

Job No. 25-0290

Sheet No. 1

By Richard Dahlmann, P.E.

Date 3/2025



CLIENT:

**ArcVision Inc.**  
1950 Craig Rd, Suite 300  
St. Louis, MO

CARUSO TURLEY SCOTT, INC.  
1215 W. RIO SALADO PKWY. SUITE 200  
TEMPE, ARIZONA 85281  
CERTIFICATION # C-1669  
04.03.2025

PROJECT:

**Scooter's Coffee**  
130 Brandywood Ct  
Cameron, NC

---

GENERAL INFORMATION:

**CARUSO  
TURLEY  
SCOTT,  
INC.**

**consulting  
structural  
engineers**

1215 W. Rio Salado  
Tempe, Arizona 85281  
480/ 774-1700  
480/ 774-1701 (FAX)

# CARUSO TURLEY SCOTT

structural engineers

1215 W. Rio Salado Parkway, Suite 200

Tempe, Arizona 85281

T: 480 774-1700 • F: 480 774-1701

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Job Name \_\_\_\_\_

Job No. 250235 Sheet No. 2

By RAJ Date 3-25

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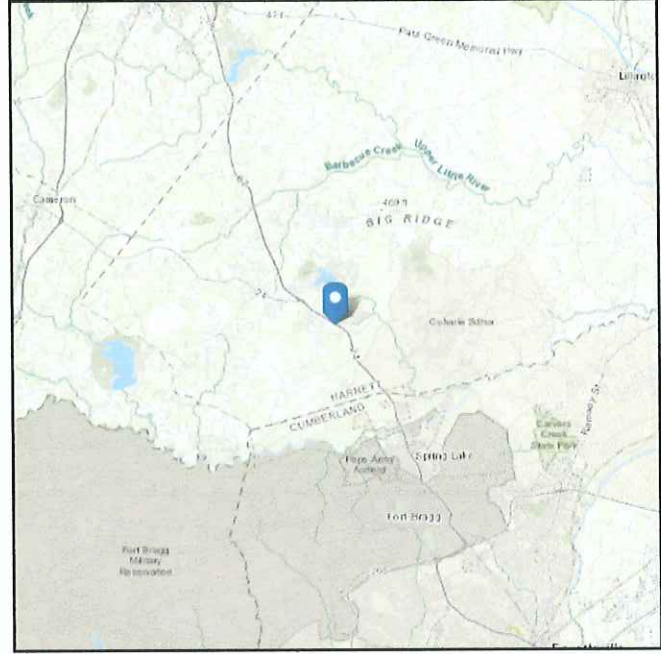
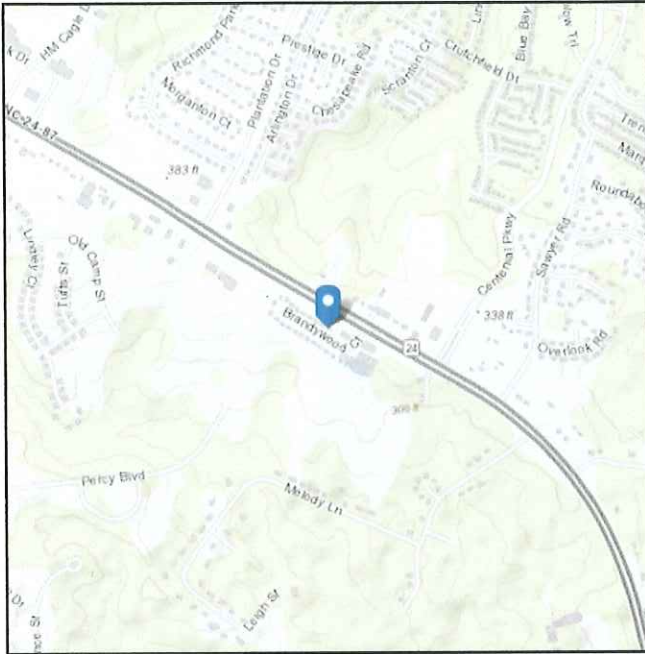


# ASCE Hazards Report

**Address:**  
130 Brandywood Court  
Cameron, North Carolina  
28326

**Standard:** ASCE/SEI 7-16  
**Risk Category:** II  
**Soil Class:** D - Stiff Soil

**Latitude:** 35.254491  
**Longitude:** -79.034286  
**Elevation:** 337.4841753008056 ft  
(NAVD 88)



## Wind

### Results:

|              |          |
|--------------|----------|
| Wind Speed   | 118 Vmph |
| 10-year MRI  | 75 Vmph  |
| 25-year MRI  | 84 Vmph  |
| 50-year MRI  | 91 Vmph  |
| 100-year MRI | 98 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:** Sun Mar 16 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).

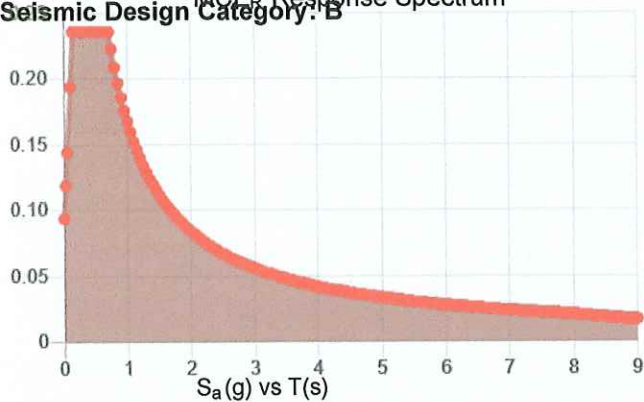
Site is in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2. Glazed openings need not be protected against wind-borne debris.

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

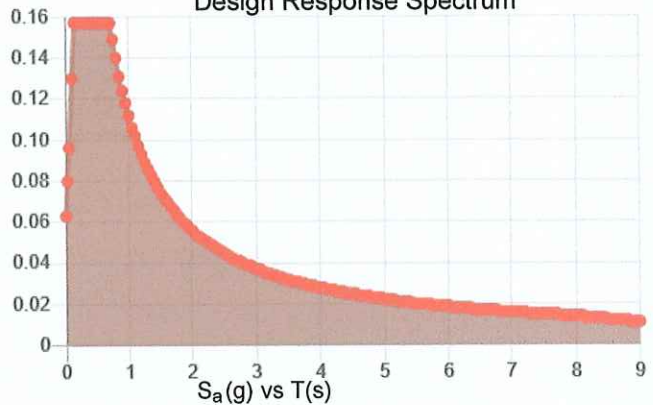
**Results:**

|            |       |                    |       |
|------------|-------|--------------------|-------|
| $S_S$ :    | 0.148 | $S_{D1}$ :         | 0.112 |
| $S_1$ :    | 0.07  | $T_L$ :            | 8     |
| $F_a$ :    | 1.6   | PGA :              | 0.073 |
| $F_v$ :    | 2.4   | PGA <sub>M</sub> : | 0.116 |
| $S_{MS}$ : | 0.236 | $F_{PGA}$ :        | 1.6   |
| $S_{M1}$ : | 0.168 | $I_e$ :            | 1     |
| $S_{DS}$ : | 0.157 | $C_v$ :            | 0.7   |

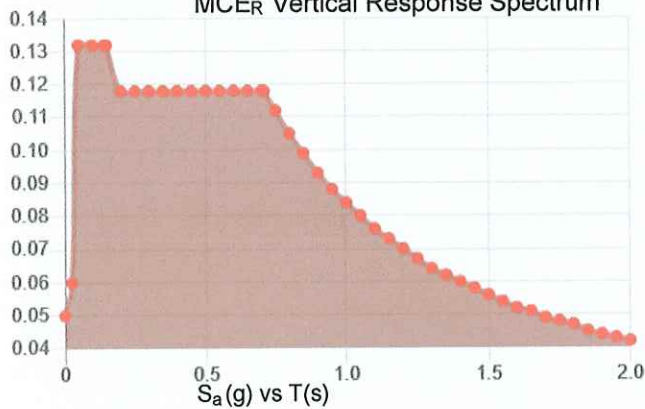
**Seismic Design Category: B**  $MCE_E$  Response Spectrum



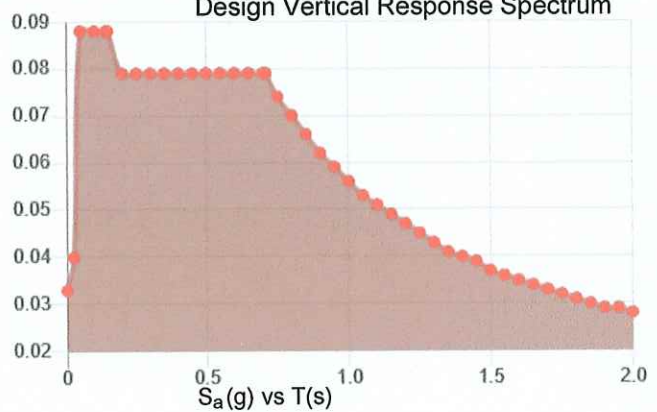
Design Response Spectrum



$MCE_R$  Vertical Response Spectrum



Design Vertical Response Spectrum



**Data Accessed:** Sun Mar 16 2025

**Date Source:**

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

## Snow

---

**Results:**Ground Snow Load,  $p_g$ : 10 lb/ft<sup>2</sup>

Mapped Elevation: 337.5 ft

Data Source: ASCE/SEI 7-16, Table 7.2-8

Date Accessed: Sun Mar 16 2025

Values provided are ground snow loads. In areas designated "case study required," extreme local variations in ground snow loads preclude mapping at this scale. Site-specific case studies are required to establish ground snow loads at elevations not covered.

Snow load values are mapped to a 0.5 mile resolution. This resolution can create a mismatch between the mapped elevation and the site-specific elevation in topographically complex areas. Engineers should consult the local authority having jurisdiction in locations where the reported 'elevation' and 'mapped elevation' differ significantly from each other.

## Rain

---

**Results:**

15-minute Precipitation Intensity: 6.61 in./h

60-minute Precipitation Intensity: 3.49 in./h

Data Source: NOAA National Weather Service, Precipitation Frequency Data Server, Atlas 14  
(<https://www.nws.noaa.gov/oh/hdsc/>)

Date Accessed: Sun Mar 16 2025



# CARUSO TURLEY SCOTT

structural engineers

1215 W. Rio Salado Parkway, Suite 200

Tempe, Arizona 85281

T: 480 774-1700 F: 480 774-1701

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Job Name: New 7-16 Spreadsheet

Job No.:

Sheet No.:

5

By:

Date: Oct-22



## MWFRS Wall Loading (Single Story) [120 mph - Exposure C]

ASCE 7-16 Section 27.3.1 Rigid Buildings & Section 27.3.4 Parapets

Table 26.11-1 ASCE 7-16, page 269  
Table 26.11-1 ASCE 7-16, page 269  
Figure 27.3-1 ASCE 7-16, page 276  
Figure 27.3-1 ASCE 7-16, page 276

$z_g = 900$   
 $\alpha = 9.5$   
 $C_{p,wind} = 0.8$   
 $C_{p,net} = -0.50$

$V_{3s} = 120$   
Exposure = C  
 $K_{zt} = 1$   
 $K_{d} = 0.85$   
 $K_{e} = 1.00$   
 $G = 0.85$

[mph - wind speed - 3 sec gust]  
[B, C, D - Section 26.7.3 ASCE 7-16, page 266]  
[Figure 26.8-1 ASCE 7-16, page 267]  
[Table 26.6-1 ASCE 7-16, page 266 (for all buildings,  $K_d = 0.85$ )]  
[Section 26.9 and Table 26.9-1 ASCE 7-16, page 269]  
[Section 26.11-1 ASCE 7-16, page 269 (for most buildings, use default of 0.85)]

| Roof Height [ft] | Average        |                       | Wall           |                       | 6 ft Tall Parapet |                       | 8 ft Tall Parapet |                       | 10 ft Tall Parapet |                       | 12 ft Tall Parapet |                       | 14 ft Tall Parapet |                       | 16 ft Tall Parapet |                       |
|------------------|----------------|-----------------------|----------------|-----------------------|-------------------|-----------------------|-------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|
|                  | Pressure [psf] | Diaphragm Force [plf] | Pressure [psf] | Diaphragm Force [plf] | Pressure [psf]    | Diaphragm Force [plf] | Pressure [psf]    | Diaphragm Force [plf] | Pressure [psf]     | Diaphragm Force [plf] | Pressure [psf]     | Diaphragm Force [plf] | Pressure [psf]     | Diaphragm Force [plf] | Pressure [psf]     | Diaphragm Force [plf] |
| 13.0             | 29.3           | 205                   | 70.4           | 718                   | 71.8              | 944                   | 73.1              | 1198                  | 74.4               | 1480                  | 75.6               | 1792                  | 76.7               | 2133                  | 77.7               | 2501                  |
| 15.0             | 29.5           | 236                   | 71.8           | 748                   | 73.1              | 967                   | 74.4              | 1212                  | 75.6               | 1483                  | 76.7               | 1779                  | 77.7               | 2101                  | 78.7               | 2488                  |
| 17.0             | 29.9           | 269                   | 73.1           | 781                   | 74.4              | 996                   | 75.6              | 1235                  | 76.7               | 1496                  | 77.7               | 1791                  | 78.7               | 2088                  | 79.7               | 2496                  |
| 19.0             | 30.3           | 303                   | 74.4           | 817                   | 75.6              | 1029                  | 76.7              | 1262                  | 77.7               | 1516                  | 78.7               | 1809                  | 79.7               | 2112                  | 80.6               | 2509                  |
| 21.0             | 30.8           | 338                   | 75.6           | 854                   | 76.7              | 1063                  | 77.7              | 1292                  | 78.7               | 1541                  | 79.7               | 1831                  | 80.6               | 2158                  | 81.5               | 2523                  |
| 23.0             | 31.2           | 374                   | 76.7           | 892                   | 77.7              | 1100                  | 78.7              | 1325                  | 79.7               | 1569                  | 80.6               | 1858                  | 81.5               | 2186                  | 82.3               | 2533                  |
| 25.0             | 31.6           | 411                   | 77.7           | 931                   | 78.7              | 1138                  | 79.7              | 1361                  | 80.6               | 1601                  | 81.5               | 1888                  | 82.3               | 2218                  | 83.1               | 2548                  |
| 27.0             | 32.0           | 448                   | 78.7           | 971                   | 79.7              | 1177                  | 80.6              | 1398                  | 81.5               | 1635                  | 82.3               | 1921                  | 83.1               | 2251                  | 83.9               | 2558                  |
| 29.0             | 32.4           | 486                   | 79.7           | 1012                  | 80.6              | 1217                  | 81.5              | 1437                  | 82.3               | 1671                  | 83.1               | 1956                  | 83.9               | 2287                  | 84.6               | 2568                  |
| 31.0             | 32.8           | 525                   | 80.6           | 1054                  | 81.5              | 1258                  | 82.3              | 1476                  | 83.1               | 1709                  | 83.9               | 1993                  | 84.6               | 2318                  | 85.4               | 2578                  |
| 33.0             | 33.2           | 564                   | 81.5           | 1096                  | 82.3              | 1300                  | 83.1              | 1517                  | 83.9               | 1748                  | 84.6               | 2031                  | 85.4               | 2351                  | 86.1               | 2588                  |
| 35.0             | 33.5           | 604                   | 82.3           | 1139                  | 83.1              | 1342                  | 83.9              | 1559                  | 84.6               | 1789                  | 85.4               | 2071                  | 86.1               | 2384                  | 86.8               | 2598                  |
| 37.0             | 33.9           | 644                   | 83.1           | 1182                  | 83.9              | 1386                  | 84.6              | 1602                  | 85.4               | 1830                  | 86.1               | 2109                  | 86.8               | 2418                  | 87.5               | 2608                  |

### Note

- The wall diaphragm force is calculated by stepping the wall loads and summing their moments about the base of the wall.
- The average wall pressure is the uniform wall pressure that would result in the same wall diaphragm force that is determined with stepped loads.
- The diaphragm force listed for the parapets is the total diaphragm force. It is the summation of the individual diaphragm force from the parapet and the diaphragm force from the wall. The individual diaphragm force for the parapet is determined by summing the forces about the base of the wall.

### Design Equations

[eq 27.3-1]

[eq 26.10-1]

$g = 0.00256 K_{zt} K_{d} K_{e} K_{g} V^2$   
 $g_1(GC_p) = 0$  [internal pressure cannot exit - no building expansion joints present]

$p_{net,wall} = 0.00256 K_{zt} K_{d} K_{e} K_{g} V^2 * GC_p * K_{e} * V^2 + K_{e} * C_{p,net}$   
 $K_{e} = K_{e}$  evaluated at the mean roof height,  $h$

$K_{e} = K_{e}$  evaluated at the height from bottom of wall to point where pressure is determined,  $z$

$p_{net,wall} = 10.191 [(z)^{0.211} + 0.625 (h)^{0.211}]$

[eq 27.3-1]

$p_{parapet} = g_1(GC_p)$

$g_1 =$  velocity pressure evaluated at top of parapet

$GC_p = 2.5$  - combined net pressure coefficient

$p_{parapet} = 37.466 (h_p)^{0.211}$  [ $h_p$  = height to top of parapet]

Sheet Printed: 10/1/2022

Sheet Updated: 2/1/2018



# CARUSO TURLEY SCOTT

structural engineers

1215 W. Rio Salado Parkway, Suite 200

Tempe, Arizona 85281

T: 480 774-1700 F: 480 774-1701

www.ctsoz.com

Job Name: Updated to ASCE 7-16 for 2018 IBC

Job No.:

Sheet No.:

By:

Date: Oct-22

## ASCE 7-16 WIND LOAD CALCULATION

### MWFRS Roof Loading (enclosed building with roof slopes less than 10° or 2:12)

[eave height = 13 ft - 120 mph - Exposure C - flat roofs & sloped roofs with wind parallel to ridge]

ASCE 7-16 Section 27.3-1 Rigid Buildings

|            |                                                                   |                                                                       |             |      |                                                                                 |
|------------|-------------------------------------------------------------------|-----------------------------------------------------------------------|-------------|------|---------------------------------------------------------------------------------|
| $V_{3s} =$ | 120                                                               | [mph - wind speed - 3 sec gust]                                       | $G =$       | 0.85 | [Section 26.11.1 ASCE 7-16, page 269 (for most buildings, use default of 0.85)] |
| Exposure = | C                                                                 | [B, C, D - Section 26.7.3 ASCE 7-16, page 266]                        | $GC_{pi} =$ | 0.18 | [Table 26.13-1 ASCE 7-16, page 271]                                             |
| $K_{zt} =$ | 1                                                                 | [Figure 26.8-1 ASCE 7-16, page 267]                                   | $z_g =$     | 900  | [Table 26.11-1 ASCE 7-16, page 269]                                             |
| $K_d =$    | 0.85                                                              | [Table 26.6-1 ASCE 7-16, page 266 (for all buildings, $K_d = 0.85$ )] | $a =$       | 9.5  | [Table 26.11-1 ASCE 7-16, page 269]                                             |
| $K_e =$    | 1.00                                                              | [Section 26.9 and Table 26.9-1 ASCE 7-16, page 268]                   |             |      |                                                                                 |
| $h =$      | 13.0                                                              | [Eave Height]                                                         |             |      |                                                                                 |
| $L =$      | Horizontal building dimension measured parallel to wind direction |                                                                       |             |      |                                                                                 |

|                |                       | Horizontal Length [ft]<br>chart value multiplied by h |       |       |
|----------------|-----------------------|-------------------------------------------------------|-------|-------|
|                |                       | 0.5 * h                                               | 1 * h | 2 * h |
| $L \geq 2 * h$ | $C_p$                 | -0.90                                                 | -0.50 | -0.30 |
|                | $G * C_p \pm GC_{pi}$ | -0.95                                                 | -0.61 | -0.44 |
|                | $P_{MWFRS}$           | -25.0                                                 | -16.0 | -11.5 |
| $L < h$        | $C_p$                 | -1.20                                                 | -0.70 | -0.40 |
|                | $G * C_p \pm GC_{pi}$ | -1.29                                                 | -0.78 | -0.48 |
|                | $P_{MWFRS}$           | -34.5                                                 | -20.5 | -14.5 |
| All Roofs      | $C_p$                 | -0.18                                                 | -0.18 | -0.18 |
|                | $G * C_p \pm GC_{pi}$ | -0.33                                                 | -0.33 | -0.33 |
|                | $P_{MWFRS}$           | -8.8                                                  | -8.8  | -8.8  |

#### Design Equations

$$P_{MWFRS} = q_h (G * C_p \pm GC_{pi}) \quad [\text{eq 27.3-1}]$$

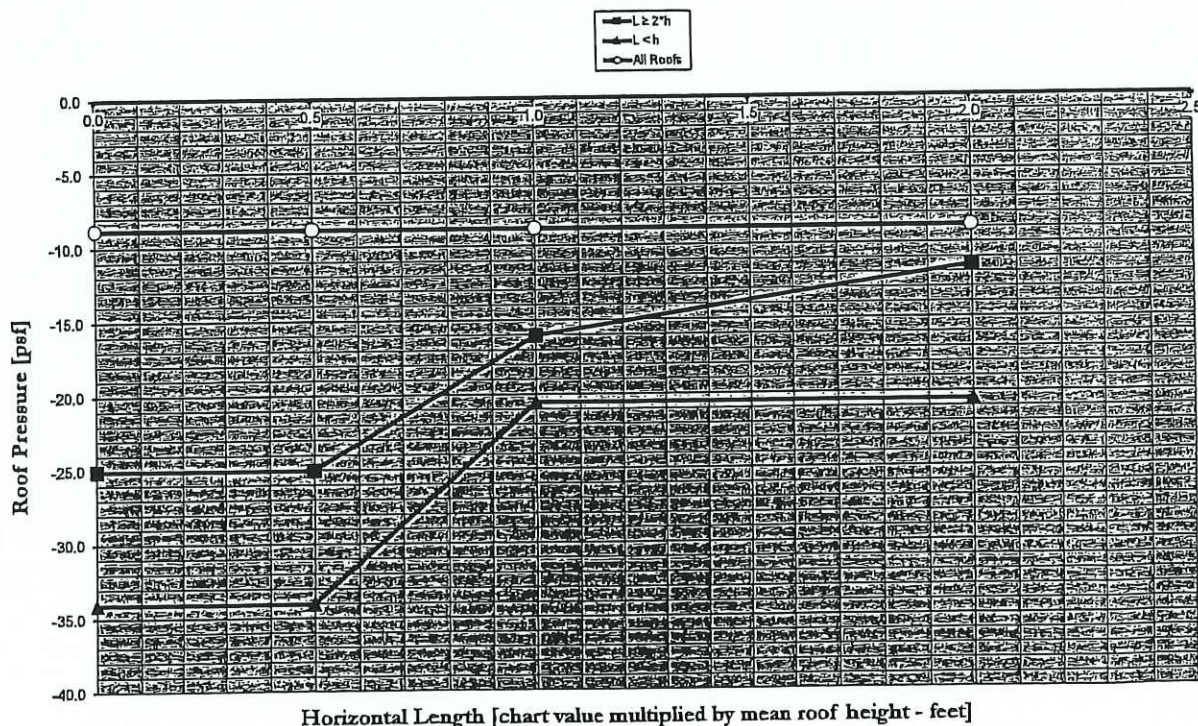
$$q_h = 0.00256 K_z * K_{zt} * K_d * K_e * V^2 \quad [\text{eq 26.10-1}]$$

$$K_z = 2.01(h/z_g)^{2/5} = 0.85 \quad [\text{table 26.10-1}]$$

$$P_{MWFRS} = 26.50 (G * C_p \pm GC_{pi})$$

note: Negative pressures act perpendicular away from the roof surface while positive pressures act perpendicular toward the surface.

### MWFRS Roof Pressures - Flat Roofs





# CARUSO TURLEY SCOTT

structural engineers

1215 W. Rio Salado Parkway, Suite 200

Tempe, Arizona 85281

T: 480 774-1700 F: 480 774-1701

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## Components & Cladding Wall Loading [eave / mean roof height = 13 ft - 120 mph - Exposure C]

ASCE 7-10 Sections 30.3 (h ≤ 60) & 30.5 (h > 60)

$V_{3s} = 120$  [mph - wind speed - 3 sec gust]  
 Exposure = C [B, C, D - Section 26.7.3 ASCE 7-16, page 266]  
 $K_{zt} = 1.00$  [Figure 26.8-1 ASCE 7-16, page 267]  
 $K_d = 0.85$  [Table 26.6-1 ASCE 7-16, page 266 (for all buildings,  $K_d = 0.85$ )]  
 $K_e = 1.00$  [Section 26.9 and Table 26.9-1 ASCE 7-16, page 268]

$z_r = 900$  [Table 26.11-1 ASCE 7-16, page 269]  
 $\alpha = 9.5$  [Table 26.11-1 ASCE 7-16, page 269]  
 $h = 13$  [ft - mean roof height]  
 $I_{cs} = 0.85$  [Table 26.10-1 ASCE 7-16, page 268, ( $K_s = K_e$  evaluated at  $h$ )]

|        |                | Tributary Area [sq ft] |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|--------|----------------|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|        |                | 10                     | 20   | 30   | 40   | 60   | 80   | 100  | 140  | 180  | 220  | 260  | 300  | 400  | 500  | 600  | 700  |
| Zone 5 | Pressure [psf] | 41.9                   | 41.9 | 39.1 | 37.4 | 36.2 | 34.6 | 33.4 | 32.5 | 31.1 | 30.1 | 29.3 | 28.6 | 28.0 | 26.9 | 26.3 | 25.6 |
|        | Pressure [psf] | 33.9                   | 33.9 | 32.5 | 31.7 | 31.1 | 30.3 | 29.7 | 29.2 | 28.6 | 28.0 | 27.6 | 27.3 | 27.0 | 26.4 | 26.0 | 25.6 |

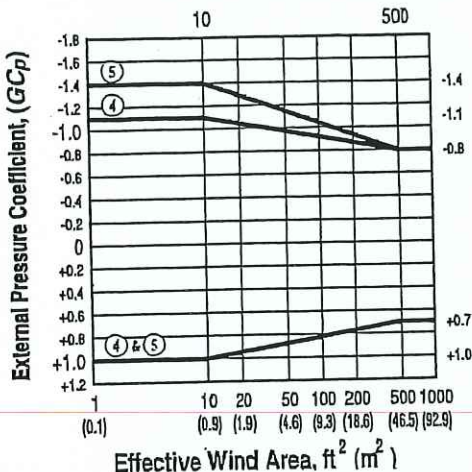


Figure 30.3-1 Components and Cladding [h ≤ 60 ft]

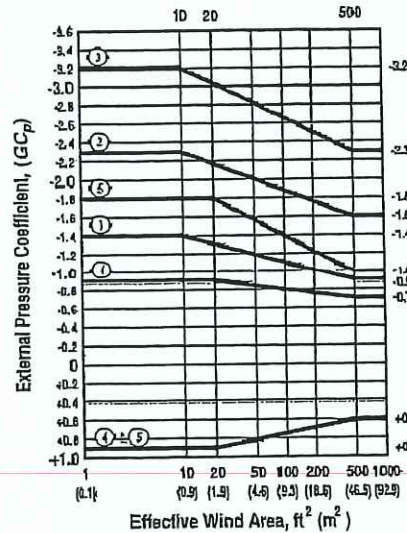
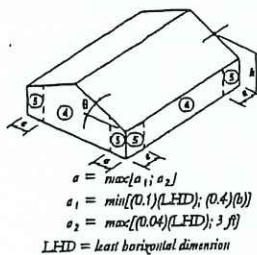
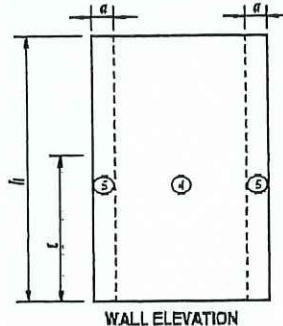


Figure 30.5-1 Components and Cladding, Part 3 [h > 60 ft]



Design Equations

$p_{cec} = q_s(GC_s \pm GC_{\mu})$  [eq 30.3-1]  
 $p_{cec} = q_s(GC_s \pm GC_{\mu})$  [eq 30.5-1]  
 (note: it is conservatively assumed  $q$  and  $q_s$  equal  $q_h$  therefore the two equations above can be combined into one equation.)  
 $p_{cec} = q_s(GC_s \pm GC_{\mu})$   
 $q_s = 0.00256 K_z K_{zt} K_d K_e V^2$  [eq 30.3-1]  
 $\pm GC_{\mu} = 0.18$  [enclosed building] [table 26.13-1]  
 $p_{cec} = 26.503 * (GC_s \pm GC_{\mu})$



# CARUSO TURLEY SCOTT

structural engineers

1215 W. Rio Salado Parkway, Suite 200

Tempe, Arizona 85281

T: 480 774-1700 F: 480 774-1701

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Date: Jul-12

## Components & Cladding Parapet Loading [top of parapet = 19 ft - 120 mph - Exposure C]

ASCE 7-16 Sections 30.8

$V_{3s} = 120$  [mph - wind speed - 3 sec gust]  
 Exposure = C [B, C, D - Section 26.7.3 ASCE 7-10]  
 $K_{zt} = 1.00$  [Figure 26.8-1 ASCE 7-16, page 267]  
 $K_d = 0.85$  [Table 26.6-1 ASCE 7-16, page 266 (for all buildings,  $K_d = 0.85$ )]  
 $K_e = 1.00$  [Section 26.9 and Table 26.9-1 ASCE 7-16, page 268]

$z_K = 900$  [Table 26.11-1 ASCE 7-16, page 269]  
 $\alpha = 9.5$  [Table 26.11-1 ASCE 7-16, page 269]  
 $h_{\text{parapet}} = 19$  [height to top of parapet]  
 $K_f = 0.89$  [Table 30.3-1 ASCE 7-16, page 335 ( $K_f = K_e$  evaluated at top of parapet)]

|        |                | Tributary Area [sq ft] |       |      |      |      |      |      |      |      |      |      |      |      |      |      |
|--------|----------------|------------------------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|        |                | 0                      | 10    | 20   | 30   | 40   | 60   | 80   | 100  | 140  | 180  | 220  | 260  | 300  | 400  | 82   |
| Zone 5 | Pressure [psf] | 105.9                  | 105.9 | 90.1 | 80.9 | 74.4 | 65.2 | 58.6 | 53.6 | 52.9 | 52.3 | 51.9 | 51.5 | 51.2 | 50.6 | 58.1 |
|        | Pressure [psf] | 78.0                   | 78.0  | 70.6 | 66.3 | 63.3 | 59.0 | 55.9 | 53.6 | 52.9 | 52.3 | 51.9 | 51.5 | 51.2 | 50.6 | 55.7 |

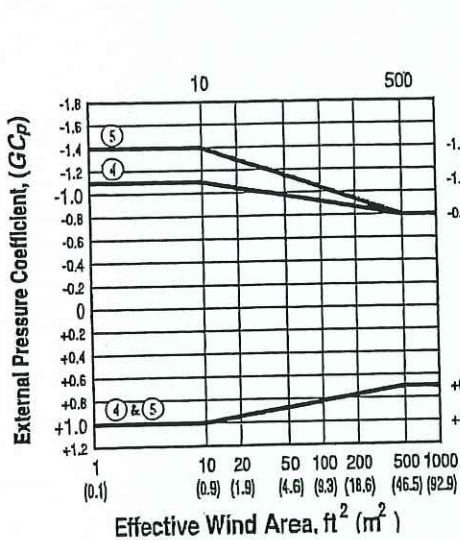
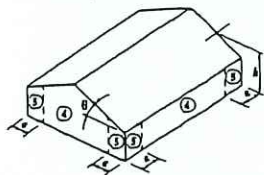


Figure 30.3-1 Components and Cladding [h<=60 ft]



$$a_1 = \min[(0.1)(L_{H/D}); (0.4)(h)]$$

$$a_2 = \max[(0.04)(L_{H/D}); 3 ft]$$

$L_{H/D}$  = least horizontal dimension

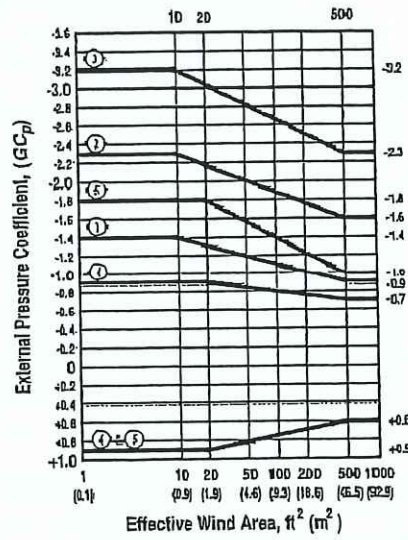
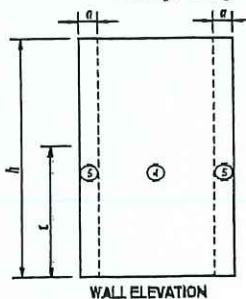


Figure 30.5-1 Components and Cladding, Part 3 [h>60 ft]



WALL ELEVATION

### Parapet Pressure Design Equations

$$p_{\text{parapet}} = q_p (GC_p \pm GC_{pi}) \quad [\text{eq. 30.8-1}]$$

$$q_p = 0.00256 K_z K_{zt} K_d V^2 \quad [\text{eq. 26.10-1}]$$

$$GC_{pi} = 0 \quad [\text{internal parapet pressures cancel out}]$$

$$p_{\text{parapet}} = 27.855 * (GC_p \pm GC_{pi})$$

Chart Printed: 10/1/2022



**CARUSO TURLEY SCOTT**  
structural engineers  
1215 W. Rio Salado Parkway, Suite 200  
Tempe, Arizona 85281  
T: 480 774-1700 F: 480 774-1701  
www.cts02.com

Job Name: ASCE 7-16 UPDATE

Job No.:

Sheet No.:

By: DEE

Date: Oct-22

**ASCE 7-16 WIND LOAD CALCULATION**

9

**Components & Cladding Roof Loading (Figure 30.3-2A - enclosed building with  $h < 60$  ft)**

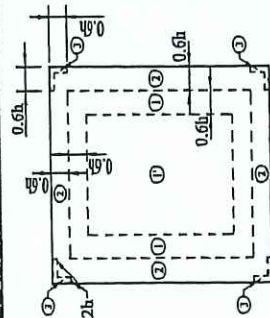
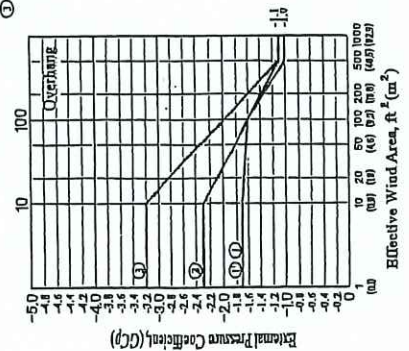
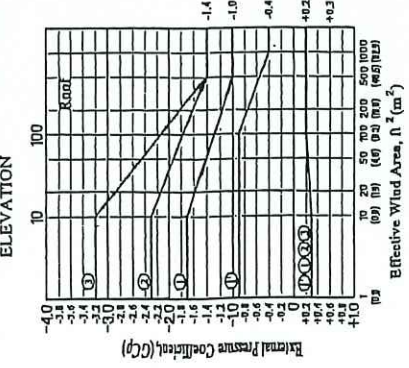
[eave height = 13 ft - 120 mph - Exposure C - gable roofs: roof slope  $< 7^\circ$ ]

$V_w = \text{Wind Speed} = 120$  [mph - 3 sec gust] [Table 26.11-1 ASCE 7-16, page 269]  
Exposure = C [B, C, D - Section 26.7.3 ASCE 7-16, page 266]  
 $K_{zt} = 1.00$  [Figure 26.8-1 ASCE 7-16, page 267]  
 $K_d = 0.85$  [Table 26.6-1 ASCE 7-16, page 266 (for all buildings;  $K_d = 0.85$ )]  
 $K_e = 1.00$  [Section 26.9 and Table 26.9-1 ASCE 7-16, page 268]  
 $K_s = 9.5$  [Table 26.11-1 ASCE 7-16, page 269]  
 $h = 13$  [ft - eave / mean roof height]  
 $K_{sc} = 0.85$  [Table 26.10-1 ASCE 7-16, page 268, ( $K_s = K_{sc}$  evaluated at  $h$ )]

| Zone           | Tributary Area [sq ft] |       |       |       |       |       |       |       |       |       |       |       | GC <sub>p</sub> |
|----------------|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------------|
|                | 0                      | 10    | 20    | 30    | 40    | 50    | 60    | 70    | 80    | 90    | 100   | 110   |                 |
| Zone -1'       | 0.30                   | 0.30  | 0.27  | 0.25  | 0.24  | 0.22  | 0.21  | 0.20  | 0.20  | 0.20  | 0.20  | 0.20  | 0.21            |
| Zone -1        | -0.90                  | -0.90 | -0.90 | -0.90 | -0.90 | -0.90 | -0.90 | -0.90 | -0.90 | -0.90 | -0.90 | -0.90 | -0.90           |
| Zone -1        | -1.70                  | -1.70 | -1.58 | -1.50 | -1.45 | -1.38 | -1.33 | -1.29 | -1.23 | -1.16 | -1.09 | -1.04 | -1.32           |
| Zone -2        | -2.30                  | -2.30 | -2.14 | -2.05 | -1.98 | -1.89 | -1.82 | -1.77 | -1.69 | -1.64 | -1.52 | -1.45 | -1.82           |
| Zone -3        | -3.20                  | -3.20 | -2.88 | -2.69 | -2.56 | -2.38 | -2.24 | -2.14 | -1.99 | -1.87 | -1.64 | -1.50 | -2.23           |
| Zone 30H       | -3.20                  | -3.20 | -2.83 | -2.61 | -2.46 | -2.24 | -2.08 | -1.96 | -1.78 | -1.65 | -1.37 | -1.22 | -2.07           |
| Zone 20H       | -2.30                  | -2.30 | -2.09 | -1.98 | -1.87 | -1.75 | -1.66 | -1.59 | -1.49 | -1.38 | -1.26 | -1.17 | -1.65           |
| Zone 10H & 10H | -1.70                  | -1.70 | -1.67 | -1.65 | -1.64 | -1.62 | -1.61 | -1.60 | -1.59 | -1.57 | -1.55 | -1.54 | -1.61           |

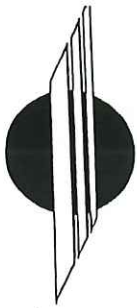
**Design Equations**

$p_{cwc} = g_s(GC_p \pm GC_{pi})$  [eq 30.3-1]  
 $g_s = 0.00256 K_{zt} K_d K_e K_{sc} K_{sc} V_w^2$  [eq 26.10-1]  
 $\pm GC_{pi} = 0.18$  [enclosed building] [Table 26.13-1]  
 $p_{cwc} = 26.5 * (GC_p \pm GC_{pi})$



| Zone      | External Pressure Coefficients (Figure 30.3-2A) |                                 | GC <sub>p</sub>       |
|-----------|-------------------------------------------------|---------------------------------|-----------------------|
|           | Trailing Area [ft <sup>2</sup> ]                | Leading Area [ft <sup>2</sup> ] |                       |
| -1'       | +1', +1, +2, +3                                 | -1'                             | 0.3                   |
|           | -1'                                             | -1'                             | 0.2                   |
|           | -1'                                             | -1'                             | -0.9                  |
| -1        | -1'                                             | -1'                             | -0.4                  |
|           | -1'                                             | -1'                             | -1.7                  |
|           | -1'                                             | -1'                             | -2.12 + 0.412 log(A)  |
| -2        | -2                                              | -2                              | -1                    |
|           | -2                                              | -2                              | -2.3                  |
|           | -2                                              | -2                              | -2.83 + 0.53 log(A)   |
| -3        | -3                                              | -3                              | -1.4                  |
|           | -3                                              | -3                              | -3.2                  |
|           | -3                                              | -3                              | -4.259 + 1.039 log(A) |
| 30H       | 30H                                             | 30H                             | -1.1                  |
|           | 30H                                             | 30H                             | -1.7                  |
|           | 30H                                             | 30H                             | -4.436 + 1.236 log(A) |
| 20H       | 20H                                             | 20H                             | -1.1                  |
|           | 20H                                             | 20H                             | -2.3                  |
|           | 20H                                             | 20H                             | -3.006 + 0.706 log(A) |
| 10H & 10H | 10H & 10H                                       | 10H & 10H                       | -1.7                  |
|           | 10H & 10H                                       | 10H & 10H                       | -1.8                  |
|           | 10H & 10H                                       | 10H & 10H                       | -3.317 + 0.858 log(A) |

Sheet Printed: 10/1/2022 Start Update: 1/25/2018

**CARUSO TURLEY SCOTT**

structural engineers

1215 W. Rio Salado Parkway, Suite 200  
 Tempe, Arizona 85281  
 T: 480 774-1700 F: 480 774-1701  
 www.ctsaz.com

Job No.: 22-xxxx Sheet No.:  
 By: CTS Date: Feb-22

10

## Site Wall Wind Loading per Section 29.3 - ASCE 7-16

Site Address:

Wind Exposure C

Velocity Pressure =  $q_h = 0.00256 K_z K_{zt} K_d K_e V^2$  (ASCE 7-16 Eqn 26.10-1)3 -Sec Wind Gust =  $V = 120$  mphExposure Coeff =  $K_z = 0.85$  (Table 26.10.1,  $h < 15$  ft)Topographic Factor =  $K_{zt} = 1.0$  (Section 26.8.2)Directional Coefficient =  $K_d = 0.85$  (Section 26.6)Ground Elevation Coefficient =  $K_e = 1$  (Section 26.9 ASCE 7-16) $q_h = 26.6$  psf

From Section 29.4.1:

Wind Load =  $F = q_h G C_f A$  (Eqn 29.4-1)Gust Factor =  $G = 0.85$  (Section 26.11.1)Force Coeff =  $C_f = 1.45$  (Fig 29.4-1,  $B/s = 10$ )Wall Area =  $A = 1.0$  ft<sup>2</sup>

10% Increase per note below\* = 1.1

Wind Pressure =  $F = 36.1$  psf  $F = q_h G C_f A$ Wind Pressure =  $0.6 * F = 21.7$  psf  $0.6 * F = 0.6 * q_h G C_f A$ 

\* Per Footnote 3, Fig 29.4-1, resultant force of wind pressure is to act at 0.05 times the average height of the wall.  
 To account for this, increase the wind load using equivalent moments.

$$\frac{w_e l^2}{2} = w l \left( \frac{l}{2} + l(0.05) \right)$$

$$w_e = 0.55w(2) = 1.1w$$

Therefore, the wind is increased in chart above by 10%



# CARUSO TURLEY SCOTT

structural engineers

1215 W. Rio Salado Parkway, Suite 200

Tempe, AZ 85281

480.774.1700

www.ctsaz.com

Job Name \_\_\_\_\_

Job No. 250235

Sheet No. 11

By RD

Date 3-25

## DESIGN LOADS

BU ROOFING

2.0

PLYWOOD

2.0

2x12 @ 16" OC

3.2

MET

7.0 - conservative

FIRE PROTECTION

1.3

CEILING

3.0

MISC.

1.5

20 P

20 L

SNOW  $P_g = 1.0 \text{ psf}$

$$P_F = 0.7(1.0)(1.0)10 = 7 \text{ psf}$$

$$\gamma = 13(10) + 1.45 = 15.3 \text{ pcf}$$

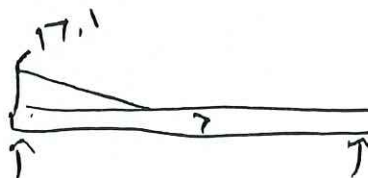
$$H_b = \frac{7}{15.3} = 0.5'$$

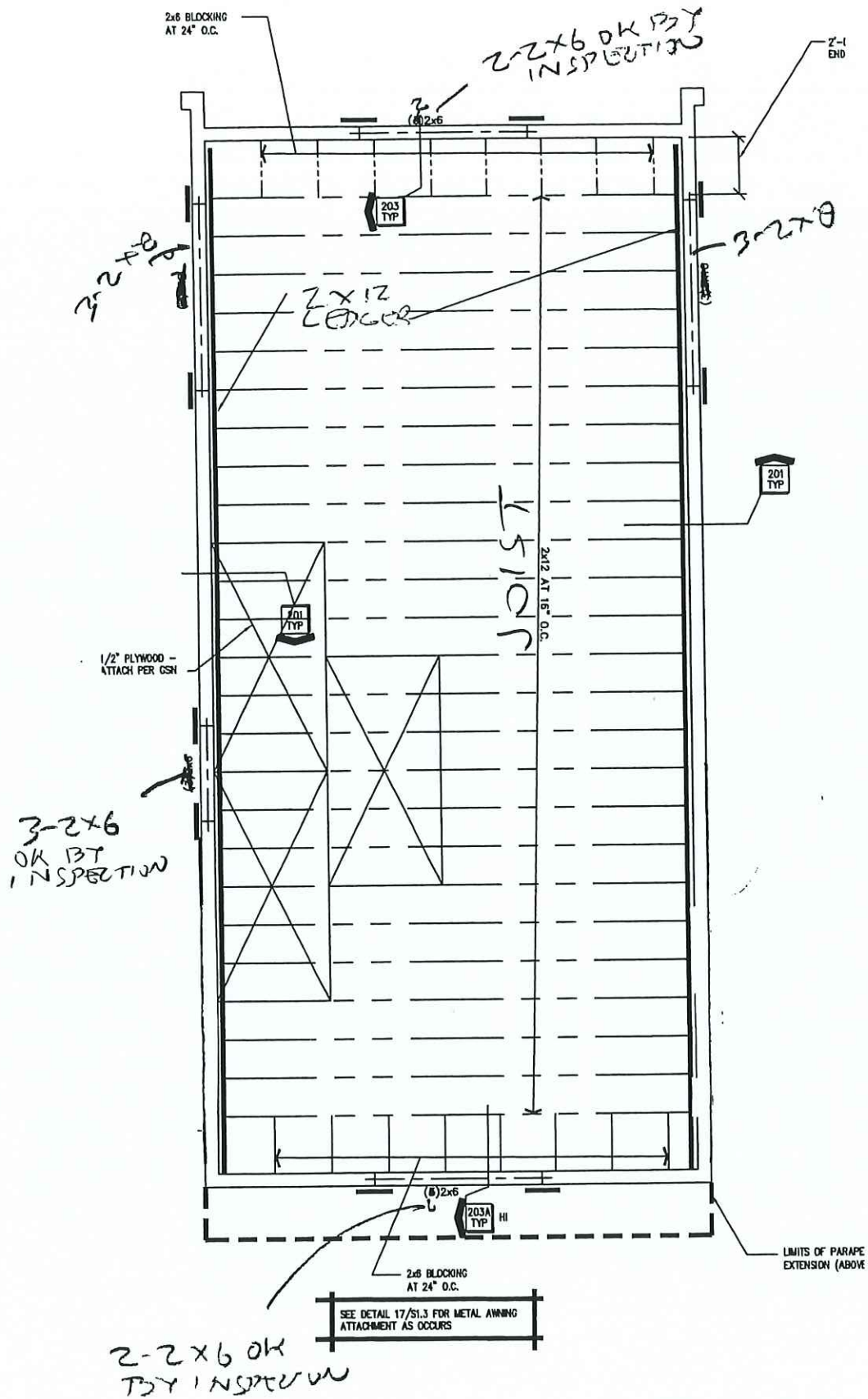
$$H_d = 1.5' \times 0.75 = 1.1'$$

$\phi = 37'$

$$P_d = 1.1(15.3) = 17.1 \text{ psf} \quad W = 4.4'$$

LL GOVERNS  
BY INSULATION





ROOF PLAN

## Wood Beam

Project File: enercalc.ec6

LIC#: KW-06016452, Build:20.24.12.17

CARUSO TURLEY SCOTT

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: joist

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021  
Load Combination Set : ASCE 7-16

### Material Properties

Analysis Method : Allowable Stress Design  
Load Combination : ASCE 7-16

Wood Species : Douglas Fir-Larch  
Wood Grade : No.2

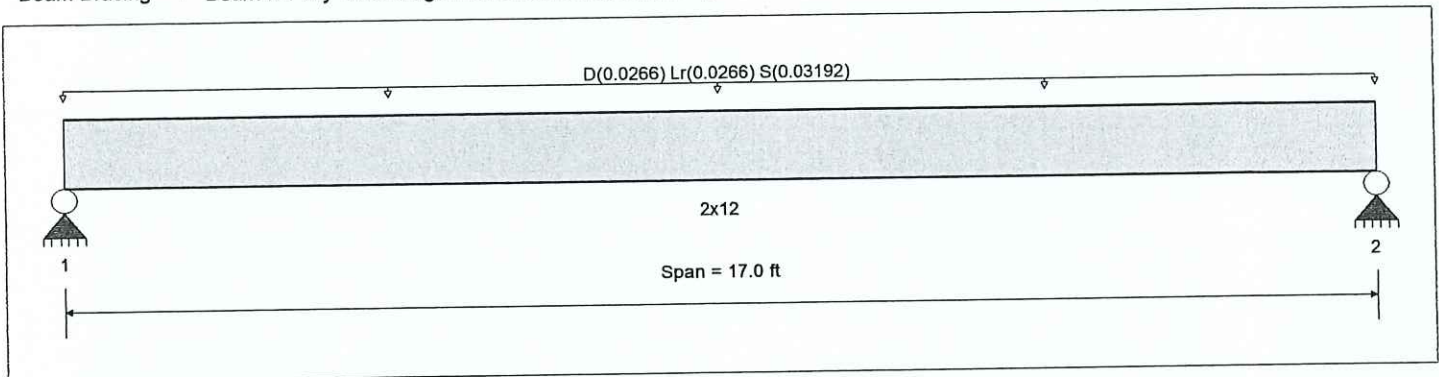
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 900.0 psi  
Fb - 900.0 psi  
Fc - Prll 1,350.0 psi  
Fc - Perp 625.0 psi  
Fv 180.0 psi  
Ft 575.0 psi

E : Modulus of Elasticity

Ebend- xx 1,600.0ksi  
Eminbend - xx 580.0ksi

Density 31.210pcf  
Repetitive Member Stress Increase



### Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.020, Lr = 0.020, S = 0.0240 ksf, Tributary Width = 1.330 ft

### DESIGN SUMMARY

Design OK

|                                   |          |             |            |                             |   |            |   |
|-----------------------------------|----------|-------------|------------|-----------------------------|---|------------|---|
| Maximum Bending Stress Ratio      | =        | 0.674       | 1          | Maximum Shear Stress Ratio  | = | 0.190      | 1 |
| Section used for this span        |          | 2x12        |            | Section used for this span  |   | 2x12       |   |
| fb: Actual                        | =        | 801.77psi   |            | f <sub>v</sub> : Actual     | = | 39.37 psi  |   |
| F'b                               | =        | 1,190.25psi |            | F'v                         | = | 207.00 psi |   |
| Load Combination                  |          | +D+S        |            | Load Combination            |   | +D+S       |   |
| Location of maximum on span       | =        | 8.500ft     |            | Location of maximum on span | = | 0.000 ft   |   |
| Span # where maximum occurs       | =        | Span # 1    |            | Span # where maximum occurs | = | Span # 1   |   |
| Maximum Deflection                |          |             |            |                             |   |            |   |
| Max Downward Transient Deflection | 0.212 in | Ratio =     | 962 >= 360 | Span: 1 : S Only            |   |            |   |
| Max Upward Transient Deflection   | 0 in     | Ratio =     | 0 < 360    | n/a                         |   |            |   |
| Max Downward Total Deflection     | 0.388 in | Ratio =     | 525 >= 180 | Span: 1 : +D+S              |   |            |   |
| Max Upward Total Deflection       | 0 in     | Ratio =     | 0 < 180    | n/a                         |   |            |   |

### Maximum Forces & Stresses for Load Combinations

| Load Combination |        | Max Stress Ratios |       |      |      |                |      |                |                 |                |                | Moment Values |       |         | Shear Values |                |       |
|------------------|--------|-------------------|-------|------|------|----------------|------|----------------|-----------------|----------------|----------------|---------------|-------|---------|--------------|----------------|-------|
| Segment Length   | Span # | M                 | V     | CD   | CM   | C <sub>t</sub> | CLx  | C <sub>F</sub> | C <sub>fu</sub> | C <sub>i</sub> | C <sub>r</sub> | M             | fb    | F'b     | V            | f <sub>v</sub> | F'v   |
| D Only           |        |                   |       |      |      |                |      |                |                 |                |                |               |       | 0.0     |              |                |       |
| Length = 17.0 ft | 1      | 0.391             | 0.110 | 0.90 | 1.00 | 1.00           | 1.00 | 1.000          | 1.00            | 1.00           | 1.15           | 0.96          | 364.4 | 931.5   | 0.20         | 17.9           | 162.0 |
| +D+Lr            |        |                   |       |      | 1.00 | 1.00           | 1.00 | 1.000          | 1.00            | 1.00           | 1.15           |               |       | 0.0     | 0.00         | 0.0            | 0.0   |
| Length = 17.0 ft | 1      | 0.563             | 0.159 | 1.25 | 1.00 | 1.00           | 1.00 | 1.000          | 1.00            | 1.00           | 1.15           | 1.92          | 728.9 | 1,293.8 | 0.40         | 35.8           | 225.0 |
| +D+S             |        |                   |       |      | 1.00 | 1.00           | 1.00 | 1.000          | 1.00            | 1.00           | 1.15           |               |       | 0.0     | 0.00         | 0.0            | 0.0   |
| Length = 17.0 ft | 1      | 0.674             | 0.190 | 1.15 | 1.00 | 1.00           | 1.00 | 1.000          | 1.00            | 1.00           | 1.15           | 2.11          | 801.8 | 1,190.3 | 0.44         | 39.4           | 207.0 |
| +D+0.750Lr       |        |                   |       |      | 1.00 | 1.00           | 1.00 | 1.000          | 1.00            | 1.00           | 1.15           |               |       | 0.0     | 0.00         | 0.0            | 0.0   |
| Length = 17.0 ft | 1      | 0.493             | 0.139 | 1.25 | 1.00 | 1.00           | 1.00 | 1.000          | 1.00            | 1.00           | 1.15           | 1.68          | 637.8 | 1,293.8 | 0.35         | 31.3           | 225.0 |
| +D+0.750S        |        |                   |       |      | 1.00 | 1.00           | 1.00 | 1.000          | 1.00            | 1.00           | 1.15           |               |       | 0.0     | 0.00         | 0.0            | 0.0   |

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

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## Wood Beam

Project File: enercalc.ec6

LIC# : KW-06016452, Build:20.24.12.17

CARUSO TURLEY SCOTT

(c) ENERCALC, LLC 1982-2025

**DESCRIPTION:** joist

### Maximum Forces & Stresses for Load Combinations

| Load Combination | Segment Length | Span # | Max Stress Ratios |       |      |      |                |      |                |                 |                |                | Moment Values |                |         | Shear Values |                |       |
|------------------|----------------|--------|-------------------|-------|------|------|----------------|------|----------------|-----------------|----------------|----------------|---------------|----------------|---------|--------------|----------------|-------|
|                  |                |        | M                 | V     | CD   | CM   | C <sub>t</sub> | CLx  | C <sub>F</sub> | C <sub>fu</sub> | C <sub>i</sub> | C <sub>r</sub> | M             | f <sub>b</sub> | F'b     | V            | f <sub>v</sub> | F'v   |
| Length = 17.0 ft | 1              |        | 0.582             | 0.164 | 1.15 | 1.00 | 1.00           | 1.00 | 1.000          | 1.00            | 1.00           | 1.15           | 1.83          | 692.4          | 1,190.3 | 0.38         | 34.0           | 207.0 |
| +0.60D           |                |        |                   |       |      | 1.00 | 1.00           | 1.00 | 1.000          | 1.00            | 1.00           | 1.15           |               |                | 0.0     | 0.00         | 0.0            | 0.0   |
| Length = 17.0 ft | 1              |        | 0.132             | 0.037 | 1.60 | 1.00 | 1.00           | 1.00 | 1.000          | 1.00            | 1.00           | 1.15           | 0.58          | 218.7          | 1,656.0 | 0.12         | 10.7           | 288.0 |

### Overall Maximum Deflections

| Span | Load Combination | Max.<br>"." Defl<br>in Span | Location<br>in Span | Load Combination | Max.<br>"+" Defl<br>in Span | Location<br>in Span |
|------|------------------|-----------------------------|---------------------|------------------|-----------------------------|---------------------|
| 1    | +D+S             | 0.3884                      | 8.562               |                  | 0.0000                      | 0.000               |

### Vertical Reactions

Support notation : Far left is #1

Values in KIPS

| Load Combination                    | Support 1 | Support 2 |
|-------------------------------------|-----------|-----------|
| Max Upward from all Load Conditions | 0.497     | 0.497     |
| Max Upward from Load Combinations   | 0.497     | 0.497     |
| Max Upward from Load Cases          | 0.271     | 0.271     |
| D Only                              | 0.226     | 0.226     |
| +D+Lr                               | 0.452     | 0.452     |
| +D+S                                | 0.497     | 0.497     |
| +D+0.750Lr                          | 0.396     | 0.396     |
| +D+0.750S                           | 0.430     | 0.430     |
| +0.60D                              | 0.136     | 0.136     |
| Lr Only                             | 0.226     | 0.226     |
| S Only                              | 0.271     | 0.271     |

## Wood Beam

Project File: enercalc.ec6

LIC#: KW-06016452, Build:20.24.12.17

CARUSO TURLEY SCOTT

(c) ENERCALC, LLC 1982-2025

**DESCRIPTION:** Bearing header 6'-6"

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : ASCE 7-16

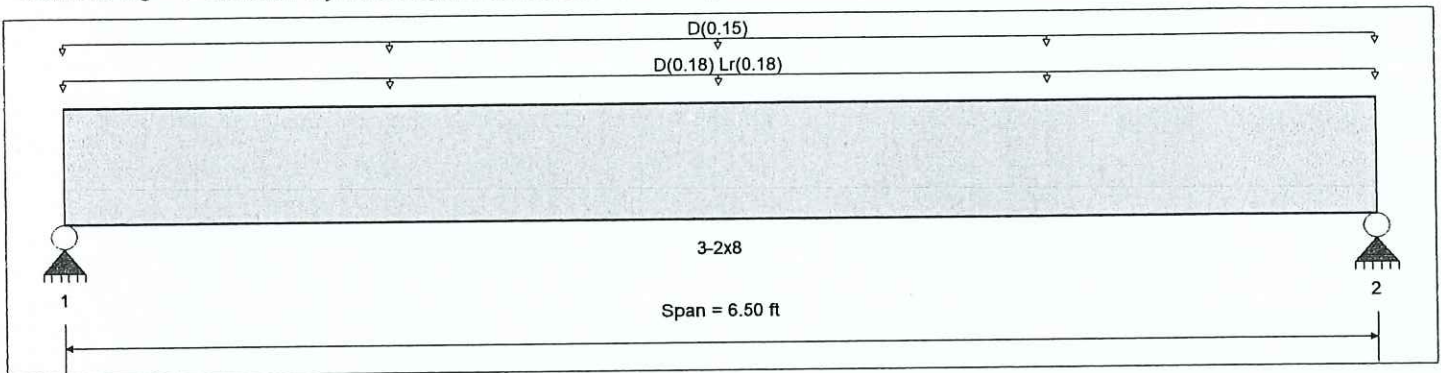
### Material Properties

Analysis Method : Allowable Stress Design  
Load Combination : ASCE 7-16

|           |             |                           |            |
|-----------|-------------|---------------------------|------------|
| Fb +      | 900.0 psi   | E : Modulus of Elasticity |            |
| Fb -      | 900.0 psi   | Ebend- xx                 | 1,600.0ksi |
| Fc - Prll | 1,350.0 psi | Eminbend - xx             | 580.0ksi   |
| Fc - Perp | 625.0 psi   |                           |            |
| Fv        | 180.0 psi   |                           |            |
| Ft        | 575.0 psi   | Density                   | 31.210pcf  |

Wood Species : Douglas Fir-Larch  
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



### Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.020, Lr = 0.020 ksf, Tributary Width = 9.0 ft

Uniform Load : D = 0.150, Tributary Width = 1.0 ft

### DESIGN SUMMARY

**Design OK**

|                                   |          |             |             |                             |   |            |   |
|-----------------------------------|----------|-------------|-------------|-----------------------------|---|------------|---|
| Maximum Bending Stress Ratio      | =        | 0.607       | 1           | Maximum Shear Stress Ratio  | = | 0.277      | 1 |
| Section used for this span        |          | 3-2x8       |             | Section used for this span  |   | 3-2x8      |   |
| fb: Actual                        | =        | 819.88psi   |             | fv: Actual                  | = | 62.30 psi  |   |
| F'b                               | =        | 1,350.00psi |             | F'v                         | = | 225.00 psi |   |
| Load Combination                  |          | +D+Lr       |             | Load Combination            |   | +D+Lr      |   |
| Location of maximum on span       | =        | 3.250ft     |             | Location of maximum on span | = | 5.907 ft   |   |
| Span # where maximum occurs       | =        | Span # 1    |             | Span # where maximum occurs | = | Span # 1   |   |
| Maximum Deflection                |          |             |             |                             |   |            |   |
| Max Downward Transient Deflection | 0.032 in | Ratio =     | 2452 >= 360 | Span: 1 : Lr Only           |   |            |   |
| Max Upward Transient Deflection   | 0 in     | Ratio =     | 0 < 360     | n/a                         |   |            |   |
| Max Downward Total Deflection     | 0.090 in | Ratio =     | 865 >= 180  | Span: 1 : +D+Lr             |   |            |   |
| Max Upward Total Deflection       | 0 in     | Ratio =     | 0 < 180     | n/a                         |   |            |   |

### Maximum Forces & Stresses for Load Combinations

| Load Combination | Segment Length | Span # | Max Stress Ratios |       |      |      |                |      |                |                 |                |                | Moment Values |       |         | Shear Values |      |       |
|------------------|----------------|--------|-------------------|-------|------|------|----------------|------|----------------|-----------------|----------------|----------------|---------------|-------|---------|--------------|------|-------|
|                  |                |        | M                 | V     | CD   | CM   | C <sub>t</sub> | CLx  | C <sub>F</sub> | C <sub>fu</sub> | C <sub>i</sub> | C <sub>r</sub> | M             | fb    | F'b     | V            | fv   | F'v   |
| D Only           |                |        |                   |       |      |      |                |      |                |                 |                |                |               |       | 0.0     |              |      |       |
| Length = 6.50 ft |                | 1      | 0.546             | 0.249 | 0.90 | 1.00 | 1.00           | 1.00 | 1.200          | 1.00            | 1.00           | 1.00           | 1.74          | 530.5 | 972.0   | 0.88         | 40.3 | 162.0 |
| +D+Lr            |                |        |                   |       |      |      |                |      |                |                 |                |                |               |       | 0.0     |              |      |       |
| Length = 6.50 ft |                | 1      | 0.607             | 0.277 | 1.25 | 1.00 | 1.00           | 1.00 | 1.200          | 1.00            | 1.00           | 1.00           | 2.69          | 819.9 | 1,350.0 | 1.36         | 62.3 | 225.0 |
| +D+0.750Lr       |                |        |                   |       |      |      |                |      |                |                 |                |                |               |       | 0.0     |              |      |       |
| Length = 6.50 ft |                | 1      | 0.554             | 0.252 | 1.25 | 1.00 | 1.00           | 1.00 | 1.200          | 1.00            | 1.00           | 1.00           | 2.46          | 747.5 | 1,350.0 | 1.24         | 56.8 | 225.0 |
| +0.60D           |                |        |                   |       |      |      |                |      |                |                 |                |                |               |       | 0.0     |              |      |       |
| Length = 6.50 ft |                | 1      | 0.184             | 0.084 | 1.60 | 1.00 | 1.00           | 1.00 | 1.200          | 1.00            | 1.00           | 1.00           | 1.05          | 318.3 | 1,728.0 | 0.53         | 24.2 | 288.0 |

Project Title:  
Engineer:  
Project ID:  
Project Descr:

**Wood Beam**

Project File: enercalc.ec6

LIC# : KW-06016452, Build:20.24.12.17

CARUSO TURLEY SCOTT

(c) ENERCALC, LLC 1982-2025

**DESCRIPTION:** Bearing header 6'-6"

**Overall Maximum Deflections**

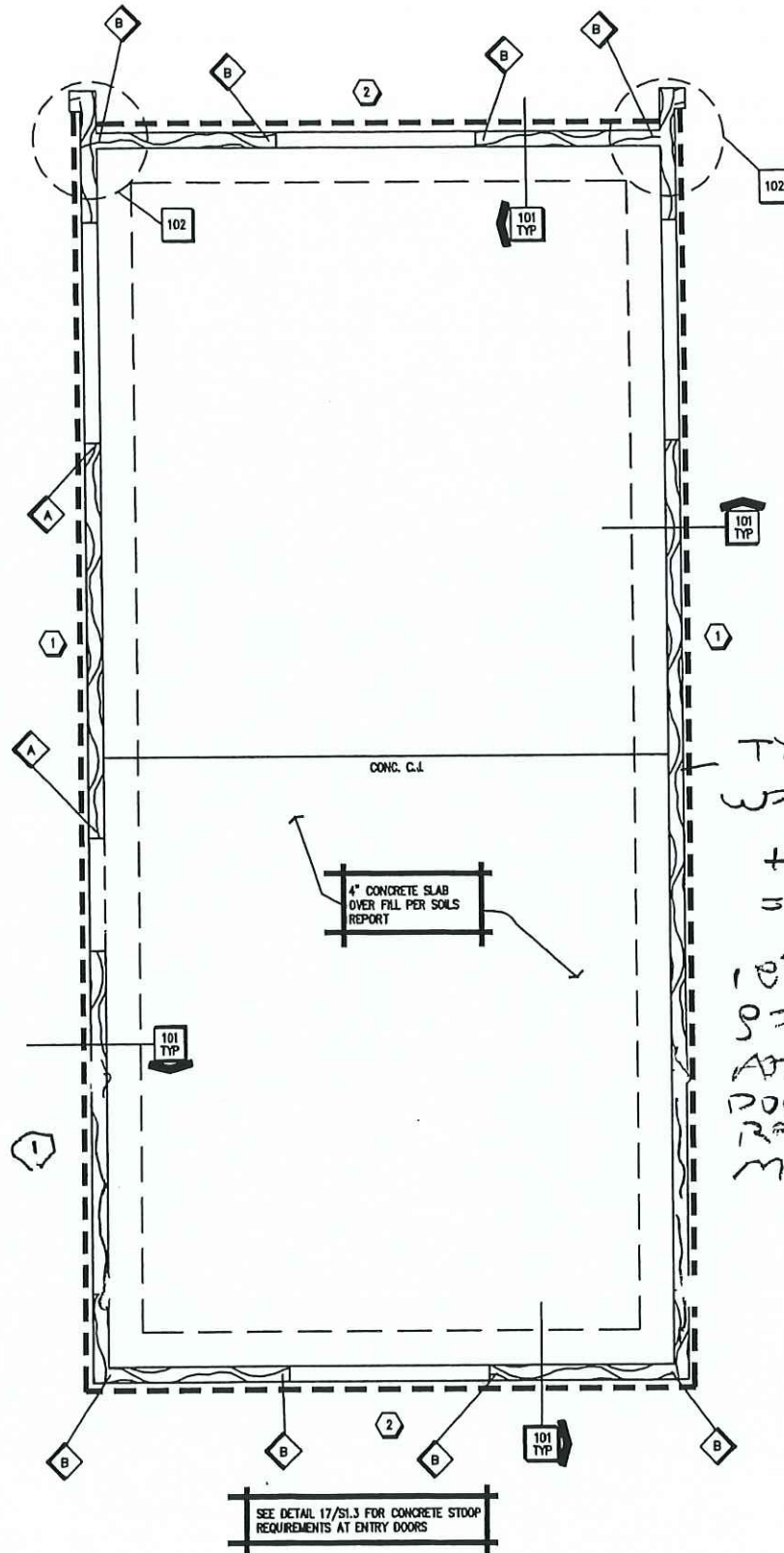
| Span | Load Combination | Max.<br>"-" Defl | Location<br>in Span | Load Combination | Max.<br>"+" Defl | Location<br>in Span |
|------|------------------|------------------|---------------------|------------------|------------------|---------------------|
| 1    | +D+Lr            | 0.0901           | 3.274               |                  | 0.0000           | 0.000               |

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

| Load Combination                    | Support 1 | Support 2 |
|-------------------------------------|-----------|-----------|
| Max Upward from all Load Conditions | 1.658     | 1.658     |
| Max Upward from Load Combinations   | 1.658     | 1.658     |
| Max Upward from Load Cases          | 1.073     | 1.073     |
| D Only                              | 1.073     | 1.073     |
| +D+Lr                               | 1.658     | 1.658     |
| +D+0.750Lr                          | 1.511     | 1.511     |
| +0.60D                              | 0.644     | 0.644     |
| Lr Only                             | 0.585     | 0.585     |



TYP wall FTg.  
 $W = \frac{12}{2} (20 + 20)$   
 $+ 19 (15)$   
 $= 64 \text{ SP.F}$

12" WIDE FEG  
 $8 \times 432 = 3456 \text{ SF}$  ✓ OK  
 ADD 500  
 POUNDS TO  
 RESIST  
 MOMENT

FOUNDATION  
 PLAN

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

## Wood Column

Project File: enercalc.ec6

LIC#: KW-06016452, Build: 20.24.06.04

CARUSO TURLEY SCOTT

(c) ENERCALC INC 1983-2023

DESCRIPTION: Stud

### Code References

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Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16  
 Load Combinations Used : ASCE 7-16

### General Information

|                                       |                         |             |           |                                   |               |
|---------------------------------------|-------------------------|-------------|-----------|-----------------------------------|---------------|
| Analysis Method                       | Allowable Stress Design |             |           | Wood Section Name                 | 2x6           |
| End Fixities                          | Top & Bottom Pinned     |             |           | Wood Grading/Manuf.               | Graded Lumber |
| Overall Column Height                 | 12.66 ft                |             |           | Wood Member Type                  | Sawn          |
| ( Used for non-slender calculations ) |                         |             |           |                                   |               |
| Wood Species                          | Douglas Fir-Larch       |             |           | Exact Width                       | 1.50 in       |
| Wood Grade                            | No.2                    |             |           | Exact Depth                       | 5.50 in       |
| Fb +                                  | 900 psi                 | Fv          | 180 psi   | Area                              | 8.250 in^2    |
| Fb -                                  | 900 psi                 | Ft          | 575 psi   | lx                                | 20.797 in^4   |
| Fc - Prll                             | 1350 psi                | Density     | 31.21 pcf | ly                                | 1.547 in^4    |
| Fc - Perp                             | 625 psi                 |             |           | Allow Stress Modification Factors |               |
| E : Modulus of Elasticity . . .       | x-x Bending             | y-y Bending | Axial     | Cf or Cv for Bending              |               |
|                                       | Basic                   | 1600        | 1600      | 1600 ksi                          | 1.30          |
|                                       | Minimum                 | 580         | 580       |                                   |               |
|                                       |                         |             |           | Cf or Cv for Compression          |               |
|                                       |                         |             |           | 1.10                              |               |
|                                       |                         |             |           | Cf or Cv for Tension              |               |
|                                       |                         |             |           | 1.30                              |               |
|                                       |                         |             |           | Cm : Wet Use Factor               |               |
|                                       |                         |             |           | 1.0                               |               |
|                                       |                         |             |           | Ct : Temperature Fact             |               |
|                                       |                         |             |           | 1.0                               |               |
|                                       |                         |             |           | Cfu : Flat Use Factor             |               |
|                                       |                         |             |           | 1.0                               |               |
|                                       |                         |             |           | Kf : Built-up columns             |               |
|                                       |                         |             |           | 1.0                               |               |
|                                       |                         |             |           | Use Cr : Repetitive ?             |               |
|                                       |                         |             |           | No                                |               |
| Column Buckling Condition:            |                         |             |           |                                   |               |

Column Buckling Condition:

ABOUT X-X Axis: Lux = 12.66 ft, Kx = 1.0

Fully braced against buckling ABOUT Y-Y Axis

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

### Applied Loads

Column self weight included : 22.637 lbs \* Dead Load Factor

AXIAL LOADS ...

Axial Load at 12.660 ft, Yecc = 5.0 in, D = 0.240, Lr = 0.240 k

BENDING LOADS ...

Lat. Uniform Load creating Mx-x, W = 0.0710 k/ft

$$\frac{1.8}{2} (1.33)(20)$$

$$\frac{71}{1.33} = 53.37 \text{ k} - \text{CONSERVATIVE}$$

### DESIGN SUMMARY

#### Bending & Shear Check Results

|                                        |                           |
|----------------------------------------|---------------------------|
| PASS Max. Axial+Bending Stress Ratio = | 0.7282 : 1                |
| Load Combination                       | +0.60D+0.60W              |
| Governing NDS Formula                  | Comp + Mxx, NDS Eq. 3.9-3 |
| Location of max. above base            | 6.203 ft                  |
| At maximum location values are .       |                           |
| Applied Axial                          | 0.1576 k                  |
| Applied Mx                             | 0.8237 k-ft               |
| Applied My                             | 0.0 k-ft                  |
| Fc : Allowable                         | 586.44 psi                |

#### Maximum SERVICE Lateral Load Reactions . .

|               |          |                  |          |
|---------------|----------|------------------|----------|
| Top along Y-Y | 0.4494 k | Bottom along Y-Y | 0.4494 k |
| Top along X-X | 0.0 k    | Bottom along X-X | 0.0 k    |

#### Maximum SERVICE Load Lateral Deflections ...

|                               |          |    |          |            |
|-------------------------------|----------|----|----------|------------|
| Along Y-Y                     | 1.247 in | at | 6.372 ft | above base |
| for load combination : W Only |          |    |          |            |
| Along X-X                     | 0.0 in   | at | 0.0 ft   | above base |
| for load combination : n/a    |          |    |          |            |

#### Other Factors used to calculate allowable stresses ...

Bending Compression Tension

|                                   |            |
|-----------------------------------|------------|
| PASS Maximum Shear Stress Ratio = | 0.1752 : 1 |
| Load Combination                  | +D+0.60W   |
| Location of max. above base       | 12.660 ft  |
| Applied Design Shear              | 75.697 psi |
| Allowable Shear                   | 288.0 psi  |

### Load Combination Results

| Load Combination  | C <sub>D</sub> | C <sub>P</sub> | Maximum Axial + Bending Stress Ratios |        |           | Maximum Shear Ratios |        |           |
|-------------------|----------------|----------------|---------------------------------------|--------|-----------|----------------------|--------|-----------|
|                   |                |                | Stress Ratio                          | Status | Location  | Stress Ratio         | Status | Location  |
| D Only            | 0.900          | 0.410          | 0.1619                                | PASS   | 12.575 ft | 0.008865             | PASS   | 12.660 ft |
| +D+Lr             | 1.250          | 0.309          | 0.2518                                | PASS   | 12.575 ft | 0.01277              | PASS   | 12.660 ft |
| +D+0.750Lr        | 1.250          | 0.309          | 0.2165                                | PASS   | 12.575 ft | 0.01117              | PASS   | 12.660 ft |
| +D+0.60W          | 1.600          | 0.247          | 0.7281                                | PASS   | 6.118 ft  | 0.1752               | PASS   | 12.660 ft |
| +D+0.750Lr+0.450W | 1.600          | 0.247          | 0.5285                                | PASS   | 5.863 ft  | 0.1364               | PASS   | 12.660 ft |
| +D+0.450W         | 1.600          | 0.247          | 0.5359                                | PASS   | 6.118 ft  | 0.1327               | PASS   | 12.660 ft |
| +0.60D+0.60W      | 1.600          | 0.247          | 0.7282                                | PASS   | 6.203 ft  | 0.1732               | PASS   | 12.660 ft |
| +0.60D            | 1.600          | 0.247          | 0.05367                               | PASS   | 12.575 ft | 0.002992             | PASS   | 12.660 ft |

# Wood Column

Project File: enercalc.ec6

LIC# : KW-06016452, Build:20.24.06.04

CARUSO TURLEY SCOTT

(c) ENERCALC INC 1983-2023

DESCRIPTION: Stud

## Maximum Reactions

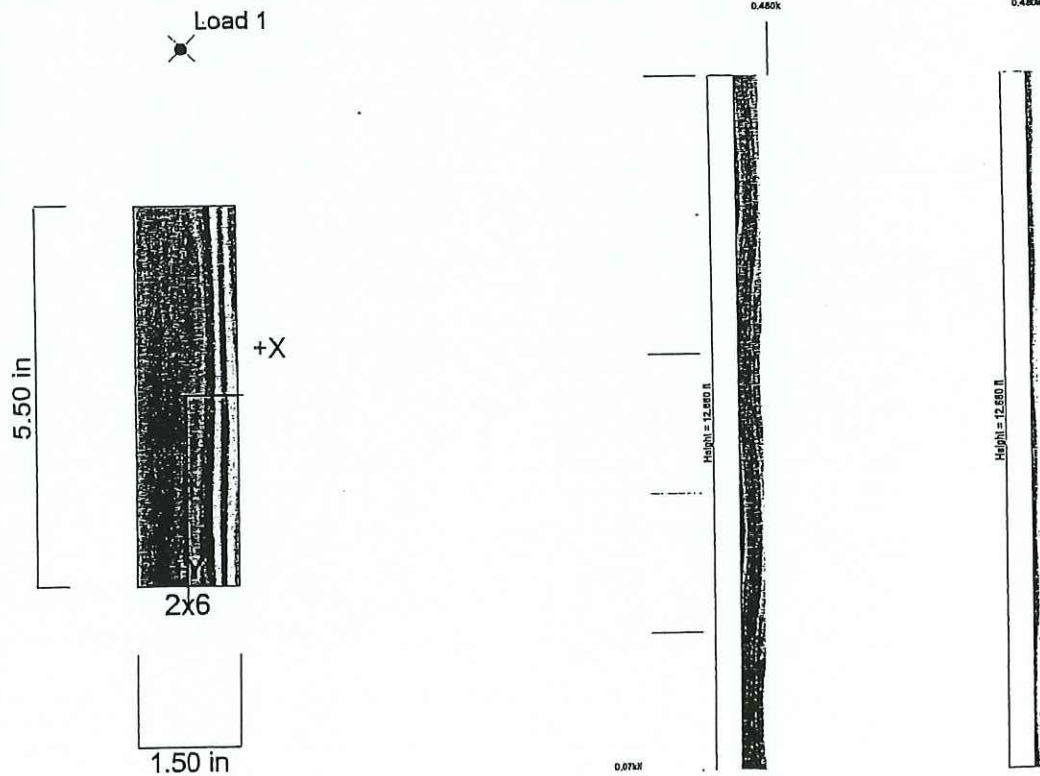
Note: Only non-zero reactions are listed.

| Load Combination  | X-X Axis Reaction |       | k | Y-Y Axis Reaction |       | Axial Reaction | My - End Moments |       | k-ft | Mx - End Moments |       |
|-------------------|-------------------|-------|---|-------------------|-------|----------------|------------------|-------|------|------------------|-------|
|                   | @ Base            | @ Top |   | @ Base            | @ Top | @ Base         | @ Base           | @ Top |      | @ Base           | @ Top |
| D Only            |                   |       |   | -0.008            | 0.008 | 0.263          |                  |       |      |                  |       |
| +D+Lr             |                   |       |   | -0.016            | 0.016 | 0.503          |                  |       |      |                  |       |
| +D+0.750Lr        |                   |       |   | -0.014            | 0.014 | 0.443          |                  |       |      |                  |       |
| +D+0.60W          |                   |       |   | 0.262             | 0.278 | 0.263          |                  |       |      |                  |       |
| +D+0.750Lr+0.450W |                   |       |   | 0.188             | 0.216 | 0.443          |                  |       |      |                  |       |
| +D+0.450W         |                   |       |   | 0.194             | 0.210 | 0.263          |                  |       |      |                  |       |
| +0.60D+0.60W      |                   |       |   | 0.265             | 0.274 | 0.158          |                  |       |      |                  |       |
| +0.60D            |                   |       |   | -0.005            | 0.005 | 0.158          |                  |       |      |                  |       |
| Lr Only           |                   |       |   | -0.008            | 0.008 | 0.240          |                  |       |      |                  |       |
| W Only            |                   |       |   | 0.449             | 0.449 |                |                  |       |      |                  |       |

## Maximum Deflections for Load Combinations

| Load Combination  | Max. X-X Deflection |         | Distance | Max. Y-Y Deflection |          | Distance |
|-------------------|---------------------|---------|----------|---------------------|----------|----------|
|                   |                     |         |          |                     |          |          |
| D Only            | 0.0000 in           | 0.000ft |          | -0.054 in           | 7.392 ft |          |
| +D+Lr             | 0.0000 in           | 0.000ft |          | -0.108 in           | 7.392 ft |          |
| +D+0.750Lr        | 0.0000 in           | 0.000ft |          | -0.094 in           | 7.392 ft |          |
| +D+0.60W          | 0.0000 in           | 0.000ft |          | 0.696 in            | 6.288 ft |          |
| +D+0.750Lr+0.450W | 0.0000 in           | 0.000ft |          | 0.470 in            | 6.203 ft |          |
| +D+0.450W         | 0.0000 in           | 0.000ft |          | 0.509 in            | 6.288 ft |          |
| +0.60D+0.60W      | 0.0000 in           | 0.000ft |          | 0.716 in            | 6.372 ft |          |
| +0.60D            | 0.0000 in           | 0.000ft |          | -0.032 in           | 7.392 ft |          |
| Lr Only           | 0.0000 in           | 0.000ft |          | -0.054 in           | 7.392 ft |          |
| W Only            | 0.0000 in           | 0.000ft |          | 1.247 in            | 6.372 ft |          |

## Sketches





# CARUSO TURLEY SCOTT

structural engineers

1215 W. Rio Salado Parkway, Suite 200

Tempe, AZ 85281

480.774.1700

www.ctsaz.com

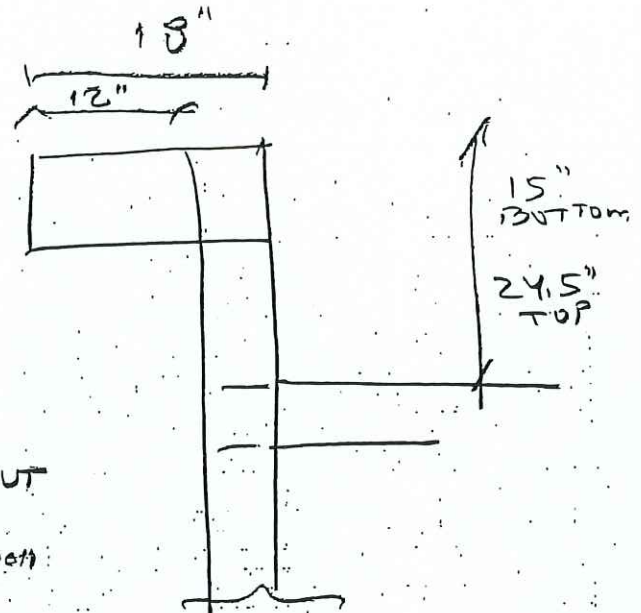
Job Name \_\_\_\_\_

Job No. 25-0235 Sheet No. 20

By RS Date 3-25

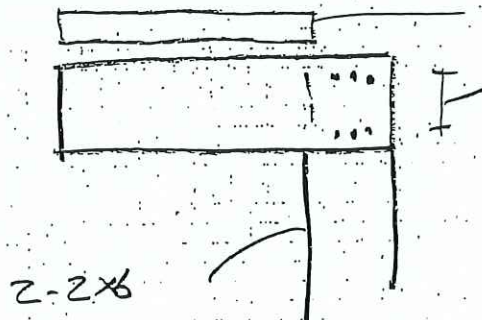
POPOUT AT REAR  
WF 18.25'

WIND CEC  
ZONE 5  
TAF 20/12  
SS 39.1 PSF UCL



USE (6) 2x6 IN TOP OUT  
+ (3) 2x8 IN RETURN WALL

TOP TRAIL RETURN WALL



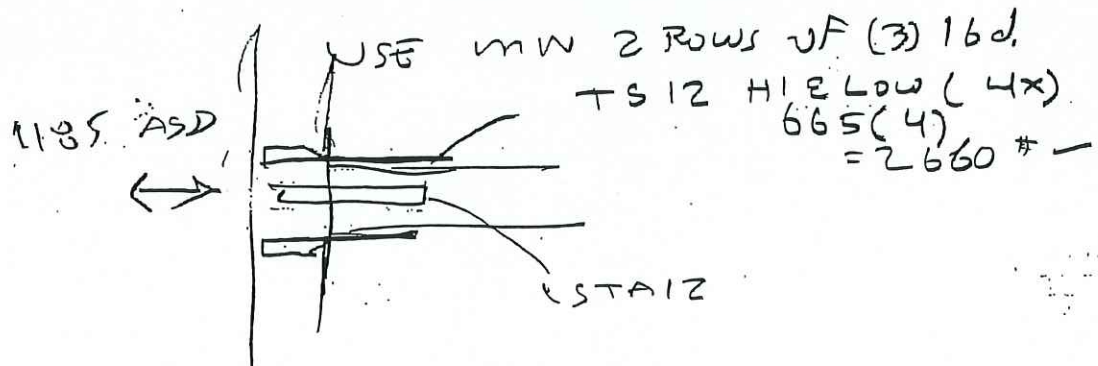
$$W = 39.1 (18.25) / 2 = 357 \text{ PLF}$$

$$M = 357 (1)^2 / 2 = 180' \#$$
$$= 2141' \#$$

$$d = 5''$$

$$V = \frac{2141}{5} = 428' \#$$
$$\times \frac{.6}{2.57} = 100' \#$$

$$16d \quad V_o = 168' \# \quad N_{rs} = 2$$



## Wood Beam

Project File: enercalc.ec6

LIC#: KW-06016452, Build: 20.24.06.04

CARUSO TURLEY SCOTT

(c) ENERCALC INC 1983-2023

DESCRIPTION: Popout stud

### CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : ASCE 7-16

### Material Properties

Analysis Method : Allowable Stress Design  
 Load Combination : ASCE 7-16

Fb + 900 psi  
 Fb - 900 psi  
 Fc - Prll 1350 psi  
 Fc - Perp 625 psi  
 Fv 180 psi  
 Ft 575 psi

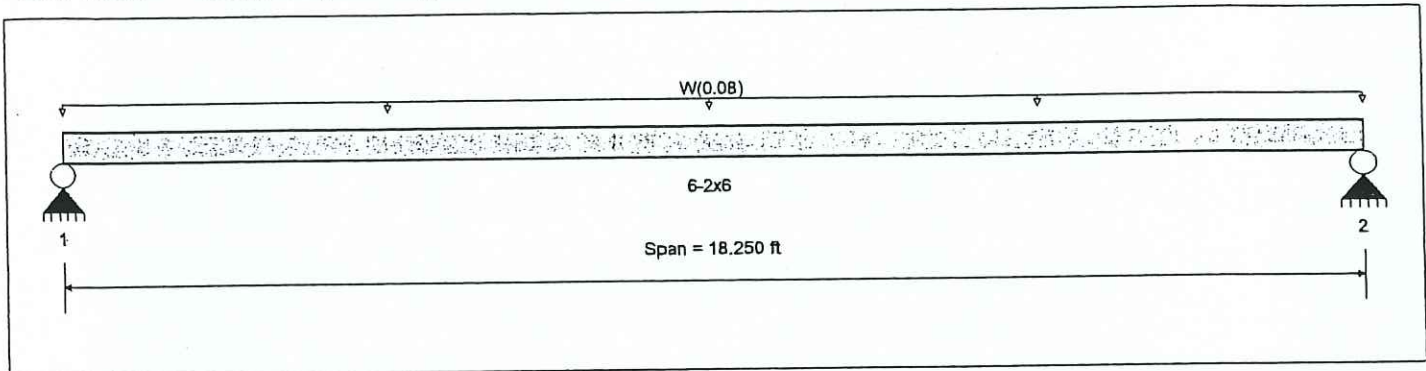
E : Modulus of Elasticity

Ebend- xx 1600 ksi  
 Eminbend - xx 580 ksi

Wood Species : Douglas Fir-Larch  
 Wood Grade : No.2

Density 31.21 pcf  
 Repetitive Member Stress Increase

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



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

### Applied Loads

Beam self weight NOT internally calculated and added  
 Uniform Load : W = 0.080 , Tributary Width = 1.0 ft

### DESIGN SUMMARY

Design OK

|                                   |   |             |                    |                             |   |            |     |
|-----------------------------------|---|-------------|--------------------|-----------------------------|---|------------|-----|
| Maximum Bending Stress Ratio      | = | 0.245       | 1                  | Maximum Shear Stress Ratio  | = | 0.044      | : 1 |
| Section used for this span        |   | 6-2x6       |                    | Section used for this span  |   | 6-2x6      |     |
| fb: Actual                        | = | 528.50psi   |                    | fv: Actual                  | = | 12.69 psi  |     |
| F'b                               | = | 2,152.80psi |                    | F'v                         | = | 288.00 psi |     |
| Load Combination                  |   | +0.60W      |                    | Load Combination            |   | +0.60W     |     |
| Location of maximum on span       | = | 9.125ft     |                    | Location of maximum on span | = | 0.000 ft   |     |
| Span # where maximum occurs       | = | Span # 1    |                    | Span # where maximum occurs | = | Span # 1   |     |
| Maximum Deflection                |   |             |                    |                             |   |            |     |
| Max Downward Transient Deflection |   | 1.006 in    | Ratio = 0 >= 180   | Span: 1 : W Only            |   |            |     |
| Max Upward Transient Deflection   |   | 0 in        | Ratio = 217 < 180  | n/a                         |   |            |     |
| Max Downward Total Deflection     |   | 0.604 in    | Ratio = 362 >= 240 | Span: 1 : +0.60W            |   |            |     |
| Max Upward Total Deflection       |   | 0 in        | Ratio = 0 < 240    | n/a                         |   |            |     |

### Maximum Forces & Stresses for Load Combinations

| Load Combination   | Segment Length | Span # | Max Stress Ratios |      |      |      |                |      |                |                 |                |                | Moment Values |       |         | Shear Values |      |       |
|--------------------|----------------|--------|-------------------|------|------|------|----------------|------|----------------|-----------------|----------------|----------------|---------------|-------|---------|--------------|------|-------|
|                    |                |        | M                 | V    | CD   | CM   | C <sub>t</sub> | CLx  | C <sub>F</sub> | C <sub>fu</sub> | C <sub>i</sub> | C <sub>r</sub> | M             | fb    | F'b     | V            | fv   | F'v   |
|                    |                |        |                   |      |      |      |                |      |                |                 |                |                |               |       | 0.0     | 0.00         | 0.0  | 0.0   |
| Length = 18.250 ft | 1              |        |                   |      | 0.90 | 1.00 | 1.00           | 1.00 | 1.300          | 1.00            | 1.00           | 1.15           |               |       | 1,211.0 | 0.00         | 0.0  | 162.0 |
| +0.60W             |                |        |                   |      |      | 1.00 | 1.00           | 1.00 | 1.300          | 1.00            | 1.00           | 1.15           |               |       | 0.0     | 0.00         | 0.0  | 0.0   |
| Length = 18.250 ft | 1              | 0.245  | 0.044             | 1.60 | 1.00 | 1.00 | 1.00           | 1.00 | 1.300          | 1.00            | 1.00           | 1.15           | 2.00          | 528.5 | 2,152.8 | 0.42         | 12.7 | 288.0 |
| +0.450W            |                |        |                   |      |      | 1.00 | 1.00           | 1.00 | 1.300          | 1.00            | 1.00           | 1.15           |               |       | 0.0     | 0.00         | 0.0  | 0.0   |
| Length = 18.250 ft | 1              | 0.184  | 0.033             | 1.60 | 1.00 | 1.00 | 1.00           | 1.00 | 1.300          | 1.00            | 1.00           | 1.15           | 1.50          | 396.4 | 2,152.8 | 0.31         | 9.5  | 288.0 |

### Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|------------------|------|---------------|------------------|------------------|---------------|------------------|
| W Only           | 1    | 1.0060        | 9.192            |                  | 0.0000        | 0.000            |

## Wood Beam

Project File: enercalc.ec6

LIC# : KW-06016452, Build:20.24.06.04

CARUSO TURLEY SCOTT

(c) ENERCALC INC 1983-2023

DESCRIPTION: Popout stud

### Vertical Reactions

Support notation : Far left is #1

Values in KIPS

| Load Combination                    | Support 1 | Support 2 |
|-------------------------------------|-----------|-----------|
| Max Upward from all Load Conditions | 0.730     | 0.730     |
| Max Upward from Load Combinations   | 0.438     | 0.438     |
| Max Upward from Load Cases          | 0.730     | 0.730     |
| +0.60W                              | 0.438     | 0.438     |
| +0.450W                             | 0.329     | 0.329     |
| W Only                              | 0.730     | 0.730     |

## Wood Beam

Project File: enercalc.ec6

LIC#: KW-06016452, Build:20.24.06.04

CARUSO TURLEY SCOTT

(c) ENERCALC INC 1983-2023

DESCRIPTION: Popout stud 2x8

### CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16  
 Load Combination Set : ASCE 7-16

### Material Properties

Analysis Method : Allowable Stress Design  
 Load Combination : ASCE 7-16

Fb + 900.0 psi  
 Fb - 900.0 psi  
 Fc - Prll 1,350.0 psi  
 Fc - Perp 625.0 psi  
 Fv 180.0 psi  
 Ft 575.0 psi

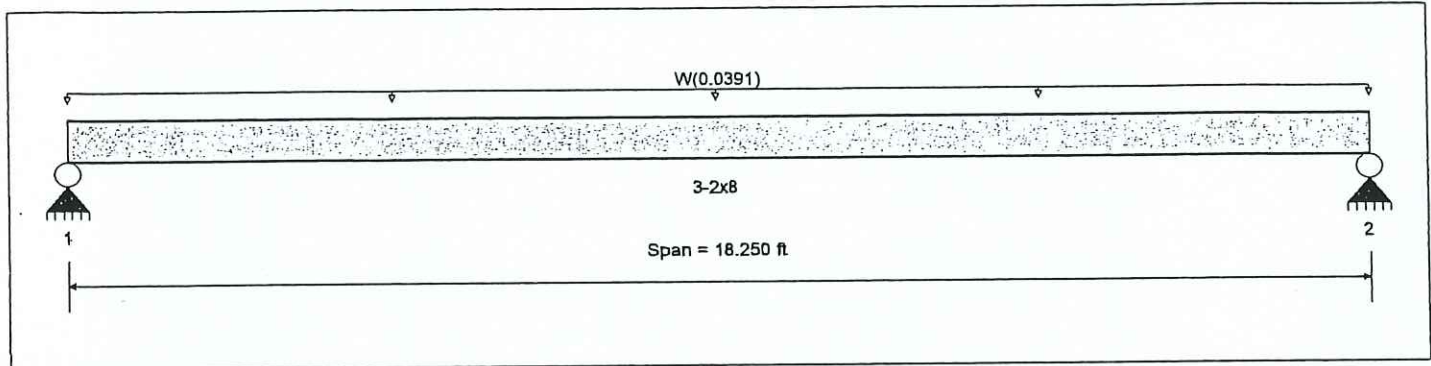
E : Modulus of Elasticity

Ebend-xx 1,600.0ksi  
 Eminbend-xx 580.0ksi

Wood Species : Douglas Fir-Larch  
 Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Density 31.210pcf  
 Repetitive Member Stress Increase



### Applied Loads

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

Beam self weight NOT internally calculated and added  
 Uniform Load : W = 0.03910 , Tributary Width = 1.0 ft

### DESIGN SUMMARY

Design OK

|                                   |          |              |            |                             |   |            |     |
|-----------------------------------|----------|--------------|------------|-----------------------------|---|------------|-----|
| Maximum Bending Stress Ratio      | =        | 0.150        | 1          | Maximum Shear Stress Ratio  | = | 0.032      | : 1 |
| Section used for this span        |          | 3-2x8        |            | Section used for this span  |   | 3-2x8      |     |
| fb: Actual                        | =        | 297.31 psi   |            | fv: Actual                  | = | 9.20 psi   |     |
| F'b                               | =        | 1,987.20 psi |            | F'v                         | = | 288.00 psi |     |
| Load Combination                  |          | +0.60W       |            | Load Combination            |   | +0.60W     |     |
| Location of maximum on span       | =        | 9.125 ft     |            | Location of maximum on span | = | 0.000 ft   |     |
| Span # where maximum occurs       | =        | Span # 1     |            | Span # where maximum occurs | = | Span # 1   |     |
| Maximum Deflection                |          |              |            |                             |   |            |     |
| Max Downward Transient Deflection | 0.429 in | Ratio =      | 0 >= 216   | Span: 1 : W Only            |   |            |     |
| Max Upward Transient Deflection   | 0 in     | Ratio =      | 510 < 216  | n/a                         |   |            |     |
| Max Downward Total Deflection     | 0.258 in | Ratio =      | 850 >= 360 | Span: 1 : +0.60W            |   |            |     |
| Max Upward Total Deflection       | 0 in     | Ratio =      | 0 < 360    | n/a                         |   |            |     |

### Maximum Forces & Stresses for Load Combinations

| Load Combination | Segment Length     | Span # | Max Stress Ratios |       |      |      |                |      |                |                 |                |                | Moment Values |       |         | Shear Values |     |       |
|------------------|--------------------|--------|-------------------|-------|------|------|----------------|------|----------------|-----------------|----------------|----------------|---------------|-------|---------|--------------|-----|-------|
|                  |                    |        | M                 | V     | CD   | CM   | C <sub>t</sub> | CLx  | C <sub>F</sub> | C <sub>fu</sub> | C <sub>i</sub> | C <sub>r</sub> | M             | fb    | F'b     | V            | fv  | F'v   |
|                  | Length = 18.250 ft | 1      |                   |       | 0.90 | 1.00 | 1.00           | 1.00 | 1.200          | 1.00            | 1.00           | 1.15           |               |       | 0.0     | 0.00         | 0.0 | 0.0   |
| +0.60W           |                    |        |                   |       |      |      |                |      |                |                 |                |                |               |       | 1,117.8 | 0.00         | 0.0 | 162.0 |
|                  | Length = 18.250 ft | 1      | 0.150             | 0.032 | 1.60 | 1.00 | 1.00           | 1.00 | 1.200          | 1.00            | 1.00           | 1.15           | 0.98          | 297.3 | 1,987.2 | 0.20         | 9.2 | 288.0 |
| +0.450W          |                    |        |                   |       |      |      |                |      |                |                 |                |                |               |       | 0.0     | 0.00         | 0.0 | 0.0   |
|                  | Length = 18.250 ft | 1      | 0.112             | 0.024 | 1.60 | 1.00 | 1.00           | 1.00 | 1.200          | 1.00            | 1.00           | 1.15           | 0.73          | 223.0 | 1,987.2 | 0.15         | 6.9 | 288.0 |

### Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|------------------|------|---------------|------------------|------------------|---------------|------------------|
| W Only           | 1    | 0.4293        | 9.192            |                  | 0.0000        | 0.000            |

Project Title:  
Engineer:  
Project ID:  
Project Descr:

24

## Wood Beam

Project File: enercalc.ec6

LIC# : KW-06016452, Build:20.24.06.04

CARUSO TURLEY SCOTT

(c) ENERCALC INC 1983-2023

**DESCRIPTION:** Popout stud 2x8

### Vertical Reactions

Support notation : Far left is #1

Values in KIPS

| Load Combination                    | Support 1 | Support 2 |
|-------------------------------------|-----------|-----------|
| Max Upward from all Load Conditions | 0.357     | 0.357     |
| Max Upward from Load Combinations   | 0.214     | 0.214     |
| Max Upward from Load Cases          | 0.357     | 0.357     |
| +0.60W                              | 0.214     | 0.214     |
| +0.450W                             | 0.161     | 0.161     |
| W Only                              | 0.357     | 0.357     |

## Wood Beam

Project File: enercalc.ec6

LIC#: KW-06016452, Build:20.24.06.04

CARUSO TURLEY SCOTT

(c) ENERCALC INC 1983-2023

**DESCRIPTION:** Popout stud top track

### CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16  
 Load Combination Set : ASCE 7-16

### Material Properties

Analysis Method : Allowable Stress Design  
 Load Combination : ASCE 7-16

Wood Species : Douglas Fir-Larch  
 Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 900.0 psi  
 Fb - 900.0 psi  
 Fc - Prll 1,350.0 psi  
 Fc - Perp 625.0 psi  
 Fv 180.0 psi  
 Ft 575.0 psi

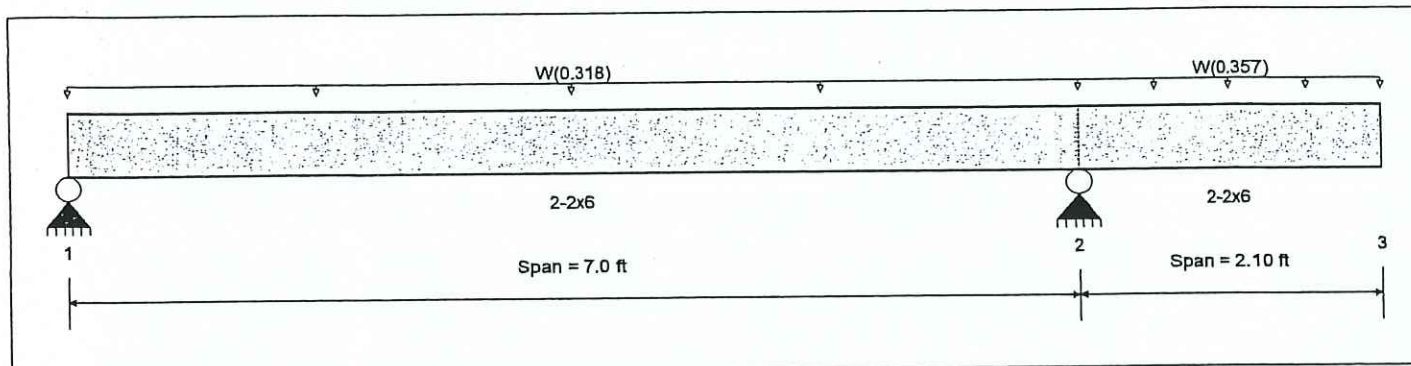
E : Modulus of Elasticity

Ebend-xx 1,600.0 ksi

Eminbend-xx 580.0 ksi

Density 31.210 pcf

Repetitive Member Stress Increase



### Applied Loads

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

Beam self weight NOT internally calculated and added

Load for Span Number 1

Uniform Load : W = 0.3180 , Tributary Width = 1.0 ft

Load for Span Number 2

Uniform Load : W = 0.3570 , Tributary Width = 1.0 ft

### DESIGN SUMMARY

Design OK

|                                   |   |              |                    |                             |   |            |     |
|-----------------------------------|---|--------------|--------------------|-----------------------------|---|------------|-----|
| Maximum Bending Stress Ratio      | = | 0.348        | 1                  | Maximum Shear Stress Ratio  | = | 0.206      | : 1 |
| Section used for this span        |   | 2-2x6        |                    | Section used for this span  |   | 2-2x6      |     |
| fb: Actual                        | = | 749.27 psi   |                    | fv: Actual                  | = | 59.38 psi  |     |
| F'b                               | = | 2,152.80 psi |                    | F'v                         | = | 288.00 psi |     |
| Load Combination                  |   | +0.60W       |                    | Load Combination            |   | +0.60W     |     |
| Location of maximum on span       | = | 3.128 ft     |                    | Location of maximum on span | = | 6.570 ft   |     |
| Span # where maximum occurs       | = | Span # 1     |                    | Span # where maximum occurs | = | Span # 1   |     |
| Maximum Deflection                |   |              |                    |                             |   |            |     |
| Max Downward Transient Deflection |   | 0.198 in     | Ratio = 402 >= 240 | Span: 1 : W Only            |   |            |     |
| Max Upward Transient Deflection   |   | -0.125 in    | Ratio = 424 >= 240 | Span: 2 : W Only            |   |            |     |
| Max Downward Total Deflection     |   | 0.119 in     | Ratio = 707 >= 240 | Span: 1 : +0.60W            |   |            |     |
| Max Upward Total Deflection       |   | -0.075 in    | Ratio = 670 >= 240 | Span: 2 : +0.60W            |   |            |     |

### Maximum Forces & Stresses for Load Combinations

| Maximum Forces & Stresses for Load Combinations |                  |                   |       |       |      |      |                |      |                |                 |                |                |      |       |              |      |      |       |
|-------------------------------------------------|------------------|-------------------|-------|-------|------|------|----------------|------|----------------|-----------------|----------------|----------------|------|-------|--------------|------|------|-------|
| Load Combination                                |                  | Max Stress Ratios |       |       |      |      |                |      |                |                 |                | Moment Values  |      |       | Shear Values |      |      |       |
| Segment                                         | Length           | Span #            | M     | V     | CD   | CM   | C <sub>t</sub> | CLx  | C <sub>F</sub> | C <sub>fu</sub> | C <sub>i</sub> | C <sub>r</sub> | M    | fb    | F'b          | V    | fv   | F'v   |
|                                                 |                  |                   |       |       |      |      |                |      |                |                 |                |                |      |       | 0.0          | 0.00 | 0.0  | 0.0   |
|                                                 | Length = 7.0 ft  | 1                 |       |       | 0.90 | 1.00 | 1.00           | 1.00 | 1.300          | 1.00            | 1.00           | 1.15           |      |       | 1,211.0      | 0.00 | 0.0  | 162.0 |
|                                                 | Length = 2.10 ft | 2                 |       |       | 0.90 | 1.00 | 1.00           | 1.00 | 1.300          | 1.00            | 1.00           | 1.15           |      |       | 1,211.0      | 0.00 | 0.0  | 162.0 |
| +0.60W                                          |                  |                   |       |       |      | 1.00 | 1.00           | 1.00 | 1.300          | 1.00            | 1.00           | 1.15           |      |       | 0.0          | 0.00 | 0.0  | 0.0   |
|                                                 | Length = 7.0 ft  | 1                 | 0.348 | 0.206 | 1.60 | 1.00 | 1.00           | 1.00 | 1.300          | 1.00            | 1.00           | 1.15           | 0.94 | 749.3 | 2,152.8      | 0.65 | 59.4 | 288.0 |
|                                                 | Length = 2.10 ft | 2                 | 0.174 | 0.206 | 1.60 | 1.00 | 1.00           | 1.00 | 1.300          | 1.00            | 1.00           | 1.15           | 0.47 | 374.7 | 2,152.8      | 0.35 | 59.4 | 288.0 |
| +0.450W                                         |                  |                   |       |       |      | 1.00 | 1.00           | 1.00 | 1.300          | 1.00            | 1.00           | 1.15           |      |       | 0.0          | 0.00 | 0.0  | 0.0   |

## Wood Beam

Project File: enercalc.ec6

LIC#: KW-06016452, Build:20.24.06.04

CARUSO TURLEY SCOTT

(c) ENERCALC INC 1983-2023

DESCRIPTION: Popout stud top track

### Maximum Forces & Stresses for Load Combinations

| Load Combination | Segment Length | Span # | Max Stress Ratios |       |      |      |                |      |                |                 |                |                | Moment Values |       |         | Shear Values |      |       |
|------------------|----------------|--------|-------------------|-------|------|------|----------------|------|----------------|-----------------|----------------|----------------|---------------|-------|---------|--------------|------|-------|
|                  |                |        | M                 | V     | CD   | CM   | C <sub>t</sub> | CLx  | C <sub>F</sub> | C <sub>fu</sub> | C <sub>i</sub> | C <sub>r</sub> | M             | fb    | F'b     | V            | fv   | F'v   |
| Length = 7.0 ft  | 1              |        | 0.261             | 0.155 | 1.60 | 1.00 | 1.00           | 1.00 | 1.300          | 1.00            | 1.00           | 1.15           | 0.71          | 562.0 | 2,152.8 | 0.49         | 44.5 | 288.0 |
| Length = 2.10 ft | 2              |        | 0.131             | 0.155 | 1.60 | 1.00 | 1.00           | 1.00 | 1.300          | 1.00            | 1.00           | 1.15           | 0.35          | 281.0 | 2,152.8 | 0.26         | 44.5 | 288.0 |

### Overall Maximum Deflections

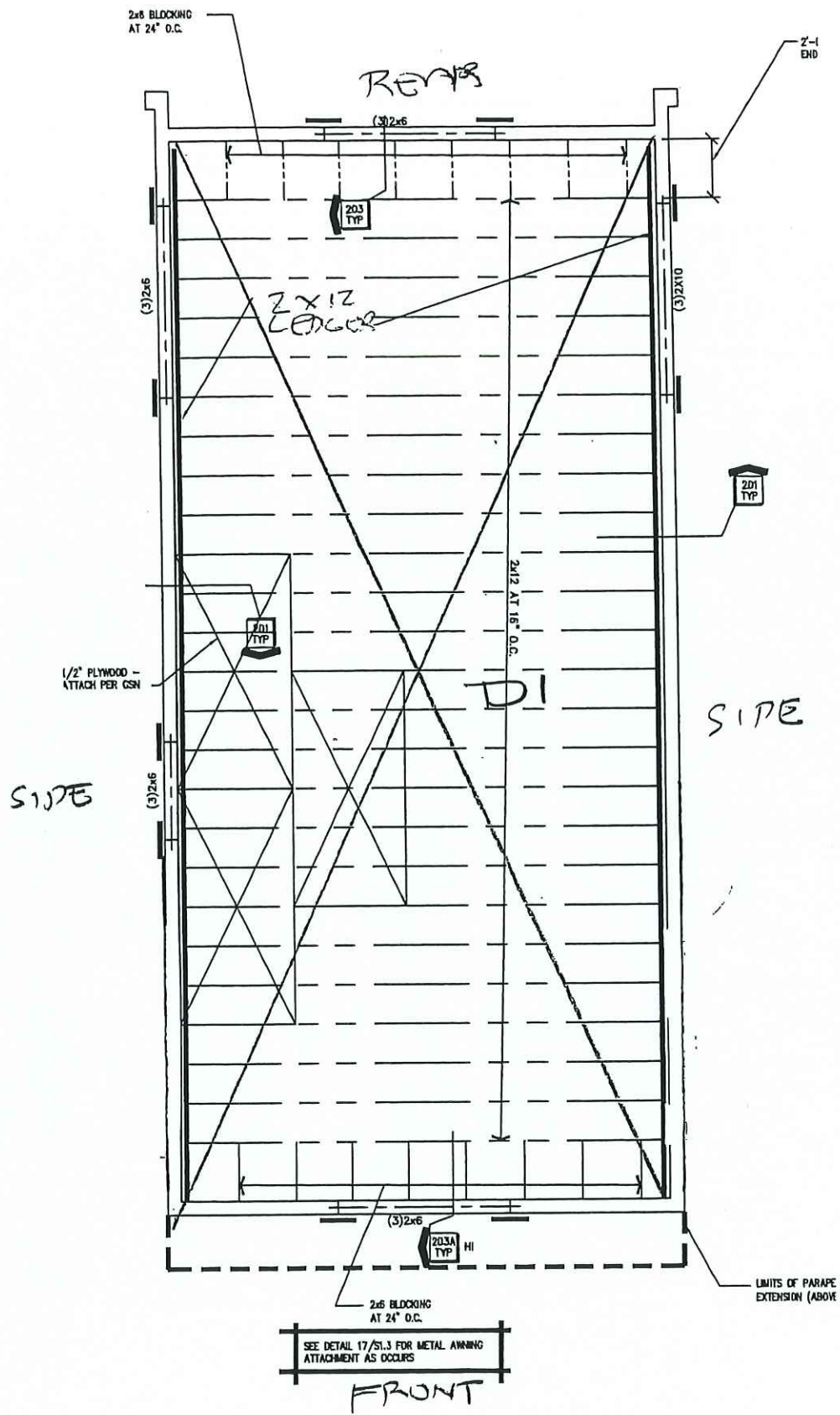
| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|------------------|------|---------------|------------------|------------------|---------------|------------------|
| W Only           | 1    | 0.1978        | 3.363            |                  | 0.0000        | 0.000            |
|                  | 2    | 0.0000        | 3.363            | W Only           | -0.1252       | 2.100            |

Support notation : Far left is #1

Values in KIPS

### Vertical Reactions

| Load Combination                    | Support 1 | Support 2 | Support 3 |
|-------------------------------------|-----------|-----------|-----------|
| Max Upward from all Load Conditions | 1.001     | 1.975     |           |
| Max Upward from Load Combinations   | 0.600     | 1.185     |           |
| Max Upward from Load Cases          | 1.001     | 1.975     |           |
| +0.60W                              | 0.600     | 1.185     |           |
| +0.450W                             | 0.450     | 0.889     |           |
| W Only                              | 1.001     | 1.975     |           |



LATERAL ANALYSIS



# CARUSO TURLEY SCOTT

structural engineers

1215 W. Rio Salado Parkway, Suite 200

Tempe, AZ 85281

480.774.1700

www.ctsaz.com

Job Name \_\_\_\_\_

Job No. \_\_\_\_\_

By \_\_\_\_\_

Sheet No. \_\_\_\_\_

Date \_\_\_\_\_

25-0235

28

AND

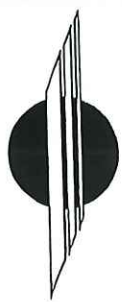
3-25

LATERAL LOADS ARE RESISTED  
BY A FLEXIBLE PLYWOOD DIAPHRAGM  
W/ PLYWOOD SHEAR WALLS.

WIND GOVERNS BY INSPECTION

$h = 13' + 6'$  PERAPET - WORST CASE

$$W = 705 \text{ PLF ULT} \\ \times 1.6 \\ \hline 423 \text{ PLF ASD}$$



# CARUSO TURLEY SCOTT

structural engineers

1215 W. Rio Salado Parkway, Suite 200  
Tempe, AZ 85281  
480.774.1700  
www.ctsaz.com

Job Name \_\_\_\_\_

Job No. 25-0235 Sheet No. 29

By RAD Date 3-25

DIAPHRAGM 37'x18'

$$V = 423 \left( \frac{37}{2} \right) = 7826^{\#}$$

$$v = \frac{7826}{18} = 434 \text{ pif}$$

19/32" plywood w/ 10d @ 6" oc AT  
EDGES & 12" oc AT FIELD

$$v_{on} = \frac{895}{2} = 447 \text{ pif} -$$

$$F_{turns} = \frac{423(37)^{3/8}}{18} = 4022^{\#}$$

USE (2) mst 26 AT LEAST  
SPICES  $T_{on} = 2745 \times 2 = 5490^{\#}$

SHORT SIDE

$$F = \frac{423(18)^{3/8}}{37} = 463^{\#}$$

USE 9 @ 8d AT SPICES  
IN 22x

| SHEAR WALL OVERTURNING                                                                                                      |                 |             |                              |
|-----------------------------------------------------------------------------------------------------------------------------|-----------------|-------------|------------------------------|
| Front wall                                                                                                                  | - 273000 (W301) |             |                              |
| WALL LENGTH=                                                                                                                | 5.9             | FT          |                              |
| WALL HEIGHT =                                                                                                               | 13.5            | FT          |                              |
| V=                                                                                                                          | 3913            | POUNDS      | $\frac{423(37/2)}{2} = 3913$ |
| w DL =                                                                                                                      | 285             | PLF         |                              |
| P (END)=                                                                                                                    | 0               | POUNDS      |                              |
| Mot=                                                                                                                        | 52825.5         | FOOT-POUNDS |                              |
| Mr (end)=                                                                                                                   | 4960            | FOOT-POUNDS | END T reqd= 8449 POUNDS      |
| END USE SIMPSON HDU11-SDS2.5 IN 6X POST (9535# ALL)<br>+ SIMPSON PAB8 ANCHOR -8" EMBED 12" EDGE DIST(11405# ALL)            |                 |             |                              |
| $V = \frac{3913}{5.9} = 663 \text{ PLF}$ $1/2" \text{ plywood w/ 1.0d @ 3'10"}$ $U_{oh} = \frac{1680}{2} = 840 \text{ PLF}$ |                 |             |                              |

力

| SHEAR WALL OVERTURNING                                                  |              |                |                         |              |       |        |             |          |    |
|-------------------------------------------------------------------------|--------------|----------------|-------------------------|--------------|-------|--------|-------------|----------|----|
| Front wall footing                                                      |              |                |                         |              |       |        |             |          |    |
| WALL LENGTH=                                                            |              | 18             | FT                      |              |       |        |             |          |    |
| WALL HEIGHT =                                                           |              | 13.5           | FT                      |              |       |        |             |          |    |
| V=                                                                      |              | 7826           | POUNDS                  |              |       |        |             |          |    |
| w DL =                                                                  |              | 285            | PLF                     |              |       |        |             |          |    |
| P (END)=                                                                |              | 0              | POUNDS                  |              |       |        |             |          |    |
| Mot=                                                                    |              | 105651         | FOOT-POUNDS             |              |       |        |             |          |    |
| Mr (end)=                                                               |              | 46170          | FOOT-POUNDS             |              |       |        |             |          |    |
| $4 \left[ \left( \frac{18}{2} \right) (285) + 19(15) + 2(1133) \right]$ |              |                |                         |              |       |        |             |          |    |
| ABOUT FOOTING:                                                          |              |                |                         |              |       |        |             |          |    |
| FOOTING WIDTH=                                                          |              | 2.33           | FT                      |              |       |        |             |          |    |
| FOOTING LENGTH =                                                        |              | 18             | FT                      |              | M ot= | 121303 | FOOT-POUNDS |          |    |
| FOOTING THICK.=                                                         |              | 2              | FT                      |              |       |        |             |          |    |
| TOE TO WALL=                                                            |              | 0              | FT                      |              |       |        |             |          |    |
| BOTTOM OF FTG=                                                          |              | 2              | FT                      |              |       |        |             |          |    |
| Mres.:                                                                  |              | WEIGHT         |                         |              | ARM   |        | MOMENT      |          |    |
|                                                                         | WALL         | 5130           |                         |              | 9     |        | 46170       |          |    |
|                                                                         | SOIL         | 0              |                         |              | 9     |        | 0           |          |    |
|                                                                         | FOOTING      | 12582          |                         |              | 9     |        | 113238      |          |    |
|                                                                         | P WALL END   | 3456           |                         |              | 18    |        | 62208       |          |    |
|                                                                         | P WALL FRONT | 3456           |                         |              | 0     |        | 0           |          |    |
|                                                                         |              | 24624          |                         | POUNDS       |       |        | 221616      |          |    |
|                                                                         |              |                |                         |              |       |        | Mrx.6=      | 132969.6 | OK |
| SOIL:                                                                   |              | qs=            | ALLOWABLE SOIL PRESSURE |              | 2000  |        | PSF         |          |    |
| a=                                                                      | 4.07         | FT             |                         | L/3=         | 6.00  | FT     |             |          |    |
|                                                                         |              | 2L/3           |                         |              | 12.00 |        |             |          |    |
|                                                                         |              |                |                         |              |       |        |             |          |    |
|                                                                         |              |                |                         |              |       |        |             |          |    |
|                                                                         | p=           | 1729           | PSF                     |              | <     | p all= | 2000        | PSF      |    |
|                                                                         |              |                |                         |              |       |        |             |          |    |
|                                                                         |              |                |                         |              |       |        |             |          |    |
| USE FOOTING:                                                            |              | 18 FEET LONG   |                         |              |       |        |             |          |    |
|                                                                         |              | 2.33 FEET WIDE |                         |              |       |        |             |          |    |
|                                                                         |              | 2 FEET THICK   |                         | TOE LENGTH = |       | 0      |             |          |    |

|               |         | SHEAR WALL OVERTURNING    |   |                                                                   |                    |
|---------------|---------|---------------------------|---|-------------------------------------------------------------------|--------------------|
| Side walls    | -       | LEFT SIDE 2 SHORTER WALLS |   |                                                                   |                    |
| WALL LENGTH=  | 11.66   | FT                        |   |                                                                   |                    |
| WALL HEIGHT = | 13.5    | FT                        |   |                                                                   |                    |
| V=            | 2115    | POUNDS                    | - | $423(\frac{7.2}{2})$                                              |                    |
| w DL =        | 465     | PLF                       |   |                                                                   |                    |
| P (END)=      | 0       | POUNDS                    |   |                                                                   |                    |
| Mot=          | 28552.5 | FOOT-POUNDS               |   |                                                                   |                    |
| Mr (end)=     | 31610   | FOOT-POUNDS               |   | END                                                               | T reqd= 822 POUNDS |
| END           |         | NO HOLDOWN REQUIRED       |   | HEADERS,<br>RETURN WALLS<br>& BASE ANCHORS<br>OK BY<br>INSPECTION |                    |



## Cantilevered Retaining Wall

Project File: enercalc.ec6

LIC# : KW-06016452, Build:20.24.12.17

CARUSO TURLEY SCOTT

(c) ENERCALC, LLC 1982-2025

**DESCRIPTION:** 6' free standing wall

### Code Reference:

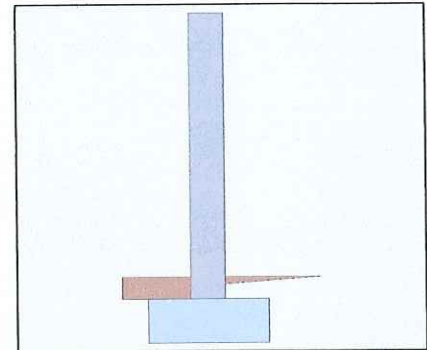
Calculations per IBC 2021, ACI 318-19, TMS 402-16

#### Criteria

|                                     |   |         |
|-------------------------------------|---|---------|
| Retained Height                     | = | 0.50 ft |
| Wall height above soil              | = | 6.00 ft |
| Slope Behind Wall                   | = | 0.00    |
| Height of Soil over Toe             | = | 6.00 in |
| Water table above bottom of footing | = | 0.0 ft  |

#### Soil Data

|                                            |   |              |
|--------------------------------------------|---|--------------|
| Allow Soil Bearing                         | = | 2,000.0 psf  |
| Equivalent Fluid Pressure Method           |   |              |
| Active Heel Pressure                       | = | 45.0 psf/ft  |
|                                            | = |              |
| Passive Pressure                           | = | 294.0 psf/ft |
| Soil Density, Heel                         | = | 110.00 pcf   |
| Soil Density, Toe                          | = | 110.00 pcf   |
| Footing  Soil Friction                     | = | 0.350        |
| Soil height to ignore for passive pressure | = | 0.00 in      |



#### Surcharge Loads

|                                      |   |         |
|--------------------------------------|---|---------|
| Surcharge Over Heel                  | = | 0.0 psf |
| Used To Resist Sliding & Overturning |   |         |
| Surcharge Over Toe                   | = | 0.0     |
| Used for Sliding & Overturning       |   |         |

#### Axial Load Applied to Stem

|                         |   |         |
|-------------------------|---|---------|
| Axial Dead Load         | = | 0.0 lbs |
| Axial Live Load         | = | 0.0 lbs |
| Axial Load Eccentricity | = | 0.0 in  |

#### Lateral Load Applied to Stem

|                     |   |                 |
|---------------------|---|-----------------|
| Lateral Load        | = | 0.0 #/ft        |
| ...Height to Top    | = | 0.00 ft         |
| ...Height to Bottom | = | 0.00 ft         |
| Load Type           | = | Wind (W)        |
|                     |   | (Service Level) |

|                      |   |          |
|----------------------|---|----------|
| Wind on Exposed Stem | = | 36.1 psf |
| (Strength Level)     |   |          |

#### Adjacent Footing Load

|                                       |   |                |
|---------------------------------------|---|----------------|
| Adjacent Footing Load                 | = | 0.0 lbs        |
| Footing Width                         | = | 0.00 ft        |
| Eccentricity                          | = | 0.00 in        |
| Wall to Ftg CL Dist                   | = | 0.00 ft        |
| Footing Type                          | = | Spread Footing |
| Base Above/Below Soil at Back of Wall | = | 0.0 ft         |
| Poisson's Ratio                       | = | 0.300          |

## Cantilevered Retaining Wall

Project File: enercalc.ec6

LIC#: KW-06016452, Build:20.24.12.17

CARUSO TURLEY SCOTT

(c) ENERCALC, LLC 1982-2025

**DESCRIPTION:** 6' free standing wall

### Design Summary

#### Wall Stability Ratios

|                  |   |      |    |
|------------------|---|------|----|
| Overturning      | = | 1.50 | OK |
| Sliding          | = | 3.35 | OK |
| Global Stability | = | 2.81 |    |

|                    |   |         |
|--------------------|---|---------|
| Total Bearing Load | = | 805 lbs |
| ...resultant ecc.  | = | 9.32 in |

*Eccentricity outside middle third*

|                      |   |           |    |
|----------------------|---|-----------|----|
| Soil Pressure @ Toe  | = | 1,346 psf | OK |
| Soil Pressure @ Heel | = | 0 psf     | OK |
| Allowable            | = | 2,000 psf |    |

*Soil Pressure Less Than Allowable*

|                      |   |           |    |
|----------------------|---|-----------|----|
| ACI Factored @ Toe   | = | 1,885 psf |    |
| ACI Factored @ Heel  | = | 0 psf     |    |
| Footing Shear @ Toe  | = | 6.6 psi   | OK |
| Footing Shear @ Heel | = | 1.7 psi   | OK |
| Allowable            | = | 75.0 psi  |    |

#### Sliding Calcs

|                          |   |           |    |
|--------------------------|---|-----------|----|
| Lateral Sliding Force    | = | 180.6 lbs |    |
| less 100% Passive Force  | = | 330.8 lbs |    |
| less 100% Friction Force | = | 275.0 lbs |    |
| Added Force Req'd        | = | 0.0 lbs   | OK |
| ....for 1.5 Stability    | = | 0.0 lbs   | OK |

Vertical component of active lateral soil pressure IS  
 NOT considered in the calculation of soil bearing

#### Load Factors

|               |       |
|---------------|-------|
| Building Code |       |
| Dead Load     | 1.200 |
| Live Load     | 1.600 |
| Earth, H      | 1.600 |
| Wind, W       | 1.000 |
| Seismic, E    | 1.000 |

### Stem Construction

#### Design Height Above Ftg

Wall Material Above "Ht"

Design Method

Thickness

Rebar Size

Rebar Spacing

Rebar Placed at

#### Design Data

fb/FB + fa/Fa = 0.842

#### Total Force @ Section

Service Level lbs = 135.6

Strength Level lbs =

#### Moment....Actual

Service Level ft-# = 455.8

Strength Level ft-# =

Moment.....Allowable = 540.7

#### Shear.....Actual

Service Level psi = 7.1

Strength Level psi =

Shear.....Allowable psi = 45.6

Anet (Masonry) in2 = 19.01

Wall Weight psf = 53.0

Rebar Depth 'd' in = 3.81

#### Masonry Data

f'm psi = 1,500

Fs psi = 20,000

Solid Grouting = No

Modular Ratio 'n' = 21.48

Equiv. Solid Thick. in = 4.27

Masonry Block Type =

Masonry Design Method = ASD

#### Concrete Data

f'c psi =

Fy psi =

### Bottom

Stem OK

ft = 0.00

Masonry

ASD

SD

SD

Project Title:  
Engineer:  
Project ID:  
Project Descr:

37

## Cantilevered Retaining Wall

Project File: enercalc.ec6

LIC#: KW-06016452, Build:20.24.12.17

CARUSO TURLEY SCOTT

(c) ENERCALC, LLC 1982-2025

**DESCRIPTION:** 6' free standing wall

### Footing Data

|                     |   |          |
|---------------------|---|----------|
| Toe Width           | = | 0.83 ft  |
| Heel Width          | = | 1.50     |
| Total Footing Width | = | 2.33     |
| Footing Thickness   | = | 12.00 in |

|                          |           |            |            |
|--------------------------|-----------|------------|------------|
| $f_c$ =                  | 2,500 psi | $F_y$ =    | 60,000 psi |
| Footing Concrete Density | =         | 150.00 pcf |            |
| Min. As %                | =         | 0.0018     |            |
| Cover @ Top              | 2.00      | @ Btm.=    | 3.00 in    |

### Footing Design Results

|                                    | Toe           | Heel  |        |
|------------------------------------|---------------|-------|--------|
| Factored Pressure                  | = 1,885       | 0     | psf    |
| $M_u'$ : Upward                    | = 497         | 0     | ft-#   |
| $M_u'$ : Downward                  | = 119         | 120   | ft-#   |
| $M_u$ : Design                     | = 378         | 120   | ft-#   |
| $\phi M_n$                         | = 2,500       | 2,500 | ft-#   |
| Actual 1-Way Shear                 | = 6.55        | 1.71  | psi    |
| Allow 1-Way Shear                  | = 40.00       | 40.00 | psi    |
| Toe Reinforcing                    | = None Spec'd |       |        |
| Heel Reinforcing                   | = None Spec'd |       |        |
| Key Reinforcing                    | = None Spec'd |       |        |
| Footing Torsion, $T_u$             | =             | 0.00  | ft-lbs |
| Footing Allow. Torsion, $\phi T_n$ | =             | 0.00  | ft-lbs |

If torsion exceeds allowable, provide supplemental design for footing torsion.

#### Other Acceptable Sizes & Spacings

Toe:  $\phi M_n = \phi \cdot 5 \cdot \lambda \cdot \sqrt{f_c} \cdot S_m$

Heel:  $\phi M_n = \phi \cdot 5 \cdot \lambda \cdot \sqrt{f_c} \cdot S_m$

Key: No key defined

|                                         |      |                     |
|-----------------------------------------|------|---------------------|
| Min footing T&S reinf Area              | 0.60 | in <sup>2</sup>     |
| Min footing T&S reinf Area per foot     | 0.26 | in <sup>2</sup> /ft |
| <u>If one layer of horizontal bars:</u> |      |                     |
| #4@ 9.26 in                             |      |                     |
| #5@ 14.35 in                            |      |                     |
| #6@ 20.37 in                            |      |                     |

#### If two layers of horizontal bars:

|              |
|--------------|
| #4@ 18.52 in |
| #5@ 28.70 in |
| #6@ 40.74 in |

## Cantilevered Retaining Wall

Project File: enercalc.ec6

LIC# : KW-06016452, Build:20.24.12.17

CARUSO TURLEY SCOTT

(c) ENERCALC, LLC 1982-2025

**DESCRIPTION:** 6' free standing wall

### Summary of Overturning & Resisting Forces & Moments

| .....OVERTURNING.....      |              |                |                | .....RESISTING.....           |                          |                |                |      |       |
|----------------------------|--------------|----------------|----------------|-------------------------------|--------------------------|----------------|----------------|------|-------|
| Item                       | Force<br>lbs | Distance<br>ft | Moment<br>ft-# |                               | Force<br>lbs             | Distance<br>ft | Moment<br>ft-# |      |       |
| HL Act Pres (ab water tbl) | 50.6         | 0.50           | 25.3           | Soil Over HL (ab. water tbl)  | 45.8                     | 1.92           | 87.8           |      |       |
| HL Act Pres (be water tbl) |              |                |                | Soil Over HL (bel. water tbl) |                          | 1.92           | 87.8           |      |       |
| Hydrostatic Force          |              |                |                | Water Table                   |                          |                |                |      |       |
| Buoyant Force              | =            |                |                | Sloped Soil Over Heel         | =                        |                |                |      |       |
| Surcharge over Heel        | =            |                |                | Surcharge Over Heel           | =                        |                |                |      |       |
| Surcharge Over Toe         | =            |                |                | Adjacent Footing Load         | =                        |                |                |      |       |
| Adjacent Footing Load      | =            |                |                | Axial Dead Load on Stem       | =                        |                |                |      |       |
| Added Lateral Load         | =            |                |                | * Axial Live Load on Stem     | =                        |                |                |      |       |
| Load @ Stem Above Soil     | =            | 130.0          | 4.50           | 584.8                         | Soil Over Toe            | =              | 45.7           | 19.0 |       |
|                            | =            |                |                |                               | Surcharge Over Toe       | =              |                |      |       |
|                            |              |                |                |                               | Stem Weight(s)           | =              | 344.5          | 1.17 | 401.3 |
|                            |              |                |                |                               | Earth @ Stem Transitions | =              |                |      |       |
|                            |              |                |                |                               | Footing Weight           | =              | 349.8          | 1.17 | 407.8 |
|                            |              |                |                |                               | Key Weight               | =              |                |      |       |
|                            |              |                |                |                               | Vert. Component          | =              |                |      |       |
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\* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

### Tilt

#### Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci  
 Horizontal Defl @ Top of Wall (approximate only) 0.104 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Project Title:  
Engineer:  
Project ID:  
Project Descr:

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## Cantilevered Retaining Wall

Project File: enercalc.ec6

LIC#: KW-06016452, Build: 20.24.12.17

CARUSO TURLEY SCOTT

(c) ENERCALC, LLC 1982-2025

**DESCRIPTION:** 6' free standing wall

### Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Calculated Rebar Stress,  $f_s$  = 16859.69 psi

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.4a) =

31.61 in

Development length for #5 bar specified in this stem design segment =

31.61 in

Hooked embedment length into footing for #5 bar specified in this stem design segment =

6.00 in

As Provided =

0.0930 in/ft

As Required =

0.0803 in/ft

Project Title:  
Engineer:  
Project ID:  
Project Descr:

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## Cantilevered Retaining Wall

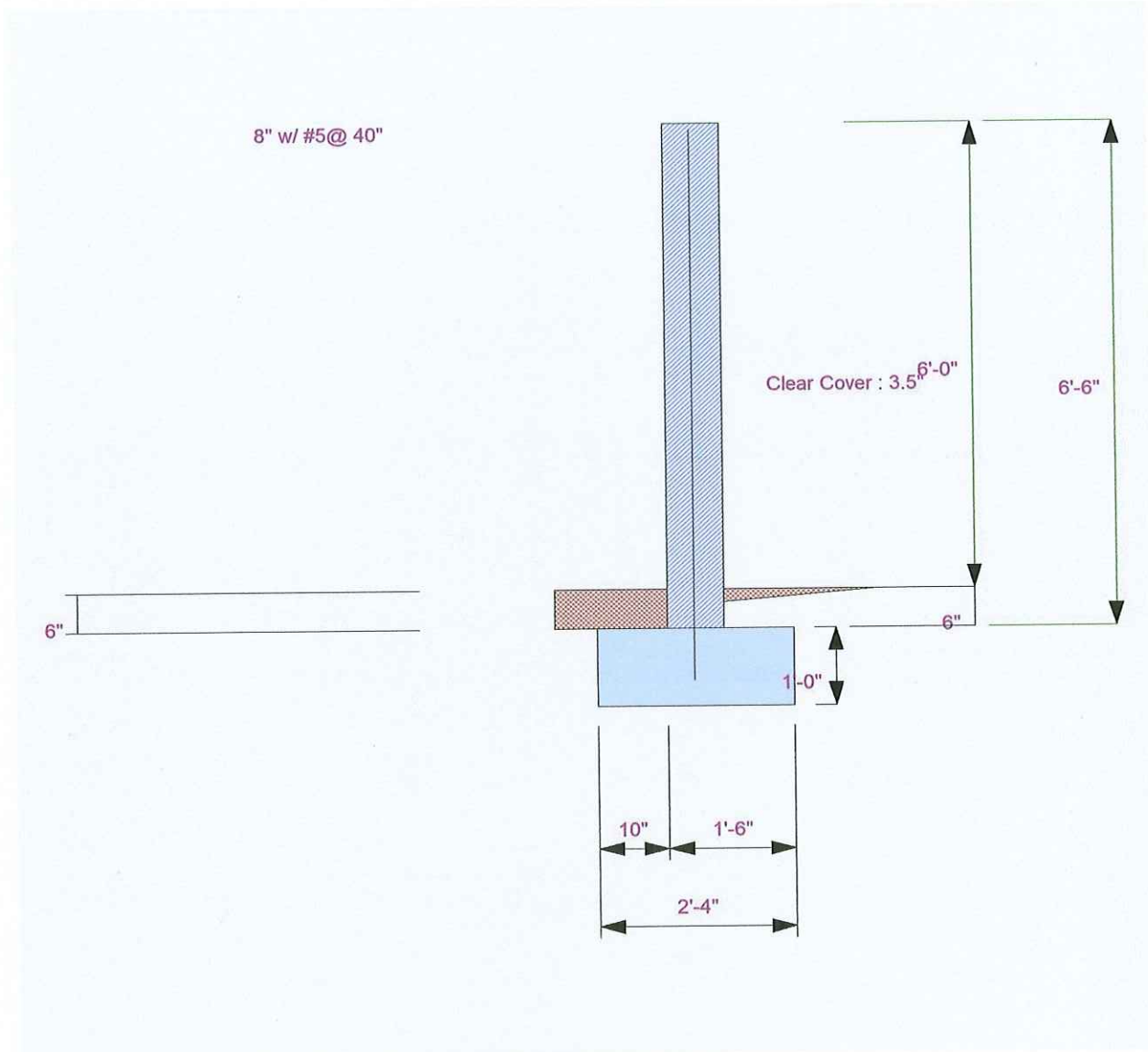
Project File: enercalc.ec6

LIC# : KW-06016452, Build:20.24.12.17

CARUSO TURLEY SCOTT

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 6' free standing wall



## Cantilevered Retaining Wall

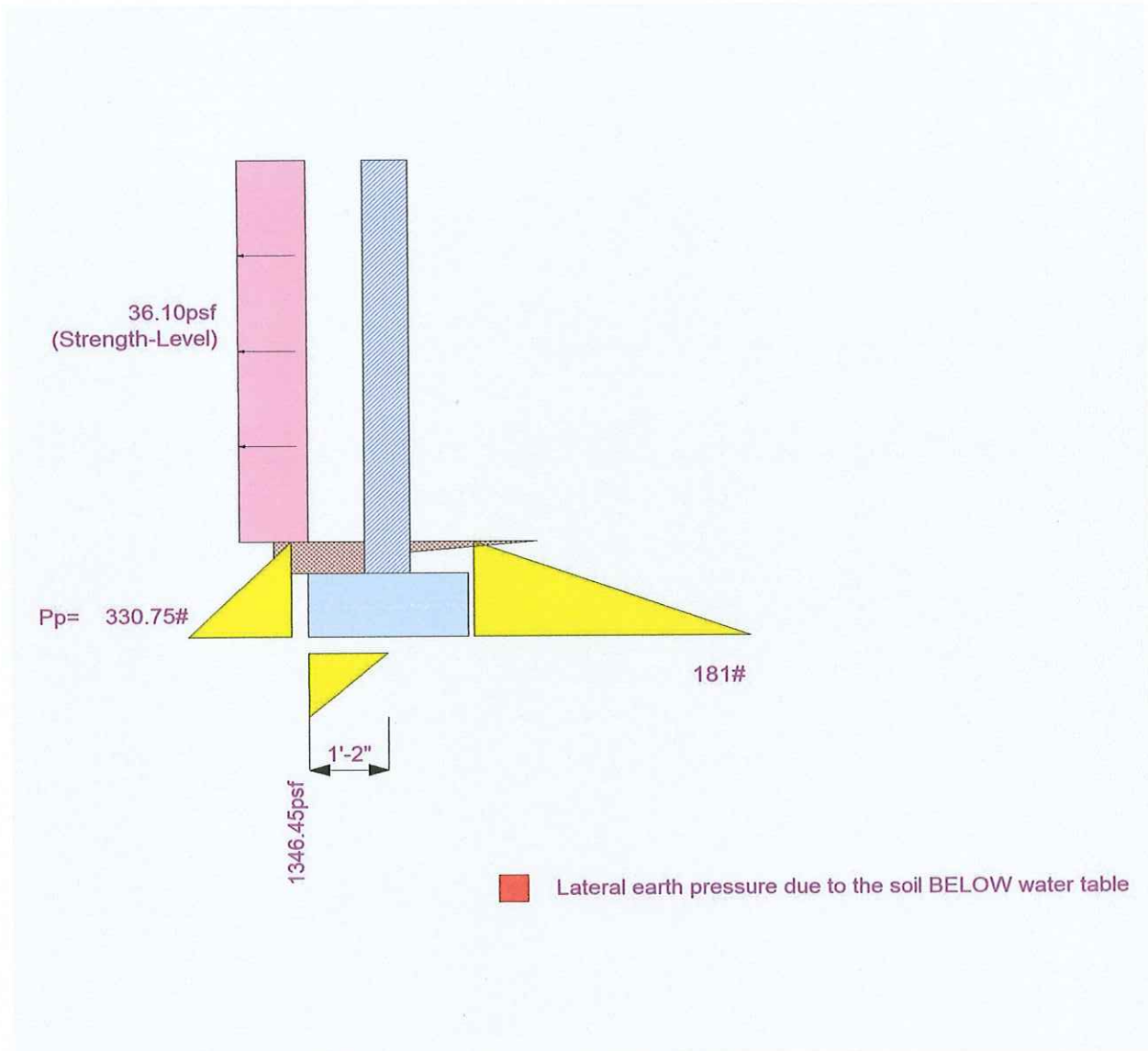
Project File: enercalc.ec6

LIC# : KW-06016452, Build: 20.24.12.17

CARUSO TURLEY SCOTT

(c) ENERCALC, LLC 1982-2025

**DESCRIPTION:** 6' free standing wall



## Pole Footing Embedded in Soil

Project File: enercalc.ec6

LIC#: KW-06016452, Build:20.24.12.17

CARUSO TURLEY SCOTT

(c) ENERCALC, LLC 1982-2025

**DESCRIPTION:** Light pole base

### Code References

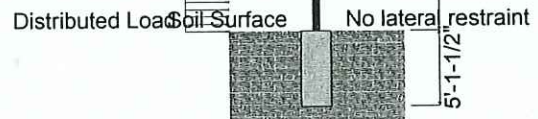
Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-16

### General Information

Pole Footing Shape Circular  
 Pole Footing Diameter ..... 24.0 in  
 Calculate Min. Depth for Allowable Pressures  
 No Lateral Restraint at Ground Surface  
 Allow Passive ..... 150.0 pcf  
 Max Passive ..... 1,500.0 psf

Point Load



### Controlling Values

Governing Load Combination +0.60W  
 Lateral Load 0.1950 k  
 Moment 3.994 k-ft  
 NO Ground Surface Restraint  
 Pressures at 1/3 Depth  
 Actual 249.093 psf  
 Allowable 250.147 psf

**Minimum Required Depth 5.125 ft**

Footing Base Area 3.142 ft<sup>2</sup>  
 Maximum Soil Pressure 0.0 ksf

### Applied Loads

| Lateral Concentrated Load (k)      |          | Lateral Distributed Loads (k)       |      | Vertical Load (k) |
|------------------------------------|----------|-------------------------------------|------|-------------------|
| D : Dead Load                      | k        |                                     | k/ft | k                 |
| Lr : Roof Live                     | k        |                                     | k/ft | k                 |
| L : Live                           | k        |                                     | k/ft | k                 |
| S : Snow                           | k        |                                     | k/ft | k                 |
| W : Wind                           | 0.20 k   | 0.050                               | k/ft | k                 |
| E : Earthquake                     | k        |                                     | k/ft | k                 |
| H : Lateral Earth                  | k        |                                     | k/ft | k                 |
| Load distance above ground surface | 32.50 ft | TOP of Load above ground surface    | ft   |                   |
|                                    |          | 2.50                                | ft   |                   |
|                                    |          | BOTTOM of Load above ground surface | ft   |                   |

### Load Combination Results

| Load Combination | Forces @ Ground Surface |                  | Required Depth - (ft) | Pressure at 1/3 Depth |               | Soil Increase Factor |
|------------------|-------------------------|------------------|-----------------------|-----------------------|---------------|----------------------|
|                  | Loads - (k)             | Moments - (ft-k) |                       | Actual - (psf)        | Allow - (psf) |                      |
|                  | 0.000                   | 0.000            | 0.13                  | 0.0                   | 0.0           | 1.000                |
| +0.60W           | 0.195                   | 3.994            | 5.13                  | 249.1                 | 250.1         | 1.000                |
| +0.450W          | 0.146                   | 2.995            | 4.63                  | 225.1                 | 225.8         | 1.000                |