STRUCTURAL CALCULATIONS

Talarico’s Pizzeria Covered Dining

4718 California Ave SW
Seattle, WA 98116

03/10/2021

CG Project No.: 21133.10
**Project Location**
4718 California Ave SW
Seattle, WA 98116

**Project Description**
A covered outdoor dining area has been built for an existing restaurant. The covered area is approximately 6 x 50ft. The covered area has minimal lateral resistance and will be designed as a temporary structural for gravity loads only.

**Scope of Work**
Provide structural calculations in accordance with current building code.

**Basis of Design**

<table>
<thead>
<tr>
<th>Loads</th>
<th>Dead</th>
<th>5 psf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snow</td>
<td>25</td>
<td>psf (snow)</td>
</tr>
</tbody>
</table>
## Gravity Design Loads

<table>
<thead>
<tr>
<th>Description</th>
<th>Roof DL</th>
<th>Roof LL (Snow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roofing Material</td>
<td>0.3 psf</td>
<td>25.0 psf</td>
</tr>
<tr>
<td>2x8 @ 24&quot; OC</td>
<td>1.5 psf</td>
<td></td>
</tr>
<tr>
<td>Misc</td>
<td>1.5 psf</td>
<td></td>
</tr>
<tr>
<td><strong>USE</strong></td>
<td><strong>5.0 psf</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Roof LL (Snow):**

- **25.0 psf**
RJ1

W = (5 + 25) psf \( \times \) (24''/12) = 5 psf
W = (10 + 50) plf

Use 2x8 HF #2 or 3x6 HF #2 @ 24'' OC Per Woodworks

BM1

W = (5 + 25) psf \( \times \) (6''/2) + 3'' = 30 psf
W = (30 + 150) plf

Use 4x6 HF #2 Per Woodworks

Reaction @ A = \( \frac{D}{44 + 229} \) #

Reaction @ B = \( \frac{D}{106 + 562} \) # (\( \sin 45\degree \)) = \( \frac{D}{75 + 397} \) #

C1

P = (339 + 1762) #

Use PT 4x4 HF #2 Per Woodworks
**Design Check Calculation Sheet**

### Loads:

<table>
<thead>
<tr>
<th>Load</th>
<th>Type</th>
<th>Distribution</th>
<th>Pattern</th>
<th>Location [ft]</th>
<th>Magnitude</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load1</td>
<td>Dead</td>
<td>Full Area</td>
<td>Start</td>
<td>End</td>
<td>5.00(24.0&quot;)</td>
<td>psf</td>
</tr>
<tr>
<td>Load2</td>
<td>Snow</td>
<td>Full Area</td>
<td>Yes</td>
<td></td>
<td>25.00(24.0&quot;)</td>
<td>psf</td>
</tr>
</tbody>
</table>

**Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in):**

- **9'-0.25"**

<table>
<thead>
<tr>
<th>Unfactored</th>
<th>Factored</th>
<th>Bearing:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Des ratio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joist</td>
<td>0.51</td>
<td></td>
</tr>
<tr>
<td>Support</td>
<td>0.26</td>
<td>0.76</td>
</tr>
<tr>
<td>Load comb</td>
<td>#3</td>
<td>0.69</td>
</tr>
<tr>
<td>Length</td>
<td>0.50*</td>
<td>0.50*</td>
</tr>
<tr>
<td>Min req'd</td>
<td>0.50*</td>
<td>0.38</td>
</tr>
<tr>
<td>Fb</td>
<td>1.00</td>
<td>1.75</td>
</tr>
<tr>
<td>Fb support</td>
<td>1.25</td>
<td>1.25</td>
</tr>
<tr>
<td>Fcp sup</td>
<td>625</td>
<td>625</td>
</tr>
</tbody>
</table>

*Minimum bearing length setting used: 1/2" for end supports and 1/2" for interior supports

**RJ1**

- Lumber-soft, Hem-Fir, No.2, 2x8 (1-1/2"x7-1/4")
- Supports: All - Timber-soft Beam, D.Fir-L No.2
- Roof joist spaced at 24.0" c/c; Total length: 9'-0.25"; Clear span: 5'-11.5"; 2'-11.75"; Volume = 0.7 cu.ft.
- Lateral support: top = continuous, bottom = at supports; Repetitive factor: applied where permitted (refer to online help);
- This section PASSES the design code check.

### Analysis vs. Allowable Stress and Deflection using NDS 2018:

- Shear:
  - Interior Live: 0.02 = < L/999
  - Total: 0.02 = < L/999
- Cantil. Live: 0.03 = < L/999
- Total: 0.04 = < L/999

### Additional Data:

- FACTORS: F/E(psi) CD CM Ct CL CF Cfu Cr Cfrt Cl Cn LC#
- Fv' 150 1.15 1.00 1.00 - - - 1.00 1.00 1.00 2
- Fb' 850 1.15 1.00 1.00 1.200 - 1.15 1.00 1.00 - 3
- Fb' 850 1.15 1.00 1.00 0.311 1.200 - 1.15 1.00 1.00 - 2
- Fcp' 405 - 1.00 1.00 - - - 1.00 1.00 - -
- E' 1.3 million 1.00 1.00 - - - - 1.00 1.00 - 4
- E' 0.47 million 1.00 1.00 - - - - 1.00 1.00 - 4

**Design Notes:**

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2018), the National Design Specification (NDS 2018), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.
4. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.
Loads:

<table>
<thead>
<tr>
<th>Load</th>
<th>Type</th>
<th>Distribution</th>
<th>Pattern</th>
<th>Location [ft]</th>
<th>Start</th>
<th>End</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load1</td>
<td>Dead</td>
<td>Full Area</td>
<td>Yes</td>
<td></td>
<td>5.00 (24.0&quot;)</td>
<td>psf</td>
</tr>
<tr>
<td>Load2</td>
<td>Snow</td>
<td>Full Area</td>
<td>Yes</td>
<td></td>
<td>25.00 (24.0&quot;)</td>
<td>psf</td>
</tr>
</tbody>
</table>

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in):

- **Maximum Reactions (lbs):**
  - Load1: 5.00 (24.0") psf
  - Load2: 25.00 (24.0") psf

- **Bearing Capacities (lbs):**
  - Joist: 886 lbs
  - Support: 898 lbs

- **Bearing Lengths (in):**
  - Minimum bearing length setting used: 1/2" for end supports and 1/2" for interior supports

Analysis vs. Allowable Stress and Deflection using NDS 2018:

- **Shear:**
  - Analysis: \( f_v = 21 \) psi
  - Design: \( F_v' = 172 \) psi
  - Analysis/Design: \( f_v/F_v' = 0.12 \)

- **Bending (+):**
  - Analysis: \( f_b = 188 \) psi
  - Design: \( F_b' = 1461 \) psi
  - Analysis/Design: \( f_b/F_b' = 0.13 \)

- **Bending (-):**
  - Analysis: \( f_b = 257 \) psi
  - Design: \( F_b' = 1435 \) psi
  - Analysis/Design: \( f_b/F_b' = 0.18 \)

**Deflection:**
- **Interior Live:**
  - Analysis: \( 0.02 = < L/999 \in \)
  - Design: \( 0.30 = L/240 \in \)
  - Analysis/Design: \( 0.08 \)

- **Total:**
  - Analysis: \( 0.03 = < L/999 \in \)
  - Design: \( 0.40 = L/180 \in \)
  - Analysis/Design: \( 0.06 \)

- **Cant. Live:**
  - Analysis: \( 0.05 = L/731 \in \)
  - Design: \( 0.40 = L/90 \in \)
  - Analysis/Design: \( 0.12 \)

Additional Data:

- **FACTORS:**
  - F/E (psi)
  - CD
  - CM
  - Ct
  - CL
  - CF
  - Cfu
  - Cr
  - Cfrt
  - Cl
  - Cn
  - LC#

- **Shear:**
  - Analysis: \( F_v' = 150 \) psi
  - Design: \( F_v' = 172 \) psi

- **Bending (+):**
  - Analysis: \( F_b' = 850 \) psi
  - Design: \( F_b' = 1461 \) psi

- **Bending (-):**
  - Analysis: \( F_b' = 850 \) psi
  - Design: \( F_b' = 1435 \) psi

- **Deflection:**
  - Analysis: \( 0.13 \)
  - Design: \( 0.14 \)

**CRITICAL LOAD COMBINATIONS:**
- **Shear:**
  - LC #2 = D+S
- **Bending (+):**
  - LC #3 = D+S (pattern: 5s)
- **Bending (-):**
  - LC #2 = D+S
- **Deflection:**
  - LC #4 = (live)
  - LC #4 = (total)
- **Bearing:**
  - Support 1 - LC #3 = D+S (pattern: 5s)

**CALCULATIONS:**
- **V max:** \( 225 \) lbs
- **M (+):** \( 197 \) lbs-ft
- **M (-):** \( 270 \) lbs-ft
- **EI:** \( 45.06e06 \) lb-in²

**Lateral stability (in):**
- \( L_d = 6' \)
- \( L_e = 10' - 0.19' \)
- \( RB = 10.3' \)

**Design Notes:**
1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2018), the National Design Specification (NDS 2018), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.
4. Sawed lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.
**Design Check Calculation Sheet**

**WoodWorks Sizer 2019 (Update 1)**

### Loads:

<table>
<thead>
<tr>
<th>Load</th>
<th>Type</th>
<th>Distribution</th>
<th>Pattern</th>
<th>Location [ft]</th>
<th>Magnitude</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load 1</td>
<td>Dead</td>
<td>Full Area</td>
<td>Start</td>
<td>End</td>
<td>5.00 x 10^6</td>
<td>psf</td>
</tr>
<tr>
<td>Load 2</td>
<td>Snow</td>
<td>Full Area</td>
<td>Yes</td>
<td></td>
<td>25.00 x 10^6</td>
<td>psf</td>
</tr>
</tbody>
</table>

**Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in):**

```
10'

3'-5.5" 6'-6.5" 9'-1.5"
```

<table>
<thead>
<tr>
<th>Unfactored</th>
<th>Load</th>
<th>44</th>
<th>562</th>
<th>562</th>
<th>229</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td>273</td>
<td>668</td>
<td>668</td>
<td>273</td>
</tr>
</tbody>
</table>

**Analysis vs. Allowable Stress and Deflection using NDS 2018:**

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Analysis Value</th>
<th>Design Value</th>
<th>Unit</th>
<th>Analysis/Design</th>
</tr>
</thead>
</table>

- **Bending (+):** fb = 137, Fb' = 1271 psi, fb/Fb' = 0.11
- **Bending (-):** fb = 143, Fb' = 1271 psi, fb/Fb' = 0.11
- **Shear:** fv = 23, Fv' = 172 psi, fv/Fv' = 0.13

**Additional Data:**

- **F/E (psi):** CD CM Ct CL CF Cu Cr Cfrt Cl Cn LC#
- **Pv:** 150 1.15 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 5
- **Fb+** 850 1.15 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 7
- **Fb-** 850 1.15 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 5
- **E'** 1.3 million 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 7

**Critical Load Combinations:**

- **Shear:** LC #5 = D+S (pattern: SSs)
- **Bending (+):** LC #7 = D+S (pattern: SSs)
- **Bending (-):** LC #5 = D+S (pattern: SSs)
- **Deflection:** LC #7 = (live)

**Minimum bearing length setting used: 1/2" for end supports**

**Analysis Notes:**

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2018), the National Design Specification (NDS 2018), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.
4. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.
Design Check Calculation Sheet
WoodWorks Sizer 2019 (Update 1)

Loads:

<table>
<thead>
<tr>
<th>Load</th>
<th>Type</th>
<th>Distribution</th>
<th>Location [ft]</th>
<th>Magnitude</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load1</td>
<td>Dead</td>
<td>Axial</td>
<td>(Ecc. = 0.59&quot;)</td>
<td>339</td>
<td>lbs</td>
</tr>
<tr>
<td>Load2</td>
<td>Snow</td>
<td>Axial</td>
<td>(Ecc. = 0.58&quot;)</td>
<td>1762</td>
<td>lbs</td>
</tr>
</tbody>
</table>

Reactions (lbs):

-Base-


-Top-

Unfactored:

<table>
<thead>
<tr>
<th>Load</th>
<th>Lateral</th>
<th>Axial</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dead</td>
<td>2</td>
<td></td>
<td>-2</td>
</tr>
<tr>
<td>Snow</td>
<td>10</td>
<td></td>
<td>-10</td>
</tr>
</tbody>
</table>

Factored:

<table>
<thead>
<tr>
<th>Load</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-&gt;L</td>
<td>-11</td>
</tr>
<tr>
<td>Load comb #2</td>
<td>#2</td>
</tr>
<tr>
<td>L-&gt;R</td>
<td>#1</td>
</tr>
</tbody>
</table>

C1
Lumber Post, Hem-Fir, No.2, 4x4 (3-1/2"x3-1/2")
Support: Non-wood
Total length: 9'; Volume = 0.8 cu.ft.
Pinned base; Load face = width(b); Wet service; Incised; Ke x Lb: 1.0 x 9.0 = 9.0 ft; Ke x Ld: 1.0 x 9.0 = 9.0 ft;
This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018:

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Analysis Value</th>
<th>Design Value</th>
<th>Unit</th>
<th>Analysis/Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shear</td>
<td>$f_v = 1$</td>
<td>$F_v' = 134$</td>
<td>psi</td>
<td>$f_v/F_v' = 0.01$</td>
</tr>
<tr>
<td>Bending(+)</td>
<td>$f_b = 172$</td>
<td>$F_b' = 997$</td>
<td>psi</td>
<td>$f_b/F_b' = 0.17$</td>
</tr>
<tr>
<td>Axial</td>
<td>$f_c = 172$</td>
<td>$F_c' = 274$</td>
<td>psi</td>
<td>$f_c/F_c' = 0.63$</td>
</tr>
<tr>
<td>Combined</td>
<td>$f = 172$</td>
<td>$F_c' = 1100$</td>
<td>psi</td>
<td>$f_c/F_c' = 0.16$</td>
</tr>
<tr>
<td>Live Defl'n</td>
<td>0.06 = &lt; L/999</td>
<td>0.60 = L/180</td>
<td>in</td>
<td>0.09</td>
</tr>
<tr>
<td>Total Defl'n</td>
<td>0.07 = &lt; L/999</td>
<td>0.60 = L/180</td>
<td>in</td>
<td>0.11</td>
</tr>
</tbody>
</table>

Additional Data:

| FACTORS: CD CM Ct CL/CP CF Cfu Cr Cfrt Ci LC# |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Fv'    | 150    | 1.15   | 0.97   | 1.00   | -      | 1.00   | 0.80   | 2      |
| Fb'    | 850    | 1.15   | 0.85   | 1.00   | 1.00   | 1.00   | 0.80   | 2      |
| Fc'    | 1300   | 1.15   | 0.80   | 1.00   | 0.249  | 1.150  | -      | 2      |
| E'     | 1.3 million | 0.90       | 1.00   | -      | -      | 1.00   | 0.95   | 2      |
| Emin'  | 0.47 million | 0.90       | 1.00   | -      | -      | 1.00   | 0.95   | 2      |
| Fc*    | 1300   | 1.15   | 0.80   | 1.00   | -      | 1.150  | -      | 2      |

CRITICAL LOAD COMBINATIONS:

Shear: LC #2 = D+S
Bending(+) : LC #2 = D+S
Deflection: LC #2 = D+S (live)
Axial : LC #2 = D+S (total)
Combined : LC #2 = D+S

V = 11 lbs; M(+) = 102 lbs-ft; P = 2101 lbs
EI = 16.26e06 lb-in^2

"Live" deflection is due to all non-dead loads (live, wind, snow...)
Total deflection = 1.0 dead + "live"

Design Notes:
1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2018), the National Design Specification (NDS 2018), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Axial load eccentricity applied in direction of load face only. It is the designers responsibility to check for effect of eccentricity in the other direction.
POST CONNECTION DETAIL

1 1/2" = 1'-0"