Load Calculation

# Prelimnary Data

Span = 30.0 m  
 Length = 30.0 m  
 Eves Hight = 9.0 m  
 Ridge Hight = 10.5 m

# Prelimnary Calculation

Angle of Roof Truss   
 tan ø = 1.5/15.0  
 ø = 5.75°

Length of Principle Rafter   
 = √(1.5^2+15.0^2 )  
 = 15.07 m

Half Slope Area   
 = 15.07\*6.0  
 = 90.42

# Dead Load

A.C.C. SHEET = 56.0 KN/m2 (IS-875, PART-1)  
 = 56.0\*90.42  
 = 336.0 KN/m  
 Wt. OF PURLIN = (64.0\*6)/85.0 (ISMC-125)  
 = 5440.0 KN/m  
  
 TOTAL D.L. = 336.0+5440.0  
 = 5776.0 KN/m

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| No. | Span | Load |
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# Live Load

Roof Area = 15.07\*6.0   
 =90.42 Sq.m

Live Load = 90.42\*0.75   
 =67.81 KN/m2

Live Load on Rafter= 67.81/15.07   
 =4.5 KN/m2

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| No. | Span | Load |
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# Design wind speed (Vz):

From Page-8  
 Vz= Vb K1 K2 K3 m/sec

Vb= Basic wind speed  
 From Fig.1 or appendix-A of the code,  
 Vb= 39 m/sec

K1= Risk cofficient   
 Table-1 page-11,  
 K1= 1.0

K2= terrain, height and structure size coefficient  
 Table-2 page-12,  
 K2= 1.005

K3= topography factor  
 Cl 5.3.3.1 page-12,  
 K3= 1.0

Now,  
 Vz= Vb K1 K2 K3  
 = 39\*1.0\*1.005\*1.0  
 = 39.19499999999999 m/sec

Design wind pressure (Pz):

Pz= 0.6 Vz^2  
 = 0.6\*39.19499999999999^2  
 = 0.9217488149999996 Kn/m2

# Wind Load (F):

Case-1: 0 deg. internal suction

Internal Wind Pressure = 54.0  
 External wind pressure for windward side wall = 0.7   
 External wind pressure for leeward side wall = 0.2   
 External wind pressure for windward side roof = 0.95   
 External wind pressure for leeward side roof = 0.4   
 External wind pressure for Front side Gabble wall = 0.5   
 External wind pressure for Front side Gabble wall = 0.5

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| --- | --- | --- | --- | --- | --- | --- |
| No. | Bay Lenght | Wall Windward | Wall Leeward | Roof Windward | Roof Leeward |  |
| 1 | 6.0 | 302.52 | -297.54 | -293.39 | -296.43 |  |
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Case-2: 0 deg. internal Pressure

Internal Wind Pressure = 54.0  
 External wind pressure for windward side wall = 0.7  
 External wind pressure for leeward side wall = 0.2  
 External wind pressure for windward side roof = 0.95  
 External wind pressure for leeward side roof = 0.4  
 External wind pressure for Front side Gabble wall = 0.5  
 External wind pressure for Front side Gabble wall = 0.5

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| --- | --- | --- | --- | --- | --- | --- |
| No. | Bay Lenght | Wall Windward | Wall Leeward | Roof Windward | Roof Leeward |  |
| 1 | 6.0 | -294.78 | 299.75 | 303.9 | 300.86 |  |
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For gabble wall

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Bay Lenght | Front Gabble | Back Gabble |
| 1 | 6.0 | -294.78 | 299.75 |
|  |  |  |  |
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Case-3: 90 deg. internal Pressure

Internal Wind Pressure = 54.0  
 External wind pressure for windward side wall = 0.5   
 External wind pressure for leeward side wall = 0.5   
 External wind pressure for windward side roof = 0.8   
 External wind pressure for leeward side roof = 0.43   
 External wind pressure for Front side Gabble wall = 0.2   
 External wind pressure for Front side Gabble wall = 0.7

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No. | Bay Lenght | Wall Windward | Wall Leeward | Roof Windward | Roof Leeward |  |
| 1 | 6.0 | -301.41 | 301.41 | -303.07 | -301.02 |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

STAAD PLANE  
 START JOB INFORMATION  
 ENGINEER DATE 04-Jun-21  
 END JOB INFORMATION  
 INPUT WIDTH 79  
 UNIT METER KN

JOINT COORDINATES  
 1 0 0 0; 2 0 9.0 0; 3 15.0 10.5 0; 4 30.0 9.0 0; 5 30.0 0 0;  
 MEMBER INCIDENCES  
 1 1 2; 2 2 3; 3 3 4; 4 4 5;  
 SUPPORTS  
 1 5 PINNED

#\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
 # DEAD LOAD  
 #\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
 LOAD 1 LOADTYPE Dead TITLE DEAD LOAD  
 SELFWEIGHT Y -1 LIST ALL  
 MEMBER LOAD  
 2 3 UNI GY -5776.0  
 #\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
 # LIVE LOAD  
 #\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
 LOAD 2 LOADTYPE Live TITLE LIVE LOAD  
 MEMBER LOAD  
 2 3 UNI GY -4.5  
 #\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
 # WIND LOAD  
 #\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
 # \*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 0 DEG. WIND INT. SUCTION \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
 LOAD 3 LOADTYPE Wind TITLE 0 DEG. WIND INT. SUCTION  
 MEMBER LOAD  
 1 UNI GX 1  
 2 UNI GY 2  
 3 UNI GY 3  
 4 UNI GX 4  
 # \*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 90 DEG. WIND INT. SUCTION \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
 LOAD 4 LOADTYPE Wind TITLE 90 DEG. WIND INT. SUCTION  
 MEMBER LOAD  
 1 UNI GX 1  
 2 UNI GY 2  
 3 UNI GY 3  
 4 UNI GX 4  
 # \*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 90 DEG. WIND INT. PRESSURE \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
 LOAD 5 LOADTYPE Wind TITLE 90 DEG. WIND INT. PRESSURE  
 MEMBER LOAD  
 1 UNI GX 1  
 2 UNI GY 2  
 3 UNI GY 3  
 4 UNI GX 4  
 PERFORM ANALYSIS PRINT ALL  
 PARAMETER 1  
 CODE IS800 LSD  
 CHECK CODE ALL  
 FINISH