

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR STEEL GIRDERS

| LEVEL | VEHICLE | WEIGHT (W) (TONS) | CONTROLLING LOAD RATING # | MINIMUM RATING FACTORS (RF) | TONS = W x RF | STRENGTH I LIMIT STATE | | | | | | | | | | SERVICE II LIMIT STATE | | | | | COMMENT NUMBER | | | |
|--------------------------|--|-----------------------|---------------------------------|-----------------------------------|---------------|---|------------------------------|---------------|------|-----------------|---|------------------------------|---------------|------|-----------------|---|---|------------------------------|---------------|------|----------------|-----------------|---|----|
| | | | | | | MOMENT | | | | | SHEAR | | | | | MOMENT | | | | | | | | |
| | | | | | | LIVE-LOAD FACTORS (γ _{LL}) | DISTRIBUTION FACTORS (DF) | RATING FACTOR | SPAN | GIRDER LOCATION | DISTANCE FROM LEFT END OF SPAN (ft) | DISTRIBUTION FACTORS (DF) | RATING FACTOR | SPAN | GIRDER LOCATION | DISTANCE FROM LEFT END OF SPAN (ft) | LIVE-LOAD FACTORS (γ _{LL}) | DISTRIBUTION FACTORS (DF) | RATING FACTOR | SPAN | | GIRDER LOCATION | DISTANCE FROM LEFT END OF SPAN (ft) | |
| DESIGN LOAD RATING | HL-93 (INVENTORY) | N/A | ① | 1.09 | -- | 1.75 | -- | 1.17 | A | 4 | 95.42 | -- | 1.09 | B | 4 | 0.00 | 1.30 | -- | 1.66 | A | 4 | 95.42 | -- | |
| | HL-93 (OPERATING) | N/A | | 1.41 | -- | 1.35 | -- | 1.52 | A | 4 | 95.42 | -- | 1.41 | B | 4 | 0.00 | 1.00 | -- | 2.16 | A | 4 | 95.42 | -- | |
| | HS-20 (INVENTORY) | 36.000 | ② | 1.80 | 64.80 | 1.75 | -- | 1.83 | D | 4 | 86.73 | -- | 1.80 | D | 4 | 48.14 | 1.30 | -- | 2.59 | D | 4 | 86.73 | -- | |
| | HS-20 (OPERATING) | 36.000 | | 2.33 | 84.00 | 1.35 | -- | 2.37 | D | 4 | 86.73 | -- | 2.33 | D | 4 | 48.14 | 1.00 | -- | 3.37 | D | 4 | 86.73 | -- | |
| LEGAL LOAD RATING | SINGLE VEHICLE (SV) | SH | 12.500 | | 3.12 | 39.00 | 1.40 | -- | 3.12 | D | 4 | 19.95 | -- | 5.95 | D | 4 | 48.14 | 1.30 | -- | 4.37 | D | 4 | 19.95 | -- |
| | | S3C | 21.500 | | 2.05 | 44.08 | 1.40 | -- | 2.05 | D | 4 | 19.95 | -- | 3.51 | D | 4 | 48.14 | 1.30 | -- | 2.87 | D | 4 | 19.95 | -- |
| | | S3A | 22.750 | | 1.96 | 44.59 | 1.40 | -- | 1.96 | D | 4 | 19.95 | -- | 3.32 | D | 4 | 48.14 | 1.30 | -- | 2.74 | D | 4 | 19.95 | -- |
| | | S4A | 26.750 | | 1.72 | 46.01 | 1.40 | -- | 1.72 | D | 4 | 19.95 | -- | 2.87 | D | 4 | 48.14 | 1.30 | -- | 2.40 | D | 4 | 19.95 | -- |
| | | S5A | 30.500 | | 1.53 | 46.67 | 1.40 | -- | 1.53 | D | 4 | 19.95 | -- | 2.52 | D | 4 | 48.14 | 1.30 | -- | 2.15 | D | 4 | 19.95 | -- |
| | TRUCK TRACTOR SEMI-TRAILER (TTS) | S6A | 34.500 | | 1.38 | 47.61 | 1.40 | -- | 1.38 | D | 4 | 19.95 | -- | 2.23 | D | 4 | 48.14 | 1.30 | -- | 1.94 | D | 4 | 19.95 | -- |
| | | S7B | 38.500 | | 1.26 | 48.51 | 1.40 | -- | 1.26 | D | 4 | 19.95 | -- | 2.09 | B | 4 | 0.00 | 1.30 | -- | 1.76 | D | 4 | 19.95 | -- |
| | | S7A | 40.000 | ③ | 1.22 | 48.80 | 1.40 | -- | 1.22 | D | 4 | 19.95 | -- | 2.10 | B | 4 | 0.00 | 1.30 | -- | 1.71 | D | 4 | 19.95 | -- |
| | | T4A | 28.250 | | 1.64 | 46.33 | 1.40 | -- | 1.64 | D | 4 | 19.95 | -- | 2.77 | D | 4 | 48.14 | 1.30 | -- | 2.30 | D | 4 | 19.95 | -- |
| | | T5B | 32.000 | | 1.47 | 47.04 | 1.40 | -- | 1.47 | D | 4 | 19.95 | -- | 2.58 | B | 4 | 0.00 | 1.30 | -- | 2.07 | D | 4 | 19.95 | -- |
| FATIGUE | T6A | 36.000 | | 1.34 | 48.24 | 1.40 | -- | 1.34 | D | 4 | 19.95 | -- | 2.26 | D | 4 | 48.14 | 1.30 | -- | 1.87 | D | 4 | 19.95 | -- | |
| | T7A | 40.000 | ③ | 1.22 | 48.80 | 1.40 | -- | 1.22 | D | 4 | 19.95 | -- | 2.07 | B | 4 | 0.00 | 1.30 | -- | 1.71 | D | 4 | 19.95 | -- | |
| | T7B | 40.000 | | 1.23 | 49.20 | 1.40 | -- | 1.23 | D | 4 | 19.95 | -- | 2.07 | B | 4 | 0.00 | 1.30 | -- | 1.72 | D | 4 | 19.95 | -- | |
| FATIGUE | HL-93 (INVENTORY) | γ _{LL} =0.75 | | -- | | | | | | | | | | | | | | | | | | | | |

LOAD FACTORS:

| DESIGN LOAD RATING FACTORS | LIMIT STATE | γ _{DC} | γ _{DW} |
|-------------------------------------|-------------|-----------------|-----------------|
| | STRENGTH I | 1.25 | 1.50 |
| | SERVICE II | 1.00 | 1.00 |

NOTES:
 MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE II LIMIT STATES.
 ALLOWABLE STRESS FOR SERVICE II LIMIT STATE ARE AS REQUIRED FOR DESIGN.

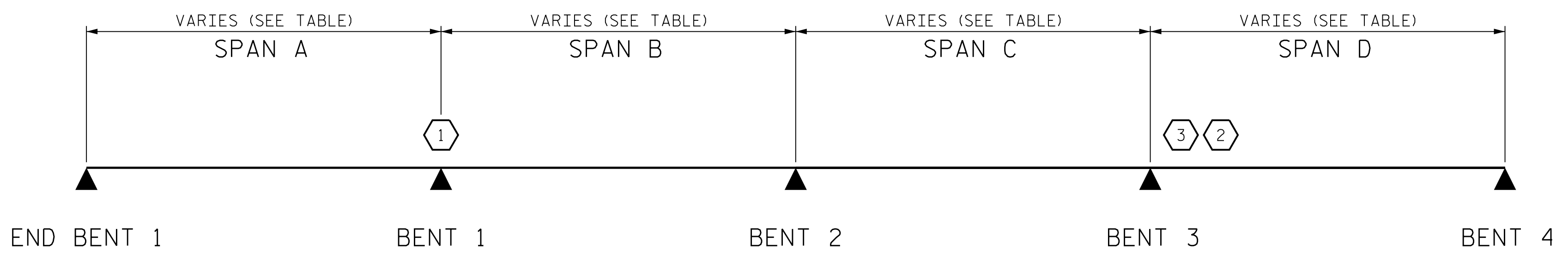
COMMENTS:
 1. THE ORIGINAL DESIGN AND RATING OF THIS BRIDGE WAS BASED ON AN INFLUENCE SURFACE ANALYSIS. LIVE LOAD DISTRIBUTION FACTORS WERE NOT USED AND ARE NOT PROVIDED.
 2. DISTANCE FROM LEFT END OF SPAN IS GIVEN WITH RESPECT TO CENTERLINE OF BEARING AND IS MEASURED ALONG THE CONTROLLING GIRDER.
 3. FATIGUE RATING IS NOT REQUIRED OR REPORTED SINCE GIRDER DESIGN DOES NOT INCLUDE FATIGUE-PRONE DETAILS.
 4. LARSA 4D VERSION 8.00 r8101 WAS USED FOR INFLUENCE SURFACE ANALYSIS.
 5. AS APPLICABLE FOR THIS UNIT, LEGAL LOAD RATING INCLUDES CONSIDERATION OF THE FOLLOWING (PER AASHTO MANUAL FOR BRIDGE EVALUATION, 3RD ED., 2018, 6A.4.4.2.1a):
 • 100% OF ONE LEGAL LOAD VEHICLE WITH NO LANE LOAD
 • 75% OF TWO LEGAL LOAD VEHICLES SEPARATED BY 30 FEET WITH 0.200 KLF LANE LOAD (NEGATIVE MOMENT ONLY)

③ CONTROLLING LOAD RATING

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

GIRDER LOCATION

GIRDER LOCATION IS PROVIDED USING GIRDER NUMBER, WHERE GIRDER 1 IS THE EXTERIOR GIRDER TO THE LEFT OF -Y15FLYBD-



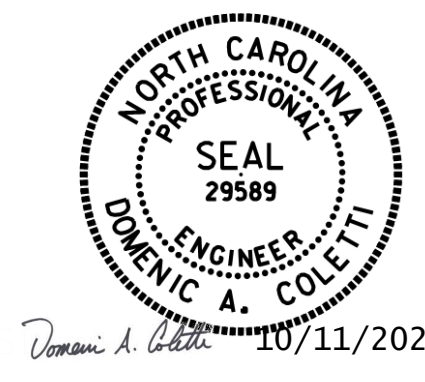
| C BRG - C BRG SPAN LENGTHS | | | | |
|----------------------------|--------------|--------------|--------------|--------------|
| GIRDER | SPAN A | SPAN B | SPAN C | SPAN D |
| 1 | 161'-9 3/4" | 166'-7 3/8" | 166'-7 3/8" | 141'-2 1/16" |
| 2 | 163'-1 1/8" | 167'-11" | 167'-11" | 142'-3 3/8" |
| 3 | 164'-4 9/16" | 169'-2 5/8" | 169'-2 5/8" | 143'-5 1/4" |
| 4 | 165'-8" | 170'-6 3/16" | 170'-6 3/16" | 144'-6 5/8" |

LRFR SUMMARY

PROJECT NO. U-2579AB
FORSYTH COUNTY
 STATION: 47+63.62 -Y15FLYBD-

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

**LRFR SUMMARY FOR
 STEEL GIRDERS
 (INTERSTATE TRAFFIC)
 (UNIT 1)**



| REVISIONS | | | | | | SHEET NO. S05-010 TOTAL SHEETS 116 |
|-----------|-----|-------|-----|-----|-------|---|
| NO. | BY: | DATE: | NO. | BY: | DATE: | |
| 1 | -- | -- | 3 | -- | -- | |
| 2 | -- | -- | 4 | -- | -- | |



**DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED**

PLOT DRIVER: NCDOT_pdf_color_eng-50dpi
 USER: PPETERSO DATE: 10/17/2021
 PENTABLE: NCDOT_STRUCTURES_DEFAULT_PEN.tbl
 TIME: 8:19:30 AM
 FILE: ...LRFR S

| | | | |
|----------------------------|--------------------|----------------------------|--------------------|
| DES BY: <u>S. NIFONG</u> | DATE: <u>10/19</u> | DWG BY: <u>B. PETERSON</u> | DATE: <u>10/19</u> |
| DES CHK: <u>G. SCHMITZ</u> | DATE: <u>10/19</u> | CHK BY: <u>G. SCHMITZ</u> | DATE: <u>10/19</u> |