

# Steel Beam End Spreadsheet v2

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## *Instruction Manual*

### **Contents**

|                                                  |   |
|--------------------------------------------------|---|
| Updates .....                                    | 2 |
| New to 2.4 .....                                 | 2 |
| New to 2.3 .....                                 | 2 |
| User Input Data .....                            | 2 |
| Basic Spreadsheet Organization & Operation ..... | 2 |
| Section Properties Input .....                   | 3 |
| Stiffened Inputs .....                           | 3 |
| UnStiffened Inputs .....                         | 3 |
| UnDefined Inputs .....                           | 3 |
| Loads .....                                      | 3 |
| Load Factors .....                               | 3 |
| BrR Automatic Import .....                       | 4 |
| Rating Factors .....                             | 6 |
| Review Results .....                             | 6 |
| Generate Input Review .....                      | 7 |
| Import Old Book .....                            | 7 |
| Method for Solution .....                        | 7 |
| Appendix .....                                   | 9 |
| Schematics .....                                 | 9 |
| Mathcad Sample Calculations .....                | 9 |
| Beam End Spreadsheet Sample .....                | 9 |

## Updates

### New to 2.4

- [Input Review Report XML](#)  
Input Review Report is now an XML report versus a plain text report.
- [Detailed and Summary Ratings](#)  
The rating output has the ability to show detailed or summary ratings.
- [Workbook Activation Method](#)  
The program is now a read-only xlsx workbook as-opposed to the template workbook.
- Plus additional minor improvements
  - Sorting of Beam End IDs
  - Bug Fixes
    - Undefined system and condition factors
    - Eccentricity formula

### New to 2.3

- [UnDefined Beam Ends](#)  
Now supports custom capacity checks for special beam ends.
- [Multiple BrR LRFRReports](#) for reactions  
Now supports batched BrR runs.
- [Import Old Book](#)  
Feature can be used to bring in input data store in older versions of the spreadsheet.
- [Generate Input Review](#)  
The Input Review replaces printing to PDF select spreadsheet tabs to add to the load rating report.
- Localized Section Loss Analysis for Stiffened Webs  
A new check was added to analyze the compressive resistance of the area with localized section loss for stiffened webs. Note that a new input variable is required: Stiffened Inputs -> H.loss.
- Plus additional minor improvements
  - Default XML path will direct to AASHTOWare BrR 6.8 Folder vs 6.7 folder
  - Auto filter, Sorting & Clearing contents before runs
  - Bug fixes
  - More behind the scenes improvements

## User Input Data

This section discusses how the user will use the spreadsheet to compute ratings. At the end of this document there are PDFs of each sheet of the Beam End Spreadsheet with samples of inputted values.

## Basic Spreadsheet Organization & Operation

The spreadsheet is designed to analyze multiple beam ends. Each row of each sheet corresponds to one beam end. Each beam end is identified by three criteria: Span, Member, and Support. Each sheet starts

with these three columns; all the inputs in that row are specific to that beam end. The order of the beam ends does not need to be the same on each sheet. There shall be no blank rows between inputs, the program will terminate when it encounters a blank row. The preferred nomenclature for the Beam End Identification is the bridge logging convention based on the most recent bridge inspection report, this nomenclature can be observed in the [Sample](#).

The workbook will be required to be activated by inputs can be made. The activation process will save a copy of the Beam End Spreadsheet and necessary data files (BE-AppData) to the users References File for the Bridge. Click **Start** on the [Introduction](#) tab and follow the on-screen instructions.

## Section Properties Input

### Stiffened Inputs

The [Stiffened Inputs](#) tab is used to input the beam's original section properties and section losses for beam ends with bearing stiffeners. For the input of these variables see [Schematics](#) S-BE.1, S-BE.2 and S-BE.3.

### UnStiffened Inputs

The [UnStiffened Inputs](#) tab is used for the inputs for the beam's original section properties and section losses for beams ends without bearing stiffeners. For the input of these variables see the [Schematic](#) S-BE.4 and S-BE.5.

### UnDefined Inputs

The [UnDefined Inputs](#) tab is used for the inputs for beam ends/reactional forces that are not supported by Stiffened and UnStiffened modules. The UnDefined module can be used to analyze bolsters, asymmetric sections, or beam ends with severe localized corrosion where typical methods may not be applicable. Capacities and section properties must be computed outside of the spreadsheet and input into each corresponding column. Leaving  $R_e$  (eccentricity ratio) blank will omit consideration of the axial load magnification, which is used to account for eccentricities caused by end conditions and localized corrosion.

## Loads

The [Loads](#) tab is used to input the reaction at each beam end. Either manual entry or BrR Automatic Import is supported. For instructions, see [BrR Automatic Import](#).

## Load Factors

The [Load Factors](#) tab is used to input the Strength Load Factors for each beam end and each loading. Either manual entry or automatic generations of the load factors are supported. For automatic generation a separate spreadsheet is used, "Permit Truck Live Load Factor\_v1.1.xltm". This spreadsheet can be found within the Beam End Spreadsheet Package. The Live Load Factors are dependent on Analysis Type, ADTT, and Structure Length; enter this information in the orange boxes prior to pressing the **Generate Live Load Factors** button. Please note if any of these fields are blank, live load factors will be computed as if those values were a zero.

## BrR Automatic Import

The BrR Control tab is used to automatically import the reaction forces generated by BrR into the spreadsheet. The inputs for this sheet is not required if the user intends to manually input the reaction loads for on the Loads tab.

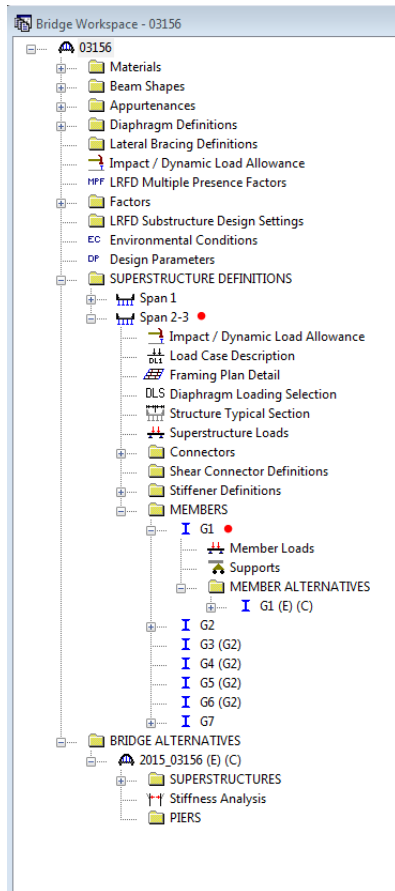
For computational intensive BrR models sometimes batch runs of the BrR model is required. Repeat steps 3 to 6 below to import multiple LRFR Reports for each BrR run. For every LRFR Report import, besides the first one, a new tab will be created.

1. In the BrR Control tab, click the **Populate IDs** button to populate the Beam End Identification columns with the data input by the user in the Stiffened Inputs tab, UnStiffened Inputs tab, and/or UnDefined Inputs tab.
2. The user will then need to link the Beam End Identification columns to the BrR Beam Identification columns, respectively. The reason for this is that the spreadsheet may use a different identification logging and naming convention then used in BrR. Below is an example on how to link IDs.

In this example, the span configuration is 3 spans, Span 1 is simple, and Span 2-3 is a two span continuous, the input would look like this:

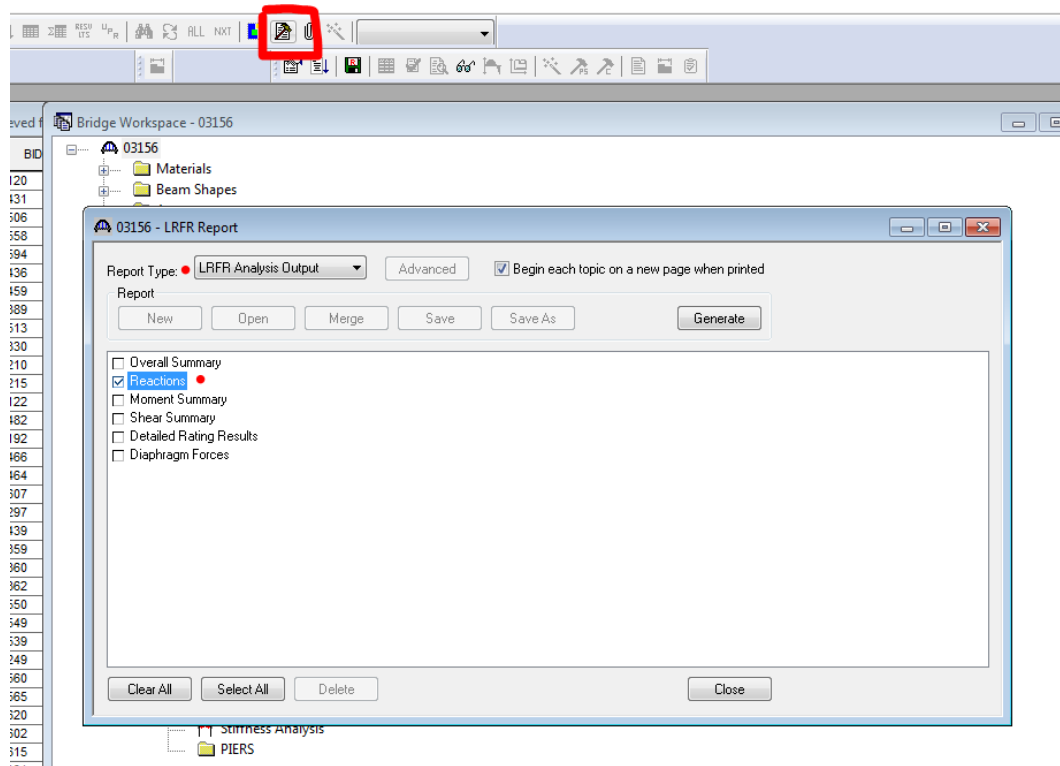
|    | A                       | B                | C                                                                    | D                              | E                  | F                                     |
|----|-------------------------|------------------|----------------------------------------------------------------------|--------------------------------|--------------------|---------------------------------------|
| 1  | <-Inputs                | Loads->          | <b>BrR Control</b>                                                   |                                | Bridge             | 00000                                 |
| 2  |                         | LRFR Report Path | D:\Users\patriacm\Documents\AASHTOWARE\BrDR68\Reports\LRFRReport.XML |                                | User               | Pontis                                |
| 3  |                         |                  |                                                                      |                                | Rundate            | Wednesday, February 01, 2017 14:53:13 |
| 4  | Top                     | Populate IDs     | Default XML Path                                                     | Custom XML Path                | Import LRFR Report | Save XML Report                       |
| 5  | Beam End Identification |                  |                                                                      | AASHTOWare Beam Identification |                    |                                       |
| 6  | Span                    | Member           | Support                                                              | Superstructure Definition      | Member             | Support                               |
| 7  | 1                       | G4               | S Abut                                                               | Span 1                         | G4                 | 1                                     |
| 8  | 1                       | G2               | Pier 1                                                               | Span 1                         | G2                 | 2                                     |
| 9  | 2                       | G3               | Pier 1                                                               | Span 2-3                       | G3                 | 1                                     |
| 10 | 3                       | G5               | N Abut                                                               | Span 2-3                       | G5                 | 3                                     |

The BrR Beam Identification (Superstructure Definition, Member, and Support) must exactly match BrR inputted values.



Note that the Member is the name by the red dot above, and not the Member Alternative name.

3. The user should run the BrR model and generate all applicable LRFR Reports for Reactions, as shown in the screen image below.



4. The user shall set the LRFR Report Path to the report location by either the **Default XML Path** or **Custom XML Path** buttons. The **Default XML Path** button will set the path to the default location on the user's machine, this button will only work correctly if the BrR report path is set to the users "D" drive my documents folder as on the state in-house engineer machine for BrR 6.8. If BrR is not defaulted to this location, or accessing a previously saved LRFR Report, use the **Custom XML Path** button.
5. The user shall click the **Import LRFR Report** button, which will import the reactions into the LRFRReport tab. This tab will unhide itself when the **Import LRFR Report** button is pressed.
6. The **Save XML Report** button is used to save the LRFRReport for future use. Include this file in the References folder upon submission.
7. Select the Loads tab and click the **Populate IDs** button, then click the **Import BrR Reactions** button to import the reactions from the LRFRReport tab to the Loads tab.

## Rating Factors

The final step is to select the Rating Factors tab and click **Compute Rating Factors** button.

## Review Results

The ratings for each vehicle and beam end can be found on the Rating Factors tab. There are two different options to display ratings, Detailed and Summary.

Selecting the 'Detail Ratings' option will output beam end rating factors for all failure mechanisms for each vehicle for a particular beam end.

Selecting the 'Summary Ratings' option will only output the controlling beam end rating factors for each beam end per vehicle. Please note that failure mechanism between Stiffened, UnStiffened and Undefined will be enveloped and only the controlling Rating Factor for each vehicle will be displayed per Beam End ID. The 'Summary Ratings' option is selected by default.

Please note that an XML data file will be created in the BE-AppData folder with all ratings included.

To review the intermediate calculation values go to the UnStiffened Outputs tab and/or the Stiffened Outputs tab.

To review the governing rating factor for each vehicle go to the Governing Ratings tab.

To review the Legal and Permit ratings less than 1.0 for the Report, go to the Low Legal and Low Permit tabs, respectively.

## Generate Input Review

After the beam end rating is complete, navigate to the Governing Ratings tab and press the **Generate Input Review** button. Print to PDF the generated Beam End Spreadsheet Input Review report from Internet Explorer. Note that the Input Review report will open in the Windows default program to view XML files; typically Internet Explorer is the default XML viewer. The XML report may not display correctly in other XML viewers. If the XML report opens in a program other than Internet Explorer and does not appear to be displaying correctly, navigate to the BE-AppData folder and open with 'BE-InputReview\_v2.xml' in Internet Explorer.

Tip: Enabling 'Print Background Colors and Images' in Internet Explorer will display the table header background colors when printing to PDF. This option is within the Page Setup dialog box.

## Import Old Book

The inputs of an older version of the Beam End Spreadsheet can be imported into the current version of the Beam End Spreadsheet. Open a new Beam End Spreadsheet, navigate to the Revision tab and click the **Import Input Values** button to select the file path of an older Beam End Spreadsheet. After the import is complete, the spreadsheet will automatically activate and the user will be prompted to save.

When updating it is recommended that rerunning the BrR automatic input on the Loads tab will provide the control vehicle configuration (lanes and truck pairs) in the Governing Ratings tab.

## Method for Solution

Mathcad worksheets are provided within the BE-References folder within the Beam End Package, and also provided in the Sample Calculation Section in the appendixes of this document. These Mathcad worksheets serve as a verification that the spreadsheet is working correctly, by providing a "proof" or "sample" calculation. This section also serves to help the load rating engineer (LRE) understand the individual inputs and outputs of the spreadsheet related to the actual analysis. The LRE should be able to easily follow the calculations to determine if the methods used are appropriate for a specific beam end. It is the LRE's responsibility to agree with the methods used herein, and shall accept ownership of

the calculations, as with any other software the LRE uses to perform their tasks. The LRE may contact the Load Rating Section by messaging: [DOT.BridgeRating@ct.gov](mailto:DOT.BridgeRating@ct.gov) with questions, improvements, or bugs to the analysis.

The LRE may modify the Mathcad worksheets to customize the analysis for any specific conditions the LRE believes it warrants. In this case the LRE shall document the reasons why the Mathcad worksheets were modified within the "Description" section of the worksheet, and add " – Modified" to the title of the Mathcad worksheet. The capacity information should then be inputted to the Beam End Spreadsheet, UnDefined Input tab.

## **Appendix**

### **Schematics**

- S-BE.1 Stiffened Web Original Section
- S-BE.2 Stiffened Web Localized Section Loss
- S-BE.3 Stiffened Web Uniform Loss
- S-BE.4 UnStiffened Web Original Section
- S-BE.5 UnStiffened Web Section Loss

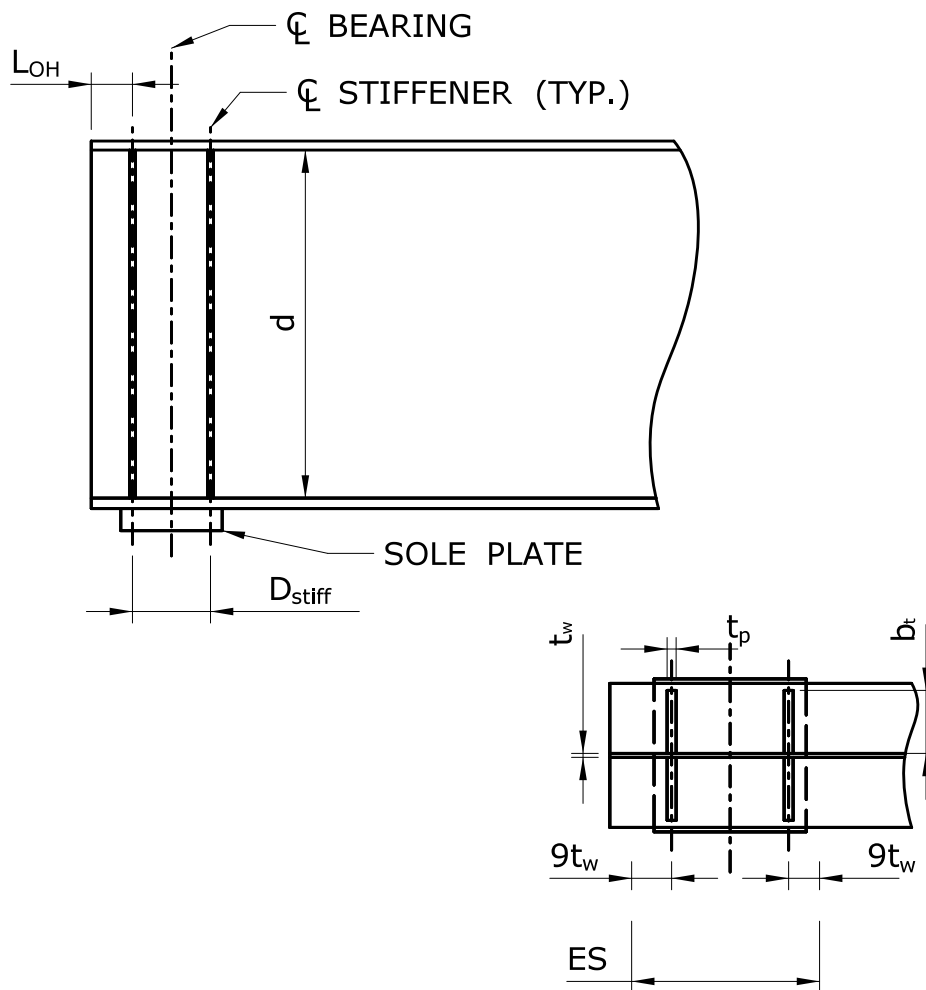
### **Mathcad Sample Calculations**

- Stiffened Web
- Stiffened Web – Localized Loss Region
- UnStiffened Web where Web Crippling Controls
- UnStiffened Web where Web Local Yielding Controls

### **Beam End Spreadsheet Sample**

- Introduction
- Revision
- Stiffened Web Inputs
- UnStiffened Web Inputs
- UnDefined Inputs
- BrR Control
- Loads
- Load Factors
- Rating Factors
- Governing Ratings
- Low Legal
- Low Permit
- Stiffened Web Capacity Outputs
- UnStiffened Web Capacity Outputs
- Beam End Spreadsheet Input Review Report

### **Input Review Report**



where:

- $L_{OH}$  Distance from the centerline of the end bearing stiffener to the girder end  
 $d$  Web depth, inside distance between flanges  
 $t_w$  Original web thickness  
 $t_p$  Original bearing stiffener thickness  
 $b_t$  Original stiffener width  
 $ES$  Effective column section  
 $D_{stiff}$  Distance between outer bearing stiffeners  
 if  $N_p = 1$ , set  $D_{stiff} = 0$   
 $N_p$  Number of stiffener pairs

NOTE:

The effective section is composed of a centrally located strip of web between the outer bearing stiffeners plus nine times the thickness of the web on each side of the outer stiffeners.

**CTDOT**  
**BLRM**  
 RATING AID

BLRM v2.0

**STIFFENED WEB**  
**ORIGINAL GIRDER SECTION**

Issue Date:

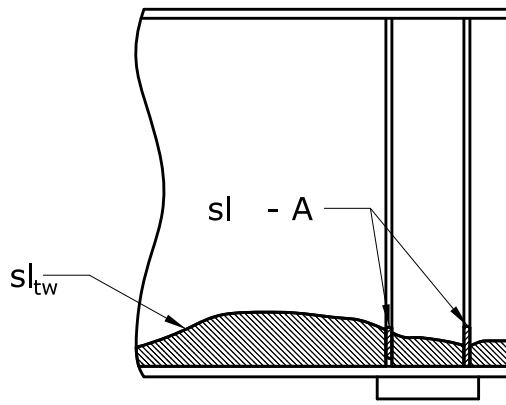
-

Revision Date:

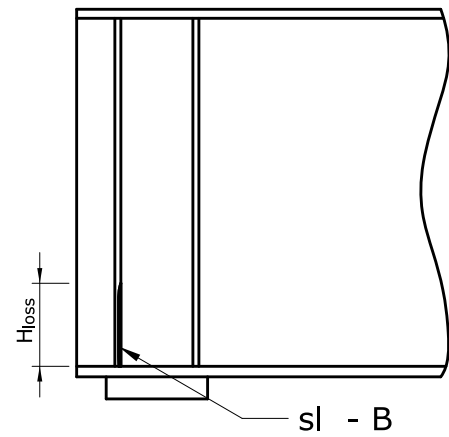
-

Plate ID:

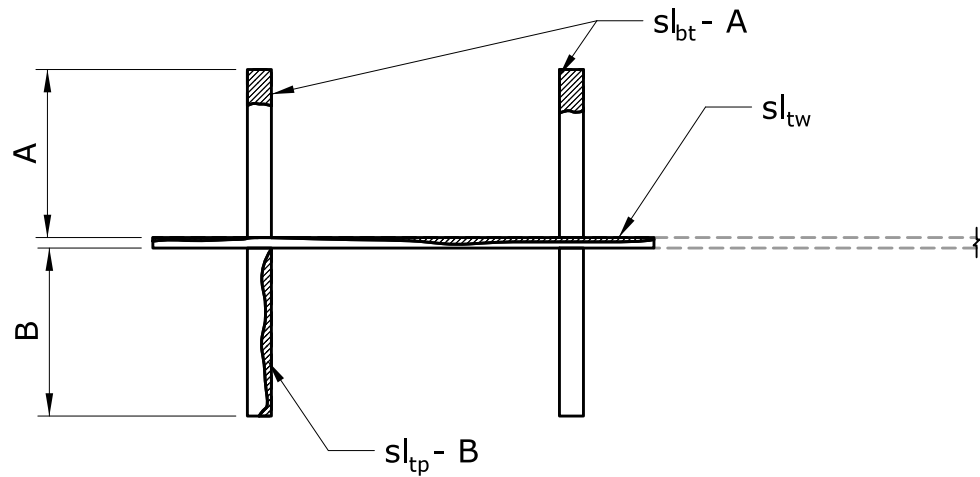
**S-BE.1**



ELEVATION A



ELEVATION B



where:

A Group A, stiffeners to the left of the web  
 B Group B, stiffeners to the right of the web  
 $sl_{bt} - A$  Width section loss of stiffeners in Group A  
 $sl_{tp} - A$  Thickness section loss of stiffeners in Group A  
 $sl_{bt} - B$  Width section loss of stiffeners in Group B  
 $sl_{tp} - B$  Thickness section loss of stiffeners in Group B  
 $sl_{tw}$  Thickness section loss of web  
 $H_{loss}$  Height of localized corrosion

NOTE:

Losses are computed in percentages against the original gross section for each group and each dimension.

CTDOT  
 BLRM

RATING AID

BLRM v2.0

STIFFENED WEB  
 LOCALIZED SECTION LOSS

Issue Date:

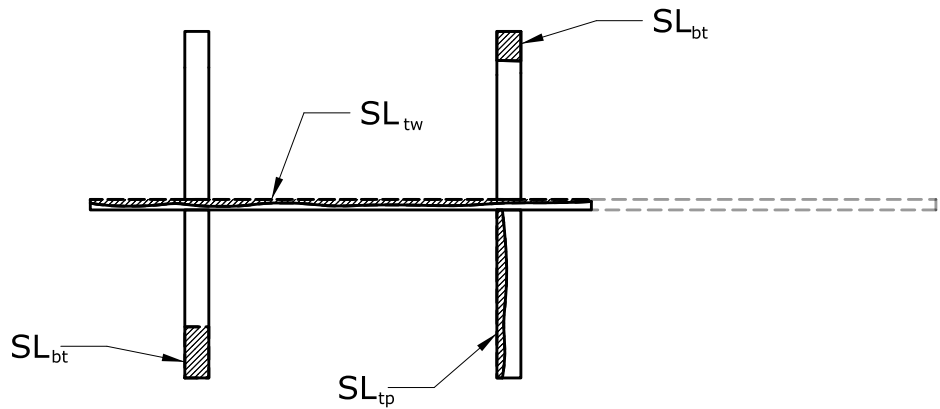
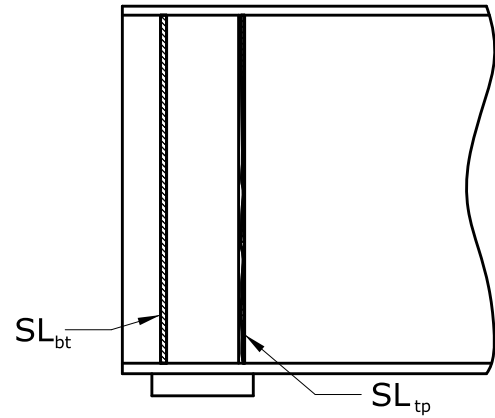
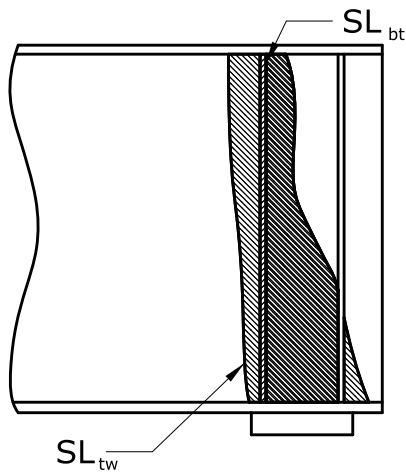
-

Revision Date:

-

Plate ID:

S-BE.2



where:

- $SL_{tw}$  Thickness section loss to the web
- $SL_{bt}$  Width section loss to the stiffeners
- $SL_{tp}$  Thickness section loss of the stiffeners

#### NOTES:

1. Losses are computed in percentages against the gross section for each dimension. Losses applied to the stiffener are assumed to be equally distributed amongst all stiffener elements.
2. Computed losses to the web should be limited to the deterioration within the effective section.

**CTDOT**  
**BLRM**  
RATING AID

BLRM v2.0

**STIFFENED WEB**  
**UNIFORM LOSS**

Issue Date:

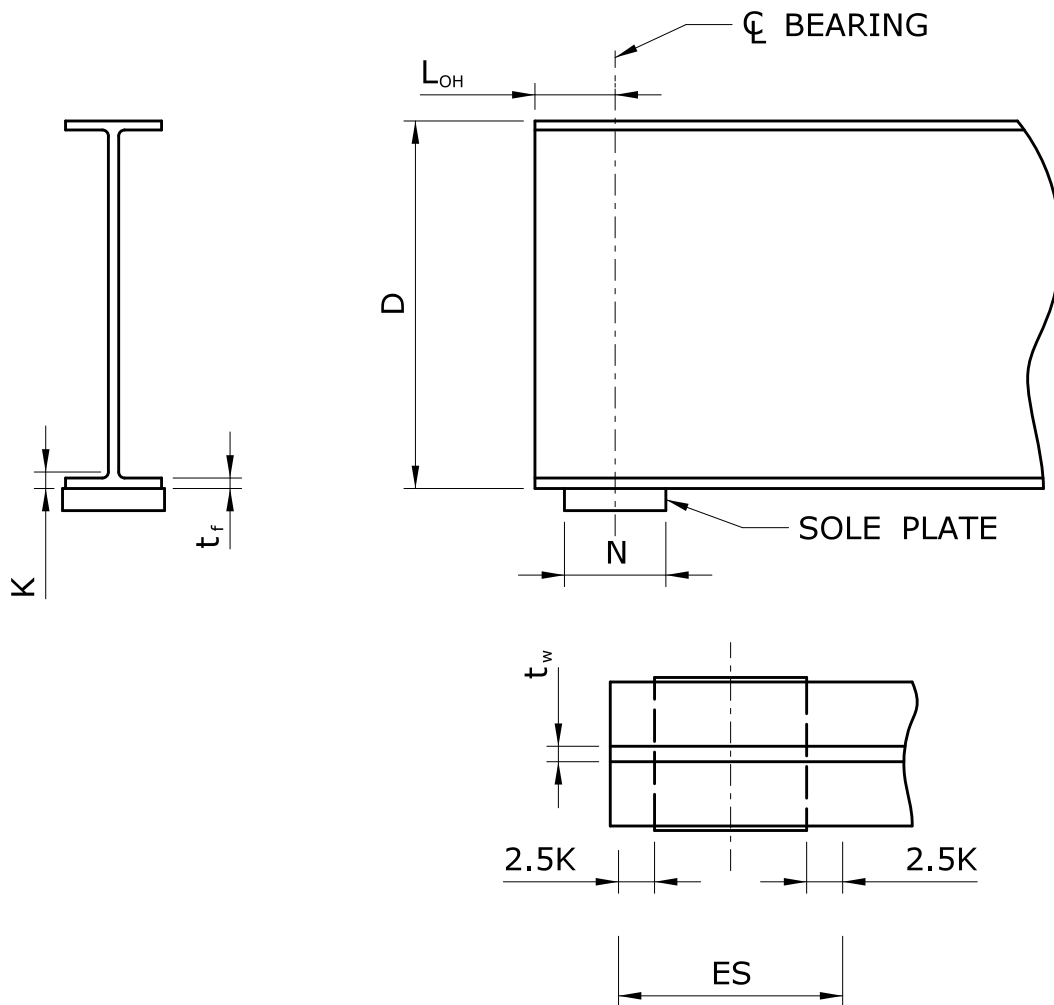
-

Revision Date:

-

Plate ID:

**S-BE.3**



where:

- $L_{OH}$  Distance from the centerline of bearing to the girder end
- $D$  Depth of the section, out-to-out of flanges
- $N$  Bearing/Sole plate length
- $t_f$  Original bottom flange thickness
- $K$  Bottom flange + fillet thickness
- $t_w$  Original web thickness
- $ES$  Effective column section

**CTDOT**  
**BLRM**

RATING AID

BLRM v2.0

**UNSTIFFENED WEB**  
**ORIGINAL SECTION**

Issue Date:

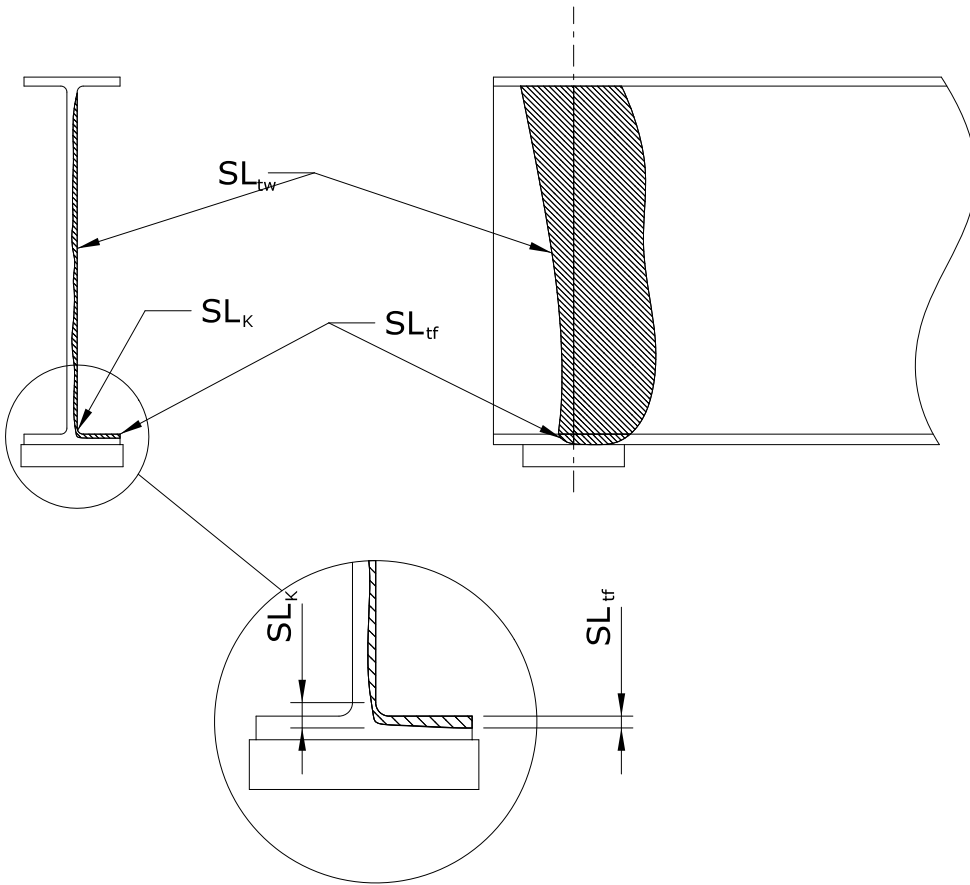
-

Revision Date:

-

Plate ID:

**S-BE.4**



where:

$SL_{tw}$  Thickness section loss to the web

$SL_k$  Thickness section loss to the bottom flange + fillet

$SL_{tf}$  Thickness section loss to the bottom flange

**CTDOT**  
**BLRM**  
RATING AID

BLRM v2.0

**UNSTIFFENED WEB  
SECTION LOSS**

Issue Date:

-

Revision Date:

-

Plate ID:

**S-BE.5**



## Steel Beam Ends Load Rating-Stiffened Web

v1.1 3/10/2017

**Description:** The purpose of this worksheet is to compute rating factors for Steel Beams with bearing stiffeners, and provide a sample calculation for the approval of the CTDOT Beam End Spreadsheet v2.

**References:**

MBE - AASHTO The Manual for Bridge Evaluation 2nd ed. 2014 with 2016 Interim Revisions  
LRFD - AASHTO LRFD Bridge Design Specifications 7th ed. with 2016 Interim Revisions  
BLRM - CTDOT Bridge Load Rating Manual v1.0

Orange backgrounds signifies input regions

**Bridge:** 00000  
**Span:** 4  
**Girder:** 6  
**Location:** Pier 4

### Original Girder Section Properties

|                                   |                               |                                                                  |
|-----------------------------------|-------------------------------|------------------------------------------------------------------|
| Web Depth                         | $d := 54\text{in}$            | Inside Flange to Flange distance                                 |
| Web Thickness                     | $t_w := \frac{3}{8}\text{in}$ |                                                                  |
| Web Yield Strength                | $F_{yw} := 33\text{ksi}$      |                                                                  |
| Modulus Elasticity of Steel       | $E := 29000\text{ksi}$        |                                                                  |
| Minimum End Length                | $L_{OH} := 8\text{in}$        | Distance from end of beam to 1st bearing stiffener from beam end |
| Stiffener Thickness               | $t_p := \frac{5}{8}\text{in}$ |                                                                  |
| Stiffener Projecting Width        | $b_t := 7\text{in}$           |                                                                  |
| Number of Stiffener Pairs         | $N_p := 1$                    |                                                                  |
| Stiffener Yield Strength          | $F_{ys} := 33\text{ksi}$      |                                                                  |
| Distance Between Outer Stiffeners | $D_{stiff} := 0\text{in}$     |                                                                  |
| Connection                        | Connection := "Welded"        | [None, Welded, Bolted]                                           |
| Fit                               | Fit := "Welded"               | [Welded, Fitted]                                                 |

\*Note Beam Ends not rated based on Stiffener Bearing Resistance.

**Section Loss***Uniform Corrosion*

|                          |                  |
|--------------------------|------------------|
| Web Thickness Loss       | $SL_w := 0\%$    |
| Stiffener Thickness Loss | $SL_{tp} := 0\%$ |
| Stiffener Width Loss     | $SL_{bt} := 0\%$ |

*Localized Corrosion*

|                                     |                     |
|-------------------------------------|---------------------|
| Stiffener Width Loss in group A     | $sl_{b,a} := 0\%$   |
| Stiffener Thickness Loss in group A | $sl_{t,a} := 10\%$  |
| Stiffener Width Loss in group B     | $sl_{b,b} := 0\%$   |
| Stiffener Thickness Loss in group B | $sl_{t,b} := 0\%$   |
| Web Thickness Loss                  | $sl_{t,w,l} := 0\%$ |

**As-Inspected Girder Section Properties**

Web Thickness  $t_w := t_w \cdot (1 - SL_w) = 0.375 \text{ in}$

Stiffener Thickness  $t_p := t_p \cdot (1 - SL_{tp}) = 0.625 \text{ in}$

Stiffener Width  $b_t := b_t \cdot (1 - SL_{bt}) = 7 \cdot \text{in}$

**LRFD Resistance Factors, MBE 6A.6.3 & LRFD 6.5.4.2**

For Bearing on Milled Surfaces

$\phi_b := 1.0$

For Axial Compression, Steel Only - (Dependent on Built Date)

$\phi_{comp} := 0.95$

**LRFR Factors**

System Factor, MBE 6A.4.2.4 & MBE Table 6A.4.2.4-1

$\phi_s := 1.0$

For All Other Girder Bridges and Slab Bridges

Condition Factor, MBE 6A.4.2.3 & MBE Table 6A.4.2.3-1

$\phi_c := 0.90$

Poor Condition + Increased by 0.05 for field measured losses, MBE C6A.4.2.3

**Beam Ends With Bearing Stiffeners, LRFD 6.10.11.2**

if(Connection = "None" , "This Section Not Applicable" , "This Section Applicable" ) = "This Section Applicable"

The following calculations are applicable only for Stiffened Beam Ends

**Bearing Resistance, LRFD 6.10.11.2.3-3**

if(Fit = "Fitted" , "This Section Applicable" , "This Section Not Applicable" ) = "This Section Not Applicable"

*Determine Area of Projecting Element*

$$A_{pn} := 2 \cdot N_p \cdot t_p \cdot b_t = 8.75 \text{ in}^2$$

*Compute Fitted End Bearing Resistance, LRFD 6.10.11.2.3-1 & 6.10.11.2.3-2*

$$R_{sb} := \phi_b \cdot 1.4 \cdot A_{pn} \cdot F_{ys} = 404.25 \text{ kip}$$

**Axial Resistance of Bearing Stiffeners, LRFD 6.10.11.2.4**

Effective Section, LRFD 6.10.11.2.4b

$$ES := \begin{cases} (D_{stiff} + 9 \cdot t_w + \min(9 \cdot t_w, L_{OH})) \cdot \min\left(1, \frac{F_{yw}}{F_{ys}}\right) & \text{if Connection = "Welded"} \\ t_p & \text{otherwise} \end{cases} = 6.75 \text{ in}$$

General Requirements, LRFD 6.10.11.2.4a

*Determine Moment of Inertia of Projecting Plate*

$$I_s := \frac{N_p \cdot t_p \cdot \left(2 \cdot b_t + \frac{t_w}{1 - SL_w}\right)^3 + (ES - t_p \cdot N_p) \cdot t_w^3}{12} = 154.738 \text{ in}^4$$

*Determine Gross Remaining Area*

$$A_g := 2N_p \cdot t_p \cdot b_t + ES \cdot t_w = 11.281 \text{ in}^2$$

*Determine Radius of Gyration*

$$r_s := \sqrt{\frac{I_s}{A_g}} = 3.704 \text{ in}$$

*Effective Length Factor, LRFD 6.10.11.2.4.a*

$$K_{eff} := 0.75$$

**Slender Member Elements, LRFD 6.9.4.2.2**

Per current AASHTO BDS, a Bearing Stiffener cannot be designed as slender. For Load Rating purposes a bridge does not need to meet the modern design standards; however, the reduced capacity of a slender Bearing Stiffener needs to be considered. As a result, the Element Reduction Factor is not always taken equal to 1.0 per LRFD C6.9.4.1.1.

**Check Bearing Stiffener Slenderness, LRFD 6.10.11.2.2 - Projecting Width**

$$\text{isSlenderStiff} := \text{if} \left( b_t \leq 0.48 t_p \cdot \sqrt{\frac{E}{F_{ys}}}, \text{"Compact"}, \text{"Slender"} \right) = \text{"Compact"}$$

**Check Web Slenderness between Stiffeners, LRFD 6.9.4.2.1-1**

$$\text{isSlenderWeb} := \begin{cases} \text{"N/A"} & \text{if } N_p = 1 \\ \text{otherwise} \\ \quad b \leftarrow \frac{D_{\text{stiff}}}{N_p - 1} \\ \quad k \leftarrow 1.49 \\ \quad \text{"Compact"} & \text{if } \frac{b}{t_w} \leq k \cdot \sqrt{\frac{E}{F_{yw}}} \\ \quad \text{"Slender"} & \text{otherwise} \end{cases} = \text{"N/A"}$$

**Determine Slender Element Reduction Factor, LRFD 6.9.4.2.2**

For outstanding legs of single angle; outstanding legs of double angles with separators; and all other Unstiffened Elements (Stiffener):

$$Q_s := \begin{cases} 1 & \text{if } \text{isSlenderStiff} = \text{"Compact"} \\ \frac{0.53 E}{F_{ys} \cdot \left( \frac{b_t}{t_p} \right)^2} & \text{if } \frac{b_t}{t_p} > 0.91 \cdot \sqrt{\frac{E}{F_{ys}}} \\ 1.34 - 0.76 \left( \frac{b_t}{t_p} \right) \cdot \sqrt{\frac{F_{ys}}{E}} & \text{otherwise} \end{cases} = 1$$

Stiffened Elements (Web):

$$Q_a := \begin{cases} 1 & \text{if } \text{isSlenderWeb} \neq \text{"Slender"} \\ \text{otherwise} \\ f \leftarrow Q_s \cdot F_{yw} \\ b \leftarrow \frac{D_{\text{stiff}}}{N_p - 1} \\ b_e \leftarrow \min \left[ b, 1.92 \cdot t_w \cdot \sqrt{\frac{E}{f}} \cdot \left[ 1 - \frac{0.34}{\left( \frac{b}{t_w} \right)} \cdot \sqrt{\frac{E}{f}} \right] \right] \\ A_{\text{eff}} \leftarrow A_g - (b - b_e) \cdot t_w \cdot (N_p - 1) \\ \text{return } \frac{A_{\text{eff}}}{A_g} \end{cases} = 1$$

Axial Compression, LRFD 6.9.2.1*Noncomposite Compression Members, LRFD 6.9.4*

$$Q := Q_s \cdot Q_a = 1$$

*Elastic Flexural Buckling Resistance, LRFD 6.9.4.1.2-1*

$$P_e := \frac{\pi^2 \cdot E}{\left( \frac{K_{\text{eff}} \cdot d}{r_s} \right)^2} \cdot A_g = 27001.356 \text{ kip}$$

*Determine Equivalent Nominal Yield Resistance, LRFD 6.9.4.1*

$$P_o := Q \cdot F_{ys} \cdot A_g = 372.281 \text{ kip}$$

*Determine  $P_n$ , LRFD 6.9.4.1-1 & 6.9.4.1.1-2*

$$P_n := \begin{cases} \left[ 0.658 \left( \frac{P_o}{P_e} \right) \right] \cdot P_o & \text{if } \frac{P_e}{P_o} \geq 0.44 \\ 0.877 \cdot P_e & \text{otherwise} \end{cases} = 370.139 \text{ kip}$$

Compressive Resistance of the Effective Section, LRFD 6.9.2.1-1

$$P_r := \phi_{\text{comp}} \cdot P_n = 351.632 \text{ kip}$$

**Loading**DC Load Factor  $\gamma_{DC} := 1.25$ DW Load Factor  $\gamma_{DW} := 1.50$ DC Load  $DC := 46\text{-kip}$ DW Load  $DW := 8.71\text{kip}$ 

| Vehicle     | Class     | Load Factor | Load (kip) |
|-------------|-----------|-------------|------------|
| HL-93       | Inventory | 1.75        | 64.66      |
| HL-93       | Operating | 1.35        | 64.66      |
| Type 3      | Legal     | 1.45        | 35.07      |
| Type 3S2    | Legal     | 1.45        | 43.05      |
| Type 3-3    | Legal     | 1.45        | 43.92      |
| SU4         | Legal     | 1.45        | 38.37      |
| SU5         | Legal     | 1.45        | 43.2       |
| SU6         | Legal     | 1.45        | 46.8       |
| SU7         | Legal     | 1.45        | 50.39      |
| Legal H20   | Legal     | 1.45        | 29.77      |
| Legal HS20  | Legal     | 1.45        | 49.23      |
| CT-L73.0    | Legal     | 1.45        | 50.88      |
| CT-L32S     | Legal     | 1.45        | 42.78      |
| CT-P76.5    | Permit    | 1.30        | 54.27      |
| CT-P120(6)  | Permit    | 1.35        | 70.84      |
| CT-P140(7)a | Permit    | 1.40        | 69.22      |
| CT-P140(7)b | Permit    | 1.40        | 65.72      |
| CT-P160(8)a | Permit    | 1.40        | 73.39      |
| CT-P160(8)b | Permit    | 1.40        | 75.93      |
| CT-P180(9)  | Permit    | 1.35        | 80.39      |
| CT-P200(10) | Permit    | 1.35        | 91.64      |
| CT-P380     | Permit    | 1.10        | 61.72      |

 $i := 0..21$

**Localized Corrosion Eccentricity Ratio, MBE C6A.6.5**

Distance From The N.A. To Extreme Fiber Of Original Section

$$c := b_t + \frac{t_w}{2} = 7.188 \text{ in}$$

Load Eccentricity In The Member From Corrosion

$$e := \frac{\frac{N_p \cdot t_p \cdot b_t^2}{2} \cdot \left[ (1 - sl_{t,a}) \cdot (1 - sl_{b,a})^2 - (1 - sl_{t,b}) \cdot (1 - sl_{b,b})^2 \right]}{t_p \cdot b_t \cdot \left[ (1 - sl_{t,a}) \cdot (1 - sl_{b,a}) + (1 - sl_{t,b}) \cdot (1 - sl_{b,b}) \right] + ES \cdot t_w \cdot (1 - sl_{t,w,l})} = -0.141 \text{ in}$$

Eccentricity Ratio

$$R_e := \frac{|e| c}{r_s^2} = 0.074$$

**Axial Load Magnification Due to Localized Corrosion, MBE I6A**Total Factored Axial Loading

$$P_{u_i} := \gamma_{DC} \cdot DC + \gamma_{DW} \cdot DW + \gamma_{LL_i} \cdot LL_i \cdot \text{kip}$$

Axial Load Magnification Factor, MBE I6A-1

$$\delta_{A_i} := \left( 1 + R_e \cdot \sec \left( \frac{K_{eff} \cdot d}{2} \cdot \sqrt{\frac{P_{u_i}}{E \cdot I_s}} \right) \right)$$

**Axial Load Magnification Output:**

| Vehicle     | Class     | Axial Load, Pu | $\delta.A$ |
|-------------|-----------|----------------|------------|
| HL-93       | Inventory | 183.72         | 1.07462075 |
| HL-93       | Operating | 157.86         | 1.07453216 |
| Type 3      | Legal     | 121.42         | 1.07440764 |
| Type 3S2    | Legal     | 132.99         | 1.07444714 |
| Type 3-3    | Legal     | 134.25         | 1.07445145 |
| SU4         | Legal     | 126.20         | 1.07442397 |
| SU5         | Legal     | 133.21         | 1.07444789 |
| SU6         | Legal     | 138.43         | 1.07446572 |
| SU7         | Legal     | 143.63         | 1.07448351 |
| Legal H20   | Legal     | 113.73         | 1.07438143 |
| Legal HS20  | Legal     | 141.95         | 1.07447776 |
| CT-L73.0    | Legal     | 144.34         | 1.07448594 |
| CT-L32S     | Legal     | 132.60         | 1.07444581 |
| CT-P76.5    | Permit    | 141.12         | 1.07447491 |
| CT-P120(6)  | Permit    | 166.20         | 1.07456072 |
| CT-P140(7)a | Permit    | 167.47         | 1.07456508 |
| CT-P140(7)b | Permit    | 162.57         | 1.0745483  |
| CT-P160(8)a | Permit    | 173.31         | 1.07458508 |
| CT-P160(8)b | Permit    | 176.87         | 1.07459726 |
| CT-P180(9)  | Permit    | 179.09         | 1.07460488 |
| CT-P200(10) | Permit    | 194.28         | 1.07465697 |
| CT-P380     | Permit    | 138.46         | 1.07446583 |

**Rating**

Determine Minimum Capacity

$$R_n := P_r = 351.632 \text{ kip}$$

\*Note Beam Ends not rated based on Stiffener Bearing

$$C := \max(0.85, \phi_s \cdot \phi_c) \cdot R_n = 316.469 \text{ kip}$$

Compute Ratings

$$RF_i := \frac{\frac{C}{\delta_{A_i}} - \gamma_{DC} \cdot DC - \gamma_{DW} \cdot DW}{\gamma_{LL_i} \cdot LL_i \cdot \text{kip}}$$

| Vehicle     | Class     | Rating |
|-------------|-----------|--------|
| HL-93       | Inventory | 1.97   |
| HL-93       | Operating | 2.56   |
| Type 3      | Legal     | 4.40   |
| Type 3S2    | Legal     | 3.58   |
| Type 3-3    | Legal     | 3.51   |
| SU4         | Legal     | 4.02   |
| SU5         | Legal     | 3.57   |
| SU6         | Legal     | 3.30   |
| SU7         | Legal     | 3.06   |
| Legal H20   | Legal     | 5.18   |
| Legal HS20  | Legal     | 3.13   |
| CT-L73.0    | Legal     | 3.03   |
| CT-L32S     | Legal     | 3.61   |
| CT-P76.5    | Permit    | 3.17   |
| CT-P120(6)  | Permit    | 2.34   |
| CT-P140(7)a | Permit    | 2.31   |
| CT-P140(7)b | Permit    | 2.43   |
| CT-P160(8)a | Permit    | 2.17   |
| CT-P160(8)b | Permit    | 2.10   |
| CT-P180(9)  | Permit    | 2.06   |
| CT-P200(10) | Permit    | 1.80   |
| CT-P380     | Permit    | 3.29   |



## **Steel Beam Ends Load Rating-Stiffened Web - Localized Region**

v1.1 3/10/2017

**Description:** The purpose of this worksheet is to compute rating factors for Steel Beams with bearing stiffeners, and provide a sample calculation for the approval of the CTDOT Beam End Spreadsheet v2. This Mathcad outlines the procedure used to analyze the localized area of the beam as a column within the column methodology. The localized analysis was added to the Beam End Spreadsheet starting in v2.3.

**Assumptions:** The localized corrosion is uniform about the each stiffener in the group for computing b/t ratios. The localized region will behave as an independent column with the height of the column equal to the height of the corrosion.

### **References:**

MBE - AASHTO The Manual for Bridge Evaluation 2nd ed. 2014 with 2016 Interim Revisions  
LRFD - AASHTO LRFD Bridge Design Specifications 7th ed. with 2016 Interim Revisions  
BLRM - CTDOT Bridge Load Rating Manual v1.0

Orange backgrounds signifies input regions

**Bridge:** 00000  
**Span:** 4  
**Girder:** 6  
**Location:** Pier 4

### **Original Girder Section Properties**

Web Depth  $d := 36\text{in}$  Inside Flange to Flange distance  
Web Thickness  $t_w := 0.25\text{in}$   
Web Yield Strength  $F_{yw} := 36\text{ksi}$   
Modulus Elasticity of Steel  $E := 29000\text{ksi}$   
Minimum End Length  $L_{OH} := 8\text{in}$  Distance from end of beam to 1st bearing stiffener from beam end  
Stiffener Thickness  $t_p := 0.5\text{in}$   
Stiffener Projecting Width  $b_t := 8\text{in}$   
Number of Stiffener Pairs  $N_p := 2$   
Stiffener Yield Strength  $F_{ys} := 32\text{ksi}$   
Distance Between Outer Stiffeners  $D_{stiff} := 6\text{in}$   
Connection  $\text{Connection} := \text{"Welded"}$   
[None, Welded, Bolted]  
Fit  $\text{Fit} := \text{"Welded"}$   
[Welded, Fitted]

\*Note Beam Ends not rated based on Stiffener Bearing Resistance.



### Section Loss

#### *Uniform Corrosion*

|                          |                  |
|--------------------------|------------------|
| Web Thickness Loss       | $SL_w := 0\%$    |
| Stiffener Thickness Loss | $SL_{tp} := 0\%$ |
| Stiffener Width Loss     | $SL_{bt} := 0\%$ |

#### *Localized Corrosion*

|                                     |                      |
|-------------------------------------|----------------------|
| Stiffener Width Loss in group A     | $sl_{b,a} := 0\%$    |
| Stiffener Thickness Loss in group A | $sl_{t,a} := 0\%$    |
| Stiffener Width Loss in group B     | $sl_{b,b} := 0\%$    |
| Stiffener Thickness Loss in group B | $sl_{t,b} := 10\%$   |
| Web Thickness Loss                  | $sl_{t,w,l} := 25\%$ |
| Height of Localized Corrosion       | $H_{loss} := 5in$    |



### **As-Inspected Girder Section Properties**

Web Thickness  $t_w := t_w \cdot (1 - sl_{t.w.l}) = 0.187 \text{ in}$

#### **Group A**

Stiffener Thickness  $t_{p.a} := t_p \cdot (1 - sl_{t.a}) = 0.5 \text{ in}$

Stiffener Width  $b_{t.a} := b_t \cdot (1 - sl_{b.a}) = 8 \text{ in}$

#### **Group B**

Stiffener Thickness  $t_{p.b} := t_p \cdot (1 - sl_{t.b}) = 0.45 \text{ in}$

Stiffener Width  $b_{t.b} := b_t \cdot (1 - sl_{b.b}) = 8 \text{ in}$

Height of Local Corrosion

$$d := H_{\text{loss}} = 5 \text{ in}$$



### **LRFD Resistance Factors, MBE 6A.6.3 & LRFD 6.5.4.2**

For Bearing on Milled Surfaces

$$\phi_b := 1.0$$

For Axial Compression, Steel Only - (Dependent on Built Date)

$$\phi_{comp} := 0.90$$

### **LRFR Factors**

System Factor, MBE 6A.4.2.4 & MBE Table 6A.4.2.4-1

$$\phi_s := 1.0$$

For All Other Girder Bridges and Slab Bridges

Condition Factor, MBE 6A.4.2.3 & MBE Table 6A.4.2.3-1

$$\phi_c := 1.0$$

Poor Condition + Increased by 0.05 for field measured losses, MBE C6A.4.2.3



### Beam Ends With Bearing Stiffeners, LRFD 6.10.11.2

if(Connection = "None" , "This Section Not Applicable" , "This Section Applicable" ) = "This Section Applicable"

The following calculations are applicable only for Stiffened Beam Ends

#### Bearing Resistance, LRFD 6.10.11.2.3-3

if(Fit = "Fitted" , "This Section Applicable" , "This Section Not Applicable" ) = "This Section Not Applicable"

Determine Area of Projecting Element

$$A_{pn} := 2 \cdot N_p (t_{p,a} \cdot b_{t,a} + t_{p,b} \cdot b_{t,b}) = 30.4 \text{ in}^2$$

Compute Fitted End Bearing Resistance, LRFD 6.10.11.2.3-1 & 6.10.11.2.3-2

$$R_{sb} := \phi_b \cdot 1.4 A_{pn} \cdot F_{ys} = 1361.92 \text{ kip}$$

#### Axial Resistance of Bearing Stiffeners, LRFD 6.10.11.2.4

Effective Section, LRFD 6.10.11.2.4b

$$ES := \begin{cases} (D_{stiff} + 9 \cdot t_w + \min(9 \cdot t_w, L_{OH})) \cdot \min\left(1, \frac{F_{yw}}{F_{ys}}\right) & \text{if Connection = "Welded"} \\ t_p & \text{otherwise} \end{cases} = 9.375 \text{ in}$$

General Requirements, LRFD 6.10.11.2.4a

Determine Neutral Axis of Section of: (Y = 0 @ Centerline of Web)

Web

$$A_w := ES \cdot t_w = 1.758 \text{ in}^2$$

$$Y_w := 0 \text{ in}$$

Stiffeners on A side of Web

$$A_a := N_p \cdot t_{p,a} \cdot b_{t,a} = 8 \text{ in}^2$$

$$Y_a := \frac{t_w}{2} + \frac{b_{t,a}}{2} = 4.094 \text{ in}$$

Stiffener on B side of Web

$$A_b := N_p \cdot t_{p,b} \cdot b_{t,b} = 7.2 \text{ in}^2$$

$$Y_b := \frac{-t_w}{2} + \frac{-b_{t,b}}{2} = -4.094 \text{ in}$$



**Determine Gross Remaining Area**

$$A_g := A_w + A_a + A_b = 16.958 \text{ in}^2$$

$$Y := \frac{A_w \cdot Y_w + A_a \cdot Y_a + A_b \cdot Y_b}{A_g} = 0.193 \text{ in}$$

**Determine Moment of Inertia of Elements**

$$I_w := \frac{1}{12} E S \cdot t_w^3 + (Y - Y_w)^2 \cdot A_w = 0.071 \text{ in}^4$$

$$I_a := \frac{N_p}{12} \cdot t_{p.a} \cdot b_{t.a}^3 + (Y - Y_a)^2 \cdot A_a = 164.386 \text{ in}^4$$

$$I_b := \frac{N_p}{12} \cdot t_{p.b} \cdot b_{t.b}^3 + (Y - Y_b)^2 \cdot A_b = 170.717 \text{ in}^4$$

$$I_s := I_w + I_a + I_b = 335.173 \text{ in}^4$$

**Determine Radius of Gyration**

$$r_s := \sqrt{\frac{I_s}{A_g}} = 4.446 \text{ in}$$

**Effective Length Factor, LRFD 6.10.11.2.4.a**

Assumed to behave similar to the full depth section due to the 2 dimensional projecting elements of the stiffeners about the Y, and the Web about the X. Corrosion generally tapers down to the bottom of the web, therefore the top of the localized region is rigidity attached to the remained of the beam end and more corrosion is located above the bottom flange.

$$K_{\text{eff}} := 0.75$$



### Slender Member Elements, LRFD 6.9.4.2.2

Per current AASHTO BDS, a Bearing Stiffener cannot be designed as slender. For Load Rating purposes a bridge does not need to meet the modern design standards; however, the reduced capacity of a slender Bearing Stiffener needs to be considered. As a result, the Element Reduction Factor is not always taken equal to 1.0 per LRFD C6.9.4.1.1.

Determine Most Slender Stiffener (largest b/t ratio):

$$b_t := \begin{cases} b_{t,a} & \text{if } \frac{b_{t,a}}{t_{p,a}} > \frac{b_{t,b}}{t_{p,b}} \\ b_{t,b} & \text{otherwise} \end{cases}$$

$$t_p := \begin{cases} t_{p,a} & \text{if } \frac{b_{t,a}}{t_{p,a}} > \frac{b_{t,b}}{t_{p,b}} \\ t_{p,b} & \text{otherwise} \end{cases}$$

### Check Bearing Stiffener Slenderness, LRFD 6.10.11.2.2 - Projecting Width

$$\text{isSlenderStiff} := \text{if} \left( b_t \leq 0.48 t_p \cdot \sqrt{\frac{E}{F_{ys}}}, \text{"Compact"}, \text{"Slender"} \right) = \text{"Slender"}$$

### Check Web Slenderness between Stiffeners, LRFD 6.9.4.2.1-1

$$\text{isSlenderWeb} := \begin{cases} \text{"N/A"} & \text{if } N_p = 1 \\ \text{otherwise} & \\ \quad b \leftarrow \frac{D_{\text{stiff}}}{N_p - 1} & \\ \quad k \leftarrow 1.49 & \\ \quad \text{"Compact"} & \text{if } \frac{b}{t_w} \leq k \cdot \sqrt{\frac{E}{F_{yw}}} \\ \quad \text{"Slender"} & \text{otherwise} \end{cases} = \text{"Compact"}$$



### Determine Slender Element Reduction Factor, LRFD 6.9.4.2.2

For outstanding legs of single angle; outstanding legs of double angles with separators; and all other Unstiffened Elements (Stiffener):

$$Q_s := \begin{cases} 1 & \text{if } \text{isSlenderStiff} = \text{"Compact"} & = 0.891 \\ \frac{0.53 \cdot E}{F_{ys} \cdot \left(\frac{b_t}{t_p}\right)^2} & \text{if } \frac{b_t}{t_p} > 0.91 \cdot \sqrt{\frac{E}{F_{ys}}} \\ 1.34 - 0.76 \left(\frac{b_t}{t_p}\right) \cdot \sqrt{\frac{F_{ys}}{E}} & \text{otherwise} \end{cases}$$

### Stiffened Elements (Web):

$$Q_a := \begin{cases} 1 & \text{if } \text{isSlenderWeb} \neq \text{"Slender"} & = 1 \\ \text{otherwise} & \\ f \leftarrow Q_s \cdot F_{yw} & \\ b \leftarrow \frac{D_{\text{stiff}}}{N_p - 1} & \\ b_e \leftarrow \min \left[ b, 1.92 t_w \cdot \sqrt{\frac{E}{f}} \cdot \left[ 1 - \frac{0.34}{\left(\frac{b}{t_w}\right)} \cdot \sqrt{\frac{E}{f}} \right] \right] & \\ A_{\text{eff}} \leftarrow A_g - (b - b_e) \cdot t_w \cdot (N_p - 1) & \\ \text{return } \frac{A_{\text{eff}}}{A_g} & \end{cases}$$



### Axial Compression, LRFD 6.9.2.1

*Noncomposite Compression Members, LRFD 6.9.4*

$$Q := Q_s \cdot Q_a = 0.891$$

*Elastic Flexural Buckling Resistance, LRFD 6.9.4.1.2-1*

$$P_e := \frac{\pi^2 \cdot E}{\left( \frac{K_{eff} \cdot d}{r_s} \right)^2} \cdot A_g = 6821880.896 \text{kip}$$

*Determine Equivalent Nominal Yield Resistance, LRFD 6.9.4.1*

$$P_o := Q \cdot F_{ys} \cdot A_g = 483.602 \text{kip}$$

*Determine  $P_n$ , LRFD 6.9.4.1-1 & 6.9.4.1.1-2*

$$P_n := \begin{cases} \left[ 0.658^{\left( \frac{P_o}{P_e} \right)} \right] \cdot P_o & \text{if } \frac{P_e}{P_o} \geq 0.44 \\ 0.877 \cdot P_e & \text{otherwise} \end{cases} = 483.587 \text{kip}$$

Compressive Resistance of the Effective Section, LRFD 6.9.2.1-1

$$P_r := \phi_{comp} \cdot P_n = 435.229 \text{kip}$$



### Loading

DC Load Factor  $\gamma_{DC} := 1.25$

DW Load Factor  $\gamma_{DW} := 1.50$

DC Load  $DC := 46\text{-kip}$

DW Load  $DW := 8.71\text{kip}$

| Vehicle     | Class     | Load Factor | Load (kip) |
|-------------|-----------|-------------|------------|
| HL-93       | Inventory | 1.75        | 64.66      |
| HL-93       | Operating | 1.35        | 64.66      |
| Type 3      | Legal     | 1.45        | 35.07      |
| Type 3S2    | Legal     | 1.45        | 43.05      |
| Type 3-3    | Legal     | 1.45        | 43.92      |
| SU4         | Legal     | 1.45        | 38.37      |
| SU5         | Legal     | 1.45        | 43.2       |
| SU6         | Legal     | 1.45        | 46.8       |
| SU7         | Legal     | 1.45        | 50.39      |
| Legal H20   | Legal     | 1.45        | 29.77      |
| Legal HS20  | Legal     | 1.45        | 49.23      |
| CT-L73.0    | Legal     | 1.45        | 50.88      |
| CT-L32S     | Legal     | 1.45        | 42.78      |
| CT-P76.5    | Permit    | 1.30        | 54.27      |
| CT-P120(6)  | Permit    | 1.35        | 70.84      |
| CT-P140(7)a | Permit    | 1.40        | 69.22      |
| CT-P140(7)b | Permit    | 1.40        | 65.72      |
| CT-P160(8)a | Permit    | 1.40        | 73.39      |
| CT-P160(8)b | Permit    | 1.40        | 75.93      |
| CT-P180(9)  | Permit    | 1.35        | 80.39      |
| CT-P200(10) | Permit    | 1.35        | 91.64      |
| CT-P380     | Permit    | 1.10        | 61.72      |

$i := 0..21$



### Localized Corrosion Eccentricity Ratio, MBE C6A.6.5

Distance From The N.A. To Extreme Fiber to Extreme Compression Fiber

$$c := \frac{t_w}{2} + b_t + |Y| = 8.287 \text{ in}$$

Load Eccentricity In The Member From Corrosion

$$e := Y = 0.193 \text{ in}$$

### Eccentricity Ratio

$$R_e := \frac{|e| c}{r_s^2} = 0.081$$

### Axial Load Magnification Due to Localized Corrosion, MBE I6A

Total Factored Axial Loading

$$P_{u_i} := \gamma_{DC} \cdot DC + \gamma_{DW} \cdot DW + \gamma_{LL_i} \cdot LL_i \cdot \text{kip}$$

Axial Load Magnification Factor, MBE I6A-1

$$\delta_{A_i} := \left( 1 + R_e \cdot \sec \left( \frac{K_{eff} \cdot d}{2} \cdot \sqrt{\frac{P_{u_i}}{E \cdot I_s}} \right) \right)$$



**Axial Load Magnification Output:**

| Vehicle     | Class     | Axial Load, Pu | $\delta.A$ |
|-------------|-----------|----------------|------------|
| HL-93       | Inventory | 183.72         | 1.08097439 |
| HL-93       | Operating | 157.86         | 1.08097401 |
| Type 3      | Legal     | 121.42         | 1.08097347 |
| Type 3S2    | Legal     | 132.99         | 1.08097364 |
| Type 3-3    | Legal     | 134.25         | 1.08097366 |
| SU4         | Legal     | 126.20         | 1.08097354 |
| SU5         | Legal     | 133.21         | 1.08097365 |
| SU6         | Legal     | 138.43         | 1.08097372 |
| SU7         | Legal     | 143.63         | 1.0809738  |
| Legal H20   | Legal     | 113.73         | 1.08097336 |
| Legal HS20  | Legal     | 141.95         | 1.08097377 |
| CT-L73.0    | Legal     | 144.34         | 1.08097381 |
| CT-L32S     | Legal     | 132.60         | 1.08097364 |
| CT-P76.5    | Permit    | 141.12         | 1.08097376 |
| CT-P120(6)  | Permit    | 166.20         | 1.08097413 |
| CT-P140(7)a | Permit    | 167.47         | 1.08097415 |
| CT-P140(7)b | Permit    | 162.57         | 1.08097408 |
| CT-P160(8)a | Permit    | 173.31         | 1.08097423 |
| CT-P160(8)b | Permit    | 176.87         | 1.08097429 |
| CT-P180(9)  | Permit    | 179.09         | 1.08097432 |
| CT-P200(10) | Permit    | 194.28         | 1.08097454 |
| CT-P380     | Permit    | 138.46         | 1.08097372 |



### Rating

Determine Minimum Capacity

$$R_n := P_r = 435.229 \cdot \text{kip}$$

\*Note Beam Ends not rated based on Stiffener Bearing

$$C := \max(0.85, \phi_s \cdot \phi_c) \cdot R_n = 435.229 \cdot \text{kip}$$

Compute Ratings

$$RF_i := \frac{\frac{C}{\delta A_i} - \gamma_{DC} \cdot DC - \gamma_{DW} \cdot DW}{\gamma_{LL_i} \cdot LL_i \cdot \text{kip}}$$

| Vehicle     | Class     | Rating |
|-------------|-----------|--------|
| HL-93       | Inventory | 2.93   |
| HL-93       | Operating | 3.80   |
| Type 3      | Legal     | 6.53   |
| Type 3S2    | Legal     | 5.31   |
| Type 3-3    | Legal     | 5.21   |
| SU4         | Legal     | 5.96   |
| SU5         | Legal     | 5.30   |
| SU6         | Legal     | 4.89   |
| SU7         | Legal     | 4.54   |
| Legal H20   | Legal     | 7.69   |
| Legal HS20  | Legal     | 4.65   |
| CT-L73.0    | Legal     | 4.50   |
| CT-L32S     | Legal     | 5.35   |
| CT-P76.5    | Permit    | 4.70   |
| CT-P120(6)  | Permit    | 3.47   |
| CT-P140(7)a | Permit    | 3.42   |
| CT-P140(7)b | Permit    | 3.60   |
| CT-P160(8)a | Permit    | 3.23   |
| CT-P160(8)b | Permit    | 3.12   |
| CT-P180(9)  | Permit    | 3.05   |
| CT-P200(10) | Permit    | 2.68   |
| CT-P380     | Permit    | 4.89   |



## Steel Beam Ends Load Rating - UnStiffened Web

v1.1 3/10/2017

**Description:** The purpose of this worksheet is to compute rating factors for Steel Beams without bearing stiffeners, and provide a sample calculation for the approval of the CTDOT Beam End Spreadsheet v2.

**References:**

MBE - AASHTO The Manual for Bridge Evaluation 2nd ed. 2014 with 2016 Interim Revisions  
LRFD - AASHTO LRFD Bridge Design Specifications 7th ed. with 2016 Interim Revisions  
BLRM - CTDOT Bridge Load Rating Manual v1.0

Orange backgrounds signifies input regions

**Bridge:** 00000  
**Span:** 4  
**Girder:** 6  
**Location:** Pier 4

### Original Girder Section

|                           |       |           |
|---------------------------|-------|-----------|
| Section Depth             | D     | 24 in     |
| Web Thickness             | t.w   | 1 in      |
| Web Yield Strength        | F.yw  | 70 ksi    |
| E of Steel                | E     | 29000 ksi |
| Flange Thickness          | t.f   | 1 in      |
| Flange + Fillet Thickness | K     | 2 in      |
| Length of Bearing         | N     | 12 in     |
| Minimum End Length        | L.OH  | 24 in     |
| Web Thickness Loss        | SL.w  | 50 %      |
| Flange + Fillet Loss      | SL.K  | 50 %      |
| Flange Loss               | SL.tf | 50 %      |

### Units

D := D·in  
t<sub>w</sub> := t<sub>w</sub>·in  
F<sub>yw</sub> := F<sub>yw</sub>·ksi  
E := E·ksi  
t<sub>f</sub> := t<sub>f</sub>·in  
K := K·in  
N := N·in  
L<sub>OH</sub> := L<sub>OH</sub>·in  
SL<sub>w</sub> := SL<sub>w</sub>·%  
SL<sub>K</sub> := SL<sub>K</sub>·%  
SL<sub>tf</sub> := SL<sub>tf</sub>·%

**As-Inspected Girder Section Properties**

Web Thickness  $t_w := t_w \cdot (1 - SL_w) = 0.5 \text{ in}$

Flange + Fillet  $K := K \cdot (1 - SL_K) = 1 \text{ in}$

Flange  $t_f := t_f \cdot (1 - SL_{tf}) = 0.5 \text{ in}$

**LRFD Resistance Factors, MBE 6A.6.3 & LRFD 6.5.4.2**

For Bearing On Milled Surfaces

$\phi_b := 1.0$

For Web Crippling

$\phi_w := 0.80$

**LRFR Factors**

System Factor, MBE 6A.4.2.4 & MBE Table 6A.4.2.4-1

$\phi_s := 1.0$

For All Other Girder Bridges and Slab Bridges

Condition Factor, MBE 6A.4.2.3 & MBE Table 6A.4.2.3-1

$\phi_c := 0.90$

Poor Condition + Increased by 0.05 for field measured losses, MBE C6A.4.2.3

**Beam Ends Without Bearing Stiffeners, LRFD D6.5.2**

The following calculations are applicable only for UnStiffened Beam Ends

**Web Local Yielding, LRFD D6.5.2**

Nominal Resistance to the Concentrated Loading, LRFD D6.5.2-2 or D6.2.2-3

$$R_{nb} := \begin{cases} (5 \cdot K + N) \cdot F_{yw} \cdot t_w & \text{if } L_{OH} > D \\ \left( 2.5 \cdot K + N + \min \left( 2.5 \cdot K, \max \left( 0, L_{OH} - \frac{N}{2} \right) \right) \right) \cdot F_{yw} \cdot t_w & \text{otherwise} \end{cases}$$

$$R_{nb} = 595 \text{ kip}$$

$$R_{ub} := \phi_b \cdot R_{nb} = 595 \text{ kip}$$

**Web Crippling, LRFD D6.5.3**

Nominal Resistance to the Concentrated Loading, LRFD D6.5.3-2, D6.5.3-3, or D6.5.3-4

$$R_{nw} := \begin{cases} \left[ 0.8 t_w^2 \cdot \left[ 1 + 3 \cdot \left( \frac{N}{D} \right) \cdot \left( \frac{t_w}{t_f} \right)^{1.5} \right] \cdot \sqrt{\frac{E \cdot F_{yw} \cdot t_f}{t_w}} \right] & \text{if } L_{OH} \geq \frac{D}{2} \\ \left[ 0.4 t_w^2 \cdot \left[ 1 + 3 \cdot \left( \frac{N}{D} \right) \cdot \left( \frac{t_w}{t_f} \right)^{1.5} \right] \cdot \sqrt{\frac{E \cdot F_{yw} \cdot t_f}{t_w}} \right] & \text{if } \frac{N}{D} \leq 0.2 \\ \left[ 0.4 t_w^2 \cdot \left[ 1 + \left( \frac{4N}{D} - 0.2 \right) \cdot \left( \frac{t_w}{t_f} \right)^{1.5} \right] \cdot \sqrt{\frac{E \cdot F_{yw} \cdot t_f}{t_w}} \right] & \text{otherwise} \end{cases}$$

$$R_{nw} = 712.39 \text{ kip}$$

$$R_{uw} := \phi_w \cdot R_{nw} = 569.912 \text{ kip}$$

**Loading**DC Load Factor  $\gamma_{DC} := 1.25$ DW Load Factor  $\gamma_{DW} := 1.50$ DC Load  $DC := 46\text{kip}$ DW Load  $DW := 8.7\text{kip}$ 

| Vehicle     | Class     | Load Factor | Load (kip) |
|-------------|-----------|-------------|------------|
| HL-93       | Inventory | 1.75        | 64.66      |
| HL-93       | Operating | 1.35        | 64.66      |
| Type 3      | Legal     | 1.45        | 35.07      |
| Type 3S2    | Legal     | 1.45        | 43.05      |
| Type 3-3    | Legal     | 1.45        | 43.92      |
| SU4         | Legal     | 1.45        | 38.37      |
| SU5         | Legal     | 1.45        | 43.2       |
| SU6         | Legal     | 1.45        | 46.8       |
| SU7         | Legal     | 1.45        | 50.39      |
| Legal H20   | Legal     | 1.45        | 29.77      |
| Legal HS20  | Legal     | 1.45        | 49.23      |
| CT-L73.0    | Legal     | 1.45        | 50.88      |
| CT-L32S     | Legal     | 1.45        | 42.78      |
| CT-P76.5    | Permit    | 1.30        | 54.27      |
| CT-P120(6)  | Permit    | 1.35        | 70.84      |
| CT-P140(7)a | Permit    | 1.40        | 69.22      |
| CT-P140(7)b | Permit    | 1.40        | 65.72      |
| CT-P160(8)a | Permit    | 1.40        | 73.39      |
| CT-P160(8)b | Permit    | 1.40        | 75.93      |
| CT-P180(9)  | Permit    | 1.35        | 80.39      |
| CT-P200(10) | Permit    | 1.35        | 91.64      |
| CT-P380     | Permit    | 1.10        | 61.72      |

 $i := 0..21$

**Rating**

Determine Minimum Capacity

$$R_n := \min(R_{ub}, R_{uw}) = 569.912 \text{ kip}$$

$$C := \max(0.85, \phi_s \cdot \phi_c) \cdot R_n = 512.921 \text{ kip}$$

Compute Ratings

$$RF_i := \frac{C - \gamma_{DC} \cdot DC - \gamma_{DW} \cdot DW}{\gamma_{LL_i} \cdot LL_i \cdot \text{kip}}$$

| Vehicle     | Class     | Rating |
|-------------|-----------|--------|
| HL-93       | Inventory | 3.90   |
| HL-93       | Operating | 5.06   |
| Type 3      | Legal     | 8.69   |
| Type 3S2    | Legal     | 7.08   |
| Type 3-3    | Legal     | 6.94   |
| SU4         | Legal     | 7.95   |
| SU5         | Legal     | 7.06   |
| SU6         | Legal     | 6.51   |
| SU7         | Legal     | 6.05   |
| Legal H20   | Legal     | 10.24  |
| Legal HS20  | Legal     | 6.19   |
| CT-L73.0    | Legal     | 5.99   |
| CT-L32S     | Legal     | 7.13   |
| CT-P76.5    | Permit    | 6.27   |
| CT-P120(6)  | Permit    | 4.62   |
| CT-P140(7)a | Permit    | 4.56   |
| CT-P140(7)b | Permit    | 4.80   |
| CT-P160(8)a | Permit    | 4.30   |
| CT-P160(8)b | Permit    | 4.16   |
| CT-P180(9)  | Permit    | 4.07   |
| CT-P200(10) | Permit    | 3.57   |
| CT-P380     | Permit    | 6.51   |



| Analysis Summary                       |      |              |
|----------------------------------------|------|--------------|
| As-Inspected Web Thickness             | t.w  | 0.5 in       |
| As-Inspected Flange + Fillet Thickness | K    | 1 in         |
| Web Local Yield Resistance             | R.ub | 595 kip      |
| Web Crippling Resistance               | R.uw | 569.9123 kip |
| Factored Capacity                      | C    | 512.921 kip  |



## STEEL BEAM ENDS - LOAD RATING

### Description

The purpose of this worksheet is to compute Rating Factors for Stiffened and UnStiffened Web subject to concentrated loads at supports.

### References

|      |                                                                                |
|------|--------------------------------------------------------------------------------|
| BLRM | CTDOT Bridge Load Rating Manual version 1.0                                    |
| MBE  | AASHTO Manual for Bridge Evaluation, 2nd ed. 2010, with 2016 Interim Revisions |
| BDS  | AASHTO LRFD Bridge Design Specifications 7th ed. with 2016 Interim Revisions   |

### Bridge Identification Data

Bridge ID 00000

### Worksheet Instructions

Please see the BeamEndSpreadsheet Package for Instructions on how to use this worksheet.

### Submittal

This spreadsheet shall be included in the References File. See the CTDOT Bridge Load Rating Manual for more information about the References file. This workbook shall be saved as a macro-enabled workbook. Consult with Microsoft Support and Excel Help for questions about saving the workbook as a macro-enabled workbook.

A PDF of the Input Review text file generated shall be include in the Load Rating Report PDF document. The Input Review file should also be digitaly provided in the references folder.

Mathcad or hand calculations may be needed for inputs for this spreadsheet. Those calculations shall be included within the Calculations section of the report.

### Accuracy

The load rating engineer is responsible for the accuracy of the results. If the load rating engineer has reason to believe the results are not true contact the load rating section for guidance.

### Resources and Contacts

|         |                                                                                                                                               |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| email   | <a href="mailto:DOT.BridgeRating@ct.gov">DOT.BridgeRating@ct.gov</a>                                                                          |
| website | <a href="http://www.ct.gov/dot/cwp/view.asp?a=4048&amp;Q=562040&amp;PM=1">http://www.ct.gov/dot/cwp/view.asp?a=4048&amp;Q=562040&amp;PM=1</a> |

Click Start Below to activate the Beam End Spreadsheet

Start

### Note:

Macros must be enabled before continuing. Consult with Microsoft Support and Excel Help for questions about enabling macros



Steel Beam Ends - Load Rating  
Connecticut Department of Transportation



[<<-Introductions](#)

Current Version: 2.3

Import Input Values

[Top](#)

| #  | Version | Date       | By  | Approved by | Description                                                                                                               |
|----|---------|------------|-----|-------------|---------------------------------------------------------------------------------------------------------------------------|
| 1  | 2       | 9/15/2016  | cmp | mgd         | Updated Stiffened web analysis method                                                                                     |
| 2  | 2       | 9/15/2016  | cmp | mgd         | Updated User Interface                                                                                                    |
| 3  | 2.1     | 10/12/2016 | cmp | mgd         | Fixed squaring of the b/t ratio of stiffener slenderness check (reported by Lochner)                                      |
| 4  | 2.1     | 10/12/2016 | cmp | mgd         | Removed MathCad library, Mathcad plugin no longer required to use spreadsheet (reported by CME)                           |
| 5  | 2.1     | 10/12/2016 | cmp | mgd         | Remove reformatting of bridge number after BrR import                                                                     |
| 6  | 2.1     | 10/12/2016 | cmp | mgd         | fix error if there where more unstiffened web locations than stiffened webs, would crash the rating (reported by Stantec) |
| 7  | 2.2     | 10/26/2016 | cmp | sjjs        | fixed issue in BrR Import routine where it would use the ID Support rather than the BrR Support Id                        |
| 8  | 2.3     | 3/17/2017  | cmp | sjjs        | fixed sorting/filtering function                                                                                          |
| 9  | 2.3     | 3/17/2017  | cmp | sjjs        | Added ability to add multiple BrR LRFRReports                                                                             |
| 10 | 2.3     | 3/17/2017  | cmp | sjjs        | Added Undefined Section Analysis for users to input user defined capacities to preform ratings                            |
| 11 | 2.3     | 3/17/2017  | cmp | sjjs        | Added Governing Rating Factors Sheets and Permit and Legal Less than 1.0 Tables for Reporting                             |
| 12 | 2.3     | 3/17/2017  | cmp | sjjs        | Updated buttons to stand out from the cell backgrounds                                                                    |
| 13 | 2.3     | 3/17/2017  | cmp | sjjs        | Added importer to import older spreadsheet input data (button on this sheet)                                              |
| 14 | 2.3     | 3/17/2017  | cmp | sjjs        | Added Input Review for reporting (button on Governing Rating Sheet)                                                       |
| 15 | 2.3     | 3/17/2017  | cmp | sjjs        | Added Localized Region analysis for Stiffened Webs                                                                        |
| 16 | 2.3     | 3/17/2017  | cmp | sjjs        | Added Effective Section to UnStiffened Outputs sheet to assist in section loss calculations                               |



[<-Introductions](#)   [Inputs ->](#)  
[UnStiffened Outputs ->>](#)

Stiffened Web Inputs

[Top](#)

| Beam End Identification |        |         | Resistance | System | Condition | Member Properties (in, kip) |      |      |    |       | Stiffener Properties (in, kip) |            |     |       |     |    | Uniform Section Loss (%) |        |       | Localized Section Losses (% in) |        |        |        |          |        |
|-------------------------|--------|---------|------------|--------|-----------|-----------------------------|------|------|----|-------|--------------------------------|------------|-----|-------|-----|----|--------------------------|--------|-------|---------------------------------|--------|--------|--------|----------|--------|
| Span                    | Member | Support | φ          | φ.s    | φ.c       | E                           | F.yw | L.OH | d  | t.w   | D.stiff                        | Connection | b.t | t.p   | F.y | Np | SL.w                     | SL.tp  | SL.bt | sl.b.a                          | sl.t.a | sl.b.b | sl.t.b | sl.t.w.l | H.loss |
| 1                       | G1     | S Abut  | 0.9        | 1      | 0.85      | 29000                       | 36   | 6    | 60 | 0.375 | 0                              | Welded     | 6   | 0.5   | 36  | 1  | 0.00%                    | 0.00%  | 0.00% | 0.00%                           | 0.00%  | 0.00%  | 0.00%  | 22.00%   | 5      |
| 1                       | G1     | Pier 1  | 0.9        | 1      | 0.85      | 29000                       | 36   | 6    | 60 | 0.375 | 0                              | Welded     | 6   | 0.5   | 36  | 1  | 0.00%                    | 0.00%  | 0.00% | 0.00%                           | 55.00% | 11.00% | 20.00% | 11.00%   | 5      |
| 1                       | G5     | S Abut  | 0.9        | 1      | 0.85      | 29000                       | 36   | 6    | 60 | 0.375 | 0                              | Welded     | 6   | 0.5   | 36  | 1  | 0.00%                    | 0.00%  | 0.00% | 0.00%                           | 0.00%  | 0.00%  | 0.00%  | 22.00%   | 5      |
| 1                       | G5     | Pier 1  | 0.9        | 1      | 0.85      | 29000                       | 36   | 6    | 60 | 0.375 | 0                              | Welded     | 6   | 0.5   | 36  | 1  | 14.82%                   | 12.50% | 0.00% | 33.33%                          | 25.00% | 0.00%  | 40.00% | 51.00%   | 5      |
| 2                       | G1     | Pier 2  | 0.9        | 1      | 0.85      | 29000                       | 36   | 6    | 60 | 0.375 | 0                              | Welded     | 7   | 0.875 | 36  | 1  | 0.00%                    | 0.00%  | 0.00% | 0.00%                           | 21.00% | 0.00%  | 0.00%  | 0.00%    | 5      |
| 2                       | G3     | Pier 2  | 0.9        | 1      | 0.85      | 29000                       | 36   | 6    | 60 | 0.375 | 0                              | Welded     | 7   | 0.875 | 36  | 1  | 0.00%                    | 0.00%  | 0.00% | 0.00%                           | 0.00%  | 0.00%  | 42.86% | 0.00%    | 5      |
| 2                       | G5     | Pier 1  | 0.9        | 1      | 0.85      | 29000                       | 36   | 6    | 60 | 0.375 | 0                              | Welded     | 7   | 0.875 | 36  | 1  | 29.63%                   | 17.88% | 0.00% | 0.00%                           | 0.00%  | 0.00%  | 0.00%  | 40.74%   | 5      |
| 2                       | G5     | Pier 2  | 0.9        | 1      | 0.85      | 29000                       | 36   | 6    | 60 | 0.375 | 0                              | Welded     | 7   | 0.875 | 36  | 1  | 0.00%                    | 0.00%  | 0.00% | 0.00%                           | 25.00% | 0.00%  | 14.00% | 18.00%   | 5      |
| 3                       | G1     | Pier 2  | 0.9        | 1      | 0.85      | 29000                       | 36   | 6    | 60 | 0.375 | 0                              | Welded     | 6   | 0.5   | 36  | 1  | 0.00%                    | 12.50% | 0.00% | 0.00%                           | 0.00%  | 0.00%  | 21.43% | 90.00%   | 5      |
| 3                       | G5     | Pier 2  | 0.9        | 1      | 0.85      | 29000                       | 36   | 6    | 60 | 0.375 | 0                              | Welded     | 6   | 0.5   | 36  | 1  | 0.00%                    | 0.00%  | 0.00% | 0.00%                           | 40.00% | 20.00% | 23.00% | 11.11%   | 5      |



Steel Beam Ends - Load Rating  
Connecticut Department of Transportation



[<-Inputs](#)   [Inputs ->](#)  
[UnStiffened Outputs ->>](#)

UnStiffened Web Inputs

|          |     |
|----------|-----|
| $\phi.b$ | 1   |
| $\phi.w$ | 0.8 |

[Top](#)

| Beam End Identification |        |         | System   | Condition | Member Properties (kip, in) |      |       |       |       |       |      |   | Section Loss (%) |       |       |
|-------------------------|--------|---------|----------|-----------|-----------------------------|------|-------|-------|-------|-------|------|---|------------------|-------|-------|
| Span                    | Member | Support | $\phi.s$ | $\phi.c$  | E                           | F.yw | D     | t.w   | t.f   | K     | L.OH | N | SL.w             | SL.tf | SL.K  |
| 1                       | G2     | S Abut  | 1        | 0.85      | 29000                       | 36   | 35.55 | 0.598 | 0.794 | 0.794 | 6    | 6 | 2.22%            | 0.00% | 7.11% |
| 1                       | G2     | Pier 1  | 1        | 0.85      | 29000                       | 36   | 35.55 | 0.598 | 0.794 | 0.794 | 6    | 6 | 0.63%            | 0.00% | 2.03% |
| 1                       | G3     | S Abut  | 1        | 0.85      | 29000                       | 36   | 35.55 | 0.598 | 0.794 | 0.794 | 6    | 6 | 2.22%            | 0.00% | 7.11% |
| 1                       | G3     | Pier 1  | 1        | 0.85      | 29000                       | 36   | 35.55 | 0.598 | 0.794 | 0.794 | 6    | 6 | 0.63%            | 0.00% | 2.03% |
| 1                       | G4     | S Abut  | 1        | 0.85      | 29000                       | 36   | 35.55 | 0.598 | 0.794 | 0.794 | 6    | 6 | 2.22%            | 0.00% | 7.11% |
| 1                       | G4     | Pier 1  | 1        | 0.85      | 29000                       | 36   | 35.55 | 0.598 | 0.794 | 0.794 | 6    | 6 | 0.63%            | 0.00% | 2.03% |
| 3                       | G2     | Pier 2  | 1        | 0.85      | 29000                       | 36   | 35.55 | 0.598 | 0.794 | 0.794 | 6    | 6 | 3.69%            | 4.50% | 0.00% |
| 3                       | G2     | N Abut  | 1        | 0.85      | 29000                       | 36   | 35.55 | 0.598 | 0.794 | 0.794 | 6    | 6 | 3.69%            | 0.00% | 0.00% |
| 3                       | G3     | Pier 2  | 1        | 0.85      | 29000                       | 36   | 35.55 | 0.598 | 0.794 | 0.794 | 6    | 6 | 3.69%            | 4.50% | 0.00% |
| 3                       | G3     | N Abut  | 1        | 0.85      | 29000                       | 36   | 35.55 | 0.598 | 0.794 | 0.794 | 6    | 6 | 3.69%            | 0.00% | 0.00% |
| 3                       | G4     | Pier 2  | 1        | 0.85      | 29000                       | 36   | 35.55 | 0.598 | 0.794 | 0.794 | 6    | 6 | 3.69%            | 4.50% | 0.00% |
| 3                       | G4     | N Abut  | 1        | 0.85      | 29000                       | 36   | 35.55 | 0.598 | 0.794 | 0.794 | 6    | 6 | 3.69%            | 0.00% | 0.00% |



Steel Beam Ends - Load Rating  
Connecticut Department of Transportation



[<-Inputs](#) [BrR Cntrl ->](#)

UnDefined Section Inputs

[Top](#)

| Beam End Identification |        |         | System   | Condition | Resistance (kip) |                   | Secant Formula (kip, in) |   |    |   |
|-------------------------|--------|---------|----------|-----------|------------------|-------------------|--------------------------|---|----|---|
| Span                    | Member | Support | $\phi.s$ | $\phi.c$  | $\phi P.n$       | Failure Mechanism | R.e                      | E | KL | I |
| 1                       | G2     | S Abut  | 1        | 0.85      | 200              | Pedestal Bearing  |                          |   |    |   |
| 1                       | G2     | Pier 1  | 1        | 0.85      | 204              | Pedestal Bearing  |                          |   |    |   |
| 1                       | G3     | S Abut  | 1        | 0.85      | 230              | Pedestal Bearing  |                          |   |    |   |



Steel Beam Ends - Load Rating  
Connecticut Department of Transportation



[<-Inputs](#)   [Loads ->](#)

BrR Control

|                  |                                                                      |         |
|------------------|----------------------------------------------------------------------|---------|
| LRFR Report Path | D:\Users\patriacm\Documents\AASHTOWARE\BrDR68\Reports\LRFRReport.XML | Bridge  |
|                  |                                                                      | User    |
|                  |                                                                      | Rundate |
|                  |                                                                      | Version |

00000  
patriacm  
Wednesday, February 01, 2017 14:53:13  
AASHTO LRFR Engine Version 6.8.1.3001

[Top](#)

| Beam End Identification |        |         | AASHTOWare Beam Identification |        |         |
|-------------------------|--------|---------|--------------------------------|--------|---------|
| Span                    | Member | Support | Superstructure Definition      | Member | Support |
| 1                       | G1     | S Abut  | Span 1                         | G1     | 1       |
| 1                       | G1     | Pier 1  | Span 1                         | G1     | 2       |
| 1                       | G5     | S Abut  | Span 1                         | G5     | 1       |
| 1                       | G5     | Pier 1  | Span 1                         | G5     | 2       |
| 2                       | G1     | Pier 2  | Span 2                         | G1     | 2       |
| 2                       | G3     | Pier 2  | Span 2                         | G3     | 2       |
| 2                       | G5     | Pier 1  | Span 2                         | G5     | 1       |
| 2                       | G5     | Pier 2  | Span 2                         | G5     | 2       |
| 3                       | G1     | Pier 2  | Span 3                         | G1     | 1       |
| 3                       | G5     | Pier 2  | Span 3                         | G5     | 1       |
| 1                       | G2     | S Abut  | Span 1                         | G2     | 1       |
| 1                       | G2     | Pier 1  | Span 1                         | G2     | 2       |
| 1                       | G3     | S Abut  | Span 1                         | G3     | 1       |
| 1                       | G3     | Pier 1  | Span 1                         | G3     | 2       |
| 1                       | G4     | S Abut  | Span 1                         | G4     | 1       |
| 1                       | G4     | Pier 1  | Span 1                         | G4     | 2       |
| 3                       | G2     | Pier 2  | Span 3                         | G2     | 1       |
| 3                       | G2     | N Abut  | Span 3                         | G2     | 2       |
| 3                       | G3     | Pier 2  | Span 3                         | G3     | 1       |
| 3                       | G3     | N Abut  | Span 3                         | G3     | 2       |
| 3                       | G4     | Pier 2  | Span 3                         | G4     | 1       |
| 3                       | G4     | N Abut  | Span 3                         | G4     | 2       |



[<-BrR Cntrl](#) [Factors ->](#)

Loads

Populate IDs

Import AASHTOWare Reactions

[Top](#)

| Beam End Identification |        |         | Dead Load |       | INVENTORY | OPERATING | AASHTO LEGAL |          |          |       |       |       |       | CT LEGAL |       |          |         | CT PERMIT |            |             |             |             |             |            |             |         |  |
|-------------------------|--------|---------|-----------|-------|-----------|-----------|--------------|----------|----------|-------|-------|-------|-------|----------|-------|----------|---------|-----------|------------|-------------|-------------|-------------|-------------|------------|-------------|---------|--|
| Span                    | Member | Support | DC        | DW    | HL-93     | HL-93     | Type 3       | Type 3S2 | Type 3-3 | SU4   | SU5   | SU6   | SU7   | H-20     | HS-20 | CT-L73.0 | CT-L3S2 | CT-P76.5  | CT-P120(6) | CT-P140(7)a | CT-P140(7)b | CT-P160(8)a | CT-P160(8)b | CT-P180(9) | CT-P200(10) | CT-P380 |  |
| 1                       | G1     | S Abut  | 23.29     | 3.97  | 57.75     | 57.75     | 36.34        | 34.44    | 32.24    | 40.46 | 44.36 | 45.75 | 46.62 | 33.27    | 49.24 | 52.28    | 37.26   | 57.12     | 56.45      | 59.93       | 59.42       | 61.43       | 64.21       | 63.21      | 70.42       | 48.21   |  |
| 1                       | G1     | Pier 1  | 23.28     | 3.79  | 52.22     | 52.22     | 32.86        | 31.14    | 29.16    | 36.59 | 40.11 | 41.37 | 42.15 | 30.09    | 44.52 | 47.28    | 33.7    | 51.65     | 51.04      | 54.2        | 53.73       | 55.55       | 58.06       | 57.16      | 63.68       | 43.59   |  |
| 1                       | G5     | S Abut  | 23.29     | 3.85  | 52.22     | 52.22     | 32.86        | 31.14    | 29.16    | 36.59 | 40.11 | 41.37 | 42.15 | 30.09    | 44.52 | 47.28    | 33.7    | 51.65     | 51.04      | 54.2        | 53.73       | 55.55       | 58.06       | 57.16      | 63.68       | 43.59   |  |
| 1                       | G5     | Pier 1  | 23.31     | 3.67  | 57.75     | 57.75     | 36.34        | 34.44    | 32.24    | 40.46 | 44.36 | 45.75 | 46.62 | 33.27    | 49.24 | 52.28    | 37.26   | 57.12     | 56.45      | 59.93       | 59.42       | 61.43       | 64.21       | 63.21      | 70.42       | 48.21   |  |
| 2                       | G1     | Pier 2  | 69.93     | 11.44 | 74.41     | 74.41     | 37.7         | 48.29    | 50.5     | 41.12 | 46.52 | 50.84 | 55.24 | 31.55    | 53.27 | 54.79    | 49.57   | 58.19     | 79.74      | 82.21       | 77.12       | 89.34       | 90.79       | 98.75      | 111.59      | 85.54   |  |
| 2                       | G3     | Pier 2  | 77.71     | 8.84  | 105.36    | 105.36    | 53.39        | 68.38    | 71.51    | 58.22 | 65.87 | 71.99 | 78.22 | 44.67    | 75.44 | 77.59    | 70.2    | 82.39     | 112.91     | 116.4       | 109.2       | 126.5       | 128.55      | 139.83     | 158.01      | 112.37  |  |
| 2                       | G5     | Pier 1  | 70.11     | 11.12 | 74.41     | 74.41     | 37.7         | 48.29    | 50.5     | 41.12 | 46.52 | 50.84 | 55.24 | 31.55    | 53.27 | 54.79    | 49.57   | 58.19     | 79.74      | 82.21       | 77.12       | 89.34       | 90.79       | 98.75      | 111.59      | 85.54   |  |
| 2                       | G5     | Pier 2  | 70.13     | 11.12 | 81.09     | 81.09     | 41.09        | 52.62    | 55.03    | 44.81 | 50.7  | 55.4  | 60.2  | 34.38    | 58.06 | 59.71    | 54.02   | 63.41     | 86.9       | 89.59       | 84.04       | 97.36       | 98.93       | 107.61     | 121.61      | 93.21   |  |
| 3                       | G1     | Pier 2  | 21.96     | 4.01  | 56.19     | 56.19     | 35.75        | 33.06    | 30.92    | 39.9  | 43.59 | 44.64 | 45.11 | 33.06    | 48.2  | 51.37    | 36.84   | 56.31     | 53.77      | 59.1        | 58.78       | 60.57       | 63.3        | 62.35      | 69.44       | 45.88   |  |
| 3                       | G5     | Pier 2  | 21.96     | 3.9   | 50.9      | 50.9      | 32.38        | 29.95    | 28.01    | 36.14 | 39.48 | 40.44 | 40.86 | 29.94    | 43.66 | 46.54    | 33.37   | 51.01     | 48.71      | 53.53       | 53.25       | 54.87       | 57.34       | 56.48      | 62.9        | 41.56   |  |
| 1                       | G2     | S Abut  | 25.47     | 3.79  | 78.22     | 78.22     | 49.22        | 46.65    | 43.68    | 54.81 | 60.09 | 61.97 | 63.14 | 45.07    | 66.69 | 70.82    | 50.48   | 77.37     | 76.46      | 81.18       | 80.49       | 83.21       | 86.97       | 85.63      | 95.39       | 60.58   |  |
| 1                       | G2     | Pier 1  | 25.48     | 3.79  | 67.85     | 67.85     | 42.69        | 40.46    | 37.89    | 47.54 | 52.12 | 53.76 | 54.77 | 39.1     | 57.85 | 61.43    | 43.78   | 67.12     | 66.32      | 70.42       | 69.82       | 72.18       | 75.45       | 74.27      | 82.74       | 52.55   |  |
| 1                       | G3     | S Abut  | 25.31     | 2.84  | 67.85     | 67.85     | 42.69        | 40.46    | 37.89    | 47.54 | 52.12 | 53.76 | 54.77 | 39.1     | 57.85 | 61.43    | 43.78   | 67.12     | 66.32      | 70.42       | 69.82       | 72.18       | 75.45       | 74.27      | 82.74       | 52.55   |  |
| 1                       | G3     | Pier 1  | 25.31     | 2.84  | 78.22     | 78.22     | 49.22        | 46.65    | 43.68    | 54.81 | 60.09 | 61.97 | 63.14 | 45.07    | 66.69 | 70.82    | 50.48   | 77.37     | 76.46      | 81.18       | 80.49       | 83.21       | 86.97       | 85.63      | 95.39       | 60.58   |  |
| 1                       | G4     | S Abut  | 25.49     | 3.67  | 67.85     | 67.85     | 42.69        | 40.46    | 37.89    | 47.54 | 52.12 | 53.76 | 54.77 | 39.1     | 57.85 | 61.43    | 43.78   | 67.12     | 66.32      | 70.42       | 69.82       | 72.18       | 75.45       | 74.27      | 82.74       | 52.55   |  |
| 1                       | G4     | Pier 1  | 25.49     | 3.67  | 78.22     | 78.22     | 49.22        | 46.65    | 43.68    | 54.81 | 60.09 | 61.97 | 63.14 | 45.07    | 66.69 | 70.82    | 50.48   | 77.37     | 76.46      | 81.18       | 80.49       | 83.21       | 86.97       | 85.63      | 95.39       | 60.58   |  |
| 3                       | G2     | Pier 2  | 24.03     | 4.01  | 76.06     | 76.06     | 48.39        | 44.75    | 41.85    | 54.01 | 59    | 60.43 | 61.06 | 44.75    | 65.24 | 69.54    | 49.87   | 76.22     | 72.79      | 79.99       | 79.57       | 81.99       | 85.68       | 84.4       | 93.99       | 57.62   |  |
| 3                       | G2     | N Abut  | 24.03     | 4.01  | 66.14     | 66.14     | 42.07        | 38.91    | 36.39    | 46.96 | 51.3  | 52.54 | 53.09 | 38.91    | 56.73 | 60.47    | 43.36   | 66.28     | 63.29      | 69.56       | 69.18       | 71.3        | 74.5        | 73.39      | 81.73       | 50.1    |  |
| 3                       | G3     | Pier 2  | 23.86     | 3.12  | 66.14     | 66.14     | 42.07        | 38.91    | 36.39    | 46.96 | 51.3  | 52.54 | 53.09 | 38.91    | 56.73 | 60.47    | 43.36   | 66.28     | 63.29      | 69.56       | 69.18       | 71.3        | 74.5        | 73.39      | 81.73       | 50.1    |  |
| 3                       | G3     | N Abut  | 23.86     | 3.12  | 76.06     | 76.06     | 48.39        | 44.75    | 41.85    | 54.01 | 59    | 60.43 | 61.06 | 44.75    | 65.24 | 69.54    | 49.87   | 76.22     | 72.79      | 79.99       | 79.57       | 81.99       | 85.68       | 84.4       | 93.99       | 57.62   |  |
| 3                       | G4     | Pier 2  | 24.04     | 3.9   | 66.14     | 66.14     | 42.07        | 38.91    | 36.39    | 46.96 | 51.3  | 52.54 | 53.09 | 38.91    | 56.73 | 60.47    | 43.36   | 66.28     | 63.29      | 69.56       | 69.18       | 71.3        | 74.5        | 73.39      | 81.73       | 50.1    |  |
| 3                       | G4     | N Abut  | 24.04     | 3.9   | 76.06     | 76.06     | 48.39        | 44.75    | 41.85    | 54.01 | 59    | 60.43 | 61.06 | 44.75    | 65.24 | 69.54    | 49.87   | 76.22     | 72.79      | 79.99       | 79.57       | 81.99       | 85.68       | 84.4       | 93.99       | 57.62   |  |



<- Loads   Ratings ->

Load Factors

|          |       |
|----------|-------|
| Analysis | Other |
| ADTT     | 5000  |

|    |      |
|----|------|
| DC | 1.25 |
| DW | 1.50 |

|           |      |
|-----------|------|
| Inventory | 1.75 |
| Operating | 1.35 |

|                       |                                                                                                   |
|-----------------------|---------------------------------------------------------------------------------------------------|
| Live Load Factor Path | X:\Z_V8_CTDOT_NON_PROJECTS\Struct_Bridge\A_Bridge_Load_Rating\Development\Beam End Development\2. |
|-----------------------|---------------------------------------------------------------------------------------------------|

Generate Live Load Factors

|                         |        |         |           |           |     |           |           |              |          |          |     |     |     |     | Generate Live Load Factors |       |          |         |           |            |             |             |             |             |            |             |         |  |  |  |
|-------------------------|--------|---------|-----------|-----------|-----|-----------|-----------|--------------|----------|----------|-----|-----|-----|-----|----------------------------|-------|----------|---------|-----------|------------|-------------|-------------|-------------|-------------|------------|-------------|---------|--|--|--|
| Beam End Identification |        |         | Structure | Dead Load |     | INVENTORY | OPERATING | AASHTO LEGAL |          |          |     |     |     |     | CT LEGAL                   |       |          |         | CT PERMIT |            |             |             |             |             |            |             |         |  |  |  |
| Span                    | Member | Support | Length    | DC        | DW  | HL-93     | HL-93     | Type 3       | Type 3S2 | Type 3-3 | SU4 | SU5 | SU6 | SU7 | H-20                       | HS-20 | CT-L73.0 | CT-L3S2 | CT-P76.5  | CT-P120(6) | CT-P140(7)a | CT-P140(7)b | CT-P160(8)a | CT-P160(8)b | CT-P180(9) | CT-P200(10) | CT-P380 |  |  |  |
| 1                       | G1     | S Abut  | 39.52083  | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.16        | 1.16        | 1.16        | 1.31        | 1.31       | 1.31        | 1.1     |  |  |  |
| 1                       | G1     | Pier 1  | 39.52083  | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.16        | 1.16        | 1.16        | 1.31        | 1.31       | 1.31        | 1.1     |  |  |  |
| 1                       | G5     | S Abut  | 39.52083  | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.16        | 1.16        | 1.16        | 1.31        | 1.31       | 1.31        | 1.1     |  |  |  |
| 1                       | G5     | Pier 1  | 39.52083  | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.16        | 1.16        | 1.16        | 1.31        | 1.31       | 1.31        | 1.1     |  |  |  |
| 2                       | G1     | Pier 2  | 108.5     | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.31        | 1.31        | 1.31        | 1.31        | 1.31       | 1.21        | 1.1     |  |  |  |
| 2                       | G3     | Pier 2  | 108.5     | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.31        | 1.31        | 1.31        | 1.31        | 1.31       | 1.21        | 1.1     |  |  |  |
| 2                       | G5     | Pier 1  | 108.5     | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.31        | 1.31        | 1.31        | 1.31        | 1.31       | 1.21        | 1.1     |  |  |  |
| 2                       | G5     | Pier 2  | 108.5     | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.31        | 1.31        | 1.31        | 1.31        | 1.31       | 1.21        | 1.1     |  |  |  |
| 3                       | G1     | Pier 2  | 37.1875   | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.16        | 1.16        | 1.16        | 1.31        | 1.31       | 1.31        | 1.1     |  |  |  |
| 3                       | G5     | Pier 2  | 37.1875   | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.16        | 1.16        | 1.16        | 1.31        | 1.31       | 1.31        | 1.1     |  |  |  |
| 1                       | G2     | S Abut  | 39.52083  | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.16        | 1.16        | 1.16        | 1.31        | 1.31       | 1.31        | 1.1     |  |  |  |
| 1                       | G2     | Pier 1  | 39.52083  | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.16        | 1.16        | 1.16        | 1.31        | 1.31       | 1.31        | 1.1     |  |  |  |
| 1                       | G3     | S Abut  | 39.52083  | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.16        | 1.16        | 1.16        | 1.31        | 1.31       | 1.31        | 1.1     |  |  |  |
| 1                       | G3     | Pier 1  | 39.52083  | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.16        | 1.16        | 1.16        | 1.31        | 1.31       | 1.31        | 1.1     |  |  |  |
| 1                       | G4     | S Abut  | 39.52083  | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.16        | 1.16        | 1.16        | 1.31        | 1.31       | 1.31        | 1.1     |  |  |  |
| 1                       | G4     | Pier 1  | 39.52083  | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.16        | 1.16        | 1.16        | 1.31        | 1.31       | 1.31        | 1.1     |  |  |  |
| 3                       | G2     | Pier 2  | 37.1875   | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.16        | 1.16        | 1.16        | 1.31        | 1.31       | 1.31        | 1.1     |  |  |  |
| 3                       | G2     | N Abut  | 37.1875   | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.16        | 1.16        | 1.16        | 1.31        | 1.31       | 1.31        | 1.1     |  |  |  |
| 3                       | G3     | Pier 2  | 37.1875   | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.16        | 1.16        | 1.16        | 1.31        | 1.31       | 1.31        | 1.1     |  |  |  |
| 3                       | G3     | N Abut  | 37.1875   | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.16        | 1.16        | 1.16        | 1.31        | 1.31       | 1.31        | 1.1     |  |  |  |
| 3                       | G4     | Pier 2  | 37.1875   | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.16        | 1.16        | 1.16        | 1.31        | 1.31       | 1.31        | 1.1     |  |  |  |
| 3                       | G4     | N Abut  | 37.1875   | 1.25      | 1.5 | 1.75      | 1.35      | 1.3          | 1.3      | 1.3      | 1.3 | 1.3 | 1.3 | 1.3 | 1.3                        | 1.3   | 1.3      | 1.3     | 1.16      | 1.20977778 | 1.16        | 1.16        | 1.16        | 1.31        | 1.31       | 1.31        | 1.1     |  |  |  |



[<- Factors](#)   [Summary->](#)   **Rating Factors**

Compute Rating Factors

[Top](#)

| Beam End Identification |        |         |             | Vehicle     |              | Rating |                                   | Loading |       |      |      |          |       | Capacity   | Axial Magnification |             |
|-------------------------|--------|---------|-------------|-------------|--------------|--------|-----------------------------------|---------|-------|------|------|----------|-------|------------|---------------------|-------------|
| Span                    | Member | Support | S.M.S       | Vehicle     | Load Type    | RF     | Failure Mechanism                 | γ.DC    | DC    | γ.DW | DW   | γ.LL     | LL    | C          | P.u                 | δ.A         |
| 1                       | G1     | S Abut  | 1.G1.S Abut | HL-93       | INVENTORY    | 1.95   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.75     | 57.75 | 232.259984 | 136.13              | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | HL-93       | OPERATING    | 2.52   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.35     | 57.75 | 232.259984 | 113.03              | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | Type 3      | AASHTO LEGAL | 4.17   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 36.34 | 232.259984 | 82.3095             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | Type 3S2    | AASHTO LEGAL | 4.4    | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 34.44 | 232.259984 | 79.8395             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | Type 3-3    | AASHTO LEGAL | 4.7    | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 32.24 | 232.259984 | 76.9795             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | SU4         | AASHTO LEGAL | 3.74   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 40.46 | 232.259984 | 87.6655             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | SU5         | AASHTO LEGAL | 3.41   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 44.36 | 232.259984 | 92.7355             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | SU6         | AASHTO LEGAL | 3.31   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 45.75 | 232.259984 | 94.5425             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | SU7         | AASHTO LEGAL | 3.25   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 46.62 | 232.259984 | 95.6735             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | H-20        | CT LEGAL     | 4.55   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 33.27 | 232.259984 | 78.3185             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | HS-20       | CT LEGAL     | 3.08   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 49.24 | 232.259984 | 99.0795             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-L73.0    | CT LEGAL     | 2.9    | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 52.28 | 232.259984 | 103.0315            | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-L3S2     | CT LEGAL     | 4.07   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 37.26 | 232.259984 | 83.5055             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-P76.5    | CT PERMIT    | 2.97   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.16     | 57.12 | 232.259984 | 101.3267            | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-P120(6)  | CT PERMIT    | 2.88   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.209778 | 56.45 | 232.259984 | 103.3595            | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-P140(7)a | CT PERMIT    | 2.83   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.16     | 59.93 | 232.259984 | 104.5863            | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-P140(7)b | CT PERMIT    | 2.86   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.16     | 59.42 | 232.259984 | 103.9947            | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-P160(8)a | CT PERMIT    | 2.76   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.16     | 61.43 | 232.259984 | 106.3263            | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-P160(8)b | CT PERMIT    | 2.34   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.31     | 64.21 | 232.259984 | 119.1826            | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-P180(9)  | CT PERMIT    | 2.38   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.31     | 63.21 | 232.259984 | 117.8726            | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-P200(10) | CT PERMIT    | 2.13   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.31     | 70.42 | 232.259984 | 127.3177            | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-P380     | CT PERMIT    | 3.71   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.97 | 1.1      | 48.21 | 232.259984 | 88.0985             | 1           |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | HL-93       | INVENTORY    | 1.75   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.75     | 52.22 | 232.259984 | 126.17              | 1.192574271 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | HL-93       | OPERATING    | 2.26   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.35     | 52.22 | 232.259984 | 105.282             | 1.192574226 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | Type 3      | AASHTO LEGAL | 3.74   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 32.86 | 232.259984 | 77.503              | 1.192574179 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | Type 3S2    | AASHTO LEGAL | 3.95   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 31.14 | 232.259984 | 75.267              | 1.192574176 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | Type 3-3    | AASHTO LEGAL | 4.21   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 29.16 | 232.259984 | 72.693              | 1.192574172 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | SU4         | AASHTO LEGAL | 3.36   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 36.59 | 232.259984 | 82.352              | 1.192574186 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | SU5         | AASHTO LEGAL | 3.06   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 40.11 | 232.259984 | 86.928              | 1.192574193 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | SU6         | AASHTO LEGAL | 2.97   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 41.37 | 232.259984 | 88.566              | 1.192574196 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | SU7         | AASHTO LEGAL | 2.91   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 42.15 | 232.259984 | 89.58               | 1.192574198 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | H-20        | CT LEGAL     | 4.08   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 30.09 | 232.259984 | 73.902              | 1.192574174 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | HS-20       | CT LEGAL     | 2.76   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 44.52 | 232.259984 | 92.661              | 1.192574203 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-L73.0    | CT LEGAL     | 2.6    | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 47.28 | 232.259984 | 96.249              | 1.192574209 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-L3S2     | CT LEGAL     | 3.65   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 33.7  | 232.259984 | 78.595              | 1.192574181 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-P76.5    | CT PERMIT    | 2.66   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.16     | 51.65 | 232.259984 | 94.699              | 1.192574207 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-P120(6)  | CT PERMIT    | 2.59   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.209778 | 51.04 | 232.259984 | 96.53206            | 1.19257421  |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-P140(7)a | CT PERMIT    | 2.54   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.16     | 54.2  | 232.259984 | 97.657              | 1.192574212 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-P140(7)b | CT PERMIT    | 2.56   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.16     | 53.73 | 232.259984 | 97.1118             | 1.192574211 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-P160(8)a | CT PERMIT    | 2.48   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.16     | 55.55 | 232.259984 | 99.223              | 1.192574215 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-P160(8)b | CT PERMIT    | 2.1    | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.31     | 58.06 | 232.259984 | 110.8436            | 1.192574237 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-P180(9)  | CT PERMIT    | 2.13   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.31     | 57.16 | 232.259984 | 109.6646            | 1.192574235 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-P200(10) | CT PERMIT    | 1.91   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.31     | 63.68 | 232.259984 | 118.2058            | 1.192574253 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-P380     | CT PERMIT    | 3.33   | Stiffened Web - Flexural Buckling | 1.25    | 23.28 | 1.5  | 3.79 | 1.1      | 43.59 | 232.259984 | 82.734              | 1.192574187 |
| 1                       | G5     | S Abut  | 1.G5.S Abut | HL-93       | INVENTORY    | 2.15   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85 | 1.75     | 52.22 | 232.259984 | 126.2725            | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | HL-93       | OPERATING    | 2.79   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85 | 1.35     | 52.22 | 232.259984 | 105.3845            | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | Type 3      | AASHTO LEGAL | 4.62   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85 | 1.3      | 32.86 | 232.259984 | 77.6055             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | Type 3S2    | AASHTO LEGAL | 4.87   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85 | 1.3      | 31.14 | 232.259984 | 75.3695             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | Type 3-3    | AASHTO LEGAL | 5.2    | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85 | 1.3      | 29.16 | 232.259984 | 72.7955             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | SU4         | AASHTO LEGAL | 4.14   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85 | 1.3      | 36.59 | 232.259984 | 82.4545             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | SU5         | AASHTO LEGAL | 3.78   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85 | 1.3      | 40.11 | 232.259984 | 87.0305             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | SU6         | AASHTO LEGAL | 3.66   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85 | 1.3      | 41.37 | 232.259984 | 88.6685             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | SU7         | AASHTO LEGAL | 3.6    | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85 | 1.3      | 42.15 | 232.259984 | 89.6825             | 1           |



[<- Factors](#)   [Summary->](#)   **Rating Factors**

[Compute Rating Factors](#)

[Top](#)

| Beam End Identification |        |         |             | Vehicle     |              | Rating |                                   | Loading |       |      |       |          |       | Capacity    | Axial Magnification |             |
|-------------------------|--------|---------|-------------|-------------|--------------|--------|-----------------------------------|---------|-------|------|-------|----------|-------|-------------|---------------------|-------------|
| Span                    | Member | Support | S.M.S       | Vehicle     | Load Type    | RF     | Failure Mechanism                 | γ.DC    | DC    | γ.DW | DW    | γ.LL     | LL    | C           | P.u                 | δ.A         |
| 1                       | G5     | S Abut  | 1.G5.S Abut | H-20        | CT LEGAL     | 5.04   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85  | 1.3      | 30.09 | 232.259984  | 74.0045             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | HS-20       | CT LEGAL     | 3.41   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85  | 1.3      | 44.52 | 232.259984  | 92.7635             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-L73.0    | CT LEGAL     | 3.21   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85  | 1.3      | 47.28 | 232.259984  | 96.3515             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-L3S2     | CT LEGAL     | 4.5    | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85  | 1.3      | 33.7  | 232.259984  | 78.6975             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-P76.5    | CT PERMIT    | 3.29   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85  | 1.16     | 51.65 | 232.259984  | 94.8015             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-P120(6)  | CT PERMIT    | 3.19   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85  | 1.209778 | 51.04 | 232.259984  | 96.63456            | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-P140(7)a | CT PERMIT    | 3.13   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85  | 1.16     | 54.2  | 232.259984  | 97.7595             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-P140(7)b | CT PERMIT    | 3.16   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85  | 1.16     | 53.73 | 232.259984  | 97.2143             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-P160(8)a | CT PERMIT    | 3.06   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85  | 1.16     | 55.55 | 232.259984  | 99.3255             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-P160(8)b | CT PERMIT    | 2.59   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85  | 1.31     | 58.06 | 232.259984  | 110.9461            | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-P180(9)  | CT PERMIT    | 2.63   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85  | 1.31     | 57.16 | 232.259984  | 109.7671            | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-P200(10) | CT PERMIT    | 2.36   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85  | 1.31     | 63.68 | 232.259984  | 118.3083            | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-P380     | CT PERMIT    | 4.11   | Stiffened Web - Flexural Buckling | 1.25    | 23.29 | 1.5  | 3.85  | 1.1      | 43.59 | 232.259984  | 82.8365             | 1           |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | HL-93       | INVENTORY    | 1.02   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.75     | 57.75 | 187.8470071 | 135.705             | 1.361026626 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | HL-93       | OPERATING    | 1.32   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.35     | 57.75 | 187.8470071 | 112.605             | 1.361026495 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | Type 3      | AASHTO LEGAL | 2.18   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 36.34 | 187.8470071 | 81.8845             | 1.361026359 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | Type 3S2    | AASHTO LEGAL | 2.3    | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 34.44 | 187.8470071 | 79.4145             | 1.36102635  |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | Type 3-3    | AASHTO LEGAL | 2.46   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 32.24 | 187.8470071 | 76.5545             | 1.36102634  |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | SU4         | AASHTO LEGAL | 1.96   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 40.46 | 187.8470071 | 87.2405             | 1.36102638  |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | SU5         | AASHTO LEGAL | 1.79   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 44.36 | 187.8470071 | 92.3105             | 1.361026401 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | SU6         | AASHTO LEGAL | 1.73   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 45.75 | 187.8470071 | 94.1175             | 1.361026408 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | SU7         | AASHTO LEGAL | 1.7    | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 46.62 | 187.8470071 | 95.2485             | 1.361026413 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | H-20        | CT LEGAL     | 2.39   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 33.27 | 187.8470071 | 77.8935             | 1.361026345 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | HS-20       | CT LEGAL     | 1.61   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 49.24 | 187.8470071 | 98.6545             | 1.361026428 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-L73.0    | CT LEGAL     | 1.52   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 52.28 | 187.8470071 | 102.6065            | 1.361026446 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-L3S2     | CT LEGAL     | 2.13   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 37.26 | 187.8470071 | 83.0805             | 1.361026364 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-P76.5    | CT PERMIT    | 1.56   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.16     | 57.12 | 187.8470071 | 100.9017            | 1.361026438 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-P120(6)  | CT PERMIT    | 1.51   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.209778 | 56.45 | 187.8470071 | 102.9345            | 1.361026448 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-P140(7)a | CT PERMIT    | 1.48   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.16     | 59.93 | 187.8470071 | 104.1613            | 1.361026454 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-P140(7)b | CT PERMIT    | 1.49   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.16     | 59.42 | 187.8470071 | 103.5697            | 1.361026451 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-P160(8)a | CT PERMIT    | 1.45   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.16     | 61.43 | 187.8470071 | 105.9013            | 1.361026462 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-P160(8)b | CT PERMIT    | 1.22   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.31     | 64.21 | 187.8470071 | 118.7576            | 1.361026528 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-P180(9)  | CT PERMIT    | 1.24   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.31     | 63.21 | 187.8470071 | 117.4476            | 1.361026521 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-P200(10) | CT PERMIT    | 1.12   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.31     | 70.42 | 187.8470071 | 126.8927            | 1.361026573 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-P380     | CT PERMIT    | 1.94   | Stiffened Web - Flexural Buckling | 1.25    | 23.31 | 1.5  | 3.67  | 1.1      | 48.21 | 187.8470071 | 87.6735             | 1.361026382 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | HL-93       | INVENTORY    | 1.86   | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.75     | 74.41 | 404.1248081 | 234.79              | 1.163631556 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | HL-93       | OPERATING    | 2.41   | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.35     | 74.41 | 404.1248081 | 205.026             | 1.163631542 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | Type 3      | AASHTO LEGAL | 4.95   | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 37.7  | 404.1248081 | 153.5825            | 1.163631523 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | Type 3S2    | AASHTO LEGAL | 3.86   | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 48.29 | 404.1248081 | 167.3495            | 1.163631527 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | Type 3-3    | AASHTO LEGAL | 3.69   | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 50.5  | 404.1248081 | 170.2225            | 1.163631528 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | SU4         | AASHTO LEGAL | 4.54   | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 41.12 | 404.1248081 | 158.0285            | 1.163631524 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | SU5         | AASHTO LEGAL | 4.01   | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 46.52 | 404.1248081 | 165.0485            | 1.163631527 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | SU6         | AASHTO LEGAL | 3.67   | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 50.84 | 404.1248081 | 170.6645            | 1.163631529 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | SU7         | AASHTO LEGAL | 3.37   | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 55.24 | 404.1248081 | 176.3845            | 1.163631531 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | H-20        | CT LEGAL     | 5.91   | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 31.55 | 404.1248081 | 145.5875            | 1.16363152  |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | HS-20       | CT LEGAL     | 3.5    | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 53.27 | 404.1248081 | 173.8235            | 1.16363153  |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-L73.0    | CT LEGAL     | 3.4    | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 54.79 | 404.1248081 | 175.7995            | 1.16363153  |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-L3S2     | CT LEGAL     | 3.76   | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 49.57 | 404.1248081 | 169.0135            | 1.163631528 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-P76.5    | CT PERMIT    | 3.59   | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.16     | 58.19 | 404.1248081 | 172.0729            | 1.163631529 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-P120(6)  | CT PERMIT    | 2.51   | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.209778 | 79.74 | 404.1248081 | 201.0402            | 1.16363154  |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-P140(7)a | CT PERMIT    | 2.25   | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.31     | 82.21 | 404.1248081 | 212.2676            | 1.163631545 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-P140(7)b | CT PERMIT    | 2.4    | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.31     | 77.12 | 404.1248081 | 205.5997            | 1.163631542 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-P160(8)a | CT PERMIT    | 2.07   | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.31     | 89.34 | 404.1248081 | 221.6079            | 1.16363155  |



[<- Factors](#)   [Summary->](#)   **Rating Factors**

Compute Rating Factors

[Top](#)

| Beam End Identification |        |         |             | Vehicle     |              | Rating |                                   | Loading |       |      |       |          |        | Capacity    | Axial Magnification |             |
|-------------------------|--------|---------|-------------|-------------|--------------|--------|-----------------------------------|---------|-------|------|-------|----------|--------|-------------|---------------------|-------------|
| Span                    | Member | Support | S.M.S       | Vehicle     | Load Type    | RF     | Failure Mechanism                 | γ.DC    | DC    | γ.DW | DW    | γ.LL     | LL     | C           | P.u                 | δ.A         |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-P160(8)b | CT PERMIT    | 2.04   | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.31     | 90.79  | 404.1248081 | 223.5074            | 1.16363155  |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-P180(9)  | CT PERMIT    | 1.87   | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.31     | 98.75  | 404.1248081 | 233.935             | 1.163631555 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-P200(10) | CT PERMIT    | 1.79   | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.21     | 111.59 | 404.1248081 | 239.5964            | 1.163631558 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-P380     | CT PERMIT    | 2.57   | Stiffened Web - Flexural Buckling | 1.25    | 69.93 | 1.5  | 11.44 | 1.1      | 85.54  | 404.1248081 | 198.6665            | 1.163631539 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | HL-93       | INVENTORY    | 1      | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.75     | 105.36 | 404.1248081 | 294.7775            | 1.370717062 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | HL-93       | OPERATING    | 1.29   | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.35     | 105.36 | 404.1248081 | 252.6335            | 1.370717007 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | Type 3      | AASHTO LEGAL | 2.65   | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 53.39  | 404.1248081 | 179.8045            | 1.370716932 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | Type 3S2    | AASHTO LEGAL | 2.07   | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 68.38  | 404.1248081 | 199.2915            | 1.370716949 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | Type 3-3    | AASHTO LEGAL | 1.98   | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 71.51  | 404.1248081 | 203.3605            | 1.370716953 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | SU4         | AASHTO LEGAL | 2.43   | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 58.22  | 404.1248081 | 186.0835            | 1.370716937 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | SU5         | AASHTO LEGAL | 2.15   | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 65.87  | 404.1248081 | 196.0285            | 1.370716946 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | SU6         | AASHTO LEGAL | 1.97   | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 71.99  | 404.1248081 | 203.9845            | 1.370716954 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | SU7         | AASHTO LEGAL | 1.81   | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 78.22  | 404.1248081 | 212.0835            | 1.370716962 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | H-20        | CT LEGAL     | 3.17   | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 44.67  | 404.1248081 | 168.4685            | 1.370716922 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | HS-20       | CT LEGAL     | 1.88   | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 75.44  | 404.1248081 | 208.4695            | 1.370716958 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-L73.0    | CT LEGAL     | 1.82   | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 77.59  | 404.1248081 | 211.2645            | 1.370716961 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-L3S2     | CT LEGAL     | 2.02   | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 70.2   | 404.1248081 | 201.6575            | 1.370716952 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-P76.5    | CT PERMIT    | 1.92   | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.16     | 82.39  | 404.1248081 | 205.9699            | 1.370716956 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-P120(6)  | CT PERMIT    | 1.35   | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.209778 | 112.91 | 404.1248081 | 246.9935            | 1.370717    |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-P140(7)a | CT PERMIT    | 1.2    | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.31     | 116.4  | 404.1248081 | 262.8815            | 1.370717019 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-P140(7)b | CT PERMIT    | 1.28   | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.31     | 109.2  | 404.1248081 | 253.4495            | 1.370717008 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-P160(8)a | CT PERMIT    | 1.11   | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.31     | 126.5  | 404.1248081 | 276.1125            | 1.370717036 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-P160(8)b | CT PERMIT    | 1.09   | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.31     | 128.55 | 404.1248081 | 278.798             | 1.37071704  |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-P180(9)  | CT PERMIT    | 1      | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.31     | 139.83 | 404.1248081 | 293.5748            | 1.37071706  |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-P200(10) | CT PERMIT    | 0.96   | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.21     | 158.01 | 404.1248081 | 301.5896            | 1.370717071 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-P380     | CT PERMIT    | 1.49   | Stiffened Web - Flexural Buckling | 1.25    | 77.71 | 1.5  | 8.84  | 1.1      | 112.37 | 404.1248081 | 234.0045            | 1.370716985 |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | HL-93       | INVENTORY    | 1.57   | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.75     | 74.41  | 309.4757369 | 234.535             | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | HL-93       | OPERATING    | 2.04   | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.35     | 74.41  | 309.4757369 | 204.771             | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | Type 3      | AASHTO LEGAL | 4.18   | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 37.7   | 309.4757369 | 153.3275            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | Type 3S2    | AASHTO LEGAL | 3.26   | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 48.29  | 309.4757369 | 167.0945            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | Type 3-3    | AASHTO LEGAL | 3.12   | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 50.5   | 309.4757369 | 169.9675            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | SU4         | AASHTO LEGAL | 3.83   | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 41.12  | 309.4757369 | 157.7735            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | SU5         | AASHTO LEGAL | 3.39   | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 46.52  | 309.4757369 | 164.7935            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | SU6         | AASHTO LEGAL | 3.1    | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 50.84  | 309.4757369 | 170.4095            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | SU7         | AASHTO LEGAL | 2.85   | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 55.24  | 309.4757369 | 176.1295            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | H-20        | CT LEGAL     | 5      | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 31.55  | 309.4757369 | 145.3325            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | HS-20       | CT LEGAL     | 2.96   | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 53.27  | 309.4757369 | 173.5685            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-L73.0    | CT LEGAL     | 2.88   | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 54.79  | 309.4757369 | 175.5445            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-L3S2     | CT LEGAL     | 3.18   | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 49.57  | 309.4757369 | 168.7585            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-P76.5    | CT PERMIT    | 3.03   | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.16     | 58.19  | 309.4757369 | 171.8179            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-P120(6)  | CT PERMIT    | 2.12   | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.209778 | 79.74  | 309.4757369 | 200.7852            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-P140(7)a | CT PERMIT    | 1.9    | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.31     | 82.21  | 309.4757369 | 212.0126            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-P140(7)b | CT PERMIT    | 2.03   | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.31     | 77.12  | 309.4757369 | 205.3447            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-P160(8)a | CT PERMIT    | 1.75   | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.31     | 89.34  | 309.4757369 | 221.3529            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-P160(8)b | CT PERMIT    | 1.72   | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.31     | 90.79  | 309.4757369 | 223.2524            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-P180(9)  | CT PERMIT    | 1.58   | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.31     | 98.75  | 309.4757369 | 233.68              | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-P200(10) | CT PERMIT    | 1.51   | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.21     | 111.59 | 309.4757369 | 239.3414            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-P380     | CT PERMIT    | 2.18   | Stiffened Web - Flexural Buckling | 1.25    | 70.11 | 1.5  | 11.12 | 1.1      | 85.54  | 309.4757369 | 198.4115            | 1           |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | HL-93       | INVENTORY    | 1.86   | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.75     | 81.09  | 404.1248081 | 246.25              | 1.096899762 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | HL-93       | OPERATING    | 2.41   | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.35     | 81.09  | 404.1248081 | 213.814             | 1.096899752 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | Type 3      | AASHTO LEGAL | 4.94   | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 41.09  | 404.1248081 | 157.7595            | 1.096899739 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | Type 3S2    | AASHTO LEGAL | 3.86   | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 52.62  | 404.1248081 | 172.7485            | 1.096899742 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | Type 3-3    | AASHTO LEGAL | 3.69   | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 55.03  | 404.1248081 | 175.8815            | 1.096899743 |



[<- Factors](#)   [Summary->](#)   **Rating Factors**

[Compute Rating Factors](#)

[Top](#)

| Beam End Identification |        |         |             | Vehicle     |              | Rating |                                   | Loading |       |      |       |          |        | Capacity    | Axial Magnification |             |
|-------------------------|--------|---------|-------------|-------------|--------------|--------|-----------------------------------|---------|-------|------|-------|----------|--------|-------------|---------------------|-------------|
| Span                    | Member | Support | S.M.S       | Vehicle     | Load Type    | RF     | Failure Mechanism                 | γ.DC    | DC    | γ.DW | DW    | γ.LL     | LL     | C           | P.u                 | δ.A         |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | SU4         | AASHTO LEGAL | 4.53   | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 44.81  | 404.1248081 | 162.5955            | 1.09689974  |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | SU5         | AASHTO LEGAL | 4      | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 50.7   | 404.1248081 | 170.2525            | 1.096899742 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | SU6         | AASHTO LEGAL | 3.66   | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 55.4   | 404.1248081 | 176.3625            | 1.096899743 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | SU7         | AASHTO LEGAL | 3.37   | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 60.2   | 404.1248081 | 182.6025            | 1.096899745 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | H-20        | CT LEGAL     | 5.9    | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 34.38  | 404.1248081 | 149.0365            | 1.096899738 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | HS-20       | CT LEGAL     | 3.49   | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 58.06  | 404.1248081 | 179.8205            | 1.096899744 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-L73.0    | CT LEGAL     | 3.4    | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 59.71  | 404.1248081 | 181.9655            | 1.096899744 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-L3S2     | CT LEGAL     | 3.76   | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 54.02  | 404.1248081 | 174.5685            | 1.096899743 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-P76.5    | CT PERMIT    | 3.59   | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.16     | 63.41  | 404.1248081 | 177.8981            | 1.096899744 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-P120(6)  | CT PERMIT    | 2.51   | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.209778 | 86.9   | 404.1248081 | 209.4722            | 1.096899751 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-P140(7)a | CT PERMIT    | 2.25   | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.31     | 89.59  | 404.1248081 | 221.7054            | 1.096899754 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-P140(7)b | CT PERMIT    | 2.39   | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.31     | 84.04  | 404.1248081 | 214.4349            | 1.096899752 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-P160(8)a | CT PERMIT    | 2.07   | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.31     | 97.36  | 404.1248081 | 231.8841            | 1.096899757 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-P160(8)b | CT PERMIT    | 2.03   | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.31     | 98.93  | 404.1248081 | 233.9408            | 1.096899758 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-P180(9)  | CT PERMIT    | 1.87   | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.31     | 107.61 | 404.1248081 | 245.3116            | 1.096899761 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-P200(10) | CT PERMIT    | 1.79   | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.21     | 121.61 | 404.1248081 | 251.4906            | 1.096899763 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-P380     | CT PERMIT    | 2.57   | Stiffened Web - Flexural Buckling | 1.25    | 70.13 | 1.5  | 11.12 | 1.1      | 93.21  | 404.1248081 | 206.8735            | 1.096899751 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | HL-93       | INVENTORY    | 1.35   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.75     | 56.19  | 206.0396908 | 131.7975            | 1.239555706 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | HL-93       | OPERATING    | 1.75   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.35     | 56.19  | 206.0396908 | 109.3215            | 1.239555624 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | Type 3      | AASHTO LEGAL | 2.85   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 35.75  | 206.0396908 | 79.94               | 1.239555554 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | Type 3S2    | AASHTO LEGAL | 3.08   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 33.06  | 206.0396908 | 76.443              | 1.239555532 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | Type 3-3    | AASHTO LEGAL | 3.3    | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 30.92  | 206.0396908 | 73.661              | 1.239555526 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | SU4         | AASHTO LEGAL | 2.55   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 39.9   | 206.0396908 | 85.335              | 1.239555554 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | SU5         | AASHTO LEGAL | 2.34   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 43.59  | 206.0396908 | 90.132              | 1.239555566 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | SU6         | AASHTO LEGAL | 2.28   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 44.64  | 206.0396908 | 91.497              | 1.239555557 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | SU7         | AASHTO LEGAL | 2.26   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 45.11  | 206.0396908 | 92.108              | 1.239555572 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | H-20        | CT LEGAL     | 3.08   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 33.06  | 206.0396908 | 76.443              | 1.239555532 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | HS-20       | CT LEGAL     | 2.11   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 48.2   | 206.0396908 | 96.125              | 1.239555583 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-L73.0    | CT LEGAL     | 1.98   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 51.37  | 206.0396908 | 100.246             | 1.239555596 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-L3S2     | CT LEGAL     | 2.77   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 36.84  | 206.0396908 | 81.357              | 1.239555544 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-P76.5    | CT PERMIT    | 2.03   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.16     | 56.31  | 206.0396908 | 98.7846             | 1.239555591 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-P120(6)  | CT PERMIT    | 2.04   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.209778 | 53.77  | 206.0396908 | 98.51475            | 1.239555559 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-P140(7)a | CT PERMIT    | 1.93   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.16     | 59.1   | 206.0396908 | 102.021             | 1.239555601 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-P140(7)b | CT PERMIT    | 1.94   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.16     | 58.78  | 206.0396908 | 101.6498            | 1.23955556  |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-P160(8)a | CT PERMIT    | 1.88   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.16     | 60.57  | 206.0396908 | 103.7262            | 1.239555606 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-P160(8)b | CT PERMIT    | 1.6    | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.31     | 63.3   | 206.0396908 | 116.388             | 1.239555648 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-P180(9)  | CT PERMIT    | 1.62   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.31     | 62.35  | 206.0396908 | 115.1435            | 1.239555644 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-P200(10) | CT PERMIT    | 1.45   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.31     | 69.44  | 206.0396908 | 124.4314            | 1.239555678 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-P380     | CT PERMIT    | 2.63   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 4.01  | 1.1      | 45.88  | 206.0396908 | 83.933              | 1.239555555 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | HL-93       | INVENTORY    | 1.97   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 3.9   | 1.75     | 50.9   | 232.259984  | 122.375             | 1.109357411 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | HL-93       | OPERATING    | 2.56   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 3.9   | 1.35     | 50.9   | 232.259984  | 102.015             | 1.109357386 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | Type 3      | AASHTO LEGAL | 4.18   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 3.9   | 1.3      | 32.38  | 232.259984  | 75.394              | 1.109357361 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | Type 3S2    | AASHTO LEGAL | 4.52   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 3.9   | 1.3      | 29.95  | 232.259984  | 72.235              | 1.109357359 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | Type 3-3    | AASHTO LEGAL | 4.83   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 3.9   | 1.3      | 28.01  | 232.259984  | 69.713              | 1.109357357 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | SU4         | AASHTO LEGAL | 3.74   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 3.9   | 1.3      | 36.14  | 232.259984  | 80.282              | 1.109357366 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | SU5         | AASHTO LEGAL | 3.43   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 3.9   | 1.3      | 39.48  | 232.259984  | 84.624              | 1.109357369 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | SU6         | AASHTO LEGAL | 3.34   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 3.9   | 1.3      | 40.44  | 232.259984  | 85.872              | 1.10935737  |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | SU7         | AASHTO LEGAL | 3.31   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 3.9   | 1.3      | 40.86  | 232.259984  | 86.418              | 1.109357371 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | H-20        | CT LEGAL     | 4.52   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 3.9   | 1.3      | 29.94  | 232.259984  | 72.222              | 1.109357359 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | HS-20       | CT LEGAL     | 3.1    | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 3.9   | 1.3      | 43.66  | 232.259984  | 90.058              | 1.109357374 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-L73.0    | CT LEGAL     | 2.91   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 3.9   | 1.3      | 46.54  | 232.259984  | 93.802              | 1.109357378 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-L3S2     | CT LEGAL     | 4.05   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 3.9   | 1.3      | 33.37  | 232.259984  | 76.681              | 1.109357363 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-P76.5    | CT PERMIT    | 2.97   | Stiffened Web - Flexural Buckling | 1.25    | 21.96 | 1.5  | 3.9   | 1.16     | 51.01  | 232.259984  | 92.4716             | 1.109357377 |



[<- Factors](#)   [Summary->](#)   **Rating Factors**

[Compute Rating Factors](#)

[Top](#)

| Beam End Identification |        |         |             | Vehicle     |              | Rating |                                       | Loading |       |      |      |          |       | Capacity    | Axial Magnification |             |
|-------------------------|--------|---------|-------------|-------------|--------------|--------|---------------------------------------|---------|-------|------|------|----------|-------|-------------|---------------------|-------------|
| Span                    | Member | Support | S.M.S       | Vehicle     | Load Type    | RF     | Failure Mechanism                     | γ.DC    | DC    | γ.DW | DW   | γ.LL     | LL    | C           | P.u                 | δ.A         |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-P120(6)  | CT PERMIT    | 2.98   | Stiffened Web - Flexural Buckling     | 1.25    | 21.96 | 1.5  | 3.9  | 1.209778 | 48.71 | 232.259984  | 92.22828            | 1.109357376 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-P140(7)a | CT PERMIT    | 2.83   | Stiffened Web - Flexural Buckling     | 1.25    | 21.96 | 1.5  | 3.9  | 1.16     | 53.53 | 232.259984  | 95.3948             | 1.10935738  |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-P140(7)b | CT PERMIT    | 2.85   | Stiffened Web - Flexural Buckling     | 1.25    | 21.96 | 1.5  | 3.9  | 1.16     | 53.25 | 232.259984  | 95.07               | 1.109357379 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-P160(8)a | CT PERMIT    | 2.76   | Stiffened Web - Flexural Buckling     | 1.25    | 21.96 | 1.5  | 3.9  | 1.16     | 54.87 | 232.259984  | 96.9492             | 1.109357381 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-P160(8)b | CT PERMIT    | 2.34   | Stiffened Web - Flexural Buckling     | 1.25    | 21.96 | 1.5  | 3.9  | 1.31     | 57.34 | 232.259984  | 108.4154            | 1.109357394 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-P180(9)  | CT PERMIT    | 2.37   | Stiffened Web - Flexural Buckling     | 1.25    | 21.96 | 1.5  | 3.9  | 1.31     | 56.48 | 232.259984  | 107.2888            | 1.109357392 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-P200(10) | CT PERMIT    | 2.13   | Stiffened Web - Flexural Buckling     | 1.25    | 21.96 | 1.5  | 3.9  | 1.31     | 62.9  | 232.259984  | 115.699             | 1.109357402 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-P380     | CT PERMIT    | 3.85   | Stiffened Web - Flexural Buckling     | 1.25    | 21.96 | 1.5  | 3.9  | 1.1      | 41.56 | 232.259984  | 79.016              | 1.109357364 |
| 1                       | G1     | S Abut  | 1.G1.S Abut | HL-93       | INVENTORY    | 1.7    | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.75     | 57.75 | 207.6369701 | 136.13              | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | HL-93       | OPERATING    | 2.21   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.35     | 57.75 | 207.6369701 | 113.03              | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | Type 3      | AASHTO LEGAL | 3.65   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 36.34 | 207.6369701 | 82.3095             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | Type 3S2    | AASHTO LEGAL | 3.85   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 34.44 | 207.6369701 | 79.8395             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | Type 3-3    | AASHTO LEGAL | 4.11   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 32.24 | 207.6369701 | 76.9795             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | SU4         | AASHTO LEGAL | 3.28   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 40.46 | 207.6369701 | 87.6655             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | SU5         | AASHTO LEGAL | 2.99   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 44.36 | 207.6369701 | 92.7355             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | SU6         | AASHTO LEGAL | 2.9    | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 45.75 | 207.6369701 | 94.5425             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | SU7         | AASHTO LEGAL | 2.84   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 46.62 | 207.6369701 | 95.6735             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | H-20        | CT LEGAL     | 3.98   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 33.27 | 207.6369701 | 78.3185             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | HS-20       | CT LEGAL     | 2.69   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 49.24 | 207.6369701 | 99.0795             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-L73.0    | CT LEGAL     | 2.53   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 52.28 | 207.6369701 | 103.0315            | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-L3S2     | CT LEGAL     | 3.56   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.3      | 37.26 | 207.6369701 | 83.5055             | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-P76.5    | CT PERMIT    | 2.6    | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.16     | 57.12 | 207.6369701 | 101.3267            | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-P120(6)  | CT PERMIT    | 2.52   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.209778 | 56.45 | 207.6369701 | 103.3595            | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-P140(7)a | CT PERMIT    | 2.48   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.16     | 59.93 | 207.6369701 | 104.5863            | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-P140(7)b | CT PERMIT    | 2.5    | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.16     | 59.42 | 207.6369701 | 103.9947            | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-P160(8)a | CT PERMIT    | 2.42   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.16     | 61.43 | 207.6369701 | 106.3263            | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-P160(8)b | CT PERMIT    | 2.05   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.31     | 64.21 | 207.6369701 | 119.1826            | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-P180(9)  | CT PERMIT    | 2.08   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.31     | 63.21 | 207.6369701 | 117.8726            | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-P200(10) | CT PERMIT    | 1.87   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.31     | 70.42 | 207.6369701 | 127.3177            | 1           |
| 1                       | G1     | S Abut  | 1.G1.S Abut | CT-P380     | CT PERMIT    | 3.25   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.97 | 1.1      | 48.21 | 207.6369701 | 88.0985             | 1           |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | HL-93       | INVENTORY    | 0.38   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.75     | 52.22 | 90.78676773 | 126.17              | 1.294783496 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | HL-93       | OPERATING    | 0.5    | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.35     | 52.22 | 90.78676773 | 105.282             | 1.294783494 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | Type 3      | AASHTO LEGAL | 0.82   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 32.86 | 90.78676773 | 77.503              | 1.294783492 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | Type 3S2    | AASHTO LEGAL | 0.87   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 31.14 | 90.78676773 | 75.267              | 1.294783492 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | Type 3-3    | AASHTO LEGAL | 0.93   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 29.16 | 90.78676773 | 72.693              | 1.294783492 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | SU4         | AASHTO LEGAL | 0.74   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 36.59 | 90.78676773 | 82.352              | 1.294783492 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | SU5         | AASHTO LEGAL | 0.67   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 40.11 | 90.78676773 | 86.928              | 1.294783493 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | SU6         | AASHTO LEGAL | 0.65   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 41.37 | 90.78676773 | 88.566              | 1.294783493 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | SU7         | AASHTO LEGAL | 0.64   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 42.15 | 90.78676773 | 89.58               | 1.294783493 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | H-20        | CT LEGAL     | 0.9    | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 30.09 | 90.78676773 | 73.902              | 1.294783492 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | HS-20       | CT LEGAL     | 0.61   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 44.52 | 90.78676773 | 92.661              | 1.294783493 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-L73.0    | CT LEGAL     | 0.57   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 47.28 | 90.78676773 | 96.249              | 1.294783493 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-L3S2     | CT LEGAL     | 0.8    | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.3      | 33.7  | 90.78676773 | 78.595              | 1.294783492 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-P76.5    | CT PERMIT    | 0.58   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.16     | 51.65 | 90.78676773 | 94.699              | 1.294783493 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-P120(6)  | CT PERMIT    | 0.57   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.209778 | 51.04 | 90.78676773 | 96.53206            | 1.294783493 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-P140(7)a | CT PERMIT    | 0.56   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.16     | 54.2  | 90.78676773 | 97.657              | 1.294783493 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-P140(7)b | CT PERMIT    | 0.56   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.16     | 53.73 | 90.78676773 | 97.1118             | 1.294783493 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-P160(8)a | CT PERMIT    | 0.54   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.16     | 55.55 | 90.78676773 | 99.223              | 1.294783494 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-P160(8)b | CT PERMIT    | 0.46   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.31     | 58.06 | 90.78676773 | 110.8436            | 1.294783495 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-P180(9)  | CT PERMIT    | 0.47   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.31     | 57.16 | 90.78676773 | 109.6646            | 1.294783494 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-P200(10) | CT PERMIT    | 0.42   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.31     | 63.68 | 90.78676773 | 118.2058            | 1.294783495 |
| 1                       | G1     | Pier 1  | 1.G1.Pier 1 | CT-P380     | CT PERMIT    | 0.73   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.28 | 1.5  | 3.79 | 1.1      | 43.59 | 90.78676773 | 82.734              | 1.294783492 |
| 1                       | G5     | S Abut  | 1.G5.S Abut | HL-93       | INVENTORY    | 1.89   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85 | 1.75     | 52.22 | 207.6369701 | 126.2725            | 1           |



Steel Beam Ends - Load Rating  
Connecticut Department of Transportation



[<- Factors](#)   [Summary->](#)   **Rating Factors**

Compute Rating Factors

[Top](#)

| Beam End Identification |        |         |             | Vehicle     |              | Rating |                                       | Loading |       |      |       |          |       | Capacity    | Axial Magnification |             |
|-------------------------|--------|---------|-------------|-------------|--------------|--------|---------------------------------------|---------|-------|------|-------|----------|-------|-------------|---------------------|-------------|
| Span                    | Member | Support | S.M.S       | Vehicle     | Load Type    | RF     | Failure Mechanism                     | γ.DC    | DC    | γ.DW | DW    | γ.LL     | LL    | C           | P.u                 | δ.A         |
| 1                       | G5     | S Abut  | 1.G5.S Abut | HL-93       | OPERATING    | 2.45   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.35     | 52.22 | 207.6369701 | 105.3845            | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | Type 3      | AASHTO LEGAL | 4.04   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.3      | 32.86 | 207.6369701 | 77.6055             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | Type 3S2    | AASHTO LEGAL | 4.26   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.3      | 31.14 | 207.6369701 | 75.3695             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | Type 3-3    | AASHTO LEGAL | 4.55   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.3      | 29.16 | 207.6369701 | 72.7955             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | SU4         | AASHTO LEGAL | 3.63   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.3      | 36.59 | 207.6369701 | 82.4545             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | SU5         | AASHTO LEGAL | 3.31   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.3      | 40.11 | 207.6369701 | 87.0305             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | SU6         | AASHTO LEGAL | 3.21   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.3      | 41.37 | 207.6369701 | 88.6685             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | SU7         | AASHTO LEGAL | 3.15   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.3      | 42.15 | 207.6369701 | 89.6825             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | H-20        | CT LEGAL     | 4.41   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.3      | 30.09 | 207.6369701 | 74.0045             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | HS-20       | CT LEGAL     | 2.98   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.3      | 44.52 | 207.6369701 | 92.7635             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-L73.0    | CT LEGAL     | 2.81   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.3      | 47.28 | 207.6369701 | 96.3515             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-L3S2     | CT LEGAL     | 3.94   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.3      | 33.7  | 207.6369701 | 78.6975             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-P76.5    | CT PERMIT    | 2.88   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.16     | 51.65 | 207.6369701 | 94.8015             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-P120(6)  | CT PERMIT    | 2.79   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.209778 | 51.04 | 207.6369701 | 96.63456            | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-P140(7)a | CT PERMIT    | 2.74   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.16     | 54.2  | 207.6369701 | 97.7595             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-P140(7)b | CT PERMIT    | 2.77   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.16     | 53.73 | 207.6369701 | 97.2143             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-P160(8)a | CT PERMIT    | 2.68   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.16     | 55.55 | 207.6369701 | 99.3255             | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-P160(8)b | CT PERMIT    | 2.27   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.31     | 58.06 | 207.6369701 | 110.9461            | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-P180(9)  | CT PERMIT    | 2.3    | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.31     | 57.16 | 207.6369701 | 109.7671            | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-P200(10) | CT PERMIT    | 2.07   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.31     | 63.68 | 207.6369701 | 118.3083            | 1           |
| 1                       | G5     | S Abut  | 1.G5.S Abut | CT-P380     | CT PERMIT    | 3.6    | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.29 | 1.5  | 3.85  | 1.1      | 43.59 | 207.6369701 | 82.8365             | 1           |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | HL-93       | INVENTORY    | 0.21   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.75     | 57.75 | 86.56845354 | 135.705             | 1.549338251 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | HL-93       | OPERATING    | 0.27   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.35     | 57.75 | 86.56845354 | 112.605             | 1.549338243 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | Type 3      | AASHTO LEGAL | 0.44   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 36.34 | 86.56845354 | 81.8845             | 1.549338236 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | Type 3S2    | AASHTO LEGAL | 0.47   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 34.44 | 86.56845354 | 79.4145             | 1.549338235 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | Type 3-3    | AASHTO LEGAL | 0.5    | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 32.24 | 86.56845354 | 76.5545             | 1.549338234 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | SU4         | AASHTO LEGAL | 0.4    | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 40.46 | 86.56845354 | 87.2405             | 1.549338237 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | SU5         | AASHTO LEGAL | 0.36   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 44.36 | 86.56845354 | 92.3105             | 1.549338238 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | SU6         | AASHTO LEGAL | 0.35   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 45.75 | 86.56845354 | 94.1175             | 1.549338238 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | SU7         | AASHTO LEGAL | 0.35   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 46.62 | 86.56845354 | 95.2485             | 1.549338239 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | H-20        | CT LEGAL     | 0.49   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 33.27 | 86.56845354 | 77.8935             | 1.549338235 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | HS-20       | CT LEGAL     | 0.33   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 49.24 | 86.56845354 | 98.6545             | 1.549338239 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-L73.0    | CT LEGAL     | 0.31   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 52.28 | 86.56845354 | 102.6065            | 1.549338241 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-L3S2     | CT LEGAL     | 0.43   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.3      | 37.26 | 86.56845354 | 83.0805             | 1.549338236 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-P76.5    | CT PERMIT    | 0.32   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.16     | 57.12 | 86.56845354 | 100.9017            | 1.54933824  |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-P120(6)  | CT PERMIT    | 0.31   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.209778 | 56.45 | 86.56845354 | 102.9345            | 1.549338241 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-P140(7)a | CT PERMIT    | 0.3    | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.16     | 59.93 | 86.56845354 | 104.1613            | 1.549338241 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-P140(7)b | CT PERMIT    | 0.3    | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.16     | 59.42 | 86.56845354 | 103.5697            | 1.549338241 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-P160(8)a | CT PERMIT    | 0.29   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.16     | 61.43 | 86.56845354 | 105.9013            | 1.549338241 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-P160(8)b | CT PERMIT    | 0.25   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.31     | 64.21 | 86.56845354 | 118.7576            | 1.549338245 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-P180(9)  | CT PERMIT    | 0.25   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.31     | 63.21 | 86.56845354 | 117.4476            | 1.549338245 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-P200(10) | CT PERMIT    | 0.23   | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.31     | 70.42 | 86.56845354 | 126.8927            | 1.549338248 |
| 1                       | G5     | Pier 1  | 1.G5.Pier 1 | CT-P380     | CT PERMIT    | 0.4    | Stiffened Web - Localized Flex. Buck. | 1.25    | 23.31 | 1.5  | 3.67  | 1.1      | 48.21 | 86.56845354 | 87.6735             | 1.549338237 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | HL-93       | INVENTORY    | 1.6    | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.75     | 74.41 | 371.6329834 | 234.79              | 1.186031905 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | HL-93       | OPERATING    | 2.07   | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.35     | 74.41 | 371.6329834 | 205.026             | 1.186031904 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | Type 3      | AASHTO LEGAL | 4.25   | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 37.7  | 371.6329834 | 153.5825            | 1.186031904 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | Type 3S2    | AASHTO LEGAL | 3.32   | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 48.29 | 371.6329834 | 167.3495            | 1.186031904 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | Type 3-3    | AASHTO LEGAL | 3.18   | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 50.5  | 371.6329834 | 170.2225            | 1.186031904 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | SU4         | AASHTO LEGAL | 3.9    | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 41.12 | 371.6329834 | 158.0285            | 1.186031904 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | SU5         | AASHTO LEGAL | 3.45   | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 46.52 | 371.6329834 | 165.0485            | 1.186031904 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | SU6         | AASHTO LEGAL | 3.15   | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 50.84 | 371.6329834 | 170.6645            | 1.186031904 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | SU7         | AASHTO LEGAL | 2.9    | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 55.24 | 371.6329834 | 176.3845            | 1.186031904 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | H-20        | CT LEGAL     | 5.09   | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 31.55 | 371.6329834 | 145.5875            | 1.186031904 |



[<- Factors](#)   [Summary->](#)   **Rating Factors**

Compute Rating Factors

[Top](#)

| Beam End Identification |        |         |             | Vehicle     |              | Rating |                                       | Loading |       |      |       |          |        | Capacity    | Axial Magnification |             |
|-------------------------|--------|---------|-------------|-------------|--------------|--------|---------------------------------------|---------|-------|------|-------|----------|--------|-------------|---------------------|-------------|
| Span                    | Member | Support | S.M.S       | Vehicle     | Load Type    | RF     | Failure Mechanism                     | γ.DC    | DC    | γ.DW | DW    | γ.LL     | LL     | C           | P.u                 | δ.A         |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | HS-20       | CT LEGAL     | 3.01   | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 53.27  | 371.6329834 | 173.8235            | 1.186031904 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-L73.0    | CT LEGAL     | 2.93   | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 54.79  | 371.6329834 | 175.7995            | 1.186031904 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-L3S2     | CT LEGAL     | 3.23   | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.3      | 49.57  | 371.6329834 | 169.0135            | 1.186031904 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-P76.5    | CT PERMIT    | 3.09   | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.16     | 58.19  | 371.6329834 | 172.0729            | 1.186031904 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-P120(6)  | CT PERMIT    | 2.16   | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.209778 | 79.74  | 371.6329834 | 201.0402            | 1.186031904 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-P140(7)a | CT PERMIT    | 1.93   | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.31     | 82.21  | 371.6329834 | 212.2676            | 1.186031904 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-P140(7)b | CT PERMIT    | 2.06   | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.31     | 77.12  | 371.6329834 | 205.5997            | 1.186031904 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-P160(8)a | CT PERMIT    | 1.78   | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.31     | 89.34  | 371.6329834 | 221.6079            | 1.186031905 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-P160(8)b | CT PERMIT    | 1.75   | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.31     | 90.79  | 371.6329834 | 223.5074            | 1.186031905 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-P180(9)  | CT PERMIT    | 1.61   | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.31     | 98.75  | 371.6329834 | 233.935             | 1.186031905 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-P200(10) | CT PERMIT    | 1.54   | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.21     | 111.59 | 371.6329834 | 239.5964            | 1.186031905 |
| 2                       | G1     | Pier 2  | 2.G1.Pier 2 | CT-P380     | CT PERMIT    | 2.21   | Stiffened Web - Localized Flex. Buck. | 1.25    | 69.93 | 1.5  | 11.44 | 1.1      | 85.54  | 371.6329834 | 198.6665            | 1.186031904 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | HL-93       | INVENTORY    | 0.58   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.75     | 105.36 | 323.088702  | 294.7775            | 1.475564994 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | HL-93       | OPERATING    | 0.76   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.35     | 105.36 | 323.088702  | 252.6335            | 1.475564993 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | Type 3      | AASHTO LEGAL | 1.56   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 53.39  | 323.088702  | 179.8045            | 1.475564992 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | Type 3S2    | AASHTO LEGAL | 1.22   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 68.38  | 323.088702  | 199.2915            | 1.475564992 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | Type 3-3    | AASHTO LEGAL | 1.16   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 71.51  | 323.088702  | 203.3605            | 1.475564992 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | SU4         | AASHTO LEGAL | 1.43   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 58.22  | 323.088702  | 186.0835            | 1.475564992 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | SU5         | AASHTO LEGAL | 1.26   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 65.87  | 323.088702  | 196.0285            | 1.475564992 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | SU6         | AASHTO LEGAL | 1.16   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 71.99  | 323.088702  | 203.9845            | 1.475564992 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | SU7         | AASHTO LEGAL | 1.06   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 78.22  | 323.088702  | 212.0835            | 1.475564992 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | H-20        | CT LEGAL     | 1.86   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 44.67  | 323.088702  | 168.4685            | 1.475564992 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | HS-20       | CT LEGAL     | 1.1    | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 75.44  | 323.088702  | 208.4695            | 1.475564992 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-L73.0    | CT LEGAL     | 1.07   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 77.59  | 323.088702  | 211.2645            | 1.475564992 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-L3S2     | CT LEGAL     | 1.18   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.3      | 70.2   | 323.088702  | 201.6575            | 1.475564992 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-P76.5    | CT PERMIT    | 1.13   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.16     | 82.39  | 323.088702  | 205.9699            | 1.475564992 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-P120(6)  | CT PERMIT    | 0.79   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.209778 | 112.91 | 323.088702  | 246.9935            | 1.475564993 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-P140(7)a | CT PERMIT    | 0.71   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.31     | 116.4  | 323.088702  | 262.8815            | 1.475564993 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-P140(7)b | CT PERMIT    | 0.75   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.31     | 109.2  | 323.088702  | 253.4495            | 1.475564993 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-P160(8)a | CT PERMIT    | 0.65   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.31     | 126.5  | 323.088702  | 276.1125            | 1.475564993 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-P160(8)b | CT PERMIT    | 0.64   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.31     | 128.55 | 323.088702  | 278.798             | 1.475564994 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-P180(9)  | CT PERMIT    | 0.59   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.31     | 139.83 | 323.088702  | 293.5748            | 1.475564994 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-P200(10) | CT PERMIT    | 0.56   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.21     | 158.01 | 323.088702  | 301.5896            | 1.475564994 |
| 2                       | G3     | Pier 2  | 2.G3.Pier 2 | CT-P380     | CT PERMIT    | 0.87   | Stiffened Web - Localized Flex. Buck. | 1.25    | 77.71 | 1.5  | 8.84  | 1.1      | 112.37 | 323.088702  | 234.0045            | 1.475564993 |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | HL-93       | INVENTORY    | 1.97   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.75     | 74.41  | 361.8280074 | 234.535             | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | HL-93       | OPERATING    | 2.56   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.35     | 74.41  | 361.8280074 | 204.771             | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | Type 3      | AASHTO LEGAL | 5.25   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 37.7   | 361.8280074 | 153.3275            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | Type 3S2    | AASHTO LEGAL | 4.1    | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 48.29  | 361.8280074 | 167.0945            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | Type 3-3    | AASHTO LEGAL | 3.92   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 50.5   | 361.8280074 | 169.9675            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | SU4         | AASHTO LEGAL | 4.81   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 41.12  | 361.8280074 | 157.7735            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | SU5         | AASHTO LEGAL | 4.25   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 46.52  | 361.8280074 | 164.7935            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | SU6         | AASHTO LEGAL | 3.89   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 50.84  | 361.8280074 | 170.4095            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | SU7         | AASHTO LEGAL | 3.58   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 55.24  | 361.8280074 | 176.1295            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | H-20        | CT LEGAL     | 6.27   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 31.55  | 361.8280074 | 145.3325            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | HS-20       | CT LEGAL     | 3.71   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 53.27  | 361.8280074 | 173.5685            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-L73.0    | CT LEGAL     | 3.61   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 54.79  | 361.8280074 | 175.5445            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-L3S2     | CT LEGAL     | 3.99   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.3      | 49.57  | 361.8280074 | 168.7585            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-P76.5    | CT PERMIT    | 3.81   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.16     | 58.19  | 361.8280074 | 171.8179            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-P120(6)  | CT PERMIT    | 2.66   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.209778 | 79.74  | 361.8280074 | 200.7852            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-P140(7)a | CT PERMIT    | 2.39   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.31     | 82.21  | 361.8280074 | 212.0126            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-P140(7)b | CT PERMIT    | 2.54   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.31     | 77.12  | 361.8280074 | 205.3447            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-P160(8)a | CT PERMIT    | 2.2    | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.31     | 89.34  | 361.8280074 | 221.3529            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-P160(8)b | CT PERMIT    | 2.16   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.31     | 90.79  | 361.8280074 | 223.2524            | 1           |



[<- Factors](#)   [Summary->](#)   **Rating Factors**

[Compute Rating Factors](#)

[Top](#)

| Beam End Identification |        |         |             | Vehicle     |              | Rating |                                       | Loading |       |      |       |          |        | Capacity    | Axial Magnification |             |
|-------------------------|--------|---------|-------------|-------------|--------------|--------|---------------------------------------|---------|-------|------|-------|----------|--------|-------------|---------------------|-------------|
| Span                    | Member | Support | S.M.S       | Vehicle     | Load Type    | RF     | Failure Mechanism                     | γ.DC    | DC    | γ.DW | DW    | γ.LL     | LL     | C           | P.u                 | δ.A         |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-P180(9)  | CT PERMIT    | 1.99   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.31     | 98.75  | 361.8280074 | 233.68              | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-P200(10) | CT PERMIT    | 1.9    | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.21     | 111.59 | 361.8280074 | 239.3414            | 1           |
| 2                       | G5     | Pier 1  | 2.G5.Pier 1 | CT-P380     | CT PERMIT    | 2.73   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.11 | 1.5  | 11.12 | 1.1      | 85.54  | 361.8280074 | 198.4115            | 1           |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | HL-93       | INVENTORY    | 1.29   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.75     | 81.09  | 318.4363451 | 246.25              | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | HL-93       | OPERATING    | 1.67   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.35     | 81.09  | 318.4363451 | 213.814             | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | Type 3      | AASHTO LEGAL | 3.43   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 41.09  | 318.4363451 | 157.7595            | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | Type 3S2    | AASHTO LEGAL | 2.68   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 52.62  | 318.4363451 | 172.7485            | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | Type 3-3    | AASHTO LEGAL | 2.56   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 55.03  | 318.4363451 | 175.8815            | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | SU4         | AASHTO LEGAL | 3.15   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 44.81  | 318.4363451 | 162.5955            | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | SU5         | AASHTO LEGAL | 2.78   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 50.7   | 318.4363451 | 170.2525            | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | SU6         | AASHTO LEGAL | 2.54   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 55.4   | 318.4363451 | 176.3625            | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | SU7         | AASHTO LEGAL | 2.34   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 60.2   | 318.4363451 | 182.6025            | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | H-20        | CT LEGAL     | 4.1    | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 34.38  | 318.4363451 | 149.0365            | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | HS-20       | CT LEGAL     | 2.43   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 58.06  | 318.4363451 | 179.8205            | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-L73.0    | CT LEGAL     | 2.36   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 59.71  | 318.4363451 | 181.9655            | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-L3S2     | CT LEGAL     | 2.61   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.3      | 54.02  | 318.4363451 | 174.5685            | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-P76.5    | CT PERMIT    | 2.49   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.16     | 63.41  | 318.4363451 | 177.8981            | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-P120(6)  | CT PERMIT    | 1.74   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.209778 | 86.9   | 318.4363451 | 209.4722            | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-P140(7)a | CT PERMIT    | 1.56   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.31     | 89.59  | 318.4363451 | 221.7054            | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-P140(7)b | CT PERMIT    | 1.66   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.31     | 84.04  | 318.4363451 | 214.4349            | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-P160(8)a | CT PERMIT    | 1.43   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.31     | 97.36  | 318.4363451 | 231.8841            | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-P160(8)b | CT PERMIT    | 1.41   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.31     | 98.93  | 318.4363451 | 233.9408            | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-P180(9)  | CT PERMIT    | 1.3    | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.31     | 107.61 | 318.4363451 | 245.3116            | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-P200(10) | CT PERMIT    | 1.24   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.21     | 121.61 | 318.4363451 | 251.4906            | 1.105800923 |
| 2                       | G5     | Pier 2  | 2.G5.Pier 2 | CT-P380     | CT PERMIT    | 1.79   | Stiffened Web - Localized Flex. Buck. | 1.25    | 70.13 | 1.5  | 11.12 | 1.1      | 93.21  | 318.4363451 | 206.8735            | 1.105800923 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | HL-93       | INVENTORY    | 0.83   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.75     | 56.19  | 138.0018244 | 131.7975            | 1.192865037 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | HL-93       | OPERATING    | 1.08   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.35     | 56.19  | 138.0018244 | 109.3215            | 1.192865036 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | Type 3      | AASHTO LEGAL | 1.76   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 35.75  | 138.0018244 | 79.94               | 1.192865036 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | Type 3S2    | AASHTO LEGAL | 1.91   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 33.06  | 138.0018244 | 76.443              | 1.192865036 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | Type 3-3    | AASHTO LEGAL | 2.04   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 30.92  | 138.0018244 | 73.661              | 1.192865036 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | SU4         | AASHTO LEGAL | 1.58   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 39.9   | 138.0018244 | 85.335              | 1.192865036 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | SU5         | AASHTO LEGAL | 1.45   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 43.59  | 138.0018244 | 90.132              | 1.192865036 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | SU6         | AASHTO LEGAL | 1.41   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 44.64  | 138.0018244 | 91.497              | 1.192865036 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | SU7         | AASHTO LEGAL | 1.4    | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 45.11  | 138.0018244 | 92.108              | 1.192865036 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | H-20        | CT LEGAL     | 1.91   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 33.06  | 138.0018244 | 76.443              | 1.192865036 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | HS-20       | CT LEGAL     | 1.31   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 48.2   | 138.0018244 | 96.125              | 1.192865036 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-L73.0    | CT LEGAL     | 1.23   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 51.37  | 138.0018244 | 100.246             | 1.192865036 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-L3S2     | CT LEGAL     | 1.71   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.3      | 36.84  | 138.0018244 | 81.357              | 1.192865036 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-P76.5    | CT PERMIT    | 1.25   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.16     | 56.31  | 138.0018244 | 98.7846             | 1.192865036 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-P120(6)  | CT PERMIT    | 1.26   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.209778 | 53.77  | 138.0018244 | 98.51475            | 1.192865036 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-P140(7)a | CT PERMIT    | 1.19   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.16     | 59.1   | 138.0018244 | 102.021             | 1.192865036 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-P140(7)b | CT PERMIT    | 1.2    | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.16     | 58.78  | 138.0018244 | 101.6498            | 1.192865036 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-P160(8)a | CT PERMIT    | 1.17   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.16     | 60.57  | 138.0018244 | 103.7262            | 1.192865036 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-P160(8)b | CT PERMIT    | 0.99   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.31     | 63.3   | 138.0018244 | 116.388             | 1.192865036 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-P180(9)  | CT PERMIT    | 1      | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.31     | 62.35  | 138.0018244 | 115.1435            | 1.192865036 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-P200(10) | CT PERMIT    | 0.9    | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.31     | 69.44  | 138.0018244 | 124.4314            | 1.192865037 |
| 3                       | G1     | Pier 2  | 3.G1.Pier 2 | CT-P380     | CT PERMIT    | 1.62   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 4.01  | 1.1      | 45.88  | 138.0018244 | 83.933              | 1.192865036 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | HL-93       | INVENTORY    | 0.84   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9   | 1.75     | 50.9   | 125.119045  | 122.375             | 1.15533022  |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | HL-93       | OPERATING    | 1.09   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9   | 1.35     | 50.9   | 125.119045  | 102.015             | 1.155330219 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | Type 3      | AASHTO LEGAL | 1.78   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9   | 1.3      | 32.38  | 125.119045  | 75.394              | 1.155330218 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | Type 3S2    | AASHTO LEGAL | 1.92   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9   | 1.3      | 29.95  | 125.119045  | 72.235              | 1.155330218 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | Type 3-3    | AASHTO LEGAL | 2.05   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9   | 1.3      | 28.01  | 125.119045  | 69.713              | 1.155330218 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | SU4         | AASHTO LEGAL | 1.59   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9   | 1.3      | 36.14  | 125.119045  | 80.282              | 1.155330218 |



[<- Factors](#)   [Summary->](#)   **Rating Factors**

Compute Rating Factors

[Top](#)

| Beam End Identification |        |         |             | Vehicle     |              | Rating |                                       | Loading |       |      |      |          |       | Capacity    | Axial Magnification |             |
|-------------------------|--------|---------|-------------|-------------|--------------|--------|---------------------------------------|---------|-------|------|------|----------|-------|-------------|---------------------|-------------|
| Span                    | Member | Support | S.M.S       | Vehicle     | Load Type    | RF     | Failure Mechanism                     | γ.DC    | DC    | γ.DW | DW   | γ.LL     | LL    | C           | P.u                 | δ.A         |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | SU5         | AASHTO LEGAL | 1.46   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9  | 1.3      | 39.48 | 125.119045  | 84.624              | 1.155330218 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | SU6         | AASHTO LEGAL | 1.42   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9  | 1.3      | 40.44 | 125.119045  | 85.872              | 1.155330218 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | SU7         | AASHTO LEGAL | 1.41   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9  | 1.3      | 40.86 | 125.119045  | 86.418              | 1.155330218 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | H-20        | CT LEGAL     | 1.92   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9  | 1.3      | 29.94 | 125.119045  | 72.222              | 1.155330218 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | HS-20       | CT LEGAL     | 1.32   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9  | 1.3      | 43.66 | 125.119045  | 90.058              | 1.155330218 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-L73.0    | CT LEGAL     | 1.23   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9  | 1.3      | 46.54 | 125.119045  | 93.802              | 1.155330218 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-L3S2     | CT LEGAL     | 1.72   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9  | 1.3      | 33.37 | 125.119045  | 76.681              | 1.155330218 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-P76.5    | CT PERMIT    | 1.26   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9  | 1.16     | 51.01 | 125.119045  | 92.4716             | 1.155330218 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-P120(6)  | CT PERMIT    | 1.27   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9  | 1.209778 | 48.71 | 125.119045  | 92.22828            | 1.155330218 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-P140(7)a | CT PERMIT    | 1.2    | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9  | 1.16     | 53.53 | 125.119045  | 95.3948             | 1.155330219 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-P140(7)b | CT PERMIT    | 1.21   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9  | 1.16     | 53.25 | 125.119045  | 95.07               | 1.155330219 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-P160(8)a | CT PERMIT    | 1.17   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9  | 1.16     | 54.87 | 125.119045  | 96.9492             | 1.155330219 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-P160(8)b | CT PERMIT    | 0.99   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9  | 1.31     | 57.34 | 125.119045  | 108.4154            | 1.155330219 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-P180(9)  | CT PERMIT    | 1.01   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9  | 1.31     | 56.48 | 125.119045  | 107.2888            | 1.155330219 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-P200(10) | CT PERMIT    | 0.91   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9  | 1.31     | 62.9  | 125.119045  | 115.699             | 1.155330219 |
| 3                       | G5     | Pier 2  | 3.G5.Pier 2 | CT-P380     | CT PERMIT    | 1.64   | Stiffened Web - Localized Flex. Buck. | 1.25    | 21.96 | 1.5  | 3.9  | 1.1      | 41.56 | 125.119045  | 79.016              | 1.155330218 |
| 1                       | G2     | S Abut  | 1.G2.S Abut | HL-93       | INVENTORY    | 0.79   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.75     | 78.22 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | HL-93       | OPERATING    | 1.02   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.35     | 78.22 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | Type 3      | AASHTO LEGAL | 1.69   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 49.22 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | Type 3S2    | AASHTO LEGAL | 1.79   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 46.65 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | Type 3-3    | AASHTO LEGAL | 1.91   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 43.68 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | SU4         | AASHTO LEGAL | 1.52   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 54.81 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | SU5         | AASHTO LEGAL | 1.39   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 60.09 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | SU6         | AASHTO LEGAL | 1.34   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 61.97 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | SU7         | AASHTO LEGAL | 1.32   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 63.14 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | H-20        | CT LEGAL     | 1.85   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 45.07 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | HS-20       | CT LEGAL     | 1.25   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 66.69 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-L73.0    | CT LEGAL     | 1.17   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 70.82 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-L3S2     | CT LEGAL     | 1.65   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 50.48 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-P76.5    | CT PERMIT    | 1.21   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.16     | 77.37 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-P120(6)  | CT PERMIT    | 1.17   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.209778 | 76.46 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-P140(7)a | CT PERMIT    | 1.15   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.16     | 81.18 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-P140(7)b | CT PERMIT    | 1.16   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.16     | 80.49 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-P160(8)a | CT PERMIT    | 1.12   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.16     | 83.21 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-P160(8)b | CT PERMIT    | 0.95   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.31     | 86.97 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-P180(9)  | CT PERMIT    | 0.96   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.31     | 85.63 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-P200(10) | CT PERMIT    | 0.86   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.31     | 95.39 | 146.1532624 |                     | 1           |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-P380     | CT PERMIT    | 1.63   | UnStiffened Web - Web Crippling       | 1.25    | 25.47 | 1.5  | 3.79 | 1.1      | 60.58 | 146.1532624 |                     | 1           |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | HL-93       | INVENTORY    | 0.95   | UnStiffened Web - Web Crippling       | 1.25    | 25.48 | 1.5  | 3.79 | 1.75     | 67.85 | 150.6187873 |                     | 1           |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | HL-93       | OPERATING    | 1.23   | UnStiffened Web - Web Crippling       | 1.25    | 25.48 | 1.5  | 3.79 | 1.35     | 67.85 | 150.6187873 |                     | 1           |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | Type 3      | AASHTO LEGAL | 2.03   | UnStiffened Web - Web Crippling       | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 42.69 | 150.6187873 |                     | 1           |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | Type 3S2    | AASHTO LEGAL | 2.14   | UnStiffened Web - Web Crippling       | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 40.46 | 150.6187873 |                     | 1           |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | Type 3-3    | AASHTO LEGAL | 2.29   | UnStiffened Web - Web Crippling       | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 37.89 | 150.6187873 |                     | 1           |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | SU4         | AASHTO LEGAL | 1.82   | UnStiffened Web - Web Crippling       | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 47.54 | 150.6187873 |                     | 1           |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | SU5         | AASHTO LEGAL | 1.66   | UnStiffened Web - Web Crippling       | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 52.12 | 150.6187873 |                     | 1           |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | SU6         | AASHTO LEGAL | 1.61   | UnStiffened Web - Web Crippling       | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 53.76 | 150.6187873 |                     | 1           |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | SU7         | AASHTO LEGAL | 1.58   | UnStiffened Web - Web Crippling       | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 54.77 | 150.6187873 |                     | 1           |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | H-20        | CT LEGAL     | 2.22   | UnStiffened Web - Web Crippling       | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 39.1  | 150.6187873 |                     | 1           |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | HS-20       | CT LEGAL     | 1.5    | UnStiffened Web - Web Crippling       | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 57.85 | 150.6187873 |                     | 1           |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-L73.0    | CT LEGAL     | 1.41   | UnStiffened Web - Web Crippling       | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 61.43 | 150.6187873 |                     | 1           |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-L3S2     | CT LEGAL     | 1.98   | UnStiffened Web - Web Crippling       | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 43.78 | 150.6187873 |                     | 1           |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-P76.5    | CT PERMIT    | 1.45   | UnStiffened Web - Web Crippling       | 1.25    | 25.48 | 1.5  | 3.79 | 1.16     | 67.12 | 150.6187873 |                     | 1           |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-P120(6)  | CT PERMIT    | 1.4    | UnStiffened Web - Web Crippling       | 1.25    | 25.48 | 1.5  | 3.79 | 1.209778 | 66.32 | 150.6187873 |                     | 1           |



[<- Factors](#)   [Summary->](#)   **Rating Factors**

[Compute Rating Factors](#)

[Top](#)

| Beam End Identification |        |         |             | Vehicle     |              | Rating |                                 | Loading |       |      |      |          |       | Capacity    | Axial Magnification |     |
|-------------------------|--------|---------|-------------|-------------|--------------|--------|---------------------------------|---------|-------|------|------|----------|-------|-------------|---------------------|-----|
| Span                    | Member | Support | S.M.S       | Vehicle     | Load Type    | RF     | Failure Mechanism               | γ.DC    | DC    | γ.DW | DW   | γ.LL     | LL    | C           | P.u                 | δ.A |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-P140(7)a | CT PERMIT    | 1.38   | UnStiffened Web - Web Crippling | 1.25    | 25.48 | 1.5  | 3.79 | 1.16     | 70.42 | 150.6187873 |                     | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-P140(7)b | CT PERMIT    | 1.39   | UnStiffened Web - Web Crippling | 1.25    | 25.48 | 1.5  | 3.79 | 1.16     | 69.82 | 150.6187873 |                     | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-P160(8)a | CT PERMIT    | 1.35   | UnStiffened Web - Web Crippling | 1.25    | 25.48 | 1.5  | 3.79 | 1.16     | 72.18 | 150.6187873 |                     | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-P160(8)b | CT PERMIT    | 1.14   | UnStiffened Web - Web Crippling | 1.25    | 25.48 | 1.5  | 3.79 | 1.31     | 75.45 | 150.6187873 |                     | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-P180(9)  | CT PERMIT    | 1.16   | UnStiffened Web - Web Crippling | 1.25    | 25.48 | 1.5  | 3.79 | 1.31     | 74.27 | 150.6187873 |                     | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-P200(10) | CT PERMIT    | 1.04   | UnStiffened Web - Web Crippling | 1.25    | 25.48 | 1.5  | 3.79 | 1.31     | 82.74 | 150.6187873 |                     | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-P380     | CT PERMIT    | 1.95   | UnStiffened Web - Web Crippling | 1.25    | 25.48 | 1.5  | 3.79 | 1.1      | 52.55 | 150.6187873 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | HL-93       | INVENTORY    | 0.92   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.75     | 67.85 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | HL-93       | OPERATING    | 1.2    | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.35     | 67.85 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | Type 3      | AASHTO LEGAL | 1.98   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 42.69 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | Type 3S2    | AASHTO LEGAL | 2.09   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 40.46 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | Type 3-3    | AASHTO LEGAL | 2.23   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 37.89 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | SU4         | AASHTO LEGAL | 1.78   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 47.54 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | SU5         | AASHTO LEGAL | 1.62   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 52.12 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | SU6         | AASHTO LEGAL | 1.57   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 53.76 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | SU7         | AASHTO LEGAL | 1.54   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 54.77 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | H-20        | CT LEGAL     | 2.16   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 39.1  | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | HS-20       | CT LEGAL     | 1.46   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 57.85 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-L73.0    | CT LEGAL     | 1.38   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 61.43 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-L3S2     | CT LEGAL     | 1.93   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 43.78 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-P76.5    | CT PERMIT    | 1.41   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.16     | 67.12 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-P120(6)  | CT PERMIT    | 1.37   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.209778 | 66.32 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-P140(7)a | CT PERMIT    | 1.34   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.16     | 70.42 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-P140(7)b | CT PERMIT    | 1.36   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.16     | 69.82 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-P160(8)a | CT PERMIT    | 1.31   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.16     | 72.18 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-P160(8)b | CT PERMIT    | 1.11   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.31     | 75.45 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-P180(9)  | CT PERMIT    | 1.13   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.31     | 74.27 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-P200(10) | CT PERMIT    | 1.01   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.31     | 82.74 | 146.1532624 |                     | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-P380     | CT PERMIT    | 1.9    | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.1      | 52.55 | 146.1532624 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | HL-93       | INVENTORY    | 0.83   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.75     | 78.22 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | HL-93       | OPERATING    | 1.08   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.35     | 78.22 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | Type 3      | AASHTO LEGAL | 1.79   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 49.22 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | Type 3S2    | AASHTO LEGAL | 1.89   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 46.65 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | Type 3-3    | AASHTO LEGAL | 2.02   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 43.68 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | SU4         | AASHTO LEGAL | 1.61   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 54.81 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | SU5         | AASHTO LEGAL | 1.46   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 60.09 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | SU6         | AASHTO LEGAL | 1.42   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 61.97 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | SU7         | AASHTO LEGAL | 1.39   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 63.14 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | H-20        | CT LEGAL     | 1.95   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 45.07 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | HS-20       | CT LEGAL     | 1.32   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 66.69 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | CT-L73.0    | CT LEGAL     | 1.24   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 70.82 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | CT-L3S2     | CT LEGAL     | 1.74   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 50.48 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | CT-P76.5    | CT PERMIT    | 1.27   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.16     | 77.37 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | CT-P120(6)  | CT PERMIT    | 1.24   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.209778 | 76.46 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | CT-P140(7)a | CT PERMIT    | 1.21   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.16     | 81.18 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | CT-P140(7)b | CT PERMIT    | 1.22   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.16     | 80.49 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | CT-P160(8)a | CT PERMIT    | 1.18   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.16     | 83.21 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | CT-P160(8)b | CT PERMIT    | 1      | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.31     | 86.97 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | CT-P180(9)  | CT PERMIT    | 1.02   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.31     | 85.63 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | CT-P200(10) | CT PERMIT    | 0.91   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.31     | 95.39 | 150.6187873 |                     | 1   |
| 1                       | G3     | Pier 1  | 1.G3.Pier 1 | CT-P380     | CT PERMIT    | 1.72   | UnStiffened Web - Web Crippling | 1.25    | 25.31 | 1.5  | 2.84 | 1.1      | 60.58 | 150.6187873 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | HL-93       | INVENTORY    | 0.91   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.75     | 67.85 | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | HL-93       | OPERATING    | 1.18   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.35     | 67.85 | 146.1532624 |                     | 1   |



[<- Factors](#)   [Summary->](#)   **Rating Factors**

Compute Rating Factors

[Top](#)

| Beam End Identification |        |         |             | Vehicle     |              | Rating |                                 | Loading |       |      |      |          |       | Capacity    | Axial Magnification |     |
|-------------------------|--------|---------|-------------|-------------|--------------|--------|---------------------------------|---------|-------|------|------|----------|-------|-------------|---------------------|-----|
| Span                    | Member | Support | S.M.S       | Vehicle     | Load Type    | RF     | Failure Mechanism               | γ.DC    | DC    | γ.DW | DW   | γ.LL     | LL    | C           | P.u                 | δ.A |
| 1                       | G4     | S Abut  | 1.G4.S Abut | Type 3      | AASHTO LEGAL | 1.96   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 42.69 | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | Type 3S2    | AASHTO LEGAL | 2.06   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 40.46 | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | Type 3-3    | AASHTO LEGAL | 2.2    | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 37.89 | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | SU4         | AASHTO LEGAL | 1.76   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 47.54 | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | SU5         | AASHTO LEGAL | 1.6    | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 52.12 | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | SU6         | AASHTO LEGAL | 1.55   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 53.76 | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | SU7         | AASHTO LEGAL | 1.52   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 54.77 | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | H-20        | CT LEGAL     | 2.14   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 39.1  | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | HS-20       | CT LEGAL     | 1.44   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 57.85 | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | CT-L73.0    | CT LEGAL     | 1.36   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 61.43 | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | CT-L3S2     | CT LEGAL     | 1.91   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 43.78 | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | CT-P76.5    | CT PERMIT    | 1.39   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.16     | 67.12 | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | CT-P120(6)  | CT PERMIT    | 1.35   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.209778 | 66.32 | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | CT-P140(7)a | CT PERMIT    | 1.33   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.16     | 70.42 | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | CT-P140(7)b | CT PERMIT    | 1.34   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.16     | 69.82 | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | CT-P160(8)a | CT PERMIT    | 1.29   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.16     | 72.18 | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | CT-P160(8)b | CT PERMIT    | 1.1    | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.31     | 75.45 | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | CT-P180(9)  | CT PERMIT    | 1.11   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.31     | 74.27 | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | CT-P200(10) | CT PERMIT    | 1      | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.31     | 82.74 | 146.1532624 |                     | 1   |
| 1                       | G4     | S Abut  | 1.G4.S Abut | CT-P380     | CT PERMIT    | 1.88   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.1      | 52.55 | 146.1532624 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | HL-93       | INVENTORY    | 0.82   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.75     | 78.22 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | HL-93       | OPERATING    | 1.07   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.35     | 78.22 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | Type 3      | AASHTO LEGAL | 1.76   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 49.22 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | Type 3S2    | AASHTO LEGAL | 1.86   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 46.65 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | Type 3-3    | AASHTO LEGAL | 1.99   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 43.68 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | SU4         | AASHTO LEGAL | 1.58   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 54.81 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | SU5         | AASHTO LEGAL | 1.44   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 60.09 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | SU6         | AASHTO LEGAL | 1.4    | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 61.97 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | SU7         | AASHTO LEGAL | 1.37   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 63.14 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | H-20        | CT LEGAL     | 1.93   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 45.07 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | HS-20       | CT LEGAL     | 1.3    | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 66.69 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | CT-L73.0    | CT LEGAL     | 1.23   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 70.82 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | CT-L3S2     | CT LEGAL     | 1.72   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.3      | 50.48 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | CT-P76.5    | CT PERMIT    | 1.26   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.16     | 77.37 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | CT-P120(6)  | CT PERMIT    | 1.22   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.209778 | 76.46 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | CT-P140(7)a | CT PERMIT    | 1.2    | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.16     | 81.18 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | CT-P140(7)b | CT PERMIT    | 1.21   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.16     | 80.49 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | CT-P160(8)a | CT PERMIT    | 1.17   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.16     | 83.21 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | CT-P160(8)b | CT PERMIT    | 0.99   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.31     | 86.97 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | CT-P180(9)  | CT PERMIT    | 1      | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.31     | 85.63 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | CT-P200(10) | CT PERMIT    | 0.9    | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.31     | 95.39 | 150.6187873 |                     | 1   |
| 1                       | G4     | Pier 1  | 1.G4.Pier 1 | CT-P380     | CT PERMIT    | 1.69   | UnStiffened Web - Web Crippling | 1.25    | 25.49 | 1.5  | 3.67 | 1.1      | 60.58 | 150.6187873 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | HL-93       | INVENTORY    | 0.79   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.75     | 76.06 | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | HL-93       | OPERATING    | 1.02   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.35     | 76.06 | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | Type 3      | AASHTO LEGAL | 1.67   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 48.39 | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | Type 3S2    | AASHTO LEGAL | 1.8    | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 44.75 | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | Type 3-3    | AASHTO LEGAL | 1.93   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 41.85 | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | SU4         | AASHTO LEGAL | 1.49   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 54.01 | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | SU5         | AASHTO LEGAL | 1.37   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 59    | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | SU6         | AASHTO LEGAL | 1.33   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 60.43 | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | SU7         | AASHTO LEGAL | 1.32   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 61.06 | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | H-20        | CT LEGAL     | 1.8    | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 44.75 | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | HS-20       | CT LEGAL     | 1.24   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 65.24 | 141.2208466 |                     | 1   |



[<- Factors](#)   [Summary->](#)   **Rating Factors**

[Compute Rating Factors](#)

[Top](#)

| Beam End Identification |        |         |             | Vehicle     |              | Rating |                                 | Loading |       |      |      |          |       | Capacity    | Axial Magnification |     |
|-------------------------|--------|---------|-------------|-------------|--------------|--------|---------------------------------|---------|-------|------|------|----------|-------|-------------|---------------------|-----|
| Span                    | Member | Support | S.M.S       | Vehicle     | Load Type    | RF     | Failure Mechanism               | γ.DC    | DC    | γ.DW | DW   | γ.LL     | LL    | C           | P.u                 | δ.A |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | CT-L73.0    | CT LEGAL     | 1.16   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 69.54 | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | CT-L3S2     | CT LEGAL     | 1.62   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 49.87 | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | CT-P76.5    | CT PERMIT    | 1.18   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.16     | 76.22 | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | CT-P120(6)  | CT PERMIT    | 1.19   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.209778 | 72.79 | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | CT-P140(7)a | CT PERMIT    | 1.13   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.16     | 79.99 | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | CT-P140(7)b | CT PERMIT    | 1.13   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.16     | 79.57 | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | CT-P160(8)a | CT PERMIT    | 1.1    | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.16     | 81.99 | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | CT-P160(8)b | CT PERMIT    | 0.93   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.31     | 85.68 | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | CT-P180(9)  | CT PERMIT    | 0.95   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.31     | 84.4  | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | CT-P200(10) | CT PERMIT    | 0.85   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.31     | 93.99 | 141.2208466 |                     | 1   |
| 3                       | G2     | Pier 2  | 3.G2.Pier 2 | CT-P380     | CT PERMIT    | 1.65   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.1      | 57.62 | 141.2208466 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | HL-93       | INVENTORY    | 0.91   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.75     | 66.14 | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | HL-93       | OPERATING    | 1.18   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.35     | 66.14 | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | Type 3      | AASHTO LEGAL | 1.93   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 42.07 | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | Type 3S2    | AASHTO LEGAL | 2.09   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 38.91 | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | Type 3-3    | AASHTO LEGAL | 2.24   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 36.39 | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | SU4         | AASHTO LEGAL | 1.73   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 46.96 | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | SU5         | AASHTO LEGAL | 1.58   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 51.3  | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | SU6         | AASHTO LEGAL | 1.55   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 52.54 | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | SU7         | AASHTO LEGAL | 1.53   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 53.09 | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | H-20        | CT LEGAL     | 2.09   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 38.91 | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | HS-20       | CT LEGAL     | 1.43   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 56.73 | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | CT-L73.0    | CT LEGAL     | 1.34   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 60.47 | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | CT-L3S2     | CT LEGAL     | 1.88   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.3      | 43.36 | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | CT-P76.5    | CT PERMIT    | 1.37   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.16     | 66.28 | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | CT-P120(6)  | CT PERMIT    | 1.38   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.209778 | 63.29 | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | CT-P140(7)a | CT PERMIT    | 1.31   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.16     | 69.56 | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | CT-P140(7)b | CT PERMIT    | 1.32   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.16     | 69.18 | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | CT-P160(8)a | CT PERMIT    | 1.28   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.16     | 71.3  | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | CT-P160(8)b | CT PERMIT    | 1.08   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.31     | 74.5  | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | CT-P180(9)  | CT PERMIT    | 1.1    | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.31     | 73.39 | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | CT-P200(10) | CT PERMIT    | 0.99   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.31     | 81.73 | 142.0889569 |                     | 1   |
| 3                       | G2     | N Abut  | 3.G2.N Abut | CT-P380     | CT PERMIT    | 1.92   | UnStiffened Web - Web Crippling | 1.25    | 24.03 | 1.5  | 4.01 | 1.1      | 50.1  | 142.0889569 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | HL-93       | INVENTORY    | 0.92   | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.75     | 66.14 | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | HL-93       | OPERATING    | 1.19   | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.35     | 66.14 | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | Type 3      | AASHTO LEGAL | 1.95   | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 42.07 | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | Type 3S2    | AASHTO LEGAL | 2.1    | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 38.91 | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | Type 3-3    | AASHTO LEGAL | 2.25   | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 36.39 | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | SU4         | AASHTO LEGAL | 1.74   | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 46.96 | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | SU5         | AASHTO LEGAL | 1.6    | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 51.3  | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | SU6         | AASHTO LEGAL | 1.56   | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 52.54 | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | SU7         | AASHTO LEGAL | 1.54   | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 53.09 | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | H-20        | CT LEGAL     | 2.1    | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 38.91 | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | HS-20       | CT LEGAL     | 1.44   | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 56.73 | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | CT-L73.0    | CT LEGAL     | 1.35   | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 60.47 | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | CT-L3S2     | CT LEGAL     | 1.89   | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 43.36 | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | CT-P76.5    | CT PERMIT    | 1.38   | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.16     | 66.28 | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | CT-P120(6)  | CT PERMIT    | 1.39   | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.209778 | 63.29 | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | CT-P140(7)a | CT PERMIT    | 1.32   | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.16     | 69.56 | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | CT-P140(7)b | CT PERMIT    | 1.32   | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.16     | 69.18 | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | CT-P160(8)a | CT PERMIT    | 1.29   | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.16     | 71.3  | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | CT-P160(8)b | CT PERMIT    | 1.09   | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.31     | 74.5  | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | CT-P180(9)  | CT PERMIT    | 1.1    | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.31     | 73.39 | 141.2208466 |                     | 1   |



[<- Factors](#)   [Summary->](#)   **Rating Factors**

[Compute Rating Factors](#)

[Top](#)

| Beam End Identification |        |         |             | Vehicle     |              | RF   | Rating                          | Loading |       |      |      |          |       | Capacity    | Axial Magnification |     |
|-------------------------|--------|---------|-------------|-------------|--------------|------|---------------------------------|---------|-------|------|------|----------|-------|-------------|---------------------|-----|
| Span                    | Member | Support | S.M.S       | Vehicle     | Load Type    |      | Failure Mechanism               | γ.DC    | DC    | γ.DW | DW   | γ.LL     | LL    | C           | P.u                 | δ.A |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | CT-P200(10) | CT PERMIT    | 0.99 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.31     | 81.73 | 141.2208466 |                     | 1   |
| 3                       | G3     | Pier 2  | 3.G3.Pier 2 | CT-P380     | CT PERMIT    | 1.93 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.1      | 50.1  | 141.2208466 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | HL-93       | INVENTORY    | 0.8  | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.75     | 76.06 | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | HL-93       | OPERATING    | 1.04 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.35     | 76.06 | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | Type 3      | AASHTO LEGAL | 1.71 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 48.39 | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | Type 3S2    | AASHTO LEGAL | 1.84 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 44.75 | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | Type 3-3    | AASHTO LEGAL | 1.97 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 41.85 | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | SU4         | AASHTO LEGAL | 1.53 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 54.01 | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | SU5         | AASHTO LEGAL | 1.4  | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 59    | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | SU6         | AASHTO LEGAL | 1.36 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 60.43 | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | SU7         | AASHTO LEGAL | 1.35 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 61.06 | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | H-20        | CT LEGAL     | 1.84 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 44.75 | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | HS-20       | CT LEGAL     | 1.26 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 65.24 | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | CT-L73.0    | CT LEGAL     | 1.19 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 69.54 | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | CT-L3S2     | CT LEGAL     | 1.65 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.3      | 49.87 | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | CT-P76.5    | CT PERMIT    | 1.21 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.16     | 76.22 | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | CT-P120(6)  | CT PERMIT    | 1.22 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.209778 | 72.79 | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | CT-P140(7)a | CT PERMIT    | 1.15 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.16     | 79.99 | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | CT-P140(7)b | CT PERMIT    | 1.16 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.16     | 79.57 | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | CT-P160(8)a | CT PERMIT    | 1.13 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.16     | 81.99 | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | CT-P160(8)b | CT PERMIT    | 0.95 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.31     | 85.68 | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | CT-P180(9)  | CT PERMIT    | 0.97 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.31     | 84.4  | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | CT-P200(10) | CT PERMIT    | 0.87 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.31     | 93.99 | 142.0889569 |                     | 1   |
| 3                       | G3     | N Abut  | 3.G3.N Abut | CT-P380     | CT PERMIT    | 1.69 | UnStiffened Web - Web Crippling | 1.25    | 23.86 | 1.5  | 3.12 | 1.1      | 57.62 | 142.0889569 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | HL-93       | INVENTORY    | 0.9  | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.75     | 66.14 | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | HL-93       | OPERATING    | 1.17 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.35     | 66.14 | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | Type 3      | AASHTO LEGAL | 1.92 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 42.07 | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | Type 3S2    | AASHTO LEGAL | 2.08 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 38.91 | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | Type 3-3    | AASHTO LEGAL | 2.22 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 36.39 | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | SU4         | AASHTO LEGAL | 1.72 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 46.96 | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | SU5         | AASHTO LEGAL | 1.57 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 51.3  | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | SU6         | AASHTO LEGAL | 1.54 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 52.54 | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | SU7         | AASHTO LEGAL | 1.52 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 53.09 | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | H-20        | CT LEGAL     | 2.08 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 38.91 | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | HS-20       | CT LEGAL     | 1.42 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 56.73 | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | CT-L73.0    | CT LEGAL     | 1.33 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 60.47 | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | CT-L3S2     | CT LEGAL     | 1.86 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 43.36 | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | CT-P76.5    | CT PERMIT    | 1.36 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.16     | 66.28 | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | CT-P120(6)  | CT PERMIT    | 1.37 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.209778 | 63.29 | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | CT-P140(7)a | CT PERMIT    | 1.3  | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.16     | 69.56 | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | CT-P140(7)b | CT PERMIT    | 1.31 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.16     | 69.18 | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | CT-P160(8)a | CT PERMIT    | 1.27 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.16     | 71.3  | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | CT-P160(8)b | CT PERMIT    | 1.07 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.31     | 74.5  | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | CT-P180(9)  | CT PERMIT    | 1.09 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.31     | 73.39 | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | CT-P200(10) | CT PERMIT    | 0.98 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.31     | 81.73 | 141.2208466 |                     | 1   |
| 3                       | G4     | Pier 2  | 3.G4.Pier 2 | CT-P380     | CT PERMIT    | 1.91 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.1      | 50.1  | 141.2208466 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | HL-93       | INVENTORY    | 0.79 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.75     | 76.06 | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | HL-93       | OPERATING    | 1.03 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.35     | 76.06 | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | Type 3      | AASHTO LEGAL | 1.68 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 48.39 | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | Type 3S2    | AASHTO LEGAL | 1.82 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 44.75 | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | Type 3-3    | AASHTO LEGAL | 1.95 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 41.85 | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | SU4         | AASHTO LEGAL | 1.51 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 54.01 | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | SU5         | AASHTO LEGAL | 1.38 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 59    | 142.0889569 |                     | 1   |



[<- Factors](#)   [Summary->](#)   **Rating Factors**

[Compute Rating Factors](#)

[Top](#)

| Beam End Identification |        |         |             | Vehicle     |              | RF   | Rating                          | Loading |       |      |      |          |       | Capacity    | Axial Magnification |     |
|-------------------------|--------|---------|-------------|-------------|--------------|------|---------------------------------|---------|-------|------|------|----------|-------|-------------|---------------------|-----|
| Span                    | Member | Support | S.M.S       | Vehicle     | Load Type    |      | Failure Mechanism               | γ.DC    | DC    | γ.DW | DW   | γ.LL     | LL    | C           | P.u                 | δ.A |
| 3                       | G4     | N Abut  | 3.G4.N Abut | SU6         | AASHTO LEGAL | 1.35 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 60.43 | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | SU7         | AASHTO LEGAL | 1.33 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 61.06 | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | H-20        | CT LEGAL     | 1.82 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 44.75 | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | HS-20       | CT LEGAL     | 1.25 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 65.24 | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | CT-L73.0    | CT LEGAL     | 1.17 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 69.54 | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | CT-L3S2     | CT LEGAL     | 1.63 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.3      | 49.87 | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | CT-P76.5    | CT PERMIT    | 1.2  | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.16     | 76.22 | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | CT-P120(6)  | CT PERMIT    | 1.2  | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.209778 | 72.79 | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | CT-P140(7)a | CT PERMIT    | 1.14 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.16     | 79.99 | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | CT-P140(7)b | CT PERMIT    | 1.15 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.16     | 79.57 | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | CT-P160(8)a | CT PERMIT    | 1.11 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.16     | 81.99 | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | CT-P160(8)b | CT PERMIT    | 0.94 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.31     | 85.68 | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | CT-P180(9)  | CT PERMIT    | 0.96 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.31     | 84.4  | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | CT-P200(10) | CT PERMIT    | 0.86 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.31     | 93.99 | 142.0889569 |                     | 1   |
| 3                       | G4     | N Abut  | 3.G4.N Abut | CT-P380     | CT PERMIT    | 1.67 | UnStiffened Web - Web Crippling | 1.25    | 24.04 | 1.5  | 3.9  | 1.1      | 57.62 | 142.0889569 |                     | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | HL-93       | INVENTORY    | 1.18 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.75     | 78.22 | 200         | 174.4075            | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | HL-93       | OPERATING    | 1.53 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.35     | 78.22 | 200         | 143.1195            | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | Type 3      | AASHTO LEGAL | 2.53 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 49.22 | 200         | 101.5085            | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | Type 3S2    | AASHTO LEGAL | 2.67 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 46.65 | 200         | 98.1675             | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | Type 3-3    | AASHTO LEGAL | 2.86 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 43.68 | 200         | 94.3065             | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | SU4         | AASHTO LEGAL | 2.28 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 54.81 | 200         | 108.7755            | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | SU5         | AASHTO LEGAL | 2.07 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 60.09 | 200         | 115.6395            | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | SU6         | AASHTO LEGAL | 2.01 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 61.97 | 200         | 118.0835            | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | SU7         | AASHTO LEGAL | 1.97 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 63.14 | 200         | 119.6045            | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | H-20        | CT LEGAL     | 2.77 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 45.07 | 200         | 96.1135             | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | HS-20       | CT LEGAL     | 1.87 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 66.69 | 200         | 124.2195            | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-L73.0    | CT LEGAL     | 1.76 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 70.82 | 200         | 129.5885            | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-L3S2     | CT LEGAL     | 2.47 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.3      | 50.48 | 200         | 103.1465            | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-P76.5    | CT PERMIT    | 1.81 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.16     | 77.37 | 200         | 127.2717            | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-P120(6)  | CT PERMIT    | 1.75 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.209778 | 76.46 | 200         | 130.0221            | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-P140(7)a | CT PERMIT    | 1.72 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.16     | 81.18 | 200         | 131.6913            | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-P140(7)b | CT PERMIT    | 1.74 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.16     | 80.49 | 200         | 130.8909            | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-P160(8)a | CT PERMIT    | 1.68 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.16     | 83.21 | 200         | 134.0461            | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-P160(8)b | CT PERMIT    | 1.42 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.31     | 86.97 | 200         | 151.4532            | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-P180(9)  | CT PERMIT    | 1.44 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.31     | 85.63 | 200         | 149.6978            | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-P200(10) | CT PERMIT    | 1.3  | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.31     | 95.39 | 200         | 162.4834            | 1   |
| 1                       | G2     | S Abut  | 1.G2.S Abut | CT-P380     | CT PERMIT    | 2.43 | UnDefined - Pedestal Bearing    | 1.25    | 25.47 | 1.5  | 3.79 | 1.1      | 60.58 | 200         | 104.1605            | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | HL-93       | INVENTORY    | 1.4  | UnDefined - Pedestal Bearing    | 1.25    | 25.48 | 1.5  | 3.79 | 1.75     | 67.85 | 204         | 156.2725            | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | HL-93       | OPERATING    | 1.81 | UnDefined - Pedestal Bearing    | 1.25    | 25.48 | 1.5  | 3.79 | 1.35     | 67.85 | 204         | 129.1325            | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | Type 3      | AASHTO LEGAL | 2.99 | UnDefined - Pedestal Bearing    | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 42.69 | 204         | 93.032              | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | Type 3S2    | AASHTO LEGAL | 3.16 | UnDefined - Pedestal Bearing    | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 40.46 | 204         | 90.133              | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | Type 3-3    | AASHTO LEGAL | 3.37 | UnDefined - Pedestal Bearing    | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 37.89 | 204         | 86.792              | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | SU4         | AASHTO LEGAL | 2.69 | UnDefined - Pedestal Bearing    | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 47.54 | 204         | 99.337              | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | SU5         | AASHTO LEGAL | 2.45 | UnDefined - Pedestal Bearing    | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 52.12 | 204         | 105.291             | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | SU6         | AASHTO LEGAL | 2.38 | UnDefined - Pedestal Bearing    | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 53.76 | 204         | 107.423             | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | SU7         | AASHTO LEGAL | 2.33 | UnDefined - Pedestal Bearing    | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 54.77 | 204         | 108.736             | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | H-20        | CT LEGAL     | 3.27 | UnDefined - Pedestal Bearing    | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 39.1  | 204         | 88.365              | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | HS-20       | CT LEGAL     | 2.21 | UnDefined - Pedestal Bearing    | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 57.85 | 204         | 112.74              | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-L73.0    | CT LEGAL     | 2.08 | UnDefined - Pedestal Bearing    | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 61.43 | 204         | 117.394             | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-L3S2     | CT LEGAL     | 2.92 | UnDefined - Pedestal Bearing    | 1.25    | 25.48 | 1.5  | 3.79 | 1.3      | 43.78 | 204         | 94.449              | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-P76.5    | CT PERMIT    | 2.13 | UnDefined - Pedestal Bearing    | 1.25    | 25.48 | 1.5  | 3.79 | 1.16     | 67.12 | 204         | 115.3942            | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-P120(6)  | CT PERMIT    | 2.07 | UnDefined - Pedestal Bearing    | 1.25    | 25.48 | 1.5  | 3.79 | 1.209778 | 66.32 | 204         | 117.7675            | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-P140(7)a | CT PERMIT    | 2.03 | UnDefined - Pedestal Bearing    | 1.25    | 25.48 | 1.5  | 3.79 | 1.16     | 70.42 | 204         | 119.2222            | 1   |



[<- Factors](#)   [Summary->](#)   **Rating Factors**

[Compute Rating Factors](#)

[Top](#)

| Beam End Identification |        |         |             | Vehicle     |              | Rating |                              | Loading |       |      |      |          |       | Capacity | Axial Magnification |     |
|-------------------------|--------|---------|-------------|-------------|--------------|--------|------------------------------|---------|-------|------|------|----------|-------|----------|---------------------|-----|
| Span                    | Member | Support | S.M.S       | Vehicle     | Load Type    | RF     | Failure Mechanism            | γ.DC    | DC    | γ.DW | DW   | γ.LL     | LL    | C        | P.u                 | δ.A |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-P140(7)b | CT PERMIT    | 2.05   | UnDefined - Pedestal Bearing | 1.25    | 25.48 | 1.5  | 3.79 | 1.16     | 69.82 | 204      | 118.5262            | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-P160(8)a | CT PERMIT    | 1.98   | UnDefined - Pedestal Bearing | 1.25    | 25.48 | 1.5  | 3.79 | 1.16     | 72.18 | 204      | 121.2638            | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-P160(8)b | CT PERMIT    | 1.68   | UnDefined - Pedestal Bearing | 1.25    | 25.48 | 1.5  | 3.79 | 1.31     | 75.45 | 204      | 136.3745            | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-P180(9)  | CT PERMIT    | 1.71   | UnDefined - Pedestal Bearing | 1.25    | 25.48 | 1.5  | 3.79 | 1.31     | 74.27 | 204      | 134.8287            | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-P200(10) | CT PERMIT    | 1.53   | UnDefined - Pedestal Bearing | 1.25    | 25.48 | 1.5  | 3.79 | 1.31     | 82.74 | 204      | 145.9244            | 1   |
| 1                       | G2     | Pier 1  | 1.G2.Pier 1 | CT-P380     | CT PERMIT    | 2.87   | UnDefined - Pedestal Bearing | 1.25    | 25.48 | 1.5  | 3.79 | 1.1      | 52.55 | 204      | 95.34               | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | HL-93       | INVENTORY    | 1.63   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.75     | 67.85 | 230      | 154.635             | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | HL-93       | OPERATING    | 2.11   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.35     | 67.85 | 230      | 127.495             | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | Type 3      | AASHTO LEGAL | 3.49   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 42.69 | 230      | 91.3945             | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | Type 3S2    | AASHTO LEGAL | 3.69   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 40.46 | 230      | 88.4955             | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | Type 3-3    | AASHTO LEGAL | 3.94   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 37.89 | 230      | 85.1545             | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | SU4         | AASHTO LEGAL | 3.14   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 47.54 | 230      | 97.6995             | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | SU5         | AASHTO LEGAL | 2.86   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 52.12 | 230      | 103.6535            | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | SU6         | AASHTO LEGAL | 2.77   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 53.76 | 230      | 105.7855            | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | SU7         | AASHTO LEGAL | 2.72   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 54.77 | 230      | 107.0985            | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | H-20        | CT LEGAL     | 3.81   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 39.1  | 230      | 86.7275             | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | HS-20       | CT LEGAL     | 2.58   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 57.85 | 230      | 111.1025            | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-L73.0    | CT LEGAL     | 2.43   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 61.43 | 230      | 115.7565            | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-L3S2     | CT LEGAL     | 3.41   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.3      | 43.78 | 230      | 92.8115             | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-P76.5    | CT PERMIT    | 2.49   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.16     | 67.12 | 230      | 113.7567            | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-P120(6)  | CT PERMIT    | 2.41   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.209778 | 66.32 | 230      | 116.13              | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-P140(7)a | CT PERMIT    | 2.37   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.16     | 70.42 | 230      | 117.5847            | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-P140(7)b | CT PERMIT    | 2.39   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.16     | 69.82 | 230      | 116.8887            | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-P160(8)a | CT PERMIT    | 2.31   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.16     | 72.18 | 230      | 119.6263            | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-P160(8)b | CT PERMIT    | 1.96   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.31     | 75.45 | 230      | 134.737             | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-P180(9)  | CT PERMIT    | 1.99   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.31     | 74.27 | 230      | 133.1912            | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-P200(10) | CT PERMIT    | 1.79   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.31     | 82.74 | 230      | 144.2869            | 1   |
| 1                       | G3     | S Abut  | 1.G3.S Abut | CT-P380     | CT PERMIT    | 3.35   | UnDefined - Pedestal Bearing | 1.25    | 25.31 | 1.5  | 2.84 | 1.1      | 52.55 | 230      | 93.7025             | 1   |



Steel Beam Ends - Load Rating  
Connecticut Department of Transportation



[<-Ratings](#) [Outputs ->](#)

|               |            |
|---------------|------------|
| Bridge ID:    | 00000      |
| Analyze Date: | 3/20/2017  |
| Analyze Time: | 3:53:34 PM |

[Generate Input Review](#)

| Vehicle     | Vehicle Class | Vehicle Configuration | Governing Rating | Failure Mechanism                     | Span | Member | Support | GVW (tons) | Rating Tons | Num. Location <1 |
|-------------|---------------|-----------------------|------------------|---------------------------------------|------|--------|---------|------------|-------------|------------------|
| HL-93       | INVENTORY     | Truck + Lane          | 0.21             | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | #N/A       | #N/A        | #N/A             |
| HL-93       | OPERATING     | Truck + Lane          | 0.27             | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | #N/A       | #N/A        | #N/A             |
| Type 3      | AASHTO LEGAL  | Axle Load             | 0.44             | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 25         | 11          | 2                |
| Type 3S2    | AASHTO LEGAL  | Axle Load             | 0.47             | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 36         | 16.92       | 2                |
| Type 3-3    | AASHTO LEGAL  | Axle Load             | 0.5              | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 40         | 20          | 2                |
| SU4         | AASHTO LEGAL  | Axle Load             | 0.4              | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 27         | 10.8        | 2                |
| SU5         | AASHTO LEGAL  | Axle Load             | 0.36             | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 31         | 11.16       | 2                |
| SU6         | AASHTO LEGAL  | Axle Load             | 0.35             | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 34.75      | 12.1625     | 2                |
| SU7         | AASHTO LEGAL  | Axle Load             | 0.35             | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 38.75      | 13.5625     | 2                |
| H-20        | CT LEGAL      | Axle Load             | 0.49             | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 36.5       | 17.885      | 2                |
| HS-20       | CT LEGAL      | Axle Load             | 0.33             | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 40         | 13.2        | 2                |
| CT-L73.0    | CT LEGAL      | Axle Load             | 0.31             | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 36         | 11.16       | 2                |
| CT-L3S2     | CT LEGAL      | Axle Load             | 0.43             | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 20         | 8.6         | 2                |
| CT-P76.5    | CT PERMIT     | Axle Load             | 0.32             | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 38.25      | 12.24       | 2                |
| CT-P120(6)  | CT PERMIT     | Axle Load             | 0.31             | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 60         | 18.6        | 3                |
| CT-P140(7)a | CT PERMIT     | Axle Load             | 0.3              | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 70         | 21          | 3                |
| CT-P140(7)b | CT PERMIT     | Axle Load             | 0.3              | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 70         | 21          | 3                |
| CT-P160(8)a | CT PERMIT     | Axle Load             | 0.29             | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 80         | 23.2        | 3                |
| CT-P160(8)b | CT PERMIT     | Axle Load             | 0.25             | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 80         | 20          | 10               |
| CT-P180(9)  | CT PERMIT     | Axle Load             | 0.25             | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 90         | 22.5        | 7                |
| CT-P200(10) | CT PERMIT     | Axle Load             | 0.23             | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 100        | 23          | 15               |
| CT-P380     | CT PERMIT     | Axle Load             | 0.4              | Stiffened Web - Localized Flex. Buck. | 1    | G5     | Pier 1  | 190        | 76          | 3                |

Bridge No.  
Town

Route over Feature

Prepared By:  
Prepared On: 3/20/2017

### Rating Factors Less Than 1.0 - AASHTO & CT Legal Vehicles

| Failure Mechanism | Limit State | Span | Member | Location on Member (%) | Member Length (ft) | Rating Factor | Rating Tons | Vehicle  |
|-------------------|-------------|------|--------|------------------------|--------------------|---------------|-------------|----------|
| Beam End Bearing  | Strength I  | 1    | G1     | Pier 1                 |                    | 0.57          | 20.5        | CT-L73.0 |
| Beam End Bearing  | Strength I  | 1    | G1     | Pier 1                 |                    | 0.61          | 24.4        | HS-20    |
| Beam End Bearing  | Strength I  | 1    | G1     | Pier 1                 |                    | 0.64          | 24.8        | SU7      |
| Beam End Bearing  | Strength I  | 1    | G1     | Pier 1                 |                    | 0.65          | 22.6        | SU6      |
| Beam End Bearing  | Strength I  | 1    | G1     | Pier 1                 |                    | 0.67          | 20.8        | SU5      |
| Beam End Bearing  | Strength I  | 1    | G1     | Pier 1                 |                    | 0.74          | 20.0        | SU4      |
| Beam End Bearing  | Strength I  | 1    | G1     | Pier 1                 |                    | 0.8           | 16.0        | CT-L3S2  |
| Beam End Bearing  | Strength I  | 1    | G1     | Pier 1                 |                    | 0.82          | 20.5        | Type 3   |
| Beam End Bearing  | Strength I  | 1    | G1     | Pier 1                 |                    | 0.87          | 31.3        | Type 3S2 |
| Beam End Bearing  | Strength I  | 1    | G1     | Pier 1                 |                    | 0.9           | 32.9        | H-20     |
| Beam End Bearing  | Strength I  | 1    | G1     | Pier 1                 |                    | 0.93          | 37.2        | Type 3-3 |
| Beam End Bearing  | Strength I  | 1    | G5     | Pier 1                 |                    | 0.31          | 11.2        | CT-L73.0 |
| Beam End Bearing  | Strength I  | 1    | G5     | Pier 1                 |                    | 0.33          | 13.2        | HS-20    |
| Beam End Bearing  | Strength I  | 1    | G5     | Pier 1                 |                    | 0.35          | 12.2        | SU6      |
| Beam End Bearing  | Strength I  | 1    | G5     | Pier 1                 |                    | 0.35          | 13.6        | SU7      |
| Beam End Bearing  | Strength I  | 1    | G5     | Pier 1                 |                    | 0.36          | 11.2        | SU5      |
| Beam End Bearing  | Strength I  | 1    | G5     | Pier 1                 |                    | 0.4           | 10.8        | SU4      |
| Beam End Bearing  | Strength I  | 1    | G5     | Pier 1                 |                    | 0.43          | 8.6         | CT-L3S2  |
| Beam End Bearing  | Strength I  | 1    | G5     | Pier 1                 |                    | 0.44          | 11.0        | Type 3   |
| Beam End Bearing  | Strength I  | 1    | G5     | Pier 1                 |                    | 0.47          | 16.9        | Type 3S2 |
| Beam End Bearing  | Strength I  | 1    | G5     | Pier 1                 |                    | 0.49          | 17.9        | H-20     |
| Beam End Bearing  | Strength I  | 1    | G5     | Pier 1                 |                    | 0.5           | 20.0        | Type 3-3 |

Bridge No.  
Town

Route over Feature

Prepared By:  
Prepared On: 3/20/2017

### Rating Factors Less Than 1.0 - CT Permit Vehicles

| Failure Mechanism | Limit State | Span | Member | Location on Member (%) | Member Length (ft) | Rating Factor | Rating Tons | Vehicle     |
|-------------------|-------------|------|--------|------------------------|--------------------|---------------|-------------|-------------|
| Beam End Bearing  | Strength II | 1    | G1     | Pier 1                 |                    | 0.42          | 42.0        | CT-P200(10) |
| Beam End Bearing  | Strength II | 1    | G1     | Pier 1                 |                    | 0.46          | 36.8        | CT-P160(8)b |
| Beam End Bearing  | Strength II | 1    | G1     | Pier 1                 |                    | 0.47          | 42.3        | CT-P180(9)  |
| Beam End Bearing  | Strength II | 1    | G1     | Pier 1                 |                    | 0.54          | 43.2        | CT-P160(8)a |
| Beam End Bearing  | Strength II | 1    | G1     | Pier 1                 |                    | 0.56          | 39.2        | CT-P140(7)a |
| Beam End Bearing  | Strength II | 1    | G1     | Pier 1                 |                    | 0.56          | 39.2        | CT-P140(7)b |
| Beam End Bearing  | Strength II | 1    | G1     | Pier 1                 |                    | 0.57          | 34.2        | CT-P120(6)  |
| Beam End Bearing  | Strength II | 1    | G1     | Pier 1                 |                    | 0.58          | 22.2        | CT-P76.5    |
| Beam End Bearing  | Strength II | 1    | G1     | Pier 1                 |                    | 0.73          | 138.7       | CT-P380     |
| Beam End Bearing  | Strength II | 1    | G2     | S Abut                 |                    | 0.86          | 86.0        | CT-P200(10) |
| Beam End Bearing  | Strength II | 1    | G2     | S Abut                 |                    | 0.95          | 76.0        | CT-P160(8)b |
| Beam End Bearing  | Strength II | 1    | G2     | S Abut                 |                    | 0.96          | 86.4        | CT-P180(9)  |
| Beam End Bearing  | Strength II | 1    | G3     | Pier 1                 |                    | 0.91          | 91.0        | CT-P200(10) |
| Beam End Bearing  | Strength II | 1    | G4     | Pier 1                 |                    | 0.9           | 90.0        | CT-P200(10) |
| Beam End Bearing  | Strength II | 1    | G4     | Pier 1                 |                    | 0.99          | 79.2        | CT-P160(8)b |
| Beam End Bearing  | Strength II | 1    | G5     | Pier 1                 |                    | 0.23          | 23.0        | CT-P200(10) |
| Beam End Bearing  | Strength II | 1    | G5     | Pier 1                 |                    | 0.25          | 20.0        | CT-P160(8)b |
| Beam End Bearing  | Strength II | 1    | G5     | Pier 1                 |                    | 0.25          | 22.5        | CT-P180(9)  |
| Beam End Bearing  | Strength II | 1    | G5     | Pier 1                 |                    | 0.29          | 23.2        | CT-P160(8)a |
| Beam End Bearing  | Strength II | 1    | G5     | Pier 1                 |                    | 0.3           | 21.0        | CT-P140(7)a |
| Beam End Bearing  | Strength II | 1    | G5     | Pier 1                 |                    | 0.3           | 21.0        | CT-P140(7)b |
| Beam End Bearing  | Strength II | 1    | G5     | Pier 1                 |                    | 0.31          | 18.6        | CT-P120(6)  |
| Beam End Bearing  | Strength II | 1    | G5     | Pier 1                 |                    | 0.32          | 12.2        | CT-P76.5    |
| Beam End Bearing  | Strength II | 1    | G5     | Pier 1                 |                    | 0.4           | 76.0        | CT-P380     |
| Beam End Bearing  | Strength II | 2    | G3     | Pier 2                 |                    | 0.56          | 56.0        | CT-P200(10) |
| Beam End Bearing  | Strength II | 2    | G3     | Pier 2                 |                    | 0.59          | 53.1        | CT-P180(9)  |
| Beam End Bearing  | Strength II | 2    | G3     | Pier 2                 |                    | 0.64          | 51.2        | CT-P160(8)b |
| Beam End Bearing  | Strength II | 2    | G3     | Pier 2                 |                    | 0.65          | 52.0        | CT-P160(8)a |
| Beam End Bearing  | Strength II | 2    | G3     | Pier 2                 |                    | 0.71          | 49.7        | CT-P140(7)a |
| Beam End Bearing  | Strength II | 2    | G3     | Pier 2                 |                    | 0.75          | 52.5        | CT-P140(7)b |
| Beam End Bearing  | Strength II | 2    | G3     | Pier 2                 |                    | 0.79          | 47.4        | CT-P120(6)  |
| Beam End Bearing  | Strength II | 2    | G3     | Pier 2                 |                    | 0.87          | 165.3       | CT-P380     |
| Beam End Bearing  | Strength II | 2    | G3     | Pier 2                 |                    | 0.96          | 96.0        | CT-P200(10) |
| Beam End Bearing  | Strength II | 3    | G1     | Pier 2                 |                    | 0.9           | 90.0        | CT-P200(10) |
| Beam End Bearing  | Strength II | 3    | G1     | Pier 2                 |                    | 0.99          | 79.2        | CT-P160(8)b |
| Beam End Bearing  | Strength II | 3    | G2     | N Abut                 |                    | 0.99          | 99.0        | CT-P200(10) |
| Beam End Bearing  | Strength II | 3    | G2     | Pier 2                 |                    | 0.85          | 85.0        | CT-P200(10) |
| Beam End Bearing  | Strength II | 3    | G2     | Pier 2                 |                    | 0.93          | 74.4        | CT-P160(8)b |
| Beam End Bearing  | Strength II | 3    | G2     | Pier 2                 |                    | 0.95          | 85.5        | CT-P180(9)  |
| Beam End Bearing  | Strength II | 3    | G3     | N Abut                 |                    | 0.87          | 87.0        | CT-P200(10) |
| Beam End Bearing  | Strength II | 3    | G3     | N Abut                 |                    | 0.95          | 76.0        | CT-P160(8)b |
| Beam End Bearing  | Strength II | 3    | G3     | N Abut                 |                    | 0.97          | 87.3        | CT-P180(9)  |
| Beam End Bearing  | Strength II | 3    | G3     | Pier 2                 |                    | 0.99          | 99.0        | CT-P200(10) |
| Beam End Bearing  | Strength II | 3    | G4     | N Abut                 |                    | 0.86          | 86.0        | CT-P200(10) |
| Beam End Bearing  | Strength II | 3    | G4     | N Abut                 |                    | 0.94          | 75.2        | CT-P160(8)b |
| Beam End Bearing  | Strength II | 3    | G4     | N Abut                 |                    | 0.96          | 86.4        | CT-P180(9)  |
| Beam End Bearing  | Strength II | 3    | G4     | Pier 2                 |                    | 0.98          | 98.0        | CT-P200(10) |
| Beam End Bearing  | Strength II | 3    | G5     | Pier 2                 |                    | 0.91          | 91.0        | CT-P200(10) |
| Beam End Bearing  | Strength II | 3    | G5     | Pier 2                 |                    | 0.99          | 79.2        | CT-P160(8)b |

Low Permit



[<-Summary Outputs->](#)  
[<<- Stiffened Inputs](#)

Stiffened Web Capacity Outputs

Compute Capacities Without  
Performing a Rating

| Beam End Identification |        |         | Capacity | Mechanism                             | As-Inspected Section |          |     | As-Inspected Section Properties |          |          |          |       | Eccentricity Ratio |          |             | Slenderness    |              |          |     | Axial Resistance |          |          |          |
|-------------------------|--------|---------|----------|---------------------------------------|----------------------|----------|-----|---------------------------------|----------|----------|----------|-------|--------------------|----------|-------------|----------------|--------------|----------|-----|------------------|----------|----------|----------|
| Span                    | Member | Support | C        | Localized or Unifrom                  | t.w                  | t.p      | b.t | ES                              | I.s      | A.g      | r.s      | K.eff | c                  | e        | R.e         | isSlenderStiff | isSlenderWeb | Q.s      | Q.a | P.e              | P.o      | P.n      | P.r      |
| 1                       | G1     | S Abut  | 232.26   | Stiffened Web - Flexural Buckling     | 0.375                | 0.5      | 6   | 6.75                            | 78.96094 | 8.53125  | 3.042284 | 0.75  | 6.1875             | 0        | 0           | FALSE          | FALSE        | 1        | 1   | 11160.53         | 307.125  | 303.6078 | 273.247  |
| 1                       | G1     | S Abut  | 207.637  | Stiffened Web - Localized Flex. Buck. | 0.2925               | 0.5      | 6   | 5.265                           | 77.40431 | 7.540013 | 3.20403  | 0.75  | 6.14625            | 0        | 0           | FALSE          | FALSE        | 1        | 1   | 1575435          | 271.4405 | 271.4209 | 244.2788 |
| 1                       | G1     | Pier 1  | 232.26   | Stiffened Web - Flexural Buckling     | 0.375                | 0.5      | 6   | 6.75                            | 78.96094 | 8.53125  | 3.042284 | 0.75  | 6.1875             | -0.28806 | 0.192574123 | FALSE          | FALSE        | 1        | 1   | 11160.53         | 307.125  | 303.6078 | 273.247  |
| 1                       | G1     | Pier 1  | 90.78677 | Stiffened Web - Localized Flex. Buck. | 0.33375              | 0.225    | 6   | 6.0075                          | 39.2941  | 5.491003 | 2.675087 | 0.75  | 6.491822           | -0.32495 | 0.29478349  | TRUE           | FALSE        | 0.600391 | 1   | 799765.3         | 118.6829 | 118.6755 | 106.808  |
| 1                       | G5     | S Abut  | 232.26   | Stiffened Web - Flexural Buckling     | 0.375                | 0.5      | 6   | 6.75                            | 78.96094 | 8.53125  | 3.042284 | 0.75  | 6.1875             | 0        | 0           | FALSE          | FALSE        | 1        | 1   | 11160.53         | 307.125  | 303.6078 | 273.247  |
| 1                       | G5     | S Abut  | 207.637  | Stiffened Web - Localized Flex. Buck. | 0.2925               | 0.5      | 6   | 5.265                           | 77.40431 | 7.540013 | 3.20403  | 0.75  | 6.14625            | 0        | 0           | FALSE          | FALSE        | 1        | 1   | 1575435          | 271.4405 | 271.4209 | 244.2788 |
| 1                       | G5     | Pier 1  | 187.847  | Stiffened Web - Flexural Buckling     | 0.319444             | 0.4375   | 6   | 5.749988                        | 69.09155 | 7.086798 | 3.122392 | 0.75  | 6.159722           | -0.57142 | 0.361026207 | TRUE           | FALSE        | 0.972769 | 1   | 9765.572         | 248.1775 | 245.5516 | 220.9965 |
| 1                       | G5     | Pier 1  | 86.56845 | Stiffened Web - Localized Flex. Buck. | 0.18375              | 0.3      | 6   | 3.3075                          | 29.66519 | 3.907761 | 2.755241 | 0.75  | 6.713083           | -0.62121 | 0.549338227 | TRUE           | FALSE        | 0.804455 | 1   | 603785           | 113.1703 | 113.1614 | 101.8452 |
| 2                       | G1     | Pier 2  | 404.1248 | Stiffened Web - Flexural Buckling     | 0.375                | 0.875    | 7   | 6.75                            | 216.5921 | 14.78125 | 3.827946 | 0.75  | 7.1875             | -0.3336  | 0.163631498 | FALSE          | FALSE        | 1        | 1   | 30613.67         | 532.125  | 528.2677 | 475.441  |
| 2                       | G1     | Pier 2  | 371.633  | Stiffened Web - Localized Flex. Buck. | 0.375                | 0.69125  | 7   | 6.75                            | 192.2126 | 13.495   | 3.774022 | 0.75  | 7.538967           | -0.35147 | 0.186031904 | FALSE          | FALSE        | 1        | 1   | 3912164          | 485.82   | 485.7947 | 437.2153 |
| 2                       | G3     | Pier 2  | 404.1248 | Stiffened Web - Flexural Buckling     | 0.375                | 0.875    | 7   | 6.75                            | 216.5921 | 14.78125 | 3.827946 | 0.75  | 7.1875             | 0.755781 | 0.370716855 | FALSE          | FALSE        | 1        | 1   | 30613.67         | 532.125  | 528.2677 | 475.441  |
| 2                       | G3     | Pier 2  | 323.0887 | Stiffened Web - Localized Flex. Buck. | 0.375                | 0.500001 | 7   | 6.75                            | 162.5017 | 12.15626 | 3.656192 | 0.75  | 7.983769           | 0.796269 | 0.475564991 | TRUE           | FALSE        | 0.96512  | 1   | 3307449          | 422.3607 | 422.3382 | 380.1044 |
| 2                       | G5     | Pier 1  | 309.4757 | Stiffened Web - Flexural Buckling     | 0.263888             | 0.718594 | 7   | 4.749975                        | 177.8783 | 11.31377 | 3.965134 | 0.75  | 7.131944           | 0        | 0           | FALSE          | FALSE        | 1        | 1   | 25141.77         | 407.2958 | 404.5434 | 364.0891 |
| 2                       | G5     | Pier 1  | 361.828  | Stiffened Web - Localized Flex. Buck. | 0.222221             | 0.875    | 7   | 3.999983                        | 209.766  | 13.13888 | 3.995658 | 0.75  | 7.111111           | 0        | 0           | FALSE          | FALSE        | 1        | 1   | 4269433          | 472.9997 | 472.9778 | 425.68   |
| 2                       | G5     | Pier 2  | 404.1248 | Stiffened Web - Flexural Buckling     | 0.375                | 0.875    | 7   | 6.75                            | 216.5921 | 14.78125 | 3.827946 | 0.75  | 7.1875             | -0.19755 | 0.096899724 | FALSE          | FALSE        | 1        | 1   | 30613.67         | 532.125  | 528.2677 | 475.441  |
| 2                       | G5     | Pier 2  | 318.4363 | Stiffened Web - Localized Flex. Buck. | 0.3075               | 0.65625  | 7   | 5.535                           | 171.4027 | 11.56326 | 3.85007  | 0.75  | 7.366641           | -0.21289 | 0.105800922 | FALSE          | FALSE        | 1        | 1   | 3488614          | 416.2775 | 416.2567 | 374.631  |
| 3                       | G1     | Pier 2  | 206.0397 | Stiffened Web - Flexural Buckling     | 0.375                | 0.4375   | 6   | 6.75                            | 69.09082 | 7.78125  | 2.979789 | 0.75  | 6.1875             | 0.343765 | 0.239555444 | TRUE           | FALSE        | 0.972769 | 1   | 9765.468         | 272.497  | 269.3329 | 242.3996 |
| 3                       | G1     | Pier 2  | 138.0018 | Stiffened Web - Localized Flex. Buck. | 0.0375               | 0.392855 | 6   | 0.675                           | 64.19041 | 5.382443 | 3.453388 | 0.75  | 6.379304           | 0.360554 | 0.192865035 | TRUE           | FALSE        | 0.931036 | 1   | 1306488          | 180.405  | 180.3945 | 162.3551 |
| 3                       | G5     | Pier 2  | 232.26   | Stiffened Web - Flexural Buckling     | 0.375                | 0.5      | 6   | 6.75                            | 78.96094 | 8.53125  | 3.042284 | 0.75  | 6.1875             | 0.163581 | 0.109357331 | FALSE          | FALSE        | 1        | 1   | 11160.53         | 307.125  | 303.6078 | 273.247  |
| 3                       | G5     | Pier 2  | 125.119  | Stiffened Web - Localized Flex. Buck. | 0.333334             | 0.3      | 6   | 6.000008                        | 39.02881 | 5.648005 | 2.628725 | 0.75  | 6.336072           | 0.169405 | 0.155330217 | TRUE           | FALSE        | 0.804455 | 1   | 794365.8         | 163.5684 | 163.5543 | 147.1989 |



Steel Beam Ends - Load Rating  
Connecticut Department of Transportation



[<-Outputs](#)

[<<- UnStiffened Inputs](#)

### UnStiffened Web Capacity Outputs

Compute Capacities Without Performing  
a Rating

[Top](#)

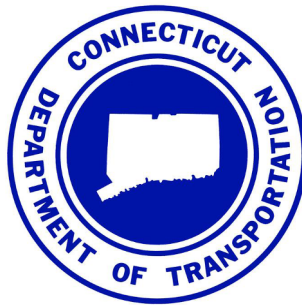
| Beam End Identification |        |         | Capactiy | As-Inspected Section |            |           | Resistance |          |
|-------------------------|--------|---------|----------|----------------------|------------|-----------|------------|----------|
| Span                    | Member | Support | C        | t.w                  | K          | ES        | R.ub       | R.uw     |
| 1                       | G2     | S Abut  | 146.1533 | 0.584712             | 0.73757836 | 9.6878918 | 203.9267   | 171.945  |
| 1                       | G2     | Pier 1  | 150.6188 | 0.594215             | 0.7779215  | 9.8896075 | 211.5558   | 177.1986 |
| 1                       | G3     | S Abut  | 146.1533 | 0.584712             | 0.73757836 | 9.6878918 | 203.9267   | 171.945  |
| 1                       | G3     | Pier 1  | 150.6188 | 0.594215             | 0.7779215  | 9.8896075 | 211.5558   | 177.1986 |
| 1                       | G4     | S Abut  | 146.1533 | 0.584712             | 0.73757836 | 9.6878918 | 203.9267   | 171.945  |
| 1                       | G4     | Pier 1  | 150.6188 | 0.594215             | 0.7779215  | 9.8896075 | 211.5558   | 177.1986 |
| 3                       | G2     | Pier 2  | 141.2208 | 0.575916             | 0.794      | 9.97      | 206.7077   | 166.1422 |
| 3                       | G2     | N Abut  | 142.089  | 0.575916             | 0.794      | 9.97      | 206.7077   | 167.1635 |
| 3                       | G3     | Pier 2  | 141.2208 | 0.575916             | 0.794      | 9.97      | 206.7077   | 166.1422 |
| 3                       | G3     | N Abut  | 142.089  | 0.575916             | 0.794      | 9.97      | 206.7077   | 167.1635 |
| 3                       | G4     | Pier 2  | 141.2208 | 0.575916             | 0.794      | 9.97      | 206.7077   | 166.1422 |
| 3                       | G4     | N Abut  | 142.089  | 0.575916             | 0.794      | 9.97      | 206.7077   | 167.1635 |

# **BeamEnd Spreadsheet Input Review**

**Connecticut Department of Transportation**

**Bridge Design Unit - Load Rating**

**Bridge: 00000**



**Analyzed By: patriacm**

**Last Run on: 5/17/2017 4:08:06 PM**

**Report Generated on: 5/17/2017 4:08:08 PM**

**BeamEnd version: 2.4**

## Stiffened BeamEnds Inputs

### Factors

| Span | Member | Support | Resistance Factor | System Factor | Condition Factor |
|------|--------|---------|-------------------|---------------|------------------|
| 1    | G1     | Abut 1  | 0.9               | 1             | 0.9              |
| 1    | G1     | Pier 1  | 0.9               | 1             | 0.9              |
| 1    | G5     | Abut 1  | 0.9               | 1             | 0.9              |
| 1    | G5     | Pier 1  | 0.9               | 1             | 0.9              |
| 2    | G1     | Pier 2  | 0.9               | 1             | 0.9              |
| 2    | G3     | Pier 2  | 0.9               | 1             | 0.9              |
| 2    | G5     | Pier 1  | 0.9               | 1             | 0.9              |
| 2    | G5     | Pier 2  | 0.9               | 1             | 0.9              |
| 3    | G1     | Pier 2  | 0.9               | 1             | 0.9              |
| 3    | G5     | Pier 2  | 0.9               | 1             | 0.9              |

### Member Properties

| Span | Member | Support | Modulus of Elasticity (ksi) | Fy Web (ksi) | L.o.h (in) | Web Depth (in) | Web Thickness (in) |
|------|--------|---------|-----------------------------|--------------|------------|----------------|--------------------|
| 1    | G1     | Abut 1  | 29000                       | 36           | 1.5        | 60             | 0.375              |
| 1    | G1     | Pier 1  | 29000                       | 36           | 6          | 60             | 0.375              |
| 1    | G5     | Abut 1  | 29000                       | 36           | 1.5        | 60             | 0.375              |
| 1    | G5     | Pier 1  | 29000                       | 36           | 6          | 60             | 0.375              |
| 2    | G1     | Pier 2  | 29000                       | 36           | 6          | 60             | 0.375              |
| 2    | G3     | Pier 2  | 29000                       | 36           | 6          | 60             | 0.375              |
| 2    | G5     | Pier 1  | 29000                       | 36           | 6          | 60             | 0.375              |
| 2    | G5     | Pier 2  | 29000                       | 36           | 6          | 60             | 0.375              |
| 3    | G1     | Pier 2  | 29000                       | 36           | 6          | 60             | 0.375              |
| 3    | G5     | Pier 2  | 29000                       | 36           | 6          | 60             | 0.375              |

### Stiffener Properties

| Span | Member | Support | Out-Out<br>Stiffener<br>(in) | Connection<br>Type | Projecting<br>Width (in) | Stiffener<br>Thickness<br>(in) | Fy<br>Stiffener<br>(ksi) | Number<br>of Pairs |
|------|--------|---------|------------------------------|--------------------|--------------------------|--------------------------------|--------------------------|--------------------|
| 1    | G1     | Abut 1  | 9                            | Welded             | 6                        | 0.5                            | 36                       | 2                  |
| 1    | G1     | Pier 1  | 0                            | Welded             | 6                        | 0.5                            | 36                       | 1                  |
| 1    | G5     | Abut 1  | 9                            | Welded             | 6                        | 0.5                            | 36                       | 2                  |
| 1    | G5     | Pier 1  | 0                            | Welded             | 6                        | 0.5                            | 36                       | 1                  |
| 2    | G1     | Pier 2  | 0                            | Welded             | 7                        | 0.875                          | 36                       | 1                  |
| 2    | G3     | Pier 2  | 0                            | Welded             | 7                        | 0.875                          | 36                       | 1                  |
| 2    | G5     | Pier 1  | 0                            | Welded             | 7                        | 0.875                          | 36                       | 1                  |
| 2    | G5     | Pier 2  | 0                            | Welded             | 7                        | 0.875                          | 36                       | 1                  |
| 3    | G1     | Pier 2  | 0                            | Welded             | 6                        | 0.5                            | 36                       | 1                  |
| 3    | G5     | Pier 2  | 0                            | Welded             | 6                        | 0.5                            | 36                       | 1                  |

### Uniform Section Loss

| Span | Member | Support | Web Thickness Loss (%) | Stiffener Thickness Loss (%) | Stiffener Width Loss (%) |
|------|--------|---------|------------------------|------------------------------|--------------------------|
| 1    | G1     | Abut 1  | 0                      | 0                            | 0                        |
| 1    | G1     | Pier 1  | 0                      | 34.375                       | 0                        |
| 1    | G5     | Abut 1  | 0                      | 0                            | 0                        |
| 1    | G5     | Pier 1  | 8.33                   | 12.5                         | 0                        |
| 2    | G1     | Pier 2  | 0                      | 0                            | 0                        |
| 2    | G3     | Pier 2  | 0                      | 0                            | 0                        |
| 2    | G5     | Pier 1  | 16.667                 | 53.571                       | 0                        |
| 2    | G5     | Pier 2  | 0                      | 0                            | 0                        |
| 3    | G1     | Pier 2  | 0                      | 21.875                       | 0                        |
| 3    | G5     | Pier 2  | 0                      | 0                            | 0                        |

### Localized Section Loss

| Span | Member | Support | Side-A<br>Stiffener<br>Width<br>Loss (%) | Side-A<br>Stiffener<br>Thickness<br>Loss (%) | Side-B<br>Stiffener<br>Width<br>Loss (%) | Side-B<br>Stiffener<br>Thickness<br>Loss (%) | Web<br>Thickness<br>Loss (%) | Height of<br>Localized<br>Loss (in) |
|------|--------|---------|------------------------------------------|----------------------------------------------|------------------------------------------|----------------------------------------------|------------------------------|-------------------------------------|
| 1    | G1     | Abut 1  | 0                                        | 0                                            | 0                                        | 0                                            | 10.811                       | 4                                   |
| 1    | G1     | Pier 1  | 100                                      | 0                                            | 0                                        | 0                                            | 50                           | 5                                   |
| 1    | G5     | Abut 1  | 0                                        | 0                                            | 0                                        | 0                                            | 10.811                       | 4                                   |
| 1    | G5     | Pier 1  | 33.333                                   | 25                                           | 0                                        | 0                                            | 66.667                       | 4                                   |
| 2    | G1     | Pier 2  | 0                                        | 21.429                                       | 0                                        | 0                                            | 0                            | 3                                   |
| 2    | G3     | Pier 2  | 0                                        | 42.857                                       | 0                                        | 0                                            | 0                            | 4                                   |
| 2    | G5     | Pier 1  | 0                                        | 0                                            | 0                                        | 0                                            | 66.667                       | 6                                   |
| 2    | G5     | Pier 2  | 0                                        | 14.286                                       | 0                                        | 25                                           | 100                          | 6                                   |
| 3    | G1     | Pier 2  | 0                                        | 37.5                                         | 0                                        | 0                                            | 91.667                       | 2                                   |
| 3    | G5     | Pier 2  | 0                                        | 75                                           | 66.667                                   | 0                                            | 50                           | 2                                   |

## UnStiffened BeamEnds Inputs

### Factors

| Span | Member | Support | System Factor | Condition Factor | Bearing Resistance Factor | Web Crippling Resistance Factor |
|------|--------|---------|---------------|------------------|---------------------------|---------------------------------|
| 1    | G2     | Abut 1  | 1             | 0.9              | 1                         | 0.8                             |
| 1    | G2     | Pier 1  | 1             | 0.9              | 1                         | 0.8                             |
| 1    | G3     | Abut 1  | 1             | 0.9              | 1                         | 0.8                             |
| 1    | G3     | Pier 1  | 1             | 0.9              | 1                         | 0.8                             |
| 1    | G4     | Abut 1  | 1             | 0.9              | 1                         | 0.8                             |
| 1    | G4     | Pier 1  | 1             | 0.9              | 1                         | 0.8                             |
| 3    | G2     | Pier 2  | 1             | 0.9              | 1                         | 0.8                             |
| 3    | G2     | Abut 2  | 1             | 0.9              | 1                         | 0.8                             |
| 3    | G3     | Pier 2  | 1             | 0.9              | 1                         | 0.8                             |
| 3    | G3     | Abut 2  | 1             | 0.9              | 1                         | 0.8                             |
| 3    | G4     | Pier 2  | 1             | 0.9              | 1                         | 0.8                             |
| 3    | G4     | Abut 2  | 1             | 0.9              | 1                         | 0.8                             |

### Member Properties

| Span | Member | Support | Modulus of Elasticity (ksi) | Fy Web (ksi) | Section Depth (in) | Web Thickness (in) | Bottom Flange Thickness (in) | Bottom Flange + Fillet Thickness (in) | L.OH (in) | Bearing Length (in) |
|------|--------|---------|-----------------------------|--------------|--------------------|--------------------|------------------------------|---------------------------------------|-----------|---------------------|
| 1    | G2     | Abut 1  | 29000                       | 36           | 35.55              | 0.598              | 0.794                        | 0.794                                 | 6         | 6                   |
| 1    | G2     | Pier 1  | 29000                       | 36           | 35.55              | 0.598              | 0.794                        | 0.794                                 | 6         | 15                  |
| 1    | G3     | Abut 1  | 29000                       | 36           | 35.55              | 0.598              | 0.794                        | 0.794                                 | 6         | 6                   |
| 1    | G3     | Pier 1  | 29000                       | 36           | 35.55              | 0.598              | 0.794                        | 0.794                                 | 6         | 15                  |
| 1    | G4     | Abut 1  | 29000                       | 36           | 35.55              | 0.598              | 0.794                        | 0.794                                 | 6         | 6                   |
| 1    | G4     | Pier 1  | 29000                       | 36           | 35.55              | 0.598              | 0.794                        | 0.794                                 | 6         | 15                  |
| 3    | G2     | Pier 2  | 29000                       | 36           | 35.55              | 0.598              | 0.794                        | 0.794                                 | 6         | 15                  |
| 3    | G2     | Abut 2  | 29000                       | 36           | 35.55              | 0.598              | 0.794                        | 0.794                                 | 6         | 6                   |
| 3    | G3     | Pier 2  | 29000                       | 36           | 35.55              | 0.598              | 0.794                        | 0.794                                 | 6         | 15                  |
| 3    | G3     | Abut 2  | 29000                       | 36           | 35.55              | 0.598              | 0.794                        | 0.794                                 | 6         | 6                   |
| 3    | G4     | Pier 2  | 29000                       | 36           | 35.55              | 0.598              | 0.794                        | 0.794                                 | 6         | 15                  |
| 3    | G4     | Abut 2  | 29000                       | 36           | 35.55              | 0.598              | 0.794                        | 0.794                                 | 6         | 6                   |

### Section Loss

| Span | Member | Support | Web Thickness Loss (%) | Flange Thickness Loss (%) | Flange + Fillet Thickness Loss (%) |
|------|--------|---------|------------------------|---------------------------|------------------------------------|
| 1    | G2     | Abut 1  | 20.9                   | 0                         | 0                                  |
| 1    | G2     | Pier 1  | 20.9                   | 0                         | 0                                  |
| 1    | G3     | Abut 1  | 20.9                   | 0                         | 0                                  |
| 1    | G3     | Pier 1  | 20.9                   | 0                         | 0                                  |
| 1    | G4     | Abut 1  | 20.9                   | 0                         | 0                                  |
| 1    | G4     | Pier 1  | 20.9                   | 0                         | 0                                  |
| 3    | G2     | Pier 2  | 20.9                   | 9.269                     | 0                                  |
| 3    | G2     | Abut 2  | 20.9                   | 0                         | 0                                  |
| 3    | G3     | Pier 2  | 20.9                   | 9.269                     | 0                                  |
| 3    | G3     | Abut 2  | 20.9                   | 0                         | 0                                  |
| 3    | G4     | Pier 2  | 20.9                   | 9.269                     | 0                                  |
| 3    | G4     | Abut 2  | 20.9                   | 0                         | 0                                  |

## UnDefined BeamEnds Inputs

### Factors

| Span | Member | Support | System Factor | Condition Factor |
|------|--------|---------|---------------|------------------|
| 1    | B2     | Pier 1  | 1             | 0.9              |
| 1    | B3     | Pier 1  | 1             | 0.9              |
| 1    | B4     | Pier 1  | 1             | 0.9              |
| 3    | B2     | Pier 2  | 1             | 0.9              |
| 3    | B3     | Pier 2  | 1             | 0.9              |
| 3    | B4     | Pier 2  | 1             | 0.9              |

### Resistance

| Span | Member | Support | Resistance (kip) | Failure Mechanism |
|------|--------|---------|------------------|-------------------|
| 1    | B2     | Pier 1  | 880.961          | Axial Compression |
| 1    | B3     | Pier 1  | 880.961          | Axial Compression |
| 1    | B4     | Pier 1  | 880.961          | Axial Compression |
| 3    | B2     | Pier 2  | 880.961          | Axial Compression |
| 3    | B3     | Pier 2  | 880.961          | Axial Compression |
| 3    | B4     | Pier 2  | 880.961          | Axial Compression |

### Secant Formula

| Span | Member | Support | Eccentricity Ratio (in) | Modulus of Elasticity (ksi) | Effective Length, KL (in) | Moment of Inertia (in <sup>4</sup> ) |
|------|--------|---------|-------------------------|-----------------------------|---------------------------|--------------------------------------|
| 1    | B2     | Pier 1  | 0.089                   | 29000                       | 34.5                      | 251.815                              |
| 1    | B3     | Pier 1  | 0.089                   | 29000                       | 34.5                      | 251.815                              |
| 1    | B4     | Pier 1  | 0.089                   | 29000                       | 34.5                      | 251.815                              |
| 3    | B2     | Pier 2  | 0.089                   | 29000                       | 34.5                      | 251.815                              |
| 3    | B3     | Pier 2  | 0.089                   | 29000                       | 34.5                      | 251.815                              |
| 3    | B4     | Pier 2  | 0.089                   | 29000                       | 34.5                      | 251.815                              |

## BrR Association

| Span | Member | Support | BrR Superstructure Definition | BrR Member | BrR Support |
|------|--------|---------|-------------------------------|------------|-------------|
| 1    | G1     | Abut 1  | Span 01                       | G1         | 1           |
| 1    | G1     | Pier 1  | Span 01                       | G1         | 2           |
| 1    | G5     | Abut 1  | Span 01                       | G5         | 1           |
| 1    | G5     | Pier 1  | Span 01                       | G5         | 2           |
| 2    | G1     | Pier 2  | Span 02                       | G1         | 2           |
| 2    | G3     | Pier 2  | Span 02                       | G3         | 2           |
| 2    | G5     | Pier 1  | Span 02                       | G5         | 1           |
| 2    | G5     | Pier 2  | Span 02                       | G5         | 2           |
| 3    | G1     | Pier 2  | Span 03                       | G1         | 1           |
| 3    | G5     | Pier 2  | Span 03                       | G5         | 1           |
| 1    | G2     | Abut 1  | Span 01                       | G2         | 1           |
| 1    | G2     | Pier 1  | Span 01                       | G2         | 2           |
| 1    | G3     | Abut 1  | Span 01                       | G3         | 1           |
| 1    | G3     | Pier 1  | Span 01                       | G3         | 2           |
| 1    | G4     | Abut 1  | Span 01                       | G4         | 1           |
| 1    | G4     | Pier 1  | Span 01                       | G4         | 2           |
| 3    | G2     | Pier 2  | Span 03                       | G2         | 1           |
| 3    | G2     | Abut 2  | Span 03                       | G2         | 2           |
| 3    | G3     | Pier 2  | Span 03                       | G3         | 1           |
| 3    | G3     | Abut 2  | Span 03                       | G3         | 2           |
| 3    | G4     | Pier 2  | Span 03                       | G4         | 1           |
| 3    | G4     | Abut 2  | Span 03                       | G4         | 2           |
| 1    | B2     | Pier 1  | Span 01                       | G2         | 2           |
| 1    | B3     | Pier 1  | Span 01                       | G3         | 2           |
| 1    | B4     | Pier 1  | Span 01                       | G4         | 2           |
| 3    | B2     | Pier 2  | Span 03                       | G2         | 1           |
| 3    | B3     | Pier 2  | Span 03                       | G3         | 1           |
| 3    | B4     | Pier 2  | Span 03                       | G4         | 1           |

## Load Factor Information

**Live Load Factor Analysis Option: Other**

**ADTT: 285**

| Span | Member | Support | Structure Length (ft) | DC Factor | DW Factor |
|------|--------|---------|-----------------------|-----------|-----------|
| 1    | G1     | Abut 1  | 39.52                 | 1.25      | 1.5       |
| 1    | G1     | Pier 1  | 39.52                 | 1.25      | 1.5       |
| 1    | G5     | Abut 1  | 39.52                 | 1.25      | 1.5       |
| 1    | G5     | Pier 1  | 39.52                 | 1.25      | 1.5       |
| 2    | G1     | Pier 2  | 108.5                 | 1.25      | 1.5       |
| 2    | G3     | Pier 2  | 108.5                 | 1.25      | 1.5       |
| 2    | G5     | Pier 1  | 108.5                 | 1.25      | 1.5       |
| 2    | G5     | Pier 2  | 108.5                 | 1.25      | 1.5       |
| 3    | G1     | Pier 2  | 37.19                 | 1.25      | 1.5       |
| 3    | G5     | Pier 2  | 37.19                 | 1.25      | 1.5       |
| 1    | G2     | Abut 1  | 39.52                 | 1.25      | 1.5       |
| 1    | G2     | Pier 1  | 39.52                 | 1.25      | 1.5       |
| 1    | G3     | Abut 1  | 39.52                 | 1.25      | 1.5       |
| 1    | G3     | Pier 1  | 39.52                 | 1.25      | 1.5       |
| 1    | G4     | Abut 1  | 39.52                 | 1.25      | 1.5       |
| 1    | G4     | Pier 1  | 39.52                 | 1.25      | 1.5       |
| 3    | G2     | Pier 2  | 37.19                 | 1.25      | 1.5       |
| 3    | G2     | Abut 2  | 37.19                 | 1.25      | 1.5       |
| 3    | G3     | Pier 2  | 37.19                 | 1.25      | 1.5       |
| 3    | G3     | Abut 2  | 37.19                 | 1.25      | 1.5       |
| 3    | G4     | Pier 2  | 37.19                 | 1.25      | 1.5       |
| 3    | G4     | Abut 2  | 37.19                 | 1.25      | 1.5       |
| 1    | B2     | Pier 1  | 39.52                 | 1.25      | 1.5       |
| 1    | B3     | Pier 1  | 39.52                 | 1.25      | 1.5       |
| 1    | B4     | Pier 1  | 39.52                 | 1.25      | 1.5       |
| 3    | B2     | Pier 2  | 37.19                 | 1.25      | 1.5       |
| 3    | B3     | Pier 2  | 37.19                 | 1.25      | 1.5       |
| 3    | B4     | Pier 2  | 37.19                 | 1.25      | 1.5       |

## Governing Beam End Ratings

**Governing ratings for only inputs provided in this Beam End Report.**

| Vehicle      | Vehicle Class | Vehicle Config. | Rating | Failure Mechanism                     | Span | Member | Support | GVW (tons) | Rating Tons | Num. Locations below 1.00 |
|--------------|---------------|-----------------|--------|---------------------------------------|------|--------|---------|------------|-------------|---------------------------|
| HL-93        | INVENTORY     | Truck + Lane    | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | N/A        | N/A         | N/A                       |
| HL-93        | OPERATING     | Truck + Lane    | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | N/A        | N/A         | N/A                       |
| Type 3       | AASHTO LEGAL  | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 25         | 0           | 3                         |
| Type 3S2     | AASHTO LEGAL  | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 36         | 0           | 3                         |
| Type 3-3     | AASHTO LEGAL  | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 40         | 0           | 3                         |
| SU4          | AASHTO LEGAL  | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 27         | 0           | 6                         |
| SU5          | AASHTO LEGAL  | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 31         | 0           | 7                         |
| SU6          | AASHTO LEGAL  | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 34.75      | 0           | 9                         |
| SU7          | AASHTO LEGAL  | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 38.75      | 0           | 9                         |
| H-20         | CT LEGAL      | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 36.5       | 0           | 3                         |
| HS-20        | CT LEGAL      | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 40         | 0           | 10                        |
| CT-L73.0     | CT LEGAL      | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 36         | 0           | 10                        |
| CT-L3S2      | CT LEGAL      | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 20         | 0           | 3                         |
| CT-P76.5     | CT PERMIT     | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 38.25      | 0           | 10                        |
| CT-P120 (6)  | CT PERMIT     | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 60         | 0           | 12                        |
| CT-P140 (7)a | CT PERMIT     | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 70         | 0           | 12                        |
| CT-P140 (7)b | CT PERMIT     | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 70         | 0           | 12                        |
| CT-P160 (8)a | CT PERMIT     | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 80         | 0           | 12                        |
| CT-P160 (8)b | CT PERMIT     | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 80         | 0           | 15                        |
| CT-P180 (9)  | CT PERMIT     | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 90         | 0           | 15                        |
| CT-P200 (10) | CT PERMIT     | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 100        | 0           | 16                        |
| CT-P380      | CT PERMIT     | Axle Load       | 0      | Stiffened Web - Localized Flex. Buck. | 1    | G1     | Pier 1  | 190        | 0           | 5                         |