



PROJECT: PHASE II – UPPER RESIDENTIAL ADDITION

ADDRESS: 425 E. BROADWAY
WAUKESHA, WI 53186

CLIENT: EAST COAST HAIR DESIGN
425 E. BROADWAY
WAUKESHA, WI 53186

SCOPE: CALCULATION PACKAGE FOR RESIDENTIAL ALTERATIONS TO THE UPPER UNIT. AN ADDITION IS PROPOSED TO THE FRONT OF THE PROPERTY TO CONVERT DECK INTO A LIVABLE SPACE. BEDROOMS AND OCCUPANCY TO STAY THE SAME.

PHASE I ANALYSIS INCLUDED FOR SECOND FLOOR JOISTS PREVIOUSLY SIZED FOR LIVABLE SPACE ABOVE. FRONT FROST FOOTING 20" WIDE, ACCEPTABLE FOR TWO STORIES OF LIVE LOAD PLUS ROOF LOAD.

ENGINEER OF RECORD: VINCENT M. MATARRESE, PE

LICENSE: E-45530



A handwritten signature in black ink that reads 'Vince Matarrese'.

Vincent M. Matarrese, PE
Signed Electronically 2/24/2023



Client:		Date:	Jan 16, 2023
Author:	Vincent Matarrese	Job #:	
Project:	PHASE 2 - BROADWAY ADDITION	Subject:	Project Defaults

Design Criteria

Design Code Full Name $code =$ International Building Code (IBC) 2015
 Additionally Include Simplified DL+(LL or SL) Service Load Combination? No

Deflection Span Limits $\Delta_{span} =$

Member Type $type$	Short-Term (L, Lr, S, or W) D_{ST} (L/)	Long-Term (kD+L) D_{LT} (L/)
Roof	180	120
Ceiling	240	180
Floor	360	240
Wall	240	1

Absolute Deflection Limit $\Delta_{lim} =$ 1 in

Default Bearing Length $l_b =$ 3 in

Building Geometry

Number of Stories $n_{story} =$ 2

Roof Slope $\alpha =$ 6 : 12

Default Member Spacings $spacings =$

Rafters s_{rafter} (in)	Joists s_{joist} (in)	Wall Studs s_{studs} (in)
16	16	16

Top Floor Height Dimensions $h_{top.floor} =$

Story Height (Floor to Eave) h_{story} (ft)	Headroom (Floor to Ceiling) h_{head} (ft)	Window Height (Floor to Top of Window) h_{window} (ft)
12	10	8

Lower Floors Height Dimensions $h_{lower.floors} =$

Story Height (Floor to Floor) h_{story} (ft)	Headroom (Floor to Ceiling) h_{head} (ft)	Window Height (Floor to Top of Window) h_{window} (ft)
12	10	8

Maximum Roof Beam Depth $d_{max,R} =$ 24 in

Floor Beam Depth Limits $d_{min/max} =$

Minimum Beam Depth d_{min} (in)	Maximum Beam Depth d_{max} (in)
0	24

Default Roof Loads

Default Roof Loads $loads_{roof} =$

Superimposed Dead Load w_D (psf)	Roof Live Load w_{Lr} (psf)	Alternative Minimum Live Load P_{Lr2} (lb)	Snow Load w_S (psf)	Ultimate Wind Uplift (C&C) w_{Wu} (psf)	Ultimate Wind Downward (C&C) w_{Wd} (psf)
15	20	300	30	30	30

Default Ceiling Loads

Default Ceiling Loads $loads_{ceiling} =$

Superimposed Dead Load w_D (psf)	Live Load w_L (psf)	Alternative Minimum Live Load P_{L2} (lb)
5	20	0

Default Floor Loads

Default Floor Loads $loads_{floor} =$

Superimposed Dead Load w_D (psf)	Live Load w_L (psf)	Alternative Minimum Live Load P_{L2} (lb)
10	40	0

Default Wall & Window Loads

Default Total Wall & Window Dead Loads $w_{D,wall+window} =$

Total Weight of Interior Wall $w_{D,IW}$ (psf)	Total Weight of Exterior Wall $w_{D,EW}$ (psf)	Total Weight of Window $w_{D,window}$ (psf)
5	30	1.5

Default Ultimate Wall & Window Wind Loads $w_{W,wall+window} =$

Ultimate Inward Wind Load (C&C) $w_{W,i}$ (psf)	Ultimate Outward Wind Load (C&C) $w_{W,o}$ (psf)
30	30

Default Railing Properties

Railing Height $h_{railing} =$ 4 ft

Railing Total Weight $w_{D,railing} =$ 20 plf

Comments

	MWFRS Wind Loads ASCE 7-10 <i>Enclosed & Partially Enclosed Buildings of All Heights</i>	Job No: 425 BROADWAY
	Notes:	Designer: Checker: VMM Date: 2/24/2023

Basic Parameters

Risk Category	II	Table 1.5-1
Basic Wind Speed, V	115 mph	Figure 26.5-1A
Wind Directionality Factor, K _d	0.85	Table 26.6-1
Exposure Category	B	Section 26.7
Topographic Factor, K _{zt}	1.00	Section 26.8
Gust Effect Factor, G or G _f	0.850	Section 26.9
Enclosure Classification	Enclosed	Section 26.10
Internal Pressure Coefficient, GC _{pi}	+/- 0.18	Table 26.11-1
Terrain Exposure Constant, α	7.0	Table 26.9-1
Terrain Exposure Constant, z _g	1,200 ft	Table 26.9-1

Wall Pressure Coefficients

Windward Wall Width, B	30 ft	
Side Wall Width, L	75 ft	
L/B Ratio	2.50	
Windward Wall Coefficient, C _p	0.80	Figure 27.4-1
Leeward Wall Coefficient, C _p	-0.35	Figure 27.4-1
Side Wall Coefficient, C _p	-0.70	Figure 27.4-1

Roof Pressure Coefficients

Roof Slope, θ	35.0°	
Median Roof Height, h	27 ft	
Velocity Pressure Exposure Coef., K _h	0.68	Table 27.3-1
Velocity Pressure, q _h	19.6 psf	Equation 27.3-1
h/L Ratio	0.36	
Windward Roof Area	0 ft ²	
Roof Area Within 14 ft of WW Edge	0 ft ²	

Location	Min/Max	Horiz Distance From Windward Edge			
		0 ft	14 ft	27 ft	54 ft
Windward Roof Coefficient Normal to Ridge, C _p	Min	-0.20	-0.20	-0.20	-0.20
	Max	0.30	0.30	0.30	0.30
Leeward Roof Coefficient Normal to Ridge, C _p	Min	-0.60	-0.60	-0.60	-0.60
	Max	-0.60	-0.60	-0.60	-0.60
Roof Coefficient Parallel to Ridge, C _p	Min	-0.90	-0.90	-0.90	-0.90
	Max	-0.18	-0.18	-0.18	-0.18

Figure 27.4-1

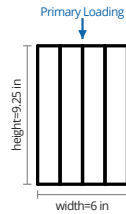
Structure Pressure Summary (Add Internal Pressure q,GC_{pi} or q_i,GC_{pi} as Necessary)

Height, z	K _z	q _z	Walls				Roof			Internal	
			WW	LW	WW + LW	Side	Normal to Ridge		Parallel to Ridge	Positive	Negative
							WW	LW			
0 ft	0.57	16.5 psf	11.2 psf		17.1 psf					3.5 psf	
3 ft	0.57	16.5 psf	11.2 psf		17.1 psf		Min:	Min:	Min:	3.5 psf	
5 ft	0.57	16.5 psf	11.2 psf		17.1 psf		-3.3 psf	-10.0 psf	-15.0 psf	3.5 psf	
8 ft	0.57	16.5 psf	11.2 psf		17.1 psf					3.5 psf	
11 ft	0.57	16.5 psf	11.2 psf		17.1 psf					3.5 psf	
14 ft	0.57	16.5 psf	11.2 psf	-5.8 psf	17.1 psf	-11.6 psf				3.5 psf	-3.5 psf
16 ft	0.59	16.9 psf	11.5 psf		17.3 psf					3.5 psf	
19 ft	0.61	17.7 psf	12.0 psf		17.8 psf					3.5 psf	
22 ft	0.64	18.4 psf	12.5 psf		18.3 psf		Max:	Max:	Max:	3.5 psf	
24 ft	0.66	19.0 psf	12.9 psf		18.7 psf		5.0 psf	-10.0 psf	-3.0 psf	3.5 psf	
27 ft	0.68	19.6 psf	13.3 psf		19.1 psf					3.5 psf	

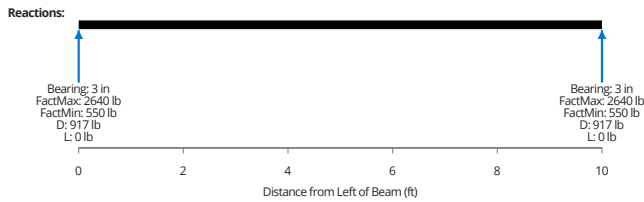


Client:		Date:	Jan 16, 2023
Author:	Vincent Matarrese	Job #:	
Project:	PHASE 2 - BROADWAY ADDITION	Subject:	NEW ROOF HEADER PASS
References:	NDS 2018 (ASD)		

Summary



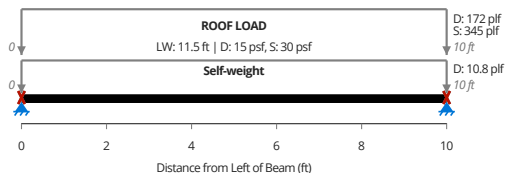
Member	4 plies - 2x10 S-P-F No. 1 / No. 2
73% Moment Utilization	$M/M' = 6600 \text{ lb*ft} / 9010 \text{ lb*ft}$
46% Shear Utilization	$V/V' = 2640 \text{ lb} / 5740 \text{ lb}$
35% Bearing Utilization	$R/R' = 2640 \text{ lb} / 7650 \text{ lb}$
Minimum Bearing Length (End Supports)	$\ell_{b,min,end} = 1.04 \text{ in}$
42% Governing Live / Short-Term Deflection	$\delta_{ST} = -0.14 \text{ in} (L/857)$
7% Governing Long-Term Deflection	$\delta_{LT} = -0.0372 \text{ in} (L/3220)$
Governing Long-Term Deflection	$\delta_{LT} = -0.0372 \text{ in}$



Key Properties

Beam Plan Length	$L_X = 10 \text{ ft}$
Continuous Bracing for Lateral Torsional Buckling	No Continuous Bracing

Loads



Design Conditions

Design Code for Load Combinations	International Building Code (IBC) 2015
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Member Properties

Cross-Sectional Area	$A = 55.5 \text{ in}^2$
Strong Axis Moment of Inertia	$I_{xx} = 396 \text{ in}^4$
Section Modulus	$S = 85.6 \text{ in}^3$
Base Allowable Bending Stress	$F_b = 875 \text{ psi}$
Base Allowable Shear Stress	$F_v = 135 \text{ psi}$
Base Perpendicular Compression Allowable Stress	$F_{c\perp} = 425 \text{ psi}$
True Modulus of Elasticity	$E_{true} = 1\,400\,000 \text{ psi}$
Apparent Modulus of Elasticity	$E_{app} = 1\,400\,000 \text{ psi}$
Modulus of Elasticity for Deflections	$E = 1\,400\,000 \text{ psi}$

Elastic Modulus (NDS 2018 2.3)

Adjusted Modulus of Elasticity	$E' = 1\,400\,000 \text{ psi}$
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Section Bending (NDS 2018 2.3)

Size Factor	$C_{F,b} = 1.1$
Incising Factor	$C_{i,b} = 1$

Positive Bending (NDS 2018 2.3)

Governing Duration Factor - Positive Bending	$C_{D,b}^+ = 1.15$
Governing Beam Stability Factor - Positive Bending	$C_L^+ = 0.993$
Adjusted Bending Strength - Positive Bending	$F_b^+ = 1260 \text{ psi}$

Negative Bending (NDS 2018 2.3)

Governing Duration Factor - Negative Bending	$C_{D,b}^- = 0.9$
Governing Beam Stability Factor - Negative Bending	$C_L^- = 0.995$
Adjusted Bending Strength - Negative Bending	$F_b^- = 991 \text{ psi}$

Shear Design (NDS 2018 3.4)

Governing Duration Factor	$C_D = 1.15$
Adjusted Shear Strength	$F_v' = 155 \text{ psi}$

Bearing (NDS 2018 3.10)

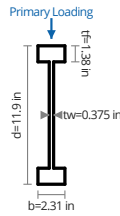
Base Bearing Strength	$F_{c\perp}' / C_b = 425 \text{ psi}$
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Comments



Client:		Date:	Jan 16, 2023
Author:	Vincent Matarrese	Job #:	
Project:	PHASE 2 - BROADWAY ADDITION	Subject:	ROOF RAFTERS PASS
References:	NDS 2018 (ASD)		

Summary



Member	11-7/8" TJI 230
84% Moment Utilization	$M/M' = 4060 \text{ lb}\cdot\text{ft} / 4850 \text{ lb}\cdot\text{ft}$
35% Shear Utilization	$V/V' = 661 \text{ lb} / 1900 \text{ lb}$
42% Bearing Utilization	$R/R' = 661 \text{ lb} / 1570 \text{ lb}$
69% Governing Live / Short-Term Deflection	$\delta_{ST} = -0.685 \text{ in (L/368)}$
83% Governing Long-Term Deflection	$\delta_{LT} = -0.829 \text{ in (L/304)}$
Governing Long-Term Deflection	$\delta_{LT} = -0.829 \text{ in}$

Design Conditions

Design Code for Load Combinations: International Building Code (IBC) 2015

Member Properties

Base Allowable Moment	$M_r = 4220 \text{ lb}\cdot\text{ft}$
Base Allowable Shear	$V_r = 1660 \text{ lb}$
Base Perpendicular Compression Allowable Stress	$F_{c\perp} = 0 \text{ psi}$

Section Bending (NDS 2018 2.3)

Governing Duration Factor in Bending	$C_{D,b} = 1.15$
Beam Stability Factor	$C_L = 1$
Adjusted Allowable Moment	$M'_r = 4850 \text{ lb}\cdot\text{ft}$

Shear Design (NDS 2018 3.4)

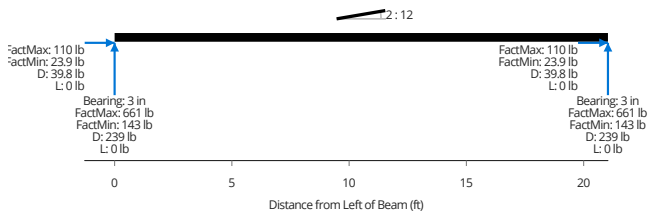
Governing Duration Factor	$C_D = 1.15$
Adjusted Allowable Shear	$V'_r = 1900 \text{ lb}$

Bearing (NDS 2018 3.10)

Base Bearing Strength	$F'_{c\perp}/C_b = 0 \text{ psi}$
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Comments

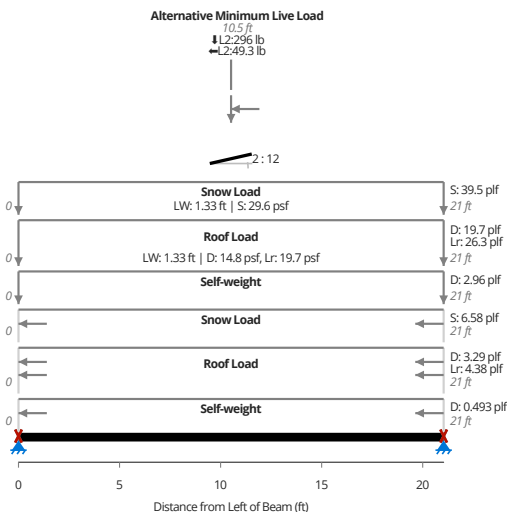
Reactions:



Key Properties

Beam Plan Length $L_X = 20.8 \text{ ft}$

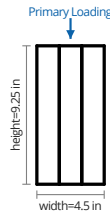
Loads



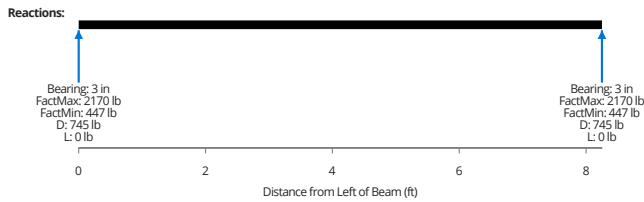


Client:		Date:	Jan 16, 2023
Author:	Vincent Matarrese	Job #:	
Project:	PHASE 2 - BROADWAY ADDITION	Subject:	H1 PASS
References:	NDS 2018 (ASD)		

Summary



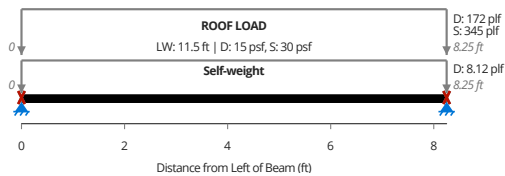
Member	3 plies - 2x10 S-P-F No. 1 / No. 2
66% Moment Utilization	$M/M' = 4470 \text{ lb*ft} / 6730 \text{ lb*ft}$
50% Shear Utilization	$V/V' = 2170 \text{ lb} / 4310 \text{ lb}$
38% Bearing Utilization	$R/R' = 2170 \text{ lb} / 5740 \text{ lb}$
Minimum Bearing Length (End Supports)	$\ell_{b,min,end} = 1.13 \text{ in}$
31% Governing Live / Short-Term Deflection	$\delta_{ST} = -0.0865 \text{ in} (L/1140)$
5% Governing Long-Term Deflection	$\delta_{LT} = -0.0227 \text{ in} (L/4370)$
Governing Long-Term Deflection	$\delta_{LT} = -0.0227 \text{ in}$



Key Properties

Beam Plan Length	$L_X = 8.25 \text{ ft}$
Continuous Bracing for Lateral Torsional Buckling	No Continuous Bracing

Loads



Design Conditions

Design Code for Load Combinations	International Building Code (IBC) 2015
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Member Properties

Cross-Sectional Area	$A = 41.6 \text{ in}^2$
Strong Axis Moment of Inertia	$I_{xx} = 297 \text{ in}^4$
Section Modulus	$S = 64.2 \text{ in}^3$
Base Allowable Bending Stress	$F_b = 875 \text{ psi}$
Base Allowable Shear Stress	$F_v = 135 \text{ psi}$
Base Perpendicular Compression Allowable Stress	$F_{c\perp} = 425 \text{ psi}$
True Modulus of Elasticity	$E_{true} = 1\,400\,000 \text{ psi}$
Apparent Modulus of Elasticity	$E_{app} = 1\,400\,000 \text{ psi}$
Modulus of Elasticity for Deflections	$E = 1\,400\,000 \text{ psi}$

Elastic Modulus (NDS 2018 2.3)

Adjusted Modulus of Elasticity	$E' = 1\,400\,000 \text{ psi}$
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Section Bending (NDS 2018 2.3)

Size Factor	$C_{F,b} = 1.1$
Incising Factor	$C_{i,b} = 1$

Positive Bending (NDS 2018 2.3)

Governing Duration Factor - Positive Bending	$C_{D,b}^+ = 1.15$
Governing Beam Stability Factor - Positive Bending	$C_L^+ = 0.989$
Adjusted Bending Strength - Positive Bending	$F_b^{+} = 1260 \text{ psi}$

Negative Bending (NDS 2018 2.3)

Governing Duration Factor - Negative Bending	$C_{D,b}^- = 0.9$
Governing Beam Stability Factor - Negative Bending	$C_L^- = 0.992$
Adjusted Bending Strength - Negative Bending	$F_b^{-} = 988 \text{ psi}$

Shear Design (NDS 2018 3.4)

Governing Duration Factor	$C_D = 1.15$
Adjusted Shear Strength	$F_v' = 155 \text{ psi}$

Bearing (NDS 2018 3.10)

Base Bearing Strength	$F'_{c\perp} / C_b = 425 \text{ psi}$
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Comments



PROJECT: FIRST FLOOR HEADER

ADDRESS: 425 E BROADWAY

DATE: 4/27/2020

ASD DESIGN FORCES

L= 29 FT

EQ. DIST LOAD 605 PLF
 END REACTION 8772.5 #
 SHEAR 8772.5 #
 MOMENT 63600.6 #-FT

(SIZED FOR THIRD STORY ADDITION W/ BEARING)

DESIGN STEEL BEAM:

Wa = 605 plf
 L = 29 ft

TRIAL: **W 10x49** TABLE 3-2 AISC 14th EDITION (SEE ATTACHED REF.)
 Vn/Ω = 68 kips > Va= 8.77 lbs OK
 Mn/Ω = 99.5 kips*ft > Ma= 63.60 kips*ft OK

CHECK DEFLECTION

E= 29000 ksi Δ= 1.22 in
 I= 272 in⁴ L/ 285 OK

USE: W10x49 STEEL BEAM**DESIGN STEEL COLUMN:**

Pu = 26.3 kips

TRIAL: **4** in. Dia. TABLE 4-6 AISC 14th EDITION (SEE ATTACHED REF.)
 φPn = **45.1** kips > 26.32 kips OK

USE: 4 in. DIA. STEEL STANDARD PIPE COLUMN