# 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 ($\gamma_{LL}$) | 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 | 1.21 | -- | 1.75 | 4.94 | 1 | EXTERIOR WALL | 6.22 | 1.21 | 1 | TOP SLAB | 11.08 | |
| | | HL-93 (OPERATING) | N/A | | 1.57 | -- | 1.35 | 6.41 | 1 | EXTERIOR WALL | 6.22 | 1.57 | 1 | TOP SLAB | 11.08 | |
| | | HS-20 (INVENTORY) | 36.000 | 2 | 1.21 | 43.55 | 1.75 | 4.94 | 1 | EXTERIOR WALL | 6.22 | 1.21 | 1 | TOP SLAB | 11.08 | |
| | | HS-20 (OPERATING) | 36.000 | | 1.57 | 56.46 | 1.35 | 6.41 | 1 | EXTERIOR WALL | 6.22 | 1.57 | 1 | TOP SLAB | 11.08 | |
| LEGAL LOAD RATING | SINGLE VEHICLE (SV) | SH | 12.500 | | 3.78 | 47.26 | 1.40 | 6.16 | 1 | EXTERIOR WALL | 6.22 | 3.78 | 1 | TOP SLAB | 11.08 | |
| | | S3C | 21.500 | | 2.20 | 47.20 | 1.40 | 6.16 | 1 | EXTERIOR WALL | 6.22 | 2.20 | 1 | TOP SLAB | 11.08 | |
| | | S3A | 22.750 | | 2.06 | 46.92 | 1.40 | 6.16 | 1 | EXTERIOR WALL | 6.22 | 2.06 | 1 | TOP SLAB | 11.08 | |
| | | S4A | 26.750 | | 1.84 | 49.20 | 1.40 | 6.16 | 1 | EXTERIOR WALL | 6.22 | 1.84 | 1 | TOP SLAB | 11.08 | |
| | | S5A | 30.500 | | 1.66 | 50.63 | 1.40 | 6.16 | 1 | EXTERIOR WALL | 6.22 | 1.66 | 1 | TOP SLAB | 11.08 | |
| | | S6A | 34.500 | | 1.58 | 54.60 | 1.40 | 6.16 | 1 | EXTERIOR WALL | 6.22 | 1.58 | 1 | TOP SLAB | 11.08 | |
| | | S7B | 38.500 | 3 | 1.45 | 55.75 | 1.40 | 6.16 | 1 | EXTERIOR WALL | 6.22 | 1.45 | 1 | TOP SLAB | 11.08 | |
| | | S7A | 40.000 | | 1.62 | 64.81 | 1.40 | 6.16 | 1 | EXTERIOR WALL | 6.22 | 1.62 | 1 | TOP SLAB | 11.08 | |
| | TRUCK TRACTOR SEMI-TRAILER (TTST) | T4A | 28.250 | | 1.94 | 54.93 | 1.40 | 6.16 | 1 | EXTERIOR WALL | 6.22 | 1.94 | 1 | TOP SLAB | 11.08 | |
| | | T5B | 32.000 | | 1.74 | 55.84 | 1.40 | 6.16 | 1 | EXTERIOR WALL | 6.22 | 1.74 | 1 | TOP SLAB | 11.08 | |
| | | T6A | 36.000 | | 1.70 | 61.25 | 1.40 | 6.16 | 1 | EXTERIOR WALL | 6.22 | 1.70 | 1 | TOP SLAB | 11.08 | |
| | | T7A | 40.000 | | 1.62 | 64.81 | 1.40 | 6.16 | 1 | EXTERIOR WALL | 6.22 | 1.62 | 1 | TOP SLAB | 11.08 | |
| | | T7B | 40.000 | | 1.89 | 75.62 | 1.40 | 6.16 | 1 | EXTERIOR WALL | 6.22 | 1.89 | 1 | TOP SLAB | 11.08 | |

## 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.

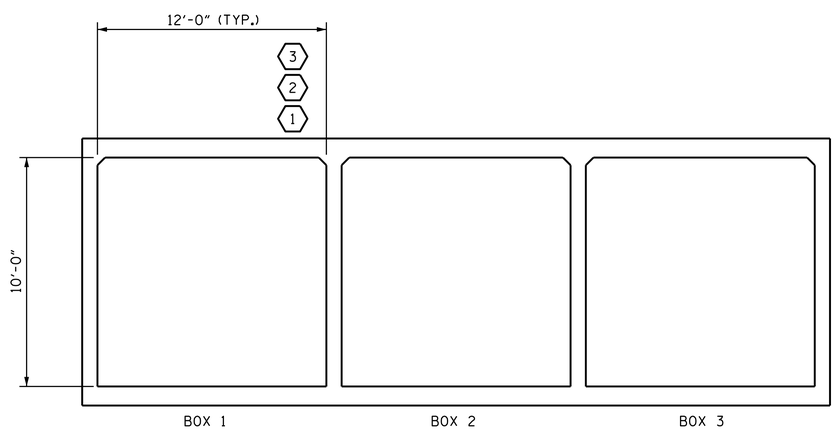
(#) CONTROLLING LOAD RATING

(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-2579B

FORSYTH COUNTY

STATION: 667+15.00 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

(INTERSTATE TRAFFIC)

NORTH CAROLINA PROFESSIONAL SEAL 23371 ENGINEER VIPUL A. PATEL

DocuSigned by: Vipul A. Patel 339B086CBE1C486 8/8/2014

| REVISIONS | | | | | | SHEET NO. |
|---|---|---|---|---|---|---|
| NO. | BY: | DATE: | NO. | BY: | DATE: | C-18 |
| 1 | | | 3 | | | TOTAL SHEETS |
| 2 | | | 4 | | | 30 |

ASSEMBLED BY : T. H. CARROLL DATE : 12/23/13
CHECKED BY : V. A. PATEL DATE : 2/25/14

DRAWN BY : WMC 7/11
CHECKED BY : GM 7/11

REV. 10/1/11 MAA/GM

DESIGN ENGINEER OF RECORD:
T. H. CARROLL DATE : 6/14/14

05-AUG-2014 12:46
R:\Structures\Plans\Culverts\U2579B_SD_CU_21.dgn
lsutton

STR. #21

STD. NO. LRFR6