STRUCTURAL WIND CALCULATIONS

For

CAFÉ HOLLANDER
Milwaukee, WI

For

The Kubala Washatko Architects

By

Alan T. Rentmeester, PE

SPIRE ENGINEERING, INC.
305 N Plankinton Ave. Suite 101
Milwaukee, WI 53203
(414) 278-9200

April 10, 2024

Wind Calculation Summary

WIND LOAD INFORMATION:

BASIC WIND SPEED		115 MPH	
RISK CATEGORY		II	
WIND EXPOSURE		B	
INTERNAL PRESSURE COEFFICIENTS		± 0.18	
COMPONENTS AND CLADDING (STRENGTH DESIGN/ULTIMATE LOADS)			
WIDTH OF PRESSURE COEFFICIENT ZONE (a)		5.0 ft	
TRIBUTARY WIND LOAD AREAS:	10 ft²	50 ft²	100 ft²
WALLS:			
ZONE 4	-23.6 psf	-21.3 psf	-20.4 psf
ZONE 5	-29.0 psf	-24.6 psf	-22.6 psf
POSITIVE PRESSURE ALL ZONES	21.8 psf	19.5 psf	18.6 psf

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Code Search

Code: Wisconsin Building Code 2018

Occupancy:

Occupancy Group = B Business

Risk Category & Importance Factors:

Risk Category =	II
Wind factor =	1.00
Snow factor =	1.00
Seismic factor =	1.00

Type of Construction:

Fire Rating:

Roof =	0.0 hr
Floor =	0.0 hr

Building Geometry:

Roof angle (θ)	0.00 / 12	0.0 deg
Building length (L)	55.0 ft	
Least width (B)	50.0 ft	
Mean Roof Ht (h)	30.0 ft	
Parapet ht above grd	30.0 ft	
Minimum parapet ht	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

Awnings and canopys - non fabric	20 psf

Floor:

Typical Floor	40 psf
Partitions	15 psf
Stairs and exit ways	100 psf
Public rooms & corridors serving ther	100 psf

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JOB TITLE Café Hollander Wind Loads

JOB NO. _____ **SHEET NO.** _____
CALCULATED BY Spire Engineering **DATE** _____
CHECKED BY _____ **DATE** _____

Wind Loads : ASCE 7 - 10

Ultimate Wind Speed	115 mph
Nominal Wind Speed	89.1 mph
Risk Category	II
Exposure Category	B
Enclosure Classif.	Enclosed Building
Internal pressure	+/-0.18
Directionality (Kd)	0.85
Kh case 1	0.701
Kh case 2	0.701
Type of roof	Monoslope

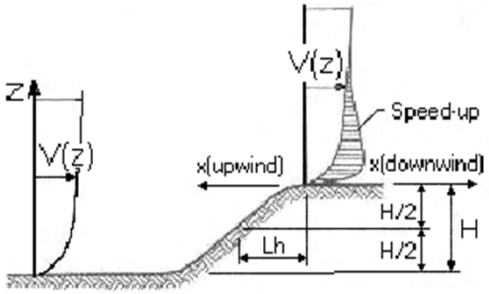
Topographic Factor (Kzt)

Topography		Flat
Hill Height	(H)	0.0 ft
Half Hill Length (Lh)		0.0 ft
Actual H/Lh	=	0.00
Use H/Lh	=	0.00
Modified Lh	=	0.0 ft
From top of crest: x =		50.0 ft
Bldg up/down wind?		downwind

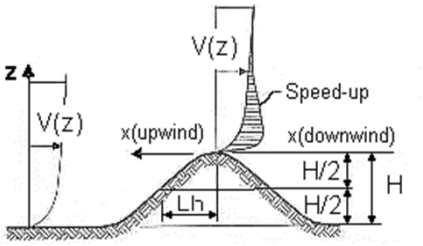
H/Lh= 0.00 K_1 = 0.000
x/Lh = 0.00 K_2 = 0.000
z/Lh = 0.00 K_3 = 1.000

At Mean Roof Ht:
$Kzt = (1+K_1K_2K_3)^2$ = 1.00

H< 60ft;exp B
∴ Kzt=1.0



ESCARPMENT



2D RIDGE or 3D AXISYMMETRICAL HILL

Gust Effect Factor

Flexible structure if natural frequency < 1 Hz (T > 1 second).
If building h/B>4 then may be flexible and should be investigated.

h =	30.0 ft
B =	50.0 ft
/z (0.6h) =	30.0 ft

h/B = 0.60 Rigid structure (low rise bldg)

G = 0.85 Using rigid structure default

Rigid Structure

ē =	0.33	
ℓ =	320 ft	
z_{min} =	30 ft	
c =	0.30	
g_Q, g_v =	3.4	
L_z =	310.0 ft	
Q =	0.89	
I_z =	0.30	
G =	0.86	use G = 0.85

Flexible or Dynamically Sensitive Structure

34 ncy (η_1) =	0.0 Hz				
Damping ratio (β) =	0				
/b =	0.45				
/α =	0.25				
Vz =	74.1				
N_1 =	0.00				
R_n =	0.000				
R_h =	28.282	η =	0.000	h =	30.0 ft
R_B =	28.282	η =	0.000		
R_L =	28.282	η =	0.000		
g_R =	0.000				
R =	0.000				
Gf =	0.000				

Enclosure Classification

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

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Test for Open Building: All walls are at least 80% open.
Ao ≥ 0.8Ag

Test for Partially Enclosed Building: Predominately open on one side only

	Input			Test	
Ao	500.0	sf	Ao ≥ 1.1Aoi	NO	
Ag	600.0	sf	Ao > 4' 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 4' 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.

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): 0 sf
Unpartitioned internal volume (Vi) : 0 cf
Ri = 1.00

Altitude adjustment to constant 0.00256 (caution - see code) :

Grd level above sea level = 0.0 ft
Constant = 0.00256 Adj Constant = 0.00256
Average Air Density = 0.0765 lbm/ft3

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Ultimate Wind Pressures

Wind Loads - Components & Cladding : h ≤ 60'

Kh (case 1) =	0.70	h =	30.0 ft
Base pressure (qh) =	**20.2 psf**	a =	5.0 ft
Minimum parapet ht =	5.0 ft	GCpi =	+/-0.18
Roof Angle (θ) =	0.0 deg		
Type of roof =	Monoslope		

Roof

	GCp +/- GCpi				Surface Pressure (psf)				User input	
Area	10 sf	50 sf	100 sf	500 sf	10 sf	50 sf	100 sf	500 sf	20 sf	50 sf
Negative Zone 1	-1.18	-1.11	-1.08	-1.08	-23.8	-22.4	-21.8	-21.8	-23.2	-22.4
Negative Zone 2	-1.98	-1.49	-1.28	-1.28	-39.9	-30.0	-25.8	-25.8	-35.7	-30.1
Negative Zone 3	-1.98	-1.49	-1.28	-1.28	-39.9	-30.0	-25.8	-25.8	-35.7	-30.1
Positive Zone 1	0.48	0.41	0.38	0.38	16.0	16.0	16.0	16.0	16.0	16.0
Positive Zones 2 & 3	1.08	0.97	0.92	0.81	21.8	19.6	18.5	16.3	20.8	19.5
Overhang Zone 1&2	-1.7	-1.63	-1.6	-1.1	-34.3	-32.9	-32.3	-22.2	-33.7	-32.9
Overhang Zone 3	-1.7	-1.63	-1.6	-1.1	-34.3	-32.9	-32.3	-22.2	-33.7	-32.9

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 3.6 psf)

Parapet

qp = 21.1 psf

		Surface Pressure (psf)						User input
Solid Parapet Pressure		10 sf	20 sf	50 sf	100 sf	200 sf	500 sf	50 sf
CASE A:	Zone 2 :	56.9	51.4	44.2	38.8	37.8	36.4	44.2
	Zone 3 :	56.9	51.4	44.2	38.8	37.8	36.4	44.2
CASE B:	Edge zones 2 :	-39.8	-37.8	-35.1	-33.1	-31.1	-28.4	-35.1
	Corner zones 3 :	-45.5	-42.5	-38.5	-35.5	-32.4	-28.4	-38.5

Walls

	GCp +/- GCpi				Surface Pressure (psf)				User input	
Area	10 sf	100 sf	200 sf	500 sf	10 sf	100 sf	200 sf	500 sf	50 sf	150 sf
Negative Zone 4	-1.17	-1.01	-0.96	-0.90	-23.6	-20.4	-19.4	-18.1	-21.3	-19.8
Negative Zone 5	-1.44	-1.12	-1.03	-0.90	-29.0	-22.6	-20.7	-18.1	-24.6	-21.5
Positive Zone 4 & 5	1.08	0.92	0.87	0.81	21.8	18.6	17.6	16.3	19.5	18.0

Note: GCp reduced by 10% due to roof angle <= 10 deg.

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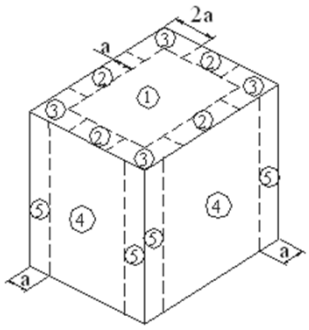
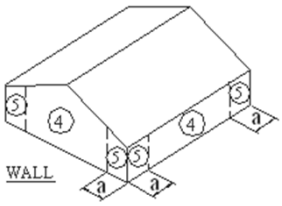
CALCULATED BY	Spire Engineering	**DATE**	
CHECKED BY		**DATE**	

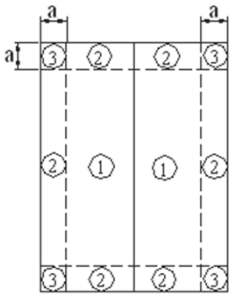
Location of C&C Wind Pressure Zones - ASCE 7-10 & earlier



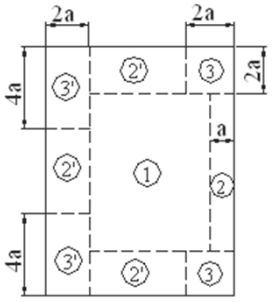
Roofs w/ θ ≤ 10°
and all walls
h > 60'



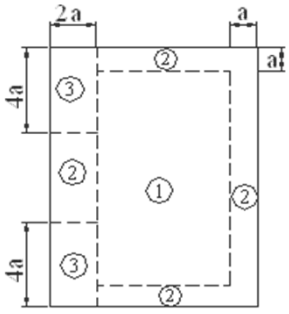
Walls h ≤ 60'
& alt design h<90'



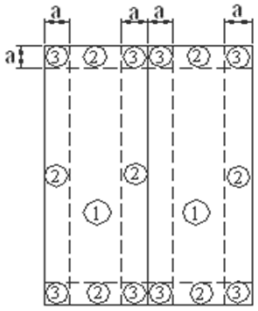
Gable, Sawtooth and
Multispan Gable θ ≤ 7 degrees &
Monoslope ≤ 3 degrees
h ≤ 60' & alt design h<90'



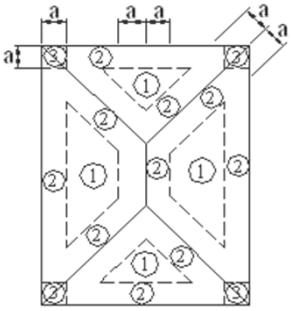
Monoslope roofs
3° < θ ≤ 10°
h ≤ 60' & alt design h<90'



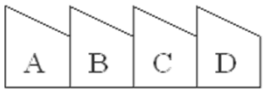
Monoslope roofs
10° < θ ≤ 30°
h ≤ 60' & alt design h<90'

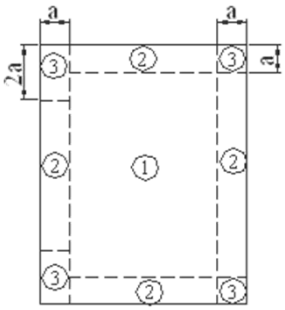


Multispan Gable &
Gable 7° < θ ≤ 45°

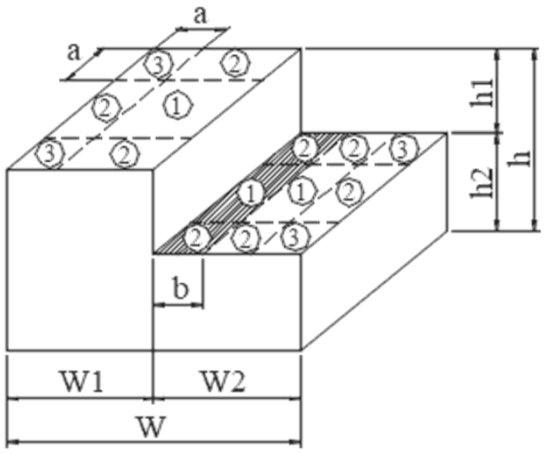


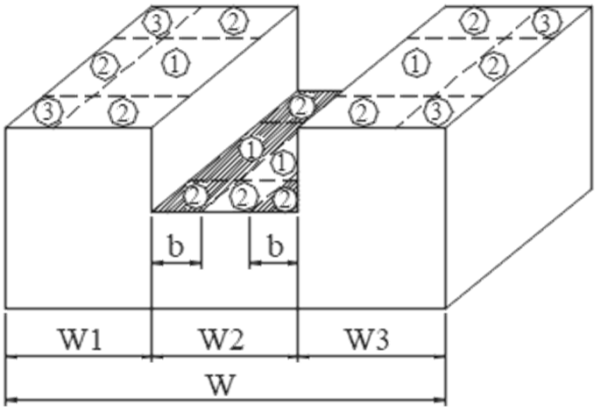
Hip 7° < θ ≤ 27°





Sawtooth 10° < θ ≤ 45°
h ≤ 60' & alt design h<90'





Stepped roofs θ ≤ 3°
h ≤ 60' & alt design h<90'

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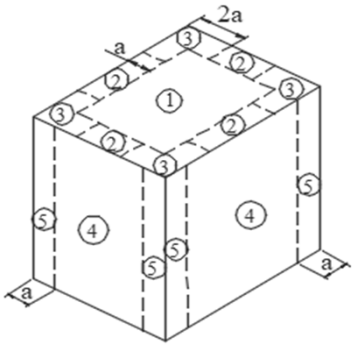
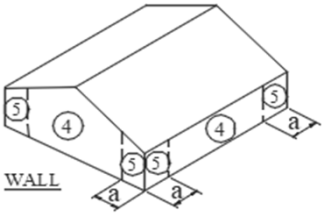
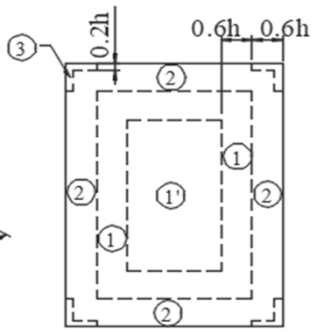
Location of C&C Wind Pressure Zones - ASCE 7-16



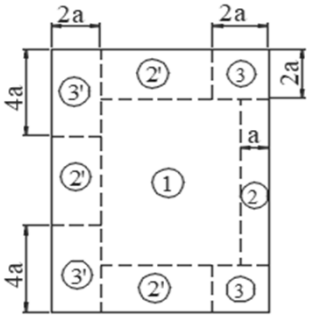
Roofs w/ θ ≤ 10°
and all walls
h > 60'



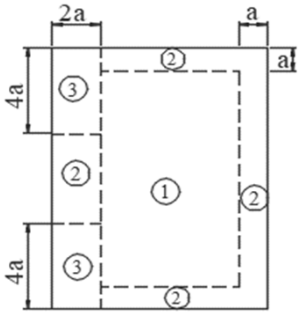
Walls h ≤ 60'
& alt design h<90'



Gable, Sawtooth and
Multispan Gable θ ≤ 7 degrees &
Monoslope ≤ 3 degrees
h ≤ 60' & alt design h<90'



Monoslope roofs
3° < θ ≤ 10°
h ≤ 60' & alt design h<90'



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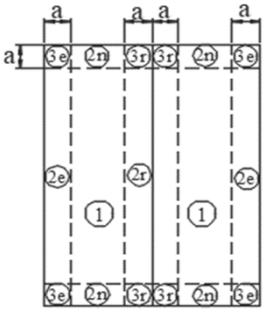
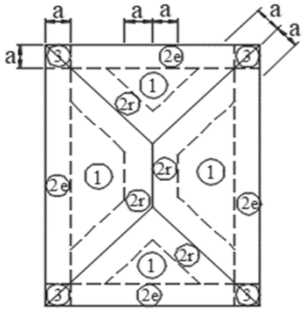
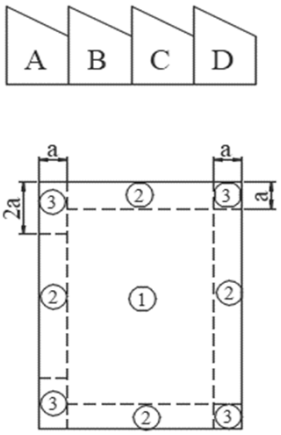


Multispan Gable &
Gable 7° < θ ≤ 45°



Hip 7° < θ ≤ 27°



Sawtooth 10° < θ ≤ 45°
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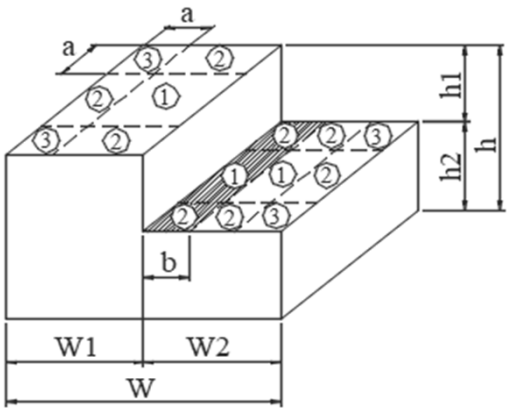

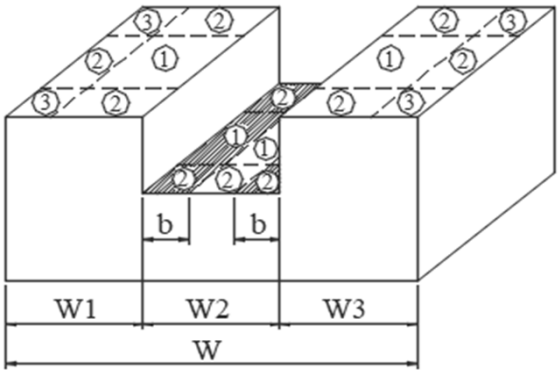

Stepped roofs θ ≤ 3°
h ≤ 60' & alt design h<90'

This is a beta release of the new ATC Hazards by Location website. Please contact us with feedback.

The ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Hazards by Location

Search Information

Address: 2608 N Downer Ave, Milwaukee, WI 53211

Coordinates: 43.0665232, -87.8778741

Elevation: 683 ft

Timestamp: 2024-04-10T14:39:54.551Z

Hazard Type: Wind

ASCE 7-16

MRI 10-Year	73 mph
MRI 25-Year	80 mph
MRI 50-Year	85 mph
MRI 100-Year	91 mph
Risk Category I	100 mph
Risk Category II	106 mph
Risk Category III	114 mph
Risk Category IV	118 mph

ASCE 7-10

MRI 10-Year	76 mph
MRI 25-Year	84 mph
MRI 50-Year	90 mph
MRI 100-Year	96 mph
Risk Category I	105 mph
Risk Category II	115 mph
Risk Category III-IV	120 mph

ASCE 7-05

ASCE 7-05 Wind Speed	90 mph

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Please note that the ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Disclaimer

Hazard loads are interpolated from data provided in ASCE 7 and rounded up to the nearest whole integer. Per ASCE 7, islands and coastal areas outside the last contour should use the last wind speed contour of the coastal area – in some cases, this website will extrapolate past the last wind speed contour and therefore, provide a wind speed that is slightly higher. NOTE: For queries near wind-borne debris region boundaries, the resulting determination is sensitive to rounding which may affect whether or not it is considered to be within a wind-borne debris region.

Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

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