



July 31, 2025

**STRUCTURAL CALCULATIONS**  
(Permit Submittal)

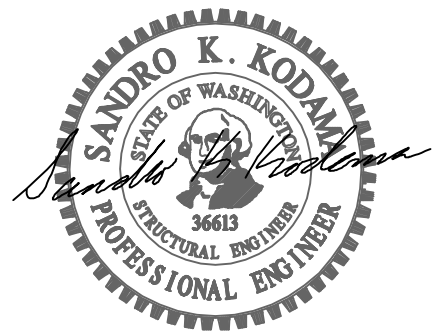
**INTRACHAT RESIDENCE – OUTDOOR DECK**

7929 East Mercer Way  
Mercer Island, WA 98040

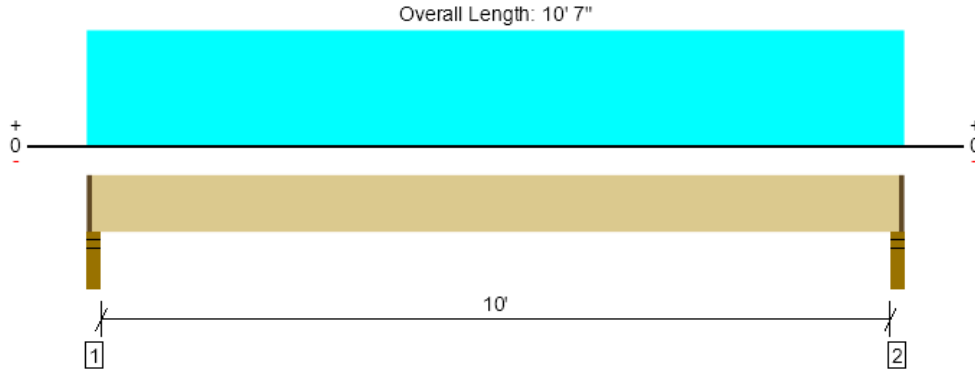
Quantum Job Number: 22252.01

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6/26/25 - Outdoor Deck, Deck Joists  
**1 piece(s) 2 x 10 HF No.2 @ 16" 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) | 519 @ 2 1/2"      | 1367 (2.25") | Passed (38%)   | --   | 1.0 D + 1.0 L (All Spans)   |
| Shear (lbs)           | 423 @ 1' 3/4"     | 1388         | Passed (30%)   | 1.00 | 1.0 D + 1.0 L (All Spans)   |
| Moment (Ft-lbs)       | 1292 @ 5' 3 1/2"  | 1917         | Passed (67%)   | 1.00 | 1.0 D + 1.0 L (All Spans)   |
| Live Load Defl. (in)  | 0.150 @ 5' 3 1/2" | 0.254        | Passed (L/816) | --   | 1.0 D + 1.0 L (All Spans)   |
| Total Load Defl. (in) | 0.187 @ 5' 3 1/2" | 0.508        | Passed (L/653) | --   | 1.0 D + 1.0 L (All Spans)   |
| TJ-Pro™ Rating        | N/A               | N/A          | N/A            | --   | N/A                         |

Member Length : 10' 4 1/2"  
 System : Floor  
 Member Type : Joist  
 Building Use : Residential  
 Building Code : IBC 2018  
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- 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.
- No composite action between deck and joist was considered in analysis.

| Supports            | Bearing Length |           |          | Loads to Supports (lbs) |            |          | Accessories      |
|---------------------|----------------|-----------|----------|-------------------------|------------|----------|------------------|
|                     | Total          | Available | Required | Dead                    | Floor Live | Factored |                  |
| 1 - Stud wall - SPF | 3.50"          | 2.25"     | 1.50"    | 106                     | 423        | 529      | 1 1/4" Rim Board |
| 2 - Stud wall - SPF | 3.50"          | 2.25"     | 1.50"    | 106                     | 423        | 529      | 1 1/4" Rim Board |

• Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

| Lateral Bracing  | Bracing Intervals | Comments |
|------------------|-------------------|----------|
| Top Edge (Lu)    | 7' 4" o/c         |          |
| Bottom Edge (Lu) | 10' 5" o/c        |          |

•Maximum allowable bracing intervals based on applied load.

| Vertical Load     | Location (Side) | Spacing | Dead (0.90) | Floor Live (1.00) | Comments     |
|-------------------|-----------------|---------|-------------|-------------------|--------------|
| 1 - Uniform (PSF) | 0 to 10' 7"     | 16"     | 15.0        | 60.0              | 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

| ForteWEB Software Operator   | Job Notes |
|--|-----------|
| Gerald Eggink<br>Quantum Consulting Engineers LLC<br>(206) 957-3900<br>geggink@quantumce.com |           |

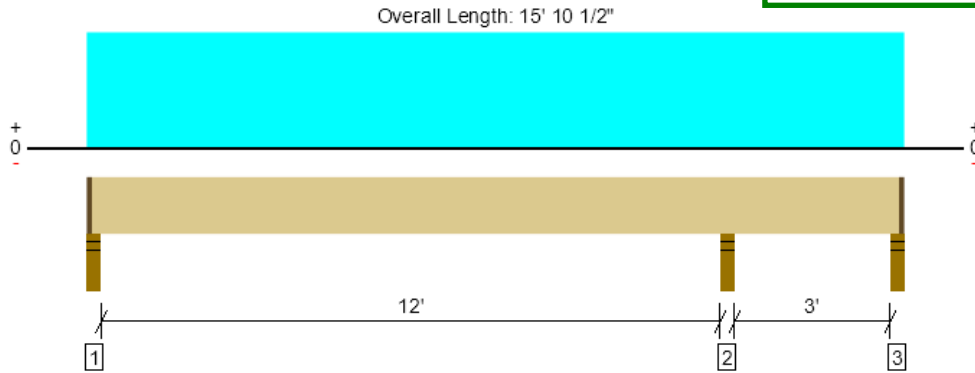


6/26/25 - Outdoor Deck, Deck Beam - South

**1 piece(s) 6 x 10 HF No.1**

An excessive uplift of -1583 lbs at support located at 15' 8 1/2" failed this product.

**POST CAP PROVIDED  
CBT4Z = 4.2 K UPLIFT CAPACITY**



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) | 5293 @ 12' 5 1/4"  | 7796 (3.50") | Passed (68%)   | --   | 1.0 D + 1.0 L (All Spans)   |
| Shear (lbs)           | 2497 @ 11' 6"      | 4877         | Passed (51%)   | 1.00 | 1.0 D + 1.0 L (All Spans)   |
| Moment (Ft-lbs)       | -5879 @ 12' 5 1/4" | 7239         | Passed (81%)   | 1.00 | 1.0 D + 1.0 L (All Spans)   |
| Live Load Defl. (in)  | 0.160 @ 5' 8"      | 0.307        | Passed (L/919) | --   | 1.0 D + 1.0 L (Alt Spans)   |
| Total Load Defl. (in) | 0.207 @ 5' 8"      | 0.614        | Passed (L/713) | --   | 1.0 D + 1.0 L (Alt Spans)   |

Member Length : 15' 8"  
System : Floor  
Member Type : Flush Beam  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Lumber grading provisions must be extended over the length of the member per NDS 4.2.5.5.
- Applicable calculations are based on NDS.

| Supports            | Bearing Length |           |          | Loads to Supports (lbs) |            |           | Accessories      |
|---------------------|----------------|-----------|----------|-------------------------|------------|-----------|------------------|
|                     | Total          | Available | Required | Dead                    | Floor Live | Factored  |                  |
| 1 - Stud wall - SPF | 3.50"          | 2.25"     | 1.50"    | 446                     | 1527       | 1973      | 1 1/4" Rim Board |
| 2 - Stud wall - SPF | 3.50"          | 3.50"     | 2.38"    | 1203                    | 4090       | 5293      | None             |
| 3 - Stud wall - SPF | 3.50"          | 2.25"     | 1.50"    | -251                    | 515/-1332  | 264/-1583 | 1 1/4" Rim Board |

• Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

| Lateral Bracing  | Bracing Intervals | Comments |
|------------------|-------------------|----------|
| Top Edge (Lu)    | 15' 8" o/c        |          |
| Bottom Edge (Lu) | 15' 8" o/c        |          |

•Maximum allowable bracing intervals based on applied load.

| Vertical Loads        | Location (Side)          | Tributary Width | Dead (0.90) | Floor Live (1.00) | Comments     |
|-----------------------|--------------------------|-----------------|-------------|-------------------|--------------|
| 0 - Self Weight (PLF) | 1 1/4" to 15' 9 1/4"     | N/A             | 13.2        | --                |              |
| 1 - Uniform (PSF)     | 0 to 15' 10 1/2" (Front) | 5'              | 15.0        | 60.0              | Default Load |

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

**Weyerhaeuser Notes**

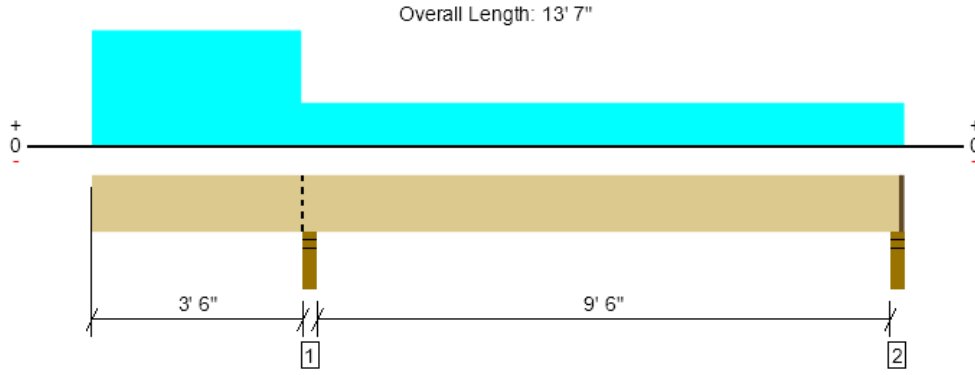
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6/26/25 - Outdoor Deck, Cantilever Beam - East  
**1 piece(s) 4 x 10 HF No.1**



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) | 1702 @ 3' 7 3/4"  | 4961 (3.50") | Passed (34%)    | --   | 1.0 D + 1.0 L (All Spans)   |
| Shear (lbs)           | 756 @ 2' 8 3/4"   | 3238         | Passed (23%)    | 1.00 | 1.0 D + 1.0 L (All Spans)   |
| Moment (Ft-lbs)       | -1839 @ 3' 7 3/4" | 4866         | Passed (38%)    | 1.00 | 1.0 D + 1.0 L (All Spans)   |
| Live Load Defl. (in)  | 0.108 @ 0         | 0.243        | Passed (2L/808) | --   | 1.0 D + 1.0 L (Alt Spans)   |
| Total Load Defl. (in) | 0.120 @ 0         | 0.365        | Passed (2L/732) | --   | 1.0 D + 1.0 L (Alt Spans)   |

Member Length : 13' 5 3/4"  
 System : Floor  
 Member Type : Flush Beam  
 Building Use : Residential  
 Building Code : IBC 2018  
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- 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                    | Floor Live | Factored |                  |
| 1 - Stud wall - SPF | 3.50"          | 3.50"     | 1.50"    | 401                     | 1301       | 1702     | Blocking         |
| 2 - Stud wall - SPF | 3.50"          | 2.25"     | 1.50"    | 100                     | 404/-138   | 504/-38  | 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)    | 13' 6" o/c        |          |
| Bottom Edge (Lu) | 13' 6" o/c        |          |

- Maximum allowable bracing intervals based on applied load.

| Vertical Loads        | Location (Side)     | Tributary Width | Dead (0.90) | Floor Live (1.00) | Comments     |
|-----------------------|---------------------|-----------------|-------------|-------------------|--------------|
| 0 - Self Weight (PLF) | 0 to 13' 5 3/4"     | N/A             | 8.2         | --                |              |
| 1 - Uniform (PSF)     | 0 to 13' 7" (Front) | 1' 4"           | 15.0        | 60.0              | Default Load |
| 2 - Uniform (PSF)     | 0 to 3' 6" (Front)  | 2' 3"           | 15.0        | 60.0              | Default Load |

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

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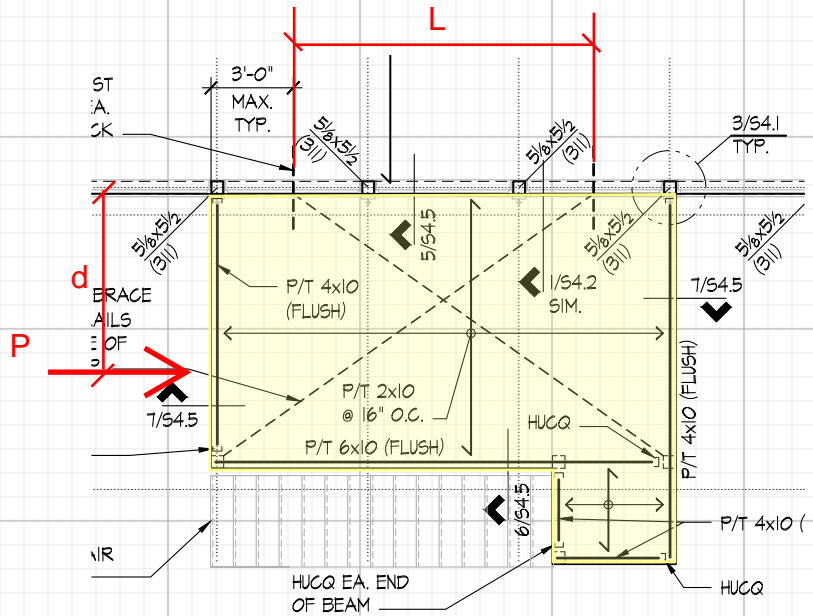
LATERAL DESIGN

DECK AREA - 180 SF

DL = 15 PSF

CS = 0.15

BASE SHEAR = P = 405 LBS



CHECK TENSION TIE

$$M = P \times D$$

$$= 405 \text{ LBS} \times 6 \text{ FT}$$

$$= 2430 \text{ LB-FT}$$

$$T = M/L$$

$$= 2430 \text{ LB-FT} / 11 \text{ FT}$$

$$T = 221 \text{ LBS}$$

**DTT1Z = 840 LBS > 221 LBS - OK!**



**QUANTUM**  
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INTRACHAT RESIDENCE

project

LINDAL  
client

7/31/2025

date

drawn by:

GAE

design by:

22252.01

job no.

Page 4 of 5  
sheet no.

PIN PILE DESIGN

USE 2" DIA. PIN PILES = 6K CAPACITY

(2) PILES PER CAP = 12 K CAPACITY PER PILE CAP

WORST CASE POST LOAD = 5.3 K

PILE CAP SELF WEIGHT = 1.2 K

**TOTAL LOAD = 6.5 K < 12 K - OK!**

