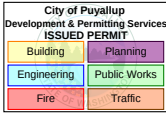


**PRPF20251347**



**City of Puyallup  
Building  
REVIEWED  
FOR  
COMPLIANCE**

SKinnear  
10/20/2025  
9:01:52 AM



**JOB #25-5238--STRUCTURAL CALCULATIONS  
TIMBERLAND CUSTOM HOMES  
DESIGN #7161**

**MARCOE CANDY**

**FEBRUARY 4, 2025**

**Calculations required to be provided by  
the Permittee on site for all Inspections**

DANIEL TYRRELL, P.E.  
PO BOX 537  
MILTON, WA 98354

**INDEX**

**PGS 1-2 CONSTRUCTION NOTES  
PGS 3-10 LATERAL CALCULATIONS  
PGS 11-16 VERTICAL CALCULATIONS**



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Engineering calculations are based on code required design loads imposed on the structure once it has been completely installed on site. Design for resistance to forces imposed during transportation and placement are beyond the scope of these calculations and are the sole responsibility of the manufacturer.

IBC CODE REQUIREMENTS ARE TO BE FOLLOWED. 2021 EDITION AND ALL APPLICABLE CODES AND AUTHORITIES HAVING JURISDICTION.

CONTRACTOR SHALL VERIFY ALL NOTES, DIMENSIONS & CONDITIONS PRIOR TO CONSTRUCTION & PROVIDE TEMP. BRACING AS REQUIRED UNTIL ALL PERMANENT CONNECTIONS HAVE BEEN INSTALLED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO IDENTIFY AND REPORT ALL DISCREPANCIES TO THE DESIGNER AT THE TIME THEY ARE NOTED. DIMENSIONS TAKE PRECEDENCE OVER SCALED DRAWINGS.

WIND = 110 MPH, EXPOSURE C

SEISMIC = SITE CLASS D, SEISMIC DESIGN CATEGORY D ( $S_s=1.270.958$ ,  $S_1=.437$ )

**ROOF**                      20 PSF DEAD LOAD        25 PSF SNOW LOAD        = 45 PSF

FLOOR                      10 PSF DEAD LOAD    +            40 PSF LIVE LOAD            =    50 PSF

$$\text{DECK} \quad 10 \text{ PSF DEAD LOAD} \quad + \quad 60 \text{ PSF LIVE LOAD} \quad = \quad 70 \text{ PSF}$$

INTERIOR PARTITION = 7 PSF

EXTERIOR WALL = 9 PSF

UNLESS A SOILS INVESTIGATION BY A QUALIFIED SOILS ENGINEER IS PROVIDED, FOUNDATION DESIGN IS BASED ON AN ASSUMED AVERAGE SOIL BEARING OF 1000 PSF. EXTERIOR FOOTINGS SHALL BEAR 1'-0" (MINIMUM) BELOW FINISHED GRADE. ALL FOOTINGS TO BEAR ON FIRM UNDISTURBED EARTH BELOW ORGANIC SURFACE SOILS. BACK FILL TO BE THOROUGHLY COMPACTED. FOUNDATION VENTS SHALL NOT INTERFERE WITH DIRECT LOAD PATH OF COLUMNS.

| CLASS AND USE               | F'C  | SLUMP | MINIMUM<br>SACKS/C.Y. |
|-----------------------------|------|-------|-----------------------|
| A: FOOTINGS AND FOUNDATIONS | 2500 | 3 - 4 | 5-1/2                 |
| B: SLABS ON GRADE           | 2500 | 3 - 4 | 5-1/2                 |

1. AIR ENTRAINING AGENT (5% TO 7%) TO BE USED IN ALL CONCRETE FLAT WORK EXPOSED TO WEATHER.
2. MIX MAY BE DESIGNED IN ACCORDANCE WITH THE PROVISIONS OF SECTIONS 1904 OF THE IBC.
3. WATER - CEMENT RATIO PER IBC.

ASTM A615 GRADE 40 (#4 BARS & SMALLER) AND GRADE 60 (#5 BARS & GREATER) REINFORCING STEEL DETAILS SHALL BE PREPARED BY AN EXPERIENCED APPROVED DETAILER AND CONFORM TO STANDARD PRACTICE OUTLINED IN ACI REPORT 315.

- |        |                                                         |
|--------|---------------------------------------------------------|
| 3"     | CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH. |
| 1-1/2" | CONCRETE EXPOSED TO EARTH OR WEATHER.                   |
| 1-1/2" | BEAMS AND COLUMNS NOT EXPOSED TO EARTH OR WEATHER.      |
| 3/4"   | SLABS AND WALLS NOT EXPOSED TO EARTH OR WEATHER.        |

LAP COLUMN VERTICALS. CLASS "A" CONCRETE AND MASONRY COLUMN AND WALL VERTICALS 32 DIAMETERS. LAP ALL OTHER REINFORCING 24 DIAMETERS. SPLICES AT TENSION REGIONS SHALL NOT BE PERMITTED.

2/16

## ANCHOR BOLTS:

ANCHOR BOLTS ARE TO BE 1/2" MINIMUM DIA. X 12" ASTM-A307 AT 4'-0" O.C. UNLESS NOTED OTHERWISE BY ENGINEER W/ 7" MIN. EMBEDMENT. SILL PLATE WASHERS TO BE 3" X 3" X .229". THERE SHALL BE A MIN. OF TWO ANCHOR BOLTS PER FOUNDATION SILL PLATE WITH ONE BOLT LOCATED WITHIN 12" OF EACH END OF EACH SILL PLATE. SIMPSON MASA MAY ALSO BE WHERE NOTED.

## CARPENTRY:

### GENERAL:

ALL FRAMING TO COMPLY WITH IBC CHAPTER 23. NAIL SIZES AND SPACING TO CONFORM TO IBC TABLE 2304.10.2.

ALL WOOD IN CONTACT WITH CONCRETE TO BE PRESSURED TREATED.

- 6" MIN. CLEARANCE BETWEEN WOOD AND EARTH.
- 18" MIN. CLEARANCE BETWEEN FLOOR JOIST AND EARTH.
- 12" MIN. CLEARANCE BETWEEN FLOOR BEAMS AND EARTH.

### LUMBER STRENGTH (UNITS IN psi):

|                         |                       |                        |                |
|-------------------------|-----------------------|------------------------|----------------|
| PARALLAM PSL            | F <sub>V</sub><br>290 | F <sub>B</sub><br>2900 | E<br>2,000,000 |
| GLUED LAMINATED TIMBERS |                       |                        |                |
| DOUG-FIR LARCH (24F-V4) | 165                   | 2400                   | 1,800,000      |
| MICRO-LAM LVL           |                       |                        |                |
| DOUG-FIR LARCH          | 285                   | 2600                   | 1,900,000      |

WOOD BEARING ON OR INSTALLED WITHIN 1" OF MASONRY OR CONCRETE SHALL BE TREATED WITH AN APPROVED PRESERVATIVE, SOLID BLOCKING OF NOT LESS THAN 2X THICKNESS SHALL BE PROVIDED AT ENDS AND AT ALL SUPPORT OF JOISTS AND RAFTERS.

### Construction Hardware

All structural connectors to be manufactured by Simpson Strong-Tie. Where connectors are in contact with pressure treated wood (ACQ-C, ACQ-D, CBA-A, CA-B and non-DOT Borates), Simpson Z-max (G185) coated or Stainless Steel connectors are required.

### PLYWOOD:

WALL AND ROOF SHEATHING SHALL BE 7/16" CDX PLYWOOD, UNLESS OTHERWISE SPECIFIED. MINIMUM NAILING SHALL BE 8d @ 6" O.C. @ PANEL EDGES AND 12" O.C. IN FIELD. SPAN INDEX SHALL BE 32/16. FLOOR SHEATHING SHALL BE 23/32" CDX T&G PLYWOOD, UNLESS OTHERWISE SPECIFIED. FLOOR SHEATHING SHALL BE GLUED AND NAILED W/ 8d RING SHANK @ 4" O.C. AT PANEL EDGES AND 6" O.C. IN FIELD. SPAN INDEX SHALL BE 40/20. STAGGER END LAPS AT ROOF AND FLOOR SHEATHING. OSB SHEATHING PRODUCTS OF EQUIVALENT SPAN RATINGS SHALL BE ALLOWED.

### STRUCTURAL GLUED – LAMINATED LUMBER:

SHALL BE DOUGLAS FIR FABRICATED TO THE REQUIREMENTS OF U.S. PRODUCT STANDARD PS 56. LUMBER SHALL BE OF SUCH GRADE TO PROVIDE NORMAL WORKING STRESS VALUES OF 2400 PSI IN BENDING: 1100 PSI IN TENSION: 1600 PSI IN COMPRESSION PARALLEL TO GRAIN: 560 PSI IN COMPRESSION PERPENDICULAR TO GRAIN AND 165 PSI HORIZONTAL SHEAR (COMBINATION 24F-V4). LAMINATED MEMBERS TO BE AITC CERTIFIED. USE WATERPROOF GLUE.

### WOOD TRUSSES:

TRUSSES SHALL BE DESIGNED BY A REGISTERED WASHINGTON STATE ENGINEER AND FABRICATED FROM ONLY THOSE DESIGNS. TRUSSES TO BE STAMPED BY THE MANUFACTURER OR BY A QUALITY CONTROL AGENCY SUCH AS THE TRUSS PLATE INSTITUTE. ROOF TRUSS DESIGN SHALL BE SUBMITTED FOR APPROVAL PRIOR TO FABRICATION. AS PER WASHINGTON STATE LABOR & INDUSTRIES, MAXIMUM LOAD DURATION FACTOR FOR LUMBER AND CONNECTOR PLATES IS 1.00.

NONBEARING WALLS SHALL BE HELD AWAY FROM THE TRUSS BOTTOM CHORD WITH AN APPROVED FASTENER (SUCH AS SIMPSON STC) TO ENSURE THAT THE TRUSS BOTTOM CHORD WILL NOT BEAR ON THE WALL.

APPROVED HANGERS SHALL BE USED AT ALL CONNECTIONS OF RAFTERS, JACK OR HIP TRUSSES TO MAIN GIRDER TRUSS.

ALL ROOF TRUSSES SHALL BE FRAMED AND TIED INTO THE FRAME WORK AND SUPPORTING WALLS SO AS TO FORM AN INTEGRAL PART OF THE WHOLE BUILDING. ROOF TRUSSES SHALL HAVE JOINTS WELL FITTED AND SHALL HAVE ALL TENSION MEMBERS WELL TIGHTENED BEFORE ANY LOAD IS PLACED UPON THE TRUSS. DIAGONAL AND SWAY BRACING SHALL BE USED TO BRACE ALL TRUSSES.



---

**Site Soil Class:** D - Default (see Section 11.4.3)

**Results:**

|            |       |             |       |
|------------|-------|-------------|-------|
| $S_s$ :    | 1.27  | $S_{D1}$ :  | N/A   |
| $S_1$ :    | 0.437 | $T_L$ :     | 6     |
| $F_a$ :    | 1.2   | $PGA$ :     | 0.5   |
| $F_v$ :    | N/A   | $PGA_M$ :   | 0.6   |
| $S_{MS}$ : | 1.524 | $F_{PGA}$ : | 1.2   |
| $S_{M1}$ : | N/A   | $I_e$ :     | 1     |
| $S_{DS}$ : | 1.016 | $C_v$ :     | 1.354 |

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

**Data Accessed:** Sat Jan 25 2025

**Date Source:** [USGS Seismic Design Maps](#)



# ASCE Hazards Report

**Address:**

No Address at This Location

**Standard:** ASCE/SEI 7-16

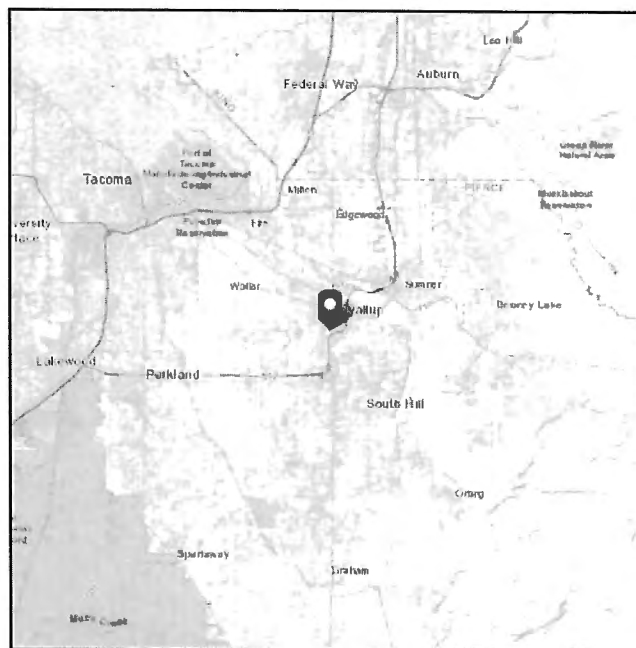
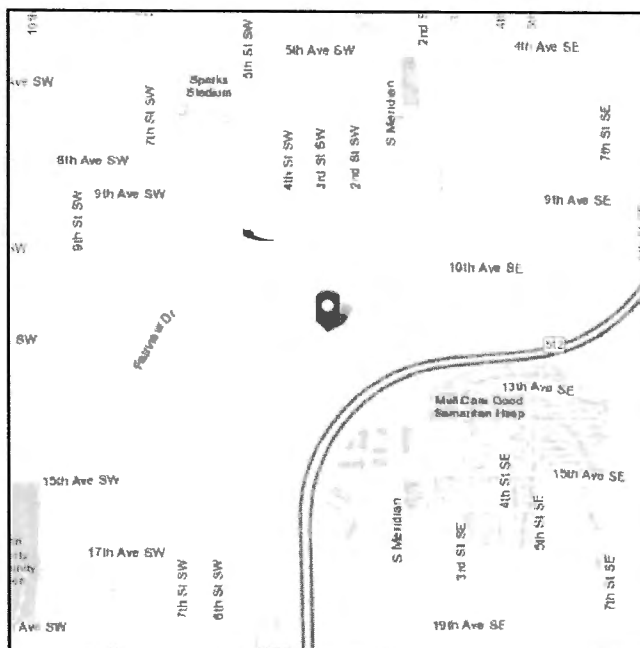
**Risk Category: II**

**Soil Class:** D - Default (see Section 11.4.3)

**Latitude:** 47.181015

**Longitude:** -122.296052

**Elevation:** 42.22146304400016 ft  
(NAVD 88)



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PROJECT: Timberland #7161 Marcoe

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BY: DT DATE: 2/4/2025

$$\begin{aligned} C_s &= S_{DS}/R & (\text{equ. 12.8-2 ASCE 7-16}) & h = 13 \text{ ft} \\ C_s(\text{max}) &= \text{N/A per 11.4.8 ASCE 7-16} & (\text{equ. 12.8-3 ASCE 7-16}) & R = 6.50 \\ C_s(\text{min}) &= 0.044(S_{DS})(I) & (\text{equ. 12.8-5 ASCE 7-16}) & I = 1.00 \end{aligned}$$

$$\begin{aligned} C_s(\text{min}) &= 0.045 \\ C_s &= 0.156 \quad \leftarrow \text{governs} \\ C_s(\text{max}) &= \text{N/A} \end{aligned}$$

$$V = C_s W = Q_E = \quad (\text{equ. 12.8-1 ASCE 7-16})$$

## SINGLE STORY:

$$\begin{aligned} \text{Roof Area} &= 1333.0 \text{ ft}^2 & \text{Wall Length} &= 40.0 \text{ ft} \\ \text{Roof Dead Weight} &= 20.0 \text{ psf} & \text{Wall Dead Weight} &= 9.0 \text{ psf} \\ \text{Snow Load} &= 25 \text{ psf} & \text{Tributary Wall Height} &= 4.5 \text{ ft} \\ & & \text{\# of Walls} &= 2 \end{aligned}$$

$$\begin{aligned} W &= \text{Roof} + \text{Wall} = 29,900 \text{ \#} \\ V &= 0.156 * 29900 = 4664 \text{ \#} \end{aligned}$$

$\rho$  calc: Wall Height = 9.0

| Wall Line | Trib. Shear | Wall Segments |      |      |      |      | Panel Ratio |          |
|-----------|-------------|---------------|------|------|------|------|-------------|----------|
| LA        | 0.50        | 14.00         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00        | <=.33 OK |
| LB        | 0.50        | 2.50          | 2.00 | 2.00 | 2.50 | 0.00 | 0.14        | <=.33 OK |
| N/A       | 0.00        | 0.00          | 0.00 | 0.00 | 0.00 | 0.00 | 0.00        | N/A      |
| N/A       | 0.00        | 0.00          | 0.00 | 0.00 | 0.00 | 0.00 | 0.00        | N/A      |
| N/A       | 0.00        | 0.00          | 0.00 | 0.00 | 0.00 | 0.00 | 0.00        | N/A      |
| N/A       | 0.00        | 0.00          | 0.00 | 0.00 | 0.00 | 0.00 | 0.00        | N/A      |
| TA        | 0.50        | 13.00         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00        | <=.33 OK |
| TB        | 0.50        | 13.00         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00        | <=.33 OK |
| N/A       | 0.00        | 0.00          | 0.00 | 0.00 | 0.00 | 0.00 | 0.00        | N/A      |
| N/A       | 0.00        | 0.00          | 0.00 | 0.00 | 0.00 | 0.00 | 0.00        | N/A      |
| N/A       | 0.00        | 0.00          | 0.00 | 0.00 | 0.00 | 0.00 | 0.00        | N/A      |
| N/A       | 0.00        | 0.00          | 0.00 | 0.00 | 0.00 | 0.00 | 0.00        | N/A      |

$$\begin{aligned} \rho &= 1.0 \quad \text{per ASCE 7-16, 12.3.4.2} \\ 0.7\rho Q_E &= .7(1)(4664) = 3265 \text{ \#} \end{aligned}$$

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## WIND

Enclosed Simple Diaphragm Method  
(Part 2, Chapter 28, ASCE 7-16)

Code IBC 2021, ASCE 7-16

Wind Ult. = 110 mph

Exposure = C

$$P_s = \lambda K_{zt} P_{s30} \quad (\text{Section 28.5.3 ASCE 7-16})$$

by figure 28.5-1 ASCE 7-16

where:

$$\begin{aligned} \lambda &= 1.21 \\ K_{zt} &= 1.00 \\ h &= 13 \text{ ft} \\ 2a &= (0.2) (28.0) \\ &= 5.6 \approx 6 \\ \text{pitch} &= 2.0 / 12 \\ \Rightarrow \theta &= \tan^{-1} (2/12) \\ &= 9.46 \end{aligned}$$

$$\begin{aligned} A &= (1.21) (1.00) (21.60) = 26.1 \text{ psf} \\ B &= (1.21) (1.00) (.00) = .0 \text{ psf} \\ C &= (1.21) (1.00) (14.40) = 17.4 \text{ psf} \\ D &= (1.21) (1.00) (.00) = .0 \text{ psf} \end{aligned}$$

## ASD Pressure

$$P = (.6)[\text{Area}_A * A + \text{Area}_B * B + \text{Area}_C * C + \text{Area}_D * D] = \text{Pressure Calculated}$$

check 10psf minimum per ASCE 7-16 =

$$P_{\min} = (.6)[16\text{psf}(\text{AREA}_A + \text{AREA}_C) + 8\text{psf}(\text{AREA}_B + \text{AREA}_D)]$$

Front -Rear (number of wall lines = 2)

|                         |              |   |            |   |   |               |
|-------------------------|--------------|---|------------|---|---|---------------|
| P(LA) = (.6) [          | (27) (26.10) | + | (50) (.00) | + |   |               |
|                         | (63) (17.40) |   | (0) (.00)  | ] | = | 1080.5        |
| P(LA) <sub>min</sub> =  | 1104.0       |   |            |   |   | Pmin. Governs |
| P(LB) = (.6) [          | (27) (26.10) | + | (50) (.00) | + |   |               |
|                         | (63) (17.40) |   | (0) (.00)  | ] | = | 1080.5        |
| P(LB) <sub>min</sub> =  | 1104.0       |   |            |   |   | Pmin. Governs |
| P(N/A) = (.6) [         | (0) (.00)    | + | (0) (.00)  | + |   |               |
|                         | (0) (.00)    |   | (0) (.00)  | ] | = | 0.0           |
| P(N/A) <sub>min</sub> = | 0.0          |   |            |   |   |               |
| P(N/A) = (.6) [         | (0) (.00)    | + | (0) (.00)  | + |   |               |
|                         | (0) (.00)    |   | (0) (.00)  | ] | = | 0.0           |
| P(N/A) <sub>min</sub> = | 0.0          |   |            |   |   |               |
| P(N/A) = (.6) [         | (0) (.00)    | + | (0) (.00)  | + |   |               |
|                         | (0) (.00)    |   | (0) (.00)  | ] | = | 0.0           |
| P(N/A) <sub>min</sub> = | 0.0          |   |            |   |   |               |
| P(N/A) = (.6) [         | (0) (.00)    | + | (0) (.00)  | + |   |               |
|                         | (0) (.00)    |   | (0) (.00)  | ] | = | 0.0           |
| P(N/A) <sub>min</sub> = | 0.0          |   |            |   |   |               |

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by figure 28.5-1 ASCE 7-16

A = (1.21) (1.00) (19.20) = 23.2 psf  
B = (1.21) (1.00) (.00) = .0 psf  
C = (1.21) (1.00) (12.70) = 15.4 psf  
D = (1.21) (1.00) (.00) = .0 psf

pitch = 0.0 / 12  
==>  $\theta = \tan^{-1} (1/12)$   
= 0.00

Side - Side (number of wall lines = 2 )

|                         |              |                 |           |   |         |
|-------------------------|--------------|-----------------|-----------|---|---------|
| P(TA) = (.6) [          | (30) (23.20) | +               | (0) (.00) | + |         |
|                         | (48) (15.40) |                 | (0) (.00) | ] | = 861.1 |
| P(TA) <sub>min</sub> =  | 748.8        | Pcalced Governs |           |   |         |
| P(TB) = (.6) [          | (30) (23.20) | +               | (0) (.00) | + |         |
|                         | (48) (15.40) |                 | (0) (.00) | ] | = 861.1 |
| P(TB) <sub>min</sub> =  | 748.8        | Pcalced Governs |           |   |         |
| P(N/A) = (.6) [         | (0) (.00)    | +               | (0) (.00) | + |         |
|                         | (0) (.00)    |                 | (0) (.00) | ] | = 0.0   |
| P(N/A) <sub>min</sub> = | 0.0          |                 |           |   |         |
| P(N/A) = (.6) [         | (0) (.00)    | +               | (0) (.00) | + |         |
|                         | (0) (.00)    |                 | (0) (.00) | ] | = 0.0   |
| P(N/A) <sub>min</sub> = | 0.0          |                 |           |   |         |
| P(N/A) = (.6) [         | (0) (.00)    | +               | (0) (.00) | + |         |
|                         | (0) (.00)    |                 | (0) (.00) | ] | = 0.0   |
| P(N/A) <sub>min</sub> = | 0.0          |                 |           |   |         |
| P(N/A) = (.6) [         | (0) (.00)    | +               | (0) (.00) | + |         |
|                         | (0) (.00)    |                 | (0) (.00) | ] | = 0.0   |
| P(N/A) <sub>min</sub> = | 0.0          |                 |           |   |         |

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## SHEAR TABLE

| Wall Line | Wind Shear | Seismic Shear | Wall Length | Vw    | Vs    | SW Type |
|-----------|------------|---------------|-------------|-------|-------|---------|
| LA        | 1104       | 1632          | 14.00       | 78.9  | 116.6 | 1       |
| LB        | 1104       | 1632          | 9.00        | 122.7 | 181.4 | 1       |
| N/A       | 0          | 0             | 0.00        | 0.0   | 0.0   | 0       |
| N/A       | 0          | 0             | 0.00        | 0.0   | 0.0   | 0       |
| N/A       | 0          | 0             | 0.00        | 0.0   | 0.0   | 0       |
| N/A       | 0          | 0             | 0.00        | 0.0   | 0.0   | 0       |
| TA        | 861        | 1632          | 13.00       | 66.2  | 125.6 | 1       |
| TB        | 861        | 1632          | 13.00       | 66.2  | 125.6 | 1       |
| N/A       | 0          | 0             | 0.00        | 0.0   | 0.0   | 0       |
| N/A       | 0          | 0             | 0.00        | 0.0   | 0.0   | 0       |
| N/A       | 0          | 0             | 0.00        | 0.0   | 0.0   | 0       |
| N/A       | 0          | 0             | 0.00        | 0.0   | 0.0   | 0       |

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## Overturning

Wall Line LA (14' wall)

$$U = 1632^{\#}, M_o = 1632(9) = 14,688 \text{ Ft.}\cdot\#$$

$$W_r = 2.5(20) + 81 = 131^{\#}/\text{ft}$$

$$M_r = 131(14)^2 / 2 (1.6 - .14(1.02)) = 5905 \text{ Ft.}\cdot\#$$

$$R_u = (14,688 - 5905) / 12.5 = 703^{\#}$$

⇒ Simp m5727 SW to rim + Simp m57A12 rim to 8'x8'  
+ Simp Titen HD 1/2" x 12" (THD501200 HMB)

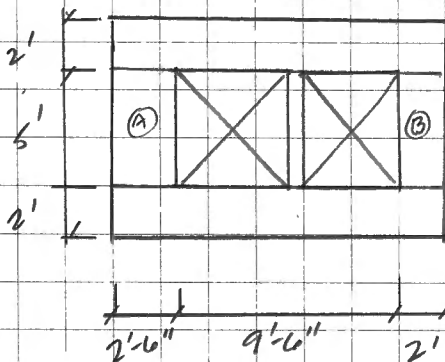
Wall Line LB (14' wall w/ 4°50' & 5°50' strapped per 016)

$$U = 1632/2 = 816^{\#}, M_o = 816(9) = 7344 \text{ Ft.}\cdot\#$$

$$M_r = 5905 \text{ Ft.}\cdot\# \text{ (prev calcd)}$$

$$R_u = (7344 - 5905) / 13.5 = 107^{\#} \text{ negl.}$$

⇒ no holdown reqd



OTM B:

$$M_o = (2)(181)(5) = 1810 \text{ Ft.}\cdot\#$$

$$M_r = 131(2)^2 / 2 (1.46) = 121 \text{ Ft.}\cdot\#$$

$$R_u = (1810 - 121) / 2 = 844^{\#}$$

$$U = 844(9.5) = 211^{\#}/\text{ft} \Rightarrow < 1 \text{ ok}$$

Verify CS20 strap:

$$P = 181(2.5) - 58(2.5) = 309^{\#} < 1030^{\#} \text{ OK}$$

$$\text{Verify seismic H/W ratio: } 181(5) / 2(2) = 226 \text{ plf} \Rightarrow < 1 \text{ ok}$$

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Well Line TA & TB (13' wall)

$$V = 1632 \# \quad M_o = 1632(9) = 14,688 \text{ ft.}\#$$

$$W_f = (14\frac{1}{2} + 1.5)(20) + 81 = 251 \#/\text{ft}$$

$$M_f = 251(13)^2 / (2 \cdot 1.46) = 9756 \text{ ft.}\#$$

$$R_u = (14,688 - 9756) / 11.5 = 429 \#$$

⇒ Smp MST27 strap SW to rim

+ Smp MSTA12 rim to 8x8

+ Smp Titen HD  $1\frac{1}{2}" \times 12"$   
(THD 501200 HMLG)

Project: 7161

Location: PIER PAD @ GIRDER POINTLOADS

Footing

[2021 International Building Code(2018 NDS)]

Footing Size: 3.51 FT x 3.51 FT x 12.00 IN

Reinforcement: #4 Bars @ 7.00 IN. O.C. E/W / (6) min.

Section Footing Design Adequate

Carolyn Tyrrell  
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#### FOOTING PROPERTIES

Allowable Soil Bearing Pressure:  $Q_s = 1000$  psf  
Concrete Compressive Strength:  $F'_c = 2500$  psi  
Reinforcing Steel Yield Strength:  $F_y = 40000$  psi  
Concrete Reinforcement Cover:  $c = 3$  in

#### FOOTING SIZE

Width:  $W = 3.51$  ft  
Length:  $L = 3.51$  ft  
Depth:  $\text{Depth} = 12$  in  
Effective Depth to Top Layer of Steel:  $d = 8.25$  in

#### COLUMN AND BASEPLATE SIZE

Column Type: Wood  
Column Width:  $m = 4$  in  
Column Depth:  $n = 8$  in

#### FOOTING CALCULATIONS

##### Bearing Calculations:

Ultimate Bearing Pressure:  $Q_u = 845$  psf  
Effective Allowable Soil Bearing Pressure:  $Q_e = 850$  psf  
Required Footing Area:  $A_{req} = 12.25$  sf  
Area Provided:  $A = 12.32$  sf

##### Baseplate Bearing:

Bearing Required:  $\text{Bear} = 14739$  lb  
Allowable Bearing:  $\text{Bear-A} = 88400$  lb

##### Beam Shear Calculations (One Way Shear):

Beam Shear:  $V_{u1} = 4483$  lb  
Allowable Beam Shear:  $V_{c1} = 26062$  lb

##### Punching Shear Calculations (Two Way Shear):

Critical Perimeter:  $B_o = 57$  in  
Punching Shear:  $V_{u2} = 13085$  lb  
Allowable Punching Shear (ACI 11-35):  $vc2-a = 70538$  lb  
Allowable Punching Shear (ACI 11-36):  $vc2-b = 137363$  lb  
Allowable Punching Shear (ACI 11-37):  $vc2-c = 70538$  lb  
Controlling Allowable Punching Shear:  $vc2 = 70538$  lb

##### Bending Calculations:

Factored Moment:  $M_u = 77602$  in-lb  
Nominal Moment Strength:  $M_n = 338564$  in-lb

##### Reinforcement Calculations:

Concrete Compressive Block Depth:  $a = 0.53$  in  
Steel Required Based on Moment:  $A_s(1) = 0.26$  in<sup>2</sup>  
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4):  $A_s(2) = 1.01$  in<sup>2</sup>  
Controlling Reinforcing Steel:  $A_{s-reqd} = 1.01$  in<sup>2</sup>  
Selected Reinforcement: #4's @ 7.0 in. o.c. e/w (6) Min.  
Reinforcement Area Provided:  $A_s = 1.18$  in<sup>2</sup>

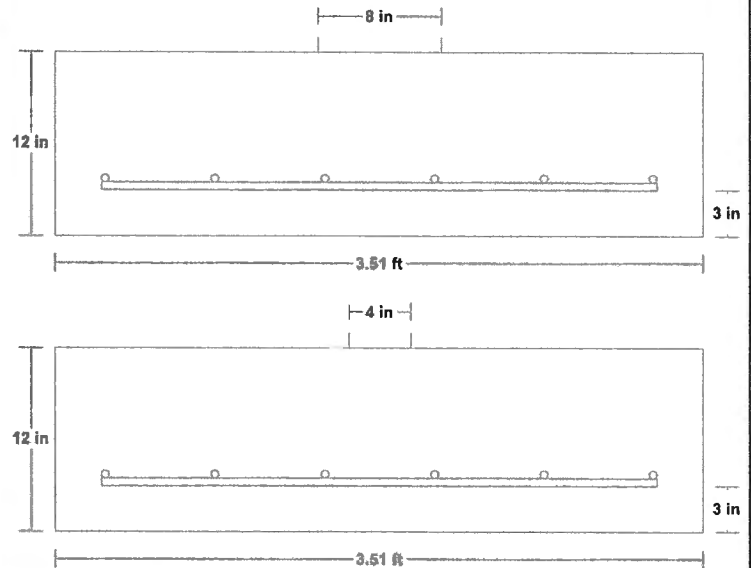
##### Development Length Calculations:

Development Length Required:  $L_d = 15$  in  
Development Length Supplied:  $L_{d-sup} = 18.06$  in

Note: Plain concrete adequate for bending,  
therefore adequate development length not required.

#### NOTES

#### LOADING DIAGRAM



#### FOOTING LOADING

Live Load:  $PL = 5600$  lb \*  
Dead Load:  $PD = 4816$  lb \*  
Total Load:  $PT = 10416$  lb \*  
Ultimate Factored Load:  $P_u = 14739$  lb  
Footing plus soil above footing weight:  $W_t = 1191$  lb

\* Load obtained from Load Tracker. See Summary Report for details.

Project: 7161

Location: 1) WINDOW / DOOR HDRS

Roof Beam

[2021 International Building Code(2018 NDS)]

( 3 ) 1.75 IN x 7.25 IN x 6.5 FT

1.9E Microllam - iLevel Trus Joist

Section Adequate By: 453.1%

Controlling Factor: Moment

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### CAUTIONS

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

### DEFLECTIONS

Center

Live Load 0.03 IN L/2735

Dead Load 0.02 in

Total Load 0.05 IN L/1467

Live Load Deflection Criteria: L/240 Total Load Deflection Criteria: L/180

### REACTIONS

A

B

Live Load 731 lb 731 lb

Dead Load 632 lb 632 lb

Total Load 1363 lb 1363 lb

Bearing Length 0.35 in 0.35 in

### BEAM DATA

Span Length 6.5 ft

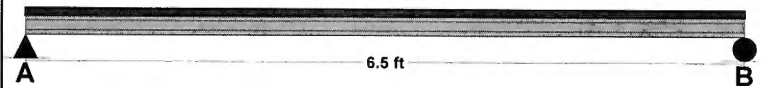
Unbraced Length-Top 2 ft

Unbraced Length-Bottom 0 ft

Roof Pitch 2 :12

Roof Duration Factor 1.15

### LOADING DIAGRAM



### ROOF LOADING

Side One:

Roof Live Load: LL = 25 psf

Roof Dead Load: DL = 20 psf

Tributary Width: TW = 7 ft

Side Two:

Roof Live Load: LL = 25 psf

Roof Dead Load: DL = 20 psf

Tributary Width: TW = 2 ft

Wall Load: WALL = 0 plf

### MATERIAL PROPERTIES

1.9E Microllam - iLevel Trus Joist

Base Values

Adjusted

Bending Stress: Fb = 2600 psi Fb' = 3196 psi

Cd=1.15 Cf=1.00 CF=1.07

Shear Stress: Fv = 285 psi Fv' = 328 psi

Cd=1.15

Modulus of Elasticity: E = 1900 ksi E' = 1900 ksi

Comp.  $\perp$  to Grain: Fc  $\perp$  = 750 psi Fc  $\perp$ ' = 750 psi

Controlling Moment: 2215 ft-lb

3.25 ft from left support

Created by combining all dead and live loads.

Controlling Shear: 1118 lb

At a distance d from support.

Created by combining all dead and live loads.

### SLOPE/PITCH ADJUSTED LENGTHS AND LOADS

Adjusted Beam Length: Ladj = 6.5 ft

Beam Self Weight: BSW = 12 plf

Beam Uniform Live Load: wL = 225 plf

Beam Uniform Dead Load: wD\_adj = 194 plf

Total Uniform Load: wT = 419 plf

Comparisons with required sections:

Req'd

Provided

Section Modulus: 8.32 in3 45.99 in3

Area (Shear): 5.12 in2 38.06 in2

Moment of Inertia (deflection): 20.45 in4 166.72 in4

Moment: 2215 ft-lb 12250 ft-lb

Shear: 1118 lb 8317 lb

### NOTES

Project: 7161

Location: 2) MAIN FLOOR BEAM @ MODULE  
Uniformly Loaded Floor Beam  
[2021 International Building Code(2018 NDS)]  
1.75 IN x 9.5 IN x 4.0 FT  
1.9E Microllam - iLevel Trus Joist  
Section Adequate By: 201.4%  
Controlling Factor: Shear

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#### DEFLECTIONS

Center

Live Load 0.02 IN L/2571

Dead Load 0.00 in

Total Load 0.02 IN L/2343

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

#### REACTIONS

A

B

Live Load 1540 lb 1540 lb

Dead Load 150 lb 150 lb

Total Load 1690 lb 1690 lb

Bearing Length 1.29 in 1.29 in

#### BEAM DATA

Center

Span Length 4 ft

Unbraced Length-Top 1.33 ft

Floor Duration Factor 1.00

Notch Depth 0.00

#### MATERIAL PROPERTIES

1.9E Microllam - iLevel Trus Joist

Base Values

Adjusted

Bending Stress: Fb = 2600 psi Fb' = 2644 psi

Cd=1.00 Cf=0.99 CF=1.03

Shear Stress: Fv = 285 psi Fv' = 285 psi

Cd=1.00

Modulus of Elasticity: E = 1900 ksi E' = 1900 ksi

Comp.  $\perp$  to Grain: Fc  $\perp$  = 750 psi Fc  $\perp$ ' = 750 psi

Controlling Moment: 1690 ft-lb

2.0 ft from left support

Created by combining all dead and live loads.

Controlling Shear: -1048 lb

At a distance d from support.

Created by combining all dead and live loads.

Comparisons with required sections:

Req'd

Provided

Section Modulus: 7.67 in3 26.32 in3

Area (Shear): 5.52 in2 16.63 in2

Moment of Inertia (deflection): 17.5 in4 125.03 in4

Moment: 1690 ft-lb 5800 ft-lb

Shear: -1048 lb 3159 lb

#### LOADING DIAGRAM



#### FLOOR LOADING

Side 1

Side 2

Floor Live Load FLL = 110 psf 0 psf

Floor Dead Load FDL = 10 psf 0 psf

Floor Tributary Width FTW = 7 ft 0 ft

Wall Load WALL = 0 plf

#### BEAM LOADING

Beam Total Live Load: wL = 770 plf

Beam Total Dead Load: wD = 70 plf

Beam Self Weight: BSW = 5 plf

Total Maximum Load: wT = 845 plf

#### NOTES

Project: 7161

Location: FLOOR JOISTS

Floor Joist

[2021 International Building Code(2018 NDS)]

( 2 ) 1.5 IN x 9.25 IN x 13.75 FT @ 16 O.C.

#2 - Douglas-Fir-Larch - Dry Use

Section Adequate By: 1.5%

Controlling Factor: Deflection

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### CAUTIONS

\* Properly connect sheathing to double joists/rafters or fully laminate to transfer diaphragm forces.

### DEFLECTIONS

Center

Live Load 0.34 IN L/487

Dead Load 0.03 in

Total Load 0.37 IN L/443

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

### REACTIONS

A

B

Live Load 917 lb 917 lb

Dead Load 92 lb 92 lb

Total Load 1009 lb 1009 lb

Bearing Length 0.54 in 0.54 in

### SUPPORT LOADS

A

B

Live Load 688 plf 688 plf

Dead Load 69 plf 69 plf

Total Load 757 plf 757 plf

### MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

Base Values

Adjusted

Bending Stress: Fb = 900 psi Fb' = 1139 psi

Cd=1.00 CF=1.10 Cr=1.15

Shear Stress: Fv = 180 psi Fv' = 180 psi

Cd=1.00

Modulus of Elasticity: E = 1600 ksi E' = 1600 ksi

Comp.  $\perp$  to Grain: Fc  $\perp$  = 625 psi Fc  $\perp$ ' = 625 psi

Controlling Moment: 3466 ft-lb

6.88 Ft from left support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: -908 lb

At a distance d from right support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:

Req'd

Provided

Section Modulus: 36.53 in<sup>3</sup> 42.78 in<sup>3</sup>

Area (Shear): 7.56 in<sup>2</sup> 27.75 in<sup>2</sup>

Moment of Inertia (deflection): 194.94 in<sup>4</sup> 197.86 in<sup>4</sup>

Moment: 3466 ft-lb 4059 ft-lb

Shear: -908 lb 3330 lb

### LOADING DIAGRAM



### JOIST DATA

Center

Span Length 13.75 ft

Unbraced Length-Top 0 ft

Unbraced Length-Bottom 0 ft

Floor sheathing applied to top of joists-top of joists fully braced.

Floor Duration Factor 1.00

### JOIST LOADING

Uniform Floor Loading

Center

Live Load LL = 100 psf

Dead Load DL = 10 psf

Total Load TL = 110 psf

TL Adj. For Joist Spacing wT = 146.7 plf

### NOTES

Project: 7161

Location: FLOOR JOISTS W/ MIXER

Floor Joist

[2021 International Building Code(2018 NDS)]

( 2 ) 1.5 IN x 9.25 IN x 13.75 FT @ 16 O.C.

#2 - Douglas-Fir-Larch - Dry Use

Section Adequate By: 12.0%

Controlling Factor: Moment

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### CAUTIONS

\* Properly connect sheathing to double joists/rafters or fully laminate to transfer diaphragm forces.

### DEFLECTIONS

Center

Live Load 0.35 IN L/466

Dead Load 0.03 in

Total Load 0.39 IN L/426

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

### REACTIONS

A

B

Live Load 943 lb 944 lb

Dead Load 92 lb 92 lb

Total Load 1035 lb 1036 lb

Bearing Length 0.55 in 0.55 in

### SUPPORT LOADS

A

B

Live Load 707 plf 708 plf

Dead Load 69 plf 69 plf

Total Load 776 plf 777 plf

### MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

Base Values

Adjusted

Bending Stress:  $F_b = 900$  psi  $F_b' = 1139$  psi

$C_d = 1.00$   $CF = 1.10$   $Cr = 1.15$

Shear Stress:  $F_v = 180$  psi  $F_v' = 180$  psi

$C_d = 1.00$

Modulus of Elasticity:  $E = 1600$  ksi  $E' = 1600$  ksi

Comp.  $\perp$  to Grain:  $F_c \perp = 625$  psi  $F_c \perp' = 625$  psi

Controlling Moment: 3623 ft-lb

6.88 Ft from left support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: -935 lb

At a distance d from right support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:

Req'd

Provided

Section Modulus: 38.18 in<sup>3</sup> 42.78 in<sup>3</sup>

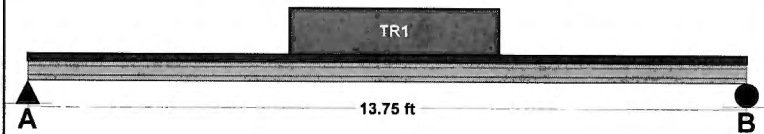
Area (Shear): 7.79 in<sup>2</sup> 27.75 in<sup>2</sup>

Moment of Inertia (deflection): 152.74 in<sup>4</sup> 197.86 in<sup>4</sup>

Moment: 3623 ft-lb 4059 ft-lb

Shear: -935 lb 3330 lb

### LOADING DIAGRAM



### JOIST DATA

Center

Span Length 13.75 ft

Unbraced Length-Top 0 ft

Unbraced Length-Bottom 0 ft

Floor sheathing applied to top of joists-top of joists fully braced.

Floor Duration Factor 1.00

### JOIST LOADING

#### Uniform Floor Loading

Center

Live Load LL = 100 psf

Dead Load DL = 10 psf

Total Load TL = 110 psf

TL Adj. For Joist Spacing wT = 146.7 plf

#### Partially Distributed Loading

Live Load LL = 10 psf

Dead Load DL = 0 psf

Load Start A = 5 ft

Load End B = 9 ft

Load Length C = 4 ft

### NOTES

Project: 7161

Location: TYPICAL COLUMN

Column

[2021 International Building Code(2018 NDS)]

3.5 IN x 7.25 IN x 9.0 FT

#2 - Douglas-Fir-Larch - Dry Use

Section Adequate By: 54.7%

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### VERTICAL REACTIONS

Live Load: Vert-LL-Rxn = 2900 lb  
Dead Load: Vert-DL-Rxn = 2350 lb  
Total Load: Vert-TL-Rxn = 5250 lb

### COLUMN DATA

Total Column Length: 9 ft  
Unbraced Length (X-Axis) Lx: 9 ft  
Unbraced Length (Y-Axis) Ly: 9 ft  
Column End Condition-K (e): 1  
Axial Load Duration Factor 1.00

### COLUMN PROPERTIES

#2 - Douglas-Fir-Larch

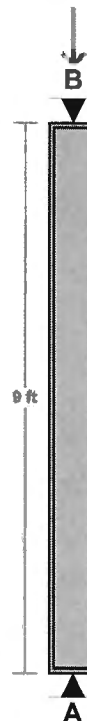
|                             | Base Values                 | Adjusted        |
|-----------------------------|-----------------------------|-----------------|
| Compressive Stress:         | Fc = 1350 psi               | Fc' = 457 psi   |
|                             | Cd=1.00 Cf=1.05 Cp=0.32     |                 |
| Bending Stress (X-X Axis):  | Fbx = 900 psi               | Fbx' = 1170 psi |
|                             | Cd=1.00 CF=1.30             |                 |
| Bending Stress (Y-Y Axis):  | Fby = 900 psi               | Fby' = 1170 psi |
|                             | Cd=1.00 CF=1.30             |                 |
| Modulus of Elasticity:      | E = 1600 ksi                | E' = 1600 ksi   |
| Column Section (X-X Axis):  | dx = 7.25 in                |                 |
| Column Section (Y-Y Axis):  | dy = 3.5 in                 |                 |
| Area:                       | A = 25.38 in <sup>2</sup>   |                 |
| Section Modulus (X-X Axis): | Sx = 30.66 in <sup>3</sup>  |                 |
| Section Modulus (Y-Y Axis): | Sy = 14.8 in <sup>3</sup>   |                 |
| Slenderness Ratio:          | L <sub>ex</sub> /dx = 14.9  |                 |
|                             | L <sub>ey</sub> /dy = 30.86 |                 |

### Column Calculations (Controlling Case Only):

Controlling Load Case: Axial Total Load Only (L + D)

|                                               |                 |
|-----------------------------------------------|-----------------|
| Actual Compressive Stress:                    | Fc = 207 psi    |
| Allowable Compressive Stress:                 | Fc' = 457 psi   |
| Eccentricity Moment (X-X Axis):               | Mx-ex = 0 ft-lb |
| Eccentricity Moment (Y-Y Axis):               | My-ey = 0 ft-lb |
| Moment Due to Lateral Loads (X-X Axis):       | Mx = 0 ft-lb    |
| Moment Due to Lateral Loads (Y-Y Axis):       | My = 0 ft-lb    |
| Bending Stress Lateral Loads Only (X-X Axis): | Fbx = 0 psi     |
| Allowable Bending Stress (X-X Axis):          | Fbx' = 1170 psi |
| Bending Stress Lateral Loads Only (Y-Y Axis): | Fby = 0 psi     |
| Allowable Bending Stress (Y-Y Axis):          | Fby' = 1170 psi |
| Combined Stress Factor:                       | CSF = 0.45      |

### LOADING DIAGRAM



### AXIAL LOADING

|                     |              |
|---------------------|--------------|
| Live Load:          | PL = 2900 lb |
| Dead Load:          | PD = 2300 lb |
| Column Self Weight: | CSW = 50 lb  |
| Total Axial Load:   | PT = 5250 lb |

### NOTES