	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.350	31.725	1.40	3.37	1 & 2	ROOF SLAB	4.68′	2.35	1 & 2	ROOF SLAB	9.85′	
		SNGARBS2	20.000		2.190	43.800	1.40	3.15	1 & 2	ROOF SLAB	4.68′	2.19	1 & 2	ROOF SLAB	9.85′	
		SNAGRIS2	22.000		2.330	51.260	1.40	3.37	1 & 2	ROOF SLAB	4.68′	2.33	1 & 2	ROOF SLAB	9.85′	
		SNCOTTS3	27.250	3	1.320	35.970	1.40	2.21	1 & 2	ROOF SLAB	4.68′	1.32	1 & 2	ROOF SLAB	9.85′	
		SNAGGRS4	34.925		1.670	58.325	1.40	2.74	1 & 2	FLOOR SLAB	4.68′	1.67	1 & 2	ROOF SLAB	9.85′	
		SNS5A	35.550		1.520	54.036	1.40	2.63	1 & 2	ROOF SLAB	4.68′	1.52	1 & 2	ROOF SLAB	9.85′	
		SNS6A	39.950		1.480	59.126	1.40	2.63	1 & 2	ROOF SLAB	4.68′	1.48	1 & 2	ROOF SLAB	9.85′	
		SNS7B	42.000		1.480	62.160	1.40	2.76	1 & 2	ROOF SLAB	4.68′	1.48	1 & 2	ROOF SLAB	9.85′	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.890	62.370	1.40	3.12	1 & 2	FLOOR SLAB	4.68′	1.89	1 & 2	FLOOR SLAB	10.09′	
		TNT4A	33.075		1.530	50.605	1.40	2.63	1 & 2	ROOF SLAB	4.68′	1.53	1 & 2	ROOF SLAB	9.85′	
		TNT6A	41.600		1.510	62.816	1.40	2.69	1 & 2	ROOF SLAB	4.68′	1.51	1 & 2	ROOF SLAB	9.85′	
		TNT7A	42.000		1.520	63.840	1.40	2.66	1 & 2	ROOF SLAB	4.68′	1.52	1 & 2	ROOF SLAB	9.85′	
		TNT7B	42.000		1.510	63.420	1.40	2.60	1 & 2	ROOF SLAB	4.68′	1.51	1 & 2	ROOF SLAB	9.85′	
		TNAGRIT4	43.000		1.490	64.070	1.40	2.63	1 & 2	ROOF SLAB	4.68′	1.49	1 & 2	ROOF SLAB	9.85′	
		TNAGT5A	45.000		1.490	67.050	1.40	2.83	1 & 2	FLOOR SLAB	4.68′	1.49	1 & 2	ROOF SLAB	9.85′	
		TNAGT5B	45.000		1.470	66.150	1.40	2.36	1 & 2	FLOOR SLAB	4.68′	1.47	1 & 2	FLOOR SLAB	10.09′	

◆ MEASURED FROM OUTSIDE EDGE OF CULVERT



LRFR SUMMARY

(LOOKING DOWNSTREAM)

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

PROJECT NO. B-6028

MACON COUNTY

STATION: 15+25.00 -L-

SHEET 4 OF 11

DocuSigned by: J. Wesley Jones 88C7E5EFD4F8...

NORTH CAROLINA PROFESSIONAL SEAL 038640 ENGINEER J. WESLEY JONES

12/10/2021

STV 100 Years

STV ENGINEERS, INC.
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

(NON-INTERSTATE TRAFFIC)

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

DRAWN BY : LEM DATE : 8-17
CHECKED BY : JAD DATE : 9-17
DESIGN ENGINEER OF RECORD : JWJ DATE : 12-21

JJones 12/1/2021 6:24:50 PM R:\Structures\ustation\40L_007_I7BP.I4.R.I57_SMU_RCBC04.dgn