Company: PDelta Ingenieria Estructural S.A.S Engineer: Ing. Osvaldo Guzman A
Project: P046-2024 - PLAZA DOÑA CEIBA (LOCALES) 5:52:33 p. m. 26/06/2024
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WIND LOADS NSR-10

Wind pressure

$p = q\ G\ Cp$ rigid buildings
$p = q\ Gf\ Cp$ flexible buildings
$qz = 0.00483\ Kz\ Kzt\ Kd\ V^2\ I$ (Kg/m²); V in Km/h

W I N D L O A D I N G P A R A M E T E R S

Basic wind speed (Km/h), V ..... = 100

V: 3-second gust speed at 10 m, with annual probability of 0.002

Importance factor, I ..... = 1.0

OCCUPANCY CATEGORY		IMPORTANCE FACTOR (1)	(2)
I	Normal occupancy buildings	0.87	0.77
II	Especial occupancy buildings	1.00	1.00
III	Public assistance facilities	1.15	1.15
IV	Essential facilities	1.15	1.15

(1): Non-hurricane prone regions with V=140-160 km/h
(2): Hurricane prone regions with V >160 Km/h

Exposure category ..... = C

ROUGHNESS	DESCRIPTION
B	Urban and suburban areas, wooded areas, obstructions >30ft
C	Open terrain with scattered obstructions less than 30 ft
D	Flat, unobstructed areas, wind over large bodies of water

Directionality factor, Kd ..... = 0.85

Topographic factor, Kzt ..... = 1.0

$Kzt = (1 + K1\ K2\ K3)^2$

Wall pressure coefficients, Cp

Windward wall ..... = 0.8
Leeward wall (Wind X) ..... = -0.362
Leeward wall (Wind Y) ..... = -0.5
Side walls ..... = -0.7
Roof ..... = 0.0

G U S T E F F E C T S F A C T O R S

Basic wind velocity, (Km/h) = 100
Exposure category ..... = C
Exposed height, (m) ..... = 2.4

	X-direction	Y-direction	
Computed natural frequency, f (Hz) =	6.944	7.519	
Height / Length ratio, H/L ..... =	.594	1.004	
Structure clasification ..... =	RIGID	RIGID	
Background response index, Q ..... =	.957	.949	(Eq. B.6.5-4)
Resonant response factor, R1 *.... =	.122	.087	(Eq. B.6.5-8)
Gh: Rigid - Simplified analysis .. =	.85	.85	(Sec B.6.5.8.1)
Gh: Rigid - Complete analysis .... =	.901	.896	(Eq. B.6.5-2)
Gf: Flexible -Analytical(2% dampng)=	1.189	1.184	(Eq. B.6.5-2)
Gf: Flexible -Analytical(1% dampng)=	1.19	1.185	(Eq. B.6.5-2)
Gust effects factor, G ..... =	.901	.896	

* 1% damping ratio. For damping ratio ß, R = R1 * (0.01/ß)^½

V E L O C I T Y P R E S S U R E

Floor -	Height z, m	Pressure qz, K/m2
2	2.40	35.226
1	0.0	35.226

A C C I D E N T A L T O R S I O N F O R W I N D L O A D S

	X-direction	Y-direction
Accidental eccentricity as a percentage of building dimension, (%)=	15	15

WY is Envelope of:
Case 1: Pwy + Ply
Case 2: 0.75 (Pwy + Ply) + Mt
Mt=0.75(Pwy+Ply)Bx ex

WX is Envelope of:
Case 1: Pwx + Plx
Case 2: 0.75 (Pwx + Plx) + Mt
Mt=0.75(Pwx+Plx)By ey

NOTE: Load cases 3 and 4 are handled through load combinations

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A C C I D E N T A L E C C E N T R I C I T Y W I N D L O A D S

	X-DIRECTION (WY)	Y-DIRECTION (WX)
Level -	ex (m)	ey (m)
2	0.61	0.36

WY is Envelope of:
Case 1: Pwy + Ply
Case 2: 0.75 (Pwy + Ply) + Mt
Mt=0.75(Pwy+Ply)Bx ex

WX is Envelope of:
Case 1: Pwx + Plx
Case 2: 0.75 (Pwx + Plx) + Mt
Mt=0.75(Pwx+Plx)By ey

NOTE: Load cases 3 and 4 are handled through load combinations

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Wind nodal forces:

Pw = Σ pz Ai Pl = Σ ph Ai
Ps = Σ ph Ai Pr = Σ ph Ai
Ai = Nodal tributary area

W I N D F O R C E S: X - D I R E C T I O N

Floor No	Height z, m	Windward Pw, Ton	Leeward Pl, Ton	Side Ps, Ton	Roof Pr, Ton
2	2.40	0.07	0.03	0.11	0.0
1	0.0	0.07	0.03	0.11	0.0

Base shear, V:Σ(Pw+Pl) .. = 0.21 ton
Building Weight, W ..... = 10.56 ton (V/W = 0.020)
Overturning moment
From horizontal forces . = 0.25 ton-m
From roof forces ..... = 0.0 ton-m
Total moment, Mo ..... = 0.25 ton-m
Stabilizing moment, Ms.... = 21.32 ton-m (Mo/Ms = 0.012)

Wind nodal forces:
Pw = ∑ pz Ai Pl = ∑ ph Ai
Ps = ∑ ph Ai Pr = ∑ ph Ai
Ai = Nodal tributary area

W I N D F O R C E S: Y - D I R E C T I O N

Floor No	Height z, m	Windward Pw, Ton	Leeward Pl, Ton	Side Ps, Ton	Roof Pr, Ton
2	2.40	0.12	0.08	0.06	0.0
1	0.0	0.12	0.08	0.06	0.0

Base shear, V:∑(Pw+Pl) .. = 0.40 ton
Building Weight, W ..... = 10.56 ton (V/W = 0.038)
Overturning moment
From horizontal forces . = 0.48 ton-m
From roof forces ..... = 0.0 ton-m
Total moment, Mo ..... = 0.48 ton-m
Stabilizing moment, Ms.... = 12.61 ton-m (Mo/Ms = 0.038)