

# Structural Calculations for Fontana Fire Station No. 80 Phase 1: Training Center

Fontana, CA

REVIEWED  
Aug 25 2025  
BUILDING & SAFETY  
CITY OF FONTANA

Initial Permit Submittal  
MI2328021.00  
06-30-2023



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# **1. BASIS OF DESIGN**

# STRUCTURAL BASIS OF DESIGN

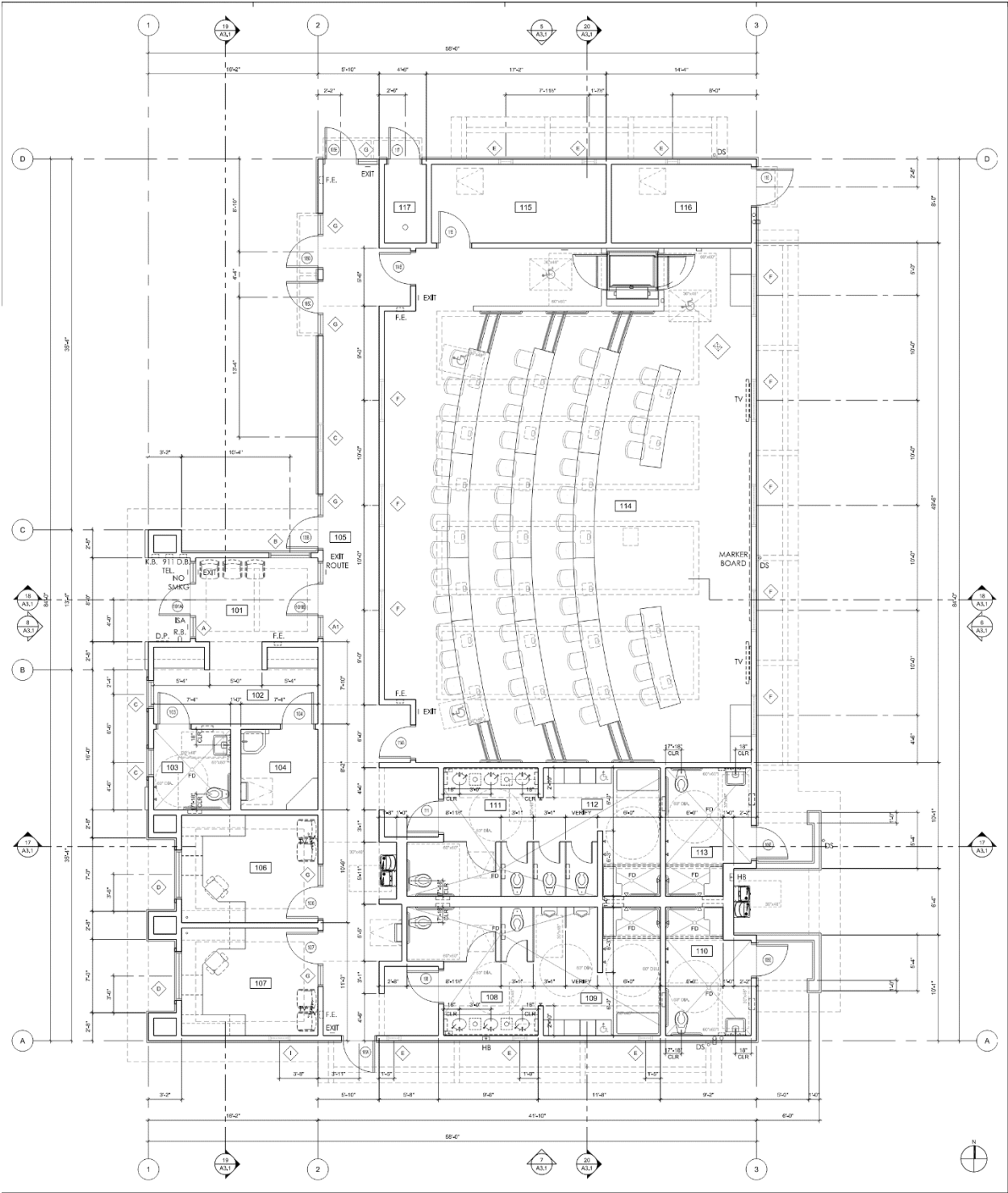
## BUILDING DESCRIPTION

Phase 1 of the project (this submittal) includes a 4200 sq. ft. single story training center. In the future, phase 2 is planned to include a 10,000 sq. ft. fire station expansion with an additional 5,100 sq. ft. 2<sup>nd</sup> story for the crews living quarters, partially resting on top of the phase 1 training center. In anticipation of this future expansion part of the training center roof has been designed for their future loads. Additionally, the lateral resisting elements have been designed for additional loads.

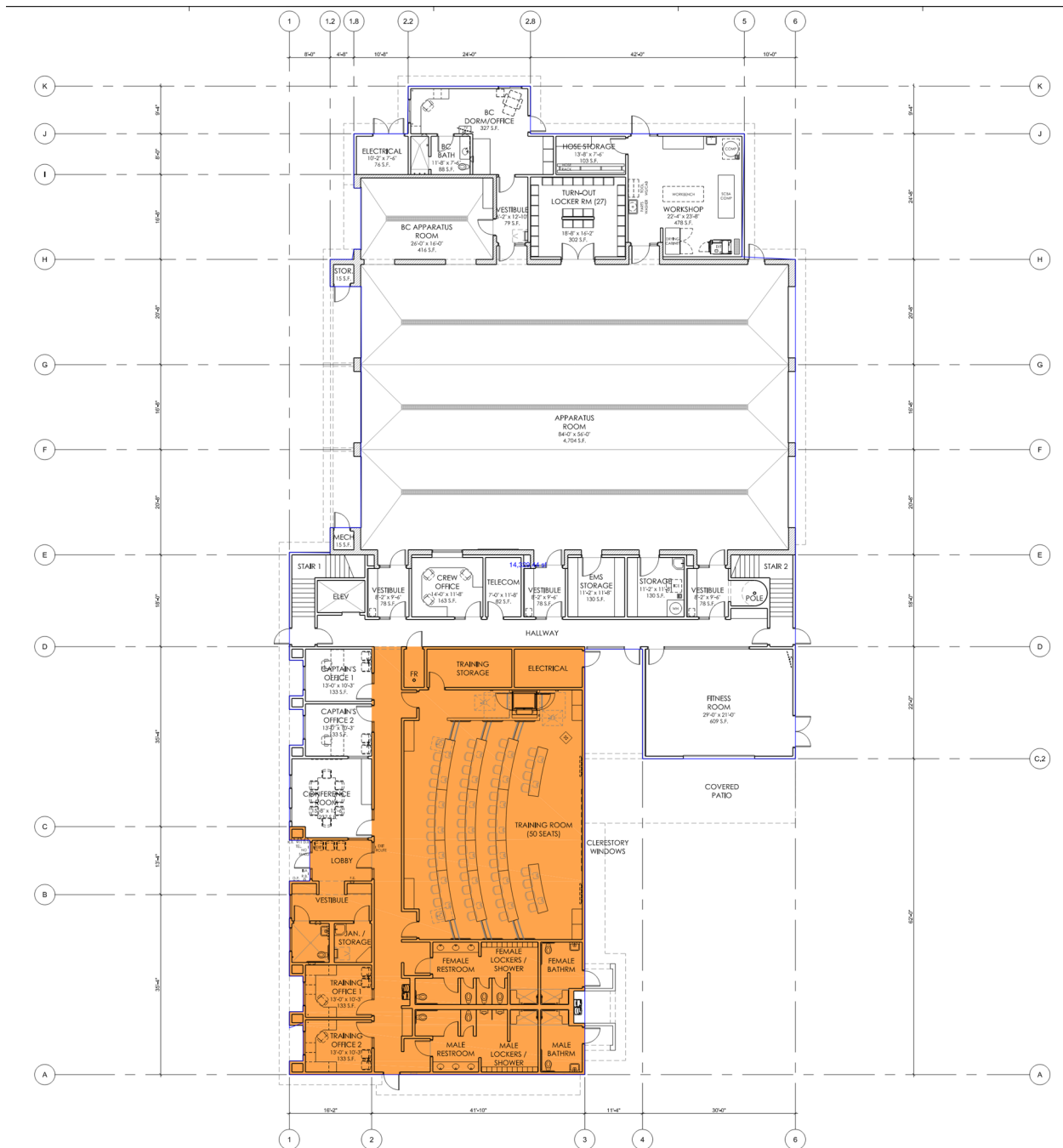
The gravity system will consist of engineered I-joists spanning to wood bearing walls and steel beams. The lateral system will consist of flexible plywood sheathed wood diaphragms. These diaphragms will span to plywood sheathed wood shear-walls. Conventional strip footings will be used to transfer the bearing and lateral loads into the soil. Additional pad footings will be designed for bearing where required by point loads.



BUILDING LAYOUT



**PHASE 1: Training Center**



**Phase 2: Fire Station Expansion - 1<sup>st</sup> Story (For Reference)**



## CODES AND STANDARDS

- 2022 California Building Code (Title 24, Part 2, California Code of Regulations), with inclusion of all Amendments
- Minimum Design Loads for Buildings and Other Structures (ASCE/SEI 7-16)
- National Design Specification for Wood Construction (NDS – 2018)
- Special Design Provisions for Wind and Seismic (SDPWS – 2021)
- Building Code Requirements for Structural Concrete (ACI 318-19)
- Specification for Structural Steel Buildings (ANSI/AISC 360-16)
- Seismic Provisions for Structural Steel Buildings (ANSI/AISC 341-16)
- Structural Welding Code – Steel (AWS D1.4/D1.4M – 2017)

## GEOTECHNICAL INFORMATION

<b>Shallow Foundation Recommendations</b>	
<b>Bearing</b>	
Min. Size (Width x Depth):	12" x 18"
Allowable Bearing Pressure:	2500 psf*
	+250 psf/ft (4000psf Max)
<b>Lateral</b>	
Ultimate Friction Coefficient:	0.40
Ultimate Passive Pressure:	290 pcf* (3000 psf Max)
Included Lateral Factor of Safety:	1.5
EFP – Active Pressure:	38 pcf
EFP – At-Rest Pressure:	59 pcf
Soil Unit Weight:	120 pcf

\* 1/3 increase when considering short-duration loads

## MATERIAL INFORMATION

Wood:	Douglas Fir-Larch; UNO
Steel – W:	A992; UNO
Steel – HSS Rectangular:	A500 Gr. C; UNO
Steel – Plate:	A36; UNO
Concrete – Foundations:	2500 psi; UNO
Bolts:	ASTM A307; UNO

## **2. LOADS**

# miyamoto

Calc By: TCB Date: 6/28/2023  
 Checked By: - Date: NA

## LOAD TAKEOFF

	Item	Gravity	Seismic
<b>Live Loads</b>			
Roof	Roof Live Load	20.0 psf	0.0 psf
Floor	Residential Live Load	40.0 psf	0.0 psf
Floor	Office Live Loads	50.0 psf	0.0 psf
Partition	Live Load	15.0 psf	15.0 psf

### Typical Roof (Pitched)

Concrete Tile (Normal-weight)	10.0 psf	10.0 psf
Insulation Allowance	3.0 psf	3.0 psf
3/4" Plywood/OSB Sheathing	2.3 psf	2.3 psf
2x10 @ 24" OC	2.0 psf	2.0 psf
Sprinklers	1.5 psf	1.5 psf
Ceiling	4.0 psf	4.0 psf
Misc./HVAC	2.3 psf	2.3 psf
Dead Load	25.0 psf	25.0 psf

### Typical Roof (Flat)

4-Ply Build-Up	5.0 psf	5.0 psf
12" Max. Sloped Rigid Insulation	3.0 psf	3.0 psf
3/4" Plywood/OSB Sheathing	2.3 psf	2.3 psf
14" Red I-65 Joists @ 24" OC	2.0 psf	2.0 psf
Sprinklers	1.5 psf	1.5 psf
Ceiling	4.0 psf	4.0 psf
Misc./HVAC	2.3 psf	2.3 psf
Dead Load	20.0 psf	20.0 psf

### Future Floor (For Reference)

Floor Finish Allowance	4.0 psf	4.0 psf
1 1/2" Lightweight Concrete (115pcf)	14.4 psf	14.4 psf
3/4" Plywood/OSB Sheathing	2.3 psf	2.3 psf
14" Red I-65 Joists @ 24" OC	2.0 psf	2.0 psf
Sprinklers	1.5 psf	1.5 psf
Ceiling	4.0 psf	4.0 psf
Misc./HVAC	1.9 psf	1.9 psf
Dead Load	30.0 psf	30.0 psf

### Typ. Exterior Wall

5/8" Gypsum Board	2.8 psf	2.8 psf
2x6 @ 16" OC	1.5 psf	1.5 psf
5 1/2" Batt Insulation	0.6 psf	0.6 psf
1/2" Plywood/OSB Sheathing	1.5 psf	1.5 psf
Stucco	10.0 psf	10.0 psf
Misc./HVAC	1.6 psf	1.6 psf
Dead Load	18.0 psf	18.0 psf

### Typ. Interior Wall

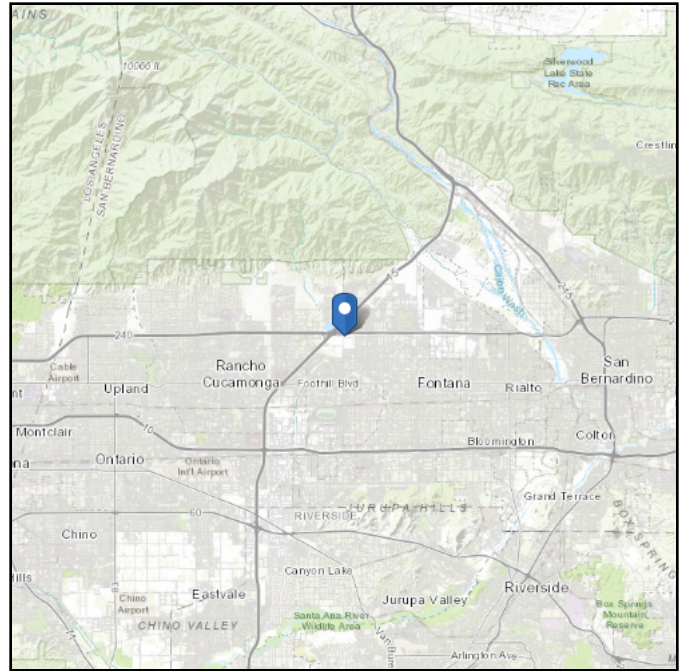
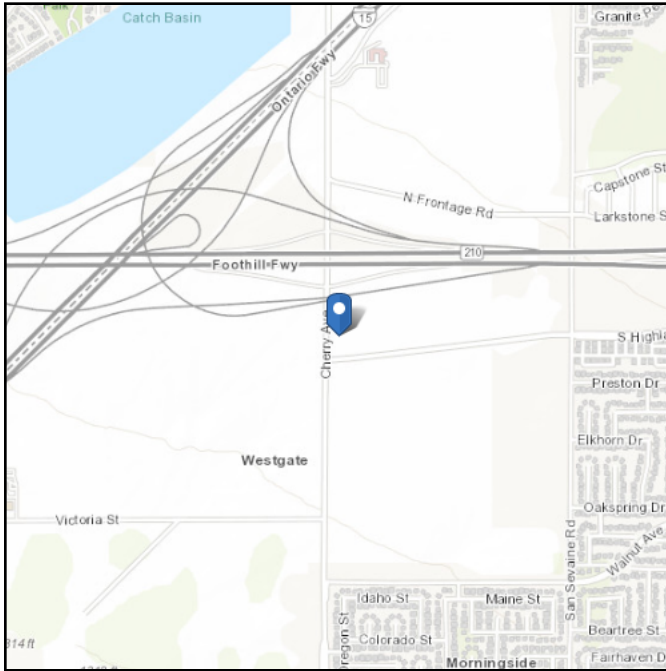
2 - 5/8" Gypsum Board	5.6 psf	5.6 psf
2x6 @ 16" OC	1.5 psf	1.5 psf
Misc.	2.9 psf	2.9 psf
Dead Load	10.0 psf	10.0 psf

# ASCE 7 Hazards Report

**Address:**  
No Address at This Location

**Standard:** ASCE/SEI 7-16  
**Risk Category:** IV  
**Soil Class:** C - Very Dense  
Soil and Soft Rock

**Latitude:** 34.13409  
**Longitude:** -117.488008  
**Elevation:** 1393.7281256097972 ft  
(NAVD 88)



## Wind

### Results:

Wind Speed	106 Vmph
10-year MRI	66 Vmph
25-year MRI	72 Vmph
50-year MRI	77 Vmph
100-year MRI	82 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1D and Figs. CC.2-1–CC.2-4, and Section 26.5.2

Date Accessed: Fri May 19 2023

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 1.6% probability of exceedance in 50 years (annual exceedance probability = 0.00033, MRI = 3,000 years).

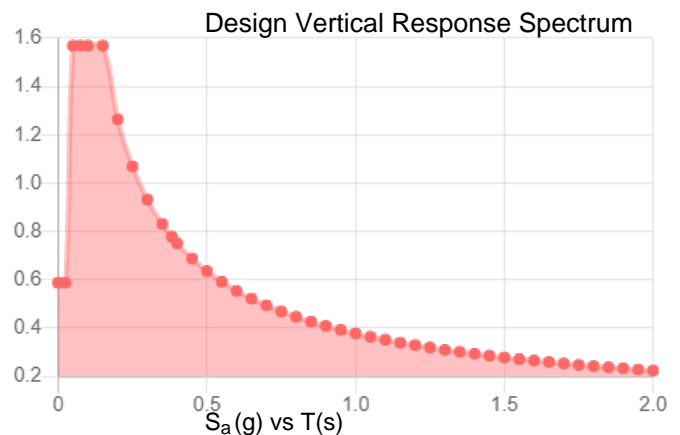
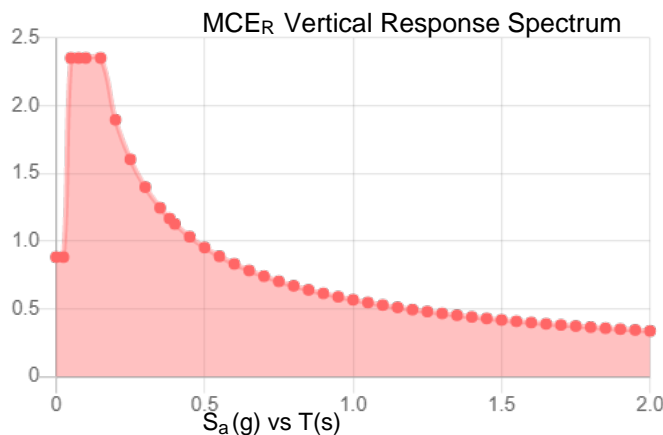
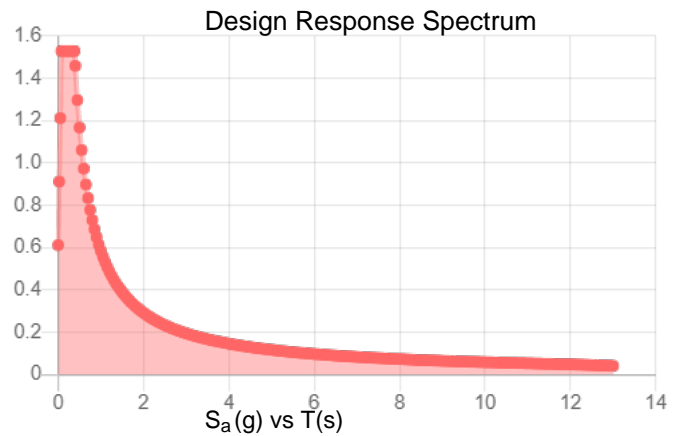
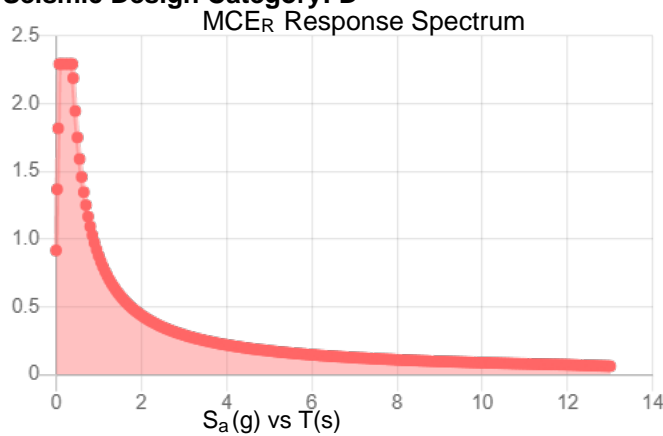
Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

**Site Soil Class:**

**Results:**

$S_S$ :	1.911	$S_{D1}$ :	0.584
$S_1$ :	0.625	$T_L$ :	12
$F_a$ :	1.2	PGA :	0.777
$F_v$ :	1.4	PGA <sub>M</sub> :	0.932
$S_{MS}$ :	2.293	$F_{PGA}$ :	1.2
$S_{M1}$ :	0.876	$I_e$ :	1.5
$S_{DS}$ :	1.529	$C_v$ :	1.282

**Seismic Design Category: D**



**Data Accessed:**

**Fri May 19 2023**

**Date Source:**

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



## Rain

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**Results:**

15-minute Precipitation Intensity: 3.61 in./h

60-minute Precipitation Intensity: 1.97 in./h

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

**Date Accessed:** Fri May 19 2023

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The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided "as is" and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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BUILDING & SAFETY  
8353 SIERRA AVE., FONTANA CA 92335  
PHONE: (909) 350-7640  
EMAIL: BUILDING@FONTANA.ORG

# WIND LOADS

Portions of the City of Fontana are located within a special wind region. The design parameters for wind loads are different depending upon the wind region of the proposed project as determined by the ASCE 7-22 Wind Map.

The design parameters for wind loads in Fontana are as follows:

If designing under the 2022 California *Building* Code:

The minimum basic design wind speed, V, shall be:

Special Wind Regions	
Risk Category	Basic Design Wind Speed, V
I	116 Vmph
II	129 Vmph
III	135 Vmph
IV	135 Vmph

ASCE 7-22	
Risk Category	Basic Design Wind Speed, V
I	90 Vmph
II	96 Vmph
III	103 Vmph
IV	106 Vmph

Exposure C, as a minimum, shall apply in all cases unless the architect or engineer in general responsible charge can justify to the building official that the building site and surrounding terrain conform to the criteria for Exposure B.

### **3. GRAVITY SYSTEM**

## Gravity Loading

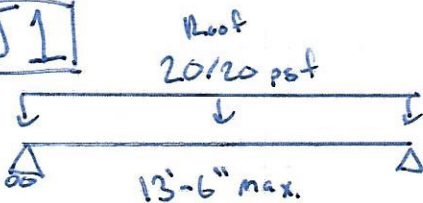
### Phase 1 Loading (DL/LL)

Roof (Pitched) = 25/20 psf  
 (Flat) = 20/20 psf

### Deflection Criteria

Roof  $\frac{LL}{TL} = \frac{L}{L}$

J1



USE 14" Red I-65 @ 24" O.C.

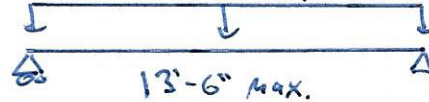
### Phase 2 Loading (DL/LL)

Future Floor = 30/50 psf  
 Partition = 15 psf

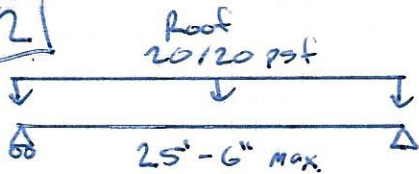
### Deflection Criteria

Floor  $\frac{LL}{TL} = \frac{L}{L}$

Future Floor (Governs)  
 30/50 psf + 15 psf Partition

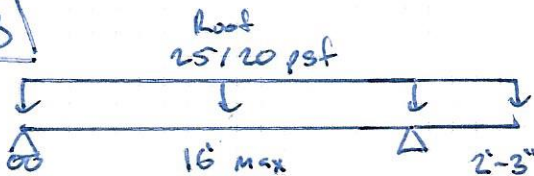


J2



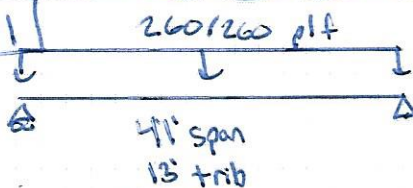
USE 14" Red I-65 @ 24" O.C.

J3

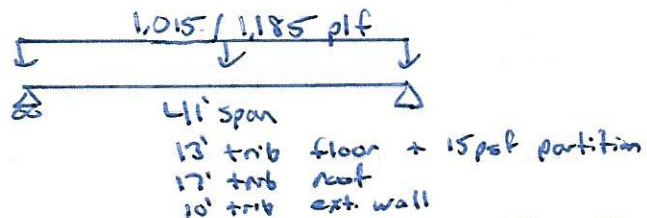


USE 2x10

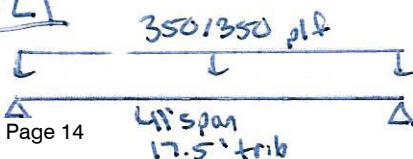
B1



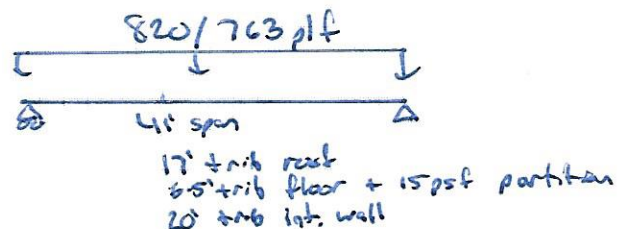
USE W24x68

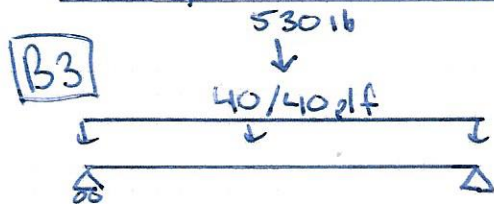


B2



USE W24x68



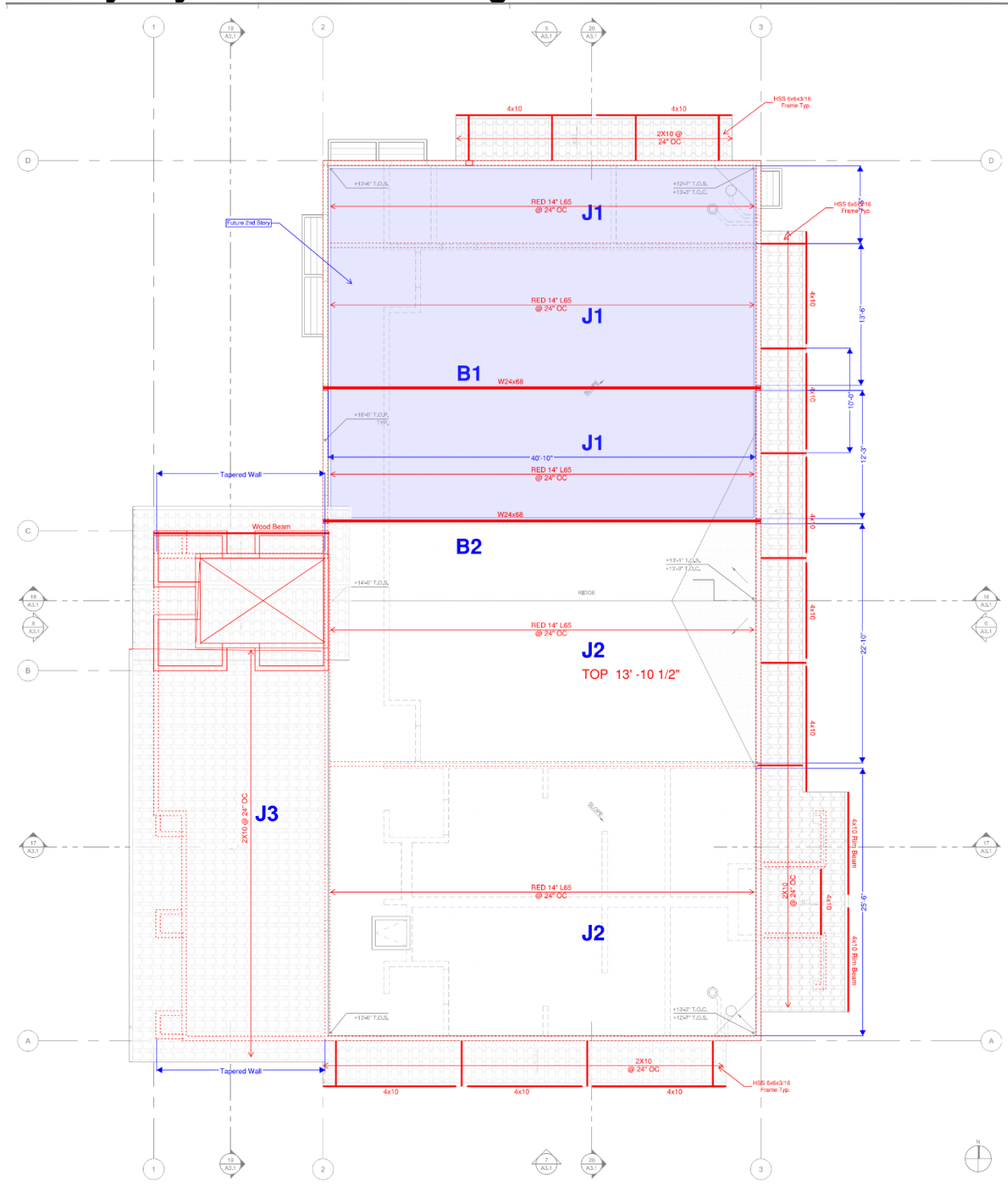
Gravity Load Cont.

USE  $3\frac{1}{2}" \times 14"$  RL

---

## **3.1 ROOF FRAMING**

## Gravity Layout – Roof Framing





RedSpec™ by RedBuilt™  
v7.1.15

**Project:** Fontana Fire Station  
**Location:** Fontana  
**Folder:** RoofFuture Floor  
**Date:** 5/19/23 12:30 PM  
**Designer:** Tyler Bouma  
**Comment:**

**Type:** J1 - (Roof Load)

## 14" Red-I65™ @ 24" o.c.

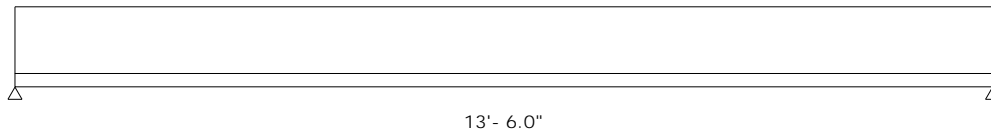
This product meets or exceeds the set design controls for the application and loads listed

DESIGN CONTROLS		%	Design	Allow.	DOL	Combination	Pattern	Pass/Fail
Shear (lb)		17%	540	3175	Roof(125%)	1.0D+1.0Lr	All Spans	PASS
Positive Moment (ft-lb)		18%	1822	10038	Roof(125%)	1.0D+1.0Lr	All Spans	PASS
DEFLECTIONS (in)		%	Design	Allow.	Design	Allow.	Combination	Pattern
Span Live		8%	0.057	0.675	L / 999+	L / 240	1.0D+1.0Lr	All Spans
Span Total		13%	0.114	0.900	L / 999+	L / 180	1.0D+1.0Lr	All Spans
SUPPORTS			Support 1	Support 2				
Live Reaction, Critical (lb) (DOL%)			270 (125)	270 (125)				
Dead Reaction (lb)			270	270				
Total Reaction (lb) (DOL%)			540 (125)	540 (125)				
Bearing			Flush	Flush				
Support			Wall	Beam				
Req'd Bearing, No Stiffeners (in)			1.75	1.75				
Req'd Bearing, Stiffeners (in)			-	-				
HANGERS	Model		Top	Face	Member	Header	Size	
Left	IUS2.56/11.88*			(10) 0.148x3	(2) 0.148x1.5	Glulam DF/SP	8.75x34.5	
Slope: 0 None, Skew: 0 None								
Right	None Selected							
(* = Web stiffeners required)								

### SPANS AND LOADS

Dimensions represent horizontal design spans.

Member Slope: 0/12



### APPLICATION LOADS

Type	Units	DOL	Live	Dead	Partition	Tributary	Member Type
Uniform	psf	Roof(125%)	20	20	0	24"	Roof Joist

### NOTES

- Building code and design methodology: 2021 IBC ASD (US).
- Product Acceptance: ICC-ES ESR-2994 and LABC/LARC Supplement.
- Continuous lateral support required at top edge. Lateral support at bottom edge shall be per RedBuilt recommendations.

T:\Projects\2023\MI2328021.00 - Fontana FS 80 Training Phase 1\Engineering\Calculations\2.3) RedBuilt - 2328021.00 Fontana FS #80.red

5/19/2023 12:30:30 PM

Fontana Fire Station : RoofFuture Floor : J1 - (Roof Load)

Page 1 of 1

The products noted are intended for interior, untreated, non-corrosive applications with normal temperatures and dry conditions of use, and must be installed in accordance with local building code requirements and RedBuilt™ recommendations. The loads, spans, and spacing have been provided by others and must be approved for the specific application by the design professional for the project. Unless otherwise noted, this output has not been reviewed by a RedBuilt™ associate. PRODUCT SUBSTITUTION VOIDS THIS ANALYSIS.

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RedSpec™ by RedBuilt™  
v7.1.15

**Project:** Fontana Fire Station  
**Location:** Fontana  
**Folder:** RoofFuture Floor  
**Date:** 5/19/23 12:30 PM  
**Designer:** Tyler Bouma  
**Comment:**

**Type:** J2 - (Roof Load)

## 14" Red-I65™ @ 24" o.c.

This product meets or exceeds the set design controls for the application and loads listed

DESIGN CONTROLS	%	Design	Allow.	DOL	Combination	Pattern	Pass/Fail
Shear (lb)	32%	1020	3175	Roof(125%)	1.0D+1.0Lr	All Spans	PASS
Positive Moment (ft-lb)	65%	6502	10038	Roof(125%)	1.0D+1.0Lr	All Spans	PASS

DEFLECTIONS (in)	%	Design	Allow.	Design	Allow.	Combination	Pattern	Pass/Fail
Span Live	48%	0.614	1.275	L / 498	L / 240	1.0D+1.0Lr	All Spans	PASS
Span Total	72%	1.228	1.700	L / 249	L / 180	1.0D+1.0Lr	All Spans	PASS

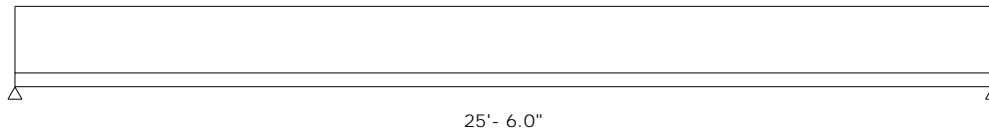
SUPPORTS	Support 1	Support 2
Live Reaction, Critical (lb) (DOL%)	510 (125)	510 (125)
Dead Reaction (lb)	510	510
Total Reaction (lb) (DOL%)	1020 (125)	1020 (125)
Bearing	Flush	Flush
Support	Wall	Beam
Req'd Bearing, No Stiffeners (in)	1.75	1.75
Req'd Bearing, Stiffeners (in)	-	-

HANGERS	Model	Top	Face	Member	Header	Size
Left	IUS2.56/14		(12) 0.148x3	(2) Strong-Grip	Glulam DF/SP	8.75x34.5
	Slope: 0 None, Skew: 0 None					
Right	None Selected					

### SPANS AND LOADS

Dimensions represent horizontal design spans.

Member Slope: 0/12



### APPLICATION LOADS

Type	Units	DOL	Live	Dead	Partition	Tributary	Member Type
Uniform	psf	Roof(125%)	20	20	0	24"	Roof Joist

### NOTES

- Building code and design methodology: 2021 IBC ASD (US).
- Product Acceptance: ICC-ES ESR-2994 and LABC/LARC Supplement.
- Continuous lateral support required at top edge. Lateral support at bottom edge shall be per RedBuilt recommendations.

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5/19/2023 12:30:32 PM

Fontana Fire Station : RoofFuture Floor : J2 - (Roof Load)

Page 1 of 1

The products noted are intended for interior, untreated, non-corrosive applications with normal temperatures and dry conditions of use, and must be installed in accordance with local building code requirements and RedBuilt™ recommendations. The loads, spans, and spacing have been provided by others and must be approved for the specific application by the design professional for the project. Unless otherwise noted, this output has not been reviewed by a RedBuilt™ associate. PRODUCT SUBSTITUTION VOIDS THIS ANALYSIS.

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**Wood Beam**

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80.ec6

LIC#: KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

(c) ENERCALC INC 1983-2023

**DESCRIPTION: J3****CODE REFERENCES**

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

Load Combination Set : IBC 2021

**Material Properties**

Analysis Method : Allowable Stress Design

Load Combination : IBC 2021

Wood Species : Douglas Fir-South

Wood Grade : No.1

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

Fb + 925 psi

Fb - 925 psi

Fc - Prll 1450 psi

Fc - Perp 520 psi

Fv 180 psi

Ft 600 psi

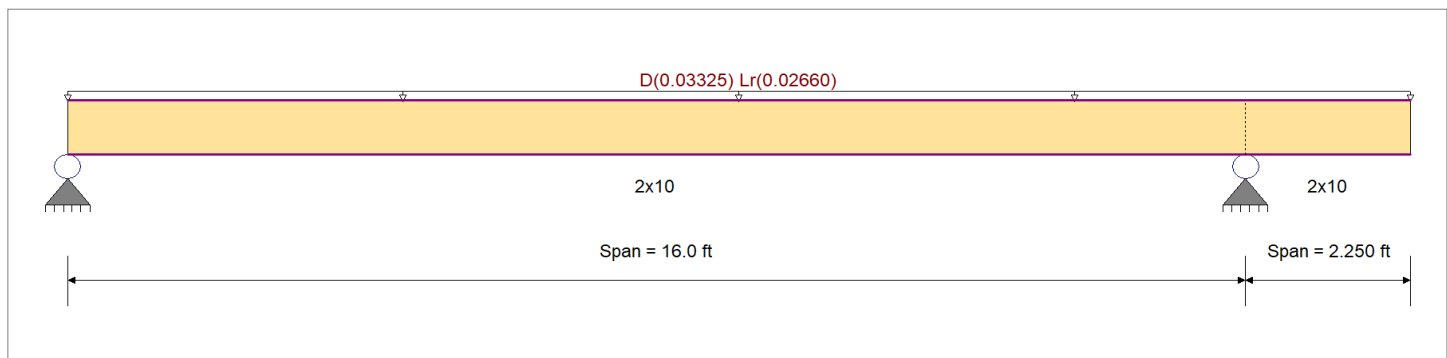
*E : Modulus of Elasticity*

Ebend- xx 1300ksi

Eminbend - xx 470ksi

Density 28.72pcf

Repetitive Member Stress Increase

**Applied Loads**

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

Beam self weight NOT internally calculated and added

Loads on all spans...

Uniform Load on ALL spans : D = 0.0250, Lr = 0.020 ksf, Tributary Width = 1.330 ft

**DESIGN SUMMARY****Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.706</b>	<b>1</b>	<b>Maximum Shear Stress Ratio</b>	=	<b>0.214</b>	<b>1</b>
Section used for this span		<b>2x10</b>		Section used for this span		<b>2x10</b>	
fb: Actual	=	1,032.33psi		fv: Actual	=	48.16 psi	
F'b	=	1,462.66psi		F'v	=	225.00 psi	
Load Combination		+D+Lr		Load Combination		+D+Lr	
Location of maximum on span	=	7.866ft		Location of maximum on span	=	15.285 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	

**Maximum Deflection**

Max Downward Transient Deflection	0.293 in	Ratio =	654	>=360	Span: 1 : Lr Only
Max Upward Transient Deflection	-0.125 in	Ratio =	430	>=360	Span: 2 : Lr Only
Max Downward Total Deflection	0.660 in	Ratio =	291	>=180	Span: 1 : +D+Lr
Max Upward Total Deflection	-0.282 in	Ratio =	190	>=180	Span: 2 : +D+Lr

**Maximum Forces & Stresses for Load Combinations**

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v
<b>D Only</b>																	
Length = 16.0 ft	1	0.545	0.165	0.90	1.00	1.00	1.00	1.100	1.00	1.00	1.15	1.02	573.5	1,053.1	0.25	26.8	162.0
Length = 2.250 ft	2	0.045	0.165	0.90	1.00	1.00	1.00	1.100	1.00	1.00	1.15	0.08	47.2	1,053.1	0.05	26.8	162.0
<b>+D+Lr</b>																	
Length = 16.0 ft	1	0.706	0.214	1.25	1.00	1.00	1.00	1.100	1.00	1.00	1.15	1.84	1,032.3	1,462.7	0.45	48.2	225.0
Length = 2.250 ft	2	0.058	0.214	1.25	1.00	1.00	1.00	1.100	1.00	1.00	1.15	0.15	85.0	1,462.7	0.09	48.2	225.0
<b>+D+0.750Lr</b>																	
Length = 16.0 ft	1	0.627	0.190	1.25	1.00	1.00	1.00	1.100	1.00	1.00	1.15	1.64	917.6	1,462.7	0.40	42.8	225.0
Length = 2.250 ft	2	0.052	0.190	1.25	1.00	1.00	1.00	1.100	1.00	1.00	1.15	0.13	75.5	1,462.7	0.08	42.8	225.0

**Wood Beam**

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80.ec6

LIC# : KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

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**DESCRIPTION: J3****Maximum Forces & Stresses for Load Combinations**

Load Combination		Max Stress Ratios											Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>		M	fb	F'b	V	fv	F'v
+0.60D					1.00	1.00	1.00	1.100	1.00	1.00	1.15				0.0	0.00	0.0	0.0
Length = 16.0 ft	1	0.184	0.056	1.60	1.00	1.00	1.00	1.100	1.00	1.00	1.15		0.61	344.1	1,872.2	0.15	16.1	288.0
Length = 2.250 ft	2	0.015	0.056	1.60	1.00	1.00	1.00	1.100	1.00	1.00	1.15		0.05	28.3	1,872.2	0.03	16.1	288.0

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.6596	7.955		0.0000	0.000
	2	0.0000	7.955	+D+Lr	-0.2818	2.250

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.469	0.623	
Max Upward from Load Combinations	0.469	0.623	
Max Upward from Load Cases	0.261	0.346	
D Only	0.261	0.346	
+D+Lr	0.469	0.623	
+D+0.750Lr	0.417	0.554	
+0.60D	0.156	0.208	
Lr Only	0.209	0.277	

**Steel Beam**

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80.ec6

LIC# : KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

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**DESCRIPTION:** B1 (Roof Loading)**CODE REFERENCES**

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2021

**Material Properties**

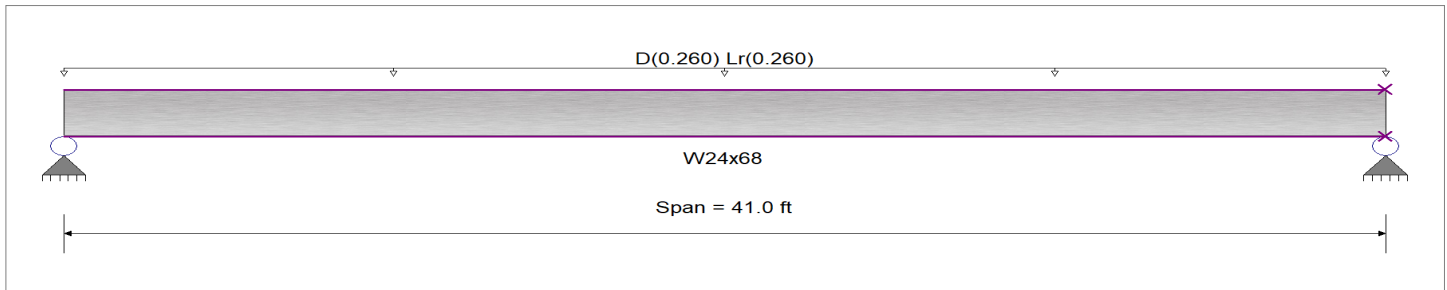
Analysis Method Load Resistance Factor Design

Fy : Steel Yield : 50.0 ksi

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

E: Modulus : 29,000.0 ksi

Bending Axis : Major Axis Bending

**Applied Loads**

Service loads entered. Load Factors will be applied for calculations

Beam self weight calculated and added to loading

Loads on all spans...

Uniform Load on ALL spans : D = 0.020, Lr = 0.020 ksf, Tributary Width = 13.0 ft

**DESIGN SUMMARY****Design OK**

<b>Maximum Bending Stress Ratio =</b>		<b>0.256 : 1</b>	<b>Maximum Shear Stress Ratio =</b>		<b>0.056 : 1</b>
Section used for this span		<b>W24x68</b>	Section used for this span		<b>W24x68</b>
Mu : Applied		170.117 k-ft	Vu : Applied		16.597 k
Mn * Phi : Allowable		663.750 k-ft	Vn * Phi : Allowable		295.065 k
Load Combination		+1.20D+1.60Lr+0.50L	Load Combination		+1.20D+1.60Lr+0.50L
Span # where maximum occurs		Span # 1	Location of maximum on span		0.000 ft
			Span # where maximum occurs		Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection		0.313 in	Ratio =	1,572	>=360
Max Upward Transient Deflection		0.000 in	Ratio =	0	<360
Max Downward Total Deflection		0.708 in	Ratio =	695	>=180
Max Upward Total Deflection		0.000 in	Ratio =	0	<180
			Span: 1 : Lr Only		
			Span: 1 : +D+Lr		

**Maximum Forces & Stresses for Load Combinations**

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	max Mu +	max Mu -	Mu Max	Mnx	Phi*Mnx	Cb	Rm	VuMax	Vnx	Phi*Vnx
+1.40D													
Dsgn. L = 41.00 ft	1	0.145	0.032	96.49		96.49	737.50	663.75	1.00	1.00	9.41	295.07	295.07
+1.20D+0.50Lr+1.60L													
Dsgn. L = 41.00 ft	1	0.166	0.036	110.02		110.02	737.50	663.75	1.00	1.00	10.73	295.07	295.07
+1.20D+1.60L													
Dsgn. L = 41.00 ft	1	0.125	0.027	82.71		82.71	737.50	663.75	1.00	1.00	8.07	295.07	295.07
+1.20D+1.60Lr+0.50L													
Dsgn. L = 41.00 ft	1	0.256	0.056	170.12		170.12	737.50	663.75	1.00	1.00	16.60	295.07	295.07
+1.20D+1.60Lr													
Dsgn. L = 41.00 ft	1	0.256	0.056	170.12		170.12	737.50	663.75	1.00	1.00	16.60	295.07	295.07
+1.20D+0.50L													
Dsgn. L = 41.00 ft	1	0.125	0.027	82.71		82.71	737.50	663.75	1.00	1.00	8.07	295.07	295.07
+1.20D													
Dsgn. L = 41.00 ft	1	0.125	0.027	82.71		82.71	737.50	663.75	1.00	1.00	8.07	295.07	295.07
+1.20D+0.50Lr+0.50L													
Dsgn. L = 41.00 ft	1	0.166	0.036	110.02		110.02	737.50	663.75	1.00	1.00	10.73	295.07	295.07
+0.90D													
Dsgn. L = 41.00 ft	1	0.093	0.021	62.03		62.03	737.50	663.75	1.00	1.00	6.05	295.07	295.07

**Steel Beam**

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80.ec6

LIC# : KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

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**DESCRIPTION: B1 (Roof Loading)****Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.7077	20.617		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #'

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	12.054	12.054
Max Upward from Load Combinations	12.054	12.054
Max Upward from Load Cases	6.724	6.724
D Only	6.724	6.724
+D+L	6.724	6.724
+D+Lr	12.054	12.054
+D+0.750Lr+0.750L	10.722	10.722
+D+0.750L	6.724	6.724
+0.60D	4.034	4.034
Lr Only	5.330	5.330
L Only		

**Steel Beam**

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80.ec6

LIC#: KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

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**DESCRIPTION:** B2 (Roof Loading)**CODE REFERENCES**

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2021

**Material Properties**

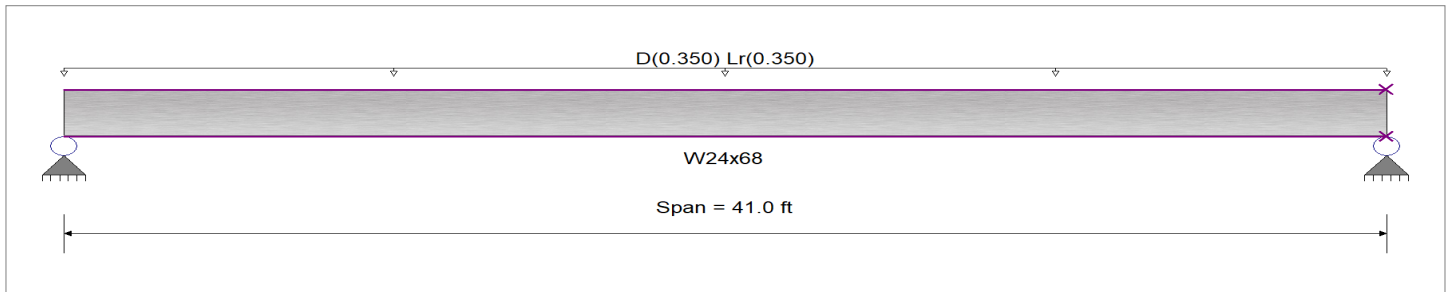
Analysis Method Load Resistance Factor Design

Fy : Steel Yield : 50.0 ksi

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

E: Modulus : 29,000.0 ksi

Bending Axis : Major Axis Bending

**Applied Loads**

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

Beam self weight calculated and added to loading

Loads on all spans...

Uniform Load on ALL spans : D = 0.020, Lr = 0.020 ksf, Tributary Width = 17.50 ft

**DESIGN SUMMARY****Design OK**

Maximum Bending Stress Ratio = **0.336** : 1  
 Section used for this span **W24x68**  
 Mu : Applied 223.069 k-ft  
 Mn \* Phi : Allowable 663.750 k-ft  
 Load Combination +1.20D+1.60Lr+0.50L  
 Span # where maximum occurs Span # 1

Maximum Shear Stress Ratio = **0.074** : 1  
 Section used for this span **W24x68**  
 Vu : Applied 21.763 k  
 Vn \* Phi : Allowable 295.065 k  
 Load Combination +1.20D+1.60Lr+0.50L  
 Location of maximum on span 0.000 ft  
 Span # where maximum occurs Span # 1

**Maximum Deflection**

Max Downward Transient Deflection 0.421 in Ratio = **1,168** >=360  
 Max Upward Transient Deflection 0.000 in Ratio = **0** <360 Span: 1 : Lr Only  
 Max Downward Total Deflection 0.924 in Ratio = **532** >=180 Span: 1 : +D+Lr  
 Max Upward Total Deflection 0.000 in Ratio = **0** <180

**Maximum Forces & Stresses for Load Combinations**

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	max Mu +	max Mu -	Mu Max	Mnx	Phi*Mnx	Cb	Rm	VuMax	Vnx	Phi*Vnx
+1.40D													
Dsgn. L = 41.00 ft	1	0.185	0.041	122.97		122.97	737.50	663.75	1.00	1.00	12.00	295.07	295.07
+1.20D+0.50Lr+1.60L													
Dsgn. L = 41.00 ft	1	0.214	0.047	142.17		142.17	737.50	663.75	1.00	1.00	13.87	295.07	295.07
+1.20D+1.60L													
Dsgn. L = 41.00 ft	1	0.159	0.035	105.40		105.40	737.50	663.75	1.00	1.00	10.28	295.07	295.07
+1.20D+1.60Lr+0.50L													
Dsgn. L = 41.00 ft	1	0.336	0.074	223.07		223.07	737.50	663.75	1.00	1.00	21.76	295.07	295.07
+1.20D+1.60Lr													
Dsgn. L = 41.00 ft	1	0.336	0.074	223.07		223.07	737.50	663.75	1.00	1.00	21.76	295.07	295.07
+1.20D+0.50L													
Dsgn. L = 41.00 ft	1	0.159	0.035	105.40		105.40	737.50	663.75	1.00	1.00	10.28	295.07	295.07
+1.20D													
Dsgn. L = 41.00 ft	1	0.159	0.035	105.40		105.40	737.50	663.75	1.00	1.00	10.28	295.07	295.07
+1.20D+0.50Lr+0.50L													
Dsgn. L = 41.00 ft	1	0.214	0.047	142.17		142.17	737.50	663.75	1.00	1.00	13.87	295.07	295.07
+0.90D													
Dsgn. L = 41.00 ft	1	0.119	0.026	79.05		79.05	737.50	663.75	1.00	1.00	7.71	295.07	295.07



Printed: 28 JUN 2023, 9:21AM

## Steel Beam

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80.ec6

LIC# : KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

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**DESCRIPTION:** B2 (Roof Loading)

### Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.9243	20.617		0.0000	0.000

### Vertical Reactions

Support notation : Far left is #'

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	15.744	15.744
Max Upward from Load Combinations	15.744	15.744
Max Upward from Load Cases	8.569	8.569
D Only	8.569	8.569
+D+L	8.569	8.569
+D+Lr	15.744	15.744
+D+0.750Lr+0.750L	13.950	13.950
+D+0.750L	8.569	8.569
+0.60D	5.141	5.141
Lr Only	7.175	7.175
L Only		



RedSpec™ by RedBuilt™  
v7.1.15

**Project:** Fontana Fire Station  
**Location:** Fontana  
**Folder:** RoofFuture Floor  
**Date:** 6/1/23 7:21 AM  
**Designer:** Tyler Bouma  
**Comment:**

**Type: B3 - Mech. Support B**

## 3.5"x14" RedLam™ LVL 2.0E

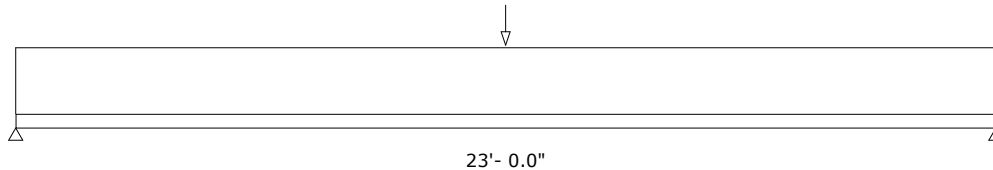
This product meets or exceeds the set design controls for the application and loads listed

DESIGN CONTROLS		%	Design	Allow.	DOL	Combination	Pattern	Pass/Fail
Shear (lb)		11%	1239	11638	Roof(125%)	1.0D+1.0Lr	All Spans	PASS
Positive Moment (ft-lb)		27%	9283	33822	Roof(125%)	1.0D+1.0Lr	All Spans	PASS
DEFLECTIONS (in)		%	Design	Allow.	Design	Allow.	Combination	Pattern
Span Live		14%	0.162	1.150	L / 999+	L / 240	1.0D+1.0Lr	All Spans
Span Total		35%	0.532	1.533	L / 519	L / 180	1.0D+1.0Lr	All Spans
SUPPORTS			Support 1	Support 2				
Live Reaction, Critical (lb) (DOL%)			460 (125)	460 (125)				
Dead Reaction (lb)			889	889				
Total Reaction (lb) (DOL%)			1349 (125)	1349 (125)				
Bearing			Flush	Flush				
Support			Wall	Beam				
Req'd Bearing (in)			1.50	1.50				
HANGERS	Model		Top	Face	Member	Header	Size	
Left	None Selected							
Right	None Selected							

### SPANS AND LOADS

Dimensions represent horizontal design spans.

Member Slope: 0/12



### APPLICATION LOADS

Type	Units	DOL	Live	Dead	Partition	Tributary	Member Type
Uniform	psf	Roof(125%)	20	20	0	2'-0.0"	Roof Beam

### ADDITIONAL LOADS

Type	Units	DOL	Live	Dead	Location from left	Application	Comment
Point	lb	Dead(90%)	0	530	11'-6.0"	Adds To	

### NOTES

- Building code and design methodology: 2021 IBC ASD (US).
- Product Acceptance: ICC-ES ESR-2993 and LABC/LARC Supplement.
- No repetitive member increase applied in design.
- Support bearing length requirements must be checked separately.
- Continuous lateral support required at top and bottom edge.

T:\Projects\2023\MI2328021.00 - Fontana FS 80 Training Phase 1\Engineering\Calculations\2.3) RedBuilt - 2328021.00 Fontana FS #80.red

6/1/2023 7:21:48 AM

Fontana Fire Station : RoofFuture Floor : B3 - Mech. Support B

Page 1 of 1

The products noted are intended for interior, untreated, non-corrosive applications with normal temperatures and dry conditions of use, and must be installed in accordance with local building code requirements and RedBuilt™ recommendations. The loads, spans, and spacing have been provided by others and must be approved for the specific application by the design professional for the project. Unless otherwise noted, this output has not been reviewed by a RedBuilt™ associate. PRODUCT SUBSTITUTION VOIDS THIS ANALYSIS.

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## 3.2 FLOOR FRAMING

**FOR REFERENCE**  
FUTURE PHASE 2: NOT PART OF THIS PERMIT APPROVAL



RedSpec™ by RedBuilt™  
v7.1.15

**Project:** Fontana Fire Station  
**Location:** Fontana  
**Folder:** RoofFuture Floor  
**Date:** 5/19/23 12:30 PM  
**Designer:** Tyler Bouma  
**Comment:**

**Type:** J1 - (Floor Load)

## 14" Red-I65™ @ 24" o.c. with Glued Sheathing

This product meets or exceeds the set design controls for the application and loads listed

DESIGN CONTROLS	%	Design	Allow.	DOL	Combination	Pattern	Pass/Fail	
Shear (lb)	50%	1282	2540	Floor(100%)	1.0D+1.0L	All Spans	PASS	
Positive Moment (ft-lb)	54%	4328	8030	Floor(100%)	1.0D+1.0L	All Spans	PASS	
DEFLECTIONS (in)	%	Design	Allow.	Design	Allow.	Combination	Pattern	Pass/Fail
Span Live	47%	0.157	0.338	L / 999+	L / 480	1.0D+1.0L	All Spans	PASS
Span Total	34%	0.230	0.675	L / 706	L / 240	1.0D+1.0L	All Spans	PASS

FloorChoice™ Rating: 9.2



Performance rating is based on: 24 oc (23/32", 3/4") sheathing, glued and nailed, 1 1/2" Lightweight Concrete topping, simple span, flexible support. RedSpec has not performed a structural analysis of the sheathing.

### SUPPORTS

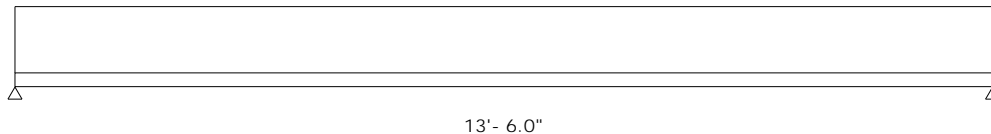
	Support 1	Support 2
Live Reaction, Critical (lb) (DOL%)	877 (100)	877 (100)
Dead Reaction (lb)	405	405
Total Reaction (lb) (DOL%)	1282 (100)	1282 (100)
Bearing	Flush	Flush
Support	Wall	Beam
Req'd Bearing, No Stiffeners (in)	1.75	1.75
Req'd Bearing, Stiffeners (in)	-	-

### HANGERS

Model	Top	Face	Member	Header	Size
Left IUS2.56/14		(12) 0.148x3	(2) Strong-Grip	Glulam DF/SP	8.75x34.5
Slope: 0 None, Skew: 0 None					
Right IUS2.56/14		(12) 0.148x3	(2) Strong-Grip	Glulam DF/SP	8.75x34.5
Slope: 0 None, Skew: 0 None					

### SPANS AND LOADS

Dimensions represent horizontal design spans.



### APPLICATION LOADS

Type	Units	DOL	Live	Dead	Partition	Tributary	Member Type
Uniform	psf	Floor(100%)	50	30	15	24"	Glued Floor Joist

### NOTES

- Building code and design methodology: 2021 IBC ASD (US).
- Product Acceptance: ICC-ES ESR-2994 and LABC/LARC Supplement.
- Deflection analysis is based on composite action with 24 oc (23/32", 3/4") sheathing, glued and nailed.
- Continuous lateral support required at top edge. Lateral support at bottom edge shall be per RedBuilt recommendations.
- Joist design includes consideration for a 200 lb load distributed over a 30" square area and all live loads removed.

T:\Projects\2023\MI2328021.00 - Fontana FS 80 Training Phase 1\Engineering\Calculations\2.3) RedBuilt - 2328021.00 Fontana FS #80.red

5/19/2023 12:30:28 PM

Fontana Fire Station : RoofFuture Floor : J1 - (Floor Load)

Page 1 of 1

The products noted are intended for use in accordance with local building code and must be approved for the specific application by a RedBuilt associate. PRODUCT SUBSTITUTION VOIDS THIS ANALYSIS.

**FOR REFERENCE**  
**FUTURE PHASE 2: NOT PART OF THIS PERMIT APPROVAL**

conditions of use, and must be installed in accordance with the conditions of use and must be approved for the specific application by a RedBuilt associate. PRODUCT SUBSTITUTION VOIDS THIS ANALYSIS.

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**Steel Beam**

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80.ec6

LIC#: KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

(c) ENERCALC INC 1983-2023

**DESCRIPTION:** B1 (Future Floor Loading)**CODE REFERENCES**

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2021

**Material Properties**

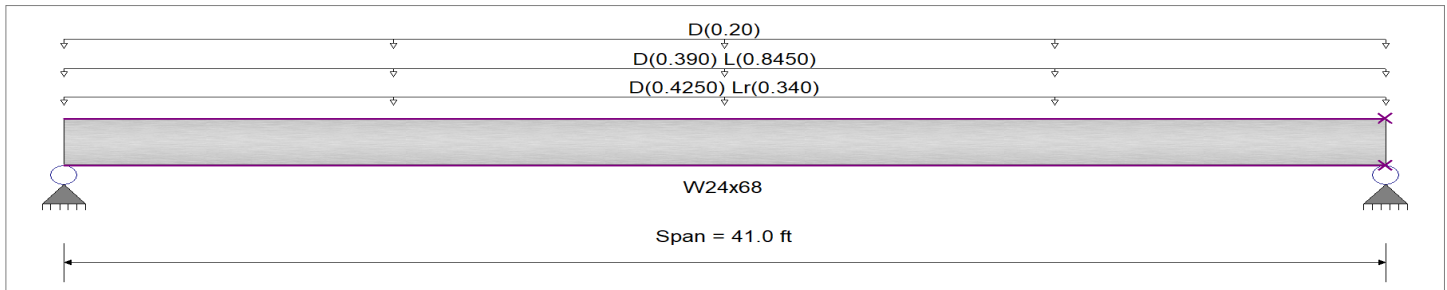
Analysis Method Load Resistance Factor Design

Fy : Steel Yield : 50.0 ksi

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

E: Modulus : 29,000.0 ksi

Bending Axis : Major Axis Bending

**Applied Loads**

Service loads entered. Load Factors will be applied for calculations

Beam self weight calculated and added to loading

Loads on all spans...

Uniform Load on ALL spans : D = 0.0250, Lr = 0.020 ksf, Tributary Width = 17.0 ft

Uniform Load on ALL spans : D = 0.030, L = 0.0650 ksf, Tributary Width = 13.0 ft

Partial Length Uniform Load : D = 0.20 k/ft, Extent = 0.0 --&gt; 41.0 ft

**DESIGN SUMMARY****Design OK**

Maximum Bending Stress Ratio =		0.893 : 1	Maximum Shear Stress Ratio =		0.196 : 1
Section used for this span		W24x68	Section used for this span		W24x68
Mu : Applied		592.889 k-ft	Vu : Applied		57.843 k
Mn * Phi : Allowable		663.750 k-ft	Vn * Phi : Allowable		295.065 k
Load Combination		+1.20D+0.50Lr+1.60L	Load Combination		+1.20D+0.50Lr+1.60L
Span # where maximum occurs		Span # 1	Location of maximum on span		0.000 ft
Span # where maximum occurs		Span # 1	Span # where maximum occurs		Span # 1
Maximum Deflection					
Max Downward Transient Deflection		1.017 in	Ratio =	483	>=360
Max Upward Transient Deflection		0.000 in	Ratio =	0	<360
Max Downward Total Deflection		2.373 in	Ratio =	207	>=180
Max Upward Total Deflection		0.000 in	Ratio =	0	<180
			Span: 1 : L Only		
			Span: 1 : +D+0.750Lr+0.750L		

**Maximum Forces & Stresses for Load Combinations**

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	max Mu +	max Mu -	Mu Max	Mnx	Phi*Mnx	Cb	Rm	VuMax	Vnx	Phi*Vnx
+1.40D													
Dsgn. L = 41.00 ft	1	0.480	0.105	318.59		318.59	737.50	663.75	1.00	1.00	31.08	295.07	295.07
+1.20D+0.50Lr+1.60L													
Dsgn. L = 41.00 ft	1	0.893	0.196	592.89		592.89	737.50	663.75	1.00	1.00	57.84	295.07	295.07
+1.20D+1.60L													
Dsgn. L = 41.00 ft	1	0.839	0.184	557.17		557.17	737.50	663.75	1.00	1.00	54.36	295.07	295.07
+1.20D+1.60Lr+0.50L													
Dsgn. L = 41.00 ft	1	0.717	0.157	476.16		476.16	737.50	663.75	1.00	1.00	46.46	295.07	295.07
+1.20D+1.60Lr													
Dsgn. L = 41.00 ft	1									1.00	37.79	295.07	295.07
+1.20D+0.50L													
Dsgn. L = 41.00 ft	1									1.00	35.30	295.07	295.07
+1.20D													
Dsgn. L = 41.00 ft	1	0.411	0.090	273.08		273.08	737.50	663.75	1.00	1.00	26.64	295.07	295.07
+1.20D+0.50Lr+0.50L													
Dsgn. L = 41.00 ft	1	0.599	0.131	397.58		397.58	737.50	663.75	1.00	1.00	38.79	295.07	295.07

**FOR REFERENCE****FUTURE PHASE 2: NOT PART OF THIS PERMIT APPROVAL**

**Steel Beam**

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80.ec6

LIC# : KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

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**DESCRIPTION:** B1 (Future Floor Loading)**Maximum Forces & Stresses for Load Combinations**

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	max Mu +	max Mu -	Mu Max	Mnx	Phi*Mnx	Cb	Rm	VuMax	Vnx	Phi*Vnx
+0.90D													
Dsgn. L = 41.00 ft	1	0.309	0.068	204.81		204.81	737.50	663.75	1.00	1.00	19.98	295.07	295.07

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	2.3730	20.617		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #'

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	40.421	40.421
Max Upward from Load Combinations	40.421	40.421
Max Upward from Load Cases	22.202	22.202
D Only	22.202	22.202
+D+L	39.524	39.524
+D+Lr	29.172	29.172
+D+0.750Lr+0.750L	40.421	40.421
+D+0.750L	35.193	35.193
+0.60D	13.321	13.321
Lr Only	6.970	6.970
L Only	17.323	17.323

**FOR REFERENCE**

FUTURE PHASE 2: NOT PART OF THIS PERMIT APPROVAL

**Steel Beam**

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80.ec6

LIC# : KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

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**DESCRIPTION:** B2 (Future Floor Loading)**CODE REFERENCES**

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2021

**Material Properties**

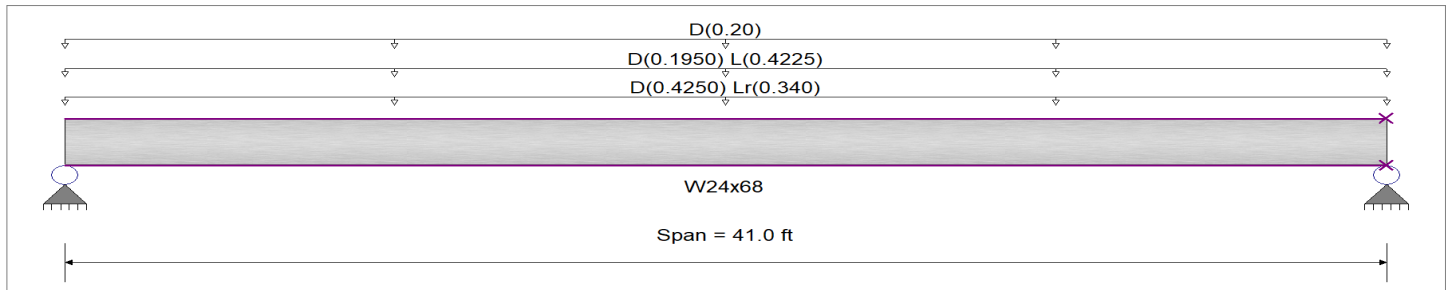
Analysis Method Load Resistance Factor Design

Fy : Steel Yield : 50.0 ksi

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

E: Modulus : 29,000.0 ksi

Bending Axis : Major Axis Bending

**Applied Loads**

Service loads entered. Load Factors will be applied for calculations

Beam self weight calculated and added to loading

Loads on all spans...

Uniform Load on ALL spans : D = 0.0250, Lr = 0.020 ksf, Tributary Width = 17.0 ft

Uniform Load on ALL spans : D = 0.030, L = 0.0650 ksf, Tributary Width = 6.50 ft

Partial Length Uniform Load : D = 0.20 k/ft, Extent = 0.0 --&gt; 41.0 ft

**DESIGN SUMMARY****Design OK**

Maximum Bending Stress Ratio =	<b>0.605 : 1</b>	Maximum Shear Stress Ratio =	<b>0.133 : 1</b>
Section used for this span	<b>W24x68</b>	Section used for this span	<b>W24x68</b>
Mu : Applied	401.675 k-ft	Vu : Applied	39.188 k
Mn * Phi : Allowable	663.750 k-ft	Vn * Phi : Allowable	295.065 k
Load Combination	+1.20D+0.50Lr+1.60L	Load Combination	+1.20D+0.50Lr+1.60L
Span # where maximum occurs	Span # 1	Location of maximum on span	0.000 ft
		Span # where maximum occurs	Span # 1
<b>Maximum Deflection</b>			
Max Downward Transient Deflection	0.508 in Ratio =	967	>=360
Max Upward Transient Deflection	0.000 in Ratio =	0	<360
Max Downward Total Deflection	1.757 in Ratio =	280	>=180
Max Upward Total Deflection	0.000 in Ratio =	0	<180

**Maximum Forces & Stresses for Load Combinations**

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	max Mu +	max Mu -	Mu Max	Mnx	Phi*Mnx	Cb	Rm	VuMax	Vnx	Phi*Vnx
+1.40D													
Dsgn. L = 41.00 ft	1	0.394	0.086	261.23		261.23	737.50	663.75	1.00	1.00	25.49	295.07	295.07
+1.20D+0.50Lr+1.60L													
Dsgn. L = 41.00 ft	1	0.605	0.133	401.67		401.67	737.50	663.75	1.00	1.00	39.19	295.07	295.07
+1.20D+1.60L													
Dsgn. L = 41.00 ft	1	0.551	0.121	365.95		365.95	737.50	663.75	1.00	1.00	35.70	295.07	295.07
+1.20D+1.60Lr+0.50L													
Dsgn. L = 41.00 ft	1	0.576	0.127	382.61		382.61	737.50	663.75	1.00	1.00	37.33	295.07	295.07
+1.20D+1.60Lr													
Dsgn. L = 41.00 ft	1									1.00	33.00	295.07	295.07
+1.20D+0.50L													
Dsgn. L = 41.00 ft	1									1.00	26.18	295.07	295.07
+1.20D													
Dsgn. L = 41.00 ft	1	0.337	0.074	223.91		223.91	737.50	663.75	1.00	1.00	21.84	295.07	295.07
+1.20D+0.50Lr+0.50L													
Dsgn. L = 41.00 ft	1	0.458	0.101	304.02		304.02	737.50	663.75	1.00	1.00	29.66	295.07	295.07

**FOR REFERENCE****FUTURE PHASE 2: NOT PART OF THIS PERMIT APPROVAL**

**Steel Beam**

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80.ec6

LIC# : KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

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**DESCRIPTION:** B2 (Future Floor Loading)**Maximum Forces & Stresses for Load Combinations**

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	max Mu +	max Mu -	Mu Max	Mnx	Phi*Mnx	Cb	Rm	VuMax	Vnx	Phi*Vnx
+0.90D													
Dsgn. L = 41.00 ft	1	0.253	0.056	167.93		167.93	737.50	663.75	1.00	1.00	16.38	295.07	295.07

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	1.7570	20.617		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #'

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	29.927	29.927
Max Upward from Load Combinations	29.927	29.927
Max Upward from Load Cases	18.204	18.204
D Only	18.204	18.204
+D+L	26.865	26.865
+D+Lr	25.174	25.174
+D+0.750Lr+0.750L	29.927	29.927
+D+0.750L	24.700	24.700
+0.60D	10.922	10.922
Lr Only	6.970	6.970
L Only	8.661	8.661

**FOR REFERENCE**

FUTURE PHASE 2: NOT PART OF THIS PERMIT APPROVAL

## **3.3 FOUNDATION DESIGN**



Foundation Design

Cont. Fdn's.

Bearing Capacity = 2500 psf

CF 2.0 Design Capacity

2'-0" wide x 2'-0" depth

$$[2500 + 250(2-1.5)] \times 2' \text{ width} = 5250 \text{ plf}$$

CF 3.0 Design Capacity

3'-0" wide x 2'-0" depth

$$[2500 + 250(2-1.5)] \times 3' \text{ width} = 7875 \text{ plf}$$

Line A Phase 1 LoadingPhase 2 Loading

$$\text{Roof Trib} = \frac{26'}{2} + 4.5' = 17.5'$$

$$\text{Ext. Wall Trib} = 18'$$

$$17.5'(20+20) + 18'(18) = 1024 \text{ plf}$$

$$< 5250 \therefore \text{use CF 2.0 min}$$

Line A.7

$$\text{Roof Trib} = \frac{23'}{2} + \frac{26'}{2} = 24.5'$$

$$\text{Int. Wall Trib} = 14'$$

$$24.5'(20+20) + 14(10) = 1120 \text{ plf}$$

$$< 5250 \therefore \text{use CF 2.0 min}$$

Line C.8

$$\text{Roof Trib} = \frac{7.5' + 13.5'}{2} = 10.5'$$

$$\text{Int. Wall Trib} = 14'$$

$$10.5'(20+20) + 14(10) = 560 \text{ plf}$$

$$< 5250 \therefore \text{use CF 2.0 min}$$

$$\text{Roof Trib} = \frac{22'}{2} = 11'$$

$$\text{Floor Trib} = \frac{22'}{2} = 11'$$

$$\text{Int. Wall} = 14'$$

$$11'(25+20) + 11'(30+50+15) + 14(10) = 1680 \text{ plf}$$



Foundation Design Cont.

Line D Phase 1 Loading

$$\text{Roof Trib} = \frac{7.5'}{2} = 3.75'$$

$$\text{Ext Wall Trib} = 18'$$

$$3.75(20+20) + 18(18) = 4174 \text{ plf}$$

$$< 5250 \therefore \text{use CF 2.0 min.}$$

Phase 2 Loading

$$\text{Roof Trib} = \frac{18+22}{2} = 20'$$

$$\text{Floor Trib} = \frac{18+8}{2} = 13'$$

$$\text{Int. Wall Trib} = 14'$$

$$20'(15+20) + 13'(30+50+15) + 14'(10) = 2275 \text{ plf}$$

Line 1

$$\text{Roof Trib} = \frac{16'}{2} + 2 = 10'$$

$$\text{Ext Wall Trib} = 10'$$

$$10(25+20) + 10(18) = 630 \text{ plf}$$

$$< 5250 \therefore \text{use CF 2.0 min.}$$

Line 2

$$\text{Roof Trib} = \frac{16'}{2} = 8'$$

$$\text{Int. Wall Trib} = 14'$$

$$8'(25+20) + 14(10) = 500 \text{ plf}$$

$$< 5250 \therefore \text{use CF 2.0 min.}$$

## Steel Column Design:

Column		Future Floor					Roof					Total Load					Column Design			
Mark	Location	Area	DL	LL	D	L	Area	DL	LL	D	L	TD	TL	T <sup>(3)</sup>	U <sup>(4)</sup>	U/T <sup>(5)</sup>	Ht	Size	Cap <sup>(1)</sup>	DCR <sup>(6)</sup>
		ft <sup>2</sup>	psf	psf	kips	kips	ft <sup>2</sup>	psf	psf	kips	kips	kips	kips	kips	kips	factor	ft	HSS	kips	
<b>C1A</b>	Future Floor	267	30	65	8	17	349	20	20	7	7	15	24	39	57	1.45	12.0	HSS4x4x1/4	76.3	0.745
<b>C1B</b>	Roof Loading	0	0	0	0	0	359	20	20	7	7	7	7	14	20	1.40	12.0	HSS4x4x1/4	76.3	0.263

### Notes:

- $\phi P_n = \phi * F_{cr} * A_g$ , where  $F_{cr} = [0.658^{(F_y/F_c)}] * F_y$  for  $F_y/F_c \leq 2.25$ , or  $F_{cr} = 0.877 * F_e$  for  $F_y/F_c > 2.25$  (AISC E3-1)
- $F_e = \pi^2 * E / (K * L / r)^2$  per (AISC E3-4)
- Total load T is based on total dead load + total live load in ASD, used for footing design below
- Factor total load U is based on load combo 1.2DL+1.6LL
- U/T is conversion factor to convert each column load from ASD to LRFD
- DCR = U/Cap

### Base Plate Design: C1

Max col load P = 39 kips  
 Max col load Pu = 57 kips  
 Column Width = 4.0  
 Base plate:  
 $F_y = 36$  ksi  
 size B x N = 12 in x 12 in  
 Bearing Check = OK  
 Req'd Thickness = 0.640 in.

### Pad Footing Design:

Allowable Soil Bearing Pressure = 2750 psf (Min. Width = 1 ft)

Ftg Mark	Column				Ftg Size Req'd		Footing Load <sup>(1), (2), (3)</sup>				Reinforcing Provided			Design Check <sup>(4), (5), (6)</sup>				
	Mark	dim in	T kips	U/T factor	W SQ. x Thick.		fs psf	Vu (k) 1-Way	Vu (k) 2-Way	Mu kip-ft	Thk in	Reinf	As in²	f Mn kip-ft		φ Vn (k)		
					ft	in								1-Way	2-Way	1-Way	2-Way	
F1	C1A	4.0	39	1.45	4.0	x 10.6	2529	7.63	50.614	23.23	18	4 - #	5	1.24	78	> Mu,OK	53.1	192.488
F1	C1B	4.0	14	1.40	4.0	x 7.0	972	7.38	48.952	22.47	18	4 - #	5	1.24	78	> Mu, OK	53.1	192.488

### Notes:

- Soil pressure  $f_s = (\text{Total load} + \text{footing weight}) / (\text{Footing Width} \times \text{Footing Width})$
- Shear demand  $V_u$  (1 way) and  $V_u$  (2 way) are shear load at critical section for each footing due to soil pressure
- Moment Demand  $M_u$  is the cantilever ment at face of critical section due to soil pressure.
- Moment capacity  $fM_n$  is moment capacity based on bottom reinforcement per ACI,  $fM_n = 0.9 * A_s * f_y * (\text{Thk} - 3.25" \text{ Cover} - A_s * f_y / 0.85 / f_c / (\text{Ftg Width}))$
- Shear Capacity  $\phi V_n$  (1 way) is shear capacity based on concrete strength per ACI,  $\phi V_n = \phi * 2 * d * (\text{Width} * 12) * (f_c^{0.5})$
- Shear Capacity  $\phi V_n$  (2 way) is shear capacity based on concrete strength per ACI similar to 1-way shear capacity

## **4. OUT-OF-PLANE**

**Cantilevered Retaining Wall**

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80.ec6

LIC# : KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

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**DESCRIPTION:** Training Center Stem Wall**Code Reference:**

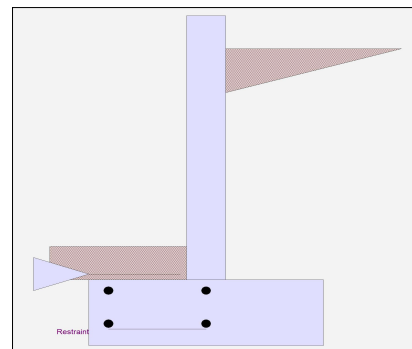
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

**Criteria**

Retained Height	=	3.50 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	6.00 in
Water table above bottom of footing	=	0.0 ft

**Soil Data**

Allow Soil Bearing	=	2,750.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	59.0 psf/ft
Passive Pressure	=	290.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing  Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

**Surcharge Loads**

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

**Axial Load Applied to Stem**

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

**Lateral Load Applied to Stem**

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)

**Adjacent Footing Load**

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

**Cantilevered Retaining Wall**

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80.ec6

LIC# : KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

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**DESCRIPTION: Training Center Stem Wall****Design Summary****Wall Stability Ratios**

Overturning = 2.58 OK  
Slab Resists All Sliding !

Global Stability = 1.31

Total Bearing Load = 1,300 lbs  
...resultant ecc. = 4.94 in

*Eccentricity within middle third*

Soil Pressure @ Toe = 790 psf OK

Soil Pressure @ Heel = 77 psf OK

Allowable = 2,750 psf

*Soil Pressure Less Than Allowable*

ACI Factored @ Toe = 1,106 psf

ACI Factored @ Heel = 107 psf

Footing Shear @ Toe = 4.0 psi OK

Footing Shear @ Heel = 3.4 psi OK

Allowable = 75.0 psi

**Sliding Calcs**

Lateral Sliding Force = 597.4 lbs

**Stem Construction****Design Height Above Ftg**

Wall Material Above "Ht" =

Design Method =

Thickness =

Rebar Size =

Rebar Spacing =

Rebar Placed at =

**Design Data**

fb/FB + fa/Fa = 0.271

**Total Force @ Section**

Service Level lbs =

Strength Level lbs = 578.2

**Moment....Actual**

Service Level ft-# =

Strength Level ft-# = 674.6

Moment.....Allowable = 2,487.6

**Shear.....Actual**

Service Level psi =

Strength Level psi = 16.1

Shear.....Allowable psi = 75.0

Anet (Masonry) in2 =

Wall Weight psf = 75.0

Rebar Depth 'd' in = 3.00

**Masonry Data**

f'm psi =

Fs psi =

Solid Grouting =

Modular Ratio 'n' =

Equiv. Solid Thick. =

Masonry Block Type =

Masonry Design Method = ASD

**Concrete Data**

f'c psi = 2,500.0

Fy psi = 60,000.0

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

**Load Factors**

Building Code

Dead Load 1.200

Live Load 1.600

Earth, H 1.600

Wind, W 1.600

Seismic, E 1.000

**Cantilevered Retaining Wall**

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80.ec6

LIC#: KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

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**DESCRIPTION: Training Center Stem Wall****Concrete Stem Rebar Area Details**

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.0559 in <sup>2</sup> /ft	
(4/3) * As :	0.0745 in <sup>2</sup> /ft	Min Stem T&S Reinf Area 0.576 in <sup>2</sup>
200bd/fy : 200(12)(3)/60000 :	0.12 in <sup>2</sup> /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.144 in <sup>2</sup> /ft
0.0018bh : 0.0018(12)(6) :	0.1296 in <sup>2</sup> /ft	Horizontal Reinforcing Options :
	=====	<u>One layer of :</u> <u>Two layers of :</u>
Required Area :	0.1296 in <sup>2</sup> /ft	#4@ 16.67 in    #4@ 33.33 in
Provided Area :	0.2 in <sup>2</sup> /ft	#5@ 25.83 in    #5@ 51.67 in
Maximum Area :	0.4064 in <sup>2</sup> /ft	#6@ 36.67 in    #6@ 73.33 in

**Footing Data**

Toe Width	=	1.25 ft
Heel Width	=	1.75
Total Footing Width	=	3.00
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c = 2,500 psi	Fy = 60,000 psi	
Footing Concrete Density = 150.00 pcf		
Min. As % = 0.0018		
Cover @ Top 2.00	@ Btm = 3.00 in	

**Footing Design Results**

	Toe	Heel
Factored Pressure	= 1,106	107 psf
Mu' : Upward	= 756	192 ft-#
Mu' : Downward	= 192	502 ft-#
Mu: Design	= 564 OK	309 ft-# OK
phiMn	= 9,777	2,500 ft-#
Actual 1-Way Shear	= 3.97	3.40 psi
Allow 1-Way Shear	= 75.00	40.00 psi
Toe Reinforcing	= # 5 @ 14.35 in	
Heel Reinforcing	= None Spec'd	
Key Reinforcing	= None Spec'd	
Footing Torsion, Tu	=	0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=	0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46.29 in, #10@ 58.79 in

Heel: phiMn = phi\*5\*lambda\*sqrt(fc)\*Sm

Key: No key defined

Min footing T&S reinf Area	0.78 in <sup>2</sup>
Min footing T&S reinf Area per foot	0.26 in <sup>2</sup> /ft
<u>If one layer of horizontal bars:</u>	<u>If two layers of horizontal bars:</u>
#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

**Cantilevered Retaining Wall**

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80.ec6

LIC# : KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

(c) ENERCALC INC 1983-2023

**DESCRIPTION:** Training Center Stem Wall**Summary of Overturning & Resisting Forces & Moments**

.....OVERTURNING.....				.....RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	597.4	1.50	896.1	Soil Over HL (ab. water tbl)	481.3	2.38	1,143.0
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.38	1,143.0
Hydrostatic Force				Water Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =	68.8	0.63	43.0
=				Surcharge Over Toe =			
				Stem Weight(s) =	300.0	1.50	450.0
				Earth @ Stem Transitions =			
				Footing Weight =	450.0	1.50	675.0
				Key Weight =			
				Vert. Component =			
<b>Total</b>	=	597.4	<b>O.T.M. =</b>				
			896.1				
<b>Resisting/Overturning Ratio</b>			=				
Vertical Loads used for Soil Pressure =		1,300.0	lbs				
				<b>Total =</b>	1,300.0	lbs	<b>R.M.=</b>
							2,310.9

\* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

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

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

**Tilt****Horizontal Deflection at Top of Wall due to settlement of soil**

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci

Horizontal Defl @ Top of Wall (approximate only) 0.029 in

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

**Cantilevered Retaining Wall**

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80.ec6

LIC# : KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

(c) ENERCALC INC 1983-2023

**DESCRIPTION:** Training Center Stem Wall**Rebar Lap & Embedment Lengths Information**Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) =

18.72 in

Development length for #4 bar specified in this stem design segment =

14.40 in

Hooked embedment length into footing for #4 bar specified in this stem design segment =

8.40 in

As Provided =

0.2000 in<sup>2</sup>/ft

As Required =

0.1296 in<sup>2</sup>/ft



## Cantilevered Retaining Wall

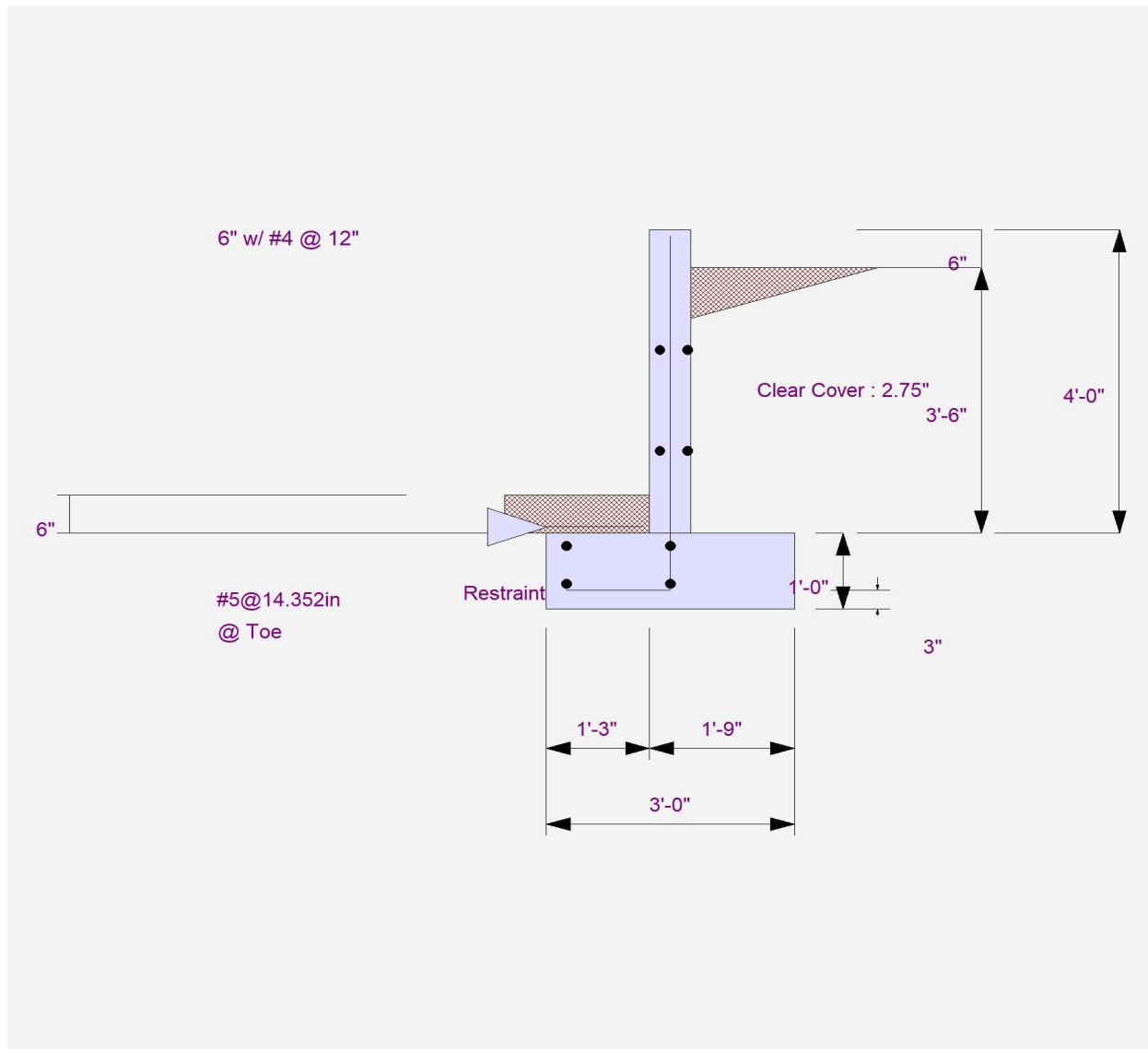
Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80.ec6

LIC# : KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

(c) ENERCALC INC 1983-2023

**DESCRIPTION:** Training Center Stem Wall



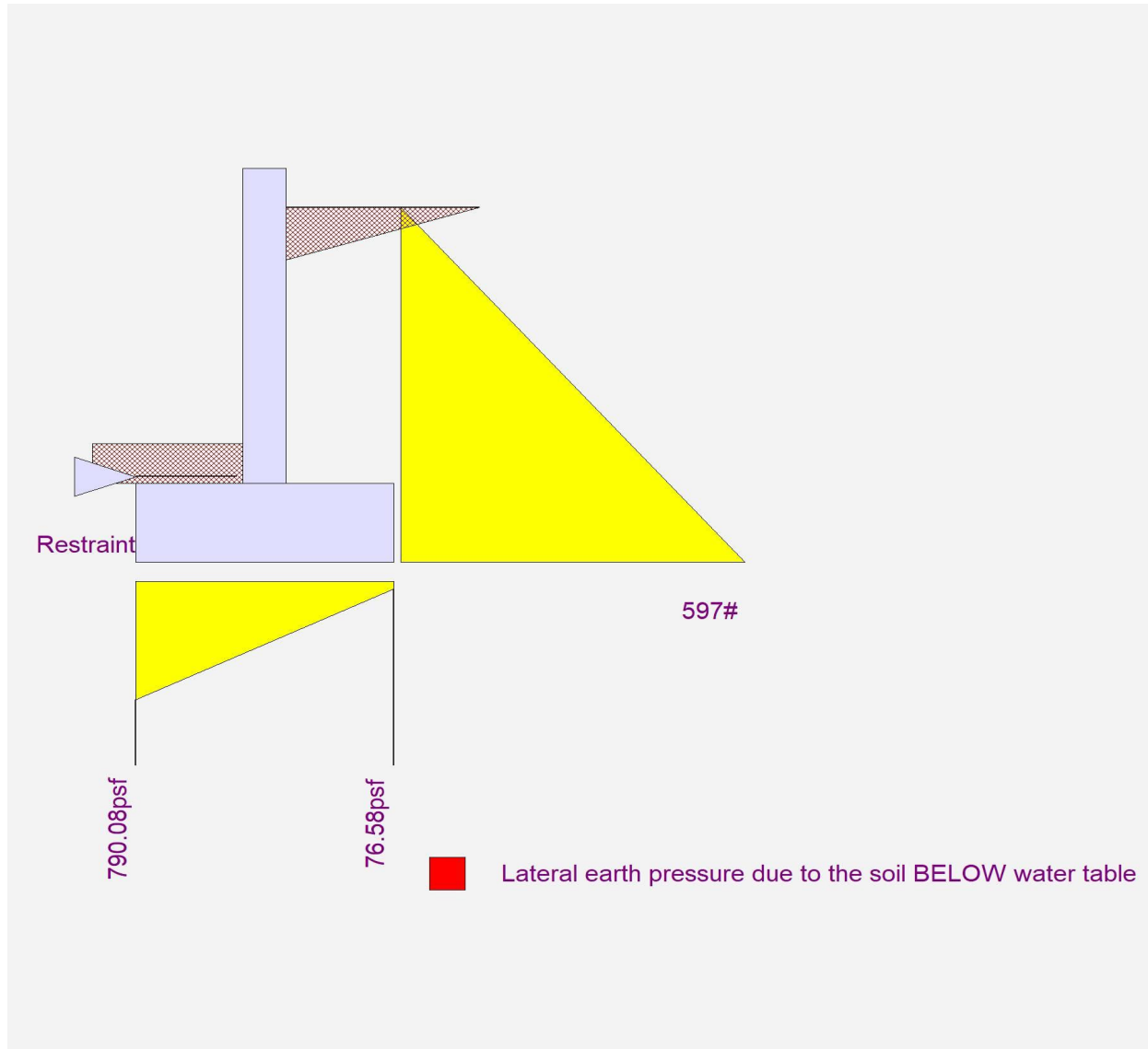
**Cantilevered Retaining Wall**

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80.ec6

LIC# : KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

(c) ENERCALC INC 1983-2023

**DESCRIPTION:** Training Center Stem Wall

## **5. LATERAL FORCE RESISTING SYSTEM (LFRS) DESIGN**

**ASCE 7-16 Seismic Base Shear**

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80.ec6

LIC# : KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

(c) ENERCALC INC 1983-2023

**DESCRIPTION: Seismic Base Shear Analysis****Specific Description:****Risk Category**

Calculations per ASCE 7-16

Risk Category of Building or Other Structure : "IV" : Buildings and other structures designated as essential facilities. [ASCE 7-16, Page 4, Table 1.5-1](#)Seismic Importance Factor = 1.5 [ASCE 7-16, Page 5, Table 1.5-2](#)**Gridded Ss & S1 values from ASCE 7-16**[ASCE 7-16 11.4.2](#)

Max. Ground Motions, 5% Damping

 $S_S = 1.952$  g, 0.2 sec response $S_1 = 0.6994$  g, 1.0 sec response

Location Fontana, CA 92335

Latitude = 34.089 deg North

Longitude = 117.452 deg West

For the closest datapoint grid location . . .

Latitude = 34.090 deg North

Longitude = 117.450 deg West

Conforms to ASCE 7 Section 12.8.1.3: Regular structure with period of 0.5 s or less, SDS limited to max of 0.7\*SDS or 1.0 for calculation

**Site Class, Site Coeff. and Design Category**Classification: "C" : Shear Wave Velocity 1,200 to 2,500 ft/sec = **C** [ASCE 7-16 Table 20.3-1](#)Site Coefficients  $F_a$  &  $F_v$   $F_a = 1.00$  [ASCE 7-16 Table 11.4-1 & 11.4-2](#)  
(using straight-line interpolation from table values)  $F_v = 1.40$ Maximum Considered Earthquake Acceleration  $S_{MS} = F_a * S_s = 1.952$  [ASCE 7-16 Eq. 11.4-1](#) $S_{M1} = F_v * S_1 = 0.979$  [ASCE 7-16 Eq. 11.4-2](#)Design Spectral Acceleration  $S_{DS} = S_{MS} * 2/3 = 1.301$  [ASCE 7-16 Eq. 11.4-3](#) $S_{D1} = S_{M1} * 2/3 = 0.653$  [ASCE 7-16 Eq. 11.4-4](#)Seismic Design Category = **D** [ASCE 7-16 Table 11.6-1 & -2](#)**Resisting System**[ASCE 7-16 Table 12.2-1](#)Basic Seismic Force Resisting System . . . **Bearing Wall Systems****15.Light-frame (wood) walls sheathed w/wood structural panels rated for shear resistance.**

Response Modification Coefficient "I" = 6.50

System Overstrength Factor "Wo" = 2.50

Deflection Amplification Factor "Cd" = 4.00

**Building height Limits :**

Category "A &amp; B" Limit: No Limit

Category "C" Limit: No Limit

Category "D" Limit: Limit = 65

Category "E" Limit: Limit = 65

Category "F" Limit: Limit = 65

*NOTE! See ASCE 7-16 for all applicable footnotes***Lateral Force Procedure**[ASCE 7-16 Section 12.8.2](#)

Equivalent Lateral Force Procedure

[The "Equivalent Lateral Force Procedure" is being used according to the provisions of ASCE 7-16 12.8](#)**Determine Building Period**[Use ASCE 12.8-7](#)

Structure Type for Building Period Calculation All Other Structural Systems

"Ct" value = 0.020 "hn" : Height from base to highest level 33.0 ft

"x" value = 0.75

"Ta" Approximate fundamental period using Eq. 12.8-7 :  $T_a = C_t * (h_n^x) = 0.275$  sec

"TL" : Long-period transition period per ASCE 7-16 Maps 22-14 -&gt; 22-17 8.000 sec

Building Period "Ta" Calculated from Approximate Method selected = 0.275

**PHASE 1 LOADING**

**ASCE 7-16 Seismic Base Shear**

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80.ec6

LIC#: KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

(c) ENERCALC INC 1983-2023

**DESCRIPTION: Seismic Base Shear Analysis****" Cs " Response Coefficient**

ASCE 7-16 Section 12.8.1.1

$S_{DS}$ : Short Period Design Spectral Response	=	1.301	From Eq. 12.8-2, Preliminary $C_s$	=	0.231
" R " : Response Modification Factor	=	6.50	From Eq. 12.8-3 & 12.8-4, $C_s$ need not exceed	=	0.547
" I " : Seismic Importance Factor	=	1.5	From Eq. 12.8-5 & 12.8-6, $C_s$ not be less than	=	0.081

User has selected ASCE 12.8.1.3 : Regular structure, **Cs : Seismic Response Coefficient = 0.2308**  
 Less than 5 Stories and with  $T \leq 0.5$  sec, SO  $S_s \leq 1.5$  for  $C_s$  calcul

**Seismic Base Shear**

ASCE 7-16 Section 12.8.1

<b>Cs = 0.2308 from 12.8.1.1</b>	W ( see Sum $W_i$ below ) =	142.20 k
	Seismic Base Shear $V = C_s * W =$	32.82 k

**Vertical Distribution of Seismic Forces**

ASCE 7-16 Section 12.8.3

" k " : hx exponent based on  $T_a = 1.00$ 

Table of building Weights by Floor Level...

Level #	$W_i$ : Weight	$H_i$ : Height	$(W_i * H_i^k)$	$C_{vx}$	$F_x = C_{vx} * V$	Sum Story Shear	Sum Story Moment
1	142.20	14.00	1,990.80	1.0000	32.82	32.82	0.00
Sum $W_i =$	142.20 k	Sum $W_i * H_i =$	1,990.80 k-ft	Total Base Shear =	32.82 k	Base Moment =	459.4 k-ft

**Diaphragm Forces : Seismic Design Category "B" to "F"**

ASCE 7-16 12.10.1.1

Level #	$W_i$	$F_i$	Sum $F_i$	Sum $W_i$	$F_{px}$ : Calcd	$F_{px}$ : Min	$F_{px}$ : Max	$F_{px}$	Dsgn. Force
1	142.20	32.82	32.82	142.20	32.82	55.51	111.03	55.51	55.51

W<sub>px</sub> ..... Weight at level of diaphragm and other structure elements attached to it.F<sub>i</sub> ..... Design Lateral Force applied at the level.Sum F<sub>i</sub> ..... Sum of "Lat. Force" of current level plus all levels aboveMIN Req'd Force @ Level ...  $0.20 * S_{DS} * I * W_{px}$ MAX Req'd Force @ Level ...  $0.40 * S_{DS} * I * W_{px}$ F<sub>px</sub> : Design Force @ Level .  $W_{px} * \text{SUM}(x \rightarrow n) F_i / \text{SUM}(x \rightarrow n) w_i$ , x = Current level, n = Top Level**Weight of Roof Diaphragm**

5170 sq ft \* (20 psf Roof DL + 15/2 psf Partition Load) = 142.2k

**Seismic Wall Force**

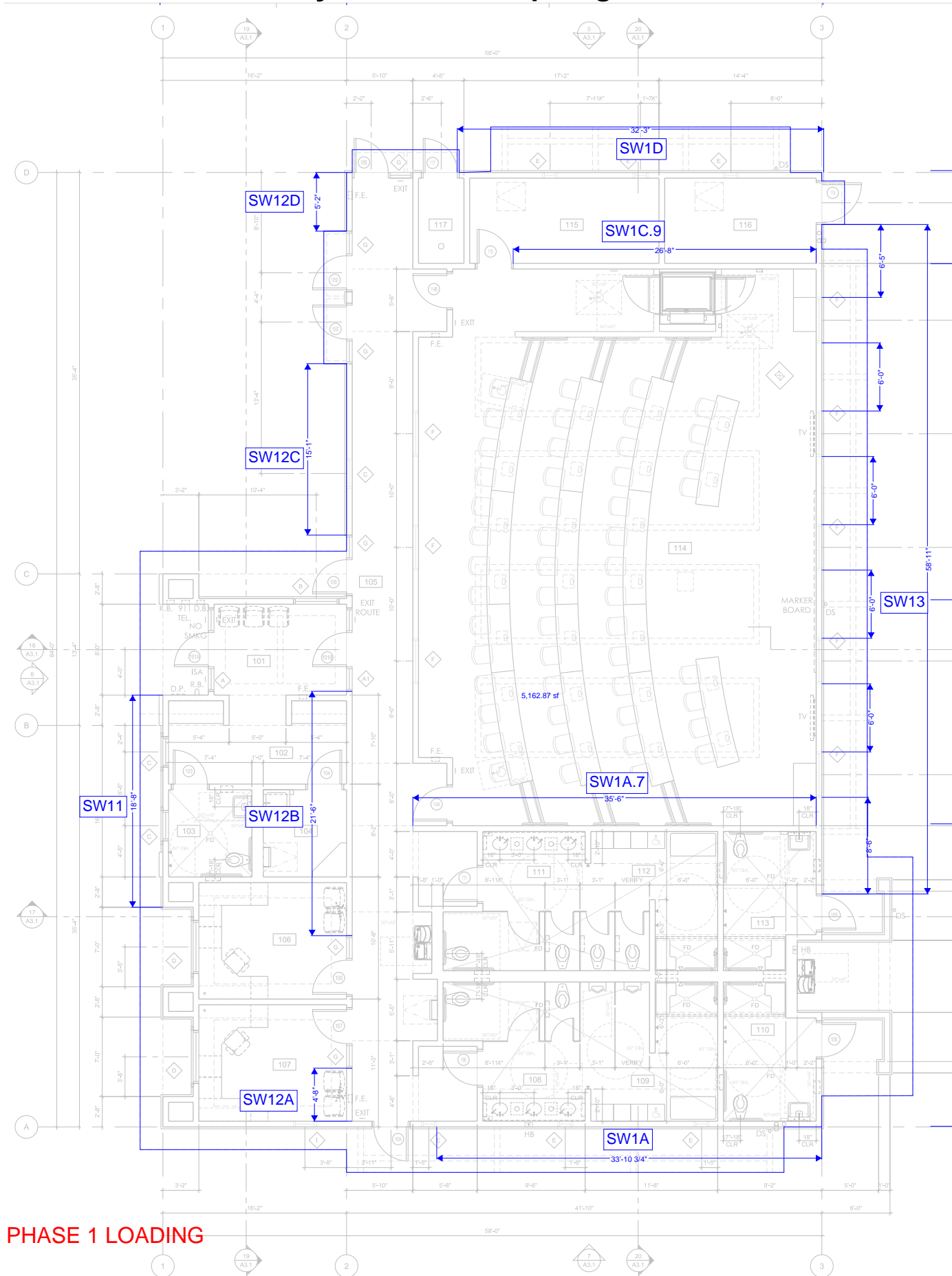
0.2308 \* (20 psf Roof DL + 15/2 psf Partition Load) = 6.35 psf

**Seismic Diaphragm Forces**

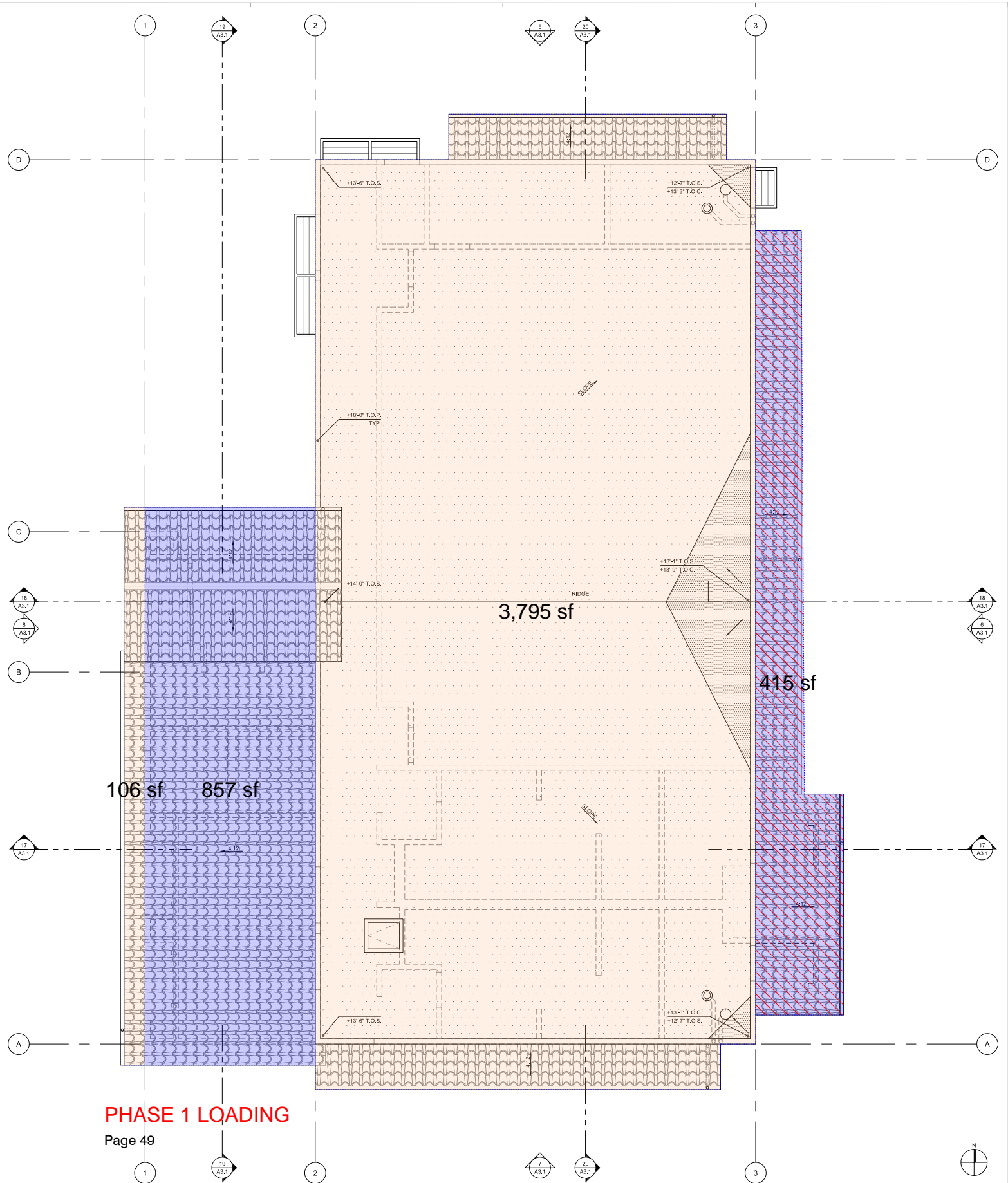
55.52k / 5170 sq ft = 10.74 psf

**PHASE 1 LOADING**

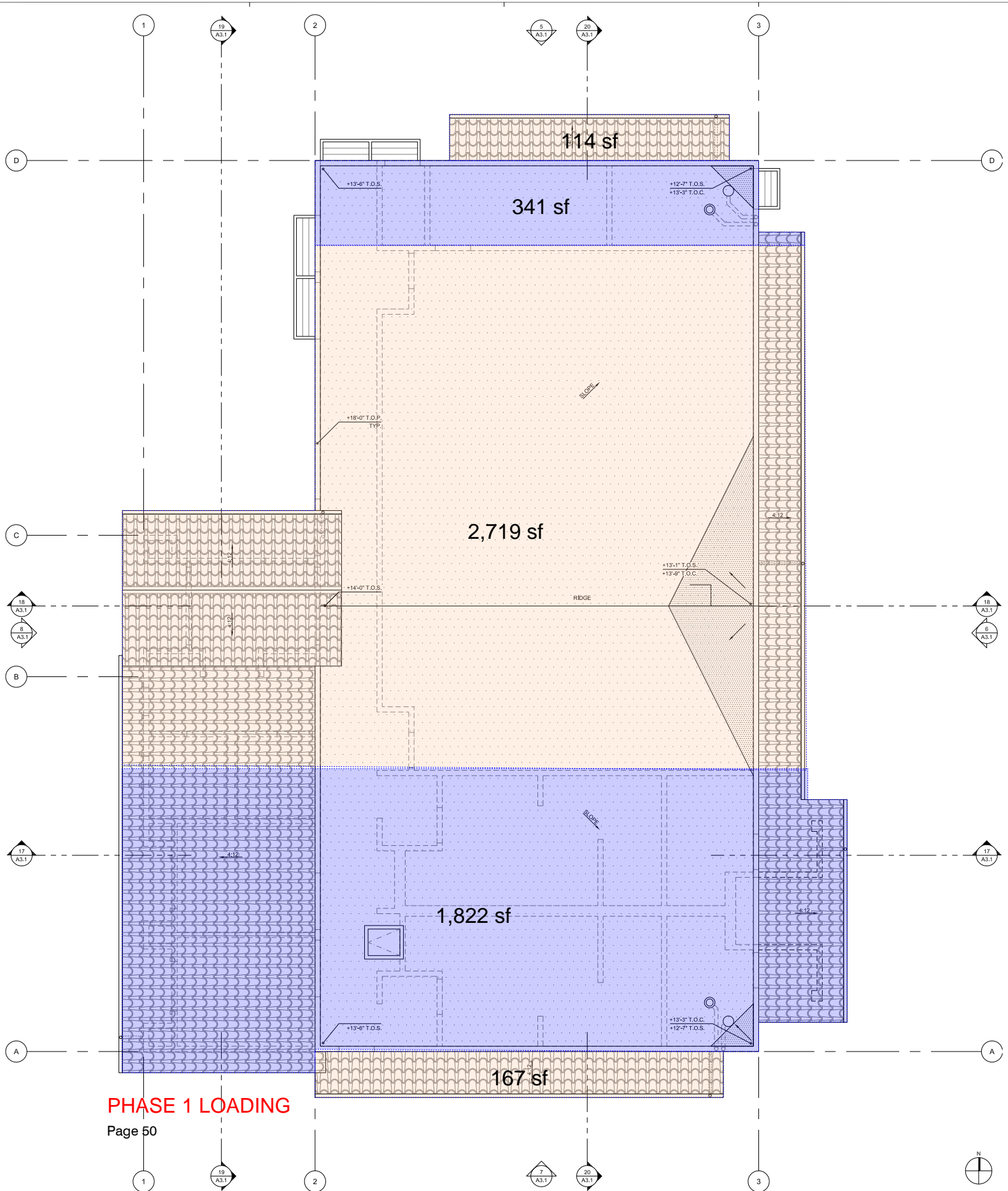
## Phase 1 Lateral Layout – Roof Diaphragm



## Phase 1 Lateral Layout – Roof Diaphragm



## Phase 1 Lateral Layout – Roof Diaphragm



**PHASE 1 LOADING**



# miyamoto

Calc By: TCB Date: 6/28/2023  
 Checked By: - Date: NA

## HORIZONTAL DISTRIBUTION OF SEISMIC FORCES (1.0E)

Seis. Response Coef.			
$S_{ds} =$	1.301		
$C_s =$	0.2308	W	
$\rho =$	1.0	$R =$	6.5
1.0E Seismic Forces (psf)			
Level	Wall Forces	Diaphragm	
		N/S	E/W
Roof	6.35	9.76	9.76
Floor	0.00	0.00	0.00

Shearwall Schedule					
ID	Shtg.	Sides	Nail	Spac.	Cap.
A	15/32" Ply.	1	10d	6	311
B	15/32" Ply.	1	10d	4	461
C	15/32" Ply.	1	10d	3	600
D	15/32" Ply.	1	10d	2	770
2-B	15/32" Ply.	2	10d	4	921
2-C	15/32" Ply.	2	10d	3	1200
2-D	15/32" Ply.	2	10d	2	1539

Shear-Line ID			Diaphragm					Seismic SW Forces (1.0E)				
Level	Dirac.	Line	Area sq. ft.	Collec. Length	Chord Length	Collec. plf	Chord lbs	Area sq. ft.	Add'l kips	Story kips	R Line	Total kips
Roof	N-S	11	106	48.7	2.0	21	5	535	0.0	3.39	6.5	3.39
Roof	N-S	12	857	48.7	22.5	86	618	2326	0.0	14.77	6.5	14.77
Roof	N-S	13	3795	84.0	35.5	220	1538	2313	0.0	14.68	6.5	14.68
			415	74.5	4.0	54	20					
Roof	E-W	1A	167	58.0	4.0	28	20	1164	0.0	7.39	6.5	7.39
Roof	E-W	1A.7	1993	58.0	26.5	168	857	2356	0.0	14.96	6.5	14.96
Roof	E-W	1C.9	2719	41.5	50.0	320	3050	1530	0.0	9.72	6.5	9.72
Roof	E-W	1D	341	41.5	8.5	40	88	285	0.0	1.81	6.5	1.81
			114	32.3	4.0	35	20	114		0.72	6.5	0.72

# miyamoto

Calc By: TCB      Date: 6/28/2023  
 Checked By: -      Date: NA

## SHEARWALL FORCES (0.7E & 0.6W)

<b>Seis. Response Coef.</b>			
S <sub>ds</sub> = 1.301			
C <sub>s</sub> = 0.2308 W			
ρ = 1.0      R = 6.5			
<b>1.0E Seismic Forces (psf)</b>			
<b>Level</b>	<b>Wall Forces</b>	<b>Diaphragm</b>	
		<b>N/S</b>	<b>E/W</b>
Roof	6.35	9.76	9.76
Floor	0.00	0.00	0.00

<b>Shearwall Schedule</b>					
<b>ID</b>	<b>Shtg.</b>	<b>Sides</b>	<b>Nail</b>	<b>Spac.</b>	<b>Cap.</b>
A	15/32" Ply.	1	10d	6	311
B	15/32" Ply.	1	10d	4	461
C	15/32" Ply.	1	10d	3	600
D	15/32" Ply.	1	10d	2	770
2-B	15/32" Ply.	2	10d	4	921
2-C	15/32" Ply.	2	10d	3	1200
2-D	15/32" Ply.	2	10d	2	1539

<b>Shear-Wall ID</b>				<b>Properties</b>			<b>Reductions</b>			<b>Pier Design (0.7E)</b>				
Level	Direc.	Line	Segment	Length ft.	Height ft.	h/b	Inside HD w/ 10d (Footnote 10)		Aspect Red.	% of Total	Cap. pft	Dem. pft	DCR	SW Delta
Roof	N-S	11	*	18.5	14.0	0.76	No	1.00	1.00	100%	770	128	17%	D
Roof	N-S	12	A	4.5	14.0	3.11	No	1.00	0.86	9%	1325	198	15%	2-D
Roof	N-S	12	B	21.5	14.0	0.65	No	1.00	1.00	48%	1539	230	15%	2-D
Roof	N-S	12	C*	15.0	14.0	0.93	No	1.00	1.00	33%	1539	230	15%	2-D
Roof	N-S	12	D	5.0	14.0	2.80	No	1.00	0.90	10%	1385	207	15%	2-D
Roof	N-S	13	*	58.5	14.0	0.24	No	1.00	1.00	100%	770	176	23%	D
Roof	E-W	1A	*	34.0	14.0	0.41	No	1.00	1.00	100%	600	152	25%	C
Roof	E-W	1A.7		35.5	14.0	0.39	No	1.00	1.00	100%	1200	295	25%	2-C
Roof	E-W	1C.9		26.5	14.0	0.53	No	1.00	1.00	100%	770	257	33%	D
Roof	E-W	1D	*	32.0	14.0	0.44	No	1.00	1.00	100%	1200	40	3%	2-C

## PHASE 1 LOADING

\*Denotes Shear Wall with Opening; See Additional Calcs

# miyamoto

Calc By: TCB Date: 6/28/2023  
 Checked By: - Date: NA

## OVERTURNING FORCES

Seis. Response Coef.			
S <sub>ds</sub> = 1.301			
C <sub>s</sub> = 0.2308 W			
ρ = 1.0 R = 6.5			
1.0E Seismic Forces (psf)			
Level	Wall Forces	Diaphragm	
		N/S	E/W
Roof	6.35	9.76	9.76
Floor	0.00	0.00	0.00

Shearwall Schedule					
ID	Shtg.	Sides	Nail	Spac.	Cap.
A	15/32" Ply.	1	10d	6	311
B	15/32" Ply.	1	10d	4	461
C	15/32" Ply.	1	10d	3	600
D	15/32" Ply.	1	10d	2	770
2-B	15/32" Ply.	2	10d	4	921
2-C	15/32" Ply.	2	10d	3	1200
2-D	15/32" Ply.	2	10d	2	1539

Shear-Wall ID				Properties			Applied Loads							Apply Ω
Level	Direc.	Line	Segment	HD Offset	OT Length	Height ft.	Wall (psf)	Distributed (plf)		Left Point (lbs)		Right Point (lbs)		
								DL	LL	DL	LL	DL	LL	
Roof	N-S	11	*	0.5	17.8	14.0	18	0	0	0	0	0	0	No
Roof	N-S	12	A	0.5	3.8	14.0	10	0	0	0	0	0	0	No
Roof	N-S	12	B	0.5	20.8	14.0	10	0	0	0	0	0	0	No
Roof	N-S	12	C*	0.5	14.3	14.0	18	0	0	0	0	0	0	No
Roof	N-S	12	D	0.5	4.3	14.0	18	0	0	0	0	0	0	No
Roof	N-S	13	*	0.5	57.8	14.0	18	0	0	0	0	0	0	No
Roof	E-W	1A	*	0.5	33.3	14.0	18	0	0	0	0	0	0	No
Roof	E-W	1A.7		0.5	34.8	14.0	10	0	0	0	0	0	0	No
Roof	E-W	1C.9		0.5	25.8	14.0	10	0	0	0	0	0	0	No
Roof	E-W	1D	*	0.5	31.3	14.0	18	0	0	0	0	0	0	No

## PHASE 1 LOADING

\*Denotes Shear Wall with Opening; See Additional Calcs



Calc By: TCB      Date: 6/28/2023  
 Checked By: -      Date: NA

## OVERTURNING FORCES

Seis. Response Coef.			
$S_{ds} = 1.301$			
$C_s = 0.2308 \text{ W}$			
$\rho = 1.0 \quad R = 6.5$			
1.0E Seismic Forces (psf)			
Level	Wall Forces	Diaphragm	
		N/S	E/W
Roof	6.35	9.76	9.76
Floor	0.00	0.00	0.00

Shearwall Schedule					
ID	Shtg.	Sides	Nail	Spac.	Cap.
A	15/32" Ply.	1	10d	6	311
B	15/32" Ply.	1	10d	4	461
C	15/32" Ply.	1	10d	3	600
D	15/32" Ply.	1	10d	2	770
2-B	15/32" Ply.	2	10d	4	921
2-C	15/32" Ply.	2	10d	3	1200
2-D	15/32" Ply.	2	10d	2	1539

Shear-Wall ID				$\Omega$ Adjust.	Left HD Force				Right HD Force				Strap/ Anchor	
Level	Dir.	Line	Segment		LC8 <sup>+</sup> kips	LC9 <sup>+</sup> kips	LC10 <sup>+</sup> kips	Max kips	LC8 <sup>+</sup> kips	LC9 <sup>+</sup> kips	LC10 <sup>+</sup> kips	Max kips		
Roof	N-S	11	*	1	-1.00	-1.36	0.86	<b>0.86</b>	-1.00	-1.36	0.86	<b>0.86</b>	HDU5	4x6
Roof	N-S	12	A	1	2.89	2.07	3.18	<b>3.18</b>	2.89	2.07	3.18	<b>3.18</b>	HDU14	6x8
Roof	N-S	12	B	1	1.50	0.73	2.69	<b>2.69</b>	1.50	0.73	2.69	<b>2.69</b>	HD19	6x8
Roof	N-S	12	C*	1	1.04	0.29	2.56	<b>2.56</b>	1.04	0.29	2.56	<b>2.56</b>	HD19	6x8
Roof	N-S	12	D	1	2.54	1.72	3.11	<b>3.11</b>	2.54	1.72	3.11	<b>3.11</b>	HDU14	6x8
Roof	N-S	13	*	1	-6.33	-6.62	-0.63	<b>0.00</b>	-6.33	-6.62	-0.63	<b>0.00</b>	HDU11	6x6
Roof	E-W	1A	*	1	-3.00	-3.35	0.35	<b>0.35</b>	-3.00	-3.35	0.35	<b>0.35</b>	HDU2	4x6
Roof	E-W	1A.7		1	1.22	0.28	3.16	<b>3.16</b>	1.22	0.28	3.16	<b>3.16</b>	HDU5	4x6
Roof	E-W	1C.9		1	1.44	0.60	2.90	<b>2.90</b>	1.44	0.60	2.90	<b>2.90</b>	HDU11	6x6
Roof	E-W	1D	*	1	-4.31	-4.27	-1.16	<b>0.00</b>	-4.31	-4.27	-1.16	<b>0.00</b>	HDU8	4x6

## PHASE 1 LOADING

Note: Positive HD force indicates an uplift force

<sup>+</sup> ASCE 7-16 2.4.5 ASD Seismic Load Combinations

\*Denotes Shear Wall with Opening; See Additional Calcs

**ASCE 7-16 Seismic Base Shear**

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80 - Phase 2.ec6

LIC#: KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

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**DESCRIPTION: Seismic Base Shear Analysis****Specific Description:****Risk Category**

Calculations per ASCE 7-16

Risk Category of Building or Other Structure : "IV" : Buildings and other structures designated as essential facilities. [ASCE 7-16, Page 4, Table 1.5-1](#)Seismic Importance Factor = 1.5 [ASCE 7-16, Page 5, Table 1.5-2](#)**Gridded Ss & S1 values from ASCE 7-16**[ASCE 7-16 11.4.2](#)

Max. Ground Motions, 5% Damping

 $S_S = 1.952$  g, 0.2 sec response $S_1 = 0.6994$  g, 1.0 sec response

Location Fontana, CA 92335

Latitude = 34.089 deg North

Longitude = 117.452 deg West

For the closest datapoint grid location . . .

Latitude = 34.090 deg North

Longitude = 117.450 deg West

Conforms to ASCE 7 Section 12.8.1.3: Regular structure with period of 0.5 s or less, SDS limited to max of 0.7\*SDS or 1.0 for calculation

**Site Class, Site Coeff. and Design Category**Classification: "C" : Shear Wave Velocity 1,200 to 2,500 ft/sec = **C** [ASCE 7-16 Table 20.3-1](#)Site Coefficients  $F_a$  &  $F_v$   $F_a = 1.00$  [ASCE 7-16 Table 11.4-1 & 11.4-2](#)(using straight-line interpolation from table values)  $F_v = 1.40$ Maximum Considered Earthquake Acceleration  $S_{MS} = F_a * S_s = 1.952$  [ASCE 7-16 Eq. 11.4-1](#) $S_{M1} = F_v * S_1 = 0.979$  [ASCE 7-16 Eq. 11.4-2](#)Design Spectral Acceleration  $S_{DS} = S_{MS} * 2/3 = 1.301$  [ASCE 7-16 Eq. 11.4-3](#) $S_{D1} = S_{M1} * 2/3 = 0.653$  [ASCE 7-16 Eq. 11.4-4](#)Seismic Design Category = **D** [ASCE 7-16 Table 11.6-1 & -2](#)**Resisting System**[ASCE 7-16 Table 12.2-1](#)Basic Seismic Force Resisting System . . . **Bearing Wall Systems****15. Light-frame (wood) walls sheathed w/wood structural panels rated for shear resistance.**

Response Modification Coefficient "R" = 6.50

System Overstrength Factor "Wo" = 2.50

Deflection Amplification Factor "Cd" = 4.00

**Building height Limits :**

Category "A &amp; B" Limit: No Limit

Category "C" Limit: No Limit

Category "D" Limit: Limit = 65

Category "E" Limit: Limit = 65

Category "F" Limit: Limit = 65

*NOTE! See ASCE 7-16 for all applicable footnotes***Lateral Force Procedure**[ASCE 7-16 Section 12.8.2](#)

Equivalent Lateral Force Procedure

[The "Equivalent Lateral Force Procedure" is being used according to the provisions of ASCE 7-16 12.8](#)**Determine Building Period**[Use ASCE 12.8-7](#)

Structure Type for Building Period Calculation All Other Structural Systems

"Ct" value = 0.020 "hn" : Height from base to highest level 33.0 ft

"x" value = 0.75

"Ta" Approximate fundamental period using Eq. 12.8-7 :  $T_a = C_t * (h_n^x) = 0.275$  sec

"TL" : Long-period transition period per ASCE 7-16 Maps 22-14 -&gt; 22-17 8.000 sec

Building Period "Ta" Calculated from Approximate Method selected = 0.275

**PHASE 2 LOADING**

Page 55

**FOR REFERENCE****FUTURE PHASE 2: NOT PART OF THIS PERMIT APPROVAL**

**ASCE 7-16 Seismic Base Shear**

Project File: 2.2) Enercalc - 2328021.00 Fontana FS #80 - Phase 2.ec6

LIC#: KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

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**DESCRIPTION: Seismic Base Shear Analysis****" Cs " Response Coefficient**

ASCE 7-16 Section 12.8.1.1

$S_{DS}$ : Short Period Design Spectral Response	=	1.301	From Eq. 12.8-2, Preliminary $C_s$	=	0.231
" R " : Response Modification Factor	=	6.50	From Eq. 12.8-3 & 12.8-4, $C_s$ need not exceed	=	0.547
" I " : Seismic Importance Factor	=	1.5	From Eq. 12.8-5 & 12.8-6, $C_s$ not be less than	=	0.081

User has selected ASCE 12.8.1.3 : Regular structure,

**Cs : Seismic Response Coefficient =****= 0.2308**Less than 5 Stories and with  $T \leq 0.5$  sec, SO  $S_s \leq 1.5$  for  $C_s$  calcul**Seismic Base Shear**

ASCE 7-16 Section 12.8.1

**Cs = 0.2308 from 12.8.1.1**W ( see Sum  $W_i$  below ) = **742.60 k**Seismic Base Shear  $V = C_s * W =$  **171.37 k****Vertical Distribution of Seismic Forces**

ASCE 7-16 Section 12.8.3

" k " : hx exponent based on  $T_a = 1.00$ 

Table of building Weights by Floor Level...

Level #	$W_i$ : Weight	$H_i$ : Height	$(W_i * H_i^k)$	$C_{vx}$	$F_x = C_{vx} * V$	Sum Story Shear	Sum Story Moment
2	381.10	24.00	9,146.28	0.6438	110.32	110.32	0.00
1	361.50	14.00	5,061.00	0.3562	61.05	171.37	1,103.22
Sum $W_i =$	742.60 k	Sum $W_i * H_i =$	14,207.28 k-ft	Total Base Shear =	171.37 k	Base Moment =	3,502.4 k-ft

**Diaphragm Forces : Seismic Design Category "B" to "F"**

ASCE 7-16 12.10.1.1

Level #	$W_i$	$F_i$	Sum $F_i$	Sum $W_i$	$F_{px}$ : Calcd	$F_{px}$ : Min	$F_{px}$ : Max	$F_{px}$	Dsgn. Force
2	381.10	110.32	110.32	381.10	110.32	148.78	297.56	148.78	148.78
1	361.50	61.05	171.37	742.60	83.42	141.13	282.26	141.13	141.13

 $W_{px}$  : Weight at level of diaphragm and other structure elements attached to it. $F_i$  : Design Lateral Force applied at the level.Sum  $F_i$  : Sum of "Lat. Force" of current level plus all levels aboveMIN Req'd Force @ Level ...  $0.20 * S_{DS} * I * W_{px}$ MAX Req'd Force @ Level ...  $0.40 * S_{DS} * I * W_{px}$  $F_{px}$  : Design Force @ Level .  $W_{px} * \text{SUM}(x \rightarrow n) F_i / \text{SUM}(x \rightarrow n) w_i$ ,  $x$  = Current level,  $n$  = Top Level**ROOF**

- Weight of Diaphragm

11726 sq ft \* (25 psf Roof DL + 15/2 psf Partition Load) = 381.1k

- Seismic Wall Force

110.32k / 11726 sq ft = 9.41 psf

- Seismic Diaphragm Forces

148.78k / 11726 sq ft = 12.09 psf

**LOW ROOF/2nd FLOOR**

- Weight of Diaphragm

5125 sq ft \* (30 psf Floor DL + 15 psf Partition Load) +

4760 sq ft \* (25 psf Low Roof DL) = 361.5k

- Seismic Wall Force

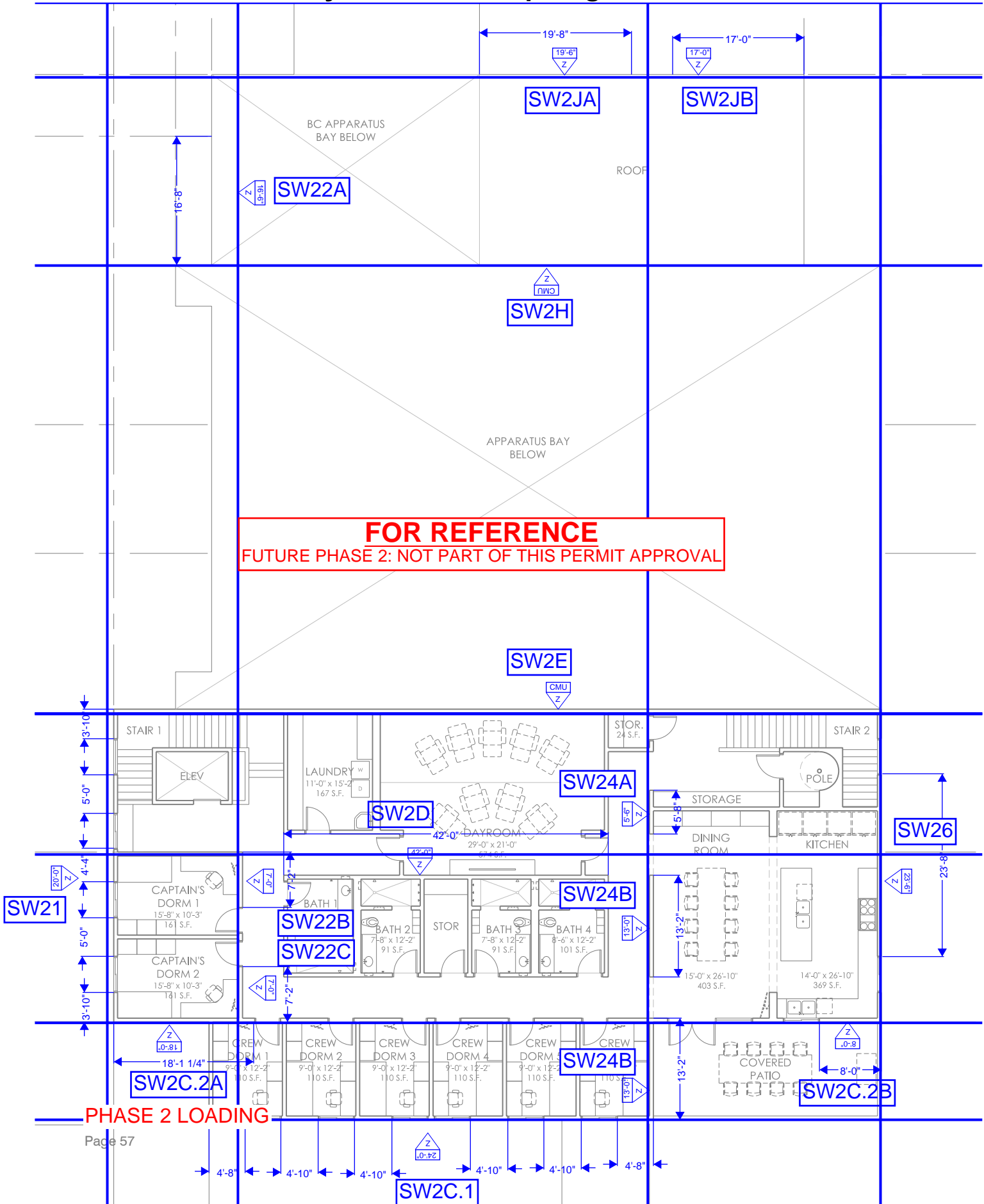
61.05k / 9885 sq ft = 6.18 psf

- Seismic Diaphragm Forces

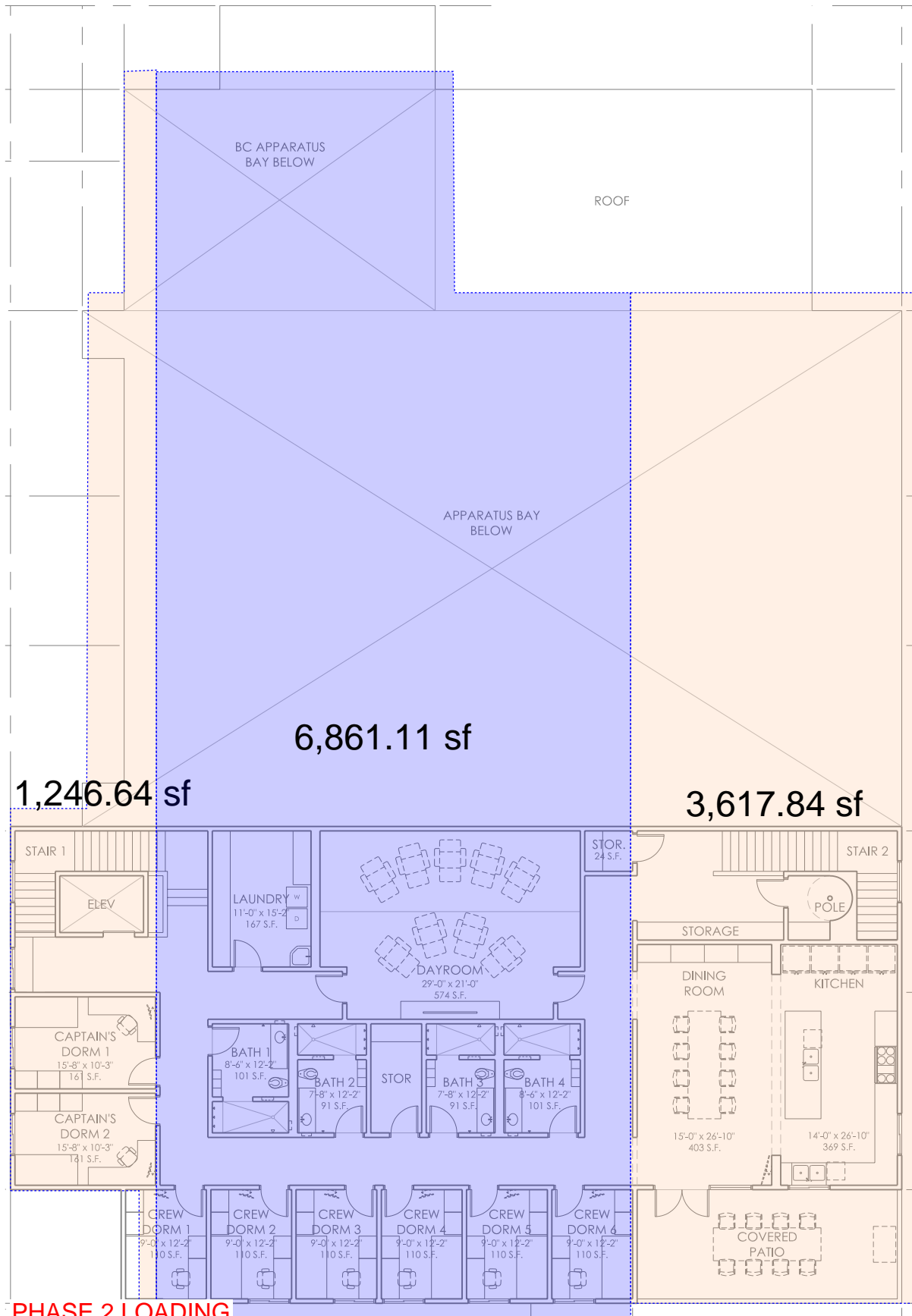
141.13k / 9885 sq ft = 14.28 psf

**PHASE 2 LOADING**

## Phase 2 Lateral Layout – Roof Diaphragm



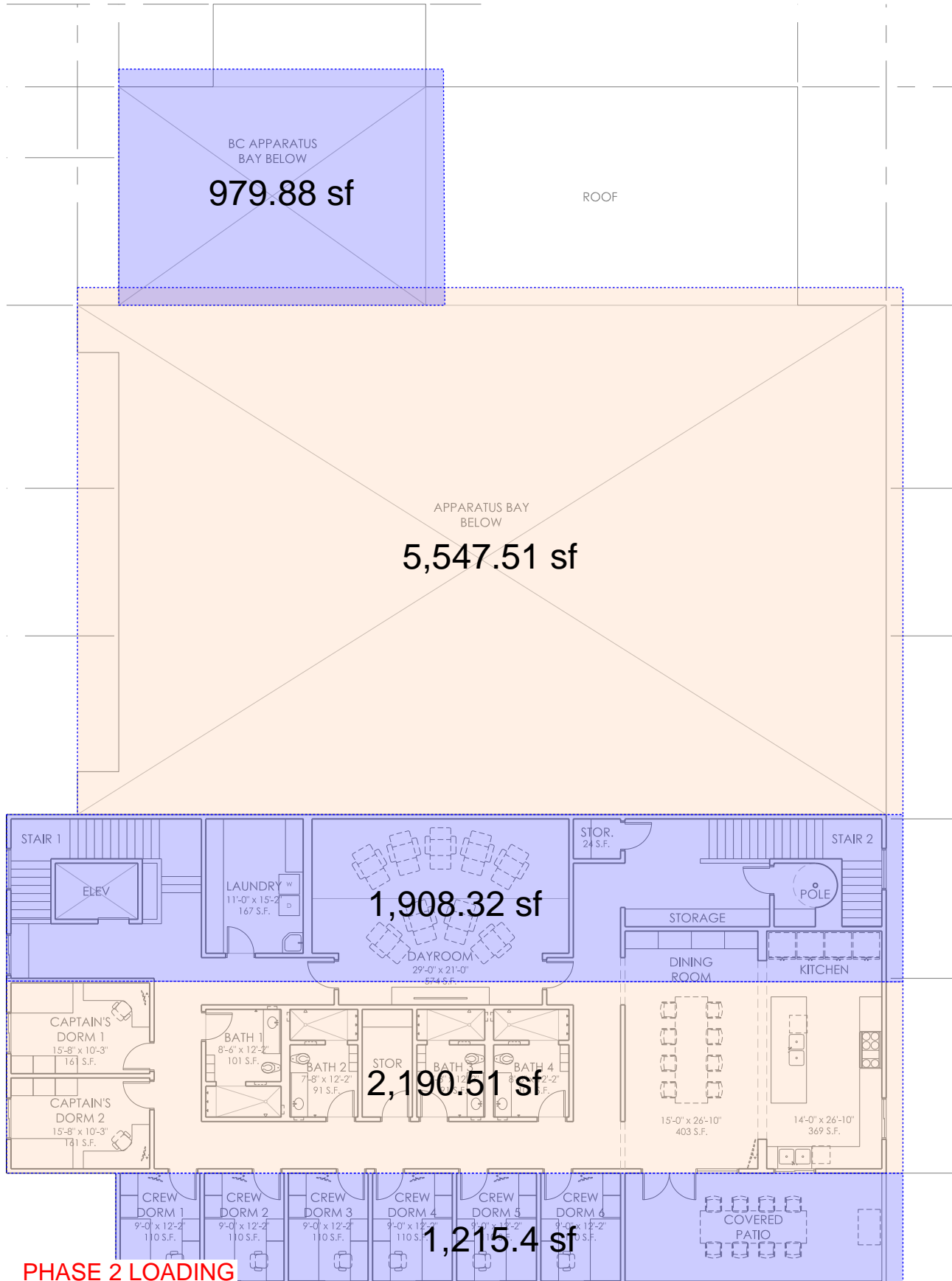
## Phase 2 Lateral Layout – Roof Diaphragm



PHASE 2 LOADING



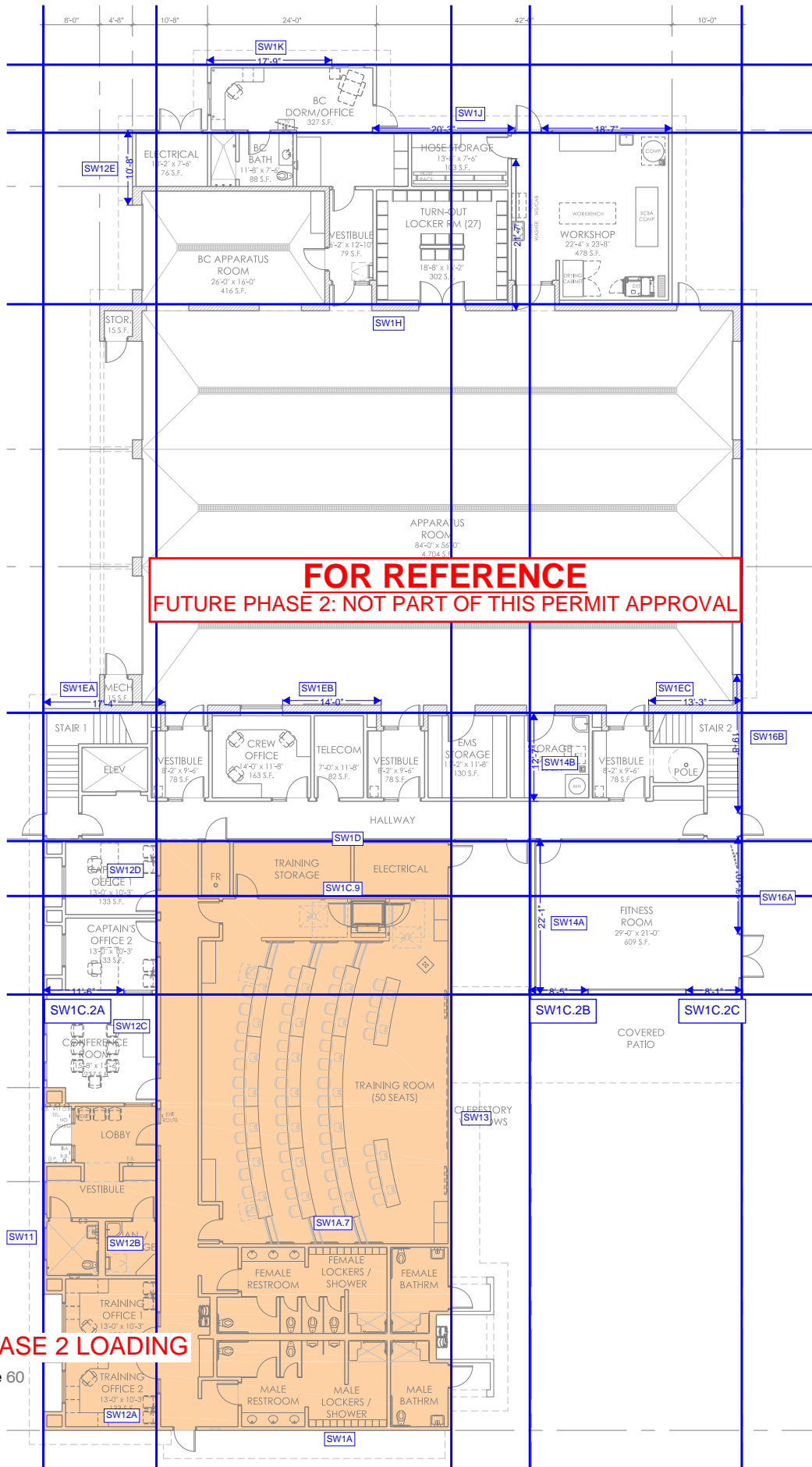
## Phase 2 Lateral Layout – Roof Diaphragm



**PHASE 2 LOADING**

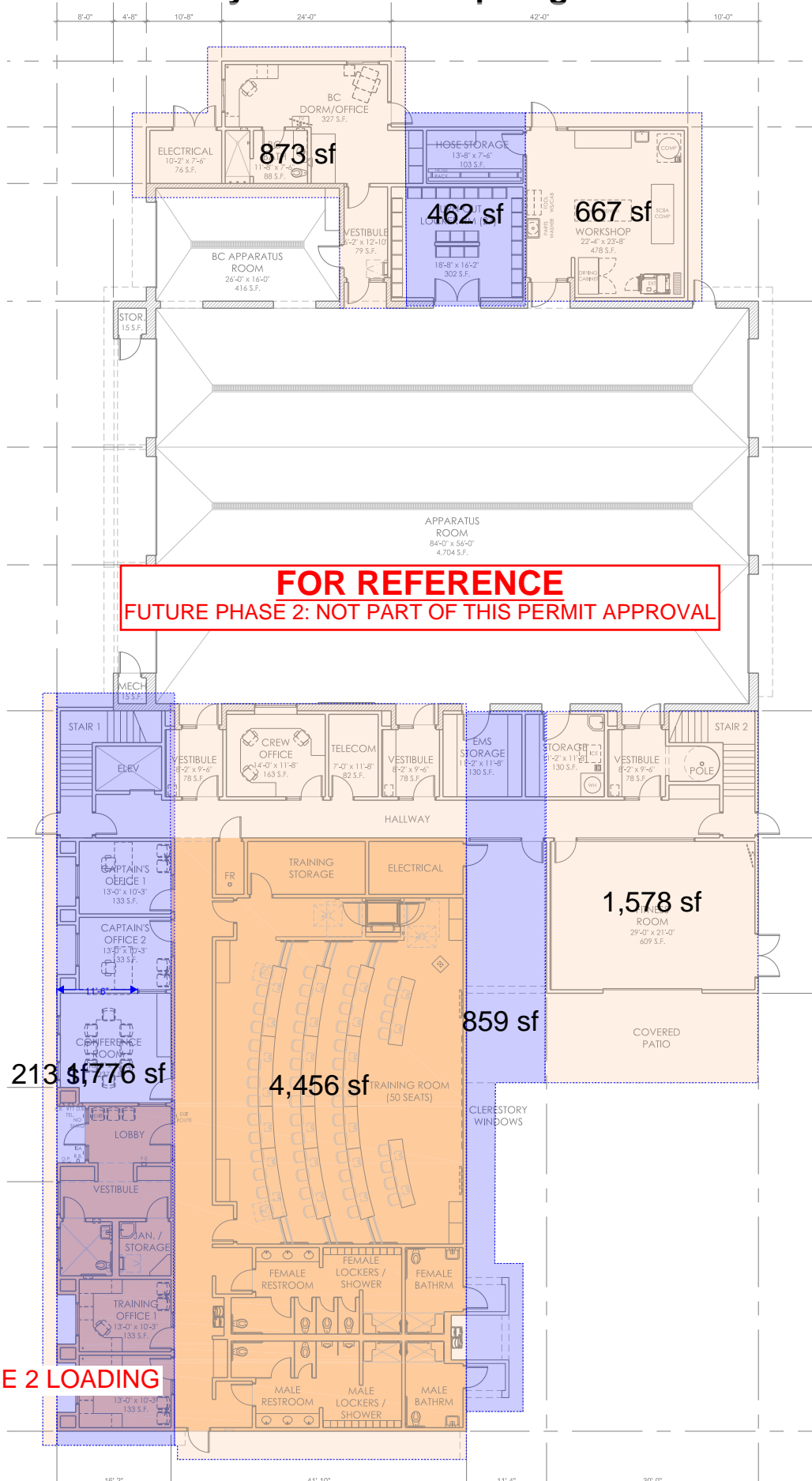
**FOR REFERENCE**  
 FUTURE PHASE 2: NOT PART OF THIS PERMIT APPROVAL

## Phase 2 Lateral Layout – Roof Diaphragm

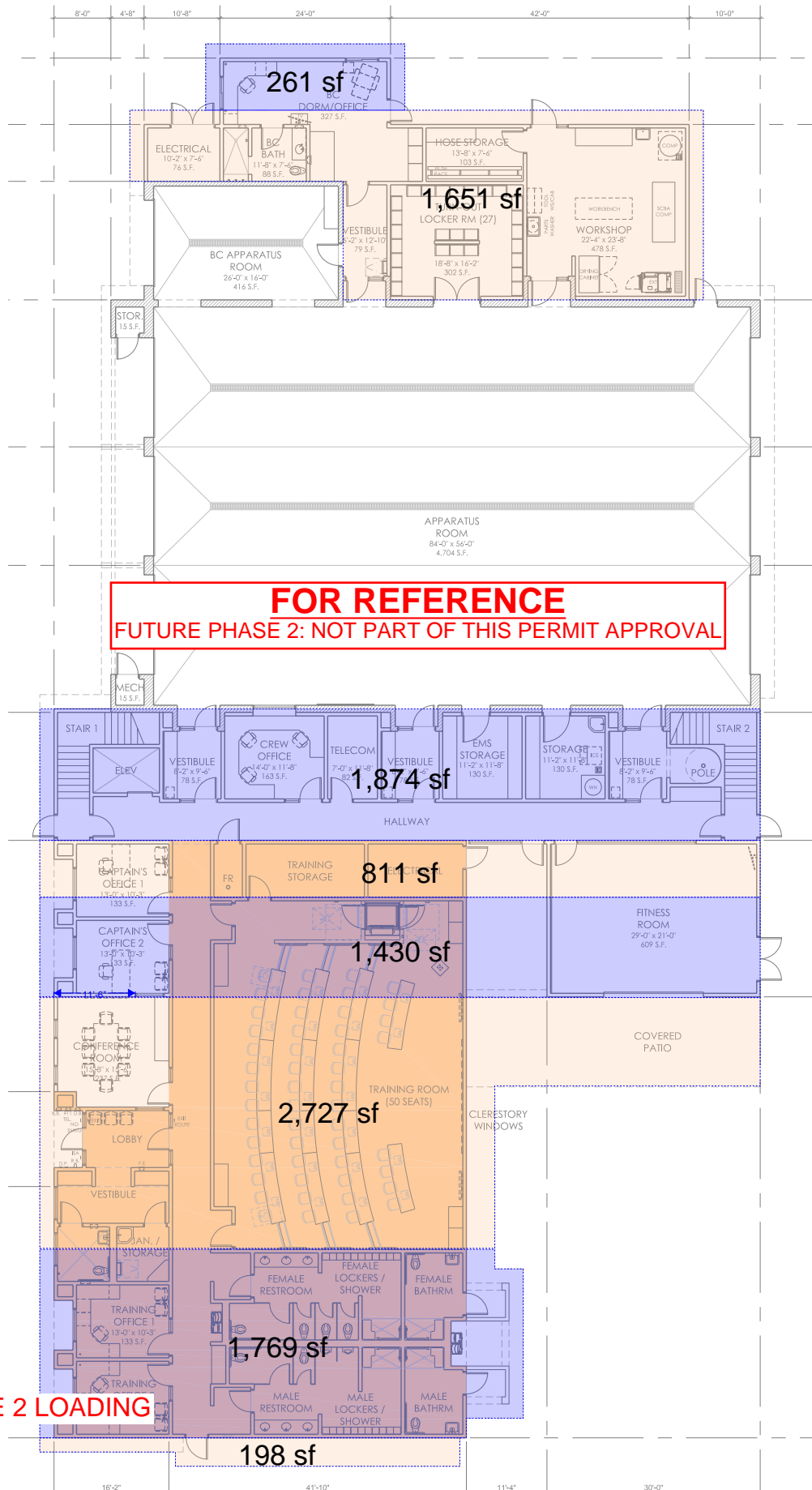


**PHASE 2 LOADING**

## Phase 2 Lateral Layout – Roof Diaphragm



## Phase 2 Lateral Layout – Roof Diaphragm



**PHASE 2 LOADING**

# miyamoto

Calc By: TCB Date: 6/29/2023  
 Checked By: - Date: NA

## HORIZONTAL DISTRIBUTION OF SEISMIC FORCES (1.0E)

Seis. Response Coef.			
$S_{ds} =$	1.301		
$C_s =$	0.2308 W		
$\rho =$	1.0	$R =$	6.5
1.0E Seismic Forces (psf)			
Level	Wall Forces	Diaphragm	
		N-S	E-W
Roof	9.43	12.69	12.69
Low Rf.	16.49	13.68	13.68
2nd Flr.	16.49	13.68	13.68

Shearwall Schedule					
ID	Shtg.	Sides	Nail	Spac.	Cap.
A	15/32" Ply.	1	10d	6	311
B	15/32" Ply.	1	10d	4	461
C	15/32" Ply.	1	10d	3	600
D	15/32" Ply.	1	10d	2	770
2-B	15/32" Ply.	2	10d	4	921
2-C	15/32" Ply.	2	10d	3	1200
2-D	15/32" Ply.	2	10d	2	1539

Shear-Line ID			Diaphragm					Seismic SW Forces (1.0E)				
Level	Dirac.	Line	Area sq. ft.	Collec. Length	Chord Length	Collec. plf	Chord lbs	Area sq. ft.	Add'l kips	Story kips	R Line	Total kips
Roof	N-S	21						624	0.0	5.88	6.5	5.88
Roof	N-S	22	1247	40.0	16.0	198	406	4054	0.0	38.21	6.5	38.21
Roof	N-S	24	6861	138.0	53.0	315	4455	5240	0.0	49.39	6.5	49.39
Roof	N-S	26	3618	114.0	30.0	201	1427	1809	0.0	17.05	6.5	17.05
Roof	E-W	2C.1						608	0.0	5.73	6.5	5.73
Roof	E-W	2C.2	1215	87.0	13.0	89	268	1703	0.0	16.05	6.5	16.05
Roof	E-W	2D	2191	99.0	22.0	140	768	2051	0.0	19.33	6.5	19.33
Roof	E-W	2E	1910	99.0	18.8	122	558	3730	0.0	35.16	6.5	35.16
Roof	E-W	2H	5550	92.0	57.5	383	5244	3265	0.0	30.78	6.5	30.78
Roof	E-W	2J	980	31.0	24.0	201	914	490	0.0	4.62	6.5	4.62

**FOR REFERENCE**

FUTURE PHASE 2: NOT PART OF THIS PERMIT APPROVAL

PHASE 2 LOADING

# miyamoto

Calc By: TCB Date: 6/29/2023  
 Checked By: - Date: NA

## HORIZONTAL DISTRIBUTION OF SEISMIC FORCES (1.0E)

Seis. Response Coef.			
$S_{ds} =$	1.301		
$C_s =$	0.2308	W	
$\rho =$	1.0	$R =$	6.5
1.0E Seismic Forces (psf)			
Level	Wall Forces	Diaphragm	
		N-S	E-W
Roof	9.43	12.69	12.69
Low Rf.	16.49	13.68	13.68
2nd Flr.	16.49	13.68	13.68

Shearwall Schedule					
ID	Shtg.	Sides	Nail	Spac.	Cap.
A	15/32" Ply.	1	10d	6	311
B	15/32" Ply.	1	10d	4	461
C	15/32" Ply.	1	10d	3	600
D	15/32" Ply.	1	10d	2	770
2-B	15/32" Ply.	2	10d	4	921
2-C	15/32" Ply.	2	10d	3	1200
2-D	15/32" Ply.	2	10d	2	1539

Shear-Line ID			Diaphragm					Seismic SW Forces (1.0E)				
Level	Dirac.	Line	Area sq. ft.	Collec. Length	Chord Length	Collec. plf	Chord lbs	Area sq. ft.	Add'l kips	Story kips	R Line	Total kips
2nd Flr.	N-S	11	213	48.7	2.0	60	6	601	5.9	9.91	6.5	15.79
2nd Flr.	N-S	12	776	48.7	22.5	109	803	3053	38.2	50.33	6.5	88.54
2nd Flr.	N-S	13	5329	84.0	35.5	434	1999	3326	0.0	54.83	6.5	54.83
2nd Flr.	N-S	14	1322	74.5	4.0	121	25	1784	49.4	29.41	6.5	78.80
2nd Flr.	N-S	16	2245	52.0	30.0	295	1427	1123	17.1	18.51	6.5	35.56
2nd Flr.	E-W	1A	198	58.0	4.0	47	25	1083	0.0	17.86	6.5	17.86
2nd Flr.	E-W	1A.7	1770	58.0	26.5	209	1114	2250	1.9	37.10	6.5	38.99
2nd Flr.	E-W	1C.2	2730	62.0	35.0	301	1943	2080	19.9	34.30	6.5	54.19
2nd Flr.	E-W	1C.9	1430	96.0	14.0	102	311	1120	0.0	18.47	6.5	18.47
2nd Flr.	E-W	1D	810	96.0	8.0	58	102	1342	19.3	22.13	6.5	41.46
2nd Flr.	E-W	1E	1874	84.0	18.0	153	514	937	35.2	15.45	6.5	50.61
Seperation												
2nd Flr.	E-W	1H	826	30.8	13.61	6.5	44.39					
2nd Flr.	E-W	1J	1651	50.0	26.0	226	1072	956	4.6	15.76	6.5	20.38
2nd Flr.	E-W	1K	261	24.0	7.0	74	78	131	0.0	2.15	6.5	2.15

**FOR REFERENCE**  
 FUTURE PHASE 2: NOT PART OF THIS PERMIT APPROVAL

PHASE 2 LOADING

# miyamoto

Calc By: TCB Date: 6/29/2023  
 Checked By: - Date: NA

## SHEARWALL FORCES (0.7E & 0.6W)

Seis. Response Coef.			
S <sub>ds</sub> = 1.301			
C <sub>s</sub> = 0.2308 W			
ρ = 1.0 R = 6.5			
1.0E Seismic Forces (psf)			
Level	Wall Forces	Diaphragm	
		N/S	E/W
Roof	9.43	12.69	12.69
Low Rf.	16.49	13.68	13.68
2nd Flr.	16.49	13.68	13.68

Shearwall Schedule					
ID	Shtg.	Sides	Nail	Spac.	Cap.
A	15/32" Ply.	1	10d	6	311
B	15/32" Ply.	1	10d	4	461
C	15/32" Ply.	1	10d	3	600
D	15/32" Ply.	1	10d	2	770
2-B	15/32" Ply.	2	10d	4	921
2-C	15/32" Ply.	2	10d	3	1200
2-D	15/32" Ply.	2	10d	2	1539

Shear-Wall ID				Properties			Reductions			Pier Design (0.7E)				
Level	Dir.	Line	Segment	Length ft.	Height ft.	h/b	Inside HD w/ 10d (Footnote 10)	Aspect Red.	% of Total	Cap. PII	Dem. PII	DCR	SW Delta	
Roof	N-S	21		20.0	10.0	0.50	No	1.00	1.00	100%	311	206	66%	A
Roof	N-S	22	A	16.5	10.0	0.61	No	1.00	1.00	54%	921	877	95%	2-B
Roof	N-S	22	B	7.0	10.0	1.43	No	1.00	1.00	23%	921	877	95%	2-B
Roof	N-S	22	C	7.0	10.0	1.43	No	1.00	1.00	23%	921	877	95%	2-B
Roof	N-S	24	A	5.5	10.0	1.82	No	1.00	1.00	17%	1200	1098	91%	2-C
Roof	N-S	24	B	13.0	10.0	0.77	No	1.00	1.00	41%	1200	1098	91%	2-C
Roof	N-S	24	C	13.0	10.0	0.77	No	1.00	1.00	41%	1200	1098	91%	2-C
Roof	N-S	26		23.5	10.0	0.43	No	1.00	1.00	100%	600	508	85%	C
Roof	E-W	2C.1		24.0	10.0	0.42	No	1.00	1.00	100%	311	167	54%	A
Roof	E-W	2C.2	A	18.0	10.0	0.56	No	1.00	1.00	69%	461	432	94%	B
Roof	E-W	2C.2	B	8.0	10.0	1.25	No	1.00	1.00	31%	461	432	94%	B
Roof	E-W	2D		42.0	10.0	0.24	No	1.00	1.00	100%	461	322	70%	B
Roof	E-W	2E		56.5	10.0	0.18	No	1.00	1.00	100%	461	436	95%	B
Roof	E-W	2H		56.5	10.0	0.18	No	1.00	1.00	100%	461	381	83%	B
Roof	E-W	2J	A	19.5	10.0	0.51	No	1.00	1.00	53%	311	89	29%	A
Roof	E-W	2J	B	17.0	10.0	0.59	No	1.00	1.00	47%	311	89	29%	A

**FOR REFERENCE**

FUTURE PHASE 2: NOT PART OF THIS PERMIT APPROVAL

PHASE 2 LOADING

# miyamoto

Calc By: TCB Date: 6/29/2023  
 Checked By: - Date: NA

## SHEARWALL FORCES (0.7E & 0.6W)

Seis. Response Coef.			
S <sub>ds</sub> = 1.301			
C <sub>s</sub> = 0.2308 W			
ρ = 1.0 R = 6.5			
1.0E Seismic Forces (psf)			
Level	Wall Forces	Diaphragm	
		N/S	E/W
Roof	9.43	12.69	12.69
Low Rf.	16.49	13.68	13.68
2nd Flr.	16.49	13.68	13.68

Shearwall Schedule					
ID	Shtg.	Sides	Nail	Spac.	Cap.
A	15/32" Ply.	1	10d	6	311
B	15/32" Ply.	1	10d	4	461
C	15/32" Ply.	1	10d	3	600
D	15/32" Ply.	1	10d	2	770
2-B	15/32" Ply.	2	10d	4	921
2-C	15/32" Ply.	2	10d	3	1200
2-D	15/32" Ply.	2	10d	2	1539

Shear-Wall ID				Properties			Reductions			Pier Design (0.7E)				
Level	Dir.	Line	Segment	Length ft.	Height ft.	h/b	Inside HD w/ 10d (Footnote 10)		Aspect Red.	% of Total	Cap. pi	Dem. pi	DCR	SW Delta
Floor	N-S	11	*	18.5	14.0	0.76	Yes	0.92	1.00	100%	708	597	84%	D
Floor	N-S	12	A	4.5	14.0	3.11	Yes	0.92	0.86	7%	1219	964	79%	2-D
Floor	N-S	12	B	21.5	14.0	0.65	Yes	0.92	1.00	39%	1416	1119	79%	2-D
Floor	N-S	12	C*	15.0	14.0	0.93	Yes	0.92	1.00	27%	1416	1119	79%	2-D
Floor	N-S	12	D	5.0	14.0	2.80	Yes	0.92	0.90	8%	1275	1007	79%	2-D
Floor	N-S	12	E	10.5	14.0	1.33	Yes	0.92	1.00	19%	1416	1119	79%	2-D
Floor	N-S	13	*	58.5	14.0	0.24	Yes	0.92	1.00	100%	708	656	93%	D
Floor	N-S	14	A	22.0	14.0	0.64	Yes	0.92	1.00	40%	1416	994	70%	2-D
Floor	N-S	14	B	12.0	14.0	1.17	Yes	0.92	1.00	22%	1416	994	70%	2-D
Floor	N-S	14	C	21.5	14.0	0.65	Yes	0.92	1.00	39%	1416	994	70%	2-D
Floor	N-S	16	A	13.8	14.0	1.02	Yes	0.92	1.00	41%	848	743	88%	2-B
Floor	N-S	16	B	19.8	14.0	0.71	Yes	0.92	1.00	59%	848	743	88%	2-B
Floor	E-W	1A		34.0	14.0	0.41	Yes	0.92	1.00	100%	552	368	67%	C
Floor	E-W	1A.7		35.5	14.0	0.39	Yes	0.92	1.00	100%	1104	769	70%	2-C
Floor	E-W	1C.2	A	11.5	14.0	1.22	Yes	0.92	1.00	42%	1416	1379	97%	2-D
Floor	E-W	1C.2	B	8.0	14.0	1.75	Yes	0.92	1.00	29%	1416	1379	97%	2-D
Floor	E-W	1C.2	C	8.0	14.0	1.75	Yes	0.92	1.00	29%	1416	1379	97%	2-D
Floor	E-W	1C.9	A	26.5	14.0	0.53	Yes	0.92	1.00	100%	708	488	69%	D
Floor	E-W	1D	A	32.0	14.0	0.44	Yes	0.92	1.00	100%	1104	907	82%	2-C
Floor	E-W	1E	A	17.0	14.0	0.82	Yes	0.92	1.00	39%	1104	814	74%	2-C
Floor	E-W	1E	B	13.5	14.0	1.04	Yes	0.92	1.00	31%	1104	814	74%	2-C
Floor	E-W	1E	C	13.0	14.0	1.08	Yes	0.92	1.00	30%	1104	814	74%	2-C
Seperation														
Floor	E-W	1H	A	39.0	14.0	0.36	Yes	0.92	1.00	100%	1104	797	72%	2-C
Floor	E-W	1J	A	41.0	14.0	0.34	Yes	0.92	1.00	100%	552	348	63%	C
Floor	E-W	1K	A	16.0	14.0	0.88	Yes	0.92	1.00	#DIV/0!	286	#DIV/0!	#DIV/0!	A

Note: Italics indicates walls to be built in Phase 2 Construction

\*Denotes Shear Wall with Opening; See Additional Calcs

**FOR REFERENCE**  
 FUTURE PHASE 2: NOT PART OF THIS PERMIT APPROVAL

**PHASE 2 LOADING**



# miyamoto

Calc By: TCB Date: 6/29/2023  
 Checked By: - Date: NA

## OVERTURNING FORCES

Seis. Response Coef.			
S <sub>ds</sub> = 1.301			
C <sub>s</sub> = 0.2308 W			
ρ = 1.0 R = 6.5			
1.0E Seismic Forces (psf)			
Level	Wall Forces	Diaphragm	
		N/S	E/W
Roof	9.43	12.69	12.69
Low Rf.	16.49	13.68	13.68
2nd Flr.	16.49	13.68	13.68

Shearwall Schedule					
ID	Shtg.	Sides	Nail	Spac.	Cap.
A	15/32" Ply.	1	10d	6	311
B	15/32" Ply.	1	10d	4	461
C	15/32" Ply.	1	10d	3	600
D	15/32" Ply.	1	10d	2	770
2-B	15/32" Ply.	2	10d	4	921
2-C	15/32" Ply.	2	10d	3	1200
2-D	15/32" Ply.	2	10d	2	1539

Shear-Wall ID				Properties			Applied Loads							Apply Ω
Level	Direc.	Line	Segment	HD Offset	OT Length	Height ft.	Wall (psf)	Distributed DL	(plf) LL	Left Point (lbs) DL	LL	Right Point (lbs) DL	LL	
Roof	N-S	21		0.4	19.2	10.0	18	0	0	0	0	0	0	No
Roof	N-S	22	A	0.4	15.7	10.0	10	0	0	0	0	0	0	No
Roof	N-S	22	B	0.4	6.2	10.0	10	0	0	0	0	0	0	No
Roof	N-S	22	C	0.4	6.2	10.0	10	0	0	0	0	0	0	No
Roof	N-S	24	A	0.4	4.7	10.0	10	0	0	0	0	0	0	No
Roof	N-S	24	B	0.4	12.2	10.0	18	0	0	0	0	0	0	No
Roof	N-S	24	C	0.4	12.2	10.0	10	0	0	0	0	0	0	No
Roof	N-S	26		0.4	22.7	10.0	18	0	0	0	0	0	0	No
Roof	E-W	2C.1		0.4	23.2	10.0	18	0	0	0	0	0	0	No
Roof	E-W	2C.2	A	0.4	17.2	10.0	18	0	0	0	0	0	0	No
Roof	E-W	2C.2	B	0.4	7.2	10.0	18	0	0	0	0	0	0	No
Roof	E-W	2D		0.4	41.2	10.0	10	0	0	0	0	0	0	No
Roof	E-W	2E		0.4	55.7	10.0	18	0	0	0	0	0	0	No
Roof	E-W	2H		0.4	55.7	10.0	18	0	0	0	0	0	0	No
Roof	E-W	2J	A	0.4	18.7	10.0	18	0	0	0	0	0	0	No
Roof	E-W	2J	B	0.4	16.2	10.0	18	0	0	0	0	0	0	No

**FOR REFERENCE**

FUTURE PHASE 2: NOT PART OF THIS PERMIT APPROVAL

**PHASE 2 LOADING**

# miyamoto

Calc By: TCB Date: 6/29/2023  
 Checked By: - Date: NA

## OVERTURNING FORCES

Seis. Response Coef.			
S <sub>ds</sub> = 1.301			
C <sub>s</sub> = 0.2308 W			
ρ = 1.0 R = 6.5			
1.0E Seismic Forces (psf)			
Level	Wall Forces	Diaphragm	
		N/S	E/W
Roof	9.43	12.69	12.69
Low Rf.	16.49	13.68	13.68
2nd Flr.	16.49	13.68	13.68

Shearwall Schedule					
ID	Shtg.	Sides	Nail	Spac.	Cap.
A	15/32" Ply.	1	10d	6	311
B	15/32" Ply.	1	10d	4	461
C	15/32" Ply.	1	10d	3	600
D	15/32" Ply.	1	10d	2	770
2-B	15/32" Ply.	2	10d	4	921
2-C	15/32" Ply.	2	10d	3	1200
2-D	15/32" Ply.	2	10d	2	1539

Shear-Wall ID				Properties			Applied Loads							Apply Ω
Level	Dir.	Line	Segment	HD Offset	OT Length	Height ft.	Wall (psf)	Distributed DL	(plf) LL	Left Point DL	(lbs) LL	Right Point DL	(lbs) LL	
Floor	N-S	11	*	0.4	17.7	14.0	10	0	0	0	0	0	0	No
Floor	N-S	12	A	0.4	3.7	14.0	10	0	0	0	0	0	0	No
Floor	N-S	12	B	0.4	20.7	14.0	10	0	0	0	0	0	0	No
Floor	N-S	12	C*	0.4	14.2	14.0	10	0	0	0	0	0	0	No
Floor	N-S	12	D	0.4	4.2	14.0	10	0	0	0	0	0	0	No
Floor	N-S	12	E	0.4	9.7	14.0	10	0	0	0	0	0	0	No
Floor	N-S	13	*	0.4	57.7	14.0	10	0	0	0	0	0	0	No
Floor	N-S	14	A	0.4	21.2	14.0	10	0	0	0	0	0	0	No
Floor	N-S	14	B	0.4	11.2	14.0	10	0	0	0	0	0	0	No
Floor	N-S	14	C	0.4	20.7	14.0	10	0	0	0	0	0	0	No
Floor	N-S	16	A	0.4	13.0	14.0	10	0	0	0	0	0	0	No
Floor	N-S	16	B	0.4	19.0	14.0	10	0	0	0	0	0	0	No
Floor	E-W	1A		0.4	33.2	14.0	10	0	0	0	0	0	0	No
Floor	E-W	1A.7		0.4	34.7	14.0	10	0	0	0	0	0	0	No
Floor	E-W	1C.2	A	0.4	10.7	14.0	18	0	0	0	0	0	0	No
Floor	E-W	1C.2	B	0.4	7.2	14.0	18	0	0	0	0	0	0	No
Floor	E-W	1C.2	C	0.4	7.2	14.0	18	0	0	0	0	0	0	No
Floor	E-W	1C.9	A	0.4	25.7	14.0	10	0	0	0	0	0	0	No
Floor	E-W	1D	A	0.4	31.2	14.0	10	0	0	0	0	0	0	No
Floor	E-W	1E	A	0.4	16.2	14.0	10	0	0	0	0	0	0	No
Floor	E-W	1E	B	0.4	12.7	14.0	10	0	0	0	0	0	0	No
Floor	E-W	1E	C	0.4	12.2	14.0	10	0	0	0	0	0	0	No
Floor	E-W	1H	A	0.4	38.2	14.0	10	0	0	0	0	0	0	No
Floor	E-W	1J	A	0.4	40.2	14.0	10	0	0	0	0	0	0	No
Floor	E-W	1K	A	0.4	15.2	14.0	10	0	0	0	0	0	0	No

Note: Italics indicates walls to be built in Phase 2 Construction

\*Denotes Shear Wall with Opening; See Additional Calcs

# miyamoto

Calc By: TCB Date: 6/29/2023  
 Checked By: - Date: NA

## OVERTURNING FORCES

Seis. Response Coef.			
$S_{ds} = 1.301$			
$C_s = 0.2308$ W			
$\rho = 1.0$ $R = 6.5$			
1.0E Seismic Forces (psf)			
Level	Wall Forces	Diaphragm	
		N/S	E/W
Roof	9.43	12.69	###
Low Rf.	16.49	13.68	###
2nd Flr.	16.49	13.68	###

Shearwall Schedule					
ID	Shtg.	Sides	Nail	Spac.	Cap.
A	15/32" Ply.	1	10d	6	311
B	15/32" Ply.	1	10d	4	461
C	15/32" Ply.	1	10d	3	600
D	15/32" Ply.	1	10d	2	770
2-B	15/32" Ply.	2	10d	4	921
2-C	15/32" Ply.	2	10d	3	1200
2-D	15/32" Ply.	2	10d	2	1539

Shear-Wall ID				$\Omega$ Adju	Left HD Force				Right HD Force				Strap/ Anchor	
Level	Direc.	Line	Segment		LC8 <sup>+</sup> kips	LC9 <sup>+</sup> kips	LC10 <sup>+</sup> kips	Max kips	LC8 <sup>+</sup> kips	LC9 <sup>+</sup> kips	LC10 <sup>+</sup> kips	Max kips	HD	Mem.
Roof	N-S	21		1	-0.07	-0.52	1.36	<b>1.36</b>	-0.07	-0.52	1.36	<b>1.36</b>		
Roof	N-S	22	A	1	8.19	5.93	8.85	<b>8.85</b>	8.19	5.93	8.85	<b>8.85</b>		
Roof	N-S	22	B	1	9.43	6.98	9.74	<b>9.74</b>	9.43	6.98	9.74	<b>9.74</b>		
Roof	N-S	22	C	1	9.43	6.98	9.74	<b>9.74</b>	9.43	6.98	9.74	<b>9.74</b>		
Roof	N-S	24	A	1	12.46	9.27	12.71	<b>12.71</b>	12.46	9.27	12.71	<b>12.71</b>		
Roof	N-S	24	B	1	10.22	7.35	11.17	<b>11.17</b>	10.22	7.35	11.17	<b>11.17</b>		
Roof	N-S	24	C	1	10.88	7.98	11.41	<b>11.41</b>	10.88	7.98	11.41	<b>11.41</b>		
Roof	N-S	26		1	2.67	1.46	4.34	<b>4.34</b>	2.67	1.46	4.34	<b>4.34</b>		
Roof	E-W	2C.1		1	-0.91	-1.24	0.79	<b>0.79</b>	-0.91	-1.24	0.79	<b>0.79</b>		
Roof	E-W	2C.2	A	1	2.52	1.47	3.81	<b>3.81</b>	2.52	1.47	3.81	<b>3.81</b>		
Roof	E-W	2C.2	B	1	3.86	2.69	4.47	<b>4.47</b>	3.86	2.69	4.47	<b>4.47</b>		
Roof	E-W	2D		1	0.75	0.03	2.39	<b>2.39</b>	0.75	0.03	2.39	<b>2.39</b>		
Roof	E-W	2E		1	-1.68	-2.55	2.26	<b>2.26</b>	-1.68	-2.55	2.26	<b>2.26</b>		
Roof	E-W	2H		1	-2.23	-2.96	1.71	<b>1.71</b>	-2.23	-2.96	1.71	<b>1.71</b>		
Roof	E-W	2J	A	1	-1.24	-1.39	0.16	<b>0.16</b>	-1.24	-1.39	0.16	<b>0.16</b>		
Roof	E-W	2J	B	1	-0.97	-1.13	0.26	<b>0.26</b>	-0.97	-1.13	0.26	<b>0.26</b>		

**FOR REFERENCE**

FUTURE PHASE 2: NOT PART OF THIS PERMIT APPROVAL

PHASE 2 LOADING

# miyamoto

Calc By: TCB Date: 6/29/2023  
 Checked By: - Date: NA

## OVERTURNING FORCES

Seis. Response Coef.			
$S_{ds} = 1.301$			
$C_s = 0.2308$ W			
$\rho = 1.0$ R = 6.5			
1.0E Seismic Forces (psf)			
Level	Wall Forces	Diaphragm	
		N/S	E/W
Roof	9.43	12.69	###
Low Rf.	16.49	13.68	###
2nd Flr.	16.49	13.68	###

Shearwall Schedule					
ID	Shtg.	Sides	Nail	Spac.	Cap.
A	15/32" Ply.	1	10d	6	311
B	15/32" Ply.	1	10d	4	461
C	15/32" Ply.	1	10d	3	600
D	15/32" Ply.	1	10d	2	770
2-B	15/32" Ply.	2	10d	4	921
2-C	15/32" Ply.	2	10d	3	1200
2-D	15/32" Ply.	2	10d	2	1539

Shear-Wall ID				$\Omega$ Adju	Left HD Force				Right HD Force				Strap/ Anchor	
Level	Direc.	Line	Segment		LC8 <sup>+</sup> kips	LC9 <sup>+</sup> kips	LC10 <sup>+</sup> kips	Max kips	LC8 <sup>+</sup> kips	LC9 <sup>+</sup> kips	LC10 <sup>+</sup> kips	Max kips	HD	Mem.
Floor	N-S	11	*	1	7.14	5.02	8.18	<b>8.18</b>	7.14	5.02	8.18	<b>8.18</b>	HDU11	6x6
Floor	N-S	12	A	1	15.96	11.87	16.25	<b>16.25</b>	15.96	11.87	16.25	<b>16.25</b>	HD19	6x8
Floor	N-S	12	B	1	14.43	10.43	15.62	<b>15.62</b>	14.43	10.43	15.62	<b>15.62</b>	HD19	6x8
Floor	N-S	12	C*	1	15.24	11.15	16.09	<b>16.09</b>	15.24	11.15	16.09	<b>16.09</b>	HD19	6x8
Floor	N-S	12	D	1	16.30	12.12	16.62	<b>16.62</b>	16.30	12.12	16.62	<b>16.62</b>	HD19	6x8
Floor	N-S	12	E	1	16.02	11.82	16.63	<b>16.63</b>	16.02	11.82	16.63	<b>16.63</b>	HD19	6x8
Floor	N-S	13	*	1	4.41	2.27	7.58	<b>7.58</b>	4.41	2.27	7.58	<b>7.58</b>	HDU11	4x6
Floor	N-S	14	A	1	12.55	9.01	13.77	<b>13.77</b>	12.55	9.01	13.77	<b>13.77</b>	HDU14	6x8
Floor	N-S	14	B	1	13.84	10.16	14.53	<b>14.53</b>	13.84	10.16	14.53	<b>14.53</b>	HD19	6x8
Floor	N-S	14	C	1	12.60	9.06	13.80	<b>13.80</b>	12.60	9.06	13.80	<b>13.80</b>	HDU14	6x8
Floor	N-S	16	A	1	9.84	7.12	10.62	<b>10.62</b>	9.84	7.12	10.62	<b>10.62</b>	HDU14	6x6
Floor	N-S	16	B	1	9.14	6.49	10.24	<b>10.24</b>	9.14	6.49	10.24	<b>10.24</b>	HDU14	6x6
Floor	E-W	1A		1	2.39	1.18	4.25	<b>4.25</b>	2.39	1.18	4.25	<b>4.25</b>	HDU5	4x6
Floor	E-W	1A.7		1	8.01	5.37	9.95	<b>9.95</b>	8.01	5.37	9.95	<b>9.95</b>	HDU14	6x6
Floor	E-W	1C.2	A	1	18.91	13.80	20.10	<b>20.10</b>	18.91	13.80	20.10	<b>20.10</b>	HD19	6x8
Floor	E-W	1C.2	B	1	20.13	14.82	20.99	<b>20.99</b>	20.13	14.82	20.99	<b>20.99</b>	HD19	6x8
Floor	E-W	1C.2	C	1	20.13	14.82	20.99	<b>20.99</b>	20.13	14.82	20.99	<b>20.99</b>	HD19	6x8
Floor	E-W	1C.9	A	1	4.78	3.11	6.24	<b>6.24</b>	4.78	3.11	6.24	<b>6.24</b>	HDU11	4x6
Floor	E-W	1D	A	1	10.31	7.15	12.06	<b>12.06</b>	10.31	7.15	12.06	<b>12.06</b>	HDU14	6x8
Floor	E-W	1E	A	1	10.49	7.55	11.44	<b>11.44</b>	10.49	7.55	11.44	<b>11.44</b>	HDU14	6x8
Floor	E-W	1E	B	1	10.93	7.95	11.70	<b>11.70</b>	10.93	7.95	11.70	<b>11.70</b>	HDU14	6x8
Floor	E-W	1E	C	1	11.00	8.01	11.74	<b>11.74</b>	11.00	8.01	11.74	<b>11.74</b>	HDU14	6x8
Floor	E-W	1H	A	1	8.09	5.37	10.22	<b>10.22</b>	8.09	5.37	10.22	<b>10.22</b>	HDU14	6x6
Floor	E-W	1J	A	1	1.51	0.40	3.75	<b>3.75</b>	1.51	0.40	3.75	<b>3.75</b>	HDU5	4x6
Floor	E-W	1K	A	1	-1.39	-1.34	-0.49	<b>0.00</b>	-1.39	-1.34	-0.49	<b>0.00</b>	HDU4	4x6

Note: Italics indicates walls to be built in Phase 2 Construction

\* ASCE 7-16 2.4.5 ASD Seismic Load Combinations

Note: Positive HD force indicates an uplift force

\*Denotes Shear Wall with Opening; See Additional Calcs

## **6. MISCELLANEOUS**

# miyamoto

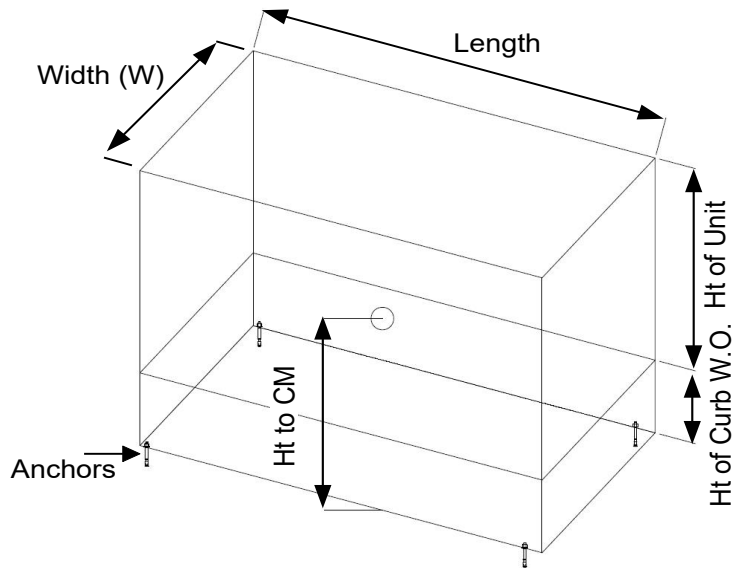
Calc By: TCB      Date: 7/6/2023  
 Checked By: -      Date: NA

## Mechanical Anchorage Calculation - AC1 to AC3

### Problem Statement:

Determine the anchorage required for mechanical equipment to resist lateral forces from seismic.

### Diagram:



**Mechanical Unit Schematic Diagram**

### Assumptions:

- Building Code: CBC 2022
- Reference Codes: ASCE 7-16; NDS 2018; SPDWS 2022
- List statements, conditions, and assumptions here (If an input is required place it to the right). Y (Y/N)

### Unit Properties

Unit Number: MECH-1

Unit Location: Roof

Occupancy Category: IV

Unit Type: A/C Unit

$\Omega = 2.5$

### Center of Mass

Unit CM = 20 in

Curb Height = 16 in

$W_p = 1060$  lbs

$I_p = 1.5$

### Unit Parameters

$W = 46$  in.

$L = 75$  in.

$H = 60$  in.

$A_p = 2.5$

### Site Parameters

$S_{DS} = 1.000$

$h = 10.0$  ft.

$z = 10.0$  ft.

$R_p = 6.0$

### Governing Equations:

$$F_p = [ (0.4 * A_p S_{ds} W_p) / (R_p / I_p) ] * (1 + 2 (z/h))$$

$$F_{p \max.} = 1.6 * S_{ds} I_p W_p$$

$$F_{p \min.} = 0.3 * S_{ds} I_p W_p$$

ASCE 7-16 Eq. (13.3-1)

ASCE 7-16 Eq. (13.3-2)

ASCE 7-16 Eq. (13.3-3)

# miyamoto

Calc By: TCB Date: 7/6/2023  
 Checked By: - Date: NA

## Mechanical Anchorage Calculation - AC1 to AC3

### Calculations:

#### Seismic Design Force ( $F_p$ )

	LRFD (1.0E)	ASD (0.7E)
$F_p =$	795 lbs	557 lbs
$F_p \text{ max.} =$	2544 lbs	1781 lbs
$F_p \text{ min.} =$	477 lbs	334 lbs
<b>Governing <math>F_p =</math></b>	<b>477 lbs</b>	<b>334 lbs</b>

#### Overturning Moment

Mom. Arm = 36.0 in.

	LRFD (1.0E)	ASD (0.7E)
$M_{OT} =$	17172 in.-lbs	12020 in.-lbs

$$M_{OT} = F_p * (\text{Unit CM} + \text{Curb Height})$$

#### Resisting Moment

	Across Width	
	LRFD (1.0E)	ASD (0.7E)
$M_{RES.} =$	17066 in.-lbs*	11215 in.-lbs*
* (LRFD - 1.0E) $M_{RES.} = (0.9 - 0.2 * S_{ds}) * W_p * ((W \text{ or } L)/2)$		

	Across Length	
	LRFD (1.0E)	ASD (0.7E)
$M_{RES.} =$	27825 in.-lbs*	18285 in.-lbs*
* (ASD - 0.7E) $M_{RES.} = (0.6 - 0.14 * S_{DS}) * W_p * ((W \text{ or } L)/2)$		

#### Unit Anchorage Demands

	Across Width		Across Length	
	LRFD (1.0E)	ASD (0.7E)	LRFD (1.0E)	ASD (0.7E)
Shear =	477 lbs	334 lbs		
Tension =	2 lbs	18 lbs	0 lbs	0 lbs
Shear (w $\Omega$ ) =	1193 lbs	835 lbs		
Tension (w/ $\Omega$ ) =	6 lbs	44 lbs	0 lbs	0 lbs

### Results:

Anchor spacing = One Anchor per Corner # Anchors (Length) = 2 6  
 Total Anchors = 4 # Anchors (Width) = 2

#### Anchor Demand

	Across Width		Across Length	
	LRFD (1.0E)	ASD (0.7E)	LRFD (1.0E)	ASD (0.7E)
Shear =	119 lbs	83 lbs		
Tension =	1 lbs	9 lbs	0 lbs	0 lbs
Shear (w $\Omega$ ) =	298 lbs	209 lbs		
Tension (w/ $\Omega$ ) =	3 lbs	22 lbs	0 lbs	0 lbs

**Use 1/2" Ø Lag Screw w/ 2" Min. Embed**

	Governing Demand		Allowable Capacity	
Shear =	209 lbs	>	432 lbs	OK
Tension =	22 lbs	>	782 lbs	OK

# miyamoto

Calc By: MKT      Date: 5-15-25  
 Checked By: -      Date: NA



**FONTANA**  
CALIFORNIA

BUILDING & SAFETY  
 8353 SIERRA AVE., FONTANA CA 92335  
 PHONE: (909) 350-7640  
 EMAIL: BUILDING@FONTANA.ORG

## WIND LOADS

Portions of the City of Fontana are located within a special wind region. The design parameters for wind loads are different depending upon the wind region of the proposed project as determined by the ASCE 7-22 Wind Map.

The design parameters for wind loads in Fontana are as follows:

If designing under the 2022 California *Building Code*:

The minimum basic design wind speed, V, shall be:

Special Wind Regions	
Risk Category	Basic Design Wind Speed, V
I	116 Vmph
II	129 Vmph
III	135 Vmph
IV	135 Vmph

ASCE 7-22	
Risk Category	Basic Design Wind Speed, V
I	90 Vmph
II	96 Vmph
III	103 Vmph
IV	106 Vmph

Exposure C, as a minimum, shall apply in all cases unless the architect or engineer in general responsible charge can justify to the building official that the building site and surrounding terrain conform to the criteria for Exposure B.

WIND SPEED  $V = 135 \text{ mph}$

$$\begin{aligned}
 q &= 0.00256 \times K_z K_e K_d V^2 \\
 &= 0.00256 \times 0.85 \times 135^2 \\
 &= 39.7 \text{ psf}
 \end{aligned}$$

AREA OF LIGHT FIXTURE  $\approx 1.5 \text{ ft}^2$

$$\begin{aligned}
 \text{Lateral load} &= 1.5 \text{ ft}^2 \times 39.7 \text{ psf} \\
 &= 60 \text{ lbs @ 17'-0" above ground}
 \end{aligned}$$

SEE ENERCALL RESULTS.

USE 24"  $\phi$  X 5'-0" DEEP CIRCULAR  
 FOOTING W/ 6 #5 VERTS



# miyamoto

Calc By: MKT Date: 5-15-25  
 Checked By: - Date: NA

## Pole Footing Embedded in Soil

Project File: Light pole.ec6

LIC# : KW-06018304, Build:20.23.04.05

MIYAMOTO INTERNATIONAL INC

(c) ENERCALC INC 1983-2023

**DESCRIPTION:** Light pole 17ft tall

### Code References

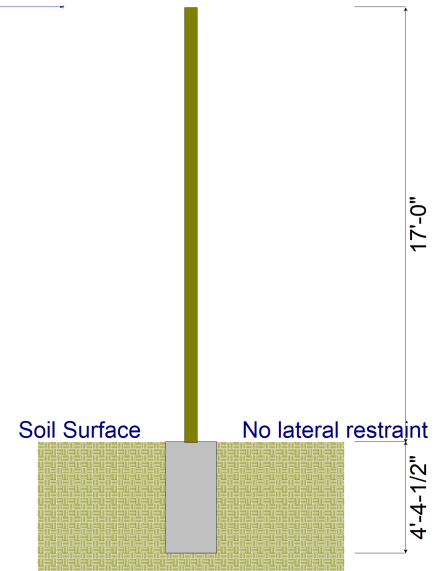
Calculations per IBC 2021 1807.3, ASCE 7-16

Load Combinations Used : IBC 2021

### General Information

Pole Footing Shape Circular  
 Pole Footing Diameter . . . . . 24.0 in  
 Calculate Min. Depth for Allowable Pressures  
 No Lateral Restraint at Ground Surface  
 Allow Passive . . . . . 290.0 pcf  
 Max Passive . . . . . 2,000.0 psf

Point Load



### Controlling Values

Governing Load Combination **D+0.60W**  
 Lateral Load 0.30 k  
 Moment 5.10 k-ft

**NO Ground Surface Restraint**

Pressures at 1/3 Depth  
 Actual **420.693** psf  
 Allowable **422.549** psf

**Minimum Required Depth 4.375 ft**

Footing Base Area 3.142 ft<sup>2</sup>  
 Maximum Soil Pressure 0.1910 ksf

### Applied Loads

Lateral Concentrated Load (k)	Lateral Distributed Loads (k)	Vertical Load (k)
D : Dead Load k	k/ft	0.60 k
Lr : Roof Live k	k/ft	k
L : Live k	k/ft	k
S : Snow k	k/ft	k
W : Wind 0.50 k	k/ft	k
E : Earthquake k	k/ft	k
H : Lateral Earth k	k/ft	k
Load distance above ground surface 17.0 ft	TOP of Load above ground surface ft	
	BOTTOM of Load above ground surface ft	

### Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
D Only	0.000	0.000	0.13	0.0	0.0	1.000
+D+0.60W	0.300	5.100	4.38	420.7	422.5	1.000
+D+0.450W	0.225	3.825	4.00	379.5	381.7	1.000
+0.60D+0.60W	0.300	5.100	4.38	420.7	422.5	1.000
+0.60D	0.000	0.000	0.13	0.0	0.0	1.000

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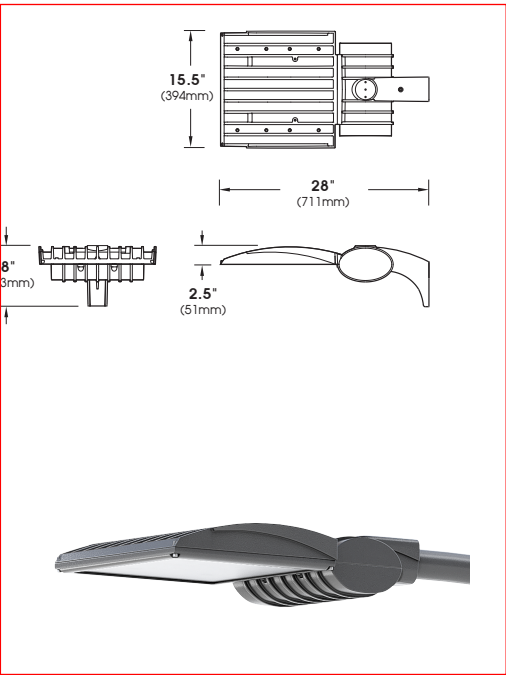
Calc By: MKT

Checked By: -

Date: 5-15-25

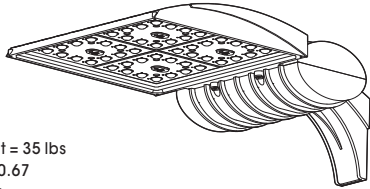
Date: NA

POLE DRILLING TEMPLATE

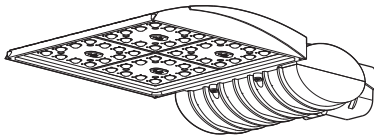


EPA & WEIGHT

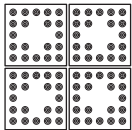
TSN15  
Max Weight = 35 lbs  
Max EPA = 0.67  
48 LED Max



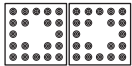
TSN15-ST  
Max Weight = 35 lbs  
Max EPA = 0.67  
48 LED Max



PLED™ MODULES



80 LED Module



40 LED Module

ORDERING INFORMATION

Spec/Order Example: TSN15/PLED-IV-FT/40LED-700mA/50K/277/3-120/RAL-9003-T

Luminaire	Optics	LED Mode			Voltage	Mounting	Finish	Options
Luminaire	Optics	LED			Voltage	Mounting	Finish	Options
	<b>PLED™</b> Distribution Type	# of LEDs	Drive Current	Color Temp - CCT		Arm Mount	Standard Textured Finish	
<input type="checkbox"/> TSN15	<input type="checkbox"/> Type II <b>PLED-II</b>	<input type="checkbox"/> 80LED	<input type="checkbox"/> 1050mA	<input type="checkbox"/> 27K (2700K)	<input type="checkbox"/> 120	<input type="checkbox"/> 1	<input type="checkbox"/> Black <b>RAL-9005-T</b>	<input type="checkbox"/> Internal House Side Shield inc. LED Count (Example: HS-PLED/48) <b>HS-PLED</b>
<input type="checkbox"/> TSN15-ST	<input type="checkbox"/> Type II Front Row <b>PLED-II-FR</b>	<input type="checkbox"/> 40LED	<input type="checkbox"/> 875mA	<input type="checkbox"/> 30K (3000K)	<input type="checkbox"/> 208	<input type="checkbox"/> 2-180	<input type="checkbox"/> White <b>RAL-9003-T</b>	<input type="checkbox"/> External Glare Shield 4 Sided <b>EGS4</b>
	<input type="checkbox"/> Type III Median Illuminator <b>PLED-II-ML</b>		<input type="checkbox"/> 700mA	<input type="checkbox"/> 40K (4000K)	<input type="checkbox"/> 240	<input type="checkbox"/> 2-90	<input type="checkbox"/> Grey <b>RAL-7004-T</b>	<input type="checkbox"/> External Glare Shield 3 Sided Rear Wedge <b>EGS3W</b>
	<input type="checkbox"/> Type III Med. <b>PLED-III-M</b>		<input type="checkbox"/> 525mA	<input type="checkbox"/> 50K (5000K)	<input type="checkbox"/> 277	<input type="checkbox"/> 3-90	<input type="checkbox"/> Dark Bronze <b>RAL-8019-T</b>	<input type="checkbox"/> Twist Lock Receptacle Only <b>TPR</b>
	<input type="checkbox"/> Type III Wide <b>PLED-III-W</b>		<input type="checkbox"/> 350mA	<input type="checkbox"/> TRA True Amber*	<input type="checkbox"/> 347	<input type="checkbox"/> 3-120	<input type="checkbox"/> Green <b>RAL-6005-T</b>	<input type="checkbox"/> 7-Pin Twist Lock Receptacle Only <b>TPR7</b>
	<input type="checkbox"/> Type IV <b>PLED-IV</b>			Consult Factory for Other LED Color, CCT, & CRI Options	<input type="checkbox"/> 480	<input type="checkbox"/> 4-90	For smooth finish replace suffix "T" with suffix "S" (Example: RAL-9500-S)	<input type="checkbox"/> High-Low Dimming for Switch by Others/Select Levels 50/100 or 25/100 (Example: HLSW/25) <b>HLSW</b>
	<input type="checkbox"/> Type IV <b>PLED-IV-FT</b>					<input type="checkbox"/> Universal Pole Adaptor <b>UPA</b>	Consult factor for custom colors	<input type="checkbox"/> Photo Cell + Voltage (Example: PC120V) <b>PC+V</b>
	<input type="checkbox"/> Type V Narrow <b>PLED-VSQ-N</b>					Wall Mount		<input type="checkbox"/> Single Fuse (120V, 277V) <b>SF</b>
	<input type="checkbox"/> Type V Med. <b>PLED-V-SQ-M</b>					<input type="checkbox"/> WM		<input type="checkbox"/> Double Fuse (208V, 240V) <b>DF</b>
	<input type="checkbox"/> Type V Wide <b>PLED-V-SQ-W</b>					WM - Wall Mount provided with mounting bracket and cover.		<input type="checkbox"/> Blue-Tooth Programmable Photo/Motion Sensor (Factory - Motion 50/100; Photo 75/c) <b>MS-F311</b>
	Ambience™ Lens							
	<input type="checkbox"/> AL-ASY							
	<input type="checkbox"/> AL-ASY-HS							
	<input type="checkbox"/> AL-SYM							

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Calc By: MKT

Checked By: -

Date: 5-15-25

Date: NA

