CQN

CARTER QUINN NORLIN

STRUCTURAL
ENGINEERING

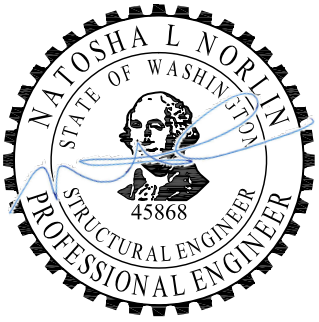
# STRUCTURAL CALCULATIONS

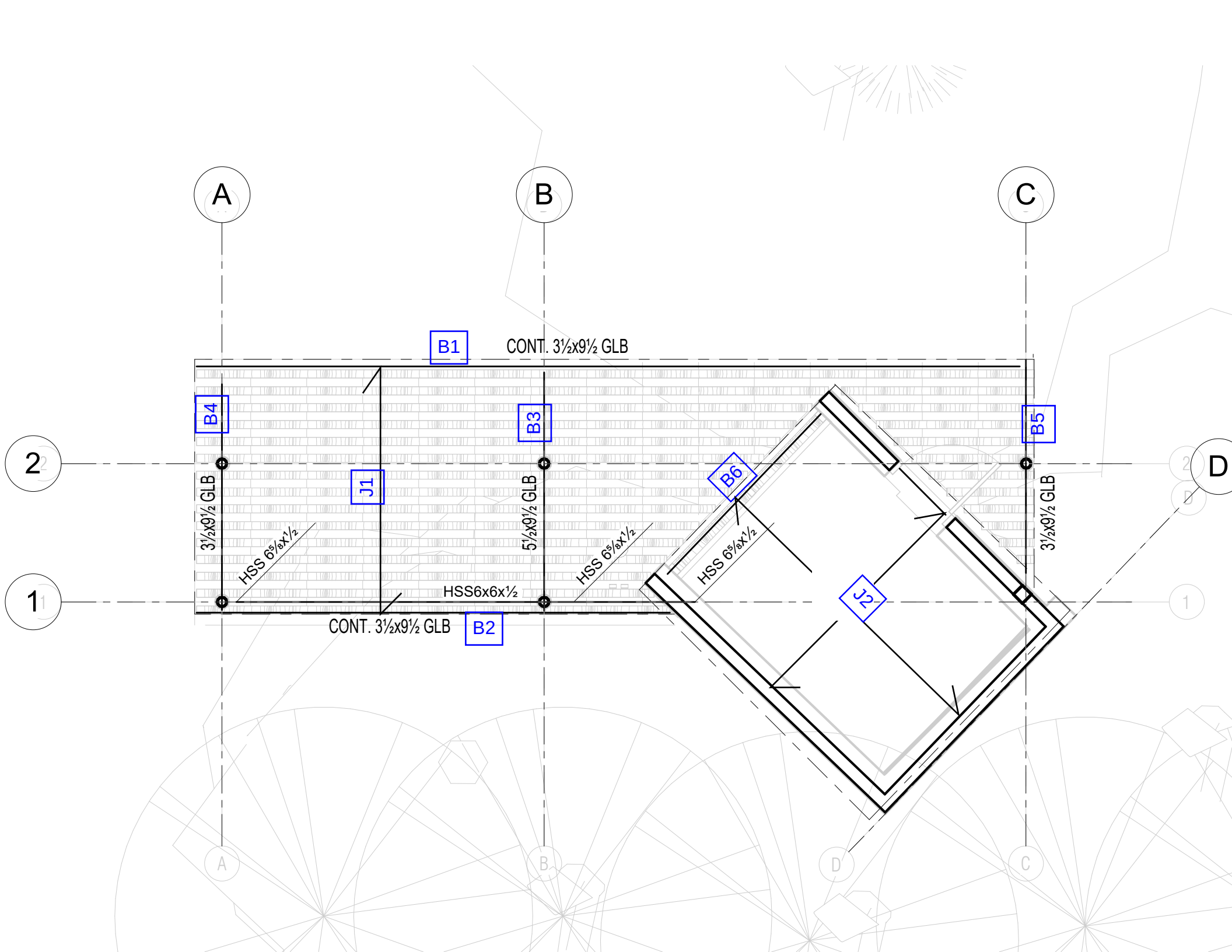
**Yamamoto & LaRose**
5245 Forest Ave. SE
Mercer Island, WA 98040

**Office of Ordinary Architecture**
1521 30th Ave South
Seattle, WA 98144

**August 12th, 2025**

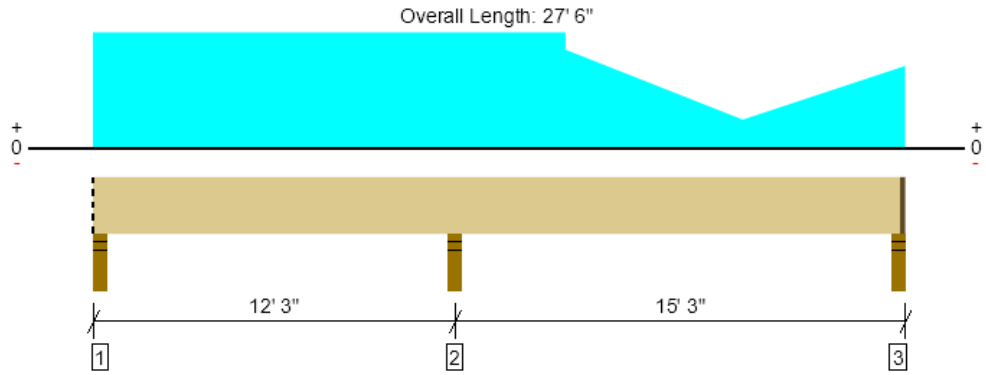
**Permit Corr. #1 Calculations**




A
B
C
2
1
D
B1
CONT. 3½x9½ GLB
B4
B3
B5
B6
J1
J2
3½x9½ GLB
5½x9½ GLB
3½x9½ GLB
HSS 6⅝x½
HSS 6⅝x½
HSS 6⅝x½
HSS6x6x½
CONT. 3½x9½ GLB
B2

*Wood Option, B1*

**1 piece(s) 3 1/2" x 9 1/2" 24F-V4 DF Glulam**




Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|---|---|---|---|---|---|
| Member Reaction (lbs) | 2489 @ 12' 3" | 5206 (3.50") | Passed (48%) | -- | 1.0 D + 1.0 S (All Spans) |
| Shear (lbs) | 1139 @ 11' 3 3/4" | 6755 | Passed (17%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Pos Moment (Ft-lbs) | 1991 @ 4' 11 9/16" | 12109 | Passed (16%) | 1.15 | 1.0 D + 1.0 S (Alt Spans) |
| Neg Moment (Ft-lbs) | -3093 @ 12' 3" | 9334 | Passed (33%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Live Load Defl. (in) | 0.064 @ 5' 8 1/4" | 0.604 | Passed (L/999+) | -- | 1.0 D + 1.0 S (Alt Spans) |
| Total Load Defl. (in) | 0.095 @ 5' 6 7/16" | 0.806 | Passed (L/999+) | -- | 1.0 D + 1.0 S (Alt Spans) |

Member Length : 27' 4 3/4"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 1.00 was calculated for positive bending using length L = 9' 7 1/8".
- Volume factor of 1.00 was calculated for negative bending using length L = 6' 5 7/16".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|---|---|---|---|---|---|---|---|
| | Total | Available | Required | Dead | Snow | Factored | |
| 1 - Stud wall - SPF | 3.50" | 3.50" | 1.50" | 328 | 531 | 859 | Blocking |
| 2 - Stud wall - SPF | 3.50" | 3.50" | 1.67" | 1020 | 1469 | 2489 | None |
| 3 - Stud wall - SPF | 3.50" | 2.25" | 1.50" | 227 | 325 | 553 | 1 1/4" Rim Board |

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

| Lateral Bracing | Bracing Intervals | Comments |
|---|---|---|
| Top Edge (Lu) | 27' 5" o/c | |
| Bottom Edge (Lu) | 27' 5" o/c | |

•Maximum allowable bracing intervals based on applied load.

| Vertical Loads | Location (Side) | Tributary Width | Dead (0.90) | Snow (1.15) | Comments |
|---|---|---|---|---|---|
| 0 - Self Weight (PLF) | 0 to 27' 4 3/4" | N/A | 8.1 | -- | |
| 1 - Uniform (PSF) | 0 to 16' (Front) | 4' 1 1/2" | 15.0 | 25.0 | Default Load |
| 2 - Tapered (PSF) | 16' to 22' (Front) | 3' 6" to 1' | 15.0 | 25.0 | |
| 3 - Tapered (PSF) | 22' to 27' 6" (Front) | 1' to 2' 11 1/16" | 15.0 | 25.0 | |

- Side loads are assumed to not induce cross-grain tension.

## Weyerhaeuser Notes

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

| ForteWEB Software Operator | Job Notes |
|---|---|
| Ri Han<br>Carter Quinn Norlin<br>(206) 264-7784<br>wrh@cqn-se.com | |

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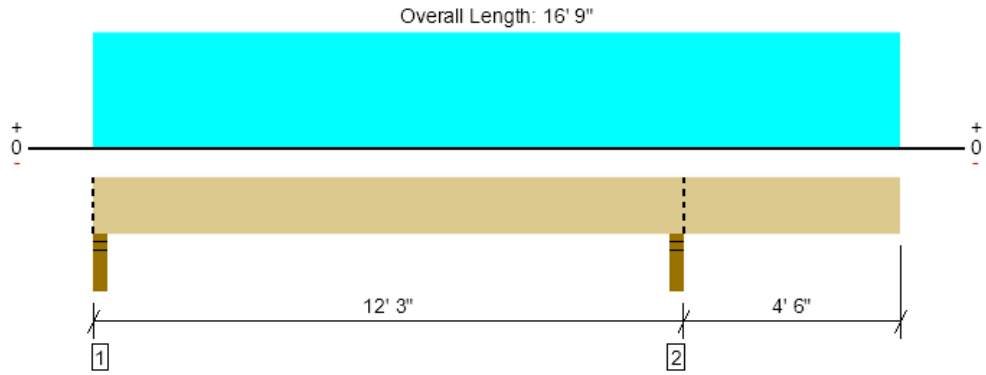
8/7/2025 6:15:46 PM UTC
ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: Yamamoto Sauna

*Wood Option, B2*

**1 piece(s) 3 1/2" x 9 1/2" 24F-V4 DF Glulam**




Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|---|---|---|---|---|---|
| Member Reaction (lbs) | 1994 @ 12' 1 1/4" | 5206 (3.50") | Passed (38%) | -- | 1.0 D + 1.0 S (All Spans) |
| Shear (lbs) | 1027 @ 11' 2" | 6755 | Passed (15%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Pos Moment (Ft-lbs) | 2462 @ 5' 6" | 12109 | Passed (20%) | 1.15 | 1.0 D + 1.0 S (Alt Spans) |
| Neg Moment (Ft-lbs) | -1868 @ 12' 1 1/4" | 9334 | Passed (20%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Live Load Defl. (in) | 0.086 @ 5' 11 5/8" | 0.597 | Passed (L/999+) | -- | 1.0 D + 1.0 S (Alt Spans) |
| Total Load Defl. (in) | 0.131 @ 5' 10 9/16" | 0.796 | Passed (L/999+) | -- | 1.0 D + 1.0 S (Alt Spans) |

Member Length : 16' 9"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 1.00 was calculated for positive bending using length L = 10' 8".
- Volume factor of 1.00 was calculated for negative bending using length L = 6' 5 7/16".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|---|---|---|---|---|---|---|---|
| | Total | Available | Required | Dead | Snow | Factored | |
| 1 - Stud wall - SPF | 3.50" | 3.50" | 1.50" | 366 | 586 | 952 | Blocking |
| 2 - Stud wall - SPF | 3.50" | 3.50" | 1.50" | 806 | 1188 | 1994 | Blocking |

• Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

| Lateral Bracing | Bracing Intervals | Comments |
|---|---|---|
| Top Edge (Lu) | 16' 9" o/c | |
| Bottom Edge (Lu) | 16' 9" o/c | |

•Maximum allowable bracing intervals based on applied load.

| Vertical Loads | Location (Side) | Tributary Width | Dead (0.90) | Snow (1.15) | Comments |
|---|---|---|---|---|---|
| 0 - Self Weight (PLF) | 0 to 16' 9" | N/A | 8.1 | -- | |
| 1 - Uniform (PSF) | 0 to 16' 9" (Front) | 4' 1 1/2" | 15.0 | 25.0 | Default Load |

• Side loads are assumed to not induce cross-grain tension.

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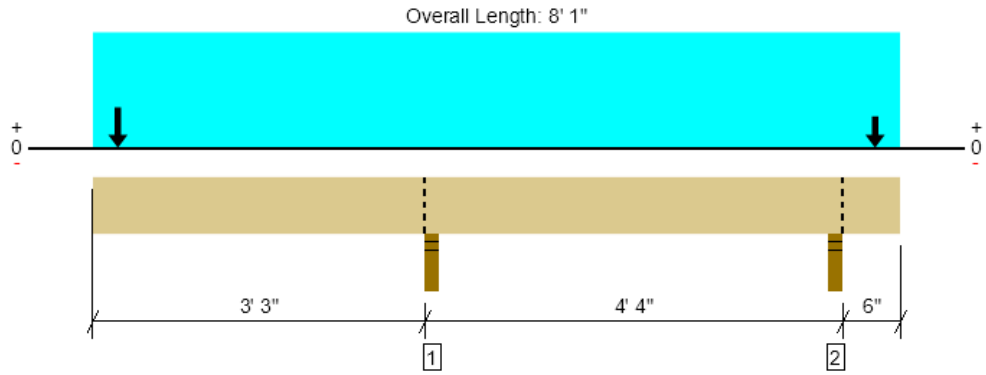
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

| ForteWEB Software Operator | Job Notes |
|---|---|
| Ri Han<br>Carter Quinn Norlin<br>(206) 264-7784<br>wrh@cqn-se.com | |

Weyerhaeuser

*Wood Option, B3*

**1 piece(s) 5 1/2" x 9 1/2" 24F-V4 DF Glulam**




Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|---|---|---|---|---|---|
| Member Reaction (lbs) | 4648 @ 3' 4 3/4" | 8181 (3.50") | Passed (57%) | -- | 1.0 D + 1.0 S (Adj Spans) |
| Shear (lbs) | 2619 @ 2' 5 1/2" | 10615 | Passed (25%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Pos Moment (Ft-lbs) | 0 @ N/A | N/A | Passed (N/A) | -- | N/A |
| Neg Moment (Ft-lbs) | -8134 @ 3' 4 3/4" | 14667 | Passed (55%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Live Load Defl. (in) | 0.098 @ 0 | 0.226 | Passed (2L/828) | -- | 1.0 D + 1.0 S (Alt Spans) |
| Total Load Defl. (in) | 0.167 @ 0 | 0.340 | Passed (2L/488) | -- | 1.0 D + 1.0 S (Alt Spans) |

Member Length : 8' 1"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Left cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 1.00 was calculated for negative bending using length L = 8' 1".
- -341 lbs uplift at support located at 7' 5 1/4". Strapping or other restraint may be required.
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|---|---|---|---|---|---|---|---|
| | Total | Available | Required | Dead | Snow | Factored | |
| 1 - Stud wall - SPF | 3.50" | 3.50" | 1.99" | 1923 | 2725 | 4648 | Blocking |
| 2 - Stud wall - SPF | 3.50" | 3.50" | 1.50" | 127 | 783/-468 | 910/-341 | Blocking |

• Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

| Lateral Bracing | Bracing Intervals | Comments |
|---|---|---|
| Top Edge (Lu) | 8' 1" o/c | |
| Bottom Edge (Lu) | 8' 1" o/c | |

•Maximum allowable bracing intervals based on applied load.

| Vertical Loads | Location (Side) | Tributary Width | Dead (0.90) | Snow (1.15) | Comments |
|---|---|---|---|---|---|
| 0 - Self Weight (PLF) | 0 to 8' 1" | N/A | 12.7 | -- | |
| 1 - Uniform (PSF) | 0 to 8' 1" (Front) | 1' | 15.0 | 25.0 | Default Load |
| 2 - Point (lb) | 3" (Front) | N/A | 1020 | 1469 | Linked from: B1, Support 2 |
| 3 - Point (lb) | 7' 10" (Back) | N/A | 806 | 1188 | Linked from: B2, Support 2 |

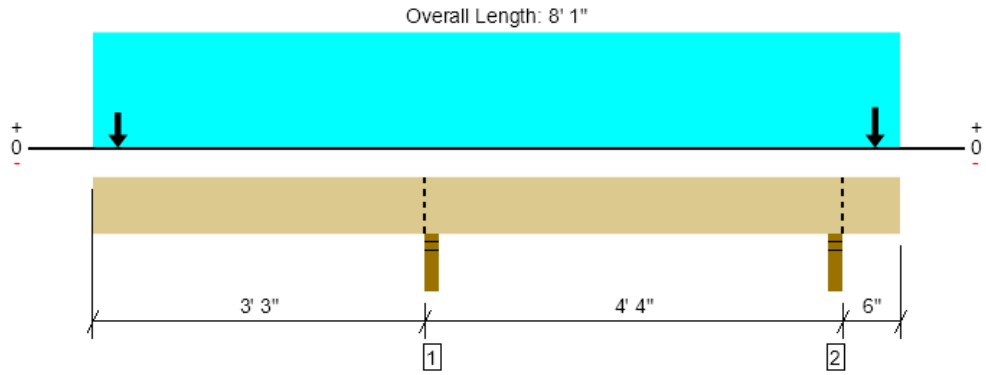
• Side loads are assumed to not induce cross-grain tension.

| ForteWEB Software Operator | Job Notes |
|---|---|
| Ri Han<br>Carter Quinn Norlin<br>(206) 264-7784<br>wrh@cqn-se.com | |

Weyerhaeuser

*Wood Option, B4*

**1 piece(s) 3 1/2" x 9 1/2" 24F-V4 DF Glulam**




Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|---|---|---|---|---|---|
| Member Reaction (lbs) | 1790 @ 3' 4 3/4" | 5206 (3.50") | Passed (34%) | -- | 1.0 D + 1.0 S (Adj Spans) |
| Shear (lbs) | 977 @ 2' 5 1/2" | 6755 | Passed (14%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Pos Moment (Ft-lbs) | 0 @ N/A | N/A | Passed (N/A) | -- | N/A |
| Neg Moment (Ft-lbs) | -2980 @ 3' 4 3/4" | 9334 | Passed (32%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Live Load Defl. (in) | 0.059 @ 0 | 0.226 | Passed (2L/999+) | -- | 1.0 D + 1.0 S (Alt Spans) |
| Total Load Defl. (in) | 0.096 @ 0 | 0.340 | Passed (2L/850) | -- | 1.0 D + 1.0 S (Alt Spans) |

Member Length : 8' 1"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Left cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 1.00 was calculated for negative bending using length L = 8' 1".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|---|---|---|---|---|---|---|---|
| | Total | Available | Required | Dead | Snow | Factored | |
| 1 - Stud wall - SPF | 3.50" | 3.50" | 1.50" | 704 | 1086 | 1790 | Blocking |
| 2 - Stud wall - SPF | 3.50" | 3.50" | 1.50" | 176 | 487/-68 | 663 | Blocking |

• Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

| Lateral Bracing | Bracing Intervals | Comments |
|---|---|---|
| Top Edge (Lu) | 8' 1" o/c | |
| Bottom Edge (Lu) | 8' 1" o/c | |

•Maximum allowable bracing intervals based on applied load.

| Vertical Loads | Location (Side) | Tributary Width | Dead (0.90) | Snow (1.15) | Comments |
|---|---|---|---|---|---|
| 0 - Self Weight (PLF) | 0 to 8' 1" | N/A | 8.1 | -- | |
| 1 - Uniform (PSF) | 0 to 8' 1" (Front) | 1' | 15.0 | 25.0 | Default Load |
| 2 - Point (lb) | 3" (Front) | N/A | 328 | 531 | Linked from: North Edge, Support 1 |
| 3 - Point (lb) | 7' 10" (Front) | N/A | 366 | 586 | Linked from: South Edge, Support 1 |

• Side loads are assumed to not induce cross-grain tension.

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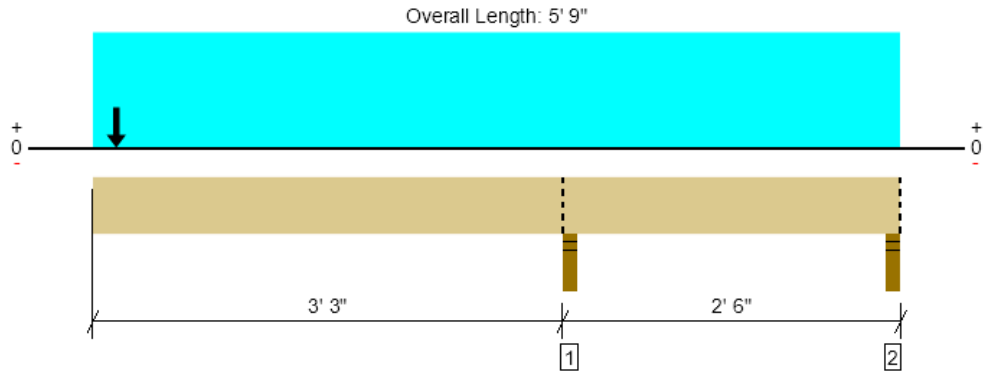
Weyerhaeuser

*Wood Option, B5*

**1 piece(s) 3 1/2" x 9 1/2" 24F-V4 DF Glulam**

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| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|---|---|---|---|---|---|
| Member Reaction (lbs) | 1709 @ 3' 4 3/4" | 5206 (3.50") | Passed (33%) | -- | 1.0 D + 1.0 S (All Spans) |
| Shear (lbs) | 949 @ 4' 4" | 6755 | Passed (14%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Pos Moment (Ft-lbs) | 0 @ N/A | N/A | Passed (N/A) | -- | N/A |
| Neg Moment (Ft-lbs) | -2060 @ 3' 4 3/4" | 9334 | Passed (22%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Live Load Defl. (in) | 0.028 @ 0 | 0.226 | Passed (2L/999+) | -- | 1.0 D + 1.0 S (Alt Spans) |
| Total Load Defl. (in) | 0.048 @ 0 | 0.340 | Passed (2L/999+) | -- | 1.0 D + 1.0 S (Alt Spans) |

Member Length : 5' 9"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Left cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 1.00 was calculated for negative bending using length L = 5' 7".
- -897 lbs uplift at support located at 5' 7". Strapping or other restraint may be required.
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|---|---|---|---|---|---|---|---|
| | Total | Available | Required | Dead | Snow | Factored | |
| 1 - Stud wall - SPF | 3.50" | 3.50" | 1.50" | 727 | 983 | 1709 | Blocking |
| 2 - Stud wall - SPF | 3.50" | 3.50" | 1.50" | -367 | -530 | -897 | Blocking |

• Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

| Lateral Bracing | Bracing Intervals | Comments |
|---|---|---|
| Top Edge (Lu) | 5' 9" o/c | |
| Bottom Edge (Lu) | 5' 9" o/c | |

•Maximum allowable bracing intervals based on applied load.

| Vertical Loads | Location (Side) | Tributary Width | Dead (0.90) | Snow (1.15) | Comments |
|---|---|---|---|---|---|
| 0 - Self Weight (PLF) | 0 to 5' 9" | N/A | 8.1 | -- | |
| 1 - Uniform (PSF) | 0 to 5' 9" (Front) | 1' | 15.0 | 25.0 | Default Load |
| 2 - Point (lb) | 2" (Front) | N/A | 227 | 325 | Linked from: B1, Support 3 |

• Side loads are assumed to not induce cross-grain tension.

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| ForteWEB Software Operator | Job Notes |
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8/7/2025 6:15:46 PM UTC
ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: Yamamoto Sauna

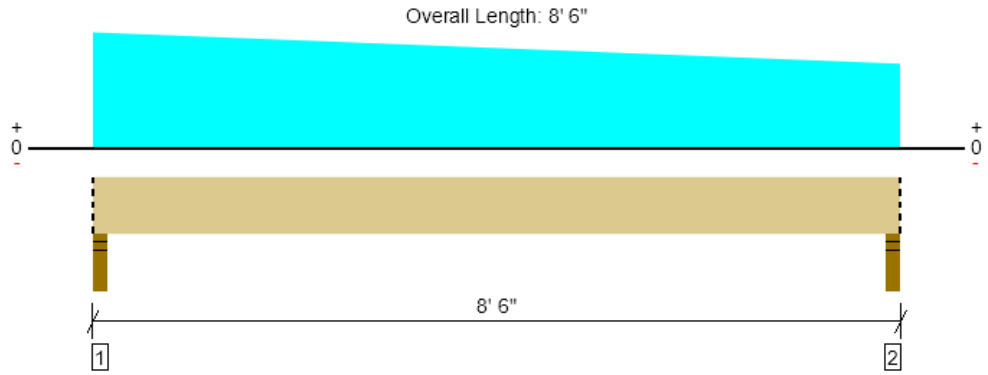
FORTEWEB

MEMBER REPORT

PASSED

*Wood Option, B6*

**2 piece(s) 2 x 8 HF No.2**




Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|---|---|---|---|---|---|
| Member Reaction (lbs) | 1405 @ 2" | 4253 (3.50") | Passed (33%) | -- | 1.0 D + 1.0 S (All Spans) |
| Shear (lbs) | 1085 @ 10 3/4" | 2501 | Passed (43%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Moment (Ft-lbs) | 2618 @ 4' 1 13/16" | 2569 | Passed (102%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Live Load Defl. (in) | 0.156 @ 4' 2 3/4" | 0.408 | Passed (L/629) | -- | 1.0 D + 1.0 S (All Spans) |
| Total Load Defl. (in) | 0.254 @ 4' 2 3/4" | 0.544 | Passed (L/386) | -- | 1.0 D + 1.0 S (All Spans) |

Member Length : 8' 6"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|---|---|---|---|---|---|---|---|
| | Total | Available | Required | Dead | Snow | Factored | |
| 1 - Stud wall - SPF | 3.50" | 3.50" | 1.50" | 541 | 863 | 1405 | Blocking |
| 2 - Stud wall - SPF | 3.50" | 3.50" | 1.50" | 488 | 775 | 1263 | Blocking |

• Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

| Lateral Bracing | Bracing Intervals | Comments |
|---|---|---|
| Top Edge (Lu) | 6" o/c | |
| Bottom Edge (Lu) | 8' 6" o/c | |

•Maximum allowable bracing intervals based on applied load.

| Vertical Loads | Location (Side) | Tributary Width | Dead (0.90) | Snow (1.15) | Comments |
|---|---|---|---|---|---|
| 0 - Self Weight (PLF) | 0 to 8' 6" | N/A | 5.5 | -- | |
| 1 - Tapered (PSF) | 0 to 8' 6" (Front) | 3' 5" to 1' | 15.0 | 25.0 | Default Load |
| 2 - Uniform (PSF) | 0 to 8' 6" (Front) | 5' 6" | 15.0 | 25.0 | |

• Side loads are assumed to not induce cross-grain tension.

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

| ForteWEB Software Operator | Job Notes |
|---|---|
| Ri Han<br>Carter Quinn Norlin<br>(206) 264-7784<br>wrh@cqn-se.com | |

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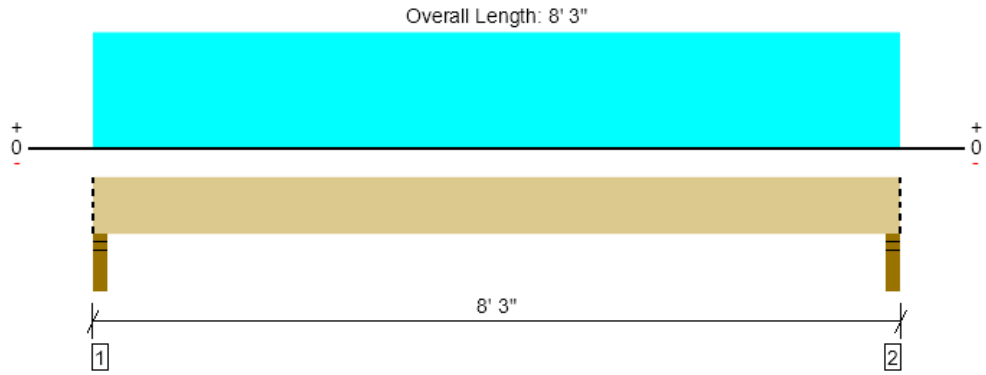
8/7/2025 11:28:26 PM UTC
ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: Yamamoto Sauna

*Wood Option, J1*

**1 piece(s) 2 x 10 HF No.2 @ 24" OC**




Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|---|---|---|---|---|---|
| Member Reaction (lbs) | 330 @ 2 1/2" | 2126 (3.50") | Passed (16%) | -- | 1.0 D + 1.0 S (All Spans) |
| Shear (lbs) | 245 @ 1' 3/4" | 1596 | Passed (15%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Moment (Ft-lbs) | 614 @ 4' 1 1/2" | 2204 | Passed (28%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Live Load Defl. (in) | 0.033 @ 4' 1 1/2" | 0.392 | Passed (L/999+) | -- | 1.0 D + 1.0 S (All Spans) |
| Total Load Defl. (in) | 0.053 @ 4' 1 1/2" | 0.522 | Passed (L/999+) | -- | 1.0 D + 1.0 S (All Spans) |

Member Length : 8' 3"
System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|---|---|---|---|---|---|---|---|
| | Total | Available | Required | Dead | Snow | Factored | |
| 1 - Stud wall - SPF | 3.50" | 3.50" | 1.50" | 124 | 206 | 330 | Blocking |
| 2 - Stud wall - SPF | 3.50" | 3.50" | 1.50" | 124 | 206 | 330 | Blocking |

• Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

| Lateral Bracing | Bracing Intervals | Comments |
|---|---|---|
| Top Edge (Lu) | 8' 3" o/c | |
| Bottom Edge (Lu) | 8' 3" o/c | |

•Maximum allowable bracing intervals based on applied load.

| Vertical Load | Location (Side) | Spacing | Dead (0.90) | Snow (1.15) | Comments |
|---|---|---|---|---|---|
| 1 - Uniform (PSF) | 0 to 8' 3" | 24" | 15.0 | 25.0 | Default Load |

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

| ForteWEB Software Operator | Job Notes |
|---|---|
| Ri Han<br>Carter Quinn Norlin<br>(206) 264-7784<br>wrh@cqn-se.com | |

Weyerhaeuser

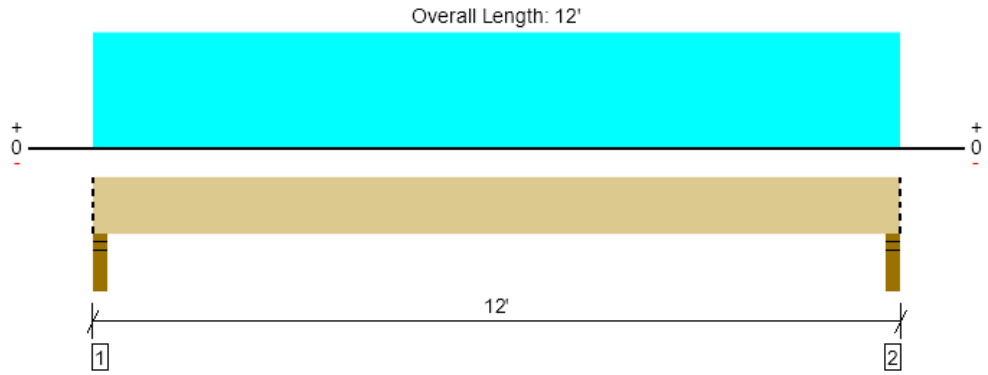
FORTEWEB

# MEMBER REPORT

**PASSED**

*Wood Option, J2*

**1 piece(s) 2 x 8 HF No.2 @ 24" OC**




Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|---|---|---|---|---|---|
| Member Reaction (lbs) | 480 @ 2 1/2" | 2126 (3.50") | Passed (23%) | -- | 1.0 D + 1.0 S (All Spans) |
| Shear (lbs) | 408 @ 10 3/4" | 1251 | Passed (33%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Moment (Ft-lbs) | 1342 @ 6' | 1477 | Passed (91%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Live Load Defl. (in) | 0.327 @ 6' | 0.579 | Passed (L/425) | -- | 1.0 D + 1.0 S (All Spans) |
| Total Load Defl. (in) | 0.523 @ 6' | 0.772 | Passed (L/266) | -- | 1.0 D + 1.0 S (All Spans) |

Member Length : 12'
System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|---|---|---|---|---|---|---|---|
| | Total | Available | Required | Dead | Snow | Factored | |
| 1 - Stud wall - SPF | 3.50" | 3.50" | 1.50" | 180 | 300 | 480 | Blocking |
| 2 - Stud wall - SPF | 3.50" | 3.50" | 1.50" | 180 | 300 | 480 | Blocking |

• Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

| Lateral Bracing | Bracing Intervals | Comments |
|---|---|---|
| Top Edge (Lu) | 3' 10" o/c | |
| Bottom Edge (Lu) | 12' o/c | |

•Maximum allowable bracing intervals based on applied load.

| Vertical Load | Location (Side) | Spacing | Dead (0.90) | Snow (1.15) | Comments |
|---|---|---|---|---|---|
| 1 - Uniform (PSF) | 0 to 12' | 24" | 15.0 | 25.0 | Default Load |

## Weyerhaeuser Notes

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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|---|---|
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8/12/2025 6:37:01 PM UTC
ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: Yamamoto Sauna

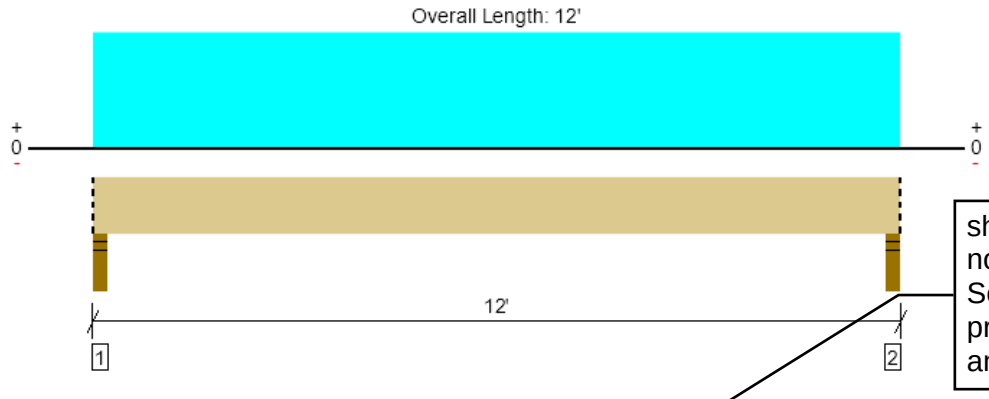
FORTEWEB

# MEMBER REPORT

**FAILED**

*Wood Option, J2*

**1 piece(s) 2 x 6 HF No.2 @ 24" OC**




shear capacity at notched end passed. See 2x8 calculation printout for moment and deflection

Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|---|---|---|---|---|---|
| Member Reaction (lbs) | 480 @ 2 1/2" | 2126 (3.50") | Passed (23%) | -- | 1.0 D + 1.0 S (All Spans) |
| Shear (lbs) | 420 @ 9" | 949 | Passed (44%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Moment (Ft-lbs) | 1342 @ 6' | 921 | Failed (146%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Live Load Defl. (in) | 0.749 @ 6' | 0.579 | Failed (L/186) | -- | 1.0 D + 1.0 S (All Spans) |
| Total Load Defl. (in) | 1.199 @ 6' | 0.772 | Failed (L/116) | -- | 1.0 D + 1.0 S (All Spans) |

Member Length : 12'
System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|---|---|---|---|---|---|---|---|
| | Total | Available | Required | Dead | Snow | Factored | |
| 1 - Stud wall - SPF | 3.50" | 3.50" | 1.50" | 180 | 300 | 480 | Blocking |
| 2 - Stud wall - SPF | 3.50" | 3.50" | 1.50" | 180 | 300 | 480 | Blocking |

• Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

| Lateral Bracing | Bracing Intervals | Comments |
|---|---|---|
| Top Edge (Lu) | 6" o/c | |
| Bottom Edge (Lu) | 12' o/c | |

•Maximum allowable bracing intervals based on applied load.

| Vertical Load | Location (Side) | Spacing | Dead (0.90) | Snow (1.15) | Comments |
|---|---|---|---|---|---|
| 1 - Uniform (PSF) | 0 to 12' | 24" | 15.0 | 25.0 | Default Load |

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| ForteWEB Software Operator | Job Notes |
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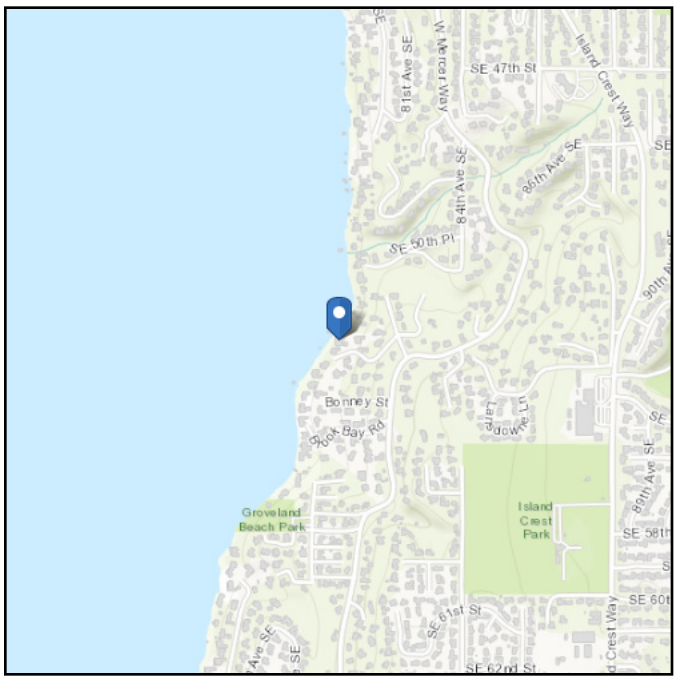
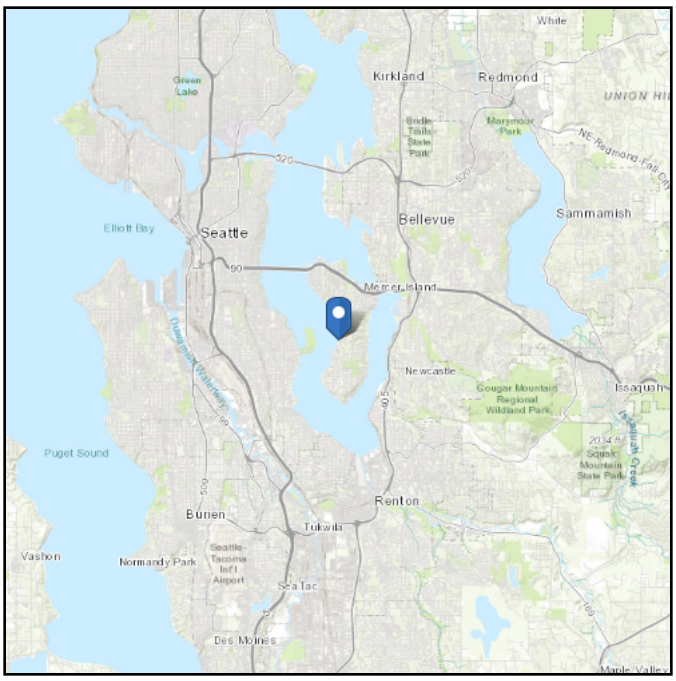
8/12/2025 6:38:03 PM UTC
ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: Yamamoto Sauna

# ASCE Hazards Report

**Address:**
5245 Forest Ave SE
Mercer Island, Washington
98040

| | | | |
|---|---|---|---|
| **Standard:** | ASCE/SEI 7-16 | **Latitude:** | 47.555383 |
| **Risk Category:** | II | **Longitude:** | -122.231389 |
| **Soil Class:** | D - Stiff Soil | **Elevation:** | 31.50013275997272 ft (NAVD 88) |




## Wind

**Results:**

| | |
|---|---|
| Wind Speed | 98 Vmph |
| 10-year MRI | 67 Vmph |
| 25-year MRI | 74 Vmph |
| 50-year MRI | 78 Vmph |
| 100-year MRI | 83 Vmph |

| | |
|---|---|
| Data Source: | ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2 |
| Date Accessed: | Mon May 05 2025 |

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

# Seismic

**Site Soil Class:** D - Stiff Soil

**Results:**

| | | | |
|---|---|---|---|
| $S_S$ : | 1.454 | $S_{D1}$ : | N/A |
| $S_1$ : | 0.505 | $T_L$ : | 6 |
| $F_a$ : | 1 | PGA : | 0.623 |
| $F_v$ : | N/A | $PGA_M$ : | 0.685 |
| $S_{MS}$ : | 1.454 | $F_{PGA}$ : | 1.1 |
| $S_{M1}$ : | N/A | $I_e$ : | 1 |
| $S_{DS}$ : | 0.97 | $C_v$ : | 1.391 |

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

**Data Accessed:** Mon May 05 2025

**Date Source:** USGS Seismic Design Maps

The ASCE Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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Project Title:
Engineer:
Project ID:
Project Descr:

# Torsional Analysis of Rigid Diaphragm

Project File: Yamamoto.ec6

LIC# : KW-06015393, Build:20.25.05.28 BYKONEN CARTER QUINN (c) ENERCALC, LLC 1982-2025

**DESCRIPTION:** Sauna Lateral - Seismic 08.07.25

## General Information

IBC 2021

| | | | |
|---|---|---|---|
| Applied Lateral Force | 0.230 k | Center of Shear Application : | |
| .....Additional Orthogonal Force | k | Distance from "X" datum point | ft |
| Maximum Load Used for Analysis : | 0.230 k | Distance from "Y" datum point | ft |
| Note: This load is the vector resolved from the above two entries and will be applied to the system of elements at angular increments. | | Ecc. as % of Maximum Dimension | 5.00 % |
| | | Maximum Dimensions : | |
| | | Along "X" Axis | ft |
| Load Orientation Angular Increment | 15.0 deg | Along "Y" Axis | ft |
| Load Location Angular Increment | 30.0 deg | | |
| Center of Rigidity Location (calculated) . . . | | | |
| "X" dist. from Datum | -2.828 ft | | |
| "Y" dist. from Datum | -5.750 ft | | |

Accidental Eccentricity +/- from "X" Coord. of Load Application : 0.0 ft

Accidental Eccentricity +/- from "Y" Coord. of Load Application : 0.0 ft

## Wall Information

| | | | | | |
|---|---|---|---|---|---|
| **Label :** SE | | X Wall C.G. Location | 4 ft | Length | 5.5 ft |
| | | Y Wall C.G. Location | -3 ft | Height | 8 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 5.5 in |
| Along Wall "y" Dir | 2.5555E-003 in | Wall Fixity | Fix-Pin | E - Bending | 1 Mpsi |
| Along Wall "x" Dir | 3.2260E+004 in | | | E - Shear | 1 Mpsi |
| **Label :** South | | X Wall C.G. Location | 0 ft | Length | 8.5 ft |
| | | Y Wall C.G. Location | -5.75 ft | Height | 8 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 0 deg | Thickness | 5.5 in |
| Along Wall "y" Dir | 8.1168E-004 in | Wall Fixity | Fix-Pin | E - Bending | 1 Mpsi |
| Along Wall "x" Dir | 2.0874E+004 in | | | E - Shear | 1 Mpsi |
| **Label :** West | | X Wall C.G. Location | -4 ft | Length | 11 ft |
| | | Y Wall C.G. Location | -0.25 ft | Height | 8 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 5.5 in |
| Along Wall "y" Dir | 4.3844E-004 in | Wall Fixity | Fix-Pin | E - Bending | 1 Mpsi |
| Along Wall "x" Dir | 1.6130E+004 in | | | E - Shear | 1 Mpsi |

## *ANALYSIS SUMMARY*

Maximum shear forces applied to resisting elements. Eccentricity with respect to Center of Rigidity

| | Max Shear along Member Local "y-y" Axis | | | | Max Shear along Member Local "x-x" Axis | | | |
|---|---|---|---|---|---|---|---|---|
| Resisting Element | Load Angle | X-Ecc (ft) | Y-Ecc (ft) | Shear Force (k) | Load Angle | X-Ecc (ft) | Y-Ecc (ft) | Shear Force (k) |
| **SE** | 330 | -2.83 | 5.75 | **0.201** | 0 | -2.83 | 5.75 | **0.000** |
| **South** | 0 | -2.83 | 5.75 | **0.230** | 90 | -2.83 | 5.75 | **0.000** |
| **West** | 90 | -2.83 | 5.75 | **0.196** | 0 | -2.83 | 5.75 | **0.000** |

Project Title:
Engineer:
Project ID:
Project Descr:

# Torsional Analysis of Rigid Diaphragm

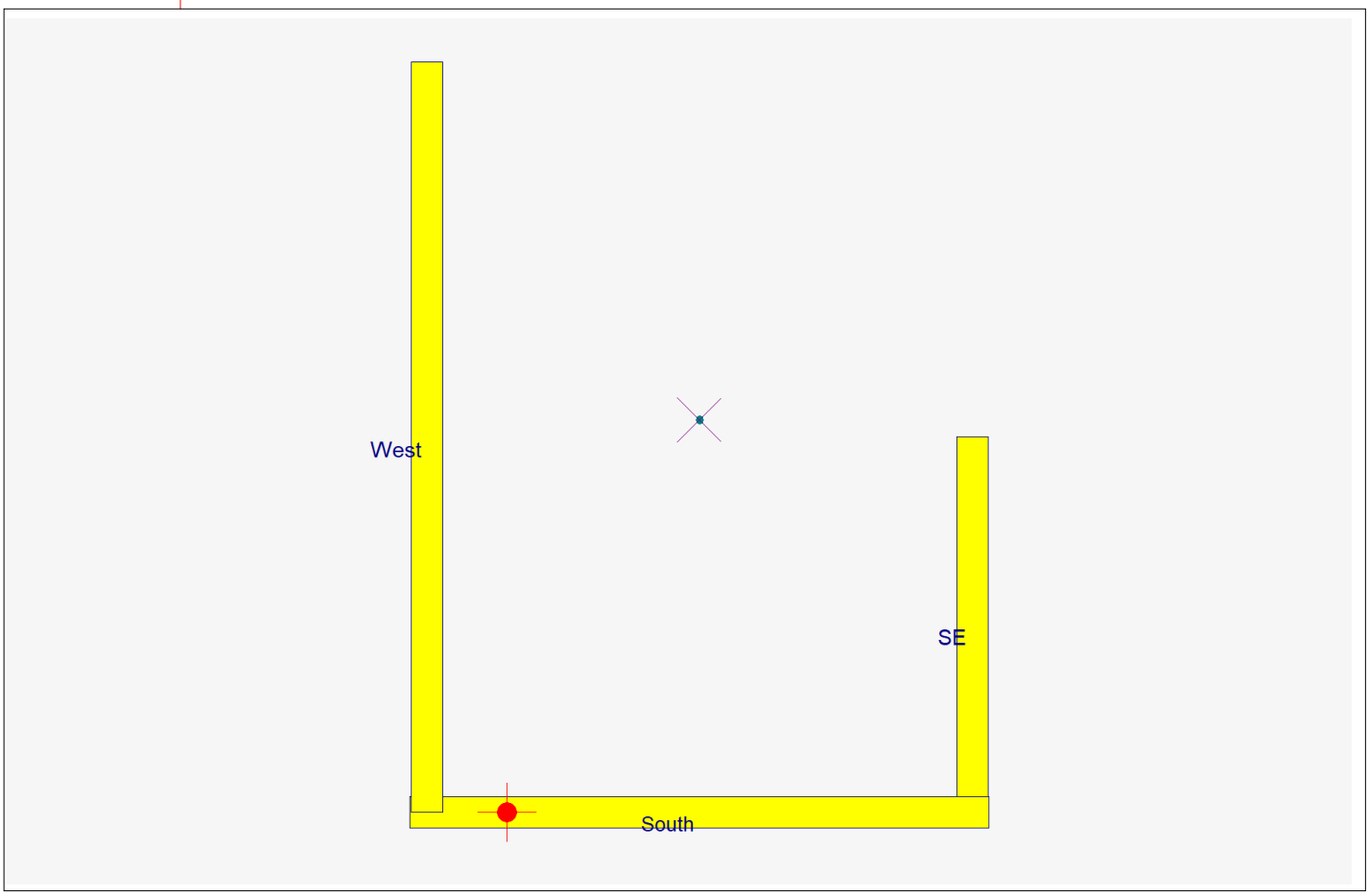
Project File: Yamamoto.ec6

LIC# : KW-06015393, Build:20.25.05.28 BYKONEN CARTER QUINN (c) ENERCALC, LLC 1982-2025

**DESCRIPTION:** Sauna Lateral - Seismic 08.07.25

## *Layout of Resisting Elements*

Legend : Defined Wall | X Datum | Center of Rigidity | Center of Mass | Accidental eccentricity application boundary



Project Title:
Engineer:
Project ID:
Project Descr:

# Torsional Analysis of Rigid Diaphragm

Project File: Yamamoto.ec6

LIC# : KW-06015393, Build:20.25.05.28 BYKONEN CARTER QUINN (c) ENERCALC, LLC 1982-2025

**DESCRIPTION:** Sauna Lateral - Seismic 08.07.25

## Analysis Notes

This program is designed to distribute an applied shear load to a set of resisting elements.

Each resisting element data entry specifies a deflection along a "major" and "minor" axis due to a 1,000 lb load. Each resisting element may be entered as a wall or a column (whereby the deflection is calculated), or as a generic resisting element with specified deflection. The deflections define the stiffness of each resisting element.

Each resisting element is defined at an (X,Y) location from a datum the user has previously defined. A counter-clockwise rotation of the element can be entered with respect to a traditional "+X" axis line.

A main "shear" load and an optional orthogonal shear load are specified for distribution to the system of resisting elements. In addition the maximum orthogonal dimensions of the structure and minimum accidental eccentricity percentage are specified.

From the entered loads the program calculates resultant force vectors for each angular orientation that is requested. The force is applied to the resisting elements in angular increments to generate a series of resulting direct and torsional shear loads on each element. This application of force is then repeated at angular intervals along an elliptical path defined by the minimum accidental eccentricity.

The end result is a table of direct shear and torsional shear values for each element from the iterated angles of load application and accidental eccentricity. These values are then searched to find the maximum major and minor axis shears applied to each resisting element.

Project Title:
Engineer:
Project ID:
Project Descr:

# Torsional Analysis of Rigid Diaphragm

Project File: Yamamoto.ec6

LIC# : KW-06015393, Build:20.25.05.28 BYKONEN CARTER QUINN (c) ENERCALC, LLC 1982-2025

**DESCRIPTION:** Sauna Lateral - Wind 08.07.25

## General Information

IBC 2021

| | | | |
|---|---|---|---|
| Applied Lateral Force | 0.510 k | Center of Shear Application : | |
| .....Additional Orthogonal Force | k | Distance from "X" datum point | ft |
| Maximum Load Used for Analysis : | 0.510 k | Distance from "Y" datum point | ft |
| Note: This load is the vector resolved from the above two entries and will be applied to the system of elements at angular increments. | | Ecc. as % of Maximum Dimension | 5.00 % |
| | | Maximum Dimensions : | |
| | | Along "X" Axis | ft |
| Load Orientation Angular Increment | 15.0 deg | Along "Y" Axis | ft |
| Load Location Angular Increment | 30.0 deg | | |
| Center of Rigidity Location (calculated) . . . | | | |
| "X" dist. from Datum | -2.828 ft | | |
| "Y" dist. from Datum | -5.750 ft | | |

Accidental Eccentricity +/- from "X" Coord. of Load Application : 0.0 ft

Accidental Eccentricity +/- from "Y" Coord. of Load Application : 0.0 ft

## Wall Information

| | | | | | |
|---|---|---|---|---|---|
| **Label :** SE | | X Wall C.G. Location | 4 ft | Length | 5.5 ft |
| | | Y Wall C.G. Location | -3 ft | Height | 8 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 5.5 in |
| Along Wall "y" Dir | 2.5555E-003 in | Wall Fixity | Fix-Pin | E - Bending | 1 Mpsi |
| Along Wall "x" Dir | 3.2260E+004 in | | | E - Shear | 1 Mpsi |
| **Label :** South | | X Wall C.G. Location | 0 ft | Length | 8.5 ft |
| | | Y Wall C.G. Location | -5.75 ft | Height | 8 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 0 deg | Thickness | 5.5 in |
| Along Wall "y" Dir | 8.1168E-004 in | Wall Fixity | Fix-Pin | E - Bending | 1 Mpsi |
| Along Wall "x" Dir | 2.0874E+004 in | | | E - Shear | 1 Mpsi |
| **Label :** West | | X Wall C.G. Location | -4 ft | Length | 11 ft |
| | | Y Wall C.G. Location | -0.25 ft | Height | 8 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 5.5 in |
| Along Wall "y" Dir | 4.3844E-004 in | Wall Fixity | Fix-Pin | E - Bending | 1 Mpsi |
| Along Wall "x" Dir | 1.6130E+004 in | | | E - Shear | 1 Mpsi |

## *ANALYSIS SUMMARY*

Maximum shear forces applied to resisting elements. Eccentricity with respect to Center of Rigidity

| | Max Shear along Member Local "y-y" Axis | | | | Max Shear along Member Local "x-x" Axis | | | |
|---|---|---|---|---|---|---|---|---|
| Resisting Element | Load Angle | X-Ecc (ft) | Y-Ecc (ft) | Shear Force (k) | Load Angle | X-Ecc (ft) | Y-Ecc (ft) | Shear Force (k) |
| **SE** | 330 | -2.83 | 5.75 | **0.445** | 0 | -2.83 | 5.75 | **0.000** |
| **South** | 0 | -2.83 | 5.75 | **0.510** | 90 | -2.83 | 5.75 | **0.000** |
| **West** | 90 | -2.83 | 5.75 | **0.435** | 0 | -2.83 | 5.75 | **0.000** |

Project Title:
Engineer:
Project ID:
Project Descr:

# Torsional Analysis of Rigid Diaphragm

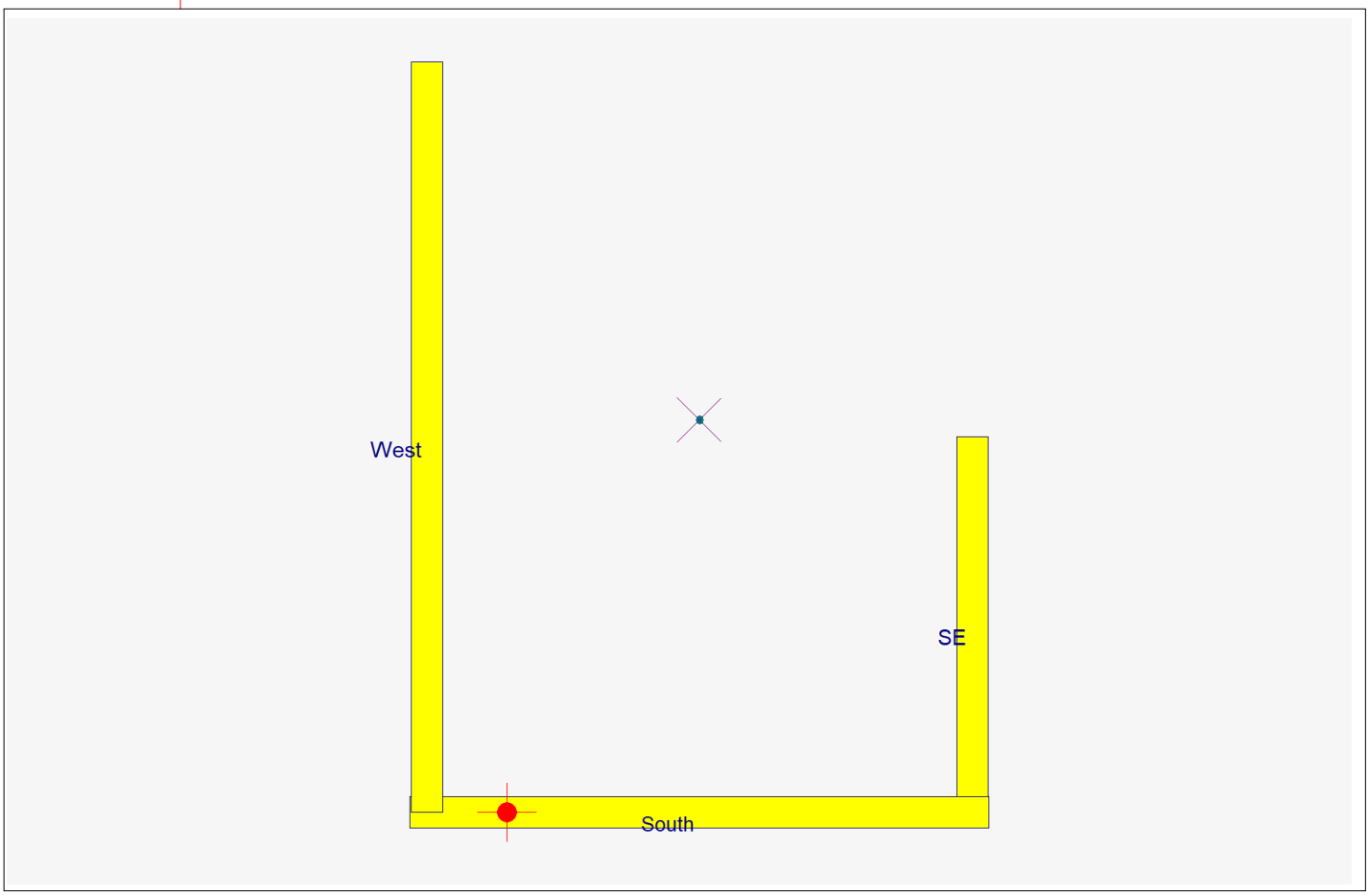
Project File: Yamamoto.ec6

LIC# : KW-06015393, Build:20.25.05.28 BYKONEN CARTER QUINN (c) ENERCALC, LLC 1982-2025

**DESCRIPTION:** Sauna Lateral - Wind 08.07.25

## *Layout of Resisting Elements*

Legend : Defined Wall | X Datum | Center of Rigidity | Center of Mass | Accidental eccentricity application boundary



Project Title:
Engineer:
Project ID:
Project Descr:

# Torsional Analysis of Rigid Diaphragm

Project File: Yamamoto.ec6

LIC# : KW-06015393, Build:20.25.05.28 BYKONEN CARTER QUINN (c) ENERCALC, LLC 1982-2025

**DESCRIPTION:** Sauna Lateral - Wind 08.07.25

## Analysis Notes

This program is designed to distribute an applied shear load to a set of resisting elements.

Each resisting element data entry specifies a deflection along a "major" and "minor" axis due to a 1,000 lb load. Each resisting element may be entered as a wall or a column (whereby the deflection is calculated), or as a generic resisting element with specified deflection. The deflections define the stiffness of each resisting element.

Each resisting element is defined at an (X,Y) location from a datum the user has previously defined. A counter-clockwise rotation of the element can be entered with respect to a traditional "+X" axis line.

A main "shear" load and an optional orthogonal shear load are specified for distribution to the system of resisting elements. In addition the maximum orthogonal dimensions of the structure and minimum accidental eccentricity percentage are specified.

From the entered loads the program calculates resultant force vectors for each angular orientation that is requested. The force is applied to the resisting elements in angular increments to generate a series of resulting direct and torsional shear loads on each element. This application of force is then repeated at angular intervals along an elliptical path defined by the minimum accidental eccentricity.

The end result is a table of direct shear and torsional shear values for each element from the iterated angles of load application and accidental eccentricity. These values are then searched to find the maximum major and minor axis shears applied to each resisting element.

# BASE SHEAR CALCULATION

| Seismic Design Parameters | |
|---|---|
| *Risk Category* | II |
| *Site Class* | D - Default |
| *R* | 6.50 |
| $I_e$ | 1.00 |
| $S_{ds}$ | 0.97 |
| $S_{d1}$ | |
| $S_s$ | 1.45 |
| $S_1$ | 0.505 |
| $F_a$ | 1.00 |
| $F_v$ | |
| $S_{ms}$ *(g)* | 1.55 |
| $S_{m1}$ *(g)* | |
| $C_s$ | 0.15 |
| *k* | 1.00 |
| *V (k) (LRFD)* | **0.33** |
| *V (k) (ASD)* | 0.23 |

From ATC

| Areas ($ft^2$) | |
|---|---|
| *Sauna Roof* | 110 |

| Loads | |
|---|---|
| *DL-Roof (psf)* | 15.00 |
| *DL-Walls (psf)* | 10 |

| | Height (ft) | Weight (k) | $w_x h_x^k$ | $C_{vx}$ | $F_x$ (LRFD) | $F_x$ (ASD) |
|---|---|---|---|---|---|---|
| *Roof* | 9.33 | 2.20 | 20.53 | 1.00 | 0.328307692 | 0.23 |
| *TOTAL* | 9.33 | 2.20 | 20.53 | 1.00 | | 0.23 |

## WIND PRESSURE CALCULATION

| Building Parameters | | | | |
|---|---|---|---|---|
| | Height (ft) | Trib. Height (ft) | N/S | E/W |
| Roof | 9.33 | 4.67 | 11.0 | 8.667 |
| Total | 9.33 | - | - | - |

| Wind Load Parameters | |
|---|---|
| Exposure | C |
| Risk Category | II |
| Site Class | D |
| θ | 0.0 |
| a | 3 |
| $K_{zt}$ | 1 |
| $K_d$ | 0.85 |
| $K_z$ | 0.77 |
| V (mph) | 98 |
| $q_h$ (psf) | 16.05 |

**DETERMINE WIND PRESSURE**

$p = q_h\ [(GC_{pf})-(Gc_{pi})]$ per ASCE 7-16 Eqn. 28.3-1

| $Gc_{pf}$ Values per ASCE 7-10 Figure 28.4-1 | | | |
|---|---|---|---|
| | | Case A (Trans) | Case B (Long) |
| Roof | | 0.320 | |
| | corners | 0.540 | |
| Walls | | 0.690 | 0.690 |
| | corners | 1.040 | 1.040 |

| | Wind Direction - Plan N/S | | | | | Wind Direction - Plan E/W | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | A*Gcpf | F (k) | Total (LRFD) | Min. Load | Total (ASD) | A*GCpf | F (k) | Total (LRFD) | Min. Load | Total (ASD) |
| Roof | 18.24 | 0.29 | 0.53 | 0.65 | 0.40 | 16.09 | 0.26 | 0.73 | 0.82 | 0.51 |
| corner | 14.55 | 0.23 | | | | 29.11 | 0.47 | | | |
| Total | | | 0.53 | | 0.40 | | | 0.73 | | 0.51 |

West

| Level | Story Height (ft) | Seismic (k) | Wind (k) | Wall Length |
|---|---|---|---|---|
| Roof | 8.00 | 0.20 | 0.44 | 11.00 |

| **Roof** | Wall | Width (ft) | H:W Ratio | Increase Factor[1] | Shear Seismic (plf) | Shear Wind (plf)2 | Weight (k) | Hold Down Seismic (k) | Hold Down Wind (k) |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 11.00 | 0.7 | 1.00 | 17.82 | 39.55 | 0.88 | -0.12 | 0.05 |

[1] Increase per SDPWS-2021 4.3.3.2.

[2] Per IBC 2306.2 When wind governs, wind capacities for shearwalls may be increased by 40%

South

| Level | Story Height (ft) | Seismic (k) | Wind (k) | Wall Length |
|---|---|---|---|---|
| Roof | 8.00 | 0.23 | 0.51 | 8.50 |

| **Roof** | Wall | Width (ft) | H:W Ratio | Increase Factor[1] | Shear Seismic (plf) | Shear Wind (plf)2 | Weight (k) | Hold Down Seismic (k) | Hold Down Wind (k) |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 8.50 | 0.9 | 1.00 | 27.06 | 60.00 | 0.68 | 0.01 | 0.28 |

[1] Increase per SDPWS-2021 4.3.3.2.

[2] Per IBC 2306.2 When wind governs, wind capacities for shearwalls may be increased by 40%

SE

| Level | Story Height (ft) | Seismic (k) | Wind (k) | Wall Length |
|---|---|---|---|---|
| Roof | 8.00 | 0.20 | 0.45 | 5.50 |

| **Roof** | Wall | Width (ft) | H:W Ratio | Increase Factor[1] | Shear Seismic (plf) | Shear Wind (plf)2 | Weight (k) | Hold Down Seismic (k) | Hold Down Wind (k) |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 5.50 | 1.5 | 1.00 | 36.36 | 80.91 | 0.44 | 0.16 | 0.52 |

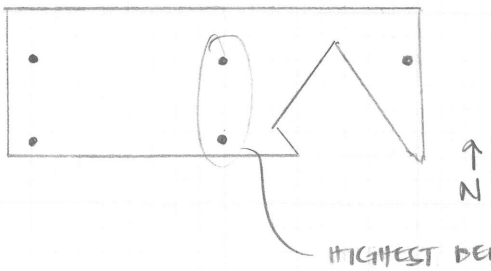
[1] Increase per SDPWS-2021 4.3.3.2.

[2] Per IBC 2306.2 When wind governs, wind capacities for shearwalls may be increased by 40%

CANOPY LATERAL - canopy decreased in size slightly, design is still valid

- STEEL ORDINARY CANT. COLUMN SYSTEM
  PER ASCE 7-16, TABLE 12.2-1 · R = 1.25
  Ω0 = 1.25
  Cd = 1.25

- TOTAL AREA OF CANOPY = 215 FT²
  WT. = 215 FT² × 15 PSF = 3225 LBS
  Cs = SDS / (R/I) = 0.97 / (1.25/1.0) = 0.776
  V = CsW = 0.776 × 3225 lb = 2503 lb (ULT)
  1752 lb (ASD)




(3) LINES IN N/S DIRECTION
(2) LINES IN E/W DIRECTION

HIGHEST DEMAND = ~50% OF BASE
LOAD: 2503 × 0.5 / 2 = 626 lb / COL (ULT)
1752 × 0.05 / 2 = 438 lb / COL (ASD)

CHECK DRIFT:
PER ASCE 7-16, TABLE 12.12-1, LIMIT = 0.02h = 0.02 × 50.25' × 12" = 1.98"
SXE = 1.537 in (PER ATTACHED ENERCALC PRINTOUT)
δx = Cd × δxe / Ie = 1.25 × 1.537 / 1.0 = 1.92" < 1.98", OK

M @ BASE: 5.165 K-FT (ULT)
(SEISMIC) 3.616 K-FT (ASD)


CQN
CARTER QUINN NORLIN
STRUCTURAL ENGINEERING
▶ 2033 Sixth Avenue #995 Seattle, WA 98121 206-264-7784 www.CQN-SE.com


PROJECT: YAMAMOTO DATE: 5/5/25
DESIGNER: RH SHEET #:

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Column

Project File: Yamamoto.ec6

LIC# : KW-06015393, Build:20.24.10.03 BYKONEN CARTER QUINN (c) ENERCALC, LLC 1982-2025

**DESCRIPTION:** Canopy Support

## Code References

Calculations per AISC 360-16, IBC 2021, SDPWS 2021
Load Combinations Used : ASCE 7-16

## General Information

Steel Section Name : **Pipe3-1/2STD**

| | |
|---|---|
| Analysis Method : | Load Resistance Factor |
| Steel Stress Grade | |
| Fy : Steel Yield | 36.0 ksi |
| E : Elastic Bending Modulus | 29,000.0 ksi |

| | |
|---|---|
| Overall Column Height | 8.250 ft |
| Top & Bottom Fixity | Top Free, Bottom Fixed |
| Brace condition : | |

Unbraced Length for buckling ABOUT X-X Axis = 8.250 ft, K = 2.1
Unbraced Length for buckling ABOUT Y-Y Axis = 8.250 ft, K = 2.1

## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 75.240 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 8.250 ft, D = 0.1530, S = 0.960 k
BENDING LOADS . . .
Lat. Point Load at 8.250 ft creating Mx-x, E = 0.6260 k

## DESIGN SUMMARY

**Bending & Shear Check Results**

PASS Max. Axial+Bending Stress Ratio = **0.6412** : 1

| | |
|---|---|
| Load Combination | +1.20D+0.20S+E |
| Location of max.above base | 0.0 ft |
| At maximum location values are . . . | |
| Pu | 0.4659 k |
| 0.9 * Pn | 23.463 k |
| Mu-x | -5.165 k-ft |
| 0.9 * Mn-x : | 8.181 k-ft |
| Mu-y | 0.0 k-ft |
| 0.9 * Mn-y : | 8.181 k-ft |

PASS Maximum Shear Stress Rati **0.03091** : 1

| | |
|---|---|
| Load Combination | +1.20D+0.20S+E |
| Location of max.above base | 0.0 ft |
| At maximum location values are . . . | |
| Vu : Applied | 0.6260 k |
| Vn * Phi : Allowable | 20.250 k |

**Maximum Load Reactions . .**

| | |
|---|---|
| Top along X-X | 0.0 k |
| Bottom along X-X | 0.0 k |
| Top along Y-Y | 0.0 k |
| Bottom along Y-Y | 0.6260 k |

**Maximum Load Deflections . . .**

Along Y-Y 1.537 in at 8.250 ft above base
for load combination : E Only

Along X-X 0.0 in at 0.0 ft above base
for load combination :

## Load Combination Results

| Load Combination | Maximum Axial + Bending Stress Ratios: Stress Ratio | Status | Location | Cbx | Cby | KxLx/Rx | KyLy/Ry | Maximum Shear Ratios: Stress Ratio | Status | Location |
|---|---|---|---|---|---|---|---|---|---|---|
| +1.40D | 0.014 | PASS | 0.00 ft | 1.67 | 1.00 | 155.15 | 155.15 | 0.000 | PASS | 0.00 ft |
| +1.20D | 0.012 | PASS | 0.00 ft | 1.67 | 1.00 | 155.15 | 155.15 | 0.000 | PASS | 0.00 ft |
| +1.20D+0.50S | 0.032 | PASS | 0.00 ft | 1.67 | 1.00 | 155.15 | 155.15 | 0.000 | PASS | 0.00 ft |
| +1.20D+1.60S | 0.077 | PASS | 0.00 ft | 1.67 | 1.00 | 155.15 | 155.15 | 0.000 | PASS | 0.00 ft |
| +0.90D | 0.009 | PASS | 0.00 ft | 1.67 | 1.00 | 155.15 | 155.15 | 0.000 | PASS | 0.00 ft |
| +1.20D+0.20S+E | 0.641 | PASS | 0.00 ft | 1.67 | 1.00 | 155.15 | 155.15 | 0.031 | PASS | 0.00 ft |
| +0.90D+E | 0.636 | PASS | 0.00 ft | 1.67 | 1.00 | 155.15 | 155.15 | 0.031 | PASS | 0.00 ft |

## Maximum Reactions

Note: Only non-zero reactions are listed.

| Load Combination | Axial Reaction @ Base | X-X Axis Reaction @ Base | @ Top | k | Y-Y Axis Reaction @ Base | @ Top | Mx - End Moments k-ft @ Base | @ Top | My - End Moments @ Base | @ Top |
|---|---|---|---|---|---|---|---|---|---|---|
| D Only | 0.228 | | | | | | | | | |
| +D+S | 1.188 | | | | | | | | | |
| +D+0.750S | 0.948 | | | | | | | | | |
| +0.60D | 0.137 | | | | | | | | | |
| +D+0.70E | 0.228 | | | | 0.438 | | -3.615 | | | |
| +D+0.750S+0.5250E | 0.948 | | | | 0.329 | | -2.711 | | | |
| +0.60D+0.70E | 0.137 | | | | 0.438 | | -3.615 | | | |

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Column

Project File: Yamamoto.ec6



**DESCRIPTION:** Canopy Support

## Maximum Reactions

Note: Only non-zero reactions are listed.

| Load Combination | Axial Reaction @ Base | X-X Axis Reaction @ Base | @ Top | k | Y-Y Axis Reaction @ Base | @ Top | Mx - End Moments k-ft @ Base | @ Top | My - End Moments @ Base | @ Top |
|---|---|---|---|---|---|---|---|---|---|---|
| S Only | 0.960 | | | | | | | | | |
| E Only | | | | | 0.626 | | -5.165 | | | |

## Extreme Reactions

| Item | Extreme Value | Axial Reaction @ Base | X-X Axis Reaction @ Base | @ Top | k | Y-Y Axis Reaction @ Base | @ Top | Mx - End Moments k-ft @ Base | @ Top | My - End Moments @ Base | @ Top |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Axial @ Base | Maximum | 1.188 | | | | | | | | | |
| " | Minimum | | | | | 0.626 | | -5.165 | | | |
| Reaction, X-X Axis Base | Maximum | 0.228 | | | | | | | | | |
| " | Minimum | 0.228 | | | | | | | | | |
| Reaction, Y-Y Axis Base | Maximum | | | | | 0.626 | | -5.165 | | | |
| " | Minimum | 0.228 | | | | | | | | | |
| Reaction, X-X Axis Top | Maximum | 0.228 | | | | | | | | | |
| " | Minimum | 0.228 | | | | | | | | | |
| Reaction, Y-Y Axis Top | Maximum | 0.228 | | | | | | | | | |
| " | Minimum | 0.228 | | | | | | | | | |
| Moment, X-X Axis Base | Maximum | 0.228 | | | | | | | | | |
| " | Minimum | | -5.165 | | | 0.626 | | -5.165 | | | |
| Moment, Y-Y Axis Base | Maximum | 0.228 | | | | | | | | | |
| " | Minimum | 0.228 | | | | | | | | | |
| Moment, X-X Axis Top | Maximum | 0.228 | | | | | | | | | |
| " | Minimum | 0.228 | | | | | | | | | |
| Moment, Y-Y Axis Top | Maximum | 0.228 | | | | | | | | | |
| " | Minimum | 0.228 | | | | | | | | | |

## Maximum Deflections for Load Combinations

| Load Combination | Max. Deflection in X dir | | Distance | | Max. Deflection in Y dir | | Distance | |
|---|---|---|---|---|---|---|---|---|
| D Only | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |
| +D+S | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |
| +D+0.750S | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |
| +0.60D | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |
| +D+0.70E | 0.0000 | in | 0.000 | ft | 1.076 | in | 8.250 | ft |
| +D+0.750S+0.5250E | 0.0000 | in | 0.000 | ft | 0.807 | in | 8.250 | ft |
| +0.60D+0.70E | 0.0000 | in | 0.000 | ft | 1.076 | in | 8.250 | ft |
| S Only | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |
| E Only | 0.0000 | in | 0.000 | ft | 1.521 | in | 8.195 | ft |

## Steel Section Properties : Pipe3-1/2STD

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Depth | = | 4.000 | in | I xx | = | 4.52 | in^4 | J | = 9.040 in^4 |
| | | | | S xx | = | 2.26 | in^3 | | |
| Diameter | = | 4.000 | in | R xx | = | 1.340 | in | | |
| Wall Thick | = | 0.227 | in | Zx | = | 3.030 | in^3 | | |
| Area | = | 2.500 | in^2 | I yy | = | 4.520 | in^4 | | |
| Weight | = | 9.120 | plf | S yy | = | 2.260 | in^3 | | |
| | | | | R yy | = | 1.340 | in | | |
| Ycg | = | 0.000 | in | | | | | | |

Project Title:
Engineer:
Project ID:
Project Descr:

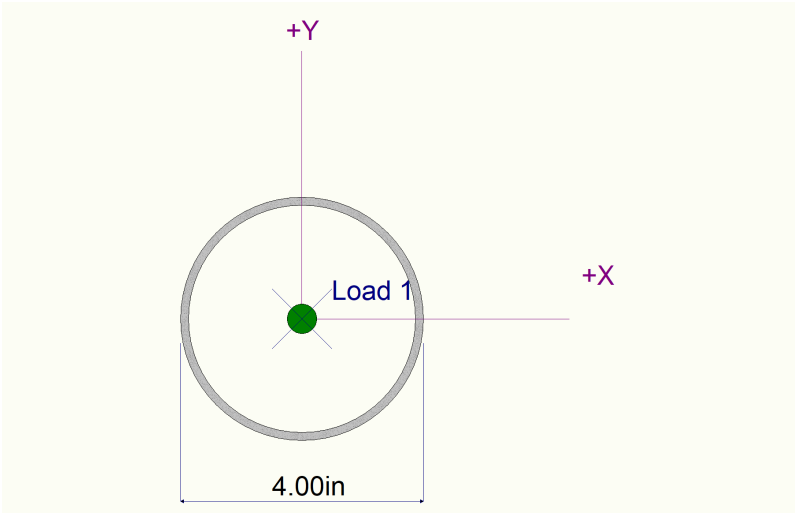
# Steel Column

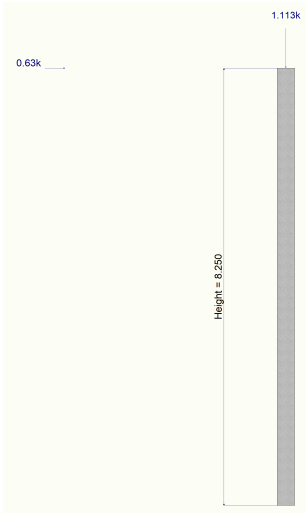
Project File: Yamamoto.ec6

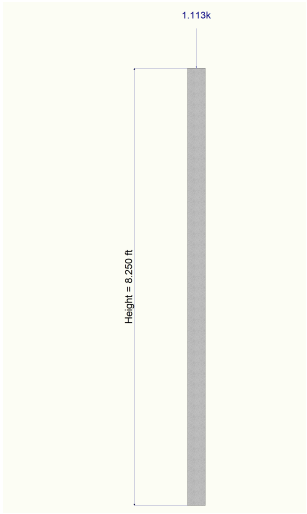


**DESCRIPTION:** Canopy Support

## Sketches



| | | | |
|---|---|---|---|
| Company: | | Date: | 2/22/2023 |
| Engineer: | | Page: | 1/5 |
| Project: | | | |
| Address: | | | |
| Phone: | | | |
| E-mail: | | | |

## 1.Project information

Project description:
Location:
Fastening description:

Comment:

## 2. Input Data & Anchor Parameters

**General**
Design method:ACI 318-19
Units: Imperial units

**Anchor Information:**
Anchor type: Cast-in-place
Material: AWS Type A
Diameter (inch): 0.625
Effective Embedment depth, $h_{ef}$ (inch): 6.000
Anchor category: -
Anchor ductility: Yes
$h_{min}$ (inch): 7.38
$C_{min}$ (inch): 1.38
$S_{min}$ (inch): 2.50

**Base Material**
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, $f'_c$ (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: Supplementary reinforcement present
Supplemental edge reinforcement: Not applicable
Reinforcement provided at corners: Yes
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: No
Build-up grout pad: No

**Base Plate**
Length x Width x Thickness (inch): 12.00 x 12.00 x 0.88
Yield stress: 36000 psi

**Profile type/size**: 3-1/2STD

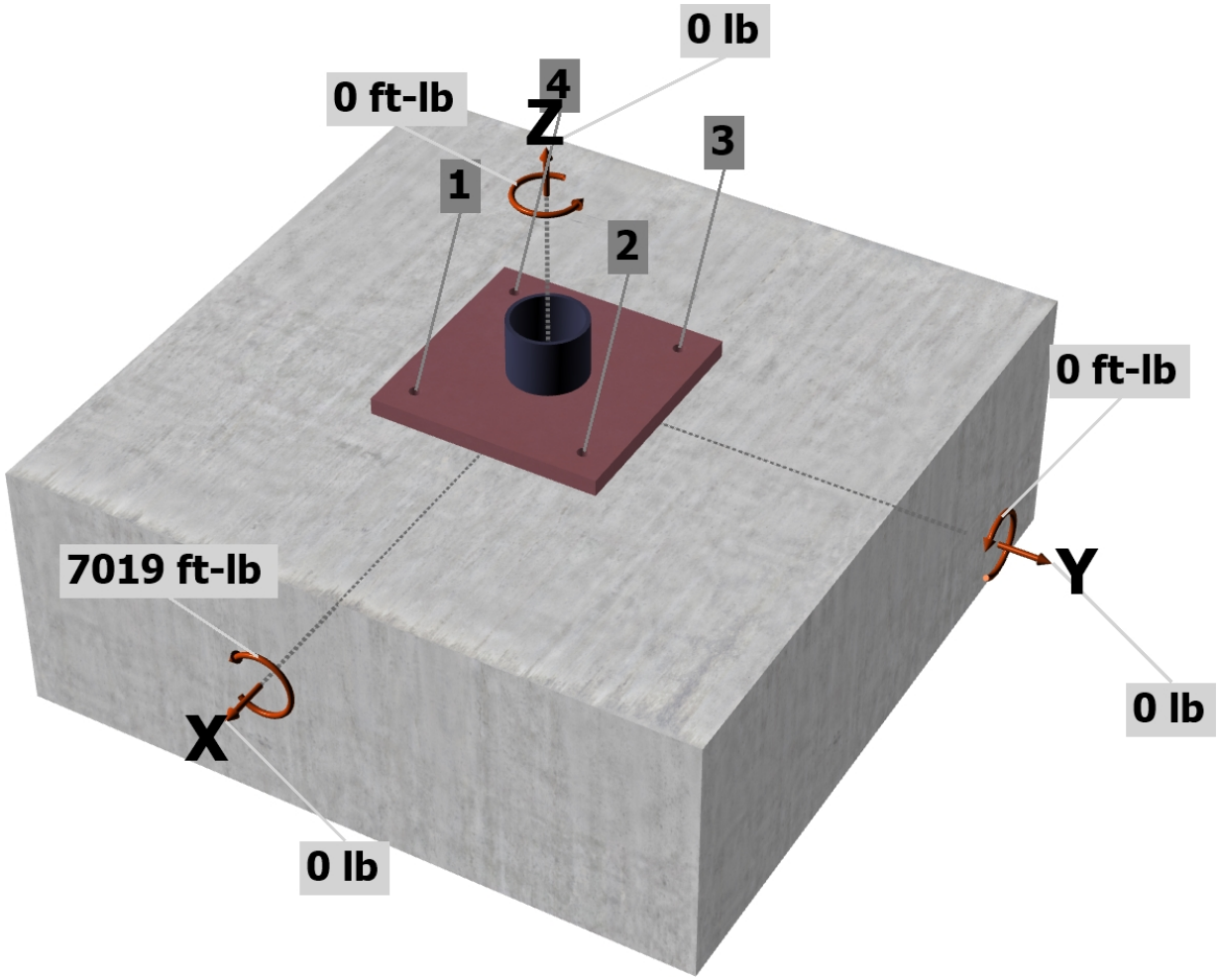
**Recommended Anchor**
Anchor Name: Headed Stud - 5/8"Ø AWS Type A Headed Stud

**Load and Geometry**
Load factor source: ACI 318 Section 5.3
Load combination: not set
Seismic design: Yes
Anchors subjected to sustained tension: Not applicable
Ductility section for tension: 17.10.5.3 (d) is satisfied
Ductility section for shear: 17.10.6.2 not applicable
$\Omega_0$ factor: not set
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: Yes

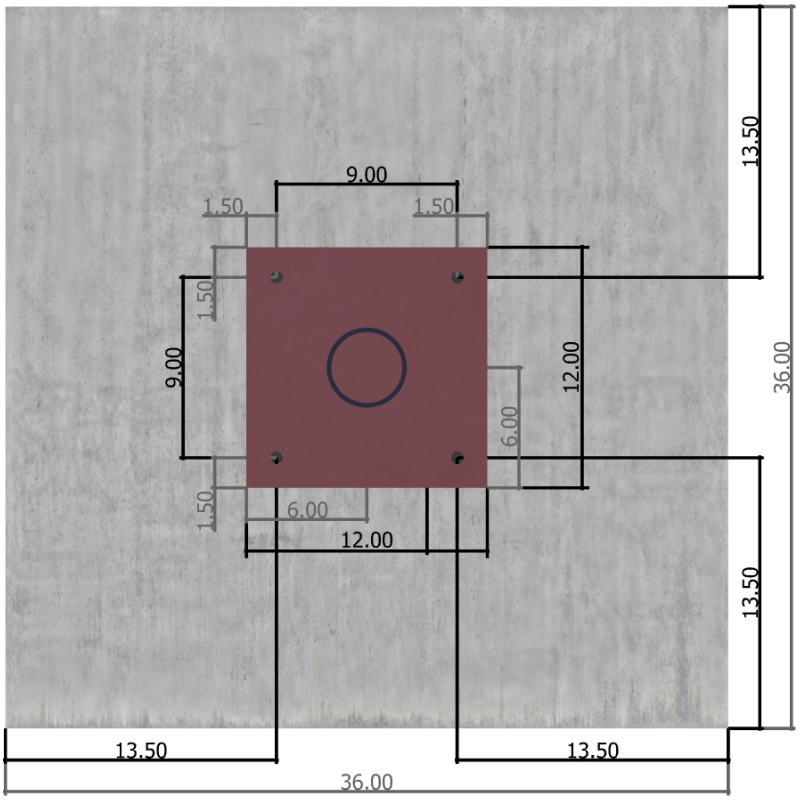
Strength level loads:

$N_{ua}$ [lb]: 0
$V_{uax}$ [lb]: 0
$V_{uay}$ [lb]: 0
$M_{ux}$ [ft-lb]: 7019
$M_{uy}$ [ft-lb]: 0
$M_{uz}$ [ft-lb]: 0

<Figure 1>



<Figure 2>

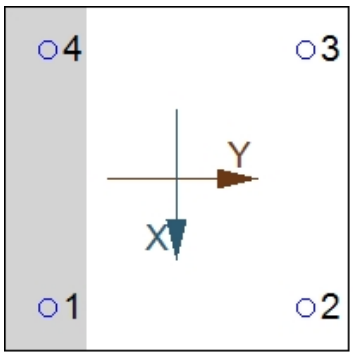



**3. Resulting Anchor Forces**

| Anchor | Tension load, $N_{ua}$ (lb) | Shear load x, $V_{uax}$ (lb) | Shear load y, $V_{uay}$ (lb) | Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb) |
|---|---|---|---|---|
| 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2 | 4406.1 | 0.0 | 0.0 | 0.0 |
| 3 | 4406.1 | 0.0 | 0.0 | 0.0 |
| 4 | 0.0 | 0.0 | 0.0 | 0.0 |
| Sum | 8812.1 | 0.0 | 0.0 | 0.0 |

Maximum concrete compression strain (‰): 0.12
Maximum concrete compression stress (psi): 520
Resultant tension force (lb): 8812
Resultant compression force (lb): 8812
Eccentricity of resultant tension forces in x-axis, $e'_{Nx}$ (inch): 0.00
Eccentricity of resultant tension forces in y-axis, $e'_{Ny}$ (inch): 0.00

<Figure 3>



## 4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

| $N_{sa}$ (lb) | $\phi$ | $\phi N_{sa}$ (lb) |
|---|---|---|
| 18715 | 0.75 | 14036 |

## 5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.6.2)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. 17.6.2.2.1)

| $k_c$ | $\lambda_a$ | $f'_c$ (psi) | $h_{ef}$ (in) | $N_b$ (lb) |
|---|---|---|---|---|
| 24.0 | 1.00 | 2500 | 6.000 | 17636 |

$0.75\phi N_{cbg} = 0.75\phi (A_{Nc} / A_{Nco}) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.6.2.1a)

| $A_{Nc}$ (in$^2$) | $A_{Nco}$ (in$^2$) | $c_{a,min}$ (in) | $\Psi_{ec,N}$ | $\Psi_{ed,N}$ | $\Psi_{c,N}$ | $\Psi_{cp,N}$ | $N_b$ (lb) | $\phi$ | $0.75\phi N_{cbg}$ (lb) |
|---|---|---|---|---|---|---|---|---|---|
| 486.00 | 324.00 | 13.50 | 1.000 | 1.000 | 1.00 | 1.000 | 17636 | 0.75 | 14881 |

## 6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$0.75\phi N_{pn} = 0.75\phi \Psi_{c,P} N_p = 0.75\phi \Psi_{c,P} 8 A_{brg} f'_c$ (Sec. 17.5.1.2, Eq. 17.6.3.1 & 17.6.3.2.2a)

| $\Psi_{c,P}$ | $A_{brg}$ (in$^2$) | $f'_c$ (psi) | $\phi$ | $0.75\phi N_{pn}$ (lb) |
|---|---|---|---|---|
| 1.0 | 0.92 | 2500 | 0.70 | 9660 |

## 11. Results

### Interaction of Tensile and Shear Forces (Sec. 17.8)

| Tension | Factored Load, $N_{ua}$ (lb) | Design Strength, ø$N_n$ (lb) | Ratio | Status |
|---|---|---|---|---|
| Steel | 4406 | 14036 | 0.31 | Pass |
| **Concrete breakout** | **8812** | **14881** | **0.59** | **Pass (Governs)** |
| Pullout | 4406 | 9660 | 0.46 | Pass |

**5/8"Ø AWS Type A Headed Stud with hef = 6.000 inch meets the selected design criteria.**

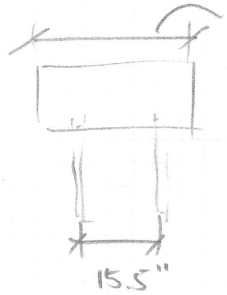
## 12. Warnings

- Per designer input, ductility requirements for tension have been determined to be satisfied – designer to verify.

- Per designer input, the shear component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor shear force associated with the same load combination. Therefore the ductility requirements of ACI 318 17.10.6.2 for shear need not be satisfied – designer to verify.

- Designer must exercise own judgement to determine if this design is suitable.

CANOPY COLUMN SUPPORT PILES.




GOVERNING LOAD COMBINATIONS (ASD):

LC1. $(1.0 + 0.14S_{DS})D + 0.7\Omega_0 Q_E$ } MAX. COMPRESSION

LC2. $(1.0 + 0.14S_{DS})D + 0.525Q_{0ft} + 0.75S$ }

LC3. $(0.6 - 0.14S_{DS})D + 0.7\Omega_0 Q_E$, MAX TENSION

BEAM #3, WORST CASE COMP / TENSION.

FROM $\Omega \times Q_E$ = 1.25 × 6261b × 8.25' = 6455.6 lb FT

T & C = 6455.6 K-FT / 15.5/12 = 4998 lb

MAX COMPRESSION: BM 3, SUPPORT 1

- LC1: 2204 (FROM FORTE) + 0.14 × 1.03 × 2204 + 0.7 × 4998 = 6020 lb
- LC2: 5456 (FROM FORTE) + 0.14 × 1.03 × 2204 + 0.525 × 4998 = 8398 lb ← GOVERNS.

MAX TENSION: BM 3, SUPPORT 2

- LC3: (0.6 - 0.14 × 1.03) × 131 (FROM FORTE) - 0.7 × 4998 = -3439 lb

2"ϕ PIPE PILE CAPACITY = 3 TONS = 6K

(2) PILES AXIAL CAPACITY = 12K > 8.4K, OK

TENSION TO BE RESISTED BY DEAD LOAD OF FTG:

TRY 3 × 3 × 1.5' FTG.; PILE SPACING = 27.625" W/ 3" CLEARANCE

T & C = 6455.6 K-FT / (27.625'/12) = 2804 lb.

TENSION: (0.6 - 0.14 × 1.03) × 131 - 0.7 × 2804 = 1903 lb.

FTG. WT: 3' × 3' × 1.5' × 150 PCF = 2025 lb > 1903 lb, OK

USE SAME FTG SIZE EVERYWHERE, W/ (4) 2"ϕ PIPE PILES

CQN
CARTER QUINN NORLIN
STRUCTURAL ENGINEERING
▶ 2033 Sixth Avenue #995 Seattle, WA 98121 206-264-7784 www.CQN-SE.com

PROJECT: YAMAMOTO DATE: 5/5/25

DESIGNER: RH SHEET #:

FORTEWEB

**FULL DETAIL REPORT** *Wood Option, B3*

**1 piece(s) 5 1/2" x 9 1/2" 24F-V4 DF Glulam**

**PASSED**

**Summary of Loads to Supports**

| All load groups / combinations / patterns | 3' 10 3/4" ▲ | | 4' 7 1/2" ▲ | | 1' 3/4" |
|---|---|---|---|---|---|
| Maximum Down (lbs) / LDF | -- | 5456/1.15 | -- | 1091/1.15 | -- |
| Critical Down (lbs) / LDF | -- | 5456/1.15 | -- | 1091/1.15 | -- |
| Maximum Uplift (lbs) / LDF | -- | 0/1.00 | -- | -491/1.15 | -- |
| Critical Uplift (lbs) / LDF | -- | 0/1.00 | -- | -491/1.15 | -- |
| Bearing Length | -- | 3.50" | -- | 3.50" | -- |
| Support Fc-perp (psi) | -- | 425 | -- | 425 | -- |
| Top edge required unbraced length / $C_L$ | N/A | N/A | N/A | N/A | N/A |
| Bottom edge required unbraced length / $C_L$ | 115.00"/1.0000 | 115.00"/1.0000 | N/A | 115.00"/1.0000 | 115.00"/1.0000 |

**1.0 Dead (LDF = 0.9)**

| Loading On All Spans | 3' 10 3/4" ▲ | | | 4' 7 1/2" ▲ | | | 1' 3/4" |
|---|---|---|---|---|---|---|---|
| Member Reaction (lbs) | -- | 2204 | | -- | 131 | | -- |
| Loads to Supports (lbs) | -- | 2204 | | -- | 131 | | -- |
| Shear used for design (lbs) | -- | -1272 | 880 | -- | 804 | 883 | -- |
| Shear at support node (lbs) | -- | -1298 | 906 | -- | 778 | 909 | -- |
| Shear at span point load (lbs) | N/A | -- | | N/A | -- | | N/A |
| Moment (Ft-lbs) | 0 | -4846 | | N/A | -951 | | 0 |
| Live Load Deflection (in) | 0.000" | -- | | 0.000" | -- | | 0.000" |
| Total Load Deflection (in) | 0.136" | -- | | -0.019" | -- | | 0.014" |

**1.0 Dead + 0.75 Floor + 0.75 Snow (LDF = 1.15)**

| Loading On All Spans | 3' 10 3/4" ▲ | | | 4' 7 1/2" ▲ | | | 1' 3/4" |
|---|---|---|---|---|---|---|---|
| Member Reaction (lbs) | -- | 4528 | | -- | 286 | | -- |
| Loads to Supports (lbs) | -- | 4528 | | -- | 286 | | -- |
| Shear used for design (lbs) | -- | -2634 | 1807 | -- | 1679 | 1878 | -- |
| Shear at support node (lbs) | -- | -2677 | 1851 | -- | 1636 | 1922 | -- |
| Shear at span point load (lbs) | N/A | -- | | N/A | -- | | N/A |
| Moment (Ft-lbs) | 0 | -10078 | | N/A | -2015 | | 0 |
| Live Load Deflection (in) | 0.148" | -- | | -0.021" | -- | | 0.016" |
| Total Load Deflection (in) | 0.284" | -- | | -0.039" | -- | | 0.030" |

**1.0 Dead + 0.75 Floor + 0.75 Snow (LDF = 1.15)**

| ALTERNATE span loading on odd # spans | 3' 10 3/4" ▲ | | | 4' 7 1/2" ▲ | | | 1' 3/4" |
|---|---|---|---|---|---|---|---|
| Member Reaction (lbs) | -- | 4507 | | -- | 264 | | -- |
| Loads to Supports (lbs) | -- | 4507 | | -- | 264 | | -- |
| Shear used for design (lbs) | -- | -2634 | 1794 | -- | 1692 | 1878 | -- |
| Shear at support node (lbs) | -- | -2677 | 1829 | -- | 1658 | 1922 | -- |
| Shear at span point load (lbs) | N/A | -- | | N/A | -- | | N/A |
| Moment (Ft-lbs) | 0 | -10078 | | N/A | -2015 | | 0 |
| Live Load Deflection (in) | 0.148" | -- | | -0.021" | -- | | 0.016" |
| Total Load Deflection (in) | 0.285" | -- | | -0.039" | -- | | 0.030" |

**1.0 Dead + 0.75 Floor + 0.75 Snow (LDF = 1.15)**

| ALTERNATE span loading on even # spans | 3' 10 3/4" | ▲ | | 4' 7 1/2" | ▲ | | 1' 3/4" |
|---|---|---|---|---|---|---|---|
| Member Reaction (lbs) | -- | 3388 | | -- | 230 | | -- |
| Loads to Supports (lbs) | -- | 3388 | | -- | 230 | | -- |
| Shear used for design (lbs) | -- | -1953 | 1357 | -- | 1229 | 1381 | -- |
| Shear at support node (lbs) | -- | -1988 | 1400 | -- | 1185 | 1416 | -- |
| Shear at span point load (lbs) | N/A | -- | | N/A | -- | | N/A |
| Moment (Ft-lbs) | 0 | -7462 | | N/A | -1483 | | 0 |
| Live Load Deflection (in) | 0.074" | -- | | -0.010" | -- | | 0.008" |
| Total Load Deflection (in) | 0.210" | -- | | -0.029" | -- | | 0.022" |

**1.0 Dead + 0.75 Floor + 0.75 Snow (LDF = 1.15)**

| ADJACENT span loading on support 1 | 3' 10 3/4" | ▲ | | 4' 7 1/2" | ▲ | | 1' 3/4" |
|---|---|---|---|---|---|---|---|
| Member Reaction (lbs) | -- | 4643 | | -- | -336 | | -- |
| Loads to Supports (lbs) | -- | 4643 | | -- | -336 | | -- |
| Shear used for design (lbs) | -- | -2634 | 1922 | -- | 1795 | 1381 | -- |
| Shear at support node (lbs) | -- | -2677 | 1966 | -- | 1751 | 1416 | -- |
| Shear at span point load (lbs) | N/A | -- | | N/A | -- | | N/A |
| Moment (Ft-lbs) | 0 | -10078 | | N/A | -1483 | | 0 |
| Live Load Deflection (in) | 0.144" | -- | | -0.019" | -- | | 0.013" |
| Total Load Deflection (in) | 0.280" | -- | | -0.038" | -- | | 0.027" |

**1.0 Dead + 0.75 Floor + 0.75 Snow (LDF = 1.15)**

| ADJACENT span loading on support 2 | 3' 10 3/4" | ▲ | | 4' 7 1/2" | ▲ | | 1' 3/4" |
|---|---|---|---|---|---|---|---|
| Member Reaction (lbs) | -- | 3273 | | -- | 851 | | -- |
| Loads to Supports (lbs) | -- | 3273 | | -- | 851 | | -- |
| Shear used for design (lbs) | -- | -1953 | 1242 | -- | 1114 | 1878 | -- |
| Shear at support node (lbs) | -- | -1988 | 1285 | -- | 1070 | 1922 | -- |
| Shear at span point load (lbs) | N/A | -- | | N/A | -- | | N/A |
| Moment (Ft-lbs) | 0 | -7462 | | N/A | -2015 | | 0 |
| Live Load Deflection (in) | 0.078" | -- | | -0.012" | -- | | 0.010" |
| Total Load Deflection (in) | 0.214" | -- | | -0.031" | -- | | 0.024" |

**1.0 Dead + 1.0 Snow (LDF = 1.15)**

| Loading On All Spans | 3' 10 3/4" | ▲ | | 4' 7 1/2" | ▲ | | 1' 3/4" |
|---|---|---|---|---|---|---|---|
| Member Reaction (lbs) | -- | 5303 | | -- | 337 | | -- |
| Loads to Supports (lbs) | -- | 5303 | | -- | 337 | | -- |
| Shear used for design (lbs) | -- | -3088 | 2116 | -- | 1971 | 2210 | -- |
| Shear at support node (lbs) | -- | -3137 | 2166 | -- | 1922 | 2259 | -- |
| Shear at span point load (lbs) | N/A | -- | | N/A | -- | | N/A |
| Moment (Ft-lbs) | 0 | -11823 | | N/A | -2370 | | 0 |
| Live Load Deflection (in) | 0.197" | -- | | -0.027" | -- | | 0.021" |
| Total Load Deflection (in) | 0.334" | -- | | -0.046" | -- | | 0.035" |

**1.0 Dead + 1.0 Snow (LDF = 1.15)**

| ALTERNATE span loading on odd # spans |
|---|

| | 3' 10 3/4" | ▲ | | 4' 7 1/2" | ▲ | | 1' 3/4" |
|---|---|---|---|---|---|---|---|
| Member Reaction (lbs) | -- | 5274 | | -- | 308 | | -- |
| Loads to Supports (lbs) | -- | 5274 | | -- | 308 | | -- |
| Shear used for design (lbs) | -- | -3088 | 2099 | -- | 1988 | 2210 | -- |
| Shear at support node (lbs) | -- | -3137 | 2137 | -- | 1951 | 2259 | -- |
| Shear at span point load (lbs) | N/A | -- | | N/A | -- | | N/A |
| Moment (Ft-lbs) | 0 | -11823 | | N/A | -2370 | | 0 |
| Live Load Deflection (in) | 0.198" | -- | | -0.028" | -- | | 0.021" |
| Total Load Deflection (in) | 0.334" | -- | | -0.046" | -- | | 0.035" |

**1.0 Dead + 1.0 Snow (LDF = 1.15)**

**ALTERNATE span loading on even # spans**

| | 3' 10 3/4" | ▲ | | 4' 7 1/2" | ▲ | | 1' 3/4" |
|---|---|---|---|---|---|---|---|
| Member Reaction (lbs) | -- | 3782 | | -- | 263 | | -- |
| Loads to Supports (lbs) | -- | 3782 | | -- | 263 | | -- |
| Shear used for design (lbs) | -- | -2180 | 1515 | -- | 1371 | 1547 | -- |
| Shear at support node (lbs) | -- | -2218 | 1565 | -- | 1321 | 1584 | -- |
| Shear at span point load (lbs) | N/A | -- | | N/A | -- | | N/A |
| Moment (Ft-lbs) | 0 | -8334 | | N/A | -1661 | | 0 |
| Live Load Deflection (in) | 0.098" | -- | | -0.013" | -- | | 0.010" |
| Total Load Deflection (in) | 0.234" | -- | | -0.032" | -- | | 0.024" |

**1.0 Dead + 1.0 Snow (LDF = 1.15)**

**ADJACENT span loading on support 1**

| | 3' 10 3/4" | ▲ | | 4' 7 1/2" | ▲ | | 1' 3/4" |
|---|---|---|---|---|---|---|---|
| Member Reaction (lbs) | -- | 5456 | | -- | -491 | | -- |
| Loads to Supports (lbs) | -- | 5456 | | -- | -491 | | -- |
| Shear used for design (lbs) | -- | -3088 | 2270 | -- | 2125 | 1547 | -- |
| Shear at support node (lbs) | -- | -3137 | 2319 | -- | 2075 | 1584 | -- |
| Shear at span point load (lbs) | N/A | -- | | N/A | -- | | N/A |
| Moment (Ft-lbs) | 0 | -11823 | | N/A | -1661 | | 0 |
| Live Load Deflection (in) | 0.192" | -- | | -0.025" | -- | | 0.017" |
| Total Load Deflection (in) | 0.328" | -- | | -0.044" | -- | | 0.031" |

**1.0 Dead + 1.0 Snow (LDF = 1.15)**

**ADJACENT span loading on support 2**

| | 3' 10 3/4" | ▲ | | 4' 7 1/2" | ▲ | | 1' 3/4" |
|---|---|---|---|---|---|---|---|
| Member Reaction (lbs) | -- | 3629 | | -- | 1091 | | -- |
| Loads to Supports (lbs) | -- | 3629 | | -- | 1091 | | -- |
| Shear used for design (lbs) | -- | -2180 | 1362 | -- | 1217 | 2210 | -- |
| Shear at support node (lbs) | -- | -2218 | 1411 | -- | 1168 | 2259 | -- |
| Shear at span point load (lbs) | N/A | -- | | N/A | -- | | N/A |
| Moment (Ft-lbs) | 0 | -8334 | | N/A | -2370 | | 0 |
| Live Load Deflection (in) | 0.103" | -- | | -0.016" | -- | | 0.014" |
| Total Load Deflection (in) | 0.240" | -- | | -0.034" | -- | | 0.028" |