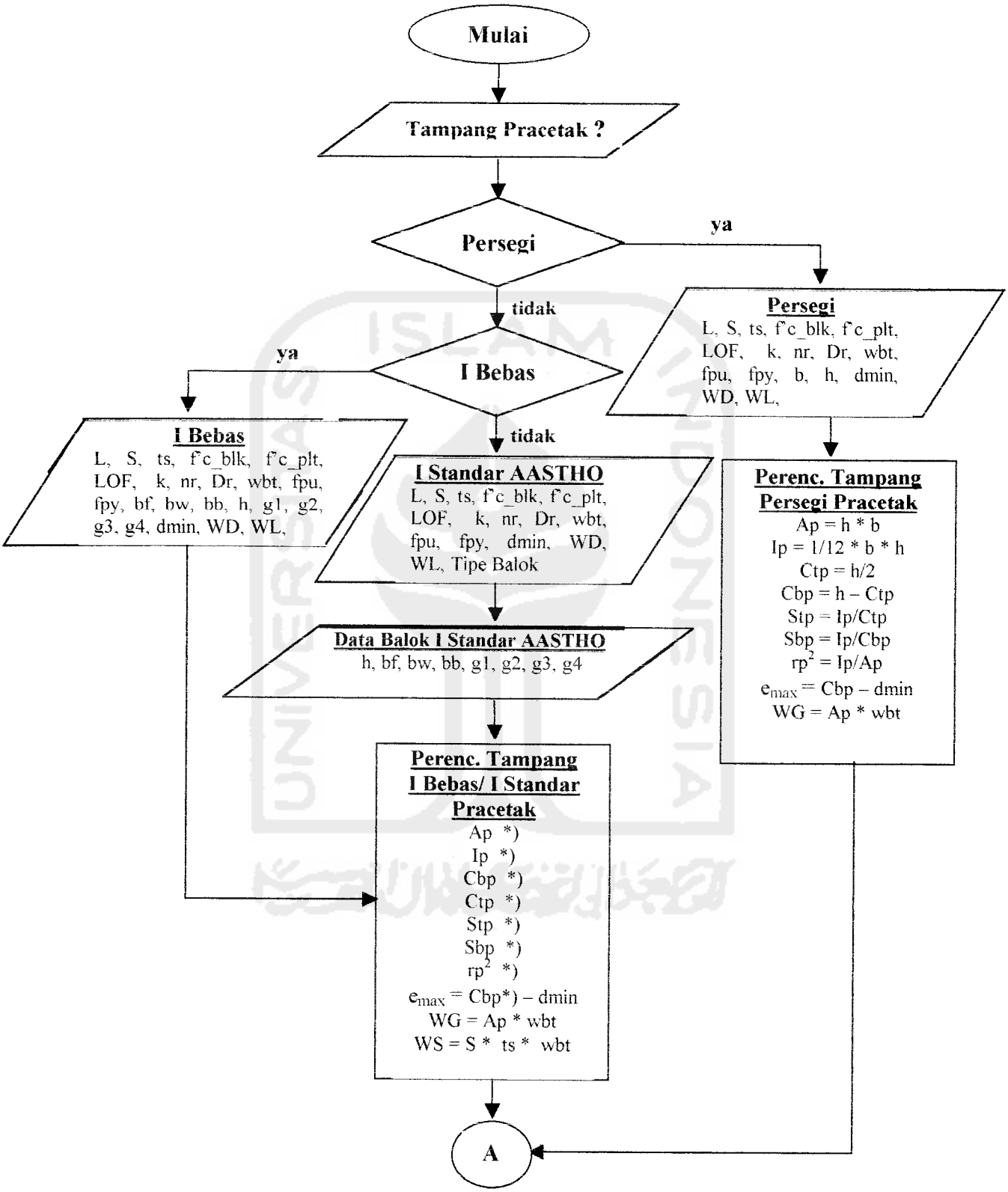
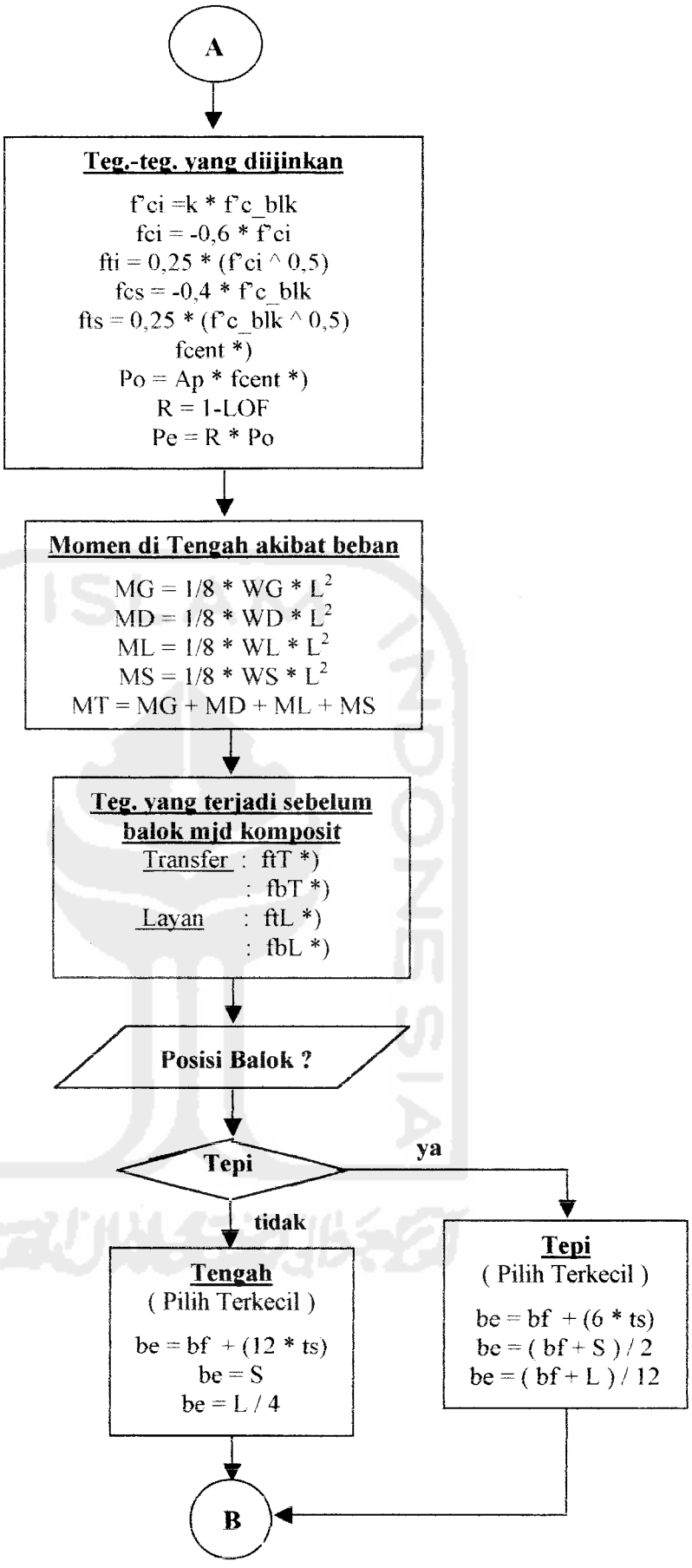
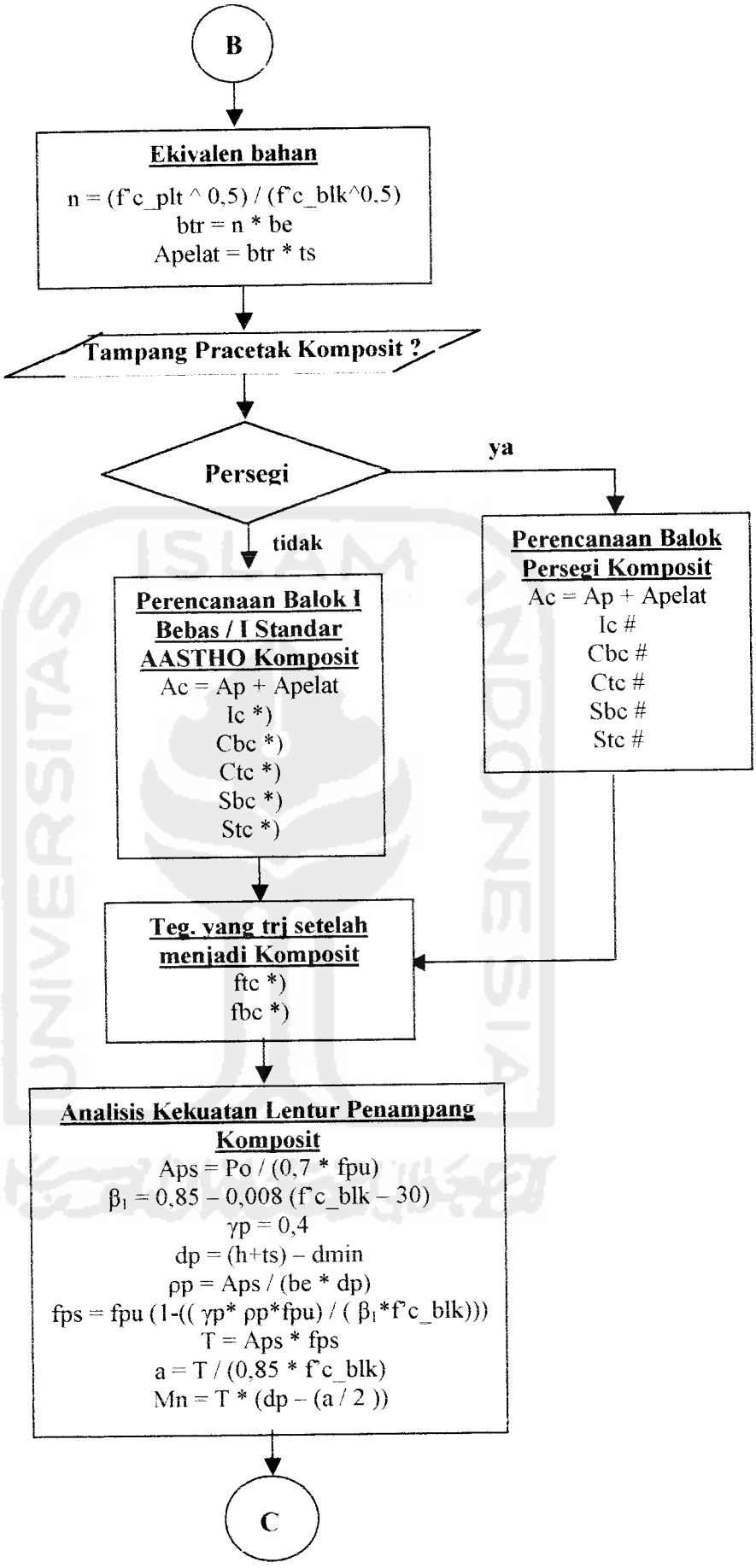
LAMPIRAN - LAMPIRAN

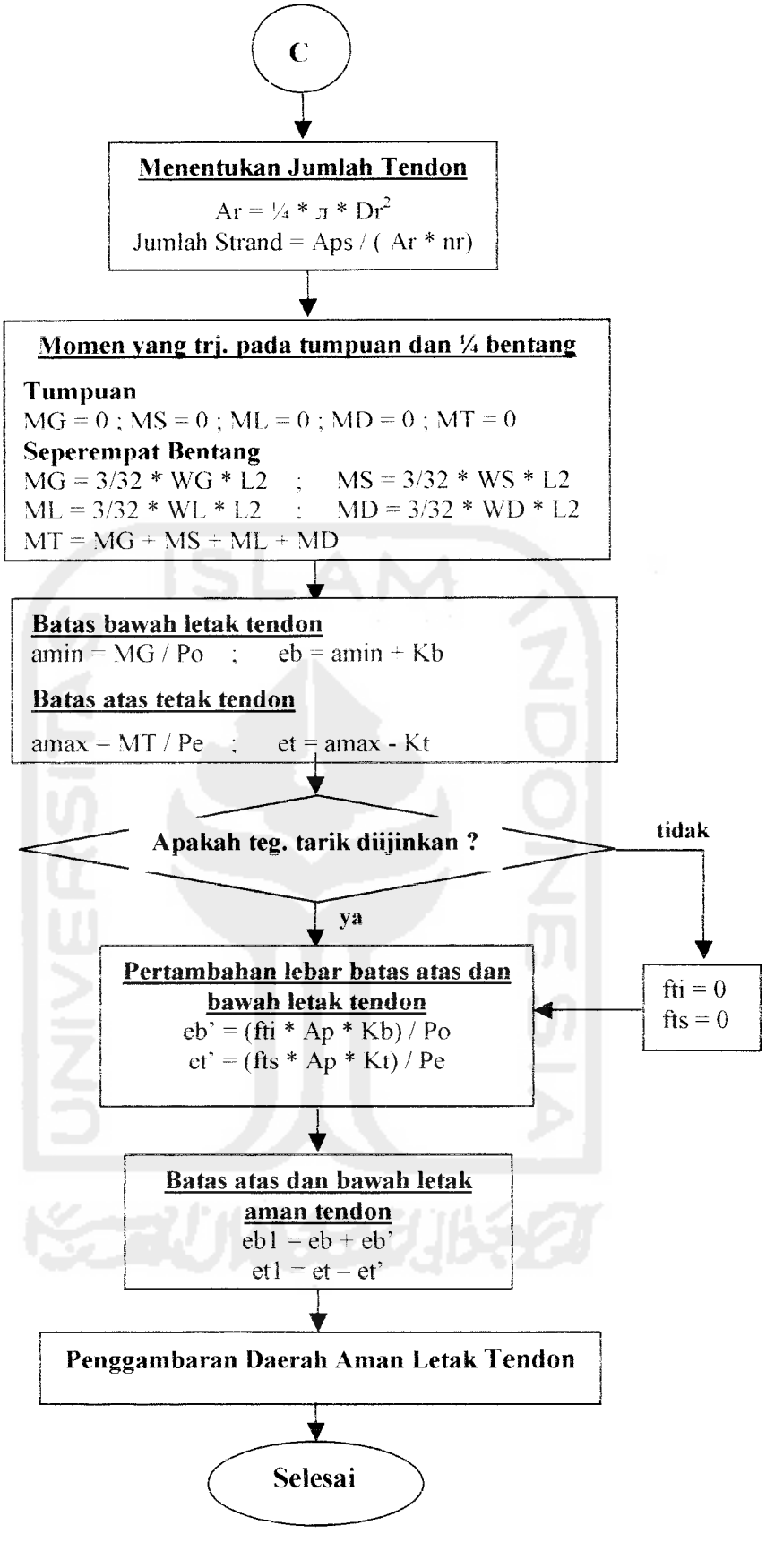
LAMPIRAN 1

FlowCart Analisis Balok Pracetak Pratekan Komposit dengan Pelat Cor di Tempat tanpa dukungan sementara sistim penarikan Pratarik




A
Teg.-teg. yang diijinkan
f'ci =k * f'c_blk
fci = -0,6 * f'ci
fti = 0,25 * (f'ci ^ 0,5)
fcs = -0,4 * f'c_blk
fts = 0,25 * (f'c_blk ^ 0,5)
fcent *)
Po = Ap * fcent *)
R = 1-LOF
Pe = R * Po
Momen di Tengah akibat beban
MG = 1/8 * WG * L2
MD = 1/8 * WD * L2
ML = 1/8 * WL * L2
MS = 1/8 * WS * L2
MT = MG + MD + ML + MS
Teg. yang terjadi sebelum balok mjd komposit
Transfer : ftT *)
: fbT *)
Layan : ftL *)
: fbL *)
Posisi Balok ?
Tepi
ya
tidak
Tengah
(Pilih Terkecil)
be = bf + (12 * ts)
be = S
be = L / 4
Tepi
(Pilih Terkecil)
be = bf + (6 * ts)
be = (bf + S) / 2
be = (bf + L) / 12
B


B
Ekivalen bahan
n = (f'c_plt ^ 0,5) / (f'c_blk^0,5)
btr = n * be
Apelat = btr * ts
Tampang Pracetak Komposit ?
Persegi
ya
tidak
Perencanaan Balok Persegi Komposit
Ac = Ap + Apelat
Ic #
Cbc #
Ctc #
Sbc #
Stc #
Perencanaan Balok I Bebas / I Standar AASTHO Komposit
Ac = Ap + Apelat
Ic *)
Cbc *)
Ctc *)
Sbc *)
Stc *)
Teg. yang trj setelah menjadi Komposit
ftc *)
fbc *)
Analisis Kekuatan Lentur Penampang Komposit
Aps = Po / (0,7 * fpu)
β1 = 0,85 – 0,008 (f'c_blk – 30)
γp = 0,4
dp = (h+ts) – dmin
ρp = Aps / (be * dp)
fps = fpu (1-((γp* ρp*fpu) / (β1*f'c_blk)))
T = Aps * fps
a = T / (0,85 * f'c_blk)
Mn = T * (dp – (a / 2))
C


C
Menentukan Jumlah Tendon
Ar = ¼ * л * Dr²
Jumlah Strand = Aps / (Ar * nr)
Momen yang trj. pada tumpuan dan ¼ bentang
Tumpuan
MG = 0 ; MS = 0 ; ML = 0 ; MD = 0 ; MT = 0
Seperempat Bentang
MG = 3/32 * WG * L2 ; MS = 3/32 * WS * L2
ML = 3/32 * WL * L2 ; MD = 3/32 * WD * L2
MT = MG + MS + ML + MD
Batas bawah letak tendon
amin = MG / Po ; eb = amin + Kb
Batas atas tetak tendon
amax = MT / Pe ; et = amax - Kt
Apakah teg. tarik diijinkan ?
tidak
ya
fti = 0
fts = 0
Pertambahan lebar batas atas dan bawah letak tendon
eb' = (fti * Ap * Kb) / Po
et' = (fts * Ap * Kt) / Pe
Batas atas dan bawah letak aman tendon
eb1 = eb + eb'
et1 = et – et'
Penggambaran Daerah Aman Letak Tendon
Selesai

Keterangan :

Ap *) = A1 + A2 + A3 + A4 + A5

A1 = bf * g1

A2 = (0,5 * (bf - bw) * g2)

A3 = (h - g1 - g4) * bw

A4 = (0,5 * (bb - bw) * g3)

A5 = bb * g4

Cbp *) = ((A1 * (h - (g1 / 2))) + (A2 * (h - g1- ((2 / 3) * g2))) + (A3 * (((h - g1 - g4) / 2) + g4)) + (A4 * (((2 / 3) * g3) + g4) + (A5 * (g4 / 2))) / Ap

Ctp *) = h - Cbp

Ip *) = (((1 / 12) * bf * (g1 ^ 3)) + (A1 * (Ctp - (g1 / 2)) ^ 2)) + ((((1 / 36) * ((bf - bw) / 2) * (g2 ^ 3))* 2) + (A2 * (Ctp - ((2 / 3) * g2)) ^ 2) + (((1 / 12) * bw * ((h - g1 - g4) ^ 3)) + (A3 * (Ctp - ((h - g1 - g4) / 2)) ^ 2) + ((((1 / 36) * ((bb - bw) / 2) * (g3 ^ 3)) * 2) + (A4 * (Cbp - g4 - ((2 / 3) * g3)) ^ 2)) + (((1 / 12) * bb * (g4 ^ 3)) + (A5 * (Cbp - (g4 / 2)) ^ 2))

Stp *) = Ip / Ctp

Sbp *) = Ip / Cbp

rp^2 *) = Ip / Ap

Kt *) = rp^2 / Cbp

Kb *) = rp^2 / Ctp

ftT *) = ((-Po / Ap) * (1 - ((emax * Ctp) / rp^2))) - (MG / Stp)

fbT *) = ((-Po / Ap) * (1 + ((emax * Cbp) / rp^2))) + (MG / Sbp)

ftL *) = ((-Pe / Ap) * (1- ((emax * Ctp) / rp^2))) - ((MG + MS) / Stp)

fbL *) = ((-Pe / Ap) * (1 + ((emax * Cbp) / rp^2))) + ((MG + MS) / Sbp)

Ic *) = (Ip + (Ap * (Cbc - Cbp) ^ 2)) + (((1 / 12) * btr * (ts ^ 3)) + (Apelat * (Ctc - (ts / 2)) ^ 2))

Cbc *) = ((Apelat * (h + (ts / 2))) + (Ap * Cbp)) / Ac

Ctc *) = (h + ts) - Cbc

Stc *) = Ic / Ctc

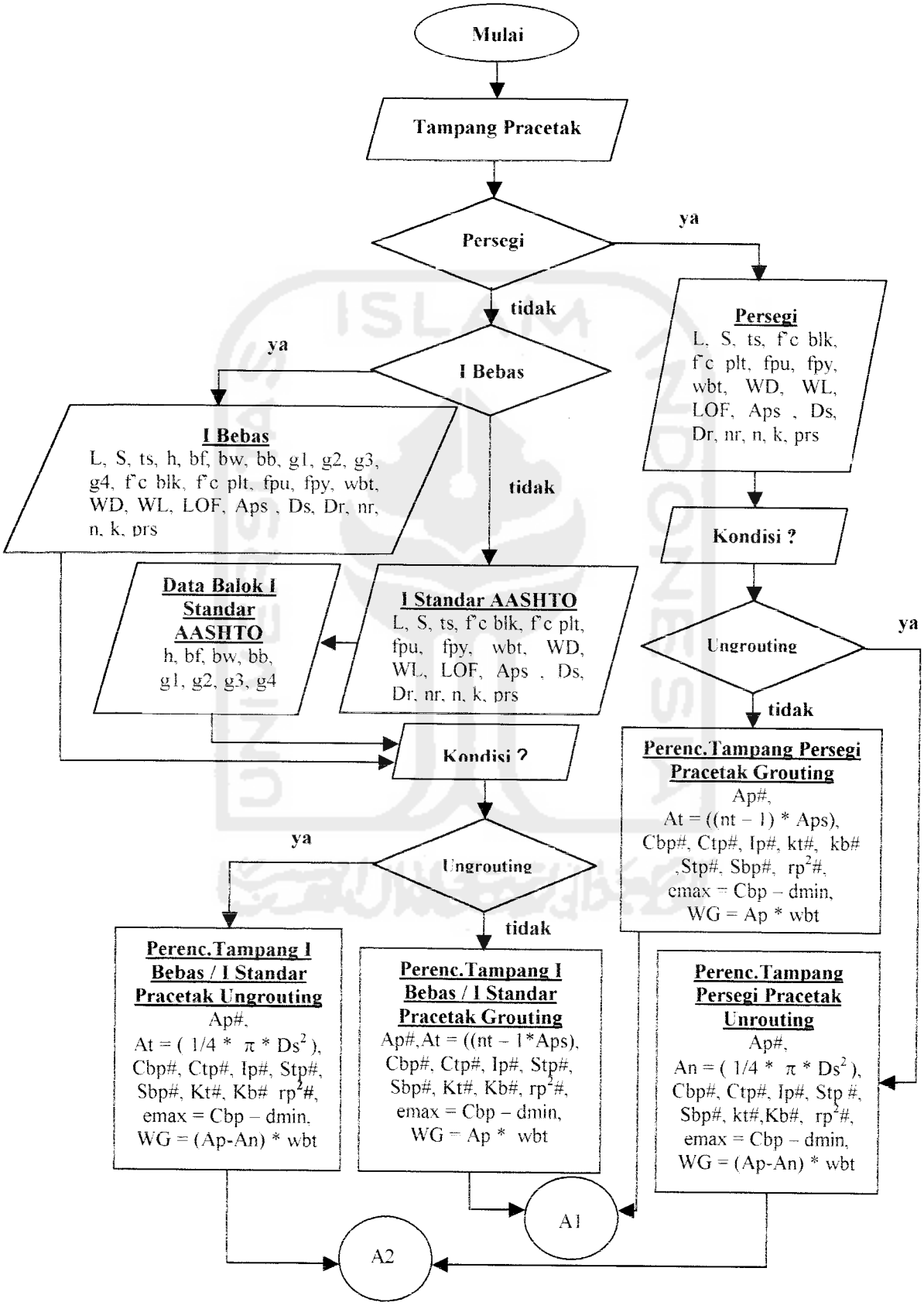
Sbc *) = Ic / Cbc

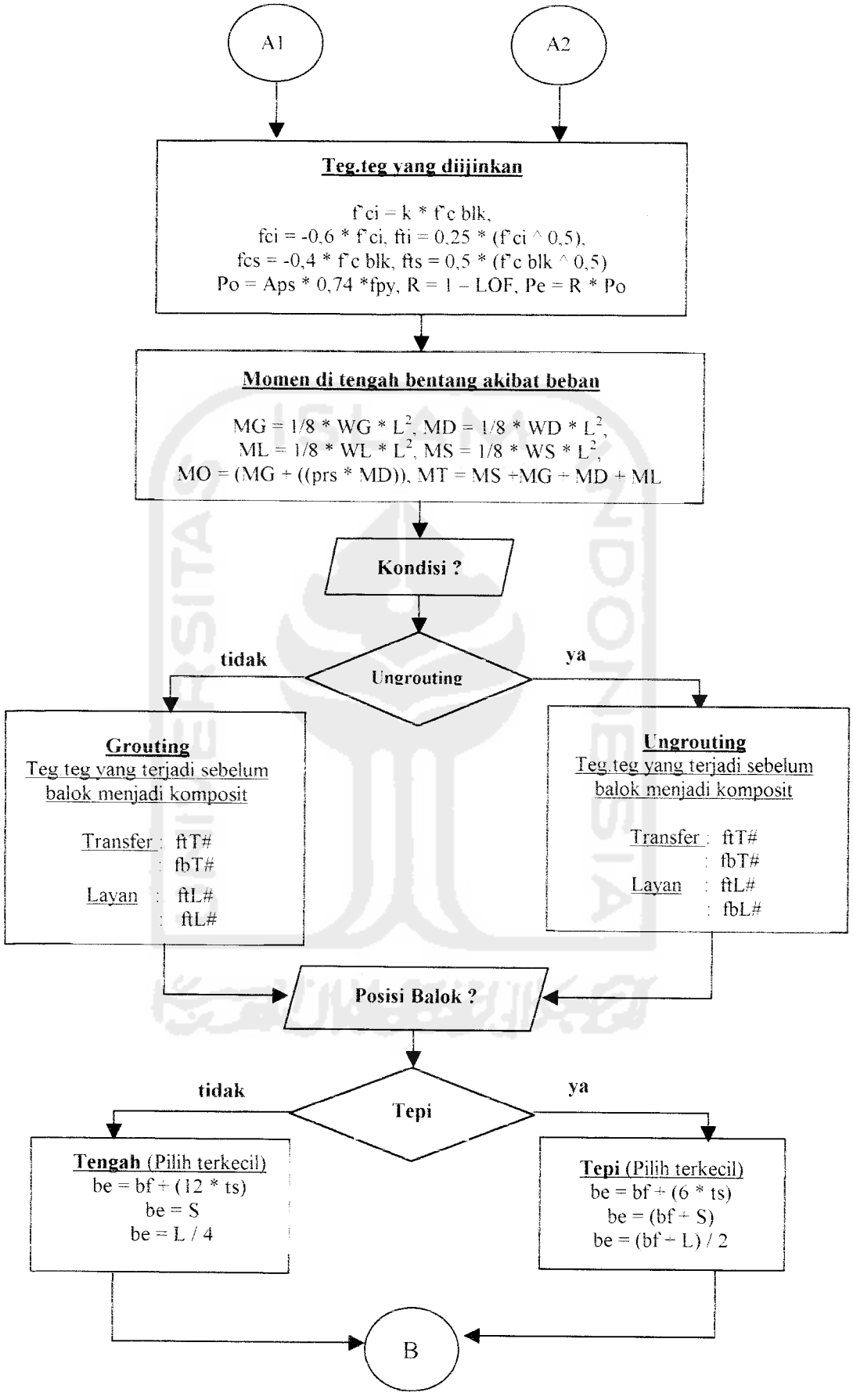
ftc *) = ftL - ((MD + ML) / Stc)

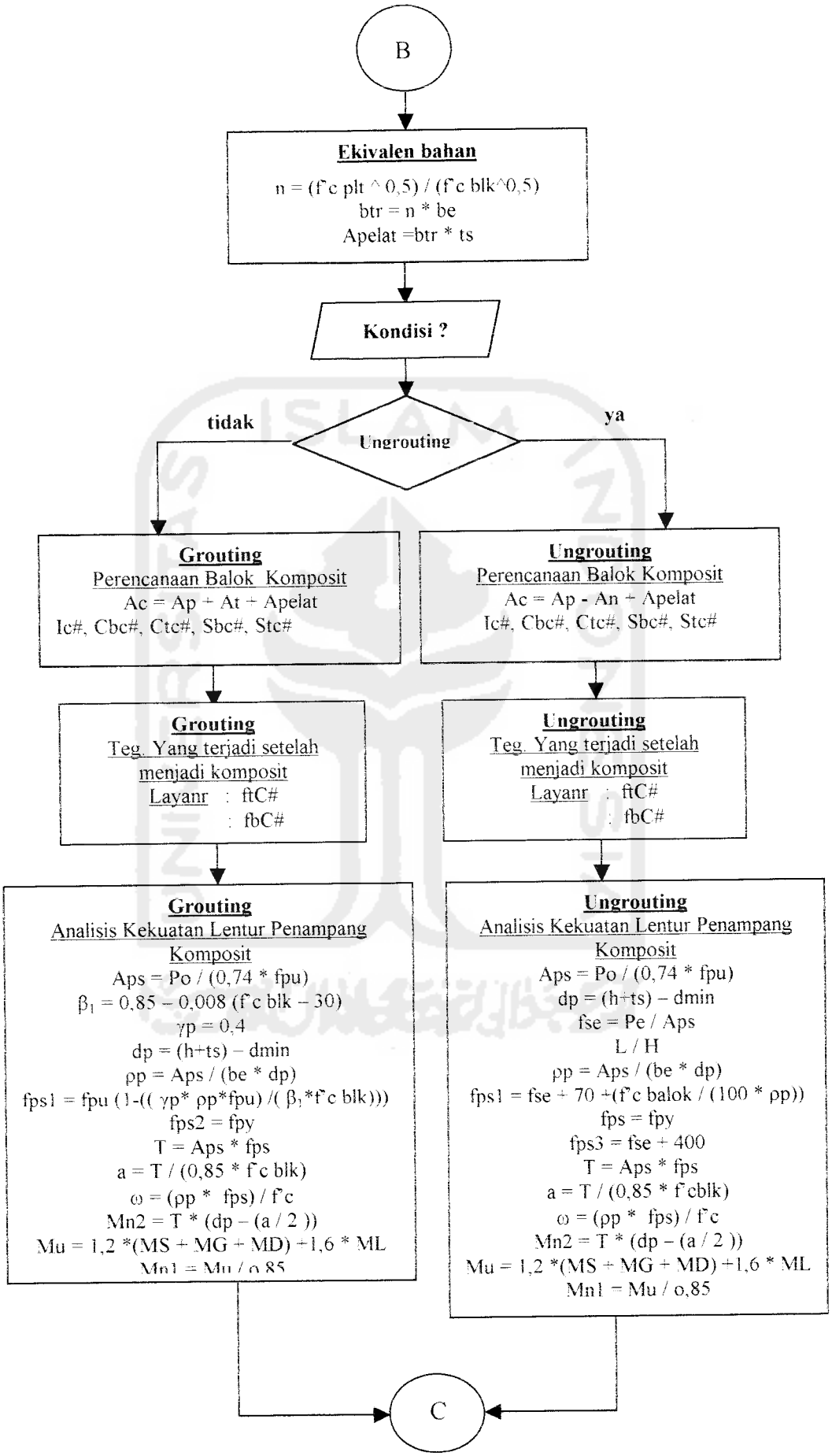
fbc *) = fbL + ((MD + ML) / Sbc)

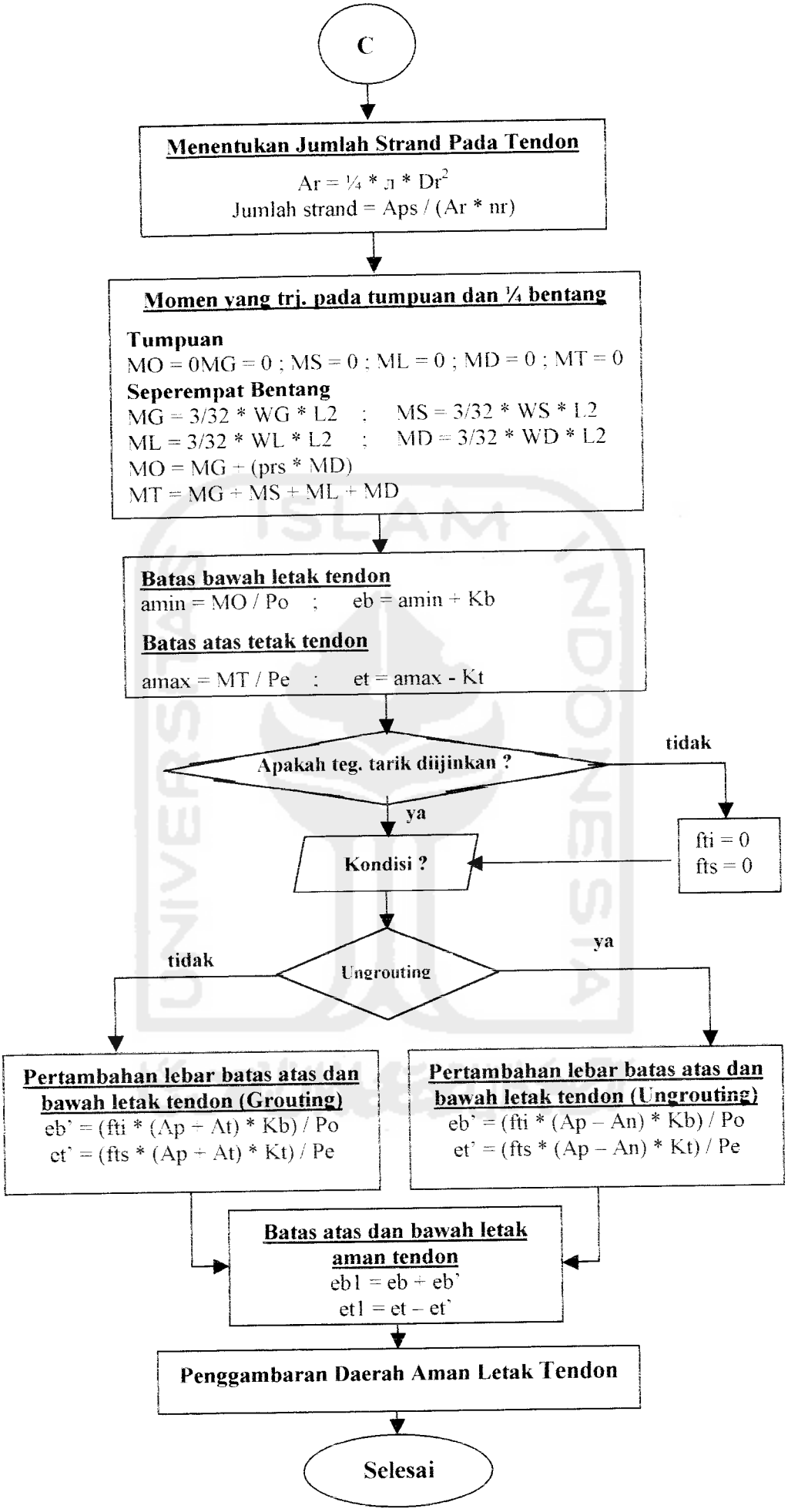
LAMPIRAN 2

Flow Chart Balok Pracetak Pratekan Komposit dengan Pelat Cor di Tempat Tanpa Dukungan Sementara Sistem Penarikan Pascatarik




A1
A2
Teg.teg yang diijinkan
f'ci = k * f'c blk,
fci = -0,6 * f'ci, fti = 0,25 * (f'ci ^ 0,5),
fcs = -0,4 * f'c blk, fts = 0,5 * (f'c blk ^ 0,5)
Po = Aps * 0,74 *fpy, R = 1 – LOF, Pe = R * Po
Momen di tengah bentang akibat beban
MG = 1/8 * WG * L2, MD = 1/8 * WD * L2,
ML = 1/8 * WL * L2, MS = 1/8 * WS * L2,
MO = (MG + ((prs * MD)), MT = MS +MG + MD + ML
Kondisi ?
Ungrouting
tidak
ya
Grouting
Teg teg yang terjadi sebelum balok menjadi komposit
Transfer : ftT#
: fbT#
Layan : ftL#
: ftL#
Ungrouting
Teg.teg yang terjadi sebelum balok menjadi komposit
Transfer : ftT#
: fbT#
Layan : ftL#
: fbL#
Posisi Balok ?
Tepi
tidak
ya
Tengah (Pilih terkecil)
be = bf + (12 * ts)
be = S
be = L / 4
Tepi (Pilih terkecil)
be = bf + (6 * ts)
be = (bf + S)
be = (bf + L) / 2
B


B
Ekivalen bahan
n = (f'c plt ^ 0,5) / (f'c blk^0,5)
btr = n * be
Apelat =btr * ts
Kondisi ?
tidak
Ungrouting
ya
Grouting
Perencanaan Balok Komposit
Ac = Ap + At + Apelat
Ic#, Cbc#, Ctc#, Sbc#, Stc#
Ungrouting
Perencanaan Balok Komposit
Ac = Ap - An + Apelat
Ic#, Cbc#, Ctc#, Sbc#, Stc#
Grouting
Teg. Yang terjadi setelah menjadi komposit
Layanr : ftC#
: fbC#
Ungrouting
Teg. Yang terjadi setelah menjadi komposit
Layanr : ftC#
: fbC#
Grouting
Analisis Kekuatan Lentur Penampang Komposit
Aps = Po / (0,74 * fpu)
β1 = 0,85 – 0,008 (f'c blk – 30)
γp = 0,4
dp = (h+ts) – dmin
ρp = Aps / (be * dp)
fps1 = fpu (1-((γp* ρp*fpu) /(β1*f'c blk)))
fps2 = fpy
T = Aps * fps
a = T / (0,85 * f'c blk)
ω = (ρp * fps) / f'c
Mn2 = T * (dp – (a / 2))
Mu = 1,2 *(MS + MG + MD) +1,6 * ML
Mn1 = Mu / o,85
Ungrouting
Analisis Kekuatan Lentur Penampang Komposit
Aps = Po / (0,74 * fpu)
dp = (h+ts) – dmin
fse = Pe / Aps
L / H
ρp = Aps / (be * dp)
fps1 = fse + 70 +(f'c balok / (100 * ρp))
fps = fpy
fps3 = fse + 400
T = Aps * fps
a = T / (0,85 * f'cblk)
ω = (ρp * fps) / f'c
Mn2 = T * (dp – (a / 2))
Mu = 1,2 *(MS + MG + MD) +1,6 * ML
Mn1 = Mu / o,85
C


C
Menentukan Jumlah Strand Pada Tendon
Ar = ¼ * л * Dr²
Jumlah strand = Aps / (Ar * nr)
Momen yang trj. pada tumpuan dan ¼ bentang
Tumpuan
MO = 0MG = 0 ; MS = 0 ; ML = 0 ; MD = 0 ; MT = 0
Seperempat Bentang
MG = 3/32 * WG * L2 ; MS = 3/32 * WS * L2
ML = 3/32 * WL * L2 ; MD = 3/32 * WD * L2
MO = MG + (prs * MD)
MT = MG + MS + ML + MD
Batas bawah letak tendon
amin = MO / Po ; eb = amin + Kb
Batas atas tetak tendon
amax = MT / Pe ; et = amax - Kt
Apakah teg. tarik diijinkan ?
tidak
ya
fti = 0
fts = 0
Kondisi ?
Ungrouting
tidak
ya
Pertambahan lebar batas atas dan bawah letak tendon (Grouting)
eb' = (fti * (Ap + At) * Kb) / Po
et' = (fts * (Ap + At) * Kt) / Pe
Pertambahan lebar batas atas dan bawah letak tendon (Ungrouting)
eb' = (fti * (Ap – An) * Kb) / Po
et' = (fts * (Ap – An) * Kt) / Pe
Batas atas dan bawah letak aman tendon
eb1 = eb + eb'
et1 = et – et'
Penggambaran Daerah Aman Letak Tendon
Selesai

Keterangan :

Luas tampang balok I Bebas I Standar AASHTO :

A1 = bf * g1

A2 = (0,5 * (bf – bw) * g2)

A3 = (h – g1 – g4) * bw

A5 = bb * g4

Ap# = A1 + A2 + A3 + A4 + A5

Luas tampang balok persegi :

Ap# = b * h

nt = Es baja / Ec balok pracetak

Balok I Bebas I Standar AASHTO :

$Cbp\#_{grouting}$ = ((A1 * (h – (g1 / 2))) + (A2 * (h – g1 – ((2 / 3) * g2))) + (A3 * (((h – g1 – g4) / 2) + g4)) + (A4 * (((2/3) * g3)+ g4) + (A5 * (g4 / 2)) + (At * dmin)) / (Ap +At)

$Cbp\#_{ungrouting}$ = ((A1 * (h – (g1 / 2))) + (A2 * (h – g1 – ((2 / 3) * g2)))+ (A3 * (((h – g1 – g4) / 2) + g4)) + (A4 * (((2/3) * g3)+ g4) + (A5 * (g4 / 2)) - (An * dmin)) / (Ap - An)

Masing-masing kondisi : Ctp *) = h – Cbp *)

$Ip\#_{grouting}$ = (((1 / 12 * bf * (g1 ^ 3)) + (A1 * (Ctp – (g1 / 2)) ^2)) + ((((1 / 36) * ((bf – bw) / 2) * (g2 ^ 3)) * 2) + (A2 * (Ctp – ((2 / 3) * g2)) ^ 2) + (((1/ 12) * bw * ((h – g1 g4) ^ 3)) + (A3 * (Ctp – ((h – g1 – g4) / 2)) ^ 2) + ((((1 / 36) * ((bb – bw) / 2) * (g3 ^ 3)) * 2)

$$+ (A4 * (Cbp - g4 - ((2 / 3) * g3)) ^ 2)) + (((1 / 12) * bb * (g4 ^ 3)) + (A5 * (Cbp - (g4 / 2)) ^ 2) + (At * emax^2))$$

$$Ip\#_{ungrouting} = (((1 / 12 * bf * (g1 ^ 3)) + (A1 * (Ctp - (g1 / 2)) ^2)) + ((((1 / 36) * ((bf - bw) / 2) * (g2 ^ 3)) * 2) + (A2 * (Ctp - ((2 / 3) * g2)) ^ 2) + (((1/ 12) * bw * ((h - g1 g4) ^ 3)) + (A3 * (Ctp - ((h - g1 - g4) / 2)) ^ 2) + ((((1 / 36) * ((bb - bw) / 2) * (g3 ^ 3)) * 2) + (A4 * (Cbp - g4 - ((2 / 3) * g3)) ^ 2)) + (((1 / 12) * bb * (g4 ^ 3)) + (A5 * (Cbp - (g4 / 2)) ^ 2) - (1 / 64 * \pi * Ds^2 + An * emax^2))$$

Balok Persegi :

$$Cbp\#_{grouting} = ((Ap *(1 / 2 * h)) + (At * dmin)) / (Ap +At)$$

$$Cbp\#_{ungrouting} = ((Ap * (1 / 2 * h)) - (An * dmin)) / (Ap - An)$$

Masing - masing kondisi : Ctp *) = h – Cbp *)

$$Ip\#_{grouting} = ((1 / 12 * b * h ^ 3) + (Ap * (Cbp - 1 / 2 * h)) + (At * emax^2)))$$

$$Ip\#_{ungrouting} = ((1 / 12 * b * h ^ 3) + (Ap * (Ctp - 1 / 2 * h))) - (1 / 64 * \pi * Ds^2 + An * emax^2))$$

$$Stp\# = Ip\# / Ctp\#$$

$$Sbp\# = Ip\# / Cbp\#$$

$$rp^2\#_{grouting} = Ip\# / (Ap\# + At)$$

$$rp^2\#_{ungrouting} = Ip\# / (Ap\# - An)$$

$$Kt\# = rp^2\# / Cbp\#$$

$$Kb\# = rp^2\# / Ctp\#$$

$$ftT\#_{grouting} = ((-Po / (Ap\# + At)) * (1 - ((emax * Ctp\#) / rp^2\#))) - (MO / Stp\#)$$

$$ftT\#_{ungrouting} = ((-Po / (Ap\# - An)) * (1 - ((emax * Ctp\#) / rp^2\#))) - (MO / Stp\#)$$

$$ftL\#_{grouting} = ((-Pe / (Ap\# + At)) * (1 - ((emax * Cbp\#) / rp^2\#))) - (MO / Sbp\#)$$

$$ftL\#_{ungrouting} = ((-Pe / (Ap\# - An)) * (1 - ((emax * Cbp\#) / rp^2\#))) - (MO / Sbp\#)$$

$$Cbc\# = ((Apelat * (h + (ts / 2))) + (Ap\# * Cbp)) / Ac$$

$$Ic\# = (Ip\# + (Ap\# * (Cbc\# - Cbp\#) ^ 2)) + (((1 / 12) * btr * (ts ^ 3)) + (Apelat * (Ctc\# - ts / 2)) ^ 2))$$

$$Stc\# = Ic\#) / Ctc\#)$$

$$Sbp\# = Ic\# / Cbc\#$$

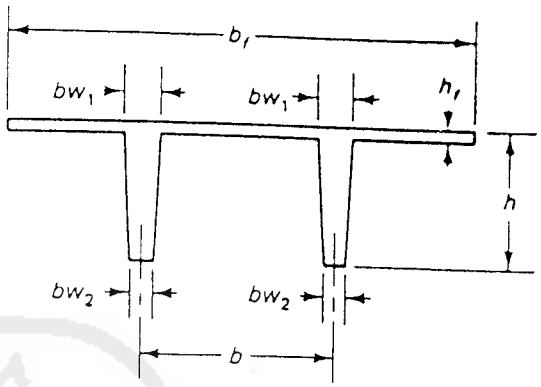
$$ftc\#_{grouting} = ftL - ((MD + ML) / Stc\#)$$

$$ftc\#_{ungrouting} = ftL + ((MD + ML) / Sbc\#)$$

LAMPIRAN 3

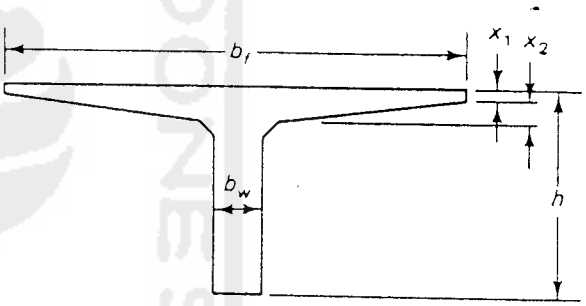
TABLE 4.4 GEOMETRICAL DETAILS OF AS-BUILT PCI AND AASHTO SECTIONS

Designation	b_f (in.)	h_f (in.)	b_{w1} (in.)	b_{w2} (in.)	h (in.)	b (in.)
8DT12	96	2	5.75	3.75	12	48
8DT14	96	2	5.75	3.75	14	48
8DT16	96	2	5.75	3.75	16	48
8DT18	96	2	5.75	3.75	18	48
8DT20	96	2	5.75	3.75	20	48
8DT24	96	2	5.75	3.75	24	48
8DT32	96	2	7.75	4.75	32	48
10DT32	120	2	7.75	4.75	32	60



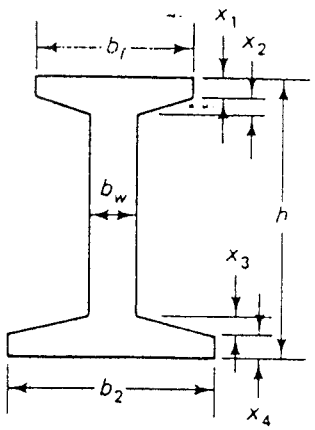
Actual double-T sections

Designation	b_f (in.)	x_1 (in.)	x_2 (in.)	b_w (in.)	h (in.)
8ST36	96	1.5	3	8	36
10ST48	120	1.5	4	8	48



Actual T sections

Designation	b_f (in.)	x_1 (in.)	x_2 (in.)	b_2 (in.)	x_3 (in.)	x_4 (in.)	b_w (in.)	h (in.)
AASHTO 1	12	4	3	16	5	5	6	28
AASHTO 2	12	6	3	18	6	6	6	36
AASHTO 3	16	7	4.5	22	7.5	7	7	45
AASHTO 4	20	8	6	26	9	8	8	54
AASHTO 5	42	5	7	28	10	8	8	63
AASHTO 6	42	5	7	28	10	8	8	72



Actual I sections

$$f_{ci} = -0.60 \times 3{,}750 = -2{,}250 \text{ psi (15.5 MPa)}$$

$$f_{ti} = 3\sqrt{3{,}750} = 184 \text{ psi (midspan)}$$

$$= 6\sqrt{3{,}760} = 368 \text{ psi (support)}$$

$$f_c = -0.45 \times 5{,}000 = -2{,}250 \text{ psi (15.5 MPa)}$$

Perhitungan tegangan ijin pada pelat komposit yang diakibatkan oleh gaya yang bekerja hanya pada penampang komposit.

Diketahui :

Tebal pelat (ts) = 200 mm

Mutu pelat beton (f'c plt) = 28 Mpa

Tegangan–tegangan yang diijinkan pada pelat beton saat layan:

Serat tarik (fts) $= 0{,}5\ \sqrt{f'c\_plt}$

$= 2{,}645751$ Mpa

Serat tekan (fcs) $= -0{,}45\ .\ f'c\ plt$

$= -12{,}6$ Mpa

Tegangan-tegangan yang terjadi pada pelat akibat beban yang bekerja:

Serat atas :

$$ft = \frac{-(MD + ML).Ctc}{Ic}$$

Serat bawah :

$$fb = \frac{-(MD + ML).(Ctc - ts)}{Ic}$$

1. Sistem pratarik

$$ft = \frac{-(648 + 864)\cdot 10^{-6}\cdot 571{,}6684836}{274071883947{,}871} = -3{,}153781 \text{ Mpa} \le -12{,}6 \text{ Mpa} \quad \text{AMAN}$$

$$fb = \frac{-(648 + 864)\cdot 10^{-6}\cdot (571{,}6684836 - 200)}{274071883947{,}871} = -2{,}050421 \text{ Mpa}$$

$\le -12{,}6$ Mpa AMAN

2. Sistem pascatarik

a. Kondisi Grouting

$$ft = \frac{-(405+648)\cdot 10^{-6}\cdot 429{,}849204}{169810717600} = -2{,}665504 \text{ Mpa} \leq \text{-12,6 Mpa} \quad \text{AMAN}$$

$$fb = \frac{-(405+648)\cdot 10^{-6}\cdot (429{,}849204-200)}{169810717600} = -1{,}425300 \text{ Mpa}$$

$\leq$ -12,6 Mpa AMAN

b. Kondisi Ungrouting

$$ft = \frac{-(405+648)\cdot 10^{-6}\cdot 410{,}440537}{156722951800} = -2{,}757694 \text{ Mpa} \leq \text{-12,6 Mpa} \quad \text{AMAN}$$

$$fb = \frac{-(405+648)\cdot 10^{-6}\cdot (410{,}440537-200)}{156722951800} = -1{,}413921 \text{ Mpa}$$

$\leq$ -12,6 Mpa AMAN

LAMPIRAN 4

```
vate Sub cmdOK_Click()
nload Me
 Sub
```

```
 waktu

vate Sub Form_Load()
tu = 0
er1.Enabled = True
mpilkan logo Uii
ture1.Picture = LoadPicture(App.Path & "\pic_files\uii2.bmp")
 Sub

vate Sub Timer1_Timer()
Error Resume Next
tu = waktu + 1
 'Pengatur waktu untuk lamanya frmIntro Tampil
 If waktu = 1 Then
     frmUtama.Show
     Unload frmAwal
 End If

 Sub
```

```
vate Sub mnuAbout_Click()
About.Show
 Sub

vate Sub mnuKeluar_Click()
oad Me
 Sub

vate Sub mnuPascaTarik_Click()
BntkTmpgPscTrk.Show
 Sub

vate Sub mnuPratarik_Click()
BntkTmpg.Show
 Sub
```

```
 TipeBalok
vate Sub Command1_Click()
oad Me
 Sub

vate Sub Command2_Click()
 If Option1(0).Value = True Then
     TipeBalok = "Balok Persegi"
 ElseIf Option1(1).Value = True Then
     TipeBalok = "Balok I Bebas"
 ElseIf Option1(2).Value = True Then
     TipeBalok = "Balok I Standar AASHTO"
 ElseIf Option1(0).Value = False And Option1(1).Value = False And Option1(3).Value = False
n
     MsgBox "Pilih Bentuk Tampang", vbCritical, "Pilih Bentuk Tampang"
 End If

n App.Path & "\temp_data\tipebalok.ini" For Output As #1
 Print #1, TipeBalok
se #1

 It Option1(0).Value = True Then
     frmBalokPersegi.Show
     Unload Me
 ElseIf Option1(1).Value = True Then
     frmBalokIBebas.Show
     Unload Me
 ElseIf Option1(2).Value = True Then
     frmBalokIStandar.Show
     Unload Me
 End If

 Sub

/ate Sub Option1_Click(Index As Integer)
ect Case Index
 Case 0
     picTampangBalok_1.Picture = LoadPicture(App.Path & "\pic_files\tmpg1.bmp")
 Case 1
     picTampangBalok_1.Picture = LoadPicture(App.Path & "\pic_files\tmpg3.bmp")
 Case 2
     picTampangBalok_1.Picture = LoadPicture(App.Path & "\pic_files\tmpg3.bmp")

 Select


 Sub
```

```
 TipeBalok
vate Sub Command1_Click()
oad Me
 Sub

vate Sub Command2_Click()
 If Option1(0).Value = True Then
     TipeBalok = "Balok Persegi"
 ElseIf Option1(1).Value = True Then
     TipeBalok = "Balok I Bebas"
 ElseIf Option1(2).Value = True Then
     TipeBalok = "Balok I Standar AASHTO"
 ElseIf Option1(0).Value = False And Option1(1).Value = False And Option1(3).Value = False
n
     MsgBox "Pilih Bentuk Tampang", vbCritical, "Pilih Bentuk Tampang"
 End If

n App.Path & "\temp_data\tipebalok.ini" For Output As #1
 Print #1, TipeBalok
se #1

 If Option1(0).Value = True Then
     frmBalokPersegiPscTarik.Show
     Unload Me
 ElseIf Option1(1).Value = True Then
     frmBalokIBebasPscTrk.Show
     Unload Me
 ElseIf Option1(2).Value = True Then
     frmBalokIStandarPscTrk.Show
     Unload Me
 End If

 Sub

/ate Sub Option1_Click(Index As Integer)
ect Case Index
 Case 0
     picTampangBalok_1.Picture = LoadPicture(App.Path & "\pic_files\tmpg1.bmp")
 Case 1
     picTampangBalok_1.Picture = LoadPicture(App.Path & "\pic_files\tmpg3.bmp")
 Case 2
     picTampangBalok_1.Picture = LoadPicture(App.Path & "\pic_files\tmpg3.bmp")

 Select


 Sub
```

```
klarasi variable masukan dan sifat-sifat mekanis penampang i bebas pratarik
 Status As String
 L As Double
 S As Double
 ts As Double
 dmin As String
 fc_blk As Double
 fc_plt As Double
 fpu As Double
 fpy As Double
 wbt As Double
 Dr As Double
 WD As Double
 WL As Double
 LOF As Double
 nr As String
 k As Double
 Posisi
 TegTrkDiijinkan

klarasi variabel hasil hitungan perencanaan tampang pracetak komposit
 A1 As Double
 A2 As Double
 A3 As Double
 A4 As Double
 A5 As Double
 bf As Double
 bb As Double
 bw As Double
 g1 As Double
 g2 As Double
 g3 As Double
 g4 As Double
 Ap As Double
 Ip As Double
 Stp As Double
 Sbp As Double
 ctp As Double
 cbp As Double
 rp2 As Double
 Kt As Double
 Kb As Double
 emax As Double
 WG As Double

larasi variabel untuk hitungan teg. yang terjadi
 flci As Double
 fci As Double
 fti As Double
 fcs As Double
 fts As Double
 fcent As Double
 Po As Double
 R As Double
 Pe As Double
 WS As Double

larasi variabel hitungan momen ditengah bentang
 MGm As Double
 MSm As Double
 MDm As Double
 MLm As Double
 MTm As Double

larasi variabel tegangan ijin yang terjadi sebelum komposit
 ftT As Double
 fbT As Double
 ftL As Double
 fbL As Double

larasi variabel untuk hitungan be
 be1 As Double
 be2 As Double
```

```
 be3 As Double
 be As Double

klarasi variabel hasil hit. perenc. tampang 1 bebas pratarik komposit
 n As Double
 btr As Double
 Apelat As Double
 Ac As Double
 Ic As Double
 ctc As Double
 cbc As Double
 Stc As Double
 Sbc As Double

klarasi var. hsl. hit. yang tjd. setelah menjadi komposit
 ftc As Double
 fbs As Double

klarasi var. untuk hit. kekuatan lentur penampang
 Bl As Double
 Gp As Double
 Aps As Double
 dp As Double
 Pp As Double
 fpsi As Double
 fps2 As Double
 fps As Double
 T As Double
 a As Double
 Mn As Double
 Z As Double

klarasi var. kontrol rasio tul. & jumlah tendon
 w As Double
 Ar As Double
 JmlStrand As String
 JmlStrandK As String

klarasi var. hsl. hit. momen pada tump. dan 1/4 bentang
 MG As Double
 MS As Double
 MD As Double
 ML As Double
 MGq As Double
 MSq As Double
 MDq As Double
 MLq As Double

larasi var. untuk menentukan batas atas & bawah letak aman tendon
 amin As Double
 eb As Double
 amax As Double
 et As Double
 aminq As Double
 ebq As Double
 amaxq As Double
 etq As Double
 aminm As Double
 ebm As Double
 amaxm As Double
 etm As Double

 larasi untuk menent. penamb. lebar daerah aman tendon
 ebAks As Double
 etAks As Double
 eb1 As Double
 et1 As Double
 eb1q As Double
 et1q As Double
 eb1m As Double
 et1m As Double

 ite Sub Command1_Click()
```

```
Error Resume Next
 CDbl(Text2(0).Text)
 CDbl(Text2(1).Text)
= CDbl(Text2(2).Text)
 CDbl(Text2(3).Text)
= CDbl(Text2(4).Text)
= CDbl(Text2(5).Text)
= CDbl(Text2(6).Text)
= CDbl(Text2(7).Text)
= CDbl(Text2(8).Text)
= CDbl(Text2(9).Text)
= CDbl(Text2(10).Text)
n = CStr(Text2(11).Text)
blk = CDbl(Text3(0).Text)
plt = CDbl(Text3(1).Text)
 = CDbl(Text3(2).Text)
 = CDbl(Text3(3).Text)
 = CDbl(Text3(4).Text)
= CDbl(Text3(5).Text)
= CDbl(Text3(6).Text)
= CDbl(Text3(7).Text)
 = CDbl(Text3(8).Text)
= CStr(Text3(9).Text)
 CDbl(Text3(10).Text)

 Text2(0).Text = "" Or Text2(1).Text = "" Or Text2(2).Text = "" Or Text2(3).Text = "" Or Te
(4).Text = "" Or Text2(5).Text = "" Or Text3(0).Text = "" Or Text3(1).Text = "" Or Text3(2)
<t = "" Or Text3(3).Text = "" Or Text3(4).Text = "" Or Text4(0).Text = "" Or Text4(1).Text
' Or Text4(2).Text = "" Or Text5(0).Text = "" Or Text5(1).Text = "" Then
 MsgBox "Masih Ada Field yang Kosong... Harus Diisi!", vbCritical, "PESAN KESALAHAN"
i If

:hitungan perencanaan tampang I bebas pratarik pracetak
     A1 = bf * g1
     A2 = (0.5 * (bf - bw) * g2)
     A3 = (h - g1 - g4) * bw
     A4 = (0.5 * (bb - bw) * g3)
     A5 = bb * g4
     Ap = A1 + A2 + A3 + A4 + A5
     cbp = ((A1 * (h - (g1 / 2))) + (A2 * (h - g1 - ((2 / 3) * g2))) + (A3 * (((h - g1 - g4
2) + g4)) + (A4 * (((2 / 3) * g3) + g4)) + (A5 * (g4 / 2))) / Ac
     ctp = h - cbp
     Ip = (((1 / 12) * bf * (g1 ^ 3)) + (A1 * (ctp - (g1 / 2)) ^ 2)) + ((((1 / 36) * ((bf -
 / 2) * (g2 ^ 3)) * 2) + (A2 * (ctp - g1 - ((2 / 3) * g2)) ^ 2)) + (((1 / 12) * bw * ((h -
- g4) ^ 3)) + (A3 * (ctp - ((h - g1 - g4) / 2)) ^ 2)) + ((((1 / 36) * ((bb - bw) / 2) * (g
3)) * 2) + (A4 * (cbp - g4 - ((2 / 3) * g3)) ^ 2)) + (((1 / 12) * bb * (g4 ^ 3)) + (A5 * (
- (g4 / 2)) ^ 2))
     Stp = Ip / ctp
     Sbp = Ip / cbp
     rp2 = Ip / Ap
     Kt = rp2 / cbp
     Kb = rp2 / ctp
     emax = cbp - dmin
     WG = Ap * (10 ^ (-6)) * wbt

 hitungan tegangan ijin yang terjadi
     f1ci = k * fc_blk
     fci = (-0.6) * f1ci
     fti = 0.25 * (f1ci ^ 0.5)
     fcs = (-0.45) * fc_blk
     fts = 0.25 * (fc_blk ^ 0.5)
     fcent = (fti - ((ctp / h) * (fti - fci))) * (-1)
     Po = fcent * Ap
     R = 1 - LOF
     Pe = R * Po
     WS = S * ts * wbt * (10 ^ (-6))

 ıitungan momen yang terjadi ditengah bentang
     MGm = (WG * (L ^ 2)) / 8
     MSm = (WS * (L ^ 2)) / 8
     MDm = (WD * (L ^ 2)) / 8
     MLm = (WL * (L ^ 2)) / 8
     MTm = MGm + MSm + MDm + MLm
```

```
rhitungan teg. yang tjd. sblm. tampang mjd. komposit
     ftT = ((-Po / Ap) * (1 - ((emax * ctp) / rp2))) - ((MGm * (10 ^ 6)) / Stp)
     fbT = ((-Po / Ap) * (1 + ((emax * cbp) / rp2))) + ((MGm * (10 ^ 6)) / Sbp)
     ftL = ((-Pe / Ap) * (1 - ((emax * ctp) / rp2))) - (((MGm + MSm) * (10 ^ 6)) / Stp)
     fbL = ((-Pe / Ap) * (1 + ((emax * cbp) / rp2))) + (((MGm + MSm) * (10 ^ 6)) / Sbp)

LIHAN TEPI DAN TENGAH
 'TEPI
 If Option3(0).Value = True Then
     Posisi = "TEPI"
     be1 = bf + (6 * ts)
     be2 = (bf + S) / 2
     be3 = (bf + (L * (10 ^ 3))) / 12
          'pilih nilai be terkecil
          If be1 < be2 And be1 < be3 Then
               be = be1
          ElseIf be2 < be1 And be2 < be3 Then
               be = be2
          ElseIf be3 < be1 And be3 < be2 Then
               be = be3
          End If
 'POSISI TENGAH
 ElseIf Option3(1).Value = True Then
     Posisi = "TENGAH"
     be1 = bf + (12 * ts)
     be2 = S
     be3 = (L * (10 ^ 3)) / 4
          'pilih nilai be terkecil
          If be1 < be2 And be1 < be3 Then
               be = be1
          ElseIf be2 < be1 And be2 < be3 Then
               be = be2
          ElseIf be3 < be1 And be3 < be2 Then
               be = be3
          End If
 End If

rhitungan perenc. tampang I bebas pratarik komposit
     n = (fc_plt ^ 0.5) / (fc_blk ^ 0.5)
     btr = n * be
     Apelat = btr * ts
     Ac = Ap + Apelat
     cbc = ((Apelat * (h + (ts / 2))) + (Ap * cbp)) / Ac
     ctc = (h + ts) - cbc
     Ic = (Ip + (Ap * (cbc - cbp) ^ 2)) + (((1 / 12) * btr * (ts ^ 3)) + (Apelat * (ctc - (
  2)) ^ 2))
     Stc = Ic / ctc
     Sbc = Ic / cbc

 rhitungan teg. yang tjd. stlh. menjadi komposit
     ftc = ftL - (((MDm + MLm) * (10 ^ 6)) / Stc)
     fbc = fbL + (((MDm + MLm) * (10 ^ 6)) / Sbc)

 rhitungan kekuatanlentur penampang I bebas komposit
     B1 = 0.85 - (0.008 * (fc_blk - 30))
     Gp = 0.4
     Aps = Po / (0.7 * fpu)
     dp = (h + ts) - dmin
     Pp = Aps / (be * dp)
     fps1 = fpu * (1 - ((Gp * Pp * fpu) / (B1 * fc_blk)))
     fps2 = fpy
          'pilih fps nilai terkecil
          If fps1 < fps2 Then
               fps = fps1
          ElseIf fps2 < fps1 Then
               fps = fps2
          End If
     T = Aps * fps
     a = T / (0.85 * fc_blk * S)
     Mn = T * (dp - (a / 2)) * (10 ^ (-6))
     Z = 0.35 * B1
```

```
ontrol rasio tulangan dan jumlah tendon
     w = (Pp * fps) / fc_blk
     Ar = (1 / 4) * 3.141592654 * (Dr ^ 2)
     JmlStrand = Aps / (Ar * nr)

erhitungan momen yang tjd. ditump. dan 1/4 bentang
     MG = 0
     MS = 0
     MD = 0
     ML = 0
     MT = 0
     MGq = (3 / 32) * WG * (L ^ 2)
     MSq = (3 / 32) * WS * (L ^ 2)
     MDq = (3 / 32) * WD * (L ^ 2)
     MLq = (3 / 32) * WL * (L ^ 2)
     MTq = MGq + MSq + MDq + MLq

enentukan daerah batas letak aman tendon ditump. ,1/4 bentang & tengah bentang
     amin = (MG * (10 ^ 6)) / Po
     eb = amin + Kb
     amax = (MT * (10 ^ 6)) / Pe
     et = amax - Kt
     aminq = (MGq * (10 ^ 6)) / Po
     ebq = aminq + Kb
     amaxq = (MTq * (10 ^ 6)) / Pe
     etq = amaxq - Kt
     aminm = (MGm * (10 ^ 6)) / Po
     ebm = aminm + Kb
     amaxm = (MTm * (10 ^ 6)) / Pe
     etm = amaxm - Kt

ILIHAN APA TEGANGAN TARIK DIIJINKAN
  If Option2(0).Value = True Then
     TegTrkDiijinkan = "Ya"
     ebAks = (fti * Ac * Kb) / Po
     etAks = (fts * Ac * Kt) / Pe
  ElseIf Option2(1).Value = True Then
     TegTrkDijinkan = "Tidak"
     ebAks = 0
     etAks = 0
  End If

enambahan lebar daerah batas aman tendon pada tum., 1/4 bentang & tengah bentang
     eb1 = eb + ebAks
     et1 = et - etAks
     eb1q = ebq + ebAks
     et1q = etq - etAks
     eb1m = ebm + ebAks
     et1m = etm - etAks

 mlStrand <= 1 And JmlStrand > 0 Then
 JmlStrandK = 1
 If JmlStrand > 1 And JmlStrand <= 2 Then
 JmlStrandK = 2
 If JmlStrand > 2 And JmlStrand <= 3 Then
 JmlStrandK = 3
 If JmlStrand > 3 And JmlStrand <= 4 Then
 JmlStrandK = 4
 If JmlStrand > 4 And JmlStrand <= 5 Then
 JmlStrandK = 5
 If JmlStrand > 5 And JmlStrand <= 6 Then
 JmlStrandK = 6
 If


  ig.Print "Posisi " & Posisi
  ig.Print "TegTrkDiijinkan " & TegTrkDiijinkan
  ig.Print "fci " & fci
  ig.Print "fti " & fti
  ig.Print "fcs " & fcs
  ig.Print "fts " & fts
  ig.Print "R " & R
  ig.Print "Ap " & Ap
```

```
bug.Print "Cbp " & cbp
bug.Print "Ctp " & ctp
bug.Print "Ip " & Ip
bug.Print "Stp " & Stp
bug.Print "Sbp " & Sbp
bug.Print "rp2 " & rp2
bug.Print "Kt " & Kt
bug.Print "Kb " & Kb
bug.Print "emax " & emax
bug.Print "fcent " & fcent
bug.Print "Po " & Po
bug.Print "ftT " & ftT
bug.Print "fbT " & fbT
bug.Print "Pe " & Pe
bug.Print "ftL " & ftL
bug.Print "fbL " & fbL
oug.Print "be " & be
oug.Print "n " & n
oug.Print "btr " & btr
oug.Print "Apelat " & Apelat
oug.Print "Ac " & Ac
oug.Print "Cbc " & cbc
oug.Print "Ctc " & ctc
oug.Print "Ic " & Ic
oug.Print "Stc " & Stc
oug.Print "Sbc " & Sbc
oug.Print "ftc " & ftc
oug.Print "fbc " & fbc
oug.Print "B1 " & B1
oug.Print "Aps " & Aps
oug.Print "Pp " & Pp
oug.Print "fps1 " & fps1
oug.Print "fps2 " & fps2
oug.Print "fps " & fps
oug.Print "T " & T
oug.Print "a " & a
oug.Print "w " & w
oug.Print "Z " & Z
oug.Print "Mn " & Mn
oug.Print "amin " & amin
oug.Print "aminq " & aminq
oug.Print "aminm " & aminm
oug.Print "eb " & eb
oug.Print "ebq " & ebq
oug.Print "ebm " & ebm
ug.Print "amax " & amax
ug.Print "amaxq " & amaxq
ug.Print "amaxm " & amaxm
ug.Print "et " & et
ug.Print "etq " & etq
ug.Print "etm " & etm
ug.Print "ebAks " & ebAks
ug.Print "etAks " & etAks
ug.Print "eb1 " & eb1
ug.Print "eb1q " & eb1q
ug.Print "eb1m " & eb1m
ug.Print "et1 " & et1
ug.Print "et1q " & et1q
ug.Print "et1m " & et1m
ug.Print "Ar " & Ar
ug.Print "JmlStrand " & JmlStrand
ug.Print "JmlStrandK " & JmlStrandK

ve di temp_data
            Open App.Path & "\temp_data\hasil_temp.ini" For Output As #1
e #1, tipe
            Write #1, Posisi
            Write #1, TegTrkDiijinkan
            Write #1, Apelat
            Write #1, cbp
            Write #1, ts
            Write #1, btr
            Write #1, Ap
```

```
                Write #1, lp
                Write #1, Ac
                Write #1, Ic
                Write #1, cbc
                Write #1, ctc
                Write #1, Sbc
                Write #1, Stc
                Write #1, Kt
                Write #1, Kb
                Write #1, Mn
                Write #1, w
                Write #1, eb
                Write #1, et
                Write #1, ebq
                Write #1, etq
                Write #1, ebm
                Write #1, etm
                Write #1, eb1
                Write #1, et1
                Write #1, eb1q
                Write #1, et1q
                Write #1, eb1m
                Write #1, et1m
                Write #1, dmin
                Write #1, JmlStrand
                Write #1, JmlStrandK
                Write #1, ftT
                Write #1, fbT
                Write #1, ftL
                Write #1, fbL
                Write #1, ftc
                Write #1, fbc
                Write #1, fti
                Write #1, fci
                Write #1, fts
                Write #1, fcs
                Write #1, Z
                Write #1, "I"
                Write #1, Po
                Write #1, Pe
                Close #1
                frmHasilPraTarik.Show
Sub

ate Sub Text3_Change(Index As Integer)
If Text3(1).Text > "Text3(0).Text" Then
ox "Nilai fc_plt < fc_blk", vbExclamation, "Mohon Diganti"
End If
Sub

ate Sub Command2_Click()
ad Me
Sub

ate Sub mnuIBebasKEluar_Click()
ad Me
Sub
```

klarasi variable masukan dan sifat-sifat mekanis penampang I bebas pascatarik
Status As String
L As Double
S As Double
ts As Double
h As Double
dmin As String
fc_blk As Double
fc_plt As Double
fpu As Double
fpy As Double
wbt As Double
WD As Double
WL As Double
LOF As Double
Aps As Double
Ds As Double
Dr As Double
nr As String
nt As String
k As Double
prs As Double
Posisi
Kondisi
TegTrkDiijinkan

klarasi variabel hasil hitungan perencanaan tampang pracetak komposit
A1 As Double
A2 As Double
A3 As Double
A4 As Double
A5 As Double
bf As Double
bb As Double
bw As Double
g1 As Double
g2 As Double
g3 As Double
g4 As Double
Ap As Double
At As Double
An As Double
cbp As Double
ctp As Double
Ip As Double
Stp As Double
Sbp As Double
rp2 As Double
Kt As Double
Kb As Double
emax As Double
WG As Double

larasi variabel untuk hitungan teg. yang terjadi
R As Single
Po As Double
Pe As Double

larasi variabel hitungan momen ditengah bentang
MGm As Double
MSm As Double
MDm As Double
MLm As Double
MOm As Double
MTm As Double

Mn2 As Double
Mu As Double
Mn1 As Double

arasi Tegangan-Tegangan yang Diijinkan
fci As Double
fci As Double

```
 fti As Double
 fcs As Double
 fts As Double

klarasi variabel tegangan ijin yang terjadi sebelum komposit
 ftT As Double
 fbT As Double
 ftL As Double
 fbL As Double

klarasi variabel untuk hitungan be
 be1 As Double
 be2 As Double
 be3 As Double
 be As Double

klarasi variabel hasil hit. perenc. tampang I bebas komposit
 WS As Double
 ntr As Double
 btr As Double
 Apelat As Double
 Ac As Double
 Ic As Double
 ctc As Double
 cbc As Double
 Stc As Double
 Sbc As Double

klarasi var. hsl. hit. yang tjd. setelah menjadi komposit
 ftc As Double
 fbc As Double

klarasi var. untuk hit. kekuatan lentur penampang
 B1 As Double
 Gp As Double
 dp As Double
 Pp As Double
 fps1 As Double
 fps2 As Double
 fps3 As Double
 fps As Double
 fpe As Double
 T As Double
 a As Double
 Z As Double

larasi var. kontrol rasio tul. & jumlah tendon
 w As Double
 Ar As Double
 JmlTendon As String
 JmlTendonK As String
 JmlStrandlTendon As String
 JmlStrandlTendonK As String

larasi var. hsl. hit. momen pada tump. dan 1/4 bentang
 MG As Double
 MS As Double
 MD As Double
 ML As Double
 MO As Double
 MT As Double
 MGq As Double
 MSq As Double
 MDq As Double
 MLq As Double
 MOq As Double
 MTq As Double

larasi var. untuk menentukan batas atas & bawah letak aman tendon
 amin As Double
 eb As Double
 amax As Double
 et As Double
```

```
aminq As Double
ebq As Double
amaxq As Double
etq As Double
aminm As Double
ebm As Double
amaxm As Double
etm As Double

klarasi untuk menent. penamb. lebar daerah aman tendon
ebAks As Double
etAks As Double
eb1 As Double
et1 As Double
eb1q As Double
et1q As Double
eb1m As Double
et1m As Double

vate Sub Command1_Click()
Error Resume Next
CDbl(Text3(0).Text)
CDbl(Text3(1).Text)
= CDbl(Text3(2).Text)
CDbl(Text3(3).Text)
= CDbl(Text3(4).Text)
= CDbl(Text3(5).Text)
= CDbl(Text3(6).Text)
= CDbl(Text3(7).Text)
= CDbl(Text3(8).Text)
= CDbl(Text3(9).Text)
= CDbl(Text3(10).Text)
1 = CStr(Text3(11).Text)
)lk = CDbl(Text4(0).Text)
)lt = CDbl(Text4(1).Text)
= CDbl(Text4(2).Text)
= CDbl(Text4(3).Text)
= CDbl(Text4(4).Text)
- CDbl(Text4(5).Text)
= CDbl(Text4(6).Text)
= CDbl(Text4(7).Text)
= CDbl(Text4(8).Text)
= CDbl(Text4(9).Text)
= CDbl(Text4(10).Text)
= CStr(Text4(11).Text)
= CStr(Text4(12).Text)
CDbl(Text4(13).Text)
= CDbl(Text4(14).Text)


IHAN GRPOUTING DAN UNGROUTING
'GROUTING
If Option2(0).Value = True Then
    Kondisi = "GROUTING"

'Perhitungan perencanaan tampang I bebas pracetak
    A1 = bf * g1
    A2 = (0.5 * (bf - bw) * g2)
    A3 = (h - g1 - g4) * bw
    A4 = (0.5 * (bb - bw) * g3)
    A5 = bb * g4
    Ap = A1 + A2 + A3 + A4 + A5
    At = ((nt - 1) * Aps)
    cbp = (((A1 * (h - (g1 / 2))) + (A2 * (h - g1 - ((2 / 3) * g2))) + (A3 * (((h - g1 - g
 2) + g4)) + (A4 * (((2 / 3) * g3) + g4)) + (A5 * (g4 / 2))) + (At * dmin)) / (Ap + At)
    ctp = (h - cbp)
    emax = (cbp - dmin)
    Ip = (1 / 12 * bf * g1 ^ 3 + A1 * (ctp - (g1 / 2)) ^ 2) + (((1 / 36 * ((bf - bw) / 2)
 ^ 3) * 2) + (A2 * (ctp - g1 - (2 / 3 * g2)) ^ 2)) + (1 / 12 * bw * (h - g1 - g4) ^ 3) + A
(ctp - ((h - g1 - g4) / 2)) ^ 2 + ((1 / 36 * ((bb - bw) / 2) * g3 ^ 3) * 2 + A4 * (cbp - g
(2 / 3) * g3) ^ 2) + (1 / 12 * bb * g4 ^ 3 + A5 * (cbp - g4 / 2) ^ 2) + (At * (emax ^ 2))
    Stp = Ip / ctp
```

```
    Sbp = Ip / cbp
    rp2 = Ip / (Ap + At)
    Kt = rp2 / cbp
    Kb = rp2 / ctp
    WG = (Ap * (10 ^ (-6)) * wbt)

LIHAN TEPI DAN TENGAH
 'TEPI
 If Option1(0).Value = True Then
    Posisi = "TEPI"
    be1 = bf + (6 * ts)
    be2 = (bf + S) / 2
    be3 = (bf + (L * 1000)) / 12
        'pilih nilai be terkecil
        If be1 < be2 And be1 < be3 Then
            be = be1
        ElseIf be2 < be1 And be2 < be3 Then
            be = be2
        ElseIf be3 < be1 And be3 < be2 Then
            be = be3
        End If
 'POSISI TENGAH
 ElseIf Option1(1).Value = True Then
    Posisi = "TENGAH"
    be1 = bf + (12 * ts)
    be2 = S
    be3 = (L * 1000) / 4
        'pilih nilai be terkecil
        If be1 < be2 And be1 < be3 Then
            be = be1
        ElseIf be2 < be1 And be2 < be3 Then
            be = be2
        ElseIf be3 < be1 And be3 < be2 Then
            be = be3
        End If
 End If


 'Perhitungan perenc. tampang I bebas komposit
    ntr = (fc_plt ^ 0.5) / (fc_blk ^ 0.5)
    btr = ntr * be
    Apelat = btr * ts
    Ac = (Ap + At + Apelat)
    cbc = ((Apelat * (h + ts / 2)) + ((Ap + At) * cbp)) / (Ac)
    ctc = (h + ts) - cbc
    Ic = ((1 / 12 * btr * ts ^ 3 + Apelat * (ctc - ts / 2) ^ 2) + (Ip + ((Ap + At) * (cbc
p) ^ 2)))
    Stc = Ic / ctc
    Sbc = Ic / cbc

 'Perhitungan momen yang terjadi ditengah bentang
 'Pada saat transfer beban mati telah bekerja (sebanyak p persen)
    WS = S * ts * wbt * (10 ^ (-6))
    MGm = (WG * (L ^ 2)) / 8
    MSm = (WS * (L ^ 2)) / 8
    MDm = (WD * (L ^ 2)) / 8
    MLm = (WL * (L ^ 2)) / 8
    MOm = (MGm + (prs * MDm))
    MTm = (MGm + MSm + MDm + MLm)

 'Perhitungan teg. yang tjd. sblm. tampang mjd. komposit
    R = 1 - LOF
    Po = (0.74 * fpu) * Aps
    Pe = R * Po
    ftT = ((-Po / (Ap + At)) * (1 - ((emax * ctp) / rp2))) - ((MOm * (10 ^ 6)) / Stp)
    fbT = ((-Po / (Ap + At)) * (1 + ((emax * cbp) / rp2))) + ((MOm * (10 ^ 6)) / Sbp)
    ftL = ((-Pe / (Ap + At)) * (1 - ((emax * ctp) / rp2))) - (((MOm + MSm) * (10 ^ 6)) / S

    fbL = ((-Pe / (Ap + At)) * (1 + ((emax * cbp) / rp2))) + (((MOm + MSm) * (10 ^ 6)) / S


  Perhitungan teg. yang tjd. stlh. menjadi komposit
    ftc = (ftL) - (((MDm + MLm) * (10 ^ 6)) / Stc)
```

```
    fbc = (fbL) + (((MDm + MLm) * (10 ^ 6)) / Sbc)

'Perhitungan kekuatan lentur penampang I bebas komposit
    Gp = 0.4
    dp = (h + ts) - dmin
    Pp = Aps / (be * dp)
    B1 = 0.85 - (0.008 * (fc_blk - 30))
    fps1 = fpu * (1 - ((Gp * Pp * fpu) / (B1 * fc_blk)))
    fps2 = fpy
        'pilih fps nilai terkecil
        If fps1 < fps2 Then
            fps = fps1
        ElseIf fps2 < fps1 Then
            fps = fps2
        End If
    T = Aps * fps
    a = T / (0.85 * fc_blk * be)

'Kapasitas penampang
    Mn2 = T * (dp - (a / 2)) * (10 ^ (-6)) '(kapasitas momen yang tersedia)

'Akibat beban-beban yang tersedia
    Mu = 1.2 * (MSm + MGm + MDm) + 1.6 * (MLm)
    Mn1 = Mu / 0.85 '(Kapasitas momen yang diperlukan)< Mn2

'Kontrol rasio tulangan
    w = (Pp * fps2) / fc_blk      '<  dari
    Z = 0.35 * B1

'Jumlah tendon
    'phi = 3.141592654
    Ar = (1 / 4) * 3.141592654 * (Dr ^ 2)
    JmlStrand1Tendon = Aps / (Ar * nr)
    JmlTendon = 1

JmlStrand1Tendon <= 1 And JmlStrand1Tendon > 0 Then
JmlStrand1TendonK = 1
ElIf JmlStrand1Tendon > 1 And JmlStrand1Tendon <= 2 Then
JmlStrand1TendonK = 2
ElIf JmlStrand1Tendon > 2 And JmlStrand1Tendon <= 3 Then
JmlStrand1TendonK = 3
ElIf JmlStrand1Tendon > 3 And JmlStrand1Tendon <= 4 Then
JmlStrand1TendonK = 4
ElIf JmlStrand1Tendon > 4 And JmlStrand1Tendon <= 5 Then
JmlStrand1TendonK = 5
If JmlStrand1Tendon > 5 And JmlStrand1Tendon <= 6 Then
JmlStrand1TendonK = 6
If

'Perhitungan momen yang tjd. ditump. dan 1/4 bentang
    MG = 0
    MS = 0
    MD = 0
    ML = 0
    MO = 0
    MT = 0
    MGq = (3 / 32) * WG * (L ^ 2)
    MSq = (3 / 32) * WS * (L ^ 2)
    MDq = (3 / 32) * WD * (L ^ 2)
    MLq = (3 / 32) * WL * (L ^ 2)
    MOq = (MGq + prs * MDq)
    MTq = MGq + MSq + MDq + MLq

'Menentukan daerah batas letak aman tendon ditump. ,1/4 bentang & tengah bentang
    amin = (MO * (10 ^ 6)) / Po
    eb = amin + Kb
    amax = (MT * (10 ^ 6)) / Pe
    et = amax - Kt
    aminq = (MOq * (10 ^ 6)) / Po
    ebq = aminq + Kb
    amaxq = (MTq * (10 ^ 6)) / Pe
    etq = amaxq - Kt
    aminm = (MOm * (10 ^ 6)) / Po
```

```
    ebm = aminm + Kb
    amaxm = (MTm * (10 ^ 6)) / Pe
    etm = amaxm - Kt

'Perhitungan tegangan ijin yang terjadi
    f1ci = k * fc_blk
    fci = (-0.6) * f1ci
    fti = 0.25 * (f1ci ^ 0.5)
    fcs = (-0.45) * fc_blk
    fts = 0.5 * (fc_blk ^ 0.5)

'PILIHAN APA TEGANGAN TARIK DIIJINKAN
 If Option3(0).Value = True Then
    TegTrkDiijinkan = "Ya"
    ebAks = (fti * (Ap + At) * Kb) / Po
    etAks = (fts * (Ap + At) * Kt) / Pe
 ElseIf Option3(1).Value = True Then
    TegTrkDijinkan = "Tidak"
    ebAks = 0
    etAks = 0
 End If

  'Penambahan lebar daerah batas aman tendon pada tum., 1/4 bentang & tengah bentang
    eb1 = eb + ebAks
    et1 = et - etAks
    eb1q = ebq + ebAks
    et1q = etq - etAks
    eb1m = ebm + ebAks
    et1m = etm - etAks

JmlTendon < 1.5 And JmlTendon > 0 Then
 JmlTendonK = 1
ElIf JmlTendon >= 1.5 And JmlTendon <= 2.5 Then
 JmlTendonK = 2
ElIf JmlTendon > 2.5 And JmlTendon <= 3.5 Then
 JmlTendonK = 3
ElIf JmlTendon > 3.5 And JmlTendon <= 4.5 Then
 JmlTendonK = 4
 If

GROUTING
 ElseIf Option2(1).Value = True Then
    Kondisi = "UNGROUTING"

  'Perhitungan perencanaan tampang I bebas pracetak
    A1 = bf * g1
    A2 = (0.5 * (bf - bw) * g2)
    A3 = (h - g1 - g4) * bw
    A4 = (0.5 * (bb - bw) * g3)
    A5 = bb * g4
    Ap = A1 + A2 + A3 + A4 + A5
    'phi = 3.141592654
    An = (1 / 4 * 3.141592654 * Ds ^ 2)
    cbp = (((A1 * (h - (g1 / 2))) + (A2 * (h - g1 - ((2 / 3) * g2))) + (A3 * (((h - g1 - g
 2) + g4)) + (A4 * (((2 / 3) * g3) + g4)) + (A5 * (g4 / 2))) - (An * dmin)) / (Ap - An)
    ctp = (h - cbp)
    emax = (cbp - dmin)
    Ip = (1 / 12 * bf * g1 ^ 3 + A1 * (ctp - (g1 / 2)) ^ 2) + (((1 / 36 * ((bf - bw) / 2)
 ^ 3) * 2) + (A2 * (ctp - g1 - (2 / 3 * g2)) ^ 2)) + (1 / 12 * bw * (h - g1 - g4) ^ 3) + A
(ctp - ((h - g1 - g4) / 2)) ^ 2 + ((1 / 36 * ((bb - bw) / 2) * g3 ^ 3) * 2 + A4 * (cbp - g
(2 / 3) * g3) ^ 2) + (1 / 12 * bb * g4 ^ 3 + A5 * (cbp - g4 / 2) ^ 2) - ((1 / 64 * 3.14159
 * Ds ^ 2) + (An * (emax ^ 2)))
    Stp = Ip / ctp
    Sbp = Ip / cbp
    rp2 = Ip / (Ap - An)
    Kt = rp2 / cbp
    Kb = rp2 / ctp
    WG = ((Ap - An) * (10 ^ (-6)) * wbt)
HAN TEPI DAN TENGAH
 TEPI
f Option1(0).Value = True Then
    Posisi = "TEPI"
    be1 = bf + (6 * ts)
```

```
    be2 = (bf + S) / 2
    be3 = (bf + (L * 1000)) / 12
        'pilih nilai be terkecil
        If be1 < be2 And be1 < be3 Then
            be = be1
        ElseIf be2 < be1 And be2 < be3 Then
            be = be2
        ElseIf be3 < be1 And be3 < be2 Then
            be = be3
        End If
'POSISI TENGAH
ElseIf Option1(1).Value = True Then
    Posisi = "TENGAH"
    be1 = bf + (12 * ts)
    be2 = S
    be3 = (L * 1000) / 4
        'pilih nilai be terkecil
        If be1 < be2 And be1 < be3 Then
            be = be1
        ElseIf be2 < be1 And be2 < be3 Then
            be = be2
        ElseIf be3 < be1 And be3 < be2 Then
            be = be3
        End If
End If


'Perhitungan perenc. tampang I bebas komposit
    ntr = (fc_plt ^ 0.5) / (fc_blk ^ 0.5)
    btr = ntr * be
    Apelat = btr * ts
    Ac = (Ap - An + Apelat)
    cbc = ((Apelat * (h + ts / 2)) + ((Ap - An) * cbp)) / (Ac)
    ctc = (h + ts) - cbc
    Ic = ((1 / 12 * btr * ts ^ 3 + Apelat * (ctc - ts / 2) ^ 2) + (Ip + ((Ap - An) * (cbc
)p) ^ 2)))
    Stc = Ic / ctc
    Sbc = Ic / cbc

'Perhitungan momen yang terjadi ditengah bentang
'Pada saat transfer beban mati telah bekerja (sebanyak p persen)
    WS = S * ts * wbt * (10 ^ (-6))
    MGm = (WG * (L ^ 2)) / 8
    MSm = (WS * (L ^ 2)) / 8
    MDm = (WD * (L ^ 2)) / 8
    MLm = (WL * (L ^ 2)) / 8
    MOm = (MGm + (prs * MDm))
    MTm = (MGm + MSm + MDm + MLm)

'Perhitungan teg. yang tjd. sblm. tampang mjd. komposit
    R = 1 - LOF
    Po = (0.74 * fpu) * Aps
    Pe = R * Po
    ftT = ((-Po / (Ap - An)) * (1 - ((emax * ctp) / rp2))) - ((MOm * (10 ^ 6)) / Stp)
    fbT = ((-Po / (Ap - An)) * (1 + ((emax * cbp) / rp2))) + ((MOm * (10 ^ 6)) / Sbp)
    ftL = ((-Pe / (Ap - An)) * (1 - ((emax * ctp) / rp2))) - (((MOm + MSm) * (10 ^ 6)) / S

    fbL = ((-Pe / (Ap - An)) * (1 + ((emax * cbp) / rp2))) + (((MOm + MSm) * (10 ^ 6)) / S

'Perhitungan teg. yang tjd. stlh. menjadi komposit
    ftc = (ftL) - (((MDm + MLm) * (10 ^ 6)) / Stc)
    fbc = (fbL) + (((MDm + MLm) * (10 ^ 6)) / Sbc)

'Perhitungan kekuatan lentur penampang I bebas komposit
    dp = (h + ts) - dmin
    Pp = Aps / (be * dp)
    fse = Pe / Aps
    fps1 = fse + 70 + (fc_blk / (100 * Pp))
    fps2 = fpy
    fps3 = fse + 400
        'pilih fps nilai terkecil
        If fps1 < fps2 And fps1 < fps3 Then
            fps = fps1
```

```
        ElseIf fps2 < fps1 And fps2 < fps3 Then
            fps = fps2
        ElseIf fps3 < fps1 And fps3 < fps2 Then
            fps = fps3
        End If
    T = Aps * fps
    a = T / (0.85 * fc_blk * be)

'Kapasitas penampang
    Mn2 = T * (dp - (a / 2)) * (10 ^ (-6)) '(kapasitas momen yang tersedia)

'Akibat beban-beban yang tersedia
   Mu = 1.2 * (MSm + MGm + MDm) + 1.6 * (MLm)
   Mn1 = Mu / 0.85 '(Kapasitas momen yang diperlukan)< Mn2

'Kontrol rasio tulangan
    w = (Pp * fps2) / fc_blk     '<  dari
    Z = 0.35 * B1
'Jumlah tendon
    'phi = 3.141592654
    Ar = (1 / 4) * 3.141592654 * (Dr ^ 2)
    JmlStrand1Tendon = Aps / (Ar * nr)
    JmlTendon = 1

JmlStrand1Tendon <= 1 And JmlStrand1Tendon > 0 Then
 JmlStrand1TendonK = 1
eIf JmlStrand1Tendon > 1 And JmlStrand1Tendon <= 2 Then
 JmlStrand1TendonK = 2
eIf JmlStrand1Tendon > 2 And JmlStrand1Tendon <= 3 Then
 JmlStrand1TendonK = 3
eIf JmlStrand1Tendon > 3 And JmlStrand1Tendon <= 4 Then
 JmlStrand1TendonK = 4
eIf JmlStrand1Tendon > 4 And JmlStrand1Tendon <= 5 Then
 JmlStrand1TendonK = 5
eIf JmlStrand1Tendon > 5 And JmlStrand1Tendon <= 6 Then
 JmlStrand1TendonK = 6
 If

'Perhitungan momen yang tjd. ditump. dan 1/4 bentang
    MG = 0
    MS = 0
    MD = 0
    ML = 0
    MO = 0
    MT = 0
    MGq = (3 / 32) * WG * (L ^ 2)
    MSq = (3 / 32) * WS * (L ^ 2)
    MDq = (3 / 32) * WD * (L ^ 2)
    MLq = (3 / 32) * WL * (L ^ 2)
    MOq = (MGq + prs * MDq)
    MTq = MGq + MSq + MDq + MLq

'Menentukan daerah batas letak aman tendon ditump. ,1/4 bentang & tengah bentang
    amin = (MO * (10 ^ 6)) / Po
    eb = amin + Kb
    amax = (MT * (10 ^ 6)) / Pe
    et = amax - Kt
    aminq = (MOq * (10 ^ 6)) / Po
    ebq = aminq + Kb
    amaxq = (MTq * (10 ^ 6)) / Pe
    etq = amaxq - Kt
    aminm = (MOm * (10 ^ 6)) / Po
    ebm = aminm + Kb
    amaxm = (MTm * (10 ^ 6)) / Pe
    etm = amaxm - Kt


'Perhitungan tegangan ijin yang terjadi
    f1ci = k * fc_blk
    fci = (-0.6) * f1ci
    fti = 0.25 * (f1ci ^ 0.5)
    fcs = (-0.45) * fc_blk
    fts = 0.5 * (fc_blk ^ 0.5)
```

```
'PILIHAN APA TEGANGAN TARIK DIIJINKAN
 If Option3(0).Value = True Then
    TegTrkDiijinkan = "Ya"
    ebAks = (fti * (Ap - An) * Kb) / Po
    etAks = (fts * (Ap - An) * Kt) / Pe
 ElseIf Option3(1).Value = True Then
    TegTrkDijinkan = "Tidak"
    ebAks = 0
    etAks = 0
 End If

  'Penambahan lebar daerah batas aman tendon pada tum., 1/4 bentang & tengah bentang
    eb1 = eb + ebAks
    et1 = et - etAks
    eb1q = ebq + ebAks
    et1q = etq - etAks
    eb1m = ebm + ebAks
    et1m = etm - etAks

JmlTendon < 1.5 And JmlTendon > 0 Then
 JmlTendonK = 1
elf JmlTendon >= 1.5 And JmlTendon <= 2.5 Then
 JmlTendonK = 2
elf JmlTendon > 2.5 And JmlTendon <= 3.5 Then
 JmlTendonK = 3
elf JmlTendon > 3.5 And JmlTendon <= 4.5 Then
 JmlTendonK = 4
 If
 If
oug.Print "fti " & fti
oug.Print "fci " & fci
oug.Print "fts " & fts
oug.Print "fcs " & fcs
oug.Print "R " & R
oug.Print "Ap " & Ap
oug.Print "At " & At
oug.Print "An " & An
oug.Print "Cbp " & cbp
oug.Print "Ctp " & ctp
oug.Print "Ip " & Ip
oug.Print "Stp " & Stp
oug.Print "Sbp " & Sbp
oug.Print "rp2 " & rp2
ug.Print "Kt " & Kt
ug.Print "Kb " & Kb
ug.Print "emax " & emax
ug.Print "Po " & Po
ug.Print "ftT " & ftT
ug.Print "fbT " & fbT
ug.Print "Pe " & Pe
ug.Print "ftL " & ftL
ug.Print "fbL " & fbL
ug.Print "be " & be
ug.Print "ntr " & ntr
ug.Print "btr " & btr
ug.Print "Apelat " & Apelat
ug.Print "Ac " & Ac
ug.Print "Cbc " & cbc
ug.Print "Ctc " & ctc
g.Print "Ic " & Ic
g.Print "Stc " & Stc
g.Print "Sbc " & Sbc
g.Print "ftc " & ftc
g.Print "fbc " & fbc
g.Print "B1 " & B1
g.Print "Aps " & Aps
g.Print "Pp " & Pp
g.Print "fps1 " & fps1
g.Print "fps2 " & fps2
g.Print "fps " & fps
g.Print "T " & T
g.Print "a " & a
```

```
bug.Print "w " & w
bug.Print "Z " & Z
bug.Print "Mn1 " & Mn1
bug.Print "Mn2 " & Mn2
bug.Print "Mu " & Mu
bug.Print "amin " & amin
bug.Print "aminq " & aminq
bug.Print "aminm " & aminm
bug.Print "eb " & eb
bug.Print "ebq " & ebq
ilPscbug.Print "ebm " & ebm
bug.Print "amax " & amax
bug.Print "amaxq " & amaxq
bug.Print "amaxm " & amaxm
b Texbug.Print "et " & et
t3(1)bug.Print "etq " & etq
lai fbug.Print "etm " & etm
bug.Print "ebAks " & ebAks
bug.Print "etAks " & etAks
bug.Print "eb1 " & eb1
b Combug.Print "eb1q " & eb1q
bug.Print "eb1m " & eb1m
bug.Print "et1 " & et1
bug.Print "et1q " & et1q
b mnulbug.Print "et1m " & et1m
bug.Print "Ar " & Ar
bug.Print "nr " & nr
bug.Print "Jml1Tendon " & Jml1Tendon
bug.Print "Jml1TendonK " & Jml1TendonK
bug.Print "Jml1Strand1Tendon " & Jml1Strand1Tendon
bug.Print "Jml1Strand1TendonK " & Jml1Strand1TendonK

    Open App.Path & "\temp_data\hasil_temp.ini" For Output As #1
        Write #1, tipe
        Write #1, Posisi
        Write #1, TegTrkDiijinkan
        Write #1, Apelat
        Write #1, cbp
        Write #1, ts
        Write #1, btr
        Write #1, Ap
        Write #1, Ip
        Write #1, Ac
        Write #1, Ic
        Write #1, cbc
        Write #1, ctc
        Write #1, Sbc
        Write #1, Stc
        Write #1, Kt
        Write #1, Kb
        Write #1, Mn1
        Write #1, w
        Write #1, eb
        Write #1, et
        Write #1, ebq
        Write #1, etq
        Write #1, ebm
        Write #1, etm
        Write #1, eb1
        Write #1, et1
        Write #1, eb1q
        Write #1, et1q
        Write #1, eb1m
        Write #1, et1m
        Write #1, dmin
        Write #1, Jml1Tendon
        Write #1, Jml1TendonK
        Write #1, Jml1Strand1Tendon
        Write #1, Jml1Strand1TendonK
        Write #1, ftT
        Write #1, fbT
        Write #1, ftL
        Write #1, fbL
```

```
                Write #1, ftc
                Write #1, fbc
                Write #1, fti
                Write #1, fci
                Write #1, fts
                Write #1, fcs
                Write #1, Z
                Write #1, "I"
                Write #1, Po
                Write #1, Pe
                Close #1
frmHasilPscTrk.Show

Sub

vate Sub Text3_Change(Index As Integer)
 If Text3(1).Text > "Text3(0).Text" Then
Box "Nilai fc_plt < fc_blk", vbExclamation, "Mohon Diganti"
 End If
 Sub

vate Sub Command2_Click()
oad Me
 Sub

vate Sub mnuIBebasPscTrkKEluar_Click()
oad Me
 Sub
```

klarasi variable masukan dan sifat-sifat mekanis penampang I standar AASHTO pratarik
Status As String
L As Double
S As Double
ts As Double
dmin As String
fc_blk As Double
fc_plt As Double
fpu As Double
fpy As Double
wbt As Double
Dr As Double
WD As Double
WL As Double
LOF As Double
nr As String
k As Double
tipe
Posisi
TegTrkDiijinkan

klarasi variabel hasil hitungan perencanaan tampang pracetak komposit
A1 As Double
A2 As Double
A3 As Double
A4 As Double
A5 As Double
bf As Double
bb As Double
bw As Double
g1 As Double
g2 As Double
g3 As Double
g4 As Double
Ap As Double
Ip As Double
ctp As Double
cbp As Double
Stp As Double
Sbp As Double
rp2 As Double
Kt As Double
Kb As Double
emax As Double
WG As Double

larasi variabel untuk hitungan teg. yang terjadi
f1ci As Double
fci As Double
fti As Double
fcs As Double
fts As Double
fcent As Double
Po As Double
R As Double
Pe As Double
WS As Double

larasi variabel hitungan momen ditengah bentang
MGm As Double
MSm As Double
MDm As Double
MLm As Double
MTm As Double

larasi variabel tegangan ijin yang terjadi sebelum komposit
ftT As Double
fbT As Double
ftL As Double
fbL As Double

arasi variabel untuk hitungan be
be1 As Double

```
be2 As Double
be3 As Double
be As Double

klarasi variabel hasil hit. perenc. tampang I standar AASHTO pratarik komposit
n As Double
btr As Double
Apelat As Double
Ac As Double
Ic As Double
ctc As Double
cbc As Double
Stc As Double
Sbc As Double

klarasi var. hsl. hit. yang tjd. setelah menjadi komposit
ftc As Double
fbs As Double

klarasi var. untuk hit. kekuatan lentur penampang
B1 As Double
Gp As Double
Aps As Double
dp As Double
Pp As Double
fps1 As Double
fps2 As Double
fps As Double
T As Double
a As Double
Mn As Double
Z As Double

klarasi var. kontrol rasio tul. & jumlah tendon
w As Double
Ar As Double
JmlStrand As String
JmlStrandK As String

klarasi var. hsl. hit. momen pada tump. dan 1/4 bentang
MG As Double
MS As Double
MD As Double
ML As Double
MGq As Double
MSq As Double
MDq As Double
MLq As Double

larasi var. untuk menentukan batas atas & bawah letak aman tendon
amin As Double
eb As Double
amax As Double
et As Double
aminq As Double
ebq As Double
amaxq As Double
etq As Double
aminm As Double
ebm As Double
amaxm As Double
etm As Double

larasi untuk menent. penamb. lebar daerah aman tendon
ebAks As Double
etAks As Double
eb1 As Double
et1 As Double
eb1q As Double
et1q As Double
eb1m As Double
et1m As Double
```

```
vate Sub Command1_Click()
Error Resume Next
 CDbl(Text2(0).Text)
 CDbl(Text2(1).Text)
= CDbl(Text2(2).Text)
n = CStr(Text2(3).Text)
blk = CDbl(Text3(0).Text)
plt = CDbl(Text3(1).Text)
 = CDbl(Text3(2).Text)
 = CDbl(Text3(3).Text)
 = CDbl(Text3(4).Text)
= CDbl(Text3(5).Text)
= CDbl(Text3(6).Text)
= CDbl(Text3(7).Text)
 = CDbl(Text3(8).Text)
= CStr(Text3(9).Text)
 CDbl(Text3(10).Text)

 Text2(0).Text = "" Or Text2(1).Text = "" Or Text2(2).Text = "" Or Text2(3).Text = "" Or Te
(4).Text = "" Or Text2(5).Text = "" Or Text3(0).Text = "" Or Text3(1).Text = "" Or Text3(2)
xt = "" Or Text3(3).Text = "" Or Text3(4).Text = "" Or Text4(0).Text = "" Or Text4(1).Text
" Or Text4(2).Text = "" Or Text5(0).Text = "" Or Text5(1).Text = "" Then
 MsgBox "Masih Ada Field yang Kosong... Harus Diisi!", vbCritical, "PESAN KESALAHAN"
d If

LIHAN TIPE TAMPANG BALOK AASHTO
 If Option1(0).Value = True Then
     tipe = "TIPE I"
     h = 711
     bf = 305
     bb = 406
     bw = 152
     g1 = 102
     g2 = 76
     g3 = 127
     g4 = 127
 ElseIf Option1(1).Value = True Then
     tipe = "TIPE II"
     h = 914
     bf = 305
     bb = 457
     bw = 152
     g1 = 152
     g2 = 76
     g3 = 152
     g4 = 152
 ElseIf Option1(2).Value = True Then
     tipe = "TIPE III"
     h = 1143
     bf = 406
     bb = 559
     bw = 178
     g1 = 178
     g2 = 114
     g3 = 191
     g4 = 178
 ElseIf Option1(3).Value = True Then
     tipe = "TIPE IV"
     h = 1371
     bf = 508
     bb = 660
     bw = 203
     g1 = 203
     g2 = 152
     g3 = 229
     g4 = 203
 ElseIf Option1(4).Value = True Then
     tipe = "TIPE V"
     h = 1600
     bf = 1067
     bb = 711
     bw = 203
     g1 = 127
```

```
    g2 = 178
    g3 = 254
    g4 = 203
ElseIf Option1(5).Value = True Then
    tipe = "TIPE VII"
    h = 1829
    bf = 1067
    bb = 711
    g1 = 127
    g2 = 178
    g3 = 254
    g4 = 203
End If

rhitungan perencanaan tampang I standar AASHTO pratarik pracetak
    A1 = bf * g1
    A2 = (0.5 * (bf - bw) * g2)
    A3 = (h - g1 - g4) * bw
    A4 = (0.5 * (bb - bw) * g3)
    A5 = bb * g4
    Ap = A1 + A2 + A3 + A4 + A5
    cbp = ((A1 * (h - (g1 / 2))) + (A2 * (h - g1 - ((2 / 3) * g2))) + (A3 * (((h - g1 - g4
2) + g4)) + (A4 * (((2 / 3) * g3) + g4)) + (A5 * (g4 / 2))) / Ap
    ctp = h - cbp
    Ip = (((1 / 12) * bf * (g1 ^ 3)) + (A1 * (ctp - (g1 / 2)) ^ 2)) + ((((1 / 36) * ((bf -
) / 2) * (g2 ^ 3)) * 2) + (A2 * (ctp - g1 - ((2 / 3) * g2)) ^ 2)) + (((1 / 12) * bw * ((h -
- g4) ^ 3)) + (A3 * (ctp - ((h - g1 - g4) / 2)) ^ 2)) + ((((1 / 36) * ((bb - bw) / 2) * (g
3)) * 2) + (A4 * (cbp - g4 - ((2 / 3) * g3)) ^ 2)) + (((1 / 12) * bb * (g4 ^ 3)) + (A5 * (
- (g4 / 2)) ^ 2))
    Stp = Ip / ctp
    Sbp = Ip / cbp
    rp2 = Ip / Ap
    Kt = rp2 / cbp
    Kb = rp2 / ctp
    emax = cbp - dmin
    WG = Ap * (10 ^ (-6)) * wbt

:hitungan tegangan ijin yang terjadi
    f1ci = k * fc_blk
    fci = (-0.6) * f1ci
    fti = 0.25 * (f1ci ^ 0.5)
    fcs = (-0.45) * fc_blk
    fts = 0.25 * (fc_blk ^ 0.5)
    fcent = (fti - ((ctp / h) * (fti - fci))) * (-1)
    Po = fcent * Ap
    R = 1 - LOF
    Pe = R * Po
    WS = S * ts * wbt * (10 ^ (-6))

hitungan momen yang terjadi ditengah bentang
    MGm = (WG * (L ^ 2)) / 8
    MSm = (WS * (L ^ 2)) / 8
    MDm = (WD * (L ^ 2)) / 8
    MLm = (WL * (L ^ 2)) / 8
    MTm = MGm + MSm + MDm + MLm

hitungan teg. yang tjd. sblm. tampang mjd. komposit
    ftT = ((-Po / Ap) * (1 - ((emax * ctp) / rp2))) - ((MGm * (10 ^ 6)) / Stp)
    fbT = ((-Po / Ap) * (1 + ((emax * cbp) / rp2))) + ((MGm * (10 ^ 6)) / Sbp)
    ftL = ((-Pe / Ap) * (1 - ((emax * ctp) / rp2))) - (((MGm + MSm) * (10 ^ 6)) / Stp)
    fbL = ((-Pe / Ap) * (1 + ((emax * cbp) / rp2))) + (((MGm + MSm) * (10 ^ 6)) / Sbp)

IHAN TEPI DAN TENGAH
'TEPI
If Option3(0).Value = True Then
    Posisi = "TEPI"
    be1 = bf + (6 * ts)
    be2 = (bf + S) / 2
    be3 = (bf + (L * (10 ^ 3))) / 12
        'pilih nilai be terkecil
        If be1 < be2 And be1 < be3 Then
            be = be1
        ElseIf be2 < be1 And be2 < be3 Then
```

```
            be = be2
        ElseIf be3 < be1 And be3 < be2 Then
            be = be3
        End If
'POSISI TENGAH
ElseIf Option3(1).Value = True Then
    Posisi = "TENGAH"
    be1 = bf + (12 * ts)
    be2 = S
    be3 = (L * (10 ^ 3)) / 4
        'pilih nilai be terkecil
        If be1 < be2 And be1 < be3 Then
            be = be1
        ElseIf be2 < be1 And be2 < be3 Then
            be = be2
        ElseIf be3 < be1 And be3 < be2 Then
            be = be3
        End If
End If

rhitungan perenc. tampang I standar AASTHO pratarik komposit
    n = (fc_plt ^ 0.5) / (fc_blk ^ 0.5)
    btr = n * be
    Apelat = btr * ts
    Ac = Ap + Apelat
    cbc = ((Apelat * (h + (ts / 2))) + (Ap * cbp)) / Ac
    ctc = (h + ts) - cbc
    Ic = (Ip + (Ap * (cbc - cbp) ^ 2)) + (((1 / 12) * btr * (ts ^ 3)) + (Apelat * (ctc - (
/ 2)) ^ 2))
    Stc = Ic / ctc
    Sbc = Ic / cbc

erhitungan teg. yang tjd. stlh. menjadi komposit
    ftc = ftL - (((MDm + MLm) * (10 ^ 6)) / Stc)
    fbc = fbL + (((MDm + MLm) * (10 ^ 6)) / Sbc)

erhitungan kekuatanlentur penampang I standar AASTHO komposit
    B1 = 0.85 - (0.008 * (fc_blk - 30))
    Gp = 0.4
    Aps = Po / (0.7 * fpu)
    dp = (h + ts) - dmin
    Pp = Aps / (be * dp)
    fps1 = fpu * (1 - ((Gp * Pp * fpu) / (B1 * fc_blk)))
    fps2 = fpy
        'pilih fps nilai terkecil
        If fps1 < fps2 Then
            fps = fps1
        ElseIf fps2 < fps1 Then
            fps = fps2
        End If
    T = Aps * fps
    a = T / (0.85 * fc_blk * S)
    Mn = T * (dp - (a / 2)) * (10 ^ (-6))
    Z = 0.35 * B1

ntrol rasio tulangan dan jumlah tendon
    w = (Pp * fps) / fc_blk
    Ar = (1 / 4) * 3.1415592654 * (Dr ^ 2)
    JmlStrand = Aps / (Ar * nr)

rhitungan momen yang tjd. ditump. dan 1/4 bentang
    MG = 0
    MS = 0
    MD = 0
    ML = 0
    MT = 0
    MGq = (3 / 32) * WG * (L ^ 2)
    MSq = (3 / 32) * WS * (L ^ 2)
    MDq = (3 / 32) * WD * (L ^ 2)
    MLq = (3 / 32) * WL * (L ^ 2)
    MTq = MGq + MSq + MDq + MLq

ientukan daerah batas letak aman tendon ditump. ,1/4 bentang & tengah bentang
```

```
    amin = (MG * (10 ^ 6)) / Po
    eb = amin + Kb
    amax = (MT * (10 ^ 6)) / Pe
    et = amax - Kt
    aminq = (MGq * (10 ^ 6)) / Po
    ebq = aminq + Kb
    amaxq = (MTq * (10 ^ 6)) / Pe
    etq = amaxq - Kt
    aminm = (MGm * (10 ^ 6)) / Po
    ebm = aminm + Kb
    amaxm = (MTm * (10 ^ 6)) / Pe
    etm = amaxm - Kt

ILIHAN APA TEGANGAN TARIK DIIJINKAN
  If Option2(0).Value = True Then
    TegTrkDiijinkan = "Ya"
    ebAks = (fti * Ac * Kb) / Po
    etAks = (fts * Ac * Kt) / Pe
  ElseIf Option2(1).Value = True Then
    TegTrkDijinkan = "Tidak"
    ebAks = 0
    etAks = 0
  End If

enambahan lebar daerah batas aman tendon pada tum., 1/4 bentang & tengah bentang
    eb1 = eb + ebAks
    et1 = et - etAks
    eb1q = ebq + ebAks
    et1q = etq - etAks
    eb1m = ebm + ebAks
    et1m = etm - etAks

JmlStrand <= 1 And JmlStrand > 0 Then
 JmlStrandK = 1
elIf JmlStrand > 1 And JmlStrand <= 2 Then
 JmlStrandK = 2
elIf JmlStrand > 2 And JmlStrand <= 3 Then
 JmlStrandK = 3
elIf JmlStrand > 3 And JmlStrand <= 4 Then
 JmlStrandK = 4
elIf JmlStrand > 4 And JmlStrand <= 5 Then
 JmlStrandK = 5
elIf JmlStrand > 5 And JmlStrand <= 6 Then
 JmlStrandK = 6
 If

ebug.Print "Posisi " & Posisi
ebug.Print "TegTrkDiijinkan " & TegTrkDiijinkan
ebug.Print "Tipe " & tipe
bug.Print "fci " & fci
bug.Print "fti " & fti
bug.Print "fcs " & fcs
bug.Print "fts " & fts
bug.Print "R " & R
bug.Print "Ap " & Ap
bug.Print "Cbp " & cbp
bug.Print "Ctp " & ctp
bug.Print "Ip " & Ip
bug.Print "Stp " & Stp
bug.Print "Sbp " & Sbp
ug.Print "rp2 " & rp2
g.Print "Kt " & Kt
g.Print "Kb " & Kb
g.Print "emax " & emax
g.Print "fcent " & fcent
g.Print "Po " & Po
g.Print "ftT " & ftT
g.Print "fbT " & fbT
g.Print "Pe " & Pe
g.Print "ftL " & ftL
g.Print "fbL " & fbL
g.Print "be " & be
g.Print "n " & n
```

```
bug.Print "btr " & btr
bug.Print "Apelat " & Apelat
bug.Print "Ac " & Ac
bug.Print "Cbc " & cbc
bug.Print "Ctc " & ctc
bug.Print "Ic " & Ic
bug.Print "Stc " & Stc
bug.Print "Sbc " & Sbc
bug.Print "ftc " & ftc
bug.Print "fbc " & fbc
bug.Print "Bl " & Bl
bug.Print "Aps " & Aps
bug.Print "Pp " & Pp
bug.Print "fps1 " & fps1
bug.Print "fps2 " & fps2
bug.Print "fps " & fps
bug.Print "T " & T
bug.Print "a " & a
bug.Print "w " & w
oug.Print "Z " & Z
oug.Print "Mn " & Mn
oug.Print "amin " & amin
oug.Print "aminq " & aminq
oug.Print "aminm " & aminm
oug.Print "eb " & eb
oug.Print "ebq " & ebq
oug.Print "ebm " & ebm
oug.Print "amax " & amax
oug.Print "amaxq " & amaxq
oug.Print "amaxm " & amaxm
oug.Print "et " & et
oug.Print "etq " & etq
oug.Print "etm " & etm
oug.Print "ebAks " & ebAks
oug.Print "etAks " & etAks
oug.Print "eb1 " & eb1
oug.Print "eb1q " & eb1q
oug.Print "eb1m " & eb1m
oug.Print "et1 " & et1
oug.Print "et1q " & et1q
oug.Print "et1m " & et1m
oug.Print "Ar " & Ar
oug.Print "JmlStrand " & JmlStrand
oug.Print "JmlStrandK " & JmlStrandK

ve di temp_data
            Open App.Path & "\temp_data\hasil_temp.ini" For Output As #1
            Write #1, tipe
            Write #1, Posisi
            Write #1, TegTrkDiijinkan
            Write #1, Apelat
            Write #1, cbp
            Write #1, ts
            Write #1, btr
            Write #1, Ap
            Write #1, Ip
            Write #1, Ac
            Write #1, Ic
            Write #1, cbc
            Write #1, ctc
            Write #1, Sbc
            Write #1, Stc
            Write #1, Kt
            Write #1, Kb
            Write #1, Mn
            Write #1, w
            Write #1, eb
            Write #1, et
            Write #1, ebq
            Write #1, etq
            Write #1, ebm
            Write #1, etm
            Write #1, eb1
```

```
klarasi variable masukan dan sifat-sifat mekanis penampang i bebas
 Status As String
 L As Double
 S As Double
 ts As Double
 h As Double
 dmin As String
 fc_blk As Double
 fc_plt As Double
 fpu As Double
 fpy As Double
 wbt As Double
 WD As Double
 WL As Double
 LOF As Double
 Aps As Double
 Ds As Double
 Dr As Double
 nr As Single
 nt As Single
 k As Double
 prs As Double
 Posisi
 Kondisi
 TegTrkDiijinkan

klarasi variabel hasil hitungan perencanaan tampang pracetak komposit
 A1 As Double
 A2 As Double
 A3 As Double
 A4 As Double
 A5 As Double
 bf As Double
 bb As Double
 bw As Double
 g1 As Double
 g2 As Double
 g3 As Double
 g4 As Double
 Ap As Double
 At As Double
 An As Double
 cbp As Double
 ctp As Double
 Ip As Double
 Stp As Double
 Sbp As Double
 rp2 As Double
 Kt As Double
 Kb As Double
 emax As Double
 WG As Double

larasi variabel untuk hitungan teg. yang terjadi
 R As Single
 Po As Double
 Pe As Double

 larasi variabel hitungan momen ditengah bentang
 MGm As Double
 MSm As Double
 MDm As Double
 MLm As Double
 MOm As Double
 MTm As Double
 Mn2 As Double
 Mu As Double
 Mn1 As Double

 larasi Tegangan-Tegangan yang Diijinkan
 f1ci As Double
 fci As Double
 fti As Double
```

```
 fcs As Double
 fts As Double

klarasi variabel tegangan ijin yang terjadi sebelum komposit
 ftT As Double
 fbT As Double
 ftL As Double
 fbL As Double

klarasi variabel untuk hitungan be
 be1 As Double
 be2 As Double
 be3 As Double
 be As Double

klarasi variabel hasil hit. perenc. tampang I bebas komposit
 WS As Double
 ntr As Double
 btr As Double
 Apelat As Double
 Ac As Double
 Ic As Double
 ctc As Double
 cbc As Double
 Stc As Double
 Sbc As Double

klarasi var. hsl. hit. yang tjd. setelah menjadi komposit
 ftc As Double
 fbc As Double

klarasi var. untuk hit. kekuatan lentur penampang
 B1 As Double
 Gp As Double
 dp As Double
 Pp As Double
 fps1 As Double
 fps2 As Double
 fps3 As Double
 fps As Double
 fpe As Double
 T As Double
 a As Double
 Z As Double

larasi var. kontrol rasio tul. & jumlah tendon
 w As Double
 Ar As Double
 JmlTendon As String
 JmlTendonK As String
 JmlStrandlTendon As String
 JmlStrandlTendonK As String

larasi var. hsl. hit. momen pada tump. dan 1/4 bentang
 MG As Double
 MS As Double
 MD As Double
 ML As Double
 MO As Double
 MT As Double

 MGq As Double
 MSq As Double
 MDq As Double
 MLq As Double
 MOq As Double
 MTq As Double

 larasi var. untuk menentukan batas atas & bawah letak aman tendon
 amin As Double
 eb As Double
 amax As Double
 et As Double
```

```
aminq As Double
ebq As Double
amaxq As Double
etq As Double
aminm As Double
ebm As Double
amaxm As Double
etm As Double

klarasi untuk menent. penamb. lebar daerah aman tendon
ebAks As Double
etAks As Double
eb1 As Double
et1 As Double
eb1q As Double
et1q As Double
eb1m As Double
et1m As Double

vate Sub Command3_Click()
Error Resume Next
CDbl(Text3(0).Text)
CDbl(Text3(1).Text)
= CDbl(Text3(2).Text)
n = CStr(Text3(3).Text)
b1k = CDbl(Text4(0).Text)
p1t = CDbl(Text4(1).Text)
= CDbl(Text4(2).Text)
= CDbl(Text4(3).Text)
= CDbl(Text4(4).Text)
= CDbl(Text4(5).Text)
= CDbl(Text4(6).Text)
= CDbl(Text4(7).Text)
= CDbl(Text4(8).Text)
= CDbl(Text4(9).Text)
= CDbl(Text4(10).Text)
= CStr(Text4(11).Text)
= CStr(Text4(12).Text)
CDbl(Text4(13).Text)
= CDbl(Text4(14).Text)


IHAN TIPE TAMPANG BALOK AASHTO
If Option1(0).Value = True Then
    tipe = "TIPE I"
    h = 711
    bf = 305
    bb = 406
    bw = 152
    g1 = 102
    g2 = 76
    g3 = 127
    g4 = 127
ElseIf Option1(1).Value = True Then
    tipe = "TIPE II"
    h = 914
    bf = 305
    bb = 457
    bw = 152
    g1 = 152
    g2 = 76
    g3 = 152
    g4 = 152
ElseIf Option1(2).Value = True Then
    tipe = "TIPE III"
    h = 1143
    bf = 406
    bb = 559
    bw = 178
    g1 = 178
    g2 = 114
    g3 = 191
    g4 = 178
```

```
ElseIf Option1(3).Value = True Then
    tipe = "TIPE IV"
    h = 1371
    bf = 508
    bb = 660
    bw = 203
    g1 = 203
    g2 = 152
    g3 = 229
    g4 = 203
ElseIf Option1(4).Value = True Then
    tipe = "TIPE V"
    h = 1600
    bf = 1067
    bb = 711
    bw = 203
    g1 = 127
    g2 = 178
    g3 = 254
    g4 = 203
ElseIf Option1(5).Value = True Then
    tipe = "TIPE VII"
    h = 1829
    bf = 1067
    bb = 711
    g1 = 127
    g2 = 178
    g3 = 254
    g4 = 203
End If


LIHAN GRPOUTING DAN UNGROUTING
 'GROUTING
 If Option2(3).Value = True Then
    Kondisi = "GROUTING"

 'Perhitungan perencanaan tampang I bebas pracetak
    A1 = bf * g1
    A2 = (0.5 * (bf - bw) * g2)
    A3 = (h - g1 - g4) * bw
    A4 = (0.5 * (bb - bw) * g3)
    A5 = bb * g4
    Ap = A1 + A2 + A3 + A4 + A5
    At = ((nt - 1) * Aps)
    cbp = (((A1 * (h - (g1 / 2))) + (A2 * (h - g1 - ((2 / 3) * g2))) + (A3 * (((h - g1 - g
' 2) + g4)) + (A4 * (((2 / 3) * g3) + g4)) + (A5 * (g4 / 2))) + (At * dmin)) / (Ap + At)
    ctp = (h - cbp)
    emax = (cbp - dmin)
    Ip = (1 / 12 * bf * g1 ^ 3 + A1 * (ctp - (g1 / 2)) ^ 2) + (((1 / 36 * ((bf - bw) / 2)
: ^ 3) * 2) + (A2 * (ctp - g1 - (2 / 3 * g2)) ^ 2)) + (1 / 12 * bw * (h - g1 - g4) ^ 3) + A
 (ctp - ((h - g1 - g4) / 2)) ^ 2 + ((1 / 36 * ((bb - bw) / 2) * g3 ^ 3) * 2 + A4 * (cbp - g
 (2 / 3) * g3) ^ 2) + (1 / 12 * bb * g4 ^ 3 + A5 * (cbp - g4 / 2) ^ 2) + (At * (emax ^ 2))
    Stp = Ip / ctp
    Sbp = Ip / cbp
    rp2 = Ip / (Ap + At)
    Kt = rp2 / cbp
    Kb = rp2 / ctp
    WG = (Ap * (10 ^ (-6)) * wbt)

 IHAN TEPI DAN TENGAH
 'TEPI
 If Option1(6).Value = True Then
    Posisi = "TEPI"
    be1 = bf + (6 * ts)
    be2 = (bf + S) / 2
    be3 = (bf + (L * 1000)) / 12
        'pilih nilai be terkecil
        If be1 < be2 And be1 < be3 Then
            be = be1
        ElseIf be2 < be1 And be2 < be3 Then
            be = be2
        ElseIf be3 < be1 And be3 < be2 Then
```

```
            be = be3
        End If
'POSISI TENGAH
ElseIf Option1(7).Value = True Then
    Posisi = "TENGAH"
    be1 = bf + (12 * ts)
    be2 = S
    be3 = (L * 1000) / 4
        'pilih nilai be terkecil
        If be1 < be2 And be1 < be3 Then
            be = be1
        ElseIf be2 < be1 And be2 < be3 Then
            be = be2
        ElseIf be3 < be1 And be3 < be2 Then
            be = be3
        End If
End If

'Perhitungan perenc. tampang I bebas komposit
    ntr = (fc_plt ^ 0.5) / (fc_blk ^ 0.5)
    btr = ntr * be
    Apelat = btr * ts
    Ac = (Ap + At + Apelat)
    cbc = ((Apelat * (h + ts / 2)) + ((Ap + At) * cbp)) / (Ac)
    ctc = (h + ts) - cbc
    Ic = ((1 / 12 * btr * ts ^ 3 + Apelat * (ctc - ts / 2) ^ 2) + (Ip + ((Ap + At) * (cbc
bp) ^ 2)))
    Stc = Ic / ctc
    Sbc = Ic / cbc

'Perhitungan momen yang terjadi ditengah bentang
'Pada saat transfer beban mati telah bekerja (sebanyak p persen)
    WS = S * ts * wbt * (10 ^ (-6))
    MGm = (WG * (L ^ 2)) / 8
    MSm = (WS * (L ^ 2)) / 8
    MDm = (WD * (L ^ 2)) / 8
    MLm = (WL * (L ^ 2)) / 8
    MOm = (MGm + (prs * MDm))
    MTm = (MGm + MSm + MDm + MLm)

'Perhitungan teg. yang tjd. sblm. tampang mjd. komposit
    R = 1 - LOF
    Po = (0.74 * fpu) * Aps
    Pe = R * Po
    ftT = ((-Po / (Ap + At)) * (1 - ((emax * ctp) / rp2))) - ((MOm * (10 ^ 6)) / Stp)
    fbT = ((-Po / (Ap + At)) * (1 + ((emax * cbp) / rp2))) + ((MOm * (10 ^ 6)) / Sbp)
    ftL = ((-Pe / (Ap + At)) * (1 - ((emax * ctp) / rp2))) - (((MOm + MSm) * (10 ^ 6)) / S

    fbL = ((-Pe / (Ap + At)) * (1 + ((emax * cbp) / rp2))) + (((MOm + MSm) * (10 ^ 6)) / S


'Perhitungan teg. yang tjd. stlh. menjadi komposit
    ftc = (ftL) - (((MDm + MLm) * (10 ^ 6)) / Stc)
    fbc = (fbL) + (((MDm + MLm) * (10 ^ 6)) / Sbc)

'Perhitungan kekuatan lentur penampang I bebas komposit
    Gp = 0.4
    dp = (h + ts) - dmin
    Pp = Aps / (be * dp)
    B1 = 0.85 - (0.008 * (fc_blk - 30))
    fps1 = fpu * (1 - ((Gp * Pp * fpu) / (B1 * fc_blk)))
    fps2 = fpy
        'pilih fps nilai terkecil
        If fps1 < fps2 Then
            fps = fps1
        ElseIf fps2 < fps1 Then
            fps = fps2
        End If
    T = Aps * fps
    a = T / (0.85 * fc_blk * be)

'Kapasitas penampang
    Mn2 = T * (dp - (a / 2)) * (10 ^ (-6)) '(kapasitas momen yang tersedia)
```

```
 'Akibat beban-beban yang tersedia
    Mu = 1.2 * (MSm + MGm + MDm) + 1.6 * (MLm)
    Mn1 = Mu / 0.85 '(Kapasitas momen yang diperlukan)< Mn2

 'Kontrol rasio tulangan
     w = (Pp * fps2) / fc_blk      '<  dari
     Z = 0.35 * B1
 'Jumlah tendon
     'phi = 3.141592654
     Ar = (1 / 4) * 3.141592654 * (Dr ^ 2)
     JmlStrand1Tendon = Aps / (Ar * nr)
     JmlTendon = 1

JmlStrand1Tendon <= 1 And JmlStrand1Tendon > 0 Then
 JmlStrand1TendonK = 1
eIf JmlStrand1Tendon > 1 And JmlStrand1Tendon <= 2 Then
 JmlStrand1TendonK = 2
eIf JmlStrand1Tendon > 2 And JmlStrand1Tendon <= 3 Then
 JmlStrand1TendonK = 3
eIf JmlStrand1Tendon > 3 And JmlStrand1Tendon <= 4 Then
 JmlStrand1TendonK = 4
eIf JmlStrand1Tendon > 4 And JmlStrand1Tendon <= 5 Then
 JmlStrand1TendonK = 5
eIf JmlStrand1Tendon > 5 And JmlStrand1Tendon <= 6 Then
 JmlStrand1TendonK = 6
 If

 'Perhitungan momen yang tjd. ditump. dan 1/4 bentang
     MG = 0
     MS = 0
     MD = 0
     ML = 0
     MO = 0
     MT = 0
     MGq = (3 / 32) * WG * (L ^ 2)
     MSq = (3 / 32) * WS * (L ^ 2)
     MDq = (3 / 32) * WD * (L ^ 2)
     MLq = (3 / 32) * WL * (L ^ 2)
     MOq = (MGq + prs * MDq)
     MTq = MGq + MSq + MDq + MLq

 'Menentukan daerah batas letak aman tendon ditump. ,1/4 bentang & tengah bentang
     amin = (MO * (10 ^ 6)) / Po
     eb = amin + Kb
     amax = (MT * (10 ^ 6)) / Pe
     et = amax - Kt
     aminq = (MOq * (10 ^ 6)) / Po
     ebq = aminq + Kb
     amaxq = (MTq * (10 ^ 6)) / Pe
     etq = amaxq - Kt
     aminm = (MOm * (10 ^ 6)) / Po
     ebm = aminm + Kb
     amaxm = (MTm * (10 ^ 6)) / Pe
     etm = amaxm - Kt

 'Perhitungan tegangan ijin yang terjadi
     flci = k * fc_blk
     fci = (-0.6) * flci
     fti = 0.25 * (flci ^ 0.5)
     fcs = (-0.45) * fc_blk
     fts = 0.5 * (fc_blk ^ 0.5)

 'PILIHAN APA TEGANGAN TARIK DIIJINKAN
  If Option2(0).Value = True Then
     TegTrkDiijinkan = "Ya"
     ebAks = (fti * (Ap + At) * Kb) / Po
     etAks = (fts * (Ap + At) * Kt) / Pe
  ElseIf Option2(1).Value = True Then
     TegTrkDijinkan = "Tidak"
     ebAks = 0
     etAks = 0
  End If
```

```
'Penambahan lebar daerah batas aman tendon pada tum., 1/4 bentang & tengah bentang
    eb1 = eb + ebAks
    et1 = et - etAks
    eb1q = ebq + ebAks
    et1q = etq - etAks
    eb1m = ebm + ebAks
    et1m = etm - etAks

JmlTendon < 1.5 And JmlTendon > 0 Then
 JmlTendonK = 1
eIf JmlTendon >= 1.5 And JmlTendon <= 2.5 Then
 JmlTendonK = 2
eIf JmlTendon > 2.5 And JmlTendon <= 3.5 Then
 JmlTendonK = 3
eIf JmlTendon > 3.5 And JmlTendon <= 4.5 Then
 JmlTendonK = 4
 If

GROUTING
 ElseIf Option2(2).Value = True Then
     Kondisi = "UNGROUTING"

  'Perhitungan perencanaan tampang I bebas pracetak
     A1 = bf * g1
     A2 = (0.5 * (bf - bw) * g2)
     A3 = (h - g1 - g4) * bw
     A4 = (0.5 * (bb - bw) * g3)
     A5 = bb * g4
     Ap = A1 + A2 + A3 + A4 + A5
     'phi = 3.141592654
     An = (1 / 4 * 3.141592654 * Ds ^ 2)
     cbp = (((A1 * (h - (g1 / 2))) + (A2 * (h - g1 - ((2 / 3) * g2))) + (A3 * (((h - g1 - g
/ 2) + g4)) + (A4 * (((2 / 3) * g3) + g4)) + (A5 * (g4 / 2))) - (An * dmin)) / (Ap - An)
     ctp = (h - cbp)
     emax = (cbp - dmin)
     Ip = (1 / 12 * bf * g1 ^ 3 + A1 * (ctp - (g1 / 2)) ^ 2) + (((1 / 36 * ((bf - bw) / 2)
2 ^ 3) * 2) + (A2 * (ctp - g1 - (2 / 3 * g2)) ^ 2)) + (1 / 12 * bw * (h - g1 - g4) ^ 3) + A
 (ctp - ((h - g1 - g4) / 2)) ^ 2 + ((1 / 36 * ((bb - bw) / 2) * g3 ^ 3) * 2 + A4 * (cbp - g
 (2 / 3) * g3) ^ 2) + (1 / 12 * bb * g4 ^ 3 + A5 * (cbp - g4 / 2) ^ 2) - ((1 / 64 * 3.14159
4 * Ds ^ 2) + (An * (emax ^ 2)))
     Stp = Ip / ctp
     Sbp = Ip / cbp
     rp2 = Ip / (Ap - An)
     Kt = rp2 / cbp
     Kb = rp2 / ctp
     WG = ((Ap - An) * (10 ^ (-6)) * wbt)

 IHAN TEPI DAN TENGAH
 'TEPI
 If Option1(6).Value = True Then
     Posisi = "TEPI"
     be1 = bf + (6 * ts)
     be2 = (bf + S) / 2
     be3 = (bf + (L * 1000)) / 12
         'pilih nilai be terkecil
         If be1 < be2 And be1 < be3 Then
             be = be1
         ElseIf be2 < be1 And be2 < be3 Then
             be = be2
         ElseIf be3 < be1 And be3 < be2 Then
             be = be3
         End If
  'POSISI TENGAH
  ElseIf Option1(7).Value = True Then
     Posisi = "TENGAH"
     be1 = bf + (12 * ts)
     be2 = S
     be3 = (L * 1000) / 4
         'pilih nilai be terkecil
         If be1 < be2 And be1 < be3 Then
             be = be1
         ElseIf be2 < be1 And be2 < be3 Then
```

```
            be = be2
        ElseIf be3 < be1 And be3 < be2 Then
            be = be3
        End If
End If

'Perhitungan perenc. tampang I bebas komposit
    ntr = (fc_plt ^ 0.5) / (fc_blk ^ 0.5)
    btr = ntr * be
    Apelat = btr * ts
    Ac = (Ap - An + Apelat)
    cbc = ((Apelat * (h + ts / 2)) + ((Ap - An) * cbp)) / (Ac)
    ctc = (h + ts) - cbc
    Ic = ((1 / 12 * btr * ts ^ 3 + Apelat * (ctc - ts / 2) ^ 2) + (Ip + ((Ap - An) * (cbc
bp) ^ 2)))
    Stc = Ic / ctc
    Sbc = Ic / cbc

'Perhitungan momen yang terjadi ditengah bentang
'Pada saat transfer beban mati telah bekerja (sebanyak p persen)
    WS = S * ts * wbt * (10 ^ (-6))
    MGm = (WG * (L ^ 2)) / 8
    MSm = (WS * (L ^ 2)) / 8
    MDm = (WD * (L ^ 2)) / 8
    MLm = (WL * (L ^ 2)) / 8
    MOm = (MGm + (prs * MDm))
    MTm = (MGm + MSm + MDm + MLm)

'Perhitungan teg. yang tjd. sblm. tampang mjd. komposit
    R = 1 - LOF
    Po = (0.74 * fpu) * Aps
    Pe = R * Po
    ftT = ((-Po / (Ap - An)) * (1 - ((emax * ctp) / rp2))) - ((MOm * (10 ^ 6)) / Stp)
    fbT = ((-Po / (Ap - An)) * (1 + ((emax * cbp) / rp2))) + ((MOm * (10 ^ 6)) / Sbp)
    ftL = ((-Pe / (Ap - An)) * (1 - ((emax * ctp) / rp2))) - (((MOm + MSm) * (10 ^ 6)) / S

    fbL = ((-Pe / (Ap - An)) * (1 + ((emax * cbp) / rp2))) + (((MOm + MSm) * (10 ^ 6)) / S

'Perhitungan teg. yang tjd. stlh. menjadi komposit
    ftc = (ftL) - (((MDm + MLm) * (10 ^ 6)) / Stc)
    fbc = (fbL) + (((MDm + MLm) * (10 ^ 6)) / Sbc)


'Perhitungan kekuatan lentur penampang I bebas komposit

    dp = (h + ts) - dmin
    Pp = Aps / (be * dp)
    fse = Pe / Aps
    fps1 = fse + 70 + (fc_blk / (100 * Pp))
    fps2 = fpy
    fps3 = fse + 400
        'pilih fps nilai terkecil
        If fps1 < fps2 And fps1 < fps3 Then
            fps = fps1
        ElseIf fps2 < fps1 And fps2 < fps3 Then
            fps = fps2
        ElseIf fps3 < fps1 And fps3 < fps2 Then
            fps = fps3
        End If
    T = Aps * fps
    a = T / (0.85 * fc_blk * be)

'Kapasitas penampang
    Mn2 = T * (dp - (a / 2)) * (10 ^ (-6)) '(kapasitas momen yang tersedia)

'Akibat beban-beban yang tersedia
   Mu = 1.2 * (MSm + MGm + MDm) + 1.6 * (MLm)
   Mn1 = Mu / 0.85 '(Kapasitas momen yang diperlukan)< Mn2
'Kontrol rasio tulangan
    w = (Pp * fps2) / fc_blk     '<  dari
    Z = 0.35 * B1
'Jumlah tendon
    'phi = 3.141592654
```

```
    Ar = (1 / 4) * 3.141592654 * (Dr ^ 2)
    JmlStrand1Tendon = Aps / (Ar * nr)
    JmlTendon = 1

JmlStrand1Tendon <= 1 And JmlStrand1Tendon > 0 Then
 JmlStrand1TendonK = 1
elf JmlStrand1Tendon > 1 And JmlStrand1Tendon <= 2 Then
 JmlStrand1TendonK = 2
elf JmlStrand1Tendon > 2 And JmlStrand1Tendon <= 3 Then
 JmlStrand1TendonK = 3
elf JmlStrand1Tendon > 3 And JmlStrand1Tendon <= 4 Then
 JmlStrand1TendonK = 4
elf JmlStrand1Tendon > 4 And JmlStrand1Tendon <= 5 Then
 JmlStrand1TendonK = 5
elf JmlStrand1Tendon > 5 And JmlStrand1Tendon <= 6 Then
 JmlStrand1TendonK = 6
 lf

 'Perhitungan momen yang tjd. ditump. dan 1/4 bentang
    MG = 0
    MS = 0
    MD = 0
    ML = 0
    MO = 0
    MT = 0
    MGq = (3 / 32) * WG * (L ^ 2)
    MSq = (3 / 32) * WS * (L ^ 2)
    MDq = (3 / 32) * WD * (L ^ 2)
    MLq = (3 / 32) * WL * (L ^ 2)
    MOq = (MGq + prs * MDq)
    MTq = MGq + MSq + MDq + MLq

 'Menentukan daerah batas letak aman tendon ditump. ,1/4 bentang & tengah bentang
    amin = (MO * (10 ^ 6)) / Po
    eb = amin + Kb
    amax = (MT * (10 ^ 6)) / Pe
    et = amax - Kt
    aminq = (MOq * (10 ^ 6)) / Po
    ebq = aminq + Kb
    amaxq = (MTq * (10 ^ 6)) / Pe
    etq = amaxq - Kt
    aminm = (MOm * (10 ^ 6)) / Po
    ebm = aminm + Kb
    amaxm = (MTm * (10 ^ 6)) / Pe
    etm = amaxm - Kt


 'Perhitungan tegangan ijin yang terjadi
    f1ci = k * fc_blk
    fci = (-0.6) * f1ci
    fti = 0.25 * (f1ci ^ 0.5)
    fcs = (-0.45) * fc_blk
    fts = 0.5 * (fc_blk ^ 0.5)

 'PILIHAN APA TEGANGAN TARIK DIIJINKAN
  If Option2(0).Value = True Then
    TegTrkDiijinkan = "Ya"
    ebAks = (fti * (Ap - An) * Kb) / Po
    etAks = (fts * (Ap - An) * Kt) / Pe
  ElseIf Option2(1).Value = True Then
    TegTrkDijinkan = "Tidak"
    ebAks = 0
    etAks = 0
  End If

  'Penambahan lebar daerah batas aman tendon pada tum., 1/4 bentang & tengah bentang
    eb1 = eb + ebAks
    et1 = et - etAks
    eb1q = ebq + ebAks
    et1q = etq - etAks
    eb1m = ebm + ebAks
    et1m = etm - etAks
```

```
JmlTendon < 1.5 And JmlTendon > 0 Then
 JmlTendonK = 1
eIf JmlTendon >= 1.5 And JmlTendon <= 2.5 Then
 JmlTendonK = 2
eIf JmlTendon > 2.5 And JmlTendon <= 3.5 Then
 JmlTendonK = 3
eIf JmlTendon > 3.5 And JmlTendon <= 4.5 Then
 JmlTendonK = 4
 If

 End If

 Open App.Path & "\temp_data\hasil_temp.ini" For Output As #1
              Write #1, tipe
              Write #1, Posisi
              Write #1, TegTrkDiijinkan
              Write #1, Apelat
              Write #1, cbp
              Write #1, ts
              Write #1, btr
              Write #1, Ap
              Write #1, Ip
              Write #1, Ac
              Write #1, Ic
              Write #1, cbc
              Write #1, ctc
              Write #1, Sbc
              Write #1, Stc
              Write #1, Kt
              Write #1, Kb
              Write #1, Mn1
              Write #1, w
              Write #1, eb
              Write #1, et
              Write #1, ebq
              Write #1, etq
              Write #1, ebm
              Write #1, etm
              Write #1, eb1
              Write #1, et1
              Write #1, eb1q
              Write #1, et1q
              Write #1, eb1m
              Write #1, et1m
              Write #1, dmin
              Write #1, JmlTendon
              Write #1, JmlTendonK
              Write #1, JmlStrand1Tendon
              Write #1, JmlStrand1TendonK
              Write #1, ftT
              Write #1, fbT
              Write #1, ftL
              Write #1, fbL
              Write #1, ftc
              Write #1, fbc
              Write #1, fti
              Write #1, fci
              Write #1, fts
              Write #1, fcs
              Write #1, Z
              Write #1, "I"
              Write #1, Po
              Write #1, Pe
              Close #1

  frmHasilPscTrk.Show

  Sub

  ate Sub Command2_Click()
  ad Me
  Sub
```

```
vate Sub mnu1StandarKEluar_Click()
oad Me
 Sub
vate Sub Option1_Click(Index As Integer)
ect Case Index
 Case 0
     Picture1.Picture = LoadPicture(App.Path & "\pic_files\type1.bmp")
 Case 1
     Picture1.Picture = LoadPicture(App.Path & "\pic_files\type2.bmp")
 Case 2
     Picture1.Picture = LoadPicture(App.Path & "\pic_files\type3.bmp")
 Case 3
     Picture1.Picture = LoadPicture(App.Path & "\pic_files\type4.bmp")
 Case 4
     Picture1.Picture = LoadPicture(App.Path & "\pic_files\type5.bmp")
 Case 5
     Picture1.Picture = LoadPicture(App.Path & "\pic_files\type6.bmp")
 Select


 Sub
```

klarasi variable masukan dan sifat-sifat mekanis penampang persegi pratarik
Status As String
L As Double
S As Double
ts As Double
h As Double
b As Double
dmin As String
fc_blk As Double
fc_plt As Double
fpu As Double
fpy As Double
wbt As Double
Dr As Double
WD As Double
WL As Double
LOF As Double
nr As String
k As Double
Posisi
TegTrkDiijinkan

klarasi variabel hasil hitungan perencanaan tampang pracetak komposit
Ap As Double
Ip As Double
ctp As Double
cbp As Double
Stp As Double
Sbp As Double
rp2 As Double
Kt As Double
Kb As Double
emax As Double
WG As Double

klarasi variabel untuk hitungan teg. yang terjadi
f1ci As Double
fci As Double
fti As Double
fcs As Double
fts As Double
fcent As Double
Po As Double
R As Double
Pe As Double
WS As Double

klarasi variabel hitungan momen ditengah bentang
MGm As Double
MSm As Double
MDm As Double
MLm As Double
MTm As Double

klarasi variabel tegangan ijin yang terjadi sebelum komposit
ftT As Double
fbT As Double
ftL As Double
fbL As Double

larasi variabel untuk hitungan be
be1 As Double
be2 As Double
be3 As Double
be As Double

larasi variabel hasil hit. perenc. tampang persegi pratarik komposit
n As Double
btr As Double
Apelat As Double
Ac As Double
Ic As Double
ctc As Double

```
cbc As Double
Stc As Double
Sbc As Double

klarasi var. hsl. hit. yang tjd. setelah menjadi komposit
ftc As Double
fbs As Double

klarasi var. untuk hit. kekuatan lentur penampang
B1 As Double
Gp As Double
Aps As Double
dp As Double
Pp As Double
fps1 As Double
fps2 As Double
fps As Double
T As Double
a As Double
Mn As Double
Z As Double

klarasi var. kontrol rasio tul. & jumlah tendon
w As Double
Ar As Double
JmlStrand As String
JmlStrandK As String

klarasi var. hsl. hit. momen pada tump. dan 1/4 bentang
MG As Double
MS As Double
MD As Double
ML As Double
MGq As Double
MSq As Double
MDq As Double
MLq As Double

klarasi var. untuk menentukan batas atas & bawah letak aman tendon
amin As Double
eb As Double
amax As Double
et As Double
aminq As Double
ebq As Double
amaxq As Double
etq As Double
aminm As Double
ebm As Double
amaxm As Double
etm As Double

klarasi untuk menent. penamb. lebar daerah aman tendon
ebAks As Double
etAks As Double
eb1 As Double
et1 As Double
eb1q As Double
et1q As Double
eb1m As Double
et1m As Double

ate Sub Command1_Click()
rror Resume Next
CDbl(Text2(0).Text)
CDbl(Text2(1).Text)
 CDbl(Text2(2).Text)
CDbl(Text2(3).Text)
CDbl(Text2(4).Text)
 = CStr(Text2(5).Text)
lk = CDbl(Text3(0).Text)
lt = CDbl(Text3(1).Text)
= CDbl(Text3(2).Text)
```

```
= CDbl(Text3(3).Text)
= CDbl(Text3(4).Text)
 CDbl(Text3(5).Text)
 CDbl(Text3(6).Text)
 CDbl(Text3(7).Text)
= CDbl(Text3(8).Text)
: CStr(Text3(9).Text)
 CStr(Text3(10).Text)

 Text2(0).Text = "" Or Text2(1).Text = "" Or Text2(2).Text = "" Or Text2(3).Text = "" Or Te
(4).Text = "" Or Text2(5).Text = "" Or Text3(0).Text = "" Or Text3(1).Text = "" Or Text3(2)
xt = "" Or Text3(3).Text = "" Or Text3(4).Text = "" Or Text4(0).Text = "" Or Text4(1).Text
" Or Text4(2).Text = "" Or Text5(0).Text = "" Or Text5(1).Text = "" Then
 MsgBox "Masih Ada Field yang Kosong... Harus Diisi!", vbCritical, "PESAN KESALAHAN"
d If

rhitungan perencanaan tampang persegi pratarik pracetak
      Ap = h * b
      ctp = h / 2
      cbp = h - ctp
      Ip = (1 / 2) * b * (h ^ 3)
      Stp = Ip / ctp
      Sbp = Ip / cbp
      rp2 = Ip / Ap
      Kt = rp2 / cbp
      Kb = rp2 / ctp
      emax = cbp - dmin
      WG = Ap * (10 ^ (-6)) * wbt
 rhitungan tegangan ijin yang terjadi
      f1ci = k * fc_blk
      fci = (-0.6) * f1ci
      fti = 0.25 * (f1ci ^ 0.5)
      fcs = (-0.45) * fc_blk
      fts = 0.25 * (fc_blk ^ 0.5)
      fcent = (fti - ((ctp / h) * (fti - fci))) * (-1)
      Po = fcent * Ap
      R = 1 - LOF
      Pe = R * Po
      WS = S * ts * wbt * (10 ^ (-6))

  hitungan momen yang terjadi ditengah bentang
      MGm = (WG * (L ^ 2)) / 8
      MSm = (WS * (L ^ 2)) / 8
      MDm = (WD * (L ^ 2)) / 8
      MLm = (WL * (L ^ 2)) / 8
      MTm = MGm + MSm + MDm + MLm

  hitungan teg. yang tjd. sblm. tampang mjd. komposit
      ftT = ((-Po / Ap) * (1 - ((emax * ctp) / rp2))) - ((MGm * (10 ^ 6)) / Stp)
      fbT = ((-Po / Ap) * (1 + ((emax * cbp) / rp2))) + ((MGm * (10 ^ 6)) / Sbp)
      ftL = ((-Pe / Ap) * (1 - ((emax * ctp) / rp2))) - (((MGm + MSm) * (10 ^ 6)) / Stp)
      fbL = ((-Pe / Ap) * (1 + ((emax * cbp) / rp2))) + (((MGm + MSm) * (10 ^ 6)) / Sbp)

   IHAN TEPI DAN TENGAH
   'TEPI
   If Option3(0).Value = True Then
      Posisi = "TEPI"
      be1 = bf + (6 * ts)
      be2 = (bf + S) / 2
      be3 = (bf + (L * (10 ^ 3))) / 12
          'pilih nilai be terkecil
          If be1 < be2 And be1 < be3 Then
              be = be1
          ElseIf be2 < be1 And be2 < be3 Then
              be = be2
          ElseIf be3 < be1 And be3 < be2 Then
              be = be3
          End If
     POSISI TENGAH
     lseIf Option3(1).Value = True Then
        Posisi = "TENGAH"
        be1 = bf + (12 * ts)
        be2 = S
```

```
      be3 = (L * (10 ^ 3)) / 4
          'pilih nilai be terkecil
          If be1 < be2 And be1 < be3 Then
              be = be1
          ElseIf be2 < be1 And be2 < be3 Then
              be = be2
          ElseIf be3 < be1 And be3 < be2 Then
              be = be3
          End If
 End If

rhitungan perenc. tampang persegi pratarik komposit
      n = (fc_plt ^ 0.5) / (fc_blk ^ 0.5)
      btr = n * be
      Apelat = btr * ts
      Ac = Ap + Apelat
      cbc = ((Apelat * (h + (ts / 2))) + (Ap * cbp)) / Ac
      ctc = (h + ts) - cbc
      Ic = (Ip + (Ap * (cbc - cbp) ^ 2)) + (((1 / 12) * btr * (ts ^ 3)) + (Apelat * (ctc - (
/ 2)) ^ 2))
      Stc = Ic / ctc
      Sbc = Ic / cbc

erhitungan teg. yang tjd. stlh. menjadi komposit
      ftc = ftL - (((MDm + MLm) * (10 ^ 6)) / Stc)
      fbc = fbL + (((MDm + MLm) * (10 ^ 6)) / Sbc)

erhitungan kekuatanlentur penampang persegi komposit
      B1 = 0.85 - (0.008 * (fc_blk - 30))
      Gp = 0.4
      Aps = Po / (0.7 * fpu)
      dp = (h + ts) - dmin
      Pp = Aps / (be * dp)
      fps1 = fpu * (1 - ((Gp * Pp * fpu) / (B1 * fc_blk)))
      fps2 = fpy
          'pilih fps nilai terkecil
          If fps1 < fps2 Then
              fps = fps1
          ElseIf fps2 < fps1 Then
              fps = fps2
          End If
      T = Aps * fps
      a = T / (0.85 * fc_blk * S)
      Mn = T * (dp - (a / 2)) * (10 ^ (-6))
      Z = 0.35 * B1

ntrol rasio tulangan dan jumlah tendon
      w = (Pp * fps) / fc_blk
      Ar = (1 / 4) * 3.141592654 * (Dr ^ 2)
      JmlStrand = Aps / (Ar * nr)

rhitungan momen yang tjd. ditump. dan 1/4 bentang
      MG = 0
      MS = 0
      MD = 0
      ML = 0
      MT = 0
      MGq = (3 / 32) * WG * (L ^ 2)
      MSq = (3 / 32) * WS * (L ^ 2)
      MDq = (3 / 32) * WD * (L ^ 2)
      MLq = (3 / 32) * WL * (L ^ 2)
      MTq = MGq + MSq + MDq + MLq

ientukan daerah batas letak aman tendon ditump. ,1/4 bentang & tengah bentang
      amin = (MG * (10 ^ 6)) / Po
      eb = amin + Kb
      amax = (MT * (10 ^ 6)) / Pe
      et = amax - Kt
      aminq = (MGq * (10 ^ 6)) / Po
      ebq = aminq + Kb
      amaxq = (MTq * (10 ^ 6)) / Pe
      etq = amaxq - Kt
      aminm = (MGm * (10 ^ 6)) / Po
```

```
      ebm = aminm + Kb
      amaxm = (MTm * (10 ^ 6)) / Pe
      etm = amaxm - Kt

'ILIHAN APA TEGANGAN TARIK DIIJINKAN
   If Option2(0).Value = True Then
      TegTrkDiijinkan = "Ya"
      ebAks = (fti * Ac * Kb) / Po
      etAks = (fts * Ac * Kt) / Pe
   ElseIf Option2(1).Value = True Then
      TegTrkDijinkan = "Tidak"
      ebAks = 0
      etAks = 0
   End If

'enambahan lebar daerah batas aman tendon pada tum., 1/4 bentang & tengah bentang
      eb1 = eb + ebAks
      et1 = et - etAks
      eb1q = ebq + ebAks
      et1q = etq - etAks
      eb1m = ebm + ebAks
      et1m = etm - etAks

JmlStrand <= 1 And JmlStrand > 0 Then
 JmlStrandK = 1
eIf JmlStrand > 1 And JmlStrand <= 2 Then
 JmlStrandK = 2
eIf JmlStrand > 2 And JmlStrand <= 3 Then
 JmlStrandK = 3
eIf JmlStrand > 3 And JmlStrand <= 4 Then
 JmlStrandK = 4
eIf JmlStrand > 4 And JmlStrand <= 5 Then
 JmlStrandK = 5
eIf JmlStrand > 5 And JmlStrand <= 6 Then
 JmlStrandK = 6
 If

bug.Print "Posisi " & Posisi
bug.Print "TegTrkDiijinkan " & TegTrkDiijinkan
bug.Print "fci " & fci
bug.Print "fti " & fti
bug.Print "fcs " & fcs
bug.Print "fts " & fts
bug.Print "R " & R
bug.Print "Ap " & Ap
bug.Print "Cbp " & cbp
bug.Print "Ctp " & ctp
bug.Print "Ip " & Ip
bug.Print "Stp " & Stp
bug.Print "Sbp " & Sbp
bug.Print "rp2 " & rp2
bug.Print "Kt " & Kt
bug.Print "Kb " & Kb
bug.Print "emax " & emax
bug.Print "fcent " & fcent
bug.Print "Po " & Po
bug.Print "ftT " & ftT
bug.Print "fbT " & fbT
bug.Print "Pe " & Pe
bug.Print "ftL " & ftL
bug.Print "fbL " & fbL
bug.Print "be " & be
bug.Print "n " & n
bug.Print "btr " & btr
bug.Print "Apelat " & Apelat
bug.Print "Ac " & Ac
bug.Print "Cbc " & cbc
bug.Print "Ctc " & ctc
bug.Print "Ic " & Ic
bug.Print "Stc " & Stc
bug.Print "Sbc " & Sbc
bug.Print "ftc " & ftc
bug.Print "fbc " & fbc
```

```
ebug.Print "B1 " & B1
ebug.Print "Aps " & Aps
ebug.Print "Pp " & Pp
ebug.Print "fps1 " & fps1
ebug.Print "fps2 " & fps2
ebug.Print "fps " & fps
ebug.Print "T " & T
ebug.Print "a " & a
bug.Print "w " & w
bug.Print "Z " & Z
bug.Print "Mn " & Mn
bug.Print "amin " & amin
bug.Print "aminq " & aminq
bug.Print "aminm " & aminm
bug.Print "eb " & eb
bug.Print "ebq " & ebq
bug.Print "ebm " & ebm
bug.Print "amax " & amax
bug.Print "amaxq " & amaxq
bug.Print "amaxm " & amaxm
bug.Print "et " & et
bug.Print "etq " & etq
bug.Print "etm " & etm
bug.Print "ebAks " & ebAks
bug.Print "etAks " & etAks
bug.Print "eb1 " & eb1
bug.Print "eb1q " & eb1q
bug.Print "eb1m " & eb1m
bug.Print "et1 " & et1
bug.Print "et1q " & et1q
bug.Print "et1m " & et1m
bug.Print "Ar " & Ar
bug.Print "JmlStrand " & JmlStrand
bug.Print "JmlStrandK " & JmlStrandK

ave di temp_data
            Open App.Path & "\temp_data\hasil_temp.ini" For Output As #1
            Write #1, tipe
            Write #1, Posisi
            Write #1, TegTrkDiijinkan
            Write #1, Apelat
            Write #1, cbp
            Write #1, ts
            Write #1, btr
            Write #1, Ap
            Write #1, Ip
            Write #1, Ac
            Write #1, Ic
            Write #1, cbc
            Write #1, ctc
            Write #1, Sbc
            Write #1, Stc
            Write #1, Kt
            Write #1, Kb
            Write #1, Mn
            Write #1, w
            Write #1, eb
            Write #1, et
            Write #1, ebq
            Write #1, etq
            Write #1, ebm
            Write #1, etm
            Write #1, eb1
            Write #1, et1
            Write #1, eb1q
            Write #1, et1q
            Write #1, eb1m
            Write #1, et1m
            Write #1, dmin
            Write #1, JmlStrand
            Write #1, JmlStrandK
            Write #1, ftT
            Write #1, fbT
```

```
                Write #1, ftL
                Write #1, fbL
                Write #1, ftc
                Write #1, fbc
                Write #1, fti
                Write #1, fci
                Write #1, fts
                Write #1, fcs
                Write #1, Z
                Write #1, "I"
                Write #1, Po
                Write #1, Pe
                Close #1
                frmHasilPraTarik.Show
 Sub
vate Sub Text3_Change(Index As Integer)
 If Text3(1).Text > "Text3(0).Text" Then
Box "Nilai fc_plt < fc_blk", vbExclamation, "Mohon Diganti"
 End If
 Sub

vate Sub Command2_Click()
oad Me
 Sub

vate Sub mnuPersegiKEluar_Click()
oad Me
 Sub
```

```
eklarasi variable masukan dan sifat-sifat mekanis penampang 1 bebas
 Status As String
 L As Double
 S As Double
 ts As Double
 h As Double
 dmin As String
 fc_blk As Double
 fc_plt As Double
 fpu As Double
 fpy As Double
 wbt As Double
 WD As Double
 WL As Double
 LOF As Double
 Aps As Double
 Ds As Double
 Dr As Double
 nr As String
 nt As String
 k As Double
 prs As Double
 Posisi
 Kondisi
 TegTrkDiijinkan

klarasi variabel hasil hitungan perencanaan tampang pracetak komposit
 Ap As Double
 At As Double
 An As Double
 cbp As Double
 ctp As Double
 Ip As Double
 Stp As Double
 Sbp As Double
 rp2 As Double
 Kt As Double
 Kb As Double
 emax As Double
 WG As Double

klarasi variabel untuk hitungan teg. yang terjadi
 R As Single
 Po As Double
 Pe As Double

klarasi variabel hitungan momen ditengah bentang
 MGm As Double
 MSm As Double
 MDm As Double
 MLm As Double
 MOm As Double
 MTm As Double
 Mn2 As Double
 Mu As Double
 Mn1 As Double

klarasi Tegangan-Tegangan yang Diijinkan
 flci As Double
 fci As Double
 fti As Double
 fcs As Double
 fts As Double

 larasi variabel tegangan ijin yang terjadi sebelum komposit
 ftT As Double
 fbT As Double
 ftL As Double
 fbL As Double

 larasi variabel untuk hitungan be
 be1 As Double
 be2 As Double
```

```
 be3 As Double
 be As Double

klarasi variabel hasil hit. perenc. tampang I bebas komposit
 WS As Double
 ntr As Double
 btr As Double
 Apelat As Double
 Ac As Double
 Ic As Double
 ctc As Double
 cbc As Double
 Stc As Double
 Sbc As Double

klarasi var. hsl. hit. yang tjd. setelah menjadi komposit
 ftc As Double
 fbc As Double

klarasi var. untuk hit. kekuatan lentur penampang
 B1 As Double
 Gp As Double
 dp As Double
 Pp As Double
 fps1 As Double
 fps2 As Double
 fps3 As Double
 fps As Double
 fpe As Double
 T As Double
 a As Double
 Z As Double

klarasi var. kontrol rasio tul. & jumlah tendon
 w As Double
 Ar As Double
 JmlTendon As String
 JmlTendonK As String
 JmlStrand1Tendon As String
 JmlStrand1TendonK As String

klarasi var. hsl. hit. momen pada tump. dan 1/4 bentang
 MG As Double
 MS As Double
 MD As Double
 ML As Double
 MO As Double
 MT As Double
 MGq As Double
 MSq As Double
 MDq As Double
 MLq As Double
 MOq As Double
 MTq As Double

larasi var. untuk menentukan batas atas & bawah letak aman tendon
 amin As Double
 eb As Double
 amax As Double
 et As Double
 aminq As Double
 ebq As Double
 amaxq As Double
 etq As Double
 aminm As Double
 ebm As Double
 amaxm As Double
 etm As Double

larasi untuk menent. penamb. lebar daerah aman tendon
 ebAks As Double
 etAks As Double
 eb1 As Double
```

```
 et1 As Double
 eb1q As Double
 et1q As Double
 eb1m As Double
 et1m As Double

vate Sub Command1_Click()
Error Resume Next
 CDbl(Text3(0).Text)
 CDbl(Text3(1).Text)
= CDbl(Text3(2).Text)
 CDbl(Text3(3).Text)
 CDbl(Text3(4).Text)
n = CStr(Text3(5).Text)
blk = CDbl(Text4(0).Text)
plt = CDbl(Text4(1).Text)
 = CDbl(Text4(2).Text)
 = CDbl(Text4(3).Text)
 = CDbl(Text4(4).Text)
= CDbl(Text4(5).Text)
= CDbl(Text4(6).Text)
 = CDbl(Text4(7).Text)
 = CDbl(Text4(8).Text)
= CDbl(Text4(9).Text)
= CDbl(Text4(10).Text)
= CStr(Text4(11).Text)
= CStr(Text4(12).Text)
 CDbl(Text4(13).Text)
 = CDbl(Text4(14).Text)

LIHAN GRPOUTING DAN UNGROUTING
 'GROUTING
 If Option2(0).Value = True Then
     Kondisi = "GROUTING"

 'Perhitungan perencanaan tampang I bebas pracetak
     Ap = h * b
     At = ((nt - 1) * Aps)
     cbp = ((Ap * (1 / 2 * h)) + (At * dmin)) / (Ap + At)
     ctp = h - ctp
     emax = (cbp - dmin)
     Ip = ((1 / 12 * b * h ^ 3) + (Ap * (cbp - 1 / 2 * h)) + (At * (emax ^ 2)))
     Stp = Ip / ctp
     Sbp = Ip / cbp
     rp2 = Ip / (Ap + At)
     Kt = rp2 / cbp
     Kb = rp2 / ctp
     WG = (Ap * (10 ^ (-6)) * wbt)

LIHAN TEPI DAN TENGAH
 'TEPI
 If Option1(0).Value = True Then
     Posisi = "TEPI"
     be1 = bf + (6 * ts)
     be2 = (bf + S) / 2
     be3 = (bf + (L * 1000)) / 12
         'pilih nilai be terkecil
         If be1 < be2 And be1 < be3 Then
             be = be1
         ElseIf be2 < be1 And be2 < be3 Then
             be = be2
         ElseIf be3 < be1 And be3 < be2 Then
             be = be3
         End If
 'POSISI TENGAH
 ElseIf Option1(1).Value = True Then
     Posisi = "TENGAH"
     be1 = bf + (12 * ts)
     be2 = S
     be3 = (L * 1000) / 4
         'pilih nilai be terkecil
         If be1 < be2 And be1 < be3 Then
             be = be1
```

```
        ElseIf be2 < be1 And be2 < be3 Then
            be = be2
        ElseIf be3 < be1 And be3 < be2 Then
            be = be3
        End If
End If


'Perhitungan perenc. tampang I bebas komposit
    ntr = (fc_plt ^ 0.5) / (fc_blk ^ 0.5)
    btr = ntr * be
    Apelat = btr * ts
    Ac = (Ap + At + Apelat)
    cbc = ((Apelat * (h + ts / 2)) + ((Ap + At) * cbp)) / (Ac)
    ctc = (h + ts) - cbc
    Ic = ((1 / 12 * btr * ts ^ 3 + Apelat * (ctc - ts / 2) ^ 2) + (Ip + ((Ap + At) * (cbc
bp) ^ 2)))
    Stc = Ic / ctc
    Sbc = Ic / cbc

'Perhitungan momen yang terjadi ditengah bentang
'Pada saat transfer beban mati telah bekerja (sebanyak p persen)
    WS = S * ts * wbt * (10 ^ (-6))
    MGm = (WG * (L ^ 2)) / 8
    MSm = (WS * (L ^ 2)) / 8
    MDm = (WD * (L ^ 2)) / 8
    MLm = (WL * (L ^ 2)) / 8
    MOm = (MGm + (prs * MDm))
    MTm = (MGm + MSm + MDm + MLm)

'Perhitungan teg. yang tjd. sblm. tampang mjd. komposit
    R = 1 - LOF
    Po = (0.74 * fpu) * Aps
    Pe = R * Po
    ftT = ((-Po / (Ap + At)) * (1 - ((emax * ctp) / rp2))) - ((MOm * (10 ^ 6)) / Stp)
    fbT = ((-Po / (Ap + At)) * (1 + ((emax * cbp) / rp2))) + ((MOm * (10 ^ 6)) / Sbp)
    ftL = ((-Pe / (Ap + At)) * (1 - ((emax * ctp) / rp2))) - (((MOm + MSm) * (10 ^ 6)) / S

    fbL = ((-Pe / (Ap + At)) * (1 + ((emax * cbp) / rp2))) + (((MOm + MSm) * (10 ^ 6)) / S


'Perhitungan teg. yang tjd. stlh. menjadi komposit
    ftc = (ftL) - (((MDm + MLm) * (10 ^ 6)) / Stc)
    fbc = (fbL) + (((MDm + MLm) * (10 ^ 6)) / Sbc)

'Perhitungan kekuatan lentur penampang I bebas komposit
    Gp = 0.4
    dp = (h + ts) - dmin
    Pp = Aps / (be * dp)
    B1 = 0.85 - (0.008 * (fc_blk - 30))
    fps1 = fpu * (1 - ((Gp * Pp * fpu) / (B1 * fc_blk)))
    fps2 = fpy
        'pilih fps nilai terkecil
        If fps1 < fps2 Then
            fps = fps1
        ElseIf fps2 < fps1 Then
            fps = fps2
        End If
    T = Aps * fps
    a = T / (0.85 * fc_blk * be)

'Kapasitas penampang
    Mn2 = T * (dp - (a / 2)) * (10 ^ (-6)) '(kapasitas momen yang tersedia)

'Akibat beban-beban yang tersedia
   Mu = 1.2 * (MSm + MGm + MDm) + 1.6 * (MLm)
   Mn1 = Mu / 0.85 '(Kapasitas momen yang diperlukan)< Mn2

'Kontrol rasio tulangan
    w = (Pp * fps2) / fc_blk     '<  dari
    Z = 0.35 * B1

'Jumlah tendon
```

```
      'phi = 3.141592654
      Ar = (1 / 4) * 3.141592654 * (Dr ^ 2)
      JmlStrand1Tendon = Aps / (Ar * nr)
      JmlTendon = 1

JmlStrand1Tendon <= 1 And JmlStrand1Tendon > 0 Then
 JmlStrand1TendonK = 1
eIf JmlStrand1Tendon > 1 And JmlStrand1Tendon <= 2 Then
 JmlStrand1TendonK = 2
eIf JmlStrand1Tendon > 2 And JmlStrand1Tendon <= 3 Then
 JmlStrand1TendonK = 3
eIf JmlStrand1Tendon > 3 And JmlStrand1Tendon <= 4 Then
 JmlStrand1TendonK = 4
eIf JmlStrand1Tendon > 4 And JmlStrand1Tendon <= 5 Then
 JmlStrand1TendonK = 5
eIf JmlStrand1Tendon > 5 And JmlStrand1Tendon <= 6 Then
 JmlStrand1TendonK = 6
 If

 'Perhitungan momen yang tjd. ditump. dan 1/4 bentang
      MG = 0
      MS = 0
      MD = 0
      ML = 0
      MO = 0
      MT = 0
      MGq = (3 / 32) * WG * (L ^ 2)
      MSq = (3 / 32) * WS * (L ^ 2)
      MDq = (3 / 32) * WD * (L ^ 2)
      MLq = (3 / 32) * WL * (L ^ 2)
      MOq = (MGq + prs * MDq)
      MTq = MGq + MSq + MDq + MLq

 'Menentukan daerah batas letak aman tendon ditump. ,1/4 bentang & tengah bentang
      amin = (MO * (10 ^ 6)) / Po
      eb = amin + Kb
      amax = (MT * (10 ^ 6)) / Pe
      et = amax - Kt
      aminq = (MOq * (10 ^ 6)) / Po
      ebq = aminq + Kb
      amaxq = (MTq * (10 ^ 6)) / Pe
      etq = amaxq - Kt
      aminm = (MOm * (10 ^ 6)) / Po
      ebm = aminm + Kb
      amaxm = (MTm * (10 ^ 6)) / Pe
      etm = amaxm - Kt


 'Perhitungan tegangan ijin yang terjadi
      f1ci = k * fc_blk
      fci = (-0.6) * f1ci
      fti = 0.25 * (f1ci ^ 0.5)
      fcs = (-0.45) * fc_blk
      fts = 0.5 * (fc_blk ^ 0.5)

 'PILIHAN APA TEGANGAN TARIK DIIJINKAN
  If Option3(0).Value = True Then
     TegTrkDiijinkan = "Ya"
     ebAks = (fti * (Ap + At) * Kb) / Po
     etAks = (fts * (Ap + At) * Kt) / Pe
  ElseIf Option3(1).Value = True Then
     TegTrkDijinkan = "Tidak"
     ebAks = 0
     etAks = 0
  End If

  'Penambahan lebar daerah batas aman tendon pada tum., 1/4 bentang & tengah bentang
     eb1 = eb + ebAks
     et1 = et - etAks
     eb1q = ebq + ebAks
     et1q = etq - etAks
     eb1m = ebm + ebAks
     et1m = etm - etAks
```

```
JmlTendon < 1.5 And JmlTendon > 0 Then
 JmlTendonK = 1
elf JmlTendon >= 1.5 And JmlTendon <= 2.5 Then
 JmlTendonK = 2
elf JmlTendon > 2.5 And JmlTendon <= 3.5 Then
 JmlTendonK = 3
elf JmlTendon > 3.5 And JmlTendon <= 4.5 Then
 JmlTendonK = 4
 If

GROUTING
 ElseIf Option2(1).Value = True Then
     Kondisi = "UNGROUTING"

  'Perhitungan perencanaan tampang I bebas pracetak
     Ap = h * b
     'phi = 3.141592654
     An = (1 / 4 * 3.141592654 * Ds ^ 2)
     cbp = ((Ap * (1 / 2 * h)) - (An * dmin)) / (Ap - An)
     ctp = h - ctp
     emax = (cbp - dmin)
     Ip = ((1 / 12 * b * h ^ 3) + (Ap * (cbp - 1 / 2 * h))) - ((1 / 64 * 3.141592654 * Ds ^
+ (An * (emax ^ 2)))
     Stp = Ip / ctp
     Sbp = Ip / cbp
     rp2 = Ip / (Ap - An)
     Kt = rp2 / cbp
     Kb = rp2 / ctp
     WG = ((Ap - An) * (10 ^ (-6)) * wbt)

LIHAN TEPI DAN TENGAH
 'TEPI
 If Option1(0).Value = True Then
     Posisi = "TEPI"
     be1 = bf + (6 * ts)
     be2 = (bf + S) / 2
     be3 = (bf + (L * 1000)) / 12
         'pilih nilai be terkecil
         If be1 < be2 And be1 < be3 Then
             be = be1
         ElseIf be2 < be1 And be2 < be3 Then
             be = be2
         ElseIf be3 < be1 And be3 < be2 Then
             be = be3
         End If
 'POSISI TENGAH
 ElseIf Option1(1).Value = True Then
     Posisi = "TENGAH"
     be1 = bf + (12 * ts)
     be2 = S
     be3 = (L * 1000) / 4
         'pilih nilai be terkecil
         If be1 < be2 And be1 < be3 Then
             be = be1
         ElseIf be2 < be1 And be2 < be3 Then
             be = be2
         ElseIf be3 < be1 And be3 < be2 Then
             be = be3
         End If
 End If


 'Perhitungan perenc. tampang I bebas komposit
     ntr = (fc_plt ^ 0.5) / (fc_blk ^ 0.5)
     btr = ntr * be
     Apelat = btr * ts
     Ac = (Ap - An + Apelat)
     cbc = ((Apelat * (h + ts / 2)) + ((Ap - An) * cbp)) / (Ac)
     ctc = (h + ts) - cbc
     Ic = ((1 / 12 * btr * ts ^ 3 + Apelat * (ctc - ts / 2) ^ 2) + (Ip + ((Ap - An) * (cbc
p) ^ 2)))
     Stc = Ic / ctc
```

```
    Sbc = Ic / cbc

'Perhitungan momen yang terjadi ditengah bentang
'Pada saat transfer beban mati telah bekerja (sebanyak p persen)
    WS = S * ts * wbt * (10 ^ (-6))
    MGm = (WG * (L ^ 2)) / 8
    MSm = (WS * (L ^ 2)) / 8
    MDm = (WD * (L ^ 2)) / 8
    MLm = (WL * (L ^ 2)) / 8
    MOm = (MGm + (prs * MDm))
    MTm = (MGm + MSm + MDm + MLm)

'Perhitungan teg. yang tjd. sblm. tampang mjd. komposit
    R = 1 - LOF
    Po = (0.74 * fpu) * Aps
    Pe = R * Po
    ftT = ((-Po / (Ap - An)) * (1 - ((emax * ctp) / rp2))) - ((MOm * (10 ^ 6)) / Stp)
    fbT = ((-Po / (Ap - An)) * (1 + ((emax * cbp) / rp2))) + ((MOm * (10 ^ 6)) / Sbp)
    ftL = ((-Pe / (Ap - An)) * (1 - ((emax * ctp) / rp2))) - (((MOm + MSm) * (10 ^ 6)) / S

    fbL = ((-Pe / (Ap - An)) * (1 + ((emax * cbp) / rp2))) + (((MOm + MSm) * (10 ^ 6)) / S


'Perhitungan teg. yang tjd. stlh. menjadi komposit
    ftc = (ftL) - (((MDm + MLm) * (10 ^ 6)) / Stc)
    fbc = (fbL) + (((MDm + MLm) * (10 ^ 6)) / Sbc)

'Perhitungan kekuatan lentur penampang I bebas komposit
    dp = (h + ts) - dmin
    Pp = Aps / (be * dp)
    fse = Pe / Aps
    fps1 = fse + 70 + (fc_blk / (100 * Pp))
    fps2 = fpy
    fps3 = fse + 400
        'pilih fps nilai terkecil
        If fps1 < fps2 And fps1 < fps3 Then
            fps = fps1
        ElseIf fps2 < fps1 And fps2 < fps3 Then
            fps = fps2
        ElseIf fps3 < fps1 And fps3 < fps2 Then
            fps = fps3
        End If
    T = Aps * fps
    a = T / (0.85 * fc_blk * be)

'Kapasitas penampang
    Mn2 = T * (dp - (a / 2)) * (10 ^ (-6)) '(kapasitas momen yang tersedia)

'Akibat beban-beban yang tersedia
   Mu = 1.2 * (MSm + MGm + MDm) + 1.6 * (MLm)
   Mn1 = Mu / 0.85 '(Kapasitas momen yang diperlukan)< Mn2

'Kontrol rasio tulangan
    w = (Pp * fps2) / fc_blk     '<  dari
    'Z = 0.35 * B1

'Jumlah tendon
    phi = 3.141592654
    Ar = (1 / 4) * phi * (Dr ^ 2)
    JmlStrand1Tendon = Aps / (Ar * nr)
    JmlTendon = 1

mlStrand1Tendon <= 1 And JmlStrand1Tendon > 0 Then
JmlStrand1TendonK = 1
If JmlStrand1Tendon > 1 And JmlStrand1Tendon <= 2 Then
JmlStrand1TendonK = 2
If JmlStrand1Tendon > 2 And JmlStrand1Tendon <= 3 Then
JmlStrand1TendonK = 3
If JmlStrand1Tendon > 3 And JmlStrand1Tendon <= 4 Then
JmlStrand1TendonK = 4
If JmlStrand1Tendon > 4 And JmlStrand1Tendon <= 5 Then
JmlStrand1TendonK = 5
If JmlStrand1Tendon > 5 And JmlStrand1Tendon <= 6 Then
```

```
    JmlStrandlTendonK = 6
End If

'Perhitungan momen yang tjd. ditump. dan 1/4 bentang
    MG = 0
    MS = 0
    MD = 0
    ML = 0
    MO = 0
    MT = 0
    MGq = (3 / 32) * WG * (L ^ 2)
    MSq = (3 / 32) * WS * (L ^ 2)
    MDq = (3 / 32) * WD * (L ^ 2)
    MLq = (3 / 32) * WL * (L ^ 2)
    MOq = (MGq + prs * MDq)
    MTq = MGq + MSq + MDq + MLq

'Menentukan daerah batas letak aman tendon ditump. ,1/4 bentang & tengah bentang
    amin = (MO * (10 ^ 6)) / Po
    eb = amin + Kb
    amax = (MT * (10 ^ 6)) / Pe
    et = amax - Kt
    aminq = (MOq * (10 ^ 6)) / Po
    ebq = aminq + Kb
    amaxq = (MTq * (10 ^ 6)) / Pe
    etq = amaxq - Kt
    aminm = (MOm * (10 ^ 6)) / Po
    ebm = aminm + Kb
    amaxm = (MTm * (10 ^ 6)) / Pe
    etm = amaxm - Kt


'Perhitungan tegangan ijin yang terjadi
    flci = k * fc_blk
    fci = (-0.6) * flci
    fti = 0.25 * (flci ^ 0.5)
    fcs = (-0.45) * fc_blk
    fts = 0.5 * (fc_blk ^ 0.5)

'PILIHAN APA TEGANGAN TARIK DIIJINKAN
 If Option3(0).Value = True Then
    TegTrkDiijinkan = "Ya"
    ebAks = (fti * (Ap - An) * Kb) / Po
    etAks = (fts * (Ap - An) * Kt) / Pe
 ElseIf Option3(1).Value = True Then
    TegTrkDijinkan = "Tidak"
    ebAks = 0
    etAks = 0
 End If

 'Penambahan lebar daerah batas aman tendon pada tum., 1/4 bentang & tengah bentang
    eb1 = eb + ebAks
    et1 = et - etAks
    eb1q = ebq + ebAks
    et1q = etq - etAks
    eb1m = ebm + ebAks
    et1m = etm - etAks

If JmlTendon < 1.5 And JmlTendon > 0 Then
    JmlTendonK = 1
ElseIf JmlTendon >= 1.5 And JmlTendon <= 2.5 Then
    JmlTendonK = 2
ElseIf JmlTendon > 2.5 And JmlTendon <= 3.5 Then
    JmlTendonK = 3
ElseIf JmlTendon > 3.5 And JmlTendon <= 4.5 Then
    JmlTendonK = 4
End If
If



Open App.Path & "\temp_data\hasil_temp.ini" For Output As #1
            Write #1, tipe
```

```
                Write #1, Posisi
                Write #1, TegTrkDiijinkan
                Write #1, Apelat
                Write #1, cbp
                Write #1, ts
                Write #1, btr
                Write #1, Ap
                Write #1, Ip
                Write #1, Ac
                Write #1, Ic
                Write #1, cbc
                Write #1, ctc
                Write #1, Sbc
                Write #1, Stc
                Write #1, Kt
                Write #1, Kb
                Write #1, Mn1
                Write #1, w
                Write #1, eb
                Write #1, et
                Write #1, ebq
                Write #1, etq
                Write #1, ebm
                Write #1, etm
                Write #1, eb1
                Write #1, et1
                Write #1, eb1q
                Write #1, et1q
                Write #1, eb1m
                Write #1, et1m
                Write #1, dmin
                Write #1, Jm1Tendon
                Write #1, Jm1TendonK
                Write #1, Jm1Strand1Tendon
                Write #1, Jm1Strand1TendonK
                Write #1, ftT
                Write #1, fbT
                Write #1, ftL
                Write #1, fbL
                Write #1, ftc
                Write #1, fbc
                Write #1, fti
                Write #1, fci
                Write #1, fts
                Write #1, fcs
                Write #1, Z
                Write #1, "I"
                Write #1, Po
                Write #1, Pe
                Close #1

lHasilPscTrk.Show
 Sub
ate Sub Text3_Change(Index As Integer)
 If Text3(1).Text > "Text3(0).Text" Then
ox "Nilai fc_plt < fc_blk", vbExclamation, "Mohon Diganti"
 End If
 Sub
 ate Sub Command2_Click()
 ad Me
 Sub

 ate Sub mnuPersegiKEluar_Click()
 ad Me
 Sub
```

```
Status As String
tipe
Posisi
TegTrkDijinkan
Apelat
cbp
ts
btr
Ap
Ip
Ac
Ic
cbc
ctc
Sbc
Stc
Kt
Kb
Mn
w
eb
et
ebq
etq
ebm
etm
eb1
et1
eb1q
et1q
eb1m
et1m
dmin
JmlStrand
JmlStrandK
ftT
fbT
ftL
fbL
ftc
fbc
fti
fci
fts
fcs
Z
Po
Pe


vate Sub Form_Load()
l4(5).Caption = ""
l4(6).Caption = ""
l4(14).Caption = ""
l4(13).Caption = ""
l3(9).Caption = ""
l3(11).Caption = ""
l7(6).Caption = ""

rror Resume Next
 App.Path & "\temp_data\tipebalok.ini" For Input As #2
t #2, Balok
e #2

 App.Path & "\temp_data\hasil_temp.ini" For Input As #1
            Input #1, tipe
            Input #1, Posisi
            Input #1, TegTrkDiijinkan
            Input #1, Apelat
            Input #1, cbp
            Input #1, ts
            Input #1, btr
            Input #1, Ap
```

```
                Input #1, lp
                Input #1, Ac
                Input #1, Ic
                Input #1, cbc
                Input #1, ctc
                Input #1, Sbc
                Input #1, Stc
                Input #1, Kt
                Input #1, Kb
                Input #1, Mn
                Input #1, w
                Input #1, eb
                Input #1, et
                Input #1, ebq
                Input #1, etq
                Input #1, ebm
                Input #1, etm
                Input #1, eb1
                Input #1, et1
                Input #1, eb1q
                Input #1, et1q
                Input #1, eb1m
                Input #1, et1m
                Input #1, dmin
                Input #1, JmlStrand
                Input #1, JmlStrandK
                Input #1, ftT
                Input #1, fbT
                Input #1, ftL
                Input #1, fbL
                Input #1, ftc
                Input #1, fbc
                Input #1, Z
                Input #1, fcs
                Input #1, fts
                Input #1, fti
                Input #1, fci
                Input #1, Status
                Input #1, Po
                Input #1, Pe
se #1


JmlStrandK >= 1 And JmlStrandK <= 6 Then
 Picture1.Picture = LoadPicture(App.Path & "\pic_files\strand" & JmlStrandK & Status & ".bm

 If

el1.Caption = Balok & " Komposit " & " " & tipe
el3(0).Caption = Ac
el3(1).Caption = Ic
el3(2).Caption = cbc
el3(3).Caption = ctc
el3(4).Caption = Sbc
el3(5).Caption = Stc
el3(6).Caption = Kt
el3(7).Caption = Kb
el3(8).Caption = ftc
 13(10).Caption = fbc
 14(10).Caption = ftT
 14(11).Caption = fbT
 14(9).Caption = ftL
 14(12).Caption = fbL
 17(1).Caption = Mn
 17(5).Caption = w
 13(12).Caption = Po
 13(13).Caption = Pe
 If w < Z Then
  Label7(6).Caption = "OK"
 ElseIf w > Z Then
  Label7(6).Caption = "Tidak OK"
 End If
```

```
ndisi pertama
  If ftc < 0 And Abs(ftc) <= Abs(fcs) Then
E     Label3(9).Caption = "Aman"
E ElseIf ftc >= 0 And Abs(ftc) <= Abs(fts) Then
S     Label3(9).Caption = "Aman"
  Else
      Label3(9).Caption = "Tidak Aman"
  End If

  If fbc < 0 And Abs(fbs) <= Abs(fcs) Then
      Label3(11).Caption = "Aman"
  ElseIf fbc >= 0 And Abs(fbs) <= Abs(fts) Then
      Label3(11).Caption = "Aman"
  Else
      Label3(11).Caption = "Tidak Aman"
  End If

  'kondisi kedua
  If ftL < 0 And Abs(ftL) <= Abs(fcs) Then
      Label4(14).Caption = "Aman"
  ElseIf ftL >= 0 And Abs(ftL) <= Abs(fts) Then
      Label4(14).Caption = "Aman"
  Else
      Label4(14).Caption = "Tidak Aman"
  End If

  If fbL < 0 And Abs(fbL) <= Abs(fcs) Then
      Label4(13).Caption = "Aman"
  ElseIf fbL >= 0 And Abs(fbL) <= Abs(fts) Then
      Label4(13).Caption = "Aman"
  Else
      Label4(13).Caption = "Tidak Aman"
  End If

  'kondisi ketiga
  If ftT < 0 And Abs(ftT) <= Abs(fci) Then
      Label4(5).Caption = "Tidak Aman"
  ElseIf ftT >= 0 And Abs(ftT) <= Abs(fti) Then
      Label4(5).Caption = "Tidak Aman"
  Else
      Label4(5).Caption = "Aman"
  End If

  If fbT < 0 And Abs(fbT) <= Abs(fci) Then
      Label4(6).Caption = "Tidak Aman"
  ElseIf fbT >= 0 And Abs(fbT) <= Abs(fti) Then
      Label4(6).Caption = "Tidak Aman"
  Else
      Label4(6).Caption = "Aman"
  End If



  Sub
ate Sub Command2_Click()
ad Me
  Sub

  ate Sub Combo1_Click()
  With Combo1
  If .Text = "TUMPUAN" Then
      Text1.Text = et
      Text2.Text = eb
      Text3.Text = et1
      Text4.Text = eb1
  ElseIf .Text = "1/4 BENTANG" Then
      Text1.Text = etq
      Text2.Text = ebq
      Text3.Text = et1q
      Text4.Text = eb1q
  ElseIf .Text = "1/2 BENTANG" Then
      Text1.Text = etm
```

```
        Text2.Text = ebm
        Text3.Text = et1m
        Text4.Text = eb1m
    End If
    End With
End Sub
```

```
Status As String
tipe
Posisi
TegTrkDijinkan
Apelat
cbp
ts
btr
Ap
Ip
Ac
Ic
cbc
ctc
Sbc
Stc
Kt
Kb
Mn1
w
eb
et
ebq
etq
ebm
etm
eb1
et1
eb1q
et1q
eb1m
et1m
dmin
JmlTendon
JmlTendonK
JmlStrand1Tendon
JmlStrand1TendonK
ftT
fbT
ftL
fbL
ftc
fbc
fti
fci
fts
fcs
Z
Po
Pe


ate Sub Form_Load()
14(5).Caption = ""
14(6).Caption = ""
14(14).Caption = ""
14(13).Caption = ""
13(9).Caption = ""
13(11).Caption = ""
17(6).Caption = ""

rror Resume Next
 App.Path & "\temp_data\tipebalok.ini" For Input As #2
t #2, Balok
e #2

 App.Path & "\temp_data\hasil_temp.ini" For Input As #1
             Input #1, tipe
             Input #1, Posisi
             Input #1, TegTrkDiijinkan
             Input #1, Apelat
             Input #1, cbp
             Input #1, ts
```

```
                Input #1, btr
                Input #1, Ap
                Input #1, Ip
                Input #1, Ac
                Input #1, Ic
                Input #1, cbc
                Input #1, ctc
                Input #1, Sbc
                Input #1, Stc
                Input #1, Kt
                Input #1, Kb
                Input #1, Mn1
                Input #1, w
                Input #1, eb
                Input #1, et
                Input #1, ebq
                Input #1, etq
                Input #1, ebm
                Input #1, etm
                Input #1, eb1
                Input #1, et1
                Input #1, eb1q
                Input #1, et1q
                Input #1, eb1m
                Input #1, et1m
                Input #1, dmin
                Input #1, JmlTendon
                Input #1, JmlTendonK
                Input #1, JmlStrand1Tendon
                Input #1, JmlStrand1TendonK
                Input #1, ftT
                Input #1, fbT
                Input #1, ftL
                Input #1, fbL
                Input #1, ftc
                Input #1, fbc
                Input #1, Z
                Input #1, fcs
                Input #1, fts
                Input #1, fti
                Input #1, fci
                Input #1, Status
                Input #1, Po
                Input #1, Pe
se #1


JmlTendonK >= 1 And JmlTendonK <= 4 Then
 Picture1.Picture = LoadPicture(App.Path & "\pic_files\tendon" & JmlTendonK & Status & ".bm

 If

l1.Caption = Balok & " Komposit " & " " & tipe
l3(0).Caption = Ac
l3(1).Caption = Ic
l3(2).Caption = cbc
l3(3).Caption = ctc
l3(4).Caption = Sbc
l3(5).Caption = Stc
l3(6).Caption = Kt
l3(7).Caption = Kb
l3(8).Caption = ftc
l3(10).Caption = fbc
l4(10).Caption = ftT
l4(11).Caption = fbT
l4(9).Caption = ftL
l4(12).Caption = fbL
l7(1).Caption = Mn1
l7(5).Caption = w
l3(12).Caption = Po
l3(13).Caption = Pe
If w < Z Then
 Label7(6).Caption = "OK"
```

```
ElseIf w > Z Then
 Label7(6).Caption = "Tidak OK"
End If


ndisi pertama
If ftc < 0 And Abs(ftc) <= Abs(fcs) Then
    Label3(9).Caption = "Aman"
ElseIf ftc >= 0 And Abs(ftc) <= Abs(fts) Then
    Label3(9).Caption = "Aman"
Else
     Label3(9).Caption = "Tidak Aman"
End If

If fbc < 0 And Abs(fbs) <= Abs(fcs) Then
    Label3(11).Caption = "Aman"
ElseIf fbc >= 0 And Abs(fbs) <= Abs(fts) Then
    Label3(11).Caption = "Aman"
Else
    Label3(11).Caption = "Tidak Aman"
End If

'kondisi kedua
If ftL < 0 And Abs(ftL) <= Abs(fcs) Then
    Label4(14).Caption = "Aman"
ElseIf ftL >= 0 And Abs(ftL) <= Abs(fts) Then
    Label4(14).Caption = "Aman"
Else
    Label4(14).Caption = "Tidak Aman"
End If

If fbL < 0 And Abs(fbL) <= Abs(fcs) Then
    Label4(13).Caption = "Aman"
ElseIf fbL >= 0 And Abs(fbL) <= Abs(fts) Then
    Label4(13).Caption = "Aman"
Else
    Label4(13).Caption = "Tidak Aman"
End If

'kondisi ketiga
If ftT < 0 And Abs(ftT) <= Abs(fci) Then
    Label4(5).Caption = "Tidak Aman"
ElseIf ftT >= 0 And Abs(ftT) <= Abs(fti) Then
    Label4(5).Caption = "Tidak Aman"
Else
    Label4(5).Caption = "Aman"
End If

If fbT < 0 And Abs(fbT) <= Abs(fci) Then
    Label4(6).Caption = "Tidak Aman"
ElseIf fbT >= 0 And Abs(fbT) <= Abs(fti) Then
    Label4(6).Caption = "Tidak Aman"
Else
    Label4(6).Caption = "Aman"
End If



Sub
ate Sub Command2_Click()
ad Me
Sub

ate Sub Combo1_Click()
With Combo1
If .Text = "TUMPUAN" Then
    Text1.Text = et
    Text2.Text = eb
    Text3.Text = et1
    Text4.Text = eb1
ElseIf .Text = "1/4 BENTANG" Then
    Text1.Text = etq
    Text2.Text = ebq
```

```
    Text3.Text = et1q
    Text4.Text = eb1q
ElseIf .Text = "1/2 BENTANG" Then
    Text1.Text = etm
    Text2.Text = ebm
    Text3.Text = et1m
    Text4.Text = eb1m
End If
End With
Sub
```

LAMPIRAN 5

FM-UII-AA-FPU-09

KARTU PESERTA TUGAS AKHIR

NO.	N A M A	NO. MHS.	BID.STUDI
1	Dwi Magdalena	97511105	Struktur
2	Fitri Hidayati	97511240	Struktur

JUDUL TUGAS AKHIR :

Pemrograman Dengan V. B

PERIODE III : MARET - AGUSTUS
TAHUN : 2001 - 2002

No.	Kegiatan	Bulan Ke :					
		Mar.	Apr.	Mei.	Jun.	Jul.	Aug.
1.	Pendaftaran						
2.	Penentuan Dosen Pembimbing						
3.	Pembuatan Proposal						
4.	Seminar Proposal						
5.	Konsultasi Penyusunan TA.						
6.	Sidang-Sidang						
7.	Pendadaran.						

DOSEN PEMBIMBING I : Ir. Tri Fajar Budiono, MT.
DOSEN PEMBIMBING II : Ir. H. A. Kadir Aboe, MS.

Yogyakarta, 07 Maret 2002
a.n. Dekan,

(Ir. H. Munadhir, MS)

Catatan.

Seminar : .....
Sidang : .....
Pendadaran : .....

CATATAN KONSULTASI TUGAS AKHIR

NO	TANGGAL	CATATAN KONSULTASI	TANDA TANGAN
1	11/04/02	- untuk seminar proposal di ringkas - maju ke Pembimbing I	[signature]
2	11/04/02	- ~~Pendahuluan~~ : latar b, manfaat & tujuan, batasan, tinjauan pustaka, keaslian, Metode penelitian : algoritma dan flow chart	[signature]
3	16/04/02	- Bahas seminar Proposal	[signature]
4		siapkan seminar proposal	[signature]
5	7/05/02	Lanjutkan s/d selesai	[signature]
6	6/07/02	- Tambahkan - Bagaimana kalau Pc...	[signature]
7	9/07/02	siapkan disket yg berisi & source code program	[signature]