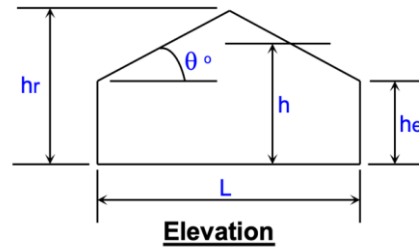
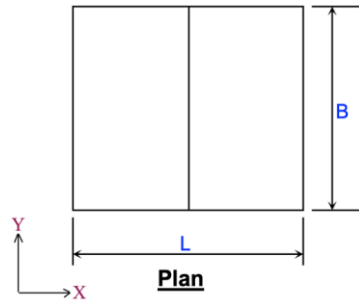




WIND LOADING ANALYSIS - ROOF COMPONENTS & CLADDING (C&C)

Based on ASCE 7-16 Chapter 30 - Part 1 & Part 3

Client:		Designed By:	Ali Akbar Shaikhzadeh	Date:	4-Feb-20
Job Name:		Verified By:		Revision:	35%



DESIGN INPUT DATA

BASIC WIND SPEED, V	40	m/sec
BUILDING WIDTH, L (HORIZONTAL DIMENSION PARALLEL TO X DIRECTION)	18.00	m (SEE NOTE 3)
BUILDING LENGTH, B (HORIZONTAL DIMENSION PARALLEL TO Y DIRECTION)	13.00	m (SEE NOTE 3)
ROOF TYPE	Gable	(RIDGE MUST BE PARALLEL TO Y DIRECTION)
ROOF EAVE HEIGHT, h_e	23.00	m
ROOF RIDGE HEIGHT, h_r	26.00	m
BUILDING RISK CATEGORY	II	TABLE 1.5-1
EXPOSURE CATEGORY	B	SECTION 26.7
ENCLOSURE CLASSIFICATION	2	TABLE 26.13-1
WIND DIRECTIONALITY FACTOR, K_d	0.85	TABLE 26.6-1
TOPOGRAPHIC FACTOR, K_{zt}	1.0	FIGURE 26.8-1
GROUND ELEVATION FACTOR, K_e	1.0	TABLE 26.9-1
EFFECTIVE AREA (AREA TRIBUTARY TO C&C), A_e	15.00	m ² SEE NOTE 10
REFERENCE HEIGHT INCREMENT OF WINDWARD WALL	4.00	m

RESULTING PARAMETERS & CONSTANT

θ	18	deg.	Roof angle
$h = (h_r + h_e) / 2$	24.50	m	Mean roof height
GC_{pi}	± 0.55		Internal pressure coefficient
α	7.0		Terrain exposure constants
z_g	365.76	m	Terrain exposure constants

SEE NOTES 6 & 9

TABLE 26.13-1

TABLE 26.11-1

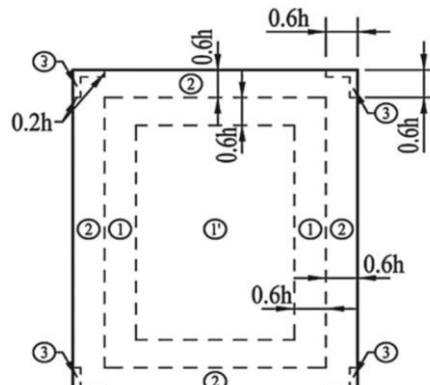
TABLE 26.11-1

ROOF EXTERNAL PRESSURE COEFFICIENTS

Table Used to Obtain GC_p Coefficients & Zones = Part 1, Table 30.3-2B

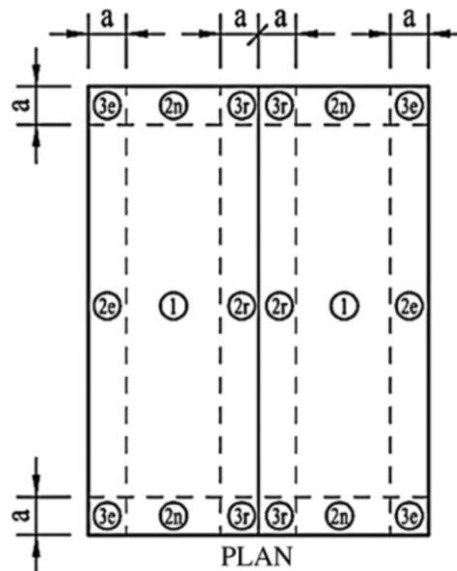
Part 1, Table 30.3-2A : Flat & Gable Roofs, $\theta \leq 7^\circ$

0.2 h	N/A	m
0.6 h	N/A	m
(GC_p) All Zones Positive	N/A	
(GC_p) Zone 1' Negative	N/A	
(GC_p) Zone 1 Negative	N/A	
(GC_p) Zone 2 Negative	N/A	
(GC_p) Zone 3 Negative	N/A	



Part 1, Table 30.3-2B : Gable Roofs, $7^\circ < \theta \leq 20^\circ$

a	1.30 m
(GC _p) All Zones Positive	0.30
(GC _p) Zones 1, 2e Negative	-0.50
(GC _p) Zones 2n, 2r, 3e Neg	-1.74
(GC _p) Zone 3r Negative	-1.80



Part 1, Table 30.3-2C : Gable Roofs, $20^\circ < \theta \leq 27^\circ$

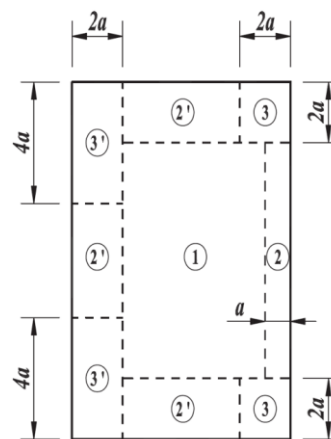
a	N/A m
(GC _p) All Zones Positive	N/A
(GC _p) Zones 1, 2e Negative	N/A
(GC _p) Zones 2n, 2r, 3e Neg	N/A
(GC _p) Zone 3r Negative	N/A

Part 1, Table 30.3-2D : Gable Roofs, $27^\circ < \theta \leq 45^\circ$

a	N/A m
(GC _p) All Zones Positive	N/A
(GC _p) Zones 1, 2e, 2r Neg.	N/A
(GC _p) Zones 2n, 3r Negative	N/A
(GC _p) Zone 3e Negative	N/A

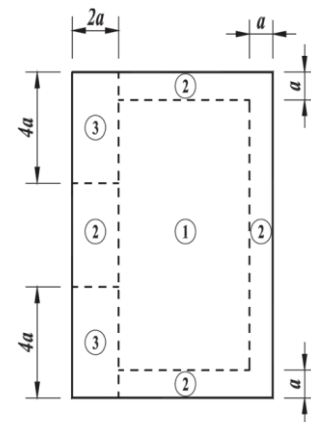
Part 1, Table 30.3-5A : Monoslope Roofs, $3^\circ < \theta \leq 10^\circ$

a	N/A m
2a	N/A m
4a	N/A m
(GC _p) All Zones Positive	N/A
(GC _p) Zone 1 Negative	N/A
(GC _p) Zone 2 Negative	N/A
(GC _p) Zone 2' Negative	N/A
(GC _p) Zone 3 Negative	N/A
(GC _p) Zone 3' Negative	N/A



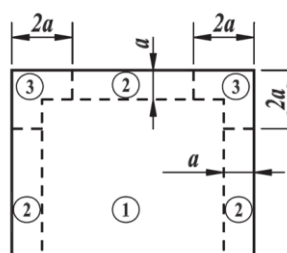
Part 1, Table 30.3-5B : Monoslope Roofs, $10^\circ < \theta \leq 30^\circ$

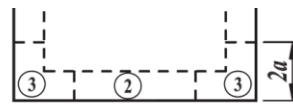
a	N/A m
2a	N/A m
4a	N/A m
(GC _p) All Zones Positive	N/A
(GC _p) Zone 1 Negative	N/A
(GC _p) Zone 2 Negative	N/A
(GC _p) Zone 3 Negative	N/A



Part 3, Table 30.5-1 : Flat, Gable & Monoslope, $\theta \leq 7^\circ$

a	N/A m
2a	N/A m
(GC _p) Zone 1 Negative	N/A
(GC _p) Zone 2 Negative	N/A





ROOF PLAN

(cont'd)

PRESSURE ON ROOF C&C

 P_{\min}

0.77 kPa

Minimum design wind pressure (see note 9)

Section 30.2.2

[illegible][illegible]

NOTES:

- 1- Plus and minus signs signify pressures acting toward and away from surfaces, respectively.
- 2- N/A = Not Applicable
- 3- The definition of ASCE 7-16 of L and B is as follows:

L = Horizontal dimension of building parallel to wind direction

B = Horizontal dimension of building normal to wind direction

This definition has been minorly changed in this spreadsheet for more clarification:

L = Horizontal dimension of building parallel to X direction

B = Horizontal dimension of building normal to Y direction

- 4- Each component shall be designed for maximum positive and negative pressures. Both positive and negative net pressures have been shown in the spreadsheet.
- 5- This program does not consider roof overhangs.
- 6- Two cases shall be considered to determine the critical load requirements for the appropriate condition (Notes 3 on Table 26.13-1):
- a. A positive value of (GCpi) applied to all internal surfaces, or
- b. A negative value of (GCpi) applied to all internal surfaces.
- Both cases have been evaluated in this spreadsheet.

- 7- C&C elements with tributary areas greater than 65 m^2 shall be permitted to be designed using the provisions for MWFRS (Section 30.2.3)
- 8- (GC_p) is combined gust-effect factor and external pressure coefficients for C&C. The pressure coefficient values and gust-effect factor shall not be separated.
- 9- The design wind pressure for C&C of buildings shall not be less than a net pressure of 0.77 kPa acting in either direction normal to the surface (Section 30.2.2)
- 10- For C&C elements, the effective wind area is the span length multiplied by an effective width that need not be less than one-third the span length. For cladding the effective wind area shall not be greater than the area that is tributary to an individual fastener. (Section 26.2)