BAB V

KESIMPULAN DAN SARAN

5.1. Kesimpulan

Berdasarkan perhitungan pada program sub struktur pada portal bidang pada bab sebelumnya, dapat disimpulkan hal-hal pokok sebagai berikut :

1. Matriks kekakuan [*K*] sub struktur telah berhasil diturunkan dan telah diuji solusi manualnya dengan kesalahan pada pengujian terhadap perpindahan didapati persentase kesalahan maksimum adalah sebesar 19,82896268 % dan pengujian terhadap momen pada ujung batang didapati kesalahan maksimum adalah sebesar 3,395440741%.
2. Program yang telah dibuat memberikan hasil yang relatif akurat dan telah diuji terhadap *software* lain, yaitu *GRASP* dan *SAP2000*. Pengujian dengan *software GRASP* didapat kesalahan maksimum adalah sebesar 3,8121007254196 % untuk perpindahan, 5,55489147515879 % untuk gaya yang terjadi pada ujung batang, dan 0,00318013592066 % untuk reaksi tumpuan yang terjadi. Pengujian dengan *software SAP2000* didapat kesalahan maksimum adalah sebesar 6,08349254983406 % untuk perpindahan, 13,8419400454196 % untuk gaya yang terjadi pada ujung batang dan 2,30191908954785 % untuk reaksi tumpuan.
3. Penerapan teknik sub struktur pada program ini dengan batasan maksimal sebanyak 10 buah sub struktur dimana struktur dapat dibagi baik dengan potongan horisontal, vertikal, diagonal maupun dikombinasi lalu

dianalisis, kemudian hasil analisis perbagian sub struktur digabungkan kembali menjadi struktur utuh. Dari berberapa kasus yang dianalisis hasil pengujian validasi yaitu kasus 2 penggunaan *memory* dalam analisis struktur utuh adalah sebesar 80780 byte dengan dimensi *array* matriks kekakuan 13 x 13. Pada pengujian kasus 2 tersebut dengan 2 buah sub struktur penggunaan *memory*-nya adalah sebesar 80516 byte dengan dimensi matriks kekakuan 6 x 6 dan 10 x 10. Pada pengujian kasus 3 penggunaan *memory* dalam analisis struktur utuh adalah sebesar 81096 byte dengan dimensi matrik kekakuan 15 x 15. Pada pengujian kasus 2 dengan 3 buah sub struktur penggunaan *memory*-nya adalah sebesar 80632 byte dengan dimensi matriks kekakuan 6 x 6, 9 x 9 dan 6 x 6. Pada pengujian kasus 4 penggunaan *memory* dalam analisis struktur utuh adalah sebesar 118168 byte dengan dimensi *array* matriks kekakuan 75 x 75. Pengujian kasus 4 dengan 2 buah sub struktur pemakaian *memory*-nya adalah sebesar 113716 byte dengan dimensi *array* matriks kekakuan 30 x 30 dan 60 x 60. Pengujian kasus 4 dengan 4 buah sub struktur pemakaian *memory*-nya sebesar 110732 byte dengan dimensi *array* matriks kekakuan masing-masing adalah sebesar 27 x 27. Dari pengujian tersebut maka dapat disimpulkan semakin banyaknya sub struktur dalam menganalisis suatu struktur maka penggunaan *memory* dari komputer semakin berkurang apabila dibandingkan dengan penggunaan *memory* dalam menganalisis struktur tersebut sebagai struktur yang utuh. Pengurangan memori itu disebabkan karena analisis sub struktur dapat mempartisi

besarnya dimensi *array* matriks kekakuan pada analisis struktur utuh sehingga menjadi berberapa *array* matriks kekakuan yang berdimensi lebih kecil. Pengujian hasil dari program dalam menganalisis struktur dengan sub struktur dibandingkan hasil program dalam menganalisis struktur yang utuh didapat hasil perbedaan maksimum adalah sebesar $3{,}78197.10^{-11}$ % untuk perpindahan, $1{,}25128.10^{-9}$ % untuk gaya yang terjadi pada titik kumpul dan $1{,}6529.10^{-11}$ % untuk reaksi tumpuan.

5.2. Saran

Pada penyusunan dan penulisan program sub struktur pada portal bidang dapat dikembangkan lagi untuk hal-hal seperti berikut :

1. Pengembangan lebih lanjut dari program ini dapat disusun suatu program sub struktur dimana diberikan fasilitas yang dapat memudahkan pengguna dalam mengoperasikan, khususnya pada bagian bagaimana batang-batang dengan dimensi yang sama dapat dikelompokan sehingga dalam memasukan data dapat lebih mudah dan pada bagian pembebanan dimana beban sendiri batang dapat dimasukan secara otomatis dan adanya suatu *procedure* untuk menganalisis beban pada batang sehingga didapatkan beban ekivalennya.
2. Metoda sub struktur merupakan suatu metoda yang banyak digunakan dalam menganalisis suatu struktur dengan jumlah derajat kebebasan yang besar, sehingga program sub struktur ini dapat dikembangkan untuk menganalisis struktur rangka lainnya terutama yang memiliki derajat kebebasan yang besar, seperti portal ruang atau rangka batang ruang.

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LAMPIRAN

```
unit Unit1;

interface

uses
  Windows, Messages, SysUtils, Classes, Graphics, Controls, Forms,
Dialogs,
  Grids, StdCtrls, Buttons, ToolWin, ComCtrls, Menus;

type
  TForm1 = class(TForm)
    Label1: TLabel;
    Edit1: TEdit;
    Label3: TLabel;
    Edit2: TEdit;
    Label4: TLabel;
    Edit3: TEdit;
    Label5: TLabel;
    Edit4: TEdit;
    Label6: TLabel;
    Edit5: TEdit;
    Button1: TButton;
    SG1: TStringGrid;
    Label7: TLabel;
    Label8: TLabel;
    SG2: TStringGrid;
    SG3: TStringGrid;
    Label9: TLabel;
    Button2: TButton;
    SG4: TStringGrid;
    Label10: TLabel;
    MainMenu1: TMainMenu;
    File1: TMenuItem;
    DataBaru1: TMenuItem;
    OpenData1: TMenuItem;
    Exit1: TMenuItem;
    ListBox1: TListBox;
    OpenDialog1: TOpenDialog;
    procedure FormActivate(Sender: TObject);
    procedure Button1Click(Sender: TObject);
    procedure Button2Click(Sender: TObject);
    procedure DataBaru1Click(Sender: TObject);
    procedure OpenData1Click(Sender: TObject);
    procedure Exit1Click(Sender: TObject);
  private
    { Private declarations }
  public
    { Public declarations }
    procedure Variabel1;
    procedure Data1;
    procedure Pengekang;
    procedure IndeksPerpindahan;
  end;

var
  Form1: TForm1;
```

```
  MD, M, N, ND, NJ, NR, NRJ : Byte;
  E : Real;
  IM                    : Array [1..6] of byte;
  k, JJ, JK, JRL, ID    : Array [1..maxbyte] of integer;
  AE, AR, A, ZI, CX, CY, EL, XCL, YCL  : Array [1..maxbyte] of
real;
  SMS                   : Array [1..6,1..6] of real;

implementation

uses Unit2, Unit3, Unit4;

{$R *.DFM}

procedure TForm1.Variabel1;
begin
  E  := StrToFloat (Edit1.text);
  M  := StrToInt (Edit2.text);
  NJ := StrToInt (Edit3.text);
  NR := StrToInt (Edit4.text);
  NRJ:= StrToInt (Edit5.text);
  ND := 3 * NJ;
  N  := ND - NR;
end;

procedure TForm1.FormActivate(Sender: TObject);
begin
  SG1.Cells [0,0] := 'Joint';
  SG1.Cells [1,0] := 'Koordinat X';
  SG1.Cells [2,0] := 'Koordinat Y';
  SG2.Cells [0,0] := 'Batang';
  SG2.Cells [1,0] := 'Luas Penampang';
  SG2.Cells [2,0] := 'Momen Inersia';
  SG3.Cells [0,0] := 'Batang';
  SG3.Cells [1,0] := 'Ujung i Pada Joint ke-';
  SG3.Cells [2,0] := 'Ujung j Pada Joint ke-';
  SG4.Cells [0,0] := 'Joint';
  SG4.Cells [1,0] := 'Arah X';
  SG4.Cells [2,0] := 'Arah Y';
  SG4.Cells [3,0] := 'Arah Z';
end;

procedure TForm1.Button1Click(Sender: TObject);
var i : byte;
begin
Variabel1 ;
  SG1.RowCount := NJ + 1;
  SG2.RowCount := M + 1;
  SG3.RowCount := M + 1;
  SG4.RowCount := NRJ + 1;
 for i := 1 to NJ do
 begin
   SG1.Cells [0,i] := IntToStr (i);
 end;
 for i := 1 to M do
 begin
```

```
    SG2.Cells [0,i] := IntToStr (i);
    SG3.Cells [0,i] := IntToStr (i);
  end;
end;

procedure TForm1.Pengekang ;
var i : byte;
begin
  for i := 1 to ND do begin
    JRL[i] := 0;
    k[i] := 0;
  end;
  for i := 1 to NRJ do
  begin
    k[i] := StrToInt (SG4.Cells [0,i]);
    JRL[3 * k[i] -2] := StrToInt (SG4.Cells [1,i]);
    JRL[3 * k[i] -1] := StrToInt (SG4.Cells [2,i]);
    JRL[3 * k[i]]    := StrToInt (SG4.Cells [3,i]);
  end;
end;

procedure TForm1.IndeksPerpindahan ;
var i : byte;
     N1 : integer;
begin
  for i := 1 to ND do begin
    ID[i] := 0;
  end;
    N1 := 0;
  for i := 1 to ND do
  begin
    N1 := N1 + JRL[i];
    if JRL[i] > 0 then
      ID[i] := N + N1
    else
      ID[i] := i - N1;
  end;
end;

procedure TForm1.Data1 ;
var i : byte;
begin
  for i := 1 to M do begin
    A  [i] := 0; ZI [i] := 0; JJ [i] := 0; JK [i] := 0;
    XCL[i] := 0; YCL[i] := 0; EL [i] := 0; CX [i] := 0; CY [i] :=
0;
  end;
  for i := 1 to M do
  begin
    MD := 6 ;
    A  [i] := StrtoFloat(SG2.Cells [1,i]) ;
    ZI [i] := StrtoFloat(SG2.Cells [2,i]) ;
    JJ [i] := StrToInt (SG3.Cells [1,i]);
    JK [i] := StrToInt (SG3.Cells [2,i]);
    XCL[i] := StrToFloat(SG1.Cells [1,JK[i]]) -
StrToFloat(SG1.Cells [1,JJ[i]]);
```

```
   YCL[i] := StrToFloat(SG1.Cells [2,JK[i]]) -
StrToFloat(SG1.Cells [2,JJ[i]]);
   EL [i] := SQRT ( XCL[i] * XCL[i] + YCL[i] * YCL[i] );
   CX [i] := XCL [i] / EL [i];
   CY [i] := YCL [i] / EL [i];
 end;
end;

procedure TForm1.Button2Click(Sender: TObject);
begin
  form2.Show ;
  form1.Hide ;
end;

procedure TForm1.DataBaru1Click(Sender: TObject);
var i,j : byte;
begin
  form1.Edit1.Text := ''; form1.Edit2.Text := ''; form1.Edit3.Text
:= '';
  form1.Edit4.Text := ''; form1.Edit5.Text := '';
  for i := 1 to NJ do begin
    form1.SG1.Cells [1,i] := '';
    form1.SG1.Cells [2,i] := '';
  end;
  for i := 1 to M do begin
    form1.SG2.Cells [1,i] := '';
    form1.SG2.Cells [2,i] := '';
    form1.SG3.Cells [1,i] := '';
    form1.SG3.Cells [2,i] := '';
  end;
  for i := 1 to NRJ do begin
    form1.SG4.Cells [0,i] := '';
    form1.SG4.Cells [1,i] := '';
    form1.SG4.Cells [2,i] := '';
    form1.SG4.Cells [3,i] := '';
  end;
  form2.Edit1.Text := '';
  for i := 1 to NPART do begin
    form2.SG1.Cells [i-1,1] := '';
    form2.SG2.Cells [i-1,1] := '';
    form2.SG3.Cells [i-1,1] := '';
    for j := 1 to 149 do begin
      form2.SG4.Cells [i-1,j] := '';
      form2.SG5.Cells [i-1,j] := '';
      form2.SG6.Cells [i-1,j] := '';
    end;
  end;
  form3.Edit1.Text := ''; form3.Edit2.Text := '';
  for i := 1 to NLJ do begin
    for j := 0 to 3 do begin
      form3.SG1.Cells [j,i] := '';
    end;
  end;
  for i := 1 to NLM do begin
    for j := 0 to 6 do begin
      form3.SG2.Cells [j,i] := '';
```

```
    end;
  end;
end;

procedure TForm1.OpenData1Click(Sender: TObject);
var i, j, l : integer;
begin
OpenDialog1.Title := 'Open Data';
OpenDialog1.Filter   := 'Data (*.ron)|*.ron' ;
OpenDialog1.DefaultExt := 'Data files (*.ron)|*.ron';
if OpenDialog1.Execute then
  listbox1.items.LoadFromFile (OpenDialog1.FileName);
        Edit1.Text := (Listbox1.Items.Strings [0]);
        Edit2.Text := (Listbox1.Items.Strings [1]);
        Edit3.Text := (Listbox1.Items.Strings [2]);
        Edit4.Text := (Listbox1.Items.Strings [3]);
        Edit5.Text := (Listbox1.Items.Strings [4]);
  Button1.Click ;
  for i := 1 to NJ do begin
    SG1.Cells[1,i] := (Listbox1.Items.Strings [4+i]);
  end;
  j := 4 + NJ;
  for i := 1 to NJ do begin
    SG1.Cells[2,i] := (Listbox1.Items.Strings [j+i]);
  end;
  j := j + NJ;
  for i := 1 to NRJ do begin
    SG4.Cells[0,i] := (Listbox1.Items.Strings [j+i]);
  end;
  j := j + NRJ;
  for i := 1 to NRJ do begin
    SG4.Cells[1,i] := (Listbox1.Items.Strings [j+i]);
  end;
  j := j + NRJ;
  for i := 1 to NRJ do begin
    SG4.Cells[2,i] := (Listbox1.Items.Strings [j+i]);
  end;
  j := j + NRJ;
  for i := 1 to NRJ do begin
    SG4.Cells[3,i] := (Listbox1.Items.Strings [j+i]);
  end;
  j := j + NRJ;
  for i := 1 to M do begin
    SG2.Cells[1,i] := (Listbox1.Items.Strings [j+i]);
  end;
  j := j + M;
  for i := 1 to M do begin
    SG2.Cells[2,i] := (Listbox1.Items.Strings [j+i]);
  end;
  j := j + M;
  for i := 1 to M do begin
    SG3.Cells[1,i] := (Listbox1.Items.Strings [j+i]);
  end;
  j := j + M;
  for i := 1 to M do begin
    SG3.Cells[2,i] := (Listbox1.Items.Strings [j+i]);
```

```
end;
j := j + M;
  form2.Edit1.Text := (Listbox1.Items.Strings [j+1]);
  j := j + 1;
  form2.Button1.Click ;
for i := 1 to NPART do begin
  form2.SG1.Cells [i-1,1] := (Listbox1.Items.Strings [j+i]);
end;
j := j + NPART;
for i := 1 to NPART do begin
  form2.SG2.Cells [i-1,1] := (Listbox1.Items.Strings [j+i]);
end;
j := j + NPART;
for i := 1 to NPART do begin
  form2.SG3.Cells [i-1,1] := (Listbox1.Items.Strings [j+i]);
end;
j := j + NPART;
for i := 1 to NPART do begin
  for l := 1 to StrToInt (form2.SG1.Cells [i-1,1]) do begin
    form2.SG4.Cells [i-1,l] := (Listbox1.Items.Strings [j+l]);
  end;
  j := j + StrToInt (form2.SG1.Cells [i-1,1]);
end;
for i := 1 to NPART do begin
  for l := 1 to StrToInt (form2.SG2.Cells [i-1,1]) do begin
    form2.SG5.Cells [i-1,l] := (Listbox1.Items.Strings [j+l]);
  end;
  j := j + StrToInt (form2.SG2.Cells [i-1,1]);
end;
for i := 1 to NPART do begin
  for l := 1 to StrToInt (form2.SG3.Cells [i-1,1]) do begin
    form2.SG6.Cells [i-1,l] := (Listbox1.Items.Strings [j+l]);
  end;
  j := j + StrToInt (form2.SG3.Cells [i-1,1]);
end;
    form3.Edit1.Text := (Listbox1.Items.Strings [j+1]);
    j := j + 1;
    form3.Edit2.Text := (Listbox1.Items.Strings [j+1]);
    j := j + 1;
    form3.Button2.Click ;
for i := 1 to NLJ do begin
  form3.SG1.Cells [0,i] := (Listbox1.Items.Strings [j+i]);
end;
  j := j + NLJ;
for i := 1 to NLJ do begin
  form3.SG1.Cells [1,i] := (Listbox1.Items.Strings [j+i]);
end;
  j := j + NLJ;
for i := 1 to NLJ do begin
  form3.SG1.Cells [2,i] := (Listbox1.Items.Strings [j+i]);
end;
  j := j + NLJ;
for i := 1 to NLJ do begin
  form3.SG1.Cells [3,i] := (Listbox1.Items.Strings [j+i]);
end;
  j := j + NLJ;
```

```
  for i := 1 to NLM do begin
    form3.SG2.Cells [0,i] := (Listbox1.Items.Strings [j+i]);
  end;
    j := j + NLM;
  for i := 1 to NLM do begin
    form3.SG2.Cells [1,i] := (Listbox1.Items.Strings [j+i]);
  end;
    j := j + NLM;
  for i := 1 to NLM do begin
    form3.SG2.Cells [2,i] := (Listbox1.Items.Strings [j+i]);
  end;
    j := j + NLM;
  for i := 1 to NLM do begin
    form3.SG2.Cells [3,i] := (Listbox1.Items.Strings [j+i]);
  end;
    j := j + NLM;
  for i := 1 to NLM do begin
    form3.SG2.Cells [4,i] := (Listbox1.Items.Strings [j+i]);
  end;
    j := j + NLM;
  for i := 1 to NLM do begin
    form3.SG2.Cells [5,i] := (Listbox1.Items.Strings [j+i]);
  end;
    j := j + NLM;
  for i := 1 to NLM do begin
    form3.SG2.Cells [6,i] := (Listbox1.Items.Strings [j+i]);
  end;
end;

procedure TForm1.Exit1Click(Sender: TObject);
begin
  Close;
end;

end.
```

```
unit Unit2;

interface

uses
  Windows, Messages, SysUtils, Classes, Graphics, Controls, Forms,
Dialogs,
  Grids, StdCtrls, Buttons;

type
  TForm2 = class(TForm)
    SG4: TStringGrid;
    SG6: TStringGrid;
    Label1: TLabel;
    Label2: TLabel;
    Edit1: TEdit;
    Label3: TLabel;
    Button1: TButton;
    Button2: TButton;
    SG1: TStringGrid;
    Label4: TLabel;
    SG5: TStringGrid;
    Label5: TLabel;
    SG2: TStringGrid;
    Label6: TLabel;
    SG3: TStringGrid;
    Label7: TLabel;
    BitBtn1: TBitBtn;
    procedure Button1Click(Sender: TObject);
    procedure Button2Click(Sender: TObject);
    procedure BitBtn1Click(Sender: TObject);
  private
    { Private declarations }
  public
    { Public declarations }
    procedure PengekangSubStruktur;
    procedure IndeksPerpindahanSubStruktur;
    procedure MatKekakuanSubStruktur;
    procedure DimensiMatSubStruktur;
    procedure MatSubStruktur;
    procedure InversMatriksKbb;
    procedure MatKccT;
    procedure Tukar (var nilai1, nilai2 : byte);
    procedure TotalKccT1;
    procedure TotalKccT2;
  end;

var
  Form2: TForm2;
  SCM1, SCM2, SCM3, SCM4         : Real;
  NPART, MSUB, NCj, NC, nilai1, nilai2, I1, I2, IR, IC, ITEM  :
byte;
  Take, CC1, CCi1, Temp1, Temp2 : Array [1..maxbyte] of byte;
  CCi, BBi, BB, CC              : Array [1..maxbyte] of integer;
  JRLS, IDSUB                   : Array [1..maxbyte,1..maxbyte] of
byte;
```

```
  Ns, N1, N2, NDS, L1Sub        : Array [1..10] of integer;
  iKbb, Kbb, Kcb, Kbc, Kcc, KccT: Array
[1..10,1..maxbyte,1..maxbyte] of real;
  TKccT, Kbbi, SFFi, KTemp3     : Array [1..maxbyte,1..maxbyte] of
real;
  SFF, Ktempl, Ktemp2           : Array
[1..10,1..maxbyte,1..maxbyte] of real;

implementation

uses Unit1, Unit3;

{$R *.DFM}

procedure TForm2.Button1Click(Sender: TObject);
var i : byte;
begin
NPART := StrToInt (Edit1.text) ;
  SG1.ColCount := NPART ;
  SG2.ColCount := NPART ;
  SG3.ColCount := NPART ;
  SG4.ColCount := NPART ;
  SG5.ColCount := NPART ;
  SG6.ColCount := NPART ;
 for i := 0 to NPART-1 do
 begin
   SG1.Cells [i,0] := 'Sub' + IntToStr (i+1);
   SG2.Cells [i,0] := 'Sub' + IntToStr (i+1);
   SG3.Cells [i,0] := 'Sub' + IntToStr (i+1);
   SG4.Cells [i,0] := 'Sub' + IntToStr (i+1);
   SG5.Cells [i,0] := 'Sub' + IntToStr (i+1);
   SG6.Cells [i,0] := 'Sub' + IntToStr (i+1);
 end;
SG4.RowCount := 150 ;
SG5.RowCount := 150 ;
SG6.RowCount := 150 ;
  if NPART = 1 then begin
    SG2.Cells [0,1] := IntToStr (0);
    for i := 1 to NJ do begin
      SG1.Cells [0,1] := IntToStr (NJ);
      SG4.Cells [0,i] := IntToStr (i);
    end;
    for i := 1 to M do begin
      SG3.Cells [0,1] := IntToStr (M);
      SG6.Cells [0,i] := IntToStr (i);
    end;
  end;
end;

procedure TForm2.PengekangSubStruktur ;
var h, i, j, l : byte;
begin
NPART := StrToInt (Edit1.text) ;
  for h := 1 to NPART do begin
      L1Sub[h] := 0;
      NDS[h] := 0;
```

```
    for i := 1 to ND do begin
      JRLS [h,i] := 1 ;
    end;
  end;
  for h := 1 to NPART do
  begin
    NDS[h] := 3 * (StrToInt(SG1.Cells [h-1,1]) +
StrToInt(SG2.Cells [h-1,1]));
  end;
  for h := 1 to NPART do
  begin
    for i := 1 to StrToInt (SG2.Cells [h-1,1]) do
    begin
      l := StrToInt (SG5.Cells [h-1,i]);
      JRLS [h,3 * l - 2] := 0;
      JRLS [h,3 * l - 1] := 0;
      JRLS [h,3 * l ] := 0;
      for j := 1 to NRJ do
      begin
        if l = k[j] then begin
          JRLS [h,3 * l - 2] := JRL [3 * k[j] - 2];
          JRLS [h,3 * l - 1] := JRL [3 * k[j] - 1];
          JRLS [h,3 * l] := JRL [3 * k[j]];
        end;
      end;
    end;
    for i := 1 to StrToInt (SG1.Cells [h-1,1]) do
    begin
      l := StrToInt (SG4.Cells [h-1,i]);
      JRLS [h,3 * l - 2] := 0;
      JRLS [h,3 * l - 1] := 0;
      JRLS [h,3 * l] := 0;
      for j := 1 to NRJ do
      begin
        if l = k[j] then begin
          JRLS [h,3 * l - 2] := JRL [3 * k[j] - 2];
          JRLS [h,3 * l - 1] := JRL [3 * k[j] - 1];
          JRLS [h,3 * l] := JRL [3 * k[j] ];
        end;
      end;
    end;
  end;
  for h := 1 to NPART do
  begin
    for i := 1 to ND do
    begin
      if JRLS[h,i] = 1 then
      L1Sub[h] := L1Sub[h] + 1; {jumlah DOF sub struktur
terkekang}
    end;
  end;
end;

procedure TForm2.IndeksPerpindahanSubStruktur ;
var h, i : byte;
    M1 : integer;
```

```
begin
  for h := 1 to NPART do begin
    for i := 1 to ND do begin
      IDSUB[h,i] := 0;
    end;
  end;
  for h := 1 to NPART do
  begin
  M1 := 0;
    Ns[h] := ND - L1Sub[h]; {jumlah DOF sub struktur bebas}
    for i := 1 to ND do
    begin
      M1 := M1 + JRLS[h,i];
      if JRLS[h,i] > 0 then
        IDSUB[h,i] := Ns[h] + M1
      else
        IDSUB[h,i] := i - M1; {ID pada masing-masing sub struktur}
    end;
  end;
end;

procedure TForm2.MatKekakuanSubStruktur ;
var d, h, i, j, l : byte;
label 1, 2;
begin
  for h := 1 to NPART do begin
    for i := 1 to Ns[h] do begin
      for j := 1 to Ns[h] do begin
        SFF[h,i,j] := 0;
      end;
    end;
  end;
  for h := 1 to NPART do
  begin
    for i := 1 to Ns[h] do begin
      for j := 1 to Ns[h] do begin
        SFFi[i,j] := 0;
      end;
    end;
    MSUB := StrToInt (SG3.Cells [h-1,1]);
    for i := 1 to MSUB do
    begin
      d := StrToInt (SG6.Cells [h-1,i]);
      SCM1 := E * A[d] / EL[d];
      SCM2 := 4 * E * ZI[d] / EL[d];
      SCM3 := 1.5 * SCM2 / EL[d];
      SCM4 := 2 * SCM3 / EL[d];
        SMS[1,1] := SCM1 * CX[d] * CX[d] + SCM4 * CY[d] * CY[d];
        SMS[1,2] := (SCM1 - SCM4) * CX[d] * CY[d] ;
        SMS[1,3] := -SCM3 * CY[d];
        SMS[1,4] := -SMS[1,1] ;
        SMS[1,5] := -SMS[1,2] ;
        SMS[1,6] := SMS[1,3]  ;
        SMS[2,2] := SCM1 * CY[d] * CY[d] + SCM4 * CX[d] * CX[d] ;
        SMS[2,3] := SCM3 * CX[d] ;
        SMS[2,4] := -SMS[1,2] ;
```

```
        SMS[2,5] := -SMS[2,2] ;
        SMS[2,6] := SMS[2,3]  ;
        SMS[3,3] := SCM2      ;
        SMS[3,4] := -SMS[1,3] ;
        SMS[3,5] := -SMS[2,3] ;
        SMS[3,6] := SCM2 / 2  ;
        SMS[4,4] := SMS[1,1]  ;
        SMS[4,5] := SMS[1,2]  ;
        SMS[4,6] := SMS[3,4]  ;
        SMS[5,5] := SMS[2,2]  ;
        SMS[5,6] := SMS[3,5]  ;
        SMS[6,6] := SCM2      ;
      IM[1] := 3 * JJ[d] - 2;
      IM[2] := 3 * JJ[d] - 1;
      IM[3] := 3 * JJ[d] ;
      IM[4] := 3 * JK[d] - 2;
      IM[5] := 3 * JK[d] - 1;
      IM[6] := 3 * JK[d] ;
      for j := 1 to MD do
      begin
        I1 := IM[j];
      if JRLS[h,I1] > 0 Then
        goto 2
      else
        for l := j to MD do
        begin
          I2 := IM[l];
        if JRLS[h,I2] > 0 Then
          goto 2
        else
          IR := IDSUB[h,I1];
          IC := IDSUB[h,I2];
        if IR < IC then goto 1
        else
          ITEM := IR;
          IR := IC;
          IC := ITEM;
1 :       IC := IC - IR + 1;
          SFFi [IR,IC] := SFFi[IR,IC] + SMS[j,l];
        end;
2 :   end;
    end;
    for i := 1 to Ns[h] do
    begin
      for j := 1 to Ns[h] do
      begin
        SFF [h,i,j+i-l] := SFFi [i,j];
        SFF [h,j,i] := SFF [h,i,j];     {matriks kekakuan sub
struktur}
      end;
    end;
  end;
end;

procedure TForm2.DimensiMatSubStruktur ;
var h, i, j, l1, l2 : byte;
```

```
    c, b, x, y : byte;
begin
 for h := 1 to NPART do
 begin
   N1[h] := 0;
   N2[h] := 0;
 end;
 for h := 1 to NPART do
 begin
   c := StrToInt (SG1.Cells [h-1,1]);
   b := StrToInt (SG2.Cells [h-1,1]);
   for i := 1 to c do
   begin
     x := StrToInt (SG4.Cells [h-1,i]);
     for l1 := (3 * x - 2) to (3 * x) do
     begin
       if JRLS [h,l1] = 0 then
         N1[h] := N1[h] + 1; {jumlah DOF bebas node Pertemuan }
     end;
   end;
   for j := 1 to b do
   begin
     y := StrToInt (SG5.Cells [h-1,j]);
     for l2 := (3 * y - 2) to (3 * y) do
     begin
       if JRLS [h,l2] = 0 then
         N2[h] := N2[h] + 1; {jumlah DOF bebas node Dalam}
     end;
   end;
   if Ns[h] <> N1[h] + N2[h] then MessageBox (0,'Data anda
kemungkinan salah',
     'Pemberitahuan', Mb_Ok);
 end;
end;

procedure TForm2.MatSubStruktur ;
var h, i, j, j1, j2, j3, l, l1, l2 : byte;
    c, b, x , y : integer;
begin
 for h := 1 to NPART do begin
   for j1 := 1 to N1[h] do begin
     for j2 := 1 to N1[h] do begin
       Kcc [h,j1,j2] := 0;
     end;
   end;
   for j1 := 1 to N2[h] do begin
     for j2 := 1 to N2[h] do begin
       Kbb [h,j1,j2] := 0;
     end;
   end;
   for j1 := 1 to N1[h] do begin
     for j2 := 1 to N2[h] do begin
       Kbc [h,j1,j2] := 0; BBi[j2] := 0; BB[j2]  := 0;
     end;
   end;
   for j1 := 1 to N2[h] do begin
```

```
    for j2 := 1 to N1[h] do begin
      Kcb [h,j1,j2] := 0; CCi[j2] := 0; CC[j2]  := 0;
    end;
  end;
end;
for h := 1 to NPART do
begin
  c := StrToInt (SG1.Cells [h-1,1]);
  b := StrToInt (SG2.Cells [h-1,1]);
  for i := 1 to c do
  begin
    x := StrToInt (SG4.Cells [h-1,i]);
    CCi[3 * i - 2] := 3 * x - 2;
    CCi[3 * i - 1] := 3 * x - 1;
    CCi[3 * i] := 3 * x;
  end;
  for j1 := 1 to N1[h] do
  begin
    if JRLS [h,CCi[j1]] = 0 then CC[j1] := IDSUB[h,CCi[j1]];
  end;
  for j1 := 1 to N1[h] do
  begin
    for j2 := 1 to N1[h] do
    begin
      Kcc [h,j1,j2] := SFF [h,CC[j1],CC[j2]];
    end;
  end;
  for j := 1 to b do
  begin
    y := StrToInt (SG5.Cells [h-1,j]);
    BBi[3 * j - 2] := 3 * y - 2;
    BBi[3 * j - 1] := 3 * y - 1;
    BBi[3 * j] := 3 * y;
  end;
  j3 := 0;
  for j2 := 1 to b * 3 do
  begin
    if JRLS [h,BBi[j2]] = 0 then begin
      j3 := j3 + 1;
      BB[j3] := IDSUB[h,BBi[j2]];
    end;
  end;
  for j1 := 1 to N2[h] do
  begin
    for j2 := 1 to N2[h] do
    begin
      Kbb [h,j1,j2] := SFF [h,BB[j1],BB[j2]];
    end;
  end;
  for j1 := 1 to N1[h] do
  begin
    for j2 := 1 to N2[h] do
    begin
      Kbc [h,j1,j2] := SFF [h,CC[j1],BB[j2]];
    end;
  end;
```

```
   for j1 := 1 to N2[h] do
   begin
     for j2 := 1 to N1[h] do
     begin
       Kcb [h,j1,j2] := SFF [h,BB[j1],CC[j2]};
     end;
   end;
 end;
end;

procedure TForm2.InversMatriksKbb ;
var h, i, j, l : byte;
    PIVOT, AA : real;
begin
 for h := 1 to NPART do begin
   for i := 1 to N2[h] do begin
     for j := 1 to N2[h] do begin
       iKbb[h,i,j] := 0;
     end;
   end;
 end;
 for h := 1 to NPART do
 begin
   for i := 1 to N2[h] do begin
     for j := 1 to N2[h] do begin
       Kbbi[i,j] := 0;
       Kbbi[i,j] := Kbb[h,i,j];
     end;
   end;
   for i := 1 to N2[h] do
   begin
     PIVOT := Kbbi[i,i];
     Kbbi[i,i] := 1;
     for j := 1 to N2[h] do
       Kbbi[i,j] := Kbbi[i,j] / PIVOT;
     for l := 1 to N2[h] do
     begin
       if l <> i then
       begin
         AA := Kbbi[l,i];
         Kbbi[l,i] := 0;
         for j := 1 to N2[h] do
           Kbbi[l,j] := Kbbi[l,j]-AA*Kbbi[i,j];
       end;
     end;
   end;
   for i := 1 to N2[h] do begin
     for j := 1 to N2[h] do begin
       iKbb[h,i,j] := Kbbi[i,j]; {invers matriks Kbb sub struktur}
     end;
   end;
 end;
end;

procedure TForm2.MatKccT ;
var h, i, j, l, l1, l2 : byte;
```

```
begin
 for h := 1 to NPART do begin
   for j := 1 to N1[h] do begin
     for l1 := 1 to N2[h] do begin
       Ktemp1[h,l1,j] := 0;
     end;
     for l2 := 1 to N1[h] do begin
       Ktemp2[h,l2,j] := 0;
     end;
   end;
   for i := 1 to N1[h] do
   begin
     for j := 1 to N1[h] do
     begin
       KccT[h,i,j] := 0;
     end;
   end;
 end;
 for h := 1 to NPART do
 begin
   for i := 1 to N2[h] do
   begin
     for j := 1 to N1[h] do
     begin
       for l := 1 to N2[h] do
       begin
         Ktemp1[h,l,j] := Ktemp1[h,l,j] + Kcb[h,i,j] *
iKbb[h,l,i];
       end;
     end;
   end;
   for i := 1 to N2[h] do
   begin
     for j := 1 to N1[h] do
     begin
       for l := 1 to N1[h] do
       begin
         Ktemp2[h,l,j] := Ktemp2[h,l,j] + Ktemp1[h,i,j] *
Kbc[h,l,i];
       end;
     end;
   end;
   for i := 1 to N1[h] do
   begin
     for j := 1 to N1[h] do
     begin
       KccT[h,i,j] := KccT[h,i,j] + Kcc[h,i,j] - Ktemp2[h,i,j];
     end;
   end;
 end;
end;

procedure TForm2.Tukar (var nilai1, nilai2 : byte);
var tampung : byte;
begin
 tampung := nilai2;
```

```
 nilai2 := nilai1;
 nilai1 := tampung;
end;

procedure TForm2.TotalKccT1 ;
var h, i, j, j1, j2, l, l1, l2 : byte;
    z, y, aa, bb  : byte;
label 3;
begin
{pengurutan indeks awal}
z := 0;
  for h := 1 to NPART do
  begin
    aa := z;
    z := z + StrToInt (SG1.Cells [h-1,1]);
    for i := (aa + 1) to z do
    begin
      temp1[i] := StrToInt (SG4.Cells [h-1,i-aa]);
    end;
  end;
  for j := 1 to z - 1 do
  begin
    j2 := j;
    for j1 := j + 1 to z do
    if temp1[j2] > temp1[j1] then
      j2 := j1;
    Tukar (temp1[j], temp1[j2]);
  end;
{pengurutan indeks akhir}
bb := 2;
y  := 1;
  for j := bb to z do
  begin
    temp2[1] := temp1[1];
    if temp1[j] = temp1[j-1] then goto 3;
      y := y + 1;
      temp2[y] := temp1[j];
      bb := j + 1;
3:end;
{Dimensi TKccT}
NC := y;                {jumlah node pertemuan struktur}
NCj := NC * 3;          {jumlah DOF pertemuan struktur}
 for i := 1 to 3 * y do begin
   for j := 1 to 3 * y do begin
     TKccT [i,j] := 0;
   end;
 end;
 for h := 1 to NPART do begin
   for i := 1 to N1[h] do begin
     CCi1[i] := 0;
   end;
 end;
 for i := 1 to y do begin
   take[i] := 0;
 end;
 for i := 1 to ND do begin
```

```
    CC1[i] := 0;
    for j := 1 to ND do begin
      KTemp3 [i,j] := 0;
    end;
  end;
  for i := 1 to y do begin
    take[i] := temp2[i];   {indeks titik kumpul node pertemuan}
  end;
{perakitan matriks TKccT}
  for h := 1 to NPART do
  begin
    for i := 1 to StrToInt (SG1.Cells[h-1,1]) do
    begin
      j := StrToInt (SG4.Cells[h-1,i]);
      CCi1 [3 * i - 2] := 3 * j - 2;
      CCi1 [3 * i - 1] := 3 * j - 1;
      CCi1 [3 * i ] := 3 * j;
    end;
    for j1 := 1 to N1[h] do
    begin
      for j2 := 1 to N1[h] do
      begin
        KTemp3[CCi1[j1],CCi1[j2]] := KTemp3[CCi1[j1],CCi1[j2]] +
KccT[h,j1,j2];
      end;
    end;
  end;
  for i := 1 to y do
  begin
    j := Temp2[i];
    CC1 [3 * i - 2] := 3 * j - 2;
    CC1 [3 * i - 1] := 3 * j - 1;
    CC1 [3 * i ] := 3 * j;
  end;
  for l1 := 1 to NCj do
  begin
    for l2 := 1 to NCj do
    begin                    {total matriks KccT}
      TKccT[l1,l2] := TKccT[l1,l2] + KTemp3[CC1[l1],CC1[l2]];
    end;
  end;
end;

procedure TForm2.TotalKccT2 ;
var h, j1, j2 : byte;
begin
  for j1 := 1 to N1[1] do begin
    for j2 := 1 to N1[1] do begin
      TKccT[j1,j2] := 0;
    end;
  end;
  for h := 1 to 1 do
  begin
    for j1 := 1 to N1[1] do
    begin
      for j2 := 1 to N1[1] do
```

```
      begin
        TKccT[j1,j2] := TKccT[j1,j2] + SFF[h,j1,J2];
      end;
    end;
  end;
  NCj := N1[1]; {jumlah DOF bebas struktur}
end;

procedure TForm2.Button2Click(Sender: TObject);
begin
  form3.Show ;
  form2.Hide ;
end;

procedure TForm2.BitBtn1Click(Sender: TObject);
begin
  form1.Show;
  form2.Hide;
end;

end.
```

```
unit Unit3;

interface

uses
  Windows, Messages, SysUtils, Classes, Graphics, Controls, Forms,
Dialogs,
  StdCtrls, Grids, Buttons;

type
  TForm3 = class(TForm)
    Label1: TLabel;
    Label2: TLabel;
    Edit1: TEdit;
    Edit2: TEdit;
    SG1: TStringGrid;
    Label3: TLabel;
    Label4: TLabel;
    SG2: TStringGrid;
    Button1: TButton;
    Button2: TButton;
    BitBtn1: TBitBtn;
    procedure FormActivate(Sender: TObject);
    procedure Button1Click(Sender: TObject);
    procedure Button2Click(Sender: TObject);
    procedure BitBtn1Click(Sender: TObject);
  private
    { Private declarations }
  public
    { Public declarations }
    procedure DataBebanJoint;
    procedure DataBebanBatang;
    procedure DataBeban;
    procedure DataBebanStruktur;
    procedure InversTKccT;
    procedure MatRc;
    procedure PerpindahanNodePertemuan;
    procedure PerpindahanNodeDalam;
    procedure PerpindahanStruktur;
    procedure GayaBatang;
    procedure ReaksiTumpuan;
  end;

var
  Form3: TForm3;
  NLJ, NLM : byte;
  AMD                    : Array [1..6] of real;
  load1, load2           : Array [1..maxbyte] of real;
  Displacement, DJ, DjC, PC, PMc, PJc, Rc, PJ, LML : Array
[1..maxbyte] of real;
  PML                    : Array [1..6,1..maxbyte] of real;
  AM                     : Array [1..maxbyte,1..6] of real;
  DjB, PB, PMb, PJb, RCi, Kt3, DjBi, DjBj : Array
[1..10,1..maxbyte] of real;
  TKccTi, iTKccT, Temp4 : Array [1..maxbyte,1..maxbyte] of real;
```

```
  PBj, Kt2, PBi, DjCb, Temp3 : Array [1..10,1..1,1..maxbyte] of
real;
  Kt1, KTemp4, KTemp5   : Array [1..10,1..maxbyte,1..maxbyte] of
real;

implementation

uses Unit2, Unit1, Unit4;

{$R *.DFM}

procedure TForm3.FormActivate(Sender: TObject);
begin
  SG1.Cells [0,0] := 'Joint';
  SG1.Cells [1,0] := 'beban arah x';
  SG1.Cells [2,0] := 'beban arah y';
  SG1.Cells [3,0] := 'momen z';
  SG2.Cells [0,0] := 'batang ke';
  SG2.Cells [1,0] := 'AML1';
  SG2.Cells [2,0] := 'AML2';
  SG2.Cells [3,0] := 'AML3';
  SG2.Cells [4,0] := 'AML4';
  SG2.Cells [5,0] := 'AML5';
  SG2.Cells [6,0] := 'AML6';
end;

procedure TForm3.Button2Click(Sender: TObject);
begin
NLJ := StrToInt (edit1.text);
NLM := StrToInt (edit2.text);
  SG1.Rowcount := StrToInt (edit1.Text) + 1;
  SG2.Rowcount := StrToInt (edit2.Text) + 1;
end;

procedure TForm3.DataBebanJoint ;
var h, i, j : byte;
label 4;
begin
 for i := 1 to ND do begin
   PJ[i] := 0; PJc[i] := 0;
   for h := 1 to NPART do begin
     PJb[h,i] := 0;
   end
 end;
   if NLJ = 0 then goto 4 ;
 for i := 1 to NLJ do
 begin
   j := StrToInt (SG1.Cells [0,i]);  {beban pada joint}
   PJ[3 * j - 2] := StrToFloat (SG1.Cells [1,i]);
   PJ[3 * j - 1] := StrToFloat (SG1.Cells [2,i]);
   PJ[3 * j] := StrToFloat (SG1.Cells [3,i]);
 end;
 for i := 1 to NC do
 begin
   j := take[i];              {beban joint pada node pertemuan}
   PJc[3 * i - 2] := PJc[3 * i - 2] + PJ[3 * j - 2];
```

```
   PJc[3 * i - 1] := PJc[3 * i - 1] + PJ[3 * j - 1];
   PJc[3 * i]     := PJc[3 * i] + PJ[3 * j];
 end;
 for h := 1 to NPART do
 begin
   for i := 1 to StrToInt (Form2.SG2.Cells [h-1,1]) do
   begin                        {beban joint pada node dalam}
     j := StrToInt (Form2.SG5.Cells [h-1,i]);
     PJb[h,3 * j - 2] := PJ[3 * j - 2];
     PJb[h,3 * j - 1] := PJ[3 * j - 1];
     PJb[h,3 * j] := PJ[3 * j];
   end;
 end;
4 :
end;

procedure TForm3.DataBebanBatang ;
var h, i, j, l : byte;
    bb, aa, z, j1, j2, j3, k1, k2, k3 : byte;
label 5, 6;
begin
  for i := 1 to 6 do begin
    for j := 1 to M do begin
      PML[i,j] := 0; LML[M] := 0;
    end;
  end;
  for i := 1 to ND do begin
    AE[i] := 0; PMc[i] := 0;
    for h := 1 to NPART do begin
      PMb[h,i] := 0;
    end;
  end;
if NLM = 0 then goto 5;
 for i := 1 to NLM do
 begin              {beban pada batang}
   j := StrToInt (SG2.Cells [0,i]);
   PML[1,j] := StrToFloat (SG2.Cells [1,i]);
   PML[2,j] := StrToFloat (SG2.Cells [2,i]);
   PML[3,j] := StrToFloat (SG2.Cells [3,i]);
   PML[4,j] := StrToFloat (SG2.Cells [4,i]);
   PML[5,j] := StrToFloat (SG2.Cells [5,i]);
   PML[6,j] := StrToFloat (SG2.Cells [6,i]);
   LML[j] := 1;
 end;
 for i := 1 to M do
 begin              {beban pada ujung batang}
   if LML[i] = 0 then goto 6;
     j1 := 3 * JJ[i] - 2;
     j2 := 3 * JJ[i] - 1;
     j3 := 3 * JJ[i];
     k1 := 3 * JK[i] - 2;
     k2 := 3 * JK[i] - 1;
     k3 := 3 * JK[i];
    AE[j1] := AE[j1] - CX[i] * PML[1,i] + CY[i] * PML[2,i];
    AE[j2] := AE[j2] - CY[i] * PML[1,i] - CX[i] * PML[2,i];
    AE[j3] := AE[j3] - PML[3,i];
```

```
    AE[k1] := AE[k1] - CX[i] * PML[4,i] + CY[i] * PML[5,i];
    AE[k2] := AE[k2] - CY[i] * PML[4,i] - CX[i] * PML[5,i];
    AE[k3] := AE[k3] - PML[6,i];
 6 :
 end;
 for i := 1 to NC do
 begin
   j := take[i];   {beban pada ujung batang node pertemuan}
   PMc[3 * i - 2] := AE[3 * j - 2];
   PMc[3 * i - 1] := AE[3 * j - 1];
   PMc[3 * i]     := AE[3 * j];
 end;
 for h := 1 to NPART do
 begin
   for i := 1 to StrToInt (Form2.SG2.Cells [h-1,1]) do
   begin          {beban pada ujung batang node dalam}
     j := StrToInt (Form2.SG5.Cells [h-1,i]);
     PMb[h,3 * j - 2] := AE[3 * j - 2];
     PMb[h,3 * j - 1] := AE[3 * j - 1];
     PMb[h,3 * j] := AE[3 * j];
   end;
 end;
5 :
end;

procedure TForm3.DataBeban ;
var h, i, j : byte;
begin
 for i := 1 to ND do begin
   PC[i] := 0;
   for h := 1 to NPART do begin
     PB[h,i] := 0;
   end;
 end;
 for i := 1 to NC * 3 do
 begin              {beban total pada node pertemuan}
   PC[i] := PJc [i] + PMc[i]
 end;
 for h := 1 to NPART do
 begin              {beban total pada node dalam}
   for i := 1 to StrToInt (Form2.SG2.Cells [h-1,1]) do
   begin
     j := StrToInt (Form2.SG5.Cells [h-1,i]);
     PB[h,3 * i - 2] := PMb[h,3 * j - 2] + PJb[h,3 * j - 2];
     PB[h,3 * i - 1] := PMb[h,3 * j - 1] + PJb[h,3 * j - 1];
     PB[h,3 * i] := PMb[h,3 * j] + PJb[h,3 * j];
   end;
 end;
end;

procedure TForm3.DataBebanStruktur ;
var i, j, j1, j2, j3, k1, k2, k3, JR : byte;
label 6, 7, 8;
begin
  for i := 1 to 6 do begin
    for j := 1 to M do begin
```

```
      PML[i,j] := 0; LML[M] := 0;
    end;
  end;
  for i := 1 to ND do begin
    AE[i] := 0; PJ[i] := 0; PC[i] := 0;
  end;

NLJ := StrToInt (edit1.text);
  if NLJ = 0 then goto 6 ;
 for i := 1 to NLJ do
 begin           {beban pada joint}
   j := StrToInt (SG1.Cells [0,i]);
   PJ[3 * j - 2] := StrToFloat (SG1.Cells [1,i]);
   PJ[3 * j - 1] := StrToFloat (SG1.Cells [2,i]);
   PJ[3 * j] := StrToFloat (SG1.Cells [3,i]);
 end;
6 :
NLM := StrToInt (edit2.text);
if NLM = 0 then goto 7;
 for i := 1 to NLM do
 begin           {beban pada batang}
   j := StrToInt (SG2.Cells [0,i]);
   PML[1,j] := StrToFloat (SG2.Cells [1,i]);
   PML[2,j] := StrToFloat (SG2.Cells [2,i]);
   PML[3,j] := StrToFloat (SG2.Cells [3,i]);
   PML[4,j] := StrToFloat (SG2.Cells [4,i]);
   PML[5,j] := StrToFloat (SG2.Cells [5,i]);
   PML[6,j] := StrToFloat (SG2.Cells [6,i]);
   LML[j] := 1;
 end;
 for i := 1 to M do
 begin           {beban pada ujung batang}
   if LML[i] = 0 then goto 8;
     j1 := 3 * JJ[i] - 2;
     j2 := 3 * JJ[i] - 1;
     j3 := 3 * JJ[i];
     k1 := 3 * JK[i] - 2;
     k2 := 3 * JK[i] - 1;
     k3 := 3 * JK[i];
    AE[j1] := AE[j1] - CX[i] * PML[1,i] + CY[i] * PML[2,i];
    AE[j2] := AE[j2] - CY[i] * PML[1,i] - CX[i] * PML[2,i];
    AE[j3] := AE[j3] - PML[3,i];
    AE[k1] := AE[k1] - CX[i] * PML[4,i] + CY[i] * PML[5,i];
    AE[k2] := AE[k2] - CY[i] * PML[4,i] - CX[i] * PML[5,i];
    AE[k3] := AE[k3] - PML[6,i];
8 :
 end;
7 :
 for i := 1 to ND do
 begin
   JR := ID[i];
   PC[JR] := PJ[i] + AE[i];  {beban total}
 end;
end;

procedure TForm3.InversTKccT ;
```

```
var i, j, l : byte;
    PIVOT, AA : real;
begin
 for i := 1 to NCj do begin
   for j := 1 to NCj do begin
     iTKccT[i,j] := 0;
     TKccTi[i,j] := 0;
   end;
 end;
 for i := 1 to NCj do begin
   for j := 1 to NCj do begin
     TKccTi[i,j] := TKccT[i,j];
   end;
 end;
 for i := 1 to NCj do
 begin
   PIVOT := TKccTi[i,i];
   TKccTi[i,i] := 1;
   for j := 1 to NCj do
     TKccTi[i,j] := TKccTi[i,j] / PIVOT;
   for l := 1 to NCj do
   begin
     if l <> i then
     begin
       AA := TKccTi[l,i];
       TKccTi[l,i] := 0;
         for j := 1 to NCj do
         TKccTi[l,j] := TKccTi[l,j] - AA * TKccTi[i,j];
     end;
   end;
 end;
 for l := 1 to NCj do begin
   for j := 1 to NCj do begin
     iTKccT[l,j] := TKccTi[l,j];
   end;
 end;
end;

procedure TForm3.MatRc ;
var h, i, j, j1, j2, tk, g, gg, l : byte;
label 9;
begin
 for h := 1 to NPART do begin
   for l := 1 to ND do begin
     RCi[h,l] := 0; RC[l] := 0; PBj[h,1,l] := 0;
   end;
   for l := 1 to N2[h] do begin
     for j1 := 1 to N1[h] do begin
       Ktemp4[h,1,j1] := 0;
     end;
   end;
   for j1 := 1 to N1[h] do begin
     Ktemp5[h,1,j1] := 0;
   end;
 end;
 for h := 1 to NPART do
```

```
 begin
   for i := 1 to N2[h] do
   begin
     for j2 := 1 to N1[h] do
     begin
       for l := 1 to N2[h] do
       begin
         Ktemp4[h,l,j2] := Ktemp4[h,l,j2] + Kcb[h,i,j2] *
iKbb[h,l,i];
       end;
     end;
   end;
g := 0;
gg := 0;
   for i := 1 to StrToInt(form2.SG2.Cells [h-1,1]) do begin
     j := StrToInt (form2.SG5.Cells [h-1,i]);
     for l := (3 * j - 2) to (3 * j) do begin
       if JRLS[h,l] = 1 then begin
         g := g + 1;
         goto 9;
       end;
       gg := gg + 1;
       PBj[h,1,gg] := PB[h,gg+g];
9:   end;
   end;
   for i := 1 to N2[h] do
   begin
     for j1 := 1 to N1[h] do
     begin
       for l := 1 to 1 do
       begin
         Ktemp5[h,l,j1] := Ktemp5[h,l,j1] + Ktemp4[h,i,j1] *
PBj[h,l,i];
       end
     end;
   end;
 end;
 for h := 1 to NPART do
 begin
   for i := 1 to StrToInt (form2.SG1.Cells [h-1,1]) do
   begin
    RCi[h,3 * (StrToInt(form2.SG4.Cells [h-1,i])) - 2] :=
Ktemp5[h,1,3 * i - 2];
    RCi[h,3 * (StrToInt(form2.SG4.Cells [h-1,i])) - 1] :=
Ktemp5[h,1,3 * i - 1];
    RCi[h,3 * (StrToInt(form2.SG4.Cells [h-1,i]))] := Ktemp5[h,1,3
* i];
   end;
   for i := 1 to NC do
   begin
     tk := Take[i];
     Rc[3 * i - 2] := Rc[3 * i - 2] + RCi[h,3 * tk - 2];
     Rc[3 * i - 1] := Rc[3 * i - 1] + RCi[h,3 * tk - 1];
     Rc[3 * i] := Rc[3 * i] + RCi[h,3 * tk];
   end
 end;
```

```
end;

procedure TForm3.PerpindahanNodePertemuan ;
var i, j, l : byte;
begin
  for i := 1 to ND do begin
    load1[i] := 0;
    DjC[i] := 0;
    Displacement[i] := 0;
  end;
  for i := 1 to NC * 3 do
  begin
    load1[i] := PC[i] - Rc[i];
  end;
  for i := 1 to NC * 3 do
  begin
    for j := 1 to NC * 3 do
    begin
      DjC[j] := DjC[j] + iTKccT[i,j] * Load1[i];
    end;
  end;
  for i := 1 to NC do
  begin
    l := take[i];
      Displacement [3 * l - 2] := DjC [3 * i - 2];
      Displacement [3 * l - 1] := DjC [3 * i - 1];
      Displacement [3 * l] := DjC [3 * i];
  end;
end;

procedure TForm3.PerpindahanNodeDalam ;
var h, i, j, j1, j2, l, g, gg, x, y : byte;
label 10;
begin
 for h := 1 to NPART do begin
   for i := 1 to ND do begin
     PBi[h,1,i] := 0; DjCb[h,1,i] := 0; Kt2[h,1,i] := 0; Kt3[h,i]
:= 0;
     for j := 1 to ND do begin
        Kt1[h,i,j] := 0;
     end;
   end;
   for i := 1 to N2[h] do begin
     Temp3[h,1,i] := 0; Temp4[h,i] := 0;
     DjBi[h,i] := 0; DjBj[h,i] := 0; DjB[h,i] := 0;
   end;
 end;
 for h := 1 to NPART do
 begin
g := 0;
gg := 0;
   for i := 1 to StrToInt(form2.SG2.Cells [h-1,1]) do begin
     j := StrToInt (form2.SG5.Cells [h-1,i]);
     for l := (3 * j - 2) to (3 * j) do begin
       if JRLS[h,l] = 1 then begin
         g := g + 1;
```

```
          goto 10;
        end;
        gg := gg + 1;
        PBi[h,1,gg] := PB[h,gg+g];
10:   end;
    end;
    for l := 1 to StrToInt (Form2.SG1.Cells [h-1,1]) do
    begin
      j2 := StrToInt (Form2.SG4.Cells [h-1,l]);
      DjCb [h,1,3 * l - 2] := Displacement [3 * j2 - 2];
      DjCb [h,1,3 * l - 1] := Displacement [3 * j2 - 1];
      DjCb [h,1,3 * l] := Displacement [3 * j2];
    end;
 end;
 for h := 1 to NPART do
 begin
    for i := 1 to N2[h] do
    begin
      for j := 1 to N2[h] do
      begin
        for l := 1 to 1 do begin
          Temp3[h,l,i] := Temp3[h,l,i] + iKbb[h,j,i] * PBi[h,l,j];
        end;
      end;
      Temp4[h,i] := Temp4[h,i] + Temp3[h,1,i];
      DjBi[h,i] := DjBi[h,i] + Temp4[h,i];
    end;
 end;
 for h := 1 to NPART do
 begin
    for i := 1 to N2[h] do
    begin
      for j := 1 to N2[h] do
      begin
        for l := 1 to N1[h] do
        begin
          Kt1[h,l,j] := Kt1[h,l,j] + iKbb[h,i,j] * Kbc [h,l,i];
        end;
      end;
    end;
    for i := 1 to N1[h] do
    begin
      for j := 1 to N2[h] do
      begin
        for l := 1 to 1 do
        begin
          Kt2[h,l,j] := Kt2[h,l,j] + Kt1[h,i,j] * DjCb[h,l,i];
          Kt3[h,j] := Kt2[h,l,j];
        end;
      end;
    end;
    for i := 1 to N2[h] do
    begin
      DjBj[h,i] := DjBj[h,i] + Kt3[h,i];
    end;
 end;
```

```
 for h := 1 to NPART do
 begin
   for i := 1 to N2[h] do
   begin
     DjB[h,i] := DjBi[h,i] - DjBj[h,i];
   end;
 end;
 for h := 1 to NPART do
 begin
   x := 0; y := 0;
   for i := 1 to StrToInt (form2.SG2.Cells [h-1,1]) do
   begin
     x := StrToInt (form2.SG5.Cells [h-1,i]);
     for j := (3 * x - 2) to (3 * x) do
     begin
       if JRL[j] = 0 then
       begin
         y := y + 1;
         Displacement [j] := DjB [h,y];
       end;
     end;
   end;
 end;
end;

procedure TForm3.PerpindahanStruktur ;
var i, j, l, JE : byte;
label 11, 12;
begin
  for i := 1 to ND do begin
    load2[i] := 0; DjC[i] := 0;
  end;
  for i := 1 to NCj do
  begin
    load2[i] := PC[i];
  end;
  for i := 1 to NCj  do
  begin
    for j := 1 to NCj  do
    begin
      DjC[j] := DjC[j] + iTKccT[i,j] * load2[i];
    end;
  end;
  l := N + 1;
  for i := 1 to ND do
  begin
    JE := ND - i + 1;
    if JRL[JE] = 0 then goto 11;
      Displacement[JE] := 0;
      goto 12;
11 :  l := l - 1;
      Displacement[JE] := DjC[l];
12 :
  end;
end;
```

```
procedure TForm3.GayaBatang ;
var i, j : byte;
    J1, J2, J3, K1, K2, K3 : byte;
begin
  for i := 1 to ND do begin
    AR[i] := 0;
  end;
  for i := 1 to M do
  begin
    J1 := 3 * JJ[i] - 2;
    J2 := 3 * JJ[i] - 1;
    J3 := 3 * JJ[i];
    K1 := 3 * JK[i] - 2;
    K2 := 3 * JK[i] - 1;
    K3 := 3 * JK[i];
      SCM1 := E * A[i] / EL[i];
      SCM2 := 4 * E * ZI[i] / EL[i];
      SCM3 := 1.5 * SCM2 / EL[i];
      SCM4 := 2 * SCM3 / EL[i];
      AMD [1] := SCM1 * ((Displacement[J1] - Displacement[K1]) *
CX[i]
                 + (Displacement[J2] - Displacement[K2]) * CY[i]);
      AMD [2] := SCM4 * ((-(Displacement[J1] - Displacement[K1]))
* CY[i]
                 + ((Displacement[J2] - Displacement[K2]) *
CX[i]))
                 + SCM3 * (Displacement[J3] + Displacement[K3]);
      AMD [3] := SCM3 * ((-(Displacement[J1] - Displacement[K1]))
* CY[i]
                 + ((Displacement[J2] - Displacement[K2]) *
CX[i]))
                 + SCM2 * (Displacement[J3] + 0.5 *
Displacement[K3]);
      AMD [4] := - AMD[1];
      AMD [5] := - AMD[2];
      AMD [6] := SCM3 * ((-(Displacement[J1] - Displacement[K1]))
* CY[i]
                 + ((Displacement[J2] - Displacement[K2]) *
CX[i]))
                 + SCM2 * (0.5 * Displacement[J3] +
Displacement[K3]);
    for j := 1 to MD do
    begin
      AM [i,j] := PML[j,i] + AMD[j];
    end;
    if JRL[J1] = 1 then AR[J1] := AR[J1] + CX[i] * AMD[1] - CY[i]
* AMD[2];
    if JRL[J2] = 1 then AR[J2] := AR[J2] + CY[i] * AMD[1] + CX[i]
* AMD[2];
    if JRL[J3] = 1 then AR[J3] := AR[J3] + AMD[3];
    if JRL[K1] = 1 then AR[K1] := AR[K1] + CX[i] * AMD[4] - CY[i]
* AMD[5];
    if JRL[K2] = 1 then AR[K2] := AR[K2] + CY[i] * AMD[4] + CX[i]
* AMD[5];
    if JRL[K3] = 1 then AR[K3] := AR[K3] + AMD[6];
  end;
```

```
end;

procedure TForm3.ReaksiTumpuan;
var i : byte;
begin
  for i := 1 to ND do
  begin
    if JRL[i] = 1 then AR[i] := AR[i] - PJ[i] - AE[i] ;
  end;
end;

procedure TForm3.Button1Click(Sender: TObject);
var i, j : byte;
begin
form1.Variabel1;
form1.Data1;
form1.Pengekang;
form1.IndeksPerpindahan;
form2.PengekangSubStruktur;
form2.IndeksPerpindahanSubStruktur;
form2.MatKekakuanSubStruktur;
form2.DimensiMatSubStruktur;
  if StrToInt(form2.Edit1.text) = 1 then
    begin;
      form2.TotalKccT2;
      form3.DataBebanStruktur;
      form3.InversTKccT;
      form3.PerpindahanStruktur;
    end
  else
    begin
      form2.MatSubStruktur;
      form2.InversMatriksKbb;
      form2.MatKccT;
      form2.TotalKccT1;
      form3.DataBebanJoint;
      form3.DataBebanBatang;
      form3.DataBeban;
      form3.InversTKccT;
      form3.MatRc;
      form3.PerpindahanNodePertemuan;
      form3.PerpindahanNodeDalam;
    end;
form3.GayaBatang;
form3.ReaksiTumpuan;
  for i := 1 to NJ do
  begin
    form4.SG1.Cells [1,i] := FloatToStr (Displacement [3 * i -
2]);
    form4.SG1.Cells [2,i] := FloatToStr (Displacement [3 * i -
1]);
    form4.SG1.Cells [3,i] := FloatToStr (Displacement [3 * i]);
  end;
  for i := 1 to NRJ do
  begin
    j := StrToInt (form1.SG4.Cells [0,i]);
```

```
    form4.SG2.Cells [1,i] := FloatToStr (AR [3 * j - 2]);
    form4.SG2.Cells [2,i] := FloatToStr (AR [3 * j - 1]);
    form4.SG2.Cells [3,i] := FloatToStr (AR [3 * j]);
  end;
  for i := 1 to M do
  begin
    form4.SG3.Cells [1,i] := FloatToStr (AM [i,1]);
    form4.SG3.Cells [2,i] := FloatToStr (AM [i,2]);
    form4.SG3.Cells [3,i] := FloatToStr (AM [i,3]);
    form4.SG3.Cells [4,i] := FloatToStr (AM [i,4]);
    form4.SG3.Cells [5,i] := FloatToStr (AM [i,5]);
    form4.SG3.Cells [6,i] := FloatToStr (AM [i,6]);
  end;
form4.Show ;
form3.Hide ;
end;

procedure TForm3.BitBtn1Click(Sender: TObject);
begin
  form2.Show;
  form3.Hide;
end;

end.
```

```
unit Unit4;

interface

uses
  Windows, Messages, SysUtils, Classes, Graphics, Controls, Forms, Dialogs,
  Menus, Grids, StdCtrls;

type
  TForm4 = class(TForm)
    SG1: TStringGrid;
    MainMenu1: TMainMenu;
    File1: TMenuItem;
    MulaiBaru1: TMenuItem;
    Exit1: TMenuItem;
    SG2: TStringGrid;
    SG3: TStringGrid;
    Label1: TLabel;
    Label2: TLabel;
    Label3: TLabel;
    View1: TMenuItem;
    Hasil1: TMenuItem;
    AnalisisUlang1: TMenuItem;
    Edit1: TMenuItem;
    UbahData1: TMenuItem;
    SaveDialog1: TSaveDialog;
    SimpanData1: TMenuItem;
    ListBox1: TListBox;
    procedure FormActivate(Sender: TObject);
    procedure Exit1Click(Sender: TObject);
    procedure MulaiBaru1Click(Sender: TObject);
    procedure AnalisisUlang1Click(Sender: TObject);
    procedure Hasil1Click(Sender: TObject);
    procedure UbahData1Click(Sender: TObject);
    procedure SimpanData1Click(Sender: TObject);
  private
    { Private declarations }
  public
    { Public declarations }
  end;

var
  Form4: TForm4;

implementation

uses Unit1,Unit2,Unit3, Unit5;

{$R *.DFM}

procedure TForm4.FormActivate(Sender: TObject);
var i : byte;
begin
  SG1.RowCount := NJ + 1;
  SG2.RowCount := NRJ + 1;
```

```
 SG3.RowCount := M + 1;
 for i := 1 to NJ do
 begin
   SG1.Cells [0,0] := 'Joint ke-';
   SG1.Cells [1,0] := 'Arah x';
   SG1.Cells [2,0] := 'Arah y';
   SG1.Cells [3,0] := 'rotasi z';
   SG1.Cells [0,i] := IntToStr (i);
 end;
 for i := 1 to NRJ do
 begin
   SG2.Cells [0,0] := 'Joint ke-';
   SG2.Cells [1,0] := 'Arah x';
   SG2.Cells [2,0] := 'Arah y';
   SG2.Cells [3,0] := 'rotasi z';
   SG2.Cells [0,i] := form1.SG4.Cells [0,i];
 end;
 for i := 1 to M do
 begin
   SG3.Cells [0,0] := 'Batang ke-';
   SG3.Cells [1,0] := 'AM1';
   SG3.Cells [2,0] := 'AM2';
   SG3.Cells [3,0] := 'AM3';
   SG3.Cells [4,0] := 'AM4';
   SG3.Cells [5,0] := 'AM5';
   SG3.Cells [6,0] := 'AM6';
   SG3.Cells [0,i] := IntToStr (i);
 end;
end;

procedure TForm4.MulaiBaru1Click(Sender: TObject);
var i,j : byte;
begin
form1.Edit1.Text := ''; form1.Edit2.Text := ''; form1.Edit3.Text := '';
form1.Edit4.Text := ''; form1.Edit5.Text := '';
for i := 1 to NJ do begin
  form1.SG1.Cells [1,i] := '';
  form1.SG1.Cells [2,i] := '';
end;
for i := 1 to M do begin
  form1.SG2.Cells [1,i] := '';
  form1.SG2.Cells [2,i] := '';
  form1.SG3.Cells [1,i] := '';
  form1.SG3.Cells [2,i] := '';
end;
for i := 1 to NRJ do begin
  form1.SG4.Cells [0,i] := '';
  form1.SG4.Cells [1,i] := '';
  form1.SG4.Cells [2,i] := '';
  form1.SG4.Cells [3,i] := '';
end;
form2.Edit1.Text := '';
for i := 1 to NPART do begin
  form2.SG1.Cells [i-1,1] := '';
  form2.SG2.Cells [i-1,1] := '';
```

```
  form2.SG3.Cells [i-1,1] := '';
  for j := 1 to 149 do begin
    form2.SG4.Cells [i-1,j] := '';
    form2.SG5.Cells [i-1,j] := '';
    form2.SG6.Cells [i-1,j] := '';
  end;
end;
form3.Edit1.Text := ''; form3.Edit2.Text := '';
for i := 1 to NLJ do begin
  for j := 0 to 3 do begin
    form3.SG1.Cells [j,i] := '';
  end;
end;
for i := 1 to NLM do begin
  for j := 0 to 6 do begin
    form3.SG2.Cells [j,i] := '';
  end;
end;
  form1.Show ;
  form4.Hide ;
end;

procedure TForm4.AnalisisUlang1Click(Sender: TObject);
var i, j : byte;
begin
form2.Edit1.Text := '';
for i := 1 to NPART do begin
  form2.SG1.Cells [i-1,1] := '';
  form2.SG2.Cells [i-1,1] := '';
  form2.SG3.Cells [i-1,1] := '';
  for j := 1 to 149 do begin
    form2.SG4.Cells [i-1,j] := '';
    form2.SG5.Cells [i-1,j] := '';
    form2.SG6.Cells [i-1,j] := '';
  end;
end;
  form2.Show;
  form4.Hide;
end;

procedure TForm4.Hasil1Click(Sender: TObject);
var sent : string;
    i, j, j1, j2, j3, l : byte;
begin
  form5.ListBox1.Items.Clear ;
  form5.ListBox1.Items.Add('Pemograman Portal Bidang dengan Sub Struktur');
  form5.ListBox1.Items.Add('');
  form5.ListBox1.Items.Add('Data Struktur :');
    sent := format ('%14.4f',[E]);
  form5.ListBox1.Items.Add('Modulus Elastisitas Bahan =' + sent);
    sent := format ('%3d',[NJ]);
  form5.ListBox1.Items.Add('Jumlah Titik Kumpul =' + sent);
  form5.ListBox1.Items.Add('Koordinat Titik Kumpul');
  form5.ListBox1.Items.Add('Joint' + '       ' + 'X' + '           ' + 'Y');
  for i := 1 to NJ do begin
```

```
  sent := format ('%3d %12s %12s',[i,form1.SG1.Cells[1,i],
        form1.SG1.Cells[2,i]]);
form5.ListBox1.Items.Add(sent);
end;
  sent := format ('%3d',[M]);
form5.ListBox1.Items.Add('Jumlah Batang Struktur =' + sent);
form5.ListBox1.Items.Add('Data Batang');
form5.ListBox1.Items.Add('Nomor'+' '+'ujung i'+' '+'ujung j'+'    '+'Luas(A)'
                    +'       '+'Inersia(I)'+'       '+'panjang(L)');
for i := 1 to M do begin
    sent := format ('%3d   %3d    %3d    %14.8e   %14.8e   %14.8e',
              [i,JJ[i],JK[i],A[i],ZI[i],EL[i]]);
form5.ListBox1.Items.Add(sent);
end;
  sent := format ('%3d',[NRJ]);
form5.ListBox1.Items.Add('Jumlah Pengekang Tumpuan =' + sent);
form5.ListBox1.Items.Add('Data Pengekang Tumpuan');
form5.ListBox1.Items.Add('Joint'+' '+'arah x'+' '+'arah y'+' '+'rotasi z');
for i := 1 to NRJ do begin
  sent := format('%3d     %1d     %1d     %1d',
            [K[i],JRL[3 * k[i] -2],JRL[3 * k[i] -1],JRL[3 * k[i]]]);
form5.ListBox1.Items.Add(sent);
end;
form5.ListBox1.Items.Add('');
form5.ListBox1.Items.Add('Data Sub Struktur');
  sent := format ('%2d',[NPART]);
form5.ListBox1.Items.Add('Jumlah Sub Struktur yang Direncanakan = ' + sent);
if NPART = 1 then form5.ListBox1.Items.Add
              ('Analisis Sebagai Struktur Utuh (tanpa Sub Struktur)')
else begin
  for i := 1 to NPART do
  begin
    j1 := StrToInt(form2.SG1.Cells [i-1,1]);
    j2 := StrToInt(form2.SG2.Cells [i-1,1]);
    j3 := StrToInt(form2.SG3.Cells [i-1,1]);
      sent := format ('%2d',[i]);
    form5.ListBox1.Items.Add('Sub Struktur'+ sent);
      sent := format ('%3d',[j1]);
    form5.ListBox1.Items.Add('Jumlah Node Pertemuan = '+ sent);
      sent := format ('%3d',[j2]);
    form5.ListBox1.Items.Add('Jumlah Node Dalam = '+ sent);
      sent := format ('%3d',[j3]);
    form5.ListBox1.Items.Add('Jumlah Batang = '+ sent);
    form5.ListBox1.Items.Add('Indeks Sub Struktur');
    form5.ListBox1.Items.Add('Node Pertemuan'+'  '+'Node Dalam'+'  '+'Batang');
     l := j1;
     if j2 > l then l := j2
     else if j3 > l then l := j3;
     for j := 1 to l do
     begin
     sent := format ('   %3s          %3s      %3s',
     [form2.SG4.Cells[i-1,j],form2.SG5.Cells[i-1,j],form2.SG6.Cells[i-1,j]]);
     form5.ListBox1.Items.Add(sent);
     end;
  end;
```

```
end;
form5.ListBox1.Items.Add('');
form5.ListBox1.Items.Add('Data Beban');
  sent := format ('%3d',[NLJ]);
form5.ListBox1.Items.Add('Jumlah Titik Kumpul yang Terbebani = '+ sent);
if NLJ > 0 then begin
form5.ListBox1.Items.Add('Gaya di Titik Kumpul');
form5.ListBox1.Items.Add('Joint'+'    '+'arah x'+'          '+'arah y'
                  +'    '+'rotasi z');
for i := 1 to NLJ do
begin
  j := StrToInt (form3.SG1.Cells [0,i]);
  sent := format ('%3d    %14.8e  %14.8e  %14.8e',[j,PJ[3 * j - 2],PJ[3 * j - 1]
          ,PJ[3 * j]]);
  form5.ListBox1.Items.Add(sent);
end;
end;
  sent := format ('%3d',[NLM]);
form5.ListBox1.Items.Add('Jumlah Batang yang Terbebani = '+ sent);
if NLM > 0 then begin
form5.ListBox1.Items.Add('Gaya di Ujung Batang Terkekang Akibat Beban');
form5.ListBox1.Items.Add('Batang'+'  '+'AML1'+'    '+'AML2'+'    '+
        'AML3'+'    '+'AML4'+'    '+'AML5'+'    '+'AML6');
for i := 1 to NLM do
  begin
  j := StrToInt (form3.SG2.Cells [0,i]);
  sent := format ('%3d  %5.4e %5.4e %5.4e %5.4e %5.4e %5.4e',
          [j,PML[1,j],PML[2,j],PML[3,j],PML[4,j],PML[5,j],PML[6,j]]);
  form5.ListBox1.Items.Add(sent);
  end;
end;
form5.ListBox1.Items.Add('');
form5.ListBox1.Items.Add('Hasil');
form5.ListBox1.Items.Add('');
form5.ListBox1.Items.Add('Perpindahan Titik Kumpul(Displacement)');
form5.ListBox1.Items.Add('Joint'+'  '+'arah x'+'      '+
                  'arah y'+'    '+'rotasi z');
for i := 1 to NJ do
begin
  sent := format ('%3d  %9.8e  %9.8e  %9.8e',[i,Displacement[3*i-2],
          Displacement[3*i-1],Displacement[3*i]]);
form5.ListBox1.Items.Add(sent);
end;
form5.ListBox1.Items.Add('');
form5.ListBox1.Items.Add('Gaya Ujung Batang');
form5.ListBox1.Items.Add('Batang'+'  '+'AM1'+'    '+'AM2'+'    '+
          'AM3'+'    '+'AM4'+'    '+'AM5'+'    '+'AM6');
for i := 1 to M do
begin
  sent := format ('%3d  %5.4e %5.4e %5.4e %5.4e %5.4e %5.4e',
          [i,AM[i,1],AM[i,2],AM[i,3],AM[i,4],AM[i,5],AM[i,6]]);
form5.ListBox1.Items.Add(sent);
end;
form5.ListBox1.Items.Add('');
form5.ListBox1.Items.Add('Reaksi Tumpuan');
```

```
 form5.ListBox1.Items.Add('Joint'+'    '+'arah x'+'          '+
                    'arah y'+'       '+'rotasi z');
 for i := 1 to NRJ do
 begin
  sent := format ('%3d  %-9.8e  %-9.8e  %-9.8e',[K[i],AR[3 * k[i] -2],
            AR[3 * k[i] -1],AR[3 * k[i]]]);
 form5.ListBox1.Items.Add(sent);
 end;
 form5.ListBox1.Items.Add('');
 form5.ListBox1.Items.Add('SELESAI');
 form5.Show;
end;

procedure TForm4.UbahData1Click(Sender: TObject);
begin
 form1.Show;
 form4.Hide;
end;

procedure TForm4.SimpanData1Click(Sender: TObject);
var i, j : byte;
begin
  SaveDialog1.Title    := 'save data struktur';
  SaveDialog1.FileName  := 'Struktur1';
  SaveDialog1.Filter    := 'Data (*.ron)|*.ron' ;
  SaveDialog1.DefaultExt := 'Data (*.ron)|*.ron';
  if SaveDialog1.Execute then begin
   listbox1.Items.Add (FloatToStr(E));
   listbox1.Items.Add (IntToStr(M));
   listbox1.Items.Add (IntToStr(NJ));
   listbox1.Items.Add (IntToStr(NR));
   listbox1.Items.Add (IntToStr(NRJ));
   for i := 1 to NJ do begin
    listbox1.Items.Add (form1.SG1.Cells[1,i]);
   end;
   for i := 1 to NJ do begin
    listbox1.Items.Add (form1.SG1.Cells[2,i]);
   end;
   for i := 1 to NRJ do begin
    listbox1.Items.Add (IntToStr(K[i]));
   end;
   for i := 1 to NRJ do begin
    listbox1.Items.Add (format('%1d',[JRL[3 * k[i] -2]]));
   end;
   for i := 1 to NRJ do begin
    listbox1.Items.Add (format('%1d',[JRL[3 * k[i] -1]]));
   end;
   for i := 1 to NRJ do begin
    listbox1.Items.Add (format('%1d',[JRL[3 * k[i]]]));
   end;
   for i := 1 to M do begin
    listbox1.Items.add (FloatToStr(A[i]));
   end;
   for i := 1 to M do begin
    listbox1.Items.add (FloatToStr(ZI[i]));
```

```
end;
for i := 1 to M do begin
  listbox1.Items.add (IntToStr(JJ[i]));
end;
for i := 1 to M do begin
  listbox1.Items.add (IntToStr(JK[i]));
end;
  listbox1.Items.Add (IntToStr(NPART));
for i := 1 to NPART do begin
  listbox1.Items.Add (form2.SG1.Cells [i-1,1]);
end;
for i := 1 to NPART do begin
  listbox1.Items.Add (form2.SG2.Cells [i-1,1]);
end;
for i := 1 to NPART do begin
  listbox1.Items.Add (form2.SG3.Cells [i-1,1]);
end;
for i := 1 to NPART do begin
  for j := 1 to StrToInt (form2.SG1.Cells [i-1,1]) do begin
    listbox1.Items.Add (form2.SG4.Cells [i-1,j]);
  end;
end;
for i := 1 to NPART do begin
  for j := 1 to StrToInt (form2.SG2.Cells [i-1,1]) do begin
    listbox1.Items.Add (form2.SG5.Cells [i-1,j]);
  end;
end;
for i := 1 to NPART do begin
  for j := 1 to StrToInt (form2.SG3.Cells [i-1,1]) do begin
    listbox1.Items.Add (form2.SG6.Cells [i-1,j]);
  end;
end;
  listbox1.Items.Add (IntToStr(NLJ));
  listbox1.Items.Add (IntToStr(NLM));
for i := 1 to NLJ do begin
  listbox1.Items.Add (form3.SG1.Cells [0,i]);
end;
for i := 1 to NLJ do begin
  listbox1.Items.Add (form3.SG1.Cells [1,i]);
end;
for i := 1 to NLJ do begin
  listbox1.Items.Add (form3.SG1.Cells [2,i]);
end;
for i := 1 to NLJ do begin
  listbox1.Items.Add (form3.SG1.Cells [3,i]);
end;
for i := 1 to NLM do begin
  listbox1.Items.Add (form3.SG2.Cells [0,i]);
end;
for i := 1 to NLM do begin
  listbox1.Items.Add (form3.SG2.Cells [1,i]);
end;
for i := 1 to NLM do begin
  listbox1.Items.Add (form3.SG2.Cells [2,i]);
end;
```

```
  for i := 1 to NLM do begin
   listbox1.Items.Add (form3.SG2.Cells [3,i]);
  end;
  for i := 1 to NLM do begin
   listbox1.Items.Add (form3.SG2.Cells [4,i]);
  end;
  for i := 1 to NLM do begin
   listbox1.Items.Add (form3.SG2.Cells [5,i]);
  end;
  for i := 1 to NLM do begin
   listbox1.Items.Add (form3.SG2.Cells [6,i]);
  end;
 listbox1.items.SaveToFile(SaveDialog1.FileName);
 end;
end;

procedure TForm4.Exit1Click(Sender: TObject);
begin
 Form1.Close ;
end;

end.
```

```
unit Unit5;

interface

uses
  Windows, Messages, SysUtils, Classes, Graphics, Controls, Forms,
Dialogs,
  StdCtrls, Buttons;

type
  TForm5 = class(TForm)
    ListBox1: TListBox;
    SaveDialog1: TSaveDialog;
    BitBtn1: TBitBtn;
    procedure BitBtn1Click(Sender: TObject);
  private
    { Private declarations }
  public
    { Public declarations }
  end;

var
  Form5: TForm5;

implementation

{$R *.DFM}

procedure TForm5.BitBtn1Click(Sender: TObject);
begin
SaveDialog1.Title      := 'Print To File';
SaveDialog1.FileName   := 'Struktur1';
SaveDialog1.Filter     := 'Text files (*.txt)|*.TXT';
SaveDialog1.DefaultExt := 'Text files (*.txt)|*.TXT';
if SaveDialog1.Execute then
   ListBox1.Items.SaveToFile (SaveDialog1.FileName);
end;

end.
```

aman Portal Bidang dengan Sub Struktur

truktur :
s Elastisitas Bahan = 200000,0000
Titik Kumpul = 8
nat Titik Kumpul

X	Y
0	0
8000	0
0	5000
8000	5000
0	10000
8000	10000
0	15000
8000	15000

Batang Struktur = 9
atang

ujung i	ujung j	Luas(A)	Inersia(I)	panjang(L)
1	3	24494,7540	50000000,0000	5000,0000
2	4	24494,7540	50000000,0000	5000,0000
3	4	38400,0000	200000000,0000	8000,0000
3	5	24494,7540	50000000,0000	5000,0000
4	6	24494,7540	50000000,0000	5000,0000
5	6	38400,0000	200000000,0000	8000,0000
5	7	24494,7540	50000000,0000	5000,0000
6	8	24494,7540	50000000,0000	5000,0000
7	8	38400,0000	200000000,0000	8000,0000

Pengekang Tumpuan = 2
engekang Tumpuan

arah x	arah y	rotasi z
1	1	1
1	1	1

ub Struktur
Sub Struktur yang Direncanakan = 2
ruktur 1
Node Pertemuan = 2
Node Dalam = 4
Batang = 5
Sub Struktur

ertemuan	Node Dalam	Batang
	1	1
	2	2
	3	3
	4	4

ruktur 2
Node Pertemuan = 2
Node Dalam = 2
Batang = 4
Sub Struktur

ertemuan	Node Dalam	Batang
	7	6
	8	7
		8
		9

```
)eban
ı Titik Kumpul yang Terbebani =    3
li Titik Kumpul
      arah x           arah y          rotasi z
        3000,0000           0,0000      2000000,0000
        3000,0000           0,0000      2000000,0000
        3000,0000           0,0000      2000000,0000
ı Batang yang Terbebani =    0
```

```
ıdahan Titik Kumpul(Displacement)
     arah x           arah y           rotasi z
0,0000000E+000   0,0000000E+000   0,0000000E+000
0,0000000E+000   0,0000000E+000   0,0000000E+000
6,0479811E+000   7,5685250E-003  -5,0940172E-004
6,0463557E+000  -7,5685250E-003  -5,7833303E-004
1,1388546E+001   1,0988392E-002  -3,1687039E-004
1,1386945E+001  -1,0988392E-002  -3,6785628E-004
1,4082098E+001   1,1808598E-002  -6,0197267E-005
1,4080724E+001  -1,1808598E-002  -1,6000843E-004
```

```
jung Batang
      AM1          AM2          AM3          AM4          AM5          AM6
-7,569E-003  4,583E+003  1,248E+007  7,569E-003 -4,583E+003  1,044E+007
 7,569E-003  4,417E+003  1,220E+007 -7,569E-003 -4,417E+003  9,885E+006
 1,560E+003 -4,079E+003 -1,597E+007 -1,560E+003  4,079E+003 -1,666E+007
-3,420E-003  3,144E+003  7,475E+006  3,420E-003 -3,144E+003  8,245E+006
 3,420E-003  2,856E+003  6,719E+006 -3,420E-003 -2,856E+003  7,561E+006
 1,537E+003 -2,568E+003 -1,002E+007 -1,537E+003  2,568E+003 -1,053E+007
-8,202E-004  1,681E+003  3,689E+006  8,202E-004 -1,681E+003  4,715E+006
 8,202E-004  1,319E+003  2,882E+006 -8,202E-004 -1,319E+003  3,714E+006
 1,319E+003 -8,257E+002 -2,804E+006 -1,319E+003  8,257E+002 -3,802E+006
```

```
 Tumpuan
     arah x           arah y          rotasi z
-4,5834978E+003  -7,5685250E-003   1,2477548E+007
-4,4165022E+003   7,5685250E-003   1,2197922E+007
```

I

Kasus 2

Perhitungan Beban Titik Kumpul Ekivalen

Batang 2 :

AML(1,I) = 0

$$AML(2,I) = \frac{15}{2} = 7{,}5$$

$$AML(3,I) = \frac{15 \times 5}{8} = 9{,}375$$

AML(4,I) = 0

$$AML(5,I) = \frac{15}{2} = 7{,}5$$

$$AML(6,I) = -\frac{15 \times 5}{8} = -9{,}375$$

Batang 5 :

AML(1,I) = 0

$$AML(2,I) = \frac{20 \times 5}{2} = 50$$

$$AML(3,I) = \frac{20 \times 5^2}{12} = 41{,}6667$$

AML(4,I) = 0

$$AML(5,I) = \frac{20 \times 5}{2} = 50$$

$$AML(6,I) = -\frac{20 \times 5^2}{12} = -41{,}6667$$

aman Portal Bidang dengan Sub Struktur

truktur :
s Elastisitas Bahan = 10000000,0000
Titik Kumpul = 7
nat Titik Kumpul

X	Y
0	0
5	0
10	0
0	5
5	5
5	10
10	10

Batang Struktur = 6
atang

ujung i	ujung j	Luas(A)	Inersia(I)	panjang(L)
1	4	6,2500000E-002	3,2552083E-004	5,0000000E+000
4	5	6,2500000E-002	3,2552083E-004	5,0000000E+000
2	5	6,2500000E-002	3,2552083E-004	5,0000000E+000
5	6	6,2500000E-002	3,2552083E-004	5,0000000E+000
6	7	6,2500000E-002	3,2552083E-004	5,0000000E+000
3	7	6,2500000E-002	3,2552083E-004	1,0000000E+001

Pengekang Tumpuan = 3
engekang Tumpuan

arah x	arah y	rotasi z
1	1	1
1	1	0
1	1	1

ub Struktur
Sub Struktur yang Direncanakan = 1
is Sebagai Struktur Utuh (tanpa Sub Struktur)

eban
Titik Kumpul yang Terbebani = 2
i Titik Kumpul

arah x	arah y	rotasi z
1,0000000E+001	0,0000000E+000	0,0000000E+000
-7,0000000E+000	0,0000000E+000	0,0000000E+000

Batang yang Terbebani = 2
i Ujung Batang Terkekang Akibat Beban

AML1	AML2	AML3	AML4	AML5	AML6
0,000E+000	7,500E+000	9,375E+000	0,000E+000	7,500E+000	-9,375E+000
0,000E+000	5,000E+001	4,167E+001	0,000E+000	5,000E+001	-4,167E+001

dahan Titik Kumpul(Displacement)

arah x	arah y	rotasi z
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	-3,8922505E-003
0,0000000E+000	0,0000000E+000	0,0000000E+000
3,7230805E-003	-7,2174278E-005	-3,8207909E-003
3,6285083E-003	-4,7537285E-004	5,6073959E-003
1,4261255E-002	-9,0291998E-004	-1,0416500E-002
1,4336037E-002	-7,4490574E-004	1,4887247E-002

jung Batang

AM1	AM2	AM3	AM4	AM5	AM6
9,022E+000	-1,822E+000	-2,066E+000	-9,022E+000	1,822E+000	-7,041E+000
1,182E+001	9,022E+000	7,041E+000	-1,182E+001	5,978E+000	5,676E-001
5,942E+001	2,474E+000	-9,652E-015	-5,942E+001	-2,474E+000	1,237E+001
5,344E+001	-9,348E+000	-1,294E+001	-5,344E+001	9,348E+000	-3,380E+001
9,348E+000	5,344E+001	3,380E+001	-9,348E+000	4,656E+001	-1,658E+001
4,656E+001	2,348E+000	6,892E+000	-4,656E+001	-2,348E+000	1,658E+001

Tumpuan

arah x	arah y	rotasi z
1,8215302E+000	9,0217848E+000	-2,0663314E+000
2,4738663E+000	5,9421606E+001	0,0000000E+000
2,3476639E+000	4,6556609E+001	6,8922108E+000

I

```
:aman Portal Bidang dengan Sub Struktur

;truktur :
is Elastisitas Bahan = 10000000,0000
i Titik Kumpul =  7
.nat Titik Kumpul
        X             Y
          0             0
          5             0
         10             0
          0             5
          5             5
          5            10
         10            10
i Batang Struktur =  6
)atang
ujung i ujung j     Luas(A)          Inersia(I)          panjang(L)
   1       4      6,2500000E-002    3,2552083E-004    5,0000000E+000
   4       5      6,2500000E-002    3,2552083E-004    5,0000000E+000
   2       5      6,2500000E-002    3,2552083E-004    5,0000000E+000
   5       6      6,2500000E-002    3,2552083E-004    5,0000000E+000
   6       7      6,2500000E-002    3,2552083E-004    5,0000000E+000
   3       7      6,2500000E-002    3,2552083E-004    1,0000000E+001
. Pengekang Tumpuan =  3
'engekang Tumpuan
arah x arah y rotasi z
    1       1       1
    1       1       0
    1       1       1

ub Struktur
 Sub Struktur yang Direncanakan =  2
ruktur 1
 Node Pertemuan =   1
 Node Dalam =   2
 Batang =   2
 Sub Struktur
ertemuan  Node Dalam  Batang
                1         1
                4         2
ruktur 2
 Node Pertemuan =   1
 Node Dalam =   4
 Batang =   4
 Sub Struktur
ertemuan  Node Dalam  Batang
                2         3
                3         4
                6         5
                7         6

eban
 Titik Kumpul yang Terbebani =   2
i Titik Kumpul
     arah x           arah y          rotasi z
  1,0000000E+001   0,0000000E+000   0,0000000E+000
 -7,0000000E+000   0,0000000E+000   0,0000000E+000
```

ı Batang yang Terbebani = 2

di Ujung Batang Terkekang Akibat Beban

g AML1	AML2	AML3	AML4	AML5	AML6
0,000E+000	7,500E+000	9,375E+000	0,000E+000	7,500E+000	-9,375E+000
0,000E+000	5,000E+001	4,167E+001	0,000E+000	5,000E+001	-4,167E+001

ıdahan Titik Kumpul(Displacement)

arah x	arah y	rotasi z
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	-3,8922505E-003
0,0000000E+000	0,0000000E+000	0,0000000E+000
3,7230805E-003	-7,2174278E-005	-3,8207909E-003
3,6285083E-003	-4,7537285E-004	5,6073959E-003
-1,4261255E-002	-9,0291998E-004	-1,0416500E-002
-1,4336037E-002	-7,4490574E-004	1,4887247E-002

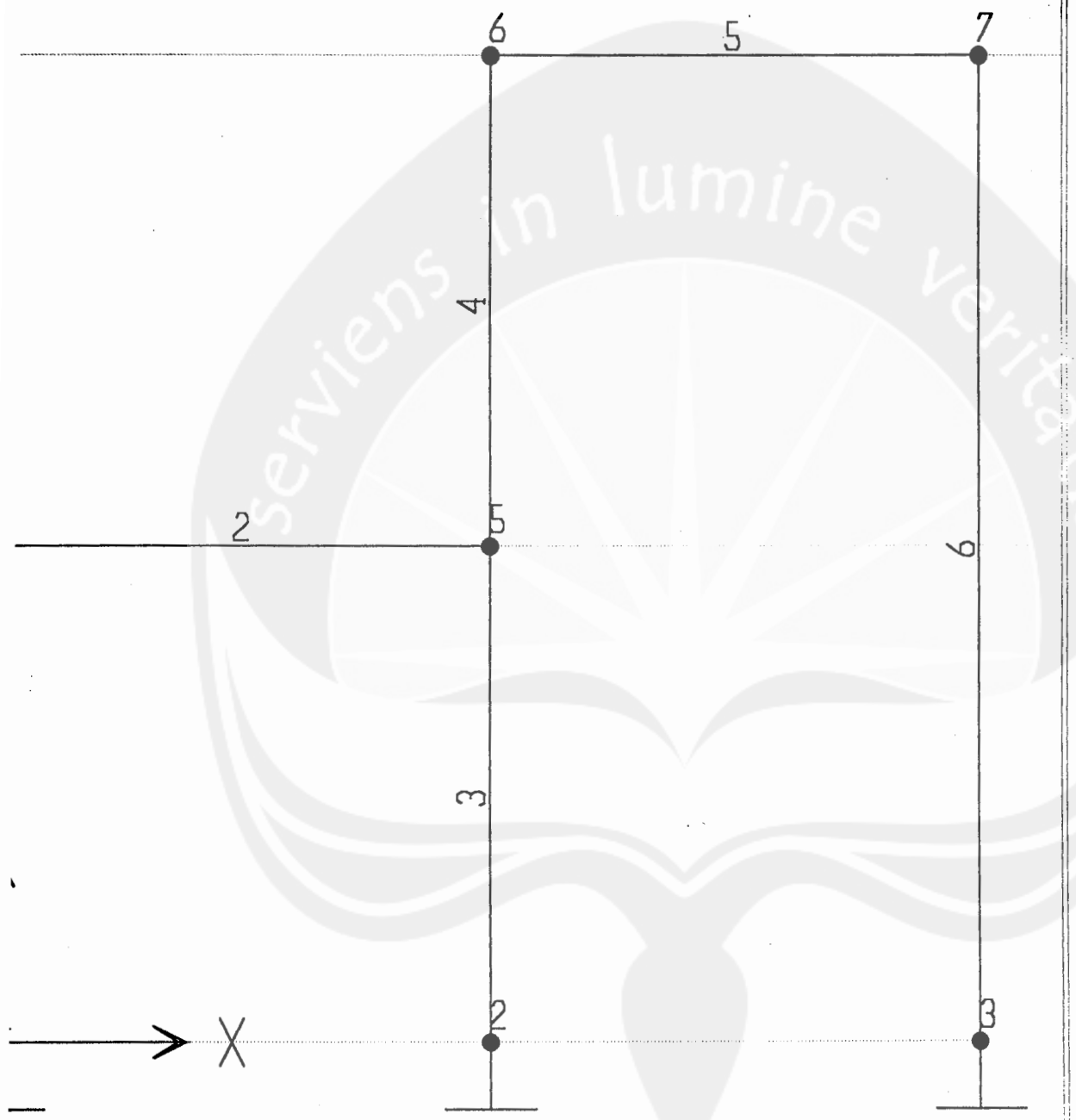
Ujung Batang

g AM1	AM2	AM3	AM4	AM5	AM6
9,022E+000	-1,822E+000	-2,066E+000	-9,022E+000	1,822E+000	-7,041E+000
1,182E+001	9,022E+000	7,041E+000	-1,182E+001	5,978E+000	5,676E-001
5,942E+001	2,474E+000	8,515E-016	-5,942E+001	-2,474E+000	1,237E+001
5,344E+001	-9,348E+000	-1,294E+001	-5,344E+001	9,348E+000	-3,380E+001
9,348E+000	5,344E+001	3,380E+001	-9,348E+000	4,656E+001	-1,658E+001
4,656E+001	2,348E+000	6,892E+000	-4,656E+001	-2,348E+000	1,658E+001

ı Tumpuan

arah x	arah y	rotasi z
1,8215302E+000	9,0217848E+000	-2,0663314E+000
-2,4738663E+000	5,9421606E+001	0,0000000E+000
-2,3476639E+000	4,6556609E+001	6,8922108E+000

AI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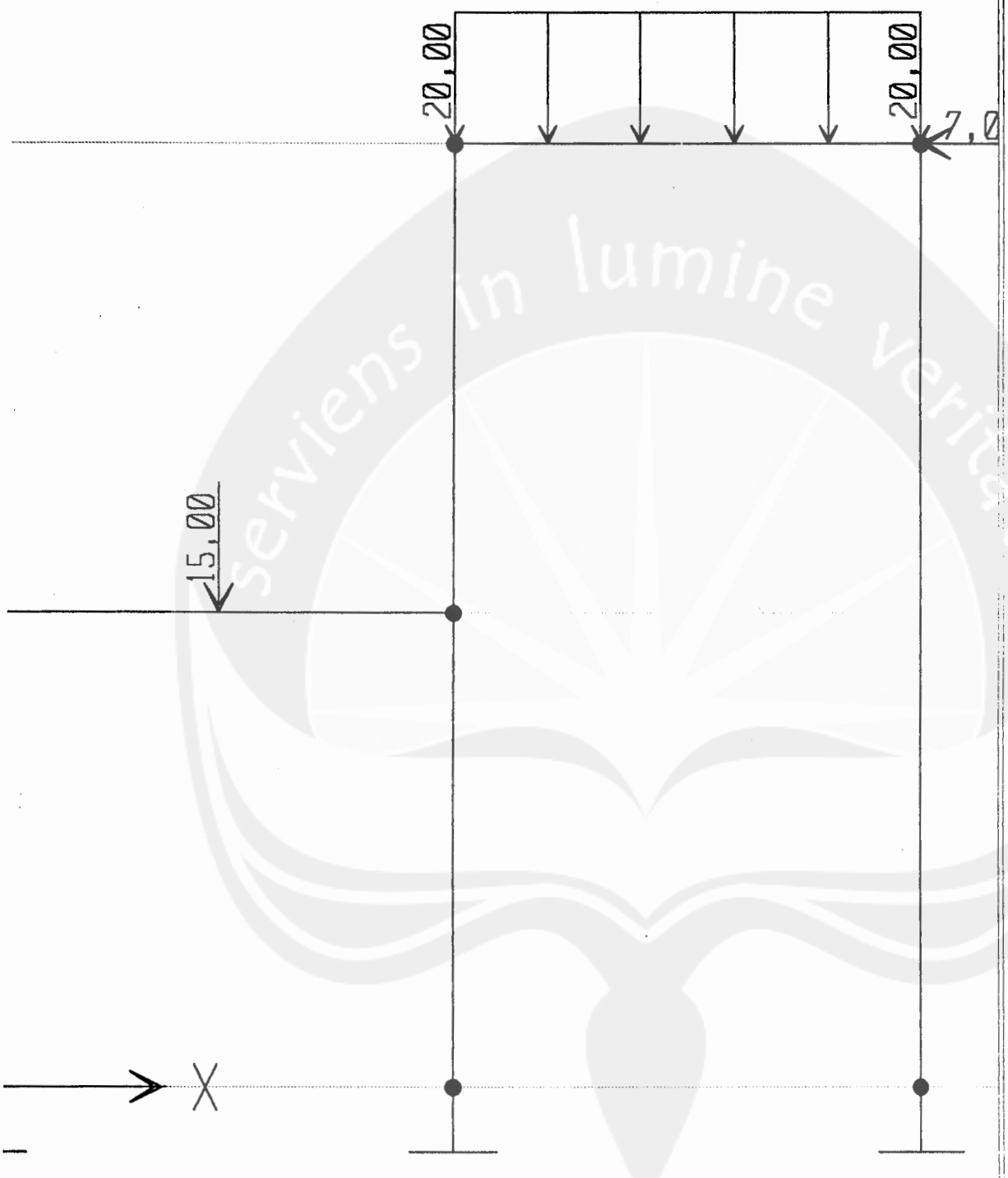
5
7
4
2
5
6
3
X
2
3


20,00
20,00
7,0
15,00
X

) v7.42 File: PORTAL2 KN-m Units PAGE 1
9:47:59

Comp
dasi Kasus 2

F I C L O A D C A S E S

STATIC CASE	CASE TYPE	SELF WT FACTOR
1	DEAD	0,0000

) v7.42 File: PORTAL2 KN-m Units PAGE 2
9:47:59

Comp
dasi Kasus 2

N T D A T A

NT	GLOBAL-X	GLOBAL-Y	GLOBAL-Z	RESTRAINTS	ANGLE-A	ANGLE-B	ANGLE-C
1	0,00000	0,00000	0,00000	1 1 1 1 1 1	0,000	0,000	0,000
2	5,00000	0,00000	0,00000	1 1 1 1 0 1	0,000	0,000	0,000
3	10,00000	0,00000	0,00000	1 1 1 1 1 1	0,000	0,000	0,000
4	0,00000	0,00000	5,00000	0 1 0 1 0 1	0,000	0,000	0,000
5	5,00000	0,00000	5,00000	0 1 0 1 0 1	0,000	0,000	0,000
6	5,00000	0,00000	10,00000	0 1 0 1 0 1	0,000	0,000	0,000
7	10,00000	0,00000	10,00000	0 1 0 1 0 1	0,000	0,000	0,000

) v7.42 File: PORTAL2 KN-m Units PAGE 3
9:47:59

Comp
dasi Kasus 2

M E E L E M E N T D A T A

ME	JNT-1	JNT-2	SECTION	ANGLE	RELEASES	SEGMENTS	R1	R2	FACTOR
1	1	4	1	180,000	000000	4	0,000	0,000	0,000
2	4	5	1	0,000	000000	4	0,000	0,000	0,000
3	2	5	1	180,000	000000	4	0,000	0,000	0,000
4	5	6	1	180,000	000000	4	0,000	0,000	0,000
5	6	7	1	0,000	000000	4	0,000	0,000	0,000
6	3	7	1	180,000	000000	4	0,000	0,000	0,000

) v7.42 File: PORTAL2 KN-m Units PAGE 1
9:48:13

Comp
dasi Kasus 2

N T D I S P L A C E M E N T S

NT	LOAD	U1	U2	U3	R1	R2	R3
1	1	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
2	1	0,0000	0,0000	0,0000	0,0000	3,875E-03	0,0000
3	1	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000

4	1	3,714E-03	0,0000	-7,212E-05	0,0000	3,823E-03	0,0000
5	1	3,619E-03	0,0000	-4,754E-04	0,0000	-5,616E-03	0,0000
6	1	-0,0145	0,0000	-9,030E-04	0,0000	0,0104	0,0000
7	1	-0,0146	0,0000	-7,449E-04	0,0000	-0,0149	0,0000

0 v7.42 File: PORTAL2 KN-m Units PAGE 2
9:48:14

Comp
dasi Kasus 2

N T R E A C T I O N S

NT	LOAD	F1	F2	F3	M1	M2	M3
1	1	1,8117	0,0000	9,0150	0,0000	2,0407	0,0000
2	1	-2,4715	0,0000	59,4305	0,0000	0,0000	0,0000
3	1	-2,3402	0,0000	46,5544	0,0000	-6,8437	0,0000
4	1	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
5	1	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
6	1	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
7	1	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000

0 v7.42 File: PORTAL2 KN-m Units PAGE 3
9:48:14

Comp
dasi Kasus 2

M E E L E M E N T F O R C E S

ME	LOAD	LOC	P	V2	V3	T	M2	M3
1	1							
		0,00	-9,02	1,81	0,00	0,00	0,00	2,04
		1,25	-9,02	1,81	0,00	0,00	0,00	-2,240E-01
		2,50	-9,02	1,81	0,00	0,00	0,00	-2,49
		3,75	-9,02	1,81	0,00	0,00	0,00	-4,75
		5,00	-9,02	1,81	0,00	0,00	0,00	-7,02
2	1							
		0,00	-11,81	-9,02	0,00	0,00	0,00	-7,02
		1,25	-11,81	-9,02	0,00	0,00	0,00	4,25
		2,50	-11,81	-9,02	0,00	0,00	0,00	15,52
		3,75	-11,81	5,98	0,00	0,00	0,00	8,04
		5,00	-11,81	5,98	0,00	0,00	0,00	5,572E-01
3	1							
		0,00	-59,43	-2,47	0,00	0,00	0,00	0,00
		1,25	-59,43	-2,47	0,00	0,00	0,00	3,09
		2,50	-59,43	-2,47	0,00	0,00	0,00	6,18
		3,75	-59,43	-2,47	0,00	0,00	0,00	9,27
		5,00	-59,43	-2,47	0,00	0,00	0,00	12,36
4	1							
		0,00	-53,45	9,34	0,00	0,00	0,00	12,91
		1,25	-53,45	9,34	0,00	0,00	0,00	1,24
		2,50	-53,45	9,34	0,00	0,00	0,00	-10,44
		3,75	-53,45	9,34	0,00	0,00	0,00	-22,11

	5,00	-53,45	9,34	0,00	0,00	0,00	-33,79
5	1						
	0,00	-9,34	-53,45	0,00	0,00	0,00	-33,79
	1,25	-9,34	-28,45	0,00	0,00	0,00	17,40
	2,50	-9,34	-3,45	0,00	0,00	0,00	37,33
	3,75	-9,34	21,55	0,00	0,00	0,00	26,01
	5,00	-9,34	46,55	0,00	0,00	0,00	-16,56
6	1						
	0,00	-46,55	-2,34	0,00	0,00	0,00	-6,84
	2,50	-46,55	-2,34	0,00	0,00	0,00	-9,932E-01
	5,00	-46,55	-2,34	0,00	0,00	0,00	4,86
	7,50	-46,55	-2,34	0,00	0,00	0,00	10,71
	10,00	-46,55	-2,34	0,00	0,00	0,00	16,56

aman Portal Bidang dengan Sub Struktur

truktur :
s Elastisitas Bahan = 21000,0000
Titik Kumpul = 8
nat Titik Kumpul

X	Y
0	0
8000	0
16000	0
0	4000
8000	4000
16000	4000
4000	7000
12000	7000

Batang Struktur = 7
atang

ujung i	ujung j	Luas(A)	Inersia(I)	panjang(L)
1	4	1,2000000E+005	9,0000000E+008	4,0000000E+003
2	5	1,2000000E+005	9,0000000E+008	4,0000000E+003
3	6	1,2000000E+005	9,0000000E+008	4,0000000E+003
4	7	1,2000000E+005	9,0000000E+008	5,0000000E+003
7	5	1,2000000E+005	9,0000000E+008	5,0000000E+003
5	8	1,2000000E+005	9,0000000E+008	5,0000000E+003
8	6	1,2000000E+005	9,0000000E+008	5,0000000E+003

Pengekang Tumpuan = 3
engekang Tumpuan

arah x	arah y	rotasi z
1	1	1
1	1	1
1	1	1

ub Struktur
Sub Struktur yang Direncanakan = 1
is Sebagai Struktur Utuh (tanpa Sub Struktur)

eban
Titik Kumpul yang Terbebani = 2
i Titik Kumpul

arah x	arah y	rotasi z
0,0000000E+000	-2,0000000E+004	0,0000000E+000
0,0000000E+000	-2,0000000E+004	0,0000000E+000

Batang yang Terbebani = 0

dahan Titik Kumpul(Displacement)

arah x	arah y	rotasi z
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
2,3111960E+000	-1,6405284E-002	2,3311414E-004
2,4422738E-014	-3,0681496E-002	-4,7491284E-018
2,3111960E+000	-1,6405284E-002	-2,3311414E-004
1,1507434E+000	-1,6014785E+000	-6,0865505E-005
1,1507434E+000	-1,6014785E+000	6,0865505E-005

jung Batang

AM1	AM2	AM3	AM4	AM5	AM6
1,034E+004	-6,538E+003	-1,418E+007	-1,034E+004	6,538E+003	-1,197E+007
1,933E+004	5,289E-011	1,282E-007	-1,933E+004	-5,289E-011	8,334E-008
1,034E+004	6,538E+003	1,418E+007	-1,034E+004	-6,538E+003	1,197E+007
1,143E+004	4,345E+003	1,197E+007	-1,143E+004	-4,345E+003	9,752E+006
1,103E+004	-3,809E+003	-9,752E+006	-1,103E+004	3,809E+003	-9,292E+006
1,103E+004	3,809E+003	9,292E+006	-1,103E+004	-3,809E+003	9,752E+006
1,143E+004	-4,345E+003	-9,752E+006	-1,143E+004	4,345E+003	-1,197E+007

Tumpuan

arah x	arah y	rotasi z
6,5381042E+003	1,0335329E+004	-1,4177673E+007
5,2888630E-011	1,9329343E+004	1,2821689E-007
6,5381042E+003	1,0335329E+004	1,4177673E+007

I

aman Portal Bidang dengan Sub Struktur

truktur :
s Elastisitas Bahan = 21000,0000
Titik Kumpul = 8
nat Titik Kumpul

X	Y
0	0
8000	0
16000	0
0	4000
8000	4000
16000	4000
4000	7000
12000	7000

. Batang Struktur = 7
atang

ujung i	ujung j	Luas(A)	Inersia(I)	panjang(L)
1	4	1,2000000E+005	9,0000000E+008	4,0000000E+003
2	5	1,2000000E+005	9,0000000E+008	4,0000000E+003
3	6	1,2000000E+005	9,0000000E+008	4,0000000E+003
4	7	1,2000000E+005	9,0000000E+008	5,0000000E+003
7	5	1,2000000E+005	9,0000000E+008	5,0000000E+003
5	8	1,2000000E+005	9,0000000E+008	5,0000000E+003
8	6	1,2000000E+005	9,0000000E+008	5,0000000E+003

ı Pengekang Tumpuan = 3
engekang Tumpuan

arah x	arah y	rotasi z
1	1	1
1	1	1
1	1	1

ub Struktur
ı Sub Struktur yang Direncanakan = 2
ruktur 1
ı Node Pertemuan = 1
ı Node Dalam = 3
ı Batang = 3
s Sub Struktur

ertemuan	Node Dalam	Batang
	1	1
	4	4
	7	5

ruktur 2
ı Node Pertemuan = 1
ı Node Dalam = 4
ı Batang = 4
s Sub Struktur

ertemuan	Node Dalam	Batang
	2	2
	3	3
	6	6
	8	7

eban
ı Titik Kumpul yang Terbebani = 2

i Titik Kumpul

arah x	arah y	rotasi z
0,0000000E+000	-2,0000000E+004	0,0000000E+000
0,0000000E+000	-2,0000000E+004	0,0000000E+000

Batang yang Terbebani = 0

dahan Titik Kumpul(Displacement)

arah x	arah y	rotasi z
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
2,3111960E+000	-1,6405284E-002	2,3311414E-004
0,0000000E+000	-3,0681496E-002	0,0000000E+000
2,3111960E+000	-1,6405284E-002	-2,3311414E-004
1,1507434E+000	-1,6014785E+000	-6,0865505E-005
1,1507434E+000	-1,6014785E+000	6,0865505E-005

jung Batang

AM1	AM2	AM3	AM4	AM5	AM6
,034E+004	-6,538E+003	-1,418E+007	-1,034E+004	6,538E+003	-1,197E+007
,933E+004	0,000E+000	0,000E+000	-1,933E+004	0,000E+000	0,000E+000
,034E+004	6,538E+003	1,418E+007	-1,034E+004	-6,538E+003	1,197E+007
,143E+004	4,345E+003	1,197E+007	-1,143E+004	-4,345E+003	9,752E+006
,103E+004	-3,809E+003	-9,752E+006	-1,103E+004	3,809E+003	-9,292E+006
,103E+004	3,809E+003	9,292E+006	-1,103E+004	-3,809E+003	9,752E+006
,143E+004	-4,345E+003	-9,752E+006	-1,143E+004	4,345E+003	-1,197E+007

Tumpuan

arah x	arah y	rotasi z
,5381042E+003	1,0335329E+004	-1,4177673E+007
,0000000E+000	1,9329343E+004	0,0000000E+000
,5381042E+003	1,0335329E+004	1,4177673E+007

:aman Portal Bidang dengan Sub Struktur

:truktur :
:s Elastisitas Bahan = 21000,0000
: Titik Kumpul = 8
.nat Titik Kumpul

X	Y
0	0
8000	0
16000	0
0	4000
8000	4000
16000	4000
4000	7000
12000	7000

. Batang Struktur = 7
atang

ujung i	ujung j	Luas(A)	Inersia(I)	panjang(L)
1	4	1,2000000E+005	9,0000000E+008	4,0000000E+003
2	5	1,2000000E+005	9,0000000E+008	4,0000000E+003
3	6	1,2000000E+005	9,0000000E+008	4,0000000E+003
4	7	1,2000000E+005	9,0000000E+008	5,0000000E+003
7	5	1,2000000E+005	9,0000000E+008	5,0000000E+003
5	8	1,2000000E+005	9,0000000E+008	5,0000000E+003
8	6	1,2000000E+005	9,0000000E+008	5,0000000E+003

. Pengekang Tumpuan = 3
engekang Tumpuan

arah x	arah y	rotasi z
1	1	1
1	1	1
1	1	1

ub Struktur
Sub Struktur yang Direncanakan = 3
ruktur 1
Node Pertemuan = 1
Node Dalam = 2
Batang = 2
Sub Struktur

ertemuan	Node Dalam	Batang
	1	1
	4	4

ruktur 2
Node Pertemuan = 2
Node Dalam = 2
Batang = 3
Sub Struktur

ertemuan	Node Dalam	Batang
	2	2
	5	5
		6

ruktur 3
Node Pertemuan = 1
Node Dalam = 2
Batang = 2
Sub Struktur

```
'ertemuan  Node Dalam  Batang
                3          3
                6          7

3eban
ı Titik Kumpul yang Terbebani =    2
li Titik Kumpul
      arah x            arah y         rotasi z
   0,0000000E+000   -2,0000000E+004   0,0000000E+000
   0,0000000E+000   -2,0000000E+004   0,0000000E+000
ı Batang yang Terbebani =    0


ıdahan Titik Kumpul(Displacement)
     arah x            arah y          rotasi z
 0,0000000E+000   0,0000000E+000   0,0000000E+000
 0,0000000E+000   0,0000000E+000   0,0000000E+000
 0,0000000E+000   0,0000000E+000   0,0000000E+000
·2,3111960E+000  -1,6405284E-002   2,3311414E-004
 2,5349586E-016  -3,0681496E-002   7,1856353E-020
 2,3111960E+000  -1,6405284E-002  -2,3311414E-004
·1,1507434E+000  -1,6014785E+000  -6,0865505E-005
 1,1507434E+000  -1,6014785E+000   6,0865505E-005

Ujung Batang
      AM1          AM2          AM3          AM4          AM5          AM6
 1,034E+004 -6,538E+003 -1,418E+007  -1,034E+004  6,538E+003 -1,197E+007
 1,933E+004  1,408E-012  2,476E-009  -1,933E+004 -1,408E-012  3,155E-009
 1,034E+004  6,538E+003  1,418E+007  -1,034E+004 -6,538E+003  1,197E+007
 1,143E+004  4,345E+003  1,197E+007  -1,143E+004 -4,345E+003  9,752E+006
 1,103E+004 -3,809E+003 -9,752E+006  -1,103E+004  3,809E+003 -9,292E+006
 1,103E+004  3,809E+003  9,292E+006  -1,103E+004 -3,809E+003  9,752E+006
 1,143E+004 -4,345E+003 -9,752E+006  -1,143E+004  4,345E+003 -1,197E+007

. Tumpuan
     arah x            arah y          rotasi z
 6,5381042E+003   1,0335329E+004  -1,4177673E+007
·1,4076079E-012   1,9329343E+004   2,4756945E-009
·6,5381042E+003   1,0335329E+004   1,4177673E+007

ıI
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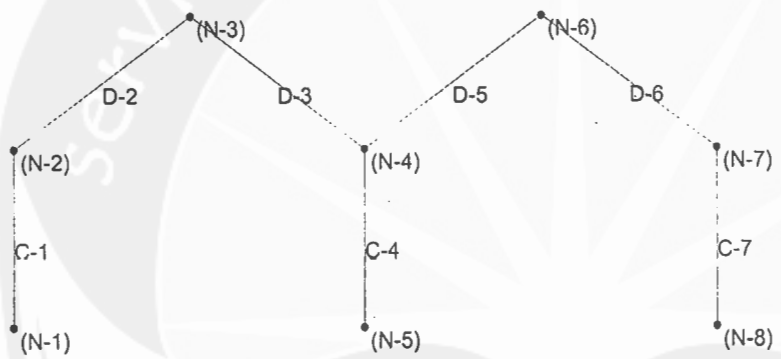
ronald_4



Report prepared by
Atma Jaya University

General Information

Members	7
Nodes	8
Basic Load Cases * Self Load * Dead Load * Live Load	3
Combination Load Cases * Service Load * Ultimate Load	2

Nodal Information

Node	X (mm)	Y (mm)	Restraint X	Restraint Y	Restraint Z
N-1	0.000	0.000	Fixed	Fixed	Fixed
N-2	0.000	4.0E+03			
N-3	4.0E+03	7.0E+03			
N-4	8.0E+03	4.0E+03			
N-5	8.0E+03	0.000	Fixed	Fixed	Fixed
N-6	1.2E+04	7.0E+03			
N-7	1.6E+04	4.0E+03			
N-8	1.6E+04	0.000	Fixed	Fixed	Fixed

Spring constant and imposed displacements, if any, are in N/mm, N-mm/radian, mm and radians.

Material Information

Material	Name	E [N/mm^2]	W [N/mm^3]	alpha [/C]
1	Default Material	2.050E+04	2.400E-05	9.900E-04
2	ronald	2.100E+04	1.00	1.00

Member Information

Member	Node i	Node j	Area X (sq mm)	Inertia Z (mm^4)	Length (mm)
C-1	N-1	N-2	1.200E+05	9.000E+08	4.000E+03
C-4	N-5	N-4	1.200E+05	9.000E+08	4.000E+03
C-7	N-8	N-7	1.200E+05	9.000E+08	4.000E+03
D-2	N-2	N-3	1.200E+05	9.000E+08	5.000E+03
D-3	N-3	N-4	1.200E+05	9.000E+08	5.000E+03
D-5	N-4	N-6	1.200E+05	9.000E+08	5.000E+03

D-6	N-6	N-7	1.200E+05	9.000E+08	5.000E+03

Live Load Nodal Displacements

Node	delta X (mm)	delta Y (mm)	theta Z
N-1	0.0000	0.0000	0.0000
N-2	-2.3676	-0.0168	2.3880E-04
N-3	-1.1788	-1.6405	-6.2350E-05
N-4	1.8229E-15	-0.0314	-1.3507E-18
N-5	0.0000	0.0000	0.0000
N-6	1.1788	-1.6405	6.2350E-05
N-7	2.3676	-0.0168	-2.3880E-04
N-8	0.0000	0.0000	0.0000

Live Load Support Reactions

Node	Rx (N)	Ry(N)	Mz (N-mm)
N-1	6.5381E+03	1.0335E+04	-1.4178E+07
N-5	3.0389E-12	1.9329E+04	1.5227E-10
N-8	-6.5381E+03	1.0335E+04	1.4178E+07

Live Load Member End Results

Member	Mzi (N-mm) Mzj (N-mm)	Mpos (N-mm) @ (mm)	Vi (N) Vj (N)	Pi (N) Pj (N)
C-1	1.4178E+07 -1.1975E+07	1.4178E+07 (200.0000)	-6.5381E+03 -6.5381E+03	-1.0335E+04 -1.0335E+04
C-4	-1.5227E-10 -1.2308E-08	0.0000 (0.0000)	-3.0389E-12 -3.0389E-12	-1.9329E+04 -1.9329E+04
C-7	-1.4178E+07 1.1975E+07	1.1975E+07 (4.2000E+03)	6.5381E+03 6.5381E+03	-1.0335E+04 -1.0335E+04
D-2	-1.1975E+07 9.7523E+06	9.7523E+06 (5.2500E+03)	4.3454E+03 4.3454E+03	-1.1432E+04 -1.1432E+04
D-3	9.7523E+06 -9.2921E+06	9.7523E+06 (250.0000)	-3.8089E+03 -3.8089E+03	-1.1029E+04 -1.1029E+04
D-5	-9.2921E+06 9.7523E+06	9.7523E+06 (5.2500E+03)	3.8089E+03 3.8089E+03	-1.1029E+04 -1.1029E+04
D-6	9.7523E+06 -1.1975E+07	9.7523E+06 (250.0000)	-4.3454E+03 -4.3454E+03	-1.1432E+04 -1.1432E+04

Kasus 4

Perhitungan Beban Titik Kumpul Ekivalen

Batang 43 dan 44 :

AML(1,I) = 0

$$AML(2,I) = \frac{10 \times 4}{2} = 20$$

$$AML(3,I) = \frac{10 \times 4^2}{12} = 13{,}3333$$

AML(4,I) = 0

$$AML(5,I) = \frac{10 \times 4}{2} = 20$$

$$AML(6,I) = -\frac{10 \times 4^2}{12} = -13{,}3333$$

aman Portal Bidang dengan Sub Struktur

truktur :
s Elastisitas Bahan = 21000000,0000
Titik Kumpul = 30
nat Titik Kumpul

X	Y
0	0
3	0
7	0
11	0
14	0
0	2,5
3	2,5
7	2,5
11	2,5
14	2,5
0	5
3	5
7	5
11	5
14	5
0	7,5
3	7,5
7	7,5
11	7,5
14	7,5
0	10
3	10
7	10
11	10
14	10
0	12,5
3	12,5
7	12,5
11	12,5
14	12,5

h Batang Struktur = 45
Batang

ujung i	ujung j	Luas(A)	Inersia(I)	panjang(L)
1	6	1,2000000E-001	1,6000000E-003	2,5000000E+000
2	7	1,2000000E-001	1,6000000E-003	2,5000000E+000
3	8	1,2000000E-001	1,6000000E-003	2,5000000E+000
4	9	1,2000000E-001	1,6000000E-003	2,5000000E+000
5	10	1,2000000E-001	1,6000000E-003	2,5000000E+000
6	7	9,0000000E-002	6,7500000E-004	3,0000000E+000
7	8	9,0000000E-002	6,7500000E-004	4,0000000E+000
8	9	9,0000000E-002	6,7500000E-004	4,0000000E+000
9	10	9,0000000E-002	6,7500000E-004	3,0000000E+000
6	11	1,2000000E-001	1,6000000E-003	2,5000000E+000
7	12	1,2000000E-001	1,6000000E-003	2,5000000E+000
8	13	1,2000000E-001	1,6000000E-003	2,5000000E+000
9	14	1,2000000E-001	1,6000000E-003	2,5000000E+000
10	15	1,2000000E-001	1,6000000E-003	2,5000000E+000
11	12	9,0000000E-002	6,7500000E-004	3,0000000E+000
12	13	9,0000000E-002	6,7500000E-004	4,0000000E+000

13	14	9,0000000E-002	6,7500000E-004	4,0000000E+000
14	15	9,0000000E-002	6,7500000E-004	3,0000000E+000
11	16	1,2000000E-001	1,6000000E-003	2,5000000E+000
12	17	1,2000000E-001	1,6000000E-003	2,5000000E+000
13	18	1,2000000E-001	1,6000000E-003	2,5000000E+000
14	19	1,2000000E-001	1,6000000E-003	2,5000000E+000
15	20	1,2000000E-001	1,6000000E-003	2,5000000E+000
16	17	9,0000000E-002	6,7500000E-004	3,0000000E+000
17	18	9,0000000E-002	6,7500000E-004	4,0000000E+000
18	19	9,0000000E-002	6,7500000E-004	4,0000000E+000
19	20	9,0000000E-002	6,7500000E-004	3,0000000E+000
16	21	1,2000000E-001	1,6000000E-003	2,5000000E+000
17	22	1,2000000E-001	1,6000000E-003	2,5000000E+000
18	23	1,2000000E-001	1,6000000E-003	2,5000000E+000
19	24	1,2000000E-001	1,6000000E-003	2,5000000E+000
20	25	1,2000000E-001	1,6000000E-003	2,5000000E+000
21	22	9,0000000E-002	6,7500000E-004	3,0000000E+000
22	23	9,0000000E-002	6,7500000E-004	4,0000000E+000
23	24	9,0000000E-002	6,7500000E-004	4,0000000E+000
24	25	9,0000000E-002	6,7500000E-004	3,0000000E+000
21	26	1,2000000E-001	1,6000000E-003	2,5000000E+000
22	27	1,2000000E-001	1,6000000E-003	2,5000000E+000
23	28	1,2000000E-001	1,6000000E-003	2,5000000E+000
24	29	1,2000000E-001	1,6000000E-003	2,5000000E+000
25	30	1,2000000E-001	1,6000000E-003	2,5000000E+000
26	27	9,0000000E-002	6,7500000E-004	3,0000000E+000
27	28	9,0000000E-002	6,7500000E-004	4,0000000E+000
28	29	9,0000000E-002	6,7500000E-004	4,0000000E+000
29	30	9,0000000E-002	6,7500000E-004	3,0000000E+000

. Pengekang Tumpuan = 5
'engekang Tumpuan

arah x	arah y	rotasi z
1	1	1
1	1	1
1	1	1
1	1	1
1	1	1

ub Struktur
ı Sub Struktur yang Direncanakan = 1
is Sebagai Struktur Utuh (tanpa Sub Struktur)

eban
ı Titik Kumpul yang Terbebani = 8
li Titik Kumpul

arah x	arah y	rotasi z
5,0000000E+001	0,0000000E+000	1,0000000E+001
1,0000000E+002	0,0000000E+000	1,0000000E+001
1,0000000E+002	0,0000000E+000	1,0000000E+001
2,0000000E+002	0,0000000E+000	2,0000000E+001
2,0000000E+002	0,0000000E+000	2,0000000E+001
0,0000000E+000	-5,0000000E+001	0,0000000E+000
0,0000000E+000	-5,0000000E+001	0,0000000E+000
0,0000000E+000	-5,0000000E+001	0,0000000E+000

ı Batang yang Terbebani = 2
li Ujung Batang Terkekang Akibat Beban

AML1	AML2	AML3	AML4	AML5	AML6
0,000E+000	2,000E+001	1,333E+001	0,000E+000	2,000E+001	-1,333E+001
0,000E+000	2,000E+001	1,333E+001	0,000E+000	2,000E+001	-1,333E+001

dahan Titik Kumpul(Displacement)

arah x	arah y	rotasi z
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
1,2775932E-002	4,1943740E-004	-6,5826284E-003
1,2732893E-002	-2,3781965E-004	-5,7415796E-003
1,2674459E-002	-9,0326408E-005	-5,9932672E-003
1,2628977E-002	1,0806706E-004	-5,6926316E-003
1,2592256E-002	-4,2753300E-004	-6,5622181E-003
3,3466034E-002	7,2744321E-004	-7,0408351E-003
3,3339272E-002	-4,2647959E-004	-6,2834113E-003
3,3219952E-002	-1,8052890E-004	-6,4865689E-003
3,3140050E-002	1,6674037E-004	-6,2547065E-003
3,3113862E-002	-7,4352429E-004	-7,0606830E-003
5,2712832E-002	9,1774622E-004	-6,0523643E-003
5,2569622E-002	-5,6542692E-004	-5,3687270E-003
5,2429467E-002	-2,7084717E-004	-5,5019031E-003
5,2335954E-002	1,7437702E-004	-5,2994370E-003
5,2311106E-002	-9,4037296E-004	-6,0142217E-003
6,7948506E-002	1,0102463E-003	-4,1350676E-003
6,7685627E-002	-6,6467368E-004	-3,7359487E-003
6,7446792E-002	-3,6119725E-004	-3,8160454E-003
6,7290665E-002	1,4104944E-004	-3,7462791E-003
6,7233581E-002	-1,0381233E-003	-4,1261653E-003
7,6987973E-002	1,0394239E-003	-2,1614375E-003
7,6718388E-002	-7,4122305E-004	-2,1379364E-003
7,6451261E-002	-4,5212591E-004	-1,9031445E-003
7,6285467E-002	8,2491245E-005	-1,7036258E-003
7,6250514E-002	-1,0694392E-003	-2,4046975E-003

jung Batang

AM1	AM2	AM3	AM4	AM5	AM6
4,228E+002	1,174E+002	2,352E+002	4,228E+002	-1,174E+002	5,822E+001
2,397E+002	1,434E+002	2,564E+002	-2,397E+002	-1,434E+002	1,020E+002
9,105E+001	1,337E+002	2,477E+002	-9,105E+001	-1,337E+002	8,663E+001
1,089E+002	1,423E+002	2,543E+002	1,089E+002	-1,423E+002	1,013E+002
4,310E+002	1,133E+002	2,298E+002	-4,310E+002	-1,133E+002	5,339E+001
2,711E+001	-1,123E+002	-1,725E+002	-2,711E+001	1,123E+002	-1,645E+002
2,761E+001	-6,277E+001	-1,246E+002	-2,761E+001	6,277E+001	-1,264E+002
2,149E+001	-6,265E+001	-1,264E+002	-2,149E+001	6,265E+001	-1,242E+002
2,313E+001	-1,124E+002	-1,645E+002	-2,313E+001	1,124E+002	-1,728E+002
3,105E+002	9,447E+001	1,242E+002	3,105E+002	-9,447E+001	1,119E+002
1,902E+002	1,439E+002	1,871E+002	-1,902E+002	-1,439E+002	1,725E+002
9,092E+001	1,276E+002	1,662E+002	-9,092E+001	-1,276E+002	1,529E+002
5,914E+001	1,439E+002	1,874E+002	5,914E+001	-1,439E+002	1,723E+002
3,185E+002	9,014E+001	1,194E+002	-3,185E+002	-9,014E+001	1,060E+002
7,986E+001	-1,186E+002	-1,815E+002	-7,986E+001	1,186E+002	-1,744E+002

5,638E+001	-6,853E+001	-1,363E+002	-5,638E+001	6,853E+001	-1,378E+002
3,775E+001	-6,865E+001	-1,381E+002	-3,775E+001	6,865E+001	-1,365E+002
1,650E+001	-1,201E+002	-1,763E+002	-1,650E+001	1,201E+002	-1,840E+002
1,918E+002	7,433E+001	7,962E+001	1,918E+002	-7,433E+001	1,062E+002
1,401E+002	1,204E+002	1,382E+002	-1,401E+002	-1,204E+002	1,628E+002
9,104E+001	1,090E+002	1,230E+002	-9,104E+001	-1,090E+002	1,495E+002
7,698E+000	1,227E+002	1,405E+002	7,698E+000	-1,227E+002	1,662E+002
1,984E+002	7,364E+001	7,798E+001	-1,984E+002	-7,364E+001	1,061E+002
9,022E+001	-9,859E+001	-1,511E+002	-9,022E+001	9,859E+001	-1,446E+002
6,622E+001	-5,857E+001	-1,167E+002	-6,622E+001	5,857E+001	-1,176E+002
4,419E+001	-5,860E+001	-1,179E+002	-4,419E+001	5,860E+001	-1,165E+002
1,565E+001	-9,989E+001	-1,465E+002	-1,565E+001	9,989E+001	-1,532E+002
9,324E+001	6,455E+001	5,492E+001	9,324E+001	-6,455E+001	1,065E+002
1,000E+002	9,639E+001	9,854E+001	-1,000E+002	-9,639E+001	1,424E+002
9,107E+001	8,696E+001	8,604E+001	-9,107E+001	-8,696E+001	1,314E+002
3,359E+001	9,412E+001	9,678E+001	-3,359E+001	-9,412E+001	1,385E+002
9,853E+001	5,798E+001	4,710E+001	-9,853E+001	-5,798E+001	9,785E+001
1,656E+002	-6,383E+001	-9,763E+001	-1,656E+002	6,383E+001	-9,386E+001
1,128E+002	-4,095E+001	-8,162E+001	-1,128E+002	4,095E+001	-8,218E+001
7,377E+001	-4,153E+001	-8,331E+001	-7,377E+001	4,153E+001	-8,282E+001
3,596E+001	-6,697E+001	-9,865E+001	-3,596E+001	6,697E+001	-1,022E+002
2,941E+001	3,016E+001	1,118E+001	2,941E+001	-3,016E+001	6,423E+001
7,716E+001	4,362E+001	3,305E+001	-7,716E+001	-4,362E+001	7,600E+001
9,166E+001	4,788E+001	3,414E+001	-9,166E+001	-4,788E+001	8,556E+001
5,903E+001	5,632E+001	4,294E+001	-5,903E+001	-5,632E+001	9,785E+001
3,157E+001	2,202E+001	4,389E+000	-3,157E+001	-2,202E+001	5,066E+001
1,698E+002	-2,941E+001	-4,423E+001	-1,698E+002	2,941E+001	-4,401E+001
1,262E+002	-2,249E+000	-3,200E+001	-1,262E+002	4,225E+001	-5,700E+001
7,834E+001	-5,932E-001	-2,856E+001	-7,834E+001	4,059E+001	-5,381E+001
2,202E+001	-3,157E+001	-4,404E+001	-2,202E+001	3,157E+001	-5,066E+001

Tumpuan

arah x	arah y	rotasi z
-1,1735111E+002	-4,2279290E+002	2,3515942E+002
-1,4336938E+002	2,3972221E+002	2,5637855E+002
-1,3374305E+002	9,1049019E+001	2,4772832E+002
-1,4226671E+002	-1,0893159E+002	2,5434235E+002
-1,1326975E+002	4,3095327E+002	2,2978340E+002

aman Portal Bidang dengan Sub Struktur

truktur :
s Elastisitas Bahan = 21000000,0000
Titik Kumpul = 30
nat Titik Kumpul

X	Y
0	0
3	0
7	0
11	0
14	0
0	2,5
3	2,5
7	2,5
11	2,5
14	2,5
0	5
3	5
7	5
11	5
14	5
0	7,5
3	7,5
7	7,5
11	7,5
14	7,5
0	10
3	10
7	10
11	10
14	10
0	12,5
3	12,5
7	12,5
11	12,5
14	12,5

ı Batang Struktur = 45
Batang

ujung i	ujung j	Luas(A)	Inersia(I)	panjang(L)
1	6	1,2000000E-001	1,6000000E-003	2,5000000E+000
2	7	1,2000000E-001	1,6000000E-003	2,5000000E+000
3	8	1,2000000E-001	1,6000000E-003	2,5000000E+000
4	9	1,2000000E-001	1,6000000E-003	2,5000000E+000
5	10	1,2000000E-001	1,6000000E-003	2,5000000E+000
6	7	9,0000000E-002	6,7500000E-004	3,0000000E+000
7	8	9,0000000E-002	6,7500000E-004	4,0000000E+000
8	9	9,0000000E-002	6,7500000E-004	4,0000000E+000
9	10	9,0000000E-002	6,7500000E-004	3,0000000E+000
6	11	1,2000000E-001	1,6000000E-003	2,5000000E+000
7	12	1,2000000E-001	1,6000000E-003	2,5000000E+000
8	13	1,2000000E-001	1,6000000E-003	2,5000000E+000
9	14	1,2000000E-001	1,6000000E-003	2,5000000E+000
10	15	1,2000000E-001	1,6000000E-003	2,5000000E+000
11	12	9,0000000E-002	6,7500000E-004	3,0000000E+000
12	13	9,0000000E-002	6,7500000E-004	4,0000000E+000

13	14	9,0000000E-002	6,7500000E-004	4,0000000E+000
14	15	9,0000000E-002	6,7500000E-004	3,0000000E+000
11	16	1,2000000E-001	1,6000000E-003	2,5000000E+000
12	17	1,2000000E-001	1,6000000E-003	2,5000000E+000
13	18	1,2000000E-001	1,6000000E-003	2,5000000E+000
14	19	1,2000000E-001	1,6000000E-003	2,5000000E+000
15	20	1,2000000E-001	1,6000000E-003	2,5000000E+000
16	17	9,0000000E-002	6,7500000E-004	3,0000000E+000
17	18	9,0000000E-002	6,7500000E-004	4,0000000E+000
18	19	9,0000000E-002	6,7500000E-004	4,0000000E+000
19	20	9,0000000E-002	6,7500000E-004	3,0000000E+000
16	21	1,2000000E-001	1,6000000E-003	2,5000000E+000
17	22	1,2000000E-001	1,6000000E-003	2,5000000E+000
18	23	1,2000000E-001	1,6000000E-003	2,5000000E+000
19	24	1,2000000E-001	1,6000000E-003	2,5000000E+000
20	25	1,2000000E-001	1,6000000E-003	2,5000000E+000
21	22	9,0000000E-002	6,7500000E-004	3,0000000E+000
22	23	9,0000000E-002	6,7500000E-004	4,0000000E+000
23	24	9,0000000E-002	6,7500000E-004	4,0000000E+000
24	25	9,0000000E-002	6,7500000E-004	3,0000000E+000
21	26	1,2000000E-001	1,6000000E-003	2,5000000E+000
22	27	1,2000000E-001	1,6000000E-003	2,5000000E+000
23	28	1,2000000E-001	1,6000000E-003	2,5000000E+000
24	29	1,2000000E-001	1,6000000E-003	2,5000000E+000
25	30	1,2000000E-001	1,6000000E-003	2,5000000E+000
26	27	9,0000000E-002	6,7500000E-004	3,0000000E+000
27	28	9,0000000E-002	6,7500000E-004	4,0000000E+000
28	29	9,0000000E-002	6,7500000E-004	4,0000000E+000
29	30	9,0000000E-002	6,7500000E-004	3,0000000E+000

ı Pengekang Tumpuan = 5

'engekang Tumpuan

arah x	arah y	rotasi z
1	1	1
1	1	1
1	1	1
1	1	1
1	1	1

ub Struktur

ı Sub Struktur yang Direncanakan = 2

ruktur 1

ı Node Pertemuan = 5

ı Node Dalam = 15

ı Batang = 27

Sub Struktur

ertemuan	Node Dalam	Batang
	1	1
	2	2
	3	3
	4	4
	5	5
	6	6
	7	7
	8	8
	9	9
	10	10

11	11
12	12
13	13
14	14
15	15

ruktur 2
Node Pertemuan = 5
Node Dalam = 10
Batang = 18
Sub Struktur

ertemuan	Node Dalam	Batang
	21	28
	22	29
	23	30
	24	31
	25	32
	26	33
	27	34
	28	35
	29	36
	30	37

eban
Titik Kumpul yang Terbebani = 8
li Titik Kumpul

arah x	arah y	rotasi z
5,0000000E+001	0,0000000E+000	1,0000000E+001
1,0000000E+002	0,0000000E+000	1,0000000E+001
1,0000000E+002	0,0000000E+000	1,0000000E+001
2,0000000E+002	0,0000000E+000	2,0000000E+001
2,0000000E+002	0,0000000E+000	2,0000000E+001
0,0000000E+000	-5,0000000E+001	0,0000000E+000
0,0000000E+000	-5,0000000E+001	0,0000000E+000
0,0000000E+000	-5,0000000E+001	0,0000000E+000

Batang yang Terbebani = 2
li Ujung Batang Terkekang Akibat Beban

AML1	AML2	AML3	AML4	AML5	AML6
0,000E+000	2,000E+001	1,333E+001	0,000E+000	2,000E+001	-1,333E+001
0,000E+000	2,000E+001	1,333E+001	0,000E+000	2,000E+001	-1,333E+001

ıdahan Titik Kumpul(Displacement)

arah x	arah y	rotasi z
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
1,2775932E-002	4,1943740E-004	-6,5826284E-003
1,2732893E-002	-2,3781965E-004	-5,7415796E-003
1,2674459E-002	-9,0326408E-005	-5,9932672E-003
1,2628977E-002	1,0806706E-004	-5,6926316E-003
1,2592256E-002	-4,2753300E-004	-6,5622181E-003
3,3466034E-002	7,2744321E-004	-7,0408351E-003
3,3339272E-002	-4,2647959E-004	-6,2834113E-003

3,3219952E-002	-1,8052890E-004	-6,4865689E-003
3,3140050E-002	1,6674037E-004	-6,2547065E-003
3,3113862E-002	-7,4352429E-004	-7,0606830E-003
5,2712832E-002	9,1774622E-004	-6,0523643E-003
5,2569622E-002	-5,6542692E-004	-5,3687270E-003
5,2429467E-002	-2,7084717E-004	-5,5019031E-003
5,2335954E-002	1,7437702E-004	-5,2994370E-003
5,2311106E-002	-9,4037296E-004	-6,0142217E-003
6,7948506E-002	1,0102463E-003	-4,1350676E-003
6,7685627E-002	-6,6467368E-004	-3,7359487E-003
6,7446792E-002	-3,6119725E-004	-3,8160454E-003
6,7290665E-002	1,4104944E-004	-3,7462791E-003
6,7233581E-002	-1,0381233E-003	-4,1261653E-003
7,6987973E-002	1,0394239E-003	-2,1614375E-003
7,6718388E-002	-7,4122305E-004	-2,1379364E-003
7,6451261E-002	-4,5212591E-004	-1,9031445E-003
7,6285467E-002	8,2491245E-005	-1,7036258E-003
7,6250514E-002	-1,0694392E-003	-2,4046975E-003

jung Batang

AM1	AM2	AM3	AM4	AM5	AM6
1,228E+002	1,174E+002	2,352E+002	4,228E+002	-1,174E+002	5,822E+001
2,397E+002	1,434E+002	2,564E+002	-2,397E+002	-1,434E+002	1,020E+002
9,105E+001	1,337E+002	2,477E+002	-9,105E+001	-1,337E+002	8,663E+001
,089E+002	1,423E+002	2,543E+002	1,089E+002	-1,423E+002	1,013E+002
4,310E+002	1,133E+002	2,298E+002	-4,310E+002	-1,133E+002	5,339E+001
2,711E+001	-1,123E+002	-1,725E+002	-2,711E+001	1,123E+002	-1,645E+002
2,761E+001	-6,277E+001	-1,246E+002	-2,761E+001	6,277E+001	-1,264E+002
2,149E+001	-6,265E+001	-1,264E+002	-2,149E+001	6,265E+001	-1,242E+002
2,313E+001	-1,124E+002	-1,645E+002	-2,313E+001	1,124E+002	-1,728E+002
3,105E+002	9,447E+001	1,242E+002	3,105E+002	-9,447E+001	1,119E+002
,902E+002	1,439E+002	1,871E+002	-1,902E+002	-1,439E+002	1,725E+002
9,092E+001	1,276E+002	1,662E+002	-9,092E+001	-1,276E+002	1,529E+002
,914E+001	1,439E+002	1,874E+002	5,914E+001	-1,439E+002	1,723E+002
,185E+002	9,014E+001	1,194E+002	-3,185E+002	-9,014E+001	1,060E+002
,986E+001	-1,186E+002	-1,815E+002	-7,986E+001	1,186E+002	-1,744E+002
,638E+001	-6,853E+001	-1,363E+002	-5,638E+001	6,853E+001	-1,378E+002
,775E+001	-6,865E+001	-1,381E+002	-3,775E+001	6,865E+001	-1,365E+002
,650E+001	-1,201E+002	-1,763E+002	-1,650E+001	1,201E+002	-1,840E+002
,918E+002	7,433E+001	7,962E+001	1,918E+002	-7,433E+001	1,062E+002
,401E+002	1,204E+002	1,382E+002	-1,401E+002	-1,204E+002	1,628E+002
,104E+001	1,090E+002	1,230E+002	-9,104E+001	-1,090E+002	1,495E+002
,698E+000	1,227E+002	1,405E+002	7,698E+000	-1,227E+002	1,662E+002
,984E+002	7,364E+001	7,798E+001	-1,984E+002	-7,364E+001	1,061E+002
,022E+001	-9,859E+001	-1,511E+002	-9,022E+001	9,859E+001	-1,446E+002
,622E+001	-5,857E+001	-1,167E+002	-6,622E+001	5,857E+001	-1,176E+002
,419E+001	-5,860E+001	-1,179E+002	-4,419E+001	5,860E+001	-1,165E+002
,565E+001	-9,989E+001	-1,465E+002	-1,565E+001	9,989E+001	-1,532E+002
,324E+001	6,455E+001	5,492E+001	9,324E+001	-6,455E+001	1,065E+002
,000E+002	9,639E+001	9,854E+001	-1,000E+002	-9,639E+001	1,424E+002
,107E+001	8,696E+001	8,604E+001	-9,107E+001	-8,696E+001	1,314E+002
,359E+001	9,412E+001	9,678E+001	-3,359E+001	-9,412E+001	1,385E+002
,853E+001	5,798E+001	4,710E+001	-9,853E+001	-5,798E+001	9,785E+001
,656E+002	-6,383E+001	-9,763E+001	-1,656E+002	6,383E+001	-9,386E+001
,128E+002	-4,095E+001	-8,162E+001	-1,128E+002	4,095E+001	-8,218E+001
,377E+001	-4,153E+001	-8,331E+001	-7,377E+001	4,153E+001	-8,282E+001

3,596E+001	-6,697E+001	-9,865E+001	-3,596E+001	6,697E+001	-1,022E+002
2,941E+001	3,016E+001	1,118E+001	2,941E+001	-3,016E+001	6,423E+001
7,716E+001	4,362E+001	3,305E+001	-7,716E+001	-4,362E+001	7,600E+001
9,166E+001	4,788E+001	3,414E+001	-9,166E+001	-4,788E+001	8,556E+001
5,903E+001	5,632E+001	4,294E+001	-5,903E+001	-5,632E+001	9,785E+001
3,157E+001	2,202E+001	4,389E+000	-3,157E+001	-2,202E+001	5,066E+001
1,698E+002	-2,941E+001	-4,423E+001	-1,698E+002	2,941E+001	-4,401E+001
1,262E+002	-2,249E+000	-3,200E+001	-1,262E+002	4,225E+001	-5,700E+001
7,834E+001	-5,932E-001	-2,856E+001	-7,834E+001	4,059E+001	-5,381E+001
2,202E+001	-3,157E+001	-4,404E+001	-2,202E+001	3,157E+001	-5,066E+001

Tumpuan

arah x	arah y	rotasi z
-1,1735111E+002	-4,2279290E+002	2,3515942E+002
-1,4336938E+002	2,3972221E+002	2,5637855E+002
-1,3374305E+002	9,1049019E+001	2,4772832E+002
-1,4226671E+002	-1,0893159E+002	2,5434235E+002
-1,1326975E+002	4,3095327E+002	2,2978340E+002

I

aman Portal Bidang dengan Sub Struktur

truktur :
s Elastisitas Bahan = 21000000,0000
Titik Kumpul = 30
nat Titik Kumpul

X	Y
0	0
3	0
7	0
11	0
14	0
0	2,5
3	2,5
7	2,5
11	2,5
14	2,5
0	5
3	5
7	5
11	5
14	5
0	7,5
3	7,5
7	7,5
11	7,5
14	7,5
0	10
3	10
7	10
11	10
14	10
0	12,5
3	12,5
7	12,5
11	12,5
14	12,5

ı Batang Struktur = 45
batang

ujung i	ujung j	Luas(A)	Inersia(I)	panjang(L)
1	6	1,2000000E-001	1,6000000E-003	2,5000000E+000
2	7	1,2000000E-001	1,6000000E-003	2,5000000E+000
3	8	1,2000000E-001	1,6000000E-003	2,5000000E+000
4	9	1,2000000E-001	1,6000000E-003	2,5000000E+000
5	10	1,2000000E-001	1,6000000E-003	2,5000000E+000
6	7	9,0000000E-002	6,7500000E-004	3,0000000E+000
7	8	9,0000000E-002	6,7500000E-004	4,0000000E+000
8	9	9,0000000E-002	6,7500000E-004	4,0000000E+000
9	10	9,0000000E-002	6,7500000E-004	3,0000000E+000
6	11	1,2000000E-001	1,6000000E-003	2,5000000E+000
7	12	1,2000000E-001	1,6000000E-003	2,5000000E+000
8	13	1,2000000E-001	1,6000000E-003	2,5000000E+000
9	14	1,2000000E-001	1,6000000E-003	2,5000000E+000
10	15	1,2000000E-001	1,6000000E-003	2,5000000E+000
11	12	9,0000000E-002	6,7500000E-004	3,0000000E+000
12	13	9,0000000E-002	6,7500000E-004	4,0000000E+000

13	14	9,0000000E-002	6,7500000E-004	4,0000000E+000
14	15	9,0000000E-002	6,7500000E-004	3,0000000E+000
11	16	1,2000000E-001	1,6000000E-003	2,5000000E+000
12	17	1,2000000E-001	1,6000000E-003	2,5000000E+000
13	18	1,2000000E-001	1,6000000E-003	2,5000000E+000
14	19	1,2000000E-001	1,6000000E-003	2,5000000E+000
15	20	1,2000000E-001	1,6000000E-003	2,5000000E+000
16	17	9,0000000E-002	6,7500000E-004	3,0000000E+000
17	18	9,0000000E-002	6,7500000E-004	4,0000000E+000
18	19	9,0000000E-002	6,7500000E-004	4,0000000E+000
19	20	9,0000000E-002	6,7500000E-004	3,0000000E+000
16	21	1,2000000E-001	1,6000000E-003	2,5000000E+000
17	22	1,2000000E-001	1,6000000E-003	2,5000000E+000
18	23	1,2000000E-001	1,6000000E-003	2,5000000E+000
19	24	1,2000000E-001	1,6000000E-003	2,5000000E+000
20	25	1,2000000E-001	1,6000000E-003	2,5000000E+000
21	22	9,0000000E-002	6,7500000E-004	3,0000000E+000
22	23	9,0000000E-002	6,7500000E-004	4,0000000E+000
23	24	9,0000000E-002	6,7500000E-004	4,0000000E+000
24	25	9,0000000E-002	6,7500000E-004	3,0000000E+000
21	26	1,2000000E-001	1,6000000E-003	2,5000000E+000
22	27	1,2000000E-001	1,6000000E-003	2,5000000E+000
23	28	1,2000000E-001	1,6000000E-003	2,5000000E+000
24	29	1,2000000E-001	1,6000000E-003	2,5000000E+000
25	30	1,2000000E-001	1,6000000E-003	2,5000000E+000
26	27	9,0000000E-002	6,7500000E-004	3,0000000E+000
27	28	9,0000000E-002	6,7500000E-004	4,0000000E+000
28	29	9,0000000E-002	6,7500000E-004	4,0000000E+000
29	30	9,0000000E-002	6,7500000E-004	3,0000000E+000

ı Pengekang Tumpuan = 5

Pengekang Tumpuan

arah x	arah y	rotasi z
1	1	1
1	1	1
1	1	1
1	1	1
1	1	1

Sub Struktur

ı Sub Struktur yang Direncanakan = 2

truktur 1

ı Node Pertemuan = 5

ı Node Dalam = 10

ı Batang = 18

Sub Struktur

Pertemuan	Node Dalam	Batang
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
	6	6
	7	7
	8	8
	9	9
	10	10

ruktur 2
Node Pertemuan = 5
Node Dalam = 15
Batang = 27
Sub Struktur

ertemuan	Node Dalam	Batang
	16	19
	17	20
	18	21
	19	22
	20	23
	21	24
	22	25
	23	26
	24	27
	25	28
	26	29
	27	30
	28	31
	29	32
	30	33

eban
Titik Kumpul yang Terbebani = 8
li Titik Kumpul

arah x	arah y	rotasi z
5,0000000E+001	0,0000000E+000	1,0000000E+001
1,0000000E+002	0,0000000E+000	1,0000000E+001
1,0000000E+002	0,0000000E+000	1,0000000E+001
2,0000000E+002	0,0000000E+000	2,0000000E+001
2,0000000E+002	0,0000000E+000	2,0000000E+001
0,0000000E+000	-5,0000000E+001	0,0000000E+000
0,0000000E+000	-5,0000000E+001	0,0000000E+000
0,0000000E+000	-5,0000000E+001	0,0000000E+000

Batang yang Terbebani = 2
li Ujung Batang Terkekang Akibat Beban

AML1	AML2	AML3	AML4	AML5	AML6
0,000E+000	2,000E+001	1,333E+001	0,000E+000	2,000E+001	-1,333E+001
0,000E+000	2,000E+001	1,333E+001	0,000E+000	2,000E+001	-1,333E+001

dahan Titik Kumpul(Displacement)

arah x	arah y	rotasi z
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
1,2775932E-002	4,1943740E-004	-6,5826284E-003
1,2732893E-002	-2,3781965E-004	-5,7415796E-003
1,2674459E-002	-9,0326408E-005	-5,9932672E-003
1,2628977E-002	1,0806706E-004	-5,6926316E-003
1,2592256E-002	-4,2753300E-004	-6,5622181E-003
3,3466034E-002	7,2744321E-004	-7,0408351E-003
3,3339272E-002	-4,2647959E-004	-6,2834113E-003

3,3219952E-002	-1,8052890E-004	-6,4865689E-003
3,3140050E-002	1,6674037E-004	-6,2547065E-003
3,3113862E-002	-7,4352429E-004	-7,0606830E-003
5,2712832E-002	9,1774622E-004	-6,0523643E-003
5,2569622E-002	-5,6542692E-004	-5,3687270E-003
5,2429467E-002	-2,7084717E-004	-5,5019031E-003
5,2335954E-002	1,7437702E-004	-5,2994370E-003
5,2311106E-002	-9,4037296E-004	-6,0142217E-003
6,7948506E-002	1,0102463E-003	-4,1350676E-003
6,7685627E-002	-6,6467368E-004	-3,7359487E-003
6,7446792E-002	-3,6119725E-004	-3,8160454E-003
6,7290665E-002	1,4104944E-004	-3,7462791E-003
6,7233581E-002	-1,0381233E-003	-4,1261653E-003
7,6987973E-002	1,0394239E-003	-2,1614375E-003
7,6718388E-002	-7,4122305E-004	-2,1379364E-003
7,6451261E-002	-4,5212591E-004	-1,9031445E-003
7,6285467E-002	8,2491245E-005	-1,7036258E-003
7,6250514E-002	-1,0694392E-003	-2,4046975E-003

Ujung Batang

AM1	AM2	AM3	AM4	AM5	AM6
-4,228E+002	1,174E+002	2,352E+002	4,228E+002	-1,174E+002	5,822E+001
2,397E+002	1,434E+002	2,564E+002	-2,397E+002	-1,434E+002	1,020E+002
9,105E+001	1,337E+002	2,477E+002	-9,105E+001	-1,337E+002	8,663E+001
-1,089E+002	1,423E+002	2,543E+002	1,089E+002	-1,423E+002	1,013E+002
4,310E+002	1,133E+002	2,298E+002	-4,310E+002	-1,133E+002	5,339E+001
2,711E+001	-1,123E+002	-1,725E+002	-2,711E+001	1,123E+002	-1,645E+002
2,761E+001	-6,277E+001	-1,246E+002	-2,761E+001	6,277E+001	-1,264E+002
2,149E+001	-6,265E+001	-1,264E+002	-2,149E+001	6,265E+001	-1,242E+002
2,313E+001	-1,124E+002	-1,645E+002	-2,313E+001	1,124E+002	-1,728E+002
-3,105E+002	9,447E+001	1,242E+002	3,105E+002	-9,447E+001	1,119E+002
1,902E+002	1,439E+002	1,871E+002	-1,902E+002	-1,439E+002	1,725E+002
9,092E+001	1,276E+002	1,662E+002	-9,092E+001	-1,276E+002	1,529E+002
-5,914E+001	1,439E+002	1,874E+002	5,914E+001	-1,439E+002	1,723E+002
3,185E+002	9,014E+001	1,194E+002	-3,185E+002	-9,014E+001	1,060E+002
7,986E+001	-1,186E+002	-1,815E+002	-7,986E+001	1,186E+002	-1,744E+002
5,638E+001	-6,853E+001	-1,363E+002	-5,638E+001	6,853E+001	-1,378E+002
3,775E+001	-6,865E+001	-1,381E+002	-3,775E+001	6,865E+001	-1,365E+002
1,650E+001	-1,201E+002	-1,763E+002	-1,650E+001	1,201E+002	-1,840E+002
-1,918E+002	7,433E+001	7,962E+001	1,918E+002	-7,433E+001	1,062E+002
1,401E+002	1,204E+002	1,382E+002	-1,401E+002	-1,204E+002	1,628E+002
9,104E+001	1,090E+002	1,230E+002	-9,104E+001	-1,090E+002	1,495E+002
-7,698E+000	1,227E+002	1,405E+002	7,698E+000	-1,227E+002	1,662E+002
1,984E+002	7,364E+001	7,798E+001	-1,984E+002	-7,364E+001	1,061E+002
9,022E+001	-9,859E+001	-1,511E+002	-9,022E+001	9,859E+001	-1,446E+002
6,622E+001	-5,857E+001	-1,167E+002	-6,622E+001	5,857E+001	-1,176E+002
4,419E+001	-5,860E+001	-1,179E+002	-4,419E+001	5,860E+001	-1,165E+002
1,565E+001	-9,989E+001	-1,465E+002	-1,565E+001	9,989E+001	-1,532E+002
-9,324E+001	6,455E+001	5,492E+001	9,324E+001	-6,455E+001	1,065E+002
1,000E+002	9,639E+001	9,854E+001	-1,000E+002	-9,639E+001	1,424E+002
9,107E+001	8,696E+001	8,604E+001	-9,107E+001	-8,696E+001	1,314E+002
3,359E+001	9,412E+001	9,678E+001	-3,359E+001	-9,412E+001	1,385E+002
9,853E+001	5,798E+001	4,710E+001	-9,853E+001	-5,798E+001	9,785E+001
1,656E+002	-6,383E+001	-9,763E+001	-1,656E+002	6,383E+001	-9,386E+001
1,128E+002	-4,095E+001	-8,162E+001	-1,128E+002	4,095E+001	-8,218E+001
7,377E+001	-4,153E+001	-8,331E+001	-7,377E+001	4,153E+001	-8,282E+001

3,596E+001	-6,697E+001	-9,865E+001	-3,596E+001	6,697E+001	-1,022E+002
2,941E+001	3,016E+001	1,118E+001	2,941E+001	-3,016E+001	6,423E+001
7,716E+001	4,362E+001	3,305E+001	-7,716E+001	-4,362E+001	7,600E+001
9,166E+001	4,788E+001	3,414E+001	-9,166E+001	-4,788E+001	8,556E+001
5,903E+001	5,632E+001	4,294E+001	-5,903E+001	-5,632E+001	9,785E+001
3,157E+001	2,202E+001	4,389E+000	-3,157E+001	-2,202E+001	5,066E+001
1,698E+002	-2,941E+001	-4,423E+001	-1,698E+002	2,941E+001	-4,401E+001
1,262E+002	-2,249E+000	-3,200E+001	-1,262E+002	4,225E+001	-5,700E+001
7,834E+001	-5,932E-001	-2,856E+001	-7,834E+001	4,059E+001	-5,381E+001
2,202E+001	-3,157E+001	-4,404E+001	-2,202E+001	3,157E+001	-5,066E+001

Tumpuan

arah x	arah y	rotasi z
-1,1735111E+002	-4,2279290E+002	2,3515942E+002
-1,4336938E+002	2,3972221E+002	2,5637855E+002
-1,3374305E+002	9,1049019E+001	2,4772832E+002
-1,4226671E+002	-1,0893159E+002	2,5434235E+002
-1,1326975E+002	4,3095327E+002	2,2978340E+002

'aman Portal Bidang dengan Sub Struktur

truktur :
ıs Elastisitas Bahan = 21000000,0000
ı Titik Kumpul = 30
.nat Titik Kumpul

X	Y
0	0
3	0
7	0
11	0
14	0
0	2,5
3	2,5
7	2,5
11	2,5
14	2,5
0	5
3	5
7	5
11	5
14	5
0	7,5
3	7,5
7	7,5
11	7,5
14	7,5
0	10
3	10
7	10
11	10
14	10
0	12,5
3	12,5
7	12,5
11	12,5
14	12,5

ı Batang Struktur = 45
Batang

ujung i	ujung j	Luas(A)	Inersia(I)	panjang(L)
1	6	1,2000000E-001	1,6000000E-003	2,5000000E+000
2	7	1,2000000E-001	1,6000000E-003	2,5000000E+000
3	8	1,2000000E-001	1,6000000E-003	2,5000000E+000
4	9	1,2000000E-001	1,6000000E-003	2,5000000E+000
5	10	1,2000000E-001	1,6000000E-003	2,5000000E+000
6	7	9,0000000E-002	6,7500000E-004	3,0000000E+000
7	8	9,0000000E-002	6,7500000E-004	4,0000000E+000
8	9	9,0000000E-002	6,7500000E-004	4,0000000E+000
9	10	9,0000000E-002	6,7500000E-004	3,0000000E+000
6	11	1,2000000E-001	1,6000000E-003	2,5000000E+000
7	12	1,2000000E-001	1,6000000E-003	2,5000000E+000
8	13	1,2000000E-001	1,6000000E-003	2,5000000E+000
9	14	1,2000000E-001	1,6000000E-003	2,5000000E+000
10	15	1,2000000E-001	1,6000000E-003	2,5000000E+000
11	12	9,0000000E-002	6,7500000E-004	3,0000000E+000
12	13	9,0000000E-002	6,7500000E-004	4,0000000E+000

13	14	9,0000000E-002	6,7500000E-004	4,0000000E+000
14	15	9,0000000E-002	6,7500000E-004	3,0000000E+000
11	16	1,2000000E-001	1,6000000E-003	2,5000000E+000
12	17	1,2000000E-001	1,6000000E-003	2,5000000E+000
13	18	1,2000000E-001	1,6000000E-003	2,5000000E+000
14	19	1,2000000E-001	1,6000000E-003	2,5000000E+000
15	20	1,2000000E-001	1,6000000E-003	2,5000000E+000
16	17	9,0000000E-002	6,7500000E-004	3,0000000E+000
17	18	9,0000000E-002	6,7500000E-004	4,0000000E+000
18	19	9,0000000E-002	6,7500000E-004	4,0000000E+000
19	20	9,0000000E-002	6,7500000E-004	3,0000000E+000
16	21	1,2000000E-001	1,6000000E-003	2,5000000E+000
17	22	1,2000000E-001	1,6000000E-003	2,5000000E+000
18	23	1,2000000E-001	1,6000000E-003	2,5000000E+000
19	24	1,2000000E-001	1,6000000E-003	2,5000000E+000
20	25	1,2000000E-001	1,6000000E-003	2,5000000E+000
21	22	9,0000000E-002	6,7500000E-004	3,0000000E+000
22	23	9,0000000E-002	6,7500000E-004	4,0000000E+000
23	24	9,0000000E-002	6,7500000E-004	4,0000000E+000
24	25	9,0000000E-002	6,7500000E-004	3,0000000E+000
21	26	1,2000000E-001	1,6000000E-003	2,5000000E+000
22	27	1,2000000E-001	1,6000000E-003	2,5000000E+000
23	28	1,2000000E-001	1,6000000E-003	2,5000000E+000
24	29	1,2000000E-001	1,6000000E-003	2,5000000E+000
25	30	1,2000000E-001	1,6000000E-003	2,5000000E+000
26	27	9,0000000E-002	6,7500000E-004	3,0000000E+000
27	28	9,0000000E-002	6,7500000E-004	4,0000000E+000
28	29	9,0000000E-002	6,7500000E-004	4,0000000E+000
29	30	9,0000000E-002	6,7500000E-004	3,0000000E+000

n Pengekang Tumpuan = 5

Pengekang Tumpuan

arah x	arah y	rotasi z
1	1	1
1	1	1
1	1	1
1	1	1
1	1	1

Sub Struktur

h Sub Struktur yang Direncanakan = 2

truktur 1

h Node Pertemuan = 5

h Node Dalam = 12

h Batang = 20

s Sub Struktur

Pertemuan	Node Dalam	Batang
8	1	1
3	2	2
8	6	6
3	7	7
8	11	10
	12	11
	16	15
	17	16
	21	19
	22	20

26	24
27	25

ruktur 2
. Node Pertemuan = 5
. Node Dalam = 13
. Batang = 25
Sub Struktur

'ertemuan	Node Dalam	Batang
	3	3
	4	4
	5	5
	9	8
	10	9
	14	12
	15	13
	19	14
	20	17
	24	18
	25	21
	29	22
	30	23

)eban
ı Titik Kumpul yang Terbebani = 8
ıi Titik Kumpul

arah x	arah y	rotasi z
5,0000000E+001	0,0000000E+000	1,0000000E+001
1,0000000E+002	0,0000000E+000	1,0000000E+001
1,0000000E+002	0,0000000E+000	1,0000000E+001
2,0000000E+002	0,0000000E+000	2,0000000E+001
2,0000000E+002	0,0000000E+000	2,0000000E+001
0,0000000E+000	-5,0000000E+001	0,0000000E+000
0,0000000E+000	-5,0000000E+001	0,0000000E+000
0,0000000E+000	-5,0000000E+001	0,0000000E+000

ı Batang yang Terbebani = 2
ıi Ujung Batang Terkekang Akibat Beban

; AML1	AML2	AML3	AML4	AML5	AML6
0,000E+000	2,000E+001	1,333E+001	0,000E+000	2,000E+001	-1,333E+001
0,000E+000	2,000E+001	1,333E+001	0,000E+000	2,000E+001	-1,333E+001

ıdahan Titik Kumpul(Displacement)

arah x	arah y	rotasi z
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
1,2775932E-002	4,1943740E-004	-6,5826284E-003
1,2732893E-002	-2,3781965E-004	-5,7415796E-003
1,2674459E-002	-9,0326408E-005	-5,9932672E-003
1,2628977E-002	1,0806706E-004	-5,6926316E-003
1,2592256E-002	-4,2753300E-004	-6,5622181E-003
3,3466034E-002	7,2744321E-004	-7,0408351E-003
3,3339272E-002	-4,2647959E-004	-6,2834113E-003

3,3219952E-002	-1,8052890E-004	-6,4865689E-003
3,3140050E-002	1,6674037E-004	-6,2547065E-003
3,3113862E-002	-7,4352429E-004	-7,0606830E-003
5,2712832E-002	9,1774622E-004	-6,0523643E-003
5,2569622E-002	-5,6542692E-004	-5,3687270E-003
5,2429467E-002	-2,7084717E-004	-5,5019031E-003
5,2335954E-002	1,7437702E-004	-5,2994370E-003
5,2311106E-002	-9,4037296E-004	-6,0142217E-003
6,7948506E-002	1,0102463E-003	-4,1350676E-003
6,7685627E-002	-6,6467368E-004	-3,7359487E-003
6,7446792E-002	-3,6119725E-004	-3,8160454E-003
6,7290665E-002	1,4104944E-004	-3,7462791E-003
6,7233581E-002	-1,0381233E-003	-4,1261653E-003
7,6987973E-002	1,0394239E-003	-2,1614375E-003
7,6718388E-002	-7,4122305E-004	-2,1379364E-003
7,6451261E-002	-4,5212591E-004	-1,9031445E-003
7,6285467E-002	8,2491245E-005	-1,7036258E-003
7,6250514E-002	-1,0694392E-003	-2,4046975E-003

Ujung Batang

AM1	AM2	AM3	AM4	AM5	AM6
-4,228E+002	1,174E+002	2,352E+002	4,228E+002	-1,174E+002	5,822E+001
2,397E+002	1,434E+002	2,564E+002	-2,397E+002	-1,434E+002	1,020E+002
9,105E+001	1,337E+002	2,477E+002	-9,105E+001	-1,337E+002	8,663E+001
-1,089E+002	1,423E+002	2,543E+002	1,089E+002	-1,423E+002	1,013E+002
4,310E+002	1,133E+002	2,298E+002	-4,310E+002	-1,133E+002	5,339E+001
2,711E+001	-1,123E+002	-1,725E+002	-2,711E+001	1,123E+002	-1,645E+002
2,761E+001	-6,277E+001	-1,246E+002	-2,761E+001	6,277E+001	-1,264E+002
2,149E+001	-6,265E+001	-1,264E+002	-2,149E+001	6,265E+001	-1,242E+002
2,313E+001	-1,124E+002	-1,645E+002	-2,313E+001	1,124E+002	-1,728E+002
-3,105E+002	9,447E+001	1,242E+002	3,105E+002	-9,447E+001	1,119E+002
1,902E+002	1,439E+002	1,871E+002	-1,902E+002	-1,439E+002	1,725E+002
9,092E+001	1,276E+002	1,662E+002	-9,092E+001	-1,276E+002	1,529E+002
-5,914E+001	1,439E+002	1,874E+002	5,914E+001	-1,439E+002	1,723E+002
3,185E+002	9,014E+001	1,194E+002	-3,185E+002	-9,014E+001	1,060E+002
7,986E+001	-1,186E+002	-1,815E+002	-7,986E+001	1,186E+002	-1,744E+002
5,638E+001	-6,853E+001	-1,363E+002	-5,638E+001	6,853E+001	-1,378E+002
3,775E+001	-6,865E+001	-1,381E+002	-3,775E+001	6,865E+001	-1,365E+002
1,650E+001	-1,201E+002	-1,763E+002	-1,650E+001	1,201E+002	-1,840E+002
-1,918E+002	7,433E+001	7,962E+001	1,918E+002	-7,433E+001	1,062E+002
1,401E+002	1,204E+002	1,382E+002	-1,401E+002	-1,204E+002	1,628E+002
9,104E+001	1,090E+002	1,230E+002	-9,104E+001	-1,090E+002	1,495E+002
-7,698E+000	1,227E+002	1,405E+002	7,698E+000	-1,227E+002	1,662E+002
1,984E+002	7,364E+001	7,798E+001	-1,984E+002	-7,364E+001	1,061E+002
9,022E+001	-9,859E+001	-1,511E+002	-9,022E+001	9,859E+001	-1,446E+002
6,622E+001	-5,857E+001	-1,167E+002	-6,622E+001	5,857E+001	-1,176E+002
4,419E+001	-5,860E+001	-1,179E+002	-4,419E+001	5,860E+001	-1,165E+002
1,565E+001	-9,989E+001	-1,465E+002	-1,565E+001	9,989E+001	-1,532E+002
-9,324E+001	6,455E+001	5,492E+001	9,324E+001	-6,455E+001	1,065E+002
1,000E+002	9,639E+001	9,854E+001	-1,000E+002	-9,639E+001	1,424E+002
9,107E+001	8,696E+001	8,604E+001	-9,107E+001	-8,696E+001	1,314E+002
3,359E+001	9,412E+001	9,678E+001	-3,359E+001	-9,412E+001	1,385E+002
9,853E+001	5,798E+001	4,710E+001	-9,853E+001	-5,798E+001	9,785E+001
1,656E+002	-6,383E+001	-9,763E+001	-1,656E+002	6,383E+001	-9,386E+001
1,128E+002	-4,095E+001	-8,162E+001	-1,128E+002	4,095E+001	-8,218E+001
7,377E+001	-4,153E+001	-8,331E+001	-7,377E+001	4,153E+001	-8,282E+001

3,596E+001	-6,697E+001	-9,865E+001	-3,596E+001	6,697E+001	-1,022E+002
2,941E+001	3,016E+001	1,118E+001	2,941E+001	-3,016E+001	6,423E+001
7,716E+001	4,362E+001	3,305E+001	-7,716E+001	-4,362E+001	7,600E+001
9,166E+001	4,788E+001	3,414E+001	-9,166E+001	-4,788E+001	8,556E+001
5,903E+001	5,632E+001	4,294E+001	-5,903E+001	-5,632E+001	9,785E+001
3,157E+001	2,202E+001	4,389E+000	-3,157E+001	-2,202E+001	5,066E+001
1,698E+002	-2,941E+001	-4,423E+001	-1,698E+002	2,941E+001	-4,401E+001
1,262E+002	-2,249E+000	-3,200E+001	-1,262E+002	4,225E+001	-5,700E+001
7,834E+001	-5,932E-001	-2,856E+001	-7,834E+001	4,059E+001	-5,381E+001
2,202E+001	-3,157E+001	-4,404E+001	-2,202E+001	3,157E+001	-5,066E+001

Tumpuan

arah x	arah y	rotasi z
-1,1735111E+002	-4,2279290E+002	2,3515942E+002
-1,4336938E+002	2,3972221E+002	2,5637855E+002
-1,3374305E+002	9,1049019E+001	2,4772832E+002
-1,4226671E+002	-1,0893159E+002	2,5434235E+002
-1,1326975E+002	4,3095327E+002	2,2978340E+002

I

aman Portal Bidang dengan Sub Struktur

truktur :
s Elastisitas Bahan = 21000000,0000
Titik Kumpul = 30
nat Titik Kumpul

X	Y
0	0
3	0
7	0
11	0
14	0
0	2,5
3	2,5
7	2,5
11	2,5
14	2,5
0	5
3	5
7	5
11	5
14	5
0	7,5
3	7,5
7	7,5
11	7,5
14	7,5
0	10
3	10
7	10
11	10
14	10
0	12,5
3	12,5
7	12,5
11	12,5
14	12,5

ı Batang Struktur = 45
Batang

ujung i	ujung j	Luas(A)	Inersia(I)	panjang(L)
1	6	1,2000000E-001	1,6000000E-003	2,5000000E+000
2	7	1,2000000E-001	1,6000000E-003	2,5000000E+000
3	8	1,2000000E-001	1,6000000E-003	2,5000000E+000
4	9	1,2000000E-001	1,6000000E-003	2,5000000E+000
5	10	1,2000000E-001	1,6000000E-003	2,5000000E+000
6	7	9,0000000E-002	6,7500000E-004	3,0000000E+000
7	8	9,0000000E-002	6,7500000E-004	4,0000000E+000
8	9	9,0000000E-002	6,7500000E-004	4,0000000E+000
9	10	9,0000000E-002	6,7500000E-004	3,0000000E+000
6	11	1,2000000E-001	1,6000000E-003	2,5000000E+000
7	12	1,2000000E-001	1,6000000E-003	2,5000000E+000
8	13	1,2000000E-001	1,6000000E-003	2,5000000E+000
9	14	1,2000000E-001	1,6000000E-003	2,5000000E+000
10	15	1,2000000E-001	1,6000000E-003	2,5000000E+000
11	12	9,0000000E-002	6,7500000E-004	3,0000000E+000
12	13	9,0000000E-002	6,7500000E-004	4,0000000E+000

13	14	9,0000000E-002	6,7500000E-004	4,0000000E+000
14	15	9,0000000E-002	6,7500000E-004	3,0000000E+000
11	16	1,2000000E-001	1,6000000E-003	2,5000000E+000
12	17	1,2000000E-001	1,6000000E-003	2,5000000E+000
13	18	1,2000000E-001	1,6000000E-003	2,5000000E+000
14	19	1,2000000E-001	1,6000000E-003	2,5000000E+000
15	20	1,2000000E-001	1,6000000E-003	2,5000000E+000
16	17	9,0000000E-002	6,7500000E-004	3,0000000E+000
17	18	9,0000000E-002	6,7500000E-004	4,0000000E+000
18	19	9,0000000E-002	6,7500000E-004	4,0000000E+000
19	20	9,0000000E-002	6,7500000E-004	3,0000000E+000
16	21	1,2000000E-001	1,6000000E-003	2,5000000E+000
17	22	1,2000000E-001	1,6000000E-003	2,5000000E+000
18	23	1,2000000E-001	1,6000000E-003	2,5000000E+000
19	24	1,2000000E-001	1,6000000E-003	2,5000000E+000
20	25	1,2000000E-001	1,6000000E-003	2,5000000E+000
21	22	9,0000000E-002	6,7500000E-004	3,0000000E+000
22	23	9,0000000E-002	6,7500000E-004	4,0000000E+000
23	24	9,0000000E-002	6,7500000E-004	4,0000000E+000
24	25	9,0000000E-002	6,7500000E-004	3,0000000E+000
21	26	1,2000000E-001	1,6000000E-003	2,5000000E+000
22	27	1,2000000E-001	1,6000000E-003	2,5000000E+000
23	28	1,2000000E-001	1,6000000E-003	2,5000000E+000
24	29	1,2000000E-001	1,6000000E-003	2,5000000E+000
25	30	1,2000000E-001	1,6000000E-003	2,5000000E+000
26	27	9,0000000E-002	6,7500000E-004	3,0000000E+000
27	28	9,0000000E-002	6,7500000E-004	4,0000000E+000
28	29	9,0000000E-002	6,7500000E-004	4,0000000E+000
29	30	9,0000000E-002	6,7500000E-004	3,0000000E+000

ı Pengekang Tumpuan = 5

Pengekang Tumpuan

arah x	arah y	rotasi z
1	1	1
1	1	1
1	1	1
1	1	1
1	1	1

Sub Struktur

ı Sub Struktur yang Direncanakan = 4

truktur 1

ı Node Pertemuan = 5

ı Node Dalam = 6

ı Batang = 10

Sub Struktur

Pertemuan	Node Dalam	Batang
3	1	1
3	2	2
5	6	6
7	7	7
3	11	10
	12	11

truktur 2

ı Node Pertemuan = 5

ı Node Dalam = 7

ı Batang = 13

s Sub Struktur

Pertemuan	Node Dalam	Batang
8	3	3
3	4	4
8	5	5
9	9	8
0	10	9
	14	12
	15	13

truktur 3
h Node Pertemuan = 5
n Node Dalam = 4
n Batang = 10
s Sub Struktur

Pertemuan	Node Dalam	Batang
6	21	24
7	22	25
8	26	28
3	27	29
8		33
		34
		37
		38
		42
		43

truktur 4
h Node Pertemuan = 5
n Node Dalam = 4
h Batang = 12
s Sub Struktur

Pertemuan	Node Dalam	Batang
8	24	26
9	25	27
0	29	30
3	30	31
8		32
		35
		36
		39
		40
		41
		44
		45

Beban
h Titik Kumpul yang Terbebani = 8
di Titik Kumpul

arah x	arah y	rotasi z
5,0000000E+001	0,0000000E+000	1,0000000E+001
1,0000000E+002	0,0000000E+000	1,0000000E+001
1,0000000E+002	0,0000000E+000	1,0000000E+001
2,0000000E+002	0,0000000E+000	2,0000000E+001
2,0000000E+002	0,0000000E+000	2,0000000E+001
0,0000000E+000	-5,0000000E+001	0,0000000E+000
0,0000000E+000	-5,0000000E+001	0,0000000E+000
0,0000000E+000	-5,0000000E+001	0,0000000E+000

Batang yang Terbebani = 2

i Ujung Batang Terkekang Akibat Beban

AML1	AML2	AML3	AML4	AML5	AML6
0,000E+000	2,000E+001	1,333E+001	0,000E+000	2,000E+001	-1,333E+001
0,000E+000	2,000E+001	1,333E+001	0,000E+000	2,000E+001	-1,333E+001

dahan Titik Kumpul(Displacement)

arah x	arah y	rotasi z
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
0,0000000E+000	0,0000000E+000	0,0000000E+000
1,2775932E-002	4,1943740E-004	-6,5826284E-003
1,2732893E-002	-2,3781965E-004	-5,7415796E-003
1,2674459E-002	-9,0326408E-005	-5,9932672E-003
1,2628977E-002	1,0806706E-004	-5,6926316E-003
1,2592256E-002	-4,2753300E-004	-6,5622181E-003
3,3466034E-002	7,2744321E-004	-7,0408351E-003
3,3339272E-002	-4,2647959E-004	-6,2834113E-003
3,3219952E-002	-1,8052890E-004	-6,4865689E-003
3,3140050E-002	1,6674037E-004	-6,2547065E-003
3,3113862E-002	-7,4352429E-004	-7,0606830E-003
5,2712832E-002	9,1774622E-004	-6,0523643E-003
5,2569622E-002	-5,6542692E-004	-5,3687270E-003
5,2429467E-002	-2,7084717E-004	-5,5019031E-003
5,2335954E-002	1,7437702E-004	-5,2994370E-003
5,2311106E-002	-9,4037296E-004	-6,0142217E-003
6,7948506E-002	1,0102463E-003	-4,1350676E-003
6,7685627E-002	-6,6467368E-004	-3,7359487E-003
6,7446792E-002	-3,6119725E-004	-3,8160454E-003
6,7290665E-002	1,4104944E-004	-3,7462791E-003
6,7233581E-002	-1,0381233E-003	-4,1261653E-003
7,6987973E-002	1,0394239E-003	-2,1614375E-003
7,6718388E-002	-7,4122305E-004	-2,1379364E-003
7,6451261E-002	-4,5212591E-004	-1,9031445E-003
7,6285467E-002	8,2491245E-005	-1,7036258E-003
7,6250514E-002	-1,0694392E-003	-2,4046975E-003

Jjung Batang

g AM1	AM2	AM3	AM4	AM5	AM6
-4,228E+002	1,174E+002	2,352E+002	4,228E+002	-1,174E+002	5,822E+001
2,397E+002	1,434E+002	2,564E+002	-2,397E+002	-1,434E+002	1,020E+002
9,105E+001	1,337E+002	2,477E+002	-9,105E+001	-1,337E+002	8,663E+001
-1,089E+002	1,423E+002	2,543E+002	1,089E+002	-1,423E+002	1,013E+002
4,310E+002	1,133E+002	2,298E+002	-4,310E+002	-1,133E+002	5,339E+001
2,711E+001	-1,123E+002	-1,725E+002	-2,711E+001	1,123E+002	-1,645E+002
2,761E+001	-6,277E+001	-1,246E+002	-2,761E+001	6,277E+001	-1,264E+002
2,149E+001	-6,265E+001	-1,264E+002	-2,149E+001	6,265E+001	-1,242E+002
2,313E+001	-1,124E+002	-1,645E+002	-2,313E+001	1,124E+002	-1,728E+002
-3,105E+002	9,447E+001	1,242E+002	3,105E+002	-9,447E+001	1,119E+002
1,902E+002	1,439E+002	1,871E+002	-1,902E+002	-1,439E+002	1,725E+002
9,092E+001	1,276E+002	1,662E+002	-9,092E+001	-1,276E+002	1,529E+002
-5,914E+001	1,439E+002	1,874E+002	5,914E+001	-1,439E+002	1,723E+002

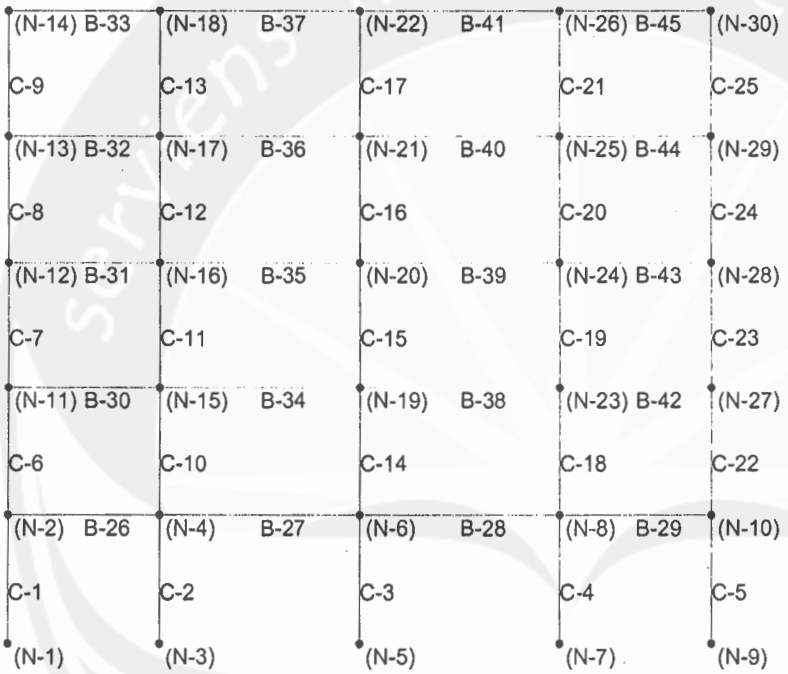
3,185E+002	9,014E+001	1,194E+002	-3,185E+002	-9,014E+001	1,060E+002
7,986E+001	-1,186E+002	-1,815E+002	-7,986E+001	1,186E+002	-1,744E+002
5,638E+001	-6,853E+001	-1,363E+002	-5,638E+001	6,853E+001	-1,378E+002
3,775E+001	-6,865E+001	-1,381E+002	-3,775E+001	6,865E+001	-1,365E+002
1,650E+001	-1,201E+002	-1,763E+002	-1,650E+001	1,201E+002	-1,840E+002
-1,918E+002	7,433E+001	7,962E+001	1,918E+002	-7,433E+001	1,062E+002
1,401E+002	1,204E+002	1,382E+002	-1,401E+002	-1,204E+002	1,628E+002
9,104E+001	1,090E+002	1,230E+002	-9,104E+001	-1,090E+002	1,495E+002
-7,698E+000	1,227E+002	1,405E+002	7,698E+000	-1,227E+002	1,662E+002
1,984E+002	7,364E+001	7,798E+001	-1,984E+002	-7,364E+001	1,061E+002
9,022E+001	-9,859E+001	-1,511E+002	-9,022E+001	9,859E+001	-1,446E+002
6,622E+001	-5,857E+001	-1,167E+002	-6,622E+001	5,857E+001	-1,176E+002
4,419E+001	-5,860E+001	-1,179E+002	-4,419E+001	5,860E+001	-1,165E+002
1,565E+001	-9,989E+001	-1,465E+002	-1,565E+001	9,989E+001	-1,532E+002
-9,324E+001	6,455E+001	5,492E+001	9,324E+001	-6,455E+001	1,065E+002
1,000E+002	9,639E+001	9,854E+001	-1,000E+002	-9,639E+001	1,424E+002
9,107E+001	8,696E+001	8,604E+001	-9,107E+001	-8,696E+001	1,314E+002
3,359E+001	9,412E+001	9,678E+001	-3,359E+001	-9,412E+001	1,385E+002
9,853E+001	5,798E+001	4,710E+001	-9,853E+001	-5,798E+001	9,785E+001
1,656E+002	-6,383E+001	-9,763E+001	-1,656E+002	6,383E+001	-9,386E+001
1,128E+002	-4,095E+001	-8,162E+001	-1,128E+002	4,095E+001	-8,218E+001
7,377E+001	-4,153E+001	-8,331E+001	-7,377E+001	4,153E+001	-8,282E+001
3,596E+001	-6,697E+001	-9,865E+001	-3,596E+001	6,697E+001	-1,022E+002
-2,941E+001	3,016E+001	1,118E+001	2,941E+001	-3,016E+001	6,423E+001
7,716E+001	4,362E+001	3,305E+001	-7,716E+001	-4,362E+001	7,600E+001
9,166E+001	4,788E+001	3,414E+001	-9,166E+001	-4,788E+001	8,556E+001
5,903E+001	5,632E+001	4,294E+001	-5,903E+001	-5,632E+001	9,785E+001
3,157E+001	2,202E+001	4,389E+000	-3,157E+001	-2,202E+001	5,066E+001
1,698E+002	-2,941E+001	-4,423E+001	-1,698E+002	2,941E+001	-4,401E+001
1,262E+002	-2,249E+000	-3,200E+001	-1,262E+002	4,225E+001	-5,700E+001
7,834E+001	-5,932E-001	-2,856E+001	-7,834E+001	4,059E+001	-5,381E+001
2,202E+001	-3,157E+001	-4,404E+001	-2,202E+001	3,157E+001	-5,066E+001

i Tumpuan

arah x	arah y	rotasi z
-1,1735111E+002	-4,2279290E+002	2,3515942E+002
-1,4336938E+002	2,3972221E+002	2,5637855E+002
-1,3374305E+002	9,1049019E+001	2,4772832E+002
-1,4226671E+002	-1,0893159E+002	2,5434235E+002
-1,1326975E+002	4,3095327E+002	2,2978340E+002

AI

ronald_2



Report prepared by
Atma Jaya University

General Information

Members	45
Nodes	30
Basic Load Cases * Self Load * Dead Load * Live Load	3
Combination Load Cases * Service Load * Ultimate Load	2

Nodal Information

Node	X (meter)	Y (meter)	Restraint X	Restraint Y	Restraint Z
N-1	1.000	0.000	Fixed	Fixed	Fixed
N-10	15.000	2.500			
N-11	1.000	5.000			
N-12	1.000	7.500			
N-13	1.000	10.000			
N-14	1.000	12.500			
N-15	4.000	5.000			
N-16	4.000	7.500			
N-17	4.000	10.000			
N-18	4.000	12.500			
N-19	8.000	5.000			
N-2	1.000	2.500			
N-20	8.000	7.500			
N-21	8.000	10.000			
N-22	8.000	12.500			
N-23	12.000	5.000			
N-24	12.000	7.500			
N-25	12.000	10.000			
N-26	12.000	12.500			
N-27	15.000	5.000			
N-28	15.000	7.500			
N-29	15.000	10.000			
N-3	4.000	0.000	Fixed	Fixed	Fixed
N-30	15.000	12.500			
N-4	4.000	2.500			
N-5	8.000	0.000	Fixed	Fixed	Fixed
N-6	8.000	2.500			
N-7	12.000	0.000	Fixed	Fixed	Fixed
N-8	12.000	2.500			
N-9	15.000	0.000	Fixed	Fixed	Fixed

Spring constant and imposed displacements, if any, are in kN/m, KN-m/radian, mm and radians.

Material Information

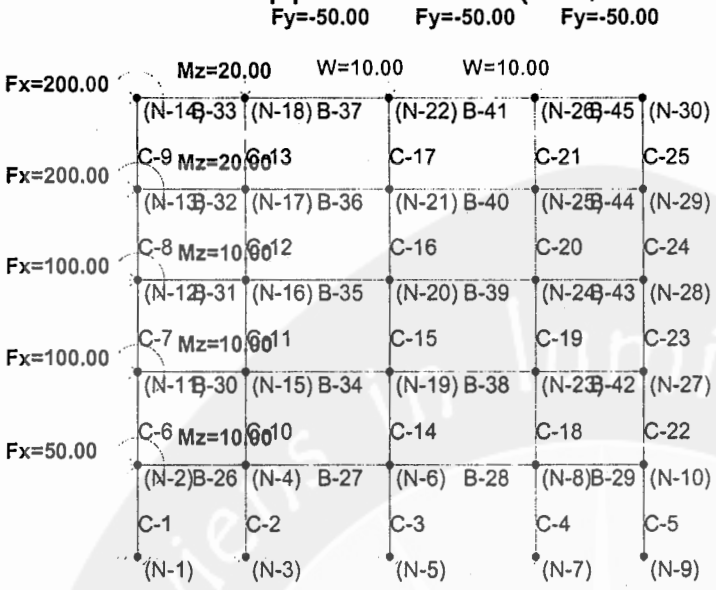
Material	Name	E [N/mm^2]	W [KN/m^3]	alpha [/C]
1	Default Material	2.050E+04	24.00	9.900E-04
2	ronald	2.100E+04	1.00	1.00

Member Information

Member	Node i	Node j	Area X (sq mm)	Inertia Z (mm^4)	Length (meter)
B-26	N-2	N-4	9.000E+04	6.750E+08	3.00
B-27	N-4	N-6	9.000E+04	6.750E+08	4.00
B-28	N-6	N-8	9.000E+04	6.750E+08	4.00
B-29	N-8	N-10	9.000E+04	6.750E+08	3.00
B-30	N-11	N-15	9.000E+04	6.750E+08	3.00
B-31	N-12	N-16	9.000E+04	6.750E+08	3.00
B-32	N-13	N-17	9.000E+04	6.750E+08	3.00
B-33	N-14	N-18	9.000E+04	6.750E+08	3.00
B-34	N-15	N-19	9.000E+04	6.750E+08	4.00
B-35	N-16	N-20	9.000E+04	6.750E+08	4.00
B-36	N-17	N-21	9.000E+04	6.750E+08	4.00
B-37	N-18	N-22	9.000E+04	6.750E+08	4.00
B-38	N-19	N-23	9.000E+04	6.750E+08	4.00
B-39	N-20	N-24	9.000E+04	6.750E+08	4.00
B-40	N-21	N-25	9.000E+04	6.750E+08	4.00
B-41	N-22	N-26	9.000E+04	6.750E+08	4.00
B-42	N-23	N-27	9.000E+04	6.750E+08	3.00
B-43	N-24	N-28	9.000E+04	6.750E+08	3.00
B-44	N-25	N-29	9.000E+04	6.750E+08	3.00
B-45	N-26	N-30	9.000E+04	6.750E+08	3.00
C-1	N-1	N-2	1.200E+05	1.600E+09	2.50
C-10	N-4	N-15	1.200E+05	1.600E+09	2.50
C-11	N-15	N-16	1.200E+05	1.600E+09	2.50
C-12	N-16	N-17	1.200E+05	1.600E+09	2.50
C-13	N-17	N-18	1.200E+05	1.600E+09	2.50
C-14	N-6	N-19	1.200E+05	1.600E+09	2.50
C-15	N-19	N-20	1.200E+05	1.600E+09	2.50
C-16	N-20	N-21	1.200E+05	1.600E+09	2.50
C-17	N-21	N-22	1.200E+05	1.600E+09	2.50
C-18	N-8	N-23	1.200E+05	1.600E+09	2.50
C-19	N-23	N-24	1.200E+05	1.600E+09	2.50
C-2	N-3	N-4	1.200E+05	1.600E+09	2.50
C-20	N-24	N-25	1.200E+05	1.600E+09	2.50
C-21	N-25	N-26	1.200E+05	1.600E+09	2.50
C-22	N-10	N-27	1.200E+05	1.600E+09	2.50
C-23	N-27	N-28	1.200E+05	1.600E+09	2.50
C-24	N-28	N-29	1.200E+05	1.600E+09	2.50
C-25	N-29	N-30	1.200E+05	1.600E+09	2.50
C-3	N-5	N-6	1.200E+05	1.600E+09	2.50
C-4	N-7	N-8	1.200E+05	1.600E+09	2.50
C-5	N-9	N-10	1.200E+05	1.600E+09	2.50
C-6	N-2	N-11	1.200E+05	1.600E+09	2.50
C-7	N-11	N-12	1.200E+05	1.600E+09	2.50
C-8	N-12	N-13	1.200E+05	1.600E+09	2.50

C-9	N-13	N-14	1.200E+05	1.600E+09	2.50

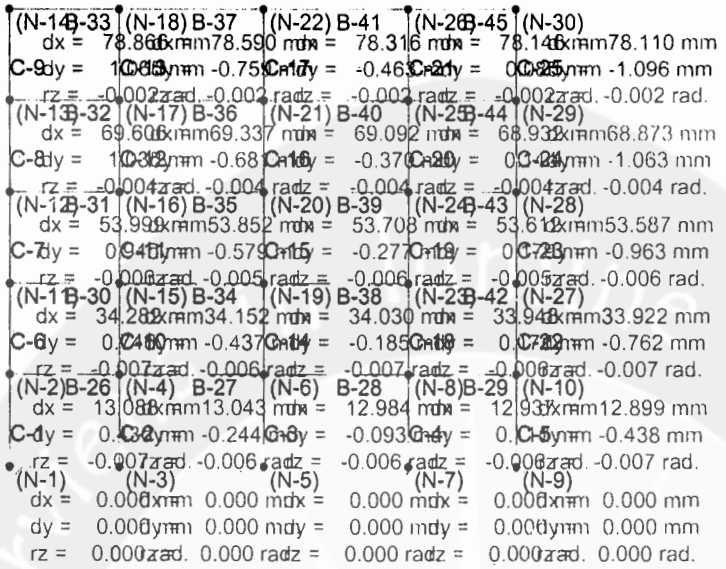
Live Load Applied Loads (KN, KN-m)



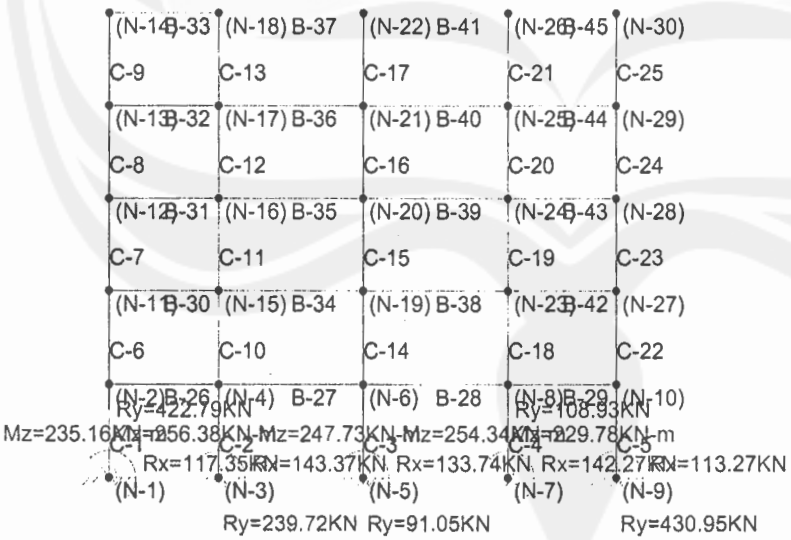
Live Load Applied Nodal Loads

Node	Fx [KN]	Fy [KN]	Mz [KN-m]
N-11	100		10
N-12	100		10
N-13	200		20
N-14	200		20
N-18		-50	
N-2	50		10
N-22		-50	
N-26		-50	

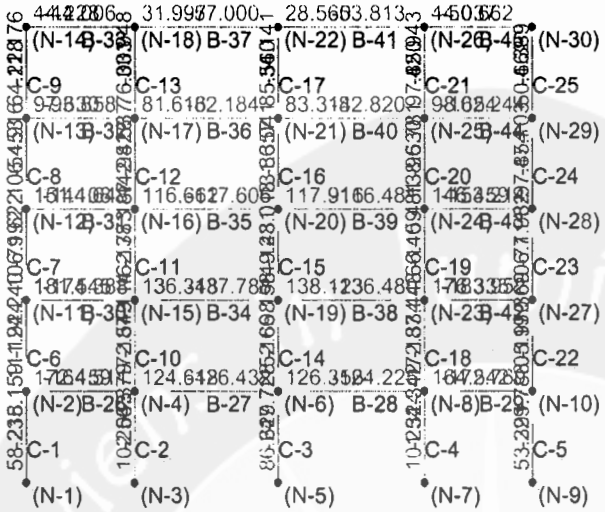
Live Load Deflected Shape (mm)



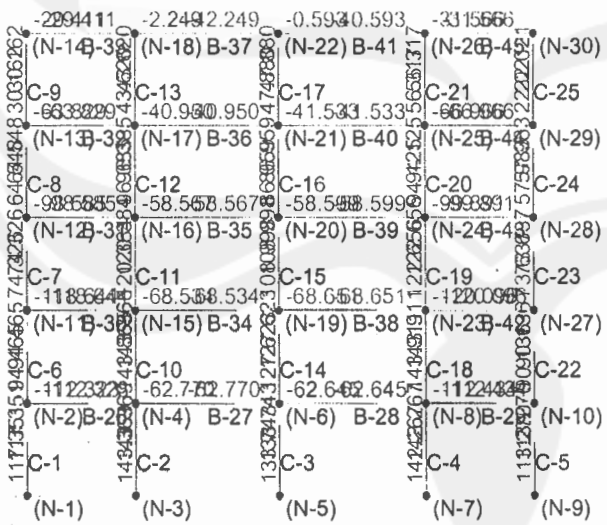
Live Load Reactions (KN, KN-m)



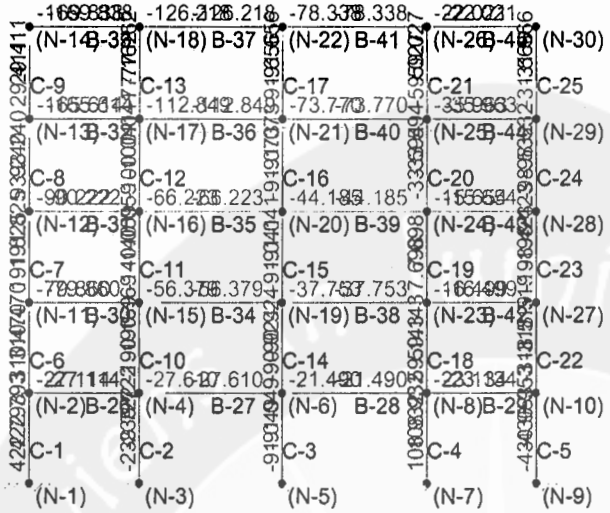
Live Load Bending Moment (KN-m)



Live Load Shear Force (KN)



Live Load Axial Force (KN)



Live Load Nodal Displacements

Node	delta X (mm)	delta Y (mm)	theta Z
N-1	0.0000	0.0000	0.0000
N-10	12.8994	-0.4380	-0.0067
N-11	34.2823	0.7452	-0.0072
N-12	53.9985	0.9401	-0.0062
N-13	69.6058	1.0349	-0.0042
N-14	78.8657	1.0648	-0.0022
N-15	34.1524	-0.4369	-0.0064
N-16	53.8518	-0.5792	-0.0055
N-17	69.3365	-0.6809	-0.0038
N-18	78.5896	-0.7593	-0.0022
N-19	34.0302	-0.1849	-0.0066
N-2	13.0875	0.4297	-0.0067
N-20	53.7082	-0.2775	-0.0056
N-21	69.0918	-0.3700	-0.0039
N-22	78.3159	-0.4632	-0.0019
N-23	33.9483	0.1708	-0.0064
N-24	53.6124	0.1786	-0.0054
N-25	68.9319	0.1445	-0.0038
N-26	78.1461	0.0845	-0.0017
N-27	33.9215	-0.7617	-0.0072
N-28	53.5870	-0.9633	-0.0062
N-29	68.8734	-1.0634	-0.0042
N-3	0.0000	0.0000	0.0000
N-30	78.1103	-1.0955	-0.0025
N-4	13.0435	-0.2436	-0.0059
N-5	0.0000	0.0000	0.0000
N-6	12.9836	-0.0925	-0.0061
N-7	0.0000	0.0000	0.0000
N-8	12.9370	0.1107	-0.0058
N-9	0.0000	0.0000	0.0000

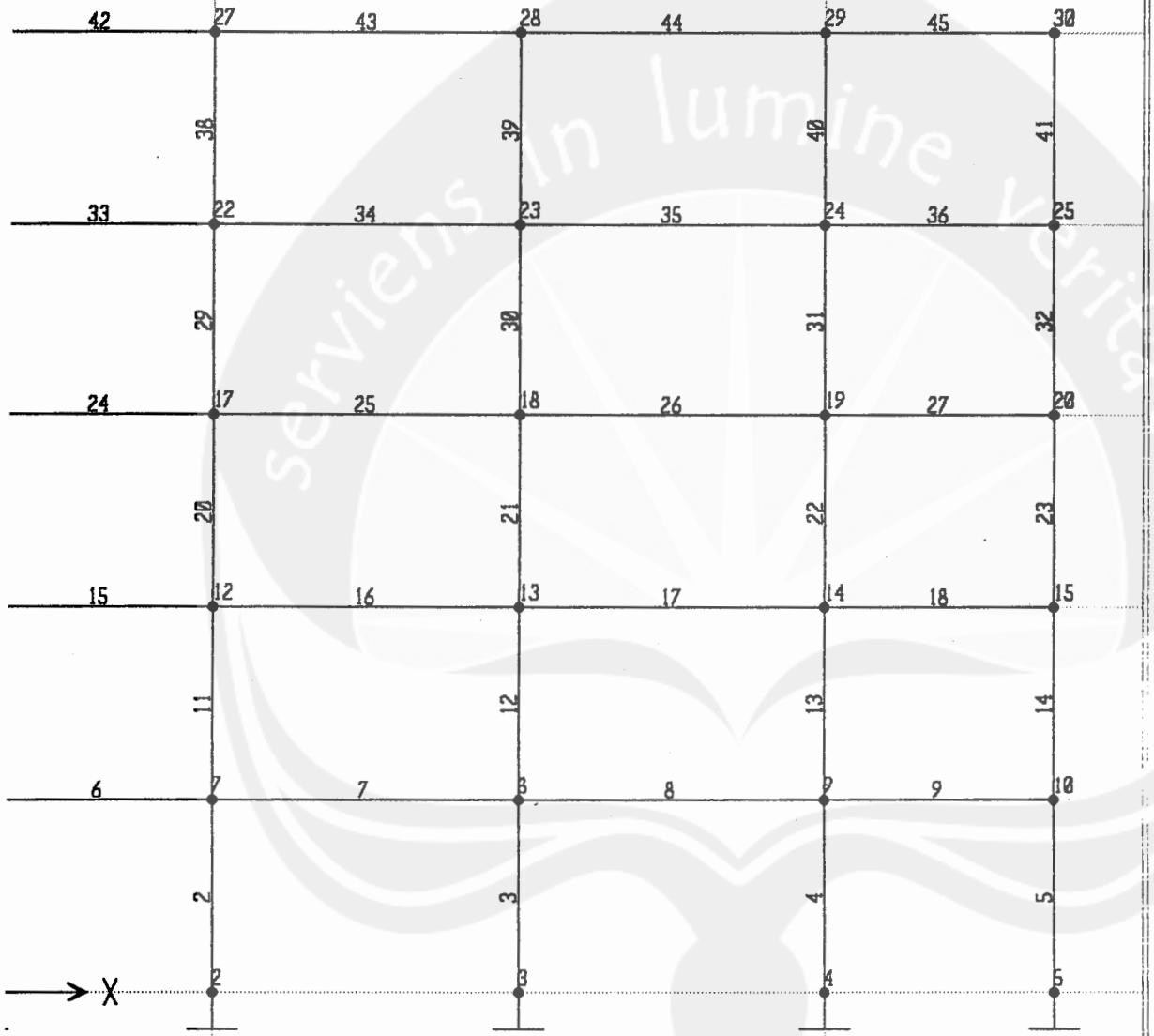
Live Load Support Reactions

Node	Rx (KN)	Ry(KN)	Mz (KN-m)
N-1	-117.3511	-422.7930	235.1594
N-3	-143.3694	239.7222	256.3786
N-5	-133.7431	91.0491	247.7283
N-7	-142.2667	-108.9316	254.3424
N-9	-113.2698	430.9533	229.7834

Live Load Member End Results

Member	Mzi (KN-m) Mzj (KN-m)	Mpos (KN-m) @ (meter)	Vi (KN) Vj (KN)	Pi (KN) Pj (KN)
B-26	172.4585 -164.5106	172.4585 (0.1500)	-112.3230 -112.3230	-27.1144 -27.1144
B-27	124.6482 -126.4320	124.6482 (0.2000)	-62.7701 -62.7701	-27.6104 -27.6104
B-28	126.3557 -124.2249	126.3557 (0.2000)	-62.6452 -62.6452	-21.4900 -21.4900
B-29	164.5423 -172.7599	164.5423 (0.1500)	-112.4341 -112.4341	-23.1341 -23.1341
B-30	181.5455 -174.3878	181.5455 (0.1500)	-118.6444 -118.6444	-79.8601 -79.8601
B-31	151.1082 -144.6478	151.1082 (0.1500)	-98.5853 -98.5853	-90.2222 -90.2222
B-32	97.6295 -93.8578	97.6295 (0.1500)	-63.8291 -63.8291	-165.6139 -165.6139
B-33	44.2276 -44.0055	44.2276 (0.1500)	-29.4110 -29.4110	-169.8384 -169.8384
B-34	136.3483 -137.7882	136.3483 (0.2000)	-68.5341 -68.5341	-56.3787 -56.3787
B-35	116.6623 -117.6062	116.6623 (0.2000)	-58.5671 -58.5671	-66.2233 -66.2233
B-36	81.6165 -82.1842	81.6165 (0.2000)	-40.9502 -40.9502	-112.8493 -112.8493
B-37	31.9972 -56.9998	31.9972 (0.2000)	-2.2493 -42.2493	-126.2180 -126.2180
B-38	138.1233 -136.4800	138.1233 (0.2000)	-68.6508 -68.6508	-37.7535 -37.7535
B-39	117.9159 -116.4809	117.9159 (0.2000)	-58.5992 -58.5992	-44.1851 -44.1851
B-40	83.3140 -82.8195	83.3140 (0.2000)	-41.5334 -41.5334	-73.7702 -73.7702
B-41	28.5600 -53.8125	28.5600 (0.2000)	-0.5931 -40.5931	-78.3376 -78.3376
B-42	176.3354 -183.9519	176.3354 (0.1500)	-120.0958 -120.0958	-16.4987 -16.4987
B-43	146.4594 -153.2141	146.4594 (0.1500)	-99.8912 -99.8912	-15.6538 -15.6538
B-44	98.6538 -102.2437	98.6538 (0.1500)	-66.9658 -66.9658	-35.9626 -35.9626
B-45	44.0371 -50.6623	44.0371 (0.1500)	-31.5665 -31.5665	-22.0206 -22.0206
C-1	-235.1594 58.2184	58.2184 (2.6250)	117.3511 117.3511	422.7930 422.7930
C-10	-187.1139 172.5495	172.5495 (2.6250)	143.8654 143.8654	-190.1692 -190.1692
C-11	-138.1866 162.7733	162.7733 (2.6250)	120.3840 120.3840	-140.0589 -140.0589
C-12	-98.5368 142.4259	142.4259 (2.6250)	96.3851 96.3851	-100.0407 -100.0407
C-13	-33.0484 76.0028	76.0028 (2.6250)	43.6205 43.6205	-77.1618 -77.1618

C-14	-166.1584	152.8985	127.6227	-90.9241
	152.8985	(2.6250)	127.6227	-90.9241
C-15	-123.0130	149.4809	108.9976	-91.0408
	149.4809	(2.6250)	108.9976	-91.0408
C-16	-86.0413	131.3571	86.9593	-91.0729
	131.3571	(2.6250)	86.9593	-91.0729
C-17	-34.1410	85.5598	47.8803	-91.6561
	85.5598	(2.6250)	47.8803	-91.6561
C-18	-187.4428	172.3342	143.9108	59.1427
	172.3342	(2.6250)	143.9108	59.1427
C-19	-140.4812	166.1588	122.6560	7.6977
	166.1588	(2.6250)	122.6560	7.6977
C-2	-256.3786	102.0449	143.3694	-239.7222
	102.0449	(2.6250)	143.3694	-239.7222
C-20	-96.7814	138.5303	94.1247	-33.5942
	138.5303	(2.6250)	94.1247	-33.5942
C-21	-42.9430	97.8496	56.3170	-59.0267
	97.8496	(2.6250)	56.3170	-59.0267
C-22	-119.3689	105.9702	90.1356	-318.5192
	105.9702	(2.6250)	90.1356	-318.5192
C-23	-77.9817	106.1106	73.6369	-198.4234
	106.1106	(2.6250)	73.6369	-198.4234
C-24	-47.1035	97.8545	57.9832	-98.5323
	97.8545	(2.6250)	57.9832	-98.5323
C-25	-4.3892	50.6623	22.0206	-31.5665
	50.6623	(2.6250)	22.0206	-31.5665
C-3	-247.7283	86.6293	133.7431	-91.0491
	86.6293	(2.6250)	133.7431	-91.0491
C-4	-254.3424	101.3244	142.2667	108.9316
	101.3244	(2.6250)	142.2667	108.9316
C-5	-229.7834	53.3910	113.2698	-430.9533
	53.3910	(2.6250)	113.2698	-430.9533
C-6	-124.2402	111.9236	94.4655	310.4699
	111.9236	(2.6250)	94.4655	310.4699
C-7	-79.6219	106.1920	74.3256	191.8255
	106.1920	(2.6250)	74.3256	191.8255
C-8	-54.9162	106.4531	64.5477	93.2402
	106.4531	(2.6250)	64.5477	93.2402
C-9	-11.1764	64.2276	30.1616	29.4110
	64.2276	(2.6250)	30.1616	29.4110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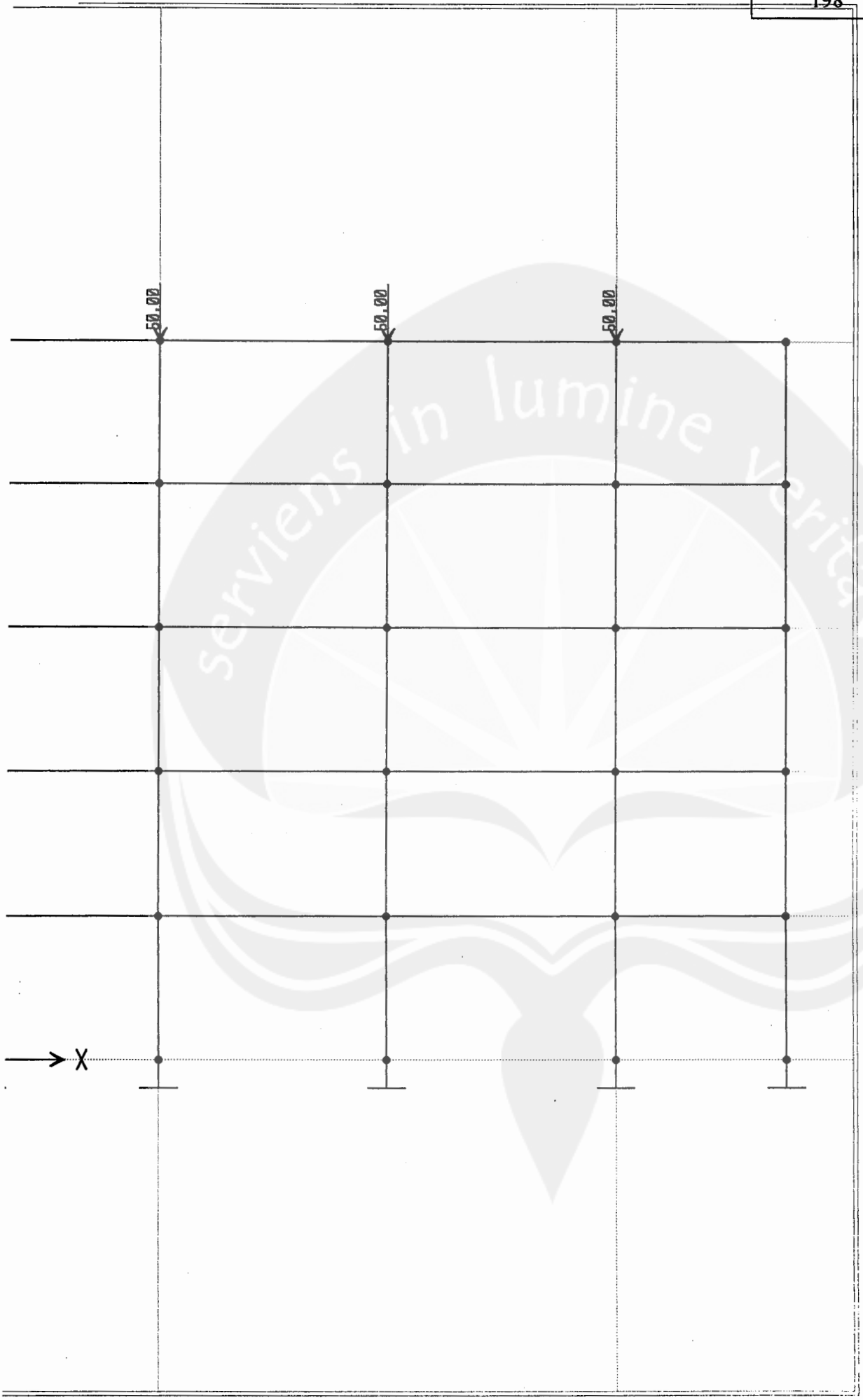
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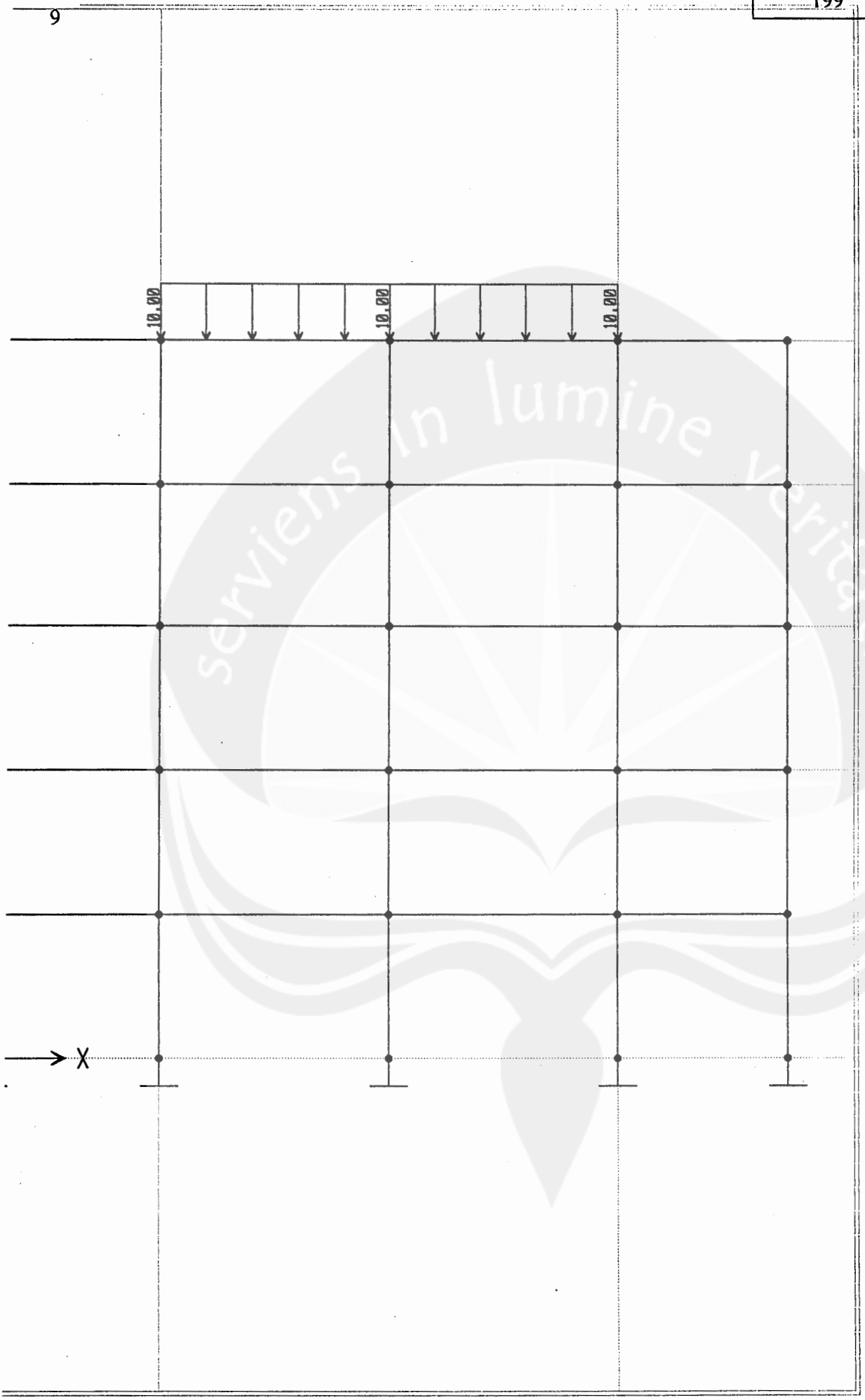

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'ech

' I C L O A D C A S E S

STATIC CASE SELF WT
CASE TYPE FACTOR

LOAD1 DEAD 0,0000

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'ech

J T D A T A

JT	GLOBAL-X	GLOBAL-Y	GLOBAL-Z	RESTRAINTS	ANGLE-A	ANGLE-B	ANGLE-C
1	0,00000	0,00000	0,00000	1 1 1 1 1 1	0,000	0,000	0,000
2	3,00000	0,00000	0,00000	1 1 1 1 1 1	0,000	0,000	0,000
3	7,00000	0,00000	0,00000	1 1 1 1 1 1	0,000	0,000	0,000
4	11,00000	0,00000	0,00000	1 1 1 1 1 1	0,000	0,000	0,000
5	14,00000	0,00000	0,00000	1 1 1 1 1 1	0,000	0,000	0,000
6	0,00000	0,00000	2,50000	0 0 0 0 0 0	0,000	0,000	0,000
7	3,00000	0,00000	2,50000	0 0 0 0 0 0	0,000	0,000	0,000
8	7,00000	0,00000	2,50000	0 0 0 0 0 0	0,000	0,000	0,000
9	11,00000	0,00000	2,50000	0 0 0 0 0 0	0,000	0,000	0,000
10	14,00000	0,00000	2,50000	0 0 0 0 0 0	0,000	0,000	0,000
11	0,00000	0,00000	5,00000	0 0 0 0 0 0	0,000	0,000	0,000
12	3,00000	0,00000	5,00000	0 0 0 0 0 0	0,000	0,000	0,000
13	7,00000	0,00000	5,00000	0 0 0 0 0 0	0,000	0,000	0,000
14	11,00000	0,00000	5,00000	0 0 0 0 0 0	0,000	0,000	0,000
15	14,00000	0,00000	5,00000	0 0 0 0 0 0	0,000	0,000	0,000
16	0,00000	0,00000	7,50000	0 0 0 0 0 0	0,000	0,000	0,000
17	3,00000	0,00000	7,50000	0 0 0 0 0 0	0,000	0,000	0,000
18	7,00000	0,00000	7,50000	0 0 0 0 0 0	0,000	0,000	0,000
19	11,00000	0,00000	7,50000	0 0 0 0 0 0	0,000	0,000	0,000
20	14,00000	0,00000	7,50000	0 0 0 0 0 0	0,000	0,000	0,000
21	0,00000	0,00000	10,00000	0 0 0 0 0 0	0,000	0,000	0,000
22	3,00000	0,00000	10,00000	0 0 0 0 0 0	0,000	0,000	0,000
23	7,00000	0,00000	10,00000	0 0 0 0 0 0	0,000	0,000	0,000
24	11,00000	0,00000	10,00000	0 0 0 0 0 0	0,000	0,000	0,000
25	14,00000	0,00000	10,00000	0 0 0 0 0 0	0,000	0,000	0,000
26	0,00000	0,00000	12,50000	0 0 0 0 0 0	0,000	0,000	0,000
27	3,00000	0,00000	12,50000	0 0 0 0 0 0	0,000	0,000	0,000
28	7,00000	0,00000	12,50000	0 0 0 0 0 0	0,000	0,000	0,000
29	11,00000	0,00000	12,50000	0 0 0 0 0 0	0,000	0,000	0,000
30	14,00000	0,00000	12,50000	0 0 0 0 0 0	0,000	0,000	0,000

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Tech

M E E L E M E N T D A T A

ME	JNT-1	JNT-2	SECTION	ANGLE	RELEASES	SEGMENTS	R1	R2	FACTOR
1	1	6	KOLOM	0,000	000000	2	0,000	0,000	1,000
2	2	7	KOLOM	0,000	000000	2	0,000	0,000	1,000

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3	3	8	KOLOM	0,000	000000	2	0,000	0,000	1,000
4	4	9	KOLOM	0,000	000000	2	0,000	0,000	1,000
5	5	10	KOLOM	0,000	000000	2	0,000	0,000	1,000
6	6	7	BALOK	0,000	000000	4	0,000	0,000	1,000
7	7	8	BALOK	0,000	000000	4	0,000	0,000	1,000
8	8	9	BALOK	0,000	000000	4	0,000	0,000	1,000
9	9	10	BALOK	0,000	000000	4	0,000	0,000	1,000
.0	6	11	KOLOM	0,000	000000	2	0,000	0,000	1,000
.1	7	12	KOLOM	0,000	000000	2	0,000	0,000	1,000
.2	8	13	KOLOM	0,000	000000	2	0,000	0,000	1,000
.3	9	14	KOLOM	0,000	000000	2	0,000	0,000	1,000
.4	10	15	KOLOM	0,000	000000	2	0,000	0,000	1,000
.5	11	12	BALOK	0,000	000000	4	0,000	0,000	1,000
.6	12	13	BALOK	0,000	000000	4	0,000	0,000	1,000
.7	13	14	BALOK	0,000	000000	4	0,000	0,000	1,000
.8	14	15	BALOK	0,000	000000	4	0,000	0,000	1,000
.9	11	16	KOLOM	0,000	000000	2	0,000	0,000	1,000
20	12	17	KOLOM	0,000	000000	2	0,000	0,000	1,000
21	13	18	KOLOM	0,000	000000	2	0,000	0,000	1,000
22	14	19	KOLOM	0,000	000000	2	0,000	0,000	1,000
23	15	20	KOLOM	0,000	000000	2	0,000	0,000	1,000
24	16	17	BALOK	0,000	000000	4	0,000	0,000	1,000
25	17	18	BALOK	0,000	000000	4	0,000	0,000	1,000
26	18	19	BALOK	0,000	000000	4	0,000	0,000	1,000
27	19	20	BALOK	0,000	000000	4	0,000	0,000	1,000
28	16	21	KOLOM	0,000	000000	2	0,000	0,000	1,000
29	17	22	KOLOM	0,000	000000	2	0,000	0,000	1,000
30	18	23	KOLOM	0,000	000000	2	0,000	0,000	1,000
31	19	24	KOLOM	0,000	000000	2	0,000	0,000	1,000
32	20	25	KOLOM	0,000	000000	2	0,000	0,000	1,000
33	21	22	BALOK	0,000	000000	4	0,000	0,000	1,000
34	22	23	BALOK	0,000	000000	4	0,000	0,000	1,000
35	23	24	BALOK	0,000	000000	4	0,000	0,000	1,000
36	24	25	BALOK	0,000	000000	4	0,000	0,000	1,000
37	21	26	KOLOM	0,000	000000	2	0,000	0,000	1,000

8	22	27	KOLOM	0,000	000000	2	0,000	0,000	1,000
9	23	28	KOLOM	0,000	000000	2	0,000	0,000	1,000
0	24	29	KOLOM	0,000	000000	2	0,000	0,000	1,000
1	25	30	KOLOM	0,000	000000	2	0,000	0,000	1,000
2	26	27	BALOK	0,000	000000	4	0,000	0,000	1,000
3	27	28	BALOK	0,000	000000	4	0,000	0,000	1,000
4	28	29	BALOK	0,000	000000	4	0,000	0,000	1,000
5	29	30	BALOK	0,000	000000	4	0,000	0,000	1,000

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ech

T F O R C E S Load Case LOAD1

T	GLOBAL-X	GLOBAL-Y	GLOBAL-Z	GLOBAL-XX	GLOBAL-YY	GLOBAL-ZZ
6	50,000	0,000	0,000	0,000	-10,000	0,000
1	100,000	0,000	0,000	0,000	-10,000	0,000
6	100,000	0,000	0,000	0,000	-10,000	0,000
1	200,000	0,000	0,000	0,000	-20,000	0,000
6	200,000	0,000	0,000	0,000	-20,000	0,000
7	0,000	0,000	-50,000	0,000	0,000	0,000
8	0,000	0,000	-50,000	0,000	0,000	0,000
9	0,000	0,000	-50,000	0,000	0,000	0,000

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ech

E S P A N D I S T R I B U T E D L O A D S Load Case LOAD1

E	TYPE	DIRECTION	DISTANCE-A	VALUE-A	DISTANCE-B	VALUE-B
3	FORCE	GLOBAL-Z	0,0000	-10,0000	1,0000	-10,0000
4	FORCE	GLOBAL-Z	0,0000	-10,0000	1,0000	-10,0000

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ech

T D I S P L A C E M E N T S

T	LOAD	U1	U2	U3	R1	R2	R3
1	LOAD1	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
2	LOAD1	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
3	LOAD1	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
4	LOAD1	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
5	LOAD1	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
6	LOAD1	0,0133	0,0000	4,176E-04	0,0000	6,721E-03	0,0000

7	LOAD1	0,0132	0,0000	-2,354E-04	0,0000	5,835E-03	0,0000
8	LOAD1	0,0132	0,0000	-9,039E-05	0,0000	6,090E-03	0,0000
9	LOAD1	0,0131	0,0000	1,056E-04	0,0000	5,786E-03	0,0000
0	LOAD1	0,0131	0,0000	-4,256E-04	0,0000	6,706E-03	0,0000
1	LOAD1	0,0346	0,0000	7,247E-04	0,0000	7,212E-03	0,0000
2	LOAD1	0,0345	0,0000	-4,226E-04	0,0000	6,399E-03	0,0000
3	LOAD1	0,0344	0,0000	-1,807E-04	0,0000	6,608E-03	0,0000
4	LOAD1	0,0343	0,0000	1,628E-04	0,0000	6,369E-03	0,0000
5	LOAD1	0,0343	0,0000	-7,405E-04	0,0000	7,235E-03	0,0000
6	LOAD1	0,0545	0,0000	9,147E-04	0,0000	6,200E-03	0,0000
7	LOAD1	0,0544	0,0000	-5,609E-04	0,0000	5,471E-03	0,0000
8	LOAD1	0,0542	0,0000	-2,710E-04	0,0000	5,609E-03	0,0000
9	LOAD1	0,0541	0,0000	1,697E-04	0,0000	5,403E-03	0,0000
0	LOAD1	0,0541	0,0000	-9,370E-04	0,0000	6,165E-03	0,0000
1	LOAD1	0,0702	0,0000	1,007E-03	0,0000	4,236E-03	0,0000
2	LOAD1	0,0700	0,0000	-6,600E-04	0,0000	3,812E-03	0,0000
3	LOAD1	0,0697	0,0000	-3,615E-04	0,0000	3,892E-03	0,0000
4	LOAD1	0,0696	0,0000	1,362E-04	0,0000	3,818E-03	0,0000
5	LOAD1	0,0695	0,0000	-1,035E-03	0,0000	4,236E-03	0,0000
6	LOAD1	0,0796	0,0000	1,037E-03	0,0000	2,225E-03	0,0000
7	LOAD1	0,0793	0,0000	-7,367E-04	0,0000	2,187E-03	0,0000
8	LOAD1	0,0790	0,0000	-4,524E-04	0,0000	1,949E-03	0,0000
9	LOAD1	0,0789	0,0000	7,776E-05	0,0000	1,741E-03	0,0000
0	LOAD1	0,0788	0,0000	-1,066E-03	0,0000	2,478E-03	0,0000

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Tech

T R E A C T I O N S

NT	LOAD	F1	F2	F3	M1	M2	M3
1	LOAD1	-117,4529	0,0000	-420,8941	0,0000	-237,1526	0,0000
2	LOAD1	-143,0568	0,0000	237,2886	0,0000	-257,2411	0,0000
3	LOAD1	-133,9924	0,0000	91,1128	0,0000	-249,3392	0,0000
4	LOAD1	-142,0117	0,0000	-106,4805	0,0000	-255,2824	0,0000
5	LOAD1	-113,4862	0,0000	428,9732	0,0000	-231,9901	0,0000

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ech

E E L E M E N T F O R C E S

E	LOAD	LOC	P	V2	V3	T	M2	M3
1	LOAD1							
		0,00	420,89	117,45	0,00	0,00	0,00	237,15
		1,25	420,89	117,45	0,00	0,00	0,00	90,34
		2,50	420,89	117,45	0,00	0,00	0,00	-56,48
2	LOAD1							
		0,00	-237,29	143,06	0,00	0,00	0,00	257,24
		1,25	-237,29	143,06	0,00	0,00	0,00	78,42
		2,50	-237,29	143,06	0,00	0,00	0,00	-100,40
3	LOAD1							
		0,00	-91,11	133,99	0,00	0,00	0,00	249,34
		1,25	-91,11	133,99	0,00	0,00	0,00	81,85
		2,50	-91,11	133,99	0,00	0,00	0,00	-85,64
4	LOAD1							
		0,00	106,48	142,01	0,00	0,00	0,00	255,28
		1,25	106,48	142,01	0,00	0,00	0,00	77,77
		2,50	106,48	142,01	0,00	0,00	0,00	-99,75
5	LOAD1							
		0,00	-428,97	113,49	0,00	0,00	0,00	231,99
		1,25	-428,97	113,49	0,00	0,00	0,00	90,13
		2,50	-428,97	113,49	0,00	0,00	0,00	-51,73
6	LOAD1							
		0,00	-27,04	111,34	0,00	0,00	0,00	171,19
		7,5E-01	-27,04	111,34	0,00	0,00	0,00	87,69
		1,50	-27,04	111,34	0,00	0,00	0,00	4,19
		2,25	-27,04	111,34	0,00	0,00	0,00	-79,31
		3,00	-27,04	111,34	0,00	0,00	0,00	-162,82
7	LOAD1							
		0,00	-27,54	62,76	0,00	0,00	0,00	124,61
		1,00	-27,54	62,76	0,00	0,00	0,00	61,85
		2,00	-27,54	62,76	0,00	0,00	0,00	-9,040E-01
		3,00	-27,54	62,76	0,00	0,00	0,00	-63,66
		4,00	-27,54	62,76	0,00	0,00	0,00	-126,42
8	LOAD1							
		0,00	-21,67	62,64	0,00	0,00	0,00	126,35
		1,00	-21,67	62,64	0,00	0,00	0,00	63,71
		2,00	-21,67	62,64	0,00	0,00	0,00	1,08
		3,00	-21,67	62,64	0,00	0,00	0,00	-61,56
		4,00	-21,67	62,64	0,00	0,00	0,00	-124,20
9	LOAD1							
		0,00	-23,28	111,50	0,00	0,00	0,00	162,90
		7,5E-01	-23,28	111,50	0,00	0,00	0,00	79,28
		1,50	-23,28	111,50	0,00	0,00	0,00	-4,35
		2,25	-23,28	111,50	0,00	0,00	0,00	-87,97
		3,00	-23,28	111,50	0,00	0,00	0,00	-171,59
10	LOAD1							
		0,00	309,56	94,49	0,00	0,00	0,00	124,71
		1,25	309,56	94,49	0,00	0,00	0,00	6,60
		2,50	309,56	94,49	0,00	0,00	0,00	-111,52
11	LOAD1							
		0,00	-188,71	143,56	0,00	0,00	0,00	187,02
		1,25	-188,71	143,56	0,00	0,00	0,00	7,58

	2,50	-188,71	143,56	0,00	0,00	0,00	-171,87
2	LOAD1						
	0,00	-90,99	128,13	0,00	0,00	0,00	167,12
	1,25	-90,99	128,13	0,00	0,00	0,00	6,96
	2,50	-90,99	128,13	0,00	0,00	0,00	-153,19
3	LOAD1						
	0,00	57,62	143,61	0,00	0,00	0,00	187,35
	1,25	57,62	143,61	0,00	0,00	0,00	7,83
	2,50	57,62	143,61	0,00	0,00	0,00	-171,69
4	LOAD1						
	0,00	-317,48	90,21	0,00	0,00	0,00	119,87
	1,25	-317,48	90,21	0,00	0,00	0,00	7,11
	2,50	-317,48	90,21	0,00	0,00	0,00	-105,65
5	LOAD1						
	0,00	-79,84	118,00	0,00	0,00	0,00	180,84
	7,5E-01	-79,84	118,00	0,00	0,00	0,00	92,34
	1,50	-79,84	118,00	0,00	0,00	0,00	3,84
	2,25	-79,84	118,00	0,00	0,00	0,00	-84,65
	3,00	-79,84	118,00	0,00	0,00	0,00	-173,15
6	LOAD1						
	0,00	-56,57	68,67	0,00	0,00	0,00	136,60
	1,00	-56,57	68,67	0,00	0,00	0,00	67,93
	2,00	-56,57	68,67	0,00	0,00	0,00	-7,418E-01
	3,00	-56,57	68,67	0,00	0,00	0,00	-69,41
	4,00	-56,57	68,67	0,00	0,00	0,00	-138,08
7	LOAD1						
	0,00	-37,82	68,78	0,00	0,00	0,00	138,41
	1,00	-37,82	68,78	0,00	0,00	0,00	69,63
	2,00	-37,82	68,78	0,00	0,00	0,00	8,478E-01
	3,00	-37,82	68,78	0,00	0,00	0,00	-67,93
	4,00	-37,82	68,78	0,00	0,00	0,00	-136,71
8	LOAD1						
	0,00	-16,64	119,43	0,00	0,00	0,00	175,05
	7,5E-01	-16,64	119,43	0,00	0,00	0,00	85,48
	1,50	-16,64	119,43	0,00	0,00	0,00	-4,09
	2,25	-16,64	119,43	0,00	0,00	0,00	-93,66
	3,00	-16,64	119,43	0,00	0,00	0,00	-183,23
9	LOAD1						
	0,00	191,56	74,34	0,00	0,00	0,00	79,32
	1,25	191,56	74,34	0,00	0,00	0,00	-13,60
	2,50	191,56	74,34	0,00	0,00	0,00	-106,53
10	LOAD1						
	0,00	-139,38	120,28	0,00	0,00	0,00	137,89
	1,25	-139,38	120,28	0,00	0,00	0,00	-12,46
	2,50	-139,38	120,28	0,00	0,00	0,00	-162,81
11	LOAD1						
	0,00	-91,10	109,38	0,00	0,00	0,00	123,29
	1,25	-91,10	109,38	0,00	0,00	0,00	-13,43
	2,50	-91,10	109,38	0,00	0,00	0,00	-150,15
12	LOAD1						
	0,00	6,97	122,44	0,00	0,00	0,00	140,07
	1,25	6,97	122,44	0,00	0,00	0,00	-12,98
	2,50	6,97	122,44	0,00	0,00	0,00	-166,03
13	LOAD1						
	0,00	-198,05	73,57	0,00	0,00	0,00	77,58
	1,25	-198,05	73,57	0,00	0,00	0,00	-14,38
	2,50	-198,05	73,57	0,00	0,00	0,00	-106,34
14	LOAD1						

	0,00	-90,12	98,17	0,00	0,00	0,00	150,70
	7,5E-01	-90,12	98,17	0,00	0,00	0,00	77,07
	1,50	-90,12	98,17	0,00	0,00	0,00	3,44
	2,25	-90,12	98,17	0,00	0,00	0,00	-70,19
	3,00	-90,12	98,17	0,00	0,00	0,00	-143,82
25	LOAD1						
	0,00	-66,04	58,72	0,00	0,00	0,00	116,95
	1,00	-66,04	58,72	0,00	0,00	0,00	58,23
	2,00	-66,04	58,72	0,00	0,00	0,00	-4,876E-01
	3,00	-66,04	58,72	0,00	0,00	0,00	-59,21
	4,00	-66,04	58,72	0,00	0,00	0,00	-117,92
26	LOAD1						
	0,00	-43,94	58,76	0,00	0,00	0,00	118,24
	1,00	-43,94	58,76	0,00	0,00	0,00	59,49
	2,00	-43,94	58,76	0,00	0,00	0,00	7,296E-01
	3,00	-43,94	58,76	0,00	0,00	0,00	-58,03
	4,00	-43,94	58,76	0,00	0,00	0,00	-116,78
27	LOAD1						
	0,00	-15,64	99,48	0,00	0,00	0,00	145,62
	7,5E-01	-15,64	99,48	0,00	0,00	0,00	71,01
	1,50	-15,64	99,48	0,00	0,00	0,00	-3,60
	2,25	-15,64	99,48	0,00	0,00	0,00	-78,21
	3,00	-15,64	99,48	0,00	0,00	0,00	-152,82
28	LOAD1						
	0,00	93,39	64,46	0,00	0,00	0,00	54,18
	1,25	93,39	64,46	0,00	0,00	0,00	-26,40
	2,50	93,39	64,46	0,00	0,00	0,00	-106,97
29	LOAD1						
	0,00	-99,93	96,20	0,00	0,00	0,00	97,95
	1,25	-99,93	96,20	0,00	0,00	0,00	-22,30
	2,50	-99,93	96,20	0,00	0,00	0,00	-142,54
30	LOAD1						
	0,00	-91,14	87,28	0,00	0,00	0,00	86,02
	1,25	-91,14	87,28	0,00	0,00	0,00	-23,08
	2,50	-91,14	87,28	0,00	0,00	0,00	-132,17
31	LOAD1						
	0,00	-33,75	94,14	0,00	0,00	0,00	96,38
	1,25	-33,75	94,14	0,00	0,00	0,00	-21,30
	2,50	-33,75	94,14	0,00	0,00	0,00	-138,97
32	LOAD1						
	0,00	-98,57	57,93	0,00	0,00	0,00	46,49
	1,25	-98,57	57,93	0,00	0,00	0,00	-25,92
	2,50	-98,57	57,93	0,00	0,00	0,00	-98,33
33	LOAD1						
	0,00	-165,66	63,72	0,00	0,00	0,00	97,58
	7,5E-01	-165,66	63,72	0,00	0,00	0,00	49,79
	1,50	-165,66	63,72	0,00	0,00	0,00	2,00
	2,25	-165,66	63,72	0,00	0,00	0,00	-45,79
	3,00	-165,66	63,72	0,00	0,00	0,00	-93,58
34	LOAD1						
	0,00	-113,26	41,08	0,00	0,00	0,00	81,88
	1,00	-113,26	41,08	0,00	0,00	0,00	40,80
	2,00	-113,26	41,08	0,00	0,00	0,00	-2,815E-01
	3,00	-113,26	41,08	0,00	0,00	0,00	-41,36
	4,00	-113,26	41,08	0,00	0,00	0,00	-82,44
35	LOAD1						
	0,00	-73,92	41,63	0,00	0,00	0,00	83,53
	1,00	-73,92	41,63	0,00	0,00	0,00	41,89
	2,00	-73,92	41,63	0,00	0,00	0,00	2,602E-01
	3,00	-73,92	41,63	0,00	0,00	0,00	-41,37

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	4,00	-73,92	41,63	0,00	0,00	0,00	-83,01
6	LOAD1						
	0,00	-35,94	66,82	0,00	0,00	0,00	98,25
	7,5E-01	-35,94	66,82	0,00	0,00	0,00	48,14
	1,50	-35,94	66,82	0,00	0,00	0,00	-1,97
	2,25	-35,94	66,82	0,00	0,00	0,00	-52,09
	3,00	-35,94	66,82	0,00	0,00	0,00	-102,20
7	LOAD1						
	0,00	29,67	30,11	0,00	0,00	0,00	10,61
	1,25	29,67	30,11	0,00	0,00	0,00	-27,03
	2,50	29,67	30,11	0,00	0,00	0,00	-64,68
8	LOAD1						
	0,00	-77,29	43,80	0,00	0,00	0,00	32,91
	1,25	-77,29	43,80	0,00	0,00	0,00	-21,84
	2,50	-77,29	43,80	0,00	0,00	0,00	-76,59
9	LOAD1						
	0,00	-91,69	47,93	0,00	0,00	0,00	33,80
	1,25	-91,69	47,93	0,00	0,00	0,00	-26,11
	2,50	-91,69	47,93	0,00	0,00	0,00	-86,03
0	LOAD1						
	0,00	-58,94	56,16	0,00	0,00	0,00	42,28
	1,25	-58,94	56,16	0,00	0,00	0,00	-27,92
	2,50	-58,94	56,16	0,00	0,00	0,00	-98,12
1	LOAD1						
	0,00	-31,75	21,99	0,00	0,00	0,00	3,86
	1,25	-31,75	21,99	0,00	0,00	0,00	-23,62
	2,50	-31,75	21,99	0,00	0,00	0,00	-51,11
2	LOAD1						
	0,00	-169,89	29,67	0,00	0,00	0,00	44,68
	7,5E-01	-169,89	29,67	0,00	0,00	0,00	22,43
	1,50	-169,89	29,67	0,00	0,00	0,00	1,764E-01
	2,25	-169,89	29,67	0,00	0,00	0,00	-22,07
	3,00	-169,89	29,67	0,00	0,00	0,00	-44,32
3	LOAD1						
	0,00	-126,08	2,38	0,00	0,00	0,00	32,27
	1,00	-126,08	12,38	0,00	0,00	0,00	24,89
	2,00	-126,08	22,38	0,00	0,00	0,00	7,51
	3,00	-126,08	32,38	0,00	0,00	0,00	-19,87
	4,00	-126,08	42,38	0,00	0,00	0,00	-57,25
4	LOAD1						
	0,00	-78,15	6,884E-01	0,00	0,00	0,00	28,78
	1,00	-78,15	10,69	0,00	0,00	0,00	23,09
	2,00	-78,15	20,69	0,00	0,00	0,00	7,40
	3,00	-78,15	30,69	0,00	0,00	0,00	-18,29
	4,00	-78,15	40,69	0,00	0,00	0,00	-53,97
5	LOAD1						
	0,00	-21,99	31,75	0,00	0,00	0,00	44,15
	7,5E-01	-21,99	31,75	0,00	0,00	0,00	20,33
	1,50	-21,99	31,75	0,00	0,00	0,00	-3,48
	2,25	-21,99	31,75	0,00	0,00	0,00	-27,30
	3,00	-21,99	31,75	0,00	0,00	0,00	-51,11