

**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 (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 | 1.23 | -- | 1.75 | 1.49 | 2 | TOP SLAB | 5.50 | 1.23 | 1 | BOTTOM SLAB | 11.00 | | |
| | HL-93 (OPERATING) | N/A | | 1.60 | -- | 1.35 | 1.93 | 2 | TOP SLAB | 5.50 | 1.60 | 1 | BOTTOM SLAB | 11.00 | | |
| | HS-20 (INVENTORY) | 36.000 | ② | 1.23 | 44.28 | 1.75 | 1.49 | 2 | TOP SLAB | 5.50 | 1.23 | 1 | BOTTOM SLAB | 11.00 | | |
| | HS-20 (OPERATING) | 36.000 | | 1.60 | 57.60 | 1.35 | 1.93 | 2 | TOP SLAB | 5.50 | 1.60 | 1 | BOTTOM SLAB | 11.00 | | |
| LEGAL LOAD RATING | SINGLE VEHICLE (SV) | SNSH | 13.500 | | 1.97 | 26.60 | 1.40 | 1.97 | 1 | EXTERIOR WALL | 5.50 | 3.48 | 1 | TOP SLAB | 11.00 | |
| | | SNGARBS2 | 20.000 | | 1.97 | 39.40 | 1.40 | 1.97 | 1 | EXTERIOR WALL | 5.50 | 2.95 | 1 | BOTTOM SLAB | 11.00 | |
| | | SNAGRIS2 | 22.000 | | 1.97 | 43.34 | 1.40 | 1.97 | 1 | EXTERIOR WALL | 5.50 | 2.71 | 1 | BOTTOM SLAB | 11.00 | |
| | | SNCOTTS3 | 27.250 | | 1.55 | 42.24 | 1.40 | 1.55 | 2 | TOP SLAB | 5.50 | 1.71 | 1 | TOP SLAB | 11.00 | |
| | | SNAGGRS4 | 34.925 | | 1.66 | 57.98 | 1.40 | 1.66 | 2 | TOP SLAB | 5.50 | 1.81 | 1 | BOTTOM SLAB | 11.00 | |
| | | SNS5A | 35.550 | | 1.62 | 57.59 | 1.40 | 1.62 | 1 | TOP SLAB | 5.50 | 1.71 | 1 | TOP SLAB | 11.00 | |
| | | SNS6A | 39.950 | | 1.61 | 64.32 | 1.40 | 1.61 | 2 | TOP SLAB | 5.50 | 1.68 | 1 | TOP SLAB | 11.00 | |
| | | SNS7B | 42.000 | | 1.61 | 67.62 | 1.40 | 1.61 | 2 | TOP SLAB | 5.50 | 1.66 | 1 | TOP SLAB | 11.00 | |
| | TRUCK TRACTOR SEMI-TRAILER (TTST) | TNAGRIT3 | 33.000 | | 1.96 | 64.68 | 1.40 | 1.96 | 1 | EXTERIOR WALL | 5.50 | 2.09 | 1 | BOTTOM SLAB | 11.00 | |
| | | TNT4A | 33.075 | | 1.85 | 61.19 | 1.40 | 1.85 | 2 | TOP SLAB | 5.50 | 1.97 | 1 | TOP SLAB | 11.00 | |
| | | TNT6A | 41.600 | | 1.71 | 71.14 | 1.40 | 1.71 | 1 | TOP SLAB | 5.50 | 1.81 | 1 | BOTTOM SLAB | 11.00 | |
| | | TNT7A | 42.000 | | 1.76 | 73.92 | 1.40 | 1.78 | 2 | TOP SLAB | 5.50 | 1.76 | 1 | BOTTOM SLAB | 11.00 | |
| | | TNT7B | 42.000 | | 1.68 | 70.56 | 1.40 | 1.68 | 2 | TOP SLAB | 5.50 | 1.82 | 1 | TOP SLAB | 11.00 | |
| | | TNAGRIT4 | 43.000 | | 1.72 | 73.96 | 1.40 | 1.85 | 2 | TOP SLAB | 5.50 | 1.72 | 1 | BOTTOM SLAB | 11.00 | |
| TNAGT5A | 45.000 | | 1.76 | 79.20 | 1.40 | 1.85 | 2 | TOP SLAB | 5.50 | 1.76 | 1 | BOTTOM SLAB | 11.00 | | | |
| TNAGT5B | 45.000 | | ③ | 1.52 | 68.40 | 1.40 | 1.85 | 2 | TOP SLAB | 5.50 | 1.52 | 1 | BOTTOM SLAB | 11.00 | | |

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 | -- |

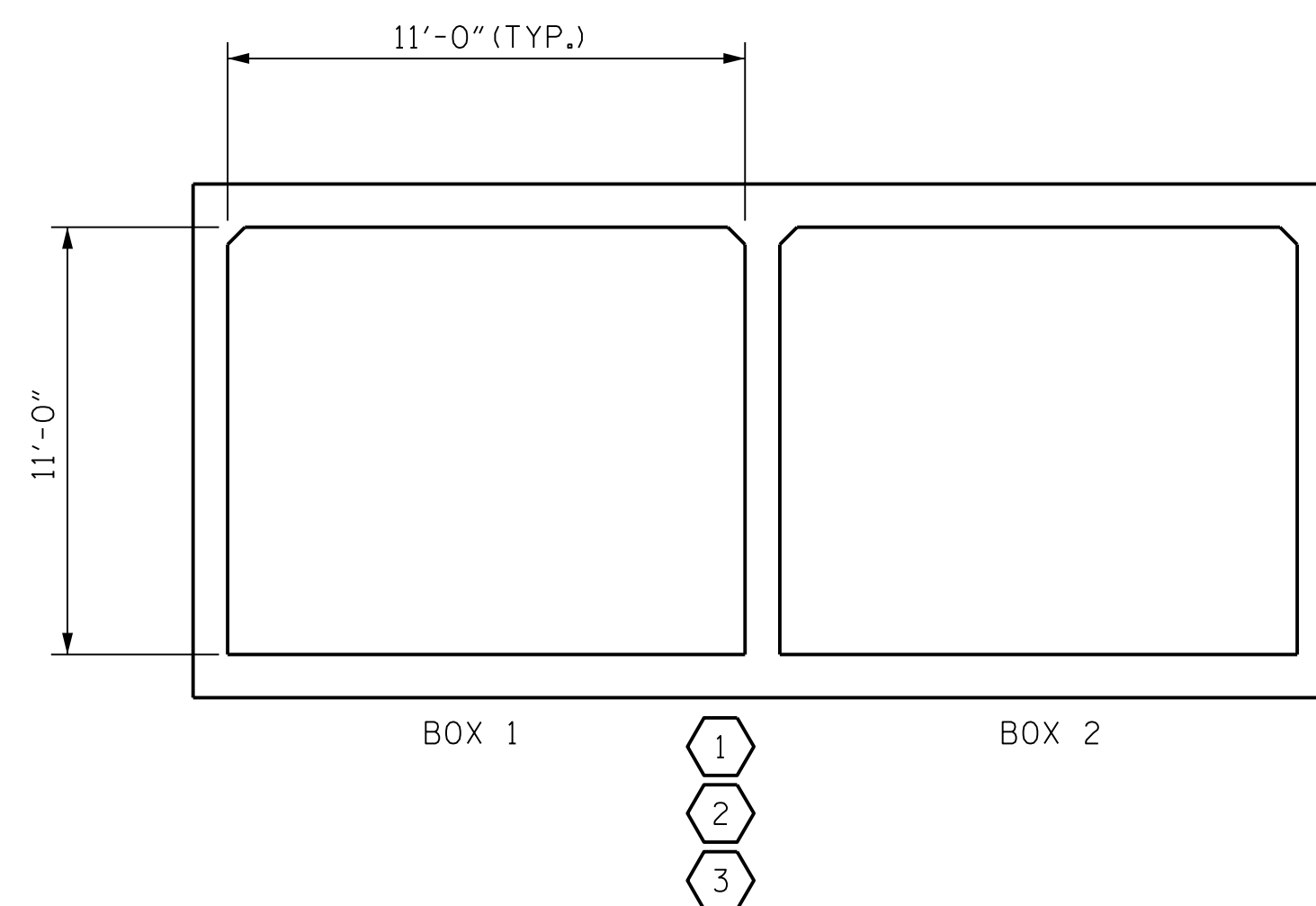
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

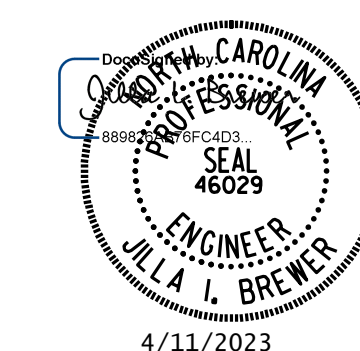
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| | |
|-------------------------------|----------------------------|
| ① | CONTROLLING LOAD RATING |
| ② | DESIGN LOAD RATING (HL-93) |
| ③ | DESIGN LOAD RATING (HS-20) |
| ④ | LEGAL LOAD RATING ** |
| ** SEE CHART FOR VEHICLE TYPE | |



PROJECT NO. U-5312
WILKES COUNTY
 STATION: 179+42.00 -L-

SHEET 2 OF 8



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**

MI ENGINEERING
 1011 SCHAUB DRIVE, SUITE 100
 RALEIGH, NC 27606
 (919) 851-6606
 FIRM PE NUMBER: P-0671

| REVISIONS | | | | | | SHEET NO. |
|-----------|-----|-------|-----|-----|-------|----------------|
| NO. | BY: | DATE: | NO. | BY: | DATE: | |
| 1 | | | 3 | | | C1-2 |
| 2 | | | 4 | | | TOTAL SHEETS 8 |

LRFR SUMMARY
(LOOKING DOWNSTREAM)

| | |
|--|---------------------|
| ASSEMBLED BY: B.E. LANNING | DATE: 04/2022 |
| CHECKED BY: J.I. BREWER | DATE: 09/2022 |
| DESIGN ENGINEER OF RECORD: J.I. BREWER | DATE: 09/2022 |
| DRAWN BY: WMC 7/II | REV. 10/1/II MAA/GM |
| CHECKED BY: GM 7/II | REV. 12/17 MAA/THC |