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Project Name :
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REVISION HISTORICAL SHEET

[illegible]

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1. BASIS OF CALCULATIO

1.1 CODES AND STANDARDS

SNI 03 1729 2002 - Tata cara perencanaan struktur baja untuk bangunan gedung

SNI 03 1727 1989 - Pedoman Perencanaan Pembebanan untuk Rumah dan Gedung

SNI-03-1726-2002 - Tata cara perencanaan ketahanan gempa untuk bangunan gedung

Peraturan Pembebanan Indonesia Untuk Gedung (1983)

1.2 MATERIALS AND STANDARDS

Steel Construction : JIS G3101 SS-400

Quality of Steel : $F_y = 240 \text{ Mpa}$

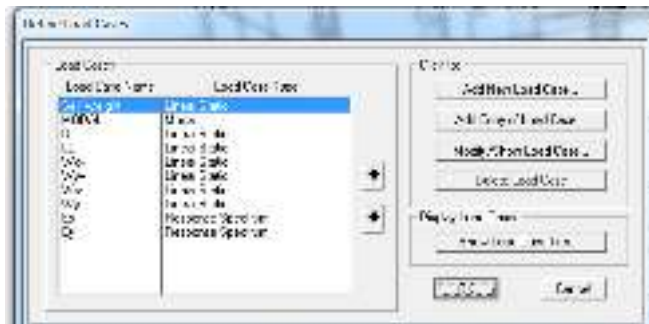
Steel Density : $\gamma_{\text{steel}} = 7850 \text{ kg/m}^3 = 7.698 \text{E-05 N/m}^3$

1.3 WELDING

Welding electrode : AWS A5.1/D1.1 or JIS Z 3211

Quality of weld: AWS E70XX, $F_y = 70 \text{ ksi}$

2. LOADING





2.1 DEAD LOAD

For model analysis, dead load are considered as selfweight and automatically computed by programs, selfweight factor = -1

Steel : $\gamma_{\text{steel}} = 7850 \text{ kg/m}^3$

The 'Material Property Data' dialog box for SS400 steel shows the following values:

| Property | Value |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Material Name and Display Color | SS400 |
| Material Type | Steel |
| Weight and Mass | Weight per Unit Volume: 76.8729, Mass per Unit Volume: 7.849 |
| Units | KN, m, C |
| Isotropic Property Data | Modulus of Elasticity, E: 2E+08, Poisson's Ratio, U: 0.3, Coefficient of Thermal Expansion, A: 1.170E-05, Shear Modulus, G: 76823077 |
| Other Properties for Steel Materials | Minimum Yield Stress, Fy: 248211.28, Minimum Tensile Stress, Fu: 399896, Effective Yield Stress, Fye: 372316.9, Effective Tensile Stress, Fue: 439895.6 |

The 'Define Load Cases' dialog box shows the following settings:

- Method: ☒ From Element and Additional Members
- Factor: ☒ Full Load
- Define Mass, N, up to Load: ☒ From Element and Additional Members and Loads

| Load Case | Factor |
|-------------|--------|
| Self Weight | -1 |
| DL | 1 |
| UL | 1.5 |



2.2 LIVE LOAD

Live loads on Roof based on SNI state :

(2) Beban hidup pada atap dan/atau bagian atap yang tidak dapat dicapai dan dibebani oleh orang, harus diambil yang paling menentukan di antara dua macam beban berikut:

- a. Beban terbagi rata per m^2 bidang datar berasal dari beban air hujan sebesar $(40 - 0,8 \alpha)$ kg/m^2 di mana α adalah sudut kemiringan atap dalam

derajat, dengan ketentuan bahwa beban tersebut tidak perlu diambil lebih besar dari $20 kg/m^2$ dan tidak perlu ditinjau bila kemiringan atapnya adalah lebih besar dari 50° .

- b. Beban terpusat berasal dari seorang pekerja atau seorang pemadam kebakaran dengan peralatannya sebesar minimum 100 kg.

“ It means that area of roof which unreachable and unloaded by people, have to be defined by one of these conditions :

- a. Distributed load per m^2 from rain = $(40 - 0,8 * \alpha)$ kg/m^2 , where α is slope roof degrees.*

In this case, load on roof is less than $20 kg/m^2$ and no need to reviewed if slope of roof moreover than 50° .

- b. Point Load from people/fireman with their equipments, approximately 100 kg.”*

In this calculation,

Live Loads on Roof is Rain Load = $20 kg/m^2$.

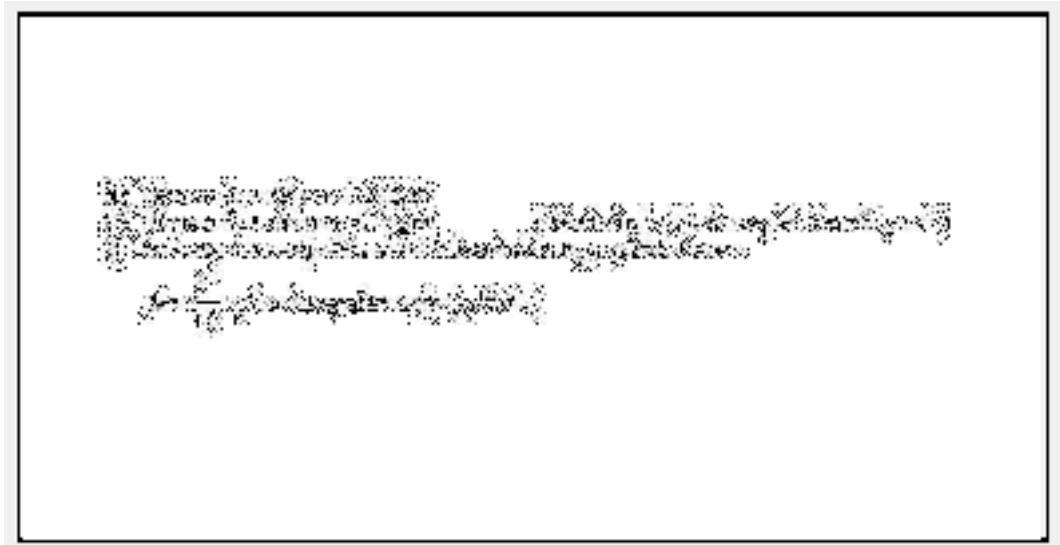
Live loads on platform (Checker Plate) : $2,5 kN/m^2$

2.3 WIND LOAD

Wind pressure from structure refer to below :



A. Wind Load Pressure



“ It means that :

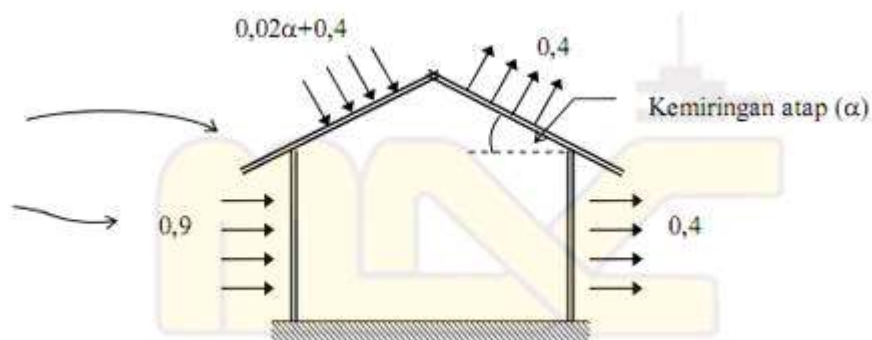
(1) Minimum Wind Pressure is 25 kg/m²

(2) Minimum Wind Pressure is 40 kg/m² (if location close with coast and tolerance 5 km from coast)

(3) If Wind Pressure assumed more than (1) and (2) conditions, it will defined :

$P = V^2/16$; where is v = wind speed velocity (m/s) or (km/hr). “

B. Wind Load Coefficient



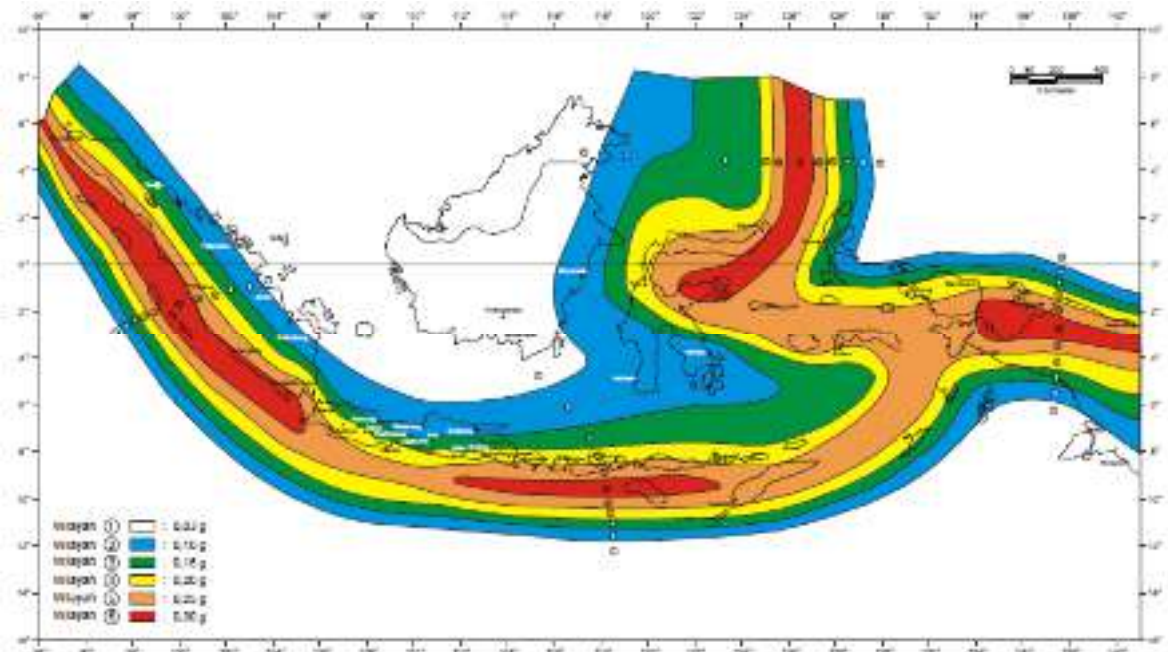
Where is “ α ” is slope roof



2.4 EARTHQUAKE LOAD

Earthquake Zone

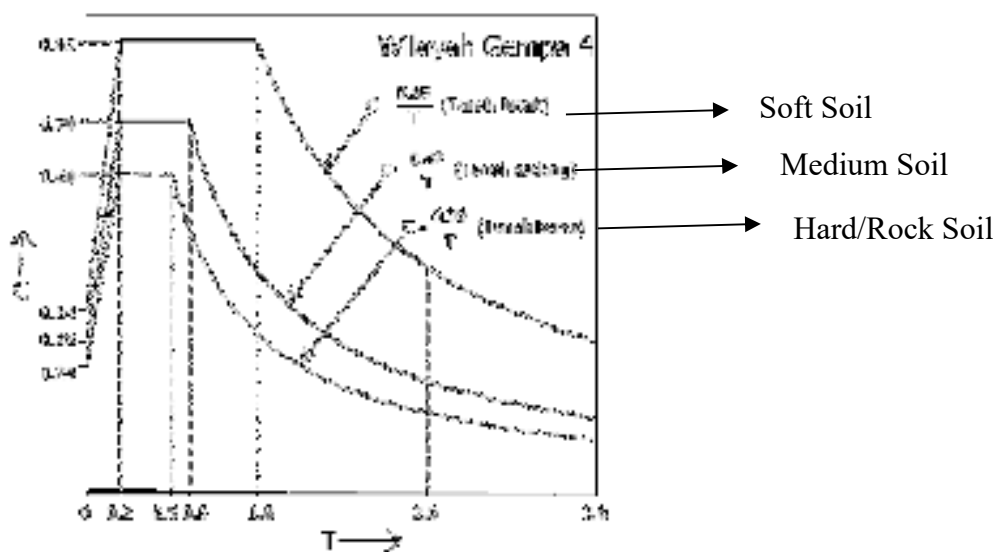
Location Suralaya ; Banten (About 100 km west of Jakarta, Indonesia)



Picture 1. Indonesia Earthquake Zone (SNI-03-1726-2002)

Coefficient Response Spectrum

Earthquake Zone = Zone 4





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Soil Classification = Medium Soil

Scale Factor

Importance Factor (I) = 1

Reduction Factor (R) = 4.5

Gravitational Acceleration = 9.81 m/s^2

$$\text{Scale} = \frac{R \cdot I}{E} = 2.18$$

3. LOAD COMBINATION

Load Combination for Steel Structure Design (Ultimate Condition)

| Group | SW | DL | LL | Wx+ | Wy+ | Wx- | Wy- | Ex | Ey |
|------------|-----|-----|-----|------|------|------|------|----|----|
| DSTL1 | 1.4 | 1.4 | | | | | | | |
| DSTL2 | 1.2 | 1.2 | 1.6 | | | | | | |
| DSTL3 | 1.2 | 1.2 | 0.5 | 1.3 | | | | | |
| DSTL4 | 1.2 | 1.2 | 0.5 | -1.3 | | | | | |
| DSTL5 | 1.2 | 1.2 | 0.5 | | 1.3 | | | | |
| DSTL6 | 1.2 | 1.2 | 0.5 | | -1.3 | | | | |
| DSTL7 | 1.2 | 1.2 | 0.5 | | | 1.3 | | | |
| DSTL8 | 1.2 | 1.2 | 0.5 | | | -1.3 | | | |
| DSTL9 | 1.2 | 1.2 | 0.5 | | | | 1.3 | | |
| DSTL10 | 1.2 | 1.2 | 0.5 | | | | -1.3 | | |
| DSTL11 | 1.2 | 1.2 | 0.5 | | | | | 1 | |
| DSTL12 | 1.2 | 1.2 | 0.5 | | | | | | 1 |
| DSTL13 | 0.9 | 0.9 | | | | | | 1 | |
| DSTL14 | 0.9 | 0.9 | | | | | | | 1 |
| Deflection | 1.0 | 1.0 | 1.0 | | | | | | |

4. ALLOWABLE DEFLECTION

Maximum allowable deflection of beam shall be as specified in the following :

Table 2. Deflection Maximum (SNI-03-1729-2002)

| Komponen struktur dengan beban tidak terfaktor | Beban tetap | Beban sementara |
|-------------------------------------------------|-------------|-----------------|
| Balok pemikul dinding atau finishing yang getas | $L/360$ | - |
| Balok biasa | $L/240$ | - |
| Kolom dengan analisis orde pertama saja | $h/500$ | $h/200$ |
| Kolom dengan analisis orde kedua | $h/300$ | $h/200$ |

Kantilever Beam

$L/150$

Crane Girder

$L/500$

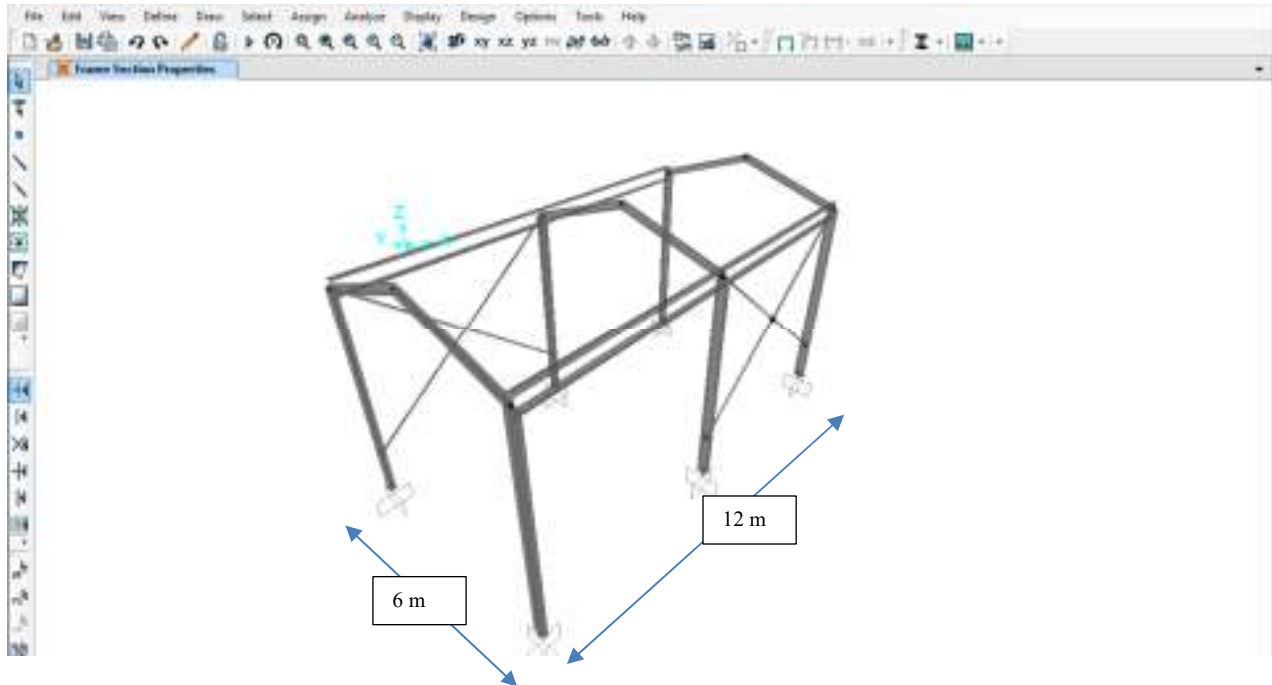


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5. CALCULATION SHEET

Modelling 3D



MODEL ANALYSIS STRUCTURE

Dead Loading on Rafter





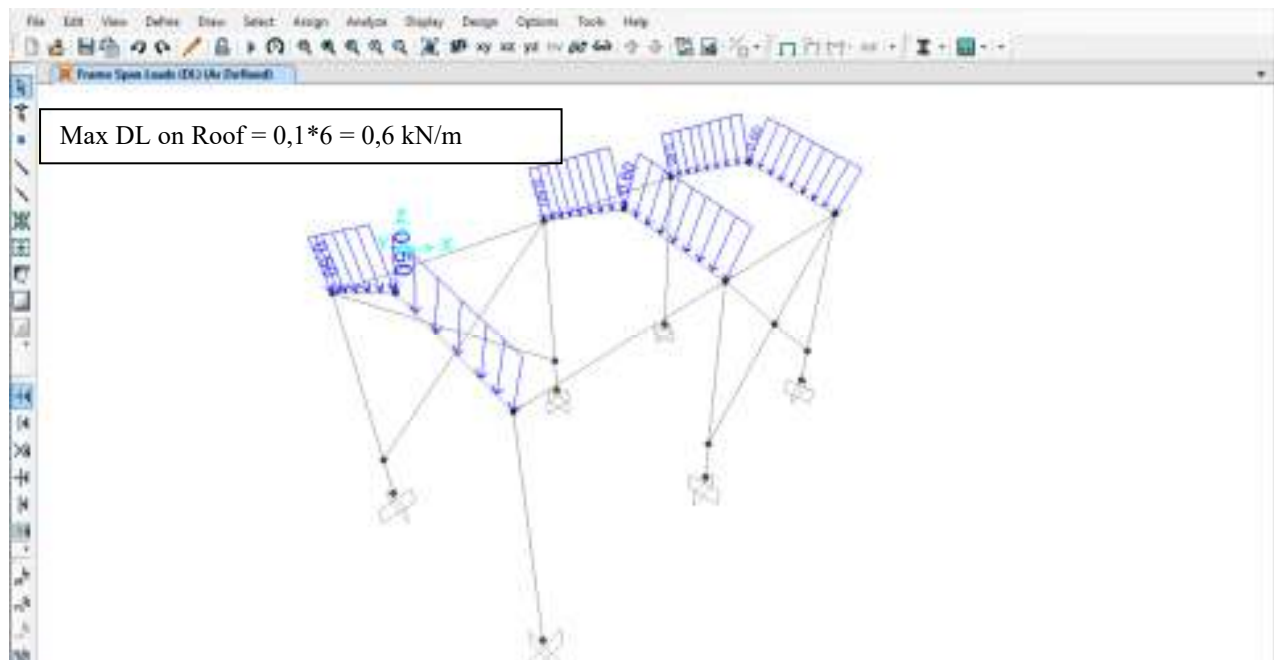
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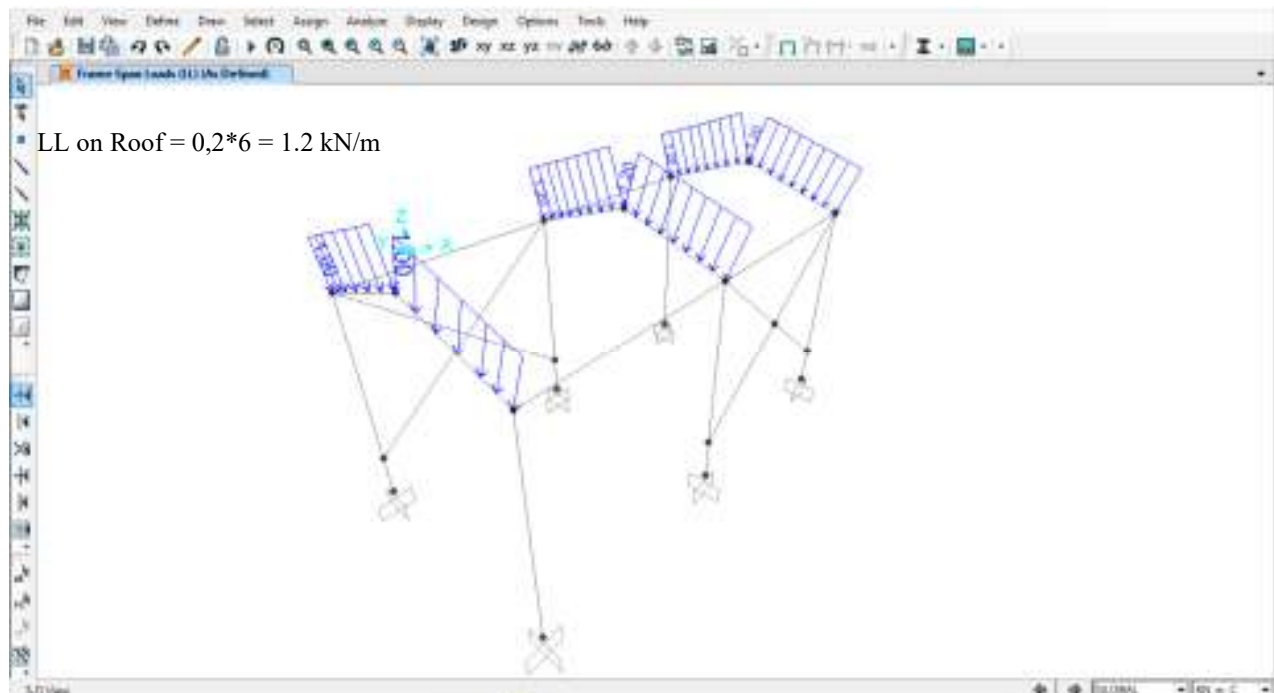
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Live Load on Roof & Platform



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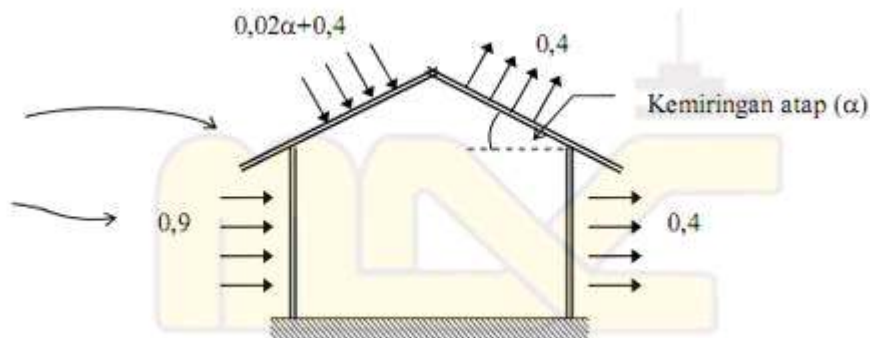
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Wind Pressure : 40 kg/m^2 (0.4 kN/m^2)

Angle : 10° ($0^\circ \leq \alpha \leq 20^\circ$)

Length of pressure area (B) : 5,5 m

Wind Pressure for column =

Winward Pressure = $0,4 \text{ kN/m}^2 \times 6 \text{ m} \times 0,9 = 2,16 \text{ kN/m}$

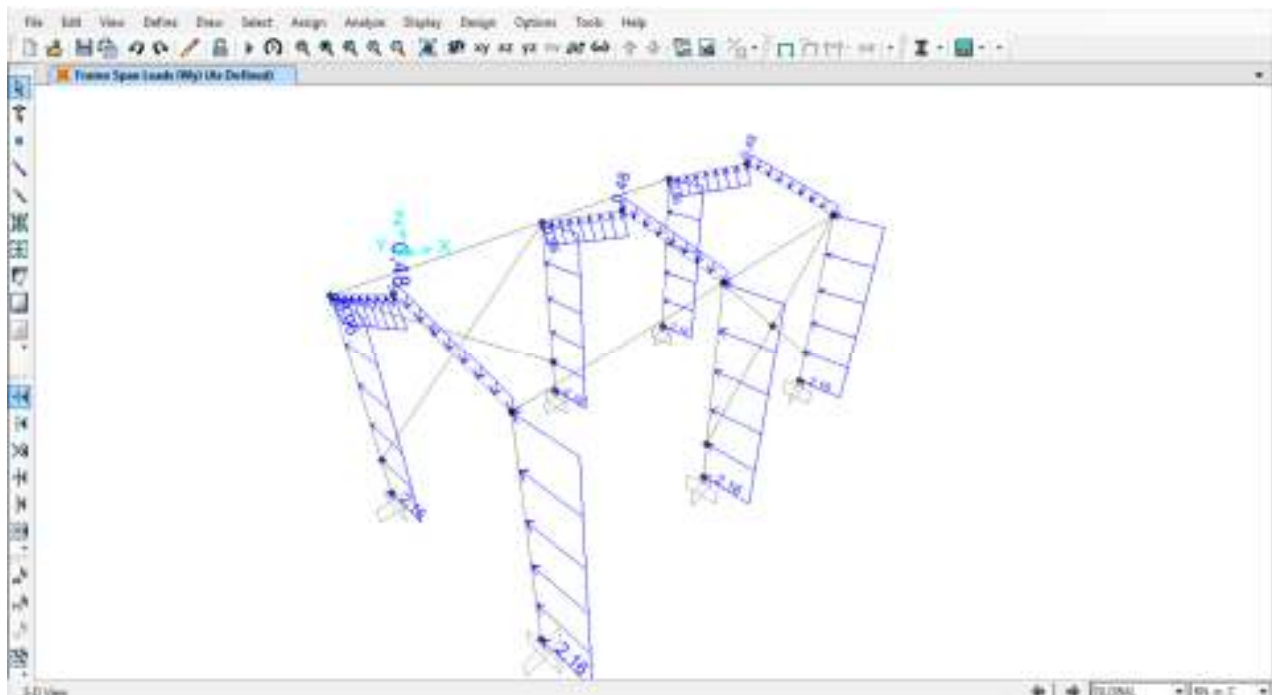
Leeward Pressure = $0,4 \text{ kN/m}^2 \times 6 \text{ m} \times 0,4 = 0,96 \text{ kN/m}$

Wind Pressure for Roof =

Winward Pressure = $0,4 \text{ kN/m}^2 \times (0,02 \times 10 - 0,4) \times 6 \text{ m} = -0,48 \text{ kN/m}$

Leeward Pressure = $0,4 \text{ kN/m}^2 \times 6 \text{ m} \times 0,4 = 0,96 \text{ kN/m}$

WIND LOAD Y+ DIRECTION



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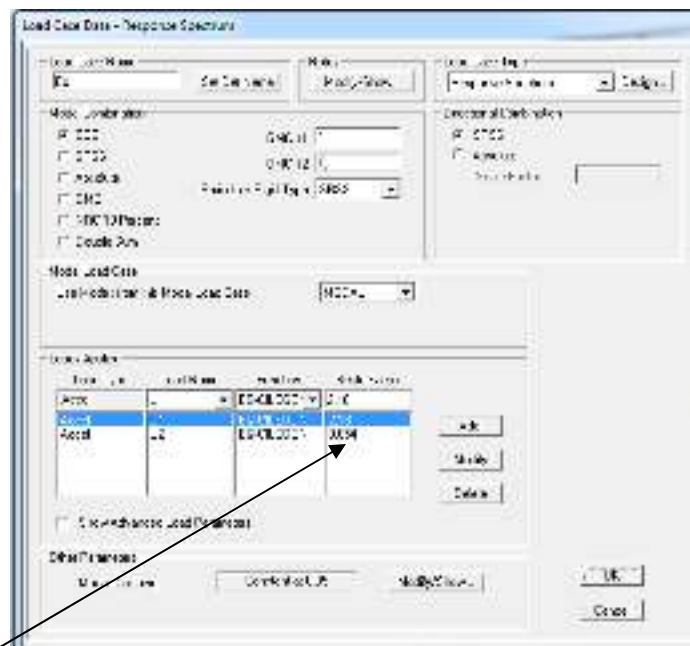
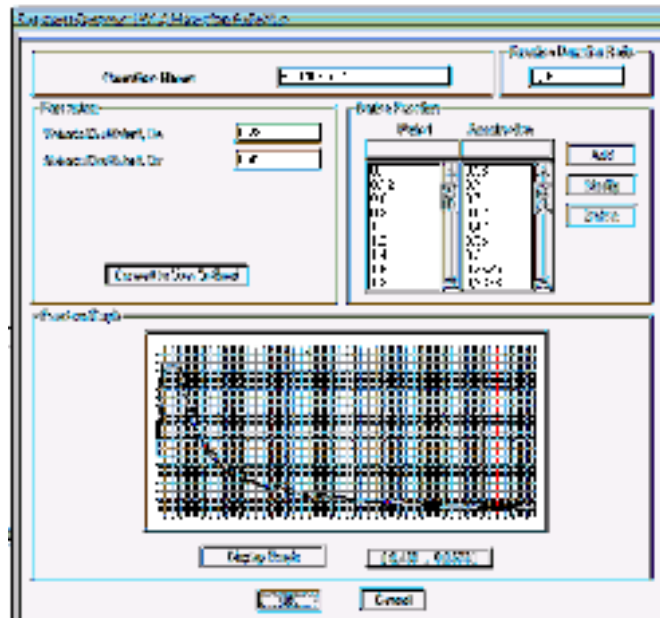
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Earthquake Load



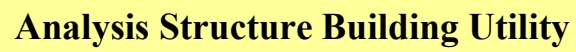
$$\text{Acceleration} = \frac{0.2}{0.5} = 0.4$$

Note :

- For Values of members forces due to earthquake, please see steel summary data.



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Overall checking stress ratio

