DIVERSIFIED STRUCTURAL DESIGN, INC.

STRUCTURAL CALCULATION

This cover sheet is provided as per Florida Statute 61G15-31 in lieu of signing and sealing each individual sheet. An index sheet is attached which is numbered.

FOR:

LISA AND CHRIS MONTERO RESIDENCE

LOCATED AT:

PINECREST, FLORIDA

EDUARDO GONZALEZ LICENSE No. 24927 STATE OF FLORIDA PROFESSIONAL ENGINEER

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DESIGN CRITERIA:

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P.E.# 24927 State of FL CA-0006188

JOB	ADDITION AND RENOVATION RESIDENCE		
SHEET No.		JOB No.	22-22
CALCULATE BY	AR	DATE	08/12/2022
CHECKED BY		DATE	
SCALE			

DESIGN CRITERIA

CALCULATION ACCORDING:

WIND LOADS (ASCE 7-16)
FLORIDA BUILDING CODE 2020

Basic Wind Speed, V=175 mph (FBC 2020)

Structural Category II

Exposure Category C

Kd =0.85

TYPICAL ROOF LOADS:

$RoofDL := 25 \cdot psf$

$RoofLL := 30 \cdot psf$

SOIL CAPACITY:

SOIL IS ASSUMED TO PROVIDE 2000 PSF BEARING CAPACITY, AS FOR VISUAL INSPECTION IT APPPEARS TO BE LIMEROCK AND SILICA SAND, FREE FROM ORGANIC MATERIALS.

FOUNDATION DESIGN

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FOUNDATION TO SUPPORT COLUMN 2 CHECK FOR UPLIFT AT AT CENTER OF BEAM AT GREAT ROOM

$Areatrib := \frac{34}{2} \cdot ft \cdot 13 \cdot ft = 221\ ft^2$

$Upliftpressure := 34.10 \cdot psf$

UPLIFT LOAD

$UpliftLoad := Upliftpressure \cdot Areatrib$

$UpliftLoad = 7536\ lb$

VERTICAL LOADS

$Column := 8 \cdot in \cdot 16 \cdot in \cdot 150 \cdot \frac{lb}{ft^3} \cdot 10.33 \cdot ft$

$Column = 1377\ lb$

$SLAB := 4 \cdot in \cdot 150 \cdot pcf \cdot 5 \cdot ft \cdot 5 \cdot ft$

$SLAB = 1250\ lb$

$FOUNDATION := 6 \cdot ft \cdot 8 \cdot ft \cdot 1.5 \cdot ft \cdot 150 \cdot pcf$

$FOUNDATION = 10800\ lb$

$TotalverticalLoads := (Column + SLAB + FOUNDATION) \cdot 0.6$

$TotalverticalLoads = 8056\ lb$

Control := if(UpliftLoad > TotalverticalLoads, "NOT O.K." , " O.K.")

Control = " O.K."

CHECK FOUNDATION FOR GRAVITY

Beam Reactions

$ReactionDL := 8.12 \cdot K$

$ReactionLL := 7.94 \cdot K$

THEN USE 6'-0"x 8'-0"x18" CONCRETE FOOTING W/ #5@10 TOP AND BOTTON EACH WAY

General Footing

DESCRIPTION: FOUNDATION TO SUPPORT COLUMN 2 AT AT CENTER OF BEAM AT GREAT ROOM

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0	ksi
fy : Rebar Yield	=	60.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
φ Values Flexure	=	0.90	
Shear	=	0.750	

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2.0	ksf
Soil Density	=	110.0	pcf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

Footing base depth below soil surface	=	3.0	ft
Allow press. increase per foot of depth	=		ksf
when footing base is below	=		ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth	=		ksf
when max. length or width is greater than	=		ft

Dimensions

Width parallel to X-X Axis	=	6.0	ft
Length parallel to Z-Z Axis	=	8.0	ft
Footing Thickness	=	18.0	in

Load location offset from footing center...

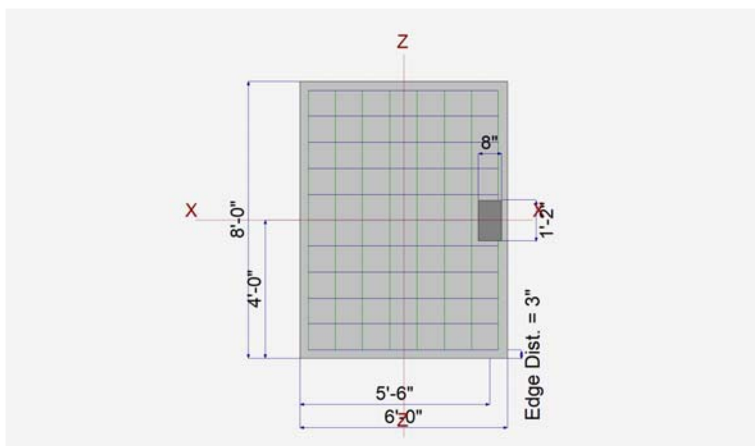
ex : Prll to X-X Axis	=	30	in
ez : Prll to Z-Z Axis	=	0	in

Pedestal dimensions...

px : parallel to X-X Axis	=	8.0	in
pz : parallel to Z-Z Axis	=	14.0	in
Height	=	18.0	in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0	in



Reinforcing

Bars parallel to X-X Axis

Number of Bars	=	11.0
Reinforcing Bar Size	=	# 5

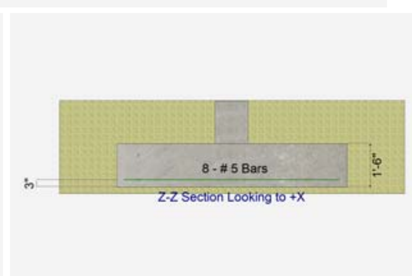
Bars parallel to Z-Z Axis

Number of Bars	=	8.0
Reinforcing Bar Size	=	# 5

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

	Bars along X-X Axis
# Bars required within zone	85.7 %
# Bars required on each side of zone	14.3 %



Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	9.490		7.940					k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

General Footing

Project File: Structural calculations.ec6

LIC# : KW-06014285, Build:20.22.10.25 DIVERSIFIED STRUCTURAL DESIGN, INC.

DESCRIPTION: FOUNDATION TO SUPPORT COLUMN 2 AT AT CENTER OF BEAM AT GREAT ROOM

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8445	Soil Bearing	1.689 ksf	2.0 ksf	+D+L
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.001167	Z Flexure (+X)	0.03264 k-ft/ft	27.970 k-ft/ft	+1.20D+1.60L
PASS	0.2570	Z Flexure (-X)	7.188 k-ft/ft	27.970 k-ft/ft	+1.40D
PASS	0.4346	X Flexure (+Z)	11.797 k-ft/ft	27.146 k-ft/ft	+1.20D+1.60L
PASS	0.07163	X Flexure (-Z)	1.944 k-ft/ft	27.146 k-ft/ft	+1.40D
PASS	n/a	1-way Shear (+X)	0.0 psi	82.158 psi	n/a
PASS	0.1562	1-way Shear (-X)	12.836 psi	82.158 psi	+1.40D
PASS	0.2952	1-way Shear (+Z)	24.256 psi	82.158 psi	+1.20D+1.60L
PASS	0.2935	1-way Shear (-Z)	24.110 psi	82.158 psi	+1.20D+1.60L
PASS	0.1528	2-way Punching	25.114 psi	164.317 psi	+1.20D+1.60L

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location: Bottom Left	Top Left	Top Right	Bottom Right	Actual / Allow Ratio
, D Only								0.000
, 0.0 deg CCW	2.0	10.131	0.0	0.09482	0.09482	1.060	1.060	0.530
, +D+L								0.000
, 0.3 deg CCW	2.0	14.555	0.0	0.0	0.0	1.678	1.689	0.845
, +D+0.750L								0.000
, 0.3 deg CCW	2.0	13.644	0.0	0.0	0.0	1.524	1.533	0.767
, +0.60D								0.000
, 0.0 deg CCW	2.0	10.131	0.0	0.05689	0.05689	0.6361	0.6361	0.318

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	12.84 psi	0.00 psi	16.40 psi	16.40 psi	16.40 psi	82.16 psi	0.20	OK
+1.20D+1.60L	11.29 psi	0.00 psi	24.11 psi	24.26 psi	24.26 psi	82.16 psi	0.30	OK
+1.20D+L	11.29 psi	0.00 psi	20.21 psi	20.32 psi	20.32 psi	82.16 psi	0.25	OK
+1.20D	11.00 psi	0.00 psi	14.05 psi	14.05 psi	14.05 psi	82.16 psi	0.17	OK
+0.90D	8.25 psi	0.00 psi	10.54 psi	10.54 psi	10.54 psi	82.16 psi	0.13	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	21.94 psi	164.32 psi	0.1335	OK
+1.20D+1.60L	25.11 psi	164.32 psi	0.1528	OK
+1.20D+L	22.77 psi	164.32 psi	0.1386	OK
+1.20D	18.80 psi	164.32 psi	0.1144	OK
+0.90D	14.10 psi	164.32 psi	0.08583	OK

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CALCULATE BY	AR	DATE	08/12/2022
CHECKED BY		DATE	
SCALE			

FOUNDATION TO SUPPORT COLUMN 2 CHECK FOR UPLIFT AT AT END OF BEAM AT GREAT ROOM

$\mathrm{Areatrib} := \frac{34}{2}\cdot \mathrm{ft}\cdot \frac{13}{2}\cdot \mathrm{ft} = 110.5\ \mathrm{ft}^2$

$\mathrm{Upliftpressure} := 34.10\cdot \mathrm{psf}$

UPLIFT LOAD

$\mathrm{UpliftLoad} := \mathrm{Upliftpressure}\cdot \mathrm{Areatrib}$

$\boxed{\mathrm{UpliftLoad} = 3768\ \mathrm{lb}}$

VERTICAL LOADS

$\mathrm{Column} := 8\cdot \mathrm{in}\cdot 16\cdot \mathrm{in}\cdot 150\cdot \frac{\mathrm{lb}}{\mathrm{ft}^3}\cdot 10.33\cdot \mathrm{ft}$ $\quad\mathrm{Column} = 1377\ \mathrm{lb}$

$\mathrm{SLAB} := 4\cdot \mathrm{in}\cdot 150\cdot \mathrm{pcf}\cdot 5\cdot \mathrm{ft}\cdot 5\cdot \mathrm{ft}$ $\quad\mathrm{SLAB} = 1250\ \mathrm{lb}$

$\mathrm{FOUNDATION} := 4.5\cdot \mathrm{ft}\cdot 4.5\cdot \mathrm{ft}\cdot 1.5\cdot \mathrm{ft}\cdot 150\cdot \mathrm{pcf}$ $\quad\mathrm{FOUNDATION} = 4556\ \mathrm{lb}$

$\mathrm{TotalverticalLoads} := (\mathrm{Column} + \mathrm{SLAB} + \mathrm{FOUNDATION})\cdot 0.6$

$\boxed{\mathrm{TotalverticalLoads} = 4310\ \mathrm{lb}}$

$\mathrm{Control} := \mathrm{if}(\mathrm{UpliftLoad} > \mathrm{TotalverticalLoads}, \text{"NOT O.K."}, \text{" O.K."})$ $\quad\boxed{\mathrm{Control} = \text{" O.K."}}$

CHECK FOUNDATION FOR GRAVITY

Beam Reactions $\quad\mathrm{ReactionDL} := 2.60\cdot \mathrm{K}$

$\mathrm{ReactionLL} := 2.53\cdot \mathrm{K}$

THEN USE 4'-6"x 4'-6"x18" CONCRETE FOOTING W/ #5@10 TOP AND BOTTON EACH WAY

General Footing

DESCRIPTION: FOUNDATION TO SUPPORT COLUMN 2 AT END OF BEAM AT GREAT ROOM

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2.0 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Increases based on footing Depth

Footing base depth below soil surface	=	3.0 ft
Allow press. increase per foot of depth	=	ksf
when footing base is below	=	ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth	=	ksf
when max. length or width is greater than	=	ft

Dimensions

Width parallel to X-X Axis	=	4.50 ft
Length parallel to Z-Z Axis	=	4.50 ft
Footing Thickness	=	18.0 in

Load location offset from footing center...

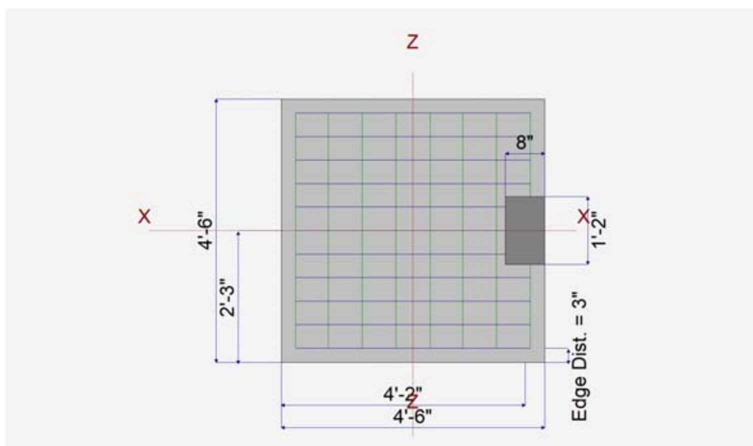
ex : Prll to X-X Axis	=	23 in
ez : Prll to Z-Z Axis	=	0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	8.0 in
pz : parallel to Z-Z Axis	=	14.0 in
Height	=	18.0 in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in



Reinforcing

Bars parallel to X-X Axis

Number of Bars	=	11.0
Reinforcing Bar Size	=	# 5

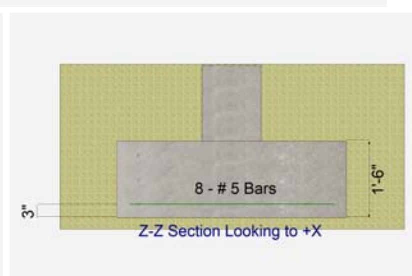
Bars parallel to Z-Z Axis

Number of Bars	=	8.0
Reinforcing Bar Size	=	# 5

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

\# Bars required within zone
\# Bars required on each side of zone



Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	4.0		2.530					k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: Structural calculations.ec6

LIC# : KW-06014285, Build:20.22.10.25 DIVERSIFIED STRUCTURAL DESIGN, INC.

DESCRIPTION: FOUNDATION TO SUPPORT COLUMN 2 AT END OF BEAM AT GREAT ROOM

DESIGN SUMMARY

Design N.G.

Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	Soil Bearing	ksf	ksf	
FAIL	Overturning - X-X	k-ft	k-ft	
FAIL	Overturning - Z-Z	k-ft	k-ft	
FAIL	Sliding - X-X	k	k	
FAIL	Sliding - Z-Z	k	k	
FAIL	Uplift	k	k	
PASS	Z Flexure (+X)	k-ft/ft	k-ft/ft	
PASS	Z Flexure (-X)	k-ft/ft	k-ft/ft	
PASS	X Flexure (+Z)	k-ft/ft	k-ft/ft	
PASS	X Flexure (-Z)	k-ft/ft	k-ft/ft	
PASS	1-way Shear (+X)	psi	psi	
PASS	1-way Shear (-X)	psi	psi	
PASS	1-way Shear (+Z)	psi	psi	
PASS	1-way Shear (-Z)	psi	psi	
PASS	2-way Punching	psi	psi	

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location: Bottom Left	Top Left	Top Right	Bottom Right	Actual / Allow Ratio
, D Only								0.000
, 0.0 deg CCW	2.0	7.665	0.0	0.08997	0.08997	1.057	1.057	0.529
, +D+L								0.000
, 0.0 deg CCW	2.0	10.408	0.0	0.0	0.0	1.519	1.519	0.760
, +D+0.750L								0.000
, 0.0 deg CCW	2.0	9.818	0.0	0.0	0.0	1.411	1.411	0.706
, +0.60D								0.000
, 0.0 deg CCW	2.0	7.665	0.0	0.05398	0.05398	0.6344	0.6344	0.317

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	7.54 psi	0.00 psi	3.06 psi	3.06 psi	7.54 psi	82.16 psi	0.09	OK
+1.20D+1.60L	5.83 psi	0.00 psi	4.09 psi	4.09 psi	5.83 psi	82.16 psi	0.07	OK
+1.20D+L	6.08 psi	0.00 psi	3.53 psi	3.53 psi	6.08 psi	82.16 psi	0.07	OK
+1.20D	6.47 psi	0.00 psi	2.63 psi	2.63 psi	6.47 psi	82.16 psi	0.08	OK
+0.90D	4.85 psi	0.00 psi	1.97 psi	1.97 psi	4.85 psi	82.16 psi	0.06	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	7.81 psi	164.32 psi	0.04751	OK
+1.20D+1.60L	8.05 psi	164.32 psi	0.04901	OK
+1.20D+L	7.55 psi	164.32 psi	0.04594	OK
+1.20D	6.69 psi	164.32 psi	0.04072	OK
+0.90D	5.02 psi	164.32 psi	0.03054	OK

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JOB ADDITION AND RENOVATION RESIDENCE

SHEET No. ______ JOB No. 22-22

CALCULATE BY AR DATE 08/12/2022

CHECKED BY ______ DATE ______

SCALE ______

FOUNDATION TO SUPPORT COLUMN AT COVERED TERRACE CHECK FOR UPLIFT AT CENTER

$Areatrib := \frac{22}{2} \cdot ft \cdot \frac{26}{2} \cdot ft = 143\ ft^2$

$Upliftpressure := 34.10 \cdot psf$

UPLIFT LOAD

$UpliftLoad := Upliftpressure \cdot Areatrib$

$UpliftLoad = 4876\ lb$

VERTICAL LOADS

$Column := 8 \cdot in \cdot 12 \cdot in \cdot 150 \cdot \frac{lb}{ft^3} \cdot 10.33 \cdot ft$

$Column = 1033\ lb$

$SLAB := 4 \cdot in \cdot 150 \cdot pcf \cdot 4 \cdot ft \cdot 4 \cdot ft$

$SLAB = 800\ lb$

$FOUNDATION := 5.5 \cdot ft \cdot 5.5 \cdot ft \cdot 1.5 \cdot ft \cdot 150 \cdot pcf$

$FOUNDATION = 6806\ lb$

$TotalverticalLoads := (Column + SLAB + FOUNDATION) \cdot 0.6$

$TotalverticalLoads = 5184\ lb$

Control := if(UpliftLoad > TotalverticalLoads, "NOT O.K." , " O.K.")

Control = " O.K."

THEN USE 5'-6"x 5'-6"x18" CONCRETE FOOTING W/ 6#5 TOP AND BOTTON EACH WAY

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JOB ADDITION AND RENOVATION RESIDENCE
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CALCULATE BY AR DATE 08/12/2022
CHECKED BY ______ DATE ______
SCALE ______

FOUNDATION TO SUPPORT COLUMN AT COVERED TERRACE CHECK FOR UPLIFT AT EDGE

$Areatrib := \frac{22}{2}\cdot ft\cdot \frac{13}{2}\cdot ft = 71.5\ ft^2$

$Upliftpressure := 34.10\cdot psf$

UPLIFT LOAD

$UpliftLoad := Upliftpressure\cdot Areatrib$

$UpliftLoad = 2438\ lb$

VERTICAL LOADS

$Column := 8\cdot in\cdot 12\cdot in\cdot 150\cdot \frac{lb}{ft^3}\cdot 10.33\cdot ft$ $\quad Column = 1033\ lb$

$SLAB := 4\cdot in\cdot 150\cdot pcf\cdot 3.5\cdot ft\cdot 3.5\cdot ft$ $\quad SLAB = 613\ lb$

$FOUNDATION := 3.5\cdot ft\cdot 3.5\cdot ft\cdot 1.5\cdot ft\cdot 150\cdot pcf$ $\quad FOUNDATION = 2756\ lb$

$TotalverticalLoads := (Column + SLAB + FOUNDATION)\cdot 0.6$

$TotalverticalLoads = 2641\ lb$

Control := if(UpliftLoad > TotalverticalLoads, "NOT O.K." , " O.K.") Control = " O.K."

THEN USE 3'-6"x 3'-6"x18" CONCRETE FOOTING W/ 4#5 TOP AND BOTTON EACH WAY

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SCALE ______

FOUNDATION TO SUPPORT EXTERIOR MASONRY WALL

$\text{Rooftriblong} := \left(\frac{34}{2} \cdot \text{ft}\right)$

$\text{Wallheight} := 10.33 \cdot \text{ft}$

LOADS AT ROOF

$\text{RoofDL} := 25 \cdot \text{psf} \cdot \text{Rooftriblong}$ $\quad \text{RoofDL} = 425 \frac{\text{lb}}{\text{ft}}$

$\text{RoofLL} := 30 \cdot \text{psf} \cdot \text{Rooftriblong}$ $\quad \text{RoofLL} = 510 \frac{\text{lb}}{\text{ft}}$

$\text{Wall} := 55 \cdot \text{psf} \cdot \text{Wallheight}$ $\quad \text{Wall} = 568.1 \frac{\text{lb}}{\text{ft}}$

TOTAL LOADS

$\text{DL} := \text{RoofDL} + \text{Wall}$

$\boxed{\text{DL} = 993.1 \frac{\text{lb}}{\text{ft}}}$

$\text{LL} := \text{RoofLL}$

$\boxed{\text{LL} = 510 \frac{\text{lb}}{\text{ft}}}$

USE WF-18 (18"x12") W/ 2#5 CONTINUOUS BOTTOM AND #5@12" TRANSVERSAL BOTTOM

Wall Footing

Project File: Structural calculations.ec6

LIC# : KW-06014285, Build:20.22.10.25 DIVERSIFIED STRUCTURAL DESIGN, INC. (c) ENERCALC INC 1983-2022

DESCRIPTION: FOUNDATION TO SUPPORT EXTERIOR MASONRY WALL

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
AutoCalc Footing Weight as DL :		Yes

Soil Design Values

Allowable Soil Bearing	=	2.0 ksf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Increases based on footing Depth

Reference Depth below Surface	=	ft
Allow. Pressure Increase per foot of depth	=	ksf
when base footing is below	=	ft

Increases based on footing Width

Allow. Pressure Increase per foot of width	=	ksf
when footing is wider than	=	ft

Adjusted Allowable Bearing Pressure = 2.0 ksf

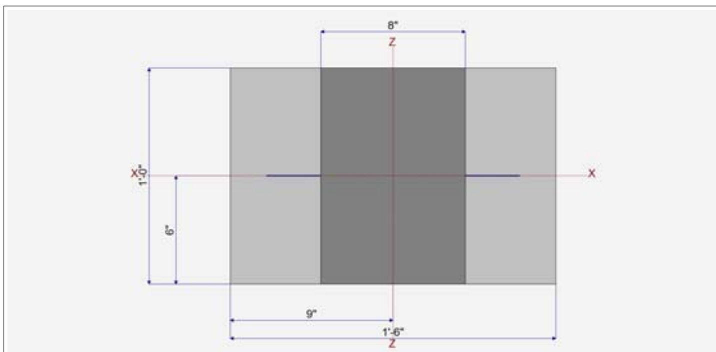
Dimensions

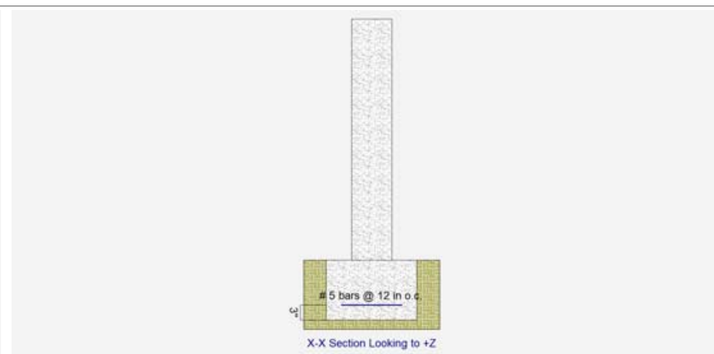
Footing Width	=	1.50 ft
Wall Thickness	=	8.0 in
Wall center offset from center of footing	=	0 in
Footing Thickness	=	12.0 in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in

Reinforcing

Bars along X-X Axis

Bar spacing	=	12.00
Reinforcing Bar Size	=	# 5





Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	1.0		0.510					k
OB : Overburden	=								ksf
V-x	=								k
M-zz	=								k-ft

Vx applied = in above top of footing

Wall Footing

Project File: Structural calculations.ec6

LIC# : KW-06014285, Build:20.22.10.25 DIVERSIFIED STRUCTURAL DESIGN, INC.

DESCRIPTION: FOUNDATION TO SUPPORT EXTERIOR MASONRY WALL

DESIGN SUMMARY

Design OK

	Factor of Safety	Item	Applied	Capacity	Governing Load Combination
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift

	Utilization Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.5758	Soil Bearing	1.152 ksf	2.0 ksf	+D+L
PASS	0.01086	Z Flexure (+X)	0.1318 k-ft	12.131 k-ft	+1.20D+1.60L
PASS	0.005227	Z Flexure (-X)	0.06341 k-ft	12.131 k-ft	+0.90D
PASS	n/a	1-way Shear (+X)	0.0 psi	82.158 psi	n/a
PASS	0.0	1-way Shear (-X)	0.0 psi	0.0 psi	n/a

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Actual Soil Bearing Stress -X	Actual Soil Bearing Stress +X	Actual / Allowable Ratio
, D Only	2.0 ksf	0.0 in	0.8117 ksf	0.8117 ksf	0.406
, +D+L	2.0 ksf	0.0 in	1.152 ksf	1.152 ksf	0.576
, +D+0.750L	2.0 ksf	0.0 in	1.067 ksf	1.067 ksf	0.533
, +0.60D	2.0 ksf	0.0 in	0.4870 ksf	0.4870 ksf	0.244

Overturning Stability

Units : k-ft

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Sliding SafetyRatio	Status
Footing Has NO Sliding				

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
, +1.40D	0.09864	-X	Bottom	0.2592	Min Temp %	0.31	12.131	OK
, +1.40D	0.09864	+X	Bottom	0.2592	Min Temp %	0.31	12.131	OK
, +1.20D+1.60L	0.1318	-X	Bottom	0.2592	Min Temp %	0.31	12.131	OK
, +1.20D+1.60L	0.1318	+X	Bottom	0.2592	Min Temp %	0.31	12.131	OK
, +1.20D+L	0.1141	-X	Bottom	0.2592	Min Temp %	0.31	12.131	OK
, +1.20D+L	0.1141	+X	Bottom	0.2592	Min Temp %	0.31	12.131	OK
, +1.20D	0.08455	-X	Bottom	0.2592	Min Temp %	0.31	12.131	OK
, +1.20D	0.08455	+X	Bottom	0.2592	Min Temp %	0.31	12.131	OK
, +0.90D	0.06341	-X	Bottom	0.2592	Min Temp %	0.31	12.131	OK
, +0.90D	0.06341	+X	Bottom	0.2592	Min Temp %	0.31	12.131	OK

One Way Shear

Units : k

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+1.60L	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+L	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D	0 psi	0 psi	0 psi	82.158 psi	0	OK
+0.90D	0 psi	0 psi	0 psi	82.158 psi	0	OK

CONCRETE BEAM DESIGN

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CONCRETE BEAM DESIGN RB-1 TO SUPPORT TRUSS AT NEW COVERED TERRACE

$Rooftriblong := \frac{20.0}{2} \cdot ft$

LOADS AT ROOF

$RoofDL := 25 \cdot psf \cdot Rooftriblong$ $\qquad RoofDL = 250 \frac{lb}{ft}$

$RoofLL := 30 \cdot psf \cdot Rooftriblong$ $\qquad RoofLL = 300 \frac{lb}{ft}$

TOTAL LOADS

$DL := RoofDL$ $\qquad LL := RoofLL$

$\boxed{DL = 250 \frac{lb}{ft}}$ $\qquad \boxed{LL = 300 \frac{lb}{ft}}$

USE CONCRETE BEAM 8"x20" W/ 2#5 TOP AND BOTTOM, STIRRUPS #3@8" O.C. AND 2#5 INTERM.

Concrete Beam

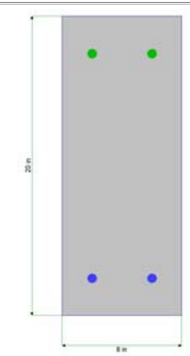
DESCRIPTION: CONCRETE BEAM DESIGN RB-1 TO SUPPORT TRUSS AT NEW COVERED TERRACE

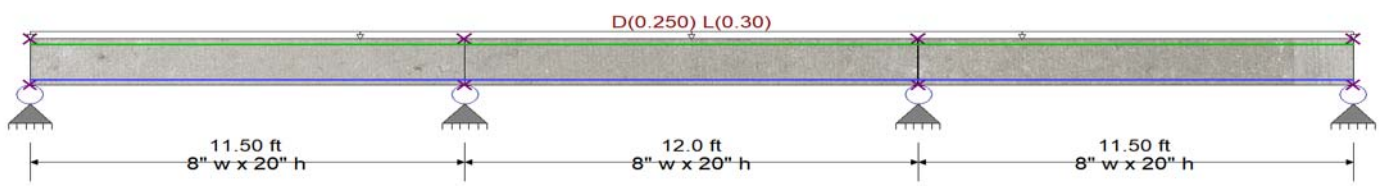
CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

General Information

f'c =	3.0 ksi	ϕ Phi Values	Flexure :	0.90
fr = $f'c^{1/2}$ * 7.50 =	410.792 psi		Shear :	0.750
ψ Density =	145.0 pcf	β_1 =		0.850
λ LtWt Factor =	1.0			
Elastic Modulus =	3,122.0 ksi	Fy - Stirrups		60.0 ksi
fy - Main Rebar =	60.0 ksi	E - Stirrups =		29,000.0 ksi
E - Main Rebar =	29,000.0 ksi	Stirrup Bar Size #		3
		Number of Resisting Legs Per Stirrup =		2





Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 20.0 in

Span #1 Reinforcing....
2-#5 at 2.50 in from Bottom, from 0.0 to 11.50 ft in this span 2-#5 at 2.50 in from Top, from 0.0 to 11.50 ft in this spa

Span #2 Reinforcing....
2-#5 at 2.50 in from Bottom, from 0.0 to 12.0 ft in this span 2-#5 at 2.50 in from Top, from 0.0 to 12.0 ft in this span

Span #3 Reinforcing....
2-#5 at 2.50 in from Bottom, from 0.0 to 11.50 ft in this span 2-#5 at 2.50 in from Top, from 0.0 to 11.50 ft in this spa

Loads on all spans...
D = 0.250, L = 0.30
Uniform Load on ALL spans : D = 0.250, L = 0.30 k/ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.231** : 1	
Section used for this span	**Typical Section**	
Mu : Applied	-10.738	k-ft
Mn * Phi : Allowable	46.436	k-ft
Location of maximum on span	0.000	ft
Span # where maximum occurs	Span # 3	

Maximum Deflection

Max Downward Transient Deflection	0.004 in	Ratio =	38317	>=360.0	L Only
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360.0	L Only
Max Downward Total Deflection	0.007 in	Ratio =	20900	>=180.0	Span: 3 : +D+L
Max Upward Total Deflection	0.000 in	Ratio =	0	<180.0	Span: 3 : +D+L

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4
Max Upward from all Load Conditions	2.504	7.121	7.121	2.504
Max Upward from Load Combinations	2.504	7.121	7.121	2.504
Max Upward from Load Cases	1.366	3.884	3.884	1.366

Concrete Beam

Project File: Structural calculations.ec6

LIC# : KW-06014285, Build:20.22.10.25 DIVERSIFIED STRUCTURAL DESIGN, INC.

DESCRIPTION: CONCRETE BEAM DESIGN RB-1 TO SUPPORT TRUSS AT NEW COVERED TERRACE

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4
D Only	1.138	3.237	3.237	1.138
+D+L	2.504	7.121	7.121	2.504
+D+0.750L	2.163	6.150	6.150	2.163
+0.60D	0.683	1.942	1.942	0.683
L Only	1.366	3.884	3.884	1.366

Shear Stirrup Requirements

Entire Beam Span Length : Vu < PhiVc/2, Req'd Vs = Not Reqd 9.6.3.1, use #3 stirrups spaced at 0.000 in

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	11.500	-10.32	46.44	0.22
Span # 2	2	12.000	-10.74	46.44	0.23
Span # 3	3	11.500	-10.74	46.44	0.23
+1.40D					
Span # 1	1	11.500	-4.63	46.44	0.10
Span # 2	2	12.000	-4.82	46.44	0.10
Span # 3	3	11.500	-4.82	46.44	0.10
+1.20D+1.60L					
Span # 1	1	11.500	-10.32	46.44	0.22
Span # 2	2	12.000	-10.74	46.44	0.23
Span # 3	3	11.500	-10.74	46.44	0.23
+1.20D+L					
Span # 1	1	11.500	-7.94	46.44	0.17
Span # 2	2	12.000	-8.26	46.44	0.18
Span # 3	3	11.500	-8.26	46.44	0.18
+1.20D					
Span # 1	1	11.500	-3.97	46.44	0.09
Span # 2	2	12.000	-4.13	46.44	0.09
Span # 3	3	11.500	-4.13	46.44	0.09
+0.90D					
Span # 1	1	11.500	-2.98	46.44	0.06
Span # 2	2	12.000	-3.10	46.44	0.07
Span # 3	3	11.500	-3.10	46.44	0.07

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L	1	0.0066	5.290	+D+L	-0.0001	11.740
+D+L	2	0.0013	6.000	+D+L	-0.0002	10.800
+D+L	3	0.0066	6.210		0.0000	10.800

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JOB ADDITION AND RENOVATION RESIDENCE

SHEET No. ______ JOB No. 22-22

CALCULATE BY AR DATE 08/12/2022

CHECKED BY ______ DATE ______

SCALE ______

CONCRETE BEAM DESIGN RB-2 TO SUPPORT TRUSS AT NEW BEDROOM SPAN 12.33 FT

$$\text{Rooftriblong} := \frac{29.67}{2} \cdot \text{ft} + 2.0 \cdot \text{ft}$$

LOADS AT ROOF

$\text{RoofDL} := 25 \cdot \text{psf} \cdot \text{Rooftriblong}$ $\qquad \text{RoofDL} = 420.9 \, \frac{\text{lb}}{\text{ft}}$

$\text{RoofLL} := 30 \cdot \text{psf} \cdot \text{Rooftriblong}$ $\qquad \text{RoofLL} = 505.1 \, \frac{\text{lb}}{\text{ft}}$

TOTAL LOADS

$\text{DL} := \text{RoofDL}$ $\qquad \text{LL} := \text{RoofLL}$

$\text{DL} = 420.9 \, \frac{\text{lb}}{\text{ft}}$ $\qquad \text{LL} = 505.1 \, \frac{\text{lb}}{\text{ft}}$

USE CONCRETE BEAM 8"x28" W/ 2#5 TOP AND BOTTOM, STIRRUPS #3@8" O.C. AND 2#5 INTERM.

Project Title:
Engineer:
Project ID:
Project Descr:

Concrete Beam

Project File: Structural calculations.ec6

LIC# : KW-06014285, Build:20.22.10.25 DIVERSIFIED STRUCTURAL DESIGN, INC. (c) ENERCALC INC 1983-2022

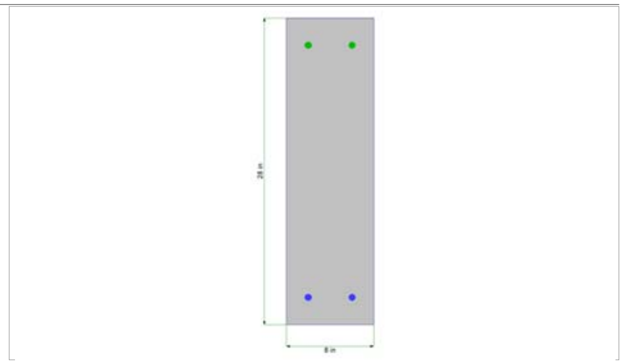
DESCRIPTION: CONCRETE BEAM DESIGN RB-2 TO SUPPORT TRUSS AT NEW BEDROOM SPAN 12.33 FT

CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

General Information

f'c	=	3.0 ksi	ϕ Phi Values	Flexure :	0.90
fr = $f'c^{1/2}$ * 7.50	=	410.792 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups		60.0 ksi
			E - Stirrups	=	29,000.0 ksi
fy - Main Rebar	=	60.0 ksi	Stirrup Bar Size #		3
E - Main Rebar	=	29,000.0 ksi			
			Number of Resisting Legs Per Stirrup	=	2



Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 28.0 in
Span #1 Reinforcing....
2-#5 at 2.50 in from Bottom, from 0.0 to 12.330 ft in this span 2-#5 at 2.50 in from Top, from 0.0 to 12.330 ft in this sp

Beam self weight calculated and added to loads
Loads on all spans...
D = 0.4210, L = 0.5060
Uniform Load on ALL spans : D = 0.4210, L = 0.5060 k/ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.438** : 1	
Section used for this span	**Typical Section**	
Mu : Applied	30.129	k-ft
Mn * Phi : Allowable	68.756	k-ft
Location of maximum on span	6.154	ft
Span # where maximum occurs	Span # 1	

Maximum Deflection

Max Downward Transient Deflection	0.006 in	Ratio =	25698	>=360.0	L Only
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360.0	L Only
Max Downward Total Deflection	0.013 in	Ratio =	11282	>=180.0	Span: 1 : +D+L
Max Upward Total Deflection	0.000 in	Ratio =	0	<180.0	Span: 1 : +D+L

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	7.106	7.106
Max Upward from Load Combinations	7.106	7.106
Max Upward from Load Cases	3.986	3.986
D Only	3.986	3.986
+D+L	7.106	7.106
+D+0.750L	6.326	6.326

Concrete Beam

Project File: Structural calculations.ec6

LIC# : KW-06014285, Build:20.22.10.25 DIVERSIFIED STRUCTURAL DESIGN, INC. (c) ENERCALC INC 1983-2022

DESCRIPTION: CONCRETE BEAM DESIGN RB-2 TO SUPPORT TRUSS AT NEW BEDROOM SPAN 12.33 FT

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
+0.60D	2.392	2.392
L Only	3.119	3.119

Shear Stirrup Requirements

Between 0.00 to 0.76 ft, PhiVc/2 < Vu <= PhiVc, Req'd Vs = Min 9.6.3.1, use #3 stirrups spaced at 12.000 in
Between 0.79 to 11.54 ft, Vu < PhiVc/2, Req'd Vs = Not Reqd 9.6.3.1, use #3 stirrups spaced at 0.000 in
Between 11.57 to 12.31 ft, PhiVc/2 < Vu <= PhiVc, Req'd Vs = Min 9.6.3.1, use #3 stirrups spaced at 12.000 in

Maximum Forces & Stresses for Load Combinations

Load Combination		Location (ft)	Bending Stress Results (k-ft)		
Segment	Span #	along Beam	Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	12.330	30.13	68.76	0.44
+1.40D					
Span # 1	1	12.330	17.20	68.76	0.25
+1.20D+1.60L					
Span # 1	1	12.330	30.13	68.76	0.44
+1.20D+L					
Span # 1	1	12.330	24.36	68.76	0.35
+1.20D					
Span # 1	1	12.330	14.74	68.76	0.21
+0.90D					
Span # 1	1	12.330	11.06	68.76	0.16

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L	1	0.0131	6.165		0.0000	0.000

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CONCRETE BEAM DESIGN RB-2 TO SUPPORT TRUSS AT NEW BEDROOM THREE SPAN 9.0, 11.17 AND 11.50 FT

$$\text{Rooftriblong} := \frac{29.67}{2}\cdot \text{ft} + 2.0\cdot \text{ft}$$

LOADS AT ROOF

$\text{RoofDL} := 25\cdot \text{psf}\cdot \text{Rooftriblong}$ $\quad\quad$ $\text{RoofDL} = 420.9\,\frac{\text{lb}}{\text{ft}}$

$\text{RoofLL} := 30\cdot \text{psf}\cdot \text{Rooftriblong}$ $\quad\quad$ $\text{RoofLL} = 505.1\,\frac{\text{lb}}{\text{ft}}$

TOTAL LOADS

$\text{DL} := \text{RoofDL}$ $\quad\quad$ $\text{LL} := \text{RoofLL}$

$\boxed{\text{DL} = 420.9\,\frac{\text{lb}}{\text{ft}}}$ $\quad\quad$ $\boxed{\text{LL} = 505.1\,\frac{\text{lb}}{\text{ft}}}$

USE CONCRETE BEAM 8"x28" W/ 2#5 TOP AND BOTTOM, STIRRUPS #3@8" O.C. AND 2#5 INTERM.

Concrete Beam

Project File: Structural calculations.ec6

LIC# : KW-06014285, Build:20.22.10.25 DIVERSIFIED STRUCTURAL DESIGN, INC. (c) ENERCALC INC 1983-2022

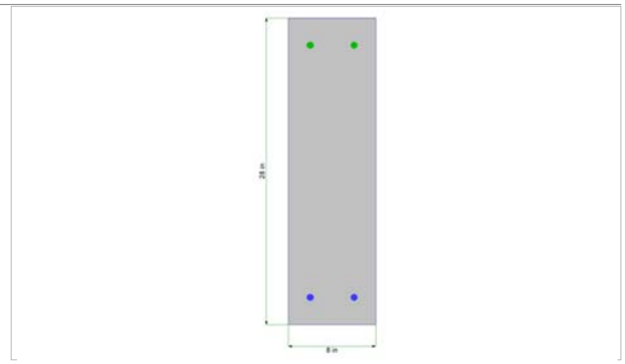
DESCRIPTION: CONCRETE BEAM DESIGN RB-2 TO SUPPORT TRUSS AT NEW BEDROOM THREE SPAN 9.0, 11.17

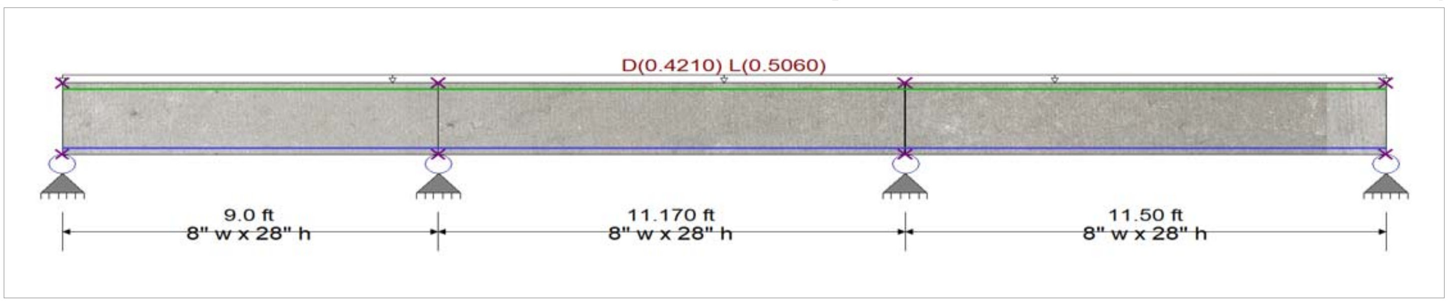
CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

General Information

f'c =	3.0 ksi	ϕ Phi Values	Flexure :	0.90	
fr = $f'c^{1/2}$ * 7.50 =	410.792 psi		Shear :	0.750	
ψ Density =	145.0 pcf	β_1 =		0.850	
λ LtWt Factor =	1.0				
Elastic Modulus =	3,122.0 ksi	Fy - Stirrups		60.0 ksi	
fy - Main Rebar =	60.0 ksi	E - Stirrups =		29,000.0 ksi	
E - Main Rebar =	29,000.0 ksi	Stirrup Bar Size #		3	
		Number of Resisting Legs Per Stirrup =		2	





Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 28.0 in

Span #1 Reinforcing....
2-#5 at 2.50 in from Bottom, from 0.0 to 9.0 ft in this span 2-#5 at 2.50 in from Top, from 0.0 to 9.0 ft in this span

Span #2 Reinforcing....
2-#5 at 2.50 in from Bottom, from 0.0 to 11.170 ft in this span 2-#5 at 2.50 in from Top, from 0.0 to 11.170 ft in this sp

Span #3 Reinforcing....
2-#5 at 2.50 in from Bottom, from 0.0 to 11.50 ft in this span 2-#5 at 2.50 in from Top, from 0.0 to 11.50 ft in this spa

Beam self weight calculated and added to loads
Loads on all spans...
D = 0.4210, L = 0.5060
Uniform Load on ALL spans : D = 0.4210, L = 0.5060 k/ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.317** : 1	
Section used for this span	**Typical Section**	
Mu : Applied	-21.830 k-ft	
Mn * Phi : Allowable	68.756 k-ft	
Location of maximum on span	0.000 ft	
Span # where maximum occurs	Span # 3	

Maximum Deflection

Max Downward Transient Deflection	0.002 in	Ratio =	62349	>=360.0	L Only
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360.0	L Only
Max Downward Total Deflection	0.005 in	Ratio =	27372	>=180.0	Span: 3 : +D+L
Max Upward Total Deflection	0.000 in	Ratio =	0	<180.0	Span: 3 : +D+L

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4
Max Upward from all Load Conditions	3.990	12.363	14.901	5.247
Max Upward from Load Combinations	3.990	12.363	14.901	5.247

3.8

Concrete Beam

Project File: Structural calculations.ec6

DESCRIPTION: CONCRETE BEAM DESIGN RB-2 TO SUPPORT TRUSS AT NEW BEDROOM THREE SPAN 9.0, 11.17

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4
Max Upward from Load Cases	2.238	6.935	8.359	2.944
D Only	2.238	6.935	8.359	2.944
+D+L	3.990	12.363	14.901	5.247
+D+0.750L	3.552	11.006	13.265	4.671
+0.60D	1.343	4.161	5.015	1.766
L Only	1.752	5.428	6.542	2.304

Shear Stirrup Requirements

Between 0.00 to 8.82 ft, Vu < PhiVc/2, Req'd Vs = Not Reqd 9.6.3.1, use #3 stirrups spaced at 0.000 in
Between 8.88 to 8.94 ft, PhiVc/2 < Vu <= PhiVc, Req'd Vs = Min 9.6.3.1, use #3 stirrups spaced at 12.000 in
Between 9.00 to 19.57 ft, Vu < PhiVc/2, Req'd Vs = Not Reqd 9.6.3.1, use #3 stirrups spaced at 0.000 in
Between 19.65 to 21.70 ft, PhiVc/2 < Vu <= PhiVc, Req'd Vs = Min 9.6.3.1, use #3 stirrups spaced at 12.000 in
Between 21.78 to 31.59 ft, Vu < PhiVc/2, Req'd Vs = Not Reqd 9.6.3.1, use #3 stirrups spaced at 0.000 in

Maximum Forces & Stresses for Load Combinations

Load Combination		Location (ft)	Bending Stress Results (k-ft)		
Segment	Span #	along Beam	Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	9.000	-14.29	68.76	0.21
Span # 2	2	11.170	-21.13	68.76	0.31
Span # 3	3	11.500	-21.83	68.76	0.32
+1.40D					
Span # 1	1	9.000	-8.16	68.76	0.12
Span # 2	2	11.170	-12.06	68.76	0.18
Span # 3	3	11.500	-12.46	68.76	0.18
+1.20D+1.60L					
Span # 1	1	9.000	-14.29	68.76	0.21
Span # 2	2	11.170	-21.13	68.76	0.31
Span # 3	3	11.500	-21.83	68.76	0.32
+1.20D+L					
Span # 1	1	9.000	-11.55	68.76	0.17
Span # 2	2	11.170	-17.08	68.76	0.25
Span # 3	3	11.500	-17.65	68.76	0.26
+1.20D					
Span # 1	1	9.000	-6.99	68.76	0.10
Span # 2	2	11.170	-10.34	68.76	0.15
Span # 3	3	11.500	-10.68	68.76	0.16
+0.90D					
Span # 1	1	9.000	-5.24	68.76	0.08
Span # 2	2	11.170	-7.75	68.76	0.11
Span # 3	3	11.500	-8.01	68.76	0.12

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L	1	0.0017	3.780	+D+L	-0.0000	9.223
+D+L	2	0.0010	5.138	+D+L	-0.0002	10.053
+D+L	3	0.0050	6.210		0.0000	10.053

DSD
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JOB ADDITION AND RENOVATION RESIDENCE

SHEET No. JOB No. 22-22

CALCULATE BY AR DATE 08/12/2022

CHECKED BY DATE

SCALE

CONCRETE BEAM DESIGN RB-2 TO SUPPORT TRUSS AT NEW GREAT ROOM THREE SPAN 11.67, 11.42 AND 11.67 FT

$$\text{Rooftriblong} := \frac{34.0}{2}\cdot\text{ft} + 2.0\cdot\text{ft}$$

LOADS AT ROOF

$\text{RoofDL} := 25\cdot\text{psf}\cdot\text{Rooftriblong}$ $\text{RoofDL} = 475\,\frac{\text{lb}}{\text{ft}}$

$\text{RoofLL} := 30\cdot\text{psf}\cdot\text{Rooftriblong}$ $\text{RoofLL} = 570\,\frac{\text{lb}}{\text{ft}}$

TOTAL LOADS

$\text{DL} := \text{RoofDL}$ $\text{LL} := \text{RoofLL}$

$\text{DL} = 475\,\frac{\text{lb}}{\text{ft}}$ $\text{LL} = 570\,\frac{\text{lb}}{\text{ft}}$

USE CONCRETE BEAM 8"x28" W/ 2#5 TOP AND BOTTOM, STIRRUPS #3@8" O.C. AND 2#5 INTERM.

Concrete Beam

Project File: Structural calculations.ec6

LIC# : KW-06014285, Build:20.22.10.25 DIVERSIFIED STRUCTURAL DESIGN, INC. (c) ENERCALC INC 1983-2022

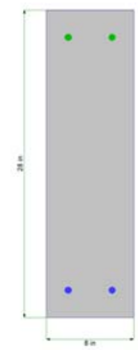
DESCRIPTION: CONCRETE BEAM DESIGN RB-2 TO SUPPORT TRUSS AT NEW GREAT ROOM THREE SPAN 11.67,

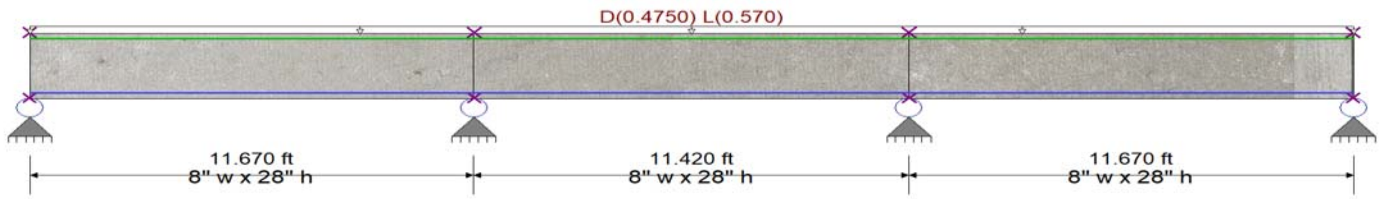
CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

General Information

f'c =	3.0 ksi	ϕ Phi Values	Flexure :	0.90	
fr = $f'c^{1/2} * 7.50$ =	410.792 psi		Shear :	0.750	
ψ Density =	145.0 pcf	β_1	=	0.850	
λ LtWt Factor =	1.0				
Elastic Modulus =	3,122.0 ksi	Fy - Stirrups		60.0 ksi	
fy - Main Rebar =	60.0 ksi	E - Stirrups	=	29,000.0 ksi	
E - Main Rebar =	29,000.0 ksi	Stirrup Bar Size #		3	
		Number of Resisting Legs Per Stirrup =		2	





Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 28.0 in
Span #1 Reinforcing....
2-#5 at 2.50 in from Bottom, from 0.0 to 11.670 ft in this span 2-#5 at 2.50 in from Top, from 0.0 to 11.670 ft in this sp
Span #2 Reinforcing....
2-#5 at 2.50 in from Bottom, from 0.0 to 11.420 ft in this span 2-#5 at 2.50 in from Top, from 0.0 to 11.420 ft in this sp
Span #3 Reinforcing....
2-#5 at 2.50 in from Bottom, from 0.0 to 11.670 ft in this span 2-#5 at 2.50 in from Top, from 0.0 to 11.670 ft in this sp

Beam self weight calculated and added to loads
Loads on all spans...
D = 0.4750, L = 0.570
Uniform Load on ALL spans : D = 0.4750, L = 0.570 k/ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.341** : 1	
Section used for this span	**Typical Section**	
Mu : Applied	-23.420	k-ft
Mn * Phi : Allowable	68.756	k-ft
Location of maximum on span	0.000	ft
Span # where maximum occurs	Span # 2	

Maximum Deflection

Max Downward Transient Deflection	0.003 in	Ratio =	50216	>=360.0	L Only
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360.0	L Only
Max Downward Total Deflection	0.006 in	Ratio =	22528	>=180.0	Span: 3 : +D+L
Max Upward Total Deflection	0.000 in	Ratio =	0	<180.0	Span: 3 : +D+L

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4
Max Upward from all Load Conditions	5.959	16.123	16.123	5.959
Max Upward from Load Combinations	5.959	16.123	16.123	5.959

3.11

Concrete Beam

Project File: Structural calculations.ec6

LIC# : KW-06014285, Build:20.22.10.25 DIVERSIFIED STRUCTURAL DESIGN, INC. (c) ENERCALC INC 1983-2022

DESCRIPTION: CONCRETE BEAM DESIGN RB-2 TO SUPPORT TRUSS AT NEW GREAT ROOM THREE SPAN 11.67,

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4
Max Upward from Load Cases	3.286	8.890	8.890	3.286
D Only	3.286	8.890	8.890	3.286
+D+L	5.959	16.123	16.123	5.959
+D+0.750L	5.291	14.315	14.315	5.291
+0.60D	1.971	5.334	5.334	1.971
L Only	2.673	7.233	7.233	2.673

Shear Stirrup Requirements

Between 0.00 to 9.49 ft, Vu < PhiVc/2, Req'd Vs = Not Reqd 9.6.3.1, use #3 stirrups spaced at 0.000 in
Between 9.57 to 12.43 ft, PhiVc/2 < Vu <= PhiVc, Req'd Vs = Min 9.6.3.1, use #3 stirrups spaced at 12.000 in
Between 12.51 to 22.25 ft, Vu < PhiVc/2, Req'd Vs = Not Reqd 9.6.3.1, use #3 stirrups spaced at 0.000 in
Between 22.33 to 25.19 ft, PhiVc/2 < Vu <= PhiVc, Req'd Vs = Min 9.6.3.1, use #3 stirrups spaced at 12.000 in
Between 25.27 to 34.68 ft, Vu < PhiVc/2, Req'd Vs = Not Reqd 9.6.3.1, use #3 stirrups spaced at 0.000 in

Maximum Forces & Stresses for Load Combinations

Load Combination		Location (ft)	Bending Stress Results (k-ft)		
Segment	Span #	along Beam	Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	11.670	-22.47	68.76	0.33
Span # 2	2	11.420	-23.42	68.76	0.34
Span # 3	3	11.670	-23.42	68.76	0.34
+1.40D					
Span # 1	1	11.670	-12.58	68.76	0.18
Span # 2	2	11.420	-13.11	68.76	0.19
Span # 3	3	11.670	-13.11	68.76	0.19
+1.20D+1.60L					
Span # 1	1	11.670	-22.47	68.76	0.33
Span # 2	2	11.420	-23.42	68.76	0.34
Span # 3	3	11.670	-23.42	68.76	0.34
+1.20D+L					
Span # 1	1	11.670	-18.09	68.76	0.26
Span # 2	2	11.420	-18.85	68.76	0.27
Span # 3	3	11.670	-18.85	68.76	0.27
+1.20D					
Span # 1	1	11.670	-10.78	68.76	0.16
Span # 2	2	11.420	-11.23	68.76	0.16
Span # 3	3	11.670	-11.23	68.76	0.16
+0.90D					
Span # 1	1	11.670	-8.08	68.76	0.12
Span # 2	2	11.420	-8.42	68.76	0.12
Span # 3	3	11.670	-8.42	68.76	0.12

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L	1	0.0062	5.368	+D+L	-0.0001	11.898
+D+L	2	0.0002	11.653	+D+L	-0.0004	1.599
+D+L	3	0.0062	6.302		0.0000	1.599

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JOB	ADDITION AND RENOVATION RESIDENCE		
SHEET No.		JOB No.	22-22
CALCULATE BY	AR	DATE	08/12/2022
CHECKED BY		DATE	
SCALE			

CONCRETE BEAM DESIGN RB-4 TO SUPPORT TRUSS AT NEW GUEST HOUSE

$Rooftriblong := \frac{26.0}{2} \cdot ft$

LOADS AT ROOF

$RoofDL := 25 \cdot psf \cdot Rooftriblong$ $\quad RoofDL = 325 \frac{lb}{ft}$

$RoofLL := 30 \cdot psf \cdot Rooftriblong$ $\quad RoofLL = 390 \frac{lb}{ft}$

TOTAL LOADS

$DL := RoofDL$ $\quad LL := RoofLL$

$\boxed{DL = 325 \frac{lb}{ft}}$ $\quad \boxed{LL = 390 \frac{lb}{ft}}$

USE CONCRETE BEAM 8"x28" W/ 2#5 TOP AND BOTTOM, STIRRUPS #3@8" O.C. AND 2#5 INTERM.

Project Title:
Engineer:
Project ID:
Project Descr:

Concrete Beam

Project File: Structural calculations.ec6

LIC# : KW-06014285, Build:20.22.10.25 DIVERSIFIED STRUCTURAL DESIGN, INC. (c) ENERCALC INC 1983-2022

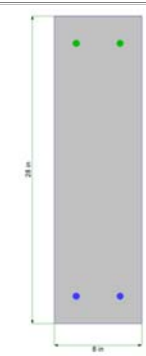
DESCRIPTION: CONCRETE BEAM DESIGN RB-4 TO SUPPORT TRUSS AT NEW GUEST HOUSE

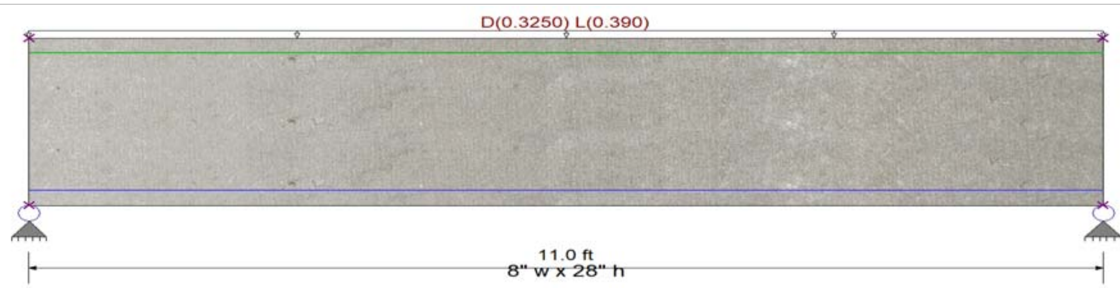
CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

General Information

f'c =	3.0 ksi	ϕ Phi Values	Flexure :	0.90
fr = $f'c^{1/2}$ * 7.50 =	410.792 psi		Shear :	0.750
ψ Density =	145.0 pcf	β_1	=	0.850
λ LtWt Factor =	1.0			
Elastic Modulus =	3,122.0 ksi	Fy - Stirrups		60.0 ksi
fy - Main Rebar =	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar =	29,000.0 ksi	Stirrup Bar Size #		3
		Number of Resisting Legs Per Stirrup =		2





Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 28.0 in
Span #1 Reinforcing....
2-#5 at 2.50 in from Bottom, from 0.0 to 11.0 ft in this span 2-#5 at 2.50 in from Top, from 0.0 to 11.0 ft in this span

Beam self weight calculated and added to loads
Loads on all spans...
D = 0.3250, L = 0.390
Uniform Load on ALL spans : D = 0.3250, L = 0.390 k/ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.283** : 1	
Section used for this span	**Typical Section**	
Mu : Applied	19.431	k-ft
Mn * Phi : Allowable	68.756	k-ft
Location of maximum on span	5.490	ft
Span # where maximum occurs	Span # 1	

Maximum Deflection

Max Downward Transient Deflection	0.003 in	Ratio =	46958	>=360.0	L Only
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360.0	L Only
Max Downward Total Deflection	0.007 in	Ratio =	19471	>=180.0	Span: 1 : +D+L
Max Upward Total Deflection	0.000 in	Ratio =	0	<180.0	Span: 1 : +D+L

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	5.173	5.173
Max Upward from Load Combinations	5.173	5.173
Max Upward from Load Cases	3.028	3.028
D Only	3.028	3.028
+D+L	5.173	5.173
+D+0.750L	4.637	4.637

Concrete Beam

Project File: Structural calculations.ec6

LIC# : KW-06014285, Build:20.22.10.25 DIVERSIFIED STRUCTURAL DESIGN, INC. (c) ENERCALC INC 1983-2022

DESCRIPTION: CONCRETE BEAM DESIGN RB-4 TO SUPPORT TRUSS AT NEW GUEST HOUSE

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
+0.60D	1.817	1.817
L Only	2.145	2.145

Shear Stirrup Requirements

Entire Beam Span Length : Vu < PhiVc/2, Req'd Vs = Not Reqd 9.6.3.1, use #3 stirrups spaced at 0.000 in

Maximum Forces & Stresses for Load Combinations

Load Combination		Location (ft)	Bending Stress Results (k-ft)		
Segment	Span #	along Beam	Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	11.000	19.43	68.76	0.28
+1.40D					
Span # 1	1	11.000	11.66	68.76	0.17
+1.20D+1.60L					
Span # 1	1	11.000	19.43	68.76	0.28
+1.20D+L					
Span # 1	1	11.000	15.89	68.76	0.23
+1.20D					
Span # 1	1	11.000	9.99	68.76	0.15
+0.90D					
Span # 1	1	11.000	7.49	68.76	0.11

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L	1	0.0068	5.500		0.0000	0.000

MASONRY & PRECAST LINTEL DESIGN

MecaWind v2405

Calculations Prepared by:

```
True
Address
0
0
City, State, 0
Date: Aug 17, 2022
Designer: 0
```

Calculations Prepared For:

```
Client:     0
Project #:  0
Location:   0
```

```
File Location : X:\DWG\Year-2022\22-22\Calculations\Masonry\wind pressure at wall.wnd
```

Basic Wind Parameters

```
Wind Load Standard          = ASCE 7-16  Exposure Category             = C
Wind Design Speed           = 175.0 mph  Risk Category                 = II
Structure Type              = Building   Building Type                 = Enclosed
```

General Wind Settings

```
Incl_LF   = Include ASD Load Factor of 0.6 in Pressures                = True
DynType   = Dynamic Type of Structure                                  = Rigid
Zg        = Altitude (Ground Elevation) above Sea Level                = 0.000 ft
Bdist     = Base Elevation of Structure                                = 0.000 ft
SDB       = Simple Diaphragm Building                                  = False
Reacs     = Show the Base Reactions in the output                      = False
MWFRSType = MWFRS Method Selected                                      = Ch 27 Pt 1
```

Topographic Factor per Fig 26.8-1

```
Topo      = Topographic Feature                                        = None
Kzt       = Topographic Factor                                         = 1.000
```

Building Inputs

```
RoofType: Building Roof Type      = Gabled     W      : Width Perp to Ridge     = 60.000 ft
L       : Length Along Ridge      = 120.000 ft EHt    : Eave Height             = 10.330 ft
RE      : Roof Entry Method       = Slope      Slope  : Slope of Roof           = 4.0 :12
Theta   : Roof Slope              = 18.43 Deg  Par    : Is there a Parapet      = False
```

Exposure Constants per Table 26.11-1:

```
Alpha: Table 26.11-1 Const        = 9.500      Zg:    Table 26.11-1 Const       = 900.000 ft
At:    Table 26.11-1 Const        = 0.105      Bt:    Table 26.11-1 Const       = 1.000
Am:    Table 26.11-1 Const        = 0.154      Bm:    Table 26.11-1 Const       = 0.650
C:     Table 26.11-1 Const        = 0.200      Eps:   Table 26.11-1 Const       = 0.200
```

Overhang Inputs:

```
Std       = Overhangs on all sides are the same                        = True
OHType    = Type of Roof Wall Intersections                            = Overhang
OH        = Overhang of Roof Beyond Wall                               = 2.000 ft
```

Main Wind Force Resisting System (MWFRS) Calculations per Ch 27 Part 1:

```
h         = Mean Roof Height above grade                               = 15.330 ft
Kh        = 15 ft [4.572 m]< Z <Zg -->(2.01*(Z/zg)^(2/Alpha) {Table 26.10-1}= 0.853
Kzt       = Topographic Factor is 1 since no Topographic feature specified  = 1.000
```

Kd = Wind Directionality Factor per Table 26.6-1 = 0.85
Zg = Elevation above Sea Level = 0.000 ft
Ke = Ground Elevation Factor: Ke = e^-(0.0000362*Zg) {Table 26.9-1} = 1.000
GCPi = Ref Table 26.13-1 for Enclosed Building = +/-0.18
RA = Roof Area = 8365.28 sq ft
LF = Load Factor based upon ASD Design = 0.60
qh = (0.00256 * Kh * Kzt * Kd * Ke * V^2) * LF = 34.10 psf
qin = For Negative Internal Pressure of Enclosed Building use qh*LF = 34.10 psf
qip = For Positive Internal Pressure of Enclosed Building use qh*LF = 34.10 psf

Gust Factor Calculation:

Gust Factor Category I Rigid Structures - Simplified Method
G1 = For Rigid Structures (Nat. Freq.>1 Hz) use 0.85 = 0.85
Gust Factor Category II Rigid Structures - Complete Analysis
Zm = Max(0.6 * Ht, Zmin) = 15.000 ft
Izm = Cc * (33 / Zm) ^ 0.167 = 0.228
Lzm = L * (Zm / 33) ^ Eps = 427.057
B = Structure Width Normal to Wind = 120.000 ft
Q = (1 / (1 + 0.63 * ((B + Ht) / Lzm)^0.63))^0.5 = 0.875
G2 = 0.925*((1+0.7*Izm*3.4*Q)/(1+0.7*3.4*Izm)) = 0.859
Gust Factor Used in Analysis
G = Lessor Of G1 Or G2 = 0.850

MWFRS Wind Normal to Ridge (Ref Fig 27.3-1}

h = Mean Roof Height Of Building = 15.330 ft
RHt = Ridge Height Of Roof = 20.330 ft
B = Horizontal Dimension Of Building Normal To Wind Direction = 120.000 ft
L = Horizontal Dimension Of building Parallel To Wind Direction = 60.000 ft
L/B = Ratio Of L/B used For Cp determination = 0.500
h/L = Ratio Of h/L used For Cp determination = 0.255
Slope = Slope of Roof = 18.43 Deg
OH_Bot_-Y = Overhang Coefficient Bottom Surface (Windward Only) = 0.8, 0.8
OH_Top_+X+Y= Overhang Coefficient Overhang +X+Y (Leeward) = -0.57, -0.57
OH_Top_+X-Y= Overhang Coefficient Overhang +X-Y (Windward) = 0.13, -0.37
OH_Top_+Y = Overhang Coefficient Top +Y (Leeward) = -0.57, -0.57
OH_Top_-X+Y= Overhang Coefficient Overhang -X+Y (Leeward) = -0.57, -0.57
OH_Top_-X-Y= Overhang Coefficient Overhang -X-Y (Windward) = 0.13, -0.37
OH_Top_-Y = Overhang Coefficient Top Windward Edge = 0.13, -0.37
Roof_LW = Roof Coefficient (Leeward) = -0.57, -0.57
Roof_WW = Roof Coefficient (Windward) = 0.13, -0.37

Cp_WW = Windward Wall Coefficient (All L/B Values) = 0.80
Cp_LW = Leward Wall Coefficient using L/B = -0.50
Cp_SW = Side Wall Coefficient (All L/B values) = -0.70
GCpn_WW = Parapet Combined Net Pressure Coefficient (Windward Parapet) = 1.50
GCpn_LW = Parapet Combined Net Pressure Coefficient (Leeward Parapet) = -1.00

Wall Wind Pressures based On Positive Internal Pressure (+GCPi) - Normal to Ridge
All wind pressures include a load factor of 0.6

Elev ft	Kz	Kzt	qz psf	GCPi	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
10.33	0.849	1.000	33.94	0.18	16.94	-20.63	-26.43	37.57	9.60

Wall Wind Pressures based on Negative Internal Pressure (-GCPi) - Normal to Ridge
All wind pressures include a load factor of 0.6

Elev ft	Kz	Kzt	qz psf	GCPi	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
10.33	0.849	1.000	33.94	-0.18	29.22	-8.35	-14.15	37.57	9.60

Notes Wall Pressures:
Kz = Velocity Press Exp Coeff   Kzt = Topographical Factor
qz = 0.00256*Kz*Kzt*Kd*V^2   GCPi = Internal Press Coefficient
Side = qh * G * Cp_SW - qip * +GCPi   Windward = qz * G * Cp_WW - qip * +GCPi
Leeward = qh * G * Cp_LW - qip * +GCPi   Total = Windward Press - Leeward Press
* Minimum Pressure: Para 27.1.5 no less than 9.60 psf (Incl LF) applied to Walls
+ Pressures Acting TOWARD Surface   - Pressures Acting AWAY from Surface

Roof Wind Pressures for Positive & Negative Internal Pressure (+/- GCPi) - Normal to Ridge
All wind pressures include a load factor of 0.6

Roof Var	Start Dist	End Dist	Cp_min	Cp_max	GCPi	Pressure Pn_min*	Pressure Pp_min*	Pressure Pn_max	Pressure Pp_max

	ft	ft				psf	psf	psf	psf
OH_Bot_-Y	N/A	N/A	0.800	0.800	0.000	23.19	23.19	23.19	23.19
OH_Top_+X+Y	N/A	N/A	-0.570	-0.570	0.000	-16.52	-16.52	-16.52	-16.52
OH_Top_+X-Y	N/A	N/A	0.130	-0.370	0.000	3.77	3.77	-10.72	-10.72
OH_Top_+Y	N/A	N/A	-0.570	-0.570	0.000	-16.52	-16.52	-16.52	-16.52
OH_Top_-X+Y	N/A	N/A	-0.570	-0.570	0.000	-16.52	-16.52	-16.52	-16.52
OH_Top_-X-Y	N/A	N/A	0.130	-0.370	0.000	3.77	3.77	-10.72	-10.72
OH_Top_-Y	N/A	N/A	0.130	-0.370	0.000	3.77	3.77	-10.72	-10.72
Roof_LW	N/A	N/A	-0.570	-0.570	0.180	-10.38	-22.66	-10.38	-22.66
Roof_WW	N/A	N/A	0.130	-0.370	0.180	9.91	-2.37	-4.59	-16.86

Notes Roof Pressures:
Start Dist = Start Dist from Windward Edge   End Dist = End Dist from Windward Edge
Cp_Max = Largest Coefficient Magnitude   Cp_Min = Smallest Coefficient Magnitude
Pp_max = qh*G*Cp_max - qip*(+GCPi)   Pn_max = qh*G*Cp_max - qin*(-GCPi)
Pp_min* = qh*G*Cp_min - qip*(+GCPi)   Pn_min* = qh*G*Cp_min - qin*(-GCPi)
OH = Overhang   X = Dir along Ridge   Y = Dir Perpendcular to Ridge   Z = Vertical
* The smaller uplift pressures due to Cp_Min can become critical when wind is combined with roof live load or snow load; load combinations are given in ASCE 7
+ Pressures Acting TOWARD Surface   - Pressures Acting AWAY from Surface

MWFRS Wind Parallel to Ridge (Ref Fig 27.3-1)

h	= Mean Roof Height Of Building	= 15.330 ft
RHt	= Ridge Height Of Roof	= 20.330 ft
B	= Horizontal Dimension Of Building Normal To Wind Direction	= 60.000 ft
L	= Horizontal Dimension Of building Parallel To Wind Direction	= 120.000 ft
L/B	= Ratio Of L/B used For Cp determination	= 2.000
h/L	= Ratio Of h/L used For Cp determination	= 0.128
Slope	= Slope of Roof	= 18.43 Deg
OH_Bot	= Overhang Bottom (Windward Face Only)	= 0.8, 0.8
OH_Top	= Overhang Top Coeff (0 to h/2) (0.000 ft to 2.000 ft)	= -0.18, -0.9
OH_Top	= Overhang Top Coeff (0 to h/2) (2.000 ft to 7.665 ft)	= -0.18, -0.9
OH_Top	= Overhang Top Coeff (h/2 to h) (7.665 ft to 15.330 ft)	= -0.18, -0.9
OH_Top	= Overhang Top Coeff (h to 2h) (15.330 ft to 30.660 ft)	= -0.18, -0.5
OH_Top	= Overhang Top Coeff (>2h) (>30.660 ft)	= -0.18, -0.3
OH_Top	= Overhang Top Coeff (>2h) (>122.000 ft)	= -0.18, -0.3
Roof	= Roof Coeff (0 to h/2) (2.000 ft to 7.665 ft)	= -0.18, -0.9
Roof	= Roof Coeff (h/2 to h) (7.665 ft to 15.330 ft)	= -0.18, -0.9
Roof	= Roof Coeff (h to 2h) (15.330 ft to 30.660 ft)	= -0.18, -0.5
Roof	= Roof Coeff (>2h) (>30.660 ft)	= -0.18, -0.3

Cp_WW	= Windward Wall Coefficient (All L/B Values)	= 0.80
Cp_LW	= Leward Wall Coefficient using L/B	= -0.30
Cp_SW	= Side Wall Coefficient (All L/B values)	= -0.70
GCpn_WW	= Parapet Combined Net Pressure Coefficient (Windward Parapet)	= 1.50
GCpn_LW	= Parapet Combined Net Pressure Coefficient (Leeward Parapet)	= -1.00

Wall Wind Pressures based On Positive Internal Pressure (+GCPi) - Parallel to Ridge
All wind pressures include a load factor of 0.6

Elev ft	Kz	Kzt	qz psf	GCPi	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
20.33	0.905	1.000	36.19	0.18	18.47	-14.83	-26.43	33.30	9.60
15.33	0.853	1.000	34.10	0.18	17.05	-14.83	-26.43	31.88	9.60
10.33	0.849	1.000	33.94	0.18	16.94	-14.83	-26.43	31.78	9.60

Wall Wind Pressures based on Negative Internal Pressure (-GCPi) - Parallel to Ridge
All wind pressures include a load factor of 0.6

Elev ft	Kz	Kzt	qz psf	GCPi	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
20.33	0.905	1.000	36.19	-0.18	30.74	-2.56	-14.15	33.30	9.60
15.33	0.853	1.000	34.10	-0.18	29.32	-2.56	-14.15	31.88	9.60
10.33	0.849	1.000	33.94	-0.18	29.22	-2.56	-14.15	31.78	9.60

Notes Wall Pressures:
Kz = Velocity Press Exp Coeff   Kzt = Topographical Factor
qz = 0.00256*Kz*Kzt*Kd*V^2   GCPi = Internal Press Coefficient
Side = qh * G * Cp_SW - qip * +GCPi   Windward = qz * G * Cp_WW - qip * +GCPi
Leeward = qh * G * Cp_LW - qip * +GCPi   Total = Windward Press - Leeward Press
* Minimum Pressure: Para 27.1.5 no less than 9.60 psf (Incl LF) applied to Walls
+ Pressures Acting TOWARD Surface   - Pressures Acting AWAY from Surface

Roof Wind Pressures for Positive & Negative Internal Pressure (+/- GCPi) - Parallel to Ridge
All wind pressures include a load factor of 0.6

Roof Var	Start Dist ft	End Dist ft	Cp_min	Cp_max	GCPi	Pressure Pn_min* psf	Pressure Pp_min* psf	Pressure Pn_max psf	Pressure Pp_max psf
OH_Bot	N/A	N/A	0.800	0.800	0.000	23.19	23.19	23.19	23.19
OH_Bot	N/A	N/A	0.800	0.800	0.000	23.19	23.19	23.19	23.19
OH_Top (-X+Y)	0.000	2.000	-0.180	-0.900	0.000	-5.22	-5.22	-26.08	-26.08
OH_Top (-X-Y)	0.000	2.000	-0.180	-0.900	0.000	-5.22	-5.22	-26.08	-26.08
OH_Top (-Y)	2.000	7.665	-0.180	-0.900	0.000	-5.22	-5.22	-26.08	-26.08
OH_Top (+Y)	2.000	7.665	-0.180	-0.900	0.000	-5.22	-5.22	-26.08	-26.08
OH_Top (-Y)	7.665	15.330	-0.180	-0.900	0.000	-5.22	-5.22	-26.08	-26.08
OH_Top (+Y)	7.665	15.330	-0.180	-0.900	0.000	-5.22	-5.22	-26.08	-26.08
OH_Top (-Y)	15.330	30.660	-0.180	-0.500	0.000	-5.22	-5.22	-14.49	-14.49
OH_Top (+Y)	15.330	30.660	-0.180	-0.500	0.000	-5.22	-5.22	-14.49	-14.49
OH_Top (-Y)	30.660	122.000	-0.180	-0.300	0.000	-5.22	-5.22	-8.69	-8.69
OH_Top (+Y)	30.660	122.000	-0.180	-0.300	0.000	-5.22	-5.22	-8.69	-8.69
OH_Top (+X+Y)	122.000	124.000	-0.180	-0.300	0.000	-5.22	-5.22	-8.69	-8.69
OH_Top (+X-Y)	122.000	124.000	-0.180	-0.300	0.000	-5.22	-5.22	-8.69	-8.69
Roof (+Y)	2.000	7.665	-0.180	-0.900	0.180	0.92	-11.35	-19.95	-32.22
Roof (-Y)	2.000	7.665	-0.180	-0.900	0.180	0.92	-11.35	-19.95	-32.22
Roof (+Y)	7.665	15.330	-0.180	-0.900	0.180	0.92	-11.35	-19.95	-32.22
Roof (-Y)	7.665	15.330	-0.180	-0.900	0.180	0.92	-11.35	-19.95	-32.22
Roof (+Y)	15.330	30.660	-0.180	-0.500	0.180	0.92	-11.35	-8.35	-20.63
Roof (-Y)	15.330	30.660	-0.180	-0.500	0.180	0.92	-11.35	-8.35	-20.63
Roof (+Y)	30.660	122.000	-0.180	-0.300	0.180	0.92	-11.35	-2.56	-14.83
Roof (-Y)	30.660	122.000	-0.180	-0.300	0.180	0.92	-11.35	-2.56	-14.83

```
Notes Roof Pressures:
Start Dist = Start Dist from Windward Edge  End Dist = End Dist from Windward Edge
Cp_Max     = Largest Coefficient Magnitude  Cp_Min   = Smallest Coefficient Magnitude
Pp_max     = qh*G*Cp_max - qip*(+GCPi)      Pn_max   = qh*G*Cp_max - qin*(-GCpi)
Pp_min*    = qh*G*Cp_min - qip*(+GCPi)      Pn_min*  = qh*G*Cp_min - qin*(-GCPi)
OH = Overhang   X = Dir along Ridge   Y = Dir Perpendcular to Ridge  Z = Vertical
* The smaller uplift pressures due to Cp_Min can become critical when wind is combined
  with roof live load or snow load;  load combinations are given in ASCE 7
+ Pressures Acting TOWARD Surface          - Pressures Acting AWAY from Surface
```

Components and Cladding (C&C) Calculations per Ch 30 Part 1:

```
h/W       = Ratio of mean roof height to building width                   = 0.255
h/L       = Ratio of mean roof height to building length                  = 0.128
h         = Mean Roof Height above grade                                  = 15.330 ft
Kh        = 15 ft [4.572 m]< Z <Zg -->(2.01*(Z/zg)^(2/Alpha) {Table 26.10-1}= 0.853
Kzt       = Topographic Factor is 1 since no Topographic feature specified  = 1.000
Kd        = Wind Directionality Factor per Table 26.6-1                   = 0.85
GCPi      = Ref Table 26.13-1 for Enclosed Building                       = +/-0.18
LF        = Load Factor based upon ASD Design                             = 0.60
qh        = (0.00256 * Kh * Kzt * Kd * Ke * V^2) * LF                     = 34.10 psf
```

LHD	= Least Horizontal Dimension: Min(B, L)	= 60.000 ft
a1	= Min(0.1 * LHD, 0.4 * h)	= 6.000 ft
a	= Max(a1, 0.04 * LHD, 3 ft [0.9 m])	= 6.000 ft
h/B	= Ratio of mean roof height to least hor dim: h / B	= 0.255

Wind Pressures for C&C Ch 30 Pt 1
All wind pressures include a load factor of 0.6

Description	Zone	Width ft	Span ft	Area sq ft	1/3 Rule	Ref Fig	GCp Max	GCp Min	p Max psf	p Min psf
wall	4	1.000	10.330	35.57	Yes	30.3-1	0.903	-1.003	36.92	-40.33
wall	5	1.000	10.330	35.57	Yes	30.3-1	0.903	-1.205	36.92	-47.24

Area = Span Length x Effective Width
1/3 Rule = Effective width need not be less than 1/3 of the span length
GCp = External Pressure Coefficients taken from Figures 30.3-1 through 30.3-7
p = Wind Pressure: qh*(GCp - GCpi) [Eqn 30.3-1]*
* Per Para 30.2.2 the Minimum Pressure for C&C is 9.60 psf [0.460 kPa] {Includes LF}

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EXTERIOR MASONRY WALL DESIGN

$$\text{Rooftriblong} := \left(\frac{34}{2}\cdot \text{ft}\right)$$

LOADS AT ROOF

$\text{RoofDL} := 25\cdot\text{psf}\cdot\text{Rooftriblong}$ $\quad \text{RoofDL} = 425\ \frac{\text{lb}}{\text{ft}}$

$\text{RoofLL} := 30\cdot\text{psf}\cdot\text{Rooftriblong}$ $\quad \text{RoofLL} = 510\ \frac{\text{lb}}{\text{ft}}$

TOTAL LOADS

$\text{DL} := \text{RoofDL}$

$\boxed{\text{DL} = 425\ \frac{\text{lb}}{\text{ft}}}$

$\text{LL} := \text{RoofLL}$

$\boxed{\text{LL} = 510\ \frac{\text{lb}}{\text{ft}}}$

WIND LOADS

$\text{Zone4} := 40.33\cdot\text{psf}$

$\text{Zone5} := 47.24\cdot\text{psf}$

Use 8" masonry wall w/ #5@ 48" for zone 4 at first floor , F'c =1500 psi

Use 8" masonry wall w/ #5@ 48" for zone 5 at first floor , F'c=1500 psi

Masonry Slender Wall

Project File: Structural calculations.ec6

LIC# : KW-06014285, Build:20.22.10.25 DIVERSIFIED STRUCTURAL DESIGN, INC.

DESCRIPTION: EXTERIOR MASONRY WALL DESIGN ZONE 5

Code References

Calculations per TMS 402-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-05

General Information

Calculations per TMS 402-16, IBC 2018, CBC 2019, ASCE 7-16

Construction Type : Grouted Hollow Concrete Masonry

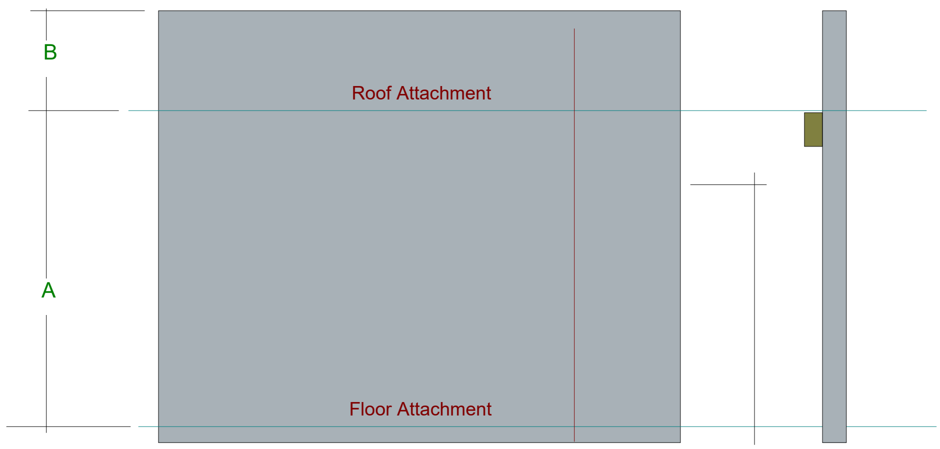
F'm	=	1.50 ksi	Nom. Wall Thickness	8 in	Temp Diff across thickness	=	deg F
Fy - Yield	=	60.0 ksi	Actual Thickness	7.625 in	Min Allow Out-of-plane Defl Ra	=	0.0
Fr - Rupture	=	61.0 psi	Rebar "d" distance	3.8125 in			
Em = f'm *	=	900.0	Lower Level Rebar . . .		Minimum Vertical Steel %	=	0.0020
Max % of ρ bal.	=	0.006993	Bar Size #	5			
Grout Density	=	140 pcf	Bar Spacing	48 in			
Block Weight		Normal Weight					
Wall Weight	=	47.0 psf					

Wall is grouted at rebar cells only

One-Story Wall Dimensions

A	Clear Height	=	11.330 ft
B	Parapet height	=	ft

Wall Support Condition Top & Bottom Pinned



Vertical Loads

Vertical Uniform Loads . . . *(Applied per foot of Strip Width*			DL : Dead	Lr : Roof Live	Lf : Floor Live	S : Snow	W : Wind
Ledger Load	Eccentricity	in	0.4250		0.510		k/ft
Concentric Load							k/ft

Lateral Loads

Wind Loads :

Full area WIND load 47.240 psf

Seismic Loads :

Wall Weight Seismic Load Input Method : Direct entry of Lateral Wall Weight

Seismic Wall Lateral Load psf

Fp 1.0 = 0.0 psf

Masonry Slender Wall

Project File: Structural calculations.ec6

LIC# : KW-06014285, Build:20.22.10.25 DIVERSIFIED STRUCTURAL DESIGN, INC. (c) ENERCALC INC 1983-2022

DESCRIPTION: EXTERIOR MASONRY WALL DESIGN ZONE 5

DESIGN SUMMARY

Results reported for "Strip Width" of 12.0 in

	Governing Load Combination . . .	Actual Values . . .		Allowable Values . . .	
PASS	Moment Capacity Check +0.90D+1.60W	Maximum Bending Stress Rat	**0.9463**		
		Max Mu	1.247 k-ft	Phi * Mn	1.318 k-ft
PASS	Service Deflection Check W Only	Actual Defl. Ratio L/	382	Allowable Defl. Ratio	240.0
		Max. Deflection	0.3562 in		
PASS	Axial Load Check +1.20D+0.50L+1.60W	Max Pu / Ag	27.182 psi	Max. Allow. Defl.	0.5665 in
		Location	5.476 ft	0.2 * f'm	300.0 psi
	Reinforcing Limit Check	Actual As/bd	0.001694	Max Allow As/bd	0.006996

Maximum Reactions	*for Load Combination...*	
Top Horizontal	+D+W	0.2684 k
Base Horizontal	W Only	0.2676 k
Vertical Reaction	+D+L	1.468 k

Design Maximum Combinations - Moments

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu k	Axial Load 0.2*f'm*b*t k	Mcr k-ft	Mu k-ft	Phi	Phi Mn k-ft	As in^2	As Ratio	0.6 * rho bal	Bar 'd'
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000	0.00
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000	0.00
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000	0.00
+1.20D+0.80W at 5.29 to 5.67	0.851	12.204	0.44	0.62	0.90	1.38	0.078	0.0017	0.0068	0.00
+1.20D+0.50L+1.60W at 5.29 to 5.67	1.106	12.204	0.44	1.27	0.90	1.44	0.078	0.0017	0.0067	0.00
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000	0.00
+0.90D+1.60W at 5.29 to 5.67	0.638	12.204	0.44	1.25	0.90	1.32	0.078	0.0017	0.0069	0.00
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000	0.00

Design Maximum Combinations - Deflections

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu k	Moment Values Mcr k-ft	Moment Values Mactual k-ft	Stiffness I gross in^4	Stiffness I cracked in^4	Stiffness I effective in^4	Deflections Deflection in	Deflections Defl. Ratio
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
+D+W at 5.67 to 6.04	0.691	0.44	0.78	331.10	19.10	20.173	0.340	400.3
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
+D+0.750L+0.750W at 5.67 to 6.04	1.074	0.44	0.58	331.10	20.21	24.166	0.128	1,059.4
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
+0.60D+W at 5.67 to 6.04	0.415	0.44	0.77	331.10	18.28	19.354	0.346	393.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
W Only at 5.67 to 6.04	0.000	0.44	0.76	331.10	17.04	18.102	0.356	381.6
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0

Reactions - Vertical & Horizontal

Load Combination	Base Horizontal	Top Horizontal	Vertical @ Wall Base
D Only	0.0 k	0.00 k	0.958 k
+D+L	0.0 k	0.00 k	1.468 k
+D+0.750L	0.0 k	0.00 k	1.340 k
+D+W	0.3 k	0.27 k	0.958 k

Masonry Slender Wall

DESCRIPTION: EXTERIOR MASONRY WALL DESIGN ZONE 5

+D+0.70E	0.0 k	0.00 k	0.958 k
+D+0.750L+0.750W	0.2 k	0.20 k	1.340 k
+D+0.750L+0.5250E	0.0 k	0.00 k	1.340 k
+0.60D+W	0.3 k	0.27 k	0.575 k

Reactions - Vertical & Horizontal

Load Combination	Base Horizontal	Top Horizontal	Vertical @ Wall Base
+0.60D+0.70E	0.0 k	0.00 k	0.575 k
L Only	0.0 k	0.00 k	0.510 k
W Only	0.3 k	0.27 k	0.000 k
E Only	0.0 k	0.00 k	0.000 k

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JOB ADDITION AND RENOVATION RESIDENCE

SHEET No. JOB No. 22-22

CALCULATE BY AR DATE 08/12/2022

CHECKED BY DATE

SCALE

FILL CELL MASONRY WALL DESIGN FOR WINDOWS

$$\text{Rooftriblong} := \left(\frac{34}{2}\cdot \text{ft}\right)$$

LOADS AT ROOF

$\text{RoofDL} := 25\cdot\text{psf}\cdot\text{Rooftriblong}$ $\quad\quad$ $\text{RoofDL} = 425\,\frac{\text{lb}}{\text{ft}}$

$\text{RoofLL} := 30\cdot\text{psf}\cdot\text{Rooftriblong}$ $\quad\quad$ $\text{RoofLL} = 510\,\frac{\text{lb}}{\text{ft}}$

TOTAL LOADS

$\text{DL} := \text{RoofDL}$ $\quad\quad$ $\boxed{\text{DL} = 425\,\frac{\text{lb}}{\text{ft}}}$

$\text{LL} := \text{RoofLL}$ $\quad\quad$ $\boxed{\text{LL} = 510\,\frac{\text{lb}}{\text{ft}}}$

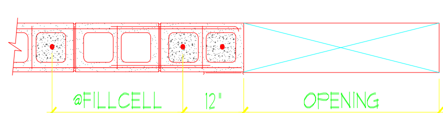
$\text{Opening} := 6.33\cdot\text{ft}$ $\quad$ $\text{Fillcell4} := 48\cdot\text{in}$ $\quad$ $\text{Fillcell5} := 48\cdot\text{in}$ $\quad$ $\text{Jamp} := 16\cdot\text{in}$ $\quad$ $\text{Jampheight} := 10.33\cdot\text{ft}$

$$\text{Tributarywind4} := \frac{\text{Fillcell4}}{2} + 12\cdot\text{in} + \frac{\text{Opening}}{4}$$

$\text{Tributarywind4} = 4.6\,\text{ft}$

$$\text{Tributarywind5} := \frac{\text{Fillcell5}}{2} + 12\cdot\text{in} + \frac{\text{Opening}}{4}$$

$\text{Tributarywind5} = 4.6\,\text{ft}$



$$\text{Verticalloads} := (\text{DL} + \text{LL})\cdot\frac{\text{Opening}}{2}$$

$\text{Verticalloads} = 2959.3\,\text{lb}$

$\text{P} := \frac{\text{Verticalloads}}{\text{Jamp}}$ $\quad\quad$ $\boxed{\text{P} = 2219.5\,\frac{\text{lb}}{\text{ft}}}$

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JOB	ADDITION AND RENOVATION RESIDENCE		
SHEET No.		JOB No.	22-22
CALCULATE BY	AR	DATE	08/12/2022
CHECKED BY		DATE	
SCALE			

FILL CELL MASONRY WALL DESIGN FOR WINDOW

WIND LOADS ZONE 4

$Zone4 := 40.33 \cdot psf$

$$Windpressurezone4 := \frac{Zone4 \cdot Tributarywind4}{Jamp} \qquad Windpressurezone4 = 138.6 \cdot \frac{\frac{lb}{(ft)}}{ft}$$

USE 2#5 IN EACH SIDE ZONE 4

WIND LOADS ZONE 5

$Zone5 := 47.24 \cdot psf$

$$Windpressurezone5 := \frac{Zone5 \cdot Tributarywind5}{Jamp} \qquad Windpressurezone5 = 162.4 \cdot \frac{\frac{lb}{ft}}{ft}$$

USE 2#5 IN EACH SIDE ZONE 5

Reinforced CMU Wall calculations For 8" and 12" thick Block Walls.

Project: ______ Date: 9/13/2021 Page: ______

Wall ID: OPENING 6'-4" FIRST FLOOR (ZONE 5) Design by: ______

ACI 530-11 / ASCE 5-11 / TMS 402-11

General Information

Height of wall (h) =	10.33	ft	124	Em =	1350	ksi
Block width=	8	in		Fs =	32000	psi
f'm =	1500	psi		Es =	29000	ksi
P =	2219	lb / ft		Ft =	19	psi
M =	2161	Lb - ft / ft				
Wind Load =	162	psf		Bar # =	5	
Kd=	0.85			Spacing=	8	in
Factor=	1.00			As=	0.47	in^2/ft
Area (A_n) =	91.5	in^2 / ft		b=	16	in
I =	443.3	in^4 / ft		d=	3.8125	in
S =	116.3	in^3 / ft		h/r =	56.35	
r =	2.2	in / ft				

Condition #1: fa<Fa

fa= 24.25 psi Compressive Stress due to Axial Load

if h/r < 99 $Fa = 0.25 \times f'm \times [1-(h/140r)^2]$

if h/r > 99 $Fa = 0.25 \times f'm \times (70 \times r / h)^2$

Fa= 314.26 psi **OK**

fbt = -M / S = -222.96 psi Bending tension stress

fbc = M / S = 222.96 psi Bending compression stress

ft = fa + fbt = -198.71 psi > Ft **REINFORCED MASONRY**

$\frac{fa}{Fa} + \frac{fl}{Fb}$ 0.407 < 1 **OK**

Condition #2 : Max Allowable Axial Stress

if h/r < 99 $Pa = (0.25 \times f'm \times A_n + 0.65 \times A_{st} \times F_s) \times [1-(h/140r)^2]$

if h/r > 99 $Pa = (0.25 \times f'm \times A_n + 0.65 \times A_{st} \times F_s) \times (70 \times r/h)^2$

Pa= 36860 Lbs **OK**

Condition #3 : Combine Axial + Bending Compression (fb+ fa < Fb)

$\rho = As/bxd =$ 0.0076

n =Es/Em = 21.48

$k = \sqrt{2 \times n \times \rho + (n \times \rho)^2} - n \times \rho$ 0.431

j =1-k/3 = 0.856

Fb = Factor x (0.45) x f'm

Fb = 675 psi

$fb = \frac{2 \times M \times 12}{j \times k \times b \times d^2} =$ 604 psi

fa + fb = 627.9 psi < Fb **OK**

Condition #4 : Checking Reinforcement (fs < Fs)

Fs = Fs x Factor = 32000 psi

$fs = \frac{M \times 12}{As \times j \times d} - fa =$ 17060 psi < Fs **OK**

Maximum Allowable Moment.

$Mr = \frac{(Fb-fa) \times j \times k \times b \times d^2}{2 \times 12} =$ 2330 Lb-ft **OK**

WOOD TRUSS REACTION & LEDGER DESIGN

MecaWind v2405

Calculations Prepared by:
True
Address
0
0
City, State, 0
Date: Aug 17, 2022
Designer: 0

Calculations Prepared For:
Client: 0
Project #: 0
Location: 0

File Location : X:\DWG\Year-2022\22-22\Calculations\roof\wind pressure at roof.wnd

Basic Wind Parameters

Wind Load Standard	= ASCE 7-16	Exposure Category	= C
Wind Design Speed	= 175.0 mph	Risk Category	= II
Structure Type	= Building	Building Type	= Enclosed

General Wind Settings

Incl_LF	= Include ASD Load Factor of 0.6 in Pressures	= True
DynType	= Dynamic Type of Structure	= Rigid
Zg	= Altitude (Ground Elevation) above Sea Level	= 0.000 ft
Bdist	= Base Elevation of Structure	= 0.000 ft
SDB	= Simple Diaphragm Building	= False
Reacs	= Show the Base Reactions in the output	= False
MWFRSType	= MWFRS Method Selected	= Ch 27 Pt 1

Topographic Factor per Fig 26.8-1

Topo	= Topographic Feature	= None
Kzt	= Topographic Factor	= 1.000

Building Inputs

RoofType:	Building Roof Type	= Gabled	W	: Width Perp to Ridge	= 60.000 ft
L	: Length Along Ridge	= 120.000 ft	EHt	: Eave Height	= 10.330 ft
RE	: Roof Entry Method	= Slope	Slope	: Slope of Roof	= 4.0 :12
Theta	: Roof Slope	= 18.43 Deg	Par	: Is there a Parapet	= False

Exposure Constants per Table 26.11-1:

Alpha:	Table 26.11-1 Const	= 9.500	Zg:	Table 26.11-1 Const	= 900.000 ft
At:	Table 26.11-1 Const	= 0.105	Bt:	Table 26.11-1 Const	= 1.000
Am:	Table 26.11-1 Const	= 0.154	Bm:	Table 26.11-1 Const	= 0.650
C:	Table 26.11-1 Const	= 0.200	Eps:	Table 26.11-1 Const	= 0.200

Overhang Inputs:

Std	= Overhangs on all sides are the same	= True
OHType	= Type of Roof Wall Intersections	= Overhang
OH	= Overhang of Roof Beyond Wall	= 2.000 ft

Main Wind Force Resisting System (MWFRS) Calculations per Ch 27 Part 1:

h	= Mean Roof Height above grade	= 15.330 ft
Kh	= 15 ft [4.572 m]< Z <Zg -->(2.01*(Z/zg)^(2/Alpha) {Table 26.10-1}	= 0.853
Kzt	= Topographic Factor is 1 since no Topographic feature specified	= 1.000

Kd = Wind Directionality Factor per Table 26.6-1 = 0.85
Zg = Elevation above Sea Level = 0.000 ft
Ke = Ground Elevation Factor: Ke = e^-(0.0000362*Zg) {Table 26.9-1} = 1.000
GCPi = Ref Table 26.13-1 for Enclosed Building = +/-0.18
RA = Roof Area = 8365.28 sq ft
LF = Load Factor based upon ASD Design = 0.60
qh = (0.00256 * Kh * Kzt * Kd * Ke * V^2) * LF = 34.10 psf
qin = For Negative Internal Pressure of Enclosed Building use qh*LF = 34.10 psf
qip = For Positive Internal Pressure of Enclosed Building use qh*LF = 34.10 psf

Gust Factor Calculation:

Gust Factor Category I Rigid Structures - Simplified Method
G1 = For Rigid Structures (Nat. Freq.>1 Hz) use 0.85 = 0.85
Gust Factor Category II Rigid Structures - Complete Analysis
Zm = Max(0.6 * Ht, Zmin) = 15.000 ft
Izm = Cc * (33 / Zm) ^ 0.167 = 0.228
Lzm = L * (Zm / 33) ^ Eps = 427.057
B = Structure Width Normal to Wind = 120.000 ft
Q = (1 / (1 + 0.63 * ((B + Ht) / Lzm)^0.63))^0.5 = 0.875
G2 = 0.925*((1+0.7*Izm*3.4*Q)/(1+0.7*3.4*Izm)) = 0.859
Gust Factor Used in Analysis
G = Lessor Of G1 Or G2 = 0.850

MWFRS Wind Normal to Ridge (Ref Fig 27.3-1}

h = Mean Roof Height Of Building = 15.330 ft
RHt = Ridge Height Of Roof = 20.330 ft
B = Horizontal Dimension Of Building Normal To Wind Direction = 120.000 ft
L = Horizontal Dimension Of building Parallel To Wind Direction = 60.000 ft
L/B = Ratio Of L/B used For Cp determination = 0.500
h/L = Ratio Of h/L used For Cp determination = 0.255
Slope = Slope of Roof = 18.43 Deg
OH_Bot_-Y = Overhang Coefficient Bottom Surface (Windward Only) = 0.8, 0.8
OH_Top_+X+Y= Overhang Coefficient Overhang +X+Y (Leeward) = -0.57, -0.57
OH_Top_+X-Y= Overhang Coefficient Overhang +X-Y (Windward) = 0.13, -0.37
OH_Top_+Y = Overhang Coefficient Top +Y (Leeward) = -0.57, -0.57
OH_Top_-X+Y= Overhang Coefficient Overhang -X+Y (Leeward) = -0.57, -0.57
OH_Top_-X-Y= Overhang Coefficient Overhang -X-Y (Windward) = 0.13, -0.37
OH_Top_-Y = Overhang Coefficient Top Windward Edge = 0.13, -0.37
Roof_LW = Roof Coefficient (Leeward) = -0.57, -0.57
Roof_WW = Roof Coefficient (Windward) = 0.13, -0.37

Cp_WW = Windward Wall Coefficient (All L/B Values) = 0.80
Cp_LW = Leward Wall Coefficient using L/B = -0.50
Cp_SW = Side Wall Coefficient (All L/B values) = -0.70
GCpn_WW = Parapet Combined Net Pressure Coefficient (Windward Parapet) = 1.50
GCpn_LW = Parapet Combined Net Pressure Coefficient (Leeward Parapet) = -1.00

Wall Wind Pressures based On Positive Internal Pressure (+GCPi) - Normal to Ridge
All wind pressures include a load factor of 0.6

Elev ft	Kz	Kzt	qz psf	GCPi	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
10.33	0.849	1.000	33.94	0.18	16.94	-20.63	-26.43	37.57	9.60

Wall Wind Pressures based on Negative Internal Pressure (-GCPi) - Normal to Ridge
All wind pressures include a load factor of 0.6

Elev ft	Kz	Kzt	qz psf	GCPi	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
10.33	0.849	1.000	33.94	-0.18	29.22	-8.35	-14.15	37.57	9.60

Notes Wall Pressures:
Kz = Velocity Press Exp Coeff
Kzt = Topographical Factor
qz = 0.00256*Kz*Kzt*Kd*V^2
GCPi = Internal Press Coefficient
Side = qh * G * Cp_SW - qip * +GCPi
Windward = qz * G * Cp_WW - qip * +GCPi
Leeward = qh * G * Cp_LW - qip * +GCPi
Total = Windward Press - Leeward Press
* Minimum Pressure: Para 27.1.5 no less than 9.60 psf (Incl LF) applied to Walls
+ Pressures Acting TOWARD Surface
- Pressures Acting AWAY from Surface

Roof Wind Pressures for Positive & Negative Internal Pressure (+/- GCPi) - Normal to Ridge
All wind pressures include a load factor of 0.6

Roof Var	Start Dist	End Dist	Cp_min	Cp_max	GCPi	Pressure Pn_min*	Pressure Pp_min*	Pressure Pn_max	Pressure Pp_max

		ft	ft				psf	psf	psf	psf
OH_Bot_-Y		N/A	N/A	0.800	0.800	0.000	23.19	23.19	23.19	23.19
OH_Top_+X+Y		N/A	N/A	-0.570	-0.570	0.000	-16.52	-16.52	-16.52	-16.52
OH_Top_+X-Y		N/A	N/A	0.130	-0.370	0.000	3.77	3.77	-10.72	-10.72
OH_Top_+Y		N/A	N/A	-0.570	-0.570	0.000	-16.52	-16.52	-16.52	-16.52
OH_Top_-X+Y		N/A	N/A	-0.570	-0.570	0.000	-16.52	-16.52	-16.52	-16.52
OH_Top_-X-Y		N/A	N/A	0.130	-0.370	0.000	3.77	3.77	-10.72	-10.72
OH_Top_-Y		N/A	N/A	0.130	-0.370	0.000	3.77	3.77	-10.72	-10.72
Roof_LW		N/A	N/A	-0.570	-0.570	0.180	-10.38	-22.66	-10.38	-22.66
Roof_WW		N/A	N/A	0.130	-0.370	0.180	9.91	-2.37	-4.59	-16.86

```
Notes Roof Pressures:
Start Dist = Start Dist from Windward Edge  End Dist = End Dist from Windward Edge
Cp_Max     = Largest Coefficient Magnitude Cp_Min   = Smallest Coefficient Magnitude
Pp_max     = qh*G*Cp_max - qip*(+GCPi)     Pn_max   = qh*G*Cp_max - qin*(-GCpi)
Pp_min*    = qh*G*Cp_min - qip*(+GCPi)     Pn_min*  = qh*G*Cp_min - qin*(-GCPi)
OH = Overhang   X = Dir along Ridge   Y = Dir Perpendcular to Ridge  Z = Vertical
* The smaller uplift pressures due to Cp_Min can become critical when wind is combined
  with roof live load or snow load;  load combinations are given in ASCE 7
+ Pressures Acting TOWARD Surface          - Pressures Acting AWAY from Surface
```

MWFRS Wind Parallel to Ridge (Ref Fig 27.3-1)

```
h         = Mean Roof Height Of Building                              = 15.330 ft
RHt       = Ridge Height Of Roof                                      = 20.330 ft
B         = Horizontal Dimension Of Building Normal To Wind Direction = 60.000 ft
L         = Horizontal Dimension Of building Parallel To Wind Direction = 120.000 ft
L/B       = Ratio Of L/B used For Cp determination                    = 2.000
h/L       = Ratio Of h/L used For Cp determination                    = 0.128
Slope     = Slope of Roof                                             = 18.43 Deg
OH_Bot    = Overhang Bottom (Windward Face Only)                      = 0.8, 0.8
OH_Top    = Overhang Top  Coeff (0 to h/2) (0.000 ft to 2.000 ft)     = -0.18, -0.9
OH_Top    = Overhang Top  Coeff (0 to h/2) (2.000 ft to 7.665 ft)     = -0.18, -0.9
OH_Top    = Overhang Top  Coeff (h/2 to h) (7.665 ft to 15.330 ft)    = -0.18, -0.9
OH_Top    = Overhang Top  Coeff (h to 2h) (15.330 ft to 30.660 ft)    = -0.18, -0.5
OH_Top    = Overhang Top  Coeff (>2h) (>30.660 ft)                    = -0.18, -0.3
OH_Top    = Overhang Top  Coeff (>2h) (>122.000 ft)                   = -0.18, -0.3
Roof      = Roof  Coeff (0 to h/2) (2.000 ft to 7.665 ft)             = -0.18, -0.9
Roof      = Roof  Coeff (h/2 to h) (7.665 ft to 15.330 ft)            = -0.18, -0.9
Roof      = Roof  Coeff (h to 2h) (15.330 ft to 30.660 ft)            = -0.18, -0.5
Roof      = Roof  Coeff (>2h) (>30.660 ft)                            = -0.18, -0.3

Cp_WW     = Windward Wall Coefficient (All L/B Values)                = 0.80
Cp_LW     = Leward Wall Coefficient using L/B                         = -0.30
Cp_SW     = Side Wall Coefficient (All L/B values)                    = -0.70
GCpn_WW   = Parapet Combined Net Pressure Coefficient (Windward Parapet) = 1.50
GCpn_LW   = Parapet Combined Net Pressure Coefficient (Leeward Parapet)  = -1.00
```

Wall Wind Pressures based On Positive Internal Pressure (+GCPi) - Parallel to Ridge
All wind pressures include a load factor of 0.6

Elev ft	Kz	Kzt	qz psf	GCPi	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
20.33	0.905	1.000	36.19	0.18	18.47	-14.83	-26.43	33.30	9.60
15.33	0.853	1.000	34.10	0.18	17.05	-14.83	-26.43	31.88	9.60
10.33	0.849	1.000	33.94	0.18	16.94	-14.83	-26.43	31.78	9.60

Wall Wind Pressures based on Negative Internal Pressure (-GCPi) - Parallel to Ridge
All wind pressures include a load factor of 0.6

Elev ft	Kz	Kzt	qz psf	GCPi	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
20.33	0.905	1.000	36.19	-0.18	30.74	-2.56	-14.15	33.30	9.60
15.33	0.853	1.000	34.10	-0.18	29.32	-2.56	-14.15	31.88	9.60
10.33	0.849	1.000	33.94	-0.18	29.22	-2.56	-14.15	31.78	9.60

```
Notes Wall Pressures:
Kz       = Velocity Press Exp Coeff        Kzt      = Topographical Factor
qz       = 0.00256*Kz*Kzt*Kd*V^2           GCPi     = Internal Press Coefficient
Side     = qh * G * Cp_SW - qip * +GCPi    Windward = qz * G * Cp_WW - qip * +GCPi
Leeward  = qh * G * Cp_LW - qip * +GCPi    Total    = Windward Press - Leeward Press
* Minimum Pressure: Para 27.1.5 no less than 9.60 psf (Incl LF) applied to Walls
+ Pressures Acting TOWARD Surface          - Pressures Acting AWAY from Surface
```

Roof Wind Pressures for Positive & Negative Internal Pressure (+/- GCPi) - Parallel to Ridge
All wind pressures include a load factor of 0.6

Roof Var	Start Dist ft	End Dist ft	Cp_min	Cp_max	GCPi	Pressure Pn_min* psf	Pressure Pp_min* psf	Pressure Pn_max psf	Pressure Pp_max psf
OH_Bot	N/A	N/A	0.800	0.800	0.000	23.19	23.19	23.19	23.19
OH_Bot	N/A	N/A	0.800	0.800	0.000	23.19	23.19	23.19	23.19
OH_Top (-X+Y)	0.000	2.000	-0.180	-0.900	0.000	-5.22	-5.22	-26.08	-26.08
OH_Top (-X-Y)	0.000	2.000	-0.180	-0.900	0.000	-5.22	-5.22	-26.08	-26.08
OH_Top (-Y)	2.000	7.665	-0.180	-0.900	0.000	-5.22	-5.22	-26.08	-26.08
OH_Top (+Y)	2.000	7.665	-0.180	-0.900	0.000	-5.22	-5.22	-26.08	-26.08
OH_Top (-Y)	7.665	15.330	-0.180	-0.900	0.000	-5.22	-5.22	-26.08	-26.08
OH_Top (+Y)	7.665	15.330	-0.180	-0.900	0.000	-5.22	-5.22	-26.08	-26.08
OH_Top (-Y)	15.330	30.660	-0.180	-0.500	0.000	-5.22	-5.22	-14.49	-14.49
OH_Top (+Y)	15.330	30.660	-0.180	-0.500	0.000	-5.22	-5.22	-14.49	-14.49
OH_Top (-Y)	30.660	122.000	-0.180	-0.300	0.000	-5.22	-5.22	-8.69	-8.69
OH_Top (+Y)	30.660	122.000	-0.180	-0.300	0.000	-5.22	-5.22	-8.69	-8.69
OH_Top (+X+Y)	122.000	124.000	-0.180	-0.300	0.000	-5.22	-5.22	-8.69	-8.69
OH_Top (+X-Y)	122.000	124.000	-0.180	-0.300	0.000	-5.22	-5.22	-8.69	-8.69
Roof (+Y)	2.000	7.665	-0.180	-0.900	0.180	0.92	-11.35	-19.95	-32.22
Roof (-Y)	2.000	7.665	-0.180	-0.900	0.180	0.92	-11.35	-19.95	-32.22
Roof (+Y)	7.665	15.330	-0.180	-0.900	0.180	0.92	-11.35	-19.95	-32.22
Roof (-Y)	7.665	15.330	-0.180	-0.900	0.180	0.92	-11.35	-19.95	-32.22
Roof (+Y)	15.330	30.660	-0.180	-0.500	0.180	0.92	-11.35	-8.35	-20.63
Roof (-Y)	15.330	30.660	-0.180	-0.500	0.180	0.92	-11.35	-8.35	-20.63
Roof (+Y)	30.660	122.000	-0.180	-0.300	0.180	0.92	-11.35	-2.56	-14.83
Roof (-Y)	30.660	122.000	-0.180	-0.300	0.180	0.92	-11.35	-2.56	-14.83

```
Notes Roof Pressures:
Start Dist = Start Dist from Windward Edge  End Dist = End Dist from Windward Edge
Cp_Max     = Largest Coefficient Magnitude  Cp_Min   = Smallest Coefficient Magnitude
Pp_max     = qh*G*Cp_max - qip*(+GCPi)      Pn_max   = qh*G*Cp_max - qin*(-GCpi)
Pp_min*    = qh*G*Cp_min - qip*(+GCPi)      Pn_min*  = qh*G*Cp_min - qin*(-GCpi)
OH = Overhang   X = Dir along Ridge   Y = Dir Perpendcular to Ridge  Z = Vertical
* The smaller uplift pressures due to Cp_Min can become critical when wind is combined
  with roof live load or snow load;  load combinations are given in ASCE 7
+ Pressures Acting TOWARD Surface          - Pressures Acting AWAY from Surface
```

Components and Cladding (C&C) Calculations per Ch 30 Part 1:

```
h/W       = Ratio of mean roof height to building width                    = 0.255
h/L       = Ratio of mean roof height to building length                   = 0.128
h         = Mean Roof Height above grade                                   = 15.330 ft
Kh        = 15 ft [4.572 m]< Z <Zg -->(2.01*(Z/zg)^(2/Alpha) {Table 26.10-1}= 0.853
Kzt       = Topographic Factor is 1 since no Topographic feature specified = 1.000
Kd        = Wind Directionality Factor per Table 26.6-1                    = 0.85
GCPi      = Ref Table 26.13-1 for Enclosed Building                        = +/-0.18
LF        = Load Factor based upon ASD Design                              = 0.60
qh        = (0.00256 * Kh * Kzt * Kd * Ke * V^2) * LF                      = 34.10 psf
```

LHD	= Least Horizontal Dimension: Min(B, L)	= 60.000 ft
a1	= Min(0.1 * LHD, 0.4 * h)	= 6.000 ft
a	= Max(a1, 0.04 * LHD, 3 ft [0.9 m])	= 6.000 ft
h/B	= Ratio of mean roof height to least hor dim: h / B	= 0.255

Wind Pressures for C&C Ch 30 Pt 1
All wind pressures include a load factor of 0.6

Description ft	Zone	Width ft	Span ft	Area sq ft	1/3 Rule	Ref Fig	GCp Max	GCp Min	p Max psf	p Min psf
truss	2r	2.000	20.000	133.33	Yes	30.3-2B	0.300	-1.391	16.37	-53.55
zone 1	1	2.000	5.000	10.00	No	30.3-2B	0.535	-2.000	24.39	-74.33
zone 2e	2e	2.000	5.000	10.00	No	30.3-2B	0.535	-2.000	24.39	-74.33
zone 2n	2n	2.000	5.000	10.00	No	30.3-2B	0.535	-3.000	24.39	-108.43
zone 2r	2r	2.000	5.000	10.00	No	30.3-2B	0.535	-3.000	24.39	-108.43
zone 3e	3e	2.000	5.000	10.00	No	30.3-2B	0.535	-3.000	24.39	-108.43
zone 3r	3r	2.000	5.000	10.00	No	30.3-2B	0.535	-3.600	24.39	-128.89

Area = Span Length x Effective Width
1/3 Rule = Effective width need not be less than 1/3 of the span length
GCp = External Pressure Coefficients taken from Figures 30.3-1 through 30.3-7
p = Wind Pressure: qh*(GCp - GCpi) [Eqn 30.3-1]*
* Per Para 30.2.2 the Minimum Pressure for C&C is 9.60 psf [0.460 kPa] {Includes LF}

TRUSS REACTIONS - ROOF

Truss Mark	Q1 (psf)	Q2 (psf)	LENGTH	TRIBUTARY WIDTH	TRIBUTARY AREA	Uplift Reaction (lbs)	DL Reaction (lbs)	LL Reaction (lbs)	DL+LL Reaction (lbs)	Net Uplift (lbs)	Truss Mark
T1	16.4	53.55	36	2	36	1928	900	1080	1980	1388	**T1**
T2	16.4	53.55	31.67	2	31.67	1696	792	950	1742	1221	**T2**
T3	16.4	53.55	14.5	2	14.5	776	363	435	798	559	**T3**
T4	16.4	53.55	22	2	22	1178	550	660	1210	848	**T4**
T5	16.4	53.55	26	2	26	1392	650	780	1430	1002	**T5**
T6	16.4	53.55	4.33	2	4.33	232	108	130	238	167	**T6**
T7	16.4	53.55	7	2	7	375	175	210	385	270	**T7**
T8	16.4	53.55	15.67	2	15.67	839	392	470	862	604	**T8**
CJ1	16.4	53.55	10	2	10	536	250	300	550	386	**T8**

GIRDERS REACTIONS -ROOF

Truss Mark	**Q1** (psf)	**Q2** (psf)	**LENGTH**	**TRIBUTARY WIDTH**	**TRIBUTARY AREA**	**Uplift Reaction** (lbs)	**DL Reaction** (lbs)	**LL Reaction** (lbs)	**DL+LL Reaction** (lbs)	**Net Uplift** (lbs)	**Truss Mark**
GT1	16.4	53.55	26	3.5	46	2437	1138	1365	2503	1754	**GT1**

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JOB ADDITION AND RENOVATION RESIDENCE

SHEET No. ______ JOB No. 22-22

CALCULATE BY AR DATE 08/12/2022

CHECKED BY ______ DATE ______

SCALE ______

WOOD LEDGER TYPE A DESIGN AT ROOF

$$\text{Rooftriblong} := \frac{20.67}{2} \cdot \text{ft}$$

LOADS AT ROOF

$$\text{RoofDL} := 25 \cdot \text{psf} \cdot \text{Rooftriblong} \qquad \text{RoofDL} = 258.4\ \frac{\text{lb}}{\text{ft}}$$

$$\text{RoofLL} := 30 \cdot \text{psf} \cdot \text{Rooftriblong} \qquad \text{RoofLL} = 310.1\ \frac{\text{lb}}{\text{ft}}$$

TOTAL LOADS

$$\text{DL} := \text{RoofDL}$$

$$\boxed{\text{DL} = 258.4\ \frac{\text{lb}}{\text{ft}}}$$

$$\text{LL} := \text{RoofLL}$$

$$\boxed{\text{LL} = 310.1\ \frac{\text{lb}}{\text{ft}}}$$

USE (2)2X12 WOOD LEDGER W/3/4" KWIK BOLT @12" STAGGERED

Wood Ledger

Project File: Structural calculations.ec6

LIC# : KW-06014285, Build:20.22.10.25 DIVERSIFIED STRUCTURAL DESIGN, INC. (c) ENERCALC INC 1983-2022

DESCRIPTION: WOOD LEDGER TYPE A DESIGN AT ROOF

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Ledger Width	3.0 in
Ledger Depth	11.250 in
Ledger Wood Specie	Southern Pine
G : Specific Gravity	0.55
Bolt Diameter	3/4" in
Bolt Spacing	12.0 in
Cm - Wet Service Factor	1.0
Ct - Temperature Factor	1.0
Cg - Group Action Factor	1.0
C /\ - Geometry Factor	1.0

Design Method: ASD (using Service Load Combinations
Wood Stress Grade :

Fb Allow	1,000.0 psi
Fv Allow	100.0 psi
Fyb : Bolt Bending Yield	45,000 psi

Concrete as Main Supporting Member
Using 6" anchor embedment length in equations.
Using dowel bearing strength fixed at 7.5 ksi per NDS Table 11E

Analytical model uses 100 spans to ensure that all possible combinations of bolt location and load location are evaluated. Final results are an envelope solution.

Load Data

	Dead	Roof Live	Floor Live	Snow	Wind	Seismic	Earth
Uniform Load...	259.0 plf	311.0 plf	plf	plf	plf	plf	plf
Point Load...	lbs	lbs	lbs	lbs	lbs	lbs	lbs
Spacing	in						
Offset	in						
Horizontal Shear	lbs	lbs	lbs	lbs	lbs	lbs	lbs

Wood Ledger

DESCRIPTION: WOOD LEDGER TYPE A DESIGN AT ROOF

DESIGN SUMMARY

Design OK

Maximum Ledger Bending

Load Combination . . .	+D+Lr	
Moment	47.50	ft-lb
fb : Actual Stress	9.007	psi
Fb : Allowable Stress	1,250.0	psi
Stress Ratio	**0.007206**	:1

Maximum Ledger Shear

Load Combination . . .	+D+Lr	
Shear	285.002	lbs
fv : Actual Stress	16.889	psi
Fv : Allowable Stress	83.333	psi
Stress Ratio	**0.2027**	**:1**

Maximum Bolt Bearing Summary

Load Combination . . .	+D+Lr	
Max. Vertical Load	570.0	lbs
Bolt Allow Vertical Load	1,138.27	lbs
Max. Horizontal Load	0.0	lbs
Bolt Allow Horizontal Load	2,212.31	lbs
Angle of Resultant	90.0	deg
Diagonal Component	570.0	lbs
Allow Diagonal Bolt Force	1,138.27	lbs
Stress Ratio, Wood @ Bolt	**0.5008**	:1

Dowel Bearing Strengths

(for specific gravity & bolt diameter)

Ledger, Perp to Grain	7,500.0	psi
Ledger, Parallel to Grain	7,500.0	psi
Supporting Member, Perp to Gra	2,950.0	psi
Supporting Member, Parallel to Gr	6,150.0	psi

Allowable Bolt Capacity

Note ! Refer to NDS Section 11.3 for Bolt Capacity calculation method.

Governing Load Combinatio **+D+Lr**

Resutant Load Angle : Theta = 90.0 deg   Ktheta = 1.250   Fe theta = 1,138.27

Bolt Capacity - Load Perpendicular to Grain

Fem	7,500.0	Fes	2,950.0	Fyb	45,000.0
Re	2.542	Rt	2.0		
k1	1.404	k2	1.732	k3	0.9805
Im : Eq 11.3-1		Rd =	5.0	Z =	0.0 lbs
Is : Eq 11.3-2		Rd =	5.0	Z =	1,327.50 lbs
II : Eq 11.3-3		Rd =	4.50	Z =	2,070.74 lbs
IIIm : Eq 11.3-4		Rd =	4.0	Z =	2,402.01 lbs
IIIs : Eq 11.3-5		Rd =	4.0	Z =	910.62 lbs
IV : Eq 11.3-6		Rd =	4.0	Z =	1,120.75 lbs
		min : Basic Design Value		=	910.62 lbs

Reference design value - Perpendicular to Grain :

Z * CM * CD* Ct * Cg * Cdelta = **1,138.27** lbs

Bolt Capacity - Load Parallel to Grain

Fem	7,500.0	Fes	6,150.0	Fyb	45,000.0
Re	1.220	Rt	2.0		
k1	0.7902	k2	1.157	k3	1.108
Im : Eq 11.3-1		Rd =	4.0	Z =	0.0 lbs
Is : Eq 11.3-2		Rd =	4.0	Z =	3,459.38 lbs
II : Eq 11.3-3		Rd =	3.60	Z =	3,037.51 lbs
IIIm : Eq 11.3-4		Rd =	3.20	Z =	3,549.25 lbs
IIIs : Eq 11.3-5		Rd =	3.20	Z =	1,815.33 lbs
IV : Eq 11.3-6		Rd =	3.20	Z =	1,769.84 lbs
		Zmin : Basic Design Value		=	1,769.84 lbs

Reference design value - Parallel to Grain :

Z * CM * CD* Ct * Cg * Cdelta = **2,212.31** lbs

WINDOWS AND DOOR **PRESSURES DESIGN**

MecaWind v2404

Software Developer: Meca Enterprises Inc., www.meca.biz, Copyright © 2020

Calculations Prepared by:
Date: Nov 10, 2022

File Location : X:\DWG\Year-2022\22-22\Calculations\window and door pressure.wnd

Basic Wind Parameters

Wind Load Standard	= ASCE 7-16	Exposure Category	= C
Wind Design Speed	= 175.0 mph	Risk Category	= II
Structure Type	= Building	Building Type	= Enclosed

General Wind Settings

Incl_LF	= Include ASD Load Factor of 0.6 in Pressures	= True
DynType	= Dynamic Type of Structure	= Rigid
Zg	= Altitude (Ground Elevation) above Sea Level	= 0.000 ft
Bdist	= Base Elevation of Structure	= 0.000 ft
SDB	= Simple Diaphragm Building	= False
Reacs	= Show the Base Reactions in the output	= False
MWFRSType	= MWFRS Method Selected	= Ch 27 Pt 1

Topographic Factor per Fig 26.8-1

Topo	= Topographic Feature	= None
Kzt	= Topographic Factor	= 1.000

Building Inputs

RoofType	: Building Roof Type	= Gabled	W	: Width Perp to Ridge	= 60.000 ft
L	: Length Along Ridge	= 120.000 ft	EHt	: Eave Height	= 10.330 ft
RE	: Roof Entry Method	= Slope	Slope	: Slope of Roof	= 4.0 :12
Theta	: Roof Slope	= 18.43 Deg	Par	: Is there a Parapet	= False

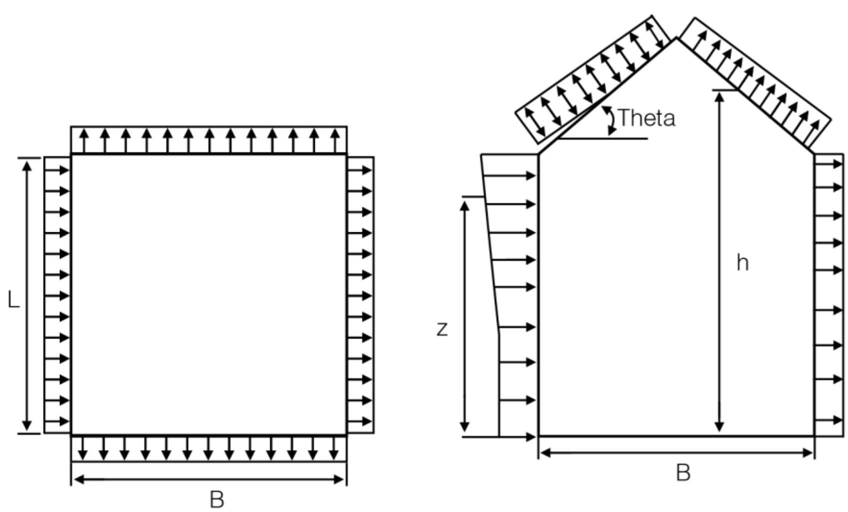
Exposure Constants per Table 26.11-1:

Alpha:	Table 26.11-1 Const	= 9.500	Zg:	Table 26.11-1 Const	= 900.000 ft
At:	Table 26.11-1 Const	= 0.105	Bt:	Table 26.11-1 Const	= 1.000
Am:	Table 26.11-1 Const	= 0.154	Bm:	Table 26.11-1 Const	= 0.650
C:	Table 26.11-1 Const	= 0.200	Eps:	Table 26.11-1 Const	= 0.200

Overhang Inputs:

Std	= Overhangs on all sides are the same	= True
OHType	= Type of Roof Wall Intersections	= Overhang
OH	= Overhang of Roof Beyond Wall	= 2.000 ft

Main Wind Force Resisting System (MWFRS) Calculations per Ch 27 Part 1:



h	= Mean Roof Height above grade	= 15.330 ft
Kh	= 15 ft [4.572 m]< Z <Zg -->(2.01*(Z/zg)^(2/Alpha) {Table 26.10-1}	= 0.853
Kzt	= Topographic Factor is 1 since no Topographic feature specified	= 1.000
Kd	= Wind Directionality Factor per Table 26.6-1	= 0.85
Zg	= Elevation above Sea Level	= 0.000 ft
Ke	= Ground Elevation Factor: Ke = e^-(0.0000362*Zg) {Table 26.9-1}	= 1.000
GCPi	= Ref Table 26.13-1 for Enclosed Building	= +/-0.18
RA	= Roof Area	= 8365.28 sq ft
LF	= Load Factor based upon ASD Design	= 0.60

```
qh        = (0.00256 * Kh * Kzt * Kd * Ke * V^2) * LF                  = 34.10 psf
qin       = For Negative Internal Pressure of Enclosed Building use qh*LF   = 34.10 psf
qip       = For Positive Internal Pressure of Enclosed Building use qh*LF   = 34.10 psf
```

Gust Factor Calculation:

```
Gust Factor Category I Rigid Structures - Simplified Method
G1        = For Rigid Structures (Nat. Freq.>1 Hz) use 0.85               = 0.85
Gust Factor Category II Rigid Structures - Complete Analysis
Zm        = Max(0.6 * Ht, Zmin)                                           = 15.000 ft
Izm       = Cc * (33 / Zm) ^ 0.167                                        = 0.228
Lzm       = L * (Zm / 33) ^ Eps                                           = 427.057
B         = Structure Width Normal to Wind                                = 120.000 ft
Q         = (1 / (1 + 0.63 * ((B + Ht) / Lzm)^0.63))^0.5                  = 0.875
G2        = 0.925*((1+0.7*Izm*3.4*Q)/(1+0.7*3.4*Izm))                      = 0.859
Gust Factor Used in Analysis
G         = Lessor Of G1 Or G2                                            = 0.850
```

MWFRS Wind Normal to Ridge (Ref Fig 27.3-1}

```
h         = Mean Roof Height Of Building                                  = 15.330 ft
RHt       = Ridge Height Of Roof                                          = 20.330 ft
B         = Horizontal Dimension Of Building Normal To Wind Direction     = 120.000 ft
L         = Horizontal Dimension Of building Parallel To Wind Direction   = 60.000 ft
L/B       = Ratio Of L/B used For Cp determination                        = 0.500
h/L       = Ratio Of h/L used For Cp determination                        = 0.255
Slope     = Slope of Roof                                                 = 18.43 Deg
OH_Bot_-Y = Overhang Coefficient Bottom Surface (Windward Only)           = 0.8, 0.8
OH_Top_+X+Y= Overhang Coefficient Overhang +X+Y (Leeward)                  = -0.57, -0.57
OH_Top_+X-Y= Overhang Coefficient Overhang +X-Y (Windward)                 = 0.13, -0.37
OH_Top_+Y = Overhang Coefficient Top +Y (Leeward)                         = -0.57, -0.57
OH_Top_-X+Y= Overhang Coefficient Overhang -X+Y (Leeward)                  = -0.57, -0.57
OH_Top_-X-Y= Overhang Coefficient Overhang -X-Y (Windward)                 = 0.13, -0.37
OH_Top_-Y = Overhang Coefficient Top Windward Edge                        = 0.13, -0.37
Roof_LW   = Roof Coefficient (Leeward)                                    = -0.57, -0.57
Roof_WW   = Roof Coefficient (Windward)                                   = 0.13, -0.37

Cp_WW     = Windward Wall Coefficient (All L/B Values)                    = 0.80
Cp_LW     = Leward Wall Coefficient using L/B                             = -0.50
Cp_SW     = Side Wall Coefficient (All L/B values)                        = -0.70
GCpn_WW   = Parapet Combined Net Pressure Coefficient (Windward Parapet)  = 1.50
GCpn_LW   = Parapet Combined Net Pressure Coefficient (Leeward Parapet)   = -1.00
```

Wall Wind Pressures based On Positive Internal Pressure (+GCPi) - Normal to Ridge
All wind pressures include a load factor of 0.6

Elev ft	Kz	Kzt	qz psf	GCPi	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
10.33	0.849	1.000	33.94	0.18	16.94	-20.63	-26.43	37.57	9.60

Wall Wind Pressures based on Negative Internal Pressure (-GCPi) - Normal to Ridge
All wind pressures include a load factor of 0.6

Elev ft	Kz	Kzt	qz psf	GCPi	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
10.33	0.849	1.000	33.94	-0.18	29.22	-8.35	-14.15	37.57	9.60

```
Notes Wall Pressures:
Kz       = Velocity Press Exp Coeff         Kzt      = Topographical Factor
qz       = 0.00256*Kz*Kzt*Kd*V^2            GCPi     = Internal Press Coefficient
Side     = qh * G * Cp_SW - qip * +GCPi     Windward = qz * G * Cp_WW - qip * +GCPi
Leeward  = qh * G * Cp_LW - qip * +GCPi     Total    = Windward Press - Leeward Press
* Minimum Pressure: Para 27.1.5 no less than 9.60 psf (Incl LF) applied to Walls
+ Pressures Acting TOWARD Surface          - Pressures Acting AWAY from Surface
```

Roof Wind Pressures for Positive & Negative Internal Pressure (+/- GCPi) - Normal to Ridge
All wind pressures include a load factor of 0.6

Roof Var	Start Dist ft	End Dist ft	Cp_min	Cp_max	GCPi	Pressure Pn_min* psf	Pressure Pp_min* psf	Pressure Pn_max psf	Pressure Pp_max psf
OH_Bot_-Y	N/A	N/A	0.800	0.800	0.000	23.19	23.19	23.19	23.19
OH_Top_+X+Y	N/A	N/A	-0.570	-0.570	0.000	-16.52	-16.52	-16.52	-16.52
OH_Top_+X-Y	N/A	N/A	0.130	-0.370	0.000	3.77	3.77	-10.72	-10.72
OH_Top_+Y	N/A	N/A	-0.570	-0.570	0.000	-16.52	-16.52	-16.52	-16.52

OH_Top_-X+Y	N/A	N/A	-0.570	-0.570	0.000	-16.52	-16.52	-16.52	-16.52
OH_Top_-X-Y	N/A	N/A	0.130	-0.370	0.000	3.77	3.77	-10.72	-10.72
OH_Top_-Y	N/A	N/A	0.130	-0.370	0.000	3.77	3.77	-10.72	-10.72
Roof_LW	N/A	N/A	-0.570	-0.570	0.180	-10.38	-22.66	-10.38	-22.66
Roof_WW	N/A	N/A	0.130	-0.370	0.180	9.91	-2.37	-4.59	-16.86

Notes Roof Pressures:
Start Dist = Start Dist from Windward Edge   End Dist = End Dist from Windward Edge
Cp_Max = Largest Coefficient Magnitude   Cp_Min = Smallest Coefficient Magnitude
Pp_max = qh*G*Cp_max - qip*(+GCPi)   Pn_max = qh*G*Cp_max - qin*(-GCpi)
Pp_min* = qh*G*Cp_min - qip*(+GCPi)   Pn_min* = qh*G*Cp_min - qin*(-GCpi)
OH = Overhang   X = Dir along Ridge   Y = Dir Perpendcular to Ridge   Z = Vertical
* The smaller uplift pressures due to Cp_Min can become critical when wind is combined with roof live load or snow load; load combinations are given in ASCE 7
+ Pressures Acting TOWARD Surface   - Pressures Acting AWAY from Surface

MWFRS Wind Parallel to Ridge (Ref Fig 27.3-1}

h	= Mean Roof Height Of Building	= 15.330 ft
RHt	= Ridge Height Of Roof	= 20.330 ft
B	= Horizontal Dimension Of Building Normal To Wind Direction	= 60.000 ft
L	= Horizontal Dimension Of building Parallel To Wind Direction	= 120.000 ft
L/B	= Ratio Of L/B used For Cp determination	= 2.000
h/L	= Ratio Of h/L used For Cp determination	= 0.128
Slope	= Slope of Roof	= 18.43 Deg
OH_Bot	= Overhang Bottom (Windward Face Only)	= 0.8, 0.8
OH_Top	= Overhang Top Coeff (0 to h/2) (0.000 ft to 2.000 ft)	= -0.18, -0.9
OH_Top	= Overhang Top Coeff (0 to h/2) (2.000 ft to 7.665 ft)	= -0.18, -0.9
OH_Top	= Overhang Top Coeff (h/2 to h) (7.665 ft to 15.330 ft)	= -0.18, -0.9
OH_Top	= Overhang Top Coeff (h to 2h) (15.330 ft to 30.660 ft)	= -0.18, -0.5
OH_Top	= Overhang Top Coeff (>2h) (>30.660 ft)	= -0.18, -0.3
OH_Top	= Overhang Top Coeff (>2h) (>122.000 ft)	= -0.18, -0.3
Roof	= Roof Coeff (0 to h/2) (2.000 ft to 7.665 ft)	= -0.18, -0.9
Roof	= Roof Coeff (h/2 to h) (7.665 ft to 15.330 ft)	= -0.18, -0.9
Roof	= Roof Coeff (h to 2h) (15.330 ft to 30.660 ft)	= -0.18, -0.5
Roof	= Roof Coeff (>2h) (>30.660 ft)	= -0.18, -0.3
Cp_WW	= Windward Wall Coefficient (All L/B Values)	= 0.80
Cp_LW	= Leward Wall Coefficient using L/B	= -0.30
Cp_SW	= Side Wall Coefficient (All L/B values)	= -0.70
GCpn_WW	= Parapet Combined Net Pressure Coefficient (Windward Parapet)	= 1.50
GCpn_LW	= Parapet Combined Net Pressure Coefficient (Leeward Parapet)	= -1.00

Wall Wind Pressures based On Positive Internal Pressure (+GCPi) - Parallel to Ridge
All wind pressures include a load factor of 0.6

Elev ft	Kz	Kzt	qz psf	GCPi	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
20.33	0.905	1.000	36.19	0.18	18.47	-14.83	-26.43	33.30	9.60
15.33	0.853	1.000	34.10	0.18	17.05	-14.83	-26.43	31.88	9.60
10.33	0.849	1.000	33.94	0.18	16.94	-14.83	-26.43	31.78	9.60

Wall Wind Pressures based on Negative Internal Pressure (-GCPi) - Parallel to Ridge
All wind pressures include a load factor of 0.6

Elev ft	Kz	Kzt	qz psf	GCPi	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
20.33	0.905	1.000	36.19	-0.18	30.74	-2.56	-14.15	33.30	9.60
15.33	0.853	1.000	34.10	-0.18	29.32	-2.56	-14.15	31.88	9.60
10.33	0.849	1.000	33.94	-0.18	29.22	-2.56	-14.15	31.78	9.60

Notes Wall Pressures:
Kz = Velocity Press Exp Coeff   Kzt = Topographical Factor
qz = 0.00256*Kz*Kzt*Kd*V^2   GCPi = Internal Press Coefficient
Side = qh * G * Cp_SW - qip * +GCPi   Windward = qz * G * Cp_WW - qip * +GCPi
Leeward = qh * G * Cp_LW - qip * +GCPi   Total = Windward Press - Leeward Press
* Minimum Pressure: Para 27.1.5 no less than 9.60 psf (Incl LF) applied to Walls
+ Pressures Acting TOWARD Surface   - Pressures Acting AWAY from Surface

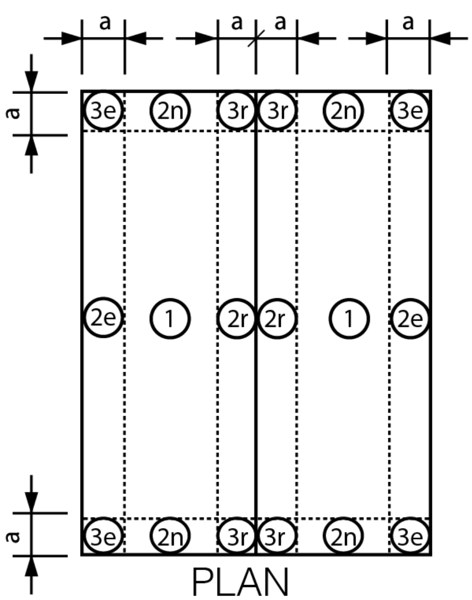
Roof Wind Pressures for Positive & Negative Internal Pressure (+/- GCPi) - Parallel to Ridge
All wind pressures include a load factor of 0.6

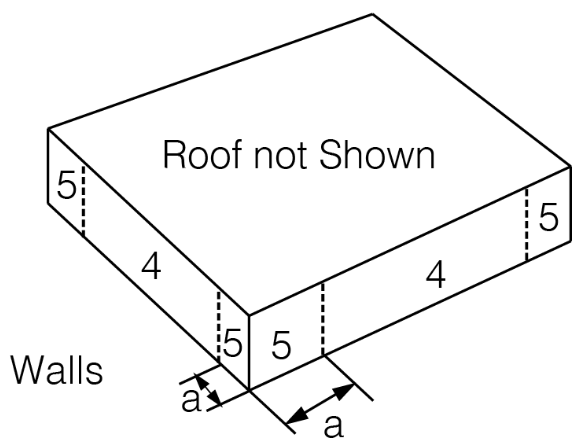
Roof Var	Start	End	Cp_min	Cp_max	GCPi	Pressure	Pressure	Pressure	Pressure

	Dist ft	Dist ft				Pn_min* psf	Pp_min* psf	Pn_max psf	Pp_max psf
OH_Bot	N/A	N/A	0.800	0.800	0.000	23.19	23.19	23.19	23.19
OH_Bot	N/A	N/A	0.800	0.800	0.000	23.19	23.19	23.19	23.19
OH_Top (-X+Y)	0.000	2.000	-0.180	-0.900	0.000	-5.22	-5.22	-26.08	-26.08
OH_Top (-X-Y)	0.000	2.000	-0.180	-0.900	0.000	-5.22	-5.22	-26.08	-26.08
OH_Top (-Y)	2.000	7.665	-0.180	-0.900	0.000	-5.22	-5.22	-26.08	-26.08
OH_Top (+Y)	2.000	7.665	-0.180	-0.900	0.000	-5.22	-5.22	-26.08	-26.08
OH_Top (-Y)	7.665	15.330	-0.180	-0.900	0.000	-5.22	-5.22	-26.08	-26.08
OH_Top (+Y)	7.665	15.330	-0.180	-0.900	0.000	-5.22	-5.22	-26.08	-26.08
OH_Top (-Y)	15.330	30.660	-0.180	-0.500	0.000	-5.22	-5.22	-14.49	-14.49
OH_Top (+Y)	15.330	30.660	-0.180	-0.500	0.000	-5.22	-5.22	-14.49	-14.49
OH_Top (-Y)	30.660	122.000	-0.180	-0.300	0.000	-5.22	-5.22	-8.69	-8.69
OH_Top (+Y)	30.660	122.000	-0.180	-0.300	0.000	-5.22	-5.22	-8.69	-8.69
OH_Top (+X+Y)	122.000	124.000	-0.180	-0.300	0.000	-5.22	-5.22	-8.69	-8.69
OH_Top (+X-Y)	122.000	124.000	-0.180	-0.300	0.000	-5.22	-5.22	-8.69	-8.69
Roof (+Y)	2.000	7.665	-0.180	-0.900	0.180	0.92	-11.35	-19.95	-32.22
Roof (-Y)	2.000	7.665	-0.180	-0.900	0.180	0.92	-11.35	-19.95	-32.22
Roof (+Y)	7.665	15.330	-0.180	-0.900	0.180	0.92	-11.35	-19.95	-32.22
Roof (-Y)	7.665	15.330	-0.180	-0.900	0.180	0.92	-11.35	-19.95	-32.22
Roof (+Y)	15.330	30.660	-0.180	-0.500	0.180	0.92	-11.35	-8.35	-20.63
Roof (-Y)	15.330	30.660	-0.180	-0.500	0.180	0.92	-11.35	-8.35	-20.63
Roof (+Y)	30.660	122.000	-0.180	-0.300	0.180	0.92	-11.35	-2.56	-14.83
Roof (-Y)	30.660	122.000	-0.180	-0.300	0.180	0.92	-11.35	-2.56	-14.83

```
Notes Roof Pressures:
Start Dist = Start Dist from Windward Edge  End Dist = End Dist from Windward Edge
Cp_Max     = Largest Coefficient Magnitude  Cp_Min   = Smallest Coefficient Magnitude
Pp_max     = qh*G*Cp_max - qip*(+GCPi)      Pn_max   = qh*G*Cp_max - qin*(-GCpi)
Pp_min*    = qh*G*Cp_min - qip*(+GCPi)      Pn_min*  = qh*G*Cp_min - qin*(-GCpi)
OH = Overhang   X = Dir along Ridge   Y = Dir Perpendcular to Ridge  Z = Vertical
* The smaller uplift pressures due to Cp_Min can become critical when wind is combined
  with roof live load or snow load;  load combinations are given in ASCE 7
+ Pressures Acting TOWARD Surface          - Pressures Acting AWAY from Surface
```

Components and Cladding (C&C) Calculations per Ch 30 Part 1:






```
h/W     = Ratio of mean roof height to building width                    = 0.255
h/L     = Ratio of mean roof height to building length                   = 0.128
h       = Mean Roof Height above grade                                   = 15.330 ft
Kh      = 15 ft [4.572 m]< Z <Zg -->(2.01*(Z/zg)^(2/Alpha) {Table 26.10-1}= 0.853
Kzt     = Topographic Factor is 1 since no Topographic feature specified  = 1.000
Kd      = Wind Directionality Factor per Table 26.6-1                    = 0.85
GCPi    = Ref Table 26.13-1 for Enclosed Building                        = +/-0.18
LF      = Load Factor based upon ASD Design                              = 0.60
qh      = (0.00256 * Kh * Kzt * Kd * Ke * V^2) * LF                      = 34.10 psf
LHD     = Least Horizontal Dimension:  Min(B, L)                         = 60.000 ft
a1      = Min(0.1 * LHD,  0.4 * h)                                       = 6.000 ft
a       = Max(a1, 0.04 * LHD, 3 ft [0.9 m])                              = 6.000 ft
h/B     = Ratio of mean roof height to least hor dim: h / B              = 0.255
```

Wind Pressures for C&C Ch 30 Pt 1
All wind pressures include a load factor of 0.6

Description	Zone	Width	Span	Area	1/3 Rule	Ref Fig	GCp Max	GCp Min	p Max	p Min
ft		ft	ft	sq ft					psf	psf
WINDOW A	4	2.000	5.000	10.00	No	30.3-1	1.000	-1.100	40.24	-43.64
WINDOW A	5	2.000	5.000	10.00	No	30.3-1	1.000	-1.400	40.24	-53.87
WINDOW B	4	4.170	5.500	22.94	No	30.3-1	0.936	-1.036	38.06	-41.47
WINDOW B	5	4.170	5.500	22.94	No	30.3-1	0.936	-1.273	38.06	-49.53
WINDOW C	4	3.500	8.000	28.00	No	30.3-1	0.921	-1.021	37.54	-40.95
WINDOW C	5	3.500	8.000	28.00	No	30.3-1	0.921	-1.242	37.54	-48.49
WINDOW D	4	2.670	8.000	21.36	No	30.3-1	0.942	-1.042	38.25	-41.66
WINDOW D	5	2.670	8.000	21.36	No	30.3-1	0.942	-1.284	38.25	-49.91
WINDOW F	4	3.170	5.500	17.44	No	30.3-1	0.957	-1.057	38.78	-42.19
WINDOW F	5	3.170	5.500	17.44	No	30.3-1	0.957	-1.315	38.78	-50.97
WINDOW G	4	2.330	6.000	13.98	No	30.3-1	0.974	-1.074	39.36	-42.77
WINDOW G	5	2.330	6.000	13.98	No	30.3-1	0.974	-1.349	39.36	-52.12
WINDOW H	4	10.330	2.670	27.58	No	30.3-1	0.922	-1.022	37.58	-40.99
WINDOW H	5	10.330	2.670	27.58	No	30.3-1	0.922	-1.244	37.58	-48.57
DOOR 1	4	3.170	8.000	25.36	No	30.3-1	0.929	-1.029	37.80	-41.21
DOOR 1	5	3.170	8.000	25.36	No	30.3-1	0.929	-1.257	37.80	-49.01
DOOR 2	4	4.250	8.000	34.00	No	30.3-1	0.906	-1.006	37.04	-40.45
DOOR 2	5	4.250	8.000	34.00	No	30.3-1	0.906	-1.212	37.04	-47.47

Area = Span Length x Effective Width
1/3 Rule = Effective width need not be less than 1/3 of the span length
GCp = External Pressure Coefficients taken from Figures 30.3-1 through 30.3-7
p = Wind Pressure: qh*(GCp - GCpi) [Eqn 30.3-1]*
* Per Para 30.2.2 the Minimum Pressure for C&C is 9.60 psf [0.460 kPa] {Includes LF}

a=6.0 ft				ZONE 4		ZONE 5	
Description	Width ft	Span ft	Area sq ft	p Max psf	p Min psf	p Max psf	p Min psf
WINDOW A	2.00	5.00	10.00	40.24	-43.64	40.24	-53.87
WINDOW B	4.17	5.50	22.94	38.06	-41.47	38.06	-49.53
WINDOW C	3.50	8.00	28.00	37.54	-40.95	37.54	-48.49
WINDOW D	2.67	8.00	21.36	38.25	-41.66	38.25	-49.91
WINDOW F	3.17	5.50	17.44	38.78	-42.19	38.78	-50.97
WINDOW G	2.33	6.00	13.98	39.36	-42.77	39.36	-52.12
WINDOW H	10.33	2.67	27.58	37.58	-40.99	37.58	-48.57
DOOR 1	3.17	8.00	25.36	37.80	-41.21	37.80	-49.01
DOOR 2	4.25	8.00	34.00	37.04	-40.45	37.04	-47.47