

TUGAS AKHIR
APLIKASI TURBO PASCAL
PADA DISAIN ELEMEN STRUKTUR BETON
DENGAN INPUTING DATA MICROFEAP



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JURUSAN TEKNIK SIPIL
FAKULTAS TEKNIK SIPIL DAN PERENCANAAN
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**Diajukan kepada Universitas Islam Indonesia
untuk memenuhi sebagian persyaratan memperoleh
derajat Sarjana Teknik Sipil**

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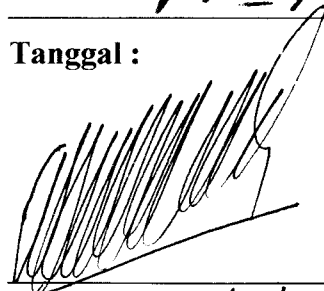
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PRAKATA

Assalamu'alaikum Wr. Wb.

Alhamdulillah, segala puji syukur dipanjatkan kehadiran Allah SWT, atas nikmat serta kemudahan yang diberikanNya hingga Tugas Akhir ini dapat diselesaikan.

Tugas Akhir ini disusun untuk melengkapi persyaratan dalam memperoleh jenjang kesarjanaan Strata Satu (S1) pada Jurusan Teknik Sipil, Fakultas Teknik Sipil dan Perencanaan, Universitas Islam Indonesia.

Permasalahan atau topik dalam penulisan Tugas Akhir ini adalah aplikasi Turbo Pascal pada program disain elemen struktur beton dengan data "input" dan keluaran program Microfeap.

Sangat disadari bahwa penulisan Tugas Akhir ini serta program komputer yang dihasilkan masih belum sempurna dan membutuhkan pengembangan lebih lanjut karena masih banyak ide-ide yang dapat dituangkan di dalamnya.

Selama penyusunan Tugas Akhir ini banyak masukan, petunjuk serta bantuan dari berbagai pihak. Oleh sebab itu diucapkan rasa terima kasih yang sebesar-besarnya kepada:

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Penyusun

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ABSTRAK

Laju perkembangan ilmu pengetahuan dan teknologi yang berkaitan dengan aplikasi program komputer pada bidang teknik sipil sangat pesat, begitu banyak program aplikasi teknik sipil yang ada, tetapi hampir tidak ada atau hanya sedikit sekali program disain elemen struktur (struktur portal beton khususnya) yang kompitibel dengan standar perencanaan atau peraturan yang berlaku di Indonesia.

Pada penelitian ini dibuat program dengan bahasa pemrograman Pascal dengan pertimbangan bahasa Pascal adalah salah satu bahasa tingkat tinggi komputer ("high level language"), yang umum digunakan untuk hampir semua penyelesaian pekerjaan di bidang teknik, ilmu pengetahuan eksak, administrasi/keuangan dan untuk proses data (statistik) dengan komputer.

Perencanaan elemen struktur beton biasanya dilakukan dengan cara coba-coba ("trial and error") yaitu mengamsumsikan dimensi-dimensi elemen struktur sebelum melakukan analisa struktur, untuk mendapatkan hasil yang efisien membutuhkan waktu yang cukup lama dan perhitungan yang berulang-ulang. Dengan program yang disain elemen struktur beton dengan "inputing" data Microfeap yang dibuat ini dapat mempermudah dan mempercepat pekerjaan perencanaan struktur beton yang sesuai dengan standar perencanaan dan peraturan yang berlaku di Indonesia, yaitu SK SNI T-15-1991-03. Program disain elemen struktur beton ini dapat digunakan pada perencanaan elemen struktur portal beton dengan jumlah tingkat yang tidak terbatas (tidak hanya terbatas dua tingkat) tetapi khusus untuk mendisain elemen fondasi terbatas pada fondasi telapak kolom setempat saja.

BAB I

PENDAHULUAN

1.1 Latar Belakang

Pesatnya laju perkembangan ilmu pengetahuan dan teknologi khususnya yang berkaitan dengan aplikasi program komputer pada bidang teknik sipil, menuntut pelajar sekolah kejuruan teknik, mahasiswa, teknisi, arsitek, praktisi dan rekayasawan yang bergerak di bidang rekayasa teknik sipil untuk terus mengikuti perkembangan tersebut.

Banyak perusahaan pembuat "software" yang menawarkan program analisis struktur dan disain elemen struktur seperti Microfeap, SAP 80 atau SAP 90 dan ETABS. Kedua program terakhir selain dapat dipakai untuk menghitung/menganalisis struktur juga bisa digunakan untuk mendisain elemen struktur beton dan baja. Program-program tersebut dalam mendisain elemen struktur memakai standar ACI untuk disain elemen struktur beton dan AISC untuk disain elemen struktur baja.

Microfeap cukup sederhana dan relatif lebih mudah untuk dipahami dan digunakan pada analisis struktur karena menggunakan analisis struktur dua dimensi.

Mengingat kondisi perkembangan ilmu pengetahuan dan teknologi, perangkat keras yang ada dan dasar-dasar perencanaan struktur beton di Indonesia, maka dirasakan perlu sebuah program disain elemen struktur beton yang dapat digunakan pada "micro computer" dan sesuai dengan kebutuhan/kondisi di Indonesia. Dengan kata lain analisis pada program komputer tersebut sesuai dengan standar perencanaan atau peraturan yang berlaku di Indonesia, yaitu SK SNI T-15-1991-03.

Turbo Pascal merupakan perangkat lunak bahasa Pascal yang banyak digunakan untuk komputer mikro. Bahasa Pascal adalah salah satu bahasa tingkat tinggi komputer ("high level language"), yang umum digunakan untuk hampir semua penyelesaian pekerjaan di bidang teknik, ilmu pengetahuan eksak, administrasi/keuangan dan untuk proses data (statistik) dengan komputer.

Program disain elemen struktur beton dengan data masukan dari keluaran program Microfeap yang memenuhi kebutuhan/kriteria di atas dapat dibuat menggunakan bahasa pemrograman Pascal.

Perencanaan elemen struktur beton biasanya dilakukan dengan cara coba-coba ("trial and error"), untuk mendapatkan hasil yang efisien membutuhkan waktu yang cukup lama dan perhitungan yang berulang-ulang. Dengan program yang dibuat untuk disain elemen struktur beton dengan "inputing" data Microfeap diharapkan dapat mempermudah dan mempercepat pekerjaan perencanaan struktur beton yang sesuai dengan standar perencanaan dan peraturan yang berlaku di Indonesia, yaitu SK SNI T-15-1991-03.

Program disain elemen struktur beton yang dimaksud tersebut harus mampu mengidentifikasi file keluaran program Microfeap yaitu berupa data hasil analisis

struktur dan mengolah data tersebut menjadi data “input” untuk proses disain/perencanaan elemen-elemen struktur beton dengan program komputer. Program ini berupa program terpadu, baik program “input” datanya maupun program proses disain elemen-elemen struktur beton dan program “output” hasil disainnya, yang dikontrol oleh sebuah program utama.

1.2 Tujuan dan Batasan Masalah

Tujuan penulisan topik tugas akhir ini ialah membuat program disain elemen struktur beton dengan “inputing” data Microfeap (berupa data hasil analisis struktur). Hasil yang diharapkan dengan pembuatan program tersebut adalah program dapat mendisain elemen: plat, balok, kolom, dan fondasi telapak dengan “output” berupa dimensi elemen dan kebutuhan baja tulangannya.

Disain atau perencanaan elemen struktur beton pada program tersebut berdasarkan dasar-dasar perencanaan beton bertulang SK SNI T-15-1991-03. Program dibuat dengan bahasa Pascal menggunakan perangkat lunak Turbo Pascal versi 7.0, “inputing” data Microfeap dari Microfeap II (P1-Module). Struktur beton yang dimaksud disini adalah struktur portal/frame beton, yang elemen strukturnya terdiri dari fondasi, kolom, balok dan plat.

Bentuk tampang perencanaan elemen struktur beton pada program tersebut digunakan bentuk tampang persegi kecuali pada perencanaan elemen kolom selain bentuk tampang persegi juga digunakan bentuk tampang lingkaran.

Sistem penulangan perencanaan elemen struktur beton pada program tersebut berupa:

1. sistem tulangan sebelah (tulangan tarik saja) untuk elemen plat dan fondasi. Dan untuk elemen balok sesuai dengan kuat momen tahan maksimumnya, bila $M_{r_{maksimum}} > M_u$ maka balok direncanakan sebagai balok bertulangan sebelah,
2. sistem tulangan rangkap (tulangan tarik dan tulangan desak) untuk elemen kolom. Dan untuk elemen balok sesuai dengan momen tahanan maksimumnya, bila $M_{r_{maksimum}} < M_u$ maka balok direncanakan sebagai balok bertulangan rangkap,
3. tulangan geser untuk perencanaan elemen balok pada program tersebut dipakai tulangan sengkang tanpa tulangan geser miring. Dan tulangan geser untuk perencanaan elemen kolom digunakan tulangan sengkang atau tulangan spiral.

Fondasi yang memungkinkan untuk didisain dengan program tersebut adalah fondasi telapak kolom setempat dengan letak kolom simetris.

Elemen kolom yang dimaksud pada program tersebut adalah kolom tanpa pengaku arah lateral ("unbrace frame").

BAB II

TINJAUAN PUSTAKA

2.1 Perencanaan Elemen-elemen Struktur

Tahapan perencanaan secara garis besar dilakukan sebagai berikut:

1. mengumpulkan data perencanaan,
2. mengumpulkan data beban,
3. melakukan perhitungan struktur sebagai berikut:
 - a. menentukan daktilitas struktur yang akan dihitung,
 - b. menentukan faktor jenis struktur K ,
 - c. menentukan ketentuan-ketentuan batas dimensi dari komponen struktur (plat, balok, kolom dan dinding),
 - d. merencanakan balok portal sebagai berikut:
 - 1) merencanakan kuat lentur perlu,
 - 2) merencanakan kuat geser perlu,
 - 3) merencanakan kuat torsi perlu,
 - e. merencanakan kolom portal sebagai berikut:
 - 1) merencanakan kuat lentur perlu,
 - 2) merencanakan kuat geser perlu,

f. menentukan penulangan pada portal sebagai berikut:

- 1) umum,
 - a) untuk komponen struktur lentur,
 - b) untuk komponen struktur tekan,
- 2) menentukan panjang sambungan lewatan baja tulangan,
- 3) menentukan penulangan geser portal sebagai berikut:
 - a) untuk balok portal,
 - b) untuk kolom portal,

2.1.1 Perencanaan elemen plat

Ringkasan langkah-langkah atau ikhtisar perencanaan plat terlentur satu arah adalah sebagai berikut:

1. menentukan syarat-syarat batas,
 - a. syarat batas lebar jaringan penulangan:

$$\begin{aligned}
 s_{\min} &= 100 \text{ mm}, \\
 s_{\max} &= 5.h, \dots\dots\dots (2.1) \\
 \text{atau } s_{\max} &= 500 \text{ mm}, \\
 &\text{pilih } s_{\max} \text{ yang terkecil,}
 \end{aligned}$$

- b. syarat batas rasio penulangan:

$$\rho_{\min} = \frac{1,4}{f_y}, \dots\dots\dots (2.2)$$

$$\rho_b = \frac{(0,85 \cdot f_c' \cdot \beta_1)}{f_y} \cdot \frac{600}{600 + f_y}, \dots \dots \dots (2.3)$$

$$\rho_{maks} = 0,75 \cdot \rho_b, \dots \dots \dots (2.4)$$

2. menentukan panjang bentang,
3. menentukan tebal plat, dengan bantuan syarat lendutan pada Tabel 3.2.5(a) SK SNI T-15-1991-03,
4. menghitung beban-beban yang bekerja pada plat (q),
5. menghitung momen yang menentukan,

menghitung tulangan, memperkirakan dan menghitung tinggi efektif plat (d),

$$d = h - p_b - \frac{1}{2} \phi_p, \dots \dots \dots (2.5)$$

$$k = \frac{M_u}{\Phi b d^2}, \dots \dots \dots (2.6)$$

tentukan rasio penulangan ρ ,

$$\rho = \frac{f_c' - \sqrt{(f_c')^2 - 2,36 \cdot k \cdot f_c'}}{1,18 \cdot f_y}, \dots \dots \dots (2.7)$$

dimana $\rho_{min} \leq \rho \leq \rho_{maks}$, jika $\rho > \rho_{maks}$, maka tebal plat diperbesar, jika $\rho < \rho_{min}$,

maka dipakai ρ_{min} untuk perhitungan As,

6. memilih tulangan,

$$A_s = \rho \cdot 1000 \cdot d, \dots \dots \dots (2.8)$$

$$A_d = \frac{1}{4} \cdot \pi \cdot D p^2, \dots \dots \dots (2.9)$$

7. memeriksa lebar retak secara memeriksa lebar jaringan,

$$s = \frac{A_d \cdot 1000}{A_s}, \dots \dots \dots (2.10)$$

$s_{min} < s < s_{maks}$, jika $s < s_{min}$ maka tulangan diperbaharui (rincian g), jika $s > s_{maks}$ maka gunakan $s = s_{maks}$,

8. sesuai SK SNI T-15-1991-03 memilih tulangan untuk susut dan suhu sebagai berikut:

a. $A_s = 0,0020 \text{ bh}$ untuk baja mutu 30, (2.11a)

b. $A_s = 0,0018 \text{ bh}$ untuk baja mutu 40, (2.11b)

c. $A_s = 0,0018 \text{ bh} \left[\frac{400}{f_y} \right]$, (2.11c)

untuk mutu baja lebih tinggi dari 40, diukur pada regangan leleh sebesar 0,35 % dan dalam segala hal tidak boleh kurang dari

$A_s = 0,0014 \text{ bh}$, (2.11d)

9. jumlah luas penampang tulangan baja pokok tidak boleh kurang dari jumlah luas penulangan susut dan suhu,

10. membuat sketsa rancangan.

Langkah-langkah perencanaan plat tersebut juga berlaku untuk perhitungan perencanaan plat tertentur dua arah.

2.1.2 Perencanaan elemen balok

Ringkasan langkah-langkah atau ikhtisar perencanaan balok persegi adalah sebagai berikut:

1. menentukan syarat-syarat batas,

a. syarat batas jarak bersih tulangan pokok:

$$s_{\min} = 25 \text{ mm},$$

b. syarat batas jarak tulangan sengkang:

1) untuk geser murni:

$$V_c = (\frac{1}{6} \sqrt{f_c'}) \cdot b \cdot d, \dots\dots\dots (2.12)$$

$$V_s = \frac{Vu}{\Phi} - V_c, \dots\dots\dots (2.13)$$

$$V = (\frac{1}{3} \sqrt{f_c'}) \cdot b \cdot d, \dots\dots\dots (2.14)$$

$$\text{bila } V_s \geq V \text{ maka } s_{maks} = 300 \text{ mm } s_{maks} = \frac{1}{4} \cdot d, \dots\dots\dots (2.15a)$$

$$\text{bila } V_s < V \text{ maka } s_{maks} = 600 \text{ mm } s_{maks} = \frac{1}{2} \cdot d, \dots\dots\dots (2.15b)$$

pilih yang terkecil,

$$s_{\min} = 25 \text{ mm},$$

2) untuk pengaruh torsi dan geser:

$$s_{maks} = \frac{1}{4} \cdot (x_1 + y_1), \dots\dots\dots (2.16)$$

$$s_{\min} = 25 \text{ mm},$$

c. syarat batas rasio penulangan:

$$\rho_{\min} = \frac{1,4}{f_y},$$

$$\rho_b = \frac{(0,85 \cdot f_c' \cdot \beta_1)}{f_y} \cdot \frac{600}{600 + f_y},$$

$$\rho_{maks} = 0,75 \cdot \rho_b,$$

2. menentukan panjang bentang,

3. menentukan ukuran balok,

4. menghitung beban-beban ,
5. anggap $d = h - 100 \text{ mm}$,
6. menghitung momen rencana total M_u ,
7. melakukan pemeriksaan $M_{R_{maks}}$,

$$\omega = \frac{\rho_{maks} \cdot f_y}{f_c'}, \dots\dots\dots (2.17)$$

$$k_{maks} = f_c' \cdot \omega \cdot (1 - 0,59 \cdot \omega), \dots\dots\dots (2.18)$$

k_{maks} digunakan untuk menghitung $M_{R_{maks}}$ balok bertulangan tarik saja,

$$M_{R_{maks}} = \Phi b d^2 k_{maks}, \dots\dots\dots (2.19)$$

apabila $M_{R_{maks}} < M_u$ rencanakan balok sebagai balok bertulangan rangkap dan

apabila $M_{R_{maks}} > M_u$ balok direncanakan sebagai balok bertulangan tarik saja,

8. apabila harus direncanakan sebagai balok bertulangan rangkap:

- a. menghitung rasio penulangan pasangan kopel gaya beton tekan dan tulangan baja tarik,

$$\rho = 0,90(\rho_{maks}) = 0,90(0,75\rho_b), \dots\dots\dots (2.20)$$

nilai ρ tersebut digunakan untuk mencari k ,

- b. menentukan kapasitas momen dari pasangan kopel gaya beton tekan dan tulangan baja tarik,

$$M_{R1} = \Phi b d^2 k, \dots\dots\dots (2.21)$$

menghitung tulangan baja tarik yang diperlukan untuk pasangan kopel gaya beton tekan dan tulangan baja tarik,

$$A_{St \text{ perlu}} = \rho b d, \dots\dots\dots (2.22)$$

- c. menghitung selisih momen atau momen yang harus ditahan oleh pasangan gaya tulangan baja tekan dan tarik tambahan,

$$MR_2 = M_u - MR_1, \dots \dots \dots (2.23)$$

- d. dengan berdasarkan pada pasangan kopel gaya tulangan baja tekan dan tarik tambahan, menghitung gaya tekan pada tulangan yang diperlukan (anggap $d' = 70 \text{ mm}$),

$$ND_2 = \frac{MR_2}{\Phi(d - d')}, \dots \dots \dots (2.23a)$$

- e. dengan $ND_2 = A_s' \cdot f_s', \dots \dots \dots (2.23b)$

menghitung f_s' sedemikian sehingga A_s' dapat ditentukan, hal tersebut dapat dilakukan dengan menggunakan letak garis netral dari pasangan gaya beton tekan dan tulangan baja tarik kemudian memeriksa regangan ϵ_s' pada tulangan tekan,

$$a = \frac{A_s \cdot f_y}{(0,85 \cdot f_c') \cdot b}, \dots \dots \dots (2.24)$$

$$c = \frac{a}{\beta_1}, \dots \dots \dots (2.25)$$

$$\epsilon_s' = \frac{c - d'}{c} (0,003), \dots \dots \dots (2.26)$$

apabila $\epsilon_s' \geq \epsilon_y$ tulangan baja tekan telah meluluh pada momen ultimit dan

$$f_s' = F_y, \dots \dots \dots (2.27a)$$

sedangkan apabila $\epsilon_s' < \epsilon_y$, menghitung

$$f_s' = \epsilon_s' \cdot E_s, \dots \dots \dots (2.27b)$$

dan gunakan tegangan tersebut untuk langkah berikutnya,

f. karena $ND_2 = A_s' \cdot f_s'$,

$$\text{maka } A_s'_{\text{perlu}} = \frac{ND_2}{f_s'}, \dots \dots \dots (2.28)$$

g. menghitung $A_{s2_{\text{perlu}}} = \frac{A_s' \cdot f_s'}{f_y}, \dots \dots \dots (2.29)$

h. menghitung jumlah luas tulangan baja tarik total yang diperlukan,

$$A_s = A_{s1} + A_{s2}, \dots \dots \dots (2.30)$$

i. memilih batang tulangan baja tekan A_s' ,

j. memilih batang tulangan baja tarik A_s , periksa lebar balok dengan mengusahakan agar tulangan dapat dipasang dalam satu lapis saja,

$$s = \frac{b - 2 \cdot Pb - 2 \cdot Ds - n \cdot Dp}{(n - 1)}, \dots \dots \dots (2.31)$$

k. memeriksa d aktual dan bandingkan dengan d teoritis, apabila d aktual sedikit lebih besar berarti rancangan agak konservatif (lebih aman), apabila d aktual lebih kecil berarti perencanaan kurang aman, dilakukan perencanaan ulang,

$$d_{\text{aktual}} = h - Pb - Ds - 0,5 \cdot Dp, \dots \dots \dots (2.32)$$

9. apabila harus direncanakan sebagai balok bertulangan tarik saja:

a. menghitung $d = h - 80$ mm, hitung nilai k yang diperlukan dengan memakai persamaan:

$$k = \frac{M_u}{\Phi b d^2},$$

b. menghitung rasio penulangan ρ ,

$$\rho = \frac{f_c' - \sqrt{(f_c')^2 - 2,36 \cdot k \cdot f_c'}}{1,18 \cdot f_y},$$

c. menghitung A_s yang diperlukan,

$$A_{s\text{perlu}} = \rho b d, \dots \dots \dots (2.33)$$

d. menentukan batang tulangan yang akan dipasang, memeriksa ulang tinggi efektif aktual balok dan membandingkan dengan tinggi efektif yang dipakai untuk perhitungan, apabila tinggi efektif aktual lebih tinggi berarti hasil rancangan agak konservatif (berada dalam keadaan lebih aman), sebaliknya apabila tinggi efektif aktual kurang dari tinggi efektif yang diperhitungkan berarti dalam keadaan tidak aman dan harus dilakukan revisi perhitungan,

$$s = \frac{b - 2 \cdot Pb - 2 \cdot Ds - n \cdot Dp}{(n - 1)},$$

$$d_{\text{aktual}} = h - Pb - Ds - 0,5 \cdot Dp,$$

10. membuat sketsa hasil rancangan.

Prosedur umum perencanaan penulangan sengkang adalah sebagai berikut:

1. menghitung nilai geser berdasarkan diagram geser V_u untuk bentang bersih,
2. menentukan apakah dibutuhkan tulangan sengkang atau tidak, apabila diperlukan sengkang gambarkan diagram V_s ,

$$V_c = (\% \sqrt{f_c'}) \cdot b \cdot d,$$

$$\text{bila } V_u < \frac{1}{2} \Phi V_c,$$

maka diperlukan tulangan geser sengkang,

$$V_{S_{perlu}} = \frac{Vu}{\Phi} - V_c, \dots \dots \dots (2.34)$$

3. menentukan bagian dari bentangan yang memerlukan tulangan sengkang,
4. memilih ukuran diameter batang tulangan sengkang (gunakan sengkang vertikal), mengikuti petunjuk-petunjuk yang berkaitan dengan anggapan-anggapan yang berlaku dan analisis yang harus dilakukan,

$$A_v = \frac{1}{4} \cdot \pi \cdot D_s^2, \dots \dots \dots (2.35)$$

5. menghitung kebutuhan jarak spasi sengkang berdasarkan kekuatan yang mampu disumbangkan oleh penulangan sengkang,

$$s_{perlu} = \frac{A_v \cdot f_y \cdot d}{V_s}, \dots \dots \dots (2.36)$$

6. menentukan pola dan tata letak sengkang secara keseluruhan dan membuat gambar sketsanya.

Langkah-langkah perencanaan penulangan torsi pada umumnya dilakukan dengan urutan sebagai berikut:

1. menentukan apakah momen torsi berupa torsi keseimbangan atau keserasian,
2. menentukan penampang kritis, umumnya berjarak d dari muka tumpuan, menghitung momen torsi rencana T_u ,

$$\text{apabila } T_u < \Phi \left[\left(\frac{1}{24} \sqrt{f_c'} \right) \sum x^2 y \right], \dots \dots \dots (3.37)$$

maka efek torsi boleh diabaikan,

3. menghitung kuat torsi nominal T_c badan beton sederhana sebagai berikut:

$$T_c = \frac{(\frac{1}{15} \sqrt{f_c'}) \sum x^2 y}{\sqrt{1 + \left[\frac{0.4 V_u}{C_t T_u} \right]^2}}, \dots\dots\dots (3.38)$$

$$\text{dimana } C_t = \frac{b_w \cdot d}{\sum x^2 y}, \dots\dots\dots (2.39)$$

apabila komponen struktur mengalami gaya tarik aksial cukup besar tulangan torsi harus direncanakan untuk memikul momen torsi total dan nilai T_c dikalikan dengan;

$$\left[1 + 0,30 \frac{N_u}{A_g} \right], \dots\dots\dots (2.40)$$

dimana N_u bernilai negatif untuk tarik,

4. memeriksa apakah $T_u > \phi T_c$, apabila tidak efek torsi boleh diabaikan, apabila $T_u > \phi T_c$ hitunglah T_s , yaitu momen torsi yang harus ditahan oleh tulangan, dengan batasan sebagai berikut:

$$\text{untuk torsi keseimbangan } T_s = T_n - T_c, \dots\dots\dots (2.41)$$

$$\text{dan untuk torsi keserasian } T_s = \left(\frac{1}{3} \sqrt{f_y'} \right) \sum \frac{1}{3} x^2 y - T_c, \dots\dots\dots (2.42)$$

dipakai yang terkecil, sesuai dengan SK SNI T-15-1991-03 pasal 3.4.6 ditentukan bahwa untuk suatu komponen struktur yang menerima beban kombinasi geser dan torsi, pengaruh torsi harus diperhitungkan bersama geser dan lentur,

$$\text{apabila } T_u > \Phi \left[\left(\frac{1}{20} \sqrt{f_y'} \right) \sum x^2 y \right], \dots\dots\dots (2.43)$$

5. nilai T_n tidak kurang dari;

$$\frac{T_u}{\Phi}, \dots\dots\dots (2.44)$$

dan apabila $T_s > 4T_c$ penampang harus diperbesar,

6. memilih tulangan sengkang tertutup sebagai tulangan melintang dan gunakan diameter minimum D10, apabila jarak spasi sengkang s , hitunglah luas sengkang untuk torsi setiap satuan jarak lengan dengan menggunakan persamaan sebagai berikut:

$$\frac{A_t}{s} = \frac{T_s}{\alpha_t \cdot x_1 \cdot y_1 \cdot f_y}, \dots \dots \dots (2.45)$$

7. menghitung penulangan geser yang diperlukan untuk A_v tiap satuan jarak di dalam penampang melintang, dengan V_u adalah gaya geser luar rencana pada penampang kritis, sedangkan V_c adalah kuat geser nominal badan beton dan V_s adalah gaya geser yang harus dipikul oleh sengkang:

$$\frac{A_v}{s} = \frac{V_s}{f_y \cdot d}, \dots \dots \dots (2.46)$$

$$\text{dimana } V_s = V_n - V_c, \dots \dots \dots (2.47)$$

$$V_c = \frac{(\frac{1}{6} \sqrt{f_c'}) b_w \cdot d}{\sqrt{1 + [2,5 \cdot C_t \frac{T_u}{V_u}]^2}}, \dots \dots \dots (2.48)$$

nilai V_n tidak boleh lebih dari V_u/ϕ

8. menghitung luas tulangan memanjang A_l yang diperlukan untuk torsi dimana:

$$A_l = 2A_t \frac{x_1 + y_1}{s}, \dots \dots \dots (2.49a)$$

$$A_l = \left[\frac{2,8 \cdot x \cdot s}{f_y} \left[\frac{T_u}{T_u + \frac{V_u}{3C_t}} \right] - 2A_t \right] \frac{x_1 + y_1}{s}, \dots \dots \dots (2.49b)$$

digunakan mana yang lebih besar dan apabila dihitung menggunakan persamaan yang kedua tidak boleh melebihi:

$$Al = \left[\frac{2,8 \cdot x \cdot s}{f_y} \left[\frac{T_u}{T_u + \frac{V_u}{3C_t}} \right] - \frac{2}{3} \left(\frac{b_w \cdot s}{f_y} \right) \right] \frac{x_1 + y_1}{s}, \dots \dots \dots (2.49c)$$

9. merencanakan tulangnya dan membuat sketsa rancangannya.

2.1.3 Perencanaan elemen kolom

Langkah-langkah perencanaan kolom pada umumnya adalah sebagai berikut:

1. menentukan kekuatan bahan-bahan yang dipakai, tentukan rasio penulangan ρ_g yang direncanakan apabila diinginkan,
2. memeriksa kelangsingan kolom,

$$K = \frac{kl}{r}, \dots \dots \dots (2.50)$$

jika $K \leq 34 - 12 \left(\frac{M_1}{M_2} \right)$, maka efek kelangsingan dapat diabaikan,

bila efek kelangsingan diperhitungkan:

$$Cm = 0,6 + 0,4 \cdot \left(\frac{M_1}{M_2} \right) \geq 0,4 \dots \dots \dots (2.51)$$

$$EI = \frac{Ec \cdot Ig}{2,50 \cdot (1 + \beta_d)}, \dots \dots \dots (2.52)$$

$$Pc = \frac{\pi^2 \cdot EI}{(kl)^2}, \dots \dots \dots (2.53)$$

$$\delta_b = \frac{Cm}{1 - \frac{Pu}{\Phi Pc}}, \dots \dots \dots (2.54)$$

3. menentukan beban rencana terfaktor P_u ,

4. menentukan luas kotor penampang kolom yang diperlukan A_g ,

untuk penampang persegi:

$$A_g = b \cdot h, \dots \dots \dots (2.55a)$$

untuk penampang lingkaran:

$$A_g = \frac{1}{4} \cdot \pi \cdot D^2, \dots \dots \dots (2.55b)$$

5. memilih bentuk dan ukuran penampang kolom, gunakan bilangan bulat,

6. menghitung beban yang dapat didukung oleh beton dan batang tulangan pokok memanjang, menentukan luas penampang batang tulangan baja memanjang yang diperlukan, kemudian memilih batang tulangan yang akan dipakai,

untuk penampang persegi:

$$\Phi P_{nb} = \Phi [0,85 \cdot f_c' \cdot \alpha_b \cdot b + A_s' \cdot f_s' - A_s \cdot f_y], \dots \dots \dots (2.56a)$$

jika $\Phi P_{nb} > P_u$,

$$m = \frac{f_y}{0,85 \cdot f_c'}, \dots \dots \dots (2.57)$$

$$P_n = 0,85 \cdot f_c' \cdot b \cdot d \cdot \left[\frac{h-2 \cdot e}{2 \cdot d} + \sqrt{\left(\frac{h-2 \cdot e}{2 \cdot d} \right)^2 + 2 \cdot m \cdot \rho \cdot \left(1 - \frac{d'}{d} \right)} \right], \dots \dots \dots (2.58a)$$

jika $\Phi P_{nb} \leq P_u$,

$$P_n = \frac{A_s' \cdot f_y}{\frac{e}{(d-d')} + 0,50} + \frac{b \cdot h \cdot f_c'}{\frac{3 \cdot h \cdot e}{d^2} + 1,18}, \dots \dots \dots (2.58b)$$

jika $\Phi P_n < P_u$,

maka perencanaan diulang kembali,

untuk penampang lingkaran:

$$\Phi P_{nb} = \Phi [0,85 \cdot f_c' \cdot \alpha_b \cdot b_{ek} + A_s' \cdot f_s' - A_s \cdot f_y], \dots \dots \dots (2.56b)$$

jika $\Phi P_{nb} > Pu$,

$$m = \frac{fy}{0,85 \cdot fc'}$$

$$\rho_s = \frac{2 \cdot As}{Ag}, \dots \dots \dots (2.59)$$

jika $\Phi P_{nb} \leq Pu$,

$$Pn = 0,85 \cdot fc' \cdot D^2 \cdot \left[\sqrt{\left(\frac{0,85 \cdot e}{D} - 0,38\right)^2 + \frac{\rho_s \cdot m \cdot Ds}{2,5 \cdot D}} - \left(\frac{0,85 \cdot e}{D} - 0,38\right) \right], \dots \dots (2.60a)$$

jika $\Phi Pn < Pu$,

$$Pn = \frac{As \cdot fy}{\frac{3 \cdot e}{Ds} + 1,0} + \frac{Ag \cdot fc'}{\frac{9,6 \cdot Ds}{(0,8 \cdot D + 0,67 \cdot Ds)^2} + 1,18}, \dots \dots \dots (2.60b)$$

maka perencanaan diulang kembali,

7. merancang tulangan pengikat, dapat berupa tulangan sengkang atau spiral,

$$As = \frac{1}{4} \cdot \pi \cdot ds^2, \dots \dots \dots (2.61)$$

bila pengikat spiral:

untuk penampang lingkaran:

$$Dc = D - 2 \cdot Pb, \dots \dots \dots (2.62)$$

$$Ac = \frac{1}{4} \cdot \pi \cdot Dc^2, \dots \dots \dots (2.63a)$$

$$\rho_s = 0,45 \cdot \left[\frac{Ag}{Ac} - 1 \right] \cdot \frac{fc'}{fy}, \dots \dots \dots (2.64)$$

$$s = \frac{4 \cdot As \cdot (Dc - ds)}{Dc^2 (\rho_s)}, \dots \dots \dots (2.65a)$$

untuk penampang persegi:

$$Ac = (b - 2 \cdot Pb) \cdot (h - 2 \cdot Pb), \dots \dots \dots (2.63b)$$

$$\rho_s = 0,45 \left[\frac{A_g}{A_c} - 1 \right] \frac{f_c'}{f_y},$$

$$s = \frac{A_s \cdot 2 \cdot ((b - 2 \cdot P_b - ds) + (h - 2 \cdot P_b - ds))}{A_c \cdot (\rho_s)}, \dots \dots \dots (2.65b)$$

bila berupa pengikat sengkang:

$$s = 16 \cdot D_p, \dots \dots \dots (2.66a)$$

$$s = 48 \cdot d_s, \dots \dots \dots (2.66b)$$

untuk penampang lingkaran:

$$\text{bila } h_{ek} \geq b_{ek} \rightarrow s = b_{ek}, \dots \dots \dots (2.66c)$$

$$\text{bila } h_{ek} < b_{ek} \rightarrow s = h_{ek}, \dots \dots \dots (2.66d)$$

untuk penampang persegi:

$$\text{bila } h \geq b \rightarrow s = b, \dots \dots \dots (2.66e)$$

$$\text{bila } h < b \rightarrow s = h, \dots \dots \dots (2.66f)$$

8. membuat sketsa rancangannya.

2.1.4 Perencanaan elemen fondasi

Langkah-langkah perencanaan fondasi telapak empat persegi panjang adalah sebagai berikut:

1. menentukan syarat-syarat batasan perencanaan dan beban rencana,
2. menentukan nilai berat rata-rata tanah dan beton fondasi (qr), menghitung tekanan tanah yang timbul di bawah fondasi,

$$q_1 = df \cdot q_r, \dots \dots \dots (2.67)$$

3. menghitung tekanan tanah ijin efektif untuk mendukung beban total,

$$q_t = \bar{q} - q_1, \dots \quad (2.68)$$

4. menghitung luas bidang telapak fondasi,

$$A_{\text{perlu}} = \frac{P_u}{q_t}, \dots \quad (2.69)$$

5. menentukan ukuran lebar bidang telapak fondasi b ,

$$l = \frac{A_{\text{perlu}}}{b}, \dots \quad (2.70)$$

tentukan ukuran panjang yang dipakai l , hitung luas bidang telapak fondasi aktual,

$$A_p = b \cdot l, \dots \quad (2.71)$$

6. menghitung tekanan tanah aktual,

$$p_u = \frac{P_u}{A_p}, \dots \quad (2.72)$$

7. menentukan tebal fondasi dan tebal selimut beton,

$$\text{hitung } d = t - p_b - \varnothing_{pk}, \dots \quad (2.73)$$

8. untuk arah kerja dua arah:

$$B = b_{\text{kolom}} + 2\left(\frac{1}{2}d\right), \dots \quad (2.74)$$

- a. geser total terfaktor yang bekerja pada penampang kritis adalah:

$$V_u = p_u(A_p - B^2), \dots \quad (2.75a)$$

- b. kuat geser beton adalah:

$$V_c = \left(1 + \frac{2}{\beta_c}\right)(2\sqrt{f_c'})b_o \cdot d, \dots \quad (2.76a)$$

$$\text{dimana } \beta_c = \frac{l_{\text{kolom}}}{b_{\text{kolom}}}, \dots\dots\dots (2.77)$$

$$b_o = 4.B, \dots\dots\dots (2.78)$$

dan nilai tersebut tidak boleh lebih besar dari:

$$V_c = (4\sqrt{f_c'})b_o.d, \dots\dots\dots (2.76b)$$

$$V_n = \phi V_c, \dots\dots\dots (2.79)$$

$$\text{dimana } \phi = 0,6, \dots\dots\dots (2.80)$$

c. memeriksa $V_u \leq \phi V_n$,

9. untuk arah kerja satu arah:

$$G = \frac{(1 - b_{\text{kolom}})}{2} - d, \dots\dots\dots (2.81)$$

a. geser total terfaktor yang bekerja pada penampang kritis adalah:

$$V_u = p_u.b.G, \dots\dots\dots (2.75b)$$

b. kuat geser beton adalah:

$$V_c = (\frac{1}{6}\sqrt{f_c'})b.d, \dots\dots\dots (2.76c)$$

$$\Phi V_n = \Phi V_c,$$

$$\text{dimana } \Phi = 0,6$$

c. memeriksa $V_u \leq \phi V_n$,

10. memeriksa anggapan yang digunakan pada langkah awal mengenai berat tanah berikut fondasi:

$$q = 2,3.t + 15,7.(df - t), \dots\dots\dots (2.82)$$

apabila $q > q_1$ revisi hitungan,

11. menghitung momen rencana:

a. arah memanjang:

$$F = \frac{(l - l_{\text{kolom}})}{2}, \text{ Mu} = \text{pu} \cdot F \cdot (\frac{1}{2} F) \cdot b, \dots \dots \dots (2.83a)$$

b. arah lebar:

$$F = \frac{(b - b_{\text{kolom}})}{2}, \text{ Mu} = \text{pu} \cdot F \cdot (\frac{1}{2} F) \cdot l, \dots \dots \dots (2.83b)$$

12. merencanakan batang tulangan baja:

$$k = \frac{\text{Mu}}{\Phi b d^2},$$

$$\rho = \frac{f_c' - \sqrt{(f_c')^2 - 2,36 \cdot k \cdot f_c'}}{1,18 \cdot f_y},$$

dimana $\rho_{\min} \leq \rho \leq \rho_{\max}$,

$$A_s = \rho b d,$$

13. memeriksa jarak tulangan:

$$s = \frac{A_{\phi} \cdot b}{A_s}, \dots \dots \dots (2.84)$$

dimana $s_{\min} \leq s \leq s_{\max}$,

$$\text{jumlah batang (jbt)} = \frac{b}{s}, \dots \dots \dots (2.85)$$

$$\beta = \frac{1}{b}, \dots \dots \dots (2.86)$$

$$z = \frac{2}{\beta + 1}, \dots \dots \dots (2.87)$$

$$j_b = z \cdot j_{bt}, \dots\dots\dots (2.88)$$

dipasang merata dalam rentang b sisanya dipasang dibagian luar dari rentang, untuk penulangan arah lebar gunakan momen rencana M_u arah lebar dan tulangan baja dipasang merata dalam arah lebar,

$$14. j = \sqrt{\frac{A_p}{A_k}} \leq 2, \dots\dots\dots (2.89)$$

$$15. \text{kuat tumpuan fondasi } P_{tp} = \Phi(0,85 \cdot f_c' \cdot A_k) \cdot (j), \dots\dots\dots (2.90)$$

$$16. \text{kuat tumpuan kolom } P_{tk} = \Phi(0,85 \cdot f_c' \cdot A_k), \dots\dots\dots (2.91)$$

$$17. \text{dimana } P_u \leq P_{tk} \leq P_{tp},$$

18. penulangan penampang pasak ("dowel"):

$$a. A_s \text{ perlu} = 0,005 \cdot A_k, \dots\dots\dots (2.92)$$

menentukan batang tulangannya dan hitung $A_{s \text{tersedia}}$,

b. panjang penyaluran:

$$l_{db} = \frac{\phi_{pk} \cdot f_y}{4 \sqrt{f_c' \cdot p}}, \dots\dots\dots (2.93)$$

$$l_{db \min} = 0,04 \cdot \phi_{pk} \cdot f_y, \dots\dots\dots (2.94)$$

$$l_{d \min} = 200 \text{mm}, \dots\dots\dots (2.95)$$

$$n = \frac{A_{s \text{perlu}}}{A_{s \text{tersedia}}}, \dots\dots\dots (2.96)$$

$$c. l_d = l_{db} \cdot n, \dots\dots\dots (2.97)$$

2.2 Program Microfeap

2.2.1 Umum

"Software" Microfeap II dikembangkan oleh K.N. Worsak, A. Somporn dan U. Sarun dari Asian Institut of Technology di Bangkok, sampai sekarang perkembangannya sudah sampai dengan versi 3.1. Program Microfeap II terdiri dari enam module, dari ke enam module tersebut yang dipasarkan hanya P1-Module dan P2-Module karena yang dianggap sudah valid.

Data yang diperlukan untuk analisis struktur dengan program Microfeap II (P1-Module) adalah:

1. data nodal berupa jumlah nodal, data koordinat dan data dukungan,
2. data elemen berupa jumlah elemen, jumlah set material struktur, data titik hubung masing-masing elemen, kode "hinge" (jika struktur mempunyai "hinge") dan data material penyusun struktur,
3. data pembebanan dapat berupa beberapa kasus pembebanan yang berupa data beban nodal, data "displacement" pada nodal (jika ada) dan data pembebanan pada elemen yang berupa data beban terpusat, data beban merata, data beban volume (jika ada), data beban temperatur (jika ada).

Pada proses penyelesaian atau solusi dan eksekusi dapat diberikan faktor pembebanan sesuai dengan kebutuhan, selain itu elemen juga dapat dibagi menjadi beberapa pias sehingga diperoleh gaya-gaya yang diperlukan.

Hasil hitungan setelah proses eksekusi berupa "displacement" dari berbagai kasus pembebanan maupun kombinasinya, gaya aksial, gaya geser, momen, reaksi tumpuan dan volume material. Hasil hitungan dapat didokumentasi pada layar, printer dan file teks, juga dapat ditampilkan dalam bentuk grafis.

2.2.2 Bekerja dengan Microfeap II (P1-Module)

Untuk dapat bekerja dengan program Microfeap II (P1-Module) harus dipersiapkan perangkat keras yang mendukung, minimal perangkat keras tersebut yaitu:

1. komputer IBM-PC/XT/AT atau kompitibel dengan memori RAM minimal 256 KB, Math-Processor tidak harus ada,
2. dua "disk-Drive" atau "HardDisk",
3. monitor monochrome, hercules atau CGA/VGA,
4. "printer" atau "ploter", tidak harus ada.

Microfeap II (P1-Module) mempunyai kemampuan:

1. untuk analisis struktur statis rangka-bidang dan kerangka-bidang/portal,
2. untuk analisis struktur statis dengan kombinasi "truss", "frame" dan "shear-wall",
3. analisis berdasarkan ketelitian "double-precission".

Semua satuan data isian Microfeap harus konsisten. File data yang tersimpan dalam disket kerja ada beberapa macam, sesuai dengan nama yang diberikan dan ekstension sesuai data yang tersimpan sebagai berikut :

Tabel 2.1 Ekstensi file data 1

Input	xxxxxxx.DIR	Directory dari semua file data.
	xxxxxxx.CON	Parameter untuk kontrol proyek.
	xxxxxxx.COO	Data koordinat.
	xxxxxxx.ELE	Data elemen, material kode "hinge"/sendi, tambahan potongan.
	xxxxxxx.BOU	Data dukungan ("boundary").
	xxxxxxx.LCn	Data directory untuk kondisi pembebanan #n.
	xxxxxxx.Fn	Gaya/"settlement" pada nodal untuk kondisi pembebanan #n.
	xxxxxxx.Pn	Data beban terpusat pada elemen untuk kondisi pembebanan #n.
	xxxxxxx.Un	Data beban merata pada elemen untuk kondisi pembebanan #n.
	xxxxxxx.Vn	Data beban volume pada elemen untuk kondisi pembebanan #n.
	xxxxxxx.Tn	Data beban temperatur pada elemen untuk kondisi pembebanan #n.
Solusi	xxxxxxx.Dn	Hasil "displacement" nodal untuk kondisi pembebanan #n.
	xxxxxxx.DCO	Hasil kombinasi "displacement".
	xxxxxxx.Si	Hasil kombinasi blok tegangan #I, jumlah elemen blok tegangan sesuai dengan jumlah elemen dan penambahan potongan tiap elemen.
	xxxxxxx.DFA	Hasil reaksi dukungan dan nilai volume untuk masing-masing material.

2.3 Pemrograman dalam bahasa Pascal

Kegagalan suatu program komputer terjadi jika susunan dan aturan instruksi yang digunakan terlalu rumit. Pendekatan disiplin pemrograman adalah mempersiapkan algoritma/bagan alir yang akan menjelaskan struktur prosedur perintah-perintah kepada komputer.

Hal utama dalam pembuatan program Pascal adalah:

1. pembuatan algoritma,
2. pembuatan bagan alir ("flowchart"),
3. pembuatan program dalam bahasa Pascal.

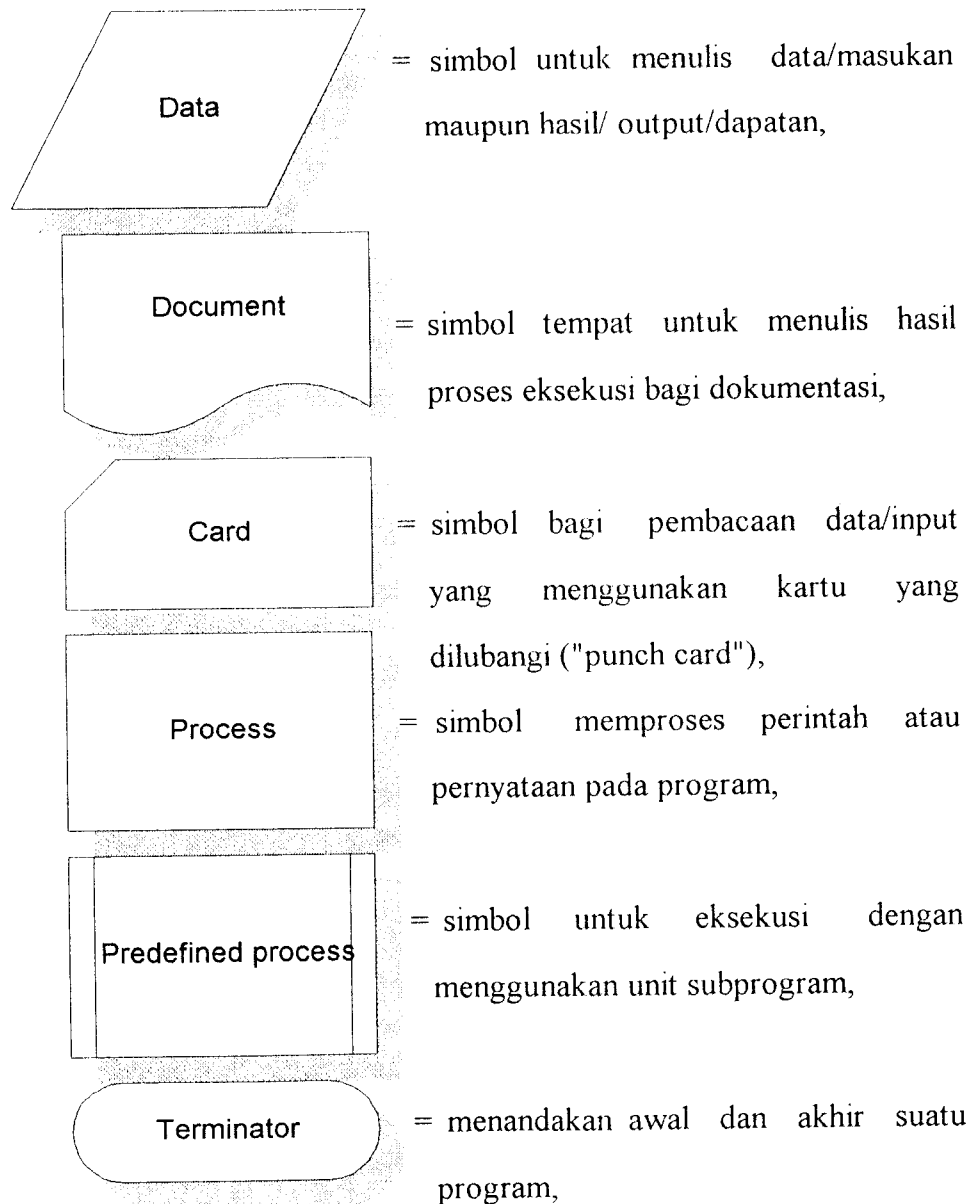
2.3.1 Pembuatan algoritma

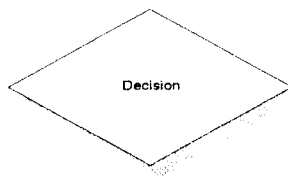
Bagian yang sangat penting untuk suksesnya pekerjaan terletak pada usaha membuat urutan/langkah penyelesaian secara rinci atau metode penyelesaian. Usaha ini disebut menulis algoritma bagi program komputer.

2.3.2 Pembuatan bagan alir ("flowchart")

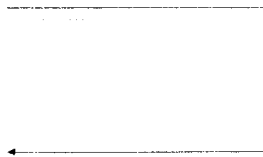
Bagan alir merupakan diagram dari suatu algoritma, tujuan pembuatan bagan alir adalah usaha mempermudah menulis program, terutama pada penyelesaian pekerjaan yang berulang-ulang sehingga algoritmanya sangat panjang.

Simbol-simbol kotak dan pengertian yang acap digunakan pada suatu bagan alir adalah:

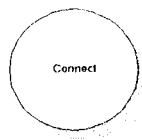




= simbol untuk melakukan tindakan pilihan berdasarkan terpenuhi tidaknya suatu syarat yang ditetapkan,



= notasi untuk tempat penjelasan. Dihubungkan ke bagan alir yang memerlukan penjelasan tambahan,



= penghubung. Menandai garis alir ke atau dari bagian tertentu bagan alir yang ditulis terpisah karena terbatasnya tempat penulisan baik pada satu bagian halaman maupun bagian yang ditulis di halaman yang berbeda.

Garis dengan tanda panah (—————→) yang menghubungkan simbol-simbol menunjukkan arah aliran proses disebut garis alir.

2.3.3 Penulisan program

Program merupakan algoritma yang ditulis dalam bahasa komputer, dalam hal ini adalah bahasa Pascal. Didalam menulis program, semua perintah mutlak dirinci agar dilaksanakan oleh komputer, sesuai dengan prosedur dan aturan perintah-perintah bahasa Pascal.

Pertimbangan berikut dapat menjadi acuan untuk penulisan program Pascal yang baik:

1. program harus mudah dibaca dan mudah dipahami,
2. penulisan program diarahkan pada proses kontrol yang dimulai pada pekerjaan awal sampai penyelesaian akhir secara berurutan. Hal ini biasanya tergantung dari pilihan struktur program yang direncanakan,
3. menulis kelompok perintah untuk satu bagian penyelesaian pekerjaan dengan tata penulisan tertentu seperti memulai dari kolom yang berbeda dari kelompok perintah lainnya. Ini mempermudah usaha perbaikan apabila terjadi kesalahan-kesalahan,
4. pemikiran untuk alternatif bentuk struktur penulisan program yang berbeda, bila ternyata penulisan program yang digarap terlalu rumit,
5. tentukan lebih dahulu program penyajian data (masukan dan keluaran) untuk memudahkan pemeriksaan,
6. penulisan program sebagai semacam koleksi dari subprogram mengurangi kemungkinan kesalahan yang fatal dari penulisan, karena subprogram dapat merupakan program yang kemungkinan pemeriksaan kesalahannya tidak bergantung kepada struktur total penulisan program utama,
7. usahakan program yang sifatnya dapat disisipi program pemeriksaan, sehingga pada percobaan eksekusi program akan mudah memeriksa bagian program yang keliru.

Suatu program komputer yang baik mampu memberikan dokumentasi program yang terbaca oleh pemakainya. Ini disebut program yang portabel dan terpelihara.

Struktur program dalam bahasa Pascal mempunyai hirarki tatanan program yang terbagi dalam tiga bagian, yaitu:

1. Judul program.

Judul program dalam bahasa Pascal merupakan suatu pernyataan unik yang ditulis sebagai:

```
PROGRAM nama_program;
```

Kata PROGRAM; merupakan sintak bahasa yang baku dari bahasa Pascal dan mutlak harus ditulis seperti adanya, sedangkan kalimat nama_program merupakan indikasi untuk menulis nama program.

2. Deklarasi.

Deklarasi dari program bahasa Pascal merupakan pernyataan yang menetapkan data dan obyek untuk digunakan dalam eksekusi program. Terdapat enam jenis deklarasi yang umum digunakan, yaitu:

- a. deklarasi LABEL,
- b. deklarasi CONST,
- c. deklarasi TYPE,
- d. deklarasi VAR,
- e. deklarasi PROCEDURE,
- f. deklarasi FUNCTION,

yang penulisannya di dalam tatanan program sumber (untuk Turbo Pascal/perangkat lunak bahasa Pascal) tidak perlu berurutan seperti di atas, kecuali dalam penulisan yang menggunakan bahasa Pascal yang baku.

3. Badan program utama.

Bagian badan program utama terdiri dari uraian rinci langkah-langkah eksekusi bagi data dan deklarasi yang telah dinyatakan dalam bagian deklarasi. Langkah-langkah eksekusi ini dinyatakan dalam pernyataan-pernyataan yang disusun berdasarkan algoritma/bagan alir. Secara sintak bahasa Pascal, pernyataan-pernyataan ini ditulis antara pernyataan BEGIN dan END. Tanda ; (titik koma) mengakhiri setiap pernyataan, kecuali pernyataan BEGIN dan tanda . (titik) setelah END adalah baku dan mutlak ditulis dalam setiap program. Dalam ketentuan bahasa Pascal, penjelasan program dapat dibuat diantara tanda { dan } atau tanda * dan *, penjelasan ini tidak berpengaruh pada eksekusi program, akan tetapi penting bagi pemahaman program.

BAB III

PROGRAM DISAIN ELEMEN STRUKTUR BETON

3.1 Program Utama

Program disain elemen struktur beton dengan “inputing” data Microfeap terdiri dari 36 buah program yaitu:

LOGO.EXE, DB.EXE, DBP.EXE, DE.EXE, GPL.EXE, GBL.EXE, GKO.EXE, GPO.EXE, DDPL.EXE, DDBL.EXE, DDKO.EXE, DDPO.EXE, PPL.EXE, PBL.EXE, PKO.EXE, PPO.EXE, TDPL.EXE, TDBL.EXE, TDKO.EXE, TDPO.EXE, CDPL.EXE, CDBL.EXE, CDKO.EXE, CDPO.EXE, TPL.EXE, TBL.EXE, TKO.EXE, TPO.EXE, CPL.EXE, CBL.EXE, CKO.EXE, CPO.EXE, SKETSPLT.EXE, SKETSBLK.EXE, SKETSKLM.EXE, SKETSPON.EXE, dan UIH-CDP.EXE.

3.1.1 Algoritma dan bagan alir program

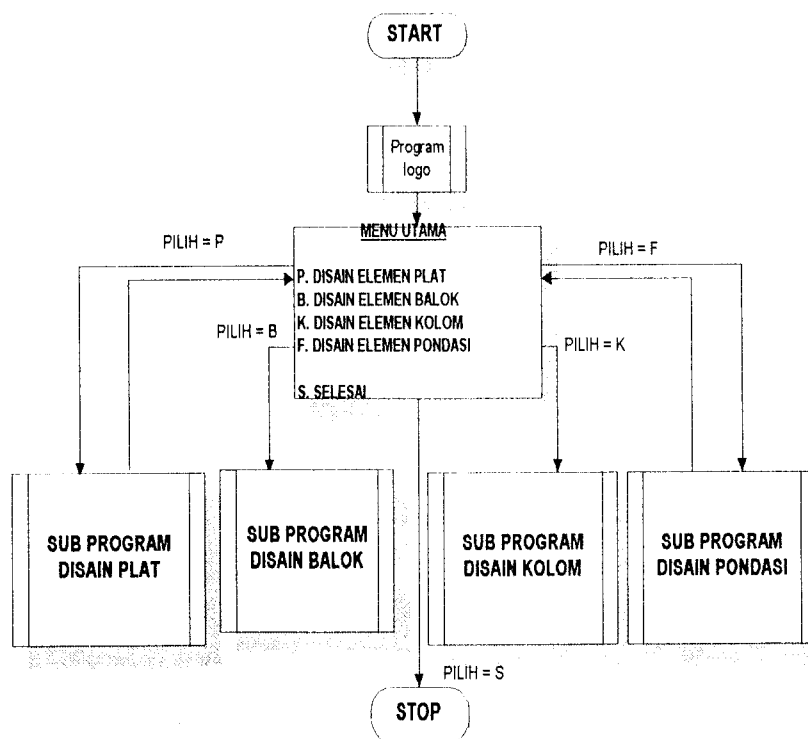
Untuk pembuatan program utama dibuat algoritma dan bagan alir program utama sebagai berikut:

1. Algoritma program utama.

Algoritma atau langkah penyelesaian program utama perencanaan elemen-elemen struktur beton bertulang adalah sebagai berikut:

- menampilkan menu pilihan program disain elemen struktur beton yang dapat dieksekusi,
- membaca pilihan program yang akan dieksekusi,
- memproses program yang dipilih,
- kembali ke menu pilihan.

2. Bagan alir program utama.



Gambar 3.1 Bagan alir program utama

3.1.2 Listing program

Mengacu pada algoritma dan bagan alir program utama di atas di buat

program sebagai berikut:

```

PROGRAM UTAMA;
{$M $4000,0,0}
Uses DOS,Crt,PRINTER;

TYPE
  FDAT = RECORD
    NPROY : string[19];
    NFDAT : string[8];
    NaFil : string[12];
    ENG : string[19];
  END;
  FDMC = RECORD
    ELEM : INTEGER;
    SEC : REAL;
    AX : REAL;
    SHE : REAL;
    MOM : REAL;
  END;
VAR
  FTIPE,DATAMIC : TEXT;
  NFILE : FILE OF FDAT;
  RECORDFDAT : FDAT;
  FMICRO : FILE OF FDMC;
  RECORDFDMC : FDMC;
  JTIPE,ELEMEN,NOREC,ISI,ADA,JUM,I : INTEGER;
  SECTION,AXIAL,SHEAR,MOMENT : REAL;
  YA,PIL : CHAR;
  PILIH,KOSONG : BYTE;
  BENAR : BOOLEAN;
  EL : STRING[7];
  NFDA,NFD : STRING[8];
  FTIP,NaFile,NaF,FBC : STRING[12];
  NPRO,EN : STRING[19];
  FTP,BBN,BBT,BEL,BGM,BDD,BLK,DATA,
  DIRAK,DIREK : STRING;

PROCEDURE AKTIF;
BEGIN
  YA:='U'; ASSIGN(NFILE,'FILEDATA.DAT'); {$I-} RESET(NFILE); {$I+}
  IF IORESULT=0 THEN BEGIN JUM:=FILESIZE(NFILE);
    WITH RECORDFDAT DO BEGIN
      WHILE UPCASE(YA)='U' DO BEGIN
        CLRSCR; TEXTCOLOR(10);
        GotoXY(10,4); Write('FILE DATA YANG SEDANG AKTIF : ',NFDA);
        GotoXY(10,5); Write('DIRUBAH DENGAN FILE DATA : ');
        TEXTCOLOR(11);
        GOTOXY(10,7); WRITE('U : ulang L : lanjutkan ==> ');
        TEXTCOLOR(10); GOTOXY(1,9); I:=0;
        REPEAT
          I:=I+1; SEEK(NFILE,I-1); READ(NFILE,RECORDFDAT);
          WRITE(' ',RECORDFDAT.NFDAT);
        UNTIL I=JUM;
        GOTOXY(40,5); READLN(NFD); IF NFD="" THEN BEGIN GOTOXY(40,5);
          WRITE(NFDA); END; BENAR:=TRUE;
        WHILE BENAR DO BEGIN
          TEXTCOLOR(11); GOTOXY(41,7); ya:=READKEY; write(ya);
          IF UPCASE(YA)='U' THEN BENAR:=FALSE;
        
```

```

        IF UPCASE(YA)='L' THEN BENAR:=FALSE; END;
        TEXTCOLOR(10); END; END;
    IF NFD<>" THEN BEGIN NFDA:=NFD;
        WHILE NOT EOF(NFILE) DO BEGIN READ(NFILE,RECORDFDAT);
            IF RECORDFDAT.NFDAT=NFDA THEN NaFile:=RECORDFDAT.NaFil; END;
        END; CLOSE(NFILE);
    END
    ELSE BEGIN
        CLRSCR; TEXTCOLOR(11); GOTOXY(20,10); WRITE('File Data Belum Pernah Dibuat !');
        WRITE('^G'); READKEY; TEXTCOLOR(10); END;
    END;

PROCEDURE BARU;
BEGIN
    YA:='U'; ASSIGN(NFILE,'FILEDATA.DAT'); {$I-} RESET(NFILE); {$I+}
    IF IORESULT <> 0 THEN REWRITE(NFILE); JUM:=FILESIZE(NFILE);
    WHILE UPCASE(YA)='U' DO BEGIN
        CLRSCR; TEXTCOLOR(10); GotoXY(20,4);
        WRITE(CHAR(201)); FOR I:=1 TO 46 DO WRITE(CHAR(205)); WRITE(CHAR(187));
        GotoXY(20,5); Write(CHAR(186),' '); TEXTCOLOR(13);
        WRITE('PROGRAM DISAIN ELEMEN STRUKTUR BETON'); TEXTCOLOR(10);
        WRITE(' ',CHAR(186));
        GotoXY(20,6); WRITE(CHAR(204)); FOR I:=1 TO 46 DO WRITE(CHAR(205));
        WRITE(CHAR(185)); GotoXY(20,7);
        Write(CHAR(186),' Nama Proyek          :          ',CHAR(186));
        GotoXY(20,8); Write(CHAR(186),
        ' Nama File Data          :          ',CHAR(186)); GotoXY(20,9);
        Write(CHAR(186),' File Data Microfeap II :          ',CHAR(186));
        GotoXY(20,10); Write(CHAR(186),' Engineer          :          ');
        CHAR(186)); GotoXY(20,11);
        WRITE(CHAR(200)); FOR I:=1 TO 46 DO WRITE(CHAR(205)); WRITE(CHAR(188));
        TEXTCOLOR(11); GOTOXY(20,14); WRITE('U : ulang  L : lanjutkan ==>');
        TEXTCOLOR(10); KOSONG:=0; GOTOXY(47,7); READLN(NPRO); IF NPRO="" THEN KOSONG:=1;
        GOTOXY(47,8); READLN(NFD); IF NFD="" THEN KOSONG:=1; GOTOXY(47,9); READLN(NaF);
        IF NaF="" THEN KOSONG:=1; GOTOXY(47,10); READLN(EN); IF EN="" THEN KOSONG:=1;
        I:=0; ADA:=0;
        WITH RECORDFDAT DO BEGIN
            WHILE NOT EOF(NFILE) DO BEGIN READ(NFILE,RECORDFDAT);
                IF NFD=RECORDFDAT.NFDAT THEN BEGIN
                    ADA:=1; NOREC:=I; TEXTCOLOR(11); GOTOXY(20,13);
                    WRITE('File data sudah ada & akan ditumpangi !'); WRITE('^G');
                    TEXTCOLOR(10); END; I:=I+1; END; BENAR:=TRUE;
            WHILE BENAR DO BEGIN
                TEXTCOLOR(11); GOTOXY(51,14); ya:=READKEY; write(ya);
                IF UPCASE(YA)='U' THEN BENAR:=FALSE;
                IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10);
                IF ADA = 0 THEN NOREC:=FILESIZE(NFILE);
                IF (KOSONG=0) THEN BEGIN
                    NFDA:=NFD; NPROY:=NPRO; NFDAT:=NFD; NaFil:=NaF; ENG:=EN;
                    SEEK(NFILE,NOREC); WRITE(NFILE,RECORDFDAT); NaFile:=NaFil; END; END;
            END; CLOSE(NFILE);
        IF KOSONG=0 THEN BEGIN
            FBC:=NFDA+'.DMC'; ASSIGN(FMICRO,FBC); {$I-} RESET(FMICRO); {$I+}
            IF IORESULT <> 0 THEN REWRITE(FMICRO); ASSIGN(DATAMIC,NaFile); Reset(Datamic);
            While Not Eof(Datamic) Do Begin
                Readln(Datamic,Elemen,Section,Axial,Shear,Moment);
                WITH RECORDFDMC DO BEGIN
                    ELEM := ELEMEN; SEC := SECTION; AX := AXIAL; SHE := SHEAR;
                    MOM := MOMENT; WRITE(FMICRO,RECORDFDMC); END;
            END; CLOSE(DATAMIC); CLOSE(FMICRO); END;
        END;
    END;

```

```

PROCEDURE RUBAH;
BEGIN
    YA:='U'; ASSIGN(NFILE,'FILEDATA.DAT'); {$I-} RESET(NFILE); {$I+}
    IF IORESULT = 0 THEN BEGIN JUM:=FILESIZE(NFILE);
        WITH RECORDFDAT DO BEGIN I:=1;
            WHILE NOT EOF(NFILE) DO BEGIN READ(NFILE,RECORDFDAT);

```

```

IF RECORDFDAT.NFDAT=NFDA THEN BEGIN NOREC:=I-1;
WHILE UPCASE(YA)='U' DO BEGIN
CLRSCR; GotoXY(20,4);
WRITE(CHAR(201)); FOR I:=1 TO 46 DO WRITE(CHAR(205)); WRITE(CHAR(187));
GotoXY(20,5); Write(CHAR(186),' '); TEXTCOLOR(13);
WRITE('PROGRAM DISAIN ELEMEN STRUKTUR BETON'); TEXTCOLOR(10);
WRITE(' ',CHAR(186));
GotoXY(20,6); WRITE(CHAR(204)); FOR I:=1 TO 46 DO WRITE(CHAR(205));
WRITE(CHAR(185)); GotoXY(20,7);
Write(CHAR(186),' Nama Proyek      :      ',CHAR(186));
GotoXY(20,8); Write(CHAR(186),' File Data Microfeap II :      ');
CHAR(186)); GotoXY(20,9);
Write(CHAR(186),' Engineer      :      ',CHAR(186));
GotoXY(20,10); WRITE(CHAR(200)); FOR I:=1 TO 46 DO WRITE(CHAR(205));
WRITE(CHAR(188)); TEXTCOLOR(11); GOTOXY(20,12);
WRITE('U : ulang  L : lanjutkan ==> '); TEXTCOLOR(10);
GOTOXY(47,7); WRITE(NPROY); GOTOXY(47,8); WRITE(NaFil); GOTOXY(47,9);
WRITE(ENG);
GOTOXY(47,7); READLN(NPRO); IF NPRO<>" THEN NPROY:=NPRO; GOTOXY(47,8);
READLN(NaF); IF NaF<>" THEN NaFil:=NaF; GOTOXY(47,9); READLN(EN);
IF EN<>" THEN ENG:=EN; BENAR:=TRUE;
WHILE BENAR DO BEGIN
    TEXTCOLOR(11); GOTOXY(51,12); ya:=READKEY; write(ya);
    IF UPCASE(YA)='U' THEN BENAR:=FALSE;
    IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10);
END; SEEK(NFILE,NOREC); WRITE(NFILE,RECORDFDAT); END; I:=I+1; END;
END; CLOSE(NFILE);
END
ELSE BEGIN
    CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
    WRITE('File Data Belum Pernah Dibuat !'); WRITE('^G'); READKEY; TEXTCOLOR(10);
END;
END;

```

PROCEDURE FILEDATA;

Begin Pilih:=0;

REPEAT

```

    CLRSCR; GotoXY(20,4);
    WRITE(CHAR(201)); FOR I:=1 TO 37 DO WRITE(CHAR(205)); WRITE(CHAR(187));
    GotoXY(20,5); Write(CHAR(186)); TEXTBACKGROUND(1); WRITE(' ');
    TEXTCOLOR(11); WRITE('<>>> FILE DATA <<<<'); TEXTCOLOR(10);
    WRITE(' '); TEXTBACKGROUND(0); WRITE(CHAR(186));
    GotoXY(20,6); WRITE(CHAR(204)); FOR I:=1 TO 37 DO WRITE(CHAR(205));
    WRITE(CHAR(185)); GotoXY(20,7); Write(CHAR(186)); TEXTBACKGROUND(5) ;
    WRITE(' '); TEXTCOLOR(15); WRITE('B'); TEXTCOLOR(10);
    WRITE(' MEMBUAT FILE DATA BARU ');
    TEXTBACKGROUND(0); WRITE(CHAR(186));
    GotoXY(20,8); Write(CHAR(186)); TEXTBACKGROUND(5) ;
    WRITE(' '); TEXTCOLOR(15); WRITE('R'); TEXTCOLOR(10);
    WRITE(' MERUBAH FILE DATA YANG AKTIF ');
    TEXTBACKGROUND(0); WRITE(CHAR(186));
    GotoXY(20,9); Write(CHAR(186)); TEXTBACKGROUND(5) ;
    WRITE(' '); TEXTCOLOR(15); WRITE('T'); TEXTCOLOR(10);
    WRITE(' MERUBAH ISI FILE DATA YANG AKTIF ');
    TEXTBACKGROUND(0); WRITE(CHAR(186));
    GotoXY(20,10); Write(CHAR(186)); TEXTBACKGROUND(5) ;
    WRITE(' '); TEXTCOLOR(15); WRITE('S'); TEXTCOLOR(10);
    WRITE(' SELESAI ');
    TEXTBACKGROUND(0); WRITE(CHAR(186));
    GotoXY(20,11); WRITE(CHAR(204)); FOR I:=1 TO 37 DO WRITE(CHAR(205));
    WRITE(CHAR(185)); GotoXY(20,12);
    Write(CHAR(186)); TEXTCOLOR(15); TEXTBACKGROUND(4);
    WRITE(' ==> Pilih ? '); TEXTCOLOR(10);
    TEXTBACKGROUND(0); WRITE(CHAR(186));
    GOTOXY(20,13); WRITE(CHAR(200)); FOR I:=1 TO 37 DO WRITE(CHAR(205));
    WRITE(CHAR(188)); PILIH:=0;
    While (Pilih<1) or (Pilih>4) Do Begin
        TEXTCOLOR(15); TEXTBACKGROUND(4); GotoXY(35,12);
        PIL:=READKEY; write(PIL); TEXTCOLOR(10); TEXTBACKGROUND(0);
    End;

```

```

IF UPCASE(PIL)='B' THEN Pilih := 1; IF UPCASE(PIL)='R' THEN Pilih := 2;
IF UPCASE(PIL)='T' THEN Pilih := 3; IF UPCASE(PIL)='S' THEN Pilih := 4;
IF (PILIH<1) OR (PILIH>4) THEN Write('^G'); End;
Case Pilih of
  1: BEGIN CHDIR(DIREK); Baru; CHDIR(DIRAK); END;
  2: BEGIN CHDIR(DIREK); Aktif; CHDIR(DIRAK); END;
  3: BEGIN CHDIR(DIREK); Rubah; CHDIR(DIRAK); END; End;
UNTIL PILIH=4; Write('^G');
END;

```

```

PROCEDURE DATAELEMEN;

```

```

Begin
  CHDIR(DIREK);
  FTIP:=NFDA+FTP; ASSIGN(FTIPE,FTIP); {$I-} RESET(FTIPE); {$I+}
  IF IORESULT=0 THEN BEGIN READ(FTIPE,JTIPE); CLOSE(FTIPE); END
  ELSE JTIPE:=0; CHDIR(DIRAK); PILIH:=0;
  REPEAT
    ClrScr; GOTOXY(20,4);
    WRITE(CHAR(201)); FOR I:=1 TO 40 DO WRITE(CHAR(205)); WRITE(CHAR(187));
    GotoXY(20,5); Write(CHAR(186)); TEXTBACKGROUND(1); WRITE(' ');
    TEXTCOLOR(11); WRITE('>>> DATA <<<'); TEXTCOLOR(10);
    WRITE(' '); TEXTBACKGROUND(0); WRITE(CHAR(186));
    GOTOXY(20,6); WRITE(CHAR(204)); FOR I:=1 TO 40 DO WRITE(CHAR(205));
    WRITE(CHAR(185)); GotoXY(20,7); Write(CHAR(186)); TEXTBACKGROUND(5) ;
    Write(' '); TEXTCOLOR(15); WRITE('J'); TEXTCOLOR(10);
    WRITE(' JUMLAH TIPE 'EL:7; ': ',JTIPE:3; ' ');
    TEXTBACKGROUND(0); WRITE(CHAR(186));
    GotoXY(20,8); Write(CHAR(186)); TEXTBACKGROUND(5) ;
    Write(' '); TEXTCOLOR(15); WRITE('B'); TEXTCOLOR(10);
    WRITE(' DATA BAHAN '); TEXTBACKGROUND(0);
    WRITE(CHAR(186)); GotoXY(20,9); Write(CHAR(186)); TEXTBACKGROUND(5) ;
    Write(' '); TEXTCOLOR(15); WRITE('E'); TEXTCOLOR(10);
    WRITE(' DATA ELEMEN 'EL:7; ' '); TEXTBACKGROUND(0);
    WRITE(CHAR(186)); GotoXY(20,10); Write(CHAR(186)); TEXTBACKGROUND(5) ;
    Write(' '); TEXTCOLOR(15); WRITE('G'); TEXTCOLOR(10);
    WRITE(' DATA GAYA YANG BEKERJA PADA 'EL:7; ' '); TEXTBACKGROUND(0);
    WRITE(CHAR(186)); GotoXY(20,11); Write(CHAR(186)); TEXTBACKGROUND(5) ;
    Write(' '); TEXTCOLOR(15); WRITE('D'); TEXTCOLOR(10);
    WRITE(' DATA DIMENSI 'EL:7; ' '); TEXTBACKGROUND(0);
    WRITE(CHAR(186)); GotoXY(20,12); Write(CHAR(186)); TEXTBACKGROUND(5) ;
    Write(' '); TEXTCOLOR(15); WRITE('S'); TEXTCOLOR(10);
    WRITE(' SELESAI '); TEXTBACKGROUND(0);
    WRITE(CHAR(186)); GOTOXY(20,13);
    WRITE(CHAR(204)); FOR I:=1 TO 40 DO WRITE(CHAR(205));
    WRITE(CHAR(185)); GotoXY(20,14);
    Write(CHAR(186)); TEXTCOLOR(15); TEXTBACKGROUND(4);
    WRITE(' ==> Pilih ? '); TEXTCOLOR(10);
    TEXTBACKGROUND(0); WRITE(CHAR(186)); GOTOXY(20,15); WRITE(CHAR(200));
    FOR I:=1 TO 40 DO WRITE(CHAR(205)); WRITE(CHAR(188)); Pilih:=0;
    While (Pilih<1) or (Pilih>6) Do Begin
      TEXTCOLOR(15); TEXTBACKGROUND(4); GotoXY(35,14);
      PIL:=READKEY; write(PIL); TEXTCOLOR(10); TEXTBACKGROUND(0);
      if UPCASE(Pil)='J' Then Pilih := 1; if UPCASE(Pil)='B' Then Pilih := 2;
      if UPCASE(Pil)='E' Then Pilih := 3; if UPCASE(Pil)='G' Then Pilih := 4;
      if UPCASE(Pil)='D' Then Pilih := 5; if UPCASE(Pil)='S' Then Pilih := 6;
      IF (Pilih<1) or (Pilih>6) THEN WRITE('^G'); End;
    Case Pilih of
      1: BEGIN CHDIR(DIREK); FTIP:=NFDA+FTP; ASSIGN(FTIPE,FTIP);
        {$I-} RESET(FTIPE); {$I+}
        IF IORESULT=0 THEN BEGIN
          READ(FTIPE,JTIPE); CLOSE(FTIPE); END; YA:='U';
          WHILE UPCASE(YA)='U' DO BEGIN
            CLRSCR; GOTOXY(20,6); WRITE('JUMLAH TIPE 'EL:7; ' DISAIN ? : ');
            TEXTCOLOR(11); GOTOXY(20,10); WRITE('U : ulang L : lanjutkan ==> ');
            TEXTCOLOR(10); GOTOXY(51,6); WRITE(JTIPE); GOTOXY(51,6); READLN(JTIPE);
            BENAR:=TRUE;
            WHILE BENAR DO BEGIN
              TEXTCOLOR(11); GOTOXY(51,10); ya:=READKEY; write(ya);
              IF UPCASE(YA)='U' THEN BENAR:=FALSE;
            
```

```

    IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10); END;
  {SI-} RESET(FTIPE); {SI+}
  IF IORESULT<>0 THEN BEGIN
    REWRITE(FTIPE); WRITELN(FTIPE,JTIPE); CLOSE(FTIPE); END
  ELSE BEGIN
    CLOSE(FTIPE); ERASE(FTIPE); REWRITE(FTIPE);
    WRITELN(FTIPE,JTIPE); CLOSE(FTIPE); END; CHDIR(DIRAK); END;
2: BEGIN
  IF JTIPE=0 THEN BEGIN
    TEXTCOLOR(11); CLRSCR; GOTOXY(20,10);
    WRITE('JUMLAH TIPE 'EL,' BELUM ADA....!');
    WRITE('^G'); READKEY; TEXTCOLOR(10); END
  ELSE BEGIN
    DATA:=DIREK+' '+NFDA+' '+EL+' '+FTP+' '+BBN+' '+BBT;
    IF (EL='BALOK') OR (EL='KOLOM') THEN EXEC('DB.EXE',DATA);
    IF EL='PONDASI' THEN EXEC('DBP.EXE',DATA); END; END;
3: BEGIN
  DATA:=DIREK+' '+NFDA+' '+EL+' '+FTP+' '+BEL;
  IF JTIPE=0 THEN BEGIN
    TEXTCOLOR(11); CLRSCR; GOTOXY(20,10);
    WRITE('JUMLAH TIPE 'EL,' BELUM ADA....!');
    WRITE('^G'); READKEY; TEXTCOLOR(10); END
  ELSE EXEC('DE.EXE',DATA); END;
4: BEGIN
  IF JTIPE=0 THEN BEGIN
    TEXTCOLOR(11); CLRSCR; GOTOXY(20,10);
    WRITE('JUMLAH TIPE 'EL,' BELUM ADA....!');
    WRITE('^G'); READKEY; TEXTCOLOR(10); END
  ELSE BEGIN
    DATA:=DIREK+' '+NFDA+' '+EL+' '+FTP+' '+BEL+' '+BGM;
    IF EL='BALOK' THEN EXEC('GBL.EXE',DATA);
    IF EL='KOLOM' THEN EXEC('GKO.EXE',DATA);
    IF EL='PONDASI' THEN EXEC('GPO.EXE',DATA); END; END;
5: BEGIN
  IF JTIPE=0 THEN BEGIN
    TEXTCOLOR(11); CLRSCR; GOTOXY(20,10);
    WRITE('JUMLAH TIPE 'EL,' BELUM ADA....!');
    WRITE('^G'); READKEY; TEXTCOLOR(10); END
  ELSE BEGIN
    DATA:=DIREK+' '+NFDA+' '+EL+' '+FTP+' '+BEL+' '+BDD;
    IF EL='BALOK' THEN EXEC('DDBL.EXE',DATA);
    IF EL='KOLOM' THEN EXEC('DDKO.EXE',DATA);
    IF EL='PONDASI' THEN BEGIN
      DATA:=DIREK+' '+NFDA+' '+EL+' '+FTP+' '+BDD; EXEC('DDPO.EXE',DATA); END;
    END; END; End;
  UNTIL PILIH=6; WRITE('^G'); PILIH:=0;
END;

```

Procedure DATAPLAT;

Begin

```

  CHDIR(DIREK); FTIP:=NFDA+FTP; ASSIGN(FTIPE,FTIP); {SI-} RESET(FTIPE); {SI+}
  IF IORESULT=0 THEN BEGIN READ(FTIPE,JTIPE); CLOSE(FTIPE); END
  ELSE JTIPE:=0; CHDIR(DIRAK); PILIH:=0;
  REPEAT
    ClrScr; GOTOXY(20,4);
    WRITE(CHAR(201)); FOR I:=1 TO 40 DO WRITE(CHAR(205)); WRITE(CHAR(187));
    GotoXY(20,5); Write(CHAR(186)); TEXTBACKGROUND(1); WRITE(' ');
    TEXTCOLOR(11); WRITE('>>> DATA <<<'); TEXTCOLOR(10);
    WRITE(' '); TEXTBACKGROUND(0); WRITE(CHAR(186)); GOTOXY(20,6);
    WRITE(CHAR(204)); FOR I:=1 TO 40 DO WRITE(CHAR(205)); WRITE(CHAR(185));
    GotoXY(20,7); Write(CHAR(186)); TEXTBACKGROUND(5) ;
    Write(' '); TEXTCOLOR(15); WRITE('J'); TEXTCOLOR(10);
    WRITE(' JUMLAH TIPE 'EL:7,' : ',JTIPE:3,' ');
    TEXTBACKGROUND(0); WRITE(CHAR(186));
    GotoXY(20,8); Write(CHAR(186)); TEXTBACKGROUND(5) ;
    Write(' '); TEXTCOLOR(15); WRITE('B'); TEXTCOLOR(10);
    WRITE(' DATA BAHAN '); TEXTBACKGROUND(0);
    WRITE(CHAR(186)); GotoXY(20,9); Write(CHAR(186)); TEXTBACKGROUND(5) ;
    Write(' '); TEXTCOLOR(15); WRITE('D'); TEXTCOLOR(10);
  UNTIL PILIH=6;

```

```

WRITE(' DATA DIMENSI 'EL:7,' '); TEXTBACKGROUND(0);
WRITE(CHAR(186)); GotoXY(20,10); Write(CHAR(186)); TEXTBACKGROUND(5) ;
Write(' '); TEXTCOLOR(15); WRITE('G'); TEXTCOLOR(10);
WRITE(' DATA GAYA YANG BEKERJA PADA 'EL:7,' '); TEXTBACKGROUND(0);
WRITE(CHAR(186)); GotoXY(20,11); Write(CHAR(186)); TEXTBACKGROUND(5) ;
Write(' '); TEXTCOLOR(15); WRITE('S'); TEXTCOLOR(10);
WRITE(' SELESAI '); TEXTBACKGROUND(0);
WRITE(CHAR(186)); GOTOXY(20,12);
WRITE(CHAR(204)); FOR I:=1 TO 40 DO WRITE(CHAR(205)); WRITE(CHAR(185));
GotoXY(20,13); Write(CHAR(186)); TEXTCOLOR(15); TEXTBACKGROUND(4);
WRITE(' ==> Pilih ? '); TEXTCOLOR(10);
TEXTBACKGROUND(0); WRITE(CHAR(186)); GOTOXY(20,14);
WRITE(CHAR(200)); FOR I:=1 TO 40 DO WRITE(CHAR(205)); WRITE(CHAR(188)); Pilih:=0;
While (Pilih<1) or (Pilih>5) Do Begin
  TEXTCOLOR(15); TEXTBACKGROUND(4); GotoXY(35,13);
  PIL:=READKEY; write(PIL); TEXTCOLOR(10); TEXTBACKGROUND(0);
  if UPCASE(Pil)='J' Then Pilih := 1; if UPCASE(Pil)='B' Then Pilih := 2;
  if UPCASE(Pil)='D' Then Pilih := 3; if UPCASE(Pil)='G' Then Pilih := 4;
  if UPCASE(Pil)='S' Then Pilih := 5; IF (Pilih<1) or (Pilih>5) THEN WRITE('G');End;
Case Pilih of
1: BEGIN CHDIR(DIREK); FTIP:=NFDA+FTP; ASSIGN(FTIPE,FTIP);
  {$I-} RESET(FTIPE); {$I+}
  IF IORESULT=0 THEN BEGIN
    READ(FTIPE,JTIPE); CLOSE(FTIPE); END; YA:='U';
    WHILE UPCASE(YA)='U' DO BEGIN
      CLRSCR; GOTOXY(20,6); WRITE('JUMLAH TIPE 'EL,' DISAIN ? : ');
      TEXTCOLOR(11); GOTOXY(20,10); WRITE('U : ulang L : lanjutkan ==> ');
      TEXTCOLOR(10); GOTOXY(51,6); WRITE(JTIPE); GOTOXY(51,6); READLN(JTIPE);
      BENAR:=TRUE;
      WHILE BENAR DO BEGIN
        TEXTCOLOR(11); GOTOXY(51,10); ya:=READKEY; write(ya);
        IF UPCASE(YA)='U' THEN BENAR:=FALSE;
        IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10);
      END; {$I-} RESET(FTIPE); {$I+}
      IF IORESULT<>0 THEN BEGIN
        REWRITE(FTIPE); WRITELN(FTIPE,JTIPE); CLOSE(FTIPE); END
      ELSE BEGIN
        CLOSE(FTIPE); ERASE(FTIPE); REWRITE(FTIPE); WRITELN(FTIPE,JTIPE);
        CLOSE(FTIPE); END; CHDIR(DIRAK); END;
2: BEGIN
  DATA:=DIREK+' '+NFDA+' '+EL+' '+FTP+' '+BBN+' '+BBI;
  IF JTIPE=0 THEN BEGIN
    CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
    WRITE('JUMLAH TIPE 'EL,' BELUM ADA....!');
    WRITE('^G'); READKEY; TEXTCOLOR(10); END
  ELSE EXEC('DB.EXE',DATA); END;
3: BEGIN
  DATA:=DIREK+' '+NFDA+' '+EL+' '+FTP+' '+BBN+' '+BDI;
  IF JTIPE=0 THEN BEGIN
    CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
    WRITE('JUMLAH TIPE 'EL,' BELUM ADA....!');
    WRITE('^G'); READKEY; TEXTCOLOR(10); END
  ELSE EXEC('DDPL.EXE',DATA); END;
4: BEGIN
  DATA:=DIREK+' '+NFDA+' '+EL+' '+FTP+' '+BGM+' '+BDI;
  IF JTIPE=0 THEN BEGIN
    TEXTCOLOR(11); CLRSCR; GOTOXY(20,10);
    WRITE('JUMLAH TIPE 'EL,' BELUM ADA....!');
    WRITE('^G'); READKEY; TEXTCOLOR(10); END
  ELSE EXEC('GPL.EXE',DATA); END; End;
UNTIL PILIH=5; WRITE('^G'); PILIH:=0;
END;

```

PROCEDURE OUTPUTHASIL;

BEGIN PILIH:=0;

REPEAT

ClrScr; GotoXY(20,4);

WRITE(CHAR(201)); FOR I:=1 TO 41 DO WRITE(CHAR(205)); WRITE(CHAR(187));

GOTOXY(20,5); Write(CHAR(186)); TEXTBACKGROUND(1); WRITE(' ');


```

TEXTCOLOR(11); WRITE(">>> HASIL DISAIN <<<"); TEXTCOLOR(10);
WRITE(' '); TEXTBACKGROUND(0); WRITE(CHAR(186));
TEXTCOLOR(10); GotoXY(20,6);
WRITE(CHAR(204)); FOR I:=1 TO 41 DO WRITE(CHAR(205)); WRITE(CHAR(185));
GotoXY(20,7); Write(CHAR(186)); TEXTBACKGROUND(5) ;
Write(' '); TEXTCOLOR(15); WRITE('L'); TEXTCOLOR(10);
WRITE(' MENAMPILKAN HASIL DISAIN PADA LAYAR '); TEXTBACKGROUND(0);
WRITE(CHAR(186)); GotoXY(20,8); Write(CHAR(186)); TEXTBACKGROUND(5) ;
Write(' '); TEXTCOLOR(15); WRITE('P'); TEXTCOLOR(10);
WRITE(' MENAMPILKAN HASIL DISAIN PADA PRINTER '); TEXTBACKGROUND(0);
WRITE(CHAR(186)); GotoXY(20,9); Write(CHAR(186)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('S'); TEXTCOLOR(10);
WRITE(' SELESAI '); TEXTBACKGROUND(0);
WRITE(CHAR(186)); GOTOXY(20,10);
WRITE(CHAR(204)); FOR I:=1 TO 41 DO WRITE(CHAR(205)); WRITE(CHAR(185));
GOTOXY(20,11); Write(CHAR(186)); TEXTCOLOR(15); TEXTBACKGROUND(4);
WRITE(' ==> Pilih ? '); TEXTCOLOR(10);
TEXTBACKGROUND(0); WRITE(CHAR(186)); GOTOXY(20,12);
WRITE(CHAR(200)); FOR I:=1 TO 41 DO WRITE(CHAR(205)); WRITE(CHAR(188)); Pilih:=0;
While (Pilih<1) or (Pilih>3) Do Begin
  TEXTCOLOR(15); TEXTBACKGROUND(4); GotoXY(35,11);
  PIL:=READKEY; write(PIL); TEXTCOLOR(10); TEXTBACKGROUND(0);
  if UPCASE(Pil)='L' Then Pilih := 1; if UPCASE(Pil)='P' Then Pilih := 2;
  if UPCASE(Pil)='S' Then Pilih := 3; IF (Pilih<1)or(Pilih>3) THEN WRITE('^G');End;
Case Pilih of
1: BEGIN
  IF (EL='PLAT') OR (EL='BALOK') THEN BEGIN
    DATA:=DIREK+' '+NFDA+' '+EL+' '+BLK+' '+DIRAK;
    IF EL='PLAT' THEN EXEC('TPL.EXE',DATA);
    IF EL='BALOK' THEN EXEC('TBL.EXE',DATA); END;
  IF EL='KOLOM' THEN BEGIN
    DATA:=DIREK+' '+NFDA+' '+EL+' '+BDD+' '+BLK; EXEC('TKO.EXE',DATA); END;
  IF EL='PONDASI' THEN BEGIN
    DATA:=DIREK+' '+NFDA+' '+EL+' '+BLK; EXEC('TPO.EXE',DATA); END; END;
2: BEGIN
  IF (EL='PLAT') OR (EL='BALOK') OR (EL='PONDASI') THEN BEGIN
    DATA:=DIREK+' '+NFDA+' '+EL+' '+BLK; IF EL='PLAT' THEN EXEC('CPL.EXE',DATA);
    IF EL='BALOK' THEN EXEC('CBL.EXE',DATA);
    IF EL='PONDASI' THEN EXEC('CPON.EXE',DATA); END
  ELSE BEGIN
    DATA:=DIREK+' '+NFDA+' '+EL+' '+BDD+' '+BLK; EXEC('CKO.EXE',DATA); END; END; END;
UNTIL PILIH=3; Write('^G'); PILIH:=0;
END;

```

PROCEDURE OUTPUTDATA;

BEGIN PILIH:=0;

REPEAT

ClrScr; GotoXY(20,4);

WRITE(CHAR(201)); FOR I:=1 TO 41 DO WRITE(CHAR(205)); WRITE(CHAR(187));

GOTOXY(20,5); Write(CHAR(186)); TEXTBACKGROUND(1); WRITE(' ');

TEXTCOLOR(11); WRITE(">>> DATA DISAIN <<<"); TEXTCOLOR(10);

WRITE(' '); TEXTBACKGROUND(0); WRITE(CHAR(186));

TEXTCOLOR(10); GotoXY(20,6);

WRITE(CHAR(204)); FOR I:=1 TO 41 DO WRITE(CHAR(205)); WRITE(CHAR(185));

GotoXY(20,7); Write(CHAR(186)); TEXTBACKGROUND(5) ;

Write(' '); TEXTCOLOR(15); WRITE('L'); TEXTCOLOR(10);

WRITE(' MENAMPILKAN DATA DISAIN PADA LAYAR '); TEXTBACKGROUND(0);

WRITE(CHAR(186)); GotoXY(20,8); Write(CHAR(186)); TEXTBACKGROUND(5);

Write(' '); TEXTCOLOR(15); WRITE('P'); TEXTCOLOR(10);

WRITE(' MENAMPILKAN DATA DISAIN PADA PRINTER '); TEXTBACKGROUND(0);

WRITE(CHAR(186)); GotoXY(20,9); Write(CHAR(186)); TEXTBACKGROUND(5);

Write(' '); TEXTCOLOR(15); WRITE('S'); TEXTCOLOR(10);

WRITE(' SELESAI '); TEXTBACKGROUND(0);

WRITE(CHAR(186)); GOTOXY(20,10);

WRITE(CHAR(204)); FOR I:=1 TO 41 DO WRITE(CHAR(205)); WRITE(CHAR(185));

GOTOXY(20,11); Write(CHAR(186)); TEXTCOLOR(15); TEXTBACKGROUND(4);

WRITE(' ==> Pilih ? '); TEXTCOLOR(10);

TEXTBACKGROUND(0); WRITE(CHAR(186)); GOTOXY(20,12);

WRITE(CHAR(200)); FOR I:=1 TO 41 DO WRITE(CHAR(205)); WRITE(CHAR(188)); Pilih:=0;

```

While (Pilih<1) or (Pilih>3) Do Begin
  TEXTCOLOR(15); TEXTBACKGROUND(4); GotoXY(35,11);
  PIL:=READKEY; write(PIL); TEXTCOLOR(10); TEXTBACKGROUND(0);
  if UPCASE(Pil)='L' Then Pilih := 1; if UPCASE(Pil)='P' Then Pilih := 2;
  if UPCASE(Pil)='S' Then Pilih := 3; IF (Pilih<1) or (Pilih>3) THEN WRITE('^G');End;
Case Pilih of
1: BEGIN
  DATA:=DIREK+' '+NFDA+' '+EL+' '+FTP+' '+BBN+' '+BBT+' '+BEL+' '+BGM+' '+BDD+' '+DIRAK;
  IF EL='PLAT' THEN EXEC('TDPL.EXE',DATA); IF EL='BALOK' THEN EXEC('TDBL.EXE',DATA);
  IF EL='PONDASI' THEN EXEC('TDPO.EXE',DATA);
  IF EL='KOLOM' THEN EXEC('TDKO.EXE',DATA); END;
2: BEGIN
  DATA:=DIREK+' '+NFDA+' '+EL+' '+FTP+' '+BBN+' '+BBT+' '+BEL+' '+BGM+' '+BDD;
  IF EL='PLAT' THEN EXEC('CDPL.EXE',DATA); IF EL='BALOK' THEN EXEC('CDBL.EXE',DATA);
  IF EL='PONDASI' THEN EXEC('CDPO.EXE',DATA);
  IF EL='KOLOM' THEN EXEC('CDKO.EXE',DATA); END; END;
UNTIL PILIH=3; Write('^G'); PILIH:=0;
END;

```

```

PROCEDURE DISAINPLAT;
Begin PILIH:=0;
REPEAT
  ClrScr; GotoXY(20,4); WRITE(CHAR(201)); FOR I:=1 TO 28 DO WRITE(CHAR(205));
  WRITE(CHAR(187)); GOTOXY(20,5);
  Write(CHAR(186)); TEXTBACKGROUND(1); TEXTCOLOR(11);
  WRITE(' >>> DISAIN ELEMEN PLAT <<< '); TEXTCOLOR(10);
  TEXTBACKGROUND(0); WRITE(CHAR(186)); TEXTCOLOR(10); GotoXY(20,6);
  WRITE(CHAR(204)); FOR I:=1 TO 28 DO WRITE(CHAR(205));
  WRITE(CHAR(185)); GotoXY(20,7); Write(CHAR(186)); TEXTBACKGROUND(5);
  Write(' '); TEXTCOLOR(15); WRITE('D'); TEXTCOLOR(10);
  WRITE(' DATA '); TEXTBACKGROUND(0);
  WRITE(CHAR(186)); GotoXY(20,8); Write(CHAR(186)); TEXTBACKGROUND(5);
  Write(' '); TEXTCOLOR(15); WRITE('P'); TEXTCOLOR(10);
  WRITE(' PROSES DISAIN '); TEXTBACKGROUND(0);
  WRITE(CHAR(186)); GotoXY(20,9); Write(CHAR(186)); TEXTBACKGROUND(5);
  Write(' '); TEXTCOLOR(15); WRITE('M'); TEXTCOLOR(10);
  WRITE(' MENAMPILKAN DATA DISAIN '); TEXTBACKGROUND(0);
  WRITE(CHAR(186)); GotoXY(20,10); Write(CHAR(186)); TEXTBACKGROUND(5);
  Write(' '); TEXTCOLOR(15); WRITE('H'); TEXTCOLOR(10);
  WRITE(' HASIL DISAIN '); TEXTBACKGROUND(0);
  WRITE(CHAR(186)); GotoXY(20,11); Write(CHAR(186)); TEXTBACKGROUND(5);
  Write(' '); TEXTCOLOR(15); WRITE('G'); TEXTCOLOR(10);
  WRITE(' SKETSA HASIL DISAIN '); TEXTBACKGROUND(0);
  WRITE(CHAR(186)); GotoXY(20,12); Write(CHAR(186)); TEXTBACKGROUND(5);
  Write(' '); TEXTCOLOR(15); WRITE('S'); TEXTCOLOR(10);
  WRITE(' SELESAI '); TEXTBACKGROUND(0);
  WRITE(CHAR(186)); GOTOXY(20,13);
  WRITE(CHAR(204)); FOR I:=1 TO 28 DO WRITE(CHAR(205)); WRITE(CHAR(185));
  GOTOXY(20,14); Write(CHAR(186)); TEXTCOLOR(15); TEXTBACKGROUND(4);
  WRITE(' ==> Pilih ? '); TEXTCOLOR(10);
  TEXTBACKGROUND(0); WRITE(CHAR(186)); GOTOXY(20,15);
  WRITE(CHAR(200)); FOR I:=1 TO 28 DO WRITE(CHAR(205));
  WRITE(CHAR(188)); Pilih:=0;
  While (Pilih<1) or (Pilih>6) Do Begin
    TEXTCOLOR(15); TEXTBACKGROUND(4); GotoXY(35,14);
    PIL:=READKEY; write(PIL); TEXTCOLOR(10); TEXTBACKGROUND(0);
    if UPCASE(Pil)='D' Then Pilih := 1; if UPCASE(Pil)='P' Then Pilih := 2;
    if UPCASE(Pil)='M' Then Pilih := 3; if UPCASE(Pil)='H' Then Pilih := 4;
    if UPCASE(Pil)='G' Then Pilih := 5; if UPCASE(Pil)='S' Then Pilih := 6;
    IF (PILIH<1) OR (PILIH>6) THEN Write('^G');End;
  Case Pilih of
  1: DATAPLAT;
  2: BEGIN
    DATA:=DIREK+' '+NFDA+' '+EL+' '+FTP+' '+BBN+' '+BBT+' '+BGM+' '+BDD+' '+BLK;
    EXEC('PPL.EXE',DATA); END;
  3: Outputdata;
  4: Outputhasil;
  5: BEGIN
    DATA:=DIREK+' '+NFDA+' '+FTP+' '+BDD+' '+BLK;

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```

EXEC('SKETSPLT.EXE',DATA); END; End;
UNTIL PILIH=6; Write('^G'); PILIH:=0;
END;

```

```

PROCEDURE DisainBalok;
Begin PILIH:=0;
REPEAT
  ClrScr; GotoXY(20,4);
  WRITE(CHAR(201)); FOR I:=1 TO 29 DO WRITE(CHAR(205)); WRITE(CHAR(187));
  GOTOXY(20,5); Write(CHAR(186)); TEXTBACKGROUND(1); TEXTCOLOR(11);
  WRITE(' >>> DISAIN ELEMEN BALOK <<< '); TEXTCOLOR(10);
  TEXTBACKGROUND(0); WRITE(CHAR(186)); TEXTCOLOR(10); GotoXY(20,6);
  WRITE(CHAR(204)); FOR I:=1 TO 29 DO WRITE(CHAR(205)); WRITE(CHAR(185));
  GotoXY(20,7); Write(CHAR(186)); TEXTBACKGROUND(5);
  Write(' '); TEXTCOLOR(15); WRITE('D'); TEXTCOLOR(10);
  WRITE(' DATA '); TEXTBACKGROUND(0);
  WRITE(CHAR(186)); GotoXY(20,8); Write(CHAR(186)); TEXTBACKGROUND(5);
  Write(' '); TEXTCOLOR(15); WRITE('P'); TEXTCOLOR(10);
  WRITE(' PROSES DISAIN '); TEXTBACKGROUND(0);
  WRITE(CHAR(186)); GotoXY(20,9); Write(CHAR(186)); TEXTBACKGROUND(5);
  Write(' '); TEXTCOLOR(15); WRITE('M'); TEXTCOLOR(10);
  WRITE(' MENAMPILKAN DATA DISAIN '); TEXTBACKGROUND(0);
  WRITE(CHAR(186)); GotoXY(20,10); Write(CHAR(186)); TEXTBACKGROUND(5);
  Write(' '); TEXTCOLOR(15); WRITE('H'); TEXTCOLOR(10);
  WRITE(' HASIL DISAIN '); TEXTBACKGROUND(0);
  WRITE(CHAR(186)); GotoXY(20,11); Write(CHAR(186)); TEXTBACKGROUND(5);
  Write(' '); TEXTCOLOR(15); WRITE('G'); TEXTCOLOR(10);
  WRITE(' SKETSA HASIL DISAIN '); TEXTBACKGROUND(0);
  WRITE(CHAR(186)); GotoXY(20,12); Write(CHAR(186)); TEXTBACKGROUND(5);
  Write(' '); TEXTCOLOR(15); WRITE('S'); TEXTCOLOR(10);
  WRITE(' SELESAI '); TEXTBACKGROUND(0);
  WRITE(CHAR(186)); GOTOXY(20,13);
  WRITE(CHAR(204)); FOR I:=1 TO 29 DO WRITE(CHAR(205)); WRITE(CHAR(185));
  GOTOXY(20,14); Write(CHAR(186)); TEXTCOLOR(15); TEXTBACKGROUND(4);
  WRITE(' ==> Pilih ? '); TEXTCOLOR(10);
  TEXTBACKGROUND(0); WRITE(CHAR(186)); GOTOXY(20,15);
  WRITE(CHAR(200)); FOR I:=1 TO 29 DO WRITE(CHAR(205)); WRITE(CHAR(188)); Pilih:=0;
  While (Pilih<1) or (Pilih>6) Do Begin
    TEXTCOLOR(15); TEXTBACKGROUND(4); GotoXY(35,14);
    PIL:=READKEY; write(PIL); TEXTCOLOR(10); TEXTBACKGROUND(0);
    if UPCASE(Pil)='D' Then Pilih := 1; if UPCASE(Pil)='P' Then Pilih := 2;
    if UPCASE(Pil)='M' Then Pilih := 3; if UPCASE(Pil)='H' Then Pilih := 4;
    if UPCASE(Pil)='G' Then Pilih := 5; if UPCASE(Pil)='S' Then Pilih := 6;
    IF (PILIH<1) OR (PILIH>6) THEN Write('^G');End;
  Case Pilih of
    1: DATAELEMEN;
    2: BEGIN
      DATA:=DIREK+' '+NFDA+' '+EL+' '+FTP+' '+BBN+' '+BBT+' '+BGM+' '+BDD+' '+BLK;
      EXEC('PBLEXE',DATA); END;
    3: Outputdata;
    4: Outputhasil;
    5: BEGIN
      DATA:=DIREK+' '+NFDA+' '+FTP+' '+BDD+' '+BLK+' '+DIRAK;
      EXEC('SKETSBLK.EXE',DATA); END; End;
  UNTIL PILIH=6; Write('^G'); PILIH:=0;
End;

```

```

PROCEDURE DISAINKOLOM;
Begin PILIH:=0;
REPEAT
  ClrScr; GotoXY(20,4);
  WRITE(CHAR(201)); FOR I:=1 TO 29 DO WRITE(CHAR(205)); WRITE(CHAR(187));
  GOTOXY(20,5); Write(CHAR(186)); TEXTBACKGROUND(1); TEXTCOLOR(11);
  WRITE(' >>> DISAIN ELEMEN KOLOM <<< '); TEXTCOLOR(10);
  TEXTBACKGROUND(0); WRITE(CHAR(186)); TEXTCOLOR(10);
  GotoXY(20,6); WRITE(CHAR(204)); FOR I:=1 TO 29 DO WRITE(CHAR(205));
  WRITE(CHAR(185)); GotoXY(20,7); Write(CHAR(186)); TEXTBACKGROUND(5);
  Write(' '); TEXTCOLOR(15); WRITE('D'); TEXTCOLOR(10);

```

```

WRITE(' DATA          '); TEXTBACKGROUND(0);
WRITE(CHAR(186)); GotoXY(20,8); Write(CHAR(186)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('P'); TEXTCOLOR(10);
WRITE(' PROSES DISAIN          '); TEXTBACKGROUND(0);
WRITE(CHAR(186)); GotoXY(20,9); Write(CHAR(186)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('M'); TEXTCOLOR(10);
WRITE(' MENAMPILKAN DATA DISAIN '); TEXTBACKGROUND(0);
WRITE(CHAR(186)); GotoXY(20,10); Write(CHAR(186)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('H'); TEXTCOLOR(10);
WRITE(' HASIL DISAIN          '); TEXTBACKGROUND(0);
WRITE(CHAR(186)); GotoXY(20,11); Write(CHAR(186)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('G'); TEXTCOLOR(10);
WRITE(' SKETSA HASIL DISAIN '); TEXTBACKGROUND(0);
WRITE(CHAR(186)); GotoXY(20,12); Write(CHAR(186)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('S'); TEXTCOLOR(10);
WRITE(' SELESAI          '); TEXTBACKGROUND(0);
WRITE(CHAR(186)); GOTOXY(20,13);
WRITE(CHAR(204)); FOR I:=1 TO 29 DO WRITE(CHAR(205));
WRITE(CHAR(185)); GOTOXY(20,14);
Write(CHAR(186)); TEXTCOLOR(15); TEXTBACKGROUND(4);
WRITE(' ==> Pilih ? '); TEXTCOLOR(10);
TEXTBACKGROUND(0); WRITE(CHAR(186));
GOTOXY(20,15); WRITE(CHAR(200)); FOR I:=1 TO 29 DO WRITE(CHAR(205));
WRITE(CHAR(188)); Pilih:=0;
While (Pilih<1) or (Pilih>6) Do Begin
  TEXTCOLOR(15); TEXTBACKGROUND(4); GotoXY(35,14);
  PIL:=READKEY; write(PIL); TEXTCOLOR(10); TEXTBACKGROUND(0);
  if UPCASE(Pil)='D' Then Pilih := 1; if UPCASE(Pil)='P' Then Pilih := 2;
  if UPCASE(Pil)='M' Then Pilih := 3; if UPCASE(Pil)='H' Then Pilih := 4;
  if UPCASE(Pil)='G' Then Pilih := 5; if UPCASE(Pil)='S' Then Pilih := 6;
  IF (PILIH<1) OR (PILIH>6) THEN Write('^G');End;
Case Pilih of
  1: DATAELEMEN;
  2: BEGIN
    DATA:=DIREK+' '+NFDA+' '+EL+' '+FTP+' '+BBN+' '+BBT+' '+BGM+' '+BDD+' '+BLK;
    EXEC('PKO.EXE',DATA); END;
  3: Outputdata;
  4: Outputhasil;
  5: BEGIN
    DATA:=DIREK+' '+NFDA+' '+FTP+' '+BDD+' '+BLK;
    EXEC('SKETSKLM.EXE',DATA); END; End;
UNTIL PILIH=6; Write('^G'); PILIH:=0;
End;

PROCEDURE DISAINPONDASI;
Begin PILIH:=0;
REPEAT
  ClrScr; GotoXY(20,4); WRITE(CHAR(201)); FOR I:=1 TO 31 DO WRITE(CHAR(205));
  WRITE(CHAR(187)); GOTOXY(20,5); Write(CHAR(186)); TEXTBACKGROUND(1); TEXTCOLOR(11);
  WRITE(' >>> DISAIN ELEMEN PONDASI <<< '); TEXTCOLOR(10);
  TEXTBACKGROUND(0); WRITE(CHAR(186)); TEXTCOLOR(10); GotoXY(20,6);
  WRITE(CHAR(204)); FOR I:=1 TO 31 DO WRITE(CHAR(205)); WRITE(CHAR(185));
  GotoXY(20,7); Write(CHAR(186)); TEXTBACKGROUND(5);
  Write(' '); TEXTCOLOR(15); WRITE('D'); TEXTCOLOR(10);
  WRITE(' DATA          '); TEXTBACKGROUND(0); WRITE(CHAR(186));
  GotoXY(20,8); Write(CHAR(186)); TEXTBACKGROUND(5) ; Write(' '); TEXTCOLOR(15);
  WRITE('P'); TEXTCOLOR(10); WRITE(' PROSES DISAIN          '); TEXTBACKGROUND(0);
  WRITE(CHAR(186)); GotoXY(20,9);
  Write(CHAR(186)); TEXTBACKGROUND(5) ; Write(' '); TEXTCOLOR(15); WRITE('M');
  TEXTCOLOR(10); WRITE(' MENAMPILKAN DATA DISAIN '); TEXTBACKGROUND(0);
  WRITE(CHAR(186)); GotoXY(20,10);
  Write(CHAR(186)); TEXTBACKGROUND(5) ; Write(' '); TEXTCOLOR(15);
  WRITE('H'); TEXTCOLOR(10); WRITE(' HASIL DISAIN          '); TEXTBACKGROUND(0);
  WRITE(CHAR(186)); GotoXY(20,11); Write(CHAR(186)); TEXTBACKGROUND(5);
  Write(' '); TEXTCOLOR(15); WRITE('G'); TEXTCOLOR(10);
  WRITE(' SKETSA HASIL DISAIN '); TEXTBACKGROUND(0);
  WRITE(CHAR(186)); GotoXY(20,12); Write(CHAR(186)); TEXTBACKGROUND(5);
  Write(' '); TEXTCOLOR(15); WRITE('S'); TEXTCOLOR(10);
  WRITE(' SELESAI          '); TEXTBACKGROUND(0);

```



```

WRITE(CHAR(186)); GOTOXY(20,13); WRITE(CHAR(204)); FOR I:=1 TO 31 DO WRITE(CHAR(205));
WRITE(CHAR(185)); GOTOXY(20,14); Write(CHAR(186)); TEXTCOLOR(15); TEXTBACKGROUND(4);
WRITE('====> Pilih ? '); TEXTCOLOR(10);
TEXTBACKGROUND(0); WRITE(CHAR(186)); GOTOXY(20,15);
WRITE(CHAR(200)); FOR I:=1 TO 31 DO WRITE(CHAR(205)); WRITE(CHAR(188)); Pilih:=0;
While (Pilih<1) or (Pilih>6) Do Begin
  GotoXY(35,14); TEXTCOLOR(15); TEXTBACKGROUND(4);
  PIL:=READKEY; write(PIL); TEXTCOLOR(10); TEXTBACKGROUND(0);
  if UPCASE(Pil)='D' Then Pilih := 1; if UPCASE(Pil)='P' Then Pilih := 2;
  if UPCASE(Pil)='M' Then Pilih := 3; if UPCASE(Pil)='H' Then Pilih := 4;
  if UPCASE(Pil)='G' Then Pilih := 5; if UPCASE(Pil)='S' Then Pilih := 6;
  IF (PILIH<1) OR (PILIH>6) THEN Write('^G');End;
Case Pilih of
  1: DATAELEMEN;
  2: BEGIN
    DATA:=DIREK+' '+NFDA+' '+EL+' '+FTP+' '+BBN+' '+BBT+' '+BGM+' '+BDD+' '+BLK;
    EXEC('PPO.EXE',DATA); END;
  3: Outputdata;
  4: Outputhasil;
  5: BEGIN
    DATA:=DIREK+' '+NFDA+' '+FTP+' '+BDD+' '+BLK;
    EXEC('SKETSPON.EXE',DATA); END; End;
UNTIL PILIH=6; Write('^G'); PILIH:=0;
End;

BEGIN
GETDIR(0,DIRAK); IF (DIRAK='A:') OR (DIRAK='C:') OR (DIRAK='B:') OR (DIRAK='D:') OR
(DIRAK='E:') THEN CHDIR(DIRAK+'LOGO') ELSE CHDIR(DIRAK+'LOGO'); EXEC('LOGO.EXE',DIRAK);
YA:='U'; WHILE UPCASE(YA)='U' DO BEGIN
  CLRSCR; TEXTCOLOR(10);
  GotoXY(10,4); Write('DIREKTORI YANG SEDANG AKTIF : ',DIRAK);
  GotoXY(10,5); Write('DIREKTORI FILE DATA ANDA : '); TEXTCOLOR(11);
  GOTOXY(10,7); WRITE('U : ulang L : lanjutkan ====> '); TEXTCOLOR(10);
  GOTOXY(40,5); READLN(DIREK); IF (DIREK='') OR (DIREK=' ') OR (DIREK=' ') THEN BEGIN
  GOTOXY(40,5); WRITE(DIRAK); END; BENAR:=TRUE;
  WHILE BENAR DO BEGIN
    TEXTCOLOR(11); GOTOXY(41,7); YA:=READKEY; WRITE(YA);
    IF UPCASE(YA)='U' THEN BENAR:=FALSE;
    IF UPCASE(YA)='L' THEN BENAR:=FALSE; END;
    TEXTCOLOR(10); END;
IF (DIREK='') OR (DIREK=' ') OR (DIREK=' ') THEN DIREK:=DIRAK;
{$I-} CHDIR(DIREK); {$I+} IF IORESULT<>0 THEN MKDIR(DIREK); TEXTCOLOR(10);
ASSIGN(NFILE,'FILEDATA.DAT'); {$I-} RESET(NFILE); {$I+}
IF IORESULT = 0 THEN BEGIN
  WHILE NOT EOF(NFILE) DO BEGIN
    READ(NFILE,RECORDFDAT); NFDA:=RECORDFDAT.NF'DAT'; END; END; CHDIR(DIRAK);
While True Do Begin
  ClrScr; GotoXY(20,4); WRITE(CHAR(201)); FOR I:=1 TO 46 DO WRITE(CHAR(205));
  WRITE(CHAR(187)); GOTOXY(20,5); Write(CHAR(186)); TEXTCOLOR(13);
  WRITE(' >>> PROGRAM DISAIN ELEMEN STRUKTUR BETON <<< ');
  TEXTCOLOR(10); WRITE(CHAR(186)); GotoXY(20,6);
  WRITE(CHAR(204)); FOR I:=1 TO 46 DO WRITE(CHAR(205)); WRITE(CHAR(185));
  GotoXY(20,7); WRITE(CHAR(186)); FOR I:=1 TO 46 DO WRITE(CHAR(0));
  WRITE(CHAR(186)); GotoXY(20,8);
  WRITE(CHAR(186)); FOR I:=1 TO 46 DO WRITE(CHAR(0)); WRITE(CHAR(186));
  GOTOXY(20,9); Write(CHAR(186)); ' **** Nama File Data : ';
  TEXTBACKGROUND(15); TEXTCOLOR(1); WRITE(NF'DA:8);
  TEXTBACKGROUND(0); TEXTCOLOR(10); WRITE(' ',CHAR(186));
  GotoXY(20,10); Write(CHAR(186)); Write(' '); TEXTCOLOR(11);
  WRITE('D'); TEXTCOLOR(10); WRITE(' FILE DATA ');
  WRITE(CHAR(186)); GotoXY(20,11);
  Write(CHAR(186)); Write(' '); TEXTCOLOR(11); WRITE('P');
  TEXTCOLOR(10); WRITE(' DISAIN ELEMEN PLAT '); WRITE(CHAR(186));
  GotoXY(20,12); Write(CHAR(186)); Write(' '); TEXTCOLOR(11); WRITE('B');
  TEXTCOLOR(10); WRITE(' DISAIN ELEMEN BALOK '); WRITE(CHAR(186));
  GotoXY(20,13); Write(CHAR(186)); Write(' '); TEXTCOLOR(11); WRITE('K');
  TEXTCOLOR(10); WRITE(' DISAIN ELEMEN KOLOM '); WRITE(CHAR(186));
  GotoXY(20,14); Write(CHAR(186)); Write(' '); TEXTCOLOR(11); WRITE('F');
  TEXTCOLOR(10); WRITE(' DISAIN ELEMEN PONDASI '); WRITE(CHAR(186));

```

```

GotoXY(20,15); Write(CHAR(186)); Write(' '); TEXTCOLOR(11); WRITE('S');
TEXTCOLOR(10); WRITE(' SELESAI '); WRITE(CHAR(186));
GOTOXY(20,16); WRITE(CHAR(204)); FOR I:=1 TO 46 DO WRITE(CHAR(205));
WRITE(CHAR(185)); GOTOXY(20,17); Write(CHAR(186)); TEXTCOLOR(11);
WRITE('      Pilih ? : '); TEXTCOLOR(10);
WRITE(CHAR(186)); GOTOXY(20,18);
WRITE(CHAR(200)); FOR I:=1 TO 46 DO WRITE(CHAR(205)); WRITE(CHAR(188)); Pilih:=0;
While (Pilih<1) or (Pilih>6) Do Begin
  TEXTCOLOR(11); GotoXY(41,17); PIL:=READKEY; write(PIL);
  IF UPCASE(PIL)='D' THEN Pilih := 1; IF UPCASE(PIL)='P' THEN Pilih := 2;
  IF UPCASE(PIL)='B' THEN Pilih := 3; IF UPCASE(PIL)='K' THEN Pilih := 4;
  IF UPCASE(PIL)='F' THEN Pilih := 5; IF UPCASE(PIL)='S' THEN Pilih := 6;
  IF (PILIH<1) OR (PILIH>6) THEN Write('^G'); End; TEXTCOLOR(10);
Case Pilih of
  1: FILEDATA;
  2: BEGIN
    IF NFDA<>' ' THEN BEGIN
      EL:='PLAT';FTP:='P';BBN:='.PBN';BBT:='.PBT';BEL:='.PEL';BGM:='.PGM';
      BDD:='.PDD';BLK:='.PLT';DISAINPLAT;END;WRITE('^G');END;
  3: BEGIN
    IF NFDA<>' ' THEN BEGIN
      EL:='BALOK';FTP:='B';BBN:='.BBN';BBT:='.BBT';BEL:='.BEL';BGM:='.BGM';
      BDD:='.BDD';BLK:='.BLK';DISAINBALOK;END;WRITE('^G');END;
  4: BEGIN
    IF NFDA<>' ' THEN BEGIN
      EL:='KOLOM';FTP:='K';BBN:='.KBN';BBT:='.KBT';BEL:='.KEL';BGM:='.KGM';
      BDD:='.KDD';BLK:='.KOL';DISAINKOLOM;END;WRITE('^G');END;
  5: BEGIN
    IF NFDA<>' ' THEN BEGIN
      EL:='PONDASI';FTP:='F';BBN:='.FBN';BBT:='.FBT';BEL:='.FEL';BGM:='.FGM';
      BDD:='.FDD';BLK:='.PON';DISAINPONDASI;END;WRITE('^G');END;
  6: BEGIN
    Write('^G'); CHDIR(DIRAK); TEXTBACKGROUND(0); TEXTCOLOR(15);
    CLRSCR; Exit; END; END; End;
End.

```

3.2 Program Disain Elemen Plat

Program disain elemen plat adalah subprogram pada program utama untuk mengontrol semua program yang berhubungan dengan perencanaan elemen plat.

3.2.1 Algoritma dan bagan alir program

Dengan mengacu pada langkah-langkah perencanaan plat dan rumus-rumus pada sub bab 2.1.1 dibuat algoritma dan bagan alir program disain elemen plat sebagai berikut:

1. Algoritma program disain elemen plat.

Algoritma atau langkah penyelesaian perencanaan elemen struktur plat dengan program komputer adalah sebagai berikut:

1. data:

a. data bahan:

- 1) tegangan tekan beton (f_c'),
- 2) tegangan tarik baja tulangan (f_y),
- 3) modulus elastisitas baja tulangan (E_s),
- 4) diameter tulangan pokok yang digunakan (D_p),
- 5) diameter tulangan susut yang digunakan (D_s),

b. data dimensi:

- 1) panjang bentang plat (y),
- 2) lebar plat (x),
- 3) selimut beton (P_b),

c. data beban yang bekerja pada plat (q),

2. menentukan kondisi struktur,

3. untuk plat satu arah:

- a. menghitung ketebalan plat (h),
- b. menghitung momen yang menentukan (M_u),

$$d = h - P_b - \frac{1}{2} \cdot D_p$$

$$k = \frac{M_u}{\Phi b d^2}$$

$$\rho = \frac{f_c' \cdot p - \sqrt{f_c'^2 - 2,36 \cdot k \cdot f_c'}}{1,18 \cdot f_y}$$

memeriksa ρ terhadap ρ_{\min} dan ρ_{\max} ,

$$\rho_b = \frac{(0,85 \cdot f_c' \cdot \beta_1)}{f_y} \frac{600}{600 + f_y}$$

$$\rho_{\max} = 0,75 \cdot \rho_b$$

$$\rho_{\min} = \frac{1,4}{f_y}$$

bila $\rho > \rho_{\max} \rightarrow$ tebal plat diperbaharui,

bila $\rho < \rho_{\min} \rightarrow \rho = \rho_{\min}$,

$$A_s = \rho d$$

menentukan $A_{s_{\text{aktual}}}$,

$$s = \frac{A_d \cdot l}{A_{s_{\text{aktual}}}}$$

$$s_{\max} = 3 \cdot h$$

$$s_{\max} = 500 \text{ mm}$$

pilih s_{\max} yang terkecil sebagai s_{\max} ,

bila $s > s_{\max}$ maka perencanaan diulang kembali

4. untuk plat dua arah:

- a. menghitung ketebalan plat (h),
- b. menghitung momen yang menentukan (M_{ux} dan M_{uy}),

$$d = h - P_b - \frac{1}{2} \cdot D_{p_x} \rightarrow \text{untuk arah } x,$$

$$d = h - P_b - D_{p_x} - \frac{1}{2} \cdot D_{p_y} \rightarrow \text{untuk arah } y,$$

$$k = \frac{M_u}{\Phi b d^2}$$

$$\rho = \frac{f_c' \cdot \left(1 - \sqrt{1 - 2,36 \cdot k \cdot f_c'} \right)}{1,18 \cdot f_y}$$

memeriksa ρ terhadap ρ_{\min} dan ρ_{\max} ,

$$\rho_b = \frac{(0,85 \cdot f_c' \cdot \beta_1)}{f_y} \cdot \frac{600}{600 + f_y}$$

$$\rho_{\max} = 0,75 \cdot \rho_b$$

$$\rho_{\min} = \frac{1,4}{f_y}$$

bila $\rho > \rho_{\max} \rightarrow$ tebal plat diperbaharui,

bila $\rho < \rho_{\min} \rightarrow \rho = \rho_{\min}$,

$$A_s = \rho d$$

menentukan $A_{s_{\text{aktual}}}$,

$$s = \frac{A_d \cdot l}{A_{s_{\text{aktual}}}}$$

$$s_{\max} = 3 \cdot h$$

$$s_{\max} = 500 \text{ mm}$$

pilih s_{\max} yang terkecil sebagai s_{\max} ,

bila $s > s_{\max}$ maka perencanaan diulang kembali

5. merencanakan penulangan susut dan suhu:

bila mutu baja 30 $\rightarrow A_{s_s} = 0,0020 \cdot b \cdot h$,

bila mutu baja 40 $\rightarrow A_{s_s} = 0,0018 \cdot b \cdot h$,

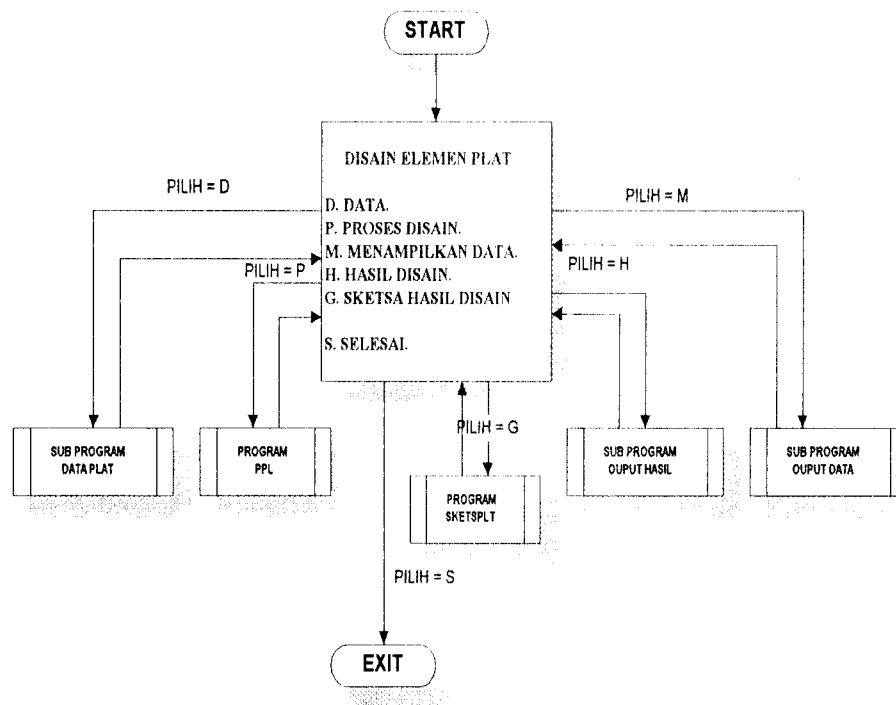
bila mutu baja $> 40 \rightarrow A_{s_s} = 0,0018 \cdot b \cdot h \cdot \left(\frac{400}{f_y} \right)$,

bila $A_s > 0,0014 \cdot b \cdot h$ maka $A_{s_s} = 0,0014 \cdot b \cdot h$

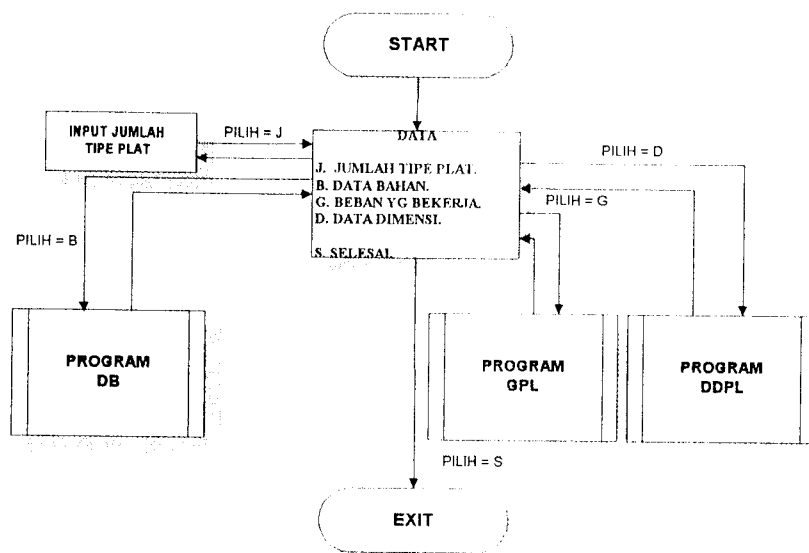
6. bila $A_s < A_{s_s}$ maka $A_s = A_{s_s}$,

1. Bagan alir program disain elemen plat.

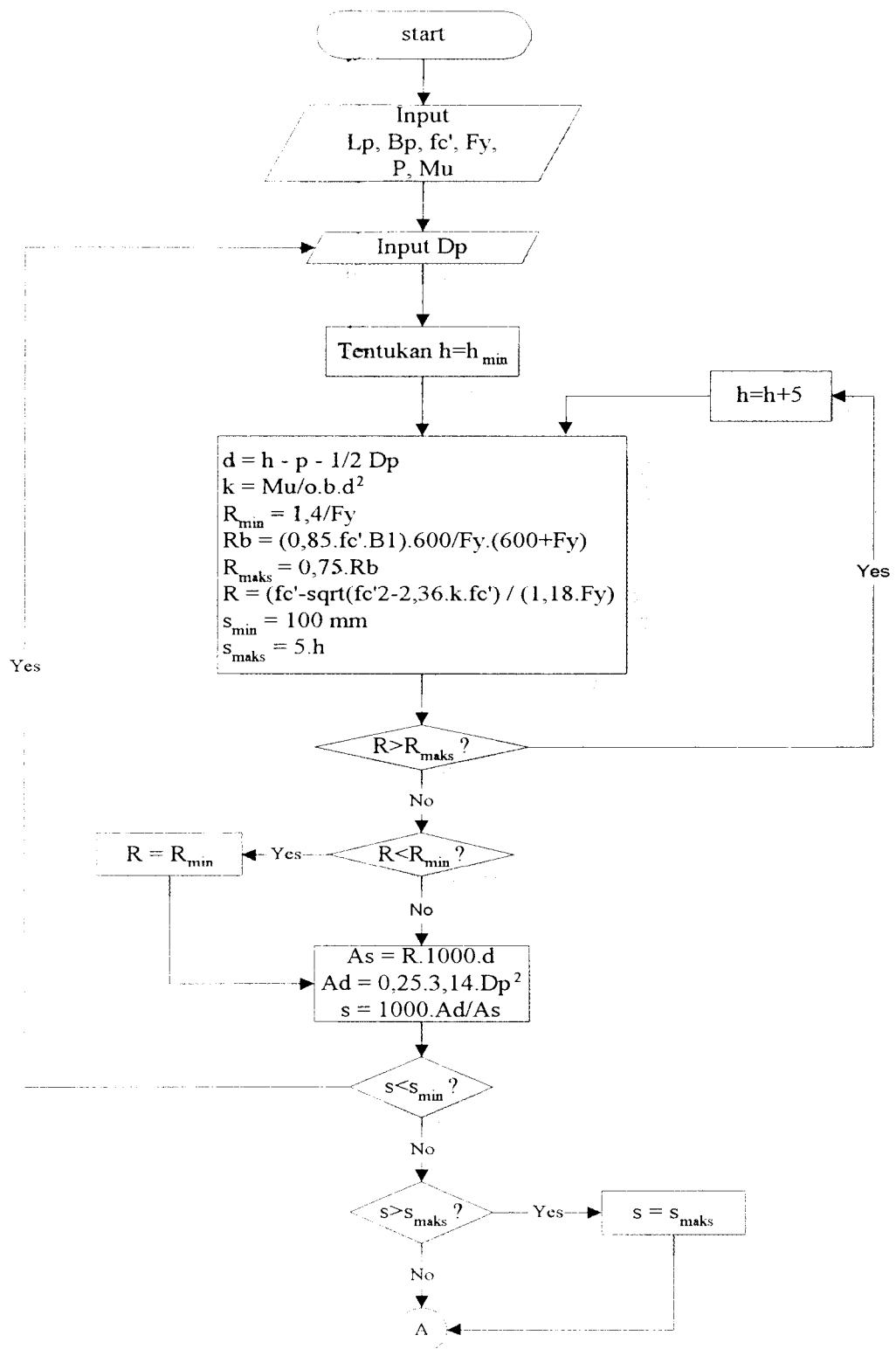
Berdasarkan algoritma program disain elemen plat, secara umum dibuat bagan alir program disain elemen plat sebagai berikut:



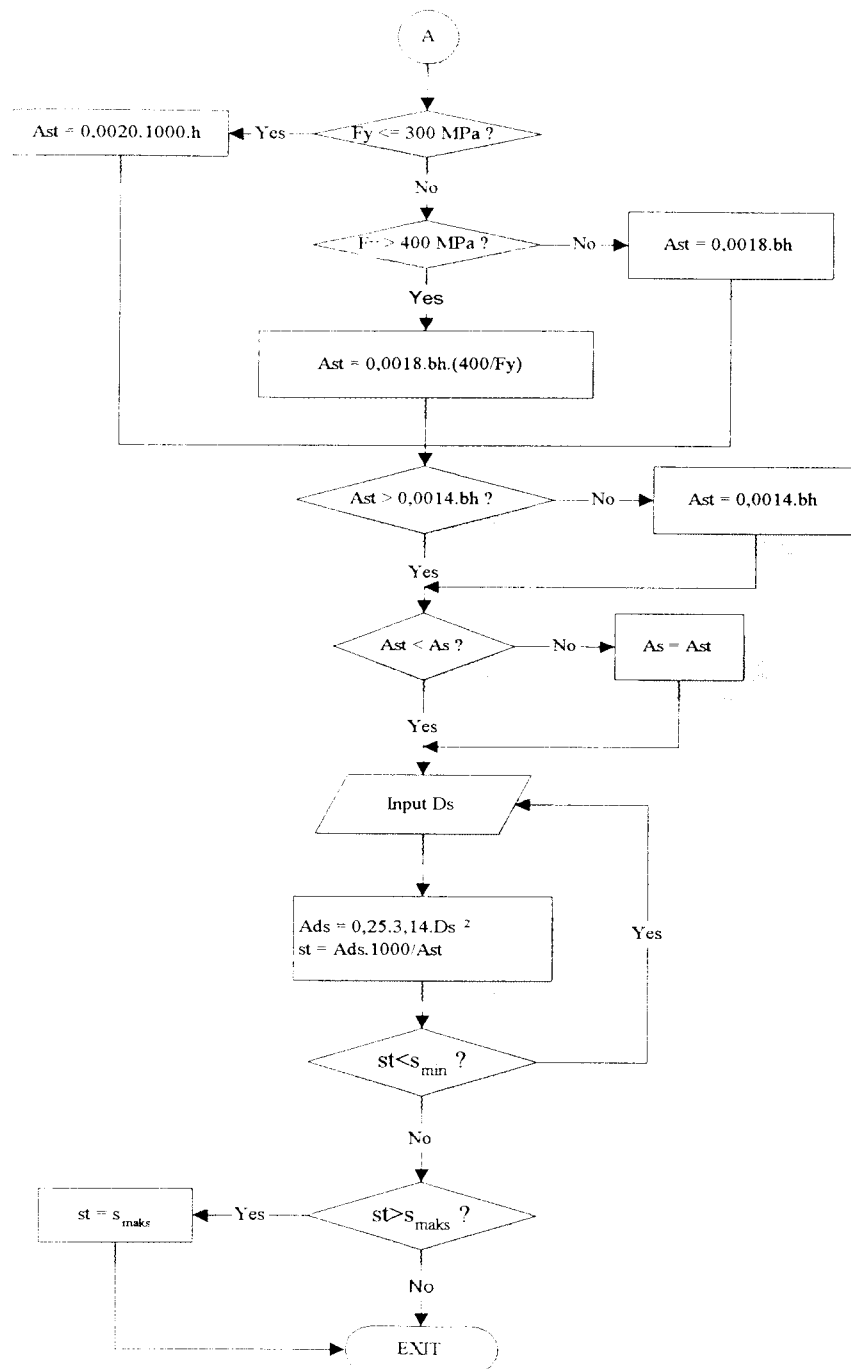
Gambar 3.2 Bagan alir sub program disain elemen plat



Gambar 3.3 Bagan alir sub program data plat



Gambar 3.4 Bagan alir proses disain plat 1



Gambar 3.5 Bagan alir proses disain plat 2 (lanjutan)

3.2.2 Listing program

Dengan berdasarkan bagan alir subprogram disain PLAT di atas dibuat program dan subprogram yang terkait dengan perencanaan disain elemen PLAT, baik dalam hal “input” data, proses disain maupun “output” hasil disain. Subprogram disain elemen PLAT tersebut berada pada program utama yang akan dieksekusi bila pilihan disain elemen PLAT diberikan.

Subprogram disain PLAT tersebut akan mengeksekusi subprogram data PLAT, subprogram “output” data dan “output” hasil yang juga berada pada program utama.

Dengan subprogram data PLAT tersebut dieksekusi program-program sebagai berikut: program DB (“input” data bahan PLAT), program GPL (“input” gaya maksimum yang bekerja pada PLAT), program DDPL (“input” data dimensi PLAT). Bila program-program tersebut telah selesai dieksekusi maka akan kembali pada program utama pada subprogram data PLAT dan bila subprogram data PLAT sudah selesai dieksekusi maka program akan kembali ke subprogram disain PLAT.

Dengan subprogram “output” data dieksekusi program-program sebagai berikut: program TDPL (“output” data PLAT ke layar) dan program CDPL (“output” data PLAT ke printer). Bila program-program tersebut telah selesai dieksekusi maka akan kembali pada program utama pada subprogram “output” data dan bila subprogram “output” data sudah selesai dieksekusi maka program akan kembali ke subprogram disain PLAT.

Dengan subprogram “output” hasil dieksekusi program-program sebagai berikut: program TPL (“output” hasil disain PLAT ke layar) dan program CPL (“output” hasil disain PLAT ke printer). Bila program-program tersebut telah selesai dieksekusi maka akan kembali pada program utama pada subprogram “output” hasil dan bila subprogram “output” hasil sudah selesai dieksekusi maka program akan kembali ke subprogram disain PLAT.

Program-program yang langsung dapat dieksekusi (tidak melalui subprogram) oleh subprogram disain PLAT adalah program PPL (program proses disain PLAT) dan program sketsa PLAT (program sketsa hasil disain PLAT).

Dan bila subprogram disain PLAT telah selesai dieksekusi maka program kembali ke program utama (menu utama).

Listing program untuk program-program yang berada di bawah kontrol subprogram disain PLAT di atas dapat dilihat pada lampiran 1.

3.3 Program Disain Elemen Balok

Program disain elemen balok adalah subprogram pada program utama untuk mengontrol semua program yang berhubungan dengan perencanaan elemen balok.

3.3.1 Algoritma dan bagan alir program

Dengan mengacu pada langkah-langkah perencanaan balok dan rumus-rumus pada sub bab 2.1.2 dibuat algoritma dan bagan alir program disain elemen balok sebagai berikut:

1. Algoritma program disain elemen balok.

Algoritma atau langkah penyelesaian perencanaan elemen struktur balok dengan program komputer adalah sebagai berikut:

1. data:

a. data bahan:

- 1) kuat desak beton (f_c'),
- 2) tegangan tarik baja (f_y),
- 3) modulus elastisitas baja (E_s),
- 4) diameter tulangan baja yang digunakan (D_p , D_s),

b. data dimensi balok:

- 1) panjang bentang balok (L),
- 2) lebar penampang balok (b),
- 3) tinggi penampang balok (h),

c. data gaya yang bekerja pada balok:

- 1) gaya geser/"shear force" (V_u),

2) gaya aksial/"axial force" (Pu),

3) momen tumpuan dan lapangan maksimal atau M_{maks}^- dan M_{maks}^+ (Mu),

4) momen torsi (Tu),

2. menghitung MR_{maks} :

$$d = h - P_b - D_s - \frac{1}{2} D_p$$

$$\rho_b = \frac{(0,85 \cdot f_c' \cdot \beta_1)}{f_y} \cdot \frac{600}{(600 + f_y)}$$

$$\rho_{maks} = 0,75 \cdot \rho_b$$

$$\omega = \frac{\rho_{maks} \cdot f_y}{f_c'}$$

$$k_{maks} = f_c' \cdot \omega \cdot (1 - 0,59 \cdot \omega)$$

$$MR_{maks} = \Phi \cdot b \cdot d^2 \cdot k_{maks}$$

3. memeriksa MR_{maks} terhadap Mu:

a. jika $MR_{maks} \geq Mu$ maka merencanakan balok sebagai balok bertulangan tarik saja:

$$d = h - P_b - D_s - \frac{1}{2} D_p$$

$$k = \frac{Mu}{\Phi \cdot b \cdot d^2}$$

$$\rho = \frac{f_c' - \sqrt{f_c'^2 - 2,36 \cdot k \cdot f_c'}}{1,18 \cdot f_y}$$

$$A_s = \rho \cdot b \cdot d$$

b. jika $MR_{maks} < Mu$ maka merencanakan balok sebagai balok bertulangan rangkap

(bertulangan tarik dan desak):

$$\rho = 0,90 \cdot \rho_{maks}$$

$$\omega = \frac{\rho \cdot f_y}{f_c'}$$

$$k = f_c' \cdot \omega \cdot (1 - 0,59 \cdot \omega)$$

$$MR_1 = \Phi \cdot b \cdot d^2 \cdot k$$

$$As_1 = \rho \cdot b \cdot d$$

$$MR_2 = Mu - MR_1$$

$$d' = 70 \text{ mm}$$

$$ND_2 = \frac{MR_2}{\Phi \cdot (d - d')}$$

$$a = \frac{As_1 \cdot f_y}{(0,85 \cdot f_c') \cdot b}$$

$$c = \frac{a}{\beta_1}$$

$$\epsilon_s' = \frac{c - d'}{c} (0,003)$$

$$\epsilon_y = \frac{f_y}{E_s}$$

memeriksa ϵ_s' terhadap ϵ_y :

jika $\epsilon_s' \geq \epsilon_y \rightarrow f_s' = f_y$

jika $\epsilon_s' < \epsilon_y \rightarrow f_s' = \epsilon_s' \cdot E_s$

$$As' = \frac{ND_2}{f_s'}$$

$$As_2 = \frac{As' \cdot f_s'}{f_y}$$

$$As = As_1 + As_2$$

4. memilih tulangan baja yang digunakan (As dan As'),

5. merencanakan penulangan sengkang:

a. memeriksa V_u terhadap $\frac{1}{2} \Phi V_c$,

b. $V_c = (\frac{1}{6} \sqrt{f_c'}) \cdot b \cdot d$

c. jika $V_u < \frac{1}{2} \Phi V_c$ maka tidak diperlukan tulangan geser sengkang,

dimana $\Phi = 0,60$

d. menghitung V_s pada tempat dukungan balok:

$$V_{s_{perlu}} = \frac{V_u}{\Phi} - V_c$$

e. memilih diameter tulangan sengkang (D_s),

f. menghitung luas penampang tulangan (A_v):

$$A_v = \frac{1}{4} \cdot \pi \cdot D_s^2$$

g. menghitung jarak spasi sengkang pada tempat berjarak x dari dukungan:

$$s_{perlu} = \frac{A_v \cdot f_y \cdot d}{V_{s_{perlu}}}$$

h. memeriksa V_s pada penampang kritis dengan $V = (\frac{1}{3} \sqrt{f_c'}) \cdot b \cdot d$,

1) bila $V_s \geq V$ maka $s_{maks} = 300 \text{ mm}$ atau $s_{maks} = \frac{1}{4} \cdot d$, pilih yg terkecil

2) bila $V_s < V$ maka $s_{maks} = 600 \text{ mm}$ atau $s_{maks} = \frac{1}{2} \cdot d$, pilih yg terkecil

6. merencanakan penulangan torsi:

a. membandingkan T_u terhadap $\Phi[(\frac{1}{24} \sqrt{f_c'}) \sum x^2 y]$,

$$T_u \leq \Phi[(\frac{1}{24} \sqrt{f_c'}) \sum x^2 y] \rightarrow \text{efek torsi boleh diabaikan,}$$

$$T_u > \Phi[(\frac{1}{24} \sqrt{f_c'}) \sum x^2 y] \rightarrow \text{diperlukan tulangan sengkang,}$$

$$C_t = \frac{b \cdot d}{\sum x^2 y},$$

b. $T_c = \frac{(\frac{1}{15}\sqrt{f_c'}) \sum x^2 y}{\sqrt{1 + (\frac{0.4 V_u}{C_t T_u})^2}}$, apabila komponen struktur mengalami gaya tarik cukup

besar tulangan torsi harus direncanakan untuk memikul momen torsi total dan nilai T_c dikalikan $(1 + 0,30 \frac{N_u}{A_g})$, dimana N_u bernilai negatif untuk tarik,

c. memeriksa T_u terhadap ΦT_c ,

$T_u \leq \Phi T_c \rightarrow$ efek torsi boleh diabaikan ,

$$T_n = \frac{T_u}{\Phi},$$

$T_s = T_n - T_c$ atau $T_s = (\frac{1}{3}\sqrt{f_y'}) \sum \frac{1}{3} x^2 y$ dan pilih yang terkecil,

d. memeriksa T_s terhadap T_c ,

bila $T_s > 4T_c$ maka penampang harus diperbesar,

e. menghitung tulangan torsi yang dibutuhkan:

$$x_1 = b - 2(Pb + \frac{1}{2}Ds)$$

$$y_1 = h - 2(Pb + \frac{1}{2}Ds)$$

$$\alpha_t = \frac{1}{3}(2 + \frac{y_1}{x_1})$$

$$\frac{A_t}{s} = \frac{T_s}{\alpha_t \cdot x_1 \cdot y_1}$$

f. menghitung penulangan geser yang diperlukan:

$$V_c = \frac{(\frac{1}{6}\sqrt{f_c'}) \cdot b \cdot d}{\sqrt{1 + (2,5 \cdot C_t \frac{T_u}{V_u})^2}}$$

$$V_n = \frac{V_u}{\Phi}$$

$$V_s = V_n - V_c$$

$$\frac{A_v}{s} = \frac{V_s}{f_y \cdot d}$$

g. merencanakan sengkang tertutup gabungan untuk torsi dan geser:

$$\frac{Av_t}{s} = \frac{2At}{s} + \frac{Av}{s}$$

$$\text{luas dua kaki } Ast = 2 \cdot \left(\frac{1}{4} \cdot \pi \cdot Ds^2\right)$$

$$s_{\text{perlu}} = \frac{Ast}{\frac{Av_t}{s}}$$

$$s_{\text{maks}} = \frac{1}{4} (x_1 + y_1)$$

$$As_{\text{perlu}} = Av + 2At = \frac{1}{3} \frac{b \cdot s}{f_y} < As_{\text{terpasang}}$$

h. merencanakan tulangan torsi memanjang:

$$Al = \frac{2At}{s} (x_1 + y_1)$$

$$\text{memeriksa } \frac{1}{3} \frac{b \cdot s}{f_y} \text{ terhadap } At,$$

$$\text{jika } \frac{1}{3} \frac{b \cdot s}{f_y} \leq At \rightarrow A = At,$$

$$\text{jika } \frac{1}{3} \frac{b \cdot s}{f_y} > At \rightarrow A = \frac{1}{3} \frac{b \cdot s}{f_y},$$

$$Al = \left[\frac{2,8 \cdot h \cdot s}{f_y} \left[\frac{T_u}{T_u + \frac{V_u}{3 \cdot C_t}} \right] - 2 \cdot A \right] \frac{x_1 + y_1}{s},$$

memilih Al yang terbesar dan memilih diameter tulangan torsi memanjang

(DI) yang digunakan, jarak tulangan tidak boleh melebihi 300mm,

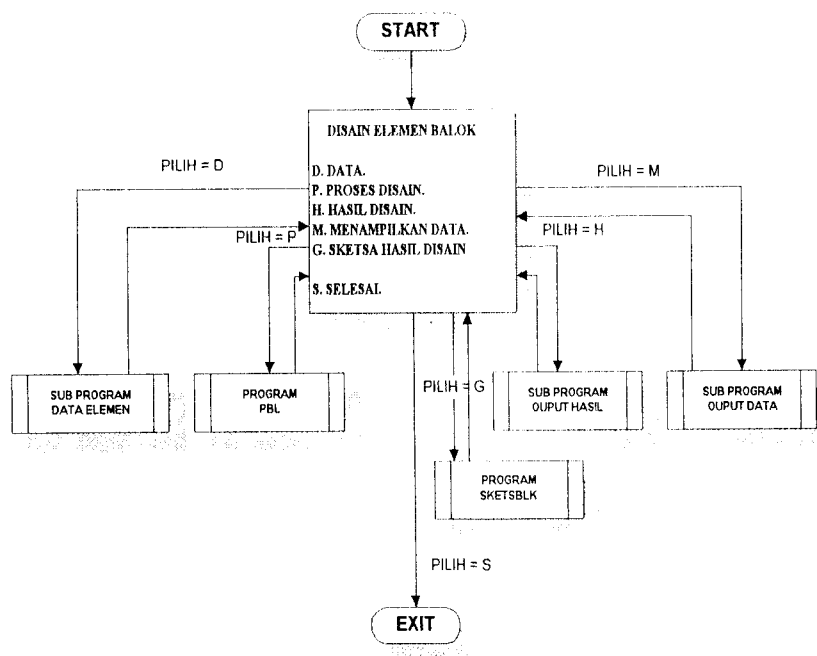
7. menghitung luas total tulangan memanjang yang dipasang,
8. memilih tulangan memanjang yang dipasang pada balok,
9. memeriksa jarak tulangan (s),

$$n = \frac{A_s}{A\phi}$$

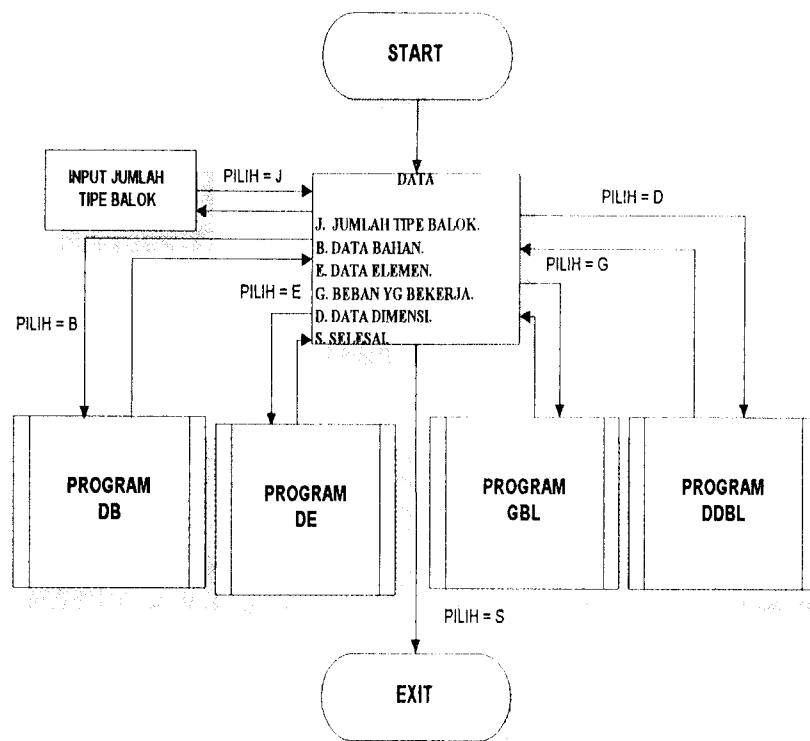
$$s = \frac{b - 2.Pb - n.Dp - 2.Ds}{(n - 1)} \geq 25\text{mm}$$

1. Bagan alir program disain elemen balok.

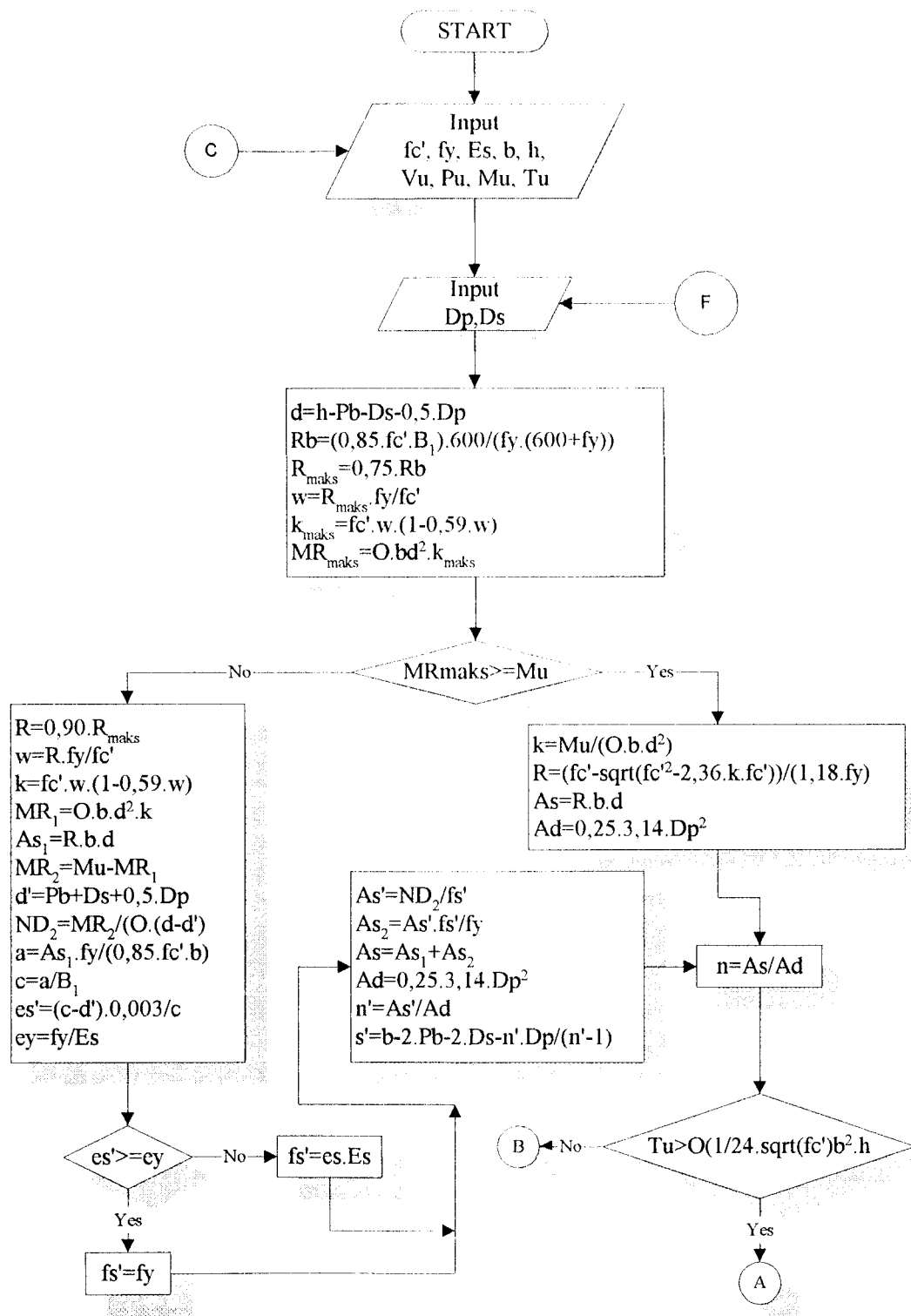
Berdasarkan algoritma program disain elemen balok, secara umum dibuat bagan alir program disain elemen balok sebagai berikut:



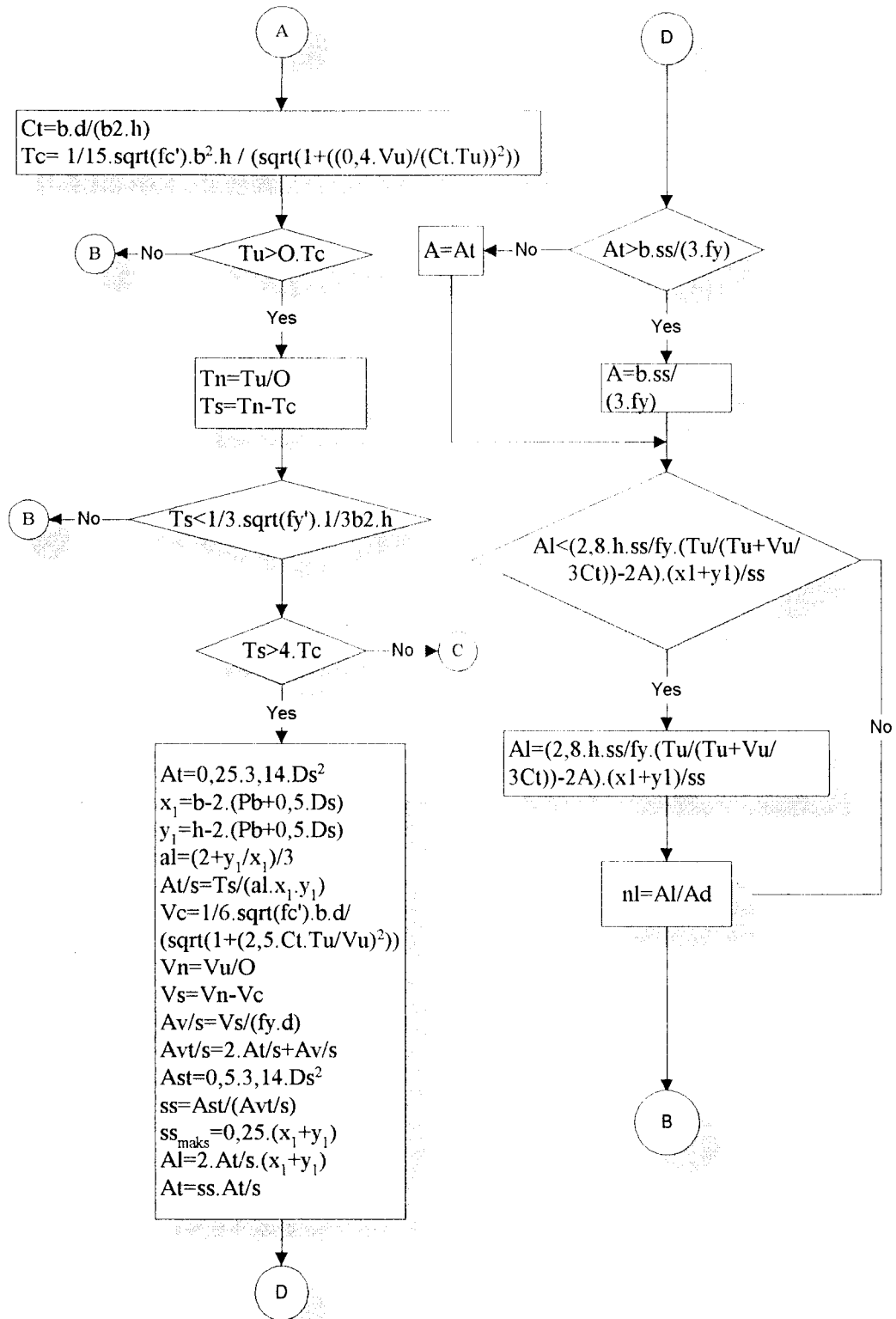
Gambar 3.6 Bagan alir subprogram disain elemen balok



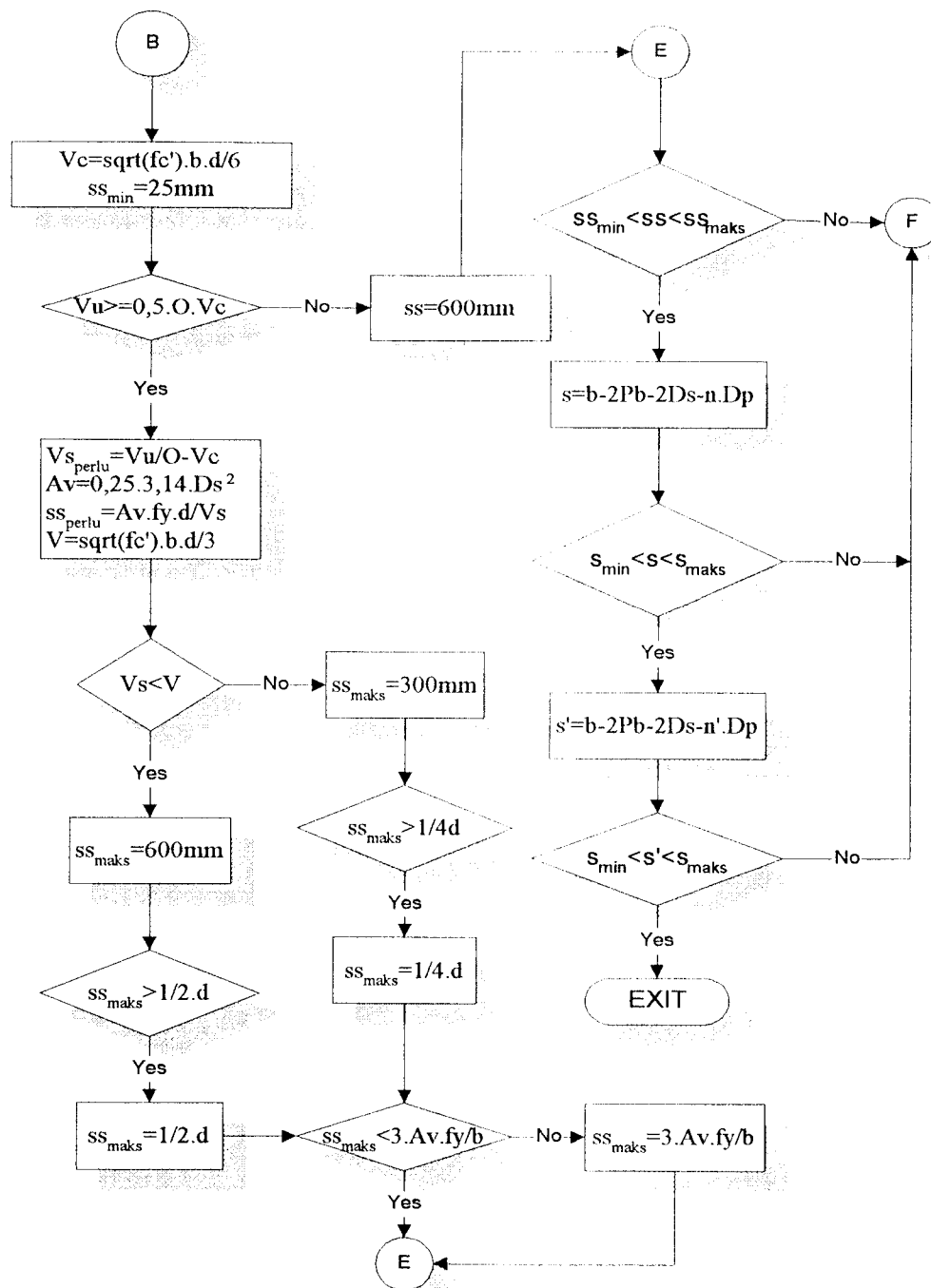
Gambar 3.7 Bagan alir subprogram data elemen



Gambar 3.8 Bagan alir proses disain balok 1



Gambar 3.9 Bagan alir proses disain balok 2 (lanjutan)



Gambar 3.10 Bagan alir proses disain balok 3 (lanjutan)

3.3.2 Listing program

Dengan berdasarkan bagan alir subprogram disain BALOK di atas dibuat program dan subprogram yang terkait dengan perencanaan disain elemen BALOK, baik dalam hal “input” data, proses disain maupun “output” hasil disain. Subprogram disain elemen BALOK tersebut berada pada program utama yang akan dieksekusi bila pilihan disain elemen BALOK diberikan.

Subprogram disain BALOK tersebut akan mengeksekusi subprogram data elemen, subprogram “output” data dan “output” hasil yang juga berada pada program utama.

Dengan subprogram data elemen tersebut dieksekusi program-program sebagai berikut: program DE (“input” data elemen), program DB (“input” data bahan BALOK), program GBL (“input” gaya maksimum yang bekerja pada BALOK), program DDBL (“input” data dimensi BALOK). Bila program-program tersebut telah selesai dieksekusi maka akan kembali pada program utama pada subprogram data elemen dan bila subprogram data elemen sudah selesai dieksekusi maka program akan kembali ke subprogram disain BALOK.

Dengan subprogram “output” data dieksekusi program-program sebagai berikut: program TDBL (“output” data BALOK ke layar) dan program CDBL (“output” data BALOK ke printer). Bila program-program tersebut telah selesai dieksekusi maka akan kembali pada program utama pada subprogram “output” data dan bila subprogram “output” data sudah selesai dieksekusi maka program akan kembali ke subprogram disain BALOK.

Dengan subprogram “output” hasil dieksekusi program-program sebagai berikut: program TBL (“output” hasil disain BALOK ke layar) dan program CBL (“output” hasil disain BALOK ke printer). Bila program-program tersebut telah selesai dieksekusi maka akan kembali pada program utama pada subprogram “output” hasil dan bila subprogram “output” hasil sudah selesai dieksekusi maka program akan kembali ke subprogram disain BALOK.

Program-program yang langsung dapat dieksekusi (tidak melalui subprogram) oleh subprogram disain BALOK adalah program PBL (program proses disain BALOK) dan program sketsa BALOK (program sketsa hasil disain BALOK).

Dan bila subprogram disain BALOK telah selesai dieksekusi maka program kembali ke program utama (menu utama).

Listing program untuk program-program yang berada di bawah kontrol subprogram disain BALOK di atas dapat dilihat pada lampiran 2.

3.4 Program Disain Elemen Kolom

Program disain elemen kolom adalah subprogram pada program utama untuk mengontrol semua program yang berhubungan dengan perencanaan elemen kolom.

3.4.1 Algoritma dan bagan alir program

Dengan mengacu pada langkah-langkah perencanaan kolom dan rumus-rumus pada sub bab 2.1.3 dibuat algoritma dan bagan alir program disain elemen kolom sebagai berikut:

1. Algoritma program disain elemen kolom.

Algoritma atau langkah penyelesaian perencanaan elemen struktur kolom dengan program komputer adalah sebagai:

1. data:

a. data bahan:

- 1) kuat desak beton (f_c'),
- 2) kuat tarik baja tulangan (f_y),
- 3) modulus elastisitas baja tulangan (E_s),
- 4) diameter tulangan baja yang digunakan (D_p dan D_s),

b. data gaya yang bekerja pada kolom:

- 1) gaya aksial/"axial force" (P_u),
- 2) gaya geser/"shear force" (V_u),
- 3) momen (M_u),

c. data dimensi kolom:

- 1) lebar penampang kolom (b),
- 2) tinggi penampang kolom (h),

- 3) diameter penampang kolom (D) untuk kolom berpenampang lingkaran,
 - 4) tinggi elemen kolom (l),
 - 5) penutup beton (Pb),
2. memilih bentuk tulangan pengikat dan bentuk penampang kolom,
 - a. jika tulangan pengikat menggunakan pengikat sengkang, $\Phi = 0,65$,
 - b. jika tulangan pengikat menggunakan pengikat spiral, $\Phi = 0,70$,
 3. memeriksa kelangsingan kolom:

$$K = \frac{kl}{r}$$

jika $K \leq 34 - 12 \cdot \left(\frac{M1}{M2}\right)$ maka efek kelangsingan dapat diabaikan ,

4. bila efek kelangsingan diperhitungkan :

$$C_m = 0,60 + 0,40 \left(\frac{M1}{M2}\right)$$

$$\text{bila } C_m < 0,40 \rightarrow C_m = 0,40$$

$$I_g = \frac{1}{12} \cdot b \cdot h^3 \rightarrow \text{untuk kolom penampang persegi,}$$

$$I_g = \frac{1}{64} \cdot D^4 \rightarrow \text{untuk kolom penampang lingkaran,}$$

$$\beta d = 0,25$$

$$EI = \frac{E_c \cdot I_g}{2,50 \cdot (1 + \beta d)}$$

$$P_c = \frac{\pi^2 \cdot EI}{(kl)^2}$$

$$\delta_b = \frac{C_m}{1 - \frac{P_u}{\Phi P_c}}$$

$$M_c = \delta_b \cdot M_u$$

$$M_u = M_c$$

5. memperkirakan rasio penulangan ρ_g ,

$$6. e = \frac{M_u}{P_u},$$

$$7. A_{s_{perlu}} = A_{s'_{perlu}} = \frac{\rho_g \cdot b \cdot d}{2},$$

8. memilih tulangan yang digunakan dan menghitung $A_{s_{aktual}}$,

9. untuk kolom berpenampang persegi:

$$a. A_g = b \cdot h$$

$$b. \rho = \frac{A_s}{b \cdot d},$$

$$c. c_b = \frac{600}{600 + f_y} \cdot d$$

$$a_b = \beta_1 \cdot c_b$$

$$\epsilon_s' = \frac{c_b - d'}{c_b} \cdot (0,003)$$

$$\epsilon_y = \frac{f_y}{E_s}$$

$$\text{jika } \epsilon_s' < \epsilon_y \rightarrow f_s' = \epsilon_s' \cdot E_s,$$

$$\text{jika } \epsilon_s' \geq \epsilon_y \rightarrow f_s' = f_y,$$

$$d. \Phi P_{nb} = \Phi [0,85 \cdot f_c' \cdot a_b \cdot b + A_s' \cdot f_s' - A_s \cdot f_y]$$

e. memeriksa ΦP_{nb} terhadap P_u ,

1) jika $\Phi P_{nb} > P_u$,

$$m = \frac{f_y}{0,85 \cdot f_c'}$$

$$P_n = 0,85 \cdot f_c' \cdot b \cdot d \left[\frac{h-2e}{2d} + \sqrt{\left(\frac{h-2e}{2d}\right)^2 + 2 \cdot m \cdot \rho \cdot \left(1 - \frac{d'}{d}\right)} \right]$$

2) jika $\Phi P_{nb} \leq P_u$,

$$P_n = \frac{A_s' \cdot f_y}{\frac{e}{(d-d')} + 0,50} + \frac{b \cdot h \cdot f_c'}{\frac{3 \cdot h \cdot e}{d^2} + 1,18}$$

f. memeriksa ΦP_n terhadap P_u ,

jika $\Phi P_n < P_u \rightarrow$ mengulang perencanaan

10. untuk kolom berpenampang lingkaran:

$$A_g = \frac{1}{4} \cdot \pi \cdot D^2$$

$$h_{ek} = 0,80 \cdot D$$

$$b_{ek} = \frac{A_g}{h_{ek}}$$

memilih tulangan yang digunakan ,

$$P_{b_{eff}} = P_b + D_p$$

$$D_s = D - 2 \cdot P_{b_{eff}}$$

$$d' = P_{b_{eff}} + \frac{1}{2} \cdot D_p$$

$$a. \quad c_b = \frac{600}{600 + f_y} \cdot d$$

$$a_b = \beta_1 \cdot c_b$$

$$\epsilon_s' = \frac{c_b - d'}{c_b} \cdot (0,003)$$

$$\epsilon_y = \frac{f_y}{E_s}$$

jika $\epsilon_s' < \epsilon_y \rightarrow f_s' = \epsilon_s' \cdot E_s$,

jika $\epsilon_s' \geq \epsilon_y \rightarrow f_s' = f_y$,

$$b. \quad \Phi P_{nb} = \Phi [0,85 \cdot f_c' \cdot a_b \cdot b_{ek} + A_s' \cdot f_s' - A_s \cdot f_y]$$

c. memeriksa ΦP_{nb} terhadap P_u ,

1) jika $\Phi P_{nb} > P_u$,

$$m = \frac{f_y}{0,85 \cdot f_c'}$$

$$\rho_s = \frac{2 \cdot A_s}{A_g}$$

$$P_n = 0,85 \cdot f_c' \cdot D^2 \cdot \left[\sqrt{\left(\frac{0,85 \cdot e}{D} - 0,38\right)^2 + \frac{f_y \cdot m \cdot D s}{2,50 \cdot D}} - \left(\frac{0,85 \cdot e}{D} - 0,38\right) \right]$$

2) jika $\Phi P_{nb} \leq P_u$,

$$P_n = \frac{A_s \cdot f_y}{\frac{3 \cdot e}{D_s} + 1,0} + \frac{A_g \cdot f_c'}{\frac{9,6 \cdot D \cdot e}{(0,8 \cdot D + 0,67 \cdot D_s)^2} + 1,18}$$

d. memeriksa ΦP_n terhadap P_u ,

jika $\Phi P_n < P_u \rightarrow$ mengulang perencanaan

2. merencanakan tulangan pengikat:

a. memilih diameter tulangan pengikat (d_s),

$$A_s = \frac{1}{4} \cdot \pi \cdot d_s^2$$

1) bila tulangan pengikat berupa pengikat spiral:

untuk penampang lingkaran:

$$D_c = D - 2 \cdot P_b$$

$$A_c = \frac{1}{4} \cdot \pi \cdot D_c^2$$

$$\rho_s = 0,45 \cdot \left[\frac{A_g}{A_c} - 1 \right] \cdot \frac{f_c'}{f_y}$$

$$s = \frac{4 \cdot A_s \cdot (D_c - d_s)}{D_c^2 (\rho_s)}$$

untuk penampang persegi:

$$A_c = (b - 2 \cdot P_b) \cdot (h - 2 \cdot P_b),$$

$$\rho_s = 0,45 \left[\frac{A_g}{A_c} - 1 \right] \frac{f_c'}{f_y},$$

$$s = \frac{A_s \cdot 2 \cdot ((b - 2 \cdot P_b - ds) + (h - 2 \cdot P_b - ds))}{A_c \cdot (\rho_s)}$$

2) bila berupa pengikat sengkang:

$$s = 16 \cdot D_p,$$

$$s = 48 \cdot d_s,$$

untuk penampang lingkaran:

$$\text{bila } h_{ek} \geq b_{ek} \rightarrow s = b_{ek},$$

$$\text{bila } h_{ek} < b_{ek} \rightarrow s = h_{ek},$$

untuk penampang persegi:

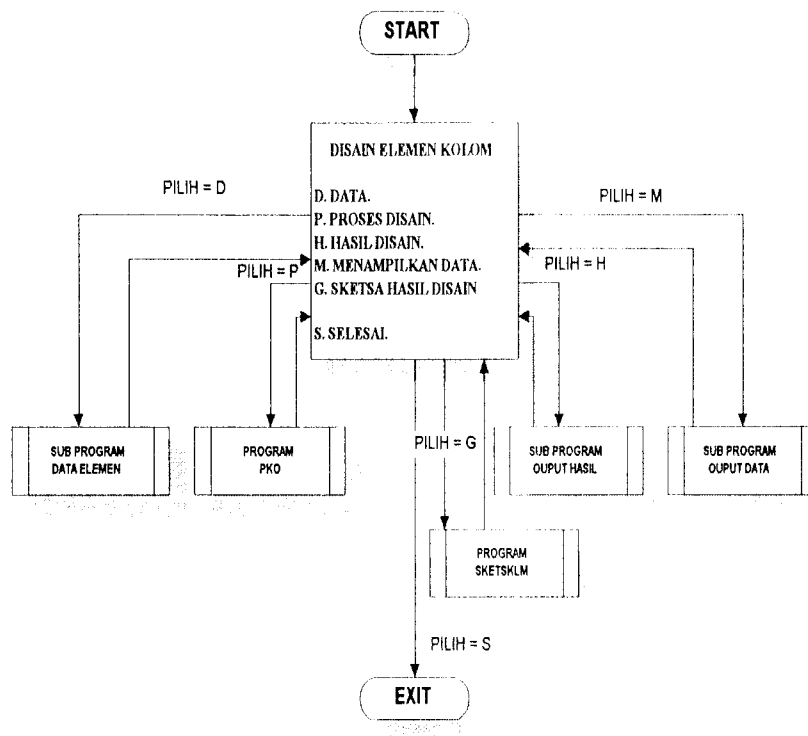
$$\text{bila } h \geq b \rightarrow s = b,$$

$$\text{bila } h < b \rightarrow s = h,$$

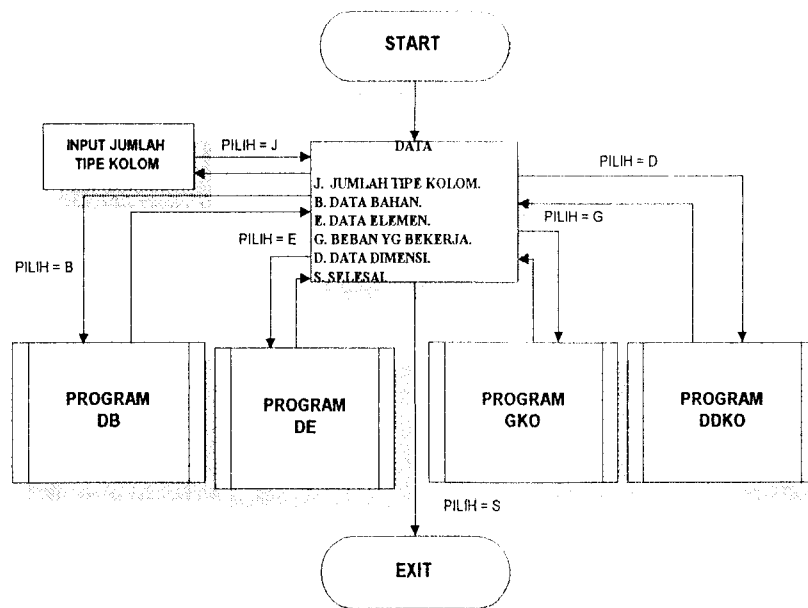
memilih nilai s yang terkecil sebagai jarak spasi sengkang,

2. Bagan alir program disain elemen kolom.

Berdasarkan algoritma program disain elemen kolom, secara umum dibuat bagan alir program disain elemen kolom sebagai berikut:



Gambar 3.11 Bagan alir subprogram disain elemen kolom



Gambar 3.12 Bagan alir subprogram data elemen

3.4.2 Listing program

Dengan berdasarkan bagan alir subprogram disain kolom di atas dibuat program dan subprogram yang terkait dengan perencanaan disain elemen kolom, baik dalam hal “input” data, proses disain maupun “output” hasil disain. Subprogram disain elemen kolom tersebut berada pada program utama yang akan dieksekusi bila pilihan disain elemen kolom diberikan.

Subprogram disain kolom tersebut akan mengeksekusi subprogram data elemen, subprogram “output” data dan “output” hasil yang juga berada pada program utama.

Dengan subprogram data elemen tersebut dieksekusi program-program sebagai berikut: program DE (“input” data elemen), program DB (“input” data bahan kolom), program GKO (“input” gaya maksimum yang bekerja pada kolom), program DDKO (“input” data dimensi kolom). Bila program-program tersebut telah selesai dieksekusi maka akan kembali pada program utama pada subprogram data elemen dan bila subprogram data elemen sudah selesai dieksekusi maka program akan kembali ke subprogram disain kolom.

Dengan subprogram “output” data dieksekusi program-program sebagai berikut: program TDKO (“output” data kolom ke layar) dan program CDKO (“output” data kolom ke printer). Bila program-program tersebut telah selesai dieksekusi maka akan kembali pada program utama pada subprogram “output” data dan bila subprogram “output” data sudah selesai dieksekusi maka program akan kembali ke subprogram disain kolom.

Dengan subprogram “output” hasil dieksekusi program-program sebagai berikut: program TKO (“output” hasil disain kolom ke layar) dan program CKO (“output” hasil disain kolom ke printer). Bila program-program tersebut telah selesai dieksekusi maka akan kembali pada program utama pada subprogram “output” hasil dan bila subprogram “output” hasil sudah selesai dieksekusi maka program akan kembali ke subprogram disain kolom.

Program-program yang langsung dapat dieksekusi (tidak melalui subprogram) oleh subprogram disain kolom adalah program PKO (program proses disain kolom) dan program sketsa kolom (program sketsa hasil disain kolom).

Dan bila subprogram disain kolom telah selesai dieksekusi maka program kembali ke program utama (menu utama).

Listing program untuk program-program yang berada di bawah kontrol subprogram disain kolom di atas dapat dilihat pada lampiran 3.

3.5 Program Disain Elemen Fondasi

Program disain elemen fondasi adalah subprogram pada program utama untuk mengontrol semua program yang berhubungan dengan perencanaan elemen fondasi.

3.5.1 Algoritma dan bagan alir program

Dengan mengacu pada langkah-langkah perencanaan fondasi dan rumus-rumus pada sub bab 2.1.3 dibuat algoritma dan bagan alir program disain elemen fondasi sebagai berikut:

1. Algoritma program disain elemen fondasi.

Algoritma atau langkah penyelesaian perencanaan elemen struktur fondasi dengan program komputer adalah sebagai berikut:

1. data:

a. data bahan:

- 1) kuat desak beton fondasi (fc'_p),
- 2) kuat desak beton kolom (fc'_k),
- 3) tegangan izin tanah (\bar{q}),
- 4) perkiraan tegangan rata-rata tanah dan beton (q_r),

b. data beban yang bekerja pada fondasi:

- 1) reaksi tumpuan vertikal (P_u),

c. data dimensi fondasi dan kolom di atasnya:

- 1) kedalaman fondasi (df),
- 2) lebar fondasi (b),
- 3) tebal plat kaki (t),

- 4) selimut beton fondasi (P_b),
- 5) diameter tulangan pokok fondasi (D_p),
- 6) lebar penampang kolom (b_k),
- 7) tinggi penampang kolom (h_k),
- 8) diameter tulangan pokok kolom (D_{pk}),

$$A_d = \frac{1}{4} \cdot \pi \cdot D_p^2$$

$$A_k = b_k \cdot h_k$$

$$q_1 = q_r \cdot df$$

$$q_t = \bar{q} - q_1$$

$$A_{\text{perlu}} = \frac{P_u}{q_t}$$

$$l_{\text{perlu}} = \frac{A_{\text{perlu}}}{b}, \text{ tentukan } l \text{ yang digunakan,}$$

$$A_p = b \cdot l$$

$$p_u = \frac{P_u}{A_p}$$

$$d = t - P_b - D_p$$

$$\Phi = 0,60$$

2. menentukan arah kerja,

a. arah kerja dua arah:

$$B = b_k + 2 \cdot (\frac{1}{2} \cdot d)$$

$$V_u = p_u \cdot (A_p - B^2)$$

$$\beta_c = \frac{l_k}{b_k}$$

$$b_0 = 4 \cdot B$$

$$V_{c1} = (1 + \frac{2}{\beta_c}) (2 \sqrt{f'_{cp}}) b_0 \cdot d$$

$$V_{c2} = (4 \sqrt{f'_{cp}}) b_0 \cdot d$$

$$\text{bila } V_{c1} > V_{c2} \rightarrow V_c = V_{c2},$$

$$\text{bila } V_{c1} \leq V_{c2} \rightarrow V_c = V_{c1},$$

$$\Phi V_n = \Phi V_c$$

memeriksa ΦV_n terhadap V_u ,

bila $\Phi V_n < V_u \rightarrow$ mengulang perencanaan,

b. arah kerja satu arah:

$$G = \frac{(l - b_k)}{2} - d$$

$$V_u = p_u \cdot b \cdot G$$

$$V_c = (\frac{1}{6} \sqrt{f'_{cp}}) b \cdot d$$

$$\Phi V_n = \Phi V_c$$

memeriksa ΦV_n terhadap V_u ,

bila $\Phi V_n < V_u \rightarrow$ mengulang perencanaan,

$$q = 2,3 \cdot t + 15,7 \cdot (df - t)$$

memeriksa q terhadap q_1 ,

bila $q > q_1 \rightarrow$ mengulang perhitungan,

3. arah memanjang:

$$F = \frac{(b - b_k)}{2}$$

$$M_u = p_u \cdot F \cdot (\frac{1}{2} F) \cdot l$$

$$k = \frac{M_u}{\phi l d^2}$$

$$\rho = \frac{f_c' \cdot p - \sqrt{f_c'^2 - 2,36 \cdot k \cdot f_c' \cdot p}}{1,18 \cdot f_y}$$

memeriksa ρ terhadap ρ_{\min} dan ρ_{\max} ,

$$\rho_b = \frac{(0,85 \cdot f_c' \cdot \beta_1)}{f_y} \frac{600}{600 + f_y}$$

$$\rho_{\max} = 0,75 \cdot \rho_b$$

$$\rho_{\min} = \frac{1,4}{f_y}$$

bila $\rho > \rho_{\max} \rightarrow$ tebal plat kaki (t) diperbesar,

bila $\rho < \rho_{\min} \rightarrow \rho = \rho_{\min}$,

$$A_s = \rho l d$$

menentukan $A_{s_{\text{aktual}}}$,

$$s = \frac{A_d \cdot l}{A_{s_{\text{aktual}}}}$$

$$j b_1 = \frac{l}{s}$$

$$\beta = \frac{l}{b}$$

$$z = \frac{2}{\beta + 1}$$

$$j b = z \cdot j b_1$$

jb buah tulangan dipasang merata dalam rentang b, sisanya dipasang di bagian luar dari rentang,

4. arah lebar:

$$F = \frac{(l - h_k)}{2}$$

$$M_u = p_u \cdot F \cdot (\frac{1}{2} F) \cdot b$$

$$k = \frac{M_u}{\Phi b d^2}$$

$$\rho = \frac{f_c' \cdot p - \sqrt{f_c'^2 - 2,36 \cdot k \cdot f_c' \cdot p}}{1,18 \cdot f_y}$$

memeriksa ρ terhadap ρ_{\min} dan ρ_{\max} ,

$$\rho_b = \frac{(0,85 \cdot f_c' \cdot \beta_1)}{f_y} \cdot \frac{600}{600 + f_y}$$

$$\rho_{\max} = 0,75 \cdot \rho_b$$

$$\rho_{\min} = \frac{1,4}{f_y}$$

bila $\rho > \rho_{\max} \rightarrow$ tebal plat kaki (t) diperbesar,

bila $\rho < \rho_{\min} \rightarrow \rho = \rho_{\min}$,

$$A_s = \rho b d$$

menentukan $A_{s_{\text{aktual}}}$,

$$s = \frac{A_d \cdot b}{A_{s_{\text{aktual}}}}$$

tulangan dipasang merata pada arah lebar,

$$j = \sqrt{\frac{A_p}{A_k}}, \text{ jika } j > 2 \text{ maka } j = 2,$$

$$\Phi = 0,70$$

$$P_{t_p} = \Phi(0,85 \cdot f_{c'_p} \cdot A_k) \cdot (j)$$

$$P_{t_k} = \Phi(0,85 \cdot f_{c'_k} \cdot A_k)$$

memeriksa P_{t_k} terhadap P_{t_p} dan P_u ,

bila $P_{t_k} > P_{t_p}$ maka perhitungan diulang ,

bila $P_{t_k} < P_u$ maka perhitungan diulang ,

5. menghitung penulangan pasak (“dowel”):

$$A_{sd_{perlu}} = 0,005 \cdot A_k$$

memilih diameter batang tulangan pasak (D_d) = D_{p_k} ,

$$A_s = \frac{1}{4} \cdot \pi \cdot D_d^2$$

$j_n = \frac{A_{sd_{perlu}}}{A_s}$, tentukan jumlah tulangan pasak (j_n) yang digunakan,

$$A_{sd_{tersedia}} = j_n \cdot A_s$$

$$l_{db} = \frac{D_d \cdot f_y}{4\sqrt{f_{c'}}$$

$$l_{db_{min}} = 0,004 \cdot D_d \cdot f_y$$

$$l_{d_{min}} = 200 \text{ mm}$$

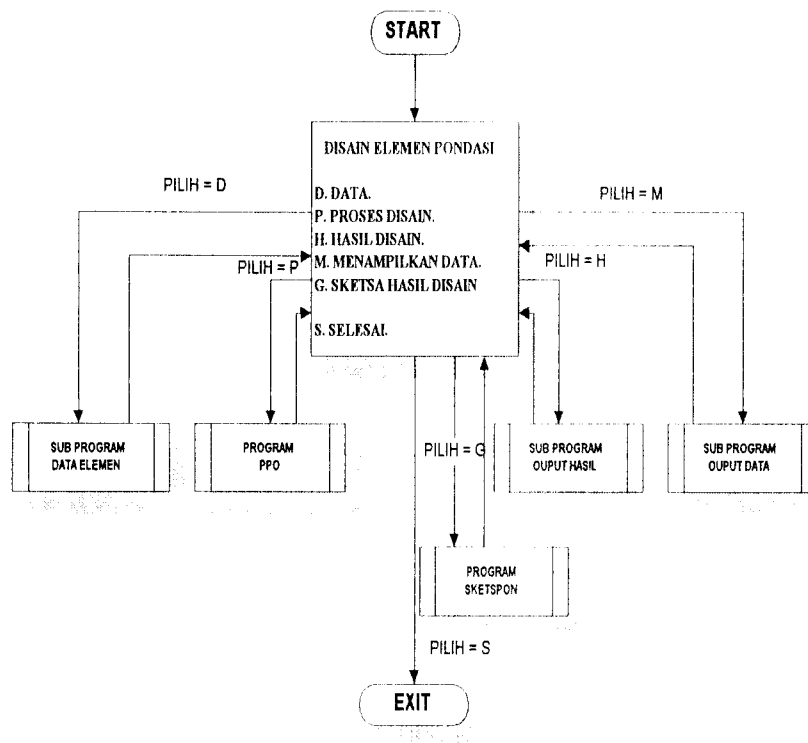
bila $l_d < l_{d_{min}} \rightarrow l_d = l_{d_{min}}$,

$$n = \frac{A_{sd_{perlu}}}{A_{sd_{tersedia}}}$$

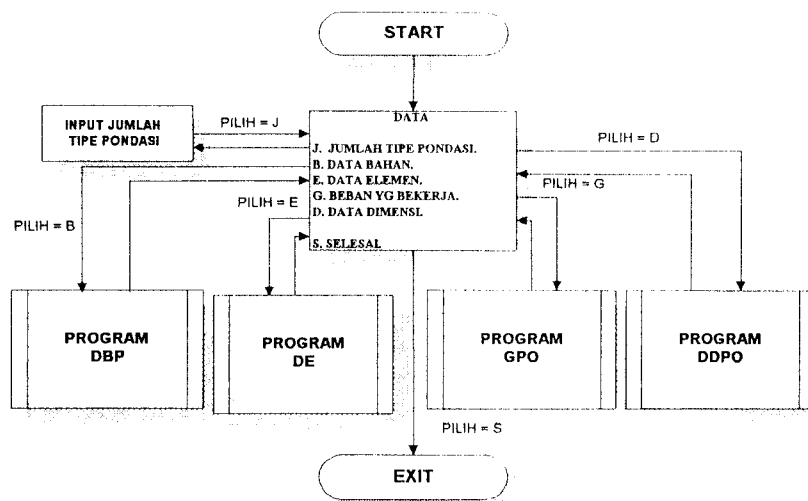
$$l_d = l_{db} \cdot n$$

2. Bagan alir program disain elemen fondasi.

Berdasarkan algoritma program disain elemen fondasi, secara umum dibuat bagan alir program disain elemen fondasi sebagai berikut:



Gambar 3.13 Bagan alir subprogram disain elemen fondasi



Gambar 3.14 Bagan alir subprogram data elemen

3.5.2 Listing Program

Dengan berdasarkan bagan alir subprogram disain fondasi di atas dibuat program dan subprogram yang terkait dengan perencanaan disain elemen fondasi, baik dalam hal “input” data, proses disain maupun “output” hasil disain. Subprogram disain elemen fondasi tersebut berada pada program utama yang akan dieksekusi bila pilihan disain elemen fondasi diberikan.

Subprogram disain fondasi tersebut akan mengeksekusi subprogram data elemen, subprogram “output” data dan “output” hasil yang juga berada pada program utama.

Dengan subprogram data elemen tersebut dieksekusi program-program sebagai berikut: program DE (“input” data elemen), program DBP (“input” data bahan fondasi), program GPO (“input” gaya maksimum yang bekerja pada fondasi), program DDPO (“input” data dimensi fondasi). Bila program-program tersebut telah selesai dieksekusi maka akan kembali pada program utama pada subprogram data elemen dan bila subprogram data elemen sudah selesai dieksekusi maka program akan kembali ke subprogram disain fondasi.

Dengan subprogram “output” data dieksekusi program-program sebagai berikut: program TDPO (“output” data fondasi ke layar) dan program CDPO (“output” data fondasi ke printer). Bila program-program tersebut telah selesai dieksekusi maka akan kembali pada program utama pada subprogram “output” data dan bila subprogram “output” data sudah selesai dieksekusi maka program akan kembali ke subprogram disain fondasi.

Dengan subprogram “output” hasil dieksekusi program-program sebagai berikut: program TPO (“output” hasil disain fondasi ke layar) dan program CPO (“output” hasil disain fondasi ke printer). Bila program-program tersebut telah selesai dieksekusi maka akan kembali pada program utama pada subprogram “output” hasil dan bila subprogram “output” hasil sudah selesai dieksekusi maka program akan kembali ke subprogram disain fondasi.

Program-program yang langsung dapat dieksekusi (tidak melalui subprogram) oleh subprogram disain fondasi adalah program PPO (program proses disain fondasi) dan program sketsa fondasi (program sketsa hasil disain fondasi).

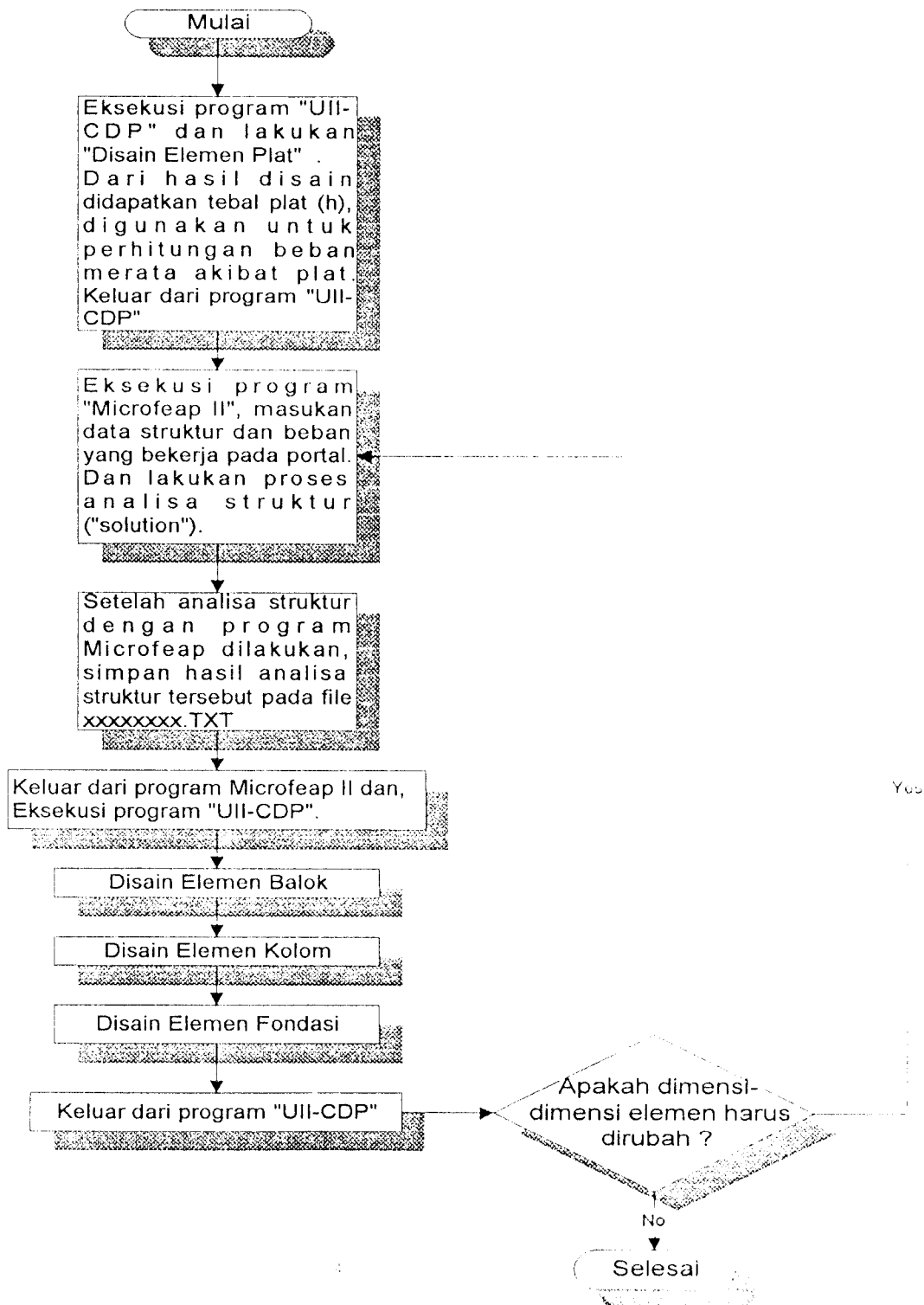
Dan bila subprogram disain fondasi telah selesai dieksekusi maka program kembali ke program utama (menu utama).

Listing program untuk program-program yang berada di bawah kontrol subprogram disain fondasi di atas dapat dilihat pada lampiran 4.

BAB IV

EKSEKUSI PROGRAM

Perencanaan elemen struktur beton menggunakan program Disain Elemen Struktur Beton dengan data “input” dari keluaran program Microfeap sebagai langkah awal adalah mendisain elemen plat dengan program UII-CDP, sehingga didapat tebal plat (h) yang akan digunakan untuk perhitungan beban merata akibat plat pada portal. Kemudian dilakukan asumsi dimensi dan material properti elemen-elemen struktur portal, identifikasi nomor titik nodal dan elemen (batang) struktur portal, dimasukkan data tersebut pada program Microfeap dan dilakukan analisa struktur dengan program Microfeap. Selanjutnya hasil program ini disimpan pada file dengan ekstensi TXT. Langkah berikutnya adalah mendisain elemen balok, kolom dan fondasi dengan program UII-CDP. Apabila saat mendisain elemen-elemen tersebut asumsi dimensi elemen struktur salah (dimensi harus diperbesar), maka perencanaan diulang kembali dimulai pada asumsi dimensi karena dengan berubahnya dimensi gaya-gaya yang bekerja pada elemen struktur juga berubah, karena itu material propertinya harus disesuaikan kembali. Apabila asumsi dimensi sudah benar, maka perencanaan tersebut telah selesai dilakukan. Untuk lebih jelasnya dapat dilihat pada skema kerja eksekusi program (gambar 4.1).



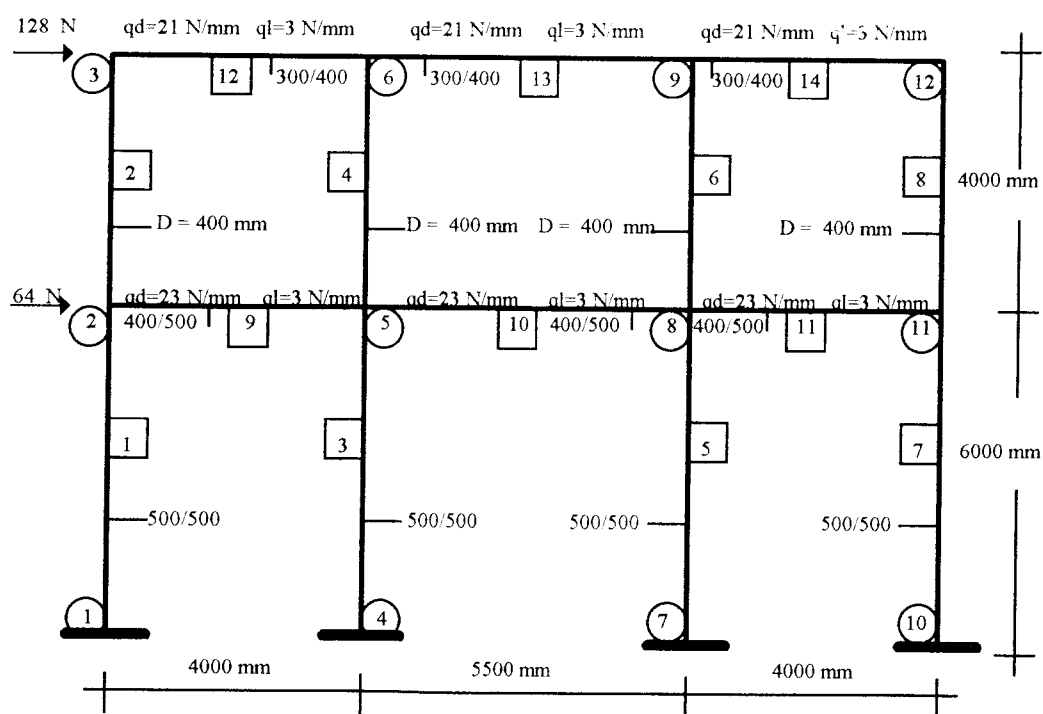
Gambar 4.1 Skema kerja eksekusi program

4.1 Penggunaan Program Microfeap II (P1-Module)

Menggunakan program Microfeap II (P1-Module) untuk analisis struktur diperlukan dimensi penampang rencana tiap elemen struktur dan beban-beban yang bekerja pada elemen ataupun titik nodal. Sebagai contoh seperti pada struktur portal gambar 4.2. Satuan gaya dan panjang harus konsisten yaitu N dan mm, karena program disain elemen struktur beton yang dibuat menggunakan satuan (SI).

4.1.1 Data Struktur

Penggunaan program Microfeap II (P1-Module) pada disain elemen struktur portal beton dengan data struktur seperti pada gambar 4.2, “Output” data strukturnya secara rinci dapat dilihat pada lampiran 5



Gambar 4.2 Struktur portal beton

$$E_c = 4700\sqrt{f_{c'}} = 4700\sqrt{30} = 25742 \text{ MPa.}$$

$$E_s = 2,1 \times 10^5 \text{ MPa.}$$

4.1.2 Keluaran/hasil program

Keluaran atau hasil program Microfeap II berupa hasil perhitungan analisis struktur yaitu seperti berikut ini:

1. Elemen balok.

Momen maksimum elemen balok lantai pada batang no.9 yaitu:

$$\text{Momen tumpuan} = -64924000 \text{ Nmm.}$$

$$\text{Momen lapangan} = 41966000 \text{ Nmm.}$$

Momen maksimum elemen balok atap pada batang no.12 yaitu.

$$\text{Momen tumpuan} = -59975000 \text{ Nmm.}$$

$$\text{Momen lapangan} = 41542000 \text{ Nmm.}$$

Gaya geser maksimum elemen balok lantai pada batang no 9 yaitu

$$\text{Gaya geser (Vu)} = 74674 \text{ N.}$$

Gaya geser maksimum elemen balok atap pada batang no.12 yaitu.

$$\text{Gaya geser (Vu)} = 69833 \text{ N.}$$

2. Elemen Kolom.

Momen-momen ujung maksimum elemen kolom lantai dasar pada batang no.1 yaitu:

$$M1 = 2,2 \times 10^7 \text{ Nmm.}$$

$$M2 = -1,0 \text{ Nmm.}$$

Momen-momen ujung maksimum elemen kolom lantai I pada batang no 8 yaitu

$$M1 = 3,8 \times 10^7 \text{ Nmm.}$$

$$M2 = -2,7 \times 10^7 \text{ Nmm.}$$

Gaya geser maksimum elemen kolom lantai dasar pada batang no 7 yaitu

$$Vu = 3,7 \times 10^3 \text{ Nmm.}$$

Gaya geser maksimum elemen kolom lantai I pada batang no 8 yaitu

$$Vu = 1,6 \times 10^4 \text{ Nmm.}$$

Gaya aksial maksimum elemen kolom lantai dasar pada batang no.5 yaitu

$$Pu = 2,4 \times 10^5 \text{ Nmm.}$$

Gaya aksial maksimum elemen kolom lantai I pada batang no.6 yaitu:

$$Pu = 1,2 \times 10^5 \text{ Nmm.}$$

Untuk disain elemen fondasi gaya aksial elemen kolom yaitu:

$$\text{batang no.7 } Pu = 1,3 \times 10^5 \text{ Nmm.}$$

$$\text{batang no.5 } Pu = 2,4 \times 10^5 \text{ Nmm.}$$

Hasil keluaran program Microfeap II berupa hasil perhitungan analisis struktur itu dengan lengkap dapat dilihat pada lampiran 6.

4.2 Penggunaan Program Disain Elemen Struktur Beton

“Output” hasil keluaran program Microfeap II pada lampiran 6 selain didokumentasikan ke printer juga didokumentasikan ke file teks dengan nama xxxxxxxx.TXT yang akan berfungsi sebagai file data “inputing” program disain elemen struktur beton. Penjelasan tentang cara penggunaan menu-menu pada program disain elemen struktur beton dengan “inputing” data Microfeap ini secara garis besar dapat dilihat pada lampiran 7.

4.2.1 Data masukan

Data masukan untuk program disain elemen struktur beton dengan “inputing” data Microfeap adalah data yang dibutuhkan untuk proses disain masing-masing elemen struktur beton yang telah di-“input”-kan. Untuk contoh struktur portal gambar 4.2 di atas “output” datanya dapat dilihat pada lampiran 8.

4.2.2 Keluaran/hasil program

Keluaran program disain elemen struktur beton adalah hasil disain penulangan elemen struktur beton untuk masing-masing tipe elemen. “Output” hasil disain untuk struktur portal gambar 4.2 di atas dapat dilihat pada lampiran 9.

4.3 Perbandingan Hasil Disain Dengan Perhitungan Manual

Sebagai perbandingan antara perhitungan manual dengan hasil program disain elemen struktur beton dengan “inputing” data Microfeap dilakukan perhitungan manual dengan mengambil gaya-gaya maksimum keluaran program Microfeap yang bekerja pada masing-masing elemen struktur beton dengan tipe yang sama

4.3.1 Disain elemen plat

Perhitungan manual disain elemen plat mengacu pada langkah-langkah dan rumus-rumus perencanaan plat pada sub bab 2.1.1 di atas, dan untuk perhitungan manual disain elemen plat ini diambil plat tipe 2.

Plat Tipe 2:

Data perencanaan:

$$B = 4000 \text{ mm. } L = 5500 \text{ mm. } P_b = 40 \text{ mm. } H = 110 \text{ mm.}$$

$$M_{lx} = 1,7 \cdot 10^5 \text{ Nmm. } M_{ly} = 1,2 \cdot 10^5 \text{ Nmm. } M_{tx} = -1,71 \cdot 10^5 \text{ Nmm}$$

$$M_{ty} = -1,23 \cdot 10^5 \text{ Nmm.}$$

Plat merupakan plat dua arah.

$$\Phi = 0,8. \beta = 0,85. f_c' = 30 \text{ MPa. } F_y = 300 \text{ MPa.}$$

$$\rho_b = \frac{0,85 \cdot f_c' \cdot \beta_1}{F_y} \cdot \frac{600}{600 + F_y} = \frac{0,85 \cdot 30 \cdot 0,85}{300} \cdot \frac{600}{600 + 300}$$

$$= 0,048$$

$$\rho_{maks} = 0,75 \cdot \rho_b = 0,75 \cdot 0,048 = 0,036$$

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

$$s_{maks} = 5 \cdot H = 5 \cdot 110 = 550 \text{ mm.}$$

$$s_{maks} = 500 \text{ mm.}$$

$$\text{digunakan } s_{maks} = 500 \text{ mm.}$$

$$s_{min} = 100 \text{ mm.}$$

$$F_y = 300 \text{ MPa} \longrightarrow A_{ss} = 0,0020 \cdot b \cdot h = 0,0020 \cdot 1000 \cdot 110 = 220 \text{ mm}^2$$

Penulangan daerah lapangan arah(x) melebar:

$$D_p = 16 \text{ mm. } D = H - P_b - 0,5 \cdot D_p = 110 - 40 - 0,5 \cdot 16 = 62 \text{ mm.}$$

$$k = \frac{M/x}{\Phi \cdot 1000 \cdot D^2} = \frac{1,7 \cdot 10^5}{0,8 \cdot 1000 \cdot 62^2} = 0,055$$

$$\rho = \frac{f_c' - \sqrt{f_c'^2 - 2,36 \cdot k \cdot f_c'}}{1,18 \cdot F_y} = \frac{30 - \sqrt{30^2 - 2,36 \cdot 0,055 \cdot 30}}{1,18 \cdot 300}$$

$$= 0,00018 < \rho_{min} = 0,0035$$

$$\text{digunakan } \rho = 0,0035$$

$$A_s = \rho \cdot 1000 \cdot D = 0,0035 \cdot 1000 \cdot 62$$

$$= 217 \text{ mm}^2 < A_{ss} = 220 \text{ mm}^2 \rightarrow A_s = 220 \text{ mm}^2$$

$$AD = 0,25 \cdot \pi \cdot D_p^2 = 0,25 \cdot 3,14 \cdot 16^2 = 200,96 \text{ mm}^2.$$

$$s = \frac{AD \cdot 1000}{A_s} = \frac{200,96 \cdot 1000}{220} = 913 \text{ mm} > s_{maks} = 500 \text{ mm}$$

$$\text{digunakan } s = 500 \text{ mm, dipakai sengkang } D16 - 500 \text{ mm}$$

Penulangan daerah lapangan arah(y) memanjang:

$$D_p = 16 \text{ mm. } D = H - P_b - D_{px} - 0,5 \cdot D_p = 110 - 40 - 16 - 0,5 \cdot 16 = 46 \text{ mm.}$$

$$k = \frac{Mly}{\Phi \cdot 1000 \cdot D^2} = \frac{1,2 \cdot 10^5}{0,8 \cdot 1000 \cdot 46^2} = 0,071$$

$$\rho = \frac{f_c' - \sqrt{f_c'^2 - 2,36 \cdot k \cdot f_c'}}{1,18 \cdot f_y} = \frac{30 - \sqrt{30^2 - 2,36 \cdot 0,071 \cdot 30}}{1,18 \cdot 300}$$

$$= 0,00024 < \rho_{\min} = 0,0035$$

$$\text{digunakan } \rho = 0,0035$$

$$A_s = \rho \cdot 1000 \cdot D = 0,0035 \cdot 1000 \cdot 46$$

$$= 161 \text{ mm}^2 < A_{ss} = 220 \text{ mm}^2$$

$$\text{digunakan } A_s = 220 \text{ mm}^2.$$

$$AD = 0,25 \cdot \pi \cdot D_p^2 = 0,25 \cdot 3,14 \cdot 16^2 = 200,96 \text{ mm}^2.$$

$$s = \frac{AD \cdot 1000}{A_s} = \frac{200,96 \cdot 1000}{220} = 913 \text{ mm} > s_{\max} = 500 \text{ mm}$$

$$\text{digunakan } s = 500 \text{ mm, dipakai sengkang } D16 - 500 \text{ mm.}$$

Penulangan daerah tumpuan arah(x) melebar:

$$D_p = 16 \text{ mm. } D = H - P_b - 0,5 \cdot D_p = 110 - 40 - 0,5 \cdot 16 = 62 \text{ mm.}$$

$$k = \frac{Mtx}{\Phi \cdot 1000 \cdot D^2} = \frac{1,71 \cdot 10^5}{0,8 \cdot 1000 \cdot 62^2} = 0,056$$

$$\rho = \frac{f_c' - \sqrt{f_c'^2 - 2,36 \cdot k \cdot f_c'}}{1,18 \cdot f_y} = \frac{30 - \sqrt{30^2 - 2,36 \cdot 0,056 \cdot 30}}{1,18 \cdot 300}$$

$$= 0,00019 < \rho_{\min} = 0,0035$$

$$\text{digunakan } \rho = 0,0035$$

$$A_s = \rho \cdot 1000 \cdot D = 0,0035 \cdot 1000 \cdot 82$$

$$= 217 \text{ mm}^2 < A_{ss} = 220 \text{ mm}^2 \rightarrow A_s = 220 \text{ mm}^2$$

$$AD = 0,25 \cdot \pi \cdot Dp^2 = 0,25 \cdot 3,14 \cdot 16^2 = 200,96 \text{ mm}^2$$

$$s = \frac{AD \cdot 1000}{As} = \frac{200,96 \cdot 1000}{220} = 913 \text{ mm} > s_{maks} = 500 \text{ mm}$$

digunakan $s = 500 \text{ mm}$, dipakai sengkang D16 – 500 mm

Penulangan daerah tumpuan arah(y) memanjang:

$$Dp = 16 \text{ mm}. D = H - Pb - 0,5 \cdot Dp = 110 - 40 - 0,5 \cdot 16 = 62 \text{ mm}$$

$$k = \frac{M_{ly}}{\Phi \cdot 1000 \cdot D^2} = \frac{1,23 \cdot 10^5}{0,8 \cdot 1000 \cdot 62^2} = 0,040$$

$$\rho = \frac{fc' - \sqrt{fc'^2 - 2,36 \cdot k \cdot fc'}}{1,18 \cdot Fy} = \frac{30 - \sqrt{30^2 - 2,36 \cdot 0,040 \cdot 30}}{1,18 \cdot 300}$$

$$= 0,00013 < \rho_{min} = 0,0035$$

digunakan $\rho = 0,0035$

$$As = \rho \cdot 1000 \cdot D = 0,0035 \cdot 1000 \cdot 62$$

$$= 217 \text{ mm}^2 < Ass = 220 \text{ mm}^2 \rightarrow As = 220 \text{ mm}^2$$

$$AD = 0,25 \cdot \pi \cdot Dp^2 = 0,25 \cdot 3,14 \cdot 16^2 = 200,96 \text{ mm}^2$$

$$s = \frac{AD \cdot 1000}{As} = \frac{200,96 \cdot 1000}{220} = 913 \text{ mm} > s_{maks} = 500 \text{ mm}$$

digunakan $s = 500 \text{ mm}$, dipakai sengkang D16 – 500 mm

Perhitungan tulangan susut:

$$Ds = 10 \text{ mm}. AD = 0,25 \cdot \pi \cdot Ds^2 = 0,25 \cdot 3,14 \cdot 10^2 = 78,5 \text{ mm}^2$$

$$s = \frac{AD \cdot 1000}{Ass} = \frac{78,5 \cdot 1000}{220} = 356,8 \text{ mm} \approx 350 \text{ mm}$$

digunakan D10 – 350 mm.

4.3.2 Disain elemen balok

Perhitungan manual disain elemen balok mengacu pada langkah-langkah dan rumus-rumus perencanaan balok pada sub bab 2.1.2 di atas, dan untuk perhitungan manual disain elemen balok ini diambil balok tipe 1.

Balok Tipe 1 (balok atap):

Data perencanaan:

$$f_c' = 30 \text{ MPa. } F_y = 300 \text{ MPa. } E_s = 200000 \text{ MPa. } D_{p_{maks}} = 18 \text{ mm.}$$

$$D_{smaks} = 10 \text{ mm. } L = 5500 \text{ mm. } B = 300 \text{ mm. } H = 400 \text{ mm}$$

$$M^+ = 4,15 \cdot 10^7 \text{ Nmm. } M^- = 6,0 \cdot 10^7 \text{ Nmm. } V_u = 69830 \text{ N.}$$

$$T_u = 2 \cdot 10^7 \text{ Nmm. } \Phi = 0,8. \beta_1 = 0,85.$$

$$D = H - P_b - 0,5 \cdot D_{p_{maks}} - D_{s_{maks}} = 400 - 50 - 0,5 \cdot 18 - 10 = 331 \text{ mm}$$

$$\rho_b = \frac{0,85 \cdot f_c' \cdot \beta_1}{F_y} \cdot \frac{600}{600 + F_y} = \frac{0,85 \cdot 30 \cdot 0,85}{300} \cdot \frac{600}{600 + 300}$$

$$= 0,048$$

$$\rho_{maks} = 0,75 \cdot \rho_b = 0,75 \cdot 0,048 = 0,036$$

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

$$\omega = \rho_{maks} \cdot \frac{F_y}{f_c'} = 0,036 \cdot \frac{300}{30} = 0,36$$

$$k_{maks} = f_c' \cdot \omega \cdot [1 - 0,59 \cdot \omega] = 30 \cdot 0,36 \cdot [1 - 0,59 \cdot 0,36] = 8,5$$

$$MR_{maks} = \Phi \cdot B \cdot D^2 \cdot k_{maks} = 0,8 \cdot 300 \cdot 331^2 \cdot 8,5 = 223504440 \text{ Nmm.}$$

Penulangan daerah lapangan:

$$D_p = 12 \text{ mm. } MR_{maks} = 223504440 \text{ Nmm} > M^+ = 4,15 \cdot 10^7 \text{ Nmm}$$

Balok bertulangan tarik saja....!

$$k = \frac{M^+}{\Phi \cdot B \cdot D^2} = \frac{4,15 \cdot 10^7}{0,8 \cdot 300 \cdot 331^2} = 1,56$$

$$\rho = \frac{fc' - \sqrt{fc'^2 - 2,36 \cdot k \cdot fc'}}{1,18 \cdot fy} = \frac{30 - \sqrt{30^2 - 2,36 \cdot 1,56 \cdot 30}}{1,18 \cdot 300}$$

$$= 0,0054 > \rho_{\min} = 0,0035 \text{ dan } < \rho_{\max} = 0,036 \dots \text{ok.}$$

digunakan $\rho = 0,0054$

$$As = \rho \cdot B \cdot D = 0,0054 \cdot 300 \cdot 331$$

$$= 536,22 \text{ mm}^2.$$

$$AD = 0,25 \cdot \pi \cdot Dp^2 = 0,25 \cdot 3,14 \cdot 12^2 = 113,04 \text{ mm}^2.$$

$$n = \frac{As}{AD} = \frac{536,22}{113,04} = 4,7 \text{ buah} \approx 5 \text{ buah.}$$

digunakan $n = 5$ buah, dipakai 5D12

Penulangan daerah tumpuan:

$$Dp=12 \text{ mm. } MR_{\max} = 223504440 \text{ Nmm} > M^- = 6 \cdot 10^7 \text{ Nmm}$$

Balok bertulangan tarik saja....!

$$k = \frac{M^+}{\Phi \cdot B \cdot D^2} = \frac{6 \cdot 10^7}{0,8 \cdot 300 \cdot 331^2} = 2,28$$

$$\rho = \frac{fc' - \sqrt{fc'^2 - 2,36 \cdot k \cdot fc'}}{1,18 \cdot fy} = \frac{30 - \sqrt{30^2 - 2,36 \cdot 2,28 \cdot 30}}{1,18 \cdot 300}$$

$$= 0,0079 > \rho_{\min} = 0,0035 \text{ dan } < \rho_{\max} = 0,036 \dots \text{ok.}$$

digunakan $\rho = 0,0079$

$$As = \rho \cdot B \cdot D = 0,0079 \cdot 300 \cdot 331$$

$$= 784,47 \text{ mm}^2.$$

$$AD = 0,25 \cdot \pi \cdot Dp^2 = 0,25 \cdot 3,14 \cdot 12^2 = 113,04 \text{ mm}^2.$$

$$n = \frac{As}{AD} = \frac{784,47}{113,04} = 6,94 \text{ buah} \approx 7 \text{ buah}.$$

digunakan $n = 7$ buah, dipakai 7D12

Penulangan sengkang:

$$\Phi = 0,6.$$

$$\begin{aligned} Tu &= 2 \cdot 10^7 \text{ Nmm} > \Phi \cdot \left(\frac{1}{24} \cdot \sqrt{fc'} \cdot B^2 \cdot H \right) \\ &= 0,6 \cdot \left(\frac{1}{24} \cdot \sqrt{30} \cdot 300^2 \cdot 400 \right) = 49295 \text{ Nmm}. \end{aligned}$$

→ efek torsi diperhitungkan....!

$$CT = \frac{B \cdot D}{B^2 \cdot H} = \frac{300 \cdot 331}{300^2 \cdot 400} = 0,00276$$

$$Tc = \frac{\frac{1}{15} \cdot \sqrt{fc'} \cdot B^2 \cdot H}{\sqrt{1 + \left(\frac{0,4 \cdot Tu}{CT \cdot Tu} \right)^2}} = \frac{\frac{1}{15} \cdot \sqrt{30} \cdot 300^2 \cdot 400}{\sqrt{1 + \left(\frac{0,4 \cdot 6,983 \cdot 10^4}{0,00276 \cdot 2 \cdot 10^7} \right)^2}} = 11729197 \text{ Nmm}.$$

$$Tu = 2 \cdot 10^7 \text{ Nmm} > \Phi \cdot Tc = 0,6 \cdot 11729197 = 7037518 \text{ Nmm}.$$

→ efek torsi diperhitungkan...!

$$Tn = \frac{Tu}{\Phi} = \frac{2 \cdot 10^7}{0,6} = 33333333 \text{ Nmm}.$$

$$Ts = Tn - Tc = 33333333 - 11729197 = 21604136 \text{ Nmm}.$$

$$\begin{aligned} Ts &= 21604136 \text{ Nmm} < \frac{1}{3} \cdot \sqrt{F_y} \cdot \frac{1}{3} \cdot B^2 \cdot H - Tc \\ &= \frac{1}{3} \cdot \sqrt{300} \cdot \frac{1}{3} \cdot 300^2 \cdot 400 - 11729197 = 57552835 \text{ Nmm} \end{aligned}$$

digunakan $Ts = 21604136 \text{ Nmm}.$

$$Ts = 21604136 \text{ Nmm} < 4 \cdot Tc = 4 \cdot 11729197 = 46916788 \text{ Nmm}$$

→ penampang memadai.....!

$$Vc = \frac{\frac{1}{6} \cdot \sqrt{fc'} \cdot B \cdot D}{\sqrt{1 + \left(2,5 \cdot CT \cdot \frac{Tn}{Vu} \right)^2}} = \frac{\frac{1}{6} \cdot \sqrt{30} \cdot 300 \cdot 331}{\sqrt{1 + \left(2,5 \cdot 0,00276 \cdot \frac{2 \cdot 10^7}{69830} \right)^2}} = 41204 \text{ N}$$

$$V_n = \frac{Vu}{\Phi} = \frac{69830}{0,6} = 116383 N.$$

$$V_s = V_n - V_c = 116383 - 41204 = 75179 N.$$

$$D_s = 10 \text{ mm.}$$

$$\frac{Av}{s} = \frac{V_s}{F_y \cdot D} = \frac{75179}{300.331} = 0,76 \text{ mm.}$$

$$x_1 = B - 2 \cdot (Pb + 0,5 \cdot D_s) = 300 - 2 \cdot (50 + 0,5 \cdot 10) = 190 \text{ mm}$$

$$y_1 = H - 2 \cdot (Pb + 0,5 \cdot D_s) = 400 - 2 \cdot (50 + 0,5 \cdot 10) = 290 \text{ mm}$$

$$\alpha = \frac{(2 + \frac{y_1}{x_1})}{3} = \frac{(2 + \frac{290}{190})}{3} = 1,18$$

$$\frac{At}{s} = \frac{T_s}{\alpha \cdot x_1 \cdot y_1 \cdot F_y} = \frac{21604136}{1,18 \cdot 190 \cdot 290 \cdot 300} = 1,1 \text{ mm.}$$

$$\frac{Av_t}{s} = 2 \cdot \frac{At}{s} + \frac{Av}{s} = 2 \cdot 1,1 + 0,76 = 2,98 \text{ mm.}$$

$$Av = 2 \cdot \frac{1}{4} \cdot \pi \cdot D_s^2 = 2 \cdot \frac{1}{2} \cdot 3,14 \cdot 10^2 = 157 \text{ mm}^2$$

$$s = \frac{Av}{\frac{Av_t}{s}} = \frac{157}{2,98} = 52,7 \text{ mm} \approx 50 \text{ mm.}$$

$$s_{maks} = \frac{x_1 + y_1}{4} = \frac{190 + 290}{4} = 120 \text{ mm.}$$

$$s_{maks} = \frac{3 \cdot Av \cdot F_y}{B} = \frac{3 \cdot 157 \cdot 300}{300} = 471 \text{ mm.}$$

$$\rightarrow \text{dipakai } s_{maks} = 120 \text{ mm.}$$

$$s = 50 \text{ mm} < s_{maks} = 120 \text{ mm} \dots \dots \text{ok}$$

$$\text{maka } s = 50 \text{ mm} \rightarrow \text{digunakan } D10 - 50 \text{ mm.}$$

Penulangan torsi memanjang:

$$At = \frac{At}{s} \cdot (x_1 + y_1) = 1,1 \cdot (190 + 290) = 532,8 \text{ mm}^2,$$

$$A_t = \frac{A_t}{s} \cdot s = 1,11 \cdot 50 = 55,5 \text{ mm}^2 > \frac{B \cdot s}{3 \cdot f_y} = \frac{300 \cdot 50}{3 \cdot 300} = 17 \text{ mm}^2,$$

maka digunakan $A_R = A_t = 55,5 \text{ mm}^2$,

$$\begin{aligned} A_l &= \left(\frac{2,8 \cdot H \cdot s}{f_y} \cdot \left(\frac{T_u}{T_u + \frac{f_u}{3 \cdot C_T}} \right) - 2 \cdot A_R \right) \cdot \frac{x_1 + y_1}{s} \\ &= \left(\frac{2,8 \cdot 400 \cdot 50}{300} \cdot \left(\frac{2 \cdot 10^7}{2 \cdot 10^7 + \frac{69830}{3,0,00276}} \right) - 2 \cdot 55,5 \right) \cdot \frac{190 + 290}{50} \\ &= 194,88 \text{ mm}^2 < A_l = 532,8 \text{ mm}^2. \\ &\rightarrow \text{dipakai } A_l = 532,8 \text{ mm}^2. \end{aligned}$$

$$A_{s_{total}} = 536,22 + 784,47 = 1320,69 \text{ mm}^2.$$

$$A_{s_{total}} = 1320,69 \text{ mm}^2 > A_l = 532,8 \text{ mm}^2.$$

\rightarrow tidak dibutuhkan tulangan torsi memanjang.

4.3.3 Disain elemen kolom

Perhitungan manual disain elemen kolom mengacu pada langkah-langkah dan rumus-rumus perencanaan kolom pada sub bab 2.1.3 di atas, dan untuk perhitungan manual disain elemen kolom ini diambil kolom tipe 2.

Kolom Tipe 2 (kolom lantai dasar):

Data perencanaan:

$$M_1 = 2,2 \cdot 10^7 \text{ Nmm}. M_2 = -1,0 \cdot 10^7 \text{ Nmm}. V_u = 3,7 \cdot 10^3 \text{ N}$$

$$P_u = 2,4 \cdot 10^5 \text{ N}. L_k = 6000 \text{ mm}. P_b = 40 \text{ mm}. B = 500 \text{ mm}. H = 500 \text{ mm}.$$

$$\Phi = 0,65 \quad \rho_g = 0,01. D_{p_{maks}} = 25 \text{ mm}. D_{s_{maks}} = 10 \text{ mm}. f_c' = 30 \text{ MPa}. f_y = 300$$

MPa.

$$R = 0,30. \quad H = 0,30.500 = 150 \text{ mm.}$$

$$\frac{Lk}{r} = 34 - 12\left(\frac{M2}{M1}\right) = 34 - 12\left(\frac{1,0.10^7}{2,2.10^7}\right) = 28,55 \approx 29$$

$$\frac{Lk}{R} = \frac{6000}{150} = 40 > \frac{Lk}{r} = 29 \rightarrow \text{efek kelangsingan diperhitungkan.}$$

$$cm = 0,6 + 0,4\left(\frac{M2}{M1}\right) = 0,6 + 0,4\left(\frac{-1,0.10^7}{2,2.10^7}\right) = 0,42 > 0,4 \dots \dots \text{ok}$$

$$I_g = \frac{1}{12} \cdot B \cdot H^3 = \frac{1}{12} \cdot 500 \cdot 500^3 = 5208333333 \text{ mm}^4.$$

$$Ec = 4700\sqrt{fc'} = 4700\sqrt{30} = 25743 \text{ MPa.}$$

$$\beta_d = 0,25$$

$$EI = \frac{Ec \cdot I}{2,5 \cdot (1 + \beta_d)} = \frac{5743.5208333333}{2,5 \cdot (1 + 0,25)} = 9,57 \cdot 10^{12} \text{ Nmm}^2$$

$$Pc = \frac{\pi^2 \cdot EI}{Lk^2} = \frac{3,14^2 \cdot 9,57 \cdot 10^{12}}{6000^2} = 2621010 \text{ N}$$

$$\delta_b = \frac{cm}{\left(1 - \frac{Pu}{\Phi Pc}\right)} = \frac{0,42}{\left(1 - \frac{2,4 \cdot 10^5}{0,65 \cdot 2621010}\right)} = 0,49 < 1$$

$$\rightarrow \delta_b = 1,0$$

$$Mc = \delta_b \cdot Mu = 1,2 \cdot 2 \cdot 10^7 \text{ Nmm.}$$

$$e \frac{Mc}{Pu} = \frac{2,2 \cdot 10^7}{2,4 \cdot 10^5} = 917 \text{ mm.}$$

$$d' = Pb + \frac{1}{2} \cdot Dp + Ds = 40 + \frac{1}{2} \cdot 12 + 6 = 52 \text{ mm.}$$

$$d = H - d' = 500 - 52 = 448 \text{ mm.}$$

$$As_{\text{perlu}} = \frac{\rho_g \cdot B \cdot d}{2} = \frac{0,01 \cdot 500 \cdot 448}{2} = 1120 \text{ mm}^2.$$

$$Dp = 12 \text{ mm.}$$

$$AD = \frac{1}{4} \cdot \pi \cdot Dp^2 = \frac{1}{4} \cdot 3,14 \cdot 12^2 = 113,04 \text{ mm}^2.$$

$$n = \frac{As_{\text{perlu}}}{AD} = \frac{1120}{113,04} = 9,9 \approx 10 \text{ buah.}$$

$$As' = As = n \cdot AD = 10.113,04 = 1130,4 \text{ mm}^2.$$

$$\rho = \frac{2 \cdot As}{B \cdot d} = \frac{2 \cdot 1130,4}{500 \cdot 448} = 0,01$$

$$c_b = \frac{600 \cdot d}{600 + Fy} = \frac{600 \cdot 448}{600 + 300} = 299$$

$$\beta_1 = 0,85 - 0,008 \cdot (fc' - 30) = 0,85 - 0,008 \cdot (30 - 30) = 0,85$$

$$a_b = \beta_1 \cdot c_b = 0,85 \cdot 299 = 254$$

$$\varepsilon_s' = \left(\frac{c_b - d'}{c_b} \right) \cdot 0,003 = \left(\frac{299 - 52}{299} \right) \cdot 0,003 = 0,0025$$

$$\varepsilon_y = \frac{Fy}{Es} = \frac{300}{200000} = 0,0015 < \varepsilon_s' = 0,0025$$

$$\text{maka } F_s' = Fy = 300 \text{ MPa.}$$

$$\begin{aligned} Pn_b &= \Phi \cdot (0,85 \cdot fc' \cdot a_b \cdot B + As' \cdot F_s' - As \cdot Fy) \\ &= 0,65 \cdot (0,85 \cdot 30 \cdot 254 \cdot 300 + 1130,4 \cdot 300 - 1130,4 \cdot 300) \\ &= 2526030 \text{ N} > Pu = 2,4 \cdot 10^5 \text{ N.} \end{aligned}$$

maka:

$$m = \frac{Fy}{0,85 \cdot fc'} = \frac{300}{0,85 \cdot 30} = 11,765$$

$$\begin{aligned} Pn &= 0,85 \cdot fc' \cdot B \cdot d \cdot \left[\frac{H-2e}{2 \cdot d} + \sqrt{\left(\frac{H-2e}{2 \cdot d} \right)^2 + 2 \cdot m \cdot \rho \cdot \left(1 - \frac{d'}{d} \right)} \right] \\ &= 0,85 \cdot 30 \cdot 500 \cdot 448 \cdot \left[\frac{500-2 \cdot 917}{2 \cdot 448} + \sqrt{\left(\frac{500-2 \cdot 917}{2 \cdot 448} \right)^2 + 2 \cdot 11,765 \cdot 0,01 \cdot \left(1 - \frac{52}{448} \right)} \right] \\ &= 390034 \text{ N.} \end{aligned}$$

$$\Phi Pn = 0,65 \cdot 390034 = 253522 \text{ N} > Pu = 2,4 \cdot 10^5 \text{ N} \dots \dots \text{Ok!}$$

Penulangan sengkang:

$$Ds = 6 \text{ mm.}$$

$$s = 16 \cdot Dp = 16 \cdot 12 = 192 \text{ mm.}$$

$$s = B = 500 \text{ mm.}$$

$$s = 48.Ds = 48.6 = 288mm.$$

$$\text{dipilih jarak tulangan } s = 192mm$$

$$\rightarrow \text{digunakan } D6 - 192mm.$$

4.3.4 Disain elemen fondasi

Perhitungan manual disain elemen fondasi mengacu pada langkah-langkah dan rumus-rumus perencanaan fondasi pada sub bab 2.1.4 di atas, dan untuk perhitungan manual disain elemen fondasi ini diambil fondasi tipe 1.

Fondasi Tipe 1:

Data perencanaan:

$$f_c' = 30 \text{ MPa}. f_y = 300 \text{ MPa}. \beta_1 = 0,80. \Phi = 0,60. Q = 260 \text{ kPa}.$$

$$P_u = 2,4.10^5 \text{ N}. L_p = 1500 \text{ mm}. T = 600 \text{ mm}. P_b = 75 \text{ mm}$$

$$D_f = 2000 \text{ mm}. B_k = 500 \text{ mm}. H_k = 500 \text{ mm}$$

$$D_p = 18mm.$$

$$AD = \frac{1}{4} \cdot \pi \cdot D_p^2 = \frac{1}{4} \cdot 3,14 \cdot 18^2 = 254,34mm^2.$$

$$q_1 = (23.T + 15,7.(D_f - T)) \cdot 10^{-6} = (23.600 + 15,7.(2000 - 600)) \cdot 10^{-6} \\ = 35,78kPa.$$

$$q_t = Q - q_1 = 260 - 35,78 = 224,22kPa = 224,22 \cdot 10^{-3} MPa.$$

$$Ak = 2,5.10^5 mm^2.$$

$$A_{p_{perlu}} = \frac{P_u}{q_t} = \frac{2,4.10^5}{224,22.10^{-3}} = 1070377mm^2.$$

$$B_{\text{perlu}} = \frac{Ap_{\text{perlu}}}{Lp} = \frac{1070377}{1500} = 714\text{mm} \approx Bp = 750\text{mm}.$$

$$Ap = Bp \cdot Lp = 750 \cdot 1500 = 1125000\text{mm}^2.$$

$$p = \frac{Pu}{Ap} = \frac{2,4 \cdot 10^5}{1125000} = 0,213\text{MPa}.$$

$$d = T - Pb - Dp = 600 - 75 - 20 = 505\text{mm}.$$

Arah kerja dua arah:

$$B = Bk + d = 500 + 505 = 1005\text{mm}.$$

$$\beta_c = Hk/Bk = 500/500 = 1,0.$$

$$B_0 = 4 \cdot B = 4 \cdot 1005 = 4020\text{mm}.$$

$$Vu = p \cdot (Ap - B^2) = 0,213 \cdot (1125000 - 1005^2) = 24490\text{N}$$

$$Vc = (1 + \frac{2}{\beta_c}) \cdot (2\sqrt{fc'}) \cdot B_0 \cdot d = (1 + \frac{2}{1}) \cdot (2\sqrt{30}) \cdot 4020 \cdot 505 \\ = 66715893\text{N}.$$

$$Vc = 4\sqrt{fc'} \cdot B_0 \cdot d = 4\sqrt{30} \cdot 4020 \cdot 505 = 44477263\text{N}.$$

$$\rightarrow \text{digunakan } Vc = 44477263\text{N}.$$

$$\Phi Vn = \Phi Vc = 0,60 \cdot 44477263 = 26686358\text{N}.$$

$$Vu = 24490\text{N} < \Phi Vn = 2668635\text{N} \dots\dots \text{Ok!}$$

Momen yang terjadi:

Arah memanjang:

$$F = \frac{Lp - Hk}{2} = \frac{1500 - 500}{2} = 500\text{mm}.$$

$$Mu_l = p \cdot F \cdot \frac{1}{2} F \cdot Bp = 0,213 \cdot 500 \cdot 250 \cdot 750 = 19968750\text{Nmm}.$$

Arah melebar:

$$F = \frac{Bp - Bk}{2} = \frac{750 - 500}{2} = 125mm.$$

$$Mu_b = p \cdot F \cdot \frac{1}{2} F \cdot lp = 0,213 \cdot 125 \cdot 62,5 \cdot 1500 = 2496094 Nmm$$

Penulangan arah panjang:

$$k = \frac{Mu_l}{\Phi \cdot Bp \cdot d^2} = \frac{19968750}{0,80 \cdot 750 \cdot 505^2} = 0,13$$

$$\rho = \frac{fc' - \sqrt{fc'^2 - 2,36 \cdot k \cdot fc'}}{1,18 \cdot Fy} = \frac{30 - \sqrt{30^2 - 2,36 \cdot 0,13 \cdot 30}}{1,18 \cdot 300} = 0,0004$$

$$\rho_{\min} = \frac{1,4}{Fy} = \frac{1,4}{300} = 0,0047 > \rho = 0,0004$$

→ digunakan $\rho = 0,0047$

$$As = \rho \cdot Bp \cdot d = 0,0047 \cdot 750 \cdot 505 = 1780,125mm^2.$$

$$s = \frac{AD \cdot Bp}{As} = \frac{254,34 \cdot 750}{1780,125} = 107,2mm \approx 100mm.$$

$$s_{maks} = 500mm. \quad s_{\min} = 40mm.$$

$$s_{\min} < s < s_{maks} \dots \dots Ok!$$

→ digunakan D18 – 100mm.

Penulangan arah lebar:

$$k = \frac{Mu_b}{\Phi \cdot lp \cdot d^2} = \frac{2496094}{0,80 \cdot 1500 \cdot 505^2} = 0,008$$

$$\rho = \frac{fc' - \sqrt{fc'^2 - 2,36 \cdot k \cdot fc'}}{1,18 \cdot Fy} = \frac{30 - \sqrt{30^2 - 2,36 \cdot 0,008 \cdot 30}}{1,18 \cdot 300} = 0,00003$$

$$\rho_{\min} = \frac{1,4}{Fy} = \frac{1,4}{300} = 0,0047 > \rho = 0,00003$$

→ digunakan $\rho = 0,0047$

$$As = \rho \cdot Lp \cdot d = 0,0047 \cdot 1500 \cdot 505 = 3560,25 \text{ mm}^2.$$

$$jb = \frac{As}{AD} = \frac{3560,25}{254,34} = 14 \text{ buah.}$$

$$\beta = \frac{Lp}{Bp} = \frac{1500}{750} = 2$$

$$z = \frac{2}{\beta+1} = \frac{2}{2+1} = 0,67$$

$$jb_1 = z \cdot jb = 0,67 \cdot 14 = 9,4 \text{ buah} \approx 10 \text{ buah.}$$

$$Sisa = jb - jb_1 = 14 - 10 = 4 \text{ buah.}$$

$$s = \frac{Bp}{n-1} = \frac{750}{9} = 83,3 \text{ mm} \approx 80 \text{ mm.}$$

$$s_{maks} = 500 \text{ mm. } s_{min} = 40 \text{ mm.}$$

$$s_{min} < s < s_{maks} \dots \dots \dots Ok!$$

$$\rightarrow \text{digunakan } D18 - 80 \text{ mm.}$$

dipasang merata dalam rentang 750 mm disepanjang sisi panjang dan 4 buah

dipasang merata di luar rentang.

$$j = \sqrt{\frac{Ap}{Ak}} = \sqrt{\frac{1125000}{250000}} = 2,12 > 2 \rightarrow j = 2$$

$$Pt_p = \Phi(0,85 \cdot fc'_p \cdot Ak) \cdot j = 0,70(0,85 \cdot 30 \cdot 250000) \cdot 2 = 8925000 \text{ N}$$

$$Pt_k = \Phi(0,85 \cdot fc'_k \cdot Ak) = 0,70(0,85 \cdot 30 \cdot 250000) = 4462500 \text{ N}$$

$$Pu = 2,4 \cdot 10^5 \text{ N} < Pt_k = 4462500 \text{ N} < Pt_p = 8925000 \text{ N} \dots \dots \dots Ok!$$

Penulangan “dowel” atau pasak:

$$As_{perlu} = 0,005 \cdot Ak = 0,005 \cdot 250000 = 1250 \text{ mm}^2.$$

$$AD = \frac{1}{4} \pi \cdot Dp_k^2 = \frac{1}{4} \cdot 3,14 \cdot 12^2 = 113,04 \text{ mm}^2.$$

$$n = \frac{As_{perlu}}{AD} = \frac{1250}{113,04} = 11,06 \text{ buah} \approx 12 \text{ buah.}$$

$$As = n \cdot AD = 12 \cdot 113,04 = 1356,48 \text{ mm}^2.$$

$$x = \frac{As_{perlu}}{As} = \frac{1250}{1356,48} = 0,92$$

$$ld_{b_{min}} = 0,04 \cdot Dp_k \cdot F_y = 0,04 \cdot 12 \cdot 300 = 144 \text{ mm.}$$

$$ld_b = \frac{Dp_k \cdot F_y}{4\sqrt{fc'_p}} = \frac{12 \cdot 300}{4\sqrt{30}} = 164,3 \text{ mm.}$$

$$ld_{min} = 200 \text{ mm.}$$

$$ld_b = 164,3 \text{ mm} > ld_{b_{min}} = 144 \text{ mm} \dots \dots \text{ok!}$$

$$ld = x \cdot ld_b = 0,92 \cdot 164,3 = 150,9 \text{ mm} < ld_{min} = 200 \text{ mm.}$$

→ digunakan tulangan pasak 12D12, $ld = 200 \text{ mm}$.

Hasil disain di atas sama dengan hasil disain dengan menggunakan program disain elemen struktur beton dengan “inputing” data dari keluaran program Microcap II (P1-Module).

BAB V

KESIMPULAN DAN SARAN

5.1 Kesimpulan

Dari hasil studi dan pembuatan program disain elemen struktur beton dengan masukan (“inputing”) data dari hasil keluaran (“outputing”) program Microfeap II (P1-Module) ini dapat disimpulkan sebagai berikut ini.

1. Program disain elemen struktur beton ini cukup dapat membantu untuk mendisain elemen struktur beton yang dilakukan dengan metode coba-coba (“trial and error”) yaitu memberikan asumsi-asumsi awal perencanaan, dalam usaha mendapatkan hasil disain yang efektif atau ekonomis. Perencanaan struktur beton akan lebih cepat dilakukan, sehingga memungkinkan untuk mendisain elemen struktur beton dengan tipe yang banyak atau dengan kata lain dimensi elemen-elemen struktur beton tidak harus disamakan.
2. Program disain elemen struktur beton ini terutama dimaksudkan untuk mendisain struktur beton pada perencanaan struktur bangunan (dalam bentuk portal) yang perhitungan mekanika strukturnya menggunakan program Microfeap II (P1-Module), dalam pada itu juga dapat digunakan data dari file jenis text (file tipe teks) dengan ekstension TXT yang berisi data dan urutan yang sama dengan file

- data keluaran program Microfeap II yaitu elemen, “section”, “axial force”, “shear”, “moment”.
3. Program disain elemen struktur beton ini tidak terbatas pada perencanaan struktur portal bertingkat dua saja, akan tetapi dapat digunakan untuk mendisain elemen struktur portal dengan jumlah tingkat yang tidak terbatas.
 4. Program disain elemen struktur beton ini terbatas untuk mendisain elemen fondasi telapak kolom setempat.
 5. Perhitungan penulangan geser/sengkan pada disain elemen balok pada program disain elemen struktur beton ini agak konservatif karena dalam perhitungan digunakan gaya geser maksimum.
 6. Untuk mempermudah dan memperjelas penggunaan program disain elemen struktur beton ini dibutuhkan buku panduan/manual penggunaan program tersebut yang dibuat terpisah dari penulisan Tugas Akhir ini.

5.2 Saran-saran

1. Program disain elemen struktur beton ini dalam setiap perhitungan menggunakan satuan SI yaitu N (Newton) untuk satuan gaya, mm (milimeter) untuk satuan panjang. Dalam memasukan data-data pada program disain elemen struktur beton ini dan pada program Microfeap II juga harus menggunakan satuan-satuan tersebut.

2. Data dimensi pada program disain elemen struktur beton ini sebaiknya disesuaikan dengan “material data” (asumsi dimensi) yang digunakan pada program Microfeap II.
3. Menu-menu pada program disain elemen struktur beton ini sebaiknya digunakan urut dari atas ke bawah (sesuai skema kerja eksekusi program gambar 4.1).
4. Program disain elemen struktur beton ini masih dirasa perlu inovasi/pengembangan lebih lanjut dimasa mendatang.
5. Hendaknya mahasiswa teknik sipil (masiswa Jurusan Teknik Sipil, Univerisitas Islam Indonesia khususnya) tidak hanya mampu sebagai user/operator program aplikasi teknik sipil, akan tetapi juga mampu membuat program atau “software” program aplikasi teknik sipil.

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```

PROGRAM CDPL;
USES CRT,PRINTER;
TYPE
  FDAT = RECORD
    NPROY : string[19];
    NFDAT : string[8];
    NaFil : string[12];
    ENG : string[19];
  END;
  FDBN = RECORD
    TIPE : INTEGER;
    FC : REAL;
    FY : REAL;
    ES : REAL;
  END;
  FDBT = RECORD
    TIPE : INTEGER;
    N : INTEGER;
    DP : INTEGER;
    DS : INTEGER;
  END;
  FGMS = RECORD
    TIPE : INTEGER;
    MLX : REAL;
    MLY : REAL;
    MTX : REAL;
    MTY : REAL;
  END;
  FDMN = RECORD
    TIPE : INTEGER;
    LP : INTEGER;
    BP : INTEGER;
    PB : INTEGER;
    HP : INTEGER;
    ARAH : INTEGER;
  END;

VAR
  FTYPE : TEXT;
  FDATBAH : FILE OF FDBN;
  FBAHTUL : FILE OF FDBT;
  FGMAKS : FILE OF FGMS;
  FDM : FILE OF FDMN;
  NFILE : FILE OF FDAT;
  RECORDFDAT : FDAT;
  RECORDFDBN : FDBN;
  RECORDFDBT : FDBT;
  RECORDFGMS : FGMS;
  RECORDFDMN : FDMN;
  L,J,TYPE,JUM,NOREC,J,TP,DPMMAKS,DSMAKS,
  NTUL,DPTUL,K,F,BATASKIRI,BATASATAS,
  BATASBAWAH,KERTAS,JUMLAHBARIS,BARIS,
  HAL,A,B,C,D : Integer;
  YA : CHAR;
  BENAR : BOOLEAN;
  NFDA,EL : STRING[7];
  FDB,FDT,FGM,FTIP,FDM,FELM : STRING[12];
  NPRO,EN : STRING[19];
  FTP,BBN,BBT,BEL,BGM,BDD,DIRAK,DIREK : STRING;

PROCEDURE JUDUL;
BEGIN
  ASSIGN(NFILE,'FILEDATA.DAT'); RESET(NFILE);
  WHILE NOT EOF(NFILE) DO BEGIN
    READ(NFILE,RECORDFDAT);
    IF RECORDFDAT.NFDAT=NFDA THEN BEGIN
      NPRO:=RECORDFDAT.NPROY; EN:=RECORDFDAT.ENG; END;
    END; CLOSE(NFILE); HAL:=HAL+1; A:=LENGTH(NPRO); B:=LENGTH(NFDA);
    C:=LENGTH(EN); D:=LENGTH(EL);
  
```

```

FOR J:=1 TO BATASATAS DO WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(201));
FOR J:=1 TO 65 DO WRITE(LST,CHAR(205)); WRITE(LST,CHAR(187));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(186),
'      UII-CDP PROGRAM DISAIN ELEMEN STRUKTUR BETON      ',
CHAR(186)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(204));
FOR J:=1 TO 65 DO WRITE(LST,CHAR(205)); WRITE(LST,CHAR(185));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(186),
' AUTHORITY : UII CIVIL ENGINEERING 1996  DATA  : ',
EL:D); FOR J:=1 TO (7-D) DO WRITE(LST,' '); WRITE(LST,' ',CHAR(186));
WRITELN(LST); FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(186),
' Proyek  : ',NPRO:A); FOR J:=1 TO (19-A) DO WRITE(LST,' ');
WRITE(LST,'      Halaman  : ',HAL:3,' ',CHAR(186)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(186),
' Perencana : ',EN:C); FOR J:=1 TO (19-C) DO WRITE(LST,' ');
WRITE(LST,'      File Data : ',NFDA:B);
FOR J:=1 TO (8-B) DO WRITE(LST,' '); WRITE(LST,' ',CHAR(186)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(200));
FOR J:=1 TO 65 DO WRITE(LST,CHAR(205)); WRITE(LST,CHAR(188));
WRITELN(LST); I:=7;
END;

```

```

BEGIN
DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);FTP:=PARAMSTR(4);BBN:=PARAMSTR(5);
BBT:=PARAMSTR(6); BEL:=PARAMSTR(7); BGM:=PARAMSTR(8); BDD:=PARAMSTR(9);
GETDIR(0,DIRAK); CHDIR(DIREK); FDM:=NFDA+BDD; ASSIGN(FDIM,FDM);
{$I-} RESET(FDIM); {$I+}
IF IORESULT=0 THEN BEGIN
CLOSE(FDIM); FGM:=NFDA+BGM; ASSIGN(FGMAKS,FGM);
{$I-} RESET(FGMAKS); {$I+}
IF IORESULT=0 THEN BEGIN
CLOSE(FGMAKS); FDT :=NFDA+BBT; ASSIGN(FBAHTUI,FDT);
{$I-} RESET(FBAHTUI); {$I+}
IF IORESULT=0 THEN BEGIN
CLOSE(FBAHTUI); FDB :=NFDA+BBN; ASSIGN(FDATBAH,FDB);
{$I-} RESET(FDATBAH); {$I+}
IF IORESULT=0 THEN BEGIN
CLOSE(FDATBAH); YA:='U'; HAL:=0; BATASATAS:=0; BATASBAWAH:=0;
BATASKIRI:=0;
WHILE UPCASE(YA)='U' DO BEGIN
TEXTBACKGROUND(0); TEXTCOLOR(10); CLRSCR;
GOTOXY(10,2); WRITE(CHAR(218));
FOR I:=1 TO 50 DO WRITE(CHAR(196)); WRITE(CHAR(191));
GOTOXY(10,3);
WRITE(CHAR(179),' Ukuran Kertas : '); TEXTCOLOR(11); WRITE('1');
TEXTCOLOR(10); WRITE(' Folio '); TEXTCOLOR(11); WRITE('2');
TEXTCOLOR(10); WRITE(' Kuarto '); TEXTCOLOR(11);
WRITE('--> Pilih : '); TEXTCOLOR(10); WRITE(CHAR(179));
GOTOXY(10,4);
WRITE(CHAR(179),' Batas Atas :           ');
WRITE(CHAR(179));
GOTOXY(10,5);
WRITE(CHAR(179),' Batas Bawah :           ');
WRITE(CHAR(179));
GOTOXY(10,6);
WRITE(CHAR(179),' Batas Kiri :           ');
WRITE(CHAR(179));
GOTOXY(10,7);
WRITE(CHAR(192)); FOR I:=1 TO 50 DO WRITE(CHAR(196));
WRITE(CHAR(217)); TEXTCOLOR(11);
GOTOXY(10,9); WRITE(' U : ulang L : lanjutkan ==> ');
GOTOXY(29,4); WRITE('Baris'); GOTOXY(29,5); WRITE('Baris');
GOTOXY(29,6); WRITE('Spasi'); GOTOXY(59,3); READLN(KERTAS);
GOTOXY(26,4); READLN(BATASATAS); GOTOXY(26,5); READLN(BATASBAWAH);
GOTOXY(26,6); READLN(BATASKIRI); BENAR:=TRUE;
WHILE BENAR DO BEGIN

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GOTOXY(42,9); YA:=READKEY; WRITE(YA);
IF UPCASE(YA)='U' THEN BENAR:=FALSE;
IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10); END;
IF KERTAS=1 THEN JUMLAHBARIS:=71; IF KERTAS=2 THEN JUMLAHBARIS:=65;
BARIS:=JUMLAHBARIS-BATASATAS-BATASBAWAH; HAL:=0; K:=1;
F:=1; JUDUL; RESET(FDATBAH);
WHILE NOT EOF(FDATBAH) DO BEGIN
  SEEK(FDATBAH,F-1); READ(FDATBAH,RECORDFDBN); F:=F+1;
  WITH RECORDFDBN DO BEGIN
    IF (K=1) THEN BEGIN
      IF (BARIS-I)<=6 THEN FOR J:=1 TO (BARIS-I) DO Writeln(LST); I:=I+6;
      IF I>=BARIS THEN BEGIN FOR J:=1 TO BATASBAWAH DO Writeln(LST); JUDUL; END;
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(218));
      FOR J:=1 TO 63 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(191));
      Writeln(LST);
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
        ' >>> DATA BAHAN <<<',
        ' ',CHAR(179)); Writeln(LST);
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
      FOR J:=1 TO 63 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
      Writeln(LST);
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
        ' Tipe Teg. Desak Beton Teg. Tarik Baja Mod. ',
        ' Elastisitas Baja ',CHAR(179)); Writeln(LST);
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
        ' Plat (MPa) (MPa) (MPa)',
        ' ',CHAR(179)); Writeln(LST);
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
      FOR J:=1 TO 63 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
      Writeln(LST); END;
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),' ',
        ' TIPE:3, ' ',TRUNC(FC):3, ' ',TRUNC(FY):3,
        ' ',TRUNC(ES):6, ' ',CHAR(179));
      Writeln(LST); K:=K+1; I:=I+1;
      IF (I>=BARIS) OR EOF(FDATBAH) THEN BEGIN
        FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(192));
        FOR J:=1 TO 63 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(217));
        Writeln(LST); K:=1; I:=I+1; END;
      IF I>=BARIS THEN BEGIN
        K:=1; FOR J:=1 TO BATASBAWAH DO Writeln(LST); JUDUL; END; END;
    END; CLOSE(FDATBAH); F:=1; RESET (FBAHTUL);
    WHILE NOT EOF(FBAHTUL) DO BEGIN
      SEEK(FBAHTUL,F-1); READ(FBAHTUL,RECORDFDBT); F:=F+1;
      WITH RECORDFDBT DO BEGIN
        IF (K=1) THEN BEGIN
          IF (BARIS-I)<=6 THEN FOR J:=1 TO (BARIS-I) DO Writeln(LST); I:=I+6;
          IF I>=BARIS THEN BEGIN FOR J:=1 TO BATASBAWAH DO Writeln(LST); JUDUL; END;
          FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(218));
          FOR J:=1 TO 65 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(191));
          Writeln(LST);
          FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
            ' >>> DIAMETER TULANGAN YANG AKAN DIGUNAKAN <<<',
            ' ',CHAR(179)); Writeln(LST);
          FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
          FOR J:=1 TO 65 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
          Writeln(LST);
          FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
            ' Tipe No. Diameter Tulangan Pokok Diameter Tulangan',
            ' Sengkang ',CHAR(179)); Writeln(LST);
          FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),' (mm)',
            ' Plat (mm) ',CHAR(179));
          Writeln(LST);
          FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
          FOR J:=1 TO 65 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
          Writeln(LST); END;
          FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
            ' ',TIPE:3, ' ',N:2, ' ',DP:2,
            ' ',DS:2, ' ',CHAR(179));
          Writeln(LST); K:=K+1; I:=I+1;
          IF (I>=BARIS) OR EOF(FBAHTUL) THEN BEGIN

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FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(192));
FOR J:=1 TO 65 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(217));
WRITE(LST); K:=1; I:=I+1; END;
IF I>=BARIS THEN BEGIN
  K:=1; FOR J:=1 TO BATASBAWAH DO WRITE(LST); JUDUL; END; END;
END; CLOSE(FBAHTUL); F:=1; RESET(FDIM);
WHILE NOT EOF(FDIM) DO BEGIN
  SEEK(FDIM,F-1); READ(FDIM,RECORDFDIMN); F:=F+1;
  WITH RECORDFDIMN DO BEGIN
    IF K=1 THEN BEGIN
      IF (BARIS-I)<=6 THEN FOR J:=1 TO (BARIS-I) DO WRITE(LST); I:=I+6;
      IF I>=BARIS THEN BEGIN FOR J:=1 TO BATASBAWAH DO WRITE(LST); JUDUL; END;
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(218));
      FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(191));
      WRITE(LST);
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
        ' >>> DATA DIMENSI <<< ',
        CHAR(179)); WRITE(LST);
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
      FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
      WRITE(LST);
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
        ' Tipe Panjang Lebar Tebal Penutup Beton Arah ',
        CHAR(179)); WRITE(LST);
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
        ' Plat (mm) (mm) (mm) Kerja ',
        CHAR(179)); WRITE(LST);
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
      FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
      WRITE(LST); END;
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
        ',,TIPE:3, ',,LP:5, ',,BP:5, ',,HP:4, ',,PB:3,
        ' ',,ARAH, ' Arah ',CHAR(179)); WRITE(LST); K:=K+1; I:=I+1;
      IF (I>=BARIS) OR EOF(FDIM) THEN BEGIN
        FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(192));
        FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(217));
        WRITE(LST); I:=I+1; K:=1; END;
      IF I>=BARIS THEN BEGIN
        K:=1; FOR J:=1 TO BATASBAWAH DO WRITE(LST); JUDUL; END; END;
      END; CLOSE(FDIM); F:=1; RESET(FDMAKS);
      WHILE NOT EOF(FDMAKS) DO BEGIN
        SEEK(FDMAKS,F-1); READ(FDMAKS,RECORDFDGMS); F:=F+1;
        WITH RECORDFDGMS DO BEGIN
          IF K=1 THEN BEGIN
            IF (BARIS-I)<=6 THEN FOR J:=1 TO (BARIS-I) DO WRITE(LST); I:=I+6;
            IF I>=BARIS THEN BEGIN FOR J:=1 TO BATASBAWAH DO WRITE(LST); JUDUL; END;
            FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(218));
            FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(191));
            WRITE(LST);
            FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
              ' >>> DATA GAYA-GAYA MAKSIMUM <<< ',
              CHAR(179)); WRITE(LST);
            FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
            FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
            WRITE(LST);
            FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
              ' Tipe M Lap. x M Lap. y M Tum. x M Tum. y ',
              CHAR(179)); WRITE(LST);
            FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
              ' Plat (Nmm) (Nmm) (Nmm) (Nmm) ',
              CHAR(179)); WRITE(LST);
            FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
            FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
            WRITE(LST); END;
            FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
              ',,TIPE:3, ',,MLX:8, ',,MLY:8, ',,MTX:9, ',,MTY:9,
              ',,CHAR(179)); WRITE(LST); K:=K+1; I:=I+1;
            IF (I>=BARIS) OR EOF(FDMAKS) THEN BEGIN
              FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(192));
              FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(217));

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        WRITELN(LST); I:=I+1; K:=1; END;
    IF (I>=BARIS) THEN BEGIN
        K:=1; FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END; END;
    END; CLOSE(FGMAKS);
END
ELSE BEGIN
    CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
    WRITE('DATA BAHAN BELUM DIBUAT...!'); WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
    CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
    WRITE('DATA TULANGAN YG AKAN DIGUNAKAN BELUM DIBUAT...!');
    WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
    CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
    WRITE('DATA GAYA YG BEKERJA PADA BALOK BELUM DIBUAT...!');
    WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
    CLRSCR; TEXTCOLOR(11);
    GOTOXY(20,10); WRITE('DATA DIMENSI BALOK BELUM DIBUAT...!');
    WRITE('^G'); READKEY; TEXTCOLOR(10); END; CHDIR(DIRAK);
END.

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PROGRAM CPL;
USES CRT,PRINTER;
TYPE
    FDAT = RECORD
        NPROY : string[19];
        NFDAT : string[8];
        NaFil : string[12];
        ENG : string[19];
    END;
    FKLM = RECORD
        TIPE : INTEGER;
        SX : INTEGER;
        DPX : INTEGER;
        SY : INTEGER;
        DPY : INTEGER;
        STX : INTEGER;
        DPTX : INTEGER;
        STY : INTEGER;
        DPTY : INTEGER;
        S : INTEGER;
        DSU : INTEGER;
    END;
VAR
    FPLAT : FILE OF FKLM;
    NFILE : FILE OF FDAT;
    RECORDFDAT : FDAT;
    RECORDFPLT : FKLM;
    I,JUM,J,BATASATAS,BATASBAWAH,
    BARIS,JUMLAHBARIS,HAL,BATASKIRI,A,
    B,C,D : INTEGER;
    BENAR : BOOLEAN;
    KERTAS : BYTE;
    YA : CHAR;
    NFDA,EL : STRING[7];
    FBK : STRING[12];
    NPRO,EN : STRING[19];
    BLK,DIRAK,DIREK : STRING;

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BEGIN
    DIREK:=PARAMSTR(1); NFDA:=PARAMSTR(2); EL:=PARAMSTR(3); BLK:=PARAMSTR(4);
    GETDIR(0,DIRAK); CHDIR(DIRAK); ASSIGN(NFILE,'FILEDATA.DAT'); RESET(NFILE);
    WHILE NOT EOF(NFILE) DO BEGIN READ(NFILE,RECORDFDAT);
    IF RECORDFDAT.NFDAT=NFDA THEN BEGIN
        NPRO:=RECORDFDAT.NPROY; EN :=RECORDFDAT.ENG; END;

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END; CLOSE(NFILE); FBK:=NFDA+BLK; ASSIGN(FPLAT,FBK); {$I-} RESET(FPLAT); {$I+}
IF IORESULT=0 THEN BEGIN
YA:='U'; BATASATAS:=0; BATASBAWAH:=0; BATASKIRI:=0;
WHILE UPCASE(YA)='U' DO BEGIN
TEXTBACKGROUND(0); TEXTCOLOR(10); CLRSCR;
GOTOXY(10,2); WRITE(CHAR(218)); FOR I:=1 TO 50 DO WRITE(CHAR(196)); WRITE(CHAR(191));
GOTOXY(10,3); WRITE(CHAR(179),' Ukuran Kertas : '); TEXTCOLOR(11); WRITE('1');
TEXTCOLOR(10); WRITE('. Folio '); TEXTCOLOR(11); WRITE('2');
TEXTCOLOR(10); WRITE('. Kuarto '); TEXTCOLOR(11);
WRITE('--> Pilih : '); TEXTCOLOR(10); WRITE(CHAR(179)); GOTOXY(10,4);
WRITE(CHAR(179),' Batas Atas : ',CHAR(179));
GOTOXY(10,5);
WRITE(CHAR(179),' Batas Bawah : ',CHAR(179));
GOTOXY(10,6);
WRITE(CHAR(179),' Batas Kiri : ',CHAR(179));
GOTOXY(10,7);
WRITE(CHAR(192)); FOR I:=1 TO 50 DO WRITE(CHAR(196)); WRITE(CHAR(217));
TEXTCOLOR(11);
GOTOXY(10,9); WRITE(' U : ulang L : lanjutkan ==> ');
GOTOXY(29,4); WRITE('Baris'); GOTOXY(29,5); WRITE('Baris');
GOTOXY(29,6); WRITE('Spasi'); GOTOXY(59,3); READLN(KERTAS);
GOTOXY(26,4); READLN(BATASATAS); GOTOXY(26,5); READLN(BATASBAWAH);
GOTOXY(26,6); READLN(BATASKIRI); BENAR:=TRUE;
WHILE BENAR DO BEGIN
GOTOXY(42,9); YA:=READKEY; WRITE(YA); IF UPCASE(YA)='U' THEN BENAR:=FALSE;
IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10); END;
IF KERTAS=1 THEN JUMLAHBARIS:=63; IF KERTAS=2 THEN JUMLAHBARIS:=57;
BARIS:=JUMLAHBARIS-BATASATAS-BATASBAWAH; I:=1; HAL:=0;
WHILE NOT EOF(FPLAT) DO BEGIN
CLRSCR; TEXTCOLOR(11);
GOTOXY(20,10); WRITE('MENCETAK HASIL DISAIN.....'); TEXTCOLOR(11);
WRITE(I); TEXTCOLOR(10);
WITH RECORDFPLT DO BEGIN READ(FPLAT,RECORDFPLT);
IF I=1 THEN BEGIN
A:=LENGTH(NPRO); B:=LENGTH(NFDA); C:=LENGTH(EN); D:=LENGTH(EL);
FOR J:=1 TO BATASATAS DO BEGIN Writeln(LST); END; HAL:=HAL+1;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(218)); FOR J:=1 TO 61 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(191)); Writeln(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
' UII-CDP PROGRAM DISAIN ELEMEN STRUKTUR BETON ',
CHAR(179)); Writeln(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(195)); FOR J:=1 TO 61 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(180)); Writeln(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
' AUTHORITY : UII CIVIL ENGINEERING 1996 DISAIN : ',
EL:D); FOR J:=1 TO (7-D) DO WRITE(LST,' '); WRITE(LST,' ',CHAR(179));
Writeln(LST); FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(179),' Proyek : ',NPRO:A);
FOR J:=1 TO (19-A) DO WRITE(LST,' '); WRITE(LST,' Halaman : ',
HAL:3,' ',CHAR(179)); Writeln(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
' Perencana : ',EN:C); FOR J:=1 TO (19-C) DO WRITE(LST,' ');
WRITE(LST,' File Data : ',NFDA:B); FOR J:=1 TO (8-B) DO WRITE(LST,' ');
WRITE(LST,' ',CHAR(179)); Writeln(LST); FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(195)); FOR J:=1 TO 6 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(194)); FOR J:=1 TO 21 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(194)); FOR J:=1 TO 21 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(194)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(180)); Writeln(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(179),' TIPE ',CHAR(179),' ARAH MELEBAR ',
CHAR(179),' ARAH MEMANJANG ',CHAR(179),' TULANGAN ',
CHAR(179)); Writeln(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(179)); FOR J:=1 TO 6 DO WRITE(LST,' ');
WRITE(LST,CHAR(195)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(194)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(197)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));

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WRITE(LST,CHAR(194)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(180),' BAGI/ ',CHAR(179)); Writeln(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(179),' PLAT ',CHAR(179),' LAPANGAN ',CHAR(179),
'TUMPUAN ',CHAR(179),' LAPANGAN ',CHAR(179),' TUMPUAN ',
CHAR(179),' SUSUT ',CHAR(179)); Writeln(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(195)); FOR J:=1 TO 6 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(197)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(197)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(197)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(197)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(197)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(180)); Writeln(LST); END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(179),' ',TIPE:3,' ',CHAR(179),'D',DPX:2,' ',SX:3,
'mm ',CHAR(179),'D',DPY:2,' ',SY:3,'mm ',CHAR(179),'D',
DPTX:2,' ',STX:3,'mm ',CHAR(179),'D',DPTY:2,' ',STY:3,'mm ',
CHAR(179),'D',DSU:2,' ',S:3,'mm ',CHAR(179)); Writeln(LST); I:=I+1;
IF (I=BARIS) OR EOF(FPLAT) THEN BEGIN I:=1;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(192)); FOR J:=1 TO 6 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(193)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(193)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(193)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(193)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(193)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(217)); Writeln(LST);
IF I=BARIS THEN FOR J:=1 TO BATASBAWAH DO Writeln(LST); END; END;
END; CLOSE(FPLAT); END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11);GOTOXY(20,5); WRITE(' PROSES DISAIN BELUM DILAKUKAN');
GOTOXY(15,7); WRITE('Tekan "SEMBARANG TOMBOL" Untuk Melanjutkan.....!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END; CHDIR(DIRAK);
END.

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PROGRAM DDPL;
USES CRT;

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TYPE
FDMN = RECORD
    TIPE : INTEGER;
    LP : INTEGER;
    BP : INTEGER;
    PB : INTEGER;
    HP : INTEGER;
    ARAH : INTEGER;
END;
FDBN = RECORD
    TIPE : INTEGER;
    FC : REAL;
    FY : REAL;
    ES : REAL;
END;
VAR
FTIPE : TEXT;
FDIM : FILE OF FDMN;
FDATBAH : FILE OF FDBN;
RECORDFDBN : FDBN;
RECORDFDMN : FDMN;
I, J, TIPE, JUM, NOREC, TP, DPKB, LPB,
BPP, HB, PBB, ARAHB, ARAHS, LPS, TUMB : INTEGER;
FCB, FYB, ESB, HMIN, BETA : REAL;
BENAR : BOOLEAN;
YA : CHAR;
NFDA, EL : STRING[7];
FTIP, FDM, FDB : STRING[12];
FTP, BDD, BBN, DIRAK, DIREK : STRING;

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```

BEGIN
DIREK:=PARAMSTR(1); NFDA:=PARAMSTR(2); EL:=PARAMSTR(3); FTP:=PARAMSTR(4);
BBN:=PARAMSTR(5); BDD:=PARAMSTR(6); GETDIR(0,DIREK); CHDIR(DIREK);
FTIP:=NFDA+FTP, ASSIGN(FTIPE,FTIP); {$I-} RESET(FTIPE); {$I+}
IF IORESULT=0 THEN BEGIN
READ(FTIPE,JTIPE); CLOSE(FTIPE); FDB:=NFDA+BBN; ASSIGN(FDATBAH,FDB);
{$I-} RESET(FDATBAH); {$I+}
IF IORESULT=0 THEN BEGIN
CLOSE(FDATBAH); RESET(FDATBAH);
WHILE NOT EOF(FDATBAH) DO BEGIN
WITH RECORDFDBN DO BEGIN
READ(FDATBAH,RECORDFDBN);
IF RECORDFDBN.TIPE=TP THEN BEGIN
FCB:=RECORDFDBN.FC; FYB:=RECORDFDBN.FY; ESB:=RECORDFDBN.ES; END; END;
END; TP:=0;
REPEAT
TP:=TP+1; YA:='U';
WHILE UPCASE(YA)='U' DO BEGIN
TEXTCOLOR(10); TEXTBACKGROUND(0); CLRSCR; GOTOXY(10,2);
WRITE(CHAR(218)); FOR I:=1 TO 47 DO WRITE(CHAR(196)); WRITE(CHAR(191));
GOTOXY(10,3); WRITE(CHAR(179)); TEXTCOLOR(13);
WRITE(' >>> DATA DIMENSI <<< ');
TEXTCOLOR(10); WRITE(CHAR(179));
GOTOXY(10,4);
WRITE(CHAR(195)); FOR I:=1 TO 47 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,5);
WRITE(CHAR(179),' ,EL:7, Tipe : '); TEXTCOLOR(11); WRITE(TP:3);
WRITE(' '); TEXTCOLOR(10);
WRITE(CHAR(179));
GOTOXY(10,6);
WRITE(CHAR(195)); FOR I:=1 TO 47 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,7);
WRITE(CHAR(179),' Panjang p.k.p Lebar p.k.p Penutup Beton ',CHAR(179));
GOTOXY(10,8);
WRITE(CHAR(179),' (L)--->mm (B)--->mm (Pb)--->mm ',CHAR(179));
GOTOXY(10,9);
WRITE(CHAR(195)); FOR I:=1 TO 47 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,10);
WRITE(CHAR(179)); FOR I:=1 TO 47 DO WRITE(CHAR(0)); WRITE(CHAR(179));
GOTOXY(10,11);
WRITE(CHAR(192)); FOR I:=1 TO 47 DO WRITE(CHAR(196)); WRITE(CHAR(217));
GOTOXY(10,13);
WRITE(' Jenis Plat : '); TEXTCOLOR(15); WRITE('1'); TEXTCOLOR(10);
WRITE(' Plat Satu Arah. '); GOTOXY(10,14);
WRITE(' '); TEXTCOLOR(15); WRITE('2'); TEXTCOLOR(10);
WRITE(' Plat Dua Arah. '); TEXTCOLOR(11);
GOTOXY(10,15); WRITE(' Pilih ? : ');
GOTOXY(10,18); WRITE(' U : ulang L : lanjutkan ===> ');
GOTOXY(17,10); READLN(LPB); GOTOXY(33,10); READLN(BPB);
GOTOXY(49,10); READLN(PBB); ARAHB:=0; ARAHS:=0;
WHILE (ARAHB<1) OR (ARAHB>2) DO BEGIN
GOTOXY(21,15); READLN(ARAHB); END;
IF LPB<BPB THEN BEGIN
LPS:=LPB; LPB:=BPB; BPB:=LPS; END;
IF ARAHB=2 THEN BEGIN
IF LPB/BPB>2 THEN ARAHS:=1; END; BENAR:=TRUE;
WHILE BENAR DO BEGIN
IF ARAHS=1 THEN BEGIN
TEXTCOLOR(11);GOTOXY(10,17);
WRITE(' Plat Termasuk "PLAT SATU ARAH".....! ');
TEXTCOLOR(11); END;
GOTOXY(42,18); YA:=READKEY; WRITE(YA);
IF UPCASE(YA)='U' THEN BENAR:=FALSE;
IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10); END;
IF ARAHS=1 THEN ARAHB:=ARAHS;
IF ARAHB=1 THEN BEGIN
CLRSCR; GOTOXY(10,2);
WRITE(CHAR(218)); FOR I:=1 TO 35 DO WRITE(CHAR(196)); WRITE(CHAR(191));
GOTOXY(10,3); WRITE(CHAR(179)); TEXTCOLOR(11); TEXTBACKGROUND(1);
WRITE(' >>> DATA DIMENSI <<< ');

```



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TEXTBACKGROUND(128); TEXTCOLOR(10); WRITE(CHAR(179));
GOTOXY(10,4);
WRITE(CHAR(195)); FOR I:=1 TO 35 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,5);
WRITE(CHAR(179),' Komponen Struktur Plat Tipe : '); TEXTCOLOR(11);
WRITE(TP:3,' '); TEXTCOLOR(10); WRITE(CHAR(179));
GOTOXY(10,6);
WRITE(CHAR(195)); FOR I:=1 TO 35 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,7); Write(CHAR(179)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('1'); TEXTCOLOR(10);
WRITE(' Dua Tumpuan. '); TEXTBACKGROUND(128);
WRITE(CHAR(179)); GOTOXY(10,8); Write(CHAR(179)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('2'); TEXTCOLOR(10);
WRITE(' Kantilever. '); TEXTBACKGROUND(128);
WRITE(CHAR(179)); GOTOXY(10,9);
WRITE(CHAR(195)); FOR I:=1 TO 35 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,10); WRITE(CHAR(179)); TEXTCOLOR(15); TEXTBACKGROUND(4);
WRITE(' PILIH ? '); TEXTCOLOR(10);
TEXTBACKGROUND(128); WRITE(CHAR(179)); GOTOXY(10,11);
WRITE(CHAR(192)); FOR I:=1 TO 35 DO WRITE(CHAR(196)); WRITE(CHAR(217));
TUMB:=0;
WHILE (TUMB<1) OR (TUMB>2) DO BEGIN
TEXTBACKGROUND(4); TEXTCOLOR(15); GOTOXY(30,10); READLN(TUMB);
TEXTBACKGROUND(128); TEXTCOLOR(10); END;
IF TUMB=1 THEN BEGIN
IF FYB=400 THEN HMIN:=LPB/20;
IF FYB<>400 THEN HMIN:=LPB/20*(0.4+FYB/700); END;
IF TUMB=2 THEN BEGIN
IF FYB=400 THEN HMIN:=LPB/16;
IF FYB<>400 THEN HMIN:=LPB/16*(0.4+FYB/700); END; END;
IF ARAHB=2 THEN BEGIN
CLRSCR; GOTOXY(10,2);
WRITE(CHAR(218)); FOR I:=1 TO 35 DO WRITE(CHAR(196)); WRITE(CHAR(191));
GOTOXY(10,3); WRITE(CHAR(179)); TEXTCOLOR(11); TEXTBACKGROUND(1);
WRITE(' >>> DATA DIMENSI <<< ');
TEXTBACKGROUND(128); TEXTCOLOR(10); WRITE(CHAR(179));
GOTOXY(10,4);
WRITE(CHAR(195)); FOR I:=1 TO 35 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,5);
WRITE(CHAR(179),' Komponen Struktur Plat Tipe : '); TEXTCOLOR(11);
WRITE(TP:3,' '); TEXTCOLOR(10); WRITE(CHAR(179)); GOTOXY(10,6);
WRITE(CHAR(195)); FOR I:=1 TO 35 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,7); Write(CHAR(179)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('1'); TEXTCOLOR(10);
WRITE(' Dengan Balok Tepi. '); TEXTBACKGROUND(128);
WRITE(CHAR(179)); GOTOXY(10,8); Write(CHAR(179)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('2'); TEXTCOLOR(10);
WRITE(' Tanpa Balok Tepi. '); TEXTBACKGROUND(128);
WRITE(CHAR(179)); GOTOXY(10,9);
WRITE(CHAR(195)); FOR I:=1 TO 35 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,10); WRITE(CHAR(179)); TEXTCOLOR(15); TEXTBACKGROUND(4);
WRITE(' PILIH ? '); TEXTCOLOR(10);
TEXTBACKGROUND(128); WRITE(CHAR(179)); GOTOXY(10,11);
WRITE(CHAR(192)); FOR I:=1 TO 35 DO WRITE(CHAR(196)); WRITE(CHAR(217));
TUMB:=0;
WHILE (TUMB<1) OR (TUMB>2) DO BEGIN
TEXTBACKGROUND(4); TEXTCOLOR(15);
GOTOXY(27,10); READLN(TUMB); TEXTBACKGROUND(128); TEXTCOLOR(10); END;
BETA:=LPB/BPB;
IF TUMB=1 THEN HMIN:=(0.8+FYB/1500)*LPB/(36+5*BETA*(1-0.12*(1+1/BETA)));
IF TUMB=2 THEN HMIN:=(0.8+FYB/1500)*LPB/36; END; YA:='U';
WHILE UPCase(YA)='U' DO BEGIN
CLRSCR; GOTOXY(10,2);
WRITE(CHAR(218)); FOR I:=1 TO 41 DO WRITE(CHAR(196)); WRITE(CHAR(191));
GOTOXY(10,3); WRITE(CHAR(179)); TEXTCOLOR(13);
WRITE(' >>> DATA DIMENSI <<< ');
TEXTCOLOR(10); WRITE(CHAR(179)); GOTOXY(10,4);
WRITE(CHAR(195)); FOR I:=1 TO 41 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,5);
WRITE(CHAR(179),' ,EL:7, Tipe : '); TEXTCOLOR(11); WRITE(TP:3);

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```

WRITE(' '); TEXTCOLOR(10);
WRITE(CHAR(179)); GOTOXY(10,6);
WRITE(CHAR(195)); FOR I:=1 TO 41 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,7);
WRITE(CHAR(179),' Tebal Plat Minimum Tebal Plat Rencana 'CHAR(179));
GOTOXY(10,8);
WRITE(CHAR(179),' (hmin)--->mm (h)--->mm 'CHAR(179));
GOTOXY(10,9);
WRITE(CHAR(195)); FOR I:=1 TO 41 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,10);
WRITE(CHAR(179)); FOR I:=1 TO 41 DO WRITE(CHAR(0)); WRITE(CHAR(179));
GOTOXY(10,11);
WRITE(CHAR(192)); FOR I:=1 TO 41 DO WRITE(CHAR(196)); WRITE(CHAR(217));
TEXTCOLOR(11); GOTOXY(10,13); WRITE(' U : ulang L : lanjutkan ==> ');
GOTOXY(18,10); WRITE(HMIN:3:2); GOTOXY(40,10); READLN(HB); BENAR:= TRUE;
WHILE BENAR DO BEGIN
  GOTOXY(42,13); YA:=READKEY; WRITE(YA); IF UPCASE(YA)='U' THEN BENAR:=FALSE;
  IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10); END;
FDM:=NFDA+BDD; ASSIGN(FDIM,FDM); {$I-} RESET(FDIM); {$I+}
IF IORESULT<>0 THEN REWRITE(FDIM); NOREC:=-1; JUM:= FILESIZE(FDIM);
WITH RECORDFDMN DO BEGIN
  IF JUM<>0 THEN BEGIN
    FOR I:=1 TO JUM DO BEGIN
      SEEK(FDIM,I-1); READ(FDIM,RECORDFDMN);
      IF RECORDFDMN.TIPE=TP THEN NOREC:=I-1; END;
      IF NOREC=-1 THEN NOREC:=JUM; SEEK(FDIM,NOREC); END;
      TIPE:=TP; LP:=LPB; BP:=BPB; PB:=PBB; HP:=HB; ARAH:=ARAHB;
      WRITE(FDIM,RECORDFDMN);
    END; CLOSE(FDIM);
  UNTIL TP=JTIPE;
END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11);
  GOTOXY(20,10); WRITE('DATA BAHAN BELUM DIBUAT...!');
  WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END; CHDIR(DIRAK);
END.

```

```

PROGRAM GPL;
USES CRT;
TYPE

```

```

  FGMS = RECORD
    TIPE : INTEGER;
    MLX : REAL;
    MLY : REAL;
    MTX : REAL;
    MTY : REAL;
  END;
  FDMN = RECORD
    TIPE : INTEGER;
    LP : INTEGER;
    BP : INTEGER;
    PB : INTEGER;
    HP : INTEGER;
    ARAH : INTEGER;
  END;

```

```

VAR
  FTIPE,BERKAS : TEXT;
  FGMAKS : FILE OF FGMS;
  FDM : FILE OF FDMN;
  RECORDFGMS : FGMS;
  RECORDFDMN : FDMN;
  Element,I,J,TIPE,JUM,NOREC,TP,A,J,
  LPB,BPB,HPB,JEP,JEPIT,K,JEN,KO,LX,LY,
  TX,TY,CTX,CTY,CTTX,CTTY,CTX2,CTY2,
  CTTX2,CTTY2 : INTEGER;
  QBS,MX,MY,MTUX,MTUY,CTXP,CTYP,CTTXP,
  CTTY : REAL;
  YA : CHAR;

```

```

BENAR                : BOOLEAN;
NFDA,EL              : STRING[7];
FGM,FTIP,FDM         : STRING[12];
FTP,BGM,BDD,DIRAK,DIREK : STRING;

```

```

Begin
DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);FTP:=PARAMSTR(4);
BGM:=PARAMSTR(5); BDD:=PARAMSTR(6); GETDIR(0,DIRAK); CHDIR(DIREK);
FTIP:=NFDA+FTP; ASSIGN(FTIPE,FTIP); {$I-} RESET(FTIPE); {$I+}
IF IORESULT=0 THEN BEGIN
  READ(FTIPE,FTIPE); CLOSE(FTIPE); IF (DIRAK='A:\') OR (DIRAK='C:\') OR (DIRAK='B:\') OR (DIRAK='D:\') OR
(DIRAK='E:\') THEN ASSIGN(BERKAS,DIRAK+'DATA\PLAT.DAT') ELSE
ASSIGN(BERKAS,DIRAK+'DATA\PLAT.DAT');
{$I-} RESET(BERKAS); {$I+}
IF IORESULT=0 THEN BEGIN
  CLOSE(BERKAS); FDM:=NFDA+BDD; ASSIGN(FDIM,FDM); {$I-} RESET(FDIM); {$I+}
IF IORESULT=0 THEN BEGIN
  CLOSE(FDIM); TP:=0;
  REPEAT
    TP:=TP+1; RESET(FDIM);
    WHILE NOT EOF(FDIM) DO BEGIN
      WITH RECORDFDMN DO BEGIN
        READ(FDIM,RECORDFDMN);
        IF TIPE=TP THEN BEGIN
          LPB:=RECORDFDMN.LP; BPB:=RECORDFDMN.BP; HPB:=RECORDFDMN.HP; END; END;
        END; CLOSE(FDIM); YA:='U';
        WHILE UPCASE(YA)='U' DO BEGIN
          TEXTCOLOR(10); TEXTBACKGROUND(0); CLRSCR;
          GOTOXY(10,9);
          WRITE('Plat Tipe : '); TEXTCOLOR(11); WRITE(TP:3); TEXTCOLOR(10);
          GOTOXY(10,10);
          WRITE('Beban Merata Yg Bekerja Pada Plat ? (kPa) : ');
          GOTOXY(10,11);
          WRITE('Plat Ditumpu Pada Keempat Sisinya : '); TEXTCOLOR(11);
          WRITE('1'); TEXTCOLOR(10); WRITE('Jepit Elastis Atau Mencrus. ');
          GOTOXY(10,12);
          WRITE(' '); TEXTCOLOR(11);
          WRITE('2'); TEXTCOLOR(10); WRITE('Jepit Penuh. ');
          GOTOXY(10,13); WRITE('====> Pilih : ');
          TEXTCOLOR(11);
          GOTOXY(10,15); WRITE('U : ulang L : lanjutkan ====> ');
          GOTOXY(54,10); READLN(QB);
          GOTOXY(46,13); READLN(JEP); BENAR:=TRUE;
          WHILE BENAR DO BEGIN
            GOTOXY(41,15); YA:=READKEY; WRITE(YA);
            IF UPCASE(YA)='U' THEN BENAR:=FALSE;
            IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10); END;
          IF JEP=2 THEN BEGIN YA:='U';
          WHILE UPCASE(YA)='U' DO BEGIN
            CLRSCR; GOTOXY(10,2);
            WRITE(CHAR(218)); FOR I:=1 TO 65 DO WRITE(CHAR(196));
            WRITE(CHAR(191));
            GOTOXY(10,3);
            WRITE(CHAR(179)); TEXTCOLOR(11); TEXTBACKGROUND(1);
            WRITE(' >>> PERLETAKAN PADA SISI-SISI PLAT <<< ');
            WRITE(' '); TEXTBACKGROUND(128); TEXTCOLOR(10);
            WRITE(CHAR(179));
            GOTOXY(10,4);
            WRITE(CHAR(195)); FOR I:=1 TO 65 DO WRITE(CHAR(196));
            WRITE(CHAR(180));
            GOTOXY(10,5);
            WRITE(CHAR(179),' PLAT TIPE : '); TEXTCOLOR(11);
            WRITE(TP:3);
            TEXTCOLOR(10); WRITE(CHAR(179));
            GOTOXY(10,6);
            WRITE(CHAR(195)); FOR I:=1 TO 65 DO WRITE(CHAR(196));
            WRITE(CHAR(180));
            GOTOXY(10,7);
            WRITE(CHAR(179)); TEXTBACKGROUND(5);
            WRITE(' '); TEXTCOLOR(15); WRITE('1'); TEXTCOLOR(10);

```

```

WRITE(' Keempat Sisi Terletak Bebas. ');
'); TEXTBACKGROUND(128); WRITE(CHAR(179));
GOTOXY(10,8);
Write(CHAR(179)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('2'); TEXTCOLOR(10);
WRITE(' Keempat Sisi Terjepit Penuh. ');
'); TEXTBACKGROUND(128); WRITE(CHAR(179));
GOTOXY(10,9);
Write(CHAR(179)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('3'); TEXTCOLOR(10);
WRITE(' Dua Sisi (Panjang & Pendek) Terjepit Penuh. ');
'); TEXTBACKGROUND(128); WRITE(CHAR(179));
GOTOXY(10,10);
Write(CHAR(179)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('4'); TEXTCOLOR(10);
WRITE(' Dua Sisi (Pendek) Terjepit Penuh. ');
'); TEXTBACKGROUND(128); WRITE(CHAR(179));
GOTOXY(10,11);
Write(CHAR(179)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('5'); TEXTCOLOR(10);
WRITE(' Dua Sisi (Panjang) Terjepit Penuh. ');
'); TEXTBACKGROUND(128); WRITE(CHAR(179));
GOTOXY(10,12);
Write(CHAR(179)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('6'); TEXTCOLOR(10);
WRITE(' Sisi Pendek Terjepit Penuh. ');
'); TEXTBACKGROUND(128); WRITE(CHAR(179));
GOTOXY(10,13);
Write(CHAR(179)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('7'); TEXTCOLOR(10);
WRITE(' Sisi Panjang Terjepit Penuh. ');
'); TEXTBACKGROUND(128); WRITE(CHAR(179));
GOTOXY(10,14);
Write(CHAR(179)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('8'); TEXTCOLOR(10);
WRITE(' Tiga Sisi Terjepit Penuh & Satu Sisi Pendek Terletak ');
' Bebas. '); TEXTBACKGROUND(128); WRITE(CHAR(179));
GOTOXY(10,15);
Write(CHAR(179)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('9'); TEXTCOLOR(10);
WRITE(' Tiga Sisi Terjepit Penuh & Satu Sisi Panjang Terletak ');
'k Bebas. '); TEXTBACKGROUND(128); WRITE(CHAR(179));
GOTOXY(10,16);
WRITE(CHAR(195)); FOR I:=1 TO 65 DO WRITE(CHAR(196));
WRITE(CHAR(180));
GOTOXY(10,17);
WRITE(CHAR(179));
TEXTCOLOR(15); TEXTBACKGROUND(4);
WRITE(' PILIH ? ');
'); TEXTCOLOR(10); TEXTBACKGROUND(128); WRITE(CHAR(179));
GOTOXY(10,18);
WRITE(CHAR(192)); FOR I:=1 TO 65 DO WRITE(CHAR(196));
WRITE(CHAR(217));
GOTOXY(10,20); TEXTCOLOR(11);
WRITE(' U : ulang L : lanjutkan ==> '); TEXTCOLOR(15); TEXTBACKGROUND(4);
GOTOXY(20,17); READLN(JEPIT); TEXTCOLOR(10); TEXTBACKGROUND(128);
BENAR:=TRUE;
WHILE BENAR DO BEGIN
  TEXTCOLOR(11); GOTOXY(42,20); YA:=READKEY; WRITE(YA);
  IF UPCASE(YA)='U' THEN BENAR:=FALSE;
  IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10); END;
END;
IF JEP=1 THEN BEGIN YA:='U';
  WHILE UPCASE(YA)='U' DO BEGIN
    CLRSCR; GOTOXY(10,2);
    WRITE(CHAR(218)); FOR I:=1 TO 67 DO WRITE(CHAR(196)); WRITE(CHAR(191));
    GOTOXY(10,3); WRITE(CHAR(179)); TEXTCOLOR(11); TEXTBACKGROUND(1);
    WRITE(' >>> PERLETAKAN PADA SISI-SISI PLAT <<< ');
    '); TEXTBACKGROUND(128); TEXTCOLOR(10);
    WRITE(CHAR(179));

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```

GOTOXY(10,4); WRITE(CHAR(195)); FOR I:=1 TO 67 DO WRITE(CHAR(196));
WRITE(CHAR(180));
GOTOXY(10,5); WRITE(CHAR(179),' PLAT TIPE : '); TEXTCOLOR(11);
WRITE(TP:3,' ');
TEXTCOLOR(10); WRITE(CHAR(179));
GOTOXY(10,6); WRITE(CHAR(195)); FOR I:=1 TO 67 DO WRITE(CHAR(196));
WRITE(CHAR(180));
GOTOXY(10,7); Write(CHAR(179)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('1'); TEXTCOLOR(10);
WRITE(' Keempat Sisi Terletak Bebas. ');
' '); TEXTBACKGROUND(128); WRITE(CHAR(179));
GOTOXY(10,8);
Write(CHAR(179)); TEXTBACKGROUND(5); Write(' '); TEXTCOLOR(15);
WRITE('2'); TEXTCOLOR(10); WRITE(' Keempat Sisi Terjepit Elastis. ');
' '); TEXTBACKGROUND(128);
WRITE(CHAR(179));
GOTOXY(10,9);
Write(CHAR(179)); TEXTBACKGROUND(5); Write(' '); TEXTCOLOR(15);
WRITE('3'); TEXTCOLOR(10); WRITE(' Dua Sisi (Panjang & Pendek) ');
' Terjepit Elastis. '); TEXTBACKGROUND(128);
WRITE(CHAR(179));
GOTOXY(10,10);
Write(CHAR(179)); TEXTBACKGROUND(5); Write(' '); TEXTCOLOR(15);
WRITE('4'); TEXTCOLOR(10); WRITE(' Dua Sisi (Pendek) Terjepit ');
' Elastis. '); TEXTBACKGROUND(128);
WRITE(CHAR(179));
GOTOXY(10,11);
Write(CHAR(179)); TEXTBACKGROUND(5); Write(' '); TEXTCOLOR(15);
WRITE('5'); TEXTCOLOR(10); WRITE(' Dua Sisi (Panjang) Terjepit ');
' Elastis. '); TEXTBACKGROUND(128);
WRITE(CHAR(179));
GOTOXY(10,12);
Write(CHAR(179)); TEXTBACKGROUND(5); Write(' '); TEXTCOLOR(15);
WRITE('6'); TEXTCOLOR(10); WRITE(' Sisi Pendek Terjepit Elastis. ');
' '); TEXTBACKGROUND(128);
WRITE(CHAR(179));
GOTOXY(10,13);
Write(CHAR(179)); TEXTBACKGROUND(5); Write(' '); TEXTCOLOR(15);
WRITE('7'); TEXTCOLOR(10); WRITE(' Sisi Panjang Terjepit Elastis. ');
' '); TEXTBACKGROUND(128);
WRITE(CHAR(179));
GOTOXY(10,14);
Write(CHAR(179)); TEXTBACKGROUND(5); Write(' '); TEXTCOLOR(15);
WRITE('8'); TEXTCOLOR(10); WRITE(' Tiga Sisi Terjepit Elastis & ');
' Satu Sisi Pendek Terletak Bebas. '); TEXTBACKGROUND(128);
WRITE(CHAR(179));
GOTOXY(10,15);
Write(CHAR(179)); TEXTBACKGROUND(5); Write(' '); TEXTCOLOR(15);
WRITE('9'); TEXTCOLOR(10); WRITE(' Tiga Sisi Terjepit Elastis & ');
' Satu Sisi Panjang Terletak Bebas. '); TEXTBACKGROUND(128);
WRITE(CHAR(179));
GOTOXY(10,16);
WRITE(CHAR(195)); FOR I:=1 TO 67 DO WRITE(CHAR(196));
WRITE(CHAR(180));
GOTOXY(10,17);
WRITE(CHAR(179));
TEXTCOLOR(15); TEXTBACKGROUND(4); WRITE(' PILIH ? ');
' '); TEXTCOLOR(10);
TEXTBACKGROUND(128); WRITE(CHAR(179));
GOTOXY(10,18);
WRITE(CHAR(192)); FOR I:=1 TO 67 DO WRITE(CHAR(196));
WRITE(CHAR(217));
GOTOXY(10,20); TEXTCOLOR(11); WRITE(' U : ulang L : lanjutkan ==> ');
TEXTCOLOR(15); TEXTBACKGROUND(4);
GOTOXY(20,17); READLN(JEPIT);
TEXTCOLOR(10); TEXTBACKGROUND(128); BENAR:=TRUE;
WHILE BENAR DO BEGIN
GOTOXY(42,20); YA:=READKEY; WRITE(YA);
IF UPCASE(YA)=U THEN BENAR:=FALSE;
IF UPCASE(YA)=L THEN BENAR:=FALSE; END; TEXTCOLOR(10); END; END;

```

```

IF JEP=1 THEN JEPIT:=JEPIT+9; S:=LPB/BPB;
IF S>2.5 THEN A:=16;
IF S<=2.5 THEN A:=TRUNC((TRUNC(S*10)/10-1)*10);
IF (DIRAK='A:') OR (DIRAK='C:') OR (DIRAK='B:') OR (DIRAK='D:') OR
(DIRAK='E:') THEN ASSIGN(BERKAS,DIRAK+'DATAPLAT.DAT') ELSE
ASSIGN(BERKAS,DIRAK+'DATAPLAT.DAT'); RESET(BERKAS);
WHILE NOT EOF(BERKAS) DO BEGIN
  READLN(BERKAS,JEN,KO,LX,LY,TX,TY);
  IF (JEN=JEPIT) AND (KO=A) THEN
    BEGIN CTX:=LX; CTY:=LY; CTTX:=TX; CTTY:=TY; END;
  IF (JEN=JEPIT) AND (KO=A+1) THEN
    BEGIN CTX2:=LX; CTY2:=LY; CTTX2:=TX; CTTY2:=TY; END;
end; CLOSE(BERKAS);
IF A<15 THEN BEGIN
  CTXP:=CTX+(S-((A/10)+1))*10*(CTX2-CTX);
  CTYP:=CTY+(S-((A/10)+1))*10*(CTY2-CTY);
  CTTXP:=CTTX+(S-((A/10)+1))*10*(CTTX2-CTTX);
  CTTYP:=CTTY+(S-((A/10)+1))*10*(CTTY2-CTTY); END;
MX:=0.001*QB*SQR(BPB)*CTXP; MY:=0.001*QB*SQR(BPB)*CTYP;
MTUX:=-0.001*QB*SQR(BPB)*CTTXP; MTUY:=-0.001*QB*SQR(BPB)*CTTYP;
FGM:=NFDA+BGM; ASSIGN(FGMAKS,FGM); {$I-} RESET(FGMAKS); {$I+}
IF IORESULT<>0 THEN REWRITE(FGMAKS); NOREC:=-1; JUM:=FILESIZE(FGMAKS);
WITH RECORDFGMS DO BEGIN
  IF JUM<>0 THEN BEGIN
    FOR I:=1 TO JUM DO BEGIN
      SEEK(FGMAKS,I-1); READ(FGMAKS,RECORDFGMS);
      IF RECORDFGMS.TIPE=TP THEN NOREC:=I-1; END;
      IF NOREC=-1 THEN NOREC:=JUM; SEEK(FGMAKS,NOREC); END;
      TIPE:=TP; MLX:=MX; MLY:=MY; MTX:=MTUX; MTY:=MTUY;
      WRITE(FGMAKS,RECORDFGMS);
    END; CLOSE(FGMAKS);
  UNTIL TP=JTIPE;
END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11);
  GOTOXY(20,10); WRITE(' Data Dimensi Belum Ada.....!');
  WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11);
  GOTOXY(20,10); WRITE(' Data Perletakan Plat Belum Ada.....!');
  WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END; CHDIR(DIRAK);
END.

```

```

PROGRAM PPL;
USES CRT;
TYPE

```

```

  FGMS = RECORD
    TIPE : INTEGER;
    MLX : REAL;
    MLY : REAL;
    MTX : REAL;
    MTY : REAL;
  END;
  FDMN = RECORD
    TIPE : INTEGER;
    LP : INTEGER;
    BP : INTEGER;
    PB : INTEGER;
    HP : INTEGER;
    ARAH : INTEGER;
  END;
  FDBN = RECORD
    TIPE : INTEGER;
    FC : REAL;
    FY : REAL;
    ES : REAL;

```

```

END;
FDBT = RECORD
  TIPE : INTEGER;
  N : INTEGER;
  DP : INTEGER;
  DS : INTEGER;
END;
FKLM = RECORD
  TIPE : INTEGER;
  SX : INTEGER;
  DPX : INTEGER;
  SY : INTEGER;
  DPY : INTEGER;
  STX : INTEGER;
  DPTX : INTEGER;
  STY : INTEGER;
  DPTY : INTEGER;
  S : INTEGER;
  DSU : INTEGER;
END;
VAR
  FTIPE : TEXT;
  FDI : FILE OF FDMN;
  FDATBAH : FILE OF FDBN;
  FBAHTUL : FILE OF FDBT;
  FGMAKS : FILE OF FGMS;
  FPLAT : FILE OF FKLM;
  RECORDFDBN : FDBN;
  RECORDFDBT : FDBT;
  RECORDFGMS : FGMS;
  RECORDFDN : FDMN;
  RECORDFPLT : FKLM;
  I, J, TIPE, JUM, NOREC, J, TP, TERUS, DPB,
  SMAKS, LPB, BPB, HPB, PBB, DPBS, DPLS, DPTBS,
  DPTLS, DSB, DSS : INTEGER;
  FCB, FYB, ESB, DB, O, BI, KB, RHOB, RMAKS, RMIN, KL,
  RHOL, ASL, SL, AD, ASB, SB, ASTB, ASTL, STB, ASBS,
  SBS, ASLS, SLS, ASTBS, STBS, ASTLS, STLS, ASS, SS,
  SSS, MB, ML, MTB, MTL, RB, DL, DTB, DTL, KTB, KTL,
  RHOTB, RHOTL, STL : Real;
  NFDA, EL : STRING[7];
  FDB, FDT, FGM, FTIP, FDM, FBK : STRING[12];
  FTP, BBN, BBT, BGM, BDD, BLK, DIRAK, DIREK : STRING;
BEGIN
  DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);FTP:=PARAMSTR(4);BBN:=PARAMSTR(5);
  BBT:=PARAMSTR(6);BGM:=PARAMSTR(7);BDD:=PARAMSTR(8);BLK:=PARAMSTR(9);
  GETDIR(0,DIRAK);CHDIR(DIREK);FTIP:=NFDA+FTP;ASSIGN(FTIPE,FTIP);{$I-}RESET(FTIPE);{$I+}
  IF IORESULT=0 THEN BEGIN
    READ(FTIPE,FTIPE);CLOSE(FTIPE);FDM:=NFDA+BDD;ASSIGN(FDI,FDM);{$I-}RESET(FDI);{$I+}
    IF IORESULT=0 THEN BEGIN
      CLOSE(FDI);FGM:=NFDA+BGM;ASSIGN(FGMAKS,FGM);{$I-}RESET(FGMAKS);{$I+}
      IF IORESULT=0 THEN BEGIN
        CLOSE(FGMAKS);FDT:=NFDA+BBT;ASSIGN(FBAHTUL,FDT);{$I-}RESET(FBAHTUL);{$I+}
        IF IORESULT=0 THEN BEGIN
          CLOSE(FBAHTUL);FDB:=NFDA+BBN;ASSIGN(FDATBAH,FDB);{$I-}RESET(FDATBAH);{$I+}
          IF IORESULT=0 THEN BEGIN
            CLOSE(FDATBAH);TP:=0;
            REPEAT
              SBS:=100;SLS:=100;STBS:=100;STLS:=0;SSS:=100;TEXTBACKGROUND(0);CLRSCR;
              FOR I:=1 TO 1000 DO BEGIN
                TEXTCOLOR(5);GOTOXY(20,10);FOR j:=1 TO 36 DO WRITE(CHAR(176));
                GOTOXY(20,11);WRITE(CHAR(176),' ');FOR j:=1 TO 3 DO WRITE(CHAR(175));
                TEXTCOLOR(11);WRITE(' PROSES DISAIN PLAT ');TEXTCOLOR(5);
                FOR j:=1 TO 3 DO WRITE(CHAR(174));WRITE(' ',CHAR(176));
                GOTOXY(20,12);FOR j:=1 TO 36 DO WRITE(CHAR(176));TEXTCOLOR(10);END;
              TP:=TP+1;RESET(FGMAKS);
              WHILE NOT EOF(FGMAKS) DO BEGIN
                WITH RECORDFGMS DO BEGIN READ(FGMAKS.RECORDFGMS);
                IF RECORDFGMS.TIPE=TP THEN BEGIN

```

```

MB:=MLX; ML:=MLY; MTB:=MTX; MTL:=MTY; END; END;
END; CLOSE(FGMAKS); RESET(FDATBAH);
WHILE NOT EOF(FDATBAH) DO BEGIN
  WITH RECORDFDBN DO BEGIN READ(FDATBAH,RECORDFDBN);
  IF RECORDFDBN.TIPE=TP THEN BEGIN
    FCB:=FC; FYB:=FY; ESB:=ES; END; END;
  END; CLOSE(FDATBAH); RESET(FDI);
  WHILE NOT EOF(FDI) DO BEGIN
    WITH RECORDFDN DO BEGIN READ(FDI,RECORDFDN);
    IF RECORDFDN.TIPE=TP THEN BEGIN
      LPB:=LP; BPB:=BP; PBB:=PB; HPB:=HP; END; END;
    END; CLOSE(FDI); RESET(FBAHTUL); JUM:=FILESIZE(FBAHTUL);
    FOR I:=1 TO JUM DO BEGIN TERUS:=0;
    WITH RECORDFDBT DO BEGIN
      SEEK(FBAHTUL,I-1); READ(FBAHTUL,RECORDFDBT);
      IF (RECORDFDBT.TIPE=TP) AND (RECORDFDBT.DP<>0) THEN BEGIN
        DPB:=RECORDFDBT.DP; AD:=0.25*3.14*SQR(DPB); O:=0.8; B1:=0.85;
        RB:=(0.85*FCB*B1)*600/(FYB*(600+FYB)); RMAKS:=0.75*RB;
        RMIN:=1.4/FYB; SMAKS:=5*HPB; IF SMAKS>500 THEN SMAKS:=500;
        IF FYB=300 THEN ASS:=0.0020*1000*HPB; IF FYB=400 THEN ASS:=0.0018*1000*HPB;
        IF FYB>400 THEN BEGIN ASS:=0.0018*1000*HPB*(400/FYB);
        IF ASS>0.0014*1000*HPB THEN ASS:=0.0014*1000*HPB; END;
        DB:=HPB-PBB-0.5*DPB; KB:=MB/(O*1000*SQR(DB));
        RHOB:=(FCB-SQRT(SQR(FCB)-2.36*KB*FCB))/(1.18*FYB);
        IF RHOB>RMAKS THEN TERUS:=1;
        IF RHOB<RMIN THEN RHOB:=RMIN; ASB:=RHOB*1000*DB;
        IF ASB<ASS THEN ASB:=ASS; SB:=TRUNC(AD*1000/ASB/10)*10;
        IF SB>SMAKS THEN SB:=SMAKS;
        IF (TERUS<>1) THEN BEGIN
          IF (SB>SBS) AND (SB>=100) THEN BEGIN
            SBS:=SB; ASBS:=ASB; DPBS:=DPB; END; END;
            DL:=HPB-PBB-DPBS-0.5*DPB; KL:=ML/(O*1000*SQR(DL));
            RHOL:=(FCB-SQRT(SQR(FCB)-2.36*KL*FCB))/(1.18*FYB);
            IF RHOL>RMAKS THEN TERUS:=1; IF RHOL<RMIN THEN RHOL:=RMIN;
            ASL:=RHOL*1000*DL; IF ASL<ASS THEN ASL:=ASS;
            SL:=TRUNC(AD*1000/ASL/10)*10; IF SL>SMAKS THEN SL:=SMAKS;
            IF (TERUS<>1) THEN BEGIN
              IF (SL>SLS) AND (SL>=100) THEN BEGIN
                SLS:=SL; ASLS:=ASL; DPLS:=DPB; END; END;
                DTB:=HPB-PBB-0.5*DPB; KTB:=MTB/(O*1000*SQR(DTB));
                RHOT:=(FCB-SQRT(SQR(FCB)-2.36*KTB*FCB))/(1.18*FYB);
                IF RHOT>RMAKS THEN TERUS:=1; IF RHOT<RMIN THEN RHOT:=RMIN;
                ASTB:=RHOT*1000*DTB; IF ASTB<ASS THEN ASTB:=ASS;
                STB:=TRUNC(AD*1000/ASTB/10)*10; IF STB>SMAKS THEN STB:=SMAKS;
                IF (TERUS<>1) THEN BEGIN
                  IF (STB>STBS) AND (STB>=100) THEN BEGIN
                    STBS:=STB; ASTBS:=ASTB; DPTBS:=DPB; END; END;
                    DTL:=HPB-PBB-0.5*DPB; KTL:=MTL/(O*1000*SQR(DTL));
                    RHOTL:=(FCB-SQRT(SQR(FCB)-2.36*KTL*FCB))/(1.18*FYB);
                    IF RHOTL>RMAKS THEN TERUS:=1; IF RHOTL<RMIN THEN RHOTL:=RMIN;
                    ASTL:=RHOTL*1000*DTL; IF ASTL<ASS THEN ASTL:=ASS;
                    STL:=TRUNC(AD*1000/ASTL/10)*10; IF STL>SMAKS THEN STL:=SMAKS;
                    IF (TERUS<>1) THEN BEGIN
                      IF (STL>STLS) AND (STL>=100) THEN BEGIN
                        STLS:=STL; ASTLS:=ASTL; DPTLS:=DPB; END; END; END;
                      END; CLOSE(FBAHTUL); RESET(FBAHTUL); JUM:=FILESIZE(FBAHTUL);
                      FOR I:=1 TO JUM DO BEGIN
                        WITH RECORDFDBT DO BEGIN
                          SEEK(FBAHTUL,I-1); READ(FBAHTUL,RECORDFDBT);
                          IF (RECORDFDBT.TIPE=TP) AND (RECORDFDBT.DS<>0) THEN BEGIN
                            DSB:=RECORDFDBT.DS; AD:=0.25*3.14*SQR(DSB); SS:=TRUNC(AD*1000/ASS/10)*10;
                            IF SS>SMAKS THEN SS:=SMAKS;
                            IF SS>SSS THEN BEGIN
                              DSS:=DSB; SSS:=SS; END; END; END;
                            END; CLOSE(FBAHTUL);
                            IF TERUS=1 THEN BEGIN
                              CLRSCR; TEXTCOLOR(11); GOTOXY(20,10); WRITE('T'bal Plat "DIPERBESAR" .....!');
                              WRITE('^G'); READKEY; TEXTCOLOR(10); END;
                              IF (TERUS<>1) THEN BEGIN
                                FBK:=NFDA+BLK; ASSIGN(FPLAT,FBK); {$I-} RESET(FPLAT); {$I+}

```



```

IF IORESULT<>0 THEN REWRITE(FPLAT);
NOREC:=1; JUM:=FILESIZE(FPLAT);
WITH RECORDFPLT DO BEGIN
  IF JUM<>0 THEN BEGIN
    FOR J:=1 TO JUM DO BEGIN
      SEEK(FPLAT,J-1); READ(FPLAT,RECORDFPLT);
      IF TP=RECORDFPLT.TIPE THEN NOREC:=J-1; END;
      IF NOREC=-1 THEN NOREC:=JUM; SEEK(FPLAT,NOREC); END;
      TIPE:=TP; SX:=TRUNC(SBS); DPX:=TRUNC(DPBS); SY:=TRUNC(SLS);
      DPY:=TRUNC(DPLS); STX:=TRUNC(STBS); DPTX:=TRUNC(DPTBS); STY:=TRUNC(STLS);
      DPTY:=TRUNC(DPTLS); S:=TRUNC(SSS); DSU:=TRUNC(DSS); WRITE(FPLAT,RECORDFPLT);
      END; CLOSE(FPLAT); END;
    UNTIL TP=JTIPE;
  END
  ELSE BEGIN
    CLRSCR; TEXTCOLOR(11); GOTOXY(20,10); WRITE('DATA BAHAN BELUM DIBUAT...!');
    WRITE('^G'); READKEY; TEXTCOLOR(10); END;
  END
  ELSE BEGIN
    CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
    WRITE('DATA TULANGAN YG AKAN DIGUNAKAN BELUM DIBUAT...!');
    WRITE('^G'); READKEY; TEXTCOLOR(10); END;
  END
  ELSE BEGIN
    CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
    WRITE('DATA GAYA YG BEKERJA PADA 'EL,' BELUM DIBUAT...!');
    WRITE('^G'); READKEY; TEXTCOLOR(10); END;
  END
  ELSE BEGIN
    CLRSCR; TEXTCOLOR(11); GOTOXY(20,10); WRITE('DATA DIMENSI 'EL,
    ' BELUM DIBUAT...!'); WRITE('^G'); READKEY; TEXTCOLOR(10); END;
  END
  ELSE BEGIN
    CLRSCR; TEXTCOLOR(11); GOTOXY(20,10); WRITE('JUMLAH TIPE 'EL,
    ' BELUM ADA...!'); WRITE('^G'); READKEY; TEXTCOLOR(10); END;
    CLRSCR; TEXTCOLOR(5); GOTOXY(20,10); FOR J:=1 TO 35 DO WRITE(CHAR(176));
    GOTOXY(20,11); WRITE(CHAR(176),' '); FOR J:=1 TO 3 DO WRITE(CHAR(175));
    TEXTCOLOR(4); WRITE('DISAIN PLAT SELESAI '); TEXTCOLOR(5);
    FOR J:=1 TO 3 DO WRITE(CHAR(174)); WRITE(' ',CHAR(176));
    GOTOXY(20,12); FOR J:=1 TO 35 DO WRITE(CHAR(176));
    GOTOXY(26,13); FOR J:=1 TO 5 DO WRITE(CHAR(3)); TEXTCOLOR(11);
    WRITE('TEKAN ENTER '); TEXTCOLOR(5); FOR J:=1 TO 5 DO WRITE(CHAR(3));
    TEXTCOLOR(10); WRITE('^G'); READLN; CHDIR(DIRAK);
  END.

```

```

PROGRAM SKETSAPLAT;

```

```

uses crt,graph,printer;

```

```

TYPE

```

```

  FDMN = RECORD

```

```

    TIPE : INTEGER;

```

```

    LP : INTEGER;

```

```

    BP : INTEGER;

```

```

    PB : INTEGER;

```

```

    HP : INTEGER;

```

```

    ARAH : INTEGER;

```

```

  END;

```

```

  FBK = RECORD

```

```

    TIPE : INTEGER;

```

```

    SX : INTEGER;

```

```

    DPX : INTEGER;

```

```

    SY : INTEGER;

```

```

    DPY : INTEGER;

```

```

    STX : INTEGER;

```

```

    DPTX : INTEGER;

```

```

    STY : INTEGER;

```

```

    DPTY : INTEGER;

```

```

    S : INTEGER;

```

```

    DSU : INTEGER;

```

```

  END;

```

```

Var
  FTIPE          : TEXT;
  FDM            : FILE OF FDMN;
  FBALOK         : FILE OF FBLK;
  RECORDFDMN    : FDMN;
  RECORDFBLK    : FBLK;
  NFDA,EL       : STRING[7];
  FTP,FDM,FBK   : STRING[12];
  FTP,BDD,BLK,DIRAK,DIREK,S1,D1,S3,D3,S4,D4,S5,D5,TB,O,P : STRING;
  JTIPE,tp,i,J,a,b,c,drivergrafik,
  modegrafik,Z,X,Y,NTTA,DPTTA,DSB,PBB,BB,
  HB,SS,NTTB,DPTTB,NMAKS,D,DPTLA,DPTLB,ARAHB,
  NTLA,NTLB,DL,NL,E,BARA,BARB,T,L,S,SBTX,SBTY,SBX,SBY : INTEGER;
  TULIS         : STRING[9];

begin
  DIREK:=PARAMSTR(1); NFDA:=PARAMSTR(2); FTP:=PARAMSTR(3); BDD:=PARAMSTR(4);
  BLK:=PARAMSTR(5); GETDIR(0,DIRAK); CHDIR(DIREK); drivergrafik := detect;
  IF (DIRAK='A:\') OR (DIRAK='C:\') OR (DIRAK='B:\') OR (DIRAK='D:\') OR
  (DIRAK='E:\') THEN initgraph(drivergrafik, modegrafik,DIRAK+'LOGO');
  initgraph(drivergrafik, modegrafik,DIRAK+'LOGO');
  FTIP:=NFDA+FTP; ASSIGN(FTIPE,FTIP); {SI-} RESET(FTIPE); {SI+}
  IF IORESULT=0 THEN BEGIN READ(FTIPE,JTIPE); CLOSE(FTIPE);
  FBK:=NFDA+BLK; ASSIGN(FBALOK,FBK); {SI-} RESET(FBALOK); {SI+}
  IF IORESULT=0 THEN BEGIN CLOSE(FBALOK);
  FDM:=NFDA+BDD; ASSIGN(FDIM,FDM); {SI-} RESET(FDIM); {SI+}
  IF IORESULT=0 THEN BEGIN CLOSE(FDIM); TP:=0;
  REPEAT
    TP:=TP+1; RESET(FDIM); cleardevice; setfillstyle(1,15); Y:=0; S:=0;
    floodfill(300,200,14); setteXTstyle(SMALLfont,horizdir,4); Z:=0;
    WHILE NOT EOF(FDIM) DO BEGIN
      WITH RECORDFDMN DO BEGIN READ(FDIM,RECORDFDMN);
      IF RECORDFDMN.TIPE=TP THEN BEGIN BB:=TRUNC(BP); HB:=TRUNC(HP); T:=TRUNC(TP);
      PBB:=TRUNC(PB); ARAHB:=ARAH; END; END; CLOSE(FDIM); RESET(FBALOK);
      WHILE NOT EOF(FBALOK) DO BEGIN WITH RECORDFBLK DO BEGIN READ(FBALOK,RECORDFBLK);
      IF RECORDFBLK.TIPE=TP THEN BEGIN SBTX:=STX; DPTTA:=DPTX; SBTY:=STY;
      DPTTB:=DPTY; SBX:=SX; DPTLA:=DPX; SBY:=SY; DPTLB:=DPY;
      DSB:=DSU; SS:=S; END; END; END; CLOSE(FBALOK);
      FOR I:=0 TO 1 DO BEGIN
        IF I=0 THEN BEGIN L:=HB; S:=SBX; STR(SBTY,S5); STR(DPTTB,D5); END
        ELSE BEGIN L:=BB; S:=SBY; STR(SBTX,S5); STR(DPTTA,D5); END;
        STR((I+1)*SBX,S1); STR(DPTLA,D1); STR(TRUNC(2/(I+1))*SBY,S3); STR(DPTLB,D3); STR(SS,S4); STR(DSB,D4);
        STR(T,TB); STR(TP,O); STR(L,P);
        Z:=0; IF (I=0) THEN Z:=1;
        SETLINestyle(0,0,1); setteXTstyle(SMALLfont,horizdir,4); SETCOLOR(0);
        MOVETO(30+I*25,50+I*180); LINEREL(550-I*50,0);
        MOVETO(30+I*25,110+I*180); LINEREL(550-I*50,0);
        MOVETO(25+I*25,150+I*180); LINEREL(560-I*50,0);
        MOVETO(30+I*25,148+I*180); LINEREL(0,5);
        MOVETO(580-I*25,148+I*180); LINEREL(0,5);
        OUTTEXTXY(285,I*180+138,P+' mm');
        MOVETO(590-I*25,45+I*180); LINEREL(0,70);
        MOVETO(588-I*25,50+I*180); LINEREL(5,0);
        MOVETO(588-I*25,110+I*180); LINEREL(5,0);
        OUTTEXTXY(592-I*25,I*180+70,TB+' mm');
        SETLINestyle(1,0,1);
        MOVETO(30+I*25,45+I*180); LINEREL(0,70);
        MOVETO(580-I*25,45+I*180); LINEREL(0,70);
        SETLINestyle(0,0,3);
        MOVETO(30+I*25,60+I*180); LINEREL(171-I*25,0);
        MOVETO(201,60+I*180); LINEREL(-3,3);
        MOVETO(580-I*25,60+I*180); LINEREL(-172+I*25,0);
        MOVETO(408,60+I*180); LINEREL(3,3);
        MOVETO(30+I*25,100+I*180-Z*4); LINEREL(550-I*50,0);
        MOVETO(422,100+I*180-Z*4); LINEREL(-3,-3);
        MOVETO(187,100+I*180-Z*4); LINEREL(3,-3);
        IF FRAC(L/S)=0 THEN NTLA:=TRUNC(L/S)+1 ELSE NTLA:=TRUNC(L/S)+2;
        A:=0; C:=1; D:=1;
        IF NTLA>2 THEN BEGIN

```

```

IF NTLA-2>1 THEN BEGIN
  B:=TRUNC((220)/(NTLA-1));
  FOR J:=1 TO NTLA-2 DO
  BEGIN
    IF A=0 THEN BEGIN
      CIRCLE(195+B*C,96+I*180+Z*4,2);
      A:=1; C:=C+1;
    END
    ELSE BEGIN
      CIRCLE(415-B*D,96+I*180+Z*4,2);
      A:=0; D:=D+1;
    END;
  END;
  ELSE CIRCLE(305,96+I*180+Z*4,2);
  END;
  CIRCLE(195,96+I*180+Z*4,2);
  CIRCLE(415,96+I*180+Z*4,2);
  FOR E:=0 TO 1 DO
  BEGIN
    NTLA:=TRUNC(0.3*L/SS)+1; IF (E=1) AND (I=0) THEN Z:=1 ELSE Z:=0;
    IF NTLA>1 THEN BEGIN
      B:=TRUNC((165-I*25-E*11-NTLA*2)/(NTLA-1));
      FOR J:=1 TO NTLA-1 DO
      BEGIN
        CIRCLE(195-B*J-E*11,64+I*180+E*32+Z*4,2);
        CIRCLE(415+B*J+E*11,64+I*180+E*32+Z*4,2);
      END;
    END;
    CIRCLE(195-E*11,64+I*180+E*32+Z*4,2);
    CIRCLE(415+E*11,64+I*180+E*32+Z*4,2);
  END;
  setteXTstyle(SMALLfont,horizdir,4);
  SETLINESTYLE(0,0,1); MOVETO(305+110*Z,I*180+100); LINEREL(-13,13);
  OUTTEXTXY(275+85*Z,I*180+115,'D'+D1+'-'+S1); MOVETO(415-Z*110,I*180+96); LINEREL(-8,-8);
  OUTTEXTXY(360-Z*110,I*180+80,'D'+D3+'-'+S3); MOVETO(415,I*180+64); LINEREL(-8,8);
  OUTTEXTXY(360,I*180+65,'D'+D4+'-'+S4); MOVETO(195,I*180+64); LINEREL(8,8);
  OUTTEXTXY(212,I*180+65,'D'+D4+'-'+S4); MOVETO(410,I*180+58); LINEREL(13,-13);
  OUTTEXTXY(405,I*180+29,'D'+D5+'-'+S5); MOVETO(200,I*180+58); LINEREL(-13,-13);
  OUTTEXTXY(160,I*180+29,'D'+D5+'-'+S5); MOVETO(185,I*180+100); LINEREL(-13,13-I*26);
  OUTTEXTXY(155,I*140+115,'D'+D4+'-'+S4); setteXTstyle(tripleXfont,horizdir,1);
  outteXTXy(145,380,'SKETSA PENULANGAN PLAT TIPE '+O);
  setteXTstyle(SMALLfont,horizdir,6); IF I=0 THEN
  OUTTEXTXY(150,170,'PENULANGAN PLAT ARAH MEMANJANG') ELSE
  OUTTEXTXY(170,350,'PENULANGAN PLAT ARAH LEBAR');
  setteXTstyle(SMALLfont,horizdir,4);
  SETLINESTYLE(0,0,1); SETCOLOR(1); setteXTstyle(tripleXfont,horizdir,1);
  outteXTXy(516,440,'UII-CDP'); setteXTstyle(SMALLfont,horizdir,4);
  setcolor(4); rectangle(500,440,600,465); setcolor(0);
  END; READKEY; UNTIL TP=JTIPE; END; END;
  END; closegraph; restorecrtmode; CHDIR(DIRAK);
end.

```

```

PROGRAM TDPL;
USES CRT;
TYPE
  FDBN = RECORD
    TIPE : INTEGER;
    FC : REAL;
    FY : REAL;
    ES : REAL;
  END;
  FDBT = RECORD
    TIPE : INTEGER;
    N : INTEGER;
    DP : INTEGER;
    DS : INTEGER;
  END;
  FGMS = RECORD
    TIPE : INTEGER;

```

```

        MLX : REAL;
        MLY : REAL;
        MTX : REAL;
        MTY : REAL;
    END;
FDMN = RECORD
    TIPE : INTEGER;
    LP : INTEGER;
    BP : INTEGER;
    PB : INTEGER;
    HP : INTEGER;
    ARAH : INTEGER;
END;

VAR
    FTIPE          : TEXT;
    FDATBAH        : FILE OF FDBN;
    FBAHTUL        : FILE OF FDBT;
    FGMAKS         : FILE OF FGMS;
    FDM            : FILE OF FDMN;
    RECORDFDBN     : FDBN;
    RECORDFDBT     : FDBT;
    RECORDFGMS     : FGMS;
    RECORDFDMN     : FDMN;
    I,TIPE,JUM,NOREC,J,TP,DPMAXS,DSMAXS,
    NTUL,DPTUL,K,F,A : Integer;
    NFDA,EL        : STRING[7];
    FDB,FDT,FGM,FTIP,FDM,FELM : STRING[12];
    FTP,BBN,BBT,BEL,BGM,BDD,DIRAK,DIREK : STRING;

BEGIN
    DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2); EL:=PARAMSTR(3); FTP:=PARAMSTR(4);
    BBN:=PARAMSTR(5); BBT:=PARAMSTR(6); BEL:=PARAMSTR(7); BGM:=PARAMSTR(8);
    BDD:=PARAMSTR(9); GETDIR(0,DIRAK); CHDIR(DIREK); FDM:=NFDA+BDD;
    ASSIGN(FDM,FDM); {$I-} RESET(FDM); {$I+}
    IF IORESULT=0 THEN BEGIN
        CLOSE(FDM); FGM:=NFDA+BGM; ASSIGN(FGMAKS,FGM); {$I-} RESET(FGMAKS); {$I+}
        IF IORESULT=0 THEN BEGIN
            CLOSE(FGMAKS); FDT :=NFDA+BBT; ASSIGN(FBAHTUL,FDT); {$I-} RESET(FBAHTUL); {$I+}
            IF IORESULT=0 THEN BEGIN
                CLOSE(FBAHTUL); FDB :=NFDA+BBN; ASSIGN(FDATBAH,FDB); {$I-} RESET(FDATBAH); {$I+}
                IF IORESULT=0 THEN BEGIN
                    CLOSE(FDATBAH); TEXTCOLOR(10); TEXTBACKGROUND(0); CLRSCR;
                    I:=1; K:=1; F:=1; RESET(FDATBAH);
                    WHILE NOT EOF(FDATBAH) DO BEGIN
                        SEEK(FDATBAH,F-1); READ(FDATBAH,RECORDFDBN); F:=F+1;
                        WITH RECORDFDBN DO BEGIN
                            IF (K=1) THEN BEGIN I:=I+6;
                                IF I>=22 THEN BEGIN CLRSCR; I:=7; END;
                                WRITE(' ',CHAR(218));
                                FOR J:=1 TO 63 DO WRITE(CHAR(196)); WRITE(CHAR(191));
                                WRITELN; WRITE(' ',CHAR(179)); TEXTCOLOR(11);
                                WRITE(' >>> DATA BAHAN <<< ',
                                    ' '); TEXTCOLOR(10); WRITE(CHAR(179));
                                WRITELN; WRITE(' ',CHAR(195));
                                FOR J:=1 TO 63 DO WRITE(CHAR(196)); WRITE(CHAR(180));
                                WRITELN; WRITE(' ',CHAR(179),
                                    ' Tipe Teg. Desak Beton Teg. Tarik Baja Mod. ',
                                    'Elastisitas Baja ',CHAR(179)); WRITELN;
                                WRITE(' ',CHAR(179),
                                    ' Plat (MPa) (MPa) (MPa)',
                                    ' ',CHAR(179)); WRITELN; WRITE(' ',CHAR(195));
                                FOR J:=1 TO 63 DO WRITE(CHAR(196)); WRITE(CHAR(180));
                                WRITELN; END;
                                WRITE(' ',CHAR(179),' ',TIPE:3,' ',TRUNC(FC):3,
                                    ' ',TRUNC(FY):3,' ',TRUNC(ES):6,
                                    ' ',CHAR(179)); WRITELN; K:=K+1; I:=I+1;
                                IF (I>=22) OR EOF(FDATBAH) THEN BEGIN
                                    WRITE(' ',CHAR(192));
                                    FOR J:=1 TO 63 DO WRITE(CHAR(196)); WRITE(CHAR(217));
                                END;
                            END;
                        END;
                    END;
                END;
            END;
        END;
    END;

```

```

    READKEY; WRITELN; K:=1; I:=I+1; END;
    IF I>=22 THEN BEGIN I:=1; K:=1; CLRSCR; END; END;
END; CLOSE(FDATBAH); F:=1; RESET (FBAHTUL);
WHILE NOT EOF(FBAHTUL) DO BEGIN
    SEEK(FBAHTUL,F-1); READ(FBAHTUL,RECORDFDBT); F:=F+1;
    WITH RECORDFDBT DO BEGIN
        IF (K=1) THEN BEGIN I:=I+6;
        IF I>=22 THEN BEGIN I:=7; CLRSCR; END;
        WRITE('      ',CHAR(218));
        FOR J:=1 TO 65 DO WRITE(CHAR(196)); WRITE(CHAR(191));
        WRITELN; WRITE('      ',CHAR(179)); TEXTCOLOR(11);
        WRITE('      >>> DIAMETER TULANGAN YANG AKAN DIGUNAKAN',
        '<<<< '); TEXTCOLOR(10); WRITE(CHAR(179)); WRITELN;
        WRITE('      ',CHAR(195));
        FOR J:=1 TO 65 DO WRITE(CHAR(196)); WRITE(CHAR(180));
        WRITELN; WRITE('      ',CHAR(179),' Tipe No. Diameter Tulangan',
        ' Pokok Diameter Tulangan Sengkan',CHAR(179)); WRITELN;
        WRITE('      ',CHAR(179),' Plat (mm)',
        ' (mm) ',CHAR(179));
        WRITELN; WRITE('      ',CHAR(195));
        FOR J:=1 TO 65 DO WRITE(CHAR(196)); WRITE(CHAR(180));
        WRITELN; END;
        WRITE('      ',CHAR(179),' TIPE:3, ' N:2,
        '      ',DP:2, '      ',DS:2,
        '      ',CHAR(179)); WRITELN; K:=K+1; I:=I+1;
    IF (I>=22) OR EOF(FBAHTUL) THEN BEGIN
        WRITE('      ',CHAR(192)); FOR J:=1 TO 65 DO WRITE(CHAR(196));
        WRITE(CHAR(217)); READKEY; WRITELN; K:=1; I:=I+1; END;
    IF I>=22 THEN BEGIN K:=1; I:=1; CLRSCR; END; END;
END; CLOSE(FBAHTUL); F:=1; RESET(FDIM);
WHILE NOT EOF(FDIM) DO BEGIN
    SEEK(FDIM,F-1); READ(FDIM,RECORDFDMN); F:=F+1;
    WITH RECORDFDMN DO BEGIN
        IF K=1 THEN BEGIN I:=I+6;
        IF I>=22 THEN BEGIN I:=7; CLRSCR; END;
        WRITE('      ',CHAR(218));
        FOR J:=1 TO 51 DO WRITE(CHAR(196)); WRITE(CHAR(191));
        WRITELN; WRITE('      ',CHAR(179)); TEXTCOLOR(11);
        WRITE('      >>> DATA DIMENSI <<<< ');
        TEXTCOLOR(10); WRITE(CHAR(179)); WRITELN;
        WRITE('      ',CHAR(195));
        FOR J:=1 TO 51 DO WRITE(CHAR(196)); WRITE(CHAR(180));
        WRITELN; WRITE('      ',CHAR(179),
        ' Tipe Panjang Lebar Tebal Penutup Beton Arah ',
        CHAR(179)); WRITELN; WRITE('      ',CHAR(179),
        ' Plat (mm) (mm) (mm) (mm) Kerja ',
        CHAR(179)); WRITELN; WRITE('      ',CHAR(195));
        FOR J:=1 TO 51 DO WRITE(CHAR(196)); WRITE(CHAR(180));
        WRITELN; END;
        WRITE('      ',CHAR(179),' TIPE:3, ' LP:5, ' BP:5,
        '      ',HP:4, '      ',PB:3, '      ',ARAH,' Arah ',CHAR(179));
        WRITELN; K:=K+1; I:=I+1;
    IF (I>=22) OR EOF(FDIM) THEN BEGIN
        WRITE('      ',CHAR(192)); FOR J:=1 TO 51 DO WRITE(CHAR(196));
        WRITE(CHAR(217)); READKEY; WRITELN; K:=1; I:=I+1; END;
    IF I>=22 THEN BEGIN K:=1; I:=1; CLRSCR; END; END;
END; CLOSE(FDIM); F:=1; A:=11; RESET(FGMAKS);
WHILE NOT EOF(FGMAKS) DO BEGIN
    SEEK(FGMAKS,F-1); READ(FGMAKS,RECORDFGMS); F:=F+1;
    WITH RECORDFGMS DO BEGIN
        IF K=1 THEN BEGIN I:=I+6;
        IF I>=22 THEN BEGIN I:=22; CLRSCR; END;
        WRITE('      ',CHAR(218));
        FOR J:=1 TO 51 DO WRITE(CHAR(196)); WRITE(CHAR(191));
        WRITELN; WRITE('      ',CHAR(179)); TEXTCOLOR(11);
        WRITE('      >>> DATA GAYA-GAYA MAKSIMUM <<<< ');
        TEXTCOLOR(10); WRITE(CHAR(179)); WRITELN;
        WRITE('      ',CHAR(195));
        FOR J:=1 TO 51 DO WRITE(CHAR(196)); WRITE(CHAR(180));
        WRITELN; WRITE('      ',CHAR(179),

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```

' Tipe M Lap. x M Lap. y M Tum. x M Tum. y',
CHAR(179)); WRITELN; WRITE(' ',CHAR(179),
' Plat (Nmm) (Nmm) (Nmm) (Nmm) ',
CHAR(179)); WRITELN; WRITE(' ',CHAR(195));
FOR J:=1 TO 51 DO WRITE(CHAR(196)); WRITE(CHAR(180)); WRITELN; END;
WRITE(' '); WRITE(CHAR(179),' ',TIPE:3,' ',MLX:8,' ',MLY:8,
' ',MTX:9,' ',MTY:9,' ',CHAR(179)); WRITELN; K:=K+1; I:=I+1;
IF (I>=22) OR EOF(FGMAKS) THEN BEGIN
WRITE(' ',CHAR(192)); FOR J:=1 TO 51 DO WRITE(CHAR(196));
WRITE(CHAR(217)); READKEY; WRITELN; K:=1; I:=I+1; END;
IF (I>=22) THEN BEGIN K:=1; I:=1; CLRSCR; END; END;
END; CLOSE(FGMAKS);
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10); WRITE('DATA BAHAN BELUM DIBUAT...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
WRITE('DATA TULANGAN YG AKAN DIGUNAKAN BELUM DIBUAT...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
WRITE('DATA GAYA YG BEKERJA PADA BALOK BELUM DIBUAT...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
WRITE('DATA DIMENSI BALOK BELUM DIBUAT...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END; CHDIR(DIRAK);
END.

```

PROGRAM TPL;

USES CRT;

TYPE

FDAT = RECORD

NPROY : string[19];

NFDAT : string[8];

NaFil : string[12];

ENG : string[19];

END;

FKLM = RECORD

TIPE : INTEGER;

SX : INTEGER;

DPX : INTEGER;

SY : INTEGER;

DPY : INTEGER;

STX : INTEGER;

DPTX : INTEGER;

STY : INTEGER;

DPTY : INTEGER;

S : INTEGER;

DSU : INTEGER;

END;

VAR

FPLAT : FILE OF FKLM;

NFILE : FILE OF FDAT;

RECORDFDAT : FDAT;

RECORDFPLT : FKLM;

I,J,A,B,C : INTEGER;

NFDA,EL : STRING[7];

FBK : STRING[12];

NPRO,EN : STRING[19];

BLK,DIRAK,

DIREK : STRING;

BEGIN

DIREK:=PARAMSTR(1); NFDA:=PARAMSTR(2); EL:=PARAMSTR(3); BLK:=PARAMSTR(4);

```

GETDIR(0,DIRAK); CHDIR(DIREK); ASSIGN(NFILE,FILEDATA.DAT); RESET(NFILE);
WHILE NOT EOF(NFILE) DO BEGIN READ(NFILE,RECORDFDAT);
IF RECORDFDAT.NFDAT=NFDA THEN BEGIN
  NPRO:=RECORDFDAT.NPROY; EN :=RECORDFDAT.ENG; END; END;
CLOSE(NFILE); FBK:=NFDA+BLK; ASSIGN(FPLAT,FBK); {$I-} RESET(FPLAT); {$I+}
IF IORESULT=0 THEN BEGIN I:=1;
WHILE NOT EOF(FPLAT) DO BEGIN
  WITH RECORDFPLT DO BEGIN READ(FPLAT,RECORDFPLT);
  IF I=1 THEN BEGIN
    A:=LENGTH(NPRO); B:=LENGTH(NFDA); C:=LENGTH(EN);
    TEXTCOLOR(10); TEXTBACKGROUND(0); CLRSCR; GOTOXY(10,1);
    WRITE(CHAR(218)); FOR J:=1 TO 61 DO WRITE(CHAR(196)); WRITE(CHAR(191));
    GOTOXY(10,2); WRITE(CHAR(179)); TEXTCOLOR(11);
    WRITE('          PENULANGAN PLAT          ');
    TEXTCOLOR(10); WRITE(CHAR(179)); GOTOXY(10,3);
    WRITE(CHAR(195)); FOR J:=1 TO 61 DO WRITE(CHAR(196)); WRITE(CHAR(180));
    GOTOXY(10,4); WRITE(CHAR(179),' Proyek : ',NPRO:A);
    FOR J:=1 TO (19-A) DO WRITE(' '); WRITE(' Nama File Data : ',NFDA:B);
    FOR J:=1 TO (8-B) DO WRITE(' '); WRITE(' ',CHAR(179)); GOTOXY(10,5);
    WRITE(CHAR(179),' Perencana : ',EN:C); FOR J:=1 TO (19-C) DO WRITE(' ');
    WRITE(' ',CHAR(179)); GOTOXY(10,6);
    WRITE(CHAR(195)); FOR J:=1 TO 6 DO WRITE(CHAR(196)); WRITE(CHAR(194));
    FOR J:=1 TO 21 DO WRITE(CHAR(196)); WRITE(CHAR(194));
    FOR J:=1 TO 21 DO WRITE(CHAR(196)); WRITE(CHAR(194));
    FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(180));
    GOTOXY(10,7);
    WRITE(CHAR(179),' TIPE ',CHAR(179),' ARAH MELEBAR ',CHAR(179),
    ' ARAH MEMANJANG ',CHAR(179),' TULANGAN ',CHAR(179)); GOTOXY(10,8);
    WRITE(CHAR(179)); FOR J:=1 TO 6 DO WRITE(CHAR(0)); WRITE(CHAR(195));
    FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(194));
    FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(197));
    FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(194));
    FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(180),' BAGI/ ',CHAR(179));
    GOTOXY(10,9); WRITE(CHAR(179),' PLAT ',CHAR(179),' LAPANGAN ',CHAR(179),
    ' TUMPUAN ',CHAR(179),' LAPANGAN ',CHAR(179),' TUMPUAN ',CHAR(179),
    ' SUSUT ',CHAR(179)); GOTOXY(10,10);
    WRITE(CHAR(195)); FOR J:=1 TO 6 DO WRITE(CHAR(196)); WRITE(CHAR(197));
    FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(197));
    FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(197));
    FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(197));
    FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(197));
    FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(180)); END;
    GOTOXY(10,I+10); WRITE(CHAR(179),' TIPE:3,' ',CHAR(179),'D',DPX:2,'-',
    SX:3,'mm ',CHAR(179),'D',DPTX:2,'-',STX:3,'mm ',CHAR(179),'D',DPY:2,'-',
    SY:3,'mm ',CHAR(179),'D',DPTY:2,'-',STY:3,'mm ',CHAR(179),'D',DSU:2,
    ' ',S:3,'mm ',CHAR(179)); I:=I+1;
    IF (I=15) OR (EOF(FPLAT)) THEN BEGIN
      GOTOXY(10,I+10);
      WRITE(CHAR(192)); FOR J:=1 TO 6 DO WRITE(CHAR(196)); WRITE(CHAR(193));
      FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(193));
      FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(193));
      FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(193));
      FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(193));
      FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(217));
      GOTOXY(10,I+11); TEXTCOLOR(11); WRITE('Tekan "SEMBARANG TOMBOL." Untuk Melanjutkan.....!');
      WRITE('G'); READKEY; TEXTCOLOR(10); I:=1; END; END;
    END; CLOSE(FPLAT);
  END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11); GOTOXY(20,5);
  WRITE(' PROSES DISAIN BELUM DILAKUKAN'); GOTOXY(15,7);
  WRITE('Tekan "SEMBARANG TOMBOL." Untuk Melanjutkan.....!');
  WRITE('G'); READKEY; TEXTCOLOR(10); END; CHDIR(DIRAK);
END.

PROGRAM CBL;
USES CRT,PRINTER;
TYPE
  FDAT = RECORD

```

```

        NPROY : string[19];
        NFDAT : string[8];
        NaFil : string[12];
        ENG : string[19];
    END;
FBLK = RECORD
    TIPE : INTEGER;
    FNTLB : INTEGER;
    FDPTLB : INTEGER;
    FNTLA : INTEGER;
    FDPTLA : INTEGER;
    FNTTB : INTEGER;
    FDPTTB : INTEGER;
    FNTTA : INTEGER;
    FDPTTA : INTEGER;
    FNTLB1 : INTEGER;
    FDPTLB1 : INTEGER;
    FNTLA1 : INTEGER;
    FDPTLA1 : INTEGER;
    FNTTB1 : INTEGER;
    FDPTTB1 : INTEGER;
    FNTTA1 : INTEGER;
    FDPTTA1 : INTEGER;
    FDSS : INTEGER;
    FS : INTEGER;
    FNL : INTEGER;
    FDL : INTEGER;
END;
VAR
    FBALOK          : FILE OF FBLK;
    NFILE           : FILE OF FDAT;
    RECORDFDAT      : FDAT;
    RECORDFBLK      : FBLK;
    I,JUM,J,BATASATAS,BATASBAWAH,
    BARIS,JUMLAHBARIS,HAL,BATASKIRI,A,
    B,C,D,E         : INTEGER;
    BENAR           : BOOLEAN;
    KERTAS          : BYTE;
    YA              : CHAR;
    EL              : STRING[7];
    NFDA            : STRING[8];
    FBK             : STRING[12];
    NPRO,EN         : STRING[19];
    BLK,DIRAK,DIREK : STRING;

BEGIN
    DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);BLK:=PARAMSTR(4);E:=0;
    GETDIR(0,DIRAK); CHDIR(DIREK);
    REPEAT
    ASSIGN(NFILE,'FILEDATA.DAT'); RESET(NFILE);
    WHILE NOT EOF(NFILE) DO BEGIN READ(NFILE,RECORDFDAT);
    IF RECORDFDAT.NFDAT=NFDA THEN BEGIN
        NPRO:=RECORDFDAT.NPROY; EN:=RECORDFDAT.ENG; END;
    END; CLOSE(NFILE); FBK:=NFDA+BLK; ASSIGN(FBALOK,FBK); {$I-} RESET(FBALOK); {$I+}
    IF IORESULT=0 THEN BEGIN
        YA:=U; BATASATAS:=0; BATASBAWAH:=0; BATASKIRI:=0;
        WHILE UPCASE(YA)=U DO BEGIN
            TEXTBACKGROUND(0); TEXTCOLOR(10); CLRSCR; GOTOXY(10,2);
            WRITE(CHAR(218)); FOR I:=1 TO 50 DO WRITE(CHAR(196)); WRITE(CHAR(191));
            GOTOXY(10,3); WRITE(CHAR(179),' Ukuran Kertas : '); TEXTCOLOR(11); WRITE('1');
            TEXTCOLOR(10); WRITE('Folio '); TEXTCOLOR(11); WRITE('2');
            TEXTCOLOR(10); WRITE('Kuarto '); TEXTCOLOR(11);
            WRITE('---> Pilih : '); TEXTCOLOR(10); WRITE(CHAR(179)); GOTOXY(10,4);
            WRITE(CHAR(179),' Batas Atas : ',CHAR(179));
            GOTOXY(10,5);
            WRITE(CHAR(179),' Batas Bawah : ',CHAR(179));
            GOTOXY(10,6);
            WRITE(CHAR(179),' Batas Kiri : ',CHAR(179));
            GOTOXY(10,7); WRITE(CHAR(192)); FOR I:=1 TO 50 DO WRITE(CHAR(196)); WRITE(CHAR(217));
            TEXTCOLOR(11); GOTOXY(10,9); WRITE('U : ulang L : lanjutkan ==> ');

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GOTOXY(29,4); WRITE('Baris'); GOTOXY(29,5); WRITE('Baris');
GOTOXY(29,6); WRITE('Spasi'); GOTOXY(59,3); READLN(KERTAS);
GOTOXY(26,4); READLN(BATASATAS); GOTOXY(26,5); READLN(BATASBAWAH);
GOTOXY(26,6); READLN(BATASKIRI); BENAR:=TRUE;
WHILE BENAR DO BEGIN
  GOTOXY(42,9); YA:=READKEY; WRITE(YA); IF UPCASE(YA)='U' THEN BENAR:=FALSE;
  IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10); END;
IF KERTAS=1 THEN JUMLAHBARIS:=63; IF KERTAS=2 THEN JUMLAHBARIS:=57;
BARIS:=JUMLAHBARIS-BATASATAS-BATASBAWAH; I:=1; HAL:=0;
WHILE NOT EOF(FBALOK) DO BEGIN
  CLRSCR; TEXTCOLOR(11);
  GOTOXY(20,10); WRITE('MENCETAK HASIL DISAIN.....'); TEXTCOLOR(11);
  WRITE(I); TEXTCOLOR(10);
  WITH RECORDFBLK DO BEGIN READ(FBALOK,RECORDFBLK);
  IF I=1 THEN BEGIN
    FNTLB:=FNTLB1; FDPTLB:=FDPTLB1; FNTLA:=FNTLA1; FDPTLA:=FDPTLA1;
    FNTTB:=FNTTB1; FDPTTB:=FDPTTB1; FNTTA:=FNTTA1; FDPTTA:=FDPTTA1;
    END;
  IF I=1 THEN BEGIN
    A:=LENGTH(NPRO); B:=LENGTH(NFDA); C:=LENGTH(EN); D:=LENGTH(EL);
    FOR J:=1 TO BATASATAS DO BEGIN WRITELN(LST); END; HAL:=HAL+1;
    FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
    WRITE(LST,CHAR(218)); FOR J:=1 TO 59 DO WRITE(LST,CHAR(196));
    WRITE(LST,CHAR(191)); WRITELN(LST);
    FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); IF I=0 THEN WRITE(LST,CHAR(179),
    ' UII-CDP PENULANGAN BALOK YG MENDEKATI KEBUTUHAN ',
    CHAR(179)) ELSE WRITE(LST,CHAR(179),
    ' UII-CDP PENULANGAN BALOK YANG DIGUNAKAN ',
    CHAR(179)); WRITELN(LST);
    FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
    WRITE(LST,CHAR(195)); FOR J:=1 TO 59 DO WRITE(LST,CHAR(196));
    WRITE(LST,CHAR(180)); WRITELN(LST);
    FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
    ' AUTHORITY : UII CIVIL ENGINEERING 1996 DISAIN : ',
    EL:D); FOR J:=1 TO (7-D) DO WRITE(LST,' '); WRITE(LST,' ',CHAR(179));
    WRITELN(LST); FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
    WRITE(LST,CHAR(179),' Proyek : ',NPRO:A);
    FOR J:=1 TO (19-A) DO WRITE(LST,' '); WRITE(LST,' Halaman : ',
    HAL:3,' ',CHAR(179)); WRITELN(LST); FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
    WRITE(LST,CHAR(179),' Perencana : ',EN:C); FOR J:=1 TO (19-C) DO WRITE(LST,' ');
    WRITE(LST,' File Data : ',NFDA:B); FOR J:=1 TO (8-B) DO WRITE(LST,' ');
    WRITE(LST,' ',CHAR(179)); WRITELN(LST); FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
    WRITE(LST,CHAR(195)); FOR J:=1 TO 5 DO WRITE(LST,CHAR(196));
    WRITE(LST,CHAR(194)); FOR J:=1 TO 7 DO WRITE(LST,CHAR(196));
    WRITE(LST,CHAR(194)); FOR J:=1 TO 8 DO WRITE(LST,CHAR(196));
    WRITE(LST,CHAR(194)); FOR J:=1 TO 7 DO WRITE(LST,CHAR(196));
    WRITE(LST,CHAR(194)); FOR J:=1 TO 8 DO WRITE(LST,CHAR(196));
    WRITE(LST,CHAR(194)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
    WRITE(LST,CHAR(194)); FOR J:=1 TO 8 DO WRITE(LST,CHAR(196));
    WRITE(LST,CHAR(180)); WRITELN(LST);
    FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
    WRITE(LST,CHAR(179),' TIPE ',CHAR(179),' TUL.LAP',CHAR(179),
    ' TUL.LAP',CHAR(179),' TUL.TUM',CHAR(179),' TUL.TUM',
    CHAR(179),' TULANGAN',CHAR(179),' TULANGAN',CHAR(179));
    WRITELN(LST);
    FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
    WRITE(LST,CHAR(179),' BALOK',CHAR(179),' BAWAH',CHAR(179),
    ' ATAS',CHAR(179),' BAWAH',CHAR(179),' ATAS',
    CHAR(179),' SENGKANG',CHAR(179),' TORSI',CHAR(179));
    WRITELN(LST);
    FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
    WRITE(LST,CHAR(195)); FOR J:=1 TO 5 DO WRITE(LST,CHAR(196));
    WRITE(LST,CHAR(197)); FOR J:=1 TO 7 DO WRITE(LST,CHAR(196));
    WRITE(LST,CHAR(197)); FOR J:=1 TO 8 DO WRITE(LST,CHAR(196));
    WRITE(LST,CHAR(197)); FOR J:=1 TO 7 DO WRITE(LST,CHAR(196));
    WRITE(LST,CHAR(197)); FOR J:=1 TO 8 DO WRITE(LST,CHAR(196));
    WRITE(LST,CHAR(197)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
    WRITE(LST,CHAR(197)); FOR J:=1 TO 8 DO WRITE(LST,CHAR(196));
    WRITE(LST,CHAR(180)); WRITELN(LST);
  IF I=BARIS THEN FOR J:=1 TO BATASBAWAH DO WRITELN(LST); END;

```

```

IF FNL<>0 THEN BEGIN FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(179),' ',TIPE:3,' ',CHAR(179),' ',FNTLB:2,'D',
  FDPTLB:2,' ',CHAR(179),' ',FNFLA:2,'D',FDPTLA:2,' ',
  CHAR(179),' ',FNTTB:2,'D',FDPTTB:2,' ',CHAR(179),' ',
  FNFTA:2,'D',FDPTTA:2,' ',CHAR(179),'D',FDSS:2,'-',FS:3,
  'mm',CHAR(179),' ',FNL:2,'D',FDL:2,' ',CHAR(179));
  WRITELN(LST); END ELSE BEGIN
FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(179),' ',TIPE:3,' ',CHAR(179),' ',FNTLB:2,'D',
  FDPTLB:2,' ',CHAR(179),' ',FNFLA:2,'D',FDPTLA:2,' ',
  CHAR(179),' ',FNTTB:2,'D',FDPTTB:2,' ',CHAR(179),' ',
  FNFTA:2,'D',FDPTTA:2,' ',CHAR(179),'D',FDSS:2,'-',FS:3,
  'mm',CHAR(179),' ',FNL:2,'D',FDL:2,' ',CHAR(179));
  WRITELN(LST); END; I:=I+1;
IF (I=BARIS) OR EOF(FBALOK) THEN BEGIN I:=1;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(192)); FOR J:=1 TO 5 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(193)); FOR J:=1 TO 7 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(193)); FOR J:=1 TO 8 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(193)); FOR J:=1 TO 7 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(193)); FOR J:=1 TO 8 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(193)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(193)); FOR J:=1 TO 8 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(217)); WRITELN(LST); END; END;
END; CLOSE(FBALOK);
IF E=0 THEN BEGIN CLRSCR; TEXTCOLOR(11); GOTOXY(20,5);
WRITE(' GANTI KERTAS BARU PADA PRINTER'); GOTOXY(15,7);
WRITE('Tekan "SEMbarang TOMBOL" Untuk Melanjutkan.....!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11);
  GOTOXY(20,5); WRITE(' PROSES DISAIN BELUM DILAKUKAN');
  GOTOXY(15,7); WRITE('Tekan "SEMbarang TOMBOL" Untuk Melanjutkan.....!');
  WRITE('^G'); READKEY; TEXTCOLOR(10); END; E:=E+1;
UNTIL E=2;
CHDIR(DIRAK);
END.

```

```

PROGRAM CDBL;
USES CRT,PRINTER;
TYPE
  FDAT = RECORD
    NPROY : string[19];
    NFDAT : string[8];
    NaFil : string[12];
    ENG : string[19];
  END;
  FDBN = RECORD
    TIPE : INTEGER;
    FC : REAL;
    FY : REAL;
    ES : REAL;
  END;
  FDBT = RECORD
    TIPE : INTEGER;
    N : INTEGER;
    DP : INTEGER;
    DS : INTEGER;
  END;
  FGMS = RECORD
    TIPE : INTEGER;
    MUlap : REAL;
    MUtum : REAL;
    VU : REAL;
    TU : REAL;
  END;
  FDMN = RECORD
    TIPE : INTEGER;

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    L : REAL;
    B : REAL;
    H : REAL;
    PB : REAL;
END;
FELN = RECORD
    TIPE : INTEGER;
    NO : INTEGER;
    ELE : INTEGER;
END;

VAR
    FTIPE : TEXT;
    FDBAH : FILE OF FDBN;
    FBAHTUL : FILE OF FDBT;
    FGMAKS : FILE OF FGMS;
    FDM : FILE OF FDMN;
    FELE : FILE OF FELN;
    NFILE : FILE OF FDAT;
    RECORDFDAT : FDAT;
    RECORDFELN : FELN;
    RECORDFDBN : FDBN;
    RECORDFDBT : FDBT;
    RECORDFGMS : FGMS;
    RECORDFDMN : FDMN;
    I,J,TIPE,JUM,NOREC,J,TP,DPMMAKS,DSMAKS,
    NTUL,DPTUL,K,F,HAL,BATASATAS,
    BATASBAWAH,BATASKIRI,JUMLAHBARIS,BARIS,
    KERTAS,A,B,C,D : Integer;
    YA : CHAR;
    BENAR : BOOLEAN;
    EL : STRING[7];
    NFDA : STRING[8];
    FDB,FDT,FGM,FTIP,FDM,FELM : STRING[12];
    NPRO,EN : STRING[19];
    FTP,BBN,BBT,BEL,BGM,BDD,DIRAK,DIREK : STRING;

PROCEDURE JUDUL;
BEGIN
    ASSIGN(NFILE,'FILEDATA.DAT'); RESET(NFILE);
    WHILE NOT EOF(NFILE) DO BEGIN
        READ(NFILE,RECORDFDAT);
        IF RECORDFDAT.NFDAT=NFDA THEN BEGIN
            NPRO:=RECORDFDAT.NPROY; EN:=RECORDFDAT.ENG; END;
        END; CLOSE(NFILE); HAL:=HAL+1; A:=LENGTH(NPRO); B:=LENGTH(NFDA);
        C:=LENGTH(EN); D:=LENGTH(EL);
        FOR J:=1 TO BATASATAS DO WRITELN(LST);
        FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(201));
        FOR J:=1 TO 65 DO WRITE(LST,CHAR(205)); WRITE(LST,CHAR(187));
        WRITELN(LST);
        FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(186),
        ' UII-CDP PROGRAM DISAIN ELEMEN STRUKTUR BETON '
        CHAR(186)); WRITELN(LST);
        FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(204));
        FOR J:=1 TO 65 DO WRITE(LST,CHAR(205)); WRITE(LST,CHAR(185));
        WRITELN(LST);
        FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(186),
        ' AUTHORITY : UII CIVIL ENGINEERING 1996 DATA : '
        EL:D); FOR J:=1 TO (7-D) DO WRITE(LST,' '); WRITE(LST,' ',CHAR(186));
        WRITELN(LST); FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(186),
        ' Proyek : ',NPRO:A); FOR J:=1 TO (19-A) DO WRITE(LST,' ');
        WRITE(LST,' Halaman : ',HAL:3,
        ' ',CHAR(186)); WRITELN(LST);
        FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(186),
        ' Perencana : ',EN:C); FOR J:=1 TO (19-C) DO WRITE(LST,' ');
        WRITE(LST,' File Data : ',NFDA:B);
        FOR J:=1 TO (8-B) DO WRITE(LST,' '); WRITE(LST,' ',CHAR(186)); WRITELN(LST);
        FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(200));
        FOR J:=1 TO 65 DO WRITE(LST,CHAR(205)); WRITE(LST,CHAR(188));
        WRITELN(LST); I:=7;

```

END;

BEGIN

```
DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);FTP:=PARAMSTR(4);BBN:=PARAMSTR(5);
BBT:=PARAMSTR(6); BEL:=PARAMSTR(7); BGM:=PARAMSTR(8); BDD:=PARAMSTR(9);
GETDIR(0,DIRAK); CHDIR(DIREK); FDM:=NFDA+BDD; ASSIGN(FDIM,FDM);
{$I-} RESET(FDIM); {$I+}
IF IORESULT=0 THEN BEGIN
  CLOSE(FDIM); FGM:=NFDA+BGM; ASSIGN(FGMAKS,FGM);
  {$I-} RESET(FGMAKS); {$I+}
  IF IORESULT=0 THEN BEGIN
    CLOSE(FGMAKS); FDT:=NFDA+BBT; ASSIGN(FBAHTUL,FDT);
    {$I-} RESET(FBAHTUL); {$I+}
    IF IORESULT=0 THEN BEGIN
      CLOSE(FBAHTUL); FDB:=NFDA+BBN; ASSIGN(FDATBAH,FDB);
      {$I-} RESET(FDATBAH); {$I+}
      IF IORESULT=0 THEN BEGIN
        CLOSE(FDATBAH); FELM:=NFDA+BEL; ASSIGN(FELE,FELM);
        {$I-} RESET(FELE); {$I+}
        IF IORESULT=0 THEN BEGIN
          CLOSE(FELE); YA:='U'; HAL:=0; BATASATAS:=0; BATASBAWAH:=0;
          BATASKIRI:=0;
          WHILE UPCASE(YA)='U' DO BEGIN
            TEXTBACKGROUND(0); TEXTCOLOR(10); CLRSCR;
            GOTOXY(10,2); WRITE(CHAR(218));
            FOR I:=1 TO 50 DO WRITE(CHAR(196)); WRITE(CHAR(191));
            GOTOXY(10,3);
            WRITE(CHAR(179),' Ukuran Kertas : '); TEXTCOLOR(11); WRITE('1');
            TEXTCOLOR(10); WRITE(' Folio '); TEXTCOLOR(11); WRITE('2');
            TEXTCOLOR(10); WRITE(' Kuarto '); TEXTCOLOR(11);
            WRITE('--> Pilih : '); TEXTCOLOR(10); WRITE(CHAR(179));
            GOTOXY(10,4);
            WRITE(CHAR(179),' Batas Atas : ');
            ' ',CHAR(179));
            GOTOXY(10,5);
            WRITE(CHAR(179),' Batas Bawah : ');
            ' ',CHAR(179));
            GOTOXY(10,6);
            WRITE(CHAR(179),' Batas Kiri : ');
            ' ',CHAR(179));
            GOTOXY(10,7);
            WRITE(CHAR(192)); FOR I:=1 TO 50 DO WRITE(CHAR(196));
            WRITE(CHAR(217)); TEXTCOLOR(11);
            GOTOXY(10,9); WRITE(' U : ulang L : lanjutkan ==> ');
            GOTOXY(29,4); WRITE('Baris'); GOTOXY(29,5); WRITE('Baris');
            GOTOXY(29,6); WRITE('Spasi'); GOTOXY(59,3); READLN(KERTAS);
            GOTOXY(26,4); READLN(BATASATAS); GOTOXY(26,5); READLN(BATASBAWAH);
            GOTOXY(26,6); READLN(BATASKIRI); BENAR:=TRUE;
            WHILE BENAR DO BEGIN
              GOTOXY(42,9); YA:=READKEY; WRITE(YA);
              IF UPCASE(YA)='U' THEN BENAR:=FALSE;
              IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10); END;
            IF KERTAS=1 THEN JUMLAHBARIS:=71; IF KERTAS=2 THEN JUMLAHBARIS:=65;
            BARIS:=JUMLAHBARIS-BATASATAS-BATASBAWAH; HAL:=0; K:=1;
            F:=1; JUDUL; RESET(FDATBAH);
            WHILE NOT EOF(FDATBAH) DO BEGIN
              SEEK(FDATBAH,F-1); READ(FDATBAH,RECORDFDBN); F:=F+1;
              WITH RECORDFDBN DO BEGIN
                IF (K=1) THEN BEGIN
                  IF (BARIS-I)<=6 THEN FOR J:=1 TO (BARIS-I) DO WRITELN(LST); I:=I+6;
                  IF I>=BARIS THEN BEGIN FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END;
                  FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(218));
                  FOR J:=1 TO 63 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(191));
                  WRITELN(LST);
                  FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179));
                  ' >>> DATA BAHAN <<< ',CHAR(179));
                  WRITELN(LST);
                  FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
                  FOR J:=1 TO 63 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
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WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'Tipe Teg. Desak Beton Teg. Tarik Baja Mod. ',
'Elastisitas Baja',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'Balok (MPa) (MPa) (MPa)',
',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 63 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST); END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
',TIPE:3,' ',TRUNC(FC):3,' ',
TRUNC(FY):3,' ',TRUNC(ES):6,' ',
CHAR(179)); WRITELN(LST); K:=K+1; I:=I+1;
IF (I>=BARIS) OR EOF(FDATBAH) THEN BEGIN
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(192));
FOR J:=1 TO 63 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(217));
WRITELN(LST); K:=1; I:=I+1; END;
IF I>=BARIS THEN BEGIN
K:=1; FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END; END;
END; CLOSE(FDATBAH); F:=1; RESET (FBAHTUL);
WHILE NOT EOF(FBAHTUL) DO BEGIN
SEEK(FBAHTUL,F-1); READ(FBAHTUL,RECORDFDBT); F:=F+1;
WITH RECORDFDBT DO BEGIN
IF (K=1) THEN BEGIN
IF (BARIS-I)<=6 THEN FOR J:=1 TO (BARIS-I) DO WRITELN(LST); I:=I+6;
IF I>=BARIS THEN BEGIN FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(218));
FOR J:=1 TO 65 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(191));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),' >>> DIAMETER',
'TULANGAN YANG AKAN DIGUNAKAN <<< ',CHAR(179));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 65 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'Tipe No. Diameter Tulangan Pokok Diameter Tulangan',
'Sengkang',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'Balok (mm) (mm)',
',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 65 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST); END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
',TIPE:3,' ',N:2,' ',DP:2,
',DS:2,' ',CHAR(179));
WRITELN(LST); K:=K+1; I:=I+1;
IF (I>=BARIS) OR EOF(FBAHTUL) THEN BEGIN
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(192));
FOR J:=1 TO 65 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(217));
WRITELN(LST); K:=1; I:=I+1; END;
IF I>=BARIS THEN BEGIN
K:=1; FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END; END;
END; CLOSE(FBAHTUL); F:=1; RESET(FELE);
WHILE NOT EOF(FELE) DO BEGIN
SEEK(FELE,F-1); READ(FELE,RECORDFELN); F:=F+1;
WITH RECORDFELN DO BEGIN
IF K=1 THEN BEGIN
IF (BARIS-I)<=6 THEN FOR J:=1 TO (BARIS-I) DO WRITELN(LST); I:=I+6;
IF I>=BARIS THEN BEGIN FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(218));
FOR J:=1 TO 29 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(191));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'>>> DATA ELEMEN',EL:7,' <<< ',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 29 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST);

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FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'Tipe No. Elemen',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 29 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST); END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),'
TIPE:3,' 'NO:2,' 'ELE:3,' 'CHAR(179));
WRITELN(LST); K:=K+1; I:=I+1;
IF (I>=BARIS) OR EOF(FELE) THEN BEGIN
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(192));
FOR J:=1 TO 29 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(217));
WRITELN(LST); K:=1; I:=I+1; END;
IF I>=BARIS THEN BEGIN
K:=1; FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END; END;
END; CLOSE(FELE); F:=1; RESET(FDIM);
WHILE NOT EOF(FDIM) DO BEGIN
SEEK(FDIM,F-1); READ(FDIM,RECORDFDIMN); F:=F+1;
WITH RECORDFDIMN DO BEGIN
IF K=1 THEN BEGIN
IF (BARIS-I)<=6 THEN FOR J:=1 TO (BARIS-I) DO WRITELN(LST); I:=I+6;
IF I>=BARIS THEN BEGIN FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(218));
FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(191));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),' >>> DATA ',
'DIMENSI <<< ',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'Tipe Bentang Balok Lebar Tinggi Penutup Beton ',
CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'Balok (mm) (mm) (mm) (mm) ',
CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST); END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'',TIPE:3,' ',TRUNC(L):5,' ',TRUNC(B):4,' ',
TRUNC(H):4,' ',TRUNC(PB):3,' ',CHAR(179));
WRITELN(LST); K:=K+1; I:=I+1;
IF (I>=BARIS) OR EOF(FDIM) THEN BEGIN
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(192));
FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(217));
WRITELN(LST); K:=1; I:=I+1; END;
IF I>=BARIS THEN BEGIN
K:=1; FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END; END;
END; CLOSE(FDIM); F:=1; RESET(FGMAKS);
WHILE NOT EOF(FGMAKS) DO BEGIN
SEEK(FGMAKS,F-1); READ(FGMAKS,RECORDFGMS); F:=F+1;
WITH RECORDFGMS DO BEGIN
IF K=1 THEN BEGIN
IF (BARIS-I)<=6 THEN FOR J:=1 TO (BARIS-I) DO WRITELN(LST); I:=I+6;
IF I>=BARIS THEN BEGIN FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(218));
FOR J:=1 TO 65 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(191));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
' >>> DATA GAYA-',
'GAYA MAKSIMUM <<< ',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 65 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'Tipe M Lapangan M Tumpuan Gaya Geser M Torsi ',
CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'Balok (Nmm) (Nmm) (N) (Nmm) ',
CHAR(179)); WRITELN(LST);

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FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 65 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST); END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(179),' ',TIPE:3,' ',MUlap:12,' ',-MuUm:13,
' ',VU:10,' ',TU:12,' ',CHAR(179)); WRITELN(LST); K:=K+1; I:=I+1;
IF (I>=BARIS) OR EOF(FGMAKS) THEN BEGIN
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(192));
FOR J:=1 TO 65 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(217));
WRITELN(LST); K:=1; I:=I+1; END;
IF (I>=BARIS) THEN BEGIN
K:=1; FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END; END;
END; CLOSE(FGMAKS);
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
WRITE('DATA ELEMEN BELUM DIBUAT...!'); WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
WRITE('DATA BAHAN BELUM DIBUAT...!'); WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
WRITE('DATA TULANGAN YG AKAN DIGUNAKAN BELUM DIBUAT...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
WRITE('DATA GAYA YG BEKERJA PADA BALOK BELUM DIBUAT...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11);
GOTOXY(20,10); WRITE('DATA DIMENSI BALOK BELUM DIBUAT...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END; CHDIR(DIRAK);
END.

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```

PROGRAM DDBL;
USES CRT;
TYPE
  FELN = RECORD
    TIPE : INTEGER;
    NO : INTEGER;
    ELE : INTEGER;
  END;
  FDMN = RECORD
    TIPE : INTEGER;
    L : REAL;
    B : REAL;
    H : REAL;
    PB : REAL;
  END;
  FDMC = RECORD
    ELEM : INTEGER;
    SEC : REAL;
    AX : REAL;
    SHE : REAL;
    MOM : REAL;
  END;
VAR
  FTIPE : TEXT;
  FELE : FILE OF FELN;
  FDM : FILE OF FDMN;
  FMICRO : FILE OF FDMC;
  RECORDFELN : FELN;
  RECORDFDMN : FDMN;
  RECORDFDMC : FDMC;
  Elemen,I,JIPE,JUM,NOREC,TP : INTEGER;

```

```

x, LB, BB, HB, PBB          : REAL;
YA                           : CHAR;
BENAR                        : BOOLEAN;
NFDA, EL                     : STRING[7];
FBC, FELM, FTIP, FDM        : STRING[12];
FTP, BEL, BDD, DIRAK, DIREK : STRING;

```

```

BEGIN
DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);FTP:=PARAMSTR(4);
BEL:=PARAMSTR(5);BDD:=PARAMSTR(6);GETDIR(0,DIRAK);CHDIR(DIREK);
FTIP:=NFDA+FTP; ASSIGN(FTIPE,FTIP); {$I-} RESET(FTIPE); {$I+}
IF IORESULT=0 THEN BEGIN
  READ(FTIPE,FTIPE); CLOSE(FTIPE); FELM:=NFDA+BEL; ASSIGN(FELE,FELM);
  {$I-} RESET(FELE); {$I+}
  IF IORESULT=0 THEN BEGIN
    CLOSE(FELE); TP:=0;
    REPEAT
      TP:=TP+1; X:=0; LB:=0; PBB:=0; BB:=0; HB:=0; ASSIGN(FELE,FELM);
      RESET(FELE);
      WITH RECORDFELN DO BEGIN
        WHILE NOT EOF(FELE) DO BEGIN
          READ(FELE,RECORDFELN); ELEMEN:=RECORDFELN.FELE;
          IF RECORDFELN.TIPE=TP THEN Begin
            FBC:=NFDA+'.DMC'; Assign(FMICRO,FBC); Reset(FMICRO);
            While Not Eof(FMICRO) Do Begin
              WITH RECORDFDMC DO BEGIN
                Read(FMICRO,RECORDFDMC);
                if ELEMEN=Elem Then X:=Sec; END; End;
                if X>LB Then LB:=X; Close(FMICRO); End; END; END;
            CLOSE(FELE); YA:='U';
            WHILE UPCASE(YA)='U' DO BEGIN
              TEXTCOLOR(10); TEXTBACKGROUND(0); CLRSCR; GOTOXY(10,2);
              WRITE(CHAR(218)); FOR I:=1 TO 54 DO WRITE(CHAR(196)); WRITE(CHAR(191));
              GOTOXY(10,3); WRITE(CHAR(179)); TEXTCOLOR(13);
              WRITE(' >>> DATA DIMENSI <<< ');
              TEXTCOLOR(10); WRITE(CHAR(179));
              GOTOXY(10,4); WRITE(CHAR(195)); FOR I:=1 TO 54 DO WRITE(CHAR(196));
              WRITE(CHAR(180));
              GOTOXY(10,5); WRITE(CHAR(179),'.EL:7, Tipe : '); TEXTCOLOR(11);
              WRITE(TP,3); WRITE(' ');
              TEXTCOLOR(10); WRITE(CHAR(179));
              GOTOXY(10,6); WRITE(CHAR(195)); FOR I:=1 TO 54 DO WRITE(CHAR(196));
              WRITE(CHAR(180));
              GOTOXY(10,7);
              WRITE(CHAR(179), 'Bentang Balok Lebar Tinggi Penutup ',
              ' Beton ',CHAR(179));
              GOTOXY(10,8);
              WRITE(CHAR(179), ' (L)--->mm (b)--->mm (h)--->mm (Pb)--->mm',
              ' ',CHAR(179));
              GOTOXY(10,9);
              WRITE(CHAR(195)); FOR I:=1 TO 54 DO WRITE(CHAR(196)); WRITE(CHAR(180));
              GOTOXY(10,10);
              WRITE(CHAR(179)); FOR I:=1 TO 54 DO WRITE(CHAR(0)); WRITE(CHAR(179));
              GOTOXY(10,11);
              WRITE(CHAR(192)); FOR I:=1 TO 54 DO WRITE(CHAR(196)); WRITE(CHAR(217));
              TEXTCOLOR(11);
              GOTOXY(10,13); WRITE(' U : ulang L : lanjutkan ==> ');
              GOTOXY(17,10); WRITE(LB,5,2); GOTOXY(31,10); READLN(BB);
              GOTOXY(43,10); READLN(HB); GOTOXY(56,10); READLN(PBB); BENAR:=TRUE;
              WHILE BENAR DO BEGIN
                GOTOXY(42,13); YA:=READKEY;
                WRITE(YA);IF UPCASE(YA)='U' THEN BENAR:=FALSE;
                IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10); END;
              FDM:=NFDA+BDD; ASSIGN(FDIM,FDM); {$I-} RESET(FDIM); {$I+}
              IF IORESULT<>0 THEN REWRITE(FDIM); NOREC:=-1; JUM:=FILESIZE(FDIM);
              WITH RECORDFDMN DO BEGIN
                IF JUM<>0 THEN BEGIN
                  FOR I:=1 TO JUM DO BEGIN
                    SEEK(FDIM,I-1); READ(FDIM,RECORDFDMN);
                    IF RECORDFDMN.TIPE=TP THEN NOREC:=I-1; END;

```



```

        IF NOREC=-1 THEN NOREC:=JUM; SEEK(FDIM,NOREC); END;
        TIPE:=TP; L:=LB; B:=BB; H:=HB; PB:=PBB; WRITE(FDIM,RECORDFDMN); END;
        CLOSE(FDIM);
        UNTIL TP=JTIPE;
    END
ELSE BEGIN
    CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
    WRITE(' Data Elemen Belum Ada.....!');
    WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END; CHDIR(DIRAK);
END.

```

```

PROGRAM GBL;
USES CRT;

```

```

TYPE
    FELN = RECORD
        TIPE : INTEGER;
        NO   : INTEGER;
        ELE  : INTEGER;
    END;
    FGMS = RECORD
        TIPE : INTEGER;
        MUlap : REAL;
        MUtum : REAL;
        VU   : REAL;
        TU   : REAL;
    END;
    FDMC = RECORD
        ELEM : INTEGER;
        SEC  : REAL;
        AX   : REAL;
        SHE  : REAL;
        MOM  : REAL;
    END;

```

```

VAR
    FTIPE      : TEXT;
    FELE       : FILE OF FELN;
    FGMAKS     : FILE OF FGMS;
    FMICRO     : FILE OF FDMC;
    RECORDFELN : FELN;
    RECORDFGMS : FGMS;
    RECORDFDMC : FDMC;
    Elemen,I,J,TIPE,JUM,NOREC,TP : INTEGER;
    MUI,MUt,TUB,VUS,MUla,MUtu,VUB : REAL;
    YA         : CHAR;
    BENAR      : BOOLEAN;
    NFDA,EL    : STRING[7];
    FBC,FELM,FGM,FTIP : STRING[12];
    FTP,BEL,BGM,DIRAK,DIREK : STRING;

```

```

Begin
    DIREK:=PARAMSTR(1); NFDA:=PARAMSTR(2); EL:=PARAMSTR(3); FTP:=PARAMSTR(4);
    BEL:=PARAMSTR(5); BGM:=PARAMSTR(6); GETDIR(0,DIRAK); CHDIR(DIREK);
    FTIP:=NFDA+FTP; ASSIGN(FTIPE,FTIP); {$I-} RESET(FTIPE); {$I+}
    IF IORESULT=0 THEN BEGIN
        READ(FTIPE,JTIPE); CLOSE(FTIPE); TP:=0;
        REPEAT
            TP:=TP+1; VUB:=0; VUS:=0; MUI:=0; MUla:=0; MUt:=0; MUtu:=0; YA:='U';
            WHILE UPCASE(YA)='U' DO BEGIN
                TEXTCOLOR(10); TEXTBACKGROUND(0); CLRSCR;
                GOTOXY(10,9);
                WRITE('Balok Tipe : '); TEXTCOLOR(11); WRITE(TP:3); TEXTCOLOR(10);
                GOTOXY(10,10);
                WRITE('Momen Torsi Yang Terjadi Pada 'EL:7,' ? (Nmm) : ');
                GOTOXY(10,12); TEXTCOLOR(11); WRITE('U : ulang L : lanjutkan ==>');
                GOTOXY(59,10); READLN(TUB); BENAR:=TRUE;
            WHILE BENAR DO BEGIN

```

```

GOTOXY(41,12); YA:=READKEY; WRITE(YA);
IF UPCASE(YA)='U' THEN BENAR:=FALSE;
IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10); END;
FELM:=NFDA+BEL; ASSIGN(FELE,FELM); {$I-} RESET(FELE); {$I+}
IF IORESULT=0 THEN BEGIN
WHILE NOT EOF(FELE) DO BEGIN
WITH RECORDFELN DO BEGIN
READ(FELE,RECORDFELN); ELEMEN:=RECORDFELN.ELE;
IF TIPE = TP THEN BEGIN
FBC:=NFDA+'.DMC'; ASSIGN(FMICRO,FBC); Reset(FMICRO);
While Not Eof(FMICRO) Do Begin
WITH RECORDFDMC DO BEGIN
Read(FMICRO,RECORDFDMC);
IF ELEMEN=Elem THEN BEGIN
if Mom<0 Then BEGIN if -MOM>MuT Then MuT:=-MOM; END;
if MOM>MUI Then MUI:=MOM;
IF ABS(SHE)>VUS THEN VUS:=ABS(SHE); END; END; END;
IF MUI>MUIa THEN MUIa:=MUI;
IF MuT>MuTu THEN MuTu:=MuT;
IF VUS>VUB THEN VUB:=VUS;
Close(FMICRO); FGM:=NFDA+BGM; ASSIGN(FGMAKS,FGM); {$I-} RESET(FGMAKS); {$I+}
IF IORESULT<>0 THEN REWRITE(FGMAKS);
NOREC:=-1; JUM:=FILESIZE(FGMAKS);
WITH RECORDFGMS DO BEGIN
IF JUM<>0 THEN BEGIN
FOR I:=1 TO JUM DO BEGIN
SEEK(FGMAKS,I-1); READ(FGMAKS,RECORDFGMS);
IF RECORDFGMS.TIPE=TP THEN NOREC:=I-1; END;
IF NOREC=-1 THEN NOREC:=JUM; SEEK(FGMAKS,NOREC); END;
TIPE:=TP; MUIap:=MUIa; MuTum:=MuTu; VU:=VUB; TU:=TUB;
WRITE(FGMAKS,RECORDFGMS);
END; CLOSE(FGMAKS);
End; END;
END; CLOSE(FELE);
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11);
GOTOXY(20,10); WRITE(' Data Elemen Balok Belum Ada.....!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
UNTIL TP=JTIPE;
END; CHDIR(DIRAK);
END.

```

```

PROGRAM PBL;
USES CRT;
TYPE
FDBN = RECORD
TIPE : INTEGER;
FC : REAL;
FY : REAL;
ES : REAL;
END;
FDBT = RECORD
TIPE : INTEGER;
N : INTEGER;
DP : INTEGER;
DS : INTEGER;
END;
FGMS = RECORD
TIPE : INTEGER;
MUIap : REAL;
MuTum : REAL;
VU : REAL;
TU : REAL;
END;
FDMN = RECORD
TIPE : INTEGER;
L : REAL;
B : REAL;

```

```

H : REAL;
PB : REAL;
END;
FBLK = RECORD
  TIPE : INTEGER;
  FNTLB : INTEGER;
  FDPTLB : INTEGER;
  FNTLA : INTEGER;
  FDPTLA : INTEGER;
  FNITB : INTEGER;
  FDPTTB : INTEGER;
  FNITTA : INTEGER;
  FDPTTA : INTEGER;
  FNTLB1 : INTEGER;
  FDPTLB1 : INTEGER;
  FNTLA1 : INTEGER;
  FDPTLA1 : INTEGER;
  FNITB1 : INTEGER;
  FDPTTB1 : INTEGER;
  FNITTA1 : INTEGER;
  FDPTTA1 : INTEGER;
  FDSS : INTEGER;
  FS : INTEGER;
  FNL : INTEGER;
  FDL : INTEGER;
END;
VAR
  FTIPE : TEXT;
  FDATAH : FILE OF FDBN;
  FBAHTUL : FILE OF FDBT;
  FGMAKS : FILE OF FGMS;
  FDIM : FILE OF FDMN;
  FBALOK : FILE OF FBLK;
  RECORDFDBN : FDBN;
  RECORDFDBT : FDBT;
  RECORDFGMS : FGMS;
  RECORDFDMN : FDMN;
  RECORDFBLK : FBLK;
  I, J, TIPE, JUM, NOREC, J, TP, DPMMAKS, DSMMAKS,
  NTUL, DPTUL, X, H : Integer;
  MU1, MU2, TUB, LB, FCB, FYB, ESB, BB, HB,
  PBB, O, OS, B1, D, RB, RMAKS, W, KMAKS, MRMAKS,
  R, K, MR1, AS1, MR2, DA, ND2, A, C, ESA, EY, FSA,
  ASAL, AS2, ASL, ASAT, AST, DPTLB, NTLB,
  DPTLA, NTLA, DPTTA, NTTA, DPTTB, NTTB,
  VC, VSP, M, VS, V, SMAKS, AV, SS, S, DSS,
  CT, TC, TN, TS, VN, AVS, X1, Y1, ALPA, ATS,
  AVT, PENAM, ABAI, AL, AT, AR, AD, PEM,
  NL, DL, VUB, ATUL, ADP, ATULS, ATULR, NTULS,
  ALX, NLX, ALY, DLX : REAL;
  NFDA, EL : STRING[7];
  FDB, FDT, FGM, FTIP, FDM, FBK : STRING[12];
  FTP, BBN, BBT, BGM, BDD, BLK, DIRAK, DIREK : STRING;

PROCEDURE PILIHTULANGAN;
BEGIN
  FDT:=NFDA+BBT; ASSIGN(FBAHTUL,FDT); RESET(FBAHTUL); JUM:=FILESIZE(FBAHTUL);
  FOR I:=1 TO JUM DO BEGIN SEEK(FBAHTUL,I-1); READ(FBAHTUL,RECORDFDBT);
    IF (RECORDFDBT.TIPE=TP) AND (RECORDFDBT.DP<>0) THEN BEGIN
      ADP:=0.25*3.14*SQR(RECORDFDBT.DP);
      IF ATULR<>0 THEN BEGIN
        NTULS:=ATULR/ADP; IF (FRAC(NTULS)>0) THEN NTULS:=TRUNC(NTULS)+1;
        IF (FRAC(NTULS)=0) THEN NTULS:=TRUNC(NTULS); ATULS:=ADP*NTULS;
        IF I=1 THEN BEGIN ATUL:=ATULS; DPTUL:=RECORDFDBT.DP; NTUL:=TRUNC(NTULS); END;
        IF (ATULS<ATUL) AND (ATULS>=ATULR) THEN BEGIN
          ATUL:=ATULS; DPTUL:=RECORDFDBT.DP; NTUL:=TRUNC(NTULS); END;
        IF (ATULS=ATUL) AND (ATULS>=ATULR) THEN BEGIN
          IF RECORDFDBT.DP<DPTUL THEN BEGIN
            DPTUL:=RECORDFDBT.DP; NTUL:=TRUNC(NTULS); END; END; END
        ELSE BEGIN

```

```

        IF I=1 THEN DPTUL:=RECORDFDBT.DP;
        IF RECORDFDBT.DP<DPTUL THEN DPTUL:=RECORDFDBT.DP;
        NTUL:=2; ATUL:=NTUL*ADP; END; END;
    END; CLOSE(FBAHTUL);
END;

BEGIN
DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);FTP:=PARAMSTR(4);BBN:=PARAMSTR(5);
BBT:=PARAMSTR(6);BGM:=PARAMSTR(7);BDD:=PARAMSTR(8);BLK:=PARAMSTR(9);
GETDIR(0,DIRAK);CHDIR(DIREK);FTP:=NFDA+FTP;ASSIGN(FTIPE,FTP);{$I-}RESET(FTIPE);{$I+}
IF IORESULT=0 THEN BEGIN
    READ(FTIPE,FTIPE);CLOSE(FTIPE);FDM:=NFDA+BDD;ASSIGN(FDIM,FDM);
    {$I-}RESET(FDIM);{$I+}
    IF IORESULT=0 THEN BEGIN
        CLOSE(FDIM);FGM:=NFDA+BGM;ASSIGN(FGMAKS,FGM);{$I-}RESET(FGMAKS);{$I+}
        IF IORESULT=0 THEN BEGIN
            CLOSE(FGMAKS);FDT:=NFDA+BBT;ASSIGN(FBAHTUL,FDT);{$I-}RESET(FBAHTUL);{$I+}
            IF IORESULT=0 THEN BEGIN
                CLOSE(FBAHTUL);FDB:=NFDA+BBN;ASSIGN(FDATBAH,FDB);{$I-}RESET(FDATBAH);{$I+}
                IF IORESULT=0 THEN BEGIN CLOSE(FDATBAH);TP:=0;
                REPEAT
                    TEXTBACKGROUND(0);CLRSCR;ABAI:=0;PENAM:=0;NTLB:=0;DPTLB:=0;
                    NTLA:=0;DPTLA:=0;NTTB:=0;DPTTB:=0;NTTA:=0;DPTTA:=0;NL:=0;
                    DL:=0;PEM:=0;ASL:=0;AST:=0;ASAL:=0;ASAT:=0;NLX:=0;
                    DSS:=0;S:=0;SS:=0;DPMMAKS:=0;DSMAKS:=0;
                    FOR I:=1 TO 1000 DO BEGIN
                        TEXTCOLOR(5);GOTOXY(20,10);FOR J:=1 TO 35 DO WRITE(CHAR(176));
                        GOTOXY(20,11);WRITE(CHAR(176),' ');FOR J:=1 TO 3 DO WRITE(CHAR(175));
                        TEXTCOLOR(11);WRITE('PROSES DISAIN BALOK ');TEXTCOLOR(5);
                        FOR J:=1 TO 3 DO WRITE(CHAR(174));WRITE(' ',CHAR(176));
                        GOTOXY(20,12);FOR J:=1 TO 35 DO WRITE(CHAR(176));TEXTCOLOR(10);END;
                        TP:=TP+1;RESET(FGMAKS);
                        WHILE NOT EOF(FGMAKS) DO BEGIN
                            WITH RECORDFGMS DO BEGIN READ(FGMAKS,RECORDFGMS);
                            IF RECORDFGMS.TIPE=TP THEN BEGIN
                                MUI:=RECORDFGMS.MUlap;MUT:=RECORDFGMS.MUtum;VUB:=RECORDFGMS.VU;
                                TUB:=RECORDFGMS.TU;END;END;CLOSE(FGMAKS);RESET(FDATBAH);
                                WHILE NOT EOF(FDATBAH) DO BEGIN
                                    WITH RECORDFDBN DO BEGIN READ(FDATBAH,RECORDFDBN);
                                    IF RECORDFDBN.TIPE=TP THEN BEGIN
                                        FCB:=RECORDFDBN.FC;FYB:=RECORDFDBN.FY;ESB:=RECORDFDBN.ES;END;END;
                                    END;CLOSE(FDATBAH);RESET(FDIM);
                                    WHILE NOT EOF(FDIM) DO BEGIN
                                        WITH RECORDFDMN DO BEGIN READ(FDIM,RECORDFDMN);
                                        IF RECORDFDMN.TIPE=TP THEN BEGIN
                                            LB:=RECORDFDMN.L;BB:=RECORDFDMN.B;HB:=RECORDFDMN.H;
                                            PBB:=RECORDFDMN.PB;END;END;END;
                                            CLOSE(FDIM);O:=0.8;B1:=0.85;RESET(FBAHTUL);JUM:=FILESIZE(FBAHTUL);
                                            FOR I:=1 TO JUM DO BEGIN
                                                WITH RECORDFDBT DO BEGIN SEEK(FBAHTUL,I-1);READ(FBAHTUL,RECORDFDBT);
                                                IF TIPE=TP THEN BEGIN
                                                    IF (DP>DPMMAKS) AND (DP<>0) THEN DPMMAKS:=DP;
                                                    IF (DS>DSMAKS) AND (DS<>0) THEN DSMAKS:=DS;END;END;
                                                END;CLOSE(FBAHTUL);
                                                D:=-HB-PBB-0.5*DPMMAKS-DSMAKS;RB:=(0.85*FCB*B1)*600/(FYB*(600+FYB));
                                                RMAKS:=0.75*RB;W:=RMAKS*FYB/FCB;KMAKS:=FCB*W*(1-0.59*W);
                                                MRMAKS:=O*BB*SQR(D)*KMAKS;
                                                IF MRMAKS<MUI THEN BEGIN
                                                    CLRSCR;GOTOXY(20,10);
                                                    WRITELN('PERENCANAAN BALOK BERTULANGAN RANGKAP.....OK !');READKEY;
                                                    R:=0.90*RMAKS;W:=R*FYB/FCB;K:=FCB*W*(1-0.59*W);MR1:=O*BB*SQR(D)*K;
                                                    AS1:=R*BB*D;MR2:=MUI-MR1;DA:=PBB+0.5*DPMMAKS+DSMAKS;
                                                    ND2:=MR2/(O*(D-DA));A:=AS1*FYB/((0.85*FCB)*BB);C:=A/B1;
                                                    ESA:=(C-DA)*0.003/C;EY:=FYB/ESB;
                                                    IF ESA>EY THEN FSA:=FYB;IF ESA<EY THEN FSA:=ESA*ESB;
                                                    ASAL:=ND2/FSA;AS2:=ASAL*FSA;ASL:=AS1+AS2;END;
                                                    IF MRMAKS>=MUI THEN BEGIN
                                                        CLRSCR;GOTOXY(20,10);
                                                        WRITELN('PERENCANAAN BALOK BERTULANGAN SEBELAH.....OK !');READKEY;
                                                        K:=MUI/(O*BB*SQR(D));R:=(FCB-(SQR(SQR(FCB)-2.36*K*FCB)))/(1.18*FYB);

```

```

IF R<1.4/FYB THEN R:=1.4/FYB; ASL:=R*BB*D; END;
IF MRMAKS<MUt THEN BEGIN
R:=0.90*RMMAKS; W:=R*FYB/FCB; K:=FCB*W*(1-0.59*W); MR1:=O*BB*SQR(D)*K;
AS1:=R*BB*D; MR2:=MUt-MR1; DA:=PBB+0.5*DPMMAKS+DSMAKS; ND2:=MR2/(O*(D-DA));
A:=AS1*FYB/(0.85*FCB*BB); C:=A/BI; ESA:=(C-DA)*0.003/C; EY:=FYB/ESB;
IF ESA>=EY THEN FSA:=FYB; IF ESA<EY THEN FSA:=ESA*ESB;
ASAT:=ND2/FSA; AS2:=ASAT*FSA; AST:=AS1+AS2; END;
IF MRMAKS>=MUt THEN BEGIN K:=MUt/(O*BB*SQR(D));
R:=(FCB-(SQR(SQR(FCB)-2.36*K*FCB)))/(1.18*FYB);
IF R<1.4/FYB THEN R:=1.4/FYB; AST:=R*BB*D; END;
ATULR:=ASL; PILIHTULANGAN; DPTLB:=DPTUL; IF NTUL=1 THEN NTUL:=2; NTLB:=NTUL;
ATULR:=ASAL; PILIHTULANGAN; DPTLA:=DPTUL; IF NTUL=1 THEN NTUL:=2; NTLA:=NTUL;
ATULR:=AST; PILIHTULANGAN; DPTTA:=DPTUL; IF NTUL=1 THEN NTUL:=2; NTTA:=NTUL;
ATULR:=ASAT; PILIHTULANGAN; DPTTB:=DPTUL; IF NTUL=1 THEN NTUL:=2; NTTB:=NTUL;
OS:=0.6; IF TUB>OS*(SQR(FCB)*SQR(BB)*HB)/24 THEN BEGIN
CT:=BB*D/(SQR(BB)*HB);
TC:=(SQR(FCB)*SQR(BB)*HB/15)/(SQR(1+SQR((0.4*VUB)/(CT*TUB))));
IF TUB>OS*TC THEN
BEGIN
TN:=TUB/OS; TS:=TN-TC;
IF (TS>SQR(FYB)/3*SQR(BB)*HB/3-TC) THEN TS:=SQR(FYB)/3*SQR(BB)*HB/3-TC;
IF TS<=4*TC THEN
BEGIN
RESET(FBAHTUL); JUM:=FILESIZE(FBAHTUL);
WHILE NOT EOF(FBAHTUL) DO
BEGIN
WITH RECORDFDBT DO
BEGIN
READ(FBAHTUL,RECORDFDBT);
IF (TIPE=TP) AND (DS<>0) THEN
BEGIN
VC:=(SQR(FCB)*BB*D/6)/(SQR(1+SQR(2.5*CT*TUB/VUB)));
VN:=VUB/OS; VS:=VN-VC; AVS:=VS/(FYB*D); X1:=BB-2*(PBB+0.5*DS);
Y1:=HB-2*(PBB+0.5*DS); ALPA:=(2+Y1/X1)/3;
ATS:=TS/(ALPA*X1*Y1*FYB); AVT:=2*ATS+AVS;
AST:=2*0.25*3.14*SQR(DS); SS:=AST/AVT;
SMAKS:=(X1+Y1)/4; IF SMAKS>3*AST*FYB/BB THEN SMAKS:=3*AST*FYB/BB;
IF SS>SMAKS THEN SS:=SMAKS;
IF (SS>S) AND (SS>=25) THEN
BEGIN
S:=SS; DSS:=RECORDFDBT.DS;
END;
END;
END;
END;
CLOSE(FBAHTUL);
IF S=0 THEN PEM:=1;
END
ELSE PENAM:=1;
END
ELSE ABAL:=1;
END
ELSE ABAL:=1;
IF ABAL=1 THEN
BEGIN
VC:=SQR(FCB)*BB*D/6;
IF (VUB>OS*VC/2) THEN
BEGIN
VSP:=(VUB/OS)-VC; VS:=VSP; V:=SQR(FCB)*BB*D/3;
IF VS>=V THEN
BEGIN
SMAKS:=D/4;
IF SMAKS>300 THEN SMAKS:=300;
END
ELSE
BEGIN
SMAKS:=D/2;
IF SMAKS>600 THEN SMAKS:=600;
END;
RESET(FBAHTUL); JUM:=FILESIZE(FBAHTUL);

```

```

FOR I:=1 TO JUM DO
BEGIN
WITH RECORDFDBT DO
BEGIN
SEEK(FBAHTUL,I-1); READ(FBAHTUL,RECORDFDBT);
IF (TIPE=TP) AND (DS<>0) THEN
BEGIN
AV:=2*0.25*3.14*SQR(DS); SS:=AV*FYB*D/VS;
IF SMAKS>3*AV*FYB/BB THEN SMAKS:=3*AV*FYB/BB;
IF SS>SMAKS THEN SS:=SMAKS;
IF (SS>S) and (SS>=25) THEN
BEGIN
S:=SS; DSS:=RECORDFDBT.DS;
END;
END;
END;
END; CLOSE(FBAHTUL);
END
ELSE
BEGIN
RESET(FBAHTUL); JUM:=FILESIZE(FBAHTUL); X:=1;
FOR I:=1 TO JUM DO
BEGIN
WITH RECORDFDBT DO
BEGIN
SEEK(FBAHTUL,I-1); READ(FBAHTUL,RECORDFDBT);
IF (RECORDFDBT.TIPE=TP) AND (RECORDFDBT.DS<>0) THEN
BEGIN
IF X=1 THEN DSS:=RECORDFDBT.DS;
IF RECORDFDBT.DS<DSS THEN DSS:=RECORDFDBT.DS; X:=X+1;
END;
END;
END; CLOSE(FBAHTUL); S:=300;
END;
END;
IF (ABAI<>1) AND (PEM<>1) THEN
BEGIN
X1:=BB-2*(PBB+0.5*DSS); Y1:=HB-2*(PBB+0.5*DSS); ALPA:=(2+Y1/X1)/3;
ATS:=TS/(ALPA*X1*Y1*FYB); AL:=ATS*(X1+Y1); AT:=ATS*S;
IF (AT>=BB*S/(3*FYB)) THEN AR:=AT;
IF (AT<BB*S/(3*FYB)) THEN AR:=BB*S/(3*FYB);
IF AL<(2.8*HB*S*TUB/(FYB*(TUB+VUB/(3*CT)))-2*AR)*(X1+Y1)/S THEN
AL:=(2.8*HB*S*TUB/(FYB*(TUB+VUB/(3*CT)))-2*AR)*(X1+Y1)/S;
ALX:=0; ALY:=NTTA*(0.25*3.14*SQR(DPTTA))+NTTB*(0.25*3.14*SQR(DPTTB));
IF ALY<NTLA*(0.25*3.14*SQR(DPTLA))+NTLB*(0.25*3.14*SQR(DPTLB)) THEN
ALY:=NTLA*(0.25*3.14*SQR(DPTLA))+NTLB*(0.25*3.14*SQR(DPTLB));
IF AL>ALY THEN ALX:=AL-ALY;
ATULR:=ALX; PILIHTULANGAN; DL:=DPTUL; IF ALX=0 THEN NLX:=0 ELSE NLX:=NTUL;
IF NLX=0 THEN BEGIN
IF HB-DPTTA-DPTTB-2*PBB-2*DSS>=300 THEN NLX:=1;
END;
END;
IF ABAI=1 THEN BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
WRITE('Efek Torsi Balok ',TP,' Boleh "DIABAIKAN"...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
IF PENAM=1 THEN BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
WRITE('Ukuran Penampang Balok ',TP,' Harus "DIPERBESAR"...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
IF PEM=1 THEN BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
WRITE('Sengkang Tipe ',TP,' Tidak Ada Yg "MEMADAI"...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
FBK:=NFDA+BLK; ASSIGN(FBALOK,FBK); {$I-} RESET(FBALOK); {$I+}
IF IORESULT<>0 THEN REWRITE(FBALOK); NOREC:=-1; JUM:=FILESIZE(FBALOK);
WITH RECORDFBLK DO BEGIN
IF JUM<>0 THEN BEGIN
FOR J:=1 TO JUM DO BEGIN SEEK(FBALOK,J-1); READ(FBALOK,RECORDFBLK);
IF TP=RECORDFBLK.TIPE THEN NOREC:=J-1; END;

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IF NOREC=-1 THEN NOREC:=JUM; SEEK(FBALOK,NOREC); END;
S:=TRUNC(S/10)*10;
TIPE:=TP; FNTLB:=TRUNC(NTLB); FDPTLB:=TRUNC(DPTLB); FNTLA:=TRUNC(NTLA);
FDPTLA:=TRUNC(DPTLA); FNTTB:=TRUNC(NTTB); FDPTTB:=TRUNC(DPTTB);
FNTTA:=TRUNC(NTTA); FDPTTA:=TRUNC(DPTTA); FDSS:=TRUNC(DSS);
FS:=TRUNC(S); FNL:=TRUNC(NLX); FDL:=TRUNC(DL); H:=0;
IF DPTTA<DPTLB THEN BEGIN DLX:=DPTTA; H:=1; END ELSE DLX:=DPTLB;
IF (H<>1) AND (DPTTA<>DPTLB) THEN NTTA:=TRUNC(SQR(DPTTA/DLX)*NTTA)+1;
IF NTTA<2 THEN NTTA:=2; IF (H=1) AND (DPTTA<>DPTLB) THEN
NTLB:=TRUNC(SQR(DPTLB/DLX)*NTLB)+1;
IF NTLB<2 THEN NTLB:=2; IF DPTTB<>DLX THEN NTTB:=TRUNC(SQR(DPTTB/DLX)*NTTB)+1;
IF NTTB<2 THEN NTTB:=2; IF DPTLA<>DLX THEN NTLA:=TRUNC(SQR(DPTLA/DLX)*NTLA)+1;
IF NTLA<2 THEN NTLA:=2; DPTTB:=DLX; DPTLA:=DLX;
IF (H=1) AND (DPTTA<>DPTLB) THEN DPTLB:=DLX ELSE DPTTA:=DLX;
FNTLB1:=TRUNC(NTLB); FDPTLB1:=TRUNC(DPTLB); FNTLA1:=TRUNC(NTLA);
FDPTLA1:=TRUNC(DPTLA); FNTTB1:=TRUNC(NTTB); FDPTTB1:=TRUNC(DPTTB);
FNTTA1:=TRUNC(NTTA); FDPTTA1:=TRUNC(DPTTA); WRITE(FBALOK,RECORDFBLK);
END; CLOSE(FBALOK);
UNTIL TP=JTIPE;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10); WRITE('DATA BAHAN BELUM DIBUAT...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
WRITE('DATA TULANGAN YG AKAN DIGUNAKAN BELUM DIBUAT...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
WRITE('DATA GAYA YG BEKERJA PADA BALOK BELUM DIBUAT...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
WRITE('DATA DIMENSI BALOK BELUM DIBUAT...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
WRITE('JUMLAH TIPE BALOK BELUM ADA...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
CLRSCR; TEXTCOLOR(5); GOTOXY(20,10); FOR J:=1 TO 36 DO WRITE(CHAR(176));
GOTOXY(20,11); WRITE(CHAR(176),' '); FOR J:=1 TO 3 DO WRITE(CHAR(175));
TEXTCOLOR(4); WRITE('DISAIN BALOK SELESAI '); TEXTCOLOR(5);
FOR J:=1 TO 3 DO WRITE(CHAR(174)); WRITE(' ',CHAR(176));
GOTOXY(20,12); FOR J:=1 TO 36 DO WRITE(CHAR(176));
GOTOXY(26,13); FOR J:=1 TO 5 DO WRITE(CHAR(3)); TEXTCOLOR(11);
WRITE('TEKAN ENTER '); TEXTCOLOR(5); FOR J:=1 TO 5 DO WRITE(CHAR(3));
TEXTCOLOR(10); WRITE('^G'); READLN; CHDIR(DIRAK);
END.
PROGRAM SKETSABALOK;
uses CRT,DOS,PRINTER,graph;
TYPE
FDMN = RECORD
TIPE : INTEGER; L : REAL; B : REAL; H : REAL; PB : REAL; END;
FBLK = RECORD
TIPE : INTEGER;FNTLB : INTEGER;FDPTLB : INTEGER;FNTLA : INTEGER;
FDPTLA : INTEGER;FNTTB : INTEGER;FDPTTB : INTEGER;FNTTA : INTEGER;
FDPTTA : INTEGER;FNTLB1 : INTEGER;FDPTLB1 : INTEGER;FNTLA1 : INTEGER;
FDPTLA1 : INTEGER;FNTTB1 : INTEGER;FDPTTB1 : INTEGER;FNTTA1 : INTEGER;
FDPTTA1 : INTEGER;FDSS : INTEGER;FS : INTEGER;FNL : INTEGER;FDL : INTEGER; END;
Var
FTIPE : TEXT; FDMN : FILE OF FDMN; FBALOK : FILE OF FBLK;
RECORDFDMN : FDMN; RECORDFBLK : FBLK; NFDAEL : STRING[7]; FTIP,FDM,FBK : STRING[12];
FTP,BDD,BLK,DIRAK,DIREK,F,G,H,K,L,M,N,O : STRING;
JTIPE,tp,i,j,a,b,c,drivergrafik,modegrafik,Z,X,Y,NTTA,DPTTA,DSB,PBB,BB,
HB,SS,NTTB,DPTTB,NMAKS,D,DPTLA,DPTLB,NTLA,NTLB,DL,NL,E,BARA,BARB,S : INTEGER;
TULIS : STRING[9];

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begin DIREK:=PARAMSTR(1); NFDA:=PARAMSTR(2); FTP:=PARAMSTR(3); BDD:=PARAMSTR(4);
BLK:=PARAMSTR(5); DIRAK:=PARAMSTR(6); drivergrafik := detect; IF (DIRAK='A:') OR (DIRAK='C:') OR
(DIRAK='B:') OR
(DIRAK='D:') OR (DIRAK='E:') THEN initgraph(drivergrafik,modegrafik,DIRAK+'LOGO')ELSE initgraph(drivergrafik,
modegrafik,DIRAK+'LOGO');CHDIR(DIREK); FTIP:=NFDA+FTP; ASSIGN(FTIPE,FTIP); {$I-}
RESET(FTIPE); {$I+} IF IORESULT=0 THEN BEGIN READ(FTIPE,FTIPE); CLOSE(FTIPE); FBK:=NFDA+BLK;
ASSIGN(FBALOK,FBK); {$I-}
RESET(FBALOK); {$I+} IF IORESULT=0 THEN BEGIN CLOSE(FBALOK); FDM:=NFDA+BDD; ASSIGN(FDIM,FDM);
{$I-} RESET(FDIM); {$I+}
IF IORESULT=0 THEN BEGIN CLOSE(FDIM); TP:=0; REPEAT TP:=TP+1; RESET(FDIM); cleardevice; setfillstyle(1,15);
Y:=0; S:=0;
floodfill(300,200,14); setteXTstyle(SMALLfont,horizdir,4); Z:=0;
WHILE NOT EOF(FDIM) DO BEGIN WITH RECORDFDMN DO BEGIN READ(FDIM,RECORDFDMN);
IF RECORDFDMN.TIPE=TP THEN BEGIN BB:=TRUNC(B); HB:=TRUNC(H); PBB:=TRUNC(PB); END; END; END;
CLOSE(FDIM); RESET(FBALOK);
WHILE NOT EOF(FBALOK) DO BEGIN WITH RECORDFBLK DO BEGIN READ(FBALOK,RECORDFBLK);
IF RECORDFBLK.TIPE=TP THEN BEGIN NTTA:=FNTTA1; DPTTA:=FDPTTA1; NTTB:=FNTTB1;
DPTTB:=FDPTTB1; NTLA:=FNTLA1; DPTLA:=FDPTLA1; NTLB:=FNTLB1; DPTLB:=FDPTLB1;
DSB:=FDSS; SS:=FS; DL:=FDL; NL:=FNL; END; END; END; CLOSE(FBALOK); FOR I:=0 TO 1 DO BEGIN IF I=1 THEN
BEGIN
DPTTA:=DPTLA; NTTA:=NTLA; DPTTB:=DPTLB; NTTB:=NTLB; END; BARA:=1; BARB:=1; STR(HB,F); F:=F+' mm';
STR(BB,G); G:=G+' mm';
STR(PBB,H); H:=H+' mm'; STR(DSB,K); K:=D'+K+''; STR(SS,L); L:=K+L; STR(DPTTA,L); L:=D'+L; STR(NTTA,M);
L:=M+L; STR(DPTTB,M);
M:=D'+M; STR(NTTB,N); N:=N+M; STR(DL,N); N:=D'+N;
STR(2*NL,O); N:=O+N; STR(TP,O); SETCOLOR(0); SETLINESTYLE(0,0,1);

rectangle(110+I*280,30,190+I*280,130); MOVETO(60+I*280,20); LINEREL(0,120); MOVETO(55+I*280,30); LINEREL(10,0);

MOVETO(55+I*280,130); LINEREL(10,0); OUTTEXTXY(15+I*280,76,F); MOVETO(100+I*280,165); LINEREL(100,0); MO
VETO(110+I*280,160);

LINEREL(0,10); MOVETO(190+I*280,160); LINEREL(0,10); OUTTEXTXY(135+I*280,151,G); MOVETO(195+I*280,150); LI
NEREL(-20,0);
MOVETO(190+I*280,148); LINEREL(0,5); MOVETO(180+I*280,148); LINEREL(0,5); OUTTEXTXY(175+I*280,135,H);
MOVETO(200+I*280,135);
LINEREL(0,-20); MOVETO(197+I*280,130); LINEREL(5,0);
MOVETO(197+I*280,120); LINEREL(5,0); OUTTEXTXY(205+I*280,120,H);
SETLINESTYLE(0,0,3); MOVETO(122+I*280,40); LINEREL(56,0); MOVETO(180+I*280,42);
LINEREL(0,76); MOVETO(122+I*280,120); LINEREL(56,0); MOVETO(120+I*280,42); LINEREL(0,76);
SETLINESTYLE(0,0,3);
ELLIPSE(122+I*280,42,90,180,2,2); ELLIPSE(178+I*280,42,0,90,2,2); ELLIPSE(122+I*280,118,180,270,2,2);

ELLIPSE(178+I*280,118,270,0,2,2); ELLIPSE(176+I*280,44,0,360,2,2); ELLIPSE(176+I*280,116,0,360,2,2); SETLINESTYL
E(0,0,1);
MOVETO(176+I*280,44); LINEREL(10,10); MOVETO(176+I*280,116); LINEREL(10,-10); NMAKS:=TRUNC((BB-2*PBB-
2*DSB+25)/(25+DPTTA));
IF (NTTA>2) THEN BEGIN IF NMAKS>1 THEN BEGIN IF NTTA<=NMAKS THEN BEGIN B:=TRUNC((80-20-
2*NTTA)/(NTTA-1));
IF FRAC(NTTA/2)>0 THEN BEGIN A:=0; C:=1; D:=1; FOR J:=1 TO NTTA-3 DO BEGIN IF A=0 THEN BEGIN
SETLINESTYLE(0,0,3); ELLIPSE(124+I*280+B*C,44,0,360,2,2); SETLINESTYLE(0,0,1); MOVETO(124+I*280+B*C,44);
LINEREL(10,10);
A:=1; C:=C+1; END ELSE BEGIN SETLINESTYLE(0,0,3); ELLIPSE(176-B*D+I*280,44,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(176-B*D+I*280,44); LINEREL(10,10); A:=0; D:=D+1; END; END;
SETLINESTYLE(0,0,3);
ELLIPSE(150+I*280,44,0,360,2,2); ELLIPSE(176+I*280,44,0,360,2,2); ELLIPSE(124+I*280,44,0,360,2,2);
SETLINESTYLE(0,0,1);
MOVETO(124+I*280,44); LINEREL(10,10); LINEREL(130,0); OUTTEXTXY(234+I*280,42,L);
MOVETO(176+I*280,44); LINEREL(10,10); MOVETO(150+I*280,44); LINEREL(10,10);
END ELSE BEGIN A:=0; C:=1; D:=1; FOR J:=1 TO NTTA-2 DO BEGIN IF A=0 THEN BEGIN
SETLINESTYLE(0,0,3); ELLIPSE(124+I*280+B*C,44,0,360,2,2); SETLINESTYLE(0,0,1); MOVETO(124+I*280+B*C,44);
LINEREL(10,10);
A:=1; C:=C+1; END ELSE BEGIN SETLINESTYLE(0,0,3); ELLIPSE(176-B*D+I*280,44,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(176-B*D+I*280,44); LINEREL(10,10); A:=0; D:=D+1; END; END;
SETLINESTYLE(0,0,3);
ELLIPSE(176+I*280,44,0,360,2,2); ELLIPSE(124+I*280,44,0,360,2,2); SETLINESTYLE(0,0,1);
MOVETO(124+I*280,44); LINEREL(10,10);
LINEREL(130,0); OUTTEXTXY(234+I*280,42,L); MOVETO(176+I*280,44); LINEREL(10,10); END; END
ELSE BEGIN IF NTTA-NMAKS<=NMAKS THEN BEGIN B:=TRUNC((80-20-2*NMAKS)/(NMAKS-1)); BARA:=2;
IF FRAC(NMAKS/2)>0 THEN BEGIN A:=0; C:=1; D:=1; FOR J:=1 TO NMAKS-3 DO BEGIN IF A=0 THEN BEGIN

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SETLINESTYLE(0,0,3); ELLIPSE(124+I*280+B*C,44,0,360,2,2); SETLINESTYLE(0,0,1);MOVETO(124+I*280+B*C,44);
LINEREL(17,17);
A:=1; C:=C+1; END ELSE BEGIN SETLINESTYLE(0,0,3); ELLIPSE(176-
B*D+I*280,44,0,360,2,2);SETLINESTYLE(0,0,1);
MOVETO(176-B*D+I*280,44); LINEREL(17,17);A:=0; D:=D+1; END; END; SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280,44,0,360,2,2);
ELLIPSE(176+I*280,44,0,360,2,2);ELLIPSE(150+I*280,44,0,360,2,2); SETLINESTYLE(0,0,1); MOVETO(124+I*280,44);
LINEREL(17,17);
MOVETO(176+I*280,44); LINEREL(17,17); SETLINESTYLE(0,0,1); MOVETO(150+I*280,44);LINEREL(17,17); END
ELSE BEGIN A:=0; C:=1;
D:=1;FOR J:=1 TO NMAKS-2 DO BEGIN IF A=0 THEN BEGIN SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280+B*C,44,0,360,2,2);
SETLINESTYLE(0,0,1);MOVETO(124+I*280+B*C,44); LINEREL(17,17);A:=1; C:=C+1; END ELSE BEGIN
SETLINESTYLE(0,0,3);
ELLIPSE(176-B*D+I*280,44,0,360,2,2);SETLINESTYLE(0,0,1); MOVETO(176-B*D+I*280,44); LINEREL(17,17);A:=0;
D:=D+1; END; END;
SETLINESTYLE(0,0,3);ELLIPSE(124+I*280,44,0,360,2,2);ELLIPSE(176+I*280,44,0,360,2,2);
SETLINESTYLE(0,0,1);MOVETO(124+I*280,44);
LINEREL(17,17);MOVETO(176+I*280,44); LINEREL(17,17); END; IF FRAC((NTTA-NMAKS)/2)>0 THEN BEGIN A:=0;
C:=1; D:=1;
IF NTTA-NMAKS=1 THEN BEGIN SETLINESTYLE(0,0,3); ELLIPSE(150+I*280,51,0,360,2,2);SETLINESTYLE(0,0,1);
MOVETO(150+I*280,51);
LINEREL(10,10);MOVETO(141+I*280,61); LINEREL(130,0);OUTTEXTXY(234+I*280,49,L); END ELSE BEGIN FOR
J:=1 TO (NTTA-NMAKS-3) DO
BEGIN IF A=0 THEN BEGIN SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280+B*C,51,0,360,2,2);SETLINESTYLE(0,0,1);MOVETO(124+I*280+B*C,51);
LINEREL(10,10);A:=1; C:=C+1; END ELSE BEGIN SETLINESTYLE(0,0,3); ELLIPSE(176-B*D+I*280,51,0,360,2,2);
SETLINESTYLE(0,0,1);MOVETO(176-B*D+I*280,51);LINEREL(10,10);A:=0; D:=D+1; END;
END;SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280,51,0,360,2,2);ELLIPSE(176+I*280,51,0,360,2,2);ELLIPSE(150+I*280,51,0,360,2,2);SETLINESTYLE(0
,0,1);
MOVETO(124+I*280,51); LINEREL(10,10);LINEREL(130,0); OUTTEXTXY(234+I*280,49,L); MOVETO(176+I*280,51);
LINEREL(10,10);
MOVETO(150+I*280,51); LINEREL(10,10); END; END ELSE BEGIN A:=0; C:=1; D:=1;
FOR J:=1 TO (NTTA-NMAKS-2) DO BEGIN IF A=0 THEN BEGIN SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280+B*C,51,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(124+I*280+B*C,51); LINEREL(10,10);A:=1; C:=C+1; END ELSE BEGIN
SETLINESTYLE(0,0,3);
ELLIPSE(176-B*D+I*280,51,0,360,2,2);SETLINESTYLE(0,0,1); MOVETO(176-B*D+I*280,51); LINEREL(10,10);
A:=0; D:=D+1; END; END;SETLINESTYLE(0,0,3); ELLIPSE(124+I*280,51,0,360,2,2);ELLIPSE(176+I*280,51,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(124+I*280,51); LINEREL(10,10);LINEREL(130,0); OUTTEXTXY(234+I*280,49,L);
MOVETO(176+I*280,51);
LINEREL(10,10); END; END ELSE BEGIN IF NTTA-2*NMAKS<=NMAKS THEN BEGIN B:=TRUNC((80-20-
2*NMAKS)/(NMAKS-1)); BARA:=3;
IF FRAC(NMAKS/2)>0 THEN BEGIN A:=0; C:=1; D:=1;FOR J:=1 TO NMAKS-3 DO BEGIN IF A=0 THEN BEGIN
SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280+B*C,44,0,360,2,2);ELLIPSE(124+I*280+B*C,51,0,360,2,2);SETLINESTYLE(0,0,1);
MOVETO(124+I*280+B*C,44);
LINEREL(24,24);MOVETO(124+I*280+B*C,51);LINEREL(17,17);A:=1;C:=C+1;END ELSE BEGIN
SETLINESTYLE(0,0,3);
ELLIPSE(176-B*D+I*280,44,0,360,2,2);ELLIPSE(176-B*D+I*280,51,0,360,2,2);SETLINESTYLE(0,0,1); MOVETO(176-
B*D+I*280,44);
LINEREL(24,24);MOVETO(176-B*D+I*280,51); LINEREL(17,17);A:=0; D:=D+1; END; END;SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280,44,0,360,2,2);ELLIPSE(124+I*280,51,0,360,2,2);ELLIPSE(176+I*280,44,0,360,2,2);

ELLIPSE(176+I*280,51,0,360,2,2);ELLIPSE(150+I*280,44,0,360,2,2);ELLIPSE(150+I*280,51,0,360,2,2);SETLINESTYLE(0
,0,1);
MOVETO(124+I*280,44);
LINEREL(24,24);MOVETO(124+I*280,51);LINEREL(17,17);MOVETO(176+I*280,44);LINEREL(24,24);
MOVETO(176+I*280,51); LINEREL(17,17);MOVETO(150+I*280,44); LINEREL(24,24);MOVETO(150+I*280,51);
LINEREL(17,17);
END ELSE BEGIN A:=0; C:=1; D:=1;FOR J:=1 TO NMAKS-2 DO BEGIN IF A=0 THEN BEGIN
SETLINESTYLE(0,0,3); ELLIPSE(124+I*280+B*C,44,0,360,2,2);ELLIPSE(124+I*280+B*C,51,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(124+I*280+B*C,44); LINEREL(24,24);MOVETO(124+I*280+B*C,51);
LINEREL(17,17);A:=1; C:=C+1;
END ELSE BEGIN SETLINESTYLE(0,0,3);ELLIPSE(176-B*D+I*280,44,0,360,2,2);ELLIPSE(176-
B*D+I*280,51,0,360,2,2);
SETLINESTYLE(0,0,1);MOVETO(176-B*D+I*280,44); LINEREL(24,24);MOVETO(176-B*D+I*280,51); LINEREL(17,17);
A:=0; D:=D+1; END; END;

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SETLINESTYLE(0,0,3); ELLIPSE(124+I*280,44,0,360,2,2); ELLIPSE(124+I*280,51,0,360,2,2);
ELLIPSE(176+I*280,44,0,360,2,2); ELLIPSE(176+I*280,51,0,360,2,2); SETLINESTYLE(0,0,1); MOVETO(124+I*280,44);
LINEREL(24,24);
MOVETO(124+I*280,51); LINEREL(17,17); MOVETO(176+I*280,44); LINEREL(24,24); MOVETO(176+I*280,51);
LINEREL(17,17); END;
IF FRAC((NTTA-2*NMAKS)/2)>0 THEN BEGIN A:=0; C:=1; D:=1; IF NTTA-2*NMAKS=1 THEN BEGIN BARA:=2;
SETLINESTYLE(0,0,3);
ELLIPSE(150+I*280,58,0,360,2,2); SETLINESTYLE(0,0,1); MOVETO(150+I*280,58); LINEREL(10,10);
MOVETO(141+I*280,68); LINEREL(130,0); OUTTEXTXY(234+I*280,56,L); END ELSE BEGIN
FOR J:=1 TO (NTTA-2*NMAKS-3) DO BEGIN IF A=0 THEN BEGIN SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280+B*C,58,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(124+I*280+B*C,58); LINEREL(10,10); A:=1; C:=C+1; END ELSE BEGIN
SETLINESTYLE(0,0,3);
ELLIPSE(176-B*D+I*280,58,0,360,2,2); SETLINESTYLE(0,0,1); MOVETO(176-B*D+I*280,58); LINEREL(10,10);
A:=0; D:=D+1; END; END; SETLINESTYLE(0,0,3); ELLIPSE(124+I*280,58,0,360,2,2); ELLIPSE(176+I*280,58,0,360,2,2);
ELLIPSE(150+I*280,58,0,360,2,2); SETLINESTYLE(0,0,1); MOVETO(124+I*280,58); LINEREL(10,10); LINEREL(130,0);
OUTTEXTXY(234+I*280,56,L); MOVETO(176+I*280,58); LINEREL(10,10); MOVETO(150+I*280,58); LINEREL(10,10);
END; END ELSE BEGIN A:=0;
C:=1; D:=1; FOR J:=1 TO (NTTA-2*NMAKS-2) DO BEGIN IF A=0 THEN BEGIN SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280+B*C,58,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(124+I*280+B*C,58); LINEREL(10,10); A:=1; C:=C+1; END ELSE BEGIN
SETLINESTYLE(0,0,3);
ELLIPSE(176-B*D+I*280,58,0,360,2,2); SETLINESTYLE(0,0,1); MOVETO(176-B*D+I*280,58); LINEREL(10,10);
A:=0; D:=D+1; END; END; SETLINESTYLE(0,0,3); ELLIPSE(124+I*280,58,0,360,2,2); ELLIPSE(176+I*280,58,0,360,2,2); SET
LINESTYLE(0,0,1);
MOVETO(124+I*280,58); LINEREL(10,10); LINEREL(130,0); OUTTEXTXY(234+I*280,56,L); MOVETO(176+I*280,58);
LINEREL(10,10); END; END
ELSE Y:=1; END; END; END ELSE Z:=1; END ELSE BEGIN IF NMAKS>1 THEN BEGIN SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280,44,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(124+I*280,44); LINEREL(10,10); LINEREL(130,0); OUTTEXTXY(234+I*280,42,L);
END ELSE Z:=1; END;
NMAKS:=TRUNC((BB-2*PBB-2*DSB+25)/(25+DPTTB)); IF NTTB>2 THEN BEGIN IF NMAKS>1 THEN BEGIN IF
NTTB<=NMAKS THEN BEGIN
B:=TRUNC((80-20-2*NTTB)/(NTTB-1)); IF FRAC(NTTB/2)=0 THEN BEGIN A:=0; C:=1; D:=1; FOR J:=1 TO NTTB-3 DO
BEGIN IF A=0 THEN BEGIN
SETLINESTYLE(0,0,3); ELLIPSE(124+I*280+B*C,116,0,360,2,2); SETLINESTYLE(0,0,1);
MOVETO(124+I*280+B*C,116); LINEREL(10,-10);
A:=1; C:=C+1; END ELSE BEGIN SETLINESTYLE(0,0,3); ELLIPSE(176-
B*D+I*280,116,0,360,2,2); SETLINESTYLE(0,0,1);
MOVETO(176-B*D+I*280,116); LINEREL(10,-10); A:=0; D:=D+1; END; END; SETLINESTYLE(0,0,3);
ELLIPSE(150+I*280,116,0,360,2,2);
ELLIPSE(124+I*280,116,0,360,2,2); ELLIPSE(176+I*280,116,0,360,2,2); SETLINESTYLE(0,0,1);
MOVETO(124+I*280,116); LINEREL(10,-10);
LINEREL(130,0); OUTTEXTXY(234+I*280,94,M); MOVETO(176+I*280,116); LINEREL(10,-
10); MOVETO(150+I*280,116); LINEREL(10,-10); END
ELSE BEGIN A:=0; C:=1; D:=1; FOR J:=1 TO NTTB-2 DO BEGIN IF A=0 THEN BEGIN
SETLINESTYLE(0,0,3); ELLIPSE(124+I*280+B*C,116,0,360,
2,2); SETLINESTYLE(0,0,1); MOVETO(124+I*280+B*C,116); LINEREL(10,-10); A:=1; C:=C+1; END ELSE BEGIN
SETLINESTYLE(0,0,3);
ELLIPSE(176-B*D+I*280,116,0,360,2,2); SETLINESTYLE(0,0,1); MOVETO(176-B*D+I*280,116); LINEREL(10,-10);
A:=0; D:=D+1; END; END; SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280,116,0,360,2,2); ELLIPSE(176+I*280,116,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(124+I*280,116); LINEREL(10,-10);
LINEREL(130,0); OUTTEXTXY(234+I*280,94,M); MOVETO(176+I*280,116);
LINEREL(10,-10); END; END ELSE BEGIN IF NTTB-NMAKS<=NMAKS THEN BEGIN B:=TRUNC((80-20-
2*NMAKS)/(NMAKS-1)); BARB:=2;
IF FRAC(NMAKS/2)>0 THEN BEGIN A:=0; C:=1; D:=1; FOR J:=1 TO NMAKS-3 DO BEGIN IF A=0 THEN BEGIN
SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280+B*C,116,0,360,2,2); SETLINESTYLE(0,0,1); MOVETO(124+I*280+B*C,116); LINEREL(17,-17);
A:=1; C:=C+1; END ELSE BEGIN SETLINESTYLE(0,0,3); ELLIPSE(176-B*D+I*280,116,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(176-B*D+I*280,116); LINEREL(17,-17); A:=0; D:=D+1; END;
END; SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280,116,0,360,2,2); ELLIPSE(176+I*280,116,0,360,2,2); ELLIPSE(150+I*280,116,0,360,2,2); SETLINESTYL
E(0,0,1);
MOVETO(124+I*280,116); LINEREL(17,-17); MOVETO(176+I*280,116); LINEREL(17,-17); MOVETO(150+I*280,116);
LINEREL(17,-17); END
ELSE BEGIN A:=0; C:=1; D:=1; FOR J:=1 TO NMAKS-2 DO BEGIN IF A=0 THEN BEGIN SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280+B*C,116,0,

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360,2,2);SETLINESTYLE(0,0,1); MOVETO(124+I*280+B*C,116); LINEREL(17,-17);A:=1; C:=C+1; END ELSE BEGIN
SETLINESTYLE(0,0,3);
ELLIPSE(176-B*D+I*280,116,0,360,2,2);SETLINESTYLE(0,0,1); MOVETO(176-B*D+I*280,116); LINEREL(17,-17);
A:=0; D:=D+1; END; END;SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280,116,0,360,2,2);ELLIPSE(176+I*280,116,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(124+I*280,116); LINEREL(17,-17);MOVETO(176+I*280,116); LINEREL(17,-17);
END;IF FRAC((NTTB-NMAKS)
/2)>0 THEN BEGIN A:=0; C:=1; D:=1;IF NTTB-NMAKS=1 THEN BEGIN SETLINESTYLE(0,0,3);
ELLIPSE(150+I*280,109,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(150+I*280,109); LINEREL(10,-10);MOVETO(141+I*280,99);
LINEREL(130,0);OUTTEXTXY(234+I*280,87,M);END
ELSE BEGIN FOR J:=1 TO (NTTB-NMAKS-3) DO BEGIN IF A=0 THEN BEGIN SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280+B*C,109,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(124+I*280+B*C,109); LINEREL(10,-10);A:=1; C:=C+1; END ELSE BEGIN
SETLINESTYLE(0,0,3);
ELLIPSE(176-B*D+I*280,109,0,360,2,2);SETLINESTYLE(0,0,1); MOVETO(176-B*D+I*280,109); LINEREL(10,-10);
A:=0; D:=D+1; END; END;SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280,109,0,360,2,2);ELLIPSE(176+I*280,109,0,360,2,2);
ELLIPSE(150+I*280,109,0,360,2,2);SETLINESTYLE(0,0,1); MOVETO(124+I*280,109);
LINEREL(10,-10);LINEREL(130,0);OUTTEXTXY(234+I*280,87,M);MOVETO(176+I*280,109);LINEREL(10,-
10);MOVETO(150+I*280,109);LINEREL
(10,-10);END; END ELSE BEGIN A:=0; C:=1; D:=1;FOR J:=1 TO (NTTB-NMAKS-2) DO BEGIN IF A=0 THEN BEGIN
SETLINESTYLE(0,0,3); ELLIPSE(124+I*280+B*C,109,0,360,2,2);SETLINESTYLE(0,0,1);
MOVETO(124+I*280+B*C,109); LINEREL(10,-10);
A:=1; C:=C+1; END ELSE BEGIN SETLINESTYLE(0,0,3); ELLIPSE(176-
B*D+I*280,109,0,360,2,2);SETLINESTYLE(0,0,1); MOVETO(176-B*D+I*
280,109);LINEREL(10,-10);A:=0; D:=D+1; END; END;SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280,109,0,360,2,2);ELLIPSE(176+I*280,109,0,
360,2,2);SETLINESTYLE(0,0,1); MOVETO(124+I*280,109); LINEREL(10,-10); LINEREL(130,0);
OUTTEXTXY(234+I*280,87,M);MOVETO(176+I*280,109); LINEREL(10,-10); END; END ELSE BEGIN
IF NTTB-2*NMAKS<=NMAKS THEN BEGIN B:=TRUNC((80-20-2*NMAKS)/(NMAKS-1)); BARB:=3;
IF FRAC(NMAKS/2)>0 THEN BEGIN A:=0; C:=1; D:=1;FOR J:=1 TO NMAKS-3 DO BEGIN IF A=0 THEN BEGIN
SETLINESTYLE(0,0,3); ELLIPSE(124+I*280+B*C,116,0,360,2,2);ELLIPSE(124+I*280+B*C,109,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(124+I*280+B*C,116); LINEREL(24,-24);MOVETO(124+I*280+B*C,109);
LINEREL(17,-17);A:=1; C:=C+1;
END ELSE BEGIN SETLINESTYLE(0,0,3); ELLIPSE(176-B*D+I*280,116,0,360,2,2);ELLIPSE(176-
B*D+I*280,109,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(176-B*D+I*280,116); LINEREL(24,-24);MOVETO(176-B*D+I*280,109);
LINEREL(17,-17);A:=0; D:=D+1;
END; END;SETLINESTYLE(0,0,3); ELLIPSE(124+I*280,116,0,360,2,2);ELLIPSE(124+I*280,109,0,360,2,2);
ELLIPSE(176+I*280,116,0,360,2,2);ELLIPSE(176+I*280,109,0,360,2,2);ELLIPSE(150+I*280,116,0,360,2,2);
ELLIPSE(150+I*280,109,0,360,2,2);SETLINESTYLE(0,0,1); MOVETO(124+I*280,116); LINEREL(24,-
24);MOVETO(124+I*280,109);
LINEREL(17,-17);MOVETO(176+I*280,116);LINEREL(24,-24);MOVETO(176+I*280,109); LINEREL(17,-
17);MOVETO(150+I*280,116);
LINEREL(24,-24);MOVETO(150+I*280,109); LINEREL(17,-17);END ELSE BEGIN A:=0; C:=1; D:=1;FOR J:=1 TO
NMAKS-2 DO BEGIN
IF A=0 THEN BEGIN SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280+B*C,116,0,360,2,2);ELLIPSE(124+I*280+B*C,109,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(124+I*280+B*C,116); LINEREL(24,-24);MOVETO(124+I*280+B*C,109);
LINEREL(17,-17);A:=1; C:=C+1;
END ELSE BEGIN SETLINESTYLE(0,0,3);ELLIPSE(176-B*D+I*280,116,0,360,2,2);ELLIPSE(176-
B*D+I*280,109,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(176-B*D+I*280,116); LINEREL(24,-24); MOVETO(176-B*D+I*280,109);
LINEREL(17,-17);
A:=0; D:=D+1; END; END; SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280,116,0,360,2,2);ELLIPSE(124+I*280,109,0,360,2,2);
ELLIPSE(176+I*280,116,0,360,2,2);ELLIPSE(176+I*280,109,0,360,2,2);SETLINESTYLE(0,0,1);
MOVETO(124+I*280,116);LINEREL(24,-24);
MOVETO(124+I*280,109); LINEREL(17,-17);MOVETO(176+I*280,116); LINEREL(24,-24);MOVETO(176+I*280,109);
LINEREL(17,-17); END;
IF FRAC((NTTB-2*NMAKS)/2)>0 THEN BEGIN A:=0; C:=1; D:=1;IF NTTB-2*NMAKS=1 THEN BEGIN
SETLINESTYLE(0,0,3); BARB:=2;
ELLIPSE(150+I*280,102,0,360,2,2); SETLINESTYLE(0,0,1);MOVETO(150+I*280,102); LINEREL(10,-10);
MOVETO(141+I*280,92);
LINEREL(130,0); OUTTEXTXY(234+I*280,80,M); END ELSE BEGIN FOR J:=1 TO (NTTB-2*NMAKS-3) DO BEGIN IF
A=0 THEN BEGIN
SETLINESTYLE(0,0,3); ELLIPSE(124+I*280+B*C,102,0,360,2,2);SETLINESTYLE(0,0,1);
MOVETO(124+I*280+B*C,102); LINEREL(10,-10);

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A:=1; C:=C+1; END ELSE BEGIN SETLINESTYLE(0,0,3); ELLIPSE(176-
B*D+I*280,102,0,360,2,2);SETLINESTYLE(0,0,1);MOVETO(176-B*D+I*
280,102);LINEREL(10,-10);A:=0; D:=D+1; END; END; SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280,102,0,360,2,2);ELLIPSE(176+I*280,
102,0,360,2,2);ELLIPSE(150+I*280,102,0,360,2,2);SETLINESTYLE(0,0,1); MOVETO(124+I*280,102); LINEREL(10,-10);
LINEREL(130,0); OUTTEXTXY(234+I*280,80,M);MOVETO(176+I*280,102); LINEREL(10,-10);
10);MOVETO(150+I*280,102); LINEREL(10,-10);END;
END ELSE BEGIN A:=0; C:=1; D:=1;FOR J:=1 TO (NT*TB-2*NMAKS-2) DO BEGIN IF A=0 THEN BEGIN
SETLINESTYLE(0,0,3); ELLIPSE(124+I*280+B*C,102,0,360,2,2);SETLINESTYLE(0,0,1);
MOVETO(124+I*280+B*C,102); LINEREL(10,-10);
A:=1; C:=C+1; END ELSE BEGIN SETLINESTYLE(0,0,3); ELLIPSE(176-
B*D+I*280,102,0,360,2,2);SETLINESTYLE(0,0,1);MOVETO(176-B*D+I*
280,102); LINEREL(10,-10);A:=0; D:=D+1; END; END; SETLINESTYLE(0,0,3); ELLIPSE(124+I*280,102,0,360,2,2);
ELLIPSE(176+I*280,102,0,360,2,2);SETLINESTYLE(0,0,1);MOVETO(124+I*280,102);LINEREL(10,-
10);LINEREL(130,0);OUTTEXTXY(234+I*
280,80,M);MOVETO(176+I*280,102); LINEREL(10,-10); END; END ELSE Y:=1; END; END; END ELSE Z:=1; END
ELSE BEGIN IF NMAKS>1 THEN BEGIN SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280,116,0,360,2,2);SETLINESTYLE(0,0,1);MOVETO(124+I*280,
116); LINEREL(10,-10);LINEREL(130,0); OUTTEXTXY(234+I*280,94,M);END ELSE Z:=1;END;IF NL<>0 THEN BEGIN
IF NL=1 THEN BEGIN
SETLINESTYLE(0,0,3);
ELLIPSE(124+I*280,80,0,360,2,2);ELLIPSE(176+I*280,80,0,360,2,2);SETLINESTYLE(0,0,1);MOVETO(124+I*280,
80); LINEREL(-5,-5);MOVETO(176+I*280,80);LINEREL(-5,-5);LINEREL(-95,0); OUTTEXTXY(78+I*280,63,N);END
ELSE BEGIN
NMAKS:=TRUNC((HB-2*PBB-2*DSB-BARA*DPTTA-BARB*DPTTB-25)/(25+DL));E:=TRUNC((100-20-2*N-
12)/(NL+1));IF (NMAKS>=1) AND
(NL<=NMAKS) THEN BEGIN IF FRAC(NL/2)>0 THEN BEGIN FOR J:=1 TO TRUNC((NL-1)/2) DO BEGIN
SETLINESTYLE(0,0,3); ELLIPSE(124+I*
280,116-J*E,0,360,2,2);ELLIPSE(124+I*280,44+J*E,0,360,2,2);ELLIPSE(176+I*280,116-J*E,0,360,2,2);
ELLIPSE(176+I*280,44+J*E,
0,360,2,2);SETLINESTYLE(0,0,1);MOVETO(124+I*280,116-J*E); LINEREL(-80-J*E-44),(-80-J*E-
44));MOVETO(176+I*280,116-J*E);
LINEREL(-80-J*E-44),(-80-J*E-44));MOVETO(124+I*280,44+J*E);LINEREL(-80-J*E-44),(80-J*E-
44));MOVETO(176+I*280,44+J*E);
LINEREL(-80-J*E-44),(80-J*E-
44));END;SETLINESTYLE(0,0,3);ELLIPSE(124+I*280,80,0,360,2,2);ELLIPSE(176+I*280,80,0,360,2,2);
SETLINESTYLE(0,0,1);MOVETO(124+I*280,80);LINEREL(-J*E,0);MOVETO(176+280*I,80); LINEREL(-80-
J*E,0);OUTTEXTXY(88+I*280-J*E,
68,N);END ELSE BEGIN FOR J:=1 TO TRUNC(NL/2) DO BEGIN SETLINESTYLE(0,0,3); ELLIPSE(124+I*280,116-
J*E,0,360,2,2);
ELLIPSE(124+I*280,44+J*E,0,360,2,2);ELLIPSE(176+I*280,116-J*E,0,360,2,2); ELLIPSE(176+I*280,44+J*E,0,360,2,2);
SETLINESTYLE(0,0,1);MOVETO(124+I*280,116-J*E); LINEREL(-80-J*E-44),(-80-J*E-44));MOVETO(176+I*280,116-
J*E);
LINEREL(-80-J*E-44),(-80-J*E-44));MOVETO(124+I*280,44+J*E);LINEREL(-80-J*E-44),(80-J*E-
44));MOVETO(176+I*280,44+J*E);
LINEREL(-80-J*E-44),(80-J*E-44));END;MOVETO(176+280*I-(80-TRUNC(NL/2)*E-44),80); LINEREL(-77-J*E,0);
OUTTEXTXY(88+I*280-J*E,68,N);END;END ELSE S:=1; END; END;IF Y=0 THEN BEGIN IF NMAKS>1 THEN BEGIN
SETLINESTYLE(0,0,1);
MOVETO(120+I*280,110); LINEREL(-23,23);OUTTEXTXY(80+I*280,135,K);setteXTstyle(tripleXfont,horizdir,1);
outteXTxy(160,310,'SKETSA PENULANGAN BALOK TIPE '+O); IF I=0 THEN BEGIN setteXTstyle(SMALLfont,horizdir,6);
OUTTEXTXY(37,
210,'PENULANGAN DAERAH TUMPUAN');setteXTstyle(SMALLfont,horizdir,4); END ELSE BEGIN
setteXTstyle(SMALLfont,horizdir,6);
OUTTEXTXY(337,210,'PENULANGAN DAERAH LAPANGAN');setteXTstyle(SMALLfont,horizdir,4); END; END; END
ELSE BEGIN

setfillstyle(1,15);bar(111+I*280,31,189+I*280,129);bar(191+I*280,31,291+I*280,115);SETLINESTYLE(0,0,3);MOVETO(122
+I*280,
40);LINEREL(56,0);MOVETO(180+I*280,42);LINEREL(0,76);MOVETO(122+I*280,120);LINEREL(56,0);MOVETO(120+I
*280,42);LINEREL(0,76);

ELLIPSE(122+I*280,42,90,180,2,2);ELLIPSE(178+I*280,42,0,90,2,2);ELLIPSE(122+I*280,118,180,270,2,2);ELLIPSE(178+I
*280,118,
270,0,2,2); setteXTstyle(tripleXfont,horizdir,1);outteXTxy(160,310,'SKETSA PENULANGAN BALOK TIPE '+O); IF I=0
THEN BEGIN
setteXTstyle(SMALLfont,horizdir,4);OUTTEXTXY(46,190,'TULANGAN LEBIH DARI TIGA BARIS
TULANGAN');setteXTstyle(SMALLfont,
horizdir,6);OUTTEXTXY(37,210,'PENULANGAN DAERAH TUMPUAN');setteXTstyle(SMALLfont,horizdir,4); END ELSE
BEGIN

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setteXTstyle(SMALLfont,horizdir,4);OUTTEXTXY(350,190,TULANGAN LEBIH DARI TIGA BARIS TULANGAN");
setteXTstyle(SMALLfont,horizdir,6);OUTTEXTXY(337,210,PENULANGAN DAERAH LAPANGAN");
SetteXTstyle(SMALLfont,horizdir,4); END; END; IF (Z=1) OR (S=1) THEN BEGIN
setfillstyle(1,15); bar(111+I*280,31,189+I*280,129);bar(191+I*280,31,291+I*280,115);
SETLINESTYLE(0,0,3);MOVETO(122+I*280,40);LINEREL(56,0);MOVETO(180+I*280,42);
LINEREL(0,76);MOVETO(122+I*280,120);LINEREL(56,0);MOVETO(120+I*280,42);LINEREL(0,76);
ELLIPSE(122+I*280,42,90,180,2,2);ELLIPSE(178+I*280,42,0,90,2,2);ELLIPSE(122+I*280,118,180,270,2,2);
ELLIPSE(178+I*280,118,270,0,2,2); setteXTstyle(tripleXfont,horizdir,1);
outteXTXY(160,310,SKETSA PENULANGAN BALOK TIPE '+O'); IF I=0 THEN BEGIN
setteXTstyle(SMALLfont,horizdir,4); IF Z=1 THEN OUTTEXTXY(55,190,LEBAR PENAMPANG TIDAK MENCUKUPI ...
!) ELSE
OUTTEXTXY(52,190,TINGGI PENAMPANG TIDAK MENCUKUPI ... !);setteXTstyle(SMALLfont,horizdir,6);
OUTTEXTXY(37,210,PENULANGAN DAERAH TUMPUAN");setteXTstyle(SMALLfont,horizdir,4); END ELSE BEGIN
setteXTstyle(SMALLfont,horizdir,4); IF Z=1 THEN OUTTEXTXY(362,190,LEBAR PENAMPANG TIDAK MENCUKUPI ...
!) ELSE
OUTTEXTXY(359,190,TINGGI PENAMPANG TIDAK MENCUKUPI ...
!);setteXTstyle(SMALLfont,horizdir,6);OUTTEXTXY(337,210,
PENULANGAN DAERAH LAPANGAN");SetteXTstyle(SMALLfont,horizdir,4); END; END;SETLINESTYLE(0,0,1);
SETCOLOR(1);
setteXTstyle(tripleXfont,horizdir,1);outteXTXY(516,440,UII-CDP"); setteXTstyle(SMALLfont,horizdir,4);setcolor(4);
rectangle(500,440,600,465);setcolor(0);END; READKEY; UNTIL
TP=JTIPE;END;END;END;closegraph;restorecrtmode;CHDIR(DIRAK);end.

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PROGRAM TBL;
USES CRT,DOS;
TYPE
    FDAT = RECORD
        NPROY : string[19];
        NFDAT : string[8];
        NaFil : string[12];
        ENG : string[19];
    END;
    FBLK = RECORD
        TIPE : INTEGER;
        FNTLB : INTEGER;
        FDPTLB : INTEGER;
        FNTLA : INTEGER;
        FDPTLA : INTEGER;
        FNTTB : INTEGER;
        FDPTTB : INTEGER;
        FNTTA : INTEGER;
        FDPTTA : INTEGER;
        FNTLB1 : INTEGER;
        FDPTLB1 : INTEGER;
        FNTLA1 : INTEGER;
        FDPTLA1 : INTEGER;
        FNTTB1 : INTEGER;
        FDPTTB1 : INTEGER;
        FNITA1 : INTEGER;
        FDPTTA1 : INTEGER;
        FDSS : INTEGER;
        FS : INTEGER;
        FNL : INTEGER;
        FDL : INTEGER;
    END;
VAR
    FBALOK : FILE OF FBLK;
    NFILE : FILE OF FDAT;
    RECORDFDAT : FDAT;
    RECORDFBLK : FBLK;
    I,J,A,B,C,D : INTEGER;
    NFDA,EL : STRING[7];
    FBK : STRING[12];
    NPRO,EN : STRING[19];
    BLK,DIRAK,
    DIREK : STRING;

BEGIN
    DIREK:=PARAMSTR(1); NFDA:=PARAMSTR(2); EL:=PARAMSTR(3); BLK:=PARAMSTR(4);

```

```

DIRAK:=PARAMSTR(5); D:=0; CHDIR(DIREK);
REPEAT
  ASSIGN(NFILE,'FILEDATA.DAT'); RESET(NFILE);
  WHILE NOT EOF(NFILE) DO BEGIN READ(NFILE,RECORDFDAT);
  IF RECORDFDAT.NFDAT=NFDA THEN BEGIN
    NPRO:=RECORDFDAT.NPROY; EN :=RECORDFDAT.ENG; END;
  END; CLOSE(NFILE); FBK:=NFDA+BLK; ASSIGN(FBALOK,FBK); {SI-} RESET(FBALOK); {SI+}
  IF IORESULT=0 THEN BEGIN I:=1;
  WHILE NOT EOF(FBALOK) DO BEGIN
    WITH RECORDFBLK DO BEGIN READ(FBALOK,RECORDFBLK);
    IF D=1 THEN BEGIN
      FNTLB:=FNTLB1; FDPTLB:=FDPTLB1; FNTLA:=FNTLA1; FDPILA:=FDPILA1;
      FNTTB:=FNTTB1; FDPITB:=FDPITB1; FNTTA:=FNTTA1; FDPITA:=FDPITA1;
    END;
    IF I=1 THEN BEGIN
      A:=LENGTH(NPRO); B:=LENGTH(NFDA); C:=LENGTH(EN);
      TEXTCOLOR(10); TEXTBACKGROUND(0); CLRSCR; GOTOXY(10,1);
      WRITE(CHAR(218)); FOR J:=1 TO 59 DO WRITE(CHAR(196)); WRITE(CHAR(191));
      GOTOXY(10,2); WRITE(CHAR(179)); TEXTCOLOR(11); IF D=0 THEN
        WRITE('  PENULANGAN BALOK YANG MENDEKATI KEPERLUAN ') ELSE
        WRITE('  PENULANGAN BALOK YANG DIGUNAKAN ');
      TEXTCOLOR(10); WRITE(CHAR(179)); GOTOXY(10,3);
      WRITE(CHAR(195)); FOR J:=1 TO 59 DO WRITE(CHAR(196)); WRITE(CHAR(180));
      GOTOXY(10,4);
      WRITE(CHAR(179),' Proyek : ',NPRO:A); FOR J:=1 TO (19-A) DO WRITE(' ');
      WRITE(' Nama File Data : ',NFDA:B); FOR J:=1 TO (8-B) DO WRITE(' ');
      WRITE(' ',CHAR(179)); GOTOXY(10,5);
      WRITE(CHAR(179),' Perencana : ',EN:C); FOR J:=1 TO (19-C) DO WRITE(' ');
      WRITE(' ',CHAR(179)); GOTOXY(10,6);
      WRITE(CHAR(195)); FOR J:=1 TO 5 DO WRITE(CHAR(196)); WRITE(CHAR(194));
      FOR J:=1 TO 7 DO WRITE(CHAR(196)); WRITE(CHAR(194));
      FOR J:=1 TO 8 DO WRITE(CHAR(196)); WRITE(CHAR(194));
      FOR J:=1 TO 7 DO WRITE(CHAR(196)); WRITE(CHAR(194));
      FOR J:=1 TO 8 DO WRITE(CHAR(196)); WRITE(CHAR(194));
      FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(194));
      FOR J:=1 TO 8 DO WRITE(CHAR(196)); WRITE(CHAR(180));
      GOTOXY(10,7); WRITE(CHAR(179),TIPE',CHAR(179),TUL.LAP',CHAR(179),TUL.LAP',
      CHAR(179),TUL.TUM',CHAR(179),TUL.TUM',CHAR(179),TULANGAN',
      CHAR(179),TULANGAN',CHAR(179)); GOTOXY(10,8);
      WRITE(CHAR(179),BALOK',CHAR(179),BAWAH',CHAR(179),ATAS',
      CHAR(179),BAWAH',CHAR(179),ATAS',CHAR(179),SENGKANG',
      CHAR(179),TORSI',CHAR(179)); GOTOXY(10,9);
      WRITE(CHAR(195)); FOR J:=1 TO 5 DO WRITE(CHAR(196)); WRITE(CHAR(197));
      FOR J:=1 TO 7 DO WRITE(CHAR(196)); WRITE(CHAR(197));
      FOR J:=1 TO 8 DO WRITE(CHAR(196)); WRITE(CHAR(197));
      FOR J:=1 TO 7 DO WRITE(CHAR(196)); WRITE(CHAR(197));
      FOR J:=1 TO 8 DO WRITE(CHAR(196)); WRITE(CHAR(197));
      FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(197));
      FOR J:=1 TO 8 DO WRITE(CHAR(196)); WRITE(CHAR(180)); END;
    IF FNL<>0 THEN BEGIN
      GOTOXY(10,I+9); WRITE(CHAR(179),',TIPE:3,',CHAR(179),',FNTLB:2,D',
      FDPTLB:2,',CHAR(179),',FNTLA:2,D',FDPILA:2,',CHAR(179),',FNTTB:2,
      D',FDPITB:2,',CHAR(179),',FNTTA:2,D',FDPITA:2,',CHAR(179),D',FDSS:2,
      ',FS:3,mm',CHAR(179),',FNL:2,D',FDL:2,',CHAR(179)); END
    ELSE BEGIN GOTOXY(10,I+9); WRITE(CHAR(179),',TIPE:3,',CHAR(179),',FNTLB:2,D',
      FDPTLB:2,',CHAR(179),',FNTLA:2,D',FDPILA:2,',CHAR(179),',FNTTB:2,
      D',FDPITB:2,',CHAR(179),',FNTTA:2,D',FDPITA:2,',CHAR(179),D',FDSS:2,
      ',FS:3,mm',CHAR(179),', - ',CHAR(179)); END; I:=I+1;
    IF (I=15) OR (EOF(FBALOK)) THEN BEGIN
      GOTOXY(10,I+9);
      WRITE(CHAR(192)); FOR J:=1 TO 5 DO WRITE(CHAR(196)); WRITE(CHAR(193));
      FOR J:=1 TO 7 DO WRITE(CHAR(196)); WRITE(CHAR(193));
      FOR J:=1 TO 8 DO WRITE(CHAR(196)); WRITE(CHAR(193));
      FOR J:=1 TO 7 DO WRITE(CHAR(196)); WRITE(CHAR(193));
      FOR J:=1 TO 8 DO WRITE(CHAR(196)); WRITE(CHAR(193));
      FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(193));
      FOR J:=1 TO 8 DO WRITE(CHAR(196)); WRITE(CHAR(217)); TEXTCOLOR(11);
      GOTOXY(10,I+10); WRITE('Tekan "SEMBARANG TOMBOL" Untuk Melanjutkan.....!');
      WRITE('^G); READKEY; TEXTCOLOR(10); I:=1; END; END;
    END; CLOSE(FBALOK);

```

```

END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11);
  GOTOXY(20,5); WRITE('  PROSES DISAIN BELUM DILAKUKAN'); GOTOXY(15,7);
  WRITE('Tekan "SEMBARANG TOMBOL" Untuk Melanjutkan.....!');
  WRITE('^G'); READKEY; TEXTCOLOR(10);
END;
D:=D+1;
UNTIL D=2;
CHDIR(DIRAK);
END.

```

```

PROGRAM TDBL;
USES CRT;
TYPE
  FDBN = RECORD
    TIPE : INTEGER;
    FC : REAL;
    FY : REAL;
    ES : REAL;
  END;
  FDBT = RECORD
    TIPE : INTEGER;
    N : INTEGER;
    DP : INTEGER;
    DS : INTEGER;
  END;
  FGMS = RECORD
    TIPE : INTEGER;
    MUlap : REAL;
    MUtum : REAL;
    VU : REAL;
    TU : REAL;
  END;
  FDMN = RECORD
    TIPE : INTEGER;
    L : REAL;
    B : REAL;
    H : REAL;
    PB : REAL;
  END;
  FELN = RECORD
    TIPE : INTEGER;
    NO : INTEGER;
    ELE : INTEGER;
  END;

VAR
  FTIPE : TEXT;
  FDATBAH : FILE OF FDBN;
  FBAHTUL : FILE OF FDBT;
  FGMAKS : FILE OF FGMS;
  FDIM : FILE OF FDMN;
  FELE : FILE OF FELN;
  RECORDFELN : FELN;
  RECORDFDBN : FDBN;
  RECORDFDBT : FDBT;
  RECORDFGMS : FGMS;
  RECORDFDMN : FDMN;
  I,J,TIPE,JUM,NOREC,I,TP,DPMAXS,DSMAKS,
  NTUL,DPTUL,K,F : Integer;
  NFDA,EL : STRING[7];
  FDB,FDT,FGM,FTIP,FDM,FELM : STRING[12];
  FTP,BBN,BBT,BEL,BGM,BDD,DIRAK,DIREK : STRING;

BEGIN
  DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);FTP:=PARAMSTR(4);
  BBN:=PARAMSTR(5);BBT:=PARAMSTR(6);BEL:=PARAMSTR(7);BGM:=PARAMSTR(8);
  BDD:=PARAMSTR(9); DIRAK:=PARAMSTR(10); CHDIR(DIREK); FDM:=NFDA+BDD;

```

```

ASSIGN(FDIM,FDM); {$I-} RESET(FDIM); {$I+}
IF IORESULT=0 THEN BEGIN
  CLOSE(FDIM); FGM:=NFDA+BGM; ASSIGN(FGMAKS,FGM); {$I-} RESET(FGMAKS); {$I+}
  IF IORESULT=0 THEN BEGIN
    CLOSE(FGMAKS); FDT:=NFDA+BBT; ASSIGN(FBAHTUL,FDT); {$I-} RESET(FBAHTUL); {$I+}
    IF IORESULT=0 THEN BEGIN
      CLOSE(FBAHTUL); FDB:=NFDA+BBN; ASSIGN(FDATBAH,FDB); {$I-} RESET(FDATBAH); {$I+}
      IF IORESULT=0 THEN BEGIN
        CLOSE(FDATBAH); FELM:=NFDA+BEL; ASSIGN(FELE,FELM); {$I-} RESET(FELE); {$I+}
        IF IORESULT=0 THEN BEGIN
          CLOSE(FELE); TEXTCOLOR(10); TEXTBACKGROUND(0); CLRSCR;
          I:=1; K:=1; F:=1; RESET(FDATBAH);
          WHILE NOT EOF(FDATBAH) DO BEGIN
            SEEK(FDATBAH,F-1); READ(FDATBAH,RECORDFDBN); F:=F+1;
            WITH RECORDFDBN DO BEGIN
              IF (K=1) THEN BEGIN I:=I+6;
                IF I>=22 THEN BEGIN CLRSCR; I:=7; END;
                WRITE('      ',CHAR(218));
                FOR J:=1 TO 63 DO WRITE(CHAR(196)); WRITE(CHAR(191));
                WRITELN; WRITE('      ',CHAR(179)); TEXTCOLOR(11);
                WRITE('      >>> DATA BAHAN <<<');
                '      '); TEXTCOLOR(10); WRITE(CHAR(179));
                WRITELN; WRITE('      ',CHAR(195));
                FOR J:=1 TO 63 DO WRITE(CHAR(196)); WRITE(CHAR(180));
                WRITELN; WRITE('      ',CHAR(179));
                'Tipe Teg. Desak Beton Teg. Tarik Baja Mod. ';
                'Elastisitas Baja ',CHAR(179)); WRITELN;
                WRITE('      ',CHAR(179));
                'Balok (MPa) (MPa) (MPa)';
                '      ',CHAR(179)); WRITELN;
                WRITE('      ',CHAR(195));
                FOR J:=1 TO 63 DO WRITE(CHAR(196)); WRITE(CHAR(180));
                WRITELN; END;
                WRITE('      ',CHAR(179),'TIPE:3,'      ',TRUNC(FC):3,
                  '      ',TRUNC(FY):3,'      ',TRUNC(ES):6,
                  '      ',CHAR(179)); WRITELN; K:=K+1; I:=I+1;
              IF (I>=22) OR EOF(FDATBAH) THEN BEGIN
                WRITE('      ',CHAR(192));
                FOR J:=1 TO 63 DO WRITE(CHAR(196)); WRITE(CHAR(217));
                READKEY; WRITELN; K:=1; I:=I+1; END;
              IF I>=22 THEN BEGIN I:=1; K:=1; CLRSCR; END; END;
            END; CLOSE(FDATBAH); F:=1; RESET(FBAHTUL);
            WHILE NOT EOF(FBAHTUL) DO BEGIN
              SEEK(FBAHTUL,F-1); READ(FBAHTUL,RECORDFDBT); F:=F+1;
              WITH RECORDFDBT DO BEGIN
                IF (K=1) THEN BEGIN I:=I+6;
                  IF I>=22 THEN BEGIN I:=7; CLRSCR; END;
                  WRITE('      ',CHAR(218));
                  FOR J:=1 TO 65 DO WRITE(CHAR(196)); WRITE(CHAR(191));
                  WRITELN; WRITE('      ',CHAR(179)); TEXTCOLOR(11);
                  WRITE('      >>> DIAMETER TULANGAN YANG AKAN DIGUNAKAN');
                  '      <<< '); TEXTCOLOR(10); WRITE(CHAR(179)); WRITELN;
                  WRITE('      ',CHAR(195));
                  FOR J:=1 TO 65 DO WRITE(CHAR(196)); WRITE(CHAR(180));
                  WRITELN; WRITE('      ',CHAR(179),'Tipe No. Diameter Tulangan');
                  'Pokok Diameter Tulangan Sengkang ',CHAR(179)); WRITELN;
                  WRITE('      ',CHAR(179),'Balok (mm)');
                  '      (mm) ',CHAR(179));
                  WRITELN; WRITE('      ',CHAR(195));
                  FOR J:=1 TO 65 DO WRITE(CHAR(196)); WRITE(CHAR(180));
                  WRITELN; END;
                  WRITE('      ',CHAR(179),'TIPE:3,'      ',N:2,
                    '      ',DP:2,'      ',DS:2,
                    '      ',CHAR(179)); WRITELN; K:=K+1; I:=I+1;
                IF (I>=22) OR EOF(FBAHTUL) THEN BEGIN
                  WRITE('      ',CHAR(192)); FOR J:=1 TO 65 DO WRITE(CHAR(196));
                  WRITE(CHAR(217)); READKEY; WRITELN; K:=1; I:=I+1; END;
                IF I>=22 THEN BEGIN K:=1; I:=1; CLRSCR; END; END;
              END; CLOSE(FBAHTUL); F:=1; RESET(FELE);
              WHILE NOT EOF(FELE) DO BEGIN

```



```

SEEK(FELE,F-1); READ(FELE,RECORDFELN); F:=F+1;
WITH RECORDFELN DO BEGIN
IF K=1 THEN BEGIN I:=1+5;
IF I>=22 THEN BEGIN I:=6; CLRSCR; END;
WRITE(' ',CHAR(218));
FOR J:=1 TO 29 DO WRITE(CHAR(196)); WRITE(CHAR(191));
WRITELN; WRITE(' ',CHAR(179)); TEXTCOLOR(11);
WRITE(' >>> DATA ELEMEN 'EL:7,' <<< '); TEXTCOLOR(10);
WRITE(CHAR(179)); WRITELN; WRITE(' ',CHAR(195));
FOR J:=1 TO 29 DO WRITE(CHAR(196)); WRITE(CHAR(180));
WRITELN; WRITE(' ',CHAR(179),' Tipe No. Elemen ',
CHAR(179)); WRITELN; WRITE(' ',CHAR(195));
FOR J:=1 TO 29 DO WRITE(CHAR(196)); WRITE(CHAR(180));
WRITELN; END;
WRITE(' ',CHAR(179),' ',TIPE:3,' ',NO:2,
' ',ELE:3,' ',CHAR(179)); WRITELN; K:=K+1; I:=I+1;
IF (I>=22) OR EOF(FELE) THEN BEGIN
WRITE(' ',CHAR(192)); FOR J:=1 TO 29 DO WRITE(CHAR(196));
WRITE(CHAR(217)); READKEY; WRITELN; K:=1; I:=I+1; END;
IF I>=22 THEN BEGIN K:=1; I:=1; CLRSCR; END; END;
END; CLOSE(FELE); F:=1; RESET(FDIM);
WHILE NOT EOF(FDIM) DO BEGIN
SEEK(FDIM,F-1); READ(FDIM,RECORDFDMN); F:=F+1;
WITH RECORDFDMN DO BEGIN
IF K=1 THEN BEGIN I:=1+6;
IF I>=22 THEN BEGIN I:=7; CLRSCR; END;
WRITE(' ',CHAR(218));
FOR J:=1 TO 51 DO WRITE(CHAR(196)); WRITE(CHAR(191));
WRITELN; WRITE(' ',CHAR(179)); TEXTCOLOR(11);
WRITE(' >>> DATA DIMENSI <<< ');
TEXTCOLOR(10); WRITE(CHAR(179)); WRITELN;
WRITE(' ',CHAR(195));
FOR J:=1 TO 51 DO WRITE(CHAR(196)); WRITE(CHAR(180));
WRITELN; WRITE(' ',CHAR(179),
'Tipe Bentang Balok Lebar Tinggi Penutup Beton ',
CHAR(179)); WRITELN; WRITE(' ',CHAR(179),
'Balok (mm) (mm) (mm) (mm) ',
CHAR(179)); WRITELN;
WRITE(' ',CHAR(195));
FOR J:=1 TO 51 DO WRITE(CHAR(196)); WRITE(CHAR(180));
WRITELN; END;
WRITE(' ',CHAR(179),' ',TIPE:3,' ',TRUNC(L):5,
' ',TRUNC(B):4,' ',TRUNC(H):4,' ',TRUNC(PB):3,
' ',CHAR(179)); WRITELN; K:=K+1; I:=I+1;
IF (I>=22) OR EOF(FDIM) THEN BEGIN
WRITE(' ',CHAR(192)); FOR J:=1 TO 51 DO WRITE(CHAR(196));
WRITE(CHAR(217)); READKEY; WRITELN; K:=1; I:=I+1; END;
IF I>=22 THEN BEGIN K:=1; I:=1; CLRSCR; END; END;
END; CLOSE(FDIM); F:=1; RESET(FGMAKS);
WHILE NOT EOF(FGMAKS) DO BEGIN
SEEK(FGMAKS,F-1); READ(FGMAKS,RECORDFGMS); F:=F+1;
WITH RECORDFGMS DO BEGIN
IF K=1 THEN BEGIN I:=1+6;
IF I>=22 THEN BEGIN I:=7; CLRSCR; END;
WRITE(' ',CHAR(218));
FOR J:=1 TO 65 DO WRITE(CHAR(196)); WRITE(CHAR(191));
WRITELN; WRITE(' ',CHAR(179)); TEXTCOLOR(11);
WRITE(' >>> DATA GAYA-GAYA MAKSIMUM <<< ');
TEXTCOLOR(10); WRITE(CHAR(179)); WRITELN;
WRITE(' ',CHAR(195));
FOR J:=1 TO 65 DO WRITE(CHAR(196)); WRITE(CHAR(180));
WRITELN; WRITE(' ',CHAR(179),
'Tipe M Lapangan M Tumpuan Gaya Geser M Torsi ',
CHAR(179)); WRITELN; WRITE(' ',CHAR(179),
'Balok (Nmm) (Nmm) (N) (Nmm) ',
CHAR(179)); WRITELN; WRITE(' ',CHAR(195));
FOR J:=1 TO 65 DO WRITE(CHAR(196)); WRITE(CHAR(180));
WRITELN; END;
WRITE(' '); WRITE(CHAR(179),' ',TIPE:3,' ',M1lap:12,' ',
-M1tum:13,' ',VU:10,' ',TU:12,' ',CHAR(179)); WRITELN; K:=K+1; I:=I+1;

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```

IF (I>=22) OR EOF(FGMAKS) THEN BEGIN
  WRITE('      ',CHAR(192)); FOR J:=1 TO 65 DO WRITE(CHAR(196));
  WRITE(CHAR(217)); READKEY; WRITELN; K:=1; I:=I+1; END;
IF (I>=22) THEN BEGIN K:=1; I:=1; CLRSCR; END; END;
END; CLOSE(FGMAKS);
END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11); GOTOXY(20,10); WRITE('DATA ELEMEN BELUM DIBUAT...!');
  WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11); GOTOXY(20,10); WRITE('DATA BAHAN BELUM DIBUAT...!');
  WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
  WRITE('DATA TULANGAN YG AKAN DIGUNAKAN BELUM DIBUAT...!');
  WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
  WRITE('DATA GAYA YG BEKERJA PADA BALOK BELUM DIBUAT...!');
  WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
  WRITE('DATA DIMENSI BALOK BELUM DIBUAT...!');
  WRITE('^G'); READKEY; TEXTCOLOR(10); END; CHDIR(DIRAK);
END.

```

```

PROGRAM CDKO;
USES CRT,PRINTER;
TYPE
  FDAT = RECORD
    NPROY : string[19];
    NFDAT : string[8];
    NaFil : string[12];
    ENG : string[19];
  END;
  FDBN = RECORD
    TIPE : INTEGER;
    FC : REAL;
    FY : REAL;
    ES : REAL;
  END;
  FDBT = RECORD
    TIPE : INTEGER;
    N : INTEGER;
    DP : INTEGER;
    DS : INTEGER;
  END;
  FGMS = RECORD
    TIPE : INTEGER;
    MUlap : REAL;
    MUtum : REAL;
    VU : REAL;
    TU : REAL;
  END;
  FDMN = RECORD
    TIPE : INTEGER;
    LK : REAL;
    BK : REAL;
    HK : REAL;
    PBK : REAL;
    KK : REAL;
    RG : REAL;
    PEN : INTEGER;
    PENG : INTEGER;
  END;

```

```

FELN = RECORD
    TIPE : INTEGER;
    NO   : INTEGER;
    ELE  : INTEGER;
END;

VAR
    FTIPE           : TEXT;
    FDATABAH        : FILE OF FDBN;
    FBAHTUL          : FILE OF FDBT;
    FGMAKS           : FILE OF FGMS;
    FDIM             : FILE OF FDMN;
    FELE             : FILE OF FELN;
    NFILE            : FILE OF FDAT;
    RECORDFDAT       : FDAT;
    RECORDFELN       : FELN;
    RECORDFDBN       : FDBN;
    RECORDFDBT       : FDBT;
    RECORDFGMS       : FGMS;
    RECORDFDMN       : FDMN;
    I, J, TIPE, JUM, NOREC, J, TP, DPMAKS, DSMAKS,
    NTUL, DPTUL, K, F, BATASATAS, BATASBAWAH,
    BATASKIRI, JUMLAHBARIS, BARIS, KERTAS, HAL,
    A, B, C, D       : INTEGER;
    YA               : CHAR;
    BENAR            : BOOLEAN;
    NFDA, EL         : STRING[7];
    FDB, FDT, FGM, FTIP, FDM, FELM : STRING[12];
    NPRO, EN         : STRING[19];
    FTP, BBN, BBT, BEL, BGM, BDD, DIRAK, DIREK : STRING;

PROCEDURE JUDUL;
BEGIN
    ASSIGN(NFILE, 'FILEDATA.DAT'); RESET(NFILE);
    WHILE NOT EOF(NFILE) DO BEGIN
        READ(NFILE, RECORDFDAT);
        IF RECORDFDAT.NFDAT = NFDA THEN BEGIN
            NPRO := RECORDFDAT.NPROY; EN := RECORDFDAT.ENG; END;
        END; CLOSE(NFILE); HAL := HAL + 1; A := LENGTH(NPRO); B := LENGTH(NFDA);
        C := LENGTH(EN); D := LENGTH(EL);
        FOR J := 1 TO BATASATAS DO WRITELN(LST);
        FOR J := 1 TO BATASKIRI DO WRITE(LST, ' '); WRITE(LST, CHAR(201));
        FOR J := 1 TO 65 DO WRITE(LST, CHAR(205)); WRITE(LST, CHAR(187));
        WRITELN(LST);
        FOR J := 1 TO BATASKIRI DO WRITE(LST, ' '); WRITE(LST, CHAR(186),
            '      UII-CDP PROGRAM DISAIN ELEMEN STRUKTUR BETON      ',
            CHAR(186)); WRITELN(LST);
        FOR J := 1 TO BATASKIRI DO WRITE(LST, ' '); WRITE(LST, CHAR(204));
        FOR J := 1 TO 65 DO WRITE(LST, CHAR(205)); WRITE(LST, CHAR(185));
        WRITELN(LST);
        FOR J := 1 TO BATASKIRI DO WRITE(LST, ' '); WRITE(LST, CHAR(186),
            ' AUTHORITY : UII CIVIL ENGINEERING 1996  DATA   : ',
            EL, D); FOR J := 1 TO (7-D) DO WRITE(LST, ' '); WRITE(LST, ' ', CHAR(186));
        WRITELN(LST); FOR J := 1 TO BATASKIRI DO WRITE(LST, ' '); WRITE(LST, CHAR(186),
            ' Proyek   : ', NPRO, A); FOR J := 1 TO (19-A) DO WRITE(LST, ' ');
        WRITE(LST, '      Halaman : ', HAL, 3, ' ', CHAR(186)); WRITELN(LST);
        FOR J := 1 TO BATASKIRI DO WRITE(LST, ' '); WRITE(LST, CHAR(186),
            ' Perencana : ', EN, C); FOR J := 1 TO (19-C) DO WRITE(LST, ' ');
        WRITE(LST, '      File Data : ', NFDA, B); FOR J := 1 TO (8-B) DO WRITE(LST, ' ');
        WRITE(LST, ' ', CHAR(186)); WRITELN(LST);
        FOR J := 1 TO BATASKIRI DO WRITE(LST, ' '); WRITE(LST, CHAR(200));
        FOR J := 1 TO 65 DO WRITE(LST, CHAR(205)); WRITE(LST, CHAR(188));
        WRITELN(LST); I := 7;
    END;

BEGIN
    DIREK := PARAMSTR(1); NFDA := PARAMSTR(2); EL := PARAMSTR(3); FTP := PARAMSTR(4); BBN := PARAMSTR(5);
    BBT := PARAMSTR(6); BEL := PARAMSTR(7); BGM := PARAMSTR(8); BDD := PARAMSTR(9);
    GETDIR(0, DIRAK); CHDIR(DIREK); FDM := NFDA + BDD; ASSIGN(FDIM, FDM);

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FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 63 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST); END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'',TIPE:3,' ',TRUNC(FC):3,' ',
TRUNC(FY):3,' ',TRUNC(ES):6,' ',
CHAR(179)); WRITELN(LST); K:=K+1; I:=I+1;
IF (I>=BARIS) OR EOF(FDATBAH) THEN BEGIN
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(192));
FOR J:=1 TO 63 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(217));
WRITELN(LST); K:=1; I:=I+1; END;
IF I>=BARIS THEN BEGIN
K:=1; FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END; END;
END; CLOSE(FDATBAH); F:=1; RESET (FBAHTUL);
WHILE NOT EOF(FBAHTUL) DO BEGIN
SEEK(FBAHTUL,F-1); READ(FBAHTUL,RECORDFDBT); F:=F+1;
WITH RECORDFDBT DO BEGIN
IF (K=1) THEN BEGIN
IF (BARIS-I)<=6 THEN FOR J:=1 TO (BARIS-I) DO WRITELN(LST); I:=I+6;
IF I>=BARIS THEN BEGIN FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(218));
FOR J:=1 TO 65 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(191));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
' >>> DIAMETER TULANGAN YANG AKAN DIGUNAKAN',
' <<< '); WRITE(LST,CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 65 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'Tipe No. Diameter Tulangan Pokok Diameter Tulangan',
'Sengkang ',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'Kolom (mm) (mm)',
' ',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 65 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST); END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'',TIPE:3,' ',N:2,' ',DP:2,
' ',DS:2,' ',CHAR(179));
WRITELN(LST); K:=K+1; I:=I+1;
IF (I>=BARIS) OR EOF(FBAHTUL) THEN BEGIN
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(192));
FOR J:=1 TO 65 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(217));
WRITELN(LST); K:=1; I:=I+1; END;
IF I>=BARIS THEN BEGIN
K:=1; FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END; END;
END; CLOSE(FBAHTUL); F:=1; RESET (FELE);
WHILE NOT EOF(FELE) DO BEGIN
SEEK(FELE,F-1); READ(FELE,RECORDFELN); F:=F+1;
WITH RECORDFELN DO BEGIN
IF K=1 THEN BEGIN
IF (BARIS-I)<=6 THEN FOR J:=1 TO (BARIS-I) DO WRITELN(LST); I:=I+5;
IF I>=BARIS THEN BEGIN FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(218));
FOR J:=1 TO 29 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(191));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
' >>> DATA ELEMEN ',EL:7,' <<< ',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 29 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'Tipe No. Elemen ',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 29 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST); END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'',TIPE:3,' ',NO:2,' ',ELE:3,' ',CHAR(179));

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WRITELN(LST); K:=K+1; I:=I+1;
IF (I>=BARIS) OR EOF(FELE) THEN BEGIN
  FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(192));
  FOR J:=1 TO 29 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(217));
  WRITELN(LST); K:=1; I:=I+1; END;
IF I>=BARIS THEN BEGIN
  K:=1; FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END; END;
END; CLOSE(FELE); F:=1; RESET(FDIM);
WHILE NOT EOF(FDIM) DO BEGIN
  SEEK(FDIM,F-1); READ(FDIM,RECORDFDMN); F:=F+1;
  WITH RECORDFDMN DO BEGIN
    IF K=1 THEN BEGIN
      IF (BARIS-I)<=6 THEN FOR J:=1 TO (BARIS-I) DO WRITELN(LST); I:=I+6;
      IF I>=BARIS THEN BEGIN FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END;
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(218));
      FOR J:=1 TO 54 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(191));
      WRITELN(LST);
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179).
      ' >>> DATA DIMENSI <<< ',
      CHAR(179)); WRITELN(LST);
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
      FOR J:=1 TO 54 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
      WRITELN(LST);
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179).
      ' Tipe Panjang Lebar/Diameter Tinggi Penutup Beton ',
      CHAR(179)); WRITELN(LST);
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179).
      ' Kolom (mm) (mm) (mm) (mm) ',
      CHAR(179)); WRITELN(LST);
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
      FOR J:=1 TO 54 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
      WRITELN(LST); END;
      FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179).
      ',TIPE:3,' ',TRUNC(LK):5,' ',TRUNC(BK):4,' ',
      TRUNC(HK):4,' ',TRUNC(PBK):3,' ',CHAR(179));
      WRITELN(LST); K:=K+1; I:=I+1;
      IF (I>=BARIS) OR EOF(FDIM) THEN BEGIN
        FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(192));
        FOR J:=1 TO 54 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(217));
        WRITELN(LST); K:=1; I:=I+1; END;
        IF I>=BARIS THEN BEGIN
          K:=1; FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END; END;
      END; CLOSE(FDIM); F:=1; RESET(FGMAKS);
      WHILE NOT EOF(FGMAKS) DO BEGIN
        SEEK(FGMAKS,F-1); READ(FGMAKS,RECORDFGMS); F:=F+1;
        WITH RECORDFGMS DO BEGIN
          IF K=1 THEN BEGIN
            IF (BARIS-I)<=6 THEN FOR J:=1 TO (BARIS-I) DO WRITELN(LST); I:=I+6;
            IF I>=BARIS THEN BEGIN FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END;
            FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(218));
            FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(191));
            WRITELN(LST);
            FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179).
            ' >>> DATA GAYA-GAYA MAKSIMUM <<< ',
            CHAR(179)); WRITELN(LST);
            FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
            FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
            WRITELN(LST);
            FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179).
            ' Tipe M1 M2 Gaya Geser Gaya Aksial ',
            CHAR(179)); WRITELN(LST);
            FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179).
            ' Kolom (Nmm) (Nmm) (N) (N) ',
            CHAR(179)); WRITELN(LST);
            FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
            FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
            WRITELN(LST); END;
            FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179).
            ',TIPE:3,' ',MULap:8,' ',MUTum:8,' ',VU:8,
            ' ',TU:8,' ',CHAR(179)); WRITELN(LST); K:=K+1; I:=I+1;

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IF (I>=BARIS) OR EOF(FGMAKS) THEN BEGIN
  FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(192));
  FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(217));
  Writeln(LST); K:=1; I:=I+1; END;
IF (I>=BARIS) THEN BEGIN
  K:=1; FOR J:=1 TO BATASBAWAH DO Writeln(LST); JUDUL; END; END;
END; CLOSE(FGMAKS);
END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11);
  GOTOXY(20,10); WRITE('DATA ELEMEN BELUM DIBUAT...!');
  WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11);
  GOTOXY(20,10); WRITE('DATA BAHAN BELUM DIBUAT...!');
  WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
  WRITE('DATA TULANGAN YG AKAN DIGUNAKAN BELUM DIBUAT...!');
  WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
  WRITE('DATA GAYA YG BEKERJA PADA BALOK BELUM DIBUAT...!');
  WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11);
  GOTOXY(20,10); WRITE('DATA DIMENSI BALOK BELUM DIBUAT...!');
  WRITE('^G'); READKEY; TEXTCOLOR(10); END; CHDIR(DIRAK);
END.

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PROGRAM CKO;
USES CRT,PRINTER;
TYPE
  FDAT = RECORD
    NPROY : string[19];
    NFDAT : string[8];
    NaFil : string[12];
    ENG : string[19];
  END;
  FKLM = RECORD
    TIPE : INTEGER;
    FNTLB : INTEGER;
    FDPTLB : INTEGER;
    FNTLA : INTEGER;
    FDPILA : INTEGER;
    FDSS : INTEGER;
    FS : INTEGER;
  END;
  FDN = RECORD
    TIPE : INTEGER;
    LK : REAL;
    BK : REAL;
    HK : REAL;
    PBK : REAL;
    KK : REAL;
    RG : REAL;
    PEN : INTEGER;
    PENG : INTEGER;
  END;
VAR
  FKOLOM : FILE OF FKLM;
  NFILE : FILE OF FDAT;
  FDI : FILE OF FDN;
  RECORDFDAT : FDAT;

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RECORDFKLM          : FKLM;
RECORDFDN           : FDN;
I,JUM,J,TP,BATASATAS,BATASBAWAH,
BARIS,JUMLAHBARIS,HAL,X,BATASKIRI,A,
B,C,D               : INTEGER;
BENAR               : BOOLEAN;
KERTAS,Z            : BYTE;
YA                  : CHAR;
NFDA,EL             : STRING[7];
FBK,FDM             : STRING[12];
NPRO,EN             : STRING[19];
BLK,BDD,DIRAK,DIREK : STRING;

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BEGIN
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DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);BDD:=PARAMSTR(4);
BLK:=PARAMSTR(5);GETDIR(0,DIRAK);CHDIR(DIREK);ASSIGN(NFILE,'FILEDATA.DAT');
RESET(NFILE);
WHILE NOT EOF(NFILE) DO BEGIN READ(NFILE,RECORDFDAT);
IF RECORDFDAT.NFDAT=NFDA THEN BEGIN
  NPRO:=RECORDFDAT.NPROY; EN :=RECORDFDAT.ENG; END;
END; CLOSE(NFILE); FBK:=NFDA+BLK; ASSIGN(FKOLOM,FBK); {$I-} RESET(FKOLOM); {$I+}
IF IORESULT=0 THEN BEGIN
YA:= 'U'; BATASATAS:=0; BATASBAWAH:=0; BATASKIRI:= 0;
WHILE UPCASE(YA)='U' DO BEGIN
  TEXTBACKGROUND(0); TEXTCOLOR(10); CLRSCR; GOTOXY(10,2);
  WRITE(CHAR(218)); FOR I:=1 TO 50 DO WRITE(CHAR(196)); WRITE(CHAR(191));
  GOTOXY(10,3); WRITE(CHAR(179),' Ukuran Kertas : '); TEXTCOLOR(11); WRITE('1');
  TEXTCOLOR(10); WRITE(' Folio '); TEXTCOLOR(11); WRITE('2');
  TEXTCOLOR(10); WRITE(' Kuarto '); TEXTCOLOR(11);
  WRITE('--> Pilih : '); TEXTCOLOR(10); WRITE(CHAR(179));
  GOTOXY(10,4);
  WRITE(CHAR(179),' Batas Atas : ',CHAR(179));
  GOTOXY(10,5);
  WRITE(CHAR(179),' Batas Bawah : ',CHAR(179));
  GOTOXY(10,6);
  WRITE(CHAR(179),' Batas Kiri : ',CHAR(179));
  GOTOXY(10,7); WRITE(CHAR(192)); FOR I:=1 TO 50 DO WRITE(CHAR(196)); WRITE(CHAR(217));
  TEXTCOLOR(11); GOTOXY(10,9); WRITE(' U : ulang L : lanjutkan ==> ');
  GOTOXY(29,4); WRITE('Baris'); GOTOXY(29,5); WRITE('Baris');
  GOTOXY(29,6); WRITE('Spasi'); GOTOXY(59,3); READLN(KERTAS);
  GOTOXY(26,4); READLN(BATASATAS); GOTOXY(26,5); READLN(BATASBAWAH);
  GOTOXY(26,6); READLN(BATASKIRI); BENAR:=TRUE;
  WHILE BENAR DO BEGIN
    GOTOXY(42,9); YA:=READKEY; WRITE(YA);IF UPCASE(YA)='U' THEN BENAR:=FALSE;
    IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10); END;
    IF KERTAS=1 THEN JUMLAHBARIS:=63;IF KERTAS=2 THEN JUMLAHBARIS:=57;
    BARIS:=JUMLAHBARIS-BATASATAS-BATASBAWAH; I:=1; TP:=1; HAL:=0;
    WHILE NOT EOF(FKOLOM) DO BEGIN
      CLRSCR; TEXTCOLOR(11);GOTOXY(20,10); WRITE('MENCETAK HASIL DISAIN.....');
      TEXTCOLOR(11); WRITE(I); TEXTCOLOR(10);
      WITH RECORDFKLM DO BEGIN READ(FKOLOM,RECORDFKLM);
      IF I=1 THEN BEGIN
        A:=LENGTH(NPRO); B:=LENGTH(NFDA); C:=LENGTH(EN); D:=LENGTH(EL);
        FOR J:=1 TO BATASATAS DO BEGIN WRITELN(LST); END; HAL:=HAL+1;
        FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
        WRITE(LST,CHAR(218)); FOR J:=1 TO 57 DO WRITE(LST,CHAR(196));
        WRITE(LST,CHAR(191)); WRITELN(LST);
        FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179));
        ' UII-CDP PROGRAM DISAIN ELEMEN STRUKTUR BETON ',
        CHAR(179)); WRITELN(LST);
        FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
        WRITE(LST,CHAR(195)); FOR J:=1 TO 57 DO WRITE(LST,CHAR(196));
        WRITE(LST,CHAR(180)); WRITELN(LST);
        FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179));
        ' AUTHORITY : UII CIVIL ENGINEERING 1996 DISAIN : ',EL:D);
        FOR J:=1 TO (7-D) DO WRITE(LST,' '); WRITE(LST,' ',CHAR(179)); WRITELN(LST);
        FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
        WRITE(LST,CHAR(179),' Proyek : ',NPRO:A);
        FOR J:=1 TO (19-A) DO WRITE(LST,' '); WRITE(LST,' Halaman : ',HAL:3,' ',
        CHAR(179)); WRITELN(LST); FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');

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WRITE(LST,CHAR(179),' Perencana : ',EN:C); FOR J:=1 TO (19-C) DO WRITE(LST,' ');
WRITE(LST,' File Data : ',NFDA:B); FOR J:=1 TO (8-B) DO WRITE(LST,' ');
WRITE(LST,' ',CHAR(179)); WRITELN(LST); FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(195)); FOR J:=1 TO 7 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(194)); FOR J:=1 TO 12 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(194)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(194)); FOR J:=1 TO 12 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(194)); FOR J:=1 TO 12 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(180)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(179),' TIPE ',CHAR(179),' TULANGAN ',CHAR(179),
' TULANGAN ',CHAR(179),' TULANGAN ',CHAR(179),
' TULANGAN ',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(179),' KOLOM ',CHAR(179),' TARIK ',CHAR(179),
' DESAK ',CHAR(179),' SPIRAL ',CHAR(179),
' SENGKANG ',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(195)); FOR J:=1 TO 7 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(197)); FOR J:=1 TO 12 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(197)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(197)); FOR J:=1 TO 12 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(197)); FOR J:=1 TO 12 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(180)); WRITELN(LST); END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(179),' ',TIPE:3,' ',CHAR(179),' ',FNTLB:2,'D',
FDPFLB:2,' ',CHAR(179),' ',FNTLA:2,'D',FDPFLA:2);
FDM:=NFDA+BDD; ASSIGN(FDI,FDM); RESET(FDI); JUM:=FILESIZE(FDI); Z:=0;
WITH RECORDFDN DO BEGIN
IF JUM<>0 THEN BEGIN
FOR J:=1 TO JUM DO BEGIN
SEEK(FDI,J-1); READ(FDI,RECORDFDN);
IF RECORDFDN.TIPE=TP THEN Z:=RECORDFDN.PENG; END; END; END;
IF Z=2 THEN BEGIN
WRITE(LST,' ',CHAR(179),' D',FDSS:2,' ',FS:3,' mm ',CHAR(179),
' - ',CHAR(179)); END;
IF Z=1 THEN BEGIN
WRITE(LST,' ',CHAR(179),' - ',CHAR(179),' D',FDSS:2,
' ',FS:3,' mm ',CHAR(179)); END;
WRITELN(LST); TP:=TP+1; I:=I+1;
IF (I=BARIS) OR EOF(FKOLOM) THEN BEGIN
FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
WRITE(LST,CHAR(192)); FOR J:=1 TO 7 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(193)); FOR J:=1 TO 12 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(193)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(193)); FOR J:=1 TO 12 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(193)); FOR J:=1 TO 12 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(217)); WRITELN(LST); I:=1;
IF I=BARIS THEN FOR J:=1 TO BATASBAWAH DO WRITELN(LST); END; END;
END; CLOSE(FKOLOM); END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11);
GOTOXY(20,5); WRITE(' PROSES DISAIN BELUM DILAKUKAN');
GOTOXY(15,7); WRITE('Tekan "SEMBARANG TOMBOL" Untuk Melanjutkan.....!');
WRITE('G'); READKEY; TEXTCOLOR(10); END; CHDIR(DIRAK);
END.

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```

PROGRAM DDKO;
USES CRT;
TYPE
FELN = RECORD
TIPE : INTEGER;
NO : INTEGER;
ELE : INTEGER;
END;
FDMC = RECORD
ELEM : INTEGER;
SEC : REAL;
AX : REAL;

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        SHE : REAL;
        MOM : REAL;
    END;
    FDN = RECORD
        TIPE : INTEGER;
        LK : REAL;
        BK : REAL;
        HK : REAL;
        PBK : REAL;
        KK : REAL;
        RG : REAL;
        PEN : INTEGER;
        PENG : INTEGER;
    END;
VAR
    FTIPE : TEXT;
    FDI : FILE OF FDN;
    FELE : FILE OF FELN;
    FMICRO : FILE OF FDMC;
    RECORDFELN : FELN;
    RECORDFDN : FDN;
    RECORDFDMC : FDMC;
    Elemen,I,JIPE,JUM,NOREC,TP,PENAMPANG,PENGIKAT : INTEGER;
    x,LB,BB,HB,PBB,KB,RGB : Real;
    YA : Char;
    PK : Byte;
    BENAR : BOOLEAN;
    NFDA,EL : STRING[7];
    FBC,FELM,FTIP,FDM : STRING[12];
    FTP,BEL,BDD,DIRAK,DIREK : STRING;

BEGIN
    DIREK:=PARAMSTR(1); NFDA:=PARAMSTR(2); EL:=PARAMSTR(3); FTP:=PARAMSTR(4);
    BEL:=PARAMSTR(5); BDD:=PARAMSTR(6); GETDIR(0,DIRAK); CHIDIR(DIREK);
    FTIP:=NFDA+FTP; ASSIGN(FTIPE,FTIP); {$I-} RESET(FTIPE); {$I+}
    IF IORESULT=0 THEN BEGIN
        READ(FTIPE,JIPE); CLOSE(FTIPE); FELM:=NFDA+BEL; ASSIGN(FELE,FELM);
        {$I-} RESET(FELE); {$I+}
        IF IORESULT=0 THEN BEGIN
            CLOSE(FELE); TP:=0;
            REPEAT
                TP:=TP+1; X:=0; LB:=0; PBB:=0; BB:=0; HB:=0;
                ASSIGN(FELE,FELM); RESET(FELE);
                WITH RECORDFELN DO BEGIN
                    WHILE NOT EOF(FELE) DO BEGIN
                        READ(FELE,RECORDFELN); ELEMEN:=RECORDFELN.ELE;
                        IF RECORDFELN.TIPE=TP THEN Begin
                            FBC:=NFDA+'.DMC'; Assign(FMICRO,FBC); Reset(FMICRO);
                            While Not Eof(FMICRO) Do Begin
                                WITH RECORDFDMC DO BEGIN
                                    Read(FMICRO,RECORDFDMC);
                                    if ELEMEN=Elem Then X:=Sec; END; End;
                                if X>LB Then LB:=X; Close(FMICRO); End; END;
                        END; CLOSE(FELE); TEXTCOLOR(10); TEXTBACKGROUND(0); CLRSCR;
                        GOTOXY(10,2);
                        WRITE(CHAR(218)); FOR I:=1 TO 47 DO WRITE(CHAR(196)); WRITE(CHAR(191));
                        GOTOXY(10,3); WRITE(CHAR(179)); TEXTCOLOR(11); TEXTBACKGROUND(1);
                        WRITE(' >>> DATA DIMENSI <<< ');
                        TEXTBACKGROUND(128); TEXTCOLOR(10); WRITE(CHAR(179));
                        GOTOXY(10,4);
                        WRITE(CHAR(195)); FOR I:=1 TO 47 DO WRITE(CHAR(196)); WRITE(CHAR(180));
                        GOTOXY(10,5);
                        WRITE(CHAR(179));' KONDISI TAHANAN UJUNG KOLOM TIPE : '; TEXTCOLOR(11);
                        WRITE(TP:3,' '); TEXTCOLOR(10); WRITE(CHAR(179));
                        GOTOXY(10,6);
                        WRITE(CHAR(195)); FOR I:=1 TO 47 DO WRITE(CHAR(196)); WRITE(CHAR(180));
                        GOTOXY(10,7); Write(CHAR(179)); TEXTBACKGROUND(5);
                        Write(' '); TEXTCOLOR(15); WRITE('1'); TEXTCOLOR(10);
                        WRITE(' Kedua ujung sendi, tidak tergerak lateral. ');
                        TEXTBACKGROUND(128); WRITE(CHAR(179));
                    
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GOTOXY(10,8); Write(CHAR(179)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('2'); TEXTCOLOR(10);
WRITE(' Kedua ujung jepit. ');
TEXTBACKGROUND(128); WRITE(CHAR(179));
GOTOXY(10,9); Write(CHAR(179)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('3'); TEXTCOLOR(10);
WRITE(' Satu ujung jepit, ujung lain bebas. ');
TEXTBACKGROUND(128); WRITE(CHAR(179));
GOTOXY(10,10); Write(CHAR(179)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('4'); TEXTCOLOR(10);
WRITE(' Kedua ujung jepit, ada gerak lateral. ');
TEXTBACKGROUND(128); WRITE(CHAR(179));
GOTOXY(10,11);
WRITE(CHAR(195)); FOR I:=1 TO 47 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,12); WRITE(CHAR(179));
TEXTCOLOR(15); TEXTBACKGROUND(4);
WRITE(' PILIH ? ');
TEXTCOLOR(10); TEXTBACKGROUND(128); WRITE(CHAR(179));
GOTOXY(10,13);
WRITE(CHAR(192)); FOR I:=1 TO 47 DO WRITE(CHAR(196)); WRITE(CHAR(217));
PK:=0;
WHILE (PK<1) OR (PK>4) DO BEGIN
    WRITE('^G'); TEXTCOLOR(15); TEXTBACKGROUND(4); GOTOXY(20,12);
    READLN(PK); TEXTCOLOR(10); TEXTBACKGROUND(128); END;
CASE PK OF
    1: KB:=1;
    2: KB:=0.5;
    3: KB:=2;
    4: KB:=1;
END; CLRSCR;
GOTOXY(10,2);
WRITE(CHAR(218)); FOR I:=1 TO 35 DO WRITE(CHAR(196)); WRITE(CHAR(191));
GOTOXY(10,3); WRITE(CHAR(179)); TEXTCOLOR(11); TEXTBACKGROUND(1);
WRITE(' >>> DATA DIMENSI <<< ');
TEXTBACKGROUND(128); TEXTCOLOR(10); WRITE(CHAR(179));
GOTOXY(10,4);
WRITE(CHAR(195)); FOR I:=1 TO 35 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,5);
WRITE(CHAR(179),' BENTUK PENAMPANG KOLOM TIPE : '); TEXTCOLOR(11);
WRITE('3, '); TEXTCOLOR(10); WRITE(CHAR(179));
GOTOXY(10,6);
WRITE(CHAR(195)); FOR I:=1 TO 35 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,7); Write(CHAR(179)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('1'); TEXTCOLOR(10);
WRITE(' PERSEGI '); TEXTBACKGROUND(128); WRITE(CHAR(179));
GOTOXY(10,8); Write(CHAR(179)); TEXTBACKGROUND(5);
Write(' '); TEXTCOLOR(15); WRITE('2'); TEXTCOLOR(10);
WRITE(' LINGKARAN. '); TEXTBACKGROUND(128);
WRITE(CHAR(179));
GOTOXY(10,9);
WRITE(CHAR(195)); FOR I:=1 TO 35 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,10); WRITE(CHAR(179));
TEXTCOLOR(15); TEXTBACKGROUND(4);
WRITE(' PILIH ? '); TEXTCOLOR(10);
TEXTBACKGROUND(128); WRITE(CHAR(179));
GOTOXY(10,11);
WRITE(CHAR(192)); FOR I:=1 TO 35 DO WRITE(CHAR(196)); WRITE(CHAR(217));
PENAMPANG:=0;
WHILE (PENAMPANG<1) OR (PENAMPANG>2) DO BEGIN
    TEXTCOLOR(15); TEXTBACKGROUND(4); WRITE('^G'); GOTOXY(30,10);
    READLN(PENAMPANG); TEXTCOLOR(10); TEXTBACKGROUND(128); END;
CLRSCR; GOTOXY(10,2);
WRITE(CHAR(218)); FOR I:=1 TO 43 DO WRITE(CHAR(196)); WRITE(CHAR(191));
GOTOXY(10,3); WRITE(CHAR(179)); TEXTCOLOR(11); TEXTBACKGROUND(1);
WRITE(' >>> DATA DIMENSI <<< ');
TEXTBACKGROUND(128); TEXTCOLOR(10); WRITE(CHAR(179));
GOTOXY(10,4);
WRITE(CHAR(195)); FOR I:=1 TO 43 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,5);
WRITE(CHAR(179),' BENTUK TULANGAN PENGIKAT KOLOM TIPE : ');

```

```

TEXTCOLOR(11); WRITE(TP:3,' '); TEXTCOLOR(10); WRITE(CHAR(179));
GOTOXY(10,6);
WRITE(CHAR(195)); FOR I:=1 TO 43 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,7); WRITE(CHAR(179)); TEXTBACKGROUND(5);
WRITE(' '); TEXTCOLOR(15); WRITE('1'); TEXTCOLOR(10);
WRITE(' PENGIKAT SENGKANG '); TEXTBACKGROUND(128);
WRITE(CHAR(179));
GOTOXY(10,8); WRITE(CHAR(179)); TEXTBACKGROUND(5);
WRITE(' '); TEXTCOLOR(15); WRITE('2'); TEXTCOLOR(10);
WRITE(' PENGIKAT SPIRAL '); TEXTBACKGROUND(128);
WRITE(CHAR(179));
GOTOXY(10,9);
WRITE(CHAR(195)); FOR I:=1 TO 43 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,10);
WRITE(CHAR(179)); TEXTCOLOR(15); TEXTBACKGROUND(4);
WRITE(' PILIH ? '); TEXTCOLOR(10);
TEXTBACKGROUND(128); WRITE(CHAR(179));
GOTOXY(10,11);
WRITE(CHAR(192)); FOR I:=1 TO 43 DO WRITE(CHAR(196)); WRITE(CHAR(217));
PENGIKAT:=0;
WHILE (PENGIKAT<1) OR (PENGIKAT>2) DO BEGIN
    TEXTCOLOR(15); TEXTBACKGROUND(4); WRITE('G'); GOTOXY(30,10);
    READLN(PENGIKAT); TEXTCOLOR(10); TEXTBACKGROUND(128); END;
CLRSCR; GOTOXY(10,6);
WRITE(PERKIRAAN RASIO PENULANGAN KOLOM TIPE : '); TEXTCOLOR(11);
WRITE(TP:3); TEXTCOLOR(10); WRITE(' (1%-3%) ? '); RGB:= 0;
WHILE (RGB<0.01) OR (RGB>0.03) DO BEGIN
    WRITE('G'); GOTOXY(65,6); READLN(RGB); RGB:=RGB/100; END;
YA:='U';
WHILE UPCASE(YA)='U' DO BEGIN CLRSCR;
IF PENAMPANG=1 THEN BEGIN
    GOTOXY(10,2); WRITE(CHAR(218)); FOR I:=1 TO 54 DO WRITE(CHAR(196));
    WRITE(CHAR(191));
    GOTOXY(10,3); WRITE(CHAR(179)); TEXTCOLOR(13);
    WRITE(' >>> DATA DIMENSI <<< ');
    TEXTCOLOR(10); WRITE(CHAR(179));
    GOTOXY(10,4); WRITE(CHAR(195)); FOR I:=1 TO 54 DO WRITE(CHAR(196));
    WRITE(CHAR(180));
    GOTOXY(10,5);
    WRITE(CHAR(179),' ,EL:7,' Tipe : '); TEXTCOLOR(11); WRITE(TP:3);
    WRITE(' '); TEXTCOLOR(10);
    WRITE(CHAR(179));
    GOTOXY(10,6); WRITE(CHAR(195)); FOR I:=1 TO 54 DO WRITE(CHAR(196));
    WRITE(CHAR(180));
    GOTOXY(10,7);
    WRITE(CHAR(179),' Panjang Kolom Lebar Tinggi Penutup',
    ' Beton ',CHAR(179));
    GOTOXY(10,8);
    WRITE(CHAR(179),' (L)--->mm (b)--->mm (h)--->mm (Pb)-',
    '--->mm ',CHAR(179));
    GOTOXY(10,9); WRITE(CHAR(195)); FOR I:=1 TO 54 DO WRITE(CHAR(196));
    WRITE(CHAR(180));
    GOTOXY(10,10); WRITE(CHAR(179)); FOR I:=1 TO 54 DO WRITE(CHAR(0));
    WRITE(CHAR(179));
    GOTOXY(10,11); WRITE(CHAR(192)); FOR I:=1 TO 54 DO WRITE(CHAR(196));
    WRITE(CHAR(217)); TEXTCOLOR(11);
    GOTOXY(10,13); WRITE(' U : ulang L : lanjutkan =====> ');
    GOTOXY(17,10); WRITE(LB:5:2); GOTOXY(31,10); READLN(BB); GOTOXY(43,10);
    READLN(HB); GOTOXY(56,10); READLN(PBB); END;
IF PENAMPANG=2 THEN BEGIN
    GOTOXY(10,2); WRITE(CHAR(218)); FOR I:=1 TO 47 DO WRITE(CHAR(196));
    WRITE(CHAR(191));
    GOTOXY(10,3); WRITE(CHAR(179)); TEXTCOLOR(13);
    WRITE(' >>> DATA DIMENSI <<< ');
    TEXTCOLOR(10); WRITE(CHAR(179));
    GOTOXY(10,4); WRITE(CHAR(195)); FOR I:=1 TO 47 DO WRITE(CHAR(196));
    WRITE(CHAR(180));
    GOTOXY(10,5); WRITE(CHAR(179),' ,EL:7,' Tipe : '); TEXTCOLOR(11); WRITE(TP:3);
    WRITE(' '); TEXTCOLOR(10);
    WRITE(CHAR(179));

```

```

GOTOXY(10,6); WRITE(CHAR(195)); FOR I:=1 TO 47 DO WRITE(CHAR(196));
WRITE(CHAR(180));
GOTOXY(10,7);
WRITE(CHAR(179),'Tinggi Kolom Diameter Kolom Penutup Beton ',
CHAR(179));
GOTOXY(10,8);
WRITE(CHAR(179),' (L)--->mm (D)--->mm (Pb)--- mm ');
CHAR(179));
GOTOXY(10,9); WRITE(CHAR(195)); FOR I:=1 TO 47 DO WRITE(CHAR(196));
WRITE(CHAR(180));
GOTOXY(10,10);
WRITE(CHAR(179)); FOR I:=1 TO 47 DO WRITE(CHAR(0)); WRITE(CHAR(179));
GOTOXY(10,11);
WRITE(CHAR(192)); FOR I:=1 TO 47 DO WRITE(CHAR(196));
WRITE(CHAR(217)); TEXTCOLOR(11);
GOTOXY(10,13); WRITE(' U : ulang L : lanjutkan ===> ');
GOTOXY(16,10); WRITE(LB:5:2); GOTOXY(33,10); READLN(BB);
GOTOXY(49,10); READLN(PBB); END; BENAR:=TRUE;
WHILE BENAR DO BEGIN
GOTOXY(42,13); YA:=READKEY; WRITE(YA);
IF UPCASE(YA)='U' THEN BENAR:=FALSE;
IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10);
END; FDM:=NFDA+BDD; ASSIGN(FDI,FDM); {SI-} RESET(FDI); {SI+}
IF IORESULT<>0 THEN REWRITE(FDI); NOREC:=-1; JUM:=FILESIZE(FDI);
WITH RECORDFDN DO BEGIN
IF JUM<>0 THEN BEGIN
FOR I:=1 TO JUM DO BEGIN
SEEK(FDI,I-1); READ(FDI,RECORDFDN);
IF RECORDFDN.TIPE=TP THEN NOREC:=I-1; END;
IF NOREC=-1 THEN NOREC:=JUM; SEEK(FDI,NOREC); END;
TIPE:=TP; LK:=LB; BK:=BB; HK:=HB; PBK:=PBB; KK:=KB; RG:=RGB;
PEN:=PENAMPANG; PENG:=PENGKAT; WRITE(FDI,RECORDFDN);
END; CLOSE(FDI);
UNTIL TP=JTIPE;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11);
GOTOXY(20,10); WRITE(' Data Elemen Belum Ada.....!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END; CHDIR(DIRAK);
END.

```

```

PROGRAM GKO;
USES CRT;
TYPE
FELN = RECORD
TIPE : INTEGER;
NO : INTEGER;
ELE : INTEGER;
END;
FGMS = RECORD
TIPE : INTEGER;
MULap : REAL;
MUTum : REAL;
VU : REAL;
TU : REAL;
END;
FDMC = RECORD
ELEM : INTEGER;
SEC : REAL;
AX : REAL;
SHE : REAL;
MOM : REAL;
END;
VAR
FTIPE : TEXT;
FELE : FILE OF FELN;
FGMAKS : FILE OF FGMS;
FMICRO : FILE OF FDMC;

```

```

RECORDFELN      : FELN;
RECORDFGMS      : FGMS;
RECORDFDMC      : FDMC;
Elemen,I,JTIPE,JUM,NOREC,TP      : INTEGER;
MUI,MUu,TUS,TUB,VUS,MUla,MUtu,VUB : REAL;
NFDA,EL         : STRING[7];
FBC,FELM,FGM,FTIP      : STRING[12];
FTP,BEL,BGM,DIRAK,DIREK      : STRING;

```

Begin

```

DIREK:=PARAMSTR(1); NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);FTP:=PARAMSTR(4);
BEL:=PARAMSTR(5); BGM:=PARAMSTR(6); GETDIR(0.DIRAK); CHDIR(DIREK);
FTIP:=NFDA+FTP; ASSIGN(FTIPE,FTIP); {$I-} RESET(FTIPE); {$I+}
IF IORESULT=0 THEN BEGIN
  READ(FTIPE,JTIPE); CLOSE(FTIPE); TP:=0;
  REPEAT
    TP:=TP+1; VUB:=0; VUS:=0; MUI:=0; MUla:=0; MUu:=0; MUtu:=0; TUB:=0; TUS:=0;
    FELM:=NFDA+BEL; ASSIGN(FELE,FELM); {$I-} RESET(FELE); {$I+}
    IF IORESULT=0 THEN BEGIN
      WHILE NOT EOF(FELE) DO Begin
        WITH RECORDFELN DO BEGIN
          READ(FELE,RECORDFELN); ELEMEN:=RECORDFELN.ELE;
          IF TIPE = TP THEN BEGIN
            FBC:=NFDA+'.DMC'; ASSIGN(FMICRO,FBC); Reset(FMICRO);
            While Not Eof(FMICRO) Do Begin
              WITH RECORDFDMC DO BEGIN
                Read(FMICRO,RECORDFDMC);
                IF ELEMEN=Elem THEN BEGIN
                  if SEC=0 Then MUu:=MOM;
                  IF ABS(SHE)>VUS THEN VUS:=ABS(SHE);
                  IF ABS(AX)>TUS THEN TUS:=ABS(AX);
                  MUI:=MOM; END; END; End;
                  IF ABS(MUI)>ABS(MUla) THEN MUla:=MUI;
                  IF ABS(MUu)>ABS(MUtu) THEN MUtu:=MUu;
                  IF VUS>VUB THEN VUB:=VUS;
                  IF TUS>TUB THEN TUB:=TUS;
                Close(FMICRO); FGM:=NFDA+BGM; ASSIGN(FGMAKS,FGM); {$I-} RESET(FGMAKS); {$I+}
                IF IORESULT<>0 THEN REWRITE(FGMAKS);
                NOREC:=-1; JUM:=FILESIZE(FGMAKS);
                WITH RECORDFGMS DO BEGIN
                  IF JUM<>0 THEN BEGIN
                    FOR I:=1 TO JUM DO BEGIN
                      SEEK(FGMAKS,I-1); READ(FGMAKS,RECORDFGMS);
                      IF RECORDFGMS.TIPE=TP THEN NOREC:=I-1; END;
                      IF NOREC=-1 THEN NOREC:=JUM; SEEK(FGMAKS,NOREC); END;
                      TIPE:=TP; MUlap:=MUla; MUtum:=MUtu; VU:=VUB; TU:=TUB; WRITE(FGMAKS,RECORDFGMS);
                      END; CLOSE(FGMAKS);
                    End;
                  END;
                END; CLOSE(FELE);
              END
            ELSE BEGIN
              TEXTBACKGROUND(0); CLRSCR; TEXTCOLOR(11);
              GOTOXY(20,10); WRITE(' Data Elemen Belum Ada.....!');
              WRITE('^G'); READKEY; TEXTCOLOR(10); END;
            UNTIL TP=JTIPE; END; CHDIR(DIRAK);
          END.

```

PROGRAM PKO;

USES CRT;

TYPE

```

  FDBN = RECORD
    TIPE : INTEGER;
    FC : REAL;
    FY : REAL;
    ES : REAL;
  END;
  FDBT = RECORD
    TIPE : INTEGER;

```

```

    N : INTEGER;
    DP : INTEGER;
    DS : INTEGER;
END;
FGMS = RECORD
    TIPE : INTEGER;
    MUlap : REAL;
    MUtum : REAL;
    VU : REAL;
    TU : REAL;
END;
FDN = RECORD
    TIPE : INTEGER;
    LK : REAL;
    BK : REAL;
    HK : REAL;
    PBK : REAL;
    KK : REAL;
    RG : REAL;
    PEN : INTEGER;
    PENG : INTEGER;
END;
FKLM = RECORD
    TIPE : INTEGER;
    FNTLB : INTEGER;
    FDPTLB : INTEGER;
    FNTLA : INTEGER;
    FDPTLA : INTEGER;
    FDSS : INTEGER;
    FS : INTEGER;
END;
VAR
    FTIPE : TEXT;
    FDI : FILE OF FDN;
    FDATA : FILE OF FDBN;
    FBAHTUL : FILE OF FDBT;
    FGMAKS : FILE OF FGMS;
    FKOLOM : FILE OF FKLM;
    RECORDFDBN : FDBN;
    RECORDFDBT : FDBT;
    RECORDFGMS : FGMS;
    RECORDFDN : FDN;
    RECORDFKLM : FKLM;
    I, JTIPE, JUM, NOREC, J, TP, DPMMAKS, DSMMAKS,
    PENAMPANG, PENGIKAT, PENAM, NTUL, DPTUL : INTEGER;
    MUl, MUt, TUB, VUB, LB, FCB, FYB, ESB, BB, HB, MUS,
    PBB, O, OS, B1, D, DA, ESA, EY, FSA, DPTLB, NTLB,
    DPTLA, NTLA, S, SS, DSS, M, KB, RGB, KK, MUK, KL,
    CM, IG, EC, BD, EI, DB, PC, MC, E, ASPER, R, RO, CB,
    AB, PNB, PN, HEK, BEK, AG, AS, ASA, PBEFF, DC, AC,
    ROS, DSK, ASS, ATUL, ADP, ATULS, ATULR, NTULS : REAL;
    NFDA, EL : STRING[7];
    FDB, FDT, FGM, FTIP, FDM, FBK : STRING[12];
    FTP, BBN, BBT, BGM, BDD, BLK, DIREK, DIRAK : STRING;

PROCEDURE PILIHTULANGAN;
BEGIN
    FDT:=NFDA+BBT; ASSIGN(FBAHTUL,FDT); RESET(FBAHTUL); JUM:=FILESIZE(FBAHTUL);
    FOR I:=1 TO JUM DO BEGIN SEEK(FBAHTUL,I-1); READ(FBAHTUL,RECORDFDBT);
        IF (RECORDFDBT.TIPE=TP) AND (RECORDFDBT.DP<>0) THEN BEGIN
            ADP:=0.25*3.14*SQR(RECORDFDBT.DP);
            IF ATULR<>0 THEN BEGIN
                NTULS:=ATULR/ADP; IF (FRAC(NTULS)>0) THEN NTULS:=TRUNC(NTULS)+1;
                IF (FRAC(NTULS)=0) THEN NTULS:=TRUNC(NTULS); ATULS:=ADP*NTULS;
                IF I=1 THEN BEGIN ATUL:=ATULS; DPTUL:=RECORDFDBT.DP; NTUL:=TRUNC(NTULS); END;
                IF (ATULS<ATUL) AND (ATULS>=ATULR) THEN BEGIN
                    ATUL:=ATULS; DPTUL:=RECORDFDBT.DP; NTUL:=TRUNC(NTULS); END;
                IF (ATULS=ATUL) AND (ATULS>=ATULR) THEN BEGIN
                    IF RECORDFDBT.DP<DPTUL THEN BEGIN
                        DPTUL:=RECORDFDBT.DP; NTUL:=TRUNC(NTULS); END; END; END
            END;
        END;
    END;
END;

```

```

ELSE BEGIN
    IF I=1 THEN DPTUL:=RECORDFDBT.DP;
    IF RECORDFDBT.DP<DPTUL THEN DPTUL:=RECORDFDBT.DP;
    NTUL:=2; ATUL:=NTUL*ADP; END; END;
END; CLOSE(FBAHTUL);
END;

BEGIN
DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);FTP:=PARAMSTR(4);BBN:=PARAMSTR(5);
BBT:=PARAMSTR(6);BGM:=PARAMSTR(7);BDD:=PARAMSTR(8);BLK:=PARAMSTR(9);
GETDIR(0,DIRAK);CHDIR(DIREK);FTIP:=NFDA+FTP; ASSIGN(FTIPE,FTIP); {$I-} RESET(FTIPE); {$I+}
IF IORESULT=0 THEN BEGIN
    READ(FTIPE,FTIPE); CLOSE(FTIPE); FDM:=NFDA+BDD; ASSIGN(FDI,FDM);
    {$I-} RESET(FDI); {$I+}
    IF IORESULT=0 THEN BEGIN
        CLOSE(FDI); FGM:=NFDA+BGM; ASSIGN(FGMAKS,FGM); {$I-} RESET(FGMAKS); {$I+}
        IF IORESULT=0 THEN BEGIN
            CLOSE(FGMAKS); FDT:=NFDA+BBT; ASSIGN(FBAHTUL,FDT); {$I-} RESET(FBAHTUL); {$I+}
            IF IORESULT=0 THEN BEGIN
                CLOSE(FBAHTUL); FDB:=NFDA+BBN; ASSIGN(FDATBAH,FDB); {$I-} RESET(FDATBAH); {$I+}
                IF IORESULT=0 THEN BEGIN
                    CLOSE(FDATBAH); TP:=0;
                    REPEAT
                        PENAM:=0; TEXTBACKGROUND(0); CLRSCR;
                        FOR I:=1 TO 1000 DO BEGIN
                            TEXTCOLOR(5); GOTOXY(20,10); FOR J:=1 TO 35 DO WRITE(CHAR(176));
                            GOTOXY(20,11); WRITE(CHAR(176),' '); FOR J:=1 TO 3 DO WRITE(CHAR(175));
                            TEXTCOLOR(11); WRITE(' PROSES DISAIN KOLOM '); TEXTCOLOR(5);
                            FOR J:=1 TO 3 DO WRITE(CHAR(174)); WRITE(' '); CHAR(176));
                            GOTOXY(20,12); FOR J:=1 TO 35 DO WRITE(CHAR(176)); TEXTCOLOR(10); END;
                            TP:=TP+1; RESET(FGMAKS);
                            WHILE NOT EOF(FGMAKS) DO BEGIN
                                WITH RECORDFGMS DO BEGIN READ(FGMAKS,RECORDFGMS);
                                    IF RECORDFGMS.TIPE=TP THEN BEGIN
                                        MUL:=RECORDFGMS.MULap; MUT:=RECORDFGMS.MUtum; VUB:=RECORDFGMS.VU;
                                        TUB:=RECORDFGMS.TU; IF (MUL>MUK) OR (-MUL>MUK) THEN MUK:=MUL;
                                        IF (MUT>MUK) OR (-MUT>MUK) THEN MUK:=MUT;
                                        IF MUK<0 THEN MUK:=-MUK; END; END;
                                    END; CLOSE(FGMAKS); RESET(FDATBAH);
                                    WHILE NOT EOF(FDATBAH) DO BEGIN
                                        WITH RECORDFDBN DO BEGIN READ(FDATBAH,RECORDFDBN);
                                            IF RECORDFDBN.TIPE=TP THEN BEGIN
                                                FCB:=RECORDFDBN.FC; FYB:=RECORDFDBN.FY; ESB:=RECORDFDBN.ES; END; END;
                                            END; CLOSE(FDATBAH); RESET(FDI);
                                            WHILE NOT EOF(FDI) DO BEGIN
                                                WITH RECORDFDN DO BEGIN READ(FDI,RECORDFDN);
                                                    IF RECORDFDN.TIPE=TP THEN BEGIN
                                                        LB:=RECORDFDN.LK; BB:=RECORDFDN.BK; HB:=RECORDFDN.HK; PBB:=RECORDFDN.PBK;
                                                        KB:=RECORDFDN.KK; RGB:=RECORDFDN.RG; PENAMPANG:=RECORDFDN.PEN;
                                                        PENGIKAT:=RECORDFDN.PENG; END; END;
                                                    END; CLOSE(FDI); RESET(FBAHTUL); JUM:=FILESIZE(FBAHTUL);
                                                    DPMAS:=0; DSMAS:=0;
                                                    FOR I:=1 TO JUM DO BEGIN
                                                        WITH RECORDFDBT DO BEGIN SEEK(FBAHTUL,I-1); READ(FBAHTUL,RECORDFDBT);
                                                            IF TIPE=TP THEN BEGIN
                                                                IF (DP>DPMAS) AND (DP<>0) THEN DPMAS:=DP;
                                                                IF (DS>DSMAS) AND (DS<>0) THEN DSMAS:=DS; END; END;
                                                            END; CLOSE(FBAHTUL);
                                                            IF PENGIKAT=1 THEN O:=0.65;
                                                            IF PENGIKAT=2 THEN O:=0.70;
                                                            IF PENAMPANG=2 THEN HB:=0.8*BB; R:=0.30*HB;
                                                            IF MUL<0 THEN BEGIN MUS:=MUL; MUL:=MUT; MUT:=MUS; END;
                                                            IF ABS(MUT)>ABS(MUL) THEN BEGIN MUS:=MUL; MUL:=MUT; MUT:=MUS; END;
                                                            IF (MUL<>0) AND (MUT<>0) THEN KL:=34-12*(ABS(MUT)/ABS(MUL));
                                                            IF (MUL=0) OR (MUT=0) THEN KL:=22;
                                                            IF (KB*LB/R)>KL THEN BEGIN
                                                                IF (MUL=0) OR (MUT=0) THEN CM:=1 ELSE CM:=0.60+0.40*(ABS(MUT)/ABS(MUL));
                                                                IF CM<0.40 THEN CM:=0.40; IF PENAMPANG=1 THEN IG:=(BB*SQR(HB)*HB)/12;
                                                                IF PENAMPANG=2 THEN IG:=SQR(BB)*SQR(BB)/64; EC:=4700*SQR(FCB);
                                                                BD:=0.25; EI:=EC*IG/(2.5*(1+BD)); PC:=SQR(3.14)*EI/(SQR(KB*LB));

```

```

DB:=CM/(1-TUB/(O*PC)); IF DB<1 THEN DB:=1; MC:=DB*MUK; MUK:=MC; END;
E:=MUK/TUB; DA:=PBB+0.5*DPMAXS+DSMAKS;
IF PENAMPANG=1 THEN D:=HB-DA;
IF PENAMPANG=2 THEN BEGIN
    HEK:=0.8*BB; BEK:=0.25*3.14*SQR(BB)/HEK; D:=HEK-DA; END;
ASPER:=RGB*BB*D/2; ATULR:=ASPER; PILIHTULANGAN; DPTLB:=DPTUL;
IF NTUL=1 THEN NTUL:=2; NTLB:=NTUL; AS:=NTLB*0.25*3.14*SQR(DPTLB);
ASA:=AS; DA:=PBB+0.5*DPTLB+DSMAKS;
IF PENAMPANG=1 THEN D:=HB-DA;
IF PENAMPANG=2 THEN BEGIN
    HEK:=0.8*BB; BEK:=0.25*3.14*SQR(BB)/HEK; D:=HEK-DA; END;
IF PENAMPANG=1 THEN BEGIN
    RO:=2*AS/(BB*D); CB:=600*D/(600+FYB); B1:=0.85-0.008*(FCB-30);
    AB:=B1*CB; ESA:=(CB-DA)*0.003/CB; EY:=FYB/ESB;
    IF ESA>EY THEN FSA:=FYB; IF ESA<EY THEN FSA:=ESA*ESB;
    PNB:=O*(0.85*FCB*AB*BB+ASA*FSA-AS*FYB);
    IF PNB>TUB THEN BEGIN
        M:=FYB/(0.85*FCB);
        PN:=0.85*FCB*BB*D*((HB-2*E)/(2*D)+SQR(SQR((HB-2*E)/(2*D))+2*M*RO*(1-DA/D)));
    END
ELSE PN:=ASA*FYB/(E/(D-DA)+0.5)+BB*HB*FCB/(3*HB*E/SQR(D)+1.18); END;
IF PENAMPANG=2 THEN BEGIN
    PBEFF:=PBB+DPTLB; AG:=0.25*3.14*SQR(BB); RO:=2*AS/AG; DSK:=BB-2*PBEFF;
    CB:=600*D/(600+FYB); B1:=0.85-0.008*(FCB-30); AB:=B1*CB;
    ESA:=(CB-DA)*0.003/CB; EY:=FYB/ESB;
    IF ESA>EY THEN FSA:=FYB; IF ESA<EY THEN FSA:=ESA*ESB;
    PNB:=O*(0.85*FCB*AB*BEK+ASA*FSA-AS*FYB);
    IF PNB>TUB THEN BEGIN
        M:=FYB/(0.85*FCB);
        PN:=0.85*FCB*SQR(BB)*(SQR(SQR(0.85*E/BB-0.38)+RO*M*DSK/
        (2.5*BB))-(0.85*E/BB-0.38)); END;
    IF PNB<=TUB THEN PN:=AS*FYB/(3*E/DSK+1)+AG*FCB/(9.6*BB*E/
    SQR(0.8*BB+0.67*DSK)+1.18); END;
IF O*PN<TUB THEN PENAM:=1;
IF PENAM<>1 THEN BEGIN
    IF PENGIKAT=1 THEN BEGIN S:=16*DPTLB;
    IF PENAMPANG=1 THEN BEGIN
        IF S>BB THEN S:=BB; IF S>HB THEN S:=HB; END
    ELSE BEGIN
        IF S>BEK THEN S:=BEK; IF S>HEK THEN S:=HEK; END; END;
RESET(FBAHTUL); JUM:=FILESIZE(FBAHTUL); DSS:=0; SS:=0;
FOR I:=1 TO JUM DO BEGIN
    WITH RECORDFDBT DO BEGIN
        SEEK(FBAHTUL,I-1); READ(FBAHTUL,RECORDFDBT);
        IF (TIPE=TP) AND (DS<>0) THEN BEGIN
            IF PENGIKAT=1 THEN BEGIN
                IF S>48*DS THEN S:=48*DS; END
            ELSE BEGIN ASS:=0.25*3.14*SQR(DS);
                IF PENAMPANG=1 THEN BEGIN
                    AG:=BB*HB; AC:=(BB-2*PBB)*(HB-2*PBB);
                    ROS:=0.45*(AG/AC-1)*FCB/FYB;
                    S:=ASS*2*((BB-2*PBB)+(HB-2*PBB))/(AC*ROS);
                    IF S<25 THEN S:=25; IF S>80 THEN S:=80; END
                ELSE BEGIN
                    DC:=BB-2*PBB; AC:=0.25*3.14*SQR(DC);
                    ROS:=0.45*(AG/AC-1)*FCB/FYB;
                    S:=4*ASS*(DC-DS)/(SQR(DC)*ROS);
                    IF S<25 THEN S:=25; IF S>80 THEN S:=80; END; END; END;
            IF (S>SS) AND (DS<>0) THEN BEGIN
                SS:=S; DSS:=DS; END; END; END; CLOSE(FBAHTUL); END;
IF PENAM=1 THEN BEGIN
    CLRSCR; TEXTCOLOR(11);
    GOTOXY(20,10); WRITE('Perencanaan Kolom "DIULANG".....!');
    WRITE('^G'); READKEY; TEXTCOLOR(10); END;
IF PENAM<>1 THEN BEGIN
    FBK:=NFDA+BLK; ASSIGN(FKOLOM,FBK); {SI-} RESET(FKOLOM); {SI+}
    IF IORESULT<>0 THEN REWRITE(FKOLOM);
    NOREC:=1; JUM:=FILESIZE(FKOLOM);
    WITH RECORDFKLM DO BEGIN
        IF JUM<>0 THEN BEGIN

```



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FOR J:=1 TO JUM DO BEGIN
  SEEK(FKOLOM,J-1); READ(FKOLOM,RECORDFKLM);
  IF TP=RECORDFKLM.TIPE THEN NOREC:=J-1; END;
  IF NOREC=-1 THEN NOREC:=JUM; SEEK(FKOLOM,NOREC); END;
  TIPE:=TP; FNTLB:=TRUNC(NTLB); FDPTLB:=TRUNC(DPTLB); FNTLA:=TRUNC(NTLB);
  FDPTLA:=TRUNC(DPTLB); FDSS:=TRUNC(DSS); FS:=TRUNC(SS);
  WRITE(FKOLOM,RECORDFKLM); END; CLOSE(FKOLOM); END;
UNTIL TP=JTIPE;
END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
  WRITE('DATA BAHAN BELUM DIBUAT...!'); WRITE(^G);
  READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
  WRITE('DATA TULANGAN YG AKAN DIGUNAKAN BELUM DIBUAT...!');
  WRITE(^G); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
  WRITE('DATA GAYA YG BEKERJA PADA 'EL,' BELUM DIBUAT...!');
  WRITE(^G); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
  WRITE('DATA DIMENSI 'EL,' BELUM DIBUAT...!');
  WRITE(^G); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
  WRITE('JUMLAH TIPE 'EL,' BELUM ADA....!');
  WRITE(^G); READKEY; TEXTCOLOR(10); END;
CLRSCR; TEXTCOLOR(5); GOTOXY(20,10); FOR J:=1 TO 36 DO WRITE(CHAR(176));
GOTOXY(20,11); WRITE(CHAR(176),' '); FOR J:=1 TO 3 DO WRITE(CHAR(175));
TEXTCOLOR(4); WRITE('DISAIN KOLOM SELESAI'); TEXTCOLOR(5);
FOR J:=1 TO 3 DO WRITE(CHAR(174)); WRITE(' ',CHAR(176));
GOTOXY(20,12); FOR J:=1 TO 36 DO WRITE(CHAR(176));
GOTOXY(26,13); FOR J:=1 TO 5 DO WRITE(CHAR(3)); TEXTCOLOR(11);
WRITE('TEKAN ENTER '); TEXTCOLOR(5); FOR J:=1 TO 5 DO WRITE(CHAR(3)); TEXTCOLOR(10);
WRITE(^G); READLN; CHDIR(DIRAK);
END.

```

PROGRAM SKETSAKOLOM;

uses crt,graph,printer;

TYPE

FDMN = RECORD

TIPE : INTEGER;

LK : REAL;

BK : REAL;

HK : REAL;

PBK : REAL;

KK : REAL;

RG : REAL;

PEN : INTEGER;

PENG : INTEGER;

END;

FKLM = RECORD

TIPE : INTEGER;

FNTLB : INTEGER;

FDPTLB : INTEGER;

FNTLA : INTEGER;

FDPTLA : INTEGER;

FDSS : INTEGER;

FS : INTEGER;

END;

Var

FTIPE : TEXT;

```

FDM      : FILE OF FDMN;
FBALOK   : FILE OF FKLM;
RECORDFDMN : FDMN;
RECORDFBLK : FKLM;
NFDA,EL  : STRING[7];
FTIP,FDM,FBK : STRING[12];
FTP,BDD,BLK,DIRAK,DIREK,E,F,G,H,K,L : STRING;
JTIPE,tp,i,j,a,b,c,drivergrafik,
modegrafik,Z,X,Y,DSB,PBB,BB,
HB,SS,NMAKS,D,DPTLA,
NTLA,DL,NL,S,PN,PG : INTEGER;
TULIS    : STRING[9];

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begin

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DIREK:=PARAMSTR(1); NFDA:=PARAMSTR(2); FTP:=PARAMSTR(3); BDD:=PARAMSTR(4);
BLK:=PARAMSTR(5); GETDIR(0,DIRAK); CHDIR(DIREK); drivergrafik := detect;
IF (DIRAK='A:') OR (DIRAK='C:') OR (DIRAK='B:') OR (DIRAK='D:') OR
(DIRAK='E:') THEN initgraph(drivergrafik, modegrafik, DIRAK+'LOGO') ELSE
initgraph(drivergrafik, modegrafik, DIRAK+'LOGO');
FTIP:=NFDA+FTP; ASSIGN(FTIPE,FTIP); {$I-} RESET(FTIPE); {$I+}
IF IORESULT=0 THEN BEGIN READ(FTIPE,JTIPE); CLOSE(FTIPE);
FBK:=NFDA+BLK; ASSIGN(FBALOK,FBK); {$I-} RESET(FBALOK); {$I+}
IF IORESULT=0 THEN BEGIN CLOSE(FBALOK);
FDM:=NFDA+BDD; ASSIGN(FDIM,FDM); {$I-} RESET(FDIM); {$I+}
IF IORESULT=0 THEN BEGIN CLOSE(FDIM); TP:=0;
REPEAT
TP:=TP+1; RESET(FDIM); cleardevice; setfillstyle(1,15); Y:=0; S:=0;
floodfill(300,200,14); settextstyle(SMALLfont,horizdir,4); Z:=0;
WHILE NOT EOF(FDIM) DO BEGIN WITH RECORDFDMN DO BEGIN READ(FDIM,RECORDFDMN);
IF RECORDFDMN.TIPE=TP THEN BEGIN BB:=TRUNC(BK); HB:=TRUNC(HK); PN:=PEN;
PG:=PENG; PBB:=TRUNC(PBK); END; END; END; CLOSE(FDIM); RESET(FBALOK);
WHILE NOT EOF(FBALOK) DO BEGIN WITH RECORDFBLK DO BEGIN READ(FBALOK,RECORDFBLK);
IF RECORDFBLK.TIPE=TP THEN BEGIN NTLA:=FNTLA; DPTLA:=FDPTLA;
DSB:=FDSS; SS:=FS; END; END; END; CLOSE(FBALOK); SETCOLOR(0);
NMAKS:=TRUNC((BB-2*PBB-2*DSB+25)/(25+DPTLA));
STR(HB,E); E:=E+' mm'; STR(BB,F); F:=F+' mm'; STR(PBB,G); G:=G+' mm';
STR(DSB,H); H:=H+' mm'; STR(SS,K); K:=K+' mm'; STR(DPTLA,L); L:=L+' mm';
IF PG=1 THEN STR(NTLA,L) ELSE STR(2*NTLA,L); K:=L+K; STR(TP,L);
IF PG=1 THEN BEGIN
SETLINESTYLE(0,0,1); rectangle(250,30,330,130); MOVETO(200,20);
LINEREL(0,120); MOVETO(195,30); LINEREL(10,0);
MOVETO(195,130); LINEREL(10,0); OUTTEXTXY(155,76,E);
MOVETO(240,165); LINEREL(100,0); MOVETO(250,160);
LINEREL(0,10); MOVETO(330,160); LINEREL(0,10);
OUTTEXTXY(275,151,F); MOVETO(335,150); LINEREL(-20,0);
MOVETO(330,148); LINEREL(0,5); MOVETO(320,148); LINEREL(0,5);
OUTTEXTXY(315,135,G); MOVETO(340,135); LINEREL(0,-20);
MOVETO(337,130); LINEREL(5,0); MOVETO(337,120); LINEREL(5,0);
OUTTEXTXY(345,120,G); SETLINESTYLE(0,0,3);
MOVETO(262,40); LINEREL(56,0); MOVETO(320,42); LINEREL(0,76);
MOVETO(262,120); LINEREL(56,0); MOVETO(260,42);
LINEREL(0,76); SETLINESTYLE(0,0,3); ELLIPSE(262,42,90,180,2.2);
ELLIPSE(318,42,0,90,2.2); ELLIPSE(262,118,180,270,2.2);
ELLIPSE(318,118,0,90,2.2); ELLIPSE(316,44,0,360,2.2);
ELLIPSE(316,116,0,360,2.2); SETLINESTYLE(0,0,1);
MOVETO(316,44); LINEREL(10,10); MOVETO(316,116);
LINEREL(10,-10);
FOR I:=0 TO 1 DO BEGIN
IF (NTLA>2) THEN BEGIN IF NMAKS>1 THEN BEGIN
IF NTLA<=NMAKS THEN BEGIN B:=TRUNC((80-20*NTLA)/(NTLA-1));
IF FRAC(NTLA/2)>0 THEN BEGIN A:=0; C:=1; D:=1;
FOR J:=1 TO NTLA-3 DO BEGIN IF A=0 THEN BEGIN
SETLINESTYLE(0,0,3); ELLIPSE(264+B*C,44+I*72,0,360,2.2);
SETLINESTYLE(0,0,1); MOVETO(264+B*C,44+I*72); LINEREL(10,10-I*20);
A:=1; C:=C+1; END ELSE BEGIN
SETLINESTYLE(0,0,3); ELLIPSE(316-B*D,44+I*72,0,360,2.2);
SETLINESTYLE(0,0,1); MOVETO(316-B*D,44+I*72); LINEREL(10,10-I*20);
A:=0; D:=D+1; END; END; SETLINESTYLE(0,0,3); ELLIPSE(290,44+I*72,0,360,2.2);
ELLIPSE(316,44+I*72,0,360,2.2); ELLIPSE(264,44+I*72,0,360,2.2); SETLINESTYLE(0,0,1);
MOVETO(264,44+I*72); LINEREL(10,10-I*20); LINEREL(130,0); OUTTEXTXY(374,42+I*52,K);

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MOVETO(316,44+I*72); LINEREL(10,10-I*20); MOVETO(290,44+I*72); LINEREL(10,10-I*20);
END ELSE BEGIN A:=0; C:=1; D:=1; FOR J:=1 TO NTLA-2 DO BEGIN IF A=0 THEN BEGIN
  SETLINESTYLE(0,0,3); ELLIPSE(264+B*C,44+I*72,0,360,2,2);
  SETLINESTYLE(0,0,1); MOVETO(264+B*C,44+I*72); LINEREL(10,10-I*20);
  A:=1; C:=C+1; END
ELSE BEGIN SETLINESTYLE(0,0,3); ELLIPSE(316-B*D,44+I*72,0,360,2,2);
  SETLINESTYLE(0,0,1); MOVETO(316-B*D,44+I*72); LINEREL(10,10-I*20);
  A:=0; D:=D+1; END; END;
SETLINESTYLE(0,0,3); ELLIPSE(316,44+I*72,0,360,2,2); ELLIPSE(264,44+I*72,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(264,44+I*72); LINEREL(10,10-I*20); LINEREL(130,0);
OUTTEXTXY(374,42+I*52,K); MOVETO(316,44+I*72); LINEREL(10,10-I*20); END; END
ELSE BEGIN
IF NTLA-NMAKS<=NMAKS THEN BEGIN B:=TRUNC((80-20-2*NMAKS)/(NMAKS-1));
IF FRAC(NMAKS/2)>0 THEN BEGIN A:=0; C:=1; D:=1; FOR J:=1 TO NMAKS-3 DO BEGIN IF A=0 THEN BEGIN
  SETLINESTYLE(0,0,3); ELLIPSE(264+B*C,44+I*72,0,360,2,2); SETLINESTYLE(0,0,1);
  MOVETO(264+B*C,44+I*72); LINEREL(17,17-I*34); A:=1; C:=C+1; END ELSE BEGIN
  SETLINESTYLE(0,0,3); ELLIPSE(316-B*D,44+I*72,0,360,2,2);
  SETLINESTYLE(0,0,1); MOVETO(316-B*D,44+I*72); LINEREL(17,17-I*34);
  A:=0; D:=D+1; END; END;
SETLINESTYLE(0,0,3); ELLIPSE(264,44+I*72,0,360,2,2); ELLIPSE(316,44+I*72,0,360,2,2);
ELLIPSE(290,44+I*72,0,360,2,2); SETLINESTYLE(0,0,1); MOVETO(264,44+I*72); LINEREL(17,17-I*34);
MOVETO(316,44+I*72); LINEREL(17,17-I*34); SETLINESTYLE(0,0,1); MOVETO(290,44+I*72);
LINEREL(17,17-I*34); END ELSE BEGIN A:=0; C:=1; D:=1;
FOR J:=1 TO NMAKS-2 DO BEGIN IF A=0 THEN BEGIN
  SETLINESTYLE(0,0,3); ELLIPSE(264+B*C,44+I*72,0,360,2,2);
  SETLINESTYLE(0,0,1); MOVETO(264+B*C,44+I*72); LINEREL(17,17-I*34);
  A:=1; C:=C+1; END ELSE BEGIN
  SETLINESTYLE(0,0,3); ELLIPSE(316-B*D,44+I*72,0,360,2,2);
  SETLINESTYLE(0,0,1); MOVETO(316-B*D,44+I*72); LINEREL(17,17-I*34);
  A:=0; D:=D+1; END; END; SETLINESTYLE(0,0,3); ELLIPSE(264,44+I*72,0,360,2,2);
ELLIPSE(316,44+I*72,0,360,2,2); SETLINESTYLE(0,0,1); MOVETO(264,44+I*72); LINEREL(17,17-I*34);
MOVETO(316,44+I*72); LINEREL(17,17-I*34); END;
IF FRAC((NTLA-NMAKS)/2)>0 THEN BEGIN A:=0; C:=1; D:=1;
IF NTLA-NMAKS=1 THEN BEGIN
  SETLINESTYLE(0,0,3); ELLIPSE(290,51+I*58,0,360,2,2);
  SETLINESTYLE(0,0,1); MOVETO(290,51+I*58); LINEREL(10,10-I*20);
  MOVETO(281,61+I*38); LINEREL(130,0);
  OUTTEXTXY(374,49+I*38,K); END ELSE BEGIN
  FOR J:=1 TO (NTLA-NMAKS-3) DO BEGIN IF A=0 THEN BEGIN
    SETLINESTYLE(0,0,3); ELLIPSE(264+B*C,51+I*58,0,360,2,2);
    SETLINESTYLE(0,0,1); MOVETO(264+B*C,51+I*58); LINEREL(10,10-I*20);
    A:=1; C:=C+1; END ELSE BEGIN
    SETLINESTYLE(0,0,3); ELLIPSE(316-B*D,51+I*58,0,360,2,2);
    SETLINESTYLE(0,0,1); MOVETO(316-B*D,51+I*58); LINEREL(10,10-I*20);
    A:=0; D:=D+1; END; END;
  SETLINESTYLE(0,0,3); ELLIPSE(264,51+I*58,0,360,2,2); ELLIPSE(316,51+I*58,0,360,2,2);
  ELLIPSE(290,51+I*58,0,360,2,2); SETLINESTYLE(0,0,1); MOVETO(264,51+I*58); LINEREL(10,10-I*20);
  LINEREL(130,0); OUTTEXTXY(374,49+I*38,K); MOVETO(316,51+I*58); LINEREL(10,10-I*20);
  MOVETO(290,51+I*58); LINEREL(10,10-I*20); END; END
ELSE BEGIN A:=0; C:=1; D:=1;
FOR J:=1 TO (NTLA-NMAKS-2) DO BEGIN IF A=0 THEN BEGIN
  SETLINESTYLE(0,0,3); ELLIPSE(264+B*C,51+I*58,0,360,2,2);
  SETLINESTYLE(0,0,1); MOVETO(264+B*C,51+I*58); LINEREL(10,10-I*20);
  A:=1; C:=C+1; END ELSE BEGIN
  SETLINESTYLE(0,0,3); ELLIPSE(316-B*D,51+I*58,0,360,2,2);
  SETLINESTYLE(0,0,1); MOVETO(316-B*D,51+I*58); LINEREL(10,10-I*20);
  A:=0; D:=D+1; END; END;
SETLINESTYLE(0,0,3); ELLIPSE(264,51+I*58,0,360,2,2); ELLIPSE(316,51+I*58,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(264,51+I*58); LINEREL(10,10-I*20);
LINEREL(130,0); OUTTEXTXY(374,49+I*38,K); MOVETO(316,51+I*58); LINEREL(10,10-I*20); END; END
ELSE BEGIN
IF NTLA-2*NMAKS<=NMAKS THEN BEGIN B:=TRUNC((80-20-2*NMAKS)/(NMAKS-1));
IF FRAC(NMAKS/2)>0 THEN BEGIN A:=0; C:=1; D:=1;
FOR J:=1 TO NMAKS-3 DO BEGIN IF A=0 THEN BEGIN
  SETLINESTYLE(0,0,3); ELLIPSE(264+B*C,44+I*72,0,360,2,2); ELLIPSE(264+B*C,51+I*58,0,360,2,2);
  SETLINESTYLE(0,0,1); MOVETO(264+B*C,44+I*72); LINEREL(24,24-I*48);
  MOVETO(264+B*C,51+I*58); LINEREL(17,17-I*34); A:=1; C:=C+1; END ELSE BEGIN
  SETLINESTYLE(0,0,3); ELLIPSE(316-B*D,44+I*72,0,360,2,2); ELLIPSE(316-B*D,51+I*58,0,360,2,2);
  SETLINESTYLE(0,0,1); MOVETO(316-B*D,44+I*72); LINEREL(24,24-I*48);
  MOVETO(316-B*D,51+I*58); LINEREL(17,17-I*34); A:=0; D:=D+1; END; END;

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SETLINESTYLE(0,0,3); ELLIPSE(264,44+I*72,0,360,2,2);ELLIPSE(264,51+I*58,0,360,2,2);
ELLIPSE(316,44+I*72,0,360,2,2);ELLIPSE(316,51+I*58,0,360,2,2);
ELLIPSE(290,44+I*72,0,360,2,2);ELLIPSE(290,51+I*58,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(264,44+I*72); LINEREL(24,24-I*48);
MOVETO(264,51+I*58); LINEREL(17,17-I*34);MOVETO(316,44+I*72); LINEREL(24,24-I*48);
MOVETO(316,51+I*58); LINEREL(17,17-I*34);MOVETO(290,44+I*72); LINEREL(24,24-I*48);
MOVETO(290,51+I*58); LINEREL(17,17-I*34); END ELSE BEGIN A:=0; C:=1; D:=1;
FOR J:=1 TO NMAKS-2 DO BEGIN IF A=0 THEN BEGIN
SETLINESTYLE(0,0,3); ELLIPSE(264+B*C,44+I*72,0,360,2,2);ELLIPSE(264+B*C,51+I*58,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(264+B*C,44+I*72); LINEREL(24,24-I*48);
MOVETO(264+B*C,51+I*58); LINEREL(17,17-I*34);A:=1; C:=C+1; END ELSE BEGIN
SETLINESTYLE(0,0,3);ELLIPSE(316-B*D,44+I*72,0,360,2,2);ELLIPSE(316-B*D,51+I*58,0,360,2,2);
SETLINESTYLE(0,0,1);MOVETO(316-B*D,44+I*72); LINEREL(24,24-I*48);
MOVETO(316-B*D,51+I*58); LINEREL(17,17-I*34); A:=0; D:=D+1; END; END;
SETLINESTYLE(0,0,3); ELLIPSE(264,44+I*72,0,360,2,2);ELLIPSE(264,51+I*58,0,360,2,2);
ELLIPSE(316,44+I*72,0,360,2,2);ELLIPSE(316,51+I*58,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(264,44+I*72); LINEREL(24,24-I*48);
MOVETO(264,51+I*58); LINEREL(17,17-I*34);MOVETO(316,44+I*72); LINEREL(24,24-I*48);
MOVETO(316,51+I*58); LINEREL(17,17-I*34); END;
IF FRAC((NTLA-2*NMAKS)/2)>0 THEN BEGIN A:=0; C:=1; D:=1;
IF NTLA-2*NMAKS=1 THEN BEGIN
SETLINESTYLE(0,0,3); ELLIPSE(290,58+I*44,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(290,58+I*44); LINEREL(10,10-I*20);
MOVETO(281,68+I*24); LINEREL(130,0);
OUTTEXTXY(374,56+I*24,K); END ELSE BEGIN
FOR J:=1 TO (NTLA-2*NMAKS-3) DO BEGIN IF A=0 THEN BEGIN
SETLINESTYLE(0,0,3); ELLIPSE(264+B*C,58+I*44,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(264+B*C,58+I*44); LINEREL(10,10-I*20);
A:=1; C:=C+1; END ELSE BEGIN
SETLINESTYLE(0,0,3); ELLIPSE(316-B*D,58+I*44,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(316-B*D,58+I*44); LINEREL(10,10-I*20);
A:=0; D:=D+1; END; END;
SETLINESTYLE(0,0,3); ELLIPSE(264,58+I*44,0,360,2,2);ELLIPSE(316,58+I*44,0,360,2,2);
ELLIPSE(290,58+I*44,0,360,2,2);SETLINESTYLE(0,0,1); MOVETO(264,58+I*44); LINEREL(10,10-I*20);
LINEREL(130,0);OUTTEXTXY(374,56+I*24,K);MOVETO(316,58+I*44); LINEREL(10,10-I*20);
MOVETO(290,58+I*44); LINEREL(10,10-I*20); END; END ELSE BEGIN A:=0; C:=1; D:=1;
FOR J:=1 TO (NTLA-2*NMAKS-2) DO BEGIN IF A=0 THEN BEGIN
SETLINESTYLE(0,0,3); ELLIPSE(264+B*C,58+I*44,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(264+B*C,58+I*44); LINEREL(10,10-I*20);
A:=1; C:=C+1; END ELSE BEGIN
SETLINESTYLE(0,0,3); ELLIPSE(316-B*D,58+I*44,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(316-B*D,58+I*44); LINEREL(10,10-I*20);
A:=0; D:=D+1; END; END;
SETLINESTYLE(0,0,3); ELLIPSE(264,58+I*44,0,360,2,2);ELLIPSE(316,58+I*44,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(264,58+I*44); LINEREL(10,10-I*20);
LINEREL(130,0);OUTTEXTXY(374,56+I*24,K);MOVETO(316,58+I*44); LINEREL(10,10-I*20); END; END
ELSE Y:=1; END; END; END ELSE Z:=1; END
ELSE BEGIN IF NMAKS>1 THEN BEGIN
SETLINESTYLE(0,0,3); ELLIPSE(264,44+I*72,0,360,2,2);
SETLINESTYLE(0,0,1); MOVETO(264,44+I*72); LINEREL(10,10-I*20); LINEREL(130,0);
OUTTEXTXY(374,42+I*52,K); END ELSE Z:=1; END; END; END
ELSE BEGIN
SETLINESTYLE(0,0,1); ELLIPSE(300,100,0,360,70,70); SETLINESTYLE(0,0,3);
ELLIPSE(300,100,0,360,60,60); S:=0; A:=0; SETLINESTYLE(0,0,3);
IF FRAC(NTLA/2)>0 THEN BEGIN NTLA:=NTLA-1; S:=1;
FOR I:=0 TO 1 DO BEGIN ELLIPSE(300,46+I*108,0,360,2,2); END; END;
B:=TRUNC(60/(NTLA/2+1)); FOR J:=1 TO TRUNC(NTLA/2) DO BEGIN
IF (S=0) AND (J=1) THEN A:=A+TRUNC(B/2) ELSE A:=A+B;
ELLIPSE(300+A,100-TRUNC(SQRT(2916-SQR(A))),0,360,2,2);
ELLIPSE(300-A,100-TRUNC(SQRT(2916-SQR(A))),0,360,2,2);
ELLIPSE(300+A,100+TRUNC(SQRT(2916-SQR(A))),0,360,2,2);
ELLIPSE(300-A,100+TRUNC(SQRT(2916-SQR(A))),0,360,2,2); END;
settextstyle(SMALLfont,horizdir,4); SETLINESTYLE(0,0,1);
OUTTEXTXY(287,95,K);MOVETO(200,20);LINEREL(0,160);MOVETO(195,30);
LINEREL(10,0);MOVETO(195,170);LINEREL(10,0);OUTTEXTXY(155,100,F);
MOVETO(355,180);LINEREL(20,0);MOVETO(360,178);LINEREL(0,5);MOVETO(370,178);
LINEREL(0,5);OUTTEXTXY(352,165,G); MOVETO(360,100); LINEREL(20,0);
OUTTEXTXY(390,95,H); END;
IF Y=0 THEN BEGIN IF NMAKS>1 THEN BEGIN
IF PG=1 THEN BEGIN SETLINESTYLE(0,0,1); MOVETO(260,110); LINEREL(-23,23);

```

```

OUTTEXTXY(220,135,H);END;setteXTstyle(tripleXfont,horizdir,1);
outteXTXy(135,310,'SKETSA PENULANGAN KOLOM TIPE '+I.);
setteXTstyle(SMALLfont,horizdir,6); IF PG=1 THEN
OUTTEXTXY(130,270,'PENULANGAN KOLOM PENAMPANG PERSEGI') ELSE
OUTTEXTXY(120,270,'PENULANGAN KOLOM PENAMPANG LINGKARAN');
setteXTstyle(SMALLfont,horizdir,4); END; END ELSE BEGIN
setfillstyle(1,15);bar(251,31,329,129);bar(331,31,291,115);SETLINESTYLE(0,0,3);
MOVETO(262,40); LINEREL(56,0); MOVETO(320,42);LINEREL(0,76); MOVETO(262,120);
LINEREL(56,0);MOVETO(260,42); LINEREL(0,76); ELLIPSE(262,42,90,180,2,2);
ELLIPSE(318,42,0,90,2,2); ELLIPSE(262,118,180,270,2,2);
ELLIPSE(318,118,270,0,2,2);setteXTstyle(tripleXfont,horizdir,1);
outteXTXy(135,310,'SKETSA PENULANGAN KOLOM TIPE '+I.);
setteXTstyle(SMALLfont,horizdir,4);
OUTTEXTXY(186,190,'TULANGAN LEBIH DARI TIGA BARIS TULANGAN');
setteXTstyle(SMALLfont,horizdir,6);
OUTTEXTXY(177,270,'PENULANGAN KOLOM PERSEGI');
setteXTstyle(SMALLfont,horizdir,4); END; IF (Z=1) THEN BEGIN
setfillstyle(1,15); bar(251,31,329,129);
bar(331,31,431,115); SETLINESTYLE(0,0,3);
MOVETO(262,40); LINEREL(56,0); MOVETO(320,42);
LINEREL(0,76); MOVETO(262,120); LINEREL(56,0);
MOVETO(260,42); LINEREL(0,76); ELLIPSE(262,42,90,180,2,2);
ELLIPSE(318,42,0,90,2,2); ELLIPSE(262,118,180,270,2,2);
ELLIPSE(318,118,270,0,2,2); setteXTstyle(tripleXfont,horizdir,1);
outteXTXy(135,310,'SKETSA PENULANGAN KOLOM TIPE '+I.);
setteXTstyle(SMALLfont,horizdir,4);
OUTTEXTXY(195,190,'LEBAR PENAMPANG TIDAK MENCUKUPI ... !');
setteXTstyle(SMALLfont,horizdir,6);
OUTTEXTXY(177,270,'PENULANGAN KOLOM PERSEGI');
setteXTstyle(SMALLfont,horizdir,4); END;
SETLINESTYLE(0,0,1); SETCOLOR(1); setteXTstyle(tripleXfont,horizdir,1);
outteXTXy(516,440,'UII-CDP'); setteXTstyle(SMALLfont,horizdir,4);
setcolor(4); rectangle(500,440,600,465); setcolor(0);
READKEY; UNTIL TP=JTIPE;
END; END; END; closegraph; restorecrtmode; CHDIR(DIRAK);
end.

```

```

PROGRAM TDKO;
USES CRT;
TYPE
  FDBN = RECORD
    TIPE : INTEGER;
    FC : REAL;
    FY : REAL;
    ES : REAL;
  END;
  FDBT = RECORD
    TIPE : INTEGER;
    N : INTEGER;
    DP : INTEGER;
    DS : INTEGER;
  END;
  FGMS = RECORD
    TIPE : INTEGER;
    MUlap : REAL;
    MUtum : REAL;
    VU : REAL;
    TU : REAL;
  END;
  FDMN = RECORD
    TIPE : INTEGER;
    LK : REAL;
    BK : REAL;
    HK : REAL;
    PBK : REAL;
    KK : REAL;
    RG : REAL;
    PEN : INTEGER;
    PENG : INTEGER;

```

```

END;
FELN = RECORD
    TIPE : INTEGER;
    NO   : INTEGER;
    ELE  : INTEGER;
END;

VAR
    FTYPE          : TEXT;
    FDATAH         : FILE OF FDBN;
    FBAHTUL        : FILE OF FDBT;
    FGMAKS         : FILE OF FGMS;
    FDM            : FILE OF FDMN;
    FELE           : FILE OF FELN;
    RECORDFELN     : FELN;
    RECORDFDBN     : FDBN;
    RECORDFDBT     : FDBT;
    RECORDFGMS     : FGMS;
    RECORDFDMN     : FDMN;
    I, J, TIPE, JUM, NOREC, J, TP, DPMMAKS, DSMMAKS,
    NTUL, DPTUL, K, F : INTEGER;
    NFDA, EL       : STRING[7];
    FDB, FDT, FGM, FTIP, FDM, FELM : STRING[12];
    FTP, BBN, BBT, BEL, BGM, BDD, DIRAK, DIREK : STRING;

BEGIN
    DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);FTP:=PARAMSTR(4);
    BBN:=PARAMSTR(5);BBT:=PARAMSTR(6);BEL:=PARAMSTR(7);BGM:=PARAMSTR(8);
    BDD:=PARAMSTR(9);GETDIR(0,DIRAK);CHDIR(DIREK);FDM:=NFDA+BDD;
    ASSIGN(FDM,FDM);{$I-} RESET(FDM);{$I+}
    IF IORESULT=0 THEN BEGIN
        CLOSE(FDM);FGM:=NFDA+BGM;ASSIGN(FGMAKS,FGM);{$I-} RESET(FGMAKS);{$I+}
        IF IORESULT=0 THEN BEGIN
            CLOSE(FGMAKS);FDT:=NFDA+BBT;ASSIGN(FBAHTUL,FDT);{$I-} RESET(FBAHTUL);{$I+}
            IF IORESULT=0 THEN BEGIN
                CLOSE(FBAHTUL);FDB:=NFDA+BBN;ASSIGN(FDATAH,FDB);{$I-} RESET(FDATAH);{$I+}
                IF IORESULT=0 THEN BEGIN
                    CLOSE(FDATAH);FELM:=NFDA+BEL;ASSIGN(FELE,FELM);{$I-} RESET(FELE);{$I+}
                    IF IORESULT=0 THEN BEGIN
                        CLOSE(FELE);TEXTCOLOR(10);TEXTBACKGROUND(0);clrscr;I:=1;K:=1;F:=1;
                        RESET(FDATAH);
                        WHILE NOT EOF(FDATAH) DO BEGIN
                            SEEK(FDATAH,F-1);READ(FDATAH,RECORDFDBN);F:=F+1;
                            WITH RECORDFDBN DO BEGIN
                                IF (K=1) THEN BEGIN I:=I+6;
                                    IF I>=22 THEN BEGIN CLRSCR;I:=7;END;
                                    WRITE('      ',CHAR(218));
                                    FOR J:=1 TO 63 DO WRITE(CHAR(196));WRITE(CHAR(191));
                                    WRITELN;WRITE('      ',CHAR(179));TEXTCOLOR(11);
                                    WRITE('      >>> DATA BAHAN <<<',
                                        '      ');TEXTCOLOR(10);WRITE(CHAR(179));
                                    WRITELN;WRITE('      ',CHAR(195));
                                    FOR J:=1 TO 63 DO WRITE(CHAR(196));WRITE(CHAR(180));
                                    WRITELN;WRITE('      ',CHAR(179),
                                        ' Tipe Teg. Desak Beton Teg. Tarik Baja Mod. ',
                                        'Elastisitas Baja',CHAR(179));WRITELN;
                                    WRITE('      ',CHAR(179),
                                        ' Kolom (MPa)      (MPa)      (MPa)',
                                        '      ',CHAR(179));WRITELN;
                                    WRITE('      ',CHAR(195));
                                    FOR J:=1 TO 63 DO WRITE(CHAR(196));WRITE(CHAR(180));
                                    WRITELN;END;
                                WRITE('      ',CHAR(179),' ',TIPE:3,'      ',TRUNC(FC):3,
                                    '      ',TRUNC(FY):3,'      ',TRUNC(ES):6,
                                    '      ',CHAR(179));WRITELN;K:=K+1;I:=I+1;
                                IF (I>=22) OR EOF(FDATAH) THEN BEGIN
                                    WRITE('      ',CHAR(192));
                                    FOR J:=1 TO 63 DO WRITE(CHAR(196));WRITE(CHAR(217));READKEY;
                                    WRITELN;K:=1;I:=I+1;END;
                                IF I>=22 THEN BEGIN I:=1;K:=1;CLRSCR;END;END;

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END; CLOSE(FDATBAH); F:=1; RESET (FBAHTUL);
WHILE NOT EOF(FBAHTUL) DO BEGIN
  SEEK(FBAHTUL,F-1); READ(FBAHTUL,RECORDFDBT); F:=F+1;
  WITH RECORDFDBT DO BEGIN
    IF (K=1) THEN BEGIN I:=I+6;
    IF I>=22 THEN BEGIN I:=7; CLRSCR; END;
    WRITE(' ',CHAR(218));
    FOR J:=1 TO 65 DO WRITE(CHAR(196)); WRITE(CHAR(191));
    WRITELN; WRITE(' ',CHAR(179)); TEXTCOLOR(11);
    WRITE(' >>> DIAMETER TULANGAN YANG AKAN DIGUNAKAN',
    '<<< '); TEXTCOLOR(10); WRITE(CHAR(179)); WRITELN;
    WRITE(' ',CHAR(195));
    FOR J:=1 TO 65 DO WRITE(CHAR(196)); WRITE(CHAR(180));
    WRITELN; WRITE(' ',CHAR(179),' Tipe No. Diameter Tulangan'.
    ' Pokok Diameter Tulangan Senggang ',CHAR(179)); WRITELN;
    WRITE(' ',CHAR(179),' Kolom (mm)',
    ' (mm) ',CHAR(179));
    WRITELN; WRITE(' ',CHAR(195));
    FOR J:=1 TO 65 DO WRITE(CHAR(196)); WRITE(CHAR(180));
    WRITELN; END;
    WRITE(' ',CHAR(179),' ,TIPE:3,' ',N:2,
    ' ',DP:2,' ',DS:2,
    ' ',CHAR(179)); WRITELN; K:=K+1; I:=I+1;
  IF (I>=22) OR EOF(FBAHTUL) THEN BEGIN
    WRITE(' ',CHAR(192));
    FOR J:=1 TO 65 DO WRITE(CHAR(196)); WRITE(CHAR(217));
    READKEY; WRITELN; K:=1; I:=I+1; END;
    IF I>=22 THEN BEGIN K:=1; I:=1; CLRSCR; END; END;
  END; CLOSE(FBAHTUL); F:=1; RESET(FELE);
  WHILE NOT EOF(FELE) DO BEGIN
    SEEK(FELE,F-1); READ(FELE,RECORDFELN); F:=F+1;
    WITH RECORDFELN DO BEGIN
      IF K=1 THEN BEGIN I:=I+5;
      IF I>=22 THEN BEGIN I:=6; CLRSCR; END;
      WRITE(' ',CHAR(218));
      FOR J:=1 TO 29 DO WRITE(CHAR(196)); WRITE(CHAR(191));
      WRITELN; WRITE(' ',CHAR(179)); TEXTCOLOR(11);
      WRITE(' >>> DATA ELEMEN 'EL:7,' <<< '); TEXTCOLOR(10);
      WRITE(CHAR(179)); WRITELN; WRITE(' ',CHAR(195));
      FOR J:=1 TO 29 DO WRITE(CHAR(196)); WRITE(CHAR(180));
      WRITELN; WRITE(' ',CHAR(179),' Tipe No. Elemen ',
      CHAR(179)); WRITELN; WRITE(' ',CHAR(195));
      FOR J:=1 TO 29 DO WRITE(CHAR(196)); WRITE(CHAR(180));
      WRITELN; END;
      WRITE(' ',CHAR(179),' ,TIPE:3,' ',NO:2,
      ' ',ELE:3,' ',CHAR(179)); WRITELN; K:=K+1; I:=I+1;
    IF (I>=22) OR EOF(FELE) THEN BEGIN
      WRITE(' ',CHAR(192));
      FOR J:=1 TO 29 DO WRITE(CHAR(196)); WRITE(CHAR(217));
      READKEY; WRITELN; K:=1; I:=I+1; END;
      IF I>=22 THEN BEGIN K:=1; I:=1; CLRSCR; END; END;
    END; CLOSE(FELE); F:=1; RESET(FDIM);
    WHILE NOT EOF(FDIM) DO BEGIN
      SEEK(FDIM,F-1); READ(FDIM,RECORDFDMN); F:=F+1;
      WITH RECORDFDMN DO BEGIN
        IF K=1 THEN BEGIN I:=I+6;
        IF I>=22 THEN BEGIN I:=7; CLRSCR; END;
        WRITE(' ',CHAR(218));
        FOR J:=1 TO 54 DO WRITE(CHAR(196)); WRITE(CHAR(191));
        WRITELN; WRITE(' ',CHAR(179)); TEXTCOLOR(11);
        WRITE(' >>> DATA DIMENSI <<< ',
        ' '); TEXTCOLOR(10); WRITE(CHAR(179)); WRITELN;
        WRITE(' ',CHAR(195));
        FOR J:=1 TO 54 DO WRITE(CHAR(196)); WRITE(CHAR(180));
        WRITELN; WRITE(' ',CHAR(179),' Tipe Panjang Lebar'.
        ' Diameter Tinggi Penutup Beton ',CHAR(179)); WRITELN;
        WRITE(' ',CHAR(179),' Kolom (mm) (mm)',
        ' (mm) (mm) ',
        CHAR(179)); WRITELN; WRITE(' ',CHAR(195));
        FOR J:=1 TO 54 DO WRITE(CHAR(196)); WRITE(CHAR(180));

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        WRITELN; END;
        WRITE(' ',CHAR(179),' ',TIPE:3,' ',TRUNC(LK):5,
        ' ',TRUNC(BK):4,' ',TRUNC(HK):4,' ',
        TRUNC(PBK):3,' ',CHAR(179)); WRITELN; K:=K+1; I:=I+1;
        IF (I>=22) OR EOF(FDIM) THEN BEGIN
            WRITE(' ',CHAR(192));
            FOR J:=1 TO 54 DO WRITE(CHAR(196)); WRITE(CHAR(217));
            READKEY; WRITELN; K:=1; I:=I+1; END;
            IF I>=22 THEN BEGIN K:=1; I:=1; CLRSCR; END; END;
        END; CLOSE(FDIM); F:=1; RESET(FGMAKS);
        WHILE NOT EOF(FGMAKS) DO BEGIN
            SEEK(FGMAKS,F-1); READ(FGMAKS,RECORDFGMS); F:=F+1;
            WITH RECORDFGMS DO BEGIN
                IF K=1 THEN BEGIN I:=I+6;
                    IF I>=22 THEN BEGIN I:=7; CLRSCR; END;
                    WRITE(' ',CHAR(218));
                    FOR J:=1 TO 51 DO WRITE(CHAR(196)); WRITE(CHAR(191));
                    WRITELN; WRITE(' ',CHAR(179)); TEXTCOLOR(11);
                    WRITE(' >>> DATA GAYA-GAYA MAKSIMUM <<< ');
                    ' '); TEXTCOLOR(10); WRITE(CHAR(179)); WRITELN;
                    WRITE(' ',CHAR(195));
                    FOR J:=1 TO 51 DO WRITE(CHAR(196)); WRITE(CHAR(180));
                    WRITELN; WRITE(' ',CHAR(179),
                    ' Tipe M1 M2 Gaya Geser Gaya Aksial ',
                    CHAR(179)); WRITELN;
                    WRITE(' ',CHAR(179),
                    ' Kolom (Nmm) (Nmm) (N) (N) ',
                    CHAR(179)); WRITELN;
                    WRITE(' ',CHAR(195));
                    FOR J:=1 TO 51 DO WRITE(CHAR(196)); WRITE(CHAR(180));
                    WRITELN; END;
                    WRITE(' ',CHAR(179),' ',TIPE:3,' ',MULap:8,
                    ' ',MUTum:8,' ',VU:8,' ',TU:8,' ',CHAR(179));
                    WRITELN; K:=K+1; I:=I+1;
                    IF (I>=22) OR EOF(FGMAKS) THEN BEGIN
                        WRITE(' ',CHAR(192)); FOR J:=1 TO 51 DO WRITE(CHAR(196));
                        WRITE(CHAR(217)); READKEY; WRITELN; K:=1; I:=I+1; END;
                        IF (I>=22) THEN BEGIN K:=1; I:=1; CLRSCR; END; END;
                    END; CLOSE(FGMAKS);
                END
            ELSE BEGIN
                CLRSCR; TEXTCOLOR(11); GOTOXY(20,10); WRITE('DATA ELEMEN BELUM DIBUAT...!');
                WRITE('^G'); READKEY; TEXTCOLOR(10); END;
            END
            ELSE BEGIN
                CLRSCR; TEXTCOLOR(11); GOTOXY(20,10); WRITE('DATA BAHAN BELUM DIBUAT...!');
                WRITE('^G'); READKEY; TEXTCOLOR(10); END;
            END
            ELSE BEGIN
                CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
                WRITE('DATA TULANGAN YG AKAN DIGUNAKAN BELUM DIBUAT...!');
                WRITE('^G'); READKEY; TEXTCOLOR(10); END;
            END
            ELSE BEGIN
                CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
                WRITE('DATA GAYA YG BEKERJA PADA BALOK BELUM DIBUAT...!');
                WRITE('^G'); READKEY; TEXTCOLOR(10); END;
            END
            ELSE BEGIN
                CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
                WRITE('DATA DIMENSI BALOK BELUM DIBUAT...!');
                WRITE('^G'); READKEY; TEXTCOLOR(10); END; CHDIR(DIRAK);
            END.

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```

PROGRAM TKO;
USES CRT;
TYPE
    FDAT = RECORD
        NPROY : string[19];

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```

    NFDAT : string[8];
    NaFil : string[12];
    ENG : string[19];
END;
FKLM = RECORD
    TIPE : INTEGER;
    FNTLB : INTEGER;
    FDPTLB : INTEGER;
    FNTLA : INTEGER;
    FDPTLA : INTEGER;
    FDSS : INTEGER;
    FS : INTEGER;
END;
FDN = RECORD
    TIPE : INTEGER;
    LK : REAL;
    BK : REAL;
    HK : REAL;
    PBK : REAL;
    KK : REAL;
    RG : REAL;
    PEN : INTEGER;
    PENG : INTEGER;
END;
VAR
    FKOLOM : FILE OF FKLM;
    FDI : FILE OF FDN;
    NFILE : FILE OF FDAT;
    RECORDFDAT : FDAT;
    RECORDFKLM : FKLM;
    RECORDFDN : FDN;
    I,JUM,I,TP,Z,A,B;
    C : INTEGER;
    NFDA,EL : STRING[7];
    FBK,FDM : STRING[12];
    NPRO,EN : STRING[19];
    BLK,BDD,DIRAK;
    DIREK : STRING;

BEGIN
    DIREK:=PARAMSTR(1); NFDA:=PARAMSTR(2); EL:=PARAMSTR(3); BDD:=PARAMSTR(4);
    BLK:=PARAMSTR(5); GETDIR(0,DIRAK); CHDIR(DIREK); ASSIGN(NFILE,'FILEDATA.DAT'); RESET(NFILE);
    WHILE NOT EOF(NFILE) DO BEGIN READ(NFILE,RECORDFDAT);
    IF RECORDFDAT.NFDAT=NFDA THEN BEGIN
        NPRO:=RECORDFDAT.NPROY; EN :=RECORDFDAT.ENG; END;
    END; CLOSE(NFILE); FBK:=NFDA+BLK; ASSIGN(FKOLOM,FBK); {$I-} RESET(FKOLOM); {$I+}
    IF IORESULT=0 THEN BEGIN I:=1; TP:=1;
    WHILE NOT EOF(FKOLOM) DO BEGIN
        WITH RECORDFKLM DO BEGIN READ(FKOLOM,RECORDFKLM);
        IF I=1 THEN BEGIN
            A:=LENGTH(NPRO); B:=LENGTH(NFDA); C:=LENGTH(EN);
            TEXTCOLOR(10); TEXTBACKGROUND(0); CLRSCR; GOTOXY(10,1);
            WRITE(CHAR(218)); FOR J:=1 TO 57 DO WRITE(CHAR(196)); WRITE(CHAR(191));
            GOTOXY(10,2); WRITE(CHAR(179)); TEXTCOLOR(11);
            WRITE(' PENULANGAN KOLOM ');
            TEXTCOLOR(10); WRITE(CHAR(179));
            GOTOXY(10,3);
            WRITE(CHAR(195)); FOR J:=1 TO 57 DO WRITE(CHAR(196)); WRITE(CHAR(180));
            GOTOXY(10,4);
            WRITE(CHAR(179),' Proyek : ',NPRO:A); FOR J:=1 TO (19-A) DO WRITE(' ');
            WRITE('Nama File Data: ',NFDA:B); FOR J:=1 TO (8-B) DO WRITE(' ');
            WRITE(' ',CHAR(179)); GOTOXY(10,5);
            WRITE(CHAR(179),' Perencana : ',EN:C); FOR J:=1 TO (19-C) DO WRITE(' ');
            WRITE(' ',CHAR(179)); GOTOXY(10,6);
            WRITE(CHAR(195)); FOR J:=1 TO 7 DO WRITE(CHAR(196)); WRITE(CHAR(194));
            FOR J:=1 TO 12 DO WRITE(CHAR(196)); WRITE(CHAR(194));
            FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(194));
            FOR J:=1 TO 12 DO WRITE(CHAR(196)); WRITE(CHAR(194));
            FOR J:=1 TO 12 DO WRITE(CHAR(196)); WRITE(CHAR(180));
            GOTOXY(10,7);

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WRITE(CHAR(179),' TIPE ',CHAR(179),' TULANGAN ',CHAR(179),
'TULANGAN',CHAR(179),' TULANGAN ',CHAR(179),' TULANGAN ',
CHAR(179));
GOTOXY(10,8);
WRITE(CHAR(179),' KOLOM',CHAR(179),' TARIK ',CHAR(179),
'DESAK ',CHAR(179),' SPIRAL ',CHAR(179),' SENGKANG ',
CHAR(179));
GOTOXY(10,9);
WRITE(CHAR(195)); FOR J:=1 TO 7 DO WRITE(CHAR(196)); WRITE(CHAR(197));
FOR J:=1 TO 12 DO WRITE(CHAR(196)); WRITE(CHAR(197));
FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(197));
FOR J:=1 TO 12 DO WRITE(CHAR(196)); WRITE(CHAR(197));
FOR J:=1 TO 12 DO WRITE(CHAR(196)); WRITE(CHAR(180)); END;
GOTOXY(10,I+9);
WRITE(CHAR(179),' ',TIPE:3,' ',CHAR(179),' ',FNTLB:2,D,FDPTLB:2,
' ',CHAR(179),' ',FNTLA:2,D,FDPTLA:2);
FDM:=NFDA+BDD; ASSIGN(FDI,FDM); RESET(FDI); JUM:= FILESIZE(FDI); Z:=0;
WITH RECORDFDN DO BEGIN
IF JUM<>0 THEN BEGIN
FOR J:=1 TO JUM DO BEGIN
SEEK(FDI,J-1); READ(FDI,RECORDFDN);
IF RECORDFDN.TIPE=TP THEN Z:=RECORDFDN.PENG; END; END; END;
IF Z=2 THEN BEGIN
GOTOXY(40,I+9); WRITE(' ',CHAR(179),' D',FDSS:2,' ',FS:3,' mm ',
CHAR(179),' - ',CHAR(179)); END
ELSE BEGIN
GOTOXY(40,I+9); WRITE(' ',CHAR(179),' - ',CHAR(179),' D',
FDSS:2,' ',FS:3,' mm ',CHAR(179)); END;
TP:=TP+1; I:=I+1;
IF (I=15) OR (EOF(FKOLOM)) THEN BEGIN
GOTOXY(10,I+9);
WRITE(CHAR(192)); FOR J:=1 TO 7 DO WRITE(CHAR(196)); WRITE(CHAR(193));
FOR J:=1 TO 12 DO WRITE(CHAR(196)); WRITE(CHAR(193));
FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(193));
FOR J:=1 TO 12 DO WRITE(CHAR(196)); WRITE(CHAR(193));
FOR J:=1 TO 12 DO WRITE(CHAR(196)); WRITE(CHAR(217)); TEXTCOLOR(11);
GOTOXY(10,I+10); WRITE("Tekan "SEMBARANG TOMBOL" Untuk Melanjutkan.....!");
WRITE('^G'); READKEY; TEXTCOLOR(10); I:=I+1; END; END;
END; CLOSE(FKOLOM);
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,5);
WRITE(' PROSES DISAIN BELUM DILAKUKAN');
GOTOXY(15,7); WRITE("Tekan "SEMBARANG TOMBOL" Untuk Melanjutkan.....!");
WRITE('^G'); READKEY; TEXTCOLOR(10); END; CHDIR(DIRAK);
END.

```

```

PROGRAM DB;
USES CRT;
TYPE
  FDBN = RECORD
    TIPE : INTEGER;
    FC : REAL;
    FY : REAL;
    ES : REAL;
  END;
  FDBT = RECORD
    TIPE : INTEGER;
    N : INTEGER;
    DP : INTEGER;
    DS : INTEGER;
  END;
VAR
  FTIPE : TEXT;
  FDATAH : FILE OF FDBN;
  FBAHTUL : FILE OF FDBT;
  RECORDFDBN : FDBN;
  RECORDFDBT : FDBT;
  I, J, TIPE, JUM, NOREC, TP, DPB, DSB, U : INTEGER;

```

```

FCB,FYB,ESB          : REAL;
YA                    : CHAR;
BENAR                 : BOOLEAN;
NFDA,EL               : STRING[7];
FDB,FDT,FTIP         : STRING[12];
FTP,BBN,BBT,DIRAK,DIREK : STRING;

```

Begin

```

DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);FTP:=PARAMSTR(4);
BBN:=PARAMSTR(5);BBT:=PARAMSTR(6);GETDIR(0,DIRAK);CHDIR(DIREK);
FTIP:=NFDA+FTP;ASSIGN(FTIP,FTIP);{$I-}RESET(FTIP);{$I+}
IF IORESULT=0 THEN BEGIN
  READ(FTIP,FTIP);CLOSE(FTIP);TP:=0;
  REPEAT
    TP:=TP+1;YA:='U';FDB:=NFDA+BBN;ASSIGN(FDATBAH,FDB);{$I-}RESET(FDATBAH);{$I+}
    IF IORESULT<>0 THEN REWRITE(FDATBAH);
    WHILE UPCASE(YA)='U' DO BEGIN
      TEXTCOLOR(10);TEXTBACKGROUND(0);CLRSCR;GOTOXY(10,2);
      WRITE(CHAR(218));FOR I:=1 TO 59 DO WRITE(CHAR(196));WRITE(CHAR(191));
      GOTOXY(10,3);
      WRITE(CHAR(179));TEXTCOLOR(13);
      WRITE('          >>> DATA BAHAN <<<          ');
      TEXTCOLOR(10);WRITE(CHAR(179));
      GOTOXY(10,4);
      WRITE(CHAR(195));FOR I:=1 TO 59 DO WRITE(CHAR(196));WRITE(CHAR(180));
      GOTOXY(10,5);
      WRITE(CHAR(179),'EL:7,' Tipe : ');TEXTCOLOR(11);WRITE(TP:3);
      WRITE('          ');TEXTCOLOR(10);
      WRITE(CHAR(179));
      GOTOXY(10,6);
      WRITE(CHAR(195));FOR I:=1 TO 59 DO WRITE(CHAR(196));WRITE(CHAR(180));
      GOTOXY(10,7);
      WRITE(CHAR(179),' Teg. Desak Beton Teg. Tarik Baja Mod. Elastisitas',
      ' Baja ',CHAR(179));
      GOTOXY(10,8);
      WRITE(CHAR(179),' (fc)--->MPa (fy)--->MPa (Es)--->MPa',
      ' ',CHAR(179));
      GOTOXY(10,9);
      WRITE(CHAR(195));FOR I:=1 TO 59 DO WRITE(CHAR(196));WRITE(CHAR(180));
      GOTOXY(10,10);
      WRITE(CHAR(179));FOR I:=1 TO 59 DO WRITE(CHAR(0));WRITE(CHAR(179));
      GOTOXY(10,11);
      WRITE(CHAR(192));FOR I:=1 TO 59 DO WRITE(CHAR(196));WRITE(CHAR(217));
      TEXTCOLOR(11);
      GOTOXY(10,13);WRITE(' U : ulang L : lanjutkan ===> ');
      GOTOXY(19,10);READLN(FCB);
      GOTOXY(37,10);READLN(FYB);
      GOTOXY(57,10);READLN(ESB);BENAR:=TRUE;
      WHILE BENAR DO BEGIN
        GOTOXY(42,13);YA:=READKEY;WRITE(YA);
        IF UPCASE(YA)='U' THEN BENAR:=FALSE;
        IF UPCASE(YA)='L' THEN BENAR:=FALSE;END;END;TEXTCOLOR(10);
        NOREC:=-1;JUM:=FILESIZE(FDATBAH);
        WITH RECORDFDBN DO BEGIN
          IF JUM<>0 THEN BEGIN
            FOR I:=1 TO JUM DO BEGIN
              SEEK(FDATBAH,I-1);READ(FDATBAH,RECORDFDBN);
              IF RECORDFDBN.TIPE=TP THEN NOREC:=I-1;END;
              IF NOREC=-1 THEN NOREC:=JUM;SEEK(FDATBAH,NOREC);
            END;TIPE:=TP;FC:=FCB;FY:=FYB;ES:=ESB;WRITE(FDATBAH,RECORDFDBN);END;
            CLOSE(FDATBAH);U:=1;
          Repeat
            FDT:=NFDA+BBT;ASSIGN(FBAHTUL,FDT);{$I-}RESET(FBAHTUL);{$I+}
            IF IORESULT<>0 THEN REWRITE(FBAHTUL);CLRSCR;GOTOXY(10,2);
            WRITE(CHAR(218));FOR I:=1 TO 59 DO WRITE(CHAR(196));WRITE(CHAR(191));
            GOTOXY(10,3);
            WRITE(CHAR(179));TEXTCOLOR(13);
            WRITE('          >>> DIAMETER TULANGAN YANG AKAN DIGUNAKAN <<<          ');
            TEXTCOLOR(10);WRITE(CHAR(179));
            GOTOXY(10,4);

```

```

WRITE(CHAR(195)); FOR I:=1 TO 59 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,5);
WRITE(CHAR(179),'EL:7,' Tipe : '); TEXTCOLOR(11); WRITE(TP:3);
WRITE(' '); TEXTCOLOR(10);
WRITE(CHAR(179));
GOTOXY(10,6);
WRITE(CHAR(195)); FOR I:=1 TO 59 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,7);
WRITE(CHAR(179),'No. Diameter Tulangan Pokok Diameter Tulangan';
'Senggang',CHAR(179));
GOTOXY(10,8);
WRITE(CHAR(179),' (Dp)--->mm (Ds)--->mm';
' ',CHAR(179));
GOTOXY(10,9);
WRITE(CHAR(195)); FOR I:=1 TO 59 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,10);
WRITE(CHAR(179)); FOR I:=1 TO 59 DO WRITE(CHAR(0)); WRITE(CHAR(179));
GOTOXY(10,11);
WRITE(CHAR(192)); FOR I:=1 TO 59 DO WRITE(CHAR(196)); WRITE(CHAR(217));
TEXTCOLOR(11);
GOTOXY(10,13); WRITE('Isikan No. = '); TEXTCOLOR(13); WRITE(0);
TEXTCOLOR(11); WRITE(' jika sudah selesai ... !');
GOTOXY(13,10); WRITE(U);
GOTOXY(13,10); READLN(U);
IF U<>0 THEN BEGIN
GOTOXY(26,10); READLN(DPB);
GOTOXY(54,10); READLN(DSB); END; TEXTCOLOR(10);
IF U<>0 THEN BEGIN
NOREC:=1; JUM:=FILESIZE(FBAHTUL);
WITH RECORDFDBT DO BEGIN
IF JUM<>0 THEN BEGIN
FOR I:=1 TO JUM DO BEGIN
SEEK(FBAHTUL,I-1); READ(FBAHTUL,RECORDFDBT);
IF (RECORDFDBT.TIPE=TP) AND (RECORDFDBT.N=U) THEN NOREC:=I-1; END;
IF NOREC=-1 THEN NOREC:=JUM; SEEK(FBAHTUL,NOREC); END;
TIPE:=TP; N:=U; DP:=DPB; DS:=DSB; WRITE(FBAHTUL,RECORDFDBT); END;
END; CLOSE(FBAHTUL);
Until U=0;
UNTIL TP=JTIPE;
END; CHDIR(DIRAK);
END.

```

```

PROGRAM DE;
USES CRT;
TYPE
  FELN = RECORD
    TIPE : INTEGER;
    NO : INTEGER;
    ELE : INTEGER;
  END;
VAR
  FTIPE : TEXT;
  FELE : FILE OF FELN;
  RECORDFELN : FELN;
  FELM,FTIP : STRING[12];
  Element,I,JTIPE,JUM,NOREC,J,TP : INTEGER;
  NFDA,EL : STRING[7];
  FTP,BEL,DIRAK,DIREK : STRING;

```

```

Begin
DIREK:=PARAMSTR(1); NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);FTP:=PARAMSTR(4);
BEL:=PARAMSTR(5); GETDIR(0,DIRAK); CHDIR(DIREK); FTIP:=NFDA+FTP;
ASSIGN(FTIPE,FTIP); {$I-} RESET(FTIPE); {$I+}
IF IORESULT=0 THEN BEGIN
READ(FTIPE,JTIPE); CLOSE(FTIPE); FELM:=NFDA+BEL; ASSIGN(FELE,FELM); TP:=0;
REPEAT
TP:=TP+1; {$I-} RESET(FELE); {$I+} IF IORESULT<>0 THEN REWRITE(FELE);
WITH RECORDFELN DO BEGIN I:=1;

```

```

Repeat
  TEXTCOLOR(10); TEXTBACKGROUND(0); CLRSCR; GOTOXY(10,2);
  WRITE(CHAR(218)); FOR J:=1 TO 52 DO WRITE(CHAR(196)); WRITE(CHAR(191));
  GOTOXY(10,3); WRITE(CHAR(179)); TEXTCOLOR(13);
  WRITE(' >>> DATA ELEMEN 'EL:7,' <<< ');
  TEXTCOLOR(10); WRITE(CHAR(179)); GOTOXY(10,4);
  WRITE(CHAR(195)); FOR J:=1 TO 52 DO WRITE(CHAR(196)); WRITE(CHAR(180));
  GOTOXY(10,5);
  WRITE(CHAR(179),'EL:7,' Tipe : '); TEXTCOLOR(11); WRITE(1P:3);
  WRITE(' '); TEXTCOLOR(10);
  WRITE(CHAR(179)); GOTOXY(10,6);
  WRITE(CHAR(195)); FOR J:=1 TO 52 DO WRITE(CHAR(196)); WRITE(CHAR(180));
  GOTOXY(10,7);
  WRITE(CHAR(179),' Masukan Elemen 'EL:7,' Yang Mempunyai Tipe Yg'.
  ' Sama 'CHAR(179));
  GOTOXY(10,8);
  WRITE(CHAR(179),'      No.      Elemen      ');
  ' 'CHAR(179));
  GOTOXY(10,9);
  WRITE(CHAR(195)); FOR J:=1 TO 52 DO WRITE(CHAR(196)); WRITE(CHAR(180));
  GOTOXY(10,10);
  WRITE(CHAR(179)); FOR J:=1 TO 52 DO WRITE(CHAR(0)); WRITE(CHAR(179));
  GOTOXY(10,11);
  WRITE(CHAR(192)); FOR J:=1 TO 52 DO WRITE(CHAR(196)); WRITE(CHAR(217));
  TEXTCOLOR(11); GOTOXY(10,13);
  WRITE(' Isikan No. = '); TEXTCOLOR(13); WRITE(0); TEXTCOLOR(11);
  WRITE(' jika sudah selesai ... !');
  GOTOXY(23,10); WRITE(1);
  GOTOXY(23,10); READLN(I);
  IF I<>0 THEN BEGIN
    GOTOXY(42,10); READLN(ELEMEN); NOREC:=-1; JUM:=FILESIZE(FELE);
    IF JUM<>0 THEN BEGIN
      FOR J:=1 TO JUM DO BEGIN
        SEEK(FELE,J-1); READ(FELE,RECORDFELN);
        IF (I=RECORDFELN.NO) AND (TP=RECORDFELN.TIPE) THEN NOREC:=J-1; END;
        IF NOREC=-1 THEN NOREC:=JUM; SEEK(FELE,NOREC); END;
        TIPE:=TP; NO:=I; ELE:=ELEMEN; WRITE(FELE,RECORDFELN); END; TEXTCOLOR(10);
      Until I=0;
    END; CLOSE(FELE);
    UNTIL TP=JTIPE;
  END; CHDIR(DIRAK);
END.

```

```

PROGRAM CDFO;
USES CRT,PRINTER;
TYPE
  FDAT = RECORD
    NPROY : string[19];
    NFDAT : string[8];
    NaFil : string[12];
    ENG : string[19];
  END;
  FDBN = RECORD
    TIPE : INTEGER;
    FCK : REAL;
    FCP : REAL;
    FY : REAL;
  END;
  FDBT = RECORD
    TIPE : INTEGER;
    N : INTEGER;
    DP : INTEGER;
  END;
  FDMN = RECORD
    TIPE : INTEGER;
    LP : REAL;
    T : REAL;
    PB : REAL;
    DF : REAL;
  END;

```

```

        BK : REAL;
        HK : REAL;
        DPK : INTEGER;
    END;
FGMS = RECORD
    TIPE : INTEGER;
    PU : REAL;
    Q : REAL;
    AKER : INTEGER;
END;
FELN = RECORD
    TIPE : INTEGER;
    NO : INTEGER;
    ELE : INTEGER;
END;

VAR
    FTIPE          : TEXT;
    FDATBAH        : FILE OF FDBN;
    FBAHTUL        : FILE OF FDBT;
    FGMAKS         : FILE OF FGMS;
    FDIM           : FILE OF FDMN;
    FELE           : FILE OF FELN;
    NFILE          : FILE OF FDAT;
    RECORDFDAT     : FDAT;
    RECORDFELN     : FELN;
    RECORDFDBN     : FDBN;
    RECORDFDBT     : FDBT;
    RECORDFGMS     : FGMS;
    RECORDFDMN     : FDMN;
    I,J,TIPE,JUM,NOREC,J,TP,DPMAXS,DSMAKS,
    NTUL,DPTUL,K,F,BATASATAS,BATASBAWAH,
    BATASKIRI,JUMLAHBARIS,BARIS,KERTAS,HAL,
    A,B,C,D        : Integer;
    YA             : CHAR;
    BENAR          : BOOLEAN;
    NFDA,EL        : STRING[7];
    FDB,FDT,FGM,FTIP,FDM,FELM : STRING[12];
    NPRO,EN        : STRING[19];
    FTP,BBN,BBT,BEL,BGM,BDD,DIRAK,DIREK : STRING;

PROCEDURE JUDUL;
BEGIN
    ASSIGN(NFILE,'FILEDATA.DAT'); RESET(NFILE);
    WHILE NOT EOF(NFILE) DO BEGIN
        READ(NFILE,RECORDFDAT);
        IF RECORDFDAT.NFDAT=NFDA THEN BEGIN
            NPRO:=RECORDFDAT.NPROY; EN:=RECORDFDAT.ENG; END;
        END;
        CLOSE(NFILE); HAL:=HAL+1; A:=LENGTH(NPRO); B:=LENGTH(NFDA);
        C:=LENGTH(EN); D:=LENGTH(EL);
        FOR J:=1 TO BATASATAS DO WRITELN(LST);
        FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(201));
        FOR J:=1 TO 65 DO WRITE(LST,CHAR(205)); WRITE(LST,CHAR(187));
        WRITELN(LST);
        FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(186),
        '      UII-CDP PROGRAM DISAIN ELEMEN STRUKTUR BETON      ',
        CHAR(186)); WRITELN(LST);
        FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(204));
        FOR J:=1 TO 65 DO WRITE(LST,CHAR(205)); WRITE(LST,CHAR(185));
        WRITELN(LST); FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(186),
        ' AUTHORITY : UII CIVIL ENGINEERING 1996  Data   : ',EL,D);
        FOR J:=1 TO (7-D) DO WRITE(LST,' '); WRITE(LST,' ',CHAR(186));
        WRITELN(LST); FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(186),
        ' Proyek   : ',NPRO:A); FOR J:=1 TO (19-A) DO WRITE(LST,' ');
        WRITE(LST,'      Halaman   : ',HAL:3,' ',CHAR(186));
        WRITELN(LST); FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(186),
        ' Perencana : ',EN:C); FOR J:=1 TO (19-C) DO WRITE(LST,' ');
        WRITE(LST,'      File Data : ',NFDA:B); FOR J:=1 TO (8-B) DO WRITE(LST,' ');
        WRITE(LST,' ',CHAR(186)); WRITELN(LST);
    END;

```

```

FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(200));
FOR J:=1 TO 65 DO WRITE(LST,CHAR(205)); WRITE(LST,CHAR(188)); I:=7;
WRITELN(LST);
END;

BEGIN
DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);FTP:=PARAMSTR(4);BBN:=PARAMSTR(5);
BBT:=PARAMSTR(6); BEL:=PARAMSTR(7); BGM:=PARAMSTR(8); BDD:=PARAMSTR(9);
GETDIR(0,DIREK); CHDIR(DIREK); FDM:=NFDA+BDD; ASSIGN(FDIM,FDM);
{$I-} RESET(FDIM); {$I+}
IF IORESULT=0 THEN BEGIN
CLOSE(FDIM); FGM:=NFDA+BGM; ASSIGN(FGMAKS,FGM);
{$I-} RESET(FGMAKS); {$I+}
IF IORESULT=0 THEN BEGIN
CLOSE(FGMAKS); FDT:=NFDA+BBT; ASSIGN(FBAHTUL,FDT);
{$I-} RESET(FBAHTUL); {$I+}
IF IORESULT=0 THEN BEGIN
CLOSE(FBAHTUL); FDB:=NFDA+BBN; ASSIGN(FDATBAH,FDB);
{$I-} RESET(FDATBAH); {$I+}
IF IORESULT=0 THEN BEGIN
CLOSE(FDATBAH); FELM:=NFDA+BEL; ASSIGN(FELE,FELM);
{$I-} RESET(FELE); {$I+}
IF IORESULT=0 THEN BEGIN
CLOSE(FELE); YA:=U; HAL:=0; BATASATAS:=0; BATASBAWAH:=0; BATASKIRI:=0;
WHILE UPCASE(YA)=U DO BEGIN
TEXTBACKGROUND(0); TEXTCOLOR(10); CLRSCR;
GOTOXY(10,2); WRITE(CHAR(218));
FOR I:=1 TO 50 DO WRITE(CHAR(196)); WRITE(CHAR(191));
GOTOXY(10,3);
WRITE(CHAR(179),'Ukuran Kertas : '); TEXTCOLOR(11); WRITE('1');
TEXTCOLOR(10); WRITE('Folio '); TEXTCOLOR(11); WRITE('2');
TEXTCOLOR(10); WRITE('Kuarto '); TEXTCOLOR(11);
WRITE('--> Pilih : '); TEXTCOLOR(10); WRITE(CHAR(179));
GOTOXY(10,4);
WRITE(CHAR(179),'Batas Atas : ');
' ',CHAR(179));
GOTOXY(10,5);
WRITE(CHAR(179),'Batas Bawah : ');
' ',CHAR(179));
GOTOXY(10,6);
WRITE(CHAR(179),'Batas Kiri : ');
' ',CHAR(179));
GOTOXY(10,7);
WRITE(CHAR(192)); FOR I:=1 TO 50 DO WRITE(CHAR(196));
WRITE(CHAR(217)); TEXTCOLOR(11);
GOTOXY(10,9); WRITE('U : ulang I : lanjutkan ==> ');
GOTOXY(29,4); WRITE('Baris'); GOTOXY(29,5); WRITE('Baris');
GOTOXY(29,6); WRITE('Spasi'); GOTOXY(59,3); READLN(KERTAS);
GOTOXY(26,4); READLN(BATASATAS); GOTOXY(26,5); READLN(BATASBAWAH);
GOTOXY(26,6); READLN(BATASKIRI); BENAR:=TRUE;
WHILE BENAR DO BEGIN
GOTOXY(42,9); YA:=READKEY; WRITE(YA);
IF UPCASE(YA)=U THEN BENAR:=FALSE;
IF UPCASE(YA)=L THEN BENAR:=FALSE; END; TEXTCOLOR(10); END;
IF KERTAS=1 THEN JUMLAHBARIS:=71; IF KERTAS=2 THEN JUMLAHBARIS:=65;
BARIS:=JUMLAHBARIS-BATASATAS-BATASBAWAH; HAL:=0; K:=1;
F:=1; JUDUL; RESET(FDATBAH);
WHILE NOT EOF(FDATBAH) DO BEGIN
SEEK(FDATBAH,F-1); READ(FDATBAH,RECORDFDBN); F:=F+1;
WITH RECORDFDBN DO BEGIN
IF (K=1) THEN BEGIN
IF (BARIS-I)<=6 THEN FOR J:=1 TO (BARIS-I) DO WRITELN(LST); I:=I+6;
IF I>=BARIS THEN BEGIN FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(218));
FOR J:=1 TO 63 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(191));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179);
' >>> DATA BAHAN <<<',
' ',CHAR(179)); WRITELN(LST);

```

```

FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 63 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'Tipe Teg. Desak Beton Teg. Desak Beton Tegangan Tarik',
'Baja ',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'Pond. Kolom (MPa) Pond. (MPa) (MPa)',
',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 63 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST); END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
',TIPE:3,' ',TRUNC(FCK):3,' ',
TRUNC(FCP):3,' ',TRUNC(FY):6,' ',
CHAR(179)); WRITELN(LST); K:=K+1; I:=I+1;
IF (I>=BARIS) OR EOF(FDATBAH) THEN BEGIN
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(192));
FOR J:=1 TO 63 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(217));
WRITELN(LST); K:=1; I:=I+1; END;
IF I>=BARIS THEN BEGIN
K:=1; FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END; END;
END; CLOSE(FDATBAH); F:=1; RESET (FBAHTUL);
WHILE NOT EOF(FBAHTUL) DO BEGIN
SEEK(FBAHTUL,F-1); READ(FBAHTUL,RECORDFDBT); F:=F+1;
WITH RECORDFDBT DO BEGIN
IF (K=1) THEN BEGIN
IF (BARIS-I)<=6 THEN FOR J:=1 TO (BARIS-I) DO WRITELN(LST); I:=I+6;
IF I>=BARIS THEN BEGIN FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(218));
FOR J:=1 TO 47 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(191));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'>>> DIAMETER TULANGAN YANG AKAN DIGUNAKAN <<<',CHAR(179));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 47 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'Tipe No. Diameter Tulangan Pokok ', CHAR(179));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'Pondasi (mm) ', CHAR(179));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 47 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST); END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
',TIPE:3,' ',N:2,' ',DP:2,
',CHAR(179)); WRITELN(LST); K:=K+1; I:=I+1;
IF (I>=BARIS) OR EOF(FBAHTUL) THEN
BEGIN
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(192));
FOR J:=1 TO 47 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(217));
WRITELN(LST); K:=1; I:=I+1; END;
IF I>=BARIS THEN BEGIN
K:=1; FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END; END;
END; CLOSE(FBAHTUL); F:=1; RESET(FELE);
WHILE NOT EOF(FELE) DO BEGIN
SEEK(FELE,F-1); READ(FELE,RECORDFELN); F:=F+1;
WITH RECORDFELN DO BEGIN
IF K=1 THEN BEGIN
IF (BARIS-I)<=6 THEN FOR J:=1 TO (BARIS-I) DO WRITELN(LST); I:=I+5;
IF I>=BARIS THEN BEGIN FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(218));
FOR J:=1 TO 29 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(191));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'>>> DATA ELEMEN ',EL:7,' <<<',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));

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FOR J:=1 TO 29 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'Tipe No. Elemen ',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 29 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST); END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
',TIPE:3, ',NO:2, ',ELE:3, ',CHAR(179));
WRITELN(LST); K:=K+1; I:=I+1;
IF (I>=BARIS) OR EOF(FELE) THEN BEGIN
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(192));
FOR J:=1 TO 29 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(217));
WRITELN(LST); K:=1; I:=I+1; END;
IF I>=BARIS THEN BEGIN
K:=1; FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END; END;
END; CLOSE(FELE); F:=1; RESET(FDIM);
WHILE NOT EOF(FDIM) DO BEGIN
SEEK(FDIM,F-1); READ(FDIM,RECORDFDIMN); F:=F+1;
WITH RECORDFDIMN DO BEGIN
IF K=1 THEN BEGIN
IF (BARIS-I)<=6 THEN FOR J:=1 TO (BARIS-I) DO WRITELN(LST); I:=I+6;
IF I>=BARIS THEN BEGIN FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(218));
FOR J:=1 TO 54 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(191));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
' >>> DATA DIMENSI <<< ',
CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 54 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'Tipe Panjang Tebal Plat Kedalaman Penutup Beton ',
CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
' Pond. (mm) (mm) (mm) (mm) ',
CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 54 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST); END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
',TIPE:3, ',TRUNC(LP):5, ',TRUNC(T):4, ',
TRUNC(DF):5, ',TRUNC(PB):3, ',CHAR(179));
WRITELN(LST); K:=K+1; I:=I+1;
IF (I>=BARIS) OR EOF(FDIM) THEN BEGIN
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(192));
FOR J:=1 TO 54 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(217));
WRITELN(LST); K:=1; I:=I+1; END;
IF I>=BARIS THEN BEGIN
K:=1; FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END; END;
END; CLOSE(FDIM); F:=1; RESET(FGMAKS);
WHILE NOT EOF(FGMAKS) DO BEGIN
SEEK(FGMAKS,F-1); READ(FGMAKS,RECORDFGMS); F:=F+1;
WITH RECORDFGMS DO BEGIN
IF K=1 THEN BEGIN
IF (BARIS-I)<=6 THEN FOR J:=1 TO (BARIS-I) DO WRITELN(LST); I:=I+6;
IF I>=BARIS THEN BEGIN FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(218));
FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(191));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
' >>> DATA GAYA-GAYA MAKSIMUM <<< ',
CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'Tipe Gaya Aksial Kolom Tegangan Izin Arah Kerja ',
CHAR(179)); WRITELN(LST);

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FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
' Pond. (N) (kPa) ',
CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(195));
FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(180));
WRITELN(LST); END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
'TIPE:3,' 'PU:8,' 'Q:8,' 'AKER,
'Arah ',CHAR(179)); WRITELN(LST); K:=K+1; I:=I+1;
IF (I>=BARIS) OR EOF(FGMAKS) THEN BEGIN
FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(192));
FOR J:=1 TO 51 DO WRITE(LST,CHAR(196)); WRITE(LST,CHAR(217));
WRITELN(LST); I:=I+1; K:=1; END;
IF (I>=BARIS) THEN BEGIN
K:=1; FOR J:=1 TO BATASBAWAH DO WRITELN(LST); JUDUL; END; END;
END; CLOSE(FGMAKS);
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11);
GOTOXY(20,10); WRITE('DATA ELEMEN BELUM DIBUAT...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11);
GOTOXY(20,10); WRITE('DATA BAHAN BELUM DIBUAT...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
WRITE('DATA TULANGAN YG AKAN DIGUNAKAN BELUM DIBUAT...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
WRITE('DATA GAYA YG BEKERJA PADA BALOK BELUM DIBUAT...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11);
GOTOXY(20,10); WRITE('DATA DIMENSI BALOK BELUM DIBUAT...!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END; CHDIR(DIRAK);
END.

```

```

PROGRAM CPON;
USES CRT,PRINTER;
TYPE
  FDAT = RECORD
    NPROY : string[19];
    NFDAT : string[8];
    NaFil : string[12];
    ENG : string[19];
  END;
  FKLM = RECORD
    TIPE : INTEGER;
    FBP : INTEGER;
    FLP : INTEGER;
    FT : INTEGER;
    FDP : INTEGER;
    FSP : INTEGER;
    FDL : INTEGER;
    FSL : INTEGER;
    FND : INTEGER;
    FDD : INTEGER;
    FLD : INTEGER;
    FJB : INTEGER;
    FSISA: INTEGER;
  END;
VAR
  FPONDASI : FILE OF FKLM;

```

```

NFILE          : FILE OF FDAT;
RECORDFDAT     : FDAT;
RECORDFPON     : FKLM;
I,JUM,I,BATASATAS,BATASBAWAH,
BARIS,JUMLAHBARIS,HAL,BATASKIRI,A,
B,C,D          : INTEGER;
BENAR          : BOOLEAN;
KERTAS         : BYTE;
YA             : CHAR;
NFDA,EL       : STRING[7];
FBK            : STRING[12];
NPRO,EN       : STRING[19];
BLK,DIRAK,DIREK : STRING;

```

BEGIN

```

DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);BLK:=PARAMSTR(4);
GETDIR(0,DIRAK); CHDIR(DIREK); ASSIGN(NFILE,'FILEDATA.DAT'); RESET(NFILE);
WHILE NOT EOF(NFILE) DO BEGIN
  READ(NFILE,RECORDFDAT);
  IF RECORDFDAT.NFDAT=NFDA THEN BEGIN
    NPRO:=RECORDFDAT.NPROY; EN :=RECORDFDAT.ENG; END;
  END; CLOSE(NFILE); FBK:=NFDA+BLK; ASSIGN(FPONDASI,FBK);
  {$I-} RESET(FPONDASI); {$I+}
  IF IORESULT=0 THEN BEGIN YA:='U';
  WHILE UPCASE(YA)='U' DO BEGIN
    TEXTBACKGROUND(0); TEXTCOLOR(10); CLRSCR;
    GOTOXY(10,2);
    WRITE(CHAR(218)); FOR I:=1 TO 50 DO WRITE(CHAR(196)); WRITE(CHAR(191));
    GOTOXY(10,3); WRITE(CHAR(179),' Ukuran Kertas : '); TEXTCOLOR(11); WRITE('1');
    TEXTCOLOR(10); WRITE(' Folio '); TEXTCOLOR(11); WRITE('2');
    TEXTCOLOR(10); WRITE(' Kuarto '); TEXTCOLOR(11);
    WRITE('--> Pilih : '); TEXTCOLOR(10); WRITE(CHAR(179));
    GOTOXY(10,4);
    WRITE(CHAR(179),' Batas Atas : '); CHAR(179));
    GOTOXY(10,5);
    WRITE(CHAR(179),' Batas Bawah : '); CHAR(179));
    GOTOXY(10,6);
    WRITE(CHAR(179),' Batas Kiri : '); CHAR(179));
    GOTOXY(10,7);WRITE(CHAR(192)); FOR I:=1 TO 50 DO WRITE(CHAR(196)); WRITE(CHAR(217));
    TEXTCOLOR(11); GOTOXY(10,9); WRITE(' U : ulang L : lanjutkan ==> ');
    GOTOXY(29,4); WRITE('Baris'); GOTOXY(29,5); WRITE('Baris');
    GOTOXY(29,6); WRITE('Spasi'); GOTOXY(59,3); READLN(KERTAS);
    GOTOXY(26,4); READLN(BATASATAS); GOTOXY(26,5); READLN(BATASBAWAH);
    GOTOXY(26,6); READLN(BATASKIRI); BENAR:=TRUE;
    WHILE BENAR DO BEGIN
      GOTOXY(42,9); YA:=READKEY; WRITE(YA);IF UPCASE(YA)='U' THEN BENAR:=FALSE;
      IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10);END;
    IF KERTAS=1 THEN JUMLAHBARIS:=63;IF KERTAS=2 THEN JUMLAHBARIS:=57;
    BARIS:=JUMLAHBARIS-BATASATAS-BATASBAWAH; I:=1; HAL:=0;
    WHILE NOT EOF(FPONDASI) DO BEGIN
      CLRSCR; TEXTCOLOR(11);
      GOTOXY(20,10);
      WRITE('MENCETAK HASIL DISAIN.....'); TEXTCOLOR(11); WRITE(I);
      TEXTCOLOR(10);
      WITH RECORDFPON DO BEGIN
        READ(FPONDASI,RECORDFPON);
        IF I=1 THEN BEGIN
          A:=LENGTH(NPRO); B:=LENGTH(NFDA); C:=LENGTH(EN); D:=LENGTH(EL);
          FOR J:=1 TO BATASATAS DO BEGIN WRITELN(LST); END; HAL:=HAL+1;
          FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
          WRITE(LST,CHAR(218)); FOR J:=1 TO 58 DO WRITE(LST,CHAR(196));
          WRITE(LST,CHAR(191)); WRITELN(LST);
          FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
          ' UII-CDP PROGRAM DISAIN ELEMEN STRUKTUR BETON ',
          CHAR(179)); WRITELN(LST); FOR J:=1 TO BATASKIRI DO WRITE(LST,' ');
          WRITE(LST,CHAR(195)); FOR J:=1 TO 58 DO WRITE(LST,CHAR(196));
          WRITE(LST,CHAR(180)); WRITELN(LST);
          FOR J:=1 TO BATASKIRI DO WRITE(LST,' '); WRITE(LST,CHAR(179),
          ' AUTHORITY : UII CIVIL ENGINEERING 1996 Disain : ',EL,D);
          FOR J:=1 TO (7-D) DO WRITE(LST,' '); WRITE(LST,' ',CHAR(179)); WRITELN(LST);

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FOR J:=1 TO BATASKIRI DO WRITE(LST,'');
WRITE(LST,CHAR(179),' Proyek : ',NPRO:A); FOR J:=1 TO (19-A) DO WRITE(LST,'');
WRITE(LST,' Halaman : ',HAL:3,' ',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,''); WRITE(LST,CHAR(179),
' Perencana : ',EN:C); FOR J:=1 TO (19-C) DO WRITE(LST,'');
WRITE(LST,' File Data : ',NFDA:B); FOR J:=1 TO (8-B) DO WRITE(LST,'');
WRITE(LST,' ',CHAR(179)); WRITELN(LST); FOR J:=1 TO BATASKIRI DO WRITE(LST,'');
WRITE(LST,CHAR(195)); FOR J:=1 TO 7 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(194)); FOR J:=1 TO 12 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(194)); FOR J:=1 TO 12 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(194)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(194)); FOR J:=1 TO 13 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(180)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,'');
WRITE(LST,CHAR(179),' TIPE ',CHAR(179),' TULANGAN ',CHAR(179),
' TULANGAN ',CHAR(179),' TULANGAN ',CHAR(179),
' UKURAN ',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,'');
WRITE(LST,CHAR(179),'PONDASI',CHAR(179),' ARAH LEBAR ',CHAR(179),
' ARAH PANJANG',CHAR(179),' PASAK ',CHAR(179),
' PONDASI ',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,'');
WRITE(LST,CHAR(195)); FOR J:=1 TO 7 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(197)); FOR J:=1 TO 12 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(197)); FOR J:=1 TO 12 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(197)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(197)); FOR J:=1 TO 13 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(180)); WRITELN(LST); END;
FOR J:=1 TO BATASKIRI DO WRITE(LST,'');
WRITE(LST,CHAR(179),' ',TIPE:3,' ',CHAR(179),' D',FDP:2,' ',FSP:3,
'mm',CHAR(179),' D',FDL:2,' ',FSL:3,'mm',CHAR(179),' ',
FND:2,'D',FDD:2,' ',CHAR(179),FBP:4,'mmx',FLP:4,'mm',CHAR(179));
WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,'');
WRITE(LST,CHAR(179),' ',CHAR(179),'MERATA DALAM',
CHAR(179),' ',CHAR(179),'PANJANG ',CHAR(179),
'TEBAL PLAT ',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,'');
WRITE(LST,CHAR(179),' ',CHAR(179),'RENTANG ',FBP:4,CHAR(179),
' ',CHAR(179),'PENYALURAN',CHAR(179),'KAKI = ',
FT:4,'mm',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,'');
WRITE(LST,CHAR(179),' ',CHAR(179),'FSISA:2,' MERATA DI',CHAR(179),
' ',CHAR(179),'Ld =',FLD:4,'mm',CHAR(179),
' ',CHAR(179)); WRITELN(LST);
FOR J:=1 TO BATASKIRI DO WRITE(LST,'');
WRITE(LST,CHAR(179),' ',CHAR(179),'LUAR RENTANG',
CHAR(179),' ',CHAR(179),' ',CHAR(179),
' ',CHAR(179)); WRITELN(LST); I:=I+5;
IF (I>=BARIS) OR EOF(FPONDASI) THEN BEGIN I:=1;
FOR J:=1 TO BATASKIRI DO WRITE(LST,'');
WRITE(LST,CHAR(192)); FOR J:=1 TO 7 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(193)); FOR J:=1 TO 12 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(193)); FOR J:=1 TO 12 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(193)); FOR J:=1 TO 10 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(193)); FOR J:=1 TO 13 DO WRITE(LST,CHAR(196));
WRITE(LST,CHAR(217)); WRITELN(LST);
IF I=BARIS THEN FOR J:=1 TO BATASBAWAH DO WRITELN(LST):END:END;
END; CLOSE(FPONDASI);END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,5);
WRITE(' PROSES DISAIN BELUM DILAKUKAN');
GOTOXY(15,7); WRITE('Tekan "SEMBARANG TOMBOL" Untuk Melanjutkan.....!');
WRITE('G'); READKEY; TEXTCOLOR(10); END; CHDIR(DIRAK);
END.

```

```

PROGRAM DDPO;
USES CRT;
TYPE

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```

FDMN = RECORD
  TIPE : INTEGER;
  LP : REAL;
  T : REAL;
  PB : REAL;
  DF : REAL;
  BK : REAL;
  HK : REAL;
  DPK : INTEGER;
END;

VAR
  FTIPE : TEXT;
  FDM : FILE OF FDMN;
  RECORDFDMN : FDMN;
  I, JTIPE, JUM, NOREC, TP, DPKB : INTEGER;
  LPB, TB, HKB, BKB, PBB, DFB : REAL;
  BENAR : BOOLEAN;
  ya : CHAR;
  NFDA, EL : STRING[7];
  FTIP, FDM : STRING[12];
  FTP, BDD, DIRAK, DIREK : STRING;

BEGIN
  DIREK:=PARAMSTR(1); NFDA:=PARAMSTR(2); EL:=PARAMSTR(3); FTIP:=PARAMSTR(4);
  BDD:=PARAMSTR(5); GETDIR(0, DIRAK); CHDIR(DIREK); FTIP:=NFDA+FTIP;
  ASSIGN(FTIPE, FTIP); {$I-} RESET(FTIPE); {$I+}
  IF IORESULT=0 THEN BEGIN
    READ(FTIPE, JTIPE); CLOSE(FTIPE); TP:=0;
    REPEAT
      TP:=TP+1; YA:='U';
      WHILE UPCASE(YA)='U' DO BEGIN
        TEXTCOLOR(10); TEXTBACKGROUND(0); CLRSCR;
        GOTOXY(10,2);
        WRITE(CHAR(218)); FOR I:=1 TO 44 DO WRITE(CHAR(196)); WRITE(CHAR(191));
        GOTOXY(10,3);
        WRITE(CHAR(179)); TEXTCOLOR(13);
        WRITE(' >>> DATA DIMENSI <<< ');
        TEXTCOLOR(10); WRITE(CHAR(179));
        GOTOXY(10,4);
        WRITE(CHAR(195)); FOR I:=1 TO 44 DO WRITE(CHAR(196)); WRITE(CHAR(180));
        GOTOXY(10,5);
        WRITE(CHAR(179), ' ,EL:7, Tipe : '); TEXTCOLOR(11); WRITE(TP:3);
        WRITE(' '); TEXTCOLOR(10);
        WRITE(CHAR(179));
        GOTOXY(10,6);
        WRITE(CHAR(195)); FOR I:=1 TO 44 DO WRITE(CHAR(196)); WRITE(CHAR(180));
        GOTOXY(10,7);
        WRITE(CHAR(179), ' Panjang Tebal Plat Kaki Penutup Beton ');
        CHAR(179));
        GOTOXY(10,8);
        WRITE(CHAR(179), ' (L)--->mm (t)--->mm (Pb)--->mm ');
        CHAR(179));
        GOTOXY(10,9);
        WRITE(CHAR(195)); FOR I:=1 TO 44 DO WRITE(CHAR(196)); WRITE(CHAR(180));
        GOTOXY(10,10);
        WRITE(CHAR(179)); FOR I:=1 TO 44 DO WRITE(CHAR(0)); WRITE(CHAR(179));
        GOTOXY(10,11);
        WRITE(CHAR(192)); FOR I:=1 TO 44 DO WRITE(CHAR(196)); WRITE(CHAR(217));
        TEXTCOLOR(11);
        GOTOXY(10,13); WRITE(' U : ulang L : lanjutkan ==> ');
        GOTOXY(15,10); READLN(LP);
        GOTOXY(29,10); READLN(TB);
        GOTOXY(46,10); READLN(PBB); BENAR:=TRUE;
        WHILE BENAR DO BEGIN
          GOTOXY(42,13); YA:=READKEY; WRITE(YA);
          IF UPCASE(YA)='U' THEN BENAR:=FALSE;
          IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10);
        END; YA:='U';
        WHILE UPCASE(YA)='U' DO BEGIN CLRSCR;
          GOTOXY(10,2);

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```

WRITE(CHAR(218)); FOR I:=1 TO 61 DO WRITE(CHAR(196)); WRITE(CHAR(191));
GOTOXY(10,3);
WRITE(CHAR(179)); TEXTCOLOR(13);
WRITE('          >>> DATA DIMENSI <<<          ');
TEXTCOLOR(10); WRITE(CHAR(179));
GOTOXY(10,4);
WRITE(CHAR(195)); FOR I:=1 TO 61 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,5);
WRITE(CHAR(179),' ,EL:7,' Tipe : '); TEXTCOLOR(11); WRITE(TP:3);
WRITE('          '); TEXTCOLOR(10);
WRITE(CHAR(179));
GOTOXY(10,6);
WRITE(CHAR(195)); FOR I:=1 TO 61 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,7);
WRITE(CHAR(179),' Kedalaman Lebar Penampang Tinggi Penampang Dime',
ter Tul. ',CHAR(179));
GOTOXY(10,8);
WRITE(CHAR(179),' Pondasi      Kolom      Kolom      Poko'.
k Kolom ',CHAR(179));
GOTOXY(10,9);
WRITE(CHAR(179),' (Df)--->mm (Bk)--->mm (Hk)--->mm (Dpk',
')--->mm ',CHAR(179));
GOTOXY(10,10);
WRITE(CHAR(195)); FOR I:=1 TO 61 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,11);
WRITE(CHAR(179)); FOR I:=1 TO 61 DO WRITE(CHAR(0)); WRITE(CHAR(179));
GOTOXY(10,12);
WRITE(CHAR(192)); FOR I:=1 TO 61 DO WRITE(CHAR(196)); WRITE(CHAR(217));
TEXTCOLOR(11);
GOTOXY(10,14); WRITE(' U : ulang L : lanjutkan ==> ');
GOTOXY(16,11); READLN(DFB);
GOTOXY(30,11); READLN(BKB);
GOTOXY(48,11); READLN(HKB);
GOTOXY(64,11); READLN(DPKB); BENAR:=TRUE;
WHILE BENAR DO BEGIN
GOTOXY(42,14); YA:=READKEY; WRITE(YA);
IF UPCASE(YA)='U' THEN BENAR:=FALSE;
IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10);
END;
FDM:=NFDA+BDD; ASSIGN(FDIM,FDM); {$I-} RESET(FDIM); {$I+}
IF IORESULT<>0 THEN REWRITE(FDIM); NOREC:=-1; JUM:=FILESIZE(FDIM);
WITH RECORDFDMN DO BEGIN
IF JUM<>0 THEN BEGIN
FOR I:=1 TO JUM DO BEGIN
SEEK(FDIM,I-1); READ(FDIM,RECORDFDMN);
IF RECORDFDMN.TIPE=TP THEN NOREC:=I-1; END;
IF NOREC=-1 THEN NOREC:=JUM; SEEK(FDIM,NOREC); END;
TIPE:=TP; LP:=LPB; T:=TB; DF:=DFB; BK:=BKB; HK:=HKB; DPK:=DPKB;
PB:=PBB; WRITE(FDIM,RECORDFDMN);
END; CLOSE(FDIM);
UNTIL TP=JTIPE;
END; CHDIR(DIRAK);
END.

```

```

PROGRAM DBP;
USES CRT;
TYPE
  FDBN = RECORD
    TIPE : INTEGER;
    FCK : REAL;
    FCP : REAL;
    FY : REAL;
  END;
  FDBT = RECORD
    TIPE : INTEGER;
    N : INTEGER;
    DP : INTEGER;
  END;
VAR

```

```

FTIPE          : TEXT;
FDATBAH        : FILE OF FDBN;
FBAHTUL        : FILE OF FDBT;
RECORDFDBN     : FDBN;
RECORDFDBT     : FDBT;
I,J,TIPE,JUM,NOREC,TP,DPB,U : INTEGER;
FKB,FPB,FYB    : REAL;
YA             : CHAR;
BENAR          : BOOLEAN;
NFDA,EL        : STRING[7];
FDB,FDT,FTIP   : STRING[12];
FTP,BBN,BBT,DIRAK,DIREK : STRING;

```

Begin

```

DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);FTP:=PARAMSTR(4);
BBN:=PARAMSTR(5); BBT:=PARAMSTR(6); GETDIR(0,DIRAK); CHDIR(DIREK);
FTIP:=NFDA+FTP; ASSIGN(FTIPE,FTIP); {$I-} RESET(FTIPE); {$I+}
IF IORESULT=0 THEN BEGIN
  READ(FTIPE,JIPE); CLOSE(FTIPE); TP:=0;
  REPEAT
    TP:=TP+1; YA:='U'; FDB:=NFDA+BBN; ASSIGN(FDATBAH,FDB); {$I-} RESET(FDATBAH); {$I+}
    IF IORESULT<>0 THEN REWRITE(FDATBAH);
    WHILE UPCASE(YA)='U' DO BEGIN
      TEXTCOLOR(10); TEXTBACKGROUND(0); CLRSCR;
      GOTOXY(10,2);
      WRITE(CHAR(218)); FOR I:=1 TO 59 DO WRITE(CHAR(196)); WRITE(CHAR(191));
      GOTOXY(10,3);
      WRITE(CHAR(179)); TEXTCOLOR(13);
      WRITE('          >>> DATA BAHAN <<<          ');
      TEXTCOLOR(10); WRITE(CHAR(179));
      GOTOXY(10,4);
      WRITE(CHAR(195)); FOR I:=1 TO 59 DO WRITE(CHAR(196)); WRITE(CHAR(180));
      GOTOXY(10,5);
      WRITE(CHAR(179),' ,EL:7, 'Tipe : '); TEXTCOLOR(11); WRITE(TP:3);
      WRITE('          '); TEXTCOLOR(10);
      WRITE(CHAR(179));
      GOTOXY(10,6);
      WRITE(CHAR(195)); FOR I:=1 TO 59 DO WRITE(CHAR(196)); WRITE(CHAR(180));
      GOTOXY(10,7);
      WRITE(CHAR(179),' Teg. Desak Beton   Teg. Desak Beton   Teg. Tarik';
      ' Baja ',CHAR(179));
      GOTOXY(10,8);
      WRITE(CHAR(179),' Kolom--->MPa   Pondasi--->MPa   (Fy)--->';
      'MPa ',CHAR(179));
      GOTOXY(10,9);
      WRITE(CHAR(195)); FOR I:=1 TO 59 DO WRITE(CHAR(196)); WRITE(CHAR(180));
      GOTOXY(10,10);
      WRITE(CHAR(179)); FOR I:=1 TO 59 DO WRITE(CHAR(0)); WRITE(CHAR(179));
      GOTOXY(10,11);
      WRITE(CHAR(192)); FOR I:=1 TO 59 DO WRITE(CHAR(196)); WRITE(CHAR(217));
      TEXTCOLOR(11);
      GOTOXY(10,13); WRITE(' U : ulang L : lanjutkan ===> ');
      GOTOXY(19,10); READLN(FKB);
      GOTOXY(41,10); READLN(FPB);
      GOTOXY(60,10); READLN(FYB); BENAR:=TRUE;
      WHILE BENAR DO BEGIN
        GOTOXY(42,13); YA:=READKEY; WRITE(YA);
        IF UPCASE(YA)='U' THEN BENAR:=FALSE;
        IF UPCASE(YA)='L' THEN BENAR:=FALSE; END; TEXTCOLOR(10); END;
      NOREC:=-1; JUM:=FILESIZE(FDATBAH);
      WITH RECORDFDBN DO BEGIN
        IF JUM<>0 THEN BEGIN
          FOR I:=1 TO JUM DO BEGIN
            SEEK(FDATBAH,I-1); READ(FDATBAH,RECORDFDBN);
            IF RECORDFDBN.TIPE=TP THEN NOREC:=I-1; END;
            IF NOREC=-1 THEN NOREC:=JUM; SEEK(FDATBAH,NOREC); END;
            TIPE:=TP; FCK:=FKB; FCP:=FPB; FY:=FYB; WRITE(FDATBAH,RECORDFDBN); END;
          CLOSE(FDATBAH); U:=1;
        Repeat
          FDT:=NFDA+BBT; ASSIGN(FBAHTUL,FDT); {$I-} RESET(FBAHTUL); {$I+}

```

```

IF IORESULT<>0 THEN REWRITE(FBAHTUL); CLRSCR; GOTOXY(10,2);
WRITE(CHAR(218)); FOR I:=1 TO 47 DO WRITE(CHAR(196)); WRITE(CHAR(191));
GOTOXY(10,3);
WRITE(CHAR(179)); TEXTCOLOR(13);
WRITE(' >>> DIAMETER TULANGAN YANG AKAN DIGUNAKAN <<< ');
TEXTCOLOR(10); WRITE(CHAR(179));
GOTOXY(10,4);
WRITE(CHAR(195)); FOR I:=1 TO 47 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,5);
WRITE(CHAR(179),' EL:7,' Tipe : '); TEXTCOLOR(11); WRITE(TP:3);
WRITE(' '); TEXTCOLOR(10);
WRITE(CHAR(179));
GOTOXY(10,6);
WRITE(CHAR(195)); FOR I:=1 TO 47 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,7);
WRITE(CHAR(179),' No.           Diameter Tulangan Pokok ');
WRITE(CHAR(179));
GOTOXY(10,8);
WRITE(CHAR(179),'           (Dp)--->mm           ');
WRITE(CHAR(179));
GOTOXY(10,9);
WRITE(CHAR(195)); FOR I:=1 TO 47 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,10);
WRITE(CHAR(179)); FOR I:=1 TO 47 DO WRITE(CHAR(0)); WRITE(CHAR(179));
GOTOXY(10,11);
WRITE(CHAR(192)); FOR I:=1 TO 47 DO WRITE(CHAR(196)); WRITE(CHAR(217));
TEXTCOLOR(11);
GOTOXY(10,13); WRITE(' Isikan No. = '); TEXTCOLOR(13); WRITE('0');
TEXTCOLOR(11); WRITE(' jika sudah selesai ... !');
GOTOXY(13,10); WRITE(U);
GOTOXY(13,10); READLN(U);
IF U<>0 THEN BEGIN
GOTOXY(43,10); READLN(DPB); END; TEXTCOLOR(10);
IF U<>0 THEN BEGIN
NOREC:=1; JUM:=FILESIZE(FBAHTUL);
WITH RECORDFDBT DO BEGIN
IF JUM<>0 THEN BEGIN
FOR I:=1 TO JUM DO BEGIN
SEEK(FBAHTUL,I-1); READ(FBAHTUL,RECORDFDBT);
IF (RECORDFDBT.TIPE=TP) AND (RECORDFDBT.N=U) THEN NOREC:=I-1; END;
IF NOREC=-1 THEN NOREC:=JUM; SEEK(FBAHTUL,NOREC); END;
TIPE:=TP; N:=U; DP:=DPB; WRITE(FBAHTUL,RECORDFDBT); END;
END; CLOSE(FBAHTUL);
Until U=0;
UNTIL TP=JTIPE;
END; CHDIR(DIRAK);
END.

```

```

PROGRAM GPO;
USES CRT;
TYPE
  FELN = RECORD
    TIPE : INTEGER;
    NO   : INTEGER;
    ELE  : INTEGER;
  END;
  FGMS = RECORD
    TIPE : INTEGER;
    PU   : REAL;
    Q    : REAL;
    AKER : INTEGER;
  END;
  FDMC = RECORD
    ELEM : INTEGER;
    SEC  : REAL;
    AX   : REAL;
    SHE  : REAL;
    MOM  : REAL;
  END;

```



```

VAR
FTIPE                                : TEXT;
FELE                                : FILE OF FELN;
FGMAKS                               : FILE OF FGMS;
FMICRO                               : FILE OF FDMC;
RECORDFELN                          : FELN;
RECORDFGMS                          : FGMS;
RECORDFDMC                          : FDMC;
Elemen,I,JIPE,JUM,NOREC,TP,AKERB : INTEGER;
PUS,PUB,QB                          : REAL;
YA                                  : CHAR;
BENAR                               : BOOLEAN;
NFDA,EL                             : STRING[7];
FBC,FELM,FGM,FTIP                  : STRING[12];
FTP,BEL,BGM,DIRAK,DIREK            : STRING;

Begin
DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);FTP:=PARAMSTR(4);
BEL:=PARAMSTR(5);BGM:=PARAMSTR(6);GETDIR(0,DIRAK);CHDIR(DIREK);
FTIP:=NFDA+FTP;ASSIGN(FTIPE,FTIP);{$I-}RESET(FTIPE);{$I+}
IF IORESULT=0 THEN BEGIN
READ(FTIPE,JIPE);CLOSE(FTIPE);TP:=0;
REPEAT
TP:=TP+1;PUB:=0;PUS:=0;FELM:=NFDA+BEL;ASSIGN(FELM,FELM);
{$I-}RESET(FELE);{$I+}
IF IORESULT=0 THEN BEGIN
WHILE NOT EOF(FELE) DO Begin
WITH RECORDFELN DO BEGIN
READ(FELE,RECORDFELN);ELEMEN:=RECORDFELN.ELEM;
IF TIPE = TP THEN BEGIN
FBC:=NFDA+'.DMC';ASSIGN(FMICRO,FBC);Reset(FMICRO);
While Not Eof(FMICRO) Do Begin
WITH RECORDFDMC DO BEGIN
Read(FMICRO,RECORDFDMC);
IF ELEMEN=Elem THEN BEGIN
IF ABS(AX)>PUS THEN PUS:=ABS(AX);END;END;
END;IF PUS>PUB THEN PUB:=PUS;Close(FMICRO);
END;END;
END;CLOSE(FELE);YA:='U';
WHILE UPCASE(YA)='U' DO BEGIN
TEXTCOLOR(10);TEXTBACKGROUND(0);CLRSCR;
GOTOXY(5,9);
WRITE('Pondasi Tipe : ');TEXTCOLOR(11);WRITE(TP:3);TEXTCOLOR(10);
GOTOXY(5,10);
WRITE('Tegangan Izin Tanah ? (kPa) : ');
GOTOXY(5,11);
WRITE('Arah Kerja Gaya Pada Pondasi : ');TEXTCOLOR(11);WRITE('1');
TEXTCOLOR(10);WRITE(' Arah Kerja Satu Arah');
GOTOXY(5,12);
WRITE(' ');TEXTCOLOR(11);WRITE('2');
TEXTCOLOR(10);WRITE(' Arah Kerja Dua Arah');
GOTOXY(5,13);
WRITE('Pilih Arah Kerja Pondasi ! : ');
GOTOXY(5,15);TEXTCOLOR(11);WRITE('U : ulang  L : lanjutkan  ---=>');
GOTOXY(35,10);READLN(QB);
GOTOXY(34,13);READLN(AKERB);BENAR:=TRUE;
WHILE BENAR DO BEGIN
GOTOXY(36,15);YA:=READKEY;WRITE(YA);
IF UPCASE(YA)='U' THEN BENAR:=FALSE;
IF UPCASE(YA)='L' THEN BENAR:=FALSE;END;TEXTCOLOR(10);END;
FGM:=NFDA+BGM;ASSIGN(FGMAKS,FGM);{$I-}RESET(FGMAKS);{$I+}
IF IORESULT<>0 THEN REWRITE(FGMAKS);NOREC:=-1;JUM:=FILESIZE(FGMAKS);
WITH RECORDFGMS DO BEGIN
IF JUM<>0 THEN BEGIN
FOR I:=1 TO JUM DO BEGIN
SEEK(FGMAKS,I-1);READ(FGMAKS,RECORDFGMS);
IF RECORDFGMS.TIPE=TP THEN NOREC:=I-1;END;
IF NOREC=-1 THEN NOREC:=JUM;SEEK(FGMAKS,NOREC);END;
TIPE:=TP;PU:=PUB;Q:=QB;AKER:=AKERB;WRITE(FGMAKS,RECORDFGMS);
END;CLOSE(FGMAKS);

```

```

END
ELSE BEGIN
  CLRSCR; TEXTCOLOR(11);
  GOTOXY(20,10); WRITE(' Data Elemen Belum Ada.....!');
  WRITE('^G'); READKEY; TEXTCOLOR(10); END;
UNTIL TP=JTIPE; END; CHDIR(DIRAK);
END.

```

```

PROGRAM PPO;
USES CRT;
TYPE
  FDN = RECORD
    TIPE : INTEGER;
    LP : REAL;
    T : REAL;
    PB : REAL;
    DF : REAL;
    BK : REAL;
    HK : REAL;
    DPK : INTEGER;
  END;
  FGMS = RECORD
    TIPE : INTEGER;
    PU : REAL;
    Q : REAL;
    AKER : INTEGER;
  END;
  FDBN = RECORD
    TIPE : INTEGER;
    FCK : REAL;
    FCP : REAL;
    FY : REAL;
  END;
  FDBT = RECORD
    TIPE : INTEGER;
    N : INTEGER;
    DP : INTEGER;
  END;
  FKLM = RECORD
    TIPE : INTEGER;
    FBP : INTEGER;
    FLP : INTEGER;
    FT : INTEGER;
    FDP : INTEGER;
    FSP : INTEGER;
    FDL : INTEGER;
    FSL : INTEGER;
    FND : INTEGER;
    FDD : INTEGER;
    FLD : INTEGER;
    FJB : INTEGER;
    FSISA : INTEGER;
  END;
VAR
  FTIPE : TEXT;
  FDI : FILE OF FDN;
  FDATA : FILE OF FDBN;
  FBAHTUL : FILE OF FDBT;
  FGMAKS : FILE OF FGMS;
  FPONDASI : FILE OF FKLM;
  RECORDFDBN : FDBN;
  RECORDFDBT : FDBT;
  RECORDFGMS : FGMS;
  RECORDFDN : FDN;
  RECORDFPON : FKLM;
  I,JTIPE,JUM,NOREC,J,TP,ULANG,ULANGT,AKERB,
  TERUS,TERUST,ULANG2,TERUS2,SISAS,DPB,
  DD,DPKB,JBS,SISA : INTEGER;
  PUB,QB,FCKB,FCPB,FYB,LPB,TB,DFB,BKB,HKB,

```

```

PBB,AD,AK,Q1,QT,APER,BPER,BPB,LPS,
AP,P,D,O,B,VU,B1,BC,B0,VC1,VC2,VC,OVN,
G,FP,MUP,KP,ROP,ROB,ROMAKS,ROMIN,ASP,SP,
JB1,BE,Z,JB,FL,MUL,KL,ROL,ASL,SL,PTP,PTK,
ASDPER,ADS,JN,ASD,LDB,LDBMAKS,LDBMIN,N,LD,
ASPS,SPS,DPS,ASLS,SLS,DLS,JI      : Real;
NFDA,EL      : STRING[7];
FDB,FDT,FGM,FTIP,FDM,FBK      : STRING[12];
FTP,BBN,BBT,BGM,BDD,BLK,DIRAK,DIREK      : STRING;

```

```

BEGIN
DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);FTP:=PARAMSTR(4);BBN:=PARAMSTR(5);
BBT:=PARAMSTR(6);BGM:=PARAMSTR(7);BDD:=PARAMSTR(8);BLK:=PARAMSTR(9);
GETDIR(0,DIRAK); CHDIR(DIREK); FTIP:=NFDA+FTP; ASSIGN(FTIPE,FTIP); {SI-} RESET(FTIPE); {SI+}
IF IORESULT=0 THEN BEGIN
READ(FTIPE,FTIPE); CLOSE(FTIPE); FDM:=NFDA+BDD; ASSIGN(FDI,FDM);
{SI-} RESET(FDI); {SI+}
IF IORESULT=0 THEN BEGIN
CLOSE(FDI); FGM:=NFDA+BGM; ASSIGN(FGMAKS,FGM); {SI-} RESET(FGMAKS); {SI+}
IF IORESULT=0 THEN BEGIN
CLOSE(FGMAKS); FDT:=NFDA+BBT; ASSIGN(FBAHTUL,FDT);
{SI-} RESET(FBAHTUL); {SI+}
IF IORESULT=0 THEN BEGIN
CLOSE(FBAHTUL); FDB:=NFDA+BBN; ASSIGN(FDATBAH,FDB); {SI-} RESET(FDATBAH); {SI+}
IF IORESULT=0 THEN BEGIN CLOSE(FDATBAH); TP:=0;
REPEAT
ULANG:=0; ULANGT:=0; ULANG2:=0; TEXTBACKGROUND(0); CLRSCR;
FOR I:=1 TO 1000 DO BEGIN
TEXTCOLOR(5); GOTOXY(20,10); FOR J:=1 TO 36 DO WRITE(CHAR(176));
GOTOXY(20,11); WRITE(CHAR(176),' '); FOR J:=1 TO 3 DO WRITE(CHAR(175));
TEXTCOLOR(11); WRITE('PROSES DIASIN PONDASI '); TEXTCOLOR(5);
FOR J:=1 TO 3 DO WRITE(CHAR(174)); WRITE(' ',CHAR(176));
GOTOXY(20,12); FOR J:=1 TO 36 DO WRITE(CHAR(176)); TEXTCOLOR(10); END;
TP:=TP+1; RESET(FGMAKS);
WHILE NOT EOF(FGMAKS) DO BEGIN
WITH RECORDFGMS DO BEGIN READ(FGMAKS,RECORDFGMS);
IF RECORDFGMS.TIPE=TP THEN BEGIN
PUB:=PU; QB:=Q*1E-3; AKERB:=AKER; END; END;
END; CLOSE(FGMAKS); RESET(FDATBAH);
WHILE NOT EOF(FDATBAH) DO BEGIN
WITH RECORDFDBN DO BEGIN READ(FDATBAH,RECORDFDBN);
IF RECORDFDBN.TIPE=TP THEN BEGIN
FCKB:=FCK; FCPB:=FCP; FYB:=FY; END; END;
END; CLOSE(FDATBAH); RESET(FDI);
WHILE NOT EOF(FDI) DO BEGIN
WITH RECORDFDN DO BEGIN READ(FDI,RECORDFDN);
IF RECORDFDN.TIPE=TP THEN BEGIN
LPS:=LP; TB:=T; PBB:=PB; DFB:=DF; BKB:=BK;
HKB:=HK; DPKB:=DPK; END; END;
END; CLOSE(FDI); RESET(FBAHTUL); JUM:=FILESIZE(FBAHTUL); ASPS:=0;
DPS:=0; ASLS:=0; DLS:=0; JBS:=2; SISAS:=2;
FOR I:=1 TO JUM DO BEGIN TERUS:=0; TERUST:=0; TERUS2:=0;
WITH RECORDFDBT DO BEGIN SEEK(FBAHTUL,I-1); READ(FBAHTUL,RECORDFDBT);
IF (RECORDFDBT.TIPE=TP) AND (RECORDFDBT.DP<>0) THEN BEGIN
DPB:=RECORDFDBT.DP; AD:=0.25*3.14*SQR(DPB); AK:=BKB*HKB;
Q1:=(23*TB+15.7*(DFB-TB))*1E-6; QT:=QB-Q1; APER:=PUB/QT;
BPER:=APER/LPS; IF FRAC(BPER/100)>0.5 THEN BEGIN BPER:=(ROUND(BPER/100))*100; END
ELSE BPER:=(TRUNC(BPER/100)+0.5)*100;
IF BPER>LPS THEN BEGIN
BPB:=LPS; LPB:=BPER; END
ELSE BEGIN
BPB:=BPER; LPB:=LPS; END;
AP:=BPB*LPB; P:=PUB/AP; D:=TB-PBB-DPB; O:=0.60; B1:=0.80;
IF AKERB=2 THEN BEGIN
B:=BKB+D; VU:=P*(AP-SQR(B)); BC:=HKB/BKB; B0:=4*B;
VC1:=(1+2/BC)*2*SQR(FCPB)*B0*D*1000;
VC2:=4*SQR(FCPB)*B0*D*1000;
IF VC1<=VC2 THEN VC:=VC1
ELSE VC:=VC2;
OVN:=O*VC;

```

```

IF OVN<VU THEN BEGIN TERUS:=1; ULANG:=ULANG+1; END; END
ELSE BEGIN
G:=(LPB-BKB)/2-D; VU:=P*BPB*G; VC:=SQRT(FCPB)*BPH*1000*D/6; OVN:=O*VC;
IF OVN<VU THEN BEGIN TERUS:=1; ULANG:=ULANG+1; END; END;
IF TERUS<>1 THEN BEGIN O:=0.8;
FP:=(BPB-BKB)/2; MUP:=P*FP*(0.5*FP)*LPB; KP:=MUP/(O*LPB*SQR(D));
ROP:=(FCPB-SQRT(SQR(FCPB)-2.36*KP*FCPB))/(1.18*FYB);
ROB:=(0.85*FCPB*B1)*600/(FYB*(600+FYB)); ROMAKS:=0.75*ROB; ROMIN:=1.4*FYB;
IF ROP<ROMIN THEN ROP:=ROMIN;
IF ROP>ROMAKS THEN BEGIN TERUST:=1; ULANGT:=ULANGT+1; END;
IF TERUST<>1 THEN BEGIN
ASP:=ROP*LPB*D; JB1:=TRUNC(ASP/AD)+1; BE:=LPB/BPB; Z:=2/(BE+1);
JB:=Z*JB1; JB:=TRUNC(JB)+1; SISA:=TRUNC(JB1-JB);
SP:=BPB/(JB-1); SP:=TRUNC(SP/10)*10;
IF SISA=0 THEN SISA:=2; END;
FL:=(LPB-HKB)/2; MUL:=P*FL*(0.5*FL)*BPB; KL:=MUL/(O*BPB*SQR(D));
ROL:=(FCPB-SQRT(SQR(FCPB)-2.36*KL*FCPB))/(1.18*FYB);
IF ROL<ROMIN THEN ROL:=ROMIN;
IF ROL>ROMAKS THEN BEGIN TERUST:=1; ULANGT:=ULANGT+1; END;
IF TERUST<>1 THEN BEGIN
ASL:=ROL*BPB*D; SL:=AD*BPB/ASL; SL:=TRUNC(SL/10)*10; JL:=SQRT(AP/AK);
IF JL>2 THEN JL:=2;
O:=0.70; PTP:=O*(0.85*FCPB*AK)*JL*1000; PTK:=O*(0.85*FCKB*AK)*1000;
IF (PTK>PTP) OR (PTK<PUB) THEN BEGIN
TERUS2:=1; ULANG2:=ULANG2+1; END;
IF TERUS2<>1 THEN BEGIN
IF (ASPS=0) AND (SP>=25) THEN BEGIN
ASPS:=ASP; SPS:=SP; DPS:=DPB; JBS:=TRUNC(JB); SISAS:=SISA; END
ELSE IF (ASP<ASPS) AND (SP>=25) THEN BEGIN
ASPS:=ASP; SPS:=SP; DPS:=DPB; JBS:=TRUNC(JB); SISAS:=SISA; END;
IF (ASLS=0) AND (SL>=25) THEN BEGIN
ASLS:=ASL; SLS:=SL; DLS:=DPB; END
ELSE IF (ASL<ASLS) AND (SL>=25) THEN BEGIN
ASLS:=ASL; SLS:=SL; DLS:=DPB; END;
END; END; END; END; END;
IF (FRAC(SISAS/2)>0) THEN SISAS:=SISAS+1;
IF SPS>=500 THEN SPS:=500; IF SLS>=500 THEN SLS:=500;
END; CLOSE(FBAHTUL);
IF (ULANG=JUM) OR (ULANG2=JUM) THEN BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
WRITE('Perencanaan Pondasi "DIULANG".....!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
IF ULANGT=JUM THEN BEGIN
CLRSCR; TEXTCOLOR(11);
GOTOXY(20,10); WRITE('Tebal Plat Kaki "DIPERBESAR".....!');
WRITE('^G'); READKEY; TEXTCOLOR(10); END;
IF (ULANG<JUM) AND (ULANGT<JUM) THEN BEGIN
IF ULANG2<JUM THEN BEGIN
ASDPER:=0.005*AK; DD:=DPKB; ADS:=0.25*3.14*SQR(DD); JN:=ASDPER/ADS;
JN:=TRUNC(JN)+1; ASD:=JN*ADS; LDB:=DD*FYB/(4*SQR(FCPB));
LDBMAKS:=0.04*DD*FYB; LDBMIN:=200;
IF LDB<LDBMAKS THEN LDB:=LDBMAKS;
N:=ASDPER/ASD; LD:=N*LDB; LD:=(TRUNC(LD/10)+1)*10;
IF LD<LDBMIN THEN LD:=LDBMIN; FBK:=NFDA+BLK;
ASSIGN(FPONDASI,FBK); {$I-} RESET(FPONDASI); {$I+}
IF IORESULT<>0 THEN REWRITE(FPONDASI); NOREC:=-1; JUM:=FILESIZE(FPONDASI);
WITH RECORDFPON DO BEGIN
IF JUM<>0 THEN BEGIN
FOR J:=1 TO JUM DO BEGIN SEEK(FPONDASI,J-1); READ(FPONDASI,RECORDFPON);
IF TP=RECORDFPON.TIPE THEN NOREC:=J-1; END;
IF NOREC=-1 THEN NOREC:=JUM; SEEK(FPONDASI,NOREC); END;
TIPE:=TP; FBP:=TRUNC(BPB); FLP:=TRUNC(LPB); FT:=TRUNC(TB);
FDP:=TRUNC(DPS); FSP:=TRUNC(SPS); FDL:=TRUNC(DLS); FSL:=TRUNC(SLS);
FND:=TRUNC(JN); FDD:=TRUNC(DD); FLD:=TRUNC(LD); FJB:=JBS;
FSISA:=SISAS; WRITE(FPONDASI,RECORDFPON); END; CLOSE(FPONDASI);
END; END;
UNTIL TP=JTIPE;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10); WRITE('DATA BAHAN BELUM DIBUAT...!');

```

```

        WRITE('^G'); READKEY; TEXTCOLOR(10); END;
    END
    ELSE BEGIN
        CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
        WRITE('DATA TULANGAN YG AKAN DIGUNAKAN BELUM DIBUAT...!');
        WRITE('^G'); READKEY; TEXTCOLOR(10); END;
    END
    ELSE BEGIN
        CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
        WRITE('DATA GAYA YG BEKERJA PADA 'EL,' BELUM DIBUAT...!');
        WRITE('^G'); READKEY; TEXTCOLOR(10); END;
    END
    ELSE BEGIN
        CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
        WRITE('DATA DIMENSI 'EL,' BELUM DIBUAT...!');
        WRITE('^G'); READKEY; TEXTCOLOR(10); END;
    END
    ELSE BEGIN
        CLRSCR; TEXTCOLOR(11); GOTOXY(20,10); WRITE('JUMLAH TIPE 'EL,' BELUM ADA...!');
        WRITE('^G'); READKEY; TEXTCOLOR(10); END;
        CLRSCR; TEXTCOLOR(5); GOTOXY(20,10); FOR J:=1 TO 36 DO WRITE(CHAR(176));
        GOTOXY(20,11);
        WRITE(CHAR(176),' '); FOR J:=1 TO 3 DO WRITE(CHAR(175)); TEXTCOLOR(4);
        WRITE(' DISAIN PONDASI SELESAI '); TEXTCOLOR(5);
        FOR J:=1 TO 3 DO WRITE(CHAR(174)); WRITE(' ',CHAR(176)); GOTOXY(20,12);
        FOR J:=1 TO 36 DO WRITE(CHAR(176)); GOTOXY(26,13);
        FOR J:=1 TO 5 DO WRITE(CHAR(3)); TEXTCOLOR(11); WRITE(' TEKAN ENTER ');
        TEXTCOLOR(5); FOR J:=1 TO 5 DO WRITE(CHAR(3)); TEXTCOLOR(10);
        WRITE('^G'); READLN; CHDIR(DIRAK);
    END.

```

PROGRAM SKETSABALOK;

uses crt,graph,printer;

TYPE

```

    FDMN = RECORD
        TIPE : INTEGER;
        LP   : REAL;
        T    : REAL;
        PB   : REAL;
        DF   : REAL;
        BK   : REAL;
        HK   : REAL;
        DPK  : INTEGER;
    END;

```

```

    FBLK = RECORD
        TIPE : INTEGER;
        FBP  : INTEGER;
        FLP  : INTEGER;
        FT   : INTEGER;
        FDP  : INTEGER;
        FSP  : INTEGER;
        FDL  : INTEGER;
        FSL  : INTEGER;
        FND  : INTEGER;
        FDD  : INTEGER;
        FLD  : INTEGER;
        FJB  : INTEGER;
        FSISA: INTEGER;
    END;

```

Var

```

    FTIPE          : TEXT;
    FDIM           : FILE OF FDMN;
    FBALOK         : FILE OF FBLK;
    RECORDFDMN     : FDMN;
    RECORDFBLK     : FBLK;
    NFDA,EL        : STRING[7];
    FTIP,FDM,FBK   : STRING[12];
    FTP,BDD,BLK,DIRAK,DIREK,O,BPS,P,HBS,PBS,

```

```

DLS,SLS,DPS,SPS,NDS,DDS,LDS,HKS,BKS : STRING;
JTIPE,tp,i,j,a,b,c,drivergrafik,
modegrafik,Z,X,Y,PBB,BP,LP,HB,DL,SL,DP,
SP,ND,DD,LD,D,NTLA,E,BARA,BARB,T,L,S,
SISA,HKO,BKO : INTEGER;
TULIS : STRING[9];

begin
DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2);FTP:=PARAMSTR(3);BDD:=PARAMSTR(4);BLK:=PARAMSTR(5);
GETDIR(0,DIRAK); CHDIR(DIREK); drivergrafik := detect;
IF (DIRAK='A:\') OR (DIRAK='C:\') OR (DIRAK='B:\') OR (DIRAK='D:\') OR
(DIRAK='E:\') THEN initgraph(drivergrafik, modegrafik,DIRAK+'LOGO') ELSE
initgraph(drivergrafik, modegrafik,DIRAK+'LOGO');
FTIP:=NFDA+FTP; ASSIGN(FTIPE,FTIP); {$I-} RESET(FTIPE); {$I+}
IF IORESULT=0 THEN BEGIN READ(FTIPE,JTIPE); CLOSE(FTIPE);
FBK:=NFDA+BLK; ASSIGN(FBALOK,FBK); {$I-} RESET(FBALOK); {$I+}
IF IORESULT=0 THEN BEGIN CLOSE(FBALOK);
FDM:=NFDA+BDD; ASSIGN(FDIM,FDM); {$I-} RESET(FDIM); {$I+}
IF IORESULT=0 THEN BEGIN CLOSE(FDIM); TP:=0;
REPEAT
TP:=TP+1; RESET(FDIM); cleardevice; setfillstyle(1,15);
floodfill(1,1,14); setteXTstyle(SMALLfont,horizdir,4); X:=0; Y:=0;
WHILE NOT EOF(FDIM) DO BEGIN
WITH RECORDFDMN DO BEGIN READ(FDIM,RECORDFDMN);
IF RECORDFDMN.TIPE=TP THEN BEGIN PBB:=TRUNC(PB); HKO:=TRUNC(HK);
BKO:=TRUNC(BK); END; END; END; CLOSE(FDIM); RESET(FBALOK);
WHILE NOT EOF(FBALOK) DO BEGIN WITH RECORDFBLK DO BEGIN
READ(FBALOK,RECORDFBLK);
IF RECORDFBLK.TIPE=TP THEN BEGIN
BP:=FBP; LP:=FLP; HB:=FT; DL:=FDP; SL:=FSP; DP:=FDL; SP:=FSL; ND:=FND;
DD:=FDD; LD:=FLD; SISA:=FSISA; END; END; END; CLOSE(FBALOK);
STR(BP,BPS); STR(HB,HBS); STR(PBB,PBS); STR(DL,DLS);
STR(SL,SLS); STR(DP,DPS); STR(SP,SPS); STR(ND,NDS); STR(DD,DDS);
STR(LD,LDS); STR(HKO,HKS); STR(BKO,BKS); STR(TP,O);
FOR I:=0 TO 1 DO BEGIN
IF I=0 THEN BEGIN S:=SL; L:=LP; END ELSE BEGIN S:=SP; L:=BP; END;
STR(L,P); L:=BP; SETLINESTYLE(0,0,1);
setteXTstyle(SMALLfont,horizdir,4); SETCOLOR(0);
MOVETO(20+I*25,50+I*180); LINEREL(255-I*15,0); LINEREL(0,-30);
MOVETO(335-I*10,50+I*180); LINEREL(0,-30); LINEREL(0,30);
LINEREL(255-I*15,0); MOVETO(20+I*25,110+I*180); LINEREL(570-I*50,0);
MOVETO(15+I*25,150+I*180); LINEREL(580-I*50,0);
MOVETO(20+I*25,148+I*180); LINEREL(0,5);
MOVETO(590-I*25,148+I*180); LINEREL(0,5);
OUTTEXTXY(285,I*180+138,P+' mm');
MOVETO(600-I*25,45+I*180); LINEREL(0,70);
MOVETO(598-I*25,50+I*180); LINEREL(5,0);
MOVETO(598-I*25,110+I*180); LINEREL(5,0);
OUTTEXTXY(602-I*25,I*180+70,HBS+' mm');
MOVETO(607-I*25,95+I*180); LINEREL(0,20);
MOVETO(605-I*25,100+I*180); LINEREL(5,0);
MOVETO(605-I*25,110+I*180); LINEREL(5,0);
OUTTEXTXY(612-I*25,I*180+100,PBS+' mm');
MOVETO(20+I*25,50+I*180); LINEREL(0,60);
MOVETO(590-I*25,50+I*180); LINEREL(0,60);
MOVETO(260,15+I*180); LINEREL(0,70);
MOVETO(257,20+I*180); LINEREL(5,0);
MOVETO(257,80+I*180); LINEREL(5,0);
OUTTEXTXY(210,I*180+30,LDS+' mm');
OUTTEXTXY(210,I*180+60,LDS+' mm');
SETLINESTYLE(0,0,3);
MOVETO(30+I*25,100+I*176); LINEREL(550-I*50,0); LINEREL(-3,-3);
MOVETO(30+I*25,100+I*176); LINEREL(3,-3);
MOVETO(285+I*10,20+I*180); LINEREL(0,60); LINEREL(-20,0);
MOVETO(325-I*10,20+I*180); LINEREL(0,60); LINEREL(20,0);
SETLINESTYLE(1,0,1);
MOVETO(270+I*10,20+I*180); LINEREL(70-I*20,0);
SETLINESTYLE(0,0,3);
IF FRAC(L/S)=0 THEN NTLA:=TRUNC(L/S)+1 ELSE NTLA:=TRUNC(L/S)+2;
A:=0; C:=1; D:=1;

```

```

IF (I=0) THEN BEGIN
  IF SISA>2 THEN BEGIN
    B:=TRUNC((160-SISA)/((SISA-2)/2+1));
    FOR J:=1 TO SISA-2 DO BEGIN
      IF A=0 THEN BEGIN
        CIRCLE(38+B*C,96,2);
        A:=1; C:=C+1; X:=X+1;
      END
      ELSE BEGIN
        CIRCLE(572-B*D,96,2);
        A:=0; D:=D+1; Y:=Y+1;
      END;
    END;
  END;
  CIRCLE(38,96,2);
  CIRCLE(572,96,2);
  END;
  A:=0; C:=1; D:=1;
  IF NTLA>2 THEN BEGIN
    IF NTLA-2>1 THEN BEGIN
      B:=TRUNC((220+I*280)/(NTLA-1));
      FOR J:=1 TO NTLA-2 DO
        BEGIN
          IF A=0 THEN BEGIN
            CIRCLE(195+B*C-I*157+I*25,96+I*184,2);
            A:=1; C:=C+1;
          END
          ELSE BEGIN
            CIRCLE(415-B*D+I*157-I*25,96+I*184,2);
            A:=0; D:=D+1;
          END;
        END;
      END
      ELSE CIRCLE(305,96+I*184,2);
    END;
    CIRCLE(195-I*157+I*25,96+I*184,2); CIRCLE(415+I*157-I*25,96+I*184,2);
    SETLINESTYLE(0,0,1);
    IF I=0 THEN BEGIN
      MOVETO(190,130); LINEREL(230,0);
      MOVETO(195,127); LINEREL(0,5);
      MOVETO(415,127); LINEREL(0,5);
      OUTTEXTXY(285,118,BPS+'mm');
      STR(Y+1,TULIS);
      MOVETO(572,96); LINEREL(-15,-15); OUTTEXTXY(525,73,TULIS+'D'+DLS);
      STR(X+1,TULIS);
      MOVETO(38,96); LINEREL(15,-15); OUTTEXTXY(55,73,TULIS+'D'+DLS);
    END;
    SetteXTstyle(SMALLfont,horizdir,4);
    MOVETO(32+I*515,I*180+100); LINEREL(-15,15); OUTTEXTXY(10+I*500,I*176+117,'D'+DPS+''+SPS);
    MOVETO(415-358*I,I*180+96); LINEREL(-15,-15+I*30); OUTTEXTXY(358-I*330,I*220+73,'D'+DLS+''+SLS);
    MOVETO(285+10*I,I*180+60); LINEREL(60-I*20,0); OUTTEXTXY(355-I*10,55+I*180,NDS+'D'+DDS);
    MOVETO(330-10*I,I*180+30); LINEREL(15,0); IF I=0 THEN OUTTEXTXY(355-I*10,I*180+25,HKS+'mm x '+BKS+'
mm')
    ELSE OUTTEXTXY(355-I*10,I*180+25,BKS+'mm x '+HKS+'mm');
    SetteXTstyle(tripleXfont,horizdir,1); OutteXTXy(130,380,'SKETSA PENULANGAN PONDASI TIPE '+O);
    setteXTstyle(SMALLfont,horizdir,6); IF I=0 THEN
    OUTTEXTXY(140,170,'PENULANGAN PONDASI ARAH MEMANJANG') ELSE
    OUTTEXTXY(160,350,'PENULANGAN PONDASI ARAH LEBAR'); SetteXTstyle(SMALLfont,horizdir,4);
    setteXTstyle(SMALLfont,horizdir,4);
    SETLINESTYLE(0,0,1); SETCOLOR(1); setteXTstyle(tripleXfont,horizdir,1);
    outteXTXy(516,440,'Ull-CDP'); setteXTstyle(SMALLfont,horizdir,4);
    setcolor(4); rectangle(500,440,600,465); setcolor(0);
  END; READKEY; UNTIL TP=JTIPE; END; END; END; closegraph; restorecrtmode; CHDIR(DIRAK);
end.

```

```

PROGRAM TDPO;
USES CRT;
TYPE
  FDBN = RECORD

```

```

TYPE : INTEGER;
FCK : REAL;
FCP : REAL;
FY : REAL;
END;
FDBT = RECORD
TYPE : INTEGER;
N : INTEGER;
DP : INTEGER;
END;
FDMN = RECORD
TYPE : INTEGER;
LP : REAL;
T : REAL;
PB : REAL;
DF : REAL;
BK : REAL;
HK : REAL;
DPK : INTEGER;
END;
FGMS = RECORD
TYPE : INTEGER;
PU : REAL;
Q : REAL;
AKER : INTEGER;
END;
FELN = RECORD
TYPE : INTEGER;
NO : INTEGER;
ELE : INTEGER;
END;

VAR
FTYPE : TEXT;
FDBTBAH : FILE OF FDBN;
FBAHTUL : FILE OF FDBT;
FGMAKS : FILE OF FGMS;
FDM : FILE OF FDMN;
FELE : FILE OF FELN;
RECORDFELN : FELN;
RECORDFDBN : FDBN;
RECORDFDBT : FDBT;
RECORDFGMS : FGMS;
RECORDFDMN : FDMN;
I,J,TYPE,JUM,NOREC,J,TP,DPMKS,DSMAKS,
NTUL,DPTUL,ISI,K,F : Integer;
NFDA,EL : STRING[7];
FDB,FDT,FGM,FTIP,FDM,FELM : STRING[12];
FTP,BBN,BBT,BEL,BGM,BDD,DIRAK,DIREK : STRING;

BEGIN
DIREK:=PARAMSTR(1);NFDA:=PARAMSTR(2);EL:=PARAMSTR(3);FTP:=PARAMSTR(4);
BBN:=PARAMSTR(5);BBT:=PARAMSTR(6);BEL:=PARAMSTR(7);BGM:=PARAMSTR(8);
BDD:=PARAMSTR(9);GETDIR(0,DIRAK);CHDIR(DIREK);FDM:=NFDA+BDD;
ASSIGN(FDM,FDM);{$I-} RESET(FDM); {$I+}
IF IORESULT=0 THEN BEGIN
CLOSE(FDM); FGM:=NFDA+BGM; ASSIGN(FGMAKS,FGM); {$I-} RESET(FGMAKS); {$I+}
IF IORESULT=0 THEN BEGIN
CLOSE(FGMAKS); FDT :=NFDA+BBT; ASSIGN(FBAHTUL,FDT); {$I-} RESET(FBAHTUL); {$I+}
IF IORESULT=0 THEN BEGIN
CLOSE(FBAHTUL); FDB :=NFDA+BBN; ASSIGN(FDATBAH,FDB); {$I-} RESET(FDATBAH); {$I+}
IF IORESULT=0 THEN BEGIN
CLOSE(FDATBAH); FELM:=NFDA+BEL; ASSIGN(FELE,FELM); {$I-} RESET(FELE); {$I+}
IF IORESULT=0 THEN BEGIN
CLOSE(FELE); TEXTCOLOR(10); TEXTBACKGROUND(0); CLRSCR; I:=1; K:=1;
F:=1; RESET(FDATBAH);
WHILE NOT EOF(FDATBAH) DO BEGIN
SEEK(FDATBAH,F-1); READ(FDATBAH,RECORDFDBN); F:=F+1;
WITH RECORDFDBN DO BEGIN
IF (K=1) THEN BEGIN I:=I+6;

```



```

IF I>=22 THEN BEGIN CLRSCR; I:=7; END;
WRITE(' ',CHAR(218)); FOR J:=1 TO 63 DO WRITE(CHAR(196));
WRITE(CHAR(191)); WRITELN; WRITE(' ',CHAR(179));
TEXTCOLOR(11); WRITE(' >>> DATA BAHAN <<<');
WRITE(' '); TEXTCOLOR(10); WRITE(CHAR(179));
WRITELN; WRITE(' ',CHAR(195));
FOR J:=1 TO 63 DO WRITE(CHAR(196)); WRITE(CHAR(180));
WRITELN; WRITE(' ',CHAR(179),' Tipe Teg. Desak Beton Teg. ');
'Desak Beton Tegangan Tarik Baja ',CHAR(179)); WRITELN;
WRITE(' ',CHAR(179),' Pond. Kolom (MPa) ',
'Pond. (MPa) (MPa) ',CHAR(179));
WRITELN; WRITE(' ',CHAR(195));
FOR J:=1 TO 63 DO WRITE(CHAR(196)); WRITE(CHAR(180)); WRITELN; END;
WRITE(' ',CHAR(179),' TIPE:3,' ');
TRUNC(FCK):3,' ',TRUNC(FCP):3,
' ',TRUNC(FY):6,' ',CHAR(179)); WRITELN;
K:=K+1; I:=I+1;
IF (I>=22) OR EOF(FDATBAH) THEN BEGIN
WRITE(' ',CHAR(192)); FOR J:=1 TO 63 DO WRITE(CHAR(196));
WRITE(CHAR(217)); READKEY; WRITELN; K:=1; I:=I+1; END;
IF I>=22 THEN BEGIN I:=1; K:=1; CLRSCR; END; END;
END; CLOSE(FDATBAH); F:=1; RESET (FBAHTUL);
WHILE NOT EOF(FBAHTUL) DO BEGIN
SEEK(FBAHTUL,F-1); READ(FBAHTUL,RECORDFDBT); F:=F+1;
WITH RECORDFDBT DO BEGIN
IF (K=1) THEN BEGIN I:=I+6;
IF I>=22 THEN BEGIN I:=7; CLRSCR; END;
WRITE(' ',CHAR(218));
FOR J:=1 TO 47 DO WRITE(CHAR(196)); WRITE(CHAR(191));
WRITELN; WRITE(' ',CHAR(179)); TEXTCOLOR(11);
WRITE(' >>> DIAMETER TULANGAN YANG AKAN DIGUNAKAN <<< ');
TEXTCOLOR(10); WRITE(CHAR(179)); WRITELN;
WRITE(' ',CHAR(195));
FOR J:=1 TO 47 DO WRITE(CHAR(196)); WRITE(CHAR(180));
WRITELN; WRITE(' ',CHAR(179),
' Tipe No. Diameter Tulangan Pokok ',
CHAR(179)); WRITELN; WRITE(' ',CHAR(179),
' Pondasi (mm) ',
CHAR(179)); WRITELN; WRITE(' ',CHAR(195));
FOR J:=1 TO 47 DO WRITE(CHAR(196)); WRITE(CHAR(180));
WRITELN; END;
WRITE(' ',CHAR(179),' TIPE:3,' ',N:2,
' ',DP:2,' ',CHAR(179));
WRITELN; K:=K+1; I:=I+1;
IF (I>=22) OR EOF(FBAHTUL) THEN BEGIN
WRITE(' ',CHAR(192));
FOR J:=1 TO 47 DO WRITE(CHAR(196)); WRITE(CHAR(217));
READKEY; WRITELN; K:=1; I:=I+1; END;
IF I>=22 THEN BEGIN K:=1; I:=1; CLRSCR; END; END;
END; CLOSE(FBAHTUL); F:=1; RESET (FELE);
WHILE NOT EOF(FELE) DO BEGIN
SEEK(FELE,F-1); READ(FELE,RECORDFELN); F:=F+1;
WITH RECORDFELN DO BEGIN
IF K=1 THEN BEGIN I:=I+5;
IF I>=22 THEN BEGIN I:=6; CLRSCR; END;
WRITE(' ',CHAR(218));
FOR J:=1 TO 29 DO WRITE(CHAR(196)); WRITE(CHAR(191));
WRITELN; WRITE(' ',CHAR(179)); TEXTCOLOR(11);
WRITE(' >>> DATA ELEMEN ',EL:7,' <<< '); TEXTCOLOR(10);
WRITE(CHAR(179)); WRITELN; WRITE(' ',CHAR(195));
FOR J:=1 TO 29 DO WRITE(CHAR(196)); WRITE(CHAR(180));
WRITELN; WRITE(' ',CHAR(179),' Tipe No. Elemen ',
CHAR(179)); WRITELN; WRITE(' ',CHAR(195));
FOR J:=1 TO 29 DO WRITE(CHAR(196)); WRITE(CHAR(180));
WRITELN; END;
WRITE(' ',CHAR(179),' TIPE:3,' ',NO:2,
' ',ELE:3,' ',CHAR(179)); WRITELN; K:=K+1; I:=I+1;
IF (I>=22) OR EOF(FELE) THEN BEGIN
WRITE(' ',CHAR(192));
FOR J:=1 TO 29 DO WRITE(CHAR(196)); WRITE(CHAR(217));

```

```

    READKEY; WRITELN; K:=1; I:=I+1; END;
    IF I>=22 THEN BEGIN K:=1; I:=1; CLRSCR; END; END;
END; CLOSE(FELE); F:=1; RESET(FDIM);
WHILE NOT EOF(FDIM) DO BEGIN
    SEEK(FDIM,F-1); READ(FDIM,RECORDFDMN); F:=F+1;
    WITH RECORDFDMN DO BEGIN
        IF K=1 THEN BEGIN I:=I+6;
            IF I>=22 THEN BEGIN I:=7; CLRSCR; END;
            WRITE(' ',CHAR(218));
            FOR J:=1 TO 54 DO WRITE(CHAR(196)); WRITE(CHAR(191));
            WRITELN; WRITE(' ',CHAR(179)); TEXTCOLOR(11);
            WRITE(' >>> DATA DIMENSI <<< ');
            TEXTCOLOR(10); WRITE(CHAR(179)); WRITELN;
            WRITE(' ',CHAR(195));
            FOR J:=1 TO 54 DO WRITE(CHAR(196)); WRITE(CHAR(180));
            WRITELN; WRITE(' ',CHAR(179),
            ' Tipe Panjang Tebal Plat Kedalaman Penutup Beton ',
            CHAR(179)); WRITELN; WRITE(' ',CHAR(179),
            ' Pond. (mm) (mm) (mm) (mm) ',
            CHAR(179)); WRITELN; WRITE(' ',CHAR(195));
            FOR J:=1 TO 54 DO WRITE(CHAR(196)); WRITE(CHAR(180));
            WRITELN; END;
            WRITE(' ',CHAR(179),' TIPE:3,' ',TRUNC(LP):5,
            ' ',TRUNC(T):4,' ',TRUNC(DF):5,' ',
            TRUNC(PB):3,' ',CHAR(179)); WRITELN; K:=K+1; I:=I+1;
            IF (I>=22) OR EOF(FDIM) THEN BEGIN
                WRITE(' ',CHAR(192));
                FOR J:=1 TO 54 DO WRITE(CHAR(196)); WRITE(CHAR(217));
                READKEY; WRITELN; K:=1; I:=I+1; END;
            IF I>=22 THEN BEGIN K:=1; I:=1; CLRSCR; END; END;
        END; CLOSE(FDIM); F:=1; RESET(FGMAKS);
        WHILE NOT EOF(FGMAKS) DO BEGIN
            SEEK(FGMAKS,F-1); READ(FGMAKS,RECORDFGMS); F:=F+1;
            WITH RECORDFGMS DO BEGIN
                IF K=1 THEN BEGIN I:=I+6;
                    IF I>=22 THEN BEGIN I:=7; CLRSCR; END;
                    WRITE(' ',CHAR(218));
                    FOR J:=1 TO 51 DO WRITE(CHAR(196)); WRITE(CHAR(191));
                    WRITELN; WRITE(' ',CHAR(179)); TEXTCOLOR(11);
                    WRITE(' >>> DATA GAYA-GAYA MAKSIMUM <<< ');
                    TEXTCOLOR(10); WRITE(CHAR(179)); WRITELN;
                    WRITE(' ',CHAR(195));
                    FOR J:=1 TO 51 DO WRITE(CHAR(196)); WRITE(CHAR(180));
                    WRITELN; WRITE(' ',CHAR(179),
                    ' Tipe Gaya Aksial Kolom Tegangan Izin Arah Kerja ',
                    CHAR(179)); WRITELN; WRITE(' ',CHAR(179),
                    ' Pond. (N) (kPa) ',
                    CHAR(179)); WRITELN; WRITE(' ',CHAR(195));
                    FOR J:=1 TO 51 DO WRITE(CHAR(196)); WRITE(CHAR(180));
                    WRITELN; END;
                    WRITE(' ');
                    WRITE(CHAR(179),' TIPE:3,' ',PU:8,' ',Q:8,
                    ' ',AKER,' Arah ',CHAR(179)); WRITELN; K:=K+1; I:=I+1;
                    IF (I>=22) OR EOF(FGMAKS) THEN BEGIN
                        WRITE(' ',CHAR(192));
                        FOR J:=1 TO 51 DO WRITE(CHAR(196)); WRITE(CHAR(217));
                        READKEY; WRITELN; I:=I+1; K:=1; END;
                        IF (I>=22) THEN BEGIN K:=1; I:=1; CLRSCR; END; END;
                    END; CLOSE(FGMAKS);
                END
            ELSE BEGIN
                CLRSCR; TEXTCOLOR(11); GOTOXY(20,10); WRITE('DATA ELEMEN BELUM DIBUAT...!');
                WRITE('^G'); READKEY; TEXTCOLOR(10); END;
            END
        ELSE BEGIN
            CLRSCR; TEXTCOLOR(11); GOTOXY(20,10); WRITE('DATA BAHAN BELUM DIBUAT...!');
            WRITE('^G'); READKEY; TEXTCOLOR(10); END;
        END
    ELSE BEGIN
        CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);

```

```

WRITE('DATA TULANGAN YG AKAN DIGUNAKAN BELUM DIBUAT...!');
WRITE('^G); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
WRITE('DATA GAYA YG BEKERJA PADA BALOK BELUM DIBUAT...!');
WRITE('^G); READKEY; TEXTCOLOR(10); END;
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,10);
WRITE('DATA DIMENSI BALOK BELUM DIBUAT...!');
WRITE('^G); READKEY; TEXTCOLOR(10); END; CHDIR(DIRAK);
END.

```

```

PROGRAM TPO;
USES CRT;
TYPE
  FDAT = RECORD
    NPROY : STRING[19];
    NFDAT : STRING[8];
    NaFil : STRING[12];
    ENG : STRING[19];
  END;
  FKLM = RECORD
    TIPE : INTEGER;
    FBP : INTEGER;
    FLP : INTEGER;
    FT : INTEGER;
    FDP : INTEGER;
    FSP : INTEGER;
    FDL : INTEGER;
    FSL : INTEGER;
    FND : INTEGER;
    FDD : INTEGER;
    FLD : INTEGER;
    FJB : INTEGER;
    FSISA : INTEGER;
  END;
VAR
  FPONDASI : FILE OF FKLM;
  NFILE : FILE OF FDAT;
  RECORDFDAT : FDAT;
  RECORDFPON : FKLM;
  I,J,A,B,C : INTEGER;
  NFDA,EL : STRING[7];
  FBK : STRING[12];
  NPRO,EN : STRING[19];
  BLK,DIRAK,DIREK : STRING;

```

```

BEGIN
DIREK:=PARAMSTR(1); NFDA:=PARAMSTR(2); EL:=PARAMSTR(3); BLK:=PARAMSTR(4);
GETDIR(0,DIRAK); CHDIR(DIREK); ASSIGN(NFILE,'FILEDATA.DAT'); RESET(NFILE);
WHILE NOT EOF(NFILE) DO BEGIN READ(NFILE,RECORDFDAT);
IF RECORDFDAT.NFDAT=NFDA THEN BEGIN
  NPRO:=RECORDFDAT.NPROY; EN :=RECORDFDAT.ENG; END; END;
CLOSE(NFILE); FBK:=NFDA+BLK; ASSIGN(FPONDASI,FBK); {$I-} RESET(FPONDASI); {$I+}
IF IORESULT=0 THEN BEGIN I:=1;
WHILE NOT EOF(FPONDASI) DO BEGIN
  WITH RECORDFPON DO BEGIN READ(FPONDASI,RECORDFPON);
  IF I=1 THEN BEGIN
    A:=LENGTH(NPRO); B:=LENGTH(NFDA); C:=LENGTH(EN);
    TEXTCOLOR(10); TEXTBACKGROUND(0); CLRSCR; GOTOXY(10,1);
    WRITE(CHAR(218)); FOR J:=1 TO 58 DO WRITE(CHAR(196)); WRITE(CHAR(191));
    GOTOXY(10,2); WRITE(CHAR(179)); TEXTCOLOR(11);
    WRITE('        HASIL PERENCANAAN PONDASI          ');
    TEXTCOLOR(10); WRITE(CHAR(179));
    GOTOXY(10,3);
    WRITE(CHAR(195)); FOR J:=1 TO 58 DO WRITE(CHAR(196)); WRITE(CHAR(180));
    GOTOXY(10,4);

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```

WRITE(CHAR(179),' Proyek : ',NPRO:A); FOR J:=1 TO (19-A) DO WRITE(' ');
WRITE('Nama File Data : ',NFDA:B); FOR J:=1 TO (8-B) DO WRITE(' ');
WRITE(' ',CHAR(179)); GOTOXY(10,5);
WRITE(CHAR(179),' Perencana : ',EN:C); FOR J:=1 TO (19-C) DO WRITE(' ');
WRITE(' ', CHAR(179)); GOTOXY(10,6);
WRITE(CHAR(195)); FOR J:=1 TO 7 DO WRITE(CHAR(196)); WRITE(CHAR(194));
FOR J:=1 TO 12 DO WRITE(CHAR(196)); WRITE(CHAR(194));
FOR J:=1 TO 12 DO WRITE(CHAR(196)); WRITE(CHAR(194));
FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(194));
FOR J:=1 TO 13 DO WRITE(CHAR(196)); WRITE(CHAR(180));
GOTOXY(10,7); WRITE(CHAR(179),' TIPE ',CHAR(179),' TULANGAN ',CHAR(179),
' TULANGAN ',CHAR(179),' TULANGAN ',CHAR(179),' UKURAN ',
CHAR(179)); GOTOXY(10,8);
WRITE(CHAR(179),'PONDASI',CHAR(179),' ARAH LEBAR ',CHAR(179),
' ARAH PANJANG',CHAR(179),' PASAK ',CHAR(179),' PONDASI ',
CHAR(179)); GOTOXY(10,9);
WRITE(CHAR(195)); FOR J:=1 TO 7 DO WRITE(CHAR(196)); WRITE(CHAR(197));
FOR J:=1 TO 12 DO WRITE(CHAR(196)); WRITE(CHAR(197));
FOR J:=1 TO 12 DO WRITE(CHAR(196)); WRITE(CHAR(197));
FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(197));
FOR J:=1 TO 13 DO WRITE(CHAR(196)); WRITE(CHAR(180)); END;
GOTOXY(10,I+9);
WRITE(CHAR(179),' ',TIPE:3,' ',CHAR(179),'D',FDP:2,' ',FSP:3,' mm ',
CHAR(179),'D',FDL:2,' ',FSL:3,' mm ',CHAR(179),' ',FND:2,'D',
FDD:2,' ',CHAR(179),'FBP:4,'mmx',FLP:4,'mm',CHAR(179));
GOTOXY(10,I+10);
WRITE(CHAR(179),' ',CHAR(179),'MERATA DALAM',CHAR(179),
' ',CHAR(179),'PANJANG ',CHAR(179),'TEBAL PLAT ',
CHAR(179));
GOTOXY(10,I+11); WRITE(CHAR(179),' ',CHAR(179),'RENTANG ',FBP:4,CHAR(179),
' ',CHAR(179),'PENYALURAN',CHAR(179),'KAKI = ',FI:4,
'mm',CHAR(179));
GOTOXY(10,I+12); WRITE(CHAR(179),' ',CHAR(179),'FSISA:2,' MERATA DI',CHAR(179),
' ',CHAR(179),'Ld =',FLD:4,'mm',CHAR(179),
' ',CHAR(179));
GOTOXY(10,I+13);
WRITE(CHAR(179),' ',CHAR(179),'LUAR RENTANG',CHAR(179),
' ',CHAR(179),' ',CHAR(179),' ',
CHAR(179)); I:=I+5;
IF (I>=10) OR (EOF(FPONDASI)) THEN BEGIN
GOTOXY(10,I+9);
WRITE(CHAR(192)); FOR J:=1 TO 7 DO WRITE(CHAR(196)); WRITE(CHAR(193));
FOR J:=1 TO 12 DO WRITE(CHAR(196)); WRITE(CHAR(193));
FOR J:=1 TO 12 DO WRITE(CHAR(196)); WRITE(CHAR(193));
FOR J:=1 TO 10 DO WRITE(CHAR(196)); WRITE(CHAR(193));
FOR J:=1 TO 13 DO WRITE(CHAR(196)); WRITE(CHAR(217));
GOTOXY(10,I+10); TEXTCOLOR(11); WRITE('Tekan "SEMBARANG TOMBOL" Untuk Melanjutkan.....!');
WRITE('^G'); READKEY; TEXTCOLOR(10); I:=1; END; END;
END; CLOSE(FPONDASI);
END
ELSE BEGIN
CLRSCR; TEXTCOLOR(11); GOTOXY(20,5);
WRITE(' PROSES DISAIN BELUM DILAKUKAN'); GOTOXY(15,7);
WRITE('Tekan "SEMBARANG TOMBOL" Untuk Melanjutkan.....!'); WRITE('^G'); READKEY;
TEXTCOLOR(10); END; CHDIR(DIRAK);
END.

```

```

=====
MICROFEAP-P1          DATE: 10-25-1996          <DATA> P.1
OBJECT   : TUGAS AKHIR                               FILENAME: TAKHIR
AUTHORITY: PETRA CIVIL ENGINEERING 1986             ENGINEER: FN ABDI
=====

```

```

*****
*                                     *
*   STRUCTURE DATA                 *
*                                     *
*****

```

COORDINATE DATA (mm)**			**BOUNDARY DATA**		
DE	1-COOR	2-COOR	1-B	2-B	3-B
1	0.00	0.00	L	L	F
2	0.00	6000.00			
3	0.00	10000.00			
4	5500.00	0.00	L	L	F
5	5500.00	6000.00			
6	5500.00	10000.00			
7	9500.00	0.00	L	L	F
8	9500.00	6000.00			
9	9500.00	10000.00			
10	15000.00	0.00	L	L	F
11	15000.00	6000.00			
12	15000.00	10000.00			

ELEMENT DATA**				
EM	1-NODE	2-NODE	HINGE	MATERIAL
1	1	2		3
2	2	3		4
3	4	5		3
4	5	6		4
5	7	8		3
6	8	9		4
7	10	11		3
8	11	12		4
9	2	5		1
10	5	8		1
11	8	11		1
12	3	6		2
13	6	9		2
14	9	12		2

MATERIAL DATA**			
ITE	E-MODULUS (N/mm ²)	AXIAL-AREA (mm ²)	INERTIA (mm ⁴)
1	2.574D+04	2.000D+05	4.170D+09

=====

MICROFEAP-P1

DATE: 10-25-1996

<DATA> P.2

PROJECT : TUGAS AKHIR

FILENAME: TAKHIR

INSTITUTION: PETRA CIVIL ENGINEERING 1986

ENGINEER: FN ABDI

=====

MATERIAL DATA**

ITEM	E-MODULUS (N/mm ²)	AXIAL-AREA (mm ²)	INERTIA (mm ⁴)
2	2.574D+04	1.200D+05	1.600D+09
3	2.574D+04	2.500D+05	5.210D+09
4	2.574D+04	1.256D+05	1.256D+09

LOAD CASE #1 : BEBAN MATI

UNIFORM LOAD DATA**

ITEM	1-UNIFORM (N/mm)	2-UNIFORM (N/mm)
9	0.000D+00	-2.300D+01
10	0.000D+00	-2.300D+01
11	0.000D+00	-2.300D+01
12	0.000D+00	-2.100D+01
13	0.000D+00	-2.100D+01
14	0.000D+00	-2.100D+01

LOAD CASE #2 : BEBAN HIDUP

UNIFORM LOAD DATA**

ITEM	1-UNIFORM (N/mm)	2-UNIFORM (N/mm)
9	0.000D+00	-3.000D+00
10	0.000D+00	-3.000D+00
11	0.000D+00	-3.000D+00
12	0.000D+00	-3.000D+00
13	0.000D+00	-3.000D+00
14	0.000D+00	-3.000D+00

LOAD CASE #3 : GAYA GEMPA

NODAL FORCE DATA**

NODE	1-FORC (N)	2-FORC (N)	3-FORC (N-mm)
2	6.400D+01	0.000D+00	0.000D+00
3	1.280D+02	0.000D+00	0.000D+00

```

=====
MICROFEAP-P1                      DATE: 10-25-1996                      <COMB> P.1
OBJECT : TUGAS AKHIR
AUTHORITY: PETRA CIVIL ENGINEERING 1986                      ENGINEER: FN ABDI
=====

```

```

*****
*                                *
*  COMBINATION                  *
*                                *
*****

```

SPLACEMENT COMBINATION <2D-FRAME SYSTEM>
AD FACTOR : 1.05/.63/1.05

DE	1-DISP (mm)	2-DISP (mm)	3-DISP (Rad)
1	0.0000D+00	0.0000D+00	1.5673D-04
2	2.4168D-02	-1.2156D-01	-3.2554D-04
3	8.6540D-02	-1.9806D-01	-1.0355D-03
4	0.0000D+00	0.0000D+00	-8.0872D-05
5	3.7483D-02	-2.2779D-01	1.4300D-04
6	5.7592D-02	-3.7338D-01	4.8241D-04
7	0.0000D+00	0.0000D+00	6.2268D-05
8	4.2476D-02	-2.2784D-01	-1.4577D-04
9	4.6516D-02	-3.7345D-01	-4.8410D-04
10	0.0000D+00	0.0000D+00	-1.7380D-04
11	5.5818D-02	-1.2176D-01	3.1969D-04
12	1.7733D-02	-1.9830D-01	1.0327D-03

RESS COMBINATION <2D-FRAME SYSTEM>
AD FACTOR : 1.05/.63/1.05

EM	MA	HINGE SECTION (mm)	AXIAL F. (N)	SHEAR (N)	MOMENT (N-mm)
1	3	0.00	-1.3038D+05	-3.5935D+03	-1.0000D+00
		1000.00	-1.3038D+05	-3.5935D+03	-3.5935D+06
		2000.00	-1.3038D+05	-3.5935D+03	-7.1870D+06
		3000.00	-1.3038D+05	-3.5935D+03	-1.0780D+07
		4000.00	-1.3038D+05	-3.5935D+03	-1.4374D+07
		5000.00	-1.3038D+05	-3.5935D+03	-1.7967D+07
		6000.00	-1.3038D+05	-3.5935D+03	-2.1561D+07
2	4	0.00	-6.1837D+04	-1.6124D+04	2.6510D+07
		666.67	-6.1837D+04	-1.6124D+04	1.5760D+07
		1333.33	-6.1837D+04	-1.6124D+04	5.0108D+06
		2000.00	-6.1837D+04	-1.6124D+04	-5.7388D+06
		2666.67	-6.1837D+04	-1.6124D+04	-1.6488D+07
		3333.33	-6.1837D+04	-1.6124D+04	-2.7238D+07
		4000.00	-6.1837D+04	-1.6124D+04	-3.7988D+07
3	3	0.00	-2.4433D+05	1.6681D+03	0.0000D+00

=====

MICROFEAP-F1

DATE: 10-25-1996

<COMB> P.2

OBJECT : TUGAS AKHIR

FILENAME: TAKHIR

AUTHORITY: PETRA CIVIL ENGINEERING 1986

ENGINEER: FN ABDI

=====

RESS COMBINATION <2D-FRAME SYSTEM>

LOAD FACTOR : 1.05/.63/1.05

EM	MA	HINGE SECTION (mm)	AXIAL F. (N)	SHEAR (N)	MOMENT (N-mm)
3	3	1000.00	-2.4433D+05	1.6681D+03	1.6681D+06
		2000.00	-2.4433D+05	1.6681D+03	3.3362D+06
		3000.00	-2.4433D+05	1.6681D+03	5.0044D+06
		4000.00	-2.4433D+05	1.6681D+03	6.6725D+06
		5000.00	-2.4433D+05	1.6681D+03	8.3406D+06
		6000.00	-2.4433D+05	1.6681D+03	1.0009D+07
4	4	0.00	-1.1769D+05	7.7050D+03	-1.2667D+07
		666.67	-1.1769D+05	7.7050D+03	-7.5298D+06
		1333.33	-1.1769D+05	7.7050D+03	-2.3931D+06
		2000.00	-1.1769D+05	7.7050D+03	2.7436D+06
		2666.67	-1.1769D+05	7.7050D+03	7.8802D+06
		3333.33	-1.1769D+05	7.7050D+03	1.3017D+07
		4000.00	-1.1769D+05	7.7050D+03	1.8154D+07
5	3	0.00	-2.4438D+05	-1.5502D+03	0.0000D+00
		1000.00	-2.4438D+05	-1.5502D+03	-1.5502D+06
		2000.00	-2.4438D+05	-1.5502D+03	-3.1003D+06
		3000.00	-2.4438D+05	-1.5502D+03	-4.6505D+06
		4000.00	-2.4438D+05	-1.5502D+03	-6.2006D+06
		5000.00	-2.4438D+05	-1.5502D+03	-7.7508D+06
		6000.00	-2.4438D+05	-1.5502D+03	-9.3009D+06
6	4	0.00	-1.1770D+05	-7.6127D+03	1.2491D+07
		666.67	-1.1770D+05	-7.6127D+03	7.4155D+06
		1333.33	-1.1770D+05	-7.6127D+03	2.3403D+06
		2000.00	-1.1770D+05	-7.6127D+03	-2.7348D+06
		2666.67	-1.1770D+05	-7.6127D+03	-7.8099D+06
		3333.33	-1.1770D+05	-7.6127D+03	-1.2885D+07
		4000.00	-1.1770D+05	-7.6127D+03	-1.7960D+07
7	3	0.00	-1.3060D+05	3.6771D+03	0.0000D+00
		1000.00	-1.3060D+05	3.6771D+03	3.6771D+06
		2000.00	-1.3060D+05	3.6771D+03	7.3542D+06
		3000.00	-1.3060D+05	3.6771D+03	1.1031D+07
		4000.00	-1.3060D+05	3.6771D+03	1.4708D+07
		5000.00	-1.3060D+05	3.6771D+03	1.8386D+07
		6000.00	-1.3060D+05	3.6771D+03	2.2063D+07
8	4	0.00	-6.1874D+04	1.6166D+04	-2.6570D+07
		666.67	-6.1874D+04	1.6166D+04	-1.5792D+07
		1333.33	-6.1874D+04	1.6166D+04	-5.0145D+06
		2000.00	-6.1874D+04	1.6166D+04	5.7632D+06
		2666.67	-6.1874D+04	1.6166D+04	1.6541D+07
		3333.33	-6.1874D+04	1.6166D+04	2.7319D+07
		4000.00	-6.1874D+04	1.6166D+04	3.8096D+07

MICROFEAP-F1

DATE: 10-25-1996

<COMB> P.3

PROJECT : TUGAS AKHIR

FILENAME: TAKHI

AUTHORITY: PETRA CIVIL ENGINEERING 1986

ENGINEER: FN ABDI

STRESS COMBINATION <2D-FRAME SYSTEM>

LOAD FACTOR : 1.05/.63/1.05

ELEM	MA	HINGE	SECTION (mm)	AXIAL F. (N)	SHEAR (N)	MOMENT (N-mm)
9	1	0.00	1.2464D+04	6.8546D+04	-4.8071D+07	
		916.67	1.2464D+04	4.4676D+04	3.8222D+06	
		1833.33	1.2464D+04	2.0806D+04	3.3835D+07	
		2750.00	1.2464D+04	-3.0642D+03	4.1966D+07	
		3666.67	1.2464D+04	-2.6934D+04	2.8217D+07	
		4583.33	1.2464D+04	5.0804D+04	-7.4130D+06	
		5500.00	1.2464D+04	7.4674D+04	-6.4924D+07	
10	1	0.00	6.4268D+03	5.1969D+04	-4.2249D+07	
		666.67	6.4268D+03	3.4609D+04	-1.3389D+07	
		1333.33	6.4268D+03	1.7249D+04	3.8971D+06	
		2000.00	6.4268D+03	-1.1058D+02	9.6101D+06	
		2666.67	6.4268D+03	-1.7471D+04	3.7497D+06	
		3333.33	6.4268D+03	-3.4831D+04	-1.3684D+07	
		4000.00	6.4268D+03	-5.2191D+04	-4.2691D+07	
11	1	0.00	1.2489D+04	7.4492D+04	-6.4483D+07	
		916.67	1.2489D+04	5.0622D+04	-7.1388D+06	
		1833.33	1.2489D+04	2.6752D+04	2.8324D+07	
		2750.00	1.2489D+04	2.8818D+03	4.1906D+07	
		3666.67	1.2489D+04	-2.0988D+04	3.3607D+07	
		4583.33	1.2489D+04	-4.4858D+04	3.4280D+06	
		5500.00	1.2489D+04	-6.8728D+04	-4.8633D+07	
12	2	0.00	-1.6259D+04	6.1837D+04	-3.7988D+07	
		916.67	-1.6259D+04	3.9892D+04	8.6384D+06	
		1833.33	-1.6259D+04	1.7947D+04	3.5148D+07	
		2750.00	-1.6259D+04	-3.9977D+03	4.1542D+07	
		3666.67	-1.6259D+04	-2.5943D+04	2.7819D+07	
		4583.33	-1.6259D+04	-4.7888D+04	-6.0198D+06	
		5500.00	-1.6259D+04	-6.9833D+04	-5.9975D+07	
13	2	0.00	-8.5538D+03	4.7854D+04	-4.1821D+07	
		666.67	-8.5538D+03	3.1894D+04	-1.5238D+07	
		1333.33	-8.5538D+03	1.5934D+04	7.0465D+05	
		2000.00	-8.5538D+03	-2.5522D+01	6.0076D+06	
		2666.67	-8.5538D+03	-1.5986D+04	6.7062D+05	
		3333.33	-8.5538D+03	-3.1946D+04	-1.5306D+07	
		4000.00	-8.5538D+03	-4.7906D+04	-4.1923D+07	
14	2	0.00	-1.6166D+04	6.9796D+04	-5.9884D+07	
		916.67	-1.6166D+04	4.7851D+04	-5.9617D+06	
		1833.33	-1.6166D+04	2.5906D+04	2.7844D+07	
		2750.00	-1.6166D+04	3.9613D+03	4.1533D+07	
		3666.67	-1.6166D+04	-1.7984D+04	3.5106D+07	
		4583.33	-1.6166D+04	-3.7929D+04	8.5632D+06	

MICROFEAP-P1

DATE: 10-25-1996

<COMB> P.4

PROJECT : TUGAS AKHIR

FILENAME: TAKHI

AUTHORITY: PETRA CIVIL ENGINEERING 1986

ENGINEER: FN ABDI

STRESS COMBINATION <2D-FRAME SYSTEM>

LOAD FACTOR : 1.05/.63/1.05

MEM	MA	HINGE SECTION (mm)	AXIAL F. (N)	SHEAR (N)	MOMENT (N-mm)
14	2	5500.00	-1.6166D+04	-6.1874D+04	-3.8096D+07

SUPPORT REACTIONS <2D-FRAME SYSTEM>

LOAD FACTOR : 1.05/.63/1.05

NODE	1-REACTION (N)	2-REACTION (N)	3-REACTION (N-mm)
1	3.5935D+03	1.3038D+05	0.0000D+00
4	-1.6681D+03	2.4433D+05	0.0000D+00
7	1.5502D+03	2.4438D+05	0.0000D+00
10	-3.6771D+03	1.3060D+05	0.0000D+00

VOLUME OF MATERIALS <2D-FRAME SYSTEM>

SETS VOLUME
(mm^3)

1	3.0000D+09
2	1.8000D+09
3	6.0000D+09
4	2.0096D+09

Manual Penggunaan Program Disain Elemen Struktur Beton Dengan Inputing Data Dari Program Microfeaf II (P1-Module)

Untuk menggunakan program disain elemen struktur beton ini diperlukan file data keluaran dari program microfeaf atau file data yang dibuat dengan program editor (seperti edit line dalam DOS, Sidekick, WS dan lainnya) non dokumen dengan ekstension file .TXT.

File data tersebut berisi gaya-gaya yang bekerja pada elemen portal beton yang akan didisain dengan urutan data sebagai berikut:

Elemen-Section-Gaya Aksial-Gaya Geser-Momen

Dalam pengeksekusian, program tersebut dapat langsung dipanggil dari prompt atau direktori dimana program tersebut berada, dengan nama UII-CDP.

Pada saat program dieksekusi akan tampak di layar logo program, untuk melanjutkan dapat ditekan sembarang tombol maka akan tampak di layar menu isian sebagai berikut:

```
DIREKTORI YANG SEDANG AKTIF : C:\UII-CDUI
DIREKTORI FILE DATA ANDA    : A:\
U : ulang    L : lanjutkan ===>
```

Direktori yang sedang aktif adalah drive atau direktori dimana program berada.

Direktori file data anda adalah menu isian yang harus diisikan, di direktori mana data akan disimpan. Seperti contoh di atas DIREKTORI YANG SEDANG AKTIF berisi C:\UII-CDUI artinya program tersimpan pada direktori C:\UII-CDUI. DIREKTORI FILE DATA ANDA berisi A:\ artinya semua file data yang akan dibuat akan disimpan pada direktori A:\ , dan di bawahnya tampak menu pilihan U:Ulang L:Lanjutkan, pilih U bila ingin mengulang pengisian direktori file data anda, pilih L untuk melanjutkan eksekusi program.

>>> PROGRAM DISAIN ELEMEN STRUKTUR BETON <<<
**** Nama File Data : T-AKHIR D FILE DATA P DISAIN ELEMEN PLAT B DISAIN ELEMEN BALOK K DISAIN ELEMEN KOLOM F DISAIN ELEMEN PONDASI S SELESAI
Pilih ? :

Bila pilihan L, akan tampak pada layar menu pilihan PROGRAM DISAIN ELEMEN STRUKTUR BETON seperti di atas.

>>> PROGRAM DISAIN ELEMEN STRUKTUR BETON <<<
<p>**** Nama File Data : T-AKHIR</p> <p>D FILE DATA</p> <p>P DISAIN ELEMEN PLAT</p> <p>B DISAIN ELEMEN BALOK</p> <p>K DISAIN ELEMEN KOLOM</p> <p>F DISAIN ELEMEN PONDASI</p> <p>S SELESAI</p>
Pilih ? :

Nama File Data : adalah nama file data yang akan digunakan untuk diakses atau dibuat dalam pemasukan data maupun proses disain. Kalau file data belum pernah dibuat dengan program ini, maka nama file data akan kosong. Seperti contoh di atas nama file data yang sedang aktif adalah T-AKHIR.

D FILE DATA : menu pilihan untuk membuat, merubah file data yang aktif, merubah isi file data.

P DISAIN ELEMEN PLAT : menu pilihan untuk mendisain elemen plat.

B DISAIN ELEMEN BALOK : menu pilihan untuk mendisain elemen balok.

K DISAIN ELEMEN KOLOM: menu pilihan untuk mendisain elemen kolom.

F DISAIN ELEMEN PONDASI: menu pilihan untuk mendisain elemen pondasi.

S SELESAI : menu pilihan untuk keluar dari program ini.

Bila menu pilihan di isikan (**D**), akan tampak di layar menu pilihan FILE DATA sebagai berikut:

>>> FILE DATA <<<	
B	MEMBUAT FILE DATA BARU
R	MERUBAH FILE DATA YANG AKTIF
I	MERUBAH ISI FILE DATA YANG AKTIF
S	SELESAI
===> Pilih ?	

Pilihan (**B**) untuk membuat file data baru.

Pilihan (**R**) untuk merubah file data yang sedang aktif. Untuk merubah file data yang sedang aktif dengan file data yang lain, file data yang dimaksud harus sudah pernah dibuat.

Pilihan (**I**) untuk merubah isi file data yang sedang aktif dengan isian-isian yang baru.

Bila menu pilihan diisikan (**B**) maka akan tampak di layar menu isian seperti sebagai berikut:

PROGRAM DISAIN ELEMEN STRUKTUR BETON	
Nama Proyek	:
Nama File Data	:
File Data Microfeap II	:
Engineer	:

U : ulang L : lanjutkan ===>

File Data Microfeap II diisi dengan nama file data keluaran Microfeap II atau file data gaya berekstension TXT. Jika semua isian sudah diisi dan di pilih menu pilihan (L) akan tampak kembali menu pilihan FILE DATA sebagai berikut:

>>> FILE DATA <<<	
B	MEMBUAT FILE DATA BARU
R	MERUBAH FILE DATA YANG AKTIF
I	MERUBAH ISI FILE DATA YANG AKTIF
S	SELESAI
===> Pilih ?	

Bila menu pilihan diisi (R) maka akan tampak di layar menu isian sebagai berikut:

FILE DATA YANG SEDANG AKTIF : T-AKHIR
DIRUBAH DENGAN FILE DATA : T-AKHIR

U : ulang L : lanjutkan ===>

[-AKHIR

File data yang aktif dapat dirubah dengan file data yang lain dengan mengisi nama file datanya. Pada contoh di atas file data yang aktif tidak dirubah. Di bawah menu isian terdapat nama-nama file yang pernah dibuat, untuk contoh di atas hanya terdapat satu file data yaitu T-AKHIR.

Bila menu pilihan diisi (L) maka akan tampak kembali menu pilihan FILE DATA seperti di bawah ini:

>>> FILE DATA <<<	
B	MEMBUAT FILE DATA BARU
R	MERUBAH FILE DATA YANG AKTIF
I	MERUBAH ISI FILE DATA YANG AKTIF
S	SELESAI
==> Pilih ?	

Bila menu pilihan diisikan (I) maka akan tampak di layar menu isian sebagai berikut:

PROGRAM DISAIN ELEMEN STRUKTUR BETON	
Nama Proyek	: GEDUNG SEKOLAH
File Data Microfeap II	: TAKHIR.TXT
Engineer	: FN ABDI

U : ulang L : lanjutkan ==>
 File Data Microfeap II pada menu isian di atas harus berekstension TXT, seperti contoh di atas file data yang berisi data gaya-gaya yang terjadi pada struktur portal beton adalah TAKHIR.TXT.

Bila menu pilihan diisikan (L) maka akan tampak kembali menu pilihan FILE DATA sebagai berikut:

>>> FILE DATA <<<	
B	MEMBUAT FILE DATA BARU
R	MERUBAH FILE DATA YANG AKTIF
I	MERUBAH ISI FILE DATA YANG AKTIF
S	SELESAI
===> Pilih ?	

Bila menu pilihan diisikan (S) maka akan tampak menu pilihan utama sebagai berikut:

>>> PROGRAM DISAIN ELEMEN STRUKTUR BETON <<<	
<p>**** Nama File Data : T-AKHIR</p> <p>D FILE DATA</p> <p>P DISAIN ELEMEN PLAT</p> <p>B DISAIN ELEMEN BALOK</p> <p>K DISAIN ELEMEN KOLOM</p> <p>F DISAIN ELEMEN PONDASI</p> <p>S SELESAI</p>	
Pilih ? :	

Bila menu pilihan utama di atas diisikan (P) maka akan tampak di layar menu pilihan DISAIN ELEMEN PLAT seperti di bawah ini:

>>> DISAIN ELEMEN PLAT <<<	
D	DATA
P	PROSES DISAIN
M	MENAMPILKAN DATA DISAIN
H	HASIL DISAIN
G	SKETSA HASIL DISAIN
S	SELESAI
==> Pilih ?	

Pilihan (**D**) untuk memasukan data-data elemen struktur plat.

Pilihan (**P**) untuk proses disain elemen struktur plat.

Pilihan (**M**) untuk menampilkan data-data elemen struktur plat yang sudah dimasukan.

Pilihan (**H**) untuk menampilkan hasil disain elemen plat yang diproses.

Pilihan (**G**) untuk menampilkan hasil disain elemen plat dalam bentuk gambar sketsa.

Pilihan (**S**) untuk kembali pada menu pilihan utama.

Bila menu pilihan DISAIN ELEMEN PLAT diisikan (**D**) maka akan tampak menu pilihan DATA sebagai berikut:

>>> DATA <<<			
J	JUMLAH TIPE	PLAT :	3
B	DATA BAHAN		
D	DATA DIMENSI	PLAT	
G	DATA GAYA YANG BEKERJA	PADA	PLAT
S	SELESAI		
====> Pilih ?			

Pilihan (**J**) untuk memasukan jumlah tipe elemen struktur plat yang akan didisain.

Pilihan (**B**) untuk memasukan spesifikasi bahan yang digunakan untuk disain elemen struktur plat.

Pilihan (**D**) untuk memasukan data-data dimensi elemen struktur plat yang akan didisain.

Pilihan (**G**) untuk memasukan gaya yang bekerja pada elemen plat.

Pilihan (**S**) untuk untuk kembali pada menu pilihan DISAIN ELEMEN PLAT.

Bila menu pilihan DISAIN ELEMEN PLAT diisikan (**J**) maka akan tampak menu isian sebagai berikut:

JUMLAH TIPE PLAT DISAIN ? : 3

U : ulang L : lanjutkan ==>

Jumlah tipe plat disain pada contoh di atas adalah tiga tipe atau tiga macam dimensi dan kondisi plat yang berbeda.

Bila menu pilihan diisikan (L) maka di layar akan tampak kembali menu pilihan DATA sebagai berikut:

>>> DATA <<<			
J	JUMLAH TIPE	PLAT :	3
B	DATA BAHAN		
D	DATA DIMENSI	PLAT	
G	DATA GAYA YANG BEKERJA PADA	PLAT	
S	SELESAI		
==> Pilih ?			

Bila menu pilihan tersebut diisikan (B) maka akan tampak menu isian DATA BAHAN seperti di bawah:

>>> DATA BAHAN <<<		
PLAT Tipe : 2		
Teg. Desak Beton (f_c)--->MPa	Teg. Tarik Baja (f_y)--->MPa	Mod. Elastisitas Baja (E_s)--->MPa
30	300	210000

U : ulang L : lanjutkan ==>

Menu isian DATA BAHAN di atas untuk mengisi data bahan masing-masing tipe plat, setelah masing-masing tipe diisi dan menu pilihan diisi (L) maka akan tampak di layar menu isian DIAMETER TULANGAN YANG DIGUNAKAN seperti di bawah ini:

>>> DIAMETER TULANGAN YANG AKAN DIGUNAKAN <<<		
PLAT Tipe : 2		
No.	Diameter Tulangan Pokok (D_p)--->mm	Diameter Tulangan Sengkang (D_s)--->mm
1		

Isikan No. = 0 jika sudah selesai ... !

Untuk mengakhiri pengisian diameter tulangan yang digunakan masing-masing tipe plat isikan 0 pada kolom No.

Setelah semua diameter tulangan yang akan digunakan untuk masing-masing tipe plat diisi dan mengisi No. = 0 pada tipe plat terakhir maka akan tampak kembali menu pilihan DATA sebagai berikut:

>>> DATA <<<			
J	JUMLAH TIPE	PLAT :	3
B	DATA BAHAN		
D	DATA DIMENSI	PLAT	
G	DATA GAYA YANG BEKERJA PADA	PLAT	
S	SELESAI		
==> Pilih ?			

Bila pada menu pilihan DATA di atas diisikan (D) maka akan tampak menu isian seperti di bawah ini:

>>> DATA DIMENSI <<<		
PLAT Tipe : 1		
Panjang p.k.p (L)--->mm	Lebar p.k.p (B)--->mm	Penutup Beton (Pb)--->mm
4000	2000	50

Jenis Plat : 1. Plat Satu Arah.
 2. Plat Dua Arah.
 Pilih ? : 2

U : ulang L : lanjutkan ==>

Bila semua isian pada menu isian DATA DIMENSI di atas sudah diisikan maka dan jenis plat diisikan (2) yaitu plat dua arah serta pilihan (L) maka akan tampak menu pilihan sebagai berikut ini:

>>> DATA DIMENSI <<<
Komponen Struktur Plat Tipe : 1
1. Dengan Balok Tepi. 2. Tanpa Balok Tepi.
PILIH ?

Bila salah satu dari dua pilihan pada menu di atas diisikan, maka akan tampak menu isian DATA DIMENSI sebagai berikut:

>>> DATA DIMENSI <<<
PLAT Tipe : 1
Tebal Plat Minimum (hmin)--->mm Tebal Plat Rencana (h)--->mm
88.89 100

U : ulang L : lanjutkan ==>

Bila pada pilihan Jenis Plat dipilih (1) yaitu Plat Satu Arah maka akan tampak menu pilihan sebagai berikut:

>>> DATA DIMENSI <<<
Komponen Struktur Plat Tipe : 2
1. Dua Tumpuan. 2. Kantilever.
PILIH ?

Bila salah satu dari dua pilihan pada menu di atas diisikan, maka akan tampak menu isian DATA DIMENSI sebagai berikut:

>>> DATA DIMENSI <<<
PLAT Tipe : 2
Tebal Plat Minimum (hmin)--->mm Tebal Plat Rencana (h)--->mm
125.00 130

U : ulang L : lanjutkan ==>

Bila isian Tebal Plat Rencana sudah diisikan dan menu pilihan diisikan (L) maka akan tampak menu pilihan DATA kembali seperti berikut ini:

>>> DATA <<<			
J	JUMLAH TIPE	PLAT :	3
B	DATA BAHAN		
D	DATA DIMENSI	PLAT	
G	DATA GAYA YANG BEKERJA PADA	PLAT	
S	SELESAI		
====> Pilih ?			

Bila diisikan (G) pada menu pilihan di atas maka akan tampak di layar menu isian seperti di bawah ini.

Dan bila semua isian pada menu tersebut sudah diisikan dan pilihan (L) Lanjutkan.

Plat Tipe : 1
 Beban Merata Yg Bekerja Pada Plat ? (kPa) : 8.24
 Plat Ditumpu Pada Keempat Sisinya : 1. Jepit Elastis Atau Menerus.
 2. Jepit Penuh.
 ====> Pilih : 1

U : ulang L : lanjutkan ====>

>>> PERLETAKAN PADA SISI-SISI PLAT <<<
PLAT TIPE : 1
1. Keempat Sisi Terletak Bebas. 2. Keempat Sisi Terjepit Elastis. 3. Dua Sisi (Panjang & Pendek) Terjepit Elastis. 4. Dua Sisi (Pendek) Terjepit Elastis. 5. Dua Sisi (Panjang) Terjepit Elastis. 6. Sisi Pendek Terjepit Elastis. 7. Sisi Panjang Terjepit Elastis. 8. Tiga Sisi Terjepit Elastis & Satu Sisi Pendek Terletak Bebas. 9. Tiga Sisi Terjepit Elastis & Satu Sisi Panjang Terletak Bebas.
PILIH ? 2

U : ulang L : lanjutkan ==>

Bila dipilih (1) Jepit Elastis Atau Menerus maka akan tampak menu pilihan seperti di atas.

Bila dipilih (2) Jepit Penuh maka akan tampak menu pilihan seperti di bawah ini.

>>> PERLETAKAN PADA SISI-SISI PLAT <<<
PLAT TIPE : 2
1. Keempat Sisi Terletak Bebas. 2. Keempat Sisi Terjepit Penuh. 3. Dua Sisi (Panjang & Pendek) Terjepit Penuh. 4. Dua Sisi (Pendek) Terjepit Penuh. 5. Dua Sisi (Panjang) Terjepit Penuh. 6. Sisi Pendek Terjepit Penuh. 7. Sisi Panjang Terjepit Penuh. 8. Tiga Sisi Terjepit Penuh & Satu Sisi Pendek Terletak Bebas. 9. Tiga Sisi Terjepit Penuh & Satu Sisi Panjang Terletak Bebas.
PILIH ? 5

U : ulang L : lanjutkan ==>

Bila menu pilihan tersebut telah diisikan dan dipilih (L) maka akan tampak kembali menu pilihan DATA seperti di bawah ini:

>>> DATA <<<			
J	JUMLAH TIPE	PLAT :	3
B	DATA BAHAN		
D	DATA DIMENSI	PLAT	
G	DATA GAYA YANG BEKERJA PADA	PLAT	
S	SELESAI		
====> Pilih ?			

Bila pilihan diisikan (S) pada menu pilihan tersebut maka akan tampak kembali menu pilihan DISAIN ELEMEN PLAT seperti berikut ini:

>>> DISAIN ELEMEN PLAT <<<	
D	DATA
P	PROSES DISAIN
M	MENAMPILKAN DATA DISAIN
H	HASIL DISAIN
G	SKETSA HASIL DISAIN
S	SELESAI
==> Pilih ?	

Bila dipilih (**P**) pada menu pilihan di atas maka akan dilakukan proses disain elemen plat dengan data-data yang telah dimasukan.

Bila dipilih (**M**) pada menu pilihan di atas maka akan ditampilkan data-data yang telah diisikan.

Bila dipilih (**H**) pada menu pilihan di atas maka akan ditampilkan hasil disain elemen plat yang telah diproses tersebut.

Bila dipilih (**G**) pada menu pilihan di atas maka akan ditampilkan hasil disain elemen plat yang telah diproses tersebut dalam bentuk gambar sketsa.

Dan bila dipilih (**S**) pada menu pilihan di atas maka akan tampak kembali menu pilihan utama sebagai berikut ini:

>>> PROGRAM DISAIN ELEMEN STRUKTUR BETON <<<
<p>**** Nama File Data : T-AKHIR</p> <p>D FILE DATA</p> <p>P DISAIN ELEMEN PLAT</p> <p>B DISAIN ELEMEN BALOK</p> <p>K DISAIN ELEMEN KOLOM</p> <p>F DISAIN ELEMEN PONDASI</p> <p>S SELESAI</p>
Pilih ? :

Bila dipilih (**B**) pada menu utama di atas maka akan tampak di layar menu pilihan DISAIN ELEMEN BALOK seperti di bawah ini:

>>> DISAIN ELEMEN BALOK <<<
<p>D DATA</p> <p>P PROSES DISAIN</p> <p>M MENAMPILKAN DATA DISAIN</p> <p>H HASIL DISAIN</p> <p>G SKETSA HASIL DISAIN</p> <p>S SELESAI</p>
==> Pilih ?

Bila dipilih (**D**) pada menu pilihan di atas maka akan tampak di layar menu pilihan DATA sebagai berikut:

>>> DATA <<<			
J	JUMLAH TIPE	BALOK :	2
B	DATA BAHAN		
E	DATA ELEMEN	BALOK	
G	DATA GAYA YANG BEKERJA PADA	BALOK	
D	DATA DIMENSI	BALOK	
S	SELESAI		
==> Pilih ?			

Pilihan (**J**) untuk memasukan jumlah tipe elemen struktur balok yang akan didisain.

Pilihan (**B**) untuk memasukan spesifikasi bahan yang digunakan untuk disain elemen struktur balok.

Pilihan (**D**) untuk memasukan data-data dimensi elemen struktur balok yang akan didisain.

Pilihan (**G**) untuk memasukan gaya yang bekerja pada elemen balok.

Pilihan (**S**) untuk untuk kembali pada menu pilihan DISAIN ELEMEN BALOK.

Bila menu pilihan DISAIN ELEMEN BALOK diisikan (**J**) maka akan tampak menu isian sebagai berikut:

JUMLAH TIPE BALOK DISAIN ? : 2

U : ulang L : lanjutkan ==>

Bila menu isian telah diisikan dan dipilih (**L**) pada menu pilihannya maka akan tampak kembali menu pilihan DATA seperti di bawah ini:

>>> DATA <<<		
J	JUMLAH TIPE	BALOK : 2
B	DATA BAHAN	
E	DATA ELEMEN	BALOK
G	DATA GAYA YANG BEKERJA PADA	BALOK
D	DATA DIMENSI	BALOK
S	SELESAI	
==> Pilih ?		

Bila dipilih (**B**) pada menu pilihan di atas maka akan tampak menu isian DATA BAHAN dan DIAMETER TULANGAN YG DIGUNAKAN (seperti pada disain elemen plat, kolom, pondasi) seperti di bawah ini:

>>> DATA BAHAN <<<		
BALOK Tipe : 2		
Teg. Desak Beton (fc)--->MPa	Teg. Tarik Baja (fy)--->MPa	Mod. Elastisitas Baja (Es)--->MPa
30	400	210000

U : ulang L : lanjutkan ==>

Bila menu isian telah diisikan untuk masing-masing tipe balok dan menu pilihan dipilih (**L**) maka akan tampak kembali menu pilihan data sebagai berikut:

>>> DATA <<<			
J	JUMLAH TIPE	BALOK :	2
B	DATA BAHAN		
E	DATA ELEMEN	BALOK	
G	DATA GAYA YANG BEKERJA PADA	BALOK	
D	DATA DIMENSI	BALOK	
S	SELESAI		
==> Pilih ?			

Bila dipilih (E) pada menu pilihan di atas maka akan tampak menu isian DATA ELEMEN BALOK seperti di bawah ini.

>>> DATA ELEMEN BALOK <<<	
BALOK Tipe : 1	
Masukan Elemen No.	BALOK Yang Mempunyai Tipe Yg Sama Elemen
1	

Isikan No. = 0 jika sudah selesai ... !

Menu isian DATA ELEMEN BALOK adalah untuk memasukan data elemen-elemen balok pada portal beton atau portal dalam program Microfeap II yang mempunyai tipe atau dimensi-dimensi yang sama.

Untuk mengakhiri pemasukan elemen-elemen tiap tipe isikan 0 pada kolom No.

Dan bila semua elemen-elemen pada masing-masing tipe telah dimasukan maka akan tampak kembali menu pilihan DATA sebagai berikut:

>>> DATA <<<			
J	JUMLAH TIPE	BALOK :	2
B	DATA BAHAN		
E	DATA ELEMEN	BALOK	
G	DATA GAYA YANG BEKERJA PADA	BALOK	
D	DATA DIMENSI	BALOK	
S	SELESAI		
====> Pilih ?			

Bila dipilih (G) pada menu pilihan di atas maka akan dilakukan pembacaan file data gaya dari program Microfeap II dan tampak menu isian seperti di bawah ini:

```

Balok Tipe :    1
Momen Torsi Yang Terjadi Pada  BALOK ?  (Nmm) : 2000000
U : ulang    L : lanjutkan ====>

```

Setelah momen torsi yang bekerja pada balok untuk masing-masing tipe balok telah diisikan maka akan tampak kembali di layar menu pilihan DATA sebagai berikut:

>>> DATA <<<			
J	JUMLAH TIPE	BALOK :	2
B	DATA BAHAN		
E	DATA ELEMEN	BALOK	
G	DATA GAYA YANG BEKERJA PADA	BALOK	
D	DATA DIMENSI	BALOK	
S	SELESAI		
==> Pilih ?			

Bila dipilih (**D**) pada menu pilihan di atas maka akan tampak menu isian DATA DIMENSI seperti di bawah ini:

>>> DATA DIMENSI <<<			
BALOK Tipe : 1			
Bentang Balok (L)--->mm	Lebar (b)--->mm	Tinggi (h)--->mm	Penutup Beton (Pb)--->mm
5500.00	300	400	50

U : ulang L : lanjutkan ==>

Bila semua data dimensi balok untuk masing-masing tipe balok telah diisikan maka akan tampak kembali menu pilihan DATA sebagai berikut:

>>> DATA <<<			
J	JUMLAH TIPE	BALOK :	2
B	DATA BAHAN		
E	DATA ELEMEN	BALOK	
G	DATA GAYA YANG BEKERJA PADA	BALOK	
D	DATA DIMENSI	BALOK	
S	SELESAI		
==> Pilih ?			

Bila dipilih (S) pada menu pilihan di atas maka akan tampak kembali menu pilihan DISAIN ELEMEN BALOK seperti di bawah ini:

>>> DISAIN ELEMEN BALOK <<<	
D	DATA
P	PROSES DISAIN
M	MENAMPILKAN DATA DISAIN
H	HASIL DISAIN
G	SKETSA HASIL DISAIN
S	SELESAI
==> Pilih ?	

Bila dipilih (P) maka akan dilakukan proses disain elemen balok dengan data-data yang telah dimasukan. Bila dipilih (M) maka akan ditampilkan data-data yang telah diisikan. Bila dipilih (H) maka akan ditampilkan hasil disain elemen balok yang telah diproses tersebut. Bila dipilih (G) maka akan ditampilkan hasil disain elemen balok yang telah diproses tersebut dalam bentuk gambar sketsa.

Dan bila dipilih (S) maka akan tampak kembali menu pilihan utama sebagai berikut ini:

>>> PROGRAM DISAIN ELEMEN STRUKTUR BETON <<<
<p>**** Nama File Data : T-AKHIR</p> <p>D FILE DATA</p> <p>P DISAIN ELEMEN PLAT</p> <p>B DISAIN ELEMEN BALOK</p> <p>K DISAIN ELEMEN KOLOM</p> <p>F DISAIN ELEMEN PONDASI</p> <p>S SELESAI</p>
Pilih ? :

Bila dipilih (**K**) pada menu pilihan di atas maka akan tampak menu pilihan DISAIN ELEMEN KOLOM seperti di bawah ini:

>>> DISAIN ELEMEN KOLOM <<<
<p>D DATA</p> <p>P PROSES DISAIN</p> <p>M MENAMPILKAN DATA DISAIN</p> <p>H HASIL DISAIN</p> <p>G SKETSA HASIL DISAIN</p> <p>S SELESAI</p>
==> Pilih ?

Bila dipilih (**D**) pada menu pilihan di atas maka akan tampak menu pilihan DATA sebagai berikut:

>>> DATA <<<			
J	JUMLAH TIPE	KOLOM :	2
B	DATA BAHAN		
E	DATA ELEMEN	KOLOM	
G	DATA GAYA YANG BEKERJA PADA	KOLOM	
D	DATA DIMENSI	KOLOM	
S	SELESAI		
==> Pilih ?			

Pilihan (**J**) untuk memasukan jumlah tipe elemen struktur kolom yang akan didisain.

Pilihan (**B**) untuk memasukan spesifikasi bahan yang digunakan untuk disain elemen struktur kolom.

Pilihan (**D**) untuk memasukan data-data dimensi elemen struktur kolom yang akan didisain.

Pilihan (**G**) untuk memasukan gaya yang bekerja pada elemen kolom.

Pilihan (**S**) untuk untuk kembali pada menu pilihan DISAIN ELEMEN KOLOM.

Bila menu pilihan DISAIN ELEMEN KOLOM diisikan (**J**) maka akan tampak menu isian sebagai berikut:

JUMLAH TIPE KOLOM DISAIN ? : 2

U : ulang L : lanjutkan ==>

Bila menu isian telah diisikan dan dipilih (L) pada menu pilihannya maka akan tampak kembali menu pilihan DATA seperti di bawah ini:

>>> DATA <<<		
J	JUMLAH TIPE	KOLOM : 2
B	DATA BAHAN	
E	DATA ELEMEN	KOLOM
G	DATA GAYA YANG BEKERJA PADA	KOLOM
D	DATA DIMENSI	KOLOM
S	SELESAI	
====> Pilih ?		

Bila dipilih (B) pada menu pilihan di atas maka akan tampak menu isian DATA BAHAN seperti di bawah ini:

>>> DATA BAHAN <<<		
KOLOM Tipe : 2		
Teg. Desak Beton (fc)--->MPa	Teg. Tarik Baja (fy)--->MPa	Mod. Elastisitas Baja (Es)--->MPa
30	400	210000

U : ulang L : lanjutkan ====>

Bila menu isian telah diisikan untuk masing-masing tipe kolom dan menu pilihan dipilih (L) maka akan tampak menu pilihan DIAMETER TULANGAN YANG DIGUNAKAN sebagai berikut:

>>> DIAMETER TULANGAN YANG AKAN DIGUNAKAN <<<		
KOLOM Tipe : 2		
No.	Diameter Tulangan Pokok (Dp)--->mm	Diameter Tulangan Sengkang (Ds)--->mm
1		

Isikan No. = 0 jika sudah selesai ... !

Bila menu isian telah diisikan untuk masing-masing tipe kolom dan menu pilihan dipilih (L) maka akan tampak kembali menu pilihan DATA seperti di bawah ini:

>>> DATA <<<	
J	JUMLAH TIPE KOLOM : 2
B	DATA BAHAN
E	DATA ELEMEN KOLOM
G	DATA GAYA YANG BEKERJA PADA KOLOM
D	DATA DIMENSI KOLOM
S	SELESAI
===> Pilih ?	

Bila dipilih (E) pada menu pilihan di atas maka akan tampak menu isian DATA ELEMEN KOLOM seperti di bawah ini:

>>> DATA ELEMEN KOLOM <<<	
KOLOM Tipe :	1
Masukan Elemen No.	KOLOM Yang Mempunyai Tipe Yg Sama Elemen
1	

Isikan No. = 0 jika sudah selesai ... !

Menu isian DATA ELEMEN KOLOM adalah untuk memasukan data elemen-elemen kolom pada portal beton dalam program Microfeap II yang mempunyai tipe atau dimensi yang sama. Dan bila semua elemen-elemen pada masing-masing tipe telah dimasukan maka akan tampak kembali menu pilihan DATA sebagai berikut:

>>> DATA <<<	
J	JUMLAH TIPE KOLOM : 2
B	DATA BAHAN
E	DATA ELEMEN KOLOM
G	DATA GAYA YANG BEKERJA PADA KOLOM
D	DATA DIMENSI KOLOM
S	SELESAI
==> Pilih ?	

Bila dipilih (G) pada menu pilihan di atas maka akan dilakukan pembacaan pada file data dari Microfeap II atau file data gaya-gaya yang bekerja pada kolom yang dibuat dengan program lain tapi mempunyai struktur data/isi file yang sama:

Bila dipilih (D) pada menu pilihan di atas maka akan tampak menu pilihan DATA DIMENSI sebagai berikut ini:

>>> DATA DIMENSI <<<
BENTUK TULANGAN PENGIKAT KOLOM TIPE : 1
1. PENGIKAT SENGKANG. 2. PENGIKAT SPIRAL.
PILIH ?

Bila menu pilihan bentuk tulangan pengikat di atas telah dipilih maka akan tampak menu isian rasio penulangan kolom seperti di bawah ini.

PERKIRAAN RASIO PENULANGAN KOLOM TIPE : 1 (1%-3%) ? 2

Bila menu isian rasio penulangan kolom di atas telah diisikan dan pilihan bentuk penampang adalah penampang kolom persegi akan tampak di layar menu isian DATA DIMENSI sebagai berikut:

>>> DATA DIMENSI <<<			
KOLOM Tipe : 1			
Panjang Kolom (L)--->mm	Lebar (b)--->mm	Tinggi (h)--->mm	Penutup Beton (Pb)--->mm
4000.00	400	400	40

U : ulang L : lanjutkan ===>

Bila pada menu pilihan bentuk penampang kolom dipilih bentuk penampang kolom lingkaran maka akan tampak menu isian DATA DIMENSI seperti di bawah ini:

>>> DATA DIMENSI <<<		
KOLOM Tipe : 2		
Tinggi Kolom (L)--->mm	Diameter Kolom (D)--->mm	Penutup Beton (Pb)--->mm
4000.00	600	50

U : ulang L : lanjutkan ===> S

Bila semua menu pilihan dan menu isian DATA DIMENSI sudah diisikan maka akan tampak kembali menu pilihan DATA sebagai berikut:

>>> DATA <<<			
J	JUMLAH TIPE	KOLOM :	2
B	DATA BAHAN		
E	DATA ELEMEN	KOLOM	
G	DATA GAYA YANG BEKERJA PADA	KOLOM	
D	DATA DIMENSI	KOLOM	
S	SELESAI		
====> Pilih ?			

Bila dipilih (S) pada menu pilihan di atas maka akan tampak kembali menu pilihan DISAIN ELEMEN KOLOM seperti di bawah ini:

>>> DISAIN ELEMEN KOLOM <<<	
D	DATA
P	PROSES DISAIN
M	MENAMPILKAN DATA DISAIN
H	HASIL DISAIN
G	SKETSA HASIL DISAIN
S	SELESAI
====> Pilih ?	

Bila dipilih (P) maka akan dilakukan proses disain elemen kolom dengan data-data yang telah dimasukan. Bila dipilih (M) maka akan ditampilkan data-data yang telah diisikan. Bila dipilih (H) maka akan ditampilkan hasil disain elemen kolom yang telah diproses tersebut. Bila dipilih (G) maka akan ditampilkan hasil disain elemen kolom yang telah diproses tersebut dalam bentuk gambar sketsa. Dan bila dipilih (S) maka akan tampak kembali menu pilihan utama sebagai berikut ini:

>>> PROGRAM DISAIN ELEMEN STRUKTUR BETON <<<
<p>**** Nama File Data : T-AKHIR</p> <p>D FILE DATA</p> <p>P DISAIN ELEMEN PLAT</p> <p>B DISAIN ELEMEN BALOK</p> <p>K DISAIN ELEMEN KOLOM</p> <p>F DISAIN ELEMEN PONDASI</p> <p>S SELESAI</p>
Pilih ? :

Bila dipilih (F) pada menu pilihan di atas maka akan tampak menu pilihan DISAIN ELEMEN PONDASI seperti di bawah ini:

>>> DISAIN ELEMEN PONDASI <<<
<p>D DATA</p> <p>P PROSES DISAIN</p> <p>M MENAMPILKAN DATA DISAIN</p> <p>H HASIL DISAIN</p> <p>G SKETSA HASIL DISAIN</p> <p>S SELESAI</p>
==> Pilih ?

Bila dipilih (D) pada menu pilihan di atas maka akan tampak menu pilihan DATA sebagai berikut:

>>> DATA <<<	
J	JUMLAH TIPE PONDASI : 2
B	DATA BAHAN
E	DATA ELEMEN PONDASI
G	DATA GAYA YANG BEKERJA PADA PONDASI
D	DATA DIMENSI PONDASI
S	SELESAI
==> Pilih ?	

Pilihan (**J**) untuk memasukan jumlah tipe elemen struktur pondasi yang akan didisain.

Pilihan (**B**) untuk memasukan spesifikasi bahan yang digunakan untuk disain elemen struktur pondasi.

Pilihan (**D**) untuk memasukan data-data dimensi elemen struktur pondasi yang akan didisain.

Pilihan (**G**) untuk memasukan gaya yang bekerja pada elemen pondasi.

Pilihan (**S**) untuk untuk kembali pada menu pilihan DISAIN ELEMEN PONDASI.

Bila menu pilihan DISAIN ELEMEN PONDASI diisikan (**J**) maka akan tampak menu isian sebagai berikut:

JUMLAH TIPE PONDASI DISAIN ? : 2

U : ulang L : lanjutkan ==>

Bila menu isian telah diisikan dan dipilih (**L**) pada menu pilihannya maka akan tampak kembali menu pilihan DATA seperti di bawah ini:

>>> DATA <<<	
J	JUMLAH TIPE PONDASI : 2
B	DATA BAHAN
E	DATA ELEMEN PONDASI
G	DATA GAYA YANG BEKERJA PADA PONDASI
D	DATA DIMENSI PONDASI
S	SELESAI
===> Pilih ?	

Bila dipilih (**B**) pada menu pilihan di atas maka akan tampak menu isian DATA BAHAN seperti di bawah ini:

>>> DATA BAHAN <<<		
PONDASI Tipe : 1		
Teg. Desak Beton Kolom--->MPa	Teg. Desak Beton Pondasi--->MPa	Teg. Tarik Baja (Fy)--->MPa

U : ulang L : lanjutkan ===>

Bila menu isian telah diisikan untuk masing-masing tipe pondasi dan menu pilihan dipilih (**L**) maka akan tampak menu pilihan DIAMETER TULANGAN YANG DIGUNAKAN sebagai berikut:

>>> DIAMETER TULANGAN YANG AKAN DIGUNAKAN <<<	
PONDASI Tipe : 1	
No.	Diameter Tulangan Pokok (Dp)--->mm
1	

Isikan No. = 0 jika sudah selesai ... !

Bila menu isian telah diisikan untuk masing-masing tipe pondasi dan menu pilihan dipilih (L) maka akan tampak kembali menu pilihan DATA seperti di bawah ini:

>>> DATA <<<	
J	JUMLAH TIPE PONDASI : 2
B	DATA BAHAN
E	DATA ELEMEN PONDASI
G	DATA GAYA YANG BEKERJA PADA PONDASI
D	DATA DIMENSI PONDASI
S	SELESAI
==> Pilih ?	

Bila dipilih (E) pada menu pilihan di atas maka akan tampak menu isian DATA ELEMEN PONDASI seperti di bawah ini:

>>> DATA ELEMEN PONDASI <<<
PONDASI Tipe : 1
Masukan Elemen PONDASI Yang Mempunyai Tipe Yg Sama No. Elemen
1

Isikan No. = 0 jika sudah selesai ... !

Menu isian DATA ELEMEN PONDASI adalah untuk memasukan elemen kolom di atas pondasi pada portal beton dalam program Microfeap II yang mempunyai tipe yang sama. Dan bila semua elemen-elemen pada masing-masing tipe telah dimasukan maka akan tampak kembali menu pilihan DATA sebagai berikut:

>>> DATA <<<
J JUMLAH TIPE PONDASI : 2 B DATA BAHAN E DATA ELEMEN PONDASI G DATA GAYA YANG BEKERJA PADA PONDASI D DATA DIMENSI PONDASI S SELESAI
==> Pilih ?

Bila dipilih (G) pada menu pilihan di atas maka akan dilakukan pembacaan pada file data dari Microfeap II atau file data gaya-gaya yang bekerja pada pondasi yang dibuat dengan program lain tapi mempunyai struktur data/isi file yang sama dan akan tampak menu isian sebagai berikut:

ndasi Tipe : 1
gangan Izin Tanah ? (kPa) : 260
ah Kerja Gaya Pada Pondasi : 1. Arah Kerja Satu Arah
2. Arah Kerja Dua Arah
lih Arah Kerja Pondasi ! : 2
: ulang L : lanjutkan ==>

Setelah semua isian dan pilihan di atas untuk masing-masing tipe pondasi diisikan
maka akan tampak kembali menu pilihan DATA seperti di bawah ini:

>>> DATA <<<	
J	JUMLAH TIPE PONDASI : 2
B	DATA BAHAN
E	DATA ELEMEN PONDASI
G	DATA GAYA YANG BEKERJA PADA PONDASI
D	DATA DIMENSI PONDASI
S	SELESAI
==> Pilih ?	

Bila dipilih (**D**) pada menu pilihan di atas maka akan tampak menu pilihan DATA

DIMENSI sebagai berikut ini:

>>> DATA DIMENSI <<<		
PONDASI Tipe : 1		
Panjang (L)--->mm	Tebal Plat Kaki (t)--->mm	Penutup Beton (Pb)--->mm

U : ulang L : lanjutkan ==>

Bila menu isian ini telah diisi maka akan tampak menu isian DATA DIMENSI seperti di bawah ini:

>>> DATA DIMENSI <<<			
PONDASI Tipe : 1			
Kedalaman Pondasi (Df)--->mm	Lebar Penampang Kolom (Bk)--->mm	Tinggi Penampang Kolom (Hk)--->mm	Diameter Tul. Pokok Kolom (Dpk)--->mm

U : ulang L : lanjutkan ==>

Bila semua menu pilihan dan menu isian DATA DIMENSI sudah diisikan maka akan tampak kembali menu pilihan DATA sebagai berikut:

>>> DATA <<<	
J	JUMLAH TIPE PONDASI : 2
B	DATA BAHAN
E	DATA ELEMEN PONDASI
G	DATA GAYA YANG BEKERJA PADA PONDASI
D	DATA DIMENSI PONDASI
S	SELESAI
==> Pilih ?	

Bila dipilih (S) pada menu pilihan di atas maka akan tampak kembali menu pilihan DISAIN ELEMEN PONDASI seperti di bawah ini:

Bila dipilih (P) maka akan dilakukan proses disain elemen pondasi dengan data-data yang telah dimasukan. Bila dipilih (M) maka akan ditampilkan data-data yang telah diisikan. Bila dipilih (H) maka akan ditampilkan hasil disain elemen pondasi yang telah diproses tersebut. Bila dipilih (G) maka akan ditampilkan hasil disain elemen pondasi yang telah diproses tersebut dalam bentuk gambar sketsa. Dan bila dipilih (S) maka akan tampak kembali menu pilihan utama.

>>> DISAIN ELEMEN PONDASI <<<	
D	DATA
P	PROSES DISAIN
M	MENAMPILKAN DATA DISAIN
H	HASIL DISAIN
G	SKETSA HASIL DISAIN
S	SELESAI
==> Pilih ?	

>>> PROGRAM DISAIN ELEMEN STRUKTUR BETON <<<
**** Nama File Data : T-AKHIR D FILE DATA P DISAIN ELEMEN PLAT B DISAIN ELEMEN BALOK K DISAIN ELEMEN KOLOM F DISAIN ELEMEN PONDASI S SELESAI
Pilih ? :

Bila dipilih (S) pada menu pilihan utama di atas maka akan keluar dari program ini.

UII-CDP PROGRAM DISAIN ELEMEN STRUKTUR BETON

AUTHORITY : UII CIVIL ENGINEERING 1996
 Proyek : KAMPUS
 Perencana : FN ABDI

DATA : PLAT
 Halaman : 1
 File Data : T-AKHIR

>>> DATA BAHAN <<<

Tipe Plat	Teg. Desak Beton (MPa)	Teg. Tarik Baja (MPa)	Mod. Elastisitas Baja (MPa)
1	30	300	200000
2	30	300	200000

>>> DIAMETER TULANGAN YANG AKAN DIGUNAKAN <<<

Tipe	No.	Diameter Tulangan Pokok (mm) Plat	Diameter Tulangan Sengkang (mm)
1	1	16	8
1	2	19	10
1	3	22	0
2	1	16	8
2	2	19	10
2	3	22	0

>>> DATA DIMENSI <<<

Tipe Plat	Panjang (mm)	Lebar (mm)	Tebal (mm)	Penutup Beton (mm)	Arah Kerja
1	4000	4000	100	40	2 Arah
2	5500	4000	110	40	2 Arah

>>> DATA GAYA-GAYA MAKSIMUM <<<

Tipe Plat	M Lap. x (Nmm)	M Lap. y (Nmm)	M Tum. x (Nmm)	M Tum. y (Nmm)
1	1.0E+05	1.0E+05	-9.95E+04	-9.95E+04
2	1.7E+05	1.2E+05	-1.71E+05	-1.23E+05

UII-CDP PROGRAM DISAIN ELEMEN STRUKTUR BETON

AUTHORITY : UII CIVIL ENGINEERING 1996
 Proyek : KAMPUS
 Perencana : FN ABDI

DATA : BALOK
 Halaman : 1
 File Data : T-AKHIR

>>> DATA BAHAN <<<

Tipe Balok	Teg. Desak Beton (MPa)	Teg. Tarik Baja (MPa)	Mod. Elastisitas Baja (MPa)
1	30	300	200000
2	30	300	200000

>>> DIAMETER TULANGAN YANG AKAN DIGUNAKAN <<<

Tipe Balok	No.	Diameter Tulangan Pokok (mm)	Diameter Tulangan Sengkang (mm)
1	1	12	6
1	2	18	8
1	3	20	10
2	1	12	6
2	2	16	8
2	3	18	10

>>> DATA ELEMEN BALOK <<<

Tipe	No.	Elemen
1	1	12
1	2	13
1	3	14
2	1	9
2	2	10
2	3	11

>>> DATA DIMENSI <<<

Tipe Balok	Bentang Balok (mm)	Lebar (mm)	Tinggi (mm)	Penutup Beton (mm)
1	5500	300	400	50
2	5500	400	500	50

UII-CDP PROGRAM DISAIN ELEMEN STRUKTUR BETON

AUTHORITY : UII CIVIL ENGINEERING 1996
 Proyek : KAMPUS
 Perencana : FN ABDI

DATA : BALOK
 Halaman : 2
 File Data : T-AKHIR

>>> DATA GAYA-GAYA MAKSIMUM <<<

Tipe Balok	M Lapangan (Nmm)	M Tumpuan (Nmm)	Gaya Geser (N)	M Torsi (Nmm)
1	4.15420E+07	-5.997500E+07	6.983E+04	2.00000E+07
2	4.19660E+07	-6.492400E+07	7.467E+04	3.00000E+07

UII-CDP PROGRAM DISAIN ELEMEN STRUKTUR BETON			
AUTHORITY : UII CIVIL ENGINEERING 1996	DATA	:	KOLOM
Proyek : KAMPUS	Halaman	:	1
Perencana : FN ABDI	File Data	:	T-AKHIR

>>> DATA BAHAN <<<			
Tipe Teg. Desak Beton Kolom	(MPa)	Teg. Tarik Baja (MPa)	Mod. Elastisitas Baja (MPa)
1	30	300	200000
2	30	300	200000

>>> DIAMETER TULANGAN YANG AKAN DIGUNAKAN <<<			
Tipe Kolom	No.	Diameter Tulangan Pokok (mm)	Diameter Tulangan Senggang (mm)
1	1	12	6
1	2	16	8
1	3	18	10
2	1	12	6
2	2	16	8
2	3	18	10

>>> DATA ELEMEN KOLOM <<<		
Tipe	No.	Elemen
1	1	2
1	2	4
1	3	6
1	4	8
2	1	1
2	2	3
2	3	5
2	4	7

>>> DATA DIMENSI <<<				
Tipe Kolom	Panjang (mm)	Lebar/Diameter (mm)	Tinggi (mm)	Penutup Beton (mm)
1	4000	400	0	40
2	6000	500	500	40

UII-CDP PROGRAM DISAIN ELEMEN STRUKTUR BETON

AUTHORITY : UII CIVIL ENGINEERING 1996
 Proyek : KAMPUS
 Perencana : FN ABDI

DATA : KOLOM
 Halaman : 2
 File Data : T-AKHIR

>>> DATA GAYA-GAYA MAKSIMUM <<<

Tipe Kolom	M 1 (Nmm)	M 2 (Nmm)	Gaya Geser (N)	Gaya Aksial (N)
1	3.8E+07	-2.7E+07	1.6E+04	1.2E+05
2	2.2E+07	-1.0E+00	3.7E+03	2.4E+05

UII-CDP PROGRAM DISAIN ELEMEN STRUKTUR BETON			
AUTHORITY : UII CIVIL ENGINEERING 1996	Data	:	PONDASI
Proyek : KAMPUS	Halaman	:	1
Perencana : FN ABDI	File Data	:	T-AKHIR

>>> DATA BAHAN <<<			
Tipe Pond.	Teg. Desak Beton Kolom (MPa)	Teg. Desak Beton Pond. (MPa)	Tegangan Tarik Baja (MPa)
1	30	30	300
2	30	30	300

>>> DIAMETER TULANGAN YANG AKAN DIGUNAKAN <<<		
Tipe Pondasi	No.	Diameter Tulangan Pokok (mm)
1	1	12
1	2	16
1	3	18
2	1	12
2	2	16
2	3	18

>>> DATA ELEMEN PONDASI <<<		
Tipe	No.	Elemen
1	1	3
1	2	5
2	1	1
2	2	7

>>> DATA DIMENSI <<<				
Tipe Pond.	Panjang (mm)	Tebal Plat (mm)	Kedalaman (mm)	Penutup Beton (mm)
1	1500	600	2000	75
2	1000	500	2000	75

>>> DATA GAYA-GAYA MAKSIMUM <<<			
Tipe Pond.	Gaya Aksial Kolom (N)	Tegangan Izin (kPa)	Arah Kerja
1	2.4E+05	2.6E+02	2 Arah
2	1.3E+05	2.6E+02	2 Arah

UII-CDP PROGRAM DISAIN ELEMEN STRUKTUR BETON					
AUTHORITY : UII CIVIL ENGINEERING 1996 DISAIN : PLAT Proyek : KAMPUS Halaman : 1 Perencana : FN ABDI File Data : T-AKHIR					
TIPE	ARAH MELEBAR		ARAH MEMANJANG		TULANGAN BAGI/ SUSUT
PLAT	LAPANGAN	TUMPUAN	LAPANGAN	TUMPUAN	
1	D16-500mm	D16-500mm	D16-500mm	D16-500mm	D10-390mm
2	D16-500mm	D16-500mm	D16-500mm	D16-500mm	D10-350mm

UII-CDP PENULANGAN BALOK YG MENDEKATI KEBUTUHAN

AUTHORITY : UII CIVIL ENGINEERING 1996 DISAIN : BALOK
 Proyek : KAMPUS Halaman : 1
 Perencana : FN ABDI File Data : T-AKHIR

TIPE BALOK	TUL.LAP BAWAH	TUL.LAP ATAS	TUL.TUM BAWAH	TUL.TUM ATAS	TULANGAN SENGKANG	TULANGAN TORSI
1	5D12	2D12	2D12	8D12	D10- 50mm	-
2	2D12	2D12	2D12	2D12	D10- 90mm	2D12

UII-CDP PROGRAM DISAIN ELEMEN STRUKTUR BETON

AUTHORITY : UII CIVIL ENGINEERING 1996 DISAIN : KOLOM
 Proyek : KAMPUS Halaman : 1
 Perencana : FN ABDI File Data : T-AKHIR

TIPE KOLOM	TULANGAN TARIK	TULANGAN DESAK	TULANGAN SPIRAL	TULANGAN SENGKANG
1	10D12	10D12	D10- 37 mm	-
2	10D12	10D12	-	D 6-192 mm