JOB TITLE	Example 3.5 - 160'	Building on E	scarpmer
JOB NO.		SHEET NO.	
<b>CALCULATED BY</b>		DATE	
CHECKED BY		DATE	

CS2024 Ver 2024-03-08 <u>www.struware.com</u>

# STRUCTURAL CALCULATIONS

FOR

**Example 3.5 - 160' Building on Escarpment** 

Guide to Wind Load Procedures ASCE 7-22

Phone

	JOB TITLE	Example 3.5 -	160'	Buildina	on Escarpmer	٦t
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JOB NO.	SHEET NO.
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# **Code Search**

**Code:** ASCE 7 - 22

Occupancy:

Occupancy Group = B Business

## **Risk Category & Importance Factors:**

Risk Category = II

Wind Factor = 1.00 Snow Factor 1.00

Seismic Importance factor = 1.00

## **Type of Construction:**

Fire Rating:

Roof = 0.0 hrFloor = 0.0 hr

# **Building Geometry:**

Roof angle (θ)	0.00 / 12	0.0 deg
Building length	200.0 ft	
Least width	100.0 ft	
Mean Roof Ht (h)	157.0 ft	
Parapet ht above grd	160.0 ft	
Minimum parapet ht	3.0 ft	
hb for Elevated bldg	0.0 ft	

### **Live Loads:**

Roof 0 to 200 sf: 20 psf

200 to 600 sf: 24 - 0.02Area, but not less than 12 psf

over 600 sf: 12 psf

Roofs used for roof gardens 100 psf

Floor:

Typical Floor 50 psf
Partitions 15 psf
Corridors above first floor 80 psf
Lobbies & first floor corridors 100 psf
Stairs and exit ways 100 psf

# Company

Address City, State Phone

	JOB TITLE	Example 3.5 - 7	160'	Building	on Escarpme
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JOB NO.	SHEET NO.
CALCULATED BY	DATE
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# Wind Loads: ASCE 7- 22

Ultimate Wind Speed 140 mph Nominal Wind Speed 108.4 mph Risk Category Ш Exposure Category В Enclosure Classif. **Enclosed Building** Internal pressure +/-0.18 Bldg Directionality (Kd) 0.85 Kh MWFRS<=60 1.072 1.072 Kh all other Type of roof Monoslope

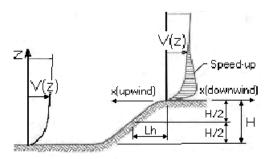
#### Topographic Factor (Kzt)

Topography	2D Escarpment
Hill Height (H)	80.0 ft
Half Hill Length (Lh)	100.0 ft
Actual H/Lh =	0.80
Use H/Lh =	0.50
Modified Lh =	160.0 ft
From top of crest: x =	50.0 ft
Bldg up/down wind?	downwind

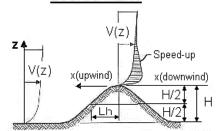
H/Lh= 0.50  $K_1 = 0.375$  x/Lh = 0.31  $K_2 = 0.922$  z/Lh = 0.98  $K_3 = 0.086$ 

At Mean Roof Ht:

 $Kzt = (1+K_1K_2K_3)^2 = 1.06$ 



#### **ESCARPMENT**



2D RIDGE or 3D AXISYMMETRICAL HILL

# Gust Effect Factor

h =	157.0 ft	Flexible structure if natural frequency < 1 Hz (T > 1 second).
B =	100.0 ft	If building h/B>4 then may be flexible and should be investigated
/z (0.6h) =	94.2 ft	h/B = 1.57

## **G** = **0.83** Using rigid structure formula

Rigio	d Structure	Flexible or Dy	namically Se	ensitive S	tructure		
ē =	0.33	Natural Frequency $(\eta_1) =$	0.7 Hz				
ℓ = z <sub>min</sub> =	320 ft 30 ft	Damping ratio (β) = /b =	0.01 0.470				
$c = g_Q, g_V =$	0.30 3.4	/α = Vz =	0.222 121.8				
$L_z =$	453.9 ft	$N_1 =$	2.61				
Q =	0.83	$R_n =$	0.076				
$I_z =$	0.25	$R_h =$	0.212	η =	4.149	h =	157.0 ft
G =	0.83	$R_B =$	0.307	η =	2.643		
		$R_L =$	0.055	η =	17.695		
		$g_R =$	4.104				
		R =	0.525				
		Gf =	0.951				

JOB TITLE	Example 3.5 - 160'	Building or	n Escarpme
JOB NO.		SHEET NO.	
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## **Ground Elevation Factor (Ke)**

Grd level above sea level = 0 ft Ke = 1.0000

Constant = 0.00256 0.00256Ke = 0.00256

#### **Enclosure Classification**

<u>Test for Enclosed Building:</u> Ao < 0.01Ag or 4 sf, whichever is smaller

<u>Test for Open Building:</u> All walls are at least 80% open.

Ao ≥ 0.8Ag

<u>Test for Partially Enclosed Building:</u> Predominately open on one side only

	Input			Test	
Ao	500.0	sf	Ao ≥ 1.1Aoi	NO	1
Ag Aoi	600.0	sf	Ao > 4sf or 0.01Ag	YES	
Aoi	1000.0	sf	Aoi / Agi ≤ 0.20	YES	Building is NOT
Agi	10000.0	sf			Partially Enclosed

Conditions to qualify as Partially Enclosed Building. Must satisfy all of the following:

Ao ≥ 1.1Aoi

Ao > smaller of 4sf or 0.01 Ag

Aoi / Agi ≤ 0.20

Where:

Ao = the total area of openings in a wall that receives positive external pressure.

Ag = the gross area of that wall in which Ao is identified.

Aoi = the sum of the areas of openings in the building envelope (walls and roof) not including Ao.

Agi = the sum of the gross surface areas of the building envelope (walls and roof) not including Ag.

Test for Partially Open Building: A building that does not qualify as open, enclosed or partially enclosed.

(This type building will have same wind pressures as an enclosed building.)

#### Reduction Factor for large volume partially enclosed buildings (Ri):

If the partially enclosed building contains a single room that is unpartitioned , the internal pressure coefficient may be multiplied by the reduction factor Ri.

Total area of all wall & roof openings (Aog): - SF Unpartitioned internal volume (Vi): - CF

Ri = 1.00

Company
Address
City, State
Phone

IOR TITLE	Example 3.5 - 160	' Building on	Escarnment
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JOB NO.	SHEET NO.	
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CHECKED BY	 DATE	

## Wind Loads - MWFRS all h (Except for Open Buildings)

Base pressure (qh) = 57.0 psf Kh = 1.072 GCpi = +/-0.18(Kd qh) = 48.5 psf Bldg dim parallel to ridge = 200.0 ft G = 0.83Roof Angle ( $\theta$ ) = 0.0 deg Bldg dim normal to ridge = 100.0 ft qi = qh

Roof Angle ( $\theta$ ) = 0.0 deg Bldg dim normal to ridge = 100.0 ft Roof tributary area: h = 157.0 ft

Wind normal to ridge =(h/2)\*L: 15700 sf ridge ht = 157.0 ft

Wind parallel to ridge =(h/2)\*L: 7850 sf

Ultimate Wind Surface Pressures (psf)

Ottimate Wind Outrace Fressures (psi)										
		Wind Norn	nal to Ridge			Wind	Parallel to	Ridge		
	L/B =	0.50	h/L =	1.57		L/B = 2.00		h/L = 0.79		
Surface	Ср	$q_hGC_p$	w/+q <sub>i</sub> GC <sub>pi</sub>	w/-q <sub>h</sub> GCpi	Dist.*	Ср	$q_hGC_p$	w/ +q <sub>i</sub> GC <sub>pi</sub>	w/ -q <sub>h</sub> GC <sub>pi</sub>	
Windward Wall (WW)	0.80	32.3	see tab	le below		0.80	32.3	see t	able below	
Leeward Wall (LW)	-0.50	-20.2	-28.9	-11.5		-0.30	-12.1	-20.8	-3.4	
Side Wall (SW)	-0.70	-28.3	-37.0	-19.6		-0.70	-28.3	-37.0	-19.6	
Leeward Roof (LR)		**				Inc	cluded in w	indward roof		
Neg Windward Roof: 0 to h/2*	-1.04	-42.0	-50.7	-33.3	0 to h/2*	-0.98	-39.6	-48.3	-30.9	
> h/2*	-0.70	-28.3	-37.0	-19.6	h/2 to h*	-0.79	-31.8	-40.5	-23.0	
					h to 2h*	-0.61	-24.8	-33.5	-16.1	
Pos/min windward roof press.	-0.18	-7.3	-16.0	1.5	Min press.	-0.18	-7.3	-16.0	1.5	

<sup>\*</sup>Horizontal distance from windward edge

For monoslope roofs, entire roof surface is either windward or leeward surface.

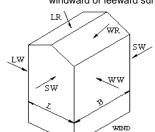
Windward roof overhangs: 32.3 psf (upward: add to qhGCp windward roof pressure)

Para	pet

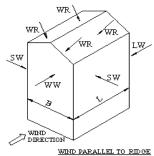
Z	Kz	Kzt	Kdqp (psf)
160.0 ft	1.077	1.06	48.6

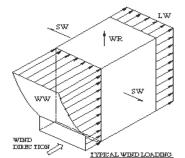
Windward parapet: 72.9 pst (GCpn = +1.5) Leeward parapet: -48.6 psf (GCpn = -1.0)

	<u>Windwar</u>	d Wall Pre	essures at "z	z" (psf)			Combined V	VW + LW
				V	Windward Wa	all	Wind Normal	Wind Parallel
	z	Kz	Kzt	$q_zGC_p$	$w/+q_iGC_{pi}$	$w/-q_hGC_{pi}$	to Ridge	to Ridge
•	0 to 15'	0.57	1.71	27.9	19.1	36.6	48.1	40.0
	20.0 ft	0.62	1.60	28.1	19.3	36.8	48.3	40.2
	25.0 ft	0.66	1.55	28.9	20.1	37.6	49.1	41.0
	30.0 ft	0.69	1.50	29.4	20.7	38.1	49.6	41.5
	40.0 ft	0.74	1.44	30.5	21.8	39.2	50.7	42.6
	50.0 ft	0.79	1.37	30.8	22.1	39.5	51.0	42.9
	60.0 ft	0.83	1.31	31.0	22.3	39.7	51.2	43.1
	70.0 ft	0.86	1.27	31.1	22.4	39.8	51.3	43.2
	80.0 ft	0.90	1.23	31.2	22.5	39.9	51.4	43.3
	90.0 ft	0.92	1.19	31.3	22.6	40.0	51.5	43.4
	100.0 ft	0.95	1.16	31.4	22.7	40.1	51.6	43.5
	120.0 ft	1.00	1.13	32.0	23.3	40.7	52.2	44.1
	140.0 ft	1.04	1.09	32.3	23.6	41.0	52.5	44.4
h=	157.0 ft	1.07	1.07	32.6	23.9	41.3	52.8	44.7
n=	157.0 ft	1.07	1.07	32.6	23.9	41.3	52.8	44.7



WIND NORMAL TO RIDGE





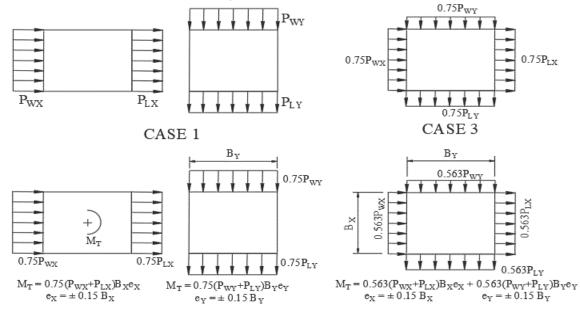
<sup>\*\*</sup>Roof angle < 10 degrees. Therefore, leeward roof is included in windward roof pressure zones.

 JOB NO.
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NOTE: ASCE 7 requires the application of full and partial loading of the wind pressures per the 4 cases below.



CASE 2

CASE 4

#### **Wind Forces at Floors**

Total Floors above grade = 11T/Fdn (dist below grade) = 2.0 ft  $\begin{array}{llll} \mbox{Building dimension (parallel with ridge)} = & 200.0 \mbox{ ft} & e = & 30.00 \mbox{ ft} \\ \mbox{Building dimension (normal to ridge)} = & 100.0 \mbox{ ft} & e = & 15.00 \mbox{ ft} \\ \end{array}$ 

L is the building dimension parallel to the wind direction

	Elevation	Height of			Wind	Normal to R	idge		_	Wind	Parallel to I	Ridge	
	Above	Centroid				Applied	Story	Overturning		Applied	Story	Overturning	
Level	Grade (ft)	to Fdn (ft)	L	В	Area (sf)	Force (k)	Shear (k)	Moment ('k)	Area	Force (k)	Shear (k)	Moment ('k)	
Equip,etc	158.00	160.00	wind or	n equip, scree	nwalls, etc =	2				0			
Parapet	160.00	160.50	100.0	200.0	600.0	72.9			300.0	36.4			
T/Ridge	157.00	159.00	100.0	200.0	0.0	0.0			0.0	0.0			
Roof	157.00	159.00	100.0	200.0	1,400.0	73.8	148.7	111.3	700.0	31.3	67.7	54.6 R	oof
11	143.00	145.00	100.0	200.0	2,800.0	146.8	295.5	2,192.9	1,400.0	62.1	129.8	1,002.3	11
10	129.00	131.00	100.0	200.0	2,800.0	146.1	441.6	6,329.9	1,400.0	61.7	191.5	2,819.2	10
9	115.00	117.00	100.0	200.0	2,800.0	145.5	587.0	12,511.8	1,400.0	61.4	252.9	5,500.3	9
8	101.00	103.00	100.0	200.0	2,800.0	145.0	732.0	20,730.1	1,400.0	61.2	314.1	9,041.2	8
7	87.00	89.00	100.0	200.0	2,800.0	144.6	876.6	30,978.0	1,400.0	61.0	375.1	13,438.6	7
6	73.00	75.00	100.0	200.0	2,800.0	144.3	1,020.9	43,250.6	1,400.0	60.9	436.0	18,690.0	6
5	59.00	61.00	100.0	200.0	2,800.0	144.0	1,165.0	57,543.9	1,400.0	60.7	496.6	24,793.3	5
4	45.00	47.00	100.0	200.0	2,800.0	143.3	1,308.2	73,853.2	1,400.0	60.3	557.0	31,746.4	4
3	31.00	33.00	100.0	200.0	2,800.0	141.4	1,449.6	92,168.5	1,400.0	59.4	616.3	39,544.0	3
2	17.00	19.00	100.0	200.0	3,100.0	151.2	1,600.8	112,462.8	1,550.0	63.1	679.4	48,172.8	2
1	0.00	2.00	100.0	200.0	1,700.0	84.5	1,685.3	139,676.9	850.0	35.4	714.8	59,723.3	1
GRD		2.00						139,676.9				59,723.3 G	RD
FDN		0.00						143,047.6				61,153.0 F	DN

				_
IOB TITLI	E Example	3.5 - 160'	Building c	n Escarpment

SHEET NO.	JOB NO.
DATE	CALCULATED BY
DATE	CHECKED BY

#### **Ultimate Wind Pressures**

100.0 ft

100.0 ft

### Wind Loads - Components & Cladding : h > 60'

Base pressure (qh) = 57.0 psf 1.072 (Kd qh) =48.5 psf 157.0 ft Minimum parapet ht = 3.0 ft 0.0 deg Roof Angle ( $\theta$ ) = Kd qi = Kd qh = Type of roof = Monoslope 48.5 psf

a =	10.0 ft	<del>100.0 ft</del>
GCpi =	+/-0.18	

	GCp		Surface Pressure (psf)					
10 sf	50 sf	100 sf	500 sf	10 sf	50 sf	100 sf	500 sf	
-1.40	-1.19	-1.11	-0.90	-76.6	-66.6	-62.3	-52.3	
-2.30	-2.01	-1.89	-1.60	-120.2	-106.2	-100.2	-86.3	
-2.30	-2.01	-1.89	-1.60	-120.2	-106.2	-100.2	-86.3	
-	-	-	-	16.0	16.0	16.0	16.0	
-2.30	-2.04	-1.91	-1.60	-111.5	-98.7	-92.3	-77.5	
-3.20	-2.86	-2.69	-2.30	-155.1	-138.4	-130.3	-111.5	
-3.20	-2.86	-2.69	-2.30	-155.1	-138.4	-130.3	-111.5	
-4.10	-3.58	-3.29	-2.60	-198.7	-173.7	-159.3	-126.0	
	-1.40 -2.30 -2.30 - -2.30 -3.20 -3.20 -4.10	-1.40 -1.19 -2.30 -2.01 -2.30 -2.01 	-1.40 -1.19 -1.11 -2.30 -2.01 -1.89 -2.30 -2.01 -1.89 	-1.40	-1.40	-1.40	-1.40	

User input 80 sf 200 sf -63.7 -58.0 -94.2 -94.2 -102.2 -102.2 16.0 16.0 -94.4 -86.0 -132.9 -122.2 -132.9 -122.2 -164.0 -145.0

30.0 ft

Negative zone 3 = zone 2, since parapet >= 3ft.

Overhang pressures in the table above assume an internal pressure coefficient (Gcpi) of 0.0 Overhang soffit pressure equals adj wall pressure (which includes internal pressure of 8.7 psf)

### <u>Parapet</u>

Kd qp = 48.6 psf

Ī	Surrace Pressure (psr)						
Solid Parapet Pressure	10 sf	20 sf	50 sf	100 sf	200 sf	500 sf	
CASE A: Edge zones:	155.4	149.4	137.3	128.1	119.0	106.9	
Corner zones:	155.4	149.4	137.3	128.1	119.0	106.9	
CASE B : Edge zones:	-87.4	-87.4	-80.5	-75.3	-70.1	-63.2	
Corner zones:	-131.2	-131.2	-115.9	-104.4	-92.9	-77.7	

User input
50 sf
137.3
137.3
-80.5
-115 9

#### **Walls**

Surface Pressure at h GCp Area 100 sf 500 sf 100 sf 500 sf Negative Zone 4 -0.90 -0.80 -0.76 -0.70 -1.80 -1.40 -1.23 -96.0 -76.6 -68.2 Negative Zone 5 -1.00 -57.2 Positive Zone 4 & 5 0.90 0.75 0.69 0.60 52.3 45.1 41.9 37.8

NOTE: Negative zor	nes 4 & 5 pre	ssures appl	v to all height	s. Positive	pressures	varv with hei	aht, see bel	ow.

٧	Vall surfac	e pressure	at 'z'		Positiv	e zone 4 &	5 (psf)	
	Z	Kz	Kzt	qz (psf)	20	100	200	500
_	0 to 15'	0.57	1.71	41.8	46.3	40.0	37.4	33.8
	20.0 ft	0.62	1.60	42.1	46.6	40.3	37.6	34.0
	25.0 ft	0.66	1.55	43.3	47.7	41.2	38.4	34.7
	30.0 ft	0.69	1.50	44.1	48.4	41.8	39.0	35.2
	40.0 ft	0.74	1.44	45.7	49.9	43.0	40.1	36.1
	50.0 ft	0.79	1.37	46.2	50.3	43.4	40.4	36.4
	60.0 ft	0.83	1.31	46.5	50.5	43.6	40.6	36.6
	70.0 ft	0.86	1.27	46.7	50.7	43.7	40.7	36.7
	80.0 ft	0.90	1.23	46.8	50.8	43.8	40.8	36.8
	90.0 ft	0.92	1.19	46.9	51.0	43.9	40.9	36.9
	100.0 ft	0.95	1.16	47.1	51.1	44.1	41.0	37.0
	120.0 ft	1.00	1.13	48.0	51.9	44.7	41.6	37.5
	140.0 ft	1.04	1.09	48.4	52.3	45.1	41.9	37.8
=	157.0 ft	1.07	1.07	48.9	52.7	45.4	42.2	38.0

User input				
100 sf	200 sf			
-47.5	-45.4			
-76.6	-68.2			
45.1	41.9			

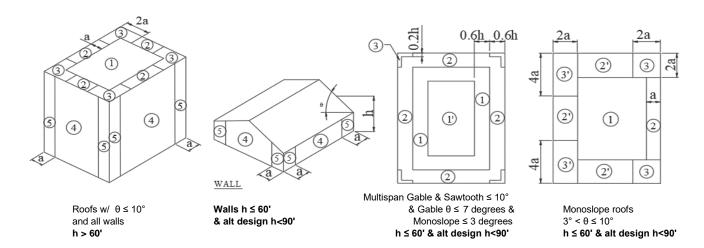
User	input
100 sf	200 sf
40.0	37.4
40.3	37.6
41.2	38.4
41.8	39.0
43.0	40.1
43.4	40.4
43.6	40.6
43.7	40.7
43.8	40.8
43.9	40.9
44.1	41.0
44.7	41.6
45.1	41.9
45.4	42.2

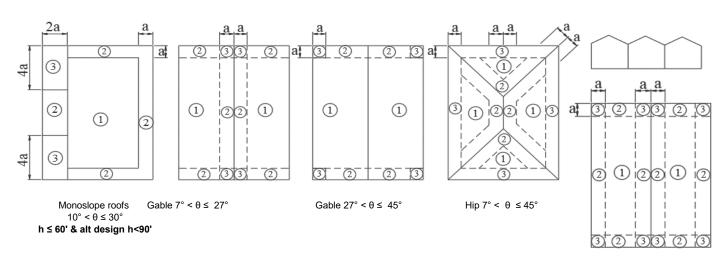
IOR TITLE	Example 3.5 -	160'	Ruilding	Λn	Escarnment
JOB IIILE	LAGITIDIE 3.3 -	100	Dullulliq	OH	Localpillelli

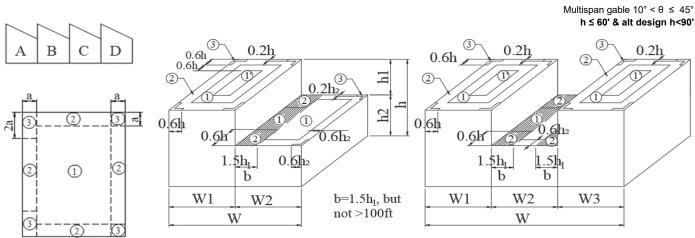
JOB NO. SHEET NO. DATE

CHECKED BY DATE

### **Location of C&C Wind Pressure Zones - ASCE 7-22**







Sawtooth  $10^{\circ} < \theta \le 45^{\circ}$ h  $\le 60'$  & alt design h<90'

Stepped roofs  $\theta \le 3^{\circ}$ h  $\le 60'$  & alt design h<90'

Note: The hatched area indicates where roof positive pressures are equal to the adjacent wall positive pressure.

Company
Address
City, State
Phone

JOB TITLE	Example 3.5 -	-160' I	Buildina on	Escarpment

JOB NO.	SHEET NO.	
CALCULATED BY	DATE	
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# **Roof Design Loads**

Items	Description	Multiple	psf (max)	psf (min)
Roofing	3 ply felt & gravel		5.5	5.0
Decking	Metal Roof deck, 1.5, 22 ga.		1.7	1.2
Framing	Steel roof joists & girders		3.0	2.0
Insulation	Rigid insulation, per 1"	x 2.0	3.0	1.4
Ceiling	Suspended acoustical tile		1.8	1.0
Sprinklers	Sprinklers		2.0	0.0
Mech & Elec	Mech. & Elec.		2.0	0.0
			0.0	0.0
	Actual D	Dead Load	O 19.0	O 10.6
	Use this [	DL instead	20.0	9.0
		Live Load	20.0	0.0
		Snow Load	12.1	0.0
	Ultimate Wind (zor	ne 2 - 100 sf)	16.0	-100.2
ASD Loading		D + Lr	40.0	-
	D + 0.75	5(0.6W + Lr)	42.2	-
	0.6	6*D + 0.6*W	-	-54.7
LRFD Loading	1.2D + 1.6	6 Lr + 0.5W	64.0	-
	== : ::	0W + 0.5Lr	50.0	-
	(	).9D + 1.0W	-	-92.1

**Roof Live Load Reduction** 

Roof angle 0.00 / 12 0.0 deg

0 to 200 sf: 20.0 psf 200 to 600 sf: 24 - 0.02Area, but not less than 12 psf

over 600 sf: 12.0 psf

300 sf 18.0 psf 400 sf 16.0 psf 500 sf 14.0 psf User Input: 450 sf 15.0 psf

JOB TITLE	Example 3.5 - 160'	Building on Escarpment

JOB NO.	SHEET NO.
CALCULATED BY	DATE
CHECKED BY	DATE

IBC alternate procedure

# Floor Design Loads

Items	Description	Multiple	psf (max)	psf (min)
Flooring	Carpet & pad		1.0	1.0
Topping	Concrete regular per 1"	x 4.3	53.8	51.6
Decking	Metal Floor deck - 2", 20ga		2.0	1.5
Framing	Steel floor bms/joists & girders		8.0	5.0
Topping	Deflection Concrete	x 0.8	10.0	1.6
Ceiling	Suspended acoustical tile		1.8	1.0
Sprinklers	Sprinklers		2.0	0.0
Mech & Elec	Mech. & Elec.		2.0	0.0
Misc.	Misc.		0.5	0.0
	Act	tual Dead Load	○ 81.1	• 61.7
	Use	this DL instead	85.0	O 65.0
		Partitions	15.0	0.0
		Live Load	50.0	0.0
	-	Total Live Load	65.0	0.0
		Total Load	150.0	61.7

## FLOOR LIVE LOAD REDUCTION (not including partitions)

NOTE: Not allowed for assembly occupancy or LL>100psf or passenger car garages, except may reduce members supporting 2 or more floors & non-assembly 20%.

		Smallest of:	_
L=L	_o(0.25+15/√K <sub>LL</sub> A <sub>T</sub> )	R= .08%(SF - 150)	
Unreduced design live load: Lo =	50 psf	R = 23.1(1+D/L) =	62.4%
		R= 40% beams; 60% co	olumns
Floor member & 1 floor cols $K_{LL} =$	2		
Tributary Area $A_T =$	300 sf	R =	12.0%
Reduced live load: L =	43.1 psf	Reduced live load: L =	44.0 psf
Columns (2 or more floors) $K_{LL} =$	4		
Tributary Area $A_T =$	500 sf	R =	28.0%
Reduced live load: L =	29.3 psf	Reduced live load: L =	36.0 psf

Company
Address
City, State
Phone

JOB TITLE	Example 3.5 ·	- 160'	Building or	n Escaroment

JOB NO.	SHEET NO.	
CALCULATED BY	DATE	
CHECKED BY	DATE	_

# Wall Design Load #1

Items	Description	Multiple	psf (max)	psf (min)
Sheathing	7/16" plywood/OSB		1.6	1.4
Sheathing	5/8" gypsum		2.8	2.5
Framing	6" metal studs @16"		2.5	0.9
veneer	4" Clay Brick		40.0	38.0
Wall Covering	1" Wood Paneling	x 0.38	0.9	0.9
Insulation	R-11 Fiberglass insul.		0.4	0.4
Mech & Elec	Mech. & Elec.		1.0	0.0
Misc.	Misc.		0.5	0.0
	Act	ual Dead Load	O 49.7	O 44.0
	Use t	this DL instead	• 50.0	• 40.0

# Wall Design Load #2

Items	Description	Multiple	psf (max)	psf (min)
Sheathing	7/16" plywood/OSB		1.6	1.4
Sheathing	5/8" gypsum		2.8	2.5
Framing	CMU wall		47.0	45.0
veneer	7/8" Stucco		10.0	10.0
			0.0	0.0
Insulation	R-11 Fiberglass insul.		0.4	0.4
Mech & Elec	Mech. & Elec.		1.0	0.0
Misc.	Misc.		0.5	0.0
			-	
	Actual De	ead Load	O 63.3	O 59.3
	Use this D	L instead	● 65.0	<b>●</b> 55.0

JOB TITLE	Example 3.5 -	160'	Building of	n Escarpment

JOB NO.	SHEET NO.	
CALCULATED BY	DATE	
CHECKED BY	DATE	

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### **CODE SUMMARY**

<u>Code:</u> ASCE 7 - 22

**Live Loads:** 

Roof 0 to 200 sf: 20 psf

200 to 600 sf: 24 - 0.02Area, but not less than 12 psf

over 600 sf: 12 psf

Roofs used for roof gardens 100 psf

Typical Floor 50 psf
Partitions 15 psf
Corridors above first floor 80 psf
Lobbies & first floor corridors 100 psf
Stairs and exit ways 100 psf

#### Dead Loads:

Floor 85.0 psf Roof 20.0 psf

#### **Roof Snow Loads:**

Design Uniform Roof Snow load 12.1 psf Flat Roof Snow Load Pf 4.1 psf Risk Category Balanced Snow Load Ps = 4.1 psf **Ground Snow Load** Pg = 5.0 psf Importance Factor = 1.00 Snow Exposure Factor Ce = 0.97 Thermal Factor Ct =1.20 Sloped-roof Factor Cs = 1.00 Pd = Drift Surcharge load Width of Snow Drift w = Winter wind Parameter W2 = 0.55

#### Earthquake Design Data:

**Risk Category** Ш Importance Factor I = 1.00 Mapped spectral response accelerat Ss = 0.60 g 0.10 g S1 = Site Class Sds = 0.007 Spectral Response Coef. Sd1 =0.007 Seismic Design Category

Basic Structural System = Structural steel systems not specifically detailed for seismic resistance
Seismic Resisting System = Structural steel systems not specifically detailed for seismic resistance

Analysis Procedure = Equivalent Lateral-Force Analysis

#### Rain Design Data:

Rain intensity i = 7.23 in/hrRain Load R = 34.8 psf

#### Wind Design Data:

Ultimate Design Wind Speed 140 mph 108.44 mph Nominal Design Wind Speed Risk Category Ш Mean Roof Ht (h) 157.0 ft **Exposure Category** В **Enclosed Building** Enclosure Classif. Internal pressure Coef. +/-0.18 Directionality (Kd) 0.85

Company
Address
City, State
Phone

JOB TITLE	Example	3.5 - 160'	Building on	Escarpment

JOB NO.	SHEET NO.	
CALCULATED BY	DATE	
CHECKED BY	 DATE	

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## **Component and Cladding Ultimate Wind Pressures**

Roof	Surface Pressure (psf)						
Area	10 sf	50 sf	100 sf	500 sf			
Negative Zone 1	-76.6	-66.6	-62.3	-52.3			
Negative Zone 2	-120.2	-106.2	-100.2	-86.3			
Negative Zone 3	-120.2	-106.2	-100.2	-86.3			
Positive All Zones	16.0	16.0	16.0	16.0			
Overhang Zone 1	-111.5	-98.7	-92.3	-77.5			
Overhang Zone 2	-155.1	-138.4	-130.3	-111.5			
Overhang Zone 3 @zone 4	-155.1	-138.4	-130.3	-111.5			
Overhang Zone 3 @zone 5	-198.7	-173.7	-159.3	-126.0			

Overhang soffit pressure equals adj wall pressure (which includes internal pressure of 8.7 psf)

-							
Parapet	Solid Parapet Pressure (psf)						
Area	10 sf	20 sf	50 sf	100 sf	200 sf	500 sf	
CASE A: Edge zones:	155.4	149.4	137.3	128.1	119.0	106.9	
Corner zones:	155.4	149.4	137.3	128.1	119.0	106.9	
CASE B: Edge zones:	-87.4	-87.4	-80.5	-75.3	-70.1	-63.2	
Corner zones:	-131.2	-131.2	-115.9	-104.4	-92.9	-77.7	

Wall	Surface Pressure (psf)					
Area	20 sf	100 sf	200 sf	500 sf		
Negative Zone 4	-52.3	-47.5	-45.4	-42.6		
Negative Zone 5	-96.0	-76.6	-68.2	-57.2		
Positive Zone 4 & 5						
0 to 15'	46.3	40.0	37.4	33.8		
20 ft	46.6	40.3	37.6	34.0		
25 ft	47.7	41.2	38.4	34.7		
30 ft	48.4	41.8	39.0	35.2		
40 ft	49.9	43.0	40.1	36.1		
50 ft	50.3	43.4	40.4	36.4		
60 ft	50.5	43.6	40.6	36.6		
70 ft	50.7	43.7	40.7	36.7		
80 ft	50.8	43.8	40.8	36.8		
90 ft	51.0	43.9	40.9	36.9		
100 ft	51.1	44.1	41.0	37.0		
120 ft	51.9	44.7	41.6	37.5		
140 ft	52.3	45.1	41.9	37.8		
h = 157 ft	52.7	45.4	42.2	38.0		