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Yogyakarta, 11 Mei 1997
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ABSTRAK

Pada perencanaan struktur gedung bertingkat diperlukan struktur yang aman dan ekonomis.Struktur yang aman dan ekonomis memerlukan perhitungan untuk mendapatkan tulangan dan dimensi yang minimal dalam batas keamanan yang telah ditentukan. Perkembangan ilmu dalam bidang teknik sipil selalu berupaya untuk memperoleh perencanaan strukutur yang optimal, hal ini ditunjukan dengan penggunaaan metode perencanaan ultimate yang dirasa lebih mendekati kenyataan daripada penggunaan metode elastis. Perencanaan dengan struktur beton bertulang pada intinya adalah penggabungan penggunaan bahan beton dan baja tulangan. Dalam struktur yang telah mengalami pembebanan, pada bagian penampang yang mengalami gaya tarik diberikan tulangan baja yang berfungsi untuk menahan gaya tarik , karena beton relatif kecil dapat menahan tarik sehingga diasumsikan beton tidak menahan tarik, sedangkan pada bagian penampang yang mengalami gaya tekan, ditahan oleh beton. Dari perhitungan perencanaan rumah susun pada tugas akhir ini diperoleh hasil : tebal pelat 12 cm dengan rata- rata tulangan ∅8-80, balok dimensi 30/40,30/50,30/60,40/70,50/80 dengan diameter tulangan D22, kolom dimensi 30/30,40/40,60/60,70/70 dengan diameter tulangan D25 dan pondasi telapak dengan diameter tulangan D25.

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BAB I

PENDAHULUAN

1.1. Latar Belakang

Pertumbuhan Indonesia yang semakin meningkat banyak menimbulkan berbagai masalah baru. Perumahan sebagai salah satu kebutuhan pokok merupakan permasalahan yang harus ditangani secara serius. Pertumbuhan ekonomi Indonesia yang stabil dan cukup tinggi menjadikan perumahan bukan hanya sekedar tempat berteduh namun kelayakan dan kenyamanan menjadi pertimbangan pokok dalam perencanaan perumahan. Kebutuhan perumahan di pedesaaan tidak terlalu menjadi permasalahan yang serius, tetapi diperkotaan pemenuhan kebutuhan tersebut sangat perlu dipertimbangkan karena menyangkut berbagai aspek .

Yogyakarta sebagai salah satu kota di Indonesia, jumlah penduduknya semakin meningkat dari tahun ke tahun. Daya tarik Yogyakarta sebagai kota wisata, budaya dan pelajar menjadikan Yogyakarta semakin banyak diminati pendatang. Dengan latar belakang tersebut, bangunan-bangunan baru banyak berdiri untuk memenuhi sarana dan prasarana seperti hotel, pusat perbelanjaan, restoran, perkantoran dan lain-lain. Keadaan tersebut menimbulkan masalah ketersediaan lahan.

Perumahan sebagai salah satu kebutuhan pokok manusia perlu direncanakan pemenuhannya dengan mempertimbangkan berbagai aspek. Harga tanah yang semakin mahal menjadi salah satu kendala yang harus diselesaikan untuk mencari alternatif pemenuhan perumahan yang layak dan nyaman.

Salah satu alternatif adalah perumahan yang tidak menggunakan lahan yang luas tetapi mempunyai tata ruang yang layak dan nyaman adalah Rumah Susun.

Pertimbangan biaya dirasa telah memenuhi syarat karena biaya pembangunan rumah susun jika dibandingkan dengan harga tanah relatif kecil. Disamping itu pembangunan rumah susun dapat dilaksanakan ditengah kota atau dipinggiran sehingga waktu tempuh untuk mencapai jantung kota lebih pendek.

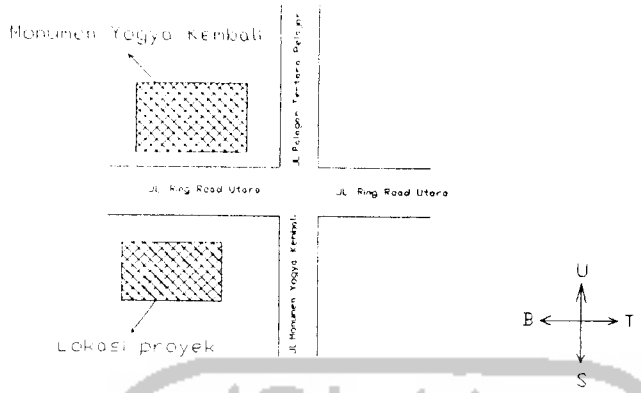
1.2 Batasan Masalah

Perencanaan gedung rumah susun di bangun disekitar Monumen Yogya Kembali. Gedung ini mempunyai bagian gedung dengan dua bagian simetris. Pada tugas akhir ini direncanakan satu bagian gedung, sedangkan gedung dengan portal lift tidak dihitung. Perencanaan ini menggunakan pondasi footplate, dan balok dianalisa dengan anggapan sebagai balok persegi. Mutu bahan yang digunakan pelat : fy=240 MPa, fc'=25 Mpa balok,kolom dan pondasi : fy=400 Mpa, fc'=30 Mpa

Untuk lebih menyakinkan hasil perencanan ini maka kontrol dengan bantuan program SAPCON dari SAP90.

1.3. Lokasi Proyek

Proyek Rumah Susun ini terletak di jalan Ring Road utara sebelah selatan Monumen Yogya Kembali



Gambar 1.1Denah Situasi Proyek

Pemilihan lokasi ini didasarkan pada pertimbangan-pertimbangan sebagai berikut :

1. Letaknya cukup strategis, dikarenakan berada diantara pusat kota dan pemukiman penduduk.
2. Tersedianya jaringan listrik, air minum serta fasilitas-fasilitas lainnya.
3. Relatif dekat dengan pemukiman penduduk.

1.4. Data Teknis Bangunan

Proyek Rumah Susun ini terdiri dari 5 lantai ditambah satu lantai basement dengan perincian penggunaan sebagai berikut :

1. Lantai "basement" digunakan sebagai ruang pengelola, parkir mobil dan sepeda motor, lift, sampah.
2. Lantai pertama, digunakan sebagai ruang serbaguna, kantor, Taman Kanak-Kanak, toko, koperasi, gudang, musholla, pengurus, kamar sewa.
3. Lantai kedua s/d keempat digunakan sebagai kamar rumah susun
4. Lantai kelima digunakan sebagai kamar rumah susun, ruang Water Tank dan ruang mesin lift.

BAB II

PERENCANAAN

2.1 Uraian Umum

Perencanaan suatu gedung haruslah dikerjakan oleh perencana yang mengerti dan menguasai unsur-unsur dari suatu perencanaan itu sendiri, agar gedung yang direncanakan terhindar dari kesalahan-kesalahan yang dapat mengakibatkan kerugian material maupun keselamatan dari pemakai gedung tersebut, sehingga para penghuni merasa nyaman selama berada didalamnya. Disamping itu harus mengetahui dan memahami fungsi dari bangunan yang direncanakan, karena setiap bangunan mempunyai fungsi dan kegunaan yang berbeda-beda.

2.2. Perencanaan Konstruksi

2.2.1. Dasar perencanaan

Sebagai dasar perencanaan gedung ini adalah segi keamanan yang paling utama, baik terhadap beban tetap maupun sementara dengan tidak mengurangi nilai-nilai estetika dari bentuk bangunan yang telah direncanakan.

2.2.2. Peraturan dan standar yang digunakan

Pedoman dari perencanaan gedung ini menggunakan beberapa peraturan yaitu:

1. Tata Cara Perhitungan Struktur Beton Untuk Bangunan Gedung berdasarkan SK SNI-T-15-1991-03.

2. Peraturan Pembebanan Indonesia Untuk Gedung 1983

3. Pedoman Perencanaan Ketahanan Gempa Untuk Rumah Dan Gedung, 1987

4. Peraturan Konstruksi Kayu Indonesia, 1961

2.2.3 Kriteria perencanaan struktur

A. Perencanaan Atap

Atap mempunyai fungsi sebagai penutup bagian atas dari suatu bangunan. Atap pada gedung ini direncanakan menggunakan rangka kayu kalimantan yang di cat dengan oli bekas sebelum digunakan agar tidak dimakan kutu kayu. Kuda-kuda menggunakan kayu dengan pertimbangan biaya yang lebih ekonomis dalam pembuatan awal dan kayu terlindung sehingga tahan lama untuk jangka waktu 20 tahun, disamping itu untuk bentang kuda-kuda 6 meter penggunaan bahan lain tidak ekonomis. Penutup atapnya memakai genteng press dengan peertimbangan estetika bangunan, disamping juga genteng press relatif lebih rapat terhadap kebocoran jika dibanding penutup atap lain yang sejenis. Perencananaan kuda-kuda kayu ini menggunakan perumusan sebagai berikut :

1.Perencanaan gording

-Beban yang bekerja pada gording :

1.Beban angin

2.Beban hidup

3.Beban atap

4. Berat sendiri gording

-Tegangan yang terjadi :

$$\sigma_{lt} = \frac{Mx}{Wx} + \frac{My}{Wy} \leq \bar{\sigma}_{lt} \quad \text{.....(2.1)}$$

-Lendutan yang terjadi :

$$F = \frac{5.q.L^4}{384.E.I} + \frac{P.L^3}{48.E.I} < \frac{1}{200}L \quad \text{.....(2.2)}$$

2.Perencanaan kuda-kuda kayu

-Beban yang bekerja pada kuda-kuda:

1.Beban atap

2.Beban eternit

3.Beban plafon

4. Berat kuda-kuda (ditaksir)

5.Berat gording

6.Beban tak terduga

3.Perencanaan batang kuda-kuda

Tegangan -tegangan izin untuk kayu bermutu A

Tabel 2.1 Tegangan - tegangan izin kayu mutu A

Tegangan izin kg/cm^2	Kelas kuat			
	I	II	III	IV
$\bar{\sigma}_{lt}$	150	100	70	50
$\bar{\sigma}_{ds}$ // = $\bar{\sigma}_{tr}$ //	130	85	60	45
$\bar{\sigma}_{ds}\perp$	40	25	15	10
τ //	20	12	8	5

Untuk Kayu bermutu B, tegangan - tegangan izin dikurangi 25%

-Batang tekan

Tegangan yang terjadi:

$$\sigma_{ds}//=\frac{P.\omega}{F}<\overline{\sigma}_{ds}// \quad \text{.....(2.3)}$$

ω = faktor tekuk

-Batang tarik

Tegangan yang terjadi :

$$\sigma_{tr}=\frac{P}{c.A}<\overline{\sigma}_{tr} \quad \text{.....(2.4)}$$

c = perlemahan akibat sambungan

4. Sambungan batang

-Sambungan gigi

$$\sigma_{ds}1/2\alpha=\overline{\sigma}_{ds}//-(\overline{\sigma}_{ds}//-\overline{\sigma}_{ds}\perp).\sin 1/2\alpha \quad \text{.....(2.5)}$$

$$tv=\frac{s.\cos^2 1/2.\alpha}{b.\overline{\sigma}1/2.\alpha} \quad \text{.....(2.6)}$$

$$Lv=\frac{s.\cos\alpha}{b.\overline{\tau}//} \quad \text{.....(2.7)}$$

syarat Lv≥15 cm ; tv≤ 1/4.h

-Sambungan baut

Gaya izin $\overline{P}$ yang didapat berdasarkan golongan kayu dan bentuk sambungan (tampang satu atau tampang dua)

Jumlah baut (n) = $\frac{P}{\overline{P}}$

B. Perencanaan Pelat Lantai

Pelat lantai berfungsi sebagai pendukung beban akibat berat sendiri dan beban berguna yang ada diatasnya. Pelat pada gedung ini direncanakan menggunakan beton bertulang, dengan spesifikasi sebagai berikut :

1. Spasi tulangan (SK-SNI T-15-1991-03 subbab 3.16.6):

   - Jarak bersih antara tulangan sejajar ≥ D atau 25 mm.

   - Jarak bersih antara tulangan sejajar ≤ 3ht atau 500mm

2. Tulangan Susut atau suhu (SK-SNI T-15-1991-03) :

   - Jarak bersih tulangan pembagi ≤ 5ht atau 500 mm.

3. Pelindung beton untuk tulangan (SK-SNI T-15-1991-03 subbab 3.16.12):

   - Lantai yang tidak berhubungan langsung dengan tanah dengan tulangan ≤D16 maka dipakai penutup beton (pb) 20 mm.

   -Lantai yang langsung berhubungan dengan tanah dengan tulangan ≤D16 , maka dipakai penutup beton (pb) 40 mm.

4. Distribusi gaya untuk pelat tumpuan satu arah dapat dianggap sebagai gelagar diatas berbagai tumpuan dan diselesaikan dengan menggunakan persamaan mekanika biasa. Menurut SK-SNI T-15-1991-03 subbab 3.6.6 mengijinkan untuk menentukan distribusi gaya menggunakan koefisien momen untuk mempermudah, tetapi penggunaannya dibatasi untuk syarat-syarat seperti berikut ini :

   -jumlah bentang minimal dua

   - panjang bentang bersebelahan yang paling besar disebelah kiri dan kanan tumpuan tidak boleh 1,2 kali lipat dari besar daripada panjang bentang

bersebelahan yang paling pendek.

- beban harus merupakan beban terbagi merata (distribusi).
- beban hidup harus 3 kali lebih kecil dari beban mati.
- penggunaan koefisien momen diatur sebagai berikut:

-Untuk momen lapangan : bentang bersih (lu) terletak diantara tumpuan .

-Untuk momen tumpuan : bentang bersih rata-rata (lu) terletak pada sebelah kiri dan kanan tumpuan.

5. Distribusi gaya untuk pelat 2 arah yang ditumpu oleh ke-4 sisinya adalah merupakan struktur statis tak tentu.

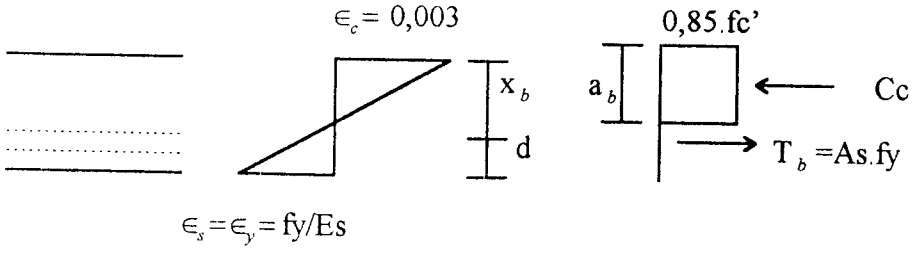
Momen kerja : $Mu = qu.Lx^2.C$ .....(2.8)

6. Menentuan tebal pelat

Menurut SK-SNI T-15-1991-03 subbab 3.2. 5-3 tebal pelat (non praktekan) dapat ditentukan dengan pendekatan sebagai berikut :

$$h_{min} = \frac{\ln x\left(0{,}8 + \frac{fy}{1500}\right)}{36 + 9\beta} \quad \text{.....(2.9)}$$

7. Analisis Tampang



Gambar 2.1 Regangan dan Gaya dalam pelat

Dari diagram regangan :

cb = 0,003.d/(0,003 + (fy/200000))

= 600.d / (600 +fy) .....(2.10)

dari diagram gaya dalam :

Cc = 0,85.fc'. a_b .b

= 0,85.fc'. x_b .ß1. b .....(2.11)

Jika :

fc' < 30 Mpa → ß1 = 0,85

fc' > 30 Mpa → ß1 = 0,85 - 0,008 (f c' - 30)

T_b = As.fy = ρ .b.d. fy .....(2.12)

Persamaan kesetimbangan : Σ H = 0 (pers 2.4 dan 2.5)

Cc = T_b

0,85. fc'. x_b .ß1. b = ρb . b . d . fy

$$\rho b = \frac{0,85.fc'.\beta_1}{fy}\frac{x_b}{d}$$

$$\rho b = \frac{0,85.fc'.\beta_1}{fy}\frac{600}{600+fy} \quad \text{.....(2.13)}$$

Menurut Sk SNI T-15-1991-03 subbab 3. 3. 5

ρ_{min} = 1,4/fy .....(2.14)

ρ_{max} = 0,75. ρb .....(2.15)

m = fy/ (0,85.f'c)

Rn = $M_{max}/(b.d^2)$

$$\rho_{perlu} = \frac{1}{m}\left[1-\sqrt{1-\frac{2.m.Rn}{fy}}\right] \quad \text{.....(2.16)}$$

syarat $\rho_{min} < \rho_{perlu} < \rho_{max}$

8.Perhitungan tulangan pokok

As = ρ_{perlu}. b. d ..... (2.17)

jarak tulangan = $A_{\varnothing}$ .100 / As ..... (2.18)

9. Perhitungan tulangan susut

Menurut SK SNI T-15-1991-03 subbab 3. 16. 12 :

Asbg = (0,0018. 400. b.h) / fy ..... (2.20)

jarak tulangan = $A_{\varnothing}$ .100/Asbg ..... .(2.21)

10. Chek geser

Vu = 0,5. 1,15 .qu. Lx ..... (2.22)

Vc = ($\sqrt{f'c}$ / 6) bw. d ..... (2.23)

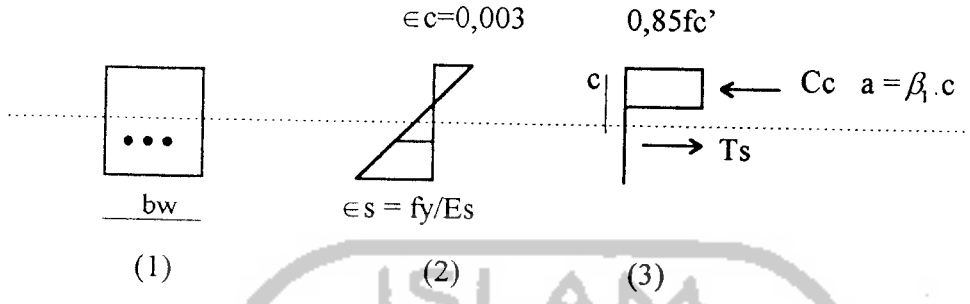
$\varnothing$ Vc > Vu

Vu = gaya geser yang terjadi pada balok

C. Perencanaan Balok

Balok merupakan batang struktural yang didesain untuk menahan gaya-gaya yang bekerja dalam arah transversal terhadap sumbunya. Balok pada gedung ini menggunakan beton bertulang.

Dalam pelaksanaan dilapangan pada umumnya pengecoran balok dilakukan secara monolit dengan pelat, sehingga lendutan yang terjadi pada balok akan didistribusikan pula ke pelat. Dengan demikian tegangan tekan akan terjadi di kedua belah pihak. Untuk itu kita perlu mengetahui berapa bagian dari lebar pelat yang ikut menerima distribusi lendutan dari gaya-gaya balok.



Gambar 2.2 Regangan dan Gaya dalam balok

Keterangan :

Gambar 1 : Penampang balok dalam keadaan tarik

Gambar 2 : Diagram regangan

Gambar 3 : Diagram tegangan

1. Penentuan syarat batas Tulangan

-Spasi tulangan (SK SNI T-15-1991-03 , : Jarak bersih antara tulangan sejajar > D atau 25 mm.

2. Kontrol Dimensi

Pada umumnya dalam suatu perencanaan struktur terlebih dahulu kita tentukan dimensinya, sehingga dimensi tersebut harus kita kontrol untuk mengetahui kelayakannya.

3. Kontrol geser (SK SNI T-15-1991-03 subbab 3. 4. 11)

Vu_{max} → dari hasil analisis struktur

$Vc = \sqrt{f'c} / 6.\ bw.\ d$

$Vs = 2.\ \sqrt{f'c} / 3.\ bw.d$

Syarat : $Vu_{max} \leq \varnothing\ (Vc + Vs)$

4. Kontrol Torsi $\rightarrow$ kalau ada yang menyebabkan torsi (SK SNI T-15-1991- subbab 3. 3. 4 - 22)

   $Tu_{max} \rightarrow$ dari hasil analisis struktur dipilih yang terbesar yang paling menentukan.

   $\Sigma x^2Y = bw^2.h + (bf-bw)^2.hf \rightarrow$ balok tepi

   $= bw^2 . h + 2. (bf-bw)^2.hf \rightarrow$ balok tengah

   $Ct = (bw.d / (\Sigma x^2.Y)$

   Tulangan torsi harus disediakan paling tidak (bt+d) diluar titik teoritis yang diperlukan $bt = bw - 2.pb - 2.Ds$

   $d = h - 2.pb - 2.Ds - 1/2.D$

   Pada umumnya torsi terjadi bersamaan dengan gaya geser,maka hitungan tahanan tegangan torsi (Tc) sebagai berikut :

   Hitung Tc $\rightarrow$ jika terjadi gaya lintang

   $$Tc = \frac{(\sqrt{f'c}/15)\Sigma x^2 y}{\sqrt{1+\left(\frac{0,4Vu}{CtTu}\right)^2}} \quad \ldots\ldots(2.24)$$

   Hitung Tc ==> torsi murni (Vu = 0)

   $Tc = (\sqrt{f'c}/15).\Sigma x^2 y$

   $Ts = Tu/\varnothing - Tc$

   Syarat : $Ts < 4Tc$

5. Menentukan momen rencana

   MD = momen akibat beban mati

   ML = momen akibat beban hidup

MG = momen akibat beban gempa

Mu = 1,2.MD + 1,6.ML ..... (2.25)

Mu = 0,9.D ± E ..... (2.26)

Mu = 1,05.(D + LR ± E) ..... (2.27)

Mn = Mu / ∅

Kontrol kapasitas tampang :

Mn_{tot} = 0,85. f'c. b. hf. (d - 1/2.hf) > Mn ..... (2.28)

6. Perencanaan Tulangan Pokok

Dari rumus 2.13 :

$$\rho b = \frac{0{,}85.fc'.\beta_1}{fy}\frac{600}{600+fy}$$

Menurut SK SNI T-15-1991-03 subbab 3. 3. 5 :

ρ_{min} = 1,4 / fy

ρ_{max} = 0,75. ρb

m = fy / (0,85.f'c)

Rn = Mn / (b.d^2)

$$\rho_{perlu} = \frac{1}{m}.\left[1-\sqrt{1-\frac{2.m.Rn}{fy}}\right]$$

Jika $\rho_{min} < \rho_{perlu} < \rho_{max}$ → tulangan tunggal

As = ρ_{perlu}. bw. d

A∅ = ¼. π .D^2

N = As / A∅ → dibulatkan keatas

Asb = N.A∅ > As

d_{aktual} = h - pb - Ds - 1/2 D

$\rho_{min} < \rho_{aktual}$ = Asb / (bw.d_{aktual}) < ρ_{max}

Jarak horisontal : x = (bw - 2.pb - 2.Ds - N.D) / (N-1) > 2,5 cm

Jarak vertikal : Y= 2,5 cm ; jarak maksimum tulangan samping ≤ 30 cm

kontrol kapasitas :

Cc = 0,85. fc'. bw. a

Ts = Asb. fy

Syarat : Cc = Ts ==> a = ...

Mn tot = Ts. (d - 1/2.a) > Mn ==> tulangan desak diabaikan.

Kontrol :

c = a / ß1 > hf ==> pemisalan sebagai balok T murni

< hf ==> pemisalan sebagai balok T biasa ,maka bw diganti bf

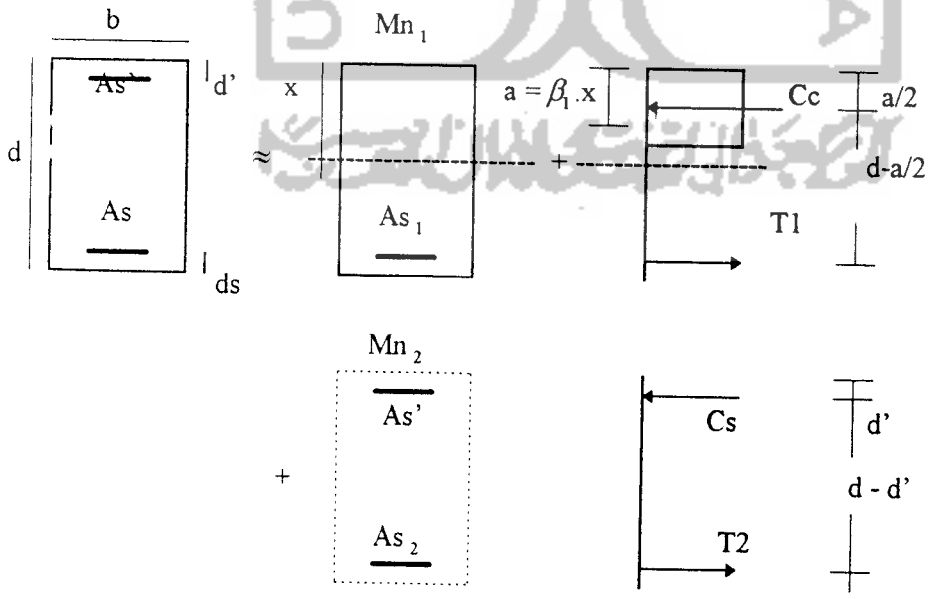
Jika $\rho_{perlu} > \rho_{max}$ ==> tulangan rangkap

Ada dua alternatif penyelesaian :

a. sesuaikan ukuran penampang balok (diperbesar)

b. bila tidak memungkinkan, maka dipasang tulangan rangkap sehingga tulangan desak diperhitungkan.

Analisa balok dengan tulangan rangkap



Gambar 2.3 Analisa balok bertulangan rangkap

$As = As_1 + As_2$ dan $T = T1 + T2$

$$T = Cc + Cs$$

Prosedur yang logis, untuk perencanaan penampang pesegi dengan tulangan rangkap:

1. menghitung kapasitas / momen nominal penampang dengan tulangan tarik saja, dengan menggunakan tulangan tarik maksimum yang diijinkan.

$$Mn_1 < Mn$$

$As_1 = \rho . b . d$

2. kelebihan momen

$Mn_2 = Mn - Mn_1$

ditahan oleh tambahan tulangan tarik bersama dengan tulangan tekan

$$Cs = \frac{Mn2}{d - d'}$$

luas tulangan tekan : $As = \frac{Cs}{f's - 0{,}85 . f'c}$

dengan : fs' = fy, bila $\varepsilon's \geq \varepsilon y$ dan fs' = Es . $\varepsilon's$ bila $\varepsilon's < \varepsilon y$

dari keseimbangan gaya dalam diperoleh T2 = Cs , sehingga

Tambahan tulangan tarik :

$$As_2 = \frac{T2}{fy}$$ (baja tarik telah leleh)

Luas tulangan tarik : $As = As_1 + As_2$

7. Perencanaan tulangan torsi dan geser

Dalam prakteknya torsi murni hampir tidak pernah terjadi, umumnya penampang harus menyalurkan torsi maupun gaya lintang.

Persyaratan :

- Pengaruh torsi harus diperhitungkan bersama geser dan lentur bila

$$Tu > \varnothing . \left[(\sqrt{f'c} / 20) . \Sigma x^2 . y \right]$$

- Bila momen torsi berfaktor (Tu) yang bekerja lebih besar dari $0{,}6.\left[(\sqrt{fc'}/24).\Sigma x^2.y\right]$,maka luas tulangan tertutup minimum harus dihitung sebesar Avt + 2. At = (bw.s) / (3 . fy)

- Spasi sengkang terhadap torsi dihitung tidak boleh lebih dari nilai yang paling kecil antara 1/4 (x1 + y1) atau 300 mm.

x1 = bw - 2. pb - Ds → jarak ke pusat-pusat sengkang

y1 = hk - 2.pb - Ds → jarak ke pusat-pusat sengkang

-Perhitungan penulangan :

Kontrol : Tu > 0,6. $\sqrt{fc'}\,\Sigma x^2 y/24$

Kontrol terhadap geser :

$$Vc = \frac{(\sqrt{f'c}/6).bw.d}{\sqrt{\left(1+\frac{2{,}5.Ct.Tu}{Vu}\right)^2}} \qquad \text{.....(2.29)}$$

Jika Vu < ∅.Vc → tidak perlu tulangan geser

Jika Vu > ∅. Vc → perlu tulangan geser, maka :

vs = (Av. fy. d) / s → Av / s = vs / (fy. d)

vs = tegangan geser

Kontrol terhadap torsi :

$$Tc = \frac{(\sqrt{fc'}/15).\Sigma x^2.Y}{\sqrt{\left(1+\frac{0{,}4.Vu}{Ct.Tu}\right)^2}}$$

Jika Tu < ∅.Tc → tidak perlu tulangan torsi

Jika Tu > ∅ Tc → perlu tulangan torsi, maka :

Ts = (At. α t.x1.y1.fy) / s

α t = (2 + y1/ x1) / 3 < 1,5

At / s = Ts / (α t .x1. y1. fy) = (Tu/ ϕ - Tc) / (α t. x1.y1.fy)

Spasi tulangan sengkang

$Sx = (Av / s + 2.At / s) > Sx_{min} = bw / (3.fy)$

Spasi = $(2.\ As\varnothing) / Sx < 1/4.(x1 + y1)$ atau 300 mm

dengan : $As\varnothing = 1/4.\pi.Ds^2$

8. Perencanaan tulangan geser murni

Perencanaan ini dilakukan bila balok yang ditinjau tidak terdapat torsi hanya geser murni saja.

$vu = Vu / (bw.d)$

$\varnothing.vc = \varnothing.\sqrt{f'c} / 6$

Jika $vu > \varnothing.vc \rightarrow$ harus diberi tulangan geser

-Kontrol lebar retak :

$\varnothing.Vs = Vu - \varnothing.Vc < 2/3\sqrt{fc'}$

$Av = (Vu - \varnothing.Vc).bw.y / (\varnothing.fy) > Av_{min} = (bw.y) /(3.fy)$

spasi = $(As\varnothing.100)/Av$

9. Analisis kapasitas tampang geser dan torsi

$(Av / s + 2.At / s)_{aktual} = (2.As\varnothing) / Sx$

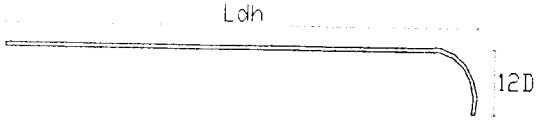
$$(Av/s)' = \frac{(Av/s).(Av/s + 2At/s)_{aktual}}{(Av/s + 2At/s)}$$

$Vs = (Av/s)'.\ fy.\ d$

$\varnothing.(Vc + Vs) > Vu \rightarrow$ aman

10. Panjang pengangkuran

Digunakan kait standar 90 ° untuk ujung penghabisan



Gambar 2.4 Kait standar SK SNI T-15-1991-03 bengkokan 90 °

$Ldh = (100.D) / \sqrt{f'c}$

Faktor-faktor reduksi :

1. kuat leleh (kl) = 1
2. Tulangan lebih (k2) = As_{perlu} / As

maka : Ldh' = ldh.(kl). (k2) > Ldh_{min} = 8D

11. Sambungan lewatan

Sambungan lewatan digunakan untuk lewatan tulangan atas menerus pada daerah tekan.

Ldb = (D.fy) / (4. $\sqrt{fc'}$) > 0,04.D.fy

D. Perencanaan Kolom

Kolom berfungsi meneruskan beban ke pondasi bangunan yang ada di bawahnya. Kolom gedung ini menggunakan bentuk persegi beton bertulang dengan ukuran disesuaikan beban yang dipikul oleh kolom tersebut.

Dalam merencanakan struktur suatu kolom kita dapat meninjau dalam dua bentuk keadaan yaitu :

a. Kolom sentris yaitu kolom yang hanya mengalami gaya normal (gaya aksial tekan) dan bersendi pada satu ujung saja.

b. Kolom eksentris yaitu kolom yang dipengaruhi oleh dua gaya momen lentur dan aksial, hal ini disebabkan karena kolom merupakan bagian struktural yang berhubungan kaku dengan komponen horisontal (balok).

Dasar-dasar perhitungan kolom yang diberikan beban aksial dan momen lentur pada prinsipnya sama dengan dasar anggapan dalam perencanaan terhadap lentur murni. Dasar-dasar anggapan tersebut antara lain :

a. beton tidak dapat menahan gaya tarik.

a. beton tidak dapat menahan gaya tarik.

b. perpanjangan dan perpendekan yang terjadi pada beton serta tulangan dianggap berbanding lurus dengan jaraknya terhadap garis netral.

Berikut ini diberikan langkah-langkah perencanaan kolom portal :

1.Spasi tulangan (SK SNI T-15-1991-03 subbab 3. 16.6)

-Jarak bersih antara tulangan sejajar > D atau 25 mm

2. Penentuan spesifikasi :

Tentukan beban kerja kolom

M1b = momen ujung atas kolom karena beban vertikal

M2b = momen ujung bawah kolom karena beban vertikal

M1s = momen ujung atas kolom karena beban horisontal

M2s = momen ujung bawah kolom karena beban horisontal

Pu = gaya aksial ultimit

Σ PU = jumlah gaya aksial ultimit yang terjadi

Σ Pc = jumlah gaya aksial kritis

ß = faktor reduksi beban = 1,2D / (1,2D + 1,6L)

φ = faktor reduksi kekuatan

3. Tentukan ukuran balok dan kolom lainnya :

-lebar balok (lb)

-tinggi balok (hb)

-panjang balok (Lb)

-lebar kolom (lk)

-tinggi kolom (hk)

-panjang kolom (Lk)

4. Perhitungan :

-Tentukan inersia :

$Igb = (lb.hb^3)/12$

$Igk = (lk.hk^3)/12$

-Tentukan kekakuan kolom dan balok :

$Ec = 4700.\sqrt{fc'}$ (Mpa)

$EIb = (Ec.Igb) / (5.(1+ß))$ ....(2.30)

$EIk = (Ec.Igk) / (2,5.(1+ß))$ ....(2.31)

-Tentukan kekakuan relatif :

$\psi = \Sigma\ (EIk1/Lk1)/\ \Sigma\ (EIb1/Lb1)$ .... (2.32)

$\psi m = (\psi 1 + \psi 2)/2$

Jika $\psi m < 2 \Longrightarrow k = (20- \psi m)/20.\sqrt{(1+\psi m}$ ....(2.33)

Jika $\psi m > 2 \Longrightarrow k = 0,90.\ \sqrt{(1+\psi m}$ .... (2.34)

Cara lain untuk menentukan nilai k dapat melalui nomogram berikut dengan cara memplotkan nilai ψ 1 dan ψ 2 kemudian tarik garis dari nilai keduanya didapat nilai k yang dicari.

-Tentukan kelangsingan kolom

$r = 0,3.hk$

Jika $k.\ Lk/r < 22 \rightarrow$ kolom tidak langsing

Jika $22 < k.\,Lk / r < 100 \rightarrow$ kolom langsing, maka ada faktor pembesaran momen.

Tentukan dulu :

$$Pc = \pi^2\ (Ec.Ik)/(k.Lk)^2 \quad \ldots\ldots (2.35)$$

$$\delta b = 1/\ (1-(Pu\ /\varnothing .Pc)) > 1 \quad \ldots\ldots (2.36)$$

$$\delta s = 1/(1-(\Sigma\ Pu\ /\varnothing .\ \Sigma\ Pc)) > 1 \quad \ldots\ldots (2.37)$$

$Mn = Mc\ /\varnothing$

$e = Mn/Pu > (15 + 0{,}03.\ hk)$

Jika $k.\ Lk\ ./r > 100 \rightarrow$ perbaiki dimensi beton

-Tentukan jumlah tulangan :

Cara I (memakai rumus)

Dari rumus :

$m = fy\ /\ (0{,}85.fc)$

$Rn = M_{max}\ /\ (b.d^2) \rightarrow$ M_{max} dipakai $Mu = 1{,}2.Md + 1{,}6.ML$

Jika kolom tidak langsing atau Mn jika kolom langsing.

$$\rho_{perlu} = \frac{1}{m}\left(1-\sqrt{1-\frac{2.m.Rn}{fy}}\right)$$

$As = \rho_{perlu}.\ b.\ d \rightarrow$ $d = hk - pb - 1/2D - Ds$

D = diameter tulangan pokok

Ds = diameter sengkang

hk = sisi panjang dimensi kolom

pb = selimut beton

$N = As/A\varnothing \Rightarrow A\varnothing = 1/4.\pi .D^2 \Rightarrow$ dibulatkan ke atas

$Asb = N.A\varnothing \Rightarrow$ N untuk 1 sisi

$\rho b = Asb / (b.d)$

Syarat $0,01 < \rho b < 0,04 \Rightarrow$ Jika $\rho b < 0,01$ maka perbanyak jumlah tulangan

Cara II (memakai diagram interaksi Gideon Kusuma)

-Tentukan $M_{max} \rightarrow$ seperti cara I

-Tentukan Pu

$et = M_{max} / Pu > (15+0,03.hk)$

-Tentukan Agr = b . h

-Tentukan nilai $\frac{Pu}{\varnothing.Agr.0,85.fc'} > 1$ ..... (2.37)

-Tentukan nilai $\frac{Pu}{\varnothing.Agr.0,85.fc'} \frac{et}{hk} > 1$ ..... (2.38)

-Tentukan d'/h $\rightarrow$ d'=pb + Ds + 1/2D

Plotkan nilai (2.37) dan (2.38) ke dalam diagram interaksi kolom pada buku Grafik dan Tabel Perencanaan Beton Bertulang oleh Gideon Kusuma, maka akan diperoleh nilai r

-Tentukan nilai β_1

Jika :

fc' < 30 Mpa $\rightarrow$ $\beta_1 = 0,85$

fc' > 30 Mpa $\rightarrow$ $\beta_1 = 0,85 - 0,008 (f c' - 30)$

$\rho_{perlu} = \beta_1 . r$

As = ρ_{perlu} . b. d → d = hk - pb - 1/2D - Ds

N = As/A∅ → A∅=1/4. πD^2 → dibulatkan keatas

Asb = ½. N. A∅ → N untuk 2 sisi

ρ b = Asb/(b. d)

Syarat 0,01 < ρ b < 0,04 → jika ρ b < 0,01 maka perbanyak jumlah tulangan

-Menentukan kapasitas tampang :

Dari rumus :

Cb = $\in$c / ($\in$c+ $\in$c) = 0,003 / (0,003+ (fy / 200.000))

= 600 / (600+fy).d

ab = β_1. cb

f 'sb = 600. (Cb-d') / C b

Jika f 'sb < fy maka :

Pnb = (0,85 .fc' .ab .b) + (As'. f' sb) - (As. fy) ..... (2.39)

Mnb = 0,85. fc'.ab. b. (1/2 h + 1/2 ab) + As'. f 'sb (1/2 h - d') + As.fy.

+ (d -1/2 .h) .....(2.40)

Jika f 'sb > fy, maka :

Pnb = (0,85. fc'. ab. b) + (As'. f'sb) - (As. fy) .....(2.41)

Mnb = 0,85. fc'. ab. b. (1/2. h + 1/2. ab) + As'.f'y (1/2h - d')+ As. fy .

(d -1/2.h) ..... (2.42)

eb = Mnb / Pn b

-Menentukan jenis keruntuhan dengan rumus Whitney

-Jika e > eb → keruntuhan tarik

Dari rumus :

m = fy / (0,85.fc')

$$Pn = 0{,}85.fc'.b.d\left[\frac{h-2e}{2d}+\sqrt{\left(\frac{h-2e}{2d}\right)^2+2m\rho\left(1-\frac{d'}{d}\right)}\right] \quad \text{.....(2.43)}$$

a = Pn / (0,85. fc'. b)

c = a/ β_1

f 'sb = 600 (c - d') / c > fy

ϕ.Pn > Pu → Ok

Jika ϕ.Pn < Pu, maka perbanyak jumlah tulangan

- Jika e < eb → keruntuhan tekan

$$Pn = \frac{A's.fy}{[e/(d-d')]+0{,}5}+\frac{b.h.f'c}{(3he/d^2)+1{,}18} \quad \text{.....(2.44)}$$

ϕ.Pn > Pu → Ok

Jika ϕ.Pn < Pu, maka perbanyak jumlah tulangan

- Kontrol tulangan

-Kontrol jarak vertikal

y = hk - 2.pb - 2.Ds - 2.D < 30 cm

x = (b - 2.pb - 2.Ds - N.D) / (N-1) > 2,5 cm

- *Desain sengkang*

s≤ 16x diameter tulangan memanjang

48x diameter tulangan sengkang

ukuran kolom terkecil

maka → dipasang dengan harga yang kecil

E. Perencanaan Pondasi

Pondasi merupakan struktur bawah suatu bangunan yang berfungsi untuk meneruskan berat dan beban bangunan pada tanah dasar. Dimensi fondasi harus sedemikian, sehingga tanah dasar mampu mendukung beban yang berada diatasnya, dan penurunan yang terjadi masih dalam toleransi yang aman bagi bangunan.

Berdasarkan data hasil pengujian dilapangan dan pengujian di laboratorium, yaitu lapisan tanah dibawah 1,00 meter kepadatan tanah sedang bahkan kedalaman 3,00 meter kepadatan lunak dan tinggi muka air tanah pada kedalaman 3,00 meter maka jenis pondasi yang sesuai untuk Rumah Susun di Yogyakarta pondasi Foot Plate

Dengan menggunakan pondasi Foot Plate dengan dukungan ujung yang dalamnya sekitar 8,00 meter, dan mempunyai daya dukung tiang sebesar kapasitas dukung struktur tiang. Tebal fondasi diatas tulangan bawah tidak boleh kurang dari 150 mm.

Daya dukung tanah izin : $\sigma = 300KN / m^2$

-Perencanaan dimensi pelat

q = berat tanah + berat pondasi

$\sigma_{netto} = \sigma - q$; σ = daya dukung tanah

$\sigma_{netto} \geq P/A$; $A = b^2$

Kontrol daya dukung :

$\sigma \geq P/A + q$; P = gaya aksial kolom

Perencanaan tebal pelat

$Vu = \phi . Vc$

$= \phi . \sqrt{fc'} . b . d / 6$ ..... (2.45)

$Vu = \sigma_{netto} . (x-d) . b$ .....(2.46)

dengan x = tebal taksiran 1,5.D

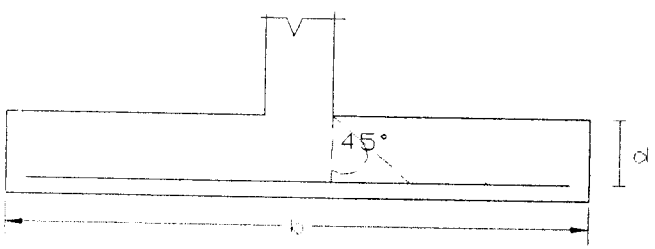
dari persamaan (2.45) dan (2.46) diperoleh $d > d_{min} = 150$ mm

Tebal pelat (t) = d + 1,5.D + pb ; D = diameter tulangan

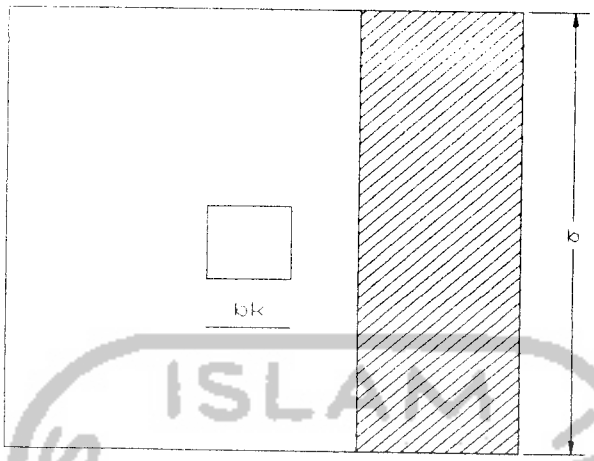
pb = penutup beton

Kontrol terhadap kuat geser

a. Geser balok



Gambar 2.5 Geser pondasi



Gambar 2.6 Daerah kritis geser pondasi

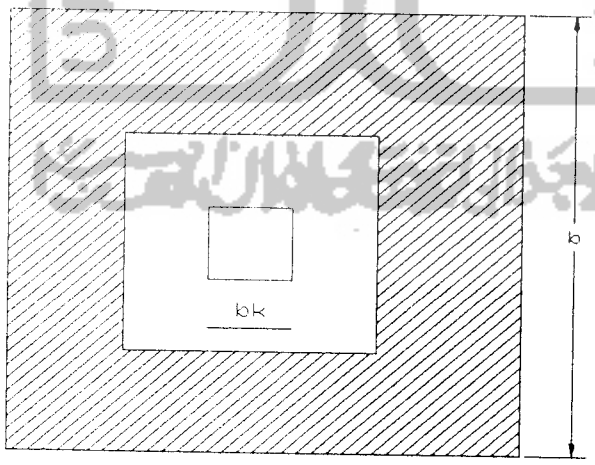
$d = t - \frac{1}{2}.D - pb$

$Vu = (P/A).\ A_{arsiran}$

$Vc = \sqrt{fc'}\ .\ b.\ d\ /6$

syarat : $\phi.Vc \geq Vu$

b.Geser Pons

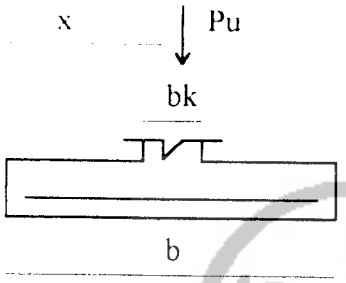


Gambar 2.7 Geser pons pondasi

$Vc = (\ 1+2/\beta_c\ )\ (\sqrt{fc'}\ .\ b.d/6 \quad ;\ \beta_c = hk\ /bk$

$Vu = \sigma_{netto}\ .\ A_{arsir} \quad$; syarat : $\phi.Vc \geq Vu$

Perencanaan penulangan berdasarkan momen lentur



$x = \frac{1}{2}.(b-bk)$

$Mu = \frac{1}{2}.(P/A).b.x^2$

Gambar 2.8 Beban aksial pada pondasi

$$\rho b = \frac{0{,}85.fc'.\beta_1}{fy}\frac{600}{600+fy}$$

Menurut SK SNI T-15-1991-03 subbab 3. 3. 5 :

$\rho_{min} = 1{,}4 / fy$

$\rho_{max} = 0{,}75.\rho b$

$m = fy / (0{,}85.f'c)$

$Rn = Mn / (b.d^2)$

$$\rho_{perlu} = \frac{1}{m}\left[1-\sqrt{1-\frac{2.m.Rn}{fy}}\right]$$

Syarat $\rho_{min} < \rho_{perlu} < \rho_{max}$

$As = \rho_{perlu}.\ bw.\ d$

jarak tulangan = $(\frac{1}{4}.\pi .D^2.100)/As$

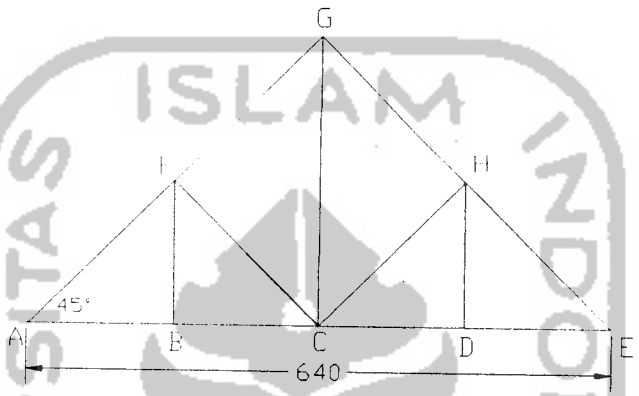
-Balok - balok pengikat pada pondasi

Bila tidak digunakan perhitungan analisa dinamik struktur bagian bawahnya maka balok-balok pengikat dapat direncanakan terhadap gaya longitudinal tarik/tekan sebesar 10% dari beban vertikal kolom dimana balok pengikat tersebut bertemu.

BAB III

PERENCANAAN STRUKTUR

3.1 Perencanaan Kuda - Kuda



Gambar 3.1 Kuda-kuda

3.1.1 Perencanaan Gording

1. Data rangka atap

Bentang kuda-kuda = 6,40 m

Jarak kuda-kuda = 3,30 m

Sudut kemiringan atap = 45 °

2. Perhitungan panjang batang

B1=B2=B3=B4=1,6m

tg 45 ° = V2/3,0

V2= 3,2 m

tg45 ° = V1/1,5

V1=1,6 m

Cos 45° = 1,5/A1

A1=2,263 m

Tabel 3.1 Panjang Batang Kayu

Batang	Panjang (m)
A1-A4	2,263
B1-B4	1,6
V1=V3	1,6
V2	3,2

3 Pembebanan gording

Kayu kelas I = 1 gr/cm^3 = 1000 kg/m^3

Jarak antar gording = 2,263 m

Jarak kuda-kuda = 3,30 m

$\bar{\sigma}_{lt}$ = 1 . 150. 5/4 = 187,5 kg/cm^2

a. Beban angin (W)

Bangunan di daerah angin daratan W=25 kg/m^2

Angin tekan (Wt) $\alpha < 65°$

C1 = 0,02 . α - 0,4

= 0,02 . 45 - 0,4 = 0,5

Wt = C1x W x jarak gording

= 0,5 x 25 x 2,263

= 28,2875 kg/m

Angin Hisap (Wh)

C2= -0,4

Wh = C2 x W x jarak gording

= -0,4 x 25 x 2,263

= 22,63 kg/m

b. Beban orang

p = 100 kg

Px = P Cos α

= 100 Cos 45 ° = 70,71 kg

Py = 100 Sin 45 °

= 70,71 kg

c. Beban atap

q=50 kg/m^2

qx = q . L . Cos α = 50 . 2,263 . Cos 45 ° = 80,0 kg/m

qy = q. L . Sin α = 50 . 2,263. Sin 45 ° = 80,0 kg/m

d. Berat gording

Kayu kelas kuat I , E = 125.000 kg/cm^2

dimensi gording 8/12 , Bj = 1000 kg/m^3

q = b. h. Bj = 0,08 . 0,12. 1000 = 9,6 kg/m

qx = q . Cos α = 9,6 . Cos 45 ° = 6,79 kg/m

qy = q . Sin α = 9,6 . Sin 45 ° = 6,79 kg/m

4. Tegangan Tetap

q tetap = q atap + q gording

qx tetap = 80,0 + 6,79 = 86,79 kg/m

qy tetap = 80,0 + 6,79 = 86,79 kg/m

$Mx = 1/8 \cdot qx \cdot L^2 + ¼ \cdot Px \cdot L$

$= 1/8 \cdot 86,79\ 2,263^2 + ¼ \cdot 70,71 \cdot 2,263 = 95,5625$ kg m

$My = 1/8 \cdot qy \cdot L^2 + ¼ \cdot Py \cdot L$

$= 1/8 \cdot 86,79\ 2,263^2 + ¼ \cdot 70,71 \cdot 2,263 = 95,5625$ kg m

$Wx = 1/6 \cdot b \cdot h^2 = 1/6 \cdot 8 \cdot 12^2 = 192\ cm^3$

$Wy = 1/6 \cdot b^2 h = 1/6 \cdot 12 \cdot 8^2 = 128\ cm^3$

$$\sigma lt = \frac{Mx}{Wx} + \frac{My}{Wy} \leq \overline{\sigma} lt$$

$$= \frac{95,5625x100}{192} + \frac{95,5625x100}{128} = 124,430 kg/cm^2 < 187,5 kg/cm^2$$

5. Tegangan Sementara I

qx s1 = qx tetap + q1 angin

= 86,79 + 28,28755 =115,0775 kg/m

qy s1 = qy tetap = 86,79 kg/m

Mx s1 = 1/8 qx s1 L+ ¼ .Px. L

= 1/8 . 115,0775 . 2,263 + ¼ . 70,71. 2,263 = 113,6706 kg m

My s1 = 1/8 . 86,79 . 2,263 + ¼ . 70,71. 2,263 = 95,5625kg m

$$\sigma_{ltst} = \frac{Mx.sl}{Wx} + \frac{My.sl}{Wy} \leq \overline{\sigma}_{lt}$$

$$= \frac{113,6706x100}{192} + \frac{95,5625x100}{128} \leq 187,5kg/cm^2$$

$$133,8616\ kg/cm^2 < 187,5\ kg/cm^2$$

6. Tegangan Sementara II

qx s2 = qx tetap + q2 angin

= 86,79 + (-22,63) = 64,16 kg/m

qy s2 = qy tetap

Mx s2 = 1/8 qx s2 L^2

= 1/8 . 64,16. $2,263^2$ = 41,072 kg m

My s2 = 1/8 qy s2 L^2

=1/8 . 86,79. $2,263^2$ = 55,5583 kg m

$$\sigma_{lts2} = \frac{Mx.s2}{Wx} + \frac{My.s2}{Wy} \leq \overline{\sigma}_{lt}$$

$$= \frac{41,072x100}{192} + \frac{55,5583x100}{128} \leq 187,5kg/cm^2$$

$$64,7966\ kg/cm^2 < 187,5\ kg/cm^2$$

7. Kontrol Lendutan

$$F = \frac{5}{384}.\frac{q.L^4}{EI} + \frac{1}{48}\frac{PL^3}{EI} < \frac{1}{200}L$$

$I = 1/12 . b. h^3$

$= 1/12 . 8. 12^3 = 1152\ cm^4$

$E = 125.000\ kg/cm^2$

L= 330 cm (jarak kuda-kuda)

$$Fx = \frac{5}{384}\frac{86,79x330^4}{125.000x1152x100} + \frac{1}{48}\frac{70,71x340^3}{125.000x1152} < \frac{1}{200}.340$$

$$0,9307 \quad + \quad 0,3676 \quad = 1,3\ cm < 1,7\ cm$$

$$Fy = \frac{5}{384}\frac{86,79x(340/2)^4}{125.00x1152x100} + \frac{1}{48}\frac{70,71x340^3}{125.000x1152} < \frac{1}{200}340$$

$$0,0582 \quad + \quad 0,3676 \quad = 0,4258\ cm < 1,7\ cm$$

$$F\,max = \sqrt{Fx^2 + Fy^2} \le \frac{1}{200}.L$$

$$= \sqrt{1,3^2 + 0,4258^2} \le \frac{1}{200}340$$

$1,368\ cm \le 1,7\ cm$ Amaan !!

3.1.2 Perencanaan Dimensi Kuda-Kuda

1. Pembebanan

a. Beban Genteng (PPI 1983) = $50\ kg/m^2$

P0 = ½ . 2,263 . 3,3 . 50 = 186,6975 kg

P1 = ½ . 3,3 2,263. 50 .2 = 360,4 kg

b. Beban eternit (PPI 1983) = $11\ kg/m^2$

P0' = ½ . 1,6 . 3,3 . 11 = 29,04 kg

P1' = ½ . 1,6 . 3,3. 11 . 2 = 58,08 kg

c. Beban Plafond (PPI 1983) = $7\ kg/m^2$

P0'' = ½. 1,6. 3,3 . 7 = 18,48 kg

P1'' = ½ . 1,6 . 3,3 . 7 .2 = 36,96 kg

d. Berat Kuda-Kuda

ditaksir = 20 kg/m

P0''' = ½ . 1,6 . 20 = 16 kg

P1''' = P2''' = P3''' = ½. 1,6.20. 2 = 32kg

e. Beban gording

dimensi gording 8/12

Kelas kuat II mutu A , Bj = 1,00 gr/cm ^{3}

P0 - IV = 0,08 . 0,12 . 3,3 . 1000 = 31,68 kg

f. Beban Tak Terduga

Beban diatas rangka :

P0 V-I = 10% . (P0 + P0-III + P0-IV)

= 10% . (186,6975 + 16 + 31,68) = 23,438 kg

PI V-I = P2 V-I = P3 V-I = P5 V-I

= 10% . (P1 + P1-III + P1-IV)

= 10% . (373,395+ 32 +31,68) = 43,7075 kg

Beban dibawah rangka :

P0 V-2 = 10% . (P0-I + P0-II)

= 10% . (29,04 + 18,48) = 4,752 kg

P1 V-2 = P2 V-2 = P3 V-2

= 10% . (P1 II + P1 III)

= 10% . (58,08+36,96) = 9,504 kg

Muatan Tetap :

diatas rangka

P0 = 234,38 + 23,438 = 257,818 kg ~ 258 kg

P1 = 437,075 + 43,7075 = 480,7825 kg ~ 481 kg

P2 = 468,76+ 46,876 = 515,636 kg ~ 516 kg

dibawah rangka :

P0 = 47,52 + 4,752 = 52,272 Kg ~ 53 kg

P1 = P2 = P3 = 95,04 + 9,504 = 104,544 kg ~ 105 kg

g. Beban Angin

Beban angin (W) = 25 kg/m^2

Kemiringan atap = 45 °

Koefisien lereng atap menurut PPI 1983 untuk < 60 ° :

Angin datang :

D= W . (0,02 . - 0,4)

= 25 . (0,02 . 45 - 0,4) = 12,5 kg/m^2

Angin pergi :

P= -0,4 . Wn

= -0,4 . 25 = -10 kg/m^2

Muatan angin datang :

Pd0 = ½ . 2,263 . 3,3 .12,5 = 46,67 kg ~ 47 kg

Pd1 = ½ . (2,263 + 2,263) . 3,3 . 12,5 = 93,35 kg ~ 94 kg

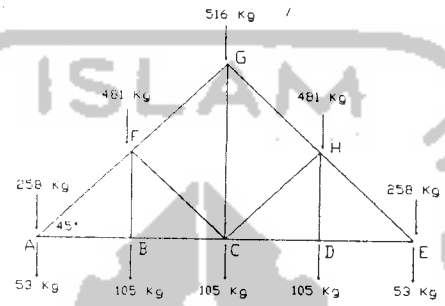
Pd2 = ½ . (2,263 + 2,263) . 3,3 . 12,5 = 93,35 kg ~ 94 kg

Muatan angin pergi :

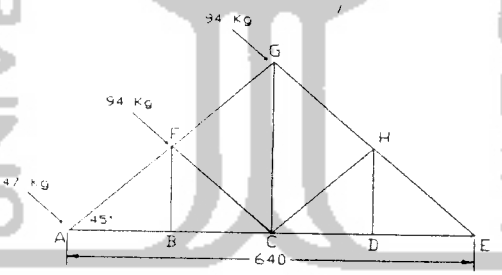
$Pp0 = ½ . 2,263 . 3,3 . 10 = 37,34 \text{ kg} \sim 38 \text{ kg}$

$Pp1 = ½ . (2,263 + 2,263) 3,3 . 10 = 74,679 \text{ kg} \sim 76 \text{ kg}$

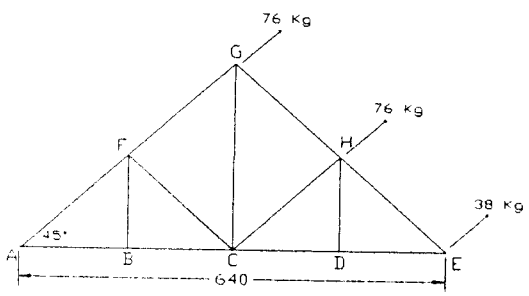
$Pp2 = ½ . (2,263 + 2,263) 3,3 . 10 = 74,679 \text{ kg} \sim 76 \text{ k}$



Gambar 3.2 Pembebanan tetap



Gambar 3.3 Pembebanan angin tekan



Gambar 3.4 Pembebanan angin hisap

2. Hitungan Dimensi Batang

Jenis kayu :

Kayu kelas II mutu A , Bj = 0,8 gr/cm ^{3}

beban tetap dan terlindung, $\beta = 1$

beban tetap dan tekanan angin, $\gamma = 5/4$

$\bar{\sigma}_{lt}$ = 1 . 5/4 . 100 = 125 kg/cm ^{2}

$\bar{\sigma}_{ds}$ // = $\bar{\sigma}_{tr}$ // = 1 . 5/4 . 85 = 106,25 kg/cm ^{2}

$\bar{\sigma}_{ds}\perp$ = 1. 5/4 . 25 = 31,25 kg/cm ^{2}

$\bar{\tau}$ // = 1. 5/4 . 12 = 10 kg/cm ^{2}

dengan Bj = 0,8 gr/cm ^{3}

$\bar{\sigma}_{lt}$ = 170 . 0,8 = 136 kg/cm ^{2}

$\bar{\sigma}_{ds}$ // = $\bar{\sigma}_{tr}$ // = 150. 0,8 = 120 kg/cm ^{2}

$\bar{\sigma}_{ds}\perp$ = 40 . 0,8 = 32 kg/cm ^{2}

$\bar{\tau}$ // = 20 . 0,8 = 16 kg/cm ^{2}

dipakai nilai yang terkecil !!

-Batang atas

batang tekan :

gaya tekan maksimum = -1440,515 kg

panjang batang = 2,263 m

balok tunggal = 8/12

i min = 0,289 . b

$= 0{,}289 \cdot 8 = 2{,}312$ cm

$$\lambda = \frac{l}{i\min}$$

$$= \frac{2{,}263}{2{,}312} = 97{,}88\sim98 \text{ kg/cm}^2$$

dicari faktor tekuk (ω)= 2,88

$$\sigma ds//= \frac{P.W}{F}$$

$$= \frac{1440{,}515x2{,}88}{12x8}$$

$$= 43{,}215 \text{ kg/cm}^2 < = 106{,}25 \text{ kg/cm}^2$$

-Batang bawah

Batang tarik

Gaya tarik maksimum = 1138,806 kg

Panjang batang = 1,6 m

Balok tunggal = 6/8

Sambungan dengan baut, perlemahan 20%

$$\sigma tr = \frac{P}{0{,}8.F}$$

$$= \frac{1138{,}806}{0{,}8.6.8} = 19{,}77 \text{ kg/cm}^2 < 106{,}25 \text{ kg/cm}^2$$

-Batang vertikal

Batang tarik

Gaya tarik maksimum = 759 kg

Panjang batang = 3,2 m

Balok ganda = 6/8

$$\sigma tr = \frac{P}{0,8.F}$$

$$= \frac{759}{2x0,8x6x8} = 6,5885 kg/cm^2 < 106,25 kg/cm^2$$

-Batang diagonal

batang tekan :

gaya tekan maksimum = 547,255 kg

panjang batang = 2,263 m

balok tunggal = 6/8

$$i\ min = 0,289 . b$$

$$= 0,289 . 6 = 1,734 cm$$

$$\lambda = \frac{l}{i\ min}$$

$$= \frac{226,3}{1,734} = 130,5 kg/cm^2$$

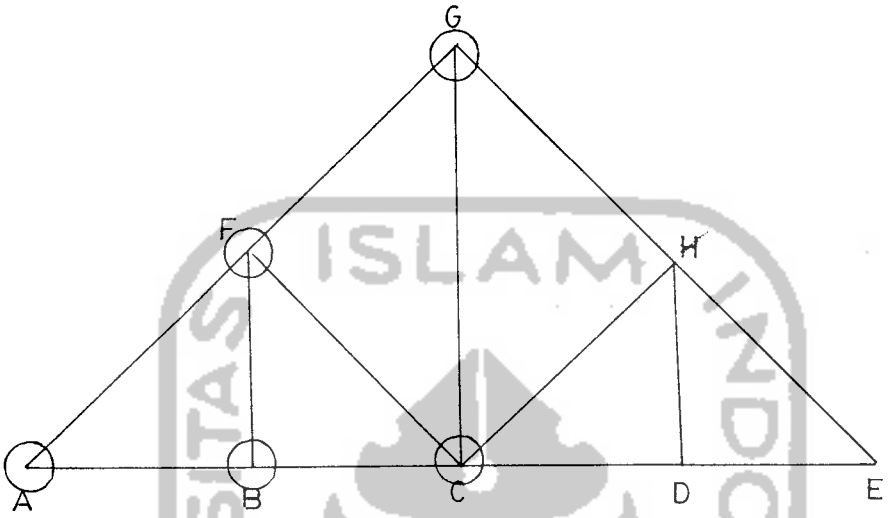
dicari faktor tekuk (ω)= 5,525

$$\sigma ds // = \frac{P.W}{F}$$

$$= \frac{547,225x5,525}{6x8}$$

$$= 42 kg/cm^2 < 106,25 kg/cm^2$$

3.1.3 Perencanaan Sambungan



1. Sambungan Join A

Gaya batang A1 = - 1440,515kg

Gaya batang B1 = 1138,806 kg

Hubungan A1 dengan B1, menggunakan sambungan gigi

$\alpha = 45^\circ$ Sin $1/2\,\alpha = 0{,}383$ Sin $\alpha = 0{,}707$

Cos $1/2\,\alpha = 0{,}924$ Cos $\alpha = 0{,}707$

$\sigma ds1 // 2\alpha = \sigma ds // - (\sigma ds // - \sigma ds\perp)\text{Sin}1 // 2\alpha$

$= 75 - (75\text{-}18{,}75).\ \text{Sin}1/2.\ 45^\circ$

$= 53{,}48\ \text{kg/cm}^2$

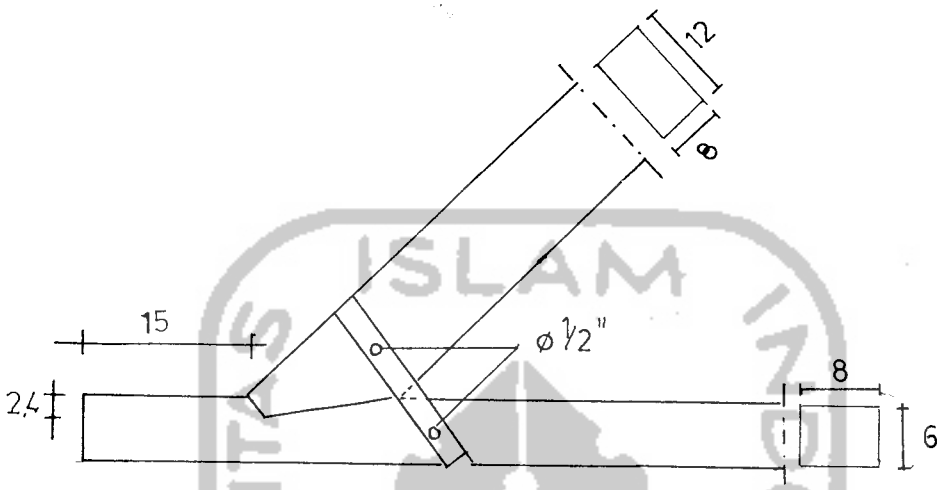
$$tv = \frac{S.\text{Cos}^2\, 1/2\alpha}{b.\bar{\sigma}\, 1/2\alpha} = \frac{1440{,}505\text{x}0{,}8538}{8\text{x}53{,}48} = 2{,}87 \approx 3$$

$$Lv = \frac{S.\text{Cos}\alpha}{b.\bar{\tau}\,//} = \frac{1440{,}505\text{x}0{,}707}{8\text{x}10} = 12{,}73 \approx 13\text{cm}$$

syarat Lv $\geq$ 15 cm

tv ≤ ¼ h = 3 cm

jadi Lv = 15 cm, tv = 2,4 cm



2. Sambungan Join B

Gaya batang V1= 106,00 kg

Gaya batang B1 = 1138,806 kg

Gaya batang B2 = 1138,806 kg

Hubungan V1 dengan B menggunakan sambungan baut, ∅ 5/8" = 1,59 cm

Sambungan golongan III tampang dua :

$P = 60.d.m.(1- 0,6.\text{Sin}\alpha)$

$= 60.1,59.6.(1-0,6.\text{Sin } 90^{o}) = 228,96$ kg

$P = 120.d.l.(1- 0,6.\text{Sin}\alpha)$

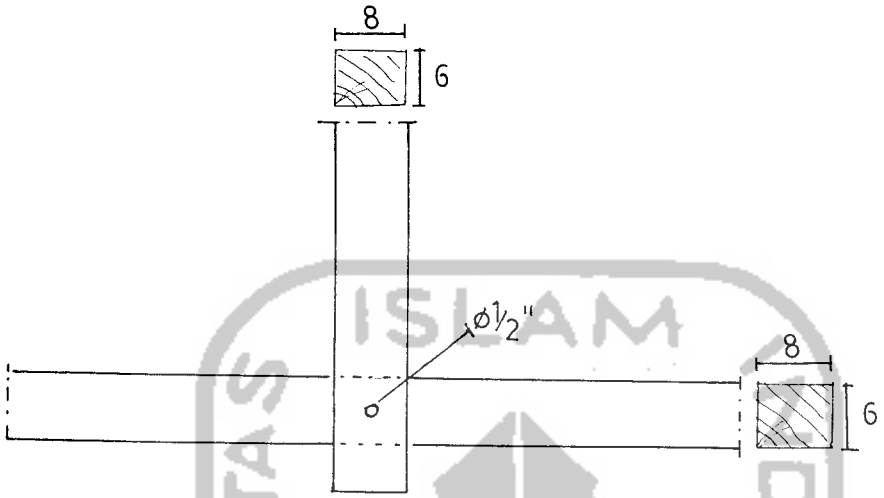
$= 120.1,59.6.(1-0,6.\text{Sin } 90^{o}) = 457,92$ kg

$P = 340.d^{2} . (1- 0,35.\text{Sin}\alpha)$

$= 340.1,59^{2} .(1-0,35.\text{Sin } 90^{o}) = 558,7101$kg

nilai yang terkecil P = 228,96 kg

$$\text{Jumlah baut} = \frac{106}{228,96} = 0,463 \approx 1\varnothing 5/8"$$



3. Sambungan Join F

Gaya batang A1 = -1352,995 kg

Gaya batang A2 = -927,317 kg

Gaya batang V1 =106,00 kg

Gaya batang D1 = -515,778 kg

Sambungan golongan II tampang dua :

$P = 60.d.m.(1- 0,6.\text{Sin}\alpha)$

$= 60.1,59.6.(1-0,6.\text{Sin } 45^{o}) = 329,5512\text{kg}$

$P = 120.d.l.(1- 0,6.\text{Sin}\alpha)$

$= 120.1,59.6.(1-0,6.\text{Sin } 45^{o}) = 659,1025 \text{ kg}$

$P = 340.d^{2} . (1- 0,35.\text{Sin}\alpha)$

$= 340.1,59^{2} .(1-0,35.\text{Sin } 45^{o}) = 646,825 \text{ kg}$

nilai terkecil P=329,551kg

$$\text{jumlah baut} = \frac{106}{329{,}5512} = 0{,}322 \approx 1\varnothing 5/8"$$

Sambungan D1 dengan A menggunakan sambungan gigi :

$$\sigma ds1/2\alpha = \sigma ds//-(\sigma ds//-\sigma ds\perp)Sin1/2\alpha$$

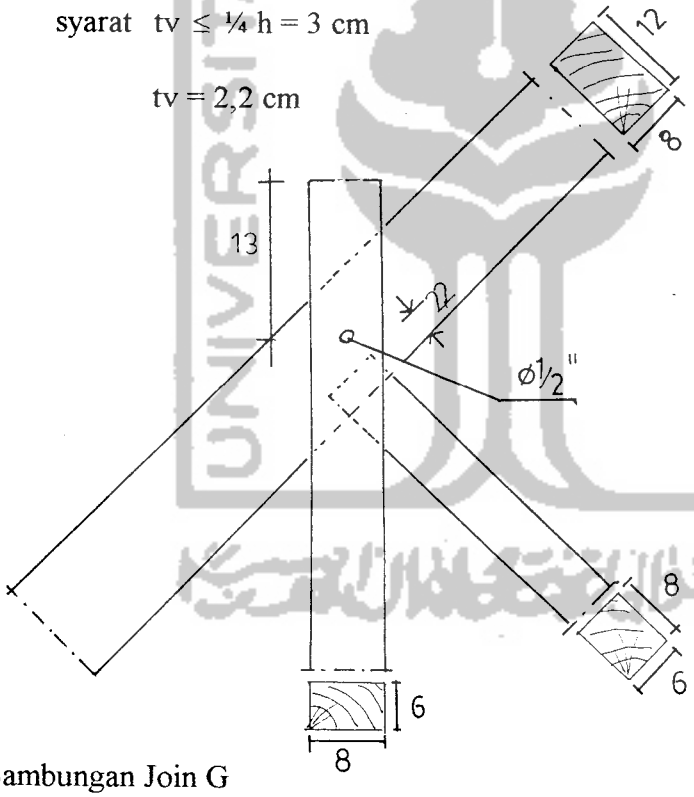
$$= 75 - (75 - 18{,}75).\ Sin1/2.90^{\circ}$$

$$= 35{,}225\ kg/cm^2$$

$$tv = \frac{S.Cos^2 1/2\alpha}{b.\bar{\sigma}1/2\alpha} = \frac{547{,}225x0{,}8538}{6x35{,}225} = 2{,}2cm$$

syarat $tv \leq \frac{1}{4} h = 3$ cm

$tv = 2{,}2$ cm



4. Sambungan Join G

$$\sigma ds1/2\alpha = \sigma ds//-(\sigma ds//-\sigma ds\perp)Sin1/2\alpha$$

$$= 75 - (75 - 18{,}75).\ Sin1/2.\ 45$$

$$= 53{,}48\ kg/cm^2$$

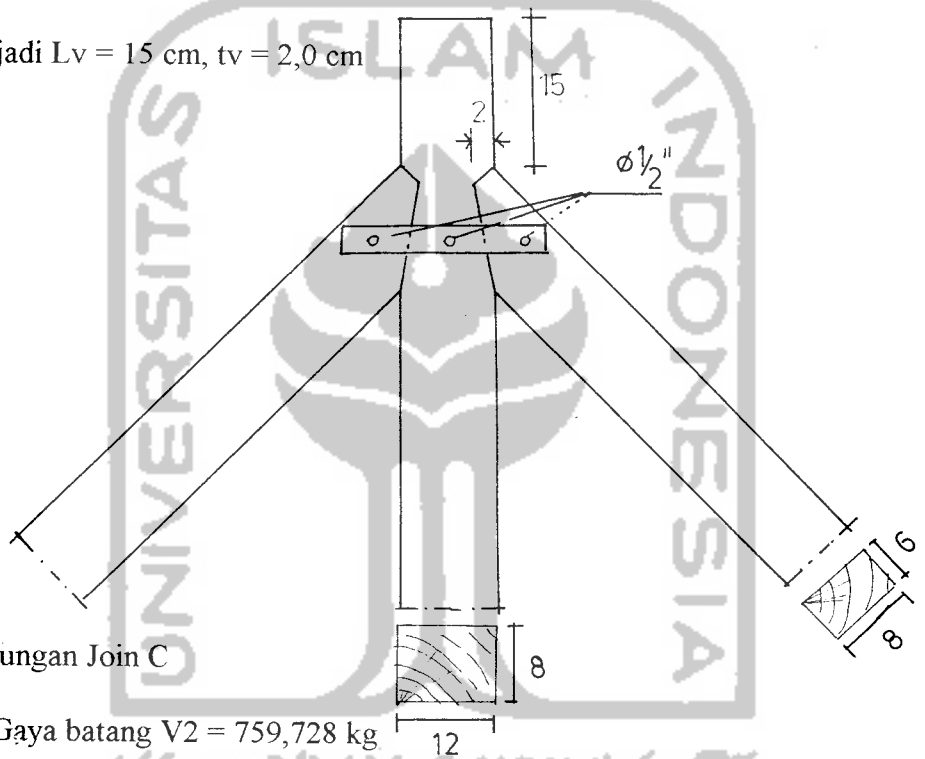
$$tv = \frac{S.Cos^2 1/2\alpha}{b.\bar{\sigma} 1/2\alpha} = \frac{987,260x0,8538}{8x53,48} = 1,97 \approx 2$$

$$Lv = \frac{S.Cos\alpha}{b.\bar{\tau} //} = \frac{987,260x0,707}{8x10} = 8,73cm$$

syarat Lv ≥ 15 cm

tv ≤ ¼ h = 3 cm

jadi Lv = 15 cm, tv = 2,0 cm



5. Sambungan Join C

Gaya batang V2 = 759,728 kg

Gaya batang D1 = 547,225 kg

Gaya batang D2 = 547,225 kg

Gaya batang B2 = 1138,806 kg

Gaya batang B3 = 1018,598 kg

Hubungan B2, B3, dan V2 menggunakan plat U tebal 0,4 cm, $\sigma = 18,75 kg / cm^2$,lebar plat yang dibutuhkan $L = \frac{759,728}{6x1875} = 6,75 \approx 7cm$

Baut yang dibutuhkan untuk batang vertikal menggunakan sambungan golongan III tampang satu :

$P = 25.d.m.(1 - 0{,}6.\text{Sin}\,\alpha)$

$= 25.1{,}59.6.(1 - 0{,}6.\text{Sin}\,0^{o}) = 238{,}5$ kg

$P = 170.d^{2}.m.(1 - 0{,}35.\text{Sin}\,\alpha)$

$= 170.1{,}59^{2}.6.(1 - 0{,}35.\text{Sin}\,0^{o}) = 429{,}777$ kg

nilai yang terkecil P = 238,5 kg

kekuatan baut dinaikkan 25%, P= 238,5 x 1,25 = 298,125 kg

Jumlah baut = $\frac{759{,}728}{298{,}125} = 2{,}55 \approx 3$ buah baut

Hubungan antara D1,D2 dan V2 menggunakan sambungan gigi

$\sigma ds1//2\alpha = \sigma ds//-(\sigma ds//-\sigma ds\perp)\text{Sin}1//2\alpha$

$= 75 - (75 - 18{,}75).\ \text{Sin}1/2.\ 45^{\circ}$

$= 53{,}48$ kg/cm^{2}

$tv = \frac{S.\text{Cos}^{2}\,1/2\alpha}{b.\sigma 1/2\alpha} = \frac{547{,}225x0{,}8538}{6x53{,}48} = 1{,}456 \approx 1{,}5$

$Lv = \frac{S.\text{Cos}\alpha}{b.\tau//} = \frac{547{,}225x0{,}707}{6x10} = 6{,}5\text{cm}$

syarat Lv ≥ 15 cm

tv ≤ ¼ h = 3 cm

jadi Lv = 15 cm, tv = 1,5 cm

2. Daftar Kebutuhan Baut

Tabel 3.3 Kebutuhan Baut

Join	∅ baut	Jumlah
A = E	---	---
B = D	2∅5/8	2
F = H	2∅5/8	2
G	3∅5/8	3
C	3∅5/8	3

jumlah = 10 buah

3. Kontrol berat kuda - kuda terhadap berat taksiran awal

Berat total kayu = 0,1007 ton = 100,7 kg

Berat baut + begel = 15% x berat total kayu

= 15% x 100,7

= 15,105 kg

Berat kuda - kuda /m = (15,105 + 100,7)/ 6,4

= 18,1 kg < 20 kg Amaan !

3.2 Perencanaan Pelat

3.2.1 Analisa pembebanan

Beban tetap = beban mati + beban hidup

a. Beban mati

Beban mati lantai Basement

-Tebal pelat diambil = 20 cm

-Berat sendiri pelat = 0,20 . 2400 = 480 kg/m^2

-Berat pasir tebal 10 cm = 0,10 . 1600 = 160 kg/m^2

-Berat ubin tebal 2 cm = 0,02 . 2400 = 48 kg/m^2

-Berat spesi tebal 1 cm = 0,01 . 2100 = 21 kg/m^2

qd = 709 kg/m^2

Beban mati lantai Groundfloor s/d Topfloor

-Tebal pelat diambil = 12 cm

-Berat sendiri pelat = 0,12 . 2400 = 288 kg/m^2

-Berat pasir tebal 10 cm = 0,10 . 1600 = 160 kg/m^2

-Berat ubin tebal 2 cm = 0,02 . 2400 = 48 kg/m^2

-Berat spesi tebal 1 cm = 0,01 . 2100 = 21 kg/m^2

qd = 517 kg/m^2

b. Beban hidup

Beban hidup atau beban berguna menurut Peraturan Pembebanan Indonesia untuk Gedung 1983 adalah sebagai berikut :

Ruang kantor = 250 kg/cm^2

Ruang serbaguna = 400 kg/cm^2

Ruang Taman Kanak - Kanak = 250 kg/cm^2

Pertokoan / koperasi = 250 kg/cm^2

Gudang , ruang mesin = 400 kg/cm^2

Musholla = 250 kg/cm^2

Kamar sewa = 250 kg/cm^2

Tabel 3.4 Spesifikasi Pembebanan

Lantai	Ruang	Beban Mati (qd) (kg / m^2)	Beban Hidup (ql) (kg / m^2)	1,2.qd + 1,6.ql (kg / m^2)
Basement	Parkir	709	800	2130,8
	R.Pengelola	709	250	1250,8
	R.Sampah	709	250	1250,8
Ground Floor	R.Sewa	517	250	1020,4
	Toko	517	250	1020,4
	Taman Kanak	517	250	1020,4
	R.Serba Guna	517	400	1260,4
	Musholla	517	250	1020,4
	Gudang	517	400	1260,4
I	R.Kamar Sewa	517	250	1020,4
II	R.Kamar Sewa	517	250	1020,4
III	R.Kamar Sewa	517	250	1020,4
IV	R.Kamar Sewa	517	250	1020,4
Topfloor	R.Kamar Sewa	517	250	1020,4

$Rn = M_{max}/(b.d^2)$

$= 8{,}0975E6/(1000.96^2) = 0{,}879$

$$\rho_{perlu} = \frac{1}{m}\left[1 - \sqrt{1 - \frac{2.m.Rn}{fy}}\right]$$

$$\rho_{perlu} = \frac{1}{11{,}294}\left[1 - \sqrt{1 - \frac{2.11{,}294.0{,}879}{400}}\right] = 0{,}00374$$

$\rho_{perlu} < \rho_{min} \rightarrow$ maka dipakai $\rho_{min} = 0{,}00583$

$As_{perlu} = \rho_{perlu} . b. d$

$= 0{,}00593.1000. 96 = 559{,}68 \text{ mm}^2$

$As\varnothing = \frac{1}{4}. \pi .D^2 = \frac{1}{4}. \pi .8^2 = 50{,}265 \text{ mm}^2$

jarak tulangan = (50,265. 1000)/ 559,68 = 89,81 ~ 80 mm

dipakai $\varnothing$8-80

arah Y

$Mnx = Mly/\phi = 3{,}5536/0{,}8 = 4{,}441$ KN.m

$$\rho b = \frac{0{,}85.fc'.\beta_1}{fy}\frac{600}{600 + fy}$$

$$\rho b = \frac{0{,}85.2.0{,}85}{240}\frac{600}{600 + 240} = 0{,}05376$$

$\rho_{min} = 1{,}4/fy$

$= 1{,}4/240 = 0{,}00583$

$\rho_{max} = 0{,}75. \rho b$

$= 0{,}75. 0{,}05376 = 0{,}04032$

$m = fy/ (0{,}85.fc)$

$=240 / (0{,}85.25) = 11{,}294$

$Rn = M_{max}/(b.d^2)$

$= 4{,}441E6/(1000.88^2) = 0{,}5734$

$$\rho_{perlu} = \frac{1}{m}\left[1 - \sqrt{1 - \frac{2.m.Rn}{fy}}\right]$$

$$\rho_{perlu} = \frac{1}{11,294}\left[1 - \sqrt{1 - \frac{2.11,294.05734}{400}}\right] = 0,0024$$

$\rho_{perlu} < \rho_{min}$ → maka dipakai $\rho_{min} = 0,00583$

$As_{perlu} = \rho_{perlu} \cdot b.d$

$= 0,00583.1000.88 = 513,128\ mm^2$

$As\varnothing = \frac{1}{4}.\pi.D^2 = \frac{1}{4}.\pi.8^2 = 50,265\ mm^2$

jarak tulangan = (50,265. 1000)/513,128 = 97,95 mm ~ 80 mm

dipakai ∅8-80

Perencanaan pemulangan tumpuan

arah x

Mnx = Mtx/ ϕ = 6,478/0,8 = 8,0975 KN.m

$$\rho b = \frac{0,85.fc'.\beta_1}{fy}\frac{600}{600 + fy}$$

$$\rho b = \frac{0,85.2.0,85}{240}\frac{600}{600 + 240} = 0,05376$$

$\rho_{min} = 1,4/fy$

$= 1,4/240 = 0,00583$

$\rho_{max} = 0,75.\ \rho b$

$= 0,75.\ 0,05376 = 0,04032$

$m = fy/(0,85.fc)$

$=240 / (0,85.25) = 11,294$

$Rn = M_{max}/(b.d^2)$

$= 8,0975E6/(1000.96^2) = 0,879$

$$\rho_{perlu} = \frac{1}{m}\left[1 - \sqrt{1 - \frac{2.m.Rn}{fy}}\right]$$

$$\rho_{perlu} = \frac{1}{11{,}294}\left[1 - \sqrt{1 - \frac{2.11{,}294.0{,}879}{400}}\right] = 0{,}00374$$

$\rho_{perlu} < \rho_{min}$ → maka dipakai $\rho_{min} = 0{,}00583$

$As_{perlu} = \rho_{perlu} \cdot b.d$

$= 0{,}00593.1000.96 = 559{,}68\ mm^2$

$As\varnothing = \frac{1}{4}.\pi.D^2 = \frac{1}{4}.\pi.8^2 = 50{,}265\ mm^2$

jarak tulangan = (50,265. 1000)/ 559,68 = 89,81 ~ 80 mm

dipakai ∅8-80

Perencanaan tulangan tumpuan

arah y

Mnx = Mty/ϕ = 3,5536/0,8 = 4,441 KN.m

$$\rho b = \frac{0{,}85.fc'.\beta_1}{fy}\frac{600}{600 + fy}$$

$$\rho b = \frac{0{,}85.2.0{,}85}{240}\frac{600}{600 + 240} = 0{,}05376$$

$\rho_{min} = 1{,}4/fy$

$= 1{,}4/240 = 0{,}00583$

$\rho_{max} = 0{,}75.\ \rho b$

$= 0{,}75.\ 0{,}05376 = 0{,}04032$

$m = fy/(0{,}85.f'c)$

$= 240 / (0{,}85.25) = 11{,}294$

$Rn = M_{max}/(b.d^2)$

$= 4{,}441E6/(1000.88^2) = 0{,}5734$

$$\rho_{perlu} = \frac{1}{m}\left[1 - \sqrt{1 - \frac{2.m.Rn}{fy}}\right]$$

$$\rho_{perlu} = \frac{1}{11{,}294}\left[1 - \sqrt{1 - \frac{2.11{,}294.05734}{400}}\right] = 0{,}0024$$

$\rho_{perlu} < \rho_{min} \rightarrow$ maka dipakai $\rho_{min} = 0{,}00583$

$As_{perlu} = \rho_{perlu} . b . d$

$= 0{,}00583 . 1000 . 96 = 559{,}68 \text{ mm}^2$

$As\varnothing = \frac{1}{4} . \pi . D^2 = \frac{1}{4} . \pi . 8^2 = 50{,}265 \text{ mm}^2$

jarak tulangan = (50,265. 1000)/559,68 = 89,81 mm ~ 80 mm

dipakai ∅8-80

Perhitungan tulangan bagi

$As_{bagi} = (0{,}0018 . 400 . b . h)/fy$

$= (0{,}0018 . 400 . 1000 . 120)/240$

$= 360 \text{ mm}^2$

dipakai $A\varnothing 6 = 28{,}26 \text{ mm}^2$

jarak tulangan = (28,26 . 1000)/360

= 78,5 mm~75 mm

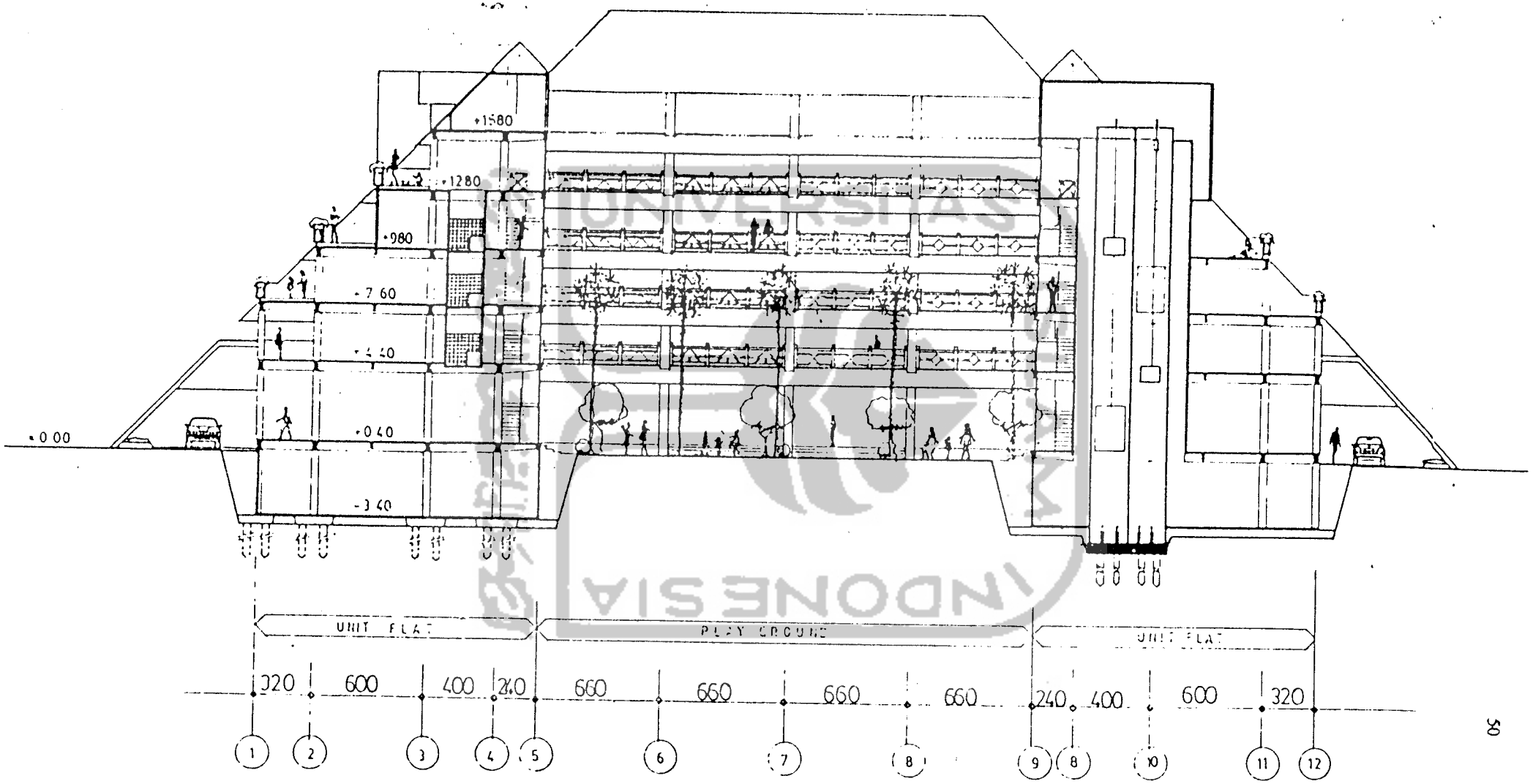
pakai ∅ 6-75

Kontrol kapasitas momen

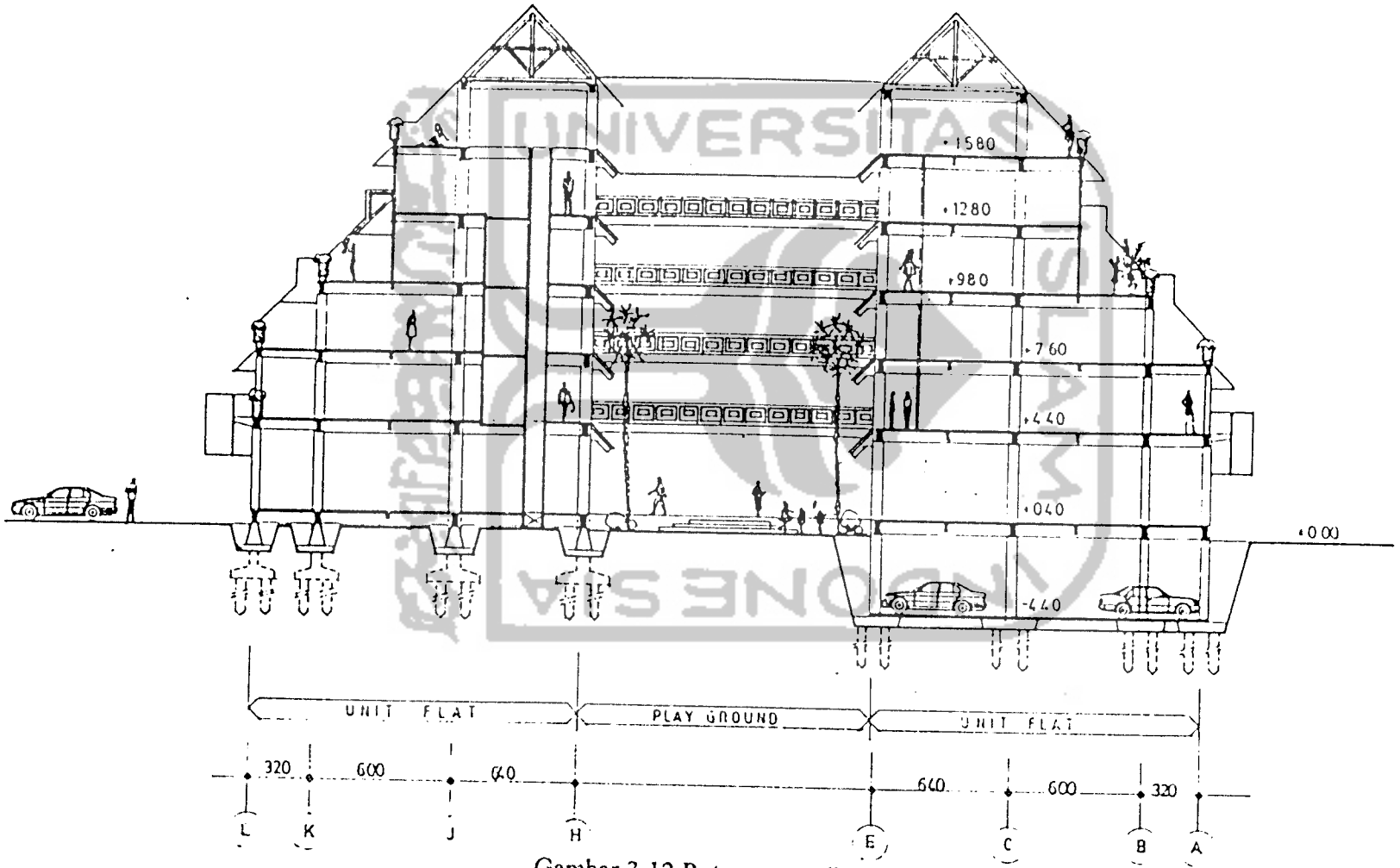
Lapangan arah x

$C = 0{,}85 . fc' . b.a$

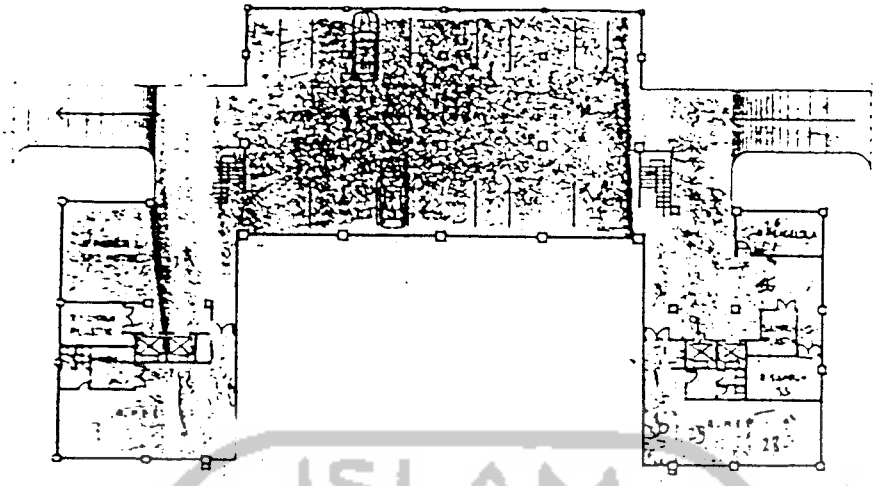
$= 0{,}85 . 25 . 1000 . a = 21250 a$



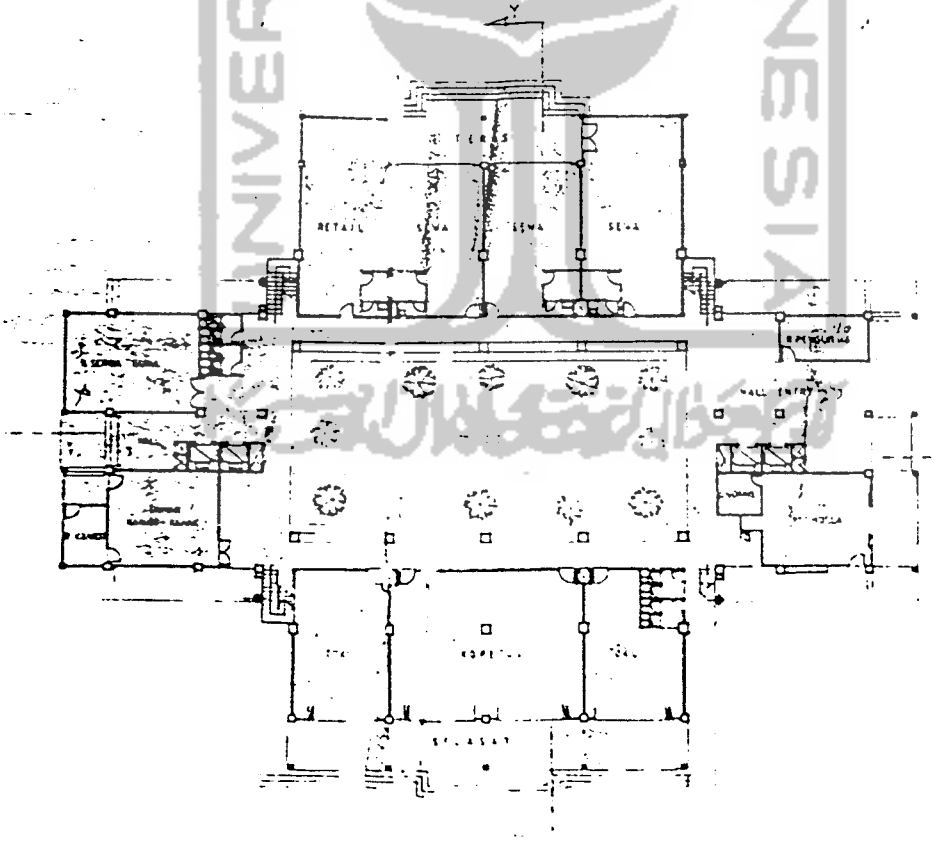
Gambar 3.11 Potongan membujur



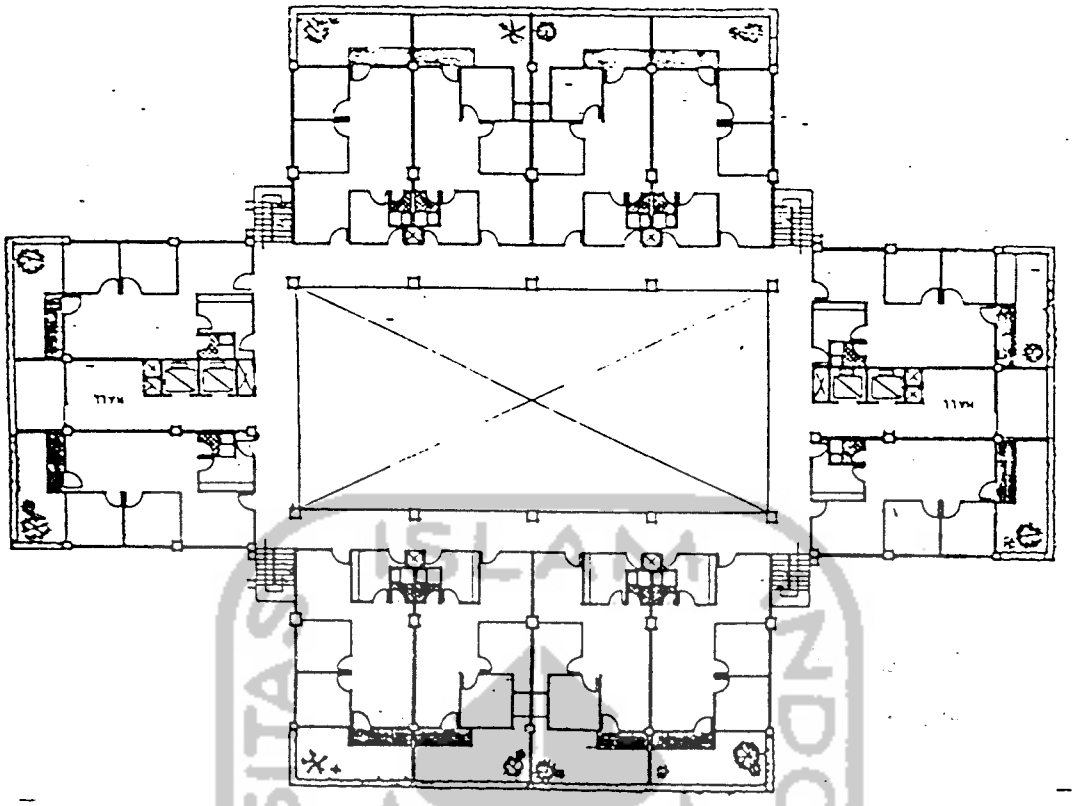
Gambar 3.12 Potongan melintang



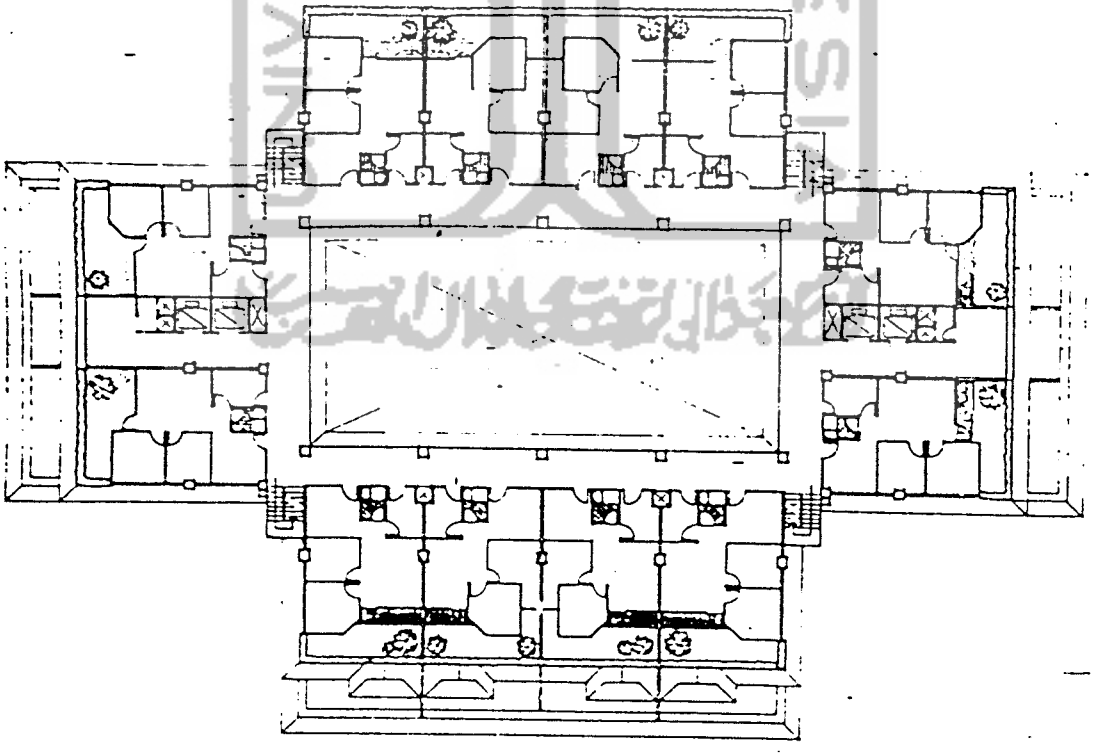
Gambar 3.13 Denah basemen



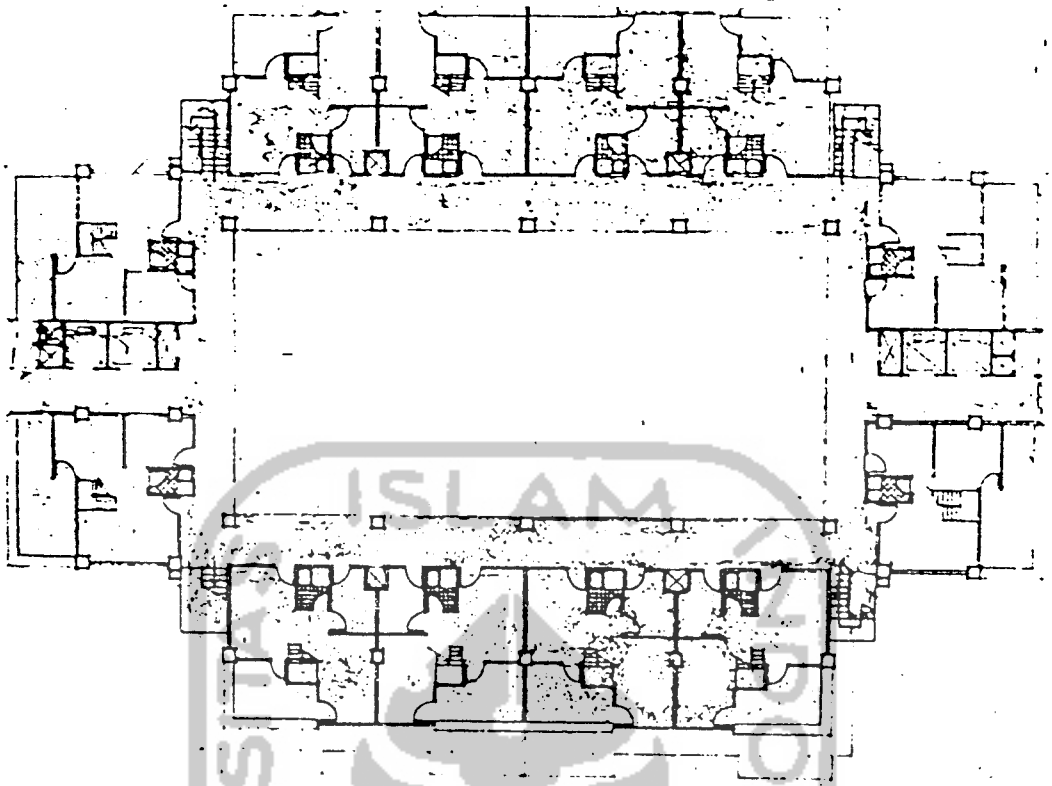
Gambar 3.14 Denah lantai dasar



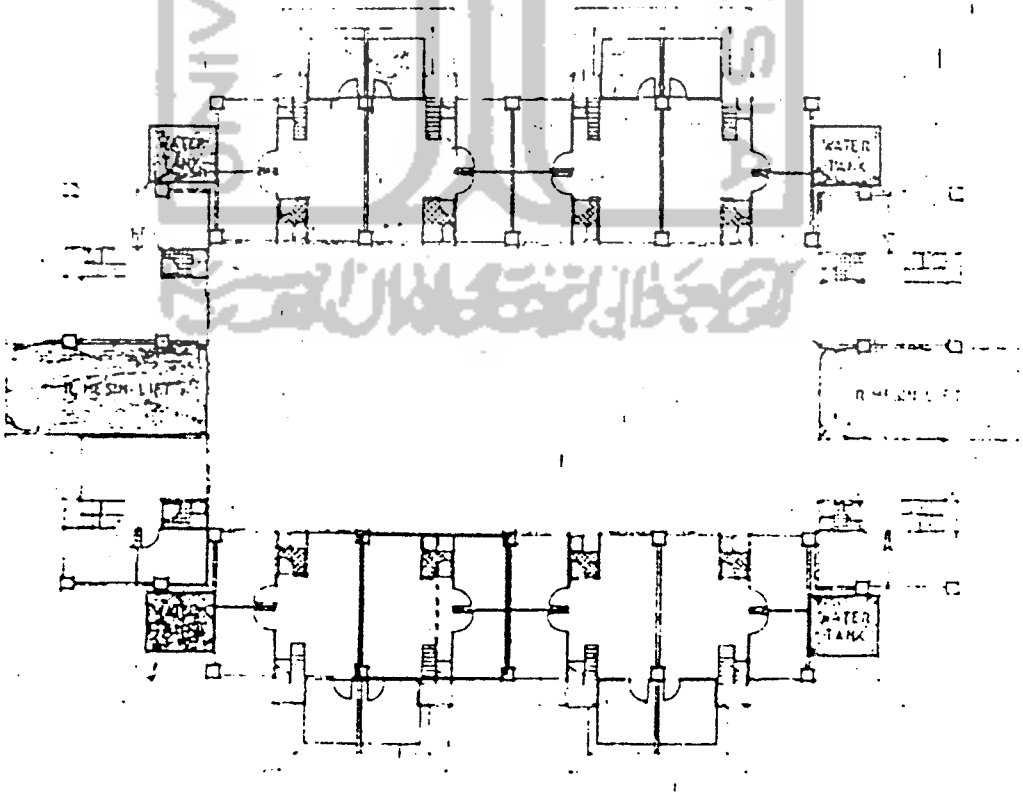
Gambar 3.15 Denah lantai I & II



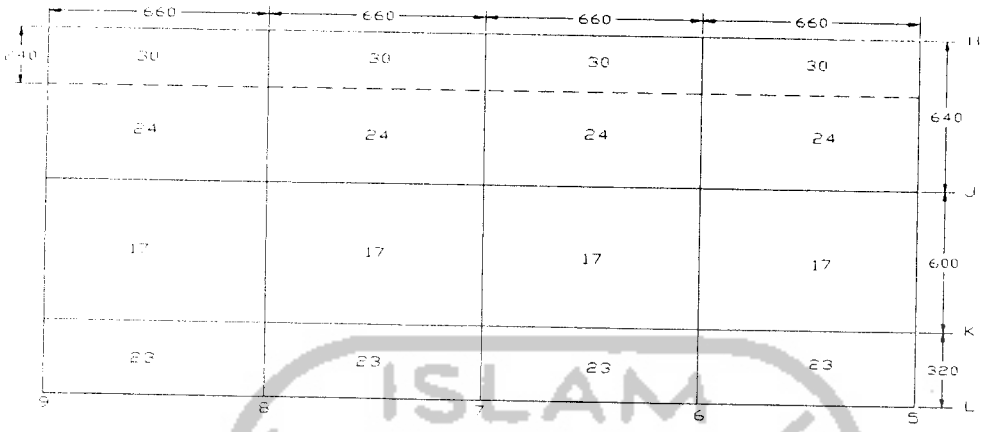
Gambar 3.16 Denah lantai III



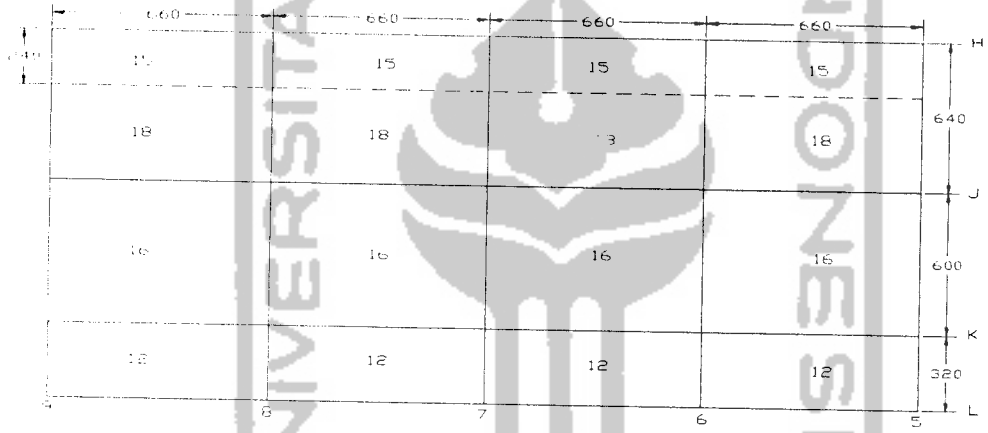
Gambar 3.17 Denah lantai IV



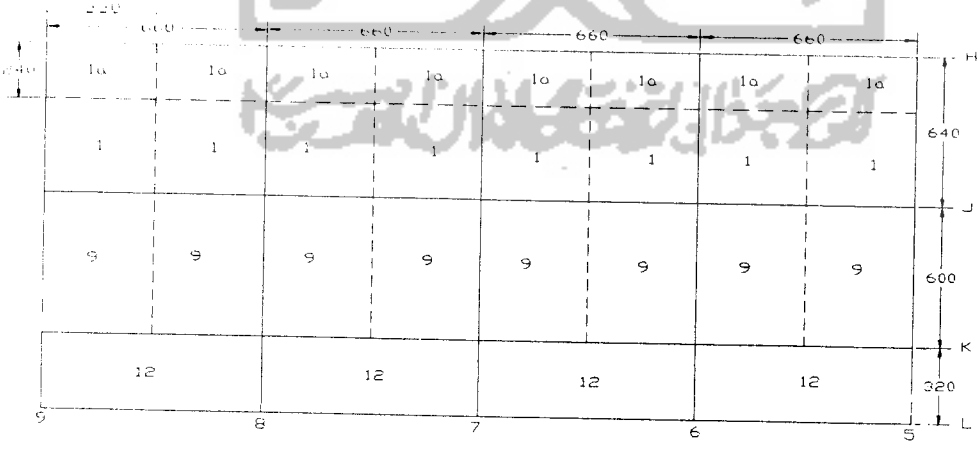
Gambar 3.18 Denah lantai atas



Gambar 3.19 Perencanaan pelat lantai Basement



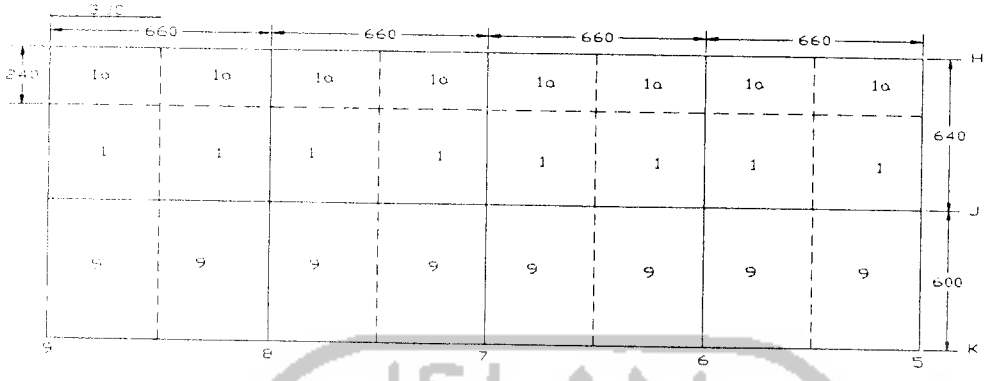
Gambar 3.20 Denah pelat lantai dasar



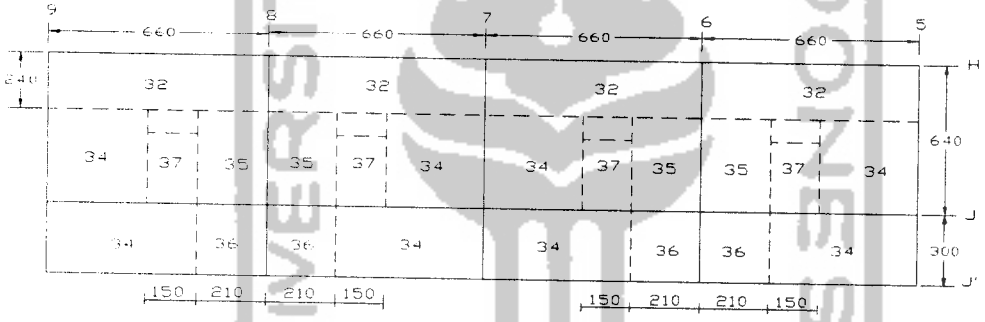
Gambar 3.21 Denah pelat lantai 1= lantai 2

——————— = Balok induk

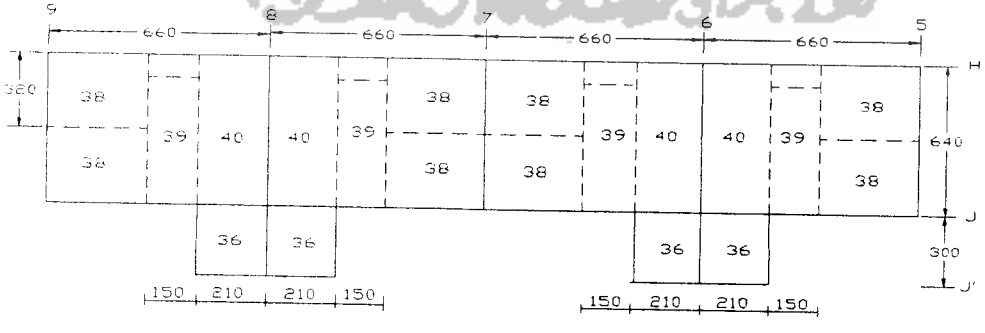
- - - - - - - = Balok anak



Gambar 3.22 Denah pelat lantai 3



Gambar 3.23 Denah pelat lantai 4



Gambar 3.24 Denah pelat lantai atas

3.2.2 Penulangan Pelat Lantai

Mutu beton dan baja yang digunakan:

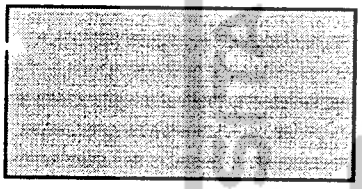
fc' = 25 Mpa

fy = 240 Mpa ; tulangan pokok = ϕ 8

tulangan bagi = ϕ 6

Tipe 1

Distribusi momen



Lx = 3,3 m

3,3 Ly = 4 m

Ly/Lx = 1,212

4

Gambar 3.25 Pelat tipe 1

Tabel 3.5 Distribusi Momen Pelat

M	C	$M = 0,001.qu.Lx^2.C$ (KN.m)
Mlx	46	5,112
Mly	38	4,223
Mtx	46	5,112
Mty	38	4,223

Kontrol Tebal Pelat

$$h_{min} = \frac{Lx.\left[0,8 + \left(\frac{fy}{1500}\right)\right]}{36 + 9\beta}$$

$$= \frac{3300.\left[0{,}8 + \left(\frac{240}{1500}\right)\right]}{36 + 9..2} = 58{,}67 \text{ mm} < 120 \text{ mm}$$

Kontrol terhadap geser

Vu = 1,15 . ½ . qu . Lx

=1,15 . ½ . 10,204 . 3,3

= 19,3621 KN

penutup beton pb = 20 mm

d = h - pb - 1/2D

d= 120 - 20 - ½ 8 = 96 mm

Vc = $\sqrt{fc'}$. b . d/6

Vc = $\sqrt{25}$. 1000 . 96/2 = 80 KN > Vu .....Ok !

Perencanaan tulangan lapangan

arah x

Mnx = Mlx/ ϕ = 5,112/0,8 = 6,39KN.m

$$\rho b = \frac{0{,}85.fc'.\beta_1}{fy}\frac{600}{600 + fy}$$

$$\rho b = \frac{0{,}85.2.0{,}85}{240}\frac{600}{600 + 240} = 0{,}05376$$

ρ_{min} = 1,4/fy

= 1,4/240 = 0,00583

ρ_{max} = 0,75. ρ b

= 0,75. 0,05376 = 0,04032

m = fy/ (0,85.f'c)

=240 / (0,85.25) = 11,294

$Rn = M_{max}/(b.d^2)$

$= 6{,}39E6/(1000.96^2) = 0{,}6934$

$$\rho_{perlu} = \frac{1}{m}\left[1 - \sqrt{1 - \frac{2.m.Rn}{fy}}\right]$$

$$\rho_{perlu} = \frac{1}{11{,}294}\left[1 - \sqrt{1 - \frac{2.11{,}294.0{,}6934}{400}}\right] = 0{,}00294$$

$\rho_{perlu} < \rho_{min} \rightarrow$ maka dipakai $\rho_{min} = 0{,}00583$

$As_{perlu} = \rho_{perlu} . b. d$

$= 0{,}00593.1000. 96 = 559{,}68 \text{ mm}^2$

$As\varnothing = \frac{1}{4}. \pi .D^2 = \frac{1}{4}. \pi .8^2 = 50{,}265 \text{ mm}^2$

jarak tulangan = (50,265. 1000)/ 559,68 = 89,81 ~ 80 mm

dipakai ∅8-80

arah Y

Mnx = Mly/ ϕ = 4,223/0,8 = 5,2788 KN.m

$$\rho b = \frac{0{,}85.fc'.\beta_1}{fy}\frac{600}{600 + fy}$$

$$\rho b = \frac{0{,}85.2{,}0{,}85}{240}\frac{600}{600 + 240} = 0{,}05376$$

$\rho_{min} = 1{,}4/fy$

$= 1{,}4/240 = 0{,}00583$

$\rho_{max} = 0{,}75. \rho b$

$= 0{,}75. 0{,}05376 = 0{,}04032$

$m = fy/ (0{,}85.f'c)$

$=240 / (0{,}85.25) = 11{,}294$

$Rn = M_{max}/(b.d^2)$

$= 5{,}2788E6/(1000.88^2) = 0{,}6816$

$$\rho_{perlu} = \frac{1}{m}\left[1 - \sqrt{1 - \frac{2.m.Rn}{fy}}\right]$$

$$\rho_{perlu} = \frac{1}{11{,}294}\left[1 - \sqrt{1 - \frac{2.11{,}294.0{,}6816}{400}}\right] = 0{,}0029$$

$\rho_{perlu} < \rho_{min}$ → maka dipakai ρ_{min} =0,00583

$As_{perlu} = \rho_{perlu} \cdot b.d$

$= 0{,}00583.1000.88 = 513{,}128\ mm^2$

$As\varnothing = \frac{1}{4}.\pi.D^2 = \frac{1}{4}.\pi.8^2 = 50{,}265\ mm^2$

jarak tulangan = (50,265. 1000)/513,128 = 97,95 mm ~ 80 mm

dipakai ∅8-80

Perencanaan pemulangan tumpuan

arah x

Mnx = Mtx/ϕ = 5,112/0,8 = 6,39 KN.m

$$\rho b = \frac{0{,}85.fc'.\beta_1}{fy}\frac{600}{600 + fy}$$

$$\rho b = \frac{0{,}85.2.0{,}85}{240}\frac{600}{600 + 240} = 0{,}05376$$

$\rho_{min} = 1{,}4/fy$

$= 1{,}4/240 = 0{,}00583$

$\rho_{max} = 0{,}75.\ \rho b$

$= 0{,}75.\ 0{,}05376 = 0{,}04032$

$m = fy/(0{,}85.f'c)$

$= 240 / (0{,}85.25) = 11{,}294$

$Rn = M_{max}/(b.d^2)$

$= 6{,}39E6/(1000.96^2) = 0{,}6934$

$$\rho_{perlu} = \frac{1}{m}\left[1 - \sqrt{1 - \frac{2\ m.Rn}{fy}}\right]$$

$$\rho_{perlu} = \frac{1}{11{,}294}\left[1 - \sqrt{1 - \frac{2.11{,}294.0{,}6934}{400}}\right] = 0{,}0029$$

$\rho_{perlu} < \rho_{min}$ → maka dipakai $\rho_{min} = 0{,}00583$

$As_{perlu} = \rho_{perlu} . b. d$

$= 0{,}00593.1000. 96 = 559{,}68\ mm^2$

$As\varnothing = ¼. \pi .D^2 = ¼. \pi .8^2 = 50{,}265\ mm^2$

jarak tulangan = (50,265. 1000)/ 559,68 = 89,81 ~ 80 mm

dipakai ∅8-80

Perencanaan tulangan tumpuan

arah y

Mnx = Mty/ ϕ = 4,223/0,8 = 5,2787KN.m

$$\rho b = \frac{0{,}85.fc'.\beta_1}{fy}\ \frac{600}{600 + fy}$$

$$\rho b = \frac{0{,}85.2.0{,}85}{240}\ \frac{600}{600 + 240} = 0{,}05376$$

$\rho_{min} = 1{,}4/fy$

$= 1{,}4/240 = 0{,}00583$

$\rho_{max} = 0{,}75.\ \rho b$

$= 0{,}75.\ 0{,}05376 = 0{,}04032$

$m = fy/ (0{,}85.fc)$

$=240 / (0{,}85.25) = 11{,}294$

$Rn = M_{max}/(b.d^2)$

$= 5{,}2787E6/(1000.88^2) = 0{,}6816$

$$\rho_{perlu} = \frac{1}{m}\left[1 - \sqrt{1 - \frac{2.m.Rn}{fy}}\right]$$

$$\rho_{perlu} = \frac{1}{11{,}294}\left[1 - \sqrt{1 - \frac{2.11{,}294.0{,}6816}{400}}\right] = 0{,}0029$$

$\rho_{perlu} < \rho_{min}$ → maka dipakai $\rho_{min} = 0{,}00583$

$As_{perlu} = \rho_{perlu} . b . d$

$= 0{,}00583 . 1000 . 96 = 559{,}68 \text{ mm}^2$

$As\varnothing = \frac{1}{4} . \pi . D^2 = \frac{1}{4} . \pi . 8^2 = 50{,}265 \text{ mm}^2$

jarak tulangan = (50,265. 1000)/559,68 = 89,81 mm ~ 80 mm

dipakai ∅8-80

Perhitungan tulangan bagi

$As_{bagi} = (0{,}0018 . 400 . b . h)/fy$

$= (0{,}0018 . 400 . 1000 . 120)/240$

$= 360 \text{ mm}^2$

dipakai $A\varnothing 6 = 28{,}26 \text{ mm}^2$

jarak tulangan = (28,26 . 1000)/360

= 78,5 mm~75 mm

pakai ∅ 6-75

Kontrol kapasitas momen

Lapangan arah x

$C = 0{,}85 . fc' . b.a$

$= 0{,}85 . 25 . 1000 . a = 21250\ a$

T = As.fy

= 559,68 . 400 = 223872 N

keseimbangan gaya C =T

21250 a = 223872

a= 10,5352 mm

Mn_{tot} = Ts . (d - a/2)

= 223872. (96 - 10,5352/2) E-6

= 20,3124 KN m > 5,112 KN m

Tumpuan arah x

C = 0,85 . fc'. b.a

= 0,85 . 25 . 1000. a = 21250 a

T = As.fy

= 559,68 . 400 = 223872 N

keseimbangan gaya C =T

21250 a = 223872

a= 10,5352 mm

Mn_{tot} = Ts . (d - a/2)

= 223872. (96 - 10,5352/2) E-6

= 20,3124 KN m > 5,112 KN m

Lapangan arah y

C c = 0,85 . fc'. b.a

= 0,85 . 25 . 1000. a = 21250 a

Ts = As.fy

= 513,128 . 400 = 205251,2 N

keseimbangan gaya C =T

21250 a = 205251,2

a= 9,6589 mm

Mn_{tot} = Ts . (d - a/2)

=205251,2. (88- 9,6569/2) E-6

= 17,701 KN m > 4,223 KN m

Tumpuan arah y

C = 0,85 . fc'. b.a

= 0,85 . 25 . 1000. a = 21250 a

T = As.fy

= 559,68 . 400 = 223872 N

keseimbangan gaya C =T

21250 a = 223872

a= 10,5352 mm

Mn_{tot} = Ts . (d - a/2)

= 223872. (96 - 10,5352/2) E-6

= 20,3124 KN m > 4,223 KN m

Tabel 3.6 Penulangan Pelat Tipe12

Daerah	Tulangan Pokok		Tulangan
	arah X	arah Y	
Tumpuan	∅8-80	∅8-80	∅8-75
Lapangan	∅8-80	∅8-80	-

hasil dari penulangan tipe pelat yang lain ditabelkan

Tabel 3.7 Penulangan Pelat Terpasang

TIPE	LY (m)	LX (m)	C	M(KN.m)	Rn	ρ_{min}	ρ_{perlu}	As(mm²)	Jarak.Tul	Pakai
1	4	3.3	46	MLX =5.111592	0.693304	0.00583	0.002937	559.68	89.81025	D8-80
		3.3	38	MLY=4.222619	0.681595	0.00583	0.002887	559.68	89.81025	D8-80
		3.3	46	MTX=5.111592	0.693304	0.00583	0.002937	559.68	89.81025	D8-80
		3.3	38	MTY=4.222619	0.572729	0.00583	0.002419	559.68	89.81025	D8-80
1a	3.3	2.4	53	MLX=3.115077	0.422509	0.00583	0.001778	559.68	89.81025	D8-80
		2.4	38	MLY=2.233452	0.360513	0.00583	0.001515	559.68	89.81025	D8-80
		2.4	53	MTX=3.115077	0.422509	0.00583	0.001778	559.68	89.81025	D8-80
		2.4	38	MTY=2.233452	0.302931	0.00583	0.001271	559.68	89.81025	D8-80
2	3	2.6	61	MLX=4.207721	0.570709	0.00583	0.002411	559.68	89.81025	D8-80
		2.6	51	MLY=3.517931	0.567848	0.00583	0.002399	559.68	89.81025	D8-80
		2.6	61	MTX=4.207721	0.570709	0.00583	0.002411	559.68	89.81025	D8-80
		2.6	51	MTY=3.517931	0.47715	0.00583	0.002011	559.68	89.81025	D8-80
3	6.6	4	59	MLX=9.632576	1.306502	0.00583	0.005622	559.68	89.81025	D8-80
		4	36	MLY=5.877504	0.948719	0.00583	0.004045	559.68	89.81025	D8-80
		4	59	MTX=9.632576	1.306502	0.00583	0.005622	559.68	89.81025	D8-80
		4	36	MTY=5.877504	0.797188	0.00583	0.003386	559.68	89.81025	D8-80
4	6.6	2.4	54	MLX=3.173852	0.430481	0.00583	0.001812	559.68	89.81025	D8-80
		2.4	19	MLY=1.116726	0.180257	0.00583	0.000754	559.68	89.81025	D8-80
		2.4	54	MTX=3.173852	0.430481	0.00583	0.001812	559.68	89.81025	D8-80
		2.4	56	MTY=3.291402	0.446425	0.00583	0.00188	559.68	89.81025	D8-80
5	9	4	62	MLX=10.12237	1.372934	0.00583	0.005918	568.1621	88.46947	D8-80

		4	34	MLY=5.550976	0.896012	0.00583	0.003816	559.68	89.81025	D8-80
		4	62	MTX=10.12237	1.372934	0.00583	0.005918	568.1621	88.46947	D8-80
		4	34	MTY=5.550976	0.752899	0.00583	0.003195	559.68	89.81025	D8-80
6	6	3.2	61	MLX=6.373827	0.864506	0.00583	0.003679	559.68	89.81025	D8-80
		3.2	35	MLY=3.657114	0.590314	0.00583	0.002495	559.68	89.81025	D8-80
		3.2	61	MTX=6.373827	0.864506	0.00583	0.003679	559.68	89.81025	D8-80
		3.2	35	MTY=3.657114	0.496028	0.00583	0.002091	559.68	89.81025	D8-80
7	3.2	2	58	MLX=2.367328	0.321089	0.00583	0.001348	559.68	89.81025	D8-80
		2	36	MLY=1.469376	0.23718	0.00583	0.000994	559.68	89.81025	D8-80
		2	58	MTX=2.367328	0.321089	0.00583	0.001348	559.68	89.81025	D8-80
		2	36	MTY=1.469376	0.199297	0.00583	0.000834	559.68	89.81025	D8-80
8	4	4	56	MLX=9.142784	1.240069	0.00583	0.005327	559.68	89.81025	D8-80
		4	37	MLY=6.040768	0.975072	0.00583	0.004161	559.68	89.81025	D8-80
		4	56	MTX=9.142784	1.240069	0.00583	0.005327	559.68	89.81025	D8-80
		4	37	MTY=6.040768	0.819332	0.00583	0.003482	559.68	89.81025	D8-80
9	6	3.3	60	MLX=6.667294	0.90431	0.00583	0.003852	559.68	89.81025	D8-80
		3.3	35	MLY=3.889255	0.627785	0.00583	0.002656	559.68	89.81025	D8-80
		3.3	60	MTX=6.667294	0.90431	0.00583	0.003852	559.68	89.81025	D8-80
		3.3	35	MTY=3.889255	0.527514	0.00583	0.002226	559.68	89.81025	D8-80
10	2.4	2	46	MLX=1.877536	0.254657	0.00583	0.001068	559.68	89.81025	D8-80
		2	38	MLY=1.551008	0.250356	0.00583	0.001049	559.68	89.81025	D8-80
		2	46	MTX=1.877536	0.254657	0.00583	0.001068	559.68	89.81025	D8-80
		2	38	MTY=1.551008	0.210369	0.00583	0.000881	559.68	89.81025	D8-80
11	4	3.2	48	MLX=5.01547	0.680267	0.00583	0.002881	559.68	89.81025	D8-80

		3.2	38	MLY=3.97058	0.640912	0.00583	0.002712	559.68	89.81025	D8-80
		3.2	48	MTX=5.01547	0.680267	0.00583	0.002881	559.68	89.81025	D8-80
		3.2	38	MTY=3.97058	0.538544	0.00583	0.002273	559.68	89.81025	D8-80
12	6.6	3.2	62	MLX=6.478316	0.878678	0.00583	0.00374	559.68	89.81025	D8-80
		3.2	34	MLY=3.552625	0.573448	0.00583	0.002423	559.68	89.81025	D8-80
		3.2	62	MTX=6.478316	0.878678	0.00583	0.00374	559.68	89.81025	D8-80
		3.2	34	MTY=3.552625	0.481856	0.00583	0.002031	559.68	89.81025	D8-80
13	6	4	56	MLX=9.142784	1.240069	0.00583	0.005327	559.68	89.81025	D8-80
		4	37	MLY=6.040768	0.975072	0.00583	0.004161	559.68	89.81025	D8-80
		4	56	MTX=9.142784	1.240069	0.00583	0.005327	559.68	89.81025	D8-80
		4	37	MTY=6.040768	0.819332	0.00583	0.003482	559.68	89.81025	D8-80
ground										
15	6.6	2.4	63	MLX=3.702828	0.502228	0.00583	0.002118	559.68	89.81025	D8-80
		2.4	13	MLY=0.764076	0.123333	0.00583	0.000515	559.68	89.81025	D8-80
		2.4	63	MTX=3.702828	0.502228	0.00583	0.002118	559.68	89.81025	D8-80
		2.4	38	MTY=2.233452	0.302931	0.00583	0.001271	559.68	89.81025	D8-80
16	6.6	6	42	MLX=15.42845	2.092617	0.00583	0.009197	882.9001	56.9317	D8-50
		6	37	MLY=13.59173	2.193913	0.00583	0.009669	928.2497	54.1503	D8-50
		6	42	MTX=15.42845	2.092617	0.00583	0.009197	882.9001	56.9317	D8-50
		6	37	MTY=13.59173	1.843496	0.00583	0.008047	772.5015	65.06783	D8-60
serbaguna17	6.6	6	42	MLX=18.78509	2.547891	0.00583	0.011343	1088.903	46.16113	D8-40
		6	37	MLY=16.54877	2.671224	0.00583	0.011934	1145.703	43.87264	D8-40
		6	42	MTX=18.78509	2.547891	0.00583	0.011343	1088.903	46.16113	D8-40
		6	37	MTY=16.54877	2.24457	0.00583	0.009907	951.0311	52.85316	D8-50
gudang18	6.6	4	59	MLX=11.72826	1.590747	0.00583	0.006897	662.0839	75.91938	D8-70

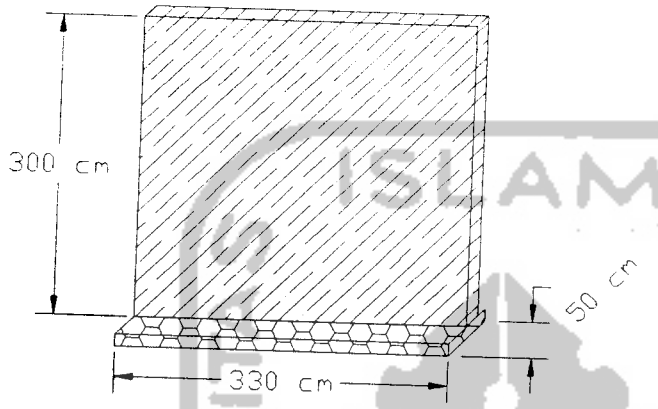
		4	36	MLY=7.156224	1.155124	0.00583	0.004951	559.68	89.81025	D8-80
		4	59	MTX=11.72826	1.590747	0.00583	0.006897	662.0839	75.91938	D8-70
		4	36	MTY=7.156224	0.970625	0.00583	0.004141	559.68	89.81025	D8-80
pengurus19	6	3	62	MLX=5.693832	0.772275	0.00583	0.003279	559.68	89.81025	D8-70
		3	35	MLY=3.21426	0.518831	0.00583	0.002189	559.68	89.81025	D8-80
		3	62	MTX=5.693832	0.772275	0.00583	0.003279	559.68	89.81025	D8-70
		3	35	MTY=3.21426	0.435962	0.00583	0.001836	559.68	89.81025	D8-80
hall20	6	3.6	59	MLX=9.499887	1.288505	0.00583	0.005542	559.68	89.81025	D8-70
		3.6	36	MLY=5.796541	0.93565	0.00583	0.003988	559.68	89.81025	D8-80
		3.6	59	MTX=9.499887	1.288505	0.00583	0.005542	559.68	89.81025	D8-70
		3.6	36	MTY=5.796541	0.786206	0.00583	0.003339	559.68	89.81025	D8-80
basement										
parkir21	6.4	3.3	61	MLX=13.16623	0.537397	0.00583	0.002268	1020.25	76.98015	D8-70
		3.3	35	MLY=7.554393	0.34685	0.00583	0.001457	961.95	81.64562	D8-80
		3.3	61	MTX=13.16623	0.537397	0.00583	0.002268	1020.25	76.98015	D8-70
		3.3	35	MTY=7.554393	0.308343	0.00583	0.001294	1020.25	76.98015	D8-70
22	6	3.3	60	MLX=12.95039	0.528587	0.00583	0.002231	1020.25	76.98015	D8-70
		3.3	35	MLY=7.554393	0.34685	0.00583	0.001457	961.95	81.64562	D8-80
		3.3	60	MTX=12.95039	0.528587	0.00583	0.002231	1020.25	76.98015	D8-70
		3.3	35	MTY=7.554393	0.308343	0.00583	0.001294	1020.25	76.98015	D8-70
23	6.6	3.2	62	MLX=12.58332	0.513605	0.00583	0.002167	1020.25	76.98015	D8-70
		3.2	34	MLY=6.900531	0.316829	0.00583	0.00133	961.95	81.64562	D8-80
		3.2	62	MTX=12.58332	0.513605	0.00583	0.002167	1020.25	76.98015	D8-70
		3.2	34	MTY=6.900531	0.281654	0.00583	0.001181	1020.25	76.98015	D8-70

30	6.6	2.4	63	MLX=4.86985	0.198769	0.00583	0.000832	1020.25	76.98015	D8-70
		2.4	13	MLY=1.00489	0.046138	0.00583	0.000192	961.95	81.64562	D8-80
		2.4	63	MTX=4.86985	0.198769	0.00583	0.000832	1020.25	76.98015	D8-70
		2.4	38	MTY=2.93737	0.119893	0.00583	0.000501	1020.25	76.98015	D8-70
31	4	2.4	59	MLX=4.560653	0.186149	0.00583	0.000779	1020.25	76.98015	D8-70
		2.4	36	MLY=2.782771	0.127767	0.00583	0.000534	961.95	81.64562	D8-80
		2.4	59	MTX=4.560653	0.186149	0.00583	0.000779	1020.25	76.98015	D8-70
		2.4	36	MTY=2.782771	0.113582	0.00583	0.000475	1020.25	76.98015	D8-70
32	6.6	2.4	63	MLX=7.192282	0.293563	0.00583	0.001232	1020.25	76.98015	D8-70
		2.4	13	MLY=1.484122	0.068141	0.00583	0.000284	961.95	81.64562	D8-80
		2.4	63	MTX=7.192282	0.293563	0.00583	0.001232	1020.25	76.98015	D8-70
		2.4	38	MTY=4.338202	0.177069	0.00583	0.000741	1020.25	76.98015	D8-70
33	6	2	63	MLX=3.38184	0.138034	0.00583	0.000577	1020.25	76.98015	D8-70
		2	13	MLY=0.69784	0.03204	0.00583	0.000134	961.95	81.64562	D8-80
		2	63	MTX=3.38184	0.138034	0.00583	0.000577	1020.25	76.98015	D8-70
		2	38	MTY=2.03984	0.083259	0.00583	0.000348	1020.25	76.98015	D8-70
fourth										
34	4	3	32	MLX=2.938752	0.398594	0.00583	0.001677	559.68	89.81025	D8-80
		3	18	MLY=1.653048	0.266827	0.00583	0.001119	559.68	89.81025	D8-80
		3	70	MTX=6.42852	0.871924	0.00583	0.003711	559.68	89.81025	D8-80
		3	57	MTY=5.234652	0.709995	0.00583	0.003009	559.68	89.81025	D8-80
35	4	2.1	40	MLX=1.799986	0.244139	0.00583	0.001023	559.68	89.81025	D8-80
		2.1	12	MLY=0.539996	0.087164	0.00583	0.000364	559.68	89.81025	D8-80
		2.1	83	MTX=3.73497	0.506588	0.00583	0.002137	559.68	89.81025	D8-80
		2.1	57	MTY=2.564979	0.347898	0.00583	0.001462	559.68	89.81025	D8-80
36	3.2	2.1	36	MLX=1.619987	0.219725	0.00583	0.00092	559.68	89.81025	D8-80

		2.1	17	MLY=0.764994	0.123482	0.00583	0.000516	559.68	89.81025	D8-80
		2.1	76	MTX=3.419973	0.463863	0.00583	0.001954	559.68	89.81025	D8-80
		2.1	57	MTY=2.564979	0.347898	0.00583	0.001462	559.68	89.81025	D8-80
37	3.2	1.5	41	MLX=0.941319	0.127675	0.00583	0.000534	559.68	89.81025	D8-80
		1.5	11	MLY=0.252549	0.040765	0.00583	0.00017	559.68	89.81025	D8-80
		1.5	83	MTX=1.905597	0.258463	0.00583	0.001084	559.68	89.81025	D8-80
		1.5	57	MTY=1.308663	0.177499	0.00583	0.000743	559.68	89.81025	D8-80
topfloor										
38	3.2	3	25	MLX=2.2959	0.311401	0.00583	0.001307	559.68	89.81025	D8-80
		3	21	MLY=1.928556	0.311298	0.00583	0.001307	559.68	89.81025	D8-80
		3	59	MTX=5.418324	0.734907	0.00583	0.003117	559.68	89.81025	D8-80
		3	54	MTY=4.959144	0.672627	0.00583	0.002848	559.68	89.81025	D8-80
39	4	1.5	42	MLX=0.964278	0.130789	0.00583	0.000547	559.68	89.81025	D8-80
		1.5	8	MLY=0.183672	0.029647	0.00583	0.000124	559.68	89.81025	D8-80
		1.5	83	MTX=1.905597	0.258463	0.00583	0.001084	559.68	89.81025	D8-80
		1.5	57	MTY=1.308663	0.177499	0.00583	0.000743	559.68	89.81025	D8-80
40	6.4	2.1	42	MLX=1.889985	0.256346	0.00583	0.001075	559.68	89.81025	D8-80
		2.1	8	MLY=0.359997	0.058109	0.00583	0.000242	559.68	89.81025	D8-80
		2.1	83	MTX=3.73497	0.506588	0.00583	0.002137	559.68	89.81025	D8-80
		2.1	57	MTY2.564979	0.347898	0.00583	0.001462	559.68	89.81025	D8-80

3.2.3 Penulangan pelat pendukung sebagai balok

Untuk menahan tembok yang mempunyai beban seberat 750 kg/m diperlukan balok pendukung dengan pertimbangan artistik. Maka diambil lebar 50 cm dibawah tembok yang dianggap menahan beban tembok.



Gambar 3.26 Pelat sebagai pendukung balok

qu = 1,2 . 750 =900 kg/m

M(+) = 1/16 . qu. L^2

= 1/16 . 900 . $3,3^2$

= 612,5625 kg.m = 6,1256 KN.m

M(-) = 1/11 . qu. L^2

= 1/11 . 900 . $3,3^2$

= 891kg.m = 8,91 KN.m

Vu = 1/2. 900. 3,3 . 1,15

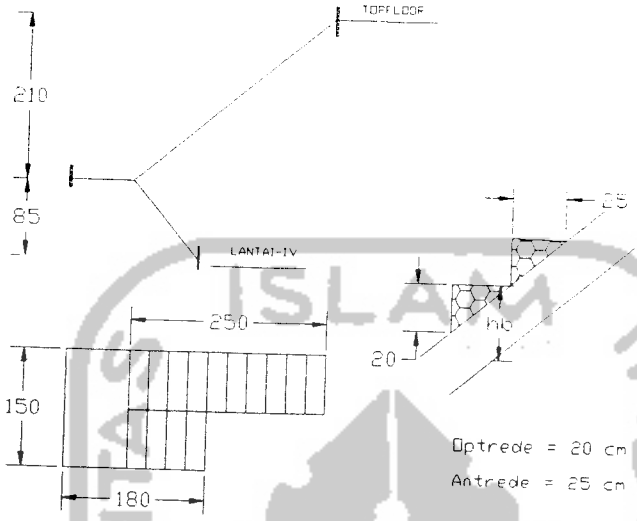
= 1707,75 kg = 17,0775 KN

Penulangan Tumpuan

ρ_{max} = 0,02432 ; d = 120 - 20 - 1/2.10 = 95mm

3.2.4 Perencanaan pelat tangga

1. Tangga Lantai - IV



Gambar 3.27 Tangga lantai -IV

Berdasar tebal minimum, pelat tangga atas:

$$\frac{L}{20} = \frac{326,7}{20} = 16,335\text{cm} \approx 20\text{cm}$$

Berdasar tebal minimum, plat tangga bawah:

$$\frac{L}{20} = \frac{131,26}{20} = 6,563\text{cm} \approx 10\text{cm}$$

Penutup beton diambil ρb = 2cm ; ∅12

d = 20 - 2 - 0,5.1,2 = 17,4 cm (atas)

d = 10 - 2 - 0,5.1,2 = 7,4 cm (bawah)

$$hb = 17,4.\ \frac{32,015}{25} + 0,5 \text{ optrede}$$

= 32,2824 cm (atas)

$hb = 7{,}4 \cdot \frac{32{,}015}{25} + 0{,}5$ optrede

$= 19{,}4764$ cm (bawah)

Beban pada tangga atas :

-Beban tangga = 0,323 . 0,75. 2400 = 581,4 kg/m

-Beban spesi = 0,02 . 0,75. 2100 = 31,5 kg/m

-Beban tegel = 0,03 . 0,75. 2400 = 54 kg/m

qd = 666,9 kg/m

-Beban hidup = 200 kg/m^2

-Beban pagar besi = 50 kg/m^2

ql = 250 kg/m^2 =250. 0,75 = 187,5 kg/m

qu = 1,2 . qd + 1,6 . ql

= 1,2 . 666,9 + 1,6 . 187,5 =1100,28 kg/m

Beban pada bordes:

-Berat bordes = 0,1. 0,75. 2400 = 180 kg/m

-Beban spesi = 0,02 .0,75. 2100 = 31,5 kg/m

-Beban tegel = 0,03 .0,75. 2400 =54 kg/m

qd = 265,5 kg/m

qu = 1,2 . qd + 1,6 ql

= 1,2 . 265,5 + 1,6. 187,5= 618,6 kg/m

Beban tangga bawah :

-beban tangga = 0,195 . 0,75. 2400 = 351 kg/m

-Beban spesi = 0,02 . 0,75. 2100 = 31,5 kg/m

-Beban tegel = 0,03 .0,75. 2400 = 54 kg/m

qd = 436,5 kg/m

qu = 1,2 .qd + 1,6. ql

= 1,2 . 436,5 +1,6. 187,5 = 823,8 kg/m

Penulangan Tangga Bawah

Penulangan Momen Lapangan

$M^+ = 59{,}505$ Kg m = $59{,}505\ 10^4$ N mm

Mutu beton dan baja : fc' = 30 Mpa

fy = 400 Mpa

$$\rho b = \frac{0{,}85.fc'.\beta}{fy}.\frac{600}{600+fy}$$

$$= \frac{0{,}85.25.0{,}85}{400}.\frac{600}{600+400} = 0{,}033$$

$$\rho_{mak} = 0{,}75.\ \rho b = 0{,}75.\ 0{,}033 = 0{,}025$$

$$\rho_{min} = \frac{1{,}4}{fy} = \frac{1{,}4}{400} = 0{,}0035$$

$$m = \frac{fy}{0{,}85.fc'} = \frac{400}{0{,}85.30} = 15{,}6863$$

$$Rn = \frac{Mn}{b.d^2} = \frac{59{,}505E4}{0{,}85.1000.74^2} = 0{,}128$$

$$\rho perlu = \frac{1}{m}.\left[1 - \sqrt{1 - \frac{2.m.Rn}{Fy}}\right]$$

$$= \frac{1}{15,6863}\left[1 - \sqrt{1 - \frac{2.15,6863.0,128}{400}}\right] = 0,0003$$

pakai $\rho_{min} = 0,0035$

As = ρ_{perlu} . b. d

= 0,0035 . 1000 .74 = 259 mm^2

A∅12 = 113,097 mm^2

jarak tulangan $\leq \frac{113,097.1000}{259} = 436,667$ mm

dipakai ∅12 - 25 ; As = 452,4 mm^2 > 259 mm^2

Penulangan Momen Tumpuan

M = 109,25 kg m = 109,25 E4 Nmm

$$Rn = \frac{Mn}{b.d^2} = \frac{109,25E4}{0,85.1000.74^2} = 0,235$$

$\rho_{mak} = 0,025$

$\rho_{min} = 0,0035$

$\rho_{perlu} = 0,0017$

pakai $\rho_{min} = 0,0035$

As = 0,0035 . 1000 . 74 =259 mm^2

jarak tulangan $\leq \frac{113,097.1000}{259} = 436,667$ mm

dipakai ∅12 - 25 As = 452,4 mm^2 >259 mm^2

Tulangan bagi

As bagi = (0,0018 . 400 . b . h)/ fy

=(0,0018 . 400 . 1000 . 100)/ 400

= 180 mm^2

A∅8 = 50,2655 mm^2

jarak tulangan $\leq \frac{50,2655.1000}{180} = 279,25$ mm

pakai ∅8-25

Cek tahanan momen:

$$a = \frac{As.fy}{(0,85.fc').b} = \frac{452,4.400}{(0,85.30).1000} = 7,1 \text{ mm}$$

z = d-a/2 = 74 - 7,1/2 =70,45 mm

Mn = As. fy . z

= 452,4 . 400 . 70,45 = 12748632 N.mm = 1274,86 Kg.m

MR = 0,8 . Mn = 1019,89 Kg m > Mu = 109,25 Kg m

***** Penulangan Tangga Atas *****

Penulangan Momen Lapangan

M^+ =320,82 Kg m = 320,82 10^4 N mm

ρ_{mak} = 0,025

ρ_{min} = 0,0035

ρ_{perlu} = 0,0003

pakai ρ_{min} = 0,0035

As = 0,0035 . 1000 . 174 = 609 mm^2

jarak tulangan $\leq \frac{113,097.1000}{609} = 185,71\,mm$

dipakai ∅12 - 18 As = 628 mm^2 > 609 mm^2

Penulangan Momen Tumpuan

M = 646,39 Kg m = 646,39. 10^4 N mm

$\rho_{mak} = 0,025$

$\rho_{min} = 0,0035$

$\rho_{perlu} = 0,0006$

pakai $\rho_{min} = 0,0035$

As = 0,0035 . 1000 . 174 = 609 mm^2

jarak tulangan $\leq \frac{113,097.1000}{609} = 185,71\,mm$

dipakai ∅12 - 18 As = 628 mm^2 > 609 mm^2

Tulangan Bagi

As bagi = (0,0018 . 400 . b . h)/ fy

=(0,0018 . 400 . 1000 . 200)/ 400

= 360 mm^2

A∅8 = 50,2655 mm^2

jarak tulangan $\leq \frac{50,2655.1000}{360} = 139,625\,mm$

pakai ∅8-13

Cek tahanan momen:

$$a = \frac{As.fy}{(0{,}85.fc').b} = \frac{628.400}{(0{,}85.30).1000} = 9{,}85\,mm$$

z = d-a/2 = 174 - 9,85/2 =169,075 mm

Mn = As. fy . z

= 628 . 400 . 169,075= 42471640 N.mm = 4247,164 Kg.m

MR = 0,8 . Mn = 3397,73 Kg m > Mu = 646,39 Kg m

Balok Bordes

coba 30/40

Pembebanan:

q. balok = 0,3 . (0,4 - 1). 2400 . 1,2 =259,2 kg/m

q.bordes = = 659,84 kg/m

q. tangga = = 2383 kg/m

3302,04 kg/m

M(+) = 1/11 . 3158,04 . $1{,}5^2$ = 645,963 kg.m

M (-) =1/16 . 3158,04 . $1{,}5^2$ =444,1 kg.m

Penulangan balok

Penulangan momen lapangan

M=645,963 kg m

balok 30/40

selimut beton 40 mm, d = 400 -60 = 340 mm

ρ_{mak} = 0,025

ρ_{min} = 0,0035

$\rho_{perlu} = 0{,}001$; pakai $\rho_{min} = 0{,}0035$

As = 0,0035 . 300 . 340 = 357 mm^2

Pakai 2∅19 As=567 mm^2 >As perlu =357 mm^2

Penulangan momen tumpuan

sama dengan hitungan diatas, didapat 2∅19

Penulangan geser

Vu = (3302,04 x 1,5)/2 = 2476,53

Vu dari muka kolom sejauh d = 693,43 kg

ϕ Vc = 0,6. $\sqrt{fc'}$. bw. d

= 0,6. $\sqrt{30}$. 300 . 340

= 55867,7 N = 5586,77 kg > 693,43 kg

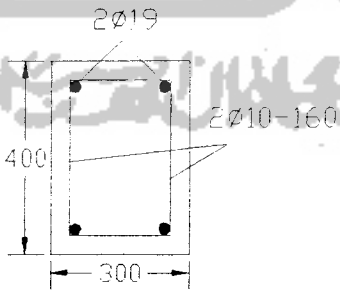
maka pakai tulangan geser minimum

Av = 2∅10 = 157 mm^2

s = (3 . Av. fy)/bw

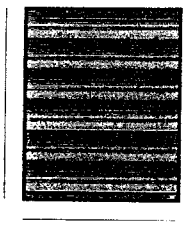
= (3. 157. 400)/300 = 628 mm

syarat :s ≤ d/2 = 170 mm atau s ≤ 600 mm ; pakai D10-160



Gambar 3.28 Potongan balok bordes tangga lantai -IV

Pelat Bordes



$M^{+} = 126{,}35$ Kg m $= 126{,}35\ 10^{4}$ N mm

$M^{-} = 466{,}08$ Kg m $= 466{,}08\ 10^{4}$ N mm

tebal pelat = 10 cm

$\rho_{mak} = 0{,}025$

$\rho_{min} = 0{,}0035$

$\rho_{perlu} = 0{,}0007$

pakai $\rho_{min} = 0{,}0035$

As $= 0{,}0035 \cdot 1000 \cdot 74 = 259\ mm^2$

jarak tulangan $\leq \dfrac{113{,}097.1000}{259} = 436{,}67$ mm

dipakai ∅12 - 25 As $= 452{,}388\ mm^2 > 259\ mm^2$

Pada daerah momen negatif

$M^{-} = 466{,}08$ Kg m $= 466{,}08\ 10^{4}$ N mm

$\rho_{mak} = 0{,}025$

$\rho_{min} = 0{,}0035$

$\rho_{perlu} = 0{,}0011$

pakai $\rho_{min} = 0{,}0035$

As = 0,0035 . 1000 . 74 = 259 mm^2

jarak tulangan $\leq \frac{113{,}097.1000}{259} = 436{,}67$ mm

dipakai ∅12 - 25 As = 452,388 $mm^2 > 259\ mm^2$

Tulangan Bagi

As bagi = (0,0018 . 400 . b . h)/ fy

=(0,0018 . 400 . 1000 . 100)/ 400

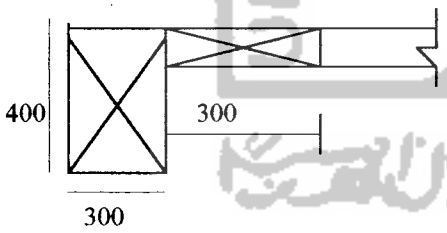
= 180 mm^2

A∅8 = 50,2655 mm^2

jarak tulangan $\leq \frac{50{,}2655.1000}{180} = 279{,}25$ mm

pakai ∅8-2

Cek torsi balok bordes



dari momen tumpuan plat :

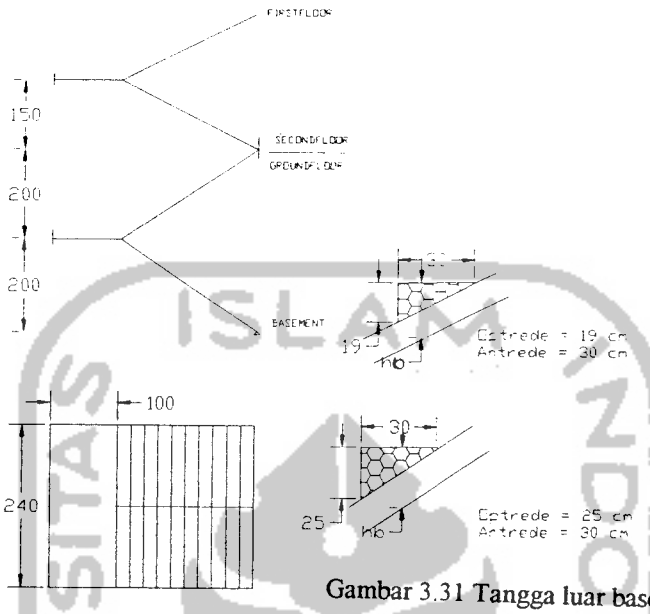
M=466,08Kg m =Tu =4,6608 KN.m

$\Sigma x^2 y = 300^2 .400 + 400.100^2 = 40E6mm^3$

$\varnothing\left(\frac{1}{24}\sqrt{fc'}\right)\Sigma x^2 y = 0{,}6.\frac{1}{24}\sqrt{25}.40 = 5{,}48KN.M > 4{,}6608\ KN.M$

⟶ maka akibat torsi diabaikan

2.Lantai tangga luar (basement ⟶ groundfloor)



Gambar 3.31 Tangga luar basemen-lantai dasar

Berdasar tebal minimum, plat tangga atas:

$$\frac{L}{20} = \frac{282,84}{20} = 14,142\text{cm} \approx 15\text{cm}$$

Penutup beton diambil $pb = 2cm$; ∅12

d = 15 - 2 - 0,5.1,2 = 12,4 cm

$$hb = 7,4.\ \frac{39,015}{30} + 0,5\ .25\ (\text{optrede})$$

= 28,64 cm

Beban pada tangga :

-Beban tangga = 0,2864 . 0,75. 2400 = 515,52 kg/m

-Beban spesi = 0,02 . 0,75. 2100 = 31,5 kg/m

-Beban tegel = 0,03 . 0,75. 2400 = 54 kg/m

qd = 601,02 kg/m

-Beban hidup = 200 kg/m^2

-Beban pagar besi = 50 kg/m^2

ql = 250 kg/m^2 =250. 0,75 = 187,5 kg/m

qu = 1,2 . qd + 1,6 . ql

= 1,2 . 601,02 + 1,6 . 187,5 =1021,244 kg/m

Beban pada bordes:

-Berat bordes = 0,12. 0,75. 2400 = 216 kg/m

-Beban spesi = 0,02 .0,75. 2100 = 31,5 kg/m

-Beban tegel = 0,03 .0,75. 2400 =54 kg/m

qd = 301,5 kg/m

qu = 1,2 . qd + 1,6 ql

= 1,2 . 301,5 + 1,6. 187,5= 661,8 kg/m

Penulangan Tangga bawah

Penulangan Momen Lapangan

M^+ = 1079,3 Kg m = 1079,3 10^4 N mm

Mutu beton dan baja : fc' = 30 Mpa

fy = 400 Mpa

$$\rho b = \frac{0,85.fc'.\beta}{fy}.\frac{600}{600+fy}$$

$$=\frac{0,85.30.0,85}{400}.\frac{600}{600+400} = 0,033$$

$$\rho_{max} = 0,75.\ \rho b = 0,75.\ 0,033 = 0,025$$

$$\rho_{min} = \frac{1,4}{fy} = \frac{1,4}{400} = 0,0035$$

$$m = \frac{fy}{0,85.fc'} = \frac{400}{0,85.30} = 15,6863$$

$$Rn = \frac{Mn}{b.d^2} = \frac{1079,3E4}{0,85.1000.12,4^2} = 0,82$$

$$\rho_{perlu} = \frac{1}{m}.\left[1 - \sqrt{1 - \frac{2.m.Rn}{Fy}}\right]$$

$$= \frac{1}{15,6863}.\left[1 - \sqrt{1 - \frac{2.15,6863.0,82}{400}}\right] = 0,0021$$

pakai ρ_{min}=0,0035

$As = \rho_{perlu} . b. d$

$= 0,0035 . 1000 . 124 = 434\ mm^2$

$A\varnothing 12 = 113,097\ mm^2$

jarak tulangan $\leq \frac{113,097.1000}{434} = 260,6\ mm$

dipakai $\varnothing 12 - 25$; $As = 452,4\ mm^2 > 434\ mm^2$

Pemulangan Momen Tumpuan

M = 1011,4 Kg m = 1011,4 E4 Nmm

$$Rn = \frac{Mn}{b.d^2} = \frac{1011,4E4}{0,85.1000.124^2} = 0,77$$

$\rho_{mak} = 0,025$

$\rho_{min} = 0,0035$

$\rho_{perlu} = 0,002$

pakai $\rho_{min} = 0{,}0035$

As = 0,0035 . 1000 . 124 =434 mm^2

jarak tulangan $\leq \frac{113{,}097.1000}{434} = 260{,}6\,mm$

dipakai ∅12 - 25 As = 452,4 mm^2 >434 mm^2

Tulangan bagi

As bagi = (0,0018 . 400 . b . h)/ fy

=(0,0018 . 400 . 1000 . 150)/ 400

= 270 mm^2

A∅8 = 50,2655 mm^2

jarak tulangan $\leq \frac{50{,}2655.1000}{270} = 186{,}17\,mm$

pakai ∅8-18

Cek tahanan momen:

$$a = \frac{As.fy}{(0{,}85.fc').b} = \frac{452{,}4.400}{(0{,}85.30).1000} = 7{,}1\,mm$$

z = d-a/2 = 124 - 7,1/2 =120,45 mm

Mn = As. fy . z

= 452,4 . 400 . 120,45 = 21796632 N.mm = 2179,6632 Kg.m

MR = 0,8 . Mn = 1743,7305 Kg m > Mu = 1079,3 Kg m

* Penulangan Tangga Atas*

Penulangan Momen Lapangan

M^+ =715,1 Kg m = 715,1 10^4 N mm

$\rho_{mak} = 0{,}025$

$\rho_{min} = 0{,}0035$

$\rho_{perlu} = 0{,}0014$

pakai $\rho_{min} = 0{,}0035$

As = 0,0035 . 1000 . 124 = 434 mm^2

jarak tulangan $\leq \frac{113{,}097.1000}{434} = 260{,}6$ mm

dipakai ∅12 - 18 As = 452,4 $mm^2 > 434\ mm^2$

Pemulangan Momen Tumpuan

$M^- = 1453{,}7$ Kg m $= 1453{,}7 . 10^4$ N mm

$\rho_{mak} = 0{,}025$

$\rho_{min} = 0{,}0035$

$\rho_{perlu} = 0{,}0028$

pakai $\rho_{min} = 0{,}0035$

As = 0,0035 . 1000 . 124 = 434 mm^2

jarak tulangan $\leq \frac{113{,}097.1000}{434} = 260{,}6$ mm

dipakai ∅12 - 25 As = 452,4 $mm^2 > 434\ mm^2$

Tulangan Bagi

As bagi = (0,0018 . 400 . b . h)/ fy

=(0,0018 . 400 . 1000 . 150)/ 400

= 270 mm^2

$$A \varnothing 8 = 50{,}2655 \text{ mm}^2$$

$$\text{jarak tulangan} \leq \frac{50{,}2655.1000}{270} = 186{,}17 \text{ mm}$$

pakai ∅8-18

Cek tahanan momen:

$$a = \frac{As.fy}{(0{,}85.fc').b} = \frac{452{,}4.400}{(0{,}85.30).1000} = 7{,}1 \text{ mm}$$

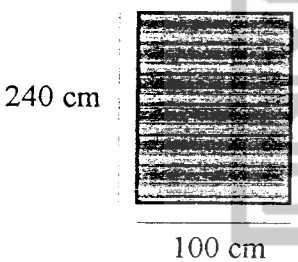
$z = d\text{-}a/2 = 124 - 7{,}1/2 = 120{,}45$ mm

$Mn = As.\ fy\ .\ z$

$= 452{,}4\ .\ 400\ .\ 120{,}45 = 21796632$ N.mm $= 2179{,}6632$ Kg.m

$MR = 0{,}8\ .\ Mn = 1743{,}7305$ Kg m $> Mu = 1453{,}7$ Kg m

Pelat Bordes



Gambar 3.32 Tipe pelat bordes

$M^- = 1297{,}4$ Kg m $= 1297{,}4\ 10^4$ N mm

tebal plat = 12 cm

$$\rho_{mak} = 0{,}025$$

$$\rho_{min} = 0{,}0035$$

$$\rho_{perlu} = 0{,}0045$$

$As = 0{,}0045\ .\ 1000\ .\ 94 = 423 \text{ mm}^2$

$$\text{jarak tulangan} \leq \frac{113{,}097.1000}{423} = 267{,}37\,\text{mm}$$

dipakai ∅12 - 25 As = 452,388 mm^2 > 423 mm^2

Tulangan Bagi

As bagi = (0,0018 . 400 . b . h)/ fy

=(0,0018 . 400 . 1000 . 120)/ 400

= 216 mm^2

A∅8 = 50,2655 mm^2

$$\text{jarak tulangan} \leq \frac{50{,}2655.1000}{216} = 232{,}71\,\text{mm}$$

pakai ∅8-20

2.Lantai tangga luar (first floor ⟶ second floor)

Berdasar tebal minimum, plat tangga atas:

$$\frac{L}{20} = \frac{250}{20} = 12{,}5\text{cm} \approx 13\text{cm}$$

Penutup beton diambil ρb = 2cm ; ∅12

d = 13 - 2 - 0,5.1,2 = 10,4 cm

$$hb = 7{,}4.\frac{35{,}51}{30} + 0{,}5 .19 \text{ (optrede)}$$

= 21,81 cm

Beban pada tangga :

-Beban tangga = 0,2181 . 0,75. 2400 = 392,58 kg/m

-Beban spesi = 0,02 . 0,75. 2100 = 31,5 kg/m

-Beban tegel = 0,03 . 0,75. 2400 = 54 kg/m

qd =478,08 kg/m

-Beban hidup = 200 kg/m^2

-Beban pagar besi = 50 kg/m^2

ql = 250 kg/m^2 =250. 0,75 = 187,5 kg/m

qu = 1,2 . qd + 1,6 . ql

= 1,2 . 478,08+ 1,6 . 187,5 =873,696 kg/m

Beban pada bordes:

-Berat bordes = 0,12. 0,75. 2400 = 216 kg/m

-Beban spesi = 0,02 .0,75. 2100 = 31,5 kg/m

-Beban tegel = 0,03 .0,75. 2400 =54 kg/m

qd = 301,5 kg/m

qu = 1,2 . qd + 1,6 ql

= 1,2 . 301,5 + 1,6. 187,5= 661,8 kg/m

Penulangan Tangga bawah

Pemulangan Momen Lapangan

M$^+$ = 563,66 Kg m = 563,66 10^4 N mm

Mutu beton dan baja : fc' = 30 Mpa

fy = 400 Mpa

$$\rho b = \frac{0,85.fc'.\beta}{fy}.\frac{600}{600+fy}$$

$$=\frac{0,85.30.0,85}{400}.\frac{600}{600+400} = 0,033$$

$\rho_{maks} = 0{,}75.\ \rho b = 0{,}75.\ 0{,}033 = 0{,}025$

$$\rho_{min} = \frac{1{,}4}{fy} = \frac{1{,}4}{400} = 0{,}0035$$

$$m = \frac{fy}{0{,}85.fc'} = \frac{400}{0{,}85.30} = 15{,}6863$$

$$Rn = \frac{Mn}{b.d^2} = \frac{563{,}66E4}{0{,}85.1000.104^2} = 0{,}613$$

$$\rho_{perlu} = \frac{1}{m}.\left[1 - \sqrt{1 - \frac{2.m.Rn}{Fy}}\right]$$

$$= \frac{1}{15{,}6863}.\left[1 - \sqrt{1 - \frac{2.15{,}6863.0{,}613}{400}}\right] = 0{,}0015$$

pakai ρ_{min}=0,0035

$As = \rho_{perlu}.\ b.\ d$

$= 0{,}0035\ .\ 1000\ .104 = 364\ mm^2$

$A\varnothing 12 = 113{,}097\ mm^2$

$$\text{jarak tulangan} \leq \frac{113{,}097.1000}{364} = 310{,}7\ mm$$

dipakai $\varnothing 12 - 25$; $As = 452{,}4\ mm^2 > 364\ mm^2$

Penulangan Momen Tumpuan

$M = 1157{,}9\ Kg\ m = 1157{,}9\ E4\ Nmm$

$$Rn = \frac{Mn}{b.d^2} = \frac{1157{,}9E4}{0{,}85.1000.104^2} = 1{,}26$$

$\rho_{mak} = 0{,}025$

$\rho_{min} = 0{,}0035$

$\rho_{perlu} = 0{,}0032$

pakai $\rho_{min} = 0{,}0035$

As = 0,0035 . 1000 . 104 =364 mm^2

jarak tulangan $\leq \frac{113{,}097.1000}{364} = 310{,}71 mm$

dipakai ∅12 - 25 As = 452,4 mm^2 >364 mm^2

Tulangan bagi

As bagi = (0,0018 . 400 . b . h)/ fy

=(0,0018 . 400 . 1000 . 130)/ 400

= 234 mm^2

A∅8 = 50,2655 mm^2

jarak tulangan $\leq \frac{50{,}2655.1000}{234} = 214{,}81 mm$

pakai ∅8-20

Cek tahanan momen:

$$a = \frac{As.fy}{(0{,}85.fc').b} = \frac{452{,}4.400}{(0{,}85.30).1000} = 7{,}1 mm$$

z = d-a/2 = 104 - 7,1/2 =100,45 mm

Mn = As. fy . z

= 452,4 . 400 . 100,45 = 18177432 N.mm = 1817,7432 Kg.m

MR = 0,8 . Mn = 1454,1946 Kg m > Mu = 1157,9 Kg m

Pondasi tangga

Beban total :

-Beban tangga = 4428,3 Kg

-balok (30/40) = 0,3 . 0.4.2400 .1,2/2 = 172,8 Kg

-berat pondasi = (0,4 + 0,8)/2. 1,5. 2200. 1,2/2 = 1188 kg

Pu = 5789,1 kg

kontrol tegangan :

tegangan izin tanah $\overline{\sigma}$ =2E4 Kg/m^2

A = Pu / $\overline{\sigma}$

= 5789,1/ 2E4 = 0,289~0,3 m^2

lebar pondasi (B) = $\sqrt{0,3}$

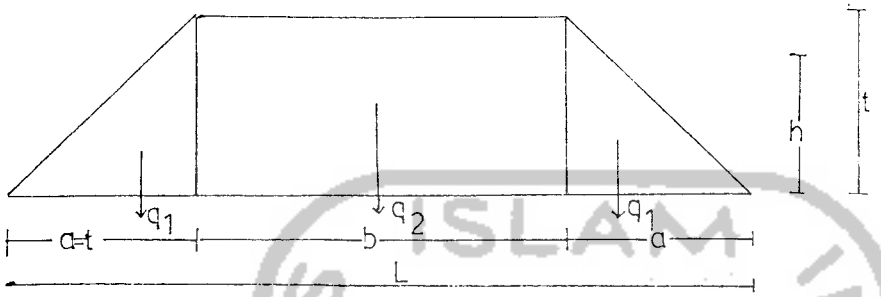
= 0,547 m ~ 0,55 m

B = 55 cm

3.3 Gaya- Gaya yang Bekerja Pada Portal

3.3.1 Pemerataan beban

Beban Trapesium



Gambar 3.33 Distribusi beban trapesium

$$Ra = (q_1 + 0{,}5.q_2)$$

$$M = (q_1 + 0{,}5.q_2).(a+0{,}5.b) - q_1\,(1/3.a + 0{,}5.b) - 0{,}5.q_2\,,0{,}25.b$$

$$= 0{,}5.a_2\,.t + 0{,}25.a.t.b + 0{,}5.t.b + 0{,}25.b^2\,.1/6.t - a^2\,.t - 0{,}25.a.b - 0{,}125.b^2\,.t$$

$$= 1/3.a^2\,t + 0{,}125.b^2\,.t + 0{,}25.a.t.b$$

$$= 1/3t^3 + 0{,}125.(L - 2t)^2\,.t + 0{,}5.t^2\,.(L - 2t)$$

$$= 1/3t^3 + 0{,}125.(L^2 - 4.L.t - 4.t^2).t + 0{,}5.L.t^2 - t^3$$

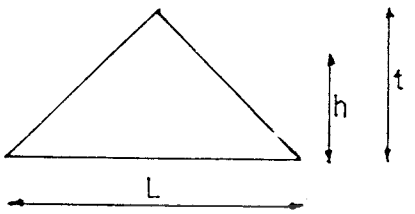
$$= -1/6\,t^3 + 1/8.L^2\,.t$$

$$1/8.L^2 = 1/8.L^2\,.t - 1/6.t^3$$

$$h = t - \frac{8/6}{L^2}.t^3 = \left(1 - 4/3.\frac{t^2}{L^2}\right).t$$

$$q_{eq} = \left(1 - 4/3.\frac{t^2}{L^2}\right).t\,.\,q_{pl}$$

Beban Segitiga



Gambar 3.34 Distribusi beban segitiga

Ra = 1/2L . 1/2.t

M_{max} = 1/4Lt . 1/2L - 1/4Lt.1/3.1/2L

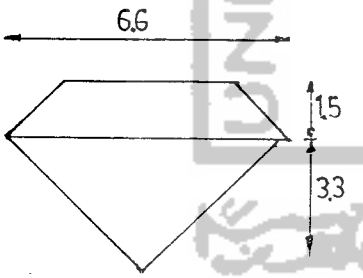
= 1/8L.t - 1/24.L t

1/8h.L = 1/12 Lt

h = 2/3t

q_{eq} =2/3.t. q_{pl}

Tipe beban 3



Gambar 3.35 Distribusi tipe beban 3

beban pelat/m akibat beban mati = 517 kg/m^2

Beban merata ekivalen bentuk trapesium

$$q_{eq} = \left(1 - 4/3.\frac{t^2}{L^2}\right).t\,.\,q_{pl}$$

$$q_{eq} = \left(1 - 4/3.\frac{1,6^2}{6,6^2}\right).1,6 . 517 \quad = 762,3811 \text{ kg/m}$$

berat sendiri balok = 0,3 . 0,6. 2400 = 432 kg/m

Beban merata ekivalen bentuk segitiga

$q_{eq} = 2/3.t. q_{pl}$

$q_{eq} = 2/3.3. 517 = 1034$ kg/m

$q_{eq(total)} = 762,3811 + 551,4667 + 432 = 2228,3811$ kg/m

Beban merata pelat/m akibat beban hidup = 250 kg/m^2

koefisien reduksi = 0,7 ; beban hidup = 0,7. 250 =175 kg/m^2

beban merata ekivalen bentuk trapesium

$$q_{eq} = \left(1 - 4/3.\frac{1,6^2}{6,6^2}\right).1,6 . 175$$

$= 258$ kg/m

beban merata ekivalen bentuk segitiga

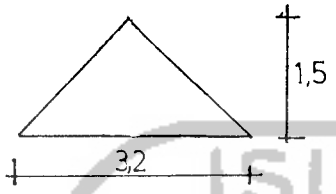
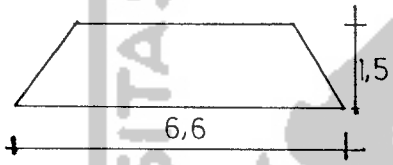
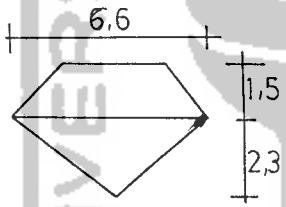
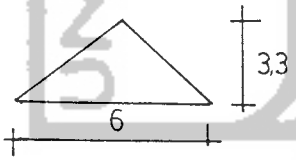
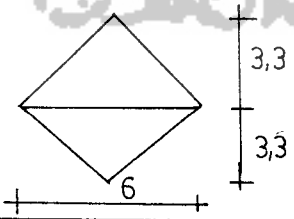
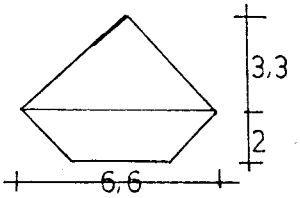
$q_{eq} = 2/3.3. 175 = 350$ kg/m

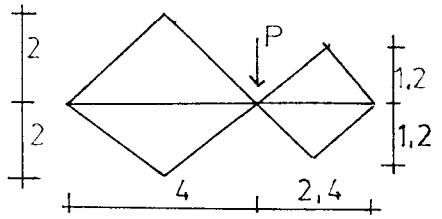
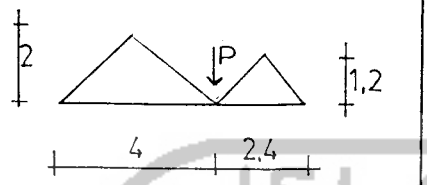
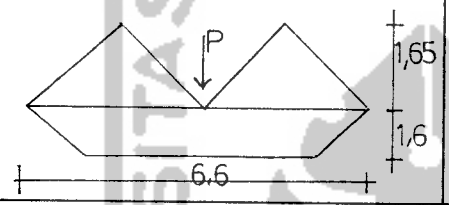
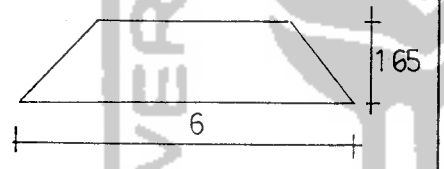
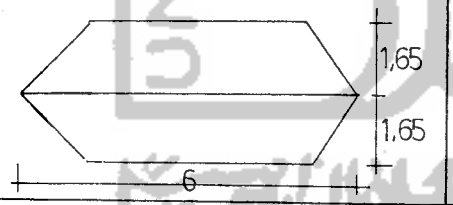
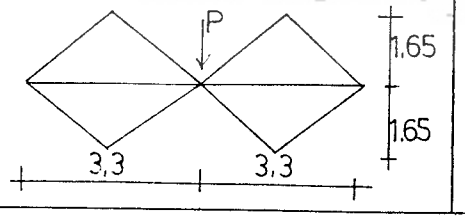
$q_{eq(total)} = 258 + 350 = 608$ kg/m

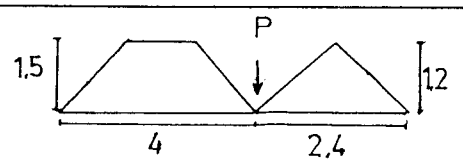
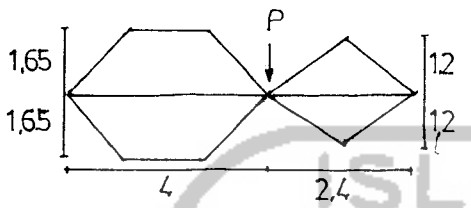
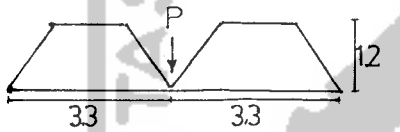
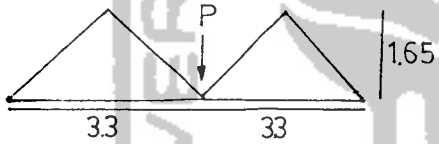
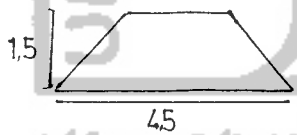
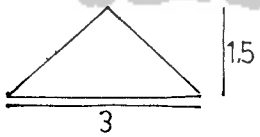
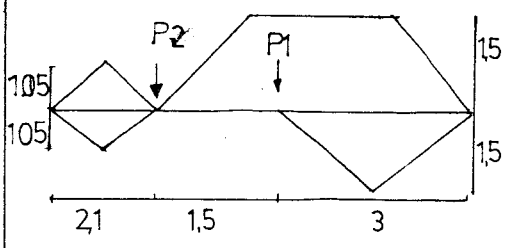
$q_{total} = 2228,3811 + 608 = 2836,3811$ kg/m

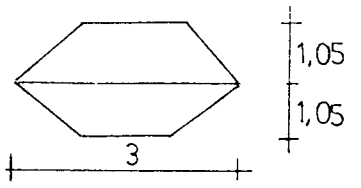
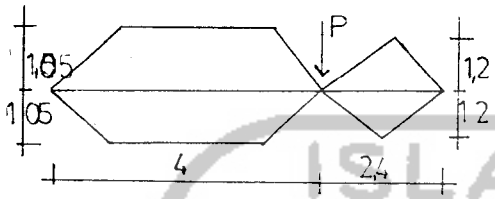
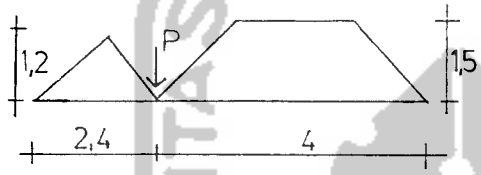
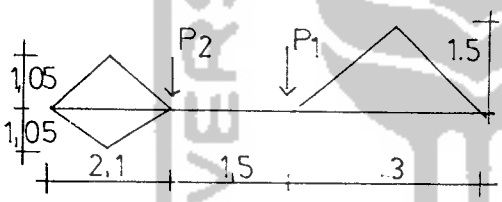
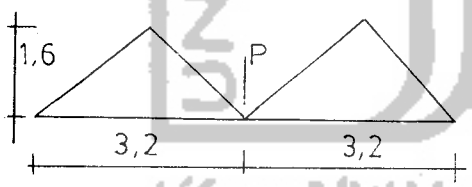
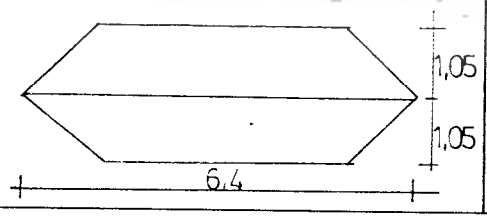
Tipe pembebanan yang lain ditabelkan !!

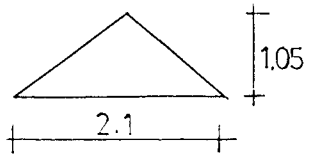
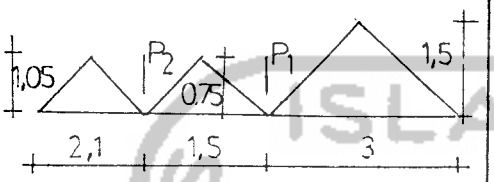
Tabel 3.8 Pola Pembebanan

No	Pola Pembebanan	$Q_{ekivalen}$
1		$q_{ekivalen}$ =651,466 kg/m (beban mati) $q_{ekivalen}$ =266,667 kg/m (beban hidup)
2		$q_{ekivalen}$ =862,381 kg/m (beban mati) $q_{ekivalen}$ =368,656 kg/m (beban hidup)
3		$q_{ekivalen}$ =2228,381kg/m (beban mati) $q_{ekivalen}$ =608 kg/m (beban hidup)
4		$q_{ekivalen}$ =1134 kg/m (beban mati) $q_{ekivalen}$ =500 kg/m (beban hidup)
5		$q_{ekivalen}$ =2168 kg/m (beban mati) $q_{ekivalen}$ =1000 kg/m (beban hidup)
6		$q_{ekivalen}$ =2041,4kg/m (bebanmati) $q_{ekivalen}$ =938,781 kg/m (beban hidup)

7		$q_{ekivalen}$ =2300 kg/m (beban mati) $q_{ekivalen}$ =1000 kg/m (beban hidup) P = 21,4 ton
8		$q_{ekivalen}$ =1200 kg/m (beban mati) $q_{ekivalen}$ =533,33 kg/m (beban hidup) P = 10,7 ton
9		$q_{ekivalen}$ =2659,78 kg/m (beban mati) $q_{ekivalen}$ =918,656 kg/m (beban hidup) P = 9,9 ton
10		$q_{ekivalen}$ =1517,34 kg/m (beban mati) $q_{ekivalen}$ =370,906 kg/m (beban hidup)
11		$q_{ekivalen}$ =2284 kg/m (beban mati) $q_{ekivalen}$ =740 kg/m (beban hidup)
12		$q_{ekivalen}$ =3266 kg/m (beban mati) $q_{ekivalen}$ =1160 kg/m (beban hidup) P = 15,7 ton

13		$q_{ekivalen}$ =1623,11kg/m (beban mati) $q_{ekivalen}$ =518,91kg/m (beban hidup) P = 15 ton
14		$q_{ekivalen}$ =2896,2 kg/m (beban mati) $q_{ekivalen}$ =1360 kg/m (beban hidup) P = 30 ton
15		$q_{ekivalen}$ =1276,02 kg/m (beban mati) $q_{ekivalen}$ =255,13kg/m (beban hidup) P = 2,3 ton
16		$q_{ekivalen}$ =1887,4 kg/m (beban mati) $q_{ekivalen}$ =550 kg/m (beban hidup) P = 9,9 ton
17		$q_{ekivalen}$ =1789,7 kg/m (beban mati) $q_{ekivalen}$ =502,78 kg/m (beban hidup)
18		$q_{ekivalen}$ =1267 kg/m (beban mati) $q_{ekivalen}$ =250 kg/m (beban hidup)
19		$q_{ekivalen}$ =2651,4 kg/m (beban mati) $q_{ekivalen}$ =920 kg/m (beban hidup) P1 = 6,6 ton ; P2 = 9,2 ton

20		$q_{ekivalen}$ =1683,5 kg/m (beban mati) $q_{ekivalen}$ =500 kg/m (beban hidup)
21		$q_{ekivalen}$ =2600 kg/m (beban mati) $q_{ekivalen}$ =895 kg/m (beban hidup) P = 18,4 ton
22		$q_{ekivalen}$ =1793,7 kg/m (beban mati) $q_{ekivalen}$ =504,69kg/m (beban hidup) P = 16,8 ton
23		$q_{ekivalen}$ =2578 kg/m (beban mati) $q_{ekivalen}$ =850 kg/m (beban hidup) P1 = 12,756 ton ; P2 = 7 ton
24		$q_{ekivalen}$ =2810 kg/m (beban mati) $q_{ekivalen}$ =1000 kg/m (beban hidup) P = 3,5 ton
25		$q_{ekivalen}$ =1850 kg/m (beban mati) $q_{ekivalen}$ =528 kg/m (beban hidup)

26		$q_{ekivalen}$ =1129,13 kg/m (beban mati) $q_{ekivalen}$ =183,33 kg/m (beban hidup)
27		$q_{ekivalen}$ =1946 kg/m (beban mati) $q_{ekivalen}$ =558,3 kg/m (beban hidup) P1 = 12 ton ; P2 = 7 ton

3.3.2 Perhitungan Gaya Geser Dasar Horisontal Total Akibat Gempa dan Distribusinya ke Sepanjang Tinggi Gedung

A. Berat bangunan total (Wt)

a. Berat Atap Topfloor

1) Beban mati :

Atap = (9 x 20 x 6,4) + (6 x 10 x 3) = 1332 kg

balok = (10 x 6,6 x 0,3 x 0,4 x 2400) + (4 x 6,4 x 0,3 x 0,4 x 2400)

(4 x 3 x 0,3 x 0,4 x 2400) = 29836,8 kg

kolom = 14 x 0,3 x 1,5 x 2400 = 4536 kg

dinding = 103,4 x 1,5 x 250 = 38775 kg

plafond = (26,4 x 6,4 x 50) + (2 x 3 x 6,6 x 50) = 10428 kg

Wm= 84907,8 kg

2) Beban hidup

qh atap = 100 kg/cm ^{2}

koefisien reduksi untuk beban hidup menurut Peraturan Pembebanan Indonesia - 1983 (PPI-1983) sama dengan 0,3 sehingga :

Wh = 0,3 x 100 x (26,4 x 6,4 + 2 x 3 x 6,6) = 6256,8 kg

Jadi berat total lantai atap topfloor = Wm + Wh

=84907,8+6256,8

=91164,6 kg

b.Berat lantai Topfloor

1)Beban mati :

plat = (26,4 x 6,4 x 0,12 x 2400) + (2 x 3 x 6,6 x 0,12 x 2400)

= 60065,28 kg

balok induk = (4 x 6,6 x 0,3 x 0,58 x 2400) + (5 x 6,4 x 0,3 x 0,48 x 2400)+ (6 x 3 x 0,3 x 0,28 x 2400) + (4 x 0,5 x 0,68 x 6,6 x 2400)

= 50929,92kg

balok anak = 4 x 0,3 x 0,4 x 6,4 x 2400 = 7372,8 kg

kolom = (10 x 1,5 x 0,5 x 0,5 x 2400) + (10 x 1,5 x 0,3 x 0,3 x 2400) (6 x 1,5 x 0,3 x 0,3 x 2400) + (6 x 1,5 x 0,5 x 0,5 x 2400)

= 19584 kg

dinding = 103,4 x 0,3x 250 = 77550 kg

plafond = (26,4 x 6,4 x 50) + (2 x 3 x 6,6 x 50) = 10428 kg

spesi = (26,4 x 6,4 x 21) + (2 x 3 x 6,6 x 21) = 4379,76 kg

tegel = (26,4 x 6,4 x 24) + (2 x 3 x 6,6 x 24) = 5005,44 kg

tangga luar = 2500 kg

Wm = 237815,2 kg

2) Beban hidup

qh atap = 250 kg/cm^2

koefisien reduksi untuk beban hidup menurut Peraturan Pembebanan Indonesia - 1983 (PPI-1983) sama dengan 0,3 sehingga :

Wh = 0,3 x 250 x (26,4 x 6,4 + 2 x 3 x 6,6) = 15642 kg

Jadi berat total lantai topfloor = Wm + Wh

=237815,2 + 15642

=253457,2 kg

c. Berat lantai 4

1) Beban mati :

plat = (9,4 x 26,4 x 0,12 x 2400) = 71470,08 kg

balok induk = (5 x 6,4 x 0,4 x 0,58 x 2400) + (4 x 6,6 x 0,3 x 0,48 x 2400) + (8 x 0,5 x 0,68x 6,6 x 2400)

= 70026,24 kg

balok anak = (4 x 0,3 x 0,6x 6,6 x 2400) + (5 x 0,3 x 0,4 x 7 x 2400)

= 21484,8 kg

kolom = (15 x 1,5 x 0,5 x 0,5 x 2400) + (15 x 1,5 x 0,6 x 0,6 x 2400) (4 x 1,5 x 0,5 x 0,5 x 2400) + (4 x 1,5 x 0,6 x 0,6 x 2400)

= 41724 kg

dinding = 127,7 x 0,3x 250 = 95775 kg

plafond = (9,4 x 26,4 x 50) = 12408 kg

spesi = (9,4 x 26,4 x 21) = 5211,36 kg

tegel = (9,4 x 26,4 x 24) = 5955,84 kg

tangga luar = 2500 kg

Wm = 326555,32 kg

2) Beban hidup

qh atap = 250 kg/cm^2

koefisien reduksi untuk beban hidup menurut Peraturan Pembebanan Indonesia - 1983 (PPI-1983) sama dengan 0,3 sehingga :

Wh = 0,3 x 250 x 9,4 x 26,4 = 18612 kg

Jadi berat total lantai 4 = Wm + Wh

=326555,32 + 18612

=345167,32 kg

d. Berat lantai 3

1) Beban mati :

plat = (12,4 x 26,4 x 0,12 x 2400) = 94279,68 kg

balok induk = (4 x 6,6 x 0,3 x 0,48 x 2400) + (8x 6,6 x 0,4 x 0,58 x 2400 (5 x 6,4 x 0,4 x 0,58 x 2400) + (5 x 6,4 x 0,5 x 0,68 x 2400) = 82452,48 kg

balok anak = (4 x 0,3 x 0,4 x 6 x 2400) + (4 x 0,3 x 0,4 x 6,4 x 2400) (4 x 0,3 x 0,4 x 6,6 x 2400) = 25344 kg

kolom = (15 x 1,5 x 0,6 x 0,6 x 2400) + (15 x 1,5 x 0,7 x 0,7 x 2400) = 45900 kg

dinding = 194 x 3x 250 = 145500kg

plafond = 12,4 x 26,4 x 50 = 16368 kg

spesi = (12,4 x 26,4 x 21) = 6874,56 kg

tegel = (12,4 x 26,4 x 24) = 7856,64 kg

tangga luar = 2500 kg

Wm = 427075,36 kg

2) Beban hidup

qh lantai = 250 kg/cm ^{2}

koefisien reduksi untuk beban hidup menurut Peraturan Pembebanan Indonesia - 1983 (PPI-1983) sama dengan 0,3 sehingga :

Wh = 0,3 x 250 x 12,4 x 26,4 = 24552 kg

Jadi berat total lantai 3 = Wm + Wh

=427075,36 + 24552

=451627,36 kg

d. Berat lantai 2

1)Beban mati

plat = (15,6 x 26,4 x 0,12 x 2400) = 118609,92 kg

balok induk = (8 x 6,6 x 0,3 x 0,48+ 8x 6,6 x 0,4 x 0,58+

5x6,4x 0,4 x 0,58+ 5 x 6 x 0,4 x 0,58+

5 x 3,2 x 0,3 x 0,28)x 2400 = 204003,84 kg

balok anak = (4 x 0,3 x 0,4 x 6 x 2400) + (4 x 0,3 x 0,4 x 6,4 x 2400)

(4 x 0,3 x 0,4 x 6,6 x 2400) = 25344 kg

kolom = (15 x 3 x 0,7 x 0,7 x 2400) + (5 x 1,5 x 0,7 x 0,7 x 2400)

= 61740 kg

dinding = 177,2 x 3x 250 = 132900kg

plafond = 12,4 x 26,4 x 50 = 16368 kg

spesi = (15,6 x 26,4 x 21) = 8648,64 kg

tegel = (15,6 x 26,4 x 24) = 9884,16 kg

tangga luar = 2500 kg

Wm = 579998,56 kg

2) Beban hidup

qh atap = 250 kg/cm^2

koefisien reduksi untuk beban hidup menurut Peraturan Pembebanan Indonesia - 1983 (PPI-1983) sama dengan 0,3 sehingga :

Wh = 0,3 x 250 x 15,6 x 26,4 = 30888 kg

Jadi berat total lantai 2 = Wm + Wh

=579998,56 + 30888

=610886,56 kg

d. Berat lantai 1

1)Beban mati

plat = (15,6 x 26,4 x 0,12 x 2400) = 118609,92 kg

balok induk = (8 x 6,6 x 0,3 x 0,48+ 8x 6,6 x 0,4 x 0,58+ 5 x 6,4 x 0,4x 0,58 + 5 x 6 x 0,4 x 0,58+ 5 x 3,2 x 0,3 x 0,28)x 2400

=204003,84 kg

balok anak = (4 x 0,3 x 0,4 x 6 x 2400) + (4 x 0,3 x 0,4 x 6,4 x 2400) (4 x 0,3 x 0,4 x 6,6 x 2400) = 25344 kg

kolom = (20 x 1,5 x 0,7 x 0,7 x 2400) + (20 x 2 x 0,8 x 0,8 x 2400)

= 96720kg

dinding = 177,2 x 3,5x 250 = 132900kg

plafond = 12,4 x 26,4 x 50 = 16368 kg

spesi = (15,6 x 26,4 x 21) = 8648,64 kg

tegel = (15,6 x 26,4 x 24) = 9884,16 kg

tangga luar = 2800 kg

615278,56 kg

2) Beban hidup

qh atap = 250 kg/cm^2

koefisien reduksi untuk beban hidup menurut Peraturan Pembebanan Indonesia - 1983 (PPI-1983) sama dengan 0,3 sehingga :

Wh = 0,3 x 250 x 15,6x 26,4 = 30888 kg

Jadi berat total lantai 1 = Wm + Wh

=615278,56 + 30888

=646166,56 kg

d. Berat Groundfloor

1) Beban mati :

plat = (15,6 x 26,4 x 0,12 x 2400) = 118609,92 kg

balok induk = (8 x 6,6 x 0,3 x 0,48 + 8x 6,6 x 0,3 x 0,48 +

5 x 6,4 x 0,4 x 0,58 + 5 x 6 x 0,4 x 0,58 +

5 x 3,2 x 0,3 x 0,28)x 2400 = 204003,84 kg

balok anak = 4 x 0,3 x 0,4 x 6,6 x 2400 = 7603,2 kg

kolom = (20 x 10 x 0,8 x 0,8 x 2400) = 307200 kg

dinding = 183,6 x 4x 250 = 183600 kg

plafond = 15,6 x 26,4 x 50 = 16368 kg

spesi = (15,6 x 26,4 x 21) = 8648,64 kg

tegel = (15,6 x 26,4 x 24) = 9884,16 kg

tangga luar = 3100 kg

Wm = 859017,76 kg

2) Beban hidup

ruang sewa = toko = taman kanak - kanak = musholla = qh lantai

= 250 kg/cm^2

koefisien reduksi untuk beban hidup menurut Peraturan Pembebanan Indonesia - 1983 (PPI-1983) sama dengan 0,3 sehingga :

Wh = 0,3 x 250 x 15,6 x 26,4 = 30888kg

Jadi berat total lantai 4 = Wm + Wh

=859017,76 + 30888

=889905,76 kg

maka berat total bangunan (Wt) :

Wt = 91164,6 + 253457,2 + 345167,32 + 451627,36 + 610886,56

= 646166,56 + 889905,76 = 3288375,36 kg

B. Waktu getar bangunan

dengan menggunakan persamaan : Tx = Ty = 0,06.H$^{3/4}$

= 0,06 x 27$^{3/4}$ = 0,71 dt

Dengan menggunakan waktu getar 0,71 dt, untuk daerah gempa 3 dan kondisi tanah lunak diperoleh koefisien gempa dasar C sama dengan 0,07

Gaya geser horisontal total akibat gempa besarnya gaya geser dasar horisontal akibat gempa yang harus ditahan oleh struktur dengan berat total Wt dan koefisien gempa dasar C dengan I dan K ditentukan berdasarkan ketentuan yang ada dalam Peraturan Perencanaan Tahan Gempa Indonesia untuk Gedung (PPTGIUG-1981), maka diperoleh :

V = C .I.Wt.K

=0,07 . 1. 3288375,36. 1 = 230186,2752 kg

Distribusi gaya geser horisontal total akibat gempa

a) arah sumbu x

kontrol H/A atau H/B < 3

dari batasan masalah tersebut diketahui H =27 m ; A=26,4 m ; B=15,6 m

27/15,6 = 1,73 < 3

$$F_{ix} = F_{iy} = \frac{W_i . h_i}{\sum W_i . h_i} . V_x, V_y$$

Tabel 3.9 Ditribusi Gaya Geser Horisontal

tingkat (i)	hi (m)	Wi (ton)	Wi.hi (ton.m)	Fix,y (ton)	untuk tiap portal	
					1/4Fix (ton)	1/5Fiy(ton)
7	27	91.1646	2461.444	11.8141	2.953526	2.362821
6	24	253.4576	6082.982	29.19627	7.299067	5.839254
5	21	345.1673	7248.513	34.79043	8.697606	6.958085
4	18	451.6274	8129.293	39.01787	9.754468	7.803575
3	15	610.8866	9163.299	43.98075	10.99519	8.796151
2	12	646.1666	7753.999	37.21659	9.304147	7.443318
1	8	889.9058	7119.246	34.16999	8.542497	6.833998
			∑=47958.78			

3.4 Perencanaan Balok

-Balok As H (5-6)

Momen rencana tumpuan = 1,39E8 Nmm = 139 KN m

Momen rencana lapangan = 3,95E7 Nmm = 39,5 KN m

Balok = 30/50

Mutu beton (fc') = 30 Mpa

Mutu baja (fy) = 400 Mpa

diasumsikan d = 500 - 70 = 430 mm

Perencanaan tulangan tumpuan

Mu = 139 KNm

$$\rho b = \frac{0,85.fc'.\beta_1}{fy}\frac{600}{600+fy}$$

$$\rho b = \frac{0,85.30.0,85}{400}\frac{600}{600+400} = 0,033$$

ρ_{min} = 1,4/fy

= 1,4/400 = 0,0035

ρ_{max} = 0,75. ρb

= 0,75. 0,033 = 0,025

m = fy/ (0,85.f'c)

=400 / (0,85.30) = 15,6863

Rn = $M_{max}/(b.d^2)$

= 1,39E8/(300.430²) = 2,948

$$\rho_{perlu} = \frac{1}{m}\left[1-\sqrt{1-\frac{2.m.Rn}{fy}}\right]$$

$$\rho_{perlu} = \frac{1}{15,6863}\left[1 - \sqrt{1 - \frac{2.15,6863.2,948}{400}}\right] = 0,0079$$

$As_{perlu} = \rho_{perlu} . b . d$

$= 0,0079 . 300 . 430 = 1019,1 mm^2$

pakai 3D22 (As = 1140,399 mm^2)

$d_{aktual} = 500 - (40 + 10 + ½.22) = 439$ mm > 430 mm ..... (Ok)

Menentukan momen nominal aktual balok

Anggab baja tarik telah mencapai regangan leleh saat beton tekan mencapai regangan hancur 0,003

Gaya dalam :

$C = 0,85 . fc' . b.a$

$= 0,85 . 30 . 300 . a = 7650 a$

$T = As.fy$

$= 1140,399 . 400 = 456159,6$ N

keseimbangan gaya C =T

$7650 a = 456159,6$

$a = 59,6287$ mm

$x = a/ \beta_1$

$=59,6287/0,85 = 70,1514$ mm

periksa regangan baja tarik :

$\varepsilon y = fy/Es = 400/200000 = 0,002$

$$\varepsilon s = \frac{d - x}{x}.\varepsilon cu = \frac{439 - 62,6898}{62,6898}.0,003$$

$$=0,0158 > 0,002.....(Ok)$$

$Mn = T.(d - a/2)$

$= 456159,6 .(439 - 53,2863/2).10^{-6}$

$= 186,654$ KNm

$MR = \varnothing .Mn = 0,8 . 186,654 = 149,323$ KNm > 139 KNm

Perencanaan tulangan lapangan

$Mu = 39,5$ KNm

$$\rho b = \frac{0,85.fc'.\beta_1}{fy}\frac{600}{600 + fy}$$

$$\rho b = \frac{0,85.30.0,85}{400}\frac{600}{600 + 400} = 0,033$$

$\rho_{min} = 1,4/fy$

$= 1,4/400 = 0,0035$

$\rho_{max} = 0,75. \rho b$

$= 0,75. 0,033 = 0,025$

$m = fy/ (0,85.fc)$

$=400 / (0,85.30) = 15,6863$

$Rn = M_{max}/(b.d^2)$

$= 3,95E7/(300.430^2) = 0,8378$

$$\rho_{perlu} = \frac{1}{m}\left[1 - \sqrt{1 - \frac{2.m.Rn}{fy}}\right]$$

$$\rho_{perlu} = \frac{1}{15,6863}\left[1 - \sqrt{1 - \frac{2.15,6863.0,8378}{400}}\right] = 0,0021$$

$\rho_{perlu} < \rho_{min}$ maka dipakai $\rho_{min} = 0{,}0035$

$As_{perlu} = \rho_{perlu} \cdot b \cdot d$

$= 0{,}0035 \cdot 300 \cdot 430 = 451{,}5\ mm^2$

pakai 2D22 ($As = 760{,}266\ mm^2$)

$d_{aktual} = 500 - (40 + 10 + \frac{1}{2}.22) = 439\ mm > 430\ mm$ ..... (Ok)

Menentukan momen nominal aktual balok

Anggab baja tarik telah mencapai regangan leleh saat beton tekan mencapai regangan hancur 0,003

Gaya dalam :

$C = 0{,}85 \cdot fc' \cdot b.a$

$= 0{,}85 \cdot 30 \cdot 300 \cdot a = 7650\ a$

$T = As.fy$

$= 760{,}266 \cdot 400 = 304106{,}4\ N$

keseimbangan gaya C =T

$7650\ a = 304106{,}4$

$a = 39{,}7525\ mm$

$x = a/\beta_1$

$=39{,}7525/0{,}85 = 46{,}7676\ mm$

periksa regangan baja tarik :

$\varepsilon y = fy/Es = 400/200000 = 0{,}002$

$$\varepsilon s = \frac{d - x}{x}.\varepsilon cu = \frac{439 - 46{,}7676}{46{,}7676}.0{,}003$$

$$=0{,}0252 > 0{,}002.....(Ok)$$

$Mn = T.(d - a/2)$

$=304106{,}4\ .(439 - 39{,}7525/2\ ).10^{-6}$

$= 127{,}4582$ KNm

$MR = \varnothing.Mn = 0{,}8\ .\ 127{,}4582 = 101{,}967$ KNm > 39,5 KNm....(Ok)

Penulangan tulangan geser

Gaya geser maksimum sejauh d (430 mm) dari perletakan :

$Vu = 55{,}83697$ (KN) .....(dari SAP90)

$½.\varnothing.Vc = 36{,}0675$ KN

$½.\varnothing.Vc < Vu < \varnothing.Vc$.....perlu tulangan geser minimum

digunakan sengkang D10 ; $Av = 2\pi 10^2 = 157$ mm²

Luas tulangan geser minimun :

$$Av = \frac{1}{3}\frac{bw.s}{fy} \rightarrow s = \frac{3.Av.fy}{bw}$$

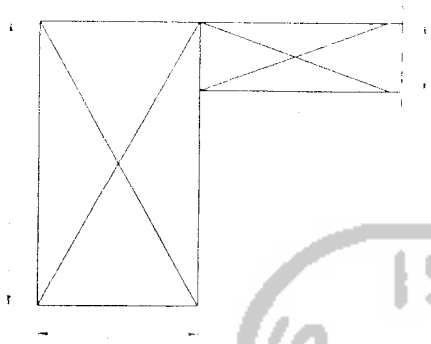
$$= \frac{3.157.400}{300} = 628\ mm$$

spasi sengkang maksimum: $s \leq d/2$ atau $s \leq 600$ mm

$s \leq 219{,}5$ mm

dipakai D10-215

Kontrol terhadap torsi



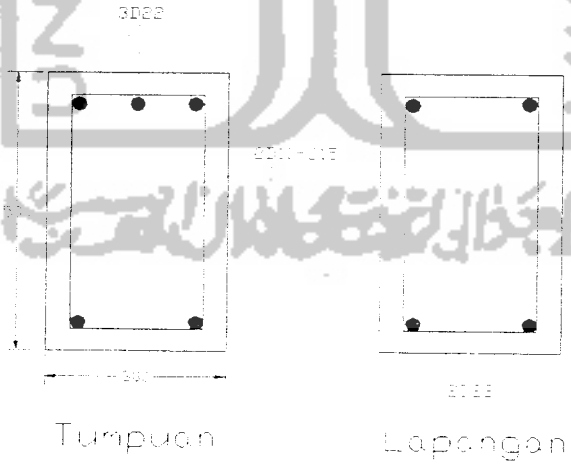
Gambar 3.6 Balok pada kontrol torsi

$$Mtx = Tu = 3{,}7028\ KNm$$

$$\Sigma x^2 y = 300^2.500 + 360.120^2 = 50{,}2E6mm^3$$

$$\varnothing\left(\frac{1}{24}\sqrt{fc'}\right)\Sigma x^2 y = 0{,}6.\frac{1}{24}\sqrt{30}.50{,}2 = 6{,}871KNm > 3{,}7028\ KNm$$

maka tidak perlu tulangan torsi



Gambar 3.37 Potongan balok As H (5-6)

Hasil tulangan balok yang lain di tabelkan !!

Tabel 3.11 Penulangan Balok Induk

Lantai	Balok	Dimensi	Mu (KN.m)		Tulangan Atas (mm^2)		Tulangan Bawah (mm^2)		Mn (KN.m)	
			Negatif	Positif	Perlu	Terpasang	Perlu	Terpasang	Negatif	Positif
ground	as H 5-6	30x50	139	39.5	1016.44	3D22 (1140.399)	451.5	2D22(760.266)	146	99.8
	as J 5-6	30x60	249	88.4	1494.335	5D22(1900.665)	556.5	2D22(760.266)	292	124
	as K 5-6	30x60	212	83.7	1254.615	4D22(1520.532)	556.5	2D22(760.266)	239	124
	as L 5-6	30x50	102	39.7	727.455	3D22(1140.399)	451.5	2D22(760.266)	146	99.8
	as 5 H-J	30x60	241	118	1437.374	5D22(1900.665)	556.5	2D22(760.266)	292	124
	as 5 J-K	30x50	110	42.4	451.5	3D22(1140.399)	451.5	2D22(760.266)	146	99.8
	as 5 K-L	30x40	24.5	8.50	346.5	2D22(760.266)	346.5	2D22(760.266)	75.45	75.45
	as 6 H-J	40x70	440	218	2204.851	6D22(2280.798)	1050.45	3D22(1140.399)	427	222
	as 6 J-K	30x60	158	69.2	556.5	3D22(1140.399)	556.5	3D22(1140.399)	183	183
	as 6 K-L	30x40	47.8	19.8	441.2445	2D22(760.266)	346.5	2D22(760.266)	75.45	75.45
1=2	as H 5-6	30x50	180	68.7	1340.432	4 D22(1520.532)	451.5	2 D22(760.266)	190	99.8
	as J 5-6	40x70	425	285	2126.179	6 D22(2280.798)	1388.429	4 D22(1520.532)	427	292
	as K 5-6	40x70	319	204	1567.148	5 D22(1900.665)	984.1106	3 D22(1140.399)	361	222
	as L 5-6	30x50	100	39.6	451.5	3 D22(1140.399)	451.5	2 D22(760.266)	146	99.8
	as 5 H-J	30x60	308	151	1882.459	6 D22(2280.798)	878.7091	3 D22(1140.399)	343	183
	as 5 J-K	30x50	122	48.5	881.8198	3 D22(1140.399)	451.5	2 D22(760.266)	146	99.8
	as 5 K-L	30x40	26.5	6.02	346.5	2 D22(760.266)	346.5	2 D22(760.266)	75.45	75.45
	as 6 H-J	40x70	521	291	2651.435	8 D22(3041.064)	1421.581	4 D22(1520.532)	555	292
	as 6 J-K	30x60	162	69.4	942.0568	3 D22(1140.399)	556.5	2 D22(760.266)	183	124
	as 6 K-L	30x40	34.1	9.65	346.5	2 D22(760.266)	346.5	2 D22(760.266)	75.45	75.45
3	as H 5-6	30x50	155	69.4	1140.429	4 D22(1520.532)	451.5	2 D22(760.266)	1.9E+08	99.8
	as J 5-6	40x70	425	287	2122.521	6 D22(2280.798)	1401.159	4 D22(1520.532)	4.27E+08	292

	as K 5-6	30x60	220	180	1306.637	4 D22(1520.532)	556.5	3 D22(1140.399)	239	183
	as 5 H-J	30x60	290	146	1764.515	5 D22(1900.665)	556.5	3 D22(1140.399)	292	183
	as 5 J-K	40x70	256	291	1244.517	4 D22(1520.532)	1422.042	4 D22(1520.532)	292	292
	as 6 H-J	40x70	560	278	2871.925	8 D22(3041.064)	1357.29	4 D22(1520.532)	555	292
	as 6 J-K	50x80	546	661	2313.745	7 D22(2660.931)	2835.68	8 D22(3041.064)	586	664
4	as H 5-6	30x50	107	39.4	767.0289	3 D22(1140.399)	451.5	2 D22(760.266)	146	99.8
	as J 5-6	40x70	321	234	1574.392	5 D22(1900.665)	882	4 D22(1520.532)	361	292
	as J' 5-6	40x70	425	196	2126.771	6 D22(2280.798)	882	3 D22(1140.399)	427	222
	as 5 H-J	30x60	284	202	1722.626	5 D22(1900.665)	1191.506	4 D22(1520.532)	292	239
	as 5 J-J'	30x40	91.0	45.5	871.0752	3 D22(1140.399)	419.1789	2 D22(760.266)	110	75.45
	as 6 H-J	40x70	532	351	2714.542	8 D22(3041.064)	1731.029	5 D22(1900.665)	555	361
	as 6 J-J'	30x40	108	56.0	1052.353	3 D22(1140.399)	520.0928	2 D22(760.266)	110	75.45
TopFloor	as H 5-6	30x60	294	225	1788.806	6 D22(2280.798)	1335.863	4 D22(1520.532)	343	239
	as J 5-6	40x70	406	345	2021.168	6 D22(2280.798)	1703.22	5 D22(1900.665)	427	361
	as 5 H-J	30x60	147	234	852.8003	3 D22(1140.399)	1394.093	4 D22(1520.532)	183	239
	as 6 H-J	30x60	145	136	837.4832	3 D22(1140.399)	782.4773	3 D22(1140.399)	183	183
	as K 5'-6	30x40	39.3	66.3	346.5	2 D22(760.266)	621.3136	2 D22(760.266)	75.45	75.45
	as 5' J-K	30x40	142	40.2	1432.2	4 D22(1520.532)	346.5	2 D22(760.266)	141	75.45
	as 6 J-K	30x40	44.8	43.2	413.1676	2 D22(760.266)	397.1671	2 D22(760.266)	75.45	75.45
Atap	as H 5-6	30x40	21.7	43.4	346.5	2 D22(760.266)	399.0696	2 D22(760.266)	75.45	75.45
	as J 5-6	30x40	42.8	51.7	393.3638	2 D22(760.266)	479.2476	2 D22(760.266)	75.45	75.45
	as 5 H-J	30x40	43.4	32.2	398.9745	2 D22(760.266)	346.5	2 D22(760.266)	75.45	75.45
	as 6 H-J	30x40	55.6	37.9	516.5001	2 D22(760.266)	346.5	2 D22(760.266)	75.45	75.45
	asK 5'-6'	30x40	32.7	29.8	346.5	2 D22(760.266)	346.5	2 D22(760.266)	75.45	75.45
	as 5' J-K	30x40	52.9		490.7366	2 D22(760.266)		2 D22(760.266)	75.45	

Tabel 3.12 Penulangan Balok Anak

Balok	Dimensi	Mu (KN.m)		Tulangan Atas (mm^2)		Tulangan Bawah (mm^2)		Mn (KN.m)		Sengkang
		Negatif	Positif	Perlu	Terpasang	Perlu	Terpasang	Negatif	Positif	
ba-1	25x30	4.10	1.63	201.25	2D22(760.266)	201.25	2D22760.266	50.15	50.15	⌀10 - 110
ba-2	30x40	46.4	21.4	428.0641	2D22(760.266)	346.5	2D22760.266	75.45	75.45	⌀10-160
ba-3	30x40	39.9	17.4	366.6199	2D22(760.266)	346.5	2D22760.266	75.45	75.45	⌀10-160
ba-4	30x40	233	128	2622.331	8D22(3041.064	1269.363	4D221520.53	244	141	⌀10-120
ba-5	25x30	19.6	9.79	259.5743	2D22(760.266)	201.25	2D22760.266	50.15	50.15	⌀10 - 110
ba-6	30x40	118	58.9	1155.076	4D22(1520.532	548.5443	2D22760.266	141	75.45	⌀10-160

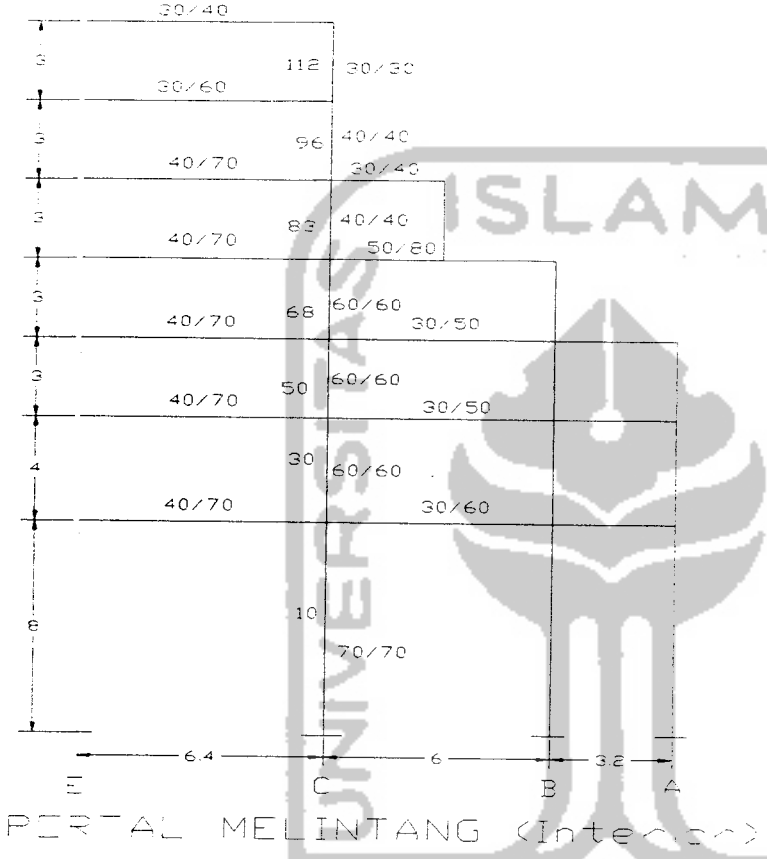
Tabel 3.13 Penulangan Geser Balok Induk

Lantai	Balok	Dimensi	Vu kritis (KN)	Vs (KN)	Tulangan Geser	
					Dalam Jarak d	Luar Jarak d
ground	as H 5-6	30x50	55.837	101.902	⌀10-265	⌀10-265
	as J 5-6	30x60	117.0565	125.6	⌀10-265	⌀10-265
	as K 5-6	30x60	107.1886	125.6	⌀10-265	⌀10-265
	as L 5-6	30x50	53.0451	125.6	⌀10-215	⌀10-215
	as 5 H-J	30x60	136.0794	144.71304	⌀10-230	⌀10-265
	as 5 J-K	30x50	65.2085	125.6	⌀10-215	⌀10-215
	as 5 K-L	30x40	22.0164	125.6	⌀10-165	⌀10-165
	as 6 H-J	40x70	235.9875	263.76	⌀10-150	⌀10-315
	as 6 J-K	30x60	103.9485	125.6	⌀10-265	⌀10-265
	as 6 K-L	30x40	40.7813	125.6	⌀10-165	⌀10-165
1=2	as H 5-6	30x50	87.3679	125.6	⌀10-215	⌀10-215
	as J 5-6	40x70	245.5499	125.6	⌀10-150	⌀10-315
	as K 5-6	40x70	190.5169	125.6	⌀10-315	⌀10-315
	as L 5-6	30x50	53.1275	125.6	⌀10-215	⌀10-215
	as 5 H-J	30x60	209.4098	221.893	⌀10-150	⌀10-250
	as 5 J-K	30x50	71.5175	125.6	⌀10-215	⌀10-215
	as 5 K-L	30x40	188.4218	125.6	⌀10-165	⌀10-165
	as 6 H-J	40x70	390.3944	439.6	⌀10-90	⌀10-150
	as 6 J-K	30x60	110.5387	125.6	⌀10-265	⌀10-265
	as 6 K-L	30x40	12.499	125.6	⌀10-165	⌀10-165
3	as H 5-6	30x50	82.14612	125.6	⌀10-215	⌀10-215
	as J 5-6	40x70	252.1003	263.76	⌀10-150	⌀10-315
	as K 5-6	30x60	160.5593	166.42	⌀10-200	⌀10-265
	as 5 H-J	30x60	187.9525	221.893	⌀10-150	⌀10-265
	as 5 J-K	40x70	193.5608	197.82	⌀10-200	⌀10-300
	as 6 H-J	40x70	345.0511	359.673	⌀10-110	⌀10-300
	as 6 J-K	50x80	412.9627	416.764	⌀10-110	⌀10-130
4	as H 5-6	30x50	59.4994	125.6	⌀10-215	⌀10-215
	as J 5-6	40x70	193.1191	197.82	⌀10-150	⌀10-200
	as J' 5-6	40x70	304.3461	329.7	⌀10-120	⌀10-180
	as 5 H-J	30x60	207.8974	208.25	⌀10-160	⌀10-240
	as 5 J-J'	30x40	40.1476	125.6	⌀10-165	⌀10-165
	as 6 H-J	40x70	363.8165	395.64	⌀10-100	⌀10-300
	as 6 J-J'	30x40	48.38	125.6	⌀10-165	⌀10-165
TopFloor	as H 5-6	30x60	220.6451	229.5448	⌀10-145	⌀10-200
	as J 5-6	40x70	258.0893	263.76	⌀10-150	⌀10-315
	as 5 H-J	30x60	159.9318	166.42	⌀10-200	⌀10-200
	as 6 H-J	30x60	111.6981	125.6	⌀10-265	⌀10-265
	as K 5'-6	30x40	11.75448	125.6	⌀10-165	⌀10-165

	as 5' J-K	30x40	58.2667	125.6	⌀10-165	⌀10-165
	as 6 J-K	30x40	42.9333	125.6	⌀10-165	⌀10-165
Atap	as H 5-6	30x40	32.0713	125.6	⌀10-165	⌀10-165
	as J 5-6	30x40	36.555	125.6	⌀10-165	⌀10-165
	as 5 H-J	30x40	30.9406	125.6	⌀10-165	⌀10-165
	as 6 H-J	30x40	31.13706	125.6	⌀10-165	⌀10-165
	asK 5'-6'	30x40	19.9327	125.6	⌀10-165	⌀10-165
	as 5' J-K	30x40	21.6384	125.6	⌀10-165	⌀10-165

3.5 Perencanaan Kolom

-Kolom As-C



Gambar 3.28 Portal melintang

Portal as 7

elemen	titik	MD(T.M)	ML(T.M)	ME(T.M)	PD (Ton)	PL (Ton)	PE (Ton)
30	1	-6,694	-0,106	13,772	-391,043	-57,976	-2,806
	2	8,855	0,811	-13,607	-384,899	-57,976	-2,806

Kelangsingan Kolom 30

-Kekakuan kolom

$Ec = 4700 \cdot \sqrt{f'c} = 4700 \cdot \sqrt{30} = 25742{,}9602$ Mpa

$Ig = 1/12 \cdot b \cdot h = 1/12 \cdot 600 \cdot 600^3 = 1.08\ E10\ mm^4$

$$\beta = \frac{1{,}2MD}{1{,}2MD + 1{,}6ML} = \frac{1{,}2.8{,}855}{(1{,}2.8{,}855 + 1{,}6.0{,}8110)} = 0{,}8922$$

$$EIk = \frac{(Ec.Ig)/2{,}5}{1+\beta} = \frac{(25742{,}9602.108E10)/2{,}5}{1+0{,}8922} = 5.88E13Nmm^2$$

$r = 0{,}3 \cdot h = 0{,}3 \cdot 600 = 180$ mm

-Kekakuan Balok :

$Ec = 4700 \cdot \sqrt{f'c} = 4700 \cdot \sqrt{30} = 25742{,}9602$ Mpa

$Ig1 = 1/12 \cdot b \cdot h = 1/12 \cdot 400.700^3 = 1{,}143\ E10\ mm^4$

$Ig2 = 1/12 \cdot b \cdot h = 1/12 \cdot 300.500^3 = 3{,}125\ E9\ mm^4$

$\beta = 0{,}8922$

$$EIb = \frac{(Ec.Ig)/5}{1+\beta} = \frac{(25742{,}9602.1{,}143E10)/5}{1+0{,}8922} = 3{,}11E13Nmm^2$$

$$EIb = \frac{(Ec.Ig)/2{,}5}{1+\beta} = \frac{(25742{,}9602.3{,}125E9)/2{,}5}{1+0{,}8922} = 8{,}5E12Nmm^2$$

-Menentukan nilai k :

$$\psi_2 = \frac{(EIk/Lk_1)+(EIk/Lk_2)}{(EIb/Lb).+(EIb_2/Lb_2)} = \frac{(5{,}88E13/4E3)+(5{,}88E13/3E3)}{(3{,}11E13/6{,}4E3)+(8{,}5E12/6E3)} = 5.46$$

$\psi_1 = \psi_2$

dari grafik dan tabel dari perhitungan beton bertulang (Gideon jilid 4,hal 106)untuk harga $\psi_1 = \psi_2 = 5{,}46$ struktur tanpa pengaku didapat k=2,29

(k1. Lk)/r = (2,29.4000/ 180) = 50.889 > 22 $\Rightarrow$ kolom langsing

$$Pc = \frac{\pi^2.EIk}{(k_1.l)^2} = \frac{\pi^2.5{,}88E13}{(2{,}29.4E3)^2}.E-3 = 6906{,}27KN$$

Pembesaran Momen

-Pembebanan pada Kolom elemen 30:

Pu = 1,05. (-391,043 - 57,976 -2,806) = -474,4163 Ton

Mb1 = (1,2 . -6,694 + 1,6 . -0,106) = -8,2024 T.M

Mb2 = (1,2 . 8,855 + 1,6 . 0,811) = 11,9236 TM

ME1 = 13,772 T.M

ME2 = -13,607 T.M

Pc = 6906,27 KN

Tabel 3.13 Perhitungan Pc Portal Melintang

Elemen	Pu(Ton)	Mb1(T.M)	Mb2(T.M)	ME1(T.M)	ME2(T.M)	PC(KN)
10	538,418	1,1496	5,3424	20,313	-5,381	35130
30	474,4163	8,2024	11,9236	13,772	-13,607	6906,27
50	379,2075	11,3316	16,7692	5,661	-10,109	10850,78
68	288,3395	3,192	20,1204	1,612	-6,233	20667,82
83	165,2522	11,502	30,2536	-3,161	3,350	8517,899
96	90,1247	8,8624	11,0468	9,215	-8,3	3630.682
112	12,4835	3,042	1,2796	1,669	-1,932	1597.716

-Pembesaran Momen pada elemen 30:

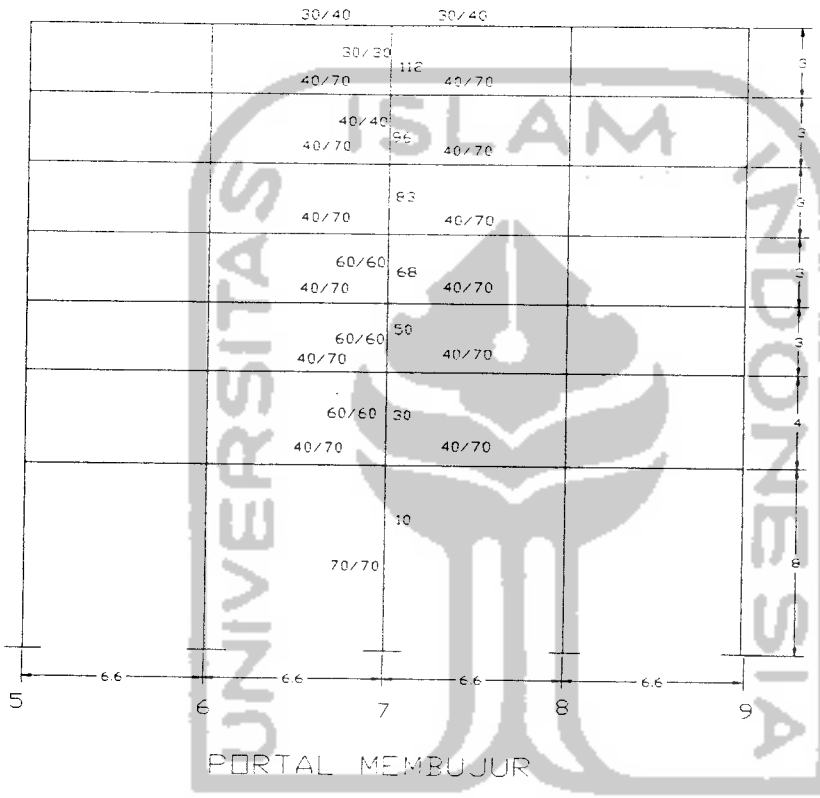
Cm = 0,6 + 0,4 .(6,694/8,855) = 0,9024

$$\delta_b = \frac{Cm}{1-(Pu/\varnothing Pc)} = \frac{0{,}9024}{1-(4744{,}163/0{,}65.6906{,}27)} = 1$$

$$\delta_b = \frac{Cm}{1-(\sum Pu / \sum \varnothing Pc)} = \frac{0,9024}{1-(19482,417 / 0,65.97017,7)} = 1,3058$$

Mcx = Mb + ME =1. 11,9236 + 1,3058 . 13,772

=29,994 T.M = 299,94 KN.m



Gambar 3.39 Portal membujur

Portal as C

elemen	titik	MD(T.M)	ML (T.M)	ME (T.M)	PD (Ton)	PL (Ton)	PE (Ton)
30	1	0,001	0,00	14,848	-391,043	-57,976	-0,007
	2	0,00	0,00	-14,798	-384,899	-57,976	-0,007

Kelangsingan Kolom 30

-Kekakuan kolom

Ec= 4700 . $\sqrt{f'c}$ = 4700 . $\sqrt{30}$ =25742,9602 Mpa

Ig = 1/12. b . h = 1/12 . 600. 600^3 = 1,08 E10 mm^4

$\beta = 1$

$$EIk = \frac{(Ec.Ig)/2,5}{1+\beta} = \frac{(25742,9602.1,08E10)/2,5}{1+1} = 5,56E13Nmm^2$$

r = 0,3 .h = 0,3 . 600 =180 mm

-Kekakuan Balok :

Ec= 4700 . $\sqrt{f'c}$ = 4700 . $\sqrt{30}$ =25742,9602 Mpa

Ig1= 1/12. b . h = 1/12 . 400.700^3 = 1,143 E10 mm^4

Ig2 = 1/12 . b. h = 1/12 .400.700^3 = 1,143 E10mm^4

$\beta = 1$

$$EIb1 = \frac{(Ec.Ig)/5}{1+\beta} = \frac{(25742,9602.1,143E10)/5}{1+1} = 2,94E13Nmm^2$$

EIb2= EIb1= 2,94E13 Nmm^2

-Menentukan nilai k :

$$\psi_2 = \frac{(EIk/Lk_1)+(EIk/Lk_2)}{(EIb/Lb).+(EIb_2/Lb_2)} = \frac{(5,56E13/4E3)+(5,56E13/3E3)}{(2,94E13/6,6E3)+(2,94E13/6,6E3)} = 3,118$$

$\psi_1 = \psi_2$

dari grafik dan tabel dari perhitungan beton bertulang (Gideon jilid 4,hal 106)untuk harga $\psi_1 = \psi_2$ =3,118 struktur tanpa pengaku didapat k=1,85

(k1. Lk)/r = (1,85.4000/ 180) = 41,11 > 22 $\Rightarrow$ kolom langsing

$$Pc = \frac{\pi^2.EIk}{(k_1.l)^2} = \frac{\pi^2.5{,}56E13}{(1{,}85.4E3)^2}.E-3 = 10011{,}71KN$$

Pembesaran Momen

-Pembebanan pada Kolom elemen 30:

Pu = 1,05. (-391,043- 57,976 -0,007) = -471,4773 Ton

Mb1 = (1,2 . 0 + 1,6 . 0) = 0 T.M

Mb2 = (1,2 .0 + 1,6 .0) = 0 TM

ME1 = 14,848 T.M

ME2 = -14,978 T.M

Pc = 10011,71 KN

Tabel 3.14 Perhitungan Pc Portal Membujur

Elemen	Pu(Ton)	Mb1(T.M)	Mb2(T.M)	ME1(T.M)	ME2(T.M)	PC(KN)
10	535,1398	0,00	0,00	24,163	-6,154	18801,13
30	471,4773	0,0012	0,00	14,848	-14,798	10011,71
50	376,682	0,0012	0,00	6,186	-10,956	12585,88
68	286,076	0,0024	0,0036	2,821	-7,018	12585,88
83	163,769	0,0024	0,0024	0,532	-2,112	108294,5
96	87,1742	0,0084	0,018	3,867	-3,876	21391,51
112	11,9249	0,0072	0,0048	1,861	-1,914	1525,088

-Pembesaran Momen pada elemen 30:

Cm = 1

$$\delta_b = \frac{Cm}{1-(Pu/\varnothing Pc)} = \frac{1}{1-(4714{,}773/0{,}65.1011{,}71)} = 3{,}63$$

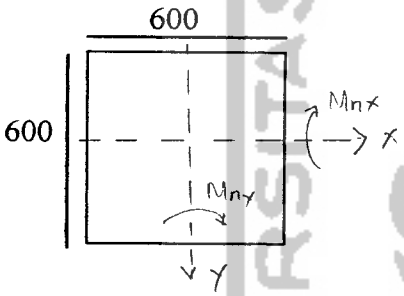
$$\delta_b = \frac{Cm}{1-(\sum Pu / \sum \varnothing Pc)} = \frac{1}{1-(19322{,}432 / 0{,}65.102080{,}1)} = 1{,}1976$$

Mcy = Mb + ME = 3,63 . 0,0012+ 1,1976 . 14,848

= 17,787 T.M =177,87 KN.M

*Perencanaan Tulangan Kolom

Kolom 1 (elemen 30)



Pu = 474,4163 Ton = 4744,163 KN

Pn = 4744,163/0,65 = 7298,712 KN

Mcx = 299,94 KN M

Mnx = 299,94/0,65 = 460,144 KN M

Mcy = 177,87 KN M

Mny = 177,87/0,65 = 273,6494KN M

h/b = 600/600 = 1 ; β = 0,75

Mox ekivalen = Mnx + Mny . h/b. (1-β)/β

= 460,144 +273,65. 1 (1-0,75)/0,75

= 551,3309 KN M

Dari grafik interaksi kolom dengan Mn = 551,3309 KN M dan

Pn =7298,712 KN

didapat nilai p = 1% (kolom menaalami patah desak)

As = 0,01. 600 .510 = 3060 mm^2 $\rightarrow$ A's = 1530 mm^2

dipasang tulangan kolom = 4 D25 (1963,5 mm^2) $\rightarrow$ satu sisi

cek patah desak:

$$Pn = \frac{A's.fy}{[e/(d-d')]+0,5} + \frac{b.h.f'c}{(3he/d^2)+1,18}$$

e=Mox / Pn = 551,3309 / 7298,871 = 0,07538 m

$$Pn = \frac{1963,5.400}{[75,538/(510-90)]+0,5} + \frac{600.600.30}{(3.600.75,538/510^2)+1,18} = 7497,324KN$$

jadi Pn=7298,71 KN < 7497,324 KN---------- OK

Perencanaan Sengkang

s $\leq$ 16x diameter tulangan memanjang = 16x 25 = 400 mm

48x diameter tulangan sengkang = 48 x 10 = 480 mm

ukuran kolom terkecil = 600 mm

maka dipasang sengkang = D10-400

Tabel 3.14 Penulangan Kolom

Lantai	Kolom	Dimensi	Pu/0,65 (KN)	As tarik	As total	PN (KN)	Tul . Geser
Basement	Exterior	60/60	3350.598	4D25	12D25	5195.97	D10-400
	Interior	70/70	8283.35	5D25	18D25	9911.459	D10-400
Ground	Exterior	60/60	2863.9	4D25	12D25	4204.119	D10-400
	Interior	60/60	7306.124	4D25	12D25	7497.324	D10-400
First	Exterior	60/60	2268.437	4D25	12D25	5661.082	D10-400
	Interior	60/60	5833.96	4D25	12D25	6219.038	D10-400
Second	Exterior	60/60	1707.462	4D25	12D25	5293.183	D10-400
	Interior	60/60	4435.99	4D25	12D25	6837.174	D10-400
Third	Exterior	40/40	1217.5	3D25	8D25	1535.511	D10-400
	Interior	40/40	2542.34	4D25	12D25	5505.89	D10-400
Fourth	Exterior	40/40	719.7831	3D19	8D19	4808.109	D10-300
	Interior	40/40	1386.53	4D19	12D19	1548.438	D10-300
Topfloor	Exterior	30/30	122.2369	2D19	4D19	2734.313	D10-300
	Interior	30/30	192.05	3D19	8D19	2918.129	D10-300

3.6 Perencanaan Pondasi

-Pondasi C7

Data :

Daya dukung tanah = 300 KN/m^2

Berat volume tanah =20,5 KN/m^2

Ukuran kolom : 70/70

Beban aksial kolom = 439,365 ton

Berat sendiri Tie Beam = ((6,6+3,2+3).2,4.0,4.0,7) = 8,6016 ton

Berat kolom pondasi = 0,7. 0,7. 4 . 2,4 = 4,704 ton

Berat tanah sepanjang kolom pondasi = 0,7.0,7. 4. 2.05 = 4,018

Beban mati PD = 439,365 + 8,6016 + 4,704 - 4,018 = 448,65 ton =4486,5KN

Beban hidup PL=70,253 ton =702,53 KN

Momen = 1,2.Md + 1,6 ML =1,2.0,422 + 1,6.0,402 =1,1496Tm

Momen gempa (ME) = 20,313 TM=203,13 KNm

q tanah = (4 -0,2 - 0,9). 20,5=59,45 KN/ m^2

q pondasi = 0,9.24. =21,6 KN/ m^2

q basement = 19,82 KN/m^2

Menentukan dimensi pondasi

daya dukung tanah efktif σ_{ef} = 300 -59,45 - 21,6- 19,82 = 198,78 KN/ m^2

A = Pu/ σ_{ef} = ((1,2.4486,5 + 1,6. 702,53)/198,78)=32,898 m^2

Pondasi direncanakan bujur sangkar, sehingga :

$A = bxb \longrightarrow b = \sqrt{A} = 5{,}735\ m \sim 5{,}9\ m$

$e = M/Pu = (11{,}496+203{,}13)/6732{,}11 = 3{,}28E\text{-}2\ m$

tegangan dengan memperhitungakan momen yang terjadi :

$$\sigma_{ex} = \frac{Pu}{b^2}\left[1+\left(\frac{6.e}{b}\right)\right]$$

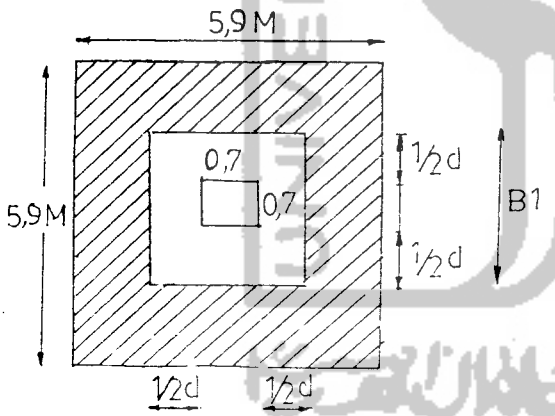
$$= \frac{6539{,}458}{5{,}9^2}\left[1+\left(\frac{6.0{,}0328}{5{,}9}\right)\right] = 194{,}13\ KN/m^2$$

$\sigma = Pu / A \leq \sigma_{ef}$

$= 6539{,}458 / 5{,}9^2 = 187{,}86\ KN/m^2 < 194{,}13\ KN/m^2$

-Cek kuat geser beton

Cek geser pons



Gambar 3.40 Daerah kritis geser pons

B1=0,7 + 2. (0,5.d)

= 0,7 + 2.(0,5 .0,92) =1,62m

B2=0,7 + 2. (0,5 d)

= 0,7 + 2.(0,5 .0,92) =1,62 m

gaya geser total pada penampang kritis

$Vu = \sigma . (5,9^2 - B1.B2)$

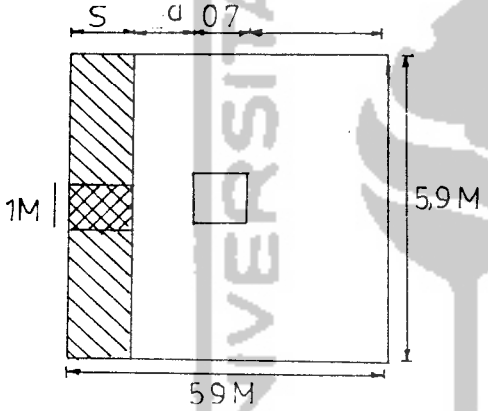
$Vu = 187,86 .(5,9^2 - 1,62 . 1,62) = 6397,854$ KN

Kuat geser beton

$\varnothing Vc = 0,6.(4.\sqrt{f'c})2.(B1+B2). d$

$=0,6.(4.\sqrt{30})2.3240.920.E-3 = 78367,27$ KN>Vu --------aman

Cek geser balok



Gambar 3.41 Daerah kritis geser balok

$Vu = \sigma .b.s$

$s=(5,9 - 0,7)/2 - 0.92 = 1,68$ m

Gaya geser total pada penampang kritis tiap 1m panjang

$Vu = \sigma .b.s$

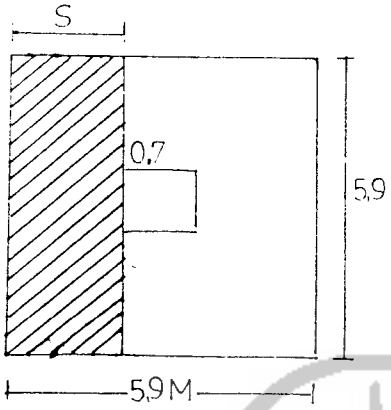
$=187,86. 1 .1,68 = 326,1411$ KN

Kuat geser beton tiap 1m panjang

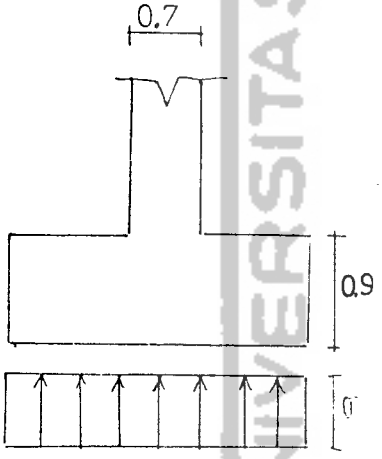
$\varnothing Vc = 0,6.(1/6.\sqrt{f'c}).b.d.$

$=0,6.(1/6 . \sqrt{30}\ ).1000. 920.E\text{-}3 = 503,905\ KN > Vu$

Penulangan



Gambar 3.42 Daerah momen



Gambar 3.43 Gaya dari bawah pondasi

momen diambil selebar b = 1m

s = (5,9-0,7)/2 =2,6 m

$M = \sigma .b.s.1/2. s$

=187.86. 1. 2,6. 1/2. 2.6 = 656,1649 KN m

Mn = 656,1649 / 0,8 =820,2061 KN m

jd = 0,9 d = 0,9 .920 = 828 mm

$$As = \frac{Mn}{jd.fy} = \frac{820,2061}{828.400} = 2476,468mm^2$$

dipakai D25 dengan $A_{1\varnothing} = 490,873$ mm2

$$\text{jarak tulangan} = x = \frac{A_{1\varnothing}.1000}{As} = \frac{490,873.1000}{2476,468} = 198,2154mm^2$$

dipasang tulangan pokok D25-150

$As_{pakai} = (A_{1\varnothing}.1000)/150 = 3272,493\ mm^2$

$As_{min} = 1,4/(400.1000.920) = 3220\ mm^2$

Tabel 3.15 Penulangan Pondasi

PONDASI	Pd (ton)	PL (ton)	PE (ton)	PU (ton)	Tebal (mm)	σ_{tf} (KN/m²)	B (m)	σ_{tx} (KN/m²)	$\sigma_{terjadi}$ (KN/m²)	Dua arah		Satu arah	
										VU(KN)	⌀VC(KN)	VU(KN)	⌀VC(KN)
AS-E5	186.2033	19.076	12.691	2666.566	600	196.08	3.7	228.2497	194.782	2392.49	33357.62	223.6847	284.8157
AS-E7	317.447	35.897	13.021	4513.926	700	195.73	4.9	202.6815	188.0019	4358.437	43032.59	299.9686	339.588
AS-B7	209.3694	34.604	0	3066.097	600	196.08	4	211.6514	191.6311	2845.435	33357.62	239.166	284.8157
AS-A7	61.0329	10.64	0	902.6348	400	196.78	2.5	210.9457	144.4216	1025.145	17162.56	122.3485	175.2712
As -C7	448.65	70.253	3.161	6539.458	1000	198.78	5.9	194.1316	187.8615	6397.854	78367.27	326.1411	503.9048

M (KN.m)	Mn (KN.m)	As (mm²)	As terpakai (mm²)	As min (mm²)	DIPAKAI
256.7809	320.9762	1714.616	1963.496	1820	D25-250
446.9127	558.6409	2502.872	2583.547	2170	D25-190
288.1104	360.138	1923.814	1963.496	1820	D25-250
85.43302	106.7913	927.0076	1227.185	1120	D25-400
656.1649	820.2061	2476.468	3272.493	3220	D25-150

Perencanaan Balok Ikat (Tie Beam)

Balok ikat dengan bentang 6,6 m (40/50)

Pu = 5384,118 KN

Pu=10%PU =538,4118 KN

- Terhadap gaya aksial tarik :

$$As_{perlu} = \frac{Pu'/\varnothing}{fy} = \frac{538,4118.E3 / 0,65}{400} = 2070mm^2$$

dipasang tulangan 5D25 dengan As = 2454 mm^2 > As_{perlu}

- Terhadap gaya aksial desak :

Pu' = 538,4118 ; fc'= 30 Mpa

Agr = 400 x 500 =200000 mm^2

$$\frac{Pu'}{\varnothing.Agr.0,85.fc'} = \frac{538,4118E3}{0,65..200000.0,85.30} = 0,162$$

Mu = 0 ⟶ et=0

et_{min} = (15+0,03 .h)

=(15 + 0,03.500)= 30 mm

et/h = 30/500 = 0,06

d'/h = 70/500 =0,14

$$\frac{Pu'}{\varnothing.Agr.0,85.fc'}.\frac{et}{h} = 0,162.0,06 = 0,00972$$

dari grafik halaman 90 (Gideon #4) didapat nilai r =0,02; β=1,2; ρ=0,024

As_{perlu}=0,024 x 400 x 500 =4800 mm^2

BAB IV

PEMBAHASAN

4.1 Umum

Pada gedung bertingkat perlakuan struktur akibat beban menyebabkan terjadinya distribusi gaya. Biasanya untuk mempersingkat perhitungan perencana menganggap elemen-elemen tertentu pada bangunan portal memiliki kesamaan, sehingga hasil dari perhitungannya sama untuk elemen-elemen tersebut.

Perencanaan Rumah Susun menggunakan bantuan program SAP90 untuk memperhitungkan momen yang terjadi dan untuk mengontrol hasil dari luas penulangan.

Perencanaan Rumah Susun ini menggunakan spesifikasi bahan sebagai berikut:-pelat menggunakan spesifikasi Beton : fc' = 25 Mpa

Baja : fy = 240 MPa

-balok dan kolom serta pondasi menggunakan spesifikasi:

Beton : fc' = 30 Mpa

Baja : fy = 400 Mpa

Peningkatan mutu bahan dan pengaruh gempa pada perencanaan Rumah Susun ini, mempengaruhi momen-momen yang terjadi.

4.2 Atap

Perencanaan kuda-kuda untuk atap untuk bentang 6,4 m paling efisien menggunakan bahan dari kayu. Kelemahan menggunakan bahan kayu pada usia penggunaannya yang relatif lebih pendek umurnya dibanding baja. Untuk

menyelesaikan masalah tersebut menggunakan cara mengolesi dengan oli bekas, sehingga hama kayu tidak merusak.

4.3 Pelat

Pada bangunan ini tebal pelat lantai adalah 120 mm dan lantai basement 200 mm. Menggunakan diameter tulangan pokok 8 mm dan tulangan bagi 6 mm. Untuk menahan beban tembok yang berada pada tengah-tengah bentang dilakukan dengan cara menganggap pelat selebar 0,5 m sebagai balok. Jika ditahan dengan balok anak akan mempengaruhi artistik bangunan.

4.4 Balok

Spesifikasi bahan yang digunakan fc'=30 Mpa dan fy =400 Mpa. Pada lantai ke-3 ada dimensi balok 50/80, hal ini disebabkan ada kolom menumpang pada balok tersebut. Dimensi balok yang relatif besar mengakibatkan penggunaan tulangan geser menjadi minimal. Torsi pada balok relatif kecil karena luasan pelat hampir sama tetapi pada balok tepi akibat torsi diperhitungkan. Untuk memperkecil luasan beban pelat agar momen dan lendutan yang terjadi kecil, maka dibagi dengan balok anak

4.5 Kolom

Spesifikasi bahan yang digunakan fc'=30 Mpa dan fy = 400 Mpa. Kolom pada sisi tepi beban aksial kecil momen yang terjadi besar banyak terjadi patah tarik sedang pada kolom tengah sebaliknya.

4.6 Pondasi

Spesifikasi bahan yang digumakan fc'=30 Mpa dan fy=400Mpa. Pondasi direncanakan dengan foot plate dan memperhitungkan momen yang terjadi karena anggapan tumpuan pondasi sebagai jepit.Beban basement ditahan oleh tanah dengan daya dukung tanah 20 Kg/cm2, sedangkan beban basement diatas luasan pelat pondasi ditahan oleh pondasi.

Tie Beam (balok pengikat) tidak diperhitungkan terhadap momen karena anggapan bahwa momen yang terjadi pada kaki pondasi telah ditahan oleh pondasi. Tie Beam diperhitungkan menahan gaya aksial desak dan tarik sebesar 10% dari beban aksial kolom (Gideon,jilid 1hal 245)

Tabel 4.1 Perbandingan Penulangan Balok Lantai Ground dengan SAP90

Lantai	Balok	Dimensi	Tulangan Atas (mm^2)		Tulangan Bawah (mm^2)		Tulangan Atas dari SAP90(mm^2)		Tulangan Bawah dari SAP90 (mm^2)	
			Perlu	Terpasang	Perlu	Terpasang	Perlu	Terpasang	Perlu	Terpasang
ground	as H 5-6	30x50	1016.44	3D22(1140.399)	451.5	2D22(760.266)	1060	3D22(1140.399)	604	2D22(760.266)
	as J 5-6	30x60	1494.335	5D22(1900.665)	556.5	2D22(760.266)	1708	5D22(1900.665)	716	2D22(760.266)
	as K 5-6	30x60	1254.615	4D22(1520.532)	556.5	2D22(760.266)	1420	4D22(1520.532)	684	2D22(760.266)
	as L 5-6	30x50	727.455	3D22(1140.399)	451.5	2D22(760.266)	878	3D22(1140.399)	464	2D22(760.266)
	as 5 H-J	30x60	1437.374	5D22(1900.665)	556.5	2D22(760.266)	1326	5D22(1900.665)	650	2D22(760.266)
	as 5 J-K	30x50	451.5	3D22(1140.399)	451.5	2D22(760.266)	596	3D22(1140.399)	464	2D22(760.266)
	as 5 K-L	30x40	346.5	2D22(760.266)	346.5	2D22(760.266)	359	2D22(760.266)	359	2D22(760.266)
	as 6 H-J	40x70	2204.851	6D22(2280.798)	1050.45	3D22(1140.399)	2242	6D22(2280.798)	1121	3D22(1140.399)
	as 6 J-K	30x60	556.5	3D22(1140.399)	556.5	3D22(1140.399)	1079	3D22(1140.399)	521	3D22(1140.399)
	as 6 K-L	30x40	441.2445	2D22(760.266)	346.5	2D22(760.266)	452	2D22(760.266)	359	2D22(760.266)

BAB V

KESIMPULAN DAN SARAN

5.1 Kesimpulan

Berdasarkan hasil perhitungan dan pembahasan pada bab-bab sebelumnya, pada tugas akhir ini dapat diambil beberapa kesimpulan sebagai berikut :

1. Hasil penulisan dapat dipakai sebagai gambaran jika akan dibangun rumah susun di Yogyakarta.

2. Untuk perhitungan jumlah tulangan struktur kolom menggunakan metode diagram Interaksi dimana antara beban terfaktor (Pn) dan momen terfaktor (Mn) akan terjadi suatu interaksi untuk mendapatkan rasio tulangan (ρ)dan rasio tulangan yang didapat kurang dari 2%

3. Pada tugas akhir ini untuk menyakinkan bahwa hasil perencanaan struktur aman maka menggunakan perbandingan dengan perhitungan cara yang lain yaitu dengan bantuan program SAP90 (SAPCON). Dari hasil perhitungan didapat tulangan pokok hampir sama dengan menggunakan SAPCON dan kondisi masih aman, tetapi untuk tulangan geser lebih aman menggunakan hasil dari SAPCON.

4. Pada pelat jika menggunakan mutu baja rendah fy =240 MPa akan diperoleh ρ_{min} yang lebih besar.

5. Beban aksial yang ditahan oleh pondasi dan daya dukung tanah menentukan jenis dan dimensi pondasi yang akan digunakan Beban aksial yang besar menyebabkan dimensi pondasi besar.

6. Apabila dimensi balok dan kolom berubah dari perencanaan awal, maka harus dihitung ulang analisa strukturnya , karena kekakuan dan distribusi gaya-gaya yang terjadi berubah.

5.2 Saran

Dengan mempertimbangkan dari hasil perhitungan dan pembahasan maka dapat diberikan beberapa saran tugas akhir ini sebagai berikut :

1. Pada tugas akhir ini perlu diadakan perhitungan sampai tahap akhir (RAB), sehingga dari segi biaya dapat diketahui biaya yang diperlukan untuk pembangunan gedung rumah susun ini.

2. Perlu adanya perhitungan redesain dengan peningkatan spesifikasi bahan yang lain, sehingga dapat diketahui sejauh mana efisiensi bahan yang digunakan.

3. Apabila beban aksial yang didukung pondasi sangat besar sehingga tidak dapat ditahan oleh pondasi telapak, maka perlu direncanakan pondasi tiang pancang yang kapasitasnya lebih besar.

4. Bentuk dimensi kolom sebaiknya disesuaikan dengan besar momen yang terjadi agar diperoleh dimensi yang ekonomis.

5. Pada pelat sebaiknya menggunakan diameter tulangan ∅ 10 agar diperoleh jarak antar tulangan tidak terlalu rapat.

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LAMPIRAN

LAMPIRAN 1



STRUCTURAL ANALYSIS PROGRAMS

VERSION P5.40

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```
ATAP RANGKA KAYU KG-M
SYSTEM
L=3
JOINTS
1        X=0      Y=0      Z=0
5        Y=6.4    G=1,5,1
6        Y=1.6   Z=1.6
7        Y=3.2    Z=3.2
8        Y=4.8   Z=1.6

RESTRAINTS
1 8 1    R=1,0,0,0,1,1
1        R=1,1,1,0,1,1
5        R=1,0,1,0,1,1

FRAME
NM=2     Z=-1
C ******************MATERIAL PROPERTY************
1        SH=R   T=0.12,0.08   E=1E9 I=1.152E-5 : BATANG ATAS
2        SH=R   T=0.08,0.06   E=1E9 I=2.56E-6
C *****ELEMENT LOCATION DATA*******************
C BATANG BAWAH
1 1 2    M=2          G=3,1,1,1
C BATANG ATAS
5 1 6    M=1
6 6 7    M=1
7 7 8    M=1
8 8 5    M=1
C BATANG VERTIKAL
9 2 6    M=2       G=1,2,2,2
10 3 7   M=2
C BATANG DIAGONAL
12 3 6   M=2
13 3 8   M=2

LOADS
2 4 1    F=0,0,-106        L=1
6 8 2    F=0,0,-535         L=1
7        F=0,0,-570         L=1
6        F=0,66.4680,-66.4680    L=2
8        F=0,53.74000,53.7400    L=2
6        F=0,-53.7400,53.7400     L=3
8        F=0,-66.4680,-66.4680    L=3
7        F=0,60.104,-6.3640   L=2
7        F=0,-60.104,-6.3640 L=3

COMBO
1 C=1,0,0
2 C=0,1,0
3 C=0,0,1
4 C=1,1,0
5 C=1,0,1
```

LAMPIRAN 2

TAP RANGKA KAYU KG-M

R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
1								
	1	0.000			979.000			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			979.000			
	2	0.000			159.806			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			159.806			
	3	0.000			-140.714			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			-140.714			
	4	0.000			1138.806			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			1138.806			
	5	0.000			838.286			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			838.286			
2								
	1	0.000			979.000			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			979.000			
	2	0.000			159.806			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			159.806			
	3	0.000			-140.714			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			-140.714			
	4	0.000			1138.806			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			1138.806			
	5	0.000			838.286			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	

ΓAP RANGKA KAYU KG-M

R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		1.600			838.286			
3								
	1	0.000			979.000			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			979.000			
	2	0.000			39.598			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			39.598			
	3	0.000			-20.506			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			-20.506			
	4	0.000			1018.598			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			1018.598			
	5	0.000			958.494			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			958.494			
4								
	1	0.000			979.000			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			979.000			
	2	0.000			39.598			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			39.598			
	3	0.000			-20.506			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			-20.506			
	4	0.000			1018.598			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			1018.598			
	5	0.000			958.494			
		0.000	0.000	0.000		0.000	0.000	

ΓAP RANGKA KAYU KG-M

R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		1.600	0.000	0.000		0.000	0.000	
		1.600			958.494			
5		----------						
	1	0.000			-1384.515			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-1384.515			
	2	0.000			29.000			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			29.000			
	3	0.000			-56.000			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-56.000			
	4	0.000			-1355.515			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-1355.515			
	5	0.000			-1440.515			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-1440.515			
6		----------						
	1	0.000			-931.260			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-931.260			
	2	0.000			29.000			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			29.000			
	3	0.000			-56.000			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-56.000			
	4	0.000			-902.260			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-902.260			
	5	0.000			-987.260			

:AP RANGKA KAYU KG-M

R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-987.260			
7		---	---	---	---	---	---	
	1	0.000			-931.260			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-931.260			
	2	0.000			-56.000			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-56.000			
	3	0.000			29.000			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			29.000			
	4	0.000			-987.260			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-987.260			
	5	0.000			-902.260			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-902.260			
8		---	---	---	---	---	---	
	1	0.000			-1384.515			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-1384.515			
	2	0.000			-56.000			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-56.000			
	3	0.000			29.000			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			29.000			
	4	0.000			-1440.515			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-1440.515			

TAP RANGKA KAYU KG-M

R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	5	0.000			-1355.515			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-1355.515			
9	----------							
	1	0.000			106.000			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			106.000			
	2	0.000			0.000			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			0.000			
	3	0.000			0.000			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			0.000			
	4	0.000			106.000			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			106.000			
	5	0.000			106.000			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			106.000			
10	----------							
	1	0.000			747.000			
		0.000	0.000	0.000		0.000	0.000	
		3.200	0.000	0.000		0.000	0.000	
		3.200			747.000			
	2	0.000			12.728			
		0.000	0.000	0.000		0.000	0.000	
		3.200	0.000	0.000		0.000	0.000	
		3.200			12.728			
	3	0.000			12.728			
		0.000	0.000	0.000		0.000	0.000	
		3.200	0.000	0.000		0.000	0.000	
		3.200			12.728			
	4	0.000			759.728			
		0.000	0.000	0.000		0.000	0.000	
		3.200	0.000	0.000		0.000	0.000	

ΓAP RANGKA KAYU KG-M

R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		3.200			759.728			
	5	0.000			759.728			
		0.000	0.000	0.000		0.000	0.000	
		3.200	0.000	0.000		0.000	0.000	
		3.200			759.728			
11	----------							
	1	0.000			106.000			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			106.000			
	2	0.000			0.000			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			0.000			
	3	0.000			0.000			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			0.000			
	4	0.000			106.000			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			106.000			
	5	0.000			106.000			
		0.000	0.000	0.000		0.000	0.000	
		1.600	0.000	0.000		0.000	0.000	
		1.600			106.000			
12	----------							
	1	0.000			-453.255			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-453.255			
	2	0.000			-94.000			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-94.000			
	3	0.000			76.000			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			76.000			
	4	0.000			-547.255			
		0.000	0.000	0.000		0.000	0.000	

'AP RANGKA KAYU KG-M

R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.263	0.000	0.000		0.000	0.000	
		2.263			-547.255			
	5	0.000			-377.256			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-377.256			
13	----------							
	1	0.000			-453.255			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-453.255			
	2	0.000			76.000			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			76.000			
	3	0.000			-94.000			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-94.000			
	4	0.000			-377.256			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-377.256			
	5	0.000			-547.255			
		0.000	0.000	0.000		0.000	0.000	
		2.263	0.000	0.000		0.000	0.000	
		2.263			-547.255			

LAMPIRAN 3

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* *
* COMBINATION *
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RESS COMBINATION <2D-FRAME SYSTEM>
AD FACTOR : 1

EM	MA HINGE	SECTION (M)	AXIAL F. (KG)	SHEAR (KG)	MOMENT (KG-M)
1	1	0.00	6.0595D+02	-4.9310D+02	1.2635D+02
		0.13	6.0595D+02	-5.7558D+02	5.5104D+01
		0.27	6.0595D+02	-6.5806D+02	-2.7138D+01
		0.40	6.0595D+02	-7.4054D+02	-1.2038D+02
		0.53	6.0595D+02	-8.2302D+02	-2.2461D+02
		0.67	6.0595D+02	-9.0550D+02	-3.3985D+02
		0.80	6.0595D+02	-9.8798D+02	-4.6608D+02
2	2	0.00	-1.4521D+03	2.2558D+02	6.5841D+00
		0.22	-1.5410D+03	1.2097D+02	4.4486D+01
		0.44	-1.6299D+03	1.6354D+01	5.9505D+01
		0.66	-1.7189D+03	-8.8260D+01	5.1641D+01
		0.87	-1.8078D+03	-1.9287D+02	2.0893D+01
		1.09	-1.8967D+03	-2.9749D+02	-3.2738D+01
		1.31	-1.9856D+03	-4.0210D+02	-1.0925D+02
3	3	0.00	1.5702D+03	1.0181D+03	-4.7266D+02
		0.55	1.8665D+03	6.6115D+02	-1.2536D+01
		1.10	2.1628D+03	3.0416D+02	2.5196D+02
		1.64	2.4591D+03	-5.2837D+01	3.2082D+02
		2.19	2.7554D+03	-4.0983D+02	1.9405D+02
		2.74	3.0518D+03	-7.6683D+02	-1.2835D+02
		3.29	3.3481D+03	-1.1238D+03	-6.4639D+02

LAMPIRAN 4

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* *
* COMBINATION *
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TRESS COMBINATION <2D-FRAME SYSTEM>
OAD FACTOR : 1

LEM	MA HINGE	SECTION (M)	AXIAL F. (KG)	SHEAR (KG)	MOMENT (KG-M)
1	1	0.00	0.0000D+00	1.2207D-04	-4.5776D-05
		0.17	0.0000D+00	-4.3248D+02	-3.6040D+01
		0.33	0.0000D+00	-8.6496D+02	-1.4416D+02
		0.50	0.0000D+00	-1.2974D+03	-3.2436D+02
		0.67	0.0000D+00	-1.7299D+03	-5.7664D+02
		0.83	0.0000D+00	-2.1624D+03	-9.0100D+02
		1.00	0.0000D+00	-2.5949D+03	-1.2974D+03
2	2	0.00	-3.6635D+03	2.5991D+03	-1.0114D+03
		0.47	-4.4107D+03	1.8519D+03	3.7729D+01
		0.94	-5.1579D+03	1.1047D+03	7.3462D+02
		1.41	-5.9050D+03	3.5758D+02	1.0793D+03
		1.89	-6.6522D+03	-3.8959D+02	1.0717D+03
		2.36	-7.3994D+03	-1.1368D+03	7.1198D+02
		2.83	-8.1465D+03	-1.8839D+03	0.0000D+00
3	2	0.00	4.4339D+03	1.8287D+03	-2.8606D+02
		0.47	5.1811D+03	1.0815D+03	3.9988D+02
		0.94	5.9283D+03	3.3434D+02	7.3360D+02
		1.41	6.6754D+03	-4.1282D+02	7.1510D+02
		1.89	7.4226D+03	-1.1600D+03	3.4438D+02
		2.36	8.1698D+03	-1.9072D+03	-3.7855D+02
		2.83	8.9169D+03	-2.6543D+03	-1.4537D+03

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* *
* COMBINATION *
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UPPORT REACTIONS <2D-FRAME SYSTEM>
OAD FACTOR : 1

ODE	1-REACTION (KG)	2-REACTION (KG)	3-REACTION (KG-M)
1	-4.4283D+03	7.0926D+03	0.0000D+00
4	4.4283D+03	8.1821D+03	-1.4537D+03

UNIVERSITAS ISLAM INDONESIA

LAMPIRAN 5

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* COMBINATION *
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RESS COMBINATION <2D-FRAME SYSTEM>
AD FACTOR : 1

EM	MA HINGE	SECTION (M)	AXIAL F. (KG)	SHEAR (KG)	MOMENT (KG-M)
1	1	0.00	0.0000D+00	0.0000D+00	6.1035D-05
		0.17	0.0000D+00	-4.3248D+02	-3.6040D+01
		0.33	0.0000D+00	-8.6496D+02	-1.4416D+02
		0.50	0.0000D+00	-1.2974D+03	-3.2436D+02
		0.67	0.0000D+00	-1.7299D+03	-5.7664D+02
		0.83	0.0000D+00	-2.1624D+03	-9.0100D+02
		1.00	0.0000D+00	-2.5949D+03	-1.2974D+03
2	2	0.00	-5.0204D+03	2.1435D+03	-6.4872D+02
		0.42	-5.6071D+03	1.3611D+03	8.1397D+01
		0.83	-6.1939D+03	5.7871D+02	4.8552D+02
		1.25	-6.7807D+03	-2.0366D+02	5.6366D+02
		1.67	-7.3675D+03	-9.8604D+02	3.1580D+02
		2.08	-7.9543D+03	-1.7684D+03	-2.5804D+02
		2.50	-8.5411D+03	-2.5508D+03	-1.1579D+03
3	2	0.00	5.0204D+03	2.1435D+03	-6.4872D+02
		0.42	5.6071D+03	1.3611D+03	8.1397D+01
		0.83	6.1939D+03	5.7871D+02	4.8552D+02
		1.25	6.7807D+03	-2.0366D+02	5.6366D+02
		1.67	7.3675D+03	-9.8604D+02	3.1580D+02
		2.08	7.9543D+03	-1.7684D+03	-2.5804D+02
		2.50	8.5411D+03	-2.5508D+03	-1.1579D+03

LAMPIRAN 6

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PORTAL RUMAH SUSUN di Yogyakarta TON-M
SYSTEM
L=6
JOINTS
C *****BASEMENT*****************
1       X=0      Y=0      Z=0
17      X=-26.4  Y=0      Z=0      G=1,17,4
2       X=0      Y=6.4    Z=0
18      X=-26.4  Y=6.4    G=2,18,4
3       X=0      Y=12.4
19      X=-26.4  Y=12.4   G=3,19,4
4       X=0      Y=15.6
20      X=-26.4  Y=15.6  G=4,20,4
C ********LT-GROUNDFLOOR********
21      X=0      Y=0      Z=8
37      X=-26.4  Y=0      G=21,37,4
22      X=0      Y=6.4    Z=8
38      X=-26.4  Y=6.4    G=22,38,4
23       X=0     Y=12.4   Z=8
39      X=-26.4  Y=12.4   G=23,39,4
24       X=0     Y=15.6   Z=8
40      X=-26.4  Y=15.6   G=24,40,4
C **********LT-I*****************
41      X=0      Y=0      Z=12
57      X=-26.4  Y=0      G=41,57,4
42      X=0      Y=6.4    Z=12
58      X=-26.4  Y=6.4    G=42,58,4
43       X=0     Y=12.4   Z=12
59      X=-26.4  Y=12.4   G=43,59,4
44       X=0     Y=15.6   Z=12
60      X=-26.4  Y=15.6   G=44,60,4
C **********LT-II****************
61      X=0      Y=0      Z=15
77      X=-26.4  Y=0      G=61,77,4
62      X=0      Y=6.4    Z=15
78      X=-26.4  Y=6.4    G=62,78,4
63       X=0     Y=12.4   Z=15
79      X=-26.4  Y=12.4   G=63,79,4
64       X=0     Y=15.6   Z=15
80      X=-26.4  Y=15.6   G=64,80,4
C ***********LT-III**************
81      X=0      Y=0      Z=18
93      X=-26.4  Y=0      G=81,93,3
82      X=0      Y=6.4    Z=18
94      X=-26.4  Y=6.4    G=82,94,3
83       X=0     Y=12.4   Z=18
95      X=-26.4  Y=12.4   G=83,95,3
141     X=0      Y=9.4    Z=18
145     X=-26.4  Y=9.4    G=141,145,1
C ***********LT-IV***************
96      X=0       Y=0     Z=21
108     X=-26.4   Y=0     G=96,108,3
97      X=0       Y=6.4   Z=21
109     X=-26.4   Y=6.4   G=97,109,3
98      X=0       Y=9.4   Z=21
110     X=-26.4   Y=9.4   G=98,110,3
146     X=-4.5    Y=9.4   Z=21
147     X=-8.7    Y=9.4
148     X=-17.7
149     X=-21.9
```

```
8         SH=R     T=0.3,0.3   E=2.35E6      W=0.3*0.3*2.4 :KOLOM
9         SH=R     T=0.4,0.3   E=2.35E6      W=0.4*0.3*2.4 :BALOK
10        SH=R     T=0.6,0.6   E=2.35E6      W=0.6*0.6*2.4 :KOLOM
C ************BEBAN MATI************************************
1   WG= 0,0,-0.651466
2   WG= 0,0,-0.862381
3   WG= 0,0,-1.896381
4   WG= 0,0,-1.134
5   WG= 0,0,-2.168
6   WG= 0,0,-2.041400
7   WG= 0,0,-2.3         PLD=2.4,-21.4,0
8   WG= 0,0,-1.2         PLD=2.4,-10.7,0
9   WG= 0,0,-2.659781    PLD=3.3,-9.9,0
10  WG= 0,0,-1.51734
11  WG= 0,0,-2.284
12  WG= 0,0,-3.266        PLD=3.3,-15.7,0
13  WG= 0,0,-1.623114     PLD=2.4,-15,0
14  WG= 0,0,-2.8962         PLD=2.4,-30,0
15  WG= 0,0,-1.27602      PLD=3.3,-2.304,0
16  WG= 0,0,-1.8874        PLD=3.3,-9.9,0
17  WG= 0,0,-1.789744
18  WG= 0,0,-1.267
19  WG= 0,0,-2.6514        PLD=3,-6.6,0,4.5,-9.2,0
20  WG= 0,0,-1.6835
21  WG= 0,0,-2.6           PLD=2.4,-18.4,0
22  WG= 0,0,-1.793693       PLD=2.4,-16.8,0
23  WG= 0,0,-2.578         PLD=3,-12.756,0,4.5,-7,0
24  WG= 0,0,-2.81          PLD=3.2,-3.5,0
25  WG= 0,0,-1.85
26  WG= 0,0,-1.129133
27  WG= 0,0,-1.946         PLD=3,-12,0,4.5,-7,0
C ***************BEBAN HIDUP*********************************
28   WG= 0,0,-0.266666
29   WG= 0,0,-0.368656
30   WG= 0,0,-0.868656
31   WG= 0,0,-0.5
32   WG= 0,0,-1
33   WG= 0,0,-0.938781
34   WG= 0,0,-1
35   WG= 0,0,-0.533333
36   WG= 0,0,-0.918656
37  WG= 0,0,-0.370906
38  WG= 0,0,-0.740
39  WG= 0,0,-1.16
40  WG= 0,0,-0.518914
41  WG= 0,0,-1.36
42  WG= 0,0,-0.255127
43  WG= 0,0,-0.55
44  WG= 0,0,-0.502777
45  WG= 0,0,-0.25
46  WG= 0,0,-0.92
47  WG= 0,0,-0.500
48  WG= 0,0,-0.895
49  WG= 0,0,-0.504687
50  WG= 0,0,-0.85
51  WG= 0,0,-1
52  WG= 0,0,-0.528
53  WG= 0,0,-0.183333
54  WG= 0,0,-0.5583
55  WG= 0,0,-0.020
```

```
C ***********LT-TOPFLOOR***********
111      X=0      Y=0      Z=24
115      X=-26.4  Y=0      G=111,115,1
116      X=0      Y=6.4    Z=24
124      X=-26.4  Y=6.4    G=116,124,2
117      X=-4.5   Y=6.4    Z=24
119      X=-8.7
121      X=-17.7
123      X=-21.9
125      X=-4.5   Y=9.4    Z=24
127      X=-8.7            G=125,127,1
128      X=-17.7  Y=9.4    Z=24
130      X=-21.9  Y=9.4    G=128,130,1
C ***********TITIK ATAS*************
131       X=0      Y=0      Z=27
139       X=-26.4  Y=0      G=131,139,2
132       X=0      Y=6.4    Z=27
140       X=-26.4  Y=6.4    G=132,140,2
150      X=-4.5   Y=6.4    Z=27
151      X=-8.7
152      X=-17.7
153      X=-21.9  Y=6.4
154      X=-4.5   Y=9.4    Z=27
155      X=-8.7   Y=9.4    Z=27
156      X=-17.7
157      X=-21.9
C ***********TITIK TANGGA LUAR KANAN************
158      X=2.4    Y=2.4    Z=0
159      Z=8
160      X=2.4    Y=2.4    Z=12
164      Z=24     G=160,164,1
165      X=0      Y=2.4    Z=8
166      Z=12
170      Z=24     G=166,170,1
C ************TITIK TANGGA LUAR KIRI*************
171      X=-28.8  Y=2.4    Z=0
172      Z=8
173      X=-28.8  Y=2.4    Z=12
177      Z=24     G=173,177,1
178      X=-26.4  Y=2.4    Z=8
179      Z=12
183      X=-26.4  Y=2.4    Z=24  G=179,183,1
:
RESTRAINTS
1        183      1 R=0,0,0,0,0,0
1        20       1 R=1,1,1,1,1,1
141      149      1 R=1,1,1,1,1,1
158      R=1,1,1,1,1,1
171      R=1,1,1,1,1,1
:
FRAME
NM=10   NL=58    NSEC=7      Z=-1
C ********DATA MATERIAL*************************************
1        SH=R     T=0.8,0.5   E=2.35E6      W=0.8*0.5*2.4  :BALOK
2        SH=R     T=0.7,0.4   E=2.35E6      W=0.7*0.4*2.4  :BALOK
3        SH=R     T=0.6,0.3   E=2.35E6      W=0.6*0.3*2.4  :BALOK
4        SH=R     T=0.4,0.3   E=2.35E6      W=0.4*0.3*2.4  :BALOK
5        SH=R     T=0.5,0.3   E=2.35E6      W=0.5*0.3*2.4  :BALOK
6        SH=R     T=0.6,0.6   E=2.35E6      W=0.6*0.6*2.4  :KOLOM
7        SH=R     T=0.4,0.4   E=2.35E6      W=0.4*0.4*2.4  :KOLOM
```

```
56 PLD=0.6,-7.637,0,1.8,-7.637,0
57 PLD=0.6,-7.637,0,1.8,-7.165,0
58 PLD=0.6,-7.165,0,1.8,-7.165,0
C *******KOLOM BASEMENT*****************************
1        1        21       M=6      LP=3,0  G=4,4,4,4
2        2        22       M=6      LP=3,0  G=4,4,4,4
3        3        23       M=6      LP=3,0  G=4,4,4,4
4        4        24       M=6      LP=3,0  G=4,4,4,4
C ********KOLOM GROUND*******************************
21       21       41       M=6      LP=3,0  G=4,4,4,4
22       22       42       M=6      LP=3,0  G=4,4,4,4
23       23       43       M=6      LP=3,0  G=4,4,4,4
24       24       44       M=6      LP=3,0  G=4,4,4,4
C *********KOLOM LT-I*********************************
 41       41       61       M=6      LP=3,0  G=4,4,4,4
 42       42       62       M=6      LP=3,0  G=4,4,4,4
 43       43       63       M=6      LP=3,0  G=4,4,4,4
 44       44       64       M=6      LP=3,0  G=4,4,4,4
C *********KOLOM LT-II********************************
 61       61       81       M=6      LP=3,0  G=4,3,4,3
 62       62       82       M=6      LP=3,0  G=4,3,4,3
 63       63       83       M=6      LP=3,0  G=4,3,4,3
C *********KOLOM LT-III*******************************
 76       81       96       M=7      LP=3,0  G=4,3,3,3
 77       82       97       M=7      LP=3,0  G=4,3,3,3
 78       141     98        M=7      LP=3,0  G=4,3,1,3
C *********KOLOM LT-IV********************************
 91       96       111      M=7      LP=3,0  G=4,2,3,1
 92       97       116      M=7      LP=3,0  G=4,2,3,2
 101      146      125      M=7      LP=3,0  G=1,2,1,2
 104      148     128       M=7      LP=3,0  G=1,2,1,2
 102     101       126      M=7      LP=3,0  G=1,3,6,3
C *********KOLOM LT-TOPFLOOR**********************
107      111      131      M=8      LP=3,0  G=4,2,1,2
108      116      132      M=8      LP=3,0  G=4,2,2,2
117      125      154      M=8      LP=3,0  G=1,1,2,1
119      128      156      M=8      LP=3,0  G=1,1,2,1
C ********KOLOM TANGGA LUAR************************
320      158      159      M=10     LP=3,0  G=1,1,1,1
322      160      161      M=10     LP=3,0  G=3,1,1,1
326      171      172      M=10     LP=3,0  G=1,1,1,1
328      173      174      M=10     LP=3,0  G=3,1,1,1
C **********BALOK GROUND*****************************
121      21       25       M=5      LP=2,0  NSL=2,29   G=3,4,4,4
122      22       26       M=3      LP=2,0  NSL=6,33   G=3,4,4,4
123      23       27       M=3      LP=2,0  NSL=3,30   G=3,4,4,4
124      24       28       M=5      LP=2,0  NSL=2,29   G=3,4,4,4
137      21       22       M=3      LP=3,0  NSL=8,35   G=1,12,16,16
140      25       26       M=2      LP=3,0  NSL=7,34   G=2,3,4,4
138      22       23       M=5      LP=3,0  NSL=4,31   G=1,12,16,16
141      26       27       M=5      LP=3,0  NSL=5,32   G=2,3,4,4
139      23       24       M=4      LP=3,0  NSL=1,28   G=1,12,16,16
142      27       28       M=4      LP=3,0  NSL=5,32   G=2,3,4,4
C ************BALOK LT-I*********************************
152      41       45       M=5      LP=2,0 NSL=15,42 G=3,4,4,4
153      42       46       M=2      LP=2,0 NSL=12,39  G=3,4,4,4
154      43       47       M=2      LP=2,0 NSL=9,36   G=3,4,4,4
155      44       48       M=5      LP=2,0 NSL=2,29   G=3,4,4,4
168      41       42       M=3      LP=3,0 NSL=13,40  G=1,12,16,16
171      45       46       M=2      LP=3,0 NSL=14,41  G=2,3,4,4
```

```
169      42       43       M=5      LP=3,0 NSL=10,37  G=1,12,16,16
172      46       47       M=3      LP=3,0 NSL=11,38  G=2,3,4,4
170      43       44       M=4      LP=3,0 NSL=1,28   G=1,12,16,16
173      47       48       M=4      LP=3,0 NSL=4,31   G=2,3,4,4
C ***********BALOK LT-II*********************************
183      61       65       M=5      LP=2,0 NSL=15,42 G=3,4,4,4
184      62       66       M=2      LP=2,0 NSL=12,39 G=3,4,4,4
185      63       67       M=2      LP=2,0 NSL=9,36  G=3,4,4,4
186      64       68       M=5      LP=2,0 NSL=2,29  G=3,4,4,4
199      61       62       M=3      LP=3,0 NSL=13,40 G=1,12,16,16
202      65       66       M=2      LP=3,0 NSL=14,41 G=2,3,4,4
200      62       63       M=5      LP=3,0 NSL=10,37 G=1,12,16,16
203      66       67       M=3      LP=3,0 NSL=11,38 G=2,3,4,4
201      63       64       M=4      LP=3,0 NSL=1,28  G=1,12,16,16
204      67       68       M=4      LP=3,0 NSL=4,31  G=2,3,4,4
C **********BALOK LT-III*************************************
214      81       84       M=5      LP=2,0 NSL=15,42 G=3,3,3,3
215      82       85       M=2      LP=2,0 NSL=12,39 G=3,3,3,3
216      83       86       M=3      LP=2,0 NSL=16,43 G=3,3,3,3
226      81       82       M=3      LP=3,0 NSL=13,40 G=1,8,12,12
228      84       85       M=2      LP=3,0 NSL=14,41 G=2,2,3,3
227      82       83       M=2      LP=3,0 NSL=10,37 G=1,8,12,12
229      85       86       M=1      LP=3,0 NSL=11,38 G=2,2,3,3
C **********BALOK LT-IV**************************************
236      96       99       M=5      LP=2,0 NSL=2,29  G=3,3,3,3
237      97       100      M=2      LP=2,0 NSL=19,46 G=3,3,3,3
238      98       101      M=2      LP=2,0 NSL=17,44 G=3,3,3,3
248      96       97       M=3      LP=3,0 NSL=22,49 G=1,8,12,12
250      99       100      M=2      LP=3,0 NSL=21,48 G=2,2,3,3
249      97       98       M=4      LP=3,0 NSL=18,45 G=1,8,12,12
251      100      101      M=4      LP=3,0 NSL=20,47 G=2,2,3,3
C **********BALOK LT-TOPFLOOR*******************************
258      111      112      M=3      LP=2,0 NSL=27,54 G=3,2,1,1
259      116      118      M=2      LP=2,0 NSL=23,50 G=3,2,2,2
266      125      126      M=4      LP=2,0 NSL=26,53 G=1,1,1,1
268      128      129      M=4      LP=2,0 NSL=26,53 G=1,1,1,1
270      111      116      M=3      LP=3,0 NSL=24,51 G=1,4,4,8
271      112      118      M=3      LP=3,0 NSL=25,52 G=2,1,1,2
275      117      125      M=4      LP=3,0 NSL=20,47 G=2,1,1,1
278      121      128      M=4      LP=3,0 NSL=20,47 G=2,2,1,1
C ***********BALOK LT-ATAP*********************************
300      131      133      M=4      LP=2,0 NSL=55  G=3,2,2,2
301      132      134      M=4      LP=2,0 NSL=55  G=3,2,2,2
308      154      155      M=4      LP=2,0 NSL=55
309      156      157      M=4      LP=2,0 NSL=55
310      131      132      M=4      LP=3,0 NSL=55  G=4,1,2,2
315      150      154      M=4      LP=3,0 NSL=55  G=1,1,1,1
317      152      156      M=4      LP=3,0 NSL=55  G=1,1,1,1
C ************BALOK TANGGA LUAR*****************************
332      165      159      M=9    LP=2,0  NSL=56
333      166      160      M=9    LP=2,0  NSL=57
334      167      161      M=9    LP=2,0  NSL=58  G=3,1,1,1
338      172      178      M=9    LP=2,0  NSL=56
339      173      179      M=9    LP=2,0  NSL=57
340      174      180      M=9    LP=2,0  NSL=58  G=3,1,1,1
:
LOADS
C GEMPA ARAH Y
21 37 4     L=3      F=0,6.8340,0
41 57 4     L=3      F=0,7.4433,0
```

```
61 77 4     L=3      F=0,8.7962,0
81 93 3     L=3      F=0,7.8036,0
96  99 3    L=3      F=0,6.9581,0
111 115 1   L=3      F=0,5.8393,0
131 139 2   L=3      F=0,2.3628,0
24 40 4     L=4      F=0,-6.8340,0
44 60 4     L=4      F=0,-7.4433,0
64 80 4     L=4      F=0,-8.7962,0
83 95 3     L=4      F=0,-7.8036,0
98 110 3    L=4      F=0,-6.9581,0
125 127 1   L=4      F=0,-5.8393,0
128 130 1   L=4      F=0,-2.3628,0
116 124 4   L=4      F=0,-5.8393,0
132 140 4   L=4      F=0,-2.3628,0
154 155 1   L=4      F=0,-2.3628,0
156 157 1   L=4      F=0,-2.3628,0
C GEMPA ARAH X
21 24 1     L=5      F=-8.5425,0,0
41 44 1     L=5      F=-9.3041,0,0
61 64 1     L=5      F=-10.9952,0,0
81 83 1     L=5      F=-9.7545,0,0
96 98 1     L=5      F=-8.6976,0,0
111 116 5   L=5      F=-7.2991,0,0
125         L=5      F=-7.2991,0,0
131 132 1   L=5      F=-2.9535,0,0
154         L=5      F=-2.9535,0,0
37 40 1     L=6      F=8.5425,0,0
57 60 1     L=6      F=9.3041,0,0
77 80 1     L=6      F=10.9952,0,0
93 95 1     L=6      F=9.7545,0,0
108 110 1   L=6      F=8.6976,0,0
115 124 9   L=6      F=7.2991,0,0
130         L=6      F=7.2991,0,0
139 140 1   L=6      F=2.9535,0,0
157         L=6      F=2.9535,0,0
:
COMBO
1  C=1,0,0,0,0,0
2  C=0,1,0,0,0,0
3  C=0,0,1,0,0,0
4  C=0,0,0,0,0,1
5  C=0,0,0,1,0,0
6  C=0,0,0,0,1,0
```

LAMPIRAN 7



STRUCTURAL ANALYSIS PROGRAMS

VERSION P5.40

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ORTAL RUMAH SUSUN TON-M

R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
1								
	1	0.000			-175.651			-0.009
		0.000	-2.875	4.946		-0.873	1.421	
		4.000	-2.875	-0.804		-0.873	-0.326	
		8.000	-2.875	-6.555		-0.873	-2.072	
		8.000			-169.507			-0.009
	2	0.000			-19.076			-0.002
		0.000	-0.355	0.641		-0.247	0.334	
		4.000	-0.355	-0.069		-0.247	-0.161	
		8.000	-0.355	-0.780		-0.247	-0.655	
		8.000			-19.076			-0.002
	3	0.000			10.982			0.068
		0.000	4.852	-17.828		-0.076	0.347	
		4.000	4.852	-8.124		-0.076	0.196	
		8.000	4.852	1.580		-0.076	0.044	
		8.000			10.982			0.068
	4	0.000			-7.959			1.037
		0.000	0.561	-2.150		-5.611	25.284	
		4.000	0.561	-1.028		-5.611	14.061	
		8.000	0.561	0.094		-5.611	2.838	
		8.000			-7.959			1.037
	5	0.000			-12.691			0.005
		0.000	-4.933	18.253		-0.001	0.001	
		4.000	-4.933	8.387		-0.001	0.000	
		8.000	-4.933	-1.479		-0.001	-0.001	
		8.000			-12.691			0.005
	6	0.000			8.063			-1.093
		0.000	-0.556	2.129		5.991	-26.703	
		4.000	-0.556	1.018		5.991	-14.722	
		8.000	-0.556	-0.094		5.991	-2.741	
		8.000			8.063			-1.093
2								
	1	0.000			-246.276			0.020
		0.000	0.421	0.566		-1.586	2.730	
		4.000	0.421	1.408		-1.586	-0.441	
		8.000	0.421	2.249		-1.586	-3.612	
		8.000			-240.132			0.020
	2	0.000			-36.278			0.002
		0.000	-0.041	0.225		-0.572	0.814	
		4.000	-0.041	0.143		-0.572	-0.331	
		8.000	-0.041	0.061		-0.572	-1.475	
		8.000			-36.278			0.002

PORTAL RUMAH SUSUN TON-M

FRAME ELEMENT FORCES

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	3	0.000			2.385			0.071
		0.000	6.114	-19.246		-0.032	0.123	
		4.000	6.114	-7.017		-0.032	0.059	
		8.000	6.114	5.212		-0.032	-0.005	
		8.000			2.385			0.071
	4	0.000			-12.130			0.665
		0.000	0.738	-2.375		-5.913	21.792	
		4.000	0.738	-0.899		-5.913	9.966	
		8.000	0.738	0.578		-5.913	-1.859	
		8.000			-12.130			0.665
	5	0.000			-2.683			0.006
		0.000	-6.372	20.139		-0.004	0.006	
		4.000	-6.372	7.395		-0.004	-0.002	
		8.000	-6.372	-5.349		-0.004	-0.009	
		8.000			-2.683			0.006
	6	0.000			12.209			-0.691
		0.000	-0.731	2.351		6.200	-22.777	
		4.000	-0.731	0.890		6.200	-10.378	
		8.000	-0.731	-0.572		6.200	2.021	
		8.000			12.209			-0.691
3	----------							
	1	0.000			-113.710			0.077
		0.000	0.405	0.469		-1.432	2.302	
		4.000	0.405	1.278		-1.432	-0.562	
		8.000	0.405	2.088		-1.432	-3.426	
		8.000			-107.566			0.077
	2	0.000			-17.001			0.009
		0.000	0.165	-0.047		-0.518	0.718	
		4.000	0.165	0.284		-0.518	-0.319	
		8.000	0.165	0.614		-0.518	-1.355	
		8.000			-17.001			0.009
	3	0.000			-4.446			0.070
		0.000	5.130	-17.836		0.027	-0.099	
		4.000	5.130	-7.576		0.027	-0.046	
		8.000	5.130	2.685		0.027	0.008	
		8.000			-4.446			0.070
	4	0.000			-9.161			0.407
		0.000	0.626	-2.223		-5.003	18.303	
		4.000	0.626	-0.971		-5.003	8.297	
		8.000	0.626	0.281		-5.003	-1.710	
		8.000			-9.161			0.407
	5	0.000			4.956			0.006

ORTAL RUMAH SUSUN TON-M

R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.000	-5.455	19.038		0.000	0.000	
		4.000	-5.455	8.127		0.000	0.000	
		8.000	-5.455	-2.784		0.000	0.000	
		8.000			4.956			0.006
	6	0.000			9.325			-0.374
		0.000	-0.620	2.200		5.293	-19.294	
		4.000	-0.620	0.961		5.293	-8.709	
		8.000	-0.620	-0.279		5.293	1.877	
		8.000			9.325			-0.374
4	----------							
	1	0.000			-33.639			0.081
		0.000	-0.028	0.992		-0.815	1.185	
		4.000	-0.028	0.937		-0.815	-0.446	
		8.000	-0.028	0.881		-0.815	-2.076	
		8.000			-27.495			0.081
	2	0.000			-4.925			0.010
		0.000	0.015	0.138		-0.233	0.337	
		4.000	0.015	0.167		-0.233	-0.129	
		8.000	0.015	0.196		-0.233	-0.595	
		8.000			-4.925			0.010
	3	0.000			-4.490			0.055
		0.000	3.587	-15.736		0.036	-0.151	
		4.000	3.587	-8.563		0.036	-0.080	
		8.000	3.587	-1.390		0.036	-0.008	
		8.000			-4.490			0.055
	4	0.000			-4.395			0.284
		0.000	0.426	-1.954		-3.532	15.155	
		4.000	0.426	-1.102		-3.532	8.090	
		8.000	0.426	-0.251		-3.532	1.025	
		8.000			-4.395			0.284
	5	0.000			4.955			0.006
		0.000	-3.925	17.232		0.000	-0.001	
		4.000	-3.925	9.383		0.000	0.000	
		8.000	-3.925	1.533		0.000	0.000	
		8.000			4.955			0.006
	6	0.000			4.572			-0.205
		0.000	-0.421	1.933		3.911	-16.564	
		4.000	-0.421	1.090		3.911	-8.742	
		8.000	-0.421	0.248		3.911	-0.921	
		8.000			4.572			-0.205
5	----------							
	1	0.000			-295.880			0.020
		0.000	-5.109	8.344		-0.194	0.404	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		4.000	-5.109	-1.874		-0.194	0.016	
		8.000	-5.109	-12.091		-0.194	-0.371	
		8.000			-289.736			0.020
	2	0.000			-35.796			0.003
		0.000	-0.600	1.036		-0.017	0.033	
		4.000	-0.600	-0.163		-0.017	0.000	
		8.000	-0.600	-1.362		-0.017	-0.034	
		8.000			-35.796			0.003
	3	0.000			9.827			0.087
		0.000	4.638	-16.961		-0.092	0.368	
		4.000	4.638	-7.686		-0.092	0.185	
		8.000	4.638	1.589		-0.092	0.001	
		8.000			9.827			0.087
	4	0.000			0.900			0.795
		0.000	0.113	-0.437		-6.811	26.969	
		4.000	0.113	-0.210		-6.811	13.346	
		8.000	0.113	0.017		-6.811	-0.277	
		8.000			0.900			0.795
	5	0.000			-13.236			0.006
		0.000	-4.958	18.352		0.000	0.001	
		4.000	-4.958	8.436		0.000	0.000	
		8.000	-4.958	-1.481		0.000	-0.001	
		8.000			-13.236			0.006
	6	0.000			-0.930			-0.813
		0.000	-0.115	0.442		7.027	-27.705	
		4.000	-0.115	0.212		7.027	-13.652	
		8.000	-0.115	-0.017		7.027	0.402	
		8.000			-0.930			-0.813
6	----------							
	1	0.000			-430.574			0.033
		0.000	1.045	0.180		-0.522	1.020	
		4.000	1.045	2.269		-0.522	-0.025	
		8.000	1.045	4.359		-0.522	-1.070	
		8.000			-424.430			0.033
	2	0.000			-69.798			0.005
		0.000	-0.098	0.347		-0.066	0.131	
		4.000	-0.098	0.150		-0.066	-0.001	
		8.000	-0.098	-0.046		-0.066	-0.134	
		8.000			-69.798			0.005
	3	0.000			3.005			0.090
		0.000	5.827	-18.286		-0.043	0.137	
		4.000	5.827	-6.632		-0.043	0.052	
		8.000	5.827	5.023		-0.043	-0.033	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		8.000			3.005			0.090
	4	0.000			0.816			0.473
		0.000	0.146	-0.478		-7.520	23.942	
		4.000	0.146	-0.187		-7.520	8.901	
		8.000	0.146	0.104		-7.520	-6.139	
		8.000			0.816			0.473
	5	0.000			-5.477			0.007
		0.000	-6.402	20.243		-0.001	0.002	
		4.000	-6.402	7.440		-0.001	0.000	
		8.000	-6.402	-5.364		-0.001	-0.002	
		8.000			-5.477			0.007
	6	0.000			-0.858			-0.478
		0.000	-0.148	0.484		7.699	-24.477	
		4.000	-0.148	0.189		7.699	-9.079	
		8.000	-0.148	-0.106		7.699	6.320	
		8.000			-0.858			-0.478
7	----------							
	1	0.000			-197.778			0.053
		0.000	0.624	0.529		-0.292	0.610	
		4.000	0.624	1.778		-0.292	0.026	
		8.000	0.624	3.027		-0.292	-0.559	
		8.000			-191.634			0.053
	2	0.000			-34.548			0.007
		0.000	0.303	-0.182		-0.036	0.079	
		4.000	0.303	0.424		-0.036	0.007	
		8.000	0.303	1.031		-0.036	-0.066	
		8.000			-34.548			0.007
	3	0.000			-3.863			0.097
		0.000	4.892	-16.942		0.034	-0.109	
		4.000	4.892	-7.158		0.034	-0.040	
		8.000	4.892	2.626		0.034	0.028	
		8.000			-3.863			0.097
	4	0.000			0.203			0.316
		0.000	0.121	-0.446		-6.356	20.120	
		4.000	0.121	-0.204		-6.356	7.409	
		8.000	0.121	0.037		-6.356	-5.302	
		8.000			0.203			0.316
	5	0.000			5.002			0.009
		0.000	-5.476	19.129		0.000	0.000	
		4.000	-5.476	8.177		0.000	0.000	
		8.000	-5.476	-2.775		0.000	0.000	
		8.000			5.002			0.009

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	6	0.000			-0.325			-0.305
		0.000	-0.123	0.452		6.536	-20.660	
		4.000	-0.123	0.207		6.536	-7.587	
		8.000	-0.123	-0.039		6.536	5.486	
		8.000			-0.325			-0.305
8	----------							
	1	0.000			-51.699			0.054
		0.000	0.168	1.079		-0.053	0.150	
		4.000	0.168	1.415		-0.053	0.045	
		8.000	0.168	1.750		-0.053	-0.061	
		8.000			-45.555			0.054
	2	0.000			-10.682			0.008
		0.000	0.131	0.030		-0.015	0.042	
		4.000	0.131	0.292		-0.015	0.012	
		8.000	0.131	0.553		-0.015	-0.018	
		8.000			-10.682			0.008
	3	0.000			-4.188			0.088
		0.000	3.430	-14.952		0.042	-0.159	
		4.000	3.430	-8.092		0.042	-0.075	
		8.000	3.430	-1.233		0.042	0.010	
		8.000			-4.188			0.088
	4	0.000			-0.033			0.237
		0.000	0.084	-0.397		-4.251	16.193	
		4.000	0.084	-0.229		-4.251	7.692	
		8.000	0.084	-0.061		-4.251	-0.810	
		8.000			-0.033			0.237
	5	0.000			5.006			0.008
		0.000	-3.940	17.316		0.000	-0.001	
		4.000	-3.940	9.436		0.000	0.000	
		8.000	-3.940	1.556		0.000	0.000	
		8.000			5.006			0.008
	6	0.000			-0.092			-0.210
		0.000	-0.086	0.403		4.466	-16.923	
		4.000	-0.086	0.232		4.466	-7.991	
		8.000	-0.086	0.060		4.466	0.940	
		8.000			-0.092			-0.210
9	----------							
	1	0.000			-307.405			0.000
		0.000	-5.165	8.587		0.001	-0.004	
		4.000	-5.165	-1.743		0.001	-0.002	
		8.000	-5.165	-12.072		0.001	0.000	
		8.000			-301.261			0.000

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	2	0.000			-35.897			0.000
		0.000	-0.612	1.086		0.000	0.000	
		4.000	-0.612	-0.138		0.000	0.000	
		8.000	-0.612	-1.362		0.000	0.000	
		8.000			-35.897			0.000
	3	0.000			9.212			0.072
		0.000	4.415	-16.076		-0.091	0.366	
		4.000	4.415	-7.246		-0.091	0.184	
		8.000	4.415	1.585		-0.091	0.002	
		8.000			9.212			0.072
	4	0.000			-0.072			0.774
		0.000	-0.004	0.016		-6.913	27.308	
		4.000	-0.004	0.008		-6.913	13.482	
		8.000	-0.004	0.001		-6.913	-0.343	
		8.000			-0.072			0.774
	5	0.000			-13.021			0.000
		0.000	-4.972	18.411		0.000	0.000	
		4.000	-4.972	8.468		0.000	0.000	
		8.000	-4.972	-1.476		0.000	0.000	
		8.000			-13.021			0.000
	6	0.000			-0.072			-0.774
		0.000	-0.004	0.016		6.913	-27.308	
		4.000	-0.004	0.008		6.913	-13.482	
		8.000	-0.004	0.001		6.913	0.343	
		8.000			-0.072			-0.774
10	----------							
	1	0.000			-439.365			0.000
		0.000	0.989	0.422		0.000	0.000	
		4.000	0.989	2.399		0.000	0.000	
		8.000	0.989	4.376		0.000	0.000	
		8.000			-433.221			0.000
	2	0.000			-70.253			0.000
		0.000	-0.115	0.402		0.000	0.000	
		4.000	-0.115	0.172		0.000	0.000	
		8.000	-0.115	-0.057		0.000	0.000	
		8.000			-70.253			0.000
	3	0.000			1.742			0.073
		0.000	5.535	-17.312		-0.042	0.137	
		4.000	5.535	-6.243		-0.042	0.052	
		8.000	5.535	4.827		-0.042	-0.033	
		8.000			1.742			0.073
	4	0.000			-0.039			0.439

ORTAL RUMAH SUSUN TON-M

R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.000	-0.005	0.017		-7.579	24.163	
		4.000	-0.005	0.007		-7.579	9.005	
		8.000	-0.005	-0.003		-7.579	-6.154	
		8.000			-0.039			0.439
	5	0.000			-3.161			0.000
		0.000	-6.423	20.313		0.000	0.000	
		4.000	-6.423	7.466		0.000	0.000	
		8.000	-6.423	-5.381		0.000	0.000	
		8.000			-3.161			0.000
	6	0.000			-0.039			-0.439
		0.000	-0.005	0.017		7.579	-24.163	
		4.000	-0.005	0.007		7.579	-9.005	
		8.000	-0.005	-0.003		7.579	6.154	
		8.000			-0.039			-0.439
11	----------							
	1	0.000			-198.003			0.000
		0.000	0.578	0.758		0.000	0.001	
		4.000	0.578	1.914		0.000	0.000	
		8.000	0.578	3.069		0.000	0.000	
		8.000			-191.859			0.000
	2	0.000			-34.604			0.000
		0.000	0.292	-0.134		0.000	0.000	
		4.000	0.292	0.449		0.000	0.000	
		8.000	0.292	1.033		0.000	0.000	
		8.000			-34.604			0.000
	3	0.000			-3.375			0.076
		0.000	4.652	-16.038		0.034	-0.108	
		4.000	4.652	-6.734		0.034	-0.041	
		8.000	4.652	2.569		0.034	0.027	
		8.000			-3.375			0.076
	4	0.000			-0.042			0.243
		0.000	-0.004	0.016		-6.415	20.339	
		4.000	-0.004	0.008		-6.415	7.509	
		8.000	-0.004	-0.001		-6.415	-5.322	
		8.000			-0.042			0.243
	5	0.000			5.076			0.000
		0.000	-5.497	19.199		0.000	0.000	
		4.000	-5.497	8.204		0.000	0.000	
		8.000	-5.497	-2.790		0.000	0.000	
		8.000			5.076			0.000
	6	0.000			-0.042			-0.243
		0.000	-0.004	0.016		6.415	-20.339	
		4.000	-0.004	0.008		6.415	-7.509	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		8.000	-0.004	-0.001		6.415	5.322	
		8.000			-0.042			-0.243
12		----------						
	1	0.000			-51.494			0.000
		0.000	0.134	1.291		0.000	0.000	
		4.000	0.134	1.560		0.000	0.000	
		8.000	0.134	1.828		0.000	0.000	
		8.000			-45.350			0.000
	2	0.000			-10.640			0.000
		0.000	0.123	0.073		0.000	0.000	
		4.000	0.123	0.319		0.000	0.000	
		8.000	0.123	0.565		0.000	0.000	
		8.000			-10.640			0.000
	3	0.000			-3.857			0.067
		0.000	3.269	-14.155		0.041	-0.157	
		4.000	3.269	-7.616		0.041	-0.074	
		8.000	3.269	-1.077		0.041	0.009	
		8.000			-3.857			0.067
	4	0.000			-0.051			0.160
		0.000	-0.003	0.015		-4.336	16.499	
		4.000	-0.003	0.009		-4.336	7.826	
		8.000	-0.003	0.003		-4.336	-0.847	
		8.000			-0.051			0.160
	5	0.000			5.022			0.000
		0.000	-3.952	17.374		0.000	0.000	
		4.000	-3.952	9.470		0.000	0.000	
		8.000	-3.952	1.565		0.000	0.000	
		8.000			5.022			0.000
	6	0.000			-0.051			-0.160
		0.000	-0.003	0.015		4.336	-16.499	
		4.000	-0.003	0.009		4.336	-7.826	
		8.000	-0.003	0.003		4.336	0.847	
		8.000			-0.051			-0.160
13		----------						
	1	0.000			-295.913			-0.021
		0.000	-5.109	8.344		0.196	-0.412	
		4.000	-5.109	-1.873		0.196	-0.020	
		8.000	-5.109	-12.091		0.196	0.373	
		8.000			-289.769			-0.021
	2	0.000			-35.796			-0.003
		0.000	-0.600	1.036		0.017	-0.033	
		4.000	-0.600	-0.163		0.017	0.000	
		8.000	-0.600	-1.362		0.017	0.034	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		8.000			-35.796			-0.003
	3	0.000			8.491			0.033
		0.000	4.307	-15.635		-0.089	0.362	
		4.000	4.307	-7.021		-0.089	0.183	
		8.000	4.307	1.594		-0.089	0.005	
		8.000			8.491			0.033
	4	0.000			-0.930			0.813
		0.000	-0.115	0.442		-7.027	27.705	
		4.000	-0.115	0.212		-7.027	13.652	
		8.000	-0.115	-0.017		-7.027	-0.402	
		8.000			-0.930			0.813
	5	0.000			-13.236			-0.006
		0.000	-4.958	18.352		0.000	-0.001	
		4.000	-4.958	8.436		0.000	0.000	
		8.000	-4.958	-1.481		0.000	0.001	
		8.000			-13.236			-0.006
	6	0.000			0.900			-0.795
		0.000	0.113	-0.437		6.811	-26.969	
		4.000	0.113	-0.210		6.811	-13.346	
		8.000	0.113	0.017		6.811	0.277	
		8.000			0.900			-0.795
14	----------							
	1	0.000			-430.577			-0.033
		0.000	1.045	0.180		0.522	-1.019	
		4.000	1.045	2.269		0.522	0.025	
		8.000	1.045	4.359		0.522	1.070	
		8.000			-424.433			-0.033
	2	0.000			-69.798			-0.005
		0.000	-0.098	0.347		0.066	-0.131	
		4.000	-0.098	0.150		0.066	0.001	
		8.000	-0.098	-0.046		0.066	0.134	
		8.000			-69.798			-0.005
	3	0.000			2.438			0.028
		0.000	5.389	-16.824		-0.042	0.136	
		4.000	5.389	-6.045		-0.042	0.052	
		8.000	5.389	4.734		-0.042	-0.032	
		8.000			2.438			0.028
	4	0.000			-0.858			0.478
		0.000	-0.148	0.484		-7.699	24.477	
		4.000	-0.148	0.189		-7.699	9.079	
		8.000	-0.148	-0.106		-7.699	-6.320	
		8.000			-0.858			0.478

ORTAL RUMAH SUSUN TON-M

R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	5	0.000			-5.477			-0.007
		0.000	-6.402	20.243		0.001	-0.002	
		4.000	-6.402	7.440		0.001	0.000	
		8.000	-6.402	-5.364		0.001	0.002	
		8.000			-5.477			-0.007
	6	0.000			0.816			-0.473
		0.000	0.146	-0.478		7.520	-23.942	
		4.000	0.146	-0.187		7.520	-8.901	
		8.000	0.146	0.104		7.520	6.139	
		8.000			0.816			-0.473
15	----------							
	1	0.000			-197.779			-0.052
		0.000	0.624	0.529		0.292	-0.609	
		4.000	0.624	1.778		0.292	-0.025	
		8.000	0.624	3.027		0.292	0.558	
		8.000			-191.635			-0.052
	2	0.000			-34.548			-0.007
		0.000	0.303	-0.182		0.036	-0.079	
		4.000	0.303	0.424		0.036	-0.007	
		8.000	0.303	1.031		0.036	0.066	
		8.000			-34.548			-0.007
	3	0.000			-3.021			0.022
		0.000	4.531	-15.582		0.033	-0.107	
		4.000	4.531	-6.520		0.033	-0.041	
		8.000	4.531	2.542		0.033	0.025	
		8.000			-3.021			0.022
	4	0.000			-0.325			0.305
		0.000	-0.123	0.452		-6.536	20.660	
		4.000	-0.123	0.207		-6.536	7.587	
		8.000	-0.123	-0.039		-6.536	-5.486	
		8.000			-0.325			0.305
	5	0.000			5.002			-0.009
		0.000	-5.476	19.129		0.000	0.000	
		4.000	-5.476	8.177		0.000	0.000	
		8.000	-5.476	-2.775		0.000	0.000	
		8.000			5.002			-0.009
	6	0.000			0.203			-0.316
		0.000	0.121	-0.446		6.356	-20.120	
		4.000	0.121	-0.204		6.356	-7.409	
		8.000	0.121	0.037		6.356	5.302	
		8.000			0.203			-0.316

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
16								
	1	0.000			-51.699			-0.054
		0.000	0.168	1.080		0.053	-0.150	
		4.000	0.168	1.415		0.053	-0.045	
		8.000	0.168	1.750		0.053	0.061	
		8.000			-45.555			-0.054
	2	0.000			-10.682			-0.008
		0.000	0.131	0.030		0.015	-0.042	
		4.000	0.131	0.292		0.015	-0.012	
		8.000	0.131	0.553		0.015	0.018	
		8.000			-10.682			-0.008
	3	0.000			-3.681			0.015
		0.000	3.190	-13.755		0.040	-0.153	
		4.000	3.190	-7.374		0.040	-0.073	
		8.000	3.190	-0.994		0.040	0.008	
		8.000			-3.681			0.015
	4	0.000			-0.092			0.210
		0.000	-0.086	0.403		-4.466	16.923	
		4.000	-0.086	0.232		-4.466	7.991	
		8.000	-0.086	0.060		-4.466	-0.940	
		8.000			-0.092			0.210
	5	0.000			5.006			-0.008
		0.000	-3.940	17.316		0.000	0.001	
		4.000	-3.940	9.436		0.000	0.000	
		8.000	-3.940	1.556		0.000	0.000	
		8.000			5.006			-0.008
	6	0.000			-0.033			-0.237
		0.000	0.084	-0.397		4.251	-16.193	
		4.000	0.084	-0.229		4.251	-7.692	
		8.000	0.084	-0.061		4.251	0.810	
		8.000			-0.033			-0.237
17								
	1	0.000			-174.884			0.008
		0.000	-2.878	4.953		0.876	-1.429	
		4.000	-2.878	-0.803		0.876	0.322	
		8.000	-2.878	-6.559		0.876	2.073	
		8.000			-168.740			0.008
	2	0.000			-19.076			0.002
		0.000	-0.355	0.641		0.247	-0.334	
		4.000	-0.355	-0.069		0.247	0.161	
		8.000	-0.355	-0.780		0.247	0.655	
		8.000			-19.076			0.002

)RTAL RUMAH SUSUN TON-M

R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	3	0.000			9.300			0.025
		0.000	4.332	-15.762		-0.073	0.338	
		4.000	4.332	-7.098		-0.073	0.193	
		8.000	4.332	1.565		-0.073	0.048	
		8.000			9.300			0.025
	4	0.000			8.063			1.093
		0.000	-0.556	2.129		-5.991	26.703	
		4.000	-0.556	1.018		-5.991	14.722	
		8.000	-0.556	-0.094		-5.991	2.741	
		8.000			8.063			1.093
	5	0.000			-12.691			-0.005
		0.000	-4.933	18.253		0.001	-0.001	
		4.000	-4.933	8.387		0.001	0.000	
		8.000	-4.933	-1.479		0.001	0.001	
		8.000			-12.691			-0.005
	6	0.000			-7.959			-1.037
		0.000	0.561	-2.150		5.611	-25.284	
		4.000	0.561	-1.028		5.611	-14.061	
		8.000	0.561	0.094		5.611	-2.838	
		8.000			-7.959			-1.037
18	----------							
	1	0.000			-246.232			-0.020
		0.000	0.418	0.574		1.585	-2.730	
		4.000	0.418	1.409		1.585	0.441	
		8.000	0.418	2.244		1.585	3.612	
		8.000			-240.088			-0.020
	2	0.000			-36.278			-0.002
		0.000	-0.041	0.225		0.572	-0.814	
		4.000	-0.041	0.143		0.572	0.331	
		8.000	-0.041	0.061		0.572	1.475	
		8.000			-36.278			-0.002
	3	0.000			1.512			0.016
		0.000	5.428	-16.968		-0.034	0.125	
		4.000	5.428	-6.112		-0.034	0.058	
		8.000	5.428	4.744		-0.034	-0.010	
		8.000			1.512			0.016
	4	0.000			12.209			0.691
		0.000	-0.731	2.351		-6.200	22.777	
		4.000	-0.731	0.890		-6.200	10.378	
		8.000	-0.731	-0.572		-6.200	-2.021	
		8.000			12.209			0.691
	5	0.000			-2.683			-0.006

)RTAL RUMAH SUSUN TON-M

R A M E E L E M E N T F O R C E S

ELT	LOAD	DIST	1-2 PLANE		AXIAL	1-3 PLANE		AXIAL
ID	COMB	ENDI	SHEAR	MOMENT	FORCE	SHEAR	MOMENT	TORQ
		0.000	-6.372	20.139		0.004	-0.006	
		4.000	-6.372	7.395		0.004	0.002	
		8.000	-6.372	-5.349		0.004	0.009	
		8.000			-2.683			-0.006
	6	0.000			-12.130			-0.665
		0.000	0.738	-2.375		5.913	-21.792	
		4.000	0.738	-0.899		5.913	-9.966	
		8.000	0.738	0.578		5.913	1.859	
		8.000			-12.130			-0.665
19	----------							
	1	0.000			-113.711			-0.077
		0.000	0.403	0.474		1.432	-2.301	
		4.000	0.403	1.280		1.432	0.563	
		8.000	0.403	2.086		1.432	3.426	
		8.000			-107.567			-0.077
	2	0.000			-17.001			-0.009
		0.000	0.165	-0.047		0.518	-0.718	
		4.000	0.165	0.284		0.518	0.319	
		8.000	0.165	0.614		0.518	1.355	
		8.000			-17.001			-0.009
	3	0.000			-3.359			0.006
		0.000	4.563	-15.717		0.025	-0.097	
		4.000	4.563	-6.592		0.025	-0.046	
		8.000	4.563	2.533		0.025	0.005	
		8.000			-3.359			0.006
	4	0.000			9.325			0.374
		0.000	-0.620	2.200		-5.293	19.294	
		4.000	-0.620	0.961		-5.293	8.709	
		8.000	-0.620	-0.279		-5.293	-1.877	
		8.000			9.325			0.374
	5	0.000			4.956			-0.006
		0.000	-5.455	19.038		0.000	0.000	
		4.000	-5.455	8.127		0.000	0.000	
		8.000	-5.455	-2.784		0.000	0.000	
		8.000			4.956			-0.006
	6	0.000			-9.161			-0.407
		0.000	0.626	-2.223		5.003	-18.303	
		4.000	0.626	-0.971		5.003	-8.297	
		8.000	0.626	0.281		5.003	1.710	
		8.000			-9.161			-0.407
20	----------							
	1	0.000			-33.638			-0.080
		0.000	-0.029	0.997		0.815	-1.185	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT	LOAD	DIST	1-2 PLANE		AXIAL	1-3 PLANE		AXIAL
ID	COMB	ENDI	SHEAR	MOMENT	FORCE	SHEAR	MOMENT	TORQ
		4.000	-0.029	0.939		0.815	0.446	
		8.000	-0.029	0.881		0.815	2.077	
		8.000			-27.494			-0.080
	2	0.000			-4.925			-0.010
		0.000	0.015	0.138		0.233	-0.337	
		4.000	0.015	0.167		0.233	0.129	
		8.000	0.015	0.196		0.233	0.595	
		8.000			-4.925			-0.010
	3	0.000			-3.805			-0.008
		0.000	3.207	-13.870		0.033	-0.142	
		4.000	3.207	-7.456		0.033	-0.076	
		8.000	3.207	-1.041		0.033	-0.010	
		8.000			-3.805			-0.008
	4	0.000			4.572			0.205
		0.000	-0.421	1.933		-3.911	16.564	
		4.000	-0.421	1.090		-3.911	8.742	
		8.000	-0.421	0.248		-3.911	0.921	
		8.000			4.572			0.205
	5	0.000			4.955			-0.006
		0.000	-3.925	17.232		0.000	0.001	
		4.000	-3.925	9.383		0.000	0.000	
		8.000	-3.925	1.533		0.000	0.000	
		8.000			4.955			-0.006
	6	0.000			-4.395			-0.284
		0.000	0.426	-1.954		3.532	-15.155	
		4.000	0.426	-1.102		3.532	-8.090	
		8.000	0.426	-0.251		3.532	-1.025	
		8.000			-4.395			-0.284
21	----------							
	1	0.000			-151.477			0.018
		0.000	-5.528	10.436		-1.926	3.060	
		2.000	-5.528	-0.620		-1.926	-0.793	
		4.000	-5.528	-11.675		-1.926	-4.645	
		4.000			-145.333			0.018
	2	0.000			-16.076			0.003
		0.000	-0.586	1.217		-0.324	0.710	
		2.000	-0.586	0.045		-0.324	0.063	
		4.000	-0.586	-1.128		-0.324	-0.585	
		4.000			-16.076			0.003
	3	0.000			8.178			0.079
		0.000	3.888	-7.743		-0.062	0.166	
		2.000	3.888	0.032		-0.062	0.042	
		4.000	3.888	7.808		-0.062	-0.082	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	6	0.000			8.838			-0.966
		0.000	-0.833	1.766		4.671	-9.393	
		2.000	-0.833	0.100		4.671	-0.050	
		4.000	-0.833	-1.566		4.671	9.293	
		4.000			8.838			-0.966
23	----------							
	1	0.000			-92.141			0.066
		0.000	1.541	-2.434		-4.095	6.249	
		2.000	1.541	0.647		-4.095	-1.941	
		4.000	1.541	3.728		-4.095	-10.131	
		4.000			-85.997			0.066
	2	0.000			-12.226			0.010
		0.000	0.291	-0.567		-0.880	1.711	
		2.000	0.291	0.016		-0.880	-0.048	
		4.000	0.291	0.599		-0.880	-1.808	
		4.000			-12.226			0.010
	3	0.000			-3.054			0.087
		0.000	4.673	-9.414		0.024	-0.056	
		2.000	4.673	-0.067		0.024	-0.008	
		4.000	4.673	9.279		0.024	0.039	
		4.000			-3.054			0.087
	4	0.000			-6.210			0.439
		0.000	0.639	-1.387		-3.785	7.508	
		2.000	0.639	-0.110		-3.785	-0.062	
		4.000	0.639	1.168		-3.785	-7.631	
		4.000			-6.210			0.439
	5	0.000			3.494			0.008
		0.000	-4.987	10.124		0.000	0.000	
		2.000	-4.987	0.149		0.000	0.000	
		4.000	-4.987	-9.825		0.000	0.000	
		4.000			3.494			0.008
	6	0.000			6.272			-0.406
		0.000	-0.632	1.371		3.935	-7.726	
		2.000	-0.632	0.108		3.935	0.145	
		4.000	-0.632	-1.156		3.935	8.016	
		4.000			6.272			-0.406
24	----------							
	1	0.000			-21.682			0.064
		0.000	0.122	-0.029		-1.324	2.548	
		2.000	0.122	0.215		-1.324	-0.101	
		4.000	0.122	0.459		-1.324	-2.750	
		4.000			-15.538			0.064

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.000	0.100	-0.213		-6.667	15.115	
		2.000	0.100	-0.013		-6.667	1.780	
		4.000	0.100	0.187		-6.667	-11.555	
		4.000			0.789			1.031
	5	0.000			-10.258			0.008
		0.000	-4.071	8.262		-0.001	0.001	
		2.000	-4.071	0.119		-0.001	0.000	
		4.000	-4.071	-8.023		-0.001	-0.001	
		4.000			-10.258			0.008
	6	0.000			-0.762			-1.050
		0.000	-0.101	0.215		6.813	-15.349	
		2.000	-0.101	0.012		6.813	-1.723	
		4.000	-0.101	-0.190		6.813	11.903	
		4.000			-0.762			-1.050
26	----------							
	1	0.000			-382.622			0.048
		0.000	3.950	-6.883		-0.383	0.551	
		2.000	3.950	1.017		-0.383	-0.215	
		4.000	3.950	8.917		-0.383	-0.981	
		4.000			-376.478			0.048
	2	0.000			-57.554			0.008
		0.000	0.249	-0.154		-0.052	0.059	
		2.000	0.249	0.344		-0.052	-0.044	
		4.000	0.249	0.841		-0.052	-0.147	
		4.000			-57.554			0.008
	3	0.000			2.769			0.122
		0.000	6.075	-12.023		-0.046	0.095	
		2.000	6.075	0.128		-0.046	0.003	
		4.000	6.075	12.278		-0.046	-0.088	
		4.000			2.769			0.122
	4	0.000			0.677			0.707
		0.000	0.163	-0.338		-7.445	14.952	
		2.000	0.163	-0.011		-7.445	0.063	
		4.000	0.163	0.316		-7.445	-14.827	
		4.000			0.677			0.707
	5	0.000			-5.165			0.009
		0.000	-6.817	13.714		-0.001	0.002	
		2.000	-6.817	0.079		-0.001	0.000	
		4.000	-6.817	-13.555		-0.001	-0.003	
		4.000			-5.165			0.009
	6	0.000			-0.646			-0.712
		0.000	-0.166	0.342		7.586	-15.201	
		2.000	-0.166	0.011		7.586	-0.028	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	5	0.000			-10.037			0.000
		0.000	-4.078	8.283		0.000	0.000	
		2.000	-4.078	0.127		0.000	0.000	
		4.000	-4.078	-8.029		0.000	0.000	
		4.000			-10.037			0.000
	6	0.000			-0.044			-1.003
		0.000	-0.004	0.010		6.679	-15.096	
		2.000	-0.004	0.003		6.679	-1.739	
		4.000	-0.004	-0.005		6.679	11.619	
		4.000			-0.044			-1.003
30	----------							
	1	0.000			-391.043			0.000
		0.000	3.887	-6.694		0.000	0.001	
		2.000	3.887	1.080		0.000	0.000	
		4.000	3.887	8.855		0.000	0.000	
		4.000			-384.899			0.000
	2	0.000			-57.976			0.000
		0.000	0.229	-0.106		0.000	0.000	
		2.000	0.229	0.353		0.000	0.000	
		4.000	0.229	0.811		0.000	0.000	
		4.000			-57.976			0.000
	3	0.000			1.505			0.099
		0.000	5.714	-11.213		-0.045	0.093	
		2.000	5.714	0.215		-0.045	0.003	
		4.000	5.714	11.642		-0.045	-0.086	
		4.000			1.505			0.099
	4	0.000			-0.007			0.661
		0.000	-0.007	0.016		-7.411	14.848	
		2.000	-0.007	0.002		-7.411	0.025	
		4.000	-0.007	-0.011		-7.411	-14.798	
		4.000			-0.007			0.661
	5	0.000			-2.806			0.000
		0.000	-6.845	13.772		0.000	0.000	
		2.000	-6.845	0.082		0.000	0.000	
		4.000	-6.845	-13.607		0.000	0.000	
		4.000			-2.806			0.000
	6	0.000			-0.007			-0.661
		0.000	-0.007	0.016		7.411	-14.848	
		2.000	-0.007	0.002		7.411	-0.025	
		4.000	-0.007	-0.011		7.411	14.798	
		4.000			-0.007			-0.661

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
31								
	1	0.000			-162.621			0.000
		0.000	2.329	-3.647		0.000	0.000	
		2.000	2.329	1.011		0.000	0.000	
		4.000	2.329	5.668		0.000	0.000	
		4.000			-156.477			0.000
	2	0.000			-24.274			0.000
		0.000	0.557	-1.054		0.000	0.000	
		2.000	0.557	0.060		0.000	0.000	
		4.000	0.557	1.174		0.000	0.000	
		4.000			-24.274			0.000
	3	0.000			-2.116			0.099
		0.000	4.147	-8.159		0.038	-0.083	
		2.000	4.147	0.135		0.038	-0.006	
		4.000	4.147	8.430		0.038	0.070	
		4.000			-2.116			0.099
	4	0.000			-0.012			0.271
		0.000	-0.005	0.013		-6.178	12.230	
		2.000	-0.005	0.003		-6.178	-0.126	
		4.000	-0.005	-0.008		-6.178	-12.483	
		4.000			-0.012			0.271
	5	0.000			3.602			0.000
		0.000	-5.035	10.243		0.000	0.000	
		2.000	-5.035	0.174		0.000	0.000	
		4.000	-5.035	-9.896		0.000	0.000	
		4.000			3.602			0.000
	6	0.000			-0.012			-0.271
		0.000	-0.005	0.013		6.178	-12.230	
		2.000	-0.005	0.003		6.178	0.126	
		4.000	-0.005	-0.008		6.178	12.483	
		4.000			-0.012			-0.271
32								
	1	0.000			-32.737			0.000
		0.000	0.320	-0.517		0.000	0.000	
		2.000	0.320	0.122		0.000	0.000	
		4.000	0.320	0.761		0.000	0.000	
		4.000			-26.593			0.000
	2	0.000			-6.606			0.000
		0.000	0.156	-0.299		0.000	0.000	
		2.000	0.156	0.013		0.000	0.000	
		4.000	0.156	0.326		0.000	0.000	
		4.000			-6.606			0.000

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	3	0.000			-2.355			0.071
		0.000	1.906	-3.525		0.037	-0.077	
		2.000	1.906	0.286		0.037	-0.003	
		4.000	1.906	4.098		0.037	0.072	
		4.000			-2.355			0.071
	4	0.000			-0.028			0.120
		0.000	-0.001	0.007		-3.875	7.946	
		2.000	-0.001	0.004		-3.875	0.196	
		4.000	-0.001	0.001		-3.875	-7.555	
		4.000			-0.028			0.120
	5	0.000			3.171			0.000
		0.000	-2.278	4.604		0.000	0.000	
		2.000	-2.278	0.049		0.000	0.000	
		4.000	-2.278	-4.506		0.000	0.000	
		4.000			3.171			0.000
	6	0.000			-0.028			-0.120
		0.000	-0.001	0.007		3.875	-7.946	
		2.000	-0.001	0.004		3.875	-0.196	
		4.000	-0.001	0.001		3.875	7.555	
		4.000			-0.028			-0.120
33	----------							
	1	0.000			-256.756			-0.033
		0.000	-9.952	18.672		0.163	-0.186	
		2.000	-9.952	-1.231		0.163	0.139	
		4.000	-9.952	-21.135		0.163	0.464	
		4.000			-250.612			-0.033
	2	0.000			-30.067			-0.005
		0.000	-1.243	2.319		0.013	-0.013	
		2.000	-1.243	-0.168		0.013	0.014	
		4.000	-1.243	-2.655		0.013	0.041	
		4.000			-30.067			-0.005
	3	0.000			6.036			0.039
		0.000	3.377	-6.453		-0.091	0.221	
		2.000	3.377	0.302		-0.091	0.039	
		4.000	3.377	7.057		-0.091	-0.143	
		4.000			6.036			0.039
	4	0.000			-0.762			1.050
		0.000	-0.101	0.215		-6.813	15.349	
		2.000	-0.101	0.012		-6.813	1.723	
		4.000	-0.101	-0.190		-6.813	-11.903	
		4.000			-0.762			1.050
	5	0.000			-10.258			-0.008

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.000	-4.071	8.262		0.001	-0.001	
		2.000	-4.071	0.119		0.001	0.000	
		4.000	-4.071	-8.023		0.001	0.001	
		4.000			-10.258			-0.008
	6	0.000			0.789			-1.031
		0.000	0.100	-0.213		6.667	-15.115	
		2.000	0.100	-0.013		6.667	-1.780	
		4.000	0.100	0.187		6.667	11.555	
		4.000			0.789			-1.031
34	----------							
	1	0.000			-382.625			-0.048
		0.000	3.950	-6.883		0.383	-0.550	
		2.000	3.950	1.017		0.383	0.216	
		4.000	3.950	8.917		0.383	0.981	
		4.000			-376.481			-0.048
	2	0.000			-57.554			-0.008
		0.000	0.249	-0.154		0.052	-0.059	
		2.000	0.249	0.344		0.052	0.044	
		4.000	0.249	0.841		0.052	0.147	
		4.000			-57.554			-0.008
	3	0.000			2.226			0.038
		0.000	5.533	-10.800		-0.044	0.093	
		2.000	5.533	0.266		-0.044	0.004	
		4.000	5.533	11.331		-0.044	-0.085	
		4.000			2.226			0.038
	4	0.000			-0.646			0.712
		0.000	-0.166	0.342		-7.586	15.201	
		2.000	-0.166	0.011		-7.586	0.028	
		4.000	-0.166	-0.320		-7.586	-15.144	
		4.000			-0.646			0.712
	5	0.000			-5.165			-0.009
		0.000	-6.817	13.714		0.001	-0.002	
		2.000	-6.817	0.079		0.001	0.000	
		4.000	-6.817	-13.555		0.001	0.003	
		4.000			-5.165			-0.009
	6	0.000			0.677			-0.707
		0.000	0.163	-0.338		7.445	-14.952	
		2.000	0.163	-0.011		7.445	-0.063	
		4.000	0.163	0.316		7.445	14.827	
		4.000			0.677			-0.707
35	----------							
	1	0.000			-162.531			-0.060
		0.000	2.371	-3.802		0.076	-0.069	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.000	2.371	0.940		0.076	0.083	
		4.000	2.371	5.682		0.076	0.235	
		4.000			-156.387			-0.060
	2	0.000			-24.206			-0.010
		0.000	0.569	-1.086		0.009	0.010	
		2.000	0.569	0.052		0.009	0.029	
		4.000	0.569	1.189		0.009	0.048	
		4.000			-24.206			-0.010
	3	0.000			-1.802			0.028
		0.000	4.011	-7.833		0.036	-0.079	
		2.000	4.011	0.188		0.036	-0.007	
		4.000	4.011	8.209		0.036	0.066	
		4.000			-1.802			0.028
	4	0.000			-0.178			0.350
		0.000	-0.116	0.248		-6.349	12.564	
		2.000	-0.116	0.015		-6.349	-0.133	
		4.000	-0.116	-0.218		-6.349	-12.830	
		4.000			-0.178			0.350
	5	0.000			3.542			-0.011
		0.000	-5.007	10.185		0.000	0.001	
		2.000	-5.007	0.172		0.000	0.000	
		4.000	-5.007	-9.841		0.000	-0.001	
		4.000			3.542			-0.011
	6	0.000			0.128			-0.363
		0.000	0.115	-0.245		6.206	-12.314	
		2.000	0.115	-0.016		6.206	0.097	
		4.000	0.115	0.214		6.206	12.508	
		4.000			0.128			-0.363
36	----------							
	1	0.000			-32.894			-0.051
		0.000	0.349	-0.639		0.069	0.028	
		2.000	0.349	0.058		0.069	0.166	
		4.000	0.349	0.755		0.069	0.305	
		4.000			-26.750			-0.051
	2	0.000			-6.638			-0.009
		0.000	0.162	-0.318		0.020	0.006	
		2.000	0.162	0.005		0.020	0.047	
		4.000	0.162	0.328		0.020	0.088	
		4.000			-6.638			-0.009
	3	0.000			-2.227			0.015
		0.000	1.860	-3.361		0.036	-0.076	
		2.000	1.860	0.358		0.036	-0.003	
		4.000	1.860	4.078		0.036	0.069	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		4.000			-2.227			0.015
	4	0.000			-0.066			0.172
		0.000	-0.052	0.118		-3.960	8.121	
		2.000	-0.052	0.014		-3.960	0.201	
		4.000	-0.052	-0.090		-3.960	-7.719	
		4.000			-0.066			0.172
	5	0.000			3.161			-0.009
		0.000	-2.268	4.583		0.000	0.000	
		2.000	-2.268	0.047		0.000	0.000	
		4.000	-2.268	-4.488		0.000	0.000	
		4.000			3.161			-0.009
	6	0.000			-0.005			-0.198
		0.000	0.051	-0.117		3.828	-7.904	
		2.000	0.051	-0.015		3.828	-0.248	
		4.000	0.051	0.088		3.828	7.409	
		4.000			-0.005			-0.198
37	----------							
	1	0.000			-150.706			-0.019
		0.000	-5.531	10.441		1.929	-3.064	
		2.000	-5.531	-0.622		1.929	0.794	
		4.000	-5.531	-11.684		1.929	4.652	
		4.000			-144.562			-0.019
	2	0.000			-16.076			-0.003
		0.000	-0.586	1.217		0.324	-0.710	
		2.000	-0.586	0.045		0.324	-0.063	
		4.000	-0.586	-1.128		0.324	0.585	
		4.000			-16.076			-0.003
	3	0.000			6.794			0.028
		0.000	3.405	-6.563		-0.058	0.160	
		2.000	3.405	0.248		-0.058	0.043	
		4.000	3.405	7.059		-0.058	-0.074	
		4.000			6.794			0.028
	4	0.000			6.012			1.332
		0.000	-0.472	1.066		-4.592	11.053	
		2.000	-0.472	0.122		-4.592	1.869	
		4.000	-0.472	-0.823		-4.592	-7.316	
		4.000			6.012			1.332
	5	0.000			-9.736			-0.007
		0.000	-4.040	8.182		0.001	-0.002	
		2.000	-4.040	0.103		0.001	0.000	
		4.000	-4.040	-7.977		0.001	0.002	
		4.000			-9.736			-0.007

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	6	0.000			-5.994			-1.277
		0.000	0.477	-1.079		4.418	-10.829	
		2.000	0.477	-0.124		4.418	-1.993	
		4.000	0.477	0.831		4.418	6.844	
		4.000			-5.994			-1.277
38	----------							
	1	0.000			-216.138			-0.038
		0.000	1.801	-3.082		5.397	-7.632	
		2.000	1.801	0.519		5.397	3.161	
		4.000	1.801	4.120		5.397	13.954	
		4.000			-209.994			-0.038
	2	0.000			-29.986			-0.006
		0.000	0.034	0.026		1.072	-1.977	
		2.000	0.034	0.095		1.072	0.168	
		4.000	0.034	0.163		1.072	2.313	
		4.000			-29.986			-0.006
	3	0.000			1.262			0.018
		0.000	5.596	-10.975		-0.030	0.063	
		2.000	5.596	0.218		-0.030	0.004	
		4.000	5.596	11.410		-0.030	-0.056	
		4.000			1.262			0.018
	4	0.000			8.838			0.966
		0.000	-0.833	1.766		-4.671	9.393	
		2.000	-0.833	0.100		-4.671	0.050	
		4.000	-0.833	-1.566		-4.671	-9.293	
		4.000			8.838			0.966
	5	0.000			-2.334			-0.010
		0.000	-6.779	13.618		0.010	-0.016	
		2.000	-6.779	0.060		0.010	0.003	
		4.000	-6.779	-13.498		0.010	0.023	
		4.000			-2.334			-0.010
	6	0.000			-8.863			-0.939
		0.000	0.842	-1.786		4.524	-9.179	
		2.000	0.842	-0.102		4.524	-0.131	
		4.000	0.842	1.582		4.524	8.917	
		4.000			-8.863			-0.939
39	----------							
	1	0.000			-92.142			-0.065
		0.000	1.540	-2.433		4.095	-6.249	
		2.000	1.540	0.646		4.095	1.941	
		4.000	1.540	3.725		4.095	10.130	
		4.000			-85.998			-0.065

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	2	0.000			-12.226			-0.010
		0.000	0.291	-0.567		0.880	-1.711	
		2.000	0.291	0.016		0.880	0.048	
		4.000	0.291	0.599		0.880	1.808	
		4.000			-12.226			-0.010
	3	0.000			-2.112			0.005
		0.000	4.065	-7.988		0.021	-0.051	
		2.000	4.065	0.142		0.021	-0.008	
		4.000	4.065	8.271		0.021	0.034	
		4.000			-2.112			0.005
	4	0.000			6.272			0.406
		0.000	-0.632	1.371		-3.935	7.726	
		2.000	-0.632	0.108		-3.935	-0.145	
		4.000	-0.632	-1.156		-3.935	-8.016	
		4.000			6.272			0.406
	5	0.000			3.494			-0.008
		0.000	-4.987	10.124		0.000	0.000	
		2.000	-4.987	0.149		0.000	0.000	
		4.000	-4.987	-9.825		0.000	0.000	
		4.000			3.494			-0.008
	6	0.000			-6.210			-0.439
		0.000	0.639	-1.387		3.785	-7.508	
		2.000	0.639	-0.110		3.785	0.062	
		4.000	0.639	1.168		3.785	7.631	
		4.000			-6.210			-0.439
40	----------							
	1	0.000			-21.682			-0.064
		0.000	0.121	-0.029		1.324	-2.548	
		2.000	0.121	0.214		1.324	0.101	
		4.000	0.121	0.457		1.324	2.750	
		4.000			-15.538			-0.064
	2	0.000			-3.289			-0.010
		0.000	0.046	-0.033		0.377	-0.729	
		2.000	0.046	0.060		0.377	0.025	
		4.000	0.046	0.153		0.377	0.780	
		4.000			-3.289			-0.010
	3	0.000			-2.322			-0.009
		0.000	1.867	-3.446		0.024	-0.052	
		2.000	1.867	0.289		0.024	-0.003	
		4.000	1.867	4.024		0.024	0.046	
		4.000			-2.322			-0.009
	4	0.000			2.925			0.158

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.000	-0.255	0.648		-2.764	5.665	
		2.000	-0.255	0.138		-2.764	0.138	
		4.000	-0.255	-0.372		-2.764	-5.389	
		4.000			2.925			0.158
	5	0.000			3.121			-0.007
		0.000	-2.262	4.540		0.000	0.000	
		2.000	-2.262	0.016		0.000	0.000	
		4.000	-2.262	-4.508		0.000	0.000	
		4.000			3.121			-0.007
	6	0.000			-2.827			-0.233
		0.000	0.257	-0.655		2.604	-5.464	
		2.000	0.257	-0.141		2.604	-0.256	
		4.000	0.257	0.373		2.604	4.953	
		4.000			-2.827			-0.233
41	----------							
	1	0.000			-120.252			0.041
		0.000	-7.494	11.132		-2.886	4.202	
		1.500	-7.494	-0.109		-2.886	-0.126	
		3.000	-7.494	-11.350		-2.886	-4.455	
		3.000			-116.724			0.041
	2	0.000			-13.402			0.007
		0.000	-0.703	1.039		-0.330	0.468	
		1.500	-0.703	-0.015		-0.330	-0.027	
		3.000	-0.703	-1.070		-0.330	-0.523	
		3.000			-13.402			0.007
	3	0.000			5.413			0.070
		0.000	2.709	-1.419		-0.054	0.070	
		1.500	2.709	2.644		-0.054	-0.012	
		3.000	2.709	6.708		-0.054	-0.094	
		3.000			5.413			0.070
	4	0.000			-3.751			1.156
		0.000	0.415	-0.457		-3.123	2.321	
		1.500	0.415	0.166		-3.123	-2.363	
		3.000	0.415	0.788		-3.123	-7.047	
		3.000			-3.751			1.156
	5	0.000			-6.773			0.010
		0.000	-2.862	1.716		-0.002	0.003	
		1.500	-2.862	-2.576		-0.002	0.000	
		3.000	-2.862	-6.868		-0.002	-0.003	
		3.000			-6.773			0.010
	6	0.000			3.698			-1.189
		0.000	-0.411	0.450		3.203	-2.109	
		1.500	-0.411	-0.166		3.203	2.695	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		3.000	-0.411	-0.782		3.203	7.499	
		3.000			3.698			-1.189
42								
	1	0.000			-170.848			0.060
		0.000	3.235	-3.845		-9.030	13.439	
		1.500	3.235	1.008		-9.030	-0.105	
		3.000	3.235	5.861		-9.030	-13.650	
		3.000			-167.320			0.060
	2	0.000			-23.470			0.010
		0.000	0.092	-0.105		-1.396	2.029	
		1.500	0.092	0.033		-1.396	-0.065	
		3.000	0.092	0.171		-1.396	-2.159	
		3.000			-23.470			0.010
	3	0.000			1.877			0.078
		0.000	4.825	-5.009		-0.017	0.016	
		1.500	4.825	2.228		-0.017	-0.010	
		3.000	4.825	9.466		-0.017	-0.035	
		3.000			1.877			0.078
	4	0.000			-5.612			0.813
		0.000	0.802	-1.056		-3.074	2.045	
		1.500	0.802	0.147		-3.074	-2.566	
		3.000	0.802	1.349		-3.074	-7.176	
		3.000			-5.612			0.813
	5	0.000			-1.962			0.015
		0.000	-5.178	5.531		-0.019	0.026	
		1.500	-5.178	-2.236		-0.019	-0.002	
		3.000	-5.178	-10.003		-0.019	-0.030	
		3.000			-1.962			0.015
	6	0.000			5.500			-0.823
		0.000	-0.792	1.041		3.166	-1.972	
		1.500	-0.792	-0.147		3.166	2.777	
		3.000	-0.792	-1.334		3.166	7.527	
		3.000			5.500			-0.823
43								
	1	0.000			-62.044			0.069
		0.000	1.530	-2.826		-6.548	9.623	
		1.500	1.530	-0.531		-6.548	-0.200	
		3.000	1.530	1.764		-6.548	-10.022	
		3.000			-58.516			0.069
	2	0.000			-7.632			0.015
		0.000	0.278	-0.387		-1.075	1.513	
		1.500	0.278	0.031		-1.075	-0.099	
		3.000	0.278	0.449		-1.075	-1.711	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		3.000			-7.632			0.015
	3	0.000			-1.682			0.066
		0.000	3.522	-2.827		0.026	-0.040	
		1.500	3.522	2.455		0.026	-0.001	
		3.000	3.522	7.738		0.026	0.038	
		3.000			-1.682			0.066
	4	0.000			-3.288			0.286
		0.000	0.576	-0.733		-2.480	1.418	
		1.500	0.576	0.131		-2.480	-2.302	
		3.000	0.576	0.995		-2.480	-6.022	
		3.000			-3.288			0.286
	5	0.000			2.029			0.006
		0.000	-3.853	3.208		0.000	-0.001	
		1.500	-3.853	-2.573		0.000	-0.001	
		3.000	-3.853	-8.353		0.000	-0.001	
		3.000			2.029			0.006
	6	0.000			3.269			-0.273
		0.000	-0.570	0.722		2.564	-1.338	
		1.500	-0.570	-0.132		2.564	2.509	
		3.000	-0.570	-0.987		2.564	6.356	
		3.000			3.269			-0.273
44	----------							
	1	0.000			-9.576			0.052
		0.000	0.722	-0.721		-2.007	1.907	
		1.500	0.722	0.362		-2.007	-1.103	
		3.000	0.722	1.446		-2.007	-4.113	
		3.000			-6.048			0.052
	2	0.000			-1.631			0.013
		0.000	0.127	-0.110		-0.570	0.541	
		1.500	0.127	0.080		-0.570	-0.314	
		3.000	0.127	0.271		-0.570	-1.168	
		3.000			-1.631			0.013
	3	0.000			-1.132			0.035
		0.000	0.173	1.431		0.012	0.000	
		1.500	0.173	1.692		0.012	0.017	
		3.000	0.173	1.952		0.012	0.035	
		3.000			-1.132			0.035
	4	0.000			-1.181			0.113
		0.000	0.170	-0.096		-0.945	-0.377	
		1.500	0.170	0.158		-0.945	-1.794	
		3.000	0.170	0.413		-0.945	-3.210	
		3.000			-1.181			0.113

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.000	-0.093	0.080		-4.647	4.824	
		1.500	-0.093	-0.059		-4.647	-2.147	
		3.000	-0.093	-0.198		-4.647	-9.118	
		3.000			-0.053			0.253
	5	0.000			2.085			-0.009
		0.000	-3.849	3.251		-0.001	0.001	
		1.500	-3.849	-2.523		-0.001	0.001	
		3.000	-3.849	-8.297		-0.001	0.000	
		3.000			2.085			-0.009
	6	0.000			0.060			-0.260
		0.000	0.091	-0.080		4.574	-4.803	
		1.500	0.091	0.057		4.574	2.059	
		3.000	0.091	0.194		4.574	8.921	
		3.000			0.060			-0.260
56	----------							
	1	0.000			-15.403			-0.034
		0.000	1.334	-1.366		-0.227	0.368	
		1.500	1.334	0.636		-0.227	0.027	
		3.000	1.334	2.637		-0.227	-0.314	
		3.000			-11.875			-0.034
	2	0.000			-3.341			-0.008
		0.000	0.252	-0.211		-0.063	0.102	
		1.500	0.252	0.167		-0.063	0.007	
		3.000	0.252	0.545		-0.063	-0.087	
		3.000			-3.341			-0.008
	3	0.000			-0.832			0.008
		0.000	-0.129	1.818		0.025	-0.017	
		1.500	-0.129	1.624		0.025	0.020	
		3.000	-0.129	1.430		0.025	0.058	
		3.000			-0.832			0.008
	4	0.000			-0.051			0.087
		0.000	-0.004	-0.032		-2.548	1.552	
		1.500	-0.004	-0.037		-2.548	-2.271	
		3.000	-0.004	-0.043		-2.548	-6.093	
		3.000			-0.051			0.087
	5	0.000			1.291			-0.006
		0.000	-0.253	-1.429		0.000	0.000	
		1.500	-0.253	-1.809		0.000	0.000	
		3.000	-0.253	-2.188		0.000	-0.001	
		3.000			1.291			-0.006
	6	0.000			0.025			-0.103
		0.000	0.004	0.030		2.501	-1.571	
		1.500	0.004	0.036		2.501	2.180	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		3.000	0.004	0.042		2.501	5.931	
		3.000			0.025			-0.103
57								
	1	0.000			-119.474			-0.041
		0.000	-7.499	11.137		2.889	-4.205	
		1.500	-7.499	-0.111		2.889	0.129	
		3.000	-7.499	-11.360		2.889	4.463	
		3.000			-115.946			-0.041
	2	0.000			-13.402			-0.007
		0.000	-0.703	1.039		0.330	-0.468	
		1.500	-0.703	-0.015		0.330	0.027	
		3.000	-0.703	-1.070		0.330	0.523	
		3.000			-13.402			-0.007
	3	0.000			4.388			0.022
		0.000	2.226	-0.726		-0.048	0.060	
		1.500	2.226	2.614		-0.048	-0.012	
		3.000	2.226	5.953		-0.048	-0.084	
		3.000			4.388			0.022
	4	0.000			3.698			1.189
		0.000	-0.411	0.450		-3.203	2.109	
		1.500	-0.411	-0.166		-3.203	-2.695	
		3.000	-0.411	-0.782		-3.203	-7.499	
		3.000			3.698			1.189
	5	0.000			-6.773			-0.010
		0.000	-2.862	1.716		0.002	-0.003	
		1.500	-2.862	-2.576		0.002	0.000	
		3.000	-2.862	-6.868		0.002	0.003	
		3.000			-6.773			-0.010
	6	0.000			-3.751			-1.156
		0.000	0.415	-0.457		3.123	-2.321	
		1.500	0.415	0.166		3.123	2.363	
		3.000	0.415	0.788		3.123	7.047	
		3.000			-3.751			-1.156
58								
	1	0.000			-170.810			-0.060
		0.000	3.230	-3.839		9.030	-13.438	
		1.500	3.230	1.006		9.030	0.106	
		3.000	3.230	5.851		9.030	13.651	
		3.000			-167.282			-0.060
	2	0.000			-23.470			-0.010
		0.000	0.092	-0.105		1.396	-2.029	
		1.500	0.092	0.033		1.396	0.065	
		3.000	0.092	0.171		1.396	2.159	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		3.000			-23.470			-0.010
	3	0.000			0.992			0.006
		0.000	3.937	-3.694		-0.029	0.028	
		1.500	3.937	2.211		-0.029	-0.015	
		3.000	3.937	8.116		-0.029	-0.059	
		3.000			0.992			0.006
	4	0.000			5.500			0.823
		0.000	-0.792	1.041		-3.166	1.972	
		1.500	-0.792	-0.147		-3.166	-2.777	
		3.000	-0.792	-1.334		-3.166	-7.527	
		3.000			5.500			0.823
	5	0.000			-1.962			-0.015
		0.000	-5.178	5.531		0.019	-0.026	
		1.500	-5.178	-2.236		0.019	0.002	
		3.000	-5.178	-10.003		0.019	0.030	
		3.000			-1.962			-0.015
	6	0.000			-5.612			-0.813
		0.000	0.802	-1.056		3.074	-2.045	
		1.500	0.802	0.147		3.074	2.566	
		3.000	0.802	1.349		3.074	7.176	
		3.000			-5.612			-0.813
59	----------							
	1	0.000			-62.045			-0.069
		0.000	1.529	-2.827		6.548	-9.622	
		1.500	1.529	-0.533		6.548	0.200	
		3.000	1.529	1.761		6.548	10.022	
		3.000			-58.517			-0.069
	2	0.000			-7.632			-0.015
		0.000	0.278	-0.387		1.075	-1.513	
		1.500	0.278	0.031		1.075	0.099	
		3.000	0.278	0.449		1.075	1.711	
		3.000			-7.632			-0.015
	3	0.000			-0.907			0.003
		0.000	2.944	-1.936		0.023	-0.029	
		1.500	2.944	2.480		0.023	0.006	
		3.000	2.944	6.896		0.023	0.041	
		3.000			-0.907			0.003
	4	0.000			3.269			0.273
		0.000	-0.570	0.722		-2.564	1.338	
		1.500	-0.570	-0.132		-2.564	-2.509	
		3.000	-0.570	-0.987		-2.564	-6.356	
		3.000			3.269			0.273

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	5	0.000			1.268			0.005
		0.000	-0.223	-1.480		0.000	0.000	
		1.500	-0.223	-1.814		0.000	0.000	
		3.000	-0.223	-2.148		0.000	0.001	
		3.000			1.268			0.005
	6	0.000			1.215			-0.069
		0.000	-0.167	0.093		0.933	0.562	
		1.500	-0.167	-0.158		0.933	1.961	
		3.000	-0.167	-0.408		0.933	3.361	
		3.000			1.215			-0.069
45	----------							
	1	0.000			-204.465			0.039
		0.000	-13.679	20.321		-0.323	0.379	
		1.500	-13.679	-0.197		-0.323	-0.106	
		3.000	-13.679	-20.715		-0.323	-0.592	
		3.000			-200.937			0.039
	2	0.000			-23.840			0.006
		0.000	-1.694	2.526		-0.048	0.072	
		1.500	-1.694	-0.016		-0.048	0.000	
		3.000	-1.694	-2.558		-0.048	-0.071	
		3.000			-23.840			0.006
	3	0.000			4.513			0.091
		0.000	2.505	-1.086		-0.093	0.128	
		1.500	2.505	2.672		-0.093	-0.012	
		3.000	2.505	6.429		-0.093	-0.153	
		3.000			4.513			0.091
	4	0.000			0.663			0.931
		0.000	0.076	-0.054		-5.503	5.955	
		1.500	0.076	0.060		-5.503	-2.301	
		3.000	0.076	0.175		-5.503	-10.556	
		3.000			0.663			0.931
	5	0.000			-7.259			0.008
		0.000	-2.901	1.796		-0.001	0.002	
		1.500	-2.901	-2.556		-0.001	0.000	
		3.000	-2.901	-6.908		-0.001	-0.001	
		3.000			-7.259			0.008
	6	0.000			-0.590			-0.942
		0.000	-0.077	0.053		5.565	-5.897	
		1.500	-0.077	-0.062		5.565	2.451	
		3.000	-0.077	-0.177		5.565	10.799	
		3.000			-0.590			-0.942

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
46								
	1	0.000			-306.559			0.054
		0.000	7.098	-8.507		-0.625	0.729	
		1.500	7.098	2.140		-0.625	-0.208	
		3.000	7.098	12.787		-0.625	-1.146	
		3.000			-303.031			0.054
	2	0.000			-43.689			0.008
		0.000	0.577	-0.830		-0.131	0.174	
		1.500	0.577	0.035		-0.131	-0.023	
		3.000	0.577	0.900		-0.131	-0.220	
		3.000			-43.689			0.008
	3	0.000			2.528			0.094
		0.000	4.415	-4.375		-0.043	0.054	
		1.500	4.415	2.248		-0.043	-0.011	
		3.000	4.415	8.871		-0.043	-0.075	
		3.000			2.528			0.094
	4	0.000			0.550			0.577
		0.000	0.131	-0.145		-5.720	6.235	
		1.500	0.131	0.051		-5.720	-2.344	
		3.000	0.131	0.247		-5.720	-10.923	
		3.000			0.550			0.577
	5	0.000			-4.869			0.007
		0.000	-5.224	5.626		-0.002	0.003	
		1.500	-5.224	-2.210		-0.002	0.000	
		3.000	-5.224	-10.046		-0.002	-0.002	
		3.000			-4.869			0.007
	6	0.000			-0.459			-0.576
		0.000	-0.132	0.145		5.799	-6.262	
		1.500	-0.132	-0.053		5.799	2.437	
		3.000	-0.132	-0.251		5.799	11.136	
		3.000			-0.459			-0.576
47								
	1	0.000			-113.437			0.054
		0.000	1.940	-4.142		-0.330	0.197	
		1.500	1.940	-1.231		-0.330	-0.298	
		3.000	1.940	1.679		-0.330	-0.793	
		3.000			-109.909			0.054
	2	0.000			-15.152			0.010
		0.000	0.600	-0.850		-0.057	0.059	
		1.500	0.600	0.049		-0.057	-0.027	
		3.000	0.600	0.949		-0.057	-0.113	
		3.000			-15.152			0.010

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	3	0.000			-1.231			0.095
		0.000	3.265	-2.379		0.045	-0.067	
		1.500	3.265	2.518		0.045	0.000	
		3.000	3.265	7.416		0.045	0.067	
		3.000			-1.231			0.095
	4	0.000			0.060			0.260
		0.000	0.091	-0.080		-4.574	4.803	
		1.500	0.091	0.057		-4.574	-2.059	
		3.000	0.091	0.194		-4.574	-8.921	
		3.000			0.060			0.260
	5	0.000			2.085			0.009
		0.000	-3.849	3.251		0.001	-0.001	
		1.500	-3.849	-2.523		0.001	-0.001	
		3.000	-3.849	-8.297		0.001	0.000	
		3.000			2.085			0.009
	6	0.000			-0.053			-0.253
		0.000	-0.093	0.080		4.647	-4.824	
		1.500	-0.093	-0.059		4.647	2.147	
		3.000	-0.093	-0.198		4.647	9.118	
		3.000			-0.053			-0.253
48	----------							
	1	0.000			-15.403			0.034
		0.000	1.334	-1.366		0.227	-0.368	
		1.500	1.334	0.636		0.227	-0.027	
		3.000	1.334	2.637		0.227	0.314	
		3.000			-11.875			0.034
	2	0.000			-3.341			0.008
		0.000	0.252	-0.211		0.063	-0.102	
		1.500	0.252	0.167		0.063	-0.007	
		3.000	0.252	0.545		0.063	0.087	
		3.000			-3.341			0.008
	3	0.000			-1.016			0.060
		0.000	0.044	1.603		0.028	-0.021	
		1.500	0.044	1.668		0.028	0.022	
		3.000	0.044	1.734		0.028	0.064	
		3.000			-1.016			0.060
	4	0.000			0.025			0.103
		0.000	0.004	0.030		-2.501	1.571	
		1.500	0.004	0.036		-2.501	-2.180	
		3.000	0.004	0.042		-2.501	-5.931	
		3.000			0.025			0.103
	5	0.000			1.291			0.006

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.000	-0.253	-1.429		0.000	0.000	
		1.500	-0.253	-1.809		0.000	0.000	
		3.000	-0.253	-2.188		0.000	0.001	
		3.000			1.291			0.006
	6	0.000			-0.051			-0.087
		0.000	-0.004	-0.032		2.548	-1.552	
		1.500	-0.004	-0.037		2.548	2.271	
		3.000	-0.004	-0.043		2.548	6.093	
		3.000			-0.051			-0.087
49	----------							
	1	0.000			-215.665			0.000
		0.000	-13.765	20.499		0.002	0.000	
		1.500	-13.765	-0.150		0.002	0.003	
		3.000	-13.765	-20.798		0.002	0.005	
		3.000			-212.137			0.000
	2	0.000			-23.873			0.000
		0.000	-1.714	2.558		0.000	0.000	
		1.500	-1.714	-0.013		0.000	0.000	
		3.000	-1.714	-2.584		0.000	0.000	
		3.000			-23.873			0.000
	3	0.000			4.258			0.075
		0.000	2.283	-0.759		-0.091	0.124	
		1.500	2.283	2.665		-0.091	-0.012	
		3.000	2.283	6.090		-0.091	-0.149	
		3.000			4.258			0.075
	4	0.000			-0.019			0.907
		0.000	-0.004	0.008		-5.504	5.899	
		1.500	-0.004	0.002		-5.504	-2.357	
		3.000	-0.004	-0.004		-5.504	-10.612	
		3.000			-0.019			0.907
	5	0.000			-7.035			0.000
		0.0		0.000	-2.904	1.793		0.000
		1.500	-2.904	-2.564		0.000	0.000	
		3.000	-2.904	-6.920		0.000	0.000	
		3.000			-7.035			0.000
	6	0.000			-0.019			-0.907
		0.000	-0.004	0.008		5.504	-5.899	
		1.500	-0.004	0.002		5.504	2.357	
		3.000	-0.004	-0.004		5.504	10.612	
		3.000			-0.019			-0.907
50	----------							
	1	0.000			-314.709			0.000
		0.000	7.066	-8.383		0.000	0.001	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT	LOAD	DIST	1-2 PLANE		AXIAL	1-3 PLANE		AXIAL
ID	COMB	ENDI	SHEAR	MOMENT	FORCE	SHEAR	MOMENT	TORQ
		1.500	7.066	2.217		0.000	0.000	
		3.000	7.066	12.817		0.000	0.000	
		3.000			-311.181			0.000
	2	0.000			-44.018			0.000
		0.000	0.554	-0.795		0.000	0.000	
		1.500	0.554	0.036		0.000	0.000	
		3.000	0.554	0.868		0.000	0.000	
		3.000			-44.018			0.000
	3	0.000			1.247			0.077
		0.000	4.028	-3.787		-0.041	0.051	
		1.500	4.028	2.255		-0.041	-0.011	
		3.000	4.028	8.297		-0.041	-0.074	
		3.000			1.247			0.077
	4	0.000			0.018			0.550
		0.000	-0.009	0.014		-5.714	6.186	
		1.500	-0.009	0.002		-5.714	-2.385	
		3.000	-0.009	-0.011		-5.714	-10.956	
		3.000			0.018			0.550
	5	0.000			-2.423			0.000
		0.000	-5.257	5.661		0.000	0.000	
		1.500	-5.257	-2.224		0.000	0.000	
		3.000	-5.257	-10.109		0.000	0.000	
		3.000			-2.423			0.000
	6	0.000			0.018			-0.550
		0.000	-0.009	0.014		5.714	-6.186	
		1.500	-0.009	0.002		5.714	2.385	
		3.000	-0.009	-0.011		5.714	10.956	
		3.000			0.018			-0.550
51	----------							
	1	0.000			-113.491			0.000
		0.000	1.875	-4.035		0.000	0.000	
		1.500	1.875	-1.221		0.000	0.000	
		3.000	1.875	1.592		0.000	0.000	
		3.000			-109.963			0.000
	2	0.000			-15.198			0.000
		0.000	0.585	-0.828		0.000	0.000	
		1.500	0.585	0.050		0.000	0.000	
		3.000	0.585	0.928		0.000	0.000	
		3.000			-15.198			0.000
	3	0.000			-0.900			0.074
		0.000	3.011	-1.983		0.043	-0.063	
		1.500	3.011	2.534		0.043	0.002	
		3.000	3.011	7.051		0.043	0.067	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		3.000			-0.900			0.074
	4	0.000			0.012			0.194
		0.000	-0.005	0.011		-4.580	4.763	
		1.500	-0.005	0.003		-4.580	-2.106	
		3.000	-0.005	-0.004		-4.580	-8.976	
		3.000			0.012			0.194
	5	0.000			2.124			0.000
		0.000	-3.896	3.296		0.000	0.000	
		1.500	-3.896	-2.548		0.000	0.000	
		3.000	-3.896	-8.392		0.000	0.000	
		3.000			2.124			0.000
	6	0.000			0.012			-0.194
		0.000	-0.005	0.011		4.580	-4.763	
		1.500	-0.005	0.003		4.580	2.106	
		3.000	-0.005	-0.004		4.580	8.976	
		3.000			0.012			-0.194
52	----------							
	1	0.000			-15.270			0.000
		0.000	1.285	-1.286		0.000	0.000	
		1.500	1.285	0.642		0.000	0.000	
		3.000	1.285	2.570		0.000	0.000	
		3.000			-11.742			0.000
	2	0.000			-3.310			0.000
		0.000	0.246	-0.201		0.000	0.000	
		1.500	0.246	0.168		0.000	0.000	
		3.000	0.246	0.536		0.000	0.000	
		3.000			-3.310			0.000
	3	0.000			-0.898			0.045
		0.000	-0.064	1.732		0.027	-0.019	
		1.500	-0.064	1.636		0.027	0.021	
		3.000	-0.064	1.540		0.027	0.061	
		3.000			-0.898			0.045
	4	0.000			-0.009			0.055
		0.000	-0.004	0.005		-2.447	1.477	
		1.500	-0.004	0.000		-2.447	-2.194	
		3.000	-0.004	-0.005		-2.447	-5.866	
		3.000			-0.009			0.055
	5	0.000			1.294			0.000
		0.000	-0.253	-1.436		0.000	0.000	
		1.500	-0.253	-1.815		0.000	0.000	
		3.000	-0.253	-2.194		0.000	0.000	
		3.000			1.294			0.000

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	6	0.000			-0.009			-0.055
		0.000	-0.004	0.005		2.447	-1.477	
		1.500	-0.004	0.000		2.447	2.194	
		3.000	-0.004	-0.005		2.447	5.866	
		3.000			-0.009			-0.055
53	----------							
	1	0.000			-204.502			-0.040
		0.000	-13.678	20.321		0.325	-0.382	
		1.500	-13.678	-0.197		0.325	0.106	
		3.000	-13.678	-20.714		0.325	0.594	
		3.000			-200.974			-0.040
	2	0.000			-23.840			-0.006
		0.000	-1.694	2.526		0.048	-0.072	
		1.500	-1.694	-0.016		0.048	0.000	
		3.000	-1.694	-2.558		0.048	0.071	
		3.000			-23.840			-0.006
	3	0.000			3.700			0.031
		0.000	2.184	-0.596		-0.087	0.119	
		1.500	2.184	2.680		-0.087	-0.012	
		3.000	2.184	5.955		-0.087	-0.143	
		3.000			3.700			0.031
	4	0.000			-0.590			0.942
		0.000	-0.077	0.053		-5.565	5.897	
		1.500	-0.077	-0.062		-5.565	-2.451	
		3.000	-0.077	-0.177		-5.565	-10.799	
		3.000			-0.590			0.942
	5	0.000			-7.259			-0.008
		0.000	-2.901	1.796		0.001	-0.002	
		1.500	-2.901	-2.556		0.001	0.000	
		3.000	-2.901	-6.908		0.001	0.001	
		3.000			-7.259			-0.008
	6	0.000			0.663			-0.931
		0.000	0.076	-0.054		5.503	-5.955	
		1.500	0.076	0.060		5.503	2.301	
		3.000	0.076	0.175		5.503	10.556	
		3.000			0.663			-0.931
54	----------							
	1	0.000			-306.562			-0.054
		0.000	7.099	-8.508		0.624	-0.727	
		1.500	7.099	2.140		0.624	0.209	
		3.000	7.099	12.788		0.624	1.145	
		3.000			-303.034			-0.054

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	2	0.000			-43.689			-0.008
		0.000	0.577	-0.830		0.131	-0.174	
		1.500	0.577	0.035		0.131	0.023	
		3.000	0.577	0.900		0.131	0.220	
		3.000			-43.689			-0.008
	3	0.000			2.012			0.026
		0.000	3.821	-3.467		-0.040	0.048	
		1.500	3.821	2.265		-0.040	-0.013	
		3.000	3.821	7.997		-0.040	-0.073	
		3.000			2.012			0.026
	4	0.000			-0.459			0.576
		0.000	-0.132	0.145		-5.799	6.262	
		1.500	-0.132	-0.053		-5.799	-2.437	
		3.000	-0.132	-0.251		-5.799	-11.136	
		3.000			-0.459			0.576
	5	0.000			-4.869			-0.007
		0.000	-5.224	5.626		0.002	-0.003	
		1.500	-5.224	-2.210		0.002	0.000	
		3.000	-5.224	-10.046		0.002	0.002	
		3.000			-4.869			-0.007
	6	0.000			0.550			-0.577
		0.000	0.131	-0.145		5.720	-6.235	
		1.500	0.131	0.051		5.720	2.344	
		3.000	0.131	0.247		5.720	10.923	
		3.000			0.550			-0.577
55	----------							
	1	0.000			-113.437			-0.054
		0.000	1.940	-4.142		0.330	-0.196	
		1.500	1.940	-1.231		0.330	0.298	
		3.000	1.940	1.679		0.330	0.793	
		3.000			-109.909			-0.054
	2	0.000			-15.152			-0.010
		0.000	0.600	-0.850		0.057	-0.059	
		1.500	0.600	0.049		0.057	0.027	
		3.000	0.600	0.949		0.057	0.113	
		3.000			-15.152			-0.010
	3	0.000			-0.636			0.019
		0.000	2.881	-1.754		0.040	-0.056	
		1.500	2.881	2.567		0.040	0.004	
		3.000	2.881	6.888		0.040	0.064	
		3.000			-0.636			0.019
	4	0.000			-0.053			0.253

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	5	0.000			2.029			-0.006
		0.000	-3.853	3.208		0.000	0.001	
		1.500	-3.853	-2.573		0.000	0.001	
		3.000	-3.853	-8.353		0.000	0.001	
		3.000			2.029			-0.006
	6	0.000			-3.288			-0.286
		0.000	0.576	-0.733		2.480	-1.418	
		1.500	0.576	0.131		2.480	2.302	
		3.000	0.576	0.995		2.480	6.022	
		3.000			-3.288			-0.286
60	----------							
	1	0.000			-9.577			-0.052
		0.000	0.723	-0.723		2.007	-1.907	
		1.500	0.723	0.361		2.007	1.103	
		3.000	0.723	1.446		2.007	4.113	
		3.000			-6.049			-0.052
	2	0.000			-1.631			-0.013
		0.000	0.127	-0.110		0.570	-0.541	
		1.500	0.127	0.080		0.570	0.314	
		3.000	0.127	0.271		0.570	1.168	
		3.000			-1.631			-0.013
	3	0.000			-0.885			-0.008
		0.000	-0.062	1.699		0.009	0.002	
		1.500	-0.062	1.607		0.009	0.016	
		3.000	-0.062	1.514		0.009	0.030	
		3.000			-0.885			-0.008
	4	0.000			1.215			0.069
		0.000	-0.167	0.093		-0.933	-0.562	
		1.500	-0.167	-0.158		-0.933	-1.961	
		3.000	-0.167	-0.408		-0.933	-3.361	
		3.000			1.215			0.069
	5	0.000			1.268			-0.005
		0.000	-0.223	-1.480		0.000	0.000	
		1.500	-0.223	-1.814		0.000	0.000	
		3.000	-0.223	-2.148		0.000	-0.001	
		3.000			1.268			-0.005
	6	0.000			-1.181			-0.113
		0.000	0.170	-0.096		0.945	0.377	
		1.500	0.170	0.158		0.945	1.794	
		3.000	0.170	0.413		0.945	3.210	
		3.000			-1.181			-0.113

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
61								
	1	0.000			-91.180			0.043
		0.000	-8.645	12.357		-3.357	4.679	
		1.500	-8.645	-0.611		-3.357	-0.357	
		3.000	-8.645	-13.579		-3.357	-5.393	
		3.000			-87.652			0.043
	2	0.000			-10.682			0.008
		0.000	-0.866	1.197		-0.383	0.566	
		1.500	-0.866	-0.102		-0.383	-0.008	
		3.000	-0.866	-1.401		-0.383	-0.583	
		3.000			-10.682			0.008
	3	0.000			3.838			0.065
		0.000	0.765	1.400		-0.046	0.054	
		1.500	0.765	2.547		-0.046	-0.015	
		3.000	0.765	3.695		-0.046	-0.084	
		3.000			3.838			0.065
	4	0.000			-1.940			0.947
		0.000	0.194	-0.231		-1.911	0.434	
		1.500	0.194	0.061		-1.911	-2.433	
		3.000	0.194	0.353		-1.911	-5.299	
		3.000			-1.940			0.947
	5	0.000			-4.989			0.018
		0.000	-0.922	-1.043		-0.002	0.005	
		1.500	-0.922	-2.426		-0.002	0.002	
		3.000	-0.922	-3.809		-0.002	-0.001	
		3.000			-4.989			0.018
	6	0.000			1.868			-0.963
		0.000	-0.195	0.222		1.778	-0.038	
		1.500	-0.195	-0.070		1.778	2.628	
		3.000	-0.195	-0.363		1.778	5.295	
		3.000			1.868			-0.963
62								
	1	0.000			-128.470			0.100
		0.000	-1.857	-1.100		-10.399	14.808	
		1.500	-1.857	-3.886		-10.399	-0.790	
		3.000	-1.857	-6.672		-10.399	-16.388	
		3.000			-124.942			0.100
	2	0.000			-16.994			0.016
		0.000	0.033	-0.094		-1.611	2.295	
		1.500	0.033	-0.045		-1.611	-0.121	
		3.000	0.033	0.004		-1.611	-2.537	
		3.000			-16.994			0.016

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	3	0.000			1.714			0.073
		0.000	2.167	-0.914		-0.015	0.001	
		1.500	2.167	2.336		-0.015	-0.022	
		3.000	2.167	5.587		-0.015	-0.045	
		3.000			1.714			0.073
	4	0.000			-3.511			0.788
		0.000	0.653	-0.819		-1.504	-0.066	
		1.500	0.653	0.160		-1.504	-2.322	
		3.000	0.653	1.139		-1.504	-4.577	
		3.000			-3.511			0.788
	5	0.000			-1.736			0.031
		0.000	-2.521	1.436		-0.030	0.044	
		1.500	-2.521	-2.345		-0.030	-0.001	
		3.000	-2.521	-6.127		-0.030	-0.045	
		3.000			-1.736			0.031
	6	0.000			3.383			-0.781
		0.000	-0.643	0.800		1.444	0.363	
		1.500	-0.643	-0.165		1.444	2.529	
		3.000	-0.643	-1.130		1.444	4.695	
		3.000			3.383			-0.781
63	----------							
	1	0.000			-34.458			0.134
		0.000	8.577	-6.387		-8.207	9.883	
		1.500	8.577	6.478		-8.207	-2.427	
		3.000	8.577	19.343		-8.207	-14.737	
		3.000			-30.930			0.134
	2	0.000			-3.010			0.011
		0.000	0.640	-0.676		-1.134	1.569	
		1.500	0.640	0.284		-1.134	-0.131	
		3.000	0.640	1.244		-1.134	-1.832	
		3.000			-3.010			0.011
	3	0.000			-1.055			0.036
		0.000	1.009	0.525		0.038	-0.046	
		1.500	1.009	2.038		0.038	0.012	
		3.000	1.009	3.552		0.038	0.070	
		3.000			-1.055			0.036
	4	0.000			-1.406			0.211
		0.000	0.684	-0.654		-0.910	-0.345	
		1.500	0.684	0.373		-0.910	-1.710	
		3.000	0.684	1.399		-0.910	-3.074	
		3.000			-1.406			0.211
	5	0.000			1.310			0.002

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.000	-1.237	-0.412		0.002	-0.004	
		1.500	-1.237	-2.267		0.002	-0.001	
		3.000	-1.237	-4.122		0.002	0.003	
		3.000			1.310			0.002
	6	0.000			1.375			-0.232
		0.000	-0.668	0.636		0.797	0.627	
		1.500	-0.668	-0.366		0.797	1.823	
		3.000	-0.668	-1.369		0.797	3.019	
		3.000			1.375			-0.232
64								
	1	0.000			-154.123			0.032
		0.000	-15.701	22.626		-0.316	0.544	
		1.500	-15.701	-0.926		-0.316	0.070	
		3.000	-15.701	-24.478		-0.316	-0.404	
		3.000			-150.595			0.032
	2	0.000			-17.559			0.005
		0.000	-2.037	2.820		-0.066	0.084	
		1.500	-2.037	-0.236		-0.066	-0.015	
		3.000	-2.037	-3.292		-0.066	-0.114	
		3.000			-17.559			0.005
	3	0.000			3.084			0.083
		0.000	0.640	1.767		-0.086	0.113	
		1.500	0.640	2.728		-0.086	-0.016	
		3.000	0.640	3.688		-0.086	-0.146	
		3.000			3.084			0.083
	4	0.000			0.572			0.784
		0.000	0.024	0.022		-3.985	3.611	
		1.500	0.024	0.058		-3.985	-2.366	
		3.000	0.024	0.094		-3.985	-8.344	
		3.000			0.572			0.784
	5	0.000			-5.422			0.009
		0.000	-0.890	-0.895		-0.001	0.003	
		1.500	-0.890	-2.229		-0.001	0.001	
		3.000	-0.890	-3.564		-0.001	-0.001	
		3.000			-5.422			0.009
	6	0.000			-0.489			-0.791
		0.000	-0.023	-0.025		3.924	-3.431	
		1.500	-0.023	-0.059		3.924	2.454	
		3.000	-0.023	-0.093		3.924	8.340	
		3.000			-0.489			-0.791
65								
	1	0.000			-234.705			0.048
		0.000	-4.514	-1.858		-1.007	1.431	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		1.500	-4.514	-8.628		-1.007	-0.080	
		3.000	-4.514	-15.399		-1.007	-1.591	
		3.000			-231.177			0.048
	2	0.000			-30.015			0.008
		0.000	0.511	-0.803		-0.153	0.212	
		1.500	0.511	-0.036		-0.153	-0.017	
		3.000	0.511	0.731		-0.153	-0.246	
		3.000			-30.015			0.008
	3	0.000			2.416			0.068
		0.000	1.733	-0.179		-0.040	0.040	
		1.500	1.733	2.421		-0.040	-0.020	
		3.000	1.733	5.020		-0.040	-0.080	
		3.000			2.416			0.068
	4	0.000			0.487			0.560
		0.000	0.066	-0.039		-3.275	2.868	
		1.500	0.066	0.060		-3.275	-2.044	
		3.000	0.066	0.159		-3.275	-6.956	
		3.000			0.487			0.560
	5	0.000			-4.749			0.004
		0.000	-2.581	1.636		-0.007	0.008	
		1.500	-2.581	-2.236		-0.007	-0.002	
		3.000	-2.581	-6.109		-0.007	-0.012	
		3.000			-4.749			0.004
	6	0.000			-0.384			-0.550
		0.000	-0.065	0.037		3.226	-2.713	
		1.500	-0.065	-0.061		3.226	2.125	
		3.000	-0.065	-0.159		3.226	6.963	
		3.000			-0.384			-0.550
66	----------							
	1	0.000			-67.002			0.094
		0.000	16.880	-11.385		0.413	-0.603	
		1.500	16.880	13.934		0.413	0.017	
		3.000	16.880	39.254		0.413	0.637	
		3.000			-63.474			0.094
	2	0.000			-6.025			0.008
		0.000	1.257	-1.363		0.013	-0.039	
		1.500	1.257	0.522		0.013	-0.019	
		3.000	1.257	2.407		0.013	0.001	
		3.000			-6.025			0.008
	3	0.000			-0.691			0.052
		0.000	0.432	1.190		0.061	-0.077	
		1.500	0.432	1.839		0.061	0.015	
		3.000	0.432	2.487		0.061	0.107	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		3.000			-0.691			0.052
	4	0.000			0.028			0.267
		0.000	0.027	0.016		-2.548	2.046	
		1.500	0.027	0.057		-2.548	-1.775	
		3.000	0.027	0.098		-2.548	-5.597	
		3.000			0.028			0.267
	5	0.000			1.374			0.005
		0.000	-1.353	-0.237		0.003	-0.005	
		1.500	-1.353	-2.267		0.003	0.000	
		3.000	-1.353	-4.297		0.003	0.005	
		3.000			1.374			0.005
	6	0.000			-0.011			-0.276
		0.000	-0.026	-0.019		2.485	-1.913	
		1.500	-0.026	-0.059		2.485	1.814	
		3.000	-0.026	-0.099		2.485	5.541	
		3.000			-0.011			-0.276
67	----------							
	1	0.000			-165.029			0.000
		0.000	-15.871	22.843		-0.010	0.006	
		1.500	-15.871	-0.964		-0.010	-0.009	
		3.000	-15.871	-24.771		-0.010	-0.025	
		3.000			-161.501			0.000
	2	0.000			-17.528			0.000
		0.000	-2.069	2.856		0.000	0.000	
		1.500	-2.069	-0.248		0.000	0.000	
		3.000	-2.069	-3.352		0.000	0.000	
		3.000			-17.528			0.000
	3	0.000			3.034			0.066
		0.000	0.504	2.082		-0.084	0.108	
		1.500	0.504	2.838		-0.084	-0.018	
		3.000	0.504	3.594		-0.084	-0.143	
		3.000			3.034			0.066
	4	0.000			-0.011			0.764
		0.000	-0.001	0.011		-3.955	3.522	
		1.500	-0.001	0.010		-3.955	-2.411	
		3.000	-0.001	0.008		-3.955	-8.343	
		3.000			-0.011			0.764
	5	0.000			-5.206			0.000
		0.000	-0.938	-0.943		0.000	0.000	
		1.500	-0.938	-2.350		0.000	0.000	
		3.000	-0.938	-3.757		0.000	0.000	
		3.000			-5.206			0.000

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	6	0.000			-0.011			-0.764
		0.000	-0.001	0.011		3.955	-3.522	
		1.500	-0.001	0.010		3.955	2.411	
		3.000	-0.001	0.008		3.955	8.343	
		3.000			-0.011			-0.764
68	----------							
	1	0.000			-242.226			0.000
		0.000	-4.745	-1.644		-0.002	0.002	
		1.500	-4.745	-8.762		-0.002	0.000	
		3.000	-4.745	-15.879		-0.002	-0.003	
		3.000			-238.698			0.000
	2	0.000			-30.204			0.000
		0.000	0.476	-0.762		0.000	0.000	
		1.500	0.476	-0.048		0.000	0.000	
		3.000	0.476	0.666		0.000	0.000	
		3.000			-30.204			0.000
	3	0.000			1.104			0.057
		0.000	1.235	0.481		-0.035	0.033	
		1.500	1.235	2.334		-0.035	-0.019	
		3.000	1.235	4.186		-0.035	-0.072	
		3.000			1.104			0.057
	4	0.000			0.023			0.554
		0.000	-0.010	0.021		-3.280	2.821	
		1.500	-0.010	0.006		-3.280	-2.099	
		3.000	-0.010	-0.009		-3.280	-7.018	
		3.000			0.023			0.554
	5	0.000			-2.179			0.000
		0.000	-2.615	1.612		0.000	0.000	
		1.500	-2.615	-2.311		0.000	0.000	
		3.000	-2.615	-6.233		0.000	0.000	
		3.000			-2.179			0.000
	6	0.000			0.023			-0.554
		0.000	-0.010	0.021		3.280	-2.821	
		1.500	-0.010	0.006		3.280	2.099	
		3.000	-0.010	-0.009		3.280	7.018	
		3.000			0.023			-0.554
69	----------							
	1	0.000			-66.777			0.000
		0.000	16.976	-11.327		0.000	0.000	
		1.500	16.976	14.138		0.000	0.000	
		3.000	16.976	39.602		0.000	0.000	
		3.000			-63.249			0.000

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	2	0.000			-6.038			0.000
		0.000	1.246	-1.347		0.000	0.000	
		1.500	1.246	0.522		0.000	0.000	
		3.000	1.246	2.390		0.000	0.000	
		3.000			-6.038			0.000
	3	0.000			-0.446			0.042
		0.000	0.037	1.639		0.052	-0.064	
		1.500	0.037	1.695		0.052	0.014	
		3.000	0.037	1.751		0.052	0.093	
		3.000			-0.446			0.042
	4	0.000			0.014			0.244
		0.000	-0.017	0.020		-2.496	1.960	
		1.500	-0.017	-0.005		-2.496	-1.783	
		3.000	-0.017	-0.030		-2.496	-5.527	
		3.000			0.014			0.244
	5	0.000			1.389			0.000
		0.000	-1.361	-0.257		0.000	0.000	
		1.500	-1.361	-2.300		0.000	0.000	
		3.000	-1.361	-4.342		0.000	0.000	
		3.000			1.389			0.000
	6	0.000			0.014			-0.244
		0.000	-0.017	0.020		2.496	-1.960	
		1.500	-0.017	-0.005		2.496	1.783	
		3.000	-0.017	-0.030		2.496	5.527	
		3.000			0.014			-0.244
70	----------							
	1	0.000			-154.163			-0.033
		0.000	-15.701	22.625		0.341	-0.554	
		1.500	-15.701	-0.927		0.341	-0.042	
		3.000	-15.701	-24.478		0.341	0.470	
		3.000			-150.635			-0.033
	2	0.000			-17.559			-0.005
		0.000	-2.037	2.820		0.066	-0.084	
		1.500	-2.037	-0.236		0.066	0.015	
		3.000	-2.037	-3.292		0.066	0.114	
		3.000			-17.559			-0.005
	3	0.000			2.564			0.024
		0.000	0.453	2.263		-0.079	0.100	
		1.500	0.453	2.942		-0.079	-0.018	
		3.000	0.453	3.621		-0.079	-0.137	
		3.000			2.564			0.024
	4	0.000			-0.489			0.791

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.000	-0.023	-0.025		-3.924	3.431	
		1.500	-0.023	-0.059		-3.924	-2.454	
		3.000	-0.023	-0.093		-3.924	-8.340	
		3.000			-0.489			0.791
	5	0.000			-5.422			-0.009
		0.000	-0.890	-0.895		0.001	-0.003	
		1.500	-0.890	-2.229		0.001	-0.001	
		3.000	-0.890	-3.564		0.001	0.001	
		3.000			-5.422			-0.009
	6	0.000			0.572			-0.784
		0.000	0.024	0.022		3.985	-3.611	
		1.500	0.024	0.058		3.985	2.366	
		3.000	0.024	0.094		3.985	8.344	
		3.000			0.572			-0.784
71	----------							
	1	0.000			-234.708			-0.048
		0.000	-4.513	-1.859		1.007	-1.428	
		1.500	-4.513	-8.628		1.007	0.083	
		3.000	-4.513	-15.398		1.007	1.593	
		3.000			-231.180			-0.048
	2	0.000			-30.015			-0.008
		0.000	0.511	-0.803		0.153	-0.212	
		1.500	0.511	-0.036		0.153	0.017	
		3.000	0.511	0.731		0.153	0.246	
		3.000			-30.015			-0.008
	3	0.000			1.934			0.020
		0.000	1.021	0.856		-0.028	0.022	
		1.500	1.021	2.387		-0.028	-0.019	
		3.000	1.021	3.918		-0.028	-0.060	
		3.000			1.934			0.020
	4	0.000			-0.384			0.550
		0.000	-0.065	0.037		-3.226	2.713	
		1.500	-0.065	-0.061		-3.226	-2.125	
		3.000	-0.065	-0.159		-3.226	-6.963	
		3.000			-0.384			0.550
	5	0.000			-4.749			-0.004
		0.000	-2.581	1.636		0.007	-0.008	
		1.500	-2.581	-2.236		0.007	0.002	
		3.000	-2.581	-6.109		0.007	0.012	
		3.000			-4.749			-0.004
	6	0.000			0.487			-0.560
		0.000	0.066	-0.039		3.275	-2.868	
		1.500	0.066	0.060		3.275	2.044	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		3.000	0.066	0.159		3.275	6.956	
		3.000			0.487			-0.560
72		----------						
	1	0.000			-67.002			-0.093
		0.000	16.880	-11.386		-0.414	0.603	
		1.500	16.880	13.934		-0.414	-0.017	
		3.000	16.880	39.254		-0.414	-0.638	
		3.000			-63.474			-0.093
	2	0.000			-6.025			-0.008
		0.000	1.257	-1.363		-0.013	0.039	
		1.500	1.257	0.522		-0.013	0.019	
		3.000	1.257	2.407		-0.013	-0.001	
		3.000			-6.025			-0.008
	3	0.000			-0.239			0.019
		0.000	-0.272	1.994		0.038	-0.044	
		1.500	-0.272	1.586		0.038	0.013	
		3.000	-0.272	1.178		0.038	0.070	
		3.000			-0.239			0.019
	4	0.000			-0.011			0.276
		0.000	-0.026	-0.019		-2.485	1.913	
		1.500	-0.026	-0.059		-2.485	-1.814	
		3.000	-0.026	-0.099		-2.485	-5.541	
		3.000			-0.011			0.276
	5	0.000			1.374			-0.005
		0.000	-1.353	-0.237		-0.003	0.005	
		1.500	-1.353	-2.267		-0.003	0.000	
		3.000	-1.353	-4.297		-0.003	-0.005	
		3.000			1.374			-0.005
	6	0.000			0.028			-0.267
		0.000	0.027	0.016		2.548	-2.046	
		1.500	0.027	0.057		2.548	1.775	
		3.000	0.027	0.098		2.548	5.597	
		3.000			0.028			-0.267
73		----------						
	1	0.000			-90.393			-0.043
		0.000	-8.653	12.365		3.352	-4.681	
		1.500	-8.653	-0.614		3.352	0.346	
		3.000	-8.653	-13.593		3.352	5.374	
		3.000			-86.865			-0.043
	2	0.000			-10.682			-0.008
		0.000	-0.866	1.197		0.383	-0.566	
		1.500	-0.866	-0.102		0.383	0.008	
		3.000	-0.866	-1.401		0.383	0.583	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		3.000			-10.682			-0.008
	3	0.000			3.164			0.014
		0.000	0.472	2.045		-0.038	0.039	
		1.500	0.472	2.752		-0.038	-0.019	
		3.000	0.472	3.460		-0.038	-0.076	
		3.000			3.164			0.014
	4	0.000			1.868			0.963
		0.000	-0.195	0.222		-1.778	0.038	
		1.500	-0.195	-0.070		-1.778	-2.628	
		3.000	-0.195	-0.363		-1.778	-5.295	
		3.000			1.868			0.963
	5	0.000			-4.989			-0.018
		0.000	-0.922	-1.043		0.002	-0.005	
		1.500	-0.922	-2.426		0.002	-0.002	
		3.000	-0.922	-3.809		0.002	0.001	
		3.000			-4.989			-0.018
	6	0.000			-1.940			-0.947
		0.000	0.194	-0.231		1.911	-0.434	
		1.500	0.194	0.061		1.911	2.433	
		3.000	0.194	0.353		1.911	5.299	
		3.000			-1.940			-0.947
74	----------							
	1	0.000			-128.439			-0.100
		0.000	-1.863	-1.094		10.397	-14.806	
		1.500	-1.863	-3.889		10.397	0.790	
		3.000	-1.863	-6.683		10.397	16.386	
		3.000			-124.911			-0.100
	2	0.000			-16.994			-0.016
		0.000	0.033	-0.094		1.611	-2.295	
		1.500	0.033	-0.045		1.611	0.121	
		3.000	0.033	0.004		1.611	2.537	
		3.000			-16.994			-0.016
	3	0.000			0.839			-0.010
		0.000	1.192	0.473		-0.021	0.010	
		1.500	1.192	2.261		-0.021	-0.021	
		3.000	1.192	4.049		-0.021	-0.052	
		3.000			0.839			-0.010
	4	0.000			3.383			0.781
		0.000	-0.643	0.800		-1.444	-0.363	
		1.500	-0.643	-0.165		-1.444	-2.529	
		3.000	-0.643	-1.130		-1.444	-4.695	
		3.000			3.383			0.781

)RTAL RUMAH SUSUN TON-M

R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	5	0.000			-1.736			-0.031
		0.000	-2.521	1.436		0.030	-0.044	
		1.500	-2.521	-2.345		0.030	0.001	
		3.000	-2.521	-6.127		0.030	0.045	
		3.000			-1.736			-0.031
	6	0.000			-3.511			-0.788
		0.000	0.653	-0.819		1.504	0.066	
		1.500	0.653	0.160		1.504	2.322	
		3.000	0.653	1.139		1.504	4.577	
		3.000			-3.511			-0.788
75	----------							
	1	0.000			-34.460			-0.134
		0.000	8.579	-6.391		8.206	-9.883	
		1.500	8.579	6.478		8.206	2.427	
		3.000	8.579	19.347		8.206	14.736	
		3.000			-30.932			-0.134
	2	0.000			-3.010			-0.011
		0.000	0.640	-0.676		1.134	-1.569	
		1.500	0.640	0.284		1.134	0.131	
		3.000	0.640	1.244		1.134	1.832	
		3.000			-3.010			-0.011
	3	0.000			-0.450			0.015
		0.000	0.055	1.578		0.014	-0.010	
		1.500	0.055	1.662		0.014	0.011	
		3.000	0.055	1.745		0.014	0.032	
		3.000			-0.450			0.015
	4	0.000			1.375			0.232
		0.000	-0.668	0.636		-0.797	-0.627	
		1.500	-0.668	-0.366		-0.797	-1.823	
		3.000	-0.668	-1.369		-0.797	-3.019	
		3.000			1.375			0.232
	5	0.000			1.310			-0.002
		0.000	-1.237	-0.412		-0.002	0.004	
		1.500	-1.237	-2.267		-0.002	0.001	
		3.000	-1.237	-4.122		-0.002	-0.003	
		3.000			1.310			-0.002
	6	0.000			-1.406			-0.211
		0.000	0.684	-0.654		0.910	0.345	
		1.500	0.684	0.373		0.910	1.710	
		3.000	0.684	1.399		0.910	3.074	
		3.000			-1.406			-0.211

81 ----------

1	0.000			-67.000			0.089
	0.000	0.218	3.380		0.966	-1.066	
	1.500	0.218	3.707		0.966	0.384	
	3.000	0.218	4.033		0.966	1.834	
	3.000			-64.408			0.089
2	0.000			-6.005			0.022
	0.000	-0.186	1.103		0.090	-0.100	
	1.500	-0.186	0.824		0.090	0.035	
	3.000	-0.186	0.545		0.090	0.169	
	3.000			-6.005			0.022
3	0.000			-4.818			0.326
	0.000	16.047	-37.314		0.057	-0.093	
	1.500	16.047	-13.244		0.057	-0.007	
	3.000	16.047	10.827		0.057	0.079	



ORTAL RUMAH SUSUN TON-M

R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		3.000			-4.818			0.326
	4	0.000			0.275			1.310
		0.000	0.312	-1.064		-7.305	11.879	
		1.500	0.312	-0.596		-7.305	0.921	
		3.000	0.312	-0.128		-7.305	-10.036	
		3.000			0.275			1.310
	5	0.000			8.947			0.041
		0.000	-20.849	49.137		0.001	-0.003	
		1.500	-20.849	17.863		0.001	-0.002	
		3.000	-20.849	-13.411		0.001	-0.001	
		3.000			8.947			0.041
	6	0.000			-0.390			-1.203
		0.000	-0.311	1.066		6.832	-11.895	
		1.500	-0.311	0.599		6.832	-1.647	
		3.000	-0.311	0.133		6.832	8.602	
		3.000			-0.390			-1.203
82	----------							
	1	0.000			-116.550			0.000
		0.000	-13.913	14.185		0.047	-0.027	
		1.500	-13.913	-6.685		0.047	0.044	
		3.000	-13.913	-27.556		0.047	0.115	
		3.000			-113.958			0.000
	2	0.000			-11.213			0.000
		0.000	-1.461	1.929		0.000	0.000	
		1.500	-1.461	-0.262		0.000	0.000	
		3.000	-1.461	-2.454		0.000	0.000	
		3.000			-11.213			0.000
	3	0.000			3.068			0.041
		0.000	-2.980	3.747		-0.073	0.091	
		1.500	-2.980	-0.723		-0.073	-0.018	
		3.000	-2.980	-5.194		-0.073	-0.128	
		3.000			3.068			0.041
	4	0.000			-0.008			0.400
		0.000	-0.013	0.037		-2.514	2.310	
		1.500	-0.013	0.017		-2.514	-1.461	
		3.000	-0.013	-0.003		-2.514	-5.232	
		3.000			-0.008			0.400
	5	0.000			-4.514			0.000
		0.000	1.670	-1.440		0.000	0.000	
		1.500	1.670	1.065		0.000	0.000	
		3.000	1.670	3.570		0.000	0.000	
		3.000			-4.514			0.000

RTAL RUMAH SUSUN TON-M

R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	6	0.000			-0.008			-0.400
		0.000	-0.013	0.037		2.514	-2.310	
		1.500	-0.013	0.017		2.514	1.461	
		3.000	-0.013	-0.003		2.514	5.232	
		3.000			-0.008			-0.400
83	----------							
	1	0.000			-139.577			0.000
		0.000	10.144	-7.689		0.000	0.002	
		1.500	10.144	7.526		0.000	0.002	
		3.000	10.144	22.742		0.000	0.002	
		3.000			-136.985			0.000
	2	0.000			-16.383			0.000
		0.000	1.091	-1.422		0.000	0.000	
		1.500	1.091	0.215		0.000	0.000	
		3.000	1.091	1.852		0.000	0.000	
		3.000			-16.383			0.000
	3	0.000			0.603			0.121
		0.000	-2.171	3.350		0.004	-0.019	
		1.500	-2.171	0.095		0.004	-0.014	
		3.000	-2.171	-3.161		0.004	-0.008	
		3.000			0.603			0.121
	4	0.000			0.011			0.424
		0.000	-0.027	0.055		-0.881	0.532	
		1.500	-0.027	0.014		-0.881	-0.790	
		3.000	-0.027	-0.028		-0.881	-2.112	
		3.000			0.011			0.424
	5	0.000			-1.423			0.000
		0.000	0.258	-0.165		0.000	0.000	
		1.500	0.258	0.222		0.000	0.000	
		3.000	0.258	0.609		0.000	0.000	
		3.000			-1.423			0.000
	6	0.000			0.011			-0.424
		0.000	-0.027	0.055		0.881	-0.532	
		1.500	-0.027	0.014		0.881	0.790	
		3.000	-0.027	-0.028		0.881	2.112	
		3.000			0.011			-0.424
84	----------							
	1	0.000			-37.857			0.000
		0.000	1.044	3.365		-0.001	0.001	
		1.500	1.044	4.931		-0.001	0.000	
		3.000	1.044	6.498		-0.001	-0.001	
		3.000			-35.265			0.000

RTAL RUMAH SUSUN TON-M

R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	2	0.000			-4.540			0.000
		0.000	-0.070	1.126		0.000	0.000	
		1.500	-0.070	1.021		0.000	0.000	
		3.000	-0.070	0.916		0.000	0.000	
		3.000			-4.540			0.000
	3	0.000			-3.501			0.256
		0.000	13.314	-32.576		0.049	-0.078	
		1.500	13.314	-12.606		0.049	-0.005	
		3.000	13.314	7.365		0.049	0.068	
		3.000			-3.501			0.256
	4	0.000			-0.537			0.947
		0.000	-0.075	0.159		-7.648	12.369	
		1.500	-0.075	0.046		-7.648	0.897	
		3.000	-0.075	-0.066		-7.648	-10.575	
		3.000			-0.537			0.947
	5	0.000			5.395			0.000
		0.000	-19.553	47.713		0.000	0.000	
		1.500	-19.553	18.383		0.000	0.000	
		3.000	-19.553	-10.946		0.000	0.000	
		3.000			5.395			0.000
	6	0.000			-0.537			-0.947
		0.000	-0.075	0.159		7.648	-12.369	
		1.500	-0.075	0.046		7.648	-0.897	
		3.000	-0.075	-0.066		7.648	10.575	
		3.000			-0.537			-0.947
85	----------							
	1	0.000			-105.922			0.005
		0.000	-13.619	14.310		0.797	-0.981	
		1.500	-13.619	-6.119		0.797	0.215	
		3.000	-13.619	-26.548		0.797	1.410	
		3.000			-103.330			0.005
	2	0.000			-11.312			-0.001
		0.000	-1.398	1.940		0.047	-0.055	
		1.500	-1.398	-0.156		0.047	0.016	
		3.000	-1.398	-2.253		0.047	0.087	
		3.000			-11.312			-0.001
	3	0.000			2.719			0.014
		0.000	-3.160	4.221		-0.065	0.080	
		1.500	-3.160	-0.519		-0.065	-0.018	
		3.000	-3.160	-5.259		-0.065	-0.116	
		3.000			2.719			0.014
	4	0.000			-0.444			0.408

)RTAL RUMAH SUSUN TON-M

R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.000	0.058	-0.036		-2.525	2.300	
		1.500	0.058	0.051		-2.525	-1.486	
		3.000	0.058	0.139		-2.525	-5.273	
		3.000			-0.444			0.408
	5	0.000			-4.670			-0.010
		0.000	1.666	-1.005		0.003	-0.006	
		1.500	1.666	1.494		0.003	-0.001	
		3.000	1.666	3.993		0.003	0.004	
		3.000			-4.670			-0.010
	6	0.000			0.516			-0.402
		0.000	-0.057	0.035		2.558	-2.364	
		1.500	-0.057	-0.051		2.558	1.472	
		3.000	-0.057	-0.137		2.558	5.309	
		3.000			0.516			-0.402
86	----------							
	1	0.000			-132.828			0.014
		0.000	10.184	-7.386		1.170	-1.447	
		1.500	10.184	7.890		1.170	0.308	
		3.000	10.184	23.167		1.170	2.064	
		3.000			-130.236			0.014
	2	0.000			-16.356			-0.005
		0.000	1.122	-1.404		0.168	-0.213	
		1.500	1.122	0.279		0.168	0.038	
		3.000	1.122	1.962		0.168	0.290	
		3.000			-16.356			-0.005
	3	0.000			1.559			-0.015
		0.000	-2.685	4.210		0.007	-0.020	
		1.500	-2.685	0.182		0.007	-0.010	
		3.000	-2.685	-3.845		0.007	0.001	
		3.000			1.559			-0.015
	4	0.000			-0.407			0.472
		0.000	0.034	-0.019		-0.750	0.341	
		1.500	0.034	0.032		-0.750	-0.783	
		3.000	0.034	0.082		-0.750	-1.908	
		3.000			-0.407			0.472
	5	0.000			-4.190			-0.018
		0.000	0.327	0.168		-0.001	0.002	
		1.500	0.327	0.659		-0.001	0.000	
		3.000	0.327	1.150		-0.001	-0.002	
		3.000			-4.190			-0.018
	6	0.000			0.476			-0.501
		0.000	-0.032	0.018		0.914	-0.564	
		1.500	-0.032	-0.031		0.914	0.807	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		3.000	-0.032	-0.079		0.914	2.179	
		3.000			0.476			-0.501
87		----------						
	1	0.000			-67.002			-0.089
		0.000	0.219	3.377		-0.968	1.068	
		1.500	0.219	3.705		-0.968	-0.384	
		3.000	0.219	4.033		-0.968	-1.836	
		3.000			-64.410			-0.089
	2	0.000			-6.005			-0.022
		0.000	-0.186	1.103		-0.090	0.100	
		1.500	-0.186	0.824		-0.090	-0.035	
		3.000	-0.186	0.545		-0.090	-0.169	
		3.000			-6.005			-0.022
	3	0.000			-4.260			0.019
		0.000	12.779	-30.327		0.037	-0.060	
		1.500	12.779	-11.159		0.037	-0.004	
		3.000	12.779	8.009		0.037	0.052	
		3.000			-4.260			0.019
	4	0.000			-0.390			1.203
		0.000	-0.311	1.066		-6.832	11.895	
		1.500	-0.311	0.599		-6.832	1.647	
		3.000	-0.311	0.133		-6.832	-8.602	
		3.000			-0.390			1.203
	5	0.000			8.947			-0.041
		0.000	-20.849	49.137		-0.001	0.003	
		1.500	-20.849	17.863		-0.001	0.002	
		3.000	-20.849	-13.411		-0.001	0.001	
		3.000			8.947			-0.041
	6	0.000			0.275			-1.310
		0.000	0.312	-1.064		7.305	-11.879	
		1.500	0.312	-0.596		7.305	-0.921	
		3.000	0.312	-0.128		7.305	10.036	
		3.000			0.275			-1.310
88		----------						
	1	0.000			-62.232			-0.043
		0.000	-7.546	7.907		2.385	-3.935	
		1.500	-7.546	-3.412		2.385	-0.357	
		3.000	-7.546	-14.730		2.385	3.221	
		3.000			-59.640			-0.043
	2	0.000			-7.971			-0.007
		0.000	-0.637	0.804		0.479	-0.539	
		1.500	-0.637	-0.152		0.479	0.179	
		3.000	-0.637	-1.108		0.479	0.897	

PORTAL RUMAH SUSUN TON-M

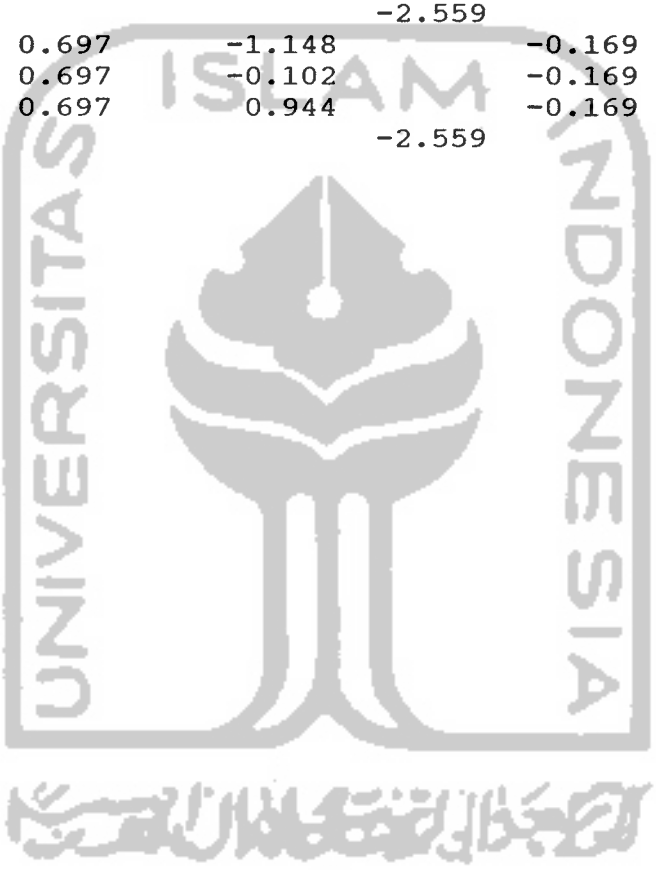
F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		3.000			-7.971			-0.007
	3	0.000			3.166			0.002
		0.000	-2.913	3.584		-0.029	0.031	
		1.500	-2.913	-0.785		-0.029	-0.012	
		3.000	-2.913	-5.154		-0.029	-0.055	
		3.000			3.166			0.002
	4	0.000			0.532			0.455
		0.000	-0.189	0.470		-1.120	0.379	
		1.500	-0.189	0.186		-1.120	-1.302	
		3.000	-0.189	-0.097		-1.120	-2.982	
		3.000			0.532			0.455
	5	0.000			-4.369			-0.035
		0.000	1.787	-1.739		0.005	-0.009	
		1.500	1.787	0.941		0.005	-0.002	
		3.000	1.787	3.621		0.005	0.005	
		3.000			-4.369			-0.035
	6	0.000			-0.595			-0.450
		0.000	0.201	-0.506		1.133	-0.431	
		1.500	0.201	-0.204		1.133	1.268	
		3.000	0.201	0.097		1.133	2.967	
		3.000			-0.595			-0.450
89	----------							
	1	0.000			-73.413			-0.019
		0.000	5.775	-4.972		9.284	-12.424	
		1.500	5.775	3.690		9.284	1.502	
		3.000	5.775	12.352		9.284	15.428	
		3.000			-70.821			-0.019
	2	0.000			-10.529			-0.012
		0.000	0.462	-0.583		1.403	-1.892	
		1.500	0.462	0.109		1.403	0.212	
		3.000	0.462	0.802		1.403	2.316	
		3.000			-10.529			-0.012
	3	0.000			0.350			-0.124
		0.000	-2.090	3.164		-0.013	-0.001	
		1.500	-2.090	0.029		-0.013	-0.021	
		3.000	-2.090	-3.106		-0.013	-0.040	
		3.000			0.350			-0.124
	4	0.000			2.476			1.247
		0.000	-0.671	1.094		0.400	-1.181	
		1.500	-0.671	0.088		0.400	-0.581	
		3.000	-0.671	-0.918		0.400	0.018	
		3.000			2.476			1.247

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	5	0.000			-1.013			-0.115
		0.000	0.420	-0.551		0.055	-0.054	
		1.500	0.420	0.079		0.055	0.028	
		3.000	0.420	0.709		0.055	0.110	
		3.000			-1.013			-0.115
	6	0.000			-2.559			-1.241
		0.000	0.697	-1.148		-0.169	0.850	
		1.500	0.697	-0.102		-0.169	0.597	
		3.000	0.697	0.944		-0.169	0.344	
		3.000			-2.559			-1.241



96 ----------

1	0.000		-75.631			0.000
	0.000	5.178	-6.912	-0.007	0.007	
	1.500	5.178	0.856	-0.007	-0.004	
	3.000	5.178	8.623	-0.007	-0.015	
	3.000		-74.479			0.000
2	0.000		-7.369			0.000
	0.000	0.264	-0.355	0.000	0.000	
	1.500	0.264	0.041	0.000	0.000	
	3.000	0.264	0.437	0.000	0.000	
	3.000		-7.369			0.000
3	0.000		-2.697			0.007
	0.000	4.317	-7.001	0.029	-0.044	
	1.500	4.317	-0.527	0.029	-0.001	
	3.000	4.317	5.948	0.029	0.042	



PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		3.000			-2.697			0.007
	4	0.000			0.003			-0.238
		0.000	-0.056	0.083		-2.581	3.867	
		1.500	-0.056	-0.001		-2.581	-0.005	
		3.000	-0.056	-0.085		-2.581	-3.876	
		3.000			0.003			-0.238
	5	0.000			2.813			0.000
		0.000	-5.839	9.215		0.000	0.000	
		1.500	-5.839	0.457		0.000	0.000	
		3.000	-5.839	-8.300		0.000	0.000	
		3.000			2.813			0.000
	6	0.000			0.003			0.238
		0.000	-0.056	0.083		2.581	-3.867	
		1.500	-0.056	-0.001		2.581	0.005	
		3.000	-0.056	-0.085		2.581	3.876	
		3.000			0.003			0.238
97	----------							
	1	0.000			-60.289			-0.001
		0.000	-7.444	11.893		0.048	-0.138	
		1.500	-7.444	0.727		0.048	-0.065	
		3.000	-7.444	-10.439		0.048	0.007	
		3.000			-59.137			-0.001
	2	0.000			-5.699			-0.002
		0.000	-1.028	1.426		-0.013	0.001	
		1.500	-1.028	-0.115		-0.013	-0.018	
		3.000	-1.028	-1.657		-0.013	-0.037	
		3.000			-5.699			-0.002
	3	0.000			2.728			-0.004
		0.000	3.330	-5.445		-0.041	0.053	
		1.500	3.330	-0.450		-0.041	-0.009	
		3.000	3.330	4.545		-0.041	-0.071	
		3.000			2.728			-0.004
	4	0.000			-0.334			-0.155
		0.000	-0.193	0.318		-1.188	1.391	
		1.500	-0.193	0.029		-1.188	-0.392	
		3.000	-0.193	-0.260		-1.188	-2.175	
		3.000			-0.334			-0.155
	5	0.000			-2.955			-0.011
		0.000	-6.563	10.108		0.004	-0.006	
		1.500	-6.563	0.263		0.004	0.000	
		3.000	-6.563	-9.581		0.004	0.007	
		3.000			-2.955			-0.011

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	6	0.000			0.388			0.157
		0.000	0.193	-0.318		1.244	-1.469	
		1.500	0.193	-0.028		1.244	0.397	
		3.000	0.193	0.261		1.244	2.262	
		3.000			0.388			0.157
98	----------							
	1	0.000			-66.517			0.021
		0.000	1.048	-1.801		0.213	-0.447	
		1.500	1.048	-0.230		0.213	-0.127	
		3.000	1.048	1.342		0.213	0.192	
		3.000			-65.365			0.021
	2	0.000			-7.664			0.003
		0.000	-0.019	0.091		0.039	-0.072	
		1.500	-0.019	0.062		0.039	-0.014	
		3.000	-0.019	0.033		0.039	0.044	
		3.000			-7.664			0.003
	3	0.000			-1.402			0.007
		0.000	3.795	-6.136		0.029	-0.043	
		1.500	3.795	-0.443		0.029	0.001	
		3.000	3.795	5.249		0.029	0.045	
		3.000			-1.402			0.007
	4	0.000			-0.222			0.053
		0.000	-0.221	0.357		-2.618	3.903	
		1.500	-0.221	0.026		-2.618	-0.023	
		3.000	-0.221	-0.305		-2.618	-3.950	
		3.000			-0.222			0.053
	5	0.000			-0.781			0.007
		0.000	-7.842	11.947		-0.010	0.012	
		1.500	-7.842	0.184		-0.010	-0.003	
		3.000	-7.842	-11.579		-0.010	-0.018	
		3.000			-0.781			0.007
	6	0.000			0.244			-0.156
		0.000	0.221	-0.358		2.594	-3.864	
		1.500	0.221	-0.026		2.594	0.028	
		3.000	0.221	0.307		2.594	3.919	
		3.000			0.244			-0.156
99	----------							
	1	0.000			-35.472			-0.078
		0.000	-4.465	6.216		3.489	-3.473	
		1.500	-4.465	-0.482		3.489	1.760	
		3.000	-4.465	-7.179		3.489	6.993	
		3.000			-34.320			-0.078

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.000	-0.861	1.339		-2.181	3.346	
		1.500	-0.861	0.047		-2.181	0.075	
		3.000	-0.861	-1.244		-2.181	-3.197	
		3.000			2.105			-0.236
	5	0.000			3.173			-0.167
		0.000	-5.382	8.576		0.041	-0.047	
		1.500	-5.382	0.502		0.041	0.015	
		3.000	-5.382	-7.571		0.041	0.076	
		3.000			3.173			-0.167
	6	0.000			-2.131			0.261
		0.000	0.916	-1.421		2.121	-3.245	
		1.500	0.916	-0.047		2.121	-0.063	
		3.000	0.916	1.327		2.121	3.118	
		3.000			-2.131			0.261
101	----------							
	1	0.000			-14.605			-1.408
		0.000	2.989	2.259		-0.287	0.292	
		1.500	2.989	6.742		-0.287	-0.138	
		3.000	2.989	11.226		-0.287	-0.569	
		3.000			-13.453			-1.408
	2	0.000			-1.723			-0.223
		0.000	0.473	0.460		-0.031	0.030	
		1.500	0.473	1.170		-0.031	-0.016	
		3.000	0.473	1.880		-0.031	-0.063	
		3.000			-1.723			-0.223
	3	0.000			-0.058			-1.275
		0.000	2.715	-6.992		-0.003	-0.016	
		1.500	2.715	-2.919		-0.003	-0.020	
		3.000	2.715	1.153		-0.003	-0.024	
		3.000			-0.058			-1.275
	4	0.000			-1.218			0.123
		0.000	1.041	-2.386		-1.659	2.995	
		1.500	1.041	-0.824		-1.659	0.507	
		3.000	1.041	0.739		-1.659	-1.981	
		3.000			-1.218			0.123
	5	0.000			0.179			-1.762
		0.000	-5.700	20.174		0.058	-0.057	
		1.500	-5.700	11.623		0.058	0.030	
		3.000	-5.700	3.073		0.058	0.118	
		3.000			0.179			-1.762
	6	0.000			6.540			-0.057
		0.000	-0.707	1.634		4.695	-8.808	
		1.500	-0.707	0.574		4.695	-1.766	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		3.000	-0.707	-0.487		4.695	5.277	
		3.000			6.540			-0.057
102		----------						
	1	0.000			-7.979			-0.021
		0.000	3.270	-2.999		0.054	-0.158	
		1.500	3.270	1.906		0.054	-0.078	
		3.000	3.270	6.812		0.054	0.003	
		3.000			-6.827			-0.021
	2	0.000			-1.217			-0.005
		0.000	0.572	-0.590		0.005	-0.015	
		1.500	0.572	0.268		0.005	-0.007	
		3.000	0.572	1.126		0.005	0.001	
		3.000			-1.217			-0.005
	3	0.000			-1.205			-0.061
		0.000	-1.397	4.094		0.016	-0.024	
		1.500	-1.397	1.999		0.016	0.001	
		3.000	-1.397	-0.097		0.016	0.025	
		3.000			-1.205			-0.061
	4	0.000			-0.104			1.053
		0.000	0.001	0.068		-0.560	0.583	
		1.500	0.001	0.070		-0.560	-0.257	
		3.000	0.001	0.072		-0.560	-1.097	
		3.000			-0.104			1.053
	5	0.000			3.732			-0.007
		0.000	1.556	-3.301		0.000	0.000	
		1.500	1.556	-0.966		0.000	0.001	
		3.000	1.556	1.368		0.000	0.001	
		3.000			3.732			-0.007
	6	0.000			0.067			-0.596
		0.000	-0.001	-0.070		4.910	-7.237	
		1.500	-0.001	-0.072		4.910	0.129	
		3.000	-0.001	-0.073		4.910	7.494	
		3.000			0.067			-0.596
103		----------						
	1	0.000			-14.583			1.407
		0.000	2.994	2.247		0.254	-0.231	
		1.500	2.994	6.739		0.254	0.149	
		3.000	2.994	11.230		0.254	0.530	
		3.000			-13.431			1.407
	2	0.000			-1.723			0.223
		0.000	0.474	0.459		0.030	-0.029	
		1.500	0.474	1.169		0.030	0.017	
		3.000	0.474	1.880		0.030	0.062	

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		3.000			-1.723			0.223
	3	0.000			-0.097			1.276
		0.000	2.710	-6.979		0.047	-0.064	
		1.500	2.710	-2.915		0.047	0.007	
		3.000	2.710	1.149		0.047	0.078	
		3.000			-0.097			1.276
	4	0.000			1.219			0.238
		0.000	-0.796	1.741		-1.659	2.995	
		1.500	-0.796	0.547		-1.659	0.507	
		3.000	-0.796	-0.648		-1.659	-1.982	
		3.000			1.219			0.238
	5	0.000			0.178			1.763
		0.000	-5.702	20.177		-0.057	0.054	
		1.500	-5.702	11.625		-0.057	-0.031	
		3.000	-5.702	3.072		-0.057	-0.116	
		3.000			0.178			1.763
	6	0.000			-6.502			-0.173
		0.000	0.461	-0.989		4.594	-8.639	
		1.500	0.461	-0.297		4.594	-1.748	
		3.000	0.461	0.395		4.594	5.142	
		3.000			-6.502			-0.173
104	----------							
	1	0.000			-14.585			-1.407
		0.000	2.995	2.245		-0.254	0.233	
		1.500	2.995	6.738		-0.254	-0.149	
		3.000	2.995	11.230		-0.254	-0.531	
		3.000			-13.433			-1.407
	2	0.000			-1.723			-0.223
		0.000	0.474	0.459		-0.030	0.029	
		1.500	0.474	1.169		-0.030	-0.017	
		3.000	0.474	1.880		-0.030	-0.062	
		3.000			-1.723			-0.223
	3	0.000			-0.074			-1.117
		0.000	2.378	-6.163		-0.022	0.019	
		1.500	2.378	-2.596		-0.022	-0.014	
		3.000	2.378	0.972		-0.022	-0.046	
		3.000			-0.074			-1.117
	4	0.000			-6.502			0.173
		0.000	0.461	-0.989		-4.594	8.639	
		1.500	0.461	-0.297		-4.594	1.748	
		3.000	0.461	0.395		-4.594	-5.142	
		3.000			-6.502			0.173

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

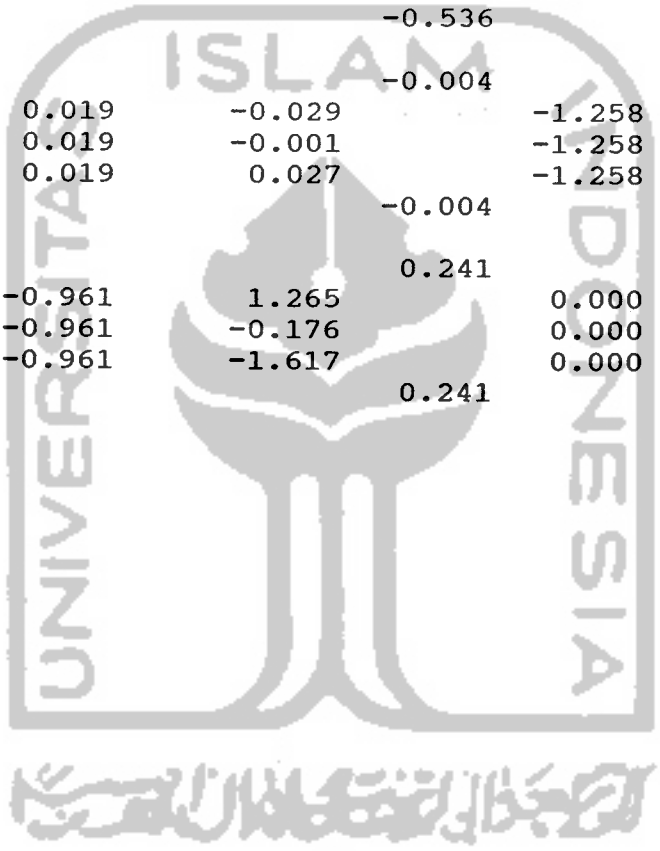
ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	5	0.000			0.178			-1.763
		0.000	-5.702	20.177		0.057	-0.054	
		1.500	-5.702	11.625		0.057	0.031	
		3.000	-5.702	3.072		0.057	0.116	
		3.000			0.178			-1.763
	6	0.000			1.219			-0.238
		0.000	-0.796	1.741		1.659	-2.995	
		1.500	-0.796	0.547		1.659	-0.507	
		3.000	-0.796	-0.648		1.659	1.982	
		3.000			1.219			-0.238

111 ----------

1	0.000		-10.788			0.000
	0.000	-1.767	3.221	-0.059	0.120	
	1.500	-1.767	0.570	-0.059	0.031	
	3.000	-1.767	-2.081	-0.059	-0.057	
	3.000		-10.140			0.000
2	0.000		-0.152			0.000
	0.000	-0.142	0.258	0.000	0.000	
	1.500	-0.142	0.046	0.000	0.000	
	3.000	-0.142	-0.167	0.000	0.000	
	3.000		-0.152			0.000
3	0.000		0.595			0.000
	0.000	1.184	-1.642	-0.020	0.029	
	1.500	1.184	0.133	-0.020	-0.001	
	3.000	1.184	1.908	-0.020	-0.031	



1	0.000			-11.137		0.000
	0.000	1.131	-2.343		-0.003	0.006
	1.500	1.131	-0.647		-0.003	0.001
	3.000	1.131	1.049		-0.003	-0.004
	3.000			-10.489		0.000
2	0.000			-0.216		0.000
	0.000	0.052	-0.144		0.000	0.000
	1.500	0.052	-0.066		0.000	0.000
	3.000	0.052	0.013		0.000	0.000
	3.000			-0.216		0.000
3	0.000			-0.536		-0.003
	0.000	1.200	-1.669		0.018	-0.027
	1.500	1.200	0.132		0.018	0.000
	3.000	1.200	1.932		0.018	0.028
	3.000			-0.536		-0.003
4	0.000			-0.004		0.040
	0.000	0.019	-0.029		-1.258	1.861
	1.500	0.019	-0.001		-1.258	-0.026
	3.000	0.019	0.027		-1.258	-1.914
	3.000			-0.004		0.040
5	0.000			0.241		0.000
	0.000	-0.961	1.265		0.000	0.000
	1.500	-0.961	-0.176		0.000	0.000
	3.000	-0.961	-1.617		0.000	0.000
	3.000			0.241		0.000



PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

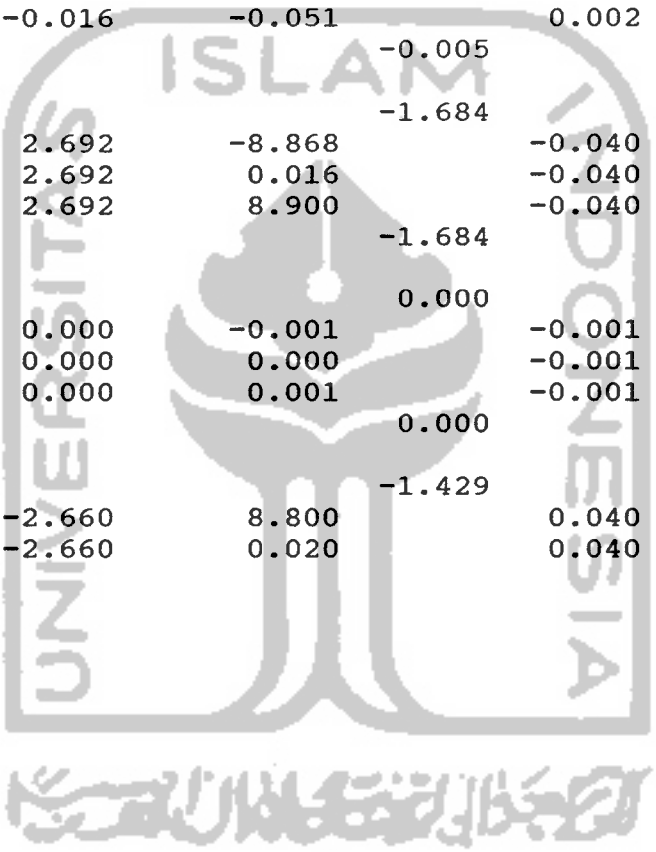
ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	6	0.000			-0.004			-0.040
		0.000	0.019	-0.029		1.258	-1.861	
		1.500	0.019	-0.001		1.258	0.026	
		3.000	0.019	0.027		1.258	1.914	
		3.000			-0.004			-0.040
113	----------							
	1	0.000			-10.097			0.000
		0.000	-0.353	0.613		0.102	-0.098	
		1.500	-0.353	0.083		0.102	0.055	
		3.000	-0.353	-0.447		0.102	0.208	
		3.000			-9.449			0.000
	2	0.000			0.125			0.000
		0.000	-0.049	0.117		0.005	0.003	
		1.500	-0.049	0.044		0.005	0.010	
		3.000	-0.049	-0.029		0.005	0.017	
		3.000			0.125			0.000
	3	0.000			0.744			0.003
		0.000	1.462	-2.064		-0.019	0.028	
		1.500	1.462	0.129		-0.019	-0.001	
		3.000	1.462	2.322		-0.019	-0.029	
		3.000			0.744			0.003
	4	0.000			-0.078			-0.015
		0.000	-0.223	0.324		-0.082	0.103	
		1.500	-0.223	-0.010		-0.082	-0.020	
		3.000	-0.223	-0.344		-0.082	-0.144	
		3.000			-0.078			-0.015
	5	0.000			-0.241			0.003
		0.000	-0.178	0.039		-0.003	0.004	
		1.500	-0.178	-0.228		-0.003	0.000	
		3.000	-0.178	-0.495		-0.003	-0.004	
		3.000			-0.241			0.003
	6	0.000			0.095			0.011
		0.000	0.218	-0.317		0.124	-0.164	
		1.500	0.218	0.010		0.124	0.021	
		3.000	0.218	0.336		0.124	0.206	
		3.000			0.095			0.011

120 ----------

1	0.000			-5.647			-0.429
	0.000	0.000	4.409		0.142	-0.229	
	1.500	0.000	4.409		0.142	-0.016	
	3.000	0.000	4.410		0.142	0.197	
	3.000			-4.999			-0.429
2	0.000			0.000			-0.068
	0.000	0.000	0.000		0.010	-0.020	
	1.500	0.000	0.000		0.010	-0.005	
	3.000	0.000	0.000		0.010	0.009	
	3.000			0.000			-0.068
3	0.000			0.000			-0.341
	0.000	0.000	-0.001		0.008	-0.015	
	1.500	0.000	0.000		0.008	-0.004	
	3.000	0.000	0.000		0.008	0.007	
	3.000			0.000			-0.341
4	0.000			1.377			0.140
	0.000	0.058	-0.223		-1.562	1.826	
	1.500	0.058	-0.135		-1.562	-0.518	
	3.000	0.058	-0.047		-1.562	-2.861	
	3.000			1.377			0.140
5	0.000			0.000			-0.538
	0.000	-2.536	7.609		-0.018	0.037	
	1.500	-2.536	3.805		-0.018	0.010	
	3.000	-2.536	0.000		-0.018	-0.017	
	3.000			0.000			-0.538
6	0.000			-0.074			-0.211
	0.000	-0.092	0.350		0.000	0.156	
	1.500	-0.092	0.212		0.000	0.156	
	3.000	-0.092	0.074		0.000	0.156	
	3.000			-0.074			-0.211

131 ----------

1	0.000			2.431		0.009
	0.000	8.471	-9.312	-0.001	0.010	
	3.300	-0.005	4.656	-0.001	0.005	
	6.600	-8.481	-9.345	-0.001	0.001	
	6.600			2.431		0.009
2	0.000			0.335		0.002
	0.000	2.865	-3.150	-0.001	0.003	
	3.300	-0.001	1.575	-0.001	0.001	
	6.600	-2.868	-3.159	-0.001	-0.001	
	6.600			0.335		0.002
3	0.000			-0.005		-0.014
	0.000	-0.016	0.051	0.002	-0.001	
	3.300	-0.016	0.000	0.002	0.005	
	6.600	-0.016	-0.051	0.002	0.012	
	6.600			-0.005		-0.014
4	0.000			-1.684		-0.013
	0.000	2.692	-8.868	-0.040	0.125	
	3.300	2.692	0.016	-0.040	-0.006	
	6.600	2.692	8.900	-0.040	-0.138	
	6.600			-1.684		-0.013
5	0.000			0.000		0.002
	0.000	0.000	-0.001	-0.001	0.003	
	3.300	0.000	0.000	-0.001	0.001	
	6.600	0.000	0.001	-0.001	-0.002	
	6.600			0.000		0.002
6	0.000			-1.429		0.014
	0.000	-2.660	8.800	0.040	-0.125	
	3.300	-2.660	0.020	0.040	0.007	



135 ----------

1	0.000			2.652		0.033
	0.000	8.329	-8.721	0.000	0.003	
	3.300	-0.146	4.781	0.000	0.003	
	6.600	-8.622	-9.687	0.000	0.002	
	6.600			2.652		0.033
2	0.000			0.362		0.009
	0.000	2.872	-3.104	0.000	0.000	
	3.300	0.005	1.643	0.000	0.000	
	6.600	-2.861	-3.071	0.000	0.001	
	6.600			0.362		0.009
3	0.000			-0.006		0.005
	0.000	-0.015	0.047	-0.006	0.022	
	3.300	-0.015	-0.001	-0.006	0.002	
	6.600	-0.015	-0.049	-0.006	-0.018	
	6.600			-0.006		0.005
4	0.000			-1.884		-0.049
	0.000	2.878	-9.268	-0.022	0.064	
	3.300	2.878	0.228	-0.022	-0.007	
	6.600	2.878	9.724	-0.022	-0.078	
	6.600			-1.884		-0.049
5	0.000			0.000		0.003
	0.000	0.000	0.000	-0.001	0.003	
	3.300	0.000	0.000	-0.001	0.000	
	6.600	0.000	0.000	-0.001	-0.004	
	6.600			0.000		0.003
6	0.000			-1.259		0.050
	0.000	-2.773	8.972	0.025	-0.073	
	3.300	-2.773	-0.180	0.025	0.009	
	6.600	-2.773	-9.332	0.025	0.092	
	6.600			-1.259		0.050

1	0.000			0.520		0.012
	0.000	4.281	-4.682		0.000	0.000
	3.300	0.009	2.396		0.000	0.001
	6.600	-4.262	-4.621		0.000	0.002
	6.600			0.520		0.012
2	0.000			0.144		0.003
	0.000	1.219	-1.331		0.000	0.000
	3.300	0.002	0.683		0.000	0.000
	6.600	-1.215	-1.318		0.000	0.000
	6.600			0.144		0.003
3	0.000			-0.011		0.002
	0.000	-0.012	0.041		-0.001	0.006
	3.300	-0.012	0.000		-0.001	0.001
	6.600	-0.012	-0.041		-0.001	-0.004
	6.600			-0.011		0.002
4	0.000			-2.142		-0.022
	0.000	1.416	-4.599		0.001	-0.002
	3.300	1.416	0.072		0.001	0.000
	6.600	1.416	4.743		0.001	0.003
	6.600			-2.142		-0.022
5	0.000			-0.001		0.001
	0.000	0.000	0.000		0.000	0.001
	3.300	0.000	0.000		0.000	0.000
	6.600	0.000	0.000		0.000	-0.001
	6.600			-0.001		0.001
6	0.000			-0.894		0.022
	0.000	-1.335	4.367		0.003	-0.007
	3.300	-1.335	-0.038		0.003	0.002
	6.600	-1.335	-4.444		0.003	0.010
	6.600			-0.894		0.022

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
121								
	1	0.000			1.399			0.042
		0.000	7.233	-8.244		0.007	-0.022	
		3.300	0.160	3.954		0.007	0.000	
		6.600	-6.912	-7.186		0.007	0.022	
		6.600			1.399			0.042
	2	0.000			-0.010			0.031
		0.000	7.025	-12.490		0.007	-0.022	
		3.300	2.156	2.658		0.007	0.000	
		6.600	-2.712	1.742		0.007	0.022	
		6.600			-0.010			0.031
	3	0.000			-0.918			0.034
		0.000	2.887	1.318		0.005	-0.017	
		3.300	-1.981	2.812		0.005	0.000	
		6.600	-6.849	-11.758		0.005	0.017	
		6.600			-0.918			0.034
	4	0.000			-0.030			0.026
		0.000	5.690	-10.341		0.005	-0.018	
		3.300	1.846	2.094		0.005	0.000	
		6.600	-1.998	1.842		0.005	0.018	
		6.600			-0.030			0.026
122								
	1	0.000			5.278			-0.052
		0.000	16.203	-18.713		0.007	-0.023	
		3.300	0.501	8.847		0.007	0.000	
		6.600	-15.201	-15.408		0.007	0.023	
		6.600			5.278			-0.052
	2	0.000			2.668			-0.052
		0.000	14.087	-23.760		0.010	-0.032	
		3.300	3.709	5.605		0.010	0.000	
		6.600	-6.668	0.722		0.010	0.032	
		6.600			2.668			-0.052
	3	0.000			2.195			-0.047
		0.000	7.356	-1.065		0.005	-0.018	
		3.300	-3.022	6.086		0.005	0.000	
		6.600	-13.400	-21.011		0.005	0.018	
		6.600			2.195			-0.047
	4	0.000			2.153			-0.044
		0.000	11.228	-19.430		0.008	-0.026	
		3.300	3.169	4.326		0.008	0.000	
		6.600	-4.889	1.488		0.008	0.026	
		6.600			2.153			-0.044

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
123								
	1	0.000			3.724			-0.037
		0.000	14.870	-16.356		0.004	-0.013	
		3.300	0.113	8.366		0.004	0.000	
		6.600	-14.644	-15.610		0.004	0.013	
		6.600			3.724			-0.037
	2	0.000			1.517			-0.029
		0.000	12.958	-21.248		0.007	-0.024	
		3.300	3.156	5.340		0.007	0.000	
		6.600	-6.647	-0.420		0.007	0.024	
		6.600			1.517			-0.029
	3	0.000			0.908			-0.024
		0.000	6.745	-0.299		0.003	-0.010	
		3.300	-3.057	5.786		0.003	0.000	
		6.600	-12.859	-20.476		0.003	0.010	
		6.600			0.908			-0.024
	4	0.000			1.202			-0.022
		0.000	10.334	-17.383		0.006	-0.020	
		3.300	2.706	4.134		0.006	0.000	
		6.600	-4.922	0.478		0.006	0.020	
		6.600			1.202			-0.022
124								
	1	0.000			0.871			-0.012
		0.000	7.056	-7.646		0.001	-0.004	
		3.300	-0.017	3.968		0.001	0.000	
		6.600	-7.089	-7.757		0.001	0.004	
		6.600			0.871			-0.012
	2	0.000			-0.343			-0.010
		0.000	6.346	-10.221		0.003	-0.008	
		3.300	1.478	2.688		0.003	0.000	
		6.600	-3.391	-0.468		0.003	0.008	
		6.600			-0.343			-0.010
	3	0.000			-1.628			-0.007
		0.000	3.281	0.014		0.001	-0.003	
		3.300	-1.587	2.810		0.001	0.000	
		6.600	-6.455	-10.460		0.001	0.003	
		6.600			-1.628			-0.007
	4	0.000			-0.333			-0.007
		0.000	5.111	-8.405		0.002	-0.007	
		3.300	1.267	2.120		0.002	0.000	
		6.600	-2.577	-0.042		0.002	0.007	
		6.600			-0.333			-0.007

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
137								
	1	0.000			3.618			-0.028
		0.000	19.142	-23.422		-0.023	0.073	
		3.200	-3.617	11.690		-0.023	0.000	
		6.400	-13.536	-15.755		-0.023	-0.073	
		6.400			3.618			-0.028
	2	0.000			2.401			-0.173
		0.000	13.959	-15.491		0.048	-0.153	
		3.200	-4.104	9.265		0.048	0.000	
		6.400	-10.931	-14.791		0.048	0.153	
		6.400			2.401			-0.173
	3	0.000			2.623			0.166
		0.000	15.746	-21.350		-0.095	0.303	
		3.200	-2.316	9.127		-0.095	0.000	
		6.400	-9.144	-9.209		-0.095	-0.303	
		6.400			2.623			0.166
	4	0.000			1.996			-0.146
		0.000	11.483	-12.733		0.042	-0.134	
		3.200	-3.538	7.683		0.042	0.000	
		6.400	-8.929	-12.264		0.042	0.134	
		6.400			1.996			-0.146
138								
	1	0.000			1.758			-0.008
		0.000	9.025	-9.256		0.014	-0.043	
		3.000	0.123	4.466		0.014	0.000	
		6.000	-8.778	-8.517		0.014	0.043	
		6.000			1.758			-0.008
	2	0.000			0.768			-0.066
		0.000	5.286	-3.592		0.066	-0.198	
		3.000	-0.876	3.023		0.066	0.000	
		6.000	-7.037	-8.847		0.066	0.198	
		6.000			0.768			-0.066
	3	0.000			1.202			0.049
		0.000	7.299	-9.545		-0.043	0.130	
		3.000	1.138	3.111		-0.043	0.000	
		6.000	-5.024	-2.718		-0.043	-0.130	
		6.000			1.202			0.049
	4	0.000			0.615			-0.057
		0.000	4.118	-2.661		0.056	-0.168	
		3.000	-0.758	2.380		0.056	0.000	
		6.000	-5.634	-7.208		0.056	0.168	
		6.000			0.615			-0.057

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

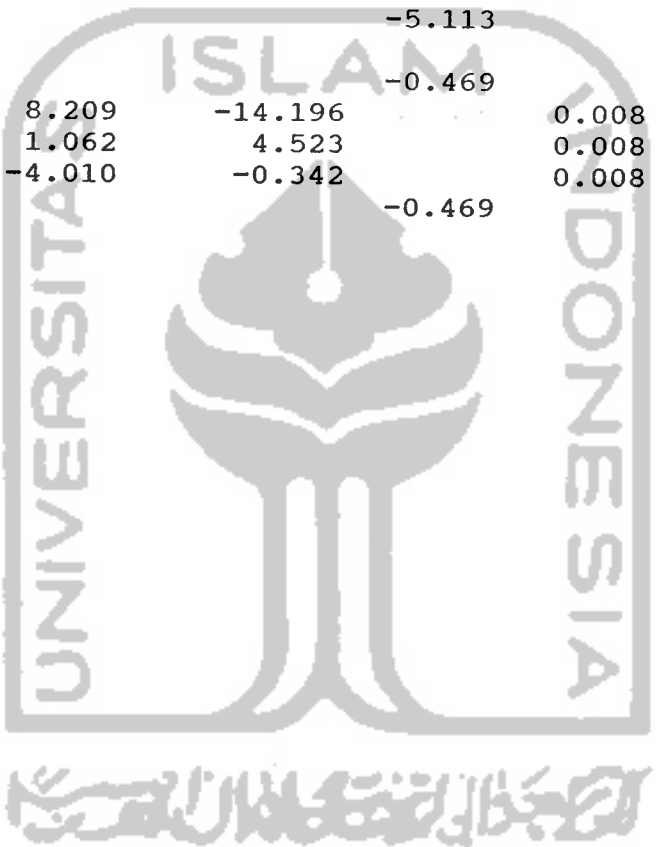
ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
139								
	1	0.000			0.287			0.012
		0.000	2.477	-1.346		0.032	-0.051	
		1.600	-0.010	0.627		0.032	0.000	
		3.200	-2.496	-1.378		0.032	0.051	
		3.200			0.287			0.012
	2	0.000			-0.243			0.003
		0.000	1.161	-0.074		0.120	-0.192	
		1.600	-0.551	0.415		0.120	0.000	
		3.200	-2.264	-1.838		0.120	0.192	
		3.200			-0.243			0.003
	3	0.000			-0.085			0.001
		0.000	2.294	-1.845		-0.044	0.071	
		1.600	0.582	0.456		-0.044	0.000	
		3.200	-1.131	0.016		-0.044	-0.071	
		3.200			-0.085			0.001
	4	0.000			-0.218			0.001
		0.000	0.878	0.004		0.102	-0.164	
		1.600	-0.475	0.326		0.102	0.000	
		3.200	-1.828	-1.516		0.102	0.164	
		3.200			-0.218			0.001
140								
	1	0.000			6.971			-0.004
		0.000	34.614	-42.259		-0.010	0.033	
		3.200	-7.598	21.511		-0.010	0.000	
		6.400	-24.131	-29.255		-0.010	-0.033	
		6.400			6.971			-0.004
	2	0.000			4.875			-0.194
		0.000	25.864	-30.230		0.059	-0.188	
		3.200	-7.600	16.968		0.059	0.000	
		6.400	-18.594	-24.943		0.059	0.188	
		6.400			4.875			-0.194
	3	0.000			5.122			0.197
		0.000	27.648	-36.074		-0.080	0.257	
		3.200	-5.816	16.833		-0.080	0.000	
		6.400	-16.810	-19.369		-0.080	-0.257	
		6.400			5.122			0.197
	4	0.000			4.005			-0.166
		0.000	21.276	-24.914		0.051	-0.162	
		3.200	-6.544	14.066		0.051	0.000	
		6.400	-15.103	-20.569		0.051	0.162	
		6.400			4.005			-0.166

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
141								
	1	0.000			2.688			0.005
		0.000	14.936	-14.798		0.007	-0.021	
		3.000	-0.088	7.473		0.007		
		6.000	-15.112	-15.327		0.007	0.021	
		6.000			2.688			0.005
	2	0.000			1.430			-0.047
		0.000	8.916	-7.103		0.060	-0.181	
		3.000	-0.975	4.809		0.060	0.000	
		6.000	-10.866	-12.952		0.060	0.181	
		6.000			1.430			-0.047
	3	0.000			1.885			0.055
		0.000	10.873	-12.885		-0.050	0.149	
		3.000	0.982	4.898		-0.050	0.000	
		6.000	-8.909	-6.992		-0.050	-0.149	
		6.000			1.885			0.055
	4	0.000			1.145			-0.041
		0.000	6.834	-5.301		0.052	-0.155	
		3.000	-0.834	3.700		0.052	0.000	
		6.000	-8.502	-10.303		0.052	0.155	
		6.000			1.145			-0.041
142								
	1	0.000			0.373			0.001
		0.000	7.089	-3.623		0.014	-0.022	
		1.600	-0.187	1.898		0.014	0.000	
		3.200	-7.462	-4.221		0.014	0.022	
		3.200			0.373			0.001
	2	0.000			-0.152			0.012
		0.000	3.980	-1.474		0.104	-0.167	
		1.600	-0.650	1.189		0.104	0.000	
		3.200	-5.280	-3.555		0.104	0.167	
		3.200			-0.152			0.012
	3	0.000			0.000			-0.015
		0.000	5.060	-3.162		-0.070	0.113	
		1.600	0.430	1.230		-0.070	0.000	
		3.200	-4.201	-1.787		-0.070	-0.113	
		3.200			0.000			-0.015
	4	0.000			-0.139			0.011
		0.000	2.981	-1.034		0.089	-0.143	
		1.600	-0.556	0.906		0.089	0.000	
		3.200	-4.092	-2.812		0.089	0.143	
		3.200			-0.139			0.011

1	0.000			1.158			0.075
	0.000	9.753	-11.930		0.008	-0.026	
	3.300	-1.123	6.871		0.008	0.000	
	6.600	-9.234	-10.218		0.008	0.026	
	6.600			1.158			0.075
2	0.000			-0.544			0.054
	0.000	9.852	-16.885		0.010	-0.033	
	3.300	1.250	5.425		0.010	0.000	
	6.600	-4.934	-0.654		0.010	0.033	
	6.600			-0.544			0.054
3	0.000			-5.113			0.056
	0.000	5.249	-1.511		0.006	-0.019	
	3.300	-3.354	5.606		0.006	0.000	
	6.600	-9.538	-15.665		0.006	0.019	
	6.600			-5.113			0.056
4	0.000			-0.469			0.044
	0.000	8.209	-14.196		0.008	-0.027	
	3.300	1.062	4.523		0.008	0.000	
	6.600	-4.010	-0.342		0.008	0.027	
	6.600			-0.469			0.044



PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
153								
	1	0.000			4.736			-0.119
		0.000	31.479	-39.586		0.014	-0.046	
		3.300	-9.080	28.459		0.014	0.000	
		6.600	-30.799	-37.341		0.014	0.046	
		6.600			4.736			-0.119
	2	0.000			2.438			-0.094
		0.000	26.589	-40.948		0.022	-0.073	
		3.300	-4.747	22.291		0.022	0.000	
		6.600	-19.598	-17.879		0.022	0.073	
		6.600			2.438			-0.094
	3	0.000			-2.614			-0.089
		0.000	19.937	-18.504		0.011	-0.035	
		3.300	-11.399	22.785		0.011	0.000	
		6.600	-26.250	-39.335		0.011	0.035	
		6.600			-2.614			-0.089
	4	0.000			2.003			-0.076
		0.000	21.735	-33.916		0.018	-0.059	
		3.300	-4.090	18.513		0.018	0.000	
		6.600	-15.786	-14.283		0.018	0.059	
		6.600			2.003			-0.076
154								
	1	0.000			3.169			-0.049
		0.000	23.897	-28.653		0.012	-0.039	
		3.300	-6.027	20.434		0.012	0.000	
		6.600	-24.072	-29.229		0.012	0.039	
		6.600			3.169			-0.049
	2	0.000			1.189			-0.038
		0.000	20.631	-31.671		0.020	-0.067	
		3.300	-2.264	15.787		0.020	0.000	
		6.600	-14.763	-12.307		0.020	0.067	
		6.600			1.189			-0.038
	3	0.000			-3.854			-0.034
		0.000	14.488	-10.945		0.009	-0.029	
		3.300	-8.406	16.243		0.009	0.000	
		6.600	-20.906	-32.122		0.009	0.029	
		6.600			-3.854			-0.034
	4	0.000			0.966			-0.030
		0.000	16.861	-26.251		0.016	-0.054	
		3.300	-1.944	13.063		0.016	0.000	
		6.600	-11.840	-9.681		0.016	0.054	
		6.600			0.966			-0.030

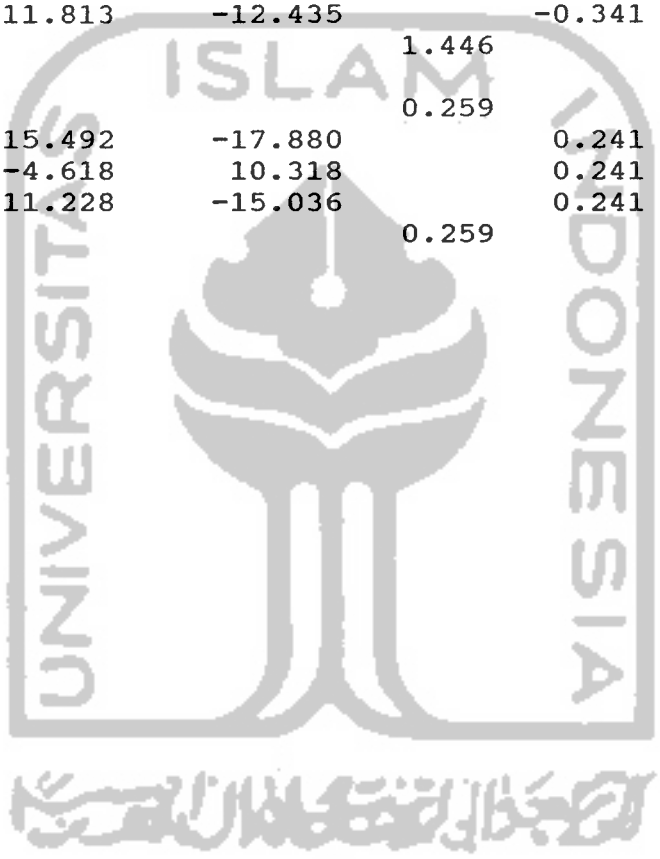
PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
155								
	1	0.000			1.157			-0.005
		0.000	7.044	-7.619		0.004	-0.013	
		3.300	-0.028	3.957		0.004	0.000	
		6.600	-7.101	-7.806		0.004	0.013	
		6.600			1.157			-0.005
	2	0.000			-0.879			-0.006
		0.000	6.382	-10.348		0.007	-0.024	
		3.300	1.514	2.680		0.007	0.000	
		6.600	-3.354	-0.357		0.007	0.024	
		6.600			-0.879			-0.006
	3	0.000			-5.072			-0.003
		0.000	3.243	0.128		0.003	-0.010	
		3.300	-1.626	2.796		0.003	0.000	
		6.600	-6.494	-10.601		0.003	0.010	
		6.600			-5.072			-0.003
	4	0.000			-0.806			-0.005
		0.000	5.143	-8.515		0.006	-0.019	
		3.300	1.299	2.113		0.006	0.000	
		6.600	-2.546	0.055		0.006	0.019	
		6.600			-0.806			-0.005

168 ----------

1	0.000			2.235		-0.245
	0.000	24.503	-30.477	-0.019	0.062	
	3.200	-4.967	15.179	-0.019	0.000	
	6.400	-16.437	-19.068	-0.019	-0.062	
	6.400			2.235		-0.245
2	0.000			0.340		-0.450
	0.000	18.643	-21.549	0.280	-0.897	
	3.200	-5.341	12.333	0.280	0.000	
	6.400	-13.576	-17.935	0.280	0.897	
	6.400			0.340		-0.450
3	0.000			1.446		0.095
	0.000	20.406	-27.332	-0.341	1.093	
	3.200	-3.579	12.192	-0.341	0.000	
	6.400	-11.813	-12.435	-0.341	-1.093	
	6.400			1.446		0.095
4	0.000			0.259		-0.378
	0.000	15.492	-17.880	0.241	-0.771	
	3.200	-4.618	10.318	0.241	0.000	
	6.400	-11.228	-15.036	0.241	0.771	
	6.400			0.259		-0.378



PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
169								
	1	0.000			1.165			0.111
		0.000	9.464	-9.085		0.012	-0.036	
		3.000	-0.198	4.813		0.012	0.000	
		6.000	-9.860	-10.274		0.012	0.036	
		6.000			1.165			0.111
	2	0.000			-0.014			0.028
		0.000	6.139	-3.995		0.154	-0.461	
		3.000	-1.108	3.551		0.154	0.000	
		6.000	-8.355	-10.645		0.154	0.461	
		6.000			-0.014			0.028
	3	0.000			0.062			0.145
		0.000	8.164	-9.974		-0.135	0.406	
		3.000	0.917	3.649		-0.135	0.000	
		6.000	-6.329	-4.469		-0.135	-0.406	
		6.000			0.062			0.145
	4	0.000			-0.029			0.021
		0.000	4.965	-3.140		0.131	-0.394	
		3.000	-0.946	2.889		0.131	0.000	
		6.000	-6.857	-8.815		0.131	0.394	
		6.000			-0.029			0.021
170								
	1	0.000			0.587			0.073
		0.000	2.296	-1.074		0.026	-0.042	
		1.600	-0.190	0.611		0.026	0.000	
		3.200	-2.676	-1.682		0.026	0.042	
		3.200			0.587			0.073
	2	0.000			-0.169			0.063
		0.000	1.020	0.138		0.182	-0.291	
		1.600	-0.693	0.399		0.182	0.000	
		3.200	-2.406	-2.080		0.182	0.291	
		3.200			-0.169			0.063
	3	0.000			-0.812			0.047
		0.000	2.178	-1.678		-0.077	0.123	
		1.600	0.465	0.437		-0.077	0.000	
		3.200	-1.248	-0.189		-0.077	-0.123	
		3.200			-0.812			0.047
	4	0.000			-0.167			0.052
		0.000	0.762	0.175		0.156	-0.250	
		1.600	-0.591	0.313		0.156	0.000	
		3.200	-1.943	-1.715		0.156	0.250	
		3.200			-0.167			0.052

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
171								
	1	0.000			4.379			-0.012
		0.000	46.266	-57.003		-0.008	0.025	
		3.200	-10.399	29.184		-0.008	0.000	
		6.400	-31.064	-37.158		-0.008	-0.025	
		6.400			4.379			-0.012
	2	0.000			1.842			-0.295
		0.000	34.700	-41.565		0.293	-0.939	
		3.200	-10.160	22.898		0.293	0.000	
		6.400	-23.520	-30.992		0.293	0.939	
		6.400			1.842			-0.295
	3	0.000			2.975			0.286
		0.000	36.472	-47.372		-0.320	1.025	
		3.200	-8.388	22.762		-0.320	0.000	
		6.400	-21.748	-25.457		-0.320	-1.025	
		6.400			2.975			0.286
	4	0.000			1.458			-0.253
		0.000	28.506	-34.223		0.252	-0.806	
		3.200	-8.771	18.953		0.252	0.000	
		6.400	-19.047	-25.555		0.252	0.806	
		6.400			1.458			-0.253
172								
	1	0.000			1.835			0.017
		0.000	13.563	-12.558		0.004	-0.013	
		3.000	-0.631	6.840		0.004		
		6.000	-14.824	-16.343		0.004	0.013	
		6.000			1.835			0.017
	2	0.000			0.497			-0.039
		0.000	8.627	-6.124		0.148	-0.443	
		3.000	-1.383	4.742		0.148	0.000	
		6.000	-11.394	-14.425		0.148	0.443	
		6.000			0.497			-0.039
	3	0.000			0.604			0.065
		0.000	10.571	-11.853		-0.141	0.424	
		3.000	0.560	4.844		-0.141	0.000	
		6.000	-9.450	-8.491		-0.141	-0.424	
		6.000			0.604			0.065
	4	0.000			0.393			-0.033
		0.000	6.809	-4.688		0.126	-0.379	
		3.000	-1.173	3.766		0.126	0.000	
		6.000	-9.154	-11.724		0.126	0.379	
		6.000			0.393			-0.033

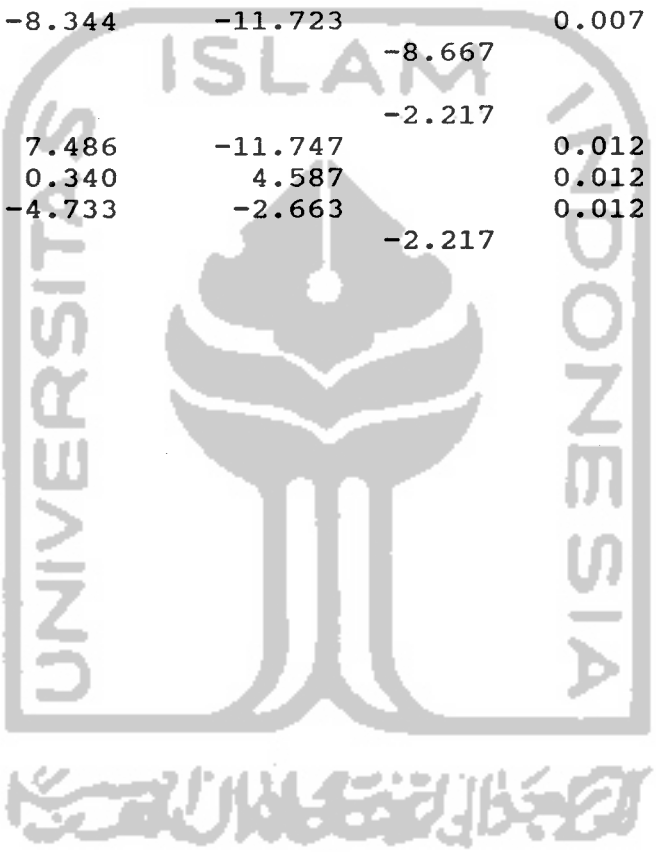
PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
173								
	1	0.000			0.773			-0.003
		0.000	3.398	-1.244		0.016	-0.025	
		1.600	-0.613	0.984		0.016	0.000	
		3.200	-4.623	-3.204		0.016	0.025	
		3.200			0.773			-0.003
	2	0.000			-0.038			0.018
		0.000	1.687	0.040		0.163	-0.260	
		1.600	-0.954	0.626		0.163	0.000	
		3.200	-3.595	-3.013		0.163	0.260	
		3.200			-0.038			0.018
	3	0.000			-0.658			-0.026
		0.000	2.766	-1.651		-0.107	0.172	
		1.600	0.125	0.662		-0.107	0.000	
		3.200	-2.516	-1.250		-0.107	-0.172	
		3.200			-0.658			-0.026
	4	0.000			-0.057			0.016
		0.000	1.246	0.126		0.139	-0.223	
		1.600	-0.801	0.482		0.139	0.000	
		3.200	-2.849	-2.438		0.139	0.223	
		3.200			-0.057			0.016

214 ----------

1	0.000		-1.113			0.117
	0.000	9.928	-12.439	0.009	-0.029	
	3.300	-0.948	6.941	0.009	0.000	
	6.600	-9.059	-9.570	0.009	0.029	
	6.600		-1.113			0.117
2	0.000		-2.557			0.084
	0.000	9.015	-14.045	0.015	-0.050	
	3.300	0.412	5.500	0.015	0.000	
	6.600	-5.772	-3.343	0.015	0.050	
	6.600		-2.557			0.084
3	0.000		-8.667			0.087
	0.000	6.442	-5.446	0.007	-0.025	
	3.300	-2.161	5.610	0.007	0.000	
	6.600	-8.344	-11.723	0.007	0.025	
	6.600		-8.667			0.087
4	0.000		-2.217			0.069
	0.000	7.486	-11.747	0.012	-0.040	
	3.300	0.340	4.587	0.012	0.000	
	6.600	-4.733	-2.663	0.012	0.040	
	6.600		-2.217			0.069



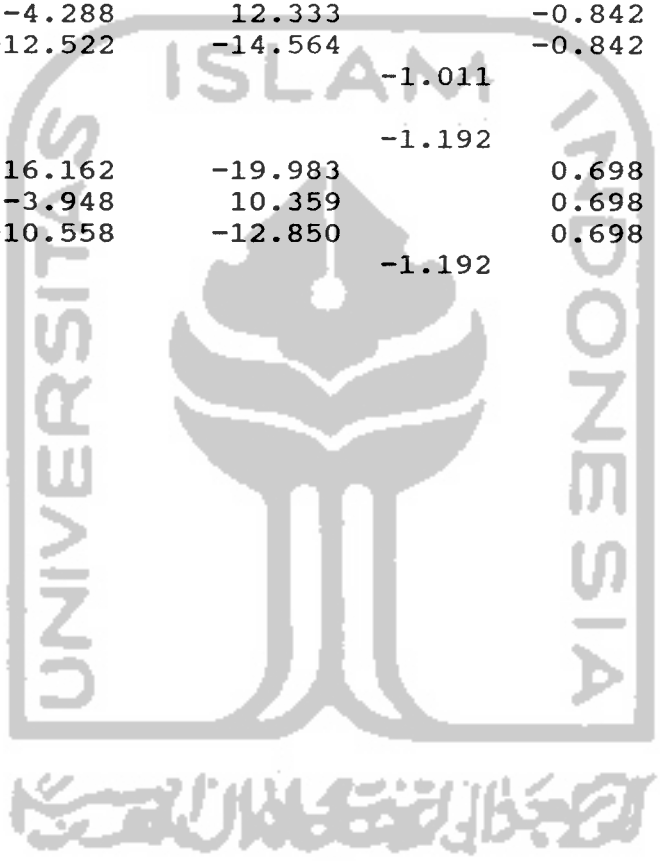
PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
215								
	1	0.000			-1.560			-0.187
		0.000	31.939	-40.877		0.041	-0.135	
		3.300	-8.621	28.684		0.041	0.000	
		6.600	-30.340	-35.601		0.041	0.135	
		6.600			-1.560			-0.187
	2	0.000			-2.450			-0.154
		0.000	24.726	-34.510		0.054	-0.180	
		3.300	-6.610	22.583		0.054	0.000	
		6.600	-21.461	-23.733		0.054	0.180	
		6.600			-2.450			-0.154
	3	0.000			-8.656			-0.151
		0.000	22.656	-27.525		0.033	-0.109	
		3.300	-8.680	22.736		0.033	0.000	
		6.600	-23.531	-30.412		0.033	0.109	
		6.600			-8.656			-0.151
	4	0.000			-2.040			-0.127
		0.000	20.128	-28.370		0.044	-0.144	
		3.300	-5.698	18.753		0.044	0.000	
		6.600	-17.394	-19.348		0.044	0.144	
		6.600			-2.040			-0.127
216								
	1	0.000			-11.276			-0.188
		0.000	18.293	-20.378		0.049	-0.162	
		3.300	-6.626	18.474		0.049	0.000	
		6.600	-19.666	-24.908		0.049	0.162	
		6.600			-11.276			-0.188
	2	0.000			-9.387			-0.131
		0.000	15.126	-19.551		0.059	-0.196	
		3.300	-4.709	14.790		0.059	0.000	
		6.600	-14.149	-16.324		0.059	0.196	
		6.600			-9.387			-0.131
	3	0.000			-17.026			-0.136
		0.000	13.004	-12.232		0.039	-0.127	
		3.300	-6.831	15.105		0.039	0.000	
		6.600	-16.271	-23.014		0.039	0.127	
		6.600			-17.026			-0.136
	4	0.000			-7.744			-0.103
		0.000	12.480	-16.266		0.048	-0.157	
		3.300	-4.031	12.376		0.048	0.000	
		6.600	-11.633	-13.470		0.048	0.157	
		6.600			-7.744			-0.103

226 ----------

1	0.000			-0.481			-0.294
	0.000	24.566	-30.519		0.012	-0.038	
	3.200	-4.905	15.339		0.012	0.000	
	6.400	-16.375	-18.708		0.012	0.038	
	6.400			-0.481			-0.294
2	0.000			-1.461			-0.528
	0.000	19.431	-24.014		0.815	-2.608	
	3.200	-4.554	12.390		0.815	0.000	
	6.400	-12.788	-15.357		0.815	2.608	
	6.400			-1.461			-0.528
3	0.000			-1.011			0.105
	0.000	19.697	-24.922		-0.842	2.696	
	3.200	-4.288	12.333		-0.842	0.000	
	6.400	-12.522	-14.564		-0.842	-2.696	
	6.400			-1.011			0.105
4	0.000			-1.192			-0.442
	0.000	16.162	-19.983		0.698	-2.233	
	3.200	-3.948	10.359		0.698	0.000	
	6.400	-10.558	-12.850		0.698	2.233	
	6.400			-1.192			-0.442



PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
227								
	1	0.000			-6.192			-0.195
		0.000	9.756	-6.199		0.185	-0.555	
		3.000	-0.942	7.022		0.185	0.000	
		6.000	-11.641	-11.853		0.185	0.555	
		6.000			-6.192			-0.195
	2	0.000			-5.068			-0.168
		0.000	7.090	-3.805		0.614	-1.842	
		3.000	-1.064	5.234		0.614	0.000	
		6.000	-9.218	-10.190		0.614	1.842	
		6.000			-5.068			-0.168
	3	0.000			-6.426			-0.219
		0.000	7.895	-6.082		-0.325	0.976	
		3.000	-0.259	5.371		-0.325	0.000	
		6.000	-8.413	-7.637		-0.325	-0.976	
		6.000			-6.426			-0.219
	4	0.000			-4.172			-0.147
		0.000	5.800	-3.084		0.521	-1.564	
		3.000	-0.889	4.283		0.521	0.000	
		6.000	-7.578	-8.417		0.521	1.564	
		6.000			-4.172			-0.147
228								
	1	0.000			-5.117			-0.036
		0.000	46.518	-57.084		0.013	-0.041	
		3.200	-10.147	29.910		0.013	0.000	
		6.400	-30.812	-35.624		0.013	0.041	
		6.400			-5.117			-0.036
	2	0.000			-4.991			-0.330
		0.000	35.645	-44.091		0.821	-2.628	
		3.200	-9.215	23.397		0.821	0.000	
		6.400	-22.575	-27.467		0.821	2.628	
		6.400			-4.991			-0.330
	3	0.000			-4.582			0.277
		0.000	35.948	-45.105		-0.823	2.634	
		3.200	-8.912	23.352		-0.823	0.000	
		6.400	-22.272	-26.543		-0.823	-2.634	
		6.400			-4.582			0.277
	4	0.000			-4.107			-0.281
		0.000	29.305	-36.371		0.704	-2.251	
		3.200	-7.971	19.363		0.704	0.000	
		6.400	-18.248	-22.587		0.704	2.251	
		6.400			-4.107			-0.281

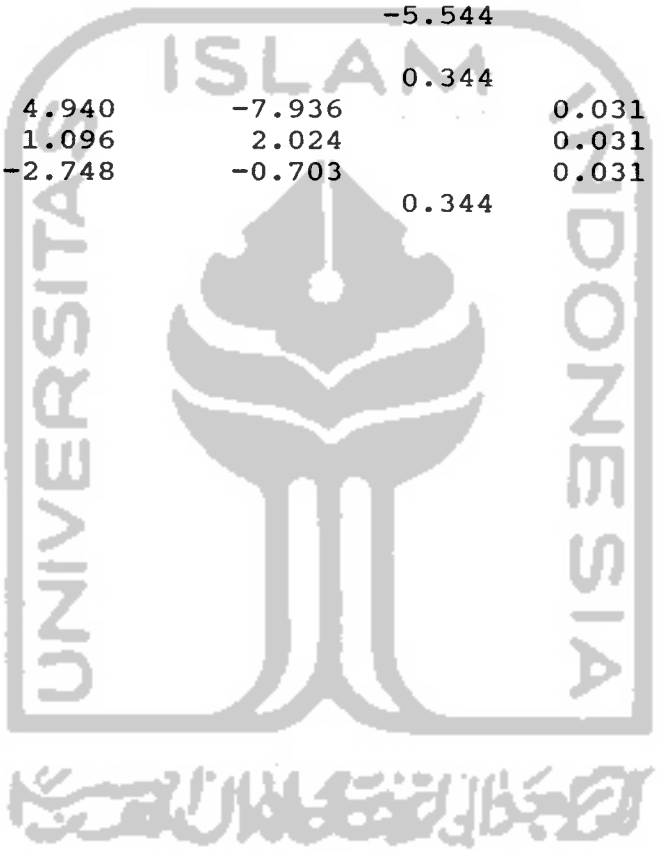
PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
229								
	1	0.000			-9.710			0.035
		0.000	13.380	-7.999		0.081	-0.243	
		3.000	-1.850	9.295		0.081	0.000	
		6.000	-17.081	-19.102		0.081	0.243	
		6.000			-9.710			0.035
	2	0.000			-7.250			-0.011
		0.000	9.290	-5.024		0.540	-1.620	
		3.000	-1.628	6.468		0.540	0.000	
		6.000	-12.546	-14.793		0.540	1.620	
		6.000			-7.250			-0.011
	3	0.000			-8.846			0.059
		0.000	9.927	-6.749		-0.415	1.244	
		3.000	-0.991	6.655		-0.415	0.000	
		6.000	-11.909	-12.695		-0.415	-1.244	
		6.000			-8.846			0.059
	4	0.000			-5.880			-0.010
		0.000	7.407	-3.918		0.460	-1.381	
		3.000	-1.352	5.165		0.460	0.000	
		6.000	-10.111	-12.028		0.460	1.381	
		6.000			-5.880			-0.010

236 ----------

1	0.000		1.633			0.028
	0.000	7.595	-9.437	0.025	-0.084	
	3.300	0.523	3.957	0.025	0.000	
	6.600	-6.550	-5.988	0.025	0.084	
	6.600		1.633			0.028
2	0.000		0.380			0.000
	0.000	6.152	-9.682	0.037	-0.122	
	3.300	1.284	2.587	0.037	0.000	
	6.600	-3.584	-1.208	0.037	0.122	
	6.600		0.380			0.000
3	0.000		-5.544			-0.001
	0.000	4.491	-4.018	0.028	-0.094	
	3.300	-0.378	2.769	0.028	0.000	
	6.600	-5.246	-6.510	0.028	0.094	
	6.600		-5.544			-0.001
4	0.000		0.344			-0.004
	0.000	4.940	-7.936	0.031	-0.101	
	3.300	1.096	2.024	0.031	0.000	
	6.600	-2.748	-0.703	0.031	0.101	
	6.600		0.344			-0.004



PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
237								
	1	0.000			-6.726			-0.616
		0.000	26.860	-30.906		0.182	-0.599	
		3.300	-0.219	23.743		0.182	0.000	
		6.600	-30.418	-31.776		0.182	0.599	
		6.600			-6.726			-0.616
	2	0.000			-6.500			-0.471
		0.000	21.057	-26.984		0.243	-0.803	
		3.300	0.657	18.200		0.243	0.000	
		6.600	-22.473	-22.143		0.243	0.803	
		6.600			-6.500			-0.471
	3	0.000			-12.206			-0.514
		0.000	19.281	-20.512		0.189	-0.623	
		3.300	-1.119	18.812		0.189	0.000	
		6.600	-24.248	-27.391		0.189	0.623	
		6.600			-12.206			-0.514
	4	0.000			-5.356			-0.379
		0.000	17.210	-22.272		0.201	-0.664	
		3.300	0.544	15.042		0.201	0.000	
		6.600	-18.462	-18.248		0.201	0.664	
		6.600			-5.356			-0.379
238								
	1	0.000			-3.811			-0.281
		0.000	12.147	-7.887		0.142	-0.467	
		3.300	-1.397	9.851		0.142	0.000	
		6.600	-14.940	-17.105		0.142	0.467	
		6.600			-3.811			-0.281
	2	0.000			-4.672			-0.422
		0.000	11.296	-14.041		0.215	-0.709	
		3.300	1.245	6.652		0.215	0.000	
		6.600	-8.805	-5.822		0.215	0.709	
		6.600			-4.672			-0.422
	3	0.000			-8.125			-0.214
		0.000	6.085	3.926		0.150	-0.496	
		3.300	-3.966	7.421		0.150	0.000	
		6.600	-14.016	-22.250		0.150	0.496	
		6.600			-8.125			-0.214
	4	0.000			-3.879			-0.350
		0.000	9.281	-11.775		0.178	-0.588	
		3.300	1.114	5.376		0.178	0.000	
		6.600	-7.053	-4.422		0.178	0.588	
		6.600			-3.879			-0.350

1	0.000			-3.949		-0.660
	0.000	26.400	-29.224		0.044	-0.139
	3.200	-5.812	19.844		0.044	0.000
	6.400	-17.864	-18.038		0.044	0.139
	6.400			-3.949		-0.660
2	0.000			-7.462		-0.768
	0.000	21.032	-22.763		1.131	-3.618
	3.200	-5.401	16.359		1.131	0.000
	6.400	-14.195	-14.994		1.131	3.618
	6.400			-7.462		-0.768
3	0.000			-1.484		-0.293
	0.000	21.513	-24.644		-1.114	3.565
	3.200	-4.921	16.016		-1.114	0.000
	6.400	-13.714	-13.799		-1.114	-3.565
	6.400			-1.484		-0.293
4	0.000			-6.449		-0.646
	0.000	17.546	-18.957		0.968	-3.098
	3.200	-4.675	13.733		0.968	0.000
	6.400	-11.776	-12.589		0.968	3.098
	6.400			-6.449		-0.646

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
249								
	1	0.000			0.576			0.164
		0.000	1.418	1.534		-0.029	0.043	
		1.500	-1.981	1.113		-0.029	0.000	
		3.000	-5.380	-4.407		-0.029	-0.043	
		3.000			0.576			0.164
	2	0.000			-4.936			0.191
		0.000	-0.354	2.556		4.867	-7.301	
		1.500	-2.921	0.099		4.867	0.000	
		3.000	-5.489	-6.208		4.867	7.301	
		3.000			-4.936			0.191
	3	0.000			4.426			0.049
		0.000	2.852	-0.755		-4.897	7.345	
		1.500	0.285	1.597		-4.897	0.000	
		3.000	-2.283	0.099		-4.897	-7.345	
		3.000			4.426			0.049
	4	0.000			-4.274			0.160
		0.000	-0.345	2.131		4.174	-6.260	
		1.500	-2.445	0.039		4.174	0.000	
		3.000	-4.544	-5.203		4.174	6.260	
		3.000			-4.274			0.160
250								
	1	0.000			-7.424			0.028
		0.000	34.363	-40.276		0.015	-0.047	
		3.200	-4.863	24.588		0.015	0.000	
		6.400	-22.010	-18.410		0.015	0.047	
		6.400			-7.424			0.028
	2	0.000			-9.776			-0.197
		0.000	26.534	-30.941		1.110	-3.552	
		3.200	-4.683	19.477		1.110	0.000	
		6.400	-16.579	-14.541		1.110	3.552	
		6.400			-9.776			-0.197
	3	0.000			-3.476			0.259
		0.000	27.161	-33.236		-1.114	3.564	
		3.200	-4.055	19.189		-1.114	0.000	
		6.400	-15.951	-12.821		-1.114	-3.564	
		6.400			-3.476			0.259
	4	0.000			-8.283			-0.167
		0.000	21.874	-25.513		0.951	-3.043	
		3.200	-4.109	16.159		0.951	0.000	
		6.400	-13.532	-12.067		0.951	3.043	
		6.400			-8.283			-0.167

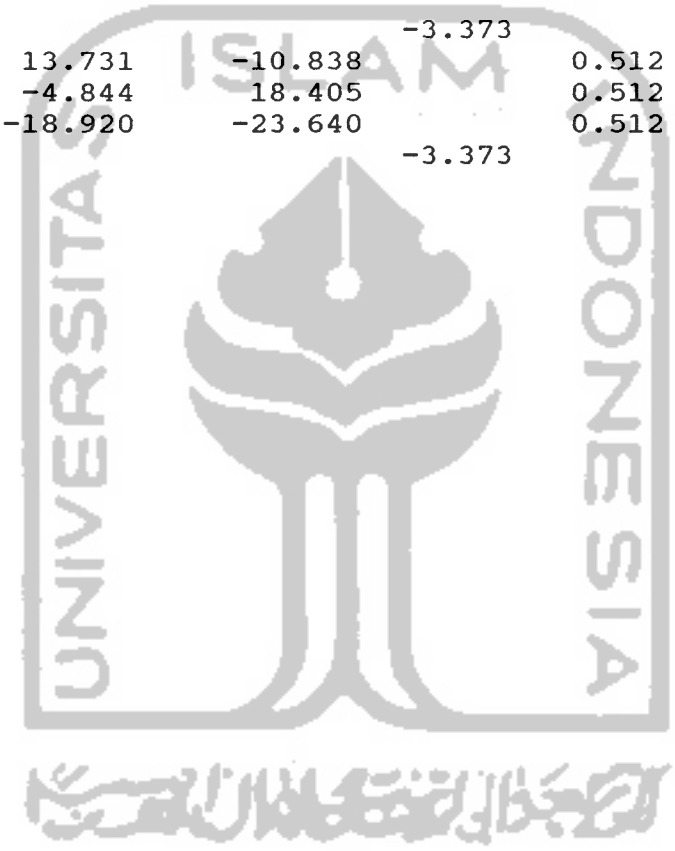
PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
251								
	1	0.000			5.265			0.032
		0.000	0.261	4.469		-0.010	0.015	
		1.500	-4.487	1.299		-0.010	0.000	
		3.000	-9.236	-8.993		-0.010	-0.015	
		3.000			5.265			0.032
	2	0.000			-1.609			0.059
		0.000	-1.106	4.435		4.879	-7.319	
		1.500	-4.447	0.271		4.879	0.000	
		3.000	-7.788	-8.906		4.879	7.319	
		3.000			-1.609			0.059
	3	0.000			8.927			-0.071
		0.000	1.671	1.656		-4.871	7.306	
		1.500	-1.671	1.656		-4.871	0.000	
		3.000	-5.012	-3.356		-4.871	-7.306	
		3.000			8.927			-0.071
	4	0.000			-1.587			0.048
		0.000	-1.013	3.681		4.183	-6.274	
		1.500	-3.674	0.166		4.183	0.000	
		3.000	-6.336	-7.341		4.183	6.274	
		3.000			-1.587			0.048

258 ----------

1	0.000			-3.059		-0.674
	0.000	20.466	-14.101	0.686	-2.265	
	3.300	-7.249	27.147	0.686	0.000	
	6.600	-28.964	-36.385	0.686	2.265	
	6.600			-3.059		-0.674
2	0.000			-4.023		-0.480
	0.000	16.541	-12.947	0.622	-2.054	
	3.300	-5.711	21.934	0.622	0.000	
	6.600	-22.712	-28.271	0.622	2.054	
	6.600			-4.023		-0.480
3	0.000			-9.782		-0.501
	0.000	15.733	-9.860	0.663	-2.187	
	3.300	-6.518	22.354	0.663	0.000	
	6.600	-23.520	-30.517	0.663	2.187	
	6.600			-9.782		-0.501
4	0.000			-3.373		-0.383
	0.000	13.731	-10.838	0.512	-1.690	
	3.300	-4.844	18.405	0.512	0.000	
	6.600	-18.920	-23.640	0.512	1.690	
	6.600			-3.373		-0.383



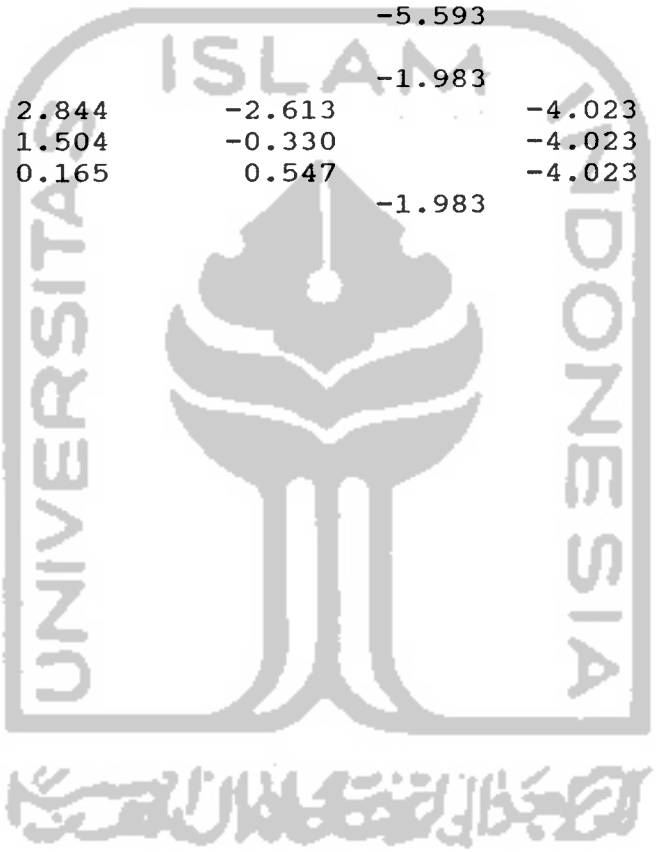
PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
259								
	1	0.000			-4.422			1.112
		0.000	25.513	-14.337		1.564	-5.162	
		3.300	-8.292	34.743		1.564	0.000	
		6.600	-35.191	-40.784		1.564	5.162	
		6.600			-4.422			1.112
	2	0.000			-3.265			0.645
		0.000	20.682	-15.605		1.417	-4.676	
		3.300	-5.854	26.943		1.417	0.000	
		6.600	-26.347	-29.496		1.417	4.676	
		6.600			-3.265			0.645
	3	0.000			-12.516			0.835
		0.000	18.436	-6.644		1.511	-4.988	
		3.300	-8.101	28.491		1.511	0.000	
		6.600	-28.593	-35.361		1.511	4.988	
		6.600			-12.516			0.835
	4	0.000			-2.684			0.492
		0.000	17.038	-13.017		1.166	-3.848	
		3.300	-4.950	22.427		1.166	0.000	
		6.600	-21.758	-24.476		1.166	3.848	
		6.600			-2.684			0.492

266 ----------

1	0.000			-0.139			2.713
	0.000	2.274	-0.783		-5.120	5.376	
	1.050	0.180	0.505		-5.120	0.000	
	2.100	-1.914	-0.405		-5.120	-5.376	
	2.100			-0.139			2.713
2	0.000			-2.320			1.583
	0.000	3.388	-3.074		-4.875	5.118	
	1.050	1.765	-0.369		-4.875	0.000	
	2.100	0.142	0.632		-4.875	-5.118	
	2.100			-2.320			1.583
3	0.000			-5.593			3.335
	0.000	-3.954	7.220		-5.283	5.547	
	1.050	-5.577	2.216		-5.283	0.000	
	2.100	-7.200	-4.492		-5.283	-5.547	
	2.100			-5.593			3.335
4	0.000			-1.983			1.270
	0.000	2.844	-2.613		-4.023	4.224	
	1.050	1.504	-0.330		-4.023	0.000	
	2.100	0.165	0.547		-4.023	-4.224	
	2.100			-1.983			1.270



PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
267								
	1	0.000			-0.071			-2.713
		0.000	1.981	-0.466		5.120	-5.376	
		1.050	-0.113	0.515		5.120	0.000	
		2.100	-2.206	-0.703		5.120	5.376	
		2.100			-0.071			-2.713
	2	0.000			2.175			-1.583
		0.000	3.163	-1.313		4.875	-5.118	
		1.050	1.540	1.157		4.875	0.000	
		2.100	-0.083	1.922		4.875	5.118	
		2.100			2.175			-1.583
	3	0.000			-3.440			-3.335
		0.000	-4.002	3.620		5.283	-5.547	
		1.050	-5.626	-1.434		5.283	0.000	
		2.100	-7.249	-8.193		5.283	5.547	
		2.100			-3.440			-3.335
	4	0.000			1.870			-1.270
		0.000	2.668	-1.120		4.023	-4.224	
		1.050	1.329	0.978		4.023	0.000	
		2.100	-0.011	1.669		4.023	4.224	
		2.100			1.870			-1.270

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270 ------------------------------------------
      1   0.000                      -4.487                      0.214
          0.000      21.364    -15.399          -0.007    0.021
          3.200      -1.327     23.380          -0.007    0.000
          6.400     -19.818    -10.451          -0.007   -0.021
          6.400                      -4.487                      0.214

      2   0.000                      -4.576                      0.292
          0.000      14.478     -9.143           0.940   -3.010
          3.200      -1.905     16.853           0.940    0.000
          6.400     -14.612     -9.575           0.940    3.010
          6.400                      -4.576                      0.292

      3   0.000                      -4.429                      0.124
          0.000      16.029    -14.052          -0.969    3.101
          3.200      -0.354     16.908          -0.969    0.000
          6.400     -13.061     -4.556          -0.969   -3.101
          6.400                      -4.429                      0.124

      4   0.000                      -3.778                      0.257
          0.000      11.523     -7.274           0.806   -2.579
          3.200      -1.655     13.557           0.806    0.000
          6.400     -11.683     -7.783           0.806    2.579
          6.400                      -3.778                      0.257
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PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
271								
	1	0.000			-9.891			-0.162
		0.000	14.584	-13.907		-0.007	0.022	
		3.200	2.196	12.941		-0.007	0.000	
		6.400	-10.192	0.148		-0.007	-0.022	
		6.400			-9.891			-0.162
	2	0.000			-9.248			-0.116
		0.000	10.079	-8.408		0.947	-3.032	
		3.200	1.073	9.435		0.947	0.000	
		6.400	-7.933	-1.541		0.947	3.032	
		6.400			-9.248			-0.116
	3	0.000			-9.765			-0.147
		0.000	11.556	-13.430		-0.965	3.088	
		3.200	2.550	9.139		-0.965	0.000	
		6.400	-6.457	2.887		-0.965	-3.088	
		6.400			-9.765			-0.147
	4	0.000			-7.617			-0.096
		0.000	8.116	-6.748		0.812	-2.598	
		3.200	0.852	7.600		0.812	0.000	
		6.400	-6.411	-1.294		0.812	2.598	
		6.400			-7.617			-0.096

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
275								
	1	0.000			0.000			0.000
		0.000	0.000	0.000		0.000	0.000	
		1.500	-4.749	-3.562		0.000	0.000	
		3.000	-9.497	-14.246		0.000	0.000	
		3.000			0.000			0.000
	2	0.000			0.000			0.000
		0.000	0.000	0.000		0.000	0.000	
		1.500	-3.341	-2.506		0.000	0.000	
		3.000	-6.683	-10.024		0.000	0.000	
		3.000			0.000			0.000
	3	0.000			0.000			0.000
		0.000	0.000	0.000		0.000	0.000	
		1.500	-3.341	-2.506		0.000	0.000	
		3.000	-6.683	-10.024		0.000	0.000	
		3.000			0.000			0.000
	4	0.000			0.000			0.000
		0.000	0.000	0.000		0.000	0.000	
		1.500	-2.662	-1.996		0.000	0.000	
		3.000	-5.323	-7.985		0.000	0.000	
		3.000			0.000			0.000
276								
	1	0.000			-14.445			-0.053
		0.000	2.920	2.183		0.038	-0.057	
		1.500	-1.829	3.002		0.038	0.000	
		3.000	-6.577	-3.303		0.038	0.057	
		3.000			-14.445			-0.053
	2	0.000			-12.336			-0.094
		0.000	1.484	2.423		5.524	-8.286	
		1.500	-1.857	2.144		5.524	0.000	
		3.000	-5.198	-3.148		5.524	8.286	
		3.000			-12.336			-0.094
	3	0.000			-16.235			-0.091
		0.000	3.175	0.432		-3.245	4.868	
		1.500	-0.167	2.688		-3.245	0.000	
		3.000	-3.508	-0.068		-3.245	-4.868	
		3.000			-16.235			-0.091
	4	0.000			-10.120			-0.081
		0.000	1.110	2.065		4.736	-7.104	
		1.500	-1.551	1.734		4.736	0.000	
		3.000	-4.213	-2.589		4.736	7.104	
		3.000			-10.120			-0.081

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
300								
	1	0.000			-2.071			0.442
		0.000	3.958	-2.119		0.363	-1.197	
		3.300	0.077	4.539		0.363	0.000	
		6.600	-3.804	-1.609		0.363	1.197	
		6.600			-2.071			0.442
	2	0.000			-2.321			0.301
		0.000	3.455	-2.054		0.366	-1.208	
		3.300	0.060	3.746		0.366	0.000	
		6.600	-3.336	-1.661		0.366	1.208	
		6.600			-2.321			0.301
	3	0.000			-4.420			0.361
		0.000	3.369	-1.548		0.243	-0.801	
		3.300	-0.027	3.967		0.243	0.000	
		6.600	-3.422	-1.723		0.243	0.801	
		6.600			-4.420			0.361
	4	0.000			-1.953			0.239
		0.000	2.946	-1.734		0.304	-1.002	
		3.300	0.035	3.185		0.304	0.000	
		6.600	-2.875	-1.501		0.304	1.002	
		6.600			-1.953			0.239
301								
	1	0.000			-2.021			0.334
		0.000	4.381	-2.953		0.361	-1.190	
		3.300	0.500	5.101		0.361	0.000	
		6.600	-3.381	0.348		0.361	1.190	
		6.600			-2.021			0.334
	2	0.000			-2.176			0.232
		0.000	4.071	-3.933		0.364	-1.203	
		3.300	0.675	3.897		0.364	0.000	
		6.600	-2.721	0.522		0.364	1.203	
		6.600			-2.176			0.232
	3	0.000			-4.380			0.283
		0.000	3.334	-0.744		0.239	-0.788	
		3.300	-0.061	4.656		0.239	0.000	
		6.600	-3.457	-1.149		0.239	0.788	
		6.600			-4.380			0.283
	4	0.000			-1.818			0.185
		0.000	3.452	-3.297		0.303	-0.998	
		3.300	0.542	3.294		0.303	0.000	
		6.600	-2.369	0.279		0.303	0.998	
		6.600			-1.818			0.185

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
308								
	1	0.000			-0.148			0.000
		0.000	2.471	-0.215		0.000	0.000	
		2.100	0.001	2.380		0.000	0.000	
		4.200	-2.468	-0.210		0.000	0.000	
		4.200			-0.148			0.000
	2	0.000			-0.120			0.000
		0.000	2.259	-0.383		0.000	0.000	
		2.100	0.098	2.091		0.000	0.000	
		4.200	-2.063	0.028		0.000	0.000	
		4.200			-0.120			0.000
	3	0.000			-1.802			0.000
		0.000	0.705	2.854		0.000	0.000	
		2.100	-1.456	2.065		0.000	0.000	
		4.200	-3.617	-3.262		0.000	0.000	
		4.200			-1.802			0.000
	4	0.000			-0.101			0.000
		0.000	1.936	-0.326		0.000	0.000	
		2.100	0.084	1.795		0.000	0.000	
		4.200	-1.768	0.026		0.000	0.000	
		4.200			-0.101			0.000

PORTAL RUMAH SUSUN TON-M

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
310								
	1	0.000			-1.415			-0.373
		0.000	3.828	-1.721		0.004	-0.012	
		3.200	0.064	4.506		0.004	0.000	
		6.400	-3.699	-1.308		0.004	0.012	
		6.400			-1.415			-0.373
	2	0.000			-1.437			-0.122
		0.000	3.193	-0.834		0.572	-1.830	
		3.200	-0.099	4.116		0.572	0.000	
		6.400	-3.392	-1.470		0.572	1.830	
		6.400			-1.437			-0.122
	3	0.000			-1.442			-0.416
		0.000	3.522	-1.887		-0.567	1.815	
		3.200	0.229	4.115		-0.567	0.000	
		6.400	-3.064	-0.421		-0.567	-1.815	
		6.400			-1.442			-0.416
	4	0.000			-1.182			-0.089
		0.000	2.737	-0.671		0.490	-1.568	
		3.200	-0.085	3.572		0.490	0.000	
		6.400	-2.908	-1.217		0.490	1.568	
		6.400			-1.182			-0.089
311								
	1	0.000			-0.988			-0.161
		0.000	3.683	-0.956		0.004	-0.013	
		3.200	-0.080	4.808		0.004	0.000	
		6.400	-3.844	-1.470		0.004	0.013	
		6.400			-0.988			-0.161
	2	0.000			-1.161			-0.065
		0.000	2.998	-0.013		0.573	-1.833	
		3.200	-0.295	4.312		0.573	0.000	
		6.400	-3.588	-1.900		0.573	1.833	
		6.400			-1.161			-0.065
	3	0.000			-0.732			-0.155
		0.000	3.304	-0.970		-0.567	1.814	
		3.200	0.011	4.333		-0.567	0.000	
		6.400	-3.282	-0.900		-0.567	-1.814	
		6.400			-0.732			-0.155
	4	0.000			-0.966			-0.048
		0.000	2.571	0.015		0.491	-1.571	
		3.200	-0.252	3.725		0.491	0.000	
		6.400	-3.074	-1.597		0.491	1.571	
		6.400			-0.966			-0.048

LAMPIRAN 8

```
/PENULANGAN PORTAL RUMAH SUSUN (TON,M)
C   THREE-DIMENSIONAL DUCTILE MOMENT RESISTING CONCRETE FRAME
C   CAPACITY CHECK AND DESIGN
C
C   CONTROL INFORMATION DATA BLOCK
CONTROL
IX=0 IC=7,21,1 IU=M       :ALL OTHER VALUES ARE DEFAULTS
C
COMBO
C 1.2 DL  = 1.2 x 0.9/0.8 = 1.350
C 1.6 LL  = 1.6 x 0.9/0.8 = 1.800
C 1.05 DL  = 1.05 x 0.9/0.8 = 1.181
C 1.05 Lr LL  = 1.05 x 0.75 x 0.9/0.8 = 0.886
C 1.05 EQx = 1.05 x 0.9/0.8 = 1.181
C 1.05 EQy = 1.05 x 0.9/0.8 = 1.181
C 30% 1.05 EQx = 0.3 x 1.05 x 0.9/0.8 = 0.227
C 30% 1.05 EQy = 0.3 x 1.05 x 0.9/0.8 = 0.227
C 0.9 DL  = 0.9 x 0.9/0.8 = 1.013
C 0.9 EQx = 0.9 x 0.9/0.8 = 1.013
C 0.9 EQy = 0.9 x 0.9/0.8 = 1.013
C 30% 0.9 EQx = 0.9 x 0.9/0.8 = 0.304
C 30% 0.9 EQy = 0.9 x 0.9/0.8 = 0.304
C      DD       DD       LL      LL       EQx      EQy
1    C=1350    1350     1800    1800       0        0        : (1.2DD+1.6DL)
2    C=1181    1181     591     591       1181     227      : 1.05(DD+DLL+-EQ)
3    C=1181    1181     591     591      -1181     227
4    C=1181    1181     591     591       1181    -227
5    C=1181    1181     591     591      -1181    -227
6    C=1181    1181     591     591       1181     227
7    C=1181    1181     591     591      -1181     227
8    C=1181    1181     591     591       1181    -227
9    C=1181    1181     591     591      -1181    -227
10   C=1013    1013     0       0         1013     304      :0.9(DD+-EQ)
11   C=1013    1013     0       0        -1013     304
12   C=1013    1013     0       0         1013    -304
13   C=1013    1013     0       0        -1013    -304
14   C=1013    1013     0       0          304     1013
15   C=1013    1013     0       0         -304     1013
16   C=1013    1013     0       0          304    -1013
17   C=1013    1013     0       0         -304    -1013
:
C SECTION INFORMATION DATA BLOCK
SECTIONS
1 MN=C SH=b E=2.1E9 F=4E7,3E6,1.8E7 T=0.8,0.5,0.07,0.07
2 MN=C SH=b E=2.1E9 F=4E7,3E6,1.8E7 T=0.7,0.4,0.07,0.07
3 MN=C SH=b E=2.1E9 F=4E7,3E6,1.8E7 T=0.6,0.3,0.06,0.06
4 MN=C SH=b E=2.1E9 F=4E7,3E6,1.8E7 T=0.4,0.3,0.06,0.06
5 MN=C SH=b E=2.1E9 F=4E7,3E6,1.8E7 T=0.5,0.3,0.06,0.06
6 MN=C SH=c E=2.1E9 F=4E7,3E6,1.8E7 IS=RR-5-5 T=0.6,0.6,0.09 \
  A=4.914E-4
7 MN=C SH=c E=2.1E9 F=4E7,3E6,1.8E7 IS=RR-3-3 T=0.4,0.4,0.06 \
  A=4.914E-4
8 MN=C SH=c E=2.1E9 F=4E7,3E6,1.8E7 IS=RR-2-2 T=0.3,0.3,0.045 \
  A=4.914E-4
9 MN=C SH=b E=2.1E9 F=4E7,3E6,1.8E7 T=0.4,0.3,0.06,0.06
10 MN=C SH=c E=2.1E9 F=4E7,3E6,1.8E7 IS=RR-7-7 T=0.6,0.6,0.09 \
   A=4.914E-4
```

LAMPIRAN 9

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

INTERACTION CHECK OF COLUMN-TYPE ELEMENTS

ELEM ID	STATN LOC	RATIO <LC>	<---DESIGN POINT---> P	M33	M22	<DESIGN FACTORS> PHI	D33	D22	<--FAILURE POINT--> PC	MC33	MC22
1											
	.0	.44 < 7>	309	5	65	.70	1.29	1.16	711	11	150
	8.0	.27 < 1>	337	21	7	.70	1.30	1.39	1234	77	27
5											
	.0	.56 < 8>	511	26	68	.70	1.32	1.22	908	47	121
	8.0	.50 < 1>	588	46	1	.70	1.45	1.69	1184	93	1
9											
	.0	.56 < 7>	505	26	69	.70	1.32	1.21	898	46	122
	8.0	.50 < 1>	587	47	0	.70	1.44	1.69	1177	94	0
13											
	.0	.57 < 7>	513	29	68	.70	1.31	1.22	898	50	120
	8.0	.51 < 1>	595	48	0	.70	1.44	1.71	1178	94	1
17											
	.0	.43 < 8>	314	8	63	.70	1.29	1.16	732	19	147
	8.0	.28 < 1>	346	21	7	.70	1.32	1.29	1245	74	27
2											
	.0	.50 < 7>	444	7	68	.70	1.18	1.21	888	14	136
	8.0	.35 < 1>	480	9	16	.70	1.42	1.53	1359	26	44
6											
	.0	.67 < 7>	740	3	71	.70	1.61	1.28	1109	4	107
	8.0	.59 < 1>	851	18	2	.70	1.77	1.48	1432	29	3
10											
	.0	.66 < 7>	742	3	69	.70	1.61	1.27	1122	5	105
	8.0	.59 < 1>	849	15	0	.70	1.77	1.96	1446	26	0
14											
	.0	.66 < 8>	740	0	70	.70	1.61	1.28	1117	0	106
	8.0	.59 < 1>	851	15	2	.70	1.77	1.97	1448	25	3
18											
	.0	.49 < 8>	452	4	66	.70	1.21	1.21	913	8	134
	8.0	.36 < 1>	491	8	15	.70	1.43	1.50	1368	23	43
3											
	.0	.32 < 7>	192	5	49	.71	1.07	1.08	608	17	154
	8.0	.16 < 1>	202	6	12	.71	1.14	1.16	1243	35	71
7											
	.0	.36 < 8>	327	4	49	.70	1.13	1.11	904	12	135
	8.0	.26 < 1>	371	10	0	.70	1.28	1.27	1408	36	2
11											
	.0	.36 < 8>	324	4	49	.70	1.13	1.10	901	10	135
	8.0	.26 < 1>	369	10	0	.70	1.28	1.27	1408	37	0
15											
	.0	.36 < 8>	324	2	49	.70	1.14	1.10	898	5	136
	8.0	.26 < 1>	370	10	1	.70	1.28	1.27	1407	36	2
19											
	.0	.31 < 8>	192	3	48	.71	1.08	1.08	628	8	156
	8.0	.16 < 1>	203	6	12	.71	1.14	1.17	1243	35	71
4											
	.0	.23 < 7>	51	3	30	.84	1.03	1.02	226	12	132
	8.0	.05 < 1>	46	2	5	.85	1.03	1.03	1028	39	110
8											
	.0	.21 < 8>	76	5	31	.82	1.04	1.03	360	22	146
	8.0	.07 < 1>	86	4	0	.81	1.06	1.06	1307	64	4

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

INTERACTION CHECK OF COLUMN-TYPE ELEMENTS

ELEM ID	STATN LOC	RATIO <LC>	<---DESIGN POINT---> P	M33	M22	<DESIGN FACTORS> PHI	D33	D22	<--FAILURE POINT--> PC	MC33	MC22
12											
	.0	.21 < 8>	75	4	30	.82	1.04	1.03	366	21	147
	8.0	.07 < 1>	84	5	0	.81	1.06	1.06	1284	70	1
16											
	.0	.21 < 7>	75	6	29	.82	1.04	1.03	363	30	143
	8.0	.07 < 1>	83	5	0	.81	1.06	1.06	1275	72	2
20											
	.0	.22 < 7>	30	9	24	.86	1.01	1.01	138	42	108
	8.0	.04 < 1>	42	3	5	.85	1.03	1.03	941	62	108
21											
	.0	.69 < 1>	291	42	63	.70	2.28	9.22	419	61	91
	4.0	.75< 1>	291	20	8	.70	2.37	.00	0	0	0
25											
	.0	.72 < 8>	439	54	50	.70	1.80	1.73	605	75	70
	4.0	.79 < 1>	506	83	20	.70	2.06	14.60	640	105	26
29											
	.0	.72 < 7>	433	54	51	.70	1.80	1.70	600	74	70
	4.0	.80 < 1>	503	85	19	.70	2.01	24.03	629	107	24
33											
	.0	.74 < 7>	440	56	51	.70	1.79	1.74	596	76	70
	4.0	.78 < 1>	511	87	7	.70	2.02	39.04	652	111	9
37											
	.0	.76 < 1>	298	23	5	.70	2.11	.00	0	0	0
	4.0	.82 < 1>	298	23	8	.70	2.26	.00	0	0	0
22											
	.0	.53 < 7>	384	14	51	.70	1.73	1.63	731	27	98
	4.0	.73 < 7>	384	17	83	.70	1.80	1.80	525	23	113
26											
	.0	.65 < 7>	645	22	41	.70	2.31	1.43	994	34	63
	4.0	.72 < 7>	645	28	54	.70	2.24	1.44	892	38	75
30											
	.0	.63 < 7>	647	16	39	.70	2.32	1.42	1024	25	62
	4.0	.70 < 7>	647	23	51	.70	2.32	1.43	928	32	73
34											
	.0	.64 < 8>	646	18	41	.70	2.32	1.43	1007	29	63
	4.0	.71 < 8>	646	25	53	.70	2.32	1.43	908	36	74
38											
	.0	.53 < 8>	392	12	52	.70	1.91	1.66	743	23	99
	4.0	.73 < 8>	392	15	83	.70	1.94	1.81	537	21	114
23											
	.0	.27 < 7>	153	8	30	.70	1.24	1.18	558	28	109
	4.0	.37 < 7>	153	9	43	.70	1.27	1.21	417	24	118
27											
	.0	.30 < 7>	255	9	25	.70	1.55	1.13	854	29	85
	4.0	.35 < 7>	255	11	34	.70	1.56	1.14	726	32	96
31											
	.0	.29 < 8>	254	6	25	.70	1.65	1.13	873	21	87
	4.0	.34 < 8>	254	9	33	.70	1.65	1.13	745	26	97
35											
	.0	.30 < 8>	254	7	26	.70	1.63	1.13	859	25	86
	4.0	.35 < 8>	254	10	34	.70	1.61	1.13	731	29	97

'PENULANGAN PORTAL RUMAH SUSUN (TON,M)

:NTERACTION CHECK OF COLUMN-TYPE ELEMENTS

ELEM ID	STATN LOC	RATIO <LC>	<---DESIGN POINT---> P	M33	M22	<DESIGN FACTORS> PHI	D33	D22	<--FAILURE POINT--> PC	MC33	MC22
39											
	.0	.27 < 8>	153	6	30	.70	1.27	1.18	566	22	112
	4.0	.36 < 8>	153	7	43	.70	1.29	1.21	422	21	119
24											
	.0	.12 < 7>	32	2	14	.85	1.06	1.07	278	18	122
	4.0	.12 < 7>	32	2	14	.85	1.08	1.08	274	17	123
28											
	.0	.11 < 7>	47	2	14	.83	1.17	1.05	423	14	123
	4.0	.11 < 7>	47	2	14	.83	1.17	1.05	415	14	124
32											
	.0	.11 < 8>	46	0	14	.83	1.19	1.05	432	3	128
	4.0	.11 < 8>	46	1	14	.83	1.19	1.05	429	6	127
36											
	.0	.11 < 8>	46	1	14	.83	1.19	1.05	425	8	126
	4.0	.11 < 8>	46	1	14	.83	1.19	1.05	417	10	126
40											
	.0	.11 < 8>	31	1	14	.85	1.07	1.07	278	10	126
	4.0	.11 < 8>	31	1	14	.85	1.08	1.08	273	13	125
41											
	.0	.37 < 1>	234	34	18	.70	1.34	1.75	633	92	48
	3.0	.37 < 7>	211	23	31	.70	1.32	1.42	573	61	85
45											
	.0	.58 < 1>	399	63	2	.70	1.29	1.39	691	110	3
	3.0	.55 < 1>	399	58	3	.70	1.29	1.71	728	106	6
49											
	.0	.59 < 1>	394	65	1	.70	1.28	1.26	673	112	1
	3.0	.56 < 1>	394	60	1	.70	1.28	1.70	708	108	2
53											
	.0	.59 < 1>	402	66	0	.70	1.29	1.72	677	112	0
	3.0	.57 < 1>	402	61	0	.70	1.28	1.41	711	109	1
57											
	.0	.39 < 1>	240	37	18	.70	1.33	1.81	613	95	45
	3.0	.37 < 8>	215	24	31	.70	1.32	1.41	576	64	82
42											
	.0	.43 < 1>	328	12	41	.70	1.33	1.24	757	28	95
	3.0	.47 < 7>	295	13	49	.70	1.24	1.19	629	28	105
46											
	.0	.50 < 1>	576	22	2	.70	1.36	1.20	1148	44	3
	3.0	.50 < 7>	499	20	29	.70	1.29	1.12	996	40	58
50											
	.0	.49 < 1>	574	18	0	.70	1.36	1.21	1178	38	1
	3.0	.48 < 7>	500	17	26	.70	1.30	1.11	1035	36	53
54											
	.0	.49 < 1>	578	17	1	.70	1.36	1.29	1189	35	2
	3.0	.50 < 8>	500	18	29	.70	1.30	1.12	1008	37	58
58											
	.0	.43 < 1>	340	6	41	.70	1.35	1.25	797	15	97
	3.0	.47 < 8>	303	12	49	.70	1.27	1.20	649	25	105
43											
	.0	.20 < 7>	87	7	22	.78	1.08	1.05	426	35	110
	3.0	.24 < 7>	87	6	29	.78	1.07	1.05	356	26	118

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

INTERACTION CHECK OF COLUMN-TYPE ELEMENTS

ELEM ID	STATN LOC	RATIO <LC>	<---DESIGN POINT---> P	M33	M22	<DESIGN FACTORS> PHI	D33	D22	<--FAILURE POINT--> PC	MC33	MC22
47											
	.0	.20 < 8>	164	10	14	.70	1.13	1.03	836	52	71
	3.0	.23 < 7>	164	10	20	.70	1.13	1.03	723	43	89
51											
	.0	.19 < 8>	163	10	13	.70	1.13	1.03	856	52	68
	3.0	.22 < 8>	163	8	19	.70	1.14	1.03	758	38	89
55											
	.0	.19 < 8>	163	10	13	.70	1.13	1.03	843	53	70
	3.0	.22 < 8>	163	9	20	.70	1.13	1.03	726	40	91
59											
	.0	.20 < 8>	86	6	23	.78	1.08	1.05	430	31	113
	3.0	.24 < 8>	86	6	29	.78	1.08	1.05	357	23	120
44											
	.0	.05 < 8>	9	1	6	.89	1.01	1.01	191	16	118
	3.0	.11 < 7>	14	4	12	.88	1.01	1.02	121	32	105
48											
	.0	.04 < 8>	21	3	3	.87	1.03	1.01	562	70	77
	3.0	.09 < 8>	21	4	10	.87	1.03	1.01	230	40	107
52											
	.0	.03 < 8>	21	2	2	.87	1.03	1.01	652	73	69
	3.0	.09 < 8>	21	4	9	.87	1.03	1.01	244	41	107
56											
	.0	.04 < 7>	21	3	3	.87	1.03	1.01	572	68	79
	3.0	.09 < 7>	21	3	10	.87	1.03	1.01	239	37	110
60											
	.0	.04 < 7>	9	0	5	.89	1.01	1.01	194	8	121
	3.0	.11 < 8>	13	3	12	.88	1.02	1.02	120	25	107
61											
	.0	.30 < 1>	177	29	13	.70	1.19	1.36	589	97	44
	3.0	.38 < 1>	177	37	19	.70	1.19	1.40	461	97	50
64											
	.0	.49 < 1>	292	58	1	.70	1.17	1.21	596	117	3
	3.0	.58 < 1>	292	72	1	.70	1.17	1.35	505	124	2
67											
	.0	.50 < 1>	285	59	1	.70	1.16	1.15	573	119	1
	3.0	.58 < 1>	285	73	1	.70	1.16	1.34	491	125	2
70											
	.0	.50 < 1>	294	60	0	.70	1.16	1.35	583	119	0
	3.0	.58 < 1>	294	73	1	.70	1.17	1.35	503	124	1
73											
	.0	.32 < 1>	182	32	13	.70	1.19	1.39	572	100	41
	3.0	.39 < 1>	182	38	19	.70	1.20	1.41	470	99	48
62											
	.0	.36 < 1>	237	9	37	.70	1.14	1.14	668	26	103
	3.0	.45 < 7>	210	14	50	.70	1.10	1.12	468	30	112
65											
	.0	.37 < 1>	414	18	3	.70	1.17	1.14	1126	48	7
	3.0	.39 < 1>	414	23	2	.70	1.17	1.17	1069	60	6
68											
	.0	.35 < 1>	410	14	0	.70	1.17	1.15	1166	40	1
	3.0	.37 < 1>	410	19	0	.70	1.17	1.17	1118	51	1

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

INTERACTION CHECK OF COLUMN-TYPE ELEMENTS

ELEM ID	STATN LOC	RATIO <LC>	<---DESIGN POINT---> P	M33	M22	<DESIGN FACTORS> PHI	D33	D22	<--FAILURE POINT--> PC	MC33	MC22
71											
	.0	.35 < 1>	416	13	2	.70	1.17	1.17	1176	37	6
	3.0	.37 < 8>	357	22	17	.70	1.14	1.07	957	60	45
74											
	.0	.35 < 1>	250	4	37	.70	1.15	1.15	720	11	105
	3.0	.44 < 8>	219	12	50	.70	1.12	1.13	492	26	113
63											
	.0	.18 < 7>	35	8	18	.85	1.02	1.02	196	44	102
	3.0	.29 < 7>	35	14	27	.85	1.02	1.02	118	49	93
66											
	.0	.13 < 8>	63	12	8	.81	1.03	1.01	489	91	58
	3.0	.19 < 8>	63	19	10	.81	1.03	1.02	327	99	51
69											
	.0	.12 < 8>	62	11	6	.81	1.03	1.01	535	93	53
	3.0	.18 < 8>	62	18	8	.81	1.03	1.01	352	103	47
72											
	.0	.12 < 7>	63	11	7	.81	1.03	1.01	521	91	57
	3.0	.18 < 7>	63	18	9	.81	1.03	1.02	351	99	51
75											
	.0	.17 < 8>	34	7	17	.85	1.02	1.02	204	40	105
	3.0	.28 < 8>	34	13	27	.85	1.02	1.02	122	45	97
76											
	.0	.73 < 1>	122	20	10	.70	1.51	1.94	167	27	13
	3.0	.94 < 1>	122	28	9	.70	1.52	2.17	130	30	9
79											
	.0	.75 < 1>	187	36	3	.70	1.42	1.76	177	34	3
	3.0	.84 < 1>	187	39	5	.70	1.44	2.04	162	34	4
82											
	.0	.65 < 1>	179	40	1	.70	1.38	1.37	160	35	1
	3.0	.69 < 1>	179	46	1	.70	1.39	1.95	136	35	1
85											
	.0	.79 < 1>	188	42	2	.70	1.39	2.04	157	35	1
	3.0	.86 < 1>	188	45	2	.70	1.40	1.92	144	35	2
88											
	.0	.90 < 1>	125	27	9	.70	1.43	2.10	139	30	10
	3.0	.97 < 1>	125	36	8	.70	1.45	2.25	108	31	7
77											
	.0	.73 < 1>	147	9	20	.70	1.34	1.35	202	12	28
	3.0	.92 < 1>	147	15	24	.70	1.34	1.39	159	16	26
80											
	.0	.51 < 8>	212	10	0	.70	1.39	1.42	417	19	1
	3.0	.63 < 1>	246	14	1	.70	1.49	1.52	391	22	2
83											
	.0	.47 < 9>	209	7	1	.70	1.38	1.18	445	16	2
	3.0	.54 < 7>	209	12	1	.70	1.38	1.22	385	23	3
86											
	.0	.49 < 1>	248	3	2	.70	1.49	1.47	503	7	3
	3.0	.57 < 7>	213	14	0	.70	1.40	1.42	374	24	0
89											
	.0	.64 < 1>	159	1	20	.70	1.38	1.39	251	1	32
	3.0	.84 < 8>	138	14	21	.70	1.30	1.36	165	17	25

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

INTERACTION CHECK OF COLUMN-TYPE ELEMENTS

ELEM ID	STATN LOC	RATIO <LC>	<---DESIGN POINT---> P	M33	M22	<DESIGN FACTORS> PHI	D33	D22	<--FAILURE POINT--> PC	MC33	MC22
78											
	.0	.88 < 7>	25	9	21	.82	1.02	1.02	28	10	24
	3.0	.92 < 7>	25	11	21	.82	1.03	1.02	27	12	23
81											
	.0	.89 < 8>	62	10	24	.72	1.07	1.04	70	11	27
	3.0	.70 < 8>	62	0	23	.72	1.14	1.04	88	1	32
84											
	.0	.80 < 8>	39	8	21	.77	1.03	1.03	49	10	26
	3.0	.68 <11>	34	7	17	.79	1.05	1.02	50	10	26
87											
	.0	.68 < 1>	60	35	0	.72	1.07	1.09	51	30	0
	3.0	.78 < 7>	61	4	23	.72	1.14	1.04	78	6	30
90											
	.0	.97 < 7>	9	18	14	.87	1.01	1.01	9	19	15
	3.0	.85 <16>	22	11	19	.82	1.02	1.02	26	12	22
91											
	.0	.98 < 1>	69	26	13	.70	1.13	1.16	69	26	13
	3.0	.85 < 1>	69	25	26	.70	1.12	1.18	51	19	19
93											
	.0	.88 < 1>	107	49	0	.70	1.15	1.20	68	31	0
	3.0	.77 < 1>	107	43	2	.70	1.14	1.16	78	31	2
95											
	.0	.78 < 1>	101	27	0	.70	1.16	1.13	130	34	1
	3.0	.61 < 1>	101	22	0	.70	1.15	1.18	167	36	0
97											
	.0	.96 < 1>	107	47	1	.70	1.15	1.17	71	31	1
	3.0	.83 < 1>	107	41	3	.70	1.14	1.17	80	31	2
99											
	.0	.93 < 1>	72	24	12	.70	1.14	1.17	77	26	13
	3.0	.84 < 1>	72	25	26	.70	1.13	1.19	54	19	19
92											
	.0	.88 < 7>	69	20	24	.70	1.11	1.08	61	18	21
	3.0	.75 < 7>	69	20	27	.70	1.10	1.10	55	16	22
94											
	.0	.39 < 1>	125	11	1	.70	1.16	1.14	319	28	2
	3.0	.46 < 1>	125	14	1	.70	1.12	1.15	270	31	3
96											
	.0	.49 < 8>	99	13	6	.70	1.16	1.06	203	27	13
	3.0	.38 < 7>	99	9	6	.70	1.16	1.06	259	24	15
98											
	.0	.36 < 1>	125	10	0	.70	1.17	1.16	343	26	0
	3.0	.44 < 1>	125	13	1	.70	1.12	1.13	285	30	3
100											
	.0	.95 < 8>	71	20	24	.70	1.11	1.09	62	17	21
	3.0	.85 < 8>	71	20	28	.70	1.11	1.10	57	16	22
101											
	.0	.85 < 1>	20	39	0	.83	1.01	1.03	13	25	0
	3.0	.76 < 1>	20	28	1	.83	1.01	1.03	19	26	1
103											
	.0	.86 < 1>	20	40	1	.83	1.01	1.03	13	25	0
	3.0	.65 < 1>	20	28	1	.83	1.01	1.03	19	26	1

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

INTERACTION CHECK OF COLUMN-TYPE ELEMENTS

ELEM ID	STATN LOC	RATIO <LC>	<---DESIGN POINT---> P	M33	M22	<DESIGN FACTORS> PHI	D33	D22	<--FAILURE POINT--> PC	MC33	MC22
104											
	.0	.77 < 1>	20	45	0	.83	1.01	1.03	11	25	0
	3.0	.61 < 1>	20	27	1	.83	1.01	1.03	20	26	1
106											
	.0	.78 < 1>	20	45	1	.83	1.01	1.03	11	25	0
	3.0	.71 < 1>	20	27	1	.83	1.01	1.03	20	26	1
102											
	.0	.42 < 6>	11	9	6	.86	1.02	1.01	26	21	14
	3.0	.72 < 1>	9	18	0	.87	1.02	1.01	13	25	0
105											
	.0	.59 < 1>	9	15	1	.87	1.02	1.01	16	26	1
	3.0	.82 < 1>	9	21	0	.87	1.02	1.01	11	25	0
107											
	.0	.70 < 1>	4	4	6	.87	1.02	1.02	6	6	9
	3.0	.36 < 1>	4	2	3	.87	1.02	1.02	11	6	9
109											
	.0	.39 < 1>	4	4	0	.88	1.01	1.01	10	10	1
	3.0	.22 < 1>	4	2	0	.88	1.01	1.01	17	11	2
111											
	.0	.19 < 8>	5	2	1	.87	1.02	1.01	26	10	5
	3.0	.18 < 7>	5	2	1	.87	1.02	1.01	27	10	6
113											
	.0	.38 < 1>	4	4	0	.88	1.01	1.01	10	10	1
	3.0	.22 < 1>	4	2	0	.88	1.01	1.01	16	11	1
115											
	.0	.70 < 1>	4	4	6	.87	1.02	1.02	6	6	9
	3.0	.34 < 1>	4	2	3	.87	1.02	1.02	11	6	8
108											
	.0	.76 < 7>	4	3	7	.87	1.02	1.01	5	4	9
	3.0	.48 < 7>	4	2	5	.87	1.02	1.01	9	3	10
110											
	.0	.85 < 1>	6	8	0	.86	1.02	1.02	7	10	0
	3.0	.52 < 1>	6	5	1	.86	1.01	1.02	11	10	1
112											
	.0	.31 < 8>	5	1	3	.87	1.02	1.01	15	5	10
	3.0	.26 < 8>	5	1	3	.87	1.02	1.01	18	3	11
114											
	.0	.86 < 1>	6	8	0	.86	1.02	1.01	7	10	0
	3.0	.52 < 1>	6	5	1	.86	1.01	1.02	11	10	1
116											
	.0	.77 < 8>	4	3	7	.87	1.02	1.01	5	4	9
	3.0	.48 < 8>	4	2	5	.87	1.02	1.01	9	4	10
117											
	.0	.95 < 1>	3	20	0	.88	1.00	1.01	1	9	0
	3.0	.50 < 7>	5	2	5	.87	1.01	1.02	9	4	10
118											
	.0	.85 < 1>	3	20	0	.88	1.00	1.01	1	9	0
	3.0	.50 < 8>	5	2	5	.87	1.01	1.02	9	4	10
119											
	.0	.95 < 1>	3	20	0	.88	1.00	1.01	1	9	0
	3.0	.43 <15>	4	2	4	.87	1.01	1.02	9	4	10

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

INTERACTION CHECK OF COLUMN-TYPE ELEMENTS

ELEM ID	STATN LOC	RATIO	<LC>	<---DESIGN POINT---> P	M33	M22	<DESIGN FACTORS> PHI	D33	D22	<--FAILURE POINT--> PC	MC33	MC22
120												
	.0	.85	< 1>	3	20	0	.88	1.00	1.01	1	9	0
	3.0	.43	<16>	4	2	4	.87	1.01	1.02	9	4	10
320												
	.0	.68	< 1>	-102	0	150	.90	1.00	1.00	-60	0	89
	4.0	.68	< 1>	-102	0	150	.90	1.00	1.00	-60	0	89
321												
	.0	.79	< 1>	-85	0	124	.90	1.00	1.00	-61	0	89
	4.0	.79	< 1>	-85	0	124	.90	1.00	1.00	-61	0	89
322												
	.0	.90	< 1>	-68	0	98	.90	1.00	1.00	-62	0	89
	3.0	.90	< 1>	-68	0	98	.90	1.00	1.00	-62	0	89
323												
	.0	.83	< 1>	-52	0	74	.90	1.00	1.00	-62	0	89
	3.0	.83	< 1>	-52	0	74	.90	1.00	1.00	-62	0	89
324												
	.0	.55	< 1>	-35	0	49	.90	1.00	1.00	-63	0	89
	3.0	.55	< 1>	-35	0	49	.90	1.00	1.00	-63	0	89
325												
	.0	.28	< 1>	-19	0	25	.90	1.00	1.00	-67	0	88
	3.0	.28	< 1>	-19	0	25	.90	1.00	1.00	-67	0	88
326												
	.0	.67	< 1>	-102	0	149	.90	1.00	1.00	-61	0	89
	4.0	.67	< 1>	-102	0	149	.90	1.00	1.00	-61	0	89
327												
	.0	.88	< 1>	-85	0	123	.90	1.00	1.00	-61	0	89
	4.0	.88	< 1>	-85	0	123	.90	1.00	1.00	-61	0	89
328												
	.0	.90	< 1>	-68	0	98	.90	1.00	1.00	-62	0	89
	3.0	.90	< 1>	-68	0	98	.90	1.00	1.00	-62	0	89
329												
	.0	.83	< 1>	-52	0	74	.90	1.00	1.00	-62	0	89
	3.0	.83	< 1>	-52	0	74	.90	1.00	1.00	-62	0	89
330												
	.0	.55	< 1>	-35	0	49	.90	1.00	1.00	-63	0	89
	3.0	.55	< 1>	-35	0	49	.90	1.00	1.00	-63	0	89
331												
	.0	.28	< 1>	-19	0	25	.90	1.00	1.00	-67	0	88
	3.0	.28	< 1>	-19	0	25	.90	1.00	1.00	-67	0	88

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

SHEAR DESIGN OF COLUMN-TYPE ELEMENTS

ELEM ID	SECTION SIZE T3 X T2	SECTION SHAPE	STATN LOC	<SHEAR ALONG 2-2 AXIS> AV COMB	V22	PU	<SHEAR ALONG 3-3 AXIS> AV <LC>	V33	PU
1	.70 X .70	RR-5-5	.0	25.19 < 1>	68	236	25.19 < 1>	68	236
			8.0	25.19 < 1>	68	236	25.19 < 1>	68	236
5	.70 X .70	RR-5-5	.0	27.10 < 8>	76	358	27.10 < 8>	76	358
			8.0	27.10 < 8>	76	358	27.10 < 8>	76	358
9	.70 X .70	RR-5-5	.0	27.10 < 6>	76	354	27.10 < 6>	76	354
			8.0	27.10 < 6>	76	354	27.10 < 6>	76	354
13	.70 X .70	RR-5-5	.0	27.10 < 7>	76	359	27.10 < 7>	76	359
			8.0	27.10 < 7>	76	359	27.10 < 7>	76	359
17	.70 X .70	RR-5-5	.0	25.38 < 1>	69	242	25.38 < 1>	69	242
			8.0	25.38 < 1>	69	242	25.38 < 1>	69	242
2	.70 X .70	RR-5-5	.0	27.08 < 1>	75	336	27.08 < 1>	75	336
			8.0	27.08 < 1>	75	336	27.08 < 1>	75	336
6	.70 X .70	RR-5-5	.0	26.05 <11>	79	443	26.05 <11>	79	443
			8.0	26.05 <11>	79	443	26.05 <11>	79	443
10	.70 X .70	RR-5-5	.0	26.00 <17>	79	445	26.00 <17>	79	445
			8.0	26.00 <17>	79	445	26.00 <17>	79	445
14	.70 X .70	RR-5-5	.0	26.04 <16>	79	443	26.04 <16>	79	443
			8.0	26.04 <16>	79	443	26.04 <16>	79	443
18	.70 X .70	RR-5-5	.0	27.09 < 1>	75	343	27.09 < 1>	75	343
			8.0	27.09 < 1>	75	343	27.09 < 1>	75	343
3	.70 X .70	RR-5-5	.0	20.97 < 1>	60	143	20.97 < 1>	60	143
			8.0	20.97 < 1>	60	143	20.97 < 1>	60	143
7	.70 X .70	RR-5-5	.0	25.75 < 1>	70	260	25.75 < 1>	70	260
			8.0	25.75 < 1>	70	260	25.75 < 1>	70	260
11	.70 X .70	RR-5-5	.0	25.72 < 1>	70	259	25.72 < 1>	70	259
			8.0	25.72 < 1>	70	259	25.72 < 1>	70	259
15	.70 X .70	RR-5-5	.0	25.73 < 1>	70	259	25.73 < 1>	70	259
			8.0	25.73 < 1>	70	259	25.73 < 1>	70	259
19	.70 X .70	RR-5-5	.0	21.00 < 1>	60	143	21.00 < 1>	60	143
			8.0	21.00 < 1>	60	143	21.00 < 1>	60	143
4	.70 X .70	RR-5-5	.0	14.80 < 7>	49	43	14.80 < 7>	49	43
			8.0	14.80 < 7>	49	43	14.80 < 7>	49	43
8	.70 X .70	RR-5-5	.0	16.72 < 1>	52	69	16.72 < 1>	52	69
			8.0	16.72 < 1>	52	69	16.72 < 1>	52	69

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

SHEAR DESIGN OF COLUMN-TYPE ELEMENTS

ELEM ID	SECTION SIZE T3 X T2	SECTION SHAPE	STATN LOC	<SHEAR ALONG 2-2 AXIS> AV COMB	V22	PU	<SHEAR ALONG 3-3 AXIS> AV <LC>	V33	PU
12	.70 X .70	RR-5-5	.0	16.62 < 1>	52	68	16.62 < 1>	52	68
			8.0	16.62 < 1>	52	68	16.62 < 1>	52	68
16	.70 X .70	RR-5-5	.0	16.60 < 1>	52	67	16.60 < 1>	52	67
			8.0	16.60 < 1>	52	67	16.60 < 1>	52	67
20	.70 X .70	RR-5-5	.0	14.71 < 8>	49	42	14.71 < 8>	49	42
			8.0	14.71 < 8>	49	42	14.71 < 8>	49	42
21	.60 X .60	RR-7-7	.0	36.97 <11>	60	159	36.97 <11>	60	159
			4.0	36.97 <11>	60	159	36.97 <11>	60	159
25	.60 X .60	RR-7-7	.0	36.06 <15>	64	259	36.06 <15>	64	259
			4.0	36.06 <15>	64	259	36.06 <15>	64	259
29	.60 X .60	RR-7-7	.0	36.09 <17>	64	258	36.09 <17>	64	258
			4.0	36.09 <17>	64	258	36.09 <17>	64	258
33	.60 X .60	RR-7-7	.0	36.06 <12>	64	259	36.06 <12>	64	259
			4.0	36.06 <12>	64	259	36.06 <12>	64	259
37	.60 X .60	RR-7-7	.0	36.97 <12>	60	161	36.97 <12>	60	161
			4.0	36.97 <12>	60	161	36.97 <12>	60	161
22	.60 X .60	RR-7-7	.0	36.74 <12>	62	207	36.74 <12>	62	207
			4.0	36.74 <12>	62	207	36.74 <12>	62	207
26	.60 X .60	RR-7-7	.0	30.91 <11>	66	386	30.91 <11>	66	386
			4.0	30.91 <11>	66	386	30.91 <11>	66	386
30	.60 X .60	RR-7-7	.0	30.73 <17>	66	388	30.73 <17>	66	388
			4.0	30.73 <17>	66	388	30.73 <17>	66	388
34	.60 X .60	RR-7-7	.0	30.90 <16>	66	386	30.90 <16>	66	386
			4.0	30.90 <16>	66	386	30.90 <16>	66	386
38	.60 X .60	RR-7-7	.0	36.72 <15>	62	211	36.72 <15>	62	211
			4.0	36.72 <15>	62	211	36.72 <15>	62	211
23	.60 X .60	RR-7-7	.0	36.29 < 1>	58	112	36.29 < 1>	58	112
			4.0	36.29 < 1>	58	112	36.29 < 1>	58	112
27	.60 X .60	RR-7-7	.0	36.91 <12>	60	155	36.91 <12>	60	155
			4.0	36.91 <12>	60	155	36.91 <12>	60	155
31	.60 X .60	RR-7-7	.0	36.89 < 9>	61	178	36.89 < 9>	61	178
			4.0	36.89 < 9>	61	178	36.89 < 9>	61	178
35	.60 X .60	RR-7-7	.0	36.91 <15>	60	155	36.91 <15>	60	155
			4.0	36.91 <15>	60	155	36.91 <15>	60	155

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

SHEAR DESIGN OF COLUMN-TYPE ELEMENTS

ELEM ID	SECTION T3 X T2	SIZE SECTION SHAPE	STATN LOC	<SHEAR ALONG 2-2 AXIS> AV COMB	V22	PU	<SHEAR ALONG 3-3 AXIS> AV <LC>	V33	PU
39	.60 X .60	RR-7-7							
			.0	36.29 < 1>	57	112	36.29 < 1>	57	112
			4.0	36.29 < 1>	57	112	36.29 < 1>	57	112
24	.60 X .60	RR-7-7							
			.0	34.09 < 7>	52	27	34.09 < 7>	52	27
			4.0	34.09 < 7>	52	27	34.09 < 7>	52	27
28	.60 X .60	RR-7-7							
			.0	34.65 < 1>	53	43	34.65 < 1>	53	43
			4.0	34.65 < 1>	53	43	34.65 < 1>	53	43
32	.60 X .60	RR-7-7							
			.0	34.60 < 1>	53	42	34.60 < 1>	53	42
			4.0	34.60 < 1>	53	42	34.60 < 1>	53	42
36	.60 X .60	RR-7-7							
			.0	34.59 < 1>	53	42	34.59 < 1>	53	42
			4.0	34.59 < 1>	53	42	34.59 < 1>	53	42
40	.60 X .60	RR-7-7							
			.0	34.05 < 8>	52	26	34.05 < 8>	52	26
			4.0	34.05 < 8>	52	26	34.05 < 8>	52	26
41	.60 X .60	RR-7-7							
			.0	62.78 < 1>	81	163	62.78 < 1>	81	163
			3.0	62.78 < 1>	81	163	62.78 < 1>	81	163
45	.60 X .60	RR-7-7							
			.0	63.81 < 6>	85	241	63.81 < 6>	85	241
			3.0	63.81 < 6>	85	241	63.81 < 6>	85	241
49	.60 X .60	RR-7-7							
			.0	63.78 < 6>	85	238	63.78 < 6>	85	238
			3.0	63.78 < 6>	85	238	63.78 < 6>	85	238
53	.60 X .60	RR-7-7							
			.0	63.82 < 6>	85	241	63.82 < 6>	85	241
			3.0	63.82 < 6>	85	241	63.82 < 6>	85	241
57	.60 X .60	RR-7-7							
			.0	62.84 < 1>	81	168	62.84 < 1>	81	168
			3.0	62.84 < 1>	81	168	62.84 < 1>	81	168
42	.60 X .60	RR-7-7							
			.0	63.66 < 1>	84	229	63.66 < 1>	84	229
			3.0	63.66 < 1>	84	229	63.66 < 1>	84	229
46	.60 X .60	RR-7-7							
			.0	62.78 <11>	87	298	62.78 <11>	87	298
			3.0	62.78 <11>	87	298	62.78 <11>	87	298
50	.60 X .60	RR-7-7							
			.0	62.75 <17>	87	300	62.75 <17>	87	300
			3.0	62.75 <17>	87	300	62.75 <17>	87	300
54	.60 X .60	RR-7-7							
			.0	62.78 <16>	87	298	62.78 <16>	87	298
			3.0	62.78 <16>	87	298	62.78 <16>	87	298
58	.60 X .60	RR-7-7							
			.0	63.78 < 1>	85	238	63.78 < 1>	85	238
			3.0	63.78 < 1>	85	238	63.78 < 1>	85	238
43	.60 X .60	RR-7-7							
			.0	59.18 < 1>	73	71	59.18 < 1>	73	71
			3.0	59.18 < 1>	73	71	59.18 < 1>	73	71

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

SHEAR DESIGN OF COLUMN-TYPE ELEMENTS

ELEM ID	SECTION SIZE T3 X T2	SECTION SHAPE	STATN LOC	<SHEAR ALONG 2-2 AXIS> AV COMB	V22	PU	<SHEAR ALONG 3-3 AXIS> AV <LC>	V33	PU
47	.60 X .60	RR-7-7	.0	61.57 < 1>	78	130	61.57 < 1>	78	130
			3.0	61.57 < 1>	78	130	61.57 < 1>	78	130
51	.60 X .60	RR-7-7	.0	61.53 < 1>	78	129	61.53 < 1>	78	129
			3.0	61.53 < 1>	78	129	61.53 < 1>	78	129
55	.60 X .60	RR-7-7	.0	61.52 < 1>	78	129	61.52 < 1>	78	129
			3.0	61.52 < 1>	78	129	61.52 < 1>	78	129
59	.60 X .60	RR-7-7	.0	59.11 < 1>	73	70	59.11 < 1>	73	70
			3.0	59.11 < 1>	73	70	59.11 < 1>	73	70
44	.60 X .60	RR-7-7	.0	55.19 < 7>	68	12	55.19 < 7>	68	12
			3.0	55.19 < 7>	68	12	55.19 < 7>	68	12
48	.60 X .60	RR-7-7	.0	55.77 < 1>	68	21	55.77 < 1>	68	21
			3.0	55.77 < 1>	68	21	55.77 < 1>	68	21
52	.60 X .60	RR-7-7	.0	55.72 < 1>	68	20	55.72 < 1>	68	20
			3.0	55.72 < 1>	68	20	55.72 < 1>	68	20
56	.60 X .60	RR-7-7	.0	55.72 < 1>	68	20	55.72 < 1>	68	20
			3.0	55.72 < 1>	68	20	55.72 < 1>	68	20
60	.60 X .60	RR-7-7	.0	55.16 < 8>	67	12	55.16 < 8>	67	12
			3.0	55.16 < 8>	67	12	55.16 < 8>	67	12
61	.60 X .60	RR-7-7	.0	61.31 < 1>	78	124	61.31 < 1>	78	124
			3.0	61.31 < 1>	78	124	61.31 < 1>	78	124
64	.60 X .60	RR-7-7	.0	63.33 < 1>	83	204	63.33 < 1>	83	204
			3.0	63.33 < 1>	83	204	63.33 < 1>	83	204
67	.60 X .60	RR-7-7	.0	63.27 < 1>	83	200	63.27 < 1>	83	200
			3.0	63.27 < 1>	83	200	63.27 < 1>	83	200
70	.60 X .60	RR-7-7	.0	63.35 < 1>	83	206	63.35 < 1>	83	206
			3.0	63.35 < 1>	83	206	63.35 < 1>	83	206
73	.60 X .60	RR-7-7	.0	61.45 < 1>	78	127	61.45 < 1>	78	127
			3.0	61.45 < 1>	78	127	61.45 < 1>	78	127
62	.60 X .60	RR-7-7	.0	62.82 < 1>	81	166	62.82 < 1>	81	166
			3.0	62.82 < 1>	81	166	62.82 < 1>	81	166
65	.60 X .60	RR-7-7	.0	63.66 < 7>	85	250	63.66 < 7>	85	250
			3.0	63.66 < 7>	85	250	63.66 < 7>	85	250
68	.60 X .60	RR-7-7	.0	63.67 < 9>	85	249	63.67 < 9>	85	249
			3.0	63.67 < 9>	85	249	63.67 < 9>	85	249

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

SHEAR DESIGN OF COLUMN-TYPE ELEMENTS

ELEM ID	SECTION SIZE T3 X T2	SECTION SHAPE	STATN LOC	<SHEAR ALONG 2-2 AXIS> AV COMB	V22	PU	<SHEAR ALONG 3-3 AXIS> AV <LC>	V33	PU
71	.60 X .60	RR-7-7							
			.0	63.65 < 8>	85	250	63.65 < 8>	85	250
			3.0	63.65 < 8>	85	250	63.65 < 8>	85	250
74	.60 X .60	RR-7-7							
			.0	62.94 < 1>	81	175	62.94 < 1>	81	175
			3.0	62.94 < 1>	81	175	62.94 < 1>	81	175
63	.60 X .60	RR-7-7							
			.0	56.45 < 1>	69	31	56.45 < 1>	69	31
			3.0	56.45 < 1>	69	31	56.45 < 1>	69	31
66	.60 X .60	RR-7-7							
			.0	58.24 < 1>	72	57	58.24 < 1>	72	57
			3.0	58.24 < 1>	72	57	58.24 < 1>	72	57
69	.60 X .60	RR-7-7							
			.0	58.13 < 1>	72	56	58.13 < 1>	72	56
			3.0	58.13 < 1>	72	56	58.13 < 1>	72	56
72	.60 X .60	RR-7-7							
			.0	58.15 < 1>	72	56	58.15 < 1>	72	56
			3.0	58.15 < 1>	72	56	58.15 < 1>	72	56
75	.60 X .60	RR-7-7							
			.0	56.33 < 1>	69	29	56.33 < 1>	69	29
			3.0	56.33 < 1>	69	29	56.33 < 1>	69	29
76	.40 X .40	RR-3-3							
			.0	13.06 <16>	20	62	13.06 <16>	20	62
			3.0	13.06 <16>	20	62	13.06 <16>	20	62
79	.40 X .40	RR-3-3							
			.0	12.74 <15>	22	95	12.74 <15>	22	95
			3.0	12.74 <15>	22	95	12.74 <15>	22	95
82	.40 X .40	RR-3-3							
			.0	12.79 <17>	22	92	12.79 <17>	22	92
			3.0	12.79 <17>	22	92	12.79 <17>	22	92
85	.40 X .40	RR-3-3							
			.0	12.74 <12>	22	95	12.74 <12>	22	95
			3.0	12.74 <12>	22	95	12.74 <12>	22	95
88	.40 X .40	RR-3-3							
			.0	13.05 <11>	20	64	13.05 <11>	20	64
			3.0	13.05 <11>	20	64	13.05 <11>	20	64
77	.40 X .40	RR-3-3							
			.0	12.95 <16>	21	75	12.95 <16>	21	75
			3.0	12.95 <16>	21	75	12.95 <16>	21	75
80	.40 X .40	RR-3-3							
			.0	12.21 <15>	23	125	12.21 <15>	23	125
			3.0	12.21 <15>	23	125	12.21 <15>	23	125
83	.40 X .40	RR-3-3							
			.0	12.22 <14>	23	124	12.22 <14>	23	124
			3.0	12.22 <14>	23	124	12.22 <14>	23	124
86	.40 X .40	RR-3-3							
			.0	12.20 <12>	23	125	12.20 <12>	23	125
			3.0	12.20 <12>	23	125	12.20 <12>	23	125
89	.40 X .40	RR-3-3							
			.0	12.92 <11>	21	79	12.92 <11>	21	79
			3.0	12.92 <11>	21	79	12.92 <11>	21	79

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

SHEAR DESIGN OF COLUMN-TYPE ELEMENTS

ELEM ID	SECTION T3 X T2	SIZE	SECTION SHAPE	STATN LOC	<SHEAR ALONG 2-2 AXIS> AV COMB	V22	PU	<SHEAR ALONG 3-3 AXIS> AV <LC>	V33	PU
78	.40 X	.40	RR-3-3							
				.0	11.56 < 7>	18	20	11.56 < 7>	18	20
				3.0	11.56 < 7>	18	20	11.56 < 7>	18	20
81	.40 X	.40	RR-3-3							
				.0	12.81 < 1>	19	45	12.81 < 1>	19	45
				3.0	12.81 < 1>	19	45	12.81 < 1>	19	45
84	.40 X	.40	RR-3-3							
				.0	12.14 < 1>	18	31	12.14 < 1>	18	31
				3.0	12.14 < 1>	18	31	12.14 < 1>	18	31
87	.40 X	.40	RR-3-3							
				.0	12.78 < 7>	19	44	12.78 < 7>	19	44
				3.0	12.78 < 7>	19	44	12.78 < 7>	19	44
90	.40 X	.40	RR-3-3							
				.0	11.43 < 8>	17	19	11.43 < 8>	17	19
				3.0	11.43 < 8>	17	19	11.43 < 8>	17	19
91	.40 X	.40	RR-3-3							
				.0	13.01 < 1>	20	49	13.01 < 1>	20	49
				3.0	13.01 < 1>	20	49	13.01 < 1>	20	49
93	.40 X	.40	RR-3-3							
				.0	13.11 <15>	20	56	13.11 <15>	20	56
				3.0	13.11 <15>	20	56	13.11 <15>	20	56
95	.40 X	.40	RR-3-3							
				.0	13.14 <17>	20	53	13.14 <17>	20	53
				3.0	13.14 <17>	20	53	13.14 <17>	20	53
97	.40 X	.40	RR-3-3							
				.0	13.11 <12>	20	56	13.11 <12>	20	56
				3.0	13.11 <12>	20	56	13.11 <12>	20	56
99	.40 X	.40	RR-3-3							
				.0	13.10 < 1>	20	50	13.10 < 1>	20	50
				3.0	13.10 < 1>	20	50	13.10 < 1>	20	50
92	.40 X	.40	RR-3-3							
				.0	13.15 < 1>	20	52	13.15 < 1>	20	52
				3.0	13.15 < 1>	20	52	13.15 < 1>	20	52
94	.40 X	.40	RR-3-3							
				.0	13.07 <15>	20	62	13.07 <15>	20	62
				3.0	13.07 <15>	20	62	13.07 <15>	20	62
96	.40 X	.40	RR-3-3							
				.0	13.08 <14>	20	60	13.08 <14>	20	60
				3.0	13.08 <14>	20	60	13.08 <14>	20	60
98	.40 X	.40	RR-3-3							
				.0	13.07 <12>	20	62	13.07 <12>	20	62
				3.0	13.07 <12>	20	62	13.07 <12>	20	62
100	.40 X	.40	RR-3-3							
				.0	13.13 < 1>	20	54	13.13 < 1>	20	54
				3.0	13.13 < 1>	20	54	13.13 < 1>	20	54
101	.40 X	.40	RR-3-3							
				.0	11.78 < 7>	18	23	11.78 < 7>	18	23
				3.0	11.78 < 7>	18	23	11.78 < 7>	18	23
103	.40 X	.40	RR-3-3							
				.0	11.78 < 8>	18	23	11.78 < 8>	18	23
				3.0	11.78 < 8>	18	23	11.78 < 8>	18	23

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

SHEAR DESIGN OF COLUMN-TYPE ELEMENTS

ELEM ID	SECTION SIZE T3 X T2	SECTION SHAPE	STATN LOC	<SHEAR ALONG 2-2 AXIS> AV COMB	V22	PU	<SHEAR ALONG 3-3 AXIS> AV <LC>	V33	PU
104	.40 X .40	RR-3-3	.0	11.55 <15>	18	20	11.55 <15>	18	20
			3.0	11.55 <15>	18	20	11.55 <15>	18	20
106	.40 X .40	RR-3-3	.0	11.55 <16>	18	20	11.55 <16>	18	20
			3.0	11.55 <16>	18	20	11.55 <16>	18	20
102	.40 X .40	RR-3-3	.0	10.73 <15>	17	10	10.73 <15>	17	10
			3.0	10.73 <15>	17	10	10.73 <15>	17	10
105	.40 X .40	RR-3-3	.0	10.74 < 8>	17	10	10.74 < 8>	17	10
			3.0	10.74 < 8>	17	10	10.74 < 8>	17	10
107	.30 X .30	RR-2-2	.0	.30 < 1>	6	3	.30 < 1>	6	3
			3.0	.30 < 1>	6	3	.30 < 1>	6	3
109	.30 X .30	RR-2-2	.0	.29 < 8>	6	3	.29 < 8>	6	3
			3.0	.29 < 8>	6	3	.29 < 8>	6	3
111	.30 X .30	RR-2-2	.0	.37 < 1>	6	5	.37 < 1>	6	5
			3.0	.37 < 1>	6	5	.37 < 1>	6	5
113	.30 X .30	RR-2-2	.0	.29 < 7>	6	3	.29 < 7>	6	3
			3.0	.29 < 7>	6	3	.29 < 7>	6	3
115	.30 X .30	RR-2-2	.0	.29 < 1>	6	3	.29 < 1>	6	3
			3.0	.29 < 1>	6	3	.29 < 1>	6	3
108	.30 X .30	RR-2-2	.0	.30 < 7>	6	4	.30 < 7>	6	4
			3.0	.30 < 7>	6	4	.30 < 7>	6	4
110	.30 X .30	RR-2-2	.0	.38 < 1>	6	5	.38 < 1>	6	5
			3.0	.38 < 1>	6	5	.38 < 1>	6	5
112	.30 X .30	RR-2-2	.0	.37 < 1>	6	5	.37 < 1>	6	5
			3.0	.37 < 1>	6	5	.37 < 1>	6	5
114	.30 X .30	RR-2-2	.0	.38 < 1>	6	5	.38 < 1>	6	5
			3.0	.38 < 1>	6	5	.38 < 1>	6	5
116	.30 X .30	RR-2-2	.0	.30 < 8>	6	4	.30 < 8>	6	4
			3.0	.30 < 8>	6	4	.30 < 8>	6	4
117	.30 X .30	RR-2-2	.0	.33 < 7>	6	4	.33 < 7>	6	4
			3.0	.33 < 7>	6	4	.33 < 7>	6	4
118	.30 X .30	RR-2-2	.0	.33 < 8>	6	4	.33 < 8>	6	4
			3.0	.33 < 8>	6	4	.33 < 8>	6	4
119	.30 X .30	RR-2-2	.0	.30 <15>	6	3	.30 <15>	6	3
			3.0	.30 <15>	6	3	.30 <15>	6	3

'PENULANGAN PORTAL RUMAH SUSUN (TON,M)

;HEAR DESIGN OF COLUMN-TYPE ELEMENTS

ELEM ID	SECTION SIZE T3 X T2	SECTION SHAPE	STATN LOC	<SHEAR ALONG 2-2 AXIS> AV COMB	V22	PU	<SHEAR ALONG 3-3 AXIS> AV <LC>	V33	PU
120	.30 X .30	RR-2-2							
			.0	.30 <16>	6	3	.30 <16>	6	3
			3.0	.30 <16>	6	3	.30 <16>	6	3
320	.60 X .60	RR-7-7							
			.0	45.24 < 1>	42	-91	45.24 < 1>	42	-91
			4.0	45.24 < 1>	42	-91	45.24 < 1>	42	-91
321	.60 X .60	RR-7-7							
			.0	43.28 < 1>	43	-76	43.28 < 1>	43	-76
			4.0	43.28 < 1>	43	-76	43.28 < 1>	43	-76
322	.60 X .60	RR-7-7							
			.0	60.34 < 1>	59	-61	60.34 < 1>	59	-61
			3.0	60.34 < 1>	59	-61	60.34 < 1>	59	-61
323	.60 X .60	RR-7-7							
			.0	58.95 < 1>	61	-46	58.95 < 1>	61	-46
			3.0	58.95 < 1>	61	-46	58.95 < 1>	61	-46
324	.60 X .60	RR-7-7							
			.0	57.55 < 1>	63	-32	57.55 < 1>	63	-32
			3.0	57.55 < 1>	63	-32	57.55 < 1>	63	-32
325	.60 X .60	RR-7-7							
			.0	56.15 < 1>	65	-17	56.15 < 1>	65	-17
			3.0	56.15 < 1>	65	-17	56.15 < 1>	65	-17
326	.60 X .60	RR-7-7							
			.0	45.24 < 1>	42	-91	45.24 < 1>	42	-91
			4.0	45.24 < 1>	42	-91	45.24 < 1>	42	-91
327	.60 X .60	RR-7-7							
			.0	43.28 < 1>	43	-76	43.28 < 1>	43	-76
			4.0	43.28 < 1>	43	-76	43.28 < 1>	43	-76
328	.60 X .60	RR-7-7							
			.0	60.34 < 1>	59	-61	60.34 < 1>	59	-61
			3.0	60.34 < 1>	59	-61	60.34 < 1>	59	-61
329	.60 X .60	RR-7-7							
			.0	58.95 < 1>	61	-46	58.95 < 1>	61	-46
			3.0	58.95 < 1>	61	-46	58.95 < 1>	61	-46
330	.60 X .60	RR-7-7							
			.0	57.55 < 1>	63	-32	57.55 < 1>	63	-32
			3.0	57.55 < 1>	63	-32	57.55 < 1>	63	-32
331	.60 X .60	RR-7-7							
			.0	56.15 < 1>	65	-17	56.15 < 1>	65	-17
			3.0	56.15 < 1>	65	-17	56.15 < 1>	65	-17

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

FLEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	REQUIRED REINFORCING TOP	<LC>	BOT	<LC>	SHR	<LC>	DESIGN FORCES -M33	+M33	V22
121	.50 X .30										
		.0	12.60	< 7>	6.04	<12>	16.57	< 1>	18	9	11
		1.6	4.64	< 7>	4.64	< 8>	12.53	< 1>	5	6	8
		3.3	4.64	<11>	4.64	< 1>	8.48	< 1>	5	4	6
		4.9	4.64	< 8>	4.64	< 7>	12.23	< 1>	5	7	8
		6.6	11.73	< 8>	5.65	<11>	16.27	< 1>	17	9	11
125	.50 X .30										
		.0	11.98	< 7>	5.76	<12>	16.18	< 1>	18	9	11
		1.6	4.64	< 7>	4.64	< 8>	12.14	< 1>	5	6	8
		3.3	4.64	<17>	4.64	< 1>	8.10	< 1>	4	4	5
		4.9	4.64	< 8>	4.64	< 7>	12.15	< 1>	4	6	8
		6.6	11.80	< 8>	5.68	<11>	16.19	< 1>	17	9	11
129	.50 X .30										
		.0	11.94	< 7>	5.74	<16>	13.85	< 1>	18	9	11
		1.6	4.64	< 7>	4.64	< 8>	12.11	< 1>	5	6	8
		3.3	4.64	<13>	4.64	< 1>	8.08	< 1>	4	4	5
		4.9	4.64	< 8>	4.64	< 7>	12.12	< 1>	4	6	8
		6.6	11.76	< 8>	5.66	<15>	13.86	< 1>	17	9	11
133	.50 X .30										
		.0	11.78	< 7>	5.67	<16>	16.14	< 1>	17	9	11
		1.6	4.64	< 7>	4.64	< 8>	12.10	< 1>	5	6	8
		3.3	4.64	<16>	4.64	< 1>	8.37	< 1>	5	4	6
		4.9	4.64	< 8>	4.64	< 7>	12.41	< 1>	5	6	8
		6.6	12.27	< 8>	5.89	<15>	16.15	< 1>	18	9	11
122	.60 X .30										
		.0	17.08	< 7>	8.16	<12>	19.48	< 1>	30	15	20
		1.6	5.70	< 7>	5.70	< 8>	18.12	< 1>	8	9	15
		3.3	5.70	<11>	5.70	< 1>	11.45	< 1>	8	9	9
		4.9	5.70	< 8>	5.70	< 7>	17.50	< 1>	8	10	14
		6.6	15.71	< 8>	7.53	<11>	18.86	< 1>	28	14	20
126	.60 X .30										
		.0	16.06	< 7>	7.69	<12>	18.82	< 1>	29	14	20
		1.6	5.70	< 7>	5.70	< 8>	17.46	< 1>	7	9	14
		3.3	5.70	<17>	5.70	< 1>	10.80	< 1>	7	8	9
		4.9	5.70	< 8>	5.70	< 7>	17.47	< 1>	7	9	14
		6.6	15.99	< 8>	7.66	<11>	18.83	< 1>	29	14	20
130	.60 X .30										
		.0	16.01	< 7>	7.67	<16>	18.78	< 1>	29	14	20
		1.6	5.70	< 7>	5.70	< 8>	17.42	< 1>	7	9	14
		3.3	5.70	<13>	5.70	< 1>	10.79	< 1>	7	8	9
		4.9	5.70	< 8>	5.70	< 7>	17.46	< 1>	7	9	14
		6.6	15.97	< 8>	7.65	<15>	18.82	< 1>	29	14	20
134	.60 X .30										
		.0	15.67	< 7>	7.51	<16>	18.76	< 1>	28	14	20
		1.6	5.70	< 7>	5.70	< 8>	17.40	< 1>	8	9	14
		3.3	5.70	<16>	5.70	< 1>	11.38	< 1>	8	9	9
		4.9	5.70	< 8>	5.70	< 7>	18.05	< 1>	8	9	15
		6.6	16.88	< 8>	8.07	<15>	19.41	< 1>	30	15	20
123	.60 X .30										
		.0	14.20	< 7>	6.84	<12>	16.90	< 1>	26	13	18
		1.6	5.70	< 7>	5.70	< 8>	15.93	< 1>	6	8	13

'PENULANGAN PORTAL RUMAH SUSUN (TON,M)

'LEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
123	.60 X .30							
		3.3	5.70 <11>	5.70 < 1>	9.65 < 1>	6	8	8
		4.9	5.70 < 8>	5.70 < 7>	15.87 < 1>	6	8	13
		6.6	13.97 < 8>	6.73 <11>	16.84 < 1>	25	13	18
127	.60 X .30							
		.0	13.80 < 7>	6.65 <12>	16.68 < 1>	25	13	18
		1.6	5.70 < 7>	5.70 < 8>	15.71 < 1>	6	7	13
		3.3	5.70 <17>	5.70 < 1>	9.43 < 1>	6	8	8
		4.9	5.70 < 8>	5.70 < 7>	15.71 < 1>	6	7	13
		6.6	13.82 < 8>	6.66 <11>	16.68 < 1>	25	13	18
131	.60 X .30							
		.0	13.74 < 7>	6.62 <16>	16.65 < 1>	25	12	18
		1.6	5.70 < 7>	5.70 < 8>	15.68 < 1>	6	7	13
		3.3	5.70 <13>	5.70 < 1>	9.43 < 1>	6	8	8
		4.9	5.70 < 8>	5.70 < 7>	15.71 < 1>	6	7	13
		6.6	13.82 < 8>	6.66 <15>	16.68 < 1>	25	13	18
135	.60 X .30							
		.0	13.81 < 7>	6.66 <16>	16.77 < 1>	25	13	18
		1.6	5.70 < 7>	5.70 < 8>	15.80 < 1>	6	8	13
		3.3	5.70 <16>	5.70 < 1>	9.61 < 1>	6	8	8
		4.9	5.70 < 8>	5.70 < 7>	15.89 < 1>	6	8	13
		6.6	14.14 < 8>	6.81 <15>	16.85 < 1>	26	13	18
124	.50 X .30							
		.0	8.78 < 7>	4.64 <12>	12.80 < 1>	13	7	10
		1.6	4.64 < 7>	4.64 < 8>	10.32 < 1>	3	4	7
		3.3	4.64 <11>	4.64 < 1>	6.39 < 1>	3	4	4
		4.9	4.64 < 8>	4.64 < 7>	10.44 < 1>	3	4	7
		6.6	8.90 < 8>	4.64 <11>	12.60 < 1>	13	7	10
128	.50 X .30							
		.0	8.67 < 7>	4.64 <12>	12.35 < 1>	13	7	10
		1.6	4.64 < 7>	4.64 < 8>	10.30 < 1>	3	4	7
		3.3	4.64 <13>	4.64 < 1>	6.26 < 1>	3	4	4
		4.9	4.64 < 8>	4.64 < 7>	10.29 < 1>	3	4	7
		6.6	8.71 < 8>	4.64 <11>	12.30 < 1>	13	7	10
132	.50 X .30							
		.0	8.60 < 7>	4.64 <16>	12.38 < 1>	13	6	10
		1.6	4.64 < 7>	4.64 < 8>	10.28 < 1>	3	4	7
		3.3	4.64 <17>	4.64 < 1>	6.26 < 1>	3	4	4
		4.9	4.64 < 8>	4.64 < 7>	10.30 < 1>	3	4	7
		6.6	8.70 < 8>	4.64 <15>	12.33 < 1>	13	7	10
136	.50 X .30							
		.0	8.70 < 7>	4.64 <16>	12.45 < 1>	13	7	10
		1.6	4.64 <15>	4.64 < 8>	10.35 < 1>	3	4	7
		3.3	4.64 <16>	4.64 < 1>	6.30 < 1>	3	4	4
		4.9	4.64 <16>	4.64 < 7>	10.25 < 1>	3	4	7
		6.6	8.72 < 8>	4.64 <15>	12.36 < 1>	13	7	10
137	.60 X .30							
		.0	13.26 < 1>	6.40 <15>	14.38 < 1>	24	12	25
		1.6	5.70 <16>	5.70 < 7>	10.11 < 1>	6	4	21
		3.2	5.70 <16>	6.50 < 1>	11.40 < 1>	6	12	12
		4.8	5.70 <15>	5.70 < 8>	13.36 < 1>	6	3	15

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

FLEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
137	.60 X .30							
		6.4	8.84 < 7>	5.70 <16>	14.62 < 1>	16	8	19
149	.60 X .30							
		.0	14.97 < 1>	7.19 <12>	15.11 < 1>	27	13	25
		1.6	5.70 < 7>	5.70 <12>	14.85 < 1>	7	4	22
		3.2	5.70 <11>	6.48 < 1>	12.12 < 1>	7	12	12
		4.8	5.70 <12>	5.70 < 1>	14.38 < 1>	7	3	16
		6.4	8.32 < 8>	5.70 <11>	18.34 < 1>	16	8	20
140	.70 X .40							
		.0	22.42 < 1>	10.79 <11>	28.43 < 1>	47	24	47
		1.6	8.86 <12>	8.86 < 7>	21.77 < 1>	12	8	41
		3.2	8.86 <12>	11.41 < 1>	24.09 < 1>	12	25	23
		4.8	8.86 <11>	8.86 < 1>	10.34 < 1>	12	6	30
		6.4	12.38 < 1>	8.86 <12>	17.00 < 1>	27	14	36
143	.70 X .40							
		.0	23.60 < 1>	11.33 <17>	28.98 < 1>	50	25	48
		1.6	8.86 < 1>	8.86 < 9>	22.32 < 1>	12	7	41
		3.2	8.86 <14>	11.40 < 1>	24.52 < 1>	12	25	24
		4.8	8.86 <17>	8.86 < 1>	10.77 < 1>	12	7	30
		6.4	11.33 < 9>	8.86 <14>	17.43 < 1>	25	12	36
146	.70 X .40							
		.0	24.08 < 1>	11.55 <16>	29.12 < 1>	51	25	48
		1.6	8.86 < 1>	8.86 < 8>	22.46 < 1>	13	7	41
		3.2	8.86 <15>	11.40 < 1>	24.78 < 1>	13	25	24
		4.8	8.86 <16>	8.86 < 1>	11.03 < 1>	13	7	30
		6.4	11.79 < 8>	8.86 <15>	17.69 < 1>	26	13	37
138	.50 X .30							
		.0	5.96 < 1>	4.64 <15>	13.36 < 1>	9	5	10
		1.5	4.64 < 8>	4.64 < 7>	10.19 < 1>	2	1	7
		3.0	4.64 <15>	4.64 < 1>	5.70 < 1>	2	4	4
		4.5	4.64 <15>	4.64 < 8>	9.88 < 1>	2	2	7
		6.0	5.10 < 7>	4.64 <16>	13.45 < 1>	8	4	10
150	.50 X .30							
		.0	7.12 < 1>	4.64 <12>	13.80 < 1>	11	5	10
		1.5	4.64 < 1>	4.64 <12>	10.76 < 1>	3	1	7
		3.0	4.64 <12>	4.64 < 1>	6.26 < 1>	3	4	4
		4.5	4.64 <12>	4.64 < 1>	10.46 < 1>	3	2	7
		6.0	4.73 < 8>	4.64 <11>	13.70 < 1>	7	4	10
141	.50 X .30							
		.0	10.79 < 1>	5.21 <11>	7.91 < 1>	16	8	16
		1.5	4.64 < 1>	4.64 < 7>	15.62 < 1>	4	2	11
		3.0	4.64 <11>	4.64 < 1>	8.02 < 1>	4	7	5
		4.5	4.64 <11>	4.64 < 1>	15.28 < 1>	4	3	10
		6.0	8.39 < 1>	4.64 <12>	7.58 < 1>	13	6	15
144	.50 X .30							
		.0	11.29 < 1>	5.44 <17>	18.17 < 1>	17	8	16
		1.5	4.64 < 1>	4.64 <17>	15.87 < 1>	4	2	11
		3.0	4.64 <17>	4.64 < 1>	8.27 < 1>	4	7	6
		4.5	4.64 <17>	4.64 < 1>	15.49 < 1>	4	3	10
		6.0	7.88 < 1>	4.64 <14>	17.79 < 1>	12	6	16

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

FLEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
147	.50 X .30							
		.0	11.50 < 1>	5.54 <16>	18.24 < 1>	17	8	16
		1.5	4.64 < 1>	4.64 <16>	15.94 < 1>	4	2	11
		3.0	4.64 <16>	4.64 < 1>	8.34 < 1>	4	7	6
		4.5	4.64 <16>	4.64 < 1>	15.60 < 1>	4	3	11
		6.0	7.83 < 8>	4.64 <15>	17.90 < 1>	12	6	16
139	.40 X .30							
		.0	3.59 < 8>	3.59 <15>	11.01 < 1>	3	1	6
		.8	3.59 < 8>	3.59 <15>	9.06 < 1>	1	1	5
		1.6	3.59 <15>	3.59 < 1>	7.11 < 1>	1	1	4
		2.4	3.59 <15>	3.59 < 8>	8.99 < 1>	1	1	5
		3.2	3.59 <15>	3.59 < 8>	10.94 < 1>	2	1	6
151	.40 X .30							
		.0	3.59 < 1>	3.59 <12>	11.01 < 1>	4	2	6
		.8	3.59 < 1>	3.59 <12>	9.06 < 1>	1	1	5
		1.6	3.59 <12>	3.59 < 1>	7.11 < 1>	1	1	4
		2.4	3.59 <12>	3.59 < 1>	8.98 < 1>	1	1	5
		3.2	3.59 <12>	3.59 < 1>	10.93 < 1>	2	1	6
142	.40 X .30							
		.0	4.52 < 1>	3.59 <11>	12.58 < 1>	5	3	9
		.8	3.59 < 1>	3.59 <11>	12.79 < 1>	1	1	7
		1.6	3.59 <11>	3.59 < 1>	8.22 < 1>	1	2	4
		2.4	3.59 <11>	3.59 < 1>	13.32 < 1>	1	1	7
		3.2	3.59 < 7>	3.59 < 1>	13.11 < 1>	4	2	10
145	.40 X .30							
		.0	5.17 < 1>	3.59 <17>	13.25 < 1>	6	3	10
		.8	3.59 < 1>	3.59 <17>	13.46 < 1>	2	1	7
		1.6	3.59 <17>	3.59 < 1>	8.76 < 1>	2	2	5
		2.4	3.59 <17>	3.59 < 1>	13.86 < 1>	2	2	7
		3.2	3.59 <17>	3.59 < 1>	13.65 < 1>	3	2	10
148	.40 X .30							
		.0	5.44 < 1>	3.59 <16>	13.43 < 1>	6	3	10
		.8	3.59 < 1>	3.59 <16>	13.64 < 1>	2	1	7
		1.6	3.59 <16>	3.59 < 1>	9.06 < 1>	2	2	5
		2.4	3.59 <16>	3.59 < 1>	14.16 < 1>	2	2	7
		3.2	3.59 <16>	3.59 < 1>	13.95 < 1>	4	2	10
152	.50 X .30							
		.0	16.96 < 7>	8.01 <12>	18.84 < 1>	24	12	16
		1.6	4.64 < 7>	4.91 < 8>	18.74 < 1>	6	8	13
		3.3	4.64 <11>	4.80 < 1>	12.86 < 1>	6	7	9
		4.9	4.64 < 8>	5.09 < 7>	18.27 < 1>	6	8	12
		6.6	15.48 < 8>	7.35 <11>	18.38 < 1>	22	11	16
156	.50 X .30							
		.0	15.97 < 7>	7.57 <12>	18.28 < 1>	23	11	16
		1.6	4.64 < 7>	4.68 < 8>	18.17 < 1>	6	7	12
		3.3	4.64 <17>	4.68 < 1>	12.82 < 1>	6	7	9
		4.9	4.64 < 8>	4.74 < 7>	18.23 < 1>	6	7	12
		6.6	15.82 < 8>	7.50 <11>	18.33 < 1>	23	11	16
160	.50 X .30							
		.0	16.02 < 7>	7.59 <16>	18.32 < 1>	23	11	16
		1.6	4.64 < 7>	4.64 < 8>	18.22 < 1>	6	7	12

'PENULANGAN PORTAL RUMAH SUSUN (TON,M)

'LEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
160	.50 X .30							
		3.3	4.64 <13>	4.68 < 1>	12.80 < 1>	6	7	9
		4.9	4.64 < 8>	4.76 < 7>	18.18 < 1>	6	7	12
		6.6	15.71 < 8>	7.45 <15>	18.29 < 1>	23	11	16
164	.50 X .30							
		.0	15.62 < 7>	7.41 <16>	18.27 < 1>	22	11	16
		1.6	4.64 < 7>	4.97 < 8>	18.17 < 1>	6	8	12
		3.3	4.64 <16>	4.81 < 1>	13.22 < 1>	6	7	9
		4.9	4.64 < 8>	4.96 < 7>	18.64 < 1>	6	8	13
		6.6	16.61 < 8>	7.85 <15>	18.74 < 1>	24	12	16
153	.70 X .40							
		.0	27.34 < 7>	13.04 <12>	26.65 < 1>	57	28	45
		1.6	8.86 < 7>	8.86 < 8>	17.55 < 1>	14	16	37
		3.3	8.86 <11>	14.94 < 1>	29.26 < 1>	14	32	28
		4.9	8.86 <12>	8.86 < 7>	17.95 < 1>	14	14	37
		6.6	26.55 < 8>	12.68 <11>	27.05 < 1>	55	28	46
157	.70 X .40							
		.0	26.71 < 7>	12.75 <12>	26.66 < 1>	56	28	45
		1.6	8.86 < 7>	8.86 < 8>	17.56 < 1>	14	12	37
		3.3	8.86 <16>	13.86 < 1>	29.04 < 1>	14	30	28
		4.9	8.86 < 8>	8.86 < 7>	17.73 < 1>	14	12	37
		6.6	26.98 < 8>	12.87 <11>	26.83 < 1>	56	28	46
161	.70 X .40							
		.0	27.01 < 7>	12.89 <16>	26.78 < 1>	56	28	45
		1.6	8.86 < 7>	8.86 < 8>	17.68 < 1>	14	12	37
		3.3	8.86 <11>	13.85 < 1>	28.99 < 1>	14	30	28
		4.9	8.86 < 8>	8.86 < 7>	17.60 < 1>	14	12	37
		6.6	26.65 < 8>	12.72 <15>	26.70 < 1>	55	28	45
165	.70 X .40							
		.0	26.60 < 7>	12.70 <16>	26.97 < 1>	55	28	46
		1.6	8.86 <15>	8.86 < 8>	17.87 < 1>	14	14	37
		3.3	8.86 <16>	14.95 < 1>	28.82 < 1>	14	32	28
		4.9	8.86 <16>	8.86 < 7>	17.50 < 1>	14	16	37
		6.6	27.15 < 8>	12.95 <15>	26.60 < 1>	56	28	45
154	.70 X .40							
		.0	19.69 < 7>	9.52 <12>	15.29 < 1>	42	21	34
		1.6	8.86 <11>	8.86 < 8>	7.59 < 1>	11	14	27
		3.3	8.86 <11>	10.55 < 1>	21.42 < 1>	11	23	21
		4.9	8.86 < 8>	8.86 < 7>	8.71 < 1>	11	10	28
		6.6	20.61 < 8>	9.95 <11>	16.41 < 1>	44	22	35
158	.70 X .40							
		.0	19.92 < 7>	9.63 <12>	15.66 < 1>	42	21	35
		1.6	8.86 < 7>	8.86 < 8>	7.96 < 1>	11	10	27
		3.3	8.86 <16>	9.74 < 1>	20.68 < 1>	11	21	20
		4.9	8.86 < 8>	8.86 < 7>	7.97 < 1>	11	10	27
		6.6	20.06 < 8>	9.70 <11>	15.67 < 1>	43	21	35
162	.70 X .40							
		.0	19.95 < 7>	9.64 <16>	15.63 < 1>	42	21	35
		1.6	8.86 < 7>	8.86 < 8>	7.93 < 1>	11	10	27
		3.3	8.86 <11>	9.74 < 1>	20.64 < 1>	11	21	20
		4.9	8.86 < 8>	8.86 < 7>	7.96 < 1>	11	9	27

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

FLEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
162	.70 X .40							
		6.6	19.99 < 8>	9.66 <15>	15.66 < 1>	43	21	35
166	.70 X .40							
		.0	20.46 < 7>	9.88 <16>	16.33 < 1>	43	22	35
		1.6	8.86 <15>	8.86 < 8>	8.63 < 1>	11	10	28
		3.3	8.86 <16>	10.54 < 1>	20.27 < 1>	11	23	20
		4.9	8.86 <16>	8.86 < 7>	7.56 < 1>	11	13	27
		6.6	19.73 < 8>	9.54 <15>	15.26 < 1>	42	21	34
155	.50 X .30							
		.0	8.75 < 7>	4.64 <12>	12.00 < 1>	13	7	10
		1.6	4.64 < 7>	4.64 < 8>	10.32 < 1>	3	4	7
		3.3	4.64 <11>	4.64 < 1>	6.40 < 1>	3	4	4
		4.9	4.64 < 8>	4.64 < 7>	10.45 < 1>	3	4	7
		6.6	8.91 < 8>	4.64 <11>	12.00 < 1>	13	7	10
159	.50 X .30							
		.0	8.61 < 7>	4.64 <12>	12.00 < 1>	13	6	10
		1.6	4.64 < 7>	4.64 < 8>	10.29 < 1>	3	4	7
		3.3	4.64 <13>	4.64 < 1>	6.29 < 1>	3	4	4
		4.9	4.64 < 8>	4.64 < 7>	10.34 < 1>	3	4	7
		6.6	8.75 < 8>	4.64 <11>	12.00 < 1>	13	7	10
163	.50 X .30							
		.0	8.64 < 7>	4.64 <16>	12.00 < 1>	13	6	10
		1.6	4.64 < 7>	4.64 < 8>	10.29 < 1>	3	4	7
		3.3	4.64 <17>	4.64 < 1>	6.24 < 1>	3	4	4
		4.9	4.64 < 8>	4.64 < 7>	10.26 < 1>	3	4	7
		6.6	8.66 < 8>	4.64 <15>	12.00 < 1>	13	7	10
167	.50 X .30							
		.0	8.74 < 7>	4.64 <16>	12.00 < 1>	13	7	10
		1.6	4.64 < 7>	4.64 < 8>	10.37 < 1>	3	4	7
		3.3	4.64 <16>	4.64 < 1>	6.32 < 1>	3	4	4
		4.9	4.64 < 8>	4.64 < 7>	10.26 < 1>	3	4	7
		6.6	8.74 < 8>	4.64 <15>	12.00 < 1>	13	7	10
168	.60 X .30							
		.0	17.92 < 1>	8.54 <15>	23.42 < 1>	32	16	32
		1.6	5.70 <16>	5.70 < 7>	18.05 < 1>	8	6	28
		3.2	5.70 <16>	8.72 < 1>	18.46 < 1>	8	16	15
		4.8	5.70 <15>	5.70 < 8>	8.53 < 1>	8	4	20
		6.4	11.07 < 7>	5.70 <16>	13.90 < 1>	20	10	24
180	.60 X .30							
		.0	20.36 < 1>	9.62 <12>	24.40 < 1>	36	18	33
		1.6	5.70 < 7>	5.70 <12>	19.02 < 1>	9	5	28
		3.2	5.70 <11>	8.68 < 1>	19.40 < 1>	9	16	16
		4.8	5.70 <12>	5.70 < 1>	9.46 < 1>	9	4	20
		6.4	10.37 < 8>	5.70 <11>	14.83 < 1>	19	10	25
171	.70 X .40							
		.0	30.58 < 1>	14.49 <11>	42.85 < 1>	63	31	61
		1.6	8.86 <12>	8.86 < 7>	34.85 < 1>	16	11	53
		3.2	8.86 <12>	15.91 < 1>	30.99 < 1>	16	34	30
		4.8	8.86 <11>	8.86 < 1>	18.58 < 1>	16	9	38
		6.4	15.75 < 1>	8.86 <12>	26.57 < 1>	34	17	45

'PENULANGAN PORTAL RUMAH SUSUN (TON,M)

'LEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
174	.70 X .40							
		.0	32.08 < 1>	15.15 <17>	43.53 < 1>	65	33	62
		1.6	8.86 < 1>	8.86 < 9>	35.53 < 1>	16	10	54
		3.2	8.86 <14>	15.88 < 1>	31.48 < 1>	16	34	30
		4.8	8.86 <17>	8.86 < 1>	19.06 < 1>	16	10	38
		6.4	14.48 < 1>	8.86 <14>	27.06 < 1>	31	16	46
177	.70 X .40							
		.0	32.67 < 1>	15.41 <16>	43.66 < 1>	67	33	62
		1.6	8.86 < 1>	8.86 < 8>	35.66 < 1>	17	10	54
		3.2	8.86 <15>	15.86 < 1>	31.79 < 1>	17	34	31
		4.8	8.86 <16>	8.86 < 1>	19.38 < 1>	17	10	38
		6.4	14.81 < 8>	8.86 <15>	27.37 < 1>	32	16	46
169	.50 X .30							
		.0	6.52 < 1>	4.64 <15>	1.81 < 1>	10	5	12
		1.5	4.64 < 8>	4.64 < 7>	11.47 < 1>	2	2	8
		3.0	4.64 <15>	4.64 < 1>	5.82 < 1>	2	5	4
		4.5	4.64 <15>	4.64 < 8>	11.46 < 1>	2	2	8
		6.0	6.10 < 7>	4.64 <16>	1.80 < 1>	9	5	12
181	.50 X .30							
		.0	8.03 < 1>	4.64 <12>	2.52 < 1>	12	6	12
		1.5	4.64 < 1>	4.64 <12>	12.18 < 1>	3	2	8
		3.0	4.64 <12>	4.64 < 1>	6.57 < 1>	3	5	4
		4.5	4.64 <12>	4.64 < 1>	12.21 < 1>	3	3	8
		6.0	5.63 < 8>	4.64 <11>	2.55 < 1>	9	4	12
172	.60 X .30							
		.0	8.53 < 1>	5.70 <11>	5.15 < 1>	16	8	17
		1.5	5.70 < 1>	5.70 <11>	13.80 < 1>	4	2	11
		3.0	5.70 <11>	5.70 < 1>	7.66 < 1>	4	7	6
		4.5	5.70 <11>	5.70 < 1>	14.31 < 1>	4	2	12
		6.0	6.90 < 7>	5.70 <12>	5.66 < 1>	13	6	17
175	.60 X .30							
		.0	9.28 < 1>	5.70 <17>	5.55 < 1>	17	9	17
		1.5	5.70 < 1>	5.70 <17>	14.21 < 1>	4	2	12
		3.0	5.70 <17>	5.70 < 1>	7.98 < 1>	4	7	7
		4.5	5.70 <17>	5.70 < 1>	14.64 < 1>	4	3	12
		6.0	6.25 < 9>	5.70 < 1>	5.99 < 1>	12	6	18
178	.60 X .30							
		.0	9.58 < 1>	5.70 <16>	5.66 < 1>	18	9	17
		1.5	5.70 < 1>	5.70 <16>	14.31 < 1>	4	2	12
		3.0	5.70 <16>	5.70 < 1>	8.17 < 1>	4	7	7
		4.5	5.70 <16>	5.70 < 1>	14.82 < 1>	4	3	12
		6.0	6.54 < 8>	5.70 < 1>	6.17 < 1>	12	6	18
170	.40 X .30							
		.0	3.59 < 8>	3.59 <15>	10.51 < 1>	3	1	5
		.8	3.59 < 8>	3.59 <15>	8.56 < 1>	1	1	4
		1.6	3.59 <15>	3.59 < 1>	7.53 < 1>	1	1	4
		2.4	3.59 <15>	3.59 < 8>	9.49 < 1>	1	1	5
		3.2	3.59 < 7>	3.59 < 8>	11.44 < 1>	3	2	6
182	.40 X .30							
		.0	3.59 < 1>	3.59 <12>	10.52 < 1>	4	2	5
		.8	3.59 < 1>	3.59 <12>	8.57 < 1>	1	1	4

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

FLEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
182	.40 X .30							
		1.6	3.59 <12>	3.59 < 1>	7.52 < 1>	1	1	4
		2.4	3.59 <12>	3.59 < 1>	9.48 < 1>	1	2	5
		3.2	3.59 <12>	3.59 < 1>	11.43 < 1>	3	1	6
173	.40 X .30							
		.0	3.59 < 1>	3.59 <11>	11.41 < 1>	3	1	6
		.8	3.59 < 1>	3.59 <11>	8.46 < 1>	1	1	4
		1.6	3.59 <11>	3.59 < 1>	8.64 < 1>	1	1	4
		2.4	3.59 <11>	3.59 < 1>	11.59 < 1>	1	0	6
		3.2	3.59 <11>	3.59 < 1>	.00 < 1>	3	2	8
176	.40 X .30							
		.0	3.59 < 1>	3.59 <17>	11.51 < 1>	3	2	6
		.8	3.59 < 1>	3.59 <17>	8.56 < 1>	1	1	4
		1.6	3.59 <17>	3.59 < 1>	8.54 < 1>	1	1	4
		2.4	3.59 <17>	3.59 < 1>	11.49 < 1>	1	1	6
		3.2	3.59 <17>	3.59 < 1>	.00 < 1>	3	1	8
179	.40 X .30							
		.0	3.59 < 1>	3.59 <16>	11.42 < 1>	4	2	6
		.8	3.59 < 1>	3.59 <16>	8.46 < 1>	1	1	4
		1.6	3.59 <16>	3.59 < 1>	8.63 < 1>	1	1	4
		2.4	3.59 <16>	3.59 < 1>	11.58 < 1>	1	1	6
		3.2	3.59 <16>	3.59 < 1>	11.80 < 1>	3	2	8
183	.50 X .30							
		.0	15.14 < 7>	7.20 <12>	17.89 < 1>	22	11	16
		1.6	4.64 < 7>	4.64 < 8>	17.79 < 1>	5	6	12
		3.3	4.64 <11>	4.76 < 1>	11.56 < 1>	5	7	8
		4.9	4.64 < 8>	4.64 < 7>	16.97 < 1>	5	7	11
		6.6	13.29 < 8>	6.36 <11>	17.07 < 1>	19	10	15
187	.50 X .30							
		.0	14.09 < 7>	6.72 <12>	17.17 < 1>	20	10	15
		1.6	4.64 < 7>	4.64 < 8>	17.07 < 1>	5	6	11
		3.3	4.64 <11>	4.70 < 1>	11.78 < 1>	5	7	8
		4.9	4.64 < 8>	4.64 < 7>	17.19 < 1>	5	6	12
		6.6	14.07 < 8>	6.72 <11>	17.30 < 1>	20	10	15
191	.50 X .30							
		.0	14.27 < 7>	6.80 <16>	7.32 < 1>	21	10	15
		1.6	4.64 < 7>	4.64 < 8>	17.21 < 1>	5	6	12
		3.3	4.64 <16>	4.70 < 1>	11.80 < 1>	5	7	8
		4.9	4.64 < 8>	4.64 < 7>	17.10 < 1>	5	6	12
		6.6	13.87 < 8>	6.63 <15>	7.21 < 1>	20	10	15
195	.50 X .30							
		.0	13.47 < 7>	6.44 <16>	7.01 < 1>	20	10	15
		1.6	4.64 < 7>	4.64 < 8>	16.91 < 1>	5	7	11
		3.3	4.64 <16>	4.76 < 1>	12.30 < 1>	5	7	8
		4.9	4.64 < 8>	4.64 < 7>	17.72 < 1>	5	6	12
		6.6	14.88 < 8>	7.08 <15>	7.82 < 1>	21	11	16
184	.70 X .40							
		.0	24.33 < 7>	11.67 <12>	25.24 < 1>	51	26	44
		1.6	8.86 < 7>	8.86 < 8>	16.14 < 1>	13	9	35
		3.3	8.86 <11>	14.57 < 1>	26.14 < 1>	13	32	25
		4.9	8.86 <12>	8.86 < 7>	14.83 < 1>	13	11	34

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

FLEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
184	.70 X .40							
		6.6	21.35 < 8>	10.30 <11>	23.93 < 1>	45	23	43
188	.70 X .40							
		.0	22.73 < 7>	10.93 <12>	24.28 < 1>	48	24	43
		1.6	8.86 <11>	8.86 < 8>	15.18 < 1>	12	9	34
		3.3	8.86 <11>	13.96 < 1>	27.01 < 1>	12	30	26
		4.9	8.86 <12>	8.86 < 7>	15.70 < 1>	12	8	35
		6.6	23.50 < 8>	11.29 <11>	24.80 < 1>	49	25	44
192	.70 X .40							
		.0	23.51 < 7>	11.29 <16>	24.74 < 1>	49	25	44
		1.6	8.86 < 7>	8.86 < 8>	15.64 < 1>	12	8	35
		3.3	8.86 <16>	13.96 < 1>	26.95 < 1>	12	30	26
		4.9	8.86 <16>	8.86 < 7>	15.23 < 1>	12	9	34
		6.6	22.70 < 8>	10.92 <15>	24.33 < 1>	48	24	43
196	.70 X .40							
		.0	21.42 < 7>	10.33 <16>	23.88 < 1>	45	23	43
		1.6	8.86 <15>	8.86 < 8>	14.78 < 1>	13	11	34
		3.3	8.86 <16>	14.58 < 1>	27.41 < 1>	13	32	26
		4.9	8.86 <16>	8.86 < 7>	16.10 < 1>	13	9	35
		6.6	24.18 < 8>	11.60 <15>	25.20 < 1>	51	25	44
185	.70 X .40							
		.0	16.82 < 7>	8.86 <12>	13.86 < 1>	36	18	33
		1.6	8.86 <11>	8.86 < 8>	6.17 < 1>	9	9	26
		3.3	8.86 <11>	10.32 < 1>	19.35 < 1>	9	23	19
		4.9	8.86 <12>	8.86 < 7>	6.64 < 1>	9	7	26
		6.6	17.20 < 8>	8.86 <11>	14.34 < 1>	37	18	33
189	.70 X .40							
		.0	16.80 < 7>	8.86 <12>	14.01 < 1>	36	18	33
		1.6	8.86 <11>	8.86 < 8>	6.32 < 1>	9	7	26
		3.3	8.86 <13>	9.84 < 1>	19.36 < 1>	9	22	19
		4.9	8.86 < 8>	8.86 < 7>	6.64 < 1>	9	7	26
		6.6	17.38 < 8>	8.86 <11>	14.34 < 1>	37	19	34
193	.70 X .40							
		.0	17.25 < 7>	8.86 <16>	14.27 < 1>	37	19	33
		1.6	8.86 <15>	8.86 < 8>	6.57 < 1>	9	7	26
		3.3	8.86 <17>	9.84 < 1>	19.28 < 1>	9	22	19
		4.9	8.86 <16>	8.86 < 7>	6.28 < 1>	9	7	26
		6.6	16.86 < 8>	8.86 <15>	13.98 < 1>	36	18	33
197	.70 X .40							
		.0	16.99 < 7>	8.86 <16>	14.23 < 1>	36	18	33
		1.6	8.86 <15>	8.86 < 8>	6.53 < 1>	9	7	26
		3.3	8.86 <16>	10.31 < 1>	18.81 < 1>	9	23	18
		4.9	8.86 <16>	8.86 < 7>	6.09 < 1>	9	9	26
		6.6	16.77 < 8>	8.86 <15>	13.79 < 1>	36	18	33
186	.50 X .30							
		.0	6.72 < 7>	4.64 <12>	12.00 < 1>	10	5	9
		1.6	4.64 <11>	4.64 < 8>	9.51 < 1>	3	4	6
		3.3	4.64 <11>	4.64 < 1>	5.96 < 1>	3	4	4
		4.9	4.64 < 8>	4.64 < 7>	10.00 < 1>	3	3	7
		6.6	7.47 < 8>	4.64 <11>	12.00 < 1>	11	6	9

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

FLEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
190	.50 X .30							
		.0	6.98 < 7>	4.64 <12>	12.00 < 1>	11	5	9
		1.6	4.64 <11>	4.64 < 8>	9.57 < 1>	3	3	6
		3.3	4.64 <13>	4.64 < 1>	5.58 < 1>	3	4	4
		4.9	4.64 < 8>	4.64 < 7>	9.62 < 1>	3	3	6
		6.6	7.11 < 8>	4.64 <11>	12.00 < 1>	11	5	9
194	.50 X .30							
		.0	7.05 < 7>	4.64 <16>	12.00 < 1>	11	5	9
		1.6	4.64 <15>	4.64 < 8>	9.59 < 1>	3	3	6
		3.3	4.64 <17>	4.64 < 1>	5.54 < 1>	3	4	4
		4.9	4.64 < 8>	4.64 < 7>	9.55 < 1>	3	3	6
		6.6	7.02 < 8>	4.64 <15>	12.00 < 1>	11	5	9
198	.50 X .30							
		.0	7.38 < 7>	4.64 <16>	12.00 < 1>	11	6	9
		1.6	4.64 <15>	4.64 < 8>	9.96 < 1>	3	3	7
		3.3	4.64 <16>	4.64 < 1>	5.91 < 1>	3	4	4
		4.9	4.64 <16>	4.64 < 7>	9.48 < 1>	3	4	6
		6.6	6.75 < 8>	4.64 <15>	12.00 < 1>	10	5	9
199	.60 X .30							
		.0	18.57 < 1>	8.83 <15>	23.91 < 1>	33	16	32
		1.6	5.70 <16>	5.70 < 7>	18.54 < 1>	8	5	28
		3.2	5.70 <16>	8.54 < 1>	18.48 < 1>	8	16	15
		4.8	5.70 <15>	5.70 < 8>	8.54 < 1>	8	4	20
		6.4	10.65 < 7>	5.70 <16>	13.92 < 1>	20	10	24
211	.60 X .30							
		.0	20.97 < 1>	9.89 <12>	24.88 < 1>	37	18	33
		1.6	5.70 < 7>	5.70 <12>	19.51 < 1>	9	5	29
		3.2	5.70 <11>	8.54 < 1>	19.38 < 1>	9	16	16
		4.8	5.70 <12>	5.70 < 1>	9.44 < 1>	9	5	20
		6.4	9.93 < 8>	5.70 <11>	14.81 < 1>	18	9	25
202	.70 X .40							
		.0	32.48 < 1>	15.33 <11>	44.25 < 1>	66	33	62
		1.6	8.86 <12>	8.86 < 7>	36.25 < 1>	17	9	55
		3.2	8.86 <12>	15.34 < 1>	31.06 < 1>	17	33	30
		4.8	8.86 <11>	8.86 < 1>	18.65 < 1>	17	9	38
		6.4	15.21 < 1>	8.86 <12>	26.64 < 1>	33	16	45
205	.70 X .40							
		.0	33.96 < 1>	15.98 <17>	44.93 < 1>	69	34	63
		1.6	8.86 < 1>	8.86 < 9>	36.94 < 1>	17	9	55
		3.2	8.86 <14>	15.33 < 1>	31.50 < 1>	17	33	30
		4.8	8.86 <17>	8.86 < 1>	19.08 < 1>	17	10	38
		6.4	13.93 < 1>	8.86 <14>	27.08 < 1>	30	15	46
208	.70 X .40							
		.0	34.44 < 1>	16.19 <16>	44.99 < 1>	70	35	63
		1.6	8.86 < 1>	8.86 < 8>	37.00 < 1>	17	9	55
		3.2	8.86 <15>	15.33 < 1>	31.80 < 1>	17	33	31
		4.8	8.86 <16>	8.86 < 1>	19.38 < 1>	17	10	38
		6.4	14.13 < 8>	8.86 <15>	27.38 < 1>	31	15	46
200	.50 X .30							
		.0	5.74 < 1>	4.64 <15>	1.42 < 1>	9	4	11
		1.5	4.64 <16>	4.64 < 7>	11.08 < 1>	3	2	7

PENULANGAN PORTAL RUMAH SUSUN (TON,M)

LEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
200	.50 X .30							
		3.0	4.64 <15>	4.64 < 1>	6.32 < 1>	3	4	4
		4.5	4.64 <15>	4.64 < 8>	.00 < 1>	3	1	8
		6.0	6.64 < 7>	4.64 <16>	2.31 < 1>	10	5	12
212	.50 X .30							
		.0	7.27 < 1>	4.64 <12>	1.70 < 1>	11	6	11
		1.5	4.64 < 1>	4.64 <12>	11.36 < 1>	3	2	8
		3.0	4.64 <12>	4.64 < 1>	6.66 < 1>	3	5	4
		4.5	4.64 <12>	4.64 < 1>	12.31 < 1>	3	2	8
		6.0	6.15 < 8>	4.64 <11>	2.65 < 1>	9	5	12
203	.60 X .30							
		.0	6.69 < 1>	5.70 <11>	4.02 < 1>	13	6	16
		1.5	5.70 < 1>	5.70 < 7>	12.67 < 1>	4	3	10
		3.0	5.70 <11>	5.70 < 1>	8.69 < 1>	4	7	7
		4.5	5.70 <11>	5.70 < 1>	.04 < 1>	4	2	13
		6.0	8.44 < 1>	5.70 <12>	6.70 < 1>	16	8	18
206	.60 X .30							
		.0	7.46 < 1>	5.70 <17>	3.72 < 1>	14	7	16
		1.5	5.70 < 1>	5.70 <17>	12.37 < 1>	4	3	10
		3.0	5.70 <17>	5.70 < 1>	8.30 < 1>	4	7	7
		4.5	5.70 <17>	5.70 < 1>	.00 < 1>	4	2	12
		6.0	7.73 < 9>	5.70 <14>	6.30 < 1>	14	7	18
209	.60 X .30							
		.0	7.74 < 1>	5.70 <16>	3.75 < 1>	14	7	16
		1.5	5.70 < 1>	5.70 <16>	12.40 < 1>	4	3	10
		3.0	5.70 <16>	5.70 < 1>	8.43 < 1>	4	7	7
		4.5	5.70 <16>	5.70 < 1>	.00 < 1>	4	2	12
		6.0	7.89 < 8>	5.70 <15>	6.43 < 1>	15	7	18
201	.40 X .30							
		.0	3.59 < 8>	3.59 <15>	10.04 < 1>	2	1	5
		.8	3.59 < 8>	3.59 < 7>	8.09 < 1>	1	1	4
		1.6	3.59 <16>	3.59 < 1>	8.00 < 1>	1	1	4
		2.4	3.59 <15>	3.59 < 8>	9.95 < 1>	1	1	5
		3.2	3.59 < 7>	3.59 < 8>	11.90 < 1>	3	2	6
213	.40 X .30							
		.0	3.59 < 1>	3.59 <12>	10.06 < 1>	3	2	5
		.8	3.59 < 1>	3.59 <12>	8.11 < 1>	1	1	4
		1.6	3.59 <11>	3.59 < 1>	7.99 < 1>	1	1	4
		2.4	3.59 <12>	3.59 < 1>	9.94 < 1>	1	1	5
		3.2	3.59 <12>	3.59 < 1>	11.89 < 1>	3	1	6
204	.40 X .30							
		.0	3.59 < 1>	3.59 <15>	10.65 < 1>	1	1	6
		.8	3.59 < 1>	3.59 <15>	7.70 < 1>	1	1	4
		1.6	3.59 <11>	3.59 < 1>	9.40 < 1>	1	1	5
		2.4	3.59 <11>	3.59 < 1>	12.35 < 1>	1	0	6
		3.2	3.59 < 7>	3.59 < 1>	.00 < 1>	4	2	8
207	.40 X .30							
		.0	3.59 < 1>	3.59 <17>	10.76 < 1>	2	1	6
		.8	3.59 < 1>	3.59 <17>	7.81 < 1>	1	1	4
		1.6	3.59 <14>	3.59 < 1>	9.28 < 1>	1	1	5
		2.4	3.59 <17>	3.59 < 1>	12.24 < 1>	1	0	6

'PENULANGAN PORTAL RUMAH SUSUN (TON,M)

'LEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
207	.40 X .30							
		3.2	3.59 <17>	3.59 < 1>	.00 < 1>	3	2	8
210	.40 X .30							
		.0	3.59 < 1>	3.59 <12>	10.65 < 1>	3	1	6
		.8	3.59 < 1>	3.59 <12>	7.70 < 1>	1	1	4
		1.6	3.59 <16>	3.59 < 1>	9.39 < 1>	1	1	5
		2.4	3.59 <16>	3.59 < 1>	12.35 < 1>	1	0	6
		3.2	3.59 <12>	3.59 < 1>	14.00 < 1>	4	2	8
214	.50 X .30							
		.0	13.32 < 7>	6.38 <12>	6.76 < 1>	19	10	15
		1.6	4.64 < 7>	4.64 < 8>	16.66 < 1>	5	5	11
		3.3	4.64 <11>	4.88 < 1>	10.61 < 1>	5	8	7
		4.9	4.64 <12>	4.64 < 7>	16.03 < 1>	5	6	11
		6.6	11.71 < 8>	5.63 <11>	6.13 < 1>	17	9	14
217	.50 X .30							
		.0	12.39 < 7>	5.95 <12>	6.17 < 1>	18	9	14
		1.6	4.64 < 7>	4.64 < 8>	16.06 < 1>	5	5	11
		3.3	4.64 <17>	4.69 < 1>	10.74 < 1>	5	7	7
		4.9	4.64 < 8>	4.64 < 7>	16.15 < 1>	5	5	11
		6.6	12.37 < 8>	5.94 <11>	6.26 < 1>	18	9	15
220	.50 X .30							
		.0	12.56 < 7>	6.03 <16>	6.29 < 1>	18	9	15
		1.6	4.64 < 7>	4.64 < 8>	16.19 < 1>	5	5	11
		3.3	4.64 <13>	4.69 < 1>	10.77 < 1>	5	7	7
		4.9	4.64 < 8>	4.64 < 7>	16.09 < 1>	5	5	11
		6.6	12.20 < 8>	5.86 <15>	6.19 < 1>	18	9	14
223	.50 X .30							
		.0	11.88 < 7>	5.72 <16>	6.09 < 1>	17	9	14
		1.6	4.64 < 7>	4.64 < 8>	15.98 < 1>	5	6	11
		3.3	4.64 <16>	4.89 < 1>	11.17 < 1>	5	8	8
		4.9	4.64 < 8>	4.64 < 7>	16.58 < 1>	5	5	11
		6.6	13.08 < 8>	6.26 <15>	6.68 < 1>	19	10	15
215	.70 X .40							
		.0	19.31 < 7>	9.35 <12>	21.93 < 1>	41	21	41
		1.6	8.86 <11>	8.86 < 8>	12.83 < 1>	10	9	32
		3.3	8.86 <11>	15.33 < 1>	24.25 < 1>	10	33	23
		4.9	8.86 <12>	8.86 < 7>	12.93 < 1>	10	8	32
		6.6	18.82 < 8>	9.12 <11>	22.04 < 1>	40	20	41
218	.70 X .40							
		.0	19.87 < 7>	9.61 <12>	22.51 < 1>	42	21	41
		1.6	8.86 <11>	8.86 < 8>	13.41 < 1>	11	6	33
		3.3	8.86 <11>	13.94 < 1>	25.12 < 1>	11	30	24
		4.9	8.86 <12>	8.86 < 7>	13.81 < 1>	11	6	33
		6.6	20.52 < 8>	9.91 <11>	22.91 < 1>	44	22	42
221	.70 X .40							
		.0	20.53 < 7>	9.92 <16>	22.88 < 1>	44	22	42
		1.6	8.86 <15>	8.86 < 8>	13.78 < 1>	11	6	33
		3.3	8.86 <16>	13.93 < 1>	25.09 < 1>	11	30	24
		4.9	8.86 <16>	8.86 < 7>	13.45 < 1>	11	6	33
		6.6	19.86 < 8>	9.61 <15>	22.55 < 1>	42	21	41

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

FLEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
224	.70 X .40							
		.0	18.92 < 7>	9.16 <16>	22.02 < 1>	40	20	41
		1.6	8.86 <15>	8.86 < 8>	12.92 < 1>	10	8	32
		3.3	8.86 <16>	15.34 < 1>	24.06 < 1>	10	33	23
		4.9	8.86 <16>	8.86 < 7>	12.75 < 1>	10	9	32
		6.6	19.15 < 8>	9.27 <15>	21.85 < 1>	41	20	41
216	.60 X .30							
		.0	12.20 < 7>	5.91 <12>	13.85 < 1>	22	11	24
		1.6	5.70 <11>	5.70 < 8>	7.59 < 1>	7	6	19
		3.3	5.70 <11>	10.52 < 1>	18.28 < 1>	7	19	15
		4.9	5.70 <12>	5.70 < 7>	9.22 < 1>	7	3	20
		6.6	14.51 < 1>	6.98 <11>	15.47 < 1>	26	13	25
219	.60 X .30							
		.0	13.71 < 7>	6.61 <12>	14.71 < 1>	25	12	25
		1.6	5.70 <11>	5.70 < 8>	8.45 < 1>	6	3	20
		3.3	5.70 <13>	9.78 < 1>	17.64 < 1>	6	18	15
		4.9	5.70 <12>	5.70 < 7>	8.58 < 1>	6	3	20
		6.6	14.00 < 1>	6.74 <11>	14.84 < 1>	25	13	25
222	.60 X .30							
		.0	13.88 < 7>	6.69 <16>	14.79 < 1>	25	13	25
		1.6	5.70 <15>	5.70 < 8>	8.53 < 1>	6	3	20
		3.3	5.70 <17>	9.78 < 1>	17.59 < 1>	6	18	15
		4.9	5.70 <16>	5.70 < 7>	8.43 < 1>	6	3	20
		6.6	13.75 < 1>	6.63 <15>	14.68 < 1>	25	12	25
225	.60 X .30							
		.0	14.36 < 1>	6.91 <16>	15.38 < 1>	26	13	25
		1.6	5.70 <15>	5.70 < 8>	9.13 < 1>	6	3	20
		3.3	5.70 <16>	10.51 < 1>	16.58 < 1>	6	19	14
		4.9	5.70 <16>	5.70 < 7>	7.53 < 1>	6	5	19
		6.6	12.11 < 8>	5.87 <15>	13.78 < 1>	22	11	24
226	.60 X .30							
		.0	17.42 < 1>	8.31 <15>	23.10 < 1>	31	16	32
		1.6	5.70 <16>	5.70 < 7>	17.72 < 1>	8	6	27
		3.2	5.70 <16>	8.90 < 1>	18.38 < 1>	8	17	15
		4.8	5.70 <15>	5.70 < 8>	8.44 < 1>	8	4	20
		6.4	10.89 < 1>	5.70 <16>	13.81 < 1>	20	10	24
234	.60 X .30							
		.0	20.06 < 1>	9.49 <12>	24.19 < 1>	35	18	33
		1.6	5.70 < 1>	5.70 <12>	18.82 < 1>	9	5	28
		3.2	5.70 <11>	8.74 < 1>	19.37 < 1>	9	16	16
		4.8	5.70 <12>	5.70 < 1>	9.43 < 1>	9	4	20
		6.4	9.82 < 8>	5.70 <11>	14.81 < 1>	18	9	25
228	.70 X .40							
		.0	29.54 < 1>	14.03 <15>	42.34 < 1>	61	30	60
		1.6	8.86 <16>	8.86 < 1>	34.34 < 1>	15	12	53
		3.2	8.86 <12>	16.76 < 1>	30.70 < 1>	15	36	30
		4.8	8.86 <15>	8.86 < 1>	18.28 < 1>	15	10	37
		6.4	15.01 < 1>	8.86 <16>	26.28 < 1>	32	16	45
230	.70 X .40							
		.0	31.13 < 1>	14.73 <17>	43.11 < 1>	64	32	61
		1.6	8.86 < 1>	8.86 < 9>	35.12 < 1>	16	12	54

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

FLEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
230	.70 X .40							
		3.2	8.86 <14>	16.62 < 1>	31.16 < 1>	16	36	30
		4.8	8.86 <17>	8.86 < 1>	18.75 < 1>	16	11	38
		6.4	13.86 < 1>	8.86 <14>	26.74 < 1>	30	15	45
232	.70 X .40							
		.0	31.72 < 1>	14.99 <12>	43.19 < 1>	65	32	61
		1.6	8.86 < 1>	8.86 < 8>	35.20 < 1>	16	12	54
		3.2	8.86 <15>	16.55 < 1>	31.54 < 1>	16	36	30
		4.8	8.86 <12>	8.86 < 1>	19.12 < 1>	16	12	38
		6.4	13.66 < 8>	8.86 <11>	27.12 < 1>	30	15	46
227	.70 X .40							
		.0	8.86 < 8>	8.86 <15>	18.16 < 1>	11	5	17
		1.5	8.86 <16>	8.86 < 7>	13.56 < 1>	3	4	13
		3.0	8.86 <16>	8.86 < 1>	9.68 < 1>	3	6	9
		4.5	8.86 <15>	8.86 < 8>	14.28 < 1>	3	3	14
		6.0	8.86 < 7>	8.86 <16>	.00 < 1>	12	6	18
235	.70 X .40							
		.0	8.86 < 1>	8.86 <12>	18.10 < 1>	15	8	17
		1.5	8.86 < 1>	8.86 <12>	13.50 < 1>	4	3	13
		3.0	8.86 <11>	8.86 < 1>	9.73 < 1>	4	6	9
		4.5	8.86 <12>	8.86 < 1>	14.33 < 1>	4	4	14
		6.0	8.86 <12>	8.86 < 7>	.00 < 1>	11	5	18
229	.80 X .50							
		.0	12.83 < 1>	12.83 <11>	24.17 < 1>	16	8	27
		1.5	12.83 < 1>	12.83 <11>	18.29 < 1>	4	4	20
		3.0	12.83 <15>	12.83 < 1>	14.59 < 1>	4	9	16
		4.5	12.83 <15>	12.83 < 1>	20.47 < 1>	4	3	23
		6.0	12.83 < 7>	12.83 <12>	26.35 < 1>	16	8	29
231	.80 X .50							
		.0	12.83 < 1>	12.83 <17>	24.29 < 1>	19	9	27
		1.5	12.83 < 1>	12.83 <17>	18.40 < 1>	5	4	21
		3.0	12.83 <14>	12.83 < 1>	14.47 < 1>	5	8	16
		4.5	12.83 <17>	12.83 < 1>	20.35 < 1>	5	4	23
		6.0	12.83 < 9>	12.83 < 1>	26.23 < 1>	14	7	29
233	.80 X .50							
		.0	12.83 < 1>	12.83 <16>	24.17 < 1>	20	10	27
		1.5	12.83 < 1>	12.83 <16>	18.29 < 1>	5	4	20
		3.0	12.83 <12>	12.83 < 1>	14.59 < 1>	5	8	16
		4.5	12.83 <12>	12.83 < 1>	20.47 < 1>	5	4	23
		6.0	12.83 <16>	12.83 < 1>	26.35 < 1>	15	7	29
236	.50 X .30							
		.0	8.87 < 7>	4.64 <16>	.00 < 1>	13	7	10
		1.6	4.64 < 7>	4.64 < 8>	11.11 < 1>	3	3	7
		3.3	4.64 <15>	4.64 < 1>	7.07 < 1>	3	4	5
		4.9	4.64 <16>	4.64 < 7>	9.62 < 1>	3	4	6
		6.6	6.38 < 8>	4.64 <15>	.00 < 1>	10	5	9
239	.50 X .30							
		.0	6.99 < 7>	4.64 <16>	.00 < 1>	11	5	9
		1.6	4.64 <15>	4.64 < 8>	9.56 < 1>	3	3	6

242	.50 X	.30						
		.0	7.61 < 7>	4.64 <12>	11.00 < 1>	12	6	9
		1.6	4.64 < 7>	4.64 < 8>	10.06 < 1>	3	3	7
		3.3	4.64 <15>	4.64 < 1>	6.01 < 1>	3	4	4
		4.9	4.64 <12>	4.64 < 7>	9.58 < 1>	3	3	6
		6.6	6.79 < 8>	4.64 <11>	11.00 < 1>	10	5	9
245	.50 X	.30						
		.0	6.67 < 7>	4.64 <12>	11.00 < 1>	10	5	9
		1.6	4.64 <11>	4.64 < 8>	9.64 < 1>	3	4	6
		3.3	4.64 <12>	4.64 < 1>	6.85 < 1>	3	4	5
		4.9	4.64 < 8>	4.64 < 7>	10.89 < 1>	3	3	7
		6.6	8.64 < 8>	4.64 <11>	12.00 < 1>	13	6	10
237	.70 X	.40						
		.0	12.60 < 7>	8.86 <16>	14.74 < 1>	27	14	34
		1.6	8.86 <15>	8.86 < 8>	7.06 < 1>	9	9	26
		3.3	8.86 <15>	11.93 < 1>	13.34 < 1>	9	26	13
		4.9	8.86 <12>	8.86 < 1>	13.49 < 1>	9	10	33
		6.6	16.65 < 1>	8.86 <11>	21.17 < 1>	36	18	40
240	.70 X	.40						
		.0	16.62 < 1>	8.86 <12>	16.24 < 1>	36	18	35
		1.6	8.86 <11>	8.86 < 8>	8.56 < 1>	9	5	28
		3.3	8.86 <17>	9.45 < 1>	12.71 < 1>	9	21	12
		4.9	8.86 <12>	8.86 < 7>	12.86 < 1>	9	7	32
		6.6	17.66 < 1>	8.86 <11>	20.54 < 1>	38	19	39
243	.70 X	.40						
		.0	17.34 < 1>	8.86 <16>	16.35 < 1>	37	19	35
		1.6	8.86 <15>	8.86 < 8>	8.67 < 1>	9	5	28
		3.3	8.86 <13>	9.44 < 1>	12.32 < 1>	9	21	12
		4.9	8.86 <16>	8.86 < 7>	12.48 < 1>	9	8	32
		6.6	16.96 < 1>	8.86 <15>	20.16 < 1>	36	18	39
246	.70 X	.40						
		.0	16.45 < 1>	8.86 <16>	17.06 < 1>	35	18	36
		1.6	8.86 <15>	8.86 < 8>	9.38 < 1>	9	5	29
		3.3	8.86 <12>	11.87 < 1>	12.87 < 1>	9	26	12
		4.9	8.86 <12>	8.86 < 7>	11.00 < 1>	9	15	30
		6.6	12.89 < 8>	8.86 <11>	18.68 < 1>	28	14	38
238	.70 X	.40						
		.0	8.86 < 7>	8.86 < 8>	19.43 < 1>	16	9	19
		1.6	8.86 <11>	8.86 < 8>	13.74 < 1>	6	15	13
		3.3	8.86 <15>	8.86 < 1>	11.42 < 1>	6	11	11
		4.9	8.86 < 8>	8.86 < 7>	17.11 < 1>	6	6	16
		6.6	11.63 < 8>	8.86 <11>	2.38 < 1>	25	13	22
241	.70 X	.40						
		.0	9.95 < 7>	8.86 <12>	15.20 < 1>	22	11	20
		1.6	8.86 < 7>	8.86 < 8>	14.92 < 1>	5	5	14
		3.3	8.86 <17>	8.86 < 1>	9.23 < 1>	5	7	9
		4.9	8.86 < 8>	8.86 < 7>	14.40 < 1>	5	5	14
		6.6	9.11 < 8>	8.86 <11>	15.00 < 1>	20	10	19

'PENULANGAN PORTAL RUMAH SUSUN (TON,M)

'LEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
244	.70 X .40							
		.0	8.86 < 7>	8.86 <16>	15.00 < 1>	19	9	19
		1.6	8.86 <15>	8.86 < 8>	13.93 < 1>	5	5	13
		3.3	8.86 <13>	8.86 < 1>	8.70 < 1>	5	7	8
		4.9	8.86 <16>	8.86 <15>	14.39 < 1>	5	4	14
		6.6	8.86 < 8>	8.86 <15>	15.00 < 1>	19	10	19
247	.70 X .40							
		.0	10.45 < 7>	8.86 <16>	1.89 < 1>	23	11	21
		1.6	8.86 <15>	8.86 <16>	16.61 < 1>	6	6	16
		3.3	8.86 <12>	8.86 < 7>	10.92 < 1>	6	12	11
		4.9	8.86 <16>	8.86 < 7>	13.16 < 1>	6	14	13
		6.6	8.86 < 8>	8.86 <15>	14.00 < 1>	16	8	18
248	.60 X .30							
		.0	16.23 < 1>	7.77 <15>	25.00 < 1>	29	15	33
		1.6	5.70 <16>	5.70 < 7>	19.18 < 1>	7	11	28
		3.2	5.70 <16>	12.04 < 1>	19.34 < 1>	7	22	16
		4.8	5.70 <15>	5.70 < 1>	9.85 < 1>	7	6	21
		6.4	10.29 < 1>	5.70 <16>	15.67 < 1>	19	10	26
256	.60 X .30							
		.0	18.00 < 1>	8.57 <12>	25.77 < 1>	32	16	34
		1.6	5.70 <11>	5.70 < 8>	19.95 < 1>	8	10	29
		3.2	5.70 <11>	11.79 < 1>	20.00 < 1>	8	22	17
		4.8	5.70 <12>	5.70 < 1>	10.51 < 1>	8	7	21
		6.4	9.70 < 8>	5.70 <11>	16.33 < 1>	18	9	26
250	.70 X .40							
		.0	23.01 < 1>	11.06 <15>	28.93 < 1>	48	24	48
		1.6	8.86 < 1>	8.86 <15>	21.60 < 1>	12	12	40
		3.2	8.86 <16>	15.75 < 1>	21.22 < 1>	12	34	20
		4.8	8.86 <12>	10.85 < 1>	28.55 < 1>	12	24	28
		6.4	8.86 <12>	8.86 < 1>	15.47 < 1>	12	6	35
252	.70 X .40							
		.0	18.51 < 1>	8.97 <17>	25.93 < 1>	40	20	45
		1.6	8.86 <14>	8.86 < 9>	18.60 < 1>	10	15	38
		3.2	8.86 <14>	15.79 < 1>	20.37 < 1>	10	34	20
		4.8	8.86 <17>	8.86 < 1>	7.29 < 1>	10	19	27
		6.4	8.86 < 9>	8.86 < 1>	14.62 < 1>	11	6	34
254	.70 X .40							
		.0	24.13 < 1>	11.57 <12>	29.40 < 1>	51	25	48
		1.6	8.86 < 1>	8.86 <12>	22.07 < 1>	13	12	41
		3.2	8.86 <11>	15.59 < 1>	21.68 < 1>	13	34	21
		4.8	8.86 <15>	11.13 < 1>	29.02 < 1>	13	24	28
		6.4	8.86 <15>	8.86 < 1>	15.94 < 1>	13	6	35
249	.40 X .30							
		.0	3.59 < 8>	3.59 <15>	14.25 < 1>	3	3	7
		.8	3.59 < 8>	3.59 < 7>	11.23 < 1>	2	2	6
		1.5	3.59 <15>	3.59 < 8>	12.49 < 1>	2	2	6
		2.3	3.59 <15>	3.59 < 8>	15.51 < 1>	3	3	8
		3.0	6.43 <15>	3.59 < 8>	18.54 < 1>	7	4	10
257	.40 X .30							
		.0	4.42 < 1>	3.59 <12>	14.74 < 1>	5	3	8
		.8	3.59 < 7>	3.59 <12>	11.71 < 1>	2	2	6

'PENULANGAN PORTAL RUMAH SUSUN (TON,M)

'LEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
257	.40 X .30							
		1.5	3.59 <12>	3.59 < 1>	13.39 < 1>	2	4	7
		2.3	3.59 <12>	5.31 < 1>	16.41 < 1>	3	6	9
		3.0	6.52 <12>	6.28 < 1>	19.44 < 1>	8	7	10
251	.40 X .30							
		.0	3.59 < 1>	3.59 <15>	12.32 < 1>	2	4	6
		.8	3.59 < 1>	3.59 <15>	16.16 < 1>	2	3	8
		1.5	3.59 <11>	3.59 < 1>	20.00 < 1>	2	2	10
		2.3	3.59 <11>	3.59 < 1>	8.53 < 1>	3	1	12
		3.0	7.58 <11>	3.67 < 1>	12.36 < 1>	9	4	14
253	.40 X .30							
		.0	3.59 < 1>	3.59 <17>	9.90 < 1>	2	4	5
		.8	3.59 < 1>	3.59 < 9>	12.58 < 1>	2	3	7
		1.5	3.59 <17>	3.62 < 1>	16.42 < 1>	2	4	9
		2.3	3.59 <17>	3.59 < 1>	4.95 < 1>	2	4	11
		3.0	5.37 <17>	3.59 < 1>	8.79 < 1>	6	3	13
255	.40 X .30							
		.0	3.59 < 1>	3.59 <12>	12.31 < 1>	2	4	6
		.8	3.59 < 1>	3.59 <12>	16.15 < 1>	2	3	8
		1.5	3.59 <16>	3.59 < 1>	19.99 < 1>	2	3	10
		2.3	3.59 <16>	3.59 < 1>	8.52 < 1>	3	2	12
		3.0	7.58 <16>	3.67 < 1>	12.35 < 1>	9	4	14
258	.60 X .30							
		.0	11.36 < 7>	5.70 <16>	20.89 < 1>	21	10	30
		1.6	5.70 <15>	5.83 < 8>	14.48 < 1>	9	11	25
		3.3	5.70 <15>	14.75 < 1>	20.28 < 1>	9	27	17
		4.9	5.70 <16>	5.70 < 7>	22.82 < 1>	9	6	32
		6.6	21.61 < 1>	10.18 <15>	29.23 < 1>	38	19	37
260	.60 X .30							
		.0	20.46 < 1>	9.67 <16>	25.31 < 1>	36	18	34
		1.6	5.70 < 7>	5.70 < 8>	18.90 < 1>	9	4	28
		3.3	5.70 <12>	11.42 < 1>	18.08 < 1>	9	21	15
		4.9	5.70 <16>	5.70 < 7>	20.62 < 1>	9	5	30
		6.6	19.19 < 1>	9.10 <15>	27.03 < 1>	34	17	35
262	.60 X .30							
		.0	19.20 < 1>	9.11 <12>	24.56 < 1>	34	17	33
		1.6	5.70 <11>	5.70 < 8>	18.15 < 1>	9	4	28
		3.3	5.70 <15>	11.42 < 1>	18.82 < 1>	9	21	16
		4.9	5.70 <12>	5.70 < 7>	21.36 < 1>	9	4	30
		6.6	20.44 < 1>	9.66 <11>	27.77 < 1>	36	18	36
264	.60 X .30							
		.0	21.62 < 1>	10.18 <12>	26.76 < 1>	38	19	35
		1.6	5.70 <11>	5.70 < 8>	20.35 < 1>	9	5	29
		3.3	5.70 <12>	14.74 < 1>	14.42 < 1>	9	27	12
		4.9	5.70 <12>	7.46 < 1>	16.96 < 1>	9	14	27
		6.6	11.58 < 8>	5.70 <11>	23.37 < 1>	21	11	32
259	.70 X .40							
		.0	10.69 < 7>	8.86 <16>	17.72 < 1>	23	12	37
		1.6	8.86 <15>	8.86 < 8>	10.21 < 1>	11	17	30
		3.3	8.86 <15>	15.73 < 1>	21.44 < 1>	11	34	21
		4.9	8.86 <12>	8.86 < 7>	18.35 < 1>	11	9	37

/PENULANGAN PORTAL RUMAH SUSUN (TON,M)

FLEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
259	.70 X .40							
		6.6	19.95 < 1>	9.65 <15>	25.86 < 1>	42	21	45
261	.70 X .40							
		.0	19.56 < 1>	9.46 <12>	21.12 < 1>	42	21	40
		1.6	8.86 <11>	8.86 < 8>	13.61 < 1>	10	5	33
		3.3	8.86 <16>	11.25 < 1>	18.11 < 1>	10	25	17
		4.9	8.86 <12>	8.86 < 7>	15.01 < 1>	10	6	34
		6.6	19.15 < 1>	9.27 <11>	22.52 < 1>	41	20	41
263	.70 X .40							
		.0	19.06 < 1>	9.23 <16>	20.59 < 1>	41	20	40
		1.6	8.86 <15>	8.86 < 8>	13.08 < 1>	10	5	32
		3.3	8.86 <11>	11.23 < 1>	18.73 < 1>	10	25	18
		4.9	8.86 <16>	8.86 < 7>	15.63 < 1>	10	5	35
		6.6	19.72 < 1>	9.54 <15>	23.14 < 1>	42	21	42
265	.70 X .40							
		.0	19.98 < 1>	9.66 <12>	23.97 < 1>	43	21	43
		1.6	8.86 <15>	8.86 < 8>	16.46 < 1>	11	6	36
		3.3	8.86 <12>	15.71 < 1>	15.22 < 1>	11	34	15
		4.9	8.86 <12>	8.95 < 7>	12.13 < 1>	11	20	31
		6.6	10.69 < 8>	8.86 <11>	19.64 < 1>	23	12	39
266	.40 X .30							
		.0	11.32 < 7>	8.84 < 8>	26.58 < 1>	13	10	14
		.5	6.77 < 7>	6.59 < 8>	24.65 < 1>	8	8	13
		1.0	3.59 < 7>	3.97 < 8>	22.72 < 1>	4	5	12
		1.6	3.59 <15>	3.59 <16>	21.38 < 1>	3	3	11
		2.1	3.59 < 6>	3.59 < 9>	23.31 < 1>	3	4	12
267	.40 X .30							
		.0	3.59 < 9>	3.59 < 6>	23.31 < 1>	3	4	12
		.5	3.59 <16>	3.59 <15>	21.38 < 1>	3	3	11
		1.0	3.59 < 8>	3.99 < 7>	22.30 < 1>	4	5	12
		1.6	6.66 < 8>	6.63 < 7>	24.23 < 1>	8	8	13
		2.1	11.15 < 8>	8.89 < 7>	26.16 < 1>	12	10	14
268	.40 X .30							
		.0	9.88 <15>	7.78 <16>	24.73 < 1>	11	9	13
		.5	5.96 <15>	5.85 <16>	22.80 < 1>	7	7	12
		1.0	3.59 <15>	3.60 <16>	20.86 < 1>	3	4	11
		1.6	3.59 < 7>	3.59 < 8>	19.67 < 1>	3	2	10
		2.1	3.59 <17>	3.59 <14>	21.60 < 1>	3	3	11
269	.40 X .30							
		.0	3.59 <14>	3.59 <17>	21.75 < 1>	3	3	11
		.5	3.59 < 8>	3.59 < 7>	19.82 < 1>	3	2	10
		1.0	3.59 <16>	3.59 <15>	20.90 < 1>	3	4	11
		1.6	6.03 <16>	5.85 <15>	22.83 < 1>	7	7	12
		2.1	9.95 <16>	7.80 <15>	24.76 < 1>	11	9	13
270	.60 X .30							
		.0	10.78 < 1>	5.70 <15>	12.80 < 1>	20	10	23
		1.6	5.70 <16>	5.70 < 7>	4.33 < 1>	5	8	16
		3.2	5.70 <15>	10.57 < 1>	10.46 < 1>	5	20	9
		4.8	5.70 <15>	5.70 < 1>	3.63 < 1>	5	10	16
		6.4	8.44 < 7>	5.70 <16>	12.11 < 1>	16	8	23

'PENULANGAN PORTAL RUMAH SUSUN (TON,M)

'LEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
274	.60 X .30							
		.0	10.73 < 1>	5.70 <12>	12.80 < 1>	20	10	23
		1.6	5.70 <11>	5.70 < 8>	4.32 < 1>	5	8	16
		3.2	5.70 <12>	10.68 < 1>	10.43 < 1>	5	20	9
		4.8	5.70 <12>	5.70 < 1>	3.59 < 1>	5	10	16
		6.4	8.42 < 8>	5.70 <11>	12.07 < 1>	16	8	23
271	.60 X .30							
		.0	11.94 < 1>	5.79 <11>	7.68 < 1>	22	11	19
		1.6	5.70 < 1>	5.70 <11>	1.72 < 1>	5	3	14
		3.2	5.70 <11>	5.70 < 1>	11.06 < 1>	5	9	9
		4.8	5.70 <11>	5.70 < 1>	11.83 < 1>	5	10	10
		6.4	5.70 <11>	5.70 < 1>	2.49 < 1>	5	3	15
272	.60 X .30							
		.0	8.29 < 1>	5.70 <17>	4.53 < 1>	15	8	16
		1.6	5.70 < 1>	5.70 < 9>	.00 < 1>	4	2	11
		3.2	5.70 <17>	5.70 < 1>	7.91 < 1>	4	9	7
		4.8	5.70 <17>	5.70 < 1>	11.72 < 1>	4	7	10
		6.4	5.70 < 9>	5.70 < 1>	2.38 < 1>	5	3	15
273	.60 X .30							
		.0	11.54 < 1>	5.70 <16>	7.51 < 1>	21	11	19
		1.6	5.70 < 1>	5.70 <16>	1.54 < 1>	5	3	14
		3.2	5.70 <16>	5.70 < 1>	10.89 < 1>	5	9	9
		4.8	5.70 <16>	5.70 < 1>	11.66 < 1>	5	10	10
		6.4	5.70 <16>	5.70 < 1>	2.31 < 1>	5	3	15
275	.40 X .30							
		.0	3.59 <11>	3.59 < 1>	16.74 < 1>	4	2	9
		.8	3.59 < 1>	3.59 <17>	20.58 < 1>	4	2	11
		1.5	3.59 < 1>	3.59 <17>	24.41 < 1>	4	2	13
		2.3	7.31 < 1>	3.59 <17>	28.25 < 1>	8	2	15
		3.0	13.71 < 1>	6.45 <17>	32.09 < 1>	15	8	17
276	.40 X .30							
		.0	3.59 < 1>	3.64 <11>	8.97 < 1>	1	4	5
		.8	3.59 <12>	3.61 < 7>	11.67 < 1>	1	4	6
		1.5	3.59 <12>	4.93 < 1>	15.50 < 1>	1	6	8
		2.3	3.59 <15>	4.89 < 1>	4.03 < 1>	1	6	10
		3.0	4.38 <15>	3.59 < 1>	7.87 < 1>	5	4	12
277	.40 X .30							
		.0	3.59 <10>	3.59 < 1>	16.74 < 1>	4	2	9
		.8	3.59 < 1>	3.59 <17>	20.58 < 1>	4	2	11
		1.5	3.59 < 1>	3.59 <17>	24.41 < 1>	4	2	13
		2.3	7.31 < 1>	3.59 <17>	28.25 < 1>	8	2	15
		3.0	13.71 < 1>	6.45 <17>	32.09 < 1>	15	8	17
278	.40 X .30							
		.0	3.59 <15>	3.59 < 1>	16.74 < 1>	4	2	9
		.8	3.59 < 1>	3.59 <17>	20.58 < 1>	4	2	11
		1.5	3.59 < 1>	3.59 <17>	24.41 < 1>	4	2	13
		2.3	7.31 < 1>	3.59 <17>	28.25 < 1>	8	2	15
		3.0	13.71 < 1>	6.45 <17>	32.09 < 1>	15	8	17
280	.40 X .30							
		.0	3.59 < 1>	3.65 <16>	8.97 < 1>	1	4	5
		.8	3.59 <15>	3.64 < 8>	11.69 < 1>	1	4	6

'PENULANGAN PORTAL RUMAH SUSUN (TON,M)

'LEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
280	.40 X .30							
		1.5	3.59 <15>	4.88 < 1>	15.53 < 1>	1	6	8
		2.3	3.59 <12>	4.70 < 1>	4.06 < 1>	1	6	10
		3.0	4.39 <12>	3.59 < 1>	7.90 < 1>	5	3	12
282	.40 X .30							
		.0	3.59 <12>	3.59 < 1>	16.74 < 1>	4	2	9
		.8	3.59 < 1>	3.59 <17>	20.58 < 1>	4	2	11
		1.5	3.59 < 1>	3.59 <17>	24.41 < 1>	4	2	13
		2.3	7.31 < 1>	3.59 <17>	28.25 < 1>	8	2	15
		3.0	13.71 < 1>	6.45 <17>	32.09 < 1>	15	8	17
300	.40 X .30							
		.0	3.59 < 7>	3.59 <16>	6.52 < 1>	3	1	3
		1.6	3.59 < 7>	3.59 <16>	5.20 < 1>	1	0	3
		3.3	3.59 <15>	3.59 < 1>	3.88 < 1>	1	1	2
		4.9	3.59 <16>	3.59 < 7>	4.30 < 1>	1	1	2
		6.6	3.59 < 8>	3.59 <15>	5.61 < 1>	1	1	3
302	.40 X .30							
		.0	3.59 < 7>	3.59 <16>	5.86 < 1>	1	1	3
		1.6	3.59 <15>	3.59 < 8>	4.54 < 1>	1	1	2
		3.3	3.59 <12>	3.59 < 1>	3.64 < 1>	1	1	2
		4.9	3.59 <16>	3.59 < 7>	4.95 < 1>	1	0	3
		6.6	3.59 < 8>	3.59 <15>	6.27 < 1>	2	1	3
304	.40 X .30							
		.0	3.59 < 7>	3.59 <12>	6.29 < 1>	2	1	3
		1.6	3.59 < 7>	3.59 < 8>	4.97 < 1>	1	0	3
		3.3	3.59 <15>	3.59 < 1>	3.65 < 1>	1	1	2
		4.9	3.59 <12>	3.59 < 7>	4.52 < 1>	1	1	2
		6.6	3.59 < 8>	3.59 <11>	5.84 < 1>	1	1	3
306	.40 X .30							
		.0	3.59 < 7>	3.59 <12>	5.66 < 1>	1	1	3
		1.6	3.59 <11>	3.59 < 8>	4.34 < 1>	1	1	2
		3.3	3.59 <12>	3.59 < 1>	3.84 < 1>	1	1	2
		4.9	3.59 < 8>	3.59 <11>	5.16 < 1>	1	0	3
		6.6	3.59 < 8>	3.59 <11>	6.48 < 1>	3	1	3
301	.40 X .30							
		.0	3.59 < 7>	3.59 <16>	6.60 < 1>	4	2	3
		1.6	3.59 < 7>	3.59 < 8>	5.28 < 1>	1	1	3
		3.3	3.59 <11>	3.59 < 8>	3.96 < 1>	1	1	2
		4.9	3.59 <16>	3.59 < 7>	4.21 < 1>	1	1	2
		6.6	3.59 < 8>	3.59 < 7>	5.53 < 1>	2	1	3
303	.40 X .30							
		.0	3.59 < 7>	3.59 <16>	5.85 < 1>	2	1	3
		1.6	3.59 <15>	3.59 < 8>	4.53 < 1>	1	1	2
		3.3	3.59 <12>	3.59 < 1>	3.65 < 1>	1	1	2
		4.9	3.59 < 8>	3.59 < 7>	4.96 < 1>	1	1	3
		6.6	3.59 < 8>	3.59 <15>	6.28 < 1>	3	1	3
305	.40 X .30							
		.0	3.59 < 7>	3.59 <12>	6.29 < 1>	3	1	3
		1.6	3.59 < 7>	3.59 < 8>	4.97 < 1>	1	1	3
		3.3	3.59 <15>	3.59 < 1>	3.65 < 1>	1	1	2
		4.9	3.59 <12>	3.59 < 7>	4.53 < 1>	1	1	2

'PENULANGAN PORTAL RUMAH SUSUN (TON,M)

'LEXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

ELEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
305	.40 X .30							
		6.6	3.59 < 8>	3.59 <11>	5.84 < 1>	2	1	3
307	.40 X .30							
		.0	3.59 < 7>	3.59 < 8>	5.57 < 1>	2	1	3
		1.6	3.59 <11>	3.59 < 8>	4.25 < 1>	1	1	2
		3.3	3.59 <16>	3.59 < 7>	3.92 < 1>	1	1	2
		4.9	3.59 < 8>	3.59 < 7>	5.24 < 1>	1	1	3
		6.6	3.59 < 8>	3.59 <11>	6.56 < 1>	4	2	3
308	.40 X .30							
		.0	3.59 < 7>	3.59 < 8>	7.07 < 1>	4	3	4
		1.0	3.59 < 7>	3.59 < 8>	6.23 < 1>	2	2	3
		2.1	3.59 <12>	3.59 < 1>	5.40 < 1>	1	1	3
		3.2	3.59 < 8>	3.59 < 7>	6.22 < 1>	2	2	3
		4.2	3.59 < 8>	3.59 < 7>	7.06 < 1>	4	3	4
309	.40 X .30							
		.0	3.59 <15>	3.59 <16>	7.06 < 1>	4	3	4
		1.0	3.59 <15>	3.59 <16>	6.22 < 1>	1	2	3
		2.1	3.59 <15>	3.59 < 1>	5.39 < 1>	1	1	3
		3.2	3.59 <16>	3.59 <15>	6.23 < 1>	1	2	3
		4.2	3.59 <16>	3.59 <15>	7.07 < 1>	4	3	4
310	.40 X .30							
		.0	3.59 < 8>	3.59 <11>	6.20 < 1>	2	1	3
		1.6	3.59 <12>	3.59 < 7>	4.92 < 1>	0	0	3
		3.2	3.59 <16>	3.59 < 1>	3.64 < 1>	0	1	2
		4.8	3.59 <11>	3.59 < 8>	4.71 < 1>	0	0	2
		6.4	3.59 < 7>	3.59 <12>	5.99 < 1>	2	1	3
311	.40 X .30							
		.0	3.59 <12>	3.59 < 1>	6.08 < 1>	1	2	3
		1.6	3.59 <12>	3.59 < 1>	4.80 < 1>	1	2	2
		3.2	3.59 <16>	3.59 < 1>	3.55 < 1>	1	1	2
		4.8	3.59 < 1>	3.59 <12>	4.83 < 1>	1	1	3
		6.4	3.59 < 1>	3.59 <12>	6.11 < 1>	4	2	3
312	.40 X .30							
		.0	3.59 < 9>	3.59 < 1>	6.35 < 1>	1	1	3
		1.6	3.59 <17>	3.59 < 1>	5.07 < 1>	0	0	3
		3.2	3.59 <14>	3.59 < 1>	3.79 < 1>	0	1	2
		4.8	3.59 < 1>	3.59 < 9>	4.56 < 1>	0	1	2
		6.4	3.59 < 1>	3.59 <17>	5.84 < 1>	1	1	3
313	.40 X .30							
		.0	3.59 <15>	3.59 < 1>	6.08 < 1>	1	2	3
		1.6	3.59 <15>	3.59 < 1>	4.80 < 1>	1	2	2
		3.2	3.59 <11>	3.59 < 1>	3.55 < 1>	1	1	2
		4.8	3.59 < 1>	3.59 <15>	4.83 < 1>	1	1	3
		6.4	3.59 < 1>	3.59 <15>	6.11 < 1>	4	2	3
314	.40 X .30							
		.0	3.59 < 7>	3.59 <16>	6.20 < 1>	2	1	3
		1.6	3.59 <15>	3.59 < 8>	4.92 < 1>	0	0	3
		3.2	3.59 <11>	3.59 < 1>	3.64 < 1>	0	1	2
		4.8	3.59 < 8>	3.59 < 7>	4.71 < 1>	0	0	2
		6.4	3.59 < 8>	3.59 <15>	5.99 < 1>	2	1	3

:NULANGAN PORTAL RUMAH SUSUN (TON,M)

:XURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

:EM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
315	.40 X .30							
		.0	3.59 < 1>	3.59 <16>	7.54 < 1>	0	0	4
		.8	3.59 < 1>	3.59 <17>	8.14 < 1>	0	0	4
		1.5	3.59 < 1>	3.59 <17>	8.74 < 1>	0	0	5
		2.3	3.59 < 1>	3.59 <17>	9.34 < 1>	1	0	5
		3.0	3.59 < 1>	3.59 <17>	9.94 < 1>	2	1	5
316	.40 X .30							
		.0	3.59 <11>	3.59 < 1>	7.54 < 1>	0	0	4
		.8	3.59 < 1>	3.59 <17>	8.14 < 1>	0	0	4
		1.5	3.59 < 1>	3.59 <17>	8.74 < 1>	0	0	5
		2.3	3.59 < 1>	3.59 <17>	9.34 < 1>	1	0	5
		3.0	3.59 < 1>	3.59 <17>	9.94 < 1>	2	1	5
317	.40 X .30							
		.0	3.59 < 1>	3.59 <11>	7.54 < 1>	0	0	4
		.8	3.59 < 1>	3.59 <17>	8.14 < 1>	0	0	4
		1.5	3.59 < 1>	3.59 <17>	8.74 < 1>	0	0	5
		2.3	3.59 < 1>	3.59 <17>	9.34 < 1>	1	0	5
		3.0	3.59 < 1>	3.59 <17>	9.94 < 1>	2	1	5
318	.40 X .30							
		.0	3.59 <16>	3.59 < 1>	7.54 < 1>	0	0	4
		.8	3.59 < 1>	3.59 <17>	8.14 < 1>	0	0	4
		1.5	3.59 < 1>	3.59 <17>	8.74 < 1>	0	0	5
		2.3	3.59 < 1>	3.59 <17>	9.34 < 1>	1	0	5
		3.0	3.59 < 1>	3.59 <17>	9.94 < 1>	2	1	5
332	.40 X .30							
		.0	5.02 <17>	3.59 < 1>	29.54 < 1>	6	3	15
		.6	5.02 <17>	3.59 < 1>	29.99 < 1>	6	3	16
		1.2	5.02 < 1>	3.59 <17>	48.46 < 1>	6	3	25
		1.8	10.43 < 1>	3.59 <17>	48.01 < 1>	12	3	25
		2.4	23.57 < 1>	10.50 <17>	52.08 < 1>	24	12	35
333	.40 X .30							
		.0	4.93 < 1>	3.59 <17>	29.17 < 1>	6	3	15
		.6	4.93 <17>	3.59 < 1>	29.62 < 1>	6	3	15
		1.2	5.02 < 1>	3.59 <17>	48.10 < 1>	6	3	25
		1.8	10.43 < 1>	3.59 <17>	47.65 < 1>	12	3	25
		2.4	23.09 < 1>	10.31 <17>	50.49 < 1>	23	12	34
334	.40 X .30							
		.0	4.68 <17>	3.59 < 1>	28.07 < 1>	6	3	15
		.6	4.68 <17>	3.59 < 1>	28.51 < 1>	6	3	15
		1.2	4.68 < 1>	3.59 <17>	45.76 < 1>	6	3	24
		1.8	9.69 < 1>	3.59 <17>	45.32 < 1>	11	3	24
		2.4	21.66 < 1>	9.76 <17>	48.15 < 1>	22	11	33
335	.40 X .30							
		.0	4.68 <17>	3.59 < 1>	28.07 < 1>	6	3	15
		.6	4.68 <17>	3.59 < 1>	28.51 < 1>	6	3	15
		1.2	4.68 < 1>	3.59 <17>	45.76 < 1>	6	3	24
		1.8	9.69 < 1>	3.59 <17>	45.32 < 1>	11	3	24
		2.4	21.66 < 1>	9.76 <17>	48.15 < 1>	22	11	33
336	.40 X .30							
		.0	4.68 < 1>	3.59 <17>	28.07 < 1>	6	3	15
		.6	4.68 <17>	3.59 < 1>	28.51 < 1>	6	3	15

'ENULANGAN PORTAL RUMAH SUSUN (TON,M)

.EXURAL AND SHEAR DESIGN OF BEAM-TYPE ELEMENTS

:LEM ID	SECTION SIZE DEPTH X WIDTH	STATN LOC	<------REQUIRED REINFORCING------> TOP <LC>	BOT <LC>	SHR <LC>	<-DESIGN FORCES-> -M33	+M33	V22
336	.40 X .30							
		1.2	4.68 < 1>	3.59 <17>	45.76 < 1>	6	3	24
		1.8	9.69 < 1>	3.59 <17>	45.32 < 1>	11	3	24
		2.4	21.66 < 1>	9.76 <17>	48.15 < 1>	22	11	33
337	.40 X .30							
		.0	4.68 <17>	3.59 < 1>	28.07 < 1>	6	3	15
		.6	4.68 <17>	3.59 < 1>	28.51 < 1>	6	3	15
		1.2	4.68 < 1>	3.59 <17>	45.76 < 1>	6	3	24
		1.8	9.69 < 1>	3.59 <17>	45.32 < 1>	11	3	24
		2.4	21.66 < 1>	9.76 <17>	48.15 < 1>	22	11	33
338	.40 X .30							
		.0	23.57 < 1>	10.50 <17>	52.08 < 1>	24	12	35
		.6	10.43 < 1>	3.59 <17>	48.01 < 1>	12	3	25
		1.2	5.02 < 1>	3.59 <17>	48.46 < 1>	6	3	25
		1.8	5.02 <17>	3.59 < 1>	29.99 < 1>	6	3	16
		2.4	5.02 < 1>	3.59 < 9>	29.54 < 1>	6	3	15
339	.40 X .30							
		.0	22.13 < 1>	9.94 <17>	49.75 < 1>	22	11	34
		.6	9.69 < 1>	3.59 <17>	45.69 < 1>	11	3	24
		1.2	4.77 < 1>	3.59 <17>	46.13 < 1>	6	3	24
		1.8	4.77 <17>	3.59 < 1>	28.89 < 1>	6	3	15
		2.4	4.77 < 1>	3.59 <17>	28.44 < 9>	6	3	15
340	.40 X .30							
		.0	21.66 < 1>	9.76 <17>	48.15 < 1>	22	11	33
		.6	9.69 < 1>	3.59 <17>	45.32 < 1>	11	3	24
		1.2	4.68 < 1>	3.59 <17>	45.76 < 1>	6	3	24
		1.8	4.68 <17>	3.59 < 1>	28.51 < 1>	6	3	15
		2.4	4.68 < 1>	3.59 <17>	28.07 < 1>	6	3	15
341	.40 X .30							
		.0	21.66 < 1>	9.76 <17>	48.15 < 1>	22	11	33
		.6	9.69 < 1>	3.59 <17>	45.32 < 1>	11	3	24
		1.2	4.68 < 1>	3.59 <17>	45.76 < 1>	6	3	24
		1.8	4.68 <17>	3.59 < 1>	28.51 < 1>	6	3	15
		2.4	4.68 < 1>	3.59 <17>	28.07 < 1>	6	3	15
342	.40 X .30							
		.0	21.66 < 1>	9.76 <17>	48.15 < 1>	22	11	33
		.6	9.69 < 1>	3.59 <17>	45.32 < 1>	11	3	24
		1.2	4.68 < 1>	3.59 <17>	45.76 < 1>	6	3	24
		1.8	4.68 <17>	3.59 < 1>	28.51 < 1>	6	3	15
		2.4	4.68 < 1>	3.59 <17>	28.07 < 1>	6	3	15
343	.40 X .30							
		.0	21.66 < 1>	9.76 <17>	48.15 < 1>	22	11	33
		.6	9.69 < 1>	3.59 <17>	45.32 < 1>	11	3	24
		1.2	4.68 < 1>	3.59 <17>	45.76 < 1>	6	3	24
		1.8	4.68 <17>	3.59 < 1>	28.51 < 1>	6	3	15
		2.4	4.68 < 1>	3.59 <17>	28.07 < 1>	6	3	15

LAMPIRAN 10
LAMPIRAN 11
LAMPIRAN 12
LAMPIRAN 13

DIAGRAM INTERAKSI *P-M* KOLOM 30/30

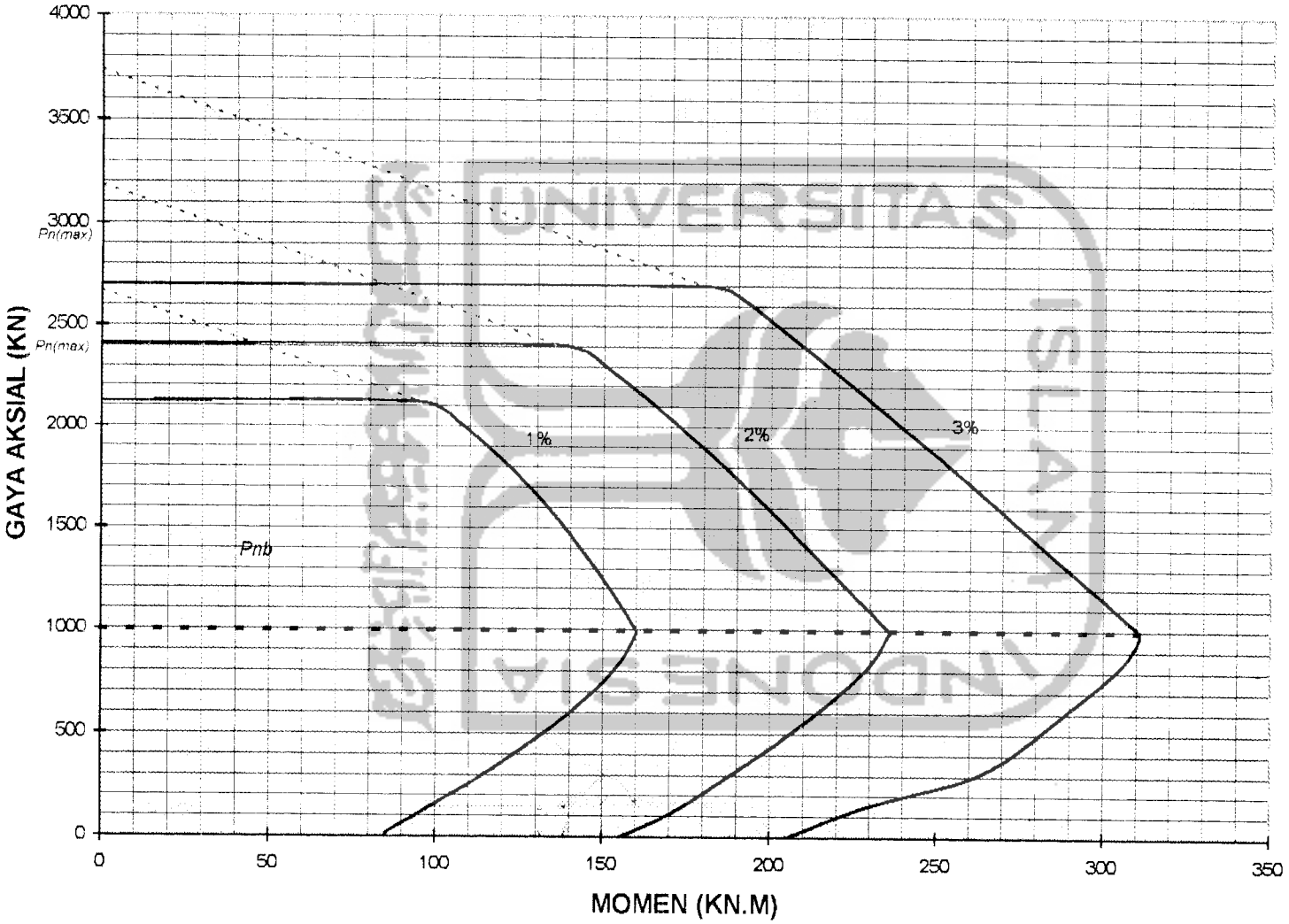


DIAGRAM INTERAKSI *P-M* KOLOM 40/40

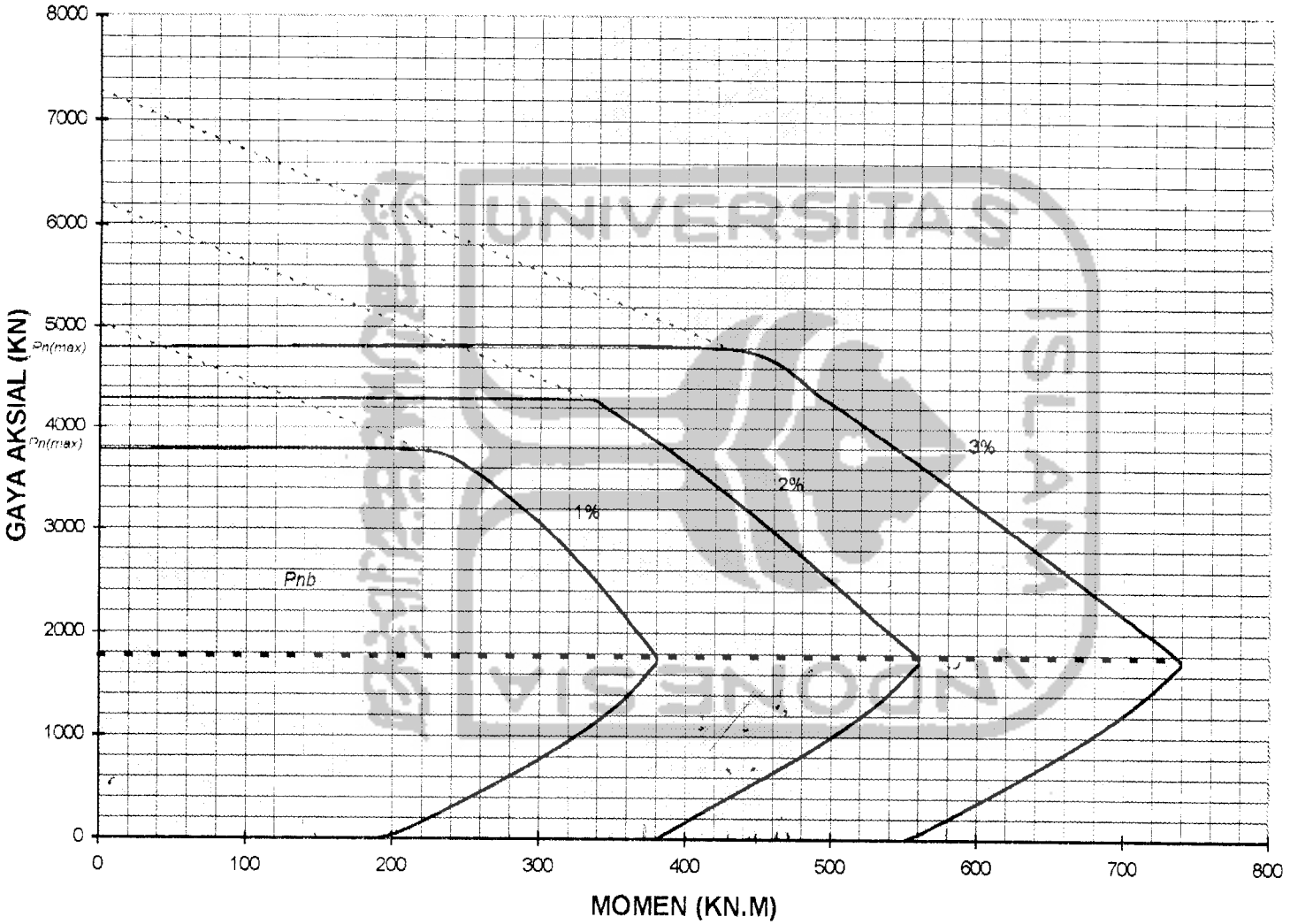


DIAGRAM INTERAKSI P-M KOLOM 60/60

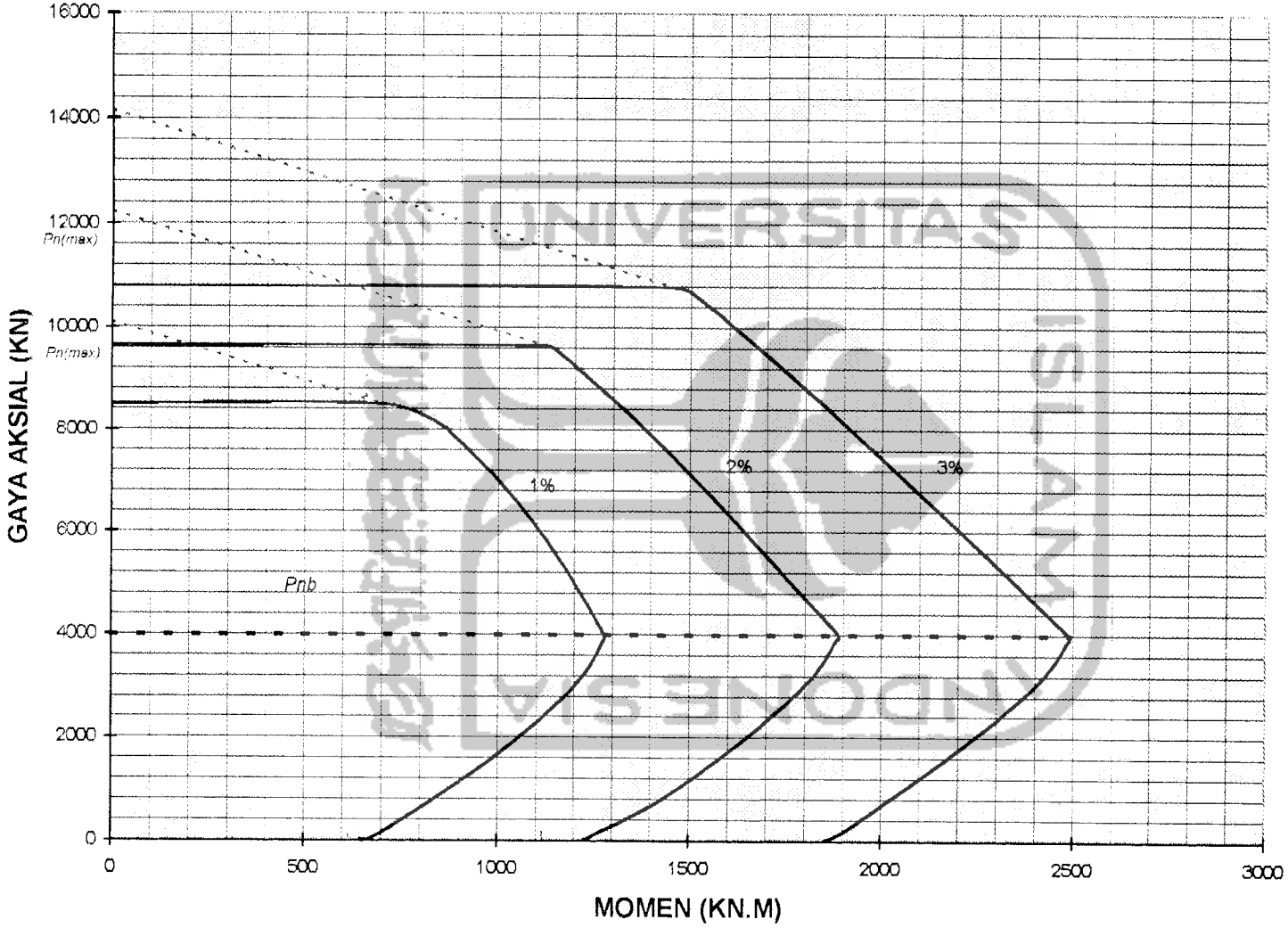
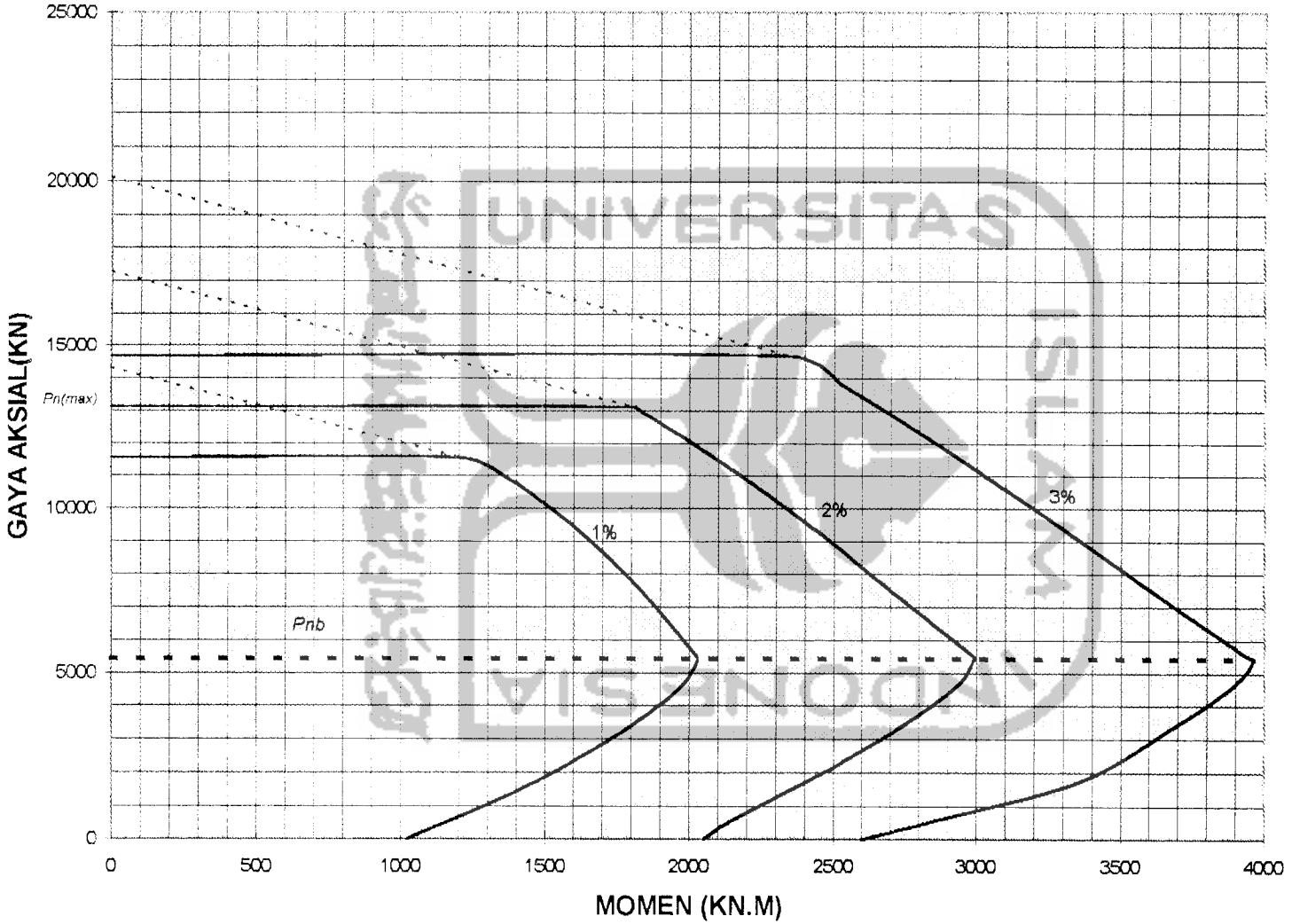
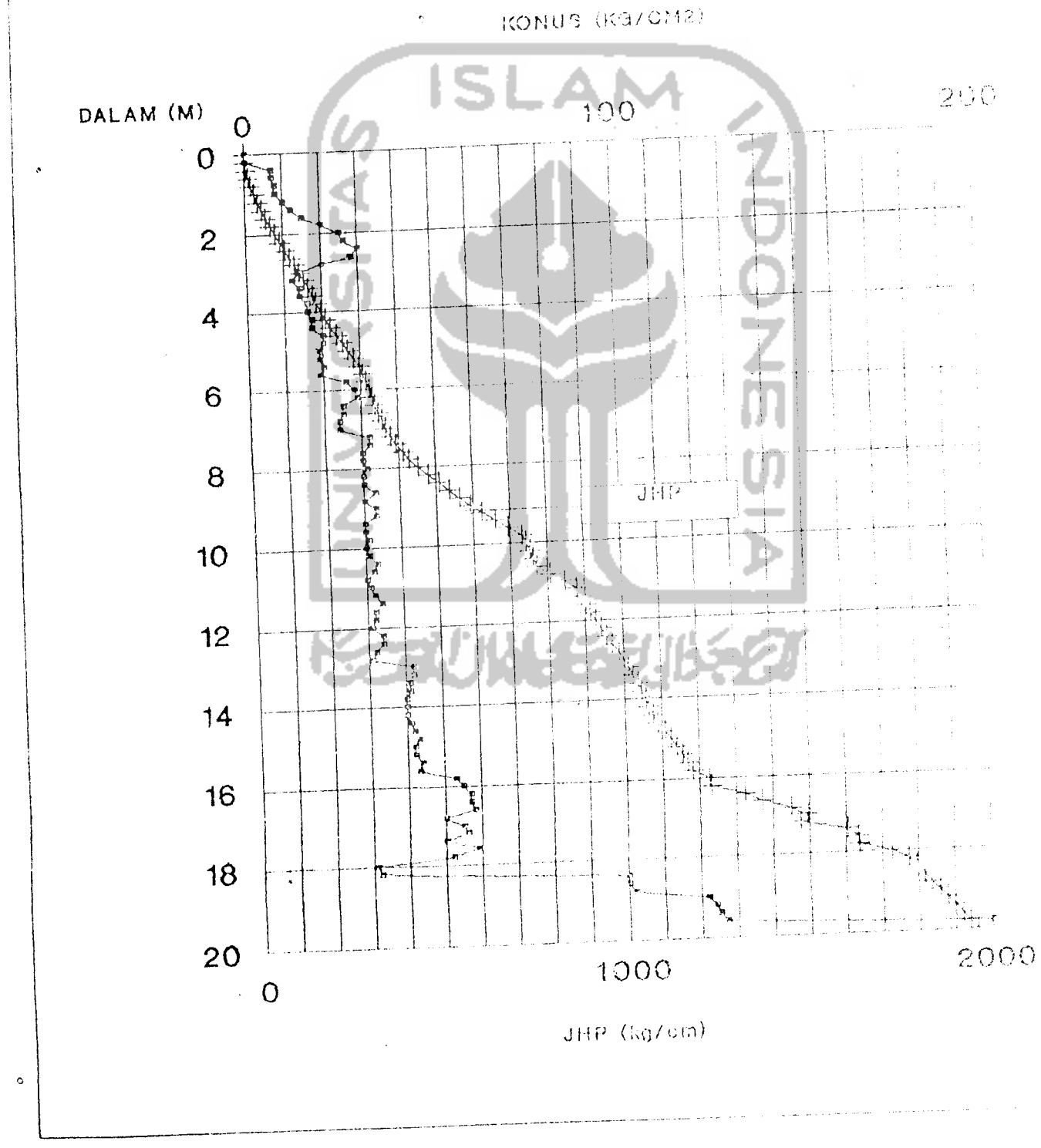


DIAGRAM INTERAKSI P-M KOLOM 70/70



LAMPIRAN 14


KONUS (KG/CM2)
DALAM (M)
0
100
200
0
2
4
6
8
10
12
14
16
18
20
JHP
0
1000
2000
JHP (kg/cm)

LAMPIRAN 15
LAMPIRAN 16
LAMPIRAN 17
LAMPIRAN 18
LAMPIRAN 19
LAMPIRAN 20
LAMPIRAN 21
LAMPIRAN 22
LAMPIRAN 23