

# **Modified Slenderness Ratio of Joist Girder Chord Members**

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## Abstract

Open-web steel joist girders are widely used in floor and roof systems due to their light weight, ease of fabrication, and efficient load-carrying behavior. However, certain failure modes, particularly top chord buckling, can govern design, especially in long-span joist girders or systems with limited lateral bracing. Previous studies have examined the effects of lateral support length, material properties, and filler placement on top chord buckling and suggested the use of reduced effective length factors.

This study focuses on slenderness-related behavior of steel joist girders, intentionally considering top chord buckling as the governing failure mode. Three different joist girder layouts were developed, each using four cross-section sizes and two lateral support lengths. Slenderness ratios were calculated using both the standard SJI equation and the modified version provided in the SJI standard. These values were used to determine expected buckling type (elastic or inelastic) and to calculate the corresponding critical buckling stress,  $F_{cr}$ , per SJI specifications.

Finite element models were developed using MASTAN2. Additional analyses were performed using both basic and advanced section modeling to investigate the effect of least radius of gyration  $r_z$ , and fillers were introduced to examine the influence of  $l_s$ . After determining top chord buckling loads, back-calculation was conducted to obtain  $F_{cr}$  and effective slenderness ratios, which were compared to theoretical values.

Results showed that both the standard and modified slenderness formulas overestimated slenderness ratios compared to back-calculated values. Similarly,  $F_{cr}$  values from finite element analysis indicated greater capacities than SJI predictions, suggesting the modified formula may be

overly conservative.

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# 1. Introduction

Steel joist girders are widely used in commercial buildings because of their efficiency and cost-effectiveness. Traditionally, the design of chord members in open-web steel joist girders has employed conservative assumptions, particularly the use of an effective length factor ( $k$ ) of 0.94 to account for potential instability. However, this approach can lead to over-conservative designs, especially when structural bracing effects are not accurately reflected.

A recent study [1] has sought to refine the estimation of  $k$ -factors by considering the stiffness contributions of web members, filler locations, geometric imperfections, differences in material properties among the joist members and lateral bracing conditions. These efforts aimed to better capture the true buckling behavior of joist chords and promote more efficient use of material.

Building on this motivation, the present study investigates if the modified slenderness ratio that incorporates the influence of least radius of gyration ( $r_z$ ) and distance between fillers and panel points ( $l_s$ ) should be used in chord members under compression. By conducting a comprehensive parametric study and referencing previous findings, this report investigates the necessity and impact of using a modified slenderness ratio in compression chord design.

Three different joist layouts were developed for this project, each representing a unique design configuration and four sets of cross-sectional properties. These joist girders were modeled using the MASTAN2 software, and 3D finite element models were constructed accordingly. For each model, both elastic and inelastic eigenvalue buckling analyses were performed to determine the buckling capacities of the double-angle top chord members.

The obtained buckling capacities were then used in a back-calculation process consistent

with the formulation provided by AISC and SJI design standards ([2] and [3]). Through this process, the actual slenderness ratios and corresponding critical stresses ( $F_{cr}$ ) were derived. The modeling approach and the back-calculation methodology are detailed in the subsequent sections.

The results showed that even the regular slenderness ratio formula tends to be overly conservative and that incorporating the modified slenderness ratio may not be necessary. Nevertheless, the individual effects of the parameters  $r_z$  (related to cross-sectional properties) and  $l_s$  (related to filler placement) on the buckling capacity were thoroughly investigated. The study also observed how these parameters influence the slenderness ratio used in design. Finally, based on the calculated capacity values, several effective length factors ( $k$ ) were evaluated, and recommendations were proposed accordingly.

## 2. Designs and Finite Element Modeling

The primary objective of this study is to evaluate whether it is safe to disregard the modified slenderness ratio when designing compression chord members of joist girders, and to identify conditions under which this ratio becomes critical. To investigate this, SJI member companies designed three joist girders with varying layouts subjected to gravity loads. Each layout includes members with four different cross-sectional sizes. Additionally, to assess the influence of lateral support length on top chord performance, each design was modeled with two different lateral support configurations.

The modified slenderness ratio, as defined in the SJI 100-2020 Standard [3], is:

$$\left(\frac{k\ell}{r_y}\right)_m = \sqrt{\left(\frac{k\ell}{r_y}\right)^2 + \left(\frac{k_i\ell_s}{r_z}\right)^2} \quad (2.1)$$

where  $k$  is the effective length factor;  $\ell$  is the center-to-center length between panel points;  $r_y$  is the radius of gyration about the vertical axis of joist girder cross section;  $\ell_s$  is the maximum spacing between a panel point and a filler (tie), or between adjacent fillers; and  $r_z$  is the least radius of gyration of a member component.  $k_i$  was used as 0.5 for this study since the chords were designed as back-to-back double angles.

To further explore the impact of the modified slenderness ratio, additional analyses were performed by explicitly including the least radius of gyration ( $r_z$ ), and modeling filler elements to represent the unbraced length between top chord members ( $\ell_s$ ).

As a result of all the design variations and technical inputs, a total of 96 Finite Element Models were generated and analyzed for buckling. This total arises from three different joist girder designs, each modeled with four different member cross-sections. Each of these 12 base configurations

was analyzed with two different unbraced lengths. Furthermore, for each case, two modeling options were considered regarding the least radius of gyration ( $r_z$ )—either included or disregarded—and two options for system length ( $l_s$ )—either with or without filler elements. The combination of these variables resulted in  $3 \times 4 \times 2 \times 2 \times 2 = 96$  distinct models. The designs are provided in Appendix A.

## 2.1. Finite Element Modeling

The intended failure mode for the joist girder models was top chord buckling. To capture this behavior, buckling analyses were conducted for each model, and the required axial forces obtained from the analysis software were used in the back-calculation of the slenderness ratio and corresponding critical stress ( $F_{cr}$ ). The methodology for this back-calculation is detailed in the following section.

Additionally, ABAQUS models were developed to verify the modeling approach used in MASTAN2 through second-order inelastic analysis. However, buckling analyses were not performed using ABAQUS due to its higher complexity and modeling difficulties. Instead, MASTAN2 was preferred for its efficiency and reliable capabilities in performing eigenvalue buckling analysis.

The MASTAN2 tutorial for steel joists (Sippel, et al. [4]) was used to model the steel joist girder in 3D. Each member was modeled with beam elements, and rigid fillers were used between each chord members at every location where web members are connected to chord members. The MSASect function was utilized to model cross-section profiles, and values of Young's Modulus of 29000 ksi, Poisson's ratio of 0.3, and yield strength of 50 ksi were input, assuming an elastic-perfectly-plastic material model (McGuire, et al. [5]). To increase the accuracy and avoid numerical instability of the models, end moment values at the end of web members were released with 0.001 as a semi-rigid, and also warping was assumed to be continuously restrained along the entire length of each member. The general layout of the model is shown in Figure 2.1.

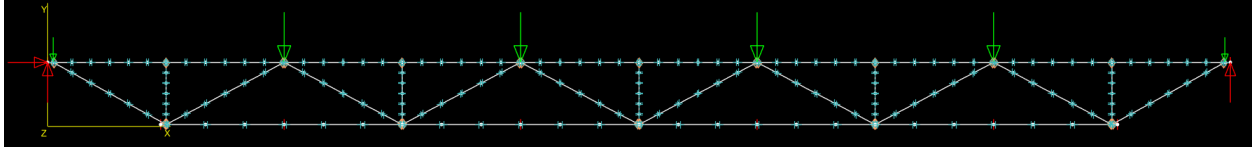


Figure 2.1: Generic layout of one modeled girder (SJI1A) in MASTAN2

## 2.2. Model Verification

While ABAQUS offers a highly detailed platform for nonlinear analysis [6], its complexity and time-consuming modeling process make it less practical for conducting large-scale parametric studies. In contrast, MASTAN2 provides a more streamlined modeling environment that enables rapid development and analysis of multiple design configurations [7]. Therefore, MASTAN2 was selected as the primary tool for this study.

To verify the modeling approach used in MASTAN2, a representative joist girder model, SJI1A, was also constructed in ABAQUS for comparison. In this verification, MASTAN2 used Second-Order Inelastic analysis, while ABAQUS employed Second-Order Static Riks analysis. To ensure consistency, both models shared identical geometry, boundary conditions, applied load, and material definitions, including the use of plastic hinge theory, a model of elastic-perfectly-plastic material described by McGuire et al. [5].

As shown in Figure 2.2, the deformed shapes and Load Proportional Factor (LPF) show excellent agreement between the two programs. This comparison confirms that the load path and general structural behavior modeled in MASTAN2 are consistent with those obtained from a more detailed finite element model, ABAQUS.

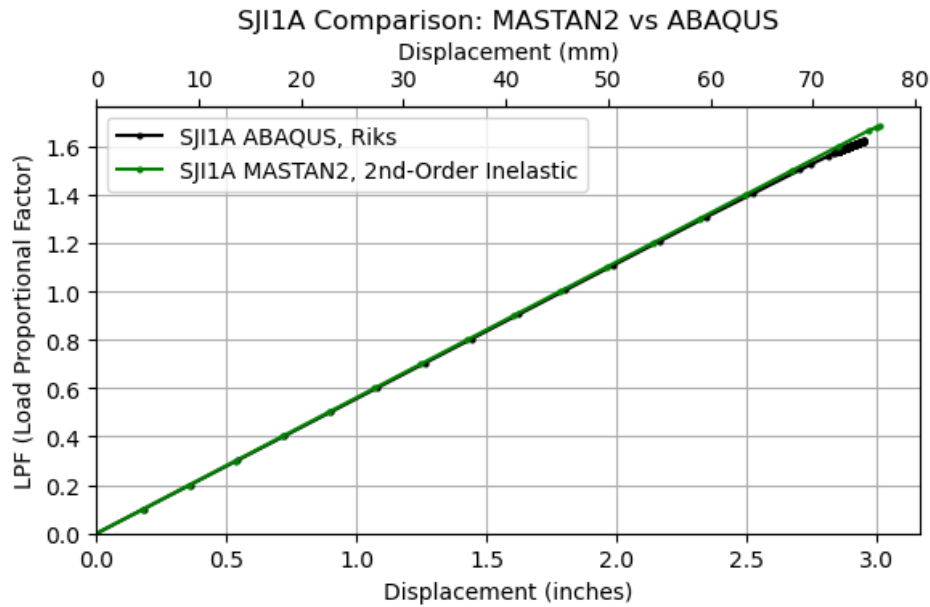


Figure 2.2: The comparison of MASTAN2 and ABAQUS for model validation

### 2.3. Buckling Analysis

Due to variations in lateral bracing lengths and member sizes, both elastic and inelastic 3D buckling analyses were employed throughout the study. Following the eigenvalue analyses for each configuration, it was observed that some failure modes did not involve top chord buckling, rather it was a web member to buckle. Since the objective of this study is to evaluate top chord buckling behavior, the models were adjusted to ensure that this failure mode was captured in all cases by increasing either area or second moment of inertia of the web member which had buckled first before the top chord buckling. Figures 2.3 and 2.4 show examples of buckled top chord members in the 3D eigenbuckling analysis with different global flexural buckling shapes depending on the varying unbraced length.

MASTAN2 enables structural analysis using basic cross-sectional inputs such as area, moment of inertia, and radius of gyration, but also allows the incorporation of more advanced section

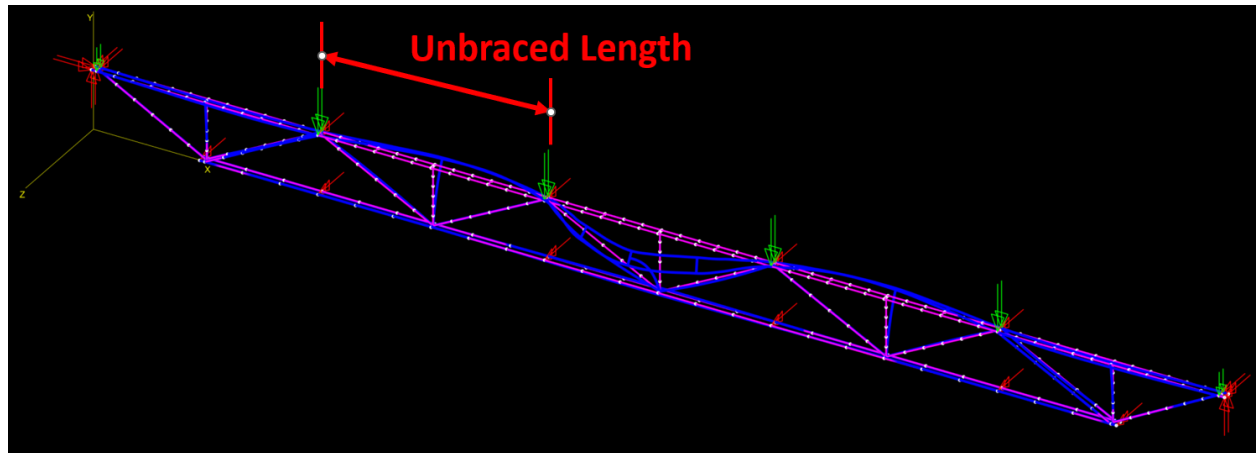


Figure 2.3: Buckled shape in MASTAN2 (deflected shape is 15 times scaled up)

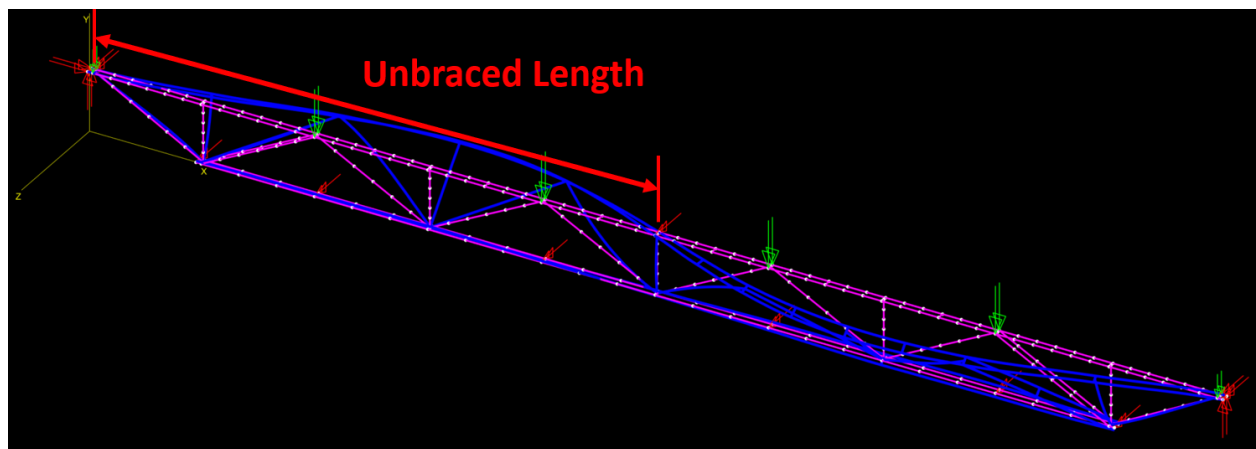


Figure 2.4: Buckled shape in MASTAN2 (deflected shape is 15 times scaled up)

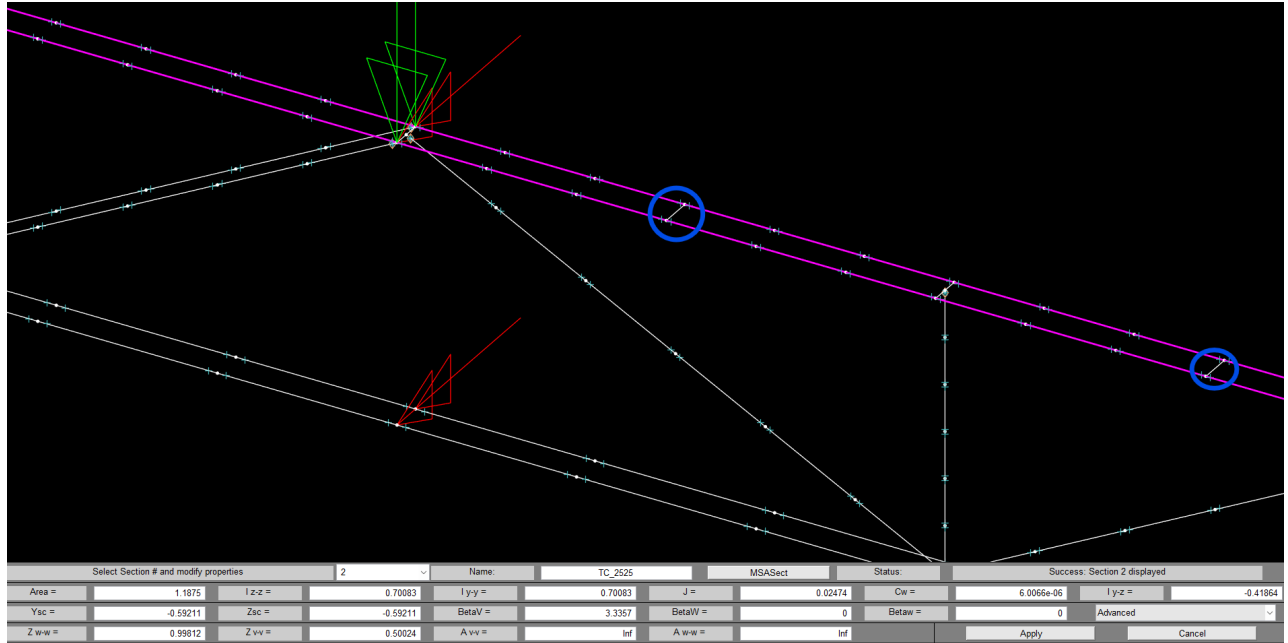


Figure 2.5: MASTAN2 model showing fillers (blue circles) and advanced section properties definitions

properties such as the effects of non-symmetric section properties and principal axis behavior. Given that the primary aim of this study is to assess the role of the modified slenderness ratio in the design process and the influence of its key parameters,  $r_z$  and  $l_s$ , each model was analyzed both with and without the inclusion of  $r_z$ . Additionally, filler elements were introduced in the models to simulate the effect of  $l_s$  on the buckling capacity of the top chord members. Figure 2.5 shows a model generated with advanced sectional properties and with fillers included in blue circles.

### 3. Back-Calculation Process for Slenderness Ratio and Critical Stress

The MASTAN2 buckling analysis calculates the buckling load for the system and provides the forces in each element. Therefore, the calculated failure load is taken as the buckling load capacity and used in the back-calculation process. The back calculation process is based on the AISC 360-10 [2] and SJI 100-2020 Standard [3] calculations for slenderness ratio and critical stress values ( $F_{cr}$ ).

The compressive strength of members is evaluated based on the guidelines provided in the American National Standard SJI 100-2020 [3]. The design and allowable stresses are determined as follows:

$$\text{Design Stress (LRFD)} = 0.9F_{cr} \quad (3.1)$$

$$\text{Allowable Stress (ASD)} = 0.6F_{cr} \quad (3.2)$$

Slenderness Ratio can be calculated as in Equation: 3.3

$$\text{Slenderness Ratio} = \frac{k\ell}{r} \quad (3.3)$$

where  $k$  is the effective length factor,  $\ell$  is the member length, and  $r$  is the radius of gyration. The critical stress ( $F_{cr}$ ) is determined based on the slenderness ratio and the procedure differs depending on whether the slenderness is below or above a certain limit which can be calculated by

Equation 3.4:

$$4.71\sqrt{\frac{E}{QF_y}} \quad (3.4)$$

Here  $Q$  is the full reduction factor for slender compression members which will be discussed in the next section,  $F_y$  is the yield stress of the material, and  $F_e$  is the elastic buckling stress, determined as:

$$F_e = \frac{\pi^2 E}{\left(\frac{k\ell}{r}\right)^2} \quad (3.5)$$

where  $E$  is the modulus of elasticity.

For members with low slenderness, the buckling will be in the inelastic region:

$$\left(\frac{k\ell}{r}\right) \leq 4.71\sqrt{\frac{E}{QF_y}} \quad (3.6)$$

and the critical stress is given by:

$$F_{cr} = Q \left[ 0.658^{\left(\frac{QF_y}{F_e}\right)} \right] F_y \quad (3.7)$$

For high slenderness members where buckling occurs in the elastic region:

$$\left(\frac{k\ell}{r}\right) > 4.71\sqrt{\frac{E}{QF_y}} \quad (3.8)$$

the critical stress is defined as:

$$F_{cr} = 0.877F_e \quad (3.9)$$

Based on the previously explained equations and assumptions, the axial force ( $F$ ) corre-

sponding to the buckling failure load obtained from MASTAN2 was considered as the axial capacity of the top chord member. Using this force, the critical stress  $F_{cr}$  was calculated as:

$$F_{cr} = \frac{F}{A} \quad (3.10)$$

where  $A$  is the cross-sectional area of the top chord section.

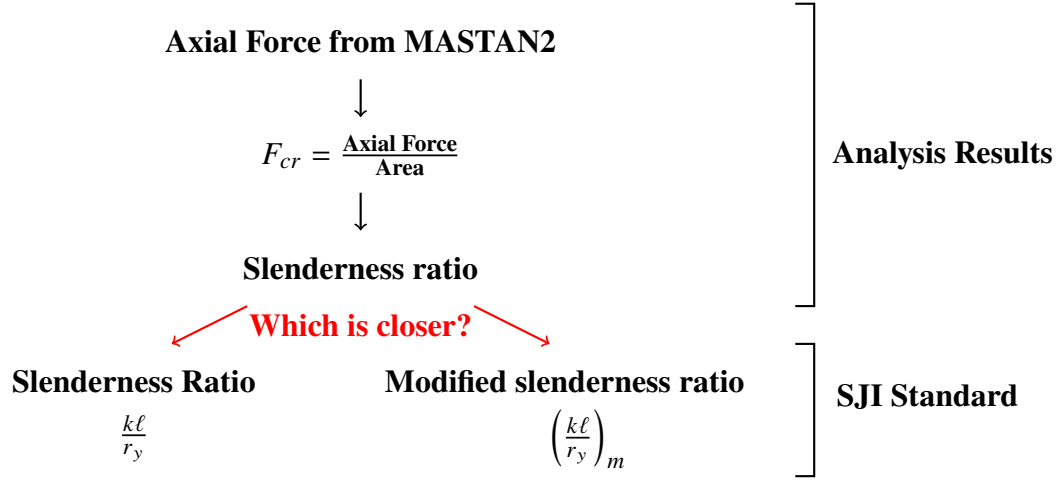
Once the  $F_{cr}$  values were determined, the actual slenderness ratio of the top chord sections was then computed using Equations 3.11 and 3.12, depending on whether the expected buckling behavior was in elastic or inelastic region.

$$\text{Back-calculated slenderness ratio (Inelastic)} = \sqrt{\left(\frac{\pi^2 E}{Q \cdot F_y}\right) \cdot \left(\log_{0.658} \left(\frac{F_{cr}}{Q \cdot F_y}\right)\right)} \quad (3.11)$$

$$\text{Back-calculated slenderness ratio (Elastic)} = \sqrt{0.877 \cdot \frac{\pi^2 E}{F_{cr}}} \quad (3.12)$$

A comparison was then made between the slenderness ratio obtained from analysis results and the values calculated using standard design equations. In addition to the slenderness ratio, the critical stress  $F_{cr}$  values were also compared. These findings are discussed in detail in Section 4.2 and 4.3 as results.

A schematic overview of the entire back-calculation process is presented below.



In cases where neither  $r_z$  nor fillers were included in the models, the slenderness ratio values were calculated from analyses results where basic section properties were used to generate models. However, since the parameters  $r_z$  and  $l_s$  can be independently incorporated into the models—where  $r_z$  is related to cross-sectional properties and  $l_s$  is related to the presence of fillers—their individual and combined effects on slenderness were also evaluated through additional analyses. Furthermore, the modified slenderness ratio, which inherently considers the combined influence of both parameters, was calculated and included in Section 4.2 and 4.3. For each calculated slenderness ratio, the corresponding  $F_{cr}$  values were also determined and compared accordingly.

## 4. Results and Discussion

This section presents the results by comparing the slenderness ratio and critical stress ( $F_{cr}$ ) values obtained from structural analyses with those calculated using the formulas recommended in current design standards ([2] and [3]). Since the primary objective of this study is to investigate whether the use of the modified slenderness ratio is necessary for compression members—specifically the double-angle top chord members analyzed in this project—such comparisons are essential.

### 4.1. Full Reduction Factor $Q$ for Slender Compression Members

In the evaluation of compressive strength for slender members, the reduction factor  $Q$  is applied to account for local buckling effects in elements that are classified as slender. This factor is particularly relevant for cold-formed and hot-rolled steel members with slender elements, such as the double angle top chords. According to the current design standards ([2] and [3]), the yield strength is modified using  $Q$  shown in Equations 3.4, 3.6, 3.7, and 3.8.

The reduction factor  $Q$  is:

$$Q = Q_s \cdot Q_a \quad (4.1)$$

where  $Q_s$  is the reduction factor for slender unstiffened elements, and  $Q_a$  is the reduction factor for slender stiffened elements. Since the top chord members in this study are double angle sections, only  $Q_s$  is applicable, while  $Q_a$  equals 1.0. The value of  $Q_s$  is calculated based on the

width-thickness ratio as presented in the following Equations for single angles:

$$Q_s = 1.0 \quad \text{for } \frac{b}{t} \leq 0.45 \sqrt{\frac{E}{F_y}} \quad (4.2)$$

$$Q_s = 1.34 - 0.76 \left( \frac{b}{t} \right) \sqrt{\frac{F_y}{E}} \quad \text{for } 0.45 \sqrt{\frac{E}{F_y}} < \frac{b}{t} \leq 0.91 \sqrt{\frac{E}{F_y}} \quad (4.3)$$

$$Q_s = \frac{0.53E}{F_y \left( \frac{b}{t} \right)^2} \quad \text{for } \frac{b}{t} > 0.91 \sqrt{\frac{E}{F_y}} \quad (4.4)$$

where  $b$  is full width of longest leg. For members designated A and B in the design sheet, Appendix A, Equation 4.2 was used, and Equation 4.3 was used for C and D members. The value of  $Q_s$  is 0.98 for the C members and 0.96 for the D members, which sets a limitation in the calculation of critical stress in Equation 3.10. As shown in Equation 3.11, the logarithmic function has a base of 0.658. This implies that the maximum value of the argument  $\frac{F_{cr}}{Q \cdot F_y}$  is 1. This relationship can be derived and expressed as follows:

$$F_{cr} \leq Q \cdot F_y \quad (4.5)$$

Considering Equation 3.10 and Equation 4.5, the maximum achievable back-calculated  $F_{cr}$  values are 49 ksi for C members (0.98 x 50 ksi) and 48 ksi for D members (0.96 x 50 ksi). If the back-calculated  $F_{cr}$  values obtained from Equation 3.10 are beyond these values, the corresponding slenderness ratios—particularly in the inelastic buckling region defined by Equation 3.11—cannot be calculated. As a result, those cases are excluded from comparison with other values.

## 4.2. Slenderness Ratios and $F_{cr}$ Values from Analyses Results

The slenderness ratios and  $F_{cr}$  values were calculated through the back-calculation method explained in Section 3, based on structural models and analysis techniques detailed previously. Figures 4.1, 4.2, and 4.3 show the back-calculated slenderness ratios and  $F_{cr}$  values, and indicate if the given top chord member is expected to have the buckling in elastic or inelastic region. If the back-calculated  $F_{cr}$  values in Figures 4.1, 4.2, and 4.3 do not comply with the inequality presented in Equation 4.5, those back-calculated slenderness ratios according to the  $F_{cr}$  values will not be considered for interpretation throughout this report.

The effect of least radius of gyration ( $r_z$ ) of the cross-section can be seen from the difference between the  $F_{cr}$  and slenderness ratios from both Basic and Advanced section columns by comparing values on the same row, and the effect of fillers ( $l_s$ ) can also be seen from the differences between values in either yellow color of the original unbraced length or green color of the changed unbraced length.

### 4.2.1 Comparison of Slenderness Ratios

Back-calculated slenderness ratios as yellow and green colors and slenderness ratios (standard and modified) as orange color calculated with the SJI standard are presented in Figures 4.4, 4.5, and 4.6.

One of the influencing parameters in the modified slenderness ratio is the least radius of gyration ( $r_z$ ) in the analysis. To determine the effect of  $r_z$ , the comparisons of slenderness ratios are given in Figures 4.7, 4.8, and 4.9 with the red dash-dot vertical line as the slenderness limit between the inelastic and the elastic region.

The other parameter in the modified slenderness ratio is the effect of fillers between the

| SJ11A    |           |                           | Basic Section Properties (w/o rz) |                                   | Advanced Section Properties (w/ rz) |                                   |
|----------|-----------|---------------------------|-----------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|
| L (inch) | Is (inch) | Category                  | Fcr (psi)                         | Back Calculated Slenderness Ratio | Fcr (psi)                           | Back Calculated Slenderness Ratio |
| 86.38    | 43.25     | Inelastic Buckling Region | 41520.84                          | 50.41                             | 40086.74                            | 54.97                             |
| 86.38    | 21.63     | Inelastic Buckling Region | 45696.84                          | 35.08                             | 44922.11                            | 38.27                             |
| 216.00   | 43.25     | Elastic Buckling Region   | 27627.79                          | 95.32                             | 23363.37                            | 103.65                            |
| 216.00   | 21.63     | Elastic Buckling Region   | 30750.32                          | 90.35                             | 25477.05                            | 99.26                             |
| SJ11B    |           |                           | Basic Section Properties (w/o rz) |                                   | Advanced Section Properties (w/ rz) |                                   |
| L (inch) | Is (inch) | Category                  | Fcr (psi)                         | Back Calculated Slenderness Ratio | Fcr (psi)                           | Back Calculated Slenderness Ratio |
| 86.38    | 43.25     | Inelastic Buckling Region | 46999.78                          | 29.09                             | 46114.97                            | 33.26                             |
| 86.38    | 21.63     | Inelastic Buckling Region | 48489.62                          | 20.48                             | 47961.53                            | 23.86                             |
| 216.00   | 43.25     | Inelastic Buckling Region | 43488.52                          | 43.68                             | 40540.33                            | 53.56                             |
| 216.00   | 21.63     | Inelastic Buckling Region | 44744.04                          | 38.97                             | 41823.83                            | 49.42                             |
| SJ11C    |           |                           | Basic Section Properties (w/o rz) |                                   | Advanced Section Properties (w/ rz) |                                   |
| L (inch) | Is (inch) | Category                  | Fcr (psi)                         | Back Calculated Slenderness Ratio | Fcr (psi)                           | Back Calculated Slenderness Ratio |
| 86.38    | 43.25     | Inelastic Buckling Region | 48138.13                          | 15.63                             | 47412.27                            | 21.36                             |
| 86.38    | 21.63     | Inelastic Buckling Region | 49050.23                          | #NUM!                             | 48670.58                            | 9.52                              |
| 216.00   | 43.25     | Inelastic Buckling Region | 46493.02                          | 27.01                             | 44621.07                            | 36.10                             |
| 216.00   | 21.63     | Inelastic Buckling Region | 47309.60                          | 22.06                             | 46122.92                            | 29.00                             |
| SJ11D    |           |                           | Basic Section Properties (w/o rz) |                                   | Advanced Section Properties (w/ rz) |                                   |
| L (inch) | Is (inch) | Category                  | Fcr (psi)                         | Back Calculated Slenderness Ratio | Fcr (psi)                           | Back Calculated Slenderness Ratio |
| 86.38    | 43.25     | Inelastic Buckling Region | 48744.35                          | #NUM!                             | 48111.30                            | #NUM!                             |
| 86.38    | 21.63     | Inelastic Buckling Region | 49339.13                          | #NUM!                             | 49017.39                            | #NUM!                             |
| 216.00   | 43.25     | Inelastic Buckling Region | 48182.61                          | #NUM!                             | 47304.35                            | 15.07                             |
| 216.00   | 21.63     | Inelastic Buckling Region | 48549.57                          | #NUM!                             | 47772.17                            | 9.33                              |

Figure 4.1: Back-Calculated Slenderness and  $F_{cr}$  values from MASTAN2 analyses for SJ11 design layout

| SJI2A    |           |                           | Basic Section Properties (w/o rz) |                                   | Advanced Section Properties (w/ rz) |                                   |
|----------|-----------|---------------------------|-----------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|
| L (inch) | Is (inch) | Category                  | Fcr (psi)                         | Back Calculated Slenderness Ratio | Fcr (psi)                           | Back Calculated Slenderness Ratio |
| 115.13   | 57.63     | Inelastic Buckling Region | 34147.37                          | 72.22                             | 32326.74                            | 77.23                             |
| 115.13   | 28.81     | Inelastic Buckling Region | 41335.58                          | 51.02                             | 40040.42                            | 55.12                             |
| 288.00   | 57.63     | Elastic Buckling Region   | 16832.84                          | 122.12                            | 15344.00                            | 127.90                            |
| 288.00   | 28.81     | Elastic Buckling Region   | 18937.26                          | 115.13                            | 16982.74                            | 121.58                            |
| SJI2B    |           |                           | Basic Section Properties (w/o rz) |                                   | Advanced Section Properties (w/ rz) |                                   |
| L (inch) | Is (inch) | Category                  | Fcr (psi)                         | Back Calculated Slenderness Ratio | Fcr (psi)                           | Back Calculated Slenderness Ratio |
| 115.13   | 57.63     | Inelastic Buckling Region | 44048.09                          | 41.63                             | 42775.08                            | 46.20                             |
| 115.13   | 28.81     | Inelastic Buckling Region | 46821.42                          | 31.21                             | 45593.88                            | 35.52                             |
| 288.00   | 57.63     | Elastic Buckling Region   | 33438.08                          | 86.64                             | 28032.35                            | 94.63                             |
| 288.00   | 28.81     | Elastic Buckling Region   | 35616.17                          | 83.95                             | 29319.69                            | 92.53                             |
| SJI2C    |           |                           | Basic Section Properties (w/o rz) |                                   | Advanced Section Properties (w/ rz) |                                   |
| L (inch) | Is (inch) | Category                  | Fcr (psi)                         | Back Calculated Slenderness Ratio | Fcr (psi)                           | Back Calculated Slenderness Ratio |
| 115.13   | 57.63     | Inelastic Buckling Region | 46392.73                          | 27.56                             | 45392.29                            | 32.62                             |
| 115.13   | 28.81     | Inelastic Buckling Region | 48002.03                          | 16.85                             | 47352.58                            | 21.77                             |
| 288.00   | 57.63     | Inelastic Buckling Region | 41529.02                          | 48.02                             | 37797.06                            | 60.17                             |
| 288.00   | 28.81     | Inelastic Buckling Region | 42584.37                          | 44.22                             | 38852.42                            | 56.88                             |
| SJI2D    |           |                           | Basic Section Properties (w/o rz) |                                   | Advanced Section Properties (w/ rz) |                                   |
| L (inch) | Is (inch) | Category                  | Fcr (psi)                         | Back Calculated Slenderness Ratio | Fcr (psi)                           | Back Calculated Slenderness Ratio |
| 115.13   | 57.63     | Inelastic Buckling Region | 47596.52                          | 11.81                             | 46720.00                            | 20.10                             |
| 115.13   | 28.81     | Inelastic Buckling Region | 48702.61                          | #NUM!                             | 48240.00                            | #NUM!                             |
| 288.00   | 57.63     | Inelastic Buckling Region | 44963.48                          | 30.81                             | 42504.35                            | 41.83                             |
| 288.00   | 28.81     | Inelastic Buckling Region | 45996.52                          | 25.02                             | 43678.26                            | 36.90                             |

Figure 4.2: Back-Calculated Slenderness and  $F_{cr}$  values from MASTAN2 analyses for SJI2 design layout

| SJI3A    |           |                           | Basic Section Properties (w/o rz) |                                   |           | Advanced Section Properties (w/ rz) |  |  |
|----------|-----------|---------------------------|-----------------------------------|-----------------------------------|-----------|-------------------------------------|--|--|
| L (inch) | Is (inch) | Category                  | Fcr (psi)                         | Back Calculated Slenderness Ratio | Fcr (psi) | Back Calculated Slenderness Ratio   |  |  |
| 102.88   | 51.50     | Inelastic Buckling Region | 36610.53                          | 65.29                             | 35227.79  | 69.21                               |  |  |
| 102.88   | 25.75     | Inelastic Buckling Region | 42236.63                          | 48.04                             | 41226.95  | 51.37                               |  |  |
| 360.00   | 51.50     | Elastic Buckling Region   | 12064.00                          | 144.25                            | 10974.32  | 151.24                              |  |  |
| 360.00   | 25.75     | Elastic Buckling Region   | 13030.74                          | 138.79                            | 11679.16  | 146.60                              |  |  |
| SJI3B    |           |                           | Basic Section Properties (w/o rz) |                                   |           | Advanced Section Properties (w/ rz) |  |  |
| L (inch) | Is (inch) | Category                  | Fcr (psi)                         | Back Calculated Slenderness Ratio | Fcr (psi) | Back Calculated Slenderness Ratio   |  |  |
| 102.88   | 51.50     | Inelastic Buckling Region | 44971.37                          | 38.07                             | 44002.62  | 41.80                               |  |  |
| 102.88   | 25.75     | Inelastic Buckling Region | 46667.54                          | 30.71                             | 45838.69  | 34.47                               |  |  |
| 360.00   | 51.50     | Elastic Buckling Region   | 23736.31                          | 102.84                            | 19973.60  | 112.10                              |  |  |
| 360.00   | 25.75     | Elastic Buckling Region   | 24591.39                          | 101.03                            | 20363.89  | 111.02                              |  |  |
| SJI3C    |           |                           | Basic Section Properties (w/o rz) |                                   |           | Advanced Section Properties (w/ rz) |  |  |
| L (inch) | Is (inch) | Category                  | Fcr (psi)                         | Back Calculated Slenderness Ratio | Fcr (psi) | Back Calculated Slenderness Ratio   |  |  |
| 102.88   | 51.50     | Inelastic Buckling Region | 46944.29                          | 24.39                             | 46120.54  | 29.02                               |  |  |
| 102.88   | 25.75     | Inelastic Buckling Region | 48307.66                          | 13.97                             | 47789.53  | 18.59                               |  |  |
| 360.00   | 51.50     | Elastic Buckling Region   | 35643.37                          | 83.92                             | 29418.67  | 92.37                               |  |  |
| 360.00   | 25.75     | Elastic Buckling Region   | 38002.40                          | 81.27                             | 30662.66  | 90.48                               |  |  |
| SJI3D    |           |                           | Basic Section Properties (w/o rz) |                                   |           | Advanced Section Properties (w/ rz) |  |  |
| L (inch) | Is (inch) | Category                  | Fcr (psi)                         | Back Calculated Slenderness Ratio | Fcr (psi) | Back Calculated Slenderness Ratio   |  |  |
| 102.88   | 51.50     | Inelastic Buckling Region | 47984.35                          | 4.91                              | 47313.04  | 14.98                               |  |  |
| 102.88   | 25.75     | Inelastic Buckling Region | 48895.65                          | #NUM!                             | 48483.48  | #NUM!                               |  |  |
| 360.00   | 51.50     | Inelastic Buckling Region | 40544.35                          | 49.20                             | 35991.30  | 64.15                               |  |  |
| 360.00   | 25.75     | Inelastic Buckling Region | 41686.96                          | 45.01                             | 36925.22  | 61.25                               |  |  |

Figure 4.3: Back-Calculated Slenderness and  $F_{cr}$  values from MASTAN2 analyses for SJI3 design layout

| SJI1A    |           |                           | Basic Section Slenderness (w/o rz) | Advanced Section Slenderness (with rz) | Current SJI Standard Slenderness Ratio for Chord Members |        | Modified Slenderness Ratio |        |
|----------|-----------|---------------------------|------------------------------------|----------------------------------------|----------------------------------------------------------|--------|----------------------------|--------|
| L (inch) | Is (inch) | Category                  | Slenderness                        | Slenderness                            | k=0.94 (Standard)                                        | k=1    | k=0.94                     | k=1    |
| 86.38    | 43.25     | Inelastic Buckling Region | 50.41                              | 54.97                                  | 53.50                                                    | 56.91  | 69.27                      | 71.94  |
| 86.38    | 21.63     | Inelastic Buckling Region | 35.08                              | 38.27                                  | 53.50                                                    | 56.91  | 57.84                      | 61.02  |
| 216.00   | 43.25     | Elastic Buckling Region   | 95.32                              | 103.65                                 | 133.78                                                   | 142.32 | 140.83                     | 148.96 |
| 216.00   | 21.63     | Elastic Buckling Region   | 90.35                              | 99.26                                  | 133.78                                                   | 142.32 | 135.58                     | 144.01 |
| SJI1B    |           |                           | Basic Section Slenderness          | Advanced Section Slenderness           | Current SJI Standard Slenderness Ratio for Chord Members |        | Modified Slenderness Ratio |        |
| L (inch) | Is (inch) | Category                  | Slenderness                        | Slenderness                            | k=0.94 (Standard)                                        | k=1    | k=0.94                     | k=1    |
| 86.38    | 43.25     | Inelastic Buckling Region | 29.09                              | 33.26                                  | 37.88                                                    | 40.29  | 46.78                      | 48.76  |
| 86.38    | 21.63     | Inelastic Buckling Region | 20.48                              | 23.86                                  | 37.88                                                    | 40.29  | 40.29                      | 42.57  |
| 216.00   | 43.25     | Inelastic Buckling Region | 43.68                              | 53.56                                  | 94.72                                                    | 100.76 | 98.62                      | 104.44 |
| 216.00   | 21.63     | Inelastic Buckling Region | 38.97                              | 49.42                                  | 94.72                                                    | 100.76 | 95.71                      | 101.69 |
| SJI1C    |           |                           | Basic Section Slenderness          | Advanced Section Slenderness           | Current SJI Standard Slenderness Ratio for Chord Members |        | Modified Slenderness Ratio |        |
| L (inch) | Is (inch) | Category                  | Slenderness                        | Slenderness                            | k=0.94 (Standard)                                        | k=1    | k=0.94                     | k=1    |
| 86.38    | 43.25     | Inelastic Buckling Region | 15.63                              | 21.36                                  | 31.72                                                    | 33.74  | 38.56                      | 40.24  |
| 86.38    | 21.63     | Inelastic Buckling Region | #NUM!                              | 9.52                                   | 31.72                                                    | 33.74  | 33.56                      | 35.48  |
| 216.00   | 43.25     | Inelastic Buckling Region | 27.01                              | 36.10                                  | 79.31                                                    | 84.37  | 82.29                      | 87.18  |
| 216.00   | 21.63     | Inelastic Buckling Region | 22.06                              | 29.00                                  | 79.31                                                    | 84.37  | 80.07                      | 85.08  |
| SJI1D    |           |                           | Basic Section Slenderness          | Advanced Section Slenderness           | Current SJI Standard Slenderness Ratio for Chord Members |        | Modified Slenderness Ratio |        |
| L (inch) | Is (inch) | Category                  | Slenderness                        | Slenderness                            | k=0.94 (Standard)                                        | k=1    | k=0.94                     | k=1    |
| 86.38    | 43.25     | Inelastic Buckling Region | #NUM!                              | #NUM!                                  | 27.26                                                    | 29.00  | 32.81                      | 34.27  |
| 86.38    | 21.63     | Inelastic Buckling Region | #NUM!                              | #NUM!                                  | 27.26                                                    | 29.00  | 28.75                      | 30.40  |
| 216.00   | 43.25     | Inelastic Buckling Region | #NUM!                              | 15.07                                  | 68.17                                                    | 72.52  | 70.57                      | 74.78  |
| 216.00   | 21.63     | Inelastic Buckling Region | #NUM!                              | 9.33                                   | 68.17                                                    | 72.52  | 68.78                      | 73.09  |

Figure 4.4: Back-calculated (yellow and green) and the SJI standard (orange) slenderness ratios

| SJI2A    |           |                           | Basic Section Slenderness (w/o rz) | Advanced Section Slenderness (with rz) | Current SJI Standard Slenderness Ratio for Chord Members |        | Modified Slenderness Ratio |        |
|----------|-----------|---------------------------|------------------------------------|----------------------------------------|----------------------------------------------------------|--------|----------------------------|--------|
| L (inch) | Is (inch) | Category                  | Slenderness                        | Slenderness                            | k=0.94 (Standard)                                        | k=1    | k=0.94                     | k=1    |
| 115.13   | 57.63     | Inelastic Buckling Region | 72.22                              | 77.23                                  | 71.30                                                    | 75.85  | 92.31                      | 95.87  |
| 115.13   | 28.81     | Inelastic Buckling Region | 51.02                              | 55.12                                  | 71.30                                                    | 75.85  | 77.09                      | 81.32  |
| 288.00   | 57.63     | Elastic Buckling Region   | 122.12                             | 127.90                                 | 178.37                                                   | 189.76 | 187.76                     | 198.61 |
| 288.00   | 28.81     | Elastic Buckling Region   | 115.13                             | 121.58                                 | 178.37                                                   | 189.76 | 180.76                     | 192.01 |
| SJI2B    |           |                           | Basic Section Slenderness          | Advanced Section Slenderness           | Current SJI Standard Slenderness Ratio for Chord Members |        | Modified Slenderness Ratio |        |
| L (inch) | Is (inch) | Category                  | Slenderness                        | Slenderness                            | k=0.94 (Standard)                                        | k=1    | k=0.94                     | k=1    |
| 115.13   | 57.63     | Inelastic Buckling Region | 41.63                              | 46.20                                  | 50.48                                                    | 53.70  | 62.34                      | 64.98  |
| 115.13   | 28.81     | Inelastic Buckling Region | 31.21                              | 35.52                                  | 50.48                                                    | 53.70  | 53.69                      | 56.73  |
| 288.00   | 57.63     | Elastic Buckling Region   | 86.64                              | 94.63                                  | 126.29                                                   | 134.35 | 131.48                     | 139.24 |
| 288.00   | 28.81     | Elastic Buckling Region   | 83.95                              | 92.53                                  | 126.29                                                   | 134.35 | 127.60                     | 135.59 |
| SJI2C    |           |                           | Basic Section Slenderness          | Advanced Section Slenderness           | Current SJI Standard Slenderness Ratio for Chord Members |        | Modified Slenderness Ratio |        |
| L (inch) | Is (inch) | Category                  | Slenderness                        | Slenderness                            | k=0.94 (Standard)                                        | k=1    | k=0.94                     | k=1    |
| 115.13   | 57.63     | Inelastic Buckling Region | 27.56                              | 32.62                                  | 42.27                                                    | 44.97  | 51.39                      | 53.63  |
| 115.13   | 28.81     | Inelastic Buckling Region | 16.85                              | 21.77                                  | 42.27                                                    | 44.97  | 44.72                      | 47.28  |
| 288.00   | 57.63     | Inelastic Buckling Region | 48.02                              | 60.17                                  | 105.75                                                   | 112.50 | 109.71                     | 116.23 |
| 288.00   | 28.81     | Inelastic Buckling Region | 44.22                              | 56.88                                  | 105.75                                                   | 112.50 | 106.75                     | 113.44 |
| SJI2D    |           |                           | Basic Section Slenderness          | Advanced Section Slenderness           | Current SJI Standard Slenderness Ratio for Chord Members |        | Modified Slenderness Ratio |        |
| L (inch) | Is (inch) | Category                  | Slenderness                        | Slenderness                            | k=0.94 (Standard)                                        | k=1    | k=0.94                     | k=1    |
| 115.13   | 57.63     | Inelastic Buckling Region | 11.81                              | 20.10                                  | 36.33                                                    | 38.65  | 43.72                      | 45.67  |
| 115.13   | 28.81     | Inelastic Buckling Region | #NUM!                              | #NUM!                                  | 36.33                                                    | 38.65  | 38.31                      | 40.52  |
| 288.00   | 57.63     | Inelastic Buckling Region | 30.81                              | 41.83                                  | 90.89                                                    | 96.69  | 94.09                      | 99.71  |
| 288.00   | 28.81     | Inelastic Buckling Region | 25.02                              | 36.90                                  | 90.89                                                    | 96.69  | 91.70                      | 97.46  |

Figure 4.5: Back-calculated (yellow and green) and the SJI standard (orange) slenderness ratios

| SJI3A    |           |                           | Basic Section (w/o rz) | Advanced Section (with rz) | Current SJI Standard Slenderness Ratio for Chord Members |        | Modified Slenderness Ratio |        |
|----------|-----------|---------------------------|------------------------|----------------------------|----------------------------------------------------------|--------|----------------------------|--------|
| L (inch) | Is (inch) | Category                  | Slenderness            | Slenderness                | k=0.94 (Standard)                                        | k=1    | k=0.94                     | k=1    |
| 102.88   | 51.50     | Inelastic Buckling Region | 65.29                  | 69.21                      | 63.71                                                    | 67.78  | 82.49                      | 85.67  |
| 102.88   | 25.75     | Inelastic Buckling Region | 48.04                  | 51.37                      | 63.71                                                    | 67.78  | 68.89                      | 72.67  |
| 360.00   | 51.50     | Elastic Buckling Region   | 144.25                 | 151.24                     | 222.96                                                   | 237.20 | 229.04                     | 242.91 |
| 360.00   | 25.75     | Elastic Buckling Region   | 138.79                 | 146.60                     | 222.96                                                   | 237.20 | 224.50                     | 238.64 |
| SJI3B    |           |                           | Basic Section          | Advanced Section           | Current SJI Standard Slenderness Ratio for Chord Members |        | Modified Slenderness Ratio |        |
| L (inch) | Is (inch) | Category                  | Slenderness            | Slenderness                | k=0.94 (Standard)                                        | k=1    | k=0.94                     | k=1    |
| 102.88   | 51.50     | Inelastic Buckling Region | 38.07                  | 41.80                      | 45.11                                                    | 47.99  | 55.71                      | 58.07  |
| 102.88   | 25.75     | Inelastic Buckling Region | 30.71                  | 34.47                      | 45.11                                                    | 47.99  | 47.98                      | 50.70  |
| 360.00   | 51.50     | Elastic Buckling Region   | 102.84                 | 112.10                     | 157.86                                                   | 167.93 | 161.21                     | 171.09 |
| 360.00   | 25.75     | Elastic Buckling Region   | 101.03                 | 111.02                     | 157.86                                                   | 167.93 | 158.70                     | 168.73 |
| SJI3C    |           |                           | Basic Section          | Advanced Section           | Current SJI Standard Slenderness Ratio for Chord Members |        | Modified Slenderness Ratio |        |
| L (inch) | Is (inch) | Category                  | Slenderness            | Slenderness                | k=0.94 (Standard)                                        | k=1    | k=0.94                     | k=1    |
| 102.88   | 51.50     | Inelastic Buckling Region | 24.39                  | 29.02                      | 37.77                                                    | 40.18  | 45.92                      | 47.92  |
| 102.88   | 25.75     | Inelastic Buckling Region | 13.97                  | 18.59                      | 37.77                                                    | 40.18  | 39.97                      | 42.25  |
| 360.00   | 51.50     | Elastic Buckling Region   | 83.92                  | 92.37                      | 132.18                                                   | 140.62 | 134.74                     | 143.03 |
| 360.00   | 25.75     | Elastic Buckling Region   | 81.27                  | 90.48                      | 132.18                                                   | 140.62 | 132.83                     | 141.23 |
| SJI3D    |           |                           | Basic Section          | Advanced Section           | Current SJI Standard Slenderness Ratio for Chord Members |        | Modified Slenderness Ratio |        |
| L (inch) | Is (inch) | Category                  | Slenderness            | Slenderness                | k=0.94 (Standard)                                        | k=1    | k=0.94                     | k=1    |
| 102.88   | 51.50     | Inelastic Buckling Region | 4.91                   | 14.98                      | 32.47                                                    | 34.54  | 39.07                      | 40.81  |
| 102.88   | 25.75     | Inelastic Buckling Region | #NUM!                  | #NUM!                      | 32.47                                                    | 34.54  | 34.24                      | 36.21  |
| 360.00   | 51.50     | Inelastic Buckling Region | 49.20                  | 64.15                      | 113.62                                                   | 120.87 | 115.68                     | 122.81 |
| 360.00   | 25.75     | Inelastic Buckling Region | 45.01                  | 61.25                      | 113.62                                                   | 120.87 | 114.13                     | 121.36 |

Figure 4.6: Back-calculated (yellow and green) and the SJI standard (orange) slenderness ratios

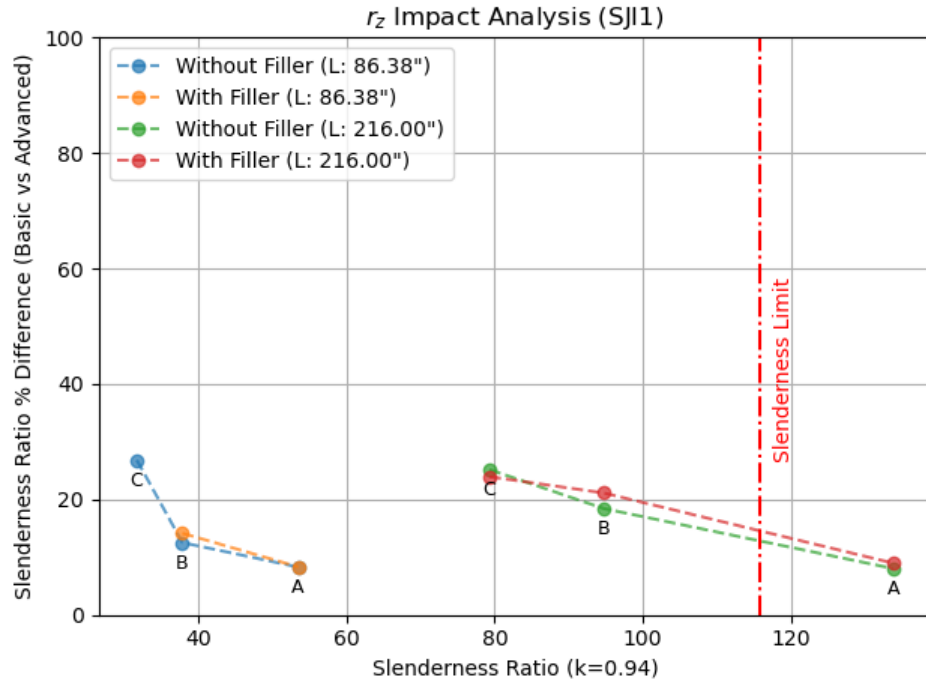


Figure 4.7: The comparison of slenderness ratios for basic and advanced section analysis for SJI1

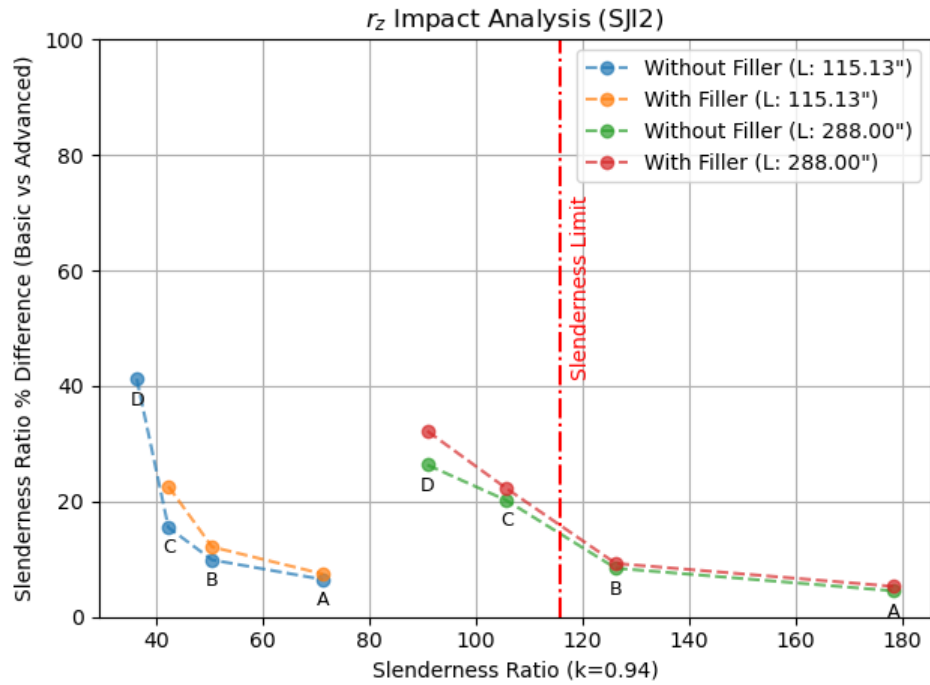


Figure 4.8: The comparison of slenderness ratios for basic and advanced section analysis for SJI2

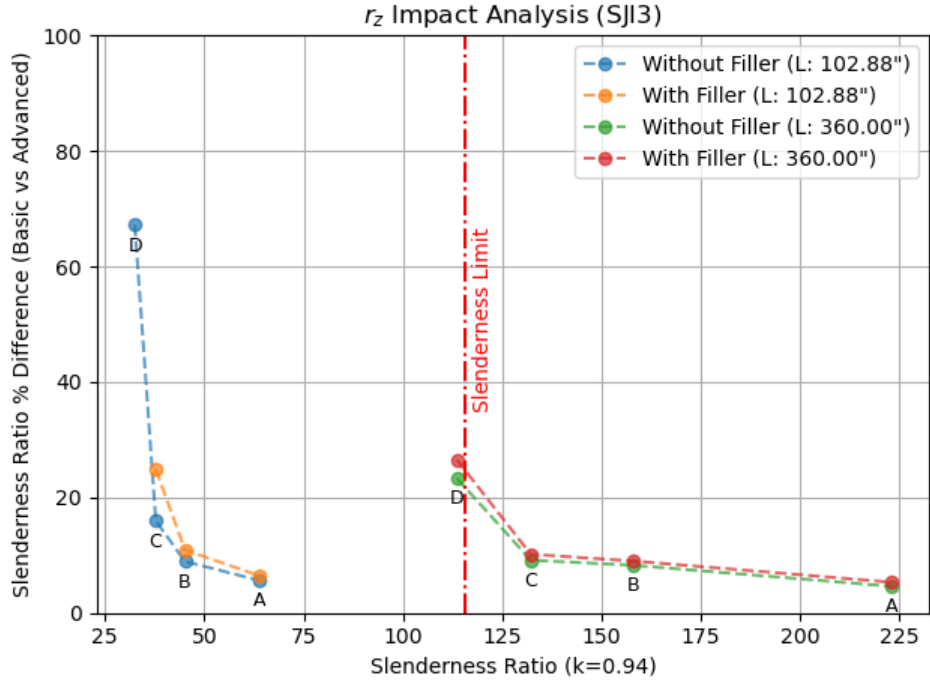


Figure 4.9: The comparison of slenderness ratios for basic and advanced section analysis for SJI3

chord members ( $l_s$ ). The comparison of the results are also presented in Figures 4.10, 4.11, and 4.12 along with the red dash-dot slenderness limit line.

#### 4.2.2 Comparison of Critical Stress Values, $F_{cr}$

Back-calculated critical stress values from the analysis results of both the slenderness and modified slenderness ratios and critical stress values calculated from the specification were also compared in Figures 4.13, 4.14, and 4.15. These figures show the results with the original models specified in Appendix A along with the advanced section properties which is more realistic. Detailed explanations will be covered in Section 4.3.

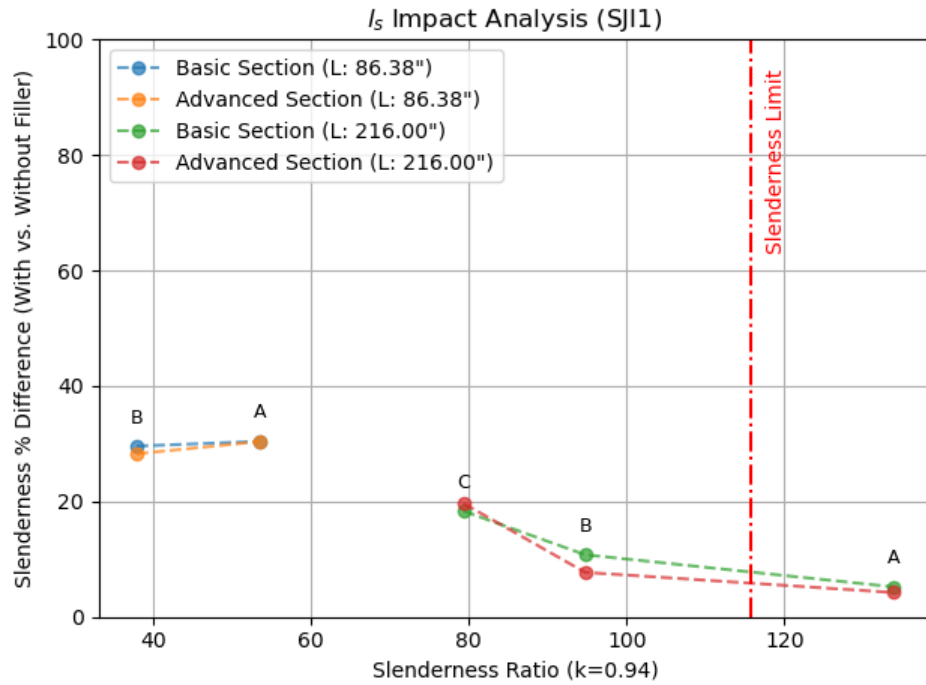


Figure 4.10: The comparison of slenderness ratios with and without the fillers for SJI1

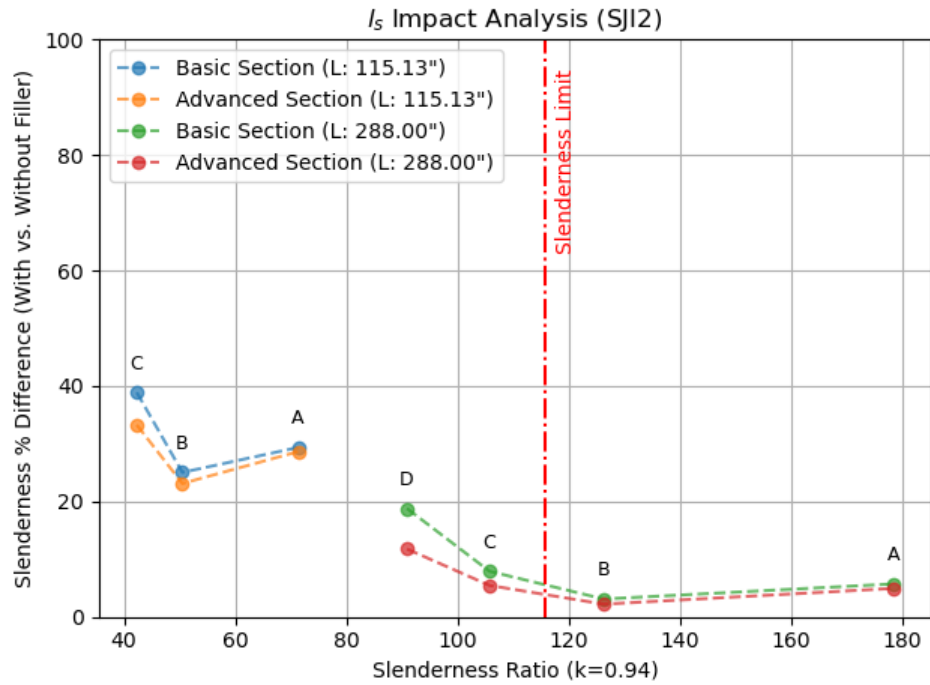


Figure 4.11: The comparison of slenderness ratios with and without the fillers for SJI2

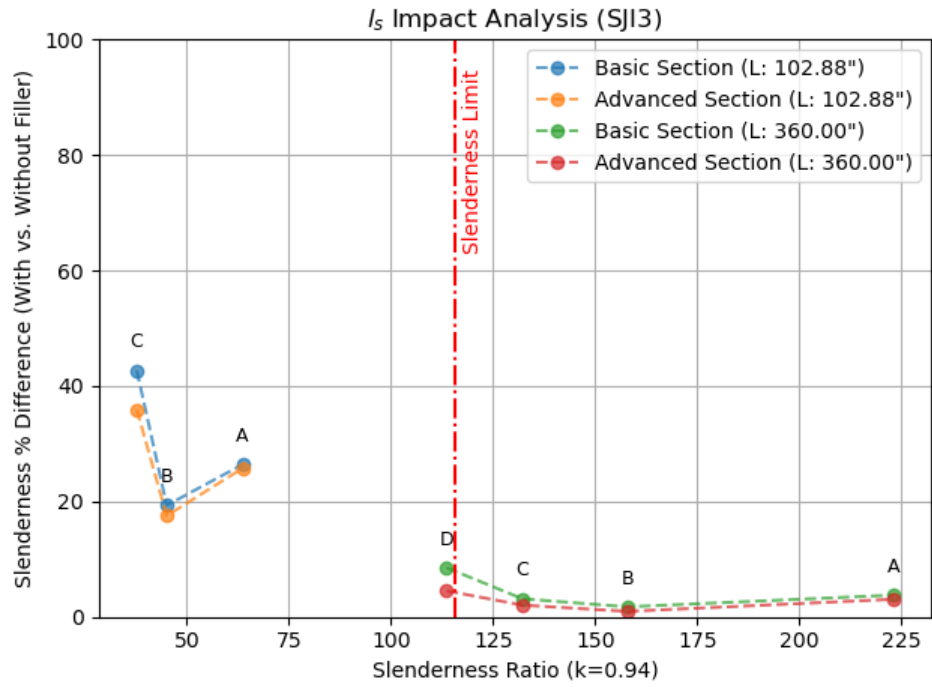


Figure 4.12: The comparison of slenderness ratios with and without the fillers for SJI3

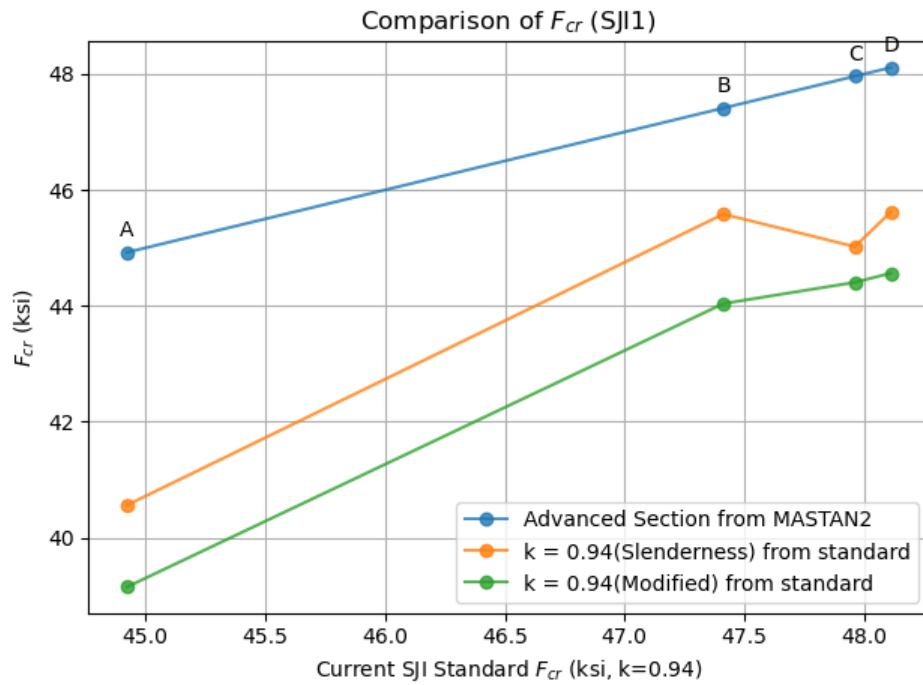


Figure 4.13: The comparison of  $F_{cr}$  for SJI1

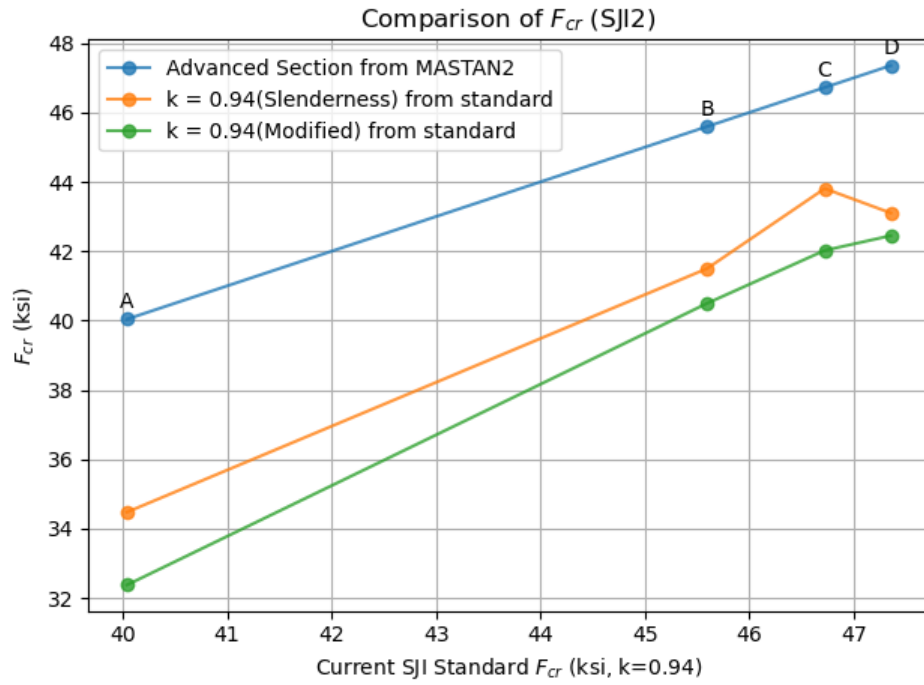


Figure 4.14: The comparison of  $F_{cr}$  for SJI2

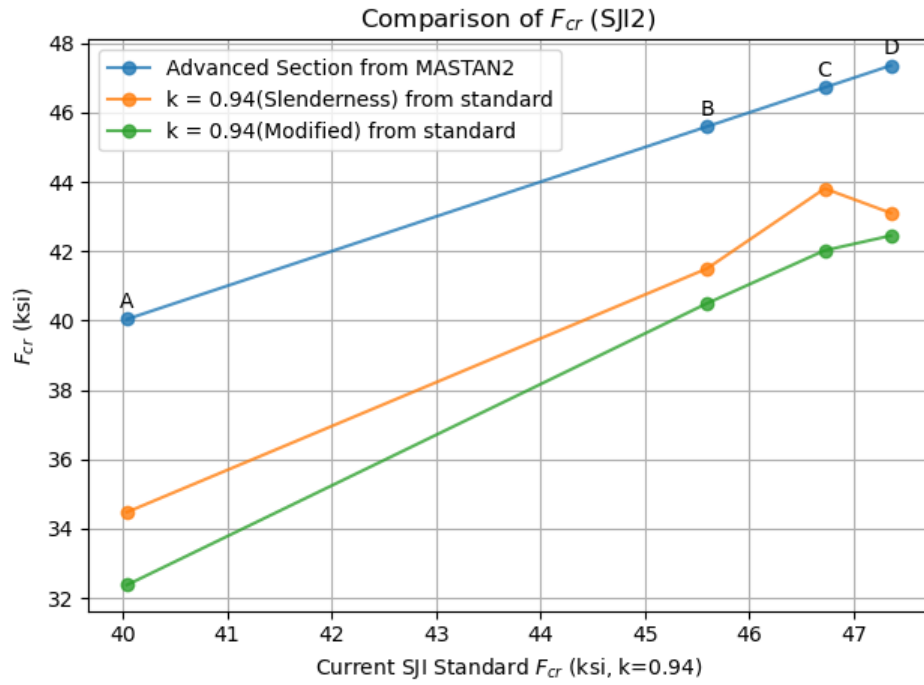


Figure 4.15: The comparison of  $F_{cr}$  for SJI3

### 4.3. Discussion and Suggested k Factors

In Figures 4.7, 4.8, and 4.9, the effect of the least radius of gyration ( $r_z$ ) becomes increasingly significant as the member transitions from A to D. This trend is reasonable, as  $r_z$  governs the member's susceptibility to flexural buckling about its weaker axis. As the cross-sectional size increases,  $r_z$  also increases, reducing the member's tendency to buckle about that axis. Therefore, the influence of  $r_z$  becomes more pronounced in larger, stiffer members due to their increased weak-axis bending stiffness.

In Figures 4.10, 4.11, and 4.12, a similar trend is observed with respect to the effect of fillers ( $I_s$ ). As the slenderness ratio decreases, the impact of fillers becomes more substantial. This observation is consistent with structural mechanics principles, as members with lower slenderness ratios are less prone to buckling. The inclusion of fillers further enhances this stability by delaying the onset of local buckling, thereby postponing the initiation of global flexural buckling (Sippel et al. [8]). Consequently, the stabilizing effect of fillers is more evident in members with lower slenderness ratios.

However, in Figures 4.13, 4.14, and 4.15 in terms of critical stress and Figures 4.16, 4.17, and 4.18 in terms of slenderness ratios, the comparison results indicate that the use of the modified slenderness ratio is generally not necessary for these members. Furthermore, the findings suggest that adopting a lower effective length factor,  $k$ , than the commonly assumed value can improve structural efficiency without compromising safety. To explore this further, slenderness ratios were recalculated using alternative  $k$  values of 0.7, 0.75, and 0.8. Comparisons are presented between (i) back-calculated slenderness ratios based on advanced section properties with original unbraced length and the number of fillers, (ii) slenderness ratios calculated using specification equations with the conventional  $k$  value of 0.94, and (iii) values obtained using the proposed lower  $k$  factors.

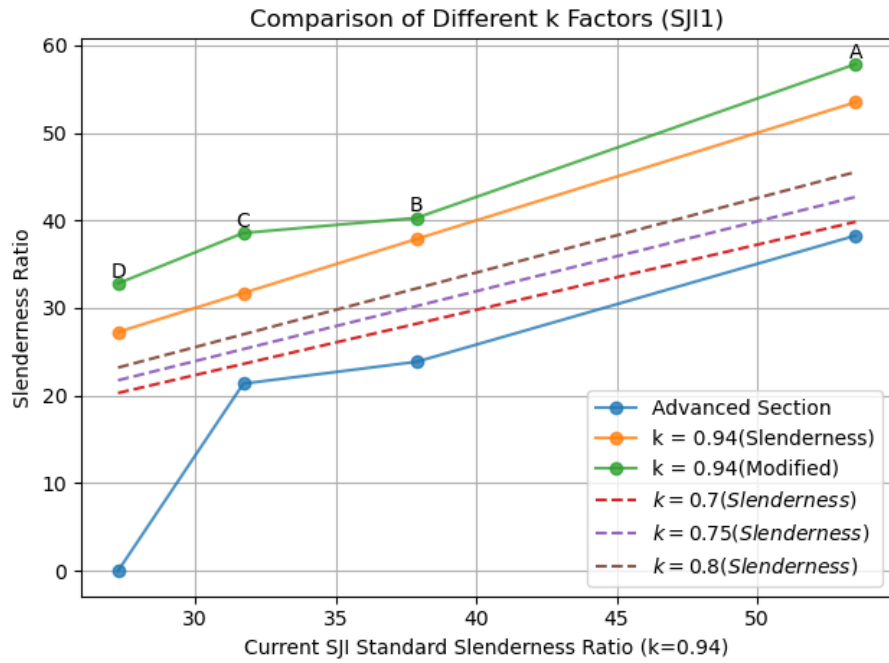


Figure 4.16: The comparison of slenderness ratios with suggested effective length factors for SJI1

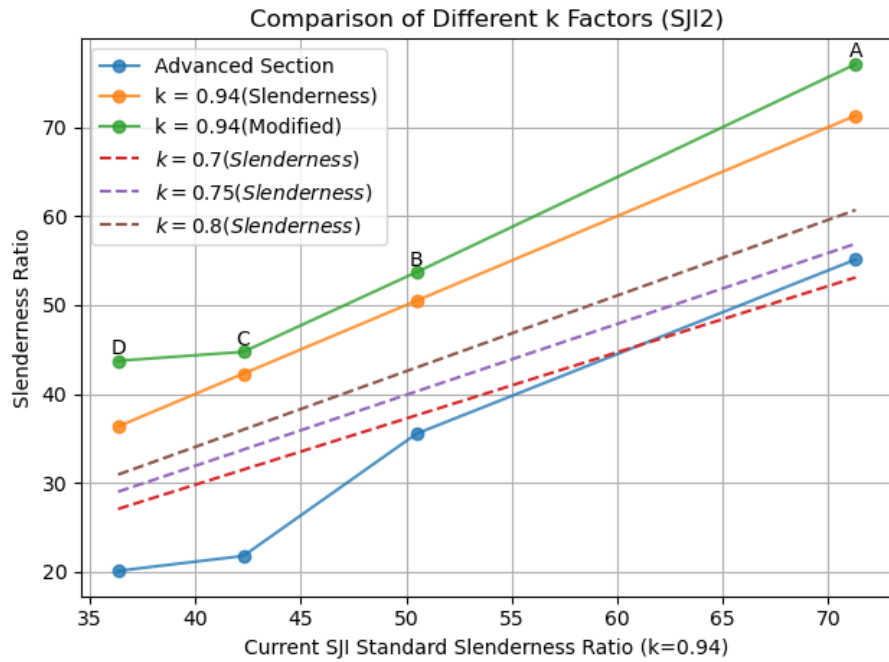


Figure 4.17: The comparison of slenderness ratios with suggested effective length factors for SJI2

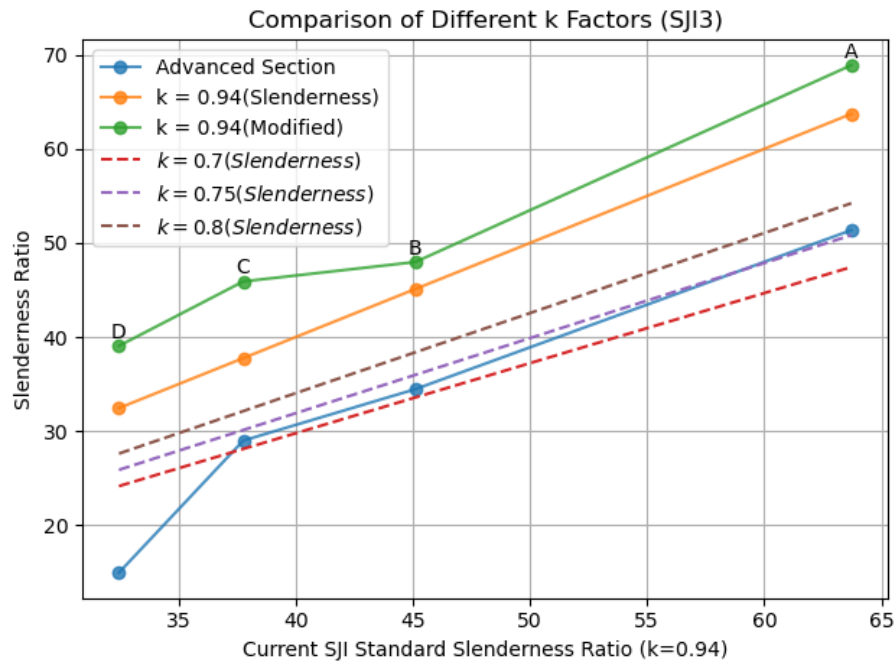


Figure 4.18: The comparison of slenderness ratios with suggested effective length factors for SJI3

As can be seen from Figures 4.16, 4.17, and 4.18, the modified slenderness ratios can safely be disregarded and the standard slenderness ratios are safe enough to design the compression chords. Additionally, as mentioned before, use of lower  $k$  factor increase the efficiency and generate conservative results. It can be seen that the  $k$  factor of 0.75 provides the most efficient and safe design values.

## 5. Conclusion

This study examined the compressive behavior of steel joist chord members with the purpose of determining whether disregarding the modified slenderness ratio in joist designs—specifically for compression chords—is a safe and acceptable assumption, and under what conditions its use may still be necessary. By analyzing the influence of key geometric parameters—including the least radius of gyration ( $r_z$ ) and filler length ( $l_s$ )—the investigation aimed to better represent their contributions to chord stiffness in open-web steel joist girder systems.

Parametric analyses demonstrated that members with larger  $r_z$  values showed improved resistance to flexural buckling about the weak axis, particularly in stronger and larger cross sections. Additionally, the presence of fillers delayed local buckling and shifted the onset of global buckling to higher load levels, with this stabilizing effect being more prominent in members with lower slenderness ratios. These trends were consistent across multiple member configurations and aligned with findings from prior studies, including Sippel et al. [8].

Based on this analysis, a set of effective length factors ( $k$ ) was proposed that can provide more efficient design and can reflect the stabilizing effects of  $r_z$  and  $l_s$ . These proposed values offer a more accurate representation of buckling behavior and provide a pathway toward more efficient and reliable design practices. Incorporating these lower  $k$ -factors into design provisions has the potential to reduce material usage without compromising safety, ultimately enhancing the structural and economic performance of joist systems.

## **A. Design Sheets**

# STRESS ANALYSIS - PAGE 1



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:09:40 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 24G5N4.5K</b>          | Mark:<br><b>SJI1A</b>                    |

## Geometry

|                             |                                |                              |                                  |                                        |                             |                                  |                            |
|-----------------------------|--------------------------------|------------------------------|----------------------------------|----------------------------------------|-----------------------------|----------------------------------|----------------------------|
| Base Length:<br><b>36-0</b> | Working Length:<br><b>35-8</b> | Joist Depth:<br><b>24.00</b> | Effective Depth:<br><b>22.58</b> | BC Panel Length:<br><b>4 @ 7-2 3/8</b> | SDS Value:<br><b>0.0000</b> | Shape:<br><b>Parallel Chords</b> | TC Slope:<br><b>0.0000</b> |
| Variable                    | Left End                       | Right End                    |                                  |                                        |                             |                                  |                            |
| BC Panel                    | 3-7 1/4                        | 3-7 1/4                      |                                  |                                        |                             |                                  |                            |
| TC Panel                    | 3-7 1/4                        | 3-7 1/4                      |                                  |                                        |                             |                                  |                            |
| First Half                  | 3-7 1/8                        | 3-7 1/4                      |                                  |                                        |                             |                                  |                            |
| First Diag.                 | 7-2 3/8                        | 7-2 1/2                      |                                  |                                        |                             |                                  |                            |
| Depth                       | 24.00                          | 24.00                        |                                  |                                        |                             |                                  |                            |
| Trib Width                  | 0-0                            | 0-0                          |                                  |                                        |                             |                                  |                            |

## Loads

| Load Type       | Category | Load1    | Load2 | Position | Direction | Loc/Begin | Sp/End  | Reference |
|-----------------|----------|----------|-------|----------|-----------|-----------|---------|-----------|
| Conc Load (lbs) | TL       | 2,250.00 | 0.00  | TC       | +         | 0-2       | 0-2     | L-BL      |
| Conc Load (lbs) | TL       | 4,500.00 | 0.00  | TC       | +         | 7-2 3/8   | 7-0 3/8 | L-BL      |
| Conc Load (lbs) | TL       | 4,500.00 | 0.00  | TC       | +         | 14-4 3/4  | 7-2 3/8 | L-BL      |
| Conc Load (lbs) | TL       | 4,500.00 | 0.00  | TC       | +         | 21-7 1/8  | 7-2 3/8 | L-BL      |
| Conc Load (lbs) | TL       | 4,500.00 | 0.00  | TC       | +         | 28-9 1/2  | 7-2 3/8 | L-BL      |
| Conc Load (lbs) | TL       | 2,250.00 | 0.00  | TC       | +         | 35-10     | 7-0 1/2 | L-BL      |

## Stress Analysis Summary

|                                |            |                               |            |                                  |             |                                  |            |                                   |  |                                   |  |                                    |  |
|--------------------------------|------------|-------------------------------|------------|----------------------------------|-------------|----------------------------------|------------|-----------------------------------|--|-----------------------------------|--|------------------------------------|--|
| Int. Panel TC:<br><b>43.25</b> |            | Max Panel BC:<br><b>86.50</b> |            | Reaction LE:<br><b>11,252.63</b> |             | Reaction RE:<br><b>11,247.37</b> |            | Minimum Shear:<br><b>2,813.16</b> |  | Max TC Comp.:<br><b>50,858.55</b> |  | Max BC Tension<br><b>50,863.57</b> |  |
| Member                         | TC Tension | TC Compression                | BC Tension | BC Compression                   | Web Tension | Web Comp.                        | Web Length | PP Dist.                          |  |                                   |  |                                    |  |
| W2                             | 0.00       | 16,442.92                     | 0.00       | 0.00                             | 18,746.12   | 4,686.53                         | 47.03      | 0-2                               |  |                                   |  |                                    |  |
| W3                             | 0.00       | 16,442.92                     | 33,633.25  | 0.00                             | 0.00        | 19,405.02                        | 48.68      | 3-7 1/4                           |  |                                   |  |                                    |  |
| W4                             | 0.00       | 42,230.92                     | 33,633.25  | 0.00                             | 9,705.34    | 2,426.34                         | 48.68      | 7-2 3/8                           |  |                                   |  |                                    |  |
| W5                             | 0.00       | 42,230.92                     | 50,853.51  | 0.00                             | 0.00        | 9,727.42                         | 48.79      | 10-9 1/2                          |  |                                   |  |                                    |  |
| W6                             | 0.00       | 50,858.55                     | 50,853.51  | 0.00                             | 6,077.51    | 1,519.38                         | 48.79      | 14-4 3/4                          |  |                                   |  |                                    |  |
| W6                             | 0.00       | 50,858.55                     | 50,863.57  | 0.00                             | 0.00        | 6,063.71                         | 48.68      | 18-0                              |  |                                   |  |                                    |  |
| W5                             | 0.00       | 42,275.93                     | 50,863.57  | 0.00                             | 0.00        | 9,694.01                         | 48.68      | 21-7 1/8                          |  |                                   |  |                                    |  |
| W4                             | 0.00       | 42,275.93                     | 33,663.41  | 0.00                             | 9,716.07    | 2,429.02                         | 48.79      | 25-2 1/4                          |  |                                   |  |                                    |  |
| W3                             | 0.00       | 16,433.32                     | 33,663.41  | 0.00                             | 0.00        | 19,437.81                        | 48.79      | 28-9 1/2                          |  |                                   |  |                                    |  |
| W2                             | 0.00       | 16,433.32                     | 0.00       | 0.00                             | 18,735.17   | 4,683.79                         | 47.03      | 32-4 3/4                          |  |                                   |  |                                    |  |

## Standard Verticals

| Member | Position  | Max Tension | Max Comp. | Length |
|--------|-----------|-------------|-----------|--------|
| V1     | End Panel | 0.00        | 328.86    | 22.58  |
| V2     | Interior  | 0.00        | 1,017.17  | 22.58  |

## STRESS ANALYSIS - PAGE 2



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:09:40 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 24G5N4.5K</b>          | Mark:<br><b>SJI1A</b>                    |

### Chord Properties

| Chord | Area   | Rx     | Rz     | Ryy    | Y      | Ix     | Q      | Material                     |
|-------|--------|--------|--------|--------|--------|--------|--------|------------------------------|
| TC    | 1.1875 | 0.7695 | 0.4915 | 1.4931 | 0.7171 | 0.7031 | 1.0000 | 2525 = 2 1/2 x 2 1/2 x 0.250 |
| BC    | 0.9117 | 0.7375 | 0.4413 | 1.4605 | 0.6982 | 0.4958 | 1.0000 | A40A = 2.375 x 2.375 x 0.209 |

### Axial and Bending Analysis

|                    |                         |                         |                                  |                          |                          |                                                 |                                  |
|--------------------|-------------------------|-------------------------|----------------------------------|--------------------------|--------------------------|-------------------------------------------------|----------------------------------|
| K:<br><b>1.00</b>  | Fy:<br><b>50,000.00</b> | Fb:<br><b>30,000.00</b> | Mom of Inertia:<br><b>528.52</b> | LL 360:<br><b>435.19</b> | LL 240:<br><b>652.78</b> | Max Bridg TC:<br><b>19-9</b>                    | Max Bridg BC:<br><b>29-2 1/2</b> |
| Top Chord Check    | End Panel LE            | First Panel LE          | Interior Panel                   | First Panel RE           | End Panel RE             | Gap Between Chords:<br><b>1.1250</b>            |                                  |
| Length             | 41.25                   | 43.13                   | 43.25                            | 43.25                    | 41.25                    | Min Weld Len 2X:<br><b>0.7500</b>               |                                  |
| Bending Load       | 0.00                    | 0.00                    | 0.00                             | 0.00                     | 0.00                     | Max Load Fillers TC:<br><b>56,064.49</b>        |                                  |
| Axial Load         | 16,442.92               | 16,442.92               | 50,858.55                        | 16,433.32                | 16,433.32                | Max Load no Fillers TC:<br><b>40,783.66</b>     |                                  |
| fa                 | 6,923.34                | 6,923.34                | 21,414.13                        | 6,919.29                 | 6,919.29                 | TC OAL/Ryy:<br><b>286.64</b>                    |                                  |
| Maximum K L/r      | 83.93                   | 87.74                   | 57.85                            | 88.00                    | 83.93                    | BC OAL/Ryy:<br><b>293.04</b>                    |                                  |
| Fcr                | 29,874.54               | 28,477.75               | 39,147.80                        | 28,384.84                | 29,874.54                | BC Stress:<br><b>0.93</b>                       |                                  |
| Fa                 | 17,924.73               | 17,086.65               | 23,488.68                        | 17,030.90                | 17,924.73                | BC L/Rz:<br><b>196.0118</b>                     |                                  |
| F'e                | 99,601.78               | 91,129.04               | 91,129.04                        | 90,603.05                | 99,601.78                | TC Shear Stress:<br><b>12,049.97</b>            |                                  |
| Cm                 | 0.9652                  | 0.9620                  | 0.8426                           | 0.9618                   | 0.9653                   | BC Shear Stress:<br><b>15,843.63</b>            |                                  |
| Panel Point Moment | 0.00                    | 0.00                    | 0.00                             | 0.00                     | 0.00                     | TC Bearing Capacity:<br><b>2.25K &lt; 6.85K</b> |                                  |
| Mid Panel Moment   | 0.00                    | 0.00                    | 0.00                             | 0.00                     | 0.00                     |                                                 |                                  |
| Panel Point fb     | 0.00                    | 0.00                    | 0.00                             | 0.00                     | 0.00                     |                                                 |                                  |
| Mid Panel fb       | 0.00                    | 0.00                    | 0.00                             | 0.00                     | 0.00                     |                                                 |                                  |
| Fillers            | 0                       | 0                       | 6                                | 0                        | 0                        |                                                 |                                  |
| Panel Point Stress | 6,923.34                | 6,923.34                | 21,414.13                        | 6,919.29                 | 6,919.29                 |                                                 |                                  |
| Mid Panel Stress   | 0.3862                  | 0.4052                  | 0.9117                           | 0.4063                   | 0.3860                   |                                                 |                                  |

### Web Design

| Member | Web Tension | Allow Tension | Web Comp  | Allow Comp | Weld         | Qty | Material                      |
|--------|-------------|---------------|-----------|------------|--------------|-----|-------------------------------|
| W2     | 18,746.12   | 24,469.72     | 4,686.53  | 6,975.13   | 6.73 x 0.188 | 1   | C38AA = 1.125 x 1.844 x 0.200 |
| W3     | 0.00        | 33,985.05     | 19,405.02 | 20,390.49  | 7.92 x 0.165 | 2   | A32A = 1.875 x 1.875 x 0.165  |
| W4     | 9,705.34    | 14,408.67     | 2,426.34  | 4,156.29   | 4.36 x 0.150 | 1   | C28AA = 1.125 x 1.347 x 0.150 |
| W5     | 0.00        | 27,487.73     | 9,727.42  | 10,125.01  | 3.49 x 0.188 | 1   | A40A = 2.375 x 2.375 x 0.209  |
| W6     | 6,077.51    | 9,017.86      | 1,519.38  | 1,750.93   | 3.56 x 0.115 | 1   | C18AA = 1.125 x 1.012 x 0.115 |
| W6     | 0.00        | 24,469.72     | 6,063.71  | 6,616.59   | 2.18 x 0.188 | 1   | C38AA = 1.125 x 1.844 x 0.200 |
| W5     | 0.00        | 27,487.73     | 9,694.01  | 10,152.58  | 3.48 x 0.188 | 1   | A40A = 2.375 x 2.375 x 0.209  |
| W4     | 9,716.07    | 14,408.67     | 2,429.02  | 4,141.47   | 4.36 x 0.150 | 1   | C28AA = 1.125 x 1.347 x 0.150 |
| W3     | 0.00        | 33,985.05     | 19,437.81 | 20,343.09  | 7.93 x 0.165 | 2   | A32A = 1.875 x 1.875 x 0.165  |
| W2     | 18,735.17   | 24,469.72     | 4,683.79  | 6,975.13   | 6.73 x 0.188 | 1   | C38AA = 1.125 x 1.844 x 0.200 |
| V1     | 0.00        | 4,784.80      | 328.86    | 2,032.06   | 2.00 x 0.077 | 1   | C10AA = 1.125 x 0.699 x 0.077 |
| V2     | 0.00        | 4,784.80      | 1,017.17  | 2,032.06   | 2.00 x 0.077 | 1   | C10AA = 1.125 x 0.699 x 0.077 |

## STRESS ANALYSIS - PAGE 3



**NEW MILLENNIUM**  
A Steel Dynamics Company

Job Number:  
**00-0-0585**

Job Name:  
**SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS**

Date Run:  
**3/21/2025 8:09:40 AM**

Location:  
**MADISON, WI**

Joist Description:  
**Girder Load @ Diag 24G5N4.5K**

Mark:  
**SJI1A**

## TCX Design

| TCX Left                           |         | TCX Right                          |         |
|------------------------------------|---------|------------------------------------|---------|
| TCX Length                         | 0-0     | TCX Length                         | 0-0     |
| TCX Type                           | R       | TCX Type                           | R       |
| TCX Depth                          | 7 1/2   | TCX Depth                          | 7 1/2   |
| BPL Length                         | 1-7 1/4 | BPL Length                         | 1-7 1/4 |
| Clear Bearing                      | 1-0 3/8 | Clear Bearing                      | 1-0 1/2 |
| BPL Material: 2024 = 2 x 2 x 0.248 |         | BPL Material: 2024 = 2 x 2 x 0.248 |         |
| Total Load                         | 0.00    | Total Load                         | 0.00    |
| Reqd TL Def L/80                   | 0.00    | Reqd TL Def L/80                   | 0.00    |
| Live Load                          | 0.00    | Live Load                          | 0.00    |
| Reqd LL Def L/120                  | 0.00    | Reqd LL Def L/120                  | 0.00    |
| Section Modulus                    | 0.0000  | Section Modulus                    | 0.0000  |
| Reqd SM                            | 0.0000  | Reqd SM                            | 0.0000  |
| Mom of Inertia                     | 0.0000  | Mom of Inertia                     | 0.0000  |
| Reqd MI                            | 0.0000  | Reqd MI                            | 0.0000  |
| Seat Type: Pegged or Butted        |         | Seat Type: Pegged or Butted        |         |
|                                    |         |                                    |         |

## Load Combinations

Case 1: DL  
Case 2a: LL  
Case 2b: SL  
Case 3a: DL+CL+TL+LL  
Case 3b: DL+CL+TL+SL  
Case 3c: DL+CL+TL+LL+FEM  
Case 3d: DL+CL+TL+SL+FEM  
Case 3e: DL+CL+TL+LL  
Case 3f: DL+CL+TL+SL  
Case 4a: DL+WL+AX+M  
Case 4a\_mr: DL+WL+AX-M  
Case 4b: DL+WL-AX-M  
Case 4b\_mr: DL+WL-AX+M  
Case 4c: DL+WL+AX+IP+M  
Case 4c\_mr: DL+WL+AX+IP-M  
Case 4d: DL+WL-AX+IP-M  
Case 4d\_mr: DL+WL-AX+IP+M  
Case 4e: (1+0.14(SDS))DL+SM+AX+M  
Case 4e\_mr: (1+0.14(SDS))DL+SM+AX-M  
Case 4f: (1+0.14(SDS))DL+SM-AX-M  
Case 4f\_mr: (1+0.14(SDS))DL+SM-AX+M  
Case 5a: 0.6(DL)+WL+AX+M  
Case 5a\_mr: 0.6(DL)+WL+AX-M  
Case 5b: 0.6(DL)+WL-AX-M  
Case 5b\_mr: 0.6(DL)+WL-AX+M  
Case 5c: 0.6(DL)+WL+AX+IP+M  
Case 5c\_mr: 0.6(DL)+WL+AX+IP-M  
Case 5d: 0.6(DL)+WL-AX+IP-M  
Case 5d\_mr: 0.6(DL)+WL-AX+IP+M  
Case 5e: (0.6-0.14(SDS))DL+AX+SM+M  
Case 5e\_mr: (0.6-0.14(SDS))DL+AX+SM-M  
Case 5f: (0.6-0.14(SDS))DL-AX+SM-M  
Case 5f\_mr: (0.6-0.14(SDS))DL-AX+SM+M  
Case 6a: DL+CL+0.85(TL)+WL+AX+M  
Case 6a\_mr: DL+CL+0.85(TL)+WL+AX-M  
Case 6b: DL+CL+0.85(TL)+WL-AX-M  
Case 6b\_mr: DL+CL+0.85(TL)+WL-AX+M  
Case 6c: DL+CL+0.85(TL)+WL+C+AX+IP+M  
Case 6c\_mr: DL+CL+0.85(TL)+WL+C+AX+IP-M  
Case 6d: DL+CL+0.85(TL)+WL+C-AX+IP-M  
Case 6d\_mr: DL+CL+0.85(TL)+WL+C-AX+IP+M  
Case 6e: DL+CL+0.85(TL)+WL+AX+IP+M  
Case 6e\_mr: DL+CL+0.85(TL)+WL+AX+IP-M  
Case 6f: DL+CL+0.85(TL)+WL-AX+IP-M  
Case 6f\_mr: DL+CL+0.85(TL)+WL-AX+IP+M  
Case 6g: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX+M  
Case 6g\_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX-M  
Case 6h: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX-M  
Case 6h\_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX+M  
Case 7a: DL+CL+0.85(TL)+0.75(WL+AX+LL+M)  
Case 7a\_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL-M)  
Case 7b: DL+CL+0.85(TL)+0.75(WL-AX+LL-M)

## STRESS ANALYSIS - PAGE 4



NEW MILLENNIUM

A Steel Dynamics Company

|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:09:40 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 24G5N4.5K</b>          | Mark:<br><b>SJI1A</b>                    |

**Load Combinations Continued**

Case 7b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+M)  
 Case 7c: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP+M)  
 Case 7c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP-M)  
 Case 7d: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP-M)  
 Case 7d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP+M)  
 Case 7e: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP+M)  
 Case 7e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP-M)  
 Case 7f: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP-M)  
 Case 7f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP+M)  
 Case 7g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL+M)  
 Case 7g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL-M)  
 Case 7h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL-M)  
 Case 7h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL+M)  
 Case 8a: DL+CL+0.85(TL)+0.75(WL+AX+SL+M)  
 Case 8a\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL-M)  
 Case 8b: DL+CL+0.85(TL)+0.75(WL-AX+SL-M)  
 Case 8b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+M)  
 Case 8c: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP+M)  
 Case 8c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP-M)  
 Case 8d: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP-M)  
 Case 8d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP+M)  
 Case 8e: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP+M)  
 Case 8e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP-M)  
 Case 8f: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP-M)  
 Case 8f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP+M)  
 Case 8g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX+M)  
 Case 8g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX-M)  
 Case 8h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX-M)  
 Case 8h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX+M)

# STRESS ANALYSIS - PAGE 1



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:09:58 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 24G5N12K</b>           | Mark:<br><b>SJI1B</b>                    |

## Geometry

|                             |                                |                              |                                  |                                        |                             |                                  |                            |
|-----------------------------|--------------------------------|------------------------------|----------------------------------|----------------------------------------|-----------------------------|----------------------------------|----------------------------|
| Base Length:<br><b>36-0</b> | Working Length:<br><b>35-8</b> | Joist Depth:<br><b>24.00</b> | Effective Depth:<br><b>21.85</b> | BC Panel Length:<br><b>4 @ 7-2 3/8</b> | SDS Value:<br><b>0.0000</b> | Shape:<br><b>Parallel Chords</b> | TC Slope:<br><b>0.0000</b> |
| Variable                    | Left End                       | Right End                    |                                  |                                        |                             |                                  |                            |
| BC Panel                    | 3-7 1/4                        | 3-7 1/4                      |                                  |                                        |                             |                                  |                            |
| TC Panel                    | 3-7 1/4                        | 3-7 1/4                      |                                  |                                        |                             |                                  |                            |
| First Half                  | 3-7 1/8                        | 3-7 1/4                      |                                  |                                        |                             |                                  |                            |
| First Diag.                 | 7-2 3/8                        | 7-2 1/2                      |                                  |                                        |                             |                                  |                            |
| Depth                       | 24.00                          | 24.00                        |                                  |                                        |                             |                                  |                            |
| Trib Width                  | 0-0                            | 0-0                          |                                  |                                        |                             |                                  |                            |

## Loads

| Load Type       | Category | Load1     | Load2 | Position | Direction | Loc/Begin | Sp/End  | Reference |
|-----------------|----------|-----------|-------|----------|-----------|-----------|---------|-----------|
| Conc Load (lbs) | TL       | 6,000.00  | 0.00  | TC       | +         | 0-2       | 0-2     | L-BL      |
| Conc Load (lbs) | TL       | 12,000.00 | 0.00  | TC       | +         | 7-2 3/8   | 7-0 3/8 | L-BL      |
| Conc Load (lbs) | TL       | 12,000.00 | 0.00  | TC       | +         | 14-4 3/4  | 7-2 3/8 | L-BL      |
| Conc Load (lbs) | TL       | 12,000.00 | 0.00  | TC       | +         | 21-7 1/8  | 7-2 3/8 | L-BL      |
| Conc Load (lbs) | TL       | 12,000.00 | 0.00  | TC       | +         | 28-9 1/2  | 7-2 3/8 | L-BL      |
| Conc Load (lbs) | TL       | 6,000.00  | 0.00  | TC       | +         | 35-10     | 7-0 1/2 | L-BL      |

## Stress Analysis Summary

|                                |                               |                                  |                                  |                                   |                                    |                                     |            |          |
|--------------------------------|-------------------------------|----------------------------------|----------------------------------|-----------------------------------|------------------------------------|-------------------------------------|------------|----------|
| Int. Panel TC:<br><b>43.25</b> | Max Panel BC:<br><b>86.50</b> | Reaction LE:<br><b>30,007.01</b> | Reaction RE:<br><b>29,992.99</b> | Minimum Shear:<br><b>7,501.75</b> | Max TC Comp.:<br><b>140,191.41</b> | Max BC Tension<br><b>140,205.25</b> |            |          |
| Member                         | TC Tension                    | TC Compression                   | BC Tension                       | BC Compression                    | Web Tension                        | Web Comp.                           | Web Length | PP Dist. |
| W2                             | 0.00                          | 45,324.86                        | 0.00                             | 0.00                              | 51,290.14                          | 12,822.54                           | 46.68      | 0-2      |
| V1S                            | 0.00                          | 45,324.86                        | 0.00                             | 0.00                              | 0.00                               | 906.50                              | 21.85      | 3-7 1/4  |
| W3                             | 0.00                          | 45,324.86                        | 92,709.93                        | 0.00                              | 0.00                               | 53,119.50                           | 48.34      | 3-7 1/4  |
| W4                             | 0.00                          | 116,409.38                       | 92,709.93                        | 0.00                              | 26,567.51                          | 6,641.88                            | 48.34      | 7-2 3/8  |
| V2                             | 0.00                          | 116,409.38                       | 92,709.93                        | 0.00                              | 0.00                               | 2,328.19                            | 21.85      | 10-9 1/2 |
| W5                             | 0.00                          | 116,409.38                       | 140,177.53                       | 0.00                              | 0.00                               | 26,628.81                           | 48.46      | 10-9 1/2 |
| W6                             | 0.00                          | 140,191.41                       | 140,177.53                       | 0.00                              | 16,637.17                          | 4,159.29                            | 48.46      | 14-4 3/4 |
| V3                             | 0.00                          | 140,191.41                       | 140,177.53                       | 0.00                              | 0.00                               | 2,803.83                            | 21.85      | 18-0     |
| W6                             | 0.00                          | 140,191.41                       | 140,205.25                       | 0.00                              | 0.00                               | 16,598.88                           | 48.34      | 18-0     |
| W5                             | 0.00                          | 116,533.46                       | 140,205.25                       | 0.00                              | 0.00                               | 26,536.49                           | 48.34      | 21-7 1/8 |
| V4                             | 0.00                          | 116,533.46                       | 140,205.25                       | 0.00                              | 0.00                               | 2,330.67                            | 21.85      | 25-2 1/4 |
| W4                             | 0.00                          | 116,533.46                       | 92,793.06                        | 0.00                              | 26,597.71                          | 6,649.43                            | 48.46      | 25-2 1/4 |
| W3                             | 0.00                          | 45,298.39                        | 92,793.06                        | 0.00                              | 0.00                               | 53,210.97                           | 48.46      | 28-9 1/2 |
| V1S                            | 0.00                          | 45,298.39                        | 0.00                             | 0.00                              | 0.00                               | 905.97                              | 21.85      | 32-4 3/4 |
| W2                             | 0.00                          | 45,298.39                        | 0.00                             | 0.00                              | 51,260.20                          | 12,815.05                           | 46.68      | 32-4 3/4 |

# STRESS ANALYSIS - PAGE 2



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:09:58 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 24G5N12K</b>           | Mark:<br><b>SJI1B</b>                    |

## Chord Properties

| Chord | Area   | Rx     | Rz     | Ryy    | Y      | Ix     | Q      | Material                     |
|-------|--------|--------|--------|--------|--------|--------|--------|------------------------------|
| TC    | 2.8594 | 1.2346 | 0.7876 | 2.1017 | 1.1383 | 4.3586 | 1.0000 | 4037 = 4 x 4 x 0.375         |
| BC    | 2.4844 | 1.0739 | 0.6869 | 1.9067 | 1.0130 | 2.8651 | 1.0000 | 3537 = 3 1/2 x 3 1/2 x 0.375 |

## Axial and Bending Analysis

|                    |                         |                         |                                    |                            |                            |                                                  |                                  |
|--------------------|-------------------------|-------------------------|------------------------------------|----------------------------|----------------------------|--------------------------------------------------|----------------------------------|
| K:<br><b>1.00</b>  | Fy:<br><b>50,000.00</b> | Fb:<br><b>30,000.00</b> | Mom of Inertia:<br><b>1,283.64</b> | LL 360:<br><b>1,056.95</b> | LL 240:<br><b>1,585.43</b> | Max Bridg TC:<br><b>27-9 5/8</b>                 | Max Bridg BC:<br><b>38-1 5/8</b> |
| Top Chord Check    | End Panel LE            | First Panel LE          | Interior Panel                     | First Panel RE             | End Panel RE               | Gap Between Chords:<br><b>1.1250</b>             |                                  |
| Length             | 41.25                   | 43.13                   | 43.25                              | 43.25                      | 41.25                      | Min Weld Len 2X:<br><b>1.0070</b>                |                                  |
| Bending Load       | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       | Max Load Fillers TC:<br><b>152,390.03</b>        |                                  |
| Axial Load         | 45,324.86               | 45,324.86               | 140,191.41                         | 45,298.39                  | 45,298.39                  | Max Load no Fillers TC:<br><b>138,480.52</b>     |                                  |
| fa                 | 7,925.59                | 7,925.59                | 24,514.13                          | 7,920.96                   | 7,920.96                   | TC OAL/Ryy:<br><b>203.65</b>                     |                                  |
| Maximum K L/r      | 52.37                   | 54.75                   | 41.10                              | 54.91                      | 52.37                      | BC OAL/Ryy:<br><b>224.47</b>                     |                                  |
| Fcr                | 40,913.39               | 40,157.52               | 44,191.09                          | 40,106.45                  | 40,913.39                  | BC Stress:<br><b>0.94</b>                        |                                  |
| Fa                 | 24,548.04               | 24,094.51               | 26,514.66                          | 24,063.87                  | 24,548.04                  | BC L/Rz:<br><b>125.9281</b>                      |                                  |
| F'e                | 256,390.75              | 234,580.56              | 234,580.56                         | 233,226.58                 | 256,390.75                 | TC Shear Stress:<br><b>13,780.43</b>             |                                  |
| Cm                 | 0.9845                  | 0.9831                  | 0.9300                             | 0.9830                     | 0.9846                     | BC Shear Stress:<br><b>15,859.69</b>             |                                  |
| Panel Point Moment | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       | TC Bearing Capacity:<br><b>6.00K &lt; 11.89K</b> |                                  |
| Mid Panel Moment   | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       |                                                  |                                  |
| Panel Point fb     | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       |                                                  |                                  |
| Mid Panel fb       | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       |                                                  |                                  |
| Fillers            | 0                       | 0                       | 2                                  | 0                          | 0                          |                                                  |                                  |
| Panel Point Stress | 7,925.59                | 7,925.59                | 24,514.13                          | 7,920.96                   | 7,920.96                   |                                                  |                                  |
| Mid Panel Stress   | 0.3229                  | 0.3289                  | 0.9246                             | 0.3292                     | 0.3227                     |                                                  |                                  |

## Web Design

| Member | Web Tension | Allow Tension | Web Comp  | Allow Comp | Weld          | Qty | Material                      |
|--------|-------------|---------------|-----------|------------|---------------|-----|-------------------------------|
| W2     | 51,290.14   | 54,975.46     | 12,822.54 | 41,016.47  | 16.53 x 0.209 | 2   | A40A = 2.375 x 2.375 x 0.209  |
| V1S    | 0.00        | 4,784.80      | 906.50    | 2,138.88   | 2.00 x 0.077  | 1   | C10AA = 1.125 x 0.699 x 0.077 |
| W3     | 0.00        | 71,606.18     | 53,119.50 | 54,903.13  | 14.31 x 0.250 | 2   | A46A = 2.594 x 2.594 x 0.250  |
| W4     | 26,567.51   | 27,475.67     | 6,641.88  | 7,307.24   | 9.54 x 0.188  | 1   | C40AA = 1.125 x 2.006 x 0.209 |
| V2     | 0.00        | 5,613.92      | 2,328.19  | 2,558.09   | 2.00 x 0.090  | 1   | C12AA = 1.125 x 0.716 x 0.090 |
| W5     | 0.00        | 43,144.61     | 26,628.81 | 28,731.04  | 9.59 x 0.187  | 2   | A36A = 2.094 x 2.094 x 0.187  |
| W6     | 16,637.17   | 16,793.53     | 4,159.29  | 4,795.26   | 6.87 x 0.163  | 1   | C32AA = 1.125 x 1.479 x 0.163 |
| V3     | 0.00        | 7,872.16      | 2,803.83  | 4,933.45   | 2.00 x 0.105  | 1   | C16AA = 1.125 x 0.943 x 0.105 |
| W6     | 0.00        | 31,241.40     | 16,598.88 | 18,232.35  | 7.12 x 0.157  | 2   | A30A = 1.813 x 1.813 x 0.157  |
| W5     | 0.00        | 43,144.61     | 26,536.49 | 28,784.80  | 9.56 x 0.187  | 2   | A36A = 2.094 x 2.094 x 0.187  |
| V4     | 0.00        | 5,613.92      | 2,330.67  | 2,558.09   | 2.00 x 0.090  | 1   | C12AA = 1.125 x 0.716 x 0.090 |
| W4     | 26,597.71   | 27,475.67     | 6,649.43  | 7,281.93   | 9.55 x 0.188  | 1   | C40AA = 1.125 x 2.006 x 0.209 |
| W3     | 0.00        | 71,606.18     | 53,210.97 | 54,835.81  | 14.33 x 0.250 | 2   | A46A = 2.594 x 2.594 x 0.250  |
| V1S    | 0.00        | 4,784.80      | 905.97    | 2,138.88   | 2.00 x 0.077  | 1   | C10AA = 1.125 x 0.699 x 0.077 |
| W2     | 51,260.20   | 54,975.46     | 12,815.05 | 41,016.47  | 16.52 x 0.209 | 2   | A40A = 2.375 x 2.375 x 0.209  |

# STRESS ANALYSIS - PAGE 3



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:09:58 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 24G5N12K</b>           | Mark:<br><b>SJI1B</b>                    |

## TCX Design

| TCX Left                             |          | TCX Right                            |          |
|--------------------------------------|----------|--------------------------------------|----------|
| TCX Length                           | 0-0      | TCX Length                           | 0-0      |
| TCX Type                             | R        | TCX Type                             | R        |
| TCX Depth                            | 7 1/2    | TCX Depth                            | 7 1/2    |
| BPL Length                           | 0-6      | BPL Length                           | 0-6      |
| Clear Bearing                        | 0-11 1/8 | Clear Bearing                        | 0-11 3/8 |
| BPL Material: 406050 = 4 x 6 x 0.500 |          | BPL Material: 406050 = 4 x 6 x 0.500 |          |
| Total Load                           | 0.00     | Total Load                           | 0.00     |
| Reqd TL Def L/80                     | 0.00     | Reqd TL Def L/80                     | 0.00     |
| Live Load                            | 0.00     | Live Load                            | 0.00     |
| Reqd LL Def L/120                    | 0.00     | Reqd LL Def L/120                    | 0.00     |
| Section Modulus                      | 0.0000   | Section Modulus                      | 0.0000   |
| Reqd SM                              | 0.0000   | Reqd SM                              | 0.0000   |
| Mom of Inertia                       | 0.0000   | Mom of Inertia                       | 0.0000   |
| Reqd MI                              | 0.0000   | Reqd MI                              | 0.0000   |
| Seat Type: Lapped                    |          | Seat Type: Lapped                    |          |
|                                      |          |                                      |          |

## Load Combinations

|                                     |                                                                         |
|-------------------------------------|-------------------------------------------------------------------------|
| Case 1: DL                          | Case 5c_mr: 0.6(DL)+WL+AX+IP-M                                          |
| Case 2a: LL                         | Case 5d: 0.6(DL)+WL-AX+IP-M                                             |
| Case 2b: SL                         | Case 5d_mr: 0.6(DL)+WL-AX+IP+M                                          |
| Case 3a: DL+CL+TL+LL                | Case 5e: (0.6-0.14(SDS))DL+AX+SM+M                                      |
| Case 3b: DL+CL+TL+SL                | Case 5e_mr: (0.6-0.14(SDS))DL+AX+SM-M                                   |
| Case 3c: DL+CL+TL+LL+FEM            | Case 5f: (0.6-0.14(SDS))DL-AX+SM-M                                      |
| Case 3d: DL+CL+TL+SL+FEM            | Case 5f_mr: (0.6-0.14(SDS))DL-AX+SM+M                                   |
| Case 3e: DL+CL+TL+LL                | Case 6a: DL+CL+0.85(TL)+WL+AX+M                                         |
| Case 3f: DL+CL+TL+SL                | Case 6a_mr: DL+CL+0.85(TL)+WL+AX-M                                      |
| Case 4a: DL+WL+AX+M                 | Case 6b: DL+CL+0.85(TL)+WL-AX-M                                         |
| Case 4a_mr: DL+WL+AX-M              | Case 6b_mr: DL+CL+0.85(TL)+WL-AX+M                                      |
| Case 4b: DL+WL-AX-M                 | Case 6c: DL+CL+0.85(TL)+WL+C+AX+IP+M                                    |
| Case 4b_mr: DL+WL-AX+M              | Case 6c_mr: DL+CL+0.85(TL)+WL+C+AX+IP-M                                 |
| Case 4c: DL+WL+AX+IP+M              | Case 6d: DL+CL+0.85(TL)+WL+C-AX+IP-M                                    |
| Case 4c_mr: DL+WL+AX+IP-M           | Case 6d_mr: DL+CL+0.85(TL)+WL+C-AX+IP+M                                 |
| Case 4d: DL+WL-AX+IP-M              | Case 6e: DL+CL+0.85(TL)+WL+AX+IP+M                                      |
| Case 4d_mr: DL+WL-AX+IP+M           | Case 6e_mr: DL+CL+0.85(TL)+WL+AX+IP-M                                   |
| Case 4e: (1+0.14(SDS))DL+SM+AX+M    | Case 6f: DL+CL+0.85(TL)+WL-AX+IP-M                                      |
| Case 4e_mr: (1+0.14(SDS))DL+SM+AX-M | Case 6f_mr: DL+CL+0.85(TL)+WL-AX+IP+M                                   |
| Case 4f: (1+0.14(SDS))DL+SM-AX-M    | Case 6g: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX+M    |
| Case 4f_mr: (1+0.14(SDS))DL+SM-AX+M | Case 6g_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX-M |
| Case 5a: 0.6(DL)+WL+AX+M            | Case 6h: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX-M    |
| Case 5a_mr: 0.6(DL)+WL+AX-M         | Case 6h_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX+M |
| Case 5b: 0.6(DL)+WL-AX-M            | Case 7a: DL+CL+0.85(TL)+0.75(WL+AX+LL+M)                                |
| Case 5b_mr: 0.6(DL)+WL-AX+M         | Case 7a_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL-M)                             |
| Case 5c: 0.6(DL)+WL+AX+IP+M         | Case 7b: DL+CL+0.85(TL)+0.75(WL-AX+LL-M)                                |

# STRESS ANALYSIS - PAGE 4



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|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:09:58 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 24G5N12K</b>           | Mark:<br><b>SJI1B</b>                    |

## Load Combinations Continued

Case 7b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+M)  
Case 7c: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP+M)  
Case 7c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP-M)  
Case 7d: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP-M)  
Case 7d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP+M)  
Case 7e: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP+M)  
Case 7e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP-M)  
Case 7f: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP-M)  
Case 7f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP+M)  
Case 7g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL+M)  
Case 7g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL-M)  
Case 7h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL-M)  
Case 7h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL+M)  
Case 8a: DL+CL+0.85(TL)+0.75(WL+AX+SL+M)  
Case 8a\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL-M)  
Case 8b: DL+CL+0.85(TL)+0.75(WL-AX+SL-M)  
Case 8b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+M)  
Case 8c: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP+M)  
Case 8c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP-M)  
Case 8d: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP-M)  
Case 8d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP+M)  
Case 8e: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP+M)  
Case 8e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP-M)  
Case 8f: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP-M)  
Case 8f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP+M)  
Case 8g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX+M)  
Case 8g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX-M)  
Case 8h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX-M)  
Case 8h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX+M)

# STRESS ANALYSIS - PAGE 1



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:10:11 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 24G5N18K</b>           | Mark:<br><b>SJI1C</b>                    |

## Geometry

|                             |                                |                              |                                  |                                        |                             |                                  |                            |
|-----------------------------|--------------------------------|------------------------------|----------------------------------|----------------------------------------|-----------------------------|----------------------------------|----------------------------|
| Base Length:<br><b>36-0</b> | Working Length:<br><b>35-8</b> | Joist Depth:<br><b>24.00</b> | Effective Depth:<br><b>21.41</b> | BC Panel Length:<br><b>4 @ 7-2 3/8</b> | SDS Value:<br><b>0.0000</b> | Shape:<br><b>Parallel Chords</b> | TC Slope:<br><b>0.0000</b> |
| Variable                    | Left End                       | Right End                    |                                  |                                        |                             |                                  |                            |
| BC Panel                    | 3-7 1/4                        | 3-7 1/4                      |                                  |                                        |                             |                                  |                            |
| TC Panel                    | 3-7 1/4                        | 3-7 1/4                      |                                  |                                        |                             |                                  |                            |
| First Half                  | 3-7 1/8                        | 3-7 1/4                      |                                  |                                        |                             |                                  |                            |
| First Diag.                 | 7-2 3/8                        | 7-2 1/2                      |                                  |                                        |                             |                                  |                            |
| Depth                       | 24.00                          | 24.00                        |                                  |                                        |                             |                                  |                            |
| Trib Width                  | 0-0                            | 0-0                          |                                  |                                        |                             |                                  |                            |

## Loads

| Load Type       | Category | Load1     | Load2 | Position | Direction | Loc/Begin | Sp/End  | Reference |
|-----------------|----------|-----------|-------|----------|-----------|-----------|---------|-----------|
| Conc Load (lbs) | TL       | 9,000.00  | 0.00  | TC       | +         | 0-2       | 0-2     | L-BL      |
| Conc Load (lbs) | TL       | 18,000.00 | 0.00  | TC       | +         | 7-2 3/8   | 7-0 3/8 | L-BL      |
| Conc Load (lbs) | TL       | 18,000.00 | 0.00  | TC       | +         | 14-4 3/4  | 7-2 3/8 | L-BL      |
| Conc Load (lbs) | TL       | 18,000.00 | 0.00  | TC       | +         | 21-7 1/8  | 7-2 3/8 | L-BL      |
| Conc Load (lbs) | TL       | 18,000.00 | 0.00  | TC       | +         | 28-9 1/2  | 7-2 3/8 | L-BL      |
| Conc Load (lbs) | TL       | 9,000.00  | 0.00  | TC       | +         | 35-10     | 7-0 1/2 | L-BL      |

## Stress Analysis Summary

|                         |            |                        |            |                           |             |                           |            |                             |  |                             |  |                              |  |
|-------------------------|------------|------------------------|------------|---------------------------|-------------|---------------------------|------------|-----------------------------|--|-----------------------------|--|------------------------------|--|
| Int. Panel TC:<br>43.25 |            | Max Panel BC:<br>86.50 |            | Reaction LE:<br>45,010.52 |             | Reaction RE:<br>44,989.48 |            | Minimum Shear:<br>11,252.63 |  | Max TC Comp.:<br>214,646.11 |  | Max BC Tension<br>214,667.30 |  |
| Member                  | TC Tension | TC Compression         | BC Tension | BC Compression            | Web Tension | Web Comp.                 | Web Length | PP Dist.                    |  |                             |  |                              |  |
| W2                      | 0.00       | 69,396.58              | 0.00       | 0.00                      | 78,183.38   | 19,545.85                 | 46.47      | 0-2                         |  |                             |  |                              |  |
| W3                      | 0.00       | 69,396.58              | 141,947.53 | 0.00                      | 0.00        | 80,996.29                 | 48.14      | 3-7 1/4                     |  |                             |  |                              |  |
| W4                      | 0.00       | 178,233.63             | 141,947.53 | 0.00                      | 40,509.97   | 10,127.49                 | 48.14      | 7-2 3/8                     |  |                             |  |                              |  |
| W5                      | 0.00       | 178,233.63             | 214,624.86 | 0.00                      | 0.00        | 40,604.21                 | 48.26      | 10-9 1/2                    |  |                             |  |                              |  |
| W6                      | 0.00       | 214,646.11             | 214,624.86 | 0.00                      | 25,368.74   | 6,342.19                  | 48.26      | 14-4 3/4                    |  |                             |  |                              |  |
| W6                      | 0.00       | 214,646.11             | 214,667.30 | 0.00                      | 0.00        | 25,309.87                 | 48.14      | 18-0                        |  |                             |  |                              |  |
| W5                      | 0.00       | 178,423.58             | 214,667.30 | 0.00                      | 0.00        | 40,462.68                 | 48.14      | 21-7 1/8                    |  |                             |  |                              |  |
| W4                      | 0.00       | 178,423.58             | 142,074.81 | 0.00                      | 40,556.80   | 10,139.20                 | 48.26      | 25-2 1/4                    |  |                             |  |                              |  |
| W3                      | 0.00       | 69,356.05              | 142,074.81 | 0.00                      | 0.00        | 81,137.30                 | 48.26      | 28-9 1/2                    |  |                             |  |                              |  |
| W2                      | 0.00       | 69,356.05              | 0.00       | 0.00                      | 78,137.73   | 19,534.43                 | 46.47      | 32-4 3/4                    |  |                             |  |                              |  |

## Standard Verticals

| Member | Position  | Max Tension | Max Comp. | Length |
|--------|-----------|-------------|-----------|--------|
| V1     | End Panel | 0.00        | 1,387.93  | 21.41  |
| V2     | Interior  | 0.00        | 4,292.92  | 21.41  |

## STRESS ANALYSIS - PAGE 2



**NEW MILLENNIUM**  
A Steel Dynamics Company

|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:10:11 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 24G5N18K</b>           | Mark:<br><b>SJI1C</b>                    |

## Chord Properties

| Chord | Area   | Rx     | Rz     | Ryy    | Y      | Ix      | Q      | Material             |
|-------|--------|--------|--------|--------|--------|---------|--------|----------------------|
| TC    | 4.1882 | 1.5476 | 0.9861 | 2.5085 | 1.4117 | 10.0307 | 0.9798 | 5043 = 5 x 5 x 0.438 |
| BC    | 3.7500 | 1.2178 | 0.7823 | 2.1286 | 1.1833 | 5.5615  | 1.0000 | 4050 = 4 x 4 x 0.500 |

## Axial and Bending Analysis

|                    |                         |                         |                                    |                            |                            |                                                  |                                  |
|--------------------|-------------------------|-------------------------|------------------------------------|----------------------------|----------------------------|--------------------------------------------------|----------------------------------|
| K:<br><b>1.00</b>  | Fy:<br><b>50,000.00</b> | Fb:<br><b>30,000.00</b> | Mom of Inertia:<br><b>1,844.18</b> | LL 360:<br><b>1,518.51</b> | LL 240:<br><b>2,277.76</b> | Max Bridg TC:<br><b>33-2 1/4</b>                 | Max Bridg BC:<br><b>42-6 7/8</b> |
| Top Chord Check    | End Panel LE            | First Panel LE          | Interior Panel                     | First Panel RE             | End Panel RE               | Gap Between Chords:<br><b>1.1250</b>             |                                  |
| Length             | 41.25                   | 43.13                   | 43.25                              | 43.25                      | 41.25                      | Min Weld Len 2X:<br><b>1.5419</b>                |                                  |
| Bending Load       | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       | Max Load Fillers TC:<br><b>227,287.33</b>        |                                  |
| Axial Load         | 69,396.58               | 69,396.58               | 214,646.11                         | 69,356.05                  | 69,356.05                  | Max Load no Fillers TC:<br><b>215,582.84</b>     |                                  |
| fa                 | 8,284.77                | 8,284.77                | 25,625.10                          | 8,279.93                   | 8,279.93                   | TC OAL/Ryy:<br><b>170.62</b>                     |                                  |
| Maximum K L/r      | 41.83                   | 43.73                   | 43.86                              | 43.86                      | 41.83                      | BC OAL/Ryy:<br><b>201.07</b>                     |                                  |
| Fcr                | 43,216.25               | 42,715.49               | 42,681.52                          | 42,681.52                  | 43,216.25                  | BC Stress:<br><b>0.95</b>                        |                                  |
| Fa                 | 25,929.75               | 25,629.29               | 25,608.91                          | 25,608.91                  | 25,929.75                  | BC L/Rz:<br><b>110.5714</b>                      |                                  |
| F'e                | 402,872.19              | 368,601.41              | 366,473.84                         | 366,473.84                 | 402,872.19                 | TC Shear Stress:<br><b>14,396.89</b>             |                                  |
| Cm                 | 0.9897                  | 0.9888                  | 0.9532                             | 0.9887                     | 0.9897                     | BC Shear Stress:<br><b>16,072.21</b>             |                                  |
| Panel Point Moment | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       | TC Bearing Capacity:<br><b>9.00K &lt; 14.44K</b> |                                  |
| Mid Panel Moment   | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       |                                                  |                                  |
| Panel Point fb     | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       |                                                  |                                  |
| Mid Panel fb       | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       |                                                  |                                  |
| Fillers            | 0                       | 0                       | 0                                  | 0                          | 0                          |                                                  |                                  |
| Panel Point Stress | 8,284.77                | 8,284.77                | 25,625.10                          | 8,279.93                   | 8,279.93                   |                                                  |                                  |
| Mid Panel Stress   | 0.3195                  | 0.3233                  | 1.0006                             | 0.3233                     | 0.3193                     |                                                  |                                  |

## Web Design

| Member | Web Tension | Allow Tension | Web Comp  | Allow Comp | Weld          | Qty | Material                      |
|--------|-------------|---------------|-----------|------------|---------------|-----|-------------------------------|
| W2     | 78,183.38   | 78,227.12     | 19,545.85 | 62,111.96  | 23.19 x 0.227 | 2   | A48A = 3.063 x 3.063 x 0.227  |
| W3     | 0.00        | 107,333.90    | 80,996.29 | 87,917.70  | 17.43 x 0.313 | 2   | 3031 = 3 x 3 x 0.313          |
| W4     | 40,509.97   | 43,144.61     | 10,127.49 | 28,880.63  | 14.59 x 0.187 | 2   | A36A = 2.094 x 2.094 x 0.187  |
| W5     | 0.00        | 61,276.80     | 40,604.21 | 46,272.41  | 14.58 x 0.188 | 2   | A42A = 2.625 x 2.625 x 0.209  |
| W6     | 25,368.74   | 27,475.67     | 6,342.19  | 7,327.05   | 9.11 x 0.188  | 1   | C40AA = 1.125 x 2.006 x 0.209 |
| W6     | 0.00        | 43,144.61     | 25,309.87 | 28,880.63  | 9.11 x 0.187  | 2   | A36A = 2.094 x 2.094 x 0.187  |
| W5     | 0.00        | 61,276.80     | 40,462.68 | 46,325.10  | 14.53 x 0.188 | 2   | A42A = 2.625 x 2.625 x 0.209  |
| W4     | 40,556.80   | 43,144.61     | 10,139.20 | 28,826.68  | 14.61 x 0.187 | 2   | A36A = 2.094 x 2.094 x 0.187  |
| W3     | 0.00        | 107,333.90    | 81,137.30 | 87,836.02  | 17.46 x 0.313 | 2   | 3031 = 3 x 3 x 0.313          |
| W2     | 78,137.73   | 78,227.12     | 19,534.43 | 62,111.96  | 23.18 x 0.227 | 2   | A48A = 3.063 x 3.063 x 0.227  |
| V1     | 0.00        | 4,784.80      | 1,387.93  | 2,204.16   | 2.00 x 0.077  | 1   | C10AA = 1.125 x 0.699 x 0.077 |
| V2     | 0.00        | 7,872.16      | 4,292.92  | 5,015.44   | 2.29 x 0.105  | 1   | C16AA = 1.125 x 0.943 x 0.105 |

# STRESS ANALYSIS - PAGE 3



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:10:11 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 24G5N18K</b>           | Mark:<br><b>SJI1C</b>                    |

## TCX Design

| TCX Left                             |         | TCX Right                            |          |
|--------------------------------------|---------|--------------------------------------|----------|
| TCX Length                           | 0-0     | TCX Length                           | 0-0      |
| TCX Type                             | R       | TCX Type                             | R        |
| TCX Depth                            | 7 1/2   | TCX Depth                            | 7 1/2    |
| BPL Length                           | 0-6     | BPL Length                           | 0-6      |
| Clear Bearing                        | 0-9 3/4 | Clear Bearing                        | 0-10 1/8 |
| BPL Material: 406050 = 4 x 6 x 0.500 |         | BPL Material: 406050 = 4 x 6 x 0.500 |          |
| Total Load                           | 0.00    | Total Load                           | 0.00     |
| Reqd TL Def L/80                     | 0.00    | Reqd TL Def L/80                     | 0.00     |
| Live Load                            | 0.00    | Live Load                            | 0.00     |
| Reqd LL Def L/120                    | 0.00    | Reqd LL Def L/120                    | 0.00     |
| Section Modulus                      | 0.0000  | Section Modulus                      | 0.0000   |
| Reqd SM                              | 0.0000  | Reqd SM                              | 0.0000   |
| Mom of Inertia                       | 0.0000  | Mom of Inertia                       | 0.0000   |
| Reqd MI                              | 0.0000  | Reqd MI                              | 0.0000   |
| Seat Type: Lapped                    |         | Seat Type: Lapped                    |          |
|                                      |         |                                      |          |

## Load Combinations

|                                     |                                                                         |
|-------------------------------------|-------------------------------------------------------------------------|
| Case 1: DL                          | Case 5c_mr: 0.6(DL)+WL+AX+IP-M                                          |
| Case 2a: LL                         | Case 5d: 0.6(DL)+WL-AX+IP-M                                             |
| Case 2b: SL                         | Case 5d_mr: 0.6(DL)+WL-AX+IP+M                                          |
| Case 3a: DL+CL+TL+LL                | Case 5e: (0.6-0.14(SDS))DL+AX+SM+M                                      |
| Case 3b: DL+CL+TL+SL                | Case 5e_mr: (0.6-0.14(SDS))DL+AX+SM-M                                   |
| Case 3c: DL+CL+TL+LL+FEM            | Case 5f: (0.6-0.14(SDS))DL-AX+SM-M                                      |
| Case 3d: DL+CL+TL+SL+FEM            | Case 5f_mr: (0.6-0.14(SDS))DL-AX+SM+M                                   |
| Case 3e: DL+CL+TL+LL                | Case 6a: DL+CL+0.85(TL)+WL+AX+M                                         |
| Case 3f: DL+CL+TL+SL                | Case 6a_mr: DL+CL+0.85(TL)+WL+AX-M                                      |
| Case 4a: DL+WL+AX+M                 | Case 6b: DL+CL+0.85(TL)+WL-AX-M                                         |
| Case 4a_mr: DL+WL+AX-M              | Case 6b_mr: DL+CL+0.85(TL)+WL-AX+M                                      |
| Case 4b: DL+WL-AX-M                 | Case 6c: DL+CL+0.85(TL)+WL+C+AX+IP+M                                    |
| Case 4b_mr: DL+WL-AX+M              | Case 6c_mr: DL+CL+0.85(TL)+WL+C+AX+IP-M                                 |
| Case 4c: DL+WL+AX+IP+M              | Case 6d: DL+CL+0.85(TL)+WL+C-AX+IP-M                                    |
| Case 4c_mr: DL+WL+AX+IP-M           | Case 6d_mr: DL+CL+0.85(TL)+WL+C-AX+IP+M                                 |
| Case 4d: DL+WL-AX+IP-M              | Case 6e: DL+CL+0.85(TL)+WL+AX+IP+M                                      |
| Case 4d_mr: DL+WL-AX+IP+M           | Case 6e_mr: DL+CL+0.85(TL)+WL+AX+IP-M                                   |
| Case 4e: (1+0.14(SDS))DL+SM+AX+M    | Case 6f: DL+CL+0.85(TL)+WL-AX+IP-M                                      |
| Case 4e_mr: (1+0.14(SDS))DL+SM+AX-M | Case 6f_mr: DL+CL+0.85(TL)+WL-AX+IP+M                                   |
| Case 4f: (1+0.14(SDS))DL+SM-AX-M    | Case 6g: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX+M    |
| Case 4f_mr: (1+0.14(SDS))DL+SM-AX+M | Case 6g_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX-M |
| Case 5a: 0.6(DL)+WL+AX+M            | Case 6h: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX-M    |
| Case 5a_mr: 0.6(DL)+WL+AX-M         | Case 6h_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX+M |
| Case 5b: 0.6(DL)+WL-AX-M            | Case 7a: DL+CL+0.85(TL)+0.75(WL+AX+LL+M)                                |
| Case 5b_mr: 0.6(DL)+WL-AX+M         | Case 7a_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL-M)                             |
| Case 5c: 0.6(DL)+WL+AX+IP+M         | Case 7b: DL+CL+0.85(TL)+0.75(WL-AX+LL-M)                                |

# STRESS ANALYSIS - PAGE 4



**NEW MILLENNIUM**  
A Steel Dynamics Company

|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:10:11 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 24G5N18K</b>           | Mark:<br><b>SJI1C</b>                    |

## Load Combinations Continued

Case 7b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+M)  
Case 7c: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP+M)  
Case 7c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP-M)  
Case 7d: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP-M)  
Case 7d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP+M)  
Case 7e: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP+M)  
Case 7e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP-M)  
Case 7f: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP-M)  
Case 7f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP+M)  
Case 7g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL+M)  
Case 7g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL-M)  
Case 7h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL-M)  
Case 7h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL+M)  
Case 8a: DL+CL+0.85(TL)+0.75(WL+AX+SL+M)  
Case 8a\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL-M)  
Case 8b: DL+CL+0.85(TL)+0.75(WL-AX+SL-M)  
Case 8b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+M)  
Case 8c: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP+M)  
Case 8c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP-M)  
Case 8d: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP-M)  
Case 8d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP+M)  
Case 8e: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP+M)  
Case 8e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP-M)  
Case 8f: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP-M)  
Case 8f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP+M)  
Case 8g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX+M)  
Case 8g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX-M)  
Case 8h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX-M)  
Case 8h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX+M)

# STRESS ANALYSIS - PAGE 1



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:10:25 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 24G5N22K</b>           | Mark:<br><b>SJI1D</b>                    |

## Geometry

|                             |                                |                              |                                  |                                        |                             |                                  |                            |
|-----------------------------|--------------------------------|------------------------------|----------------------------------|----------------------------------------|-----------------------------|----------------------------------|----------------------------|
| Base Length:<br><b>36-0</b> | Working Length:<br><b>35-8</b> | Joist Depth:<br><b>24.00</b> | Effective Depth:<br><b>20.88</b> | BC Panel Length:<br><b>4 @ 7-2 3/8</b> | SDS Value:<br><b>0.0000</b> | Shape:<br><b>Parallel Chords</b> | TC Slope:<br><b>0.0000</b> |
| Variable                    | Left End                       | Right End                    |                                  |                                        |                             |                                  |                            |
| BC Panel                    | 3-7 1/4                        | 3-7 1/4                      |                                  |                                        |                             |                                  |                            |
| TC Panel                    | 3-7 1/4                        | 3-7 1/4                      |                                  |                                        |                             |                                  |                            |
| First Half                  | 3-7 1/8                        | 3-7 1/4                      |                                  |                                        |                             |                                  |                            |
| First Diag.                 | 7-2 3/8                        | 7-2 1/2                      |                                  |                                        |                             |                                  |                            |
| Depth                       | 24.00                          | 24.00                        |                                  |                                        |                             |                                  |                            |
| Trib Width                  | 0-0                            | 0-0                          |                                  |                                        |                             |                                  |                            |

## Loads

| Load Type       | Category | Load1     | Load2 | Position | Direction | Loc/Begin | Sp/End  | Reference |
|-----------------|----------|-----------|-------|----------|-----------|-----------|---------|-----------|
| Conc Load (lbs) | TL       | 11,000.00 | 0.00  | TC       | +         | 0-2       | 0-2     | L-BL      |
| Conc Load (lbs) | TL       | 22,000.00 | 0.00  | TC       | +         | 7-2 3/8   | 7-0 3/8 | L-BL      |
| Conc Load (lbs) | TL       | 22,000.00 | 0.00  | TC       | +         | 14-4 3/4  | 7-2 3/8 | L-BL      |
| Conc Load (lbs) | TL       | 22,000.00 | 0.00  | TC       | +         | 21-7 1/8  | 7-2 3/8 | L-BL      |
| Conc Load (lbs) | TL       | 22,000.00 | 0.00  | TC       | +         | 28-9 1/2  | 7-2 3/8 | L-BL      |
| Conc Load (lbs) | TL       | 11,000.00 | 0.00  | TC       | +         | 35-10     | 7-0 1/2 | L-BL      |

## Stress Analysis Summary

|                                |                               |                                  |                                  |                                    |                                    |                                     |            |          |
|--------------------------------|-------------------------------|----------------------------------|----------------------------------|------------------------------------|------------------------------------|-------------------------------------|------------|----------|
| Int. Panel TC:<br><b>43.25</b> | Max Panel BC:<br><b>86.50</b> | Reaction LE:<br><b>55,012.85</b> | Reaction RE:<br><b>54,987.15</b> | Minimum Shear:<br><b>13,753.21</b> | Max TC Comp.:<br><b>268,928.66</b> | Max BC Tension<br><b>268,955.22</b> |            |          |
| Member                         | TC Tension                    | TC Compression                   | BC Tension                       | BC Compression                     | Web Tension                        | Web Comp.                           | Web Length | PP Dist. |
| W2                             | 0.00                          | 86,946.50                        | 0.00                             | 0.00                               | 97,451.66                          | 24,362.91                           | 46.23      | 0-2      |
| V1S                            | 0.00                          | 86,946.50                        | 0.00                             | 0.00                               | 0.00                               | 1,738.93                            | 20.88      | 3-7 1/4  |
| W3                             | 0.00                          | 86,946.50                        | 177,845.13                       | 0.00                               | 0.00                               | 100,993.53                          | 47.91      | 3-7 1/4  |
| W4                             | 0.00                          | 223,307.70                       | 177,845.13                       | 0.00                               | 50,511.50                          | 12,627.88                           | 47.91      | 7-2 3/8  |
| V2                             | 0.00                          | 223,307.70                       | 177,845.13                       | 0.00                               | 0.00                               | 4,466.15                            | 20.88      | 10-9 1/2 |
| W5                             | 0.00                          | 223,307.70                       | 268,902.06                       | 0.00                               | 0.00                               | 50,630.13                           | 48.03      | 10-9 1/2 |
| W6                             | 0.00                          | 268,928.66                       | 268,902.06                       | 0.00                               | 31,632.75                          | 7,908.19                            | 48.03      | 14-4 3/4 |
| V3                             | 0.00                          | 268,928.66                       | 268,902.06                       | 0.00                               | 0.00                               | 5,378.57                            | 20.88      | 18-0     |
| W6                             | 0.00                          | 268,928.66                       | 268,955.22                       | 0.00                               | 0.00                               | 31,558.63                           | 47.91      | 18-0     |
| W5                             | 0.00                          | 223,545.72                       | 268,955.22                       | 0.00                               | 0.00                               | 50,452.53                           | 47.91      | 21-7 1/8 |
| V4                             | 0.00                          | 223,545.72                       | 268,955.22                       | 0.00                               | 0.00                               | 4,470.91                            | 20.88      | 25-2 1/4 |
| W4                             | 0.00                          | 223,545.72                       | 178,004.58                       | 0.00                               | 50,571.02                          | 12,642.76                           | 48.03      | 25-2 1/4 |
| W3                             | 0.00                          | 86,895.73                        | 178,004.58                       | 0.00                               | 0.00                               | 101,171.60                          | 48.03      | 28-9 1/2 |
| V1S                            | 0.00                          | 86,895.73                        | 0.00                             | 0.00                               | 0.00                               | 1,737.91                            | 20.88      | 32-4 3/4 |
| W2                             | 0.00                          | 86,895.73                        | 0.00                             | 0.00                               | 97,394.75                          | 24,348.69                           | 46.23      | 32-4 3/4 |

## STRESS ANALYSIS - PAGE 2



**NEW MILLENNIUM**  
A Steel Dynamics Company

|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:10:25 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 24G5N22K</b>           | Mark:<br><b>SJI1D</b>                    |

## Chord Properties

| Chord | Area   | Rx     | Rz     | Ryy    | Y      | Ix      | Q      | Material             |
|-------|--------|--------|--------|--------|--------|---------|--------|----------------------|
| TC    | 5.7500 | 1.8607 | 1.1847 | 2.9176 | 1.6848 | 19.9078 | 0.9613 | 6050 = 6 x 6 x 0.500 |
| BC    | 4.7500 | 1.5390 | 0.9829 | 2.5210 | 1.4342 | 11.2503 | 1.0000 | 5050 = 5 x 5 x 0.500 |

## Axial and Bending Analysis

|                    |                         |                         |                                    |                            |                            |                                                   |                              |
|--------------------|-------------------------|-------------------------|------------------------------------|----------------------------|----------------------------|---------------------------------------------------|------------------------------|
| K:<br><b>1.00</b>  | Fy:<br><b>50,000.00</b> | Fb:<br><b>30,000.00</b> | Mom of Inertia:<br><b>2,330.64</b> | LL 360:<br><b>1,919.06</b> | LL 240:<br><b>2,878.58</b> | Max Bridg TC:<br><b>38-7 1/8</b>                  | Max Bridg BC:<br><b>50-5</b> |
| Top Chord Check    | End Panel LE            | First Panel LE          | Interior Panel                     | First Panel RE             | End Panel RE               | Gap Between Chords:<br><b>1.1250</b>              |                              |
| Length             | 41.25                   | 43.13                   | 43.25                              | 43.25                      | 41.25                      | Min Weld Len 2X:<br><b>1.9318</b>                 |                              |
| Bending Load       | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       | Max Load Fillers TC:<br><b>313,397.63</b>         |                              |
| Axial Load         | 86,946.50               | 86,946.50               | 268,928.66                         | 86,895.73                  | 86,895.73                  | Max Load no Fillers TC:<br><b>303,504.63</b>      |                              |
| fa                 | 7,560.57                | 7,560.57                | 23,385.10                          | 7,556.15                   | 7,556.15                   | TC OAL/Ryy:<br><b>146.69</b>                      |                              |
| Maximum K L/r      | 34.82                   | 36.40                   | 36.51                              | 36.51                      | 34.82                      | BC OAL/Ryy:<br><b>169.78</b>                      |                              |
| Fcr                | 44,139.38               | 43,791.05               | 43,767.38                          | 43,767.38                  | 44,139.38                  | BC Stress:<br><b>0.94</b>                         |                              |
| Fa                 | 26,483.63               | 26,274.63               | 26,260.43                          | 26,260.43                  | 26,483.63                  | BC L/Rz:<br><b>88.0049</b>                        |                              |
| F'e                | 582,374.75              | 532,834.38              | 529,758.88                         | 529,758.88                 | 582,374.75                 | TC Shear Stress:<br><b>13,129.16</b>              |                              |
| Cm                 | 0.9935                  | 0.9929                  | 0.9704                             | 0.9929                     | 0.9935                     | BC Shear Stress:<br><b>15,891.89</b>              |                              |
| Panel Point Moment | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       | TC Bearing Capacity:<br><b>11.00K &lt; 19.71K</b> |                              |
| Mid Panel Moment   | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       |                                                   |                              |
| Panel Point fb     | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       |                                                   |                              |
| Mid Panel fb       | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       |                                                   |                              |
| Fillers            | 0                       | 0                       | 0                                  | 0                          | 0                          |                                                   |                              |
| Panel Point Stress | 7,560.57                | 7,560.57                | 23,385.10                          | 7,556.15                   | 7,556.15                   |                                                   |                              |
| Mid Panel Stress   | 0.2855                  | 0.2878                  | 0.8905                             | 0.2877                     | 0.2853                     |                                                   |                              |

## Web Design

| Member | Web Tension | Allow Tension | Web Comp   | Allow Comp | Weld          | Qty | Material                      |
|--------|-------------|---------------|------------|------------|---------------|-----|-------------------------------|
| W2     | 97,451.66   | 107,333.90    | 24,362.91  | 89,293.42  | 26.20 x 0.250 | 2   | 3031 = 3 x 3 x 0.313          |
| V1S    | 0.00        | 4,784.80      | 1,738.93   | 2,282.01   | 2.00 x 0.077  | 1   | C10AA = 1.125 x 0.699 x 0.077 |
| W3     | 0.00        | 126,207.77    | 100,993.53 | 108,151.97 | 27.15 x 0.250 | 2   | 3531 = 3 1/2 x 3 1/2 x 0.313  |
| W4     | 50,511.50   | 54,975.46     | 12,627.88  | 40,377.20  | 18.14 x 0.188 | 2   | A40A = 2.375 x 2.375 x 0.209  |
| V2     | 0.00        | 7,872.16      | 4,466.15   | 5,111.79   | 2.86 x 0.105  | 1   | C16AA = 1.125 x 0.943 x 0.105 |
| W5     | 0.00        | 67,578.15     | 50,630.13  | 51,673.11  | 18.18 x 0.188 | 2   | A44A = 2.875 x 2.875 x 0.209  |
| W6     | 31,632.75   | 33,985.05     | 7,908.19   | 20,670.43  | 12.91 x 0.165 | 2   | A32A = 1.875 x 1.875 x 0.165  |
| V3     | 0.00        | 9,017.86      | 5,378.57   | 5,954.56   | 3.15 x 0.115  | 1   | C18AA = 1.125 x 1.012 x 0.115 |
| W6     | 0.00        | 48,969.58     | 31,558.63  | 34,359.55  | 11.33 x 0.188 | 2   | A38A = 2.219 x 2.219 x 0.200  |
| W5     | 0.00        | 67,578.15     | 50,452.53  | 51,719.96  | 18.12 x 0.188 | 2   | A44A = 2.875 x 2.875 x 0.209  |
| V4     | 0.00        | 7,872.16      | 4,470.91   | 5,111.79   | 2.87 x 0.105  | 1   | C16AA = 1.125 x 0.943 x 0.105 |
| W4     | 50,571.02   | 54,975.46     | 12,642.76  | 40,318.63  | 18.16 x 0.188 | 2   | A40A = 2.375 x 2.375 x 0.209  |
| W3     | 0.00        | 126,207.77    | 101,171.60 | 108,080.05 | 27.20 x 0.250 | 2   | 3531 = 3 1/2 x 3 1/2 x 0.313  |
| V1S    | 0.00        | 4,784.80      | 1,737.91   | 2,282.01   | 2.00 x 0.077  | 1   | C10AA = 1.125 x 0.699 x 0.077 |
| W2     | 97,394.75   | 107,333.90    | 24,348.69  | 89,293.42  | 26.18 x 0.250 | 2   | 3031 = 3 x 3 x 0.313          |

# STRESS ANALYSIS - PAGE 3



**NEW MILLENNIUM**  
A Steel Dynamics Company

Job Number:  
**00-0-0585**

Job Name:  
**SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS**

Date Run:  
**3/21/2025 8:10:25 AM**

Location:  
**MADISON, WI**

Joist Description:  
**Girder Load @ Diag 24G5N22K**

Mark:  
**SJI1D**

## TCX Design

| TCX Left                             |        | TCX Right                            |          |
|--------------------------------------|--------|--------------------------------------|----------|
| TCX Length                           | 0-0    | TCX Length                           | 0-0      |
| TCX Type                             | R      | TCX Type                             | R        |
| TCX Depth                            | 7 1/2  | TCX Depth                            | 7 1/2    |
| BPL Length                           | 0-6    | BPL Length                           | 0-6      |
| Clear Bearing                        | 0-10   | Clear Bearing                        | 0-10 1/8 |
| BPL Material: 406050 = 4 x 6 x 0.500 |        | BPL Material: 406050 = 4 x 6 x 0.500 |          |
| Total Load                           | 0.00   | Total Load                           | 0.00     |
| Reqd TL Def L/80                     | 0.00   | Reqd TL Def L/80                     | 0.00     |
| Live Load                            | 0.00   | Live Load                            | 0.00     |
| Reqd LL Def L/120                    | 0.00   | Reqd LL Def L/120                    | 0.00     |
| Section Modulus                      | 0.0000 | Section Modulus                      | 0.0000   |
| Reqd SM                              | 0.0000 | Reqd SM                              | 0.0000   |
| Mom of Inertia                       | 0.0000 | Mom of Inertia                       | 0.0000   |
| Reqd MI                              | 0.0000 | Reqd MI                              | 0.0000   |
| Seat Type: Lapped                    |        | Seat Type: Lapped                    |          |
|                                      |        |                                      |          |

## Load Combinations

Case 1: DL  
Case 2a: LL  
Case 2b: SL  
Case 3a: DL+CL+TL+LL  
Case 3b: DL+CL+TL+SL  
Case 3c: DL+CL+TL+LL+FEM  
Case 3d: DL+CL+TL+SL+FEM  
Case 3e: DL+CL+TL+LL  
Case 3f: DL+CL+TL+SL  
Case 4a: DL+WL+AX+M  
Case 4a\_mr: DL+WL+AX-M  
Case 4b: DL+WL-AX-M  
Case 4b\_mr: DL+WL-AX+M  
Case 4c: DL+WL+AX+IP+M  
Case 4c\_mr: DL+WL+AX+IP-M  
Case 4d: DL+WL-AX+IP-M  
Case 4d\_mr: DL+WL-AX+IP+M  
Case 4e: (1+0.14(SDS))DL+SM+AX+M  
Case 4e\_mr: (1+0.14(SDS))DL+SM+AX-M  
Case 4f: (1+0.14(SDS))DL+SM-AX-M  
Case 4f\_mr: (1+0.14(SDS))DL+SM-AX+M  
Case 5a: 0.6(DL)+WL+AX+M  
Case 5a\_mr: 0.6(DL)+WL+AX-M  
Case 5b: 0.6(DL)+WL-AX-M  
Case 5b\_mr: 0.6(DL)+WL-AX+M  
Case 5c: 0.6(DL)+WL+AX+IP+M  
Case 5c\_mr: 0.6(DL)+WL+AX+IP-M  
Case 5d: 0.6(DL)+WL-AX+IP-M  
Case 5d\_mr: 0.6(DL)+WL-AX+IP+M  
Case 5e: (0.6-0.14(SDS))DL+AX+SM+M  
Case 5e\_mr: (0.6-0.14(SDS))DL+AX+SM-M  
Case 5f: (0.6-0.14(SDS))DL-AX+SM-M  
Case 5f\_mr: (0.6-0.14(SDS))DL-AX+SM+M  
Case 6a: DL+CL+0.85(TL)+WL+AX+M  
Case 6a\_mr: DL+CL+0.85(TL)+WL+AX-M  
Case 6b: DL+CL+0.85(TL)+WL-AX-M  
Case 6b\_mr: DL+CL+0.85(TL)+WL-AX+M  
Case 6c: DL+CL+0.85(TL)+WL+C+AX+IP+M  
Case 6c\_mr: DL+CL+0.85(TL)+WL+C+AX+IP-M  
Case 6d: DL+CL+0.85(TL)+WL+C-AX+IP-M  
Case 6d\_mr: DL+CL+0.85(TL)+WL+C-AX+IP+M  
Case 6e: DL+CL+0.85(TL)+WL+AX+IP+M  
Case 6e\_mr: DL+CL+0.85(TL)+WL+AX+IP-M  
Case 6f: DL+CL+0.85(TL)+WL-AX+IP-M  
Case 6f\_mr: DL+CL+0.85(TL)+WL-AX+IP+M  
Case 6g: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX+M  
Case 6g\_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX-M  
Case 6h: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX-M  
Case 6h\_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX+M  
Case 7a: DL+CL+0.85(TL)+0.75(WL+AX+LL+M)  
Case 7a\_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL-M)  
Case 7b: DL+CL+0.85(TL)+0.75(WL-AX+LL-M)

# STRESS ANALYSIS - PAGE 4



**NEW MILLENNIUM**  
A Steel Dynamics Company

|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:10:25 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 24G5N22K</b>           | Mark:<br><b>SJI1D</b>                    |

## Load Combinations Continued

Case 7b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+M)  
Case 7c: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP+M)  
Case 7c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP-M)  
Case 7d: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP-M)  
Case 7d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP+M)  
Case 7e: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP+M)  
Case 7e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP-M)  
Case 7f: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP-M)  
Case 7f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP+M)  
Case 7g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL+M)  
Case 7g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL-M)  
Case 7h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL-M)  
Case 7h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL+M)  
Case 8a: DL+CL+0.85(TL)+0.75(WL+AX+SL+M)  
Case 8a\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL-M)  
Case 8b: DL+CL+0.85(TL)+0.75(WL-AX+SL-M)  
Case 8b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+M)  
Case 8c: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP+M)  
Case 8c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP-M)  
Case 8d: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP-M)  
Case 8d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP+M)  
Case 8e: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP+M)  
Case 8e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP-M)  
Case 8f: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP-M)  
Case 8f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP+M)  
Case 8g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX+M)  
Case 8g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX-M)  
Case 8h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX-M)  
Case 8h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX+M)

# STRESS ANALYSIS - PAGE 1



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:11:29 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 48G5N6K</b>            | Mark:<br><b>SJI2A</b>                    |

## Geometry

|                             |                                |                              |                                  |                                        |                             |                                  |                            |
|-----------------------------|--------------------------------|------------------------------|----------------------------------|----------------------------------------|-----------------------------|----------------------------------|----------------------------|
| Base Length:<br><b>48-0</b> | Working Length:<br><b>47-8</b> | Joist Depth:<br><b>48.00</b> | Effective Depth:<br><b>46.63</b> | BC Panel Length:<br><b>4 @ 9-7 1/8</b> | SDS Value:<br><b>0.0000</b> | Shape:<br><b>Parallel Chords</b> | TC Slope:<br><b>0.0000</b> |
| Variable                    | Left End                       | Right End                    |                                  |                                        |                             |                                  |                            |
| BC Panel                    | 4-9 1/2                        | 4-9 1/2                      |                                  |                                        |                             |                                  |                            |
| TC Panel                    | 4-9 1/2                        | 4-9 1/2                      |                                  |                                        |                             |                                  |                            |
| First Half                  | 4-9 3/4                        | 4-9 7/8                      |                                  |                                        |                             |                                  |                            |
| First Diag.                 | 9-7 1/4                        | 9-7 3/8                      |                                  |                                        |                             |                                  |                            |
| Depth                       | 48.00                          | 48.00                        |                                  |                                        |                             |                                  |                            |
| Trib Width                  | 0-0                            | 0-0                          |                                  |                                        |                             |                                  |                            |

## Loads

| Load Type       | Category | Load1    | Load2 | Position | Direction | Loc/Begin | Sp/End  | Reference |
|-----------------|----------|----------|-------|----------|-----------|-----------|---------|-----------|
| Conc Load (lbs) | TL       | 3,000.00 | 0.00  | TC       | +         | 0-2       | 0-2     | L-BL      |
| Conc Load (lbs) | TL       | 6,000.00 | 0.00  | TC       | +         | 9-7 1/4   | 9-5 1/4 | L-BL      |
| Conc Load (lbs) | TL       | 6,000.00 | 0.00  | TC       | +         | 19-2 3/8  | 9-7 1/8 | L-BL      |
| Conc Load (lbs) | TL       | 6,000.00 | 0.00  | TC       | +         | 28-9 1/2  | 9-7 1/8 | L-BL      |
| Conc Load (lbs) | TL       | 6,000.00 | 0.00  | TC       | +         | 38-4 5/8  | 9-7 1/8 | L-BL      |
| Conc Load (lbs) | TL       | 3,000.00 | 0.00  | TC       | +         | 47-10     | 9-5 3/8 | L-BL      |

## Stress Analysis Summary

|                         |            |                         |            |                           |             |                           |            |                            |  |                            |  |                             |  |
|-------------------------|------------|-------------------------|------------|---------------------------|-------------|---------------------------|------------|----------------------------|--|----------------------------|--|-----------------------------|--|
| Int. Panel TC:<br>57.63 |            | Max Panel BC:<br>115.50 |            | Reaction LE:<br>15,002.63 |             | Reaction RE:<br>14,997.38 |            | Minimum Shear:<br>3,750.66 |  | Max TC Comp.:<br>43,976.57 |  | Max BC Tension<br>43,979.81 |  |
| Member                  | TC Tension | TC Compression          | BC Tension | BC Compression            | Web Tension | Web Comp.                 | Web Length | PP Dist.                   |  |                            |  |                             |  |
| W2                      | 0.00       | 14,286.66               | 0.00       | 0.00                      | 18,659.36   | 4,664.84                  | 72.49      | 0-2                        |  |                            |  |                             |  |
| W3                      | 0.00       | 14,286.66               | 29,152.51  | 0.00                      | 0.00        | 19,106.45                 | 74.22      | 4-9 1/2                    |  |                            |  |                             |  |
| W4                      | 0.00       | 36,554.88               | 29,152.51  | 0.00                      | 9,530.29    | 2,382.57                  | 74.03      | 9-7 1/4                    |  |                            |  |                             |  |
| W5                      | 0.00       | 36,554.88               | 43,973.33  | 0.00                      | 0.00        | 9,542.80                  | 74.13      | 14-4 3/4                   |  |                            |  |                             |  |
| W6                      | 0.00       | 43,976.57               | 43,973.33  | 0.00                      | 5,962.69    | 1,490.67                  | 74.13      | 19-2 3/8                   |  |                            |  |                             |  |
| W6                      | 0.00       | 43,976.57               | 43,979.81  | 0.00                      | 0.00        | 5,954.87                  | 74.03      | 24-0                       |  |                            |  |                             |  |
| W5                      | 0.00       | 36,583.91               | 43,979.81  | 0.00                      | 0.00        | 9,521.96                  | 74.03      | 28-9 1/2                   |  |                            |  |                             |  |
| W4                      | 0.00       | 36,583.91               | 29,171.94  | 0.00                      | 9,534.46    | 2,383.62                  | 74.13      | 33-7                       |  |                            |  |                             |  |
| W3                      | 0.00       | 14,280.42               | 29,171.94  | 0.00                      | 0.00        | 19,123.14                 | 74.32      | 38-4 5/8                   |  |                            |  |                             |  |
| W2                      | 0.00       | 14,280.42               | 0.00       | 0.00                      | 18,651.21   | 4,662.80                  | 72.49      | 43-2 1/2                   |  |                            |  |                             |  |

## Standard Verticals

| Member | Position  | Max Tension | Max Comp. | Length |
|--------|-----------|-------------|-----------|--------|
| V1     | End Panel | 0.00        | 285.73    | 46.63  |
| V2     | Interior  | 0.00        | 879.53    | 46.63  |

# STRESS ANALYSIS - PAGE 2



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:11:29 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 48G5N6K</b>            | Mark:<br><b>SJI2A</b>                    |

## Chord Properties

| Chord | Area   | Rx     | Rz     | Ryy    | Y      | Ix     | Q      | Material                     |
|-------|--------|--------|--------|--------|--------|--------|--------|------------------------------|
| TC    | 1.1875 | 0.7695 | 0.4915 | 1.4931 | 0.7171 | 0.7031 | 1.0000 | 2525 = 2 1/2 x 2 1/2 x 0.250 |
| BC    | 0.8121 | 0.6883 | 0.4105 | 1.3993 | 0.6558 | 0.3848 | 1.0000 | A38A = 2.219 x 2.219 x 0.200 |

## Axial and Bending Analysis

|                    |                         |                         |                                    |                          |                            |                                                 |                                   |
|--------------------|-------------------------|-------------------------|------------------------------------|--------------------------|----------------------------|-------------------------------------------------|-----------------------------------|
| K:<br><b>1.00</b>  | Fy:<br><b>50,000.00</b> | Fb:<br><b>30,000.00</b> | Mom of Inertia:<br><b>2,099.22</b> | LL 360:<br><b>724.12</b> | LL 240:<br><b>1,086.19</b> | Max Bridg TC:<br><b>21-1 7/8</b>                | Max Bridg BC:<br><b>27-11 7/8</b> |
| Top Chord Check    | End Panel LE            | First Panel LE          | Interior Panel                     | First Panel RE           | End Panel RE               | Gap Between Chords:<br><b>1.1250</b>            |                                   |
| Length             | 55.50                   | 57.75                   | 57.63                              | 57.88                    | 55.50                      | Min Weld Len 2X:<br><b>0.7500</b>               |                                   |
| Bending Load       | 0.00                    | 0.00                    | 0.00                               | 0.00                     | 0.00                       | Max Load Fillers TC:<br><b>46,363.46</b>        |                                   |
| Axial Load         | 14,286.66               | 14,286.66               | 43,976.57                          | 14,280.42                | 14,280.42                  | Max Load no Fillers TC:<br><b>26,265.71</b>     |                                   |
| fa                 | 6,015.44                | 6,015.44                | 18,516.45                          | 6,012.81                 | 6,012.81                   | TC OAL/Ryy:<br><b>383.09</b>                    |                                   |
| Maximum K L/r      | 112.92                  | 117.50                  | 77.10                              | 117.75                   | 112.92                     | BC OAL/Ryy:<br><b>408.77</b>                    |                                   |
| Fcr                | 19,682.22               | 18,181.95               | 32,373.92                          | 18,103.49                | 19,682.22                  | BC Stress:<br><b>0.90</b>                       |                                   |
| Fa                 | 11,809.33               | 10,909.17               | 19,424.35                          | 10,862.10                | 11,809.33                  | BC L/Rz:<br><b>281.3642</b>                     |                                   |
| F'e                | 55,021.07               | 50,817.23               | 51,260.08                          | 50,597.96                | 55,021.07                  | TC Shear Stress:<br><b>11,395.95</b>            |                                   |
| Cm                 | 0.9453                  | 0.9408                  | 0.7580                             | 0.9406                   | 0.9454                     | BC Shear Stress:<br><b>18,127.37</b>            |                                   |
| Panel Point Moment | 0.00                    | 0.00                    | 0.00                               | 0.00                     | 0.00                       | TC Bearing Capacity:<br><b>3.00K &lt; 7.59K</b> |                                   |
| Mid Panel Moment   | 0.00                    | 0.00                    | 0.00                               | 0.00                     | 0.00                       |                                                 |                                   |
| Panel Point fb     | 0.00                    | 0.00                    | 0.00                               | 0.00                     | 0.00                       |                                                 |                                   |
| Mid Panel fb       | 0.00                    | 0.00                    | 0.00                               | 0.00                     | 0.00                       |                                                 |                                   |
| Fillers            | 0                       | 0                       | 6                                  | 0                        | 0                          |                                                 |                                   |
| Panel Point Stress | 6,015.44                | 6,015.44                | 18,516.45                          | 6,012.81                 | 6,012.81                   |                                                 |                                   |
| Mid Panel Stress   | 0.5094                  | 0.5514                  | 0.9533                             | 0.5536                   | 0.5092                     |                                                 |                                   |

## Web Design

| Member | Web Tension | Allow Tension | Web Comp  | Allow Comp | Weld         | Qty | Material                      |
|--------|-------------|---------------|-----------|------------|--------------|-----|-------------------------------|
| W2     | 18,659.36   | 43,144.61     | 4,664.84  | 17,369.04  | 7.77 x 0.187 | 2   | A36A = 2.094 x 2.094 x 0.187  |
| W3     | 0.00        | 48,969.58     | 19,106.45 | 20,925.01  | 6.43 x 0.200 | 2   | A38A = 2.219 x 2.219 x 0.200  |
| W4     | 9,530.29    | 18,714.09     | 2,382.57  | 2,616.34   | 3.65 x 0.176 | 1   | C34AA = 1.125 x 1.549 x 0.176 |
| W5     | 0.00        | 33,985.05     | 9,542.80  | 10,532.02  | 3.89 x 0.165 | 2   | A32A = 1.875 x 1.875 x 0.165  |
| W6     | 5,962.69    | 14,408.67     | 1,490.67  | 2,052.17   | 2.68 x 0.150 | 1   | C28AA = 1.125 x 1.347 x 0.150 |
| W6     | 0.00        | 26,079.72     | 5,954.87  | 6,328.95   | 2.78 x 0.144 | 2   | A26A = 1.656 x 1.656 x 0.144  |
| W5     | 0.00        | 33,985.05     | 9,521.96  | 10,559.68  | 3.89 x 0.165 | 2   | A32A = 1.875 x 1.875 x 0.165  |
| W4     | 9,534.46    | 18,714.09     | 2,383.62  | 2,610.26   | 3.65 x 0.176 | 1   | C34AA = 1.125 x 1.549 x 0.176 |
| W3     | 0.00        | 48,969.58     | 19,123.14 | 20,878.38  | 6.44 x 0.200 | 2   | A38A = 2.219 x 2.219 x 0.200  |
| W2     | 18,651.21   | 43,144.61     | 4,662.80  | 17,369.04  | 7.77 x 0.187 | 2   | A36A = 2.094 x 2.094 x 0.187  |
| V1     | 0.00        | 4,784.80      | 285.73    | 486.95     | 2.00 x 0.077 | 1   | C10AA = 1.125 x 0.699 x 0.077 |
| V2     | 0.00        | 7,872.16      | 879.53    | 1,461.40   | 2.00 x 0.105 | 1   | C16AA = 1.125 x 0.943 x 0.105 |

## STRESS ANALYSIS - PAGE 3



**NEW MILLENNIUM**  
A Steel Dynamics Company

Job Number:  
**00-0-0585**

Job Name:  
**SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS**

Date Run:  
**3/21/2025 8:11:29 AM**

Location:  
**MADISON, WI**

Joist Description:  
**Girder Load @ Diag 48G5N6K**

Mark:  
**SJI2A**

## TCX Design

| TCX Left                             |         | TCX Right                            |         |
|--------------------------------------|---------|--------------------------------------|---------|
| TCX Length                           | 0-0     | TCX Length                           | 0-0     |
| TCX Type                             | R       | TCX Type                             | R       |
| TCX Depth                            | 7 1/2   | TCX Depth                            | 7 1/2   |
| BPL Length                           | 0-6     | BPL Length                           | 0-6     |
| Clear Bearing                        | 0-8 1/2 | Clear Bearing                        | 0-8 5/8 |
| BPL Material: 406050 = 4 x 6 x 0.500 |         | BPL Material: 406050 = 4 x 6 x 0.500 |         |
| Total Load                           | 0.00    | Total Load                           | 0.00    |
| Reqd TL Def L/80                     | 0.00    | Reqd TL Def L/80                     | 0.00    |
| Live Load                            | 0.00    | Live Load                            | 0.00    |
| Reqd LL Def L/120                    | 0.00    | Reqd LL Def L/120                    | 0.00    |
| Section Modulus                      | 0.0000  | Section Modulus                      | 0.0000  |
| Reqd SM                              | 0.0000  | Reqd SM                              | 0.0000  |
| Mom of Inertia                       | 0.0000  | Mom of Inertia                       | 0.0000  |
| Reqd MI                              | 0.0000  | Reqd MI                              | 0.0000  |
| Seat Type: Lapped                    |         | Seat Type: Lapped                    |         |
|                                      |         |                                      |         |

## Load Combinations

Case 1: DL  
Case 2a: LL  
Case 2b: SL  
Case 3a: DL+CL+TL+LL  
Case 3b: DL+CL+TL+SL  
Case 3c: DL+CL+TL+LL+FEM  
Case 3d: DL+CL+TL+SL+FEM  
Case 3e: DL+CL+TL+LL  
Case 3f: DL+CL+TL+SL  
Case 4a: DL+WL+AX+M  
Case 4a\_mr: DL+WL+AX-M  
Case 4b: DL+WL-AX-M  
Case 4b\_mr: DL+WL-AX+M  
Case 4c: DL+WL+AX+IP+M  
Case 4c\_mr: DL+WL+AX+IP-M  
Case 4d: DL+WL-AX+IP-M  
Case 4d\_mr: DL+WL-AX+IP+M  
Case 4e: (1+0.14(SDS))DL+SM+AX+M  
Case 4e\_mr: (1+0.14(SDS))DL+SM+AX-M  
Case 4f: (1+0.14(SDS))DL+SM-AX-M  
Case 4f\_mr: (1+0.14(SDS))DL+SM-AX+M  
Case 5a: 0.6(DL)+WL+AX+M  
Case 5a\_mr: 0.6(DL)+WL+AX-M  
Case 5b: 0.6(DL)+WL-AX-M  
Case 5b\_mr: 0.6(DL)+WL-AX+M  
Case 5c: 0.6(DL)+WL+AX+IP+M  
Case 5c\_mr: 0.6(DL)+WL+AX+IP-M  
Case 5d: 0.6(DL)+WL-AX+IP-M  
Case 5d\_mr: 0.6(DL)+WL-AX+IP+M  
Case 5e: (0.6-0.14(SDS))DL+AX+SM+M  
Case 5e\_mr: (0.6-0.14(SDS))DL+AX+SM-M  
Case 5f: (0.6-0.14(SDS))DL-AX+SM-M  
Case 5f\_mr: (0.6-0.14(SDS))DL-AX+SM+M  
Case 6a: DL+CL+0.85(TL)+WL+AX+M  
Case 6a\_mr: DL+CL+0.85(TL)+WL+AX-M  
Case 6b: DL+CL+0.85(TL)+WL-AX-M  
Case 6b\_mr: DL+CL+0.85(TL)+WL-AX+M  
Case 6c: DL+CL+0.85(TL)+WL+C+AX+IP+M  
Case 6c\_mr: DL+CL+0.85(TL)+WL+C+AX+IP-M  
Case 6d: DL+CL+0.85(TL)+WL+C-AX+IP-M  
Case 6d\_mr: DL+CL+0.85(TL)+WL+C-AX+IP+M  
Case 6e: DL+CL+0.85(TL)+WL+AX+IP+M  
Case 6e\_mr: DL+CL+0.85(TL)+WL+AX+IP-M  
Case 6f: DL+CL+0.85(TL)+WL-AX+IP-M  
Case 6f\_mr: DL+CL+0.85(TL)+WL-AX+IP+M  
Case 6g: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX+M  
Case 6g\_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX-M  
Case 6h: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX-M  
Case 6h\_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX+M  
Case 7a: DL+CL+0.85(TL)+0.75(WL+AX+LL+M)  
Case 7a\_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL-M)  
Case 7b: DL+CL+0.85(TL)+0.75(WL-AX+LL-M)

## STRESS ANALYSIS - PAGE 4



NEW MILLENNIUM

A Steel Dynamics Company

|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:11:29 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 48G5N6K</b>            | Mark:<br><b>SJI2A</b>                    |

**Load Combinations Continued**

Case 7b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+M)  
 Case 7c: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP+M)  
 Case 7c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP-M)  
 Case 7d: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP-M)  
 Case 7d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP+M)  
 Case 7e: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP+M)  
 Case 7e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP-M)  
 Case 7f: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP-M)  
 Case 7f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP+M)  
 Case 7g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL+M)  
 Case 7g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL-M)  
 Case 7h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL-M)  
 Case 7h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL+M)  
 Case 8a: DL+CL+0.85(TL)+0.75(WL+AX+SL+M)  
 Case 8a\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL-M)  
 Case 8b: DL+CL+0.85(TL)+0.75(WL-AX+SL-M)  
 Case 8b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+M)  
 Case 8c: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP+M)  
 Case 8c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP-M)  
 Case 8d: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP-M)  
 Case 8d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP+M)  
 Case 8e: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP+M)  
 Case 8e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP-M)  
 Case 8f: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP-M)  
 Case 8f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP+M)  
 Case 8g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX+M)  
 Case 8g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX-M)  
 Case 8h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX-M)  
 Case 8h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX+M)

# STRESS ANALYSIS - PAGE 1



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:11:47 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 48G5N16K</b>           | Mark:<br><b>SJI2B</b>                    |

## Geometry

|                             |                                |                              |                                  |                                        |                             |                                  |                            |
|-----------------------------|--------------------------------|------------------------------|----------------------------------|----------------------------------------|-----------------------------|----------------------------------|----------------------------|
| Base Length:<br><b>48-0</b> | Working Length:<br><b>47-8</b> | Joist Depth:<br><b>48.00</b> | Effective Depth:<br><b>45.87</b> | BC Panel Length:<br><b>4 @ 9-7 1/8</b> | SDS Value:<br><b>0.0000</b> | Shape:<br><b>Parallel Chords</b> | TC Slope:<br><b>0.0000</b> |
| Variable                    | Left End                       | Right End                    |                                  |                                        |                             |                                  |                            |
| BC Panel                    | 4-9 1/2                        | 4-9 1/2                      |                                  |                                        |                             |                                  |                            |
| TC Panel                    | 4-9 1/2                        | 4-9 1/2                      |                                  |                                        |                             |                                  |                            |
| First Half                  | 4-9 3/4                        | 4-9 7/8                      |                                  |                                        |                             |                                  |                            |
| First Diag.                 | 9-7 1/4                        | 9-7 3/8                      |                                  |                                        |                             |                                  |                            |
| Depth                       | 48.00                          | 48.00                        |                                  |                                        |                             |                                  |                            |
| Trib Width                  | 0-0                            | 0-0                          |                                  |                                        |                             |                                  |                            |

## Loads

| Load Type       | Category | Load1     | Load2 | Position | Direction | Loc/Begin | Sp/End  | Reference |
|-----------------|----------|-----------|-------|----------|-----------|-----------|---------|-----------|
| Conc Load (lbs) | TL       | 8,000.00  | 0.00  | TC       | +         | 0-2       | 0-2     | L-BL      |
| Conc Load (lbs) | TL       | 16,000.00 | 0.00  | TC       | +         | 9-7 1/4   | 9-5 1/4 | L-BL      |
| Conc Load (lbs) | TL       | 16,000.00 | 0.00  | TC       | +         | 19-2 3/8  | 9-7 1/8 | L-BL      |
| Conc Load (lbs) | TL       | 16,000.00 | 0.00  | TC       | +         | 28-9 1/2  | 9-7 1/8 | L-BL      |
| Conc Load (lbs) | TL       | 16,000.00 | 0.00  | TC       | +         | 38-4 5/8  | 9-7 1/8 | L-BL      |
| Conc Load (lbs) | TL       | 8,000.00  | 0.00  | TC       | +         | 47-10     | 9-5 3/8 | L-BL      |

## Stress Analysis Summary

|                         |            |                         |            |                           |             |                           |            |                             |  |                             |  |                              |  |
|-------------------------|------------|-------------------------|------------|---------------------------|-------------|---------------------------|------------|-----------------------------|--|-----------------------------|--|------------------------------|--|
| Int. Panel TC:<br>57.63 |            | Max Panel BC:<br>115.50 |            | Reaction LE:<br>40,006.99 |             | Reaction RE:<br>39,993.00 |            | Minimum Shear:<br>10,001.75 |  | Max TC Comp.:<br>119,203.33 |  | Max BC Tension<br>119,212.09 |  |
| Member                  | TC Tension | TC Compression          | BC Tension | BC Compression            | Web Tension | Web Comp.                 | Web Length | PP Dist.                    |  |                             |  |                              |  |
| W2                      | 0.00       | 38,725.57               | 0.00       | 0.00                      | 50,240.58   | 12,560.15                 | 72.00      | 0-2                         |  |                             |  |                              |  |
| W3                      | 0.00       | 38,725.57               | 79,021.07  | 0.00                      | 0.00        | 51,460.43                 | 73.75      | 4-9 1/2                     |  |                             |  |                              |  |
| W4                      | 0.00       | 99,085.99               | 79,021.07  | 0.00                      | 25,667.58   | 6,416.90                  | 73.56      | 9-7 1/4                     |  |                             |  |                              |  |
| W5                      | 0.00       | 99,085.99               | 119,194.54 | 0.00                      | 0.00        | 25,701.70                 | 73.65      | 14-4 3/4                    |  |                             |  |                              |  |
| W6                      | 0.00       | 119,203.33              | 119,194.54 | 0.00                      | 16,059.35   | 4,014.84                  | 73.65      | 19-2 3/8                    |  |                             |  |                              |  |
| W6                      | 0.00       | 119,203.33              | 119,212.09 | 0.00                      | 0.00        | 16,038.03                 | 73.56      | 24-0                        |  |                             |  |                              |  |
| W5                      | 0.00       | 99,164.70               | 119,212.09 | 0.00                      | 0.00        | 25,645.15                 | 73.56      | 28-9 1/2                    |  |                             |  |                              |  |
| W4                      | 0.00       | 99,164.70               | 79,073.73  | 0.00                      | 25,679.25   | 6,419.81                  | 73.65      | 33-7                        |  |                             |  |                              |  |
| W3                      | 0.00       | 38,708.64               | 79,073.73  | 0.00                      | 0.00        | 51,506.24                 | 73.85      | 38-4 5/8                    |  |                             |  |                              |  |
| W2                      | 0.00       | 38,708.64               | 0.00       | 0.00                      | 50,218.63   | 12,554.66                 | 72.00      | 43-2 1/2                    |  |                             |  |                              |  |

## Standard Verticals

| Member | Position  | Max Tension | Max Comp. | Length |
|--------|-----------|-------------|-----------|--------|
| V1     | End Panel | 0.00        | 774.51    | 45.87  |
| V2     | Interior  | 0.00        | 2,384.07  | 45.87  |

## STRESS ANALYSIS - PAGE 2



**NEW MILLENNIUM**  
A Steel Dynamics Company

|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:11:47 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 48G5N16K</b>           | Mark:<br><b>SJI2B</b>                    |

## Chord Properties

| Chord | Area   | Rx     | Rz     | Ryy    | Y      | Ix     | Q      | Material                     |
|-------|--------|--------|--------|--------|--------|--------|--------|------------------------------|
| TC    | 2.8594 | 1.2346 | 0.7876 | 2.1017 | 1.1383 | 4.3586 | 1.0000 | 4037 = 4 x 4 x 0.375         |
| BC    | 2.0930 | 1.0824 | 0.6899 | 1.8930 | 0.9905 | 2.4522 | 0.9871 | 3531 = 3 1/2 x 3 1/2 x 0.313 |

## Axial and Bending Analysis

|                    |                         |                         |                                    |                            |                            |                                                  |                                   |
|--------------------|-------------------------|-------------------------|------------------------------------|----------------------------|----------------------------|--------------------------------------------------|-----------------------------------|
| K:<br><b>1.00</b>  | Fy:<br><b>50,000.00</b> | Fb:<br><b>30,000.00</b> | Mom of Inertia:<br><b>5,099.18</b> | LL 360:<br><b>1,758.96</b> | LL 240:<br><b>2,638.44</b> | Max Bridg TC:<br><b>29-9 1/4</b>                 | Max Bridg BC:<br><b>37-10 3/8</b> |
| Top Chord Check    | End Panel LE            | First Panel LE          | Interior Panel                     | First Panel RE             | End Panel RE               | Gap Between Chords:<br><b>1.1250</b>             |                                   |
| Length             | 55.50                   | 57.75                   | 57.63                              | 57.88                      | 55.50                      | Min Weld Len 2X:<br><b>0.8563</b>                |                                   |
| Bending Load       | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       | Max Load Fillers TC:<br><b>138,455.19</b>        |                                   |
| Axial Load         | 38,725.57               | 38,725.57               | 119,203.33                         | 38,708.64                  | 38,708.64                  | Max Load no Fillers TC:<br><b>116,772.84</b>     |                                   |
| fa                 | 6,771.62                | 6,771.62                | 20,844.12                          | 6,768.66                   | 6,768.66                   | TC OAL/Ryy:<br><b>272.16</b>                     |                                   |
| Maximum K L/r      | 70.47                   | 73.32                   | 54.78                              | 73.48                      | 70.47                      | BC OAL/Ryy:<br><b>302.17</b>                     |                                   |
| Fcr                | 34,776.77               | 33,747.77               | 40,150.17                          | 33,690.33                  | 34,776.77                  | BC Stress:<br><b>0.95</b>                        |                                   |
| Fa                 | 20,866.06               | 20,248.66               | 24,090.10                          | 20,214.20                  | 20,866.06                  | BC L/Rz:<br><b>167.4156</b>                      |                                   |
| F'e                | 141,632.94              | 130,811.60              | 131,951.56                         | 130,247.16                 | 141,632.94                 | TC Shear Stress:<br><b>12,710.63</b>             |                                   |
| Cm                 | 0.9761                  | 0.9741                  | 0.8942                             | 0.9740                     | 0.9761                     | BC Shear Stress:<br><b>16,386.74</b>             |                                   |
| Panel Point Moment | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       | TC Bearing Capacity:<br><b>8.00K &lt; 13.74K</b> |                                   |
| Mid Panel Moment   | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       |                                                  |                                   |
| Panel Point fb     | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       |                                                  |                                   |
| Mid Panel fb       | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       |                                                  |                                   |
| Fillers            | 0                       | 0                       | 2                                  | 0                          | 0                          |                                                  |                                   |
| Panel Point Stress | 6,771.62                | 6,771.62                | 20,844.12                          | 6,768.66                   | 6,768.66                   |                                                  |                                   |
| Mid Panel Stress   | 0.3245                  | 0.3344                  | 0.8653                             | 0.3348                     | 0.3244                     |                                                  |                                   |

## Web Design

| Member | Web Tension | Allow Tension | Web Comp  | Allow Comp | Weld          | Qty | Material                      |
|--------|-------------|---------------|-----------|------------|---------------|-----|-------------------------------|
| W2     | 50,240.58   | 54,975.46     | 12,560.15 | 27,383.65  | 16.19 x 0.209 | 2   | A40A = 2.375 x 2.375 x 0.209  |
| W3     | 0.00        | 86,681.16     | 51,460.43 | 55,271.46  | 13.86 x 0.250 | 2   | A50A = 3.094 x 3.094 x 0.250  |
| W4     | 25,667.58   | 28,799.25     | 6,416.90  | 7,913.98   | 11.52 x 0.150 | 2   | A28A = 1.750 x 1.750 x 0.150  |
| W5     | 0.00        | 54,975.46     | 25,701.70 | 26,512.88  | 9.23 x 0.188  | 2   | A40A = 2.375 x 2.375 x 0.209  |
| W6     | 16,059.35   | 27,487.73     | 4,014.84  | 4,953.93   | 5.77 x 0.188  | 1   | A40A = 2.375 x 2.375 x 0.209  |
| W6     | 0.00        | 43,144.61     | 16,038.03 | 16,905.88  | 5.78 x 0.187  | 2   | A36A = 2.094 x 2.094 x 0.187  |
| W5     | 0.00        | 54,975.46     | 25,645.15 | 26,564.22  | 9.21 x 0.188  | 2   | A40A = 2.375 x 2.375 x 0.209  |
| W4     | 25,679.25   | 28,799.25     | 6,419.81  | 7,892.98   | 11.53 x 0.150 | 2   | A28A = 1.750 x 1.750 x 0.150  |
| W3     | 0.00        | 86,681.16     | 51,506.24 | 55,210.89  | 13.87 x 0.250 | 2   | A50A = 3.094 x 3.094 x 0.250  |
| W2     | 50,218.63   | 54,975.46     | 12,554.66 | 27,383.65  | 16.18 x 0.209 | 2   | A40A = 2.375 x 2.375 x 0.209  |
| V1     | 0.00        | 7,872.16      | 774.51    | 1,509.96   | 2.00 x 0.105  | 1   | C16AA = 1.125 x 0.943 x 0.105 |
| V2     | 0.00        | 10,920.32     | 2,384.07  | 2,715.55   | 2.00 x 0.134  | 1   | C22AA = 1.125 x 1.086 x 0.134 |

# STRESS ANALYSIS - PAGE 3



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:11:47 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 48G5N16K</b>           | Mark:<br><b>SJI2B</b>                    |

## TCX Design

| TCX Left                             |         | TCX Right                            |         |
|--------------------------------------|---------|--------------------------------------|---------|
| TCX Length                           | 0-0     | TCX Length                           | 0-0     |
| TCX Type                             | R       | TCX Type                             | R       |
| TCX Depth                            | 7 1/2   | TCX Depth                            | 7 1/2   |
| BPL Length                           | 0-6     | BPL Length                           | 0-6     |
| Clear Bearing                        | 0-8 1/4 | Clear Bearing                        | 0-8 1/4 |
| BPL Material: 406050 = 4 x 6 x 0.500 |         | BPL Material: 406050 = 4 x 6 x 0.500 |         |
| Total Load                           | 0.00    | Total Load                           | 0.00    |
| Reqd TL Def L/80                     | 0.00    | Reqd TL Def L/80                     | 0.00    |
| Live Load                            | 0.00    | Live Load                            | 0.00    |
| Reqd LL Def L/120                    | 0.00    | Reqd LL Def L/120                    | 0.00    |
| Section Modulus                      | 0.0000  | Section Modulus                      | 0.0000  |
| Reqd SM                              | 0.0000  | Reqd SM                              | 0.0000  |
| Mom of Inertia                       | 0.0000  | Mom of Inertia                       | 0.0000  |
| Reqd MI                              | 0.0000  | Reqd MI                              | 0.0000  |
| Seat Type: Lapped                    |         | Seat Type: Lapped                    |         |
|                                      |         |                                      |         |

## Load Combinations

|                                     |                                                                         |
|-------------------------------------|-------------------------------------------------------------------------|
| Case 1: DL                          | Case 5c_mr: 0.6(DL)+WL+AX+IP-M                                          |
| Case 2a: LL                         | Case 5d: 0.6(DL)+WL-AX+IP-M                                             |
| Case 2b: SL                         | Case 5d_mr: 0.6(DL)+WL-AX+IP+M                                          |
| Case 3a: DL+CL+TL+LL                | Case 5e: (0.6-0.14(SDS))DL+AX+SM+M                                      |
| Case 3b: DL+CL+TL+SL                | Case 5e_mr: (0.6-0.14(SDS))DL+AX+SM-M                                   |
| Case 3c: DL+CL+TL+LL+FEM            | Case 5f: (0.6-0.14(SDS))DL-AX+SM-M                                      |
| Case 3d: DL+CL+TL+SL+FEM            | Case 5f_mr: (0.6-0.14(SDS))DL-AX+SM+M                                   |
| Case 3e: DL+CL+TL+LL                | Case 6a: DL+CL+0.85(TL)+WL+AX+M                                         |
| Case 3f: DL+CL+TL+SL                | Case 6a_mr: DL+CL+0.85(TL)+WL+AX-M                                      |
| Case 4a: DL+WL+AX+M                 | Case 6b: DL+CL+0.85(TL)+WL-AX-M                                         |
| Case 4a_mr: DL+WL+AX-M              | Case 6b_mr: DL+CL+0.85(TL)+WL-AX+M                                      |
| Case 4b: DL+WL-AX-M                 | Case 6c: DL+CL+0.85(TL)+WL+C+AX+IP+M                                    |
| Case 4b_mr: DL+WL-AX+M              | Case 6c_mr: DL+CL+0.85(TL)+WL+C+AX+IP-M                                 |
| Case 4c: DL+WL+AX+IP+M              | Case 6d: DL+CL+0.85(TL)+WL+C-AX+IP-M                                    |
| Case 4c_mr: DL+WL+AX+IP-M           | Case 6d_mr: DL+CL+0.85(TL)+WL+C-AX+IP+M                                 |
| Case 4d: DL+WL-AX+IP-M              | Case 6e: DL+CL+0.85(TL)+WL+AX+IP+M                                      |
| Case 4d_mr: DL+WL-AX+IP+M           | Case 6e_mr: DL+CL+0.85(TL)+WL+AX+IP-M                                   |
| Case 4e: (1+0.14(SDS))DL+SM+AX+M    | Case 6f: DL+CL+0.85(TL)+WL-AX+IP-M                                      |
| Case 4e_mr: (1+0.14(SDS))DL+SM+AX-M | Case 6f_mr: DL+CL+0.85(TL)+WL-AX+IP+M                                   |
| Case 4f: (1+0.14(SDS))DL+SM-AX-M    | Case 6g: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX+M    |
| Case 4f_mr: (1+0.14(SDS))DL+SM-AX+M | Case 6g_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX-M |
| Case 5a: 0.6(DL)+WL+AX+M            | Case 6h: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX-M    |
| Case 5a_mr: 0.6(DL)+WL+AX-M         | Case 6h_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX+M |
| Case 5b: 0.6(DL)+WL-AX-M            | Case 7a: DL+CL+0.85(TL)+0.75(WL+AX+LL+M)                                |
| Case 5b_mr: 0.6(DL)+WL-AX+M         | Case 7a_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL-M)                             |
| Case 5c: 0.6(DL)+WL+AX+IP+M         | Case 7b: DL+CL+0.85(TL)+0.75(WL-AX+LL-M)                                |

# STRESS ANALYSIS - PAGE 4



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|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:11:47 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 48G5N16K</b>           | Mark:<br><b>SJI2B</b>                    |

## Load Combinations Continued

Case 7b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+M)  
Case 7c: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP+M)  
Case 7c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP-M)  
Case 7d: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP-M)  
Case 7d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP+M)  
Case 7e: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP+M)  
Case 7e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP-M)  
Case 7f: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP-M)  
Case 7f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP+M)  
Case 7g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL+M)  
Case 7g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL-M)  
Case 7h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL-M)  
Case 7h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL+M)  
Case 8a: DL+CL+0.85(TL)+0.75(WL+AX+SL+M)  
Case 8a\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL-M)  
Case 8b: DL+CL+0.85(TL)+0.75(WL-AX+SL-M)  
Case 8b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+M)  
Case 8c: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP+M)  
Case 8c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP-M)  
Case 8d: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP-M)  
Case 8d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP+M)  
Case 8e: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP+M)  
Case 8e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP-M)  
Case 8f: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP-M)  
Case 8f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP+M)  
Case 8g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX+M)  
Case 8g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX-M)  
Case 8h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX-M)  
Case 8h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX+M)

# STRESS ANALYSIS - PAGE 1



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:12:03 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 48G5N26K</b>           | Mark:<br><b>SJI2C</b>                    |

## Geometry

|                             |                                |                              |                                  |                                        |                             |                                  |                            |
|-----------------------------|--------------------------------|------------------------------|----------------------------------|----------------------------------------|-----------------------------|----------------------------------|----------------------------|
| Base Length:<br><b>48-0</b> | Working Length:<br><b>47-8</b> | Joist Depth:<br><b>48.00</b> | Effective Depth:<br><b>45.43</b> | BC Panel Length:<br><b>4 @ 9-7 1/8</b> | SDS Value:<br><b>0.0000</b> | Shape:<br><b>Parallel Chords</b> | TC Slope:<br><b>0.0000</b> |
| Variable                    | Left End                       | Right End                    |                                  |                                        |                             |                                  |                            |
| BC Panel                    | 4-9 1/2                        | 4-9 1/2                      |                                  |                                        |                             |                                  |                            |
| TC Panel                    | 4-9 1/2                        | 4-9 1/2                      |                                  |                                        |                             |                                  |                            |
| First Half                  | 4-9 3/4                        | 4-9 7/8                      |                                  |                                        |                             |                                  |                            |
| First Diag.                 | 9-7 1/4                        | 9-7 3/8                      |                                  |                                        |                             |                                  |                            |
| Depth                       | 48.00                          | 48.00                        |                                  |                                        |                             |                                  |                            |
| Trib Width                  | 0-0                            | 0-0                          |                                  |                                        |                             |                                  |                            |

## Loads

| Load Type       | Category | Load1     | Load2 | Position | Direction | Loc/Begin | Sp/End  | Reference |
|-----------------|----------|-----------|-------|----------|-----------|-----------|---------|-----------|
| Conc Load (lbs) | TL       | 13,000.00 | 0.00  | TC       | +         | 0-2       | 0-2     | L-BL      |
| Conc Load (lbs) | TL       | 26,000.00 | 0.00  | TC       | +         | 9-7 1/4   | 9-5 1/4 | L-BL      |
| Conc Load (lbs) | TL       | 26,000.00 | 0.00  | TC       | +         | 19-2 3/8  | 9-7 1/8 | L-BL      |
| Conc Load (lbs) | TL       | 26,000.00 | 0.00  | TC       | +         | 28-9 1/2  | 9-7 1/8 | L-BL      |
| Conc Load (lbs) | TL       | 26,000.00 | 0.00  | TC       | +         | 38-4 5/8  | 9-7 1/8 | L-BL      |
| Conc Load (lbs) | TL       | 13,000.00 | 0.00  | TC       | +         | 47-10     | 9-5 3/8 | L-BL      |

## Stress Analysis Summary

|                         |            |                         |            |                           |             |                           |            |                             |  |                             |  |                              |  |
|-------------------------|------------|-------------------------|------------|---------------------------|-------------|---------------------------|------------|-----------------------------|--|-----------------------------|--|------------------------------|--|
| Int. Panel TC:<br>57.63 |            | Max Panel BC:<br>115.50 |            | Reaction LE:<br>65,011.36 |             | Reaction RE:<br>64,988.63 |            | Minimum Shear:<br>16,252.84 |  | Max TC Comp.:<br>195,598.66 |  | Max BC Tension<br>195,613.05 |  |
| Member                  | TC Tension | TC Compression          | BC Tension | BC Compression            | Web Tension | Web Comp.                 | Web Length | PP Dist.                    |  |                             |  |                              |  |
| W2                      | 0.00       | 63,544.08               | 0.00       | 0.00                      | 82,115.97   | 20,528.99                 | 71.72      | 0-2                         |  |                             |  |                              |  |
| W3                      | 0.00       | 63,544.08               | 129,664.30 | 0.00                      | 0.00        | 84,125.29                 | 73.48      | 4-9 1/2                     |  |                             |  |                              |  |
| W4                      | 0.00       | 162,588.47              | 129,664.30 | 0.00                      | 41,959.42   | 10,489.86                 | 73.28      | 9-7 1/4                     |  |                             |  |                              |  |
| W5                      | 0.00       | 162,588.47              | 195,584.23 | 0.00                      | 0.00        | 42,015.61                 | 73.38      | 14-4 3/4                    |  |                             |  |                              |  |
| W6                      | 0.00       | 195,598.66              | 195,584.23 | 0.00                      | 26,252.87   | 6,563.22                  | 73.38      | 19-2 3/8                    |  |                             |  |                              |  |
| W6                      | 0.00       | 195,598.66              | 195,613.05 | 0.00                      | 0.00        | 26,217.76                 | 73.28      | 24-0                        |  |                             |  |                              |  |
| W5                      | 0.00       | 162,717.63              | 195,613.05 | 0.00                      | 0.00        | 41,922.75                 | 73.28      | 28-9 1/2                    |  |                             |  |                              |  |
| W4                      | 0.00       | 162,717.63              | 129,750.69 | 0.00                      | 41,978.91   | 10,494.73                 | 73.38      | 33-7                        |  |                             |  |                              |  |
| W3                      | 0.00       | 63,516.32               | 129,750.69 | 0.00                      | 0.00        | 84,201.01                 | 73.57      | 38-4 5/8                    |  |                             |  |                              |  |
| W2                      | 0.00       | 63,516.32               | 0.00       | 0.00                      | 82,080.09   | 20,520.02                 | 71.72      | 43-2 1/2                    |  |                             |  |                              |  |

## Standard Verticals

| Member | Position  | Max Tension | Max Comp. | Length |
|--------|-----------|-------------|-----------|--------|
| V1     | End Panel | 0.00        | 1,270.88  | 45.43  |
| V2     | Interior  | 0.00        | 3,911.97  | 45.43  |

## STRESS ANALYSIS - PAGE 2



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:12:03 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 48G5N26K</b>           | Mark:<br><b>SJI2C</b>                    |

## Chord Properties

| Chord | Area   | Rx     | Rz     | Ryy    | Y      | Ix      | Q      | Material             |
|-------|--------|--------|--------|--------|--------|---------|--------|----------------------|
| TC    | 4.1882 | 1.5476 | 0.9861 | 2.5085 | 1.4117 | 10.0307 | 0.9798 | 5043 = 5 x 5 x 0.438 |
| BC    | 3.3122 | 1.2260 | 0.7846 | 2.1152 | 1.1611 | 4.9786  | 1.0000 | 4043 = 4 x 4 x 0.438 |

## Axial and Bending Analysis

|                   |                         |                         |                                    |                            |                            |                                  |                                  |
|-------------------|-------------------------|-------------------------|------------------------------------|----------------------------|----------------------------|----------------------------------|----------------------------------|
| K:<br><b>1.00</b> | Fy:<br><b>50,000.00</b> | Fb:<br><b>30,000.00</b> | Mom of Inertia:<br><b>7,663.48</b> | LL 360:<br><b>2,643.52</b> | LL 240:<br><b>3,965.27</b> | Max Bridg TC:<br><b>35-6 1/2</b> | Max Bridg BC:<br><b>42-3 5/8</b> |
|-------------------|-------------------------|-------------------------|------------------------------------|----------------------------|----------------------------|----------------------------------|----------------------------------|

| Top Chord Check    | End Panel LE | First Panel LE | Interior Panel | First Panel RE | End Panel RE | Gap Between Chords:<br><b>1.1250</b>              |
|--------------------|--------------|----------------|----------------|----------------|--------------|---------------------------------------------------|
| Length             | 55.50        | 57.75          | 57.63          | 57.88          | 55.50        | Min Weld Len 2X:<br><b>1.4050</b>                 |
| Bending Load       | 0.00         | 0.00           | 0.00           | 0.00           | 0.00         | Max Load Fillers TC:<br><b>212,780.80</b>         |
| Axial Load         | 63,544.08    | 63,544.08      | 195,598.66     | 63,516.32      | 63,516.32    | Max Load no Fillers TC:<br><b>193,945.44</b>      |
| fa                 | 7,586.08     | 7,586.08       | 23,351.16      | 7,582.77       | 7,582.77     | TC OAL/Ryy:<br><b>228.03</b>                      |
| Maximum K L/r      | 56.28        | 58.56          | 45.89          | 58.69          | 56.28        | BC OAL/Ryy:<br><b>270.43</b>                      |
| Fcr                | 39,042.36    | 38,316.29      | 42,126.77      | 38,275.51      | 39,042.36    | BC Stress:<br><b>0.98</b>                         |
| Fa                 | 23,425.42    | 22,989.77      | 25,276.06      | 22,965.31      | 23,425.42    | BC L/Rz:<br><b>147.2088</b>                       |
| F'e                | 222,550.84   | 205,547.05     | 207,338.27     | 204,660.11     | 222,550.84   | TC Shear Stress:<br><b>14,174.44</b>              |
| Cm                 | 0.9830       | 0.9815         | 0.9245         | 0.9815         | 0.9830       | BC Shear Stress:<br><b>16,964.95</b>              |
| Panel Point Moment | 0.00         | 0.00           | 0.00           | 0.00           | 0.00         | TC Bearing Capacity:<br><b>13.00K &lt; 15.97K</b> |
| Mid Panel Moment   | 0.00         | 0.00           | 0.00           | 0.00           | 0.00         |                                                   |
| Panel Point fb     | 0.00         | 0.00           | 0.00           | 0.00           | 0.00         |                                                   |
| Mid Panel fb       | 0.00         | 0.00           | 0.00           | 0.00           | 0.00         |                                                   |
| Fillers            | 0            | 0              | 2              | 0              | 0            |                                                   |
| Panel Point Stress | 7,586.08     | 7,586.08       | 23,351.16      | 7,582.77       | 7,582.77     |                                                   |
| Mid Panel Stress   | 0.3238       | 0.3300         | 0.9238         | 0.3302         | 0.3237       |                                                   |

## Web Design

| Member | Web Tension | Allow Tension | Web Comp  | Allow Comp | Weld          | Qty | Material                      |
|--------|-------------|---------------|-----------|------------|---------------|-----|-------------------------------|
| W2     | 82,115.97   | 86,681.16     | 20,528.99 | 56,523.74  | 22.12 x 0.250 | 2   | A50A = 3.094 x 3.094 x 0.250  |
| W3     | 0.00        | 126,207.77    | 84,125.29 | 89,334.05  | 18.10 x 0.313 | 2   | 3531 = 3 1/2 x 3 1/2 x 0.313  |
| W4     | 41,959.42   | 43,144.61     | 10,489.86 | 17,024.97  | 15.11 x 0.187 | 2   | A36A = 2.094 x 2.094 x 0.187  |
| W5     | 0.00        | 78,227.12     | 42,015.61 | 48,853.45  | 12.46 x 0.227 | 2   | A48A = 3.063 x 3.063 x 0.227  |
| W6     | 26,252.87   | 28,799.25     | 6,563.22  | 7,952.41   | 11.79 x 0.150 | 2   | A28A = 1.750 x 1.750 x 0.150  |
| W6     | 0.00        | 54,975.46     | 26,217.76 | 26,709.37  | 9.42 x 0.188  | 2   | A40A = 2.375 x 2.375 x 0.209  |
| W5     | 0.00        | 78,227.12     | 41,922.75 | 48,905.83  | 12.44 x 0.227 | 2   | A48A = 3.063 x 3.063 x 0.227  |
| W4     | 41,978.91   | 43,144.61     | 10,494.73 | 16,982.60  | 15.12 x 0.187 | 2   | A36A = 2.094 x 2.094 x 0.187  |
| W3     | 0.00        | 126,207.77    | 84,201.01 | 89,254.53  | 18.12 x 0.313 | 2   | 3531 = 3 1/2 x 3 1/2 x 0.313  |
| W2     | 82,080.09   | 86,681.16     | 20,520.02 | 56,523.74  | 22.11 x 0.250 | 2   | A50A = 3.094 x 3.094 x 0.250  |
| V1     | 0.00        | 7,872.16      | 1,270.88  | 1,539.62   | 2.00 x 0.105  | 1   | C16AA = 1.125 x 0.943 x 0.105 |
| V2     | 0.00        | 14,408.67     | 3,911.97  | 4,627.36   | 2.00 x 0.150  | 1   | C28AA = 1.125 x 1.347 x 0.150 |

# STRESS ANALYSIS - PAGE 3



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:12:03 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 48G5N26K</b>           | Mark:<br><b>SJI2C</b>                    |

## TCX Design

| TCX Left                             |         | TCX Right                            |         |
|--------------------------------------|---------|--------------------------------------|---------|
| TCX Length                           | 0-0     | TCX Length                           | 0-0     |
| TCX Type                             | R       | TCX Type                             | R       |
| TCX Depth                            | 7 1/2   | TCX Depth                            | 7 1/2   |
| BPL Length                           | 0-6     | BPL Length                           | 0-6     |
| Clear Bearing                        | 0-7 1/2 | Clear Bearing                        | 0-7 1/2 |
| BPL Material: 406050 = 4 x 6 x 0.500 |         | BPL Material: 406050 = 4 x 6 x 0.500 |         |
| Total Load                           | 0.00    | Total Load                           | 0.00    |
| Reqd TL Def L/80                     | 0.00    | Reqd TL Def L/80                     | 0.00    |
| Live Load                            | 0.00    | Live Load                            | 0.00    |
| Reqd LL Def L/120                    | 0.00    | Reqd LL Def L/120                    | 0.00    |
| Section Modulus                      | 0.0000  | Section Modulus                      | 0.0000  |
| Reqd SM                              | 0.0000  | Reqd SM                              | 0.0000  |
| Mom of Inertia                       | 0.0000  | Mom of Inertia                       | 0.0000  |
| Reqd MI                              | 0.0000  | Reqd MI                              | 0.0000  |
| Seat Type: Lapped                    |         | Seat Type: Lapped                    |         |
|                                      |         |                                      |         |

## Load Combinations

|                                     |                                                                         |
|-------------------------------------|-------------------------------------------------------------------------|
| Case 1: DL                          | Case 5c_mr: 0.6(DL)+WL+AX+IP-M                                          |
| Case 2a: LL                         | Case 5d: 0.6(DL)+WL-AX+IP-M                                             |
| Case 2b: SL                         | Case 5d_mr: 0.6(DL)+WL-AX+IP+M                                          |
| Case 3a: DL+CL+TL+LL                | Case 5e: (0.6-0.14(SDS))DL+AX+SM+M                                      |
| Case 3b: DL+CL+TL+SL                | Case 5e_mr: (0.6-0.14(SDS))DL+AX+SM-M                                   |
| Case 3c: DL+CL+TL+LL+FEM            | Case 5f: (0.6-0.14(SDS))DL-AX+SM-M                                      |
| Case 3d: DL+CL+TL+SL+FEM            | Case 5f_mr: (0.6-0.14(SDS))DL-AX+SM+M                                   |
| Case 3e: DL+CL+TL+LL                | Case 6a: DL+CL+0.85(TL)+WL+AX+M                                         |
| Case 3f: DL+CL+TL+SL                | Case 6a_mr: DL+CL+0.85(TL)+WL+AX-M                                      |
| Case 4a: DL+WL+AX+M                 | Case 6b: DL+CL+0.85(TL)+WL-AX-M                                         |
| Case 4a_mr: DL+WL+AX-M              | Case 6b_mr: DL+CL+0.85(TL)+WL-AX+M                                      |
| Case 4b: DL+WL-AX-M                 | Case 6c: DL+CL+0.85(TL)+WL+C+AX+IP+M                                    |
| Case 4b_mr: DL+WL-AX+M              | Case 6c_mr: DL+CL+0.85(TL)+WL+C+AX+IP-M                                 |
| Case 4c: DL+WL+AX+IP+M              | Case 6d: DL+CL+0.85(TL)+WL+C-AX+IP-M                                    |
| Case 4c_mr: DL+WL+AX+IP-M           | Case 6d_mr: DL+CL+0.85(TL)+WL+C-AX+IP+M                                 |
| Case 4d: DL+WL-AX+IP-M              | Case 6e: DL+CL+0.85(TL)+WL+AX+IP+M                                      |
| Case 4d_mr: DL+WL-AX+IP+M           | Case 6e_mr: DL+CL+0.85(TL)+WL+AX+IP-M                                   |
| Case 4e: (1+0.14(SDS))DL+SM+AX+M    | Case 6f: DL+CL+0.85(TL)+WL-AX+IP-M                                      |
| Case 4e_mr: (1+0.14(SDS))DL+SM+AX-M | Case 6f_mr: DL+CL+0.85(TL)+WL-AX+IP+M                                   |
| Case 4f: (1+0.14(SDS))DL+SM-AX-M    | Case 6g: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX+M    |
| Case 4f_mr: (1+0.14(SDS))DL+SM-AX+M | Case 6g_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX-M |
| Case 5a: 0.6(DL)+WL+AX+M            | Case 6h: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX-M    |
| Case 5a_mr: 0.6(DL)+WL+AX-M         | Case 6h_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX+M |
| Case 5b: 0.6(DL)+WL-AX-M            | Case 7a: DL+CL+0.85(TL)+0.75(WL+AX+LL+M)                                |
| Case 5b_mr: 0.6(DL)+WL-AX+M         | Case 7a_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL-M)                             |
| Case 5c: 0.6(DL)+WL+AX+IP+M         | Case 7b: DL+CL+0.85(TL)+0.75(WL-AX+LL-M)                                |

# STRESS ANALYSIS - PAGE 4



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|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:12:03 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 48G5N26K</b>           | Mark:<br><b>SJI2C</b>                    |

## Load Combinations Continued

Case 7b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+M)  
Case 7c: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP+M)  
Case 7c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP-M)  
Case 7d: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP-M)  
Case 7d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP+M)  
Case 7e: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP+M)  
Case 7e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP-M)  
Case 7f: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP-M)  
Case 7f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP+M)  
Case 7g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL+M)  
Case 7g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL-M)  
Case 7h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL-M)  
Case 7h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL+M)  
Case 8a: DL+CL+0.85(TL)+0.75(WL+AX+SL+M)  
Case 8a\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL-M)  
Case 8b: DL+CL+0.85(TL)+0.75(WL-AX+SL-M)  
Case 8b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+M)  
Case 8c: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP+M)  
Case 8c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP-M)  
Case 8d: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP-M)  
Case 8d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP+M)  
Case 8e: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP+M)  
Case 8e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP-M)  
Case 8f: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP-M)  
Case 8f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP+M)  
Case 8g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX+M)  
Case 8g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX-M)  
Case 8h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX-M)  
Case 8h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX+M)

# STRESS ANALYSIS - PAGE 1



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:12:17 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 48G5N36K</b>           | Mark:<br><b>SJI2D</b>                    |

## Geometry

|                             |                                |                              |                                  |                                        |                             |                                  |                            |
|-----------------------------|--------------------------------|------------------------------|----------------------------------|----------------------------------------|-----------------------------|----------------------------------|----------------------------|
| Base Length:<br><b>48-0</b> | Working Length:<br><b>47-8</b> | Joist Depth:<br><b>48.00</b> | Effective Depth:<br><b>44.88</b> | BC Panel Length:<br><b>4 @ 9-7 1/8</b> | SDS Value:<br><b>0.0000</b> | Shape:<br><b>Parallel Chords</b> | TC Slope:<br><b>0.0000</b> |
| Variable                    | Left End                       | Right End                    |                                  |                                        |                             |                                  |                            |
| BC Panel                    | 4-9 1/2                        | 4-9 1/2                      |                                  |                                        |                             |                                  |                            |
| TC Panel                    | 4-9 1/2                        | 4-9 1/2                      |                                  |                                        |                             |                                  |                            |
| First Half                  | 4-9 3/4                        | 4-9 7/8                      |                                  |                                        |                             |                                  |                            |
| First Diag.                 | 9-7 1/4                        | 9-7 3/8                      |                                  |                                        |                             |                                  |                            |
| Depth                       | 48.00                          | 48.00                        |                                  |                                        |                             |                                  |                            |
| Trib Width                  | 0-0                            | 0-0                          |                                  |                                        |                             |                                  |                            |

## Loads

| Load Type       | Category | Load1     | Load2 | Position | Direction | Loc/Begin | Sp/End  | Reference |
|-----------------|----------|-----------|-------|----------|-----------|-----------|---------|-----------|
| Conc Load (lbs) | TL       | 18,000.00 | 0.00  | TC       | +         | 0-2       | 0-2     | L-BL      |
| Conc Load (lbs) | TL       | 36,000.00 | 0.00  | TC       | +         | 9-7 1/4   | 9-5 1/4 | L-BL      |
| Conc Load (lbs) | TL       | 36,000.00 | 0.00  | TC       | +         | 19-2 3/8  | 9-7 1/8 | L-BL      |
| Conc Load (lbs) | TL       | 36,000.00 | 0.00  | TC       | +         | 28-9 1/2  | 9-7 1/8 | L-BL      |
| Conc Load (lbs) | TL       | 36,000.00 | 0.00  | TC       | +         | 38-4 5/8  | 9-7 1/8 | L-BL      |
| Conc Load (lbs) | TL       | 18,000.00 | 0.00  | TC       | +         | 47-10     | 9-5 3/8 | L-BL      |

## Stress Analysis Summary

|                         |                         |                           |                           |                             |                             |                              |            |          |
|-------------------------|-------------------------|---------------------------|---------------------------|-----------------------------|-----------------------------|------------------------------|------------|----------|
| Int. Panel TC:<br>57.63 | Max Panel BC:<br>115.50 | Reaction LE:<br>90,015.73 | Reaction RE:<br>89,984.27 | Minimum Shear:<br>22,503.93 | Max TC Comp.:<br>274,124.94 | Max BC Tension<br>274,145.09 |            |          |
| Member                  | TC Tension              | TC Compression            | BC Tension                | BC Compression              | Web Tension                 | Web Comp.                    | Web Length | PP Dist. |
| W2                      | 0.00                    | 89,054.91                 | 0.00                      | 0.00                        | 114,529.66                  | 28,632.41                    | 71.38      | 0-2      |
| V1S                     | 0.00                    | 89,054.91                 | 0.00                      | 0.00                        | 0.00                        | 1,781.10                     | 44.88      | 4-9 1/2  |
| W3                      | 0.00                    | 89,054.91                 | 181,720.14                | 0.00                        | 0.00                        | 117,358.91                   | 73.14      | 4-9 1/2  |
| W4                      | 0.00                    | 227,862.28                | 181,720.14                | 0.00                        | 58,533.99                   | 14,633.50                    | 72.94      | 9-7 1/4  |
| V2                      | 0.00                    | 227,862.28                | 181,720.14                | 0.00                        | 0.00                        | 4,557.25                     | 44.88      | 14-4 3/4 |
| W5                      | 0.00                    | 227,862.28                | 274,104.72                | 0.00                        | 0.00                        | 58,613.11                    | 73.04      | 14-4 3/4 |
| W6                      | 0.00                    | 274,124.94                | 274,104.72                | 0.00                        | 36,623.59                   | 9,155.90                     | 73.04      | 19-2 3/8 |
| V3                      | 0.00                    | 274,124.94                | 274,104.72                | 0.00                        | 0.00                        | 5,482.50                     | 44.88      | 24-0     |
| W6                      | 0.00                    | 274,124.94                | 274,145.09                | 0.00                        | 0.00                        | 36,574.16                    | 72.94      | 24-0     |
| W5                      | 0.00                    | 228,043.28                | 274,145.09                | 0.00                        | 0.00                        | 58,482.85                    | 72.94      | 28-9 1/2 |
| V4                      | 0.00                    | 228,043.28                | 274,145.09                | 0.00                        | 0.00                        | 4,560.87                     | 44.88      | 33-7     |
| W4                      | 0.00                    | 228,043.28                | 181,841.23                | 0.00                        | 58,561.92                   | 14,640.48                    | 73.04      | 33-7     |
| W3                      | 0.00                    | 89,015.99                 | 181,841.23                | 0.00                        | 0.00                        | 117,465.99                   | 73.24      | 38-4 5/8 |
| V1S                     | 0.00                    | 89,015.99                 | 0.00                      | 0.00                        | 0.00                        | 1,780.32                     | 44.88      | 43-2 1/2 |
| W2                      | 0.00                    | 89,015.99                 | 0.00                      | 0.00                        | 114,479.61                  | 28,619.90                    | 71.38      | 43-2 1/2 |

## STRESS ANALYSIS - PAGE 2



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:12:17 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 48G5N36K</b>           | Mark:<br><b>SJI2D</b>                    |

## Chord Properties

| Chord | Area   | Rx     | Rz     | Ryy    | Y      | Ix      | Q      | Material             |
|-------|--------|--------|--------|--------|--------|---------|--------|----------------------|
| TC    | 5.7500 | 1.8607 | 1.1847 | 2.9176 | 1.6848 | 19.9078 | 0.9613 | 6050 = 6 x 6 x 0.500 |
| BC    | 4.7500 | 1.5390 | 0.9829 | 2.5210 | 1.4342 | 11.2503 | 1.0000 | 5050 = 5 x 5 x 0.500 |

## Axial and Bending Analysis

|                    |                         |                         |                                     |                            |                            |                                                   |                              |
|--------------------|-------------------------|-------------------------|-------------------------------------|----------------------------|----------------------------|---------------------------------------------------|------------------------------|
| K:<br><b>1.00</b>  | Fy:<br><b>50,000.00</b> | Fb:<br><b>30,000.00</b> | Mom of Inertia:<br><b>10,541.49</b> | LL 360:<br><b>3,636.29</b> | LL 240:<br><b>5,454.43</b> | Max Bridg TC:<br><b>41-4</b>                      | Max Bridg BC:<br><b>50-5</b> |
| Top Chord Check    | End Panel LE            | First Panel LE          | Interior Panel                      | First Panel RE             | End Panel RE               | Gap Between Chords:<br><b>1.1250</b>              |                              |
| Length             | 55.50                   | 57.75                   | 57.63                               | 57.88                      | 55.50                      | Min Weld Len 2X:<br><b>1.9691</b>                 |                              |
| Bending Load       | 0.00                    | 0.00                    | 0.00                                | 0.00                       | 0.00                       | Max Load Fillers TC:<br><b>298,759.47</b>         |                              |
| Axial Load         | 89,054.91               | 89,054.91               | 274,124.94                          | 89,015.99                  | 89,015.99                  | Max Load no Fillers TC:<br><b>282,245.22</b>      |                              |
| fa                 | 7,743.91                | 7,743.91                | 23,836.95                           | 7,740.52                   | 7,740.52                   | TC OAL/Ryy:<br><b>196.05</b>                      |                              |
| Maximum K L/r      | 46.85                   | 48.75                   | 48.64                               | 48.85                      | 46.85                      | BC OAL/Ryy:<br><b>226.90</b>                      |                              |
| Fcr                | 41,194.60               | 40,672.25               | 40,701.64                           | 40,642.82                  | 41,194.60                  | BC Stress:<br><b>0.96</b>                         |                              |
| Fa                 | 24,716.76               | 24,403.35               | 24,420.98                           | 24,385.70                  | 24,716.76                  | BC L/Rz:<br><b>117.5094</b>                       |                              |
| F'e                | 321,709.97              | 297,130.00              | 298,420.44                          | 295,847.88                 | 321,709.97                 | TC Shear Stress:<br><b>14,369.65</b>              |                              |
| Cm                 | 0.9880                  | 0.9870                  | 0.9465                              | 0.9869                     | 0.9880                     | BC Shear Stress:<br><b>16,570.26</b>              |                              |
| Panel Point Moment | 0.00                    | 0.00                    | 0.00                                | 0.00                       | 0.00                       | TC Bearing Capacity:<br><b>18.00K &lt; 19.32K</b> |                              |
| Mid Panel Moment   | 0.00                    | 0.00                    | 0.00                                | 0.00                       | 0.00                       |                                                   |                              |
| Panel Point fb     | 0.00                    | 0.00                    | 0.00                                | 0.00                       | 0.00                       |                                                   |                              |
| Mid Panel fb       | 0.00                    | 0.00                    | 0.00                                | 0.00                       | 0.00                       |                                                   |                              |
| Fillers            | 0                       | 0                       | 0                                   | 0                          | 0                          |                                                   |                              |
| Panel Point Stress | 7,743.91                | 7,743.91                | 23,836.95                           | 7,740.52                   | 7,740.52                   |                                                   |                              |
| Mid Panel Stress   | 0.3133                  | 0.3173                  | 0.9761                              | 0.3174                     | 0.3132                     |                                                   |                              |

## Web Design

| Member | Web Tension | Allow Tension | Web Comp   | Allow Comp | Weld          | Qty | Material                      |
|--------|-------------|---------------|------------|------------|---------------|-----|-------------------------------|
| W2     | 114,529.66  | 116,173.87    | 28,632.41  | 82,071.12  | 26.87 x 0.287 | 2   | 3528 = 3 1/2 x 3 1/2 x 0.287  |
| V1S    | 0.00        | 9,017.86      | 1,781.10   | 2,069.36   | 2.00 x 0.115  | 1   | C18AA = 1.125 x 1.012 x 0.115 |
| W3     | 0.00        | 172,421.66    | 117,358.91 | 133,397.75 | 21.08 x 0.375 | 2   | 4037 = 4 x 4 x 0.375          |
| W4     | 58,533.99   | 61,276.80     | 14,633.50  | 33,758.43  | 18.86 x 0.209 | 2   | A42A = 2.625 x 2.625 x 0.209  |
| V2     | 0.00        | 14,408.67     | 4,557.25   | 4,713.76   | 2.05 x 0.150  | 1   | C28AA = 1.125 x 1.347 x 0.150 |
| W5     | 0.00        | 96,902.01     | 58,613.11  | 61,484.66  | 18.07 x 0.218 | 2   | 3028 = 3 x 3 x 0.281          |
| W6     | 36,623.59   | 37,440.23     | 9,155.90   | 12,730.03  | 14.01 x 0.176 | 2   | A34A = 1.938 x 1.938 x 0.176  |
| V3     | 0.00        | 18,714.09     | 5,482.50   | 6,005.47   | 2.10 x 0.176  | 1   | C34AA = 1.125 x 1.549 x 0.176 |
| W6     | 0.00        | 67,578.15     | 36,574.16  | 40,123.40  | 13.14 x 0.188 | 2   | A44A = 2.875 x 2.875 x 0.209  |
| W5     | 0.00        | 96,902.01     | 58,482.85  | 61,560.14  | 18.02 x 0.218 | 2   | 3028 = 3 x 3 x 0.281          |
| V4     | 0.00        | 14,408.67     | 4,560.87   | 4,713.76   | 2.05 x 0.150  | 1   | C28AA = 1.125 x 1.347 x 0.150 |
| W4     | 58,561.92   | 61,276.80     | 14,640.48  | 33,707.27  | 18.87 x 0.209 | 2   | A42A = 2.625 x 2.625 x 0.209  |
| W3     | 0.00        | 172,421.66    | 117,465.99 | 133,305.28 | 21.09 x 0.375 | 2   | 4037 = 4 x 4 x 0.375          |
| V1S    | 0.00        | 9,017.86      | 1,780.32   | 2,069.36   | 2.00 x 0.115  | 1   | C18AA = 1.125 x 1.012 x 0.115 |
| W2     | 114,479.61  | 116,173.87    | 28,619.90  | 82,071.12  | 26.86 x 0.287 | 2   | 3528 = 3 1/2 x 3 1/2 x 0.287  |

# STRESS ANALYSIS - PAGE 3



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:12:17 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 48G5N36K</b>           | Mark:<br><b>SJI2D</b>                    |

## TCX Design

| TCX Left                             |        | TCX Right                            |        |
|--------------------------------------|--------|--------------------------------------|--------|
| TCX Length                           | 0-0    | TCX Length                           | 0-0    |
| TCX Type                             | R      | TCX Type                             | R      |
| TCX Depth                            | 7 1/2  | TCX Depth                            | 7 1/2  |
| BPL Length                           | 0-6    | BPL Length                           | 0-6    |
| Clear Bearing                        | 0-7    | Clear Bearing                        | 0-7    |
| BPL Material: 406050 = 4 x 6 x 0.500 |        | BPL Material: 406050 = 4 x 6 x 0.500 |        |
| Total Load                           | 0.00   | Total Load                           | 0.00   |
| Reqd TL Def L/80                     | 0.00   | Reqd TL Def L/80                     | 0.00   |
| Live Load                            | 0.00   | Live Load                            | 0.00   |
| Reqd LL Def L/120                    | 0.00   | Reqd LL Def L/120                    | 0.00   |
| Section Modulus                      | 0.0000 | Section Modulus                      | 0.0000 |
| Reqd SM                              | 0.0000 | Reqd SM                              | 0.0000 |
| Mom of Inertia                       | 0.0000 | Mom of Inertia                       | 0.0000 |
| Reqd MI                              | 0.0000 | Reqd MI                              | 0.0000 |
| Seat Type: Lapped                    |        | Seat Type: Lapped                    |        |
|                                      |        |                                      |        |

## Load Combinations

|                                     |                                                                         |
|-------------------------------------|-------------------------------------------------------------------------|
| Case 1: DL                          | Case 5c_mr: 0.6(DL)+WL+AX+IP-M                                          |
| Case 2a: LL                         | Case 5d: 0.6(DL)+WL-AX+IP-M                                             |
| Case 2b: SL                         | Case 5d_mr: 0.6(DL)+WL-AX+IP+M                                          |
| Case 3a: DL+CL+TL+LL                | Case 5e: (0.6-0.14(SDS))DL+AX+SM+M                                      |
| Case 3b: DL+CL+TL+SL                | Case 5e_mr: (0.6-0.14(SDS))DL+AX+SM-M                                   |
| Case 3c: DL+CL+TL+LL+FEM            | Case 5f: (0.6-0.14(SDS))DL-AX+SM-M                                      |
| Case 3d: DL+CL+TL+SL+FEM            | Case 5f_mr: (0.6-0.14(SDS))DL-AX+SM+M                                   |
| Case 3e: DL+CL+TL+LL                | Case 6a: DL+CL+0.85(TL)+WL+AX+M                                         |
| Case 3f: DL+CL+TL+SL                | Case 6a_mr: DL+CL+0.85(TL)+WL+AX-M                                      |
| Case 4a: DL+WL+AX+M                 | Case 6b: DL+CL+0.85(TL)+WL-AX-M                                         |
| Case 4a_mr: DL+WL+AX-M              | Case 6b_mr: DL+CL+0.85(TL)+WL-AX+M                                      |
| Case 4b: DL+WL-AX-M                 | Case 6c: DL+CL+0.85(TL)+WL+C+AX+IP+M                                    |
| Case 4b_mr: DL+WL-AX+M              | Case 6c_mr: DL+CL+0.85(TL)+WL+C+AX+IP-M                                 |
| Case 4c: DL+WL+AX+IP+M              | Case 6d: DL+CL+0.85(TL)+WL+C-AX+IP-M                                    |
| Case 4c_mr: DL+WL+AX+IP-M           | Case 6d_mr: DL+CL+0.85(TL)+WL+C-AX+IP+M                                 |
| Case 4d: DL+WL-AX+IP-M              | Case 6e: DL+CL+0.85(TL)+WL+AX+IP+M                                      |
| Case 4d_mr: DL+WL-AX+IP+M           | Case 6e_mr: DL+CL+0.85(TL)+WL+AX+IP-M                                   |
| Case 4e: (1+0.14(SDS))DL+SM+AX+M    | Case 6f: DL+CL+0.85(TL)+WL-AX+IP-M                                      |
| Case 4e_mr: (1+0.14(SDS))DL+SM+AX-M | Case 6f_mr: DL+CL+0.85(TL)+WL-AX+IP+M                                   |
| Case 4f: (1+0.14(SDS))DL+SM-AX-M    | Case 6g: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX+M    |
| Case 4f_mr: (1+0.14(SDS))DL+SM-AX+M | Case 6g_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX-M |
| Case 5a: 0.6(DL)+WL+AX+M            | Case 6h: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX-M    |
| Case 5a_mr: 0.6(DL)+WL+AX-M         | Case 6h_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX+M |
| Case 5b: 0.6(DL)+WL-AX-M            | Case 7a: DL+CL+0.85(TL)+0.75(WL+AX+LL+M)                                |
| Case 5b_mr: 0.6(DL)+WL-AX+M         | Case 7a_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL-M)                             |
| Case 5c: 0.6(DL)+WL+AX+IP+M         | Case 7b: DL+CL+0.85(TL)+0.75(WL-AX+LL-M)                                |

## STRESS ANALYSIS - PAGE 4



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|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:12:17 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 48G5N36K</b>           | Mark:<br><b>SJI2D</b>                    |

**Load Combinations Continued**

Case 7b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+M)  
 Case 7c: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP+M)  
 Case 7c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP-M)  
 Case 7d: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP-M)  
 Case 7d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP+M)  
 Case 7e: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP+M)  
 Case 7e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP-M)  
 Case 7f: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP-M)  
 Case 7f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP+M)  
 Case 7g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL+M)  
 Case 7g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL-M)  
 Case 7h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL-M)  
 Case 7h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL+M)  
 Case 8a: DL+CL+0.85(TL)+0.75(WL+AX+SL+M)  
 Case 8a\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL-M)  
 Case 8b: DL+CL+0.85(TL)+0.75(WL-AX+SL-M)  
 Case 8b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+M)  
 Case 8c: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP+M)  
 Case 8c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP-M)  
 Case 8d: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP-M)  
 Case 8d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP+M)  
 Case 8e: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP+M)  
 Case 8e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP-M)  
 Case 8f: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP-M)  
 Case 8f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP+M)  
 Case 8g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX+M)  
 Case 8g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX-M)  
 Case 8h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX-M)  
 Case 8h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX+M)

# STRESS ANALYSIS - PAGE 1



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:19:20 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N4.5K</b>          | Mark:<br><b>SJI3A</b>                    |

## Geometry

|                             |                                |                              |                                  |                                        |                             |                                  |                            |
|-----------------------------|--------------------------------|------------------------------|----------------------------------|----------------------------------------|-----------------------------|----------------------------------|----------------------------|
| Base Length:<br><b>60-0</b> | Working Length:<br><b>59-8</b> | Joist Depth:<br><b>60.00</b> | Effective Depth:<br><b>58.58</b> | BC Panel Length:<br><b>6 @ 8-6 7/8</b> | SDS Value:<br><b>0.0000</b> | Shape:<br><b>Parallel Chords</b> | TC Slope:<br><b>0.0000</b> |
| Variable                    | Left End                       | Right End                    |                                  |                                        |                             |                                  |                            |
| BC Panel                    | 5-0                            | 5-0                          |                                  |                                        |                             |                                  |                            |
| TC Panel                    | 4-3 1/2                        | 4-3 1/2                      |                                  |                                        |                             |                                  |                            |
| First Half                  | 3-6 7/8                        | 3-6 3/4                      |                                  |                                        |                             |                                  |                            |
| First Diag.                 | 8-6 7/8                        | 8-6 3/4                      |                                  |                                        |                             |                                  |                            |
| Depth                       | 60.00                          | 60.00                        |                                  |                                        |                             |                                  |                            |
| Trib Width                  | 0-0                            | 0-0                          |                                  |                                        |                             |                                  |                            |

## Loads

| Load Type       | Category | Load1    | Load2 | Position | Direction | Loc/Begin | Sp/End  | Reference |
|-----------------|----------|----------|-------|----------|-----------|-----------|---------|-----------|
| Conc Load (lbs) | TL       | 2,250.00 | 0.00  | TC       | +         | 0-2       | 0-2     | L-BL      |
| Conc Load (lbs) | TL       | 4,500.00 | 0.00  | TC       | +         | 8-6 7/8   | 8-4 7/8 | L-BL      |
| Conc Load (lbs) | TL       | 4,500.00 | 0.00  | TC       | +         | 17-1 3/4  | 8-6 7/8 | L-BL      |
| Conc Load (lbs) | TL       | 4,500.00 | 0.00  | TC       | +         | 25-8 5/8  | 8-6 7/8 | L-BL      |
| Conc Load (lbs) | TL       | 4,500.00 | 0.00  | TC       | +         | 34-3 1/2  | 8-6 7/8 | L-BL      |
| Conc Load (lbs) | TL       | 4,500.00 | 0.00  | TC       | +         | 42-10 3/8 | 8-6 7/8 | L-BL      |
| Conc Load (lbs) | TL       | 4,500.00 | 0.00  | TC       | +         | 51-5 1/4  | 8-6 7/8 | L-BL      |
| Conc Load (lbs) | TL       | 2,250.00 | 0.00  | TC       | +         | 59-10     | 8-4 3/4 | L-BL      |

## Stress Analysis Summary

|                                |                                |                                  |                                  |                                   |                                   |                                    |            |           |
|--------------------------------|--------------------------------|----------------------------------|----------------------------------|-----------------------------------|-----------------------------------|------------------------------------|------------|-----------|
| Int. Panel TC:<br><b>51.50</b> | Max Panel BC:<br><b>103.00</b> | Reaction LE:<br><b>15,747.64</b> | Reaction RE:<br><b>15,752.36</b> | Minimum Shear:<br><b>3,938.09</b> | Max TC Comp.:<br><b>46,936.85</b> | Max BC Tension<br><b>46,938.92</b> |            |           |
| Member                         | TC Tension                     | TC Compression                   | BC Tension                       | BC Compression                    | Web Tension                       | Web Comp.                          | Web Length | PP Dist.  |
| W2                             | 0.00                           | 13,362.93                        | 0.00                             | 0.00                              | 18,993.53                         | 4,748.38                           | 82.44      | 0-2       |
| V1S                            | 0.00                           | 13,362.93                        | 0.00                             | 0.00                              | 0.00                              | 267.26                             | 59.20      | 4-3 1/2   |
| W3                             | 0.00                           | 13,362.93                        | 23,241.13                        | 0.00                              | 0.00                              | 16,726.18                          | 72.60      | 5-0       |
| W4                             | 0.00                           | 31,131.48                        | 23,241.13                        | 0.00                              | 11,967.26                         | 2,991.81                           | 77.92      | 8-6 7/8   |
| V2                             | 0.00                           | 31,131.48                        | 23,241.13                        | 0.00                              | 0.00                              | 622.63                             | 58.58      | 12-10 1/4 |
| W5                             | 0.00                           | 31,131.48                        | 39,041.04                        | 0.00                              | 0.00                              | 11,979.92                          | 78.00      | 12-10 1/4 |
| W6                             | 0.00                           | 42,994.77                        | 39,041.04                        | 0.00                              | 5,988.39                          | 1,497.10                           | 78.00      | 17-1 3/4  |
| V3                             | 0.00                           | 42,994.77                        | 39,041.04                        | 0.00                              | 0.00                              | 859.90                             | 58.58      | 21-5 1/4  |
| W7                             | 0.00                           | 42,994.77                        | 46,938.92                        | 0.00                              | 0.00                              | 5,982.06                           | 77.92      | 21-5 1/4  |
| W8                             | 0.00                           | 46,936.85                        | 46,938.92                        | 0.00                              | 0.00                              | 5,237.83                           | 77.92      | 25-8 5/8  |
| V4                             | 0.00                           | 46,936.85                        | 46,938.92                        | 0.00                              | 0.00                              | 938.74                             | 58.58      | 30-0      |
| W8                             | 0.00                           | 46,936.85                        | 46,934.78                        | 0.00                              | 5,243.37                          | 1,310.84                           | 78.00      | 30-0      |
| W7                             | 0.00                           | 42,976.89                        | 46,934.78                        | 0.00                              | 0.00                              | 5,994.67                           | 78.00      | 34-3 1/2  |
| V5                             | 0.00                           | 42,976.89                        | 46,934.78                        | 0.00                              | 0.00                              | 859.54                             | 58.58      | 38-7      |
| W6                             | 0.00                           | 42,976.89                        | 39,028.62                        | 0.00                              | 5,988.33                          | 1,497.08                           | 77.92      | 38-7      |
| W5                             | 0.00                           | 31,134.13                        | 39,028.62                        | 0.00                              | 0.00                              | 11,973.53                          | 77.92      | 42-10 3/8 |
| V6                             | 0.00                           | 31,134.13                        | 39,028.62                        | 0.00                              | 0.00                              | 622.68                             | 58.58      | 47-1 3/4  |
| W4                             | 0.00                           | 31,134.13                        | 23,220.44                        | 0.00                              | 11,986.20                         | 2,996.55                           | 78.00      | 47-1 3/4  |
| W3                             | 0.00                           | 13,367.60                        | 23,220.44                        | 0.00                              | 0.00                              | 16,715.03                          | 72.52      | 51-5 1/4  |
| V1S                            | 0.00                           | 13,367.60                        | 0.00                             | 0.00                              | 0.00                              | 267.35                             | 59.20      | 55-8 1/2  |
| W2                             | 0.00                           | 13,367.60                        | 0.00                             | 0.00                              | 19,000.16                         | 4,750.04                           | 82.44      | 55-0      |

\* Continued on Next Page...

## STRESS ANALYSIS - PAGE 1



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|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:19:20 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N4.5K</b>          | Mark:<br><b>SJI3A</b>                    |

### Stress Analysis Summary, Continued...

| Member | TC Tension | TC Compression | BC Tension | BC Compression | Web Tension | Web Comp. | Web Length | PP Dist. |
|--------|------------|----------------|------------|----------------|-------------|-----------|------------|----------|
|--------|------------|----------------|------------|----------------|-------------|-----------|------------|----------|

# STRESS ANALYSIS - PAGE 2



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:19:20 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N4.5K</b>          | Mark:<br><b>SJI3A</b>                    |

## Chord Properties

| Chord | Area   | Rx     | Rz     | Ryy    | Y      | Ix     | Q      | Material                     |
|-------|--------|--------|--------|--------|--------|--------|--------|------------------------------|
| TC    | 1.1875 | 0.7695 | 0.4915 | 1.4931 | 0.7171 | 0.7031 | 1.0000 | 2525 = 2 1/2 x 2 1/2 x 0.250 |
| BC    | 0.9117 | 0.7375 | 0.4413 | 1.4605 | 0.6982 | 0.4958 | 1.0000 | A40A = 2.375 x 2.375 x 0.209 |

## Axial and Bending Analysis

|                    |                         |                         |                                    |                          |                          |                                                 |                                  |
|--------------------|-------------------------|-------------------------|------------------------------------|--------------------------|--------------------------|-------------------------------------------------|----------------------------------|
| K:<br><b>1.00</b>  | Fy:<br><b>50,000.00</b> | Fb:<br><b>30,000.00</b> | Mom of Inertia:<br><b>3,542.62</b> | LL 360:<br><b>623.06</b> | LL 240:<br><b>934.59</b> | Max Bridg TC:<br><b>21-1 7/8</b>                | Max Bridg BC:<br><b>29-2 1/2</b> |
| Top Chord Check    | End Panel LE            | First Panel LE          | Interior Panel                     | First Panel RE           | End Panel RE             | Gap Between Chords:<br><b>1.1250</b>            |                                  |
| Length             | 49.50                   | 51.38                   | 51.50                              | 51.25                    | 49.50                    | Min Weld Len 2X:<br><b>0.7500</b>               |                                  |
| Bending Load       | 0.00                    | 0.00                    | 0.00                               | 0.00                     | 0.00                     | Max Load Fillers TC:<br><b>50,607.17</b>        |                                  |
| Axial Load         | 13,362.93               | 13,362.93               | 46,936.85                          | 13,367.60                | 13,367.60                | Max Load no Fillers TC:<br><b>32,085.95</b>     |                                  |
| fa                 | 5,626.50                | 5,626.50                | 19,762.88                          | 5,628.46                 | 5,628.46                 | TC OAL/Ryy:<br><b>479.53</b>                    |                                  |
| Maximum K L/r      | 100.71                  | 104.53                  | 68.90                              | 104.27                   | 100.71                   | BC OAL/Ryy:<br><b>490.23</b>                    |                                  |
| Fcr                | 23,817.00               | 22,491.83               | 35,337.15                          | 22,579.33                | 23,817.00                | BC Stress:<br><b>0.86</b>                       |                                  |
| Fa                 | 14,290.20               | 13,495.10               | 21,202.29                          | 13,547.60                | 14,290.20                | BC L/Rz:<br><b>233.4013</b>                     |                                  |
| F'e                | 69,167.91               | 64,211.28               | 63,899.95                          | 64,524.89                | 69,167.91                | TC Shear Stress:<br><b>11,856.57</b>            |                                  |
| Cm                 | 0.9593                  | 0.9562                  | 0.7928                             | 0.9564                   | 0.9593                   | BC Shear Stress:<br><b>17,809.04</b>            |                                  |
| Panel Point Moment | 0.00                    | 0.00                    | 0.00                               | 0.00                     | 0.00                     | TC Bearing Capacity:<br><b>2.25K &lt; 7.27K</b> |                                  |
| Mid Panel Moment   | 0.00                    | 0.00                    | 0.00                               | 0.00                     | 0.00                     |                                                 |                                  |
| Panel Point fb     | 0.00                    | 0.00                    | 0.00                               | 0.00                     | 0.00                     |                                                 |                                  |
| Mid Panel fb       | 0.00                    | 0.00                    | 0.00                               | 0.00                     | 0.00                     |                                                 |                                  |
| Fillers            | 0                       | 0                       | 10                                 | 0                        | 0                        |                                                 |                                  |
| Panel Point Stress | 5,626.50                | 5,626.50                | 19,762.88                          | 5,628.46                 | 5,628.46                 |                                                 |                                  |
| Mid Panel Stress   | 0.3937                  | 0.4169                  | 0.9321                             | 0.4155                   | 0.3939                   |                                                 |                                  |

## Web Design

| Member | Web Tension | Allow Tension | Web Comp  | Allow Comp | Weld         | Qty | Material                      |
|--------|-------------|---------------|-----------|------------|--------------|-----|-------------------------------|
| W2     | 18,993.53   | 43,144.61     | 4,748.38  | 13,457.03  | 7.77 x 0.187 | 2   | A36A = 2.094 x 2.094 x 0.187  |
| V1S    | 0.00        | 7,872.16      | 267.26    | 906.63     | 2.00 x 0.105 | 1   | C16AA = 1.125 x 0.943 x 0.105 |
| W3     | 0.00        | 43,144.61     | 16,726.18 | 17,320.70  | 6.02 x 0.187 | 2   | A36A = 2.094 x 2.094 x 0.187  |
| W4     | 11,967.26   | 24,469.72     | 2,991.81  | 3,029.31   | 4.30 x 0.188 | 1   | C38AA = 1.125 x 1.844 x 0.200 |
| V2     | 0.00        | 7,872.16      | 622.63    | 925.72     | 2.00 x 0.105 | 1   | C16AA = 1.125 x 0.943 x 0.105 |
| W5     | 0.00        | 43,144.61     | 11,979.92 | 15,031.22  | 4.31 x 0.187 | 2   | A36A = 2.094 x 2.094 x 0.187  |
| W6     | 5,988.39    | 14,408.67     | 1,497.10  | 1,873.94   | 2.69 x 0.150 | 1   | C28AA = 1.125 x 1.347 x 0.150 |
| V3     | 0.00        | 7,872.16      | 859.90    | 925.72     | 2.00 x 0.105 | 1   | C16AA = 1.125 x 0.943 x 0.105 |
| W7     | 0.00        | 28,799.25     | 5,982.06  | 7,052.21   | 2.69 x 0.150 | 2   | A28A = 1.750 x 1.750 x 0.150  |
| W8     | 0.00        | 26,079.72     | 5,237.83  | 5,712.66   | 2.45 x 0.144 | 2   | A26A = 1.656 x 1.656 x 0.144  |
| V4     | 0.00        | 9,017.86      | 938.74    | 1,214.48   | 2.00 x 0.115 | 1   | C18AA = 1.125 x 1.012 x 0.115 |
| W8     | 5,243.37    | 14,408.67     | 1,310.84  | 1,873.94   | 2.35 x 0.150 | 1   | C28AA = 1.125 x 1.347 x 0.150 |
| W7     | 0.00        | 28,799.25     | 5,994.67  | 7,037.31   | 2.69 x 0.150 | 2   | A28A = 1.750 x 1.750 x 0.150  |
| V5     | 0.00        | 7,872.16      | 859.54    | 925.72     | 2.00 x 0.105 | 1   | C16AA = 1.125 x 0.943 x 0.105 |
| W6     | 5,988.33    | 14,408.67     | 1,497.08  | 1,877.50   | 2.69 x 0.150 | 1   | C28AA = 1.125 x 1.347 x 0.150 |
| W5     | 0.00        | 43,144.61     | 11,973.53 | 15,063.06  | 4.31 x 0.187 | 2   | A36A = 2.094 x 2.094 x 0.187  |
| V6     | 0.00        | 7,872.16      | 622.68    | 925.72     | 2.00 x 0.105 | 1   | C16AA = 1.125 x 0.943 x 0.105 |
| W4     | 11,986.20   | 24,469.72     | 2,996.55  | 3,023.64   | 4.31 x 0.188 | 1   | C38AA = 1.125 x 1.844 x 0.200 |
| W3     | 0.00        | 43,144.61     | 16,715.03 | 17,352.83  | 6.02 x 0.187 | 2   | A36A = 2.094 x 2.094 x 0.187  |

\* Continued on Next Page...

# STRESS ANALYSIS - PAGE 2



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:19:20 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N4.5K</b>          | Mark:<br><b>SJI3A</b>                    |

## Web Design, Continued...

| Member | Web Tension | Allow Tension | Web Comp | Allow Comp | Weld         | Qty | Material                      |
|--------|-------------|---------------|----------|------------|--------------|-----|-------------------------------|
| V1S    | 0.00        | 7,872.16      | 267.35   | 906.63     | 2.00 x 0.105 | 1   | C16AA = 1.125 x 0.943 x 0.105 |
| W2     | 19,000.16   | 43,144.61     | 4,750.04 | 13,457.03  | 7.77 x 0.187 | 2   | A36A = 2.094 x 2.094 x 0.187  |

# STRESS ANALYSIS - PAGE 3



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:19:20 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N4.5K</b>          | Mark:<br><b>SJI3A</b>                    |

## TCX Design

| TCX Left                             |         | TCX Right                            |         |
|--------------------------------------|---------|--------------------------------------|---------|
| TCX Length                           | 0-0     | TCX Length                           | 0-0     |
| TCX Type                             | R       | TCX Type                             | R       |
| TCX Depth                            | 7 1/2   | TCX Depth                            | 7 1/2   |
| BPL Length                           | 0-6     | BPL Length                           | 0-6     |
| Clear Bearing                        | 0-7 5/8 | Clear Bearing                        | 0-7 3/4 |
| BPL Material: 406050 = 4 x 6 x 0.500 |         | BPL Material: 406050 = 4 x 6 x 0.500 |         |
| Total Load                           | 0.00    | Total Load                           | 0.00    |
| Reqd TL Def L/80                     | 0.00    | Reqd TL Def L/80                     | 0.00    |
| Live Load                            | 0.00    | Live Load                            | 0.00    |
| Reqd LL Def L/120                    | 0.00    | Reqd LL Def L/120                    | 0.00    |
| Section Modulus                      | 0.0000  | Section Modulus                      | 0.0000  |
| Reqd SM                              | 0.0000  | Reqd SM                              | 0.0000  |
| Mom of Inertia                       | 0.0000  | Mom of Inertia                       | 0.0000  |
| Reqd MI                              | 0.0000  | Reqd MI                              | 0.0000  |
| Seat Type: Lapped                    |         | Seat Type: Lapped                    |         |
|                                      |         |                                      |         |

## Load Combinations

|                                     |                                                                         |
|-------------------------------------|-------------------------------------------------------------------------|
| Case 1: DL                          | Case 5c_mr: 0.6(DL)+WL+AX+IP-M                                          |
| Case 2a: LL                         | Case 5d: 0.6(DL)+WL-AX+IP-M                                             |
| Case 2b: SL                         | Case 5d_mr: 0.6(DL)+WL-AX+IP+M                                          |
| Case 3a: DL+CL+TL+LL                | Case 5e: (0.6-0.14(SDS))DL+AX+SM+M                                      |
| Case 3b: DL+CL+TL+SL                | Case 5e_mr: (0.6-0.14(SDS))DL+AX+SM-M                                   |
| Case 3c: DL+CL+TL+LL+FEM            | Case 5f: (0.6-0.14(SDS))DL-AX+SM-M                                      |
| Case 3d: DL+CL+TL+SL+FEM            | Case 5f_mr: (0.6-0.14(SDS))DL-AX+SM+M                                   |
| Case 3e: DL+CL+TL+LL                | Case 6a: DL+CL+0.85(TL)+WL+AX+M                                         |
| Case 3f: DL+CL+TL+SL                | Case 6a_mr: DL+CL+0.85(TL)+WL+AX-M                                      |
| Case 4a: DL+WL+AX+M                 | Case 6b: DL+CL+0.85(TL)+WL-AX-M                                         |
| Case 4a_mr: DL+WL+AX-M              | Case 6b_mr: DL+CL+0.85(TL)+WL-AX+M                                      |
| Case 4b: DL+WL-AX-M                 | Case 6c: DL+CL+0.85(TL)+WL+C+AX+IP+M                                    |
| Case 4b_mr: DL+WL-AX+M              | Case 6c_mr: DL+CL+0.85(TL)+WL+C+AX+IP-M                                 |
| Case 4c: DL+WL+AX+IP+M              | Case 6d: DL+CL+0.85(TL)+WL+C-AX+IP-M                                    |
| Case 4c_mr: DL+WL+AX+IP-M           | Case 6d_mr: DL+CL+0.85(TL)+WL+C-AX+IP+M                                 |
| Case 4d: DL+WL-AX+IP-M              | Case 6e: DL+CL+0.85(TL)+WL+AX+IP+M                                      |
| Case 4d_mr: DL+WL-AX+IP+M           | Case 6e_mr: DL+CL+0.85(TL)+WL+AX+IP-M                                   |
| Case 4e: (1+0.14(SDS))DL+SM+AX+M    | Case 6f: DL+CL+0.85(TL)+WL-AX+IP-M                                      |
| Case 4e_mr: (1+0.14(SDS))DL+SM+AX-M | Case 6f_mr: DL+CL+0.85(TL)+WL-AX+IP+M                                   |
| Case 4f: (1+0.14(SDS))DL+SM-AX-M    | Case 6g: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX+M    |
| Case 4f_mr: (1+0.14(SDS))DL+SM-AX+M | Case 6g_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX-M |
| Case 5a: 0.6(DL)+WL+AX+M            | Case 6h: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX-M    |
| Case 5a_mr: 0.6(DL)+WL+AX-M         | Case 6h_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX+M |
| Case 5b: 0.6(DL)+WL-AX-M            | Case 7a: DL+CL+0.85(TL)+0.75(WL+AX+LL+M)                                |
| Case 5b_mr: 0.6(DL)+WL-AX+M         | Case 7a_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL-M)                             |
| Case 5c: 0.6(DL)+WL+AX+IP+M         | Case 7b: DL+CL+0.85(TL)+0.75(WL-AX+LL-M)                                |

## STRESS ANALYSIS - PAGE 4



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|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:19:20 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N4.5K</b>          | Mark:<br><b>SJI3A</b>                    |

**Load Combinations Continued**

Case 7b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+M)  
 Case 7c: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP+M)  
 Case 7c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP-M)  
 Case 7d: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP-M)  
 Case 7d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP+M)  
 Case 7e: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP+M)  
 Case 7e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP-M)  
 Case 7f: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP-M)  
 Case 7f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP+M)  
 Case 7g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL+M)  
 Case 7g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL-M)  
 Case 7h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL-M)  
 Case 7h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL+M)  
 Case 8a: DL+CL+0.85(TL)+0.75(WL+AX+SL+M)  
 Case 8a\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL-M)  
 Case 8b: DL+CL+0.85(TL)+0.75(WL-AX+SL-M)  
 Case 8b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+M)  
 Case 8c: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP+M)  
 Case 8c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP-M)  
 Case 8d: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP-M)  
 Case 8d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP+M)  
 Case 8e: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP+M)  
 Case 8e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP-M)  
 Case 8f: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP-M)  
 Case 8f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP+M)  
 Case 8g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX+M)  
 Case 8g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX-M)  
 Case 8h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX-M)  
 Case 8h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX+M)

# STRESS ANALYSIS - PAGE 1



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:20:19 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N12K</b>           | Mark:<br><b>SJI3B</b>                    |

## Geometry

|                             |                                |                              |                                  |                                        |                             |                                  |                            |
|-----------------------------|--------------------------------|------------------------------|----------------------------------|----------------------------------------|-----------------------------|----------------------------------|----------------------------|
| Base Length:<br><b>60-0</b> | Working Length:<br><b>59-8</b> | Joist Depth:<br><b>60.00</b> | Effective Depth:<br><b>57.86</b> | BC Panel Length:<br><b>6 @ 8-6 7/8</b> | SDS Value:<br><b>0.0000</b> | Shape:<br><b>Parallel Chords</b> | TC Slope:<br><b>0.0000</b> |
| Variable                    | Left End                       | Right End                    |                                  |                                        |                             |                                  |                            |
| BC Panel                    | 5-0                            | 5-0                          |                                  |                                        |                             |                                  |                            |
| TC Panel                    | 4-3 1/2                        | 4-3 1/2                      |                                  |                                        |                             |                                  |                            |
| First Half                  | 3-6 7/8                        | 3-6 3/4                      |                                  |                                        |                             |                                  |                            |
| First Diag.                 | 8-6 7/8                        | 8-6 3/4                      |                                  |                                        |                             |                                  |                            |
| Depth                       | 60.00                          | 60.00                        |                                  |                                        |                             |                                  |                            |
| Trib Width                  | 0-0                            | 0-0                          |                                  |                                        |                             |                                  |                            |

## Loads

| Load Type       | Category | Load1     | Load2 | Position | Direction | Loc/Begin | Sp/End  | Reference |
|-----------------|----------|-----------|-------|----------|-----------|-----------|---------|-----------|
| Conc Load (lbs) | TL       | 6,000.00  | 0.00  | TC       | +         | 0-2       | 0-2     | L-BL      |
| Conc Load (lbs) | TL       | 12,000.00 | 0.00  | TC       | +         | 8-6 7/8   | 8-4 7/8 | L-BL      |
| Conc Load (lbs) | TL       | 12,000.00 | 0.00  | TC       | +         | 17-1 3/4  | 8-6 7/8 | L-BL      |
| Conc Load (lbs) | TL       | 12,000.00 | 0.00  | TC       | +         | 25-8 5/8  | 8-6 7/8 | L-BL      |
| Conc Load (lbs) | TL       | 12,000.00 | 0.00  | TC       | +         | 34-3 1/2  | 8-6 7/8 | L-BL      |
| Conc Load (lbs) | TL       | 12,000.00 | 0.00  | TC       | +         | 42-10 3/8 | 8-6 7/8 | L-BL      |
| Conc Load (lbs) | TL       | 12,000.00 | 0.00  | TC       | +         | 51-5 1/4  | 8-6 7/8 | L-BL      |
| Conc Load (lbs) | TL       | 6,000.00  | 0.00  | TC       | +         | 59-10     | 8-4 3/4 | L-BL      |

## Stress Analysis Summary

|                                |                                |                                  |                                  |                                    |                                    |                                     |            |           |
|--------------------------------|--------------------------------|----------------------------------|----------------------------------|------------------------------------|------------------------------------|-------------------------------------|------------|-----------|
| Int. Panel TC:<br><b>51.50</b> | Max Panel BC:<br><b>103.00</b> | Reaction LE:<br><b>41,993.71</b> | Reaction RE:<br><b>42,006.29</b> | Minimum Shear:<br><b>10,501.57</b> | Max TC Comp.:<br><b>126,732.84</b> | Max BC Tension<br><b>126,738.43</b> |            |           |
| Member                         | TC Tension                     | TC Compression                   | BC Tension                       | BC Compression                     | Web Tension                        | Web Comp.                           | Web Length | PP Dist.  |
| W2                             | 0.00                           | 36,080.87                        | 0.00                             | 0.00                               | 50,964.46                          | 12,741.12                           | 81.93      | 0-2       |
| V1S                            | 0.00                           | 36,080.87                        | 0.00                             | 0.00                               | 0.00                               | 721.62                              | 58.48      | 4-3 1/2   |
| W3                             | 0.00                           | 36,080.87                        | 62,752.72                        | 0.00                               | 0.00                               | 44,798.83                           | 72.01      | 5-0       |
| W4                             | 0.00                           | 84,057.23                        | 62,752.72                        | 0.00                               | 32,087.08                          | 8,021.77                            | 77.38      | 8-6 7/8   |
| V2                             | 0.00                           | 84,057.23                        | 62,752.72                        | 0.00                               | 0.00                               | 1,681.14                            | 57.86      | 12-10 1/4 |
| W5                             | 0.00                           | 84,057.23                        | 105,413.59                       | 0.00                               | 0.00                               | 32,121.52                           | 77.46      | 12-10 1/4 |
| W6                             | 0.00                           | 116,088.97                       | 105,413.59                       | 0.00                               | 16,056.56                          | 4,014.14                            | 77.46      | 17-1 3/4  |
| V3                             | 0.00                           | 116,088.97                       | 105,413.59                       | 0.00                               | 0.00                               | 2,321.78                            | 57.86      | 21-5 1/4  |
| W7                             | 0.00                           | 116,088.97                       | 126,738.43                       | 0.00                               | 0.00                               | 16,039.34                           | 77.38      | 21-5 1/4  |
| W8                             | 0.00                           | 126,732.84                       | 126,738.43                       | 0.00                               | 0.00                               | 14,043.88                           | 77.38      | 25-8 5/8  |
| V4                             | 0.00                           | 126,732.84                       | 126,738.43                       | 0.00                               | 0.00                               | 2,534.66                            | 57.86      | 30-0      |
| W8                             | 0.00                           | 126,732.84                       | 126,727.26                       | 0.00                               | 14,058.95                          | 3,514.74                            | 77.46      | 30-0      |
| W7                             | 0.00                           | 116,040.69                       | 126,727.26                       | 0.00                               | 0.00                               | 16,073.38                           | 77.46      | 34-3 1/2  |
| V5                             | 0.00                           | 116,040.69                       | 126,727.26                       | 0.00                               | 0.00                               | 2,320.81                            | 57.86      | 38-7      |
| W6                             | 0.00                           | 116,040.69                       | 105,380.06                       | 0.00                               | 16,056.14                          | 4,014.04                            | 77.38      | 38-7      |
| W5                             | 0.00                           | 84,064.39                        | 105,380.06                       | 0.00                               | 0.00                               | 32,103.89                           | 77.38      | 42-10 3/8 |
| V6                             | 0.00                           | 84,064.39                        | 105,380.06                       | 0.00                               | 0.00                               | 1,681.29                            | 57.86      | 47-1 3/4  |
| W4                             | 0.00                           | 84,064.39                        | 62,696.85                        | 0.00                               | 32,138.35                          | 8,034.59                            | 77.46      | 47-1 3/4  |
| W3                             | 0.00                           | 36,093.47                        | 62,696.85                        | 0.00                               | 0.00                               | 44,768.21                           | 71.94      | 51-5 1/4  |
| V1S                            | 0.00                           | 36,093.47                        | 0.00                             | 0.00                               | 0.00                               | 721.87                              | 58.48      | 55-8 1/2  |
| W2                             | 0.00                           | 36,093.47                        | 0.00                             | 0.00                               | 50,982.27                          | 12,745.57                           | 81.93      | 55-0      |

\* Continued on Next Page...

## STRESS ANALYSIS - PAGE 1



**NEW MILLENNIUM**  
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|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:20:19 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N12K</b>           | Mark:<br><b>SJI3B</b>                    |

### Stress Analysis Summary, Continued...

| Member | TC Tension | TC Compression | BC Tension | BC Compression | Web Tension | Web Comp. | Web Length | PP Dist. |
|--------|------------|----------------|------------|----------------|-------------|-----------|------------|----------|
|--------|------------|----------------|------------|----------------|-------------|-----------|------------|----------|

## STRESS ANALYSIS - PAGE 2



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:20:19 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N12K</b>           | Mark:<br><b>SJI3B</b>                    |

## Chord Properties

| Chord | Area   | Rx     | Rz     | Ryy    | Y      | Ix     | Q      | Material                     |
|-------|--------|--------|--------|--------|--------|--------|--------|------------------------------|
| TC    | 2.8594 | 1.2346 | 0.7876 | 2.1017 | 1.1383 | 4.3586 | 1.0000 | 4037 = 4 x 4 x 0.375         |
| BC    | 2.2897 | 1.0781 | 0.6883 | 1.8998 | 1.0018 | 2.6613 | 1.0000 | 3534 = 3 1/2 x 3 1/2 x 0.344 |

## Axial and Bending Analysis

|                    |                         |                         |                                    |                            |                            |                                                  |                              |
|--------------------|-------------------------|-------------------------|------------------------------------|----------------------------|----------------------------|--------------------------------------------------|------------------------------|
| K:<br><b>1.00</b>  | Fy:<br><b>50,000.00</b> | Fb:<br><b>30,000.00</b> | Mom of Inertia:<br><b>8,527.53</b> | LL 360:<br><b>1,499.78</b> | LL 240:<br><b>2,249.67</b> | Max Bridg TC:<br><b>29-9 1/4</b>                 | Max Bridg BC:<br><b>38-0</b> |
| Top Chord Check    | End Panel LE            | First Panel LE          | Interior Panel                     | First Panel RE             | End Panel RE               | Gap Between Chords:<br><b>1.1250</b>             |                              |
| Length             | 49.50                   | 51.38                   | 51.50                              | 51.25                      | 49.50                      | Min Weld Len 2X:<br><b>0.9104</b>                |                              |
| Bending Load       | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       | Max Load Fillers TC:<br><b>144,713.05</b>        |                              |
| Axial Load         | 36,080.87               | 36,080.87               | 126,732.84                         | 36,093.47                  | 36,093.47                  | Max Load no Fillers TC:<br><b>126,130.67</b>     |                              |
| fa                 | 6,309.17                | 6,309.17                | 22,160.74                          | 6,311.37                   | 6,311.37                   | TC OAL/Ryy:<br><b>340.68</b>                     |                              |
| Maximum K L/r      | 62.85                   | 65.23                   | 48.95                              | 65.07                      | 62.85                      | BC OAL/Ryy:<br><b>376.88</b>                     |                              |
| Fcr                | 37,457.56               | 36,631.71               | 41,964.87                          | 36,687.14                  | 37,457.56                  | BC Stress:<br><b>0.92</b>                        |                              |
| Fa                 | 22,474.54               | 21,979.03               | 25,178.92                          | 22,012.29                  | 22,474.54                  | BC L/Rz:<br><b>149.6440</b>                      |                              |
| F'e                | 178,049.13              | 165,290.00              | 164,488.59                         | 166,097.28                 | 178,049.13                 | TC Shear Stress:<br><b>13,194.65</b>             |                              |
| Cm                 | 0.9823                  | 0.9809                  | 0.9097                             | 0.9810                     | 0.9823                     | BC Shear Stress:<br><b>15,484.09</b>             |                              |
| Panel Point Moment | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       | TC Bearing Capacity:<br><b>6.00K &lt; 13.08K</b> |                              |
| Mid Panel Moment   | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       |                                                  |                              |
| Panel Point fb     | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       |                                                  |                              |
| Mid Panel fb       | 0.00                    | 0.00                    | 0.00                               | 0.00                       | 0.00                       |                                                  |                              |
| Fillers            | 0                       | 0                       | 2                                  | 0                          | 0                          |                                                  |                              |
| Panel Point Stress | 6,309.17                | 6,309.17                | 22,160.74                          | 6,311.37                   | 6,311.37                   |                                                  |                              |
| Mid Panel Stress   | 0.2807                  | 0.2871                  | 0.8801                             | 0.2867                     | 0.2808                     |                                                  |                              |

## Web Design

| Member | Web Tension | Allow Tension | Web Comp  | Allow Comp | Weld          | Qty | Material                      |
|--------|-------------|---------------|-----------|------------|---------------|-----|-------------------------------|
| W2     | 50,964.46   | 54,975.46     | 12,741.12 | 22,300.84  | 16.42 x 0.209 | 2   | A40A = 2.375 x 2.375 x 0.209  |
| V1S    | 0.00        | 7,872.16      | 721.62    | 929.00     | 2.00 x 0.105  | 1   | C16AA = 1.125 x 0.943 x 0.105 |
| W3     | 0.00        | 78,227.12     | 44,798.83 | 49,579.96  | 13.29 x 0.227 | 2   | A48A = 3.063 x 3.063 x 0.227  |
| W4     | 32,087.08   | 33,985.05     | 8,021.77  | 9,665.79   | 13.10 x 0.165 | 2   | A32A = 1.875 x 1.875 x 0.165  |
| V2     | 0.00        | 10,920.32     | 1,681.14  | 1,706.80   | 2.00 x 0.134  | 1   | C22AA = 1.125 x 1.086 x 0.134 |
| W5     | 0.00        | 67,578.15     | 32,121.52 | 37,899.16  | 11.54 x 0.188 | 2   | A44A = 2.875 x 2.875 x 0.209  |
| W6     | 16,056.56   | 27,487.73     | 4,014.14  | 4,479.00   | 5.77 x 0.188  | 1   | A40A = 2.375 x 2.375 x 0.209  |
| V3     | 0.00        | 14,408.67     | 2,321.78  | 3,142.87   | 2.00 x 0.150  | 1   | C28AA = 1.125 x 1.347 x 0.150 |
| W7     | 0.00        | 48,969.58     | 16,039.34 | 19,436.86  | 5.76 x 0.188  | 2   | A38A = 2.219 x 2.219 x 0.200  |
| W8     | 0.00        | 43,144.61     | 14,043.88 | 15,275.40  | 5.06 x 0.187  | 2   | A36A = 2.094 x 2.094 x 0.187  |
| V4     | 0.00        | 14,408.67     | 2,534.66  | 3,142.87   | 2.00 x 0.150  | 1   | C28AA = 1.125 x 1.347 x 0.150 |
| W8     | 14,058.95   | 27,487.73     | 3,514.74  | 4,479.00   | 5.05 x 0.188  | 1   | A40A = 2.375 x 2.375 x 0.209  |
| W7     | 0.00        | 48,969.58     | 16,073.38 | 19,398.32  | 5.77 x 0.188  | 2   | A38A = 2.219 x 2.219 x 0.200  |
| V5     | 0.00        | 14,408.67     | 2,320.81  | 3,142.87   | 2.00 x 0.150  | 1   | C28AA = 1.125 x 1.347 x 0.150 |
| W6     | 16,056.14   | 27,487.73     | 4,014.04  | 4,488.62   | 5.77 x 0.188  | 1   | A40A = 2.375 x 2.375 x 0.209  |
| W5     | 0.00        | 67,578.15     | 32,103.89 | 37,940.09  | 11.53 x 0.188 | 2   | A44A = 2.875 x 2.875 x 0.209  |
| V6     | 0.00        | 10,920.32     | 1,681.29  | 1,706.80   | 2.00 x 0.134  | 1   | C22AA = 1.125 x 1.086 x 0.134 |
| W4     | 32,138.35   | 33,985.05     | 8,034.59  | 9,645.07   | 13.12 x 0.165 | 2   | A32A = 1.875 x 1.875 x 0.165  |
| W3     | 0.00        | 78,227.12     | 44,768.21 | 49,619.49  | 13.28 x 0.227 | 2   | A48A = 3.063 x 3.063 x 0.227  |

\* Continued on Next Page...

## STRESS ANALYSIS - PAGE 2



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:20:19 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N12K</b>           | Mark:<br><b>SJI3B</b>                    |

### Web Design, Continued...

| Member | Web Tension | Allow Tension | Web Comp  | Allow Comp | Weld          | Qty | Material                      |
|--------|-------------|---------------|-----------|------------|---------------|-----|-------------------------------|
| V1S    | 0.00        | 7,872.16      | 721.87    | 929.00     | 2.00 x 0.105  | 1   | C16AA = 1.125 x 0.943 x 0.105 |
| W2     | 50,982.27   | 54,975.46     | 12,745.57 | 22,300.84  | 16.43 x 0.209 | 2   | A40A = 2.375 x 2.375 x 0.209  |

# STRESS ANALYSIS - PAGE 3



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|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:20:19 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N12K</b>           | Mark:<br><b>SJI3B</b>                    |

## TCX Design

| TCX Left                             |         | TCX Right                            |         |
|--------------------------------------|---------|--------------------------------------|---------|
| TCX Length                           | 0-0     | TCX Length                           | 0-0     |
| TCX Type                             | R       | TCX Type                             | R       |
| TCX Depth                            | 7 1/2   | TCX Depth                            | 7 1/2   |
| BPL Length                           | 0-6     | BPL Length                           | 0-6     |
| Clear Bearing                        | 0-7 1/4 | Clear Bearing                        | 0-7 1/4 |
| BPL Material: 406050 = 4 x 6 x 0.500 |         | BPL Material: 406050 = 4 x 6 x 0.500 |         |
| Total Load                           | 0.00    | Total Load                           | 0.00    |
| Reqd TL Def L/80                     | 0.00    | Reqd TL Def L/80                     | 0.00    |
| Live Load                            | 0.00    | Live Load                            | 0.00    |
| Reqd LL Def L/120                    | 0.00    | Reqd LL Def L/120                    | 0.00    |
| Section Modulus                      | 0.0000  | Section Modulus                      | 0.0000  |
| Reqd SM                              | 0.0000  | Reqd SM                              | 0.0000  |
| Mom of Inertia                       | 0.0000  | Mom of Inertia                       | 0.0000  |
| Reqd MI                              | 0.0000  | Reqd MI                              | 0.0000  |
| Seat Type: Lapped                    |         | Seat Type: Lapped                    |         |
|                                      |         |                                      |         |

## Load Combinations

|                                     |                                                                         |
|-------------------------------------|-------------------------------------------------------------------------|
| Case 1: DL                          | Case 5c_mr: 0.6(DL)+WL+AX+IP-M                                          |
| Case 2a: LL                         | Case 5d: 0.6(DL)+WL-AX+IP-M                                             |
| Case 2b: SL                         | Case 5d_mr: 0.6(DL)+WL-AX+IP+M                                          |
| Case 3a: DL+CL+TL+LL                | Case 5e: (0.6-0.14(SDS))DL+AX+SM+M                                      |
| Case 3b: DL+CL+TL+SL                | Case 5e_mr: (0.6-0.14(SDS))DL+AX+SM-M                                   |
| Case 3c: DL+CL+TL+LL+FEM            | Case 5f: (0.6-0.14(SDS))DL-AX+SM-M                                      |
| Case 3d: DL+CL+TL+SL+FEM            | Case 5f_mr: (0.6-0.14(SDS))DL-AX+SM+M                                   |
| Case 3e: DL+CL+TL+LL                | Case 6a: DL+CL+0.85(TL)+WL+AX+M                                         |
| Case 3f: DL+CL+TL+SL                | Case 6a_mr: DL+CL+0.85(TL)+WL+AX-M                                      |
| Case 4a: DL+WL+AX+M                 | Case 6b: DL+CL+0.85(TL)+WL-AX-M                                         |
| Case 4a_mr: DL+WL+AX-M              | Case 6b_mr: DL+CL+0.85(TL)+WL-AX+M                                      |
| Case 4b: DL+WL-AX-M                 | Case 6c: DL+CL+0.85(TL)+WL+C+AX+IP+M                                    |
| Case 4b_mr: DL+WL-AX+M              | Case 6c_mr: DL+CL+0.85(TL)+WL+C+AX+IP-M                                 |
| Case 4c: DL+WL+AX+IP+M              | Case 6d: DL+CL+0.85(TL)+WL+C-AX+IP-M                                    |
| Case 4c_mr: DL+WL+AX+IP-M           | Case 6d_mr: DL+CL+0.85(TL)+WL+C-AX+IP+M                                 |
| Case 4d: DL+WL-AX+IP-M              | Case 6e: DL+CL+0.85(TL)+WL+AX+IP+M                                      |
| Case 4d_mr: DL+WL-AX+IP+M           | Case 6e_mr: DL+CL+0.85(TL)+WL+AX+IP-M                                   |
| Case 4e: (1+0.14(SDS))DL+SM+AX+M    | Case 6f: DL+CL+0.85(TL)+WL-AX+IP-M                                      |
| Case 4e_mr: (1+0.14(SDS))DL+SM+AX-M | Case 6f_mr: DL+CL+0.85(TL)+WL-AX+IP+M                                   |
| Case 4f: (1+0.14(SDS))DL+SM-AX-M    | Case 6g: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX+M    |
| Case 4f_mr: (1+0.14(SDS))DL+SM-AX+M | Case 6g_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX-M |
| Case 5a: 0.6(DL)+WL+AX+M            | Case 6h: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX-M    |
| Case 5a_mr: 0.6(DL)+WL+AX-M         | Case 6h_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX+M |
| Case 5b: 0.6(DL)+WL-AX-M            | Case 7a: DL+CL+0.85(TL)+0.75(WL+AX+LL+M)                                |
| Case 5b_mr: 0.6(DL)+WL-AX+M         | Case 7a_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL-M)                             |
| Case 5c: 0.6(DL)+WL+AX+IP+M         | Case 7b: DL+CL+0.85(TL)+0.75(WL-AX+LL-M)                                |

## STRESS ANALYSIS - PAGE 4



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A Steel Dynamics Company

|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:20:19 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N12K</b>           | Mark:<br><b>SJI3B</b>                    |

**Load Combinations Continued**

Case 7b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+M)  
 Case 7c: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP+M)  
 Case 7c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP-M)  
 Case 7d: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP-M)  
 Case 7d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP+M)  
 Case 7e: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP+M)  
 Case 7e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP-M)  
 Case 7f: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP-M)  
 Case 7f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP+M)  
 Case 7g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL+M)  
 Case 7g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL-M)  
 Case 7h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL-M)  
 Case 7h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL+M)  
 Case 8a: DL+CL+0.85(TL)+0.75(WL+AX+SL+M)  
 Case 8a\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL-M)  
 Case 8b: DL+CL+0.85(TL)+0.75(WL-AX+SL-M)  
 Case 8b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+M)  
 Case 8c: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP+M)  
 Case 8c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP-M)  
 Case 8d: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP-M)  
 Case 8d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP+M)  
 Case 8e: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP+M)  
 Case 8e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP-M)  
 Case 8f: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP-M)  
 Case 8f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP+M)  
 Case 8g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX+M)  
 Case 8g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX-M)  
 Case 8h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX-M)  
 Case 8h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX+M)

# STRESS ANALYSIS - PAGE 1



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:20:51 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N18K</b>           | Mark:<br><b>SJI3C</b>                    |

## Geometry

|                             |                                |                              |                                  |                                        |                             |                                  |                            |
|-----------------------------|--------------------------------|------------------------------|----------------------------------|----------------------------------------|-----------------------------|----------------------------------|----------------------------|
| Base Length:<br><b>60-0</b> | Working Length:<br><b>59-8</b> | Joist Depth:<br><b>60.00</b> | Effective Depth:<br><b>57.43</b> | BC Panel Length:<br><b>6 @ 8-6 7/8</b> | SDS Value:<br><b>0.0000</b> | Shape:<br><b>Parallel Chords</b> | TC Slope:<br><b>0.0000</b> |
| Variable                    | Left End                       | Right End                    |                                  |                                        |                             |                                  |                            |
| BC Panel                    | 5-0                            | 5-0                          |                                  |                                        |                             |                                  |                            |
| TC Panel                    | 4-3 1/2                        | 4-3 1/2                      |                                  |                                        |                             |                                  |                            |
| First Half                  | 3-6 7/8                        | 3-6 3/4                      |                                  |                                        |                             |                                  |                            |
| First Diag.                 | 8-6 7/8                        | 8-6 3/4                      |                                  |                                        |                             |                                  |                            |
| Depth                       | 60.00                          | 60.00                        |                                  |                                        |                             |                                  |                            |
| Trib Width                  | 0-0                            | 0-0                          |                                  |                                        |                             |                                  |                            |

## Loads

| Load Type       | Category | Load1     | Load2 | Position | Direction | Loc/Begin | Sp/End  | Reference |
|-----------------|----------|-----------|-------|----------|-----------|-----------|---------|-----------|
| Conc Load (lbs) | TL       | 9,000.00  | 0.00  | TC       | +         | 0-2       | 0-2     | L-BL      |
| Conc Load (lbs) | TL       | 18,000.00 | 0.00  | TC       | +         | 8-6 7/8   | 8-4 7/8 | L-BL      |
| Conc Load (lbs) | TL       | 18,000.00 | 0.00  | TC       | +         | 17-1 3/4  | 8-6 7/8 | L-BL      |
| Conc Load (lbs) | TL       | 18,000.00 | 0.00  | TC       | +         | 25-8 5/8  | 8-6 7/8 | L-BL      |
| Conc Load (lbs) | TL       | 18,000.00 | 0.00  | TC       | +         | 34-3 1/2  | 8-6 7/8 | L-BL      |
| Conc Load (lbs) | TL       | 18,000.00 | 0.00  | TC       | +         | 42-10 3/8 | 8-6 7/8 | L-BL      |
| Conc Load (lbs) | TL       | 18,000.00 | 0.00  | TC       | +         | 51-5 1/4  | 8-6 7/8 | L-BL      |
| Conc Load (lbs) | TL       | 9,000.00  | 0.00  | TC       | +         | 59-10     | 8-4 3/4 | L-BL      |

## Stress Analysis Summary

|                                |            |                                |                                  |                                  |                                    |                                    |                                     |           |
|--------------------------------|------------|--------------------------------|----------------------------------|----------------------------------|------------------------------------|------------------------------------|-------------------------------------|-----------|
| Int. Panel TC:<br><b>51.50</b> |            | Max Panel BC:<br><b>103.00</b> | Reaction LE:<br><b>62,990.56</b> | Reaction RE:<br><b>63,009.43</b> | Minimum Shear:<br><b>15,752.36</b> | Max TC Comp.:<br><b>191,531.61</b> | Max BC Tension<br><b>191,540.05</b> |           |
| Member                         | TC Tension | TC Compression                 | BC Tension                       | BC Compression                   | Web Tension                        | Web Comp.                          | Web Length                          | PP Dist.  |
| W2                             | 0.00       | 54,529.07                      | 0.00                             | 0.00                             | 76,735.92                          | 19,183.98                          | 81.62                               | 0-2       |
| V1S                            | 0.00       | 54,529.07                      | 0.00                             | 0.00                             | 0.00                               | 1,090.58                           | 58.05                               | 4-3 1/2   |
| W3                             | 0.00       | 54,529.07                      | 94,838.29                        | 0.00                             | 0.00                               | 67,378.13                          | 71.67                               | 5-0       |
| W4                             | 0.00       | 127,035.85                     | 94,838.29                        | 0.00                             | 48,290.82                          | 12,072.71                          | 77.05                               | 8-6 7/8   |
| V2                             | 0.00       | 127,035.85                     | 94,838.29                        | 0.00                             | 0.00                               | 2,540.72                           | 57.43                               | 12-10 1/4 |
| W5                             | 0.00       | 127,035.85                     | 159,311.75                       | 0.00                             | 0.00                               | 48,343.10                          | 77.14                               | 12-10 1/4 |
| W6                             | 0.00       | 175,445.48                     | 159,311.75                       | 0.00                             | 24,165.22                          | 6,041.31                           | 77.14                               | 17-1 3/4  |
| V3                             | 0.00       | 175,445.48                     | 159,311.75                       | 0.00                             | 0.00                               | 3,508.91                           | 57.43                               | 21-5 1/4  |
| W7                             | 0.00       | 175,445.48                     | 191,540.05                       | 0.00                             | 0.00                               | 24,139.09                          | 77.05                               | 21-5 1/4  |
| W8                             | 0.00       | 191,531.61                     | 191,540.05                       | 0.00                             | 0.00                               | 21,135.93                          | 77.05                               | 25-8 5/8  |
| V4                             | 0.00       | 191,531.61                     | 191,540.05                       | 0.00                             | 0.00                               | 3,830.63                           | 57.43                               | 30-0      |
| W8                             | 0.00       | 191,531.61                     | 191,523.16                       | 0.00                             | 21,158.81                          | 5,289.70                           | 77.14                               | 30-0      |
| W7                             | 0.00       | 175,372.53                     | 191,523.16                       | 0.00                             | 0.00                               | 24,190.54                          | 77.14                               | 34-3 1/2  |
| V5                             | 0.00       | 175,372.53                     | 191,523.16                       | 0.00                             | 0.00                               | 3,507.45                           | 57.43                               | 38-7      |
| W6                             | 0.00       | 175,372.53                     | 159,261.09                       | 0.00                             | 24,164.38                          | 6,041.10                           | 77.05                               | 38-7      |
| W5                             | 0.00       | 127,046.69                     | 159,261.09                       | 0.00                             | 0.00                               | 48,316.12                          | 77.05                               | 42-10 3/8 |
| V6                             | 0.00       | 127,046.69                     | 159,261.09                       | 0.00                             | 0.00                               | 2,540.93                           | 57.43                               | 47-1 3/4  |
| W4                             | 0.00       | 127,046.69                     | 94,753.88                        | 0.00                             | 48,368.42                          | 12,092.10                          | 77.14                               | 47-1 3/4  |
| W3                             | 0.00       | 54,548.14                      | 94,753.88                        | 0.00                             | 0.00                               | 67,331.41                          | 71.59                               | 51-5 1/4  |
| V1S                            | 0.00       | 54,548.14                      | 0.00                             | 0.00                             | 0.00                               | 1,090.96                           | 58.05                               | 55-8 1/2  |
| W2                             | 0.00       | 54,548.14                      | 0.00                             | 0.00                             | 76,762.74                          | 19,190.69                          | 81.62                               | 55-0      |

\* Continued on Next Page...

## STRESS ANALYSIS - PAGE 1



**NEW MILLENNIUM**  
A Steel Dynamics Company

|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:20:51 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N18K</b>           | Mark:<br><b>SJI3C</b>                    |

### Stress Analysis Summary, Continued...

| Member | TC Tension | TC Compression | BC Tension | BC Compression | Web Tension | Web Comp. | Web Length | PP Dist. |
|--------|------------|----------------|------------|----------------|-------------|-----------|------------|----------|
|--------|------------|----------------|------------|----------------|-------------|-----------|------------|----------|

## STRESS ANALYSIS - PAGE 2



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:20:51 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N18K</b>           | Mark:<br><b>SJI3C</b>                    |

## Chord Properties

| Chord | Area   | Rx     | Rz     | Ryy    | Y      | Ix      | Q      | Material             |
|-------|--------|--------|--------|--------|--------|---------|--------|----------------------|
| TC    | 4.1882 | 1.5476 | 0.9861 | 2.5085 | 1.4117 | 10.0307 | 0.9798 | 5043 = 5 x 5 x 0.438 |
| BC    | 3.3122 | 1.2260 | 0.7846 | 2.1152 | 1.1611 | 4.9786  | 1.0000 | 4043 = 4 x 4 x 0.438 |

## Axial and Bending Analysis

|                   |                         |                         |                                     |                            |                            |                                  |                                  |
|-------------------|-------------------------|-------------------------|-------------------------------------|----------------------------|----------------------------|----------------------------------|----------------------------------|
| K:<br><b>1.00</b> | Fy:<br><b>50,000.00</b> | Fb:<br><b>30,000.00</b> | Mom of Inertia:<br><b>12,229.04</b> | LL 360:<br><b>2,150.79</b> | LL 240:<br><b>3,226.18</b> | Max Bridg TC:<br><b>35-6 1/2</b> | Max Bridg BC:<br><b>42-3 5/8</b> |
|-------------------|-------------------------|-------------------------|-------------------------------------|----------------------------|----------------------------|----------------------------------|----------------------------------|

| Top Chord Check    | End Panel LE | First Panel LE | Interior Panel | First Panel RE | End Panel RE | Gap Between Chords:<br><b>1.1250</b>             |
|--------------------|--------------|----------------|----------------|----------------|--------------|--------------------------------------------------|
| Length             | 49.50        | 51.38          | 51.50          | 51.25          | 49.50        | Min Weld Len 2X:<br><b>1.3758</b>                |
| Bending Load       | 0.00         | 0.00           | 0.00           | 0.00           | 0.00         | Max Load Fillers TC:<br><b>219,349.23</b>        |
| Axial Load         | 54,529.07    | 54,529.07      | 191,531.61     | 54,548.14      | 54,548.14    | Max Load no Fillers TC:<br><b>203,518.66</b>     |
| fa                 | 6,509.85     | 6,509.85       | 22,865.62      | 6,512.12       | 6,512.12     | TC OAL/Ryy:<br><b>285.43</b>                     |
| Maximum K L/r      | 50.20        | 52.10          | 52.23          | 51.97          | 50.20        | BC OAL/Ryy:<br><b>338.51</b>                     |
| Fcr                | 40,897.14    | 40,331.22      | 40,293.03      | 40,369.35      | 40,897.14    | BC Stress:<br><b>0.96</b>                        |
| Fa                 | 24,538.28    | 24,198.73      | 24,175.82      | 24,221.61      | 24,538.28    | BC L/Rz:<br><b>131.2771</b>                      |
| F'e                | 279,772.34   | 259,723.67     | 258,464.41     | 260,992.16     | 279,772.34   | TC Shear Stress:<br><b>13,566.21</b>             |
| Cm                 | 0.9884       | 0.9875         | 0.9407         | 0.9875         | 0.9884       | BC Shear Stress:<br><b>16,160.03</b>             |
| Panel Point Moment | 0.00         | 0.00           | 0.00           | 0.00           | 0.00         | TC Bearing Capacity:<br><b>9.00K &lt; 16.30K</b> |
| Mid Panel Moment   | 0.00         | 0.00           | 0.00           | 0.00           | 0.00         |                                                  |
| Panel Point fb     | 0.00         | 0.00           | 0.00           | 0.00           | 0.00         |                                                  |
| Mid Panel fb       | 0.00         | 0.00           | 0.00           | 0.00           | 0.00         |                                                  |
| Fillers            | 0            | 0              | 0              | 0              | 0            |                                                  |
| Panel Point Stress | 6,509.85     | 6,509.85       | 22,865.62      | 6,512.12       | 6,512.12     |                                                  |
| Mid Panel Stress   | 0.2653       | 0.2690         | 0.9458         | 0.2689         | 0.2654       |                                                  |

## Web Design

| Member | Web Tension | Allow Tension | Web Comp  | Allow Comp | Weld          | Qty | Material                      |
|--------|-------------|---------------|-----------|------------|---------------|-----|-------------------------------|
| W2     | 76,735.92   | 78,227.12     | 19,183.98 | 44,419.93  | 22.77 x 0.227 | 2   | A48A = 3.063 x 3.063 x 0.227  |
| V1S    | 0.00        | 9,017.86      | 1,090.58  | 1,236.84   | 2.00 x 0.115  | 1   | C18AA = 1.125 x 1.012 x 0.115 |
| W3     | 0.00        | 107,333.90    | 67,378.13 | 68,978.27  | 14.50 x 0.313 | 2   | 3031 = 3 x 3 x 0.313          |
| W4     | 48,290.82   | 48,969.58     | 12,072.71 | 19,587.08  | 16.26 x 0.200 | 2   | A38A = 2.219 x 2.219 x 0.200  |
| V2     | 0.00        | 14,408.67     | 2,540.72  | 3,182.31   | 2.00 x 0.150  | 1   | C28AA = 1.125 x 1.347 x 0.150 |
| W5     | 0.00        | 86,681.16     | 48,343.10 | 53,170.37  | 13.02 x 0.250 | 2   | A50A = 3.094 x 3.094 x 0.250  |
| W6     | 24,165.22   | 28,799.25     | 6,041.31  | 7,196.13   | 10.85 x 0.150 | 2   | A28A = 1.750 x 1.750 x 0.150  |
| V3     | 0.00        | 16,793.53     | 3,508.91  | 3,654.40   | 2.00 x 0.163  | 1   | C32AA = 1.125 x 1.479 x 0.163 |
| W7     | 0.00        | 54,975.46     | 24,139.09 | 24,747.88  | 8.67 x 0.188  | 2   | A40A = 2.375 x 2.375 x 0.209  |
| W8     | 0.00        | 54,975.46     | 21,135.93 | 24,747.88  | 7.59 x 0.188  | 2   | A40A = 2.375 x 2.375 x 0.209  |
| V4     | 0.00        | 18,714.09     | 3,830.63  | 4,050.73   | 2.00 x 0.176  | 1   | C34AA = 1.125 x 1.549 x 0.176 |
| W8     | 21,158.81   | 26,079.72     | 5,289.70  | 5,829.24   | 9.90 x 0.144  | 2   | A26A = 1.656 x 1.656 x 0.144  |
| W7     | 0.00        | 54,975.46     | 24,190.54 | 24,705.13  | 8.69 x 0.188  | 2   | A40A = 2.375 x 2.375 x 0.209  |
| V5     | 0.00        | 16,793.53     | 3,507.45  | 3,654.40   | 2.00 x 0.163  | 1   | C32AA = 1.125 x 1.479 x 0.163 |
| W6     | 24,164.38   | 28,799.25     | 6,041.10  | 7,211.71   | 10.85 x 0.150 | 2   | A28A = 1.750 x 1.750 x 0.150  |
| W5     | 0.00        | 86,681.16     | 48,316.12 | 53,222.26  | 13.02 x 0.250 | 2   | A50A = 3.094 x 3.094 x 0.250  |
| V6     | 0.00        | 14,408.67     | 2,540.93  | 3,182.31   | 2.00 x 0.150  | 1   | C28AA = 1.125 x 1.347 x 0.150 |
| W4     | 48,368.42   | 48,969.58     | 12,092.10 | 19,548.24  | 16.29 x 0.200 | 2   | A38A = 2.219 x 2.219 x 0.200  |
| W3     | 0.00        | 107,333.90    | 67,331.41 | 69,041.85  | 14.49 x 0.313 | 2   | 3031 = 3 x 3 x 0.313          |

\* Continued on Next Page...

## STRESS ANALYSIS - PAGE 2



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:20:51 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N18K</b>           | Mark:<br><b>SJI3C</b>                    |

### Web Design, Continued...

| Member | Web Tension | Allow Tension | Web Comp  | Allow Comp | Weld          | Qty | Material                      |
|--------|-------------|---------------|-----------|------------|---------------|-----|-------------------------------|
| V1S    | 0.00        | 9,017.86      | 1,090.96  | 1,236.84   | 2.00 x 0.115  | 1   | C18AA = 1.125 x 1.012 x 0.115 |
| W2     | 76,762.74   | 78,227.12     | 19,190.69 | 44,419.93  | 22.77 x 0.227 | 2   | A48A = 3.063 x 3.063 x 0.227  |

# STRESS ANALYSIS - PAGE 3



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:20:51 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N18K</b>           | Mark:<br><b>SJI3C</b>                    |

## TCX Design

| TCX Left                             |         | TCX Right                            |         |
|--------------------------------------|---------|--------------------------------------|---------|
| TCX Length                           | 0-0     | TCX Length                           | 0-0     |
| TCX Type                             | R       | TCX Type                             | R       |
| TCX Depth                            | 7 1/2   | TCX Depth                            | 7 1/2   |
| BPL Length                           | 0-6     | BPL Length                           | 0-6     |
| Clear Bearing                        | 0-6 3/4 | Clear Bearing                        | 0-6 3/4 |
| BPL Material: 406050 = 4 x 6 x 0.500 |         | BPL Material: 406050 = 4 x 6 x 0.500 |         |
| Total Load                           | 0.00    | Total Load                           | 0.00    |
| Reqd TL Def L/80                     | 0.00    | Reqd TL Def L/80                     | 0.00    |
| Live Load                            | 0.00    | Live Load                            | 0.00    |
| Reqd LL Def L/120                    | 0.00    | Reqd LL Def L/120                    | 0.00    |
| Section Modulus                      | 0.0000  | Section Modulus                      | 0.0000  |
| Reqd SM                              | 0.0000  | Reqd SM                              | 0.0000  |
| Mom of Inertia                       | 0.0000  | Mom of Inertia                       | 0.0000  |
| Reqd MI                              | 0.0000  | Reqd MI                              | 0.0000  |
| Seat Type: Lapped                    |         | Seat Type: Lapped                    |         |
|                                      |         |                                      |         |

## Load Combinations

|                                     |                                                                         |
|-------------------------------------|-------------------------------------------------------------------------|
| Case 1: DL                          | Case 5c_mr: 0.6(DL)+WL+AX+IP-M                                          |
| Case 2a: LL                         | Case 5d: 0.6(DL)+WL-AX+IP-M                                             |
| Case 2b: SL                         | Case 5d_mr: 0.6(DL)+WL-AX+IP+M                                          |
| Case 3a: DL+CL+TL+LL                | Case 5e: (0.6-0.14(SDS))DL+AX+SM+M                                      |
| Case 3b: DL+CL+TL+SL                | Case 5e_mr: (0.6-0.14(SDS))DL+AX+SM-M                                   |
| Case 3c: DL+CL+TL+LL+FEM            | Case 5f: (0.6-0.14(SDS))DL-AX+SM-M                                      |
| Case 3d: DL+CL+TL+SL+FEM            | Case 5f_mr: (0.6-0.14(SDS))DL-AX+SM+M                                   |
| Case 3e: DL+CL+TL+LL                | Case 6a: DL+CL+0.85(TL)+WL+AX+M                                         |
| Case 3f: DL+CL+TL+SL                | Case 6a_mr: DL+CL+0.85(TL)+WL+AX-M                                      |
| Case 4a: DL+WL+AX+M                 | Case 6b: DL+CL+0.85(TL)+WL-AX-M                                         |
| Case 4a_mr: DL+WL+AX-M              | Case 6b_mr: DL+CL+0.85(TL)+WL-AX+M                                      |
| Case 4b: DL+WL-AX-M                 | Case 6c: DL+CL+0.85(TL)+WL+C+AX+IP+M                                    |
| Case 4b_mr: DL+WL-AX+M              | Case 6c_mr: DL+CL+0.85(TL)+WL+C+AX+IP-M                                 |
| Case 4c: DL+WL+AX+IP+M              | Case 6d: DL+CL+0.85(TL)+WL+C-AX+IP-M                                    |
| Case 4c_mr: DL+WL+AX+IP-M           | Case 6d_mr: DL+CL+0.85(TL)+WL+C-AX+IP+M                                 |
| Case 4d: DL+WL-AX+IP-M              | Case 6e: DL+CL+0.85(TL)+WL+AX+IP+M                                      |
| Case 4d_mr: DL+WL-AX+IP+M           | Case 6e_mr: DL+CL+0.85(TL)+WL+AX+IP-M                                   |
| Case 4e: (1+0.14(SDS))DL+SM+AX+M    | Case 6f: DL+CL+0.85(TL)+WL-AX+IP-M                                      |
| Case 4e_mr: (1+0.14(SDS))DL+SM+AX-M | Case 6f_mr: DL+CL+0.85(TL)+WL-AX+IP+M                                   |
| Case 4f: (1+0.14(SDS))DL+SM-AX-M    | Case 6g: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX+M    |
| Case 4f_mr: (1+0.14(SDS))DL+SM-AX+M | Case 6g_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX-M |
| Case 5a: 0.6(DL)+WL+AX+M            | Case 6h: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX-M    |
| Case 5a_mr: 0.6(DL)+WL+AX-M         | Case 6h_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX+M |
| Case 5b: 0.6(DL)+WL-AX-M            | Case 7a: DL+CL+0.85(TL)+0.75(WL+AX+LL+M)                                |
| Case 5b_mr: 0.6(DL)+WL-AX+M         | Case 7a_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL-M)                             |
| Case 5c: 0.6(DL)+WL+AX+IP+M         | Case 7b: DL+CL+0.85(TL)+0.75(WL-AX+LL-M)                                |

# STRESS ANALYSIS - PAGE 4



**NEW MILLENNIUM**  
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|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:20:51 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N18K</b>           | Mark:<br><b>SJI3C</b>                    |

## Load Combinations Continued

Case 7b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+M)  
Case 7c: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP+M)  
Case 7c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP-M)  
Case 7d: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP-M)  
Case 7d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP+M)  
Case 7e: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP+M)  
Case 7e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP-M)  
Case 7f: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP-M)  
Case 7f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP+M)  
Case 7g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL+M)  
Case 7g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL-M)  
Case 7h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL-M)  
Case 7h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL+M)  
Case 8a: DL+CL+0.85(TL)+0.75(WL+AX+SL+M)  
Case 8a\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL-M)  
Case 8b: DL+CL+0.85(TL)+0.75(WL-AX+SL-M)  
Case 8b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+M)  
Case 8c: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP+M)  
Case 8c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP-M)  
Case 8d: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP-M)  
Case 8d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP+M)  
Case 8e: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP+M)  
Case 8e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP-M)  
Case 8f: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP-M)  
Case 8f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP+M)  
Case 8g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX+M)  
Case 8g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX-M)  
Case 8h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX-M)  
Case 8h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX+M)

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\* Continued on Next Page...

## STRESS ANALYSIS - PAGE 1



**NEW MILLENNIUM**  
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|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:24:36 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N26K</b>           | Mark:<br><b>SJI3D</b>                    |

### Stress Analysis Summary, Continued...

| Member | TC Tension | TC Compression | BC Tension | BC Compression | Web Tension | Web Comp. | Web Length | PP Dist. |
|--------|------------|----------------|------------|----------------|-------------|-----------|------------|----------|
|--------|------------|----------------|------------|----------------|-------------|-----------|------------|----------|

## STRESS ANALYSIS - PAGE 2



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:24:36 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N26K</b>           | Mark:<br><b>SJI3D</b>                    |

## Chord Properties

| Chord | Area   | Rx     | Rz     | Ryy    | Y      | Ix      | Q      | Material             |
|-------|--------|--------|--------|--------|--------|---------|--------|----------------------|
| TC    | 5.7500 | 1.8607 | 1.1847 | 2.9176 | 1.6848 | 19.9078 | 0.9613 | 6050 = 6 x 6 x 0.500 |
| BC    | 4.7500 | 1.5390 | 0.9829 | 2.5210 | 1.4342 | 11.2503 | 1.0000 | 5050 = 5 x 5 x 0.500 |

## Axial and Bending Analysis

|                    |                         |                         |                                     |                            |                            |                                                   |                              |
|--------------------|-------------------------|-------------------------|-------------------------------------|----------------------------|----------------------------|---------------------------------------------------|------------------------------|
| K:<br><b>1.00</b>  | Fy:<br><b>50,000.00</b> | Fb:<br><b>30,000.00</b> | Mom of Inertia:<br><b>16,894.35</b> | LL 360:<br><b>2,971.30</b> | LL 240:<br><b>4,456.95</b> | Max Bridg TC:<br><b>41-4</b>                      | Max Bridg BC:<br><b>50-5</b> |
| Top Chord Check    | End Panel LE            | First Panel LE          | Interior Panel                      | First Panel RE             | End Panel RE               | Gap Between Chords:<br><b>1.1250</b>              |                              |
| Length             | 49.50                   | 51.38                   | 51.50                               | 51.25                      | 49.50                      | Min Weld Len 2X:<br><b>2.0064</b>                 |                              |
| Bending Load       | 0.00                    | 0.00                    | 0.00                                | 0.00                       | 0.00                       | Max Load Fillers TC:<br><b>305,420.41</b>         |                              |
| Axial Load         | 79,520.59               | 79,520.59               | 279,313.44                          | 79,548.36                  | 79,548.36                  | Max Load no Fillers TC:<br><b>291,852.81</b>      |                              |
| fa                 | 6,914.83                | 6,914.83                | 24,288.13                           | 6,917.25                   | 6,917.25                   | TC OAL/Ryy:<br><b>245.40</b>                      |                              |
| Maximum K L/r      | 41.78                   | 43.37                   | 43.47                               | 43.26                      | 41.78                      | BC OAL/Ryy:<br><b>284.02</b>                      |                              |
| Fcr                | 42,515.04               | 42,114.23               | 42,087.11                           | 42,141.29                  | 42,515.04                  | BC Stress:<br><b>0.98</b>                         |                              |
| Fa                 | 25,509.02               | 25,268.54               | 25,252.27                           | 25,284.78                  | 25,509.02                  | BC L/Rz:<br><b>104.7919</b>                       |                              |
| F'e                | 404,426.94              | 375,445.41              | 373,625.06                          | 377,279.09                 | 404,426.94                 | TC Shear Stress:<br><b>14,323.18</b>              |                              |
| Cm                 | 0.9915                  | 0.9908                  | 0.9564                              | 0.9908                     | 0.9914                     | BC Shear Stress:<br><b>16,427.21</b>              |                              |
| Panel Point Moment | 0.00                    | 0.00                    | 0.00                                | 0.00                       | 0.00                       | TC Bearing Capacity:<br><b>13.00K &lt; 18.93K</b> |                              |
| Mid Panel Moment   | 0.00                    | 0.00                    | 0.00                                | 0.00                       | 0.00                       |                                                   |                              |
| Panel Point fb     | 0.00                    | 0.00                    | 0.00                                | 0.00                       | 0.00                       |                                                   |                              |
| Mid Panel fb       | 0.00                    | 0.00                    | 0.00                                | 0.00                       | 0.00                       |                                                   |                              |
| Fillers            | 0                       | 0                       | 0                                   | 0                          | 0                          |                                                   |                              |
| Panel Point Stress | 6,914.83                | 6,914.83                | 24,288.13                           | 6,917.25                   | 6,917.25                   |                                                   |                              |
| Mid Panel Stress   | 0.2711                  | 0.2737                  | 0.9618                              | 0.2736                     | 0.2712                     |                                                   |                              |

## Web Design

| Member | Web Tension | Allow Tension | Web Comp  | Allow Comp | Weld          | Qty | Material                      |
|--------|-------------|---------------|-----------|------------|---------------|-----|-------------------------------|
| W2     | 111,379.54  | 116,173.87    | 27,844.88 | 75,075.16  | 26.13 x 0.287 | 2   | 3528 = 3 1/2 x 3 1/2 x 0.287  |
| V1S    | 0.00        | 10,920.32     | 1,590.41  | 1,727.48   | 2.00 x 0.134  | 1   | C22AA = 1.125 x 1.086 x 0.134 |
| W3     | 0.00        | 138,068.78    | 97,659.53 | 100,341.34 | 19.12 x 0.344 | 2   | 3534 = 3 1/2 x 3 1/2 x 0.344  |
| W4     | 70,051.98   | 71,606.18     | 17,512.99 | 36,727.14  | 18.87 x 0.250 | 2   | A46A = 2.594 x 2.594 x 0.250  |
| V2     | 0.00        | 16,793.53     | 3,705.17  | 3,712.21   | 2.00 x 0.163  | 1   | C32AA = 1.125 x 1.479 x 0.163 |
| W5     | 0.00        | 116,173.87    | 70,128.60 | 78,306.34  | 16.46 x 0.287 | 2   | 3528 = 3 1/2 x 3 1/2 x 0.287  |
| W6     | 35,055.12   | 37,440.23     | 8,763.78  | 11,534.90  | 13.41 x 0.176 | 2   | A34A = 1.938 x 1.938 x 0.176  |
| V3     | 0.00        | 24,469.72     | 5,117.10  | 5,172.98   | 2.00 x 0.188  | 1   | C38AA = 1.125 x 1.844 x 0.200 |
| W7     | 0.00        | 67,578.15     | 35,016.82 | 38,299.46  | 12.58 x 0.188 | 2   | A44A = 2.875 x 2.875 x 0.209  |
| W8     | 0.00        | 61,276.80     | 30,660.36 | 31,842.84  | 11.01 x 0.188 | 2   | A42A = 2.625 x 2.625 x 0.209  |
| V4     | 0.00        | 27,475.67     | 5,586.27  | 5,677.74   | 2.01 x 0.188  | 1   | C40AA = 1.125 x 2.006 x 0.209 |
| W8     | 30,693.89   | 31,241.40     | 7,673.47  | 8,452.63   | 13.17 x 0.157 | 2   | A30A = 1.813 x 1.813 x 0.157  |
| W7     | 0.00        | 67,578.15     | 35,091.86 | 38,258.14  | 12.60 x 0.188 | 2   | A44A = 2.875 x 2.875 x 0.209  |
| V5     | 0.00        | 24,469.72     | 5,114.97  | 5,172.98   | 2.00 x 0.188  | 1   | C38AA = 1.125 x 1.844 x 0.200 |
| W6     | 35,053.51   | 37,440.23     | 8,763.38  | 11,560.15  | 13.41 x 0.176 | 2   | A34A = 1.938 x 1.938 x 0.176  |
| W5     | 0.00        | 116,173.87    | 70,088.68 | 78,365.97  | 16.45 x 0.287 | 2   | 3528 = 3 1/2 x 3 1/2 x 0.287  |
| V6     | 0.00        | 16,793.53     | 3,705.48  | 3,712.21   | 2.00 x 0.163  | 1   | C32AA = 1.125 x 1.479 x 0.163 |
| W4     | 70,165.34   | 71,606.18     | 17,541.33 | 36,673.51  | 18.90 x 0.250 | 2   | A46A = 2.594 x 2.594 x 0.250  |
| W3     | 0.00        | 138,068.78    | 97,590.52 | 100,408.91 | 19.10 x 0.344 | 2   | 3534 = 3 1/2 x 3 1/2 x 0.344  |

\* Continued on Next Page...

## STRESS ANALYSIS - PAGE 2



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:24:36 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N26K</b>           | Mark:<br><b>SJI3D</b>                    |

### Web Design, Continued...

| Member | Web Tension | Allow Tension | Web Comp  | Allow Comp | Weld          | Qty | Material                      |
|--------|-------------|---------------|-----------|------------|---------------|-----|-------------------------------|
| V1S    | 0.00        | 10,920.32     | 1,590.97  | 1,727.48   | 2.00 x 0.134  | 1   | C22AA = 1.125 x 1.086 x 0.134 |
| W2     | 111,418.44  | 116,173.87    | 27,854.61 | 75,075.16  | 26.14 x 0.287 | 2   | 3528 = 3 1/2 x 3 1/2 x 0.287  |

# STRESS ANALYSIS - PAGE 3



|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:24:36 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N26K</b>           | Mark:<br><b>SJI3D</b>                    |

## TCX Design

| TCX Left                             |         | TCX Right                            |         |
|--------------------------------------|---------|--------------------------------------|---------|
| TCX Length                           | 0-0     | TCX Length                           | 0-0     |
| TCX Type                             | R       | TCX Type                             | R       |
| TCX Depth                            | 7 1/2   | TCX Depth                            | 7 1/2   |
| BPL Length                           | 0-6     | BPL Length                           | 0-6     |
| Clear Bearing                        | 0-6 1/4 | Clear Bearing                        | 0-6 3/8 |
| BPL Material: 406050 = 4 x 6 x 0.500 |         | BPL Material: 406050 = 4 x 6 x 0.500 |         |
| Total Load                           | 0.00    | Total Load                           | 0.00    |
| Reqd TL Def L/80                     | 0.00    | Reqd TL Def L/80                     | 0.00    |
| Live Load                            | 0.00    | Live Load                            | 0.00    |
| Reqd LL Def L/120                    | 0.00    | Reqd LL Def L/120                    | 0.00    |
| Section Modulus                      | 0.0000  | Section Modulus                      | 0.0000  |
| Reqd SM                              | 0.0000  | Reqd SM                              | 0.0000  |
| Mom of Inertia                       | 0.0000  | Mom of Inertia                       | 0.0000  |
| Reqd MI                              | 0.0000  | Reqd MI                              | 0.0000  |
| Seat Type: Lapped                    |         | Seat Type: Lapped                    |         |
|                                      |         |                                      |         |

## Load Combinations

|                                     |                                                                         |
|-------------------------------------|-------------------------------------------------------------------------|
| Case 1: DL                          | Case 5c_mr: 0.6(DL)+WL+AX+IP-M                                          |
| Case 2a: LL                         | Case 5d: 0.6(DL)+WL-AX+IP-M                                             |
| Case 2b: SL                         | Case 5d_mr: 0.6(DL)+WL-AX+IP+M                                          |
| Case 3a: DL+CL+TL+LL                | Case 5e: (0.6-0.14(SDS))DL+AX+SM+M                                      |
| Case 3b: DL+CL+TL+SL                | Case 5e_mr: (0.6-0.14(SDS))DL+AX+SM-M                                   |
| Case 3c: DL+CL+TL+LL+FEM            | Case 5f: (0.6-0.14(SDS))DL-AX+SM-M                                      |
| Case 3d: DL+CL+TL+SL+FEM            | Case 5f_mr: (0.6-0.14(SDS))DL-AX+SM+M                                   |
| Case 3e: DL+CL+TL+LL                | Case 6a: DL+CL+0.85(TL)+WL+AX+M                                         |
| Case 3f: DL+CL+TL+SL                | Case 6a_mr: DL+CL+0.85(TL)+WL+AX-M                                      |
| Case 4a: DL+WL+AX+M                 | Case 6b: DL+CL+0.85(TL)+WL-AX-M                                         |
| Case 4a_mr: DL+WL+AX-M              | Case 6b_mr: DL+CL+0.85(TL)+WL-AX+M                                      |
| Case 4b: DL+WL-AX-M                 | Case 6c: DL+CL+0.85(TL)+WL+C+AX+IP+M                                    |
| Case 4b_mr: DL+WL-AX+M              | Case 6c_mr: DL+CL+0.85(TL)+WL+C+AX+IP-M                                 |
| Case 4c: DL+WL+AX+IP+M              | Case 6d: DL+CL+0.85(TL)+WL+C-AX+IP-M                                    |
| Case 4c_mr: DL+WL+AX+IP-M           | Case 6d_mr: DL+CL+0.85(TL)+WL+C-AX+IP+M                                 |
| Case 4d: DL+WL-AX+IP-M              | Case 6e: DL+CL+0.85(TL)+WL+AX+IP+M                                      |
| Case 4d_mr: DL+WL-AX+IP+M           | Case 6e_mr: DL+CL+0.85(TL)+WL+AX+IP-M                                   |
| Case 4e: (1+0.14(SDS))DL+SM+AX+M    | Case 6f: DL+CL+0.85(TL)+WL-AX+IP-M                                      |
| Case 4e_mr: (1+0.14(SDS))DL+SM+AX-M | Case 6f_mr: DL+CL+0.85(TL)+WL-AX+IP+M                                   |
| Case 4f: (1+0.14(SDS))DL+SM-AX-M    | Case 6g: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX+M    |
| Case 4f_mr: (1+0.14(SDS))DL+SM-AX+M | Case 6g_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM+AX-M |
| Case 5a: 0.6(DL)+WL+AX+M            | Case 6h: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX-M    |
| Case 5a_mr: 0.6(DL)+WL+AX-M         | Case 6h_mr: (1+0.14(SDS))DL+(1+0.14(SDS))CL+(0.85+0.056(SDS))TL+SM-AX+M |
| Case 5b: 0.6(DL)+WL-AX-M            | Case 7a: DL+CL+0.85(TL)+0.75(WL+AX+LL+M)                                |
| Case 5b_mr: 0.6(DL)+WL-AX+M         | Case 7a_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL-M)                             |
| Case 5c: 0.6(DL)+WL+AX+IP+M         | Case 7b: DL+CL+0.85(TL)+0.75(WL-AX+LL-M)                                |

## STRESS ANALYSIS - PAGE 4



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|                                 |                                                                    |                                          |
|---------------------------------|--------------------------------------------------------------------|------------------------------------------|
| Job Number:<br><b>00-0-0585</b> | Job Name:<br><b>SJI JG CHORD MODIFIED SLENDERNESS - SHOPORDERS</b> | Date Run:<br><b>3/21/2025 8:24:36 AM</b> |
| Location:<br><b>MADISON, WI</b> | Joist Description:<br><b>Girder Load @ Diag 60G7N26K</b>           | Mark:<br><b>SJI3D</b>                    |

**Load Combinations Continued**

Case 7b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+M)  
 Case 7c: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP+M)  
 Case 7c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+LL+IP-M)  
 Case 7d: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP-M)  
 Case 7d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+LL+IP+M)  
 Case 7e: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP+M)  
 Case 7e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+LL+IP-M)  
 Case 7f: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP-M)  
 Case 7f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+LL+IP+M)  
 Case 7g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL+M)  
 Case 7g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM+AX+LL-M)  
 Case 7h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL-M)  
 Case 7h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SM-AX+LL+M)  
 Case 8a: DL+CL+0.85(TL)+0.75(WL+AX+SL+M)  
 Case 8a\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL-M)  
 Case 8b: DL+CL+0.85(TL)+0.75(WL-AX+SL-M)  
 Case 8b\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+M)  
 Case 8c: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP+M)  
 Case 8c\_mr: DL+CL+0.85(TL)+0.75(WL+C+AX+SL+IP-M)  
 Case 8d: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP-M)  
 Case 8d\_mr: DL+CL+0.85(TL)+0.75(WL+C-AX+SL+IP+M)  
 Case 8e: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP+M)  
 Case 8e\_mr: DL+CL+0.85(TL)+0.75(WL+AX+SL+IP-M)  
 Case 8f: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP-M)  
 Case 8f\_mr: DL+CL+0.85(TL)+0.75(WL-AX+SL+IP+M)  
 Case 8g: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX+M)  
 Case 8g\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM+AX-M)  
 Case 8h: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX-M)  
 Case 8h\_mr: (1+0.105(SDS))DL+(1+0.105(SDS))CL+(0.85+0.042(SDS))TL+0.75(SL+SM-AX+M)

## Bibliography

- [1] Kubilay Cicek, Thomas Sputo, and Hannah B Blum. The impact of analysis assumptions on buckling prediction in open-web steel joists. In *Annual Stability Conference, Structural Stability Research Council*, 2024.
- [2] AISC 360-10. *Specification for Structural Steel Buildings*. ANSI/AISC, 2010.
- [3] Steel Joist Institute. *ANSI/SJI 100 – 2020, Standard Specification for K-Series, LH-Series, and DLH-Series Open Web Steel Joists, and for Joist Girders*. Florence, SC, U.S.A., 2020.
- [4] Edward J Sippel, Hannah B Blum, Ronald D Ziemian, Joe Pote, and Scott Morton. Tutorial for mastan2 v5.1 - steel joist. [https://www.mastan2.com/data/Joist\\_Tutorial.pdf](https://www.mastan2.com/data/Joist_Tutorial.pdf), 2020.
- [5] William McGuire, Richard H Gallagher, and Ronald D Ziemian. *Matrix Structural Analysis*. 2nd edition, 2014.
- [6] Dassault Systèmes, SIMULIA. *Abaqus 2023*. Dassault Systèmes, 2023.
- [7] R. D. Ziemian, W. McGuire, and S. W. Liu. *MASTAN2*. 2019.
- [8] Edward J Sippel, Ronald D Ziemian, and Hannah B Blum. Influence of torsional stiffness in double-angle open-web joist and joist girder chords. *Journal of Constructional Steel Research*, 199:107595, 2022.