# 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 ($\gamma_{LL}$) | 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 | 2.36 | -- | 1.75 | 9.12 | 1 | EXTERIOR WALL | 3.70 | 2.36 | 1 | EXTERIOR WALL | 1.20 | |
| | | HL-93 (OPERATING) | N/A | | 3.06 | -- | 1.35 | 11.82 | 1 | EXTERIOR WALL | 3.70 | 3.06 | 1 | EXTERIOR WALL | 1.20 | |
| | | HS-20 (INVENTORY) | 36.000 | 2 | 2.36 | 84.99 | 1.75 | 9.12 | 1 | EXTERIOR WALL | 3.70 | 2.36 | 1 | EXTERIOR WALL | 1.20 | |
| | | HS-20 (OPERATING) | 36.000 | | 3.06 | 110.17 | 1.35 | 11.82 | 1 | EXTERIOR WALL | 3.70 | 3.06 | 1 | EXTERIOR WALL | 1.20 | |
| LEGAL LOAD RATING | SINGLE VEHICLE (SV) | SNSH | 13.500 | 3 | 2.94 | 39.63 | 1.40 | 11.38 | 1 | EXTERIOR WALL | 3.70 | 2.94 | 1 | EXTERIOR WALL | 1.20 | |
| | | SNGARBS2 | 20.000 | | 2.94 | 58.71 | 1.40 | 11.38 | 1 | EXTERIOR WALL | 3.70 | 2.94 | 1 | EXTERIOR WALL | 1.20 | |
| | | SNAGRIS2 | 22.000 | | 2.94 | 64.58 | 1.40 | 11.38 | 1 | EXTERIOR WALL | 3.70 | 2.94 | 1 | EXTERIOR WALL | 1.20 | |
| | | SNCOTTS3 | 27.250 | | 2.94 | 79.99 | 1.40 | 11.38 | 1 | EXTERIOR WALL | 3.70 | 2.94 | 1 | EXTERIOR WALL | 1.20 | |
| | | SNAGGRS4 | 34.925 | | 2.94 | 102.51 | 1.40 | 11.38 | 1 | EXTERIOR WALL | 3.70 | 2.94 | 1 | EXTERIOR WALL | 1.20 | |
| | | SNS5A | 35.550 | | 2.94 | 104.35 | 1.40 | 11.38 | 1 | EXTERIOR WALL | 3.70 | 2.94 | 1 | EXTERIOR WALL | 1.20 | |
| | | SNS6A | 39.950 | | 2.94 | 117.26 | 1.40 | 11.38 | 1 | EXTERIOR WALL | 3.70 | 2.94 | 1 | EXTERIOR WALL | 1.20 | |
| | | SNS7B | 42.000 | | 2.94 | 123.28 | 1.40 | 11.38 | 1 | EXTERIOR WALL | 3.70 | 2.94 | 1 | EXTERIOR WALL | 1.20 | |
| | TRUCK TRACTOR SEMI-TRAILER (TTST) | TNAGRIT3 | 33.000 | | 2.94 | 96.86 | 1.40 | 11.38 | 1 | EXTERIOR WALL | 3.70 | 2.94 | 1 | EXTERIOR WALL | 1.20 | |
| | | TNT4A | 33.075 | | 2.94 | 97.08 | 1.40 | 11.38 | 1 | EXTERIOR WALL | 3.70 | 2.94 | 1 | EXTERIOR WALL | 1.20 | |
| | | TNT6A | 41.600 | | 2.94 | 122.11 | 1.40 | 11.38 | 1 | EXTERIOR WALL | 3.70 | 2.94 | 1 | EXTERIOR WALL | 1.20 | |
| | | TNT7A | 42.000 | | 2.94 | 123.28 | 1.40 | 11.38 | 1 | EXTERIOR WALL | 3.70 | 2.94 | 1 | EXTERIOR WALL | 1.20 | |
| | | TNT7B | 42.000 | | 2.94 | 123.28 | 1.40 | 11.38 | 1 | EXTERIOR WALL | 3.70 | 2.94 | 1 | EXTERIOR WALL | 1.20 | |
| | | TNAGRIT4 | 43.000 | | 2.94 | 126.22 | 1.40 | 11.38 | 1 | EXTERIOR WALL | 3.70 | 2.94 | 1 | EXTERIOR WALL | 1.20 | |
| | | TNAGT5A | 45.000 | | 2.94 | 132.09 | 1.40 | 11.38 | 1 | EXTERIOR WALL | 3.70 | 2.94 | 1 | EXTERIOR WALL | 1.20 | |
| | | TNAGT5B | 45.000 | | 2.94 | 132.09 | 1.40 | 11.38 | 1 | EXTERIOR WALL | 3.70 | 2.94 | 1 | EXTERIOR WALL | 1.20 | |

## 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.

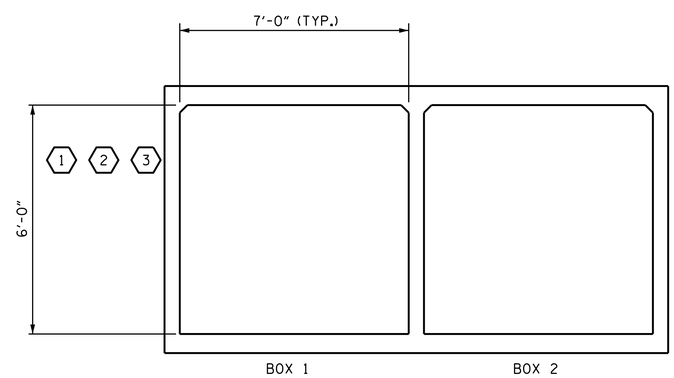
(#) CONTROLLING LOAD RATING

(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: 23+11.00 -Y1-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS
(NON-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-23 |
| 1 | | | 3 | | | TOTAL SHEETS |
| 2 | | | 4 | | | 30 |

ASSEMBLED BY : R. L. CHESSON DATE : 3/12/13
CHECKED BY : T. H. CARROLL DATE : 4/15/13

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

REV. 10/1/11 MAA/GM

DESIGN ENGINEER OF RECORD:
R. L. CHESSON DATE : 6/10/14

05-AUG-2014 12:46
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lsutton

STR. #22

STD. NO. LRFR5