UPSTATE engineering, inc.
22002 64TH AVE W - SUITE 2C, MOUNTLAKE TERRACE, WA 98043
SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

# STRUCTURAL CALCULATIONS

| | |
|---|---|
| **Client:** | BUCKWOOD LLC |
| **Project Name:** | LOT 10 |
| **Scope of Work:** | LATERAL DESIGN OF A (2)-STORY SFR |
| **Upstate Job#:** | 1616 |
| **Date:** | 11/9/2022 |

THE CALCULATIONS WITHIN THIS PACKET ARE VALID FOR BOTH GARAGE LEFT AND GARAGE RIGHT VERSIONS.


JOB # **1616**

**Andrew M. Gahan, PE**

## Lateral Analysis *IBC 2018*

UPSTATE JOB#: 1616
Description: LOT 10
Engineer: JBG

Governing Code: 2018 International Building Code all references in right margin are 2018 IBC unless specifically noted otherwise.

## 1603.1 General Design Criteria

| | Roof | Walls | Floors | Snow | Partitions |
|---|---|---|---|---|---|
| Live Load (psf) | 25 | | 40 | 25 | |
| Dead Load (psf) | 15 | 10 | 10 | 0 | 10 |

## 1603.1.4 Wind Design Criteria

| | | | | |
|---|---|---|---|---|
| 1. Basic /ASD Wind Speed | $V/V_{asd}$ | 110/85 | mph | *F 1609.3(1)* |
| 2. Risk Category | II | 1.00 | | *ASCE 7 T 1.5-1* |
| 3. Wind Exposure Category | | "B" | | *1609.4* |
| 4. Internal Pressure Coefficient | | +/-0. 55 | | *ASCE 7 F 26.13-1* |
| 5. Components and Cladding design pressure | | +/- 16 | psf | *ASCE 7 30.2.2* |

## 1603.1.5 Earthquake Design Data

| | | | | |
|---|---|---|---|---|
| 1. Risk Category | | II | | ASCE 7 T 1.5-1 |
| 2. Seismic Importance Factor | $I_e$ | 1.00 | | *ASCE 7 T 1.5-2* |
| 3. Short Period Acceleration | $S_S$ | 1.25 | | *USGS Seismic Design Map Online* |
| 1-Second Accelleration | $S_1$ | 0.4 | | *USGS Seismic Design Map Online* |
| 4. Site Class | | D | | *ASCE 7 T 20.3-1* |
| 5. Spectral response coefficient | $S_{DS}$ | 1.20 | | *EQ 16-38* |
| Spectral response coefficient | $S_{D1}$ | N/A | | *EQ 16-39* |
| 6. Seismic Design Category | | D | | *T1613.2.3(1) and (2)* |
| 7. Seis. Force Resisting System | | A.15. | | *ASCE 7 T 12.2-1* |
| 8. Design Base Shear | | 13962 | lbs | *See Page 3.0* |
| 9. Seismic Response Coefficient | $C_S$ | 0.18 | | *ASCE 7 EQ 12.8-2* |
| 10. Response Modification Factor | R | 6.5 | | *ASCE 7 T 12.2-1* |
| 11. Analysis Procedure | | Equivalent Lateral Force | | *ASCE 7 12.8* |

## Table of Contents

# Wind Design (MWFRS - Simplified Envelope Procedure) *IBC 2018*

**Part 2 Wind Load Method** *ASCE 7 28.1.1 Part 2*

| | | | | |
|---|---|---|---|---|
| ASD/Basic Wind Speed | 85/ | 110 | mph | *1609.3, F 1609.3(1)* |
| Wind Exposure Category | | B | | *1609.4* |
| Height & Exposure Adjustment | I = | 1.00 | | *ASCE 7 F 28.5-1* |
| Topographic Factor | Kzt = | 1.00 | | *ASCE 7 F 26.8-1* |

**Wind Pressures** *ASCE 7 28.5.3*

$p_s = I K_{zt} p_{S30}$ *ASCE 7 EQ 28.5-1*

Minimum pressures shall not be less than assuming the pressures for zones A and C equal +16 psf, B & D equal +8 psf, while zones E, F, G, & H all equal zero. *ASCE 7 28.5.4*

| | | | | |
|---|---|---|---|---|
| Roof Pitch | 6 | :12 | or | 26.565 degrees |
| Ridge Elevation | 28 | ft | | |
| Eave Height | 17.83 | ft | | |
| Mean Roof Height, h | 22.915 | ft | | *ASCE 7 26.2* |

**Zone Pressures, (λ)($p_{S30}$)** *ASCE 7 F 28.5-1*

| 110 | Horizontal Pressures | | | | Vertical Pressures | | | | Overhangs | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | A | B | C | D | E | F | G | H | EOH | GOH |
| **1** | 23.32 | 14.18 | 17.34 | 6.44 | -6.82 | -14.13 | -5.10 | -11.57 | -16.05 | -14.40 |
| **2** | 6.76 | 4.63 | 5.38 | 3.69 | -0.22 | -7.46 | 1.50 | -4.94 | -2.38 | -2.72 |

**Horizontal Zone Areas & Forces, Fx** *ASCE 7 F 28.5-1*

End zone distance, 2a, where "a" equals the smaller of 10 percent of least horizontal dimension (l.h.d.) or 0.4h, but not less than either 4 percent of lhd or 3 feet.

$$F_x = \left[ \sum_{x=A}^{D} (p_{sx} \cdot X) \right]$$

**Diaphragm (x = 2)**

l.h.d. (ft) = 34
a (ft) = 3.4
2a (ft) = 6.8

Areas / Forces

| Front to Rear | | | |
|---|---|---|---|
| A | B | C | D |
| 98 | 8 | 233 | 0 |
| $F_x$ = 6438 | | $F_{xmin}$ = 3390 | |

| Side to Side | | | |
|---|---|---|---|
| A | B | C | D |
| 68 | 134 | 171 | 326 |
| $F_x$ = 8551 | | $F_{xmin}$ = 6990 | |

**Diaphragm (x = 1)**

l.h.d. (ft) = 34
a (ft) = 3.4
2a (ft) = 6.8

Areas / Forces

| Front to Rear | | | |
|---|---|---|---|
| A | B | C | D |
| 106 | 25 | 231 | 0 |
| $F_x$ = 6831 | | $F_{xmin}$ = 3620 | |

| Side to Side | | | |
|---|---|---|---|
| A | B | C | D |
| 125 | 47 | 352 | 0 |
| $F_x$ = 9684 | | $F_{xmin}$ = 5240 | |

## Seismic Design *IBC 2018*

**Site Classification, Criteria Selection, & Minimum Design Lateral Force**

| | | | |
|---|---|---|---|
| Risk Category | | II | *ASCE 7 T 1.5-1* |
| Seismic Importance Factor | $I_E$ | 1.00 | *ASCE 7 T 1.5-2* |
| Seismic Design Category | | D | *T1613.2.3(1) and (2)* |
| Site Class | | D | *ASCE 7 T 20.3-1* |
| Short Period Acceleration | $S_S$ | 1.25 | *USGS Seismic Design Maps Online* |
| 1-Second Acceleration | $S_1$ | 0.4 | *USGS Seismic Design Maps Online* |
| Seis. Force Resisting System | | A.15. | *ASCE 7 T 12.2-1* |
| Response Modification Factor | R | 6.5 | *ASCE 7 T 12.2-1* |

**Design Spectral Response Acceleration Parameters**

| | | |
|---|---|---|
| Site Coeffiecient, $F_a$ | 1.2 | *T1613.2.3(1)* |
| Site Coeffiecient, $F_v$ | N/A | *T1613.2.3(2)* |

Substitute equations 16-36 & 16-37 into 16-38 & 16-39, respectively.

$$S_{DS} = \frac{2}{3} \cdot F_a \cdot S_s$$ $S_{DS}$ = 1.20 *EQ 16-38*

$$S_{D1} = \frac{2}{3} \cdot F_v \cdot S_1$$ $S_{D1}$ = N/A *EQ 16-39*

**Seismic base shear** ASCE 7 *12.14.8.1*

$V = (F\ S_{DS}/R)\ W$ Where: F=1.1 for (2)-story *ASCE 7 EQ 12.14-12*

**Vertical Distribution, Forces at each level** ASCE 7 *12.14.8.2*

$F_x = (w_x/W)\ V$ $F_x =$ 0.203 x $w_x$ *ASCE 7 EQ 12.14-13*

**Effective seismic weight & Forces (lbs) at Level *x***

| **Diaphragm (x = 2)** | | roof area ($ft^2$) | floor area ($ft^2$) | story height (ft) | wall length (ft) | $w_x$ |
|---|---|---|---|---|---|---|
| | | 1832 | 0 | 8.1 | 198 | |
| $F_x$ = 7209 | weight (lbs) | 27480 | 0 | 8019 | | 35499 |

| **Diaphragm (x = 1)** | | roof area ($ft^2$) | floor area ($ft^2$) | story height (ft) | wall length (ft) | $w_x$ |
|---|---|---|---|---|---|---|
| | | 624 | 1473 | 9 | 143 | |
| $F_x$ = 7827 | weight (lbs) | 9360 | 14730 | 6435 | | 38544 |

## Allowable Stress Design Loads For Wood *IBC 2018*

Design shall be in accordance with Sections 2304-2306. *2302.1*
Structures using wood shear walls and diaphragms to resist wind, seismic and other lateral loads shall be designed and constructed in accordance with AF&PA SDPWS and provisions of Sections 2305 - 2306.

**Design per Alternative Basic Load Combinations** *1605.3.2*

For worse case effect with wind load, L & S shall be zero. *1605.3.2*
Equations 16-18, 16-19and 16-20 become,

$$D + \omega W \; *0.6$$

Where ω equals 1.3, W equals $F_X$ of the respective diaphragm, and D shall be multiplied by two-thirds. *1605.3.2*

For worse case effect with seismic load, L & S shall be zero. *1605.1*
Equation 16-22 controls,

$0.9\,D + E/1.4$ , substitute ASCE 7 EQ 12.14-6 for E

ASCE 7 12.14.3.2 (2), EQ 12.14-6

$$0.9\,D + \frac{\left(\rho\, Q_E - 0.2\, S_{DS}\, D\right)}{1.4}$$ , simplify & arrange variables EQ 16-22

$$\left(0.9 - 0.14\, S_{DS}\right) D + \frac{\rho}{1.4}\, Q_E$$

Where $Q_E$ equals $F_x$ of the respective diaphragm.

**Principle of Mechanics**

Sum the forces in the horizontal direction, diaphragms and shearwalls shall resist,

**Wind Design Loads, 1.3 Fx**

| | For Kzt = | 1.00 |
|---|---|---|
| | Front to Rear | Side to Side |
| Diaphragm | Force (lbs) | Force (lbs) |
| x = 2 | 5022 | 6669 |
| x = 1 | 5328 | 7554 |

**Seismic Design Loads, (ρ/1.4) $F_x$**

ρ = 1.3 ASCE 7 12.3.4.2

| Diaphragm | Force (lbs) |
|---|---|
| x = 2 | 6694 |
| x = 1 | 7268 |

## Allowable Stress Design Loads For Wood - cont.

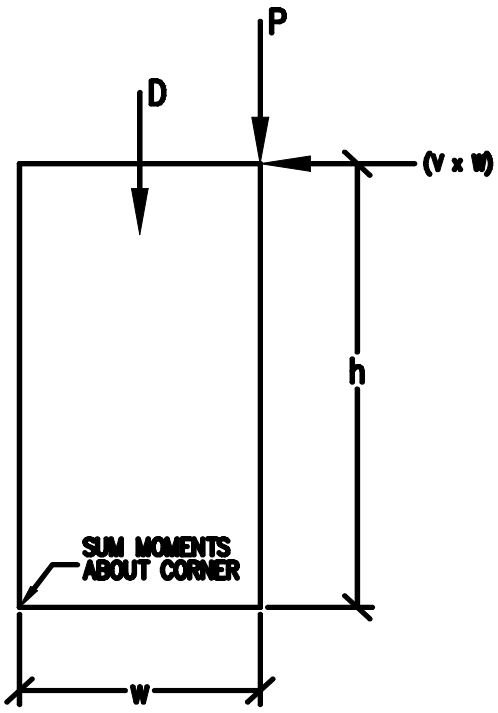
Sum the moments about the base of a shearwall, overturning shall resist,

$$(v \cdot w) \cdot h - \frac{2}{3}\left(D \cdot \frac{w}{2} + P \cdot w\right) \quad \text{for wind}$$

$$(v \cdot w) \cdot h - \left(0.9 - 0.14\ S_{DS}\right)\left(D \cdot \frac{w}{2} + P \cdot w\right) \quad \text{for seismic}$$

Where,
- $v$ = shear per linear foot of shearwall
- $w$ = width of shearwall
- $h$ = height of shearwall
- $D$ = resisting dead load centered over shearwall
- $P$ = resisting dead load at end of shearwall

**Free Body Diagram of a ShearWall**



| Wall Line | Level (x) | Direction | Segment | | Tributary loads | | | | Wind | | Seismic | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Width | Height | wr | wra | wf | wfa | T(x) | T(x+1) | T(x) | T(x+1) | Seis max |
| **1** | **2** | **F-R** | | | | | | | | | | | |
| | **Wind** | **Seis** | | | | | | | | | | | |
| $V_{D(x+1)}$ [lbs] | | | | | | | | | | | | | |
| **%** | 50% | 50% | 46.50 | 8.1 | | | | | -1044 | | -1142 | | |
| $V_{D(x)}$ [lbs] | 2510.89 | 3347.05 | | | | | | | | | | | |
| $V_{T(x)}$ [lbs] | 2510.89 | 3347.05 | | | | | | | | | | | |
| **L** | 46.50 | 46.50 | | | | | | | | | | | |
| *n* | 54 | 72 | | | | | | | | | | | |
| **2015 SDPWS** | **SEISMIC MAX** | | | | | | | | | | | | |
| $T_{MAX(x)}$ [lbs] | | | | | | | | | | | | | |
| **2** | **2** | **F-R** | | | | | | | | | | | |
| | **Wind** | **Seis** | | | | | | | | | | | |
| $V_{D(x+1)}$ [lbs] | | | | | | | | | | | | | |
| **%** | | | | | | | | | | | | | |
| $V_{D(x)}$ [lbs] | | | | | | | | | | | | | |
| $V_{T(x)}$ [lbs] | | | | | | | | | | | | | |
| **L** | | | | | | | | | | | | | |
| *n* | | | | | | | | | | | | | |
| **2015 SDPWS** | **SEISMIC MAX** | | | | | | | | | | | | |
| $T_{MAX(x)}$ [lbs] | | | | | | | | | | | | | |
| **3** | **2** | **F-R** | | | | | | | | | | | |
| | **Wind** | **Seis** | | | | | | | | | | | |
| $V_{D(x+1)}$ [lbs] | | | | | | | | | | | | | |
| **%** | 50% | 50% | 20.50 | 8.1 | | | | | -284 | | -248 | | |
| $V_{D(x)}$ [lbs] | 2510.89 | 3347.05 | 2.83 | 8.1 | | | | | 196 | | 311 | | 116 |
| $V_{T(x)}$ [lbs] | 2510.89 | 3347.05 | 18.00 | 8.1 | | | | | -216 | | -169 | | |
| **L** | 41.33 | 41.33 | | | | | | | | | | | |
| *n* | 61 | 81 | | | | | | | | | | | |
| **2015 SDPWS** | **SEISMIC MAX** | 116 | | | | | | | | | | | |
| $T_{MAX(x)}$ [lbs] | 196 | 311 | | | | | | | | | | | |
| **4** | **2** | **F-R** | | | | | | | | | | | |
| | **Wind** | **Seis** | | | | | | | | | | | |
| $V_{D(x+1)}$ [lbs] | | | | | | | | | | | | | |
| **%** | | | | | | | | | | | | | |
| $V_{D(x)}$ [lbs] | | | | | | | | | | | | | |
| $V_{T(x)}$ [lbs] | | | | | | | | | | | | | |
| **L** | | | | | | | | | | | | | |
| *n* | | | | | | | | | | | | | |
| **2015 SDPWS** | **SEISMIC MAX** | | | | | | | | | | | | |
| $T_{MAX(x)}$ [lbs] | | | | | | | | | | | | | |

| Wall Line | Level (x) | Direction | Segment | | Tributary loads | | | | Wind | | Seismic | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Width | Height | wr | wra | wf | wfa | T(x) | T(x+1) | T(x) | T(x+1) | Seis max |
| **1** | **1** | **F-R** | | | | | | | | | | | |
| | **Wind** | **Seis** | | | | | | | | | | | |
| $V_{D(x+1)}$ [lbs] | 2510.89 | 3347.05 | | | | | | | | | | | |
| **%** | 12% | 12% | 22.25 | 18 | | | | | -1095 | | -1042 | | |
| $V_{D(x)}$ [lbs] | 639.394 | 872.196 | 4.83 | 9 | | | | | 249 | | 406 | | |
| $V_{T(x)}$ [lbs] | 3150.28 | 4219.24 | 15.50 | 9 | | | | | -73 | | 32 | | |
| **L** | 42.58 | 42.58 | | | | | | | | | | | |
| *n* | 74 | 99 | | | | | | | | | | | |
| **2015 SDPWS** | **SEISMIC MAX** | | | | | | | | | | | | |
| $T_{MAX(x)}$ [lbs] | 249 | 406 | | | | | | | | | | | |
| **2** | **1** | **F-R** | | | | | | | | | | | |
| | **Wind** | **Seis** | | | | | | | | | | | |
| $V_{D(x+1)}$ [lbs] | | | | | | | | | | | | | |
| **%** | 50% | 50% | | | | | | | | | | | |
| $V_{D(x)}$ [lbs] | 2664.14 | 3634.15 | 16.00 | 9 | | | | | 745 | | 1167 | | |
| $V_{T(x)}$ [lbs] | 2664.14 | 3634.15 | | | | | | | | | | | |
| **L** | 16.00 | 16.00 | | | | | | | | | | | |
| *n* | 167 | 227 | | | | | | | | | | | |
| **2015 SDPWS** | **SEISMIC MAX** | | | | | | | | | | | | |
| $T_{MAX(x)}$ [lbs] | 745 | 1167 | | | | | | | | | | | |
| **3** | **1** | **F-R** | | | | | | | | | | | |
| | **Wind** | **Seis** | | | | | | | | | | | |
| $V_{D(x+1)}$ [lbs] | 2510.89 | 3347.05 | 5.50 | 9 | | | | | 768 | 196 | 1162 | 311 | |
| **%** | 38% | 38% | 22.75 | 9 | | | | | 248 | 196 | 557 | 311 | |
| $V_{D(x)}$ [lbs] | 2024.75 | 2761.95 | 7.00 | 9 | | | | | 723 | 196 | 1109 | 311 | |
| $V_{T(x)}$ [lbs] | 4535.64 | 6109 | 5.17 | 9 | | | | | 778 | 196 | 1174 | 311 | |
| **L** | 40.42 | 40.42 | | | | | | | | | | | |
| *n* | 112 | 151 | | | | | | | | | | | |
| **2015 SDPWS** | **SEISMIC MAX** | | | | | | | | | | | | |
| $T_{MAX(x)}$ [lbs] | 778 | 1174 | | | | | | | | | | | |
| **4** | **1** | **F-R** | | | | | | | | | | | |
| | **Wind** | **Seis** | | | | | | | | | | | |
| $V_{D(x+1)}$ [lbs] | | | | | | | | | | | | | |
| **%** | | | | | | | | | | | | | |
| $V_{D(x)}$ [lbs] | | | | | | | | | | | | | |
| $V_{T(x)}$ [lbs] | | | | | | | | | | | | | |
| **L** | | | | | | | | | | | | | |
| *n* | | | | | | | | | | | | | |
| **2015 SDPWS** | **SEISMIC MAX** | | | | | | | | | | | | |
| $T_{MAX(x)}$ [lbs] | | | | | | | | | | | | | |

| Wall Line | Level (x) | Direction | Segment | | Tributary loads | | | | Wind | | Seismic | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Width | Height | wr | wra | wf | wfa | T(x) | T(x+1) | T(x) | T(x+1) | Seis max |
| **A** | **2** | **S-S** | | | | | | | | | | | |
| | **Wind** | **Seis** | 2.67 | 8.1 | | | | | 472 | | 426 | | 144 |
| $V_{D(x+1)}$ [lbs] | | | 2.67 | 8.1 | | | | | 472 | | 426 | | 144 |
| **%** | 29% | 29% | 4.17 | 8.1 | | | | | 431 | | 379 | | |
| $V_{D(x)}$ [lbs] | 1934.14 | 1941.29 | 6.83 | 8.1 | | | | | 359 | | 295 | | |
| $V_{T(x)}$ [lbs] | 1934.14 | 1941.29 | 4.17 | 8.1 | | | | | 431 | | 379 | | |
| **L** | 20.51 | 20.51 | | | | | | | | | | | |
| *n* | 94 | 95 | | | | | | | | | | | |
| 2015 SDPWS | SEISMIC MAX | 144 | | | | | | | | | | | |
| $T_{MAX(x)}$ [lbs] | 472 | 426 | | | | | | | | | | | |
| **B** | **2** | **S-S** | | | | | | | | | | | |
| | **Wind** | **Seis** | | | | | | | | | | | |
| $V_{D(x+1)}$ [lbs] | | | | | | | | | | | | | |
| **%** | 44% | 44% | 7.00 | 8.1 | | | | | 893 | | 830 | | |
| $V_{D(x)}$ [lbs] | 2934.55 | 2945.4 | 11.25 | 8.1 | | | | | 777 | | 696 | | |
| $V_{T(x)}$ [lbs] | 2934.55 | 2945.4 | | | | | | | | | | | |
| **L** | 18.25 | 18.25 | | | | | | | | | | | |
| *n* | 161 | 161 | | | | | | | | | | | |
| 2015 SDPWS | SEISMIC MAX | | | | | | | | | | | | |
| $T_{MAX(x)}$ [lbs] | 893 | 830 | | | | | | | | | | | |
| **C** | **2** | **S-S** | | | | | | | | | | | |
| | **Wind** | **Seis** | | | | | | | | | | | |
| $V_{D(x+1)}$ [lbs] | | | 5.00 | 8.1 | | | | | 279 | | 223 | | |
| **%** | 27% | 27% | 14.00 | 8.1 | | | | | 34 | | -62 | | |
| $V_{D(x)}$ [lbs] | 1800.75 | 1807.41 | 4.00 | 8.1 | | | | | 306 | | 254 | | 80 |
| $V_{T(x)}$ [lbs] | 1800.75 | 1807.41 | | | | | | | | | | | |
| **L** | 23.00 | 23.00 | | | | | | | | | | | |
| *n* | 78 | 79 | | | | | | | | | | | |
| 2015 SDPWS | SEISMIC MAX | 80 | | | | | | | | | | | |
| $T_{MAX(x)}$ [lbs] | 306 | 254 | | | | | | | | | | | |
| **D** | **2** | **S-S** | | | | | | | | | | | |
| | **Wind** | **Seis** | | | | | | | | | | | |
| $V_{D(x+1)}$ [lbs] | | | | | | | | | | | | | |
| **%** | | | | | | | | | | | | | |
| $V_{D(x)}$ [lbs] | | | | | | | | | | | | | |
| $V_{T(x)}$ [lbs] | | | | | | | | | | | | | |
| **L** | | | | | | | | | | | | | |
| *n* | | | | | | | | | | | | | |
| 2015 SDPWS | SEISMIC MAX | | | | | | | | | | | | |
| $T_{MAX(x)}$ [lbs] | | | | | | | | | | | | | |

| Wall Line | Level (x) | Direction | Segment | | Tributary loads | | | | Wind | | Seismic | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Width | Height | wr | wra | wf | wfa | T(x) | T(x+1) | T(x) | T(x+1) | Seis max |
| **A** | **1** | **S-S** | | | | | | | | | | | |
| | **Wind** | **Seis** | | | | | | | | | | | |
| $V_{D(x+1)}$ [lbs] | 1934.14 | 1941.29 | | | | | | | | | | | |
| **%** | 22% | 22% | 2.33 | 7 | | | | | 5654 | 472 | 5490 | 426 | 1141 |
| $V_{D(x)}$ [lbs] | 1661.77 | 1599.03 | 2.33 | 7 | | | | | 5654 | 472 | 5490 | 426 | 1141 |
| $V_{T(x)}$ [lbs] | 3595.91 | 3540.31 | | | | | | | | | | | |
| **L** | 4.66 | 4.66 | | | | | | | | | | | |
| *n* | 772 | 760 | | | | | | | | | | | |
| **2015 SDPWS** | **SEISMIC MAX** | 1141 | | | | | | | | | | | |
| $T_{MAX(x)}$ [lbs] | 5654 | 5490 | | | | | | | | | | | |
| **B** | **1** | **S-S** | | | | | | | | | | | |
| | **Wind** | **Seis** | | | | | | | | | | | |
| $V_{D(x+1)}$ [lbs] | 2934.55 | 2945.4 | 11.96 | 9 | | | | | 2557 | 893 | 2343 | 830 | |
| **%** | 55% | 55% | 15.83 | 9 | | | | | 2440 | 893 | 2207 | 830 | |
| $V_{D(x)}$ [lbs] | 4154.43 | 3997.56 | | | | | | | | | | | |
| $V_{T(x)}$ [lbs] | 7088.98 | 6942.97 | | | | | | | | | | | |
| **L** | 27.79 | 27.79 | | | | | | | | | | | |
| *n* | 255 | 250 | | | | | | | | | | | |
| **2015 SDPWS** | **SEISMIC MAX** | | | | | | | | | | | | |
| $T_{MAX(x)}$ [lbs] | 2557 | 2343 | | | | | | | | | | | |
| **C** | **1** | **S-S** | | | | | | | | | | | |
| | **Wind** | **Seis** | | | | | | | | | | | |
| $V_{D(x+1)}$ [lbs] | 1800.75 | 1807.41 | 3.50 | 9 | | | | | 1919 | 306 | 1773 | 254 | 280 |
| **%** | 23% | 23% | 4.25 | 9 | | | | | 1897 | 306 | 1746 | 254 | 230 |
| $V_{D(x)}$ [lbs] | 1737.31 | 1671.71 | 4.25 | 9 | | | | | 1897 | 306 | 1746 | 254 | 230 |
| $V_{T(x)}$ [lbs] | 3538.05 | 3479.11 | 4.00 | 9 | | | | | 1904 | 306 | 1755 | 254 | 245 |
| **L** | 16.00 | 16.00 | | | | | | | | | | | |
| *n* | 221 | 217 | | | | | | | | | | | |
| **2015 SDPWS** | **SEISMIC MAX** | 280 | | | | | | | | | | | |
| $T_{MAX(x)}$ [lbs] | 1919 | 1773 | | | | | | | | | | | |
| **D** | **1** | **S-S** | | | | | | | | | | | |
| | **Wind** | **Seis** | | | | | | | | | | | |
| $V_{D(x+1)}$ [lbs] | | | | | | | | | | | | | |
| **%** | | | | | | | | | | | | | |
| $V_{D(x)}$ [lbs] | | | | | | | | | | | | | |
| $V_{T(x)}$ [lbs] | | | | | | | | | | | | | |
| **L** | | | | | | | | | | | | | |
| *n* | | | | | | | | | | | | | |
| **2015 SDPWS** | **SEISMIC MAX** | | | | | | | | | | | | |
| $T_{MAX(x)}$ [lbs] | | | | | | | | | | | | | |

## Shear wall Summary

| | Sheeting Reqm'ts | | | | Shear Transfer | | Overturning Values | |
|---|---|---|---|---|---|---|---|---|
| | Wind | Seis Max | | | Wind | Seismic | Wind | Seismic |
| 1 - 2nd | 39 | 72 | 1 | 1 | 54 | 72 | | |
| 2 - 2nd | | | | | | | | |
| 3 - 2nd | 43 | 116 | 1 | 1 | 61 | 81 | | |
| 4 - 2nd | | | | | | | | |
| A - 2nd | 67 | 144 | 1 | 1 | 94 | 95 | | |
| B - 2nd | 115 | 161 | 1 | 2 | 161 | 161 | | |
| C - 2nd | 56 | 80 | 1 | 1 | 78 | 79 | | |
| D - 2nd | | | | | | | | |
| 1 - 1st | 53 | 99 | 1 | 1 | 74 | 99 | | |
| 2 - 1st | 119 | 227 | 1 | 3 | 167 | 227 | | 1167 |
| 3 - 1st | 80 | 151 | 1 | 2 | 112 | 151 | | 1174 |
| 4 - 1st | | | | | | | | |
| A - 1st | 551 | 1141 | 7 | 8 | 772 | 760 | 5654 | 5490 |
| B - 1st | 182 | 250 | 2 | 4 | 255 | 250 | 2557 | 2343 |
| C - 1st | 158 | 280 | 2 | 2 | 221 | 217 | 1919 | 1773 |
| D - 1st | | | | | | | | |

| | SW-1 | SW-2 | SW-3 | SW-4 | RSW | | |
|---|---|---|---|---|---|---|---|
| Sheathing | 260 | 350 | 511 | 700 | 1022 | | (plf) |
| Shear Flow | 150 | 300 | 400 | 700 | 800 | | (plf) |

## Shear Transfer Connectors - $C_D$ = 1.6, Hem-Fir

| Connector | Z (lbs) | | | | | | |
|---|---|---|---|---|---|---|---|
| 16d Nails (Common: 3.5"x0.162") | 195.2 lbs | | | | | | *2018 NDS T12N* |
| | 15.6 | 7.8 | 5.9 | 3.3 | 2.9 | 0.0 | |
| Simpson A35 Clip | 510 lbs | | | | | | *Current Simpson Guide* |
| | 40.8 | 20.4 | 15.3 | 8.7 | 7.7 | 0.0 | |
| Simpson H1 Truss Connector | 440 lbs | | | | | | *Current Simpson Guide* |
| | 35.2 | 17.6 | 13.2 | 7.5 | 6.6 | 0.0 | |
| Simpson LTP4 Clip (8d COMMON NAILS REQUIRED) | 450 lbs | | | | | | *Current Simpson Guide* |
| | 36.0 | 18.0 | 13.5 | 7.7 | 6.8 | 0.0 | |
| 1/2" Diameter Anchor Bolts (2x) | 944 lbs | | | | | | *2018 NDS T12E* |
| | 75.5 | 37.8 | 28.3 | 16.2 | 14.2 | 0.0 | |
| 5/8" Diameter Anchor Bolts (2x) | 1376 lbs | | | | | | *2018 NDS T12E* |
| | 110.1 | 55.0 | 41.3 | 23.6 | 20.6 | 0.0 | |
| 5/8" Diameter Anchor Bolts (3x) | 1712 lbs | | | | | | *2018 NDS T12E* |
| | 137.0 | 68.5 | 51.4 | 29.3 | 25.7 | 0.0 | |

UPSTATE engineering

**SHEARWALL & HOLDOWN NOTES (U.N.O.) :**

**(1)** Simpson or equal. Locate at end of shearwall u.n.o. Install per manufacturer recommendations for foundation minimum end distance and embedment, deepen foundation as required.

**(2)** Construct cripple wall same as shearwall (SW) above, and gable-end same as shearwall (SW) below.

**(3)** Requires 3x or (2) 2x foundation sill plate

**(4)** Threaded rod and coupler as required.

**(5)** Common nails, UNO: 8d=0.131"x2½", 10d=0.148"x3", 12d=0.148"x3¼", 16d=0.162"x3½", 16d sinker=0.148"x3¼".

**(6)** Install H1's on all trusses/rafters, A35's at 24"o/c on gables & rim joist (or solid blkg) to top plate (sill plate at fdn) u.n.o.; When specified spacing is less than 24"o/c, install A35's at roof solid blk'ing to SW top plate, and install H1 or H2.5 on all trusses/rafters. LTP4, LTP5 or LS50 can be substituted for A35. Conn. per Simpson Strong-Tie or equal.

**(7)** Minimum 3x or dbl-2x stud lam'd w/ (2)-16d @ 6" o/c at abutting panel edges.

**(8)** Anchor bolts shall be embedded at least 7" into concrete; there shall be a minimum of two bolts per piece with one bolt located not more than 12" or less than seven bolt diameters from each end of the piece. 2x min PT, u.n.o.

**(9)** All sheathing must be APA rated.

# HOLDOWN SCHEDULE

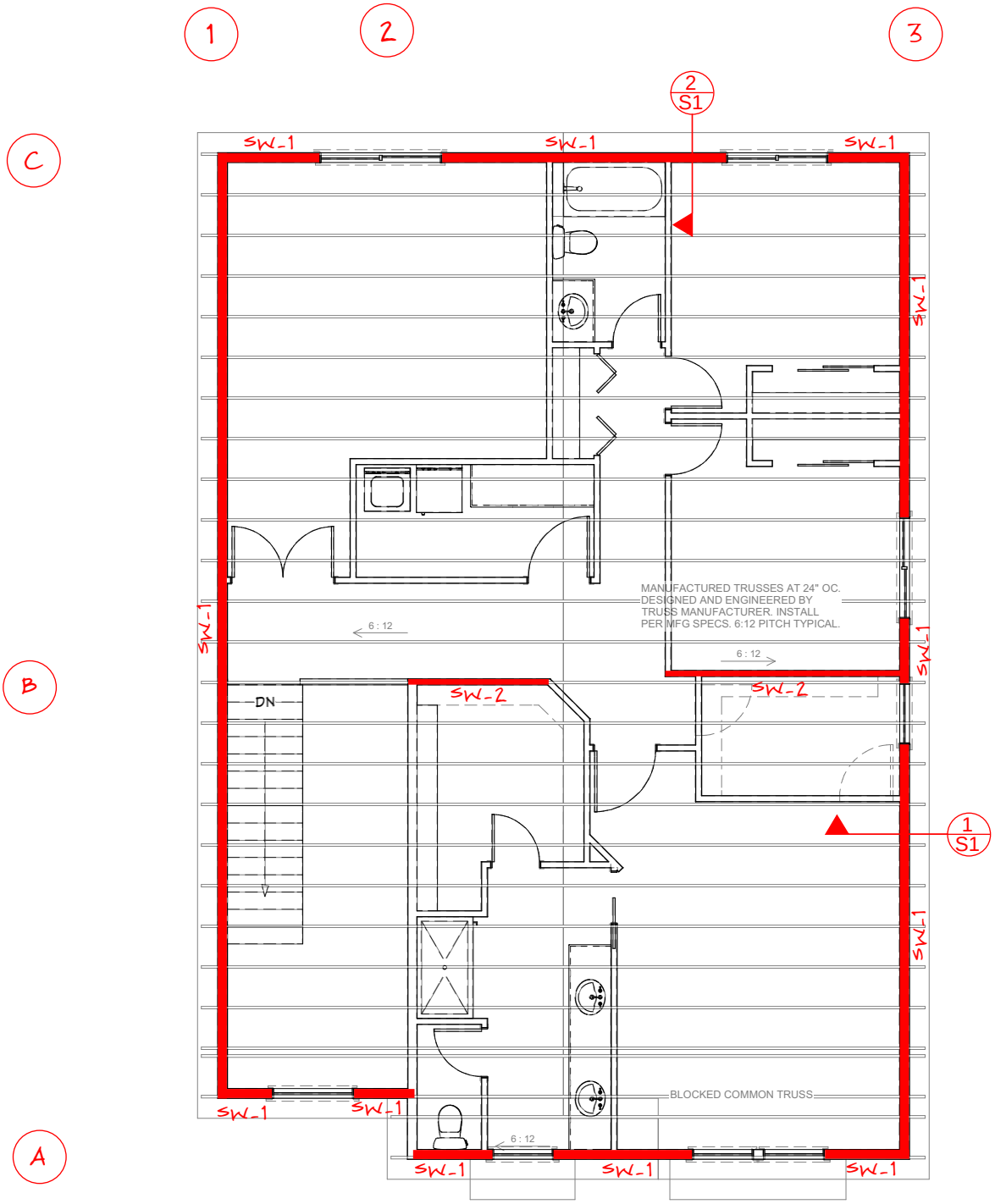
Date: 11/9/2022
Job #: 1616

| MARK | HOLDOWN / STRAP *(1) | FASTENERS TO (2)-STUDS MIN U.N.O. | FOUNDATION ANCHOR *(1)(4) | COMMENTS |
|---|---|---|---|---|
| T-1 | MSTC40 | (8) - 16d sinkers to each connected element | N/A | |
| T-2 | STHD14/14RJ | (38)/(30) - 16d | N/A | |
| T-3 | HDU8-SDS2.5 | (20) - SDS 0.25x2.5 WOOD SCREWS | SSTB28 | MIN. DF#2 4X POST |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

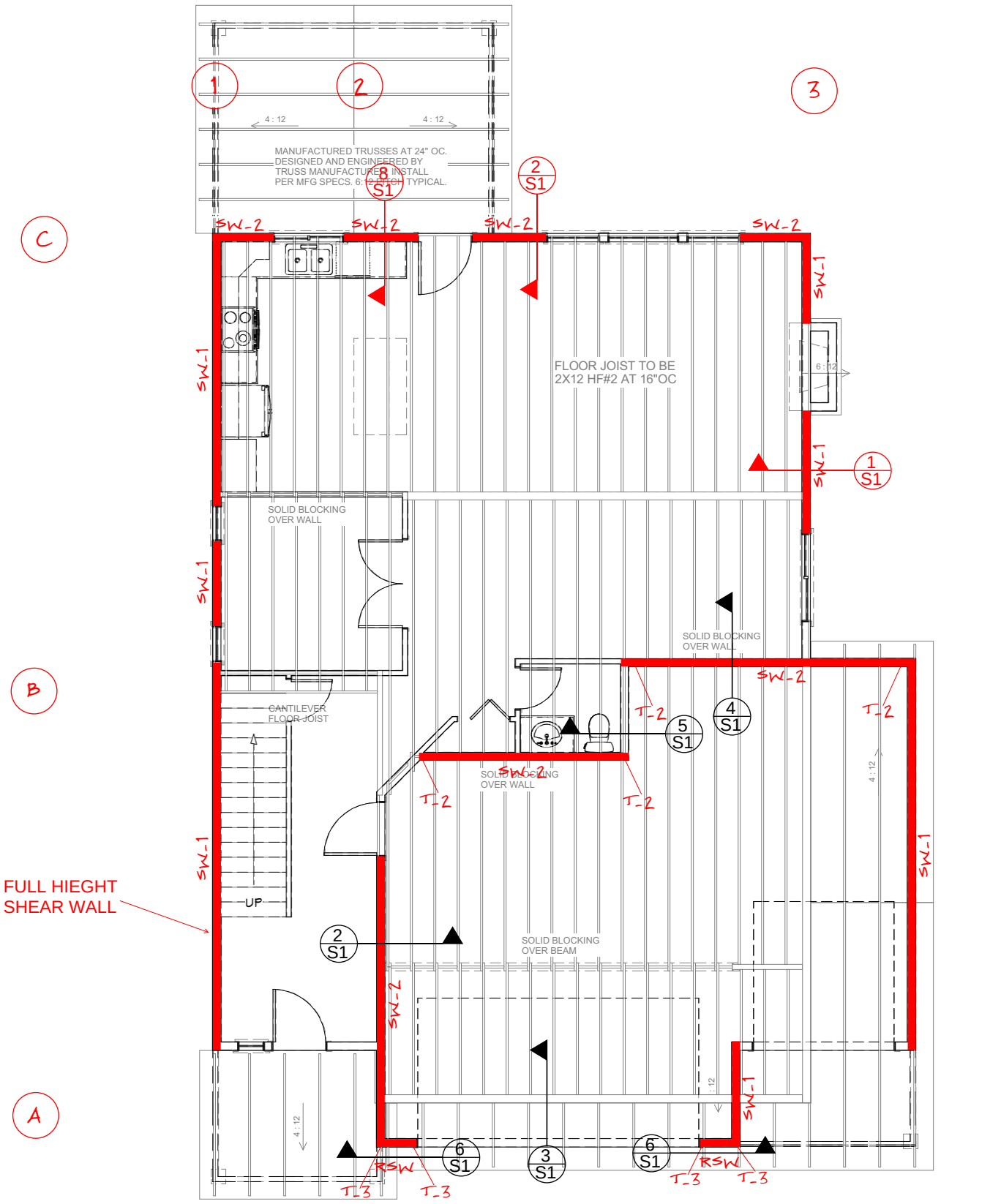
# SHEARWALL SCHEDULE

Date: 11/9/2022
Job #: 1616

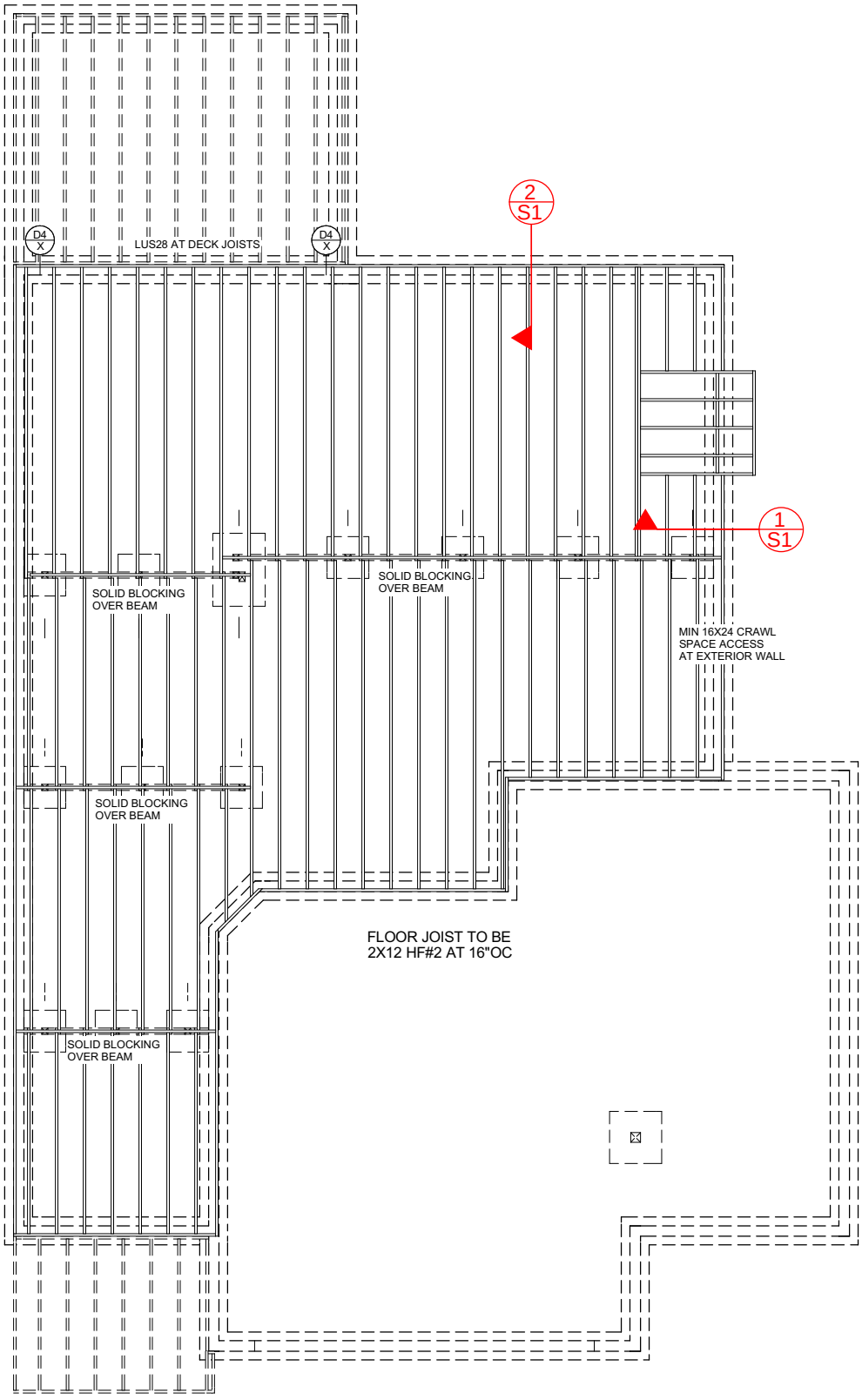
| MARK *(2) | SHEATHING - APPLY TO 2x HF STUDS @ 16"o/c U.N.O. BELOW *(9) | SHEATHING EDGE NAILS *(5) ALL EDGES BLOCKED (do not penetrate past flush) | BASE PLATE NAILS *(5) | ROOF TO TOP PLATE, FLOOR TO TOP PLATE & SILL PLATE *(6) | SILL PLATE ANCHORS w/ 3" x 3" x 1/4" WASHERS *(8) |
|---|---|---|---|---|---|
| SW-1 | 7/16" OSB | 8d @ 6" o/c (12" o/c field) | 16d @ 12 " o/c | H1 @ 24 " o/c<br>or A35 @ 24 " o/c | 5/8"Øx10" AB's @ 60 " o/c |
| SW-2 | 7/16" OSB | 8d @ 4" o/c (12" o/c field) | 16d @ 6 " o/c | A35 @ 20 " o/c | 5/8"Øx10" AB's @ 48 " o/c |
| SW-3 | 7/16" OSB *(7) | 8d @ 3" o/c (12" o/c field) | 16d @ 4 " o/c | A35 @ 15 " o/c | 5/8"Øx10" AB's @ 36 " o/c |
| SW-4 | 7/16" OSB Both Sides *(7) | 8d @ 4" o/c staggered (12" o/c field) | 16d @ 2½ " o/c | A35 @ 6 " o/c | 5/8"Øx10" AB's @ 22 " o/c *(3) |
| RSW | 7/16" OSB Both Sides *(7) | 8d @ 3" o/c staggered (12" o/c field) | SEE DETAIL 6/S1 | | |
| | | | | | |




1616 BUCKWOOD
LOT 10
UPPER FLOOR
LATERAL




1616 BUCKWOOD
LOT 10
LOWER FLOOR
LATERAL




1616 BUCKWOOD
LOT 10
FOUNDATION
LATERAL