

7/11/2017 3:16:57 PM I:\Projects\4016617\000\50_Deliverables & Submittals\U-4751\Structures\Culverts\CU #2\410_003_U4751_SML_CU_002_640002.dgn

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 | 1.14 | -- | 1.75 | 1.14 | 1 | TOP SLAB | 6.17 | 1.28 | 1 | BOTTOM SLAB | 1.33 | | |
| | HL-93 (OPERATING) | N/A | | 1.48 | -- | 1.35 | 1.48 | 1 | TOP SLAB | 6.17 | 1.66 | 1 | BOTTOM SLAB | 1.33 | | |
| | HS-20 (INVENTORY) | 36.000 | ② | 1.60 | 57.600 | 1.75 | 1.60 | 1 | TOP SLAB | 6.17 | 1.79 | 1 | BOTTOM SLAB | 1.33 | | |
| | HS-20 (OPERATING) | 36.000 | | 2.07 | 74.520 | 1.35 | 2.07 | 1 | TOP SLAB | 6.17 | 2.32 | 1 | BOTTOM SLAB | 1.33 | | |
| LEGAL LOAD RATING | SINGLE VEHICLE (SV) | SNSH | 13.500 | | 2.90 | 39.150 | 1.40 | 2.90 | 1 | TOP SLAB | 6.17 | 3.25 | 1 | BOTTOM SLAB | 1.33 | |
| | | SNGARBS2 | 20.000 | | 2.72 | 54.400 | 1.40 | 2.72 | 1 | TOP SLAB | 6.17 | 3.04 | 1 | BOTTOM SLAB | 1.33 | |
| | | SNAGRIS2 | 22.000 | | 2.90 | 63.800 | 1.40 | 2.90 | 1 | TOP SLAB | 6.17 | 3.25 | 1 | BOTTOM SLAB | 1.33 | |
| | | SNCOTTS3 | 27.250 | | 2.55 | 69.488 | 1.40 | 2.55 | 1 | TOP SLAB | 6.17 | 2.85 | 1 | BOTTOM SLAB | 1.33 | |
| | | SNAGRS4 | 34.925 | | 2.13 | 74.390 | 1.40 | 2.13 | 1 | TOP SLAB | 6.17 | 2.39 | 1 | BOTTOM SLAB | 1.33 | |
| | | SNS5A | 35.550 | | 2.37 | 84.254 | 1.40 | 2.37 | 1 | TOP SLAB | 6.17 | 2.66 | 1 | BOTTOM SLAB | 1.33 | |
| | | SNS6A | 39.950 | | 2.36 | 94.282 | 1.40 | 2.36 | 1 | TOP SLAB | 6.17 | 2.65 | 1 | BOTTOM SLAB | 1.33 | |
| | | SNS7B | 42.000 | | 2.48 | 104.160 | 1.40 | 2.48 | 1 | TOP SLAB | 6.17 | 2.78 | 1 | BOTTOM SLAB | 1.33 | |
| | TRUCK TRACTOR SEMI-TRAILER (TTST) | TNAGRIT3 | 33.000 | | 2.33 | 76.890 | 1.40 | 2.33 | 1 | TOP SLAB | 6.17 | 2.61 | 1 | BOTTOM SLAB | 1.33 | |
| | | TNT4A | 33.075 | | 2.63 | 86.987 | 1.40 | 2.63 | 1 | TOP SLAB | 6.17 | 2.94 | 1 | BOTTOM SLAB | 1.33 | |
| | | TNT6A | 41.600 | | 2.57 | 106.912 | 1.40 | 2.57 | 1 | TOP SLAB | 6.17 | 2.88 | 1 | BOTTOM SLAB | 1.33 | |
| | | TNT7A | 42.000 | | 2.78 | 116.760 | 1.40 | 2.78 | 1 | TOP SLAB | 6.17 | 3.12 | 1 | BOTTOM SLAB | 1.33 | |
| | | TNT7B | 42.000 | | 2.78 | 116.760 | 1.40 | 2.78 | 1 | TOP SLAB | 6.17 | 3.12 | 1 | BOTTOM SLAB | 1.33 | |
| | | TNAGRIT4 | 43.000 | ③ | 2.02 | 86.860 | 1.40 | 2.02 | 1 | TOP SLAB | 6.17 | 2.26 | 1 | BOTTOM SLAB | 1.33 | |
| | | TNAGT5A | 45.000 | | 2.15 | 96.750 | 1.40 | 2.15 | 1 | TOP SLAB | 6.17 | 2.41 | 1 | BOTTOM SLAB | 1.33 | |
| TNAGT5B | 45.000 | | 2.15 | 96.750 | 1.40 | 2.15 | 1 | TOP SLAB | 6.17 | 2.41 | 1 | BOTTOM SLAB | 1.33 | | | |

LOAD FACTORS:

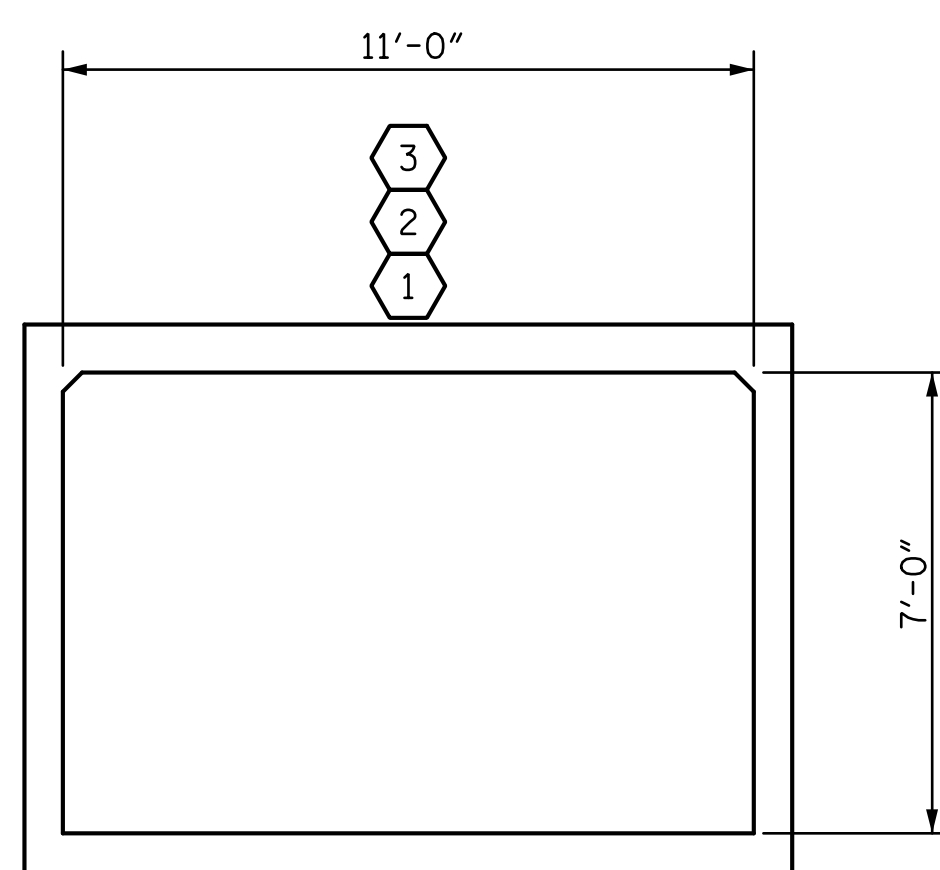
DESIGN LOAD RATING FACTORS

| 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-4751

NEW HANOVER COUNTY

STATION: 138+59.00 -L-

SHEET 2 OF 4

| DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED | | STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH STANDARD LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS (NON-INTERSTATE TRAFFIC) | | | | | | | | | | | | | | | | | | |
|--|---|--|-------------------|-----|-------|-----|-----|-------|---|--|--|---|--|--|---|--|--|---|--|--|
| | | REVISIONS | SHEET NO. C2-2 | | | | | | | | | | | | | | | | | |
| | STV ENGINEERS, INC. 900 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-5991 | <table border="1" style="width: 100%; border-collapse: collapse; font-size: x-small;"> <thead> <tr> <th>NO.</th> <th>BY:</th> <th>DATE:</th> <th>NO.</th> <th>BY:</th> <th>DATE:</th> </tr> </thead> <tbody> <tr> <td>1</td> <td></td> <td></td> <td>3</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td></td> <td></td> <td>4</td> <td></td> <td></td> </tr> </tbody> </table> | NO. | BY: | DATE: | NO. | BY: | DATE: | 1 | | | 3 | | | 2 | | | 4 | | |
| NO. | BY: | DATE: | NO. | BY: | DATE: | | | | | | | | | | | | | | | |
| 1 | | | 3 | | | | | | | | | | | | | | | | | |
| 2 | | | 4 | | | | | | | | | | | | | | | | | |

| | | |
|--|---|--|
| DRAWN BY : <u>JWJ</u> DATE : <u>5-17</u> | DESIGN ENGINEER OF RECORD: <u>J. JONES</u> DATE : <u>5-17</u> | |
| CHECKED BY : <u>BMC</u> DATE : <u>5-17</u> | | |