PRPF20251347

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

MARCOE CANDY

FEBRUARY 4, 2025

City of Puyallup
Building
REVIEWED
FOR
COMPLIANCE
SKinnear
10/20/2025
9:01:52 AM

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

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

INDEX

DANIEL J. TYRRELL
STATE OF WASHINGTON
27259
REGISTERED
PROFESSIONAL ENGINEER
2-4-2025

CONSTRUCTION NOTES:

GENERAL:

Scope:

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.

CODE:

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.

LOADING:

WIND = 110 MPH, EXPOSURE C
SEISMIC = SITE CLASS D, SEISMIC DESIGN CATEGORY D (Ss=1.270.958, S1=.437)

ROOF	20 PSF DEAD LOAD		25 PSF SNOW LOAD	= 45 PSF
FLOOR	10 PSF DEAD LOAD	+	40 PSF LIVE LOAD	= 50 PSF
DECK	10 PSF DEAD LOAD	+	60 PSF LIVE LOAD	= 70 PSF
INTERIOR PARTITION				= 7 PSF
EXTERIOR WALL				= 9 PSF

SITE WORK:

GENERAL:

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.

FOUNDATION:

GENERAL:

CLASS AND USE	F'C	SLUMP	MINIMUM 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.

REINFORCING STEEL:

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.

CONCRETE COVER OF REINFORCING:

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.

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):

	F_V	F_B	E
PARALLAM PSL	290	2900	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.

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Seismic

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

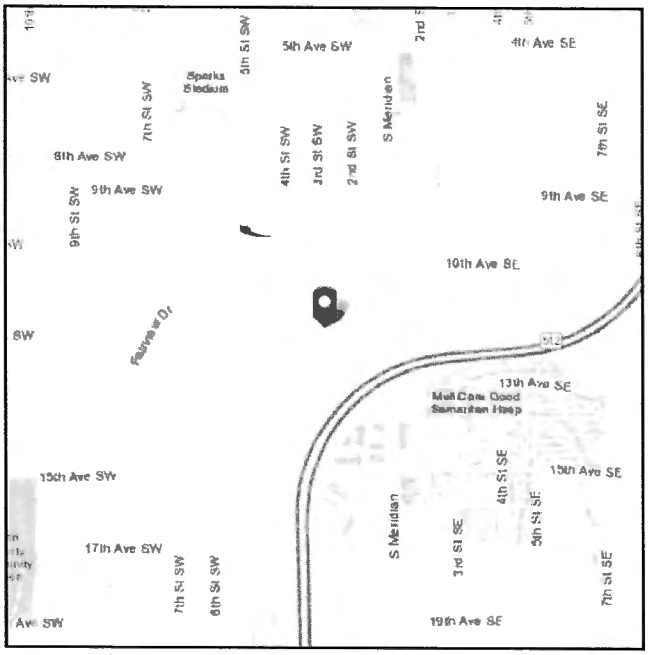
4/16

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)



Daniel J. Tyrrell, P.E.
Consulting Engineer

P.O. Box 537
Milton, WA 98354
(253) 326-1081
e-mail: dantyrrell@att.net

PROJECT: Timberland #7161 Marcoe
JOB #: 25- 5238 PAGE 5 OF 16
BY: DT DATE: 2/4/2025

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

Cs(min) = 0.045
Cs = 0.156 ← governs
Cs(max) = N/A

$V = CsW = Q_E =$ (equ. 12.8-1 ASCE 7-16)

SINGLE STORY:

Roof Area = 1333.0 ft^2 Wall Length = 40.0 ft
Roof Dead Weight = 20.0 psf Wall Dead Weight = 9.0 psf
Snow Load = 25 psf Tributary Wall Height = 4.5 ft
# of Walls = 2

W = Roof + Wall = 29,900 #
V = 0.156 * 29900 = 4664 #

ρ 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

ρ = 1.0 per ASCE 7-16, 12.3.4.2
$0.7\rho Q_E$ = .7(1)(4664) = 3265 #

Daniel J. Tyrrell, P.E.
Consulting Engineer

P.O. Box 537
Milton, WA 98354
(253) 326-1081
e-mail: dantyrrell@att.net

WIND

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

Code IBC 2021, ASCE 7-16
Wind Ult. = 110 mph
Exposure = C

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

by figure 28.5-1 ASCE 7-16

A =	(1.21)	(1.00)	(21.60)	=	26.1 psf
B =	(1.21)	(1.00)	(.00)	=	.0 psf
C =	(1.21)	(1.00)	(14.40)	=	17.4 psf
D =	(1.21)	(1.00)	(.00)	=	.0 psf

where:
λ = 1.21
Kzt = 1.00
h = 13 ft
2a = (0.2) (28.0)
= 5.6 ≈ 6
pitch = 2.0 / 12
==> θ = $\tan^{-1}$ (2/12)
= 9.46

ASD Pressure

$P = (.6)[Area_A{*}A + Area_B{*}B + Area_C{*}C + Area_D{*}D]$ = Pressure Calculated

check 10psf minimum per ASCE 7-16 =

$P_{min} = (.6)[16psf(AREA_A + AREA_C) + 8psf(AREA_B + AREA_D)]$

Front -Rear

(number of wall lines = 2)

P(LA) =	(.6) [	(27) (26.10)	+	(50) (.00)	+	
		(63) (17.40)		(0) (.00)	] =	1080.5
$P(LA)_{min}$ =	1104.0		Pmin. Governs			
P(LB) =	(.6) [	(27) (26.10)	+	(50) (.00)	+	
		(63) (17.40)		(0) (.00)	] =	1080.5
$P(LB)_{min}$ =	1104.0		Pmin. Governs			
P(N/A) =	(.6) [	(0) (.00)	+	(0) (.00)	+	
		(0) (.00)		(0) (.00)	] =	0.0
$P(N/A)_{min}$ =	0.0					
P(N/A) =	(.6) [	(0) (.00)	+	(0) (.00)	+	
		(0) (.00)		(0) (.00)	] =	0.0
$P(N/A)_{min}$ =	0.0					
P(N/A) =	(.6) [	(0) (.00)	+	(0) (.00)	+	
		(0) (.00)		(0) (.00)	] =	0.0
$P(N/A)_{min}$ =	0.0					
P(N/A) =	(.6) [	(0) (.00)	+	(0) (.00)	+	
		(0) (.00)		(0) (.00)	] =	0.0
$P(N/A)_{min}$ =	0.0					

Daniel J. Tyrrell, P.E.
Consulting Engineer

P.O. Box 537
Milton, WA 98354
(253) 326-1081
e-mail: dantyrrell@att.net

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
==> θ = $\tan^{-1}$ (/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
$P(TA)_{min}$ =	748.8		Pcalced Governs			
P(TB) =	(.6) [	(30) (23.20)	+	(0) (.00)	+	
		(48) (15.40)		(0) (.00)	] =	861.1
$P(TB)_{min}$ =	748.8		Pcalced Governs			
P(N/A) =	(.6) [	(0) (.00)	+	(0) (.00)	+	
		(0) (.00)		(0) (.00)	] =	0.0
$P(N/A)_{min}$ =	0.0					
P(N/A) =	(.6) [	(0) (.00)	+	(0) (.00)	+	
		(0) (.00)		(0) (.00)	] =	0.0
$P(N/A)_{min}$ =	0.0					
P(N/A) =	(.6) [	(0) (.00)	+	(0) (.00)	+	
		(0) (.00)		(0) (.00)	] =	0.0
$P(N/A)_{min}$ =	0.0					
P(N/A) =	(.6) [	(0) (.00)	+	(0) (.00)	+	
		(0) (.00)		(0) (.00)	] =	0.0
$P(N/A)_{min}$ =	0.0					

Daniel J. Tyrrell, P.E.
Consulting Engineer

P.O. Box 537
Milton, WA 98354
(253) 326-1081
e-mail: dantyrrell@att.net

PROJECT: Timberland #7161 Marcoe

JOB #: 25- 5238 PAGE 8 OF 16

BY: DT DATE: 2/4/2025

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

Daniel J. Tyrrell, P.E.
Consulting Engineer

P.O. BOX 537
Milton, Washington 98354

(253) 326-1081
e-mail: dantyrrell@att.net

PROJECT Timberland - #7161

JOB # 25-5238 PAGE 9 OF 16

BY DT DATE 2-4-25

Overturning

Wall Line 1A (14' wall)

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

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

$M_r = 131(14)^2/2(.6 - .14(1.02)) = 5905$ Ft.#

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

⇒ Simp MST27 SW to rim + Simp MSTA12 rim to BxB + Simp Titen HD 1/2"x12" (THD501200 HMG)

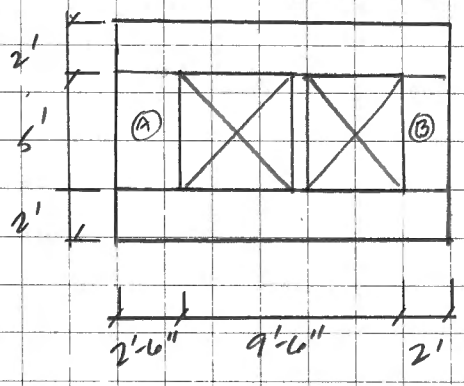
Wall Line 1B (14' wall w/ 4°5° & 5°5° strapped per D/6)

$V = 1632/2 = 816^{\#}$ $M_o = 816(9) = 7344$ Ft.#

$M_r = 5905$ Ft.# (prev calc'd)

$R_u = (7344 - 5905)/13.5 = 107^{\#}$ neg!

⇒ no holdown req'd



OTM B:

$M_o = (2 \times 181)(5) = 1810$ Ft.#

$M_r = 131(2)^2/2(.46) = 121$ Ft.#

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

$v = 844/(9-5) = 211\ ^{\#}/Ft$ ⇒ < 1 ok

Verify CS20 strap:

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

Verify seismic H/W ratio: $181(5)/2(2) = 226$ plf ⇒ < 1 ok

Daniel J. Tyrrell, P.E.
Consulting Engineer

P.O. BOX 537
Milton, Washington 98354

(253) 326-1081
e-mail: dantyrrell@att.net

PROJECT Timberland #7161

JOB # 25-5238 PAGE 10 OF 16

BY DT DATE 2-4-25

Wall Line TA & TB (13' wall)

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

$w_p = (14/2 + 1.5)(20) + 81 = 251$ #/ft

$M_r = 251(13)^2/(.46) = 9756$ ft.#

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

⇒ Simp MST27 strap sw to rim
+ Simp MSTA12 rim to 8x8
+ Simp Titan HD 1/2" x 12"
(THD50.1200 HMG)

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
Tyrrell Engineering
P.O. Box 537
Milton, WA 98354

StruCalc Version 10.0.1.6 2/2/2025 11:03:18 AM

FOOTING PROPERTIES

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

FOOTING SIZE

Width:	W =	3.51	ft
Length:	L =	3.51	ft
Depth:	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:	Qu =	845	psf
Effective Allowable Soil Bearing Pressure:	Qe =	850	psf
Required Footing Area:	Areq =	12.25	sf
Area Provided:	A =	12.32	sf

Baseplate Bearing:

Bearing Required:	Bear =	14739	lb
Allowable Bearing:	Bear-A =	88400	lb

Beam Shear Calculations (One Way Shear):

Beam Shear:	Vu1 =	4483	lb
Allowable Beam Shear:	Vc1 =	26062	lb

Punching Shear Calculations (Two Way Shear):

Critical Perimeter:	Bo =	57	in
Punching Shear:	Vu2 =	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:	Mu =	77602	in-lb
Nominal Moment Strength:	Mn =	338564	in-lb

Reinforcement Calculations:

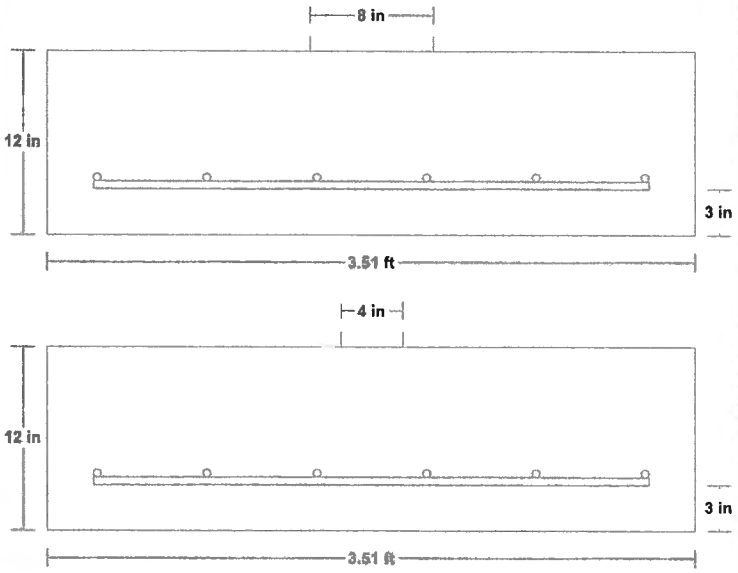
Concrete Compressive Block Depth:	a =	0.53	in
Steel Required Based on Moment:	As(1) =	0.26	in2
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4):	As(2) =	1.01	in2
Controlling Reinforcing Steel:	As-reqd =	1.01	in2
Selected Reinforcement:	#4's @ 7.0 in. o.c. e/w (6) Min.		
Reinforcement Area Provided:	As =	1.18	in2

Development Length Calculations:

Development Length Required:	Ld =	15	in
Development Length Supplied:	Ld-sup =	18.06	in

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

LOADING DIAGRAM



FOOTING LOADING

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

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

NOTES

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

Carolyn Tyrrell
Tyrrell Engineering
P.O. Box 537
Milton, WA 98354

StruCalc Version 10.0.1.6 2/2/2025 11:03:17 AM

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

MATERIAL PROPERTIES

1.9E Microllam - iLevel Trus Joist

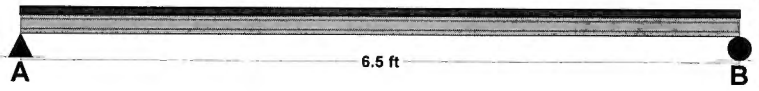
	Base Values	Adjusted
Bending Stress:	Fb = 2600 psi	Fb' = 3196 psi
	Cd=1.15 Cl=1.00 CF=1.07	
Shear Stress:	Fv = 285 psi	Fv' = 328 psi
	Cd=1.15	
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 750 psi	Fc - ⊥' = 750 psi

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.

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

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

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

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

Carolyn Tyrrell
Tyrrell Engineering
P.O. Box 537
Milton, WA 98354

StruCalc Version 10.0.1.6 2/2/2025 11:03:17 AM

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 Cl=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. ⊥ to Grain:	Fc - ⊥ = 750 psi	Fc - ⊥' = 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

Carolyn Tyrrell
Tyrrell Engineering
P.O. Box 537
Milton, WA 98354

StruCalc Version 10.0.1.6 2/2/2025 11:03:18 AM

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

LOADING DIAGRAM

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. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 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 in3	42.78 in3
Area (Shear):	7.56 in2	27.75 in2
Moment of Inertia (deflection):	194.94 in4	197.86 in4
Moment:	3466 ft-lb	4059 ft-lb
Shear:	-908 lb	3330 lb

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

Carolyn Tyrrell
Tyrrell Engineering
P.O. Box 537
Milton, WA 98354

StruCalc Version 10.0.1.6 2/2/2025 11:03:18 AM

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

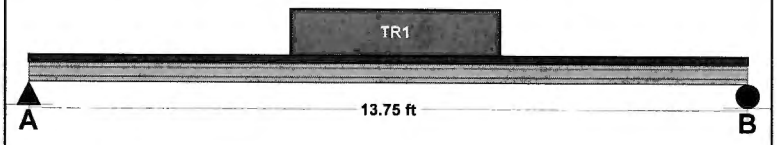
	Base Values		Adjusted	
Bending Stress:	Fb =	900 psi	Fb' =	1139 psi
	Cd=1.00 CF=1.10 Cr=1.15			
Shear Stress:	Fv =	180 psi	Fv' =	180 psi
	Cd=1.00			
Modulus of Elasticity:	E =	1600 ksi	E' =	1600 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	625 psi	Fc - ⊥' =	625 psi

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 in3	42.78 in3
Area (Shear):	7.79 in2	27.75 in2
Moment of Inertia (deflection):	152.74 in4	197.86 in4
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%

Carolyn Tyrrell
Tyrrell Engineering
P.O. Box 537
Milton, WA 98354

StruCalc Version 10.0.1.6 2/2/2025 11:03:18 AM

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

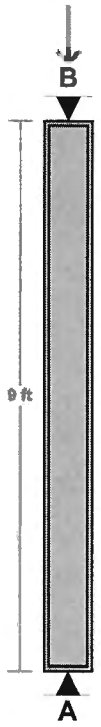
Column Section (X-X Axis):	dx =	7.25	in
Column Section (Y-Y Axis):	dy =	3.5	in
Area:	A =	25.38	in2
Section Modulus (X-X Axis):	Sx =	30.66	in3
Section Modulus (Y-Y Axis):	Sy =	14.8	in3
Slenderness Ratio:	Lex/dx =	14.9	
	Ley/dy =	30.86	

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