MecaWind v2377

Calculations Prepared by:
Date: Feb 26, 2021

File Location : M:\Website\Website Content\Freestanding Walls\FenceExample.wnd

Basic Wind Parameters

Wind Load Standard	= ASCE 7-16	Exposure Category	= C
Wind Design Speed	= 120.0 mph	Risk Category	= II
Structure Type	= Other	Other Structure Type	= Freestanding Wall

General Wind Settings

Incl_LF	= Include ASD Load Factor of 0.6 in Pressures	= False
DynType	= Dynamic Type of Structure	= Rigid
NF	= Natural Frequency of Structure (Mode 1)	= 1.000 Hz
Zg	= Altitude (Ground Elevation) above Sea Level	= 0.000 ft
Bdist	= Base Elevation of Structure	= 0.000 ft
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

Freestanding Wall Inputs

h	: Height to Top of Wall = 6.000 ft	B	: Horizontal Width of Wall= 120.000 ft
Lr	: Dimension of return corner= 0.000 ft	s	: Vertical Height of Wall= 6.000 ft
e	: Solidity Ratio = 1.000	t	: Thickness of Wall = 0.000 ft
Dbl	: Double Faced & all sides enclosed= False	IsCol: Is the Wall Supported on Columns= 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

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	= 0.6 * Ht	= 15.000 ft
Izm	= Cc * (33 / Zm) ^ 0.167	= 0.228
Lzm	= L * (Zm / 33) ^ Epsilon	= 427.057
Q	= (1 / (1 + 0.63 * ((B + Ht) / Lzm)^0.63))^0.5	= 0.979
G2	= 0.925*((1+1.7*lzm*3.4*Q)/(1+1.7*3.4*lzm))	= 0.914

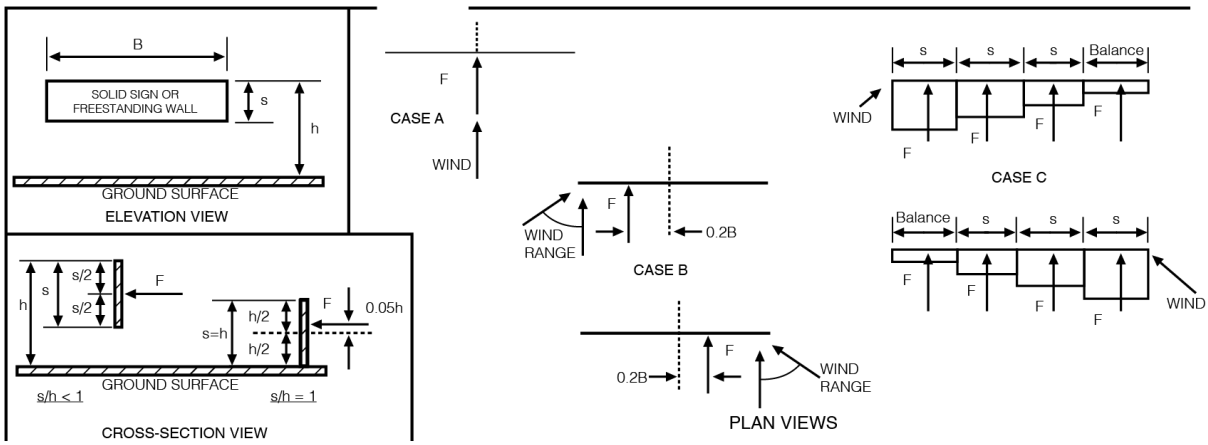
Gust Factor Used in Analysis

G	= Lessor Of G1 Or G2	= 0.850

Main Wind Force Resisting System (MWFRS) Calculations for Freestanding Wall per Ch 29:

LF	= Load Factor based upon STRENGTH Design	= 1.00
hs	= Overall height of structure	= 6.000 ft
h	= Mean Roof Height above grade	= 6.000 ft
Kh	= Z < 15 ft [4.572 m]--> (2.01 * (15/zg)^(2/Alpha) {Table 26.10-1}	= 0.849
Kzt	= Topographic Factor is 1 since no Topographic feature specified	= 1.000
Kd	= Wind Directionality Factor per Table 26.6-1	= 0.85
qh	= (0.00256 * Kh * Kzt * Kd * Ke * V^2) * LF	= 26.60 psf

MWFRS Pressures on Freestanding Wall per Fig 29.3-1:

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R         = Reduction factor to account for openings:  (1-(1-e)^1.5)        = 1.000
Rc        = Reduction factor for Case C since s/h > 0.8: (1.8-s/h)          = 0.800
As        = Gross Area of Wall:  B * s                                      = 720.00 sq ft
B/s       = Aspect Ratio:  B / s                                            = 20.000
s/h       = Clearance Ratio: s / h                                          = 1.000
Cf        = Net Force Coefficient for Case A and B per Fig 29.3-1           = 1.300
e         = Not Double Faced, Case B eccentricity is 0.2                    = 0.2

Case A:  Resultant force acts normal to face through geometric center
         and since s/h = 1 then consider force acting 0.05*s above the geometric center

0.05*s    = Since s/h=1, load applied at vertical offset from geom center   = 0.300 ft
F         = Design Wind force:  qh * G * Cf * As * R                        = 21162 lb

Case B:  Resultant force acts normal to face at a distance from the geometric
         center toward the windward edge equal to e times the average width
         and since s/h = 1 then consider force acting 0.05*s above the geometric center

0.05*s    = Since s/h=1, load applied at vertical offset from geom center   = 0.300 ft
Dx        = Force Offset from Center toward windward edge:  e * B           = 24.000 ft
F         = Design Wind force:  qh * G * Cf * As * R                        = 21162 lb

Case C:  Since B/s >= 2 then Case C must also be considered
         Forces act normal to the face and therough the geometric center of each region
         and since s/h = 1 then consider force acting 0.05*s above the geometric center

0.05*s    = Since s/h=1, load applied at vertical offset from geom center   = 0.300 ft
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MWFRS Pressures per Fig 29.3-1 on Freestanding Wall
All wind pressures include a load factor of 1.0

Range	Start Dist ft	End Dist ft	Xl ft	Cf	Rlr	A sq ft	P psf	F lb	M lb-ft
0 to s	0.000	6.000	3.000	4.070	1.000	36.00	73.62	2650	-151060.4
s to 2s	6.000	12.000	9.000	2.590	1.000	36.00	46.85	1686	-86010.4
2s to 3s	12.000	18.000	15.000	1.990	1.000	36.00	35.99	1296	-58310.5
3s to 4s	18.000	24.000	21.000	1.580	1.000	36.00	28.58	1029	-40123.9
4s to 5s	24.000	30.000	27.000	1.460	1.000	36.00	26.41	951	-31372.4
5s to 10s	30.000	60.000	45.000	0.940	1.000	180.00	17.00	3060	-45906.1
>10s	60.000	120.000	90.000	0.550	1.000	360.00	9.95	3581	107439.8
Total			0.000			720.00		14254	-305343.9

Notes:
Cf = Force Coefficient from Fig 29.3-1
A   = Area Of Region: (End Dist - Start Dist) * s
P   = Effective Wind Pressure: qh*G*Cf*R*Rlr*Rc {Eqn 29.4-1}
F   = Force acting on Region: qh*G*Cf*A*R*Rlr*Rc {Eqn 29.3-1}
Xc = Horizontal Distance from windward edge to geometric center: B/2 = 60.000 ft
Xl = Horizontal distance from windward edge to load: 0.5*(Start_Dist + End_Dist)
M   = Moment about geometric center due to force: F * (Load_Dist - Xc)
Rlr = Reduction factor for return corner per Fig 29.3-1