PROYEK AKHIR TERAPAN – RC144542

DESAIN ULANG JEMBATAN THP KENJERAN SURABAYA DENGAN MENGGUNAKAN BALOK I GIRDER BENTANG 40M

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PROGRAM STUDI DIPLOMA IV TEKNIK SIPIL
Fakultas Teknik Sipil dan Perencanaan
Institut Teknologi Sepuluh Nopember
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FINAL PROJECT - RC144542

REDESIGN THP KENJERAN SURABAYA BRIDGE USING I-BEAMS GIRDER SPAN 40M

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Civil Engineering and Planning Faculty
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DESAIN ULANG JEMBATAM THP KENJERAN SURABAYA DENGAN MENGGUNAKAN BALOK I GIRDER BENTANG 40M.

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Diajukan Untuk Memenuhi Salah Satu Persyaratan
Memperoleh Gelar Sarjana Teknik Terapan
Pada
Program Studi DIV Teknik Sipil
Jurusan Sistem dan Prasarana Transportasi
Fakultas Teknik Sipil dan Perencanaan
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DESAIN ULANG JEMBATAN THP KENJERAN SURABAYA DENGAN MENGGUNAKAN BALOK I GIRDER BENTANG 40M.

Oleh :

Nama Mahasiswa	: Rizka Febyanti
NRP	: 3114 040 603
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Dosen Pembimbing	: 1. Ir. Ibnu Pudji R. MS 2. Ir. Chomaedhi, CES

Abstrak

Jembatan Taman Hiburan Pantai Kenjeran atau yang lebih dikenal dengan Jembatan THP Kenjeran dibangun pada jalur lintas jalan Tambak Deres sampai dengan jalan Sukolilo Kenjeran, Kota Surabaya. Jembatan THP Kenjeran yang dibangun di pinggir pantai dan sekaligus menjadi tempat wisata karena dilengkapi dengan anjungan dan air mancur.

Kondisi existing jembatan saat ini yaitu terdiri dari struktur beton prategang bentang 30 m dan struktur slab on pile bentang 6 m dan 8,5 m. Jembatan THP Kenjeran direncanakan menggunakan beton prategang I-Girder dengan bentang 40 m, type struktur slab on pile bentang 6 m.

Struktur utama dari Jembatan THP Kenjeran berupa balok prategang I (PCI), dengan metode post tension dan mutu beton K-800. Untuk plat lantai menggunakan konstruksi beton bertulang dengan metode cast insitu sehingga terjadi aksi komposit antara balok precast dan plat cor. dan untuk pilar juga direncanakan menggunakan beton bertulang dengan metode cast insitu. Sedangkan untuk struktur Slab On Pile berupa plat slab tebal 35 cm direncakan dengan metode half slab yaitu setengah precast setebal 24 cm dan overtopping setebal 11 cm. Dari hasil pengujian SPT didapatkan tanah keras pada kedalaman 24 m sehingga digunakan pondasi tiang pancang.

Desain jembatan ini menggunakan acuan/pedoman dari Design Struktur Beton Prategang (T.Y Lin dan Burns, 1982), RSNI T-02-2005 (Peraturan Pembebanan untuk Jembatan), RSNI T-03-2004 (Perencanaan Struktur Beton untuk Jembatan) dan Bridge Design Manual (BMS BDM, 1992), Bridge Design Code (BMS BDC, 1992) Selain itu perencanaan jembatan ini juga mengambil beberapa sumber pustaka sebagai bahan referensi..

Kata kunci : Jembatan, Beton Prategang, Slab On Pile.

Redesign THP Kenjeran Surabaya Bridge Using I-Beam Girder Span 40M.

Oleh :

Name of Student : Rizka Febyanti
NRP : 3114 040 603
Majors : D4 Transportation Engineering
FTSP-ITS
Counsellor : 1. Ir. Ibnu Pudji R. MS
2. Ir. Chomaedhi, CES

Abstrak

Amusement Park Kenjeran Beach Bridges, better known by THP Kenjeran bridge built in Tambak Deres traffic lane road until Sukolilo Kenjeran, Surabaya . THP Kenjeran bridge built on the beach and also become a tourist spot with a pavilion and a fountain.

The existing condition of the bridge is comprised of prestressed concrete structure spans 30 m and pile on slab structure span 6 m and 8.5 m. The THP Kenjeran bridge planned using prestressed concrete I-Girder span of 40m, type pile on slab structure span 6 m.

The main structure of the THP Kenjeran bridge form prestressed I beam (PCI), a method of post-tension and quality of concrete K-800. To use the floor plate of reinforced concrete construction with cast insitu method resulting in composite action between the beams precast and cast plate. And to the pillars also structure planned to use reinforced concrete cast insitu method. As for the structure of slab on pile form of plates 35cm thick slab planned mothod that is half precast slab half as thick as 24 cm and 11 cm thick overtopping. SPT test results obtained the hard ground at a depth of 24m so used pile foundation.

Bridge Design using a references/guidelines of Prestressed Concrete Structures Design (TY Lin and Burns, 1982), SRNIT-02-2005 (Loading Regulation of Bridge), RSNIT-0302004 (Concrete Structural Design for Bridge) and Bridge Design Manual (BMS BDM, 1992), Bridge Design Code (BMS BDC, 1992). In addition, the bridge design is also taking some literature sources as references.

Keyword : Bridge, Prestressed Concrete, Slab On Pile.

DAFTAR ISI

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(halaman ini sengaja dikosongkan)

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5. Data Tanah
6. Perhitungan lengkung full circle
7. Output SAP2000 PIlar 1
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9. Output SAP2000 Slab on pile

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BAB I
PENDAHULUAN

1.1 Latar Belakang

Peran Transportasi dalam pengembangan suatu wilayah sangatlah penting karena dengan adanya sarana transportasi maka arus perputaran ekonomi dapat berjalan dengan lancar. Salah satu alat transportasi yang biasa digunakan adalah jalan raya tetapi, sering kali dalam proses pembangunannya mengalami banyak kendala dan halangan baik itu berupa sungai, laut, danau,waduk, jurang atau yang melintasi jalan penghalang lainnya. Oleh karena itu untuk menghubungkan dua buah jalan yang terpisahkan oleh suatu rintangan maka yang diperlukan adalah suatu sarana berupa bangunan Jembatan. Dengan adanya sarana jembatan ini akan memberikan kelancaran aktifitas gerak khususnya untuk kegiatan perekonomian yang akan memacu laju pertumbuhan suatu wilayah.

Selain sebagai penghubung antar dua buah jalan, jembatan juga dapat dijadikan sebagai sarana wisata yang layak dikunjungi dengan memberi suatu ruang khusus pada bagian jembatan atau sekitar jembatan. Sebagai contohnya adalah Jembatan THP Kenjeran yang dibangun di pinggir pantai yang sekaligus menjadi tempat wisata di Kota Surabaya karena terdapat ruang khusus yang diletakkan ditengah yaitu berupa Anjungan dan diujung bentang terdapat air mancur yang bertujuan memperindah jembatan serta dengan adanya sarana tersebut dapat mendatangkan sumber penghasilan baru bagi masyarakat sekitar karena keberadaannya menjadi penggerak ekonomi dan menggali potensi wisata disekitar jembatan.

Maka dari itu dalam merencanakan sebuah jembatan yang memiliki fungsi lebih dari sekedar penghubung dua buah jalan direncanakan mampu menahan beban lebih besar karena momen yang bekerja juga akan bertambah besar. Dan juga jembatan dengan bentang panjang serta memiliki fungsi lebih dari jembatan biasa dalam ini perhitungan strukturnya akan lebih kompleks sehingga struktur-struktur lainnya mampu menahan beban-beban yang bekerja.

Dari uraian tersebut maka, desain dengan system beton prategang menjadi solusi yang tepat karena lebih kuat jika dibandingkan dengan balok beton biasa. Dan beton prategang bisa menerima beban lebih besar dikarenakan beton prategang sendiri bisa menerima gaya tarik yang sebenarnya tidak dapat diterima oleh beton biasa.

Jembatan THP Kenjeran merupakan Jembatan Taman Hiburan Pantai (THP) Kenjeran Surabaya – Jawa Timur, dimana lokasi proyek direncanakan mulai jalan Tambak Deres sampai dengan jalan Sukolilo Kenjeran. Jembatan THP Kenjeran ini direncanakan memiliki panjang total kurang lebih 780 m.

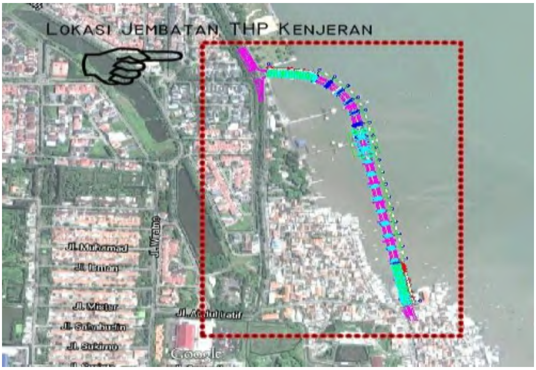
Struktur ulang jembatan THP Kenjeran direncanakan menggunakan system beton prategang dengan lebar 16 m, dimana 10 m sebagai jalan utama dan 3 meter masing – masing di sebelah kanan dan kiri jembatan sebagai fasilitas pejalan kaki dan sepeda. Alasan penggunaan system beton prategang antara lain dari segi kemampuan layanan lebih baik, design prategang lebih cocok untuk bentang yang relative panjang sebab struktur ini lebih ramping dan lebih ringan.

Data Proyek :

1. Nama Proyek : Perencanaan Rehabilitasi Jembatan THP Kenjeran
2. Pemilik Proyek : Dinas PU Bina Marga Provinsi Jawa Timur
3. Lokasi Proyek : Mulai jalan Tambak Deres sampai dengan jalan Sukolilo Kenjeran Kota Surabaya.
4. Bangunan Atas : Bentang tepi menggunakan system struktur slab on Pile dan box culvesrt

precast, bentang tengah menggunakan system beton pratekan I-Girder.

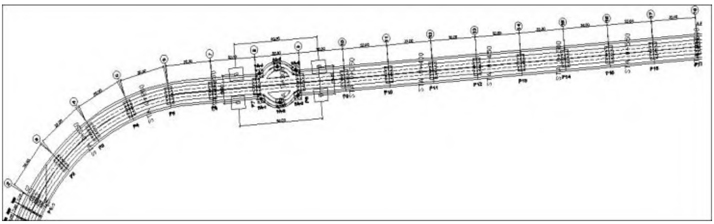
5. Bangunan Bawah : Pondasi tiang pancang.



Gambar 1.1 Denah lokasi Jembatan THP Kenjeran

Struktur eksisting jembatan THP Kenjeran ini menggunakan 2 tipe struktur diantaranya :

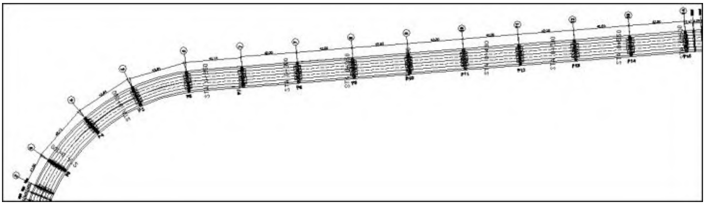
1. Type struktur beton pratekan I-Girder bentang 30 m
2. Type struktur slab on pile dengan 2 macam bentang yakni bentang 6 m dan bentang 8,50 m.



Gambar 1.2 Layout eksisting struktur utama I Girder 30M

Dalam desain ulang struktur jembatan THP Kenjeran ini direncanakan juga menggunakan 2 tipe struktur diantaranya :

1. Type struktur beton pratekan I-Girder bentang 40 M
2. Type struktur slab on pile bentang yakni bentang 6 m.



Gambar 1.3 Layout rencana struktur utama I Girder 40M

Dapat disimpulkan bahwa antara layout eksisting struktur utama I Girder 30M dan Layout rencana struktur utama I Girder 40M terdapat perbedaan dari segi penggunaan pilar. Dapat dilihat pada layout eksisting dengan I Girder Bentang 30M menggunakan pilar sebagai penopang gelagar sebanyak 17 buah sedangkan pada layout rencana jembatan dengan I Girder 40M hanya menggunakan pilar sebagai penopang gelagar sebanyak 13 buah. Maka, terdapat penghematan atau pengurangan dalam segi penggunaan pilar sebanyak 3 buah pilar.

Sehingga dalam tugas akhir ini akan dibahas lebih lanjut bagaimana Desain Ulang Jembatan THP Kenjeran dengan Menggunakan Balok I Girder Bentang 40M.

1.2 Perumusan Masalah

Dalam tugas akhir ini, membahas tentang desain ulang Jembatan THP Kenjeran. Jembatan THP Kenjeran ini masih dalam tahap pembangunan oleh Dinas Bina Marga Provinsi Jawa Timur.

Untuk desain ulang suatu bangunan jembatan harus memperhatikan beberapa factor yang akan mempengaruhi kualitas, kekuatan, kelayakan, dan kenyamanan dari suatu struktur bangunan yang akan dibuat. Jembatan THP Kenjeran ini mempunyai bentang yang cukup lebar. Selain itu, Jembatan Kenjeran ini dibangun di pinggir pantai. Yang harus diperhatikan adalah kondisi tanah sekitar dan beberapa factor lingkungan lainnya, sehingga diperlukan perencanaan cukup matang.

Masalah-masalah khusus yang uraikan pada tiap pokok tersebut:

1. Bagaimana prosedur desain dan cara menghitung bangunan atas jembatan yang meliputi:
    - Desain tiang sandaran.
    - Desain trotoar.
    - Desain dimensi dan penulangan pelat lantai kendaraan.
    - Desain system beton prategang.
    - Desain dimensi diafragma.
    - Desain elastomer
2. Bagaimana prosedur desain serta perhitungan bangunan bawah jembatan, meliputi :
    - Desain pilar
    - Desain pondasi tiang pancang (spun pile)
3. Bagaimana prosedur desain dan perhitungan bangunan slab on pile, meliputi :
    - Desain slab lantai kendaraan
    - Desain pile head
    - Desain pondasi tiang pancang (spun pile)
    - Desain wing wall
    - Desain plat injak.
4. Berapa hasil perhitungan struktur jembatan yang dititik beratkan pada desain dimensi, analisis struktur beserta kontrolnya dan bagaimana bentuk gambar teknisnya.

1.3 Batasan Masalah

Batasan tentang Desain konstruksi bangunan jembatan THP Kenjeran meliputi sebagai berikut :

- Desain beban meliputi : beban mati, beban hidup, beban angin, beban rem, beban gempa dan tekanan tanah.
- Menghitung struktur jembatan yang dititik beratkan pada desain dimensi, analisis struktur beserta kontrolnya.
- Menggunakan rumus dalam perhitungan sesuai dengan literature yang ada sehingga tidak ada penurunan rumus.
- Merencanakan struktur bangunan atas, bangunan bawah dan bangunan pelengkap.
- Menggambar hasil desain struktur jembatan.
- Tanpa meninjau anggaran biaya.

1.4 Maksud dan Tujuan

Maksud penulis melaksanakan proyek tugas akhir secara umum adalah untuk memenuhi syarat kelulusan pendidikan dan khususnya untuk mengetahui lebih jauh tentang disiplin ilmu yang sudah didapat sebelumnya, sedangkan secara khusus ialah dalam perencanaan dan perhitungan jembatan dengan menggunakan system beton prategang, serta mengatasi masalah-masalah yang mungkin timbul khususnya dalam penerapan beton prategang pada gelagar-gelagar jembatan.

Adapun tujuan-tujuan yang hendak dicapai dari desain ini adalah :

1. Mendesainkan dimensi struktur bangunan atas yang meliputi :
    a. Plat lantai kendaraan dan menghitung kebutuhan penulangannya,
    b. Gelagar memanjang dan diafragma.
    c. Tiang sandaran,
    d. Trotoar,
2. Mendesainkan dimensi struktur bangunan bawah yang meliputi :
    a. Pilar
    b. Pondasi tiang pancang
3. Mendesainkan dimensi struktur slab on pile yang meliputi :

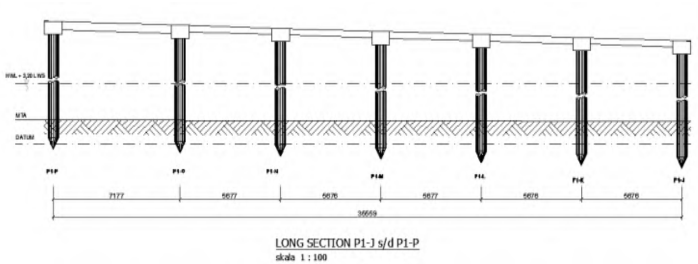
a. Plat slab lantai kendaraan
b. Pile head
c. Pondasi tiang pancang
d. Plat injak,
e. Wing wall

4. Menggambar detail dari struktur yang direncanakan tersebut.

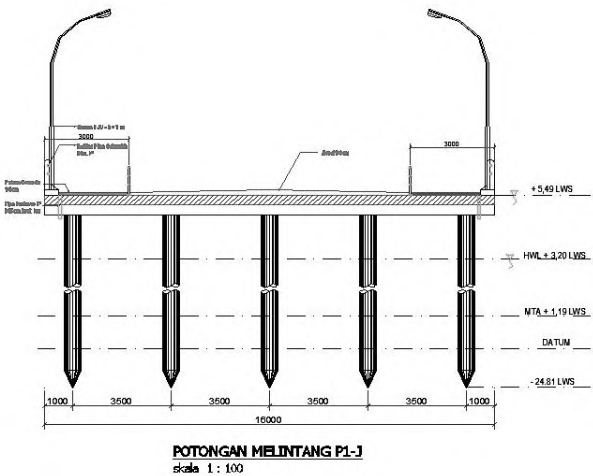
1.5 Manfaat Desain

Dalam penyusunan tugas akhir ini, mahasiswa diharapkan mampu dan kreatif dalam menyusun tugas akhir. Penyusunan tugas akhir ini sangat bermanfaat bagi mahasiswa, yaitu menambah wawasan dan ilmu pada mahasiswa sendiri. Dikarenakan tugas akhir ini diharapkan mampu menyajikan karya yang orisinil dalam merencanakan ulang suatu proyek yang telah dikerjakan. Serta dapat mengembangkan dan meningkatkan kreatifitas, keahlian dan profesinya.

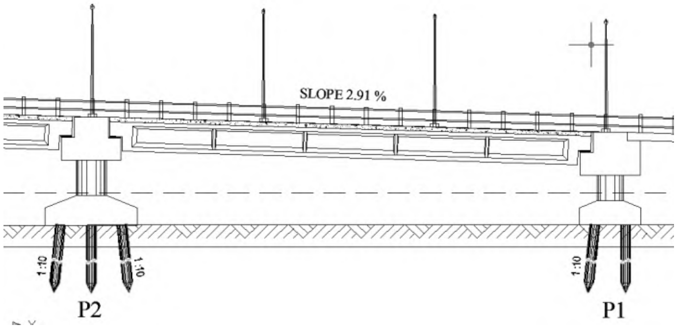
Gambar Eksisting Jembatan THP Kenjeran



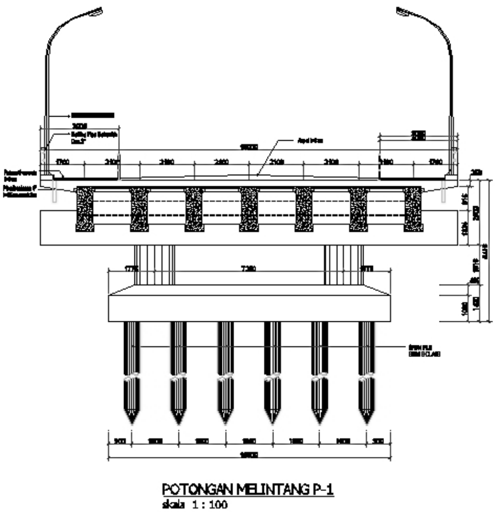
Gambar 1.4 Long section eksisting slab on pile



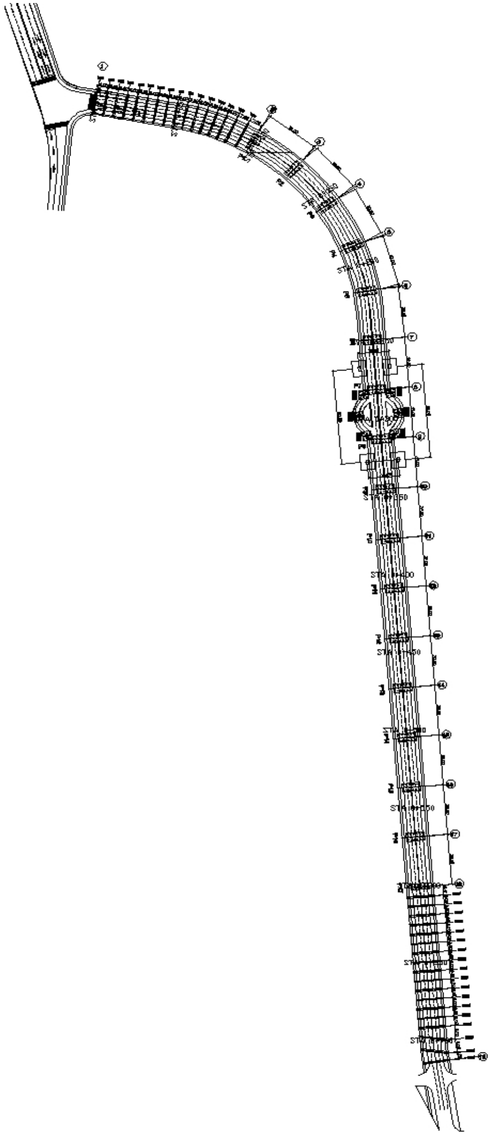
Gambar 1.5 Cross section eksisting slab on pile



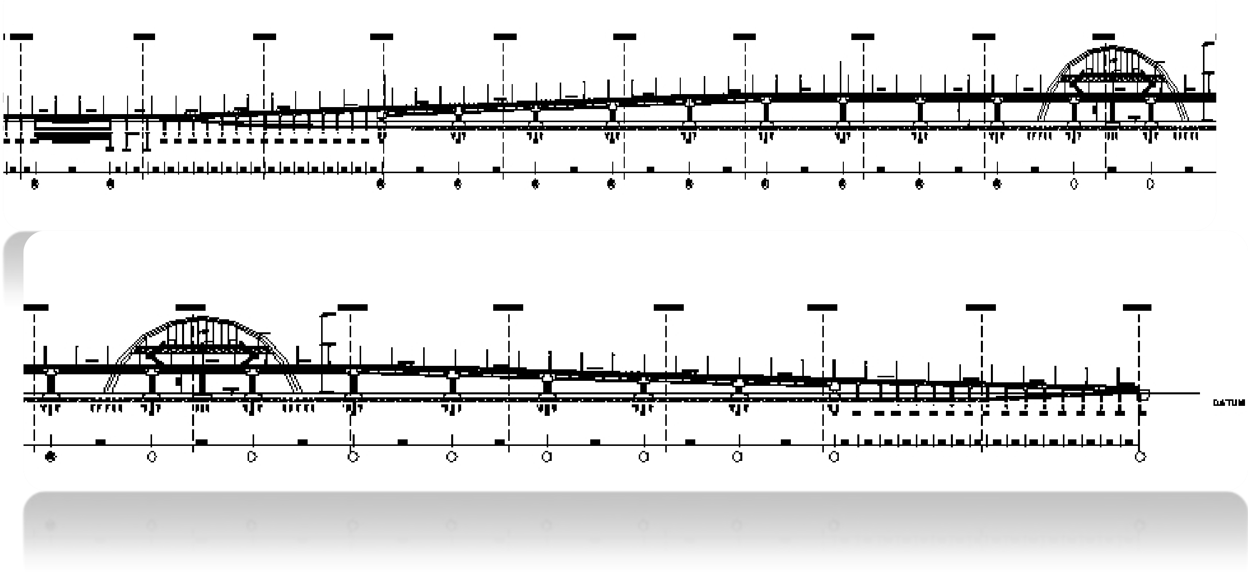
Gambar 1.6 Long section eksisting struktur beton pratekan I-Girder H170



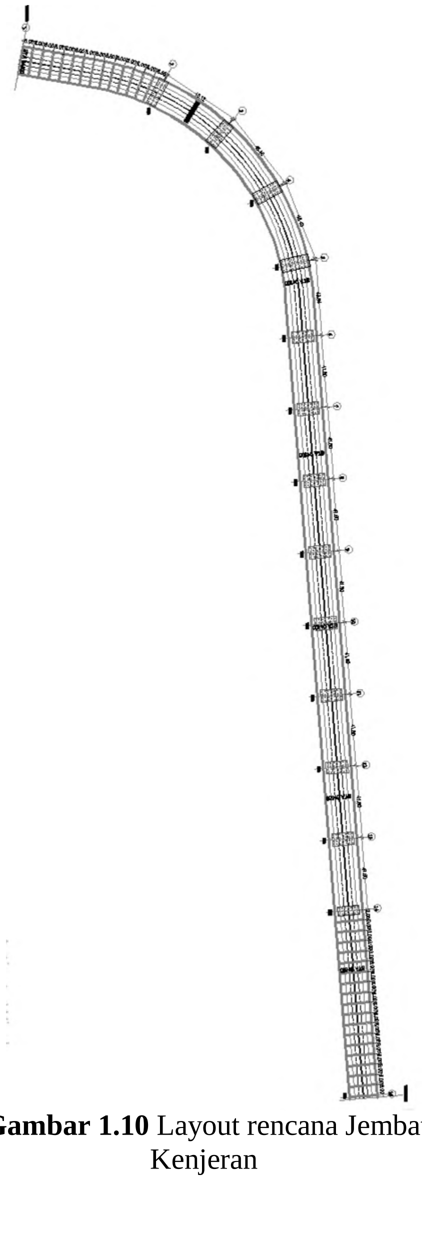
Gambar 1.7 Cross section eksisting struktur beton pratekan I Girder H170 bentang 30M



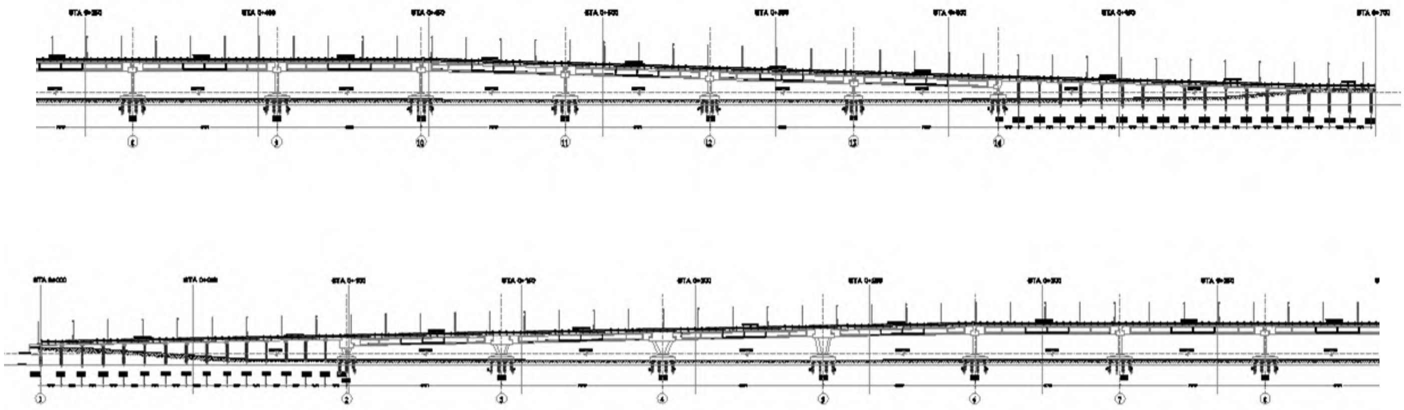
Gambar 1.8 Layout eksisting jembatan THP Kenjeran



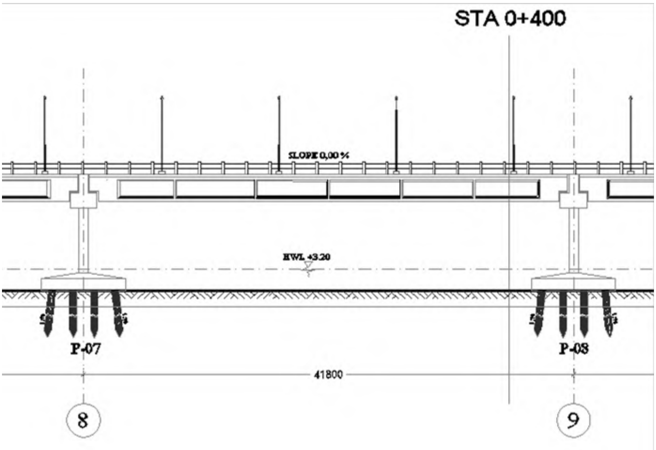
Gambar 1.9 Tampak memanjang eksisting Jembatan THP Kenjeran



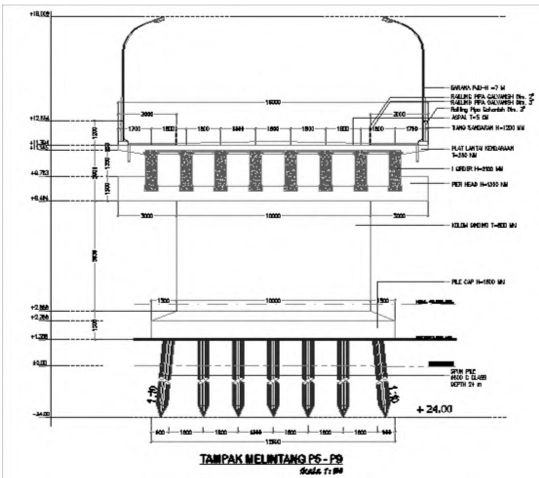
Gambar 1.10 Layout rencana Jembatan THP Kenjeran



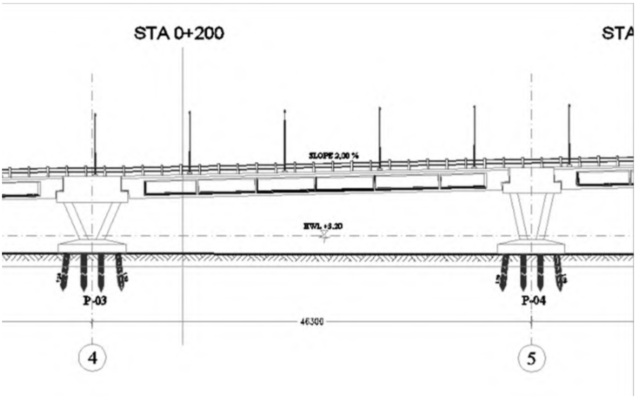
Gambar 1.11 Tampak memanjang rencana Jembatan THP Kenjeran



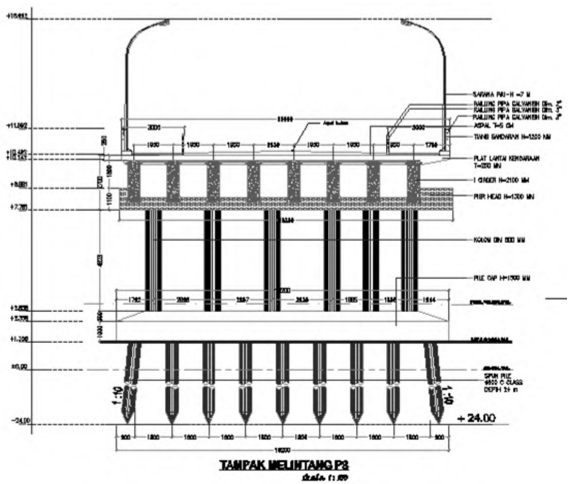
Gambar 1.12 Long section rencana struktur beton pratekan I Girder H210 bentang 40M



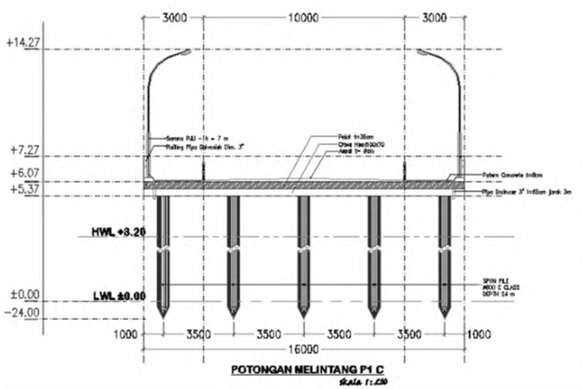
Gambar 1.13 Cross section rencana struktur beton pratekan I Girder H210 L=1.80 m.



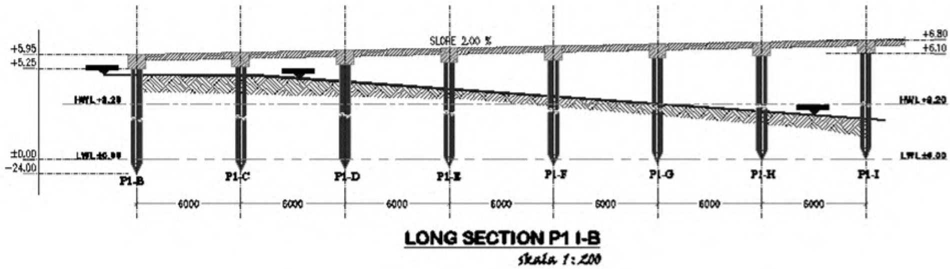
Gambar 1.14 Long section rencana struktur beton pratekan I Girder H210 bentang 40M



Gambar 1.15 Cross section rencana struktur beton pratekan I Girder H210 L=1.95 m.



Gambar 1.16 Cross section rencana struktur slab on pile.



Gambar 1.17 Long section rencana slab on pile

BAB II
TINJAUAN PUSTAKA

2.1 Data Desain Jembatan

Kondisi eksisting Jembatan THP Kenjeran memiliki panjang 762 meter lebar 16 meter dengan lebar jalur kendaraan 10 meter, lebar jalur pejalan kaki 3 meter disebelah kanan dan kiri. Bangunan utama jembatan terdiri dari 4 bagian yaitu bagian tepi/awal dengan panjang 96 meter menggunakan konstruksi slab on pile, bagian tengah dengan panjang 640 meter menggunakan konstruksi balok pratekan, bagian ujung dengan panjang 107 meter dan menggunakan konstruksi slab on pile.

Data-data desain ulang Jembatan THP Kenjeran:

a. Struktur slab on pile
   - Betang : 6 meter
   - Lebar jembatan : 16 meter
   - Lebar trotoar : 2 x 3.00 meter
   - Lebar jalan raya : 10 meter
   - As ke as pile : 3.50 meter
   - Tebal aspal : 0.05 meter
   - Tebal plat lantai : 0.35 meter
   - Pipa sandaran : 3 inch (76.3 mm)

b. Struktur beton pratekan I girder
   - Bentang : 40 meter
   - Lebar jembatan : 16 meter
   - Lebar trotoar : 2 x 3.00 meter
   - Lebar jalan raya : 10 meter
   - As ke as girder : 1.80 meter
   - Tebal aspal : 0.05 meter
   - Tebal plat lantai : 0.25 meter
   - Pipa sandaran : 3 inch (76.3 mm)

2.2 Data Bahan

2.2.1 Beton

1) Berdasarkan **Bridge Design Code** tabel 6.3 hal 6-24 didapatkan bahwa perkerasan dan lantai jembatan yang berhubungan dengan lalu lintas menengah atau berat (kendaraan mempunyai masa kotor lebih dari 3 ton), kuat tekan karajteristik minimum untuk beton f'c adalah 25 MPa.
2) Modulus elastisitas beton (Ec) berdasarkan **Bridge Design Code, BMS 1992 pasal 6.4.1.2 hal 30** pada umur tertentu mutu beton bias diambil :

   $$Ec = Wc^{1.5}(0.043\sqrt{f'c}) \qquad \ldots(2.1)$$

   Dimana:

   Wc = berat volume beton ≥ 24 MPa

   f'c = 25 MPa
3) Tebal selimut beton

   Tebal selimut beton direncanakan berdasarkan **Bridge Design Code Tabel 6.6 hal 6-28**.

2.2.2 Baja

Mutu tulangan yang digunakan adalah :

1) Untuk tulangan dengan D < 12 mm, maka fsy = 240 MPa (Grade U24), **Bridge Design Code, tabel 6.12 hal 35**.
2) Untuk tulangan dengan D ≥ 13 mm, maka fsy = 400 MPa (Grade U39), **Bridge Design Code, tabel 6.12 hal 35**.
3) Modulus elastisitas baja adalah 2.10^{3} MPa. **Bridge Design Code, tabel 6.12, pasal 2.2 hal 35**.

2.2.3 Strand Baja

Untuk konstruksi beton prategang pratarik menggunakan strand dengan 7 kawat yaitu mempunyai sebuah kawat ditengah yang sedikit lebih besar dari keenam kawat sebelah luarnya yang membungkusnya dengan erat. Untaian tujuh kawat biasa digunakan untuk system prategang menurut spesifikasi ASTM A-416 yang mempunyai kekuatan batas 1720 MPa atau 1860 MPa.

Sifat-sifatnya seperti terdapat dalam tabel. (**Lin dan Burns, 1982 hal 49**).

Tabel 2.1 Sifat-sifat Strand-Relieved
Dengan tujuh Kawat Tanpa Pelapisan. (ASTM A-416)

Diameter nominal (mm)	**Kekuatan Putus (kN)**	**Luas Nominal Strand (mm^2)**	**Beban Minimum pada Pemuaian 1% (kN)**
		Derajat 1720 MPa	
6,35	40,0	23,22	34,0
7,94	64,5	37,42	54,7
9,35	89,0	51,61	75,6
11,11	120,1	69,68	102,3
12,70	160,1	92,90	136,2
15,24	240,2	139,35	204,2
		Derajat 1860 MPa	
9,53	102,3	54,84	87,0
11,11	137,9	74,19	117,2
12,70	183,7	98,71	156,1
15,24	260,7	140,00	221,5

Kata derajat yang terdapat pada tabel 2.1 menunjukkan tegangan putus yang dijamin.

2.3 Kriteria Design Jembatan Beton Prategang

Dalam desain perhitungan pada Jembatan THP Kenjeran dengan system beton prategang digunakan acuan/pedoman sebagai berikut:

1) BRIDGE DESIGN MANUAL **(BMS BDM, 1992)**
2) BRIDGE DESIGN CODE **(BMS BDC, 1992)**

3) Tata Cara Perhitungan Struktur Beton **(SNI Beton, 2005).**
4) Design Struktur Beton Prategang **(T.Y Lin dan Burns, 1982).**

2.4 Struktur Utama Prategang

Mengingat panjang bentang total jembatan 762 meter maka memerlukan suatu struktur yang memiliki ketahanan yang kuat dan dalam hal ini system pratekan menjadi salah satu pilihan dan pertimbangan pemakaian, beberapa kelebihan antara lain:

1. Kekuatan beton lebih kuat dibandingkan beton bertulang, beton pratekan menggunakan beton dan baja mutu tinggi.
2. Lebih efektif untuk bentang panjang dengan beban besar karena beton sudah terlebih dahulu mengalami tegangan dari dalam sebelum terbebani gaya dari luar.
3. Karena beton mengalami gaya internal akibat fase, penarikan hal inilah yang menyebabkan retak jarak terjadi.
4. Pada beton prategang retak yang sudah dahulu tertekan akibat penarikan.
5. Lebih ekonomis dibandingkan beton bertulang pada bentang panjang beton bertulang membutuhkan dimensi yang besar dengan tambahan tulangan yang tidak sedikit sedangkan beton pratekan yang memiliki beton dan baja mutu tinggi.
6. Pemeliharaan beton pratekan tidak memerlukan biaya yang mahal.

Beton prategang merupakan kombinasi antara beton berkekuatan tinggi dan baja mutu tinggi dengan cara menarik baja dan menahannya ke beton sehingga membuat beton dalam keadaan pratekan. ***(T.Y Lin Ned – H.Burns: Design Struktur Beton Prategang),*** sedangkan menurut **Komisi ACI** beton dengan besar dan distribusi sedemikian sehingga dapat mengimbangi sampai batas tertentu tegangan yang terjadi akibat beban eksternal.

Beton prategang dapat digambarkan sebagai beton yang ditransformasikan dari bahan yang getas menjadi bahan yang elastic dengan memberikan tekanan terlebih dahulu pada beton. Tekanan tersebut dapat terjadi saat penarikan tendon (untaian kawat mutu tinggi, kabel). Dari hasil penarikan tersebut diharapkan tegangan yang terjadi masih kurang atau sama dengan tegangan ijin yang telah ditentukan.

Adapun tegangan ijin beton prategang untuk batang-batang lentur sesuai dengan peraturan ACI atau dapat dilihat pada *(“Edward G Nawy:Beton Prategang.Erlangga, hal 59”),* tegangan baja tidak boleh melampaui nilai-nilai berikut:

a. Akibat gaya pendongkrak yang bekerja pada kabel :
   0.80 f_{pu} atau 0.94 f_{py}
   Mana yang lebih kecil, tetapi tidak lebih besar dari nilai maksimum yang diusulkan oleh pembuat kabel prategang atau angkur.
b. Tendon penarik “segera setelah peralihan” gaya prategang atau tendon-tendon pasca tarik setelah panjangkaran/pengangkuran, 0.70 f_{pu}.

Tegangan beton tidak boleh melampaui nilai-nilai berikut ini:

a. Segera setelah peralihan gaya prategang (sebelum kehilangan), tegangan serat-serat terluar
   Tekan = 0.60 $f'ci$
   Tarik = 0 (tidak boleh ada tegangan tarik, apabila ada harus diberi tulangan lekatan dan tarik maksimum tidak boleh melebihi 7.5 $\sqrt{f'c}$).

b. Pada beban kerja setelah terjadi seluruh kehilangan gaya prategang
Tekan = 0.45 *f'c*
Tarik =3 $\sqrt{f'c}$

Desain menggunakan konsep **Sistim Pratekan Untuk Mengubah Beton Menjadi Bahan Yang Elastis,** yaitu mengubah bahan yang getas menjadi elastic dengan member tekanan (desakan) terlebih dahulu. Setiap tegangan beton prategang diperiksa pada fase sesaat transfer gaya prategang saat masa konstruksi, dan saat pemakaian jembatan (sevice).

Pada ketiga fase diatas beton prategang mengalami apa yang disebut kehilangan gaya yang diakibatkan oleh beberapa sebab diantaranya adalah:

- Kehilangan gaya akibat Gesek atau *Friction*
- Kehilangan gaya akibat slip angkur
- Kehilangan gaya akibat perpendekan Elastisitas Beton
- Kehilangan gaya akibat susut "SH"
- Kehilangan gaya akibat rangkak "CR"
- Kehilangan gaya akibat relaksasi baja "RE"

Desain awal untuk gelagar beton prategang sesuai dengan **BMS, BDM hal 3-26** gelagar I pra tegang dengan lantai komposit dalam bentang tunggal dengan variasi antara 12 m sampai 35 m perbandingan tipikal tinggi/bentang *1/15 x l* sampai *1/16.5 x l.*

Rumus yang digunakan untuk mencari kehilangan gaya diatas adalah sebagai berikut:

1. Kehilangan gaya akibat gesekan "*Friction*"

$$\frac{F2-F1}{F1} = -KL - \mu a \qquad \ldots(2.2)$$

Dimana :

F1 = Gaya awal yang diberikan
F2 = Gaya setelah menerima gesekan
K = Koefisien wobble (tendon pada selubung longam fleksibel) 0.0016 – 0.0066.
L = Panjang bentang
μ = Koefisien kelengkungan 0.15 – 0.25
α = Perpendekan sudut pusat luar tendon

2. Kehilangan gaya akibat Slip Angkur

$$\Delta P\ ANK = 3\ \%\ x\ F1 \qquad \ldots(2.3)$$

3. Kehilangan gaya akibat perpendekan elastisitas

$$ES = K_{ES} \, . \, E_S \, . \frac{fcir}{Eci} \, . \, Aps \qquad \ldots(2.4)$$

Dimana :
ES = Perpendekan elastisitas
Kes = 0.5 untuk kabel pascatarik bila kabel ditarik berurutan
Es = Modulus elastisitas baja
Fcir = Tegangan beton pada garis yang melalui cgs
Eci = Modulus elastisitas beton

4. Kehilangan gaya akibat susut SH

$$\Delta F_{SH} = 8.2 \text{ x } 10^{-6} \, K_{sh} \, . \, E_s \left(1 - 0{,}0023 \, \frac{V}{S} \right) (100 - RH) \text{ x } Aps_{total} \qquad \ldots(2.5)$$

Dimana :
ΔF_{SH} = Kehilangan gaya akibat susut beton
Ksh = Waktu akhir perawatan beton = 0.58 (selama 30 hari)
Es = Modulus elastisitas baja
$\frac{V}{S}$ = Perbandingan volume dan keliling beton perpias
RH = Kelembapan relative daerah

setempat 70%

Aps = Luas penampang total tendon

5. Kehilangan gaya akibat rangkak

ΔFCR = Kcr x $\frac{E_s}{Ec}$ x (Fcir – Fcds) …(2.6)

Dimana :

ΔFCR = Gaya akibat rangkak.

Kcr = 1.6 untuk pascatarik.

Es = Modulus elastisitas baja.

Fcir = Gaya yang bekerja pada beton terhadap cgc setelah transfer.

Fcds = Gaya yang bekerja pada beton setelah semua beban mati yang diberikan.

6. Kehilangan gaya akibat relaksasi baja

$\Delta RE = [Kre - J\ (SH + CR + ES) x\ C$ …(2.7)

Dimana :

Kre = 35 MPa (strand 7 kawat relaksasi rendah)

J = 0.04 (strand 7 kawat relaksasi rendah)

C = 1 koefisien waktu selama 1 tahun

SH = Total kehilangan gaya akibat susut

CR = Total kehilangan gaya akibat Creep (rangkak)

ES = Total kehilangan gaya akibat perpendekn elastisitas.

Secara umum rumus untuk mencari tegangan pada tiap-tiap fase beton prategang adalah

Untuk serat atas : $\frac{F}{A} = \frac{Feff.e.ya}{Ix} + \frac{M\ G\ .ya}{Ix}$ …(2.8)

Untuk serat bawah: $\frac{F}{A} + \frac{Feff.e.yb}{Ix} - \frac{M\ G\ .yb}{Ix}$ …(2.9)

Keterangan :

M = Momen yang terjadi

y = Jarak tegak lurus dari garis c.g.c ke serat yang ditinjau

A = Luas penampang

E = Eksentritas
Ix = Momen inersia penampang beton terhadap sumbu x
F = Gaya prategang efektif total setelah dikurangi kehilangan.

2.5 Dasar Desain

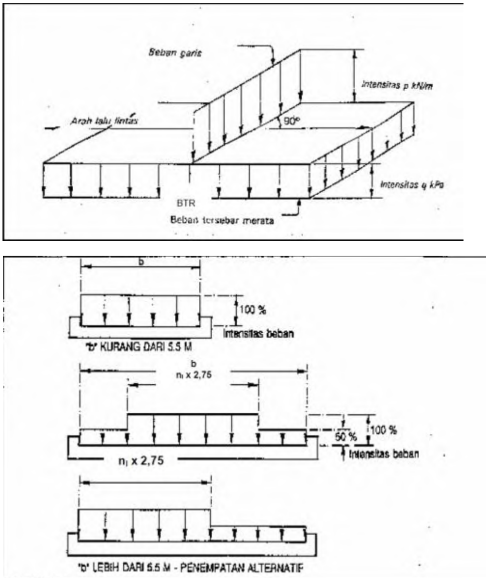
2.5.1 Analisis Pembebanan Struktur Jembatan

Pembebanan Pembebanan pada balok prategang digunakan untuk mengetahui apakah penampang balok prategang tersebut bisa menahan beban-beban yang bekerja pada penampang. Beban-beban yang bekerja pada desain struktur girder dalam tugas akhir ini adalah beban mati tetap, beban mati tambahan dan beban hidup yang mengacu pada RSNI T-02-2005. Beban-beban yang bekerja adalah :

1. Beban mati adalah beban semua bagian dari suatu jembatan yang bersifat tetap, termasuk segala beban tambahan yang tidak terpisahkan dari suatu struktur jembatan. Beban mati tetap dan beban mati tambahan merupakan berat sendiri beton girder, slab lantai, aspal dan diaphragma.
2. Beban hidup adalah semua beban yang terjadi akibat penggunaan jembatan berupa beban lalu lintas kendaraan sesuai dengan peraturan pembebanan untuk jembatan jalan raya yang berlaku.
   - Beban “D” Beban Lajur “D” terdiri atas beban tersebar merata, Uniform Distributed Load (UDL) yang digabung dengan beban garis, dan Knife Edge Load (KEL)
     a. Beban Tersebar Merata (UDL), mempunyai intensitas q t/m^2 dimana besarnya q tergantung pada panjang total wilayah yang dibebani, seperti berikut :
     q = 0.9 t/m2 → span ≤ 30 m

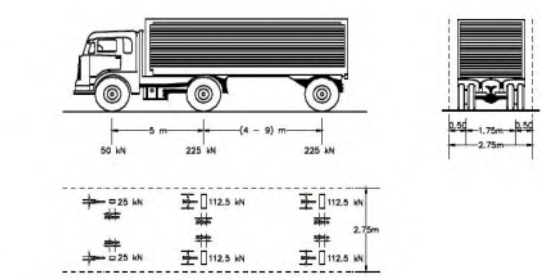
q = 0.9 x (0.5 + 15/L) t/m2 → > 30 m.
dengan pengertian :
q = intensitas beban terbagi rata (BTR) dalam arah memanjang jembatan.
L = panjang total jembatan yang dibebani (meter).

b. Beban Garis atau Knife Edge Load (KEL) dengan intensitas p ton/m’ harus ditempatkan tegak lurus terhadap lalu lintas jembatan. Besarnya intensitas p adalah 4.90 ton/m’.



Gambar 2.1 Kedudukan Beban Lajur “D”

c. Beban “T” adalah Pembebanan truk "T" terdiri dari kendaraan truk semi-trailer yang mempunyai susunan dan berat as seperti terlihat dalam Gambar 2.1. Berat dari masing-masing as disebarkan menjadi 2 beban merata sama besar yang merupakan bidang kontak antara roda dengan permukaan lantai. Jarak antara 2 as tersebut bisa diubah-ubah antara 4,0 m sampai 9,0 m untuk mendapatkan pengaruh terbesar pada arah memanjang jembatan.



Gambar 2.2 Pembebanan Truk “T”

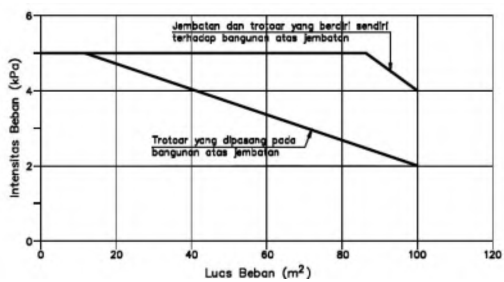
d. Faktor Pembesaran Dinamis
Faktor pembesaran dinamis (DLA) berlaku pada “KEL” lajur “D” dan truk “T” sebagai simulasi kejut dari kendaraan bergerak pada struktur jembatan. Untuk truk “T” nilai DLA 0.3 sedangkan untuk “KEL” lajur “D” nilai dapat dilihat pada tabel 2.1.

Tabel 2.2 Faktor Beban Dinamik untuk “KEL” Lajur “D”

Bentang Ekuivalensi $L_{\grave{e}}$ (m)	DLA (untuk kedua keadaan batas)
$L_{\grave{e}} \leq 50$	0.4
$50 < L_{\grave{e}} < 90$	$0.525 - 0.0025\, L_{\grave{e}}$
$L_{\grave{e}} \geq 90$	0.3

- Beban Pejalan Kaki

  Semua elemen dari trotoar atau jembatan penyeberangan yang langsung memikul pejalan kaki harus direncanakan untuk beban nominal 5 kPa. Jembatan pejalan kaki dan trotoar pada jembatan jalan raya harus direncanakan untuk memikul beban per m^2 dari luas yang dibebani seperti pada Gambar 2.3. Luas yang dibebani adalah luas yang terkait dengan elemen bangunan yang ditinjau. Apabila trotoar memungkinkan digunakan untuk kendaraan ringan atau ternak, maka trotoar harus direncanakan untuk bisa memikul beban hidup terpusat sebesar 20 kN.



Gambar 2.3 Pembebanan untuk pejalan kaki

c. Beban angin

Gaya nominal ultimit dan daya layan jembatan akibat angin tergantung kecepatan angin rencana seperti berikut:

$T_{EW} = 0.0006\ Cw\ (Vw)^2\ Ab$ …(2.10)

Apabila suatu kendaraan sedang berada diatas jembatan, beban garis merata tambahan arah horizontal harus diterapkan pada permukaan lantai seperti diberikan pada rumus dibawah ini :

$T_{EW} = 0.0012 \times Cw \times Vw^2 \times Ab$ (kN) …(2.11)

dengan pengertian :

Vw adalah kecepatan angin rencana (m/s) untuk keadaan batas yang ditinjau

Cw adalah koefisien seret - lihat Tabel 2.2

Ab adalah luas koefisien bagian samping jembatan (m^2)

Tabel 2.4 Koefisien seret Cw

Type Jembatan	Cw
Bangunan atas masif : B/d = 1.0	2.1
B/d = 2.0	1.5
B/d = 6.0	1.25

Tabel 2.5 Kecepatan angin rencana

Keadaan Batas	Lokasi	
	Sampai 5 km dari pantai	> 5 km dari pantai
Daya layan	30 m/s	25 m/s
Ultimit	35 m/s	30 m/s

Catatan :

- B = lebar keseluruhan jembatan dihitung dari sisi luar sandaran.
- D = tinggi bangunan atas, termasuk tinggi bagian sandaran yang massif.
- Untuk harga antara B/d bias diinterpolasi linier.
- Apabila bangunan atas mempunyai superelevasi, Cw harus dinaikan sebesar 3% untuk setiap derajat superelevasi dengan kenaikan maksimum 25%.

d. Beban gempa

Pembebanan gempa dihitung berdasarkan pedoman Perencanaan Ketahanan Gempa untuk Jembatan, **(PPTJ, BMS, hal. 2-45)**

Yaitu :

$$V = Kh.\ I.\ Wt \qquad \ldots(2.12)$$

Keterangan :

Kh = koefisien beban gempa horizontal

I = factor keutamaan

Wt = Total berat nominal bangunan yang dipengaruhi oleh percepatan diambil akibat gempa, sebagai beban mati tambahan (kN)

Dimana :

$$Kh = C.S \qquad \ldots(2.13)$$

Keterangan :

C = Koefisien geser dasar untuk daerah, waktu dan kondisi setempat yang sesuai.

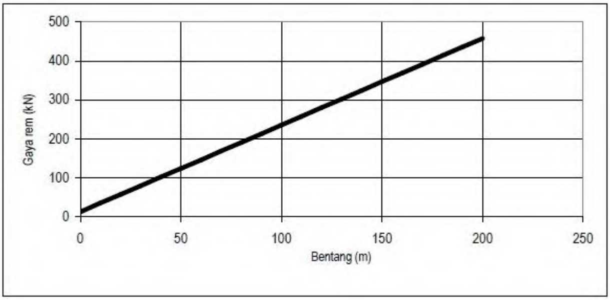
S = factor tipe bangunan

e. Beban Rem

Bekerjanya gaya-gaya di arah memanjang jembatan, akibat gaya rem dan traksi, harus ditinjau untuk kedua jurusan lalu lintas. Pengaruh ini diperhitungkan senilai dengan gaya rem sebesar 5% dari beban lajur D yang dianggap ada pada semua jalur lalu lintas (Gambar 5), tanpa dikalikan dengan faktor beban dinamis dan dalam satu jurusan. Gaya rem tersebut dianggap bekerja horisontal dalam arah sumbu jembatan dengan titik tangkap setinggi 1,8 m di atas permukaan lantai kendaraan. Beban lajur D disini jangan direduksi bila panjang bentang melebihi 30 m, digunakan rumus 1: q = 9 kPa.

Dalam memperkirakan pengaruh gaya memanjang terhadap perletakan dan bangunan bawah jembatan, maka gesekan atau karakteristik perpindahan geser dari perletakan ekspansi dan kekakuan bangunan bawah harus diperhitungkan. Gaya rem tidak boleh digunakan tanpa memperhitungkan pengaruh beban lalu lintas vertikal.

Dalam hal dimana beban lalu lintas vertikal mengurangi pengaruh dari gaya rem (seperti pada stabilitas guling dari pangkal jembatan), maka Faktor Beban Ultimit terkurangi sebesar 40% boleh digunakan untuk pengaruh beban lalu lintas vertikal.



Gambar 2.4 Gaya rem perlajur 2,75 m (KBU)

f. Gaya setrifugal

Tabel 2.6 Faktor beban akibat gaya sentrifugal

JANGKA WAKTU	FAKTOR BEBAN	
	$K_{S;;TR;}$	$K_{U;;TR;}$
Transien	1,0	1,8

Jembatan yang berada pada tikungan harus memperhitungkan bekerjanya suatu gaya horisontal radial yang dianggap bekerja pada tinggi 1,8 m di atas lantai kendaraan. Gaya horisontal tersebut harus sebanding dengan beban lajur D yang dianggap ada pada semua jalur lalu lintas (Tabel 11 dan Gambar 5), tanpa dikalikan dengan faktor beban dinamis. Beban lajur D disini tidak boleh direduksi bila panjang bentang melebihi 30 m. Untuk kondisi ini rumus 1; dimana q = 9 kPa berlaku.

Pembebanan lalu lintas 70% dan faktor pembesaran di atas 100% BGT dan BTR berlaku untuk gaya sentrifugal.

Gaya sentrifugal harus bekerja secara bersamaan dengan pembebanan "D" atau "T" dengan pola yang sama sepanjang jembatan. Gaya sentrifugal ditentukan dengan rumus berikut:

$$T_{TR} = 0{,}006\, x\, \frac{V^2}{r}\, x\, T_T \qquad \ldots (2.14)$$

Keterangan :

TTR = gaya sentrifugal yang bekerja pada bagian jembatan

TT = Pembebanan lalu lintas total yang bekerja pada bagian yang sama (TTR dan TT mempunyai satuan yang sama)

V = kecepatan lalu lintas rencana (km/jam)

r = jari-jari lengkungan (m)

2.5.2 Kombinasi Pembebanan

Menurut RSNI T-02-2005, aksi rencana digolongkan ke dalam aksi tetap dan *transien*,kombinasi beban umumnya didasarkan kepada beberapa kemungkinan tipe yang berbeda dari aksi yang bekerja secara bersamaan dan keadaan paling berbahaya yang harus diambil. Kombinasi yang diperhitungkan antara lain:

a) Kombinasi pada keadaan batas daya layan.
b) Kombinasi pada keadaan batas ultimit.

2.6 Struktur Penyusun Jembatan

Jembatan terdiri atas beberapa struktur bangunan yang umumnya dibagi menjadi bangunan atas yang berupa sandaran, pelat lantai, trotoar, gelagar, dan diafragma, bangunan bawah yang berupa kepala pile, kepala pilar, pilar dan pondasi; dan bangunan pelengkap yang terdiri dari pelat injak, retaining wall.

2.6.1 Bangunan Atas Jembatan

Yang termasuk dalam bangunan atas jembatan adalah sandaran, pelat lantai dan trotoar, gelagar dan diafragma. Dimana disetiap bangunan tersebut akan dijelaskan sebagai berikut

2.6.1.1 Desain Sandaran

Sandaran pada jembatan berguna sebagai pembatas atas pengaman pejalan kaki yang melintas diatas jembatan agar tidak jatuh ke sisi luar jembatan. Desain sandaran disesuaikan dengan BMS BDC Pasal 2.9.5 hal 2-69, sandaran untuk pejalan kaki harus direncanakan untuk dua pembebanan yang bekerja secara bersamaan dalam arah menyilang vertical dan horizontal dengan masing-masing beban sebesar W* = 0.75 kN/m.

1) Gaya yang bekerja pada pipa (Palangan)
   Sandaran
   a. Beban hidup (gaya vertikal) = 0.75 kN/m
   b. Beban hidup (gaya horizontal) = 0.75 kN/m
   c. Berat sendiri pipa sandaran (gaya vertikal) = 0.0508 kN/m
   d. Momen yang terjadi pada pipa sandaran

M_1 = M berat sendiri + M gaya vertical
M_2 = M gaya horizontal

e. M kombinasi (resultan) = $\sqrt{M_1^2 + M_2^2}$

2.6.1.2 Desain Pelat

Desain awal pelat lantai sesuai dengan BMS BDM hal 5-4 adalah :

1. Menentukan tebal pelat lantai jembatan

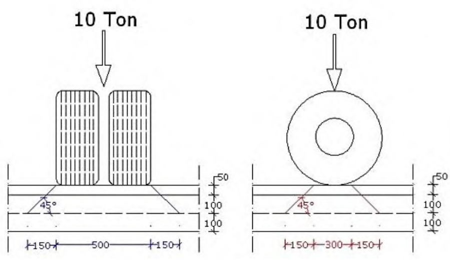
Tabel 2.7 Tinggi pelat beton bertulang

Jenis Unsur	Tinggi Nominal
Pelat Beton Bertulang	$200 \leq D \geq 100 + 0.04\ L$
Catatan : 1. Tinggi pelat menerus adalah 90% dari tinggi bentang sederhana diatas 2. D dan L dalam mm	

Dimana L adalah panjang bentang jembatan

2. Pembebanan

Beban rencana untuk kendaraan pada pelat diasumsikan dengan beban truk. Truk "T" harus ditempatkan ditengah lajur lalu lintas dan dalam tiap lajur lalu lintas rencana untuk panjang penuh jembatan ditempatkan hanya satu truk (T=10 ton).
(BMS,PPTJ, Hal 2-27)



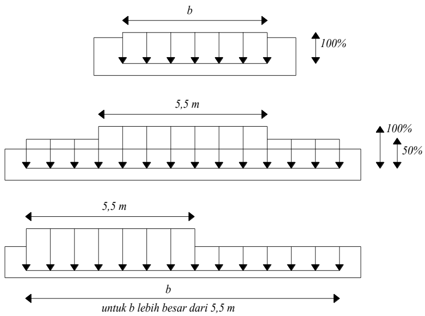
Gambar 2.5 Penyebaran beban satu roda

3. Asumsi perletakan
   Diasumsikan perletakan pelat lantai adalah pelat menerus antara dua atau lebih perletakan.
   $0{,}8 \ x \ (\frac{S+0{,}6}{10}) \ x \ P \ knm$ …(2.16)
   S = bentang efektif (m)
   P = beban roda
4. Menghitung momen penulangan
   Iy/Ix = < 2 maka pelat 2 arah
   = > 2 maka pelat 1 arah
   (SNI 03.2847-2002)
5. Menghitung penulangan (arah x-arah y)
   Data yang diperlukan : h, tebal selimut beton (tb), Mu, diameter tulangan, tinggi efektif (dx dan dy).

2.6.1.3 Desain Gelagar

1. Beban yang bekerja

Untuk lebar jalur kendaraan jembatan kurang atau sama dengan 5,5 m, maka beban D harus ditempatkan pada seluruh jalur dengan intensitas 100%, dan apabila lebih besar dari 5,5 m beban D harus ditempatkan pada dua jalur lalu lintas rencana yang berdekatan dengan intensitas yang tercantum pada pasal 2.33 PPTJ BMS. Sedangkan sisa jalur dengan intensitas sebesar 50% seperti tercantum pada pasal 2.3.2 hal 2-18 BMS, BDM.



Gambar 2.6 Kedudukan Beban Lajur “D”

2. Gelagar beton prategang

a. Menentukan dimensi balok pratekan
   Dalam mendesain balok pratekan diperlukan dimensi dengan ukuran-ukuran tertentu. Hal tersebut dapat dilihat pada **BDM, BMS hal 3-26 Tabel 3.5 (*f*).**

b. Pembebanan
   - ✓ Berat sendiri balok
   - ✓ Berat sendiri plat
   - ✓ Berat mati tambahan

c. Analisa Gaya
   1. Saat jacking
   2. Sesaat setelah transfer gaya
      - Akibat gesekan dan Wobble effect
      - Akibat slip angkur
      - Akibat perpendekan elastic
   3. Saat konstruksi
   4. Saat service
      - Kehilangan gaya prategang akibat penyusutan beton
      - Akibat rangkak beton
      - Akibat relaksasi baja

d. Penentuan jenis dan jumlah kawat (*strand*) untuk tendon.

$$As = \frac{Ti}{0{,}75 * fpu} \qquad \ldots(2.17)$$

$$n = \frac{As}{A\ nominal} \qquad \ldots(2.18)$$

e. Penentuan jumlah tendon dan type angkur. (Lihat buku Struktur Beton Prategang; T.Y. Lin)

2.6.1.4 Tahapan Desain Perletakan Elastomer

Tahapan dibawah ini diuji coba sampai diperoleh ukuran perletakan yang memadai. Tahapan perencanaan antara lain (BDM, BMS 92 hal 7-4)

1. Tentukan beban dan gerakan terburuk
2. Buatlah pemilihan perletakan permulaan
3. Periksa pemilihan perletakan permulaan terhadap :
    - Bentuk dan fungsi yang tepat
    - Luas tumpuan efectif
    - Regangan geser maximum
    - Tegangan tekan rata-rata
    - Tebal plat baja minimum
    - Tahanan gesek terhadap geser

a) Penentuan beban dan gerak terburuk

Terdiri dari beban tegak lurus pada permukaan tumpuan (V*) dan beban horizontal (H*) dan gerakan tangensial dan perputaran relative.

1. Beban vertical atau reaksi perletakan (V*)
    a. Reaksi total maksimum akibat beban mati dan beban hidup
       Ra*= Rb*
    b. Reaksi total maksimum akibat beban mati saja
       Ra*= Rb*
       = [R (Diafragma + bs.primer & sekunder)]
2. Gaya horinzontal (H*)
   Gaya horizontal berasal dari:
    a. Dari beban mati pada kepala jembatan R akibat beban mati = H_1 = 15% x R
    b. Akibat gempa bumi

BMS PPTJ hal 2-34

H_2	= Kh x V	…(2.19)
Kh	= C . S	C = 0,1
	= 0,1 x 1	S = 1 (sumsi dapat menahan simpangan besar)

c. Akibat gaya rem
H_3 = F rem

d. Akibat pengaruh suhu dan susut
Akibat pengaruh suhu dan susut pada arah melintang dapat diabaikan
(PPTJ BMS hal 6-76)
H* total = $H_1 + H_2 + H_3$

3. Gerakan tangensial (αa αb, αs)
BDM hal 7-6

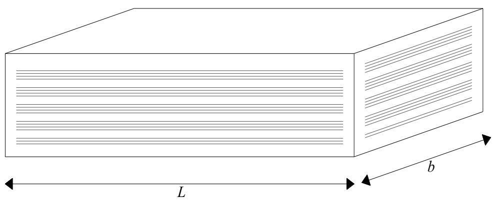
$$\alpha_a = \frac{H * xt}{1000\ x\ At\ x\ G} \quad \ldots(2.20)$$

Dimana :

H = Gaya horizontal
T = Tebal karet landasan
G = Modulus geser = 0,69 MPa
A = Luasan denah karet
α_b = 0 (lebar jembatan < 10 meter)
α_s = $\alpha_a + \alpha_b$

b) Pemilihan perletakan

Dalam pemilihan ukuran perletakan biasa didapatkan pada tabel 7.4 (a) sampai dengan 7.4 (t) BMS BDM hal 7-7 dengan ukuran dimensi dan kekuatan yang berbeda-beda.



Gambar 2.8 Elastomer Bearing

Periksa perletakan dengan perumusan dari **BMS BDM hal 7-17** sebagai berikut :

a. Faktor bentuk harus berada $4 \leq s \leq 12$

$$S = \frac{a.b}{2(a+b)to} \qquad \ldots(2.21)$$

b. Jumlah regangan tekan, perputaran dan geser

$$Esc + Est + Esh = Et \leq \frac{2.6}{\sqrt{6}} \qquad \ldots(2.22)$$

c. Pembatasan regangan geser

$$Esh = 0{,}7 \text{ bila } Aeff \geq 0{,}9\,A$$

$$Esh = \frac{2.Aeff}{A} - 1{,}1 \qquad \ldots(2.23)$$

Bila $0{,}9\,A \geq Aeff \geq 0{,}8\,A$

d. Luas tumpuan eff min $Aeff \geq 0{,}8A$

e. Mencegah lelah khusus pada jembatan

$$Esc \leq 1{,}4\sqrt{\frac{0{,}69}{G}} \qquad \ldots(2.24)$$

f. Stabilitas perletakan dalam tekan

$$\frac{V*}{Aeff} \leq \frac{2.bo.G.s}{3t} \qquad \ldots(2.25)$$

g. Tebal minimum ts dari pelat baja yang tertanam dalam perletakan

$$3mm \leq tl \geq \frac{3V*.tl.1000}{Afy}\ mm \qquad \ldots(2.26)$$

h. Tahanan gesekan tidak cukup, dan tahanan mekanis gesekan diperlukan bila :

$$H* \geq 0{,}1\ (V* + Aeff \times 10^3) \qquad \ldots(2.27)$$

Untuk semua kombinasi beban.

2.6.2 Bangunan Bawah Jembatan

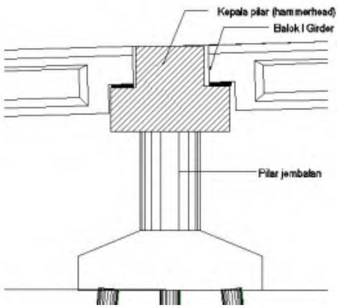
2.6.2.1 Pilar

Pilar adalah suatu bangunan yang terutama meneruskan beban dari bangunan atas ke tanah pondasi. Suatu konstruksi beton bertulang menumpu di atas fondasi tiang-tiang pancang dan terletak di tengah sungai atau yang lain yang berfungsi sebagai pemikul antara bentang tepi dan bentang tengah bangunan atas jembatan. **(SNI 2451.2008)**

2.6.2.2 Kepala pilar (Hammer head)

Kepala pilar merupakan suatu struktur beton bertulang yang menumpu diatas pilar jembatan baik itu berupa pilar dinding atau kolom. Pilar disini berfungsi penyalur beban dari bangunan atas ke pondasi.

Kepala pilar atau balok melintang tambahan yang menghubungkan dua buah girder utama juga berfungsi sebagai perletakan pada tengah bentang.



Gambar 2.9 Kepala pilar (hammerhead)

2.6.2.3 Pondasi

Pondasi dalam hal ini adalah tiang-tiang pancang yang dimasukkan kedalam tanah dengan cara ditumbuk atau ditekan dan berfungsi sebagai pemikul seluruh beban jembatan serta melimpahkannya ke lapisan tanah pendukung tidak termasuk cerucuk dan sejenisnya.

Dalam merencanakan pondasi diusahakan sedapat mungkin tidak timbul tegangan tarik pada dasar pondasi, hal ini dikarenakan bila timbul tegangan tarik pondasi menjadi kurang efisien. Pondasi yang menerima tegangan tarik tidak dapat menyalurkan beban jembatan ke tanah.

2.6.2.4 Plat injak

Sesuai dengan **BMS BDM hal 3-31** untuk dimensi permulaan pelat injak, panjang pelat injak dapat diambil sebesar 2500 mm dan setebal 200 mm. Lebar pelat injak disesuaikan dengan kelas jembatan tetapi umumnya digunakan lebar jalan kendaraan dengan kebebasan 600 mm terhadap tembok-tembok sayap.

2.6.2.5 Wing Wall

Tembok sayap/wingwall mempunyai fungsi untuk mencegah terjadinya longsoran tanah kearah samping terutama pada oprit jembatan. Untuk pembebanan tembok sayap diasumsikan bahwa tembok sayap dibebani oleh gaya horizontal tegak lurus terhadap dinding **(BMS BDC pasal 6.9 hal 6-69).**

2.6.3 Desain Slab on Pile

2.6.3.1 Desain Plat Slab

1. Menentukan tebal pelat lantai jembatan

Tabel 2.8 Tinggi pelat beton bertulang

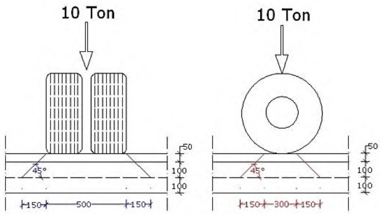
Jenis Unsur	Tinggi Nominal
Pelat Beton Bertulang	$200 \leq D \geq 100 + 0.04\ L$
Catatan : 1. Tinggi pelat menerus adalah 90% dari tinggi bentang sederhana diatas 2. D dan L dalam mm	

Dimana L adalah panjang bentang jembatan

2. Pembebanan

Beban rencana untuk kendaraan pada pelat diasumsikan dengan beban truk. Truk “T” harus ditempatkan ditengah lajur lalu lintas dan dalam tiap lajur lalu lintas rencana untuk panjang penuh jembatan ditempatkan hanya satu truk (T=10 ton).

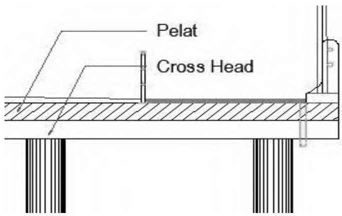
(BMS,PPTJ, Hal 2-27)



Gambar 2.10 Penyebaran Beban Satu Roda

2.6.3.2 Desain pile head

Pile head/ cross head yang langsung menumpu diatas tiang pancang merupakan suatu struktur beton bertulang yang berfungsi sebagai balok melintang yang menyalurkan langsung beban-beban yang terjadi plat lantai kendaraan ke pondasi tiang pancang (spun pile).



Gambar 2.11 Pile head (Cross Head)

2.6.3.3 Pondasi

Pondasi dalam hal ini adalah tiang-tiang pancang yang dimasukkan kedalam tanah dengan cara ditumbuk atau ditekan dan berfungsi sebagai pemikul seluruh beban jembatan serta melimpahkannya ke lapisan tanah pendukung tidak termasuk cerucuk dan sejenisnya.

Dalam merencanakan pondasi diusahakan sedapat mungkin tidak timbul tegangan tarik pada dasar pondasi, hal ini dikarenakan bila timbul tegangan tarik pondasi menjadi kurang efisien. Pondasi yang menerima tegangan tarik tidak dapat menyalurkan beban jembatan ke tanah.

BAB II
TINJAUAN PUSTAKA

2.1 Data Desain Jembatan

Kondisi eksisting Jembatan THP Kenjeran memiliki panjang 762 meter lebar 16 meter dengan lebar jalur kendaraan 10 meter, lebar jalur pejalan kaki 3 meter disebelah kanan dan kiri. Bangunan utama jembatan terdiri dari 4 bagian yaitu bagian tepi/awal dengan panjang 96 meter menggunakan konstruksi slab on pile, bagian tengah dengan panjang 640 meter menggunakan konstruksi balok pratekan, bagian ujung dengan panjang 107 meter dan menggunakan konstruksi slab on pile.

Data-data desain ulang Jembatan THP Kenjeran:

a. Struktur slab on pile
   - Betang : 6 meter
   - Lebar jembatan : 16 meter
   - Lebar trotoar : 2 x 3.00 meter
   - Lebar jalan raya : 10 meter
   - As ke as pile : 3.50 meter
   - Tebal aspal : 0.05 meter
   - Tebal plat lantai : 0.35 meter
   - Pipa sandaran : 3 inch (76.3 mm)

b. Struktur beton pratekan I girder
   - Bentang : 40 meter
   - Lebar jembatan : 16 meter
   - Lebar trotoar : 2 x 3.00 meter
   - Lebar jalan raya : 10 meter
   - As ke as girder : 1.80 meter
   - Tebal aspal : 0.05 meter
   - Tebal plat lantai : 0.25 meter
   - Pipa sandaran : 3 inch (76.3 mm)

2.2 Data Bahan

2.2.1 Beton

1) Berdasarkan **Bridge Design Code** tabel 6.3 hal 6-24 didapatkan bahwa perkerasan dan lantai jembatan yang berhubungan dengan lalu lintas menengah atau berat (kendaraan mempunyai masa kotor lebih dari 3 ton), kuat tekan karajteristik minimum untuk beton f'c adalah 25 MPa.
2) Modulus elastisitas beton (Ec) berdasarkan **Bridge Design Code, BMS 1992 pasal 6.4.1.2 hal 30** pada umur tertentu mutu beton bias diambil :

   $$Ec = Wc^{1.5}(0.043\sqrt{f'c}) \quad \ldots(2.1)$$

   Dimana:

   Wc = berat volume beton ≥ 24 MPa

   f'c = 25 MPa
3) Tebal selimut beton

   Tebal selimut beton direncanakan berdasarkan **Bridge Design Code Tabel 6.6 hal 6-28**.

2.2.2 Baja

Mutu tulangan yang digunakan adalah :

1) Untuk tulangan dengan D < 12 mm, maka fsy = 240 MPa (Grade U24), **Bridge Design Code, tabel 6.12 hal 35**.
2) Untuk tulangan dengan D ≥ 13 mm, maka fsy = 400 MPa (Grade U39), **Bridge Design Code, tabel 6.12 hal 35**.
3) Modulus elastisitas baja adalah 2.10^3 MPa. **Bridge Design Code, tabel 6.12, pasal 2.2 hal 35**.

2.2.3 Strand Baja

Untuk konstruksi beton prategang pratarik menggunakan strand dengan 7 kawat yaitu mempunyai sebuah kawat ditengah yang sedikit lebih besar dari keenam kawat sebelah luarnya yang membungkusnya dengan erat. Untaian tujuh kawat biasa digunakan untuk system prategang menurut spesifikasi ASTM A-416 yang mempunyai kekuatan batas 1720 MPa atau 1860 MPa.

Sifat-sifatnya seperti terdapat dalam tabel. (**Lin dan Burns, 1982 hal 49)**.

Tabel 2.1 Sifat-sifat Strand-Relieved
Dengan tujuh Kawat Tanpa Pelapisan. (ASTM A-416)

Diameter nominal (mm)	**Kekuatan Putus (kN)**	**Luas Nominal Strand (mm^2)**	**Beban Minimum pada Pemuaian 1% (kN)**
		Derajat 1720 MPa	
6,35	40,0	23,22	34,0
7,94	64,5	37,42	54,7
9,35	89,0	51,61	75,6
11,11	120,1	69,68	102,3
12,70	160,1	92,90	136,2
15,24	240,2	139,35	204,2
		Derajat 1860 MPa	
9,53	102,3	54,84	87,0
11,11	137,9	74,19	117,2
12,70	183,7	98,71	156,1
15,24	260,7	140,00	221,5

Kata derajat yang terdapat pada tabel 2.1 menunjukkan tegangan putus yang dijamin.

2.3 Kriteria Design Jembatan Beton Prategang

Dalam desain perhitungan pada Jembatan THP Kenjeran dengan system beton prategang digunakan acuan/pedoman sebagai berikut:

1) BRIDGE DESIGN MANUAL **(BMS BDM, 1992)**
2) BRIDGE DESIGN CODE **(BMS BDC, 1992)**

3) Tata Cara Perhitungan Struktur Beton **(SNI Beton, 2005).**
4) Design Struktur Beton Prategang **(T.Y Lin dan Burns, 1982).**

2.4 Struktur Utama Prategang

Mengingat panjang bentang total jembatan 762 meter maka memerlukan suatu struktur yang memiliki ketahanan yang kuat dan dalam hal ini system pratekan menjadi salah satu pilihan dan pertimbangan pemakaian, beberapa kelebihan antara lain:

1. Kekuatan beton lebih kuat dibandingkan beton bertulang, beton pratekan menggunakan beton dan baja mutu tinggi.
2. Lebih efektif untuk bentang panjang dengan beban besar karena beton sudah terlebih dahulu mengalami tegangan dari dalam sebelum terbebani gaya dari luar.
3. Karena beton mengalami gaya internal akibat fase, penarikan hal inilah yang menyebabkan retak jarak terjadi.
4. Pada beton prategang retak yang sudah dahulu tertekan akibat penarikan.
5. Lebih ekonomis dibandingkan beton bertulang pada bentang panjang beton bertulang membutuhkan dimensi yang besar dengan tambahan tulangan yang tidak sedikit sedangkan beton pratekan yang memiliki beton dan baja mutu tinggi.
6. Pemeliharaan beton pratekan tidak memerlukan biaya yang mahal.

Beton prategang merupakan kombinasi antara beton berkekuatan tinggi dan baja mutu tinggi dengan cara menarik baja dan menahannya ke beton sehingga membuat beton dalam keadaan pratekan. ***(T.Y Lin Ned – H.Burns: Design Struktur Beton Prategang),*** sedangkan menurut **Komisi ACI** beton dengan besar dan distribusi sedemikian sehingga dapat mengimbangi sampai batas tertentu tegangan yang terjadi akibat beban eksternal.

Beton prategang dapat digambarkan sebagai beton yang ditransformasikan dari bahan yang getas menjadi bahan yang elastic dengan memberikan tekanan terlebih dahulu pada beton. Tekanan tersebut dapat terjadi saat penarikan tendon (untaian kawat mutu tinggi, kabel). Dari hasil penarikan tersebut diharapkan tegangan yang terjadi masih kurang atau sama dengan tegangan ijin yang telah ditentukan.

Adapun tegangan ijin beton prategang untuk batang-batang lentur sesuai dengan peraturan ACI atau dapat dilihat pada *("Edward G Nawy:Beton Prategang.Erlangga, hal 59"),* tegangan baja tidak boleh melampaui nilai-nilai berikut:

a. Akibat gaya pendongkrak yang bekerja pada kabel :
   0.80 f_{pu} atau 0.94 f_{py}
   Mana yang lebih kecil, tetapi tidak lebih besar dari nilai maksimum yang diusulkan oleh pembuat kabel prategang atau angkur.
b. Tendon penarik "segera setelah peralihan" gaya prategang atau tendon-tendon pasca tarik setelah panjangkaran/pengangkuran, 0.70 f_{pu}.

Tegangan beton tidak boleh melampaui nilai-nilai berikut ini:

a. Segera setelah peralihan gaya prategang (sebelum kehilangan), tegangan serat-serat terluar
   Tekan = 0.60 *f'ci*
   Tarik = 0 (tidak boleh ada tegangan tarik, apabila ada harus diberi tulangan lekatan dan

tarik maksimum tidak boleh melebihi 7.5 √f'c).

b. Pada beban kerja setelah terjadi seluruh kehilangan gaya prategang
Tekan = 0.45 *f'c*
Tarik =3 √*f'c*

Desain menggunakan konsep **Sistim Pratekan Untuk Mengubah Beton Menjadi Bahan Yang Elastis,** yaitu mengubah bahan yang getas menjadi elastic dengan member tekanan (desakan) terlebih dahulu. Setiap tegangan beton prategang diperiksa pada fase sesaat transfer gaya prategang saat masa konstruksi, dan saat pemakaian jembatan (sevice).

Pada ketiga fase diatas beton prategang mengalami apa yang disebut kehilangan gaya yang diakibatkan oleh beberapa sebab diantaranya adalah:

- Kehilangan gaya akibat Gesek atau *Friction*
- Kehilangan gaya akibat slip angkur
- Kehilangan gaya akibat perpendekan Elastisitas Beton
- Kehilangan gaya akibat susut "SH"
- Kehilangan gaya akibat rangkak "CR"
- Kehilangan gaya akibat relaksasi baja "RE"

Desain awal untuk gelagar beton prategang sesuai dengan **BMS, BDM hal 3-26** gelagar I pra tegang dengan lantai komposit dalam bentang tunggal dengan variasi antara 12 m sampai 35 m perbandingan tipikal tinggi/bentang *1/15 x l* sampai *1/16.5 x l.*

Rumus yang digunakan untuk mencari kehilangan gaya diatas adalah sebagai berikut:

1. Kehilangan gaya akibat gesekan "*Friction*"

$$\frac{F2-F1}{F1} = -KL - \mu a \qquad \ldots(2.2)$$

Dimana :

F1 = Gaya awal yang diberikan
F2 = Gaya setelah menerima gesekan
K = Koefisien wobble (tendon pada selubung longam fleksibel) 0.0016 – 0.0066.
L = Panjang bentang
μ = Koefisien kelengkungan 0.15 – 0.25
α = Perpendekan sudut pusat luar tendon

2. Kehilangan gaya akibat Slip Angkur

$$\Delta P\ ANK = 3\ \%\ x\ F1 \qquad \ldots(2.3)$$

3. Kehilangan gaya akibat perpendekan elastisitas

$$ES = K_{ES} \,.\, E_S \,.\, \frac{fcir}{Eci} \,.\, Aps \qquad \ldots(2.4)$$

Dimana :
ES = Perpendekan elastisitas
Kes = 0.5 untuk kabel pascatarik bila kabel ditarik berurutan
Es = Modulus elastisitas baja
Fcir = Tegangan beton pada garis yang melalui cgs
Eci = Modulus elastisitas beton

4. Kehilangan gaya akibat susut SH

$$\Delta F_{SH} = 8.2 \text{ x } 10^{-6}\ K_{sh} \,.\, E_s \left(1 - 0{,}0023\ \frac{V}{S} \right) (100 - RH) \text{ x } Aps_{total} \qquad \ldots(2.5)$$

Dimana :
ΔF_{SH} = Kehilangan gaya akibat susut beton
Ksh = Waktu akhir perawatan beton = 0.58 (selama 30 hari)
Es = Modulus elastisitas baja
$\frac{V}{S}$ = Perbandingan volume dan keliling beton perpias
RH = Kelembapan relative daerah

setempat 70%

Aps = Luas penampang total tendon

5. Kehilangan gaya akibat rangkak

ΔFCR = Kcr x $\frac{E_s}{Ec}$ x (Fcir – Fcds) …(2.6)

Dimana :

ΔFCR = Gaya akibat rangkak.

Kcr = 1.6 untuk pascatarik.

Es = Modulus elastisitas baja.

Fcir = Gaya yang bekerja pada beton terhadap cgc setelah transfer.

Fcds = Gaya yang bekerja pada beton setelah semua beban mati yang diberikan.

6. Kehilangan gaya akibat relaksasi baja

$\Delta RE = [Kre - J\ (SH + CR + ES) x\ C$ …(2.7)

Dimana :

Kre = 35 MPa (strand 7 kawat relaksasi rendah)

J = 0.04 (strand 7 kawat relaksasi rendah)

C = 1 koefisien waktu selama 1 tahun

SH = Total kehilangan gaya akibat susut

CR = Total kehilangan gaya akibat Creep (rangkak)

ES = Total kehilangan gaya akibat perpendekn elastisitas.

Secara umum rumus untuk mencari tegangan pada tiap-tiap fase beton prategang adalah

Untuk serat atas : $\frac{F}{A} = \frac{Feff.e.ya}{Ix} + \frac{M\ G\ .ya}{Ix}$ …(2.8)

Untuk serat bawah: $\frac{F}{A} + \frac{Feff.e.yb}{Ix} - \frac{M\ G\ .yb}{Ix}$ …(2.9)

Keterangan :

M = Momen yang terjadi

y = Jarak tegak lurus dari garis c.g.c ke serat yang ditinjau

A = Luas penampang

E	= Eksentritas
Ix	= Momen inersia penampang beton terhadap sumbu x
F	= Gaya prategang efektif total setelah dikurangi kehilangan.

2.5 Dasar Desain

2.5.1 Analisis Pembebanan Struktur Jembatan

Pembebanan Pembebanan pada balok prategang digunakan untuk mengetahui apakah penampang balok prategang tersebut bisa menahan beban-beban yang bekerja pada penampang. Beban-beban yang bekerja pada desain struktur girder dalam tugas akhir ini adalah beban mati tetap, beban mati tambahan dan beban hidup yang mengacu pada RSNI T-02-2005. Beban-beban yang bekerja adalah :

1. Beban mati adalah beban semua bagian dari suatu jembatan yang bersifat tetap, termasuk segala beban tambahan yang tidak terpisahkan dari suatu struktur jembatan. Beban mati tetap dan beban mati tambahan merupakan berat sendiri beton girder, slab lantai, aspal dan diaphragma.
2. Beban hidup adalah semua beban yang terjadi akibat penggunaan jembatan berupa beban lalu lintas kendaraan sesuai dengan peraturan pembebanan untuk jembatan jalan raya yang berlaku.
   - Beban “D” Beban Lajur “D” terdiri atas beban tersebar merata, Uniform Distributed Load (UDL) yang digabung dengan beban garis, dan Knife Edge Load (KEL)
     a. Beban Tersebar Merata (UDL), mempunyai intensitas q t/m^2 dimana

besarnya q tergantung pada panjang total wilayah yang dibebani, seperti berikut :

q = 0.9 t/m2 → span ≤ 30 m

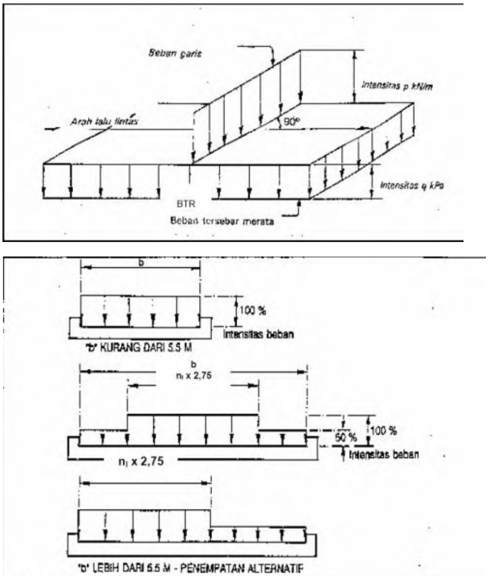
q = 0.9 x (0.5 + 15/L) t/m2 → > 30 m.

dengan pengertian :

q = intensitas beban terbagi rata (BTR) dalam arah memanjang jembatan.

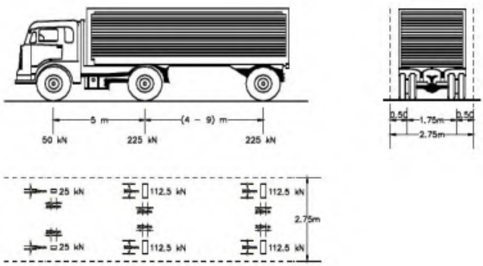
L = panjang total jembatan yang dibebani (meter).

b. Beban Garis atau Knife Edge Load (KEL) dengan intensitas p ton/m' harus ditempatkan tegak lurus terhadap lalu lintas jembatan. Besarnya intensitas p adalah 4.90 ton/m'.



Gambar 2.1 Kedudukan Beban Lajur "D"

c. Beban “T” adalah Pembebanan truk "T" terdiri dari kendaraan truk semi-trailer yang mempunyai susunan dan berat as seperti terlihat dalam Gambar 2.1. Berat dari masing-masing as disebarkan menjadi 2 beban merata sama besar yang merupakan bidang kontak antara roda dengan permukaan lantai. Jarak antara 2 as tersebut bisa diubah-ubah antara 4,0 m sampai 9,0 m untuk mendapatkan pengaruh terbesar pada arah memanjang jembatan.



Gambar 2.2 Pembebanan Truk “T”

d. Faktor Pembesaran Dinamis

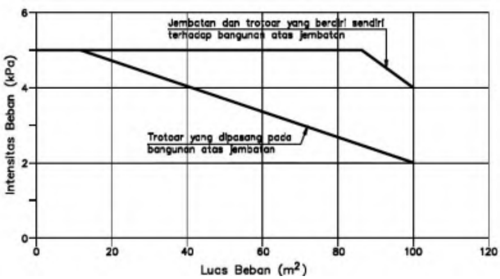
Faktor pembesaran dinamis (DLA) berlaku pada “KEL” lajur “D” dan truk “T” sebagai simulasi kejut dari kendaraan bergerak pada struktur jembatan. Untuk truk “T” nilai DLA 0.3 sedangkan untuk “KEL” lajur “D” nilai dapat dilihat pada tabel 2.1.

Tabel 2.2 Faktor Beban Dinamik untuk "KEL" Lajur "D"

Bentang Ekuivalensi $L_{\grave{\varepsilon}}$ (m)	DLA (untuk kedua keadaan batas)
$L_{\grave{\varepsilon}} \leq 50$	0.4
$50 < L_{\grave{\varepsilon}} < 90$	$0.525 - 0.0025\ L_{\grave{\varepsilon}}$
$L_{\grave{\varepsilon}} \geq 90$	0.3

- Beban Pejalan Kaki

  Semua elemen dari trotoar atau jembatan penyeberangan yang langsung memikul pejalan kaki harus direncanakan untuk beban nominal 5 kPa. Jembatan pejalan kaki dan trotoar pada jembatan jalan raya harus direncanakan untuk memikul beban per m^2 dari luas yang dibebani seperti pada Gambar 2.3. Luas yang dibebani adalah luas yang terkait dengan elemen bangunan yang ditinjau. Apabila trotoar memungkinkan digunakan untuk kendaraan ringan atau ternak, maka trotoar harus direncanakan untuk bisa memikul beban hidup terpusat sebesar 20 kN.



Gambar 2.3 Pembebanan untuk pejalan kaki

c. Beban angin

Gaya nominal ultimit dan daya layan jembatan akibat angin tergantung kecepatan angin rencana seperti berikut:

$T_{EW} = 0.0006\ Cw\ (Vw)^2\ Ab$ …(2.10)

Apabila suatu kendaraan sedang berada diatas jembatan, beban garis merata tambahan arah horizontal harus diterapkan pada permukaan lantai seperti diberikan pada rumus dibawah ini :

$T_{EW} = 0.0012 \times Cw \times Vw^2 \times Ab$ (kN) …(2.11)

dengan pengertian :

Vw adalah kecepatan angin rencana (m/s) untuk keadaan batas yang ditinjau

Cw adalah koefisien seret - lihat Tabel 2.2

Ab adalah luas koefisien bagian samping jembatan (m^2)

Tabel 2.4 Koefisien seret Cw

Type Jembatan	Cw
Bangunan atas masif : B/d = 1.0	2.1
B/d = 2.0	1.5
B/d = 6.0	1.25

Tabel 2.5 Kecepatan angin rencana

Keadaan Batas	Lokasi	
	Sampai 5 km dari pantai	> 5 km dari pantai
Daya layan	30 m/s	25 m/s
Ultimit	35 m/s	30 m/s

Catatan :

- B = lebar keseluruhan jembatan dihitung dari sisi luar sandaran.
- D = tinggi bangunan atas, termasuk tinggi bagian sandaran yang massif.
- Untuk harga antara B/d bias diinterpolasi linier.
- Apabila bangunan atas mempunyai superelevasi, Cw harus dinaikan sebesar 3% untuk setiap derajat superelevasi dengan kenaikan maksimum 25%.

d. Beban gempa

Pembebanan gempa dihitung berdasarkan pedoman Perencanaan Ketahanan Gempa untuk Jembatan, **(PPTJ, BMS, hal. 2-45)**

Yaitu :

$$V = Kh.\ I.\ Wt \qquad \ldots(2.12)$$

Keterangan :

Kh = koefisien beban gempa horizontal

I = factor keutamaan

Wt = Total berat nominal bangunan yang dipengaruhi oleh percepatan diambil akibat gempa, sebagai beban mati tambahan (kN)

Dimana :

$$Kh = C.S \qquad \ldots(2.13)$$

Keterangan :

C = Koefisien geser dasar untuk daerah, waktu dan kondisi setempat yang sesuai.

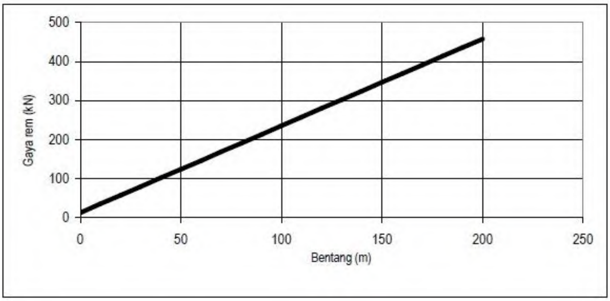
S = factor tipe bangunan

e. Beban Rem

Bekerjanya gaya-gaya di arah memanjang jembatan, akibat gaya rem dan traksi, harus ditinjau untuk kedua jurusan lalu lintas. Pengaruh ini diperhitungkan senilai dengan gaya rem sebesar 5% dari beban lajur D yang dianggap ada pada semua jalur lalu lintas (Gambar 5), tanpa dikalikan dengan faktor beban dinamis dan dalam satu jurusan. Gaya rem tersebut dianggap bekerja horisontal dalam arah sumbu jembatan dengan titik tangkap setinggi 1,8 m di atas permukaan lantai kendaraan. Beban lajur D disini jangan direduksi bila panjang bentang melebihi 30 m, digunakan rumus 1: q = 9 kPa.

Dalam memperkirakan pengaruh gaya memanjang terhadap perletakan dan bangunan bawah jembatan, maka gesekan atau karakteristik perpindahan geser dari perletakan ekspansi dan kekakuan bangunan bawah harus diperhitungkan. Gaya rem tidak boleh digunakan tanpa memperhitungkan pengaruh beban lalu lintas vertikal.

Dalam hal dimana beban lalu lintas vertikal mengurangi pengaruh dari gaya rem (seperti pada stabilitas guling dari pangkal jembatan), maka Faktor Beban Ultimit terkurangi sebesar 40% boleh digunakan untuk pengaruh beban lalu lintas vertikal.



Gambar 2.4 Gaya rem perlajur 2,75 m (KBU)

f. Gaya setrifugal

Tabel 2.6 Faktor beban akibat gaya sentrifugal

JANGKA WAKTU	FAKTOR BEBAN	
	$K_{S;;TR;}$	$K_{U;;TR;}$
Transien	1,0	1,8

Jembatan yang berada pada tikungan harus memperhitungkan bekerjanya suatu gaya horisontal radial yang dianggap bekerja pada tinggi 1,8 m di atas lantai kendaraan. Gaya horisontal tersebut harus sebanding dengan beban lajur D yang dianggap ada pada semua jalur lalu lintas (Tabel 11 dan Gambar 5), tanpa dikalikan dengan faktor beban dinamis. Beban lajur D disini tidak boleh direduksi bila panjang bentang melebihi 30 m. Untuk kondisi ini rumus 1; dimana q = 9 kPa berlaku.

Pembebanan lalu lintas 70% dan faktor pembesaran di atas 100% BGT dan BTR berlaku untuk gaya sentrifugal.

Gaya sentrifugal harus bekerja secara bersamaan dengan pembebanan "D" atau "T" dengan pola yang sama sepanjang jembatan. Gaya sentrifugal ditentukan dengan rumus berikut:

$$T_{TR} = 0{,}006\; x\; \frac{V^2}{r}\; x\; T_T \qquad \ldots (2.14)$$

Keterangan :

TTR = gaya sentrifugal yang bekerja pada bagian jembatan

TT = Pembebanan lalu lintas total yang bekerja pada bagian yang sama (TTR dan TT mempunyai satuan yang sama)

V = kecepatan lalu lintas rencana (km/jam)

r = jari-jari lengkungan (m)

2.5.2 Kombinasi Pembebanan

Menurut RSNI T-02-2005, aksi rencana digolongkan ke dalam aksi tetap dan *transien*,kombinasi beban umumnya didasarkan kepada beberapa kemungkinan tipe yang berbeda dari aksi yang bekerja secara bersamaan dan keadaan paling berbahaya yang harus diambil. Kombinasi yang diperhitungkan antara lain:

a) Kombinasi pada keadaan batas daya layan.
b) Kombinasi pada keadaan batas ultimit.

2.6 Struktur Penyusun Jembatan

Jembatan terdiri atas beberapa struktur bangunan yang umumnya dibagi menjadi bangunan atas yang berupa sandaran, pelat lantai, trotoar, gelagar, dan diafragma, bangunan bawah yang berupa kepala pile, kepala pilar, pilar dan pondasi; dan bangunan pelengkap yang terdiri dari pelat injak, retaining wall.

2.6.1 Bangunan Atas Jembatan

Yang termasuk dalam bangunan atas jembatan adalah sandaran, pelat lantai dan trotoar, gelagar dan diafragma. Dimana disetiap bangunan tersebut akan dijelaskan sebagai berikut

2.6.1.1 Desain Sandaran

Sandaran pada jembatan berguna sebagai pembatas atas pengaman pejalan kaki yang melintas diatas jembatan agar tidak jatuh ke sisi luar jembatan. Desain sandaran disesuaikan dengan BMS BDC Pasal 2.9.5 hal 2-69, sandaran untuk pejalan kaki harus direncanakan untuk dua pembebanan yang bekerja secara bersamaan dalam arah menyilang vertical dan horizontal dengan masing-masing beban sebesar W* = 0.75 kN/m.

1) Gaya yang bekerja pada pipa (Palangan)
   Sandaran
   a. Beban hidup (gaya vertikal) = 0.75 kN/m
   b. Beban hidup (gaya horizontal) = 0.75 kN/m
   c. Berat sendiri pipa sandaran (gaya vertikal) = 0.0508 kN/m

d. Momen yang terjadi pada pipa sandaran

M_1 = M berat sendiri + M gaya vertical

M_2 = M gaya horizontal

e. M kombinasi (resultan) = $\sqrt{M_1^2 + M_2^2}$

2.6.1.2 Desain Pelat

Desain awal pelat lantai sesuai dengan BMS BDM hal 5-4 adalah :

1. Menentukan tebal pelat lantai jembatan

Tabel 2.7 Tinggi pelat beton bertulang

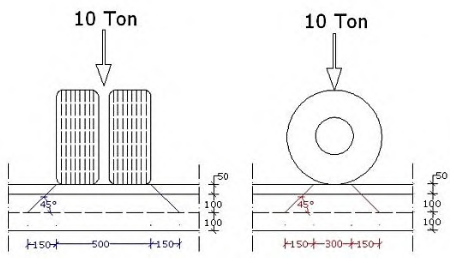
Jenis Unsur	Tinggi Nominal
Pelat Beton Bertulang	$200 \leq D \geq 100 + 0.04\ L$
Catatan : 1. Tinggi pelat menerus adalah 90% dari tinggi bentang sederhana diatas 2. D dan L dalam mm	

Dimana L adalah panjang bentang jembatan

2. Pembebanan

Beban rencana untuk kendaraan pada pelat diasumsikan dengan beban truk. Truk "T" harus ditempatkan ditengah lajur lalu lintas dan dalam tiap lajur lalu lintas rencana untuk panjang penuh jembatan ditempatkan hanya satu truk (T=10 ton).

(BMS,PPTJ, Hal 2-27)



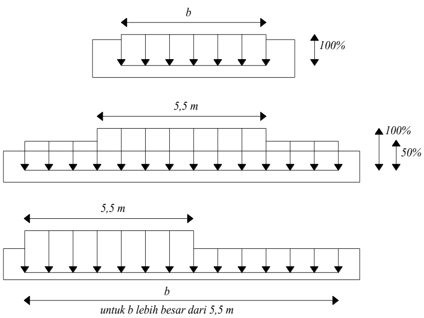
Gambar 2.5 Penyebaran beban satu roda

3. Asumsi perletakan
   Diasumsikan perletakan pelat lantai adalah pelat menerus antara dua atau lebih perletakan.
   $0{,}8 \ x \ (\frac{S+0{,}6}{10}) \ x \ P \ knm$ …(2.16)
   S = bentang efektif (m)
   P = beban roda
4. Menghitung momen penulangan
   Iy/Ix = < 2 maka pelat 2 arah
   = > 2 maka pelat 1 arah
   (SNI 03.2847-2002)
5. Menghitung penulangan (arah x-arah y)
   Data yang diperlukan : h, tebal selimut beton (tb), Mu, diameter tulangan, tinggi efektif (dx dan dy).

2.6.1.3 Desain Gelagar

1. Beban yang bekerja

Untuk lebar jalur kendaraan jembatan kurang atau sama dengan 5,5 m, maka beban D harus ditempatkan pada seluruh jalur dengan intensitas 100%, dan apabila lebih besar dari 5,5 m beban D harus ditempatkan pada dua jalur lalu lintas rencana yang berdekatan dengan intensitas yang tercantum pada pasal 2.33 PPTJ BMS. Sedangkan sisa jalur dengan intensitas sebesar 50% seperti tercantum pada pasal 2.3.2 hal 2-18 BMS, BDM.



Gambar 2.6 Kedudukan Beban Lajur “D”

2. Gelagar beton prategang

a. Menentukan dimensi balok pratekan
   Dalam mendesain balok pratekan diperlukan dimensi dengan ukuran-ukuran tertentu. Hal tersebut dapat dilihat pada **BDM, BMS hal 3-26 Tabel 3.5 (*f*).**

b. Pembebanan
   - ✓ Berat sendiri balok
   - ✓ Berat sendiri plat
   - ✓ Berat mati tambahan

c. Analisa Gaya
   1. Saat jacking
   2. Sesaat setelah transfer gaya
      - Akibat gesekan dan Wobble effect
      - Akibat slip angkur
      - Akibat perpendekan elastic
   3. Saat konstruksi
   4. Saat service
      - Kehilangan gaya prategang akibat penyusutan beton
      - Akibat rangkak beton
      - Akibat relaksasi baja

d. Penentuan jenis dan jumlah kawat (*strand*) untuk tendon.

$$As = \frac{Ti}{0{,}75 * fpu} \quad \text{…(2.17)}$$

$$n = \frac{As}{A\ nominal} \quad \text{…(2.18)}$$

e. Penentuan jumlah tendon dan type angkur. (Lihat buku Struktur Beton Prategang; T.Y. Lin)

2.6.1.4 Tahapan Desain Perletakan Elastomer

Tahapan dibawah ini diuji coba sampai diperoleh ukuran perletakan yang memadai. Tahapan perencanaan antara lain (BDM, BMS 92 hal 7-4)

1. Tentukan beban dan gerakan terburuk
2. Buatlah pemilihan perletakan permulaan
3. Periksa pemilihan perletakan permulaan terhadap :
    - Bentuk dan fungsi yang tepat
    - Luas tumpuan efectif
    - Regangan geser maximum
    - Tegangan tekan rata-rata
    - Tebal plat baja minimum
    - Tahanan gesek terhadap geser

a) Penentuan beban dan gerak terburuk

Terdiri dari beban tegak lurus pada permukaan tumpuan (V*) dan beban horizontal (H*) dan gerakan tangensial dan perputaran relative.

1. Beban vertical atau reaksi perletakan (V*)
    a. Reaksi total maksimum akibat beban mati dan beban hidup
       Ra*= Rb*
    b. Reaksi total maksimum akibat beban mati saja
       Ra*= Rb*
       = [R (Diafragma + bs.primer & sekunder)]
2. Gaya horinzontal (H*)
   Gaya horizontal berasal dari:
    a. Dari beban mati pada kepala jembatan R akibat beban mati = H_1 = 15% x R
    b. Akibat gempa bumi

BMS PPTJ hal 2-34

H_2	= Kh x V		…(2.19)
Kh	= C . S	C = 0,1	
	= 0,1 x 1	S = 1 (sumsi dapat menahan simpangan besar)	

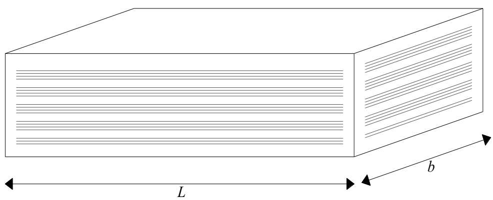
c. Akibat gaya rem
H_3 = F rem
d. Akibat pengaruh suhu dan susut
Akibat pengaruh suhu dan susut pada arah melintang dapat diabaikan
(PPTJ BMS hal 6-76)
H* total = $H_1 + H_2 + H_3$

3. Gerakan tangensial (αa αb, αs)
BDM hal 7-6

$$\alpha_a = \frac{H * xt}{1000\ x\ At\ x\ G} \quad \ldots(2.20)$$

Dimana :
H = Gaya horizontal
T = Tebal karet landasan
G = Modulus geser = 0,69 MPa
A = Luasan denah karet
α_b = 0 (lebar jembatan < 10 meter)
α_s = $\alpha_a + \alpha_b$

b) Pemilihan perletakan
Dalam pemilihan ukuran perletakan biasa didapatkan pada tabel 7.4 (a) sampai dengan 7.4 (t) BMS BDM hal 7-7 dengan ukuran dimensi dan kekuatan yang berbeda-beda.



Gambar 2.8 Elastomer Bearing

Periksa perletakan dengan perumusan dari **BMS BDM hal 7-17** sebagai berikut :

a. Faktor bentuk harus berada $4 \leq s \leq 12$

$$S = \frac{a.b}{2(a+b)to} \qquad \ldots(2.21)$$

b. Jumlah regangan tekan, perputaran dan geser

$$Esc + Est + Esh = Et \leq \frac{2.6}{\sqrt{6}} \qquad \ldots(2.22)$$

c. Pembatasan regangan geser

Esh = 0,7 bila Aeff $\geq$ 0,9 A

$$Esh = \frac{2.Aeff}{A} - 1{,}1 \qquad \ldots(2.23)$$

Bila 0,9 A $\geq$ Aeff $\geq$ 0,8 A

d. Luas tumpuan eff min Aeff $\geq$ 0,8A

e. Mencegah lelah khusus pada jembatan

$$Esc \leq 1{,}4\sqrt{\frac{0{,}69}{G}} \qquad \ldots(2.24)$$

f. Stabilitas perletakan dalam tekan

$$\frac{V*}{Aeff} \leq \frac{2.bo.G.s}{3t} \qquad \ldots(2.25)$$

g. Tebal minimum ts dari pelat baja yang tertanam dalam perletakan

$$3mm \leq tl \geq \frac{3V*.tl.1000}{Afy}\ mm \qquad \ldots(2.26)$$

h. Tahanan gesekan tidak cukup, dan tahanan mekanis gesekan diperlukan bila :

$$H^* \geq 0{,}1\ (V^* + Aeff \times 10^3) \qquad \ldots(2.27)$$

Untuk semua kombinasi beban.

2.6.2 Bangunan Bawah Jembatan

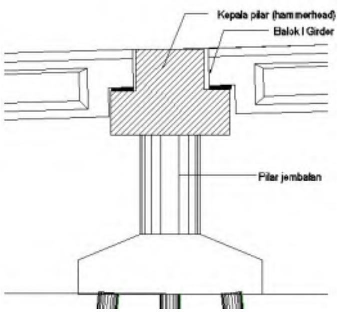
2.6.2.1 Pilar

Pilar adalah suatu bangunan yang terutama meneruskan beban dari bangunan atas ke tanah pondasi. Suatu konstruksi beton bertulang menumpu di atas fondasi tiang-tiang pancang dan terletak di tengah sungai atau yang lain yang berfungsi sebagai pemikul antara bentang tepi dan bentang tengah bangunan atas jembatan. **(SNI 2451.2008)**

2.6.2.2 Kepala pilar (Hammer head)

Kepala pilar merupakan suatu struktur beton bertulang yang menumpu diatas pilar jembatan baik itu berupa pilar dinding atau kolom. Pilar disini berfungsi penyalur beban dari bangunan atas ke pondasi.

Kepala pilar atau balok melintang tambahan yang menghubungkan dua buah girder utama juga berfungsi sebagai perletakan pada tengah bentang.



Gambar 2.9 Kepala pilar (hammerhead)

2.6.2.3 Pondasi

Pondasi dalam hal ini adalah tiang-tiang pancang yang dimasukkan kedalam tanah dengan cara ditumbuk atau ditekan dan berfungsi sebagai pemikul seluruh beban jembatan serta melimpahkannya ke lapisan tanah pendukung tidak termasuk cerucuk dan sejenisnya.

Dalam merencanakan pondasi diusahakan sedapat mungkin tidak timbul tegangan tarik pada dasar pondasi, hal ini dikarenakan bila timbul tegangan tarik pondasi menjadi kurang efisien. Pondasi yang menerima tegangan tarik tidak dapat menyalurkan beban jembatan ke tanah.

2.6.2.4 Plat injak

Sesuai dengan **BMS BDM hal 3-31** untuk dimensi permulaan pelat injak, panjang pelat injak dapat diambil sebesar 2500 mm dan setebal 200 mm. Lebar pelat injak disesuaikan dengan kelas jembatan tetapi umumnya digunakan lebar jalan kendaraan dengan kebebasan 600 mm terhadap tembok-tembok sayap.

2.6.2.5 Wing Wall

Tembok sayap/wingwall mempunyai fungsi untuk mencegah terjadinya longsoran tanah kearah samping terutama pada oprit jembatan. Untuk pembebanan tembok sayap diasumsikan bahwa tembok sayap dibebani oleh gaya horizontal tegak lurus terhadap dinding **(BMS BDC pasal 6.9 hal 6-69).**

2.6.3 Desain Slab on Pile

2.6.3.1 Desain Plat Slab

1. Menentukan tebal pelat lantai jembatan

Tabel 2.8 Tinggi pelat beton bertulang

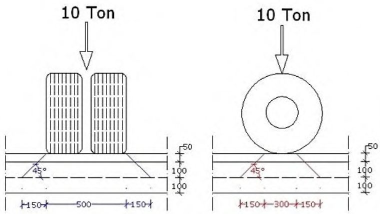
Jenis Unsur	Tinggi Nominal
Pelat Beton Bertulang	$200 \leq D \geq 100 + 0.04\ L$
Catatan : 1. Tinggi pelat menerus adalah 90% dari tinggi bentang sederhana diatas 2. D dan L dalam mm	

Dimana L adalah panjang bentang jembatan

2. Pembebanan

Beban rencana untuk kendaraan pada pelat diasumsikan dengan beban truk. Truk “T” harus ditempatkan ditengah lajur lalu lintas dan dalam tiap lajur lalu lintas rencana untuk panjang penuh jembatan ditempatkan hanya satu truk (T=10 ton).

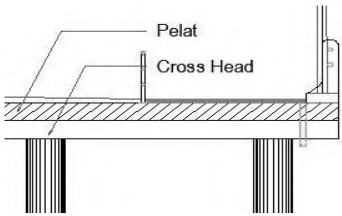
(BMS,PPTJ, Hal 2-27)



Gambar 2.10 Penyebaran Beban Satu Roda

2.6.3.2 Desain pile head

Pile head/ cross head yang langsung menumpu diatas tiang pancang merupakan suatu struktur beton bertulang yang berfungsi sebagai balok melintang yang menyalurkan langsung beban-beban yang terjadi plat lantai kendaraan ke pondasi tiang pancang (spun pile).



Gambar 2.11 Pile head (Cross Head)

2.6.3.3 Pondasi

Pondasi dalam hal ini adalah tiang-tiang pancang yang dimasukkan kedalam tanah dengan cara ditumbuk atau ditekan dan berfungsi sebagai pemikul seluruh beban jembatan serta melimpahkannya ke lapisan tanah pendukung tidak termasuk cerucuk dan sejenisnya.

Dalam merencanakan pondasi diusahakan sedapat mungkin tidak timbul tegangan tarik pada dasar pondasi, hal ini dikarenakan bila timbul tegangan tarik pondasi menjadi kurang efisien. Pondasi yang menerima tegangan tarik tidak dapat menyalurkan beban jembatan ke tanah.

BAB III
METODOLOGI

3.1 Pengumpulan Data

Seluruh data/informasi perencanaan jembatan dikumpulkan berdasarkan data-data sekunder yang diperoleh dari Dinas Pekerjaan Umum Bina Marga Provinsi Jawa Timur. Adapun data-data yang diperoleh tersebut antaranya :

1. **Data gambar**

   Dari data gambar dapat diketahui bahwa jembatan THP Kenjeran mempunyai kondisi eksisting yang merupakan jembatan dengan panjang total 762 meter yaitu panjang bangunan utama jembatan total 762 meter.

   Selain itu diketahui juga dimensi setiap bangunan jembatan baik dari gambar tampak maupun gambar potongan atau gambar detail dan lokasi/ letak jembatan THP Kenjeran yang terletak di pantai Kenjeran yaitu di Kota Surabaya.

2. **Data penyelidikan tanah**

   Pada data penyelidikan tanah didapatkan bahwa lokasi jembatan THP Kenjeran berada dilapisan tanah keras dimana pada kedalaman tanah 24 meter diketahui nilai SPT (N-value) sudah mencapai 50 blows/ft dan telah diyakini pada kedalaman tersebut benar-benar merupakan tanah keras.

3. **Data topografi**

   Data topografi merupakan pengukuran situasi dan ketinggian tanah (Levelling) dilakukan untuk mengetahui kondisi lahan, baik diperuntukkan untuk lahan yang ada sekarang (perumahan, sawah, ataupun hutan), ketinggian atau elevasi tanah, jalan dan bangunan jembatan pada saat itu.

Hasil pengukuran topografi berupa peta kontur yang menunjukkan elevasi tanah, denah jalan (plan) serta potongan melintang (cross section) dan potongan memanjang (longitudinal section) jalan yang sudah ada, profil sungai, serta instansi umum (tiang listrik, telepon, pipa PDAM, dan lainnya).

3.2 Metode Desain Jembatan

Desain jembatan THP Kenjeran seperti yang telah dijelaskan diatas tersusun dari 2 tipe struktur yaitu type struktur beton pratekan I-Girder dengan bentang 40 m, type struktur slab on pile dengan bentang 6 m. Dengan panjang 700 meter, jembatan THP Kenjeran direncanakan memiliki lebar lantai kendaraan 16 m, dimana 10 m sebagai jalan utama dan 3 meter masing – masing di sebelah kanan dan kiri jembatan sebagai fasilitas pejalan kaki dan sepeda**.** Pembebanan menggunakan rencana keadaan batas yaitu mengalikan beban dengan factor beban dalam keadaan ultimate.

3.3 Urutan Desain Jembatan

3.3.1 Preliminari design

Seperti yang telah ditentukan pada BMS 1992 bahwa terdapat beberapa bangunan jembatan perlu ditentukan terlebih dahulu yaitu:

1. Desain pelat lantai
   Desain dimensi awal untuk tebal minimum pelat lantai dapat menggunakan rumus $200 \leq D \geq 100 + 0.04$
   L = Panjang bentang jembatan **(BMS BDM hal 5-4)**.
2. Desain gelagar
   a. Gelagar beton prategang (balok memanjang)
      Untuk gelagar beton prategang dapat diperkirakan tingginya menggunakan rumus perbandingan tipikal tinggi/bentang 1/15 x L sampai 1/16,5 x L, jika perkiran tinggi sudah didapatkan penentuan dimensi

dapat dilihat pada brosur WIKA yang terdapat dalam lampiran.

3. Penentuan dimensi balok diafragma
4. Penentuan jarak antar gelagar

3.3.2 Desain bangunan atas

1. Desain tiang sandaran
   - Perhitungan pembebanan :
     a. Beban mati
        - ➢ Beban mati terpusat
          - Berat pipa sandaran
          - Berat tiang sandaran

     b. Beban hidup
        - ➢ Beban hidup terpusat
          - Beban pipa sandaran arah vertical
          - Beban pipa sandaran arah horizontal
   - Kontrol penulangan
   - Penulangan
2. Desain trotoar
   - Perhitungan pembebanan :
     a. Beban mati
        Beban mati merata :
        - Berat sendiri pelat lantai trotoar

     b. Beban hidup
        Beban hidup merata
        - Beban pejalan kaki
3. Desain pelat lantai kendaraan
   - Pembebanan pelat lantai kendaraan
     a. Beban mati
        Beban mati merata
        - Berat sendiri pelat lantai kendaraan
        - Berat sendiri pelat lantai trotoar
        - Aspal

- Genangan air hujan

Beban mati terpusat

- Berat pipa sandaran
- Berat tiang sandaran

b. Beban hidup

Beban hidup merata

- Beban truk (T)

▪ Kontrol penulangan lentur
▪ Penulangan

4. Desain gelagar beton prategang

▪ Perhitungan pembebanan :

a. Beban mati

Beban mati merata

- Berat sendiri balok prategang
- Berat sendiri pelat lantai kendaraan
- Berat sendiri pelat precast (deck slab)
- Aspal
- Genangan air

Beban mati terpusat

- Berat sendiri diafragma

b. Beban hidup

Beban hidup merata

- Beban UDL
- Beban pekerja

Beban hidup terpusat

- Beban KEL

▪ Kontrol tegangan yang terjadi pada gelagar beton prategang

5. Diafragma beton prategang

▪ Perhitungan pembebanan :

a. Beban mati

Beban mati merata

- Berat sendiri pelat lantai kendaraan

Beban mati terpusat

- Berat sendiri diafragma

6. Desain elastomer

3.3.3 Desain bangunan bawah

1. Desain pilar
    - Perhitungan pembebanan
        - Berat sendiri abutment/pilar
        - Beban gempa
        - Beban bangunan atas
    - Kontrol penulangan lentur dan geser
    - Penulangan
2. Desain pondasi
    - Perhitungan pembebanan :
      Beban mati dan hidup struktur bangunan atas
      Beban mati balok melintang (kepala pile/pilar)
      Beban gempa struktur bangunan atas
    - Daya dukung tanah

3.3.4 Desain slab on pile

1. Desain plat slab
    - Perhitungan pembebanan :
        a. Beban mati
           Beban mati merata
            - Berat sendiri pelat lantai kendaraan
            - Berat sendiri pelat lantai trotoar
            - Aspal
            - Genangan air hujan

           Beban mati terpusat
            - Berat pipa sandaran
            - Berat tiang sandaran

        b. Beban hidup
           Beban hidup merata

    - Beban truk (T)
- Kontrol penulangan tarik dan geser
- Penulangan
- Kontrol penulangan lentur
- Penulangan

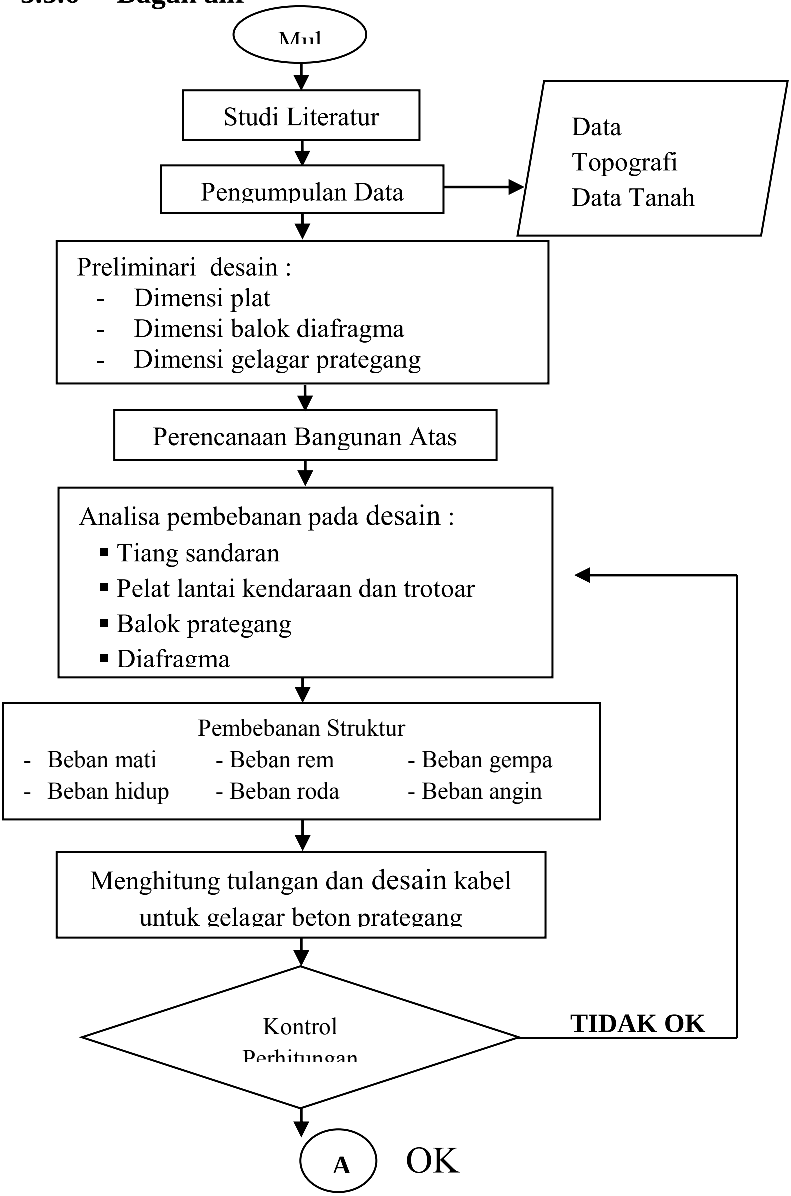
3. Desain pile head
    - Perhitungan pembebanan :
        b. Beban mati
            - Berat sendiri slab
            - Berat bangunan atas
        c. Beban hidup
            - Beban hidup terbagi rata (UDL 100%)
            - Beban hidup terpusat (KEL 100%)
    - Kontrol penulangan lentur dan geser
    - Penulangan
2. Desain pondasi
    - Perhitungan pembebanan :
      Beban mati dan hidup struktur bangunan atas
      Beban mati balok melintang (kepala pile/pilar)
      Beban gempa struktur bangunan atas
    - Daya dukung tanah
3. Desain plat injak
    - Perhitungan pembebanan :
      Beban mati : berat aspal, berat timbunan, berat pelat sendiri
    - Kontrol penulangan lentur dan geser
    - Penulangan.
4. Plat sayap (wing wall)
    - Perhitungan pembebanan :
      Berat sendiri wing wall
      Beban tekanan tanah aktif
    - Kontrol penulangan
    - Penulangan

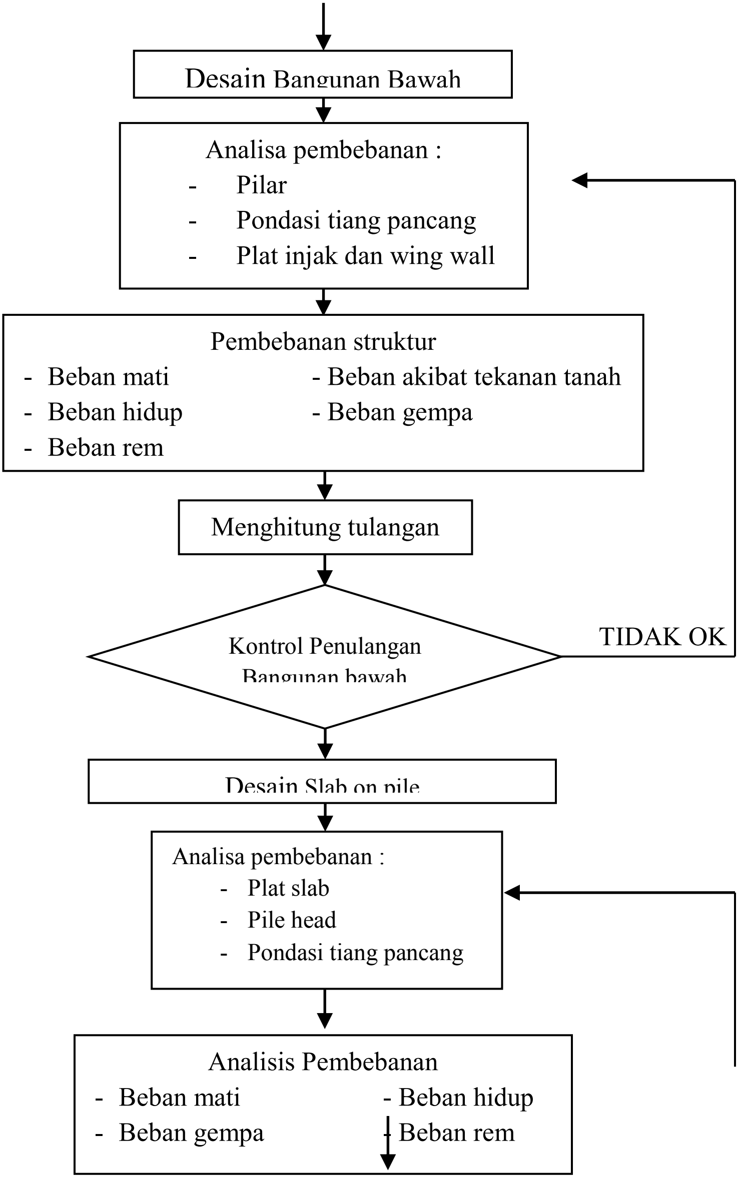
3.3.5 Penggambaran

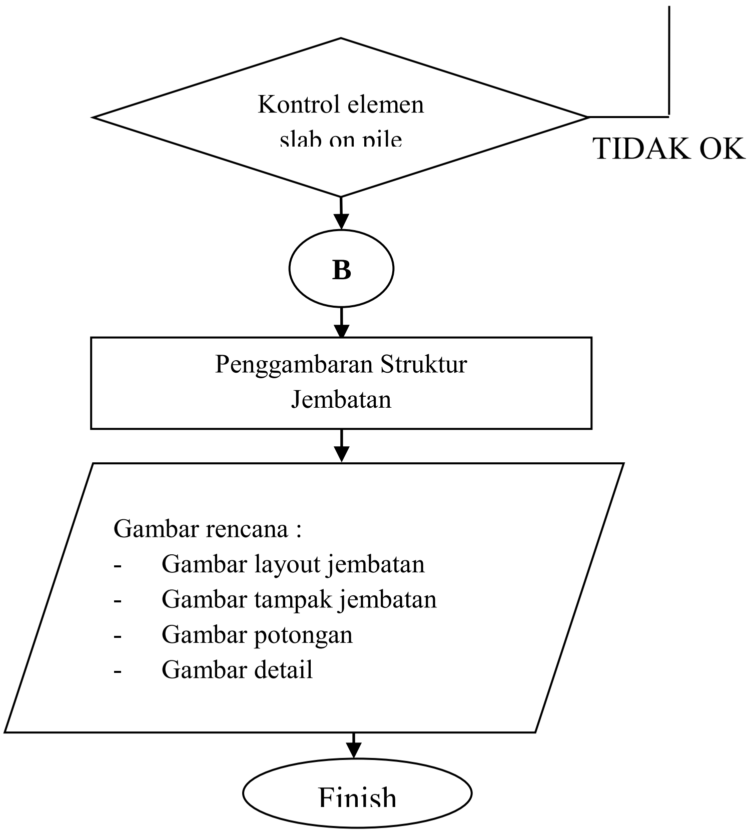
Hasil penggambaran yang dilakukan berupa :

- Gambar layout jembatan
- Gambar tampak jembatan
- Gambar potongan
- Gambar detail.

3.3.6 Bagan alir




Desain Bangunan Bawah
Analisa pembebanan :
- Pilar
- Pondasi tiang pancang
- Plat injak dan wing wall
Pembebanan struktur
- Beban mati
- Beban hidup
- Beban rem
- Beban akibat tekanan tanah
- Beban gempa
Menghitung tulangan
Kontrol Penulangan Bangunan bawah
TIDAK OK
Desain Slab on pile
Analisa pembebanan :
- Plat slab
- Pile head
- Pondasi tiang pancang
Analisis Pembebanan
- Beban mati
- Beban hidup
- Beban gempa
- Beban rem



Gambar 3.1 Bagan alir tahapan penyelesaian tugas akhir

BAB IV
BANGUNAN ATAS DAN PELENGKAPNYA

4.1 Desain Struktur Sekunder
4.1.1 Desain Pipa Sandaran
4.1.1.1 Dasar Desain

Pipa sandaran direncanakan berdasarkan **Peraturan Perencanaan Teknik Jembatan Bagian 2, BMS 1992, hal 2-69** yang menjelaskan bahwa sandaran yang digunakan oleh pejalan kaki harus direncanakan untuk dua pembebanan rencana daya layan yaitu W=0,75 kN/m. Beban-beban tersebut bekerja secara bersamaan dalam arah horizontal dan vertikal pada masing-masing sandaran.

4.1.1.2 Analisa Pembebanan

Berdasarkan dasar perencanaan diatas, maka pembebanan pada pipa sandaran dapat direncanakan sebagai berikut :

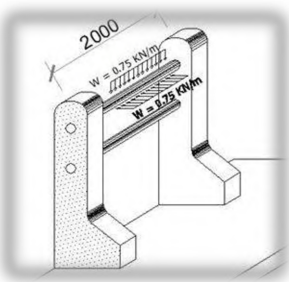
Pipa sandaran direncanakan mempunyai ø76,3 mm. dalam buku **Tabel Profil Konstruksi Baja Karangan Ir. Rudy Gunawan**, didapatkan data, bahwa pipa besi dengan ø76,3 mm mempunyai data sebagai berikut :

Tabel 4.1 Data pipa sandaran.

DATA PIPA				
Keterangan		Satuan		Satuan
Diameter	76,3	mm		
Tebal Pipa	4	mm		
Berat pipa	7,13	kg/m’	0,0713	kN/m’
Mutu Baja	BJ 37			
W	15,6	cm^3		

Tabel 4.2 Faktor beban dan berat jenis bahan.

Tabel faktor beban dan berat jenis bahan			
Jenis Beban	Notasi FB	Faktor Beban ULS	Berat Jenis (KN/m^3)
Beban Mati			
- Beton (Precast)	K_{MS}^{U}	1,2	25
- Beton (Cast in Situ)	K_{MS}^{U}	1,3	25
- Lapisan Aspal	K_{MS}^{U}	1,4	25
Beban Mati Tambahan			
- Overlay	K_{MA}^{U}	1.4	22
- Genangan air hujan	K_{MA}^{U}	2	9,8
Beban Hidup			
- Beban Lajur "D"	K_{TD}^{U}	2	
- Beban Truk	K_{TD}^{U}	2	



Gambar 4.1 Beban hidup arah horizontal dan vertikal pada sandaran.

Perhitungan Pembebanan

Beban hidup sandaran = 0,75 kN/m

Jarak pusat ke pusat tiang sandaran (L) = 2 m

- Beban Mati

  Beban mati vertikal = Beban pipa

  (PDv) = Pms

  = 0,0713 kN/m'

  Beban mati horizontal = Tidak ada beban

  (PDv)

- Beban Hidup

  Beban hidup horizontal = Beban pejalan kaki

  (PLh) = 0,75 kN/m'

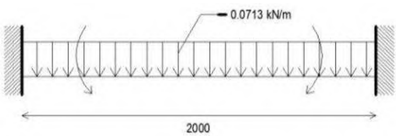
  Beban hidup vertikal = Beban pejalan kaki

  (PLv) = 0,75 kN/m'

4.1.1.3 Perhitungan Momen

Momen Akibat Beban Mati Vertikal

Momen akibat beban mati vertikal pipa sandaran



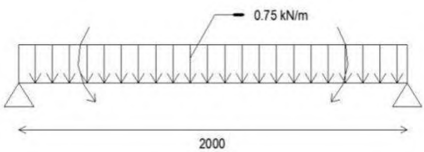
Gambar 4.2 Momen akibat beban mati pipa sandaran

MDv $= 1/12 \times q \times L^2$

$= 1/12 \times 0{,}0712 \text{ kN/m} \times (2 \text{ m})^2$

$= 0{,}024$ kNm.

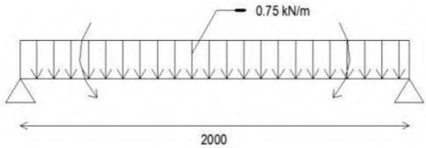
Momen Akibat Beban Hidup Vertikal



Gambar 4.3 Momen arah vertikal pipa sandaran

$$MLv = 1/8 \times q \times L^2$$
$$= 1/8 \times 0{,}75 \text{ kN/m} \times (2\text{m})^2$$
$$= 0{,}375 \text{ kNm}$$

Momen Akibat Beban Hidup Horizontal



Gambar 4.4 Momen arah horizontal pipa sandaran

$$MLh = 1/8 \times q \times L^2$$
$$= 1/8 \times 0{,}75 \text{ kN/m} \times (2\text{m})^2$$
$$= 0{,}375 \text{ kNm}$$

4.1.1.4 Kontrol Tegangan Total

Dari buku **Tabel Profil Konstruksi Baja** Karangan **Ir. Rudy Gunawan** didapatkan bahwa untuk besi baja mutu BJ 37 mempunyai tegangan izin ($\sigma izin = 1600 \text{ kg/cm}^2$)

Dikarenakan beban horizontal dan beban vertikal bekerja secara bersama-sama, maka tegangan yang diperhitungkan merupakan tegangan total.

Adapun nilai dari tegangan total diperoleh sebagai berikut:

$$\Sigma \text{ total} = \sigma v + \sigma h$$
$$= (Mv/W) + (Mh/W)$$
$$= (Mv + Mh) / W$$
$$= (0{,}024 \text{ kNm} + 0{,}375 \text{ kNm} + 0{,}375 \text{ kNm}) /15{,}6 \text{ cm}^3$$
$$= 4{,}960 \text{ kNm.}$$

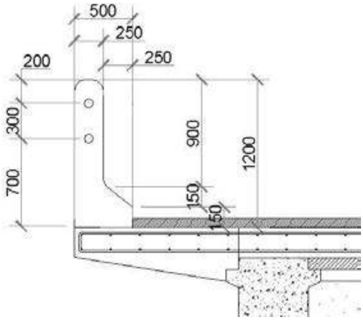
Tegangan yang terjadi pada pipa sandaran adalah sebesar:

Σ	<	σijin
σtotal	<	σijin
$496{,}0043 \text{ kg/cm}^2$	<	1600 kg/cm^2

Sehingga pipa sandaran dengan ø76,3 mm memenuhi syarat tegangan dan dapat digunakan.

4.1.2 Pembebanan Tiang Sandaran

4.1.2.1 Dasar Desain



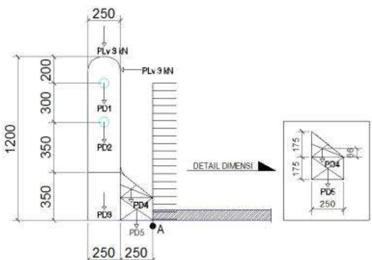
Gambar 4.5 Typikal potongan tiang sandaran

Berdasarkan pada peraturan perencanaan Teknik Jembatan (Bridge Management System) 1992, beban yang bekerja pada sandaran adalah berupa gaya horizontal dan vertikal sebesar 0,75 kN/m yang bekerja secara bersamaan.

4.1.2.2 Analisa Pembebanan

Berdasarkan dasar perencanaan diatas, maka beban-beban yang bekerja pada tiang sandaran dapat dijelaskan sebagai berikut:

Tiang sandaran direncanakan mempunyai dimensi 25cm x 10cm dibagian atas dan 50cm x 10 cm dibagian bawah. Perletakan tiang sandaran diasumsi jepit pada jarak 120 cm dari ujung bebas tiang sandaran.



Gambar 4.6 Gaya yang bekerja pada tiang sandaran

Beban mati :

Pu*D1 = Beban pipa x Jarak pusat ke pusat pipa x Faktor beban
= 0,0713 kg/m x 2,00 m x 2
= 0,285 kN

Pu*D2 = Beban pipa x Jarak pusat ke pusat pipa x Faktor beban
= 0,0713 kg/m x 2,00 m x 2
= 0,157 kN

Pu*D3 = Luasan x Tinggi x Berat sendiri x Faktor Beban
= 0,025 kg/m x 1,200 m x 25,000 kN/m^3 x 1,3
= 0, kN

Pu*D4 = Luasan x Titik berat x Berat sendiri x Faktor Beban
= 0,022 kg/m x 0,07 m x 25,000 kN/m^3 x 1,3
= 0, kN

Pu*D5 = Luasan x Titik berat x Berat sendiri x Faktor Beban
= 0,044 kg/m x 0,088 m x 25,000 kN/m^3 x 1,3
= 0, kN

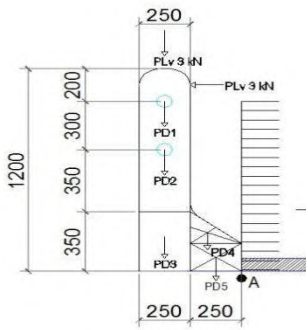
Beban hidup :

Pu*Lv = Beban pejalan kaki x L x Faktor Beban
= 0,750 kg/m x 2,00 m x 2
= 3,000 kN

Pu*Lh = Beban pejalan kaki x L x Faktor Beban
= 0,750 kg/m x 2,000 m x 2
= 3,000 kN

4.1.2.3 Perhitungan Momen

Jarak titik Beban ke Titik A	
PD1	0.375
PD2	0.375
PD3	0.375
PD4	0.083
PD5	0.125
PLv	0.375
PLh	1.200



Gambar 4.7 Gaya yang bekerja pada tiang sandaran

<u>Momen Beban Hidup</u>

M*Lv = Pu*Lv x Jarak
= 2.70 kN x 0.375 m
= 1.013 kNm

M*Lh = Pu*Lv x Jarak
= 2.70 kN x 1.200 m
= 3.240 kNm

<u>Momen Beban Mati</u>

M*PuD1 = Pu*D1 x Jarak
= 0.157 kN x 0.375 m
= 0.059 kNm

M*PuD2 = Pu*D2 x Jarak
= 0.157 kN x 0.375 m
= 0.059 kNm
M*PuD3 = Pu*D3 x Jarak
= 0.010 kN x 0.375 m
= 0.004 kNm
M*PuD4 = Pu*D4 x Jarak
= 0.00004 kN x 0.083 m
= 0.000003 kNm
Momen total = ML total x MD total
= 4.374 kNm
= 4373805 Nmm

4.1.3 Perhitungan Penulangan Tiang Sandaran

- Tulangan Lentur Tarik
  - Momen (Lapangan) ultimate rencana
    Mu = MuD + MuL
    = 4373804.527 Nmm
    = 4373805 Nmm.
  - Mutu Beton
    Fc’ = 25 MPa
  - Mutu Tulangan Baja
    Fy = 240 MPa
  - D tulangan lentur = 16 mm
  - Ø Tulangan geser = 12 mm
  - Tebal selimut = 40 mm
  - Lebar (b) = 40 mm
  - Tinggi effesien (d) = 1000 mm
  - Faktor bentuk tegangan beton β_1 = 0,85
  - Faktor distribusi tegangan beton

$$\rho b = \frac{0{,}85\ .fc'}{fy}.\beta 1.\left[\frac{600}{600+fy}\right]$$

$= \frac{0,85.25}{240} .0,85. \left[\frac{600}{600+240}\right]$

$= 0,0054$

- Faktor reduksi kekuatan lentur

  $K_{TD}^{U} = 0,9$

- Faktor tahanan momen

  $Rn = \frac{M*}{b.d^2}$

  $= \frac{4373805}{500.460^2}$

  $= 0,0413$

- Rasio tulangan minimum

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

  $= \frac{1,4}{240}$

  $= 0,0058$

- Rasio tulangan maksimum

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

  $= 0,75 . 0,054$

  $= 0,040$

- Rasio tulangan yang diperlukan

  ρ = Ast / bd

  = 0,0059 **(BMS,BDM hal 5.25)**

- Kontrol

  $\rho_{min} < \rho < \rho_{max}$

  0.0058 < 0.0059 < 0.040 …… **OK**

- Luas tulangan

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

  = 0,0058 x 500 mm x 460 mm

  = 1357.00 mm^2

  Dipasang tulangan lentur **4-D16**

  (As pasangan = 803 mm^2)

- Tulangan Geser
  - Gaya geser yang bekerja

    = 0.75 kN/m x 2 m x 2

= 3.00 kN

- Batas kehancuran badan

  = 0.2 x f'c x bv x d

  = 0.2 x 25 x 500 x 460

  = 1150000 N

  = 1150 kN
- Kekuatan geser tanpa tulangan geser (Vuc)

  = ß1 x ß2 x ß3 x bv x d ((Ast x fc) / (bv x d))$^{1/3}$

  = 1.1 x 1 x 1 x 500 x 460* ((943.17*25)/(500*460))

  = 12439.17 N

  = 12.4392 kN
- Kekuatan geser dengan tulangan geser minimum (Vu min)

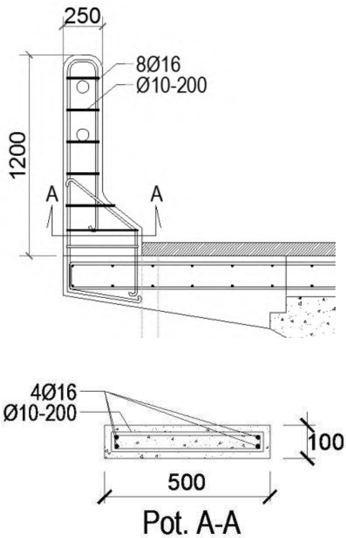
  = Vuc + (0,6 x bv x d)

  = 12.4392 + 138 m

  = 150.4392 kN
- Kontrol

Apakah :	V*	<	Vu maks
	3 kN	<	1150 kN ….**OK**
Apakah :	V*	<	Krc x Vu min
	3 kN	<	0,7 x 150.4 kN
	3 kN	<	105.31 kN...**OK**
Apakah :	V*	<	Krc x Vuc
	3 kN	<	0,7 x 12,44 kN
	3 kN	<	8,71 kN …**OK**

Maka tulangan geser tidak diperlukan, cukup menggunakan tulangan praktis Ø12 mm 300 mm.

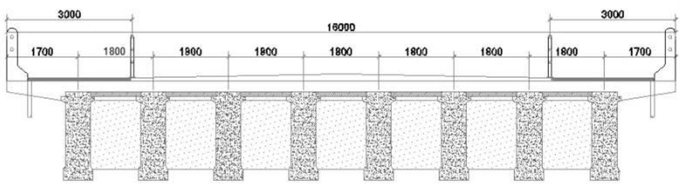


Gambar 4.8 Tulangan tiang sandaran

4.2 Desain Plat Lantai Kendaraan

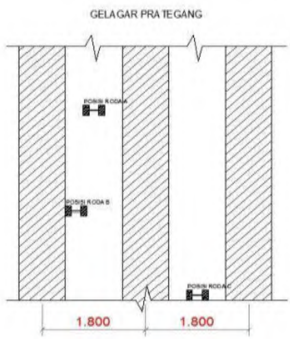
4.2.1 Preliminary Desain Dimensi Plat Lantai Kendaraan

Plat lantai kendaraan berfungsi sebagai jalan kendaraan pada jembatan harus memiliki tebal minimum plat (ts) yang memenuhi ketentuan dalam **BMS BDC (1992) hal 6-7**. Untuk menentukan tebal plat yang dipakai, harus dilakukan kontrol geser ponds terhadap ketebalan plat akibat pembebanan roda truck (P_{TT}) pada berbagai posisi.



Gambar 4.9 Potongan melintang bangunan atas jembatan

- Preliminary Dimensi
  $200 \leq ts \geq 100 + 0{,}04\ L$
  $Ts \geq 200$ mm
  $Ts \geq 100 + 0{,}04\ L$
  $Ts \geq 100 + (0{,}04 \times 1800)$ mm
  $Ts \geq 172$ mm
  $200 \text{ mm} \leq ts \geq 172$ mm
- Kontrol Geser Ponds

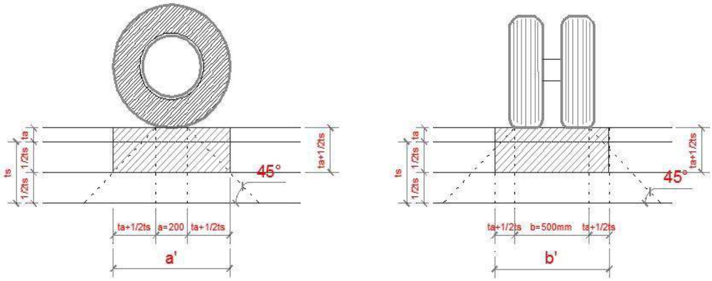


Gambar 4.10 Analisis posisi roda plat lantai kendaraan

Tabel 4.3 Data analisa geser ponds akibat beban roda

DATA ANALISA RODA		
Keterangan	Notasi	Nilai
Tebal Lapisan Aspal	Ta	50 mm
Roda Arah Memanjang	A	200 mm
Lebar Roda Ganda	B	500 mm
Kuat Tekan Beton	Fc'	25 MPa
Beban Roda	P_{roda}	112.500 N
Faktor Reduksi Kekuatan	K_C^R	0,6
Faktor Beban Truck	K_{TT}^U	2
Faktor Beban Dinamis	DLA	0,3
Tebal Plat Lantai Kendaraan	ts	….

- Posisi A (Roda Truck berada pada diantara gelagar)



Gambar 4.11 Penyebaran beban roda pada posisi A

a' = a + 2.(ta + ½ ts)
= a + 2ta + ts
= 200 + (2 x 50) + ts
= 300 + ts

b' = b + 2. (ta + ½ ts)
= 500 + 2ta + ts
= 500 + (2 x 50) + ts
= 600 + ts

K_C^R x $\frac{1}{6}$ x $\sqrt{fc'}$ x (Luasan keliling selimut bidang geser) ≥ P_{roda} x K_{TT}^U x (1+DLA)

0,6 x $\frac{1}{6}$ x $\sqrt{25}$ MPa x $\left[\,2\big((300+ts)+(600+ts)\big)x\ ts\right]$ ≥ 112.500 x 2 x (1 + 0,3)

0,6 x $\frac{1}{6}$ x 5 x [{ $300ts\,.\,ts$} + { $600ts + ts$}] ≥ 292.500

0,5 x [$2ts^2$ + 900ts] ≥ 292.500

$$\frac{[2ts^2 + 900ts] \geq 292.500}{0,5}$$

$4ts^2 + 1800ts - 585.000 = 0$

$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-1800 \pm \sqrt{1800^2 - 4.4.(-585.000)}}{2.4}$$

x_1 = 218 mm

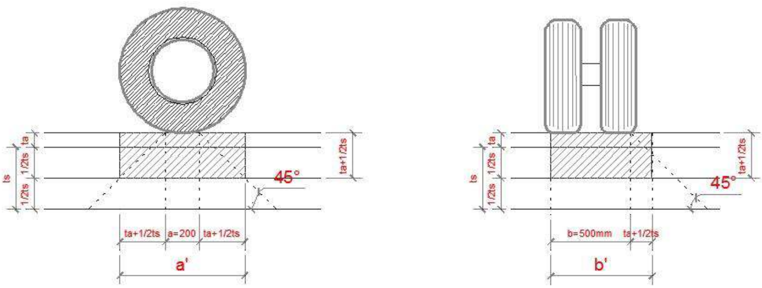
$$x_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-1800 - \sqrt{1800^2 - 4.4.(-585.000)}}{2.4}$$

$$x_2 = -668 \text{ mm}$$

Tebal pelat yang dibutuhkan = 250 mm

- Posisi B (Roda truck berada di tepi gelagar)



Gambar 4.12 Penyebaran beban roda pada posisi B

$a' = a + 2\,(t_a + ½\, t_s)$
$= a + 2t_a + t_s$
$= 200 + 2 \text{ x } 50 + t_s$
$= 200 + 100 + t_s$
$= 300 + t_s$

$b' = b + 2\,(t_a + ½\, t_s)$
$= 500 + 50 + ½\, t_s$
$= 550 + ½\, t_s$

$K_C^R \text{ x } \frac{1}{6} \text{ x } \sqrt{fc'}$ x (Luasan keliling selimut bidang geser) $\geq P_{roda} \text{ x } K_{TT}^U$ x (1+DLA)

0,6 x $\frac{1}{6}$ x $\sqrt{25}$ MPa x $\left[\, 2\big((300 + ts) + (550 + 1/2ts)\big)x\ ts\right] \geq 112.500\ x$ 2 x (1 + 0,3)

0,6 x $\frac{1}{6}$ x 5 x [{ $300ts\,.\,ts$} + { $550ts + ts$}] $\geq$ 292.500

0,5 x [$2ts^2$ + 900ts] $\geq$ 292.500

$\dfrac{[3ts^2 + 850ts] \geq 292.500}{0,5}$

$3ts^2 + 1700ts - 585.000 = 0$

$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-1700 \pm \sqrt{1700^2 - 4.3.(-585.000)}}{2.3}$$

$$x_1 = 241.33 \text{ mm}$$

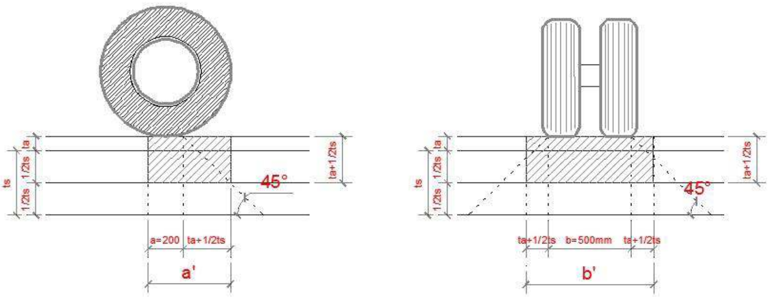
$$x_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-1700 - \sqrt{1700^2 - 4.3.(-585.000)}}{2.3}$$

$$x_2 = -808 \text{ mm}$$

Tebal pelat yang dibutuhkan = 250 mm

- Posisi C (Roda truck berada di tepi plat)



Gambar 4.13 Penyebaran beban roda pada posisi C

a' $= a + (t_a + ½\ t_s)$ b' $= b + 2\ (t_a + ½\ t_s)$

$= 200 + 50 + 1/2t_s$ $= 500 + 100 + ½\ t_s$

$= 250 + 1/2\ t_s$ $= 600 + ½\ t_s$

K_C^R x $\frac{1}{6}$ x $\sqrt{fc'}$ x (Luasan keliling selimut bidang geser) $\geq P_{roda}$ x K_{TT}^U x (1+DLA)

0,6 x $\frac{1}{6}$ x $\sqrt{25}$ MPa x $[\,2((300 + ts) + (550 + 1/2ts))x\ ts]$ $\geq 112.500\ x\ 2$ x (1 + 0,3)

0,6 x $\frac{1}{6}$ x 5 x $[\,2\,\{\,250ts\,.\,1/2ts\ \ \} + \{\,600ts + ts^2\}]$ ≥ 292.500

0,5 x $[2ts^2 + 900ts]$ ≥ 292.500

$\frac{[3ts^2 + 850ts] \geq 292.500}{0,5}$

$3ts^2 + 1700ts – 585.000 \quad = 0$

$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-1700 \pm \sqrt{1700^2 - 4.3.(-585.000)}}{2.3}$$

$$x_1 = 241.33 \ \text{mm}$$

$$x_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-1700 - \sqrt{1700^2 - 4.3.(-585.000)}}{2.3}$$

$$x_2 = -808 \ \text{mm}$$

Tebal pelat yang dibutuhkan = 250 mm

Untuk tebal pelat yang digunakan adalah 250 cm

Desain plat lantai kendaraan dibagi menjadi dua macam yaitu plat pracetak dan plat cor insitu. Plat pracetak direncanakan dengan tebal 100 mm dan plat cor insitu setebal 250 mm (dari analisa geser pons diatas maka direncanakan tebal plat lantai kendaraan ts = 250 mm).

Sehingga total tebal plat adalah 350 mm. fungsi dari plat pracetak selain sebagai plat lantai kendaraan sekaligus sebagai bekisting saat pekerjaan pengecoran untuk plat diatasnya.

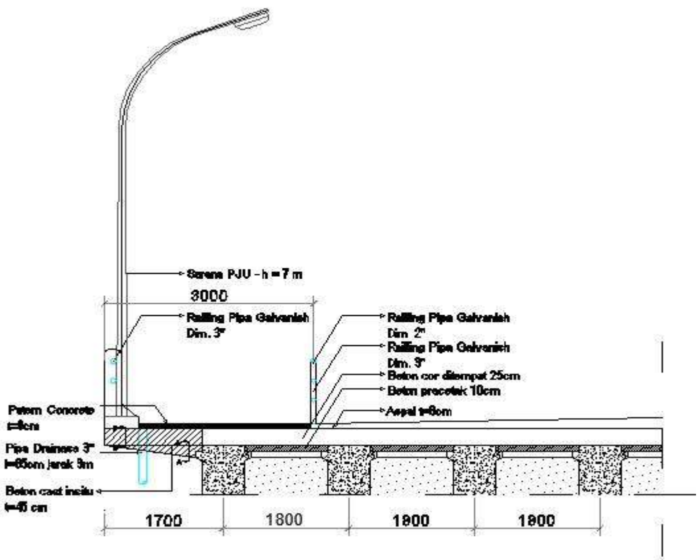
4.2.2 Analisa Pembebanan Plat Lantai Kendaraan

Tabel 4.4 Data beban plat lantai kendaraan

Jenis Beban	Perhitungan	Hasil
Beban terpusat lampu PJU	0,277 kN/m x 7 m	1,94 kN
Beban mati parapet	(1,2 m x 1 m x 25 kN/m^3).1,3	39 kN/m
Beban mati merata		
1. Plat lantai kendaraan	(0,2 m x 1 m x 25 kN/m^3). 1,3	6,5 kN/m
2. Lapisan Aspal	(0,05 m x 1 m x 22 kN/m^3). 1,3	1,43 kN/m
3. Genangan air hujan	(0,05 m x 1 m x 9,8 kN/m^3). 1,3	0,98 kN/m
4. Lapisan overlay	(0,05 m x 1 m x 22 kN/m^3). 1,3	2,2 kN/m
Total Beban Mati		11,1 kN/m
Beban Hidup Truck “T”	100 kN x 2 x (1+0,3)	250 kN

Tabel 4.5 Daftar keterangan dimensi trotoar dan pelat lantai

Keterangan	Nilai
Jarak antar tumpuan balok (L)	1.800 m
Tebal beton rabat	0.100 m
Tebal beton bertulang pot 1-1	0.200 m
Tebal beton bertulang pot 2-2	0.250 m
Tebal plat lantai	0.250 m
Tebal lapisan aspal	0.050 m
Tebal plat pracetak	0.100 m
Tebal genangan air	0.050 m
Tebal lapisan overlay	0.050 m



Gambar 4.14 Tampak melintang trotoar

Beban Mati

Beban mati terpusat

Beban mati terpusat 1	= B.mati pipa + B.mati tiang sandaran + B.mati tiang PJU
	= (Pu*DL1 + Pu*DL2) + (Pu*DL3 + Pu*DL4 + Pu*DL5)
	= 0.157 kN + 0.157 kN + 0.010 kN + 0.00004 kN + 0.003 kN + 1.94 kN
TOTAL Pu*DL1	= 2.267 kN
Beban mati terpusat 2	= B.mati pipa
	= (Pu*DL6 + Pu*DL7 + PU*DL8 + Pu*DL9)
	= 0.078 + 0.079 + 0.079 + 0.079
TOTAL Pu*DL2	= 0.315 kN

Beban Mati Merata

Beban mati merata tepi

Beban mati beton rabat (qu*DL1 tepi)	= Tebal x 1 meter x berat sendiri x F.beban
	= 0.080 m x 1m x 24 kN/m^3 x 1.3
	= 2.496 kN/m
Beban mati pot. A-A (qu*DL2 tepi)	= Tebal x 1 meter x berat sendiri x F.beban
	=(0.200 m x 1m x 25 kN/m^3 x 1.3)/2
	= 3.250 kN/m
Beban mati pot. B-B (qu*DL3 tepi)	= Tebal x 1 meter x berat sendiri x F.beban
	= 0.250 m x 1m x 25 kN/m^3 x 1.3
	= 8.125 kN/m
TOTAL qu*DL Tepi	**= 13.871 kN/m**

<u>Beban Mati Merata Tengah</u>

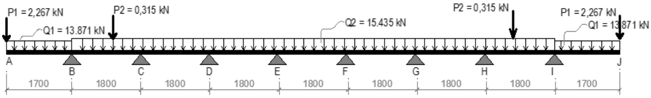
Beban mati genangan (qu*DL1 tengah)	= Tebal x 1 meter x berat sendiri x F.beban
	= 0.050 m x 1m x 9.8 kN/m^3 x 2.0
	= 0.980 kN/m
Beban mati overlay (qu*DL2 tengah)	= Tebal x 1 meter x berat sendiri x F.beban
	= 0.050 m x 1m x 22 kN/m^3 x 1.4
	= 1.540 kN/m
Beban mati aspal (qu*DL3 tengah)	= Tebal x 1 meter x berat sendiri x F.beban
	= 0.050 m x 1m x 22 kN/m^3 x 1.4
	= 1.540 kN/m
Beban mati pelat (qu*DL4 tengah)	= Tebal x 1 meter x berat sendiri x F.beban
	= 0.250 m x 1m x 25 kN/m^3 x 1.3
	= 8.125 kN/m
Beban mati precast (qu*DL5 tengah)	= Tebal x 1 meter x berat sendiri x F.beban
	= 0.100 m x 1m x 25 kN/m^3 x 1.3
	= 3.250 kN/m
TOTAL qu*DL Tengah	= 15.435 kN/m

Beban Hidup

Beban hidup truck	= Beban roda x F beban x (1+ DLA)
	= 112.5 kN x 1.8 x (1+0.3)
	= 263.250 kN
TOTAL Pu*LL	= 263.250 kN/m

4.2.3 Perhitungan Momen

Perhitungan momen akibat beban mati terpusat dan merata (Metode Cross)



- Faktor Kekakuan

KBC=KCB	4EI/L	=	4/1.8	=	2.222
KCD=KDC	4EI/L	=	4/1.8	=	2.222
KDE=KED	4EI/L	=	4/1.8	=	2.222
KEF=KFE	4EI/L	=	4/1.8	=	2.222
KFG=KGF	4EI/L	=	4/1.8	=	2.222
KGH=KHG	4EI/L	=	4/1.8	=	2.222
KHI=KIH	4EI/L	=	4/1.8	=	2.222

- Faktor Distribusi

μBA	= 0.00	
μBC	= 2.222 / (0+2.222)	= 1.000
μCB	= 2.222 / (2.222+2.222)	= 0.500
μCD	= 2.222 / (2.222+2.222)	= 0.500
μDC	= 2.222 / (2.222+2.222)	= 0.500
μDE	= 2.222 / (2.222+2.222)	= 0.500
μED	= 2.222 / (2.222+2.222)	= 0.500
μEF	= 2.222 / (2.222+2.222)	= 0.500
μFE	= 2.222 / (2.222+2.222)	= 0.500
μFG	= 2.222 / (2.222+2.222)	= 0.500
μGF	= 2.222 / (2.222+2.222)	= 0.500
μGH	= 2.222 / (2.222+2.222)	= 0.500
μHG	= 2.222 / (2.222+2.222)	= 0.500
μHI	= 2.222 / (2.222+2.222)	= 0.500
μIH	= 2.222 / (0+2.222)	= 1.000
μIJ	= 0.00	

- Momen Primer

m AB = 0.000

m BA = - (1/2 x qDL tepi x L^2 + P x L)
= - (1/2 x 13.871 x 1.7^2 + 2.267 x 1.7)
= -23.897

mBC = 0.000

mCB = - (1/8 x qDL tengah x L^2)+(P.a.b^2/L^2)
= - (1/8 x 15.435 x 1.8^2)+(0,315.1,3.0,5^2/1,8^2)
= -6.283

mCD = (1/12 x qDL tengah x L^2)
= (1/12 x 15.435 x 1.8^2)
= 4.167

mDC = - (1/12 x qDL tengah x L^2)
= - (1/12 x 15.435 x 1.8^2)
= -4.167

mDE = (1/12 x qDL tengah x L^2)
= (1/12 x 15.435 x 1.8^2)
= 4.167

mED = - (1/12 x qDL tengah x L^2)
= - (1/12 x 15.435 x 1.8^2)
= -4.167

mEF = (1/12 x qDL tengah x L^2)
= (1/12 x 15.435 x 1.8^2)
= 4.167

mFE = - (1/12 x qDL tengah x L^2)
= - (1/12 x 15.435 x 1.8^2)
= -4.167

mFG = (1/12 x qDL tengah x L^2)
= (1/12 x 15.435 x 1.8^2)
= 4.167

mGF = - (1/12 x qDL tengah x L^2)
= - (1/12 x 15.435 x 1.8^2)
= -4.524

mGH = (1/12 x qDL tengah x L^2)
= (1/12 x 15.435 x 1.8^2)

	= 4.524
mHG	= - (1/12 x qDL tengah x L^2)
	= - (1/12 x 15.435 x 1.8^2)
	= -4.167
mHI	= (1/8 x qDL tengah x L^2)+(P.a.b^2/L^2)
	= (1/8 x 15.435 x 1.8^2)+(0.315.1.3.0.5^2/1.8^2)
	= 6.283
m IH	= 0.000
m IJ	= (1/2 x qDL tepi x L^2 + P x L)
	= (1/2 x 13.871 x 1.7^2 + 2.267 x 1.7)
	= 23.897
mJI	= 0.000

Tabel 4.6 Distribusi momen plat lantai kendaraan

TITIK BATANG		B		C		D		E		F		G		H		I	
		BA	BC	CB	CD	DC	DE	ED	EF	FE	FG	GF	GH	HG	HI	IH	IJ
SIKLUS	µ	0.00	-1.00	-0.50	-0.50	-0.50	-0.50	-0.50	-0.50	-0.50	-0.50	-0.50	-0.50	-0.50	-0.50	-1.00	0.00
1.00	M	-23.90	0.00	-6.28	4.17	-4.17	4.17	-4.17	4.17	-4.17	4.17	-4.17	4.17	-4.17	6.28	0.00	23.90
	BAL	0.00	23.90	1.06	1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.06	-1.06	-23.90	0.00
2.00	CO	0.00	0.53	11.95	0.00	0.53	0.00	0.00	0.00	0.00	0.00	0.00	-0.53	0.00	-11.95	-0.53	0.00
	BAL	0.00	-0.53	-5.97	-5.97	-0.26	-0.26	0.00	0.00	0.00	0.00	0.26	0.26	5.97	5.97	0.53	0.00
3.00	CO	0.00	-2.99	-0.26	-0.13	-2.99	0.00	-0.13	0.00	0.00	0.13	0.00	2.99	0.13	0.26	2.99	0.00
	BAL	0.00	2.99	0.20	0.20	1.49	1.49	0.07	0.07	-0.07	-0.07	-1.49	-1.49	-0.20	-0.20	-2.99	0.00
4.00	CO	0.00	0.10	1.49	0.75	0.10	0.03	0.75	-0.03	0.03	-0.75	-0.03	-0.10	-0.75	-1.49	-0.10	0.00
	BAL	0.00	-0.10	-1.12	-1.12	-0.07	-0.07	-0.36	-0.36	0.36	0.36	0.07	0.07	1.12	1.12	0.10	0.00
5.00	CO	0.00	-0.56	-0.05	-0.03	-0.56	-0.18	-0.03	0.18	-0.18	0.03	0.18	0.56	0.03	0.05	0.56	0.00
	BAL	0.00	0.56	0.04	0.04	0.37	0.37	-0.07	-0.07	0.07	0.07	-0.37	-0.37	-0.04	-0.04	-0.56	0.00
6.00	CO	0.00	0.02	0.28	0.18	0.02	-0.04	0.18	0.04	-0.04	-0.18	0.04	-0.02	-0.18	-0.28	-0.02	0.00
	BAL	0.00	-0.02	-0.23	-0.23	0.01	0.01	-0.11	-0.11	0.11	0.11	-0.01	-0.01	0.23	0.23	0.02	0.00
7.00	CO	0.00	-0.12	-0.01	0.00	-0.12	-0.06	0.00	0.06	-0.06	0.00	0.06	0.12	0.00	0.01	0.12	0.00
	CO	0.00	0.12	0.00	0.00	0.09	0.09	-0.03	-0.03	0.03	0.03	-0.09	-0.09	0.00	0.00	-0.12	0.00
8.00	BAL	0.00	0.00	0.06	0.04	0.00	-0.01	0.04	0.01	-0.01	-0.04	0.01	0.00	-0.04	-0.06	0.00	0.00
	CO	0.00	0.00	-0.05	-0.05	0.01	0.01	-0.03	-0.03	0.03	0.03	-0.01	-0.01	0.05	0.05	0.00	0.00

TITIK BATANG		B		C		D		E		F		G		H		I	
		BA	BC	CB	CD	DC	DE	ED	EF	BA	BC	CB	CD	DC	DE	ED	EF
9.00	BAL	0.00	-0.03	0.00	0.00	-0.03	-0.01	0.00	0.01	-0.01	0.00	0.01	0.03	0.00	0.00	0.03	0.00
	CO	0.00	0.03	0.00	0.00	0.02	0.02	-0.01	-0.01	0.01	0.01	-0.02	-0.02	0.00	0.00	-0.03	0.00
10.00	BAL	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	-0.01	0.00	0.00	-0.01	-0.01	0.00	0.00
	CO	0.00	0.00	-0.01	-0.01	0.00	0.00	-0.01	-0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00
11.00	BAL	0.00	-0.01	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00
	CO	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00
12.00	BAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	CO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.00	CO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14.00	CO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.00	CO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
JUMLAH		**-23.90**	**23.90**	**-1.10**	**1.10**	**-5.55**	**5.55**	**-3.89**	**3.89**	**-3.89**	**3.89**	**-5.55**	**5.55**	**-1.10**	**1.10**	**-23.90**	**23.90**
		BA	**BC**	**CB**	**CD**	**DC**	**DE**	**ED**	**EF**	**FE**	**FG**	**GF**	**GH**	**HG**	**HI**	**IH**	**IJ**

Jadi, momen tumpuan pakai 23.90 kNm.

Lapangan C-D

$\sum MD$ = 0

RC = $\dfrac{(MCD + 1/2 \times qDL\ Tengah \times L^2 - MDC)}{L}$

= $\dfrac{-1.096 + 7.718\ X\ 3.2\ -\ 5.552}{1.8}$

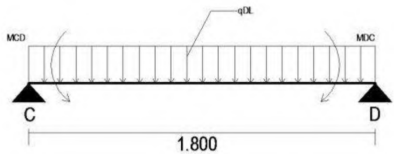
= 10.198 kN

Dx = RC – qx = 0

X = 0.609

Mmax = RB x X – ½ x qDL tepi x X^2 – MCD

= 4.444 kNm



Lapangan D-E

$\sum ME$ = 0

RD = $\dfrac{(MDE + 1/2 \times qDL\ Tengah \times L^2 - MDC)}{L}$

= $\dfrac{5.552\ +\ 8.378\ X\ 3.2\ -\ 3.890}{1.8}$

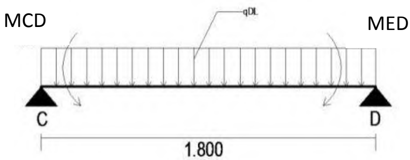
= 16.003 kN

Dx = RD – qx = 0

X = 0.955

Mmax = RD x X – ½ x qDL tengah x X^2 – MDE

= 2.090 kNm



Momen lapangan pakai Mmax = 2.793 kN.m

Perhitungan momen akibat beban hidup roda truck

Momen hidup lapangan = ((s+0.6)/10 x P x 0.8
= ((1.800 m + 0.6)/ 10) x 263.250 x 0.8
= 50.544 kN.m

Total M*L truck = 50.544 kN.m

4.2.4 Penulangan Plat Lantai Kendaraan L= 1.80 m

- Tulangan Tumpuan

  Tulangan Lentur

  - Momen ultimate rencana

    Mu = MuD + MuL
    = 21.90 + 50.54 kN.m
    = 74.44 kN.m
    = 82712087.41 N.mm
  - Mutu Beton

    Fc' = 25 MPa
  - Mutu Tulangan Baja

    Fy = 400 MPa
  - D tulangan lentur = 16 mm
  - Ø Tulangan geser = 12 mm
  - Tebal selimut = 40 mm
  - Lebar (b) = 1000 mm
  - Tebal plat (d) = 250 mm
  - Tinggi efisien (d') = 250 mm – 40 mm – 12 mm – ½ (16mm)
    = 210 mm
  - Faktor bentuk tegangan beton β_1 = 0,85
  - Faktor distribusi tegangan beton

$$\rho b = \frac{0{,}85 \,. fc'}{fy} . \beta 1. \left[\frac{600}{600 + fy}\right]$$

$$= \frac{0,85.25}{400} .0,85. \left[\frac{600}{600+400}\right]$$

$= 0,027$

- Faktor reduksi kekuatan lentur

  $K_{TD}^{U} = 0,90$

- Momen nominal rencana

  $M* = \frac{M_U}{K_C^R}$

  $= \frac{82712087.41\ Nmm}{0,90}$

  $= 91902319$ Nmm

- Faktor tahanan momen

  $Rn = \frac{M*}{b.d^2}$

  $= \frac{91902319}{1000.250^2}$

  $= 2.084\ Nmm^2$

- Rasio tulangan minimum

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

  $= \frac{1,4}{400}$

  $= 0,0035$

- Rasio tulangan maksimum

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

  $= 0,75 . 0,035$

  $= 0,020$

- Rasio tulangan yang diperlukan

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

  $= \frac{400}{0,85\ x\ 25}$

  $= 18.823$

  $\rho_{perlu} = \frac{1}{m}\ (1 - \sqrt{1 - \frac{2m\ xRn}{fy}})$

$= \frac{1}{16.20}\ (1 - \sqrt{1 - \frac{2(16.20)\ x\ 2.084}{400}}\ )$

$= 0.0055$

… (Wang, Chu Kia, 1994, hal 55)

- Kontrol

  $\rho_{min} < \rho < \rho_{max}$

  0.0035 < 0.0053 < 0.020 …… **OK**

- Luas tulangan

  As perlu = ρ . b . d

  = 0,0053 x 1000 mm x 210 mm

  = 1153.73 mm^2

  Dipasang tulangan lentur **D16-150 (As = 1340 mm^2)**

➢ Tulangan Pembagi

Ast Tulangan bagi = 20% x Ast tulangan lentur

= 0.2 x 1153.73 mm^2

= 230.747 mm^2

Maka, dipasang tulangan lentur **D13-250 (As = 531 mm^2).**

➢ Tulangan Lapangan

Tulangan Lentur

- Momen ultimate rencana

  Mu = MuD + MuL

  = 4.444+ 50.54 kN.m

  = 54.99 kN.m

  = 61097310.5 N.mm

- Mutu Beton

  Fc’ = 25 MPa

- Mutu Tulangan Baja

  Fy = 400 MPa

- D tulangan lentur = 16 mm
- Ø Tulangan geser = 12 mm
- Tebal selimut = 40 mm

- Lebar (b) = 1000 mm
- Tebal plat (d) = 250 mm
- Tinggi efisien (d') = 250 mm – 40 mm – 12 mm – ½ (16mm)
  = 210 mm
- Faktor bentuk tegangan beton β_1 = 0,85
- Faktor distribusi tegangan beton

$$\rho b = \frac{0{,}85\,.\,fc'}{fy}\,.\,\beta 1.\left[\frac{600}{600+fy}\right]$$

$$= \frac{0{,}85.25}{400}\,.0{,}85.\left[\frac{600}{600+400}\right]$$

= 0,027

- Faktor reduksi kekuatan lentur

  K^{U}_{TD} = 0,90
- Momen nominal rencana

  $M^* = \frac{M_U}{K^R_C}$

  $= \frac{61097310.5\ Nmm}{0{,}90}$

  = 61097310.50 Nmm
- Faktor tahanan momen

  $Rn = \frac{M*}{b.d^2}$

  $= \frac{61097310.50}{1000.250^2}$

  = 1.386 Nmm^2
- Rasio tulangan minimum

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

  $= \frac{1{,}4}{400}$

  = 0,0035
- Rasio tulangan maksimum

  ρ_{max} = 0,75 . ρb

  = 0,75 . 0,035

  = 0,020
- Rasio tulangan yang diperlukan

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

$= \frac{400}{0{,}85\ x\ 25}$

$= 18.823$

ρ_{perlu} $= \frac{1}{m}\ (1 - \sqrt{1 - \frac{2m\ xRn}{fy}})$

$= \frac{1}{16.20}\ (1 - \sqrt{1 - \frac{2(16.20)\ x\ 1.386}{400}})$

$= 0.0036$

… (Wang, Chu Kia, 1994, hal 55)

- Kontrol

  $\rho_{\ min} < \rho < \ \rho_{\ max}$

  0.0035 < 0.0036 < 0.020 …… **OK**

- Luas tulangan

  As perlu $= \rho\ .\ b\ .\ d$

  = 0,0036 x 1000 mm x 210 mm

  = 746.33.00 mm^2

  Dipasang tulangan lentur **D16-150 (As = 1340 mm^2)**

➢ Tulangan Pembagi

Ast Tulangan bagi = 20% x Ast tulangan lentur

= 0.2 x 1340.00

= 149.265 mm^2

Maka, dipasang tulangan lentur **D13-250 (As = 531 mm^2).**

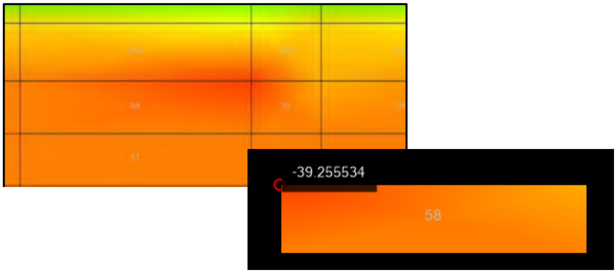
4.2.5 Penulangan Plat Lantai Kendaraan L= 1.95 m

➢ Tulangan Tumpuan

- Tulangan Lentur

  MuD = 40.118 kN.m

  (Output SAP2000)



Gambar 4.15 Momen negative akibat beban mati terpusat dan merata plat lantai kendaraan.

MuL = 50.54 kN.m

Mu = MuD + MuL
= 39.25 + 50.54
= 89.80 kN.m
= 89799000 N.mm

- Mutu Beton
  Fc' = 25 MPa
- Mutu Tulangan Baja
  Fy = 400 MPa
- D tulangan lentur = 16 mm
- Ø Tulangan geser = 12 mm
- Tebal selimut = 40 mm
- Lebar (b) = 1000 mm
- Tebal plat (d) = 250 mm
- Tinggi efisien (d') = 250 mm – 40 mm – 12 mm – ½ (16mm)
  = 210 mm
- Faktor bentuk tegangan beton $\beta_1 = 0{,}85$
- Faktor distribusi tegangan beton

$$\rho b = \frac{0{,}85 \,.\, fc'}{fy} \,.\, \beta 1 . \left[\frac{600}{600 + fy}\right]$$

$$= \frac{0,85.25}{400}.0,85.\left[\frac{600}{600+400}\right]$$

= 0,027

- Faktor reduksi kekuatan lentur

  K_{TD}^{U} = 0,90

- Momen nominal rencana

  $M^* = \frac{M_U}{K_C^R}$

  $= \frac{89799000\ Nmm}{0,90}$

  = 99776666.67 Nmm

- Faktor tahanan momen

  $Rn = \frac{M*}{b.d^2}$

  $= \frac{99776666.67}{1000.250^2}$

  = 2.2625 Nmm^2

- Rasio tulangan minimum

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

  $= \frac{1,4}{400}$

  = 0,0035

- Rasio tulangan maksimum

  ρ_{max} = 0,75 . ρb

  = 0,75 . 0,035

  = 0,020

- Rasio tulangan yang diperlukan

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

  $= \frac{400}{0,85\ x\ 25}$

  = 18.823

  $\rho_{perlu} = \frac{1}{m}\ (1 - \sqrt{1 - \frac{2m\ xRn}{fy}})$

  $= \frac{1}{16.20}\ (1 - \sqrt{1 - \frac{2(16.20)\ x\ 2.263}{400}})$

  = 0.00599

… (Wang, Chu Kia, 1994, hal 55)

- Kontrol

  $\rho_{min} < \rho < \rho_{max}$

  0.0035 < 0.00599 < 0.020 …… **OK**
- Luas tulangan

  As perlu = ρ . b . d

  = 0,00599 x 1000 mm x 210 mm

  = 1258.84 mm^2

  Dipasang tulangan lentur **D16-150 (As = 1340 mm^2)**

➢ Tulangan Pembagi

Ast Tulangan bagi = 20% x Ast tulangan lentur

= 0.2 x 1258.84

= 251.768 mm^2

Maka, dipasang tulangan lentur **D13-250 (As = 531 mm^2).**

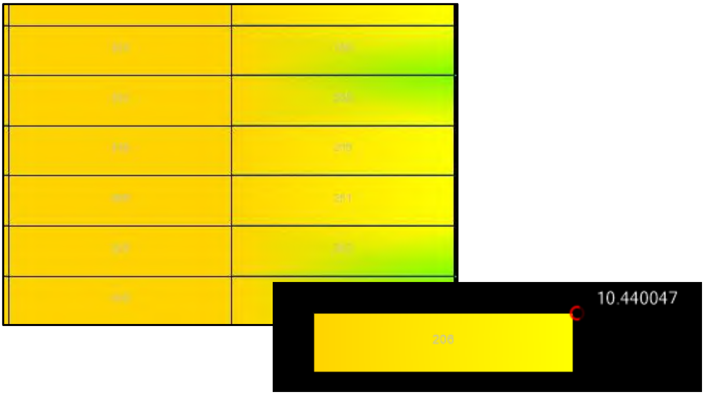
➢ Tulangan Lapangan

Tulangan Lentur

- Momen ultimate beban mati dan merata rencana

  MuD = 10.44 kN.m

  (Output SAP2000)



Gambar 4.16 Momen positif akibat beban mati terpusat dan merata plat lantai kendaraan.

MuL = 50.54 kN.m

Mu = MuD + MuL
= 10.44 + 50.54
= 60984000 kN.m
= 60984000 N.mm

- Mutu Beton
  Fc' = 25 MPa
- Mutu Tulangan Baja
  Fy = 400 MPa
- D tulangan lentur = 16 mm
- Ø Tulangan geser = 12 mm
- Tebal selimut = 40 mm
- Lebar (b) = 1000 mm
- Tebal plat (d) = 250 mm
- Tinggi efisien (d') = 250 mm – 40 mm – 12 mm – ½ (16mm)
  = 210 mm
- Faktor bentuk tegangan beton β_1 = 0,85

- Faktor distribusi tegangan beton

$$\rho b = \frac{0{,}85 \,.\, fc'}{fy} \,.\, \beta 1. \left[\frac{600}{600 + fy}\right]$$

$$= \frac{0{,}85.25}{400} \,.0{,}85. \left[\frac{600}{600+400}\right]$$

= 0,027

- Faktor reduksi kekuatan lentur

K_{TD}^{U} = 0,90

- Momen nominal rencana

$M^* = \frac{M_U}{K_C^R}$

$= \frac{60984000\ Nmm}{0{,}90}$

= 67760000 Nmm

- Faktor tahanan momen

$Rn = \frac{M*}{b.d^2}$

$= \frac{67760000}{1000.250^2}$

= 1.537 Nmm^2

- Rasio tulangan minimum

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

$= \frac{1{,}4}{400}$

= 0,0035

- Rasio tulangan maksimum

ρ_{max} = 0,75 . ρb

= 0,75 . 0,035

= 0,020

- Rasio tulangan yang diperlukan

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

$= \frac{400}{0{,}85\ x\ 25}$

= 18.823

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

$= \frac{1}{16.20}\left(1 - \sqrt{1 - \frac{2(16.20)\,x\,1.537}{400}}\right)$

$= 0.0040$

\- … (Wang, Chu Kia, 1994, hal 55)

- Kontrol

  $\rho_{min} < \rho < \rho_{max}$

  0.0035 < 0.00040 < 0.020 …… **OK**

- Luas tulangan

  As perlu = ρ . b . d

  = 0,0040 x 1000 mm x 210 mm

  = 838.15 mm^2

  Dipasang tulangan lentur **D16-150 (As = 1340 mm^2)**

➢ Tulangan Pembagi

Ast Tulangan bagi = 20% x Ast tulangan lentur

= 0.2 x 838.15

= 150.422 mm^2

Maka, dipasang tulangan lentur **D13-250 (As = 531 mm^2).**

4.3 Desain Pelat Kantilever

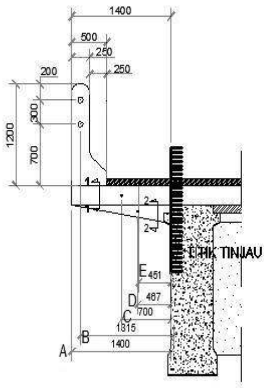
Untuk mendapatkan momen dari reaksi perletakan terbesar, maka desain plat dibawah trotoar ditempatkan pada pelat diatasnya terdapat tiang sandaran. Sehingga dengan mengasumsi jepit pada tinjauan maka diperoleh bentuk kantilever pada bentuk bangunannya. Yang kemudian gaya dikalikan dengan jarak terhadap titik tinjau.

4.3.1 Pelat Kantilever Bentang 1.4 m

Analisa pembebanan plat lantai kendaraan

Tabel 4.7 Daftar keterangan dimensi trotoar dan pelat lantai

Keterangan	Nilai
Jarak antar tumpuan balok (L)	1.800 m
Tebal beton rabat	0.100 m
Tebal beton bertulang pot 1-1	0.250 m
Tebal beton bertulang pot 2-2	0.200 m
Tebal plat lantai	0.250 m
Tebal lapisan aspal	0.050 m
Tebal plat pracetak	0.100 m
Tebal genangan air	0.050 m
Tebal lapisan overlay	0.050 m



Gambar 4.17 Gaya yang bekerja pada pelat kantilever

Beban Mati

<u>Beban mati terpusat</u>

Beban mati terpusat 1 = B.mati pipa + B.mati tiang sandaran + B.mati tiang PJU
= (Pu*DL1 + Pu*DL2) + (Pu*DL3 + Pu*DL4 + Pu*DL5)
= 0.157 kN + 0.157 kN + 0.010 kN + 0.00004 kN + 0.003 kN + 1.94 kN

TOTAL Pu*DL1 = 2.267 kN

<u>Beban Mati Merata</u>

Beban mati merata tepi

Beban mati beton rabat (qu*DL1 tepi)	= Tebal x 1 meter x berat sendiri x F.beban
	= 0.100 m x 1m x 24 kN/m^3 x 1.3
	= 3.120 kN/m
Beban mati pot. 1-1 (qu*DL2 tepi)	= Tebal x 1 meter x berat sendiri x F.beban
	= 0.250 m x 1m x 25 kN/m^3 x 1.3
	= 8.125 kN/m
Beban mati pot. 2-2 (qu*DL3 tepi)	= Tebal x 1 meter x berat sendiri x F.beban
	= 0.200 m x 1m x 25 kN/m^3 x 1.3
	= 6.500 kN/m
TOTAL qu*DL Tepi	**= 17.745 kN/m**

Beban Hidup

Beban hidup vertikal	= Beban pejalan kaki x Jarak pusat ke pusat x Faktor beban
	= 0.75 kN/m x 2 x 1.8
	= 2.700 kN
Beban hidup horizontal	= Beban pejalan kaki x Jarak pusat ke pusat x Faktor beban
	= 0.75 kN/m x 2 x 1.8
	= 2.700 kN
Beban hidup kendaraan	= Beban kendaraan ringan x 1 meter x Faktor beban
	= 20.00 kN/m x 2 x 1.8
	= 36.00 kN

TOTAL Beban hidup terpusat Pu*L = 41.400 kN

Beban hidup merata

Beban hidup trotoar (Ptp)	= 5 kPa	= 5.00 kN/m^2
	= Ptp x Jarak A-T.tinjau x KuTp	

= 5.0 kN/m^2 x 1.400 x 1.8
= 12.600 kN/m

TOTAL Beban hidup merata Qu*LL = 12.600 kN/m

4.3.2 Perhitungan Momen

Momen Beban Mati

<u>Momen beban mati terpusat</u>

M*PuD = Pu*DL x Jarak B – T.tinjau
= 2.267 kN/m x 1.315 m
= 1.407 kN

<u>Momen beban mati merata</u>

M*quD1 = B.mati beton rabat x Jarak E-T.tinjau
= 3.12 kN/m x 0.451 m
= 1.407 kN

M*quD2 = B.mati pot 1-1 x Jarak C-T.tinjau
= 8.13 kN/m x 0.700 m
= 5.688 kN

M*quD3 = B.mati pot 1-1 x Jarak C-T.tinjau
= 6.50 kN/m x 0.467 m
= 3.036 kN

TOTAL Momen beban mati (M*D) = 13.111 kN.m

Momen Beban Hidup

<u>Momen beban hidup terpusat</u>

M*PuD = Pu*LL x Jarak B-T.tinjau
= 41.400 kN x 1.315 m
= 54.441 kNm

<u>Momen beban hidup merata</u>

M*quD = qu*LL x Jarak A-T.tinjau
= 12.60 kN/m x 1.400 m
= 17.640 kN

TOTAL Momen beban hidup (M*L) = 72.081 kNm

4.3.3 Penulangan Lantai Kendaraan

- Tulangan Tumpuan

  Tulangan Lentur

- Momen ultimate rencana
  Mu = MuD + MuL
  = 13.111 + 72.08 kN.m
  = 85.19 kN.m
  = 85191748.25 N.mm
- Mutu Beton
  Fc' = 25 MPa
- Mutu Tulangan Baja
  Fy = 400 MPa
- D tulangan lentur = 16 mm
- Ø Tulangan geser = 12 mm
- Tebal selimut = 40 mm
- Lebar (b) = 1000 mm
- Tebal plat (d) = 250 mm
- Tinggi efisien (d') = 250 mm – 40 mm – 12 mm – ½ (16mm)
  = 210 mm
- Faktor bentuk tegangan beton β_1 = 0,85
- Faktor distribusi tegangan beton

$$\rho b = \frac{0{,}85 \, . fc'}{fy} . \beta 1 . \left[\frac{600}{600 + fy}\right]$$

$$= \frac{0{,}85.25}{400} \, .0{,}85. \left[\frac{600}{600+400}\right]$$

= 0,027
- Faktor reduksi kekuatan lentur
  K_{TD}^{U} = 0,90
- Momen nominal rencana
  $M^* = \frac{M_U}{K_C^R}$
  $= \frac{85191748.25 \ Nmm}{0{,}75}$
  = 94657498.05 Nmm

- Faktor tahanan momen

  $Rn = \frac{M*}{b.d^2}$

  $= \frac{94657498.05}{1000.250^2}$

  = 2.147 Nmm^2
- Rasio tulangan minimum

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

  $= \frac{1,4}{400}$

  = 0,0035
- Rasio tulangan maksimum

  ρ_{max} = 0,75 . ρb

  = 0,75 . 0,035

  = 0,020
- Rasio tulangan yang diperlukan

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

  $= \frac{400}{0,85\ x\ 25}$

  = 18.823

  $\rho_{perlu} = \frac{1}{m}\ (1 - \sqrt{1 - \frac{2m\ xRn}{fy}})$

  $= \frac{1}{16.20}\ (1 - \sqrt{1 - \frac{2(16.20)\ x\ 2.147}{400}})$

  = 0.0057

\- … (Wang, Chu Kia, 1994, hal 55)

- Kontrol

  $\rho_{min} < \rho < \rho_{max}$

  0.0035 < 0.0057 < 0.020 …… **OK**
- Luas tulangan

  As perlu = ρ . b . d

  = 0.0057 x 1000 mm x 210 mm

  = 1190.38.00 mm^2

  Dipasang tulangan lentur **D16-150 (As = 1340 mm²)**

- Tulangan Pembagi

  Ast Tulangan bagi = 20% x Ast tulangan lentur

  = 0.2 x 1190.38.00

  = 238.077 mm^2

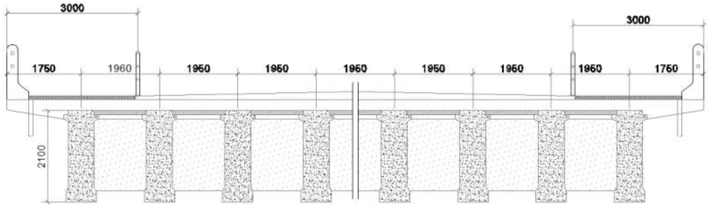
  Maka, dipasang tulangan lentur **D13-250 (As = 531 mm^2).**

(Halaman ini sengaja dikosongkan)

BAB V
DESAIN STRUKTUR UTAMA GELAGAR BETON PRATEKAN

5.1 Desain Gelagar Beton Pratekan

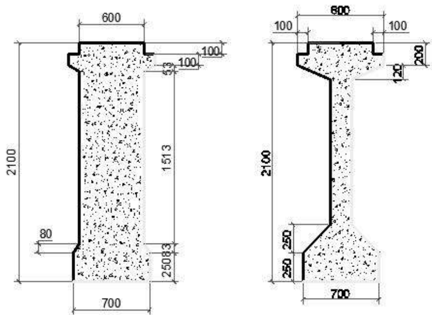
5.1.1 Spesifikasi Teknis Girder



Gambar 5.1 Tampak melintang jembatan

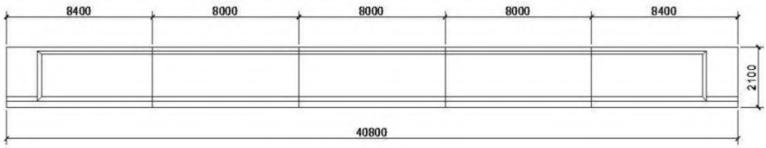
Dalam desain gelagar pada jembatan ini, dimensi awal menggunakan spesifikasi girder produksi dari PT. Wijaya Karya Beton yang disesuaikan dengan bentang jembatan. Girder yang digunakan pada proyek akhir ini yaitu girder bentang 40 m. berikut ini adalah data teknis jembatan :

- Bentang 40 m
  - Panjang bentang : 40.8 m
  - Jarak antar girder : 1.95 m
  - Sistem pratekan : pascatarik



Gambar 5.2 Penampang gelagar beton pratekan di tumpuan dan lapangan bentang 40 m

- Pembagian segmen girder



Gambar 5.3 Gambar tampak memanjang girder

Tabel 5.1 Pembagian segmen girder

SEGMEN	1	2	3	4	5
PANJANG (m)	8.40	8.00	8.00	8.00	8.40

5.1.2 Material

5.1.2.1 Beton

- Mutu Beton

Dalam mendesain gelagar yang memakai sistem beton pratekan diharuskan menggunakan beton mutu tinggi karena beberapa alasan yang dijelaskan di bab II dalam laporan proyek akhir ini.

Tabel 5.2 Mutu beton girder dan plat umur 28 hari.

Element	Gelagar	Plat
Mutu beton	K-800	K-300
Kuat tekan beton fc' (MPa)	66.4	24.9

- Modulus elastisitas

Modulus elastisitas beton (Ec)

Girder = 43798,83

Plat lantai kendaraan = 26821,20

$$n = \frac{Ec\ girder}{Ec\ plat} = 1,612$$

Tegangan ijin beton

Tegangan ijin pada keadaan awal (fase transfer)

	Gelagar	Plat
Tekan = 0,6 $\sqrt{fc'}$	39.84	14.94
Tekan = -0,25 $\sqrt{fc'}$	2.037	1.247

Tegangan ijin pada keadaan akhir (service)

	Gelagar	Plat
Tekan = 0,45 $\sqrt{fc'}$	29.88	11.205
Tekan = -0,5 $\sqrt{fc'}$	4.074	2.495

Kekuatan retak

	Girder	Plat
fr = 0,7 $\sqrt{fc'}$	5.704	3.493

5.1.2.2 Kabel Baja Prategang

Beton pratekan adalah beton yang mengalami tegangan internal dengan besar dan distribusi sedemikian rupa sehingga dapat mengimbangi sampai batas tertentu tegangan yang terjadi akibat beban eksternal atau bisa didefinisikan juga sebagai beton yang diberi tegangan terlebih dahulu untuk mengantisipasi beban yang akan bekerja. Beton prategang mengkombinasikan beton berkekuatan tinggi dan baja mutu tinggi dengan cara ”aktif”. Hal ini dicapai dengan cara menarik baja tersebut dan menahannya ke beton, jadi membuat beton dalam keadaan tertekan. Kombinasi aktif ini menghasilkan perilaku yang lebih baik dari kedua bahan tersebut.(Lin T.Y dan NED H Burns, “Desain Struktur Beton Prategang” Jilid 1hal. 11, Erlangga: Jakarta 1996).

Baja mutu tinggi merupakan bahan yang digunakan untuk menghasilkan gaya prategang dan mensuplai gaya tarik pada beton prategang.

Dalam proyek akhir ini, baja mutu tinggi untuk menghasilkan sistem prategang yaitu dengan menggunakan :

"Uncoated seven wire stress strand relieved for prestressed concrete" (ASTM A 416 Grade 270) produksi PT. VSL

Dengan spesifikasi bahan sebagai berikut:

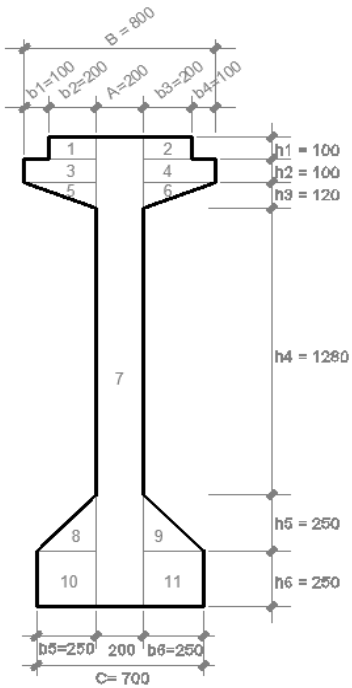
- Diameter kabel prestress = 12,7 mm
- Luas nominal strand (Aps) = 98,71 mm^2
- Kekuatan putus (Fpu) = 183,7 kN
- Batas kekuatan tarik = 1860 Mpa
- Modulus elastisitas (Es) = 190.000 Mpa

Baja tulangan

- Diameter tulangan = 16 mm
- Luas penampang = 201,06 mm^2
- Modulus elastisitas = 210000 MPa
- Tegangan Leleh (fy) = 400 MPa

5.2 Analisa Penampang

5.2.1 Analisa Penampang Bagian Lapangan Sebelum Komposit



PARAMETER PENAMPANG	
Kode	Besar (mm)
H	2100
A	200
B	800
C	700
h1	100
h2	100
h3	120
h4	1280
h5	250
h6	250
b1	100
b2	200
b3	200
b4	100
b5	250
b6	250

Gambar 5.4 Gambar penampang lapangan girder sebelum komposit

- Mencari garis netral penampang lapangan atau cgc penampang sebelum komposit.

Tabel 5.3 Perhitungan letak titik berat penampang lapangan girder

ZONA	Luas (A)	Jarak Titik Berat ke Sisi Bawah Beton (d)	Luas x Jarak (A x d)
	mm^2	mm	mm^3
1	20,000	2,050	41,000,000.00
2	20,000	2,050	41,000,000.00
3	30,000	1,950	58,500,000.00
4	30,000	1,950	58,500,000.00
5	18,000	1,860	33,480,000.00
6	18,000	1,860	33,480,000.00
7	420,000	1,050	441,000,000.00
8	31,250	333	10,416,666.67
9	31,250	333	10,416,666.67
10	62,500	125	7,812,500.00
11	62,500	125	7,812,500.00
$\sum A$ = 743.500		$\sum A$ = 743.418.333,33	

$\sum A.Yb = \sum(A.d)$

$Yb = \dfrac{\sum(A.d)}{\sum A}$

$= \dfrac{743418333{,}3\ mm^3}{743500\ mm^2}$

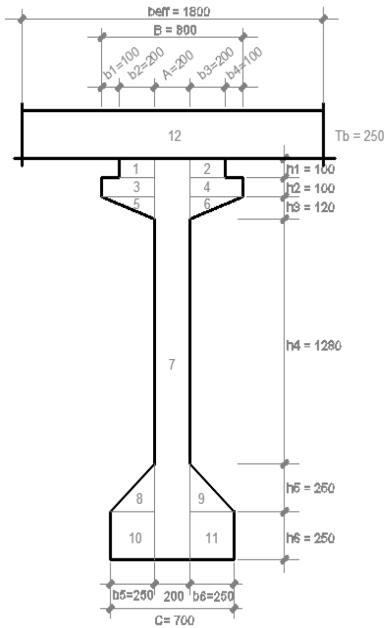
= 999.8901592 mm, dari sisi bawah beton

- Mencari momen inersia penampang lapangan sebelum komposit

Tabel 5.4 Perhitungan momen inersia Ix lapangan sebelum komposit

ZONA	*Luas (A)*	Y	$A.Y^2$	ix	*Ix* $A.Y^2 + ix$
	mm^2	mm	mm^4	mm^4	*mm^4*
1	20000	1050.110	22054613557	16666667	22071280223.37
2	20000	1050.110	22054613557	16666667	22071280223.37
3	30000	950.110	27081261290	25000000	27106261289.99
4	30000	950.110	27081261290	25000000	27106261289.99
5	18000	860.110	13316200890	14400000	13330600889.67
6	18000	860.110	13316200890	14400000	13330600889.67
7	420000	50.110	1054618383	154350000000	155404618382.71
8	31250	583.223	10629676319	108506944	10738183262.97
9	31250	583.223	10629676319	108506944	10738183262.97
10	62500	874.890	47839549412	325520833	48165070245.21
11	62500	874.890	47839549412	325520833	48165070245.21
					Ix = 398227410205

5.2.2 Analisa Penampang Lapangan Setelah Komposit



PARAMETER PENAMPANG	
Kode	Besar (mm)
H	2100
A	200
B	800
C	700
tp	250
h1	100
h2	100
h3	120
h4	1280
h5	250
h6	250
b eff	1950
beff x n	1194,126
b1	100
b2	200
b3	200
b4	100
b5	250
b6	250

Gambar 5.4 Gambar penampang lapangan girder setelah komposit.

- Mencari garis netral penampang lapangan atau cgc penampang setelah komposit

Tabel 5.5 Perhitungan letak titik berat penampang lapangan girder

ZONA	Luas (A)	Jarak Titik Berat ke sisi Bawah Beton (d)	Luas x Jarak (A x d)
	mm^2	mm	mm^3
1	20000	2050,00	41000000
2	20000	2050,00	41000000,00
3	30000	1950.00	58500000,00
4	30000	1950,00	58500000,00
5	18000	1860,00	33480000,00
6	18000	1860,00	33480000,00
7	420000	1050,00	441000000,00
8	31250	333,33	10416666,67
9	31250	333,33	10416666,67
10	62500	125,00	7812500,00
11	62500	125,00	7812500,00
12	298532	2,225	664232726.34
	∑A = 1042032	**∑(A.d) = 1407651059.677**	

$$\sum A.Yb = \sum(A.d)$$

$$Yb = \frac{\sum(A.d)}{\sum A}$$

$$= \frac{1407651059.677\ mm^3}{1042032\ mm^2}$$

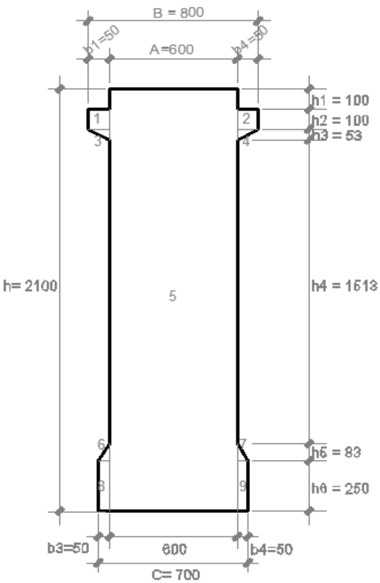
= 1350.87 mm, dari sisi bawah beton

- Mencari momen inersia Ix penampang lapangan setelah komposit

Tabel 5.6 Perhitungan momen inersia ix lapangan sebelum komposit

ZONA	Luas (A)	Y	A.Y^2	ix	Ix
					A.Y^2+ ix
	mm^2	mm	mm^4	mm^4	mm^4
1	20000	718,826	10334217876	16666666,67	10350884543,05
2	20000	718,826	10334217876	16666666,67	10350884543,05
3	30000	618,826	11488370499	25000000,00	11513370499,29
4	30000	618,286	11488370499	25000000,00	11513370499,29
5	18000	528,826	5033825889	14400000,00	5048225889,33
6	18000	528,826	5033825889	14400000,00	5048225889,33
7	420000	281,174	33204691265	154350000000,00	187554691265,27
8	31250	914,507	26135111457	108506944,44	26243618401,10
9	31250	914,507	26135111457	108506944,44	26243618401,10
10	62500	1206,174	90928474470	325520833,33	91253995303,13
11	62500	1206,174	90928474470	325520833,33	91253995303,13
12	298531.562	874.128	228107996014	1554851887.51	229662847902.00
					Ix = 715824564368.01

5.2.3 Analisa Penampang Bagian Tumpuan Sebelum Komposit



PARAMETER PENAMPANG	
Kode	**Besar (mm)**
H	2100
A	600
B	700
h1	100
h2	100
h3	40
h4	1560
h5	50
h6	250
b1	100
b2	100
b3	50
b4	50

Gambar 5.5 Gambar penampang tumpuan girder sebelum komposit

- Mencari garis netral penampang tumpuan atau cgc penampang sebelum komposit

Tabel 5.7 Perhitungan letak titik Berat tumpuan girder

ZONA	Luas (A)	Jarak titik Barat ke sisi bawah beton (d)	Luas x Jarak (A x d)
	mm^2	mm	mm^3
1	10.000	1.950	19.500.000
2	10.000	1.950	19.500.000
3	2.000	1.886,667	3.773.333
4	2.000	1.886,667	3.773.333
5	1.260.000	1.050	1.323.000
6	1.250	266,667	333.333
7	1.250	266,667	333.333
8	12.500	125	1.562.500
9	12.500	125	1.562.500
$\sum$A =	1.311.500	$\sum$(A.d) = 1.373.338.333,33	

$$\sum A.Yb = \sum(A.d)$$

$$Yb = \frac{\sum(A.d)}{\sum A}$$

$$= \frac{1.373.338.333{,}33\ mm^3}{1.311.500\ mm^2}$$

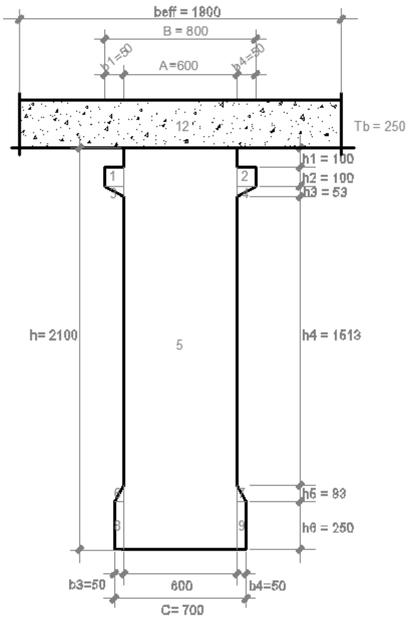
= 1047.150845 mm, dari sisi bawah beton

- Mencari momen inersia Ix penampang tumpuam sebelum komposit

Tabel 5.8 Perhitungan momen inersia Ix penampang tumpuan sebelum komposit.

Zona	Luas (A)	Y	$A.Y^2$	ix	Ix $A.Y^2 + ix$
	mm^2	mm	mm^4	mm^4	mm^4
1	10.000	902,849	8151365965	8333333	8159699299
2	10.000	902,849	8151365965	8333333	8159699299
3	2.000	839,516	1409573629	177778	1409751407
4	2.000	839,516	1409573629	177778	1409751407
5	1.260.000	-2,849	10228281	463050000000	463060228281
6	1.250	780,484	761444441	173611	761618052
7	1.250	780,484	761444441	173611	761618052
8	12.500	922,151	10629527264	65104167	10694631430
9	12.500	922,151	10629527264	65104167	10694631430
					Ix = 505111628568

5.2.4 Analisa Penampang Bagian Tumpuan Setelah Komposit



PARAMETER PENAMPANG	
Kode	(mm)
H	2100
A	600
B	700
tp	250
h1	100
h2	100
h3	40
h4	1560
h5	50
h6	250
b eff	1950
beff *x* n	1194.126
b1	100
b2	100
b3	50
b4	50

Gambar 5.6 Gambar penampang tumpuan girder setelah komposit

- Mencari garis netral penampang tumpuan atau cgc penampang setelah komposit

Tabel 5.9 Perhitungan letak titik berat tumpuan girder setelah komposit

ZONA	Luas (A)	Jarak Titik Berat ke sisi Bawah Beton (d)	Luas x Jarak (A x d)
	mm^2	mm	mm^3
1	10000,00	1950,00	19500000,00
2	10000,00	1950,00	19500000,00
3	2000,00	1886,67	3773333,33
4	2000,00	1886,67	3773333,33
5	1260000,00	1050,00	1323000000,00
6	1250,00	266,67	333333,33
7	1250,00	266,67	333333,33
8	12500,00	125,00	1562500,00
9	12500,00	125,00	1562500,00
10	298531.56	2225.00	664,232,726
∑A = 1610031.56		∑ (A . d) = 2037571059.68	

$\sum A . Yb = \sum(A.d)$

$$Yb = \frac{\sum(A.d)}{\sum A}$$

$$= \frac{2037571059.68\ mm^3}{1610031.56\ mm^2}$$

=1265.547 mm, dari sisi bawah Beton

- Mencari momen inersia Ix penampang tumpuan setelah komposit

Tabel 5.10 Perhitungan momen inersia Ix penampang tumpuam sebelum komposit

ZONA	Luas (A)	Y	$A \cdot Y^2$	ix	Ix $A.Y^2$ + ix
	mm^2	mm	mm^4	mm^4	mm^4
1	10000,00	698,335	4876724129	8333333,33	4885057462,68
2	10000,00	698,335	4876724129	8333333,33	4885057462,68
3	2000,00	635,002	806455399	177777,78	806633176,32
4	2000,00	635,002	806455399	177777,78	806633176,32
5	126000,00	201,665	51242419874	463050000000,00	514292419873,64
6	1250,00	984,998	1212776016	173611,11	1212949627,30
7	1250,00	984,998	1212776016	173611,11	1212949627,30
8	12500,00	1126,665	15867162357	65104166,67	15932266523,30
9	12500,00	1126,665	15867162357	65104166,67	15932266523,30
10	298531.56	959.453	274813088766	1554851887.51	276367940653.18
					Ix =844034186739.63

5.3 Perhitungan Strand Prategang

Sebelumnya perlu dihitung terlebih dahulu momen terbesar (ditengah bentang) yang terjadi akibat beban eksternal (Beban Hidup + Beban Mati) untuk mengestimasikan besarnya gaya prategang awal yang diberikan dan jumlah Strand yang dibutuhkan. Dengan rumus F = Mt/h, dengan mengasumsikan kehilangan gaya prategang sebesar 20%.

Tabel Faktor Beban dan Berat Jenis Bahan

Jenis Beban		Berat Jenis (KN/m^3)
-Beban Mati		
	• Beton (Precast)	25
	• Beton (Cast in Situ)	25
	• Lapisan Aspal	22
-Beban Mati Tambahan		
	• Overlay	22
	• Genangan Air Hujan	9,8
-Beban Hidup		
	• Beban Lajur "D"	
	• Beban Truck "T"	

5.3.1 Analisa Pembebanan Gelagar Tengah

Beban - beban yang bekerja pada Gelagar Memanjang adalah :

1. Beban Mati
   - Beban Mati Merata

- Berat sendiri girder

SECTION	Luas (A) m^2	Perhitungan	Berat (q) KN/m
Tumpuan (0-2.10 dan 38.70 -40.80)	1,3115	q = A x BJ	32,7875
Lapangan (2.10 – 38.70)	0,7435	q = A x BJ	18,588

- Berat RC plat

Parameter	Besar (m)	Perhitungan	Berat (q) KN/m
Tebal (t)	0,1	qRC = t.l.BJ	3,375
Jarak antar Girder (l)	1,35		

- Berat plat lantai kendaraan

Parameter	Besar (m)	Perhitungan	Berat (q) KN/m
Tebal (t)	0,25	q plat = t. s. BJ	12,188
Jarak antar Girder (s)	1,95		

- Berat lapisan aspal

Parameter	Besar (m)	Perhitungan	Berat (q) KN/m
Tebal (t)	0,05	q aspal = t.s.BJ	2,145
Jarak antar Girder (s)	1,95		

- Berat lapisan overlay

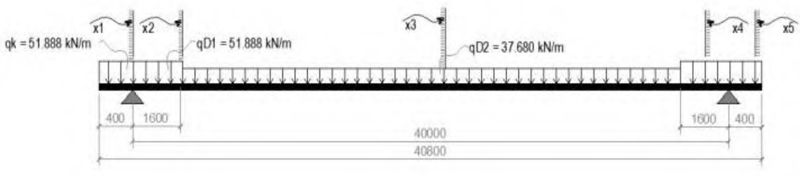
Parameter	Besar (m)	Perhitungan	Berat (q) KN/m
Tebal (t)	0,05	q ovrly = t.s.BJ	2,145
Jarak antar Girder (s)	1,95		

- Berat genangan air hujan

Parameter	Besar (m)	Perhitungan	Berat (q) KN/m
Tebal (t)	0,05	q ah = t x s xBJ	0,956
Jarak antar Girder (s)	1,80		

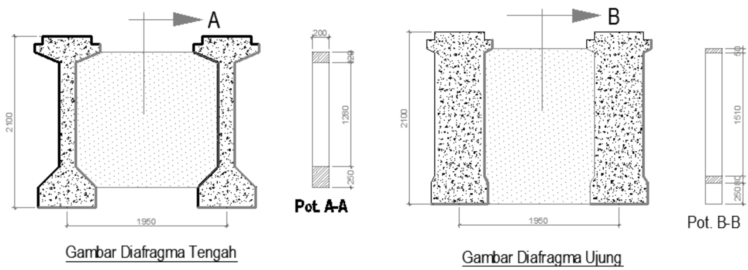
- Resume perhitungan beban mati merata

SECTION	Luas (A) m^2	Perhitungan	Berat (q) KN/m
Tumpuan (qD1) (0-2.00) dan 38.80-40.80)	32,788	20,808	53,596
Lapangan (qD2) (2.00 – 38.80)	18,588	20,808	39,396

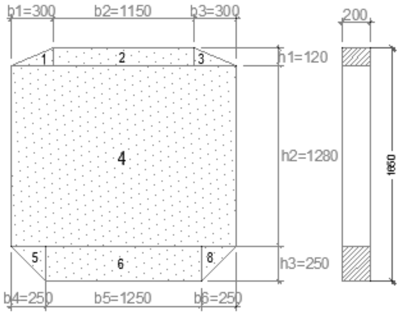


Gambar 5.7 Pemodelan beban pada girder akibat beban mati merata

Beban Mati Terpusat (Diafragma)



Diafragma Tengah



Gambar 5.8 Diafragma tengah

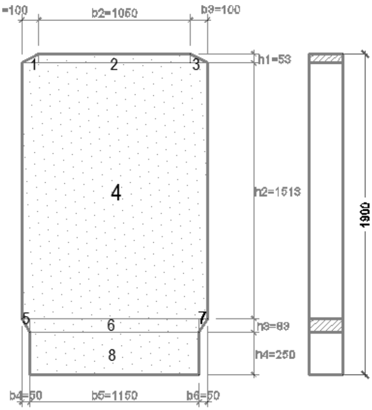
PERHITUNGAN		ZONA	LUAS
			mm^2
Kode	Besar (mm)	1	18000
b1	300	2	138000
b2	1150	3	18000
b3	300	4	2240000
b4	250	5	31250
b5	1250	6	275000
b6	250	7	31250
h1	120	$\sum A = 2789000$	
h2	1280		
h3	250		
T	200		

V = 557800000 mm^3

= 0,5578 m^3

P = 13.945 KN

Diafragma Ujung



Gambar 5.9 Diafragma ujung

PERHITUNGAN		ZONA	LUAS
			mm^2
Kode	Besar (mm)	1	2650
b1	100	2	55650
b2	1050	3	2650
b3	100	4	1891250
b4	50	5	2075
b5	1150	6	95450
b6	50	7	2075
h1	53	8	287500
h2	1513	$\sum A = 2339300$	
h3	83		
h4	250		
T	300		

$$V = 701790000\ mm^3$$

$$= 0{,}70179\ m^3$$

P = 17.545 KN

2. Beban Hidup

- Beban Hidup Terbagi Rata (UDL)

  Beban Hidup Terbagi Rata di atur dalam RSNI-T-03-2005 sebesar :

  q = 9 x (0,5+15/l)

  = 7,809 kN/m^2

  q UDL = beff x q

  = 15.227 kN/m

- Beban Hidup Garis (KEL)

  KEL = 49 kN/m

  P KEL = b eff x KEL

  = 1.950 m x 49 kN/m

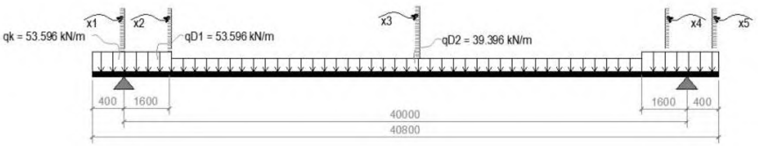
  = 95.55 kN

  L > 30 m → DLA = 0,4

  P KEL (1+DLA) = *133.77 kN*

5.3.2 Perhitungan Momen Gelagar Tengah

1. Perhitungan momen akibat beban mati merata & beban mati merata tambahan



X_1 = 0,4m

X_2 = 1,6 m

X_3 = 18.4 m

Qk = qk x X_1 → 21.438 kN

QD_1 = qD1 x X_2 → 85.753 kN

QD_2 = qD2 x X_3 → 724.877 kN

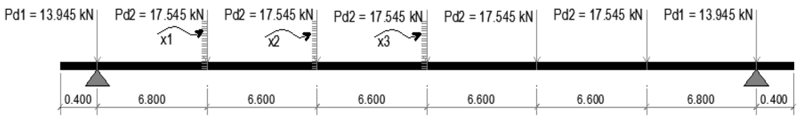
VA $= \frac{[2(qk\ x\ X1)] + [2(qD1\ x\ X2)] + (qD2\ x\ 2.X3)}{2}$

= 832.0682 kN

M_{TB} $= [VA(\ X1 + X2)] - [Qkx(0.5X1 + X2 + X3)] - [QD1\ x\ (0.5X2+X3)] - [QD2\ x\ 0.5X3]$

Momen Tengah Bentang (M_{DD}) = 7892.988 KNm

2. Perhitungan momen akibat beban mati terpusat (Diafragma)



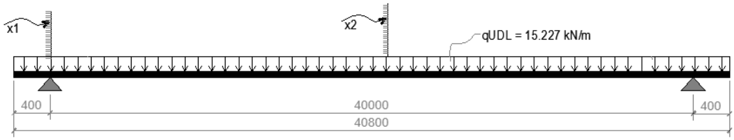
X_1 = 6,8 m
X_2 = 6,6 m
X_3 = 6,6 m

VA = P tot /2
= 52.41 kN

MTengah Bentang = [VAx (X1+X2+X3)]– [PD1 x (X1+X2+X3)] – [PD2x (X2+X3)] – [PD2 xX3]

Momen Tengah Bentang (M_{DP}) = 421.139 KNm

3. Perhitungan momen akibat beban hidup terbagi rata (UDL)



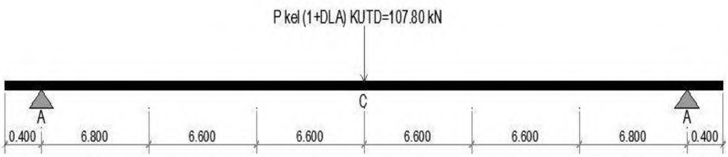
X_1 = 0,4 m
X_2 = 20 m

VA = (q UDL x L)/2
= 310.635 kN

MTengah Bentang = VA x X2 – [q UDL x X1(0.5X1 + X2)] – [q UDL x X2 (0.5X2)]

Momen Tengah Bentang (M_{UDL}) = 3044.223 kNm

4. Perhitungan momen akibat beban hidup garis (KEL)



VA = 61.75 kN
Momen Tengah Bentang (M_{KEL}) = 1337.700 kN.m

$$M_T \max = M_{DD} + M_{DP} + M_{UDL} + M_{KEL}$$

= 12696.05036 KNm
= 1269.61 Ton m
= 1269605036.00 Kg mm

Menentukan gaya prategang awal

$F \quad = M_T /(0.65\ \ h)$

$=930113.5795\ Kg$

Untuk sistem Pratekanan Postension (Pascatarik), kehilangan gaya Prategang Total dapat diestimasikan /diasumsikan dulu sebesar 20%. (T.Y. LIN hal. 103)

$F \quad =(100-20)\ \ \%\ F0$

$F0 \quad = 1162642$ Kg

$= 11626420$ N

5.3.3 Menentukan Banyaknya Kabel Strand

Dalam Proyek Akhir ini, Baja mutu tinggi untuk menghasilkan sistem Prategang yaitu dengan menggunakan :

"Uncoated Seven Wire Stress Strand Relieved for Prestressed Concrete" (ASTM A 416 Grade 270) Produksi PT. VSL

dengan Spesifikasi Bahan sebagai berikut :

Diameter Kabel Prestress	= 12,7 mm
Luas nominal Strand (Aps)	= 98,71 mm^2
	= 0,987 cm^2
Kekuatan Putus (Fpu)	=183,7 kN
Batas Kekuatan Tarik	=1860 MPa
	= 18600 Kg/cm^2
Modulus Elastisitas (Es)	= 190000 Mpa

Besar Gaya Prategang untuk satu kabel (fpi) adalah 75% dari Batas Beban Putus.

fpi $= 75\%\ x\ 18.600$ kg/cm^2

$=13950$ kg/cm^2

$Aps \ = F0/fpi$

$=\frac{1162642\ \text{kg}}{13950}$

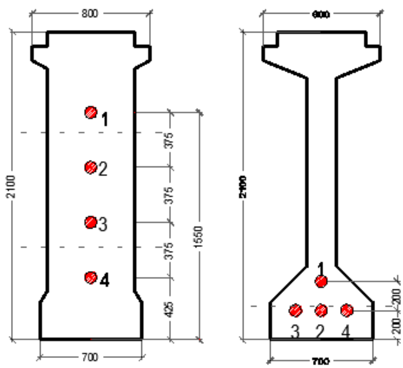
$= 83.344$ cm^2

$= 8334.35$ mm^2

Tendon	NOS	Aps TOT		F_0
		mm^2	UTS	N
1	20	1974.2	75 %	2754009
2	23	2270.33	75 %	3167110.35
3	21	2072.91	75 %	2891709.45
4	21	2072.91	75 %	2891709.45
	85	**8390.35**		**11704538.25**

Proses penarikan/stressing kabel Prategang dilakukan dengan cara menarik dari 2 sisi secara bergantian hal ini dilakukan untuk mengurangi besarnya kehilangan gaya prategang akibat gesekan.

Tendon	F_0 Ujung Kiri		F_0 Ujung Kanan	
	%	N	%	N
1	60	1652405.400	50	1377004.500
2	60	1900266.210	50	1583555.175
3	60	1735025.670	50	1445854.725
4	60	1735025.670	50	1445854.725
		7022722.95		5852269.125



Gambar 5.10 Urutan posisi kabel prategang

TATA LETAK TENDON

Tabel 5.11 Perhitungan untuk mencari garis Persamaan

Number of TENDON	*x*	*y*	*yi =*	*ax²*	+	*bx*	+	*c*	***a***	***b***	***c***	$y = ax^2 + bx + c$
Tendon 1	0	1,575	1,575 =	0	+	0	+	c	0,0028	-0,115	1,575	*yi = 0,0028 x² + -0,115 x + 1,575*
	20,4	0,400	0,4 =	416,16 a	+	20,4 b	+	c				
	40,8	1,575	1,575 =	1664,64 a	+	40,8 b	+	c				
Tendon 2	0	1,200	1,200 =	0	+	0	+	c	0,0024	-0,098	1,2	*yi = 0,0024 x² + -0,098 x + 1,2*
	20,4	0,200	0,20 =	416,16 a	+	20,4 b	+	c				
	40,8	1,200	1,200 =	1664,64 a	+	40,8 b	+	c				
Tendon 3	0	0,825	0,825 =	0	+	0	+	c	0,0015	-0,061	0,825	*yi = 0,0015 x² + -0,061 x + 0,825*
	20,4	0,200	0,20 =	416,16 a	+	20,4 b	+	c				
	40,8	0,825	0,825 =	1664,64 a	+	40,8 b	+	c				
Tendon 4	0	0,450	0,45 =	0	+	0	+	c	0,0006	-0,025	0,45	*yi = 0,0006 x² + -0,0125 x + 0,45*
	20,4	0,200	0,20 =	416,16 a	+	20,4 b	+	c				
	40,8	0,450	0,45 =	1664,64 a	+	40,8 b	+	c				

Tabel 5.12 Tata Letak tendon sebelum komposit

Section	Tendon 1	Tendon 2	Tendon 3	Tendon 4
m	*mm*	*mm*	*mm*	*mm*
0	1575.00	1200.00	825.00	450.00
0,4	1529.37	1161.17	800.73	440.29
1	1462.63	1104.36	765.23	426.09
2	1355.90	1013.53	708.46	403.38
3	1254.82	927.51	654.69	381.88
4	1159.39	846.29	603.93	361.57
5	1069.61	769.88	556.17	342.47
6	985.47	698.27	511.42	324.57
7	906.98	631.47	469.67	307.87
8	834.13	569.47	430.92	292.37
9	766.93	512.28	395.18	278.07
10	705.38	459.90	362.44	264.98
11	649.48	412.32	332.70	253.08
12	599.22	369.55	305.97	242.39
13	554.61	331.58	282.24	232.90
14	515.65	298.42	261.51	224.61
15	482.33	270.07	243.79	217.52
16	454.66	246.52	229.08	211.63
17	432.64	227.78	217.36	206.94
18	416.26	213.84	208.65	203.46
19	405.53	204.71	202.94	201.18
20	400.45	200.38	200.24	200.10
20,4	400.00	200.00	200.00	200.00
20,8	400.45	200.38	200.24	200.10
21,8	405.53	204.71	202.94	201.18
22,8	416.26	213.84	208.65	203.46

Section	Tendon 1	Tendon 2	Tendon 3	Tendon 4
m	*mm*	*mm*	*mm*	*mm*
23,8	432.64	227.78	217.36	206.94
24,8	454.66	246.52	229.08	211.63
25,8	482.33	270.07	243.79	217.52
26,8	515.65	298.42	261.51	224.61
27,8	554.61	331.58	282.24	232.90
28,8	599.22	369.55	305.97	242.39
29,8	649.48	412.32	332.70	253.08
30,8	705.38	459.90	362.44	264.98
31,8	766.93	512.28	395.18	278.07
32,8	834.13	569.47	430.92	292.37
33,8	906.98	631.47	469.67	307.87
34,8	985.47	698.27	511.42	324.57
35,8	1069.61	769.88	556.17	342.47
36,8	1159.39	846.29	603.93	361.57
37,8	1254.82	927.51	654.69	381.88
38,8	1355.90	1013.53	708.46	403.38
39,8	1462.63	1104.36	765.23	426.09
40,4	1529.37	1161.17	800.73	440.29
40,8	1575.00	1200.00	825.00	450.00

Tabel 5.13 Rekapitulasi momen

Section (m)	*Momen yang diakibatkan :*					Momen Total
	Girder Sendiri (Mg)	Diafragma	Mati Merata*	Hidup Merata (UDL)	Hidup Garis (KEL)	(Mt)
	KNm	*KNm*	*KNm*	*KNm*	*KNm*	*KNm*
0	0	0	0	0.0000	0.0000	0
0.4	-2.6230	0	-1.6646	-1.2182	0.0000	-5.5058
1	244.5510	20.9175	244.2859	178.7674	79.0581	767.5799
2	586.5610	55.7800	637.5571	466.5616	205.4707	1951.9304
3	919.2773	90.6425	1010.0203	739.1286	325.1949	3084.2635
4	1233.4060	125.5050	1361.6755	996.4684	438.2305	4155.2854
5	1528.9473	160.3675	1692.5227	1238.5809	544.5777	5164.9961
6	1805.9010	195.2300	2002.5619	1465.4663	644.2363	6113.3955
7	2064.2673	237.0650	2291.7931	1677.1245	737.2065	7007.4563
8	2304.0460	253.7990	2560.2163	1873.5554	823.4881	7815.1049
9	2525.2373	274.7165	2807.8315	2054.7592	903.0813	8565.6257
10	2727.8410	295.6340	3034.6387	2220.7357	975.9859	9254.8353

Section (m)	Momen yang diakibatkan :					Momen Total
	Girder Sendiri (Mg)	Diafragma	Mati Merata*	Hidup Merata (UDL)	Hidup Garis (KEL)	(Mt)
	KNm	*KNm*	*KNm*	*KNm*	*KNm*	*KNm*
11	2911.8573	316.5515	3240.6379	2371.4850	1042.2021	9882.7338
12	3077.2860	337.4690	3425.8291	2507.0072	1101.7297	10449.3210
13	3210.2796	358.3865	3590.2123	2627.3021	1154.5689	10940.7494
14	3340.3921	375.1205	3733.7875	2732.3698	1200.7195	11382.3894
15	3451.9171	383.4875	3856.5547	2822.2103	1240.1817	11754.3513
16	3544.8546	390.4600	3958.5139	2896.8236	1272.9553	12063.6074
17	3619.2046	397.4325	4039.6651	2956.2098	1299.0405	12311.5524
18	3674.9671	404.4050	4100.0083	3000.3686	1318.4371	12498.1861
19	3712.1421	411.3775	4139.5435	3029.3003	1331.1453	12623.5087
20	3730.7296	418.3500	4158.2707	3043.0048	1337.1649	12687.5200
20.4	3732.9601	421.1390	4159.9354	3044.2230	1337.7000	12695.9574
20.8	3732.2166	418.3500	4158.2707	3043.0048	1337.1649	12689.0070
21.8	3717.3466	411.3775	4139.5435	3029.3003	1331.1453	12628.7132
22.8	3683.8891	404.4050	4100.0083	3000.3686	1318.4371	12507.1081

Section (m)	*Momen yang diakibatkan :*					Momen Total
	Girder Sendiri (Mg)	Diafragma	Mati Merata*	Hidup Merata (UDL)	Hidup Garis (KEL)	(Mt)
	KNm	*KNm*	*KNm*	*KNm*	*KNm*	*KNm*
23.8	3631.8441	397.4325	4039.6651	2956.2098	1299.0405	12324.1919
24.8	3561.2116	390.4600	3958.5139	2896.8236	1272.9553	12079.9644
25.8	3471.9916	383.4875	3856.5547	2822.2103	1240.1817	11774.4258
26.8	3364.1841	375.1205	3733.7875	2732.3698	1200.7195	11406.1814
27.8	3237.7891	358.3865	3590.2123	2627.3021	1154.5689	10968.2589
28.8	3092.8066	337.4690	3425.8291	2507.0072	1101.7297	10464.8416
29.8	2929.2366	316.5515	3240.6379	2371.4850	1042.2021	9900.1131
30.8	2747.0791	295.6340	3034.6387	2220.7357	975.9859	9274.0734
31.8	2546.3341	274.7165	2807.8315	2054.7592	903.0813	8586.7225
32.8	2327.0016	253.7990	2560.2163	1873.5554	823.4881	7838.0604
33.8	2089.0816	237.0650	2291.7931	1677.1245	737.2065	7032.2706
34.8	1832.5741	195.2300	2002.5619	1465.4663	644.2363	6140.0686
35.8	1557.4791	160.3675	1692.5227	1238.5809	544.5777	5193.5279
36.8	1263.7966	125.5050	1361.6755	996.4684	438.2305	4185.6760

Section (m)	*Momen yang diakibatkan :*					Momen Total
	Girder Sendiri (Mg)	Diafragma	Mati Merata*	Hidup Merata (UDL)	Hidup Garis (KEL)	(Mt)
	KNm	*KNm*	*KNm*	*KNm*	*KNm*	*KNm*
37.8	951.5266	90.6425	1010.0203	739.1286	325.1949	3116.5128
38.8	244.5510	55.7800	244.2859	466.5616	205.4707	1216.6492
39.8	-1.4870	20.9175	163.1347	178.7674	79.0581	440.3907
40.4	-2.6230	0.0000	-1.6646	-1.2182	0.0000	-5.5058
40.8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Tabel 5.14 Momen inersia dan garis netral sebelum komposit

Section	*ya*	*yb*	Momen Inersia *(Ix)*
m	mm	mm	mm^4
0	1052,8492	1047,1508	505111628657,8130
0,4	1052,8492	1047,1508	505111628657,8130
1	1052,8492	1047,1508	505111628657,8130
2,1	1052,8492	1047,1508	505111628657,8130
3	1100,1098	999,8902	398227410205,1110
4	1100,1098	999,8902	398227410205,1110
5	1100,1098	999,8902	398227410205,1110
6	1100,1098	999,8902	398227410205,1110
7	1100,1098	999,8902	398227410205,1110
8	1100,1098	999,8902	398227410205,1110
9	1100,1098	999,8902	398227410205,1110
10	1100,1098	999,8902	398227410205,1110
11	1100,1098	999,8902	398227410205,1110
12	1100,1098	999,8902	398227410205,1110
13	1100,1098	999,8902	398227410205,1110
14	1100,1098	999,8902	398227410205,1110
15	1100,1098	999,8902	398227410205,1110
16	1100,1098	999,8902	398227410205,1110
17	1100,1098	999,8902	398227410205,1110
18	1100,1098	999,8902	398227410205,1110
19	1100,1098	999,8902	398227410205,1110
20	1100,1098	999,8902	398227410205,1110
20,4	1100,1098	999,8902	398227410205,1110
20,8	1100,1098	999,8902	398227410205,1110
21,8	1100,1098	999,8902	398227410205,1110

Section	*ya*	*yb*	Momen Inersia *(Ix)*
m	mm	mm	mm^4
22,8	1100,1098	999,8902	398227410205,1110
23,8	1100,1098	999,8902	398227410205,1110
24,8	1100,1098	999,8902	398227410205,1110
25,8	1100,1098	999,8902	398227410205,1110
26,8	1100,1098	999,8902	398227410205,1110
27,8	1100,1098	999,8902	398227410205,1110
28,8	1100,1098	999,8902	398227410205,1110
29,8	1100,1098	999,8902	398227410205,1110
30,8	1100,1098	999,8902	398227410205,1110
31,8	1100,1098	999,8902	398227410205,1110
32,8	1100,1098	999,8902	398227410205,1110
33,8	1100,1098	999,8902	398227410205,1110
34,8	1100,1098	999,8902	398227410205,1110
35,8	1100,1098	999,8902	398227410205,1110
36,8	1100,1098	999,8902	398227410205,1110
37,8	1100,1098	999,8902	398227410205,1110
38,7	1052,8492	1047,1508	505111628657,8130
39,8	1052,8492	1047,1508	505111628657,8130
40,4	1052,8492	1047,1508	505111628657,8130
40,8	1052,8492	1047,1508	505111628657,8130

Tabel 5.15 Posisi tendon c.g.s terhadap c.g.c sebelum komposit

Section	Tendon 1	Tendon 2	Tendon 3	Tendon 4
m	*mm*	*mm*	*mm*	*mm*
0	527.8492	152.8492	-222.1508	-597.1508
0,4	482.2225	114.0179	-246.4204	-606.8586
1	415.4765	57.2129	-281.9235	-621.0599
2	308.7507	-33.6176	-338.6926	-643.7675
3	254.9325	-72.3815	-345.1973	-618.0130
4	159.5005	-153.6003	-395.9590	-638.3177
5	69.7153	-230.0132	-443.7171	-657.4209
6	-14.4230	-301.6203	-488.4715	-675.3227
7	-92.9145	-368.4215	-530.2222	-692.0230
8	-165.7591	-430.4169	-568.9694	-707.5218
9	-232.9568	-487.6064	-604.7128	-721.8192
10	-294.5076	-539.9901	-637.4526	-734.9151
11	-350.4116	-587.5680	-667.1888	-746.8096
12	-400.6687	-630.3400	-693.9213	-757.5026
13	-445.2790	-668.3062	-717.6502	-766.9942
14	-484.2423	-701.4665	-738.3754	-775.2842
15	-517.5588	-729.8210	-756.0969	-782.3729
16	-545.2285	-753.3696	-770.8148	-788.2600
17	-567.2513	-772.1124	-782.5290	-792.9457
18	-583.6272	-786.0493	-791.2396	-796.4300
19	-594.3562	-795.1804	-796.9466	-798.7127
20	-599.4384	-799.5057	-799.6499	-799.7940
20,4	-599.8902	-799.8902	-799.8902	-799.8902
20,8	-599.4384	-799.5057	-799.6499	-799.7940
21,8	-594.3562	-795.1804	-796.9466	-798.7127

Section	Tendon 1	Tendon 2	Tendon 3	Tendon 4
m	*mm*	*mm*	*mm*	*mm*
22,8	-583.6272	-786.0493	-791.2396	-796.4300
23,8	-567.2513	-772.1124	-782.5290	-792.9457
24,8	-545.2285	-753.3696	-770.8148	-788.2600
25,8	-517.5588	-729.8210	-756.0969	-782.3729
26,8	-484.2423	-701.4665	-738.3754	-775.2842
27,8	-445.2790	-668.3062	-717.6502	-766.9942
28,8	-400.6687	-630.3400	-693.9213	-757.5026
29,8	-350.4116	-587.5680	-667.1888	-746.8096
30,8	-294.5076	-539.9901	-637.4526	-734.9151
31,8	-232.9568	-487.6064	-604.7128	-721.8192
32,8	-165.7591	-430.4169	-568.9694	-707.5218
33,8	-92.9145	-368.4215	-530.2222	-692.0230
34,8	-14.4230	-301.6203	-488.4715	-675.3227
35,8	69.7153	-230.0132	-443.7171	-657.4209
36,8	159.5005	-153.6003	-395.9590	-638.3177
37,8	254.9325	-72.3815	-345.1973	-618.0130
38,8	308.7507	-33.6176	-338.6926	-643.7675
39,8	415.4765	57.2129	-281.9235	-621.0599
40,4	482.2225	114.0179	-246.4204	-606.8586
40,8	527.8492	152.8492	-222.1508	-597.1508

Eksentrisitas (e) terhadap c.g.c sebelum Komposit

$$e = \frac{F1 \times y1 + F2 \times y2 + F3 \times y3 + F4 \times y4}{F1 + F2 + F3 + F4}$$

Tabel 5.16 Eksentrisitas (e) terhadap c.g.c sebelum komposit

Section	*e*
m	*mm*
0	36.8567
0,4	66.4941
1	109.8497
2	179.1747
3	197.5711
4	259.5601
5	317.8811
6	372.5342
7	423.5192
8	470.8363
9	514.4854
10	554.4665
11	590.7796
12	623.4247
13	652.4018
14	677.7109
15	699.3520
16	717.3252
17	731.6304
18	742.2675
19	749.2367
20	752.5379

Section	*e*
m	*mm*
20,4	752.8313
20,8	752.5379
21,8	749.2367
22,8	742.2675
23,8	731.6304
24,8	717.3252
25,8	699.3520
26,8	677.7109
27,8	652.4018
28,8	623.4247
29,8	590.7796
30,8	554.4665
31,8	514.4854
32,8	470.8363
33,8	423.5192
34,8	372.5342
35,8	317.8811
36,8	259.5601
38,8	197.5711
39,8	179.1747
39,8	109.8497
40,4	66.4941
40,8	36.8567

5.4 Perhitungan Tegangan Gelagar

5.4.1 Perhitungan Tegangan Gelagar Fase Awal

5.4.1.1 Perhitungan Kehilangan Gaya Prategang Jangka Pendek

Kabel prategang yang ditarik saat pekerjaan *stressing* akan menegang sesuai dengan besarnya gaya yang diberikan, akan tetapi besar gaya yang terjadi tidak sebesar yang terbaca pada Dial alat *Hidrolic* dan tidak tetap, karena tegangan kabel akan berkurang akibat kehilangan gaya prategang jangka pendek dan jangka panjang. Kehilangan gaya prategang jangka pendek disebabkan oleh :

- Slip pada angkur
- Gesekan kabel (efek kelengkungan tendon)
- Perpendekan elastis beton

5.4.1.2 Perhitungan Kehilangan Fase Awal

1. Perhitungan kehilangan gaya prategang akibat slip angkur.

   ΔP ANK = 3 % x F1

   Keterangan :

   F1 = Gaya prategang awal yang diberikan (N)
   F2 = Gaya setelah slip angkur (N)
   ANK = Persen kehilangan akibat slip angkur

   F1 = 1170.454 ton ***(75 % UTS)***
   ANK = 3 %
   ΔP ANK = 3 % x F1
   ΔP = 33.16 ton
   = 331582.6836 N
   F2 = (1-ANK) x *F1*
   = (1 - 3%) x 1170.454 ton
   = 1135.34 ton = 11353402.1 N

2. Perhitungan kehilangan gaya prategang akibat gesekan kabel

Pada saat dilakukan *Stressing* (Penarikan kabel prategang) dengan menggunakan Dongkrak Jack *Hidrolic*. Kabel prategang mengalami kehilangan sebagian gaya Prategang yang diakibatkan oleh gesekan kabel dan efek kelengkungan tendon, sehingga tegangan yang ada pada tendon atau kabel prategang menjadi akan lebih kecil dari pada bacaan pada alat *pressure gauge* Sehingga perlu dihitung besar kehilangan Gaya Prategangnya. Kehilangan akibat gesekan ini dapat dipertimbangkan pada dua bagian yaitu pengaruh panjang dan kelengkungan sehingga dapat dijelaskan sebagai pengaruh naik turunnya kabel *(wobbling effect)* dan tergantung dari panjang dan tegangan tendon serta koefisien gesekan antara bahan yang bersentuhan. Gesekan antara kabel dengan duck yang menyebabkan besarnya tarikan pada bagian ujung.

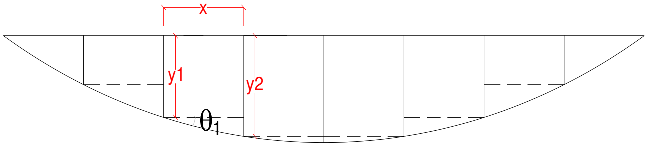
Rumus kehilangan Gaya Prategangnya adalah :

$$\frac{(\mathrm{F2} - \mathrm{F1})}{F1} = -K.L. -\mu\alpha$$

F1 = Gaya prategang awal yang diberikan (N)
F2 = Gaya setelah menerima gesekan (N)
K = Koefisien Wobble (0,0016 - 0,0066)
= 0,003
L = Panjang bentang gelagar (m)
μ = Koefisien kelengkungan (0,15 - 0,25)
= 0,2
α = Perpendekan sudut pusat dalam tendon

•

Mencari sudut pusat tendon dalam



Gambar 5.11 Sudut pusat tendon dalam

$$\theta = (y2 - y1)/x$$

Tabel 5.17 Perhitungan sudut pusat tendon

Section	Tendon 1	Tendon 2	Tendon 3	Tendon 4
m	α	α	α	α
0	0.057033	0.048539	0.030337	0.024270
0,4	0.055622	0.047338	0.029586	0.023669
1	0.053363	0.045415	0.028385	0.022708
2	0.050539	0.043012	0.026883	0.021506
3	0.047716	0.040609	0.025381	0.020305
4	0.044893	0.038206	0.023879	0.019103
5	0.042069	0.035804	0.022377	0.017902
6	0.039246	0.033401	0.020875	0.016700
7	0.036422	0.030998	0.019374	0.015499
8	0.033599	0.028595	0.017872	0.014297
9	0.030775	0.026192	0.016370	0.013096
10	0.027952	0.023789	0.014868	0.011894
11	0.025129	0.021386	0.013366	0.010693
12	0.022305	0.018983	0.011864	0.009492
13	0.019482	0.016580	0.010363	0.008290
14	0.016658	0.014177	0.008861	0.007089

Section	Tendon 1	Tendon 2	Tendon 3	Tendon 4
m	*α*	*α*	*α*	*α*
15	0.013835	0.011774	0.007359	0.005887
16	0.011011	0.009371	0.005857	0.004686
17	0.008188	0.006968	0.004355	0.003484
18	0.005365	0.004566	0.002853	0.002283
19	0.002541	0.002163	0.001352	0.001081
20	0.000565	0.000481	0.000300	0.000240
20,4	-0.000565	-0.000481	-0.000300	-0.000240
20,8	-0.002541	-0.002163	-0.001352	-0.001081
21,8	-0.005365	-0.004566	-0.002853	-0.002283
22,8	-0.008188	-0.006968	-0.004355	-0.003484
23,8	-0.011011	-0.009371	-0.005857	-0.004686
24,8	-0.013835	-0.011774	-0.007359	-0.005887
25,8	-0.016658	-0.014177	-0.008861	-0.007089
26,8	-0.019482	-0.016580	-0.010363	-0.008290
27,8	-0.022305	-0.018983	-0.011864	-0.009492
28,8	-0.025129	-0.021386	-0.013366	-0.010693
29,8	-0.027952	-0.023789	-0.014868	-0.011894
30,8	-0.030775	-0.026192	-0.016370	-0.013096
31,8	-0.033599	-0.028595	-0.017872	-0.014297
32,8	-0.036422	-0.030998	-0.019374	-0.015499
33,8	-0.039246	-0.033401	-0.020875	-0.016700
34,8	-0.042069	-0.035804	-0.022377	-0.017902
35,8	-0.044893	-0.038206	-0.023879	-0.019103
36,8	-0.047716	-0.040609	-0.025381	-0.020305
37,8	-0.050539	-0.043012	-0.026883	-0.021506
38,8	-0.053363	-0.045415	-0.028385	-0.022708
39,8	-0.055622	-0.047338	-0.029586	-0.023669

40,4	-0.057033	-0.048539	-0.030337	-0.024270
40,8	0.000000	0.000000	0.000000	0.000000

-K.L - u.α			
-0.011407	-0.009708	-0.006067	-0.004854
-0.012324	-0.010668	-0.007117	-0.005934
-0.012473	-0.010883	-0.007477	-0.006342
-0.013108	-0.011602	-0.008377	-0.007301
-0.012543	-0.011122	-0.008076	-0.007061
-0.011979	-0.010641	-0.007776	-0.006821
-0.011414	-0.010161	-0.007475	-0.006580
-0.010849	-0.009680	-0.007175	-0.006340
-0.010284	-0.009200	-0.006875	-0.006100
-0.009720	-0.008719	-0.006574	-0.005859
-0.009155	-0.008238	-0.006274	-0.005619
-0.008590	-0.007758	-0.005974	-0.005379
-0.008026	-0.007277	-0.005673	-0.005139
-0.007461	-0.006797	-0.005373	-0.004898
-0.006896	-0.006316	-0.005073	-0.004658
-0.006332	-0.005835	-0.004772	-0.004418
-0.005767	-0.005355	-0.004472	-0.004177
-0.005202	-0.004874	-0.004171	-0.003937
-0.004638	-0.004394	-0.003871	-0.003697
-0.004073	-0.003913	-0.003571	-0.003457
-0.003508	-0.003433	-0.003270	-0.003216
-0.003113	-0.003096	-0.003060	-0.003048
-0.001313	-0.001296	-0.001260	-0.001248
-0.001708	-0.001633	-0.001470	-0.001416
-0.004073	-0.003913	-0.003571	-0.003457

-0.004638	-0.004394	-0.003871	-0.003697
-0.005202	-0.004874	-0.004171	-0.003937
-0.005767	-0.005355	-0.004472	-0.004177
-0.006332	-0.005835	-0.004772	-0.004418
-0.006896	-0.006316	-0.005073	-0.004658
-0.007461	-0.006797	-0.005373	-0.004898
-0.008026	-0.007277	-0.005673	-0.005139
-0.008590	-0.007758	-0.005974	-0.005379
-0.009155	-0.008238	-0.006274	-0.005619
-0.009720	-0.008719	-0.006574	-0.005859
-0.010284	-0.009200	-0.006875	-0.006100
-0.010849	-0.009680	-0.007175	-0.006340
-0.011414	-0.010161	-0.007475	-0.006580
-0.011979	-0.010641	-0.007776	-0.006821
-0.012543	-0.011122	-0.008076	-0.007061
-0.013108	-0.011602	-0.008377	-0.007301
-0.013673	-0.012083	-0.008677	-0.007542
-0.014124	-0.012468	-0.008917	-0.007734
-0.013207	-0.011508	-0.007867	-0.006654
-0.001200	-0.001200	-0.001200	-0.001200

Kehilangan Prategang Gaya akibat Gesekan dan Efek Kelengkungan Kabel :

$$\frac{F_2 - F_1}{F_1} = -KL - \mu\alpha$$

$$F2 = (F1\,(-KL - \mu\alpha)) + F1$$

Tabel 5.18 Gaya setelah kehilangan akibat gesekan

Section	Tendon 1		Tendon 2		Tendon 3		Tendon 4	
m	F_{kiri}	F_{kanan}	F_{kiri}	F_{kanan}	F_{kiri}	F_{kanan}	F_{kiri}	F_{kanan}
	N	*N*	*N*	*N*	*N*	*N*	*N*	*N*
0	1569785.13	884441.47	1805252.90	1057320.84	1640012.36	1042479.22	1648274.39	1078203.54
0,4	1550438.58	894646.41	1785995.34	1067685.72	1628340.07	1048842.95	1638493.93	1083462.56
1	1531100.62	905809.90	1766558.27	1079198.08	1616165.13	1056361.28	1628103.38	1089929.94
2	1511031.12	917250.38	1746061.85	1091072.27	1602627.26	1064319.09	1616216.22	1096885.87
3	1492077.95	929433.29	1726642.37	1103880.00	1589684.17	1073309.71	1604804.22	1104953.39
4	1474205.06	941239.45	1708268.66	1116295.29	1577323.09	1082048.52	1593858.42	1112810.88
5	1457378.74	952650.80	1690911.44	1128301.88	1565531.90	1090528.25	1583370.27	1120453.09
6	1441567.42	963649.73	1674543.21	1139883.91	1554299.09	1098741.84	1573331.60	1127874.91
7	1426741.68	974219.18	1659138.19	1151025.98	1543613.73	1106682.37	1563734.64	1135071.33
8	1412874.08	984342.61	1644672.24	1161713.21	1533465.48	1114343.15	1554571.98	1142037.49
9	1399939.10	994004.10	1631122.82	1171931.22	1523844.55	1121717.72	1545836.55	1148768.68
10	1387913.07	1003188.37	1618468.92	1181666.23	1514741.69	1128799.78	1537521.66	1155260.30
11	1376774.08	1011880.83	1606691.00	1190905.01	1506148.18	1135583.32	1529620.95	1161507.92
12	1366501.93	1020067.60	1595770.93	1199635.00	1498055.81	1142062.53	1522128.39	1167507.28

Section	Tendon 1		Tendon 2		Tendon 3		Tendon 4	
m	F_{kiri}	F_{kanan}	F_{kiri}	F_{kanan}	F_{kiri}	F_{kanan}	F_{kiri}	F_{kanan}
	N	*N*	*N*	*N*	*N*	*N*	*N*	*N*
13	1357078.07	1027735.56	1585691.99	1207844.25	1490456.90	1148231.85	1515038.30	1173254.24
14	1348485.53	1034872.39	1576438.77	1215521.53	1483344.20	1154085.97	1508345.28	1178744.85
15	1340708.86	1041466.59	1567997.15	1222656.27	1476711.00	1159619.86	1502044.27	1183975.33
16	1333734.12	1047507.53	1560354.30	1229238.68	1470551.01	1164828.73	1496130.51	1188942.05
17	1327548.80	1052985.45	1553498.58	1235259.68	1464858.42	1169708.08	1490599.54	1193641.59
18	1322141.82	1057891.52	1547419.57	1240710.98	1459627.86	1174253.68	1485447.20	1198070.67
19	1317503.46	1062217.84	1542108.01	1245585.10	1454854.40	1178461.61	1480669.61	1202226.23
20	1313402.16	1065957.45	1537333.46	1249875.33	1450402.44	1182328.21	1476156.45	1206105.38
20,4	1311677.74	1069286.07	1535340.90	1253757.10	1448574.83	1185957.32	1474314.12	1209792.90
20,8	1309437.11	1070691.82	1532834.41	1255384.23	1446444.94	1187453.60	1472226.10	1211304.68
21,8	1304103.90	1072523.92	1526836.26	1257437.03	1441280.13	1189202.12	1467137.27	1213022.64
22,8	1298056.00	1076910.07	1520127.81	1262376.85	1435700.85	1193463.61	1461713.49	1217230.06
23,8	1291303.15	1081927.61	1512718.28	1267947.82	1429711.93	1198101.54	1455958.52	1221746.67
24,8	1283856.25	1087585.54	1504617.88	1274158.43	1423318.56	1203120.26	1449876.35	1226575.87
25,8	1275727.32	1093893.98	1495837.77	1281018.10	1416526.27	1208524.53	1443471.20	1231721.31
26,8	1266929.47	1100864.27	1486390.01	1288537.30	1409340.91	1214319.45	1436747.48	1237186.86

Section	Tendon 1		Tendon 2		Tendon 3		Tendon 4	
m	F_{kiri}	F_{kanan}	F_{kiri}	F_{kanan}	F_{kiri}	F_{kanan}	F_{kiri}	F_{kanan}
	N	*N*	*N*	*N*	*N*	*N*	*N*	*N*
27,8	1257476.88	1108508.92	1476287.58	1296727.47	1401768.68	1220510.51	1429709.85	1242976.66
28,8	1247384.73	1116841.71	1465544.34	1305601.14	1393816.10	1227103.60	1422363.14	1249095.11
29,8	1236669.20	1125877.68	1454174.96	1315171.91	1385489.97	1234104.99	1414712.40	1255546.87
30,8	1225347.39	1135633.22	1442194.93	1325454.50	1376797.44	1241521.36	1406762.87	1262336.84
31,8	1213437.30	1146126.10	1429620.50	1336464.79	1367745.89	1249359.82	1398519.98	1269470.23
32,8	1200957.75	1157375.52	1416468.65	1348219.86	1358343.03	1257627.90	1389989.33	1276952.51
33,8	1187928.39	1169402.19	1402757.06	1360738.02	1348596.82	1266333.58	1381176.71	1284789.42
34,8	1174369.57	1182228.36	1388504.06	1374038.89	1338515.46	1275485.28	1372088.08	1292987.04
35,8	1160302.37	1195877.91	1373728.58	1388143.41	1328107.42	1285091.91	1362729.55	1301551.71
36,8	1145748.46	1210376.42	1358450.14	1403073.93	1317381.40	1295162.85	1353107.40	1310490.10
37,8	1130730.11	1225751.27	1342688.78	1418854.25	1306346.30	1305707.97	1343228.06	1319809.19
38,8	1115270.11	1242031.69	1326465.01	1435509.69	1295011.26	1316737.68	1333098.07	1329516.30
39,8	1099517.67	1259248.87	1309927.29	1453067.17	1283463.39	1328262.89	1322788.22	1339619.06
40,4	1084996.71	1277289.72	1294852.90	1471412.02	1273365.90	1340213.83	1313986.51	1350060.10
40,8	1083694.71	1294384.23	1293299.08	1488541.86	1271837.86	1350841.41	1312409.73	1359103.44

Tabel 5.19 Gaya setelah kehilangan akibat gesekan pada kabel

Section	Tendon 1	Tendon 2	Tendon 3	Tendon 4
m	F	F	F	*F*
	N	*N*	*N*	*N*
0	2454226.60	2862573.74	2682491.58	2726477.93
0,4	2445084.99	2853681.07	2677183.02	2721956.49
1	2436910.52	2845756.36	2672526.41	2718033.32
2	2428281.50	2837134.12	2666946.35	2713102.09
3	2421511.24	2830522.36	2662993.87	2709757.61
4	2415444.51	2824563.96	2659371.61	2706669.30
5	2410029.53	2819213.33	2656060.16	2703823.36
6	2405217.15	2814427.12	2653040.93	2701206.51
7	2400960.86	2810164.17	2650296.10	2698805.97
8	2397216.69	2806385.45	2647808.64	2696609.47
9	2393943.20	2803054.04	2645562.26	2694605.22
10	2391101.44	2800135.15	2643541.47	2692781.96
11	2388654.91	2797596.01	2641731.50	2691128.87
12	2386569.53	2795405.93	2640118.34	2689635.67
13	2384813.63	2793536.25	2638688.74	2688292.53
14	2383357.92	2791960.30	2637430.18	2687090.13
15	2382175.45	2790653.43	2636330.86	2686019.59
16	2381241.65	2789592.98	2635379.74	2685072.56
17	2380534.26	2788758.26	2634566.50	2684241.13
18	2380033.35	2788130.55	2633881.54	2683517.87
19	2379721.30	2787693.11	2633316.01	2682895.84
20	2379359.60	2787208.79	2632730.65	2682261.83
20,4	2380963.81	2789098.00	2634532.15	2684107.02
20,8	2380128.93	2788218.64	2633898.55	2683530.78

Section	Tendon 1	Tendon 2	Tendon 3	Tendon 4
m	F	F	F	*F*
	N	*N*	*N*	*N*
21,8	2376627.82	2784273.29	2630482.25	2680159.91
22,8	2374966.07	2782504.66	2629164.47	2678943.55
23,8	2373230.76	2780666.11	2627813.47	2677705.19
24,8	2371441.78	2778776.31	2626438.82	2676452.22
25,8	2369621.30	2776855.87	2625050.80	2675192.50
26,8	2367793.74	2774927.30	2623660.36	2673934.34
27,8	2365985.80	2773015.05	2622279.19	2672686.51
28,8	2364226.44	2771145.48	2620919.70	2671458.26
29,8	2362546.88	2769346.87	2619594.96	2670259.27
30,8	2360980.61	2767649.43	2618318.80	2669099.72
31,8	2359563.39	2766085.29	2617105.71	2667990.21
32,8	2358333.28	2764688.51	2615970.93	2666941.84
33,8	2357330.58	2763495.08	2614930.40	2665966.14
34,8	2356597.93	2762542.94	2614000.74	2665075.12
35,8	2356180.27	2761871.99	2613199.34	2664281.27
36,8	2356124.88	2761524.07	2612544.25	2663597.51
37,8	2356481.38	2761543.02	2612054.28	2663037.25
38,8	2357301.80	2761974.70	2611748.94	2662614.37
39,8	2358766.54	2762994.46	2611726.28	2662407.28
40,4	2362286.43	2766264.92	2613579.74	2664046.61
40,8	2378078.94	2781840.94	2622679.28	2671513.17

3. Perhitungan Kehilangan Gaya Prategang Akibat Pemendekan Elastis Beton.

Untuk sistem pascatarik beton memendek saat tendon diangkurkan terhadap beton, karena gaya pada kabel dihiitung setelah perpendekan elastik terhadap beton terjadi. Jika tendon yang dimiliki lebih dari satu dan tendon-tendon tersebut ditarik secara berurutan, maka gaya prategang secara bertahap bekerja pada beton, perpendekan beton akan bertambah apabila setiap kabel diikatkan padanya, dan kehilangan gaya prategang akibat perpendekan elastis berbeda-beda pada setiap tendon.

Secara teoritis rekomendasi dari ACI-ASCE mengenai kehilangan gaya akibat elastisitas beton untuk komponen pascatarik ialah dirumuskan seperti berikut :

$$ES = \frac{(Es\ x\ fcir)}{Eci}\ x\ K_{es}\ x\ A_{ps}$$

Keterangan :

ES = Kehilangan Gaya akibat Perpendekan Elastis Beton (*N*)

Kes = Koefisien untuk komponen Struktur Pascatarik (0,5)

E_s = Modulus Elastisitas Baja (190000 Mpa)

f cir = Tegangan Beton yang melalui titik berat baja (c.g.s.) akibat gaya prategang yang efektif segera setelah gaya prategang telah dikerjakan pada beton (MPa).

E_{ci} = Modulus Elastisitas Beton (43798,82989 Mpa)

Aps = Luas penampang kabel baja prategang (mm^2)

$$f_{cir} = \frac{F_1}{A} + \frac{F_1 e^2}{I} - \frac{M_G e}{I}$$

F1 = Gaya yang terjadi (N)
A = Luas Penampang Girder (mm^2)
I = Momen Inersia Penampang Girder (mm^4)
e = Eksentrisitas Gaya (mm)
M_G = Momen Akibat berat sendiri Girder (Nmm)

Tabel 5.20 Tegangan beton terhadap c.g.s akibat gaya prategang

Section	Tendon 1		Tendon 2		Tendon 3		Tendon 4	
m	F_{kiri}	F_{kanan}	F_{kiri}	F_{kanan}	F_{kiri}	F_{kanan}	F_{kiri}	F_{kanan}
	N	*N*	*N*	*N*	*N*	*N*	*N*	*N*
0	1.1927	0.6720	1.3716	0.8033	1.2461	0.7921	1.2524	0. 8192
0,4	1.1683	0.6740	1.3458	0.8044	1.2270	0.7902	1.2346	0.8163
1	1.1840	0.7222	1.3580	0.8503	1.2469	0.8334	1.2557	0.8582
2	1.2642	0.8492	1.4284	0.9706	1.3282	0.9519	1.3377	0.9747
3	2.3167	1.6151	2.6091	1.8326	2.4384	1.7945	2.4572	1.8339
4	2.5373	1.9106	2.8125	2.1165	2.6586	2.0762	2.6780	2.1124
5	2.8108	2.2600	3.0657	2.4517	2.9288	2.4105	2.9483	2.4432
6	3.1259	2.6497	3.3581	2.8253	3.2382	2.7843	3.2572	2.8133
7	3.4717	3.0669	3.6796	3.2250	3.5762	3.1854	3.5942	3.2108
8	3.8379	3.5001	4.0206	3.6399	3.9330	3.6026	3.9496	3.6244
9	4.2148	3.9387	4.3721	4.0597	4.2991	4.0256	4.3141	4.0440
10	4.5933	4.3729	4.7254	4.4752	4.6660	4.4449	4.6791	4.4600
11	4.9649	4.7939	5.0726	4.8778	5.0255	4.8519	5.0365	4.8640
12	5.3218	5.1939	5.4064	5.2602	5.3703	5.2389	5.3792	5.2483

Section	Tendon 1		Tendon 2		Tendon 3		Tendon 4	
m	F_{kiri}	F_{kanan}	F_{kiri}	F_{kanan}	F_{kiri}	F_{kanan}	F_{kiri}	F_{kanan}
	N	*N*	*N*	*N*	*N*	*N*	*N*	*N*
13	5.6341	5.5431	5.6972	5.5929	5.6709	5.5764	5.6777	5.5833
14	5.9432	5.8831	5.9869	5.9177	5.9690	5.9059	5.9738	5.9106
15	6.2187	6.1838	6.2453	6.2050	6.2346	6.1976	6.2376	6.2004
16	6.4559	6.4407	6.4678	6.4503	6.4631	6.4469	6.4644	6.4482
17	6.6504	6.6501	6.6505	6.6503	6.6505	6.6502	6.6505	6.6503
18	6.7989	6.8091	6.7902	6.8021	6.7936	6.8046	6.7926	6.8037
19	6.8990	6.9155	6.8844	6.9036	6.8901	6.9079	6.8884	6.9064
20	6.9488	6.9679	6.9315	6.9537	6.9382	6.9589	6.9362	6.9570
20,4	6.9544	6.9734	6.9369	6.9589	6.9437	6.9642	6.9417	6.9624
20,8	6.9519	6.9703	6.9347	6.9561	6.9413	6.9613	6.9393	6.9595
21,8	6.9096	6.9246	6.8952	6.9126	6.9008	6.9170	6.8991	6.9155
22,8	6.8165	6.8250	6.8079	6.8178	6.8112	6.8205	6.8102	6.8196
23,8	6.6736	6.6734	6.6737	6.6735	6.6737	6.6735	6.6737	6.6735
24,8	6.4827	6.4723	6.4944	6.4822	6.4901	6.4784	6.4915	6.4796
25,8	6.2464	6.2252	6.2721	6.2470	6.2629	6.2386	6.2660	6.2413

Section	Tendon 1		Tendon 2		Tendon 3		Tendon 4	
m	F_{kiri}	F_{kanan}	F_{kiri}	F_{kanan}	F_{kiri}	F_{kanan}	F_{kiri}	F_{kanan}
	N	*N*	*N*	*N*	*N*	*N*	*N*	*N*
26,8	5.9680	5.9362	6.0101	5.9722	5.9953	5.9580	6.0006	5.9623
27,8	5.6516	5.6105	5.7121	5.6625	5.6915	5.6414	5.6992	5. 6476
28,8	5.3021	5.2539	5.3826	5.3236	5.3561	5.2946	5.3667	5.3027
29,8	4.9250	4.8731	5.0270	4.9618	4.9948	4.9238	5.0085	4.9339
30,8	4.5270	4.4756	4.6512	4.5843	4.6137	4.5362	4.6309	4.5482
31,8	4.1152	4.0694	4.2623	4.1989	4.2202	4.1397	4.2411	4.1533
32,8	3.6980	3.6637	3.8679	3.8141	3.8221	3.7427	3.8470	3.7579
33,8	3.2844	3.2679	3.4766	3.4390	3.4282	3.3546	3.4573	3.3711
34,8	2.8846	2.8924	3.0980	3.0836	3.0482	2.9853	3.0816	3.0028
35,8	2.5094	2.5482	2.7423	2.7580	2.6925	2.6456	2.7303	2.6636
36,8	2.1709	2.2469	2.4210	2.4735	2.3727	2.3466	2.4147	2.3646
37,8	1.8821	2.0006	2.1464	2.2413	2.1011	2.1003	2.1470	2.1178
38,7	0.9876	1.0762	1.1352	1.2114	1.1132	1.1284	1.1398	1.1373
39,8	0.8653	0.9833	1.0207	1.1264	1.0011	1.0342	1.0302	1.0426
40,4	0.8175	0.9624	0.9756	1.1087	0.9594	1.0098	0.9900	1.0172
40,8	0.8234	0.9835	0.9826	1.1310	0.9663	1.0264	0.9972	1.0326

Tabel 5.21 Total tegangan beton terhadap c.g.s akibat gaya prategang

Section	f_{cir} Tendon 1	f_{cir} Tendon 2	f_{cir} Tendon 3	f_{cir} Tendon 4
m	*MPa*	*MPa*	*MPa*	*MPa*
0	1.8647	2.1750	2.0381	2.0716
0,4	1.8422	2.1502	2.0172	2.0509
1	1.9063	2.2082	2.0803	2.1139
2,1	2.1133	2.3991	2.2801	2.3124
3	3.9317	4.4417	4.2328	4.2911
4	4.4479	4.9290	4.7348	4.7904
5	5.0709	5.5174	5.3393	5.3915
6	5.7755	6.1833	6.0225	6.0705
7	6.5386	6.9046	6.7616	6.8050
8	7.3380	7.6606	7.5356	7.5740
9	8.1535	8.4318	8.3247	8.3581
10	8.9662	9.2006	9.1109	9.1391
11	9.7588	9.9504	9.8774	9.9006
12	10.5157	10.6665	10.6092	10.6275
13	11.1772	11.2901	11.2473	11.2610
14	11.8263	11.9046	11.8749	11.8845
15	12.4025	12.4502	12.4322	12.4380
16	12.8966	12.9182	12.9100	12.9126
17	13.3005	13.3008	13.3007	13.3007
18	13.6080	13.5923	13.5982	13.5963
19	13.8144	13.7881	13.7980	13.7948
20	13.9166	13.8852	13.8971	13.8933
20,4	13.9278	13.8959	13.9080	13.9041
20,8	13.9222	13.8907	13.9026	13.8988

Section	f_{cir} Tendon 1	f_{cir} Tendon 2	f_{cir} Tendon 3	f_{cir} Tendon 4
m	*MPa*	*MPa*	*MPa*	*MPa*
21,8	13.8342	13.8079	13.8178	13.8146
22,8	13.6415	13.6258	13.6317	13.6298
23,8	13.3469	13.3473	13.3471	13.3472
24,8	12.9550	12.9765	12.9685	12.9711
25,8	12.4716	12.5191	12.5014	12.5073
26,8	11.9042	11.9823	11.9533	11.9629
27,8	11.2622	11.3746	11.3329	11.3469
28,8	10.5560	10.7062	10.6507	10.6694
29,8	9.7982	9.9888	9.9186	9.9423
30,8	9.0025	9.2355	9.1500	9.1791
31,8	8.1846	8.4612	8.3598	8.3945
32,8	7.3617	7.6820	7.5648	7.6049
33,8	6.5523	6.9157	6.7828	6.8284
34,8	5.7770	6.1815	6.0335	6.0844
35,8	5.0577	5.5004	5.3381	5.3939
36,8	4.4178	4.8945	4.7193	4.7793
37,8	3.8826	4.3877	4.2013	4.2649
38,7	2.0637	2.3466	2.2416	2.2771
39,8	1.8485	2.1471	2.0354	2.0728
40,4	1.7798	2.0843	1.9692	2.0073
40,8	1.8069	2.1136	1.9927	2.0298

Tabel 5.22 Kehilangan gaya prategang akibat perpendekan elastis beton.

Section	*ES* Tendon 1	*ES* Tendon 2	*ES* Tendon 3	*ES* Tendon 4
m	*N*	*N*	*N*	*N*
0	7984.8013	10710.3577	9163.8320	9314.0966
0,4	7888.6110	10588.4689	9069.5983	9221.3311
1	8162.7119	10874.1381	9353.2912	9504.4126
2	9049.3870	11813.9746	10251.8587	10396.9028
3	16835.7828	21872.6961	19031.4618	19293.6461
4	19046.3565	24272.1621	21288.2277	21538.2733
5	21713.7254	27169.6086	24006.5381	24240.8838
6	24731.2229	30448.9345	27078.1292	27293.9294
7	27998.5401	34000.9437	30401.3282	30596.4416
8	31421.8332	37723.4624	33881.1099	34054.0770
9	34913.8123	41521.4365	37429.1465	37579.1574
10	38393.8124	45307.0106	40963.8482	41090.7033
11	41787.8497	48999.5909	44410.3977	44514.4630
12	45028.6644	52525.8952	47700.7778	47782.9354
13	47861.4669	55596.5608	50569.7932	50631.3894
14	50640.6609	58622.3777	53391.6236	53434.4148
15	53108.2999	61309.5157	55897.2010	55923.2983
16	55223.8195	63613.7179	58045.4282	58057.2420
17	56953.4629	65498.1425	59802.0793	59802.2637
18	58270.2816	66933.3654	61139.8040	61131.2021
19	59154.1328	67897.3789	62038.1300	62023.7192
20	59591.7484	68375.6728	62483.5092	62466.3401
20,4	59639.5645	68428.3237	62532.3831	62514.9516
20,8	59615.5597	68402.9644	62508.3729	62491.1687

Section	*ES* Tendon 1	*ES* Tendon 2	*ES* Tendon 3	*ES* Tendon 4
m	*N*	*N*	*N*	*N*
21,8	59238.8481	67994.9053	62127.0055	62112.5663
22,8	58413.5389	67098.2173	61290.1634	61281.5367
23,8	57152.3086	65726.8119	60010.8694	60011.0546
24,8	55473.9318	63901.0823	58308.2503	58320.1403
25,8	53403.9401	61648.7867	56208.2924	56234.6276
26,8	50974.6462	59005.0745	53743.8544	53787.1746
27,8	48225.1664	56012.5122	50954.6806	51017.2746
28,8	45201.4446	52721.1082	47887.4142	47971.2662
29,8	41956.2722	49188.3366	44595.6081	44702.3424
30,8	38549.3062	45479.1557	41139.7355	41270.5591
31,8	35047.0817	41666.0232	37587.1972	37742.8409
32,8	31523.0185	37828.9037	34012.3269	34192.9855
33,8	28057.4189	34055.2677	30496.3922	30701.6651
34,8	24737.4561	30440.0812	27127.5918	27356.4246
35,8	21657.1499	27085.7815	24001.0476	24251.6763
36,8	18917.3285	24102.2391	21218.7904	21488.6903
37,8	16625.5732	21606.7032	18889.7399	19175.5796
38.8	8836.9555	11555.2926	10078.4013	10238.2455
39,8	7915.5653	10573.1235	9151.3834	9319.6871
40,4	7621.3767	10264.0106	8854.0532	9025.0804
40,8	7737.0556	10408.2949	8959.5034	9126.3280

Tabel 5.23 Total gaya efektif setelah kehilangan gaya prategang fase awal

Section	∑ *effektif Awal* Tendon 1	∑ *effectif Awal* Tendon 2	∑ *effectif Awal* Tendon 3	∑ *effectif Awal* Tendon 4
m	*N*	*N*	*N*	*N*
0	2446241.80	2851863.38	2673327.75	2717163.83
0.4	2437196.38	2843092.60	2668113.42	2712735.16
1	2428747.81	2834882.22	2663173.12	2708528.91
2	2419232.11	2825320.15	2656694.49	2702705.19
3	2404675.46	2808649.67	2643962.41	2690463.96
4	2396398.16	2800291.79	2638083.38	2685131.02
5	2388315.81	2792043.72	2632053.62	2679582.47
6	2380485.93	2783978.19	2625962.80	2673912.58
7	2372962.32	2776163.23	2619894.77	2668209.53
8	2365794.85	2768661.99	2613927.53	2662555.39
9	2359029.38	2761532.61	2608133.12	2657026.07
10	2352707.63	2754828.14	2602577.62	2651691.25
11	2346867.06	2748596.42	2597321.10	2646614.41
12	2341540.87	2742880.04	2592417.57	2641852.74
13	2336952.16	2737939.68	2588118.95	2637661.15
14	2332717.25	2733337.92	2584038.55	2633655.71
15	2329067.15	2729343.91	2580433.66	2630096.29
16	2326017.83	2725979.26	2577334.31	2627015.32
17	2323580.80	2723260.12	2574764.42	2624438.86
18	2321763.07	2721197.19	2572741.74	2622386.67
19	2320567.16	2719795.73	2571277.88	2620872.12
20	2319767.85	2718833.12	2570247.14	2619795.49
20.4	2321324.24	2720669.68	2571999.77	2621592.07

Section	∑ effektif Awal Tendon 1	∑ effectif Awal Tendon 2	∑ effectif Awal Tendon 3	∑ effectif Awal Tendon 4
m	*N*	*N*	*N*	*N*
20.8	2320513.37	2719815.68	2571390.17	2621039.61
21.8	2317388.97	2716278.39	2568355.25	2618047.34
22.8	2316552.53	2715406.44	2567874.30	2617662.01
23.8	2316078.45	2714939.30	2567802.60	2617694.14
24.8	2315967.85	2714875.23	2568130.57	2618132.08
25.8	2316217.36	2715207.08	2568842.50	2618957.87
26.8	2316819.10	2715922.23	2569916.50	2620147.17
27.8	2317760.64	2717002.54	2571324.51	2621669.24
28.8	2319025.00	2718424.37	2573032.28	2623486.99
29.8	2320590.61	2720158.54	2574999.35	2625556.93
30.8	2322431.30	2722170.28	2577179.06	2627829.16
31.8	2324516.31	2724419.27	2579518.51	2630247.37
32.8	2326810.26	2726859.61	2581958.61	2632748.85
33.8	2329273.16	2729439.81	2584434.00	2635264.47
34.8	2331860.47	2732102.86	2586873.15	2637718.70
35.8	2334523.12	2734786.20	2589198.29	2640029.59
36.8	2337207.55	2737421.83	2591325.46	2642108.82
37.8	2339855.81	2739936.32	2593164.54	2643861.67
38.8	2348464.85	2750419.41	2601670.54	2652376.12
39.8	2350850.97	2752421.33	2602574.90	2653087.59
40.4	2354665.05	2756000.91	2604725.68	2655021.53
40.8	2370341.88	2771432.65	2613719.77	2662386.84
KONTROL	75899.91	80430.74	59607.97	54776.99
	OK			

5.4.1.3 Analisa Tegangan Gelagar Fase Awal

Tegangan ijin penampang

- Tegangan tekan = 39,84 MPa
- Tegangan tarik = -2,04 MPa

$$f_{atas} = \frac{F_i}{A_C} - \frac{F_i . e . Y_a}{I_X} + \frac{M_G . Y_a}{I_X}$$

$$f_{bawah} = \frac{F_i}{A_C} + \frac{F_i . e . Y_b}{I_X} - \frac{M_G . Y_b}{I_X}$$

Tabel 5.24 Tegangan gelagar pada fase awal

Section	Gaya	Tegangan (*f*)			
		Atas		Bawah	
m	*N*	MPa	Kontrol	MPa	Kontrol
0	10688596.76	7.3288	OK	8.9666	OK
0,4	10661137.56	6.6459	OK	9.6040	OK
1	10635332.06	6.1839	OK	10.0243	OK
2	10603951.94	5.3477	OK	10.8082	OK
3	10547751.50	6.9049	OK	13.0466	OK
4	10519904.35	5.9597	OK	13.8547	OK
5	10491995.62	5.0790	OK	14.6040	OK
6	10464339.50	4.2619	OK	15.2960	OK
7	10437229.85	3.5075	OK	15.9321	OK
8	10410939.76	2.8145	OK	16.5137	OK
9	10385721.18	2.1819	OK	17.0425	OK
10	10361804.64	1.6081	OK	17.5202	OK
11	10339398.99	1.0921	OK	17.9482	OK
12	10318691.20	0.6325	OK	18.3280	OK
13	10300671.94	0.1890	OK	18.6980	OK
14	10283749.44	-0.1563	OK	18.9809	OK

Section	Gaya	Tegangan (*f*)			
		Atas		Bawah	
m	*N*	MPa	Kontrol	MPa	Kontrol
15	10268941.02	-0.4486	OK	19.2194	OK
16	10256346.72	-0.6888	OK	19.4147	OK
17	10246044.19	-0.8778	OK	19.5676	OK
18	10238088.66	-1.0162	OK	19.6788	OK
19	10232512.89	-1.1044	OK	19.7488	OK
20	10228643.60	-1.1420	OK	19.7759	OK
20,4	10235585.76	-1.1520	OK	19.7976	OK
20,8	10232758.84	-1.1425	OK	19.7839	OK
21,8	10220069.95	-1.0762	OK	19.7004	OK
22,8	10217495.29	-0.9691	OK	19.5983	OK
23,8	10216514.49	-0.8116	OK	19.4533	OK
24,8	10217105.74	-0.6036	OK	19.2653	OK
25,8	10219224.82	-0.3448	OK	19.0340	OK
26,8	10222804.99	-0.0349	OK	18.7589	OK
27,8	10227756.93	0.3265	OK	18.4395	OK
28,8	10233968.64	0.7399	OK	18.0751	OK
29,8	10241305.43	1.2061	OK	17.6649	OK
30,8	10249609.80	1.7255	OK	17.2080	OK
31,8	10258701.47	2.2988	OK	16.7036	OK
32,8	10268377.32	2.9266	OK	16.1507	OK
33,8	10278411.45	3.6094	OK	15.5484	OK
34,8	10288555.19	4.3478	OK	14.8959	OK
35,8	10298537.21	5.1420	OK	14.1923	OK
36,8	10308063.65	5.9923	OK	13.4370	OK
37,8	10316818.33	6.8984	OK	12.6294	OK
38,8	10352930.91	5.2501	OK	10.5235	OK

Section	Gaya	Tegangan (*f*)			
		Atas		Bawah	
m	*N*	*MPa*	Kontrol	*MPa*	Kontrol
39,8	10358934.80	6.0364	OK	9.7506	OK
40,4	10370413.17	6.4645	OK	9.3423	OK
40,8	10417881.15	7.1431	OK	8.7395	OK

- Perhitungan kontrol lendutan

Akibat gaya prategang dan berat sendiri balok (Bentang 40 m).

F0 = 10235585.76 N
E = 43798.83 MPa
I = 398227410205,1110 mm^4
Berat sendiri (q) = 18.588 N/mm
e = 752.8313 mm
L = 40800 mm

➢ Saat Transfer

Wp $= \frac{8.F0.e}{L^2}$

= 37.0322 N/mm

W = Wp – q
= 37.0322 – 18.588
= 18.445 N/mm

Δ0 $= \frac{5.w.L^4}{384.EI}$

= 38.20 mm < 50 mm **OK** *Keatas* ↑

5.4.2 Perhitungan Tegangan Gelagar Fase Konstruksi

5.4.3.1 Perhitungan Momen Fase Konstruksi

Pada fase konstruksi ini beban yang terjadi antara lain akibat dari berat sendiri girder, beban pelat pracetak, beban diafragma dan beban beton basah plat lantai kendaraan. Selain beban akibat beban mati, pada fase ini juga ada beban hidup berupa beban pekerja.

1. Analisa pembebanan (tambah)

   Diasumsikan beton basah rata adalah setinggi 30 cm yang diletakkan sepanjang bentang jembatan.

- Berat beton basah plat lantai kendaraan (rata)

Parameter	Besar	Perhitungan	*Berat (q)*
	(m)		KN/m
Tebal (t)	0,3	q plat = t x s x BJ	15.210
Jarak antar Girder (s)	1,95		

2. Beban hidup Pekerja

   Asumsikan berat pekerja @ 80 kg, sehingga KN/m^2 Pekerja, maka beban pekerja per m2 : 2,5 KN/m^2 dan beban hidup pekerja tersebut diasumsikan bergerak setiap 0,5m dan bekerja sepanjang beff Gelagar, sehingga beban hidup Pekerja :

$$q_{pk} = 4,68 \text{ KN/m}$$

5.4.3.2 Perhitungan Momen Akibat Beban Tambah

Tabel 5.25 Momen akibat beban hidup

X1 (m)	Section Girder (m)	*Momen/MdL [KNm]*
0	0	0
0,4	0,4	-0,3744
X2 (m)	Section Girder (m)	*Momen/MdL [KNm]*
0	0,4	-0.3744
0,6	1	54.9432
1,6	2	143.3952
2,6	3	227.1672
3,6	4	306.2592
4,6	5	380.6712
5,6	6	450.4032
6,6	7	515.4552
7,6	8	575.8272
8,6	9	631.5192
9,6	10	682.5312
10,6	11	728.8632
11,6	12	770.5152
12,6	13	807.4872
13,6	14	839.7792
14,6	15	867.3912
15,6	16	890.3232
16,6	17	908.5752
17,6	18	922.1472
18,6	19	931.0392

X2 (m)	Section Girder (m)	*Momen/MdL [KNm]*
19,6	20	935.2512
20,0	20,4	935.6256
20,4	20,8	935.2512
21,4	21,8	931.0392
22,4	22,8	922.1472
23,4	23,8	908.5752
24,4	24,8	890.3232
25,4	25,8	867.3912
26,4	26,8	839.7792
27,4	27,8	807.4872
28,4	28,8	770.5152
29,4	29,8	728.8632
30,4	30,8	682.5312
31,4	31,8	631.5192
32,4	32,8	575.8272
33,4	33,8	515.4552
34,4	34,8	450.4032
35,4	35,8	380.6712
36,4	36,8	306.2592
37,4	37,8	227.1672
38,4	38,8	143.3952
39,4	39,8	54.9432
40	40,4	-0.3744
40,4	40,8	0,0000

Tabel 5.26 Momen akibat beban mati (beton basah)

X1 (m)	Section Girder (m)	Momen/MdL [KNm]
0	0	0
0,4	0,4	-1,2168
X2 (m)	Section Girder (m)	Momen/MdL [KNm]
0	0,4	-1,2168
0,6	1	178.5654
1,6	2,1	466.0344
2,6	3	738.2934
3,6	4	995.3424
4,6	5	1237.1814
5,6	6	1463.8104
6,6	7	1675.2294
7,6	8	1871.4384
8,6	9	2052.4374
9,6	10	2218.2264
10,6	11	2368.8054
11,6	12	2504.1744
12,6	13	2624.3334
13,6	14	2729.2824
14,6	15	2819.0214
15,6	16	2893.5504
16,6	17	2952.8694
17,6	18	2996.9784
18,6	19	3025.8774
19,6	20	3039.5664

X2 (m)	Section Girder (m)	Momen/MdL [KNm]
20,0	20,4	3040.7832
20,4	20,8	3039.5664
21,4	21,8	3025.8774
22,4	22,8	2996.9784
23,4	23,8	2952.8694
24,4	24,8	2893.5504
25,4	25,8	2819.0214
26,4	26,8	2729.2824
27,4	27,8	2624.3334
28,4	28,8	2504.1744
29,4	29,8	2368.8054
30,4	30,8	2218.2264
31,4	31,8	2052.4374
32,4	32,8	1871.4384
33,4	33,8	1675.2294
34,4	34,8	1463.8104
35,4	35,8	1237.1814
36,4	36,8	995.3424
37,4	37,8	738.2934
38,4	38,8	466.0344
39,4	39,8	178.5654
40	40,4	-1.2168
40,4	40,8	0

Tabel 5.27 Momen yang terjadi pada gelagar pada saat fase konstruksi

Section	*Momen yang diakibatkan :*				*Momen Konstruksi*
	Girder Sendiri (Mg)	Diafragma	Beton Basah	Pekerja	*(M_{konst})*
m	*KNm*	*KNm*	*KNm*	*KNm*	*KNm*
0	0	0	0	0	0
0,4	-2.6230	0	-1.2168	-0.3744	-4.2142
1	244.5510	20.9175	178.5654	54.9432	498.9771
2	586.5610	55.7800	466.0344	143.3952	1251.7706
3	919.2773	90.6425	738.2934	227.1672	1975.3804
4	1233.4060	125.5050	995.3424	306.2592	2660.5126
5	1528.9473	160.3675	1237.1814	380.6712	3307.1674
6	1805.9010	195.2300	1463.8104	450.4032	3915.3446
7	2064.2673	237.0650	1675.2294	515.4552	4492.0169
8	2304.0460	253.7990	1871.4384	575.8272	5005.1106
9	2525.2373	274.7165	2052.4374	631.5192	5483.9104
10	2727.8410	295.6340	2218.2264	682.5312	5924.2326
11	2911.8573	316.5515	2368.8054	728.8632	6326.0774
12	3077.2860	337.4690	2504.1744	770.5152	6689.4446
13	3210.2796	358.3865	2624.3334	807.4872	7000.4867
14	3340.3921	375.1205	2729.2824	839.7792	7284.5742
15	3451.9171	383.4875	2819.0214	867.3912	7521.8172
16	3544.8546	390.4600	2893.5504	890.3232	7719.1882
17	3619.2046	397.4325	2952.8694	908.5752	7878.0817
18	3674.9671	404.4050	2996.9784	922.1472	7998.4977
19	3712.1421	411.3775	3025.8774	931.0392	8080.4362

Section	Momen yang diakibatkan :				Momen Konstruksi
	Girder Sendiri (Mg)	Diafragma	Beton Basah	Pekerja	(M_{konst})
m	*KNm*	*KNm*	*KNm*	*KNm*	*KNm*
20	3730.7296	418.3500	3039.5664	935.2512	8123.8972
20,4	3732.9601	421.1390	3040.7832	935.6256	8130.5079
20,8	3732.2166	418.3500	3039.5664	935.2512	8125.3842
21,8	3717.3466	411.3775	3025.8774	931.0392	8085.6407
22,8	3683.8891	404.4050	2996.9784	922.1472	8007.4197
23,8	3631.8441	397.4325	2952.8694	908.5752	7890.7212
24,8	3561.2116	390.4600	2893.5504	890.3232	7735.5452
25,8	3471.9916	383.4875	2819.0214	867.3912	7541.8917
26,8	3364.1841	375.1205	2729.2824	839.7792	7308.3662
27,8	3237.7891	358.3865	2624.3334	807.4872	7027.9962
28,8	3092.8066	337.4690	2504.1744	770.5152	6704.9652
29,8	2929.2366	316.5515	2368.8054	728.8632	6343.4567
30,8	2747.0791	295.6340	2218.2264	682.5312	5943.4707
31,8	2546.3341	274.7165	2052.4374	631.5192	5505.0072
32,8	2327.0016	253.7990	1871.4384	575.8272	5028.0662
33,8	2089.0816	237.0650	1675.2294	515.4552	4516.8312
34,8	1832.5741	195.2300	1463.8104	450.4032	3942.0177
35,8	1557.4791	160.3675	1237.1814	380.6712	3335.6992
36,8	1263.7966	125.5050	995.3424	306.2592	2690.9032
37,8	951.5266	90.6425	738.2934	227.1672	2007.6297
38,8	244.5510	55.7800	466.0344	143.3952	909.7606
39,8	-1.4870	20.9175	178.5654	54.9432	252.9391
40,4	-2.6230	0.0000	-1.2168	-0.3744	-4.2142
40,8	0.00000	0.00000	0.00000	0.00000	0.00000

5.4.3.3 Analisa Tegangan Gelagar Fase Konstruksi

Tegangan ijin penampang

- Tegangan tekan = 39,84 Mpa
- Tegangan tarik = -2,04

$$f_{atas} = \frac{F_i}{A_C} - \frac{F_i . e . Y_a}{I_X} + \frac{M_G . Y_a}{I_X}$$

$$f_{bawah} = \frac{F_i}{A_C} + \frac{F_i . e . Y_b}{I_X} - \frac{M_G . Y_b}{I_X}$$

Tabel 5.28 Tegangan gelagar pada fase konstruksi

Section	Gaya	Tegangan (*f*)			
		Atas		Bawah	
m	N	MPa	Kontrol	MPa	Kontrol
0	10688596.76	7.32876	OK	8.96660	OK
0,4	10661137.56	6.64255	OK	9.60733	OK
1	10635332.06	6.71418	OK	9.49684	OK
2	10603951.94	6.73428	OK	9.42913	OK
3	10547751.50	13.88675	OK	14.45917	OK
4	10519904.35	13.95569	OK	14.32501	OK
5	10491995.62	14.03417	OK	14.18203	OK
6	10464339.50	14.12145	OK	14.03169	OK
7	10437229.85	14.23590	OK	13.85807	OK
8	10410939.76	14.28787	OK	13.74333	OK
9	10385721.18	14.35712	OK	13.61564	OK
10	10361804.64	14.43090	OK	13.48718	OK
11	10339398.99	14.50799	OK	13.35959	OK
12	10318691.20	14.58717	OK	13.23446	OK

Section	Gaya	Tegangan (*f*)			
		Atas		Bawah	
m	*N*	MPa	Kontrol	MPa	Kontrol
13	10300671.94	14.62866	OK	13.15048	OK
14	10283749.44	14.70219	OK	13.04021	OK
15	10268941.02	14.75146	OK	12.95740	OK
16	10256346.72	14.79486	OK	12.88562	OK
17	10246044.19	14.83546	OK	12.82227	OK
18	10238088.66	14.87264	OK	12.76805	OK
19	10232512.89	14.90593	OK	12.72348	OK
20	10228643.60	14.93551	OK	12.68666	OK
20,4	10235585.76	14.94038	OK	12.70005	OK
20,8	10232758.84	14.93660	OK	12.69623	OK
21,8	10220069.95	14.92932	OK	12.67027	OK
22,8	10217495.29	14.91181	OK	12.67957	OK
23,8	10216514.49	14.89034	OK	12.69657	OK
24,8	10217105.74	14.86503	OK	12.72110	OK
25,8	10219224.82	14.83610	OK	12.75283	OK
26,8	10222804.99	14.80004	OK	12.79479	OK
27,8	10227756.93	14.73800	OK	12.86390	OK
28,8	10233968.64	14.66201	OK	12.94892	OK
29,8	10241305.43	14.58415	OK	13.03851	OK
30,8	10249609.80	14.50500	OK	13.13178	OK
31,8	10258701.47	14.42509	OK	13.22775	OK
32,8	10268377.32	14.34497	OK	13.32541	OK
33,8	10278411.45	14.27666	OK	13.41327	OK
34,8	10288555.19	14.13961	OK	13.56387	OK
35,8	10298537.21	14.02267	OK	13.69578	OK
36,8	10308063.65	13.90662	OK	13.82572	OK

Section	Gaya	Tegangan (*f*)			
		Atas		Bawah	
m	*N*	MPa	Kontrol	MPa	Kontrol
37,8	10316818.33	13.79128	OK	13.95304	OK
38,8	10352930.91	5.92375	OK	9.85351	OK
39,8	10358934.80	6.05388	OK	9.73321	OK
40,4	10370413.17	6.46117	OK	9.34558	OK
40,8	10417881.15	7.14314	OK	8.73949	OK

5.5.4 Perhitungan Tegangan Gelagar Fase Service

- Momen Inersia dan Garis Netral setelah Komposit

Tabel 5.29 Sifat balok komposit

Section	*ya*	*yb*	Momen Inersia *(Ix)*
m	*mm*	*mm*	mm^4
0	1084.4527	1265.5473	844034186739.6290
0.4	1084.4527	1265.5473	844034186739.6290
1	1084.4527	1265.5473	844034186739.6290
2	1084.4527	1265.5473	844034186739.6290
3	999.1282	1350.8718	715824564368.0120
4	999.1282	1350.8718	715824564368.0120
5	999.1282	1350.8718	715824564368.0120
6	999.1282	1350.8718	715824564368.0120
7	999.1282	1350.8718	715824564368.0120
8	999.1282	1350.8718	715824564368.0120
9	999.1282	1350.8718	715824564368.0120
10	999.1282	1350.8718	715824564368.0120
11	999.1282	1350.8718	715824564368.0120

Section	*ya*	*yb*	Momen Inersia *(Ix)*
m	*mm*	*mm*	mm^4
12	999.1282	1350.8718	715824564368.0120
13	999.1282	1350.8718	715824564368.0120
14	999.1282	1350.8718	715824564368.0120
15	999.1282	1350.8718	715824564368.0120
16	999.1282	1350.8718	715824564368.0120
17	999.1282	1350.8718	715824564368.0120
18	999.1282	1350.8718	715824564368.0120
19	999.1282	1350.8718	715824564368.0120
20	999.1282	1350.8718	715824564368.0120
20.4	999.1282	1350.8718	715824564368.0120
20.8	999.1282	1350.8718	715824564368.0120
21.8	999.1282	1350.8718	715824564368.0120
22.8	999.1282	1350.8718	715824564368.0120
23.8	999.1282	1350.8718	715824564368.0120
24.8	999.1282	1350.8718	715824564368.0120
25.8	999.1282	1350.8718	715824564368.0120
26.8	999.1282	1350.8718	715824564368.0120
27.8	999.1282	1350.8718	715824564368.0120
28.8	999.1282	1350.8718	715824564368.0120
29.8	999.1282	1350.8718	715824564368.0120
30.8	999.1282	1350.8718	715824564368.0120
31.8	999.1282	1350.8718	715824564368.0120
32.8	999.1282	1350.8718	715824564368.0120
33.8	999.1282	1350.8718	715824564368.0120
34.8	999.1282	1350.8718	715824564368.0120
35.8	999.1282	1350.8718	715824564368.0120
36.8	999.1282	1350.8718	715824564368.0120

Section	*ya*	*yb*	Momen Inersia *(Ix)*
m	*mm*	*mm*	mm^4
37.8	999.1282	1350.8718	715824564368.0120
38.8	1084.4527	1265.5473	844034186739.6290
39.8	1084.4527	1265.5473	844034186739.6290
40.4	1084.4527	1265.5473	844034186739.6290
40.8	1084.4527	1265.5473	844034186739.6290

Tabel 5.30 Posisi tendon c.g.s terhadap c.g.c setelah komposit.

Section	Tendon 1	Tendon 2	Tendon 3	Tendon 4
m	*mm*	*mm*	*mm*	*mm*
0	309.4527	-65.5473	-440.5473	-815.5473
0,4	263.8260	-104.3785	-464.8168	-825.2551
1	197.0801	-161.1836	-500.3200	-839.4564
2	90.3543	-252.0140	-557.0890	-862.1640
3	-96.0491	-423.3632	-696.1789	-968.9946
4	-191.4812	-504.5819	-746.9406	-989.2993
5	-281.2664	-580.9948	-794.6987	-1008.4026
6	-365.4047	-652.6019	-839.4531	-1026.3043
7	-443.8961	-719.4031	-881.2039	-1043.0046
8	-516.7407	-781.3985	-919.9510	-1058.5035
9	-583.9384	-838.5881	-955.6945	-1072.8009
10	-645.4893	-890.9718	-988.4343	-1085.8968
11	-701.3932	-938.5496	-1018.1704	-1097.7913
12	-751.6504	-981.3216	-1044.9029	-1108.4843
13	-796.2606	-1019.2878	-1068.6318	-1117.9758

Section	Tendon 1	Tendon 2	Tendon 3	Tendon 4
m	*mm*	*mm*	*mm*	*mm*
14	-835.2240	-1052.4481	-1089.3570	-1126.2659
15	-868.5405	-1080.8026	-1107.0786	-1133.3545
16	-896.2101	-1104.3512	-1121.7965	-1139.2417
17	-918.2329	-1123.0940	-1133.5107	-1143.9274
18	-934.6088	-1137.0310	-1142.2213	-1147.4116
19	-945.3379	-1146.1621	-1147.9282	-1149.6944
20	-950.4201	-1150.4873	-1150.6315	-1150.7757
20,4	-950.8718	-1150.8718	-1150.8718	-1150.8718
20,8	-950.4201	-1150.4873	-1150.6315	-1150.7757
21,8	-945.3379	-1146.1621	-1147.9282	-1149.6944
22,8	-934.6088	-1137.0310	-1142.2213	-1147.4116
23,8	-918.2329	-1123.0940	-1133.5107	-1143.9274
24,8	-896.2101	-1104.3512	-1121.7965	-1139.2417
25,8	-868.5405	-1080.8026	-1107.0786	-1133.3545
26,8	-835.2240	-1052.4481	-1089.3570	-1126.2659
27,8	-796.2606	-1019.2878	-1068.6318	-1117.9758
28,8	-751.6504	-981.3216	-1044.9029	-1108.4843
29,8	-701.3932	-938.5496	-1018.1704	-1097.7913
30,8	-645.4893	-890.9718	-988.4343	-1085.8968
31,8	-583.9384	-838.5881	-955.6945	-1072.8009
32,8	-516.7407	-781.3985	-919.9510	-1058.5035
33,8	-443.8961	-719.4031	-881.2039	-1043.0046
34,8	-365.4047	-652.6019	-839.4531	-1026.3043
35,8	-281.2664	-580.9948	-794.6987	-1008.4026
36,8	-191.4812	-504.5819	-746.9406	-989.2993
37,8	-96.0491	-423.3632	-696.1789	-968.9946
38,8	90.3543	-252.0140	-557.0890	-862.1640

Section	Tendon 1	Tendon 2	Tendon 3	Tendon 4
m	*mm*	*mm*	*mm*	*mm*
39,8	197.0801	-161.1836	-500.3200	-839.4564
40,4	263.8260	-104.3785	-464.8168	-825.2551
40,8	309.4527	-65.5473	-440.5473	-815.5473

- Eksentrisitas (e) terhadap c.g.c setelah Komposit

$$e = \frac{F1 \times y1 + F2 \times y2 + F3 \times y3 + F4 \times y4}{F1 + F2 + F3 + F4}$$

Tabel 5.31 Eksentrisitas (e) terhadap c.g.c setelah komposit

Section	*e*
m	*mm*
0	255.253
0,4	284.891
1	328.246
2	397.571
3	548.553
4	610.542
5	668.863
6	723.516
7	774.501
8	821.818
9	865.467
10	905.448
11	941.761
12	974.406

Section	*e*
m	*mm*
13	1003.383
14	1028.693
15	1050.334
16	1068.307
17	1082.612
18	1093.249
19	1100.218
20	1103.520
20,4	1103.813
20,8	1103.520
21,8	1100.218
22,8	1093.249
23,8	1082.612
24,8	1068.307
25,8	1050.334
26,8	1028.693
27,8	1003.383
28,8	974.406
29,8	941.761
30,8	905.448
31,8	865.467
32,8	821.818
33,8	774.501
34,8	723.516
35,8	668.863
36,8	610.542
37,8	548.553

Section	*e*
m	*mm*
38,8	397.571
39,8	328.246
40,4	284.891

Tabel 5.32 Rekapitulasi momen

Section (m)	*Momen yang diakibatkan :*					Momen Total
	Girder Sendiri (Mg)	Diafragma	Mati Merata*	Hidup Merata (UDL)	Hidup Garis (KEL)	(Mt)
	KNm	*KNm*	*KNm*	*KNm*	*KNm*	*KNm*
0	0	0	0	0	0.0000	0
0,4	-2.6230	0	-1.6646	-1.2182	0.0000	-5.5058
1	244.5510	20.9175	244.2859	178.7674	79.0581	767.5799
2	586.5610	55.78	637.5571	466.5616	205.4707	1951.9304
3	919.2773	90.6425	1010.0203	739.1286	325.1949	3084.2635
4	1233.4060	125.505	1361.6755	996.4684	438.2305	4155.2854
5	1528.9473	160.3675	1692.5227	1238.5809	544.5777	5164.9961
6	1805.9010	195.23	2002.5619	1465.4663	644.2363	6113.3955
7	2064.2673	237.065	2291.7931	1677.1245	737.2065	7007.4563
8	2304.0460	253.799	2560.2163	1873.5554	823.4881	7815.1049
9	2525.2373	274.7165	2807.8315	2054.7592	903.0813	8565.6257
10	2727.8410	295.634	3034.6387	2220.7357	975.9859	9254.8353

Section (m)	*Momen yang diakibatkan :*					Momen Total
	Girder Sendiri (Mg)	Diafragma	Mati Merata*	Hidup Merata (UDL)	Hidup Garis (KEL)	(Mt)
	KNm	*KNm*	*KNm*	*KNm*	*KNm*	*KNm*
11	2911.8573	316.5515	3240.6379	2371.4850	1042.2021	9882.7338
12	3077.2860	337.469	3425.8291	2507.0072	1101.7297	10449.3210
13	3210.2796	358.3865	3590.2123	2627.3021	1154.5689	10940.7494
14	3340.3921	375.1205	3733.7875	2732.3698	1200.7195	11382.3894
15	3451.9171	383.4875	3856.5547	2822.2103	1240.1817	11754.3513
16	3544.8546	390.46	3958.5139	2896.8236	1272.9553	12063.6074
17	3619.2046	397.4325	4039.6651	2956.2098	1299.0405	12311.5524
18	3674.9671	404.405	4100.0083	3000.3686	1318.4371	12498.1861
19	3712.1421	411.3775	4139.5435	3029.3003	1331.1453	12623.5087
20	3730.7296	418.35	4158.2707	3043.0048	1337.1649	12687.5200
20,4	3732.9601	421.139	4159.9354	3044.2230	1337.7000	12695.9574
20,8	3732.2166	418.35	4158.2707	3043.0048	1337.1649	12689.0070
21,8	3717.3466	411.3775	4139.5435	3029.3003	1331.1453	12628.7132
22,8	3683.8891	404.405	4100.0083	3000.3686	1318.4371	12507.1081

Section (m)	*Momen yang diakibatkan :*					Momen Total
	Girder Sendiri (Mg)	Diafragma	Mati Merata*	Hidup Merata (UDL)	Hidup Garis (KEL)	(Mt)
	KNm	*KNm*	*KNm*	*KNm*	*KNm*	*KNm*
23,8	3631.8441	397.4325	4039.6651	2956.2098	1299.0405	12324.1919
24,8	3561.2116	390.46	3958.5139	2896.8236	1272.9553	12079.9644
25,8	3471.9916	383.4875	3856.5547	2822.2103	1240.1817	11774.4258
26,8	3364.1841	375.1205	3733.7875	2732.3698	1200.7195	11406.1814
27,8	3237.7891	358.3865	3590.2123	2627.3021	1154.5689	10968.2589
28,8	3092.8066	337.469	3425.8291	2507.0072	1101.7297	10464.8416
29,8	2929.2366	316.5515	3240.6379	2371.4850	1042.2021	9900.1131
30,8	2747.0791	295.634	3034.6387	2220.7357	975.9859	9274.0734
31,8	2546.3341	274.7165	2807.8315	2054.7592	903.0813	8586.7225
32,8	2327.0016	253.799	2560.2163	1873.5554	823.4881	7838.0604
33,8	2089.0816	237.065	2291.7931	1677.1245	737.2065	7032.2706
34,8	1832.5741	195.23	2002.5619	1465.4663	644.2363	6140.0686
35,8	1557.4791	160.3675	1692.5227	1238.5809	544.5777	5193.5279
36,8	1263.7966	125.505	1361.6755	996.4684	438.2305	4185.6760

Section (m)	*Momen yang diakibatkan :*					Momen Total
	Girder Sendiri (Mg)	Diafragma	Mati Merata*	Hidup Merata (UDL)	Hidup Garis (KEL)	(Mt)
	KNm	*KNm*	*KNm*	*KNm*	*KNm*	*KNm*
37,8	951.5266	90.6425	1010.0203	739.1286	325.1949	3116.5128
38,7	244.5510	55.78	244.2859	466.5616	205.4707	1216.6492
39,8	-1.4870	20.9175	163.1347	178.7674	79.0581	440.3907
40,4	-2.6230	0	-1.6646	-1.2182	0.0000	-5.5058
40,8	0.0000	0	0.0000	0.0000	0.0000	0.0000

5.4.3 Perhitungan Tegangan Gelagar Fase Service

5.4.4.1 Perhitungan Kehilangan Gaya Prategang Jangka Panjang

4. Perhitungan kehilangan gaya prategang akibat Susut Beton

$$SH = 8{,}2 \; x \; 10^{-6} \; K_{sh} \; E_s \left(1 - 0{,}00236 \, \frac{V}{S}\right) (100 - RH)$$

SH = Kehilangan gaya akibat susut beton (N)
RH = Kelembaban relatif udara sekitar 80%
Ksh = Koefisien dari waktu akhir perawatan beton
0,77 Prategang dilakukan 7 hari setelah curing
Es = Modulus elastisitas baja
V/S = *Rasio volume dibagi Kell. Penampang*

Tabel 5.33 Perhitungan V/S

Section	Luas Penampang	Volume	Luas Permukaan	$\frac{Volume}{LuasPerm.}$
m	*mm²*	*mm³*	*mm²*	
0	1311500,00	0	0	0
0,4	1311500,00	524600000	5041400,00	104,06
1	1311500,00	786900000	6250600,00	125,89
2	1311500,00	1311500000	9273600.00	141.42
3	743500,00	743500000	7349600.00	101.16
4	743500,00	743500000	8001000,00	92,93
5	743500,00	743500000	8001000,00	92,93
6	743500,00	743500000	8001000,00	92,93
7	743500,00	743500000	8001000,00	92,93
8	743500,00	743500000	8001000,00	92,93
9	743500,00	743500000	8001000,00	92,93
10	743500,00	743500000	8001000,00	92,93
11	743500,00	743500000	8001000,00	92,93

Section	Luas Penampang	Volume	Luas Permukaan	$\frac{Volume}{LuasPerm.}$
m	mm^2	mm^3	mm^2	
12	743500,00	743500000	8001000,00	92,93
13	743500,00	743500000	8001000,00	92,93
14	743500,00	743500000	8001000,00	92,93
15	743500,00	743500000	8001000,00	92,93
16	743500,00	743500000	8001000,00	92,93
17	743500,00	743500000	8001000,00	92,93
18	743500,00	743500000	8001000,00	92,93
19	743500,00	743500000	8001000,00	92,93
20	743500,00	743500000	8001000,00	92,93
20,4	743500,00	297400000	8001000,00	37,17
20,8	743500,00	297400000	8001000,00	37,17
21,8	743500,00	743500000	8001000,00	92,93
22,8	743500,00	743500000	8001000,00	92,93
23,8	743500,00	743500000	8001000,00	92,93
24,8	743500,00	743500000	8001000,00	92,93
25,8	743500,00	743500000	8001000,00	92,93
26,8	743500,00	743500000	8001000,00	92,93
27,8	743500,00	743500000	8001000,00	92,93
28,8	743500,00	743500000	8001000,00	92,93
29,8	743500,00	743500000	8001000,00	92,93
30,8	743500,00	743500000	8001000,00	92,93
31,8	743500,00	743500000	8001000,00	92,93
32,8	743500,00	743500000	8001000,00	92,93
33,8	743500,00	743500000	8001000,00	92,93
34,8	743500,00	743500000	8001000,00	92,93
35,8	743500,00	743500000	8001000,00	92,93

Section	Luas Penampang	Volume	Luas Permukaan	$\frac{Volume}{LuasPerm.}$
m	*mm*^{2}	*mm*^{3}	*mm*^{2}	
36,8	743500,00	743500000	8001000,00	92,93
37,8	743500,00	743500000	7349600,00	101,16
38,8	1311500,00	1311500000	9273600.00	141.42
39,8	1311500,00	786900000	6250600,00	125,89
40,4	1311500,00	524600000	5041400,00	104,06
40,8	1311500,00	0,00	0,00	0,00

Tabel 5.34 Perhitungan kehilangan gaya prategang akibat susut beton.

Section	*SH. Aps*
m	*N*
0	201311.35
0,4	151873.75
1	141500.75
2	134122.03
3	153249.82
4	157162.74
5	157162.74
6	157162.74
7	157162.74
8	157162.74
9	157162.74
10	157162.74
11	157162.74
12	157162.74

Section	*SH. Aps*
m	*N*
13	157162.74
14	157162.74
15	157162.74
16	157162.74
17	157162.74
18	157162.74
19	157162.74
20	157162.74
20,4	183651.90
20,8	183651.90
21,8	157162.74
22,8	157162.74
23,8	157162.74
24,8	157162.74
25,8	157162.74
26,8	157162.74
27,8	157162.74
28,8	157162.74
29,8	157162.74
30,8	157162.74
31,8	157162.74
32,8	157162.74
33,8	157162.74
34,8	157162.74
35,8	157162.74
36,8	157162.74
37,8	153249.82

Section	*SH. Aps*
m	*N*
38,8	134122.03
39,8	101627.03
40,4	127154.94
40,8	201311.35

5. Perhitungan Kehilangan Gaya Prategang akibat Rangkak Beton

Kehilangan gaya prategang akibat rangkak untuk komponen struktur dengan tendon terekat dihitung dari persamaan berikut :

$$CR = K_{cr} \frac{E_s}{E_c} (f_{cir-} f_{cds})$$

CR = Kehilangan gaya akibat rangkak beton (N)
K_{cr} = 1.6 (Koefisien untuk struktur system pascatarik)
Es = Modulus elastisitas baja prategang (19000 MPa)
Ec = Modulus elastisitas beton (43798.83 MPa)
F_{cir} = Tegangan yang bekerja pada beton terhadap c.g.c setelah transfer (MPa)

$$F_{cir} = \left(\frac{F_i}{A_C} + \frac{F_i \cdot e^2}{I_X} - \frac{M_{tot}}{I_X} \right) x\ Aps$$

Fi = Gaya prategang sisa (N)
Ac = Luas penampang girder (mm^2)
Ix = Momen inersia girder (mm^4)
M_{tot} = Momen total girder saat service (Nmm)
Aps = Luas penampang kabel baja prategang (mm^2)

e = Eksentrisitas gaya (mm)

F_{cds} = Tegangan beton pada titik berat tendon akibat seluruh beban mati yang bekerja pada komponen struktur setelah diberi gaya prategang.

$$fcds = \frac{MtotDL}{Ix'} \times e'$$

$$Fcds = \frac{MtotDL}{Ix'} \times e' x Aps_{\ total}$$

Tabel 5.35 Perhitungan Fcir dan Fcds

Section	F_{cir}	F_{cds}
m	*N*	*N*
0	62981.0294	0.0000
0.4	64534.9548	-12.1427
1	67207.1983	1663.3387
2	72342.2602	5058.3667
3	122857.4319	12987.6425
4	131449.9877	19469.3465
5	140337.9295	26513.2662
6	149364.2705	33953.3216
7	158384.3339	41696.8924
8	167266.0587	49300.8697
9	175888.5140	56887.3070
10	184142.6462	64294.5948
11	191930.4350	71409.2641
12	199164.5195	78128.0085
13	205784.3238	84194.8228
14	211688.2416	89820.3093
15	216835.7872	94697.3343
16	221178.0475	98845.5623

Section	F_{cir}	F_{cds}
m	*N*	*N*
17	224674.8996	102230.8721
18	227294.6815	104812.4911
19	229013.9510	106559.8091
20	229803.2205	107452.3783
20.4	230037.7681	107567.4309
20.8	229899.2163	107471.6121
21.8	228741.8065	106626.9259
22.8	226846.9359	104926.8197
23.8	224041.2431	102391.2617
24.8	220351.3084	99050.3826
25.8	215812.1555	94944.4758
26.8	210467.4103	90107.1825
27.8	204369.5394	84518.3592
28.8	197579.8821	78305.2727
29.8	190169.0431	71601.1075
30.8	182217.2272	64498.7678
31.8	173814.4880	57101.3204
32.8	165061.0278	49521.9943
33.8	156067.4356	41922.1595
34.8	146955.3861	34179.5225
35.8	137856.7427	26736.9528
36.8	128914.8842	19686.8307
37.8	120284.2322	13194.9964
38.8	70713.3359	2152.4152
39.8	65541.6359	595.7139
40.4	62856.5265	-12.1427
40.8	61452.7112	0.0000

Tabel 5.36 Perhitungan kehilangan gaya prategang akibat rangkak.

Section	Δ *FCR*
m	*N*
0	437140.28
0.4	448010.09
1	454928.44
2	467005.71
3	762586.95
4	777238.00
5	790037.03
6	801047.16
7	809907.07
8	818775.70
9	825966.52
10	831844.31
11	836516.32
12	840093.20
13	843931.41
14	845863.95
15	847741.59
16	849088.33
17	849862.53
18	850127.41
19	849932.73
20	849215.75
20.4	850045.14
20.8	849748.54

Section	$\Delta\ FCR$
m	N
21.8	847577.98
22.8	846226.15
23.8	844351.19
24.8	841928.46
25.8	838921.38
26.8	835399.24
27.8	831866.03
28.8	827864.15
29.8	822959.26
30.8	817063.19
31.8	810085.64
32.8	801936.18
33.8	792262.35
34.8	782757.50
35.8	771262.98
36.8	758132.77
37.8	743287.61
38.8	475869.33
39.8	450778.26
40.4	436360.41
40.8	426532.50

6. Perhitungan Kehilangan Gaya Prategang akibat Relaksasi Baja

Gaya prategang/tegangan pada baja prategang akan berkurang secara perlahan-lahan karena Seiring dengan waktu balok prategang yang dibebani secara terus menerus akan mengalami relaksasi / merenggang sehingga beton prategang akan mengalami kehilangan gaya. Besarnya kehilangan gaya prategang akibat relaksasi baja dituliskan dengan persamaan rumus :

$$RE = [K_{re} - J\,(SH + CR + ES)]\,C$$

CR = Kehilangan Gaya akibat Relaksasi Baja (N)
Kre = 138 (Koefisien nilai untuk Strand atau kawat strees relieved derajat 1860 Mpa)
J = 0,15 (Faktor Nilai)
C = 0,75 (Faktor Nilai)
SH = Kehilangan Gaya Prategang akibat Susut Beton (N)
CR = Kehilangan Gaya Prategang akibat Rangkak/Creep (N)
ES = Kehilangan Gaya Prategang akibat Perpendekan Elastis Beton (N)

Tabel 5.37 Perhitungan kehilangan gaya prategang akibat Relaksasi beton

Section	Δ *FRE*
m	*N*
0	792369.96
0,4	796754.06
1	797015.95
2	796081.25
3	756661.59
4	753549.90
5	750876.50
6	748243.33
7	745737.28
8	743158.70
9	740737.55
10	738469.93
11	736377.85
12	734479.81
13	732743.99
14	731243.76
15	729893.44
16	728765.29
17	727879.56
18	727241.58
19	726855.07
20	726733.23
20,4	723637.67
20,8	723681.93

Section	Δ *FRE*
m	*N*
21,8	727079.49
22,8	727611.99
23,8	728404.51
24,8	729451.15
25,8	730744.21
26,8	732260.98
27,8	733926.68
28,8	735771.60
29,8	737820.24
30,8	740055.00
31,8	742455.38
32,8	744997.72
33,8	747684.66
34,8	750285.57
35,8	752999.97
36,8	755741.61
37,8	758910.02
38,8	795170.99
39,8	802069.77
40,4	800953.88
40,8	793665.50

Tabel 5.38 Gaya prategang efektif setelah kehilangan total

Section	F $_{awal}$	ΔF $_{susut\ beton}$	ΔF $_{creep}$	ΔF $_{relaksasi}$	F $_{effektif}$
m	N	N	N	N	N
0	10688596.76	201311.35	437140.28	792369.96	9318669.00
0,4	10661137.56	151873.75	448010.09	796754.06	9326804.39
1	10635332.06	141500.75	454928.44	797015.95	9305517.09
2	10603951.94	134122.03	467005.71	796081.25	9271571.93
3	10547751.50	153249.82	762586.95	756661.59	8941032.37
4	10519904.35	157162.74	777238.00	753549.90	8898735.62
5	10491995.62	157162.74	790037.03	750876.50	8861587.98
6	10464339.50	157162.74	801047.16	748243.33	8826333.04
7	10437229.85	157162.74	809907.07	745737.28	8793546.05
8	10410939.76	157162.74	818775.70	743158.70	8761547.42
9	10385721.18	157162.74	825966.52	740737.55	8732051.97
10	10361804.64	157162.74	831844.31	738469.93	8704935.30
11	10339398.99	157162.74	836516.32	736377.85	8680282.72
12	10318691.20	157162.74	840093.20	734479.81	8658157.37
13	10300671.94	157162.74	843931.41	732743.99	8638230.41
14	10283749.44	157162.74	845863.95	731243.76	8621008.48
15	10268941.02	157162.74	847741.59	729893.44	8605748.39
16	10256346.72	157162.74	849088.33	728765.29	8592958.19
17	10246044.19	157162.74	849862.53	727879.56	8582740.91
18	10238088.66	157162.74	850127.41	727241.58	8575086.96
19	10232512.89	157162.74	849932.73	726855.07	8569979.12
20	10228643.60	157162.74	849215.75	726733.23	8566848.84
20,4	10235585.76	183651.90	850045.14	723637.67	8549631.08
20,8	10232758.84	183651.90	849748.54	723681.93	8547178.80

Section	F_{awal}	$\Delta F_{susut\ beton}$	ΔF_{creep}	$\Delta F_{relaksasi}$	$F_{effektif}$
m	N	N	N	N	N
21,8	10220069.95	157162.74	847577.98	727079.49	8559875.61
22,8	10217495.29	157162.74	846226.15	727611.99	8558326.82
23,8	10216514.49	157162.74	844351.19	728404.51	8558653.65
24,8	10217105.74	157162.74	841928.46	729451.15	8560860.98
25,8	10219224.82	157162.74	838921.38	730744.21	8564944.71
26,8	10222804.99	157162.74	835399.24	732260.98	8570787.10
27,8	10227756.93	157162.74	831866.03	733926.68	8577864.91
28,8	10233968.64	157162.74	827864.15	735771.60	8586488.52
29,8	10241305.43	157162.74	822959.26	737820.24	8596927.86
30,8	10249609.80	157162.74	817063.19	740055.00	8609125.72
31,8	10258701.47	157162.74	810085.64	742455.38	8623006.91
32,8	10268377.32	157162.74	801936.18	744997.72	8638476.42
33,8	10278411.45	157162.74	792262.35	747684.66	8655651.92
34,8	10288555.19	157162.74	782757.50	750285.57	8672815.58
35,8	10298537.21	157162.74	771262.98	752999.97	8691648.43
36,8	10308063.65	157162.74	758132.77	755741.61	8711581.90
37,8	10316818.33	153249.82	743287.61	758910.02	8735885.16
38,8	10352930.91	134122.03	475869.33	795170.99	9022377.33
39,8	10358934.80	101627.03	450778.26	802069.77	9078852.52
40,4	10370413.17	127154.94	436360.41	800953.88	9080076.99
40,8	10417881.15	201311.35	426532.50	793665.50	9067130.61

5.4.4.2 Analisa Tegangan Gelagar Fase Konstruksi

- Tegangan ijin penampang
  - Tegangan tekan = 29,88 MPa
  - Tegangan tarik = -4,07 MPa

$$f_{atas} = \frac{F_i}{A_C} - \frac{F_i . e. Y_a}{I_X} + \frac{M_G . Y_a}{I_X}$$

$$f_{bawah} = \frac{F_i}{A_C} + \frac{F_i . e. Y_b}{I_X} - \frac{M_G . Y_b}{I_X}$$

Tabel 5.39 Tegangan gelagar pada fase service

Section	Gaya	Tegangan (*f*)			
		Atas		Bawah	
m	N	MPa	Kontrol	MPa	Kontrol
0	9259949.42	2.7145	OK	9.2954	OK
0,4	9266785.56	2.3566	OK	9.7224	OK
1	9244325.50	2.8292	OK	9.1406	OK
2,1	9209428.54	3.5236	OK	8.2832	OK
3	8879903.20	6.0277	OK	11.8937	OK
4	8837023.53	6.7497	OK	10.8208	OK
5	8799423.96	7.4387	OK	9.8044	OK
6	8763833.57	8.0930	OK	8.8394	OK
7	8730813.63	8.7212	OK	7.9155	OK
8	8698671.18	9.2779	OK	7.0902	OK
9	8669108.35	9.8029	OK	6.3138	OK
10	8641988.82	10.2893	OK	5.5948	OK
11	8617386.72	10.7364	OK	4.9348	OK
12	8595354.90	11.1434	OK	4.3348	OK
13	8575555.03	11.4904	OK	3.8209	OK

Section	Gaya	Tegangan (*f*)			
		Atas		Bawah	
m	*N*	MPa	Kontrol	MPa	Kontrol
14	8558485.12	11.8120	OK	3.3475	OK
15	8543394.23	12.0803	OK	2.9507	OK
16	8530783.53	12.3044	OK	2.6194	OK
17	8520750.02	12.4856	OK	2.3516	OK
18	8513278.95	12.6239	OK	2.1479	OK
19	8508348.75	12.7188	OK	2.0084	OK
20	8505342.50	12.7707	OK	1.9314	OK
20,4	8488073.73	12.7890	OK	1.8677	OK
20,8	8485512.59	12.7843	OK	1.8683	OK
21,8	8498064.79	12.7320	OK	1.9673	OK
22,8	8496257.53	12.6460	OK	2.0796	OK
23,8	8496267.91	12.5168	OK	2.2543	OK
24,8	8498104.96	12.3446	OK	2.4913	OK
25,8	8501769.32	12.1294	OK	2.7904	OK
26,8	8507148.77	11.8697	OK	3.1537	OK
27,8	8513726.30	11.5561	OK	3.5926	OK
28,8	8521819.27	11.1945	OK	4.0997	OK
29,8	8531705.40	10.7911	OK	4.6675	OK
30,8	8543336.07	10.3462	OK	5.2953	OK
31,8	8556645.57	9.8602	OK	5.9823	OK
32,8	8571549.20	9.3338	OK	6.7278	OK
33,8	8588175.83	8.7732	OK	7.5233	OK
34,8	8604819.72	8.1382	OK	8.4194	OK
35,8	8623174.84	7.4739	OK	9.3589	OK
36,8	8642686.48	6.7712	OK	10.3530	OK
37,8	8666638.43	6.0313	OK	11.4075	OK

Section	Gaya	Tegangan (*f*)			
		Atas		Bawah	
m	*N*	MPa	Kontrol	MPa	Kontrol
38,7	8950859.29	2.5504	OK	9.0710	OK
39,8	9007310.80	2.3615	OK	9.3673	OK
40,4	9008663.80	2.2907	OK	9.4518	OK
40,8	8998898.29	2.6380	OK	9.0334	OK

Persen kehilangan gaya prategang yang terjadi :

		Persen %
Slip angkur	=	3.00
Gesekan dan wobble	=	2.32
Perpendekan elastis	=	2.16
Susut beton	=	1.569
Rangkak Beton	=	7.168
Relaksasi Baja	=	6.193
Total Kehilangan :	=	22.41 %

1%	T.Y Lyn
	T.Y Lyn
	T.Y Lyn
6%	T.Y Lyn
5%	T.Y Lyn
8%	T.Y Lyn
20.00 %	

- Perhitungan Kontrol Lendutan

Akibat gaya prategang dan berat sendiri balok (Bentang 40 m).

F0 = 8488073.73 N

E = 43798.83 MPa

I = 715824564368.0120 mm^4

Berat sendiri (q) = 18.588 N/mm

e = 1103.813 mm

L = 40800 mm

- Saat Service

  Wp $= \frac{8.F0.e}{L^2}$

  $= 45.0271$ N/mm

  W $=$ Wp – q

  $= 45.0271 - 18.588$

  $= 26.44$ N/mm

  $\Delta 0$ $= \frac{5.w.L^4}{384.EI}$

  $= 30.43$ mm < 50 mm **OK** *Keatas* ↑

  - Lendutan tambahan

    Akibat plat lantai dan aspal

    W $= 19.853$ N/mm

    $\Delta 1$ $= \frac{5.w.L^4}{384.EI}$

    $= 41.07$ mm *Kebawah* ↓

    Akibat diafragma

    W $= 2.569$ N/mm

    $\Delta 1$ $= \frac{5.w.L^4}{384.EI}$

    $= 5.314$ mm *Kebawah* ↓

    Akibat UDL dan KEL

    W_{UDL} $= 15.227$ N/mm

    $\Delta 2$ $= \frac{5.w.L^4}{384.EI}$

    $= 17.52$ mm *Kebawah* ↓

W_{KEL} = 3.279 N/mm

Δ3 = $\frac{5.w.L^4}{384.EI}$

= 3.77 mm *Kebawah* ↓

Total Lendutan Tambahan :

Δ1 + Δ2 + Δ3 = 41.07 + 5.314 + 17.52 + 3.77

Δtot = 67.679 mm *Kebawah* ↓

Lendutan yang terjadi :

Δ0 (service) + Δtot = 30.43 + (-67.679)

= -37.252 mm

= -3.72 cm *Kebawah* ↓

1/360 x Bentang (40.8) = 113.3 mm *Kebawah* ↓

Kontrol : 37.252 mm < 113.3 mm …. **OK**

(Halaman sengaja dikosongkan)

6.3 Desain Pilar 2- Pilar 4

6.3.1 Desain Dimensi Pilar 2 –Pilar 4

Dalam desain pilar menggunakan acuan dari peraturan BMS BDM 1992 dan BMS BDC 1992. Pilar terdiri dari beberapa elemen, yaitu pondasi, pile cap (poer), dinding pilar, longitudinal stopper, dan pier head. Penulangan pilar direncanakan dari analisis elemen – elemen pilar jembatan. Analisis pembebanan untuk pilar terdiri atas beban dari bangunan atas baik beban hidup maupun beban mati, beban mati pilar, beban rem, beban angin, serta beban gempa. Berikut ini adalah analisis pembebanan serta elemen – elemen penyusun dan pelengkap pilar.

Data-data desain pilar 2

- ✓ Elevasi muka tanah asli : +1.36 LWL
- ✓ Elevasi lantai kendaraan : +8.584 LWL
- ✓ Tinggi pilar rencana : 7.227 m
- ✓ Lebar pilar : 16 m
- ✓ Panjang bentang jembatan : 40 m
- ✓ Pondasi : Tiang pancang

Data-data desain pilar 3

- ✓ Elevasi muka tanah asli : +1.36 LWL
- ✓ Elevasi lantai kendaraan : +9.496 LWL
- ✓ Tinggi pilar rencana : 8.138 m
- ✓ Lebar pilar : 16 m
- ✓ Panjang bentang jembatan : 40 m
- ✓ Pondasi : Tiang pancang

Data-data desain pilar 4

- ✓ Elevasi muka tanah asli : +1.36 LWL
- ✓ Elevasi lantai kendaraan : +10.630 LWL
- ✓ Tinggi pilar rencana : 9.272 m
- ✓ Lebar pilar : 16 m
- ✓ Panjang bentang jembatan : 40 m
- ✓ Pondasi : Tiang pancang

6.3.2 Desain Pondasi Pilar 2-Pilar 4

Berdasarkan analisis dari data penyelidikan tanah pada pilar arah Kenjeran didapatkan nilai SPT berdasarkan titik bor 2 STA 0+300 (lihat pada lampiran) pada kedalaman 25 m sehingga dipakai jenis pondasi tiang pancang.

6.3.2.1 Analisis Pembebanan pada Pilar 3

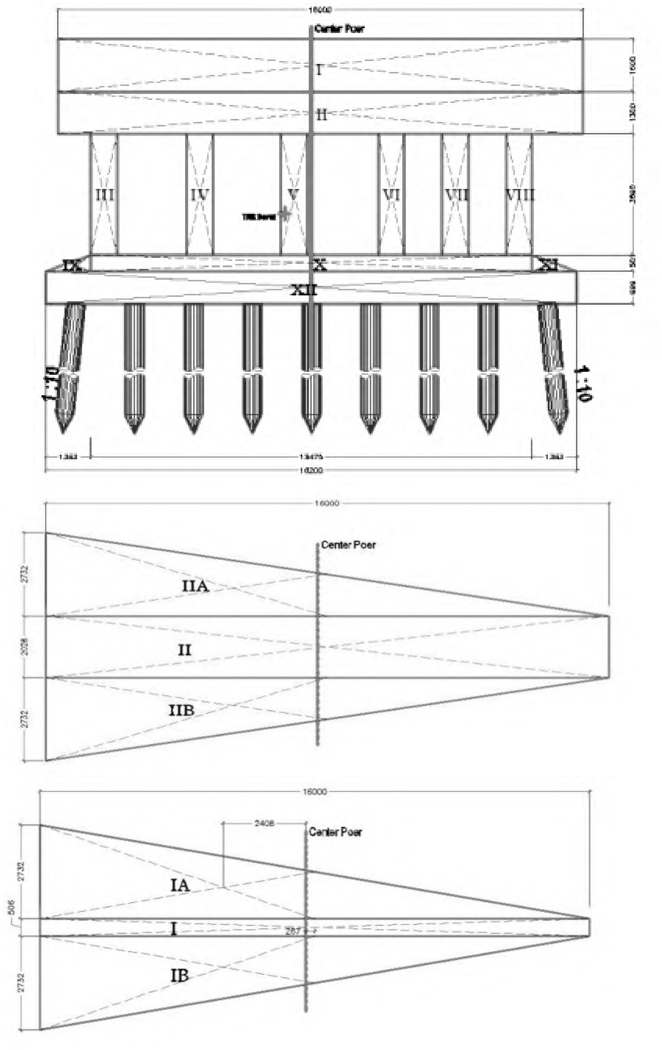
1. Beban mati bangunan atas

Tabel 6.37 Gaya reaksi V_{abt} akibat beban mati bangunan atas pilar 3

No.	Uraian	V_{abt} (kN)
1	Plat lantai kendaraan	4080.00
2	RC Plat	856.80
3	Lapisan aspal	448.80
4	Lapisan overlay	448.80
5	Genangan air hujan	319.872
6	Tiang sandaran	69.46
7	Gelagar beton pratekan	6544.8
8	Diafragma	718
9	Instalasi ME dan tiang PJU	20.00
	Jumlah	13506.54

2. Berat sendiri pilar

Dalam perhitungan beban/berat sendiri pilar dibagi atas beberapa segmen. Hal ini untuk memudahkan dalam analisis. Analisis berat pilar didapat dari volume per segmen dikalikan dengan berat jenis (γ), kemudian dilanjutkan dengan menghitung statis momen titik tangkap gaya/titik berat pilar terhadap center pilar.



Gambar 6.19 Potongan memanjang pilar 3

Tabel 6.38 Perhitungan berat sendiri pilar 3

segmen	Volume	Berat (*w*)	*y*	*z*
	m^3	*KN*	*M*	*m*
1	14.08	352.00	0.267	7.09
1A	34.97	874.24	-2.408	7.09
1B	34.97	874.24	-2.408	7.09
2	35.73	893.20	0.267	5.74
2A	24.04	601.04	-2.408	5.74
2B	24.04	601.04	-2.408	5.74
3	3.71	92.69	-6.337	3.35
4	3.71	92.69	-3.412	3.35
5	3.71	92.69	0.532	3.35
6	1.85	46.35	2.432	3.35
7	1.85	46.35	4.388	3.35
8	1.85	46.35	6.338	3.35
9	3.07	76.64	-7.194	1.17
10	60.64	1515.94	0.000	1.25
11	3.07	76.64	7.194	1.17
12	145.80	3645.00	0.000	0.50
	berat total	9927.10		

Tabel 6.39 Perhitungan statis momen pilar 3

segmen	*w. y*	*w. z*
	KNm	*KNm*
1	93.98	2495.68
1A	-2105.17	6198.36
1B	-2105.17	6198.36
2	238.48	5126.97
2A	-1447.30	3449.97

segmen	*w. y*	*w. z*
	KNm	*KNm*
2B	-1447.30	3449.97
3	-587.39	310.06
4	-316.27	310.06
5	49.31	310.06
6	112.71	155.03
7	203.37	155.03
8	293.74	155.03
9	-551.37	89.41
10	0.00	1894.92
11	551.37	89.41
12	0.00	1822.50
	-7017.00	32210.82

Sehingga, didapat titik berat atau titik tangkap gaya :

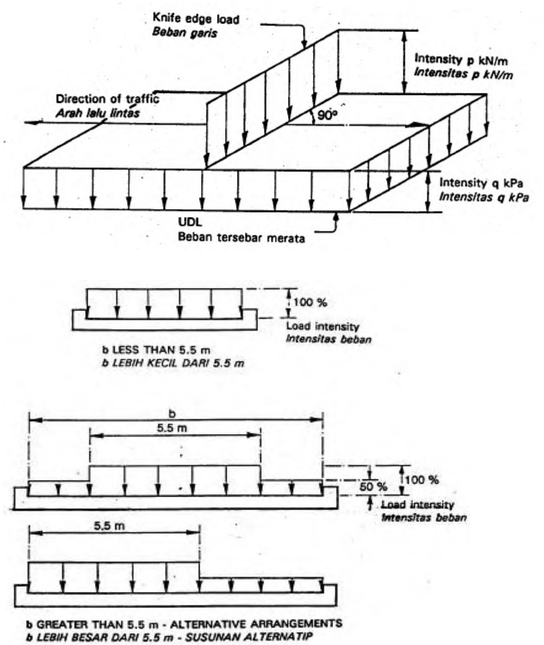
y = -0.7069

z = 3.2447

6 Beban hidup lalu-lintas

Beban lalu lintas (lajur ”D”) untuk rencana bangunan bawah jembatan jalan raya terdiri dari UDL dan KEL dimana akan ditempatkan melintang pada lebar penuh dari jalan kendaraan jembatan dan menghasilkan pengaruh pada jembatan ekuivalen dengan rangkain kendaraan sebenarnya. Jumlah total pembebanan lajur ”D” yang ditempatkan tergantung pada lebar jalan kendaraan jembatan.

Asumsi pembebanan KEL dan UDL seperti yang ditunjukkan dalam gambar di bawah ini :



Gambar 6.20 Asumsi beban hidup lalu-lintas

- ✓ Panjang bentang jembatan (L) = 40.8 m
- ✓ Lebar Perkerasan Jembatan (b) = 10 m
- ✓ Beban KEL (P_{kel}) = 49 kN/m
- Faktor beban dinamis (1+DLA) = 1.4
- ✓ Beban UDL (qUDL) = 9 kN/m^2

Total beban UDL jembatan = 2846 kN
$(((5{,}5xq_{UDL}) + ((b - 5{,}5)\ x\ 0{,}5x\ q_{UDL})\ x\ L$

Total beban UDL atas pilar = 2846 kN
$(((5{,}5xq_{UDL}) + ((b - 5{,}5)\ x\ 0{,}5x\ q_{UDL})\ x\ L$

Total Beban KEL jembatan = 532 kN

$$\left[\left(5{,}5\ x\left(P_{KEL}(1+DLA)\right)\right]+\left[b-5{,}5\ x\ (0{,}5\ x\left(P_{KEL}(1+DLA)\right)\right]$$

Total Beban KEL atas pilar = 532 kN

$$\left[\left(5{,}5\ x\left(P_{KEL}(1+DLA)\right)\right]+\left[b-5{,}5\ x\ (0{,}5\ x\left(P_{KEL}(1+DLA)\right)\right]$$

Total Beban Hidup Lalu Lintas = 4190 Kn

7 Beban Gempa

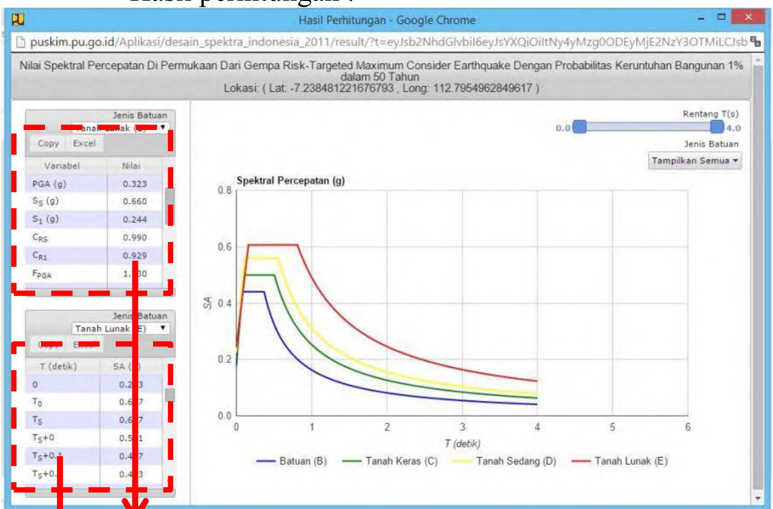
⇔ Analisis respon spectrum input SAP2000:

Analisis beban gempa berdasarkan perhitungan data grafik respon spectrum gempa dari PUSKIM Desain Spektra Indonesia 2011.

Perhitungan beban gempa :

Diketahui :

- ✓ Zona gempa = Zona 2
- ✓ Wilayah = Surabaya
- ✓ Jenis tanah = Tanah lunak
- ✓ Hasil perhitungan :

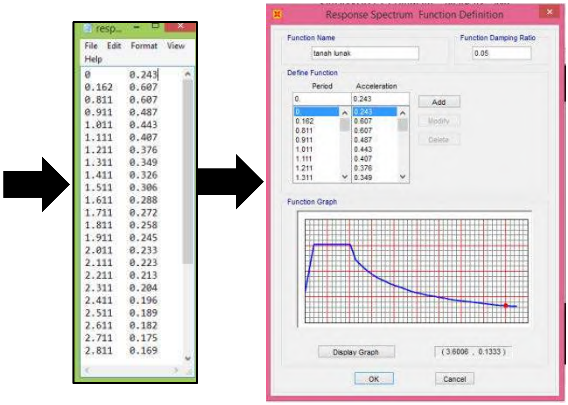


Data grafik respon specktrum

Data tanah lunak

Data tanah lunak dan data grafik Surabaya input SAP2000:

TANAH LUNAK	
PGA (g)	0.323
SS (g)	0.66
S1 (g)	0.243
CRS	0.99
CR1	0.929
FPGA	1.13
FA	1.379
FV	3.023
PSA (g)	0.365
SMS (g)	0.911
SM1 (g)	0.738
SDS (g)	0.607
SD1 (g)	0.492
T0 (detik)	0.162
TS (detik)	0.811



- ✓ Faktor keutamaan (I)

  I = 1,0
- ✓ Faktor reduksi gempa

  R = 5,0 - 6,0 untuk kolom majemuk.

  Digunakan factor reduksi = 6,0
- ✓ Massa struktur (Mass source)

  Massa untuk struktur akan ditentukan berasal dari :
  1) Berat sendiri struktur (*self weight*) seperti pilar.
  2) Beban mati tambahan (*super dead*) seperti bangunan atas, dll.
- ✓ Faktor pengali

  Sesuai dengan SNI 03-1726-2002 pasal 7.2.1, maka input *response spectrum* diberi nilai pengali sebesar I/R dengan I adalah factor keutamaan dan R adalah factor reduksi gempa. Karena nilai input C pada *response spectrum* dinyatakan dalam gravitasi bumi (g), maka untuk input juga akan ditambahakan juga factor pengali sebesar g = 9,81 m/detik^2.

  Untuk wilayah zona gempa 2 untuk tanah lunak, maka nilai-nilai tersebut adalah sebagai berikut :

  I = 1,0

R = 6,0
g = 9.81 m/detik^2
Faktor pengali = I/R x g
= 1,0 / 6,0 x 9,81 = 1,633

⇔ Analisis beban gempa statis ekivalen:

Analisis beban gempa berdasarkan BMS 1992 pasal 2.4.7. beban gempa direncanakan dengan metode beban horisontal statis ekivalen. Beban gempa bangunan atas yang masuk pada abutment direncanakan 100% dari total beban.

Perhitungan Beban Gempa :

$$T_{EO} = C.I.S.\ W$$

- ✓ Zona gempa = Zona 2
- ✓ Keofisien Geser (C) = 0.21
- ✓ Faktor kepentingan (*I*) = 1
- ✓ Faktor type bangunan = 1
- ✓ Beban mati ½ bangunan atas = 13507 kN
- ✓ Beban mati pilar (w)
  Pilar 3 = 9927 kN
- ✓ Beban gempa akibat bangunan atas = 2836 kN
- ✓ Beban gempa akibat berat pilar
  Pilar 3 = 2085 kN

8 Beban angin

Gaya angin pada bangunan atas tergantung luas ekuivalen diambil sebagai luas padat jembatan dalam elevasi proyeksi tegak lurus. Gaya nominal akibat angin bergantung pada kecepatan angin rencana. Beban angin yang diperhitungkan berdasarkan BMS 1992 adalah sebagai berikut :

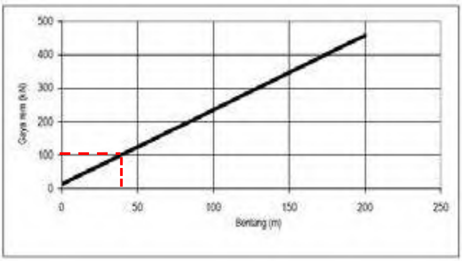
$$T_{EW} = 0{,}0006\ x\ C_w\ x\ {V_w}^2\ x\ A_b$$

- ✓ Kecepatan angin rencana (V_w) = 30 m/s
- ✓ Lebar jembatan (b) = 16.00 m

- ✓ Tinggi sampan jembatan (d) = 3.30 m
- ✓ Bentang jembatan = 45.75 m
- ✓ Luas bagian samping jembatan (A_b) = 113.24 m^2
- ✓ Rasio *b/d* = 4.85
- ✓ Koefisien seret (C_w) = 1.25
- ✓ Gaya angin (T_{EW}) = 76.43 kN

9 Beban rem (Breaking force)

Pengaruh percepatan dan pengereman dari lalu-lintas harus diperhitungkan sebagai gaya dalam arah memanjang. Beban rem yang diperhitungkan berdasarkan RSNI T-02-2005 untuk jembatan dengan panjang bentang 40m adalah = 100 kN/Lajur (2.75m), karena terdapat 2 lajur makan beban rem yang terjadi sebesar = 200 kN.



Gambar 6.21 Gaya rem perlajur 2,75 m (KBU)

10 Gaya Sentrifugal

Gaya setrifugal pada jembatan yang berada pada tikungan harus memperhitungkan bekerjanya suatu gaya horisontal radial. Gaya horisontal tersebut harus sebanding dengan beban lajur D yang dianggap ada pada semua jalur lalu lintas. Gaya sentrifugal harus bekerja secara bersamaan dengan pembebanan "D" atau "T" dengan pola yang sama sepanjang jembatan. Gaya sentrifugal diperhitungakan berdasarkan dengan rumus sebagai berikut:

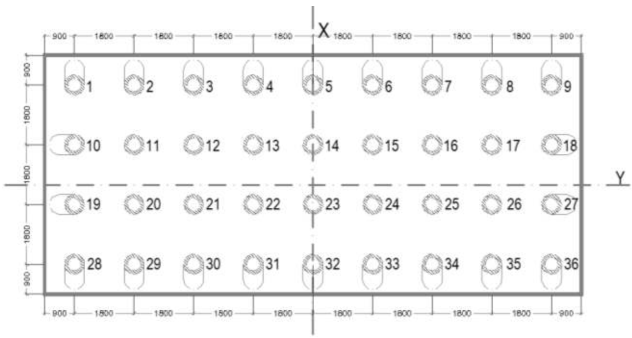
$$T_{TR} = 0{,}006 \; x \; \frac{V^2}{r} \; x \; T_T$$

- Pembebanan lalu lintas total (Lajur D) yang bekerja (TT) = 2845.80 kN
- Kecepatan lalu lintas rencana (km/jam) V = 40.00 KM/Jam
- Jari-jari lalu lintas rencana = 135 m
- Gaya sentrifugal (TTR) = 202.37 kN

6.3. Perhitungan Gaya Aksial Tiang Pancang

Dari analisis pembebanan diatas, maka langkah selanjutnya adalah analisis momen dan gaya. Perhitungan momen dan gaya tersebut dipusatkan pada center poer. Berikut ini hasil perhitungan momen dan gaya yang bekerja pada poer ditunjukkan pada Tabel 6.39 berikut :

Konfigurasi Tiang Pancang :

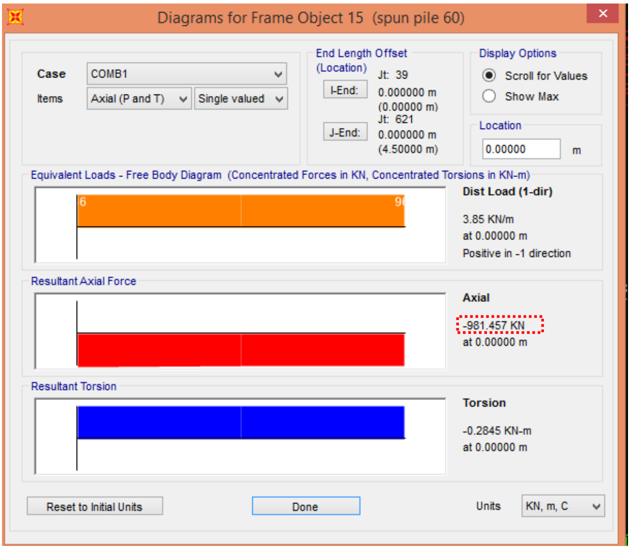


Gambar 6.22 Konfigurasi tiang pancang pilar 2-4

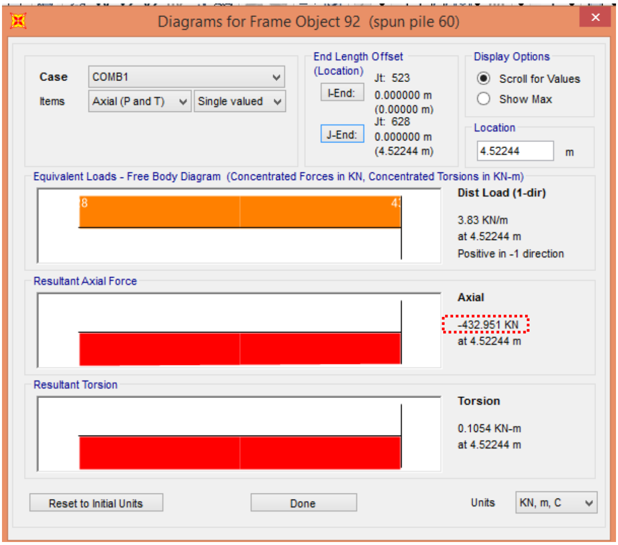
Tabel 6.40 Kombinasi Pembebanan yang pada kondisi layan.

Kombinasi Pembebanan	Faktor beban x beban yang bekerja pada struktur
Kombinasi 1	1,0 PMS +1,0 PMA+ 1,0 TTD+1,0 TTB
Kombinasi 2	1,0 PMS +1,0 PMA+ 1,0 TTD+(30%TEQx +100%TEQy)
Kombinasi 3	1,0 PMS +1,0 PMA+ 1,0 TTD+(100%TEQx +30%TEQy)

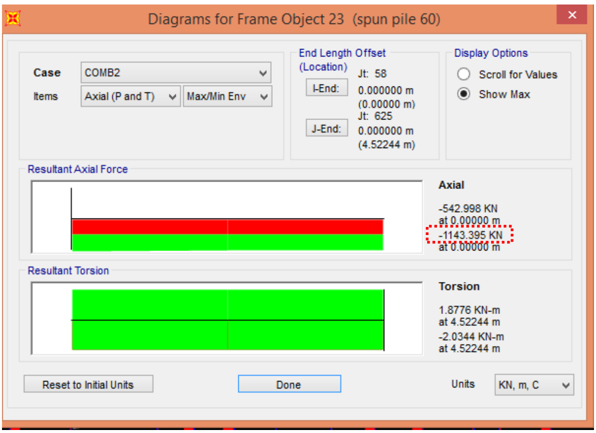
Sumber : SNI T-02-2005



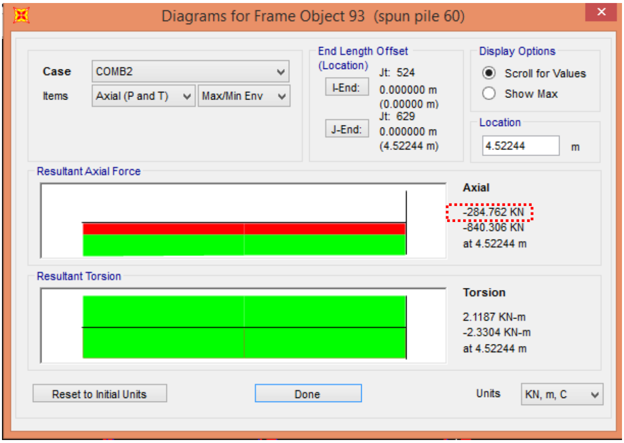
Gambar 6.23 Pmax tiang pancang pilar 3 kombinasi 1Layan



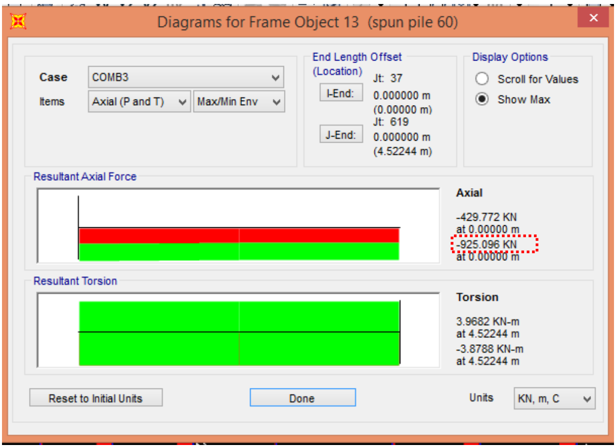
Gambar 6.24 Pmin tiang pancang pilar 3 kombinasi 1Layan



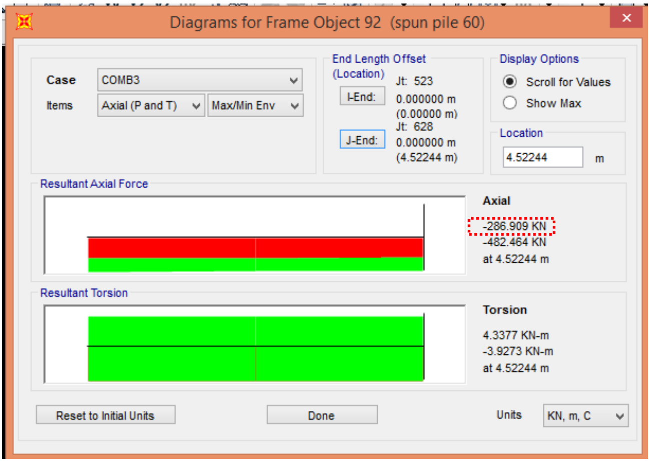
Gambar 6.25 Pmax tiang pancang pilar 3 kombinasi 2Layan



Gambar 6.26 Pmin tiang pancang pilar 3 kombinasi 2Layan



Gambar 6.27 Pmax tiang pancang pilar 3 kombinasi 3Layan



Gambar 6.28 Pmin tiang pancang pilar 3 kombinasi 3Layan

Tabel 6.41 Rekapitulasi beban (P) pada pile (kondisi Layan)

Kombinasi Pembebanan	Beban P_{layan} yang bekerja pada tiang	
	P max	P min
	Kn	*Kn*
Kombinasi 1	*981.457*	*432.951*
Kombinasi 2	*1143.395*	*284.761*
Kombinasi 3	*925.096*	*286.909*

Sumber : Output SAP2000

6.3.2.2 Perhitungan Daya Dukung Tanah

Dari Tabel 6.41 dapat diketahui nilai maksimum (Pmax) Gaya aksial tiang pancang akibat beban tetap (kombinasi 1) adalah *981.457*KN dan nilai minimum (Pmin) adalah *432.951*, sedangkan nilai maksimum (Pmax) Gaya aksial tiang pancang akibat beban sementara (kombinasi 2) adalah *1143.395* kN dan nilai minimum (Pmin) adalah *284.761* kN, Gaya aksial tiang pancang akibat beban sementara (kombinasi 3) adalah *925.096* kN dan nilai minimum (Pmin) adalah *286.909* kN.

Dari hasil kemampuan tiang pancang didapat hasil reaksi berupa gaya aksial tekan maka akan dikontrol dengan daya dukung tanah akibat tekan. Perhitungan daya dukung tanah berdasarkan tiang pancang yang berdiameter 0,60 m dan berdasarkan data penyelidikan tanah SPT pada titik bor BH2. Daya dukung tanah dihitung berdasarkan rumus dan hasilnya ditunjukkan berikut :

Perhitungan berikut ini berdasarkan rumus **Kazuto Nazakawa.**

$$R_a = \frac{1}{n} Ru$$

$$R_u = \frac{1}{n} [(qd.A) + (U.\Sigma li.fi)]$$

Keterangan :

Ra = Daya dukung tanah yang diizinkan (kN)
Rp = Daya dukung dari unsur bearing (kN)
Rf = Daya dukung dari unsur lekatan/skin friction (kN)
n = Faktor keamanan
qd = Daya dukung dari unsur bearing (kN/m^2)
A = Luas penampang dasar tiang (m^2)
U = Panjang keliling tiang (m)
Li = Tebal lapisan tanah dengan memperhitungkan geseran dinding tiang (m)
Fi = Besaran gaya geser maksimum dari lapisan tanah dengan memperhitungkan geseran dinding tiang (kN/m^2)

- Perhitungan daya dukung tiang Pilar 3 kedalam 24 m.

$$\acute{N} = \frac{N1+N2}{2}$$
$$= \frac{43+(43+22+21)}{2}$$
$$= 36$$

Keterangan :

Ń = Harga N rata-rata untuk perencanaan tanah pondasi pada ujung tiang

N1 = Harga N pada ujung tiang

Ń2 = Harga rata-rata N pada jarak 4D dari ujung tiang

4D = 2.4 m

- Panjang ekivalensi dari penetrasi tiang

  l = 1.1 m

- Daya dukung pada ujung tiang

  $\frac{l}{D} = 1{,}833$

  $\frac{qd}{\acute{N}} = 14$

  qd = 14Ń = 14 x 36 = 501.667 ton/m^2

  = 5016.7 kN/m^2

  Rp = A . qd = $\frac{\prod .0{,}62}{4}$ x 501.667 ton/m^2

  = 141.771 ton

  = 1417.71 kN

- Menghitung gaya geser dinding tiang

Kedalaman	Ketebalan lapisan li (m)	Tanah	Harga rata-rata N	fi (Ton/m²)	li.fi (Ton)
0-2	2	Lanau berlempung	1.0	1.00	2.0
2-10	8	Lempung berlanau pasir	1.6	1.56	12.4
10-11	1	Lanau pasir berkerikil	7.0	7.00	7.0
11-16	5	Lempung berlanau berpasir	15.0	12.00	60.0

Kedalaman	Ketebalan lapisan li (m)	Tanah	Harga rata-rata N	fi (Ton/m²)	li.fi (Ton)
16-19	3	Lempung lanau berpasir kerikil	21.5	12.00	36.0
19-23	4	Lanau pasir berlempung	20.6	12.00	48.0
23-24	1	Pasir berkerikil berbatu	32.5	10.00	10.0
Jumlah					175

- Rf = U.∑li.fi = ∏ x 0,6 x 175
  = 330.537 Ton
  = 3305.373 kN
- Daya dukung ultimate
  Ru = (Rp + Rf)
  = qd.A + U.∑li.fi
  = 141.771+ 330.537
  = 472.31 ton
  = 4723.1 kN
- Daya dukung yang diijinkan (Tekan)
  Ra = ⅓ Ru
  = ⅓ 472.31 ton
  = 157.44 ton
  = 1574.4 kN (Beban tetap)
  Ra = ½ Ru
  = ½ 472.31 ton
  = 236.23 ton
  = 2362.38 kN (Beban sementara)
- Daya dukung yang diijinkan (Tarik)
  Ra = ⅓ Rf
  = ⅓ 330.537ton

= 110.23 ton
= 1102.35 kN (Beban tetap)

Ra = ½ Rf
= ½ 330.537ton
= 165.35 ton
= 1653.53kN (Beban sementara)

6.3.2.4 Perhitungan Efisiensi Tiang Pancang

Untuk menghitung daya dukung tiang kelompok direncanakan konfigurasi dan koefisien efisiensinya

Efisiensi tiang kelompok dihitung dengan rumus Converse - Labbare :

$$\boldsymbol{\eta = 1 - arc\ tan\left(\frac{D}{k}\right)\ x\ \frac{(n-1)m + (m-1)n}{90.m.n}}$$

η = koefisien kelompok tiang pancang
D = diameter tiang pancang (m)
k = jarak antar tiang tegak lurus sumbu x
m = jumlah tiang dalam satu kolom (buah)
n = jumlah tiang dalam satu baris (buah)

$$\eta = 1 - arc\ tan\left(\frac{0,6}{1,8}\right)\ x\ \frac{(8-1)4 + (4-1)8}{90.4.8}$$

$$= 1 - arc \tan 0,333\, x\ \frac{28 + 24}{2880}$$

$$= 1 - 18.43\ x\ \frac{52}{2880}$$

$$= 1 - 18.43\ x\ 0,0181$$

$$= 1 - 0.333$$

$$= 0,667$$

Tabel. 6.42 P_{ijin} tiangpancang Ø0,6 m kedalaman 24 m

Data tanah	P_{ijin} Tekan beban sementara	P_{ijin} Tekan beban tetap
	KN	KN
BH2	1576.265	1050.843

6.3.2.5 Kontrol Kekuatan Tiang Pancang

Setelah mendapat P yang terjadi maka dilakukan analisis kontrol kekuatan tiang pancang terhadap gaya dan momen yang bekerja serta kontrol geser pons untuk mengetahui kemampuan beton menahan geser.

Dari wika pile classification direncanakan tiang pancang beton prategang dengan :

- Diameter tiang pancang = 0.6 m
- Tebal (t) = 0.1 m
- Kelas = C
- Mutu beton f'c = 49.8 MPa
- Allowable axial load = 2290 kN
- Bending momen crack = 290 kNm
- Bending momen ultimate = 580 kNm
- Modulus elastisitas beton = 119948
  $Ec = (wc)^{1,5}.0,043.\sqrt{fc'}$
- Momen inersia tiang pancang = $\dfrac{1}{64}\pi\,(D^4 - d^4)$

  = 510509 cm^4

10.2.2.5 Kontrol terhadap Gaya Aksial Vertikal

Daya dukung suatu tiang harus ditinjau berdasarkan kekuatan tanah tempat tiang ditanam. Hasil daya dukung yang terendah adalah yang menentukan yang dipakai sebagai daya dukung ijin tiang.

- Berdasarkan kekuatan bahan
  Kekuatan tekan (maksimal) terhadap gaya aksial vertikal untuk tiang pancang Ø0,6m adalah 2290 kN.
  Sedangkan beban vertikal maksimal yang diterima tiang adalah sebesar :
  2290 kN > **1143.395 kN→OK**
- Berdasarkan daya dukung tanah
  Berdasarkan analisa perhitungan daya dukung tanah (data SPT) dari perumusan *Kazuto Nazakawa* didapatkan besarnya daya dukung ijin tanah terhadap pondasi tiang pancang prestressed concrete spun pile Ø0,6m dengan kedalaman 24 m diperoleh Qijin seperti yang ditabelkan berikut ini :

Tabel 6.43 Kontrol daya dukung tanah

Data tanah	P_{ijin} Tekan beban sementara	P_{ijin} Tekan beban tetap
	KN	KN
BH2	1576.27 > 1143.395	1050.843 > 981.457
	OK	**OK**

6.3.2.6 Kontrol terhadap Beban Horizontal

Gaya-gaya horisontal (Hx) diperoleh dari gaya searah dengan arah sumbu x, diantarnya : Beban 100% akibat gempa (Struktur atas + pilar).

$$Hx = 4921.1 \text{ kN}$$
$$\sum Hx = 100\%\ Hx + 30\%\ Hy$$
$$= 5363.96 \text{ kN}$$

$$\text{H1 tiang} = \frac{\sum Hx}{Jumlah\ tiang}$$
$$= \frac{5363.96 \text{ kN}}{36}$$
$$= 149.00 \text{ kN}$$

Gaya-gaya horisontal (Hy) diperoleh dari Beban searah sumbu y, diantaranya : 30% akibat gempa (Struktur atas + abutment).

Hy = 1476.32 kN

∑Hy = 100% Hy + 30% Hx
= 2952.64 kN

H1 tiang $= \frac{\sum Hy}{Jumlah\ tiang}$

$= \frac{2952.64\ \text{kN}}{36}$

= 82.02 kN

Kemampuan tambahan tiang menahan gaya horisontal bila diijinkan adanya pergeseran posisi ujung tiang sebesar d.

$$H_{ijin} = \frac{k.\ D.\ d}{\beta}$$

$$k = 0{,}2\ x\ E_O\ x\ D^{-3/4}\ x\ y^{-1/2}$$

Eo = Modulus deformasi tanah pondasi (28N, Nilai N diambil NSPT rata-rata sampai pada kedalaman tiang pancang yang masuk kedalam tanah).

d = Pergeseran posisi ujung tiang (cm) = 2.5 cm

D = Diameter tiang pancang (0,6 m)

ß $= \sqrt[4]{\frac{k.D}{4EI}}$

E = Modulus elastisitas beton tiang

I = Momen inersia penampang

$$k = 0{,}2xE_Ox\ D^{-3/4}\ x\ y^{-1/2}$$

$$= 0{,}2\ x\ 28\overline{N_{SPT}}\ x\ D^{-3/4}\ x\ y^{-1/2}$$

$$= 0{,}2\ x\ 28.\ 1\ x\ 60^{-3/4}\ x\ 1^{-1/2}$$

$$= 0,2\ x\ 28\ x\ 60^{-3/4}\ x\ 1^{-1/2}$$

$$= 0.1643$$

$$\beta \quad = \sqrt[4]{\frac{k.\ D}{4EI}}$$

$$= \sqrt[4]{\frac{0.1643\ x\ 60}{4\ x\ 119948\ x\ 510609}}$$

$$= \sqrt[4]{\frac{9.85725}{2.45\ x\ 10^{11}}}$$

$$= 0,00252$$

$$H_{ijin} = \frac{k.\ D.\ d}{\beta}$$

$$= \frac{0.1643.\ 60.\ 2,5}{0,00252}$$

$$= 97.841\ KN$$

Hijin $= \frac{97.841\ KN}{2}$ = 48.921 kN

Kontrol :

Hx 1 tiang < *H ijin*

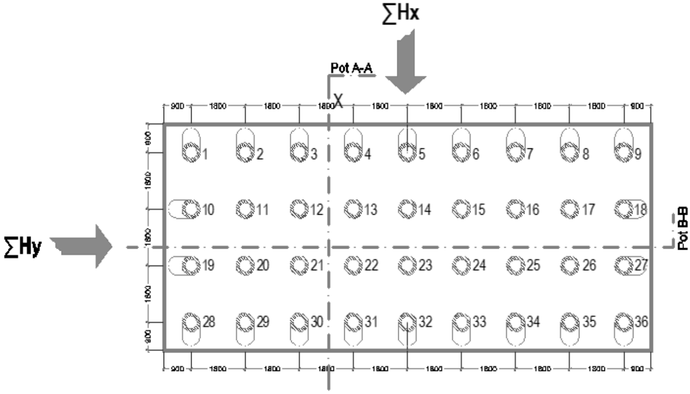
149.00 kN >48.921 kN …**NOT OK**

Hy 1 tiang < *H ijin*

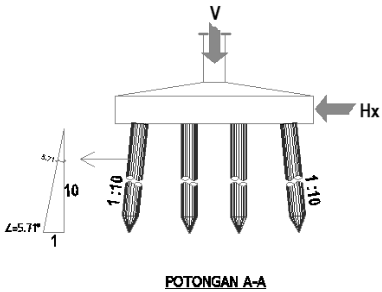
82.02 kN >48.921 kN …**NOT OK**

Kesimpulan dari perhitungan diatas bahwa H1 tiang > H_{ijin} maka perlu dilakukan pemasangan tiang pancang miring.

6.3.2.7 Kontrol Tiang Pancang Miring



- Tiang Pancang Miring arah X



α = 5.711

sin α = 0.0995

Rumus mencari jumlah tiang pancang miring :

$$H_{ijin\ total} + N1.Psin\,\alpha \ \geq \sum Hx$$

Keterangan :

H ijin 1 tiang	= 48.92 kN
H ijin total	= 2201.4 kN
Daya dukung tiang pancang	= 2362.4 kN

dalam grup SF=2 (P)

Total gaya horizontal arah x (∑Hx) = 4921.1 kN

Jumlah tiang pancang miring (N1) = …?

$$H_{ijin\,total} + N1. Psin\,\alpha \quad \geq \sum Hx$$

$$2201.4 \text{ kN} + \text{N1. } 235.1 \sin \alpha \quad \geq 4921.1 \text{ kN}$$

$$\text{N1. } 235{,}1 \quad \geq 4921.1 - 2201$$

$$\text{N1} \quad \geq \frac{2719.64}{235.1}$$

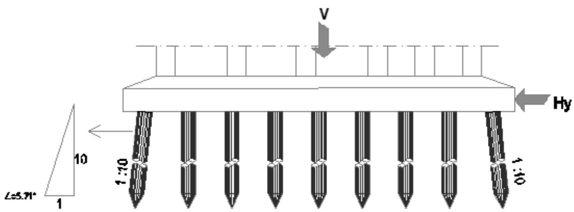
$$\text{N1} \quad \geq 11.57 \sim \mathbf{16.00}$$

Kontrol :

$$H_{ijin\,total} + 14. Psin\,\alpha \ \geq \sum Hx$$

$$5962.43 \quad \geq 4921.1 \text{ kN} \qquad \ldots\textbf{OK}$$

- Tiang Pancang Miring arah Y



α = 5.711

sin α = 0.0995

Rumus mencari jumlah tiang pancang miring :

$$H_{ijin\,total} + N1. Psin\,\alpha \ \geq \sum Hx$$

Keterangan :

H ijin 1 tiang = 48.92 kN

H ijin total = 2201.4 kN

Daya dukung tiang pancang dalam grup SF=2 (P)	= 2362.4 kN
Total gaya horizontal arah x (∑Hx)	= 2952.65 kN
Jumlah tiang pancang miring (N1)	= …?

$$H_{ijin\ total} + N1.\ Psin\ \alpha \qquad \geq \sum Hx$$

$$2201.4 \text{ kN} + \text{N1. } 235.1 \sin\alpha \quad \geq 2952.65 \text{ kN}$$

$$\text{N1. } 235{,}1 \quad \geq 2952.65 - 2201$$

$$\text{N1} \quad \geq \frac{751.21}{235.1}$$

$$\text{N1} \quad \geq 3.20 \sim \mathbf{4.00}$$

Kontrol :

$$H_{ijin\ total} + 4.\ Psin\ \alpha \ \geq \sum Hx$$

$$3141.67 \quad \geq 2952.64 \text{ kN} \quad \ldots\textbf{OK}$$

6.3.2.8 Kontrol terhadap Momen

Momen maksimum yang terjadi pada tiang pancang dihitung dengan perumusan :

$$M_m = 0{,}2079\ x \left(\frac{H}{2.\beta}\right)$$

$$k \quad = 0{,}2xE_O x\ D^{-3/4}\ x\ y^{-1/2}$$

$$= 0{,}2\ x\ 28\overline{N_{SPT}}\ x\ D^{-3/4}\ x\ y^{-1/2}$$

$$= 0{,}2\ x\ 28.\ 1\ x\ 60^{-3/4}\ x\ 1^{-1/2}$$

$$= 0{,}2\ x\ 28\ x\ 60^{-3/4}\ x\ 1^{-1/2}$$

$$= 0.1643$$

$$\beta = \sqrt[4]{\frac{k.\ D}{4EI}}$$

$$= \sqrt[4]{\frac{0.1643\ x\ 60}{4\ x\ 119948\ x\ 510509}}$$

$$= \sqrt[4]{\frac{9.857}{2.45\ x\ 10^{11}}}$$

$$= 0{,}00252$$

$$H = \frac{\sqrt{Hx^2 + Hy^2}}{36}$$

$$= \frac{5137.74}{36} = 142.72$$

$$M_m = 0{,}2079\ x\ \left(\frac{H}{2.\beta}\right)$$

$$= 58.90\ KNm$$

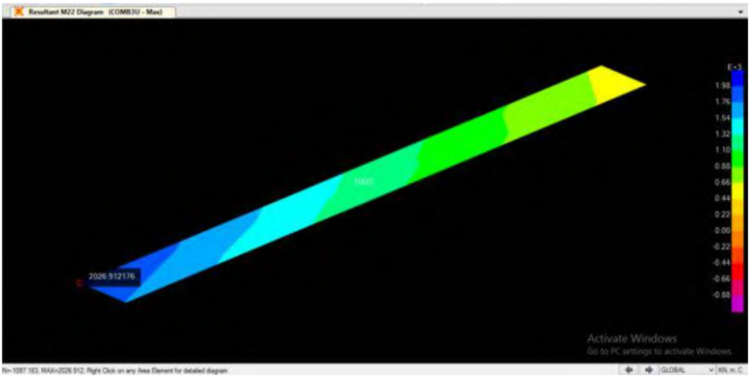
Mm	$< M_{crack}$	
58.90 KNm	< 290 kNm	… **OK**

6.3.3 Desain Poer (Pile Cap)

Perhitungan analisis poer berdasarkan pembebanan dalam keadaan batas (ultimate). Beban yang dihitung dari beban P yang terjadi pada tiang pancang, perhitungan analisis momen poer diambil dari SAP2000 :

Tabel 6.44 Momen pada poer kondisi ultimit pilar 3 (*output SAP2000)*

	Kombinasi 1U 1.3PMS+1.8TTD+1.8TTB	Kombinasi 2U 1.3PMS+1.8TTD+Ex+30%Ey	Kombinasi 3U 1.3PMS+1.8TTD+30%Ex+Ey
	Kn.m	Kn.m	Kn.m
M11	1233.2266	1109.4556	1235.5905
	-345.1357	-375.8048	-347.0068
M22	1624.4488	1551.9312	2026.9122
	-168.1429	-187.0958	-238.0809



Gambar 6.29 Momen pilecap pilar 3 output SAP2000

Sehingga untuk desain tulangan poer dipakai reaksi dari kombinasi 3U (1,3 PMS + 1,8 LL + 30% Ex + Ey). Momen yang dipakai untuk perhitungan penulangan poer adalah :

Mu = 2026.9122 kN.m

6.3.3.1 Perhitungan penulangan poer

Fc' = 29.05 MPa
Fy = 400 MPa
h = 1500 mm
b = 1000 mm
Tebal selimut (d') = 70 mm
Tinggi effesien (d) = 1401 mm

D *Tul lentur* = D32 mm
Ø *Tul bagi* = D16 mm

⇔ <u>Penulangan Lentur :</u>

K_{TD}^{U} = 0,9

M* $= \frac{Mu}{0,9}$
= 2252 kNm
= 2252124667 Nmm

Rn $= \frac{M*}{b.d^2}$
$= \frac{2252124667}{1000\ .\ 1401^2}$
=1,147

β_1 = 0,85

$$\rho b = \frac{0,85\ .fc'}{fy}.\beta 1.\left[\frac{600}{600+fy}\right]$$

$$= \frac{0,85.29.05}{400}.0,85.\left[\frac{600}{600+400}\right]$$

= 0,031

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

ρ_{max} = 0,75 . ρb
= 0,75 . 0,035
= 0,0236

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

$$= \frac{400}{0{,}85 \; x \; 29.05}$$
$= 16.20$

ρ_{perlu} $= \frac{1}{m} \left(1 - \sqrt{1 - \frac{2m \; xRn}{fy}}\right)$

$= \frac{1}{16.20} \left(1 - \sqrt{1 - \frac{2(16.20)x1.147}{400}}\right)$

$= 0.0029$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{\ min} < \rho < \rho_{\ max}$

0.0035 > 0.0026 < 0,0236…… **TIDAK OK**

Sehingga ρ tulangan yang digunakan :

ρ_{min} = 0.0035

Luas tulangan :

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

= 0,0035 x 1000 mm x 1401 mm

= 4903.5.0 mm^2

Dipasang tulangan lentur **D32-150**

($As_{\ terpasang}$ = 5361.65 mm^2)

⇔ <u>Penulangan Pembagi :</u>

A_{st} = 20 % x $As_{\ perlu}$

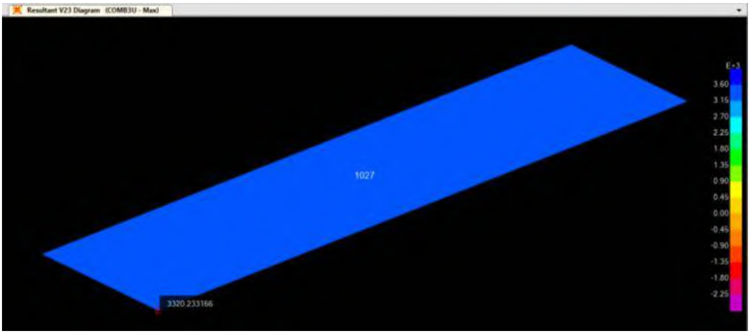
= 980.7 mm^2

Dipasang tulangan **D16 – 150**

($As_{\ terpasang}$ = 1340.41 mm^2)

Tabel 6.45 Geser pada poer kondisi ultimit (*output SAP2000)*

	Kombinasi 1U	Kombinasi 2U	Kombinasi 3U
	Kn	Kn	Kn
V13	2451.85	2131.24	2412.41
	-3716.07	-3131.98	-3279.44
V23	3704.33	3085.63	3320.23
	-3704.33	-3085.63	-3320.23



Gambar 6.30 Geser (Vu) pile cap pilar 3

<u>Kontrol Geser :</u>

V_u = 3716.07 kN

K_C^R = 0,85

$V^* = \frac{3716.07 \text{ kN}}{0.85}$

= 4371.847 KN

$ß_1$ = 1.1

$ß_2$ = 1

$ß_1$ = 1

Batas kehancuran badan

Vu_{max} = 0.2 x f'c x bv x d

= 0.2 x 29.05 x 1000 x 1401

= 8139810 N

= 8139.81 kN

Kekuatan geser tanpa tulangan geser (Vuc)

$$Vuc = ß1 \times ß2 \times ß3 \times bv \times d \times [\frac{(Ast \times fc)}{(bv \times d)}]^{1/3}$$

$$= 1.1 \times 1 \times 1 \times 1000 \times \times [\frac{(Ast \times 29.05)}{(1000 \times 1401)}$$

= 57110.524 N

= 57.110 KN

Kekuatan geser dengan tulangan geser minimum

Vu_{min} = Vuc + (0,6 x bv x d)

= 57.110 KN+ (0,6 x 1000 x 1401)
= 840657.1105 KN

Kontrol

Apakah :	V* <	Vu maks	
	4371.847 KN<	8139.81 kN	…**OK**
Apakah :	V* <	K_C^R x Vu min	
	4371.847 KN<	0,85 x 840657.11 kN	
	4371.847 KN<	714558.54 KN...**OK**	
Apakah :	V* <	K_C^R x Vuc	
	4371.847 KN>	0,85 x 57.11 KN	
	4371.847 KN>	48.54 …**NOTOK**	

Maka, dari analisa/control diatas, perlu untuk menghitung keperluan tulangan geser:

- Menghitung Kekuatan Geser yang diperlukan dari tulangan geser :

$$V_{US} = V^*/K_C^R - V_{UC}$$

$$= \frac{4371.847 \text{ KN}}{0.85} - 57.11 \text{ KN}$$

= 5143.3495 KN - 57.11 kN
= 5086.239 KN

- Menghitung tulangan geser
Luas tulangan geser yang diperlukan (A_{sv}) :

$$A_{SV} = \frac{V_{US.}\, S}{fy.\, d}$$

$$= \frac{5086.239\, KN \;\; KN \text{ x } 250}{400\, MPa\, x\, 1401}$$

=1815.217 mm^2

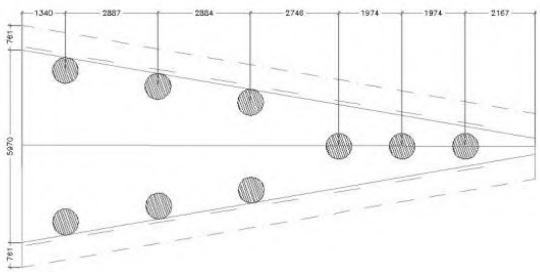
Dipasang tulangan **D16– 200 (2 kaki)**
(As $_{terpasang}$ = 2010.6 mm^2)

6.3.4 Desain Kolom Pilar 3

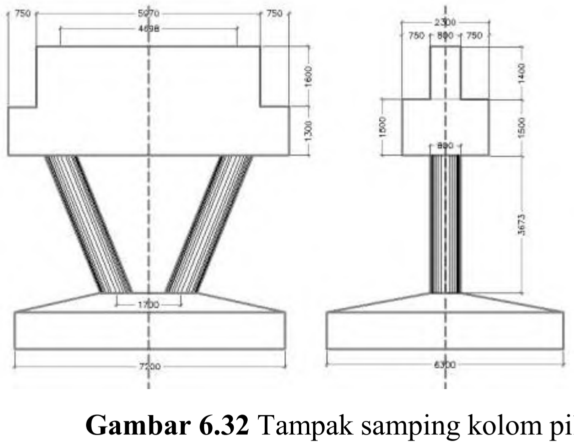
Perhitungan analisis dinding pilar berdasarkan pembebanan dalam keadaan batas (ultimate). Berikut di bawah ini analisis desain kolom pilar.

6.3.4.1 Analisis Pembebanan Kolom Pilar 3

Analisis pembebanan kolom pilar 2 dengan beban yang bekerja yaitu beban sendiri, beban lalu lintas dan beban gempa. Perhitungan beban dihitung dengan aplikasi SAP2000 dimana beban – beban tersebut dikalikan dengan faktor beban batas.



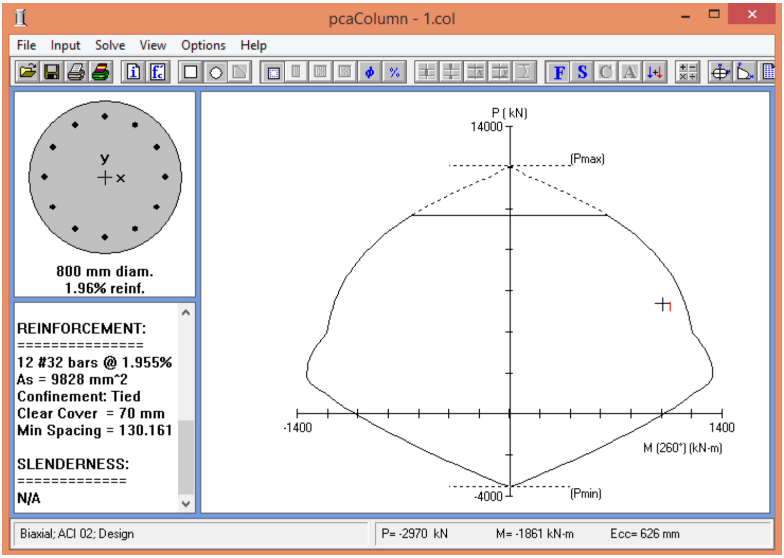
Gambar 6.31 Tampak atas kolom pilar 3



Gambar 6.32 Tampak samping kolom pilar 3

6.3.4.2Perhitungan penulangan kolom

Fc’	= 29.05 MPa
Fy	= 400 MPa
Diameter	= 800 mm
Tebal selimut (d’)	= 70 mm
Tinggi efektif (d’)	= 701 mm
D *Tul lentur*	= D32 mm



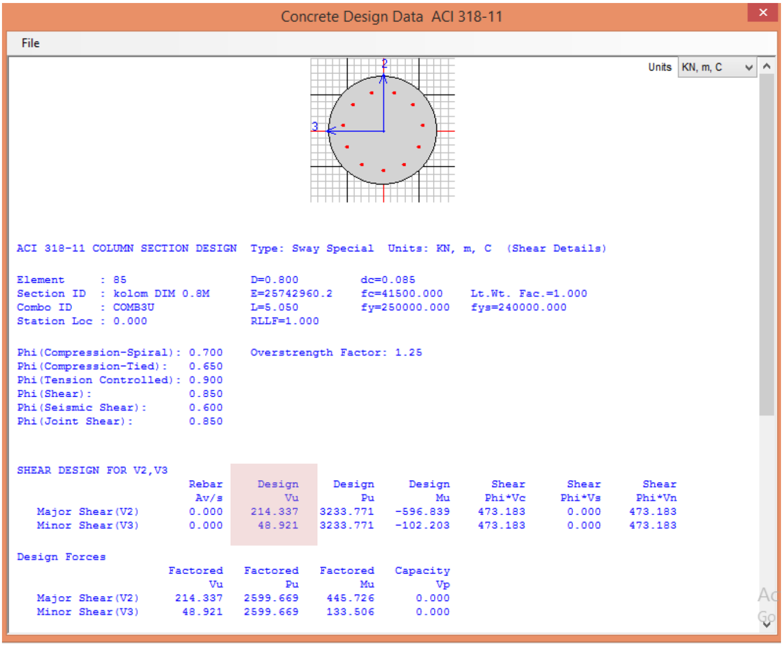
Gambar 6.33 Output PcaColomn kolom pilar 3

As = 9828 mm^2

= 12 - D32

Jadi, dipasang tulangan utama kolom 1 sebanyak 12 buah diameter 32.

Kontrol Geser



Gambar 6.34 Gaya geser (Vu) kolom pilar 3

V_u = 214.337 kN

K_C^R = 0,85

$$V^* = \frac{212.23\ \text{kN}}{0.85}$$

= 252.161 KN

β_1 = 1.1

β_2 = 1

β_1 = 1

Batas kehancuran badan

Vu_{max} = 0.2 x f'c x bv x d

= 0.2 x 29.05 x 800 x 704.5

= 3258248 N

= 3258.248 kN

Kekuatan geser tanpa tulangan geser (Vuc)

Vuc = ß1 x ß2 x ß3 x bv x d x $[\frac{(\text{Ast x fc})}{(\text{bv x d})}]^{1/3}$

= 1.1 x 1 x 1 x 800 x x $[\frac{(\text{Ast x } 29.05)}{(800\text{x } 701)}$

= 104684.58 N

= 104.685 KN

Kekuatan geser dengan tulangan geser minimum

Vu_{min} = Vuc + (0,6 x bv x d)

= 104.685 kN + (0,6 x 800 x 701)

= 336584.685 KN

Kontrol

Apakah :	V*	<	Vu maks	
	252.161 KN	<	3258.248 kN	…**OK**
Apakah :	V*	<	K_C^R x Vu min	
	252.161 KN	<	0,85 x 336584.68 KN	
	252.161 KN	<	286096.982 KN...**OK**	
Apakah :	V*	<	K_C^R x Vuc	
	252.161 KN	>	0,85 x 104.7 KN	
	252.161 KN	>	88.9819	…**NOTOK**

Maka, dari analisa/control diatas, perlu untuk menghitung keperluan tulangan geser:

- Menghitung Kekuatan Geser yang diperlukan dari tulangan geser :

$$V_{US} = V^*/K_C^R - V_{UC}$$

$$= \frac{252.161 \text{ KN}}{0.85} - 104.7 \text{ KN}$$

= 296.660 KN- 104.7 KN

= 191.976 KN

- Menghitung tulangan geser

  Luas tulangan geser yang diperlukan (A_{sv}) :

$$A_{SV} = \frac{V_{US.}\, S}{fy.\, d}$$

$$= \frac{191.976 \ KN \times 250}{400 \ MPa \ x \ 701}$$

$$= 171.16229 \ mm^2$$

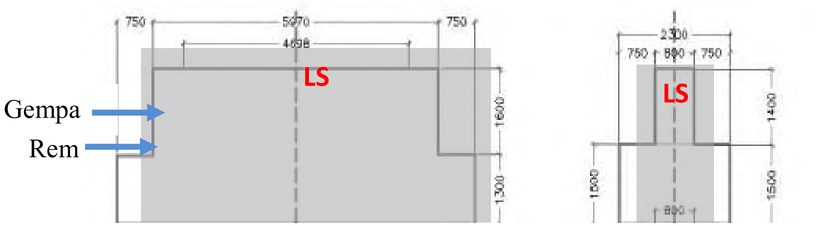
Dipasang tulangan **D16– 250 (2 kaki)**
(As $_{terpasang}$ = 1608.5 mm^2)

6.3.5 Desain Longitudinal Stopper

Perhitungan analisis longitudinal stopper berdasarkan pembebanan dalam keadaan batas (ultimate). Berikut di bawah ini analisis desain pier head :

6.3.5.1 Analisis Pembebanan Longitudinal Stopper

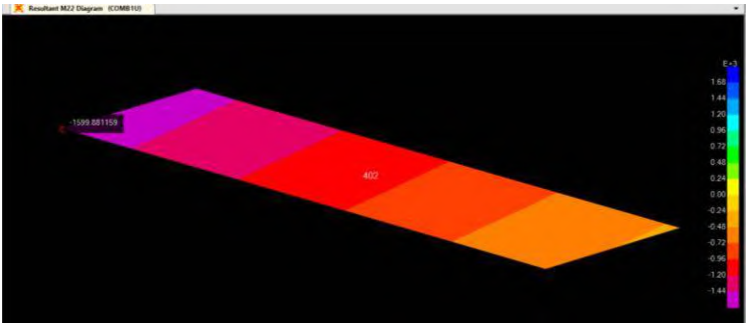
Analisis pembebanan longitudinal stopper ditunjukkan pada Gambar 6.35 dengan beban yang bekerja yaitu beban sendiri, beban lalu lintas, beban rem dan beban gempa. Perhitungan beban, gaya dan momen akan ditunjukkan pada Tabel 6.46 hasil output dari SAP2000.



Gambar 6.35 Analisis pembebanan pada longitudinal stopper

Tabel. 6.46 Momen pada longitudinal stopper pilar 3 kondisi ultimit (*output SAP2000)*

	Kombinasi 1U 1.3PMS+1.8TTD+1.8TTB	Kombinasi 2U 1.3PMS+1.8TTD+Ex+30%Ey	Kombinasi 3U 1.3PMS+1.8TTD+30%Ex+Ey
	Kn.m	Kn.m	Kn.m
M11	875.503	512.5058	464.5886
	-1377.9454	-1583.1857	-1386.8083
M22	99.7388	87.6798	89.0789
	-1599.8812	-1271.0124	-1342.671



Gambar 6.36 Momen longitudinal stopper pilar 3 *output SAP2000*

Untuk penulangan longitudinal stopper dipakai hasil reaksi dari kombinasi 1U dari perhitungan SAP2000. Momen yang dipakai untuk desain penulangan longitudinal stopper sebesar :

Mu = 1599.8812 kN.m

6.3.5.2 Perhitungan Penulangan Longitudinal Stopper

Fc’	= 29.05 MPa
Fy	= 400 MPa
h	= 2700 mm
b	= 1000 mm
Tebal selimut (d’)	= 70 mm

Tinggi effesien (d) = 2605mm
D *Tul lentur* = D25 mm
Ø *Tul bagi* = D13 mm

⇔ **Penulangan Lentur**

K_{TD}^{U} = 0,9

M* $= \frac{Mu}{0,9}$

= 1757 kNm

= 1756677778 Nmm

Rn $= \frac{M*}{b.d^2}$

$= \frac{1756677778}{1000\ .\ 2605^2}$

= 0.259

β_1 = 0,85

$$\rho b = \frac{0,85\ .fc'}{fy}.\beta 1.\left[\frac{600}{600+fy}\right]$$

$$= \frac{0,85.29.05}{400}\ .0,85.\left[\frac{600}{600+400}\right]$$

= 0,031

ρ_{min} $= \frac{1,4}{fy}$

$= \frac{1,4}{400}$

= 0,0035

$\rho_{min\ (2)}$ $= 1,333\ x\ \rho\ perlu$

= 0,0009

ρ_{max} = 0,75 . ρb

= 0,75 . 0,035

= 0,0236

m $= \frac{fy}{0,85\ x\ fc\prime}$

$$= \frac{400}{0{,}85 \ x \ 29.05}$$
$$= 16.20$$

$$\rho_{perlu} \quad = \frac{1}{m} \ (1 - \sqrt{1 - \frac{2m \ xRn}{fy}} \ )$$
$$= \frac{1}{16.20} \ (1 - \sqrt{1 - \frac{2(16.20) \ x \ 0.259}{400}} \ )$$
$$= 0.0007$$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{min} > \rho < \rho_{max}$

0.0035 > 0.0007 < 0,0236 …… **TIDAK OK**

Sehingga ρ tulangan yang digunakan :

$\rho_{min\ (2)} = 0.0009$

Luas tulangan :

$As_{perlu} = \rho_{min\ (2)}\ .\ b\ .\ d$

= 0,0009 x 1000 mm x 2605 mm

= 2254.5241 mm^2

Dipasang tulangan lentur **D25-200**

($As_{terpasang}$ = 2454.3639 mm^2)

⇔ Penulangan Pembagi :

A_{st} = 20 % x As_{perlu}

= 450.91 mm^2

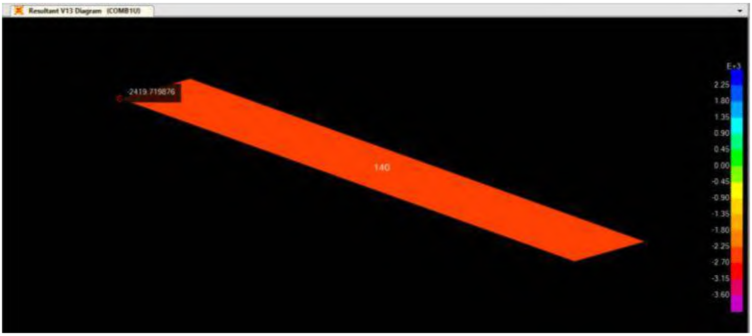
Dipasang tulangan **D16 –150**

($As_{terpasang}$ = 1340.4129 mm^2)

Kontrol Geser :

Tabel 6.47 Geser pada longitudinal stopper pilar 3 kondisi ultimit (*output SAP2000)*

	Kombinasi 1U	Kombinasi 2U	Kombinasi 3U
	Ton	Ton	Ton
V13	1296.87	1171.54	1361.98
	-2419.72	-1998.98	-2102.84
V23	2413.27	1891.33	2004.39
	-2413.27	-1891.33	-2004.39



Gambar 6.37 Gaya geser (Vu) longitudinal stopper pilar 3

V_u = 2419.72 KN

K_C^R = 0,85

$V^* = \frac{2419.72 \quad KN}{0.85}$

= 2846.73 KN

$ß_1$ = 1.1

$ß_2$ = 1

$ß_1$ = 1

Batas kehancuran badan

Vu_{max} = 0.2 x f'c x bv x d

= 0.2 x 29.05 x 1000 x 2605

= 15132145 N

= 15132.145 KN

Kekuatan geser tanpa tulangan geser (Vuc)

$Vuc = ß1 \text{ x } ß2 \text{ x } ß3 \text{ x bv x d x } [\frac{(Ast \text{ x } fc)}{(bv \text{ x } d)}]^{1/3}$

$= 1.1 \text{ x } 1 \text{ x } 1 \text{ x } 1000 \text{ x } 2605 \text{ x } [\frac{(Ast \text{ x } 29.05)}{(1000 \text{ x } 2605)}$

= 24302.625 N

= 24.30625 KN

Kekuatan geser dengan tulangan geser minimum

Vu_{min} = Vuc + (0,6 x bv x d)

= 24.0144 KN+ (0,6 x 1000 x2605)

= 1562724.014 KN

Kontrol

Apakah :	V*	<	Vu maks
	2846.73 KN	<	15132.145 KN …**OK**
Apakah :	V*	<	K_C^R x Vu min
	2846.73 KN	<	0,85 x 1562724.014KN
	2846.73 KN	<	1328315.412 KN...**OK**
Apakah :	V*	<	K_C^R x Vuc
	2846.73 KN	>	0,85 x 24.3026 KN
	2846.73 KN	>	20.4123….**NOTOK**

Maka, dari analisa/control diatas, perlu untuk menghitung keperluan tulangan geser:

- Menghitung Kekuatan Geser yang diperlukan dari tulangan geser :

$$V_{US} = V^*/K_C^R - V_{UC}$$

$$= \frac{2846.73 \text{ KN}}{0.85} - 24.3026 \text{ KN}$$

$$= 3349.093 \text{ KN} - 24.01444\text{KN}$$

$$= 3324.7908\, KN$$

- Menghitung tulangan geser

Luas tulangan geser yang diperlukan (A_{sv}) :

$$A_{SV} = \frac{V_{US.}\, S}{fy.\, d}$$

$$= \frac{3324.7908\, KN \text{ x } 200}{400\, MPa\, x\, 2605}$$

$$= 638.278 \text{ mm}^2$$

Dipasang tulangan **D13 – 200 (2 kaki)**

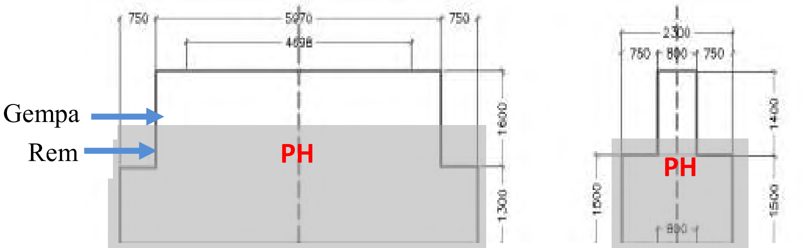
($As_{terpasang}$ = 1327.3mm^2)

6.3.6 Desain Pier Head

Perhitungan analisis pier head berdasarkan pembebanan dalam keadaan batas (ultimate). Berikut di bawah ini analisis desain Pier Head :

6.3.6.1 Analisis Pembebanan Pier Head

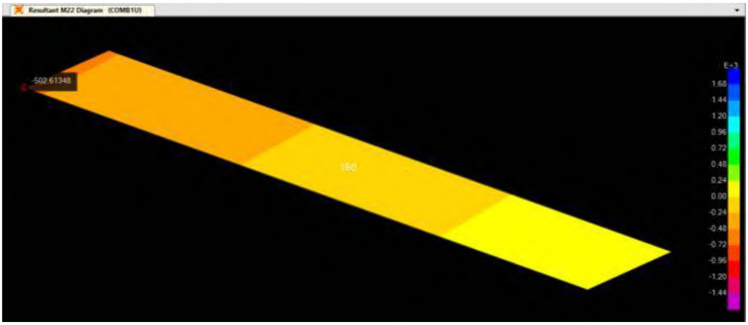
Analisis pembebanan pier head ditunjukkan pada Gambar 6.38 dengan beban yang bekerja yaitu beban sendiri, beban lalu lintas, beban rem dan beban gempa. Perhitungan beban, gaya dan momen akan ditunjukkan pada Tabel 6.48 hasil output dari SAP2000.



Gambar 6.38 Analisis pembebanan pada pier head

Tabel 6.48 Momen pada pier head pilar 3 kondisi ultimit (*output SAP2000)*

	Kombinasi 1U 1.3DL+1.8LL	Kombinasi 2U 1.3DL+1,8LL+Ex+30%Ey	Kombinasi 3U 1.3DL+1,8LL+30%Ex+Ey
	Kn.m	Kn.m	Kn.m
M11	324.4459	280.4026	289.2414
	-399.7576	-336.0575	-353.0161
M22	193.769	141.6961	139.5749
	-502.6135	-371.3077	-373.6953



Gambar 6.39 Momen pier head pilar 3 *Output SAP2000*

Untuk penulangan pier head dipakai hasil reaksi dari kombinasi 1U dari perhitungan SAP2000. Momen yang dipakai untuk desain penulangan pier head sebesar :

Mu = 502.6135 kNm

6.3.6.2 Perhitungan Penulangan Pier Head

Fc'	= 29.05 MPa
Fy	= 400 MPa
h	= 1100 mm
b	= 1000 mm
Tebal selimut (d')	= 70 mm
Tinggi effesien (d)	= 1006 mm
D *Tul lentur*	= D22 mm
Ø *Tul bagi*	= D13 mm

⇔ **Penulangan Lentur**

K_{TD}^{U} = 0,9

M* = $\frac{Mu}{0,9}$

= 558 kNm

= 5584594444.4 Nmm

Rn = $\frac{M*}{b.d^2}$

$= \frac{5584594444.4}{1000\ .\ 1006^2}$

$= 0.552$

$\beta_1 \quad = 0,85$

$$\rho b \quad = \frac{0,85\ .fc'}{fy}.\beta 1.\left[\frac{600}{600+fy}\right]$$

$= \frac{0,85.29.05}{400}\ .0,85.\left[\frac{600}{600+400}\right]$

$= 0,031$

$\rho_{\ min} \quad = \frac{1,4}{fy}$

$= \frac{1,4}{400}$

$= 0,0035$

$\rho_{\ min\ (2)} \quad = 1.333\ x\ \rho\ perlu$

$= 1.333\ x\ 0.0014$

$= 0,0019$

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

$= 0,75\ .\ 0,035$

$= 0,0236$

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

$= \frac{400}{0,85\ x\ 29.05}$

$= 16.20$

$\rho_{perlu} \quad = \frac{1}{m}\ (1 - \sqrt{1 - \frac{2m\ xRn}{fy}}\ )$

$= \frac{1}{16.20}\ (1 - \sqrt{1 - \frac{2(16.20)\ x\ 0.552}{400}}\ )$

$= 0.0014$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{min} > \rho < \rho_{max}$

0.0035 > 0.0014 < 0,0236 …… **TIDAK OK**

Sehingga ρ tulangan yang digunakan :

$\rho_{min\,(2)} = 0.0019$

Luas tulangan :

$As_{perlu} = \rho_{min\,(2)} \cdot b \cdot d$

$= 0,00019 \times 1000\ mm \times 1006mm$

$= 1866.91 mm^2$

Dipasang tulangan lentur **D22-200**

($As_{terpasang} = 1900.664\ mm^2$)

⇔ Penulangan Pembagi :

$A_{st} = 20\ \% \times As_{perlu}$

$= 373.38\ mm^2$

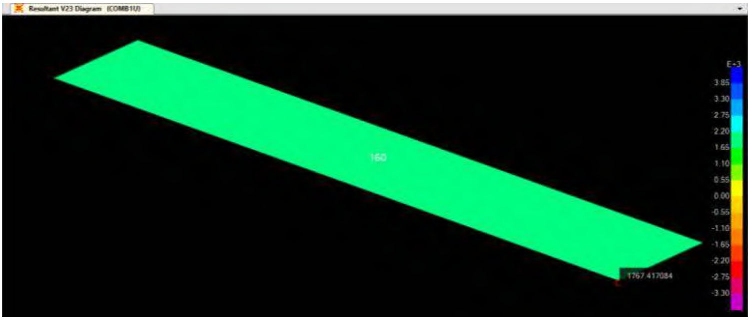
Dipasang tulangan **D16 –200**

($As_{terpasang} = 1005.3096\ mm^2$)

Kontrol Geser :

Tabel 6.49 Geser pada pier head pilar 3kondisi ultimit *output SAP2000)*

	Kombinasi 1U	Kombinasi 2U	Kombinasi 3U
	kN	kN	kN
V13	894.4	680.87	690.66
	-1062.34	-821.38	-812.5
V23	**1767.42**	1295.01	1321.28
	-1767.42	-1295.01	-1321.28



Gambar 6.40 Geser (Vu) pada pier head pilar 3

V_u = 1767.42 kN

K_C^R = 0,85

$V^* = \frac{1767.42\ \text{KN}}{0.85}$

= 2079.318 KN

$ß_1$ = 1.1

$ß_2$ = 1

$ß_1$ = 1

Batas kehancuran badan

Vu_{max} = 0.2 x f'c x bv x d

= 0.2 x 29.05 x 1000 x 1006

= 5844860 N

= 5844.86 KN

Kekuatan geser tanpa tulangan geser (Vuc)

$Vuc = ß1 \ \text{x}\ ß2 \ \text{x}\ ß3 \ \text{x bv x d x} \left[\frac{(\text{Ast x fc})}{(\text{bv x d})}\right]^{1/3}$

$= 1.1 \ \text{x}\ 1 \ \text{x}\ 1 \ \text{x}\ 1000 \ \text{x}\ 2604.5 \ \text{x}[\frac{(\text{Ast x }29.05)}{(1000 \text{ x } 1006)}$

= 198856 N

= 19.8856 KN

Kekuatan geser dengan tulangan geser minimum

$Vu_{\ min}$ = Vuc + (0,6 x bv x d)

= 19.8856 KN+ (0,6 x 1000 x2604.5)

= 603619.8856 KN

Kontrol

Apakah :	V*	<	Vu maks	
	2079.318 KN	<	5844.86 KN	…**OK**
Apakah :	V*	<	K_C^R x Vu min	
	2079.318 KN	<	0,85 x 603619.8856KN	
	2079.318 KN	<	513076.8397 KN...**OK**	
Apakah :	V*	<	K_C^R x Vuc	
	2079.318 KN	>	0,85 x19.8856 KN	
	2079.318 KN	>	16.902 kN…**NOTOK**	

Maka, dari analisa/control diatas, perlu untuk menghitung keperluan tulangan geser:

- Menghitung Kekuatan Geser yang diperlukan dari tulangan geser :

$$V_{US} = V^*/K_C^R - V_{UC}$$

$$= \frac{2079.318 \text{ KN}}{0.85} - 19.8856 \text{ KN}$$

$$= 2446.256 \text{ KN} - 19.8856 \text{ KN}$$

$$= 2426.371 \text{ KN}$$

- Menghitung tulangan geser

Luas tulangan geser yang diperlukan (A_{sv}) :

$$A_{SV} = \frac{V_{US}.\,S}{fy.\,d}$$

$$= \frac{2426.371 \text{ KN x } 150}{400\, MPa\, x\, 1006}$$

$$= 904.462 \text{ mm}^2$$

Dipasang tulangan **D13 –150 (2 kaki)**

($As_{terpasang}$ = 1769.8 mm^2)

Tabel 6.50 Rekapitulasi tulangan pilar 2 - pilar 4

	Tul. Lentur	Tul. Bagi	Tul. Geser
Pile Cap	D32	D16	D16 (2 kaki)
	150 mm	150 mm	200 mm
Kolom Dinding	D32		D16 (2 kaki)
	12 buah		250 mm
Longitudinal Stopper	D25		D13 (2 kaki)
	200 mm		200 mm
Pier Head	D22	D16	D13
	200	200 mm	150 mm

6.4 Desain Pilar 1

6.4.1 Desain Dimensi Pilar 1

Dalam desain pilar 13 menggunakan acuan dari peraturan BMS BDM 1992 dan BMS BDC 1992. Pilar terdiri dari beberapa elemen, yaitu pondasi, pile cap (poer), kolom pilar, longitudinal stopper, pier head. Penulangan pilar direncanakan dari analisis elemen – elemen pilar jembatan. Analisis pembebanan untuk pilar terdiri atas beban dari bangunan atas baik beban hidup maupun beban mati, beban mati pilar, beban rem, beban angin, serta beban gempa. Berikut ini adalah analisis pembebanan serta elemen – elemen penyusun dan pelengkap pilar.

Data-data desain pilar 1

- ✓ Elevasi muka tanah asli : +1.36 LWL
- ✓ Elevasi lantai kendaraan : +7.438 LWL
- ✓ Tinggi pilar rencana : 6.069 m
- ✓ Lebar pilar : 16 m
- ✓ Panjang bentang jembatan : 40 m
- ✓ Pondasi : Tiang pancang

6.4.2 Desain Pondasi Pilar 1

Berdasarkan analisis dari data penyelidikan tanah pada pilar arah Kenjeran didapatkan nilai SPT berdasarkan titik bor STA 0+010 (lihat pada lampiran) pada kedalaman 24 m sehingga dipakai jenis pondasi tiang pancang.

6.4.2.1 Analisis Pembebanan pada Pilar

1. Beban mati bangunan atas

Tabel 6.51 Gaya reaksi V_{abt} akibat beban mati bangunan atas kanan pilar 1

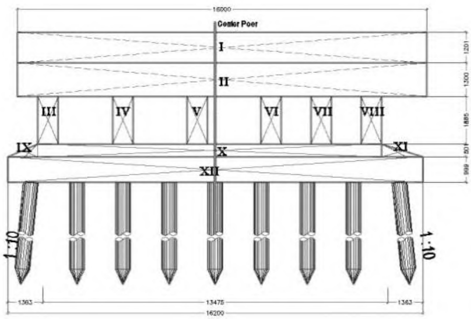
No.	Uraian	V_{abt} (kN)
1	Plat lantai kendaraan	2080.00
2	RC Plat	436.80
3	Lapisan aspal	228.80
4	Lapisan overlay	228.80
5	Genangan air hujan	163.072
6	Tiang sandaran	34.73
7	Gelagar beton pratekan	3272.4
8	Diafragma	359
9	Instalasi ME dan tiang PJU	20.00
	Jumlah	6823.60

Tabel 6.52 Gaya reaksi V_{abt} akibat beban mati bangunan atas kiri pilar 1

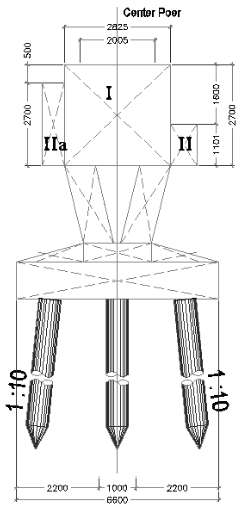
no	Uraian	V_{abt} (KN)
1	Plat lantai kendaraan 35cm	420.00
2	Lapisan Aspal	33.00
3	Lapisan Overlay	33.00
4	Genangan Air hujan	23.52
5	Tiang sandaran+pipa	7.47
6	Instalasi ME dan Salir	5.00
	Jumlah	261.00

2. Berat sendiri pilar

Dalam perhitungan beban/berat sendiri pilar dibagi atas beberapa segmen. Hal ini untuk memudahkan dalam analisis. Analisis berat pilar didapat dari volume per segmen dikalikan dengan berat jenis (γ), kemudian dilanjutkan dengan menghitung statis momen titik tangkap gaya/titik berat pilar terhadap center pilar.



Gambar 6.41 Potongan memanjang pilar 13



Gambar 6.42 Potongan melintang pilar 13

Tabel 6.53 Perhitungan berat sendiri pilar 1

segmen	Volume	Berat (*w*)	*y*	*z*	*x*
	m^3	*KN*	*m*	*m*	*m*
1	14.08	352.00	0.267	5.26	0.00
1A	18.28	456.96	-2.408	5.26	0.75
1B	18.28	456.96	-2.408	5.26	-0.75
2	35.55	888.80	0.267	3.91	0.00
2A	12.43	310.86	-2.408	3.91	1.48
2B	12.43	310.86	-2.408	4.61	-1.49
3	1.18	29.57	-6.527	2.43	0.75
3A	1.18	29.57	-6.527	2.43	-0.75
4	1.18	29.57	-3.607	2.43	0.75
4A	1.18	29.57	-3.607	2.43	-0.75
5	1.18	29.57	0.698	2.43	0.75
5A	1.18	29.57	0.698	2.43	-0.75
6	0.93	23.36	2.222	2.43	0.00
7	0.93	23.36	4.138	2.43	0.00
8	0.93	23.36	6.096	2.43	0.00
9	2.25	56.20	-7.194	1.17	1.74
10	44.47	1111.69	0.000	1.25	0.00
11	2.25	56.20	7.194	1.17	-1.74
12	106.92	2673.00	0.000	0.50	0.00
	berat total	6921.02			

Tabel 6.54 Perhitungan statis momen pilar 1

segmen	*w. y*	*w. z*	*w.x*
	KNm	*KNm*	*KNm*
1	93.98	1851.52	0.00
1A	-1100.36	2403.61	343.18
1B	-1100.36	2403.61	-341.96
2	237.31	3475.21	0.00
2A	-748.55	1215.46	460.38
2B	-748.55	1433.06	-462.15
3	-192.98	71.85	22.18
4	-106.65	71.85	-22.18
5	20.64	71.85	22.18
6	51.91	56.77	-22.18
7	96.67	56.77	22.18
8	142.41	56.77	-22.18
9	-404.33	65.57	97.85
10	0.00	1389.61	0.00
11	404.33	65.57	-97.85
12	0.00	1336.50	0.00
	-3354.53	16025.57	-0.54

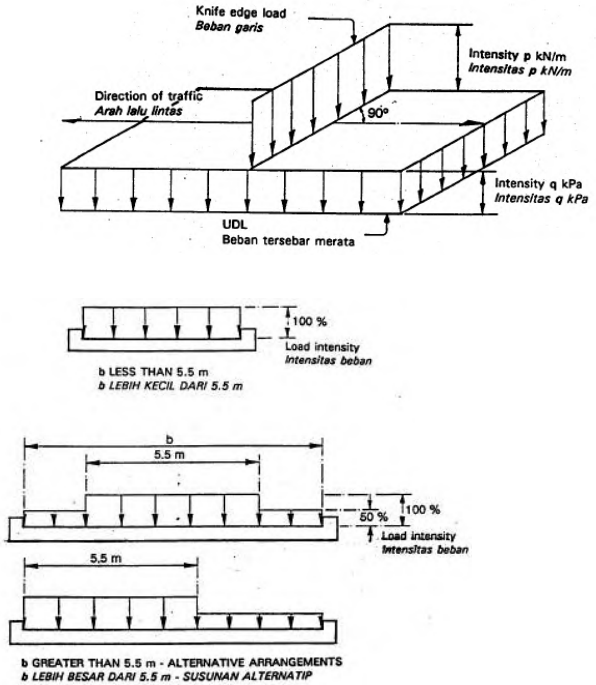
Sehingga didapatkan titik berat atau titik tangkap gaya :

x = -0.00008 m
y = -0.4847 m
z = 2.32 m

3. Beban hidup lalu-lintas

Beban lalu lintas (lajur ”D”) untuk rencana bangunan bawah jembatan jalan raya terdiri dari UDL dan KEL dimana akan ditempatkan melintang pada lebar penuh dari jalan kendaraan jembatan dan menghasilkan pengaruh pada jembatan ekuivalen dengan rangkain kendaraan sebenarnya. Jumlah total pembebanan lajur ”D” yang ditempatkan tergantung pada lebar jalan kendaraan jembatan.

Asumsi pembebanan KEL dan UDL seperti yang ditunjukkan dalam gambar di bawah ini :



Gambar 6.43 Asumsi beban hidup lalu-lintas

- ✓ Panjang bentang jembatan (L) = 23.8 m
- ✓ Panjang bentang atas pilar = 1.28 m
- ✓ Lebar Perkerasan Jembatan (b) = 10 m
- ✓ Beban KEL (P_{kel}) = 49 kN/m
  Faktor beban dinamis (1+DLA) = 1.4
- ✓ Beban UDL (qUDL) = 9 kN/m^2

Total beban UDL = 1451 kN
$(((5{,}5 x q_{UDL}) + ((b - 5{,}5)\ x\ 0{,}5 x\ q_{UDL})\ x\ L$

Total beban UDL = 209 kN
$(((5{,}5 x q_{UDL}) + ((b - 5{,}5)\ x\ 0{,}5 x\ q_{UDL})\ x\ L$

Total Beban KEL = 532 kN

$$\left[(5{,}5\ x\left(P_{KEL}(1 + DLA)\right)\right] + \left[b - 5{,}5\ x\ (0{,}5\ x\ \left(P_{KEL}(1 + DLA)\right)\ \right]$$

Total Beban Hidup Lalu Lintas = 2604 kN

4. Beban Gempa

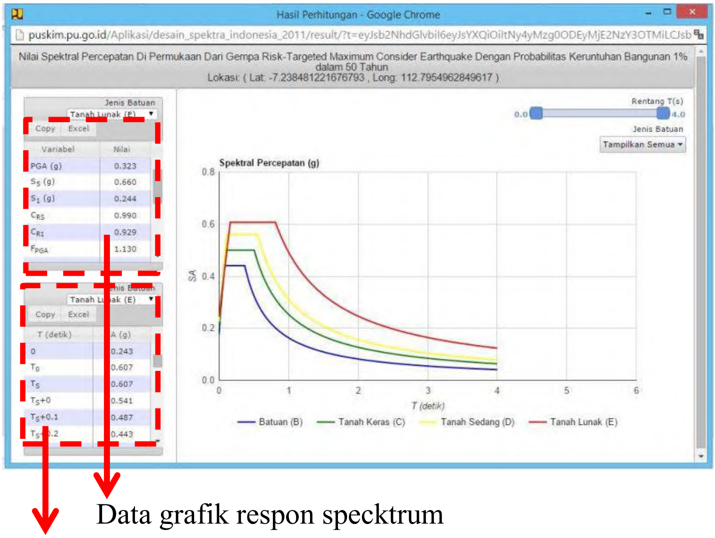
⇔ Analisa respon spectrum input SAP2000 :

Analisis beban gempa berdasarkan perhitungan data grafik respon spectrum gempa dari PUSKIM Desain Spektra Indonesia 2011.

Perhitungan Beban Gempa :

Diketahui :

- ✓ Zona gempa = Zona 2
- ✓ Wilayah = Surabaya
- ✓ Jenis tanah = Tanah lunak
- ✓ Hasil perhitungan respon spektrum :

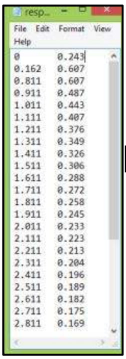


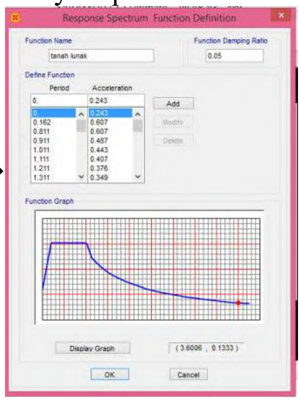
Data grafik respon specktrum

Data tanah lunak

Data Tanah dan data grafik Surabaya input SAP2000:

TANAH LUNAK	
PGA (g)	0.323
SS (g)	0.66
S1 (g)	0.243
CRS	0.99
CR1	0.929
FPGA	1.13
FA	1.379
FV	3.023
PSA (g)	0.365
SMS (g)	0.911
SM1 (g)	0.738
SDS (g)	0.607
SD1 (g)	0.492
T0 (detik)	0.162
TS (detik)	0.811





✓ Faktor keutamaan (I)

I = 1,0

✓ Faktor reduksi gempa

R = 5,0 - 6,0 untuk kolom majemuk.

Digunakan factor reduksi = 6,0

- ✓ Massa struktur (Mass source)

  Massa untuk struktur akan ditentukan berasal dari :

  3) Berat sendiri struktur (*self weight*) seperti pilar.
  4) Beban mati tambahan (*super dead*) seperti bangunan atas, dll.

- ✓ Faktor pengali

  Sesuai dengan SNI 03-1726-2002 pasal 7.2.1, maka input *response spectrum* diberi nilai pengali sebesar I/R dengan I adalah factor keutamaan dan R adalah factor reduksi gempa. Karena nilai input C pada *response spectrum* dinyatakan dalam gravitasi bumi (g), maka untuk input juga akan ditambahakan juga factor pengali sebesar g = 9,81 m/detik^2.

  Untuk wilayah zona gempa 2 untuk tanah lunak, maka nilai-nilai tersebut adalah sebagai berikut :

  I = 1,0
  R = 6,0
  g = 9.81 m/detik^2
  Faktor pengali = I/R x g
  = 1,0 / 6,0 x 9,81 = 1,633

⇔ Analisa beban gempa statis ekivalen

Analisis beban gempa berdasarkan BMS 1992 pasal 2.4.7. beban gempa direncanakan dengan metode beban horisontal statis ekivalen. Beban gempa bangunan atas yang masuk pada abutment direncanakan 100% dari total beban.

Perhitungan Beban Gempa :

$$T_{EO} = C.I.S.\,W$$

- ✓ Zona gempa = Zona 2
- ✓ Keofisien Geser (C) = 0.21
- ✓ Faktor kepentingan (*I*) = 1
- ✓ Faktor type bangunan = 1
- ✓ Beban mati ½ bangunan atas kiri = 6824 kN

- ✓ Beban mati ½ bangunan atas kanan = 261 kN
- ✓ Beban mati pilar (w) = 6921kN
- ✓ Beban gempa bangunan atas kiri = 1543kN
- ✓ Beban gempa akibat berat pilar = 1453kN

5. Beban angin

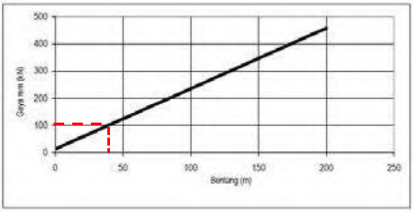
Gaya angin pada bangunan atas tergantung luas ekuivalen diambil sebagai luas padat jembatan dalam elevasi proyeksi tegak lurus. Gaya nominal akibat angin bergantung pada kecepatan angin rencana. Beban angin yang diperhitungkan berdasarkan BMS 1992 adalah sebagai berikut :

$$T_{EW} = 0{,}0006 \; x \; C_w \; x \; {V_w}^2 \; x \; A_b$$

- ✓ Kecepatan angin rencana (V_w) = 30 m/s
- ✓ Lebar jembatan (b) = 16.00 m
- ✓ Tinggi samping jembatan (d) kiri = 3.30 m
- ✓ Tinggi samping jembatan (d) kanan = 1.20 m
- ✓ Bentang jembatan kanan = 20.40 m
- ✓ Bentang jembatan kiri = 3.00 m
- ✓ Luas bagian samping jembatan (A_b) = 71.16 m^2
- ✓ Rasio *b/d* = 4.85
- ✓ Koefisien seret (C_w) = 1.25
- ✓ Gaya angin (T_{EW}) = 43.02 kN

6. Beban rem (Breaking force)

Pengaruh percepatan dan pengereman dari lalu-lintas harus diperhitungkan sebagai gaya dalam arah memanjang. Beban rem yang diperhitungkan berdasarkan RSNI T-02-2005 untuk jembatan dengan panjang bentang 40m adalah = 100 kN/Lajur (2.75m), karena terdapat 2 lajur makan beban rem yang terjadi sebesar = 200 kN.



Gambar 6.44 Gaya rem perlajur 2,75 m (KBU)

7. Gaya Sentrifugal

Gaya setrifugal pada jembatan yang berada pada tikungan harus memperhitungkan bekerjanya suatu gaya horisontal radial. Gaya horisontal tersebut harus sebanding dengan beban lajur D yang dianggap ada pada semua jalur lalu lintas. Gaya sentrifugal harus bekerja secara bersamaan dengan pembebanan "D" atau "T" dengan pola yang sama sepanjang jembatan. Gaya sentrifugal diperhitungakan berdasarkan dengan rumus sebagai berikut:

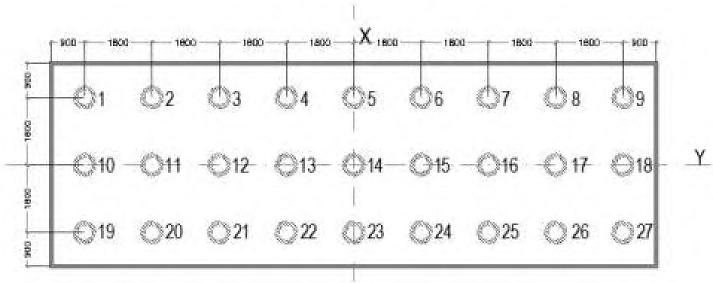
$$T_{TR} = 0,006\, x\, \frac{V^2}{r}\, x\, T_T$$

- Pembebanan lalu lintas total (Lajur D) yang bekerja (TT) = 1450.80 kN
- Kecepatan lalu lintas rencana (km/jam) V = 40.00 KM/Jam
- Jari-jari lalu lintas rencana = 135 m
- Gaya sentrifugal (TTR) = 103.17 kN

6.4.2.2 Perhitungan Gaya Aksial Tiang Pancang

Dari analisis pembebanan diatas, maka langkah selanjutnya adalah analisis momen dan gaya. Perhitungan momen dan gaya tersebut dipusatkan pada center poer. Berikut ini perhitungan momen dan gaya yang bekerja pada poer ditunjukkan pada Tabel 6.56 berikut :

Konfigurasi tiang pancang :

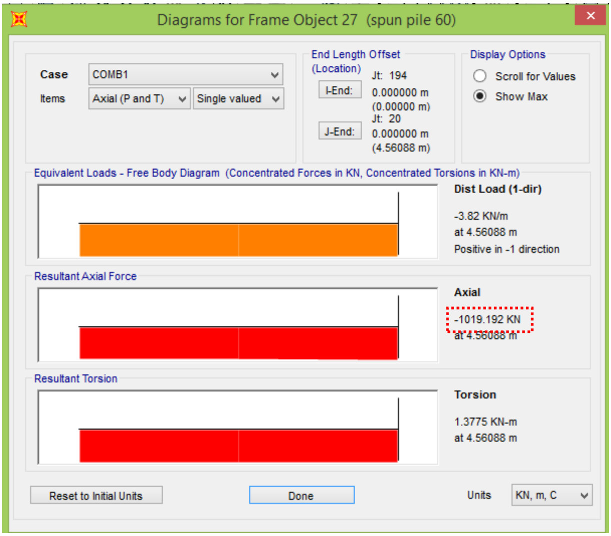


Gambar 6.45 Konfigurasi tiang pancang pilar 1

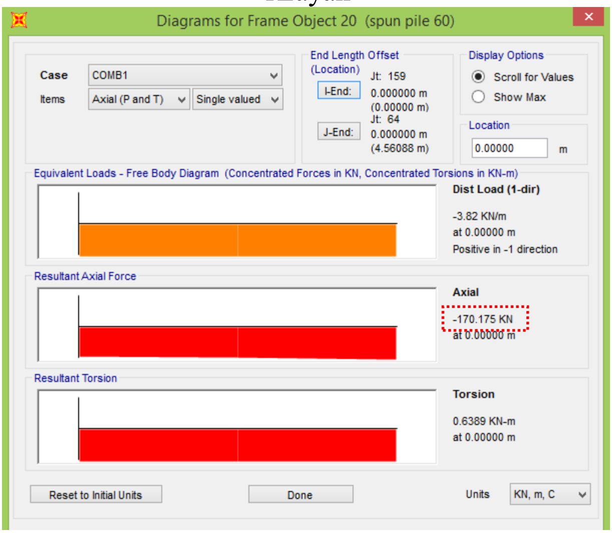
Tabel 6.55 Kombinasi Pembebanan yang dihitung pada kondisi layan.

Kombinasi Pembebanan	Faktor beban x beban yang bekerja pada struktur
Kombinasi 1	1,0 PMS +1,0 PMA+ 1,0 TTD+1,0 TTB
Kombinasi 2	1,0 PMS +1,0 PMA+ 1,0 TTD+(30%TEQx +100%TEQy)
Kombinasi 3	1,0 PMS +1,0 PMA+ 1,0 TTD+(100%TEQx +30%TEQy)

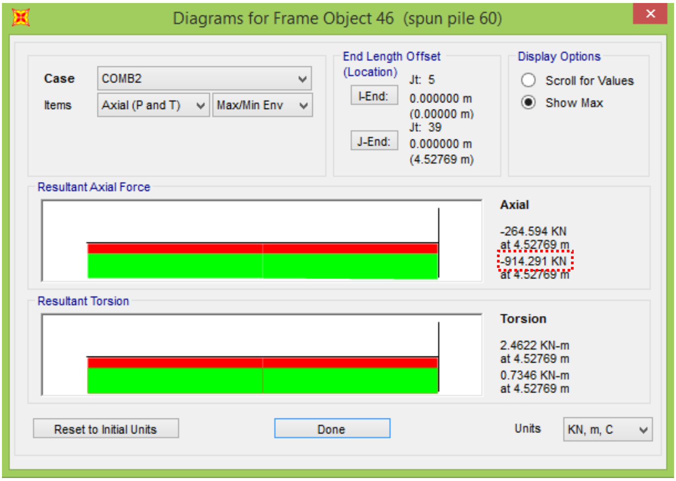
Sumber : SNI T-02-2005



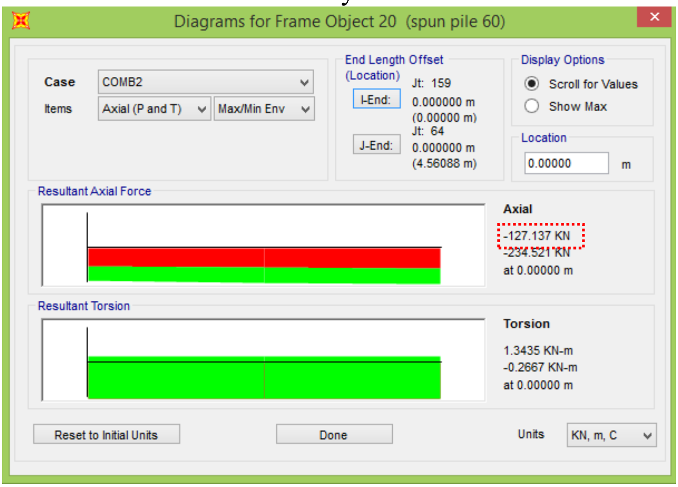
Gambar 6.46 Pmax tiang pancang pilar 1 akibat kombinasi 1Layan



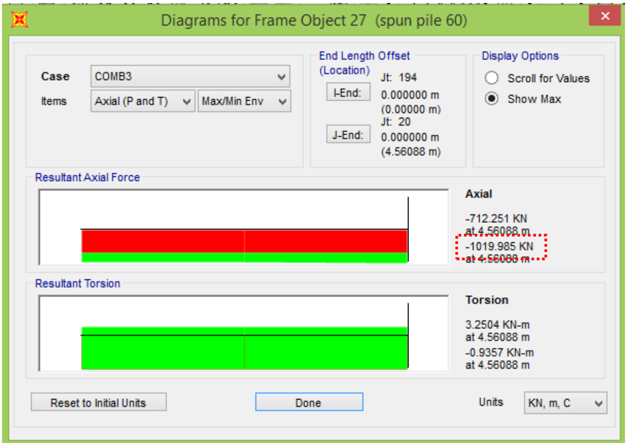
Gambar 6.47 Pmin tiang pancang pilar 1 akibat kombinasi 1Layan



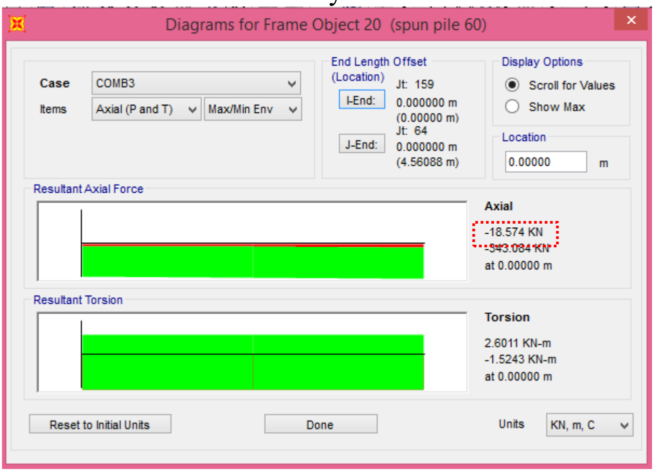
Gambar 6.48 Pmax tiang pancang pilar 1 akibat kombinasi 2Layan



Gambar 6.49 Pmin tiang pancang pilar 1 akibat kombinasi 2Layan



Gambar 6.50 Pmax tiang pancang pilar 1 akibat kombinasi 3Layan



Gambar 6.51 Pmin tiang pancang pilar 1 akibat kombinasi 3Layan

Tabel 6.56 Rekapitulasi beban yang bekerja pada pile (kondisi layan)

Kombinasi Pembebanan	Beban P_{layan} yang bekerja pada tiang	
	P max	P min
	Kn	*Kn*
Kombinasi 1	*1029.192*	*170.175*
Kombinasi 2	*914.291*	*127.137*
Kombinasi 3	*1019.985*	*18.574*

Sumber : Output SAP2000

6.4.2.3 Perhitungan Daya Dukung Tanah

Dari Tabel 6.56 dapat diketahui nilai maksimum (Pmax) Gaya aksial tiang pancang akibat beban tetap (kombinasi 1) adalah 1029.192 Kn dan nilai minimum (Pmin) adalah 170.175 Kn, sedangkan nilai maksimum (Pmax) Gaya aksial tiang pancang akibat beban sementara (kombinasi 2) adalah 914.291 Kn dan nilai minimum (Pmin) adalah 127.137 Kn, Gaya aksial tiang pancang akibat beban sementara (kombinasi 3) adalah 1019.985 Kn dan nilai minimum (Pmin) adalah 18.574 Kn.

Dari hasil kemampuan tiang pancang didapat hasil reaksi berupa gaya aksial tekan dan tarik maka akan dikontrol dengan daya dukung tanah akibat tekan. Perhitungan daya dukung tanah berdasarkan tiang pancang yang berdiameter 0,60 m dan berdasarkan data penyelidikan tanah SPT pada titik bor BH2. Daya dukung tanah dihitung berdasarkan rumus dan hasilnya ditunjukkan berikut :

Perhitungan berikut ini berdasarkan rumus **Kazuto Nazakawa.**

$$R_a = \frac{1}{n} Ru$$

$$R_u = \frac{1}{n} [(\text{qd.A}) + (\text{U}.\Sigma \text{li.fi})]$$

Keterangan :
Ra = Daya dukung tanah yang diizinkan (kN)
Rp = Daya dukung dari unsur bearing (kN)
Rf = Daya dukung dari unsur lekatan/skin friction (kN)
n = Faktor keamanan
qd = Daya dukung dari unsur bearing (kN/m^2)
A = Luas penampang dasar tiang (m^2)
U = Panjang keliling tiang (m)
Li = Tebal lapisan tanah dengan memperhitungkan geseran dinding tiang (m)
Fi = Besaran gaya geser maksimum dari lapisan tanah dengan memperhitungkan geseran dinding tiang (kN/m^2)

- Perhitungan daya dukung tiang Pilar 3 kedalam 24 m.

$$\acute{N} = \frac{N1+N2}{2}$$
$$= \frac{43+(43+22+21)}{2}$$
$$= 36$$

Keterangan :
Ń = Harga N rata-rata untuk perencanaan tanah pondasi pada ujung tiang
N1 = Harga N pada ujung tiang
Ń2 = Harga rata-rata N pada jarak 4D dari ujung tiang
4D = 2.4 m

- Panjang ekivalensi dari penetrasi tiang

l = 1.1 m

- Daya dukung pada ujung tiang

$$\frac{l}{D} = 1,833$$
$$\frac{qd}{\acute{N}} = 14$$

qd = 14Ń = 14 x 36 = 501.667 ton/m^2

$= 5016.7\ kN/m^2$

$Rp = A \cdot qd \quad = \frac{\prod .0,62}{4} \times 501.667\ ton/m^2$

$= 141.771\ ton$

$= 1417.71\ kN$

➤ Menghitung gaya geser dinding tiang

Kedalaman	Ketebalan lapisan li (m)	Tanah	Harga rata-rata N	fi (Ton/m²)	li.fi (Ton)
0-2	2	Lanau berlempung	1.0	1.00	2.0
2-10	8	Lempung berlanau pasir	1.6	1.56	12.4
10-11	1	Lanau pasir berkerikil	7.0	7.00	7.0
11-16	5	Lempung berlanau berpasir	15.0	12.00	60.0
16-19	3	Lempung lanau berpasir kerikil	21.5	12.00	36.0
19-23	4	Lanau pasir berlempung	20.6	12.00	48.0
23-24	1	Pasir berkerikil berbatu	32.5	10.00	10.0
Jumlah					175

➤ $Rf \quad = U.\sum li.fi \quad = \prod \times 0,6 \times 175$

$= 330.537\ Ton$

$= 3305.373\ kN$

- Daya dukung ultimate

  Ru = (Rp + Rf)
  = qd.A + U.∑li.fi
  = 141.771+ 330.537
  = 472.31 ton
  = 4723.1 kN
- Daya dukung yang diijinkan (Tekan)

  Ra = ⅓ Ru
  = ⅓ 472.31 ton
  = 157.44 ton
  = 1574.4 kN (Beban tetap)

  Ra = ½ Ru
  = ½ 472.31 ton
  = 236.23 ton
  = 2362.38 kN (Beban sementara)

- Daya dukung yang diijinkan (Tarik)

  Ra = ⅓ Rf
  = ⅓ 330.537ton
  = 110.23 ton
  = 1102.35 kN (Beban tetap)

  Ra = ½ Rf
  = ½ 330.537ton
  = 165.35 ton
  = 1653.53 kN (Beban sementara)

6.4.2.4 Perhitungan Efisiensi Tiang Pancang

Untuk menghitung daya dukung tiang kelompok direncanakan konfigurasi dan koefisien efisiensinya

Efisiensi tiang kelompok dihitung dengan rumus Converse - Labbare :

$$\boldsymbol{\eta = 1 - arc\ tan\left(\frac{D}{k}\right)\ x\ \frac{(n-1)m + (m-1)n}{90.m.n}}$$

η = koefisien kelompok tiang pancang

D = diameter tiang pancang (m)
k = jarak antar tiang tegak lurus sumbu x
m = jumlah tiang dalam satu kolom (buah)
n = jumlah tiang dalam satu baris (buah)

$$\eta = 1 - arc\ tan\left(\frac{0,6}{1,8}\right)\ x\ \frac{(9-1)4+(4-1)9}{90.4.9}$$

$$= 1 - arc \tan 0,333\, x\ \frac{21+16}{2880}$$

$$= 1 - 18.43\ x\ \frac{37}{2160}$$

$$= 1 - 18.43\ x\ 0,0171$$

$$= 1 - 0.315$$

$$= 0,684$$

Tabel 6.57 P_{ijin} tiangpancang Ø0,6 m kedalaman 24 m

Data tanah	P_{ijin} Tekan beban sementara	P_{ijin} Tekan beban tetap
	KN	KN
BH2	1616.58	1077.72

6.4.2.5 Kontrol Kekuatan Tiang Pancang

Setelah mendapat P yang terjadi maka dilakukan analisis kontrol kekuatan tiang pancang terhadap gaya dan momen yang bekerja serta kontrol geser pons untuk mengetahui kemampuan beton menahan geser.

Dari wika pile classification direncanakan tiang pancang beton prategang dengan :

- Diameter tiang pancang = 0.6 m
- Tebal (t) = 0.1 m
- Kelas = C
- Mutu beton f'c = 49.8 MPa
- Allowable axial load = 2290 kN
- Bending momen crack = 290 kNm
- Bending momen ultimate = 580 kNm
- Modulus elastisitas beton = 119948
  $Ec = (wc)^{1,5} . 0,043 . \sqrt{fc'}$
- Momen inersia tiang pancang = $\frac{1}{64}\pi\,(D^4 - d^4)$

  = 510509 cm^4

6.4.2.6 Kontrol terhadap Gaya Aksial Vertikal

Daya dukung suatu tiang harus ditinjau berdasarkan kekuatan tanah tempat tiang ditanam. Hasil daya dukung yang terendah adalah yang menentukan yang dipakai sebagai daya dukung ijin tiang.

- Berdasarkan kekuatan bahan
  Kekuatan tekan (maksimal) terhadap gaya aksial vertikal untuk tiang pancang Ø0,6m adalah 2290 kN.
  Sedangkan beban vertikal maksimal yang diterima tiang adalah sebesar :
  2290 kN>1029.192 kN→OK
- Berdasarkan daya dukung tanah
  Berdasarkan analisa perhitungan daya dukung tanah (data SPT) dari perumusan *Kazuto Nazakawa* didapatkan besarnya daya dukung ijin tanah terhadap pondasi tiang pancang prestressed concrete spun pile Ø0,6m dengan kedalaman 24 m diperoleh Qijin seperti yang ditabelkan berikut ini :

Tabel 6.58 Kontrol daya dukung tanah

Data tanah	P_{ijin} Tekan beban sementara	P_{ijin} Tekan beban tetap
	KN	KN
BH2	1616.58 > 1029.192	1077.72 > 1019.985
	OK	**OK**

6.4.2.7 Kontrol terhadap Beban Horizontal

Gaya-gaya horisontal (Hx) diperoleh dari gaya searah dengan arah sumbu x, diantarnya : Beban 100% akibat gempa (Struktur atas + pilar).

Hx = 2996 kN

∑Hx = 100% Hx + 30% Hy

= 3265.63 kN

$$\text{H1 tiang} = \frac{\sum Hx}{Jumlah\ tiang} = \frac{3265.63\text{ kN}}{27} = 120.95\text{ kN}$$

Gaya-gaya horisontal (Hy) diperoleh dari Beban searah sumbu y, diantaranya : 30% akibat gempa (Struktur atas + abutment).

Hy = 898.8 kN

∑Hy = 100% Hy + 30% Hx

= 1797.60 kN

$$\text{H1 tiang} = \frac{\sum Hy}{Jumlah\ tiang}$$

$= \frac{1797.60 \text{ kN}}{27}$
$= 66.58\text{kN}$

Kemampuan tambahan tiang menahan gaya horisontal bila diijinkan adanya pergeseran posisi ujung tiang sebesar d.

$$H_{ijin} = \frac{k.\ D.\ d}{\beta}$$

$$k = 0{,}2\ x\ E_O\ x\ D^{-3/4}\ x\ y^{-1/2}$$

Eo = Modulus deformasi tanah pondasi (28N, Nilai N diambil NSPT rata-rata sampai pada kedalaman tiang pancang yang masuk kedalam tanah).
d = Pergeseran posisi ujung tiang (cm) = 2.5 cm
D = Diameter tiang pancang (0,6 m)
ß = $\sqrt[4]{\frac{k.D}{4EI}}$
E = Modulus elastisitas beton tiang
I = Momen inersia penampang

$$k = 0{,}2xE_Ox\ D^{-3/4}\ x\ y^{-1/2}$$
$$= 0{,}2\ x\ 28\overline{N_{SPT}}\ x\ D^{-3/4}\ x\ y^{-1/2}$$
$$= 0{,}2\ x\ 28.\ 1\ x\ 60^{-3/4}\ x\ 1^{-1/2}$$
$$= 0{,}2\ x\ 28\ x\ 60^{-3/4}\ x\ 1^{-1/2}$$
$$= 0.1643$$

$$\beta = \sqrt[4]{\frac{k.\ D}{4EI}}$$
$$= \sqrt[4]{\frac{0.1643\ x\ 60}{4\ x\ 119948\ x\ 510609}}$$
$$= \sqrt[4]{\frac{9.85725}{2.45\ x\ 10^{11}}}$$

$$= 0{,}00252$$

$$H_{ijin} = \frac{k.\ D.\ d}{\beta}$$

$$= \frac{0.1643.\ 60.\ 2{,}5}{0{,}00252}$$

$$= 97.841\ KN$$

Hijin $= \frac{97.841\ KN}{2}$ = 48.921 kN

Kontrol :

Hx 1 tiang < *H ijin*

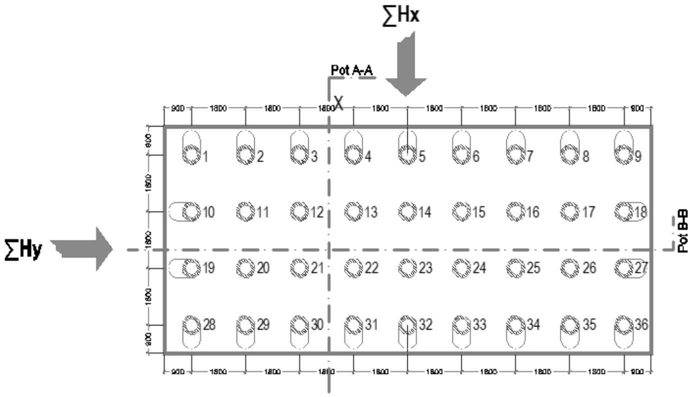
120.95 kN >48.921 kN **…NOT OK**

Hy 1 tiang < *H ijin*

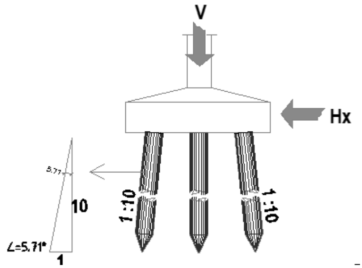
66.58 kN >48.921 kN **…NOT OK**

Kesimpulan dari perhitungan diatas bahwa H1 tiang > Hijin maka perlu dilakukan pemasangan tiang pancang miring.

6.4.2.8 Kontrol Tiang Pancang Miring



- Tiang Pancang Miring arah X



α = 5.711
sin α = 0.0995
Rumus mencari jumlah tiang pancang miring :

$$H_{ijin\ total} + N1.Psin\ \alpha\ \geq \sum Hx$$

Keterangan :

H ijin 1 tiang	= 48.92 kN
H ijin total	= 1320.9 kN
Daya dukung tiang pancang dalam grup SF=2 (P)	= 2362.4 kN
Total gaya horizontal arah x ($\sum$Hx)	= 2995.9 kN
Jumlah tiang pancang miring (N1)	= …?

$$H_{ijin\ total} + N1.Psin\ \alpha \quad \geq \sum Hx$$

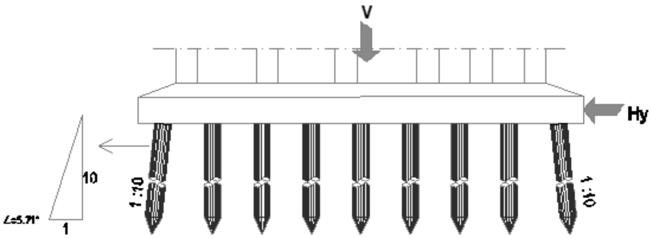
$$1320.9\text{ kN} + N1.\ 235.1 \sin\alpha \quad \geq 2995.9\text{ kN}$$
$$N1.\ 235,1 \quad \geq 2996.6 - 1320.9$$
$$N1 \quad \geq \frac{1675.14}{235.1}$$
$$N1 \quad \geq 7.13 \sim \mathbf{18.00}$$

Kontrol :

$$H_{ijin\ total} + 18.Psin\ \alpha\ \geq \sum Hx$$

5551.98 kN $\geq$ 2995.9kN …**OK**

- Tiang Pancang Miring arah Y



α = 5.711
sin α = 0.0995
Rumus mencari jumlah tiang pancang miring :

$$H_{ijin\,total} + N1.Psin\,\alpha \;\geq \sum Hy$$

Keterangan :

H ijin 1 tiang	= 48.92 kN
H ijin total	= 1320.9 kN
Daya dukung tiang pancang dalam grup SF=2 (P)	= 2362.4 kN
Total gaya horizontal arah x (∑Hy)	= 1798kN
Jumlah tiang pancang miring (N1)	= …?

$$H_{ijin\,total} + N1.Psin\,\alpha \qquad \geq \sum Hy$$

1320.9 kN + N1. 235.1 sin α ≥ 1798 kN
N1. 235,1 ≥ 1798 –1320.9
N1 ≥ $\frac{472.05}{235.1}$
N1 ≥ 2.01~ **2.00**

Kontrol :

$$H_{ijin\,total} + 2.Psin\,\alpha \;\geq \sum Hx$$

1791.1 kN ≥ 1798 kN …**OK**

6.4.2.9 Kontrol terhadap Momen

Momen maksimum yang terjadi pada tiang pancang dihitung dengan perumusan :

$$M_m = 0,2079\ x\ \left(\frac{H}{2.\beta}\right)$$

$$k \quad = 0,2xE_O x\ D^{-3/4}\ x\ y^{-1/2}$$

$$= 0,2\ x\ 28\overline{N_{SPT}}\ x\ D^{-3/4}\ x\ y^{-1/2}$$

$$= 0,2\ x\ 28.\ 1\ x\ 60^{-3/4}\ x\ 1^{-1/2}$$

$$= 0,2\ x\ 28\ x\ 60^{-3/4}\ x\ 1^{-1/2}$$

$$= 0.1643$$

$$\beta \quad = \sqrt[4]{\frac{k.\ D}{4EI}}$$

$$= \sqrt[4]{\frac{0.1643\ x\ 60}{4\ x\ 119948\ x\ 510509}}$$

$$= \sqrt[4]{\frac{9.857}{2.45\ x\ 10^{11}}}$$

$$= 0,00252$$

$$H = \frac{\sqrt{Hx^2 + Hy^2}}{36}$$

$$= \frac{3119.74}{27} = 115.55$$

$$M_m = 0,2079\ x\ \left(\frac{H}{2.\beta}\right)$$

$$= 47.68\ KNm$$

Mm $< M_{crack}$

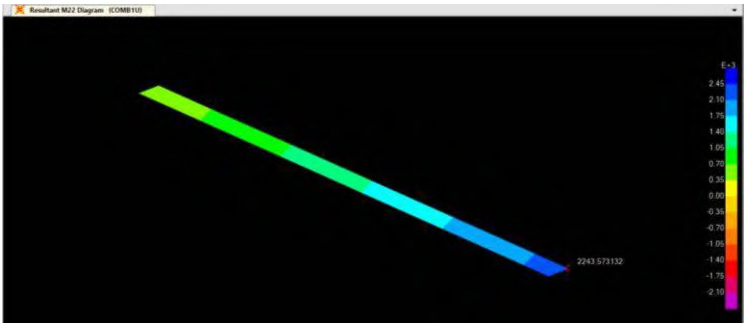
47.68 KNm < 290 kNm … **OK**

6.4.2.10 Perencanaan Poer (Pile Cap)

Perhitungan analisis poer berdasarkan pembebanan dalam keadaan batas (ultimate). Beban yang dihitung dari beban P yang terjadi pada tiang pancang, perhitungan analisis momen poer diambil dari SAP2000 :

Tabel 6.59 Momen pada pilecap pilar 1 kondisi ultimit (*output SAP2000)*

	Kombinasi 1U 1.3PMS+1.8TTD+1.8TTB	Kombinasi 2U 1.3PMS+1.8TTD+Ex+30%Ey	Kombinasi 3U 1.3PMS+1.8TTD+30%Ex+Ey
	Kn.m	Kn.m	Kn.m
M11	1297.9996	1158.0748	1098.9499
	-396.0006	-399.9809	-388.003
M22	**2243.5731**	1772.6481	1848.227
	-418.6979	-360.5313	-370.6663



Gambar 6.52 Momen pilecap pilar 1 *Output SAP2000*

Sehingga untuk desain tulangan poer dipakai reaksi dari kombinasi 1U. Momen yang dipakai untuk perhitungan penulangan poer adalah :

Mu = **2243.5731 kNm**

6.4.3.11 Perhitungan penulangan poer

Fc'	= 29.05 MPa
Fy	= 400 MPa
h	= 1500 mm
b	= 1000 mm
Tebal selimut (d')	= 70 mm
Tinggi effesien (d)	= 1401 mm
D *Tul lentur*	= D32 mm
Ø *Tul bagi*	= D16 mm

⇔ Penulangan Lentur :

$K_{TD}^{U} = 0,9$

$M^* = \frac{Mu}{0,9}$
$= 2242$ kNm
$= 2241590000$ Nmm

$Rn = \frac{M*}{b.d^2}$
$= \frac{2241590000}{1000\ .\ 1401^2}$
$= 1.142$

$\beta_1 = 0,85$

$$\rho b = \frac{0,85\ .fc'}{fy}.\beta 1.\left[\frac{600}{600+fy}\right]$$

$$= \frac{0,85.29.05}{400}\ .0,85.\left[\frac{600}{600+400}\right]$$
$= 0,031$

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

ρ_{max} = 0,75 . ρb
= 0,75 . 0,035
= 0,0236

$m = \frac{fy}{0,85 \; x \; fc'}$
$= \frac{400}{0,85 \; x \; 29.05}$
= 16.20

$\rho_{perlu} = \frac{1}{m} \left(1 - \sqrt{1 - \frac{2m \; xRn}{fy}}\right)$
$= \frac{1}{16.20} \left(1 - \sqrt{1 - \frac{2(16.20) \; x \; 1.142}{400}}\right)$
= 0.0029

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{min} < \rho < \rho_{max}$

0.0035 > 0.0029 < 0,0236…… **TIDAK OK**

Sehingga ρ tulangan yang digunakan :

ρ_{min} = 0.0035

Luas tulangan :

As_{perlu} = ρ_{min}. b . d
= 0,0035 x 1000 mm x 1401 mm
= 49035.0 mm^2

Dipasang tulangan lentur **D32-150**

($As_{terpasang}$ = 5361.65 mm^2)

⇔ Penulangan Pembagi :

A_{st} = 20 % x As_{perlu}
= 980.7 mm^2

Dipasang tulangan **D16 – 150**

($As_{terpasang}$ = 1340.4 mm^2)

Tabel 6.60 Geser pada pilecap pilar 1kondisi ultimit *output SAP2000)*

	Kombinasi 1U	Kombinasi 2U	Kombinasi 3U
	kN	kN	kN
V13	1957.61	1646.16	1630.55
	-3479.91	-2762.46	-2816.71
V23	2730.92	2119.87	2220.46
	-3859.38	-2997.72	-3049.15

Kontrol Geser :

Gambar 6.53 Geser (Vu) pilecap pilar 1 *Output SAP2000*

V_u = 3859.38 kN

K_C^R = 0,85

V^* = $\frac{3859.38 \text{ kN}}{0.85}$

= 4540.448 KN

$ß_1$ = 1.1

$ß_2$ = 1

$ß_1$ = 1

Batas kehancuran badan

Vu_{max} = 0.2 x f'c x bv x d

= 0.2 x 29.05 x 1000 x 1401

= 8139810 N

= 8139.81 kN

Kekuatan geser tanpa tulangan geser (Vuc)

Vuc = ß1 x ß2 x ß3 x bv x d x $[\frac{(\text{Ast x fc})}{(\text{bv x d})}]^{1/3}$

= 1.1 x 1 x 1 x 12600 x x $[\frac{(\text{Ast x 29.05})}{(\text{1000x 1401})}$

= 57110.524 N

= 57.111 KN

Kekuatan geser dengan tulangan geser minimum

Vu_{min} = Vuc + (0,6 x bv x d)

= 57.110 KN + (0,6 x 1000 x 1401)

= 840657.1105 KN

Kontrol

Apakah :	V*	<	Vu maks	
	4540.448 KN	<	8139.81 kN	…**OK**
Apakah :	V*	<	K_C^R x Vu min	
	4540.448 KN	<	0,85 x 840657.11 kN	
	4540.448 KN	<	714558.5439 KN...**OK**	
Apakah :	V*	<	K_C^R x Vuc	
	4540.448 KN	>	0,85 x 57.11 KN	
	4540.448 KN	>	48.544 …**NOT OK**	

Maka, dari analisa/control diatas, perlu untuk menghitung keperluan tulangan geser:

- Menghitung Kekuatan Geser yang diperlukan dari tulangan geser :

$$V_{US} = V^*/K_C^R - V_{UC}$$

$$= \frac{4540.448 \text{ KN}}{0.85} - 57.11 \text{ KN}$$

= 5341.7024 kN - 57.11 kN

= 5284.592 KN

- Menghitung tulangan geser

  Luas tulangan geser yang diperlukan (A_{sv}) :

$$A_{SV} = \frac{V_{US.}\, S}{fy.\, d}$$

$$= \frac{5284.592\ KN \text{ x } 150}{400\ MPa\ x\ 1401}$$
$$= 1414.505 \text{ mm}^2$$

Dipasang tulangan **D16– 150 (2 kaki)**
(As $_{\text{terpasang}}$ = 2680.8 mm^2)

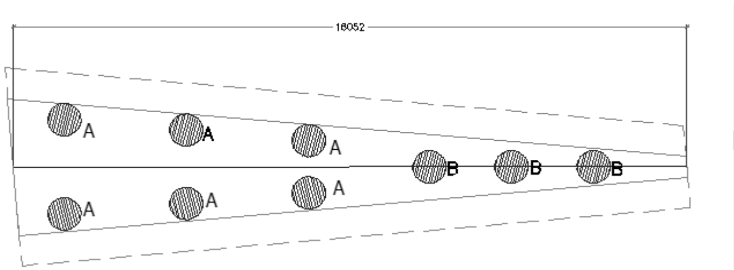
6.4.3 Desain Kolom Pilar 3

Perhitungan analisis dinding pilar berdasarkan pembebanan dalam keadaan batas (ultimate). Berikut di bawah ini analisis desain kolom pilar.

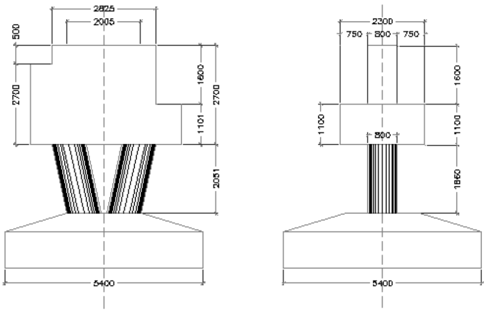
6.4.3.1 Analisis Pembebanan Kolom Pilar 3

Analisis pembebanan kolom pilar 2 dengan beban yang bekerja yaitu beban sendiri, beban lalu lintas dan beban gempa.

Perhitungan beban dihitung dengan aplikasi SAP2000 dimana beban – beban tersebut dikalikan dengan faktor beban batas. Dan perhitungan tulangan dihitung dengan aplikasi PcaColumn.



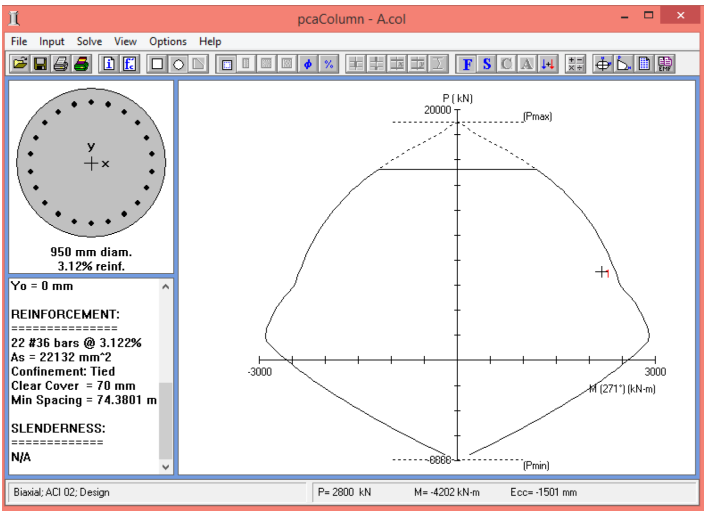
Gambar 6.54 Tampak atas kolom pilar 3



Gambar 6.55 Tampak samping kolom pilar 3

6.4.3.2 Perhitungan penulangan kolom A

Fc’	= 29.05 MPa
Fy	= 400 MPa
Diameter	= 950 mm
H	= 1860 mm
Tebal selimut (d’)	= 70 mm
D *Tul lentur*	= D36 mm



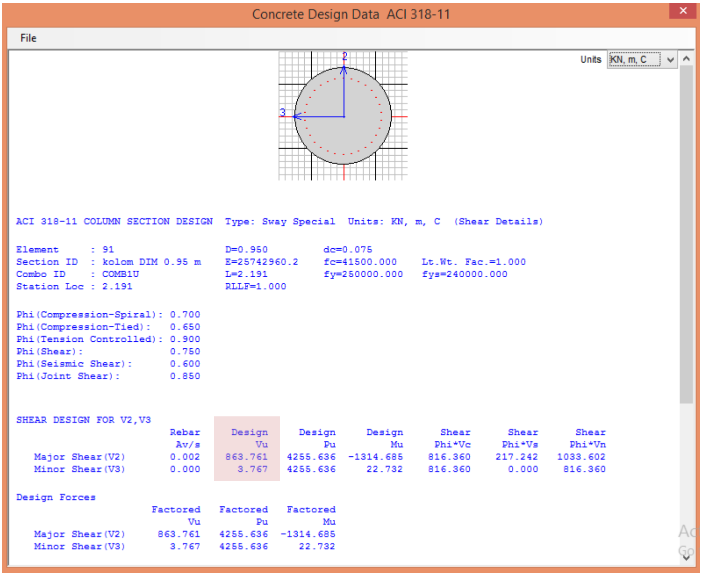
Gambar 6.56 Output PcaColumn kolom A pilar 3

As $= 22132\ mm^2$

$= 22 - D36$

Jadi, dipasang tulangan utama kolom sebanyak 22 buah D36.

Kontrol Geser



Gambar 6.57 Gaya geser (Vu) kolom pilar 1

V_u $= 863.761$ kN

K_C^R $= 0,85$

V^* $= \dfrac{863.761\ \text{kN}}{0.85}$

$= 1016.189$ KN

β_1 $= 1.1$

β_2 $= 1$

β_1 $= 1$

Batas kehancuran badan

Vu_{max} $= 0.2 \ \text{x}\ f'c\ \text{x}\ bv\ \text{x}\ d$

$= 0.2 \ \text{x}\ 29.05\ \text{x}\ 900\ \text{x}\ 849$

$= 4686055.5$ N
$= 4685.0555$ KN

Kekuatan geser tanpa tulangan geser (Vuc)

$$Vuc = ß1 \ x \ ß2 \ x \ ß3 \ x \ bv \ x \ d \ x \ [\frac{(Ast \ x \ fc)}{(bv \ x \ d)}]^{1/3}$$
$$= 1.1 \ x \ 1 \ x \ 1 \ x \ 800 \ x \ x \ [\frac{(Ast \ x \ 29.05)}{(900x \ 849)}$$
$= 214311.5$N
$= 214.31$ KN

Kekuatan geser dengan tulangan geser minimum

Vu_{min} = Vuc + (0,6 x bv x d)
= 214.31 KN+ (0,6 x 900 x 849)
= 484144.3115 KN

Kontrol

Apakah :	V*	<	Vu maks
	1016.189 KN	<	4685.0555 KN …**OK**
Apakah :	V*	<	K_C^R x Vu min
	1016.189 KN	<	0,85 x 484144.3115KN
	1016.189 KN	<	411522.6648 KN...**OK**
Apakah :	V*	<	K_C^R x Vuc
	1016.189 KN	>	0,85 x 214.3 KN
	1016.189 KN	>	182.165 KN …**NOTOK**

Maka, dari analisa/control diatas, perlu untuk menghitung keperluan tulangan geser:

- Menghitung Kekuatan Geser yang diperlukan dari tulangan geser :

$$V_{US} = V^*/K_C^R - V_{UC}$$
$$= \frac{1016.189 \text{ KN}}{0.85} - 214.3 \text{ KN}$$
= 1195.517 KN- 214.3 KN
= 981.2055 KN

- Menghitung tulangan geser
Luas tulangan geser yang diperlukan (A_{sv}) :

$$A_{SV} = \frac{V_{US}.\, S}{fy.\, d}$$

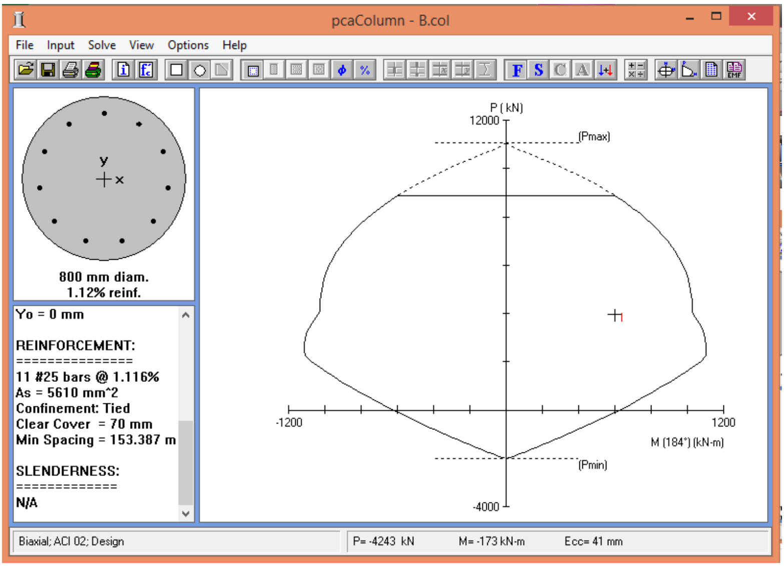
$$= \frac{981.2055\ \text{KN x } 250}{400\ MPa\ x\ 849}$$

$$= 722.325\ \text{mm}^2$$

Dipasang tulangan **D16– 250 (2 kaki)**
(As $_{terpasang}$ = 1608.5 mm^2)

6.4.3.3 Perhitungan penulangan kolom B

Fc'	= 29.05 MPa
Fy	= 400 MPa
Diameter	= 800 mm
H	= 1860 mm
Tebal selimut (d')	= 70 mm
D *Tul lentur*	= D25 mm



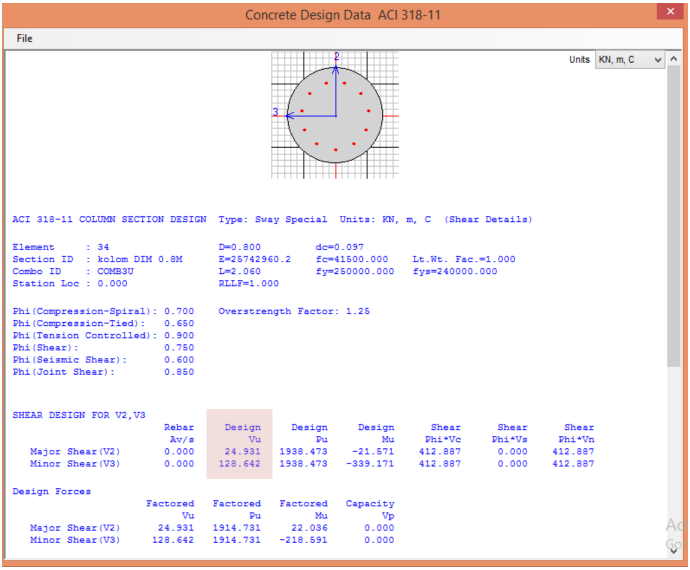
Gambar 6.58 Output PcaColumn kolom B pilar 3

As $= 7095\ mm^2$

$= 11$ - D25

Jadi, dipasang tulangan utama kolom sebanyak 11 buah D25.

<u>Kontrol Geser</u>



Gambar 6.59 Gaya geser (Vu) kolom pilar 1

$V_u = 128.642$ kN

$K_C^R = 0,85$

$V^* = \dfrac{128.642 \text{ kN}}{0.85}$

$= 151.344$ KN

$\beta_1 = 1.1$

$\beta_2 = 1$

$\beta_1 = 1$

Batas kehancuran badan

$Vu_{max} = 0.2 \times f'c \times bv \times d$

$= 0.2 \times 29.05 \times 800 \times 705$

$= 3274516$ N

= 3274.516 KN

Kekuatan geser tanpa tulangan geser (Vuc)

Vuc = ß1 x ß2 x ß3 x bv x d x $[\frac{(\text{Ast x fc})}{(\text{bv x d})}]^{1/3}$

= 1.1 x 1 x 1 x 800 x 705 x $[\frac{(\text{Ast x 29.05})}{(\text{800x 705})}$

= 49585.39 N

= 49.585 KN

Kekuatan geser dengan tulangan geser minimum

Vu_{min} = Vuc + (0,6 x bv x d)

= 49.58539 KN+ (0,6 x 800 x 705)

= 338209.5854 KN

Kontrol

Apakah :	V*	<	Vu maks
	151.344 KN	<	3274.516 KN …**OK**
Apakah :	V*	<	K_C^R x Vu min
	151.344 KN	<	0,85 x 338212.3281 KN
	151.344 KN	<	287480.4789 KN...**OK**
Apakah :	V*	<	K_C^R x Vuc
	151.344 KN	<	0,85 x 49.59 KN
	151.344 KN	<	42.147582 …**NOT OK**

Maka, dari analisa/control diatas, perlu untuk menghitung keperluan tulangan geser:

- Menghitung Kekuatan Geser yang diperlukan dari tulangan geser :

$$V_{US} = V^*/K_C^R - V_{UC}$$

$$= \frac{151.344 \text{ KN}}{0.85} - 49.59 \text{ KN}$$

= 178.0512 KN- 49.59 KN

= 128.466 KN

- Menghitung tulangan geser

Luas tulangan geser yang diperlukan (A_{sv}) :

$$A_{SV} = \frac{V_{US.}\, S}{fy.\, d}$$

$$= \frac{128.466 \text{ KN x } 250}{400\ MPa\ x\ 849}$$

$$= 113.968 \text{ mm}^2$$

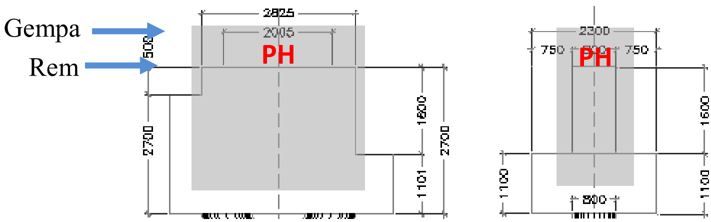
Dipasang tulangan **D16– 250 (2 kaki)**
($As_{\text{terpasang}}$ = 1608.5 mm^2)

6.4.4 Desain Longitudinal Stopper

Perhitungan analisis longitudinal ltopper berdasarkan pembebanan dalam keadaan batas (ultimate). Berikut di bawah ini analisis desain longitudinal stopper:

6.4.4.1 Analisis Pembebanan Longitudinal Stopper

Analisis pembebanan longitudinal stopper ditunjukkan pada gambar 6.60 dengan beban yang bekerja yaitu beban sendiri, beban lalu lintas, beban rem dan beban gempa. Perhitungan beban, gaya dan momen akan ditunjukkan pada tabel 6.61 hasil output SAP2000.



Gambar 6.60 Analisis pembebanan pada longitudinal stopper

Tabel. 6.61 Momen pada longitudinal stopper pilar 1 kondisi ultimit (*output SAP2000)*

	Kombinasi 1U 1.3DL+1.8LL	Kombinasi 2U 1.3DL+1,8LL+Ex+30%Ey	Kombinasi 3U 1.3DL+1,8LL+30%Ex+Ey
	Kn.m	Kn.m	Kn.m
M11	1071.3492	622.5739	620.1201
	-1877.827	-1661.4906	-1601.7592
M22	665.6927	541.1178	545.7126
	-2136.4037	-1732.9535	-1815.0116

Gambar 6.61 Momen pada longitudinal stopper 1U

Untuk penulangan longitudinal stopper dipakai hasil reaksi dari kombinasi 1U dari perhitungan SAP2000. Momen yang dipakai untuk desain penulangan longitudinal stopper sebesar :

Mu = 2136.4037 KN.m

6.4.4.2 Perhitungan Penulangan Longitudinal Stopper

Fc' = 29.05 MPa
Fy = 400 Mpa
h = 2700 mm
b = 1000 mm
Tebal selimut (d') = 70 mm

Tinggi effesien (d) = 2602 mm
D *Tul lentur* = D25 mm
Ø *Tul bagi* = D13 mm

⇔ **Penulangan Lentur :**

K_{TD}^{U} = 0,9

M* $= \frac{Mu}{0,9}$
= 2338 kNm
= 2337821111 Nmm

Rn $= \frac{M*}{b.d^2}$
$= \frac{2337821111}{1000\ .\ 2602^2}$
=0.345

β_1 = 0,85

$$\rho b \quad = \frac{0,85\ .fc'}{fy}.\beta 1.\left[\frac{600}{600+fy}\right]$$

$$= \frac{0,85.29.05}{400}.0,85.\left[\frac{600}{600+400}\right]$$

= 0,031

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

$\rho_{\ min\ (2)}$ $= 1.333\ x\ \rho\ perlu$
= 1.333 x 0.0009
= 0,0012

$\rho_{\ max}$ = 0,75 . ρb
= 0,75 . 0,035
= 0,0236

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

$= \frac{400}{0{,}85\ x\ 29.05}$

$= 16.20$

$\rho_{perlu} \quad = \frac{1}{m}\ (1 - \sqrt{1 - \frac{2m\ xRn}{fy}})$

$= \frac{1}{16.20}\ (1 - \sqrt{1 - \frac{2(16.20)\ x0.345}{400}})$

$= 0.0009$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{\ min} > \rho < \ \rho_{\ max}$

0.0035 > 0.0009 < 0,0236 …… **TIDAK OK**

Sehingga ρ tulangan yang digunakan :

$\rho_{\ min\ (2)} = 0.0012$

Luas tulangan :

$As_{\ perlu} = \rho_{\ min\ (2)} .\ B\ .\ d$

$= 0{,}0012\ x\ 1000\ mm\ x\ 2601.5 mm$

$= 3023.6713\ mm^2$

Dipasang tulangan lentur **D25-150**

($As_{\ terpasang} = 3272.492\ mm^2$)

⇔ Penulangan Pembagi :

$A_{st} = 20\ \%\ x\ As_{\ perlu}$

$= 604.7343\ mm^2$

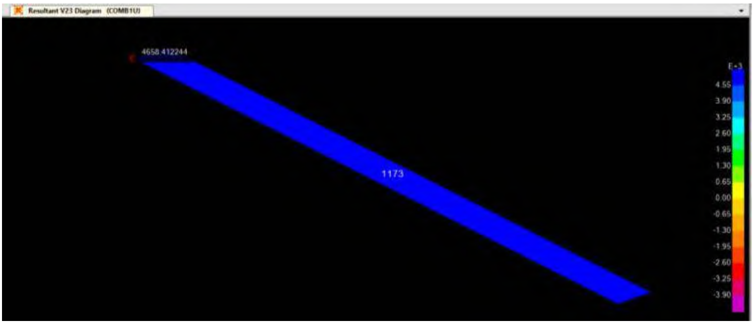
Dipasang tulangan **D16 –150**

($As_{\ terpasang} = 1340.4129 mm^2$)

<u>Kontrol Geser :</u>

Tabel 6.62 Geser pada longitudinal stopper pilar 1 kondisi ultimit (*output SAP2000)*

	Kombinasi 1U	Kombinasi 2U	Kombinasi 3U
	Kn	Kn	Kn
V13	4460.94	3646.54	3690.44
	-4422.03	-3446.41	-3517.65
V23	4658.41	3785.17	3835.14
	-4324.98	-3305.6	-3369.58



Gambar 6.62 Geser (Vu) pada longitudinal stopper pilar 1

V_u = 4658.41 KN

K_C^R = 0,85

V^* = $\frac{4658.41 \text{ KN}}{0.85}$

= 5480.482 KN

$ß_1$ = 1.1

$ß_2$ = 1

$ß_1$ = 1

Batas kehancuran badan

Vu_{max} = 0.2 x f'c x bv x d

= 0.2 x 29.05 x 1000 x 2601.5

= 15114715 N

= 15114.715 KN

Kekuatan geser tanpa tulangan geser (Vuc)

Vuc $= ß1 \text{ x } ß2 \text{ x } ß3 \text{ x bv x d x } [\frac{(\text{Ast x fc})}{(\text{bv x d})}]^{1/3}$

$= 1.1 \text{ x } 1 \text{ x } 1 \text{ x } 1000 \text{ x } 2601.5 \text{ x}[\frac{(\text{Ast x } 29.05)}{(1000 \text{ x } 2601.5)}$

= 32622.9 N

= 32.623 KN

Kekuatan geser dengan tulangan geser minimum

Vu_{min} = Vuc + (0,6 x bv x d)

= 32.125 KN+ (0,6 x 1000 x 2601.5)

= 1560923.125 KN

Kontrol

Apakah :	V*	<	Vu maks
	5480.482 KN	<	15114.715 KN …**OK**
Apakah :	V*	<	K_C^R x Vu min
	5480.482 KN	<	0,85 x 1560932.12 KN
	5480.482 KN	<	1326792.31 KN…**OK**
Apakah :	V*	<	K_C^R x Vuc
	5480.482 KN	>	0,85 x 32.623 KN
	5480.482 KN	>	27.729…**NOT OK**

Maka, dari analisa/control diatas, perlu untuk menghitung keperluan tulangan geser:

- Menghitung Kekuatan Geser yang diperlukan dari tulangan geser :

$$V_{US} = V^*/K_C^R - V_{UC}$$

$$= \frac{5480.482 \text{ KN}}{0.85} - 32.623 \text{ KN}$$

= 6447.6263 KN – 32.623 KN

= 6415.0034 KN

- Menghitung tulangan geser

  Luas tulangan geser yang diperlukan (A_{sv}) :

$$A_{SV} = \frac{V_{US.}\,S}{fy.\,d}$$

$$= \frac{6415.0034\ KN \times 150}{400\ MPa \times 2601.5}$$

$= 924.7074\ mm^2$

Dipasang tulangan **D16 – 150 (2 kaki)**

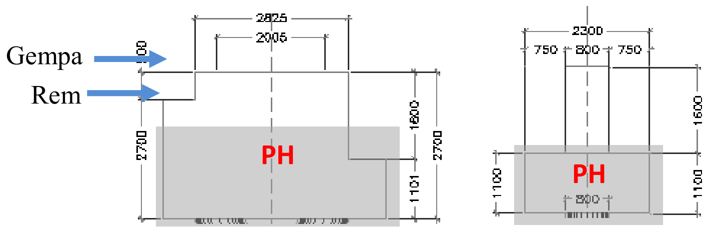
(As $_{terpasang}$ = 2680.8 mm^2)

6.4.5 Desain Pier Head

Perhitungan analisis pier pead berdasarkan pembebanan dalam keadaan batas (ultimate). Berikut di bawah ini analisis desain pier head :

6.4.5.1 Analisis Pembebanan Pier Head

Analisis pembebanan pier head ditunjukkan pada Gambar 6.63 dengan beban yang bekerja yaitu beban sendiri, beban lalu lintas, beban rem dan beban gempa. Perhitungan beban, gaya dan momen akan ditunjukkan pada tabel 6.63 hasil output SAP2000.



Gambar 6.63 Analisis pembebanan pada pier head

Tabel 6.63 Momen pada pier head pilar 1 kondisi ultimit (*output SAP2000)*

	Kombinasi 1U 1.3DL+1.8LL	Kombinasi 2U 1.3DL+1,8LL+Ex+30%Ey	Kombinasi 3U 1.3DL+1,8LL+30%Ex+Ey
	Kn.m	Kn.m	Kn.m
M11	324.9045	243.6852	242.7415
	-297.0586	-228.8253	-227.3719
M22	302.5795	241.9885	241.6383
	-631.4483	-459.3426	-460.3373

Gambar 6.64 Momen pada pier head pilar 1

Untuk penulangan pier head dipakai hasil reaksi dari kombinasi 1U dari perhitungan SAP2000. Momen yang dipakai untuk desain penulangan pier head sebesar :

Mu = 631.4483 kN.m

6.4.5.2 Perhitungan Penulangan Pier Head

Fc'	= 29.05 MPa
Fy	= 400 Mpa
h	= 1100 mm
b	= 1000 mm
Tebal selimut (d')	= 70 mm
Tinggi effesien (d)	= 1006 mm
D *Tul lentur*	= D22 mm
Ø *Tul bagi*	= D13 mm

⇔ **Penulangan Lentur :**

K_{TD}^{U} = 0,9

M* $= \frac{Mu}{0,9}$

= 702 kNm

= 701609222.2 Nmm

Rn $= \frac{M*}{b.d^2}$

$= \frac{701609222.2}{1000\ .\ 1006^2}$

$= 0.693$

β_1 $= 0,85$

$\rho b = \frac{0,85\ .fc'}{fy} . \beta 1. \left[\frac{600}{600+fy}\right]$

$= \frac{0,85.29.05}{400}\ .0,85. \left[\frac{600}{600+400}\right]$

$= 0,031$

ρ min $= \frac{1,4}{fy}$

$= \frac{1,4}{400}$

$= 0,0035$

ρ min (2) $= 1.333\ x\ \rho\ perlu$

$= 1.333$ x 0.0018

$= 0,0023$

ρ max $= 0,75$. ρb

$= 0,75 \ .\ 0,035$

$= 0,0236$

m $= \frac{fy}{0,85\ x\ fc\prime}$

$= \frac{400}{0,85\ x\ 29.05}$

$= 16.20$

ρ_{perlu} $= \frac{1}{m}\ (1 - \sqrt{1 - \frac{2m\ xRn}{fy}})$

$= \frac{1}{16.20}\ (1 - \sqrt{1 - \frac{2(16.20)\ x\ 0.693}{400}})$

$= 0.0018$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{min} > \rho < \rho_{max}$

0.0035 > 0.0018 < 0,0236 …… **TIDAK OK**

Sehingga ρ tulangan yang digunakan :

$\rho_{min (2)} = 0.0023$

Luas tulangan :

$As_{perlu} = \rho_{min (2)} . b . d$

$= 0{,}0023 \times 1000 \text{ mm} \times 1006 \text{ mm}$

$= 2346.613 \text{ mm}^2$

Dipasang tulangan lentur **D22-150**

($As_{terpasang} = 2534.22 \text{ mm}^2$)

⇔ Penulangan Pembagi :

$A_{st} = 20\ \% \times As_{perlu}$

$= 471.55 \text{ mm}^2$

Dipasang tulangan **D16 –200**

($As_{terpasang} = 1005.3096 \text{ mm}^2$)

Kontrol Geser :

Tabel 6.64 Geser pada pier head pilar 1 kondisi ultimit (*output SAP2000)*

	Kombinasi 1U	Kombinasi 2U	Kombinasi 3U
	Kn	Kn	Kn
V13	1383.04	995.69	993.67
	-1705.05	-1232.8	-1234.15
V23	1023.08	846.96	845.97
	-2435.17	-1769.05	-1777.69

Gambar 6.65 Geser (Vu) pada pier head pilar 1

V_u = 2435.17 KN

K_C^R = 0,85

V^* = $\frac{2435.17\ KN}{0.85}$

= 2864.906 KN

$ß_1$ = 1.1

$ß_2$ = 1

$ß_1$ = 1

Batas kehancuran badan

Vu_{max} = 0.2 x f'c x bv x d

= 0.2 x 29.05 x 1000 x 1006

= 5844860 N

= 5844.86 KN

Kekuatan geser tanpa tulangan geser (Vuc)

Vuc = ß1 x ß2 x ß3 x bv x d x $[\frac{(Ast\ x\ fc)}{(bv\ x\ d)}]^{1/3}$

= 1.1 x 1 x 1 x 1000 x 1006 x $[\frac{(Ast\ x\ 29.05)}{(1000\ x\ 1006)}$

= 25013.9 N

= 25.114 KN

Kekuatan geser dengan tulangan geser minimum

Vu_{min} = Vuc + (0,6 x bv x d)

= 25.114 KN + (0,6 x 1000 x 1006)

= 603625.1139 KN

Kontrol

Apakah :	V*	<	Vu maks	
	2864.906 KN	<	5844.86 KN	…**OK**
Apakah :	V*	<	K_C^R x Vu min	
	2864.906 KN	<	0,85 x 603625.114 KN	
	2864.906 KN	<	513081.34 KN…**OK**	
Apakah :	V*	<	K_C^R x Vuc	
	2864.906 KN	>	0,85 x 25.11 KN	
	2864.906 KN	>	21.35 kN…**NOTOK**	

Maka, dari analisa/control diatas, perlu untuk menghitung keperluan tulangan geser:

- Menghitung Kekuatan Geser yang diperlukan dari tulangan geser :

$$V_{US} = V^*/K_C^R - V_{UC}$$

$$= \frac{2864.906\ \text{KN}}{0.85} - 25.11\ \text{KN}$$

$$= 3370.478\ \text{KN} - 25.11\ \text{KN}$$

$$= 3345.3636\ \text{KN}$$

- Menghitung tulangan geser

Luas tulangan geser yang diperlukan (A_{sv}) :

$$A_{SV} = \frac{V_{US.}\, S}{fy.\, d}$$

$$= \frac{3345.3636\ \text{KN x } 200}{400\ MPa\ x\ 1006}$$

$$= 1662.706\ \text{mm}^2$$

Dipasang tulangan **D16– 200 (2 kaki)**

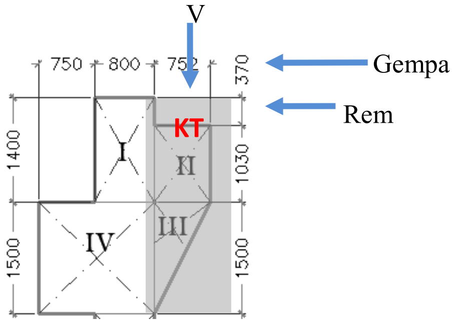
($As_{\text{terpasang}} = 2010.6\ \text{mm}^2$)

6.4.6 Desain Korbel Tumpuan Plat Slab

Perhitungan analisis korbel belakang pilar berdasarkan pembebanan dalam keadaan batas (ultimate). Berikut di bawah ini analisis desain korbel :

6.4.6.1 Analisis Pembebanan korbel

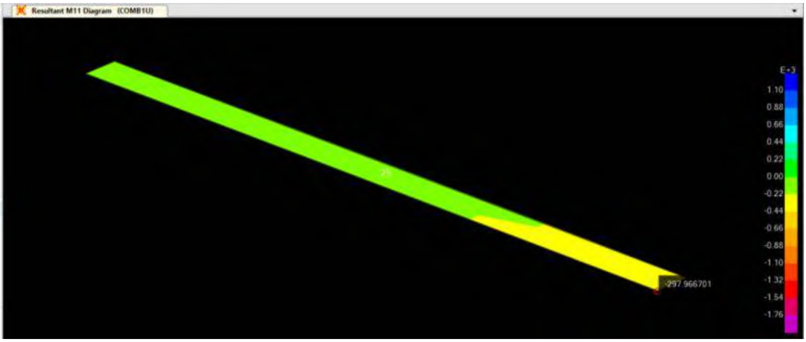
Analisis pembebanan korbel ditunjukkan pada Gambar 6.66 dengan beban yang bekerja yaitu beban sendiri, beban lalu lintas, beban rem dan beban gempa. Perhitungan beban, gaya dan momen akan ditunjukkan pada tabel 6.65 hasil output SAP2000.



Gambar 6.66 Analisis pembebanan pada korbel

Tabel 6.65 Momen pada pier head pilar 1 kondisi ultimit (*output SAP2000)*

	Kombinasi 1U 1.3DL+1.8LL	Kombinasi 2U 1.3DL+1,8LL+Ex+30%Ey	Kombinasi 3U 1.3DL+1,8LL+30%Ex+Ey
	Kn.m	Kn.m	Kn.m
M11	253.3455	108.1882	96.1941
	-297.9667	-240.5799	-237.4443
M22	153.8223	87.1286	87.5026
	-207.3702	-145.6463	-148.3322



Gambar 6.67 Momen pada korbel

Untuk penulangan korbel dipakai hasil reaksi dari kombinasi 1,3DL+1,8LL. Momen yang dipakai untuk desain penulangan korbel sebesar :

Mu = 297.9667 kN.m

6.2.6.2 Perhitungan Penulangan Korbel

Fc’	= 29.05 MPa
Fy	= 400 MPa
h	= 2350 mm
b	= 1000 mm
Tebal selimut (d’)	= 70 mm
Tinggi effesien (d)	= 2259 mm
D *Tul lentur*	= D16 mm
Ø *Tul bagi*	= D13 mm

⇔ Penulangan Lentur :

K_{TD}^{U} = 0,9

M* $= \frac{Mu}{0,9}$

= 331 kNm

= 331074111.1 Nmm

Rn $= \frac{M*}{b.d^2}$

$= \frac{331074111.1}{1000\ .\ 2259^2}$

$= 0.065$

$\beta_1 \quad = 0,85$

$\rho b \quad = \frac{0,85\ .\ fc'}{fy} . \beta 1. \left[\frac{600}{600 + fy}\right]$

$= \frac{0,85.29.05}{400}\ .0,85. \left[\frac{600}{600+400}\right]$

$= 0,031$

$\rho_{\ min} \quad = 0.04\, \frac{f'c}{fy}$

$= 0,0029$

$\rho_{\ min\ (2)} \quad = 1.333\ x\ \rho\ perlu$

$= 1.333$ x $0,00016$

$= 0.0002$

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

$= 0,75\ .\ 0,035$

$= 0,0236$

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

$= \frac{400}{0,85\ x\ 29.05}$

$= 16.20$

$\rho_{perlu} \quad = \frac{1}{m}\ (1 - \sqrt{1 - \frac{2m\ xRn}{fy}}\ )$

$= \frac{1}{16.20}\ (1 - \sqrt{1 - \frac{2(16.20)\ x\ 0.065}{400}}\ )$

$= 0.00016$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{min} > \rho < \rho_{max}$

$0.0029 > 0.00016 < 0,0236$ …… **TIDAK OK**

Sehingga ρ tulangan yang digunakan :

$\rho_{min\ (2)} = 0.0002$

Luas tulangan :

$As_{perlu} = \rho_{min\ (2)} \cdot b \cdot d$

$= 0,0002 \times 1000\ mm \times 2259\ mm$

$= 489.047\ mm^2$

Dipasang tulangan lentur **D16-150**

($As_{terpasang} = 1340.413\ mm^2$)

⇔ Penulangan Pembagi :

$A_{st} = 20\ \% \times As_{perlu}$

$= 97.809\ mm^2$

Dipasang tulangan **D13 –250**

($As_{terpasang} = 530.93\ mm^2$)

Tabel 6.66 Rekapitulasi tulangan pilar 1

	Tul. Lentur	Tul. Bagi	Tul. Geser
Pile Cap	D32	D16	D16 (2 kaki)
	150 mm	150 mm	150 mm
Kolom A	D36		D16 (2 kaki)
	22 buah		250 mm
Kolom B	D25		D16 (2 kaki)
	11 buah		250 mm
Longitudinal Stopper	D25		D16 (2 kaki)
	150 mm		150 mm
Pier Head	D22	D16	D16 (2 kaki)
	150 mm	200 mm	200 mm
Korbel	D16	D13	
	150 mm	250 mm	

BAB VI
DESAIN BANGUNAN BAWAH DAN PELENGKAPNYA

6.1 Desain Pilar 5 – Pilar 12

Elemen bangunan bawah jembatan berfungsi untuk menyalurkan semua beban – beban (baik beban hidup maupun beban mati) dari bangunan atas ke pondasi jembatan beban-beban aksi lingkungan lainnya. Dalam perencanaan Jembatan THP Kenjeran ini bangunan bawah yang dimaksudkan adalah Pilar dimana akan direncanakan pula element-element penyusun dan pelengkapnya.

Dalam desain pilar menggunakan acuan dari peraturan BMS BDM 1992 dan BMS BDC 1992. Pilar terdiri dari beberapa elemen, yaitu pondasi, pile cap (poer), dinding pilar, longitudinal stopper, dan pier head. Penulangan pilar direncanakan dari analisis elemen – elemen pilar jembatan. Analisis pembebanan untuk pilar terdiri atas beban dari bangunan atas baik beban hidup maupun beban mati, beban mati pilar, beban rem, beban angin, serta beban gempa. Berikut ini adalah analisis pembebanan serta elemen – elemen penyusun dan pelengkap pilar.

Data-data desain pilar 5 – pilar 9

- ✓ Elevasi muka tanah asli : +1.36 LWL
- ✓ Elevasi lantai kendaraan : +11.295 LWL
- ✓ Tinggi pilar rencana : 9.937 m
- ✓ Lebar pilar : 16 m
- ✓ Panjang bentang jembatan : 40 m
- ✓ Pondasi : Tiang pancang

Data-data desain pilar 10

- ✓ Elevasi muka tanah asli : +1.36 LWL
- ✓ Elevasi lantai kendaraan : +9.966 LWL
- ✓ Tinggi pilar rencana : 8.858 m
- ✓ Lebar pilar : 16 m
- ✓ Panjang bentang jembatan : 40 m
- ✓ Pondasi : Tiang pancang

Data-data desain pilar 11

- ✓ Elevasi muka tanah asli : +1.36 LWL
- ✓ Elevasi lantai kendaraan : +9.026 LWL
- ✓ Tinggi pilar rencana : 7.668 m
- ✓ Lebar pilar : 16 m
- ✓ Panjang bentang jembatan : 40 m
- ✓ Pondasi : Tiang pancang

Data-data desain pilar 12

- ✓ Elevasi muka tanah asli : +1.36 LWL
- ✓ Elevasi lantai kendaraan : +7.854 LWL
- ✓ Tinggi pilar rencana : 6.492 m
- ✓ Lebar pilar : 16 m
- ✓ Panjang bentang jembatan : 40 m
- ✓ Pondasi : Tiang pancang

6.1.2 Desain Pondasi Pilar 5-12

Berdasarkan analisis dari data penyelidikan tanah pada pilar arah Kenjeran didapatkan nilai SPT berdasarkan titik bor 2 STA 0+300 (*lihat pada lampiran*) pada kedalaman 24 m sehingga dipakai jenis pondasi tiang pancang.

6.1.2.1 Analisis Pembebanan pada Pilar 5

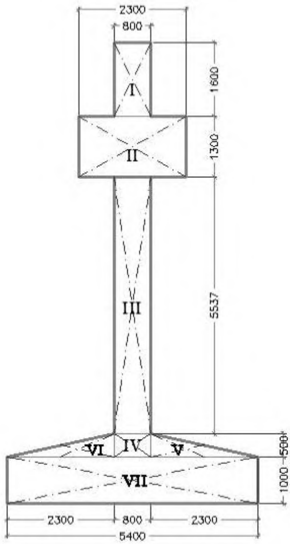
1. Beban mati bangunan atas

Tabel 6.1 Gaya reaksi V_{abt} akibat b. mati bangunan atas pilar 5

No.	Uraian	V_{abt} (kN)
1	Plat lantai kendaraan	4080.00
2	RC Plat	856.80
3	Lapisan aspal	448.80
4	Lapisan overlay	448.80
5	Genangan air hujan	319.872
6	Tiang sandaran	69.46
7	Gelagar beton pratekan	6544.8
8	Diafragma	718
9	Instalasi ME dan tiang PJU	20.00
	Jumlah	13506.54

2. Berat sendiri pilar

Dalam perhitungan beban/berat sendiri pilar dibagi atas beberapa segmen. Hal ini untuk memudahkan dalam analisis. Analisis berat pilar didapat dari volume per segmen dikalikan dengan berat jenis (γ), kemudian dilanjutkan dengan menghitung statis momen titik tangkap gaya/titik berat pilar terhadap center pilar.



Gambar 6.1 Potongan melintang pilar P5

Tabel 6.2 Perhitungan berat sendiri Pilar 5

Segmen	Volume	Berat	x	z
	m^3	kN	m	m
1	20.48	512.00	0.00	9.24
2	47.84	1196.00	0.00	7.69
3	47.84	1162.77	0.00	4.27
4	4.92	123.00	0.00	1.25
5	7.07	176.81	-0.36666667	1.17
6	7.07	176.81	0.36666667	1.17
7	66.42	1660.50	0.00	0.50
Berat total		5007.90		

Tabel 6.3 Perhitungan statis momen pilar 5

Segmen	w.x	w.z
	kNm	kNm
1	0.00	4678.14
2	0.00	9193.65
3	0.00	4963.28
4	0.00	153.75
5	-64.83	206.28
6	64.83	206.28
7	0.00	830.25
	0.00	20231.64

Sehingga didapatkan titik berat atau titik tangkap gaya :

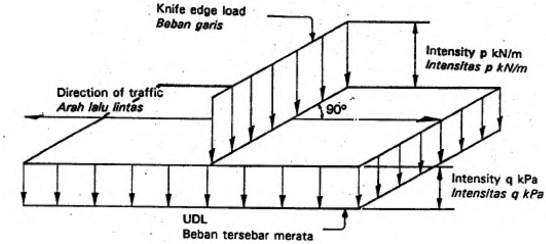
x = 0.00

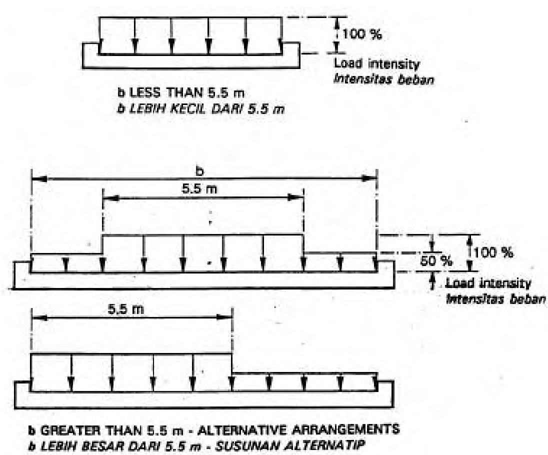
z = 4.0399 m

3. Beban hidup lalu-lintas

   Beban lalu lintas (lajur "D") untuk rencana bangunan bawah jembatan jalan raya terdiri dari UDL dan KEL dimana akan ditempatkan melintang pada lebar penuh dari jalan kendaraan jembatan dan menghasilkan pengaruh pada jembatan ekuivalen dengan rangkain kendaraan sebenarnya. Jumlah total pembebanan lajur "D" yang ditempatkan tergantung pada lebar jalan kendaraan jembatan.

   Asumsi pembebanan KEL dan UDL seperti yang ditunjukkan dalam gambar di bawah ini :





Gambar 6.2 Asumsi beban hidup lalu-lintas

- ✓ Panjang bentang jembatan (L) = 40.8 m
- ✓ Lebar Perkerasan Jembatan (b) = 10 m
- ✓ Beban KEL (P_{kel}) = 49 kN/m
  Faktor beban dinamis (1+DLA) = 1.4
- ✓ Beban UDL (qUDL) = 9 kN/m^2

Total beban UDL = 2846 kN

$$(((5,5xq_{UDL}) + ((b - 5,5)\ x\ 0,5x\ q_{UDL})\ x\ L$$

Total Beban KEL = 532 kN

$$[(5,5\ x(P_{KEL}(1 + DLA))] + [b - 5,5\ x\ (0,5\ x\ (P_{KEL}(1 + DLA))\ ]$$

Total Beban Hidup Lalu Lintas = 3377kN

4. Beban Gempa

Analisis beban gempa berdasarkan BMS 1992 pasal 2.4.7. beban gempa direncanakan dengan metode beban horisontal statis ekivalen. Beban gempa bangunan atas yang masuk pada abutment direncanakan 100% dari total beban.

Perhitungan Beban Gempa :

$$T_{EQ} = C.I.S.\ W$$

- ✓ Zona gempa = Zona 2
- ✓ Keofisien Geser (C) = 0.21
- ✓ Faktor kepentingan (*I*) = 1
- ✓ Faktor type bangunan = 1
- ✓ Beban mati ½ bangunan atas = 13507 kN
- ✓ Beban mati pilar (w)
  Pilar 5-10 = 5008 kN
- ✓ Beban gempa akibat bangunan atas =2836 kN
- ✓ Beban gempa akibat berat pilar
  Pilar 5-10 =1052 kN

5. Beban angin

Gaya angin pada bangunan atas tergantung luas ekuivalen diambil sebagai luas padat jembatan dalam elevasi proyeksi tegak lurus. Gaya nominal akibat angin bergantung pada kecepatan angin rencana. Beban angin yang diperhitungkan berdasarkan BMS 1992 adalah sebagai berikut :

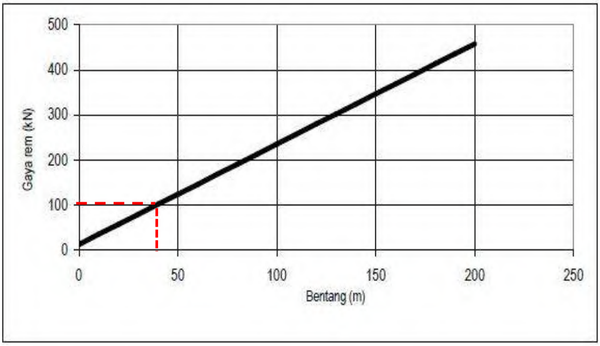
$$T_{EW} = 0{,}0006\ x\ C_w\ x\ {V_w}^2\ x\ A_b$$

- ✓ Kecepatan angin rencana (V_w) = 30 m/s
- ✓ Lebar jembatan (b) = 16.00 m
- ✓ Tinggi sampan jembatan (d) = 3.30m
- ✓ Bentang jembatan = 40.80 m
- ✓ Luas bagian samping jembatan (A_b) = 100.98 m^2
- ✓ Rasio *b/d* = 4.85

- ✓ Koefisien seret (C_w) = 1.25
- ✓ Gaya angin (T_{EW}) = 68.16 kN

6. Beban rem (Breaking force)

Pengaruh percepatan dan pengereman dari lalu-lintas harus diperhitungkan sebagai gaya dalam arah memanjang. Beban rem yang diperhitungkan berdasarkan RSNI T-02-2005 untuk jembatan dengan panjang bentang 40m adalah = 100 kN/Lajur (2.75m), karena terdapat 2 lajur makan beban rem yang terjadi sebesar = 200 kN.



Gambar 6.3 Gaya rem perlajur 2,75 m (KBU)

6.1.2.2 Perhitungan Gaya Aksial Tiang Pancang

Dari analisis pembebanan diatas, maka langkah selanjutnya adalah analisis momen dan gaya. Perhitungan momen dan gaya tersebut dipusatkan pada center poer. Berikut ini perhitungan momen dan gaya yang bekerja pada poer ditunjukkan pada Tabel 6.8 berikut :

Tabel 6.4 Perhitungan gaya dan momen pada center poer pilar 5

No.	Uraian	V	H_x	H_y	*x*	*y*	*z*
		KN	KN	KN	m	m	m
I	Beban tetap (P_{MS})						
	- Struktur Atas Kanan	6753			0.8		
	- Struktur Atas Kiri	6753			-0.8		
	- Pilar	5008			0.0		
II	Aksi Transien						
	- UDL Kanan (T_{TD})	1423			0.8		
	- UDL Kiri (T_{TD})	1423			-0.8		
	- P_{KEL}Kanan (1+DLA) (T_{TD})	266			0.8		
	- P_{KEL}Kiri (1+DLA) (T_{TD})	266			-0.8		
	- Gaya RemKanan (T_{TB})		100				8.3
	- Gaya RemKiri (T_{TB})		100				-8.3
	- Beban Angin (T_{EW})			68.16			8.3
III	Aksi Lain (*gempa*)						
	- Eq Struktur Atas (T_{EQ1})		2836	2836			8.3
	- Eq Pilar 5-Pilar 10 (T_{EQ2})		1051	1051			4.0

Lanjutan perhitungan gaya dan momen pada center poer

no.	Uraian	M*x*	M*y*
		KNm	*KNm*
I	Beban tetap		
	- Struktur Atas Kiri	-	5605.21
	- Struktur Atas Kanan	-	-5605.21
	- Pilar	-	0.00

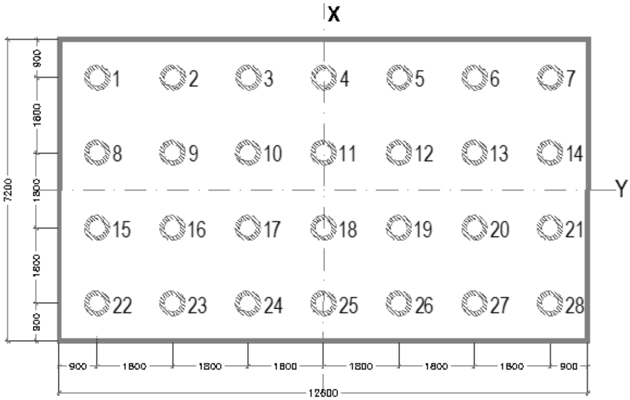
no.	Uraian	Mx	My
		KNm	*KNm*
II	Aksi Transien		
	- UDL Kanan (T_{TD})	-	1181.01
	- UDL Kiri (T_{TD})	-	-1181.01
	- P_{KEL} Kanan (1+DLA) (T_{TD})	-	220.63
	- P_{KEL}Kiri (1+DLA) (T_{TD})	-	-220.63
	- Gaya RemKanan (T_{TB})	-	833.70
	- Gaya RemKiri (T_{TB})	-	-833.70
	- Beban Angin (T_{EW})	568.26	-
III	Aksi Lain (*gempa*)		
	- Eq Struktur Atas (T_{EQ1})	23646.84	23646.84
	- Eq Pilar 5-Pilar 10 (T_{EQ2})	4248.64	4248.64

Kombinasi yang dipakai untuk kekuatan pondasi adalah :

Tabel 6.5 Kombinasi beban untuk pondasi pilar 5

uraian	kombinasi 1	kombinasi 2	kombinasi 3
	DL+LL+TEW	DL+LL+Ex+30%Ey	DL+LL+30%Ex+Ey
Hx / KN	200	3876.40	1162.92
Hy / KN	68.16	1162.92	3876.40
V / KN	21836.51	21836.51	21836.51
Mx / KNm	568.26	27845.85	8353.75
My / KNm	0.00	8353.75	27845.85

Konfigurasi Tiang Pancang :



Gambar 6.4 Konfigurasi tiang pancang pilar 5 - pilar 12

Dari kombinasi dan konfigurasi tersebut diatas, maka daya dukung pertiang dapat dihitung dengan rumus :

$$P = V/_n \pm {Mx * y}/{\sum y^2} \pm {My * x}/{\sum x^2}$$

Keterangan :

P	= Gaya aksial yang terjadi pada 1 tiang (kN)
V	= Total gaya aksial (kN)
N	= Jumlah tiang pancang (buah)
Mx	= Momen sumbu x (kNm)
My	= Momen sumbu y (kNm)
y	= Jarak tiang terhadap sumbu x (m) = 1.8
x	= Jarak tiang terhadap sumbu y (m) = 1.8

Tabel 6.6 Perhitungan kemampuan gaya aksial per-tiang

no.	*x*	*y*	x^2	y^2	komb. 1	komb. 2	komb.3
	m	*m*	m^2	m^2	*KN*	*KN*	*KN*
1	2.7	-5.4	7.29	29.16	771.42	564.40	1318.56
2	2.7	-3.6	7.29	12.96	774.24	702.53	1360.00
3	2.7	-1.8	7.29	3.24	777.06	840.65	1401.43
4	2.7	0	7.29	0.00	779.88	978.77	1442.87
5	2.7	1.8	7.29	3.24	782.69	1116.90	1484.31
6	2.7	3.6	7.29	12.96	785.51	1255.02	1525.75
7	2.7	5.4	7.29	29.16	788.33	1393.15	1567.18
8	0.9	-5.4	0.81	29.16	771.42	431.80	876.56
9	0.9	-3.6	0.81	12.96	774.24	569.93	918.00
10	0.9	-1.8	0.81	3.24	777.06	708.05	959.44
11	0.9	0	0.81	0.00	779.88	846.18	1000.87
12	0.9	1.8	0.81	3.24	782.69	984.30	1042.31
13	0.9	3.6	0.81	12.96	785.51	1122.42	1083.75
14	0.9	5.4	0.81	29.16	788.33	1260.55	1125.19
15	-0.9	-5.4	0.81	29.16	771.42	299.20	434.56
16	-0.9	-3.6	0.81	12.96	774.24	437.33	476.00
17	-0.9	-1.8	0.81	3.24	777.06	575.45	517.44
18	-0.9	0	0.81	0.00	779.88	713.58	558.88
19	-0.9	1.8	0.81	3.24	782.69	851.70	600.31
20	-0.9	3.6	0.81	12.96	785.51	989.82	641.75
21	-0.9	5.4	0.81	29.16	788.33	1127.95	683.19
22	-2.70	-5.4	7.29	29.16	771.42	166.60	-7.43
23	-2.70	-3.6	7.29	12.96	774.24	304.73	34.00
24	-2.70	-1.8	7.29	3.24	777.06	442.85	75.44
25	-2.70	0	7.29	0.00	779.88	580.98	116.88

no.	x	y	x^2	y^2	komb. 1	komb. 2	komb.3
	m	*m*	m^2	m^2	*KN*	*KN*	*KN*
26	-2.70	1.8	7.29	3.24	782.69	719.10	158.32
27	-2.70	3.6	7.29	12.96	785.51	857.22	199.75
28	-2.70	5.4	7.29	29.16	788.33	995.35	241.19
			113.40	362.9			

P_{max}	P_{min}
788.33	771.42
1393.15	166.60
1567.18	-7.43

6.1.2.3 Perhitungan Daya Dukung Tanah

Dari Tabel 6.6 dapat diketahui nilai maksimum (Pmax) Gaya aksial tiang pancang akibat beban tetap (kombinasi 1) adalah 771.42 KN dan nilai minimum (Pmin) adalah 788.33 KN, nilai maksimum (Pmax) Gaya aksial tiang pancang akibat beban sementara (kombinasi 2) adalah 1393.15 KN dan nilai minimum (Pmin)adalah 166.60KN , nilai maksimum (Pmax) Gaya aksial tiang pancang akibat beban sementara (kombinasi 3) adalah 1567.18 KN dan nilai minimum (Pmin) adalah -7.43 KN.

Dari hasil kemampuan tiang pancang didapat hasil reaksi berupa gaya aksial tekan dan tarik maka akan dikontrol dengan daya dukung tanah akibat tekan dan tarik. Perhitungan daya dukung tanah berdasarkan tiang pancang yang berdiameter 0,60 m dan berdasarkan data penyelidikan tanah SPT pada titik bor BH2. Daya dukung tanah dihitung berdasarkan rumus dan hasilnya ditunjukkan berikut :

Perhitungan berikut ini berdasarkan rumus **Kazuto Nakazawa.**

$$R_a = \frac{1}{n} Ru$$

$$R_u = \frac{1}{n} [(\mathrm{qd.A}) + (\mathrm{U.}\Sigma \mathrm{li.fi})]$$

Keterangan :
Ra = Daya dukung tanah yang diizinkan (kN)
Rp = Daya dukung dari unsur bearing (kN)
Rf = Daya dukung dari unsur lekatan/skin friction (kN)
n = Faktor keamanan
qd = Daya dukung dari unsur bearing (kN/m^2)
A = Luas penampang dasar tiang (m^2)
U = Panjang keliling tiang (m)
Li = Tebal lapisan tanah dengan memperhitungkan geseran dinding tiang (m)
Fi = Besaran gaya geser maksimum dari lapisan tanah dengan memperhitungkan geseran dinding tiang (kN/m^2)

- Perhitungan daya dukung tiang Pilar 5-10 kedalam 24 m.

$$\acute{N} = \frac{N1+N2}{2}$$
$$= \frac{43+(43+22+21)}{2}$$
$$= 36$$

Keterangan :
$\acute{N}$ = Harga N rata-rata untuk perencanaan tanah pondasi pada ujung tiang
N1 = Harga N pada ujung tiang
$\acute{N}2$ = Harga rata-rata N pada jarak 4D dari ujung tiang
4D = 2.4 m

- Panjang ekivalensi dari penetrasi tiang

l = 1.1 m

- Daya dukung pada ujung tiang

$$\frac{l}{D} = 2$$

$$\frac{qd}{\acute{N}} = 14$$

qd= 14Ń = 14 x 36 = 501.667 ton/m^2

= 5016.7 kN/m^2

Rp = A . qd = $\frac{\Pi.0,62}{4}$ x 501.667 ton/m^2

= 141.771 ton

= 1417.71 kN

➢ Menghitung gaya geser dinding tiang

Kedalaman	Ketebalan lapisan li (m)	Tanah	Harga rata-rata N	fi (Ton/m^2)	li.fi (Ton)
0-2	2	Lanau berlempung	1.0	1.00	2.0
2-10	8	Lempung berlanau pasir	1.6	1.56	12.4
10-11	1	Lanau pasir berkerikil	7.0	7.00	7.0
11-16	5	Lempung berlanau berpasir	15.0	12.00	60.0
16-19	3	Lempung lanau berpasir kerikil	21.5	12.00	36.0
19-23	4	Lanau pasir berlempung	20.6	12.00	48.0
23-24	1	Pasir berkerikil berbatu	32.5	10.00	10.0
Jumlah					175

- Rf = U.∑li.fi = ∏ x 0,6 x 175
  = 330.537 Ton
  = 3305.373 kN
- Daya dukung ultimate
  Ru = (Rp + Rf)
  = qd.A + U.∑li.fi
  = 141.771+ 330.537
  = 472.31 ton
  = 4723.1kN
- Daya dukung yang diijinkan (Tekan)
  Ra = ⅓ Ru
  = ⅓ 472.31 ton
  = 157.44 ton
  = 1574.4 kN (Beban tetap)
  Ra = ½ Ru
  = ½ 472.31 ton
  = 236.16 ton
  = 2361.6 kN (Beban sementara)

- Daya dukung yang diijinkan (Tarik)
  Ra = ⅓ Rf
  = ⅓ 330.537ton
  = 110.18 ton
  = 1101.8 kN (Beban tetap)
  Ra = ½ Rf
  = ½ 330.537ton
  = 165.27 ton
  = 1652.7 kN (Beban sementara)

6.1.2.4 Perhitungan Efisiensi Tiang Pancang

Untuk menghitung daya dukung tiang kelompok direncanakan konfigurasi dan koefisien efisiensinya

Efisiensi tiang kelompok dihitung dengan rumus Converse - Labbare :

$$\boldsymbol{\eta = 1 - arc\,tan\left(\frac{D}{k}\right)\,x\,\frac{(n-1)m + (m-1)n}{90.m.n}}$$

η = koefisien kelompok tiang pancang
D = diameter tiang pancang (m)
k = jarak antar tiang tegak lurus sumbu x
m = jumlah tiang dalam satu kolom (buah)
n = jumlah tiang dalam satu baris (buah)

$$\eta = 1 - arc\,tan\left(\frac{0,6}{1,8}\right)\,x\,\frac{(7-1)4 + (4-1)7}{90.5.7}$$

$$= 1 - arc\tan 0,333\,x\,\frac{24+21}{2520}$$

$$= 1 - 18.43\,x\,\frac{45}{2520}$$

$$= 1 - 18.43\,x\,0,0178$$

$$= 1 - 0.329$$

$$= 0,671$$

Tabel. 6.7 P_{ijin}tiangpancang Ø0,6 m kedalaman 24 m

Data tanah	P_{ijin} Tekan beban sementara	P_{ijin} Tarik beban sementara	P_{ijin} Tekan beban tetap	P_{ijin} Tarik beban tetap
	KN		KN	
BH2	1583.92	1108.481	1055.946	738.987

6.1.2.5 Kontrol Kekuatan Tiang Pancang

Setelah mendapat P yang terjadi maka dilakukan analisis kontrol kekuatan tiang pancang terhadap gaya dan momen yang bekerja serta kontrol geser pons untuk mengetahui kemampuan beton menahan geser.

Dari wika pile classification direncanakan tiang pancang beton prategang dengan :

- Diameter tiang pancang = 0.6 m
- Tebal (t) = 0.1 m
- Kelas = C
- Mutu beton f'c = 49.8 MPa
- Allowable axial load = 2290 kN
- Bending momen crack = 290 kNm
- Bending momen ultimate = 580 kNm
- Modulus elastisitas beton = 119948

  $Ec = (wc)^{1,5}.0{,}043.\sqrt{fc'}$
- Momen inersia tiang pancang $= \frac{1}{64}\pi\,(D^4 - d^4)$

  $= 510509\ cm^4$

6.1.2.6 Kontrol terhadap Gaya Aksial Vertikal

Daya dukung suatu tiang harus ditinjau berdasarkan kekuatan tanah tempat tiang ditanam. Hasil daya dukung yang terendah adalah yang menentukan yang dipakai sebagai daya dukung ijin tiang.

- Berdasarkan kekuatan bahan

  Kekuatan tekan (maksimal) terhadap gaya aksial vertikal untuk tiang pancang Ø0,6m adalah 2290 kN.

  Sedangkan beban vertikal maksimal yang diterima tiang adalah sebesar 1567.18 kN.

  2290 kN > **1567.18→OK**
- Berdasarkan daya dukung tanah

  Berdasarkan analisa perhitungan daya dukung tanah (data SPT) dari perumusan *Kazuto Nazakawa* didapatkan besarnya daya dukung ijin tanah terhadap pondasi tiang pancang prestressed concrete spun pile Ø0,6m dengan kedalaman 24 m diperoleh Qijin seperti yang ditabelkan berikut ini :

Tabel 6.8 Kontrol daya dukung tanah

Data tanah	P_{ijin} Tekan beban sementara	P_{ijin} Tarik beban sementara	P_{ijin} Tekan beban tetap
	KN		KN
BH2	1583.920 > 1567.18	1108.481 > 7.36	1055.946 > 788.33
	OK	**OK**	**OK**

6.1.2.7 Kontrol terhadap Beban Horizontal

Gaya-gaya horisontal (Hx) diperoleh dari gaya searah dengan arah sumbu x,diantarnya : Beban 100% akibat gempa (Struktur atas + pilar).

Hx = 3876.4 kN

∑Hx = 100% Hx + 30% Hy
= 4225.3 kN

$$\text{H1 tiang} = \frac{\sum Hx}{Jumlah\ tiang}$$

$$= \frac{4225.3\text{ kN}}{35}$$

= 120.722 kN

Gaya-gaya horisontal (Hy) diperoleh dari Beban searah sumbu y, diantaranya : 30% akibat gempa (Struktur atas + abutment).

Hy = 1166.4 kN

∑Hy = 100% Hy + 30% Hx
= 2325.84 kN

$$\text{H1 tiang} = \frac{\sum Hy}{Jumlah\ tiang}$$

$= \frac{2325.84 \text{ kN}}{35}$

$= 66.45$ kN

Kemampuan tambahan tiang menahan gaya horisontal bila diijinkan adanya pergeseran posisi ujung tiang sebesar d.

$$H_{ijin} = \frac{k.\, D.\, d}{\beta}$$

$$k = 0{,}2\ x\ E_O\ x\ D^{-3/4}\ x\ y^{-1/2}$$

Keterangan :

Eo = Modulus deformasi tanah pondasi (28N, Nilai N diambil NSPT rata-rata sampai pada kedalaman tiang pancang yang masuk kedalam tanah).

d = Pergeseran posisi ujung tiang (cm) = 2.5 cm

D = Diameter tiang pancang (0,6 m)

ß = $\sqrt[4]{\frac{k.\,D}{4EI}}$

E = Modulus elastisitas beton tiang

I = Momen inersia penampang

$$k = 0{,}2xE_Ox\ D^{-3/4}\ x\ y^{-1/2}$$

$$= 0{,}2\ x\ 28\overline{N_{SPT}}\ x\ D^{-3/4}\ x\ y^{-1/2}$$

$$= 0{,}2\ x\ 28.\ 1\ x\ 60^{-3/4}\ x\ 1^{-1/2}$$

$$= 0{,}2\ x\ 28\ x\ 60^{-3/4}\ x\ 1^{-1/2}$$

$$= 0.1643$$

$$\beta = \sqrt[4]{\frac{k.\ D}{4EI}}$$

$$= \sqrt[4]{\frac{0.1643\ x\ 60}{4\ x\ 119948\ x\ 510609}}$$

$$= \sqrt[4]{\frac{9.85725}{2.45 \, x \, 10^{11}}}$$

$$= 0{,}00252$$

$$H_{ijin} = \frac{k.\ D.\ d}{\beta}$$

$$= \frac{0.1643.\ 60.\ 2{,}5}{0{,}00252}$$

$$= 97.841 \, KN$$

Hijin $= \frac{97.841 \, KN}{2}$ = 48.921 kN

Kontrol :

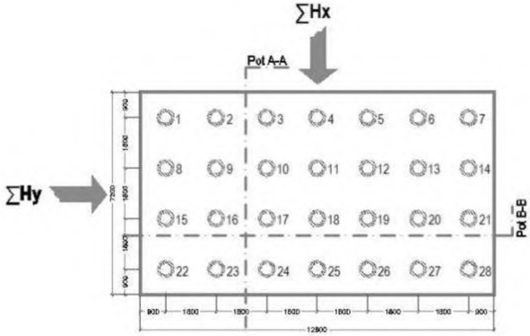
Hx 1 tiang	*< H ijin*	
121.72 kN	>48.921 kN	…**NOT OK**

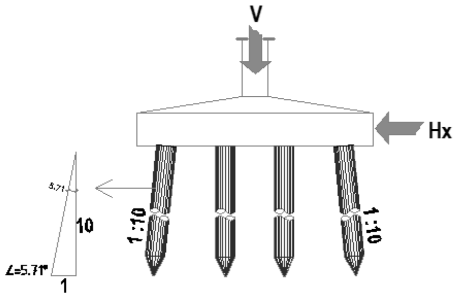
Hy 1 tiang	*< H ijin*	
66.45 kN	>48.921 kN	…**NOT OK**

Kesimpulan dari perhitungan diatas bahwa H1 tiang > H_{ijin} maka perlu dilakukan pemasangan tiang pancang miring.

6.1.2.8 Kontrol Tiang Pancang Miring

- Tiang Pancang Miring arah X





α = 5.711
sin α = 0.0995
Rumus mencari jumlah tiang pancang miring :

$$H_{ijin\ total} + N1.Psin\,\alpha \ \geq \sum Hx$$

Keterangan :

H ijin 1 tiang	= 48.92 kN
H ijin total	= 1712 kN
Daya dukung tiang pancang dalam grup SF=2 (P)	= 2262 kN

Total gaya horizontal arah x (∑Hx) = 4225 kN

Jumlah tiang pancang miring (N1) = …?

$$H_{ijin\,total} + N1.\,Psin\,\alpha \qquad \geq \sum Hx$$

$$1712\text{ kN} + \text{N1}.\ 2362\sin\alpha \qquad \geq 4225\text{ kN}$$

$$\text{N1}.\ 235 \qquad \geq 4225 - 1712$$

$$\text{N1} \qquad \geq \frac{2526.74}{235}$$

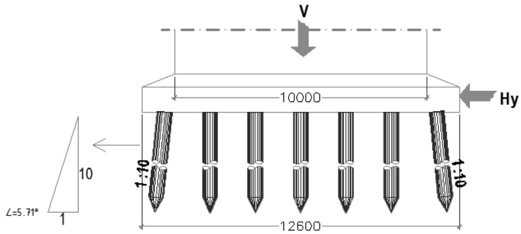
$$\text{N1} \qquad \geq 10.69 \sim \mathbf{14.00}$$

Kontrol :

$$H_{ijin\,total} + 14.\,Psin\,\alpha \ \geq \sum Hx$$

$$5001.93 \ \geq 4225.28 \qquad \ldots\textbf{OK}$$

- Tiang Pancang Miring arah Y



α = 5.711

sin α = 0.0995

Rumus mencari jumlah tiang pancang miring :

$$H_{ijin\,total} + N1.\,Psin\,\alpha \ \geq \sum Hy$$

Keterangan :

H ijin 1 tiang (SF =2) = 48.92 kN

H ijin total = 1712 kN

Daya dukung tiang pancang = 2361.5 kN

dalam grup SF =2 (P)
Total gaya horizontal arah y (∑Hy) = 2325.8 kN
Jumlah tiang pancang miring (N1) = …?

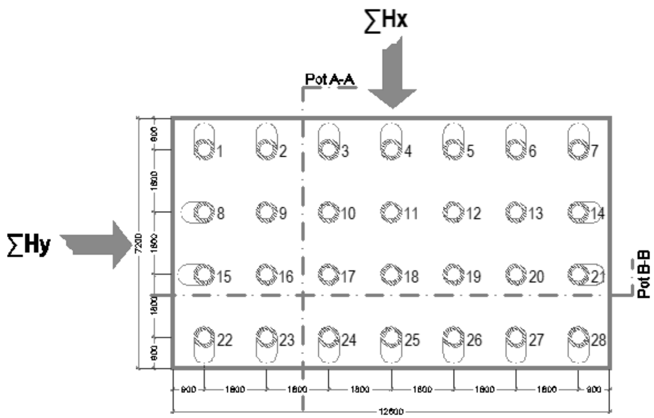
$$H_{ijin\,total} + N1. Psin\,\alpha \geq \sum Hy$$

1712 kN + N1. 2325.8 sin α ≥ 2325.8 kN
N1. 235 ≥ 2325.8 – 1712 kN
N1 ≥ $\frac{613.62}{235}$
N1 ≥ 2.61 ~ **4.00**

Kontrol :

$$H_{ijin\,total} + 4\,.Psin\,\alpha \geq \sum Hy$$

2652.13 ≥ 2325.84 …**OK**



Gambar 6.5 Rencana tiang pancang miring

6.1.2.9 Kontrol terhadap Momen

Momen maksimum yang terjadi pada tiang pancang dihitung dengan perumusan :

$$k \quad = 0{,}2xE_O x\, D^{-3/4}\, x\, y^{-1/2}$$

$$= 0{,}2\, x\, 28\overline{N_{SPT}}\, x\, D^{-3/4}\, x\, y^{-1/2}$$

$$= 0{,}2\, x\, 28.\ 1\, x\, 60^{-3/4}\, x\, 1^{-1/2}$$

$$= 0{,}2\, x\, 28\, x\, 60^{-3/4}\, x\, 1^{-1/2}$$

$$= 0.1643$$

$$\beta \quad = \sqrt[4]{\frac{k.\ D}{4EI}}$$

$$= \sqrt[4]{\frac{0.1643\, x\, 60}{4\, x\, 119948\, x\, 510509}}$$

$$= \sqrt[4]{\frac{9.857}{2.45\, x\, 10^{11}}}$$

$$= 0{,}00252$$

$$H = \frac{\sqrt{Hx^2 + Hy^2}}{36}$$

$$= \frac{4823.12}{36} = 172.25\ KNm$$

$$M_m = 0{,}2079\, x \left(\frac{H}{2.\beta}\right)$$

$$= 71\ \ KNm$$

Mm	$< M_{crack}$	
71 KNm	< 290 kNm	… **OK**

6.1.2.10 Desain Poer (Pile Cap)

Perhitungan analisis poer berdasarkan pembebanan dalam keadaan batas (ultimate). Beban yang dihitung dari beban P yang terjadi pada tiang pancang, berikut di bawah ini analisis desain poer :

Tabel 6.9 Perhitungan gaya dan momen pada center poer pilar 5

no.	Uraian	V	H_x	H_y	x	y	z
		KN	KN	KN	m	m	m
I	Beban tetap (P_{MS})						
	- Struktur Atas Kanan	8779			0.8		
	- Struktur Atas Kiri	8779			-0.8		
	- Pilar	6438			0.0		
II	Aksi Transien						
	- UDL Kanan (T_{TD})	1281			0.8		
	- UDL Kiri (T_{TD})	1281			-0.8		
	- P_{KEL}Kiri (1+DLA) (T_{TD})	239			0.8		
	- P_{KEL}Kanan (1+DLA) (T_{TD})	239			-0.8		
	- Gaya Rem Kanan (T_{TB})		180				8.3
	- Gaya RemKiri (T_{TB})		180				-8.3
	- Beban Angin (T_{EW})			81.79			8.3
III	Aksi Lain (*gempa*)						
	- Eq Struktur Atas (T_{EQ1})		2836	2836			8.3
	- Eq Pilar 5-Pilar10 (T_{EQ2})		1040	1040			4.0

Lanjutan perhitungan gaya dan momen pada center poer

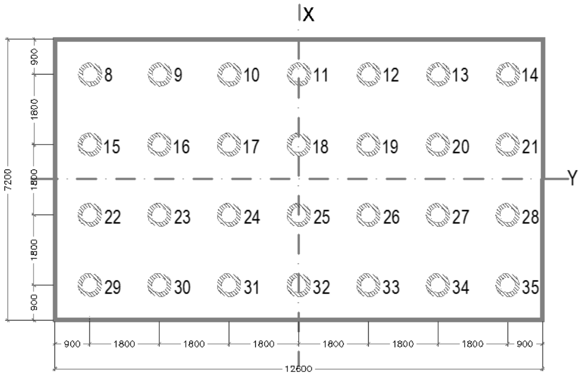
no.	Uraian	M*x*	M*y*
		KNm	*KNm*
I	Beban tetap (P_{MS})		
	- Struktur Atas	-	7286.78
	- Struktur Atas	-	-7286.78
	- Pilar 5-Pilar 10	-	0.00
II	Aksi Transien		
	- UDL Kanan (T_{TD})	-	1062.91
	- UDL Kiri (T_{TD})	-	-1062.91
	- P_{KEL}Kiri (1+DLA) (T_{TD})	-	198.57
	- P_{KEL}Kanan (1+DLA) (T_{TD})	-	-198.57
	- Gaya Rem Kanan (T_{TB})	-	1500.66
	- Gaya Rem Kiri (T_{TB})	-	-1500.66
	- Beban Angin (T_{EW})	681.91	-
III	Aksi Lain (*gempa*)		
	- Eq Struktur Atas (T_{EQ1})	23646.84	23646.84
	- Eq Pilar 5-Pilar10 (T_{EQ2})	4248.64	4248.64

Tabel 6.10 Kombinasi beban untuk pondasi pilar 5

Kombinasi 1		
1,3 P_{MS}+ 1,2 T_{EW} + 1.8 T_{TD} + 1.8 T_{TB}		
V =	27036	kN
Mx =	681.91	kNm
My =	0	kNm

Kombinasi 2		
1,3 PMS+ 1,8 TTD+ 30% Ex + Ey		
V =	27036	kN
Mx =	8353.75	kNm
My =	27845.85	kNm
Kombinasi 3		
1,3 PMS+ 1,8 TTD+ Ex + 30% Ey		
V =	27036	kN
Mx =	27846	kNm
My =	8354	kNm

Konfigurasi Tiang Pancang :



Gambar 6.6 Konfigurasi tiang pancang pilar 5- pilar 12

Dari kombinasi dan konfigurasi tersebut diatas, maka daya dukung pertiang dapat dihitung dengan rumus :

$$P = V/_n \pm \frac{Mx * y}{\sum y^2} \pm \frac{My * x}{\sum x^2}$$

Keterangan :

P = Gaya aksial yang terjadi pada 1 tiang (kN)
V = Total gaya aksial (kN)
N = Jumlah tiang pancang (buah)
Mx = Momen sumbu x (kNm)
My = Momen sumbu y (kNm)
y = Jarak tiang terhadap sumbu x (m)
x = Jarak tiang terhadap sumbu y (m)

Tabel 6.11 Perhitungan kemampuan gaya aksial per-tiang

No.	*x*	*y*	x^2	y^2	komb. 1 (Tetap)	komb. 2	komb.3
	m	*m*	m^2	m^2	*KN*	*KN*	*KN*
1	2.7	-5.4	7.29	29.16	955.44	1504.27	750.11
2	2.7	-3.6	7.29	12.96	958.82	1545.71	888.24
3	2.7	-1.8	7.29	3.24	962.21	1587.15	1026.36
4	2.7	0	7.29	0.00	965.59	1628.59	1164.49
5	2.7	1.8	7.29	3.24	968.97	1670.02	1302.61
6	2.7	3.6	7.29	12.96	972.35	1711.46	1440.74
7	2.7	5.4	7.29	29.16	975.74	1752.90	1578.86
8	0.9	-5.4	0.81	29.16	955.44	1062.28	617.52
9	0.9	-3.6	0.81	12.96	958.82	1103.71	755.64
10	0.9	-1.8	0.81	3.24	962.21	1145.15	893.76
11	0.9	0	0.81	0.00	965.59	1186.59	1031.89
12	0.9	1.8	0.81	3.24	968.97	1228.02	1170.01
13	0.9	3.6	0.81	12.96	972.35	1269.46	1308.14
14	0.9	5.4	0.81	29.16	975.74	1310.90	1446.26
15	-0.9	-5.4	0.81	29.16	955.44	620.28	484.92
16	-0.9	-3.6	0.81	12.96	958.82	661.72	623.04
17	-0.9	-1.8	0.81	3.24	962.21	703.15	761.16

No.	x	y	x^2	y^2	komb. 1 (Tetap)	komb. 2	komb.3
	m	m	m^2	m^2	KN	KN	KN
18	-0.9	0	0.81	0.00	965.59	744.59	899.29
19	-0.9	1.8	0.81	3.24	968.97	786.03	1037.41
20	-0.9	3.6	0.81	12.96	972.35	827.46	1175.54
21	-0.9	5.4	0.81	29.16	975.74	868.90	1313.66
22	-2.7	-5.4	7.29	29.16	955.44	178.28	352.32
23	-2.7	-3.6	7.29	12.96	958.82	219.72	490.44
24	-2.7	-1.8	7.29	3.24	962.21	261.16	628.57
25	-2.7	0	7.29	0.00	965.59	302.59	766.69
26	-2.7	1.8	7.29	3.24	968.97	344.03	904.81
27	-2.7	3.6	7.29	12.96	972.35	385.47	1042.94
28	-2.7	5.4	7.29	29.16	975.74	426.90	1181.06
			113.4	362.9			

Tabel 6.12 Perhitungan gaya reaksi tiang pancang

Tiang Pancang	P Komb 1 (kN)	P Komb 2 (kN)	P Komb 3 (kN)
∑P1	6759	11400	8151
∑P2	6759	8306	7223
∑P3	6759	5212	6295
∑P4	6759	2118	5367

Tabel 6.13 Perhitungan momen pada poer

Tiang Pancang	Jarak ke center Poer	P Komb 1 (kN)	P Komb 2 (kN)	P Komb 3 (kN)
∑P1	2.70	18250	**30780**	22009
∑P2	0.90	6083	7476	6501
∑P3	0.90	6083	4691	5666
∑P4	2.70	18250	5719	14490

Sehingga untuk desain tulangan poer dipakai reaksi dari kombinasi 2 (1,3 PMS + 1,8 LL + 30% Ex + Ey). Momen yang dipakai untuk perhitungan penulangan poer adalah :

Mu = 30780.26 kNm

6.1.2.11 Perhitungan penulangan poer

Fc’	= 29.05 MPa
Fy	= 400 MPa
h	= 1500 mm
b	= 12600 mm
Tebal selimut (d’)	= 70 mm
Tinggi effesien (d)	= 1398 mm
D *Tul lentur*	= D32 mm
Ø *Tul bagi*	= D16 mm

⇔ Penulangan Lentur :

K_{TD}^{U} = 0,9

M* $= \frac{Mu}{0,9}$
= 3420 kNm
= 34200287888 Nmm

Rn $= \frac{M*}{b.d^2}$
$= \frac{34200287888}{12600\ .\ 140^2}$
= 1.389

β_1 = 0,85

$$\rho b = \frac{0,85\ .fc'}{fy}.\beta 1.\left[\frac{600}{600+fy}\right]$$

$$= \frac{0,85.29.05}{400}.0,85.\left[\frac{600}{600+400}\right]$$

= 0,031

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

$\rho_{max} = 0,75 \ . \ \rho b$
$= 0,75 \ . \ 0,035$
$= 0,0236$

$m = \frac{fy}{0,85 \ x \ fc'}$
$= \frac{400}{0,85 \ x \ 29.05}$
$= 16.20$

$\rho_{perlu} = \frac{1}{m} \ (1 - \sqrt{1 - \frac{2m \ xRn}{fy}})$
$= \frac{1}{16.20} \ (1 - \sqrt{1 - \frac{2(16.20)x1.389}{400}})$
$= 0.0036$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{min} < \rho < \rho_{max}$
0.0035 < 0.0036 <0,0236…… **OK**
Sehingga ρ tulangan yang digunakan :
ρ = 0.0036

Luas tulangan :

As_{perlu} = ρ. b . d
= 0,0036 x 12600 mm x 1398 mm
= 62983.4 mm^2

Dipasang tulangan lentur **D32-125**
($As_{terpasang}$ = 67556.8 mm^2)

⇔ <u>Penulangan Pembagi :</u>

A_{st} = 20 % x As_{perlu}
= 13511.4 mm^2

Dipasang tulangan **D16 – 150**
(As $_{terpasang}$ = 16889 mm^2)

<u>Kontrol Geser :</u>

V_u = 11400.096 kN
K_C^R = 0,85

$V^* = \frac{11400.096 \text{ kN}}{0.85}$
= 13411.8776 KN
$ß_1$ = 1.1
$ß_2$ = 1
$ß_1$ = 1
Batas kehancuran badan
Vu_{max} = 0.2 x f'c x bv x d
= 0.2 x 29.05 x 12600 x 1398
= 102341988 N
= 102341.99 kN
Kekuatan geser tanpa tulangan geser (Vuc)
$Vuc = ß1 \text{ x } ß2 \text{ x } ß3 \text{ x bv x d x } [\frac{(\text{Ast x fc})}{(\text{bv x d})}]^{1/3}$
$= 1.1 \text{ x } 1 \text{ x } 1 \text{ x } 12600 \text{ x x } [\frac{(\text{Ast x } 29.05)}{(12600\text{x } 1401)}$
= 719592.6 N
= 719.593 KN
Kekuatan geser dengan tulangan geser minimum
Vu_{min} = Vuc + (0,6 x bv x d)
= 719.593kN + (0,6 x 12600 x 1398)
= 10569599.59KN
Kontrol
Apakah : V* < Vu maks
131411.8776 kN< 102561.6 kN …**OK**
Apakah : V* < K_C^R x Vu min
131411.8776 kN < 0,85 x 10569599.59kN
131411.8776 kN< 8984159.654 KN...**OK**

Apakah :	V*	<	K_C^R x Vuc
	131411.878 kN	<	0,85 x 719.6 kN
	131411.878 kN	<	611.654…**NOT OK**

Maka, dari analisa/control diatas, perlu untuk menghitung keperluan tulangan geser:

- Menghitung Kekuatan Geser yang diperlukan dari tulangan geser :

$$V_{US} = V^*/K_C^R - V_{UC}$$
$$= \frac{13411.8776 \text{ KN}}{0.85} - 719.593 \text{ kN}$$
$$= 15778.6795 \text{ KN} - 719.535 \text{ kN}$$
$$= 15059.0869\ KN$$

- Menghitung tulangan geser

Luas tulangan geser yang diperlukan (A_{sv}) :

$$A_{SV} = \frac{V_{US.}\,S}{fy.\,d}$$
$$= \frac{15059.0869\ KN \text{ x } 350}{400\ MPa\ x\ 1398}$$
$$= 9425 \text{ mm}^2$$

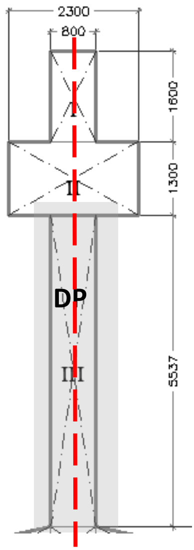
Dipasang tulangan **D16– 350 (2 kaki)**
($As_{\text{terpasang}}$ = 14476.5 mm^2)

6.1.3 Desain Kolom Dinding Pilar 5

Perhitungan analisis dinding pilar berdasarkan pembebanan dalam keadaan batas (ultimate). Berikut di bawah ini analisis desain dinding pilar.

6.1.3.1 Analisis Pembebanan Kolom Dinding Pilar 5

Analisis pembebanan dinding pilar ditunjukkan pada Gambar 6.9 dengan beban yang bekerja yaitu beban sendiri, dan beban gempa. Perhitungan beban akan ditunjukkan pada Tabel 6.18 dimana beban – beban tersebut dikalikan dengan faktor beban batas.



Gambar 6.7 Analisis Pembebanan pada kolom dinding pilar 5-12

Tabel 6.14 Gaya dan momen pada kolom dinding pilar 5

Gaya yg bekerja	besar	1,3 DL+1.8LL			1.3DL+1.8LL+EQ		
		V_u	l	M_u	V_u	l	M_u
	KN	*KN*	*m*	*KNm*	*KN*	*m*	*KNm*
UDL Kanan	1423	2561.2	0.8	2126	2561.2	0.00	2126
UDL Kiri	1423	2561.2	-0.8	-2126	2561.2	0.00	-2126
P_{KEL}Kanan (1+DLA)	532	956.97	0.8	794	1340	0.00	794
P_{KEL}Kiri (1+DLA)	532	956.97	-0.8	-794	1340	0.00	-794
Bagian 1 (DL)	512	665.6	0.0	0	666	0.00	0
Bagian 2 (DL)	1196	1554.8	0.0	0	1555	0.00	0
Bagian 3 (DL)	1107	1440	0.0	0	1440	0.00	0
Gaya Rem	200	360	6.8	2461	360	6.80	2461

Gaya yg bekerja	besar	1,3 DL+1.8LL			1.3DL+1.8LL+EQ		
		V_u	l	M_u	V_u	l	M_u
	KN	*KN*	*m*	*KNm*	*KN*	*m*	*KNm*
Gempa Struktur							
Bangunan atas	2836				2836	6.80	19392
Bagian 1 (DL)	108				108	7.64	821
Bagian 2 (DL)	251				251	6.19	1554
Bagian 3 (DL)	233				233	2.77	644
		11056.4		2461	14484		22411

Untuk penulangan kolom dinding pilar dipakai hasil reaksi dari kombinasi 1,3DL+1,8LL+ EQ. Momen yang dipakai untuk desain penulangan dinding pilar sebesar :

Mu = 22411 kNm

6.1.3.2 Perhitungan Penulangan Kolom Dinding Pilar 5

Fc' = 29.05 MPa
Fy = 400 MPa
h = 800 mm
b = 100000 mm
Tebal selimut (d') = 70 mm
Tinggi effesien (d) = 698mm
D *Tul lentur* = D32mm

⇔ <u>Penulangan Lentur :</u>

K_{TD}^{U} = 0,9

M* $= \frac{Mu}{0,9}$
= 2490 kNm
= 24901290905 Nmm

Rn $= \frac{M*}{b.d^2}$
$= \frac{24901290905}{800\ .\ 698^2}$
= 5111

β_1 = 0,85

$$\rho b = \frac{0,85\ .fc'}{fy}.\beta 1.\left[\frac{600}{600+fy}\right]$$

$$= \frac{0,85.29.05}{400}\ .0,85.\left[\frac{600}{600+400}\right]$$
= 0,031

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

$\rho_{\ max}$ = 0,75 . ρb
= 0,75 . 0,035
= 0,0236

m $= \frac{fy}{0,85\ x\ fc\prime}$
$= \frac{400}{0,85\ x\ 29.05}$
= 16.20

ρ_{perlu} $= \frac{1}{m}\ (1-\sqrt{1-\frac{2m\ xRn}{fy}})$
$= \frac{1}{16.20}\ (1-\sqrt{1-\frac{2(16.20)x5.734}{400}})$
= 0.0145

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{min} < \rho < \rho_{max}$

$0.0035 < 0.0145 < 0{,}0236$ …… **OK**

Sehingga ρ tulangan yang digunakan :

$\rho = 0.0145$

Luas tulangan :

$As_{perlu} = \rho \cdot b \cdot d$

$= 0.0145 \times 10000\ mm \times 698\ mm$

$= 101033.04\ mm^2$

Dipasang tulangan lentur **D32-75**

($As_{terpasang} = 107233.03 mm^2$)

<u>Kontrol Geser :</u>

$V_u = 14484\ kN$

$K_C^R = 0{,}85$

$V^* = \frac{14484\ kN}{0.7}$

$= 17040\ kN$

$ß_1 = 1.1$

$ß_2 = 1$

$ß_1 = 1$

Batas kehancuran badan

$Vu_{max} = 0.2 \times f'c \times bv \times d$

$= 0.2 \times 29.05 \times 10000 \times 698$

$= 40553800\ N$

$= 40553.8 kN$

Kekuatan geser tanpa tulangan geser (Vuc)

$Vuc = ß1 \times ß2 \times ß3 \times bv \times d \times [\frac{(Ast \times fc)}{(bv \times d)}]^{1/3}$

$= 1.1 \times 1 \times 1 \times 10000 \times 699 \times [\frac{(Ast \times 29.05)}{(10000 \times 698)}$

$= 1142210.5N$

$= 1142.21\ kN$

Kekuatan geser dengan tulangan geser minimum

Vu $_{min}$ = Vuc + (0,6 x bv x d)
= 1142.21 + (0,6 x 10000 x 698)
= 4189142.21 KN

Kontrol

Apakah :	V*	<	Vu maks
	170440	<	40553.8 kN …**OK**
Apakah :	V*	<	K_C^R x Vu min
	170440kN	<	0,85x 4189142.21 KN
	170440kN	<	3560770.879 KN ...**OK**
Apakah :	V*	<	K_C^R x Vuc
	170440kN	<	0,85 x 1142 kN
	170440kN	<	970.87891KN…**NOTOK**

Maka, dari analisa/control diatas, perlu untuk menghitung keperluan tulangan geser:

- Menghitung Kekuatan Geser yang diperlukan dari tulangan geser :

$$V_{US} = V^*/K_C^R - V_{UC}$$

$$= \frac{17040.0678 \text{ kN}}{0.85} - 1142.21 \text{ kN}$$

$$= 20047.0687 - 1142.21 \text{ kN}$$

$$= 18904.8574\ kN$$

- Menghitung tulangan geser

Luas tulangan geser yang diperlukan (A_{sv}) :

$$A_{SV} = \frac{V_{US.}\, S}{fy.\, d}$$

$$= \frac{18904.8574\ kN \text{ x } 175}{400\ MPa\ x\ 698}$$

$$= 11849.391 \text{ mm}^2$$

Dipasang tulangan **D16 – 175 (2 kaki)**

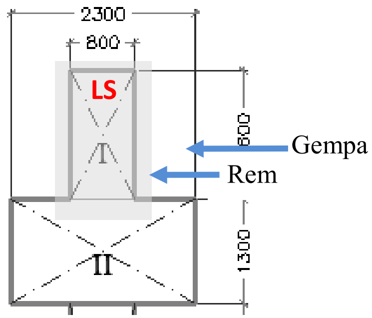
(As $_{terpasang}$ = 13327.5 mm^2)

6.1.4 Desain Longitudinal Stopper

Perhitungan analisis Longitudinal stopper berdasarkan pembebanan dalam keadaan batas (ultimate). Berikut di bawah ini analisis perencanaan Long. Stopper :

6.1.4.1 Analisis Pembebanan Longitudinal Stopper

Analisis pembebanan longitudinal stopper ditunjukkan pada Gambar 6.8 dengan beban yang bekerja yaitu beban sendiri, beban rem dan beban gempa. Perhitungan beban, gaya dan momen akan ditunjukkan pada Tabel 6.15 dimana beban – beban tersebut dikalikan dengan faktor beban batas.



Gambar 6.8 Analisis Pembebanan pada longitudinal stopper

Tabel 6.15 Gaya dan momen pada longitudinal stopper pilar 5

Gaya yg bekerja	besar	1,3 DL+1,8LL+1.25 TA			1,3DL+1,8LL+EQ		
		V_u	l	M_u	V_u	l	M_u
	KN	KN	m	KNm	KN	m	KNm
Berat Sendiri	512	666	0	0	666	0	0
Gaya Rem Kanan	100	180	0.8	288	360	0.8	288
Gaya Rem Kiri	100	180	-0.8	-288	360	-0.8	-288

Gaya yang bekerja	besar	1,3 DL+1,8LL+1.25 TA			1,3DL+1,8LL+EQ		
		V_u	l	M_u	V_u	l	M_u
	KN	*KN*	*m*	*KNm*	*KN*	*m*	*KNm*
Gempa Struktur							
Bangunan atas	2836				2836	0.8	2269
Long. Stopper	108				108	0.8	86
		1026		0	3969		2355

Untuk penulangan longitudinal stopper dipakai hasil reaksi dari kombinasi 1,3DL+1,8LL+EQ. Momen yang dipakai untuk desain penulangan longitudinal stopper sebesar :
Mu = 2355kNm

6.1.4.2 Perhitungan Penulangan Longitudinal Stopper

Fc’	= 29.05 MPa
Fy	= 400 MPa
h	= 1600 mm
b	= 16000 mm
Tebal selimut (d’)	= 70 mm
Tinggi effesien (d)	= 1509 mm
D *Tul lentur*	= D16mm
Ø *Tul bagi*	= D13 mm

⇔ <u>Penulangan Lentur :</u>

K_{TD}^{U} = 0,9

M* $= \frac{Mu}{0,9}$
= 2617 kNm
= 2616793349 Nmm

Rn $= \frac{M*}{b.d^2}$
$= \frac{2943892518}{16000\ .\ 1509^2}$
$= 0.072$

β_1 $= 0,85$

ρb $= \frac{0,85\ .fc'}{fy} . \beta 1. \left[\frac{600}{600+fy}\right]$

$= \frac{0,85.29.05}{400}\ .0,85. \left[\frac{600}{600+400}\right]$
$= 0,031$

ρ min $= \frac{1,4}{fy}$
$= \frac{1,4}{400}$
$= 0,0034$

ρ min (2) $= 1\frac{1}{3}\ \rho\ perlu$
$= 1.333\ x\ 0.0009$
$= 0,0002$

ρ max $= 0,75\ .\ \rho b$
$= 0,75\ .\ 0,035$
$= 0,0236$

m $= \frac{fy}{0,85\ x\ fc'}$
$= \frac{400}{0,85\ x\ 29.05}$
$= 16.20$

ρ_{perlu} $= \frac{1}{m}\ (1 - \sqrt{1 - \frac{2m\ xRn}{fy}})$
$= \frac{1}{16.20}\ (1 - \sqrt{1 - \frac{2(16.20)x0.072}{400}})$
$= 0.0002$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{min} > \rho < \rho_{max}$

0.0035 > 0.0002 < 0,0236 …… **TIDAK OK**

Sehingga ρ tulangan yang digunakan :

$\rho_{min\ (2)} = 0.0002$

Luas tulangan :

As_{perlu} = $\rho_{min\ (2)}$. b . d

= 0,0002 x 16000 mm x 1509 mm

= 5787.3981 mm^2

Dipasang tulangan lentur **D16-250**

($As_{terpasang}$ = 12867.96 mm^2)

⇔ Penulangan Pembagi :

A_{st} = 20 % x As_{perlu}

= 1302.4 mm^2

Dipasang tulangan **D16 – 250**

($As_{terpasang}$ = 12867.964 mm^2)

Kontrol Geser :

V_u = 3969.49 kN

K_C^R = 0,85

$V^* = \frac{3969.49}{0.85}$

= 4669.10 kN

$ß_1$ = 1.1

$ß_2$ = 1

$ß_1$ = 1

Batas kehancuran badan

Vu_{max} = 0.2 x f'c x bv x d

= 0.2 x 29.05 x 16000 x 1509

= 140276640 N

= 140276.6 KN

Kekuatan geser tanpa tulangan geser (Vuc)

Vuc = ß1 x ß2 x ß3 x bv x d x $[\frac{(\text{Ast x fc})}{(\text{bv x d})}]^{1/3}$

= 1.1 x 1 x 1 x 16000 x 1509 x $[\frac{(\text{Ast x 29.05})}{(16000 \text{ x } 1509)}$

= 61645.435N

= 61.6454 kN

Kekuatan geser dengan tulangan geser minimum

Vu_{min} = Vuc + (0,6 x bv x d)

= 61.6454 kN+ (0,6 x 16000 x 1509)

= 14486461.65 kN

Kontrol

Apakah :	V*	<	Vu maks
	4669.10 kN	<	140276.6 KN …**OK**
Apakah :	V*	<	K_C^R x Vu min
	4669.10 kN	<	0,9 x 14486461.65 kN
	4669.10 kN	<	12313492.4 KN...**OK**
Apakah :	V*	<	K_C^R x Vuc
	4669.10 kN	<	0,9 x 61.65 kN
	4669.10 4 kN	<	52.39862 kN…**NOTOK**

Maka, dari analisa/control diatas, perlu untuk menghitung keperluan tulangan geser:

- Menghitung Kekuatan Geser yang diperlukan dari tulangan geser :

$V_{US} = V^*/K_C^R - V_{UC}$

$= \frac{4669.10 \text{ kN}}{0.9} - 61.6454 \text{ kN}$

= 5494.10729- 61.6454 kN

= 5432.46186 kN

- Menghitung tulangan geser
  Luas tulangan geser yang diperlukan (A_{sv}) :

$$A_{SV} = \frac{V_{US}.S}{fy.d}$$

$$= \frac{5432 \text{ x } 350}{400\ MPa\ x\ 1509}$$

$$= 3150.0359 \text{ mm}^2$$

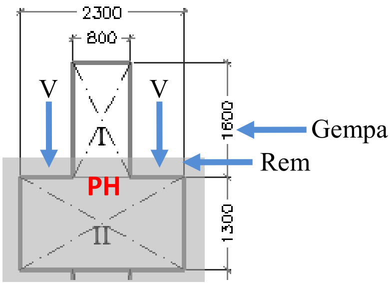
Dipasang tulangan **D13 – 350 (2 kaki)**
($As_{\text{terpasang}}$ = 12135.5 mm^2)

6.1.5 Desain Pier Head

Perhitungan analisis Pier Head berdasarkan pembebanan dalam keadaan batas (ultimate). Berikut di bawah ini analisis perencanaan Pier Head :

6.1.5.1 Analisis Pembebanan Pier Head

Analisis pembebanan pier head ditunjukkan pada Gambar 6.9 dengan beban yang bekerja yaitu beban sendiri, beban lalu lintas, beban rem dan beban gempa. Perhitungan beban, gaya dan momen akan ditunjukkan pada Tabel 6.16 dimana beban – beban tersebut dikalikan dengan faktor beban batas.



Gambar 6.9 Analisis pembebanan pada pier head

Tabel 6.16 Gaya dan momen pada pier head pilar 5

Gaya yg bekerja	Besar	1,3 DL+1,8LL+1,25TEW			1.3DL+1,8LL+EQ		
		V_u	l	M_u	V_u	l	M_u
	KN	KN	m	KNm	KN	m	KNm
Berat Struktur atas kanan	6753	8779	0.80	7287	8779	0.80	7287
Berat Struktur atas kanan	6753	8779	-0.80	-7287	8779	-0.80	-7287
UDL kanan	1423	2561.2	0.80	2126	2561.2	0.8	2126
UDL kiri	2846	2561.2	0.80	-2126	2561.2	0.8	-2126
$P_{KEL}x$ (1+DLA)	532	956.97	-0.80	794	956.97	-0.8	794
$P_{KEL}x$ (1+DLA)	532	956.97	-0.80	-794	956.97	-0.8	-794
Bagian 1	512	665.6	0.00	0	666	0.0	0
Bagian 2	1196	1554.8	0.00	0	1555	0.0	0
Gaya Rem	100	180	1.30	149	180	1.30	149
Gaya Rem	100	180	-1.30	-149	180	-1.30	-149
Angin	0	0	0.00	0	0		
Gempa Struktur							
Bangunan atas	2836				2836	2.1	5956
Bagian 1	108				108	2.1	226
Bagian 2	251				251	0.65	163
		44733.8		0	47928.8		6345

Untuk penulangan pier head dipakai hasil reaksi dari kombinasi 1,3DL+1,8LL + EQ. Momen yang dipakai untuk desain penulangan pier head sebesar :

Mu = 6345 kNm

6.1.5.2 Perhitungan Penulangan Pier Head

Fc' = 29.05 MPa

Fy = 400 MPa

h = 1300 mm

b = 16000 mm

Tebal selimut (d') = 70 mm
Tinggi effesien (d) = 1208 mm
D *Tul lentur* = D19 mm
Ø *Tul bagi* = D13 mm

⇔ Penulangan Lentur :

K_{TD}^{U} = 0,9

M* $= \frac{Mu}{0,9}$
= 7050 kNm
=7050475875 Nmm

Rn $= \frac{M*}{b.d^2}$
$= \frac{7050475875}{16000\ .\ 1208^2}$
= 0.302

β_1 = 0,85

$$\rho b = \frac{0,85\ .fc'}{fy}.\beta 1.\left[\frac{600}{600+fy}\right]$$

$$= \frac{0,85.29.05}{400}\ .0,85.\left[\frac{600}{600+400}\right]$$
= 0,031

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

$\rho_{min\ (2)}$ $= 1\frac{1}{3}\ \rho\ perlu$
$= 1.333\ x\ 0.0008$
= 0,0010

ρ_{max} = 0,75 . ρb

$= 0{,}75 \ . \ 0{,}035$
$= 0{,}0236$

$m \quad = \frac{fy}{0{,}85 \ x \ fc'}$
$= \frac{400}{0{,}85 \ x \ 29.05}$
$= 16.20$

$\rho_{perlu} \quad = \frac{1}{m} \left(1 - \sqrt{1 - \frac{2m \ xRn}{fy}}\right)$
$= \frac{1}{16.20} \left(1 - \sqrt{1 - \frac{2(16.20)x0.340}{400}}\right)$
$= 0.0008$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{\ min} > \rho < \ \rho_{\ max}$
$0.0035 > 0.0009 < 0.040$ …… **TIDAK OK**
Sehingga ρ tulangan yang digunakan :
$\rho_{\ min\ (2)} = 0.0010$

Luas tulangan :

$As_{\ perlu} = \rho_{\ min\ (2)} \ . \ b \ . \ d$
$= 0{,}0010 \text{ x } 16000 \text{ mm x } 1208 \text{ mm}$
$= 19578.703 \text{ mm}^2$
Dipasang tulangan lentur **D19-175**
($As_{\ terpasang} = 25922.63 \text{ mm}^2$)

⇔ Penulangan Pembagi :

$A_{st} = 20 \ \% \text{ x } As_{\ perlu}$
$= 3914.74 \text{ mm}^2$
Dipasang tulangan **D16 – 300**
($As_{\ terpasang} = 10723.30292 \text{ mm}^2$)

Kontrol Geser :

$V_u \quad = 30370.33 \text{ kN}$
$K_C^R \quad = 0.85$

V* $= \frac{30370.33 \text{ kN}}{0.85}$

$= 35729.80$ kN

$ß_1$ = 1.1

$ß_2$ = 1

$ß_1$ = 1

Batas kehancuran badan

Vu_{max} = 0.2 x f'c x bv x d

= 0.2 x 29.05 x 16000 x 1208

= 112249200 N

= 112249.2 KN

Kekuatan geser tanpa tulangan geser (Vuc)

Vuc $= ß1 \times ß2 \times ß3 \times bv \times d \times [\frac{(Ast \times fc)}{(bv \times d)}]^{1/3}$

$= 1.1 \times 1 \times 1 \times 16000 \times 1208 \times [\frac{(Ast \times 29.05)}{(16000 \times 1208)}]^{1/3}$

= 208545.82 N

= 208.546 KN

Kekuatan geser dengan tulangan geser minimum

Vu_{min} = Vuc + (0,6 x bv x d)

= 208.546 KN+ (0,6 x 16000 x 1208)

= 11592235.45 KN

Kontrol

Apakah :	V*	<	Vu_{maks}	
	35729.80 kN	<	112249.2 KN	…**OK**
Apakah :	V*	<	K_C^R x Vu min	
	35729.80 kN	<	0,85 x 11592235.45KN	
	35729.80 kN	<	9853377.264 KN...**OK**	
Apakah :	V*	<	K_C^R x Vuc	
	35729.80 kN	>	0,85 208.5 kN	
	35729.80 kN	>	177.26 kN	…**NOTOK**

Maka, dari analisa/control diatas, perlu untuk menghitung keperluan tulangan geser:

- Menghitung Kekuatan Geser yang diperlukan dari tulangan geser :

$$V_{US} = V^*/K_C^R - V_{UC}$$

$= \frac{35729.80 \text{ kN}}{0.9} - \quad 208.546\text{kN}$

$= 42035.0575 - 208.54\text{kN}$
$= 41826{,}5117\ kN$

- Menghitung tulangan geser
  Luas tulangan geser yang diperlukan (A_{sv}) :

$$A_{SV} = \frac{V_{US}.\,S}{fy.\,d}$$

$$= \frac{41826{,}5117\ kN \text{ x } 300}{400\ MPa\ x\ 1208}$$

$= 21649.33 \text{ mm}^2$

Dipasang tulangan **D16 – 250 (2 kaki)**
($As_{\text{terpasang}} = 25735.9 \text{ mm}^2$)

Tabel 6.17 Rekapitulasi tulangan pilar 5 - pilar 12

	Tul. Lentur	Tul. Bagi	Tul. Geser
Pile Cap	D32	D16	D16 (2 kaki)
	150 mm	150 mm	350 mm
Kolom Dinding	D32		D16 (2 kaki)
	75 mm		175 mm
Longitudinal Stropper	D16		D13 (2 kaki)
	250 mm		350 mm
Pier Head	D19	D16	D16 (2 kaki)
	175 mm	300 mm	250

6.1.6 Desain Pilar 13

6.2.1 Desain Dimensi Pilar 13

Dalam desain pilar 13 menggunakan acuan dari peraturan BMS BDM 1992 dan BMS BDC 1992. Pilar terdiri dari beberapa elemen, yaitu pondasi, pile cap (poer), kolom pilar, longitudinal stopper, pier head dan korbel. Penulangan pilar direncanakan dari analisis elemen – elemen pilar jembatan. Analisis pembebanan untuk pilar terdiri atas beban dari bangunan atas baik beban hidup maupun beban mati, beban mati pilar, beban rem, beban angin, serta beban gempa. Berikut ini adalah analisis pembebanan serta elemen – elemen penyusun dan pelengkap pilar.

Data-data desain pilar 13

- ✓ Elevasi muka tanah asli : + 1.36 LWL
- ✓ Elevasi lantai kendaraan : + 6.867 LWL
- ✓ Tinggi pilar rencana : 5.259 m
- ✓ Lebar pilar : 16 m
- ✓ Panjang bentang jembatan : 40 m
- ✓ Pondasi : Tiang pancang

6.1.7 desain Pondasi Pilar 13

Berdasarkan analisis dari data penyelidikan tanah pada pilar arah Kenjeran didapatkan nilai SPT berdasarkan titik bor 2 STA 0+300 (lihat pada lampiran) pada kedalaman 24 m sehingga dipakai jenis pondasi tiang pancang.

6.2.2.1 Analisis Pembebanan pada Pilar

1. Beban mati bangunan atas

Tabel 6.18 Gaya reaksi V_{abt} akibat beban mati bangunan atas kanan pilar 13

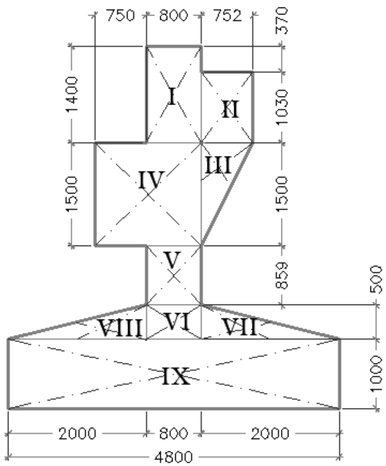
No.	Uraian	V_{abt} (kN)
1	Plat lantai kendaraan	2040.00
2	RC Plat	428.40
3	Lapisan aspal	224.40
4	Lapisan overlay	224.40
5	Genangan air hujan	159.936
6	Tiang sandaran	37.73
7	Gelagar beton pratekan	3272.4
8	Diafragma	359
9	Instalasi ME dan tiang PJU	20.00
	Jumlah	6766.27

Tabel 6.19 Gaya reaksi V_{abt} akibat beban mati bangunan atas kiri pilar 13

no	Uraian	V_{abt} (KN)
1	Plat lantai kendaraan 35cm	420.00
2	Lapisan Aspal	33.00
3	Lapisan Overlay	33.00
4	Genangan Air hujan	23.52
5	Tiang sandaran+pipa	7.47
6	Instalasi ME dan Salir	5.00
	Jumlah	261.00

2. Berat sendiri pilar

Dalam perhitungan beban/berat sendiri pilar dibagi atas beberapa segmen. Hal ini untuk memudahkan dalam analisis. Analisis berat pilar didapat dari volume per segmen dikalikan dengan berat jenis (γ), kemudian dilanjutkan dengan menghitung statis momen titik tangkap gaya/titik berat pilar terhadap center pilar.



Gambar 6.10 Potongan melintang pilar 13

Tabel 6.20 Perhitungan berat sendiri pilar 13

Segmen	Volume	Berat (*w*)	*x*	*z*
	m^3	*KN*	*m*	*m*
1	17.92	448.00	0.00	2.06
2	12.36	309.00	0.78	3.38
3	9.00	225.00	0.63	1.86
4	37.20	930.00	-0.38	1.25

Segmen	Volume	Berat (*w*)	*x*	*z*
	m^3	*KN*	*m*	*m*
5	7.43	185.76	0.00	0.93
6	6.15	153.75	0.667	0.67
7	6.15	153.75	-0.667	0.67
8	12.30	307.50	0.00	0.25
9	59.04	1476.00	0.00	0.50
	berat total	2405.26		

Tabel 6.21 Perhitungan statis momen pilar 13

segmen	*w. x*	*w. z*
	KNm	KNm
1	0.00	922.88
2	239.48	1042.88
3	140.63	418.50
4	-348.75	1162.50
5	0.00	172.76
6	102.50	102.50
7	-102.50	102.50
8	0.00	76.88
9	0.00	738.00
	31.35	4001.39

Sehingga didapatkan titik berat atau titik tangkap gaya :

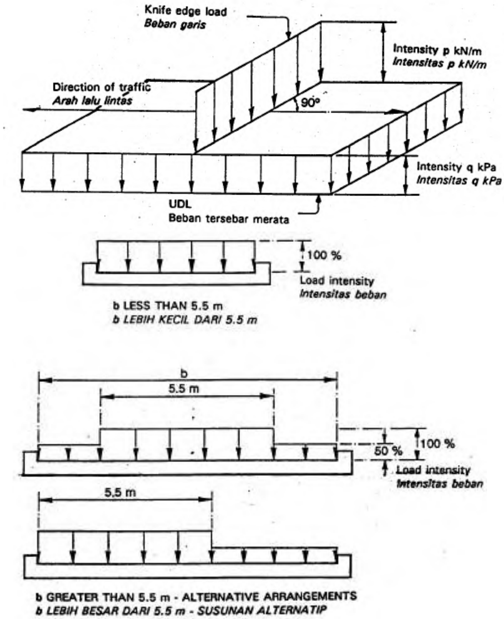
x = -0.013 m

z = 1.664

3. Beban hidup lalu-lintas

Beban lalu lintas (lajur ”D”) untuk rencana bangunan bawah jembatan jalan raya terdiri dari UDL dan KEL dimana akan ditempatkan melintang pada lebar penuh dari jalan kendaraan jembatan dan menghasilkan pengaruh pada jembatan ekuivalen dengan rangkain kendaraan sebenarnya. Jumlah total pembebanan lajur "D" yang ditempatkan tergantung pada lebar jalan kendaraan jembatan.

Asumsi pembebanan KEL dan UDL seperti yang ditunjukkan dalam gambar di bawah ini :



Gambar 6.11 Asumsi beban hidup lalu-lintas

- ✓ Panjang bentang jembatan (L) Kiri = 20.4 m
- ✓ Panjang bentang jembatan (L) Kanan = 3 m
- ✓ Lebar Perkerasan Jembatan (b) = 10 m
- ✓ Beban KEL (P_{kel}) = 49 kN/m
  Faktor beban dinamis (1+DLA) = 1.4
- ✓ Beban UDL (qUDL) = 9 kN/m^2

Total beban UDL = 1423 kN
$(((5{,}5xq_{UDL}) + ((b - 5{,}5)\ x\ 0{,}5x\ q_{UDL})\ x\ L$

Total beban UDL = 209 kN
$(((5{,}5xq_{UDL}) + ((b - 5{,}5)\ x\ 0{,}5x\ q_{UDL})\ x\ L$

Total Beban KEL = 532 kN
$[(5{,}5\ x(P_{KEL}(1 + DLA))] + [b - 5{,}5\ x\ (0{,}5\ x\ (P_{KEL}(1 + DLA))\ ]$

Total Beban Hidup Lalu Lintas = 1955 kN

4. Beban Gempa

Analisis beban gempa berdasarkan BMS 1992 pasal 2.4.7. beban gempa direncanakan dengan metode beban horisontal statis ekivalen. Beban gempa bangunan atas yang masuk pada abutment direncanakan 100% dari total beban.

Perhitungan Beban Gempa :

$$T_{EO} = C.I.S.\ W$$

- ✓ Zona gempa = Zona 2
- ✓ Keofisien Geser (C) = 0.21
- ✓ Faktor kepentingan (*I*) = 1
- ✓ Faktor type bangunan = 1
- ✓ Beban mati ½ bangunan atas kiri = 6766 kN
- ✓ Beban mati ½ bangunan atas kanan = 261 kN
- ✓ Beban mati pilar (w) = 2405kN
- ✓ Beban gempa bangunan atas kiri = 1421 kN
- ✓ Beban gempa bangunan atas kanan = 55 kN
- ✓ Beban gempa akibat berat pilar = 505 kN

5. Beban angin

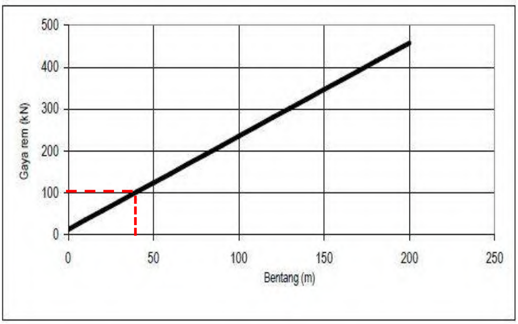
Gaya angin pada bangunan atas tergantung luas ekuivalen diambil sebagai luas padat jembatan dalam elevasi proyeksi tegak lurus. Gaya nominal akibat angin bergantung pada kecepatan angin rencana. Beban angin yang diperhitungkan berdasarkan BMS 1992 adalah sebagai berikut :

$$T_{EW} = 0{,}0006\ x\ C_w\ x\ {V_w}^2\ x\ A_b$$

- ✓ Kecepatan angin rencana (V_w) = 30 m/s
- ✓ Lebar jembatan (b) = 16.00 m
- ✓ Tinggi samping jembatan (d) kiri = 3.30 m
- ✓ Tinggi samping jembatan (d) kanan = 1.20 m
- ✓ Bentang jembatan kanan = 20.40 m
- ✓ Bentang jembatan kiri = 3.00 m
- ✓ Luas bagian samping jembatan (A_b) = 51.57 m^2
- ✓ Rasio *b/d* = 4.85
- ✓ Koefisien seret (C_w) = 1.25
- ✓ Gaya angin (T_{EW}) = 34.81 kN

6. Beban rem (Breaking force)

Pengaruh percepatan dan pengereman dari lalu-lintas harus diperhitungkan sebagai gaya dalam arah memanjang. Beban rem yang diperhitungkan berdasarkan RSNI T-02-2005 untuk jembatan dengan panjang bentang 40m adalah = 100 kN/Lajur (2.75m), karena terdapat 2 lajur makan beban rem yang terjadi sebesar = 200 kN.



Gambar 6.12 Gaya rem perlajur 2,75 m (KBU)

6.2.2.3 Perhitungan Gaya Aksial Tiang Pancang

Dari analisis pembebanan diatas, maka langkah selanjutnya adalah analisis momen dan gaya. Perhitungan momen dan gaya tersebut dipusatkan pada center poer. Berikut ini perhitungan momen dan gaya yang bekerja pada poer ditunjukkan pada Tabel 6.23 berikut :

Tabel 6.22 Perhitungan gaya dan momen pada center poer pilar 13

no.	Uraian	V	H_x	H_y	*x*	*y*	*z*
		KN	KN	KN	m	m	m
I	Beban tetap (P_{MS})						
	- Struktur Atas Kiri	6766			0.8		
	- Struktur Atas Kanan	261			-0.8		
	- Pilar	2405			0.01		
II	Aksi Transien						
	- UDL Kiri (T_{TD})	1423			-0.8		
	- UDL Kiri (T_{TD})	209			0.8		
	- P_{KEL} (1+DLA) (T_{TD})	532			-0.8		
	- P_{KEL} (1+DLA) (T_{TD})	532			0.8		
	- Gaya Rem (T_{TB})		100				3.4
	- Gaya Rem (T_{TB})		100				-3.4
	- Beban Angin (T_{EW})			34.81			3.4
III	Aksi Lain (*gempa*)						
	- Eq Struktur Atas Kiri (T_{EQ1})		1421	1421			3.4
	- Eq Struktur Atas Kanan (T_{EQ1})		55	55			3.4
	- Eq Pilar 13		505	505	0.01		1.7

Lanjutan Perhitungan Gaya dan Momen pada Center Poer

no.	Uraian	M*x*	M*y*
		KNm	*KNm*
I	Beban tetap (P_{MS})		
	- Struktur Atas	-	5615.00
	- Pilar 13	-	-216.63
II	Aksi Transien	-	31.35
	- UDL Kiri (T_{TD})		-1181.01
	- UDL Kanan (T_{TD})	-	173.68
	- PKEL (1+DLA) (T_{TD})	-	-441.27
	- PKEL (1+DLA) (T_{TD})	-	441.27
	- Gaya Rem (T_{TB})	-	336.00
	- Gaya Rem (T_{TB})	-	-336.00
	- Beban Angin (T_{EW})	116.96	-
III	Aksi Lain (*gempa*)		
	- Eq Struktur Atas Kiri (T_{EQ1})	4774.28	4774.28
	- Eq Struktur Atas Kanan (T_{EQ1})	186.35	186.35
	- Eq Pilar 13	840.29	840.29

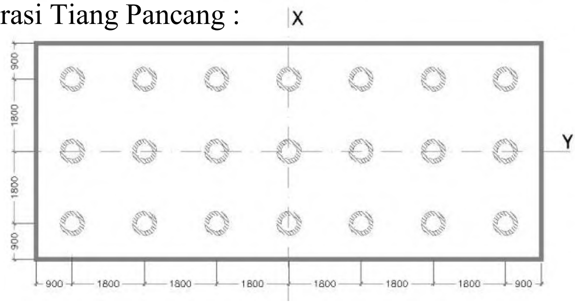
Kombinasi yang dipakai untuk kekuatan pondasi adalah :

Tabel 6.23 Kombinasi beban untuk pondasi pilar 13

uraian	kombinasi 1	kombinasi 2	kombinasi 3
	DL+LL+TEW	DL+LL+Ex+30%Ey	DL+LL+30%Ex+Ey
Hx / KN	200	1981	1981
Hy / KN	34.81	1980.83	1980.83

uraian	kombinasi 1	kombinasi 2	kombinasi 3
	DL+LL+TEW	DL+LL+Ex+30%Ey	DL+LL+30%Ex+Ey
V / KN	12127.97	12127.97	12127.97
Mx / KNm	116.96	5800.92	1740.28
My / KNm	4423.40	6163.67	10224.32

Konfigurasi Tiang Pancang :



Gambar 6.13 Konfigurasi tiang pancang pilar 13

Dari kombinasi dan konfigurasi tersebut diatas, maka daya dukung pertiang dapat dihitung dengan rumus :

$$P = V/_n \pm {Mx * y}/{\sum y^2} \pm {My * x}/{\sum x^2}$$

Keterangan :

P = Gaya aksial yang terjadi pada 1 tiang (kN)
V = Total gaya aksial (kN)
N = Jumlah tiang pancang (buah)
Mx = Momen sumbu x (kNm)
My = Momen sumbu y (kNm)
y = Jarak tiang terhadap sumbu x (m)
x = Jarak tiang terhadap sumbu y (m)

Tabel 6.24 Perhitungan kemampuan gaya aksial per-tiang

no.	*x*	*y*	x^2	y^2	komb. 1 (tetap)	komb. 2	komb.3
	m	m	m^2	m^2	KN	KN	KN
1	0.90	-5.4	0.81	29.16	926.27	951.61	1354.45
2	0.90	-3.6	0.81	12.96	927.04	989.97	1365.96
3	0.90	-1.8	0.81	3.24	927.81	1028.34	1377.47
4	0.90	0	0.81	0.00	928.59	1066.70	1388.98
5	0.90	1.8	0.81	3.24	929.36	1105.07	1400.49
6	0.90	3.6	0.81	12.96	930.13	1143.43	1412.00
7	0.90	5.4	0.81	29.16	930.91	1181.80	1423.51
8	0.00	-5.4	0.00	29.16	575.20	462.42	542.99
9	0.00	-3.6	0.00	12.96	575.98	500.79	554.50
10	0.00	-1.8	0.00	3.24	576.75	539.16	566.01
11	0.00	0	0.00	0.00	577.52	577.52	577.52
12	0.00	1.8	0.00	3.24	578.30	615.89	589.03
13	0.00	3.6	0.00	12.96	579.07	654.25	600.54
14	0.00	5.4	0.00	29.16	579.84	692.62	612.05
15	-0.90	-5.4	0.81	29.16	224.14	-26.76	-268.46
16	-0.90	-3.6	0.81	12.96	224.91	11.61	-256.95
17	-0.90	-1.8	0.81	3.24	225.69	49.98	-245.44
18	-0.90	0	0.81	0.00	226.46	88.34	-233.93
19	-0.90	1.8	0.81	3.24	227.23	126.71	-222.42
20	-0.90	3.6	0.81	12.96	228.01	165.07	-210.91
21	-0.90	5.4	0.81	29.16	228.78	203.44	-199.40
			11.34	272.2			

P_{max}	P_{min}
930.91	224.14
1181.80	-26.76
1423.51	-268.46

6.2.2.4 Perhitungan Daya Dukung Tanah

Dari Tabel 6.6 dapat diketahui nilai maksimum (Pmax) Gaya aksial tiang pancang akibat beban tetap (kombinasi 1) adalah 930.91 KN dan nilai minimum (Pmin) adalah 224.14 kN, sedangkan nilai maksimum (Pmax) Gaya aksial tiang pancang akibat beban sementara (kombinasi 2) adalah 1181.80kN dan nilai minimum (Pmin) adalah -26.76kN, Gaya aksial tiang pancang akibat beban sementara (kombinasi 2) adalah 1423.51kN dan nilai minimum (Pmin) adalah -268.46 kN.

Dari hasil kemampuan tiang pancang didapat hasil reaksi berupa gaya aksial tekan dan tarik maka akan dikontrol dengan daya dukung tanah akibat tekan dan tarik. Perhitungan daya dukung tanah berdasarkan tiang pancang yang berdiameter 0,60 m dan berdasarkan data penyelidikan tanah SPT pada titik bor BH2. Daya dukung tanah dihitung berdasarkan rumus dan hasilnya ditunjukkan berikut :

Perhitungan berikut ini berdasarkan rumus **Kazuto Nakazawa.**

$$R_a = \frac{1}{n} Ru$$

$$R_u = \frac{1}{n} [(\text{qd.A}) + (\text{U.}\Sigma \text{li.fi})]$$

Keterangan :

Ra = Daya dukung tanah yang diizinkan (kN)
Rp = Daya dukung dari unsur bearing (kN)
Rf = Daya dukung dari unsur lekatan/skin friction (kN)
n = Faktor keamanan
qd = Daya dukung dari unsur bearing (kN/m^2)

A = Luas penampang dasar tiang (m^2)
U = Panjang keliling tiang (m)
Li = Tebal lapisan tanah dengan memperhitungkan geseran dinding tiang (m)
Fi = Besaran gaya geser maksimum dari lapisan tanah dengan memperhitungkan geseran dinding tiang (kN/m^2)

- Perhitungan daya dukung tiang Pilar 13 kedalam 24 m.

$$\acute{N} = \frac{N1+N2}{2}$$

$$= \frac{43+(43+22+21)}{2}$$

$$= 36$$

Keterangan :

Ń = Harga N rata-rata untuk perencanaan tanah pondasi pada ujung tiang
N1 = Harga N pada ujung tiang
Ń2 = Harga rata-rata N pada jarak 4D dari ujung tiang
4D = 2.4 m

- Panjang ekivalensi dari penetrasi tiang

l = 1.1 m

- Daya dukung pada ujung tiang

$$\frac{l}{D} = 2$$

$$\frac{qd}{\acute{N}} = 14$$

qd = 14Ń = 14 x 36 = 501.667 ton/m^2
= 5016.7 kN/m^2

Rp = A . qd $= \frac{\Pi.0,62}{4}$ x 501.667 ton/m^2
= 141.771 ton
= 1417.71 kN

- Menghitung gaya geser dinding tiang

Kedalaman	Ketebalan lapisan li (m)	Tanah	Harga rata-rata N	fi (Ton/m²)	li.fi (Ton)
0-2	2	Lanau berlempung	1.0	1.00	2.0
2-10	8	Lempung berlanau pasir	1.6	1.56	12.4
10-11	1	Lanau pasir berkerikil	7.0	7.00	7.0
11-16	5	Lempung berlanau berpasir	15.0	12.00	60.0
16-19	3	Lempung lanau berpasir kerikil	21.5	12.00	36.0
19-23	4	Lanau pasir berlempung	20.6	12.00	48.0
23-24	1	Pasir berkerikil berbatu	32.5	10.00	10.0
Jumlah					175

- Rf = U.∑li.fi = ∏ x 0,6 x 175
  = 330.537 Ton
  = 3305.373 kN
- Daya dukung ultimate
  Ru = (Rp + Rf)
  = qd.A + U.∑li.fi
  = 141.771+ 330.537
  = 472.31 ton
  = 4723.1 kN

- Daya dukung yang diijinkan (Tekan)

  Ra = ⅓ Ru
  = ⅓ 472.31 ton
  = 157.44 ton
  = 1574.4 kN (Beban tetap)

  Ra = ½ Ru
  = ½ 472.31 ton
  = 236.16 ton
  = 2361.6 kN (Beban sementara)

- Daya dukung yang diijinkan (Tarik)

  Ra = ⅓ Rf
  = ⅓ 330.537ton
  = 110.18 ton
  = 1101.8 kN (Beban tetap)

  Ra = ½ Rf
  = ½ 330.537ton
  = 165.27 ton
  = 1652.7 kN (Beban sementara)

6.2.2.5 Perhitungan Efisiensi Tiang Pancang

Untuk menghitung daya dukung tiang kelompok direncanakan konfigurasi dan koefisien efisiensinya

Efisiensi tiang kelompok dihitung dengan rumus Converse - Labbare :

$$\boldsymbol{\eta = 1 - arc\ tan\left(\frac{D}{k}\right)\ x\ \frac{(n-1)m + (m-1)n}{90.m.n}}$$

η = koefisien kelompok tiang pancang
D = diameter tiang pancang (m)
k = jarak antar tiang tegak lurus sumbu x
m = jumlah tiang dalam satu kolom (buah)
n = jumlah tiang dalam satu baris (buah)

$$\eta = 1 - arc\ tan\left(\frac{0{,}6}{1{,}8}\right)\ x\ \frac{(7-1)3 + (3-1)7}{90.4.7}$$

$$= 1 - arc \tan 0{,}333\, x\, \frac{18 + 14}{1890}$$

$$= 1 - 18.43\, x\, \frac{32}{1890}$$

$$= 1 - 18.43\, x\, 0{,}0169$$

$$= 1 - 0.312$$

$$= 0{,}688$$

Tabel. 6.25 P_{ijin} tiangpancang Ø0,6 m kedalaman 24 m

Data tanah	P_{ijin} Tekan beban sementara	P_{ijin} Tarik beban sementara	P_{ijin} Tekan beban tetap	P_{ijin} Tarik beban tetap
	KN		KN	
BH2	1659.272	1136.840	1106.181	757.893

6.2.2.5 Kontrol Kekuatan Tiang Pancang

Setelah mendapat P yang terjadi maka dilakukan analisis kontrol kekuatan tiang pancang terhadap gaya dan momen yang bekerja serta kontrol geser pons untuk mengetahui kemampuan beton menahan geser.

Dari wika pile classification direncanakan tiang pancang beton prategang dengan :

- Diameter tiang pancang = 0.6 m
- Tebal (t) = 0.1 m
- Kelas = C
- Mutu beton f’c = 49.8 MPa
- Allowable axial load = 2290 kN
- Bending momen crack = 290 kNm

- Bending momen ultimate = 580 kNm
- Modulus elastisitas beton = 119948

  $Ec = (wc)^{1,5}.0,043.\sqrt{fc'}$
- Momen inersia tiang pancang $= \frac{1}{64}\pi\,(D^4 - d^4)$

  $= 510509\ cm^4$

6.2.2.6 Kontrol terhadap Gaya Aksial Vertikal

Daya dukung suatu tiang harus ditinjau berdasarkan kekuatan tanah tempat tiang ditanam. Hasil daya dukung yang terendah adalah yang menentukan yang dipakai sebagai daya dukung ijin tiang.

- Berdasarkan kekuatan bahan

  Kekuatan tekan (maksimal) terhadap gaya aksial vertikal untuk tiang pancang Ø0,6m adalah 2290 kN.

  Sedangkan beban vertikal maksimal yang diterima tiang adalah :

  2290 kN>1423.51 kN→OK
- Berdasarkan daya dukung tanah

  Berdasarkan analisa perhitungan daya dukung tanah (data SPT) dari perumusan *kazuto nazakawa*didapatkan besarnya daya dukung ijin tanah terhadap pondasi tiang pancang prestressed concrete spun pile Ø0,6m dengan kedalaman 24 m diperoleh Qijin seperti yang ditabelkan berikut ini :

Tabel 6.26 Kontrol daya dukung tanah

Data tanah	P_{ijin} Tekan beban sementara	P_{ijin} Tarik beban sementara	P_{ijin} Tekan beban tetap	P_{ijin} Tarik beban tetap
	KN		KN	
BH2	1659.272 > 1423.51	1136.84 > 268.46	11082.96 > 930.91	757.89
	OK	**OK**	**OK**	**OK**

6.2.2.7 Kontrol terhadap Beban Horizontal

Gaya-gaya horisontal (Hx) diperoleh dari gaya searah dengan arah sumbu x, diantarnya : Beban 100% akibat gempa (Struktur atas + pilar).

Hx = 1926.02 kN

∑Hx = 100% Hx + 30% Hy
= 2099.36 kN

H1 tiang $= \frac{\sum Hx}{Jumlah\ tiang}$
$= \frac{2099.36\ \text{kN}}{24}$
= 80.25 kN

Gaya-gaya horisontal (Hy) diperoleh dari Beban searah sumbu y, diantaranya : 30% akibat gempa (Struktur atas + abutment).

Hy = 577.81 kN

∑Hy = 100% Hy + 30% Hx
= 1207.62 kN

H1 tiang $= \frac{\sum Hy}{Jumlah\ tiang}$

$= \frac{1207.62\ \text{kN}}{24}$
= 50.32 kN

Kemampuan tambahan tiang menahan gaya horisontal bila diijinkan adanya pergeseran posisi ujung tiang sebesar d.

$$H_{ijin} = \frac{k.\ D.\ d}{\beta}$$

$$k = 0{,}2\ x\ E_O\ x\ D^{-3/4}\ x\ y^{-1/2}$$

Keterangan :

Eo = Modulus deformasi tanah pondasi (28N, Nilai N diambil NSPT rata-rata sampai pada kedalaman tiang pancang yang masuk kedalam tanah).

d = Pergeseran posisi ujung tiang (cm) = 2.5 cm

D = Diameter tiang pancang (0,6 m)

ß = $\sqrt[4]{\frac{k.D}{4EI}}$

E = Modulus elastisitas beton tiang

I = Momen inersia penampang

$$k = 0{,}2 x E_O x\, D^{-3/4}\, x\, y^{-1/2}$$

$$= 0{,}2\ x\ 28\overline{N_{SPT}}\ x\ D^{-3/4}\ x\ y^{-1/2}$$

$$= 0{,}2\ x\ 28.\ 1\ x\ 60^{-3/4}\ x\ 1^{-1/2}$$

$$= 0{,}2\ x\ 28\ x\ 60^{-3/4}\ x\ 1^{-1/2}$$

$$= 0.1643$$

$$\beta = \sqrt[4]{\frac{k.\ D}{4EI}}$$

$$= \sqrt[4]{\frac{0.1643\ x\ 60}{4\ x\ 119948\ x\ 510609}}$$

$$= \sqrt[4]{\frac{9.85725}{2.45\ x\ 10^{11}}}$$

$$= 0{,}00252$$

$$H_{ijin} = \frac{k.\ D.\ d}{\beta}$$

$$= \frac{0.1643.\ 60.\ 2{,}5}{0{,}00252}$$

$$= 97.841\ KN$$

Hijin $= \frac{97.841\ KN}{2}$ = 48.921 kN

Kontrol :

Hx 1 tiang < *H ijin*

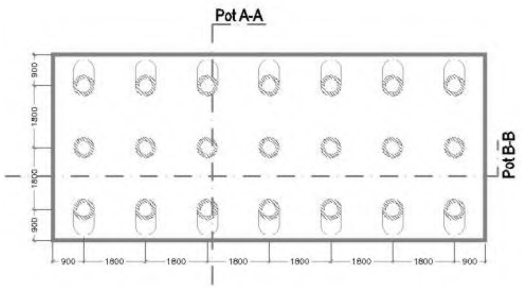
71.33 kN >48.921 kN …**NOT OK**

Hy 1 tiang < *H ijin*

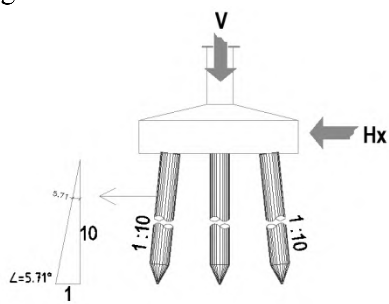
44.72 kN >48.921 kN …**NOT OK**

Kesimpulan dari perhitungan diatas bahwa H 1 tiang > H_{ijin} maka perlu dilakukan pemasangan tiang pancang miring.

6.2.2.8 Kontrol Tiang Pancang Miring



- Tiang Pancang Miring arah X



α = 5.711

sin α = 0.0995

Rumus mencari jumlah tiang pancang miring :

$$H_{ijin\ total} + N1.Psin\ \alpha\ \geq \sum Hx$$

Keterangan :

H ijin 1 tiang = 49kN
H ijin total = 1174 kN
Daya dukung tiang pancang dalam grup SF=2 (P) = 2412 kN
Total gaya horizontal arah x (∑Hx) = 2099 kN
Jumlah tiang pancang miring (N1) = …?

$$H_{ijin\,total} + N1.\,P sin\,\alpha \quad \geq \sum Hx$$

$$1174.09 \text{ kN} + \text{N1}.\ 240.02 \sin \alpha \geq 2099 \text{ kN}$$

$$\text{N1}.\ 240.02 \geq 2099 - 1174.09$$

$$\text{N1} \geq \frac{925.27}{240.02}$$

$$\text{N1} \geq 3.86 \sim \mathbf{14.00}$$

Kontrol :

$$H_{ijin\,total} + 14.\,P sin\,\alpha \ \geq \sum Hx$$

$$4534.33 \geq 2099.36 \qquad \ldots\textbf{OK}$$

6.2.2.9 Kontrol terhadap Momen

Momen maksimum yang terjadi pada tiang pancang dihitung dengan perumusan :

$$k \quad = 0{,}2 x E_O x\, D^{-3/4}\, x\, y^{-1/2}$$

$$= 0{,}2\ x\ 28\overline{N_{SPT}}\ x\ D^{-3/4}\ x\ y^{-1/2}$$

$$= 0{,}2\ x\ 28.\ 1\ x\ 60^{-3/4}\ x\ 1^{-1/2}$$

$$= 0{,}2\ x\ 28\ x\ 60^{-3/4}\ x\ 1^{-1/2}$$

$$= 0.1643$$

$$\beta \quad = \sqrt[4]{\frac{k.\ D}{4EI}}$$

$$= \sqrt[4]{\frac{0.1643 \, x \, 60}{4 \, x \, 119948 \, x \, 510509}}$$

$$= \sqrt[4]{\frac{9.857}{2.45 \, x \, 10^{11}}}$$

$$= 0,00252$$

$$H = \frac{\sqrt{Hx^2 + Hy^2}}{21}$$

$$= \frac{2421.91}{21} = 115.33$$

$$M_m = 0,208 \, x \left(\frac{H}{2.\beta}\right)$$

$$= 33.1207 \;\; KNm$$

Mm $< M_{crack}$

33 KNm < 290 kNm … **OK**

6.2.2.10 Perencanaan Poer (Pile Cap)

Perhitungan analisis poer berdasarkan pembebanan dalam keadaan batas (ultimate). Beban yang dihitung dari beban P yang terjadi pada tiang pancang, berikut di bawah ini analisis perencanaan poer :

Tabel 6.27 Perhitungan gaya dan momen pada center poer pilar 13

no.	Uraian	V	H_x	H_y	x	y	z
		KN	*KN*	*KN*	*m*	*m*	*m*
I	Beban tetap (P_{MS})						
	- Struktur Atas Kiri	8796			0.8		
	- Struktur Atas Kanan	339			-0.8		
	- Pilar	3127			0.01		

No.	Uraian	V	H_x	H_y	x	y	z
		KN	*KN*	*KN*	*m*	*m*	*m*
II	Aksi Transien						
	- UDL Kiri (T_{TD})	2611			0.8		
	- UDL Kanan (T_{TD})	377			-0.8		
	- P_{KEL}Kiri (1+DLA) (T_{TD})	957			0.8		
	- P_{KEL}Kanan (1+DLA) (T_{TD})	957			-0.8		
	- Gaya Rem Kanan (T_{TB})		180				3.4
	- Gaya Rem Kiri (T_{TB})		180				-3.4
	- Beban Angin (T_{EW})			41.77			3.4
III	Aksi Lain (*gempa*)						
	- Eq Struktur Atas Kiri (T_{EQ1})		1421	1421			3.4
	- Eq Struktur Atas Kanan (T_{EQ1})		505	505			3.4
	- Eq Pilar 13		505	505			1.7

Lanjutan perhitungan gaya dan momen pada center poer

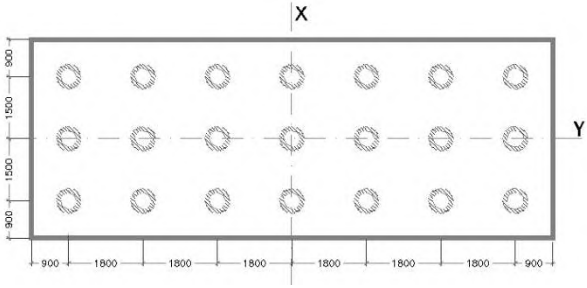
no.	Uraian	M*x*	M*y*
		KNm	*KNm*
I	Beban tetap		
	- Struktur Atas	-	7142.17
	- Pilar 13	-	40.76
II	Aksi Transien		
	- UDL (TTD)	-	2125.81
	- UDL (TTD)	-	-312.62

no.	Uraian	M*x*	M*y*
		KNm	*KNm*
	- PKEL (1+DLA) (TTD)	-	794.29
	- PKEL (1+DLA) (TTD)	-	-794.29
	- Gaya Rem (TTB)	-	604.80
	- Gaya Rem (TTB)	-	-604.80
	- Beban Angin (TEW)	140.35	-
III	Aksi Lain (*gempa*)		
	- Eq Struktur Atas Kiri (TEQ1)	4774.28	4774.28
	- Eq Struktur Atas Kanan (TEQ1)	1697.15	1697.15
	- Eq Pilar 13	840.29	840.29

Tabel 6.28 Kombinasi beban untuk pondasi pilar

Kombinasi 1		
1,3 PMS+ 1,2 TEW + 1.8 TTD + 1.8 TTB		
V =	17114	kN
Mx =	140.35	kNm
My =	8728.75	kNm
Kombinasi 2		
1,3 PMS + 1,8 TTD + 30% Ex + Ey		
V =	12262	kN
Mx =	2193.52	kNm
My =	16040.47	kNm
Kombinasi 3		
1,3 PMS+1,8 TTD+ Ex + 30% Ey		
V =	12262	kN
Mx =	7312	kNm
My =	10922	kNm

Konfigurasi Tiang Pancang :



Gambar 6.14 Konfigurasi tiang pancang pilar 13

Dari kombinasi dan konfigurasi tersebut diatas, maka daya dukung pertiang dapat dihitung dengan rumus :

$$P = V/n \pm \frac{Mx * y}{\sum y^2} \pm \frac{My * x}{\sum x^2}$$

Keterangan :

P = Gaya aksial yang terjadi pada 1 tiang (kN)
V = Total gaya aksial (kN)
N = Jumlah tiang pancang (buah)
Mx = Momen sumbu x (kNm)
My = Momen sumbu y (kNm)
y = Jarak tiang terhadap sumbu x (m)
x = Jarak tiang terhadap sumbu y (m)

Tabel 6.29 Perhitungan kemampuan gaya aksial per-tiang

no.	*x*	*y*	x^2	y^2	komb. 1 (tetap)	komb. 2	komb.3
	m	m	m^2	m^2	KN	KN	KN
1	1.8	-5.4	3.24	29.16	2197.69	3086.50	2172.54
2	1.8	-3.6	3.24	12.96	2198.62	3101.01	2220.89
3	1.8	-1.8	3.24	3.24	2199.54	3115.52	2269.25
4	1.8	0	3.24	0.00	2200.47	3130.02	2317.61

no.	x	y	x^2	y^2	komb. 1 (tetap)	komb. 2	komb.3
	m	m	m^2	m^2	KN	KN	KN
5	1.8	1.8	3.24	3.24	2201.40	3144.53	2365.97
6	1.8	3.6	3.24	12.96	2202.33	3159.04	2414.33
7	1.8	5.4	3.24	29.16	2203.26	3173.55	2462.68
8	0	-5.4	0.00	29.16	812.17	540.40	438.84
9	0	-3.6	0.00	12.96	813.10	554.90	487.20
10	0	-1.8	0.00	3.24	814.03	569.41	535.56
11	0	0	0.00	0.00	814.96	583.92	583.92
12	0	1.8	0.00	3.24	815.88	598.43	632.28
13	0	3.6	0.00	12.96	816.81	612.93	680.63
14	0	5.4	0.00	29.16	817.74	627.44	728.99
15	-1.80	-5.4	3.24	29.16	-573.34	-2005.71	-1294.85
16	-1.80	-3.6	3.24	12.96	-572.42	-1991.20	-1246.49
17	-1.80	-1.8	3.24	3.24	-571.49	-1976.70	-1198.13
18	-1.80	0	3.24	0.00	-570.56	-1962.19	-1149.77
19	-1.80	1.8	3.24	3.24	-569.63	-1947.68	-1101.42
20	-1.80	3.6	3.24	12.96	-568.70	-1933.17	-1053.06
21	-1.80	5.4	3.24	29.16	-567.77	-1918.67	-1004.70
			45.36	272.2			

Tabel 6.30 Perhitungan gaya reaksi tiang pancang

Tiang Pancang	P Komb 1 (kN)	P Komb 2 (kN)	P Komb 3 (kN)
∑P1	15403	21910	16223
∑P2	5705	4087	4087
∑P3	-3994	-13735	-8048

Tabel 6.31 Perhitungan momen pada poer

Tiang Pancang	Jarak ke center Poer	P Komb 1 (kN)	P Komb 2 (kN)	P Komb 3 (kN)
∑P1	0.75	11552	16433	12167
∑P2	0.00	0	0	0
∑P3	0.75	-2995	-10301	-6036

Sehingga untuk desain tulangan poer dipakai reaksi dari kombinasi 2U. Momen yang dipakai untuk perhitungan penulangan poer adalah :
Mu = 16432.63 KN.m

6.2.2.11 Perhitungan penulangan poer

Fc' = 29.05 MPa
Fy = 400 MPa
h = 1500 mm
b = 1000 mm
Tebal selimut (d') = 70 mm
Tinggi effesien (d) = 1401 mm
D *Tul lentur* = D32 mm
Ø *Tul bagi* = D16mm

⇔ Penulangan Lentur :

K_{TD}^{U} = 0,9

M* $= \frac{Mu}{0,9}$
= 18258 kNm
= 18258474148 Nmm

Rn $= \frac{M*}{b.d^2}$

$= \frac{1825847448}{12600.\ 1401^2}$
$= 0.738$

$\beta_1 \quad = 0,85$

$$\rho b \quad = \frac{0,85\,.fc'}{fy}.\beta 1.\left[\frac{600}{600+fy}\right]$$

$$= \frac{0,85.29.05}{400}\ .0,85.\left[\frac{600}{600+400}\right]$$
$= 0,031$

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

$\rho_{\ min\ (2)} = 1\frac{1}{3}\ \rho\ perlu$
$= 1.333\ x\ 0.0010$
$= 0,00025$

$\rho_{\ max} \quad = 0,75\ .\ \rho b$
$= 0,75\ .\ 0,035$
$= 0,0236$

$m \quad = \frac{fy}{0,85\ x\ fc\prime}$
$= \frac{400}{0,85\ x\ 29.05}$
$= 16.20$

$\rho_{\ perlu} \quad = \frac{1}{m}\ (1 - \sqrt{1 - \frac{2m\ xRn}{fy}}\ )$
$= \frac{1}{16.20}\ (1 - \sqrt{1 - \frac{2(16.20)\ x\ 0.738}{400}}\ )$
$= 0.0019$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{min} > \rho < \rho_{max}$

$0.0035 > 0.0019 < 0,0236$…… **TIDAK OK**

Sehingga ρ tulangan yang digunakan :

$\rho_{min} = 0.0035$

Luas tulangan :

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

$= 0,0035 \times 12600 \text{ mm} \times 1401 \text{ mm}$

$= 61784.1 \text{ mm}^2$

Dipasang tulangan lentur **D32-150**

($As_{terpasang} = 67556.80842 \text{ mm}^2$)

⇔ Penulangan Pembagi :

$A_{st} = 20\ \% \times As_{perlu}$

$= 12357 \text{mm}^2$

Dipasang tulangan **D16 – 150**

($As_{terpasang} = 16889.20211 \text{ mm}^2$)

Kontrol Geser :

$V_u = 21910 \text{ kN}$

$K_C^R = 0,85$

$V^* = \frac{21910 \text{ kN}}{0.85}$

$= 25776.66939 \text{KN}$

$ß_1 = 1.1$

$ß_2 = 1$

$ß_1 = 1$

Batas kehancuran badan

$Vu_{max} = 0.2 \times f'c \times bv \times d$

$= 0.2 \times 29.05 \times 12600 \times 1401$

$= 102561606 \text{ N}$

$= 102561.606 \text{kN}$

Kekuatan geser tanpa tulangan geser (Vuc)

Vuc $= ß1 \;x\; ß2 \;x\; ß3 \;x\; bv \;x\; d \;x\; [\frac{(Ast\;x\;fc)}{(bv\;x\;d)}]^{1/3}$

$= 1.1 \;x\; 1 \;x\; 1 \;x\; 1000 \;x\; x\; [\frac{(Ast\;x\;29.05)}{(12600x\;1401)}$

=719592.6044N

= 719.5926 KN

Kekuatan geser dengan tulangan geser minimum

Vu $_{min}$ = Vuc + (0,6 x bv x d)

= 719.5926 + (0,6 x 12600 x 1401)

= 10592279.59KN

Kontrol

Apakah :	V*	<	Vu maks
	25776.67 KN	<	102561.67 kN …**OK**
Apakah :	V*	<	K_C^R x Vu min
	25776.67 KN	<	0,85 x 10592279.59KN
	25776.67 KN	<	9003437.654 kN..**OK**
Apakah :	V*	<	K_C^R x Vuc
	25776.67 KN	<	0,85 x 719.59KN
	25776.67 KN	<	611.65kN…**NOTOK**

Maka, dari analisa/control diatas, perlu untuk menghitung keperluan tulangan geser:

- Menghitung Kekuatan Geser yang diperlukan dari tulangan geser :

$$V_{US} = V^*/K_C^R - V_{UC}$$

$$= \frac{25776.67\text{ KN}}{0.85} - 719.59\text{KN}$$

= 30325 KN – 719.59

= 29605.90079 KN

- Menghitung tulangan geser

  Luas tulangan geser yang diperlukan (A_{sv}) :

$$A_{SV} = \frac{V_{US.}\,S}{fy.\,d}$$

$$= \frac{29605.90079 \;\; \text{KN x } 250}{400 \; MPa \; x \; 1401}$$

$$= 13207.48608 \text{ mm}^2$$

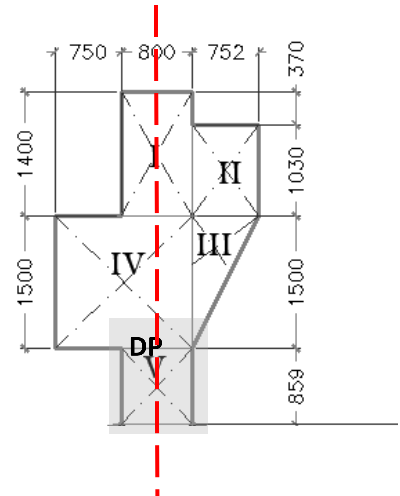
Dipasang tulangan **D16– 250 (2kaki)**
(As $_{terpasang}$ = 20267.0mm^2)

6.2.3 Desain Kolom Dinding Pilar13

Perhitungan analisis kolom dinding pilar berdasarkan pembebanan dalam keadaan batas (ultimate). Berikut di bawah ini analisis perencanaan kolom dinding pilar.

6.2.3.1 Analisis Pembebanan Kolom Dinding Pilar 13

Analisis pembebanan kolom dinding pilar ditunjukkan pada Gambar 6.15 dengan beban yang bekerja yaitu beban sendiri, dan beban gempa. Perhitungan beban akan ditunjukkan pada Tabel 6.32 dimana beban – beban tersebut dikalikan dengan faktor beban batas.



Gambar 6.15 Analisis Pembebanan pada kolom dinding pilar 13

Tabel 6.32 Gaya dan momen pada kolom dinding pilar 13

Gaya yg bekerja	besar	1,3 DL+1.8LL			1.3DL+1.8LL+EQ		
		V_u	l	M_u	V_u	l	M_u
	KN	KN	m	KNm	KN	m	KNm
UDL	1423	2561	0.81	2079.6	2561	0.81	2080
UDL	377	678	-0.81	-550.49	678	-0.81	-5550
$P_{KEL}x$ (1+DLA)	532	957	0.81	777.03	957	0.81	777
$P_{KEL}x$ (1+DLA)	532	957	-0.81	-777.03	957	-0.81	-631
Bagian 1 (DL)	448	582	0.00	0	582	0.00	0.00
Bagian 2 (DL)	309	402	0.79	316.55	402	0.79	317
Bagian 3 (DL)	225	293	0.66	193.94	293	0.66	194
Bagian 4 (DL)	930	1209	0.81	981.67	1209	-0.81	-982
Bagian 5 (DL)	186	241	0.00	0	241	0.00	0.00
Gaya Rem	100	180	0.9	154.8	180	0.86	154.80
Gaya Rem	100	180	-0.9	-154.8	180	-0.86	-154.80
Gempa Struktur							
Bangunan atas (Kanan)	1421				1421	2.88	4085
Bangunan atas (Kiri)	55				55	0.65	36
Bagian 1	94				94	1.56	147
Bagian 2	65				65	2.88	187
Bagian 3	47				47	2.38	112
Bagian 4	195				195	1.61	314
Bagian 5	39				39	4.30	168
		8240		3021	9796		6253

Untuk penulangan dinding pilar dipakai hasil reaksi dari kombinasi 1,3DL+1,8LL+ EQ. Momen yang dipakai untuk desain penulangan dinding pilar sebesar :

Mu = 6253 kNm

6.2.3.2 Perhitungan penulangan dinding pilar

Fc’	= 29.05 MPa
Fy	= 400 MPa
h	= 800 mm
b	= 1000 mm
Tebal selimut (d’)	= 70 mm
Tinggi effesien (d)	= 706 mm
D *Tul lentur*	= D22 mm
Ø *Tul bagi*	= D14 mm

⇔ Penulangan Lentur :

K_{TD}^{U} = 0,9

M* $= \frac{Mu}{0,9}$

= 6947kNm

= 6947269973 Nmm

Rn $= \frac{M*}{b.d^2}$

$= \frac{6947269973}{10000\ .\ 706^2}$

= 1.394

β_1 = 0,85

$$\rho b = \frac{0,85\ .fc'}{fy}.\beta 1.\left[\frac{600}{600+fy}\right]$$

$$= \frac{0,85.29.05}{400}\ .0,85.\left[\frac{600}{600+400}\right]$$

= 0,031

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

$\rho_{max} = 0,75 \ . \ \rho b$
$= 0,75 \ . \ 0,035$
$= 0,0236$

$m = \frac{fy}{0,85 \ x \ fc'}$
$= \frac{400}{0,85 \ x \ 29.05}$
$= 16.20$

$\rho_{perlu} = \frac{1}{m} \left(1 - \sqrt{1 - \frac{2m \ xRn}{fy}}\right)$
$= \frac{1}{16.20} \left(1 - \sqrt{1 - \frac{2(16.20)x1.390}{400}}\right)$
$= 0.0036$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{min} < \rho < \rho_{max}$
0.0035 < 0.0036< 0,0236 …… **OK**
Sehingga ρ tulangan yang digunakan :
ρ = 0.0036

Luas tulangan :

$As_{perlu} = \rho \ . \ b \ . \ d$
= 0.0036 x 10000 mm x 706 mm
= 25337.3299 mm^2

Dipasang tulangan lentur **D22-150**
($As_{terpasang}$ = 25342.1807)

Kontrol Geser :

V_u = 9796.47 KN
K_C^R = 0,85

V* $= \frac{9796.47\ KN}{0.85}$
= 11525.2622 kN
$ß_1$ = 1.1
$ß_2$ = 1
$ß_1$ = 1
Batas kehancuran badan
Vu_{max} = 0.2 x f'c x bv x d
= 0.2 x 29.05 x 10000 x 706
= 41018600 N
= 41018.6 kN
Kekuatan geser tanpa tulangan geser (Vuc)
Vuc = ß1 x ß2 x ß3 x bv x d x $[\frac{(Ast\ x\ fc)}{(bv\ x\ d)}]^{1/3}$
= 1.1 x 1 x 1 x 10000 x 706 x $[\frac{(Ast\ x\ 29.05)}{(10000\ x\ 706)}$
= 269936.4618 N
= 269.94 KN
Kekuatan geser dengan tulangan geser minimum
Vu_{min} = Vuc + (0,6 x bv x d)
= 269.94+ (0,6 x 10500 x 706)
= 4236269.936 KN

Kontrol
Apakah : V* < Vu maks
11525.26 kN < 41018.6 kN …**OK**
Apakah : V* < K_C^R x Vu min
11525.26 kN < 0,85 x 4236269.936
KN
11525.26 kN < 3600829.446 KN...**OK**
Apakah : V* < K_C^R x Vuc
11525.2 kN < 0,85 x 269.94 KN
11525.2kN < 229.45 KN…**NOT OK**

Maka, dari analisa/control diatas, perlu untuk menghitung keperluan tulangan geser:

- Menghitung Kekuatan Geser yang diperlukan dari tulangan geser :

$$V_{US} = V^*/K_C^R - V_{UC}$$

$$= \frac{11525.26228 \text{ kN}}{0.85} - 269.94 \text{ KN}$$

$$=13559.13209\text{KN} - 269.94 \text{ KN}$$

$$= 13289.19563\ KN$$

- Menghitung tulangan geser
  Luas tulangan geser yang diperlukan (A_{sv}) :

$$A_{SV} = \frac{V_{US.}\, S}{fy.\ d}$$

$$= \frac{13289.19563\ KN \text{ x } 100}{400\ MPa\ x\ 706}$$

$$= 4705.81 \text{ mm}^2$$

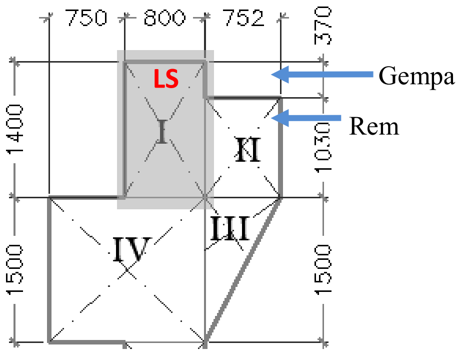
Dipasang tulangan **D16 – 100 (4 kaki)**
($As_{terpasang} = 5187.4\text{mm}^2$)

6.2.4 Desain Longitudinal Stopper

Perhitungan analisis longitudinal stopper berdasarkan pembebanan dalam keadaan batas (ultimate). Berikut di bawah ini analisis perencanaan longitudinal Stopper :

6.2.4.1 Analisis Pembebanan Longitudinal Stopper

Analisis pembebanan longitudinal stopper ditunjukkan pada Gambar 6.16 dengan beban yang bekerja yaitu beban sendiri, beban rem dan beban gempa. Perhitungan beban, gaya dan momen akan ditunjukkan pada Tabel 6.33dimana beban – beban tersebut dikalikan dengan faktor beban batas.



Gambar 6.16 Analisis pembebanan pada longitudinal stopper

Tabel 6.33 Gaya dan momen pada longitudinal stopper pilar 13

Gaya yg bekerja	besar	1,3 DL+1,8LL+1.25 TA			1,3DL+1,8LL+EQ		
		V_u	l	M_u	V_u	l	M_u
	KN	KN	m	KN m	KN	m	KNm
Berat Sendiri	448	582	0.00	0	582	0.00	0
Gaya Rem Kanan	100	360	0.84	288	360	0.0	0
Gempa Struktur							
Bangunan atas kiri	1421				1421	0.65	924
Bangunan atas kanan	55				55	2.88	158
Long. Stopper	94				94	0.65	61
		942		288	2512		1142

Untuk penulangan longitudinal stopper dipakai hasil reaksi dari kombinasi 1,3DL+1,8LL+EQ. Momen yang dipakai untuk perencanaan penulangan longitudinal stopper sebesar :

Mu = 1142 kNm

6.2.4.2 Perhitungan Penulangan Longitudinal Stopper

Fc’	= 29.05 MPa
Fy	= 400 MPa
h	= 1400 mm
b	= 16000 mm
Tebal selimut (d’)	= 70 mm
Tinggi effesien (d)	= 1309 mm
D *Tul lentur*	= D16 mm
Ø *Tul bagi*	= D13 mm

⇔ <u>Penulangan Lentur :</u>

$K_{TD}^{U} = 0{,}9$

$$M^* = \frac{Mu}{0{,}9}$$
$= 1269$ kNm
$= 1269248513$ Nmm

$$Rn = \frac{M*}{b.d^2}$$
$$= \frac{1269248513}{16000\ .\ 1310^2}$$
$= 0.046$

$\beta_1 = 0{,}85$

$$\rho b = \frac{0{,}85\ .fc'}{fy}.\beta 1.\left[\frac{600}{600+fy}\right]$$

$$= \frac{0{,}85.29.05}{400}\ .0{,}85.\left[\frac{600}{600+400}\right]$$
$= 0{,}031$

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

$\rho_{min\ (2)} = 1\frac{1}{3}\ \rho\ perlu$

$= 1.333\ x\ 0.0001$

$= 0{,}0002$

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

$= 0{,}75\ .\ 0{,}035$

$= 0{,}0236$

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

$= \frac{400}{0{,}85\ x\ 29.05}$

$= 16.20$

$\rho_{perlu} = \frac{1}{m}\ (1 - \sqrt{1 - \frac{2m\ xRn}{fy}})$

$= \frac{1}{16.20}\ (1 - \sqrt{1 - \frac{2(16.20)x0.061}{400}})$

$= 0.0001$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{min} > \rho < \rho_{max}$

$0.0035 > 0.0001 < 0{,}0236$ …… **TIDAK OK**

Sehingga ρ tulangan yang digunakan :

$\rho_{min\ (2)} = 0.0002$

Luas tulangan :

$As_{perlu} = \rho_{min\ (2)}\ .\ b\ .\ d$

$= 0{,}0002$ x 16000 mm x1309mm

$= 3234.33412\ mm^2$

Dipasang tulangan lentur **D16-250**

($As_{terpasang} = 12867.96\ mm^2$)

⇔ <u>Penulangan Pembagi :</u>

$A_{st} = 20\ \%\ x\ As_{perlu}$

$= 646.87\ mm^2$

Dipasang tulangan **D13 – 350**

($As_{terpasang} = 6067.76\ mm^2$)

<u>Kontrol Geser :</u>

V_u = 2512.21 KN
K_C^R = 0,85
V* = $\frac{2512.21\ \text{KN}}{0.85}$
= 2955.535688 kN
$ß_1$ = 1.1
$ß_2$ = 1
$ß_1$ = 1

Batas kehancuran badan
Vu_{max} = 0.2 x f'c x bv x d
= 0.2 x 29.05 x 16000 x 1309
= 121684640 N
= 121684.64 KN

Kekuatan geser tanpa tulangan geser (Vuc)

Vuc = ß1 x ß2 x ß3 x bv x d x $[\frac{(\text{Ast x fc})}{(\text{bv x d})}]^{1/3}$
= 1.1 x 1 x 1 x 16000 x 1310 x $[\frac{(\text{Ast x }29.05)}{(16000\text{ x }1309)}$
= 34451.0489 KN
=34.451049 kN

Kekuatan geser dengan tulangan geser minimum
$Vu_{\ min}$ = Vuc + (0,6 x bv x d)
= 34.451049 kN + (0,6 x 16000 x 1309)
= 12566434.45 KN

Kontrol

Apakah :	V*	<	Vu maks
	2955.54 kN	<	121684.64 kN …**OK**
Apakah :	V*	<	K_C^R x Vu min
	2955.54kN	<	0,85 x 12566434.45KN
	2955.54kN	<	10681469.28 KN...**OK**
Apakah :	V*	<	K_C^R x Vuc

2955.54kN < 0,85 x 34.4510489 KN

2955.54 kN < 29.283392…**NOTOK**

Maka, dari analisa/control diatas, perlu untuk menghitung keperluan tulangan geser:

- Menghitung Kekuatan Geser yang diperlukan dari tulangan geser :

$$V_{US} = V^*/K_C^R - V_{UC}$$

$$= \frac{2955.535688 \text{ kN}}{0.85} - 34.451 \text{ KN}$$

$$= 3477.10081 \text{ KN} - 34.451 \text{ KN}$$

$$= 3442.65\ kN$$

- Menghitung tulangan geser

Luas tulangan geser yang diperlukan (A_{sv}) :

$$A_{SV} = \frac{V_{US.}\, S}{fy.\, d}$$

$$= \frac{= 3442.65\ kN \text{ x } 250}{400\ MPa\ x\ 1309}$$

$$=1643.740337 \text{ mm}^2$$

Dipasang tulangan **D13 – 250 (2 kaki)**

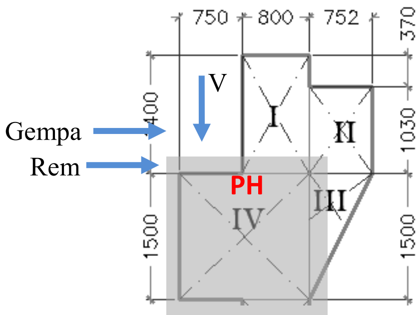
($As_{terpasang}$ = 16989.7 mm^2)

6.2.5 Desain Pier Head

Perhitungan analisis Pier Head berdasarkan pembebanan dalam keadaan batas (ultimate). Berikut di bawah ini analisis perencanaan Pier Head :

6.2.5.1 Analisis Pembebanan Pier Head

Analisis pembebanan pier head ditunjukkan pada Gambar 6.17 dengan beban yang bekerja yaitu beban sendiri, beban lalu lintas, beban rem dan beban gempa. Perhitungan beban, gaya dan momen akan ditunjukkan pada Tabel 6.34 dimana beban – beban tersebut dikalikan dengan faktor beban batas.



Gambar 6.17 Analisis pembebanan pada pier head

Tabel 6.34 Gaya dan momen pada pier head pilar 13

Gaya yg bekerja	besar	1,3 DL+1,8LL+1,25TA			1.3DL+1,8LL+EQ		
		V_u	l	M_u	V_u	l	M_u
	KN	KN	m	KNm	KN	m	KNm
Berat Struktur atas kiri	6766	8796	0.80	7036.919	8796	0.8	7037
UDL	1423	2561	0.80	2048.98	2561	0.8	2049
P_{KEL} *x* (1+DLA)	532	1340	0.80	1071.81	1340	0.8	1072
Bagian 1	448	582.4	0.00	0	582	0.0	0
Bagian 2	309	401.7	0.79	316.553	402	0.8	317
Bagian 3	225	292.5	0.66	193.937	293	0.7	194
Bagian 4	930	1209	0.81	981.667	1209	0.8	982
Gaya Rem	200	360	0.75	270	360	0.00	0
Angin	0	0	0.00	0	0	0.0	0
Gempa Struktur							
Bangunan atas	1421				1421	2.10	2984

Gaya yg bekerja	besar	1,3 DL+1,8LL+1,25TA			1.3DL+1,8LL+EQ		
		V_u	l	M_u	V_u	l	M_u
	KN	KN	m	KNm	KN	m	KNm
Bangunan atas	55				55	2.88	158
Bagian 1	94				94	2.2	207
Bagian 2	65				65	2.0	131
Bagian 3	47				47	1.5	71
Bagian 4	195				195	0.8	146
		15543		11920	17224.67		15346.44

Untuk penulangan pier head dipakai hasil reaksi dari kombinasi 1,3DL+1,8LL + EQ. Momen yang dipakai untuk desain penulangan pier head sebesar :

Mu = 13450.9 kN.m

6.2.5.2 Perhitungan Penulangan Pier Head

Fc’	= 29.05 MPa
Fy	= 400 MPa
h	= 1300 mm
b	= 16000 mm
Tebal selimut (d’)	= 70 mm
Tinggi effesien (d)	= 1206 mm
D *Tul lentur*	= D22 mm
Ø *Tul bagi*	= D16 mm

⇔ Penulangan Lentur :

K_{TD}^{U} = 0,9

M* $= \frac{Mu}{0,9}$

=17052 kNm

=17051598038 Nmm

$$Rn = \frac{M*}{b.d^2}$$
$$= \frac{17051598038}{16000\ .\ 1206^2}$$
$$= 0.733$$

$$\beta_1 = 0,85$$

$$\rho b = \frac{0,85\ .fc'}{fy}.\beta 1.\left[\frac{600}{600+fy}\right]$$

$$= \frac{0,85.29.05}{400}\ .0,85.\left[\frac{600}{600+400}\right]$$
$$= 0,031$$

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

$$\rho_{\ min\ (2)} = 1\frac{1}{3}\ \rho\ perlu$$
$$= 1.333\ x\ 0.0019$$
$$= 0,0025$$

$$\rho_{\ max} = 0,75\ .\ \rho b$$
$$= 0,75\ .\ 0,035$$
$$= 0,0236$$

$$m = \frac{fy}{0,85\ x\ fc'}$$
$$= \frac{400}{0,85\ x\ 29.05}$$
$$= 16.20$$

$$\rho_{perlu} = \frac{1}{m}\ (1 - \sqrt{1 - \frac{2m\ xRn}{fy}})$$
$$= \frac{1}{16.20}\ (1 - \sqrt{1 - \frac{2(16.20)\ x\ 0.733}{400}})$$
$$= 0.0019$$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{min} > \rho < \rho_{max}$

0.0035 > 0.0019 <0,0236 …… **TIDAK OK**

Sehingga ρ tulangan yang digunakan :

$\rho_{min\,(2)} = 0.0025$

Luas tulangan :

$As_{perlu} = \rho_{min\,(2)} \cdot b \cdot d$

$= 0,0025 \times 16000 \text{ mm} \times 1206 \text{ mm}$

$= 47731.11 \text{ mm}^2$

Dipasang tulangan lentur **D22-125**

($As_{terpasang} = 48656.99 \text{ mm}^2$)

⇔ Penulangan Pembagi :

$A_{st} = 20\ \% \times As_{perlu}$

$= 9731.4 \text{ mm}^2$

Dipasang tulangan **D16 –200**

($As_{terpasang} = 16084.9544 \text{mm}^2$)

Kontrol Geser :

$V_u = 17224.67$ KN

$K_C^R = 0,85$

$V^* = \frac{17224.67 \text{ KN}}{0.85}$

$= 2026.341954$ KN

$\beta_1 = 1.1$

$\beta_2 = 1$

$\beta_1 = 1$

Batas kehancuran badan

$Vu_{max} = 0.2 \times f'c \times bv \times d$

$= 0.2 \times 29.05 \times 16000 \times 1206$

$= 112109760$ N

$= 112109.76$ KN

Kekuatan geser tanpa tulangan geser (Vuc)

Vuc = ß1 x ß2 x ß3 x bv x d x $[\frac{(\text{Ast x fc})}{(\text{bv x d})}]^{1/3}$

= 1.1 x 1 x 1 x 16000 x 1206 x$[\frac{(\text{Ast x 29.05})}{(16000 \text{ x } 1206)}$

=508415.865 N

= 508.416 KN

Kekuatan geser dengan tulangan geser minimum

Vu_{min} = Vuc + (0,6 x bv x d)

= 508.416 KN + (0,6 x 16000 x 1206)

= 11578108.42 KN

Kontrol

Apakah :	V*	<	Vu maks
	20264.3196 KN	<	112109.76 KN …**OK**
Apakah :	V*	<	K_C^R x Vu min
	20264.3196 KN	<	0,85 x 11578108.42
	20264.3196 KN	<	9841392.153 KN...**OK**
Apakah :	V*	<	K_C^R x Vuc
	20264.3196 KN	>	0,85 x 508.416 KN
	20264.3196 KN	>	432.153…**NOTOK**

Maka, dari analisa/control diatas, perlu untuk menghitung keperluan tulangan geser:

- Menghitung Kekuatan Geser yang diperlukan dari tulangan geser :

$$V_{US} = V^*/K_C^R - V_{UC}$$

$$= \frac{20264.31954 \text{ KN}}{0.9} - 508.416 \text{ KN}$$

= 23840.37592 KN – 508.416 KN

= 23331.96 KN

- Menghitung tulangan geser

Luas tulangan geser yang diperlukan (A_{sv}) :

$$A_{SV} = \frac{V_{US.}\, S}{fy.\, d}$$

$$= \frac{23331.96 \text{ KN x } 200}{400 \; MPa \; x \; 1207.5}$$

$= 9673.284 \text{ mm}^2$

Dipasang tulangan **D13 – 200 (2 kaki)**

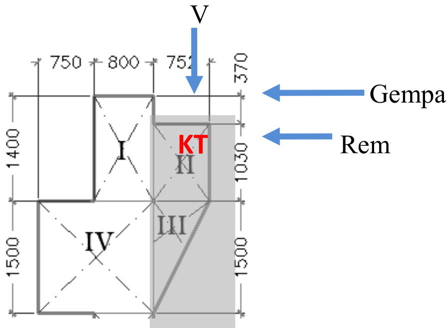
($As_{\text{terpasang}} = 21237.2 \text{ mm}^2$)

6.2.6 Desain Korbel Tumpuan Plat Slab

Perhitungan analisis korbel belakang pilar berdasarkan pembebanan dalam keadaan batas (ultimate). Berikut di bawah ini analisis desain korbel :

6.2.6.1 Analisis Pembebanan korbel

Analisis pembebanan korbel ditunjukkan pada Gambar 6.18 dengan beban yang bekerja yaitu beban sendiri, beban lalu lintas, beban rem dan beban gempa. Perhitungan beban, gaya dan momen akan ditunjukkan pada Tabel 6.35 dimana beban – beban tersebut dikalikan dengan faktor beban batas.



Gambar 6.18 Analisis pembebanan pada korbel

Tabel 6.35 Gaya dan momen pada korbel tumpuan slab

Gaya yg bekerja	besar	1,3 DL+1.8LL+1EQ		
		V_u	l	M_u
	KN	KN	m	KNm
Berat sendiri	534	694.2	0.78	538.005
Plat Slab	420	546	0.78	211.575
UDL belakang	209	376.65	0.78	992.47275
KEL belakang	532	956.97	0.78	741.65175
gaya rem	200	360	1.25	450
Gempa Struktur				
Bangunan atas	339		0.78	263
Berat sendiri	112		0.78	87
		2933.82		2795

Untuk penulangan korbel dipakai hasil reaksi dari kombinasi 1,3DL+1,8LL + EQ. Momen yang dipakai untuk desain penulangan korbel sebesar :

Mu = 2795 kN.m

6.2.6.2 Perhitungan Penulangan Korbel

Fc'	= 29.05 MPa
Fy	= 400 MPa
h	= 2500 mm
b	= 16000 mm
Tebal selimut (d')	= 70 mm
Tinggi effesien (d)	= 2409mm
D *Tul lentur*	= D16 mm
Ø *Tul bagi*	= D14 mm

⇔ Penulangan Lentur :

K_{TD}^{U} = 0,9

M* $= \frac{Mu}{0,9}$
= 3105 kNm
= 3105080074 Nmm

Rn $= \frac{M*}{b.d^2}$

$= \frac{3458406741}{16000\ .\ 2409^2}$

= 0.033

β_1 = 0,85

$\rho b = \frac{0,85\ .fc'}{fy} . \beta 1. \left[\frac{600}{600 + fy}\right]$

$= \frac{0,85.29.05}{400}$ .0,85. $\left[\frac{600}{600+400}\right]$
= 0,031

ρ_{min} $= 0.04 \frac{f'c}{fy}$
= 0,0029

$\rho_{min\,(2)}$ $= 1.333\ x\ \rho\ perlu$
= 1.333 x 0,00008
= 0.00010

ρ_{max} = 0,75 . ρb
= 0,75 . 0,035
= 0,0236

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

$= \frac{400}{0,85 \; x \; 29.05}$

$= 16.20$

$\rho_{perlu} \quad = \frac{1}{m} \; (1 - \sqrt{1 - \frac{2m \; xRn}{fy}})$

$= \frac{1}{16.20} \; (1 - \sqrt{1 - \frac{2(16.20) \; x \; 0.033}{400}})$

$= 0.00008$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{min} > \rho < \rho_{max}$

0.0029 > 0.00008 < 0,0236 …… **TIDAK OK**

Sehingga ρ tulangan yang digunakan :

$\rho_{min (2)} = 0.00010$

Luas tulangan :

$As_{perlu} = \rho_{min (2)} . b . d$

$= 0,00010 \text{ x } 16000 \text{ mm x } 2409 \text{mm}$

$= 4288.664 \text{ mm}^2$

Dipasang tulangan lentur **D16-250**

($As_{terpasang} = 12867.963 \text{ mm}^2$)

⇔ Penulangan Pembagi :

$A_{st} = 20 \% \text{ x } As_{perlu}$

$= 857.73 \text{ mm}^2$

Dipasang tulangan **D16 –200**

($As_{terpasang} = 10618.583 \text{ mm}^2$)

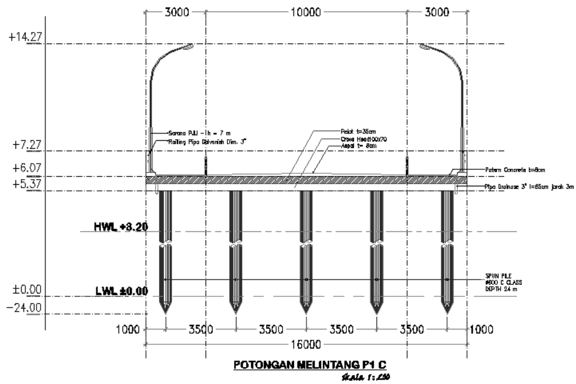
Tabel 6.36 Rekapitulasi tulangan pilar 13

	Tul. Lentur	Tul. Bagi	Tul. Geser
Pile Cap	D32	D16	D16 (2 kaki)
	150 mm	150 mm	250mm
Kolom Dinding	D22		D16 (2 kaki)
	150 mm		100 mm
Longitudinal Stropper	D16		D13 (2 kaki)
	250 mm		250 mm
Pier Head	D22	D16	D13 (2 kaki)
	125 mm	200 mm	200 mm
Korbel	D16	D16	
	250 mm	200	

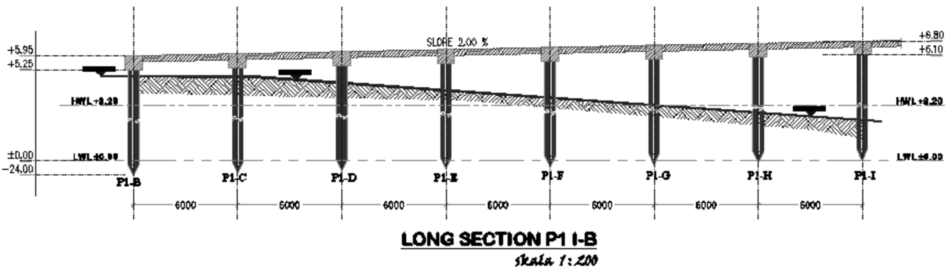
BAB VII
DESAIN STRUKTUR SLAB PILE

7.1 Desain Struktur Slab On Pile

Struktur slab on pile terdiri dari slab, pier head dan tiang pancang. Konsep desain struktur jembatan harus tahan terhadap gempa, sehingga struktur tidak mengalami kegagalan struktur apabila terjadi gempa ringan, sedang ataupun kuat.



Gambar 7.1 Potongan melintang *Slab On Pile*



Gambar 7.2 Potongan memanjang *Slab On Pile*

7.2 Desain Struktur Atas

Struktur atas terdiri dari pile head dan slab, direncanakan dari beton bertulang, dengan mutu beton K-350 (fc' 29.05 Mpa) dan baja tulangan ulir dengan mutu fy 400 Mpa.

7.2.1 Analisa Pembebanan

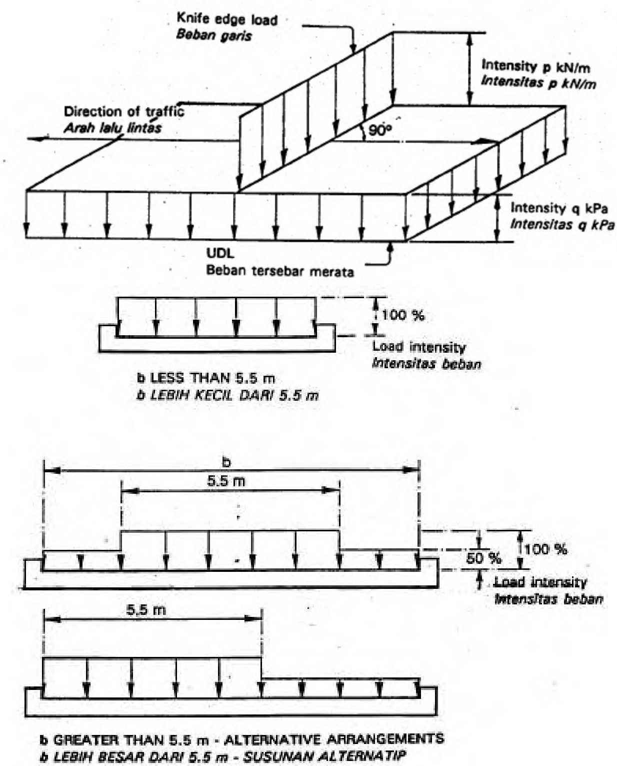
1. Beban mati bangunan atas

Tabel 7.1 Gaya Reaksi V_{ba} akibat beban mati bangunan atas

No.	Uraian	V_{abt} (KN)
1	Plat lantai kendaraan 35cm	840.00
2	Lapisan Aspal	66.00
3	Lapisan Overlay	66.00
4	Genangan Air hujan	47.04
5	Tiang sandaran+pipa	14.94
6	Instalasi ME dan Salir	10.00
	Jumlah	1043.98

2. Beban lalu lintas

Beban lalu lintas (lajur ”D”) untuk rencana bangunan bawah jembatan jalan raya terdiri dari UDL dan KEL dimana akan ditempatkan melintang pada lebar penuh dari jalan kendaraan jembatan dan menghasilkan pengaruh pada jembatan ekuivalen dengan rangkain kendaraan sebenarnya. Jumlah total pembebanan lajur ”D” yang ditempatkan tergantung pada lebar jalan kendaraan jembatan.



Gambar 7.3 Asumsi beban hidup lalu-lintas

✓	Panjang bentang jembatan (L)	= 6 m
✓	Lebar Perkerasan Jembatan (b)	= 10 m
✓	Beban KEL (P_{kel})	= 49 kN/m
	Faktor beban dinamis (1+DLA)	= 1.4
✓	Beban UDL (qUDL)	= 9 kN/m^2

Total beban UDL = 419 kN

$(((5{,}5 x q_{UDL}) + ((b - 5{,}5)\ x\ 0{,}5 x\ q_{UDL})\ x\ L$

Total Beban KEL = 532 kN

$$\left[\left(5{,}5\ x\left(P_{KEL}(1+DLA)\right)\right]\right. + \left[b - 5{,}5\ x\ \left(0{,}5\ x\ \left(P_{KEL}(1+DLA)\right)\right)\right]$$

Total Beban Hidup Lalu Lintas = 950 kN

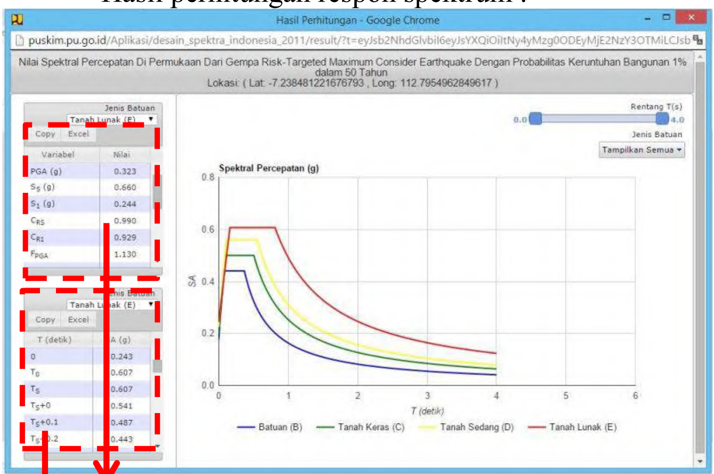
3. Beban Gempa
   - Analisa respon spectrum input SAP2000 :

Analisis beban gempa berdasarkan perhitungan data grafik respon spectrum gempa dari PUSKIM Desain Spektra Indonesia 2011.

Perhitungan Beban Gempa :

Diketahui :

- ✓ Zona gempa = Zona 2
- ✓ Wilayah = Surabaya
- ✓ Jenis tanah = Tanah lunak
- ✓ Hasil perhitungan respon spektrum :

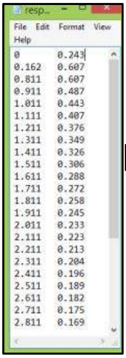


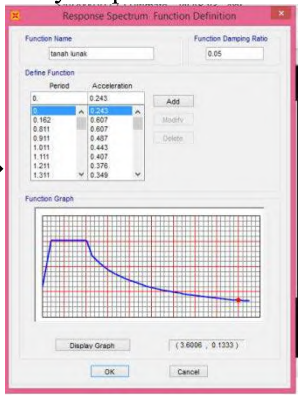
Data grafik respon specktrum

Data tanah lunak

Data Tanah dan data grafik Surabaya input SAP2000:

TANAH LUNAK	
PGA (g)	0.323
SS (g)	0.66
S1 (g)	0.243
CRS	0.99
CR1	0.929
FPGA	1.13
FA	1.379
FV	3.023
PSA (g)	0.365
SMS (g)	0.911
SM1 (g)	0.738
SDS (g)	0.607
SD1 (g)	0.492
T0 (detik)	0.162
TS (detik)	0.811





✓ Faktor keutamaan (I)

I = 1,0

✓ Faktor reduksi gempa

R = 5,0 - 6,0 untuk kolom majemuk.

Digunakan factor reduksi = 6,0

✓ Massa struktur (Mass source)

Massa untuk struktur akan ditentukan berasal dari :

1) Berat sendiri struktur (*self weight*) seperti pilar.
2) Beban mati tambahan (*super dead*) seperti bangunan atas, dll.

✓ Faktor pengali

Sesuai dengan SNI 03-1726-2002 pasal 7.2.1, maka input *response spectrum* diberi nilai pengali sebesar I/R dengan I adalah factor keutamaan dan R adalah factor reduksi gempa. Karena nilai input C pada *response spectrum* dinyatakan dalam gravitasi bumi (g), maka untuk input juga akan ditambahakan juga factor pengali sebesar g = 9,81 m/detik^2.

Untuk wilayah zona gempa 2 untuk tanah lunak, maka nilai-nilai tersebut adalah sebagai berikut :

I = 1,0
R = 6,0
g = 9.81 m/detik^2
Faktor pengali = I/R x g
= 1,0 / 6,0 x 9,81 = 1,633

- Analisa beban gempa statis ekivalen

Analisis beban gempa berdasarkan RSNI-T-03-2005 beban gempa direncanakan dengan metode beban horisontal statis ekivalen. Beban gempa bangunan atas yang masuk pada abutment direncanakan 100% dari total beban.

Perhitungan Beban Gempa :

$$T_{EQ} = C.I.S.\ W$$

- ✓ Zona gempa = Zona 2
- ✓ Keofisien Geser (C) = 0.21
- ✓ Faktor kepentingan (*I*) = 1
- ✓ Faktor type bangunan = 1
- ✓ Beban mati bangunan atas = 1044 kN
- ✓ Beban gempa akibat bangunan atas = 219 kN

4. Beban angin

Gaya angin pada bangunan atas tergantung luas ekuivalen diambil sebagai luas padat jembatan dalam elevasi proyeksi tegak lurus. Gaya nominal akibat angin bergantung pada kecepatan angin rencana. Beban angin yang diperhitungkan berdasarkan BMS 1992 adalah sebagai berikut :

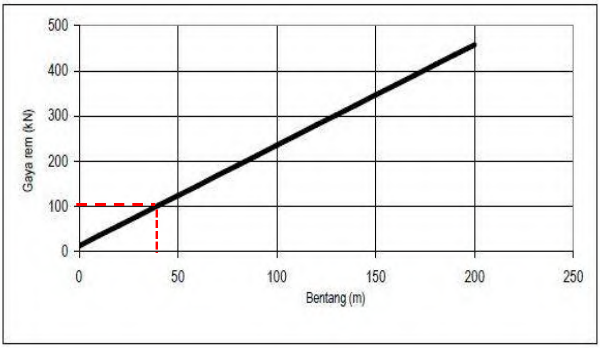
$$T_{EW} = 0{,}0006\ x\ C_w\ x\ V_w{}^2\ x\ A_b$$

- ✓ Kecepatan angin rencana (V_w) = 30 m/s
- ✓ Lebar jembatan (b) = 16.00 m
- ✓ Tinggi sampan jembatan (d) = 1.20 m
- ✓ Bentang jembatan = 40.80 m

- ✓ Luas bagian samping jembatan (A_b) = 5.76 m^2
- ✓ Rasio *b/d* = 13.33
- ✓ Koefisien seret (C_w) = 1.25
- ✓ Gaya angin (T_{EW}) = 3.89 kN

5. Beban rem (Breaking force)

Pengaruh percepatan dan pengereman dari lalu-lintas harus diperhitungkan sebagai gaya dalam arah memanjang. Beban rem yang diperhitungkan berdasarkan RSNI T-02-2005 untuk jembatan dengan panjang bentang 40m adalah = 100 kN/Lajur (2.75m), karena terdapat 2 lajur makan beban rem yang terjadi sebesar = 200 kN.



Gambar 7.4 Gaya rem perlajur 2,75 m (KBU)

7.2.2 Kombinasi Pembebanan

Tabel 7.2 Beban-beban pada struktur *Slab On Pile* dan faktor beban yang sesuai

Pembebanan Pada struktur Slab On Pile	Simbol	Faktor Beban	
		Kondisi Layan	Kondisi Ultimit
Beban mati (Berat slab, pile head, tiang)	P_{MS}	1.0	1.3
Beban mati tambahan (aspal 5 cm, dan pipa sandaran)	P_{MA}	1.0	2.0
Beban pejalan kaki di trotoar	T_{TP}	1.0	1.8
Gaya rem	T_{TB}	1.0	1.8
Gaya sentrifugal pada tikungan	T_{TR}	1.0	1.8
Beban Lajur D : UDL (BRT) dan KEL (BGT)	T_{TD}	1.0	1.8
Beban Gempa	T_{EQ}	1.0	1.0

Tabel 7.3 Kombinasi pembebanan yang dihitung pada kondisi layan.

Kombinasi Pembebanan	Faktor beban x beban yang bekerja pada struktur
Kombinasi 1	1,0 PMS +1,0 PMA+ 1,0 TTD+(100%TEQx +30%TEQy)
Kombinasi 2	1,0 PMS +1,0 PMA+ 1,0 TTD+(30%TEQx +100%TEQy)
Kombinasi 3	1,0 PMS +1,0 PMA+ 1,0 TTD+1,0 TTB

Sumber : SNI T-02-2005

Tabel 7.4 Kombinasi Pembebanan yang dihitung pada kondisi ultimate.

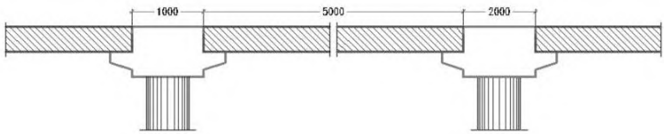
Kombinasi Pembebanan	Faktor beban x beban yang bekerja pada struktur
Kombinasi 1	1,3 PMS +2,0 PMA+ 1,8 TTD+(100%TEQx +30%TEQy)
Kombinasi 2	1,3 PMS +2,0 PMA+ 1,8 TTD+(30%TEQx +100%TEQy)
Kombinasi 3	1,3 PMS +2,0 PMA+ 1,8 TTD+1,8 TTB

Sumber : SNI T-02-2005

7.2.3 Perhitungan Plat Lantai Slab

7.2.3.1 Preliminary Desain Dimensi Plat Lantai Kendaraan

Plat lantai kendaraan berfungsi sebagai jalan kendaraan pada jembatan harus memiliki tebal minimum plat (ts) yang memenuhi ketentuan dalam **BMS BDC (1992) hal 6-7**. Untuk menentukan tebal plat yang dipakai, harus dilakukan kontrol geser ponds terhadap ketebalan plat akibat pembebanan roda truck (P_{TT}) pada berbagai posisi.



Gambar 7.5 Potongan memanjang *slab on pile*

- Preliminary Dimensi

  $200 \leq ts \geq 100 + 0{,}04\ L$

  $Ts \geq 200$ mm

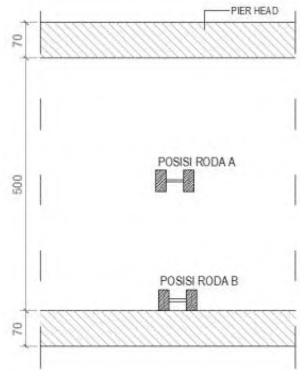
  $Ts \geq 100 + 0{,}04\ L$

  $Ts \geq 100 + (0{,}04 \times 5000)$ mm

  $Ts \geq 300$ mm

  200 mm $\leq ts \geq$ 300 mm

➢ Kontrol Geser Ponds

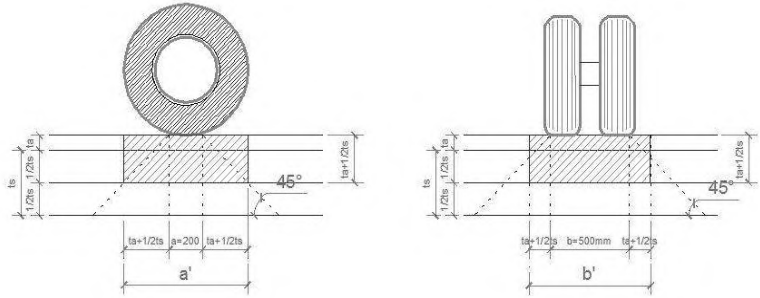


Gambar 7.6 Analisis posisi roda plat lantai kendaraan

Tabel 7.5 Data analisa geser ponds akibat beban roda

DATA ANALISA RODA		
Keterangan	Notasi	Nilai
Tebal Lapisan Aspal	Ta	50 mm
Roda Arah Melintang	A	200 mm
Lebar Roda Ganda	B	500 mm
Kuat Tekan Beton	Fc'	25 MPa
Beban Roda	P_{roda}	112.500 N
Faktor Reduksi Kekuatan	K_C^R	0,9
Faktor Beban Truck	K_{TT}^U	2
Faktor Beban Dinamis	DLA	0,3
Tebal Plat Lantai Kendaraan	ts	….

- Posisi A (Roda Truck berada ditengah bentang)



Gambar 7.7 Penyebaran beban roda pada posisi A

a' = a + 2.(ta + ½ ts)
= a + 2ta + ts
= 200 + (2 x 50) + ts
= 300 + ts

b' = b + 2. (ta + ½ ts)
= 500 + 2ta + ts
= 500 + (2 x 50) + ts
= 600 + ts

K_C^R x $\frac{1}{6}$ x $\sqrt{fc'}$ x *(Luasan keliling selimut bidang geser)* ≥ P_{roda} x K_{TT}^U x (1+DLA)

0,6 x $\frac{1}{6}$ x $\sqrt{25}$ MPa x $\left[2\big((300+ts)+(600+ts)\big)x\ ts\right]$ ≥ $112.500\ x$ 2 x (1 + 0,3)

0,6 x $\frac{1}{6}$ x 5 x [$\{300ts\ .ts\} + \{600ts + ts\}$] ≥ 292.500

0,5 x [$2ts^2$ + 900ts] ≥ 292.500

$$\frac{[2ts^2 + 900ts] \geq 292.500}{0,5}$$

$4ts^2 + 1800ts - 585000 = 0$

$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-1800 + \sqrt{1800^2 - 4.4.(-585000)}}{2.4}$$

x_1 = 218 mm

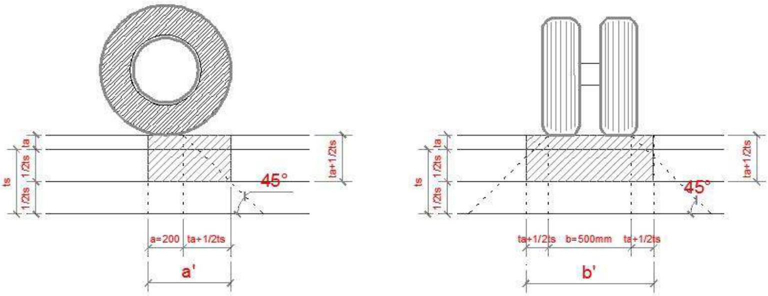
$$x_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-1800 - \sqrt{1800^2 - 4.4.(-585.000)}}{2.4}$$

$$x_2 = -668 \text{ mm}$$

Tebal pelat yang dibutuhkan = 250 mm.

- Posisi B (Roda truck berada di tepi plat)



Gambar 7.8 Penyebaran beban roda pada posisi B

$a' = a + (t_a + ½\ t_s)$
$= 200 + 50 + 1/2t_s$
$= 250 + 1/2\ t_s$

$b' = b + 2\ (t_a + ½\ t_s)$
$= 500 + 100 + ½\ t_s$
$= 600 + ½\ t_s$

K_C^R x $\frac{1}{6}$ x $\sqrt{fc'}$ x *(Luasan keliling selimut bidang geser)* $\geq$ P_{roda} x K_{TT}^U x (1+DLA)

0,6 x $\frac{1}{6}$ x $\sqrt{25}$ MPa x $\left[\, 2\big((300 + ts) + (550 + 1/2ts)\big)x\ ts\right]$ $\geq 112.500\ x\ 2$ x (1 + 0,3)

0,6 x $\frac{1}{6}$ x 5 x $\left[\, 2\,\{\, 250ts\,.1/2ts \quad\} + \{\, 600ts + ts^2\}\right]$ ≥ 292.500

0,5 x $[2ts^2 + 900ts]$ ≥ 292.500

$\dfrac{[3ts^2 + 850ts] \geq 292.500}{0{,}5}$

$3ts^2 + 1700ts - 585.000 = 0$

$x_{1,2} \quad = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$= \frac{-1700 + \sqrt{1700^2 - 4.3.(-585.000)}}{2.3}$

$x_1 \quad = 241.33$ mm

$x_2 \quad = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$

$= \frac{-1700 - \sqrt{1700^2 - 4.3.(-585.000)}}{2.3}$

$x_2 \quad = -808$ mm

Tebal pelat yang dibutuhkan = 250 mm.

Untuk tebal pelat yang digunakan adalah 350 cm.

Perhitungan plat lantai menggunakan aplikasi SAP2000, dari hasil perhitungan didapatkan momen tumpuan dan momen lapangan sebagai berikut :

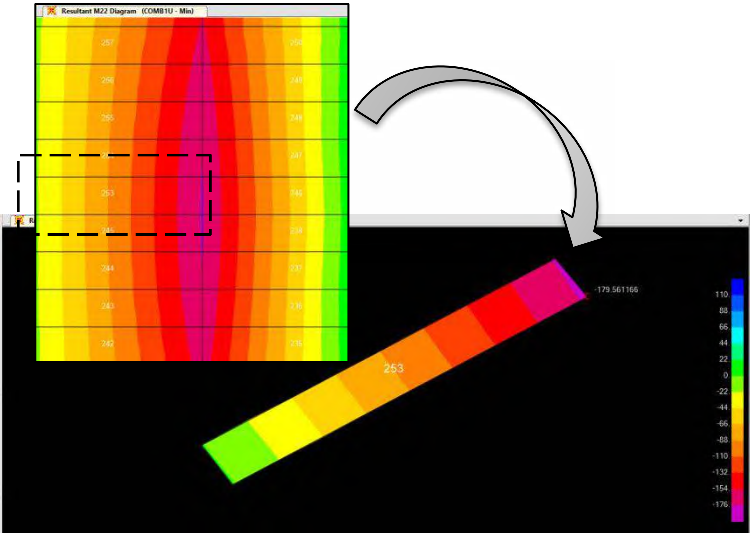
Tabel 7.6 Momen pada plat kondisi ultimate

Kombinasi Pembebanan	Gaya-gaya dalam maksimum	
	Momen(+)	Momen (-)
	Kn.m	*Kn.m*
Kombinasi 1	**101.239**	**179.561**
Kombinasi 2	*89.691*	*177.246*
Kombinasi 3	*84.661*	*176.228*

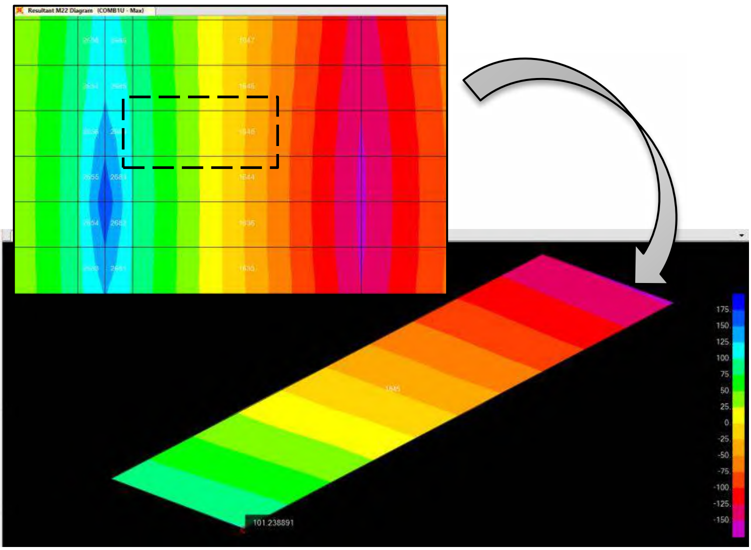
Sumber : Output SAP2000

Sehingga untuk desain tulangan plat lantai dipakai reaksi dari kombinasi 1 1,3 PMS +2,0 PMA+ 1,8 TTD+(100%TEQx +30%TEQy) Momen yang dipakai untuk perhitungan penulangan poer adalah :

Mu Tumpuan = 179.561 kNm
Mu Lapangan = 101.239 kNm



Gambar 7.9 Momen negatif plat slab



Gambar 7.10 Momen positif plat slab

7.2.3.1 Perhitungan penulangan Plat lantai

Fc’	= 29.05 MPa
Fy	= 400 MPa
h	= 350 mm
b	= 1000 mm
Tebal selimut (d’)	= 50 mm
Tinggi effesien (d)	= 276 mm
D *Tul lentur*	= D22 mm
Ø *Tul bagi*	= D14 mm

⇔ Tulangan Tumpuan :

K_{TD}^{U} = 0,9

M* $= \frac{Mu}{0,9}$
= 199.51 kNm
= 199512222.2 Nmm

Rn $= \frac{M*}{b.d^2}$
$= \frac{199512222.2 \text{ Nmm}}{1000 \, . \, 276^2}$
= 2.619

β_1 = 0,85

$$\rho b = \frac{0,85 \, . \, fc'}{fy} . \beta 1. \left[\frac{600}{600 + fy}\right]$$

$$= \frac{0,85.29.05}{400} .0,85. \left[\frac{600}{600+400}\right]$$

= 0,031

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

ρ_{max} = 0,75 . ρb
= 0,75 . 0,035
= 0,0236

$m = \frac{fy}{0,85\ x\ fc'}$
$= \frac{400}{0,85\ x\ 29.05}$
= 16.20

$\rho_{perlu} = \frac{1}{m}\ (1 - \sqrt{1 - \frac{2m\ xRn}{fy}})$
$= \frac{1}{16.20}\ (1 - \sqrt{1 - \frac{2(16.20)\ x\ 2.619}{400}})$
= 0.0069

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{min} < \rho < \rho_{max}$
0.0035 < 0.0069 < 0,0236…… **OK**
Sehingga ρ tulangan yang digunakan :
ρ = 0.0069

Luas tulangan :

As_{perlu} = ρ . b . d
= 0,0069 x 1000 mm x 276 mm
= 1914.80 mm^2

Dipasang tulangan lentur **D22-175**
($As_{terpasang}$ = 2172.186 mm^2)

⇔ Penulangan Pembagi :

A_{st} = 20 % x As_{perlu}
= 383 mm^2

Dipasang tulangan **D13 – 250**
($As_{terpasang}$ = 530.92 mm^2)

⇔ Tulangan Lapangan :

K_{TD}^{U} = 0,9

$M^* \quad = \frac{Mu}{0,9}$

$= 123.49$ kNm

$= 112487777.80$ Nmm

$Rn \quad = \frac{M*}{b.d^2}$

$= \frac{112487777.80 \text{ Nmm}}{1000 \,.\, 276^2}$

$= 1.477$

$\beta_1 \quad = 0,85$

$$\rho b \quad = \frac{0,85 \,.\, fc'}{fy} . \beta 1. \left[\frac{600}{600 + fy}\right]$$

$$= \frac{0,85.29.05}{400} .0,85. \left[\frac{600}{600+400}\right]$$

$= 0,031$

$\rho_{min} \quad = \frac{1,4}{fy}$

$= \frac{1,4}{400}$

$= 0,0035$

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

$= 0,75 \,.\, 0,035$

$= 0,0236$

$m \quad = \frac{fy}{0,85 \; x \; fc'}$

$= \frac{400}{0,85 \; x \; 29.05}$

$= 16.20$

$$\rho_{perlu} \quad = \frac{1}{m} \; (1 - \sqrt{1 - \frac{2m \; xRn}{fy}})$$

$$= \frac{1}{16.20} \; (1 - \sqrt{1 - \frac{2(16.20) \; x \; 1.477}{400}})$$

= 0.0038

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{min} < \rho < \rho_{max}$

0.0035 < 0.0038 < 0,0236...... *OK*

Sehingga ρ tulangan yang digunakan :

ρ = 0.0038

Luas tulangan :

As_{perlu} = ρ . b . d

= 0,0038 x 1000 mm x 276 mm

= 1051.30 mm^2

Dipasang tulangan lentur **D22-175**

($As_{terpasang}$ = 2172.186 mm^2)

⇔ Penulangan Pembagi :

A_{st} = 20 % x As_{perlu}

= 210.3 mm^2

Dipasang tulangan **D13 – 250**

($As_{terpasang}$ = 530.92 mm^2)

7.2.4 Desain Pile Head

Perhitungan pile head menggunakan aplikasi SAP2000, dari hasil perhitungan didapatkan momen tumpuan dan momen lapangan sebagai berikut :

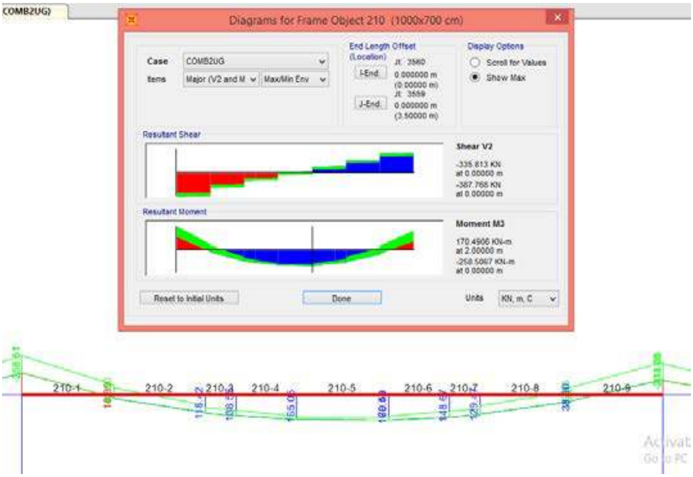
Tabel 7.7 Momen pada pile head kondisi ultimate

Kombinasi Pembebanan	Gaya-gaya dalam maksimum			
	Momen(+)	Geser	Momen (-)	Geser
	Kn.m	*Kn*	*Kn.m*	*Kn*
Kombinasi 1	*169.89*	*380.46*	*224.69*	*380.46*
Kombinasi 2	**170.49**	**390.30**	**258.51**	**390.30**
Kombinasi 3	*168.81*	*371.73*	*203.99*	*371.73*

Sumber : Output SAP2000

Sehingga untuk desain tulangan pile head dipakai momen yang dipakai untuk perhitungan penulangan poer adalah :

Mu Tumpuan = 258.51 kNm
Mu Lapangan = 170.49 kNm



Gambar 7.11 Momen positif dan negatif pile head

7.2.4.1 Perhitungan Penulangan Pile Head

Fc'	= 29.05 MPa
Fy	= 400 MPa
h	= 700 mm
b	= 1000 mm
Tebal selimut (d')	= 50 mm
Tinggi effesien (d)	= 629 mm
D *Tul lentur*	= D19 mm

⇔ <u>Tulangan Lapangan :</u>

K_{TD}^{U} = 0,9

$$M^* = \frac{Mu}{0,9}$$
$= 189.43$ kNm
$= 189434444.4$ Nmm

$$Rn = \frac{M*}{b.d^2}$$
$$= \frac{189434444.4 \text{ Nmm}}{1000\ .\ 629^2}$$
$= 0.479$

$\beta_1 = 0,85$

$$\rho b = \frac{0,85\ .fc'}{fy}.\beta 1.\left[\frac{600}{600+fy}\right]$$

$$= \frac{0,85.29.05}{400}\ .0,85.\left[\frac{600}{600+400}\right]$$
$= 0,031$

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

$\rho_{\ min\ 2} = 1⅓\ x\ \rho\ perlu$
$= 0,0016$

$\rho_{\ max} = 0,75\ .\ \rho b$
$= 0,75\ .\ 0,035$
$= 0,0236$

$$m = \frac{fy}{0,85\ x\ fc'}$$
$$= \frac{400}{0,85\ x\ 29.05}$$
$= 16.20$

$\rho_{perlu} \quad = \frac{1}{m}\ (1 - \sqrt{1 - \frac{2m\ xRn}{fy}}\ )$

$= \frac{1}{16.20}\ (1 - \sqrt{1 - \frac{2(16.20)\ x\ 0.479}{400}}\ )$

$= 0.0012$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{\ min} < \rho < \ \rho_{\ max}$

0.0035 < 0.0016 < 0,0236…… *OK*

Sehingga ρ tulangan yang digunakan :

ρ min $_2$ = 0.0016

Luas tulangan :

As $_{perlu}$ = ρ . b . d

= 0,0016 x 1000 mm x 629 mm

= 1011.30 mm^2

Dipasang tulangan lentur **D16-150**

(As $_{terpasang}$ = 1340.41 mm^2)

⇔ Tulangan Tumpuan :

K_{TD}^{U} = 0,9

M* $= \frac{Mu}{0{,}9}$

= 249.66 kNm

= 249655222.2 Nmm

Rn $= \frac{M*}{b.d^2}$

$= \frac{249655222.2\ \text{Nmm}}{1000\ .\ 629^2}$

= 0.631

β_1 = 0,85

$$\rho b \quad = \frac{0,85\,.\,fc'}{fy}.\,\beta 1.\left[\frac{600}{600+fy}\right]$$

$$= \frac{0,85.29.05}{400}\,.0,85.\left[\frac{600}{600+400}\right]$$

$= 0,031$

ρ_{min} $= \frac{1,4}{fy}$

$= \frac{1,4}{400}$

$= 0,0035$

$\rho_{min\,2}$ $= 1\tfrac{1}{3}\ x\ \rho\ perlu$

$= 0,0022$

ρ_{max} $= 0,75\ .\ \rho b$

$= 0,75\ .\ 0,035$

$= 0,0236$

m $= \frac{fy}{0,85\ x\ fc\prime}$

$= \frac{400}{0,85\ x\ 29.05}$

$= 16.20$

ρ_{perlu} $= \frac{1}{m}\ (1 - \sqrt{1 - \frac{2m\ xRn}{fy}})$

$= \frac{1}{16.20}\ (1 - \sqrt{1 - \frac{2(16.20)\ x\ 0.631}{400}})$

$= 0.0016$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{min} < \rho < \rho_{max}$

0.0035 < 0.0016 < 0,0236…… *OK*

Sehingga ρ tulangan yang digunakan :

$P_{min\,2} = 0.0021$

Luas tulangan :

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

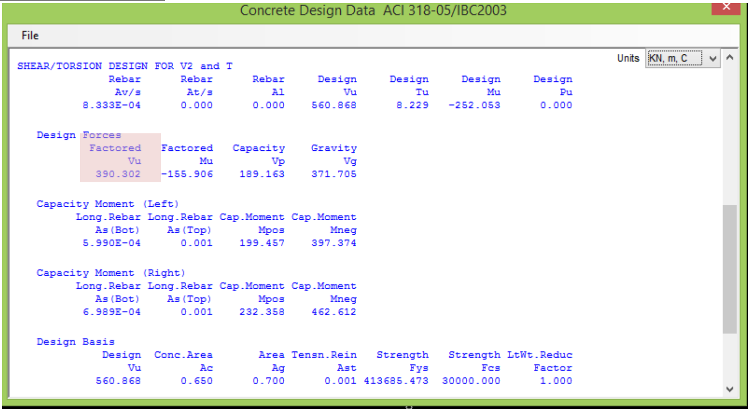
= 0,0021 x 1000 mm x 629 mm

= 1340.0 mm^2

Dipasang tulangan lentur **D16-150**

(As $_{terpasang}$ = 1340.41 mm^2)

Kontrol Geser :



Gambar 7.12 Gaya geser (Vu) pile head.

V_u = 390.302 kN

K_C^R = 0,85

$V^* = \dfrac{390.302 \text{ kN}}{0.85}$

= 459.1788 kN

ß$_1$ = 1.1

ß$_2$ = 1

ß$_1$ = 1

Batas kehancuran badan

Vu_{max} = 0.2 x f'c x bv x d

= 0.2 x 29.05 x 1000 x 629

= 3654490 N

= 3654.49 kN

Kekuatan geser tanpa tulangan geser (Vuc)

Vuc $= ß1 \ x \ ß2 \ x \ ß3 \ x \ bv \ x \ d \ x \ [\frac{(Ast \ x \ fc)}{(bv \ x \ d)}]^{1/3}$

$= 1.1 \ x \ 1 \ x \ 1 \ x \ 1000 \ x \ x \ [\frac{(Ast \ x \ 29.05)}{(1000x \ 629)}$

= 22445384.42 N

= 22445.38 kN

Kekuatan geser dengan tulangan geser minimum

Vu_{min} = Vuc + (0,6 x bv x d)

= 22445.38 kN + (0,6 x 1000 x 629)

= 399845.3844 kN

Kontrol

Apakah :	V*	<	Vu maks
	459.1788 kN	<	3654.49 kN …**OK**
Apakah :	V*	<	K_C^R x Vu min
	459.1788 kN	<	0,85 x 399845.385 kN
	459.1788 kN	<	339868.577 kN...**OK**
Apakah :	V*	<	K_C^R x Vuc
	459.1788 kN	<	0,85 x 22445.385 kN
	459.1788 kN	<	19078.58 kN …**OK**

Maka, dari analisa/control diatas, tidak perlu untuk menghitung keperluan tulangan geser, digunakan tulangan praktis :

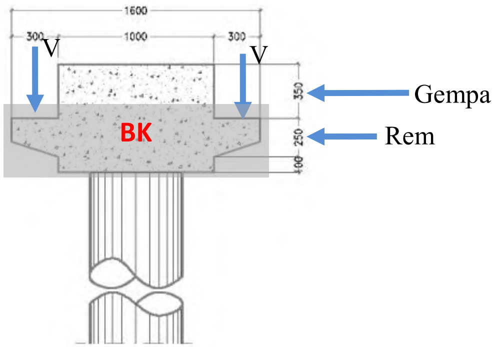
Dipasang tulangan **D13– 250 (2 kaki)**

($As_{terpasang}$ = 1061.9 mm^2)

7.2.5 Desain Balok Konsol

7.2.5.1 Analisis Pembebanan Balok Konsol

Analisis pembebanan korbel ditunjukkan pada Gambar 6.21 dengan beban yang bekerja yaitu beban sendiri, beban lalu lintas, beban rem dan beban gempa. Perhitungan beban, gaya dan momen akan ditunjukkan pada Tabel 7.35 dimana beban – beban tersebut dikalikan dengan faktor beban batas.



Gambar 7.13 Analisis pembebanan pada balok konsol

Tabel 7.8 Gaya dan momen pada balok konsol tumpuan slab

Gaya yg bekerja	besar	1,3 DL+1.8LL+1EQ		
		V_u	l	M_u
	KN	KN	m	KNm
Berat sendiri	182	236.60	0.15	35.49
Plat Slab	840	1092	0.15	163.80
UDL	419	754.20	0.15	113.13
KEL	532	957.60	0.15	143.64
gaya rem	200	360	0.18	63
Gempa Struktur				
Bangunan atas	678		0.15	102
Berat sendiri	38		0.15	6
		3400.40		626

Untuk penulangan korbel dipakai hasil reaksi dari kombinasi 1,3DL+1,8LL + EQ. Momen yang dipakai untuk desain penulangan balok konsol sebesar :

Mu = 626 kNm

7.2.5.1 Perhitungan Penulangan Balok Konsol

Fc’ = 29.05 MPa

Fy	= 400 MPa
h	= 250 mm
b	= 16000 mm
Tebal selimut (d')	= 50 mm
Tinggi effesien (d)	= 179 mm
D *Tul lentur*	= D16 mm

⇔ <u>Penulangan Lentur :</u>

K_{TD}^{U} = 0,9

M* $= \frac{Mu}{0,9}$

= 695.56 kNm

= 695555555.6 Nmm

Rn $= \frac{M*}{b.d^2}$

$= \frac{695555555.6 \text{ Nmm}}{1000 .\ 179^2}$

= 1.357

β_1 = 0,85

$$\rho b = \frac{0,85\ .fc'}{fy}.\beta 1.\left[\frac{600}{600+fy}\right]$$

$$= \frac{0,85.29.05}{400}\ .0,85.\left[\frac{600}{600+400}\right]$$

= 0,031

$\rho_{\text{ min}}$ $= 0.04\,\frac{f'c}{fy}$

= 0,0029

$\rho_{\text{ max}}$ = 0,75 . ρb

= 0,75 . 0,035

= 0,0236

$m \quad = \frac{fy}{0{,}85\ x\ fc\prime}$

$= \frac{400}{0{,}85\ x\ 29.05}$

$= 16.20$

$\rho_{perlu} \quad = \frac{1}{m}\ (1 - \sqrt{1 - \frac{2m\ xRn}{fy}})$

$= \frac{1}{16.20}\ (1 - \sqrt{1 - \frac{2(16.20)\ x\ 1.357}{400}})$

$= 0.0035$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{min} > \rho < \rho_{max}$

0.0029 < 0.0035 < 0,0236 …… **OK**

Sehingga ρ tulangan yang digunakan :

ρ = 0.0035

Luas tulangan :

As_{perlu} = ρ . b . d

= 0,0035 x 16000 mm x 179 mm

= 9997.10 mm^2

Dipasang tulangan lentur **D16-250**

($As_{terpasang}$ = 12867.96 mm^2)

⇔ <u>Penulangan Pembagi :</u>

A_{st} = 20 % x As_{perlu}

= 3217 mm^2

Dipasang tulangan **D13–350**

($As_{terpasang}$ = 6067.76 mm^2)

7.2.6 Desain plat injak

Plat injak merupakan konstruksi yang terletak menempel pada pile head, dengan ditumpu pada satu sisi korbel belakang pile head. Fungsi plat injak adalah mencegah adanya penurunan pada oprit jembatan.

7.2.6.1 Analisa pembebanan plat injak

Plat injak di desain untuk mampu menahan berat sendiri dan asumsi beban hidup lalu lintas yang lewat diatas plat injak.

Tabel 7.9 Momen dan berat pelat injak kondisi ultimate

Gaya yg bekerja	Berat	1,3DL + 1.8 LL	
		Vu	Mu
	Kn/m	*Kn*	*Kn.m*
Berat sendiri	*8.75*	*11.375*	*12.80*
Tanah urug	*16.2*	*21.06*	*23.69*
UDL	*9*	*16.2*	*18.23*
Asphalt	*1.1*	*1.54*	*1.73*
TOTAL		**50.175**	**56.45**

7.2.6.2 Perhitungan Penulangan Plat Injak

Fc' = 29.05 MPa
Fy = 400 MPa
h = 350 mm
b = 1000 mm
Tebal selimut (d') = 50 mm
Tinggi effesien (d) = 279 mm
D *Tul lentur* = D16 mm
D *Tul bagi* = D16 mm

⇔ Penulangan Lentur :

K_{TD}^{U} = 0,9

M* $= \frac{Mu}{0,9}$
= 62.72 kNm
= 62718750 Nmm

Rn $= \frac{M*}{b.d^2}$

$= \frac{62718750 \text{ Nmm}}{1000\ .\ 279^2}$

$= 0.806$

β_1 $= 0,85$

$\rho b \quad = \frac{0,85\ .f c'}{f y} . \beta 1. \left[\frac{600}{600 + f y}\right]$

$= \frac{0,85.29.05}{400}\ .0,85. \left[\frac{600}{600+400}\right]$

$= 0,031$

$\rho_{\ min}$ $= \frac{1.4}{fy}$

$= 0,0035$

$\rho_{\ min}$ $= 1,333\ x\ \rho\ perlu$

$= 0,0027$

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

$= 0,75\ .\ 0,035$

$= 0,0236$

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

$= \frac{400}{0,85\ x\ 29.05}$

$= 16.20$

ρ_{perlu} $= \frac{1}{m}\ (1 - \sqrt{1 - \frac{2m\ xRn}{fy}}\ )$

$= \frac{1}{16.20}\ (1 - \sqrt{1 - \frac{2(16.20)\ x\ 0.806}{400}}\ )$

$= 0.0020$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{\ min} > \rho < \ \rho_{\ max}$

0.0035 > 0.0027 < 0,0236 …… **TIDAK OK**

Sehingga ρ tulangan yang digunakan :

ρ = 0.0027

Luas tulangan :

As_{perlu} = ρ . b . d

= 0,0027 x 1000 mm x 279 mm

= 760.1 mm^2

Dipasang tulangan lentur **D16-150**

($As_{terpasang}$ = 1340.412 mm^2)

⇔ Penulangan Pembagi :

A_{st} = 20 % x As_{perlu}

= 268.1 mm^2

Dipasang tulangan **D16–150**

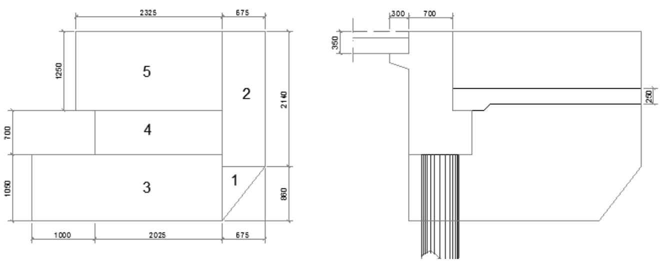
($As_{terpasang}$ = 1340.412 mm^2)

7.2.7 Desain Wing Wall

Fungsi dari *wing wall* (tembok sayap) adalah mencegah terjadinya longsoran pada timbunan tanah oprit jembatan, terutama longsoran ke samping.

7.2.7.1 Analisa Pembebanan Wing Wall

1. Akibat Berat sendiri

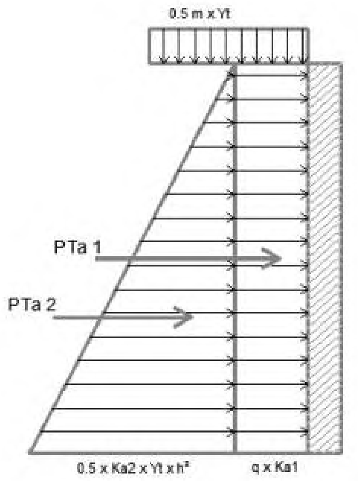


Gambar 7.14 Potongan Memanjang Wing Wall

Tabel 7.10 Berat *Wing Wall* kondisi ultimate

Gaya yg bekerja	Berat	1,3DL	
		Lengan	Mu
	Kn	*m*	*Kn.m*
1	*3.628*	*2.69*	*12.71*
2	*17.719*	*2.86*	*65.95*
3	*39.703*	*1.01*	*52.29*
4	*17.71875*	*1.51*	*34.85*
5	*36.32813*	*1.36*	*64.37*
TOTAL	115.097		230.16

2. Akibat Tekanan Tanah Aktif



γ beton = 25 KN/m^3
γ tanah = 18 KN/m^3
q beton = 7.5 kN/m^2
q tanah = 9 kN/m^2
Ø = 30°
C = 0

Ka 1 = Tg^2 (45-Ø/2) = 1

Ka 2 = Tg^2 (45-Ø/2) = 0.33

Tabel 7.11 Tekanan tanah kondisi ultimate

Bagian	Berat	1,25 Ta	
		Lengan	Mu
	Kn	*m*	*Kn.m*
Pta 1	*16.50*	*1.50*	*30.94*
Pta 2	*26.730*	*1.00*	*33.41*
TOTAL	**62.910**		**64.35**

7.2.7.2 Perhitungan Penulangan Wing Wall

Penahan Beban Vertikal :

Fc' = 29.05 MPa
Fy = 400 MPa
h = 300 mm
b = 500 mm
Tebal selimut (d') = 50 mm
Tinggi = 3000 mm
Tinggi effesien (d) = 2929 mm
D *Tul lentur* = D16 mm
D *Tul bagi* = D16 mm

⇔ Penulangan Lentur :

K_{TD}^{U} = 0,9

M* $= \frac{Mu}{0,9}$
= 255.73 kNm
= 255732993.8 Nmm

Rn $= \frac{M*}{b.d^2}$

$= \frac{255732993.8 \text{ Nmm}}{1000\ .\ 2929^2}$

$= 0.060$

β_1 $= 0,85$

$$\rho b = \frac{0,85\ .fc'}{fy} . \beta 1. \left[\frac{600}{600 + fy}\right]$$

$$= \frac{0,85.29.05}{400} .0,85. \left[\frac{600}{600+400}\right]$$

$= 0,031$

$\rho_{\ min}$ $= \frac{1.4}{fy}$

$= 0,0035$

$\rho_{\ min\ 2}$ $= 1,333\ x\ \rho\ perlu$

$= 0,0002$

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

$= 0,75\ .\ 0,035$

$= 0,0236$

m $= \frac{fy}{0,85\ x\ fc\prime}$

$= \frac{400}{0,85\ x\ 29.05}$

$= 16.20$

ρ_{perlu} $= \frac{1}{m}\ (1 - \sqrt{1 - \frac{2m\ xRn}{fy}}\ )$

$= \frac{1}{16.20}\ (1 - \sqrt{1 - \frac{2(16.20)\ x\ 0.060}{400}}\ )$

$= 0.0001$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{\ min} > \rho_{\ min\ 2} < \ \rho_{\ max}$

0.0035 > 0.0001 < 0,0236 …… **TIDAK OK**

Sehingga ρ tulangan yang digunakan :

$\rho_{\text{min 2}}$ = 0.0002

Luas tulangan :

As_{perlu} = ρ . b . d

= 0,0002 x 1000 mm x 2929 mm

= 290.7 mm^2

Dipasang tulangan lentur **D16-150**

($As_{terpasang}$ = 670.21 mm^2)

⇔ Penulangan Pembagi :

A_{st} = 20 % x As_{perlu}

= 111.72 mm^2

Dipasang tulangan **D16–150**

($As_{terpasang}$ = 1340.42 mm^2)

Penahan Beban Horizontal :

Fc' = 29.05 MPa

Fy = 400 MPa

h = 500 mm

b = 1000 mm

Tebal selimut (d') = 50 mm

Tinggi effesien (d) = 429 mm

D *Tul lentur* = D16 mm

D *Tul bagi* = D16 mm

⇔ Penulangan Lentur :

K_{TD}^{U} = 0,9

M* = $\frac{Mu}{0,9}$

= 71.50 kNm

= 71500000 Nmm

Rn = $\frac{M*}{b.d^2}$

= $\frac{124875000 \text{ Nmm}}{1000\ .\ 429^2}$

= 0.389

$\beta_1 \quad = 0{,}85$

$$\rho b \quad = \frac{0{,}85\ .\ fc'}{fy}\ .\ \beta 1.\left[\frac{600}{600 + fy}\right]$$

$$= \frac{0{,}85.29.05}{400}\ .0{,}85.\left[\frac{600}{600+400}\right]$$

$= 0{,}031$

$$\rho_{\ min} \quad = \frac{1.4}{fy}$$

$= 0{,}0035$

$\rho_{\ min\ 2} \quad = 1{,}333\ x\ \rho\ perlu$

$= 0{,}0013$

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

$= 0{,}75\ .\ 0{,}035$

$= 0{,}0236$

$$m \quad = \frac{fy}{0{,}85\ x\ fc\prime}$$

$$= \frac{400}{0{,}85\ x\ 29.05}$$

$= 16.20$

$$\rho_{perlu} \quad = \frac{1}{m}\ (1 - \sqrt{1 - \frac{2m\ xRn}{fy}}\ )$$

$$= \frac{1}{16.20}\ (1 - \sqrt{1 - \frac{2(16.20)\ x\ 0.389}{400}}\ )$$

$= 0.0010$

… (Wang, Chu Kia, 1994, hal 55)

Kontrol :

$\rho_{\ min} > \rho_{\ min\ 2} < \ \rho_{\ max}$

0.0035 > 0.0010 < 0,0236 …… **TIDAK OK**

Sehingga ρ tulangan yang digunakan :

$\rho_{\ min\ 2} \quad = 0.0013$

Luas tulangan :

As_{perlu} = $\rho_{min\ 2}$. b . d

= 0,0013 x 1000 mm x 429 mm

= 558.6 mm^2

Dipasang tulangan lentur **D16-150**

($As_{terpasang}$ = 1340.42 mm^2)

⇔ Penulangan Pembagi :

A_{st} = 20 % x As_{perlu}

= 111.72 mm^2

Dipasang tulangan **D16–150**

($As_{terpasang}$ = 1340.42 mm^2)

7.2.8 Perhitungan Penghubung Geser (Shear Connector)

Karena hubungan antara lantai slab dengan slab precast merupakan hubungan komposit, dimana hubungan seperti ini lantai slab dan slab precast tidak dicor dalam satu kesamaan, maka perlu diberi penahan geser atau *shear connector* supaya antara lantai slab dan precast slab dapat bekerja bersama-sama menahan beban-beban mati dan hidup.

7.2.8.1 Material

Beton

f'c plat = 290.5 kg/cm^2

= 29.05 MPa

BJ Beton = 2500 kg/cm^3

Ec = $Wc^{1,5}$ x 0,041 $\sqrt{fc'}$

= 27622,75

Baja

Baja yang digunakan D = 16 mm

Tinggi H = 300 mm

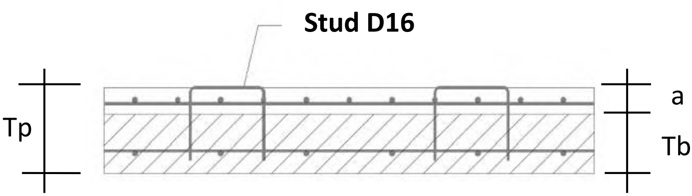
Fy = 240 MPa

Fu = 400 MPa

7.2.8.2 Perhitungan Kekuatan Stud Connector (Q)

- Ec $= W^{1.5}$ x 0,041 x √f'c
  $= 2500^{1.5}$ x 0,041 x √29.05
  = 27622.75 MPa
- Asc $= \frac{1}{4}\,\pi\, d^2$
  $= \frac{1}{4}\; x\; 3.14\; x\; 16^2$
  $= 200.96\ mm^2$
- Kekuatan satu shear connector :
  Qn = 0,5 x Asc x √(f'c x Ec)
  = 0,5 x 200.96 x √(29.05 x 27622.75)
  = 90009.045 N
- Asc x Fu = 200.96 x 400 = 80384 N

Qn > **Asc x Fu**
Dari nilai Qn dan Asc x Fu diambil nilai yang terkecil yaitu 80384 N



Pada penampang komposit :

Dik : a = 110 mm
Tp = 350 mm
Tb = 240 mm
b_{eff} = 2000 mm

C1 = 0,85 x f'c x Ac

= 0,85 x 29.05 x a x bE
= 0,85 x 29.05 x 110 x 2000
= 5432350 N

C2 = As x fy
= (2000 x 110) x 240
= 52800000 N

Dari hasi perhitungan C1 dan C2 diambil nilai terkecil yaitu C1 = 5432350 N
Maka, jumlah shear connector yang dibutuhkan sepanjang plat slab precast :

n $= \frac{C1}{Qn}$

$= \frac{5432350}{80384}$

= 67.6 buah ~ 68

Dipasang 2 baris jadi = $\frac{68}{2}$ = 34 buah

- Jarak pemasangan stud connector :
➔ $\frac{5000}{34} = 147.05\, mm$ ~ 150 mm
Jarak shear connector yang digunakan adalah 150 mm, jadi dalam 1 baris ada 34 buah karena yang dibutuhkan adalah 68 maka digunakan 2 baris, sehingga shear connector yang digunakan adalah 34 buah.

Tabel 7.12 Rekapitulasi tulangan *Slab On Pile*

	Tul. Lentur		Tul. Bagi	Tul. Geser
Plat Slab	L	D22	D13	
		175 mm	250 mm	
	T	D22	D13	
		175 mm	250 mm	
Pile Head	L	D16		D13 (2 kaki)
		150 mm		250 mm
	T	D16		D13 (2 kaki)
		150 mm		250 mm
Balok Konsol	D16		D13	
	250 mm		350	
Plat Injak	D16		D16	
	150 mm		150 mm	
Wing Wall	V	D16		
		150 mm		
	H	D16		
		150 mm		

7.3 Desain Struktur Bawah

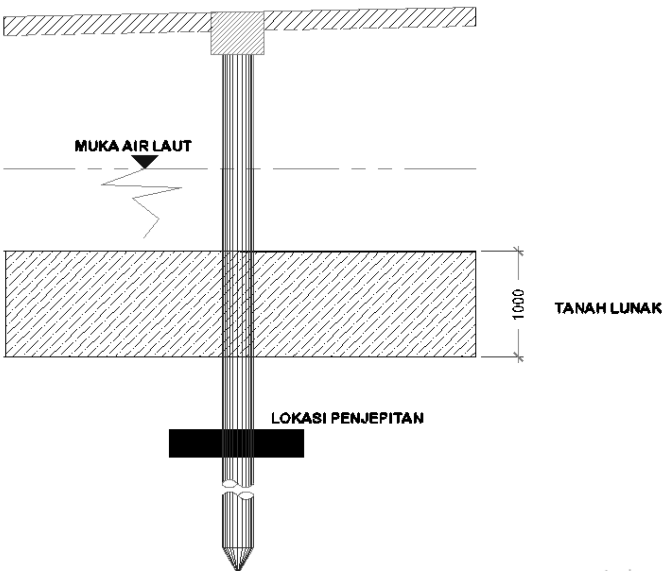
Struktur bawah menggunakan tiang pancang spun pile. Beban yang ditahan oleh tiang pancang adalah beban yang disalurkan dari *slab* dan *pile head.*

7.3.1 Tiang Pancang

7.3.1.1 Diameter Tiang Pancang

Data dimensi tiang pancang yang akan digunakan diambil dari table Wika Beton (Lampiran) yaitu direncanakan menggunakan spun pile diameter Ø0.6 m dengan tebal 10cm.

7.3.1.2 Panjang Penjepitan Tiang Pancang



Gambar 7.15 Panjang penjepitan tiang pancang

Penentuan panjang penjepitan tiang pancang dimaksudkan untuk mengetahui panjang tiang pancang saat penggunaan praktis dalam perhitungan design.

Panjang penjepitan (Lm) dihitung dari rumus yang diambil dari **Mekanika Tanah dan Teknik Pondasi, Suyono, S. Kazuto Nazakawa** sesuai dengna persamaan 2-9 sampai 12, sebagai berikut :

$$\beta = \sqrt[4]{\frac{k.\,D}{4EI}}$$

$$\mathrm{Lm} = \frac{1}{\beta}\left(tan^{-1}\,\frac{1+\beta h}{1+\beta h}\right)(cm)$$

k = 0,2 x Eo x $D^{3/4}$ x $\delta^{-1/2}$

E_0 = 28N

Keterangan :

Eo	=	Modulus deformasi tanah pondasi (28N, Nilai N diambil NSPT rata-rata sampai pada kedalaman tiang pancang yang masuk kedalam tanah).
δ	=	Pergeseran posisi ujung tiang (cm) = 2.5 cm
D	=	Diameter tiang pancang (0,6 m)
E	=	Modulus elastisitas beton tiang
I	=	Momen inersia penampang
Kh	=	Modulus reaksi horizontal yang harganya konstan sepanjang tiang terbenan.

Sehingga direncanakan panjang tiang pancang untuk dipakai sebagai data input perhitungan struktur dengan SAP 2000 adalah 7 m, untuk struktur *slab on pile* seperti ditunjukkan table berikut :

Tabel 7.13 Panjang penjepitan untuk tiang pancang *Slab On Pile*

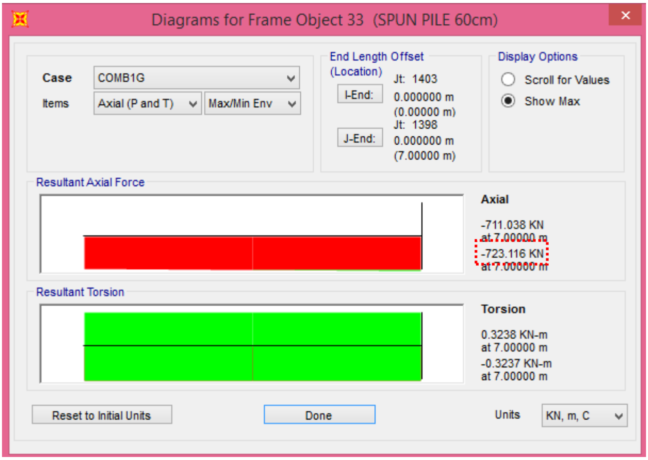
Parameter	Ø0,6 m	Satuan
Diameter	60	cm
Elv. Plat Slab	+6.35 LWL	m
Kedalaman	24	m
Tanah lunak	1	m
h	2.6	m
N	1	Blow/feet
E	119948	Kg/cm2
I	510509	cm4
β	3.32	m^{-1}
K	0.259	Kg/cm^3
δ	1	cm
Lm	3.32	m
Panjang tiang input SAP2000 (Lm+h+tanah lunak)	6.92 ~**7**	m

7.3.2 Perhitungan Gaya Aksial Tiang Pancang

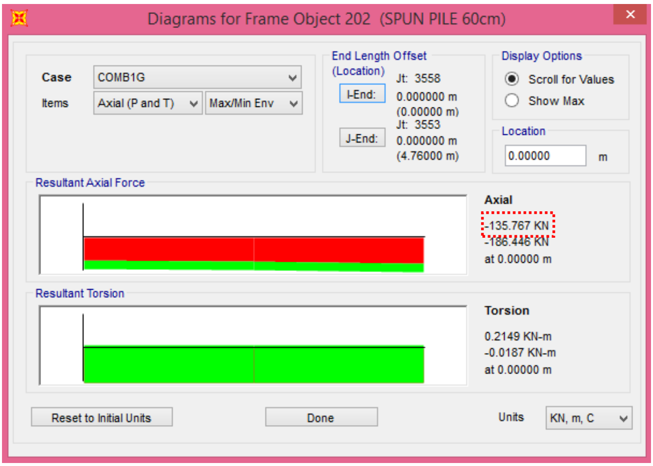
Tabel 7.14 Kombinasi pembebanan yang dihitung pada kondisi ultimate.

Kombinasi Pembebanan	Faktor beban x beban yang bekerja pada struktur
Kombinasi 1	1,3 PMS +2,0 PMA+ 1,8 TTD+(100%TEQx +30%TEQy)
Kombinasi 2	1,3 PMS +2,0 PMA+ 1,8 TTD+(30%TEQx +100%TEQy)
Kombinasi 3	1,3 PMS +2,0 PMA+ 1,8 TTD+1,8 TTB

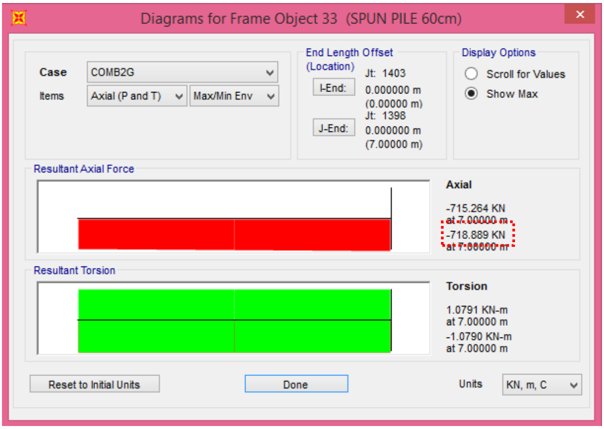
Sumber : SNI T-02-2005



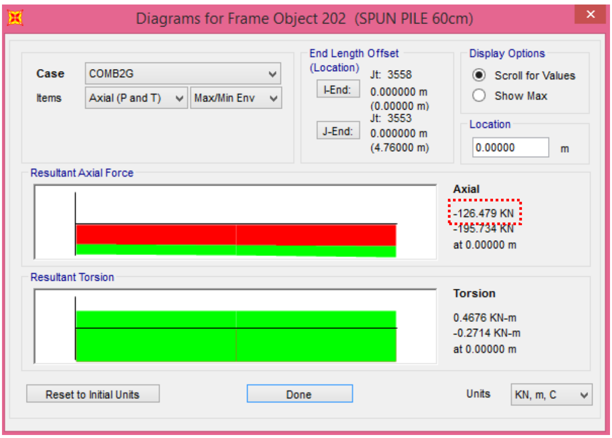
Gambar 7.16 Pmax tiang pancang akibat kombinasi 1Layan



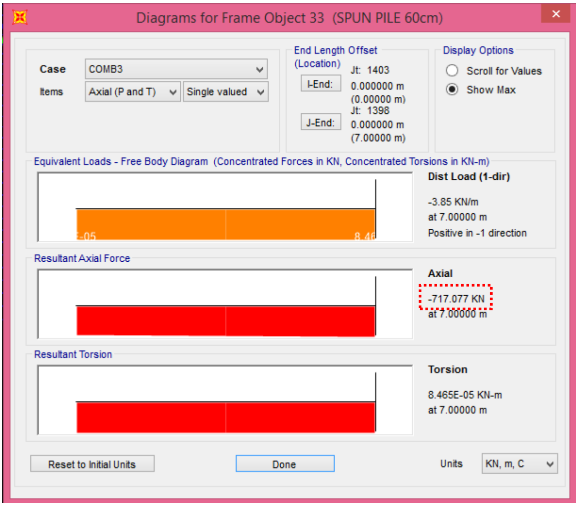
Gambar 7.17 Pmin tiang pancang akibat kombinasi 1Layan



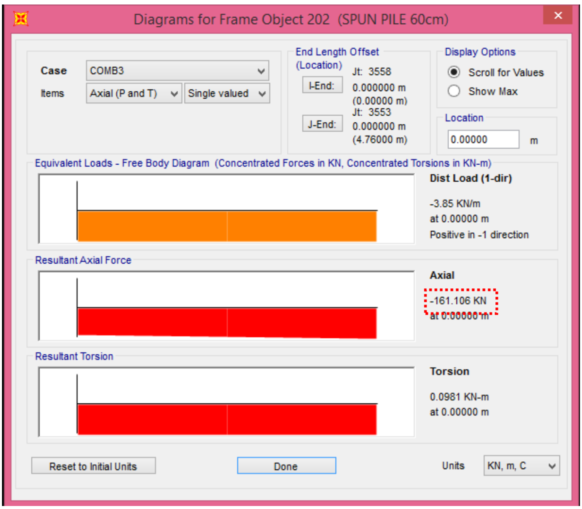
Gambar 7.18 Pmax tiang pancang akibat kombinasi 2Layan



Gambar 7.19 Pmin tiang pancang akibat kombinasi 2Layan



Gambar 7.20 Pmax tiang pancang akibat kombinasi 3Layan



Gambar 7.21 Pmin tiang pancang akibat kombinasi 3Layan

Tabel 7.15 Rekapitulasi beban yang bekerja pada pile (kondisi Layan)

Kombinasi Pembebanan	Beban P_{layan} yang bekerja pada tiang	
	P max	P min
	KN	*KN*
Kombinasi 1	**723.116**	*135.767*
Kombinasi 2	*718.889*	*126.479*
Kombinasi 3	*717.077*	*161.106*

Sumber : Output SAP2000

7.3.2 Perhitungan Daya Dukung Tanah

Dari Tabel 8.7 dapat diketahui nilai maksimum (Pmax) Gaya aksial tiang pancang akibat beban sementara (kombinasi 1) adalah 723.116 KN dan nilai minimum (Pmin) adalah 135.767 KN, nilai maksimum (Pmax) Gaya aksial tiang pancang akibat beban sementara (kombinasi 2) adalah 718.889 KN dan nilai minimum (Pmin) adalah 126.479 KN , nilai maksimum (Pmax) Gaya aksial tiang pancang akibat beban tetap (kombinasi 3) adalah 717.077 KN dan nilai minimum (Pmin) adalah 161.106 KN.

Dari hasil kemampuan tiang pancang didapat hasil reaksi berupa gaya aksial tekan dan tarik maka akan dikontrol dengan daya dukung tanah akibat tekan. Perhitungan daya dukung tanah berdasarkan tiang pancang yang berdiameter 0,60 m dan berdasarkan data penyelidikan tanah SPT pada titik bor BH1. Daya dukung tanah dihitung berdasarkan rumus dan hasilnya ditunjukkan berikut :

Perhitungan berikut ini berdasarkan rumus **Kazuto Nakazawa.**

$$R_a = \frac{1}{n} Ru$$

$$R_u = \frac{1}{n}\left[(qd.A) + (U.\Sigma li.fi)\right]$$

Keterangan :

Ra = Daya dukung tanah yang diizinkan (kN)
Rp = Daya dukung dari unsur bearing (kN)
Rf = Daya dukung dari unsur lekatan/skin friction (kN)
n = Faktor keamanan
qd = Daya dukung dari unsur bearing (kN/m^2)
A = Luas penampang dasar tiang (m^2)
U = Panjang keliling tiang (m)
Li = Tebal lapisan tanah dengan memperhitungkan geseran dinding tiang (m)
Fi = Besaran gaya geser maksimum dari lapisan tanah dengan memperhitungkan geseran dinding tiang (kN/m^2)

- Perhitungan daya dukung tiang pile slab kedalam 24 m.

$$\acute{N} = \frac{N1+N2}{2}$$
$$= \frac{38+(38+20+17)}{2}$$
$$= 32$$

Keterangan :

Ń = Harga N rata-rata untuk perencanaan tanah pondasi pada ujung tiang
N1 = Harga N pada ujung tiang
Ń2 = Harga rata-rata N pada jarak 4D dari ujung tiang
4D = 2.4 m

- Panjang ekivalensi dari penetrasi tiang

l = 1.1 m

- Daya dukung pada ujung tiang

$$\frac{l}{D} = 1.833$$
$$\frac{qd}{\acute{N}} = 14$$
$$qd = 14\acute{N} = 14 \times 32 = 441 \text{ ton/m}^2$$
$$= 4410 \text{ kN/m}^2$$

$$Rp = A \cdot qd \quad = \frac{\Pi.0{,}6^2}{4} \times 441 \text{ ton/m}^2$$
$$= 124.63 \text{ ton}$$
$$= 1246.3 \text{ kN}$$

- Menghitung gaya geser dinding tiang

Kedalaman	Ketebalan lapisan li (m)	Tanah	Harga rata-rata N	fi (Ton/m²)	li.fi (Ton)
0-2	2	Lanau berlempung	1.0	1.00	2.0
2-9	7	Lempung berlanau pasir	3.3	3.29	23
9-12	3	Lanau pasir berkerikil	22	12.00	36
12-17	5	Lempung berlanau berpasir	17.8	12.00	60.0
17-23	6	Lempung lanau berpasir kerikil	20.0	12.00	72
23-24	1	Lanau pasir berlempung	38.0	7.60	7.60
Jumlah					201

- Rf = U.∑li.fi = ∏ x 0,6 x 201
  = 377.93 Ton
  = 3779.304 kN
- Daya dukung ultimate
  Ru = (Rp + Rf)
  = qd.A + U.∑li.fi
  = 124.63 + 377.93 Ton

= 502.557 ton
= 5025.57 kN

- Daya dukung yang diijinkan (Tekan)

Ra = ⅓ Ru
= ⅓ 502.557 ton
= 167.519 ton
= 1675.19 kN (Beban tetap)

Ra = ½ Ru
= ½ 502.557 ton
= 251.2785 ton
= 2512.785 kN (Beban sementara)

7.3.3 Kontrol Kekuatan Tiang Pancang

Setelah mendapat P yang terjadi dari *Output SAP2000* maka dilakukan analisis kontrol kekuatan tiang pancang terhadap gaya dan momen yang bekerja serta kontrol geser pons untuk mengetahui kemampuan beton menahan geser.

Dari wika pile classification direncanakan tiang pancang beton prategang dengan :

- Diameter tiang pancang = 0.6 m
- Tebal (t) = 0.1 m
- Kelas = A1
- Mutu beton f'c = 49.8 MPa
- Allowable axial load = 2527 kN
- Bending momen crack = 170 kNm
- Bending momen ultimate = 2550 kNm
- Modulus elastisitas beton = 119948

  $Ec = (wc)^{1,5}.0{,}043.\sqrt{fc'}$
- Momen inersia tiang pancang $= \frac{1}{64}\pi\,(D^4 - d^4)$

  $= 510509\ cm^4$

7.3.4 Kontrol terhadap Gaya Aksial Vertikal

Daya dukung suatu tiang harus ditinjau berdasarkan kekuatan tanah tempat tiang ditanam. Hasil daya dukung yang terendah adalah yang menentukan yang dipakai sebagai daya dukung ijin tiang.

- Berdasarkan kekuatan bahan
  Kekuatan tekan (maksimal) terhadap gaya aksial vertikal untuk tiang pancang Ø0,6m adalah 2570 kN.
  Sedangkan beban vertikal maksimal yang diterima tiang adalah sebesar **723.116 kN.**
  2570 kN > **723.116 kN → OK**
- Berdasarkan daya dukung tanah
  Berdasarkan analisa perhitungan daya dukung tanah (data SPT) dari perumusan *Kazuto Nazakawa* didapatkan besarnya daya dukung ijin tanah terhadap pondasi tiang pancang spun pile Ø0,6m dengan kedalaman 24 m diperoleh Qijin seperti yang ditabelkan berikut ini :

Tabel 7.16 Kontrol daya dukung tiang pancang

Data tanah	P_{ijin} Tekan beban sementara	P_{ijin} Tekan beban tetap
	KN	KN
BH1	2512.785 kN > P_{layan} = *723.116 kN*	1675.19 kN > P_{layan} = *717.077 kN*
	OK	**OK**

7.3.5 Kontrol terhadap Momen

Momen maksimum yang terjadi pada tiang pancang Didapat dari hasil output SAP2000 :

SPUN PILE

Type	=	C		P all	=	2527 KN	
Dim	=	600	mm	M.Crack	=	170 KN.m	
tebal	=	100	mm	Pu Bahan	=	458 KN	
Luas (A)	=	86350	mm2		=		
I (inersia)	=	28260000	mm^4	Qijin tanah	=	1675.19 KN	(Beban Tetap)
				Qijin tanah	=	2512.78 KN	(Beban Sementara)

TABLE: Element Forces - Frames (SLAB ON PILE)

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	Momen	P/Pall +	Kontrol	Kontrol	FrameElem	ElemStation
Text	m	Text	Text	Text	KN	KN	KN	KN-m	KN-m	KN-m	Resultant	Mrest/Mc	Bahan	Tanah	Text	m
204	0	COMB1G	Combination	Min	-630.457	-48.062	-9.177	-0.107	-21.630	-120.253	122.183	0.968	OK	OK	204-1	0
204	2.38	COMB1G	Combination	Min	-639.623	-48.062	-9.177	-0.107	-0.206	-26.243	26.244	0.407	OK	OK	204-1	2.38
204	4.76	COMB1G	Combination	Min	-648.788	-48.062	-9.177	-0.107	-22.071	-61.406	65.252	0.641	OK	OK	204-1	4.76
205	0	COMB1G	Combination	Max	-460.248	16.711	12.537	0.043	32.519	15.066	35.839	0.393	OK	OK	205-1	0
205	2.38	COMB1G	Combination	Max	-469.414	16.711	12.537	0.043	3.083	-3.973	5.029	0.215	OK	OK	205-1	2.38
205	4.76	COMB1G	Combination	Max	-478.580	16.711	12.537	0.043	17.057	105.852	107.218	0.820	OK	OK	205-1	4.76
205	0	COMB1G	Combination	Min	-509.972	-46.145	-5.899	-0.183	-11.024	-113.799	114.332	0.874	OK	OK	205-1	0
205	2.38	COMB1G	Combination	Min	-519.138	-46.145	-5.899	-0.183	2.614	-24.707	24.845	0.352	OK	OK	205-1	2.38
205	4.76	COMB1G	Combination	Min	-528.303	-46.145	-5.899	-0.183	-27.157	-64.478	69.963	0.621	OK	OK	205-1	4.76
206	0	COMB1G	Combination	Max	-141.558	19.171	13.814	0.019	36.644	22.992	43.260	0.310	OK	OK	206-1	0
206	2.38	COMB1G	Combination	Max	-150.723	19.171	13.814	0.019	5.073	-0.593	5.107	0.090	OK	OK	206-1	2.38
206	4.76	COMB1G	Combination	Max	-159.889	19.171	13.814	0.019	14.356	100.770	101.788	0.662	OK	OK	206-1	4.76

Element Forces - Frames / Program Control / Sheet3

Momen resultant = 122,183 kN.m

Mm < M_{crack}

122,183 KNm < 170 kNm … **OK**

(Halaman ini sengaja dikosongkan)

BAB VIII
PERLETAKAN

8.1 Dasar Desain

Perletakan elastomer terbuat dari karet alam atau sintetik dengan kekerasan IHRD (Intencity Hardness of Durable Rubber) yaitu strukturnya sendiri terdiri dari lapisan-lapisan karet yang dihimpit oleh plat baja dan dilekatkan melalui proses vulkanisasi. Karet ini memiliki tingkat kekenyalan yang tinggi, bersifat elastis dan kuat dalam waktu yang cukup lama. Berdasarkan BMS BDM 1992 pasal 7.1.1 hal 7-1, fungsi dari perletakan adalah untuk mengendalikan interaksi beban dan gerakan antara bangunan atas dengan bangunan bawah. Perencanaan dimensi perletakan mengacu pada BMS BDM 1992 Tabel 7.4 hal 7-10 sedangkan untuk control elastomer mengacu pada BMS BDM 1992 volume 7 dan BMS BDC 1992 volume 8.

Perletakan elastomer ini diasumsikan sebagai sendi dan rol. Diasumsikan sebagai sendi bila elastomer terkena beban dan girder membetur longitudinal stopper atau salah satu elastomer dapat menahan gerakan girder.

Gambar 8.1 Elastomeric Bearing Pads

8.2 Analisa Pembebanan

8.2.1 Gaya Vertikal

1. Beban mati

Tabel 8.1 Beban mati bangunan atas

No.	Uraian	V (kN)
1	Plat lantai kendaraan	2040.00
2	RC Plat	428.40
3	Lapisan Aspal	224.40
4	Lapisan Overlay	224.40
5	Genangan Air hujan	159.936
6	Tiang sandaran+pipa	34.73
7	Gelagar beton Pratekan	3272.4
8	Diafragma	359
9	Instalasi ME dan Salir	10.00
	Jumlah :	**6753.27**

Beban mati/perletakan $= \frac{6753.27}{8}$

$= 844.16$ kN

2. Beban hidup

V = 1686 kN

Beban mati/perletakan $= \frac{1686}{8}$

$= 210.75$ kN

8.2.2 Gaya Horizontal

1. Beban rem

H rem = 200 kN

Jumlah gelagar = 8 buah

P rem $= \frac{200}{8}$

= 25 kN

2. Beban gempa

Teq = Kh x I x Wt

Keterangan :

Kh = Koefisien beban gempa horizontal,

= C x S x I

C = Koefisien geser dasar 0,21 zona 2 tanah sedang RSNI T-03-2005

I = factor kepentingan = 1

S = factor type bangunan = 1

Kh = C x S = 0,21

Teq = Kh x I x Wt

= 0.21 x 1 x 6752.27 kN

= 1418.186 kN

Gaya gempa/perletakan $= \frac{1418.186 \text{ kN}}{8}$

= 177.273 kN

3. Gaya gesek

Gaya gesek pada tumpuan yang ditinjau dari bahan antara karet dan besi sebesar 0,16 dari beban mati. Gaya gesek = 135.065 kN.

Tabel 8.2 Rekapitulasi gaya vertikal dan horizontal

Gaya yang bekerja	Vertikal (kN)	Hb (kN)	Ha (kN)
Beban mati	844.16		
Beban hidup	281.00		
Gaya rem			25
Gaya gesek			16.883
Gempa		177.273	177.273
TOTAL :	**1125.16**	**177.27**	**219.16**

8.3 Desain Elastomer

Data perletakan :

Ukuran perletakan = 330 x 600 x 68 mm

Tebal plat baja (ts) = 5 mm

Tebal karet tengah (te) = 12 mm

Jumlah lapis baja (n) = 3

Tebal selimut atas dan bawah = 6 mm

Tebal selimut sisi = 10 mm

Tinggi keseluruhan = 68 mm

- Data pemeriksaan 1
  At = A = 330 x 600 = 198000 mm2
  G = 0,69 MPa (**BMS BDM 1992** Tabel 8.1 Hal 8-15)
  Δa = Ha.t/ (1000.At.G)
  = 0.0013 mm
  Δb = Hb.t/(1000.At.G)
  = 0.00071 mm
  a = 320
  b = 590
  Aeff = At (1-$\delta a/a$ –$\delta b/b$)
  = 197999.0 mm²
- Data pemeriksaan 2
  S = a.b / (2(a+b).te)
  = 8.645 …… ($4 \leq S \leq 12$) **OK**
  αa = ab = 0.0035 radian (**BMS.BDM hal 7-6)**
  €sr = ($\alpha a.a^2 + \alpha b.b^2$)/(2*te.t)
  = 0.97
- Data pemeriksaan 3
  Δs = $\alpha a + \alpha b$ = 0.0020 mm
  €sh = Δs / t = 0.000029
  0.9 x A = 178200 mm²
  €sh maks = 0.7 ….. jika (Aeff $\geq$ 0.9 x A)
- Data pemeriksaan 4
  V*LL = 281.00 kN
  €sc = $6.S.V.10^3/(3.Aeff.G(1+2.S^2))$
  = 0.236
- Data pemeriksaan 5
  At = 198000 mm²
- Data pemeriksaan 6
  C = 4 + a/b (6-3,3.a/b)
  = 6.28
  Eh = A.G $(1-1/((a/b)+(b/a))^2)$
  = 112624,56
  B = 2000 MPa
  E = Eh + ($C.G.S^2$ / ($1+C.G.S^2/(0.75 \times B)$))

= 112891.01

dc = S (te(V.10³/EA)

= 0.0013

- Data pemeriksaan 7

  Bo = 320 mm
- Data pemeriksaan 8

  Fsy = 400 MPa

  ti = 12 mm

8.4 Kontrol Perletakan

1. Pemeriksaan luas efektif minimum

   Aeff / 0,8.A > 1.00

   1,25 > 1.00 **OK**
2. Pemeriksaan regangan total maksimum

   eT = esc + esr + esh ≤ 2,6/G

   1,202 ≤ 3,77 **OK**
3. Pemeriksaan regangan geser maksimum

   Esh maks/esh > 1.00

   241238.21 > 1.00 **OK**
4. Pemeriksaan batas leleh

   1,4.V.(0,69/G)/ €sc.V*LL > 1.00

   23.719 > 1.00 **OK**
5. Pemeriksaan tegangan maksimum rata-rata

   1,5. At/V* > 1.00

   263.963 > 1.00 **OK**
6. Pemeriksaan perputaran maksimum

   $(\alpha_a.a + \alpha_b.b) / (4.dc)$ > 1.00

   610.572 > 1.00 **OK**
7. Pemeriksaan stabilitas tekan

   2.Be.G.S. Aeff / (1000/V*) > 1.00

   692.78 > 1.00 **OK**
8. Pemeriksaan tebal baja minimum (ts)

   Ts/3 ≥ 1.00

   1,667 ≥ 1.00

Ts . A . fsy/(3000.V*.ti)	> 1.00	
37.15	> 1.00	**OK**

9. Pemeriksaan tahanan gesek terhadap geseran (perlu tahanan alternative bila < 1)

0,1 (V*+3000.Aeff)/H*	> 1.00	
149837.61	> 1.00	**OK**

	BERITA ACARA UJIAN TUGAS AKHIR TERAPAN PROGRAM STUDI DIPLOMA TEKNIK SIPIL FTSP-ITS	Nomor Agenda : 038172/IT2.3.1.1.1/PP.05.02/2016
	PROGRAM LANJUT JENJANG DIPLOMA IV KOSENTRASI BANGUNAN TRANSPORTASI	Tanggal Ujian : 13/07/2016

Judul Proyek Akhir	**Desain Ulang Jembatan THP Kenjeran Surabaya dengan Menggunakan Balok I Gerder Bentang 40M**		
Nama Mahasiswa	Rizka Febyanti	NRP	3114040603
Dosen Pembimbing 1 NIP: 19550319 198403 1 001	Ir. Chomaedhi, CES, Geo	Tanda tangan	
Dosen Pembimbing 2 NIP: 19600105 198603 1 003	Ir. Ibnu Pudji R.,MS	Tanda tangan	

URAIAN REVISI	Dosen Penguji
	Ir. Chomaedhi, CES, Geo NIP: 19550319 198403 1 001
	Ir. Ibnu Pudji R.,MS NIP. 19600105 198603 1 003
1. Pemakaian dimensi Spun Pile pada struktur Jembatan Pile Slab agar ditinjau lagi jika masih bisa dihemat. 2.	Prof.Ir.M.Sigit D.M.Eng Sc, PhD NIP. 19630726 198903 1 003
1. Kata "Desain" ~~sbg~~ "perencanaan" dlm judul bab pinggir 2. Hal 73 → Metode Cross - tampa setin	Ir. Agung Bp.,M.Eng,PhD NIP. 19620328 198803 1 001
Mosai tulangan, penghentian tulangan di pilar & pilecape.	Ir. Sungkono, CES NIP.19591130 198601 1 001

PERSETUJUAN HASIL REVISI

Dosen Penguji 1	Dosen Penguji 2	Dosen Penguji 3	Dosen Penguji 4	
Ir. Chomaedhi, CES, Geo	Ir. Ibnu Pudji R.,MS	Prof.Ir.M.Sigit D.M.Eng Sc, PhD	Ir. Agung Bp.,M.Eng,PhD	Ir. Sungkono, CES
NIP: 19550319 198403 1 001	NIP.119600105 198603 1 003	NIP. 19630726 198903 1 003	NIP. 19620328 198803 1 001	19591130 198601 1 001

	Pembimbing 1	Pembimbing 2	Pembimbing 3
Persetujuan Dosen Pembimbing Untuk Penjilidan Buku Laporan Tugas Akhir Terapan	Ir. Chomaedhi, CES, Geo	Ir. Ibnu Pudji R.,MS	
	NIP. 19550319 198403 1 001	NIP. 19600105 198603 1 003	

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ASISTENSI PROYEK AKHIR

Nama : 1 RIZKA FEBYANTI 2
NRP : 1 3114 040 603 2
Judul Tugas Akhir : Desain Ulang Jembatan THP Kenjeran Surabaya dengan menggunakan balok I Girder bentang 40 M.

Dosen Pembimbing : Ir. Ibnu Pudji Rahardjo, MS / Ir. Chomaedhi, CES, GEO.

No	Tanggal	Tugas / Materi yang dibahas	Tanda tangan	Keterangan
10).		- Perbaiki hitungan daya dukung tanah dan lengkapi.		
		- Perbaiki hitungan tiang pancang miring		B C K
11).		- Perbaiki / cek ulang rumus efisiensi kelompok tiang.		
		- cek kembali semua hitungan tiang dan kontrol.		B C K
12).		- Lanjut gambar tulangan bangunan atas dan bawah		
		- perbaiki hitungan pada slab pile		B C K
		- Lanjut.		
13).		- Lanjut gambar tulangan dan lengkapi		B C K
				B C K

Ket. :
B = Lebih cepat dari jadwal
C = Sesuai dengan jadwal
K = Terlambat dari jadwal

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Dosen Pembimbing : Ir. Ibnu Pudji Rahardjo, MS / Ir. Chomaedhi, CES, GEO.

No	Tanggal	Tugas / Materi yang dibahas	Tanda tangan	Keterangan
5).		- Perbaiki kolom model V		
		- Tambahkan tiang pancang nya		
		- lanjut permodelan slab on pile		B ☑ C ☐ K ☐
		- Kontrol daya dukung tanah		
6).		- lanjut pada perhitungan bangunan		
		bangunan bawah		
		- Lanjut pada hitungan struktur		B ☑ C ☐ K ☐
		utama balok prategang		
		- ~~Kon~~ Perbaiki dimensi hammer head		
		dan kolom pilar.		
7).		- Perbaiki kembali hitungan bangunan		B ☑ C ☐ K ☐
		bangunan bawah		
		- perbaiki permodelan slab pile		
		- Lanjut hitungan.		
8).		- Perbaiki hitungan pada kehilangan		B ☑ C ☐ K ☐
		prategang dan kontrol fase		
		tegangan awal		
		- Lanjutkan pada fase konstruksi & service		
9).		- perbaiki kembali dan cek kembali		B ☑ C ☐ K ☐
		semua hitungan struktur utama		
		balok prategang.		

Ket. :
B = Lebih cepat dari jadwal
C = Sesuai dengan jadwal
K = Terlambat dari jadwal

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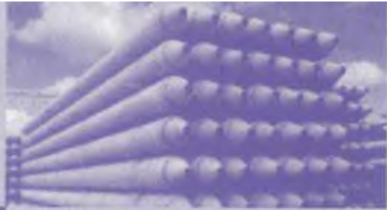
Dosen Pembimbing : Ir. Ibnu Pudji Rahardjo, MS / Ir. Chomaedhi, CES, GEO

No	Tanggal	Tugas / Materi yang dibahas	Tanda tangan	Keterangan
1).		- Cek gambar Layout Jembatan (Perbaiki)		
		- Lanjut hitungan pembebanan plat Lantai kendaraan.		B ☑ C ☐ K ☐
2).		- Cek kembali hitungan plat		
		- Cek gambar tulangan (Perbaiki)		
		- Buat Permodelan SAP2000 untuk Bangunan atas.		B ☑ C ☐ K ☐
3).		- Perbaiki pembebanan Bangunan atas		B ☑ C ☐ K ☐
		- Lanjut permodelan SAP2000 untuk Bangunan Bawah		
		- Perbaiki kombinasi pembebanan		
4).		- perbaiki permodelan SAP Bangunan Bawah		B ☑ C ☐ K ☐
		- Lanjut permodelan SAP pilar V		
		- perbaiki pembebanan gempa respon spektrum untuk tanah lunak.		B ☑ C ☐ K ☐
		- Lanjutkan		

Ket. :
B = Lebih cepat dari jadwal
C = Sesuai dengan jadwal
K = Terlambat dari jadwal

PC SPUN PILES



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Description

Type of piles	: Prestressed Concrete Spun Piles
System of Joints	: Welded at steel joint plate
Type of shoe	: Pencil (Standard)
	Mamira
Method of Driving	: Dynamic Pile Driving (Diesel or Hydraulic Hammer) Static Pile Driving (Hydraulic Static Pile Driver/Jacking Pile)

Design and Manufacturing References

Design	JIS A 5335 - 1987	Prestressed Spun Concrete Piles
	ACI 543R - 00	Design, Manufactured and Installation of Concrete Piles
	SNI 03-2847-2002	Indonesian Concrete Code
Manufacturing	JIS A 5335 - 1987	Prestressed Spun Concrete Piles
	WB-PRD-PS-16	Production Manufacturing Procedure

Specification of Material

Item	Reference	Description	Specification
Aggregate	ASTM C33 - 1999	Standard Specification for Concrete Aggregates	
Cement	SNI 15-2049 - 2004	Portland Cement	Standard product type I Special order : type II or V
Admixture	ASTM C494 - 1999	Standard Specification for Chemical Admixture for Concrete	Type F : High Range Water Reducing Admixture
Concrete	SNI 03-2834-1993 SNI 03-2493-1991	Concrete Mix Design Making and Curing Concrete Sample	Compressive strength : fc' 52Mpa (600 kg/cm² for cube sample)
PC Wire	JIS G 3536 - 1999	Uncoated Stress-Relieved Steel Wire and Strand for Prestressed Concrete	SWPD 1
PC Bar	JIS G 3137 - 1994	Small Size Deformed Steel Bars for Prestressed Concrete	SPBD 1275/1420
Spiral Wire	JIS G 3532 - 2000	Low Carbon Steel Wire	SWMP
Joint Plate	JIS G 3101 - 2004	Rolled Steel for General Structure	SS-400
Welding	ANSI / AWS D1.1 - 1990	Structural Welding Code-Steel	AWS A5.1/E6013 NIKKO STEEL RB 26 / RD 260, LION 26, or equivalent

BRIDGE CONCRETE PRODUCTS

Description

Type of girder	:	PC I Girder
		PC U Girder
		PC Voided Slab
Prestressing System	:	Post-tension, Pretension
Production System	:	Segmental, non segmental

WIKA BETON

Innovation and Trust

Design and Manufacturing Reference

SOIL CALCULATION BH1
Bearing Capacity - SPUN PILE Ø600 mm

Reference :

Kazuto Nakazawa - Suyono Sosrodarsono (Mekanika Teknik & Teknik Pondasi - 1990, judul asli : Soil Mechanics And Foundation Engineering)

♦ **Data Tiang Pancang**

Diameter of pile	Dp =	600	mm =	0.6 m
Thickness of pile wall	=	100	mm =	0.1 m
Perimeter of Pile	Up = π x D =	1.885	m	
Total area	A =1/4 x π x D^2 =	0.2827	m^2	
Concrete density	=	2500	kg/m^3	
Weight of pile	A x Density =	392.7	kg/m'	
Inertia Moment	(I) = 1/64π x (D^4- d^4) =	510509	cm^4	

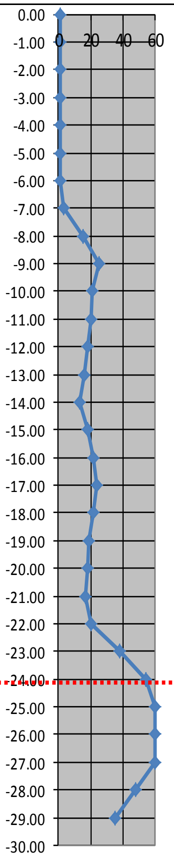
♦ **Axial Bearing Capacity of Pile**

a. Maximum Shear Force of Pile Wall (Rf) → **Rf = Up x S (fi x t)**

b. Bearing Capacity at the Point of Pile (Rt) → **Rt = qd x A**

♦ **Soil Data BH1**

Depth (m)	Kind of Soil	N-Value	N-Average	Grafik SPT	fi (t/m^2)	fi x thickness (t/m)	Σ(fi*t) (t/m)	P friction (Rf) (ton)	P bearing (Rt) (ton)	Pu total (Ra) (ton)	P ijin SF = 2 (ton)	P ijin SF = 3 (ton)
0.00	Clay	0	0		0	0	0	0	0	0	0	0
-1.00	Clay	1	1		1	1.00	1.00	1.88	3.86	5.75	2.87	1.92
-2.00	Clay	1	1		1	1.00	2.00	3.77	3.86	7.63	3.82	2.54
-3.00	Clay	1	1		1	1.00	3.00	5.65	3.86	9.52	4.76	3.17
-4.00	Clay	1	1		1	1.00	4.00	7.54	3.86	11.40	5.70	3.80
-5.00	Clay	1	1		1	1.00	5.00	9.42	3.86	13.29	6.64	4.43
-6.00	Clay	1	1		1	1.00	6.00	11.31	3.86	15.17	7.59	5.06
-7.00	Clay	1	1		1	1.00	7.00	13.19	3.86	17.06	8.53	5.69
-8.00	Clay	3	2		2	2.00	9.00	16.96	7.73	24.69	12.35	8.23
-9.00	Clay	15	9		9	9.00	18.00	33.93	34.78	68.71	34.35	22.90
-10.00	Clay	25	20		12	12.00	30.00	56.55	77.28	133.83	66.92	44.61
-11.00	Clay	21	23		12	12.00	42.00	79.17	88.88	168.04	84.02	56.01
-12.00	Clay	20	21		12	12.00	54.00	101.79	79.22	181.00	90.50	60.33
-13.00	Clay	18	19		12	12.00	66.00	124.41	73.42	197.83	98.91	65.94
-14.00	Clay	16	17		12	12.00	78.00	147.03	65.69	212.72	106.36	70.91
-15.00	Clay	13	15		12	12.00	90.00	169.65	56.03	225.68	112.84	75.23
-16.00	Clay	18	16		12	12.00	102.00	192.27	59.89	252.16	126.08	84.05
-17.00	Clay	22	20		12	12.00	114.00	214.88	77.28	292.17	146.08	97.39
-18.00	Clay	24	23		12	12.00	126.00	237.50	88.88	326.38	163.19	108.79
-19.00	Clay	22	23		12	12.00	138.00	260.12	88.88	349.00	174.50	116.33
-20.00	Clay	19	21		12	12.00	150.00	282.74	79.22	361.96	180.98	120.65
-21.00	Clay	18	19		12	12.00	162.00	305.36	71.49	376.85	188.42	125.62
-22.00	Clay	17	18		12	12.00	174.00	327.98	67.62	395.61	197.80	131.87
-23.00	Sand	20	19		12	12.00	186.00	350.60	71.49	422.09	211.04	140.70
-24.00	Sand	38	29		5.8	5.80	191.80	361.53	112.06	473.60	236.80	157.87
-25.00	Sand	54	46		9.2	9.20	201.00	378.88	177.75	556.63	278.31	185.54
-26.00	Sand	60	57		10	10.00	211.00	397.73	220.26	617.98	308.99	205.99
-27.00	Sand	60	60		10	10.00	221.00	416.58	231.85	648.42	324.21	216.14
-28.00	Sand	60	60		10	10.00	231.00	435.42	231.85	667.27	333.64	222.42
-29.00	Sand	48	54		10	10.00	241.00	454.27	208.66	662.94	331.47	220.98
-30.00	Sand	35	42		8.3	8.30	249.30	469.92	160.36	630.28	315.14	210.09



♦ **Horizontal Bearing Capacity of Pile Foundation**

a. Determinate

1 Piles that stick out of the soil base = 2.60 m

SOIL CALCULATION BH2
Bearing Capacity - SPUN PILE Ø600 mm

Reference :

Kazuto Nakazawa - Suyono Sosrodarsono (Mekanika Teknik & Teknik Pondasi - 1990, judul asli : Soil Mechanics And Foundation Engineering)

♦ **Data Tiang Pancang**

Diameter of pile	Dp =	600	mm =	0.6 m
Thickness of pile wall	=	100	mm =	0.1 m
Perimeter of Pile	$Up = \pi \times D$ =	1.885	m	
Total area	$A = 1/4 \times \pi \times D^2$ =	0.2827	m^2	
Concrete density	=	2500	kg/m^3	
Weight of pile	A x Density =	392.7	kg/m'	
Inertia Moment	(I) $= 1/64\pi \times (D^4 - d^4)$ =	510509	cm^4	

♦ **Axial Bearing Capacity of Pile**

a. Maximum Shear Force of Pile Wall (Rf) → **Rf = Up x S (fi x t)**

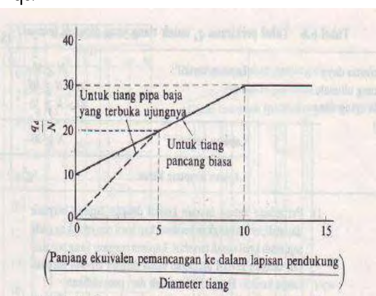
b. Bearing Capacity at the Point of Pile (Rt) → **Rt = qd x A**

l/D = 2.0

l = 1.2 m (Pile penetration length until the supported layer)

D = 0.60 m (Diameter at the point of pile)

qd/N = 14



Gbr. 6.7 **Diagram perhitungan dari intensitas daya dukung ultimate tanah pondasi pada ujung tiang.**

c. Ultimate Bearing Capacity (Ru) → **Ru = Rf + Rt**

d. Allowed Bearing Capacity (Ra) → **Ra = (Ru / SF) - Wp**

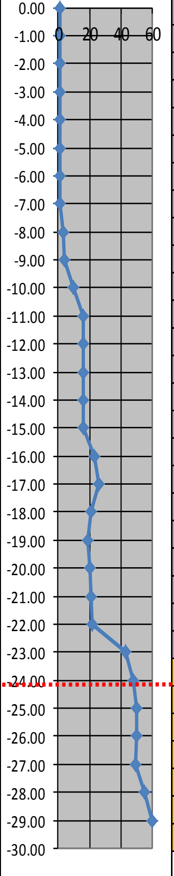
SF = 3

SF = 2

Wp = Weight of point

♦ **Soil Data BH1**

Depth (m)	Kind of Soil	N-Value	N-Average	Grafik SPT	fi (t/m²)	fi x thickness (t/m)	Σ(fi*t) (t/m)	P friction (Rf) (ton)	P bearing (Rt) (ton)	P total (Ra) (Ton)	P ijin SF = 2 (ton)	P ijn SF = 3 (ton)
0.00	Clay	0	0		0	0	0	0	0	0	0	0
-1.00	Clay	1	1		0.5	0.50	0.50	0.94	1.98	2.92	1.46	0.97
-2.00	Clay	1	1		1	1.00	1.50	2.83	3.96	6.79	3.39	2.26
-3.00	Clay	1	1		1	1.00	2.50	4.71	3.96	8.67	4.34	2.89
-4.00	Clay	1	1		1	1.00	3.50	6.60	3.96	10.56	5.28	3.52
-5.00	Clay	1	1		1	1.00	4.50	8.48	3.96	12.44	6.22	4.15
-6.00	Clay	1	1		1	1.00	5.50	10.37	3.96	14.33	7.16	4.78
-7.00	Clay	1	1		1	1.00	6.50	12.25	3.96	16.21	8.11	5.40
-8.00	Clay	1	1		1	1.00	7.50	14.14	3.96	18.10	9.05	6.03
-9.00	Clay	3	2		2	2.00	9.50	17.91	7.92	25.82	12.91	8.61
-10.00	Clay	4	4		3.5	3.50	13.00	24.50	13.85	38.36	19.18	12.79
-11.00	Clay	10	7		7	7.00	20.00	37.70	27.71	65.41	32.70	21.80
-12.00	Clay	16	13		12	12.00	32.00	60.32	51.46	111.78	55.89	37.26
-13.00	Clay	16	16		12	12.00	44.00	82.94	63.33	146.27	73.14	48.76
-14.00	Clay	16	16		12	12.00	56.00	105.56	63.33	168.89	84.45	56.30
-15.00	Clay	16	16		12	12.00	68.00	128.18	63.33	191.51	95.76	63.84
-16.00	Clay	16	16		12	12.00	80.00	150.80	63.33	214.13	107.07	71.38
-17.00	Clay	23	20		12	12.00	92.00	173.42	77.19	250.60	125.30	83.53
-18.00	Clay	26	25		12	12.00	104.00	196.04	96.98	293.02	146.51	97.67
-19.00	Clay	21	24		12	12.00	116.00	218.65	93.02	311.68	155.84	103.89
-20.00	Clay	19	20		12	12.00	128.00	241.27	79.17	320.44	160.22	106.81
-21.00	Clay	20	20		12	12.00	140.00	263.89	77.19	341.08	170.54	113.69
-22.00	Clay	21	21		12	12.00	152.00	286.51	81.15	367.66	183.83	122.55
-23.00	Sand	22	22		12	12.00	164.00	309.13	85.11	394.24	197.12	131.41
-24.00	Sand	43	33		6.5	6.50	170.50	321.38	128.65	450.03	225.02	150.01
-25.00	Sand	48	46		9.1	9.10	179.60	338.54	180.11	518.65	259.32	172.88
-26.00	Sand	50	49		9.8	9.80	189.40	357.01	193.96	550.97	275.49	183.66
-27.00	Sand	50	50		10	10.00	199.40	375.86	197.92	573.78	286.89	191.26
-28.00	Sand	49	50		9.9	9.90	209.30	394.52	195.94	590.46	295.23	196.82
-29.00	Sand	55	52		10	10.00	219.30	413.37	205.84	619.21	309.60	206.40
-30.00	Sand	60	58		10	10.00	229.30	432.22	227.61	659.83	329.91	219.94



♦ **Horizontal Bearing Capacity of Pile Foundation**

a. Determinate

1	Piles that stick out of the soil base	=	0.00 m
2	N-SPT -2.00 under soil base, take the the average of N-SPT	=	1.00
3	Diameter of Pile, calculated	=	60 cm
4	Quality of Concrete, fy	=	49.8 Mpa
5	Elasticity Modulus of Concrete (E)	=	119948.04 kg/cm2
6	Inertia Moment of Pile (I) = $\pi/64\ D^4 - d^4$	=	510509 cm^4

b. Reaction Coefficient of Soil Base(k)

$k = 0.2 \times Eo \times D^{-0.75} \times y^{-0.5}$

c. Elasticity Modulus of Soil

Eo = 28 x N = 28

N = 1.00

d. Pile deformation at the end of Pile Cap (y)

y = 1 cm (Allowed Horizontal Deformation)

k = 0.25976138 kg/cm3

$b = (kD/(4EI))^{0.25}$ = 0.0028 cm^{-1}

e. Virtual Fixity Point (lm)

Lm = 1/b = 354.1 cm **= 3.54065 m**

f. Horizontal Bearing Capacity of Stand Pile (Ha), for the Frictional as "y"

Ha = (k.D)/b*y = 5.518 Ton/tiang

SF = 3

So, Allowed horizontal force of pile (Ha) = 1.84 Ton/pile

SF = 2

So, Allowed horizontal force of pile (Ha) = 2.76 Ton/pile

g. Bearing Capacity of Bending Moment at the Top of Pile (Ma)

Mc = **29 ton**

Ma = (1+bh/2b)*ha **= 1.2528 Ton-m/pile**

= OK Ma < Mcrack

♦ **Withdraw capacity of Pile(RC)**

Rf = Up x Σ (fi x t) = 338.54 Ton

Σ (li x fi) = 179.60 t/m

Up = 1.884955592 m (Perimeter of Pile)

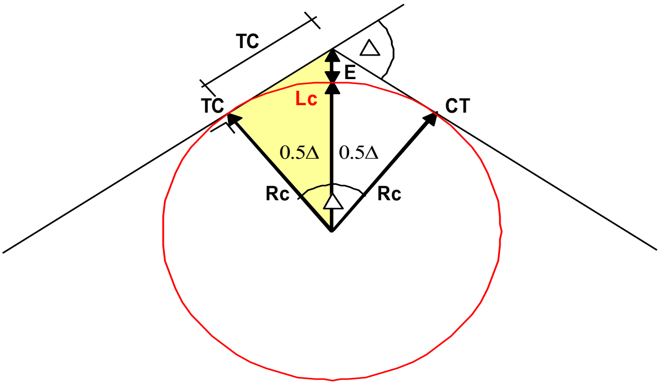
SF = 6 (Bridge Standard at Japan)

Wp = 9.817 Ton/pile (Weigth of Pile Point)

RC = Rf/SF+Wp = 67 Ton/pile

So, withdraw capacity of Pile (RC) = 67 Ton/pile

PERHITUNGAN LENGKUNG FULL CIRCLE



Vr =	40 KM/h	Rmin =	$\frac{V^2}{127 \times (e+f)}$
e maks =	0.1		
Δ =	75.17		47.3625 m
f =	0.166		

R = 135

$$Tc = Rc \times \tan \tfrac{1}{2}\Delta$$ = ***103.9 m***

$$Ec = Tc \times \tan \tfrac{1}{4}\Delta$$ = ***35.4 m***

$$Lc = 0.01745 \times \Delta \times Rc$$ = ***177.1 m***

$$Ec = \frac{Rc\left(1-\cos \tfrac{1}{2}\Delta\right)}{\cos \tfrac{1}{2}\Delta}$$ = ***35.4 m***

Dimana : T = waktu tempuh pada lengkung peralihan
ditetapkan 3 detik
e = Superelevasi
C = Perubahan percepatan (1-3m/det^3)
R= jari-jari busur lingkaran
Vr = Kecepatan rencana
em = seperelevasi maks (AASHTO 10%)
re = tingkat pencapaian perubahan kemiringan melintang jalan
Vr $\leq$ 70 km/jam , re = 0.035 m/m/det
Vr $\geq$ 80 km/jam , re = 0.025 m/m/det

panjang lengkung total = 177.1 m

SPUN PILE								
Type	=	**C**		P all	=	2295	KN	
Diameter	=	600	mm	M.Crack	=	290	KN.m	
Tebal	=	100	mm	Pu Bahan	=	4580	KN	
Luas (A)	=	86350	mm2					
I (inersia)	=	28260000	mm^4	$P_{ijin\ tanah}$	=	1330	KN	(Beban Tetap)
				$P_{ijin\ tanah}$	=	1995	KN	(Beban Sementara)

TABLE: Element Forces - Frames (SPUNPILE 60 CM Kombinasi Layan)

Frame	Station	Output Case	CaseType	Step Type	P	V2	V3	T	M2	M3	Momen Resultant	Strength Ratio	Kontrol Bahan	Kontrol Tanah	Frame Elem	Elem Station
Text	m	Text	Text	Text	KN	KN	KN	KN-m	KN-m	KN-m					Text	m
19	0	COMB1	Combination		-541.711	-2.916	29.634	0.738	76.076	-7.534	76.4478	0.4997	OK	OK	19-1	0
19	4.52769	COMB1	Combination		-559.041	-0.990	29.634	0.738	-58.100	1.308	58.1145	0.4440	OK	OK	19-1	4.52769
20	**0**	**COMB1**	**Combination**		**-170.175**	**-30.280**	**-0.560**	**0.639**	**-2.783**	**-76.685**	76.7356	0.3388	OK	OK	**20-1**	**0**
20	4.56088	COMB1	Combination		-187.611	-28.162	-0.560	0.639	-0.227	56.587	56.5879	0.2769	OK	OK	20-1	4.56088
21	0	COMB1	Combination		-820.746	27.860	4.660	0.455	13.256	72.313	73.5183	0.6111	OK	OK	21-1	0
21	4.56088	COMB1	Combination		-838.182	29.978	4.660	0.455	-7.998	-59.584	60.1186	0.5725	OK	OK	21-1	4.56088
22	0	COMB1	Combination		-681.490	1.516	-29.376	0.661	-75.719	4.569	75.8569	0.5585	OK	OK	22-1	0
22	4.5	COMB1	Combination		-698.819	1.516	-29.376	0.661	56.474	-2.255	56.5189	0.4994	OK	OK	22-1	4.5
23	0	COMB1	Combination		-238.947	-28.892	0.027	1.669	-0.955	-73.651	73.6568	0.3581	OK	OK	23-1	0
23	4.56088	COMB1	Combination		-256.383	-26.774	0.027	1.669	-1.078	53.293	53.3036	0.2955	OK	OK	23-1	4.56088
24	0	COMB1	Combination		-948.296	26.290	3.328	1.180	9.111	68.329	68.9335	0.6509	OK	OK	24-1	0
24	4.56088	COMB1	Combination		-965.733	28.408	3.328	1.180	-6.067	-56.407	56.7324	0.6164	OK	OK	24-1	4.56088
25	0	COMB1	Combination		-722.042	1.191	-27.755	0.735	-71.922	3.548	72.0095	0.5629	OK	OK	25-1	0
25	4.5	COMB1	Combination		-739.372	1.191	-27.755	0.735	52.976	-1.811	53.0065	0.5049	OK	OK	25-1	4.5
26	0	COMB1	Combination		-282.910	-27.307	0.467	1.533	0.408	-69.948	69.9496	0.3645	OK	OK	26-1	0
26	4.56088	COMB1	Combination		-300.346	-25.188	0.467	1.533	-1.724	49.763	49.7932	0.3026	OK	OK	26-1	4.56088
27	0	COMB1	Combination		-1001.755	24.819	2.175	1.378	5.527	64.832	65.0666	0.6609	OK	OK	27-1	0
27	**4.56088**	**COMB1**	**Combination**		**-1019.192**	**26.937**	**2.175**	**1.378**	**-4.392**	**-53.194**	53.3745	0.6281	OK	OK	**27-1**	**4.56088**
28	0	COMB1	Combination		-731.118	0.106	-25.419	1.759	-65.953	0.238	65.9532	0.5460	OK	OK	28-1	0
28	4.5	COMB1	Combination		-748.448	0.106	-25.419	1.759	48.433	-0.239	48.4335	0.4931	OK	OK	28-1	4.5
29	0	COMB1	Combination		-316.409	-25.359	0.351	0.835	0.041	-65.123	65.1229	0.3624	OK	OK	29-1	0
29	4.56088	COMB1	Combination		-333.845	-23.241	0.351	0.835	-1.560	45.705	45.7312	0.3032	OK	OK	29-1	4.56088
30	0	COMB1	Combination		-998.538	22.834	0.708	0.811	0.963	59.847	59.8545	0.6415	OK	OK	30-1	0
30	4.56088	COMB1	Combination		-1015.974	24.952	0.708	0.811	-2.265	-49.124	49.1766	0.6123	OK	OK	30-1	4.56088
31	0	COMB1	Combination		-753.684	-0.266	-23.069	0.645	-59.958	-0.903	59.9652	0.5352	OK	OK	31-1	0
31	4.5	COMB1	Combination		-771.014	-0.266	-23.069	0.645	43.851	0.293	43.8520	0.4872	OK	OK	31-1	4.5
35	0	COMB1	Combination		-347.959	-22.890	0.593	1.628	0.798	-58.680	58.6850	0.3540	OK	OK	35-1	0
35	4.56088	COMB1	Combination		-365.395	-20.772	0.593	1.628	-1.906	40.887	40.9316	0.3004	OK	OK	35-1	4.56088
36	0	COMB1	Combination		-954.651	19.998	-0.046	1.719	-1.366	52.298	52.3160	0.5964	OK	OK	36-1	0
36	4.56088	COMB1	Combination		-972.087	22.116	-0.046	1.719	-1.157	-43.742	43.7572	0.5745	OK	OK	36-1	4.56088

37	0	COMB1	Combination		-690.864	-0.471	-19.304	0.613	-49.565	-1.532	49.5883	0.4720	OK	OK	37-1	0
37	4.5	COMB1	Combination		-708.194	-0.471	-19.304	0.613	37.305	0.588	37.3096	0.4372	OK	OK	37-1	4.5
38	0	COMB1	Combination		-383.713	-20.201	0.524	1.686	0.600	-51.524	51.5274	0.3449	OK	OK	38-1	0
38	4.56088	COMB1	Combination		-401.149	-18.083	0.524	1.686	-1.791	35.781	35.8255	0.2983	OK	OK	38-1	4.56088
39	0	COMB1	Combination		-851.715	17.402	-0.538	1.840	-2.879	45.557	45.6478	0.5285	OK	OK	39-1	0
39	4.56088	COMB1	Combination		-869.151	19.520	-0.538	1.840	-0.425	-38.640	38.6421	0.5120	OK	OK	39-1	4.56088
40	0	COMB1	Combination		-679.730	-0.366	-16.353	1.531	-41.646	-1.212	41.6637	0.4398	OK	OK	40-1	0
40	4.5	COMB1	Combination		-697.060	-0.366	-16.353	1.531	31.942	0.436	31.9451	0.4139	OK	OK	40-1	4.5
41	0	COMB1	Combination		-419.009	-17.638	0.541	0.818	0.665	-44.734	44.7388	0.3368	OK	OK	41-1	0
41	4.56088	COMB1	Combination		-436.445	-15.520	0.541	0.818	-1.802	30.880	30.9324	0.2968	OK	OK	41-1	4.56088
42	0	COMB1	Combination		-773.197	14.586	0.066	0.879	-0.990	38.065	38.0778	0.4682	OK	OK	42-1	0
42	4.56088	COMB1	Combination		-790.633	16.704	0.066	0.879	-1.290	-33.291	33.3162	0.4594	OK	OK	42-1	4.56088
43	0	COMB1	Combination		-672.415	-0.380	-14.010	0.827	-35.575	-1.256	35.5972	0.4157	OK	OK	43-1	0
43	4.5	COMB1	Combination		-689.745	-0.380	-14.010	0.827	27.471	0.452	27.4745	0.3953	OK	OK	43-1	4.5
44	0	COMB1	Combination		-439.257	-15.378	1.017	1.456	2.156	-38.842	38.9015	0.3255	OK	OK	44-1	0
44	4.56088	COMB1	Combination		-456.693	-13.260	1.017	1.456	-2.483	26.466	26.5817	0.2907	OK	OK	44-1	4.56088
45	0	COMB1	Combination		-728.595	12.286	0.731	1.501	1.084	32.091	32.1089	0.4282	OK	OK	45-1	0
45	4.56088	COMB1	Combination		-746.031	14.404	0.731	1.501	-2.249	-28.774	28.8614	0.4246	OK	OK	45-1	4.56088
46	0	COMB1	Combination		-651.335	-0.133	-11.642	1.953	-29.709	0.672	29.7162	0.3863	OK	OK	46-1	0
46	4.52769	COMB1	Combination		-668.665	1.793	-11.642	1.953	23.004	-3.087	23.2103	0.3714	OK	OK	46-1	4.52769
47	0	COMB1	Combination		-442.403	-13.399	1.161	0.776	2.605	-33.791	33.8911	0.3096	OK	OK	47-1	0
47	2.28044	COMB1	Combination		-451.121	-12.340	1.161	0.776	-0.041	-4.442	4.4422	0.2119	OK	OK	47-1	2.28044
47	4.56088	COMB1	Combination		-459.839	-11.281	1.161	0.776	-2.688	22.492	22.6517	0.2785	OK	OK	47-1	4.56088
48	0	COMB1	Combination		-705.165	10.604	1.047	0.775	2.070	27.998	28.0746	0.4041	OK	OK	48-1	0
48	2.28044	COMB1	Combination		-713.883	11.663	1.047	0.775	-0.319	2.608	2.6273	0.3201	OK	OK	48-1	2.28044
48	4.56088	COMB1	Combination		-722.601	12.722	1.047	0.775	-2.708	-25.198	25.3425	0.4022	OK	OK	48-1	4.56088
19	0	COMB2	Combination	Max	-160.571	50.010	39.694	1.218	98.030	112.512	149.2269	0.5845	OK	OK	19-1	0
19	2.26385	COMB2	Combination	Max	-169.236	50.973	39.694	1.218	8.168	-1.248	8.2626	0.1022	OK	OK	19-1	2.26385
19	4.52769	COMB2	Combination	Max	-177.901	51.935	39.694	1.218	-13.508	119.402	120.1640	0.4919	OK	OK	19-1	4.52769
19	0	COMB2	Combination	Min	-813.222	-54.739	8.864	-0.005	26.627	-124.079	126.9037	0.7919	OK	OK	19-1	0
19	2.26385	COMB2	Combination	Min	-821.887	-53.776	8.864	-0.005	6.559	-1.793	6.7998	0.3816	OK	OK	19-1	2.26385
19	4.52769	COMB2	Combination	Min	-830.552	-52.813	8.864	-0.005	-81.695	-118.277	143.7479	0.8576	OK	OK	19-1	4.52769
20	**0**	**COMB2**	**Combination**	**Max**	**-127.137**	**-9.789**	**51.977**	**1.344**	**117.079**	**-27.475**	120.2593	0.4701	OK	OK	**20-1**	**0**
20	2.28044	COMB2	Combination	Max	-135.855	-8.729	51.977	1.344	-0.723	-6.345	6.3856	0.0812	OK	OK	20-1	2.28044
20	4.56088	COMB2	Combination	Max	-144.573	-7.670	51.977	1.344	119.211	79.779	143.4431	0.5576	OK	OK	20-1	4.56088
20	0	COMB2	Combination	Min	-234.521	-40.100	-52.644	-0.267	-120.894	-98.283	155.8043	0.6394	OK	OK	20-1	0
20	2.28044	COMB2	Combination	Min	-243.239	-39.041	-52.644	-0.267	-1.572	-8.061	8.2123	0.1343	OK	OK	20-1	2.28044
20	4.56088	COMB2	Combination	Min	-251.957	-37.982	-52.644	-0.267	-119.984	12.338	120.6169	0.5257	OK	OK	20-1	4.56088
21	0	COMB2	Combination	Max	-654.911	37.627	55.735	1.373	128.838	93.936	159.4465	0.8352	OK	OK	21-1	0
21	2.28044	COMB2	Combination	Max	-663.629	38.686	55.735	1.373	2.517	7.065	7.4998	0.3150	OK	OK	21-1	2.28044
21	4.56088	COMB2	Combination	Max	-672.347	39.745	55.735	1.373	112.664	-15.730	113.7570	0.6852	OK	OK	21-1	4.56088
21	0	COMB2	Combination	Min	-772.626	7.752	-48.353	-0.665	-107.867	24.452	110.6038	0.7180	OK	OK	21-1	0
21	2.28044	COMB2	Combination	Min	-781.344	8.811	-48.353	-0.665	1.619	5.423	5.6596	0.3600	OK	OK	21-1	2.28044
21	4.56088	COMB2	Combination	Min	-790.062	9.870	-48.353	-0.665	-125.364	-82.512	150.0808	0.8618	OK	OK	21-1	4.56088
22	0	COMB2	Combination	Max	-597.485	54.764	-9.036	1.289	-27.474	123.823	126.8340	0.6977	OK	OK	22-1	0
22	2.25	COMB2	Combination	Max	-606.150	54.764	-9.036	1.289	-7.143	1.002	7.2131	0.2890	OK	OK	22-1	2.25
22	4.5	COMB2	Combination	Max	-614.815	54.764	-9.036	1.289	79.352	119.549	143.4869	0.7627	OK	OK	22-1	4.5
22	0	COMB2	Combination	Min	-598.870	-52.688	-39.099	-0.213	-96.596	-117.546	152.1441	0.7856	OK	OK	22-1	0
22	2.25	COMB2	Combination	Min	-607.535	-52.688	-39.099	-0.213	-8.623	0.602	8.6438	0.2945	OK	OK	22-1	2.25
22	4.5	COMB2	Combination	Min	-616.199	-52.688	-39.099	-0.213	13.186	-122.617	123.3243	0.6938	OK	OK	22-1	4.5

23	0	COMB2	Combination	Max	-182.946	-9.300	52.568	2.397	118.909	-26.538	121.8346	0.4998	OK	OK	23-1	0
23	2.28044	COMB2	Combination	Max	-191.664	-8.241	52.568	2.397	-0.345	-6.531	6.5402	0.1061	OK	OK	23-1	2.28044
23	4.56088	COMB2	Combination	Max	-200.382	-7.182	52.568	2.397	118.552	75.738	140.6800	0.5724	OK	OK	23-1	4.56088
23	0	COMB2	Combination	Min	-281.048	-38.348	-52.184	0.267	-119.451	-94.334	152.2087	0.6473	OK	OK	23-1	0
23	2.28044	COMB2	Combination	Min	-289.766	-37.289	-52.184	0.267	-1.074	-8.097	8.1679	0.1544	OK	OK	23-1	2.28044
23	4.56088	COMB2	Combination	Min	-298.484	-36.230	-52.184	0.267	-120.849	11.047	121.3529	0.5485	OK	OK	23-1	4.56088
24	0	COMB2	Combination	Max	-762.004	35.828	54.667	2.305	125.506	89.526	154.1647	0.8636	OK	OK	24-1	0
24	2.28044	COMB2	Combination	Max	-770.722	36.887	54.667	2.305	1.513	6.662	6.8313	0.3594	OK	OK	24-1	2.28044
24	4.56088	COMB2	Combination	Max	-779.440	37.946	54.667	2.305	114.410	-14.258	115.2954	0.7372	OK	OK	24-1	4.56088
24	0	COMB2	Combination	Min	-864.191	6.946	-49.552	-0.291	-111.592	22.250	113.7883	0.7689	OK	OK	24-1	0
24	2.28044	COMB2	Combination	Min	-872.909	8.005	-49.552	-0.291	0.737	5.156	5.2087	0.3983	OK	OK	24-1	2.28044
24	4.56088	COMB2	Combination	Min	-881.627	9.064	-49.552	-0.291	-123.825	-78.713	146.7256	0.8901	OK	OK	24-1	4.56088
25	0	COMB2	Combination	Max	-620.186	54.522	-8.294	1.335	-25.712	123.039	125.6971	0.7037	OK	OK	25-1	0
25	2.25	COMB2	Combination	Max	-628.851	54.522	-8.294	1.335	-7.050	0.726	7.0877	0.2984	OK	OK	25-1	2.25
25	4.5	COMB2	Combination	Max	-637.516	54.522	-8.294	1.335	75.195	120.032	141.6407	0.7662	OK	OK	25-1	4.5
25	0	COMB2	Combination	Min	-621.213	-53.025	-37.185	-0.121	-92.139	-118.581	150.1697	0.7885	OK	OK	25-1	0
25	2.25	COMB2	Combination	Min	-629.878	-53.025	-37.185	-0.121	-8.472	0.364	8.4797	0.3037	OK	OK	25-1	2.25
25	4.5	COMB2	Combination	Min	-638.543	-53.025	-37.185	-0.121	11.611	-122.310	122.8598	0.7019	OK	OK	25-1	4.5
26	0	COMB2	Combination	Max	-211.971	-8.582	53.004	2.321	120.251	-24.860	122.7935	0.5158	OK	OK	26-1	0
26	2.28044	COMB2	Combination	Max	-220.689	-7.523	53.004	2.321	-0.055	-6.495	6.4953	0.1186	OK	OK	26-1	2.28044
26	4.56088	COMB2	Combination	Max	-229.407	-6.464	53.004	2.321	118.060	71.561	138.0550	0.5760	OK	OK	26-1	4.56088
26	0	COMB2	Combination	Min	-307.538	-36.453	-51.842	0.116	-118.384	-89.868	148.6307	0.6465	OK	OK	26-1	0
26	2.28044	COMB2	Combination	Min	-316.257	-35.394	-51.842	0.116	-0.729	-7.947	7.9800	0.1653	OK	OK	26-1	2.28044
26	4.56088	COMB2	Combination	Min	-324.975	-34.335	-51.842	0.116	-121.494	9.452	121.8610	0.5618	OK	OK	26-1	4.56088
27	0	COMB2	Combination	Max	-800.867	34.112	53.738	2.510	122.610	85.525	149.4913	0.8644	OK	OK	27-1	0
27	2.28044	COMB2	Combination	Max	-809.585	35.171	53.738	2.510	0.680	6.530	6.5650	0.3754	OK	OK	27-1	2.28044
27	4.56088	COMB2	Combination	Max	-818.303	36.230	53.738	2.510	115.898	-12.810	116.6039	0.7586	OK	OK	27-1	4.56088
27	0	COMB2	Combination	Min	-896.497	6.268	-50.571	-0.196	-114.753	20.606	116.5879	0.7927	OK	OK	27-1	0
27	2.28044	COMB2	Combination	Min	-905.215	7.327	-50.571	-0.196	-0.045	5.103	5.1027	0.4120	OK	OK	27-1	2.28044
27	4.56088	COMB2	Combination	Min	-913.933	8.386	-50.571	-0.196	-122.486	-74.886	143.5641	0.8933	OK	OK	27-1	4.56088
28	0	COMB2	Combination	Max	-617.863	53.692	-6.924	2.166	-22.058	120.512	122.5142	0.6917	OK	OK	28-1	0
28	2.25	COMB2	Combination	Max	-626.528	53.692	-6.924	2.166	-6.480	0.032	6.4796	0.2953	OK	OK	28-1	2.25
28	4.5	COMB2	Combination	Max	-635.193	53.692	-6.924	2.166	70.270	121.256	140.1463	0.7600	OK	OK	28-1	4.5
28	0	COMB2	Combination	Min	-620.977	-53.878	-34.732	0.706	-86.023	-121.193	148.6191	0.7831	OK	OK	28-1	0
28	2.25	COMB2	Combination	Min	-629.641	-53.878	-34.732	0.706	-7.877	-0.295	7.8823	0.3015	OK	OK	28-1	2.25
28	4.5	COMB2	Combination	Min	-638.306	-53.878	-34.732	0.706	9.099	-121.102	121.4433	0.6969	OK	OK	28-1	4.5
29	0	COMB2	Combination	Max	-232.937	-7.514	52.993	1.361	120.212	-22.113	122.2292	0.5230	OK	OK	29-1	0
29	2.28044	COMB2	Combination	Max	-241.655	-6.455	52.993	1.361	-0.240	-6.185	6.1895	0.1266	OK	OK	29-1	2.28044
29	4.56088	COMB2	Combination	Max	-250.373	-5.396	52.993	1.361	118.424	67.073	136.0992	0.5784	OK	OK	29-1	4.56088
29	0	COMB2	Combination	Min	-325.618	-34.334	-52.090	0.015	-119.152	-84.690	146.1834	0.6460	OK	OK	29-1	0
29	2.28044	COMB2	Combination	Min	-334.336	-33.275	-52.090	0.015	-0.760	-7.602	7.6400	0.1720	OK	OK	29-1	2.28044
29	4.56088	COMB2	Combination	Min	-343.054	-32.216	-52.090	0.015	-121.485	7.326	121.7056	0.5692	OK	OK	29-1	4.56088
30	0	COMB2	Combination	Max	-793.115	31.961	52.698	1.493	119.367	80.243	143.8309	0.8416	OK	OK	30-1	0
30	2.28044	COMB2	Combination	Max	-801.833	33.021	52.698	1.493	-0.371	6.155	6.1665	0.3706	OK	OK	30-1	2.28044
30	4.56088	COMB2	Combination	Max	-810.551	34.080	52.698	1.493	117.770	-10.644	118.2503	0.7609	OK	OK	30-1	4.56088
30	0	COMB2	Combination	Min	-883.373	5.167	-51.861	-0.158	-118.760	17.755	120.0799	0.7990	OK	OK	30-1	0
30	2.28044	COMB2	Combination	Min	-892.091	6.227	-51.861	-0.158	-0.932	4.757	4.8473	0.4054	OK	OK	30-1	2.28044
30	4.56088	COMB2	Combination	Min	-900.809	7.286	-51.861	-0.158	-120.984	-70.360	139.9561	0.8751	OK	OK	30-1	4.56088
31	0	COMB2	Combination	Max	-629.297	53.347	-5.455	1.266	-18.174	119.448	120.8230	0.6908	OK	OK	31-1	0
31	2.25	COMB2	Combination	Max	-637.962	53.347	-5.455	1.266	-5.901	-0.015	5.9010	0.2983	OK	OK	31-1	2.25

31	4.5	COMB2	Combination	Max	-646.626	53.347	-5.455	1.266	65.501	121.329	137.8802	0.7572	OK	OK	31-1	4.5
31	0	COMB2	Combination	Min	-634.257	-53.931	-32.357	-0.203	-80.105	-121.359	145.4130	0.7778	OK	OK	31-1	0
31	2.25	COMB2	Combination	Min	-642.922	-53.931	-32.357	-0.203	-7.302	-0.582	7.3253	0.3054	OK	OK	31-1	2.25
31	4.5	COMB2	Combination	Min	-651.587	-53.931	-32.357	-0.203	6.372	-120.612	120.7799	0.7004	OK	OK	31-1	4.5
35	0	COMB2	Combination	Max	-255.614	-5.929	52.916	2.789	119.982	-17.822	121.2981	0.5296	OK	OK	35-1	0
35	2.28044	COMB2	Combination	Max	-264.332	-4.870	52.916	2.789	-0.009	-5.506	5.5063	0.1342	OK	OK	35-1	2.28044
35	4.56088	COMB2	Combination	Max	-273.050	-3.811	52.916	2.789	118.024	62.131	133.3788	0.5789	OK	OK	35-1	4.56088
35	0	COMB2	Combination	Min	-344.688	-31.870	-51.812	-0.157	-118.284	-78.393	141.9034	0.6395	OK	OK	35-1	0
35	2.28044	COMB2	Combination	Min	-353.406	-30.811	-51.812	-0.157	-0.811	-6.926	6.9737	0.1780	OK	OK	35-1	2.28044
35	4.56088	COMB2	Combination	Min	-362.124	-29.752	-51.812	-0.157	-121.361	4.389	121.4404	0.5765	OK	OK	35-1	4.56088
36	0	COMB2	Combination	Max	-753.054	29.214	51.994	3.128	117.190	73.113	138.1267	0.8044	OK	OK	36-1	0
36	2.28044	COMB2	Combination	Max	-761.772	30.273	51.994	3.128	-0.654	5.291	5.3311	0.3503	OK	OK	36-1	2.28044
36	4.56088	COMB2	Combination	Max	-770.490	31.332	51.994	3.128	118.275	-7.226	118.4955	0.7443	OK	OK	36-1	4.56088
36	0	COMB2	Combination	Min	-841.855	3.280	-52.205	-0.294	-119.824	12.562	120.4811	0.7823	OK	OK	36-1	0
36	2.28044	COMB2	Combination	Min	-850.573	4.339	-52.205	-0.294	-1.501	3.871	4.1516	0.3849	OK	OK	36-1	2.28044
36	4.56088	COMB2	Combination	Min	-859.291	5.398	-52.205	-0.294	-119.950	-64.957	136.4091	0.8448	OK	OK	36-1	4.56088
37	0	COMB2	Combination	Max	-578.749	53.483	-2.513	1.255	-9.941	119.873	120.2848	0.6670	OK	OK	37-1	0
37	2.25	COMB2	Combination	Max	-587.414	53.483	-2.513	1.255	-4.286	-0.222	4.2922	0.2708	OK	OK	37-1	2.25
37	4.5	COMB2	Combination	Max	-596.079	53.483	-2.513	1.255	59.783	121.658	135.5529	0.7272	OK	OK	37-1	4.5
37	0	COMB2	Combination	Min	-583.303	-54.169	-29.132	-0.246	-71.310	-122.103	141.4005	0.7418	OK	OK	37-1	0
37	2.25	COMB2	Combination	Min	-591.968	-54.169	-29.132	-0.246	-5.763	-0.464	5.7821	0.2779	OK	OK	37-1	2.25
37	4.5	COMB2	Combination	Min	-600.633	-54.169	-29.132	-0.246	1.367	-120.801	120.8090	0.6783	OK	OK	37-1	4.5
38	0	COMB2	Combination	Max	-289.096	-3.890	52.891	2.560	119.926	-12.329	120.5580	0.5417	OK	OK	38-1	0
38	2.28044	COMB2	Combination	Max	-297.814	-2.831	52.891	2.560	-0.219	-4.664	4.6688	0.1459	OK	OK	38-1	2.28044
38	4.56088	COMB2	Combination	Max	-306.532	-1.772	52.891	2.560	118.466	57.590	131.7222	0.5878	OK	OK	38-1	4.56088
38	0	COMB2	Combination	Min	-369.821	-29.517	-52.109	0.204	-119.200	-72.202	139.3618	0.6417	OK	OK	38-1	0
38	2.28044	COMB2	Combination	Min	-378.539	-28.458	-52.109	0.204	-0.837	-6.100	6.1566	0.1862	OK	OK	38-1	2.28044
38	4.56088	COMB2	Combination	Min	-387.257	-27.399	-52.109	0.204	-121.304	0.583	121.3049	0.5870	OK	OK	38-1	4.56088
39	0	COMB2	Combination	Max	-671.674	26.934	51.835	2.890	116.712	67.259	134.7047	0.7572	OK	OK	39-1	0
39	2.28044	COMB2	Combination	Max	-680.392	27.993	51.835	2.890	-0.987	4.629	4.7333	0.3128	OK	OK	39-1	2.28044
39	4.56088	COMB2	Combination	Max	-689.110	29.052	51.835	2.890	118.921	-3.399	118.9700	0.7105	OK	OK	39-1	4.56088
39	0	COMB2	Combination	Min	-754.585	1.298	-52.646	0.107	-121.192	7.349	121.4143	0.7475	OK	OK	39-1	0
39	2.28044	COMB2	Combination	Min	-763.303	2.357	-52.646	0.107	-1.643	3.182	3.5813	0.3449	OK	OK	39-1	2.28044
39	4.56088	COMB2	Combination	Min	-772.021	3.416	-52.646	0.107	-119.702	-60.416	134.0848	0.7988	OK	OK	39-1	4.56088
40	0	COMB2	Combination	Max	-575.969	53.687	-0.139	1.996	-3.525	120.503	120.5543	0.6667	OK	OK	40-1	0
40	2.25	COMB2	Combination	Max	-584.633	53.687	-0.139	1.996	-3.213	-0.098	3.2144	0.2658	OK	OK	40-1	2.25
40	4.5	COMB2	Combination	Max	-593.298	53.687	-0.139	1.996	55.270	121.397	133.3863	0.7185	OK	OK	40-1	4.5
40	0	COMB2	Combination	Min	-577.032	-53.998	-26.672	0.507	-64.755	-121.594	137.7612	0.7265	OK	OK	40-1	0
40	2.25	COMB2	Combination	Min	-585.697	-53.998	-26.672	0.507	-4.743	-0.293	4.7518	0.2716	OK	OK	40-1	2.25
40	4.5	COMB2	Combination	Min	-594.362	-53.998	-26.672	0.507	-2.902	-121.087	121.1221	0.6766	OK	OK	40-1	4.5
41	0	COMB2	Combination	Max	-324.641	-1.823	52.886	1.467	119.932	-6.816	120.1255	0.5557	OK	OK	41-1	0
41	2.28044	COMB2	Combination	Max	-333.359	-0.764	52.886	1.467	-0.342	-3.865	3.8796	0.1586	OK	OK	41-1	2.28044
41	4.56088	COMB2	Combination	Max	-342.077	0.295	52.886	1.467	118.675	53.465	130.1623	0.5979	OK	OK	41-1	4.56088
41	0	COMB2	Combination	Min	-400.552	-27.387	-52.248	-0.099	-119.622	-66.613	136.9184	0.6467	OK	OK	41-1	0
41	2.28044	COMB2	Combination	Min	-409.270	-26.328	-52.248	-0.099	-0.804	-5.367	5.4271	0.1970	OK	OK	41-1	2.28044
41	4.56088	COMB2	Combination	Min	-417.988	-25.269	-52.248	-0.099	-121.277	-3.330	121.3222	0.6005	OK	OK	41-1	4.56088
42	0	COMB2	Combination	Max	-615.521	24.582	52.476	1.731	118.716	61.024	133.4820	0.7285	OK	OK	42-1	0
42	2.28044	COMB2	Combination	Max	-624.239	25.641	52.476	1.731	-0.570	3.760	3.8028	0.2851	OK	OK	42-1	2.28044
42	4.56088	COMB2	Combination	Max	-632.957	26.701	52.476	1.731	118.165	0.854	118.1683	0.6833	OK	OK	42-1	4.56088
42	0	COMB2	Combination	Min	-690.451	-0.962	-52.124	-0.313	-119.568	1.295	119.5750	0.7132	OK	OK	42-1	0

42	2.28044	COMB2	Combination	Min	-699.169	0.097	-52.124	-0.313	-1.083	2.279	2.5236	0.3134	OK	OK	42-1	2.28044
42	4.56088	COMB2	Combination	Min	-707.887	1.156	-52.124	-0.313	-120.619	-55.924	132.9526	0.7669	OK	OK	42-1	4.56088
43	0	COMB2	Combination	Max	-576.052	53.678	1.767	1.404	1.433	120.476	120.4842	0.6665	OK	OK	43-1	0
43	2.25	COMB2	Combination	Max	-584.717	53.678	1.767	1.404	-2.541	-0.013	2.5413	0.2635	OK	OK	43-1	2.25
43	4.5	COMB2	Combination	Max	-593.382	53.678	1.767	1.404	51.566	121.218	131.7301	0.7128	OK	OK	43-1	4.5
43	0	COMB2	Combination	Min	-582.141	-53.881	-24.742	-0.049	-59.771	-121.245	135.1771	0.7198	OK	OK	43-1	0
43	2.25	COMB2	Combination	Min	-590.806	-53.881	-24.742	-0.049	-4.104	-0.300	4.1147	0.2716	OK	OK	43-1	2.25
43	4.5	COMB2	Combination	Min	-599.470	-53.881	-24.742	-0.049	-6.519	-121.075	121.2500	0.6793	OK	OK	43-1	4.5
44	0	COMB2	Combination	Max	-348.874	0.053	53.125	2.085	120.693	-1.898	120.7077	0.5682	OK	OK	44-1	0
44	2.28044	COMB2	Combination	Max	-357.592	1.112	53.125	2.085	0.019	-3.220	3.2196	0.1669	OK	OK	44-1	2.28044
44	4.56088	COMB2	Combination	Max	-366.310	2.171	53.125	2.085	118.075	49.849	128.1663	0.6016	OK	OK	44-1	4.56088
44	0	COMB2	Combination	Min	-424.546	-25.562	-51.832	0.335	-118.327	-61.906	133.5421	0.6455	OK	OK	44-1	0
44	2.28044	COMB2	Combination	Min	-433.264	-24.503	-51.832	0.335	-0.602	-4.828	4.8653	0.2056	OK	OK	44-1	2.28044
44	4.56088	COMB2	Combination	Min	-441.982	-23.444	-51.832	0.335	-121.606	-6.970	121.8059	0.6126	OK	OK	44-1	4.56088
45	0	COMB2	Combination	Max	-587.987	22.659	52.996	2.302	120.343	56.018	132.7423	0.7139	OK	OK	45-1	0
45	2.28044	COMB2	Combination	Max	-596.705	23.718	52.996	2.302	0.015	3.185	3.1848	0.2710	OK	OK	45-1	2.28044
45	4.56088	COMB2	Combination	Max	-605.423	24.777	52.996	2.302	117.157	4.455	117.2413	0.6681	OK	OK	45-1	4.56088
45	0	COMB2	Combination	Min	-659.892	-2.805	-51.432	0.114	-117.419	-3.508	117.4714	0.6926	OK	OK	45-1	0
45	2.28044	COMB2	Combination	Min	-668.611	-1.746	-51.432	0.114	-0.656	1.634	1.7609	0.2974	OK	OK	45-1	2.28044
45	4.56088	COMB2	Combination	Min	-677.329	-0.687	-51.432	0.114	-121.364	-52.157	132.0971	0.7506	OK	OK	45-1	4.56088
46	0	COMB2	Combination	Max	-247.264	52.324	3.452	2.462	5.809	119.367	119.5087	0.5198	OK	OK	46-1	0
46	2.26385	COMB2	Combination	Max	-255.929	53.287	3.452	2.462	-2.006	0.477	2.0622	0.1186	OK	OK	46-1	2.26385
46	4.52769	COMB2	Combination	Max	-264.594	54.250	3.452	2.462	47.557	115.590	124.9907	0.5463	OK	OK	46-1	4.52769
46	0	COMB2	Combination	Min	-896.961	-52.293	-22.550	0.735	-54.541	-116.817	128.9221	0.8354	OK	OK	46-1	0
46	2.26385	COMB2	Combination	Min	-905.626	-51.330	-22.550	0.735	-3.492	-0.178	3.4967	0.4067	OK	OK	46-1	2.26385
46	4.52769	COMB2	Combination	Min	-914.291	-50.367	-22.550	0.735	-9.822	-121.901	122.2958	0.8201	OK	OK	46-1	4.52769
47	0	COMB2	Combination	Max	-362.633	1.759	52.964	1.727	120.197	2.477	120.2226	0.5726	OK	OK	47-1	0
47	2.28044	COMB2	Combination	Max	-371.351	2.818	52.964	1.727	0.280	-2.727	2.7410	0.1713	OK	OK	47-1	2.28044
47	4.56088	COMB2	Combination	Max	-380.069	3.877	52.964	1.727	117.595	46.680	126.5212	0.6019	OK	OK	47-1	4.56088
47	0	COMB2	Combination	Min	-435.000	-24.004	-51.502	-0.409	-117.299	-57.971	130.8422	0.6407	OK	OK	47-1	0
47	2.28044	COMB2	Combination	Min	-443.718	-22.945	-51.502	-0.409	-0.715	-4.454	4.5109	0.2089	OK	OK	47-1	2.28044
47	4.56088	COMB2	Combination	Min	-452.437	-21.886	-51.502	-0.409	-121.364	-10.378	121.8068	0.6172	OK	OK	47-1	4.56088
48	0	COMB2	Combination	Max	-573.474	21.261	53.037	1.918	120.474	52.587	131.4506	0.7032	OK	OK	48-1	0
48	2.28044	COMB2	Combination	Max	-582.192	22.320	53.037	1.918	0.449	3.018	3.0515	0.2642	OK	OK	48-1	2.28044
48	4.56088	COMB2	Combination	Max	-590.910	23.379	53.037	1.918	116.359	7.298	116.5878	0.6595	OK	OK	48-1	4.56088
48	0	COMB2	Combination	Min	-655.025	-4.136	-50.885	-0.696	-115.723	-6.738	115.9191	0.6851	OK	OK	48-1	0
48	2.28044	COMB2	Combination	Min	-663.743	-3.077	-50.885	-0.696	-0.604	1.362	1.4902	0.2944	OK	OK	48-1	2.28044
48	4.56088	COMB2	Combination	Min	-672.461	-2.018	-50.885	-0.696	-121.420	-49.216	131.0153	0.7448	OK	OK	48-1	4.56088
19	0	COMB3	Combination	Max	-388.479	13.437	73.125	2.198	175.443	29.907	177.9740	0.7830	OK	OK	19-1	0
19	2.26385	COMB3	Combination	Max	-397.144	14.400	73.125	2.198	9.900	-1.439	10.0039	0.2075	OK	OK	19-1	2.26385
19	4.52769	COMB3	Combination	Max	-405.808	15.363	73.125	2.198	60.441	36.417	70.5640	0.4201	OK	OK	19-1	4.52769
19	0	COMB3	Combination	Min	-585.315	-18.166	-24.566	-0.984	-50.787	-41.474	65.5698	0.4811	OK	OK	19-1	0
19	2.26385	COMB3	Combination	Min	-593.980	-17.203	-24.566	-0.984	4.827	-1.603	5.0860	0.2764	OK	OK	19-1	2.26385
19	4.52769	COMB3	Combination	Min	-602.645	-16.240	-24.566	-0.984	-155.644	-35.291	159.5949	0.8129	OK	OK	19-1	4.52769
20	0	COMB3	Combination	Max	-18.574	22.828	17.508	2.601	38.866	48.514	62.1624	0.2224	OK	OK	20-1	0
20	2.28044	COMB3	Combination	Max	-27.293	23.887	17.508	2.601	-0.839	-4.741	4.8145	0.0285	OK	OK	20-1	2.28044
20	4.56088	COMB3	Combination	Max	-36.011	24.946	17.508	2.601	40.213	152.548	157.7592	0.5597	OK	OK	20-1	4.56088
20	0	COMB3	Combination	Min	-343.084	-72.716	-18.175	-1.524	-42.682	-174.271	179.4216	0.7682	OK	OK	20-1	0
20	2.28044	COMB3	Combination	Min	-351.802	-71.657	-18.175	-1.524	-1.456	-9.664	9.7733	0.1870	OK	OK	20-1	2.28044
20	4.56088	COMB3	Combination	Min	-360.520	-70.598	-18.175	-1.524	-40.986	-60.431	73.0190	0.4089	OK	OK	20-1	4.56088

21	0	COMB3	Combination	Max	-549.889	70.396	21.597	2.480	51.398	170.389	177.9727	0.8533	OK	OK	21-1	0
21	2.28044	COMB3	Combination	Max	-558.607	71.455	21.597	2.480	2.383	8.695	9.0159	0.2745	OK	OK	21-1	2.28044
21	4.56088	COMB3	Combination	Max	-567.325	72.514	21.597	2.480	34.406	57.270	66.8106	0.4776	OK	OK	21-1	4.56088
21	0	COMB3	Combination	Min	-877.648	-25.017	-14.215	-1.773	-30.427	-52.002	60.2495	0.5902	OK	OK	21-1	0
21	2.28044	COMB3	Combination	Min	-886.366	-23.958	-14.215	-1.773	1.752	3.793	4.1781	0.4006	OK	OK	21-1	2.28044
21	4.56088	COMB3	Combination	Min	-895.084	-22.899	-14.215	-1.773	-47.105	-155.512	162.4896	0.9503	OK	OK	21-1	4.56088
22	0	COMB3	Combination	Max	-597.943	17.248	24.133	2.563	48.816	39.550	62.8267	0.4772	OK	OK	22-1	0
22	2.25	COMB3	Combination	Max	-606.607	17.248	24.133	2.563	-5.482	0.863	5.5497	0.2835	OK	OK	22-1	2.25
22	4.5	COMB3	Combination	Max	-615.272	17.248	24.133	2.563	152.322	34.997	156.2908	0.8070	OK	OK	22-1	4.5
22	0	COMB3	Combination	Min	-598.412	-15.171	-72.268	-1.486	-172.885	-33.274	176.0580	0.8678	OK	OK	22-1	0
22	2.25	COMB3	Combination	Min	-607.077	-15.171	-72.268	-1.486	-10.284	0.741	10.3105	0.3001	OK	OK	22-1	2.25
22	4.5	COMB3	Combination	Min	-615.742	-15.171	-72.268	-1.486	-59.785	-38.066	70.8744	0.5127	OK	OK	22-1	4.5
23	0	COMB3	Combination	Max	-74.054	22.629	18.031	3.258	40.485	47.908	62.7236	0.2486	OK	OK	23-1	0
23	2.28044	COMB3	Combination	Max	-82.772	23.688	18.031	3.258	-0.440	-4.900	4.9195	0.0530	OK	OK	23-1	2.28044
23	4.56088	COMB3	Combination	Max	-91.490	24.747	18.031	3.258	39.454	146.917	152.1225	0.5644	OK	OK	23-1	4.56088
23	0	COMB3	Combination	Min	-389.939	-70.277	-17.646	-0.594	-41.027	-168.780	173.6949	0.7689	OK	OK	23-1	0
23	2.28044	COMB3	Combination	Min	-398.657	-69.218	-17.646	-0.594	-0.980	-9.728	9.7774	0.2074	OK	OK	23-1	2.28044
23	4.56088	COMB3	Combination	Min	-407.375	-68.159	-17.646	-0.594	-41.751	-60.132	73.2048	0.4299	OK	OK	23-1	4.56088
24	0	COMB3	Combination	Max	-654.531	67.816	20.461	3.001	47.853	164.156	170.9884	0.8748	OK	OK	24-1	0
24	2.28044	COMB3	Combination	Max	-663.249	68.875	20.461	3.001	1.401	8.315	8.4319	0.3181	OK	OK	24-1	2.28044
24	4.56088	COMB3	Combination	Max	-671.967	69.934	20.461	3.001	36.051	57.004	67.4475	0.5254	OK	OK	24-1	4.56088
24	0	COMB3	Combination	Min	-971.664	-25.042	-15.346	-0.987	-33.938	-52.380	62.4132	0.6386	OK	OK	24-1	0
24	2.28044	COMB3	Combination	Min	-980.382	-23.983	-15.346	-0.987	0.848	3.503	3.6046	0.4396	OK	OK	24-1	2.28044
24	4.56088	COMB3	Combination	Min	-989.100	-22.924	-15.346	-0.987	-45.466	-149.975	156.7151	0.9714	OK	OK	24-1	4.56088
25	0	COMB3	Combination	Max	-620.491	16.972	24.105	2.576	48.795	38.678	62.2650	0.4851	OK	OK	25-1	0
25	2.25	COMB3	Combination	Max	-629.156	16.972	24.105	2.576	-5.441	0.600	5.4735	0.2930	OK	OK	25-1	2.25
25	4.5	COMB3	Combination	Max	-637.821	16.972	24.105	2.576	146.484	35.418	150.7048	0.7976	OK	OK	25-1	4.5
25	0	COMB3	Combination	Min	-620.909	-15.475	-69.584	-1.362	-166.646	-34.220	170.1228	0.8572	OK	OK	25-1	0
25	2.25	COMB3	Combination	Min	-629.573	-15.475	-69.584	-1.362	-10.082	0.490	10.0937	0.3091	OK	OK	25-1	2.25
25	4.5	COMB3	Combination	Min	-638.238	-15.475	-69.584	-1.362	-59.677	-37.696	70.5860	0.5215	OK	OK	25-1	4.5
26	0	COMB3	Combination	Max	-105.821	22.659	18.450	3.239	41.775	48.009	63.6395	0.2656	OK	OK	26-1	0
26	2.28044	COMB3	Combination	Max	-114.539	23.718	18.450	3.239	-0.129	-4.871	4.8728	0.0667	OK	OK	26-1	2.28044
26	4.56088	COMB3	Combination	Max	-123.257	24.777	18.450	3.239	38.938	141.182	146.4533	0.5587	OK	OK	26-1	4.56088
26	0	COMB3	Combination	Min	-413.689	-67.695	-17.288	-0.802	-39.909	-162.736	167.5583	0.7580	OK	OK	26-1	0
26	2.28044	COMB3	Combination	Min	-422.407	-66.636	-17.288	-0.802	-0.655	-9.571	9.5931	0.2171	OK	OK	26-1	2.28044
26	4.56088	COMB3	Combination	Min	-431.125	-65.577	-17.288	-0.802	-42.372	-60.168	73.5911	0.4416	OK	OK	26-1	4.56088
27	0	COMB3	Combination	Max	-694.815	65.363	19.517	3.250	44.911	158.424	164.6671	0.8706	OK	OK	27-1	0
27	2.28044	COMB3	Combination	Max	-703.533	66.422	19.517	3.250	0.588	8.162	8.1832	0.3348	OK	OK	27-1	2.28044
27	4.56088	COMB3	Combination	Max	-712.251	67.481	19.517	3.250	37.519	56.822	68.0912	0.5451	OK	OK	27-1	4.56088
27	0	COMB3	Combination	Min	-1002.549	-24.983	-16.350	-0.936	-37.054	-52.294	64.0905	0.6578	OK	OK	27-1	0
27	2.28044	COMB3	Combination	Min	-1011.267	-23.924	-16.350	-0.936	0.047	3.470	3.4704	0.4526	OK	OK	27-1	2.28044
27	**4.56088**	**COMB3**	**Combination**	**Min**	**-1019.985**	**-22.865**	**-16.350**	**-0.936**	**-44.106**	**-144.519**	151.0993	0.9655	OK	OK	**27-1**	**4.56088**
28	0	COMB3	Combination	Max	-618.907	16.133	24.805	3.364	50.936	36.119	62.4422	0.4850	OK	OK	28-1	0
28	2.25	COMB3	Combination	Max	-627.572	16.133	24.805	3.364	-4.876	-0.082	4.8765	0.2903	OK	OK	28-1	2.25
28	4.5	COMB3	Combination	Max	-636.237	16.133	24.805	3.364	140.057	36.636	144.7696	0.7764	OK	OK	28-1	4.5
28	0	COMB3	Combination	Min	-619.933	-16.319	-66.461	-0.492	-159.018	-36.799	163.2201	0.8330	OK	OK	28-1	0
28	2.25	COMB3	Combination	Min	-628.598	-16.319	-66.461	-0.492	-9.480	-0.181	9.4821	0.3066	OK	OK	28-1	2.25
28	4.5	COMB3	Combination	Min	-637.262	-16.319	-66.461	-0.492	-60.688	-36.481	70.8091	0.5218	OK	OK	28-1	4.5
29	0	COMB3	Combination	Max	-130.924	23.069	18.393	2.620	41.589	49.232	64.4472	0.2793	OK	OK	29-1	0
29	2.28044	COMB3	Combination	Max	-139.642	24.129	18.393	2.620	-0.233	-4.584	4.5896	0.0767	OK	OK	29-1	2.28044

29	4.56088	COMB3	Combination	Max	-148.360	25.188	18.393	2.620	39.238	135.215	140.7930	0.5501	OK	OK	29-1	4.56088
29	0	COMB3	Combination	Min	-427.631	-64.917	-17.489	-1.245	-40.529	-156.035	161.2128	0.7422	OK	OK	29-1	0
29	2.28044	COMB3	Combination	Min	-436.349	-63.858	-17.489	-1.245	-0.768	-9.203	9.2351	0.2220	OK	OK	29-1	2.28044
29	4.56088	COMB3	Combination	Min	-445.067	-62.799	-17.489	-1.245	-42.299	-60.816	74.0793	0.4494	OK	OK	29-1	4.56088
30	0	COMB3	Combination	Max	-690.323	62.554	18.428	2.646	41.510	151.619	157.1986	0.8429	OK	OK	30-1	0
30	2.28044	COMB3	Combination	Max	-699.041	63.613	18.428	2.646	-0.380	7.763	7.7722	0.3314	OK	OK	30-1	2.28044
30	4.56088	COMB3	Combination	Max	-707.759	64.672	18.428	2.646	39.323	57.509	69.6675	0.5486	OK	OK	30-1	4.56088
30	0	COMB3	Combination	Min	-986.165	-25.425	-17.590	-1.311	-40.904	-53.621	67.4414	0.6623	OK	OK	30-1	0
30	2.28044	COMB3	Combination	Min	-994.883	-24.366	-17.590	-1.311	-0.924	3.149	3.2820	0.4448	OK	OK	30-1	2.28044
30	4.56088	COMB3	Combination	Min	-1003.601	-23.307	-17.590	-1.311	-42.537	-138.513	144.8968	0.9369	OK	OK	30-1	4.56088
31	0	COMB3	Combination	Max	-631.011	15.890	25.678	2.516	53.496	35.368	64.1310	0.4961	OK	OK	31-1	0
31	2.25	COMB3	Combination	Max	-639.676	15.890	25.678	2.516	-4.279	-0.213	4.2844	0.2935	OK	OK	31-1	2.25
31	4.5	COMB3	Combination	Max	-648.340	15.890	25.678	2.516	133.928	36.854	138.9057	0.7615	OK	OK	31-1	4.5
31	0	COMB3	Combination	Min	-632.543	-16.474	-63.490	-1.453	-151.776	-37.279	156.2868	0.8145	OK	OK	31-1	0
31	2.25	COMB3	Combination	Min	-641.208	-16.474	-63.490	-1.453	-8.924	-0.385	8.9324	0.3102	OK	OK	31-1	2.25
31	4.5	COMB3	Combination	Min	-649.873	-16.474	-63.490	-1.453	-62.055	-36.137	71.8099	0.5308	OK	OK	31-1	4.5
35	0	COMB3	Combination	Max	-158.915	24.084	18.434	3.340	41.720	52.251	66.8639	0.2998	OK	OK	35-1	0
35	2.28044	COMB3	Combination	Max	-167.633	25.143	18.434	3.340	-0.099	-3.877	3.8781	0.0864	OK	OK	35-1	2.28044
35	4.56088	COMB3	Combination	Max	-176.351	26.202	18.434	3.340	39.017	128.941	134.7152	0.5414	OK	OK	35-1	4.56088
35	0	COMB3	Combination	Min	-441.386	-61.882	-17.330	-0.709	-40.023	-148.467	153.7666	0.7226	OK	OK	35-1	0
35	2.28044	COMB3	Combination	Min	-450.104	-60.823	-17.330	-0.709	-0.721	-8.556	8.5863	0.2257	OK	OK	35-1	2.28044
35	4.56088	COMB3	Combination	Min	-458.823	-59.764	-17.330	-0.709	-42.354	-62.422	75.4342	0.4600	OK	OK	35-1	4.56088
36	0	COMB3	Combination	Max	-656.237	59.229	17.844	3.510	39.700	143.194	148.5956	0.7983	OK	OK	36-1	0
36	2.28044	COMB3	Combination	Max	-664.955	60.288	17.844	3.510	-0.762	6.921	6.9623	0.3137	OK	OK	36-1	2.28044
36	4.56088	COMB3	Combination	Max	-673.673	61.347	17.844	3.510	40.009	59.589	71.7740	0.5410	OK	OK	36-1	4.56088
36	0	COMB3	Combination	Min	-938.671	-26.736	-18.054	-0.675	-42.335	-57.519	71.4186	0.6553	OK	OK	36-1	0
36	2.28044	COMB3	Combination	Min	-947.389	-25.676	-18.054	-0.675	-1.393	2.241	2.6389	0.4219	OK	OK	36-1	2.28044
36	4.56088	COMB3	Combination	Min	-956.107	-24.617	-18.054	-0.675	-41.684	-131.771	138.2072	0.8932	OK	OK	36-1	4.56088
37	0	COMB3	Combination	Max	-580.280	15.896	27.933	2.489	60.259	35.386	69.8807	0.4938	OK	OK	37-1	0
37	2.25	COMB3	Combination	Max	-588.945	15.896	27.933	2.489	-2.590	-0.306	2.6076	0.2656	OK	OK	37-1	2.25
37	4.5	COMB3	Combination	Max	-597.610	15.896	27.933	2.489	126.589	37.002	131.8861	0.7152	OK	OK	37-1	4.5
37	0	COMB3	Combination	Min	-581.772	-16.581	-59.577	-1.481	-141.509	-37.615	146.4232	0.7584	OK	OK	37-1	0
37	2.25	COMB3	Combination	Min	-590.437	-16.581	-59.577	-1.481	-7.460	-0.380	7.4700	0.2830	OK	OK	37-1	2.25
37	4.5	COMB3	Combination	Min	-599.102	-16.581	-59.577	-1.481	-65.439	-36.145	74.7577	0.5188	OK	OK	37-1	4.5
38	0	COMB3	Combination	Max	-199.498	25.429	18.355	3.429	41.493	56.189	69.8486	0.3278	OK	OK	38-1	0
38	2.28044	COMB3	Combination	Max	-208.216	26.488	18.355	3.429	-0.197	-3.008	3.0144	0.1011	OK	OK	38-1	2.28044
38	4.56088	COMB3	Combination	Max	-216.934	27.547	18.355	3.429	39.387	122.795	128.9566	0.5392	OK	OK	38-1	4.56088
38	0	COMB3	Combination	Min	-459.418	-58.836	-17.574	-0.664	-40.767	-140.719	146.5051	0.7054	OK	OK	38-1	0
38	2.28044	COMB3	Combination	Min	-468.136	-57.777	-17.574	-0.664	-0.859	-7.755	7.8026	0.2309	OK	OK	38-1	2.28044
38	4.56088	COMB3	Combination	Min	-476.854	-56.718	-17.574	-0.664	-42.225	-64.621	77.1932	0.4740	OK	OK	38-1	4.56088
39	0	COMB3	Combination	Max	-582.735	56.250	17.629	3.607	39.044	135.764	141.2666	0.7410	OK	OK	39-1	0
39	2.28044	COMB3	Combination	Max	-591.453	57.309	17.629	3.607	-0.980	6.281	6.3573	0.2796	OK	OK	39-1	2.28044
39	4.56088	COMB3	Combination	Max	-600.171	58.368	17.629	3.607	40.581	61.802	73.9340	0.5165	OK	OK	39-1	4.56088
39	0	COMB3	Combination	Min	-843.524	-28.018	-18.440	-0.611	-43.524	-61.156	75.0627	0.6264	OK	OK	39-1	0
39	2.28044	COMB3	Combination	Min	-852.242	-26.959	-18.440	-0.611	-1.651	1.530	2.2506	0.3791	OK	OK	39-1	2.28044
39	4.56088	COMB3	Combination	Min	-860.960	-25.900	-18.440	-0.611	-41.361	-125.617	132.2511	0.8312	OK	OK	39-1	4.56088
40	0	COMB3	Combination	Max	-576.265	16.088	29.623	3.272	65.175	35.975	74.4446	0.5078	OK	OK	40-1	0
40	2.25	COMB3	Combination	Max	-584.930	16.088	29.623	3.272	-1.475	-0.166	1.4840	0.2600	OK	OK	40-1	2.25
40	4.5	COMB3	Combination	Max	-593.595	16.088	29.623	3.272	120.496	36.733	125.9701	0.6930	OK	OK	40-1	4.5
40	0	COMB3	Combination	Min	-576.735	-16.400	-56.433	-0.769	-133.455	-37.065	138.5067	0.7289	OK	OK	40-1	0

40	2.25	COMB3	Combination	Min	-585.400	-16.400	-56.433	-0.769	-6.481	-0.225	6.4850	0.2774	OK	OK	40-1	2.25
40	4.5	COMB3	Combination	Min	-594.065	-16.400	-56.433	-0.769	-68.127	-36.423	77.2528	0.5252	OK	OK	40-1	4.5
41	0	COMB3	Combination	Max	-241.704	26.839	18.292	2.609	41.308	60.233	73.0363	0.3572	OK	OK	41-1	0
41	2.28044	COMB3	Combination	Max	-250.422	27.898	18.292	2.609	-0.302	-2.177	2.1983	0.1167	OK	OK	41-1	2.28044
41	4.56088	COMB3	Combination	Max	-259.140	28.957	18.292	2.609	39.518	117.141	123.6269	0.5392	OK	OK	41-1	4.56088
41	0	COMB3	Combination	Min	-483.489	-56.049	-17.653	-1.241	-40.998	-133.661	139.8075	0.6928	OK	OK	41-1	0
41	2.28044	COMB3	Combination	Min	-492.207	-54.990	-17.653	-1.241	-0.844	-7.054	7.1046	0.2390	OK	OK	41-1	2.28044
41	4.56088	COMB3	Combination	Min	-500.926	-53.931	-17.653	-1.241	-42.120	-67.006	79.1443	0.4912	OK	OK	41-1	4.56088
42	0	COMB3	Combination	Max	-532.115	53.251	18.216	2.704	40.874	128.097	134.4596	0.6955	OK	OK	42-1	0
42	2.28044	COMB3	Combination	Max	-540.834	54.310	18.216	2.704	-0.548	5.455	5.4825	0.2546	OK	OK	42-1	2.28044
42	4.56088	COMB3	Combination	Max	-549.552	55.369	18.216	2.704	39.753	64.535	75.7965	0.5008	OK	OK	42-1	4.56088
42	0	COMB3	Combination	Min	-773.856	-29.631	-17.865	-1.287	-41.725	-65.778	77.8957	0.6058	OK	OK	42-1	0
42	2.28044	COMB3	Combination	Min	-782.574	-28.572	-17.865	-1.287	-1.105	0.584	1.2498	0.3453	OK	OK	42-1	2.28044
42	4.56088	COMB3	Combination	Min	-791.292	-27.513	-17.865	-1.287	-42.207	-119.606	126.8343	0.7821	OK	OK	42-1	4.56088
43	0	COMB3	Combination	Max	-578.151	16.124	30.902	2.602	68.742	36.080	77.6352	0.5196	OK	OK	43-1	0
43	2.25	COMB3	Combination	Max	-586.816	16.124	30.902	2.602	-0.783	-0.112	0.7908	0.2584	OK	OK	43-1	2.25
43	4.5	COMB3	Combination	Max	-595.480	16.124	30.902	2.602	115.364	36.621	121.0370	0.6768	OK	OK	43-1	4.5
43	0	COMB3	Combination	Min	-580.042	-16.327	-53.876	-1.247	-127.079	-36.849	132.3140	0.7090	OK	OK	43-1	0
43	2.25	COMB3	Combination	Min	-588.707	-16.327	-53.876	-1.247	-5.862	-0.201	5.8656	0.2767	OK	OK	43-1	2.25
43	4.5	COMB3	Combination	Min	-597.372	-16.327	-53.876	-1.247	-70.316	-36.478	79.2152	0.5334	OK	OK	43-1	4.5
44	0	COMB3	Combination	Max	-271.481	28.098	18.613	3.254	42.320	63.746	76.5153	0.3821	OK	OK	44-1	0
44	2.28044	COMB3	Combination	Max	-280.199	29.157	18.613	3.254	0.027	-1.531	1.5316	0.1274	OK	OK	44-1	2.28044
44	4.56088	COMB3	Combination	Max	-288.917	30.216	18.613	3.254	39.042	112.115	118.7187	0.5353	OK	OK	44-1	4.56088
44	0	COMB3	Combination	Min	-501.938	-53.607	-17.320	-0.833	-39.954	-127.550	133.6614	0.6796	OK	OK	44-1	0
44	2.28044	COMB3	Combination	Min	-510.656	-52.548	-17.320	-0.833	-0.610	-6.516	6.5445	0.2451	OK	OK	44-1	2.28044
44	4.56088	COMB3	Combination	Min	-519.375	-51.489	-17.320	-0.833	-42.573	-69.237	81.2784	0.5066	OK	OK	44-1	4.56088
45	0	COMB3	Combination	Max	-509.228	50.757	18.818	3.316	42.751	121.831	129.1136	0.6671	OK	OK	45-1	0
45	2.28044	COMB3	Combination	Max	-517.946	51.816	18.818	3.316	0.006	4.893	4.8930	0.2426	OK	OK	45-1	2.28044
45	4.56088	COMB3	Combination	Max	-526.664	52.875	18.818	3.316	38.867	66.794	77.2790	0.4960	OK	OK	45-1	4.56088
45	0	COMB3	Combination	Min	-738.651	-30.903	-17.254	-0.900	-39.827	-69.321	79.9469	0.5975	OK	OK	45-1	0
45	2.28044	COMB3	Combination	Min	-747.369	-29.844	-17.254	-0.900	-0.647	-0.074	0.6516	0.3279	OK	OK	45-1	2.28044
45	4.56088	COMB3	Combination	Min	-756.087	-28.785	-17.254	-0.900	-43.075	-114.496	122.3306	0.7513	OK	OK	45-1	4.56088
46	0	COMB3	Combination	Max	-474.144	15.798	31.373	4.054	70.619	36.906	79.6810	0.4814	OK	OK	46-1	0
46	2.26385	COMB3	Combination	Max	-482.809	16.761	31.373	4.054	-0.405	0.249	0.4756	0.2120	OK	OK	46-1	2.26385
46	4.52769	COMB3	Combination	Max	-491.474	17.723	31.373	4.054	109.164	32.670	113.9481	0.6071	OK	OK	46-1	4.52769
46	0	COMB3	Combination	Min	-670.081	-15.766	-50.471	-0.858	-119.351	-34.355	124.1971	0.7202	OK	OK	46-1	0
46	2.26385	COMB3	Combination	Min	-678.746	-14.803	-50.471	-0.858	-5.094	0.050	5.0937	0.3133	OK	OK	46-1	2.26385
46	4.52769	COMB3	Combination	Min	-687.411	-13.841	-50.471	-0.858	-71.429	-38.981	81.3737	0.5801	OK	OK	46-1	4.52769
47	0	COMB3	Combination	Max	-287.349	29.237	18.606	2.579	42.301	66.803	79.0696	0.3979	OK	OK	47-1	0
47	2.28044	COMB3	Combination	Max	-296.067	30.296	18.606	2.579	0.131	-1.062	1.0698	0.1327	OK	OK	47-1	2.28044
47	4.56088	COMB3	Combination	Max	-304.785	31.355	18.606	2.579	38.789	107.676	114.4494	0.5275	OK	OK	47-1	4.56088
47	0	COMB3	Combination	Min	-510.285	-51.482	-17.144	-1.261	-39.403	-122.297	128.4876	0.6654	OK	OK	47-1	0
47	2.28044	COMB3	Combination	Min	-519.003	-50.423	-17.144	-1.261	-0.567	-6.119	6.1451	0.2473	OK	OK	47-1	2.28044
47	4.56088	COMB3	Combination	Min	-527.721	-49.364	-17.144	-1.261	-42.558	-71.373	83.0983	0.5165	OK	OK	47-1	4.56088
48	0	COMB3	Combination	Max	-501.491	48.866	19.015	2.601	43.365	117.305	125.0636	0.6498	OK	OK	48-1	0
48	2.28044	COMB3	Combination	Max	-510.209	49.926	19.015	2.601	0.280	4.708	4.7159	0.2386	OK	OK	48-1	2.28044
48	4.56088	COMB3	Combination	Max	-518.927	50.985	19.015	2.601	38.301	68.483	78.4659	0.4967	OK	OK	48-1	4.56088
48	0	COMB3	Combination	Min	-727.009	-31.741	-16.864	-1.378	-38.615	-71.456	81.2219	0.5969	OK	OK	48-1	0
48	2.28044	COMB3	Combination	Min	-735.727	-30.682	-16.864	-1.378	-0.435	-0.327	0.5441	0.3225	OK	OK	48-1	2.28044
48	4.56088	COMB3	Combination	Min	-744.445	-29.623	-16.864	-1.378	-43.362	-110.402	118.6116	0.7334	OK	OK	48-1	4.56088

KOMBINASI 1Layan

P Min	170.175
P Max	1019.192

KOMBINASI 2 Layan

P Min	127.137
P Max	914.291

KOMBINASI 3 Layan

P Min	18.574
P Max	1019.985

TABLE: Element Forces - Area Shells (PILECAP Kombinasi 1U)

Area	Area Elem	ShellType	Joint	Output Case	CaseType	F11	F22	F12	M11	M22	M12	V13	V23
Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
76	76	Shell-Thick	2	COMB1U	Combination	12.11	-204.3	-78.93	403.767	630.75	346.43	384.99	-663.64
76	76	Shell-Thick	380	COMB1U	Combination	-94.54	-225.6	366.22	214.355	298.13	-3.9456	384.99	-663.64
76	76	Shell-Thick	292	COMB1U	Combination	-98.31	-244.5	286.23	205.31	319.82	1.603	384.99	-663.64
76	76	Shell-Thick	387	COMB1U	Combination	8.35	-223.1	-158.92	386.196	650.84	351.98	384.99	-663.64
78	78	Shell-Thick	390	COMB1U	Combination	82.35	-127.4	184.85	1042.44	1548.4	-7.5398	-3480	-3859.4
78	78	Shell-Thick	2	COMB1U	Combination	25.21	-138.8	-84.73	153.517	-372.5	336.57	-3480	-3859.4
78	78	Shell-Thick	387	COMB1U	Combination	22.28	-153.5	-186.59	229.556	-380.4	362.14	-3480	-3859.4
78	78	Shell-Thick	293	COMB1U	Combination	79.43	-142	83	1206.98	1558.1	18.03	-3480	-3859.4
87	87	Shell-Thick	385	COMB1U	Combination	-16.56	-38.23	-18.09	-163.733	334.98	153.16	1123.6	-488.05
87	87	Shell-Thick	4	COMB1U	Combination	-42.17	-43.35	27.6	-90.3597	580.46	173.9	1123.6	-488.05
87	87	Shell-Thick	286	COMB1U	Combination	-46.63	-65.62	16.3	514.672	672.68	148.86	1123.6	-488.05
87	87	Shell-Thick	384	COMB1U	Combination	-21.01	-60.49	-29.39	434.365	429.65	128.12	1123.6	-488.05
106	106	Shell-Thick	8	COMB1U	Combination	54.03	-296.1	-133.35	-77.7792	-15.74	-50.694	1957.6	-1936.7
106	106	Shell-Thick	398	COMB1U	Combination	33.05	-300.3	344.99	348.314	955.96	261.24	1957.6	-1936.7
106	106	Shell-Thick	290	COMB1U	Combination	-83.74	-884.3	433.46	1141.44	810.13	100.1	1957.6	-1936.7
106	106	Shell-Thick	399	COMB1U	Combination	-62.76	-880.1	-44.88	697.225	-155.9	-211.84	1957.6	-1936.7
288	288	Shell-Thick	341	COMB1U	Combination	13.89	-25.69	-16.8	-9.125	311.83	-80.86	-21.64	181.06
288	288	Shell-Thick	469	COMB1U	Combination	6.74	-61.48	7.92	0.8863	385.63	-96.695	-21.64	181.06
288	288	Shell-Thick	581	COMB1U	Combination	-13.73	-65.57	2.81	-51.376	268.03	-7.5196	-21.64	181.06

291	291	Shell-Thick	359	COMB1U	Combination	-46.12	-39.58	254.33	71.7799	-66.84	86.222	119.14	-193.31
291	291	Shell-Thick	157	COMB1U	Combination	-34.67	17.69	53.27	20.516	-235.4	23.655	119.14	-193.31
291	291	Shell-Thick	584	COMB1U	Combination	7.73	26.17	-261.47	-72.9162	-110.3	-192.4	119.14	-193.31
291	291	Shell-Thick	585	COMB1U	Combination	-3.72	-31.1	-60.41	-28.6623	59.392	-129.84	119.14	-193.31
292	292	Shell-Thick	377	COMB1U	Combination	76.01	-269.8	178.17	117.581	-51.63	239.28	-57.66	-157.54
292	292	Shell-Thick	291	COMB1U	Combination	213.88	419.57	-170.7	103.563	-318.1	140.18	-57.66	-157.54
292	**292**	**Shell-Thick**	**585**	**COMB1U**	**Combination**	**81.1**	**393.02**	**-511.3**	**-119.268**	**-418.7**	**-211.88**	**-57.66**	**-157.54**
292	292	Shell-Thick	584	COMB1U	Combination	-56.78	-296.4	-162.52	-87.0566	-155.9	-112.78	-57.66	-157.54
293	293	Shell-Thick	155	COMB1U	Combination	15.39	-136.4	12.67	-40.958	-236.5	41.645	-57.8	-154.57
293	293	Shell-Thick	363	COMB1U	Combination	47.62	24.8	125.94	1.6048	-68.34	13.369	-57.8	-154.57
293	293	Shell-Thick	586	COMB1U	Combination	-35.13	8.25	-7.29	-10.477	33.52	135.65	-57.8	-154.57
293	293	Shell-Thick	587	COMB1U	Combination	-67.36	-152.9	-120.57	-50.5155	-137.2	163.93	-57.8	-154.57
294	294	Shell-Thick	289	COMB1U	Combination	-2.42	75.06	106.23	10.4292	-343.9	-38.808	181.99	-21.72
294	294	Shell-Thick	378	COMB1U	Combination	-32.96	-77.64	374.01	138.358	12.1	-155.69	181.99	-21.72
294	294	Shell-Thick	587	COMB1U	Combination	-53.12	-81.68	-3.38	9.9304	-5.455	92.077	181.99	-21.72
294	294	Shell-Thick	586	COMB1U	Combination	-22.58	71.03	-271.16	-122.199	-354.6	208.96	181.99	-21.72
295	295	Shell-Thick	144	COMB1U	Combination	-25.04	-87.04	-77.08	5.1456	-196.1	-14.471	-336.7	-350.78
295	295	Shell-Thick	367	COMB1U	Combination	-19.42	-58.91	-12.58	94.9954	-157.8	-28.995	-336.7	-350.78
295	295	Shell-Thick	589	COMB1U	Combination	-70.35	-69.1	-9.19	-341.115	55.058	368.71	-336.7	-350.78
295	295	Shell-Thick	591	COMB1U	Combination	-75.97	-97.22	-73.69	-277.032	47.041	383.23	-336.7	-350.78
296	296	Shell-Thick	292	COMB1U	Combination	-29.63	98.96	196.51	124.663	-222.1	7.677	427.12	21
296	296	Shell-Thick	380	COMB1U	Combination	-30.85	92.87	398.41	84.9342	-210.3	-9.0956	427.12	21
296	296	Shell-Thick	591	COMB1U	Combination	-38.25	91.39	21.65	-323.582	-185.7	368.67	427.12	21
296	**296**	**Shell-Thick**	**589**	**COMB1U**	**Combination**	**-37.03**	**97.48**	**-180.2**	**-396.001**	**-219.4**	**385.44**	**427.12**	**21**
303	303	Shell-Thick	390	COMB1U	Combination	83.68	-120.8	175.61	1220.14	2206.5	3.7559	-2294	2730.92
303	**303**	**Shell-Thick**	**293**	**COMB1U**	**Combination**	**87.79**	**-100.2**	**-0.69**	**1298**	**2243.6**	**5.7011**	**-2294**	**2730.92**
303	303	Shell-Thick	606	COMB1U	Combination	45.32	-108.7	-224.39	1007.79	470.16	415.91	-2294	2730.92
303	303	Shell-Thick	607	COMB1U	Combination	41.21	-129.3	-48.09	910.115	429.73	413.96	-2294	2730.92
								M+	**1298**	**2243.6**	**V+**	**1957.6**	**2730.92**
								M-	**-396.001**	**-418.7**	**V-**	**-3480**	**-3859.4**

TABLE: Element Forces - Area Shells (PILECAP Kombinasi 2U)

Area	Area Elem	Shell Type	Joint	Output Case	Case Type	Step Type	F11	F22	F12	M11	M22	M12	V13	V23
Text	Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
78	78	Shell-Thick	390	COMB2U	Combination	Max	281.21	-4.93	430.63	941.3639	1197.3877	36.7752	-2597.6	-2947.08
78	78	Shell-Thick	2	COMB2U	Combination	Max	118.92	-80.59	87.12	293.4179	-289.4577	279.3269	-2597.6	-2947.08

78	78	Shell-Thick	387	COMB2U	Combination	Max	120.41	-74.65	24.96	355.8911	-292.6622	298.5395	-2597.6	-2947.08
78	78	Shell-Thick	293	COMB2U	Combination	Max	278.81	-16.03	157.16	1073.2403	1203.5567	38.7329	-2597.6	-2947.08
78	78	Shell-Thick	390	COMB2U	Combination	Min	-169.14	-184.36	-131.87	596.5871	1161.1451	-48.8407	-2762.5	-2997.72
78	78	Shell-Thick	2	COMB2U	Combination	Min	-106.81	-128.69	-211.69	-127.54	-311.0043	239.9348	-2762.5	-2997.72
78	78	Shell-Thick	387	COMB2U	Combination	Min	-112.43	-155.23	-314.98	-72.056	-319.9174	260.2005	-2762.5	-2997.72
78	78	Shell-Thick	293	COMB2U	Combination	Min	-170.86	-193.86	-23.85	717.3126	1169.6772	-11.3201	-2762.5	-2997.72
93	93	Shell-Thick	5	COMB2U	Combination	Min	-276.6	-77.67	-54.14	-154.5182	332.7002	78.3151	949.95	-562.23
93	93	Shell-Thick	287	COMB2U	Combination	Min	-292.85	-158.41	-64.55	345.9491	426.8709	55.1482	949.95	-562.23
93	93	Shell-Thick	386	COMB2U	Combination	Min	-1.84	-125.65	-100.97	288.4947	278.3091	67.5278	949.95	-562.23
106	106	Shell-Thick	8	COMB2U	Combination	Max	172.4	-192.3	82.54	-9.1882	13.5118	-10.5145	1646.16	-1523.62
106	106	Shell-Thick	398	COMB2U	Combination	Max	122.16	-161.07	713.92	296.8994	777.9835	234.9351	1646.16	-1523.62
106	106	Shell-Thick	290	COMB2U	Combination	Max	11.74	-710.96	409.66	962.8184	672.9796	81.9433	1646.16	-1523.62
106	106	Shell-Thick	399	COMB2U	Combination	Max	98.78	-657.82	244.26	598.7402	-97.9434	-134.594	1646.16	-1523.62
292	292	Shell-Thick	377	COMB2U	Combination	Min	-51.95	-260.02	-147.32	98.6158	-33.776	173.4685	-54.26	-208.61
292	292	Shell-Thick	291	COMB2U	Combination	Min	32.55	245.23	-148.86	83.6721	-265.1148	85.7513	-54.26	-208.61
292	**292**	**Shell-Thick**	**585**	**COMB2U**	**Combination**	**Min**	**31.35**	**256.34**	**-628.03**	**-84.4752**	**-360.5313**	**-176.914**	**-54.26**	**-208.61**
302	302	Shell-Thick	386	COMB2U	Combination	Max	18.05	-43.77	13.54	178.9693	320.5546	88.4258	80.47	-178.66
302	302	Shell-Thick	605	COMB2U	Combination	Max	25.23	-38.8	65.33	71.5422	167.877	71.8019	80.47	-178.66
302	302	Shell-Thick	604	COMB2U	Combination	Max	21.88	-34.33	17.93	69.2702	173.4564	89.0546	80.47	-178.66
302	302	Shell-Thick	297	COMB2U	Combination	Min	-4.17	-69.79	-89.53	37.562	274.5438	83.4359	2.72	-306.84
302	302	Shell-Thick	386	COMB2U	Combination	Min	-1.52	-74.24	-26.44	68.9275	283.914	61.3224	2.72	-306.84
302	302	Shell-Thick	605	COMB2U	Combination	Min	-36.5	-84.78	-72.18	-2.0181	120.9583	15.5995	2.72	-306.84
302	302	Shell-Thick	604	COMB2U	Combination	Min	-28.64	-66.69	-29.4	-30.4315	152.4736	53.7334	2.72	-306.84
303	303	Shell-Thick	390	COMB2U	Combination	Max	271.43	-48.6	191.6	1085.6957	1740.1335	33.5816	-1667.6	2119.87
303	**303**	**Shell-Thick**	**293**	**COMB2U**	**Combination**	**Max**	**278.68**	**-11.89**	**38.8**	**1158.0748**	**1772.6481**	**41.411**	**-1667.6**	**2119.87**
303	303	Shell-Thick	606	COMB2U	Combination	Max	143.08	-28.74	-57.22	777.6412	393.8988	342.7254	-1667.6	2119.87
303	303	Shell-Thick	607	COMB2U	Combination	Max	144.59	-38.12	98.82	693.8491	363.1034	335.6722	-1667.6	2119.87
303	303	Shell-Thick	390	COMB2U	Combination	Min	-159.75	-142.65	84.44	726.0835	1626.8024	-28.4559	-1803.3	2029.95
303	303	Shell-Thick	293	COMB2U	Combination	Min	-161.18	-150.24	-32.79	770.3383	1650.6249	-32.753	-1803.3	2029.95
303	303	Shell-Thick	606	COMB2U	Combination	Min	-89.86	-146.24	-293.35	726.9748	334.7777	296.3448	-1803.3	2029.95
303	303	Shell-Thick	607	COMB2U	Combination	Min	-97.2	-165.99	-179.35	661.7594	303.6598	299.8657	-1803.3	2029.95
304	304	Shell-Thick	330	COMB2U	Combination	Max	87.43	-68.04	412.52	-73.314	-169.4458	-17.0132	-20.77	1079.84
304	304	Shell-Thick	189	COMB2U	Combination	Max	85.67	-62.57	180.57	-35.1386	-144.0203	17.1747	-20.77	1079.84
304	304	Shell-Thick	607	COMB2U	Combination	Max	129.65	-97.04	91.81	727.1752	499.4573	350.7387	-20.77	1079.84
304	304	Shell-Thick	606	COMB2U	Combination	Max	131.93	-102.53	43.71	783.7429	489.1161	325.4811	-20.77	1079.84
304	**304**	**Shell-Thick**	**330**	**COMB2U**	**Combination**	**Min**	**-97.3**	**-189.14**	**44.61**	**-399.9809**	**-266.5584**	**-50.1056**	**-147.4**	**1001.54**
304	304	Shell-Thick	189	COMB2U	Combination	Min	-96.75	-200.65	80.12	-377.2647	-245.4473	-25.022	-147.4	1001.54
304	304	Shell-Thick	607	COMB2U	Combination	Min	-92.14	-156.46	-275.56	714.5446	450.9674	314.7904	-147.4	1001.54
304	304	Shell-Thick	606	COMB2U	Combination	Min	-93.22	-144.94	-31.03	731.7397	440.788	280.7765	-147.4	1001.54
									M+	**1158.0748**	**1772.6481**	**V+**	**1646.16**	**2119.87**
									M-	**-399.9809**	**-360.5313**	**V-**	**-2762.5**	**-2997.72**

TABLE: Element Forces - Area Shells (PILECAP Kombinasi 3U)														
Area	Area Elem	Shell Type	Joint	Output Case	CaseType	Step Type	F11	F22	F12	M11	M22	M12	V13	V23
Text	Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
78	78	Shell-Thick	390	COMB3U	Combination	Max	140.78	3.27	358.36	892.9772	1214.338	29.2103	-2543.32	-2895.64
78	78	Shell-Thick	2	COMB3U	Combination	Max	53.92	-26.81	1.36	154.0783	-289.972	297.3671	-2543.32	-2895.64
78	78	Shell-Thick	387	COMB3U	Combination	Max	58.07	-6.49	-63.01	211.6305	-294.391	319.7787	-2543.32	-2895.64
78	78	Shell-Thick	293	COMB3U	Combination	Max	143.19	18.42	177.94	1015.237	1216.833	40.9045	-2543.32	-2895.64
78	78	Shell-Thick	390	COMB3U	Combination	Min	-28.71	-192.55	-59.6	644.9738	1144.194	-41.2758	-2816.71	-3049.15
78	78	Shell-Thick	2	COMB3U	Combination	Min	-41.81	-182.47	-125.93	11.7997	-310.490	221.8946	-2816.71	-3049.15
78	78	Shell-Thick	387	COMB3U	Combination	Min	-50.09	-223.39	-227.01	72.2046	-318.188	238.9612	-2816.71	-3049.15
78	78	Shell-Thick	293	COMB3U	Combination	Min	-35.24	-228.31	-44.63	775.3158	1156.4	-13.4917	-2816.71	-3049.15
106	106	Shell-Thick	8	COMB3U	Combination	Max	102.16	-218.97	37.25	-32.4482	38.4013	8.398	1630.55	-1508.14
106	106	Shell-Thick	398	COMB3U	Combination	Max	47.01	-217.62	474.56	308.8607	795.7718	241.1322	1630.55	-1508.14
106	106	Shell-Thick	290	COMB3U	Combination	Max	-42.08	-657.31	365.73	968.6838	700.1619	91.5851	1630.55	-1508.14
106	106	Shell-Thick	399	COMB3U	Combination	Max	25.23	-633.06	79.87	593.4118	-83.8226	-101.316	1630.55	-1508.14
294	**294**	**Shell-Thick**	**289**	**COMB3U**	**Combination**	**Min**	**-45.19**	**-35.68**	**39.63**	**-59.161**	**-370.666**	**-69.152**	**95.03**	**-117.07**
294	294	Shell-Thick	378	COMB3U	Combination	Min	-67.18	-76.25	168.54	79.7902	-41.5295	-148.006	95.03	-117.07
294	294	Shell-Thick	587	COMB3U	Combination	Min	-80.05	-92.08	-31.42	-1.9563	-8.0742	62.8737	95.03	-117.07
294	294	Shell-Thick	586	COMB3U	Combination	Min	-35.12	-32.64	-244.26	-135.6934	-314.852	150.7655	95.03	-117.07
295	295	Shell-Thick	144	COMB3U	Combination	Max	7.95	25.69	10.76	71.3908	-52.9567	9.9594	-211.4	-147.82
295	295	Shell-Thick	367	COMB3U	Combination	Max	16.95	23.04	102.38	161.3546	-17.5454	-0.999	-211.4	-147.82
295	295	Shell-Thick	589	COMB3U	Combination	Max	14.52	-3.01	40.93	-242.9836	62.4638	317.8965	-211.4	-147.82
295	295	Shell-Thick	591	COMB3U	Combination	Max	4.82	-0.31	44.4	-225.2842	59.2203	330.0194	-211.4	-147.82
296	296	Shell-Thick	292	COMB3U	Combination	Max	55.31	196.33	243.99	191.6416	-55.4647	37.4435	449.09	195.38
296	296	Shell-Thick	380	COMB3U	Combination	Max	48.24	159.6	423.86	181.066	-45.125	21.7908	449.09	195.38
296	296	Shell-Thick	591	COMB3U	Combination	Max	38.11	153.63	98.93	-247.4795	-103.011	318.744	449.09	195.38
296	296	Shell-Thick	589	COMB3U	Combination	Max	32.24	180.55	-44.08	-274.7772	-121.722	331.8425	449.09	195.38
296	296	Shell-Thick	292	COMB3U	Combination	Min	-116.82	-51.43	51.88	-77.8919	-328.749	-27.0302	282.26	-95.55
296	296	Shell-Thick	380	COMB3U	Combination	Min	-111.2	-21.94	180.69	-125.0127	-319.972	-36.6378	282.26	-95.55
296	296	Shell-Thick	591	COMB3U	Combination	Min	-114.68	-18.69	-59.2	-301.6307	-180.432	252.3186	282.26	-95.55
296	**296**	**Shell-Thick**	**589**	**COMB3U**	**Combination**	**Min**	**-107.36**	**-38.37**	**-224.86**	**-388.003**	**-214.370**	**264.4804**	**282.26**	**-95.55**
297	297	Shell-Thick	370	COMB3U	Combination	Max	-9.99	9.59	94.57	55.6787	41.1445	133.32	135.46	-177.14
297	297	Shell-Thick	147	COMB3U	Combination	Max	-26.58	-41.58	42.14	20.9246	47.3686	128.786	135.46	-177.14
297	297	Shell-Thick	600	COMB3U	Combination	Max	-29.63	-37.27	49.21	36.8612	164.2437	134.0091	135.46	-177.14
297	297	Shell-Thick	601	COMB3U	Combination	Max	-11.87	6.47	26.49	75.8198	155.1253	127.3081	135.46	-177.14
297	297	Shell-Thick	370	COMB3U	Combination	Min	-53.07	-25.09	-62.96	21.2896	-61.167	103.1037	51.08	-318.57
297	297	Shell-Thick	147	COMB3U	Combination	Min	-69.48	-138.92	-31.78	-71.1915	-117.347	101.6157	51.08	-318.57

302	302	Shell-Thick	604	COMB3U	Combination	Max	7.87	-22.94	33.2	50.9136	174.9718	83.3584	58.67	-173.17
302	302	Shell-Thick	297	COMB3U	Combination	Min	-9.1	-74.45	-53.52	57.2918	283.0041	85.2569	24.52	-312.33
302	302	Shell-Thick	386	COMB3U	Combination	Min	-10.7	-77.91	-60.03	80.4557	284.3001	62.1327	24.52	-312.33
302	302	Shell-Thick	605	COMB3U	Combination	Min	-19.82	-86.09	-35.28	5.6195	116.9424	10.9983	24.52	-312.33
302	302	Shell-Thick	604	COMB3U	Combination	Min	-14.63	-78.08	-44.67	-12.0749	150.9582	59.4296	24.52	-312.33
303	303	Shell-Thick	390	COMB3U	Combination	Max	135.71	-4.62	259.57	1058.8796	1820.847	32.0404	-1651.84	2220.46
303	**303**	**Shell-Thick**	**293**	**COMB3U**	**Combination**	**Max**	**144.8**	**42.36**	**98.51**	**1098.9499**	**1848.227**	**36.8324**	**-1651.84**	**2220.46**
303	303	Shell-Thick	606	COMB3U	Combination	Max	95.73	22.28	-86.54	809.0797	410.5494	353.6708	-1651.84	2220.46
303	303	Shell-Thick	607	COMB3U	Combination	Max	99.26	-16.45	37.81	704.6984	371.9943	351.432	-1651.84	2220.46
303	303	Shell-Thick	390	COMB3U	Combination	Min	-24.03	-186.64	16.47	752.8996	1546.088	-26.9147	-1819.03	1929.35
303	303	Shell-Thick	293	COMB3U	Combination	Min	-27.3	-204.48	-92.5	829.4632	1575.046	-28.1744	-1819.03	1929.35
303	303	Shell-Thick	606	COMB3U	Combination	Min	-42.51	-197.26	-264.02	695.5363	318.1272	285.3993	-1819.03	1929.35
303	303	Shell-Thick	607	COMB3U	Combination	Min	-51.87	-187.66	-118.34	650.9101	294.7689	284.1059	-1819.03	1929.35
304	304	Shell-Thick	330	COMB3U	Combination	Max	35.73	-57.16	344.54	-124.9427	-108.908	-12.2846	-15.65	1167.86
304	304	Shell-Thick	189	COMB3U	Combination	Max	30.64	-34.98	203.61	-114.0413	-91.2521	17.0393	-15.65	1167.86
304	304	Shell-Thick	607	COMB3U	Combination	Max	90.57	-48.11	6.87	735.783	500.4039	366.5971	-15.65	1167.86
304	304	Shell-Thick	606	COMB3U	Combination	Max	96.16	-70.33	53.07	803.9764	487.038	336.1054	-15.65	1167.86
304	304	Shell-Thick	330	COMB3U	Combination	Min	-45.6	-200.03	112.6	-348.3522	-327.095	-54.8342	-152.52	913.53
304	304	Shell-Thick	189	COMB3U	Combination	Min	-41.72	-228.24	57.08	-298.362	-298.215	-24.8866	-152.52	913.53
									M+	**1098.949**	**1848.227**	**V+**	**1630.55**	**2220.46**
									M-	**-388.003**	**-370.666**	**V-**	**-2816.71**	**-3049.15**

TABLE: Element Forces - Area Shells (LONGITUDINAL STOPPER Kombinasi 1Ultimate)													
Area	**Area Elem**	**Shell Type**	**Joint**	**Output Case**	**Case Type**	**F11**	**F22**	**F12**	**M11**	**M22**	**M12**	**V13**	**V23**
Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
12	12	Shell-Thick	1478	COMB1U	Combination	5.4	32.83	3.29	-28.9905	559.1475	84.8936	137.69	372.56
12	**12**	**Shell-Thick**	**1479**	**COMB1U**	**Combination**	**2.13**	**26.65**	**3.14**	**30.6269**	**665.6927**	**155.3282**	**137.69**	**372.56**
12	12	Shell-Thick	85	COMB1U	Combination	-3.03	0.8	-1.02	-31.7839	581.8371	123.3948	137.69	372.56
12	12	Shell-Thick	83	COMB1U	Combination	0.24	7.02	-0.58	-84.1321	479.6009	65.5499	137.69	372.56
1500	1500	Shell-Thick	1508	COMB1U	Combination	87.48	-595.2	60.04	-606.2316	-287.1912	-222.7383	-3990.09	-4324.98
1500	1500	Shell-Thick	438	COMB1U	Combination	-128.4	-638.4	-116.59	-1499.8711	-1503.08	-85.2432	-3990.09	-4324.98
1500	1500	Shell-Thick	1731	COMB1U	Combination	-38.91	-191.2	-727.95	-1305.4633	-1488.468	-8.7052	-3990.09	-4324.98
1500	1500	Shell-Thick	1732	COMB1U	Combination	176.92	-148	-551.31	-460.98	-282.3274	-146.2003	-3990.09	-4324.98
1602	1602	Shell-Thick	438	COMB1U	Combination	169.13	849.07	-122.45	-1561.0946	-1846.172	-27.9679	-4422.03	4078.92
1602	1602	Shell-Thick	1510	COMB1U	Combination	-84.43	798.35	104.64	-939.4764	-499.6735	-236.7885	-4422.03	4078.92
1602	1602	Shell-Thick	1758	COMB1U	Combination	-159.2	424.26	-690.99	-748.4422	-430.8787	-273.3456	-4422.03	4078.92
1602	1602	Shell-Thick	1731	COMB1U	Combination	94.31	474.97	-918.08	-1370.4645	-1776.499	-64.525	-4422.03	4078.92
1169	1169	Shell-Thick	429	COMB1U	Combination	-383.4	-1009	401.82	-1726.0813	-1040.722	-93.7378	4039.24	-3931.54
1169	1169	Shell-Thick	241	COMB1U	Combination	472.2	-838.1	41.71	-1038.1688	205.9508	411.8709	4039.24	-3931.54

1169	1169	Shell-Thick	1248	COMB1U	Combination	596.57	-490.4	659.72	-1052.499	181.956	401.3391	4039.24	-3931.54
1169	1169	Shell-Thick	1514	COMB1U	Combination	-392.1	-688.2	1008.03	-1566.0551	-1034.190	-105.9871	4039.24	-3931.54
1173	1173	Shell-Thick	1480	COMB1U	Combination	-67.57	1370.1	226.06	-1670.9499	-857.1547	269.0852	4460.94	4658.41
1173	**1173**	**Shell-Thick**	**429**	**COMB1U**	**Combination**	**218.84**	**1427.4**	**577.66**	**-1825.609**	**-2136.403**	**-89.8798**	**4460.94**	**4658.41**
1173	**1173**	**Shell-Thick**	**1514**	**COMB1U**	**Combination**	**154.94**	**1108**	**1185.8**	**-1877.827**	**-2126.173**	**-88.9783**	**4460.94**	**4658.41**
1173	1173	Shell-Thick	1517	COMB1U	Combination	-131.4	1050.7	834.29	-1465.1776	-796.7071	269.9868	4460.94	4658.41
1174	1174	Shell-Thick	1513	COMB1U	Combination	25.77	72.06	10.69	64.8163	-592.8896	159.6278	905.96	-222.72
1174	1174	Shell-Thick	1516	COMB1U	Combination	20.25	70.96	37.53	7.1806	-656.8292	208.6724	905.96	-222.72
1174	1174	Shell-Thick	1518	COMB1U	Combination	28.16	110.49	79.69	-372.0552	-818.8577	265.3515	905.96	-222.72
1174	1174	Shell-Thick	1515	COMB1U	Combination	33.67	111.59	52.85	-313.6137	-757.8405	216.3069	905.96	-222.72
1488	1488	Shell-Thick	1570	COMB1U	Combination	-78.09	-120.5	50.86	19.2448	-851.9028	-235.3599	587.46	-972.11
1488	1488	Shell-Thick	1569	COMB1U	Combination	-162.4	-137.3	161.82	228.692	-228.7524	-548.3435	587.46	-972.11
1488	1488	Shell-Thick	1727	COMB1U	Combination	-130.0	24.43	41.89	241.1969	-185.1444	-553.363	587.46	-972.11
1488	1488	Shell-Thick	1726	COMB1U	Combination	-45.73	41.3	-69.07	93.3356	-796.5872	-240.3794	587.46	-972.11
1489	**1489**	**Shell-Thick**	**235**	**COMB1U**	**Combination**	**-208.8**	**-63.38**	**-126.5**	**1071.3492**	**-255.1879**	**-692.8915**	**1220.9**	**-692.83**
1489	1489	Shell-Thick	1505	COMB1U	Combination	-149.6	-51.54	24.79	508.285	-453.0056	-497.1469	1220.9	-692.83
1489	1489	Shell-Thick	1723	COMB1U	Combination	-160.9	176.26	72.09	427.5639	-569.5265	-304.7476	1220.9	-692.83
1489	1489	Shell-Thick	306	COMB1U	Combination	-209.8	166.48	-71.19	985.2958	-379.1684	-494.7857	1220.9	-692.83
1490	1490	Shell-Thick	1572	COMB1U	Combination	-169.7	-50.47	24.38	507.9227	-554.0647	-214.5289	-13.82	-965.06
1490	1490	Shell-Thick	1213	COMB1U	Combination	-221.4	-60.81	78.23	769.9745	-348.6708	-176.064	-13.82	-965.06
1490	1490	Shell-Thick	306	COMB1U	Combination	-199.4	177.23	71.47	777.0342	-371.9144	-386.2576	-13.82	-965.06
1490	1490	Shell-Thick	1723	COMB1U	Combination	-144.4	188.23	10.06	496.5182	-605.1988	-415.8333	-13.82	-965.06
1682	1682	Shell-Thick	1545	COMB1U	Combination	-9.91	44.02	-38.71	62.6704	-56.5749	-236.4867	88.89	318.3
1682	1682	Shell-Thick	1628	COMB1U	Combination	-17.88	42.43	-52.58	14.8633	-153.489	-270.6354	88.89	318.3
1682	1682	Shell-Thick	1815	COMB1U	Combination	-13.71	63.26	-55.54	50.6337	-85.8568	-235.5813	88.89	318.3
1682	1682	Shell-Thick	1812	COMB1U	Combination	-5.75	64.85	-41.67	100.4193	5.3321	-201.4326	88.89	318.3
								M+	**1071.3492**	**665.6927**	**V+**	**4460.94**	**4658.41**
								M-	**-1877.827**	**- 2136.4037**	**V-**	**-4422.03**	**-4324.98**

TABLE: Element Forces - Area Shells (LONGITUDINAL STOPPER Kombinasi 2Ultimate)

Area	Area Elem	ShellType	Joint	Output Case	Case Type	Step Type	F11	F22	F12	M11	M22	M12	V13	V23
Text	Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
12	12	Shell-Thick	1478	COMB2U	Combination	Max	11.06	35.15	3.05	-24.36	451.7739	78.1778	114.45	320.79
12	**12**	**Shell-Thick**	**1479**	**COMB2U**	**Combination**	**Max**	**3.27**	**44.16**	**3.13**	**27.2966**	**541.1178**	**135.8951**	**114.45**	**320.79**
12	12	Shell-Thick	85	COMB2U	Combination	Max	-2.06	27.32	0.25	-24.8277	470.814	107.6147	114.45	320.79
12	12	Shell-Thick	83	COMB2U	Combination	Max	5.64	18.25	0.86	-71.0159	385.082	60.3553	114.45	320.79
1173	1173	Shell-Thick	1480	COMB2U	Combination	Max	78.29	1246.7	656.27	-1258.652	-632.1908	270.7202	3646.54	3785.17

1173	1173	Shell-Thick	429	COMB2U	Combination	Max	318.36	1295.99	783.38	-1384.334	-1652.854	-0.9997	3646.54	3785.17
1173	1173	Shell-Thick	1514	COMB2U	Combination	Max	241.5	1028.51	1408.65	-1432.254	-1646.382	-3.2695	3646.54	3785.17
1173	1173	Shell-Thick	1517	COMB2U	Combination	Max	7.04	972.18	841.37	-1131.061	-585.3903	265.785	3646.54	3785.17
1173	1173	Shell-Thick	1480	COMB2U	Combination	Min	-239.1	997.84	-480.55	-1424.522	-710.7265	188.7046	3541.8	3643.01
1173	**1173**	**Shell-Thick**	**429**	**COMB2U**	**Combination**	**Min**	**15.72**	**1047.53**	**51.53**	**-1642.928**	**-1732.953**	**-78.2206**	**3541.8**	**3643.01**
1173	**1173**	**Shell-Thick**	**1514**	**COMB2U**	**Combination**	**Min**	**-4.49**	**829.62**	**668.43**	**-1661.491**	**-1721.700**	**-71.342**	**3541.8**	**3643.01**
1173	1173	Shell-Thick	1517	COMB2U	Combination	Min	-264.9	786.97	576.52	-1238.194	-665.7968	198.2486	3541.8	3643.01
1488	1488	Shell-Thick	1570	COMB2U	Combination	Min	-82.76	-97.17	15.93	-175.0041	-636.6645	-206.6195	382.83	-724.84
1488	1488	Shell-Thick	1569	COMB2U	Combination	Min	-143.3	-117.43	90.35	-16.8771	-171.6589	-439.4184	382.83	-724.84
1488	1488	Shell-Thick	1727	COMB2U	Combination	Min	-118.6	6.92	10.02	-9.4394	-138.0863	-443.5682	382.83	-724.84
1488	1488	Shell-Thick	1726	COMB2U	Combination	Min	-58.01	26.62	-64.97	-117.7236	-593.6295	-210.2683	382.83	-724.84
1489	**1489**	**Shell-Thick**	**235**	**COMB2U**	**Combination**	**Max**	**-128.7**	**-40.69**	**-83.41**	**622.5739**	**-151.8146**	**-535.3048**	**884.28**	**-496.96**
1489	1489	Shell-Thick	1505	COMB2U	Combination	Max	-45.79	-23.58	24.21	226.7253	-306.4427	-364.3368	884.28	-496.96
1489	1489	Shell-Thick	1723	COMB2U	Combination	Max	-59.01	145.16	64.9	169.6176	-384.577	-217.4038	884.28	-496.96
1489	1489	Shell-Thick	306	COMB2U	Combination	Max	-128.8	143.34	-35.47	565.1136	-231.3534	-385.2159	884.28	-496.96
1491	1491	Shell-Thick	1214	COMB2U	Combination	Min	-127.8	-16.07	-5.14	-9.2505	-43.8865	-304.7409	-31.65	-562.33
1491	1491	Shell-Thick	1576	COMB2U	Combination	Min	-109.6	-13.16	0.14	-8.4574	-131.2646	-314.8429	-31.65	-562.33
1491	1491	Shell-Thick	1727	COMB2U	Combination	Min	-106.9	-0.47	85.94	-26.2961	-187.6738	-436.4125	-31.65	-562.33
1491	1491	Shell-Thick	528	COMB2U	Combination	Min	-108.2	-0.0323	71.65	-29.4249	-171.4051	-453.7752	-31.65	-562.33
1500	1500	Shell-Thick	1508	COMB2U	Combination	Min	-154.4	-528.21	-247.31	-617.1286	-233.5813	-226.4678	-3105.9	-3305.6
1500	1500	Shell-Thick	438	COMB2U	Combination	Min	-258.2	-632.19	-224.06	-1419.824	-1148.18	-92.6906	-3105.9	-3305.6
1500	1500	Shell-Thick	1731	COMB2U	Combination	Min	-191.8	-271.24	-868.16	-1259.954	-1141.635	-62.4937	-3105.9	-3305.6
1500	1500	Shell-Thick	1732	COMB2U	Combination	Min	-89.54	-167.26	-597.73	-512.111	-236.4751	-150.6621	-3105.9	-3305.6
1602	1602	Shell-Thick	438	COMB2U	Combination	Min	-22.67	601.23	-653.06	-1477.806	-1453.098	-71.6767	-3446.4	3118.92
1602	1602	Shell-Thick	1510	COMB2U	Combination	Min	-72.23	529.73	-618.57	-859.8504	-389.8066	-234.1981	-3446.4	3118.92
1602	1602	Shell-Thick	1758	COMB2U	Combination	Min	-117.1	226.15	-916.5	-721.4033	-334.3025	-243.97	-3446.4	3118.92
1602	1602	Shell-Thick	1731	COMB2U	Combination	Min	-67.5	297.99	-1213.9	-1318.742	-1393.092	-83.4539	-3446.4	3118.92
									M+	**622.5739**	**541.1178**	**V+**	**3646.54**	**3785.17**
									M-	**-1661.491**	**-1732.953**	**V-**	**-3446.4**	**-3305.6**

TABLE: Element Forces - Area Shells (LONGITUDINAL STOPPER Kombinasi 3Ultimate)

Area	Area Elem	Shell Type	Joint	Output Case	CaseType	Step Type	F11	F22	F12	M11	M22	M12	V13	V23
Text	Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
11	11	Shell-Thick	233	COMB3U	Combination	Max	6.850	48.560	8.230	19.831	23.573	15.896	1.890	-97.79
11	11	Shell-Thick	63	COMB3U	Combination	Max	-1.970	17.450	12.080	10.212	40.784	16.149	1.890	-97.79
11	11	Shell-Thick	84	COMB3U	Combination	Max	-4.910	16.340	10.620	18.174	87.648	26.958	1.890	-97.79
11	11	Shell-Thick	1489	COMB3U	Combination	Max	4.230	47.750	7.670	24.607	72.565	33.883	1.890	-97.79
11	11	Shell-Thick	233	COMB3U	Combination	Min	1.830	40.680	0.460	15.054	0.567	7.322	-4.710	-118.95

11	11	Shell-Thick	63	COMB3U	Combination	Min	-5.770	-7.510	2.620	7.461	19.334	10.785	-4.710	-118.95
11	11	Shell-Thick	84	COMB3U	Combination	Min	-8.320	-6.430	1.090	15.609	76.236	21.572	-4.710	-118.95
11	11	Shell-Thick	1489	COMB3U	Combination	Min	-1.210	41.830	-1.080	23.634	59.916	26.790	-4.710	-118.95
12	12	Shell-Thick	1478	COMB3U	Combination	Max	8.110	39.340	3.050	-23.448	459.307	80.537	115.780	329.68
12	**12**	**Shell-Thick**	**1479**	**COMB3U**	**Combination**	**Max**	**3.600**	**40.610**	**4.190**	**28.590**	**545.713**	**137.577**	**115.780**	**329.68**
12	12	Shell-Thick	85	COMB3U	Combination	Max	-2.100	27.080	0.640	-23.363	474.311	107.721	115.780	329.68
12	12	Shell-Thick	83	COMB3U	Combination	Max	2.080	25.560	-0.200	-70.273	391.614	61.183	115.780	329.68
12	12	Shell-Thick	1478	COMB3U	Combination	Min	-0.180	14.990	2.330	-26.755	435.159	72.514	111.490	300.89
12	12	Shell-Thick	1479	COMB3U	Combination	Min	0.450	7.700	0.620	24.682	528.967	132.187	111.490	300.89
12	12	Shell-Thick	85	COMB3U	Combination	Min	-2.660	-22.860	-2.930	-28.344	461.356	106.203	111.490	300.89
12	12	Shell-Thick	83	COMB3U	Combination	Min	-2.940	-15.190	-1.220	-72.592	370.894	56.962	111.490	300.89
13	13	Shell-Thick	1479	COMB3U	Combination	Max	5.980	50.420	-0.170	12.379	473.227	126.717	93.460	133.31
13	13	Shell-Thick	1481	COMB3U	Combination	Max	7.690	48.650	-1.390	41.462	505.505	145.719	93.460	133.31
13	13	Shell-Thick	86	COMB3U	Combination	Max	-1.250	21.650	3.760	-10.828	475.949	132.028	93.460	133.31
13	13	Shell-Thick	85	COMB3U	Combination	Max	-2.500	23.660	5.080	-33.052	444.657	118.451	93.460	133.31
1168	1168	Shell-Thick	230	COMB3U	Combination	Min	-18.270	1.270	8.910	340.683	-230.594	-44.157	365.130	-602.04
1168	1168	Shell-Thick	1478	COMB3U	Combination	Min	-10.280	10.130	7.310	94.082	-497.272	57.826	365.130	-602.04
1168	1168	Shell-Thick	1513	COMB3U	Combination	Min	-5.840	31.950	-0.640	-32.023	-612.445	186.237	365.130	-602.04
1168	1168	Shell-Thick	299	COMB3U	Combination	Min	-15.360	22.160	1.710	182.776	-377.458	114.843	365.130	-602.04
1169	1169	Shell-Thick	429	COMB3U	Combination	Max	-237.84	-638.590	393.610	-1379.11	-791.874	7.994	3352.240	-3056.89
1169	1169	Shell-Thick	241	COMB3U	Combination	Max	525.750	-515.430	58.340	-746.565	224.148	423.795	3352.240	-3056.89
1169	1169	Shell-Thick	1248	COMB3U	Combination	Max	594.470	-322.810	677.290	-767.325	200.891	410.795	3352.240	-3056.89
1169	1169	Shell-Thick	1514	COMB3U	Combination	Max	-257.20	-456.510	1116.560	-1244.46	-788.872	0.077	3352.240	-3056.89
1169	1169	Shell-Thick	429	COMB3U	Combination	Min	-352.77	-994.370	272.070	-1490.57	-885.251	-89.863	3179.360	-3203.56
1169	1169	Shell-Thick	241	COMB3U	Combination	Min	305.370	-833.190	-55.050	-935.508	83.026	315.757	3179.360	-3203.56
1169	1169	Shell-Thick	1248	COMB3U	Combination	Min	386.270	-509.790	439.970	-936.849	67.334	308.874	3179.360	-3203.56
1169	1169	Shell-Thick	1514	COMB3U	Combination	Min	-424.34	-708.560	645.310	-1367.52	-878.096	-104.62	3179.360	-3203.56
1173	1173	Shell-Thick	429	COMB3U	Combination	Max	253.160	1375.940	582.040	-1468.99	-1570.79	9.535	3690.440	3835.14
1173	1173	Shell-Thick	1514	COMB3U	Combination	Max	187.620	1083.100	1324.070	-1491.99	-1562.09	14.509	3690.440	3835.14
1173	1173	Shell-Thick	1517	COMB3U	Combination	Max	-69.940	1021.500	869.660	-1075.24	-535.563	276.590	3690.440	3835.14
1173	1173	Shell-Thick	1480	COMB3U	Combination	Min	-137.71	928.080	-84.180	-1487.01	-770.774	178.927	3497.900	3593.04
1173	**1173**	**Shell-Thick**	**429**	**COMB3U**	**Combination**	**Min**	**80.920**	**967.580**	**252.870**	**-1558.26**	**-1815.01**	**-88.756**	**3497.900**	**3593.04**
1173	**1173**	**Shell-Thick**	**1514**	**COMB3U**	**Combination**	**Min**	**49.380**	**775.030**	**753.010**	**-1601.76**	**-1805.99**	**-89.120**	**3497.900**	**3593.04**
1173	1173	Shell-Thick	1517	COMB3U	Combination	Min	-187.96	737.650	548.220	-1294.02	-715.624	187.443	3497.900	3593.04
1488	1488	Shell-Thick	1570	COMB3U	Combination	Max	-12.870	-83.330	63.620	-122.876	-604.322	-158.84	419.550	-719.16
1488	1488	Shell-Thick	1569	COMB3U	Combination	Max	-68.420	-101.140	151.100	43.446	-142.299	-410.32	419.550	-719.16
1488	1488	Shell-Thick	1727	COMB3U	Combination	Max	-43.710	21.020	35.260	44.927	-113.192	-413.21	419.550	-719.16
1488	1488	Shell-Thick	1726	COMB3U	Combination	Max	11.850	40.130	-50.330	-65.050	-564.540	-161.88	419.550	-719.16
1492	1492	Shell-Thick	1569	COMB3U	Combination	Max	-43.820	96.130	-502.870	43.393	-130.792	-407.14	-152.460	-838.75
1492	1492	Shell-Thick	1216	COMB3U	Combination	Max	-99.810	86.070	-477.870	57.273	-90.505	-390.96	-152.460	-838.75
1492	1492	Shell-Thick	528	COMB3U	Combination	Max	-26.200	-83.330	72.590	53.783	-105.828	-414.36	-152.460	-838.75
1492	1492	Shell-Thick	1727	COMB3U	Combination	Max	-95.950	-98.560	57.320	19.648	-247.556	-417.30	-152.460	-838.75
1492	1492	Shell-Thick	1569	COMB3U	Combination	Min	-121.76	48.490	-548.830	4.727	-142.072	-440.90	-167.160	-841.49

1492	1492	Shell-Thick	1216	COMB3U	Combination	Min	-171.76	37.360	-524.110	16.206	-106.495	-422.72	-167.160	-841.49
1492	1492	Shell-Thick	528	COMB3U	Combination	Min	-84.910	-190.260	58.620	12.529	-122.964	-464.93	-167.160	-841.49
1492	1492	Shell-Thick	1727	COMB3U	Combination	Min	-161.28	-204.250	44.410	-16.382	-250.423	-468.18	-167.160	-841.49
1500	1500	Shell-Thick	1508	COMB3U	Combination	Min	-67.570	-593.200	-72.680	-653.085	-260.783	-222.86	-3169.30	-3369.58
1500	1500	Shell-Thick	438	COMB3U	Combination	Min	-131.11	-654.310	-164.970	-1310.86	-1154.81	-99.615	-3169.30	-3369.58
1500	1500	Shell-Thick	1731	COMB3U	Combination	Min	-63.320	-218.570	-744.280	-1151.28	-1134.32	-60.326	-3169.30	-3369.58
1500	1500	Shell-Thick	1732	COMB3U	Combination	Min	-17.710	-157.470	-563.610	-541.594	-245.947	-156.02	-3169.30	-3369.58
1602	1602	Shell-Thick	438	COMB3U	Combination	Min	60.320	496.010	-326.510	-1381.46	-1518.68	-67.028	-3517.65	3021.68
1602	1602	Shell-Thick	1510	COMB3U	Combination	Min	-77.010	450.050	-195.530	-901.639	-426.358	-245.19	-3517.65	3021.68
1602	1602	Shell-Thick	1758	COMB3U	Combination	Min	-115.27	235.250	-697.040	-743.552	-360.392	-263.59	-3517.65	3021.68
1602	1602	Shell-Thick	1731	COMB3U	Combination	Min	22.060	281.310	-933.440	-1235.77	-1454.26	-92.097	-3517.65	3021.68
									M+	**620.120**	**545.713**	**V+**	**3690.440**	**3835.14**
									M-	**-1601.76**	**-1815.01**	**V-**	**-3517.65**	**-3369.58**

TABLE: Element Forces - Area Shells (PIERHEAD Kombinasi 1Ultimate)													
Area	**Area Elem**	**Shell Type**	**Joint**	**Output Case**	**Case Type**	**F11**	**F22**	**F12**	**M11**	**M22**	**M12**	**V13**	**V23**
Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
186	186	Shell-Thick	230	COMB1U	Combination	-5.73	4.49	4.2	-159.4575	-403.428	-30.2042	-468.61	-1146.9
186	186	Shell-Thick	299	COMB1U	Combination	2.09	26.42	21.28	53.5184	-398.4592	-12.8623	-468.61	-1146.9
186	186	Shell-Thick	349	COMB1U	Combination	11.7	32.08	20.71	199.7221	51.821	20.3061	-468.61	-1146.9
186	186	Shell-Thick	350	COMB1U	Combination	3.92	10.02	4.02	-44.4298	36.47	-57.0815	-468.61	-1146.9
325	325	Shell-Thick	308	COMB1U	Combination	-73.51	9.23	8.32	32.4018	-493.9538	-73.9897	-1705.05	-1714.53
325	325	Shell-Thick	355	COMB1U	Combination	-105.3	2.87	6.98	296.9377	197.806	-41.6757	-1705.05	-1714.53
325	325	Shell-Thick	262	COMB1U	Combination	-106.4	-3.86	7.77	132.0253	168.9521	-67.8364	-1705.05	-1714.53
325	325	Shell-Thick	257	COMB1U	Combination	-74.64	2.5	9.11	-132.7299	-522.1803	-100.1437	-1705.05	-1714.53
345	345	Shell-Thick	351	COMB1U	Combination	-5.29	18.74	14.13	228.4645	141.9316	10.9986	943.26	-1611.66
345	345	Shell-Thick	302	COMB1U	Combination	9.76	21.75	8.71	3.5239	-421.8276	-37.9904	943.26	-1611.66
345	345	Shell-Thick	527	COMB1U	Combination	1.73	-24.7	13.04	-186.738	-451.862	10.2898	943.26	-1611.66
345	345	Shell-Thick	546	COMB1U	Combination	-13.32	-27.71	18.46	40.3619	110.586	59.1428	943.26	-1611.66
348	348	Shell-Thick	353	COMB1U	Combination	-83.39	-46.94	-13.16	303.957	288.0031	-33.9877	-844.97	991.08
348	348	Shell-Thick	303	COMB1U	Combination	-93.72	-49.01	27.94	132.776	-60.3079	-12.1362	-844.97	991.08
348	348	Shell-Thick	552	COMB1U	Combination	-74.82	24.49	50.43	98.0222	-74.3653	-1.6944	-844.97	991.08
348	348	Shell-Thick	553	COMB1U	Combination	-64.49	26.56	9.33	250.3513	270.1108	-23.3393	-844.97	991.08
351	351	Shell-Thick	304	COMB1U	Combination	-12.84	69.33	52.49	-48.8426	-514.216	-27.9779	-1225.26	-1857.06
351	351	Shell-Thick	353	COMB1U	Combination	-57.61	60.37	11.07	302.418	221.3108	-21.9481	-1225.26	-1857.06
351	351	Shell-Thick	553	COMB1U	Combination	-93.97	-41.05	-68.64	225.9097	212.871	-43.1231	-1225.26	-1857.06
351	351	Shell-Thick	236	COMB1U	Combination	-49.19	-32.09	-27.22	-100.4852	-517.76	-49.4254	-1225.26	-1857.06
355	355	Shell-Thick	307	COMB1U	Combination	-137.1	-9.35	10.73	155.5133	-70.5407	-80.524	673.03	970.4

355	355	Shell-Thick	355	COMB1U	Combination	-104.7	-2.86	12.59	301.3159	302.5795	-2.7019	673.03	970.4
355	355	Shell-Thick	556	COMB1U	Combination	-100.9	17.05	11.84	244.2431	279.3299	-11.0273	673.03	970.4
355	355	Shell-Thick	557	COMB1U	Combination	-133.4	10.56	9.98	116.1251	-90.2217	-89.1889	673.03	970.4
359	359	Shell-Thick	306	COMB1U	Combination	-98.23	-15.81	-31.74	7.9135	-515.6974	-63.3933	-1368.46	-1903.15
359	359	Shell-Thick	354	COMB1U	Combination	-103.7	-16.91	25.67	324.9045	236.7778	-30.109	-1368.46	-1903.15
359	359	Shell-Thick	559	COMB1U	Combination	-96.77	4.65	38.95	219.4805	219.4882	-53.1325	-1368.46	-1903.15
359	359	Shell-Thick	235	COMB1U	Combination	-91.27	5.75	-18.46	-77.4501	-529.1228	-86.7847	-1368.46	-1903.15
360	360	Shell-Thick	355	COMB1U	Combination	-103.9	3.15	10.38	281.6987	161.9829	-28.6252	932.62	-1795.6
360	360	Shell-Thick	308	COMB1U	Combination	-76.82	8.57	5.31	-9.0347	-469.458	-87.4172	932.62	-1795.6
360	360	Shell-Thick	537	COMB1U	Combination	-81.19	-10.56	2.05	-69.3276	-477.6579	-63.8618	932.62	-1795.6
360	360	Shell-Thick	556	COMB1U	Combination	-108.3	-15.98	7.12	208.3571	151.1222	-4.8193	932.62	-1795.6
372	372	Shell-Thick	310	COMB1U	Combination	-66.85	2.86	-10.66	74.8477	-406.2743	-37.9588	-851.19	-1296.21
372	372	Shell-Thick	356	COMB1U	Combination	-78.97	0.44	-6.1	241.1359	107.3675	-36.3945	-851.19	-1296.21
372	372	Shell-Thick	569	COMB1U	Combination	-78.24	6.82	-8.51	-6.5374	88.2835	-77.1439	-851.19	-1296.21
372	372	Shell-Thick	542	COMB1U	Combination	-66.13	9.24	-13.06	-171.9122	-423.7216	-78.7669	-851.19	-1296.21
415	415	Shell-Thick	351	COMB1U	Combination	-22.48	-23.66	-5.21	295.9135	292.3001	-26.0505	-876.55	1023.08
415	415	Shell-Thick	301	COMB1U	Combination	-8.74	-20.92	12.98	95.3493	-72.0913	19.6693	-876.55	1023.08
415	415	Shell-Thick	592	COMB1U	Combination	-2.12	7.95	18.01	79.3295	-82.3739	27.9998	-876.55	1023.08
415	415	Shell-Thick	593	COMB1U	Combination	-15.86	5.2	-0.18	249.7666	275.9633	-17.5739	-876.55	1023.08
424	424	Shell-Thick	312	COMB1U	Combination	45.7	-72.87	-19.47	-124.5958	-626.5597	-44.4542	-1194.41	-2266.67
424	424	Shell-Thick	357	COMB1U	Combination	-4.92	-83	-23.82	220.8494	256.1438	-2.6809	-1194.41	-2266.67
424	424	Shell-Thick	597	COMB1U	Combination	6.55	-73.08	21.48	152.2747	244.7799	-16.1448	-1194.41	-2266.67
424	424	Shell-Thick	245	COMB1U	Combination	57.17	-62.96	25.83	-160.5732	-631.4483	-58.1685	-1194.41	-2266.67
588	588	Shell-Thick	353	COMB1U	Combination	-54.72	60.95	37.73	247.6883	131.5594	-0.9602	1032.44	-1577.17
588	588	Shell-Thick	304	COMB1U	Combination	-28.88	66.12	29.91	44.8313	-416.6729	-49.4172	1032.44	-1577.17
588	588	Shell-Thick	1186	COMB1U	Combination	-47.3	-14.87	16.54	-169.7505	-451.0443	-8.2118	1032.44	-1577.17
588	588	Shell-Thick	1182	COMB1U	Combination	-73.13	-20.04	24.37	35.7751	95.7269	40.0744	1032.44	-1577.17
642	642	Shell-Thick	356	COMB1U	Combination	-84.01	-0.57	-10.47	264.9052	146.2805	-20.6289	1383.04	-1745.16
642	642	Shell-Thick	310	COMB1U	Combination	-75.22	1.19	-7.13	1.8464	-455.0154	-54.4015	1383.04	-1745.16
642	642	Shell-Thick	1233	COMB1U	Combination	-73.21	11.55	-7.06	-85.7147	-473.5366	-35.2888	1383.04	-1745.16
642	642	Shell-Thick	1229	COMB1U	Combination	-82	9.79	-10.4	175.8344	127.0326	-1.4924	1383.04	-1745.16
647	647	Shell-Thick	357	COMB1U	Combination	-18.34	-85.68	-26.22	242.6561	249.0429	-4.2344	1230.56	-2435.17
647	647	Shell-Thick	312	COMB1U	Combination	109.43	-60.13	22.4	-134.6205	-617.0986	-42.874	1230.56	-2435.17
647	647	Shell-Thick	1237	COMB1U	Combination	110.79	-54.06	23.32	-144.5708	-619.9216	-37.1107	1230.56	-2435.17
647	647	Shell-Thick	1235	COMB1U	Combination	-16.97	-79.61	-25.31	202.2967	240.097	1.5587	1230.56	-2435.17
663	663	Shell-Thick	539	COMB1U	Combination	-43.76	69.83	-83.19	135.4594	-325.7685	-30.2188	-915.5	-907.37
663	663	Shell-Thick	573	COMB1U	Combination	25.23	83.63	-55.7	208.9294	47.2139	-27.4088	-915.5	-907.37
663	663	Shell-Thick	1242	COMB1U	Combination	4.14	-11.32	-69	-221.4757	-6.9206	-27.9563	-915.5	-907.37
663	663	Shell-Thick	1249	COMB1U	Combination	-64.85	-25.12	-96.49	-297.0586	-373.6871	-30.5071	-915.5	-907.37
1645	1645	Shell-Thick	236	COMB1U	Combination	-67.79	-35.81	-40.88	23.5029	-402.5449	-51.4708	-976.72	-1298.58
1645	1645	Shell-Thick	553	COMB1U	Combination	-83.51	-38.96	-51.48	182.8655	113.8479	-40.6106	-976.72	-1298.58

1645	1645	Shell-Thick	1797	COMB1U	Combination	-58.22	-39.39	68.74	20.1409	94.0838	-61.0816	-976.72	-1298.58
1645	1645	Shell-Thick	1504	COMB1U	Combination	-42.51	-36.25	79.34	-139.6946	-421.7172	-71.9154	-976.72	-1298.58
								M+	**324.9045**	**302.5795**	**V+**	**1383.04**	**1023.08**
								M-	**-297.0586**	**-631.4483**	**V-**	**-1705.05**	**-2435.17**

TABLE: Element Forces - Area Shells (PIERHEAD Kombinasi 2Ultimate)														
Area	**Area Elem**	**Shell Type**	**Joint**	**Output Case**	**Case Type**	**Step Type**	**F11**	**F22**	**F12**	**M11**	**M22**	**M12**	**V13**	**V23**
Text	Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
186	186	Shell-Thick	230	COMB2U	Combination	Max	0.89	9.35	10.14	-130.344	-331.2055	-24.3518	-383.22	-943.17
186	186	Shell-Thick	299	COMB2U	Combination	Max	6.96	30.55	27.81	44.8833	-326.1997	-9.4342	-383.22	-943.17
186	186	Shell-Thick	349	COMB2U	Combination	Max	20.63	32.37	26.49	166.0162	44.6715	18.5374	-383.22	-943.17
186	186	Shell-Thick	350	COMB2U	Combination	Max	14.07	11.29	11.23	-35.0132	31.0532	-45.7738	-383.22	-943.17
186	186	Shell-Thick	230	COMB2U	Combination	Min	-10.68	-0.35	-2.6	-130.750	-331.8908	-24.5194	-385.34	-945.36
186	186	Shell-Thick	299	COMB2U	Combination	Min	-3.96	13.84	8.09	44.231	-327.4514	-10.0033	-385.34	-945.36
186	186	Shell-Thick	349	COMB2U	Combination	Min	-0.64	19.87	8.66	164.755	42.8366	17.4958	-385.34	-945.36
186	186	Shell-Thick	350	COMB2U	Combination	Min	-6.78	5.4	-3.8	-35.7375	29.9453	-46.3772	-385.34	-945.36
325	325	Shell-Thick	308	COMB2U	Combination	Min	-64.66	-2.49	-10.25	10.2645	-350.4962	-57.2456	-1232.8	-1211.3
325	325	Shell-Thick	355	COMB2U	Combination	Min	-106.5	-7.96	-12.07	196.2901	137.8657	-34.0402	-1232.8	-1211.3
325	325	Shell-Thick	262	COMB2U	Combination	Min	-108.4	-9.86	-12.46	77.3931	116.7053	-52.4102	-1232.8	-1211.3
325	325	Shell-Thick	257	COMB2U	Combination	Min	-66.5	-8.47	-10.64	-109.284	-371.1143	-75.6087	-1232.8	-1211.3
372	372	Shell-Thick	310	COMB2U	Combination	Max	-32.74	9.77	8.55	44.3446	-286.6244	-28.6396	-583.87	-910.74
372	372	Shell-Thick	356	COMB2U	Combination	Max	-36.06	11.67	9.27	161.8095	75.193	-27.2906	-583.87	-910.74
372	372	Shell-Thick	569	COMB2U	Combination	Max	-37.23	6.58	2.34	-12.4143	61.2492	-56.1465	-583.87	-910.74
372	372	Shell-Thick	542	COMB2U	Combination	Max	-29.18	11.67	0.86	-128.218	-299.3185	-57.1655	-583.87	-910.74
372	372	Shell-Thick	310	COMB2U	Combination	Min	-58.68	-5.95	-25.03	40.9184	-289.3355	-29.5279	-604.15	-914.82
372	372	Shell-Thick	356	COMB2U	Combination	Min	-74.2	-11.62	-18.77	157.3544	71.9026	-28.998	-604.15	-914.82
372	372	Shell-Thick	569	COMB2U	Combination	Min	-71.9	3.42	-15.54	-14.2359	59.9226	-57.3128	-604.15	-914.82
372	372	Shell-Thick	542	COMB2U	Combination	Min	-61.1	2.1	-21.03	-130.799	-300.3637	-58.2742	-604.15	-914.82
415	**415**	**Shell-Thick**	**351**	**COMB2U**	**Combination**	**Max**	**21.21**	**-6.78**	**-0.43**	**243.6852**	**241.9885**	**-19.8415**	**-737.56**	**846.96**
415	415	Shell-Thick	301	COMB2U	Combination	Max	15.94	-3.48	14.76	79.6108	-57.7	15.0494	-737.56	846.96
415	415	Shell-Thick	592	COMB2U	Combination	Max	18.6	12.16	18.85	66.1334	-65.9984	21.8307	-737.56	846.96
415	415	Shell-Thick	593	COMB2U	Combination	Max	24.21	11.41	3.64	204.3891	228.6702	-13.0182	-737.56	846.96
415	415	Shell-Thick	351	COMB2U	Combination	Min	-53.25	-29.47	-8.73	239.8383	240.8946	-23.5666	-744.11	843.92
415	415	Shell-Thick	301	COMB2U	Combination	Min	-21.14	-27.4	4.13	75.849	-59.6535	11.2388	-744.11	843.92
415	415	Shell-Thick	592	COMB2U	Combination	Min	-13.91	0.04804	7.61	62.0993	-67.8933	17.9367	-744.11	843.92
415	415	Shell-Thick	593	COMB2U	Combination	Min	-46.36	-4.56	-5.23	201.2784	227.5114	-16.6652	-744.11	843.92

418	418	Shell-Thick	302	COMB2U	Combination	Max	54.56	34.25	43.1	-71.2126	-430.3996	-7.1354	-1021.9	-1592.8
418	418	Shell-Thick	351	COMB2U	Combination	Max	27.69	32.96	8.9	241.1643	201.1127	-12.4506	-1021.9	-1592.8
418	418	Shell-Thick	593	COMB2U	Combination	Max	19.67	-6.35	-3.95	191.7553	195.7544	-24.7595	-1021.9	-1592.8
418	418	Shell-Thick	234	COMB2U	Combination	Max	48.77	2.9	24.15	-95.3459	-431.091	-20.1551	-1021.9	-1592.8
418	418	Shell-Thick	302	COMB2U	Combination	Min	2.91	5.51	20.02	-82.9975	-434.8784	-13.7912	-1037.9	-1597.7
418	418	Shell-Thick	351	COMB2U	Combination	Min	-45.55	-8.26	-6.48	236.9276	199.5859	-15.9692	-1037.9	-1597.7
418	418	Shell-Thick	593	COMB2U	Combination	Min	-53.31	-15.48	-25.94	188.1818	194.6167	-28.8685	-1037.9	-1597.7
418	418	Shell-Thick	234	COMB2U	Combination	Min	-7.07	-9.66	6.65	-106.829	-434.4545	-26.2231	-1037.9	-1597.7
424	424	Shell-Thick	312	COMB2U	Combination	Max	138.91	-16.03	76.6	-101.602	-454.3925	-32.362	-827.62	-1639.6
424	424	Shell-Thick	357	COMB2U	Combination	Max	10.66	-43.07	52.02	147.0252	184.9544	-0.6271	-827.62	-1639.6
424	424	Shell-Thick	597	COMB2U	Combination	Max	27.05	-5.48	20.46	98.0959	177.0597	-10.1167	-827.62	-1639.6
424	424	Shell-Thick	245	COMB2U	Combination	Max	140.72	21.56	43.84	-125.015	-457.8635	-42.0736	-827.62	-1639.6
424	424	Shell-Thick	312	COMB2U	Combination	Min	-42.26	-89.24	-89.93	-102.506	-456.2082	-32.9823	-845.57	-1646.8
424	424	Shell-Thick	357	COMB2U	Combination	Min	-18.25	-83.05	-76.18	146.0069	182.3536	-3.0355	-845.57	-1646.8
424	424	Shell-Thick	597	COMB2U	Combination	Min	-18.66	-98.57	11	97.3665	173.9963	-12.6852	-845.57	-1646.8
424	**424**	**Shell-Thick**	**245**	**COMB2U**	**Combination**	**Min**	**-28.08**	**-104.77**	**-1.54**	**-127.986**	**-459.3426**	**-42.7839**	**-845.57**	**-1646.8**
642	642	Shell-Thick	356	COMB2U	Combination	Max	-35.15	4.99	16.23	178.3538	102.804	-16.3974	995.69	-1228.9
642	642	Shell-Thick	310	COMB2U	Combination	Max	-36.84	8.07	6.75	-7.1234	-321.2041	-40.0288	995.69	-1228.9
642	642	Shell-Thick	1233	COMB2U	Combination	Max	-32.8	16.26	5.5	-68.8773	-334.3543	-26.5502	995.69	-1228.9
642	642	Shell-Thick	1229	COMB2U	Combination	Max	-31.12	16.27	15.02	115.6551	89.2122	-2.9002	995.69	-1228.9
642	642	Shell-Thick	356	COMB2U	Combination	Min	-82.55	-6.43	-32.55	175.4008	100.0238	-17.9841	974.05	-1232.5
642	642	Shell-Thick	310	COMB2U	Combination	Min	-67.18	-6.77	-17.83	-7.5709	-323.5353	-41.005	974.05	-1232.5
642	642	Shell-Thick	1233	COMB2U	Combination	Min	-68.19	1.02	-16.87	-71.2322	-337.0682	-27.7486	974.05	-1232.5
642	642	Shell-Thick	1229	COMB2U	Combination	Min	-83.57	-1.73	-31.63	111.9542	86.1489	-4.7349	974.05	-1232.5
647	647	Shell-Thick	357	COMB2U	Combination	Min	-47.25	-80.49	-104.01	160.597	178.0412	-5.4998	879.77	-1769.0
647	647	Shell-Thick	312	COMB2U	Combination	Min	26.93	-74.06	5.8	-109.086	-449.8877	-33.5675	879.77	-1769.0
647	647	Shell-Thick	1237	COMB2U	Combination	Min	40.46	-51.01	-47.08	-117.392	-452.4152	-29.6638	879.77	-1769.0
647	647	Shell-Thick	1235	COMB2U	Combination	Min	-62.2	-88.96	-60.15	131.8261	171.492	-1.3395	879.77	-1769.0
663	663	Shell-Thick	539	COMB2U	Combination	Max	-26.04	69.8	-20.05	94.3656	-238.9641	-20.0578	-660.94	-664.04
663	663	Shell-Thick	573	COMB2U	Combination	Max	29.86	80.05	-31.58	147.0696	33.4526	-16.8074	-660.94	-664.04
663	663	Shell-Thick	1242	COMB2U	Combination	Max	13.04	18.95	-53.59	-164.385	-8.8934	-15.5074	-660.94	-664.04
663	663	Shell-Thick	1249	COMB2U	Combination	Max	-48.84	7.6	-14.81	-218.293	-276.9117	-18.9402	-660.94	-664.04
663	663	Shell-Thick	539	COMB2U	Combination	Min	-44.42	41.21	-105.96	91.9744	-242.0815	-21.9874	-679.9	-666.16
663	663	Shell-Thick	573	COMB2U	Combination	Min	13.54	53.73	-68.02	144.4003	31.4564	-17.2517	-679.9	-666.16
663	663	Shell-Thick	1242	COMB2U	Combination	Min	-0.93	-29.71	-62.43	-174.531	-11.1571	-16.3617	-679.9	-666.16
663	**663**	**Shell-Thick**	**1249**	**COMB2U**	**Combination**	**Min**	**-52.92**	**-41.14**	**-127.62**	**-228.825**	**-280.2515**	**-20.541**	**-679.9**	**-666.16**
									M+	**243.6852**	**241.9885**	**V+**	**995.69**	**846.96**
									M-	**-228.825**	**-459.3426**	**V-**	**-1232.8**	**-1769.1**

TABLE: Element Forces - Area Shells (PIERHEAD Kombinasi 3Ultimate)														
Area	**Area Elem**	**ShellType**	**Joint**	**Output Case**	**CaseType**	**Step Type**	**F11**	**F22**	**F12**	**M11**	**M22**	**M12**	**V13**	**V23**
Text	Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
186	186	Shell-Thick	230	COMB3U	Combination	Max	-2.64	8.89	7.87	-130.2967	-331.3357	-24.1909	-381.49	-941.06
186	186	Shell-Thick	299	COMB3U	Combination	Max	4.24	41.13	23.67	45.2729	-326.5478	-9.2022	-381.49	-941.06
186	186	Shell-Thick	349	COMB3U	Combination	Max	13.73	43.62	20.56	166.7244	45.2666	18.7408	-381.49	-941.06
186	186	Shell-Thick	350	COMB3U	Combination	Max	7.96	11.92	10.78	-34.9943	31.7021	-45.7609	-381.49	-941.06
186	186	Shell-Thick	230	COMB3U	Combination	Min	-7.16	0.11	-0.33	-130.7977	-331.7606	-24.6804	-387.07	-947.46
186	186	Shell-Thick	299	COMB3U	Combination	Min	-1.24	3.26	12.23	43.8415	-327.1033	-10.2352	-387.07	-947.46
186	186	Shell-Thick	349	COMB3U	Combination	Min	6.25	8.62	14.59	164.0468	42.2416	17.2924	-387.07	-947.46
186	186	Shell-Thick	350	COMB3U	Combination	Min	-0.67	4.77	-3.34	-35.7563	29.2964	-46.3901	-387.07	-947.46
325	325	Shell-Thick	308	COMB3U	Combination	Min	-66.72	-21.34	-15.14	11.9004	-350.2504	-58.6283	-1234.15	-1213.75
325	325	Shell-Thick	355	COMB3U	Combination	Min	-103.8	-24.93	-22.01	197.8711	137.8835	-35.1024	-1234.15	-1213.75
325	325	Shell-Thick	262	COMB3U	Combination	Min	-110.5	-7.45	-14.73	78.8187	116.6867	-53.3863	-1234.15	-1213.75
325	325	Shell-Thick	257	COMB3U	Combination	Min	-73.45	-5.11	-7.87	-107.3209	-370.4495	-76.8939	-1234.15	-1213.75
372	372	Shell-Thick	310	COMB3U	Combination	Max	-25.16	19.6	0.66	43.9415	-287.145	-27.6778	-587.24	-907.9
372	372	Shell-Thick	356	COMB3U	Combination	Max	-29.48	18.22	1.28	161.6781	75.3417	-26.5593	-587.24	-907.9
372	372	Shell-Thick	569	COMB3U	Combination	Max	-27.53	8.75	-0.97	-12.6679	61.9102	-55.4252	-587.24	-907.9
372	372	Shell-Thick	542	COMB3U	Combination	Max	-21.78	12.24	-4.15	-128.7992	-299.11	-56.4734	-587.24	-907.9
372	372	Shell-Thick	310	COMB3U	Combination	Min	-66.25	-15.78	-17.13	41.3216	-288.8149	-30.4897	-600.78	-917.66
372	372	Shell-Thick	356	COMB3U	Combination	Min	-80.78	-18.16	-10.78	157.4858	71.7539	-29.7293	-600.78	-917.66
372	372	Shell-Thick	569	COMB3U	Combination	Min	-81.6	1.25	-12.22	-13.9823	59.2617	-58.0341	-600.78	-917.66
372	372	Shell-Thick	542	COMB3U	Combination	Min	-68.5	1.52	-16.02	-130.2191	-300.5722	-58.9662	-600.78	-917.66
415	**415**	**Shell-Thick**	**351**	**COMB3U**	**Combination**	**Max**	**20.6**	**8.79**	**6.31**	**242.7415**	**241.6383**	**-18.9462**	**-739.82**	**845.97**
415	415	Shell-Thick	301	COMB3U	Combination	Max	30.59	12.07	20.21	80.4832	-57.4726	16.886	-739.82	845.97
415	415	Shell-Thick	592	COMB3U	Combination	Max	28.45	17.41	24.36	67.0431	-65.1713	23.8026	-739.82	845.97
415	415	Shell-Thick	593	COMB3U	Combination	Max	18.54	15.71	10.41	203.5691	228.8246	-12.2588	-739.82	845.97
415	**415**	**Shell-Thick**	**351**	**COMB3U**	**Combination**	**Min**	**-52.64**	**-45.03**	**-15.47**	**240.782**	**241.2449**	**-24.4619**	**-741.85**	**844.92**
415	415	Shell-Thick	301	COMB3U	Combination	Min	-35.79	-42.95	-1.32	74.9765	-59.8809	9.4022	-741.85	844.92
415	415	Shell-Thick	592	COMB3U	Combination	Min	-23.76	-5.2	2.1	61.1897	-68.7204	15.9648	-741.85	844.92
415	415	Shell-Thick	593	COMB3U	Combination	Min	-40.68	-8.87	-12	202.0984	227.357	-17.4246	-741.85	844.92
418	418	Shell-Thick	302	COMB3U	Combination	Max	58.74	61.45	46.32	-73.6743	-431.0423	-5.8895	-1027.52	-1594.47

418	418	Shell-Thick	351	COMB3U	Combination	Max	18.08	57	5.8	240.2406	200.6605	-11.6728	-1027.52	-1594.47
418	418	Shell-Thick	593	COMB3U	Combination	Max	13.15	-7.7	5.71	190.6352	195.9831	-24.0296	-1027.52	-1594.47
418	418	Shell-Thick	234	COMB3U	Combination	Max	54.45	-0.66	25.95	-97.0148	-431.7888	-18.8555	-1027.52	-1594.47
418	418	Shell-Thick	302	COMB3U	Combination	Min	-1.27	-21.69	16.81	-80.5358	-434.2357	-15.0371	-1032.43	-1596.09
418	418	Shell-Thick	351	COMB3U	Combination	Min	-35.94	-32.3	-3.37	237.8513	200.0381	-16.747	-1032.43	-1596.09
418	418	Shell-Thick	593	COMB3U	Combination	Min	-46.79	-14.12	-35.61	189.302	194.388	-29.5984	-1032.43	-1596.09
418	418	Shell-Thick	234	COMB3U	Combination	Min	-12.76	-6.09	4.85	-105.1604	-433.7567	-27.5227	-1032.43	-1596.09
424	424	Shell-Thick	312	COMB3U	Combination	Max	108.74	-10.88	22.09	-100.8504	-453.3389	-32.2297	-829.75	-1631.67
424	424	Shell-Thick	357	COMB3U	Combination	Max	15.8	-22.68	19.67	147.2484	186.2906	-0.6685	-829.75	-1631.67
424	424	Shell-Thick	597	COMB3U	Combination	Max	29.66	-15.36	24.37	98.552	178.39	-10.1463	-829.75	-1631.67
424	424	Shell-Thick	245	COMB3U	Combination	Max	118.24	-3.56	37.03	-125.2227	-456.8688	-41.9742	-829.75	-1631.67
424	424	Shell-Thick	312	COMB3U	Combination	Min	-12.09	-94.39	-35.41	-103.2584	-457.2618	-33.1147	-843.44	-1654.87
424	424	Shell-Thick	357	COMB3U	Combination	Min	-23.39	-103.44	-43.82	145.7836	181.0175	-2.9942	-843.44	-1654.87
424	424	Shell-Thick	597	COMB3U	Combination	Min	-21.26	-88.69	7.09	96.9104	172.6661	-12.6556	-843.44	-1654.87
424	**424**	**Shell-Thick**	**245**	**COMB3U**	**Combination**	**Min**	**-5.61**	**-79.65**	**5.27**	**-127.779**	**-460.3373**	**-42.8833**	**-843.44**	**-1654.87**
642	642	Shell-Thick	356	COMB3U	Combination	Max	-29.84	15.28	14.63	178.3502	102.9023	-15.6549	993.67	-1226.76
642	642	Shell-Thick	310	COMB3U	Combination	Max	-28.04	17.66	1.37	-7.1762	-321.5707	-39.0646	993.67	-1226.76
642	642	Shell-Thick	1233	COMB3U	Combination	Max	-23.83	23.22	7.72	-69.1762	-334.9449	-25.5892	993.67	-1226.76
642	642	Shell-Thick	1229	COMB3U	Combination	Max	-25.63	21.76	21.11	115.514	89.2211	-2.1628	993.67	-1226.76
647	647	Shell-Thick	357	COMB3U	Combination	Min	-36.93	-103.9	-60.26	160.1287	176.2695	-5.1891	882.38	-1777.69
647	647	Shell-Thick	312	COMB3U	Combination	Min	29.12	-81.64	2.07	-112.4801	-450.3152	-32.8056	882.38	-1777.69
647	647	Shell-Thick	1237	COMB3U	Combination	Min	32.15	-71.7	-14.84	-120.0316	-452.6428	-29.0187	882.38	-1777.69
647	647	Shell-Thick	1235	COMB3U	Combination	Min	-42.45	-103.4	-52.39	131.7702	169.7071	-0.9836	882.38	-1777.69
659	659	Shell-Thick	299	COMB3U	Combination	Max	-15.1	37.05	30.94	105.5783	-304.3294	-20.47	792.69	-996.31
659	659	Shell-Thick	1247	COMB3U	Combination	Max	-14.77	21.47	49.99	-223.4805	-335.1951	12.1309	792.69	-996.31
659	659	Shell-Thick	1238	COMB3U	Combination	Max	42.46	29.53	70.11	-114.628	0.9903	58.2286	792.69	-996.31
659	659	Shell-Thick	349	COMB3U	Combination	Min	18.04	10.41	21.97	210.2085	36.8054	24.9736	780.48	-999.07
659	659	Shell-Thick	299	COMB3U	Combination	Min	-26.54	-0.21	11.95	103.854	-304.7683	-22.6235	780.48	-999.07
659	**659**	**Shell-Thick**	**1247**	**COMB3U**	**Combination**	**Min**	**-19.93**	**17.46**	**23.86**	**-227.3719**	**-337.3553**	**10.4911**	**780.48**	**-999.07**
659	659	Shell-Thick	1238	COMB3U	Combination	Min	17.15	28.27	33.87	-118.0848	0.1292	57.2953	780.48	-999.07
659	659	Shell-Thick	299	COMB3U	Combination	Max	-15.1	37.05	30.94	105.5783	-304.3294	-20.47	792.69	-996.31
									M+	**242.7415**	**241.6383**	**V+**	**993.67**	**845.97**
									M-	**-227.3719**	**-460.3373**	**V-**	**-1234.15**	**-1777.69**

TABLE: Element Forces - Area Shells (KORBEL Kombinasi 1Ultimate)													
Area	**Area Elem**	**Shell Type**	**Joint**	**Output Case**	**Case Type**	**F11**	**F22**	**F12**	**M11**	**M22**	**M12**	**V13**	**V23**
Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
25	**25**	**Shell-Thick**	**1668**	**COMB1U**	**Combination**	**65.69**	**5.64**	**-14.24**	**-58.9832**	**153.8223**	**-293.5075**	**4.88**	**-156**
25	25	Shell-Thick	1153	COMB1U	Combination	59.12	-13.14	-28.03	-95.992	139.7292	-301.0239	4.88	-156
25	25	Shell-Thick	1152	COMB1U	Combination	179.15	10.86	-19.52	-260.4689	51.7871	-412.5446	4.88	-156
25	**25**	**Shell-Thick**	**1669**	**COMB1U**	**Combination**	**185.71**	**29.65**	**-5.73**	**-297.9667**	**51.3427**	**-404.8795**	**4.88**	**-156**
1400	1400	Shell-Thick	1161	COMB1U	Combination	62.52	-35.66	7.62	164.6163	-195.9536	-318.6804	132.61	160.71
1400	1400	Shell-Thick	1160	COMB1U	Combination	183.91	-11.38	33.81	161.6489	-82.9728	-315.5012	132.61	160.71
1400	1400	Shell-Thick	1677	COMB1U	Combination	192.43	26.55	28.08	115.1311	-95.8292	-305.3037	132.61	160.71
1400	**1400**	**Shell-Thick**	**1676**	**COMB1U**	**Combination**	**71.04**	**2.27**	**1.89**	**138.5469**	**-207.3702**	**-307.5421**	**132.61**	**160.71**
1401	1401	Shell-Thick	1166	COMB1U	Combination	126.43	7.97	68.48	16.4075	-78.4561	-251.2692	109.44	176.88
1401	1401	Shell-Thick	1167	COMB1U	Combination	64.38	-4.44	-32	21.8489	-189.999	-198.0151	109.44	176.88
1401	1401	Shell-Thick	1678	COMB1U	Combination	65.48	-18.38	-49.62	7.9266	-197.4954	-199.0632	109.44	176.88
1401	1401	Shell-Thick	1679	COMB1U	Combination	127.52	-5.97	50.86	46.8481	-77.5518	-252.0659	109.44	176.88
1402	1402	Shell-Thick	1165	COMB1U	Combination	45.24	3.26	29.31	114.5731	-194.5715	-228.9897	172.67	151.91
1402	1402	Shell-Thick	1164	COMB1U	Combination	151.19	24.45	21.9	89.8363	-100.4176	-272.548	172.67	151.91
1402	1402	Shell-Thick	1679	COMB1U	Combination	148.12	-1.85	12.64	11.21	-89.6122	-247.701	172.67	151.91
1402	1402	Shell-Thick	1678	COMB1U	Combination	42.16	-23.04	20.04	45.0241	-185.1185	-203.5482	172.67	151.91
1407	1407	Shell-Thick	1176	COMB1U	Combination	-19.92	18.24	39.44	-158.3175	-9.3946	-78.7556	-128.44	203.35
1407	1407	Shell-Thick	1177	COMB1U	Combination	11.99	24.62	-29.63	-229.3272	-169.8656	-91.0594	-128.44	203.35
1407	1407	Shell-Thick	1684	COMB1U	Combination	15.17	16.8	-51.47	-248.5226	-171.6285	-88.0347	-128.44	203.35
1407	1407	Shell-Thick	1685	COMB1U	Combination	-16.74	10.41	17.59	-155.0594	-6.8049	-75.6509	-128.44	203.35
1649	1649	Shell-Thick	1167	COMB1U	Combination	84.22	-0.47	76.31	-7.3671	-190.9186	-198.286	151.8	172.17
1649	1649	Shell-Thick	1166	COMB1U	Combination	109.74	4.63	2.62	47.0858	-77.2432	-250.9889	151.8	172.17
1649	1649	Shell-Thick	1799	COMB1U	Combination	114.37	22.44	-2.99	11.7271	-78.6444	-251.4667	151.8	172.17
1649	1649	Shell-Thick	1798	COMB1U	Combination	88.85	17.34	70.7	3.4371	-183.5861	-198.4591	151.8	172.17
1650	1650	Shell-Thick	1681	COMB1U	Combination	134.48	-12.57	57.61	-29.4003	-93.1026	-212.6132	113.91	128.39
1650	1650	Shell-Thick	1680	COMB1U	Combination	7.63	-37.94	-15.09	12.7289	-181.0464	-213.2508	113.91	128.39
1650	1650	Shell-Thick	1798	COMB1U	Combination	18.38	3.24	-28.28	27.9743	-174.4601	-225.645	113.91	128.39

1650	1650	Shell-Thick	1799	COMB1U	Combination	145.23	28.61	44.42	5.0811	-84.1736	-224.3197	113.91	128.39
1651	1651	Shell-Thick	1159	COMB1U	Combination	62.36	-21.8	2.57	180.9198	-191.8295	-315.73	135.76	160.69
1651	1651	Shell-Thick	1158	COMB1U	Combination	203.52	6.43	5.98	199.4463	-83.7185	-337.8629	135.76	160.69
1651	1651	Shell-Thick	1800	COMB1U	Combination	198.04	1.2	26.87	151.7728	-85.4582	-333.5446	135.76	160.69
1651	1651	Shell-Thick	1497	COMB1U	Combination	56.88	-27.03	23.47	154.5515	-192.0599	-310.435	135.76	160.69
1652	1652	Shell-Thick	1675	COMB1U	Combination	190.91	41.75	39.64	138.4717	-93.9776	-302.9569	96.66	142.76
1652	1652	Shell-Thick	1674	COMB1U	Combination	92.04	21.98	-31.6	163.6119	-194.2342	-340.0762	96.66	142.76
1652	1652	Shell-Thick	1497	COMB1U	Combination	81.25	-22.16	-20.88	134.463	-194.7986	-340.744	96.66	142.76
1652	1652	Shell-Thick	1800	COMB1U	Combination	180.12	-2.38	50.36	182.0328	-80.7183	-303.2236	96.66	142.76
1653	1653	Shell-Thick	1151	COMB1U	Combination	50.78	-14.46	11.12	143.389	-112.4192	-343.4995	72.25	144.32
1653	**1653**	**Shell-Thick**	**1150**	**COMB1U**	**Combination**	**196.3**	**14.64**	**25.04**	**253.3455**	**0.4006**	**-288.6415**	**72.25**	**144.32**
1653	1653	Shell-Thick	1801	COMB1U	Combination	198.2	27.12	27.39	221.7425	-32.8752	-315.9993	72.25	144.32
1653	1653	Shell-Thick	1802	COMB1U	Combination	52.67	-1.98	13.47	132.6531	-144.6842	-369.8321	72.25	144.32
1654	1654	Shell-Thick	1670	COMB1U	Combination	181.45	14.89	24.07	207.0055	-40.1779	-339.397	32.2	139.03
1654	1654	Shell-Thick	1671	COMB1U	Combination	65.85	-8.23	14.99	172.119	-139.6245	-355.6881	32.2	139.03
1654	1654	Shell-Thick	1802	COMB1U	Combination	68.55	1.19	10.85	147.1927	-140.5291	-351.3123	32.2	139.03
1654	1654	Shell-Thick	1801	COMB1U	Combination	184.15	24.31	19.93	238.3926	-30.8247	-334.443	32.2	139.03
1665	1665	Shell-Thick	1140	COMB1U	Combination	21.39	21.56	0.08943	139.283	21.762	-130.1759	50.44	143.92
1665	1665	Shell-Thick	1141	COMB1U	Combination	-27.23	11.83	-6.14	59.9739	-83.7396	-136.883	50.44	143.92
1665	1665	Shell-Thick	1807	COMB1U	Combination	-27.37	21.43	3.1	78.5497	-70.3365	-108.8444	50.44	143.92
1665	1665	Shell-Thick	1808	COMB1U	Combination	21.26	31.16	9.33	162.5143	34.5	-101.8386	50.44	143.92
1666	1666	Shell-Thick	1139	COMB1U	Combination	-56.55	-10.63	12.92	72.6062	-56.68	-100.4143	101.51	113.75
1666	1666	Shell-Thick	1138	COMB1U	Combination	35.46	7.77	21.26	171.3301	23.6266	-96.5214	101.51	113.75
1666	1666	Shell-Thick	1808	COMB1U	Combination	41.47	35.2	17.82	152.5546	18.9002	-103.4491	101.51	113.75
1666	1666	Shell-Thick	1807	COMB1U	Combination	-50.54	16.8	9.48	73.3053	-57.7888	-107.1847	101.51	113.75
								M+	**253.3455**	**153.8223**	**V+**	**172.67**	**203.35**
								M-	**-297.9667**	**-207.3702**	**V-**	**-198.48**	**-156**

TABLE: Element Forces - Area Shells (KORBEL Kombinasi 2Ultimate)														
Area	Area Elem	ShellType	Joint	Output Case	Case Type	Step Type	F11	F22	F12	M11	M22	M12	V13	V23
Text	Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
9	9	Shell-Thick	233	COMB2U	Combination	Max	1.26	36.57	16.15	-10.703	-29.8863	-8.6046	-0.079	88.34
9	9	Shell-Thick	63	COMB2U	Combination	Max	-0.97	18.13	-3.48	-15.6065	-30.1729	33.8856	-0.079	88.34
9	9	Shell-Thick	82	COMB2U	Combination	Max	6.31	17.24	-2.65	-8.5549	-23.9004	34.0329	-0.079	88.34
9	9	Shell-Thick	233	COMB2U	Combination	Min	-1.54	5.69	-21.1	-12.3092	-36.9474	-11.7084	-1.95	83.55
9	9	Shell-Thick	63	COMB2U	Combination	Min	-4.45	1.23	-11.58	-15.8905	-37.1742	32.5168	-1.95	83.55
9	9	Shell-Thick	82	COMB2U	Combination	Min	-8.98	2.66	-11.39	-8.9534	-31.2676	32.6622	-1.95	83.55
20	20	Shell-Thick	233	COMB2U	Combination	Min	-6.39	12.94	-14.67	-8.6012	-31.6612	9.1089	-10.71	47.11
25	**25**	**Shell-Thick**	**1668**	**COMB2U**	**Combination**	**Max**	**89.73**	**12.07**	**-6.07**	**94.0246**	**87.1286**	**-233.2427**	**58.31**	**-69.23**
25	25	Shell-Thick	1153	COMB2U	Combination	Max	83.97	-7.08	-18.97	64.3323	75.4324	-238.8391	58.31	-69.23
25	25	Shell-Thick	1152	COMB2U	Combination	Max	169.64	14.34	5	-51.4356	46.2834	-320.4985	58.31	-69.23
25	25	Shell-Thick	1669	COMB2U	Combination	Max	175.4	25.53	12.66	-81.4264	46.1251	-314.607	58.31	-69.23
25	25	Shell-Thick	1668	COMB2U	Combination	Min	35.37	-3.17	-18.35	47.5052	82.6625	-243.6506	8.09	-75.21
25	25	Shell-Thick	1153	COMB2U	Combination	Min	30.98	-13.31	-26.54	20.8042	72.3437	-249.7055	8.09	-75.21
25	25	Shell-Thick	1152	COMB2U	Combination	Min	127.39	1.69	-36.31	-101.1731	42.463	-341.1684	8.09	-75.21
25	25	Shell-Thick	1669	COMB2U	Combination	Min	131.79	19.79	-22.87	-134.2438	41.3167	-335.1699	8.09	-75.21
582	582	Shell-Thick	1176	COMB2U	Combination	Min	-26.37	11.95	-10.12	-205.0795	-31.6728	-70.13	-193.3	92.55
582	582	Shell-Thick	1178	COMB2U	Combination	Min	-29.11	-11.11	-11.86	-112.7489	-21.7429	-46.4948	-193.3	92.55
582	582	Shell-Thick	1179	COMB2U	Combination	Min	-14.93	-5.1	-7.46	-86.1155	-105.7068	-50.4766	-193.3	92.55
582	582	Shell-Thick	1177	COMB2U	Combination	Min	-12.2	10.12	-5.72	-182.1015	-118.7226	-70.2193	-193.3	92.55
1396	1396	Shell-Thick	1157	COMB2U	Combination	Max	85.32	-20.3	-15.37	33.7876	-112.7941	-256.4628	116.87	71.75
1396	1396	Shell-Thick	1156	COMB2U	Combination	Max	184.74	-5.6	20.21	55.2023	-67.0813	-271.9664	116.87	71.75
1396	1396	Shell-Thick	1673	COMB2U	Combination	Max	185	19.03	37.52	23.4387	-71.007	-269.6722	116.87	71.75
1396	1396	Shell-Thick	1672	COMB2U	Combination	Max	85.59	4.26	0.84	38.6108	-108.9912	-255.2719	116.87	71.75
1403	1403	Shell-Thick	1168	COMB2U	Combination	Max	139.01	34.11	13.18	-111.8268	-56.4482	-174.5256	113.28	88.36
1403	1403	Shell-Thick	1169	COMB2U	Combination	Max	38.4	15.5	35.34	-101.0328	-104.8857	-128.4765	113.28	88.36
1403	1403	Shell-Thick	1680	COMB2U	Combination	Max	31.64	-26.17	48.39	-90.5328	-116.2424	-133.303	113.28	88.36
1403	1403	Shell-Thick	1681	COMB2U	Combination	Max	129.64	-6.58	32.5	-91.0234	-66.6471	-179.0165	113.28	88.36
1403	1403	Shell-Thick	1168	COMB2U	Combination	Min	76.7	12.05	6.81	-143.726	-66.9823	-181.7438	75.15	82.89
1403	1403	Shell-Thick	1169	COMB2U	Combination	Min	15.14	-1.77	14.06	-129.2466	-119.7097	-150.9417	75.15	82.89

1403	1403	Shell-Thick	1680	COMB2U	Combination	Min	0.52	-31.95	36.3	-110.8754	-124.3259	-156.4186	75.15	82.89
1403	1403	Shell-Thick	1681	COMB2U	Combination	Min	64.69	-19.11	22.79	-114.9202	-70.4288	-186.8573	75.15	82.89
1407	1407	Shell-Thick	1176	COMB2U	Combination	Max	15.1	16.8	38.29	-133.9208	-0.3966	-47.5694	-135.1	172.23
1407	1407	Shell-Thick	1177	COMB2U	Combination	Max	28.43	23.35	-8.07	-214.1984	-133.8096	-71.0083	-135.1	172.23
1407	1407	Shell-Thick	1684	COMB2U	Combination	Max	29.8	25.2	-29.54	-230.4445	-134.5599	-68.9824	-135.1	172.23
1407	1407	Shell-Thick	1685	COMB2U	Combination	Max	16.47	17.44	19.66	-133.0696	2.6951	-43.1356	-135.1	172.23
1407	1407	Shell-Thick	1176	COMB2U	Combination	Min	-39.84	9.67	22.62	-170.6243	-6.0727	-65.0871	-146.3	162.19
1407	1407	Shell-Thick	1177	COMB2U	Combination	Min	-4.78	12.8	-32.42	-221.5731	-144.1232	-77.7807	-146.3	162.19
1407	**1407**	**Shell-Thic**	**1684**	**COMB2U**	**Combination**	**Min**	**-1.19**	**-1.72**	**-45.52**	**-240.5799**	**-145.6076**	**-73.9909**	**-146.3**	**162.19**
1407	1407	Shell-Thick	1685	COMB2U	Combination	Min	-36.24	-3.65	6.69	-171.1499	-4.5035	-63.5785	-146.3	162.19
1408	1408	Shell-Thick	1175	COMB2U	Combination	Max	31.78	16.24	-32.39	-179.879	-128.1503	-68.4609	-34.31	142.04
1408	1408	Shell-Thick	1174	COMB2U	Combination	Max	34.14	18.77	39.68	-177.9716	-12.1676	-50.9047	-34.31	142.04
1408	1408	Shell-Thick	1686	COMB2U	Combination	Max	32.34	12.38	52.55	-168.3579	-28.8023	-48.1793	-34.31	142.04
1408	1408	Shell-Thick	1687	COMB2U	Combination	Max	29.97	14.23	-21.15	-163.5863	-133.2159	-62.5498	-34.31	142.04
1408	1408	Shell-Thick	1175	COMB2U	Combination	Min	-27.54	-1.84	-40.6	-217.7663	-133.3363	-90.5996	-52.91	132.82
1408	1408	Shell-Thick	1174	COMB2U	Combination	Min	-14.96	-1.37	29.82	-203.716	-29.3	-66.526	-52.91	132.82
1408	1408	Shell-Thick	1686	COMB2U	Combination	Min	-18.35	7.72	43.7	-198.5367	-31.4816	-61.4292	-52.91	132.82
1408	**1408**	**Shell-Thick**	**1687**	**COMB2U**	**Combination**	**Min**	**-30.94**	**2.88**	**-25.1**	**-206.1195**	**-145.6463**	**-88.1507**	**-52.91**	**132.82**
1652	1652	Shell-Thick	1675	COMB2U	Combination	Max	181.32	33.44	35.87	-13.1358	-70.3261	-226.7652	82.71	72.33
1652	1652	Shell-Thick	1674	COMB2U	Combination	Max	98.7	17.87	-21.89	10.626	-119.8734	-265.6863	82.71	72.33
1652	1652	Shell-Thick	1497	COMB2U	Combination	Max	90.68	-14.45	-11.34	-15.1481	-119.9434	-266.3824	82.71	72.33
1652	1652	Shell-Thick	1800	COMB2U	Combination	Max	173.31	-1.46	43.76	20.0611	-59.6867	-227.3133	82.71	72.33
1665	1665	Shell-Thick	1140	COMB2U	Combination	Max	51.37	20.9	9.69	35.4585	14.3804	-116.6162	88.17	79.6
1665	1665	Shell-Thick	1141	COMB2U	Combination	Max	0.47	9.83	3.52	-20.607	-39.4835	-119.8794	88.17	79.6
1665	1665	Shell-Thick	1807	COMB2U	Combination	Max	0.89	17.25	12.86	13.9117	-28.8446	-98.5654	88.17	79.6
1665	1665	Shell-Thick	1808	COMB2U	Combination	Max	50.65	27.65	19.08	73.9813	24.4135	-95.0605	88.17	79.6
1665	1665	Shell-Thick	1140	COMB2U	Combination	Min	-4.71	10.36	-10.09	7.7728	10.5494	-125.8603	45.54	75.22
1665	1665	Shell-Thick	1141	COMB2U	Combination	Min	-21.6	7.87	-13.13	-45.6846	-43.3582	-127.5461	45.54	75.22
1665	1665	Shell-Thick	1807	COMB2U	Combination	Min	-21.92	15.93	-9.02	-28.9139	-34.7882	-106.5005	45.54	75.22
1665	1665	Shell-Thick	1808	COMB2U	Combination	Min	-3.9	19.08	-6.02	28.8038	18.6274	-104.5262	45.54	75.22
									M+	**108.1882**	**87.1286**	**V+**	**116.87**	**172.23**
									M-	**-240.5799**	**-145.6463**	**V-**	**-193.3**	**-75.21**

TABLE: Element Forces - Area Shells (KORBEL Kombinasi 3Ulitimate)														
Area	Area Elem	Shell Type	Joint	Output Case	Case Type	Step Type	F11	F22	F12	M11	M22	M12	V13	V23
Text	Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
9	9	Shell-Thick	233	COMB3U	Combination	Max	0.89	27.99	5.93	-9.2182	-27.7696	-6.4377	1.8	93.13
9	9	Shell-Thick	63	COMB3U	Combination	Max	-1.99	18.47	-4.11	-15.4671	-28.1011	34.1714	1.8	93.13
9	9	Shell-Thick	82	COMB3U	Combination	Max	1.33	18.43	-3.68	-8.2433	-21.4754	34.3161	1.8	93.13
9	9	Shell-Thick	233	COMB3U	Combination	Min	-1.17	14.27	-10.88	-13.794	-39.0641	-13.8753	-3.83	78.76
9	9	Shell-Thick	63	COMB3U	Combination	Min	-3.43	0.89	-10.95	-16.0299	-39.246	32.231	-3.83	78.76
9	9	Shell-Thick	82	COMB3U	Combination	Min	-4	1.47	-10.36	-9.2649	-33.6926	32.379	-3.83	78.76
25	**25**	**Shell-Thick**	**1668**	**COMB3U**	**Combination**	**Max**	**98.31**	**13.63**	**-8.09**	**81.165**	**87.5026**	**-222.7789**	**55.11**	**-66.72**
25	25	Shell-Thick	1153	COMB3U	Combination	Max	93.72	-6.89	-18.54	51.7065	75.8959	-228.1059	55.11	-66.72
25	25	Shell-Thick	1152	COMB3U	Combination	Max	211.17	13.15	8.34	-62.4252	45.6505	-309.4529	55.11	-66.72
25	25	Shell-Thick	1669	COMB3U	Combination	Max	215.76	24.87	17.22	-91.305	45.1915	-303.9591	55.11	-66.72
25	25	Shell-Thick	1668	COMB3U	Combination	Min	26.79	-4.73	-16.33	60.3649	82.2885	-254.1144	11.29	-77.71
25	25	Shell-Thick	1153	COMB3U	Combination	Min	21.23	-13.5	-26.97	33.4299	71.8802	-260.4387	11.29	-77.71
25	25	Shell-Thick	1152	COMB3U	Combination	Min	85.86	2.88	-39.65	-90.1836	43.0959	-352.214	11.29	-77.71
25	25	Shell-Thick	1669	COMB3U	Combination	Min	91.42	20.45	-27.43	-124.3652	42.2503	-345.8179	11.29	-77.71
566	566	Shell-Thick	1144	COMB3U	Combination	Max	179.71	4.06	-13.75	46.5499	12.1834	-168.0409	-4.07	76.79
566	566	Shell-Thick	1146	COMB3U	Combination	Max	176.79	2.17	-12.56	55.9831	14.0434	-196.4522	-4.07	76.79
566	566	Shell-Thick	1147	COMB3U	Combination	Max	76.94	0.49	-13.96	-5.6618	-43.5643	-192.1606	-4.07	76.79
566	566	Shell-Thick	1145	COMB3U	Combination	Max	80.07	2.38	-15.15	-26.531	-43.9569	-162.3712	-4.07	76.79
566	566	Shell-Thick	1144	COMB3U	Combination	Min	25.27	0.72	-28.44	33.5741	9.2207	-192.4184	-35.11	73.28
566	566	Shell-Thick	1146	COMB3U	Combination	Min	24.65	-7.34	-22.07	37.5232	12.089	-224.8878	-35.11	73.28
566	566	Shell-Thick	1147	COMB3U	Combination	Min	11.24	-28.3	-34.72	-27.3542	-45.0748	-223.2546	-35.11	73.28
566	566	Shell-Thick	1145	COMB3U	Combination	Min	11.64	-20.25	-41.1	-32.1319	-46.244	-193.0359	-35.11	73.28
568	**568**	**Shell-Thick**	**1148**	**COMB3U**	**Combination**	**Max**	**240.93**	**-4.1**	**35.48**	**96.1941**	**2.8971**	**-210.5835**	**60.13**	**57.03**
568	568	Shell-Thick	1150	COMB3U	Combination	Max	249.28	18.05	24.28	62.1412	-6.0089	-235.7455	60.13	57.03
568	568	Shell-Thick	1151	COMB3U	Combination	Max	118.02	7.67	21.74	18.4772	-47.2273	-242.2083	60.13	57.03
568	568	Shell-Thick	1149	COMB3U	Combination	Max	109.47	-14.58	33.02	44.2283	-30.7229	-217.4897	60.13	57.03
1402	1402	Shell-Thick	1165	COMB3U	Combination	Max	64.68	9.85	29.29	-21.804	-119.5018	-164.5004	102.52	80.75
1402	1402	Shell-Thick	1164	COMB3U	Combination	Max	183.19	19.99	22.65	-47.6382	-71.3759	-191.5309	102.52	80.75
1402	1402	Shell-Thick	1679	COMB3U	Combination	Max	181.3	1.91	13.46	-89.0978	-63.4486	-172.0554	102.52	80.75
1402	1402	Shell-Thick	1678	COMB3U	Combination	Max	62.79	-9.12	23.93	-56.9835	-112.4494	-146.1138	102.52	80.75
1402	1402	Shell-Thick	1165	COMB3U	Combination	Min	25.1	-4.08	19.3	-29.3392	-130.9956	-201.0578	89.3	78.51
1402	1402	Shell-Thick	1164	COMB3U	Combination	Min	64.33	17.32	13.91	-59.5727	-82.5924	-227.2349	89.3	78.51
1402	1402	Shell-Thick	1679	COMB3U	Combination	Min	61.82	-3.4	8.82	-107.328	-74.7515	-205.2364	89.3	78.51
1402	1402	Shell-Thick	1678	COMB3U	Combination	Min	22.59	-23.92	10.38	-69.5571	-124.3734	-177.0652	89.3	78.51
1403	1403	Shell-Thick	1168	COMB3U	Combination	Max	163.77	41.08	19.82	-117.9899	-55.161	-167.7335	100.14	86.56
1403	1403	Shell-Thick	1169	COMB3U	Combination	Max	52.84	28.93	37.54	-105.644	-103.0697	-115.4598	100.14	86.56

1403	1403	Shell-Thick	1680	COMB3U	Combination	Max	51.28	-22.76	49.39	-91.689	-115.8527	-120.9053	100.14	86.56
1403	1403	Shell-Thick	1681	COMB3U	Combination	Max	161.42	-0.74	35	-95.1686	-66.964	-172.8834	100.14	86.56
1403	1403	Shell-Thick	1168	COMB3U	Combination	Min	51.94	5.08	0.18	-137.5629	-68.2695	-188.5359	88.29	84.69
1403	1403	Shell-Thick	1169	COMB3U	Combination	Min	0.7	-15.2	11.85	-124.6355	-121.5257	-163.9584	88.29	84.69
1403	1403	Shell-Thick	1680	COMB3U	Combination	Min	-19.12	-35.36	35.3	-109.7192	-124.7155	-168.8162	88.29	84.69
1403	1403	Shell-Thick	1681	COMB3U	Combination	Min	32.9	-24.95	20.29	-110.775	-70.1119	-192.9903	88.29	84.69
1407	1407	Shell-Thick	1176	COMB3U	Combination	Max	47.36	16.25	55.05	-135.2735	4.1666	-47.4286	-139.0	168.8
1407	1407	Shell-Thick	1177	COMB3U	Combination	Max	29.77	25.65	-6.16	-215.9138	-130.882	-66.9001	-139.0	168.8
1407	1407	Shell-Thick	1684	COMB3U	Combination	Max	29.39	43.49	-30.72	-233.5801	-131.8353	-63.5414	-139.0	168.8
1407	1407	Shell-Thick	1685	COMB3U	Combination	Max	46.98	30.11	29.46	-135.3553	6.6045	-43.3064	-139.0	168.8
1407	1407	Shell-Thick	1176	COMB3U	Combination	Min	-72.1	10.22	5.86	-169.2716	-10.6359	-65.2278	-142.4	165.62
1407	1407	Shell-Thick	1177	COMB3U	Combination	Min	-6.12	10.5	-34.34	-219.8577	-147.0508	-81.8889	-142.4	165.62
1407	**1407**	**Shell-Thick**	**1684**	**COMB3U**	**Combination**	**Min**	**-0.77**	**-20.02**	**-44.34**	**-237.4443**	**-148.3322**	**-79.4319**	**-142.4**	**165.62**
1407	1407	Shell-Thick	1685	COMB3U	Combination	Min	-66.76	-16.32	-3.11	-168.8642	-8.413	-63.4076	-142.4	165.62
1408	1408	Shell-Thick	1175	COMB3U	Combination	Max	41.29	22.96	-30.86	-183.9252	-124.4062	-75.338	-40.78	138.97
1408	1408	Shell-Thick	1174	COMB3U	Combination	Max	64.77	21.27	43.09	-181.6262	-10.9275	-45.5627	-40.78	138.97
1408	1408	Shell-Thick	1686	COMB3U	Combination	Max	62.48	15.18	60.7	-173.4425	-26.4302	-41.1914	-40.78	138.97
1408	1408	Shell-Thick	1687	COMB3U	Combination	Max	38.99	18.2	-18.86	-169.3981	-135.9586	-69.834	-40.78	138.97
1408	1408	Shell-Thick	1175	COMB3U	Combination	Min	-37.05	-8.56	-42.13	-213.7201	-137.0803	-83.7224	-46.44	135.9
1408	1408	Shell-Thick	1174	COMB3U	Combination	Min	-45.58	-3.88	26.41	-200.0614	-30.5402	-71.868	-46.44	135.9
1408	1408	Shell-Thick	1686	COMB3U	Combination	Min	-48.5	4.92	35.54	-193.4521	-33.8536	-68.4171	-46.44	135.9
1408	1408	Shell-Thick	1687	COMB3U	Combination	Min	-39.96	-1.08	-27.39	-200.3078	-142.9036	-80.8665	-46.44	135.9
566	566	Shell-Thick	1144	COMB3U	Combination	Max	179.71	4.06	-13.75	46.5499	12.1834	-168.0409	-4.07	76.79
566	566	Shell-Thick	1146	COMB3U	Combination	Max	176.79	2.17	-12.56	55.9831	14.0434	-196.4522	-4.07	76.79
566	566	Shell-Thick	1147	COMB3U	Combination	Max	76.94	0.49	-13.96	-5.6618	-43.5643	-192.1606	-4.07	76.79
566	566	Shell-Thick	1145	COMB3U	Combination	Max	80.07	2.38	-15.15	-26.531	-43.9569	-162.3712	-4.07	76.79
582	582	Shell-Thick	1176	COMB3U	Combination	Min	-51.87	12.9	-19.74	-206.6904	-36.422	-73.3346	-191.3	94.86
582	582	Shell-Thick	1178	COMB3U	Combination	Min	-56.83	-12.8	-19.03	-113.4839	-23.4415	-49.1296	-191.3	94.86
582	582	Shell-Thick	1179	COMB3U	Combination	Min	-6.97	-5.72	-14.56	-85.5941	-108.1347	-49.8261	-191.3	94.86
582	582	Shell-Thick	1177	COMB3U	Combination	Min	-2.01	7.36	-15.28	-181.6792	-121.7762	-72.9918	-191.3	94.86
1665	1665	Shell-Thick	1140	COMB3U	Combination	Max	75.35	20.59	8.41	30.3438	15.5096	-111.5901	82.94	81.21
1665	1665	Shell-Thick	1141	COMB3U	Combination	Max	14.69	10.12	0.47	-26.6185	-39.4542	-116.9669	82.94	81.21
1665	1665	Shell-Thick	1807	COMB3U	Combination	Max	14.25	17.41	10.98	5.5996	-30.6616	-96.3171	82.94	81.21
1665	1665	Shell-Thick	1808	COMB3U	Combination	Max	74.57	28.42	19.03	66.7155	23.5121	-90.7249	82.94	81.21
									M+	**96.1941**	**87.5026**	**V+**	**110.9**	**168.8**
									M-	**-237.4443**	**-148.3322**	**V-**	**-191.3**	**-77.71**

TABLE: Element Forces – Frames (KOLOM PILAR 1)												
Frame	**Station**	**Output Case**	**CaseType**	**Step Type**	**P**	**V2**	**V3**	**T**	**M2**	**M3**	**Frame Elem**	**Elem Station**
Text	m	Text	Text	Text	KN	KN	KN	KN-m	KN-m	KN-m	Text	m
32	0	COMB1U	Combination		-2359.32	-19.888	55.126	-4.0442	-205.583	-15.3141	32-1	0
32	1.03	COMB1U	Combination		-2375.821	-19.888	55.126	-4.0442	-262.3633	5.1707	32-1	1.03
32	2.06	COMB1U	Combination		-2392.322	-19.888	55.126	-4.0442	-319.1435	25.6555	32-1	2.06
32	0	COMB2U	Combination	Max	-1764.797	65.245	62.765	-3.0267	-143.3965	72.2794	32-1	0
32	1.03	COMB2U	Combination	Max	-1781.298	65.245	62.765	-3.0267	-197.7199	5.0785	32-1	1.03
32	2.06	COMB2U	Combination	Max	-1797.799	65.245	62.765	-3.0267	-220.468	83.4462	32-1	2.06
32	0	COMB2U	Combination	Min	-1784.804	-76.882	22.077	-3.1796	-174.9928	-74.9311	32-1	0
32	1.03	COMB2U	Combination	Min	-1801.305	-76.882	22.077	-3.1796	-208.0568	4.256	32-1	1.03
32	2.06	COMB2U	Combination	Min	-1817.806	-76.882	22.077	-3.1796	-272.6961	-62.1254	32-1	2.06
32	0	COMB3U	Combination	Max	-1771.308	15.652	107.216	-2.8561	-109.2541	20.9107	32-1	0
32	1.03	COMB3U	Combination	Max	-1787.809	15.652	107.216	-2.8561	-186.0749	4.7938	32-1	1.03
32	2.06	COMB3U	Combination	Max	-1804.31	15.652	107.216	-2.8561	-163.0391	32.6531	32-1	2.06
32	0	COMB3U	Combination	Min	-1778.293	-27.289	-22.374	-3.3502	-209.1351	-23.5624	32-1	0
32	1.03	COMB3U	Combination	Min	-1794.794	-27.289	-22.374	-3.3502	-219.7018	4.5407	32-1	1.03
32	2.06	COMB3U	Combination	Min	-1811.295	-27.289	-22.374	-3.3502	-330.1249	-11.3324	32-1	2.06
33	0	COMB1U	Combination		-2386.421	-27.111	-5.477	-3.7617	-286.0097	-26.5099	33-1	0
33	1.03	COMB1U	Combination		-2402.922	-27.111	-5.477	-3.7617	-280.3686	1.414	33-1	1.03
33	**2.06**	**COMB1U**	**Combination**		**-2419.423**	**-27.111**	**-5.477**	**-3.7617**	**-274.7275**	**29.338**	**33-1**	**2.06**
33	0	COMB2U	Combination	Max	-1825.696	65.589	17.951	-2.5858	-203.9122	70.9774	33-1	0
33	1.03	COMB2U	Combination	Max	-1842.197	65.589	17.951	-2.5858	-211.4991	3.4269	33-1	1.03
33	2.06	COMB2U	Combination	Max	-1858.698	65.589	17.951	-2.5858	-183.9625	80.8331	33-1	2.06
33	0	COMB2U	Combination	Min	-1864.823	-76.23	-26.752	-3.1859	-239.0789	-76.2005	33-1	0
33	1.03	COMB2U	Combination	Min	-1881.324	-76.23	-26.752	-3.1859	-222.4267	2.3101	33-1	1.03
33	2.06	COMB2U	Combination	Min	-1897.825	-76.23	-26.752	-3.1859	-240.898	-64.1359	33-1	2.06
33	0	COMB3U	Combination	Max	-1839.005	16.148	65.315	-2.009	-167.2773	19.6581	33-1	0
33	1.03	COMB3U	Combination	Max	-1855.506	16.148	65.315	-2.009	-199.3338	3.046	33-1	1.03
33	2.06	COMB3U	Combination	Max	-1872.007	16.148	65.315	-2.009	-123.0197	30.3038	33-1	2.06
33	0	COMB3U	Combination	Min	-1851.514	-26.789	-74.116	-3.7627	-275.7137	-24.8812	33-1	0
33	1.03	COMB3U	Combination	Min	-1868.015	-26.789	-74.116	-3.7627	-234.592	2.6911	33-1	1.03
33	2.06	COMB3U	Combination	Min	-1884.516	-26.789	-74.116	-3.7627	-301.8408	-13.6066	33-1	2.06
34	**0**	**COMB1U**	**Combination**		**-2375.309**	**-29.671**	**-67.71**	**-2.9443**	**-359.8037**	**-28.1845**	**34-1**	**0**
34	1.03	COMB1U	Combination		-2391.81	-29.671	-67.71	-2.9443	-290.0626	2.3766	34-1	1.03
34	2.06	COMB1U	Combination		-2408.311	-29.671	-67.71	-2.9443	-220.3215	32.9377	34-1	2.06
34	0	COMB2U	Combination	Max	-1888.009	64.344	-27.835	-2.0882	-258.9363	72.195	34-1	0
34	1.03	COMB2U	Combination	Max	-1904.51	64.344	-27.835	-2.0882	-219.0182	5.943	34-1	1.03
34	2.06	COMB2U	Combination	Max	-1921.011	64.344	-27.835	-2.0882	-139.2749	77.8931	34-1	2.06
34	0	COMB2U	Combination	Min	-1965.195	-72.632	-77.446	-2.4277	-298.8253	-71.7297	34-1	0
34	1.03	COMB2U	Combination	Min	-1981.696	-72.632	-77.446	-2.4277	-230.304	3.0589	34-1	1.03

34	2.06	COMB2U	Combination	Min	-1998.197	-72.632	-77.446	-2.4277	-201.6081	-60.3546	34-1	2.06
34	0	COMB3U	Combination	Max	-1914.731	16.643	23.361	-1.7153	-218.591	22.036	34-1	0
34	1.03	COMB3U	Combination	Max	-1931.232	16.643	23.361	-1.7153	-206.5892	4.9692	34-1	1.03
34	2.06	COMB3U	Combination	Max	-1947.733	16.643	23.361	-1.7153	-74.1385	29.7878	34-1	2.06
34	0	COMB3U	Combination	Min	-1938.473	-24.931	-128.642	-2.8006	-339.1706	-21.5708	34-1	0
34	1.03	COMB3U	Combination	Min	-1954.974	-24.931	-128.642	-2.8006	-242.7331	4.0327	34-1	1.03
34	2.06	COMB3U	Combination	Min	-1971.475	-24.931	-128.642	-2.8006	-266.7445	-12.2492	34-1	2.06
87	0	COMB1U	Combination		-4434.044	-605.497	33.892	-8.9445	42.4047	-1032.6879	87-1	0
87	1.05591	COMB1U	Combination		-4410.775	-600.244	33.892	-8.9445	6.6174	-396.1082	87-1	1.05591
87	2.11183	COMB1U	Combination		-4387.506	-594.992	33.892	-8.9445	-29.17	234.9253	87-1	2.11183
87	0	COMB2U	Combination	Max	-3381.497	-436.66	129.059	0.0102	139.8205	-754.5604	87-1	0
87	1.05591	COMB2U	Combination	Max	-3358.228	-431.408	129.059	0.0102	3.6461	-295.9868	87-1	1.05591
87	2.11183	COMB2U	Combination	Max	-3334.959	-426.155	129.059	0.0102	60.3873	208.9882	87-1	2.11183
87	0	COMB2U	Combination	Min	-3451.911	-502.115	-54.982	-16.7389	-55.7544	-840.4079	87-1	0
87	1.05591	COMB2U	Combination	Min	-3428.642	-496.862	-54.982	-16.7389	2.2013	-313.2612	87-1	1.05591
87	2.11183	COMB2U	Combination	Min	-3405.373	-491.61	-54.982	-16.7389	-132.7586	156.3919	87-1	2.11183
87	0	COMB3U	Combination	Max	-3310.216	-362.345	66.639	-5.3209	73.6136	-656.6096	87-1	0
87	1.05591	COMB3U	Combination	Max	-3286.947	-357.092	66.639	-5.3209	3.582	-276.6907	87-1	1.05591
87	2.11183	COMB3U	Combination	Max	-3263.678	-351.84	66.639	-5.3209	-5.158	267.9074	87-1	2.11183
87	0	COMB3U	Combination	Min	-3523.192	-576.43	7.437	-11.4078	10.4525	-938.3587	87-1	0
87	1.05591	COMB3U	Combination	Min	-3499.923	-571.178	7.437	-11.4078	2.2654	-332.5573	87-1	1.05591
87	2.11183	COMB3U	Combination	Min	-3476.654	-565.925	7.437	-11.4078	-67.2133	97.4727	87-1	2.11183
88	0	COMB1U	Combination		781.166	443.859	67.639	-12.2588	78.64	835.7482	88-1	0
88	1.0522	COMB1U	Combination		804.435	448.716	67.639	-12.2588	7.4698	366.1646	88-1	1.0522
88	2.1044	COMB1U	Combination		827.704	453.573	67.639	-12.2588	-63.7004	-108.5296	88-1	2.1044
88	0	COMB2U	Combination	Max	631.219	374.16	135.323	0.7718	151.014	688.0572	88-1	0
88	1.0522	COMB2U	Combination	Max	654.488	379.017	135.323	0.7718	8.7393	291.8207	88-1	1.0522
88	2.1044	COMB2U	Combination	Max	677.757	383.874	135.323	0.7718	66.0627	-56.5671	88-1	2.1044
88	0	COMB2U	Combination	Min	559.764	306.766	-55.263	-16.3798	-50.28	599.2037	88-1	0
88	1.0522	COMB2U	Combination	Min	583.033	311.624	-55.263	-16.3798	7.7554	273.8591	88-1	1.0522
88	2.1044	COMB2U	Combination	Min	606.302	316.481	-55.263	-16.3798	-133.8073	-109.5555	88-1	2.1044
88	0	COMB3U	Combination	Max	704.546	448.113	70.159	-4.7884	82.3344	785.0507	88-1	0
88	1.0522	COMB3U	Combination	Max	727.815	452.97	70.159	-4.7884	8.8855	310.9995	88-1	1.0522
88	2.1044	COMB3U	Combination	Max	751.084	457.827	70.159	-4.7884	-2.2812	2.0644	88-1	2.1044
88	0	COMB3U	Combination	Min	486.437	232.813	9.901	-10.8196	18.3996	502.2102	88-1	0
88	1.0522	COMB3U	Combination	Min	509.706	237.67	9.901	-10.8196	7.6092	254.6803	88-1	1.0522
88	2.1044	COMB3U	Combination	Min	532.975	242.527	9.901	-10.8196	-65.4634	-168.187	88-1	2.1044
91	0	COMB1U	Combination		-4209.098	846.93	3.767	-16.651	30.9844	559.0143	91-1	0
91	1.09529	COMB1U	Combination		-4232.367	855.345	3.767	-16.651	26.858	-373.2267	91-1	1.09529
91	**2.19058**	**COMB1U**	**Combination**		**-4255.636**	**863.761**	**3.767**	**-16.651**	**22.7317**	**-1314.6849**	**91-1**	**2.19058**
91	0	COMB2U	Combination	Max	-3311.023	694.872	76.51	-4.5454	105.045	469.088	91-1	0
91	1.09529	COMB2U	Combination	Max	-3334.292	703.287	76.51	-4.5454	29.7499	-278.8609	91-1	1.09529
91	2.19058	COMB2U	Combination	Max	-3357.561	711.703	76.51	-4.5454	87.422	-971.1494	91-1	2.19058

91	0	COMB2U	Combination	Min	-3408.03	619.409	-52.691	-27.9586	-28.0499	404.1403	91-1	0
91	1.09529	COMB2U	Combination	Min	-3431.299	627.825	-52.691	-27.9586	21.1561	-296.6451	91-1	1.09529
91	2.19058	COMB2U	Combination	Min	-3454.568	636.24	-52.691	-27.9586	-62.6051	-1071.5252	91-1	2.19058
91	0	COMB3U	Combination	Max	-3299.945	771.852	33.471	-12.1513	60.0986	533.6708	91-1	0
91	1.09529	COMB3U	Combination	Max	-3323.214	780.268	33.471	-12.1513	27.7599	-259.1217	91-1	1.09529
91	2.19058	COMB3U	Combination	Max	-3346.483	788.683	33.471	-12.1513	38.1993	-867.0945	91-1	2.19058
91	0	COMB3U	Combination	Min	-3419.109	542.429	-9.651	-20.3526	16.8964	339.5575	91-1	0
91	1.09529	COMB3U	Combination	Min	-3442.378	550.845	-9.651	-20.3526	23.1461	-316.3844	91-1	1.09529
91	2.19058	COMB3U	Combination	Min	-3465.647	559.26	-9.651	-20.3526	-13.3823	-1175.5801	91-1	2.19058
92	0	COMB1U	Combination		6.41	624.312	74.91	-9.5632	114.6508	1031.9657	92-1	0
92	1.08946	COMB1U	Combination		29.679	632.332	74.91	-9.5632	33.0388	347.4333	92-1	1.08946
92	2.17892	COMB1U	Combination		52.948	640.352	74.91	-9.5632	-48.5732	-345.8364	92-1	2.17892
92	0	COMB2U	Combination	Max	-71.884	508.125	117.177	6.7935	161.1612	834.5289	92-1	0
92	1.08946	COMB2U	Combination	Max	-48.615	516.145	117.177	6.7935	33.5344	276.7478	92-1	1.08946
92	2.17892	COMB2U	Combination	Max	-25.346	524.164	117.177	6.7935	49.378	-230.2705	92-1	2.17892
92	0	COMB2U	Combination	Min	-173.406	437.061	-21.074	-15.2551	3.4319	739.4227	92-1	0
92	1.08946	COMB2U	Combination	Min	-150.137	445.081	-21.074	-15.2551	26.3583	258.7234	92-1	1.08946
92	2.17892	COMB2U	Combination	Min	-126.867	453.101	-21.074	-15.2551	-94.1857	-290.2135	92-1	2.17892
92	0	COMB3U	Combination	Max	-62.146	587.452	71.452	-0.2512	109.7122	940.8236	92-1	0
92	1.08946	COMB3U	Combination	Max	-38.877	595.472	71.452	-0.2512	31.9764	296.5227	92-1	1.08946
92	2.17892	COMB3U	Combination	Max	-15.608	603.492	71.452	-0.2512	1.2611	-163.7752	92-1	2.17892
92	0	COMB3U	Combination	Min	-183.144	357.734	24.651	-8.2105	54.8808	633.128	92-1	0
92	1.08946	COMB3U	Combination	Min	-159.875	365.753	24.651	-8.2105	27.9163	238.9485	92-1	1.08946
92	2.17892	COMB3U	Combination	Min	-136.606	373.773	24.651	-8.2105	-46.0688	-356.7088	92-1	2.17892
163	0	COMB1U	Combination		660.141	228.081	36.506	-4.6227	30.4593	652.971	163-1	0
163	1.03221	COMB1U	Combination		683.41	229.606	36.506	-4.6227	-7.2226	416.7561	163-1	1.03221
163	2.06442	COMB1U	Combination		706.679	231.131	36.506	-4.6227	-44.9045	178.9672	163-1	2.06442
163	0	COMB2U	Combination	Max	613.209	207.188	139.543	-1.3582	136.6941	546.2709	163-1	0
163	1.03221	COMB2U	Combination	Max	636.478	208.713	139.543	-1.3582	-1.1289	331.7294	163-1	1.03221
163	2.06442	COMB2U	Combination	Max	659.747	210.238	139.543	-1.3582	87.9741	163.1498	163-1	2.06442
163	0	COMB2U	Combination	Min	507.699	143.794	-86.399	-5.5321	-90.5731	463.048	163-1	0
163	1.03221	COMB2U	Combination	Min	530.968	145.319	-86.399	-5.5321	-7.6052	313.7281	163-1	1.03221
163	2.06442	COMB2U	Combination	Min	554.237	146.844	-86.399	-5.5321	-151.5633	115.2981	163-1	2.06442
163	0	COMB3U	Combination	Max	728.456	280.353	61.116	-2.7409	57.9244	642.3398	163-1	0
163	1.03221	COMB3U	Combination	Max	751.725	281.878	61.116	-2.7409	-2.7006	352.2021	163-1	1.03221
163	2.06442	COMB3U	Combination	Max	774.994	283.403	61.116	-2.7409	5.266	218.0531	163-1	2.06442
163	0	COMB3U	Combination	Min	392.451	70.629	-7.973	-4.1494	-11.8034	366.9792	163-1	0
163	1.03221	COMB3U	Combination	Min	415.72	72.154	-7.973	-4.1494	-6.0335	293.2554	163-1	1.03221
163	2.06442	COMB3U	Combination	Min	438.989	73.679	-7.973	-4.1494	-68.8551	60.3949	163-1	2.06442
164	**0**	**COMB1U**	**Combination**		**-5044.621**	**-321.914**	**64.727**	**-3.3585**	**98.258**	**-782.4929**	**164-1**	**0**
164	1.03221	COMB1U	Combination		-5021.352	-320.389	64.727	-3.3585	31.4467	-450.9974	164-1	1.03221
164	2.06442	COMB1U	Combination		-4998.083	-318.864	64.727	-3.3585	-35.3646	-121.0759	164-1	2.06442
164	0	COMB2U	Combination	Max	-3791.681	-216.864	163.197	-0.7338	188.9128	-561.4355	164-1	0

164	1.03221	COMB2U	Combination	Max	-3768.412	-215.339	163.197	-0.7338	26.4873	-338.3684	164-1	1.03221
164	2.06442	COMB2U	Combination	Max	-3745.143	-213.814	163.197	-0.7338	90.7718	-69.0672	164-1	2.06442
164	0	COMB2U	Combination	Min	-3897.648	-280.681	-62.353	-4.5252	-38.0863	-645.3689	164-1	0
164	1.03221	COMB2U	Combination	Min	-3874.379	-279.156	-62.353	-4.5252	20.2468	-356.4397	164-1	1.03221
164	2.06442	COMB2U	Combination	Min	-3851.11	-277.631	-62.353	-4.5252	-148.1301	-116.8926	164-1	2.06442
164	0	COMB3U	Combination	Max	-3676.448	-143.842	85.05	-2.001	110.2741	-465.6414	164-1	0
164	1.03221	COMB3U	Combination	Max	-3653.179	-142.317	85.05	-2.001	24.9571	-317.9513	164-1	1.03221
164	2.06442	COMB3U	Combination	Max	-3629.91	-140.792	85.05	-2.001	8.3995	-14.1187	164-1	2.06442
164	0	COMB3U	Combination	Min	-4012.882	-353.702	15.794	-3.258	40.5525	-741.163	164-1	0
164	1.03221	COMB3U	Combination	Min	-3989.613	-352.177	15.794	-3.258	21.777	-376.8568	164-1	1.03221
164	2.06442	COMB3U	Combination	Min	-3966.344	-350.653	15.794	-3.258	-65.7578	-171.8412	164-1	2.06442

REKAPITULASI MOMEN DAN GESER PILAR 1

MOMEN Pilar V1			
Longitudinal stopper			
	Kombinasi 1U	Kombinasi 2U	Kombinasi 3U
	1.3PMS+1.8TTD+1.8TTB	1.3PMS+1.8TTD+Ex+30%Ey	1.3PMS+1.8TTD+30%Ex+Ey
M11	1071.3492	622.5739	620.1201
	-1877.827	-1661.4906	-1601.7592
M22	665.6927	541.1178	545.7126
	-2136.4037	-1732.9535	-1815.0116
Pier Head			
	Kombinasi 1U	Kombinasi 2U	Kombinasi 3U
	1.3PMS+1.8TTD+1.8TTB	1.3PMS+1.8TTD+Ex+30%Ey	1.3PMS+1.8TTD+30%Ex+Ey
M11	324.9045	243.6852	242.7415
	-297.0586	-228.8253	-227.3719
M22	302.5795	241.9885	241.6383
	-631.4483	-459.3426	-460.3373

Pilecap			
	Kombinasi 1U	Kombinasi 2U	Kombinasi 3U
	1.3PMS+1.8TTD+1.8TTB	1.3PMS+1.8TTD+Ex+30%Ey	1.3PMS+1.8TTD+30%Ex+Ey
M11	1297.9996	1158.0748	1098.9499
	-396.0006	-399.9809	-388.003
M22	2243.5731	1772.6481	1848.227
	-418.6979	-360.5313	-370.6663

Korbel			
	Kombinasi 1U	Kombinasi 2U	Kombinasi 3U
	1.3PMS+1.8TTD+1.8TTB	1.3PMS+1.8TTD+Ex+30%Ey	1.3PMS+1.8TTD+30%Ex+Ey
M11	253.3455	108.1882	96.1941
	-297.9667	-240.5799	-237.4443
M22	153.8223	87.1286	87.5026
	-207.3702	-145.6463	-148.3322

Pilar V1			
Longitudinal stopper			
	Kombinasi 1U	Kombinasi 2U	Kombinasi 3U
	1.3DL+1.8LL	1.3DL+1,8LL+Ex+30%Ey	1.3DL+1,8LL+30%Ex+Ey
V13	4460.94	3646.54	3690.44
	-4422.03	-3446.41	-3517.65
V23	4658.41	3785.17	3835.14
	-4324.98	-3305.6	-3369.58
Pier Head			

	Kombinasi 1U	Kombinasi 2U	Kombinasi 3U
	1.3DL+1.8LL	1.3DL+1,8LL+Ex+30%Ey	1.3DL+1,8LL+30%Ex+Ey
V13	1383.04	995.69	993.67
	-1705.05	-1232.8	-1234.15
V23	1023.08	846.96	845.97
	-2435.17	-1769.05	-1777.69

Pilecap

	Kombinasi 1U	Kombinasi 2U	Kombinasi 3U
	1.3DL+1.8LL	1.3DL+1,8LL+Ex+30%Ey	1.3DL+1,8LL+30%Ex+Ey
V13	1957.61	1646.16	1630.55
	-3479.91	-2762.46	-2816.71
V23	2730.92	2119.87	2220.46
	-3859.38	-2997.72	-3049.15

SPUN PILE

Type	=	**C**		P all	=	2295	KN	
Diameter	=	600	mm	M.Crack	=	290	KN.m	
Tebal	=	100	mm	Pu Bahan	=	4580	KN	
Luas (A)	=	86350	mm2					
I (inersia)	=	28260000	mm^4	$P_{ijin\ tanah}$	=	1330	KN	(Beban Tetap)
				$P_{ijin\ tanah}$	=	1995	KN	(Beban Sementara)

TABLE: Element Forces - Frames (SPUNPILE 60 CM Kombinasi Layan)

Frame	Station	Output Case	Case Type	Step Type	P	V2	V3	T	M2	M3	Momen Resultant	Strength Ratio	Kontrol Bahan	Kontrol Tanah	Frame Elem	Elem Station
Text	m	Text	Text	Text	KN	KN	KN	KN-m	KN-m	KN-m					Text	m
1	0	COMB1	Combination		-679.225	1.705	-3.189	-0.0917	-8.2718	2.0465	8.5212	0.3253	OK	OK	1-1	0
1	2.26122	COMB1	Combination		-670.56	2.571	-3.189	-0.0917	-1.0603	-2.7875	2.9823	0.3025	OK	OK	1-1	2.26122
1	4.52244	COMB1	Combination		-661.895	3.438	-3.189	-0.0917	6.1511	-9.5809	11.3855	0.3277	OK	OK	1-1	4.52244
2	0	COMB1	Combination		-679.225	1.705	3.189	0.0917	8.2718	2.0465	8.5212	0.3253	OK	OK	2-1	0
2	2.26122	COMB1	Combination		-670.56	2.571	3.189	0.0917	1.0603	-2.7875	2.9823	0.3025	OK	OK	2-1	2.26122
2	4.52244	COMB1	Combination		-661.895	3.438	3.189	0.0917	-6.1511	-9.5809	11.3855	0.3277	OK	OK	2-1	4.52244
3	0	COMB1	Combination		-838.003	-3.432	2.594	0.0258	3.7037	-8.6233	9.3850	0.3975	OK	OK	3-1	0
3	2.25	COMB1	Combination		-829.338	-3.432	2.594	0.0258	-2.132	-0.9022	2.3150	0.3694	OK	OK	3-1	2.25
3	4.5	COMB1	Combination		-820.673	-3.432	2.594	0.0258	-7.9677	6.8189	10.4872	0.3938	OK	OK	3-1	4.5
4	0	COMB1	Combination		-838.003	-3.432	-2.594	-0.0258	-3.7037	-8.6233	9.3850	0.3975	OK	OK	4-1	0
4	2.25	COMB1	Combination		-829.338	-3.432	-2.594	-0.0258	2.132	-0.9022	2.3150	0.3694	OK	OK	4-1	2.25
4	4.5	COMB1	Combination		-820.673	-3.432	-2.594	-0.0258	7.9677	6.8189	10.4872	0.3938	OK	OK	4-1	4.5
5	0	COMB1	Combination		-624.629	1.827	-3.094	-0.0946	-8.1387	2.31	8.4602	0.3013	OK	OK	5-1	0
5	2.26122	COMB1	Combination		-615.964	2.694	-3.094	-0.0946	-1.1433	-2.802	3.0263	0.2788	OK	OK	5-1	2.26122
5	4.52244	COMB1	Combination		-607.299	3.56	-3.094	-0.0946	5.8521	-9.8733	11.4773	0.3042	OK	OK	5-1	4.52244
6	0	COMB1	Combination		-624.629	1.827	3.094	0.0946	8.1387	2.31	8.4602	0.3013	OK	OK	6-1	0
6	2.26122	COMB1	Combination		-615.964	2.694	3.094	0.0946	1.1433	-2.802	3.0263	0.2788	OK	OK	6-1	2.26122
6	4.52244	COMB1	Combination		-607.299	3.56	3.094	0.0946	-5.8521	-9.8733	11.4773	0.3042	OK	OK	6-1	4.52244
7	0	COMB1	Combination		-789.846	-3.186	2.702	0.0084	3.8618	-8.2827	9.1387	0.3757	OK	OK	7-1	0
7	2.25	COMB1	Combination		-781.181	-3.186	2.702	0.0084	-2.2175	-1.1143	2.4817	0.3489	OK	OK	7-1	2.25
7	4.5	COMB1	Combination		-772.517	-3.186	2.702	0.0084	-8.2968	6.054	10.2707	0.3720	OK	OK	7-1	4.5
8	0	COMB1	Combination		-789.846	-3.186	-2.702	-0.0084	-3.8618	-8.2827	9.1387	0.3757	OK	OK	8-1	0
8	2.25	COMB1	Combination		-781.181	-3.186	-2.702	-0.0084	2.2175	-1.1143	2.4817	0.3489	OK	OK	8-1	2.25
8	4.5	COMB1	Combination		-772.517	-3.186	-2.702	-0.0084	8.2968	6.054	10.2707	0.3720	OK	OK	8-1	4.5
9	0	COMB1	Combination		-553.19	1.777	-2.454	-0.1115	-7.2221	2.3446	7.5931	0.2672	OK	OK	9-1	0
9	2.26122	COMB1	Combination		-544.525	2.644	-2.454	-0.1115	-1.6738	-2.6544	3.1381	0.2481	OK	OK	9-1	2.26122

9	4.52244	COMB1	Combination		-535.86	3.51	-2.454	-0.1115	3.8745	-9.6126	10.3641	0.2692	OK	OK	9-1	4.52244
10	0	COMB1	Combination		-553.19	1.777	2.454	0.1115	7.2221	2.3446	7.5931	0.2672	OK	OK	10-1	0
10	2.26122	COMB1	Combination		-544.525	2.644	2.454	0.1115	1.6738	-2.6544	3.1381	0.2481	OK	OK	10-1	2.26122
10	4.52244	COMB1	Combination		-535.86	3.51	2.454	0.1115	-3.8745	-9.6126	10.3641	0.2692	OK	OK	10-1	4.52244
11	0	COMB1	Combination		-712.507	-2.299	2.601	-0.0292	3.7176	-7.0224	7.9457	0.3379	OK	OK	11-1	0
11	2.25	COMB1	Combination		-703.842	-2.299	2.601	-0.0292	-2.1337	-1.85	2.8240	0.3164	OK	OK	11-1	2.25
11	4.5	COMB1	Combination		-695.177	-2.299	2.601	-0.0292	-7.9851	3.3224	8.6487	0.3327	OK	OK	11-1	4.5
12	0	COMB1	Combination		-712.507	-2.299	-2.601	0.0292	-3.7176	-7.0224	7.9457	0.3379	OK	OK	12-1	0
12	2.25	COMB1	Combination		-703.842	-2.299	-2.601	0.0292	2.1337	-1.85	2.8240	0.3164	OK	OK	12-1	2.25
12	4.5	COMB1	Combination		-695.177	-2.299	-2.601	0.0292	7.9851	3.3224	8.6487	0.3327	OK	OK	12-1	4.5
13	0	COMB1	Combination		-787.845	1.605	-4.529	0.1955	-10.1837	1.6948	10.3238	0.3789	OK	OK	13-1	0
13	2.26122	COMB1	Combination		-779.18	2.472	-4.529	0.1955	0.0569	-2.9149	2.9155	0.3496	OK	OK	13-1	2.26122
13	4.52244	COMB1	Combination		-770.516	3.338	-4.529	0.1955	10.2976	-9.4839	13.9995	0.3840	OK	OK	13-1	4.52244
14	0	COMB1	Combination		-787.845	1.605	4.529	-0.1955	10.1837	1.6948	10.3238	0.3789	OK	OK	14-1	0
14	2.26122	COMB1	Combination		-779.18	2.472	4.529	-0.1955	-0.0569	-2.9149	2.9155	0.3496	OK	OK	14-1	2.26122
14	4.52244	COMB1	Combination		-770.516	3.338	4.529	-0.1955	-10.2976	-9.4839	13.9995	0.3840	OK	OK	14-1	4.52244
15	**0**	**COMB1**	**Combination**		**-981.457**	**-4.843**	**2.168**	**-0.2845**	**3.0113**	**-10.6284**	11.0468	0.4657	OK	OK	15-1	0
15	2.25	COMB1	Combination		-972.792	-4.843	2.168	-0.2845	-1.866	0.2691	1.8853	0.4304	OK	OK	15-1	2.25
15	4.5	COMB1	Combination		-964.127	-4.843	2.168	-0.2845	-6.7433	11.1666	13.0447	0.4651	OK	OK	15-1	4.5
16	0	COMB1	Combination		-981.457	-4.843	-2.168	0.2845	-3.0113	-10.6284	11.0468	0.4657	OK	OK	16-1	0
16	2.25	COMB1	Combination		-972.792	-4.843	-2.168	0.2845	1.866	0.2691	1.8853	0.4304	OK	OK	16-1	2.25
16	4.5	COMB1	Combination		-964.127	-4.843	-2.168	0.2845	6.7433	11.1666	13.0447	0.4651	OK	OK	16-1	4.5
17	0	COMB1	Combination		-768.404	1.559	-5.158	0.2592	-11.0827	1.6421	11.2037	0.3734	OK	OK	17-1	0
17	2.26122	COMB1	Combination		-759.739	2.425	-5.158	0.2592	0.5796	-2.8619	2.9200	0.3411	OK	OK	17-1	2.26122
17	4.52244	COMB1	Combination		-751.074	3.292	-5.158	0.2592	12.2419	-9.3252	15.3891	0.3803	OK	OK	17-1	4.52244
18	0	COMB1	Combination		-768.404	1.559	5.158	-0.2592	11.0827	1.6421	11.2037	0.3734	OK	OK	18-1	0
18	2.26122	COMB1	Combination		-759.739	2.425	5.158	-0.2592	-0.5796	-2.8619	2.9200	0.3411	OK	OK	18-1	2.26122
18	4.52244	COMB1	Combination		-751.074	3.292	5.158	-0.2592	-12.2419	-9.3252	15.3891	0.3803	OK	OK	18-1	4.52244
19	0	COMB1	Combination		-922.709	-4.97	2.175	0.0261	3.0781	-10.8088	11.2385	0.4408	OK	OK	19-1	0
19	2.25	COMB1	Combination		-914.044	-4.97	2.175	0.0261	-1.815	0.3738	1.8531	0.4047	OK	OK	19-1	2.25
19	4.5	COMB1	Combination		-905.379	-4.97	2.175	0.0261	-6.708	11.5565	13.3623	0.4406	OK	OK	19-1	4.5
20	0	COMB1	Combination		-922.709	-4.97	-2.175	-0.0261	-3.0781	-10.8088	11.2385	0.4408	OK	OK	20-1	0
20	2.25	COMB1	Combination		-914.044	-4.97	-2.175	-0.0261	1.815	0.3738	1.8531	0.4047	OK	OK	20-1	2.25
20	4.5	COMB1	Combination		-905.379	-4.97	-2.175	-0.0261	6.708	11.5565	13.3623	0.4406	OK	OK	20-1	4.5
21	0	COMB1	Combination		-718.333	1.481	-5.73	0.3354	-11.8912	1.6119	12.0000	0.3544	OK	OK	21-1	0
21	2.26122	COMB1	Combination		-709.668	2.348	-5.73	0.3354	1.0661	-2.7177	2.9193	0.3193	OK	OK	21-1	2.26122
21	4.52244	COMB1	Combination		-701.003	3.214	-5.73	0.3354	14.0233	-9.0067	16.6665	0.3629	OK	OK	21-1	4.52244
22	0	COMB1	Combination		-718.333	1.481	5.73	-0.3354	11.8912	1.6119	12.0000	0.3544	OK	OK	22-1	0
22	2.26122	COMB1	Combination		-709.668	2.348	5.73	-0.3354	-1.0661	-2.7177	2.9193	0.3193	OK	OK	22-1	2.26122
22	4.52244	COMB1	Combination		-701.003	3.214	5.73	-0.3354	-14.0233	-9.0067	16.6665	0.3629	OK	OK	22-1	4.52244
23	0	COMB1	Combination		-879.456	4.069	-2.049	-0.1742	-2.9112	8.8644	9.3302	0.4154	OK	OK	23-1	0
23	2.26122	COMB1	Combination		-870.791	4.935	-2.049	-0.1742	1.7216	-1.3153	2.1665	0.3869	OK	OK	23-1	2.26122
23	4.52244	COMB1	Combination		-862.126	5.802	-2.049	-0.1742	6.3544	-13.4543	14.8794	0.4270	OK	OK	23-1	4.52244

24	0	COMB1	Combination		-879.456	4.069	2.049	0.1742	2.9112	8.8644	9.3302	0.4154	OK	OK	24-1	0
24	2.26122	COMB1	Combination		-870.791	4.935	2.049	0.1742	-1.7216	-1.3153	2.1665	0.3869	OK	OK	24-1	2.26122
24	4.52244	COMB1	Combination		-862.126	5.802	2.049	0.1742	-6.3544	-13.4543	14.8794	0.4270	OK	OK	24-1	4.52244
29	0	COMB1	Combination		-740.834	1.766	-3.275	-0.1378	-8.3902	2.0268	8.6315	0.3526	OK	OK	29-1	0
29	2.26122	COMB1	Combination		-732.169	2.633	-3.275	-0.1378	-0.9856	-2.947	3.1074	0.3297	OK	OK	29-1	2.26122
29	4.52244	COMB1	Combination		-723.504	3.499	-3.275	-0.1378	6.4189	-9.8802	11.7822	0.3559	OK	OK	29-1	4.52244
30	0	COMB1	Combination		-740.834	1.766	3.275	0.1378	8.3902	2.0268	8.6315	0.3526	OK	OK	30-1	0
30	2.26122	COMB1	Combination		-732.169	2.633	3.275	0.1378	0.9856	-2.947	3.1074	0.3297	OK	OK	30-1	2.26122
30	4.52244	COMB1	Combination		-723.504	3.499	3.275	0.1378	-6.4189	-9.8802	11.7822	0.3559	OK	OK	30-1	4.52244
31	0	COMB1	Combination		-913.265	-2.899	2.274	0.1394	3.2283	-7.8556	8.4931	0.4272	OK	OK	31-1	0
31	2.25	COMB1	Combination		-904.6	-2.899	2.274	0.1394	-1.8876	-1.3323	2.3104	0.4021	OK	OK	31-1	2.25
31	4.5	COMB1	Combination		-895.935	-2.899	2.274	0.1394	-7.0036	5.1909	8.7176	0.4204	OK	OK	31-1	4.5
35	0	COMB1	Combination		-913.265	-2.899	-2.274	-0.1394	-3.2283	-7.8556	8.4931	0.4272	OK	OK	35-1	0
35	2.25	COMB1	Combination		-904.6	-2.899	-2.274	-0.1394	1.8876	-1.3323	2.3104	0.4021	OK	OK	35-1	2.25
35	4.5	COMB1	Combination		-895.935	-2.899	-2.274	-0.1394	7.0036	5.1909	8.7176	0.4204	OK	OK	35-1	4.5
36	0	COMB1	Combination		-778.714	1.662	-3.947	-0.0082	-9.3532	1.8077	9.5263	0.3722	OK	OK	36-1	0
36	2.26122	COMB1	Combination		-770.049	2.528	-3.947	-0.0082	-0.4285	-2.9299	2.9611	0.3457	OK	OK	36-1	2.26122
36	4.52244	COMB1	Combination		-761.384	3.395	-3.947	-0.0082	8.4963	-9.6267	12.8398	0.3760	OK	OK	36-1	4.52244
37	0	COMB1	Combination		-778.714	1.662	3.947	0.0082	9.3532	1.8077	9.5263	0.3722	OK	OK	37-1	0
37	2.26122	COMB1	Combination		-770.049	2.528	3.947	0.0082	0.4285	-2.9299	2.9611	0.3457	OK	OK	37-1	2.26122
37	4.52244	COMB1	Combination		-761.384	3.395	3.947	0.0082	-8.4963	-9.6267	12.8398	0.3760	OK	OK	37-1	4.52244
38	0	COMB1	Combination		-930.737	-4.13	2.229	-0.0543	3.1695	-9.6086	10.1179	0.4404	OK	OK	38-1	0
38	2.25	COMB1	Combination		-922.072	-4.13	2.229	-0.0543	-1.8449	-0.3163	1.8718	0.4082	OK	OK	38-1	2.25
38	4.5	COMB1	Combination		-913.407	-4.13	2.229	-0.0543	-6.8593	8.9761	11.2969	0.4370	OK	OK	38-1	4.5
39	0	COMB1	Combination		-930.737	-4.13	-2.229	0.0543	-3.1695	-9.6086	10.1179	0.4404	OK	OK	39-1	0
39	2.25	COMB1	Combination		-922.072	-4.13	-2.229	0.0543	1.8449	-0.3163	1.8718	0.4082	OK	OK	39-1	2.25
39	4.5	COMB1	Combination		-913.407	-4.13	-2.229	0.0543	6.8593	8.9761	11.2969	0.4370	OK	OK	39-1	4.5
91	0	COMB1	Combination		-450.28	1.555	-1.957	-0.1054	-6.5095	2.1718	6.8622	0.2199	OK	OK	91-1	0
91	2.26122	COMB1	Combination		-441.616	2.421	-1.957	-0.1054	-2.0833	-2.3237	3.1209	0.2032	OK	OK	91-1	2.26122
91	**4.52244**	**COMB1**	**Combination**		**-432.951**	**3.288**	**-1.957**	**-0.1054**	**2.3429**	**-8.7785**	9.0858	0.2200	OK	OK	91-1	4.52244
92	0	COMB1	Combination		-450.28	1.555	1.957	0.1054	6.5095	2.1718	6.8622	0.2199	OK	OK	92-1	0
92	2.26122	COMB1	Combination		-441.616	2.421	1.957	0.1054	2.0833	-2.3237	3.1209	0.2032	OK	OK	92-1	2.26122
92	4.52244	COMB1	Combination		-432.951	3.288	1.957	0.1054	-2.3429	-8.7785	9.0858	0.2200	OK	OK	92-1	4.52244
93	0	COMB1	Combination		-546.681	-3.204	2.013	-0.2281	2.8896	-8.5214	8.9980	0.2692	OK	OK	93-1	0
93	2.26122	COMB1	Combination		-538.017	-2.337	2.013	-0.2281	-1.6616	-2.2566	2.8023	0.2441	OK	OK	93-1	2.26122
93	4.52244	COMB1	Combination		-529.352	-1.471	2.013	-0.2281	-6.2128	2.0488	6.5419	0.2532	OK	OK	93-1	4.52244
94	0	COMB1	Combination		-546.681	-3.204	-2.013	0.2281	-2.8896	-8.5214	8.9980	0.2692	OK	OK	94-1	0
94	2.26122	COMB1	Combination		-538.017	-2.337	-2.013	0.2281	1.6616	-2.2566	2.8023	0.2441	OK	OK	94-1	2.26122
94	4.52244	COMB1	Combination		-529.352	-1.471	-2.013	0.2281	6.2128	2.0488	6.5419	0.2532	OK	OK	94-1	4.52244
1	0	COMB2	Combination	Max	-619.726	9.88	50.451	2.0126	113.181	20.5293	115.0278	0.6667	OK	OK	1-1	0
1	2.26122	COMB2	Combination	Max	-611.061	10.746	50.451	2.0126	-0.468	-2.5201	2.5632	0.2751	OK	OK	1-1	2.26122
1	4.52244	COMB2	Combination	Max	-602.396	11.613	50.451	2.0126	104.1507	8.8784	104.5284	0.6229	OK	OK	1-1	4.52244
1	0	COMB2	Combination	Min	-742.385	-6.461	-46.559	-2.3838	-106.411	-16.4278	107.6723	0.6948	OK	OK	1-1	0

1	2.26122	COMB2	Combination	Min	-733.72	-5.595	-46.559	-2.3838	-1.5629	-3.0679	3.4431	0.3316	OK	OK	1-1	2.26122
1	4.52244	COMB2	Combination	Min	-725.055	-4.728	-46.559	-2.3838	-114.981	-28.0745	118.3593	0.7241	OK	OK	1-1	4.52244
2	0	COMB2	Combination	Max	-619.726	9.88	46.559	2.3838	106.4117	20.5293	108.3739	0.6437	OK	OK	2-1	0
2	2.26122	COMB2	Combination	Max	-611.061	10.746	46.559	2.3838	1.5629	-2.5201	2.9654	0.2765	OK	OK	2-1	2.26122
2	4.52244	COMB2	Combination	Max	-602.396	11.613	46.559	2.3838	114.9815	8.8784	115.3238	0.6602	OK	OK	2-1	4.52244
2	0	COMB2	Combination	Min	-742.385	-6.461	-50.451	-2.0126	-113.181	-16.4278	114.3670	0.7178	OK	OK	2-1	0
2	2.26122	COMB2	Combination	Min	-733.72	-5.595	-50.451	-2.0126	0.468	-3.0679	3.1034	0.3304	OK	OK	2-1	2.26122
2	4.52244	COMB2	Combination	Min	-725.055	-4.728	-50.451	-2.0126	-104.150	-28.0745	107.8682	0.6879	OK	OK	2-1	4.52244
3	0	COMB2	Combination	Max	-820.847	49.328	10.888	2.058	22.4157	110.3446	112.5984	0.7459	OK	OK	3-1	0
3	2.25	COMB2	Combination	Max	-812.182	49.328	10.888	2.058	-1.8207	-0.5806	1.9110	0.3605	OK	OK	3-1	2.25
3	4.5	COMB2	Combination	Max	-803.517	49.328	10.888	2.058	10.6737	101.8674	102.4251	0.7033	OK	OK	3-1	4.5
3	0	COMB2	Combination	Min	-859.304	-45.755	-5.709	-1.8745	-15.0206	-104.028	105.1072	0.7369	OK	OK	3-1	0
3	2.25	COMB2	Combination	Min	-850.639	-45.755	-5.709	-1.8745	-2.4374	-1.1445	2.6927	0.3799	OK	OK	3-1	2.25
3	4.5	COMB2	Combination	Min	-841.974	-45.755	-5.709	-1.8745	-26.5849	-111.633	114.7557	0.7626	OK	OK	3-1	4.5
4	0	COMB2	Combination	Max	-820.847	49.328	5.709	1.8745	15.0206	110.3446	111.3622	0.7417	OK	OK	4-1	0
4	2.25	COMB2	Combination	Max	-812.182	49.328	5.709	1.8745	2.4374	-0.5806	2.5056	0.3625	OK	OK	4-1	2.25
4	4.5	COMB2	Combination	Max	-803.517	49.328	5.709	1.8745	26.5849	101.8674	105.2793	0.7131	OK	OK	4-1	4.5
4	0	COMB2	Combination	Min	-859.304	-45.755	-10.888	-2.058	-22.4157	-104.028	106.4160	0.7414	OK	OK	4-1	0
4	2.25	COMB2	Combination	Min	-850.639	-45.755	-10.888	-2.058	1.8207	-1.1445	2.1505	0.3781	OK	OK	4-1	2.25
4	4.5	COMB2	Combination	Min	-841.974	-45.755	-10.888	-2.058	-10.6737	-111.633	112.1429	0.7536	OK	OK	4-1	4.5
5	0	COMB2	Combination	Max	-575.092	9.092	50.807	2.1504	113.6759	18.6678	115.1985	0.6478	OK	OK	5-1	0
5	2.26122	COMB2	Combination	Max	-566.427	9.959	50.807	2.1504	-0.7197	-2.562	2.6612	0.2560	OK	OK	5-1	2.26122
5	4.52244	COMB2	Combination	Max	-557.762	10.825	50.807	2.1504	104.5527	6.5782	104.7594	0.6043	OK	OK	5-1	4.52244
5	0	COMB2	Combination	Min	-678.698	-5.423	-46.688	-2.244	-106.590	-14.0342	107.5105	0.6665	OK	OK	5-1	0
5	2.26122	COMB2	Combination	Min	-670.033	-4.557	-46.688	-2.244	-1.51	-3.0598	3.4121	0.3037	OK	OK	5-1	2.26122
5	4.52244	COMB2	Combination	Min	-661.368	-3.69	-46.688	-2.244	-116.097	-26.3742	119.0554	0.6987	OK	OK	5-1	4.52244
6	0	COMB2	Combination	Max	-575.092	9.092	46.688	2.244	106.5906	18.6678	108.2130	0.6237	OK	OK	6-1	0
6	2.26122	COMB2	Combination	Max	-566.427	9.959	46.688	2.244	1.51	-2.562	2.9739	0.2571	OK	OK	6-1	2.26122
6	4.52244	COMB2	Combination	Max	-557.762	10.825	46.688	2.244	116.0973	6.5782	116.2835	0.6440	OK	OK	6-1	4.52244
6	0	COMB2	Combination	Min	-678.698	-5.423	-50.807	-2.1504	-113.675	-14.0342	114.5389	0.6907	OK	OK	6-1	0
6	2.26122	COMB2	Combination	Min	-670.033	-4.557	-50.807	-2.1504	0.7197	-3.0598	3.1433	0.3028	OK	OK	6-1	2.26122
6	4.52244	COMB2	Combination	Min	-661.368	-3.69	-50.807	-2.1504	-104.552	-26.3742	107.8279	0.6600	OK	OK	6-1	4.52244
7	0	COMB2	Combination	Max	-771.923	49.625	10.053	2.2728	20.3879	110.7585	112.6193	0.7247	OK	OK	7-1	0
7	2.25	COMB2	Combination	Max	-763.258	49.625	10.053	2.2728	-1.9717	-0.8593	2.1508	0.3400	OK	OK	7-1	2.25
7	4.5	COMB2	Combination	Max	-754.593	49.625	10.053	2.2728	8.2464	101.2292	101.5645	0.6790	OK	OK	7-1	4.5
7	0	COMB2	Combination	Min	-813.428	-45.551	-4.645	-2.38	-12.6586	-103.749	104.5186	0.7148	OK	OK	7-1	0
7	2.25	COMB2	Combination	Min	-804.763	-45.551	-4.645	-2.38	-2.4672	-1.298	2.7878	0.3603	OK	OK	7-1	2.25
7	4.5	COMB2	Combination	Min	-796.099	-45.551	-4.645	-2.38	-24.8536	-112.553	115.2644	0.7443	OK	OK	7-1	4.5
8	0	COMB2	Combination	Max	-771.923	49.625	4.645	2.38	12.6586	110.7585	111.4795	0.7208	OK	OK	8-1	0
8	2.25	COMB2	Combination	Max	-763.258	49.625	4.645	2.38	2.4672	-0.8593	2.6126	0.3416	OK	OK	8-1	2.25
8	4.5	COMB2	Combination	Max	-754.593	49.625	4.645	2.38	24.8536	101.2292	104.2356	0.6882	OK	OK	8-1	4.5
8	0	COMB2	Combination	Min	-813.428	-45.551	-10.053	-2.2728	-20.3879	-103.749	105.7335	0.7190	OK	OK	8-1	0
8	2.25	COMB2	Combination	Min	-804.763	-45.551	-10.053	-2.2728	1.9717	-1.298	2.3606	0.3588	OK	OK	8-1	2.25

8	4.5	COMB2	Combination	Min	-796.099	-45.551	-10.053	-2.2728	-8.2464	-112.553	112.8547	0.7360	OK	OK	8-1	4.5
9	0	COMB2	Combination	Max	-510.055	8.486	51.012	2.1594	113.9527	17.3821	115.2708	0.6197	OK	OK	9-1	0
9	2.26122	COMB2	Combination	Max	-501.39	9.353	51.012	2.1594	-1.0863	-2.4235	2.6558	0.2276	OK	OK	9-1	2.26122
9	4.52244	COMB2	Combination	Max	-492.725	10.219	51.012	2.1594	101.4652	5.6283	101.6212	0.5651	OK	OK	9-1	4.52244
9	0	COMB2	Combination	Min	-602.094	-4.913	-45.684	-2.6549	-105.139	-12.6721	105.9004	0.6275	OK	OK	9-1	0
9	2.26122	COMB2	Combination	Min	-593.429	-4.046	-45.684	-2.6549	-2.1489	-2.9065	3.6146	0.2710	OK	OK	9-1	2.26122
9	4.52244	COMB2	Combination	Min	-584.764	-3.18	-45.684	-2.6549	-116.748	-24.9169	119.3780	0.6664	OK	OK	9-1	4.52244
10	0	COMB2	Combination	Max	-510.055	8.486	45.684	2.6549	105.1395	17.3821	106.5667	0.5897	OK	OK	10-1	0
10	2.26122	COMB2	Combination	Max	-501.39	9.353	45.684	2.6549	2.1489	-2.4235	3.2390	0.2296	OK	OK	10-1	2.26122
10	4.52244	COMB2	Combination	Max	-492.725	10.219	45.684	2.6549	116.7487	5.6283	116.8843	0.6177	OK	OK	10-1	4.52244
10	0	COMB2	Combination	Min	-602.094	-4.913	-51.012	-2.1594	-113.952	-12.6721	114.6551	0.6577	OK	OK	10-1	0
10	2.26122	COMB2	Combination	Min	-593.429	-4.046	-51.012	-2.1594	1.0863	-2.9065	3.1029	0.2693	OK	OK	10-1	2.26122
10	4.52244	COMB2	Combination	Min	-584.764	-3.18	-51.012	-2.1594	-101.465	-24.9169	104.4798	0.6151	OK	OK	10-1	4.52244
11	0	COMB2	Combination	Max	-693.711	50.487	9.406	2.2458	18.9291	111.9607	113.5496	0.6938	OK	OK	11-1	0
11	2.25	COMB2	Combination	Max	-685.046	50.487	9.406	2.2458	-1.8974	-1.6012	2.4827	0.3071	OK	OK	11-1	2.25
11	4.5	COMB2	Combination	Max	-676.381	50.487	9.406	2.2458	7.3704	98.4715	98.7469	0.6352	OK	OK	11-1	4.5
11	0	COMB2	Combination	Min	-738.434	-44.649	-4.185	-2.0862	-11.4659	-102.449	103.0895	0.6772	OK	OK	11-1	0
11	2.25	COMB2	Combination	Min	-729.769	-44.649	-4.185	-2.0862	-2.3851	-2.0238	3.1280	0.3288	OK	OK	11-1	2.25
11	4.5	COMB2	Combination	Min	-721.104	-44.649	-4.185	-2.0862	-23.3985	-115.232	117.5838	0.7197	OK	OK	11-1	4.5
12	0	COMB2	Combination	Max	-693.711	50.487	4.185	2.0862	11.4659	111.9607	112.5463	0.6904	OK	OK	12-1	0
12	2.25	COMB2	Combination	Max	-685.046	50.487	4.185	2.0862	2.3851	-1.6012	2.8727	0.3084	OK	OK	12-1	2.25
12	4.5	COMB2	Combination	Max	-676.381	50.487	4.185	2.0862	23.3985	98.4715	101.2133	0.6437	OK	OK	12-1	4.5
12	0	COMB2	Combination	Min	-738.434	-44.649	-9.406	-2.2458	-18.9291	-102.449	104.1839	0.6810	OK	OK	12-1	0
12	2.25	COMB2	Combination	Min	-729.769	-44.649	-9.406	-2.2458	1.8974	-2.0238	2.7741	0.3275	OK	OK	12-1	2.25
12	4.5	COMB2	Combination	Min	-721.104	-44.649	-9.406	-2.2458	-7.3704	-115.232	115.4677	0.7124	OK	OK	12-1	4.5
13	0	COMB2	Combination	Max	-704.582	14.006	48.614	2.4556	110.5888	29.7345	114.5165	0.7019	OK	OK	13-1	0
13	2.26122	COMB2	Combination	Max	-695.917	14.873	48.614	2.4556	0.7083	-2.6179	2.7120	0.3126	OK	OK	13-1	2.26122
13	4.52244	COMB2	Combination	Max	-687.252	15.739	48.614	2.4556	106.9589	18.6169	108.5670	0.6738	OK	OK	13-1	4.52244
13	0	COMB2	Combination	Min	-867.885	-10.813	-47.475	-2.3176	-107.744	-26.3663	110.9238	0.7607	OK	OK	13-1	0
13	2.26122	COMB2	Combination	Min	-859.22	-9.946	-47.475	-2.3176	-0.4386	-3.1948	3.2248	0.3855	OK	OK	13-1	2.26122
13	4.52244	COMB2	Combination	Min	-850.555	-9.08	-47.475	-2.3176	-109.263	-37.5292	115.5291	0.7690	OK	OK	13-1	4.52244
14	0	COMB2	Combination	Max	-704.582	14.006	47.475	2.3176	107.7446	29.7345	111.7723	0.6924	OK	OK	14-1	0
14	2.26122	COMB2	Combination	Max	-695.917	14.873	47.475	2.3176	0.4386	-2.6179	2.6544	0.3124	OK	OK	14-1	2.26122
14	4.52244	COMB2	Combination	Max	-687.252	15.739	47.475	2.3176	109.2636	18.6169	110.8383	0.6817	OK	OK	14-1	4.52244
14	0	COMB2	Combination	Min	-867.885	-10.813	-48.614	-2.4556	-110.588	-26.3663	113.6885	0.7702	OK	OK	14-1	0
14	2.26122	COMB2	Combination	Min	-859.22	-9.946	-48.614	-2.4556	-0.7083	-3.1948	3.2724	0.3857	OK	OK	14-1	2.26122
14	4.52244	COMB2	Combination	Min	-850.555	-9.08	-48.614	-2.4556	-106.958	-37.5292	113.3519	0.7615	OK	OK	14-1	4.52244
15	0	COMB2	Combination	Max	-957.86	47.575	14.658	1.886	31.2367	107.8966	112.3272	0.8047	OK	OK	15-1	0
15	2.25	COMB2	Combination	Max	-949.195	47.575	14.658	1.886	-1.4643	0.8783	1.7075	0.4195	OK	OK	15-1	2.25
15	4.5	COMB2	Combination	Max	-940.53	47.575	14.658	1.886	21.2804	105.3596	107.4872	0.7805	OK	OK	15-1	4.5
15	0	COMB2	Combination	Min	-1000.533	-46.898	-10.334	-2.2818	-25.227	-105.683	108.6531	0.8106	OK	OK	15-1	0
15	2.25	COMB2	Combination	Min	-991.868	-46.898	-10.334	-2.2818	-2.2539	-0.1879	2.2617	0.4400	OK	OK	15-1	2.25
15	4.5	COMB2	Combination	Min	-983.203	-46.898	-10.334	-2.2818	-34.7265	-106.191	111.7253	0.8137	OK	OK	15-1	4.5

16	0	COMB2	Combination	Max	-957.86	47.575	10.334	2.2818	25.227	107.8966	110.8065	0.7995	OK	OK	16-1	0
16	2.25	COMB2	Combination	Max	-949.195	47.575	10.334	2.2818	2.2539	0.8783	2.4190	0.4219	OK	OK	16-1	2.25
16	4.5	COMB2	Combination	Max	-940.53	47.575	10.334	2.2818	34.7265	105.3596	110.9350	0.7924	OK	OK	16-1	4.5
16	0	COMB2	Combination	Min	-1000.533	-46.898	-14.658	-1.886	-31.2367	-105.683	110.2035	0.8160	OK	OK	16-1	0
16	2.25	COMB2	Combination	Min	-991.868	-46.898	-14.658	-1.886	1.4643	-0.1879	1.4763	0.4373	OK	OK	16-1	2.25
16	4.5	COMB2	Combination	Min	-983.203	-46.898	-14.658	-1.886	-21.2804	-106.191	108.3027	0.8019	OK	OK	16-1	4.5
17	0	COMB2	Combination	Max	-672.029	15.662	47.844	2.5279	109.4863	33.4847	114.4922	0.6876	OK	OK	17-1	0
17	2.26122	COMB2	Combination	Max	-663.364	16.529	47.844	2.5279	1.3473	-2.5625	2.8951	0.2990	OK	OK	17-1	2.26122
17	4.52244	COMB2	Combination	Max	-654.699	17.395	47.844	2.5279	108.5823	22.6769	110.9250	0.6678	OK	OK	17-1	4.52244
17	0	COMB2	Combination	Min	-857.435	-12.559	-48	-2.2866	-108.493	-30.2095	112.6211	0.7620	OK	OK	17-1	0
17	2.26122	COMB2	Combination	Min	-848.77	-11.692	-48	-2.2866	-0.0021	-3.1398	3.1398	0.3807	OK	OK	17-1	2.26122
17	4.52244	COMB2	Combination	Min	-840.105	-10.826	-48	-2.2866	-106.884	-41.2755	114.5772	0.7612	OK	OK	17-1	4.52244
18	0	COMB2	Combination	Max	-672.029	15.662	48	2.2866	108.4938	33.4847	113.5435	0.6844	OK	OK	18-1	0
18	2.26122	COMB2	Combination	Max	-663.364	16.529	48	2.2866	0.0021	-2.5625	2.5625	0.2979	OK	OK	18-1	2.26122
18	4.52244	COMB2	Combination	Max	-654.699	17.395	48	2.2866	106.8844	22.6769	109.2635	0.6620	OK	OK	18-1	4.52244
18	0	COMB2	Combination	Min	-857.435	-12.559	-47.844	-2.5279	-109.486	-30.2095	113.5776	0.7653	OK	OK	18-1	0
18	2.26122	COMB2	Combination	Min	-848.77	-11.692	-47.844	-2.5279	-1.3473	-3.1398	3.4167	0.3816	OK	OK	18-1	2.26122
18	4.52244	COMB2	Combination	Min	-840.105	-10.826	-47.844	-2.5279	-108.582	-41.2755	116.1627	0.7666	OK	OK	18-1	4.52244
19	0	COMB2	Combination	Max	-891.923	47.52	16.49	2.2207	35.2817	107.7758	113.4038	0.7797	OK	OK	19-1	0
19	2.25	COMB2	Combination	Max	-883.258	47.52	16.49	2.2207	-1.5099	0.8815	1.7484	0.3909	OK	OK	19-1	2.25
19	4.5	COMB2	Combination	Max	-874.593	47.52	16.49	2.2207	25.5504	105.964	109.0009	0.7570	OK	OK	19-1	4.5
19	0	COMB2	Combination	Min	-945.53	-47.085	-12.155	-1.9871	-29.1503	-105.917	109.8556	0.7908	OK	OK	19-1	0
19	2.25	COMB2	Combination	Min	-936.866	-47.085	-12.155	-1.9871	-2.112	-0.0033	2.1120	0.4155	OK	OK	19-1	2.25
19	4.5	COMB2	Combination	Min	-928.201	-47.085	-12.155	-1.9871	-38.9256	-106.065	112.9831	0.7940	OK	OK	19-1	4.5
20	0	COMB2	Combination	Max	-891.923	47.52	12.155	1.9871	29.1503	107.7758	111.6484	0.7736	OK	OK	20-1	0
20	2.25	COMB2	Combination	Max	-883.258	47.52	12.155	1.9871	2.112	0.8815	2.2886	0.3928	OK	OK	20-1	2.25
20	4.5	COMB2	Combination	Max	-874.593	47.52	12.155	1.9871	38.9256	105.964	112.8874	0.7704	OK	OK	20-1	4.5
20	0	COMB2	Combination	Min	-945.53	-47.085	-16.49	-2.2207	-35.2817	-105.917	111.6392	0.7970	OK	OK	20-1	0
20	2.25	COMB2	Combination	Min	-936.866	-47.085	-16.49	-2.2207	1.5099	-0.0033	1.5099	0.4134	OK	OK	20-1	2.25
20	4.5	COMB2	Combination	Min	-928.201	-47.085	-16.49	-2.2207	-25.5504	-106.065	109.0999	0.7807	OK	OK	20-1	4.5
21	0	COMB2	Combination	Max	-597.394	17.378	47.031	2.572	108.3261	37.4538	114.6182	0.6555	OK	OK	21-1	0
21	2.26122	COMB2	Combination	Max	-588.729	18.245	47.031	2.572	2.0392	-2.4006	3.1498	0.2674	OK	OK	21-1	2.26122
21	4.52244	COMB2	Combination	Max	-580.065	19.111	47.031	2.572	109.8276	27.0904	113.1194	0.6428	OK	OK	21-1	4.52244
21	0	COMB2	Combination	Min	-824.978	-14.42	-48.397	-2.1871	-109.044	-34.2168	114.2872	0.7536	OK	OK	21-1	0
21	2.26122	COMB2	Combination	Min	-816.313	-13.553	-48.397	-2.1871	0.331	-3.011	3.0291	0.3661	OK	OK	21-1	2.26122
21	4.52244	COMB2	Combination	Min	-807.648	-12.687	-48.397	-2.1871	-104.368	-45.0692	113.6839	0.7439	OK	OK	21-1	4.52244
22	0	COMB2	Combination	Max	-597.394	17.378	48.397	2.1871	109.0448	37.4538	115.2977	0.6579	OK	OK	22-1	0
22	2.26122	COMB2	Combination	Max	-588.729	18.245	48.397	2.1871	-0.331	-2.4006	2.4233	0.2649	OK	OK	22-1	2.26122
22	4.52244	COMB2	Combination	Max	-580.065	19.111	48.397	2.1871	104.3686	27.0904	107.8272	0.6246	OK	OK	22-1	4.52244
22	0	COMB2	Combination	Min	-824.978	-14.42	-47.031	-2.572	-108.326	-34.2168	113.6016	0.7512	OK	OK	22-1	0
22	2.26122	COMB2	Combination	Min	-816.313	-13.553	-47.031	-2.572	-2.0392	-3.011	3.6365	0.3682	OK	OK	22-1	2.26122
22	4.52244	COMB2	Combination	Min	-807.648	-12.687	-47.031	-2.572	-109.827	-45.0692	118.7154	0.7613	OK	OK	22-1	4.52244
23	0	COMB2	Combination	Max	-542.998	45.181	14.097	1.8776	33.2844	102.2976	107.5763	0.6076	OK	OK	23-1	0

23	2.26122	COMB2	Combination	Max	-534.334	46.047	14.097	1.8776	2.1325	-0.8179	2.2840	0.2407	OK	OK	23-1	2.26122
23	4.52244	COMB2	Combination	Max	-525.669	46.914	14.097	1.8776	43.0467	101.6848	110.4211	0.6098	OK	OK	23-1	4.52244
23	**0**	**COMB2**	**Combination**	**Min**	**-1143.395**	**-47.136**	**-18.153**	**-2.0344**	**-39.05**	**-107.568**	114.4374	0.8928	OK	OK	23-1	0
23	2.26122	COMB2	Combination	Min	-1134.73	-46.27	-18.153	-2.0344	1.2731	-1.9903	2.3626	0.5026	OK	OK	23-1	2.26122
23	4.52244	COMB2	Combination	Min	-1126.066	-45.403	-18.153	-2.0344	-30.47	-105.948	110.2430	0.8708	OK	OK	23-1	4.52244
24	0	COMB2	Combination	Max	-542.998	45.181	18.153	2.0344	39.05	102.2976	109.4975	0.6142	OK	OK	24-1	0
24	2.26122	COMB2	Combination	Max	-534.334	46.047	18.153	2.0344	-1.2731	-0.8179	1.5132	0.2380	OK	OK	24-1	2.26122
24	4.52244	COMB2	Combination	Max	-525.669	46.914	18.153	2.0344	30.47	101.6848	106.1519	0.5951	OK	OK	24-1	4.52244
24	0	COMB2	Combination	Min	-1143.395	-47.136	-14.097	-1.8776	-33.2844	-107.568	112.6005	0.8865	OK	OK	24-1	0
24	2.26122	COMB2	Combination	Min	-1134.73	-46.27	-14.097	-1.8776	-2.1325	-1.9903	2.9170	0.5045	OK	OK	24-1	2.26122
24	4.52244	COMB2	Combination	Min	-1126.066	-45.403	-14.097	-1.8776	-43.0467	-105.948	114.3596	0.8850	OK	OK	24-1	4.52244
29	0	COMB2	Combination	Max	-671.102	11.144	50.222	1.9314	112.8721	23.2837	115.2486	0.6898	OK	OK	29-1	0
29	2.26122	COMB2	Combination	Max	-662.437	12.011	50.222	1.9314	-0.3218	-2.6974	2.7165	0.2980	OK	OK	29-1	2.26122
29	4.52244	COMB2	Combination	Max	-653.772	12.877	50.222	1.9314	104.0573	11.2773	104.6666	0.6458	OK	OK	29-1	4.52244
29	0	COMB2	Combination	Min	-812.89	-7.612	-46.532	-2.3754	-106.381	-19.2328	108.1059	0.7270	OK	OK	29-1	0
29	2.26122	COMB2	Combination	Min	-804.225	-6.745	-46.532	-2.3754	-1.5315	-3.1986	3.5463	0.3627	OK	OK	29-1	2.26122
29	4.52244	COMB2	Combination	Min	-795.56	-5.879	-46.532	-2.3754	-114.255	-31.0388	118.3960	0.7549	OK	OK	29-1	4.52244
30	0	COMB2	Combination	Max	-671.102	11.144	46.532	2.3754	106.3813	23.2837	108.8995	0.6679	OK	OK	30-1	0
30	2.26122	COMB2	Combination	Max	-662.437	12.011	46.532	2.3754	1.5315	-2.6974	3.1018	0.2993	OK	OK	30-1	2.26122
30	4.52244	COMB2	Combination	Max	-653.772	12.877	46.532	2.3754	114.255	11.2773	114.8102	0.6808	OK	OK	30-1	4.52244
30	0	COMB2	Combination	Min	-812.89	-7.612	-50.222	-1.9314	-112.872	-19.2328	114.4990	0.7490	OK	OK	30-1	0
30	2.26122	COMB2	Combination	Min	-804.225	-6.745	-50.222	-1.9314	0.3218	-3.1986	3.2147	0.3615	OK	OK	30-1	2.26122
30	4.52244	COMB2	Combination	Min	-795.56	-5.879	-50.222	-1.9314	-104.057	-31.0388	108.5879	0.7211	OK	OK	30-1	4.52244
31	0	COMB2	Combination	Max	-893.096	49.85	11.708	2.1146	24.6049	111.1176	113.8091	0.7816	OK	OK	31-1	0
31	2.25	COMB2	Combination	Max	-884.431	49.85	11.708	2.1146	-1.4769	-0.909	1.7342	0.3914	OK	OK	31-1	2.25
31	4.5	COMB2	Combination	Max	-875.767	49.85	11.708	2.1146	14.0476	100.2287	101.2083	0.7306	OK	OK	31-1	4.5
31	0	COMB2	Combination	Min	-936.369	-45.223	-7.151	-1.731	-18.1365	-103.277	104.8578	0.7696	OK	OK	31-1	0
31	2.25	COMB2	Combination	Min	-927.704	-45.223	-7.151	-1.731	-2.308	-1.6612	2.8437	0.4140	OK	OK	31-1	2.25
31	4.5	COMB2	Combination	Min	-919.039	-45.223	-7.151	-1.731	-28.0859	-113.209	116.6412	0.8027	OK	OK	31-1	4.5
35	0	COMB2	Combination	Max	-893.096	49.85	7.151	1.731	18.1365	111.1176	112.5880	0.7774	OK	OK	35-1	0
35	2.25	COMB2	Combination	Max	-884.431	49.85	7.151	1.731	2.308	-0.909	2.4806	0.3939	OK	OK	35-1	2.25
35	4.5	COMB2	Combination	Max	-875.767	49.85	7.151	1.731	28.0859	100.2287	104.0894	0.7405	OK	OK	35-1	4.5
35	0	COMB2	Combination	Min	-936.369	-45.223	-11.708	-2.1146	-24.6049	-103.277	106.1679	0.7741	OK	OK	35-1	0
35	2.25	COMB2	Combination	Min	-927.704	-45.223	-11.708	-2.1146	1.4769	-1.6612	2.2228	0.4119	OK	OK	35-1	2.25
35	4.5	COMB2	Combination	Min	-919.039	-45.223	-11.708	-2.1146	-14.0476	-113.209	114.0775	0.7938	OK	OK	35-1	4.5
36	0	COMB2	Combination	Max	-706.014	12.472	49.66	1.9298	112.0855	26.2917	115.1278	0.7046	OK	OK	36-1	0
36	2.26122	COMB2	Combination	Max	-697.349	13.338	49.66	1.9298	0.0629	-2.6371	2.6379	0.3130	OK	OK	36-1	2.26122
36	4.52244	COMB2	Combination	Max	-688.684	14.205	49.66	1.9298	106.3928	14.8205	107.4201	0.6705	OK	OK	36-1	4.52244
36	0	COMB2	Combination	Min	-851.202	-9.161	-47.293	-1.9244	-107.486	-22.6959	109.8569	0.7497	OK	OK	36-1	0
36	2.26122	COMB2	Combination	Min	-842.537	-8.295	-47.293	-1.9244	-0.817	-3.2116	3.3139	0.3785	OK	OK	36-1	2.26122
36	4.52244	COMB2	Combination	Min	-833.872	-7.428	-47.293	-1.9244	-112.499	-34.0324	117.5345	0.7686	OK	OK	36-1	4.52244
37	0	COMB2	Combination	Max	-706.014	12.472	47.293	1.9244	107.4869	26.2917	110.6557	0.6892	OK	OK	37-1	0
37	2.26122	COMB2	Combination	Max	-697.349	13.338	47.293	1.9244	0.817	-2.6371	2.7608	0.3134	OK	OK	37-1	2.26122

37	4.52244	COMB2	Combination	Max	-688.684	14.205	47.293	1.9244	112.4996	14.8205	113.4716	0.6914	OK	OK	37-1	4.52244
37	0	COMB2	Combination	Min	-851.202	-9.161	-49.66	-1.9298	-112.085	-22.6959	114.3602	0.7652	OK	OK	37-1	0
37	2.26122	COMB2	Combination	Min	-842.537	-8.295	-49.66	-1.9298	-0.0629	-3.2116	3.2122	0.3782	OK	OK	37-1	2.26122
37	4.52244	COMB2	Combination	Min	-833.872	-7.428	-49.66	-1.9298	-106.392	-34.0324	111.7033	0.7485	OK	OK	37-1	4.52244
38	0	COMB2	Combination	Max	-917.877	48.53	13.118	1.8617	27.8238	109.2521	112.7395	0.7887	OK	OK	38-1	0
38	2.25	COMB2	Combination	Max	-909.212	48.53	13.118	1.8617	-1.4537	0.0735	1.4556	0.4012	OK	OK	38-1	2.25
38	4.5	COMB2	Combination	Max	-900.548	48.53	13.118	1.8617	17.5202	103.7223	105.1916	0.7551	OK	OK	38-1	4.5
38	0	COMB2	Combination	Min	-942.879	-46.364	-8.669	-1.9912	-21.4966	-104.916	107.0962	0.7801	OK	OK	38-1	0
38	2.25	COMB2	Combination	Min	-934.214	-46.364	-8.669	-1.9912	-2.2285	-0.6106	2.3106	0.4150	OK	OK	38-1	2.25
38	4.5	COMB2	Combination	Min	-925.549	-46.364	-8.669	-1.9912	-31.2117	-109.132	113.5076	0.7947	OK	OK	38-1	4.5
39	0	COMB2	Combination	Max	-917.877	48.53	8.669	1.9912	21.4966	109.2521	111.3469	0.7839	OK	OK	39-1	0
39	2.25	COMB2	Combination	Max	-909.212	48.53	8.669	1.9912	2.2285	0.0735	2.2297	0.4039	OK	OK	39-1	2.25
39	4.5	COMB2	Combination	Max	-900.548	48.53	8.669	1.9912	31.2117	103.7223	108.3166	0.7659	OK	OK	39-1	4.5
39	0	COMB2	Combination	Min	-942.879	-46.364	-13.118	-1.8617	-27.8238	-104.916	108.5433	0.7851	OK	OK	39-1	0
39	2.25	COMB2	Combination	Min	-934.214	-46.364	-13.118	-1.8617	1.4537	-0.6106	1.5767	0.4125	OK	OK	39-1	2.25
39	4.5	COMB2	Combination	Min	-925.549	-46.364	-13.118	-1.8617	-17.5202	-109.132	110.5295	0.7844	OK	OK	39-1	4.5
91	0	COMB2	Combination	Max	-407.397	8.168	51.329	2.2266	114.3986	16.943	115.6465	0.5763	OK	OK	91-1	0
91	2.26122	COMB2	Combination	Max	-398.732	9.035	51.329	2.2266	-1.3884	-2.0758	2.4973	0.1824	OK	OK	91-1	2.26122
91	4.52244	COMB2	Combination	Max	-390.068	9.901	51.329	2.2266	99.4979	6.3216	99.6985	0.5138	OK	OK	91-1	4.52244
91	0	COMB2	Combination	Min	-501.416	-5.048	-45.045	-2.7373	-104.213	-12.5931	104.9719	0.5805	OK	OK	91-1	0
91	2.26122	COMB2	Combination	Min	-492.751	-4.181	-45.045	-2.7373	-2.6384	-2.5891	3.6966	0.2275	OK	OK	91-1	2.26122
91	4.52244	COMB2	Combination	Min	-484.086	-3.315	-45.045	-2.7373	-117.736	-23.9199	120.1415	0.6252	OK	OK	91-1	4.52244
92	0	COMB2	Combination	Max	-407.397	8.168	45.045	2.7373	104.2138	16.943	105.5821	0.5416	OK	OK	92-1	0
92	2.26122	COMB2	Combination	Max	-398.732	9.035	45.045	2.7373	2.6384	-2.0758	3.3571	0.1853	OK	OK	92-1	2.26122
92	4.52244	COMB2	Combination	Max	-390.068	9.901	45.045	2.7373	117.7362	6.3216	117.9058	0.5765	OK	OK	92-1	4.52244
92	0	COMB2	Combination	Min	-501.416	-5.048	-51.329	-2.2266	-114.398	-12.5931	115.0896	0.6153	OK	OK	92-1	0
92	2.26122	COMB2	Combination	Min	-492.751	-4.181	-51.329	-2.2266	1.3884	-2.5891	2.9379	0.2248	OK	OK	92-1	2.26122
92	4.52244	COMB2	Combination	Min	-484.086	-3.315	-51.329	-2.2266	-99.4979	-23.9199	102.3328	0.5638	OK	OK	92-1	4.52244
93	0	COMB2	Combination	Max	-302.091	48.433	8.821	2.1187	17.9654	108.5384	110.0152	0.5110	OK	OK	93-1	0
93	2.26122	COMB2	Combination	Max	-293.426	49.299	8.821	2.1187	-1.2285	-1.9078	2.2691	0.1357	OK	OK	93-1	2.26122
93	**4.52244**	**COMB2**	**Combination**	**Max**	**-284.761**	**50.166**	**8.821**	**2.1187**	**9.2714**	**95.5489**	95.9977	0.4551	OK	OK	93-1	4.52244
93	0	COMB2	Combination	Min	-857.636	-44.644	-4.719	-2.3304	-12.0727	-102.431	103.1404	0.7294	OK	OK	93-1	0
93	2.26122	COMB2	Combination	Min	-848.971	-43.777	-4.719	-2.3304	-2.1557	-2.5128	3.3108	0.3813	OK	OK	93-1	2.26122
93	4.52244	COMB2	Combination	Min	-840.306	-42.911	-4.719	-2.3304	-21.9326	-114.415	116.4990	0.7679	OK	OK	93-1	4.52244
94	0	COMB2	Combination	Max	-302.091	48.433	4.719	2.3304	12.0727	108.5384	109.2078	0.5082	OK	OK	94-1	0
94	2.26122	COMB2	Combination	Max	-293.426	49.299	4.719	2.3304	2.1557	-1.9078	2.8787	0.1378	OK	OK	94-1	2.26122
94	4.52244	COMB2	Combination	Max	-284.761	50.166	4.719	2.3304	21.9326	95.5489	98.0338	0.4621	OK	OK	94-1	4.52244
94	0	COMB2	Combination	Min	-857.636	-44.644	-8.821	-2.1187	-17.9654	-102.431	103.9949	0.7323	OK	OK	94-1	0
94	2.26122	COMB2	Combination	Min	-848.971	-43.777	-8.821	-2.1187	1.2285	-2.5128	2.7970	0.3796	OK	OK	94-1	2.26122
94	4.52244	COMB2	Combination	Min	-840.306	-42.911	-8.821	-2.1187	-9.2714	-114.415	114.7908	0.7620	OK	OK	94-1	4.52244
1	0	COMB3	Combination	Max	-408.674	28.385	24.355	4.3836	53.6532	63.0309	82.7742	0.4635	OK	OK	1-1	0
1	2.26122	COMB3	Combination	Max	-400.009	29.251	24.355	4.3836	0.0096	-1.4273	1.4273	0.1792	OK	OK	1-1	2.26122
1	4.52244	COMB3	Combination	Max	-391.344	30.118	24.355	4.3836	47.4713	53.4057	71.4541	0.4169	OK	OK	1-1	4.52244

1	0	COMB3	Combination	Min	-754.828	-25.951	-21.093	-4.686	-47.9222	-60.0501	76.8281	0.5938	OK	OK	1-1	0
1	2.26122	COMB3	Combination	Min	-746.163	-25.085	-21.093	-4.686	-1.6564	-3.0539	3.4742	0.3371	OK	OK	1-1	2.26122
1	4.52244	COMB3	Combination	Min	-737.498	-24.218	-21.093	-4.686	-56.4959	-69.2674	89.3855	0.6296	OK	OK	1-1	4.52244
2	0	COMB3	Combination	Max	-408.674	28.385	21.093	4.686	47.9222	63.0309	79.1797	0.4511	OK	OK	2-1	0
2	2.26122	COMB3	Combination	Max	-400.009	29.251	21.093	4.686	1.6564	-1.4273	2.1865	0.1818	OK	OK	2-1	2.26122
2	4.52244	COMB3	Combination	Max	-391.344	30.118	21.093	4.686	56.4959	53.4057	77.7429	0.4386	OK	OK	2-1	4.52244
2	0	COMB3	Combination	Min	-754.828	-25.951	-24.355	-4.3836	-53.6532	-60.0501	80.5275	0.6066	OK	OK	2-1	0
2	2.26122	COMB3	Combination	Min	-746.163	-25.085	-24.355	-4.3836	-0.0096	-3.0539	3.0539	0.3357	OK	OK	2-1	2.26122
2	4.52244	COMB3	Combination	Min	-737.498	-24.218	-24.355	-4.3836	-47.4713	-69.2674	83.9732	0.6109	OK	OK	2-1	4.52244
3	0	COMB3	Combination	Max	-683.428	18.653	29.691	4.6358	65.2841	41.2723	77.2361	0.5641	OK	OK	3-1	0
3	2.25	COMB3	Combination	Max	-674.763	18.653	29.691	4.6358	-0.7974	-0.5124	0.9478	0.2973	OK	OK	3-1	2.25
3	4.5	COMB3	Combination	Max	-666.098	18.653	29.691	4.6358	55.2575	34.5282	65.1582	0.5149	OK	OK	3-1	4.5
3	0	COMB3	Combination	Min	-741.806	-15.654	-25.433	-4.4857	-59.2041	-35.9175	69.2473	0.5620	OK	OK	3-1	0
3	2.25	COMB3	Combination	Min	-733.141	-15.654	-25.433	-4.4857	-2.7039	-0.8802	2.8436	0.3293	OK	OK	3-1	2.25
3	4.5	COMB3	Combination	Min	-724.476	-15.654	-25.433	-4.4857	-68.3402	-42.6681	80.5664	0.5935	OK	OK	3-1	4.5
4	0	COMB3	Combination	Max	-683.428	18.653	25.433	4.4857	59.2041	41.2723	72.1701	0.5467	OK	OK	4-1	0
4	2.25	COMB3	Combination	Max	-674.763	18.653	25.433	4.4857	2.7039	-0.5124	2.7520	0.3035	OK	OK	4-1	2.25
4	4.5	COMB3	Combination	Max	-666.098	18.653	25.433	4.4857	68.3402	34.5282	76.5675	0.5543	OK	OK	4-1	4.5
4	0	COMB3	Combination	Min	-741.806	-15.654	-29.691	-4.6358	-65.2841	-35.9175	74.5123	0.5802	OK	OK	4-1	0
4	2.25	COMB3	Combination	Min	-733.141	-15.654	-29.691	-4.6358	0.7974	-0.8802	1.1877	0.3235	OK	OK	4-1	2.25
4	4.5	COMB3	Combination	Min	-724.476	-15.654	-29.691	-4.6358	-55.2575	-42.6681	69.8137	0.5564	OK	OK	4-1	4.5
5	0	COMB3	Combination	Max	-401.599	25.425	24.578	5.8857	53.9535	56.1253	77.8526	0.4434	OK	OK	5-1	0
5	2.26122	COMB3	Combination	Max	-392.934	26.292	24.578	5.8857	-0.0276	-1.5514	1.5516	0.1766	OK	OK	5-1	2.26122
5	4.52244	COMB3	Combination	Max	-384.269	27.158	24.578	5.8857	47.8011	46.4042	66.6205	0.3972	OK	OK	5-1	4.52244
5	0	COMB3	Combination	Min	-676.085	-22.779	-21.198	-5.9552	-48.0648	-52.7009	71.3275	0.5405	OK	OK	5-1	0
5	2.26122	COMB3	Combination	Min	-667.42	-21.912	-21.198	-5.9552	-1.7266	-2.9688	3.4344	0.3027	OK	OK	5-1	2.26122
5	4.52244	COMB3	Combination	Min	-658.755	-21.046	-21.198	-5.9552	-57.1982	-62.7877	84.9349	0.5799	OK	OK	5-1	4.52244
6	0	COMB3	Combination	Max	-401.599	25.425	21.198	5.9552	48.0648	56.1253	73.8937	0.4298	OK	OK	6-1	0
6	2.26122	COMB3	Combination	Max	-392.934	26.292	21.198	5.9552	1.7266	-1.5514	2.3212	0.1792	OK	OK	6-1	2.26122
6	4.52244	COMB3	Combination	Max	-384.269	27.158	21.198	5.9552	57.1982	46.4042	73.6545	0.4214	OK	OK	6-1	4.52244
6	0	COMB3	Combination	Min	-676.085	-22.779	-24.578	-5.8857	-53.9535	-52.7009	75.4213	0.5547	OK	OK	6-1	0
6	2.26122	COMB3	Combination	Min	-667.42	-21.912	-24.578	-5.8857	0.0276	-2.9688	2.9689	0.3011	OK	OK	6-1	2.26122
6	4.52244	COMB3	Combination	Min	-658.755	-21.046	-24.578	-5.8857	-47.8011	-62.7877	78.9129	0.5592	OK	OK	6-1	4.52244
7	0	COMB3	Combination	Max	-650.421	18.783	26.684	5.886	58.2034	41.4529	71.4561	0.5298	OK	OK	7-1	0
7	2.25	COMB3	Combination	Max	-641.756	18.783	26.684	5.886	-1.0428	-0.7226	1.2687	0.2840	OK	OK	7-1	2.25
7	4.5	COMB3	Combination	Max	-633.091	18.783	26.684	5.886	48.177	33.9219	58.9213	0.4790	OK	OK	7-1	4.5
7	0	COMB3	Combination	Min	-701.085	-15.462	-22.22	-5.9751	-51.8245	-35.6589	62.9074	0.5224	OK	OK	7-1	0
7	2.25	COMB3	Combination	Min	-692.42	-15.462	-22.22	-5.9751	-2.6211	-0.9539	2.7893	0.3113	OK	OK	7-1	2.25
7	4.5	COMB3	Combination	Min	-683.755	-15.462	-22.22	-5.9751	-61.8837	-43.069	75.3958	0.5579	OK	OK	7-1	4.5
8	0	COMB3	Combination	Max	-650.421	18.783	22.22	5.9751	51.8245	41.4529	66.3636	0.5122	OK	OK	8-1	0
8	2.25	COMB3	Combination	Max	-641.756	18.783	22.22	5.9751	2.6211	-0.7226	2.7189	0.2890	OK	OK	8-1	2.25
8	4.5	COMB3	Combination	Max	-633.091	18.783	22.22	5.9751	61.8837	33.9219	70.5712	0.5192	OK	OK	8-1	4.5
8	0	COMB3	Combination	Min	-701.085	-15.462	-26.684	-5.886	-58.2034	-35.6589	68.2583	0.5409	OK	OK	8-1	0

8	2.25	COMB3	Combination	Min	-692.42	-15.462	-26.684	-5.886	1.0428	-0.9539	1.4133	0.3066	OK	OK	8-1	2.25
8	4.5	COMB3	Combination	Min	-683.755	-15.462	-26.684	-5.886	-48.177	-43.069	64.6217	0.5208	OK	OK	8-1	4.5
9	0	COMB3	Combination	Max	-371.278	23.488	24.615	4.0398	53.9897	51.6831	74.7398	0.4195	OK	OK	9-1	0
9	2.26122	COMB3	Combination	Max	-362.613	24.354	24.615	4.0398	-0.6522	-1.4919	1.6282	0.1636	OK	OK	9-1	2.26122
9	4.52244	COMB3	Combination	Max	-353.948	25.221	24.615	4.0398	44.909	42.4548	61.7999	0.3673	OK	OK	9-1	4.52244
9	0	COMB3	Combination	Min	-594.988	-20.908	-20.258	-4.4407	-46.7057	-48.1872	67.1076	0.4907	OK	OK	9-1	0
9	2.26122	COMB3	Combination	Min	-586.324	-20.041	-20.258	-4.4407	-1.916	-2.8055	3.3973	0.2672	OK	OK	9-1	2.26122
9	4.52244	COMB3	Combination	Min	-577.659	-19.175	-20.258	-4.4407	-57.3293	-58.4641	81.8822	0.5341	OK	OK	9-1	4.52244
10	0	COMB3	Combination	Max	-371.278	23.488	20.258	4.4407	46.7057	51.6831	69.6604	0.4020	OK	OK	10-1	0
10	2.26122	COMB3	Combination	Max	-362.613	24.354	20.258	4.4407	1.916	-1.4919	2.4283	0.1664	OK	OK	10-1	2.26122
10	4.52244	COMB3	Combination	Max	-353.948	25.221	20.258	4.4407	57.3293	42.4548	71.3376	0.4002	OK	OK	10-1	4.52244
10	0	COMB3	Combination	Min	-594.988	-20.908	-24.615	-4.0398	-53.9897	-48.1872	72.3664	0.5088	OK	OK	10-1	0
10	2.26122	COMB3	Combination	Min	-586.324	-20.041	-24.615	-4.0398	0.6522	-2.8055	2.8803	0.2654	OK	OK	10-1	2.26122
10	4.52244	COMB3	Combination	Min	-577.659	-19.175	-24.615	-4.0398	-44.909	-58.4641	73.7216	0.5059	OK	OK	10-1	4.52244
11	0	COMB3	Combination	Max	-592.039	19.464	24.691	4.2968	53.5694	42.4031	68.3206	0.4936	OK	OK	11-1	0
11	2.25	COMB3	Combination	Max	-583.374	19.464	24.691	4.2968	-1.0671	-1.3331	1.7076	0.2601	OK	OK	11-1	2.25
11	4.5	COMB3	Combination	Max	-574.709	19.464	24.691	4.2968	44.2329	31.6221	54.3738	0.4379	OK	OK	11-1	4.5
11	0	COMB3	Combination	Min	-640.216	-14.711	-20.354	-4.1658	-47.369	-34.5794	58.6477	0.4812	OK	OK	11-1	0
11	2.25	COMB3	Combination	Min	-631.551	-14.711	-20.354	-4.1658	-2.4914	-1.5373	2.9275	0.2853	OK	OK	11-1	2.25
11	4.5	COMB3	Combination	Min	-622.886	-14.711	-20.354	-4.1658	-57.5503	-45.1865	73.1701	0.5237	OK	OK	11-1	4.5
12	0	COMB3	Combination	Max	-592.039	19.464	20.354	4.1658	47.369	42.4031	63.5755	0.4772	OK	OK	12-1	0
12	2.25	COMB3	Combination	Max	-583.374	19.464	20.354	4.1658	2.4914	-1.3331	2.8256	0.2639	OK	OK	12-1	2.25
12	4.5	COMB3	Combination	Max	-574.709	19.464	20.354	4.1658	57.5503	31.6221	65.6658	0.4769	OK	OK	12-1	4.5
12	0	COMB3	Combination	Min	-640.216	-14.711	-24.691	-4.2968	-53.5694	-34.5794	63.7606	0.4988	OK	OK	12-1	0
12	2.25	COMB3	Combination	Min	-631.551	-14.711	-24.691	-4.2968	1.0671	-1.5373	1.8714	0.2816	OK	OK	12-1	2.25
12	4.5	COMB3	Combination	Min	-622.886	-14.711	-24.691	-4.2968	-44.2329	-45.1865	63.2327	0.4895	OK	OK	12-1	4.5
13	0	COMB3	Combination	Max	-429.772	42.396	22.542	3.9682	51.1243	94.5613	107.4967	0.5579	OK	OK	13-1	0
13	2.26122	COMB3	Combination	Max	-421.107	43.263	22.542	3.9682	0.2789	-1.5227	1.5480	0.1888	OK	OK	13-1	2.26122
13	4.52244	COMB3	Combination	Max	-412.442	44.129	22.542	3.9682	47.8779	85.2927	97.8117	0.5170	OK	OK	13-1	4.52244
13	**0**	**COMB3**	**Combination**	**Min**	**-925.096**	**-40.099**	**-21.24**	**-3.8788**	**-48.1806**	**-92.1425**	103.9789	0.7616	OK	OK	13-1	0
13	2.26122	COMB3	Combination	Min	-916.431	-39.233	-21.24	-3.8788	-0.2781	-3.2119	3.2239	0.4104	OK	OK	13-1	2.26122
13	4.52244	COMB3	Combination	Min	-907.766	-38.366	-21.24	-3.8788	-50.8199	-101.099	113.1537	0.7857	OK	OK	13-1	4.52244
14	0	COMB3	Combination	Max	-429.772	42.396	21.24	3.8788	48.1806	94.5613	106.1283	0.5532	OK	OK	14-1	0
14	2.26122	COMB3	Combination	Max	-421.107	43.263	21.24	3.8788	0.2781	-1.5227	1.5479	0.1888	OK	OK	14-1	2.26122
14	4.52244	COMB3	Combination	Max	-412.442	44.129	21.24	3.8788	50.8199	85.2927	99.2850	0.5221	OK	OK	14-1	4.52244
14	0	COMB3	Combination	Min	-925.096	-40.099	-22.542	-3.9682	-51.1243	-92.1425	105.3752	0.7665	OK	OK	14-1	0
14	2.26122	COMB3	Combination	Min	-916.431	-39.233	-22.542	-3.9682	-0.2789	-3.2119	3.2240	0.4104	OK	OK	14-1	2.26122
14	4.52244	COMB3	Combination	Min	-907.766	-38.366	-22.542	-3.9682	-47.8779	-101.099	111.8632	0.7813	OK	OK	14-1	4.52244
15	0	COMB3	Combination	Max	-801.775	17.216	43.367	3.8755	96.5182	39.259	104.1971	0.7087	OK	OK	15-1	0
15	2.25	COMB3	Combination	Max	-793.11	17.216	43.367	3.8755	-0.34	0.5474	0.6444	0.3478	OK	OK	15-1	2.25
15	4.5	COMB3	Combination	Max	-784.445	17.216	43.367	3.8755	87.434	36.3665	94.6954	0.6683	OK	OK	15-1	4.5
15	0	COMB3	Combination	Min	-875.112	-16.254	-39.762	-4.1999	-91.5065	-36.7767	98.6203	0.7214	OK	OK	15-1	0
15	2.25	COMB3	Combination	Min	-866.447	-16.254	-39.762	-4.1999	-2.7602	-0.2291	2.7697	0.3871	OK	OK	15-1	2.25

15	4.5	COMB3	Combination	Min	-857.782	-16.254	-39.762	-4.1999	-98.6463	-38.2122	105.7888	0.7386	OK	OK	15-1	4.5
16	0	COMB3	Combination	Max	-801.775	17.216	39.762	4.1999	91.5065	39.259	99.5726	0.6927	OK	OK	16-1	0
16	2.25	COMB3	Combination	Max	-793.11	17.216	39.762	4.1999	2.7602	0.5474	2.8140	0.3553	OK	OK	16-1	2.25
16	4.5	COMB3	Combination	Max	-784.445	17.216	39.762	4.1999	98.6463	36.3665	105.1362	0.7043	OK	OK	16-1	4.5
16	0	COMB3	Combination	Min	-875.112	-16.254	-43.367	-3.8755	-96.5182	-36.7767	103.2874	0.7375	OK	OK	16-1	0
16	2.25	COMB3	Combination	Min	-866.447	-16.254	-43.367	-3.8755	0.34	-0.2291	0.4100	0.3790	OK	OK	16-1	2.25
16	4.5	COMB3	Combination	Min	-857.782	-16.254	-43.367	-3.8755	-87.434	-38.2122	95.4195	0.7028	OK	OK	16-1	4.5
17	0	COMB3	Combination	Max	-413.411	48.038	21.917	3.7382	50.2345	107.1757	118.3644	0.5883	OK	OK	17-1	0
17	2.26122	COMB3	Combination	Max	-404.746	48.905	21.917	3.7382	0.7942	-1.5316	1.7253	0.1823	OK	OK	17-1	2.26122
17	4.52244	COMB3	Combination	Max	-396.081	49.771	21.917	3.7382	49.2072	98.344	109.9677	0.5518	OK	OK	17-1	4.52244
17	0	COMB3	Combination	Min	-918.994	-45.787	-21.671	-3.566	-48.8002	-104.814	115.6182	0.7991	OK	OK	17-1	0
17	2.26122	COMB3	Combination	Min	-910.329	-44.92	-21.671	-3.566	0.0851	-3.157	3.1581	0.4075	OK	OK	17-1	2.26122
17	4.52244	COMB3	Combination	Min	-901.664	-44.054	-21.671	-3.566	-48.883	-114.000	124.0392	0.8206	OK	OK	17-1	4.52244
18	0	COMB3	Combination	Max	-413.411	48.038	21.671	3.566	48.8002	107.1757	117.7629	0.5862	OK	OK	18-1	0
18	2.26122	COMB3	Combination	Max	-404.746	48.905	21.671	3.566	-0.0851	-1.5316	1.5340	0.1816	OK	OK	18-1	2.26122
18	4.52244	COMB3	Combination	Max	-396.081	49.771	21.671	3.566	48.883	98.344	109.8230	0.5513	OK	OK	18-1	4.52244
18	0	COMB3	Combination	Min	-918.994	-45.787	-21.917	-3.7382	-50.2345	-104.814	116.2308	0.8012	OK	OK	18-1	0
18	2.26122	COMB3	Combination	Min	-910.329	-44.92	-21.917	-3.7382	-0.7942	-3.157	3.2554	0.4079	OK	OK	18-1	2.26122
18	4.52244	COMB3	Combination	Min	-901.664	-44.054	-21.917	-3.7382	-49.2072	-114.000	124.1674	0.8210	OK	OK	18-1	4.52244
19	0	COMB3	Combination	Max	-765.657	17.167	49.465	3.9236	109.8018	39.1685	116.5788	0.7356	OK	OK	19-1	0
19	2.25	COMB3	Combination	Max	-756.992	17.167	49.465	3.9236	-0.5946	0.5608	0.8173	0.3327	OK	OK	19-1	2.25
19	4.5	COMB3	Combination	Max	-748.327	17.167	49.465	3.9236	101.5332	36.7241	107.9706	0.6984	OK	OK	19-1	4.5
19	0	COMB3	Combination	Min	-826.865	-16.366	-45.814	-3.7191	-104.638	-36.9232	110.9622	0.7429	OK	OK	19-1	0
19	2.25	COMB3	Combination	Min	-818.2	-16.366	-45.814	-3.7191	-2.457	-0.118	2.4598	0.3650	OK	OK	19-1	2.25
19	4.5	COMB3	Combination	Min	-809.535	-16.366	-45.814	-3.7191	-112.799	-38.0837	119.0550	0.7633	OK	OK	19-1	4.5
20	0	COMB3	Combination	Max	-765.657	17.167	45.814	3.7191	104.6388	39.1685	111.7294	0.7189	OK	OK	20-1	0
20	2.25	COMB3	Combination	Max	-756.992	17.167	45.814	3.7191	2.457	0.5608	2.5202	0.3385	OK	OK	20-1	2.25
20	4.5	COMB3	Combination	Max	-748.327	17.167	45.814	3.7191	112.7995	36.7241	118.6271	0.7351	OK	OK	20-1	4.5
20	0	COMB3	Combination	Min	-826.865	-16.366	-49.465	-3.9236	-109.801	-36.9232	115.8437	0.7598	OK	OK	20-1	0
20	2.25	COMB3	Combination	Min	-818.2	-16.366	-49.465	-3.9236	0.5946	-0.118	0.6062	0.3586	OK	OK	20-1	2.25
20	4.5	COMB3	Combination	Min	-809.535	-16.366	-49.465	-3.9236	-101.533	-38.0837	108.4406	0.7267	OK	OK	20-1	4.5
21	0	COMB3	Combination	Max	-362.697	53.798	21.387	3.5737	49.4794	120.1355	129.9259	0.6061	OK	OK	21-1	0
21	2.26122	COMB3	Combination	Max	-354.032	54.664	21.387	3.5737	1.277	-1.421	1.9105	0.1609	OK	OK	21-1	2.26122
21	4.52244	COMB3	Combination	Max	-345.367	55.531	21.387	3.5737	50.7757	111.9292	122.9078	0.5743	OK	OK	21-1	4.52244
21	0	COMB3	Combination	Min	-892.997	-51.668	-22.173	-3.2793	-49.5031	-117.826	127.8032	0.8298	OK	OK	21-1	0
21	2.26122	COMB3	Combination	Min	-884.332	-50.802	-22.173	-3.2793	0.4764	-3.0448	3.0818	0.3960	OK	OK	21-1	2.26122
21	4.52244	COMB3	Combination	Min	-875.667	-49.935	-22.173	-3.2793	-47.2451	-127.088	135.5862	0.8491	OK	OK	21-1	4.52244
22	0	COMB3	Combination	Max	-362.697	53.798	22.173	3.2793	49.5031	120.1355	129.9350	0.6061	OK	OK	22-1	0
22	2.26122	COMB3	Combination	Max	-354.032	54.664	22.173	3.2793	-0.4764	-1.421	1.4987	0.1594	OK	OK	22-1	2.26122
22	4.52244	COMB3	Combination	Max	-345.367	55.531	22.173	3.2793	47.2451	111.9292	121.4917	0.5694	OK	OK	22-1	4.52244
22	0	COMB3	Combination	Min	-892.997	-51.668	-21.387	-3.5737	-49.4794	-117.826	127.7940	0.8298	OK	OK	22-1	0
22	2.26122	COMB3	Combination	Min	-884.332	-50.802	-21.387	-3.5737	-1.277	-3.0448	3.3017	0.3967	OK	OK	22-1	2.26122
22	4.52244	COMB3	Combination	Min	-875.667	-49.935	-21.387	-3.5737	-50.7757	-127.088	136.8564	0.8535	OK	OK	22-1	4.52244

23	0	COMB3	Combination	Max	-612.206	15.225	51.602	3.1121	117.5271	34.6907	122.5401	0.6893	OK	OK	23-1	0
23	2.26122	COMB3	Combination	Max	-603.541	16.091	51.602	3.1121	2.4892	-0.6879	2.5825	0.2719	OK	OK	23-1	2.26122
23	4.52244	COMB3	Combination	Max	-594.876	16.958	51.602	3.1121	126.489	35.5755	131.3967	0.7123	OK	OK	23-1	4.52244
23	0	COMB3	Combination	Min	-866.787	-17.609	-55.034	-3.2423	-122.404	-40.1443	128.8195	0.8219	OK	OK	23-1	0
23	2.26122	COMB3	Combination	Min	-858.122	-16.743	-55.034	-3.2423	0.3935	-1.333	1.3899	0.3787	OK	OK	23-1	2.26122
23	4.52244	COMB3	Combination	Min	-849.457	-15.876	-55.034	-3.2423	-115.845	-38.0822	121.9448	0.7906	OK	OK	23-1	4.52244
24	0	COMB3	Combination	Max	-612.206	15.225	55.034	3.2423	122.4047	34.6907	127.2256	0.7055	OK	OK	24-1	0
24	2.26122	COMB3	Combination	Max	-603.541	16.091	55.034	3.2423	-0.3935	-0.6879	0.7925	0.2657	OK	OK	24-1	2.26122
24	4.52244	COMB3	Combination	Max	-594.876	16.958	55.034	3.2423	115.8459	35.5755	121.1853	0.6771	OK	OK	24-1	4.52244
24	0	COMB3	Combination	Min	-866.787	-17.609	-51.602	-3.1121	-117.527	-40.1443	124.1941	0.8059	OK	OK	24-1	0
24	2.26122	COMB3	Combination	Min	-858.122	-16.743	-51.602	-3.1121	-2.4892	-1.333	2.8237	0.3836	OK	OK	24-1	2.26122
24	4.52244	COMB3	Combination	Min	-849.457	-15.876	-51.602	-3.1121	-126.489	-38.0822	132.0974	0.8256	OK	OK	24-1	4.52244
29	0	COMB3	Combination	Max	-417.802	32.515	24.2	4.3978	53.459	72.299	89.9167	0.4921	OK	OK	29-1	0
29	2.26122	COMB3	Combination	Max	-409.137	33.381	24.2	4.3978	-0.0485	-1.5454	1.5462	0.1836	OK	OK	29-1	2.26122
29	4.52244	COMB3	Combination	Max	-400.472	34.248	24.2	4.3978	47.1375	62.3377	78.1533	0.4440	OK	OK	29-1	4.52244
29	0	COMB3	Combination	Min	-846.822	-29.984	-20.991	-4.7705	-47.7928	-69.3562	84.2285	0.6594	OK	OK	29-1	0
29	2.26122	COMB3	Combination	Min	-838.157	-29.118	-20.991	-4.7705	-1.5435	-3.1927	3.5462	0.3774	OK	OK	29-1	2.26122
29	4.52244	COMB3	Combination	Min	-829.492	-28.251	-20.991	-4.7705	-55.9877	-78.6754	96.5631	0.6944	OK	OK	29-1	4.52244
30	0	COMB3	Combination	Max	-417.802	32.515	20.991	4.7705	47.7928	72.299	86.6677	0.4809	OK	OK	30-1	0
30	2.26122	COMB3	Combination	Max	-409.137	33.381	20.991	4.7705	1.5435	-1.5454	2.1842	0.1858	OK	OK	30-1	2.26122
30	4.52244	COMB3	Combination	Max	-400.472	34.248	20.991	4.7705	55.9877	62.3377	83.7891	0.4634	OK	OK	30-1	4.52244
30	0	COMB3	Combination	Min	-846.822	-29.984	-24.2	-4.3978	-53.459	-69.3562	87.5680	0.6709	OK	OK	30-1	0
30	2.26122	COMB3	Combination	Min	-838.157	-29.118	-24.2	-4.3978	0.0485	-3.1927	3.1931	0.3762	OK	OK	30-1	2.26122
30	4.52244	COMB3	Combination	Min	-829.492	-28.251	-24.2	-4.3978	-47.1375	-78.6754	91.7157	0.6777	OK	OK	30-1	4.52244
31	0	COMB3	Combination	Max	-729.758	19.27	33.214	4.8194	73.7815	42.1716	84.9833	0.6110	OK	OK	31-1	0
31	2.25	COMB3	Combination	Max	-721.093	19.27	33.214	4.8194	-0.2643	-0.7603	0.8049	0.3170	OK	OK	31-1	2.25
31	4.5	COMB3	Combination	Max	-712.428	19.27	33.214	4.8194	64.1477	33.3782	72.3120	0.5598	OK	OK	31-1	4.5
31	0	COMB3	Combination	Min	-819.181	-15.279	-29.464	-4.5047	-68.4595	-35.3803	77.0615	0.6227	OK	OK	31-1	0
31	2.25	COMB3	Combination	Min	-810.516	-15.279	-29.464	-4.5047	-2.85	-1.4285	3.1880	0.3642	OK	OK	31-1	2.25
31	4.5	COMB3	Combination	Min	-801.851	-15.279	-29.464	-4.5047	-75.6982	-44.5472	87.8332	0.6523	OK	OK	31-1	4.5
35	0	COMB3	Combination	Max	-729.758	19.27	29.464	4.5047	68.4595	42.1716	80.4061	0.5952	OK	OK	35-1	0
35	2.25	COMB3	Combination	Max	-721.093	19.27	29.464	4.5047	2.85	-0.7603	2.9497	0.3244	OK	OK	35-1	2.25
35	4.5	COMB3	Combination	Max	-712.428	19.27	29.464	4.5047	75.6982	33.3782	82.7304	0.5957	OK	OK	35-1	4.5
35	0	COMB3	Combination	Min	-819.181	-15.279	-33.214	-4.8194	-73.7815	-35.3803	81.8259	0.6391	OK	OK	35-1	0
35	2.25	COMB3	Combination	Min	-810.516	-15.279	-33.214	-4.8194	0.2643	-1.4285	1.4527	0.3582	OK	OK	35-1	2.25
35	4.5	COMB3	Combination	Min	-801.851	-15.279	-33.214	-4.8194	-64.1477	-44.5472	78.0985	0.6187	OK	OK	35-1	4.5
36	0	COMB3	Combination	Max	-428.396	37.137	23.593	5.7103	52.6184	82.7891	98.0955	0.5249	OK	OK	36-1	0
36	2.26122	COMB3	Combination	Max	-419.731	38.003	23.593	5.7103	0.128	-1.4857	1.4912	0.1880	OK	OK	36-1	2.26122
36	4.52244	COMB3	Combination	Max	-411.066	38.87	23.593	5.7103	48.2246	73.1341	87.6026	0.4812	OK	OK	36-1	4.52244
36	0	COMB3	Combination	Min	-902.939	-34.77	-21.351	-5.7237	-48.3346	-80.2036	93.6421	0.7163	OK	OK	36-1	0
36	2.26122	COMB3	Combination	Min	-894.275	-33.904	-21.351	-5.7237	-0.9129	-3.239	3.3652	0.4013	OK	OK	36-1	2.26122
36	4.52244	COMB3	Combination	Min	-885.61	-33.038	-21.351	-5.7237	-54.0782	-89.0876	104.2164	0.7453	OK	OK	36-1	4.52244
37	0	COMB3	Combination	Max	-428.396	37.137	21.351	5.7237	48.3346	82.7891	95.8659	0.5172	OK	OK	37-1	0

37	2.26122	COMB3	Combination	Max	-419.731	38.003	21.351	5.7237	0.9129	-1.4857	1.7438	0.1889	OK	OK	37-1	2.26122
37	4.52244	COMB3	Combination	Max	-411.066	38.87	21.351	5.7237	54.0782	73.1341	90.9563	0.4928	OK	OK	37-1	4.52244
37	0	COMB3	Combination	Min	-902.939	-34.77	-23.593	-5.7103	-52.6184	-80.2036	95.9235	0.7242	OK	OK	37-1	0
37	2.26122	COMB3	Combination	Min	-894.275	-33.904	-23.593	-5.7103	-0.128	-3.239	3.2415	0.4008	OK	OK	37-1	2.26122
37	4.52244	COMB3	Combination	Min	-885.61	-33.038	-23.593	-5.7103	-48.2246	-89.0876	101.3026	0.7352	OK	OK	37-1	4.52244
38	0	COMB3	Combination	Max	-755.953	17.981	38.082	5.4967	84.7223	40.3692	93.8485	0.6530	OK	OK	38-1	0
38	2.25	COMB3	Combination	Max	-747.288	17.981	38.082	5.4967	-0.2932	-0.0784	0.3035	0.3267	OK	OK	38-1	2.25
38	4.5	COMB3	Combination	Max	-738.623	17.981	38.082	5.4967	75.3392	35.1459	83.1338	0.6085	OK	OK	38-1	4.5
38	0	COMB3	Combination	Min	-826.643	-15.864	-34.403	-5.6005	-79.4893	-36.2438	87.3622	0.6614	OK	OK	38-1	0
38	2.25	COMB3	Combination	Min	-817.978	-15.864	-34.403	-5.6005	-2.7524	-0.5581	2.8084	0.3661	OK	OK	38-1	2.25
38	4.5	COMB3	Combination	Min	-809.313	-15.864	-34.403	-5.6005	-86.6634	-40.5443	95.6786	0.6826	OK	OK	38-1	4.5
39	0	COMB3	Combination	Max	-755.953	17.981	34.403	5.6005	79.4893	40.3692	89.1528	0.6368	OK	OK	39-1	0
39	2.25	COMB3	Combination	Max	-747.288	17.981	34.403	5.6005	2.7524	-0.0784	2.7535	0.3351	OK	OK	39-1	2.25
39	4.5	COMB3	Combination	Max	-738.623	17.981	34.403	5.6005	86.6634	35.1459	93.5189	0.6443	OK	OK	39-1	4.5
39	0	COMB3	Combination	Min	-826.643	-15.864	-38.082	-5.4967	-84.7223	-36.2438	92.1492	0.6779	OK	OK	39-1	0
39	2.25	COMB3	Combination	Min	-817.978	-15.864	-38.082	-5.4967	0.2932	-0.5581	0.6304	0.3586	OK	OK	39-1	2.25
39	4.5	COMB3	Combination	Min	-809.313	-15.864	-38.082	-5.4967	-75.3392	-40.5443	85.5560	0.6477	OK	OK	39-1	4.5
91	0	COMB3	Combination	Max	-304.239	22.894	24.901	3.9273	54.3955	50.4856	74.2137	0.3885	OK	OK	91-1	0
91	2.26122	COMB3	Combination	Max	-295.574	23.761	24.901	3.9273	-0.9972	-1.2311	1.5843	0.1343	OK	OK	91-1	2.26122
91	**4.52244**	**COMB3**	**Combination**	**Max**	**-286.909**	**24.627**	**24.901**	**3.9273**	**43.3697**	**42.364**	60.6271	0.3341	OK	OK	91-1	4.52244
91	0	COMB3	Combination	Min	-499.794	-20.692	-19.758	-4.3377	-45.9838	-47.3006	65.9686	0.4453	OK	OK	91-1	0
91	2.26122	COMB3	Combination	Min	-491.129	-19.825	-19.758	-4.3377	-2.2225	-2.5239	3.3630	0.2256	OK	OK	91-1	2.26122
91	4.52244	COMB3	Combination	Min	-482.464	-18.959	-19.758	-4.3377	-58.2208	-56.9775	81.4622	0.4911	OK	OK	91-1	4.52244
92	0	COMB3	Combination	Max	-304.239	22.894	19.758	4.3377	45.9838	50.4856	68.2884	0.3680	OK	OK	92-1	0
92	2.26122	COMB3	Combination	Max	-295.574	23.761	19.758	4.3377	2.2225	-1.2311	2.5407	0.1376	OK	OK	92-1	2.26122
92	4.52244	COMB3	Combination	Max	-286.909	24.627	19.758	4.3377	58.2208	42.364	72.0026	0.3733	OK	OK	92-1	4.52244
92	0	COMB3	Combination	Min	-499.794	-20.692	-24.901	-3.9273	-54.3955	-47.3006	72.0848	0.4663	OK	OK	92-1	0
92	2.26122	COMB3	Combination	Min	-491.129	-19.825	-24.901	-3.9273	0.9972	-2.5239	2.7138	0.2234	OK	OK	92-1	2.26122
92	4.52244	COMB3	Combination	Min	-482.464	-18.959	-24.901	-3.9273	-43.3697	-56.9775	71.6056	0.4571	OK	OK	92-1	4.52244
93	0	COMB3	Combination	Max	-396.607	18.081	23.567	3.9644	51.4751	40.1956	65.3098	0.3980	OK	OK	93-1	0
93	2.26122	COMB3	Combination	Max	-387.942	18.948	23.567	3.9644	-0.419	-1.5379	1.5940	0.1745	OK	OK	93-1	2.26122
93	4.52244	COMB3	Combination	Max	-379.277	19.814	23.567	3.9644	44.5887	30.089	53.7913	0.3507	OK	OK	93-1	4.52244
93	0	COMB3	Combination	Min	-616.554	-15.387	-20.155	-4.1456	-46.574	-35.582	58.6107	0.4708	OK	OK	93-1	0
93	2.26122	COMB3	Combination	Min	-607.889	-14.521	-20.155	-4.1456	-2.3972	-1.8998	3.0587	0.2754	OK	OK	93-1	2.26122
93	4.52244	COMB3	Combination	Min	-599.224	-13.654	-20.155	-4.1456	-55.1223	-45.4966	71.4731	0.5076	OK	OK	93-1	4.52244
94	0	COMB3	Combination	Max	-396.607	18.081	20.155	4.1456	46.574	40.1956	61.5209	0.3850	OK	OK	94-1	0
94	2.26122	COMB3	Combination	Max	-387.942	18.948	20.155	4.1456	2.3972	-1.5379	2.8481	0.1789	OK	OK	94-1	2.26122
94	4.52244	COMB3	Combination	Max	-379.277	19.814	20.155	4.1456	55.1223	30.089	62.7998	0.3818	OK	OK	94-1	4.52244
94	0	COMB3	Combination	Min	-616.554	-15.387	-23.567	-3.9644	-51.4751	-35.582	62.5761	0.4844	OK	OK	94-1	0
94	2.26122	COMB3	Combination	Min	-607.889	-14.521	-23.567	-3.9644	0.419	-1.8998	1.9455	0.2716	OK	OK	94-1	2.26122
94	4.52244	COMB3	Combination	Min	-599.224	-13.654	-23.567	-3.9644	-44.5887	-45.4966	63.7032	0.4808	OK	OK	94-1	4.52244

KOMBINASI 1Layan

P Min	**432.951**
P Max	**981.457**

KOMBINASI 2 Layan

P Min	**284.761**
P Max	**1143.395**

KOMBINASI 3 Layan

P Min	**286.909**
P Max	**925.096**

TABLE: Element Forces - Area Shells (PILECAP Kombinasi 1Ultimate)													
Area	**Area Elem**	**Shell Type**	**Joint**	**Output Case**	**CaseType**	**F11**	**F22**	**F12**	**M11**	**M22**	**M12**	**V13**	**V23**
Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
193	**193**	**Shell-Thick**	**619**	**COMB1U**	**Combination**	**-51.73**	**-37.52**	**-63.25**	**-57.6082**	**-168.1429**	**-41.2623**	**-160.88**	**-769.8**
193	193	Shell-Thick	954	COMB1U	Combination	-55.86	-58.16	-139.2	-21.9392	-161.912	8.4165	-160.88	-769.8
193	193	Shell-Thick	296	COMB1U	Combination	-70.28	-61.04	-25.69	336.675	414.2268	5.4859	-160.88	-769.8
193	193	Shell-Thick	295	COMB1U	Combination	-66.15	-40.4	50.27	313.9136	410.4735	-44.1929	-160.88	-769.8
1002	1002	Shell-Thick	602	COMB1U	Combination	-26.61	-221.89	-123.34	-205.2256	463.5087	18.5935	2451.85	-2801.39
1002	1002	Shell-Thick	1015	COMB1U	Combination	-5.63	-217.69	-32.33	-184.1653	571.8632	-29.5577	2451.85	-2801.39
1002	1002	Shell-Thick	946	COMB1U	Combination	111.66	368.77	-135.24	1142.8606	1516.983	-22.2671	2451.85	-2801.39
1002	1002	Shell-Thick	1011	COMB1U	Combination	90.68	364.57	-226.25	1105.9547	1327.1012	25.884	2451.85	-2801.39
1008	1008	Shell-Thick	1020	COMB1U	Combination	-5.63	-217.69	32.33	-184.1653	571.8632	29.5577	2451.85	2801.39
1008	1008	Shell-Thick	601	COMB1U	Combination	-26.61	-221.89	123.34	-205.2256	463.5087	-18.5935	2451.85	2801.39
1008	1008	Shell-Thick	1022	COMB1U	Combination	90.68	364.57	226.25	1105.9547	1327.1012	-25.884	2451.85	2801.39
1008	1008	Shell-Thick	945	COMB1U	Combination	111.66	368.77	135.24	1142.8606	1516.983	22.2671	2451.85	2801.39
1024	1024	Shell-Thick	1023	COMB1U	Combination	7.71	706.12	-9.97	1202.4484	1310.7016	2.4119	-1725.44	1726.8
1024	**1024**	**Shell-Thick**	**625**	**COMB1U**	**Combination**	**-224.87**	**-456.78**	**-112.25**	**-345.1357**	**350.6992**	**72.5931**	**-1725.44**	**1726.8**
1024	1024	Shell-Thick	1003	COMB1U	Combination	-149.31	-441.67	-283.86	-324.9887	428.7438	42.2065	-1725.44	1726.8
1024	**1024**	**Shell-Thick**	**943**	**COMB1U**	**Combination**	**83.27**	**721.23**	**-181.57**	**1233.2266**	**1442.1845**	**-27.9747**	**-1725.44**	**1726.8**
1025	1025	Shell-Thick	633	COMB1U	Combination	-11.92	-493.66	217.64	-324.5025	401.2434	26.3384	1602.23	1810.92
1025	1025	Shell-Thick	1023	COMB1U	Combination	237.22	752.02	386.68	1110.4901	1284.8574	-26.0204	1602.23	1810.92
1025	1025	Shell-Thick	943	COMB1U	Combination	223.26	749.23	196.5	1136.064	1430.2045	2.3235	1602.23	1810.92
1025	1025	Shell-Thick	1028	COMB1U	Combination	-25.87	-496.45	27.46	-312.9639	475.6307	54.6824	1602.23	1810.92
1027	1027	Shell-Thick	1024	COMB1U	Combination	-5.75	755.19	54.74	948.3331	1094.0832	-10.072	-3716.07	3704.33

1027	1027	Shell-Thick	621	COMB1U	Combination	-197.04	-201.28	-320.2	283.7867	894.3228	35.6562	-3716.07	3704.33
1027	1027	Shell-Thick	1029	COMB1U	Combination	-56.88	-173.25	-734.62	334.2525	1071.9571	19.6195	-3716.07	3704.33
1027	1027	Shell-Thick	941	COMB1U	Combination	134.41	783.23	-359.67	1000.1405	1279.824	-26.1087	-3716.07	3704.33
1030	1030	Shell-Thick	1025	COMB1U	Combination	-40.79	-48.24	-18.31	154.9735	274.0857	-11.2603	-477.63	1222.07
1030	1030	Shell-Thick	609	COMB1U	Combination	-47.65	-82.54	-2.39	-40.7739	359.0733	131.573	-477.63	1222.07
1030	1030	Shell-Thick	1021	COMB1U	Combination	-40.4	-81.09	17.46	-7.0125	425.878	144.253	-477.63	1222.07
1030	1030	Shell-Thick	1031	COMB1U	Combination	-33.54	-46.79	1.54	186.9883	332.611	1.4197	-477.63	1222.07
1032	1032	Shell-Thick	1026	COMB1U	Combination	-32.4	-43.96	-9.08	314.6283	370.4193	-20.7162	-410.34	1132.34
1032	1032	Shell-Thick	613	COMB1U	Combination	-34.03	-52.1	16.65	71.617	398.2635	89.6816	-410.34	1132.34
1032	1032	Shell-Thick	1032	COMB1U	Combination	-33.78	-52.05	20.59	99.0572	480.795	96.4103	-410.34	1132.34
1032	1032	Shell-Thick	1033	COMB1U	Combination	-32.15	-43.91	-5.14	333.6836	410.1568	-13.9875	-410.34	1132.34
1034	1034	Shell-Thick	1027	COMB1U	Combination	-28.56	-24.95	10.48	380.5972	390.5352	-80.8429	-297.94	1037.31
1034	1034	Shell-Thick	617	COMB1U	Combination	-34.54	-54.84	-4.11	150.8884	459.6839	59.257	-297.94	1037.31
1034	1034	Shell-Thick	1034	COMB1U	Combination	-29.04	-53.74	14.15	178.0373	541.8544	66.5649	-297.94	1037.31
1034	1034	Shell-Thick	1035	COMB1U	Combination	-23.06	-23.85	28.74	398.8095	427.4809	-73.535	-297.94	1037.31
1036	1036	Shell-Thick	626	COMB1U	Combination	-224.87	-456.78	112.25	-345.1357	350.6992	-72.5931	-1725.44	-1726.8
1036	1036	Shell-Thick	1009	COMB1U	Combination	7.71	706.12	9.97	1202.4484	1310.7016	-2.4119	-1725.44	-1726.8
1036	1036	Shell-Thick	944	COMB1U	Combination	83.27	721.23	181.57	1233.2266	1442.1845	27.9747	-1725.44	-1726.8
1036	1036	Shell-Thick	1007	COMB1U	Combination	-149.31	-441.67	283.86	-324.9887	428.7438	-42.2065	-1725.44	-1726.8
1037	1037	Shell-Thick	1009	COMB1U	Combination	237.22	752.02	-386.68	1110.4901	1284.8574	26.0204	1602.23	-1810.92
1037	1037	Shell-Thick	634	COMB1U	Combination	-11.92	-493.66	-217.64	-324.5025	401.2434	-26.3384	1602.23	-1810.92
1037	1037	Shell-Thick	1036	COMB1U	Combination	-25.87	-496.45	-27.46	-312.9639	475.6307	-54.6824	1602.23	-1810.92
1037	1037	Shell-Thick	944	COMB1U	Combination	223.26	749.23	-196.5	1136.064	1430.2045	-2.3235	1602.23	-1810.92
1039	1039	Shell-Thick	622	COMB1U	Combination	-197.04	-201.28	320.2	283.7867	894.3228	-35.6562	-3716.07	-3704.33
1039	1039	Shell-Thick	1010	COMB1U	Combination	-5.75	755.19	-54.74	948.3331	1094.0832	10.072	-3716.07	-3704.33
1039	1039	Shell-Thick	942	COMB1U	Combination	134.41	783.23	359.67	1000.1405	1279.824	26.1087	-3716.07	-3704.33
1039	1039	Shell-Thick	1037	COMB1U	Combination	-56.88	-173.25	734.62	334.2525	1071.9571	-19.6195	-3716.07	-3704.33
								M+	**1233.2266**	**1624.4488**	**V+**	**2451.85**	**3704.33**
								M-	**-345.1357**	**-168.1429**	**V-**	**-3716.07**	**-3704.33**

TABLE: Element Forces - Area Shells (PILECAP Kombinasi 2Ultimate)

Area	Area Elem	Shell Type	Joint	Output Case	Case Type	Step Type	F11	F22	F12	M11	M22	M12	V13	V23
Text	Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
193	193	Shell-Thick	619	COMB2U	Combination	Max	37.360	57.480	91.820	45.269	-79.189	11.895	-18.110	-551.320
193	193	Shell-Thick	954	COMB2U	Combination	Max	76.310	72.450	147.740	51.468	-105.151	34.077	-18.110	-551.320
193	193	Shell-Thick	296	COMB2U	Combination	Max	63.120	14.310	83.680	304.189	348.664	60.803	-18.110	-551.320
193	193	Shell-Thick	295	COMB2U	Combination	Max	102.450	96.430	228.200	292.225	360.118	6.561	-18.110	-551.320
193	**193**	**Shell-Thick**	**619**	**COMB2U**	**Combination**	**Min**	**-98.840**	**-139.670**	**-165.390**	**-128.658**	**-187.096**	**-61.006**	**-218.370**	**-675.570**
193	193	Shell-Thick	954	COMB2U	Combination	Min	-135.680	-144.050	-310.600	-82.076	-159.094	-7.365	-218.370	-675.570

193	193	Shell-Thick	296	COMB2U	Combination	Min	-218.580	-105.120	-143.090	220.337	305.384	-63.583	-218.370	-675.570
358	358	Shell-Thick	945	COMB2U	Combination	Max	174.590	337.600	183.290	1105.722	1551.931	91.230	-1057.33	1474.070
358	358	Shell-Thick	1022	COMB2U	Combination	Max	199.790	334.490	447.910	1066.977	1407.288	85.783	-1057.33	1474.070
358	358	Shell-Thick	378	COMB2U	Combination	Max	103.070	-125.010	102.100	170.325	687.647	67.932	-1057.33	1474.070
358	358	Shell-Thick	377	COMB2U	Combination	Max	55.580	-129.760	343.030	184.171	706.467	52.008	-1057.33	1474.070
358	358	Shell-Thick	945	COMB2U	Combination	Min	-98.260	203.300	-358.660	618.609	688.808	-88.410	-1442.70	1203.330
358	358	Shell-Thick	1022	COMB2U	Combination	Min	-122.740	206.560	-600.750	618.084	626.453	-49.785	-1442.70	1203.330
358	358	Shell-Thick	378	COMB2U	Combination	Min	-212.750	-267.590	-260.980	-50.821	573.180	-54.059	-1442.70	1203.330
358	358	Shell-Thick	377	COMB2U	Combination	Min	-165.980	-262.990	-524.440	-49.332	641.286	-71.313	-1442.70	1203.330
359	359	Shell-Thick	1011	COMB2U	Combination	Max	199.790	334.490	600.750	1066.977	1407.288	49.785	-1057.33	-1203.33
359	**359**	**Shell-Thick**	**946**	**COMB2U**	**Combination**	**Max**	**174.590**	**337.600**	**358.660**	**1105.722**	**1551.931**	**88.410**	**-1057.33**	**-1203.33**
359	359	Shell-Thick	379	COMB2U	Combination	Max	55.580	-129.760	524.440	184.171	706.467	71.313	-1057.33	-1203.33
359	359	Shell-Thick	380	COMB2U	Combination	Max	103.070	-125.010	260.980	170.325	687.647	54.059	-1057.33	-1203.33
359	359	Shell-Thick	1011	COMB2U	Combination	Min	-122.740	206.560	-447.910	618.084	626.453	-85.783	-1442.70	-1474.07
359	359	Shell-Thick	946	COMB2U	Combination	Min	-98.260	203.300	-183.290	618.609	688.808	-91.230	-1442.70	-1474.07
359	359	Shell-Thick	379	COMB2U	Combination	Min	-165.980	-262.990	-343.030	-49.332	641.286	-52.008	-1442.70	1474.070
359	359	Shell-Thick	380	COMB2U	Combination	Min	-212.750	-267.590	-102.100	-50.821	573.180	-67.932	-1442.70	-1474.07
1002	1002	Shell-Thick	602	COMB2U	Combination	Max	183.250	-111.930	-22.350	-67.367	617.007	101.105	2131.240	-2022.49
1002	1002	Shell-Thick	1015	COMB2U	Combination	Max	123.810	-82.320	346.240	-32.725	773.170	112.266	2131.240	-2022.49
1002	**1002**	**Shell-Thick**	**946**	**COMB2U**	**Combination**	**Max**	**216.540**	**347.800**	**110.800**	**1109.456**	**1550.865**	**29.567**	**2131.240**	**-2022.49**
1002	1002	Shell-Thick	1011	COMB2U	Combination	Max	297.450	367.320	588.240	1081.700	1318.563	103.741	2131.240	-2022.49
1002	1002	Shell-Thick	602	COMB2U	Combination	Min	-313.410	-212.510	-148.340	-249.688	171.218	-55.925	1711.790	-2339.49
1002	1002	Shell-Thick	1015	COMB2U	Combination	Min	-203.430	-232.010	-542.470	-240.345	216.644	-130.863	1711.790	-2339.49
1002	1002	Shell-Thick	946	COMB2U	Combination	Min	-124.490	196.250	-259.270	691.115	731.329	-82.413	1711.790	-2339.49
1002	1002	Shell-Thick	1011	COMB2U	Combination	Min	-255.930	166.620	-711.170	662.730	700.845	-92.810	1711.790	-2339.49
1008	1008	Shell-Thick	1020	COMB2U	Combination	Max	123.810	-82.320	542.470	-32.725	773.170	130.863	2131.240	2339.490
1008	1008	Shell-Thick	601	COMB2U	Combination	Max	183.250	-111.930	148.340	-67.367	617.007	55.925	2131.240	2339.490
1008	1008	Shell-Thick	1022	COMB2U	Combination	Max	297.450	367.320	711.170	1081.700	1318.563	92.810	2131.240	2339.490
1008	1008	Shell-Thick	945	COMB2U	Combination	Max	216.540	347.800	259.270	1109.456	1550.865	82.413	2131.240	2339.490
1008	1008	Shell-Thick	1020	COMB2U	Combination	Min	-203.430	-232.010	-346.240	-240.345	216.644	-112.266	1711.790	2022.490
1008	1008	Shell-Thick	601	COMB2U	Combination	Min	-313.410	-212.510	22.350	-249.688	171.218	-101.105	1711.790	2022.490
1008	1008	Shell-Thick	1022	COMB2U	Combination	Min	-255.930	166.620	-588.240	662.730	700.845	-103.741	1711.790	2022.490
1008	1008	Shell-Thick	945	COMB2U	Combination	Min	-124.490	196.250	-110.800	691.115	731.329	-29.567	1711.790	2022.490

1024	1024	Shell-Thick	1023	COMB2U	Combination	Max	409.920	666.890	549.210	1066.032	1230.201	107.914	-1155.74	1537.090
1024	1024	Shell-Thick	625	COMB2U	Combination	Max	211.050	-329.380	1.960	-173.134	371.786	164.591	-1155.74	1537.090
1024	1024	Shell-Thick	1003	COMB2U	Combination	Max	110.290	-285.920	574.280	-178.396	435.454	147.524	-1155.74	1537.090
1024	1024	Shell-Thick	943	COMB2U	Combination	Max	331.680	671.100	-29.220	1098.872	1350.847	78.174	-1155.74	1537.090
1024	1024	Shell-Thick	1023	COMB2U	Combination	Min	-272.830	492.350	-861.140	850.267	860.921	-70.694	-1594.29	1243.590
1024	**1024**	**Shell-Thick**	**625**	**COMB2U**	**Combination**	**Min**	**-461.220**	**-447.660**	**-180.130**	**-375.805**	**172.278**	**-81.642**	**-1594.29**	**1243.590**
1024	1024	Shell-Thick	1003	COMB2U	Combination	Min	-278.400	-474.710	-759.510	-343.688	227.966	-114.072	-1594.29	1243.590
1024	1024	Shell-Thick	943	COMB2U	Combination	Min	-112.530	504.540	-289.770	863.874	958.323	-90.451	-1594.29	1243.590
1027	1027	Shell-Thick	1024	COMB2U	Combination	Max	631.700	832.770	1127.650	884.383	1111.678	131.653	-2711.96	3085.630
1027	1027	Shell-Thick	621	COMB2U	Combination	Max	403.660	-49.730	-52.420	330.261	866.960	94.798	-2711.96	3085.630
1027	1027	Shell-Thick	1029	COMB2U	Combination	Max	179.310	62.780	630.710	381.127	976.743	162.852	-2711.96	3085.630
1027	1027	Shell-Thick	941	COMB2U	Combination	Max	393.500	803.780	-39.670	947.825	1276.770	43.227	-2711.96	3085.630
1027	1027	Shell-Thick	1024	COMB2U	Combination	Min	-477.310	421.070	-1532.74	522.114	614.585	-112.814	-3131.98	2778.090
1027	1027	Shell-Thick	621	COMB2U	Combination	Min	-576.040	-330.270	-512.470	30.691	458.422	-65.220	-3131.98	2778.090
1027	1027	Shell-Thick	1029	COMB2U	Combination	Min	-219.910	-416.430	-1407.43	40.139	633.539	-177.245	-3131.98	2778.090
1027	1027	Shell-Thick	941	COMB2U	Combination	Min	-107.330	476.410	-577.240	520.156	739.792	-68.358	-3131.98	2778.090
1030	1030	Shell-Thick	1025	COMB2U	Combination	Max	53.600	-19.740	60.610	161.496	360.749	121.185	-320.150	1001.270
1030	1030	Shell-Thick	609	COMB2U	Combination	Max	66.770	17.560	53.380	15.601	391.778	185.120	-320.150	1001.270
1030	1030	Shell-Thick	1021	COMB2U	Combination	Max	18.690	-9.710	73.650	32.342	518.875	199.123	-320.150	1001.270
1030	1030	Shell-Thick	1031	COMB2U	Combination	Max	38.090	8.500	119.910	153.547	335.789	139.578	-320.150	1001.270
									M+	**1109.456**	**1551.931**	**V+**	**2131.240**	**3085.630**
									M-	**-375.805**	**-187.096**	**V-**	**-3131.98**	**-3085.63**

TABLE: Element Forces - Area Shells (PILECAP Kombinasi 3Ultimate)

Area	Area Elem	ShellType	Joint	Output Case	CaseType	Step Type	F11	F22	F12	M11	M22	M12	V13	V23
Text	Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
193	**193**	**Shell-Thick**	**619**	**COMB3U**	**Combination**	**Min**	**-58.61**	**-221.59**	**-196.63**	**-93.6993**	**-238.0809**	**-59.1983**	**-237.06**	**-795.96**
193	193	Shell-Thick	954	COMB3U	Combination	Min	-105.63	-151.63	-311.74	-48.0479	-206.907	-3.6787	-237.06	-795.96
193	193	Shell-Thick	296	COMB3U	Combination	Min	-237.75	-115.08	-192.15	146.0237	259.964	-82.1402	-237.06	-795.96
193	193	Shell-Thick	295	COMB3U	Combination	Min	-295.62	-276.3	-216.84	143.6015	276.7775	-99.0741	-237.06	-795.96
1002	1002	Shell-Thick	602	COMB3U	Combination	Max	138.39	-112.25	-2.37	-72.1772	536.6483	171.5781	2412.41	-1677.06
1002	1002	Shell-Thick	1015	COMB3U	Combination	Max	84.47	-64.2	402.37	-80.5305	623.6169	200.3777	2412.41	-1677.06
1002	1002	Shell-Thick	946	COMB3U	Combination	Max	141.3	420.68	82.57	1235.5905	2026.9122	23.4943	2412.41	-1677.06
1002	1002	Shell-Thick	1011	COMB3U	Combination	Max	267.3	458.07	538.94	1206.6709	1749.3648	113.5081	2412.41	-1677.06

1002	1002	Shell-Thick	602	COMB3U	Combination	Min	-268.54	-212.19	-168.32	-244.8785	251.5768	-126.398	1430.62	-2684.92
1002	1002	Shell-Thick	1015	COMB3U	Combination	Min	-164.1	-250.14	-598.6	-192.5394	366.1971	-218.974	1430.62	-2684.92
1002	1002	Shell-Thick	946	COMB3U	Combination	Min	-49.25	123.37	-231.05	564.9799	255.2823	-76.3398	1430.62	-2684.92
1002	1002	Shell-Thick	1011	COMB3U	Combination	Min	-225.78	75.87	-661.87	537.7599	270.0427	-102.576	1430.62	-2684.92
1008	1008	Shell-Thick	1020	COMB3U	Combination	Max	84.47	-64.2	598.6	-80.5305	623.6169	218.9741	2412.41	2684.92
1008	1008	Shell-Thick	601	COMB3U	Combination	Max	138.39	-112.25	168.32	-72.1772	536.6483	126.3978	2412.41	2684.92
1008	1008	Shell-Thick	1022	COMB3U	Combination	Max	267.3	458.07	661.87	1206.6709	1749.3648	102.5768	2412.41	2684.92
1008	1008	Shell-Thick	945	COMB3U	Combination	Max	141.3	420.68	231.05	1235.5905	2026.9122	76.3398	2412.41	2684.92
1008	1008	Shell-Thick	1020	COMB3U	Combination	Min	-164.1	-250.14	-402.37	-192.5394	366.1971	-200.378	1430.62	1677.06
1008	1008	Shell-Thick	601	COMB3U	Combination	Min	-268.54	-212.19	2.37	-244.8785	251.5768	-171.578	1430.62	1677.06
1008	1008	Shell-Thick	1022	COMB3U	Combination	Min	-225.78	75.87	-538.94	537.7599	270.0427	-113.508	1430.62	1677.06
1008	1008	Shell-Thick	945	COMB3U	Combination	Min	-49.25	123.37	-82.57	564.9799	255.2823	-23.4943	1430.62	1677.06
1024	1024	Shell-Thick	1023	COMB3U	Combination	Max	333.83	778.15	436.07	1026.4862	1485.9234	83.4964	-1242.7	1500.45
1024	1024	Shell-Thick	625	COMB3U	Combination	Max	172.35	-349.41	189.59	-201.9316	505.5799	220.9934	-1242.7	1500.45
1024	1024	Shell-Thick	1003	COMB3U	Combination	Max	108.11	-296.3	544.67	-211.9713	601.4847	226.4547	-1242.7	1500.45
1024	1024	Shell-Thick	943	COMB3U	Combination	Max	344.62	847.15	75.28	1053.8799	1643.735	37.5559	-1242.7	1500.45
1024	1024	Shell-Thick	1023	COMB3U	Combination	Min	-196.75	381.08	-747.99	889.8123	605.1988	-46.2763	-1507.3	1280.23
1024	**1024**	**Shell-Thick**	**625**	**COMB3U**	**Combination**	**Min**	**-422.52**	**-427.63**	**-367.76**	**-347.0068**	**38.4834**	**-138.044**	**-1507.3**	**1280.23**
1024	1024	Shell-Thick	1003	COMB3U	Combination	Min	-276.22	-464.33	-729.9	-310.112	61.9349	-193.003	-1507.3	1280.23
1024	1024	Shell-Thick	943	COMB3U	Combination	Min	-125.47	328.49	-394.27	908.8652	665.4352	-49.8329	-1507.3	1280.23
1027	1027	Shell-Thick	1024	COMB3U	Combination	Max	672.02	783.83	947.12	916.0441	1508.0663	141.056	-2564.5	3320.23
1027	1027	Shell-Thick	621	COMB3U	Combination	Max	471.28	-87.04	66.84	343.9749	836.2889	132.9867	-2564.5	3320.23
1027	1027	Shell-Thick	1029	COMB3U	Combination	Max	381.7	92.65	584.92	312.0192	910.2774	266.4241	-2564.5	3320.23
1027	1027	Shell-Thick	941	COMB3U	Combination	Max	542.92	822.28	137.28	913.1995	1775.0295	41.8427	-2564.5	3320.23
1027	1027	Shell-Thick	1024	COMB3U	Combination	Min	-517.63	470.01	-1352.2	490.4531	218.1958	-122.216	-3279.4	2543.49
1027	1027	Shell-Thick	621	COMB3U	Combination	Min	-643.66	-292.96	-631.73	16.9772	489.0934	-103.408	-3279.4	2543.49
1027	1027	Shell-Thick	1029	COMB3U	Combination	Min	-422.3	-446.29	-1361.6	109.2469	700.0048	-280.816	-3279.4	2543.49
1027	1027	Shell-Thick	941	COMB3U	Combination	Min	-256.75	457.91	-754.2	554.7816	241.533	-66.9741	-3279.4	2543.49
									M+	**1235.5905**	**2026.9122**	**V+**	**2412.41**	**3320.23**
									M-	**-347.0068**	**-238.0809**	**V-**	**-3279.4**	**-3320.23**

TABLE: Element Forces - Area Shells (LONGITUDINAL STOPPER Kombinasi 1Ultimate)														
Area	**Area Elem**	**Shell Type**	**Joint**	**Output Case**	**Case Type**	**F11**	**F22**	**F12**	**M11**	**M22**	**M12**	**V13**	**V23**
Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
123	123	Shell-Thick	132	COMB1U	Combination	69.39	0.59	1.7	-216.5466	-1503.5571	35.2649	1143.19	-1350.32
123	123	Shell-Thick	95	COMB1U	Combination	-15.32	-16.36	5.95	114.6836	-581.4032	-44.1858	1143.19	-1350.32
123	123	Shell-Thick	127	COMB1U	Combination	-16.53	-22.4	-6.71	564.4078	-437.5771	-114.395	1143.19	-1350.32
123	123	Shell-Thick	129	COMB1U	Combination	68.18	-5.46	-10.97	236.2437	-1357.0916	-34.9443	1143.19	-1350.32
126	126	Shell-Thick	87	COMB1U	Combination	-15.32	-16.36	-5.95	114.6836	-581.4032	44.1858	1143.19	1350.32
126	126	Shell-Thick	132	COMB1U	Combination	69.39	0.59	-1.7	-216.5466	-1503.5571	-35.2649	1143.19	1350.32
126	126	Shell-Thick	129	COMB1U	Combination	68.18	-5.46	10.97	236.2437	-1357.0916	34.9443	1143.19	1350.32

126	126	Shell-Thick	128	COMB1U	Combination	-16.53	-22.4	6.71	564.4078	-437.5771	114.395	1143.19	1350.32
128	128	Shell-Thick	231	COMB1U	Combination	-295.46	-407.28	252.4	-1042.298	-872.4491	102.6428	1286.9	-1222.27
128	128	Shell-Thick	99	COMB1U	Combination	-107.55	-369.7	88.82	-922.0135	-515.4763	357.9715	1286.9	-1222.27
128	128	Shell-Thick	174	COMB1U	Combination	306.54	219.78	144.88	227.5939	-356.4811	179.2482	1286.9	-1222.27
128	128	Shell-Thick	130	COMB1U	Combination	110.1	180.49	197.28	154.4886	-823.8462	263.3915	1286.9	-1222.27
134	134	Shell-Thick	138	COMB1U	Combination	-33.75	-5.13	9.38	-1208.421	-1497.5061	89.8067	-1601.15	2182.54
134	134	Shell-Thick	97	COMB1U	Combination	18.85	5.39	14.03	181.9269	-136.5665	-12.8203	-1601.15	2182.54
134	134	Shell-Thick	158	COMB1U	Combination	23.1	9.36	6.62	293.3486	-124.2882	-143.6521	-1601.15	2182.54
134	134	Shell-Thick	135	COMB1U	Combination	-32.57	-1.77	2.19	-1011.475	-1440.2703	-50.2174	-1601.15	2182.54
136	136	Shell-Thick	98	COMB1U	Combination	18.85	5.39	-14.03	181.926	-136.5665	12.8203	-1601.15	-2182.54
136	136	Shell-Thick	138	COMB1U	Combination	-33.75	-5.13	-9.38	-1208.421	-1497.5061	-89.8067	-1601.15	-2182.54
136	136	Shell-Thick	135	COMB1U	Combination	-32.57	-1.77	-2.19	-1011.475	-1440.2703	50.2174	-1601.15	-2182.54
136	136	Shell-Thick	177	COMB1U	Combination	23.1	9.36	-6.62	293.3486	-124.2882	143.6521	-1601.15	-2182.54
137	137	Shell-Thick	106	COMB1U	Combination	19.13	-132.05	60.93	-1054.098	-316.1401	35.5837	-1488.53	-1216.1
137	137	Shell-Thick	261	COMB1U	Combination	-101.75	-156.22	-170.3	-1147.607	-1039.7424	-78.6583	-1488.53	-1216.1
137	137	Shell-Thick	136	COMB1U	Combination	-49.35	-28.36	-268.2	453.8703	-553.702	-150.5525	-1488.53	-1216.1
137	137	Shell-Thick	184	COMB1U	Combination	38.94	-10.7	-6.86	482.9473	-163.9853	-184.1507	-1488.53	-1216.1
140	**140**	**Shell-Thick**	**123**	**COMB1U**	**Combination**	**0.95**	**893.78**	**-903.8**	**-1377.945**	**-1273.5975**	**96.5643**	**-2419.72**	**1669.32**
140	140	Shell-Thick	16	COMB1U	Combination	-72.74	879.04	714.29	-686.8592	-441.2021	22.7777	-2419.72	1669.32
140	140	Shell-Thick	140	COMB1U	Combination	-139.51	545.2	135.36	-577.9923	-408.4411	-26.0872	-2419.72	1669.32
140	140	Shell-Thick	141	COMB1U	Combination	-65.82	559.94	-1482	-1180.527	-1223.680	47.6994	-2419.72	1669.32
143	143	Shell-Thick	104	COMB1U	Combination	443.91	-494.8	746.85	-373.1363	-341.0268	-19.0568	-1755.62	-2413.27
143	143	Shell-Thick	123	COMB1U	Combination	-430.66	-669.71	-1014.	-1349.669	-1217.1712	9.3279	-1755.62	-2413.27
143	143	Shell-Thick	141	COMB1U	Combination	-208.64	-182.12	-1474.	-1192.582	-1191.7494	107.2985	-1755.62	-2413.27
143	143	Shell-Thick	180	COMB1U	Combination	468.98	-46.6	318.18	-312.018	-351.3886	74.2934	-1755.62	-2413.27
402	**402**	**Shell-Thick**	**132**	**COMB1U**	**Combination**	**-31.44**	**-19.58**	**-1.7**	**-360.0306**	**-1599.8812**	**30.6908**	**-1228.47**	**1590.95**
402	402	Shell-Thick	87	COMB1U	Combination	10.71	-11.15	5.15	119.0145	-512.9098	-21.5171	-1228.47	1590.95
402	402	Shell-Thick	229	COMB1U	Combination	12.06	-4.4	16.26	350.9986	-448.2863	-81.7342	-1228.47	1590.95
402	402	Shell-Thick	232	COMB1U	Combination	-30.09	-12.83	9.41	-103.1918	-1530.72	-29.5264	-1228.47	1590.95
403	403	Shell-Thick	86	COMB1U	Combination	0.76	-1.02	18.88	-56.0512	-621.7028	-4.7307	766.88	1025
403	403	Shell-Thick	134	COMB1U	Combination	26.66	4.15	11.38	-211.0265	-1324.669	-7.8189	766.88	1025
403	403	Shell-Thick	233	COMB1U	Combination	25.84	0.08744	2.41	471.731	-1180.5838	7.6495	766.88	1025
403	403	Shell-Thick	228	COMB1U	Combination	-0.0527	-5.09	9.91	624.5991	-483.9907	10.7376	766.88	1025
406	406	Shell-Thick	134	COMB1U	Combination	-33.94	-7.97	11.38	-542.8636	-1527.5285	44.5363	-1202.44	1595.51
406	406	Shell-Thick	86	COMB1U	Combination	16.01	2.03	17.05	187.0336	-436.5937	-56.5665	-1202.44	1595.51
406	406	Shell-Thick	236	COMB1U	Combination	16.88	6.34	12.3	348.0888	-378.4992	-144.5151	-1202.44	1595.51
406	406	Shell-Thick	237	COMB1U	Combination	-33.08	-3.65	6.63	-348.8467	-1463.1302	-43.4123	-1202.44	1595.51
408	408	Shell-Thick	86	COMB1U	Combination	16.44	0.07464	6.86	273.6376	-516.4169	-24.4786	591.16	1104.08
408	408	Shell-Thick	114	COMB1U	Combination	19.04	0.59	13.51	653.9906	-240.3822	167.1867	591.16	1104.08
408	408	Shell-Thick	162	COMB1U	Combination	23.67	6.98	6.39	548.9128	-401.5893	11.847	591.16	1104.08
408	408	Shell-Thick	236	COMB1U	Combination	18.2	5.89	0.15	206.4232	-653.1849	-169.1699	591.16	1104.08
412	412	Shell-Thick	94	COMB1U	Combination	16.01	2.03	-17.05	187.0336	-436.5937	56.5665	-1202.44	-1595.51

412	412	Shell-Thick	134	COMB1U	Combination	-33.94	-7.97	-11.38	-542.8636	-1527.5285	-44.5363	-1202.44	-1595.51
412	412	Shell-Thick	237	COMB1U	Combination	-33.08	-3.65	-6.63	-348.8467	-1463.1302	43.4123	-1202.44	-1595.51
412	412	Shell-Thick	239	COMB1U	Combination	16.88	6.34	-12.3	348.0888	-378.4992	144.5151	-1202.44	-1595.51
463	463	Shell-Thick	106	COMB1U	Combination	-33.66	-168.3	98.26	-949.0075	-395.3949	64.788	1296.87	-1162.29
463	463	Shell-Thick	15	COMB1U	Combination	59.37	109.01	120.15	-287.9633	-244.3548	72.787	1296.87	-1162.29
463	463	Shell-Thick	265	COMB1U	Combination	15.11	100.16	85.1	-229.6082	-735.1544	135.8027	1296.87	-1162.29
463	463	Shell-Thick	261	COMB1U	Combination	-76.44	-176.86	85.32	-949.4484	-805.5232	-101.4026	1296.87	-1162.29
477	477	Shell-Thick	138	COMB1U	Combination	40.32	9.6	-9.21	-646.6936	-1309.3594	-6.7362	1170.13	-1689.94
477	477	Shell-Thick	98	COMB1U	Combination	-6	0.34	-11.85	-279.5399	-293.3036	-67.0528	1170.13	-1689.94
477	477	Shell-Thick	92	COMB1U	Combination	-4.94	-2.23	-6.75	141.8575	-38.8926	-200.4215	1170.13	-1689.94
477	477	Shell-Thick	323	COMB1U	Combination	39.11	6.58	-3.89	-226.321	-1148.1302	-27.142	1170.13	-1689.94
503	503	Shell-Thick	67	COMB1U	Combination	-4.23	-2.62	-1.04	14.4486	72.0624	13.5783	-27.48	-65.4
503	**503**	**Shell-Thick**	**13**	**COMB1U**	**Combination**	**4.07**	**-0.96**	**0.76**	**63.6592**	**99.7388**	**116.3966**	**-27.48**	**-65.4**
503	503	Shell-Thick	404	COMB1U	Combination	3.99	4.94	-0.69	68.2755	-136.0089	-128.9044	-27.48	-65.4
503	503	Shell-Thick	402	COMB1U	Combination	-4.07	3.33	-2.01	-48.1071	-190.2352	-155.1553	-27.48	-65.4
								M+	**875.503**	**99.7388**	**V+**	**1296.87**	**2413.27**
								M-	**-1377.945**	**-1599.8812**	**V-**	**-2419.72**	**-2413.27**

TABLE: Element Forces - Area Shells (LONGITUDINAL STOPPER Kombinasi 2Ultimate)

Area	Area Elem	Shell Type	Joint	Output Case	Case Type	Step Type	F11	F22	F12	M11	M22	M12	V13	V23
Text	Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
123	123	Shell-Thick	132	COMB2U	Combination	Min	-165.01	-75.25	-45.69	-611.4819	-1187.987	-40.8283	756.06	-1036.2
123	123	Shell-Thick	95	COMB2U	Combination	Min	-28.53	-71.9	-81.03	-222.5669	-481.6486	-118.2363	756.06	-1036.2
123	123	Shell-Thick	127	COMB2U	Combination	Min	-23.38	-36.29	-41.22	147.9883	-388.1015	-123.7438	756.06	-1036.2
123	123	Shell-Thick	129	COMB2U	Combination	Min	-157.88	-39.6	-111.31	-229.7439	-1093.518	-104.1343	756.06	-1036.2
126	126	Shell-Thick	87	COMB2U	Combination	Max	18.85	49.22	81.03	-28.7317	-355.2198	118.2363	953.13	1036.2
126	126	Shell-Thick	132	COMB2U	Combination	Max	205.84	62.67	45.69	-173.2413	-1025.212	40.8283	953.13	1036.2
126	126	Shell-Thick	129	COMB2U	Combination	Max	197.34	20.16	111.31	124.3423	-911.2423	104.1343	953.13	1036.2
126	126	Shell-Thick	128	COMB2U	Combination	Max	12.33	6.75	41.22	270.7362	-243.6118	123.7438	953.13	1036.2
134	134	Shell-Thick	138	COMB2U	Combination	Max	231.37	69.3	74.1	-707.0023	-1136.561	116.0376	-1302.1	1824.99
134	134	Shell-Thick	97	COMB2U	Combination	Max	74.99	49.23	145.27	325.4391	35.7558	144.3077	-1302.1	1824.99
134	134	Shell-Thick	158	COMB2U	Combination	Max	103.47	44.06	43.46	401.7578	50.5022	-19.7594	-1302.1	1824.99
134	134	Shell-Thick	135	COMB2U	Combination	Max	202.9	27.56	83.94	-562.5007	-1114.894	24.0376	-1302.1	1824.99
134	134	Shell-Thick	138	COMB2U	Combination	Min	-215.4	-65.8	-78.97	-1241.3998	-1271.012	19.3131	-1358.3	1687.66
134	134	Shell-Thick	97	COMB2U	Combination	Min	-84.41	-50.8	-151.82	-203.2603	-202.0201	-186.6064	-1358.3	1687.66
134	134	Shell-Thick	158	COMB2U	Combination	Min	-115.19	-47.69	-46.02	-83.6506	-193.8375	-211.076	-1358.3	1687.66
134	134	Shell-Thick	135	COMB2U	Combination	Min	-187.58	-25.79	-84.94	-1069.4434	-1198.318	-93.0409	-1358.3	1687.66
136	136	Shell-Thick	98	COMB2U	Combination	Max	74.99	49.23	151.82	325.4391	35.7558	186.6064	-1302.1	-1687.6
136	136	Shell-Thick	138	COMB2U	Combination	Max	231.37	69.3	78.97	-707.0023	-1136.561	-19.3131	-1302.1	-1687.6
136	136	Shell-Thick	135	COMB2U	Combination	Max	202.9	27.56	84.94	-562.5007	-1114.894	93.0409	-1302.1	-1687.6
136	136	Shell-Thick	177	COMB2U	Combination	Max	103.47	44.06	46.02	401.7578	50.5022	211.076	-1302.1	-1687.6

136	136	Shell-Thick	98	COMB2U	Combination	Min	-84.41	-50.8	-145.27	-203.2603	-202.0201	-144.3077	-1358.3	-1824.9
136	**136**	**Shell-Thick**	**138**	**COMB2U**	**Combination**	**Min**	**-215.4**	**-65.8**	**-74.1**	**-1241.3998**	**-1271.012**	**-116.0376**	**-1358.3**	**-1824.9**
136	136	Shell-Thick	135	COMB2U	Combination	Min	-187.58	-25.79	-83.94	-1069.4434	-1198.318	-24.0376	-1358.3	-1824.9
136	136	Shell-Thick	177	COMB2U	Combination	Min	-115.19	-47.69	-43.46	-83.6506	-193.8375	19.7594	-1358.3	-1824.9
140	140	Shell-Thick	123	COMB2U	Combination	Max	200.7	792.07	-583.52	-588.5255	-799.7062	208.8848	-1705.6	1455.83
140	140	Shell-Thick	16	COMB2U	Combination	Max	63.19	766.58	1692.76	-503.8059	-196.8128	111.8227	-1705.6	1455.83
140	140	Shell-Thick	140	COMB2U	Combination	Max	-37.99	569.83	296.77	-409.0792	-174.8113	47.2124	-1705.6	1455.83
140	140	Shell-Thick	141	COMB2U	Combination	Max	99.44	575.48	520.05	-467.9177	-772.1568	146.2538	-1705.6	1455.83
140	**140**	**Shell-Thick**	**123**	**COMB2U**	**Combination**	**Min**	**-93.15**	**634.44**	**-787.21**	**-1583.1857**	**-1119.401**	**-64.6879**	**-1998.9**	**1215.87**
140	140	Shell-Thick	16	COMB2U	Combination	Min	-120.01	627.05	-1293.1	-778.3597	-392.8871	-96.7268	-1998.9	1215.87
140	140	Shell-Thick	140	COMB2U	Combination	Min	-143.96	198.13	-188.14	-694.2478	-360.1533	-89.9339	-1998.9	1215.87
140	140	Shell-Thick	141	COMB2U	Combination	Min	-117.02	225.35	-2181.7	-1413.7149	-1070.398	-59.8744	-1998.9	1215.87
143	143	Shell-Thick	104	COMB2U	Combination	Max	636.81	-270.2	1639.53	-402.2248	-116.5201	142.1725	-1232.2	-1757.4
143	143	Shell-Thick	123	COMB2U	Combination	Max	430.4	-402.2	-147.5	-599.6606	-881.5398	110.8422	-1232.2	-1757.4
143	143	Shell-Thick	141	COMB2U	Combination	Max	143.77	124.31	548.48	-506.7651	-853.7927	226.3619	-1232.2	-1757.4
143	143	Shell-Thick	180	COMB2U	Combination	Max	663.22	63.86	645.34	-337.3375	-112.0751	139.3117	-1232.2	-1757.4
143	143	Shell-Thick	104	COMB2U	Combination	Min	-177.83	-576.8	-1134.5	-506.8379	-340.4274	-84.5356	-1479.7	-1891.3
143	143	Shell-Thick	123	COMB2U	Combination	Min	-779.38	-606.3	-1194.9	-1531.918	-949.6827	-75.8728	-1479.7	-1891.3
143	143	Shell-Thick	141	COMB2U	Combination	Min	-328.23	-311.2	-2192.8	-1394.018	-928.3868	-75.2362	-1479.7	-1891.3
143	143	Shell-Thick	180	COMB2U	Combination	Min	-168.88	-115.1	-385.9	-465.4546	-348.7899	25.9324	-1479.7	-1891.3
400	400	Shell-Thick	87	COMB2U	Combination	Max	61.08	23.84	21.47	-24.1666	-496.1625	128.8558	269.21	663.96
400	**400**	**Shell-Thick**	**112**	**COMB2U**	**Combination**	**Max**	**26.47**	**15.37**	**22.47**	**512.5058**	**-83.464**	**157.1484**	**269.21**	**663.96**
400	400	Shell-Thick	164	COMB2U	Combination	Max	36.09	34.19	8.26	484.8504	-114.8127	69.3801	269.21	663.96
400	400	Shell-Thick	229	COMB2U	Combination	Max	67.34	27	30.77	-34.3225	-514.7009	8.5869	269.21	663.96
402	402	Shell-Thick	132	COMB2U	Combination	Max	132.68	71.99	33.36	-262.3854	-1134.99	55.324	-858.76	1216.33
402	402	Shell-Thick	87	COMB2U	Combination	Max	68.33	35.15	110.55	-79.6634	-318.8594	103.8117	-858.76	1216.33
402	402	Shell-Thick	229	COMB2U	Combination	Max	66.94	25.25	45.78	95.5961	-255.1658	23.784	-858.76	1216.33
402	402	Shell-Thick	232	COMB2U	Combination	Max	124.04	28.81	78.28	-93.4268	-1074.072	12.225	-858.76	1216.33
402	402	Shell-Thick	132	COMB2U	Combination	Min	-118.74	-89.94	-51.32	-605.3371	-1205.674	-15.6828	-997.53	1160.84
402	402	Shell-Thick	87	COMB2U	Combination	Min	-68.11	-55.85	-128.28	-126.9866	-398.2156	-162.3395	-997.53	1160.84
402	402	Shell-Thick	229	COMB2U	Combination	Min	-65.64	-40.53	-46.22	53.3043	-356.9823	-160.271	-997.53	1160.84
402	402	Shell-Thick	232	COMB2U	Combination	Min	-109.02	-41.35	-78.95	-391.2085	-1155.989	-50.543	-997.53	1160.84
463	463	Shell-Thick	106	COMB2U	Combination	Max	91.74	-65.41	188.71	-744.9207	-257.4737	137.6221	1171.54	-814.16
463	463	Shell-Thick	15	COMB2U	Combination	Max	94.37	92.9	143.3	-322.1166	-114.5933	87.9035	1171.54	-814.16
463	463	Shell-Thick	265	COMB2U	Combination	Max	174.18	114.25	331.92	-234.281	-443.923	149.3125	1171.54	-814.16
463	463	Shell-Thick	261	COMB2U	Combination	Max	6.07	-103.7	120.3	-698.1064	-543.9188	-44.3482	1171.54	-814.16
477	477	Shell-Thick	138	COMB2U	Combination	Max	178.22	68.29	62.4	-274.73	-962.1648	82.1262	981.35	-1302.9
477	477	Shell-Thick	98	COMB2U	Combination	Max	68.32	41.43	138.57	-148.6624	-170.5165	63.5571	981.35	-1302.9
477	477	Shell-Thick	92	COMB2U	Combination	Max	63.51	41	37.97	131.317	3.3157	-175.2341	981.35	-1302.9
477	477	Shell-Thick	323	COMB2U	Combination	Max	163.66	35.11	96.66	10.8521	-821.1234	43.4774	981.35	-1302.9
477	477	Shell-Thick	138	COMB2U	Combination	Min	-198.1	-71.92	-57.61	-1025.1004	-1162.064	-65.2611	785.42	-1417.2
477	477	Shell-Thick	98	COMB2U	Combination	Min	-66.55	-40.72	-132.66	-448.2783	-275.4856	-166.5871	785.42	-1417.2

477	477	Shell-Thick	92	COMB2U	Combination	Min	-62.62	-38.47	-35.31	-86.477	-33.4617	-186.8712	785.42	-1417.2
477	477	Shell-Thick	323	COMB2U	Combination	Min	-182.97	-36.61	-95.26	-681.1654	-1042.367	-115.8824	785.42	-1417.2
503	503	Shell-Thick	67	COMB2U	Combination	Max	40.53	16.23	21.92	11.4821	68.8306	19.4254	-30.86	-50.5
503	**503**	**Shell-Thick**	**13**	**COMB2U**	**Combination**	**Max**	**13.95**	**9.69**	**19.62**	**55.6978**	**87.6798**	**109.5135**	**-30.86**	**-50.5**
503	503	Shell-Thick	404	COMB2U	Combination	Max	16.47	31.89	16.06	52.1379	-88.012	-77.6174	-30.86	-50.5
503	503	Shell-Thick	402	COMB2U	Combination	Max	30.55	25.76	21.3	-42.1429	-139.7275	-94.3203	-30.86	-50.5
									M+	**512.5058**	**87.6798**	**V+**	**1171.54**	**1891.33**
									M-	**-1583.1857**	**-1271.012**	**V-**	**-1998.9**	**-1891.3**

TABLE: Element Forces - Area Shells (LONGITUDINAL STOPPER Kombinasi 3Ultimate)														
Area	**Area Elem**	**Shell Type**	**Joint**	**Output Case**	**Case Type**	**Step Type**	**F11**	**F22**	**F12**	**M11**	**M22**	**M12**	**V13**	**V23**
Text	Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
123	123	Shell-Thick	132	COMB3U	Combination	Min	-62.92	-165.53	-73.5	-473.6932	-1232.200	-118.1884	815.94	-1047.16
123	123	Shell-Thick	95	COMB3U	Combination	Min	-33.43	-166.82	-188.43	-188.4618	-519.0614	-113.0472	815.94	-1047.16
123	123	Shell-Thick	127	COMB3U	Combination	Min	-14.68	-40.17	-40.8	163.7109	-372.9819	-165.8201	815.94	-1047.16
123	123	Shell-Thick	129	COMB3U	Combination	Min	-37.54	-38.63	-277.33	-121.2225	-1083.226	-188.8474	815.94	-1047.16
126	126	Shell-Thick	87	COMB3U	Combination	Max	23.76	144.14	188.43	-62.8368	-317.807	113.0472	893.24	1047.16
126	126	Shell-Thick	132	COMB3U	Combination	Max	103.76	152.96	73.5	-311.03	-981.0004	118.1884	893.24	1047.16
126	126	Shell-Thick	129	COMB3U	Combination	Max	77	19.19	277.33	15.8209	-921.5341	188.8474	893.24	1047.16
126	126	Shell-Thick	128	COMB3U	Combination	Max	3.64	10.63	40.8	255.0136	-258.7314	165.8201	893.24	1047.16
137	137	Shell-Thick	106	COMB3U	Combination	Min	-157.74	-216.7	-181.94	-1299.891	-279.462	-60.4772	-1447.4	-1019.67
137	**137**	**Shell-Thick**	**261**	**COMB3U**	**Combination**	**Min**	**-143.23**	**-198.52**	**-187.36**	**-1386.808**	**-852.1051**	**-137.7366**	**-1447.4**	**-1019.67**
137	137	Shell-Thick	136	COMB3U	Combination	Min	-99.73	-69.72	-309.85	131.7552	-427.3373	-200.4985	-1447.4	-1019.67
137	137	Shell-Thick	184	COMB3U	Combination	Min	-112.37	-45.04	-124.23	160.539	-121.6306	-191.3541	-1447.4	-1019.67
140	140	Shell-Thick	123	COMB3U	Combination	Max	135.45	828.94	-570.07	-865.4184	-576.4365	351.0855	-1601.7	1628.47
140	140	Shell-Thick	16	COMB3U	Combination	Max	20.28	812.62	675.96	-381.1239	-49.0516	98.2976	-1601.7	1628.47
140	140	Shell-Thick	140	COMB3U	Combination	Max	-42.33	476.86	146.78	-345.3267	-64.1202	66.1563	-1601.7	1628.47
140	140	Shell-Thick	141	COMB3U	Combination	Max	72.55	487.61	-336.61	-700.2736	-566.653	325.5403	-1601.7	1628.47
140	**140**	**Shell-Thick**	**123**	**COMB3U**	**Combination**	**Min**	**-27.9**	**597.57**	**-800.66**	**-1306.292**	**-1342.671**	**-206.8886**	**-2102.8**	**1043.23**
140	140	Shell-Thick	16	COMB3U	Combination	Min	-77.1	581.02	-276.34	-901.0417	-540.6482	-83.2017	-2102.8	1043.23
140	140	Shell-Thick	140	COMB3U	Combination	Min	-139.62	291.1	-38.15	-758.0002	-470.8445	-108.8778	-2102.8	1043.23
140	140	Shell-Thick	141	COMB3U	Combination	Min	-90.14	313.22	-1325.1	-1181.359	-1275.902	-239.1609	-2102.8	1043.23
143	143	Shell-Thick	104	COMB3U	Combination	Max	366.69	-294.42	712.15	-360.7049	-127.9185	122.8704	-1162.9	-1644.4
143	143	Shell-Thick	123	COMB3U	Combination	Max	56.19	-383.2	-426.2	-902.9226	-846.721	286.1238	-1162.9	-1644.4
143	143	Shell-Thick	141	COMB3U	Combination	Max	33.95	-7.97	-328.1	-791.5485	-856.8474	370.9469	-1162.9	-1644.4
143	143	Shell-Thick	180	COMB3U	Combination	Max	388.87	13.25	302.83	-311.9068	-162.3387	158.5037	-1162.9	-1644.4
143	143	Shell-Thick	104	COMB3U	Combination	Min	92.28	-552.49	-207.1	-548.3578	-329.029	-65.2335	-1548.8	-2004.39
143	143	Shell-Thick	123	COMB3U	Combination	Min	-405.17	-625.3	-916.27	-1228.656	-984.5015	-251.1545	-1548.8	-2004.39
143	143	Shell-Thick	141	COMB3U	Combination	Min	-218.41	-178.99	-1316.2	-1109.234	-925.3321	-219.8212	-1548.8	-2004.39
143	143	Shell-Thick	180	COMB3U	Combination	Min	105.47	-64.45	-43.39	-490.8853	-298.5263	6.7403	-1548.8	-2004.39
400	400	Shell-Thick	87	COMB3U	Combination	Max	36.47	31.78	19.86	9.1582	-503.2107	174.303	227.41	668.78

400	400	Shell-Thick	112	COMB3U	Combination	Max	32.09	25.74	77.89	464.5886	-77.8743	195.4511	227.41	668.78
400	400	Shell-Thick	164	COMB3U	Combination	Max	75.64	72.21	51.1	433.1655	-112.3588	102.7833	227.41	668.78
400	400	Shell-Thick	229	COMB3U	Combination	Max	64.35	65.02	40.3	-12.7903	-544.1773	77.8468	227.41	668.78
402	402	Shell-Thick	132	COMB3U	Combination	Max	72.39	153.87	32.4	-366.73	-1058.478	80.0471	-899.69	1220.31
402	402	Shell-Thick	87	COMB3U	Combination	Max	47.94	140.92	236.33	-35.5702	-259.6998	151.3675	-899.69	1220.31
402	402	Shell-Thick	229	COMB3U	Combination	Max	31.76	50.9	41.51	141.5615	-236.3463	89.0311	-899.69	1220.31
402	402	Shell-Thick	232	COMB3U	Combination	Max	52.64	55.11	203.23	-179.2473	-1033.753	30.1011	-899.69	1220.31
402	402	Shell-Thick	132	COMB3U	Combination	Min	-58.45	-171.82	-50.36	-500.9925	-1282.185	-40.4059	-956.59	1156.86
402	402	Shell-Thick	87	COMB3U	Combination	Min	-47.72	-161.62	-254.06	-171.0797	-457.3753	-209.8953	-956.59	1156.86
402	402	Shell-Thick	229	COMB3U	Combination	Min	-30.46	-66.18	-41.96	7.3389	-375.8018	-225.5181	-956.59	1156.86
402	402	Shell-Thick	232	COMB3U	Combination	Min	-37.62	-67.65	-203.91	-305.388	-1196.308	-68.419	-956.59	1156.86
463	463	Shell-Thick	106	COMB3U	Combination	Max	89.89	-77.22	117.33	-612.4507	-234.0465	185.814	1361.98	-727.04
463	463	Shell-Thick	15	COMB3U	Combination	Max	134.52	88.6	144.75	-282.267	-106.1624	140.4193	1361.98	-727.04
463	463	Shell-Thick	265	COMB3U	Combination	Max	92.95	81.63	230.1	-234.9858	-429.5947	187.1269	1361.98	-727.04
463	463	Shell-Thick	261	COMB3U	Combination	Max	-0.72	-99.02	111.03	-589.8063	-539.8332	1.5916	1361.98	-727.04
477	477	Shell-Thick	138	COMB3U	Combination	Max	127.94	122.65	64.03	-532.1138	-959.0223	115.8327	913.06	-1341.5
477	477	Shell-Thick	98	COMB3U	Combination	Max	54.46	114.39	275.75	-190.8219	-103.9634	-2.6687	913.06	-1341.5
477	477	Shell-Thick	92	COMB3U	Combination	Max	62.16	61.34	34.13	115.9311	33.7283	-169.6148	913.06	-1341.5
477	477	Shell-Thick	323	COMB3U	Combination	Max	96.17	67.07	276.08	-224.9312	-887.9686	85.8256	913.06	-1341.5
477	477	Shell-Thick	138	COMB3U	Combination	Min	-147.82	-126.27	-59.24	-767.7166	-1165.207	-98.9676	853.72	-1378.61
477	477	Shell-Thick	98	COMB3U	Combination	Min	-52.7	-113.69	-269.84	-406.1187	-342.0388	-100.3613	853.72	-1378.61
477	477	Shell-Thick	92	COMB3U	Combination	Min	-61.28	-58.8	-31.46	-71.0911	-63.8743	-192.4904	853.72	-1378.61
477	477	Shell-Thick	323	COMB3U	Combination	Min	-115.48	-68.57	-274.68	-445.382	-975.5218	-158.2307	853.72	-1378.61
503	503	Shell-Thick	67	COMB3U	Combination	Max	49.3	12.35	55.91	11.7894	67.8195	15.0546	-31.03	-51.61
503	503	Shell-Thick	13	COMB3U	Combination	Max	20.24	13.89	56.03	51.3743	89.0789	101.7624	-31.03	-51.61
503	**503**	**Shell-Thick**	**404**	**COMB3U**	**Combination**	**Max**	**26.53**	**31.29**	**43.2**	**44.39**	**-89.6031**	**-89.276**	**-31.03**	**-51.61**
503	503	Shell-Thick	402	COMB3U	Combination	Max	21.36	31.68	39	-43.3612	-136.5495	-107.0799	-31.03	-51.61
									M+	**464.5886**	**89.0789**	**V+**	**1361.98**	**2004.39**
									M-	**-1386.808**	**-1342.671**	**V-**	**-2102.9**	**-2004.39**

TABLE: Element Forces - Area Shells (PIERHEAD Kombinasi 1Ultimate)

Area	Area Elem	Shell Type	Joint	Output Case	CaseType	F11	F22	F12	M11	M22	M12	V13	V23
Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
37	37	Shell-Thick	172	COMB1U	Combination	-190.38	17.07	238.29	34.6217	-284.9209	53.9095	290.81	855.05
37	37	Shell-Thick	213	COMB1U	Combination	1.91	55.53	49.58	141.912	-1.2322	-0.0705	290.81	855.05
37	37	Shell-Thick	35	COMB1U	Combination	59.65	103.56	-70.2	-33.6047	-6.2878	-53.5428	290.81	855.05
37	37	Shell-Thick	414	COMB1U	Combination	-132.63	65.1	118.51	-140.5545	-284.7241	0.2757	290.81	855.05
38	38	Shell-Thick	275	COMB1U	Combination	-43.08	-75.03	10.83	109.526	36.6739	15.3316	-442.4	953.84
38	38	Shell-Thick	105	COMB1U	Combination	17.75	-62.87	-46.42	12.9492	-341.1702	38.2629	-442.4	953.84

38	38	Shell-Thick	28	COMB1U	Combination	51.01	4.98	-98.71	-220.9559	-338.7988	57.8457	-442.4	953.84
38	38	Shell-Thick	36	COMB1U	Combination	-9.82	-7.18	-41.47	-124.5273	35.608	35.0048	-442.4	953.84
42	42	Shell-Thick	41	COMB1U	Combination	-73.34	10.36	-4.88	-50.315	-9.9602	-31.7933	55.64	238.94
42	42	Shell-Thick	42	COMB1U	Combination	-67.4	-9.94	-27.7	-90.9982	0.6432	-7.2485	55.64	238.94
42	42	Shell-Thick	36	COMB1U	Combination	-30	-2.46	-32.44	-95.6882	-78.4663	12.1317	55.64	238.94
42	42	Shell-Thick	35	COMB1U	Combination	-35.94	17.84	-9.62	-55.1076	-89.9296	-12.3828	55.64	238.94
43	43	Shell-Thick	216	COMB1U	Combination	1.91	55.53	-49.58	141.912	-1.2322	0.0705	290.81	-855.05
43	43	Shell-Thick	178	COMB1U	Combination	-190.38	17.07	-238.29	34.6217	-284.9209	-53.9095	290.81	-855.05
43	43	Shell-Thick	415	COMB1U	Combination	-132.63	65.1	-118.51	-140.5545	-284.7241	-0.2757	290.81	-855.05
43	43	Shell-Thick	43	COMB1U	Combination	59.65	103.56	70.2	-33.6047	-6.2878	53.5428	290.81	-855.05
148	148	Shell-Thick	208	COMB1U	Combination	-57.8	-10.72	27.02	234.5544	134.1738	-4.4936	-958.56	1323.37
148	148	Shell-Thick	162	COMB1U	Combination	1.67	1.18	19.85	20.1756	-401.6078	43.1049	-958.56	1323.37
148	148	Shell-Thick	114	COMB1U	Combination	4.91	7.65	14.69	-117.069	-418.6418	73.9907	-958.56	1323.37
148	148	Shell-Thick	269	COMB1U	Combination	-54.56	-4.25	21.86	92.2111	116.2445	25.9141	-958.56	1323.37
152	152	Shell-Thick	209	COMB1U	Combination	-72.55	-15.52	25.24	261.3036	133.6875	2.0173	-1062.34	1280.74
152	152	Shell-Thick	164	COMB1U	Combination	-4.7	-1.95	12.41	71.6547	-395.4558	43.9995	-1062.34	1280.74
152	152	Shell-Thick	112	COMB1U	Combination	-0.73	-1.23	3.09	-137.9888	-419.3036	76.9266	-1062.34	1280.74
152	152	Shell-Thick	271	COMB1U	Combination	-68.57	-14.8	15.91	51.0427	109.0002	34.8743	-1062.34	1280.74
156	156	Shell-Thick	210	COMB1U	Combination	-41.38	17.01	65.44	288.8149	66.3498	10.2194	-596.34	873.8
156	156	Shell-Thick	166	COMB1U	Combination	22.81	29.85	4.19	208.5921	-293.0324	46.0381	-596.34	873.8
156	**156**	**Shell-Thick**	**110**	**COMB1U**	**Combination**	**14.52**	**-40.62**	**-5.02**	**-399.7576**	**-367.565**	**49.2336**	**-596.34**	**873.8**
156	156	Shell-Thick	273	COMB1U	Combination	-49.67	-53.46	56.23	-320.9824	-19.1563	14.0877	-596.34	873.8
160	**160**	**Shell-Thick**	**212**	**COMB1U**	**Combination**	**-103.29**	**-129.38**	**59.92**	**249.4514**	**193.769**	**-44.0249**	**-972.23**	**1767.42**
160	160	Shell-Thick	170	COMB1U	Combination	179.92	-72.74	-131.42	-109.708	-492.6306	48.8056	-972.23	1767.42
160	**160**	**Shell-Thick**	**105**	**COMB1U**	**Combination**	**194.69**	**-27.48**	**-148.36**	**-153.2046**	**-502.6135**	**74.2059**	**-972.23**	**1767.42**
160	160	Shell-Thick	275	COMB1U	Combination	-88.52	-84.12	42.99	172.512	177.5385	-19.6004	-972.23	1767.42
163	163	Shell-Thick	161	COMB1U	Combination	73.49	4.62	-94.12	138.6727	-335.4468	21.073	516.12	1012.73
163	163	Shell-Thick	207	COMB1U	Combination	124.95	14.91	-82.95	214.136	-4.5989	-44.2016	516.12	1012.73
163	163	Shell-Thick	277	COMB1U	Combination	77.03	-77.08	-5.21	-253.7262	-44.3138	-37.1455	516.12	1012.73
163	163	Shell-Thick	101	COMB1U	Combination	25.57	-87.37	-16.37	-327.5433	-361.4455	27.4051	516.12	1012.73
164	164	Shell-Thick	213	COMB1U	Combination	-32	48.74	196.23	246.4128	61.3585	4.2088	-568.5	887.32
164	164	Shell-Thick	172	COMB1U	Combination	103.2	75.78	23.9	179.6568	-298.0128	48.3603	-568.5	887.32
164	164	Shell-Thick	101	COMB1U	Combination	93.65	-73.76	-15.14	-397.8933	-393.1597	16.7211	-568.5	887.32
164	164	Shell-Thick	277	COMB1U	Combination	-41.55	-100.8	157.19	-332.7754	-43.1453	-26.9294	-568.5	887.32
166	166	Shell-Thick	207	COMB1U	Combination	105.51	5.17	-39.97	308.6558	104.1432	-17.2274	713.68	46.2
166	**166**	**Shell-Thick**	**160**	**COMB1U**	**Combination**	**99.28**	**3.92**	**13.22**	**324.4459**	**82.9546**	**13.3743**	**713.68**	**46.2**
166	166	Shell-Thick	278	COMB1U	Combination	90.65	-20.01	24.16	-320.9923	-122.8001	-39.7146	713.68	46.2
166	166	Shell-Thick	277	COMB1U	Combination	96.88	-18.77	-29.03	-337.8735	-106.5864	-70.1382	713.68	46.2
168	168	Shell-Thick	214	COMB1U	Combination	124.95	14.91	82.95	214.136	-4.5989	44.2016	516.12	-1012.73
168	168	Shell-Thick	174	COMB1U	Combination	73.49	4.62	94.12	138.6727	-335.4468	-21.073	516.12	-1012.73
168	168	Shell-Thick	99	COMB1U	Combination	25.57	-87.37	16.37	-327.5433	-361.4455	-27.4051	516.12	-1012.73
168	168	Shell-Thick	279	COMB1U	Combination	77.03	-77.08	5.21	-253.7262	-44.3138	37.1455	516.12	-1012.73
171	171	Shell-Thick	180	COMB1U	Combination	179.92	-72.74	131.42	-109.708	-492.6306	-48.8056	-972.23	-1767.42

171	171	Shell-Thick	217	COMB1U	Combination	-103.29	-129.38	-59.92	249.4514	193.769	44.0249	-972.23	-1767.42
171	171	Shell-Thick	281	COMB1U	Combination	-88.52	-84.12	-42.99	172.512	177.5385	19.6004	-972.23	-1767.42
171	171	Shell-Thick	104	COMB1U	Combination	194.69	-27.48	148.36	-153.2046	-502.6135	-74.2059	-972.23	-1767.42
497	497	Shell-Thick	177	COMB1U	Combination	1.59	-0.7	-2.66	10.6292	-292.4958	-45.7562	142.41	-861.19
497	497	Shell-Thick	400	COMB1U	Combination	2.02	1.45	-2.5	-135.3764	-240.8993	12.4283	142.41	-861.19
497	497	Shell-Thick	399	COMB1U	Combination	2.77	1.6	-1.82	-40.7889	43.5139	73.0213	142.41	-861.19
497	497	Shell-Thick	215	COMB1U	Combination	2.34	-0.54	-1.98	107.9284	7.4984	15.6986	142.41	-861.19
499	499	Shell-Thick	158	COMB1U	Combination	1.59	-0.7	2.66	10.6292	-292.4958	45.7562	142.41	861.19
499	499	Shell-Thick	206	COMB1U	Combination	2.34	-0.54	1.98	107.9284	7.4984	-15.6986	142.41	861.19
499	499	Shell-Thick	401	COMB1U	Combination	2.77	1.6	1.82	-40.7889	43.5139	-73.0213	142.41	861.19
499	499	Shell-Thick	402	COMB1U	Combination	2.02	1.45	2.5	-135.3764	-240.8993	-12.4283	142.41	861.19
								M+	**324.4459**	**193.769**	**V+**	**894.4**	**1767.42**
								M-	**-399.7576**	**-502.6135**	**V-**	**-1062.34**	**-1767.42**

TABLE: Element Forces - Area Shells (PIERHEAD Kombinasi 2Ultimate)														
Area	**Area Elem**	**Shell Type**	**Joint**	**Output Case**	**CaseType**	**Step Type**	**F11**	**F22**	**F12**	**M11**	**M22**	**M12**	**V13**	**V23**
Text	Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
37	37	Shell-Thick	172	COMB2U	Combination	Max	27.83	162.11	368.49	36.3317	-202.4356	40.6243	244.14	620.41
37	37	Shell-Thick	213	COMB2U	Combination	Max	4.45	149.72	30.44	114.3211	2.5368	3.3074	244.14	620.41
37	37	Shell-Thick	35	COMB2U	Combination	Max	102.62	150.1	61.69	-26.7217	-1.9819	-35.2352	244.14	620.41
37	37	Shell-Thick	414	COMB2U	Combination	Max	-20.1	99.33	195.51	-103.5296	-200.5674	3.2519	244.14	620.41
37	37	Shell-Thick	172	COMB2U	Combination	Min	-253.11	-73.28	-128.38	7.3357	-211.7545	33.6571	187.01	610.21
37	37	Shell-Thick	213	COMB2U	Combination	Min	-40.21	-22.99	21.42	83.5008	-9.249	-6.7757	187.01	610.21
37	37	Shell-Thick	35	COMB2U	Combination	Min	-85.19	-33.03	-142.59	-35.6729	-13.2012	-45.0389	187.01	610.21
37	37	Shell-Thick	414	COMB2U	Combination	Min	-151.99	-20.16	-88.17	-112.5177	-214.5218	-6.0072	187.01	610.21
38	38	Shell-Thick	275	COMB2U	Combination	Max	71.98	11.24	121.72	68.9677	29.1179	13.2937	-269.15	700.59
38	38	Shell-Thick	105	COMB2U	Combination	Max	81.86	13.24	-8.74	0.9661	-242.4735	32.762	-269.15	700.59
38	38	Shell-Thick	28	COMB2U	Combination	Max	64.83	1.84	140.83	-159.1317	-242.7601	44.474	-269.15	700.59
38	38	Shell-Thick	36	COMB2U	Combination	Max	31.75	-4.78	-17.86	-86.5442	28.2053	28.3766	-269.15	700.59
38	38	Shell-Thick	275	COMB2U	Combination	Min	-50.65	-94.71	-220.65	55.9322	17.2054	5.0117	-324.02	686.86
38	38	Shell-Thick	105	COMB2U	Combination	Min	-12.94	-87.19	-81.87	-16.9145	-257.5719	18.1564	-324.02	686.86
38	38	Shell-Thick	28	COMB2U	Combination	Min	11.42	-8.05	-221.02	-170.3705	-248.2766	36.1806	-324.02	686.86
38	38	Shell-Thick	36	COMB2U	Combination	Min	-3.09	-10.95	-70.64	-102.4634	22.6023	19.758	-324.02	686.86
145	145	Shell-Thick	159	COMB2U	Combination	Min	-22.41	-3.42	-6.57	152.3062	41.3342	-9.9981	-821.38	-264.43
145	145	Shell-Thick	206	COMB2U	Combination	Min	-33.61	-6.99	-4.65	127.0382	91.4977	1.3052	-821.38	-264.43
145	145	Shell-Thick	267	COMB2U	Combination	Min	-32.25	-6.83	-5.96	48.3224	70.7921	5.4641	-821.38	-264.43
145	145	Shell-Thick	268	COMB2U	Combination	Min	-22.5	-4.57	-5.68	81.3698	20.9733	-3.7264	-821.38	-264.43
156	156	Shell-Thick	210	COMB2U	Combination	Max	46.87	39.89	94.55	209.1947	53.1733	9.9103	-393.84	645.76
156	156	Shell-Thick	166	COMB2U	Combination	Max	77.06	24.97	79.88	150.0258	-206.9552	37.7911	-393.84	645.76
156	156	Shell-Thick	110	COMB2U	Combination	Max	71.43	-17.23	79.72	-269.525	-260.1909	37.5227	-393.84	645.76
156	156	Shell-Thick	273	COMB2U	Combination	Max	33.32	-37.28	90.76	-214.455	-10.7312	13.845	-393.84	645.76

156	156	Shell-Thick	210	COMB2U	Combination	Min	-46.22	0.36	-53.62	188.2581	45.2315	5.626	-476.45	621.55
156	156	Shell-Thick	166	COMB2U	Combination	Min	-53.43	19.88	-61.98	132.256	-215.6689	30.4901	-476.45	621.55
156	156	Shell-Thick	110	COMB2U	Combination	Min	-67.74	-63.6	-65.79	-336.0575	-274.4317	32.4159	-476.45	621.55
156	156	Shell-Thick	273	COMB2U	Combination	Min	-52.6	-48.15	-53.8	-277.962	-18.177	4.2902	-476.45	621.55
160	160	Shell-Thick	212	COMB2U	Combination	Max	82.3	-70.61	99.3	170.4339	141.6961	-27.1134	-626.53	1295.01
160	160	Shell-Thick	170	COMB2U	Combination	Max	303.45	-8.88	187.15	-92.7664	-352.8282	37.5046	-626.53	1295.01
160	160	Shell-Thick	105	COMB2U	Combination	Max	269.58	-10.81	12.51	-119.4915	-359.4776	56.2524	-626.53	1295.01
160	160	Shell-Thick	275	COMB2U	Combination	Max	170.1	30.85	172	116.2434	130.5467	-8.6753	-626.53	1295.01
160	160	Shell-Thick	212	COMB2U	Combination	Min	-91.32	-105.4	-81.7	156.3758	131.3032	-39.7613	-692.05	1269.32
160	160	Shell-Thick	170	COMB2U	Combination	Min	-134.59	-131.6	-294.86	-94.9026	-364.8169	29.4064	-692.05	1269.32
160	160	Shell-Thick	105	COMB2U	Combination	Min	-42.33	-31.48	-220.73	-124.7651	-371.3077	46.7109	-692.05	1269.32
160	160	Shell-Thick	275	COMB2U	Combination	Min	-120.74	-108.7	-254.89	103.8099	119.9583	-23.6107	-692.05	1269.32
163	163	Shell-Thick	161	COMB2U	Combination	Max	102.43	88.92	-56.05	123.0865	-272.8483	20.7296	433.83	840.51
163	163	Shell-Thick	207	COMB2U	Combination	Max	131.88	82.59	-46.45	188.4322	-0.2818	-34.1065	433.83	840.51
163	163	Shell-Thick	277	COMB2U	Combination	Max	94.66	-10.27	35.84	-203.5216	-30.9731	-35.2128	433.83	840.51
163	163	Shell-Thick	101	COMB2U	Combination	Max	55.29	-24.9	6.14	-267.4777	-291.1128	18.9272	433.83	840.51
163	163	Shell-Thick	161	COMB2U	Combination	Min	40.31	-44.91	-87.29	112.3836	-277.0548	16.7985	429.18	827.13
163	163	Shell-Thick	207	COMB2U	Combination	Min	61.29	-28.49	-86.86	177.9687	-6.0355	-38.0981	429.18	827.13
163	163	Shell-Thick	277	COMB2U	Combination	Min	18.52	-158.1	-68.05	-212.3777	-36.0145	-38.5334	429.18	827.13
163	163	Shell-Thick	101	COMB2U	Combination	Min	7.46	-153.6	-48.38	-276.6256	-295.7097	15.7845	429.18	827.13
164	164	Shell-Thick	213	COMB2U	Combination	Max	123.33	181.66	279.58	172.0389	46.3809	3.236	-383.72	663.18
164	164	Shell-Thick	172	COMB2U	Combination	Max	189.16	145.8	273.33	125.416	-215.5243	39.8486	-383.72	663.18
164	164	Shell-Thick	101	COMB2U	Combination	Max	200.68	11.67	260.16	-265.6524	-291.1106	9.5879	-383.72	663.18
164	164	Shell-Thick	277	COMB2U	Combination	Max	72.86	-37.34	244.23	-219.9576	-36.2603	-25.9184	-383.72	663.18
164	164	Shell-Thick	213	COMB2U	Combination	Min	-67.85	-36.68	-66.03	167.0746	40.9834	-4.2577	-430.61	651.99
164	164	Shell-Thick	172	COMB2U	Combination	Min	-67.77	12.37	-148.91	117.9223	-225.097	30.2198	-430.61	651.99
164	164	Shell-Thick	101	COMB2U	Combination	Min	-118.15	-186.2	-179.95	-318.3883	-305.7912	5.7601	-430.61	651.99
164	164	Shell-Thick	277	COMB2U	Combination	Min	-56.24	-150.4	-74.9	-270.5101	-44.5721	-29.2057	-430.61	651.99
167	167	Shell-Thick	178	COMB2U	Combination	Max	189.16	145.8	148.91	125.416	-215.5243	-30.2198	-383.72	-651.99
167	167	Shell-Thick	216	COMB2U	Combination	Max	123.33	181.66	66.03	172.0389	46.3809	4.2577	-383.72	-651.99
167	167	Shell-Thick	279	COMB2U	Combination	Max	72.86	-37.34	74.9	-219.9576	-36.2603	29.2057	-383.72	-651.99
167	167	Shell-Thick	99	COMB2U	Combination	Max	200.68	11.67	179.95	-265.6524	-291.1106	-5.7601	-383.72	-651.99
167	167	Shell-Thick	178	COMB2U	Combination	Min	-67.77	12.37	-273.33	117.9223	-225.097	-39.8486	-430.61	-663.18
167	167	Shell-Thick	216	COMB2U	Combination	Min	-67.85	-36.68	-279.58	167.0746	40.9834	-3.236	-430.61	-663.18
167	167	Shell-Thick	279	COMB2U	Combination	Min	-56.24	-150.4	-244.23	-270.5101	-44.5721	25.9184	-430.61	-663.18
167	167	Shell-Thick	99	COMB2U	Combination	Min	-118.15	-186.2	-260.16	-318.3883	-305.7912	-9.5879	-430.61	-663.18
481	481	Shell-Thick	211	COMB2U	Combination	Max	5.05	13.25	0.81	190.0666	108.772	-2.0278	680.87	-101.75
481	481	Shell-Thick	169	COMB2U	Combination	Max	-19.62	5.44	7.1	190.5084	42.9278	40.5296	680.87	-101.75
481	481	Shell-Thick	325	COMB2U	Combination	Max	-24.55	-4.41	17.73	-38.3444	-41.6018	21.1713	680.87	-101.75
481	481	Shell-Thick	324	COMB2U	Combination	Max	0.12	0.53	-14.15	-37.0888	26.4865	-18.0439	680.87	-101.75
497	497	Shell-Thick	177	COMB2U	Combination	Max	5.08	17.65	20.59	3.3379	-235.1271	-36.3297	111.59	-694.07
497	497	Shell-Thick	400	COMB2U	Combination	Max	2.38	7.13	17.23	-104.4289	-193.9153	12.554	111.59	-694.07

497	497	Shell-Thick	399	COMB2U	Combination	Max	15.09	9.78	10.97	-25.5941	41.2536	60.2871	111.59	-694.07
497	497	Shell-Thick	215	COMB2U	Combination	Max	9.48	14.98	15.64	82.9816	7.5484	16.0474	111.59	-694.07
497	497	Shell-Thick	177	COMB2U	Combination	Min	-5.9	-16.75	-19.48	0.9426	-244.0259	-40.3765	103.69	-713.08
497	497	Shell-Thick	400	COMB2U	Combination	Min	-3.5	-7.82	-16.16	-111.8303	-197.6164	6.3825	103.69	-713.08
497	497	Shell-Thick	399	COMB2U	Combination	Min	-16.24	-10.47	-10.39	-35.6188	33.1404	57.758	103.69	-713.08
497	497	Shell-Thick	215	COMB2U	Combination	Min	-10.34	-14.09	-15.02	80.7631	4.4292	7.7436	103.69	-713.08
499	499	Shell-Thick	158	COMB2U	Combination	Max	5.08	17.65	19.48	3.3379	-235.1271	40.3765	111.59	713.08
499	499	Shell-Thick	206	COMB2U	Combination	Max	9.48	14.98	15.02	82.9816	7.5484	-7.7436	111.59	713.08
499	499	Shell-Thick	401	COMB2U	Combination	Max	15.09	9.78	10.39	-25.5941	41.2536	-57.758	111.59	713.08
499	499	Shell-Thick	402	COMB2U	Combination	Max	2.38	7.13	16.16	-104.4289	-193.9153	-6.3825	111.59	713.08
499	499	Shell-Thick	158	COMB2U	Combination	Min	-5.9	-16.75	-20.59	0.9426	-244.0259	36.3297	103.69	694.07
499	499	Shell-Thick	206	COMB2U	Combination	Min	-10.34	-14.09	-15.64	80.7631	4.4292	-16.0474	103.69	694.07
499	499	Shell-Thick	401	COMB2U	Combination	Min	-16.24	-10.47	-10.97	-35.6188	33.1404	-60.2871	103.69	694.07
499	499	Shell-Thick	402	COMB2U	Combination	Min	-3.5	-7.82	-17.23	-111.8303	-197.6164	-12.554	103.69	694.07
									M+	**280.4026**	**141.6961**	**V+**	**680.87**	**1295.01**
									M-	**-336.0575**	**-371.3077**	**V-**	**-821.38**	**-1295.0**

TABLE: Element Forces - Area Shells (PIERHEAD Kombinasi 3Ultimate)

Area	Area Elem	ShellType	Joint	Output Case	CaseType	Step Type	F11	F22	F12	M11	M22	M12	V13	V23
Text	Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
37	37	Shell-Thick	172	COMB3U	Combination	Max	-27.36	87.68	240.2	38.0231	-204.2868	47.5721	261.74	622.38
37	37	Shell-Thick	213	COMB3U	Combination	Max	-4.17	90.9	28.73	116.814	0.3354	5.4903	261.74	622.38
37	37	Shell-Thick	35	COMB3U	Combination	Max	45.01	98.76	7.8	-20.1459	4.2712	-30.2307	261.74	622.38
37	37	Shell-Thick	414	COMB3U	Combination	Max	-33.19	62.46	122.95	-95.6633	-194.7001	12.1101	261.74	622.38
37	37	Shell-Thick	172	COMB3U	Combination	Min	-197.92	1.15	-0.0977	5.6444	-209.9033	26.7094	169.41	608.24
37	37	Shell-Thick	213	COMB3U	Combination	Min	-31.59	35.83	23.12	81.0078	-7.0476	-8.9585	169.41	608.24
37	37	Shell-Thick	35	COMB3U	Combination	Min	-27.57	18.32	-88.7	-42.2487	-19.4543	-50.0434	169.41	608.24
37	37	Shell-Thick	414	COMB3U	Combination	Min	-138.9	16.71	-15.61	-120.384	-220.3892	-14.8654	169.41	608.24
38	38	Shell-Thick	275	COMB3U	Combination	Max	45.36	-10.75	11.57	73.2628	29.6485	20.1639	-252.32	715.57
38	38	Shell-Thick	105	COMB3U	Combination	Max	57.99	-8.16	-31.47	5.9252	-237.6639	38.8194	-252.32	715.57
38	38	Shell-Thick	28	COMB3U	Combination	Max	57.39	3.19	22.51	-155.1759	-241.7686	51.0022	-252.32	715.57
38	38	Shell-Thick	36	COMB3U	Combination	Max	37.86	-0.72	-33.46	-81.9521	29.3819	33.4306	-252.32	715.57
38	38	Shell-Thick	275	COMB3U	Combination	Min	-24.03	-72.72	-110.5	51.637	16.6748	-1.8584	-340.86	671.87
38	38	Shell-Thick	105	COMB3U	Combination	Min	10.93	-65.79	-59.14	-21.8737	-262.3814	12.0989	-340.86	671.87
38	38	Shell-Thick	28	COMB3U	Combination	Min	18.86	-9.41	-102.69	-174.3263	-249.2681	29.6523	-340.86	671.87

38	38	Shell-Thick	36	COMB3U	Combination	Min	-9.21	-15.01	-55.04	-107.0555	21.4257	14.704	-340.86	671.87
156	156	Shell-Thick	210	COMB3U	Combination	Max	47.7	32.66	55.64	218.4651	57.3853	11.9817	-367.74	660.78
156	156	Shell-Thick	166	COMB3U	Combination	Max	71.78	30.59	41.78	159.7781	-204.89	38.6802	-367.74	660.78
156	156	Shell-Thick	110	COMB3U	Combination	Max	64.23	-22.2	41.33	-252.5664	-248.0905	40.3195	-367.74	660.78
156	156	Shell-Thick	273	COMB3U	Combination	Max	37.85	-30.61	52.19	-197.1107	-7.4112	16.8464	-367.74	660.78
156	156	Shell-Thick	210	COMB3U	Combination	Min	-47.05	7.59	-14.71	178.9878	41.0195	3.5546	-502.54	606.53
156	156	Shell-Thick	166	COMB3U	Combination	Min	-48.15	14.26	-23.89	122.5037	-217.7341	29.6009	-502.54	606.53
156	**156**	**Shell-Thick**	**110**	**COMB3U**	**Combination**	**Min**	**-60.54**	**-58.62**	**-27.4**	**-353.0161**	**-286.5322**	**29.6191**	**-502.54**	**606.53**
156	156	Shell-Thick	273	COMB3U	Combination	Min	-57.13	-54.81	-15.24	-295.3063	-21.497	1.2888	-502.54	606.53
160	**160**	**Shell-Thick**	**212**	**COMB3U**	**Combination**	**Max**	**41.81**	**-51.99**	**42.35**	**167.9888**	**139.5749**	**-13.2143**	**-591.92**	**1321.28**
160	160	Shell-Thick	170	COMB3U	Combination	Max	163.59	-22.52	29.08	-92.1506	-352.5526	38.5939	-591.92	1321.28
160	160	Shell-Thick	105	COMB3U	Combination	Max	167.3	-5.13	-61.54	-115.9131	-357.09	56.8014	-591.92	1321.28
160	160	Shell-Thick	275	COMB3U	Combination	Max	81.64	-3.56	27.67	112.9335	130.4162	5.5827	-591.92	1321.28
160	160	Shell-Thick	212	COMB3U	Combination	Min	-50.83	-124.1	-24.75	158.821	133.4245	-53.6603	-726.66	1243.05
160	160	Shell-Thick	170	COMB3U	Combination	Min	5.27	-117.9	-136.8	-95.5184	-365.0924	28.3171	-726.66	1243.05
160	**160**	**Shell-Thick**	**105**	**COMB3U**	**Combination**	**Min**	**59.95**	**-37.16**	**-146.67**	**-128.3434**	**-373.6953**	**46.162**	**-726.66**	**1243.05**
160	160	Shell-Thick	275	COMB3U	Combination	Min	-32.27	-74.3	-110.57	107.1198	120.0889	-37.8687	-726.66	1243.05
161	161	Shell-Thick	171	COMB3U	Combination	Max	108.02	-0.54	28.02	83.087	38.4902	39.4833	-694.73	-251.41
161	161	Shell-Thick	212	COMB3U	Combination	Max	53.08	-0.11	25.53	155.322	82.503	7.8237	-694.73	-251.41
161	161	Shell-Thick	275	COMB3U	Combination	Max	55.39	-13.71	-0.44	100.6793	76.626	0.5204	-694.73	-251.41
161	161	Shell-Thick	276	COMB3U	Combination	Max	123.01	7.81	25.12	49.1917	43.6795	33.5674	-694.73	-251.41
161	161	Shell-Thick	171	COMB3U	Combination	Min	25.25	-9.21	-12.05	78.026	35.7698	30.0327	-744.61	-275.46
161	161	Shell-Thick	212	COMB3U	Combination	Min	-25.28	-30.73	-36.69	145.8456	63.8346	-34.1608	-744.61	-275.46
161	161	Shell-Thick	275	COMB3U	Combination	Min	-16.36	-28.46	-42.61	92.5537	65.7087	-39.1153	-744.61	-275.46
161	161	Shell-Thick	276	COMB3U	Combination	Min	21.49	-28.9	-41.04	41.6084	33.6003	24.7885	-744.61	-275.46
163	163	Shell-Thick	161	COMB3U	Combination	Max	95.01	62.24	-50.22	128.222	-270.3137	20.9527	435.96	842.72
163	163	Shell-Thick	207	COMB3U	Combination	Max	135.2	61.15	-36.63	194.6913	-0.3934	-33.6937	435.96	842.72
163	163	Shell-Thick	277	COMB3U	Combination	Max	89.45	-41.06	8.74	-196.3181	-29.3706	-31.7894	435.96	842.72
163	163	Shell-Thick	101	COMB3U	Combination	Max	46.2	-46.3	-10.61	-261.2947	-286.89	22.2133	435.96	842.72
163	163	Shell-Thick	161	COMB3U	Combination	Min	47.74	-18.23	-93.12	107.2481	-279.5894	16.5754	427.05	824.92
163	163	Shell-Thick	207	COMB3U	Combination	Min	57.98	-7.05	-96.69	171.7096	-5.9239	-38.5108	427.05	824.92
163	163	Shell-Thick	277	COMB3U	Combination	Min	23.73	-127.4	-40.95	-219.5812	-37.617	-41.9568	427.05	824.92
163	163	Shell-Thick	101	COMB3U	Combination	Min	16.55	-132.3	-31.63	-282.8086	-299.9325	12.4984	427.05	824.92

164	164	Shell-Thick	213	COMB3U	Combination	Max	57.31	106.12	197.06	172.1946	47.5312	7.3432	-371.21	665.52
164	164	Shell-Thick	172	COMB3U	Combination	Max	116.89	103.41	140.29	124.7894	-217.8223	44.8054	-371.21	665.52
164	164	Shell-Thick	101	COMB3U	Combination	Max	104.97	-35.52	114.36	-256.3541	-286.3226	13.5359	-371.21	665.52
164	164	Shell-Thick	277	COMB3U	Combination	Max	30.05	-51.28	164.44	-209.5814	-32.7169	-23.3695	-371.21	665.52
164	164	Shell-Thick	213	COMB3U	Combination	Min	-1.83	38.86	16.49	166.919	39.8331	-8.3649	-443.13	649.65
164	164	Shell-Thick	172	COMB3U	Combination	Min	4.51	54.75	-15.87	118.5489	-222.7991	25.263	-443.13	649.65
164	164	Shell-Thick	101	COMB3U	Combination	Min	-22.44	-139.1	-34.15	-327.6866	-310.5792	1.812	-443.13	649.65
164	164	Shell-Thick	277	COMB3U	Combination	Min	-13.44	-136.5	4.89	-280.8863	-48.1155	-31.7546	-443.13	649.65
166	166	Shell-Thick	207	COMB3U	Combination	Max	121.28	15.87	-12.37	275.1227	90.8033	-13.8169	602.97	34.19
166	**166**	**Shell-Thick**	**160**	**COMB3U**	**Combination**	**Max**	**133.14**	**22.03**	**8.09**	**289.2414**	**69.9889**	**11.2846**	**602.97**	**34.19**
166	166	Shell-Thick	278	COMB3U	Combination	Max	115.74	-5.06	22	-254.5942	-101.3119	-32.5936	602.97	34.19
166	166	Shell-Thick	277	COMB3U	Combination	Max	108.64	-6.26	-7.62	-269.5391	-85.8293	-57.4676	602.97	34.19
167	167	Shell-Thick	178	COMB3U	Combination	Max	116.89	103.41	15.87	124.7894	-217.8223	-25.263	-371.21	-649.65
167	167	Shell-Thick	216	COMB3U	Combination	Max	57.31	106.12	-16.49	172.1946	47.5312	8.3649	-371.21	-649.65
167	167	Shell-Thick	279	COMB3U	Combination	Max	30.05	-51.28	-4.89	-209.5814	-32.7169	31.7546	-371.21	-649.65
167	167	Shell-Thick	99	COMB3U	Combination	Max	104.97	-35.52	34.15	-256.3541	-286.3226	-1.812	-371.21	-649.65
167	167	Shell-Thick	178	COMB3U	Combination	Min	4.51	54.75	-140.29	118.5489	-222.7991	-44.8054	-443.13	-665.52
167	167	Shell-Thick	216	COMB3U	Combination	Min	-1.83	38.86	-197.06	166.919	39.8331	-7.3432	-443.13	-665.52
167	167	Shell-Thick	279	COMB3U	Combination	Min	-13.44	-136.5	-164.44	-280.8863	-48.1155	23.3695	-443.13	-665.52
167	167	Shell-Thick	99	COMB3U	Combination	Min	-22.44	-139.1	-114.36	-327.6866	-310.5792	-13.5359	-443.13	-665.52
168	168	Shell-Thick	214	COMB3U	Combination	Max	135.2	61.15	96.69	194.6913	-0.3934	38.5108	435.96	-824.92
168	168	Shell-Thick	174	COMB3U	Combination	Max	95.01	62.24	93.12	128.222	-270.3137	-16.5754	435.96	-824.92
168	168	Shell-Thick	99	COMB3U	Combination	Max	46.2	-46.3	31.63	-261.2947	-286.89	-12.4984	435.96	-824.92
168	168	Shell-Thick	279	COMB3U	Combination	Max	89.45	-41.06	40.95	-196.3181	-29.3706	41.9568	435.96	-824.92
168	168	Shell-Thick	214	COMB3U	Combination	Min	57.98	-7.05	36.63	171.7096	-5.9239	33.6937	427.05	-842.72
168	168	Shell-Thick	174	COMB3U	Combination	Min	47.74	-18.23	50.22	107.2481	-279.5894	-20.9527	427.05	-842.72
168	168	Shell-Thick	99	COMB3U	Combination	Min	16.55	-132.2	10.61	-282.8086	-299.9325	-22.2133	427.05	-842.72
168	168	Shell-Thick	279	COMB3U	Combination	Min	23.73	-127.4	-8.74	-219.5812	-37.617	31.7894	427.05	-842.72
171	171	Shell-Thick	180	COMB3U	Combination	Max	163.59	-22.52	136.8	-92.1506	-352.5526	-28.3171	-591.92	-1243.0
171	171	Shell-Thick	217	COMB3U	Combination	Max	41.81	-51.99	24.75	167.9888	139.5749	53.6603	-591.92	-1243.0
171	171	Shell-Thick	281	COMB3U	Combination	Max	81.64	-3.56	110.57	112.9335	130.4162	37.8687	-591.92	-1243.0
171	171	Shell-Thick	104	COMB3U	Combination	Max	167.3	-5.13	146.67	-115.9131	-357.09	-46.162	-591.92	-1243.0
171	171	Shell-Thick	180	COMB3U	Combination	Min	5.27	-117.9	-29.08	-95.5184	-365.0924	-38.5939	-726.66	-1321.2

171	171	Shell-Thick	217	COMB3U	Combination	Min	-50.83	-124.0	-42.35	158.821	133.4245	13.2143	-726.66	-1321.2
171	171	Shell-Thick	281	COMB3U	Combination	Min	-32.27	-74.3	-27.67	107.1198	120.0889	-5.5827	-726.66	-1321.2
171	171	Shell-Thick	104	COMB3U	Combination	Min	59.95	-37.16	61.54	-128.3434	-373.6953	-56.8014	-726.66	-1321.2
497	497	Shell-Thick	177	COMB3U	Combination	Max	5.9	34.76	18.72	3.9949	-235.4638	-35.0308	109.11	-699.54
497	497	Shell-Thick	400	COMB3U	Combination	Max	8.63	7.94	18.6	-105.7049	-193.7787	10.5475	109.11	-699.54
497	497	Shell-Thick	399	COMB3U	Combination	Max	18.46	10.01	11.36	-26.6873	40.1931	59.9226	109.11	-699.54
497	497	Shell-Thick	215	COMB3U	Combination	Max	10.81	32.64	15.82	84.8133	9.5491	16.2283	109.11	-699.54
497	497	Shell-Thick	177	COMB3U	Combination	Min	-6.72	-33.86	-17.6	0.2856	-243.6892	-41.6754	106.17	-707.61
497	497	Shell-Thick	400	COMB3U	Combination	Min	-9.74	-8.63	-17.54	-110.5543	-197.753	8.3891	106.17	-707.61
497	497	Shell-Thick	399	COMB3U	Combination	Min	-19.61	-10.71	-10.78	-34.5256	34.2009	58.1224	106.17	-707.61
497	497	Shell-Thick	215	COMB3U	Combination	Min	-11.67	-31.75	-15.2	78.9313	2.4286	7.5627	106.17	-707.61
499	499	Shell-Thick	158	COMB3U	Combination	Max	5.9	34.76	17.6	3.9949	-235.4638	41.6754	109.11	707.61
499	499	Shell-Thick	206	COMB3U	Combination	Max	10.81	32.64	15.2	84.8133	9.5491	-7.5627	109.11	707.61
499	499	Shell-Thick	401	COMB3U	Combination	Max	18.46	10.01	10.78	-26.6873	40.1931	-58.1224	109.11	707.61
499	499	Shell-Thick	402	COMB3U	Combination	Max	8.63	7.94	17.54	-105.7049	-193.7787	-8.3891	109.11	707.61
499	499	Shell-Thick	158	COMB3U	Combination	Min	-6.72	-33.86	-18.72	0.2856	-243.6892	35.0308	106.17	699.54
499	499	Shell-Thick	206	COMB3U	Combination	Min	-11.67	-31.75	-15.82	78.9313	2.4286	-16.2283	106.17	699.54
499	499	Shell-Thick	401	COMB3U	Combination	Min	-19.61	-10.71	-11.36	-34.5256	34.2009	-59.9226	106.17	699.54
499	499	Shell-Thick	402	COMB3U	Combination	Min	-9.74	-8.63	-18.6	-110.5543	-197.753	-10.5475	106.17	699.54
									M+	**289.2414**	**139.5749**	**V+**	**690.66**	**1321.28**
									M-	**-353.0161**	**-373.6953**	**V-**	**-812.5**	**-1321.2**

TABLE: Element Forces – Frames (KOLOM PILAR 3)												
Frame	**Station**	**Output Case**	**Case Type**	**Step Type**	**P**	**V2**	**V3**	**T**	**M2**	**M3**	**Frame Elem**	**ElemStation**
Text	m	Text	Text	Text	KN	KN	KN	KN-m	KN-m	KN-m	Text	m
32	0	COMB1U	Combination		-3615.627	41.051	8.91E-11	-1.433E-11	1.406E-10	101.8797	32-1	0
32	2.4115	COMB1U	Combination		-3654.26	41.051	8.91E-11	-1.433E-11	-7.43E-11	2.8855	32-1	2.4115
32	4.823	COMB1U	Combination		-3692.894	41.051	8.91E-11	-1.433E-11	-2.892E-10	-96.1086	32-1	4.823
32	0	COMB2U	Combination	Max	-2735.491	145.832	38.533	4.8797	73.7854	354.154	32-1	0
32	2.4115	COMB2U	Combination	Max	-2774.124	145.832	38.533	4.8797	19.903	2.6656	32-1	2.4115
32	4.823	COMB2U	Combination	Max	-2812.757	145.832	38.533	4.8797	112.3262	351.7927	32-1	4.823
32	0	COMB2U	Combination	Min	-2819.138	-144.81	-38.533	-4.8797	-73.7854	-346.625	32-1	0

32	2.4115	COMB2U	Combination	Min	-2857.771	-144.81	-38.533	-4.8797	-19.903	2.3982	32-1	2.4115
32	4.823	COMB2U	Combination	Min	-2896.405	-144.81	-38.533	-4.8797	-112.3262	-349.1941	32-1	4.823
32	0	COMB3U	Combination	Max	-2764.767	44.107	128.444	16.2657	245.9514	108.8814	32-1	0
32	2.4115	COMB3U	Combination	Max	-2803.401	44.107	128.444	16.2657	66.3434	2.572	32-1	2.4115
32	4.823	COMB3U	Combination	Max	-2842.034	44.107	128.444	16.2657	374.4208	106.4473	32-1	4.823
32	0	COMB3U	Combination	Min	-2789.862	-43.085	-128.444	-16.2657	-245.9514	-101.3523	32-1	0
32	2.4115	COMB3U	Combination	Min	-2828.495	-43.085	-128.444	-16.2657	-66.3434	2.4918	32-1	2.4115
32	4.823	COMB3U	Combination	Min	-2867.128	-43.085	-128.444	-16.2657	-374.4208	-103.8487	32-1	4.823
33	0	COMB1U	Combination		-3695.286	35.603	5.619E-11	-8.969E-12	7.455E-11	89.0937	33-1	0
33	2.4115	COMB1U	Combination		-3733.919	35.603	5.619E-11	-8.969E-12	-6.096E-11	3.2367	33-1	2.4115
33	4.823	COMB1U	Combination		-3772.552	35.603	5.619E-11	-8.969E-12	-1.965E-10	-82.6203	33-1	4.823
33	0	COMB2U	Combination	Max	-2799.774	142.855	34.823	4.8426	65.5227	347.7097	33-1	0
33	2.4115	COMB2U	Combination	Max	-2838.407	142.855	34.823	4.8426	20.3045	4.2165	33-1	2.4115
33	4.823	COMB2U	Combination	Max	-2877.04	142.855	34.823	4.8426	103.128	359.4627	33-1	4.823
33	0	COMB2U	Combination	Min	-2963.796	-147.315	-34.823	-4.8426	-65.5227	-351.0355	33-1	0
33	2.4115	COMB2U	Combination	Min	-3002.429	-147.315	-34.823	-4.8426	-20.3045	3.2114	33-1	2.4115
33	4.823	COMB2U	Combination	Min	-3041.062	-147.315	-34.823	-4.8426	-103.128	-341.2812	33-1	4.823
33	0	COMB3U	Combination	Max	-2857.181	41.296	116.078	16.1419	218.4091	103.1489	33-1	0
33	2.4115	COMB3U	Combination	Max	-2895.815	41.296	116.078	16.1419	67.6818	3.8647	33-1	2.4115
33	4.823	COMB3U	Combination	Max	-2934.448	41.296	116.078	16.1419	343.7601	114.2023	33-1	4.823
33	0	COMB3U	Combination	Min	-2906.388	-45.755	-116.078	-16.1419	-218.4091	-106.4747	33-1	0
33	2.4115	COMB3U	Combination	Min	-2945.021	-45.755	-116.078	-16.1419	-67.6818	3.5632	33-1	2.4115
33	4.823	COMB3U	Combination	Min	-2983.654	-45.755	-116.078	-16.1419	-343.7601	-96.0208	33-1	4.823
34	0	COMB1U	Combination		-3899.937	28.449	3.738E-11	-1.069E-11	2.875E-11	76.3339	34-1	0
34	2.4115	COMB1U	Combination		-3938.57	28.449	3.738E-11	-1.069E-11	-6.139E-11	7.7283	34-1	2.4115
34	4.823	COMB1U	Combination		-3977.203	28.449	3.738E-11	-1.069E-11	-1.515E-10	-60.8773	34-1	4.823
34	0	COMB2U	Combination	Max	-2973.237	137.506	31.932	3.7237	60.2333	338.4591	34-1	0
34	2.4115	COMB2U	Combination	Max	-3011.87	137.506	31.932	3.7237	20.5902	9.2034	34-1	2.4115
34	4.823	COMB2U	Combination	Max	-3050.503	137.506	31.932	3.7237	95.2829	374.2636	34-1	4.823
34	0	COMB2U	Combination	Min	-3285.28	-151.383	-31.932	-3.7237	-60.2333	-355.8576	34-1	0
34	2.4115	COMB2U	Combination	Min	-3323.913	-151.383	-31.932	-3.7237	-20.5902	6.8625	34-1	2.4115
34	4.823	COMB2U	Combination	Min	-3362.547	-151.383	-31.932	-3.7237	-95.2829	-324.7334	34-1	4.823
34	0	COMB3U	Combination	Max	-3082.452	36.395	106.439	12.4125	200.7776	95.4483	34-1	0
34	2.4115	COMB3U	Combination	Max	-3121.085	36.395	106.439	12.4125	68.6339	8.3841	34-1	2.4115
34	4.823	COMB3U	Combination	Max	-3159.719	36.395	106.439	12.4125	317.6098	129.6147	34-1	4.823
34	0	COMB3U	Combination	Min	-3176.065	-50.272	-106.439	-12.4125	-200.7776	-112.8467	34-1	0
34	2.4115	COMB3U	Combination	Min	-3214.698	-50.272	-106.439	-12.4125	-68.6339	7.6818	34-1	2.4115
34	4.823	COMB3U	Combination	Min	-3253.332	-50.272	-106.439	-12.4125	-317.6098	-80.0844	34-1	4.823
73	0	COMB1U	Combination		-3323.228	14.362	-42.663	-0.3258	-102.6808	37.6858	73-1	0
73	2.46335	COMB1U	Combination		-3361.862	22.417	-42.663	-0.3258	2.4129	-7.6137	73-1	2.46335
73	4.9267	COMB1U	Combination		-3400.495	30.471	-42.663	-0.3258	107.5066	-72.7536	73-1	4.9267
73	0	COMB2U	Combination	Max	-2439.175	60.178	131.334	2.8427	326.179	133.6207	73-1	0
73	2.46335	COMB2U	Combination	Max	-2477.809	68.232	131.334	2.8427	3.617	14.675	73-1	2.46335

73	4.9267	COMB2U	Combination	Max	-2516.442	76.286	131.334	2.8427	334.8319	84.6869	73-1	4.9267
73	0	COMB2U	Combination	Min	-2739.201	-40.53	-134.482	-4.5353	-327.7224	-75.311	73-1	0
73	2.46335	COMB2U	Combination	Min	-2777.834	-32.475	-134.482	-4.5353	2.5943	-24.6062	73-1	2.46335
73	4.9267	COMB2U	Combination	Min	-2816.468	-24.421	-134.482	-4.5353	-320.866	-202.54	73-1	4.9267
73	0	COMB3U	Combination	Max	-2217.139	176.208	48.187	6.8968	121.4517	373.6945	73-1	0
73	2.46335	COMB3U	Combination	Max	-2255.772	184.262	48.187	6.8968	3.6247	60.3887	73-1	2.46335
73	4.9267	COMB3U	Combination	Max	-2294.405	192.316	48.187	6.8968	129.9215	416.2599	73-1	4.9267
73	0	COMB3U	Combination	Min	-2961.238	-156.56	-51.335	-8.5894	-122.9951	-315.3848	73-1	0
73	2.46335	COMB3U	Combination	Min	-2999.871	-148.505	-51.335	-8.5894	2.5866	-70.3199	73-1	2.46335
73	4.9267	COMB3U	Combination	Min	-3038.504	-140.451	-51.335	-8.5894	-115.9556	-534.1129	73-1	4.9267
74	0	COMB1U	Combination		-3400.495	-30.471	42.663	0.3258	107.5066	-72.7536	74-1	0
74	2.46335	COMB1U	Combination		-3361.862	-22.417	42.663	0.3258	2.4129	-7.6137	74-1	2.46335
74	4.9267	COMB1U	Combination		-3323.228	-14.362	42.663	0.3258	-102.6808	37.6858	74-1	4.9267
74	0	COMB2U	Combination	Max	-2516.442	24.421	134.482	4.5353	334.8319	84.6869	74-1	0
74	2.46335	COMB2U	Combination	Max	-2477.809	32.475	134.482	4.5353	3.617	14.675	74-1	2.46335
74	4.9267	COMB2U	Combination	Max	-2439.175	40.53	134.482	4.5353	326.179	133.6207	74-1	4.9267
74	0	COMB2U	Combination	Min	-2816.468	-76.286	-131.334	-2.8427	-320.866	-202.54	74-1	0
74	2.46335	COMB2U	Combination	Min	-2777.834	-68.232	-131.334	-2.8427	2.5943	-24.6062	74-1	2.46335
74	4.9267	COMB2U	Combination	Min	-2739.201	-60.178	-131.334	-2.8427	-327.7224	-75.311	74-1	4.9267
74	0	COMB3U	Combination	Max	-2294.405	140.451	51.335	8.5894	129.9215	416.2599	74-1	0
74	2.46335	COMB3U	Combination	Max	-2255.772	148.505	51.335	8.5894	3.6247	60.3887	74-1	2.46335
74	4.9267	COMB3U	Combination	Max	-2217.139	156.56	51.335	8.5894	121.4517	373.6945	74-1	4.9267
74	0	COMB3U	Combination	Min	-3038.504	-192.316	-48.187	-6.8968	-115.9556	-534.1129	74-1	0
74	2.46335	COMB3U	Combination	Min	-2999.871	-184.262	-48.187	-6.8968	2.5866	-70.3199	74-1	2.46335
74	4.9267	COMB3U	Combination	Min	-2961.238	-176.208	-48.187	-6.8968	-122.9951	-315.3848	74-1	4.9267
84	0	COMB1U	Combination		-3533.45	15.608	-41.882	-0.8614	-97.2212	48.3148	84-1	0
84	2.52521	COMB1U	Combination		-3572.084	27.611	-41.882	-0.8614	8.5391	-6.254	84-1	2.52521
84	5.05043	COMB1U	Combination		-3610.717	39.615	-41.882	-0.8614	114.2995	-91.1337	84-1	5.05043
84	0	COMB2U	Combination	Max	-2644.437	65.109	119.71	1.5644	309.6588	155.7799	84-1	0
84	2.52521	COMB2U	Combination	Max	-2683.071	77.113	119.71	1.5644	9.5358	16.4756	84-1	2.52521
84	5.05043	COMB2U	Combination	Max	-2721.704	89.116	119.71	1.5644	326.2293	82.5769	84-1	5.05043
84	0	COMB2U	Combination	Min	-3034.469	-44.282	-125.416	-4.346	-307.1782	-80.4636	84-1	0
84	2.52521	COMB2U	Combination	Min	-3073.102	-32.279	-125.416	-4.346	7.3558	-24.0629	84-1	2.52521
84	5.05043	COMB2U	Combination	Min	-3111.736	-20.276	-125.416	-4.346	-294.9266	-233.6894	84-1	5.05043
84	0	COMB3U	Combination	Max	-2522.402	190.33	43.214	5.7995	116.0516	425.0639	84-1	0
84	2.52521	COMB3U	Combination	Max	-2561.036	202.333	43.214	5.7995	10.0011	63.3169	84-1	2.52521
84	5.05043	COMB3U	Combination	Max	-2599.669	214.337	43.214	5.7995	133.5058	445.7261	84-1	5.05043
84	0	COMB3U	Combination	Min	-3156.504	-169.503	-48.921	-8.5811	-113.571	-349.7477	84-1	0
84	2.52521	COMB3U	Combination	Min	-3195.137	-157.5	-48.921	-8.5811	6.8905	-70.9042	84-1	2.52521
84	5.05043	COMB3U	Combination	Min	-3233.771	-145.496	-48.921	-8.5811	-102.2032	-596.8386	84-1	5.05043
85	0	COMB1U	Combination		-3610.717	-39.615	41.882	0.8614	114.2995	-91.1337	85-1	0
85	2.52521	COMB1U	Combination		-3572.084	-27.611	41.882	0.8614	8.5391	-6.254	85-1	2.52521
85	5.05043	COMB1U	Combination		-3533.45	-15.608	41.882	0.8614	-97.2212	48.3148	85-1	5.05043

85	0	COMB2U	Combination	Max	-2721.704	20.276	125.416	4.346	326.2293	82.5769	85-1	0
85	2.52521	COMB2U	Combination	Max	-2683.071	32.279	125.416	4.346	9.5358	16.4756	85-1	2.52521
85	5.05043	COMB2U	Combination	Max	-2644.437	44.282	125.416	4.346	309.6588	155.7799	85-1	5.05043
85	0	COMB2U	Combination	Min	-3111.736	-89.116	-119.71	-1.5644	-294.9266	-233.6894	85-1	0
85	2.52521	COMB2U	Combination	Min	-3073.102	-77.113	-119.71	-1.5644	7.3558	-24.0629	85-1	2.52521
85	5.05043	COMB2U	Combination	Min	-3034.469	-65.109	-119.71	-1.5644	-307.1782	-80.4636	85-1	5.05043
85	0	COMB3U	Combination	Max	-2599.669	145.496	48.921	8.5811	133.5058	445.7261	85-1	0
85	2.52521	COMB3U	Combination	Max	-2561.036	157.5	48.921	8.5811	10.0011	63.3169	85-1	2.52521
85	5.05043	COMB3U	Combination	Max	-2522.402	169.503	48.921	8.5811	116.0516	425.0639	85-1	5.05043
85	0	COMB3U	Combination	Min	-3233.771	-214.337	-43.214	-5.7995	-102.2032	-596.8386	85-1	0
85	2.52521	COMB3U	Combination	Min	-3195.137	-202.333	-43.214	-5.7995	6.8905	-70.9042	85-1	2.52521
85	5.05043	COMB3U	Combination	Min	-3156.504	-190.33	-43.214	-5.7995	-113.571	-349.7477	85-1	5.05043
90	0	COMB1U	Combination		-3419.867	12.537	-41.895	-0.2101	-105.8043	26.2349	90-1	0
90	2.42505	COMB1U	Combination		-3458.5	16.638	-41.895	-0.2101	-4.2077	-9.1404	90-1	2.42505
90	4.8501	COMB1U	Combination		-3497.134	20.739	-41.895	-0.2101	97.389	-54.4614	90-1	4.8501
90	0	COMB2U	Combination	Max	-2359.382	53.622	144.635	5.3146	348.3474	109.4984	90-1	0
90	2.42505	COMB2U	Combination	Max	-2398.015	57.723	144.635	5.3146	-1.7443	12.9823	90-1	2.42505
90	4.8501	COMB2U	Combination	Max	-2436.648	61.824	144.635	5.3146	347.5442	83.8678	90-1	4.8501
90	0	COMB2U	Combination	Min	-2878.464	-35.481	-144.437	-4.8085	-352.9927	-68.5265	90-1	0
90	2.42505	COMB2U	Combination	Min	-2917.097	-31.38	-144.437	-4.8085	-3.3808	-25.9469	90-1	2.42505
90	4.8501	COMB2U	Combination	Min	-2955.73	-27.279	-144.437	-4.8085	-353.1492	-170.6601	90-1	4.8501
90	0	COMB3U	Combination	Max	-1769.302	157.458	53.223	10.9371	125.6169	316.4878	90-1	0
90	2.42505	COMB3U	Combination	Max	-1807.935	161.559	53.223	10.9371	-1.3271	57.9275	90-1	2.42505
90	4.8501	COMB3U	Combination	Max	-1846.569	165.66	53.223	10.9371	126.919	380.4865	90-1	4.8501
90	0	COMB3U	Combination	Min	-3468.543	-139.317	-53.025	-10.4309	-130.2621	-275.516	90-1	0
90	2.42505	COMB3U	Combination	Min	-3507.176	-135.216	-53.025	-10.4309	-3.798	-70.8921	90-1	2.42505
90	4.8501	COMB3U	Combination	Min	-3545.81	-131.115	-53.025	-10.4309	-132.5239	-467.2789	90-1	4.8501
95	0	COMB1U	Combination		-3497.134	-20.739	41.895	0.2101	97.389	-54.4614	95-1	0
95	2.42505	COMB1U	Combination		-3458.5	-16.638	41.895	0.2101	-4.2077	-9.1404	95-1	2.42505
95	4.8501	COMB1U	Combination		-3419.867	-12.537	41.895	0.2101	-105.8043	26.2349	95-1	4.8501
95	0	COMB2U	Combination	Max	-2436.648	27.279	144.437	4.8085	347.5442	83.8678	95-1	0
95	2.42505	COMB2U	Combination	Max	-2398.015	31.38	144.437	4.8085	-1.7443	12.9823	95-1	2.42505
95	4.8501	COMB2U	Combination	Max	-2359.382	35.481	144.437	4.8085	348.3474	109.4984	95-1	4.8501
95	0	COMB2U	Combination	Min	-2955.73	-61.824	-144.635	-5.3146	-353.1492	-170.6601	95-1	0
95	2.42505	COMB2U	Combination	Min	-2917.097	-57.723	-144.635	-5.3146	-3.3808	-25.9469	95-1	2.42505
95	4.8501	COMB2U	Combination	Min	-2878.464	-53.622	-144.635	-5.3146	-352.9927	-68.5265	95-1	4.8501
95	0	COMB3U	Combination	Max	-1846.569	131.115	53.025	10.4309	126.919	380.4865	95-1	0
95	2.42505	COMB3U	Combination	Max	-1807.935	135.216	53.025	10.4309	-1.3271	57.9275	95-1	2.42505
95	4.8501	COMB3U	Combination	Max	-1769.302	139.317	53.025	10.4309	125.6169	316.4878	95-1	4.8501
95	0	COMB3U	Combination	Min	-3545.81	-165.66	-53.223	-10.9371	-132.5239	-467.2789	95-1	0
95	2.42505	COMB3U	Combination	Min	-3507.176	-161.559	-53.223	-10.9371	-3.798	-70.8921	95-1	2.42505
95	4.8501	COMB3U	Combination	Min	-3468.543	-157.458	-53.223	-10.9371	-130.2621	-275.516	95-1	4.8501

REKAPITULASI MOMEN DAN GESER PILAR 3

Pilar V3			
Longitudinal stopper			
	Kombinasi 1U	Kombinasi 2U	Kombinasi 3U
	1.3PMS+1.8TTD+1.8TTB	1.3PMS+1.8TTD+Ex+30%Ey	1.3PMS+1.8TTD+30%Ex+Ey
M11	875.503	512.5058	464.5886
	-1377.9454	-1583.1857	-1386.8083
M22	99.7388	87.6798	89.0789
	-1599.8812	-1271.0124	-1342.671
Pier Head			
	Kombinasi 1U	Kombinasi 2U	Kombinasi 3U
	1.3PMS+1.8TTD+1.8TTB	1.3PMS+1.8TTD+Ex+30%Ey	1.3PMS+1.8TTD+30%Ex+Ey
M11	324.4459	280.4026	289.2414
	-399.7576	-336.0575	-353.0161
M22	193.769	141.6961	139.5749
	-502.6135	-371.3077	-373.6953
Pilecap			
	Kombinasi 1U	Kombinasi 2U	Kombinasi 3U
	1.3PMS+1.8TTD+1.8TTB	1.3PMS+1.8TTD+Ex+30%Ey	1.3PMS+1.8TTD+30%Ex+Ey
M11	1233.2266	1109.4556	1235.5905
	-345.1357	-375.8048	-347.0068
M22	1624.4488	1551.9312	2026.9122
	-168.1429	-187.0958	-238.0809

Pilar V3			
Longitudinal stopper			
	Kombinasi 1U	Kombinasi 2U	Kombinasi 3U
	1.3PMS+1.8TTD+1.8TTB	1.3PMS+1.8TTD+Ex+30%Ey	1.3PMS+1.8TTD+30%Ex+Ey
V13	1296.87	1171.54	1361.98
	-2419.72	-1998.98	-2102.84
V23	2413.27	1891.33	2004.39
	-2413.27	-1891.33	-2004.39
Pier Head			
	Kombinasi 1U	Kombinasi 2U	Kombinasi 3U
	1.3PMS+1.8TTD+1.8TTB	1.3PMS+1.8TTD+Ex+30%Ey	1.3PMS+1.8TTD+30%Ex+Ey
V13	894.4	680.87	690.66
	-1062.34	-821.38	-812.5
V23	1767.42	1295.01	1321.28
	-1767.42	-1295.01	-1321.28
Pilecap			
	Kombinasi 1U	Kombinasi 2U	Kombinasi 3U
	1.3PMS+1.8TTD+1.8TTB	1.3PMS+1.8TTD+Ex+30%Ey	1.3PMS+1.8TTD+30%Ex+Ey
V13	2451.85	2131.24	2412.41
	-3716.07	-3131.98	-3279.44
V23	3704.33	3085.63	3320.23
	-3704.33	-3085.63	-3320.23

SPUN PILE 600 mm

Type	=	**C**		P all	=	2527	KN	
Diameter	=	600	mm	M.Crack	=	170	KN.m	
Tebal	=	100	mm	Pu Bahan	=	4580	KN	
Luas (A)	=	86350	mm2					
I (inersia)	=	28260000	mm^4	$P_{ijin\ tanah}$	=	1675.19	KN	(Beban Tetap)
				$P_{ijin\ tanah}$	=	2512.78	KN	(Beban Sementara)

TABLE: Element Forces - Frames (SLAB ON PILE)

Frame	Station	Output Case	Case Type	Step Type	P	V2	V3	T	M2	M3	Momen Resultant	P/Pall + Mrest/M crack	Kontrol Bahan	Kontrol Tanah	Frame Elem	Elem Station
Text	m	Text	Text	Text	KN	KN	KN	KN-m	KN-m	KN-m					Text	m
31	0	COMB1G	Combination	Max	-240.235	12.575	-3.017	0.439	-14.844	40.044	42.707	0.346	OK	OK	31-1	0
31	3.5	COMB1G	Combination	Max	-253.713	12.575	-3.017	0.439	-4.211	1.661	4.526	0.127	OK	OK	31-1	3.5
31	7	COMB1G	Combination	Max	-267.192	12.575	-3.017	0.439	9.867	48.282	49.280	0.396	OK	OK	31-1	7
31	0	COMB1G	Combination	Min	-252.601	-13.32	-4.035	-0.245	-18.375	-44.961	48.571	0.386	OK	OK	31-1	0
31	3.5	COMB1G	Combination	Min	-266.080	-13.32	-4.035	-0.245	-4.327	-3.968	5.871	0.140	OK	OK	31-1	3.5
31	7	COMB1G	Combination	Min	-279.558	-13.32	-4.035	-0.245	6.276	-47.981	48.390	0.395	OK	OK	31-1	7
32	0	COMB1G	Combination	Max	-562.823	12.638	-1.560	0.390	-7.984	40.647	41.424	0.466	OK	OK	32-1	0
32	3.5	COMB1G	Combination	Max	-576.302	12.638	-1.560	0.390	-2.498	1.475	2.901	0.245	OK	OK	32-1	3.5
32	7	COMB1G	Combination	Max	-589.780	12.638	-1.560	0.390	6.559	47.215	47.668	0.514	OK	OK	32-1	7
32	0	COMB1G	Combination	Min	-575.101	-13.06	-2.588	-0.268	-11.554	-44.264	45.747	0.497	OK	OK	32-1	0
32	3.5	COMB1G	Combination	Min	-588.579	-13.06	-2.588	-0.268	-2.524	-3.587	4.386	0.259	OK	OK	32-1	3.5
32	7	COMB1G	Combination	Min	-602.058	-13.06	-2.588	-0.268	2.936	-47.822	47.912	0.520	OK	OK	32-1	7
33	0	COMB1G	Combination	Max	-684.080	12.390	0.516	0.324	1.794	39.832	39.872	0.505	OK	OK	33-1	0
33	3.5	COMB1G	Combination	Max	-697.559	12.390	0.516	0.324	0.011	1.349	1.349	0.284	OK	OK	33-1	3.5
33	7	COMB1G	Combination	Max	-711.038	12.390	0.516	0.324	1.815	46.222	46.258	0.553	OK	OK	33-1	7
33	0	COMB1G	Combination	Min	-696.158	-12.82	-0.515	-0.324	-1.793	-43.524	43.561	0.532	OK	OK	33-1	0
33	3.5	COMB1G	Combination	Min	-709.637	-12.82	-0.515	-0.324	-0.011	-3.534	3.534	0.302	OK	OK	33-1	3.5
33	7	COMB1G	Combination	Min	-723.116	-12.82	-0.515	-0.324	-1.815	-46.900	46.936	0.562	OK	OK	33-1	7
34	0	COMB1G	Combination	Max	-562.869	12.638	2.588	0.268	11.555	40.643	42.254	0.471	OK	OK	34-1	0
34	3.5	COMB1G	Combination	Max	-576.347	12.638	2.588	0.268	2.524	1.477	2.925	0.245	OK	OK	34-1	3.5
34	7	COMB1G	Combination	Max	-589.826	12.638	2.588	0.268	-2.937	47.210	47.301	0.512	OK	OK	34-1	7
34	0	COMB1G	Combination	Min	-575.070	-13.06	1.560	-0.390	7.986	-44.256	44.970	0.492	OK	OK	34-1	0
34	3.5	COMB1G	Combination	Min	-588.548	-13.06	1.560	-0.390	2.498	-3.588	4.372	0.259	OK	OK	34-1	3.5
34	7	COMB1G	Combination	Min	-602.027	-13.06	1.560	-0.390	-6.560	-47.820	48.268	0.522	OK	OK	34-1	7
35	0	COMB1G	Combination	Max	-240.248	12.574	4.034	0.245	18.372	40.041	44.055	0.354	OK	OK	35-1	0
35	3.5	COMB1G	Combination	Max	-253.727	12.574	4.034	0.245	4.327	1.663	4.635	0.128	OK	OK	35-1	3.5
35	7	COMB1G	Combination	Max	-267.206	12.574	4.034	0.245	-6.279	48.277	48.683	0.392	OK	OK	35-1	7
35	0	COMB1G	Combination	Min	-252.592	-13.31	3.018	-0.439	14.849	-44.952	47.341	0.378	OK	OK	35-1	0
35	3.5	COMB1G	Combination	Min	-266.070	-13.31	3.018	-0.439	4.212	-3.970	5.788	0.139	OK	OK	35-1	3.5
35	7	COMB1G	Combination	Min	-279.549	-13.31	3.018	-0.439	-9.866	-47.980	48.984	0.399	OK	OK	35-1	7
48	0	COMB1G	Combination	Max	-222.266	14.755	-2.589	0.431	-13.287	48.056	49.859	0.381	OK	OK	48-1	0

48	3.425	COMB1G	Combination	Max	-235.456	14.755	-2.589	0.431	-4.257	2.389	4.882	0.122	OK	OK	48-1	3.425
48	6.85	COMB1G	Combination	Max	-248.646	14.755	-2.589	0.431	11.907	48.987	50.413	0.395	OK	OK	48-1	6.85
48	0	COMB1G	Combination	Min	-225.820	-13.60	-4.719	-0.237	-20.421	-44.209	48.697	0.376	OK	OK	48-1	0
48	3.425	COMB1G	Combination	Min	-239.010	-13.60	-4.719	-0.237	-4.418	-2.480	5.066	0.124	OK	OK	48-1	3.425
48	6.85	COMB1G	Combination	Min	-252.200	-13.60	-4.719	-0.237	4.451	-53.016	53.203	0.413	OK	OK	48-1	6.85
49	0	COMB1G	Combination	Max	-544.349	14.705	-0.945	0.380	-5.703	48.132	48.468	0.501	OK	OK	49-1	0
49	3.425	COMB1G	Combination	Max	-557.539	14.705	-0.945	0.380	-2.416	2.090	3.194	0.239	OK	OK	49-1	3.425
49	6.85	COMB1G	Combination	Max	-570.729	14.705	-0.945	0.380	8.435	48.139	48.872	0.513	OK	OK	49-1	6.85
49	0	COMB1G	Combination	Min	-545.417	-13.44	-3.168	-0.264	-13.267	-43.960	45.918	0.486	OK	OK	49-1	0
49	3.425	COMB1G	Combination	Min	-558.607	-13.44	-3.168	-0.264	-2.467	-2.234	3.328	0.241	OK	OK	49-1	3.425
49	6.85	COMB1G	Combination	Min	-571.797	-13.44	-3.168	-0.264	0.769	-52.599	52.605	0.536	OK	OK	49-1	6.85
50	0	COMB1G	Combination	Max	-661.116	14.450	1.115	0.317	3.796	47.310	47.462	0.541	OK	OK	50-1	0
50	3.425	COMB1G	Combination	Max	-674.306	14.450	1.115	0.317	0.020	2.001	2.001	0.279	OK	OK	50-1	3.425
50	6.85	COMB1G	Combination	Max	-687.496	14.450	1.115	0.317	3.839	47.082	47.238	0.550	OK	OK	50-1	6.85
50	0	COMB1G	Combination	Min	-661.482	-13.16	-1.115	-0.317	-3.798	-43.081	43.248	0.516	OK	OK	50-1	0
50	3.425	COMB1G	Combination	Min	-674.672	-13.16	-1.115	-0.317	-0.021	-2.182	2.182	0.280	OK	OK	50-1	3.425
50	6.85	COMB1G	Combination	Min	-687.862	-13.16	-1.115	-0.317	-3.839	-51.673	51.815	0.577	OK	OK	50-1	6.85
51	0	COMB1G	Combination	Max	-544.317	14.686	3.169	0.264	13.272	48.043	49.843	0.509	OK	OK	51-1	0
51	3.425	COMB1G	Combination	Max	-557.507	14.686	3.169	0.264	2.468	2.110	3.247	0.240	OK	OK	51-1	3.425
51	6.85	COMB1G	Combination	Max	-570.697	14.686	3.169	0.264	-0.773	48.099	48.105	0.509	OK	OK	51-1	6.85
51	0	COMB1G	Combination	Min	-545.379	-13.42	0.946	-0.380	5.709	-43.879	44.248	0.476	OK	OK	51-1	0
51	3.425	COMB1G	Combination	Min	-558.569	-13.42	0.946	-0.380	2.417	-2.257	3.306	0.240	OK	OK	51-1	3.425
51	6.85	COMB1G	Combination	Min	-571.759	-13.42	0.946	-0.380	-8.439	-52.556	53.229	0.539	OK	OK	51-1	6.85
52	0	COMB1G	Combination	Max	-222.277	14.735	4.718	0.238	20.417	47.961	52.126	0.395	OK	OK	52-1	0
52	3.425	COMB1G	Combination	Max	-235.467	14.735	4.718	0.238	4.417	2.412	5.032	0.123	OK	OK	52-1	3.425
52	6.85	COMB1G	Combination	Max	-248.657	14.735	4.718	0.238	-4.451	48.944	49.146	0.387	OK	OK	52-1	6.85
52	0	COMB1G	Combination	Min	-225.820	-13.58	2.589	-0.431	13.284	-44.121	46.077	0.360	OK	OK	52-1	0
52	3.425	COMB1G	Combination	Min	-239.010	-13.58	2.589	-0.431	4.255	-2.505	4.938	0.124	OK	OK	52-1	3.425
52	6.85	COMB1G	Combination	Min	-252.200	-13.58	2.589	-0.431	-11.905	-52.970	54.292	0.419	OK	OK	52-1	6.85
59	0	COMB1G	Combination	Max	-222.475	15.500	-2.081	0.415	-11.459	49.135	50.453	0.385	OK	OK	59-1	0
59	3.35	COMB1G	Combination	Max	-235.376	15.500	-2.081	0.415	-4.238	2.486	4.914	0.122	OK	OK	59-1	3.35
59	6.7	COMB1G	Combination	Max	-248.277	15.500	-2.081	0.415	13.946	50.917	52.793	0.409	OK	OK	59-1	6.7
59	0	COMB1G	Combination	Min	-228.168	-14.457	-5.428	-0.220	-22.428	-45.945	51.127	0.391	OK	OK	59-1	0
59	3.35	COMB1G	Combination	Min	-241.069	-14.457	-5.428	-0.220	-4.494	-2.790	5.289	0.127	OK	OK	59-1	3.35
59	6.7	COMB1G	Combination	Min	-253.970	-14.457	-5.428	-0.220	2.477	-54.713	54.769	0.423	OK	OK	59-1	6.7
60	0	COMB1G	Combination	Max	-545.281	15.481	-0.353	0.363	-3.670	49.344	49.480	0.507	OK	OK	60-1	0
60	3.35	COMB1G	Combination	Max	-558.182	15.481	-0.353	0.363	-2.406	2.183	3.248	0.240	OK	OK	60-1	3.35
60	6.7	COMB1G	Combination	Max	-571.083	15.481	-0.353	0.363	10.502	50.107	51.195	0.527	OK	OK	60-1	6.7
60	0	COMB1G	Combination	Min	-547.840	-14.306	-3.853	-0.249	-15.313	-45.742	48.237	0.501	OK	OK	60-1	0
60	3.35	COMB1G	Combination	Min	-560.741	-14.306	-3.853	-0.249	-2.486	-2.519	3.539	0.243	OK	OK	60-1	3.35
60	6.7	COMB1G	Combination	Min	-573.642	-14.306	-3.853	-0.249	-1.303	-54.382	54.397	0.547	OK	OK	60-1	6.7
61	0	COMB1G	Combination	Max	-662.050	15.239	1.755	0.301	5.846	48.592	48.942	0.550	OK	OK	61-1	0
61	3.35	COMB1G	Combination	Max	-674.951	15.239	1.755	0.301	0.033	2.099	2.099	0.279	OK	OK	61-1	3.35
61	6.7	COMB1G	Combination	Max	-687.852	15.239	1.755	0.301	5.910	49.073	49.427	0.563	OK	OK	61-1	6.7
61	0	COMB1G	Combination	Min	-663.492	-14.022	-1.754	-0.301	-5.844	-44.876	45.255	0.529	OK	OK	61-1	0
61	3.35	COMB1G	Combination	Min	-676.393	-14.022	-1.754	-0.301	-0.033	-2.458	2.458	0.282	OK	OK	61-1	3.35
61	6.7	COMB1G	Combination	Min	-689.294	-14.022	-1.754	-0.301	-5.912	-53.508	53.833	0.589	OK	OK	61-1	6.7
62	0	COMB1G	Combination	Max	-545.302	15.478	3.854	0.249	15.316	49.330	51.653	0.520	OK	OK	62-1	0
62	3.35	COMB1G	Combination	Max	-558.203	15.478	3.854	0.249	2.486	2.186	3.311	0.240	OK	OK	62-1	3.35
62	6.7	COMB1G	Combination	Max	-571.105	15.478	3.854	0.249	1.300	50.100	50.117	0.521	OK	OK	62-1	6.7

62	0	COMB1G	Combination	Min	-547.855	-14.303	0.354	-0.363	3.673	-45.729	45.876	0.487	OK	OK	62-1	0
62	3.35	COMB1G	Combination	Min	-560.756	-14.303	0.354	-0.363	2.406	-2.523	3.486	0.242	OK	OK	62-1	3.35
62	6.7	COMB1G	Combination	Min	-573.657	-14.303	0.354	-0.363	-10.504	-54.375	55.380	0.553	OK	OK	62-1	6.7
63	0	COMB1G	Combination	Max	-222.481	15.497	5.429	0.220	22.432	49.121	54.001	0.406	OK	OK	63-1	0
63	3.35	COMB1G	Combination	Max	-235.382	15.497	5.429	0.220	4.494	2.490	5.138	0.123	OK	OK	63-1	3.35
63	6.7	COMB1G	Combination	Max	-248.283	15.497	5.429	0.220	-2.480	50.910	50.970	0.398	OK	OK	63-1	6.7
63	0	COMB1G	Combination	Min	-228.173	-14.454	2.082	-0.414	11.463	-45.932	47.340	0.369	OK	OK	63-1	0
63	3.35	COMB1G	Combination	Min	-241.074	-14.454	2.082	-0.414	4.239	-2.793	5.076	0.125	OK	OK	63-1	3.35
63	6.7	COMB1G	Combination	Min	-253.975	-14.454	2.082	-0.414	-13.949	-54.707	56.458	0.433	OK	OK	63-1	6.7
70	0	COMB1G	Combination	Max	-221.440	16.449	-1.545	0.390	-9.625	50.945	51.846	0.393	OK	OK	70-1	0
70	3.275	COMB1G	Combination	Max	-234.052	16.449	-1.545	0.390	-4.218	2.631	4.972	0.122	OK	OK	70-1	3.275
70	6.55	COMB1G	Combination	Max	-246.664	16.449	-1.545	0.390	15.981	52.809	55.174	0.422	OK	OK	70-1	6.55
70	0	COMB1G	Combination	Min	-228.530	-15.321	-6.168	-0.194	-24.418	-47.547	53.450	0.405	OK	OK	70-1	0
70	3.275	COMB1G	Combination	Min	-241.143	-15.321	-6.168	-0.194	-4.566	-2.927	5.423	0.127	OK	OK	70-1	3.275
70	6.55	COMB1G	Combination	Min	-253.755	-15.321	-6.168	-0.194	0.494	-56.798	56.800	0.435	OK	OK	70-1	6.55
71	0	COMB1G	Combination	Max	-545.190	16.461	0.263	0.339	-1.645	51.263	51.290	0.517	OK	OK	71-1	0
71	3.275	COMB1G	Combination	Max	-557.803	16.461	0.263	0.339	-2.398	2.317	3.335	0.240	OK	OK	71-1	3.275
71	6.55	COMB1G	Combination	Max	-570.415	16.461	0.263	0.339	12.570	52.080	53.575	0.541	OK	OK	71-1	6.55
71	0	COMB1G	Combination	Min	-547.944	-15.195	-4.570	-0.224	-17.365	-47.446	50.524	0.514	OK	OK	71-1	0
71	3.275	COMB1G	Combination	Min	-560.556	-15.195	-4.570	-0.224	-2.508	-2.648	3.647	0.243	OK	OK	71-1	3.275
71	6.55	COMB1G	Combination	Min	-573.168	-15.195	-4.570	-0.224	-3.371	-56.558	56.658	0.560	OK	OK	71-1	6.55
72	0	COMB1G	Combination	Max	-662.139	16.227	2.423	0.277	7.890	50.552	51.164	0.563	OK	OK	72-1	0
72	3.275	COMB1G	Combination	Max	-674.751	16.227	2.423	0.277	0.045	2.239	2.239	0.280	OK	OK	72-1	3.275
72	6.55	COMB1G	Combination	Max	-687.363	16.227	2.423	0.277	7.981	51.099	51.718	0.576	OK	OK	72-1	6.55
72	0	COMB1G	Combination	Min	-663.335	-14.919	-2.423	-0.277	-7.890	-46.622	47.285	0.541	OK	OK	72-1	0
72	3.275	COMB1G	Combination	Min	-675.948	-14.919	-2.423	-0.277	-0.046	-2.594	2.594	0.283	OK	OK	72-1	3.275
72	6.55	COMB1G	Combination	Min	-688.560	-14.919	-2.423	-0.277	-7.982	-55.738	56.307	0.604	OK	OK	72-1	6.55
73	0	COMB1G	Combination	Max	-545.160	16.439	4.572	0.224	17.371	51.166	54.034	0.534	OK	OK	73-1	0
73	3.275	COMB1G	Combination	Max	-557.772	16.439	4.572	0.224	2.509	2.341	3.431	0.241	OK	OK	73-1	3.275
73	6.55	COMB1G	Combination	Max	-570.384	16.439	4.572	0.224	3.364	52.035	52.144	0.532	OK	OK	73-1	6.55
73	0	COMB1G	Combination	Min	-547.902	-15.174	-0.261	-0.339	1.654	-47.355	47.384	0.496	OK	OK	73-1	0
73	3.275	COMB1G	Combination	Min	-560.514	-15.174	-0.261	-0.339	2.399	-2.673	3.591	0.243	OK	OK	73-1	3.275
73	6.55	COMB1G	Combination	Min	-573.126	-15.174	-0.261	-0.339	-12.574	-56.511	57.893	0.567	OK	OK	73-1	6.55
74	0	COMB1G	Combination	Max	-221.452	16.426	6.167	0.194	24.414	50.841	56.399	0.419	OK	OK	74-1	0
74	3.275	COMB1G	Combination	Max	-234.064	16.426	6.167	0.194	4.565	2.657	5.282	0.124	OK	OK	74-1	3.275
74	6.55	COMB1G	Combination	Max	-246.676	16.426	6.167	0.194	-0.496	52.760	52.763	0.408	OK	OK	74-1	6.55
74	0	COMB1G	Combination	Min	-228.531	-15.299	1.545	-0.390	9.625	-47.448	48.414	0.375	OK	OK	74-1	0
74	3.275	COMB1G	Combination	Min	-241.143	-15.299	1.545	-0.390	4.217	-2.954	5.148	0.126	OK	OK	74-1	3.275
74	6.55	COMB1G	Combination	Min	-253.755	-15.299	1.545	-0.390	-15.981	-56.748	58.955	0.447	OK	OK	74-1	6.55
81	0	COMB1G	Combination	Max	-220.464	17.441	-1.001	0.357	-7.844	52.714	53.295	0.401	OK	OK	81-1	0
81	3.2	COMB1G	Combination	Max	-232.787	17.441	-1.001	0.357	-4.199	2.782	5.037	0.122	OK	OK	81-1	3.2
81	6.4	COMB1G	Combination	Max	-245.111	17.441	-1.001	0.357	17.962	54.758	57.628	0.436	OK	OK	81-1	6.4
81	0	COMB1G	Combination	Min	-229.134	-16.242	-6.925	-0.160	-26.360	-49.194	55.812	0.419	OK	OK	81-1	0
81	3.2	COMB1G	Combination	Min	-241.458	-16.242	-6.925	-0.160	-4.639	-3.097	5.578	0.128	OK	OK	81-1	3.2
81	6.4	COMB1G	Combination	Min	-253.781	-16.242	-6.925	-0.160	-1.435	-58.906	58.924	0.447	OK	OK	81-1	6.4
82	0	COMB1G	Combination	Max	-545.144	17.497	0.892	0.308	0.326	53.186	53.187	0.529	OK	OK	82-1	0
82	3.2	COMB1G	Combination	Max	-557.467	17.497	0.892	0.308	-2.390	2.455	3.426	0.241	OK	OK	82-1	3.2
82	6.4	COMB1G	Combination	Max	-569.791	17.497	0.892	0.308	14.582	54.144	56.073	0.555	OK	OK	82-1	6.4
82	0	COMB1G	Combination	Min	-548.328	-16.153	-5.304	-0.192	-19.363	-49.235	52.905	0.528	OK	OK	82-1	0
82	3.2	COMB1G	Combination	Min	-560.651	-16.153	-5.304	-0.192	-2.530	-2.805	3.777	0.244	OK	OK	82-1	3.2

82	6.4	COMB1G	Combination	Min	-572.975	-16.153	-5.304	-0.192	-5.385	-58.795	59.041	0.574	OK	OK	82-1	6.4
83	0	COMB1G	Combination	Max	-662.222	17.288	3.106	0.247	9.881	52.573	53.493	0.577	OK	OK	83-1	0
83	3.2	COMB1G	Combination	Max	-674.545	17.288	3.106	0.247	0.059	2.376	2.376	0.281	OK	OK	83-1	3.2
83	6.4	COMB1G	Combination	Max	-686.869	17.288	3.106	0.247	9.995	53.257	54.187	0.591	OK	OK	83-1	6.4
83	0	COMB1G	Combination	Min	-663.410	-15.900	-3.105	-0.246	-9.878	-48.506	49.502	0.554	OK	OK	83-1	0
83	3.2	COMB1G	Combination	Min	-675.734	-15.900	-3.105	-0.246	-0.059	-2.750	2.751	0.284	OK	OK	83-1	3.2
83	6.4	COMB1G	Combination	Min	-688.057	-15.900	-3.105	-0.246	-9.999	-58.073	58.928	0.619	OK	OK	83-1	6.4
84	0	COMB1G	Combination	Max	-545.110	17.495	5.305	0.192	19.367	53.176	56.593	0.549	OK	OK	84-1	0
84	3.2	COMB1G	Combination	Max	-557.433	17.495	5.305	0.192	2.530	2.456	3.526	0.241	OK	OK	84-1	3.2
84	6.4	COMB1G	Combination	Max	-569.757	17.495	5.305	0.192	5.381	54.142	54.408	0.546	OK	OK	84-1	6.4
84	0	COMB1G	Combination	Min	-548.382	-16.152	-0.891	-0.308	-0.322	-49.230	49.231	0.507	OK	OK	84-1	0
84	3.2	COMB1G	Combination	Min	-560.706	-16.152	-0.891	-0.308	2.390	-2.808	3.687	0.244	OK	OK	84-1	3.2
84	6.4	COMB1G	Combination	Min	-573.029	-16.152	-0.891	-0.308	-14.586	-58.790	60.573	0.583	OK	OK	84-1	6.4
85	0	COMB1G	Combination	Max	-220.450	17.439	6.926	0.160	26.360	52.705	58.929	0.434	OK	OK	85-1	0
85	3.2	COMB1G	Combination	Max	-232.774	17.439	6.926	0.160	4.641	2.783	5.411	0.124	OK	OK	85-1	3.2
85	6.4	COMB1G	Combination	Max	-245.097	17.439	6.926	0.160	1.429	54.755	54.774	0.419	OK	OK	85-1	6.4
85	0	COMB1G	Combination	Min	-229.155	-16.241	1.004	-0.357	7.852	-49.190	49.813	0.384	OK	OK	85-1	0
85	3.2	COMB1G	Combination	Min	-241.478	-16.241	1.004	-0.357	4.198	-3.099	5.218	0.126	OK	OK	85-1	3.2
85	6.4	COMB1G	Combination	Min	-253.802	-16.241	1.004	-0.357	-17.964	-58.902	61.580	0.463	OK	OK	85-1	6.4
92	0	COMB1G	Combination	Max	-219.542	18.503	-0.464	0.319	-6.166	54.545	54.892	0.410	OK	OK	92-1	0
92	3.125	COMB1G	Combination	Max	-231.577	18.503	-0.464	0.319	-4.182	2.952	5.119	0.122	OK	OK	92-1	3.125
92	6.25	COMB1G	Combination	Max	-243.611	18.503	-0.464	0.319	19.844	56.764	60.132	0.450	OK	OK	92-1	6.25
92	0	COMB1G	Combination	Min	-229.657	-17.220	-7.688	-0.121	-28.207	-50.862	58.160	0.433	OK	OK	92-1	0
92	3.125	COMB1G	Combination	Min	-241.691	-17.220	-7.688	-0.121	-4.714	-3.279	5.743	0.129	OK	OK	92-1	3.125
92	6.25	COMB1G	Combination	Min	-253.726	-17.220	-7.688	-0.121	-3.263	-61.101	61.188	0.460	OK	OK	92-1	6.25
93	0	COMB1G	Combination	Max	-545.123	18.615	1.519	0.271	2.194	55.198	55.241	0.541	OK	OK	93-1	0
93	3.125	COMB1G	Combination	Max	-557.158	18.615	1.519	0.271	-2.383	2.613	3.536	0.241	OK	OK	93-1	3.125
93	6.25	COMB1G	Combination	Max	-569.192	18.615	1.519	0.271	16.493	56.289	58.655	0.570	OK	OK	93-1	6.25
93	0	COMB1G	Combination	Min	-548.702	-17.176	-6.040	-0.155	-21.258	-51.065	55.313	0.543	OK	OK	93-1	0
93	3.125	COMB1G	Combination	Min	-560.736	-17.176	-6.040	-0.155	-2.552	-2.975	3.919	0.245	OK	OK	93-1	3.125
93	6.25	COMB1G	Combination	Min	-572.771	-17.176	-6.040	-0.155	-7.299	-61.145	61.579	0.589	OK	OK	93-1	6.25
94	0	COMB1G	Combination	Max	-662.348	18.438	3.789	0.210	11.769	54.696	55.948	0.591	OK	OK	94-1	0
94	3.125	COMB1G	Combination	Max	-674.383	18.438	3.789	0.210	0.073	2.537	2.538	0.282	OK	OK	94-1	3.125
94	6.25	COMB1G	Combination	Max	-686.417	18.438	3.789	0.210	11.909	55.512	56.774	0.606	OK	OK	94-1	6.25
94	0	COMB1G	Combination	Min	-663.503	-16.952	-3.788	-0.210	-11.765	-50.438	51.792	0.567	OK	OK	94-1	0
94	3.125	COMB1G	Combination	Min	-675.537	-16.952	-3.788	-0.210	-0.073	-2.922	2.923	0.285	OK	OK	94-1	3.125
94	6.25	COMB1G	Combination	Min	-687.572	-16.952	-3.788	-0.210	-11.913	-60.541	61.702	0.635	OK	OK	94-1	6.25
95	0	COMB1G	Combination	Max	-545.179	18.614	6.041	0.155	21.262	55.192	59.146	0.564	OK	OK	95-1	0
95	3.125	COMB1G	Combination	Max	-557.214	18.614	6.041	0.155	2.552	2.616	3.655	0.242	OK	OK	95-1	3.125
95	6.25	COMB1G	Combination	Max	-569.248	18.614	6.041	0.155	7.294	56.283	56.754	0.559	OK	OK	95-1	6.25
95	0	COMB1G	Combination	Min	-548.659	-17.174	-1.517	-0.271	-2.189	-51.054	51.101	0.518	OK	OK	95-1	0
95	3.125	COMB1G	Combination	Min	-560.693	-17.174	-1.517	-0.271	2.383	-2.976	3.812	0.244	OK	OK	95-1	3.125
95	6.25	COMB1G	Combination	Min	-572.728	-17.174	-1.517	-0.271	-16.497	-61.143	63.329	0.599	OK	OK	95-1	6.25
96	0	COMB1G	Combination	Max	-219.562	18.502	7.691	0.121	28.216	54.540	61.407	0.448	OK	OK	96-1	0
96	3.125	COMB1G	Combination	Max	-231.596	18.502	7.691	0.121	4.713	2.955	5.563	0.124	OK	OK	96-1	3.125
96	6.25	COMB1G	Combination	Max	-243.631	18.502	7.691	0.121	3.260	56.758	56.852	0.431	OK	OK	96-1	6.25
96	0	COMB1G	Combination	Min	-229.642	-17.218	0.465	-0.319	6.166	-50.852	51.224	0.392	OK	OK	96-1	0
96	3.125	COMB1G	Combination	Min	-241.676	-17.218	0.465	-0.319	4.183	-3.281	5.316	0.127	OK	OK	96-1	3.125
96	6.25	COMB1G	Combination	Min	-253.711	-17.218	0.465	-0.319	-19.850	-61.099	64.243	0.478	OK	OK	96-1	6.25
103	0	COMB1G	Combination	Max	-218.691	19.561	0.043	0.278	-4.653	56.298	56.490	0.419	OK	OK	103-1	0

103	3.055	COMB1G	Combination	Max	-230.456	19.561	0.043	0.278	-4.165	3.118	5.203	0.122	OK	OK	103-1	3.055
103	6.11	COMB1G	Combination	Max	-242.221	19.561	0.043	0.278	21.541	58.696	62.524	0.464	OK	OK	103-1	6.11
103	0	COMB1G	Combination	Min	-230.143	-18.193	-8.415	-0.078	-29.872	-52.466	60.374	0.446	OK	OK	103-1	0
103	3.055	COMB1G	Combination	Min	-241.908	-18.193	-8.415	-0.078	-4.784	-3.462	5.906	0.130	OK	OK	103-1	3.055
103	6.11	COMB1G	Combination	Min	-253.673	-18.193	-8.415	-0.078	-4.915	-63.218	63.409	0.473	OK	OK	103-1	6.11
104	0	COMB1G	Combination	Max	-545.056	19.735	2.113	0.231	3.883	57.144	57.276	0.553	OK	OK	104-1	0
104	3.055	COMB1G	Combination	Max	-556.821	19.735	2.113	0.231	-2.376	2.767	3.647	0.242	OK	OK	104-1	3.055
104	6.11	COMB1G	Combination	Max	-568.586	19.735	2.113	0.231	18.219	58.379	61.156	0.585	OK	OK	104-1	6.11
104	0	COMB1G	Combination	Min	-548.987	-18.204	-6.741	-0.114	-22.970	-52.848	57.624	0.556	OK	OK	104-1	0
104	3.055	COMB1G	Combination	Min	-560.752	-18.204	-6.741	-0.114	-2.573	-3.147	4.065	0.246	OK	OK	104-1	3.055
104	6.11	COMB1G	Combination	Min	-572.517	-18.204	-6.741	-0.114	-9.029	-63.435	64.074	0.603	OK	OK	104-1	6.11
105	0	COMB1G	Combination	Max	-662.418	19.593	4.437	0.171	13.469	56.753	58.329	0.605	OK	OK	105-1	0
105	3.055	COMB1G	Combination	Max	-674.183	19.593	4.437	0.171	0.084	2.698	2.699	0.283	OK	OK	105-1	3.055
105	6.11	COMB1G	Combination	Max	-685.948	19.593	4.437	0.171	13.638	57.726	59.315	0.620	OK	OK	105-1	6.11
105	0	COMB1G	Combination	Min	-663.540	-18.013	-4.436	-0.170	-13.469	-52.332	54.037	0.580	OK	OK	105-1	0
105	3.055	COMB1G	Combination	Min	-675.305	-18.013	-4.436	-0.170	-0.086	-3.103	3.104	0.285	OK	OK	105-1	3.055
105	6.11	COMB1G	Combination	Min	-687.070	-18.013	-4.436	-0.170	-13.641	-62.958	64.418	0.651	OK	OK	105-1	6.11
106	0	COMB1G	Combination	Max	-545.026	19.707	6.743	0.114	22.977	57.029	61.484	0.577	OK	OK	106-1	0
106	3.055	COMB1G	Combination	Max	-556.791	19.707	6.743	0.114	2.575	2.795	3.800	0.243	OK	OK	106-1	3.055
106	6.11	COMB1G	Combination	Max	-568.556	19.707	6.743	0.114	9.020	58.327	59.020	0.572	OK	OK	106-1	6.11
106	0	COMB1G	Combination	Min	-548.941	-18.178	-2.110	-0.231	-3.870	-52.741	52.883	0.528	OK	OK	106-1	0
106	3.055	COMB1G	Combination	Min	-560.706	-18.178	-2.110	-0.231	2.376	-3.177	3.967	0.245	OK	OK	106-1	3.055
106	6.11	COMB1G	Combination	Min	-572.471	-18.178	-2.110	-0.231	-18.225	-63.379	65.948	0.614	OK	OK	106-1	6.11
107	0	COMB1G	Combination	Max	-218.705	19.531	8.414	0.078	29.868	56.175	63.622	0.461	OK	OK	107-1	0
107	3.055	COMB1G	Combination	Max	-230.470	19.531	8.414	0.078	4.784	3.147	5.726	0.125	OK	OK	107-1	3.055
107	6.11	COMB1G	Combination	Max	-242.235	19.531	8.414	0.078	4.910	58.640	58.845	0.442	OK	OK	107-1	6.11
107	0	COMB1G	Combination	Min	-230.148	-18.165	-0.041	-0.277	4.658	-52.351	52.557	0.400	OK	OK	107-1	0
107	3.055	COMB1G	Combination	Min	-241.913	-18.165	-0.041	-0.277	4.163	-3.495	5.435	0.128	OK	OK	107-1	3.055
107	6.11	COMB1G	Combination	Min	-253.678	-18.165	-0.041	-0.277	-21.542	-63.159	66.732	0.493	OK	OK	107-1	6.11
114	0	COMB1G	Combination	Max	-217.858	20.794	0.528	0.235	-3.285	58.285	58.378	0.430	OK	OK	114-1	0
114	2.98	COMB1G	Combination	Max	-229.335	20.794	0.528	0.235	-4.154	3.317	5.316	0.122	OK	OK	114-1	2.98
114	5.96	COMB1G	Combination	Max	-240.811	20.794	0.528	0.235	23.109	60.916	65.151	0.479	OK	OK	114-1	5.96
114	0	COMB1G	Combination	Min	-230.580	-19.330	-9.149	-0.034	-31.417	-54.294	62.728	0.460	OK	OK	114-1	0
114	2.98	COMB1G	Combination	Min	-242.056	-19.330	-9.149	-0.034	-4.857	-3.687	6.098	0.132	OK	OK	114-1	2.98
114	5.96	COMB1G	Combination	Min	-253.532	-19.330	-9.149	-0.034	-6.429	-65.647	65.961	0.488	OK	OK	114-1	5.96
115	0	COMB1G	Combination	Max	-545.054	21.041	2.694	0.190	5.433	59.352	59.600	0.566	OK	OK	115-1	0
115	2.98	COMB1G	Combination	Max	-556.530	21.041	2.694	0.190	-2.370	2.949	3.783	0.242	OK	OK	115-1	2.98
115	5.96	COMB1G	Combination	Max	-568.006	21.041	2.694	0.190	19.808	60.775	63.922	0.601	OK	OK	115-1	5.96
115	0	COMB1G	Combination	Min	-549.353	-19.406	-7.442	-0.073	-24.548	-54.887	60.126	0.571	OK	OK	115-1	0
115	2.98	COMB1G	Combination	Min	-560.830	-19.406	-7.442	-0.073	-2.595	-3.355	4.241	0.247	OK	OK	115-1	2.98
115	5.96	COMB1G	Combination	Min	-572.306	-19.406	-7.442	-0.073	-10.623	-66.053	66.902	0.620	OK	OK	115-1	5.96
116	0	COMB1G	Combination	Max	-662.509	20.948	5.079	0.130	15.036	59.117	61.000	0.621	OK	OK	116-1	0
116	2.98	COMB1G	Combination	Max	-673.985	20.948	5.079	0.130	0.098	2.874	2.875	0.284	OK	OK	116-1	2.98
116	5.96	COMB1G	Combination	Max	-685.461	20.948	5.079	0.130	15.227	60.274	62.167	0.637	OK	OK	116-1	5.96
116	0	COMB1G	Combination	Min	-663.618	-19.262	-5.077	-0.130	-15.031	-54.527	56.561	0.595	OK	OK	116-1	0
116	2.98	COMB1G	Combination	Min	-675.094	-19.262	-5.077	-0.130	-0.098	-3.307	3.308	0.287	OK	OK	116-1	2.98
116	5.96	COMB1G	Combination	Min	-686.571	-19.262	-5.077	-0.130	-15.232	-65.731	67.472	0.669	OK	OK	116-1	5.96
117	0	COMB1G	Combination	Max	-545.016	21.038	7.444	0.073	24.553	59.341	64.220	0.593	OK	OK	117-1	0
117	2.98	COMB1G	Combination	Max	-556.492	21.038	7.444	0.073	2.595	2.951	3.929	0.243	OK	OK	117-1	2.98
117	5.96	COMB1G	Combination	Max	-567.968	21.038	7.444	0.073	10.616	60.772	61.692	0.588	OK	OK	117-1	5.96

117	0	COMB1G	Combination	Min	-549.413	-19.405	-2.692	-0.190	-5.426	-54.881	55.148	0.542	OK	OK	117-1	0
117	2.98	COMB1G	Combination	Min	-560.889	-19.405	-2.692	-0.190	2.370	-3.358	4.111	0.246	OK	OK	117-1	2.98
117	5.96	COMB1G	Combination	Min	-572.366	-19.405	-2.692	-0.190	-19.813	-66.048	68.955	0.632	OK	OK	117-1	5.96
118	0	COMB1G	Combination	Max	-217.849	20.791	9.149	0.034	31.418	58.274	66.204	0.476	OK	OK	118-1	0
118	2.98	COMB1G	Combination	Max	-229.325	20.791	9.149	0.034	4.859	3.319	5.884	0.125	OK	OK	118-1	2.98
118	5.96	COMB1G	Combination	Max	-240.801	20.791	9.149	0.034	6.420	60.912	61.250	0.456	OK	OK	118-1	5.96
118	0	COMB1G	Combination	Min	-230.600	-19.329	-0.524	-0.235	3.297	-54.287	54.387	0.411	OK	OK	118-1	0
118	2.98	COMB1G	Combination	Min	-242.076	-19.329	-0.524	-0.235	4.153	-3.690	5.556	0.128	OK	OK	118-1	2.98
118	5.96	COMB1G	Combination	Min	-253.552	-19.329	-0.524	-0.235	-23.111	-65.642	69.592	0.510	OK	OK	118-1	5.96
125	0	COMB1G	Combination	Max	-217.136	22.146	0.974	0.195	-2.097	60.411	60.448	0.442	OK	OK	125-1	0
125	2.905	COMB1G	Combination	Max	-228.323	22.146	0.974	0.195	-4.149	3.549	5.460	0.122	OK	OK	125-1	2.905
125	5.81	COMB1G	Combination	Max	-239.510	22.146	0.974	0.195	24.488	63.286	67.859	0.494	OK	OK	125-1	5.81
125	0	COMB1G	Combination	Min	-230.903	-20.569	-9.858	0.007	-32.786	-56.219	65.080	0.474	OK	OK	125-1	0
125	2.905	COMB1G	Combination	Min	-242.090	-20.569	-9.858	0.007	-4.927	-3.940	6.309	0.133	OK	OK	125-1	2.905
125	5.81	COMB1G	Combination	Min	-253.277	-20.569	-9.858	0.007	-7.758	-68.260	68.700	0.504	OK	OK	125-1	5.81
126	0	COMB1G	Combination	Max	-545.093	22.473	3.238	0.151	6.790	61.707	62.080	0.581	OK	OK	126-1	0
126	2.905	COMB1G	Combination	Max	-556.280	22.473	3.238	0.151	-2.366	3.160	3.947	0.243	OK	OK	126-1	2.905
126	5.81	COMB1G	Combination	Max	-567.468	22.473	3.238	0.151	21.201	63.322	66.777	0.617	OK	OK	126-1	5.81
126	0	COMB1G	Combination	Min	-549.643	-20.714	-8.112	-0.033	-25.932	-57.024	62.644	0.586	OK	OK	126-1	0
126	2.905	COMB1G	Combination	Min	-560.830	-20.714	-8.112	-0.033	-2.616	-3.587	4.439	0.248	OK	OK	126-1	2.905
126	5.81	COMB1G	Combination	Min	-572.018	-20.714	-8.112	-0.033	-12.022	-68.860	69.901	0.638	OK	OK	126-1	5.81
127	0	COMB1G	Combination	Max	-662.569	22.430	5.686	0.091	16.409	61.628	63.775	0.637	OK	OK	127-1	0
127	2.905	COMB1G	Combination	Max	-673.756	22.430	5.686	0.091	0.110	3.077	3.078	0.285	OK	OK	127-1	2.905
127	5.81	COMB1G	Combination	Max	-684.943	22.430	5.686	0.091	16.622	62.969	65.126	0.654	OK	OK	127-1	5.81
127	0	COMB1G	Combination	Min	-663.705	-20.617	-5.684	-0.091	-16.402	-56.816	59.136	0.611	OK	OK	127-1	0
127	2.905	COMB1G	Combination	Min	-674.892	-20.617	-5.684	-0.091	-0.110	-3.531	3.533	0.288	OK	OK	127-1	2.905
127	5.81	COMB1G	Combination	Min	-686.079	-20.617	-5.684	-0.091	-16.629	-68.690	70.674	0.687	OK	OK	127-1	5.81
128	0	COMB1G	Combination	Max	-545.092	22.473	8.114	0.033	25.937	61.709	66.938	0.609	OK	OK	128-1	0
128	2.905	COMB1G	Combination	Max	-556.279	22.473	8.114	0.033	2.616	3.159	4.102	0.244	OK	OK	128-1	2.905
128	5.81	COMB1G	Combination	Max	-567.466	22.473	8.114	0.033	12.014	63.322	64.452	0.604	OK	OK	128-1	5.81
128	0	COMB1G	Combination	Min	-549.641	-20.714	-3.235	-0.151	-6.782	-57.025	57.427	0.555	OK	OK	128-1	0
128	2.905	COMB1G	Combination	Min	-560.828	-20.714	-3.235	-0.151	2.366	-3.587	4.296	0.247	OK	OK	128-1	2.905
128	5.81	COMB1G	Combination	Min	-572.016	-20.714	-3.235	-0.151	-21.206	-68.861	72.052	0.650	OK	OK	128-1	5.81
129	0	COMB1G	Combination	Max	-217.135	22.147	9.860	-0.007	32.790	60.414	68.739	0.490	OK	OK	129-1	0
129	2.905	COMB1G	Combination	Max	-228.323	22.147	9.860	-0.007	4.927	3.549	6.072	0.126	OK	OK	129-1	2.905
129	5.81	COMB1G	Combination	Max	-239.510	22.147	9.860	-0.007	7.749	63.287	63.759	0.470	OK	OK	129-1	5.81
129	0	COMB1G	Combination	Min	-230.904	-20.569	-0.972	-0.195	2.105	-56.220	56.260	0.422	OK	OK	129-1	0
129	2.905	COMB1G	Combination	Min	-242.092	-20.569	-0.972	-0.195	4.149	-3.940	5.721	0.129	OK	OK	129-1	2.905
129	5.81	COMB1G	Combination	Min	-253.279	-20.569	-0.972	-0.195	-24.493	-68.262	72.523	0.527	OK	OK	129-1	5.81
136	0	COMB1G	Combination	Max	-216.467	23.609	1.374	0.164	-1.111	62.577	62.587	0.454	OK	OK	136-1	0
136	2.83	COMB1G	Combination	Max	-227.366	23.609	1.374	0.164	-4.142	3.841	5.649	0.123	OK	OK	136-1	2.83
136	5.66	COMB1G	Combination	Max	-238.264	23.609	1.374	0.164	25.662	65.821	70.646	0.510	OK	OK	136-1	5.66
136	0	COMB1G	Combination	Min	-231.182	-21.910	-10.531	0.040	-33.946	-58.190	67.367	0.488	OK	OK	136-1	0
136	2.83	COMB1G	Combination	Min	-242.081	-21.910	-10.531	0.040	-4.998	-4.262	6.568	0.134	OK	OK	136-1	2.83
136	5.66	COMB1G	Combination	Min	-252.979	-21.910	-10.531	0.040	-8.885	-71.050	71.603	0.521	OK	OK	136-1	5.66
137	0	COMB1G	Combination	Max	-545.036	24.014	3.739	0.119	7.942	64.093	64.583	0.596	OK	OK	137-1	0
137	2.83	COMB1G	Combination	Max	-555.934	24.014	3.739	0.119	-2.363	3.424	4.160	0.244	OK	OK	137-1	2.83
137	5.66	COMB1G	Combination	Max	-566.833	24.014	3.739	0.119	22.394	66.014	69.709	0.634	OK	OK	137-1	5.66
137	0	COMB1G	Combination	Min	-549.924	-22.122	-8.748	-0.001	-27.120	-59.198	65.114	0.601	OK	OK	137-1	0
137	2.83	COMB1G	Combination	Min	-560.822	-22.122	-8.748	-0.001	-2.639	-3.881	4.693	0.250	OK	OK	137-1	2.83

137	5.66	COMB1G	Combination	Min	-571.721	-22.122	-8.748	-0.001	-13.219	-71.825	73.031	0.656	OK	OK	137-1	5.66
138	0	COMB1G	Combination	Max	-662.713	24.039	6.255	0.060	17.581	64.235	66.597	0.654	OK	OK	138-1	0
138	2.83	COMB1G	Combination	Max	-673.611	24.039	6.255	0.060	0.122	3.314	3.316	0.286	OK	OK	138-1	2.83
138	5.66	COMB1G	Combination	Max	-684.510	24.039	6.255	0.060	17.817	65.824	68.193	0.672	OK	OK	138-1	5.66
138	0	COMB1G	Combination	Min	-663.803	-22.088	-6.253	-0.060	-17.574	-59.196	61.750	0.626	OK	OK	138-1	0
138	2.83	COMB1G	Combination	Min	-674.702	-22.088	-6.253	-0.060	-0.122	-3.797	3.799	0.289	OK	OK	138-1	2.83
138	5.66	COMB1G	Combination	Min	-685.600	-22.088	-6.253	-0.060	-17.825	-71.829	74.007	0.707	OK	OK	138-1	5.66
139	0	COMB1G	Combination	Max	-545.102	24.011	8.750	0.001	27.126	64.084	69.589	0.625	OK	OK	139-1	0
139	2.83	COMB1G	Combination	Max	-556.001	24.011	8.750	0.001	2.639	3.428	4.326	0.245	OK	OK	139-1	2.83
139	5.66	COMB1G	Combination	Max	-566.899	24.011	8.750	0.001	13.208	66.007	67.316	0.620	OK	OK	139-1	5.66
139	0	COMB1G	Combination	Min	-549.871	-22.118	-3.735	-0.119	-7.931	-59.183	59.712	0.569	OK	OK	139-1	0
139	2.83	COMB1G	Combination	Min	-560.769	-22.118	-3.735	-0.119	2.363	-3.884	4.546	0.249	OK	OK	139-1	2.83
139	5.66	COMB1G	Combination	Min	-571.668	-22.118	-3.735	-0.119	-22.400	-71.821	75.233	0.669	OK	OK	139-1	5.66
140	0	COMB1G	Combination	Max	-216.489	23.607	10.535	-0.040	33.957	62.569	71.190	0.504	OK	OK	140-1	0
140	2.83	COMB1G	Combination	Max	-227.387	23.607	10.535	-0.040	4.997	3.844	6.304	0.127	OK	OK	140-1	2.83
140	5.66	COMB1G	Combination	Max	-238.286	23.607	10.535	-0.040	8.878	65.814	66.410	0.485	OK	OK	140-1	5.66
140	0	COMB1G	Combination	Min	-231.171	-21.906	-1.372	-0.164	1.115	-58.175	58.186	0.434	OK	OK	140-1	0
140	2.83	COMB1G	Combination	Min	-242.069	-21.906	-1.372	-0.164	4.144	-4.264	5.946	0.131	OK	OK	140-1	2.83
140	5.66	COMB1G	Combination	Min	-252.968	-21.906	-1.372	-0.164	-25.670	-71.047	75.542	0.544	OK	OK	140-1	5.66
147	0	COMB1G	Combination	Max	-215.854	25.343	1.726	0.154	-0.311	65.302	65.302	0.470	OK	OK	147-1	0
147	2.755	COMB1G	Combination	Max	-226.464	25.343	1.726	0.154	-4.146	4.092	5.825	0.124	OK	OK	147-1	2.755
147	5.51	COMB1G	Combination	Max	-237.074	25.343	1.726	0.154	26.655	68.814	73.796	0.528	OK	OK	147-1	5.51
147	0	COMB1G	Combination	Min	-231.396	-23.500	-11.180	0.052	-34.946	-60.672	70.016	0.503	OK	OK	147-1	0
147	2.755	COMB1G	Combination	Min	-242.006	-23.500	-11.180	0.052	-5.068	-4.539	6.803	0.136	OK	OK	147-1	2.755
147	5.51	COMB1G	Combination	Min	-252.615	-23.500	-11.180	0.052	-9.824	-74.338	74.985	0.541	OK	OK	147-1	5.51
148	0	COMB1G	Combination	Max	-545.100	25.810	4.202	0.108	8.920	66.991	67.582	0.613	OK	OK	148-1	0
148	2.755	COMB1G	Combination	Max	-555.710	25.810	4.202	0.108	-2.362	3.645	4.343	0.245	OK	OK	148-1	2.755
148	5.51	COMB1G	Combination	Max	-566.320	25.810	4.202	0.108	23.390	69.098	72.950	0.653	OK	OK	148-1	5.51
148	0	COMB1G	Combination	Min	-550.300	-23.763	-9.347	0.011	-28.113	-61.835	67.926	0.617	OK	OK	148-1	0
148	2.755	COMB1G	Combination	Min	-560.910	-23.763	-9.347	0.011	-2.656	-4.129	4.909	0.251	OK	OK	148-1	2.755
148	5.51	COMB1G	Combination	Min	-571.520	-23.763	-9.347	0.011	-14.231	-75.223	76.557	0.677	OK	OK	148-1	5.51
149	0	COMB1G	Combination	Max	-662.808	25.840	6.784	0.046	18.556	67.125	69.643	0.672	OK	OK	149-1	0
149	2.755	COMB1G	Combination	Max	-673.418	25.840	6.784	0.046	0.132	3.552	3.554	0.287	OK	OK	149-1	2.755
149	5.51	COMB1G	Combination	Max	-684.028	25.840	6.784	0.046	18.817	68.932	71.454	0.691	OK	OK	149-1	5.51
149	0	COMB1G	Combination	Min	-663.815	-23.732	-6.782	-0.046	-18.552	-61.829	64.553	0.642	OK	OK	149-1	0
149	2.755	COMB1G	Combination	Min	-674.424	-23.732	-6.782	-0.046	-0.134	-4.064	4.066	0.291	OK	OK	149-1	2.755
149	5.51	COMB1G	Combination	Min	-685.034	-23.732	-6.782	-0.046	-18.824	-75.253	77.572	0.727	OK	OK	149-1	5.51
150	0	COMB1G	Combination	Max	-545.072	25.771	9.350	-0.012	28.121	66.846	72.520	0.642	OK	OK	150-1	0
150	2.755	COMB1G	Combination	Max	-555.682	25.771	9.350	-0.012	2.658	3.680	4.540	0.247	OK	OK	150-1	2.755
150	5.51	COMB1G	Combination	Max	-566.291	25.771	9.350	-0.012	14.214	69.034	70.482	0.639	OK	OK	150-1	5.51
150	0	COMB1G	Combination	Min	-550.247	-23.726	-4.195	-0.107	-8.898	-61.700	62.338	0.584	OK	OK	150-1	0
150	2.755	COMB1G	Combination	Min	-560.857	-23.726	-4.195	-0.107	2.362	-4.167	4.790	0.250	OK	OK	150-1	2.755
150	5.51	COMB1G	Combination	Min	-571.467	-23.726	-4.195	-0.107	-23.397	-75.154	78.712	0.689	OK	OK	150-1	5.51
151	0	COMB1G	Combination	Max	-215.871	25.301	11.179	-0.052	34.941	65.147	73.925	0.520	OK	OK	151-1	0
151	2.755	COMB1G	Combination	Max	-226.481	25.301	11.179	-0.052	5.068	4.129	6.537	0.128	OK	OK	151-1	2.755
151	5.51	COMB1G	Combination	Max	-237.091	25.301	11.179	-0.052	9.811	68.745	69.442	0.502	OK	OK	151-1	5.51
151	0	COMB1G	Combination	Min	-231.402	-23.461	-1.722	-0.154	0.324	-60.528	60.528	0.448	OK	OK	151-1	0
151	2.755	COMB1G	Combination	Min	-242.012	-23.461	-1.722	-0.154	4.143	-4.580	6.176	0.132	OK	OK	151-1	2.755
151	5.51	COMB1G	Combination	Min	-252.622	-23.461	-1.722	-0.154	-26.656	-74.266	78.904	0.564	OK	OK	151-1	5.51
158	0	COMB1G	Combination	Max	-215.321	27.294	2.040	0.168	0.335	68.270	68.271	0.487	OK	OK	158-1	0

158	2.68	COMB1G	Combination	Max	-225.642	27.294	2.040	0.168	-4.153	4.400	6.051	0.125	OK	OK	158-1	2.68
158	5.36	COMB1G	Combination	Max	-235.963	27.294	2.040	0.168	27.478	72.190	77.242	0.548	OK	OK	158-1	5.36
158	0	COMB1G	Combination	Min	-231.448	-25.297	-11.803	0.040	-35.784	-63.404	72.805	0.520	OK	OK	158-1	0
158	2.68	COMB1G	Combination	Min	-241.768	-25.297	-11.803	0.040	-5.132	-4.886	7.086	0.137	OK	OK	158-1	2.68
158	5.36	COMB1G	Combination	Min	-252.089	-25.297	-11.803	0.040	-10.600	-78.028	78.744	0.563	OK	OK	158-1	5.36
159	0	COMB1G	Combination	Max	-545.179	27.796	4.623	0.120	9.715	70.057	70.728	0.632	OK	OK	159-1	0
159	2.68	COMB1G	Combination	Max	-555.500	27.796	4.623	0.120	-2.361	3.918	4.575	0.247	OK	OK	159-1	2.68
159	5.36	COMB1G	Combination	Max	-565.821	27.796	4.623	0.120	24.212	72.471	76.408	0.673	OK	OK	159-1	5.36
159	0	COMB1G	Combination	Min	-550.446	-25.581	-9.915	0.000	-28.934	-64.643	70.823	0.634	OK	OK	159-1	0
159	2.68	COMB1G	Combination	Min	-560.767	-25.581	-9.915	0.000	-2.675	-4.441	5.184	0.252	OK	OK	159-1	2.68
159	5.36	COMB1G	Combination	Min	-571.088	-25.581	-9.915	0.000	-15.065	-78.929	80.354	0.699	OK	OK	159-1	5.36
160	0	COMB1G	Combination	Max	-662.835	27.829	7.279	0.056	19.364	70.216	72.837	0.691	OK	OK	160-1	0
160	2.68	COMB1G	Combination	Max	-673.156	27.829	7.279	0.056	0.144	3.813	3.815	0.289	OK	OK	160-1	2.68
160	5.36	COMB1G	Combination	Max	-683.477	27.829	7.279	0.056	19.642	72.285	74.906	0.711	OK	OK	160-1	5.36
160	0	COMB1G	Combination	Min	-663.789	-25.550	-7.275	-0.056	-19.354	-64.660	67.495	0.660	OK	OK	160-1	0
160	2.68	COMB1G	Combination	Min	-674.110	-25.550	-7.275	-0.056	-0.144	-4.364	4.367	0.292	OK	OK	160-1	2.68
160	5.36	COMB1G	Combination	Min	-684.431	-25.550	-7.275	-0.056	-19.652	-78.945	81.354	0.749	OK	OK	160-1	5.36
161	0	COMB1G	Combination	Max	-545.130	27.792	9.917	0.000	28.940	70.044	75.787	0.662	OK	OK	161-1	0
161	2.68	COMB1G	Combination	Max	-555.451	27.792	9.917	0.000	2.675	3.921	4.746	0.248	OK	OK	161-1	2.68
161	5.36	COMB1G	Combination	Max	-565.771	27.792	9.917	0.000	15.051	72.467	74.014	0.659	OK	OK	161-1	5.36
161	0	COMB1G	Combination	Min	-550.518	-25.579	-4.618	-0.119	-9.700	-64.635	65.359	0.602	OK	OK	161-1	0
161	2.68	COMB1G	Combination	Min	-560.839	-25.579	-4.618	-0.119	2.361	-4.444	5.032	0.252	OK	OK	161-1	2.68
161	5.36	COMB1G	Combination	Min	-571.159	-25.579	-4.618	-0.119	-24.218	-78.923	82.555	0.712	OK	OK	161-1	5.36
162	0	COMB1G	Combination	Max	-215.309	27.291	11.803	-0.040	35.784	68.257	77.068	0.539	OK	OK	162-1	0
162	2.68	COMB1G	Combination	Max	-225.630	27.291	11.803	-0.040	5.134	4.402	6.763	0.129	OK	OK	162-1	2.68
162	5.36	COMB1G	Combination	Max	-235.951	27.291	11.803	-0.040	10.582	72.187	72.959	0.523	OK	OK	162-1	5.36
162	0	COMB1G	Combination	Min	-231.474	-25.295	-2.033	-0.168	-0.315	-63.397	63.397	0.465	OK	OK	162-1	0
162	2.68	COMB1G	Combination	Min	-241.795	-25.295	-2.033	-0.168	4.152	-4.890	6.414	0.133	OK	OK	162-1	2.68
162	5.36	COMB1G	Combination	Min	-252.116	-25.295	-2.033	-0.168	-27.480	-78.023	82.721	0.586	OK	OK	162-1	5.36
169	0	COMB1G	Combination	Max	-215.037	29.546	2.316	0.188	0.833	71.745	71.750	0.507	OK	OK	169-1	0
169	2.605	COMB1G	Combination	Max	-225.069	29.546	2.316	0.188	-4.165	4.767	6.330	0.126	OK	OK	169-1	2.605
169	5.21	COMB1G	Combination	Max	-235.101	29.546	2.316	0.188	28.164	75.875	80.933	0.569	OK	OK	169-1	5.21
169	0	COMB1G	Combination	Min	-231.932	-27.297	-12.410	0.022	-36.493	-66.345	75.719	0.537	OK	OK	169-1	0
169	2.605	COMB1G	Combination	Min	-241.964	-27.297	-12.410	0.022	-5.201	-5.225	7.372	0.139	OK	OK	169-1	2.605
169	5.21	COMB1G	Combination	Min	-251.996	-27.297	-12.410	0.022	-11.234	-82.190	82.955	0.588	OK	OK	169-1	5.21
170	0	COMB1G	Combination	Max	-545.481	30.069	5.016	0.139	10.372	73.588	74.315	0.653	OK	OK	170-1	0
170	2.605	COMB1G	Combination	Max	-555.513	30.069	5.016	0.139	-2.362	4.249	4.861	0.248	OK	OK	170-1	2.605
170	5.21	COMB1G	Combination	Max	-565.545	30.069	5.016	0.139	24.895	76.116	80.083	0.695	OK	OK	170-1	5.21
170	0	COMB1G	Combination	Min	-551.196	-27.588	-10.463	-0.018	-29.618	-67.619	73.822	0.652	OK	OK	170-1	0
170	2.605	COMB1G	Combination	Min	-561.228	-27.588	-10.463	-0.018	-2.695	-4.744	5.456	0.254	OK	OK	170-1	2.605
170	5.21	COMB1G	Combination	Min	-571.260	-27.588	-10.463	-0.018	-15.762	-83.073	84.555	0.723	OK	OK	170-1	5.21
171	0	COMB1G	Combination	Max	-663.137	30.082	7.750	0.074	20.035	73.703	76.378	0.712	OK	OK	171-1	0
171	2.605	COMB1G	Combination	Max	-673.169	30.082	7.750	0.074	0.154	4.135	4.138	0.291	OK	OK	171-1	2.605
171	5.21	COMB1G	Combination	Max	-683.201	30.082	7.750	0.074	20.331	75.857	78.534	0.732	OK	OK	171-1	5.21
171	0	COMB1G	Combination	Min	-664.349	-27.532	-7.746	-0.074	-20.023	-67.587	70.491	0.678	OK	OK	171-1	0
171	2.605	COMB1G	Combination	Min	-674.381	-27.532	-7.746	-0.074	-0.154	-4.660	4.662	0.294	OK	OK	171-1	2.605
171	5.21	COMB1G	Combination	Min	-684.413	-27.532	-7.746	-0.074	-20.342	-83.022	85.478	0.774	OK	OK	171-1	5.21
172	0	COMB1G	Combination	Max	-545.479	30.070	10.465	0.018	29.623	73.590	79.329	0.683	OK	OK	172-1	0
172	2.605	COMB1G	Combination	Max	-555.511	30.070	10.465	0.018	2.695	4.249	5.031	0.249	OK	OK	172-1	2.605
172	5.21	COMB1G	Combination	Max	-565.543	30.070	10.465	0.018	15.745	76.117	77.729	0.681	OK	OK	172-1	5.21

172	0	COMB1G	Combination	Min	-551.193	-27.589	-5.010	-0.138	-10.355	-67.622	68.410	0.621	OK	OK	172-1	0
172	2.605	COMB1G	Combination	Min	-561.225	-27.589	-5.010	-0.138	2.362	-4.744	5.299	0.253	OK	OK	172-1	2.605
172	5.21	COMB1G	Combination	Min	-571.257	-27.589	-5.010	-0.138	-24.900	-83.075	86.726	0.736	OK	OK	172-1	5.21
173	0	COMB1G	Combination	Max	-215.036	29.548	12.412	-0.022	36.498	71.750	80.500	0.559	OK	OK	173-1	0
173	2.605	COMB1G	Combination	Max	-225.068	29.548	12.412	-0.022	5.200	4.766	7.054	0.131	OK	OK	173-1	2.605
173	5.21	COMB1G	Combination	Max	-235.100	29.548	12.412	-0.022	11.217	75.878	76.702	0.544	OK	OK	173-1	5.21
173	0	COMB1G	Combination	Min	-231.938	-27.299	-2.310	-0.187	-0.817	-66.349	66.354	0.482	OK	OK	173-1	0
173	2.605	COMB1G	Combination	Min	-241.970	-27.299	-2.310	-0.187	4.165	-5.224	6.681	0.135	OK	OK	173-1	2.605
173	5.21	COMB1G	Combination	Min	-252.002	-27.299	-2.310	-0.187	-28.169	-82.194	86.887	0.611	OK	OK	173-1	5.21
180	0	COMB1G	Combination	Max	-212.145	31.613	2.592	0.204	1.306	73.982	73.993	0.519	OK	OK	180-1	0
180	2.53	COMB1G	Combination	Max	-221.888	31.613	2.592	0.204	-4.171	4.983	6.498	0.126	OK	OK	180-1	2.53
180	5.06	COMB1G	Combination	Max	-231.631	31.613	2.592	0.204	28.744	80.201	85.196	0.593	OK	OK	180-1	5.06
180	0	COMB1G	Combination	Min	-229.849	-29.731	-13.010	0.007	-37.085	-70.237	79.426	0.558	OK	OK	180-1	0
180	2.53	COMB1G	Combination	Min	-239.592	-29.731	-13.010	0.007	-5.252	-6.001	7.975	0.142	OK	OK	180-1	2.53
180	5.06	COMB1G	Combination	Min	-249.336	-29.731	-13.010	0.007	-11.811	-85.982	86.790	0.609	OK	OK	180-1	5.06
181	0	COMB1G	Combination	Max	-542.941	32.165	5.401	0.155	10.954	75.895	76.681	0.666	OK	OK	181-1	0
181	2.53	COMB1G	Combination	Max	-552.684	32.165	5.401	0.155	-2.361	4.425	5.015	0.248	OK	OK	181-1	2.53
181	5.06	COMB1G	Combination	Max	-562.428	32.165	5.401	0.155	25.482	80.419	84.359	0.719	OK	OK	181-1	5.06
181	0	COMB1G	Combination	Min	-548.371	-30.037	-11.005	-0.034	-30.203	-71.571	77.682	0.674	OK	OK	181-1	0
181	2.53	COMB1G	Combination	Min	-558.114	-30.037	-11.005	-0.034	-2.711	-5.483	6.116	0.257	OK	OK	181-1	2.53
181	5.06	COMB1G	Combination	Min	-567.857	-30.037	-11.005	-0.034	-16.376	-86.859	88.389	0.745	OK	OK	181-1	5.06
182	0	COMB1G	Combination	Max	-660.403	32.151	8.213	0.090	20.616	75.947	78.695	0.724	OK	OK	182-1	0
182	2.53	COMB1G	Combination	Max	-670.147	32.151	8.213	0.090	0.164	4.300	4.303	0.291	OK	OK	182-1	2.53
182	5.06	COMB1G	Combination	Max	-679.890	32.151	8.213	0.090	20.931	80.092	82.782	0.756	OK	OK	182-1	5.06
182	0	COMB1G	Combination	Min	-661.240	-29.957	-8.208	-0.090	-20.604	-71.492	74.402	0.699	OK	OK	182-1	0
182	2.53	COMB1G	Combination	Min	-670.983	-29.957	-8.208	-0.090	-0.164	-5.395	5.397	0.297	OK	OK	182-1	2.53
182	5.06	COMB1G	Combination	Min	-680.726	-29.957	-8.208	-0.090	-20.943	-86.737	89.229	0.794	OK	OK	182-1	5.06
183	0	COMB1G	Combination	Max	-542.866	32.161	11.006	0.034	30.207	75.883	81.674	0.695	OK	OK	183-1	0
183	2.53	COMB1G	Combination	Max	-552.609	32.161	11.006	0.034	2.711	4.429	5.193	0.249	OK	OK	183-1	2.53
183	5.06	COMB1G	Combination	Max	-562.353	32.161	11.006	0.034	16.355	80.413	82.059	0.705	OK	OK	183-1	5.06
183	0	COMB1G	Combination	Min	-548.451	-30.033	-5.393	-0.155	-10.933	-71.555	72.386	0.643	OK	OK	183-1	0
183	2.53	COMB1G	Combination	Min	-558.194	-30.033	-5.393	-0.155	2.361	-5.486	5.972	0.256	OK	OK	183-1	2.53
183	5.06	COMB1G	Combination	Min	-567.937	-30.033	-5.393	-0.155	-25.486	-86.854	90.516	0.757	OK	OK	183-1	5.06
184	0	COMB1G	Combination	Max	-212.133	31.611	13.013	-0.008	37.096	73.971	82.752	0.571	OK	OK	184-1	0
184	2.53	COMB1G	Combination	Max	-221.876	31.611	13.013	-0.008	5.250	4.987	7.241	0.130	OK	OK	184-1	2.53
184	5.06	COMB1G	Combination	Max	-231.619	31.611	13.013	-0.008	11.795	80.195	81.058	0.568	OK	OK	184-1	5.06
184	0	COMB1G	Combination	Min	-229.877	-29.727	-2.587	-0.203	-1.296	-70.222	70.233	0.504	OK	OK	184-1	0
184	2.53	COMB1G	Combination	Min	-239.620	-29.727	-2.587	-0.203	4.173	-6.004	7.312	0.138	OK	OK	184-1	2.53
184	5.06	COMB1G	Combination	Min	-249.363	-29.727	-2.587	-0.203	-28.751	-85.979	90.659	0.632	OK	OK	184-1	5.06
191	0	COMB1G	Combination	Max	-221.423	37.418	2.722	0.219	1.265	88.095	88.104	0.606	OK	OK	191-1	0
191	2.455	COMB1G	Combination	Max	-230.877	37.418	2.722	0.219	-4.287	6.648	7.910	0.138	OK	OK	191-1	2.455
191	4.91	COMB1G	Combination	Max	-240.331	37.418	2.722	0.219	29.548	82.325	87.467	0.610	OK	OK	191-1	4.91
191	0	COMB1G	Combination	Min	-249.883	-30.826	-13.811	0.001	-38.262	-69.030	78.925	0.563	OK	OK	191-1	0
191	2.455	COMB1G	Combination	Min	-259.338	-30.826	-13.811	0.001	-5.488	-3.767	6.657	0.142	OK	OK	191-1	2.455
191	4.91	COMB1G	Combination	Min	-268.792	-30.826	-13.811	0.001	-12.100	-95.629	96.391	0.673	OK	OK	191-1	4.91
192	0	COMB1G	Combination	Max	-558.764	38.214	5.729	0.169	11.278	90.779	91.477	0.759	OK	OK	192-1	0
192	2.455	COMB1G	Combination	Max	-568.218	38.214	5.729	0.169	-2.411	6.229	6.679	0.264	OK	OK	192-1	2.455
192	4.91	COMB1G	Combination	Max	-577.672	38.214	5.729	0.169	26.123	82.216	86.266	0.736	OK	OK	192-1	4.91
192	0	COMB1G	Combination	Min	-577.631	-30.952	-11.623	-0.044	-30.946	-69.759	76.315	0.677	OK	OK	192-1	0
192	2.455	COMB1G	Combination	Min	-587.085	-30.952	-11.623	-0.044	-2.788	-3.036	4.122	0.257	OK	OK	192-1	2.455

192	4.91	COMB1G	Combination	Min	-596.540	-30.952	-11.623	-0.044	-16.853	-96.851	98.306	0.814	OK	OK	192-1	4.91
193	0	COMB1G	Combination	Max	-678.724	38.317	8.690	0.101	21.161	91.241	93.663	0.820	OK	OK	193-1	0
193	2.455	COMB1G	Combination	Max	-688.178	38.317	8.690	0.101	0.174	6.227	6.229	0.309	OK	OK	193-1	2.455
193	4.91	COMB1G	Combination	Max	-697.632	38.317	8.690	0.101	21.497	81.602	84.386	0.772	OK	OK	193-1	4.91
193	0	COMB1G	Combination	Min	-692.962	-30.703	-8.686	-0.101	-21.149	-69.149	72.311	0.700	OK	OK	193-1	0
193	2.455	COMB1G	Combination	Min	-702.417	-30.703	-8.686	-0.101	-0.175	-2.826	2.832	0.295	OK	OK	193-1	2.455
193	4.91	COMB1G	Combination	Min	-711.871	-30.703	-8.686	-0.101	-21.510	-96.893	99.252	0.866	OK	OK	193-1	4.91
194	0	COMB1G	Combination	Max	-558.643	38.148	11.628	0.043	30.968	90.560	95.709	0.784	OK	OK	194-1	0
194	2.455	COMB1G	Combination	Max	-568.098	38.148	11.628	0.043	2.791	6.270	6.863	0.265	OK	OK	194-1	2.455
194	4.91	COMB1G	Combination	Max	-577.552	38.148	11.628	0.043	16.825	82.144	83.850	0.722	OK	OK	194-1	4.91
194	0	COMB1G	Combination	Min	-577.480	-30.906	-5.719	-0.169	-11.256	-69.605	70.509	0.643	OK	OK	194-1	0
194	2.455	COMB1G	Combination	Min	-586.934	-30.906	-5.719	-0.169	2.412	-3.094	3.923	0.255	OK	OK	194-1	2.455
194	4.91	COMB1G	Combination	Min	-596.389	-30.906	-5.719	-0.169	-26.129	-96.748	100.215	0.826	OK	OK	194-1	4.91
195	0	COMB1G	Combination	Max	-221.398	37.350	13.815	-0.002	38.268	87.867	95.838	0.651	OK	OK	195-1	0
195	2.455	COMB1G	Combination	Max	-230.852	37.350	13.815	-0.002	5.487	6.693	8.655	0.142	OK	OK	195-1	2.455
195	4.91	COMB1G	Combination	Max	-240.306	37.350	13.815	-0.002	12.099	82.249	83.134	0.584	OK	OK	195-1	4.91
195	0	COMB1G	Combination	Min	-249.857	-30.776	-2.722	-0.219	-1.265	-68.863	68.875	0.504	OK	OK	195-1	0
195	2.455	COMB1G	Combination	Min	-259.311	-30.776	-2.722	-0.219	4.283	-3.828	5.744	0.136	OK	OK	195-1	2.455
195	4.91	COMB1G	Combination	Min	-268.766	-30.776	-2.722	-0.219	-29.563	-95.522	99.992	0.695	OK	OK	195-1	4.91
202	0	COMB1G	Combination	Max	-135.767	19.005	4.075	0.215	5.094	22.458	23.028	0.189	OK	OK	202-1	0
202	2.38	COMB1G	Combination	Max	-144.932	19.005	4.075	0.215	-3.298	-0.745	3.381	0.077	OK	OK	202-1	2.38
202	4.76	COMB1G	Combination	Max	-154.098	19.005	4.075	0.215	29.199	101.040	105.174	0.680	OK	OK	202-1	4.76
202	0	COMB1G	Combination	Min	-186.446	-42.769	-13.872	-0.019	-36.834	-102.540	108.955	0.715	OK	OK	202-1	0
202	2.38	COMB1G	Combination	Min	-195.611	-42.769	-13.872	-0.019	-5.123	-22.780	23.349	0.215	OK	OK	202-1	2.38
202	4.76	COMB1G	Combination	Min	-204.777	-42.769	-13.872	-0.019	-14.301	-68.008	69.495	0.490	OK	OK	202-1	4.76
203	0	COMB1G	Combination	Max	-459.595	16.665	5.867	0.183	10.919	14.919	18.488	0.291	OK	OK	203-1	0
203	2.38	COMB1G	Combination	Max	-468.760	16.665	5.867	0.183	-2.642	-4.022	4.812	0.214	OK	OK	203-1	2.38
203	4.76	COMB1G	Combination	Max	-477.926	16.665	5.867	0.183	27.180	105.938	109.369	0.832	OK	OK	203-1	4.76
203	0	COMB1G	Combination	Min	-509.459	-46.202	-12.558	-0.043	-32.597	-113.985	118.554	0.899	OK	OK	203-1	0
203	2.38	COMB1G	Combination	Min	-518.625	-46.202	-12.558	-0.043	-3.111	-24.746	24.940	0.352	OK	OK	203-1	2.38
203	4.76	COMB1G	Combination	Min	-527.791	-46.202	-12.558	-0.043	-17.007	-64.408	66.616	0.601	OK	OK	203-1	4.76
204	0	COMB1G	Combination	Max	-589.409	14.774	9.187	0.106	21.659	8.920	23.424	0.371	OK	OK	204-1	0
204	2.38	COMB1G	Combination	Max	-598.574	14.774	9.187	0.106	0.210	-5.866	5.869	0.271	OK	OK	204-1	2.38
204	4.76	COMB1G	Combination	Max	-607.740	14.774	9.187	0.106	22.051	108.522	110.740	0.892	OK	OK	204-1	4.76
204	0	COMB1G	Combination	Min	-630.457	-48.062	-9.177	-0.107	-21.630	-120.253	122.183	0.968	OK	OK	204-1	0
204	2.38	COMB1G	Combination	Min	-639.623	-48.062	-9.177	-0.107	-0.206	-26.243	26.244	0.407	OK	OK	204-1	2.38
204	4.76	COMB1G	Combination	Min	-648.788	-48.062	-9.177	-0.107	-22.071	-61.406	65.252	0.641	OK	OK	204-1	4.76
205	0	COMB1G	Combination	Max	-460.248	16.711	12.537	0.043	32.519	15.066	35.839	0.393	OK	OK	205-1	0
205	2.38	COMB1G	Combination	Max	-469.414	16.711	12.537	0.043	3.083	-3.973	5.029	0.215	OK	OK	205-1	2.38
205	4.76	COMB1G	Combination	Max	-478.580	16.711	12.537	0.043	17.057	105.852	107.218	0.820	OK	OK	205-1	4.76
205	0	COMB1G	Combination	Min	-509.972	-46.145	-5.899	-0.183	-11.024	-113.799	114.332	0.874	OK	OK	205-1	0
205	2.38	COMB1G	Combination	Min	-519.138	-46.145	-5.899	-0.183	2.614	-24.707	24.845	0.352	OK	OK	205-1	2.38
205	4.76	COMB1G	Combination	Min	-528.303	-46.145	-5.899	-0.183	-27.157	-64.478	69.963	0.621	OK	OK	205-1	4.76
206	0	COMB1G	Combination	Max	-141.558	19.171	13.814	0.019	36.644	22.992	43.260	0.310	OK	OK	206-1	0
206	2.38	COMB1G	Combination	Max	-150.723	19.171	13.814	0.019	5.073	-0.593	5.107	0.090	OK	OK	206-1	2.38
206	4.76	COMB1G	Combination	Max	-159.889	19.171	13.814	0.019	14.356	100.770	101.788	0.662	OK	OK	206-1	4.76
206	0	COMB1G	Combination	Min	-192.193	-42.591	-4.117	-0.214	-5.241	-101.966	102.101	0.677	OK	OK	206-1	0
206	2.38	COMB1G	Combination	Min	-201.359	-42.591	-4.117	-0.214	3.252	-22.640	22.873	0.214	OK	OK	206-1	2.38
206	4.76	COMB1G	Combination	Min	-210.524	-42.591	-4.117	-0.214	-29.109	-68.262	74.210	0.520	OK	OK	206-1	4.76
31	0	COMB2G	Combination	Max	-241.774	5.264	-1.879	1.227	-10.961	16.151	19.519	0.210	OK	OK	31-1	0

31	3.5	COMB2G	Combination	Max	-255.252	5.264	-1.879	1.227	-4.141	-0.033	4.141	0.125	OK	OK	31-1	3.5
31	7	COMB2G	Combination	Max	-268.731	5.264	-1.879	1.227	13.952	21.001	25.213	0.255	OK	OK	31-1	7
31	0	COMB2G	Combination	Min	-251.062	-6.010	-5.173	-1.033	-22.258	-21.068	30.648	0.280	OK	OK	31-1	0
31	3.5	COMB2G	Combination	Min	-264.541	-6.010	-5.173	-1.033	-4.398	-2.275	4.951	0.134	OK	OK	31-1	3.5
31	7	COMB2G	Combination	Min	-278.019	-6.010	-5.173	-1.033	2.191	-20.700	20.816	0.232	OK	OK	31-1	7
32	0	COMB2G	Combination	Max	-566.999	4.501	-0.363	1.153	-3.824	13.795	14.316	0.309	OK	OK	32-1	0
32	3.5	COMB2G	Combination	Max	-580.478	4.501	-0.363	1.153	-2.468	-0.154	2.472	0.244	OK	OK	32-1	3.5
32	7	COMB2G	Combination	Max	-593.956	4.501	-0.363	1.153	10.779	17.105	20.218	0.354	OK	OK	32-1	7
32	0	COMB2G	Combination	Min	-570.925	-4.931	-3.785	-1.032	-15.714	-17.412	23.455	0.364	OK	OK	32-1	0
32	3.5	COMB2G	Combination	Min	-584.404	-4.931	-3.785	-1.032	-2.554	-1.959	3.219	0.250	OK	OK	32-1	3.5
32	7	COMB2G	Combination	Min	-597.882	-4.931	-3.785	-1.032	-1.284	-17.712	17.759	0.341	OK	OK	32-1	7
33	0	COMB2G	Combination	Max	-688.307	3.567	1.718	1.079	5.976	10.658	12.219	0.344	OK	OK	33-1	0
33	3.5	COMB2G	Combination	Max	-701.785	3.567	1.718	1.079	0.037	-0.360	0.362	0.280	OK	OK	33-1	3.5
33	7	COMB2G	Combination	Max	-715.264	3.567	1.718	1.079	6.048	13.630	14.912	0.371	OK	OK	33-1	7
33	0	COMB2G	Combination	Min	-691.932	-3.997	-1.718	-1.079	-5.975	-14.351	15.545	0.365	OK	OK	33-1	0
33	3.5	COMB2G	Combination	Min	-705.410	-3.997	-1.718	-1.079	-0.037	-1.825	1.826	0.290	OK	OK	33-1	3.5
33	7	COMB2G	Combination	Min	-718.889	-3.997	-1.718	-1.079	-6.048	-14.309	15.534	0.376	OK	OK	33-1	7
34	0	COMB2G	Combination	Max	-567.015	4.501	3.785	1.032	15.716	13.795	20.911	0.347	OK	OK	34-1	0
34	3.5	COMB2G	Combination	Max	-580.494	4.501	3.785	1.032	2.554	-0.153	2.559	0.245	OK	OK	34-1	3.5
34	7	COMB2G	Combination	Max	-593.973	4.501	3.785	1.032	1.283	17.102	17.150	0.336	OK	OK	34-1	7
34	0	COMB2G	Combination	Min	-570.923	-4.930	0.363	-1.153	3.825	-17.407	17.822	0.331	OK	OK	34-1	0
34	3.5	COMB2G	Combination	Min	-584.402	-4.930	0.363	-1.153	2.468	-1.959	3.151	0.250	OK	OK	34-1	3.5
34	7	COMB2G	Combination	Min	-597.880	-4.930	0.363	-1.153	-10.780	-17.712	20.734	0.359	OK	OK	34-1	7
35	0	COMB2G	Combination	Max	-241.780	5.264	5.173	1.033	22.258	16.151	27.501	0.257	OK	OK	35-1	0
35	3.5	COMB2G	Combination	Max	-255.259	5.264	5.173	1.033	4.398	-0.032	4.398	0.127	OK	OK	35-1	3.5
35	7	COMB2G	Combination	Max	-268.737	5.264	5.173	1.033	-2.193	20.997	21.111	0.231	OK	OK	35-1	7
35	0	COMB2G	Combination	Min	-251.060	-6.008	1.879	-1.227	10.963	-21.062	23.744	0.239	OK	OK	35-1	0
35	3.5	COMB2G	Combination	Min	-264.539	-6.008	1.879	-1.227	4.141	-2.275	4.724	0.132	OK	OK	35-1	3.5
35	7	COMB2G	Combination	Min	-278.017	-6.008	1.879	-1.227	-13.952	-20.700	24.963	0.257	OK	OK	35-1	7
48	0	COMB2G	Combination	Max	-218.904	6.665	-0.109	1.203	-4.974	21.833	22.392	0.218	OK	OK	48-1	0
48	3.425	COMB2G	Combination	Max	-232.094	6.665	-0.109	1.203	-4.076	0.906	4.175	0.116	OK	OK	48-1	3.425
48	6.85	COMB2G	Combination	Max	-245.283	6.665	-0.109	1.203	20.582	19.795	28.556	0.265	OK	OK	48-1	6.85
48	0	COMB2G	Combination	Min	-229.183	-5.515	-7.199	-1.009	-28.734	-17.985	33.898	0.290	OK	OK	48-1	0
48	3.425	COMB2G	Combination	Min	-242.373	-5.515	-7.199	-1.009	-4.599	-0.996	4.706	0.124	OK	OK	48-1	3.425
48	6.85	COMB2G	Combination	Min	-255.563	-5.515	-7.199	-1.009	-4.224	-23.825	24.196	0.243	OK	OK	48-1	6.85
49	0	COMB2G	Combination	Max	-543.632	5.759	1.644	1.127	3.105	18.894	19.147	0.328	OK	OK	49-1	0
49	3.425	COMB2G	Combination	Max	-556.822	5.759	1.644	1.127	-2.357	0.686	2.455	0.235	OK	OK	49-1	3.425
49	6.85	COMB2G	Combination	Max	-570.012	5.759	1.644	1.127	17.361	16.094	23.673	0.365	OK	OK	49-1	6.85
49	0	COMB2G	Combination	Min	-546.134	-4.499	-5.757	-1.012	-22.075	-14.722	26.534	0.372	OK	OK	49-1	0
49	3.425	COMB2G	Combination	Min	-559.324	-4.499	-5.757	-1.012	-2.526	-0.830	2.659	0.237	OK	OK	49-1	3.425
49	6.85	COMB2G	Combination	Min	-572.514	-4.499	-5.757	-1.012	-8.157	-20.554	22.113	0.357	OK	OK	49-1	6.85
50	0	COMB2G	Combination	Max	-661.242	4.786	3.715	1.057	12.655	15.675	20.146	0.380	OK	OK	50-1	0
50	3.425	COMB2G	Combination	Max	-674.432	4.786	3.715	1.057	0.069	0.537	0.542	0.270	OK	OK	50-1	3.425
50	6.85	COMB2G	Combination	Max	-687.622	4.786	3.715	1.057	12.795	12.519	17.901	0.377	OK	OK	50-1	6.85
50	0	COMB2G	Combination	Min	-661.356	-3.499	-3.716	-1.057	-12.657	-11.446	17.065	0.362	OK	OK	50-1	0
50	3.425	COMB2G	Combination	Min	-674.546	-3.499	-3.716	-1.057	-0.070	-0.718	0.722	0.271	OK	OK	50-1	3.425
50	6.85	COMB2G	Combination	Min	-687.736	-3.499	-3.716	-1.057	-12.795	-17.110	21.365	0.398	OK	OK	50-1	6.85
51	0	COMB2G	Combination	Max	-543.604	5.751	5.758	1.012	22.079	18.856	29.035	0.386	OK	OK	51-1	0
51	3.425	COMB2G	Combination	Max	-556.794	5.751	5.758	1.012	2.527	0.694	2.621	0.236	OK	OK	51-1	3.425
51	6.85	COMB2G	Combination	Max	-569.984	5.751	5.758	1.012	8.152	16.078	18.027	0.332	OK	OK	51-1	6.85

51	0	COMB2G	Combination	Min	-546.092	-4.492	-1.642	-1.127	-3.097	-14.691	15.014	0.304	OK	OK	51-1	0
51	3.425	COMB2G	Combination	Min	-559.282	-4.492	-1.642	-1.127	2.357	-0.840	2.502	0.236	OK	OK	51-1	3.425
51	6.85	COMB2G	Combination	Min	-572.472	-4.492	-1.642	-1.127	-17.364	-20.536	26.893	0.385	OK	OK	51-1	6.85
52	0	COMB2G	Combination	Max	-218.915	6.657	7.198	1.009	28.727	21.793	36.058	0.299	OK	OK	52-1	0
52	3.425	COMB2G	Combination	Max	-232.105	6.657	7.198	1.009	4.599	0.914	4.688	0.119	OK	OK	52-1	3.425
52	6.85	COMB2G	Combination	Max	-245.295	6.657	7.198	1.009	4.223	19.778	20.224	0.216	OK	OK	52-1	6.85
52	0	COMB2G	Combination	Min	-229.182	-5.508	0.110	-1.203	4.974	-17.952	18.628	0.200	OK	OK	52-1	0
52	3.425	COMB2G	Combination	Min	-242.372	-5.508	0.110	-1.203	4.074	-1.007	4.196	0.121	OK	OK	52-1	3.425
52	6.85	COMB2G	Combination	Min	-255.562	-5.508	0.110	-1.203	-20.579	-23.805	31.467	0.286	OK	OK	52-1	6.85
59	0	COMB2G	Combination	Max	-217.349	6.847	1.822	1.147	1.330	21.794	21.835	0.214	OK	OK	59-1	0
59	3.35	COMB2G	Combination	Max	-230.250	6.847	1.822	1.147	-3.955	0.840	4.044	0.115	OK	OK	59-1	3.35
59	6.7	COMB2G	Combination	Max	-243.152	6.847	1.822	1.147	27.305	20.283	34.014	0.296	OK	OK	59-1	6.7
59	0	COMB2G	Combination	Min	-233.293	-5.804	-9.331	-0.952	-35.217	-18.604	39.829	0.327	OK	OK	59-1	0
59	3.35	COMB2G	Combination	Min	-246.194	-5.804	-9.331	-0.952	-4.777	-1.144	4.912	0.126	OK	OK	59-1	3.35
59	6.7	COMB2G	Combination	Min	-259.096	-5.804	-9.331	-0.952	-10.881	-24.079	26.423	0.258	OK	OK	59-1	6.7
60	0	COMB2G	Combination	Max	-544.475	5.961	3.723	1.073	9.892	18.999	21.420	0.341	OK	OK	60-1	0
60	3.35	COMB2G	Combination	Max	-557.376	5.961	3.723	1.073	-2.313	0.636	2.399	0.235	OK	OK	60-1	3.35
60	6.7	COMB2G	Combination	Max	-570.277	5.961	3.723	1.073	24.249	16.668	29.425	0.399	OK	OK	60-1	6.7
60	0	COMB2G	Combination	Min	-548.646	-4.786	-7.929	-0.958	-28.876	-15.397	32.724	0.410	OK	OK	60-1	0
60	3.35	COMB2G	Combination	Min	-561.547	-4.786	-7.929	-0.958	-2.579	-0.972	2.756	0.238	OK	OK	60-1	3.35
60	6.7	COMB2G	Combination	Min	-574.449	-4.786	-7.929	-0.958	-15.050	-20.943	25.789	0.379	OK	OK	60-1	6.7
61	0	COMB2G	Combination	Max	-662.554	4.998	5.849	1.004	19.483	15.879	25.134	0.410	OK	OK	61-1	0
61	3.35	COMB2G	Combination	Max	-675.456	4.998	5.849	1.004	0.110	0.504	0.516	0.270	OK	OK	61-1	3.35
61	6.7	COMB2G	Combination	Max	-688.357	4.998	5.849	1.004	19.702	13.171	23.698	0.412	OK	OK	61-1	6.7
61	0	COMB2G	Combination	Min	-662.988	-3.781	-5.848	-1.004	-19.482	-12.163	22.967	0.397	OK	OK	61-1	0
61	3.35	COMB2G	Combination	Min	-675.889	-3.781	-5.848	-1.004	-0.110	-0.863	0.870	0.273	OK	OK	61-1	3.35
61	6.7	COMB2G	Combination	Min	-688.790	-3.781	-5.848	-1.004	-19.704	-17.606	26.423	0.428	OK	OK	61-1	6.7
62	0	COMB2G	Combination	Max	-544.494	5.960	7.930	0.958	28.879	18.993	34.565	0.419	OK	OK	62-1	0
62	3.35	COMB2G	Combination	Max	-557.395	5.960	7.930	0.958	2.579	0.637	2.656	0.236	OK	OK	62-1	3.35
62	6.7	COMB2G	Combination	Max	-570.296	5.960	7.930	0.958	15.047	16.664	22.453	0.358	OK	OK	62-1	6.7
62	0	COMB2G	Combination	Min	-548.664	-4.785	-3.722	-1.073	-9.890	-15.392	18.295	0.325	OK	OK	62-1	0
62	3.35	COMB2G	Combination	Min	-561.565	-4.785	-3.722	-1.073	2.314	-0.974	2.510	0.237	OK	OK	62-1	3.35
62	6.7	COMB2G	Combination	Min	-574.466	-4.785	-3.722	-1.073	-24.252	-20.940	32.041	0.416	OK	OK	62-1	6.7
63	0	COMB2G	Combination	Max	-217.354	6.845	9.332	0.952	35.221	21.788	41.416	0.330	OK	OK	63-1	0
63	3.35	COMB2G	Combination	Max	-230.255	6.845	9.332	0.952	4.777	0.841	4.850	0.120	OK	OK	63-1	3.35
63	6.7	COMB2G	Combination	Max	-243.157	6.845	9.332	0.952	10.878	20.279	23.013	0.232	OK	OK	63-1	6.7
63	0	COMB2G	Combination	Min	-233.300	-5.803	-1.821	-1.147	-1.326	-18.598	18.646	0.202	OK	OK	63-1	0
63	3.35	COMB2G	Combination	Min	-246.201	-5.803	-1.821	-1.147	3.956	-1.145	4.118	0.122	OK	OK	63-1	3.35
63	6.7	COMB2G	Combination	Min	-259.102	-5.803	-1.821	-1.147	-27.308	-24.076	36.406	0.317	OK	OK	63-1	6.7
70	0	COMB2G	Combination	Max	-214.346	7.104	3.841	1.062	7.625	22.112	23.390	0.222	OK	OK	70-1	0
70	3.275	COMB2G	Combination	Max	-226.959	7.104	3.841	1.062	-3.828	0.858	3.923	0.113	OK	OK	70-1	3.275
70	6.55	COMB2G	Combination	Max	-239.571	7.104	3.841	1.062	34.011	20.427	39.674	0.328	OK	OK	70-1	6.55
70	0	COMB2G	Combination	Min	-235.624	-5.976	-11.554	-0.866	-41.668	-18.714	45.677	0.362	OK	OK	70-1	0
70	3.275	COMB2G	Combination	Min	-248.236	-5.976	-11.554	-0.866	-4.956	-1.154	5.088	0.128	OK	OK	70-1	3.275
70	6.55	COMB2G	Combination	Min	-260.848	-5.976	-11.554	-0.866	-17.536	-24.417	30.061	0.280	OK	OK	70-1	6.55
71	0	COMB2G	Combination	Max	-543.787	6.261	5.893	0.991	16.665	19.513	25.660	0.366	OK	OK	71-1	0
71	3.275	COMB2G	Combination	Max	-556.400	6.261	5.893	0.991	-2.271	0.663	2.366	0.234	OK	OK	71-1	3.275
71	6.55	COMB2G	Combination	Max	-569.012	6.261	5.893	0.991	31.133	17.019	35.481	0.434	OK	OK	71-1	6.55
71	0	COMB2G	Combination	Min	-549.347	-4.995	-10.200	-0.876	-35.675	-15.696	38.975	0.447	OK	OK	71-1	0
71	3.275	COMB2G	Combination	Min	-561.959	-4.995	-10.200	-0.876	-2.635	-0.993	2.816	0.239	OK	OK	71-1	3.275

71	6.55	COMB2G	Combination	Min	-574.571	-4.995	-10.200	-0.876	-21.934	-21.497	30.712	0.408	OK	OK	71-1	6.55
72	0	COMB2G	Combination	Max	-662.553	5.327	8.076	0.924	26.297	16.543	31.068	0.445	OK	OK	72-1	0
72	3.275	COMB2G	Combination	Max	-675.165	5.327	8.076	0.924	0.152	0.548	0.568	0.271	OK	OK	72-1	3.275
72	6.55	COMB2G	Combination	Max	-687.777	5.327	8.076	0.924	26.602	13.707	29.926	0.448	OK	OK	72-1	6.55
72	0	COMB2G	Combination	Min	-662.922	-4.018	-8.076	-0.924	-26.298	-12.613	29.167	0.434	OK	OK	72-1	0
72	3.275	COMB2G	Combination	Min	-675.534	-4.018	-8.076	-0.924	-0.153	-0.903	0.916	0.273	OK	OK	72-1	3.275
72	6.55	COMB2G	Combination	Min	-688.146	-4.018	-8.076	-0.924	-26.603	-18.347	32.317	0.462	OK	OK	72-1	6.55
73	0	COMB2G	Combination	Max	-543.766	6.252	10.201	0.876	35.679	19.472	40.646	0.454	OK	OK	73-1	0
73	3.275	COMB2G	Combination	Max	-556.378	6.252	10.201	0.876	2.637	0.671	2.721	0.236	OK	OK	73-1	3.275
73	6.55	COMB2G	Combination	Max	-568.991	6.252	10.201	0.876	21.927	17.002	27.746	0.388	OK	OK	73-1	6.55
73	0	COMB2G	Combination	Min	-549.295	-4.987	-5.890	-0.991	-16.653	-15.661	22.860	0.352	OK	OK	73-1	0
73	3.275	COMB2G	Combination	Min	-561.907	-4.987	-5.890	-0.991	2.271	-1.003	2.483	0.237	OK	OK	73-1	3.275
73	6.55	COMB2G	Combination	Min	-574.520	-4.987	-5.890	-0.991	-31.136	-21.477	37.825	0.450	OK	OK	73-1	6.55
74	0	COMB2G	Combination	Max	-214.364	7.094	11.552	0.866	41.659	22.070	47.144	0.362	OK	OK	74-1	0
74	3.275	COMB2G	Combination	Max	-226.977	7.094	11.552	0.866	4.956	0.867	5.031	0.119	OK	OK	74-1	3.275
74	6.55	COMB2G	Combination	Max	-239.589	7.094	11.552	0.866	17.532	20.409	26.905	0.253	OK	OK	74-1	6.55
74	0	COMB2G	Combination	Min	-235.618	-5.967	-3.840	-1.062	-7.620	-18.677	20.172	0.212	OK	OK	74-1	0
74	3.275	COMB2G	Combination	Min	-248.230	-5.967	-3.840	-1.062	3.825	-1.164	3.999	0.122	OK	OK	74-1	3.275
74	6.55	COMB2G	Combination	Min	-260.843	-5.967	-3.840	-1.062	-34.008	-24.396	41.854	0.349	OK	OK	74-1	6.55
81	0	COMB2G	Combination	Max	-211.521	7.312	5.898	0.952	13.737	22.221	26.124	0.237	OK	OK	81-1	0
81	3.2	COMB2G	Combination	Max	-223.844	7.312	5.898	0.952	-3.701	0.865	3.801	0.111	OK	OK	81-1	3.2
81	6.4	COMB2G	Combination	Max	-236.167	7.312	5.898	0.952	40.539	20.426	45.394	0.360	OK	OK	81-1	6.4
81	0	COMB2G	Combination	Min	-238.078	-6.114	-13.825	-0.755	-47.941	-18.701	51.459	0.397	OK	OK	81-1	0
81	3.2	COMB2G	Combination	Min	-250.401	-6.114	-13.825	-0.755	-5.137	-1.180	5.271	0.130	OK	OK	81-1	3.2
81	6.4	COMB2G	Combination	Min	-262.725	-6.114	-13.825	-0.755	-24.012	-24.575	34.359	0.306	OK	OK	81-1	6.4
82	0	COMB2G	Combination	Max	-543.231	6.545	8.109	0.886	23.256	19.915	30.618	0.395	OK	OK	82-1	0
82	3.2	COMB2G	Combination	Max	-555.555	6.545	8.109	0.886	-2.228	0.681	2.330	0.234	OK	OK	82-1	3.2
82	6.4	COMB2G	Combination	Max	-567.878	6.545	8.109	0.886	37.837	17.322	41.613	0.470	OK	OK	82-1	6.4
82	0	COMB2G	Combination	Min	-550.240	-5.201	-12.520	-0.771	-42.293	-15.964	45.205	0.484	OK	OK	82-1	0
82	3.2	COMB2G	Combination	Min	-562.564	-5.201	-12.520	-0.771	-2.692	-1.031	2.882	0.240	OK	OK	82-1	3.2
82	6.4	COMB2G	Combination	Min	-574.887	-5.201	-12.520	-0.771	-28.640	-21.973	36.097	0.440	OK	OK	82-1	6.4
83	0	COMB2G	Combination	Max	-662.637	5.673	10.352	0.822	32.930	17.196	37.149	0.481	OK	OK	83-1	0
83	3.2	COMB2G	Combination	Max	-674.961	5.673	10.352	0.822	0.197	0.582	0.614	0.271	OK	OK	83-1	3.2
83	6.4	COMB2G	Combination	Max	-687.284	5.673	10.352	0.822	33.319	14.293	36.255	0.485	OK	OK	83-1	6.4
83	0	COMB2G	Combination	Min	-662.995	-4.285	-10.351	-0.821	-32.926	-13.130	35.447	0.471	OK	OK	83-1	0
83	3.2	COMB2G	Combination	Min	-675.318	-4.285	-10.351	-0.821	-0.197	-0.956	0.976	0.273	OK	OK	83-1	3.2
83	6.4	COMB2G	Combination	Min	-687.641	-4.285	-10.351	-0.821	-33.323	-19.109	38.413	0.498	OK	OK	83-1	6.4
84	0	COMB2G	Combination	Max	-543.230	6.543	12.521	0.771	42.297	19.909	46.748	0.490	OK	OK	84-1	0
84	3.2	COMB2G	Combination	Max	-555.554	6.543	12.521	0.771	2.692	0.681	2.777	0.236	OK	OK	84-1	3.2
84	6.4	COMB2G	Combination	Max	-567.877	6.543	12.521	0.771	28.636	17.320	33.466	0.422	OK	OK	84-1	6.4
84	0	COMB2G	Combination	Min	-550.262	-5.200	-8.107	-0.886	-23.252	-15.963	28.204	0.384	OK	OK	84-1	0
84	3.2	COMB2G	Combination	Min	-562.585	-5.200	-8.107	-0.886	2.228	-1.032	2.456	0.237	OK	OK	84-1	3.2
84	6.4	COMB2G	Combination	Min	-574.909	-5.200	-8.107	-0.886	-37.840	-21.969	43.755	0.485	OK	OK	84-1	6.4
85	0	COMB2G	Combination	Max	-211.517	7.310	13.826	0.755	47.945	22.215	52.841	0.395	OK	OK	85-1	0
85	3.2	COMB2G	Combination	Max	-223.841	7.310	13.826	0.755	5.138	0.865	5.210	0.119	OK	OK	85-1	3.2
85	6.4	COMB2G	Combination	Max	-236.164	7.310	13.826	0.755	24.007	20.425	31.520	0.279	OK	OK	85-1	6.4
85	0	COMB2G	Combination	Min	-238.088	-6.113	-5.897	-0.952	-13.732	-18.700	23.200	0.231	OK	OK	85-1	0
85	3.2	COMB2G	Combination	Min	-250.411	-6.113	-5.897	-0.952	3.701	-1.181	3.885	0.122	OK	OK	85-1	3.2
85	6.4	COMB2G	Combination	Min	-262.735	-6.113	-5.897	-0.952	-40.543	-24.572	47.408	0.383	OK	OK	85-1	6.4
92	0	COMB2G	Combination	Max	-208.818	7.494	7.948	0.824	19.518	22.218	29.573	0.257	OK	OK	92-1	0

92	3.125	COMB2G	Combination	Max	-220.853	7.494	7.948	0.824	-3.577	0.879	3.683	0.109	OK	OK	92-1	3.125
92	6.25	COMB2G	Combination	Max	-232.888	7.494	7.948	0.824	46.736	20.284	50.948	0.392	OK	OK	92-1	6.25
92	0	COMB2G	Combination	Min	-240.380	-6.211	-16.100	-0.626	-53.890	-18.535	56.989	0.430	OK	OK	92-1	0
92	3.125	COMB2G	Combination	Min	-252.415	-6.211	-16.100	-0.626	-5.319	-1.206	5.454	0.132	OK	OK	92-1	3.125
92	6.25	COMB2G	Combination	Min	-264.449	-6.211	-16.100	-0.626	-30.156	-24.621	38.930	0.334	OK	OK	92-1	6.25
93	0	COMB2G	Combination	Max	-542.706	6.833	10.323	0.763	29.510	20.289	35.812	0.425	OK	OK	93-1	0
93	3.125	COMB2G	Combination	Max	-554.741	6.833	10.323	0.763	-2.186	0.707	2.298	0.233	OK	OK	93-1	3.125
93	6.25	COMB2G	Combination	Max	-566.776	6.833	10.323	0.763	44.202	17.564	47.564	0.504	OK	OK	93-1	6.25
93	0	COMB2G	Combination	Min	-551.118	-5.395	-14.844	-0.647	-48.574	-16.156	51.191	0.519	OK	OK	93-1	0
93	3.125	COMB2G	Combination	Min	-563.153	-5.395	-14.844	-0.647	-2.749	-1.069	2.949	0.240	OK	OK	93-1	3.125
93	6.25	COMB2G	Combination	Min	-575.187	-5.395	-14.844	-0.647	-35.008	-22.420	41.571	0.472	OK	OK	93-1	6.25
94	0	COMB2G	Combination	Max	-662.751	6.052	12.627	0.701	39.219	17.900	43.111	0.516	OK	OK	94-1	0
94	3.125	COMB2G	Combination	Max	-674.786	6.052	12.627	0.701	0.241	0.626	0.671	0.271	OK	OK	94-1	3.125
94	6.25	COMB2G	Combination	Max	-686.821	6.052	12.627	0.701	39.697	14.894	42.399	0.521	OK	OK	94-1	6.25
94	0	COMB2G	Combination	Min	-663.100	-4.566	-12.626	-0.701	-39.215	-13.642	41.520	0.507	OK	OK	94-1	0
94	3.125	COMB2G	Combination	Min	-675.134	-4.566	-12.626	-0.701	-0.241	-1.012	1.040	0.273	OK	OK	94-1	3.125
94	6.25	COMB2G	Combination	Min	-687.169	-4.566	-12.626	-0.701	-39.701	-19.924	44.420	0.533	OK	OK	94-1	6.25
95	0	COMB2G	Combination	Max	-542.726	6.833	14.846	0.647	48.579	20.288	52.645	0.524	OK	OK	95-1	0
95	3.125	COMB2G	Combination	Max	-554.760	6.833	14.846	0.647	2.749	0.708	2.838	0.236	OK	OK	95-1	3.125
95	6.25	COMB2G	Combination	Max	-566.795	6.833	14.846	0.647	35.003	17.560	39.161	0.455	OK	OK	95-1	6.25
95	0	COMB2G	Combination	Min	-551.112	-5.393	-10.321	-0.763	-29.506	-16.150	33.636	0.416	OK	OK	95-1	0
95	3.125	COMB2G	Combination	Min	-563.147	-5.393	-10.321	-0.763	2.186	-1.069	2.433	0.237	OK	OK	95-1	3.125
95	6.25	COMB2G	Combination	Min	-575.181	-5.393	-10.321	-0.763	-44.207	-22.419	49.566	0.519	OK	OK	95-1	6.25
96	0	COMB2G	Combination	Max	-208.826	7.494	16.102	0.626	53.896	22.217	58.296	0.426	OK	OK	96-1	0
96	3.125	COMB2G	Combination	Max	-220.861	7.494	16.102	0.626	5.318	0.880	5.391	0.119	OK	OK	96-1	3.125
96	6.25	COMB2G	Combination	Max	-232.895	7.494	16.102	0.626	30.152	20.280	36.337	0.306	OK	OK	96-1	6.25
96	0	COMB2G	Combination	Min	-240.377	-6.209	-7.947	-0.824	-19.515	-18.529	26.910	0.253	OK	OK	96-1	0
96	3.125	COMB2G	Combination	Min	-252.412	-6.209	-7.947	-0.824	3.578	-1.206	3.775	0.122	OK	OK	96-1	3.125
96	6.25	COMB2G	Combination	Min	-264.446	-6.209	-7.947	-0.824	-46.741	-24.621	52.829	0.415	OK	OK	96-1	6.25
103	0	COMB2G	Combination	Max	-206.360	7.624	9.891	0.683	24.727	22.066	33.141	0.277	OK	OK	103-1	0
103	3.055	COMB2G	Combination	Max	-218.125	7.624	9.891	0.683	-3.461	0.889	3.573	0.107	OK	OK	103-1	3.055
103	6.11	COMB2G	Combination	Max	-229.890	7.624	9.891	0.683	52.331	19.995	56.021	0.421	OK	OK	103-1	6.11
103	0	COMB2G	Combination	Min	-242.474	-6.257	-18.262	-0.484	-59.252	-18.233	61.994	0.461	OK	OK	103-1	0
103	3.055	COMB2G	Combination	Min	-254.239	-6.257	-18.262	-0.484	-5.489	-1.234	5.626	0.134	OK	OK	103-1	3.055
103	6.11	COMB2G	Combination	Min	-266.004	-6.257	-18.262	-0.484	-35.705	-24.518	43.312	0.360	OK	OK	103-1	6.11
104	0	COMB2G	Combination	Max	-542.170	7.097	12.426	0.628	35.159	20.576	40.737	0.454	OK	OK	104-1	0
104	3.055	COMB2G	Combination	Max	-553.935	7.097	12.426	0.628	-2.147	0.731	2.268	0.233	OK	OK	104-1	3.055
104	6.11	COMB2G	Combination	Max	-565.700	7.097	12.426	0.628	49.953	17.729	53.006	0.536	OK	OK	104-1	6.11
104	0	COMB2G	Combination	Min	-551.873	-5.566	-17.054	-0.512	-54.247	-16.279	56.637	0.552	OK	OK	104-1	0
104	3.055	COMB2G	Combination	Min	-563.638	-5.566	-17.054	-0.512	-2.802	-1.111	3.014	0.241	OK	OK	104-1	3.055
104	6.11	COMB2G	Combination	Min	-575.403	-5.566	-17.054	-0.512	-40.763	-22.784	46.699	0.502	OK	OK	104-1	6.11
105	0	COMB2G	Combination	Max	-662.802	6.431	14.788	0.568	44.893	18.575	48.584	0.548	OK	OK	105-1	0
105	3.055	COMB2G	Combination	Max	-674.567	6.431	14.788	0.568	0.283	0.668	0.725	0.271	OK	OK	105-1	3.055
105	6.11	COMB2G	Combination	Max	-686.332	6.431	14.788	0.568	45.458	15.489	48.024	0.554	OK	OK	105-1	6.11
105	0	COMB2G	Combination	Min	-663.156	-4.852	-14.787	-0.568	-44.893	-14.154	47.071	0.539	OK	OK	105-1	0
105	3.055	COMB2G	Combination	Min	-674.921	-4.852	-14.787	-0.568	-0.284	-1.073	1.110	0.274	OK	OK	105-1	3.055
105	6.11	COMB2G	Combination	Min	-686.686	-4.852	-14.787	-0.568	-45.461	-20.720	49.960	0.566	OK	OK	105-1	6.11
106	0	COMB2G	Combination	Max	-542.159	7.086	17.055	0.511	54.249	20.531	58.004	0.556	OK	OK	106-1	0
106	3.055	COMB2G	Combination	Max	-553.924	7.086	17.055	0.511	2.805	0.740	2.901	0.236	OK	OK	106-1	3.055
106	6.11	COMB2G	Combination	Max	-565.689	7.086	17.055	0.511	40.751	17.711	44.434	0.485	OK	OK	106-1	6.11

106	0	COMB2G	Combination	Min	-551.808	-5.557	-12.421	-0.628	-35.141	-16.243	38.714	0.446	OK	OK	106-1	0
106	3.055	COMB2G	Combination	Min	-563.573	-5.557	-12.421	-0.628	2.146	-1.122	2.422	0.237	OK	OK	106-1	3.055
106	6.11	COMB2G	Combination	Min	-575.338	-5.557	-12.421	-0.628	-49.957	-22.763	54.898	0.551	OK	OK	106-1	6.11
107	0	COMB2G	Combination	Max	-206.387	7.613	18.260	0.484	59.240	22.019	63.199	0.453	OK	OK	107-1	0
107	3.055	COMB2G	Combination	Max	-218.152	7.613	18.260	0.484	5.491	0.899	5.564	0.119	OK	OK	107-1	3.055
107	6.11	COMB2G	Combination	Max	-229.917	7.613	18.260	0.484	35.696	19.975	40.905	0.332	OK	OK	107-1	6.11
107	0	COMB2G	Combination	Min	-242.465	-6.247	-9.887	-0.683	-24.714	-18.194	30.689	0.276	OK	OK	107-1	0
107	3.055	COMB2G	Combination	Min	-254.230	-6.247	-9.887	-0.683	3.456	-1.246	3.674	0.122	OK	OK	107-1	3.055
107	6.11	COMB2G	Combination	Min	-265.995	-6.247	-9.887	-0.683	-52.328	-24.495	57.777	0.445	OK	OK	107-1	6.11
114	0	COMB2G	Combination	Max	-204.053	7.783	11.793	0.540	29.485	21.925	36.743	0.297	OK	OK	114-1	0
114	2.98	COMB2G	Combination	Max	-215.529	7.783	11.793	0.540	-3.352	0.918	3.476	0.106	OK	OK	114-1	2.98
114	5.96	COMB2G	Combination	Max	-227.005	7.783	11.793	0.540	57.483	19.728	60.774	0.447	OK	OK	114-1	5.96
114	0	COMB2G	Combination	Min	-244.386	-6.319	-20.414	-0.339	-64.187	-17.934	66.645	0.489	OK	OK	114-1	0
114	2.98	COMB2G	Combination	Min	-255.862	-6.319	-20.414	-0.339	-5.659	-1.288	5.804	0.135	OK	OK	114-1	2.98
114	5.96	COMB2G	Combination	Min	-267.338	-6.319	-20.414	-0.339	-40.804	-24.460	47.573	0.386	OK	OK	114-1	5.96
115	0	COMB2G	Combination	Max	-541.736	7.405	14.499	0.490	40.351	20.910	45.447	0.482	OK	OK	115-1	0
115	2.98	COMB2G	Combination	Max	-553.213	7.405	14.499	0.490	-2.110	0.768	2.245	0.232	OK	OK	115-1	2.98
115	5.96	COMB2G	Combination	Max	-564.689	7.405	14.499	0.490	55.247	17.949	58.089	0.565	OK	OK	115-1	5.96
115	0	COMB2G	Combination	Min	-552.671	-5.771	-19.247	-0.373	-59.466	-16.445	61.698	0.582	OK	OK	115-1	0
115	2.98	COMB2G	Combination	Min	-564.147	-5.771	-19.247	-0.373	-2.855	-1.174	3.087	0.241	OK	OK	115-1	2.98
115	5.96	COMB2G	Combination	Min	-575.623	-5.771	-19.247	-0.373	-46.062	-23.227	51.587	0.531	OK	OK	115-1	5.96
116	0	COMB2G	Combination	Max	-662.897	6.875	16.925	0.433	50.111	19.343	53.715	0.578	OK	OK	116-1	0
116	2.98	COMB2G	Combination	Max	-674.373	6.875	16.925	0.433	0.326	0.711	0.782	0.271	OK	OK	116-1	2.98
116	5.96	COMB2G	Combination	Max	-685.850	6.875	16.925	0.433	50.758	16.174	53.272	0.585	OK	OK	116-1	5.96
116	0	COMB2G	Combination	Min	-663.230	-5.189	-16.923	-0.433	-50.105	-14.753	52.232	0.570	OK	OK	116-1	0
116	2.98	COMB2G	Combination	Min	-674.706	-5.189	-16.923	-0.433	-0.326	-1.144	1.189	0.274	OK	OK	116-1	2.98
116	5.96	COMB2G	Combination	Min	-686.183	-5.189	-16.923	-0.433	-50.764	-21.630	55.180	0.596	OK	OK	116-1	5.96
117	0	COMB2G	Combination	Max	-541.733	7.404	19.249	0.373	59.472	20.903	63.039	0.585	OK	OK	117-1	0
117	2.98	COMB2G	Combination	Max	-553.210	7.404	19.249	0.373	2.855	0.768	2.957	0.236	OK	OK	117-1	2.98
117	5.96	COMB2G	Combination	Max	-564.686	7.404	19.249	0.373	46.056	17.947	49.429	0.514	OK	OK	117-1	5.96
117	0	COMB2G	Combination	Min	-552.695	-5.770	-14.497	-0.490	-40.345	-16.443	43.567	0.475	OK	OK	117-1	0
117	2.98	COMB2G	Combination	Min	-564.172	-5.770	-14.497	-0.490	2.110	-1.175	2.415	0.237	OK	OK	117-1	2.98
117	5.96	COMB2G	Combination	Min	-575.648	-5.770	-14.497	-0.490	-55.253	-23.223	59.935	0.580	OK	OK	117-1	5.96
118	0	COMB2G	Combination	Max	-204.052	7.781	20.416	0.339	64.192	21.919	67.831	0.480	OK	OK	118-1	0
118	2.98	COMB2G	Combination	Max	-215.528	7.781	20.416	0.339	5.660	0.918	5.734	0.119	OK	OK	118-1	2.98
118	5.96	COMB2G	Combination	Max	-227.004	7.781	20.416	0.339	40.797	19.727	45.316	0.356	OK	OK	118-1	5.96
118	0	COMB2G	Combination	Min	-244.397	-6.318	-11.791	-0.540	-29.477	-17.932	34.503	0.300	OK	OK	118-1	0
118	2.98	COMB2G	Combination	Min	-255.873	-6.318	-11.791	-0.540	3.352	-1.289	3.591	0.122	OK	OK	118-1	2.98
118	5.96	COMB2G	Combination	Min	-267.349	-6.318	-11.791	-0.540	-57.488	-24.456	62.474	0.473	OK	OK	118-1	5.96
125	0	COMB2G	Combination	Max	-202.001	7.967	13.582	0.405	33.634	21.824	40.094	0.316	OK	OK	125-1	0
125	2.905	COMB2G	Combination	Max	-213.189	7.967	13.582	0.405	-3.255	0.981	3.400	0.104	OK	OK	125-1	2.905
125	5.81	COMB2G	Combination	Max	-224.376	7.967	13.582	0.405	62.007	19.490	64.998	0.471	OK	OK	125-1	5.81
125	0	COMB2G	Combination	Min	-246.037	-6.389	-22.465	-0.203	-68.517	-17.631	70.749	0.514	OK	OK	125-1	0
125	2.905	COMB2G	Combination	Min	-257.224	-6.389	-22.465	-0.203	-5.821	-1.372	5.980	0.137	OK	OK	125-1	2.905
125	5.81	COMB2G	Combination	Min	-268.412	-6.389	-22.465	-0.203	-45.276	-24.464	51.463	0.409	OK	OK	125-1	5.81
126	0	COMB2G	Combination	Max	-541.354	7.750	16.458	0.360	44.905	21.294	49.698	0.507	OK	OK	126-1	0
126	2.905	COMB2G	Combination	Max	-552.541	7.750	16.458	0.360	-2.075	0.828	2.235	0.232	OK	OK	126-1	2.905
126	5.81	COMB2G	Combination	Max	-563.728	7.750	16.458	0.360	59.896	18.196	62.599	0.591	OK	OK	126-1	5.81
126	0	COMB2G	Combination	Min	-553.382	-5.991	-21.333	-0.242	-64.047	-16.611	66.166	0.608	OK	OK	126-1	0
126	2.905	COMB2G	Combination	Min	-564.570	-5.991	-21.333	-0.242	-2.906	-1.255	3.166	0.242	OK	OK	126-1	2.905

126	5.81	COMB2G	Combination	Min	-575.757	-5.991	-21.333	-0.242	-50.717	-23.734	55.996	0.557	OK	OK	126-1	5.81
127	0	COMB2G	Combination	Max	-662.966	7.364	18.950	0.304	54.683	20.174	58.285	0.605	OK	OK	127-1	0
127	2.905	COMB2G	Combination	Max	-674.154	7.364	18.950	0.304	0.367	0.764	0.848	0.272	OK	OK	127-1	2.905
127	5.81	COMB2G	Combination	Max	-685.341	7.364	18.950	0.304	55.411	16.890	57.928	0.612	OK	OK	127-1	5.81
127	0	COMB2G	Combination	Min	-663.307	-5.551	-18.948	-0.304	-54.676	-15.362	56.793	0.597	OK	OK	127-1	0
127	2.905	COMB2G	Combination	Min	-674.495	-5.551	-18.948	-0.304	-0.367	-1.219	1.273	0.274	OK	OK	127-1	2.905
127	5.81	COMB2G	Combination	Min	-685.682	-5.551	-18.948	-0.304	-55.418	-22.611	59.853	0.623	OK	OK	127-1	5.81
128	0	COMB2G	Combination	Max	-541.352	7.750	21.335	0.242	64.053	21.294	67.499	0.611	OK	OK	128-1	0
128	2.905	COMB2G	Combination	Max	-552.539	7.750	21.335	0.242	2.906	0.828	3.022	0.236	OK	OK	128-1	2.905
128	5.81	COMB2G	Combination	Max	-563.727	7.750	21.335	0.242	50.710	18.195	53.875	0.540	OK	OK	128-1	5.81
128	0	COMB2G	Combination	Min	-553.381	-5.990	-16.456	-0.360	-44.898	-16.610	47.872	0.501	OK	OK	128-1	0
128	2.905	COMB2G	Combination	Min	-564.568	-5.990	-16.456	-0.360	2.075	-1.255	2.426	0.238	OK	OK	128-1	2.905
128	5.81	COMB2G	Combination	Min	-575.755	-5.990	-16.456	-0.360	-59.902	-23.733	64.432	0.607	OK	OK	128-1	5.81
129	0	COMB2G	Combination	Max	-202.002	7.967	22.467	0.203	68.523	21.824	71.914	0.503	OK	OK	129-1	0
129	2.905	COMB2G	Combination	Max	-213.189	7.967	22.467	0.203	5.821	0.981	5.903	0.119	OK	OK	129-1	2.905
129	5.81	COMB2G	Combination	Max	-224.377	7.967	22.467	0.203	45.269	19.488	49.286	0.379	OK	OK	129-1	5.81
129	0	COMB2G	Combination	Min	-246.038	-6.389	-13.579	-0.405	-33.627	-17.630	37.969	0.321	OK	OK	129-1	0
129	2.905	COMB2G	Combination	Min	-257.225	-6.389	-13.579	-0.405	3.255	-1.372	3.532	0.123	OK	OK	129-1	2.905
129	5.81	COMB2G	Combination	Min	-268.413	-6.389	-13.579	-0.405	-62.013	-24.464	66.664	0.498	OK	OK	129-1	5.81
136	0	COMB2G	Combination	Max	-200.227	8.204	15.234	0.299	37.136	21.805	43.064	0.333	OK	OK	136-1	0
136	2.83	COMB2G	Combination	Max	-211.125	8.204	15.234	0.299	-3.163	1.079	3.342	0.103	OK	OK	136-1	2.83
136	5.66	COMB2G	Combination	Max	-222.024	8.204	15.234	0.299	65.867	19.407	68.666	0.492	OK	OK	136-1	5.66
136	0	COMB2G	Combination	Min	-247.423	-6.505	-24.392	-0.095	-72.193	-17.417	74.264	0.535	OK	OK	136-1	0
136	2.83	COMB2G	Combination	Min	-258.321	-6.505	-24.392	-0.095	-5.977	-1.500	6.163	0.138	OK	OK	136-1	2.83
136	5.66	COMB2G	Combination	Min	-269.220	-6.505	-24.392	-0.095	-49.091	-24.637	54.926	0.430	OK	OK	136-1	5.66
137	0	COMB2G	Combination	Max	-541.007	8.137	18.282	0.255	48.781	21.714	53.396	0.528	OK	OK	137-1	0
137	2.83	COMB2G	Combination	Max	-551.905	8.137	18.282	0.255	-2.044	0.909	2.237	0.232	OK	OK	137-1	2.83
137	5.66	COMB2G	Combination	Max	-562.804	8.137	18.282	0.255	63.872	18.531	66.506	0.614	OK	OK	137-1	5.66
137	0	COMB2G	Combination	Min	-553.953	-6.245	-23.292	-0.136	-67.960	-16.818	70.010	0.631	OK	OK	137-1	0
137	2.83	COMB2G	Combination	Min	-564.851	-6.245	-23.292	-0.136	-2.958	-1.366	3.258	0.243	OK	OK	137-1	2.83
137	5.66	COMB2G	Combination	Min	-575.750	-6.245	-23.292	-0.136	-54.697	-24.342	59.869	0.580	OK	OK	137-1	5.66
138	0	COMB2G	Combination	Max	-663.094	7.895	20.846	0.199	58.587	21.035	62.249	0.629	OK	OK	138-1	0
138	2.83	COMB2G	Combination	Max	-673.992	7.895	20.846	0.199	0.406	0.825	0.920	0.272	OK	OK	138-1	2.83
138	5.66	COMB2G	Combination	Max	-684.891	7.895	20.846	0.199	59.392	17.647	61.958	0.635	OK	OK	138-1	5.66
138	0	COMB2G	Combination	Min	-663.422	-5.944	-20.843	-0.199	-58.580	-15.997	60.725	0.620	OK	OK	138-1	0
138	2.83	COMB2G	Combination	Min	-674.321	-5.944	-20.843	-0.199	-0.406	-1.308	1.370	0.275	OK	OK	138-1	2.83
138	5.66	COMB2G	Combination	Min	-685.219	-5.944	-20.843	-0.199	-59.400	-23.652	63.935	0.647	OK	OK	138-1	5.66
139	0	COMB2G	Combination	Max	-541.030	8.136	23.295	0.136	67.967	21.712	71.351	0.634	OK	OK	139-1	0
139	2.83	COMB2G	Combination	Max	-551.929	8.136	23.295	0.136	2.958	0.910	3.095	0.237	OK	OK	139-1	2.83
139	5.66	COMB2G	Combination	Max	-562.827	8.136	23.295	0.136	54.688	18.527	57.741	0.562	OK	OK	139-1	5.66
139	0	COMB2G	Combination	Min	-553.942	-6.243	-18.279	-0.254	-48.772	-16.811	51.588	0.523	OK	OK	139-1	0
139	2.83	COMB2G	Combination	Min	-564.841	-6.243	-18.279	-0.254	2.044	-1.367	2.459	0.238	OK	OK	139-1	2.83
139	5.66	COMB2G	Combination	Min	-575.739	-6.243	-18.279	-0.254	-63.880	-24.341	68.360	0.630	OK	OK	139-1	5.66
140	0	COMB2G	Combination	Max	-200.236	8.204	24.395	0.095	72.202	21.803	75.422	0.523	OK	OK	140-1	0
140	2.83	COMB2G	Combination	Max	-211.135	8.204	24.395	0.095	5.977	1.081	6.074	0.119	OK	OK	140-1	2.83
140	5.66	COMB2G	Combination	Max	-222.033	8.204	24.395	0.095	49.083	19.403	52.779	0.398	OK	OK	140-1	5.66
140	0	COMB2G	Combination	Min	-247.423	-6.503	-15.232	-0.299	-37.130	-17.409	41.008	0.339	OK	OK	140-1	0
140	2.83	COMB2G	Combination	Min	-258.321	-6.503	-15.232	-0.299	3.163	-1.501	3.501	0.123	OK	OK	140-1	2.83
140	5.66	COMB2G	Combination	Min	-269.220	-6.503	-15.232	-0.299	-65.875	-24.636	70.331	0.520	OK	OK	140-1	5.66
147	0	COMB2G	Combination	Max	-198.644	8.640	16.759	0.263	40.052	22.257	45.821	0.348	OK	OK	147-1	0

147	2.755	COMB2G	Combination	Max	-209.254	8.640	16.759	0.263	-3.095	1.172	3.309	0.102	OK	OK	147-1	2.755
147	5.51	COMB2G	Combination	Max	-219.863	8.640	16.759	0.263	69.120	19.833	71.909	0.510	OK	OK	147-1	5.51
147	0	COMB2G	Combination	Min	-248.607	-6.797	-26.212	-0.057	-75.309	-17.628	77.344	0.553	OK	OK	147-1	0
147	2.755	COMB2G	Combination	Min	-259.216	-6.797	-26.212	-0.057	-6.118	-1.619	6.329	0.140	OK	OK	147-1	2.755
147	5.51	COMB2G	Combination	Min	-269.826	-6.797	-26.212	-0.057	-52.289	-25.357	58.113	0.449	OK	OK	147-1	5.51
148	0	COMB2G	Combination	Max	-540.755	8.656	19.981	0.214	52.050	22.432	56.678	0.547	OK	OK	148-1	0
148	2.755	COMB2G	Combination	Max	-551.365	8.656	19.981	0.214	-2.019	0.979	2.243	0.231	OK	OK	148-1	2.755
148	5.51	COMB2G	Combination	Max	-561.975	8.656	19.981	0.214	67.207	19.146	69.880	0.633	OK	OK	148-1	5.51
148	0	COMB2G	Combination	Min	-554.645	-6.609	-25.127	-0.095	-71.244	-17.275	73.308	0.651	OK	OK	148-1	0
148	2.755	COMB2G	Combination	Min	-565.255	-6.609	-25.127	-0.095	-2.999	-1.463	3.337	0.243	OK	OK	148-1	2.755
148	5.51	COMB2G	Combination	Min	-575.865	-6.609	-25.127	-0.095	-58.047	-25.270	63.309	0.600	OK	OK	148-1	5.51
149	0	COMB2G	Combination	Max	-663.147	8.490	22.609	0.154	61.843	21.993	65.637	0.649	OK	OK	149-1	0
149	2.755	COMB2G	Combination	Max	-673.757	8.490	22.609	0.154	0.443	0.886	0.991	0.272	OK	OK	149-1	2.755
149	5.51	COMB2G	Combination	Max	-684.366	8.490	22.609	0.154	62.724	18.469	65.387	0.655	OK	OK	149-1	5.51
149	0	COMB2G	Combination	Min	-663.476	-6.382	-22.607	-0.153	-61.839	-16.697	64.053	0.639	OK	OK	149-1	0
149	2.755	COMB2G	Combination	Min	-674.086	-6.382	-22.607	-0.153	-0.444	-1.399	1.467	0.275	OK	OK	149-1	2.755
149	5.51	COMB2G	Combination	Min	-684.695	-6.382	-22.607	-0.153	-62.731	-24.790	67.451	0.668	OK	OK	149-1	5.51
150	0	COMB2G	Combination	Max	-540.756	8.643	25.128	0.095	71.246	22.382	74.679	0.653	OK	OK	150-1	0
150	2.755	COMB2G	Combination	Max	-551.366	8.643	25.128	0.095	3.003	0.988	3.162	0.237	OK	OK	150-1	2.755
150	5.51	COMB2G	Combination	Max	-561.975	8.643	25.128	0.095	58.029	19.127	61.099	0.582	OK	OK	150-1	5.51
150	0	COMB2G	Combination	Min	-554.563	-6.598	-19.973	-0.214	-52.022	-17.236	54.803	0.542	OK	OK	150-1	0
150	2.755	COMB2G	Combination	Min	-565.173	-6.598	-19.973	-0.214	2.017	-1.476	2.499	0.238	OK	OK	150-1	2.755
150	5.51	COMB2G	Combination	Min	-575.783	-6.598	-19.973	-0.214	-67.212	-25.247	71.797	0.650	OK	OK	150-1	5.51
151	0	COMB2G	Combination	Max	-198.681	8.626	26.209	0.057	75.293	22.205	78.499	0.540	OK	OK	151-1	0
151	2.755	COMB2G	Combination	Max	-209.291	8.626	26.209	0.057	6.122	1.182	6.235	0.119	OK	OK	151-1	2.755
151	5.51	COMB2G	Combination	Max	-219.901	8.626	26.209	0.057	52.272	19.812	55.901	0.416	OK	OK	151-1	5.51
151	0	COMB2G	Combination	Min	-248.593	-6.786	-16.751	-0.263	-40.029	-17.586	43.721	0.356	OK	OK	151-1	0
151	2.755	COMB2G	Combination	Min	-259.202	-6.786	-16.751	-0.263	3.089	-1.632	3.493	0.123	OK	OK	151-1	2.755
151	5.51	COMB2G	Combination	Min	-269.812	-6.786	-16.751	-0.263	-69.116	-25.333	73.613	0.540	OK	OK	151-1	5.51
158	0	COMB2G	Combination	Max	-197.281	9.355	18.161	0.307	42.417	23.335	48.412	0.363	OK	OK	158-1	0
158	2.68	COMB2G	Combination	Max	-207.602	9.355	18.161	0.307	-3.032	1.274	3.289	0.101	OK	OK	158-1	2.68
158	5.36	COMB2G	Combination	Max	-217.923	9.355	18.161	0.307	71.802	20.971	74.802	0.526	OK	OK	158-1	5.36
158	0	COMB2G	Combination	Min	-249.488	-7.357	-27.923	-0.100	-77.866	-18.469	80.026	0.569	OK	OK	158-1	0
158	2.68	COMB2G	Combination	Min	-259.808	-7.357	-27.923	-0.100	-6.254	-1.760	6.497	0.141	OK	OK	158-1	2.68
158	5.36	COMB2G	Combination	Min	-270.129	-7.357	-27.923	-0.100	-54.924	-26.809	61.118	0.466	OK	OK	158-1	5.36
159	0	COMB2G	Combination	Max	-540.521	9.338	21.557	0.253	54.732	23.462	59.549	0.564	OK	OK	159-1	0
159	2.68	COMB2G	Combination	Max	-550.841	9.338	21.557	0.253	-1.995	1.059	2.258	0.231	OK	OK	159-1	2.68
159	5.36	COMB2G	Combination	Max	-561.162	9.338	21.557	0.253	69.961	20.135	72.801	0.650	OK	OK	159-1	5.36
159	0	COMB2G	Combination	Min	-555.104	-7.123	-26.849	-0.133	-73.951	-18.048	76.121	0.667	OK	OK	159-1	0
159	2.68	COMB2G	Combination	Min	-565.425	-7.123	-26.849	-0.133	-3.041	-1.581	3.428	0.244	OK	OK	159-1	2.68
159	5.36	COMB2G	Combination	Min	-575.746	-7.123	-26.849	-0.133	-60.815	-26.594	66.375	0.618	OK	OK	159-1	5.36
160	0	COMB2G	Combination	Max	-663.168	9.147	24.257	0.186	64.530	23.011	68.510	0.665	OK	OK	160-1	0
160	2.68	COMB2G	Combination	Max	-673.489	9.147	24.257	0.186	0.478	0.951	1.064	0.273	OK	OK	160-1	2.68
160	5.36	COMB2G	Combination	Max	-683.810	9.147	24.257	0.186	65.477	19.356	68.278	0.672	OK	OK	160-1	5.36
160	0	COMB2G	Combination	Min	-663.456	-6.868	-24.253	-0.186	-64.520	-17.455	66.839	0.656	OK	OK	160-1	0
160	2.68	COMB2G	Combination	Min	-673.777	-6.868	-24.253	-0.186	-0.479	-1.503	1.577	0.276	OK	OK	160-1	2.68
160	5.36	COMB2G	Combination	Min	-684.098	-6.868	-24.253	-0.186	-65.487	-26.016	70.465	0.685	OK	OK	160-1	5.36
161	0	COMB2G	Combination	Max	-540.513	9.337	26.853	0.133	73.960	23.456	77.591	0.670	OK	OK	161-1	0
161	2.68	COMB2G	Combination	Max	-550.833	9.337	26.853	0.133	3.041	1.059	3.220	0.237	OK	OK	161-1	2.68
161	5.36	COMB2G	Combination	Max	-561.154	9.337	26.853	0.133	60.803	20.136	64.050	0.599	OK	OK	161-1	5.36

161	0	COMB2G	Combination	Min	-555.135	-7.123	-21.553	-0.253	-54.721	-18.048	57.620	0.559	OK	OK	161-1	0
161	2.68	COMB2G	Combination	Min	-565.456	-7.123	-21.553	-0.253	1.995	-1.583	2.546	0.239	OK	OK	161-1	2.68
161	5.36	COMB2G	Combination	Min	-575.777	-7.123	-21.553	-0.253	-69.971	-26.592	74.853	0.668	OK	OK	161-1	5.36
162	0	COMB2G	Combination	Max	-197.282	9.353	27.926	0.100	77.873	23.329	81.293	0.556	OK	OK	162-1	0
162	2.68	COMB2G	Combination	Max	-207.603	9.353	27.926	0.100	6.254	1.275	6.383	0.120	OK	OK	162-1	2.68
162	5.36	COMB2G	Combination	Max	-217.923	9.353	27.926	0.100	54.912	20.972	58.780	0.432	OK	OK	162-1	5.36
162	0	COMB2G	Combination	Min	-249.501	-7.358	-18.156	-0.307	-42.404	-18.469	46.251	0.371	OK	OK	162-1	0
162	2.68	COMB2G	Combination	Min	-259.822	-7.358	-18.156	-0.307	3.032	-1.762	3.506	0.123	OK	OK	162-1	2.68
162	5.36	COMB2G	Combination	Min	-270.143	-7.358	-18.156	-0.307	-71.810	-26.807	76.651	0.558	OK	OK	162-1	5.36
169	0	COMB2G	Combination	Max	-196.391	10.310	19.472	0.371	44.339	24.995	50.899	0.377	OK	OK	169-1	0
169	2.605	COMB2G	Combination	Max	-206.423	10.310	19.472	0.371	-2.979	1.413	3.297	0.101	OK	OK	169-1	2.605
169	5.21	COMB2G	Combination	Max	-216.455	10.310	19.472	0.371	74.041	22.408	77.357	0.541	OK	OK	169-1	5.21
169	0	COMB2G	Combination	Min	-250.578	-8.062	-29.566	-0.162	-79.999	-19.594	82.364	0.584	OK	OK	169-1	0
169	2.605	COMB2G	Combination	Min	-260.610	-8.062	-29.566	-0.162	-6.386	-1.871	6.654	0.142	OK	OK	169-1	2.605
169	5.21	COMB2G	Combination	Min	-270.642	-8.062	-29.566	-0.162	-57.111	-28.724	63.927	0.483	OK	OK	169-1	5.21
170	0	COMB2G	Combination	Max	-540.688	10.206	23.049	0.315	56.960	24.919	62.173	0.580	OK	OK	170-1	0
170	2.605	COMB2G	Combination	Max	-550.720	10.206	23.049	0.315	-1.974	1.176	2.298	0.231	OK	OK	170-1	2.605
170	5.21	COMB2G	Combination	Max	-560.753	10.206	23.049	0.315	72.259	21.296	75.331	0.665	OK	OK	170-1	5.21
170	0	COMB2G	Combination	Min	-555.988	-7.725	-28.496	-0.195	-76.207	-18.951	78.528	0.682	OK	OK	170-1	0
170	2.605	COMB2G	Combination	Min	-566.020	-7.725	-28.496	-0.195	-3.083	-1.671	3.506	0.245	OK	OK	170-1	2.605
170	5.21	COMB2G	Combination	Min	-576.052	-7.725	-28.496	-0.195	-63.126	-28.253	69.160	0.635	OK	OK	170-1	5.21
171	0	COMB2G	Combination	Max	-663.561	9.917	25.824	0.246	66.758	24.253	71.027	0.680	OK	OK	171-1	0
171	2.605	COMB2G	Combination	Max	-673.593	9.917	25.824	0.246	0.512	1.057	1.175	0.273	OK	OK	171-1	2.605
171	5.21	COMB2G	Combination	Max	-683.625	9.917	25.824	0.246	67.772	20.251	70.733	0.687	OK	OK	171-1	5.21
171	0	COMB2G	Combination	Min	-663.925	-7.368	-25.819	-0.246	-66.747	-18.137	69.167	0.670	OK	OK	171-1	0
171	2.605	COMB2G	Combination	Min	-673.957	-7.368	-25.819	-0.246	-0.512	-1.582	1.662	0.276	OK	OK	171-1	2.605
171	5.21	COMB2G	Combination	Min	-683.989	-7.368	-25.819	-0.246	-67.783	-27.416	73.118	0.701	OK	OK	171-1	5.21
172	0	COMB2G	Combination	Max	-540.686	10.206	28.500	0.195	76.216	24.921	80.187	0.686	OK	OK	172-1	0
172	2.605	COMB2G	Combination	Max	-550.718	10.206	28.500	0.195	3.083	1.176	3.299	0.237	OK	OK	172-1	2.605
172	5.21	COMB2G	Combination	Max	-560.750	10.206	28.500	0.195	63.113	21.297	66.609	0.614	OK	OK	172-1	5.21
172	0	COMB2G	Combination	Min	-555.986	-7.725	-23.044	-0.315	-56.948	-18.952	60.018	0.573	OK	OK	172-1	0
172	2.605	COMB2G	Combination	Min	-566.018	-7.725	-23.044	-0.315	1.974	-1.671	2.586	0.239	OK	OK	172-1	2.605
172	5.21	COMB2G	Combination	Min	-576.050	-7.725	-23.044	-0.315	-72.268	-28.255	77.595	0.684	OK	OK	172-1	5.21
173	0	COMB2G	Combination	Max	-196.392	10.311	29.570	0.162	80.008	24.997	83.822	0.571	OK	OK	173-1	0
173	2.605	COMB2G	Combination	Max	-206.424	10.311	29.570	0.162	6.386	1.413	6.540	0.120	OK	OK	173-1	2.605
173	5.21	COMB2G	Combination	Max	-216.456	10.311	29.570	0.162	57.098	22.409	61.338	0.446	OK	OK	173-1	5.21
173	0	COMB2G	Combination	Min	-250.581	-8.062	-19.467	-0.371	-44.327	-19.596	48.465	0.384	OK	OK	173-1	0
173	2.605	COMB2G	Combination	Min	-260.613	-8.062	-19.467	-0.371	2.979	-1.871	3.518	0.124	OK	OK	173-1	2.605
173	5.21	COMB2G	Combination	Min	-270.645	-8.062	-19.467	-0.371	-74.050	-28.726	79.426	0.574	OK	OK	173-1	5.21
180	0	COMB2G	Combination	Max	-193.013	11.002	20.763	0.422	46.028	25.523	52.631	0.386	OK	OK	180-1	0
180	2.53	COMB2G	Combination	Max	-202.756	11.002	20.763	0.422	-2.920	1.295	3.195	0.099	OK	OK	180-1	2.53
180	5.06	COMB2G	Combination	Max	-212.499	11.002	20.763	0.422	75.966	24.364	79.778	0.553	OK	OK	180-1	5.06
180	0	COMB2G	Combination	Min	-248.982	-9.119	-31.180	-0.211	-81.807	-21.778	84.656	0.597	OK	OK	180-1	0
180	2.53	COMB2G	Combination	Min	-258.725	-9.119	-31.180	-0.211	-6.503	-2.313	6.902	0.143	OK	OK	180-1	2.53
180	5.06	COMB2G	Combination	Min	-268.468	-9.119	-31.180	-0.211	-59.033	-30.146	66.285	0.496	OK	OK	180-1	5.06
181	0	COMB2G	Combination	Max	-537.785	10.811	24.516	0.368	58.906	25.256	64.092	0.590	OK	OK	181-1	0
181	2.53	COMB2G	Combination	Max	-547.528	10.811	24.516	0.368	-1.952	1.038	2.210	0.230	OK	OK	181-1	2.53
181	5.06	COMB2G	Combination	Max	-557.271	10.811	24.516	0.368	74.252	23.005	77.734	0.678	OK	OK	181-1	5.06
181	0	COMB2G	Combination	Min	-553.527	-8.683	-30.120	-0.247	-78.155	-20.932	80.909	0.695	OK	OK	181-1	0
181	2.53	COMB2G	Combination	Min	-563.271	-8.683	-30.120	-0.247	-3.120	-2.096	3.759	0.245	OK	OK	181-1	2.53

181	5.06	COMB2G	Combination	Min	-573.014	-8.683	-30.120	-0.247	-65.146	-29.445	71.492	0.647	OK	OK	181-1	5.06
182	0	COMB2G	Combination	Max	-660.696	10.414	27.365	0.299	68.688	24.345	72.875	0.690	OK	OK	182-1	0
182	2.53	COMB2G	Combination	Max	-670.439	10.414	27.365	0.299	0.546	0.907	1.059	0.272	OK	OK	182-1	2.53
182	5.06	COMB2G	Combination	Max	-680.182	10.414	27.365	0.299	69.768	21.704	73.066	0.699	OK	OK	182-1	5.06
182	0	COMB2G	Combination	Min	-660.948	-8.220	-27.360	-0.299	-68.676	-19.890	71.498	0.682	OK	OK	182-1	0
182	2.53	COMB2G	Combination	Min	-670.691	-8.220	-27.360	-0.299	-0.546	-2.002	2.075	0.278	OK	OK	182-1	2.53
182	5.06	COMB2G	Combination	Min	-680.434	-8.220	-27.360	-0.299	-69.780	-28.348	75.319	0.712	OK	OK	182-1	5.06
183	0	COMB2G	Combination	Max	-537.763	10.810	30.124	0.247	78.165	25.255	82.144	0.696	OK	OK	183-1	0
183	2.53	COMB2G	Combination	Max	-547.506	10.810	30.124	0.247	3.120	1.039	3.289	0.236	OK	OK	183-1	2.53
183	5.06	COMB2G	Combination	Max	-557.249	10.810	30.124	0.247	65.131	23.004	69.074	0.627	OK	OK	183-1	5.06
183	0	COMB2G	Combination	Min	-553.554	-8.682	-24.510	-0.368	-58.891	-20.927	62.499	0.587	OK	OK	183-1	0
183	2.53	COMB2G	Combination	Min	-563.298	-8.682	-24.510	-0.368	1.952	-2.097	2.864	0.240	OK	OK	183-1	2.53
183	5.06	COMB2G	Combination	Min	-573.041	-8.682	-24.510	-0.368	-74.262	-29.446	79.886	0.697	OK	OK	183-1	5.06
184	0	COMB2G	Combination	Max	-193.014	11.002	31.185	0.211	81.819	25.522	85.707	0.581	OK	OK	184-1	0
184	2.53	COMB2G	Combination	Max	-202.757	11.002	31.185	0.211	6.501	1.297	6.630	0.119	OK	OK	184-1	2.53
184	5.06	COMB2G	Combination	Max	-212.500	11.002	31.185	0.211	59.021	24.363	63.851	0.460	OK	OK	184-1	5.06
184	0	COMB2G	Combination	Min	-248.996	-9.118	-20.759	-0.422	-46.018	-21.772	50.909	0.398	OK	OK	184-1	0
184	2.53	COMB2G	Combination	Min	-258.739	-9.118	-20.759	-0.422	2.921	-2.314	3.726	0.124	OK	OK	184-1	2.53
184	5.06	COMB2G	Combination	Min	-268.482	-9.118	-20.759	-0.422	-75.977	-30.147	81.739	0.587	OK	OK	184-1	5.06
191	0	COMB2G	Combination	Max	-205.251	14.563	21.924	0.457	47.062	35.470	58.931	0.428	OK	OK	191-1	0
191	2.455	COMB2G	Combination	Max	-214.705	14.563	21.924	0.457	-2.992	3.165	4.356	0.111	OK	OK	191-1	2.455
191	4.91	COMB2G	Combination	Max	-224.160	14.563	21.924	0.457	78.033	22.733	81.277	0.567	OK	OK	191-1	4.91
191	0	COMB2G	Combination	Min	-266.055	-7.971	-33.013	-0.237	-84.059	-16.405	85.645	0.609	OK	OK	191-1	0
191	2.455	COMB2G	Combination	Min	-275.509	-7.971	-33.013	-0.237	-6.783	-0.285	6.789	0.149	OK	OK	191-1	2.455
191	4.91	COMB2G	Combination	Min	-284.964	-7.971	-33.013	-0.237	-60.585	-36.037	70.493	0.527	OK	OK	191-1	4.91
192	0	COMB2G	Combination	Max	-557.989	14.514	25.965	0.406	60.528	35.758	70.301	0.634	OK	OK	192-1	0
192	2.455	COMB2G	Combination	Max	-567.444	14.514	25.965	0.406	-1.983	3.066	3.652	0.246	OK	OK	192-1	2.455
192	4.91	COMB2G	Combination	Max	-576.898	14.514	25.965	0.406	76.229	20.870	79.034	0.693	OK	OK	192-1	4.91
192	0	COMB2G	Combination	Min	-578.405	-7.252	-31.858	-0.281	-80.195	-14.738	81.538	0.709	OK	OK	192-1	0
192	2.455	COMB2G	Combination	Min	-587.860	-7.252	-31.858	-0.281	-3.216	0.126	3.218	0.252	OK	OK	192-1	2.455
192	4.91	COMB2G	Combination	Min	-597.314	-7.252	-31.858	-0.281	-66.959	-35.505	75.790	0.682	OK	OK	192-1	4.91
193	0	COMB2G	Combination	Max	-683.690	14.160	28.956	0.335	70.505	35.106	78.762	0.734	OK	OK	193-1	0
193	2.455	COMB2G	Combination	Max	-693.145	14.160	28.956	0.335	0.581	3.058	3.113	0.293	OK	OK	193-1	2.455
193	4.91	COMB2G	Combination	Max	-702.599	14.160	28.956	0.335	71.655	19.130	74.164	0.714	OK	OK	193-1	4.91
193	0	COMB2G	Combination	Min	-687.995	-6.547	-28.951	-0.335	-70.494	-13.014	71.685	0.694	OK	OK	193-1	0
193	2.455	COMB2G	Combination	Min	-697.450	-6.547	-28.951	-0.335	-0.581	0.342	0.674	0.280	OK	OK	193-1	2.455
193	4.91	COMB2G	Combination	Min	-706.904	-6.547	-28.951	-0.335	-71.667	-34.422	79.505	0.747	OK	OK	193-1	4.91
194	0	COMB2G	Combination	Max	-557.904	14.487	31.862	0.281	80.204	35.667	87.777	0.737	OK	OK	194-1	0
194	2.455	COMB2G	Combination	Max	-567.358	14.487	31.862	0.281	3.222	3.074	4.453	0.251	OK	OK	194-1	2.455
194	4.91	COMB2G	Combination	Max	-576.813	14.487	31.862	0.281	66.932	20.858	70.107	0.641	OK	OK	194-1	4.91
194	0	COMB2G	Combination	Min	-578.219	-7.244	-25.952	-0.406	-60.493	-14.711	62.256	0.595	OK	OK	194-1	0
194	2.455	COMB2G	Combination	Min	-587.674	-7.244	-25.952	-0.406	1.982	0.102	1.984	0.244	OK	OK	194-1	2.455
194	4.91	COMB2G	Combination	Min	-597.128	-7.244	-25.952	-0.406	-76.237	-35.463	84.081	0.731	OK	OK	194-1	4.91
195	0	COMB2G	Combination	Max	-205.253	14.536	33.009	0.237	84.042	35.377	91.184	0.618	OK	OK	195-1	0
195	2.455	COMB2G	Combination	Max	-214.708	14.536	33.009	0.237	6.786	3.174	7.492	0.129	OK	OK	195-1	2.455
195	4.91	COMB2G	Combination	Max	-224.162	14.536	33.009	0.237	60.569	22.720	64.690	0.469	OK	OK	195-1	4.91
195	0	COMB2G	Combination	Min	-266.001	-7.962	-21.916	-0.457	-47.039	-16.374	49.807	0.398	OK	OK	195-1	0
195	2.455	COMB2G	Combination	Min	-275.455	-7.962	-21.916	-0.457	2.984	-0.310	3.000	0.127	OK	OK	195-1	2.455
195	4.91	COMB2G	Combination	Min	-284.910	-7.962	-21.916	-0.457	-78.033	-35.994	85.934	0.618	OK	OK	195-1	4.91
202	0	COMB2G	Combination	Max	-126.479	-1.485	24.042	0.468	50.911	-18.793	54.269	0.369	OK	OK	202-1	0

202	2.38	COMB2G	Combination	Max	-135.644	-1.485	24.042	0.468	-1.957	-8.248	8.477	0.104	OK	OK	202-1	2.38
202	4.76	COMB2G	Combination	Max	-144.810	-1.485	24.042	0.468	78.425	44.758	90.299	0.588	OK	OK	202-1	4.76
202	0	COMB2G	Combination	Min	-195.734	-22.279	-33.839	-0.271	-82.651	-61.290	102.896	0.683	OK	OK	202-1	0
202	2.38	COMB2G	Combination	Min	-204.900	-22.279	-33.839	-0.271	-6.464	-15.277	16.589	0.179	OK	OK	202-1	2.38
202	4.76	COMB2G	Combination	Min	-214.065	-22.279	-33.839	-0.271	-63.528	-11.726	64.601	0.465	OK	OK	202-1	4.76
203	0	COMB2G	Combination	Max	-469.254	-4.808	27.279	0.434	61.386	-29.055	67.915	0.585	OK	OK	203-1	0
203	2.38	COMB2G	Combination	Max	-478.419	-4.808	27.279	0.434	-2.196	-11.153	11.367	0.256	OK	OK	203-1	2.38
203	4.76	COMB2G	Combination	Max	-487.585	-4.808	27.279	0.434	78.632	47.699	91.968	0.734	OK	OK	203-1	4.76
203	0	COMB2G	Combination	Min	-499.800	-24.729	-33.970	-0.293	-83.064	-70.011	108.633	0.837	OK	OK	203-1	0
203	2.38	COMB2G	Combination	Min	-508.966	-24.729	-33.970	-0.293	-3.557	-17.615	17.971	0.307	OK	OK	203-1	2.38
203	4.76	COMB2G	Combination	Min	-518.131	-24.729	-33.970	-0.293	-68.460	-6.169	68.737	0.609	OK	OK	203-1	4.76
204	0	COMB2G	Combination	Max	-603.774	-7.218	30.603	0.354	72.145	-36.289	80.758	0.714	OK	OK	204-1	0
204	2.38	COMB2G	Combination	Max	-612.940	-7.218	30.603	0.354	0.695	-12.998	13.016	0.319	OK	OK	204-1	2.38
204	4.76	COMB2G	Combination	Max	-622.105	-7.218	30.603	0.354	73.506	49.049	88.368	0.766	OK	OK	204-1	4.76
204	0	COMB2G	Combination	Min	-616.092	-26.070	-30.593	-0.354	-72.117	-75.044	104.079	0.856	OK	OK	204-1	0
204	2.38	COMB2G	Combination	Min	-625.257	-26.070	-30.593	-0.354	-0.691	-19.111	19.124	0.360	OK	OK	204-1	2.38
204	4.76	COMB2G	Combination	Min	-634.423	-26.070	-30.593	-0.354	-73.526	-1.933	73.552	0.684	OK	OK	204-1	4.76
205	0	COMB2G	Combination	Max	-469.856	-4.758	33.945	0.294	82.977	-28.894	87.864	0.703	OK	OK	205-1	0
205	2.38	COMB2G	Combination	Max	-479.021	-4.758	33.945	0.294	3.529	-11.107	11.654	0.258	OK	OK	205-1	2.38
205	4.76	COMB2G	Combination	Max	-488.187	-4.758	33.945	0.294	68.500	47.620	83.426	0.684	OK	OK	205-1	4.76
205	0	COMB2G	Combination	Min	-500.365	-24.676	-27.307	-0.433	-61.482	-69.839	93.046	0.745	OK	OK	205-1	0
205	2.38	COMB2G	Combination	Min	-509.531	-24.676	-27.307	-0.433	2.169	-17.573	17.706	0.306	OK	OK	205-1	2.38
205	4.76	COMB2G	Combination	Min	-518.696	-24.676	-27.307	-0.433	-78.600	-6.245	78.848	0.669	OK	OK	205-1	4.76
206	0	COMB2G	Combination	Max	-132.253	-1.315	33.787	0.272	82.477	-18.244	84.471	0.549	OK	OK	206-1	0
206	2.38	COMB2G	Combination	Max	-141.419	-1.315	33.787	0.272	6.415	-8.100	10.333	0.117	OK	OK	206-1	2.38
206	4.76	COMB2G	Combination	Max	-150.584	-1.315	33.787	0.272	63.595	44.495	77.615	0.516	OK	OK	206-1	4.76
206	0	COMB2G	Combination	Min	-201.498	-22.106	-24.090	-0.467	-51.073	-60.730	79.351	0.547	OK	OK	206-1	0
206	2.38	COMB2G	Combination	Min	-210.663	-22.106	-24.090	-0.467	1.910	-15.133	15.253	0.173	OK	OK	206-1	2.38
206	4.76	COMB2G	Combination	Min	-219.829	-22.106	-24.090	-0.467	-78.348	-11.987	79.260	0.553	OK	OK	206-1	4.76
31	0	COMB3	Combination		-246.418	-0.373	-3.526	0.097	-16.610	-2.459	16.790	0.196	OK	OK	31-1	0
31	3.5	COMB3	Combination		-259.896	-0.373	-3.526	0.097	-4.269	-1.154	4.422	0.129	OK	OK	31-1	3.5
31	7	COMB3	Combination		-273.375	-0.373	-3.526	0.097	8.071	0.151	8.073	0.156	OK	OK	31-1	7
32	0	COMB3	Combination		-568.962	-0.215	-2.074	0.061	-9.769	-1.809	9.935	0.284	OK	OK	32-1	0
32	3.5	COMB3	Combination		-582.441	-0.215	-2.074	0.061	-2.511	-1.056	2.724	0.247	OK	OK	32-1	3.5
32	7	COMB3	Combination		-595.919	-0.215	-2.074	0.061	4.747	-0.304	4.757	0.264	OK	OK	32-1	7
33	0	COMB3	Combination		-690.119	-0.215	0.000	0.000	0.000	-1.846	1.846	0.284	OK	OK	33-1	0
33	3.5	COMB3	Combination		-703.598	-0.215	0.000	0.000	0.000	-1.093	1.093	0.285	OK	OK	33-1	3.5
33	7	COMB3	Combination		-717.077	-0.215	0.000	0.000	0.000	-0.339	0.339	0.286	OK	OK	33-1	7
34	0	COMB3	Combination		-568.969	-0.214	2.074	-0.061	9.770	-1.806	9.936	0.284	OK	OK	34-1	0
34	3.5	COMB3	Combination		-582.448	-0.214	2.074	-0.061	2.511	-1.056	2.724	0.247	OK	OK	34-1	3.5
34	7	COMB3	Combination		-595.927	-0.214	2.074	-0.061	-4.748	-0.305	4.758	0.264	OK	OK	34-1	7
35	0	COMB3	Combination		-246.420	-0.372	3.526	-0.097	16.611	-2.456	16.791	0.196	OK	OK	35-1	0
35	3.5	COMB3	Combination		-259.899	-0.372	3.526	-0.097	4.269	-1.154	4.422	0.129	OK	OK	35-1	3.5
35	7	COMB3	Combination		-273.377	-0.372	3.526	-0.097	-8.072	0.149	8.074	0.156	OK	OK	35-1	7
48	0	COMB3	Combination		-224.043	0.575	-3.654	0.097	-16.854	1.924	16.963	0.188	OK	OK	48-1	0
48	3.425	COMB3	Combination		-237.233	0.575	-3.654	0.097	-4.337	-0.045	4.338	0.119	OK	OK	48-1	3.425
48	6.85	COMB3	Combination		-250.423	0.575	-3.654	0.097	8.179	-2.015	8.423	0.149	OK	OK	48-1	6.85
49	0	COMB3	Combination		-544.883	0.630	-2.057	0.058	-9.485	2.086	9.711	0.273	OK	OK	49-1	0
49	3.425	COMB3	Combination		-558.073	0.630	-2.057	0.058	-2.441	-0.072	2.442	0.235	OK	OK	49-1	3.425
49	6.85	COMB3	Combination		-571.263	0.630	-2.057	0.058	4.602	-2.230	5.114	0.256	OK	OK	49-1	6.85

50	0	COMB3	Combination		-661.299	0.644	0.000	0.000	-0.001	2.115	2.115	0.274	OK	OK	50-1	0
50	3.425	COMB3	Combination		-674.489	0.644	0.000	0.000	0.000	-0.091	0.091	0.267	OK	OK	50-1	3.425
50	6.85	COMB3	Combination		-687.679	0.644	0.000	0.000	0.000	-2.296	2.296	0.286	OK	OK	50-1	6.85
51	0	COMB3	Combination		-544.848	0.629	2.058	-0.058	9.491	2.082	9.716	0.273	OK	OK	51-1	0
51	3.425	COMB3	Combination		-558.038	0.629	2.058	-0.058	2.442	-0.073	2.443	0.235	OK	OK	51-1	3.425
51	6.85	COMB3	Combination		-571.228	0.629	2.058	-0.058	-4.606	-2.229	5.117	0.256	OK	OK	51-1	6.85
52	0	COMB3	Combination		-224.049	0.574	3.654	-0.097	16.850	1.920	16.959	0.188	OK	OK	52-1	0
52	3.425	COMB3	Combination		-237.238	0.574	3.654	-0.097	4.336	-0.047	4.336	0.119	OK	OK	52-1	3.425
52	6.85	COMB3	Combination		-250.428	0.574	3.654	-0.097	-8.178	-2.013	8.422	0.149	OK	OK	52-1	6.85
59	0	COMB3	Combination		-225.321	0.521	-3.755	0.097	-16.944	1.595	17.019	0.189	OK	OK	59-1	0
59	3.35	COMB3	Combination		-238.222	0.521	-3.755	0.097	-4.366	-0.152	4.369	0.120	OK	OK	59-1	3.35
59	6.7	COMB3	Combination		-251.124	0.521	-3.755	0.097	8.212	-1.898	8.428	0.149	OK	OK	59-1	6.7
60	0	COMB3	Combination		-546.560	0.588	-2.103	0.057	-9.492	1.801	9.661	0.273	OK	OK	60-1	0
60	3.35	COMB3	Combination		-559.462	0.588	-2.103	0.057	-2.446	-0.168	2.452	0.236	OK	OK	60-1	3.35
60	6.7	COMB3	Combination		-572.363	0.588	-2.103	0.057	4.600	-2.137	5.072	0.256	OK	OK	60-1	6.7
61	0	COMB3	Combination		-662.771	0.608	0.000	0.000	0.001	1.858	1.858	0.273	OK	OK	61-1	0
61	3.35	COMB3	Combination		-675.672	0.608	0.000	0.000	0.000	-0.180	0.180	0.268	OK	OK	61-1	3.35
61	6.7	COMB3	Combination		-688.573	0.608	0.000	0.000	-0.001	-2.217	2.217	0.286	OK	OK	61-1	6.7
62	0	COMB3	Combination		-546.579	0.588	2.104	-0.057	9.495	1.801	9.664	0.273	OK	OK	62-1	0
62	3.35	COMB3	Combination		-559.480	0.588	2.104	-0.057	2.446	-0.168	2.452	0.236	OK	OK	62-1	3.35
62	6.7	COMB3	Combination		-572.381	0.588	2.104	-0.057	-4.602	-2.138	5.074	0.256	OK	OK	62-1	6.7
63	0	COMB3	Combination		-225.327	0.521	3.756	-0.097	16.947	1.595	17.022	0.189	OK	OK	63-1	0
63	3.35	COMB3	Combination		-238.228	0.521	3.756	-0.097	4.366	-0.152	4.369	0.120	OK	OK	63-1	3.35
63	6.7	COMB3	Combination		-251.129	0.521	3.756	-0.097	-8.215	-1.899	8.431	0.149	OK	OK	63-1	6.7
70	0	COMB3	Combination		-224.985	0.564	-3.856	0.098	-17.021	1.699	17.106	0.190	OK	OK	70-1	0
70	3.275	COMB3	Combination		-237.597	0.564	-3.856	0.098	-4.392	-0.148	4.394	0.120	OK	OK	70-1	3.275
70	6.55	COMB3	Combination		-250.209	0.564	-3.856	0.098	8.237	-1.995	8.475	0.149	OK	OK	70-1	6.55
71	0	COMB3	Combination		-546.567	0.633	-2.153	0.058	-9.505	1.908	9.695	0.273	OK	OK	71-1	0
71	3.275	COMB3	Combination		-559.179	0.633	-2.153	0.058	-2.453	-0.165	2.458	0.236	OK	OK	71-1	3.275
71	6.55	COMB3	Combination		-571.792	0.633	-2.153	0.058	4.600	-2.239	5.116	0.256	OK	OK	71-1	6.55
72	0	COMB3	Combination		-662.737	0.654	0.000	0.000	0.000	1.965	1.965	0.274	OK	OK	72-1	0
72	3.275	COMB3	Combination		-675.349	0.654	0.000	0.000	-0.001	-0.177	0.177	0.268	OK	OK	72-1	3.275
72	6.55	COMB3	Combination		-687.962	0.654	0.000	0.000	-0.001	-2.320	2.320	0.286	OK	OK	72-1	6.55
73	0	COMB3	Combination		-546.531	0.633	2.155	-0.058	9.513	1.905	9.702	0.273	OK	OK	73-1	0
73	3.275	COMB3	Combination		-559.143	0.633	2.155	-0.058	2.454	-0.166	2.460	0.236	OK	OK	73-1	3.275
73	6.55	COMB3	Combination		-571.755	0.633	2.155	-0.058	-4.605	-2.238	5.120	0.256	OK	OK	73-1	6.55
74	0	COMB3	Combination		-224.991	0.563	3.856	-0.098	17.020	1.696	17.104	0.190	OK	OK	74-1	0
74	3.275	COMB3	Combination		-237.604	0.563	3.856	-0.098	4.391	-0.149	4.393	0.120	OK	OK	74-1	3.275
74	6.55	COMB3	Combination		-250.216	0.563	3.856	-0.098	-8.238	-1.994	8.476	0.149	OK	OK	74-1	6.55
81	0	COMB3	Combination		-224.799	0.599	-3.963	0.099	-17.102	1.760	17.192	0.190	OK	OK	81-1	0
81	3.2	COMB3	Combination		-237.123	0.599	-3.963	0.099	-4.419	-0.157	4.422	0.120	OK	OK	81-1	3.2
81	6.4	COMB3	Combination		-249.446	0.599	-3.963	0.099	8.264	-2.074	8.520	0.149	OK	OK	81-1	6.4
82	0	COMB3	Combination		-546.736	0.672	-2.206	0.058	-9.518	1.976	9.721	0.274	OK	OK	82-1	0
82	3.2	COMB3	Combination		-559.059	0.672	-2.206	0.058	-2.460	-0.175	2.466	0.236	OK	OK	82-1	3.2
82	6.4	COMB3	Combination		-571.383	0.672	-2.206	0.058	4.599	-2.325	5.153	0.256	OK	OK	82-1	6.4
83	0	COMB3	Combination		-662.816	0.694	0.001	0.000	0.002	2.033	2.033	0.274	OK	OK	83-1	0
83	3.2	COMB3	Combination		-675.139	0.694	0.001	0.000	0.000	-0.187	0.187	0.268	OK	OK	83-1	3.2
83	6.4	COMB3	Combination		-687.463	0.694	0.001	0.000	-0.002	-2.408	2.408	0.286	OK	OK	83-1	6.4
84	0	COMB3	Combination		-546.746	0.671	2.207	-0.058	9.522	1.973	9.725	0.274	OK	OK	84-1	0
84	3.2	COMB3	Combination		-559.069	0.671	2.207	-0.058	2.460	-0.176	2.466	0.236	OK	OK	84-1	3.2

84	6.4	COMB3	Combination		-571.393	0.671	2.207	-0.058	-4.602	-2.324	5.156	0.256	OK	OK	84-1	6.4
85	0	COMB3	Combination		-224.803	0.599	3.965	-0.099	17.106	1.757	17.196	0.190	OK	OK	85-1	0
85	3.2	COMB3	Combination		-237.126	0.599	3.965	-0.099	4.419	-0.158	4.422	0.120	OK	OK	85-1	3.2
85	6.4	COMB3	Combination		-249.449	0.599	3.965	-0.099	-8.268	-2.073	8.524	0.149	OK	OK	85-1	6.4
92	0	COMB3	Combination		-224.599	0.642	-4.076	0.099	-17.186	1.841	17.285	0.191	OK	OK	92-1	0
92	3.125	COMB3	Combination		-236.634	0.642	-4.076	0.099	-4.448	-0.164	4.451	0.120	OK	OK	92-1	3.125
92	6.25	COMB3	Combination		-248.668	0.642	-4.076	0.099	8.290	-2.169	8.569	0.149	OK	OK	92-1	6.25
93	0	COMB3	Combination		-546.912	0.719	-2.261	0.058	-9.532	2.067	9.753	0.274	OK	OK	93-1	0
93	3.125	COMB3	Combination		-558.947	0.719	-2.261	0.058	-2.467	-0.181	2.474	0.236	OK	OK	93-1	3.125
93	6.25	COMB3	Combination		-570.981	0.719	-2.261	0.058	4.597	-2.428	5.199	0.257	OK	OK	93-1	6.25
94	0	COMB3	Combination		-662.926	0.743	0.001	0.000	0.002	2.129	2.129	0.275	OK	OK	94-1	0
94	3.125	COMB3	Combination		-674.960	0.743	0.001	0.000	0.000	-0.193	0.193	0.268	OK	OK	94-1	3.125
94	6.25	COMB3	Combination		-686.995	0.743	0.001	0.000	-0.002	-2.515	2.515	0.287	OK	OK	94-1	6.25
95	0	COMB3	Combination		-546.919	0.720	2.262	-0.058	9.537	2.069	9.759	0.274	OK	OK	95-1	0
95	3.125	COMB3	Combination		-558.954	0.720	2.262	-0.058	2.468	-0.180	2.474	0.236	OK	OK	95-1	3.125
95	6.25	COMB3	Combination		-570.988	0.720	2.262	-0.058	-4.602	-2.430	5.204	0.257	OK	OK	95-1	6.25
96	0	COMB3	Combination		-224.602	0.642	4.078	-0.099	17.191	1.844	17.290	0.191	OK	OK	96-1	0
96	3.125	COMB3	Combination		-236.636	0.642	4.078	-0.099	4.448	-0.163	4.451	0.120	OK	OK	96-1	3.125
96	6.25	COMB3	Combination		-248.671	0.642	4.078	-0.099	-8.295	-2.171	8.574	0.149	OK	OK	96-1	6.25
103	0	COMB3	Combination		-224.417	0.684	-4.186	0.100	-17.263	1.916	17.369	0.191	OK	OK	103-1	0
103	3.055	COMB3	Combination		-236.182	0.684	-4.186	0.100	-4.475	-0.173	4.478	0.120	OK	OK	103-1	3.055
103	6.11	COMB3	Combination		-247.947	0.684	-4.186	0.100	8.313	-2.261	8.615	0.149	OK	OK	103-1	6.11
104	0	COMB3	Combination		-547.021	0.765	-2.314	0.058	-9.544	2.148	9.782	0.274	OK	OK	104-1	0
104	3.055	COMB3	Combination		-558.786	0.765	-2.314	0.058	-2.474	-0.190	2.482	0.236	OK	OK	104-1	3.055
104	6.11	COMB3	Combination		-570.551	0.765	-2.314	0.058	4.595	-2.528	5.244	0.257	OK	OK	104-1	6.11
105	0	COMB3	Combination		-662.979	0.790	0.000	0.000	0.000	2.211	2.211	0.275	OK	OK	105-1	0
105	3.055	COMB3	Combination		-674.744	0.790	0.000	0.000	-0.001	-0.203	0.203	0.268	OK	OK	105-1	3.055
105	6.11	COMB3	Combination		-686.509	0.790	0.000	0.000	-0.002	-2.616	2.616	0.287	OK	OK	105-1	6.11
106	0	COMB3	Combination		-546.984	0.764	2.317	-0.058	9.554	2.144	9.792	0.274	OK	OK	106-1	0
106	3.055	COMB3	Combination		-558.749	0.764	2.317	-0.058	2.476	-0.191	2.483	0.236	OK	OK	106-1	3.055
106	6.11	COMB3	Combination		-570.514	0.764	2.317	-0.058	-4.603	-2.526	5.250	0.257	OK	OK	106-1	6.11
107	0	COMB3	Combination		-224.426	0.683	4.186	-0.100	17.263	1.912	17.368	0.191	OK	OK	107-1	0
107	3.055	COMB3	Combination		-236.191	0.683	4.186	-0.100	4.474	-0.174	4.477	0.120	OK	OK	107-1	3.055
107	6.11	COMB3	Combination		-247.956	0.683	4.186	-0.100	-8.316	-2.260	8.617	0.149	OK	OK	107-1	6.11
114	0	COMB3	Combination		-224.219	0.732	-4.311	0.101	-17.351	1.996	17.466	0.191	OK	OK	114-1	0
114	2.98	COMB3	Combination		-235.695	0.732	-4.311	0.101	-4.506	-0.185	4.510	0.120	OK	OK	114-1	2.98
114	5.96	COMB3	Combination		-247.171	0.732	-4.311	0.101	8.340	-2.366	8.669	0.149	OK	OK	114-1	5.96
115	0	COMB3	Combination		-547.204	0.817	-2.374	0.059	-9.557	2.233	9.815	0.274	OK	OK	115-1	0
115	2.98	COMB3	Combination		-558.680	0.817	-2.374	0.059	-2.482	-0.203	2.491	0.236	OK	OK	115-1	2.98
115	5.96	COMB3	Combination		-570.156	0.817	-2.374	0.059	4.593	-2.639	5.297	0.257	OK	OK	115-1	5.96
116	0	COMB3	Combination		-663.064	0.843	0.001	0.000	0.003	2.295	2.295	0.276	OK	OK	116-1	0
116	2.98	COMB3	Combination		-674.540	0.843	0.001	0.000	0.000	-0.217	0.217	0.268	OK	OK	116-1	2.98
116	5.96	COMB3	Combination		-686.016	0.843	0.001	0.000	-0.003	-2.728	2.728	0.288	OK	OK	116-1	5.96
117	0	COMB3	Combination		-547.214	0.817	2.376	-0.059	9.563	2.230	9.820	0.274	OK	OK	117-1	0
117	2.98	COMB3	Combination		-558.691	0.817	2.376	-0.059	2.482	-0.204	2.491	0.236	OK	OK	117-1	2.98
117	5.96	COMB3	Combination		-570.167	0.817	2.376	-0.059	-4.599	-2.638	5.301	0.257	OK	OK	117-1	5.96
118	0	COMB3	Combination		-224.224	0.731	4.313	-0.101	17.358	1.993	17.472	0.192	OK	OK	118-1	0
118	2.98	COMB3	Combination		-235.700	0.731	4.313	-0.101	4.506	-0.186	4.510	0.120	OK	OK	118-1	2.98
118	5.96	COMB3	Combination		-247.177	0.731	4.313	-0.101	-8.346	-2.365	8.674	0.149	OK	OK	118-1	5.96
125	0	COMB3	Combination		-224.019	0.789	-4.442	0.101	-17.441	2.096	17.567	0.192	OK	OK	125-1	0

125	2.905	COMB3	Combination		-235.207	0.789	-4.442	0.101	-4.538	-0.195	4.542	0.120	OK	OK	125-1	2.905
125	5.81	COMB3	Combination		-246.394	0.789	-4.442	0.101	8.365	-2.487	8.727	0.149	OK	OK	125-1	5.81
126	0	COMB3	Combination		-547.368	0.880	-2.437	0.059	-9.571	2.342	9.853	0.275	OK	OK	126-1	0
126	2.905	COMB3	Combination		-558.555	0.880	-2.437	0.059	-2.491	-0.214	2.500	0.236	OK	OK	126-1	2.905
126	5.81	COMB3	Combination		-569.743	0.880	-2.437	0.059	4.589	-2.769	5.360	0.257	OK	OK	126-1	5.81
127	0	COMB3	Combination		-663.137	0.906	0.001	0.000	0.003	2.406	2.406	0.277	OK	OK	127-1	0
127	2.905	COMB3	Combination		-674.324	0.906	0.001	0.000	0.000	-0.227	0.227	0.268	OK	OK	127-1	2.905
127	5.81	COMB3	Combination		-685.511	0.906	0.001	0.000	-0.003	-2.861	2.861	0.288	OK	OK	127-1	5.81
128	0	COMB3	Combination		-547.366	0.880	2.440	-0.059	9.578	2.342	9.860	0.275	OK	OK	128-1	0
128	2.905	COMB3	Combination		-558.554	0.880	2.440	-0.059	2.491	-0.214	2.500	0.236	OK	OK	128-1	2.905
128	5.81	COMB3	Combination		-569.741	0.880	2.440	-0.059	-4.596	-2.769	5.366	0.257	OK	OK	128-1	5.81
129	0	COMB3	Combination		-224.020	0.789	4.444	-0.101	17.448	2.097	17.573	0.192	OK	OK	129-1	0
129	2.905	COMB3	Combination		-235.207	0.789	4.444	-0.101	4.538	-0.195	4.542	0.120	OK	OK	129-1	2.905
129	5.81	COMB3	Combination		-246.395	0.789	4.444	-0.101	-8.372	-2.488	8.734	0.149	OK	OK	129-1	5.81
136	0	COMB3	Combination		-223.825	0.850	-4.579	0.102	-17.528	2.194	17.665	0.192	OK	OK	136-1	0
136	2.83	COMB3	Combination		-234.723	0.850	-4.579	0.102	-4.570	-0.210	4.575	0.120	OK	OK	136-1	2.83
136	5.66	COMB3	Combination		-245.622	0.850	-4.579	0.102	8.388	-2.615	8.786	0.149	OK	OK	136-1	5.66
137	0	COMB3	Combination		-547.480	0.946	-2.505	0.059	-9.589	2.448	9.897	0.275	OK	OK	137-1	0
137	2.83	COMB3	Combination		-558.378	0.946	-2.505	0.059	-2.501	-0.229	2.511	0.236	OK	OK	137-1	2.83
137	5.66	COMB3	Combination		-569.277	0.946	-2.505	0.059	4.588	-2.905	5.430	0.257	OK	OK	137-1	5.66
138	0	COMB3	Combination		-663.258	0.976	0.001	0.000	0.004	2.519	2.519	0.277	OK	OK	138-1	0
138	2.83	COMB3	Combination		-674.156	0.976	0.001	0.000	0.000	-0.242	0.242	0.268	OK	OK	138-1	2.83
138	5.66	COMB3	Combination		-685.055	0.976	0.001	0.000	-0.004	-3.002	3.002	0.289	OK	OK	138-1	5.66
139	0	COMB3	Combination		-547.486	0.946	2.508	-0.059	9.598	2.450	9.905	0.275	OK	OK	139-1	0
139	2.83	COMB3	Combination		-558.385	0.946	2.508	-0.059	2.501	-0.228	2.511	0.236	OK	OK	139-1	2.83
139	5.66	COMB3	Combination		-569.283	0.946	2.508	-0.059	-4.596	-2.907	5.438	0.257	OK	OK	139-1	5.66
140	0	COMB3	Combination		-223.830	0.850	4.582	-0.102	17.536	2.197	17.673	0.193	OK	OK	140-1	0
140	2.83	COMB3	Combination		-234.728	0.850	4.582	-0.102	4.570	-0.210	4.575	0.120	OK	OK	140-1	2.83
140	5.66	COMB3	Combination		-245.627	0.850	4.582	-0.102	-8.396	-2.617	8.794	0.149	OK	OK	140-1	5.66
147	0	COMB3	Combination		-223.625	0.921	-4.727	0.103	-17.628	2.315	17.780	0.193	OK	OK	147-1	0
147	2.755	COMB3	Combination		-234.235	0.921	-4.727	0.103	-4.607	-0.224	4.612	0.120	OK	OK	147-1	2.755
147	5.51	COMB3	Combination		-244.845	0.921	-4.727	0.103	8.415	-2.762	8.857	0.149	OK	OK	147-1	5.51
148	0	COMB3	Combination		-547.700	1.024	-2.573	0.059	-9.597	2.578	9.937	0.275	OK	OK	148-1	0
148	2.755	COMB3	Combination		-558.310	1.024	-2.573	0.059	-2.509	-0.242	2.520	0.236	OK	OK	148-1	2.755
148	5.51	COMB3	Combination		-568.920	1.024	-2.573	0.059	4.580	-3.062	5.509	0.258	OK	OK	148-1	5.51
149	0	COMB3	Combination		-663.311	1.054	0.001	0.000	0.002	2.648	2.648	0.278	OK	OK	149-1	0
149	2.755	COMB3	Combination		-673.921	1.054	0.001	0.000	-0.001	-0.256	0.256	0.268	OK	OK	149-1	2.755
149	5.51	COMB3	Combination		-684.531	1.054	0.001	0.000	-0.003	-3.161	3.161	0.289	OK	OK	149-1	5.51
150	0	COMB3	Combination		-547.660	1.022	2.578	-0.060	9.612	2.573	9.950	0.275	OK	OK	150-1	0
150	2.755	COMB3	Combination		-558.269	1.022	2.578	-0.060	2.510	-0.244	2.522	0.236	OK	OK	150-1	2.755
150	5.51	COMB3	Combination		-568.879	1.022	2.578	-0.060	-4.592	-3.060	5.518	0.258	OK	OK	150-1	5.51
151	0	COMB3	Combination		-223.637	0.920	4.729	-0.103	17.633	2.310	17.783	0.193	OK	OK	151-1	0
151	2.755	COMB3	Combination		-234.247	0.920	4.729	-0.103	4.605	-0.225	4.611	0.120	OK	OK	151-1	2.755
151	5.51	COMB3	Combination		-244.856	0.920	4.729	-0.103	-8.422	-2.760	8.863	0.149	OK	OK	151-1	5.51
158	0	COMB3	Combination		-223.385	0.999	-4.881	0.104	-17.725	2.433	17.891	0.194	OK	OK	158-1	0
158	2.68	COMB3	Combination		-233.705	0.999	-4.881	0.104	-4.643	-0.243	4.649	0.120	OK	OK	158-1	2.68
158	5.36	COMB3	Combination		-244.026	0.999	-4.881	0.104	8.439	-2.919	8.929	0.149	OK	OK	158-1	5.36
159	0	COMB3	Combination		-547.812	1.108	-2.646	0.060	-9.609	2.707	9.983	0.276	OK	OK	159-1	0
159	2.68	COMB3	Combination		-558.133	1.108	-2.646	0.060	-2.518	-0.261	2.532	0.236	OK	OK	159-1	2.68
159	5.36	COMB3	Combination		-568.454	1.108	-2.646	0.060	4.573	-3.229	5.599	0.258	OK	OK	159-1	5.36

160	0	COMB3	Combination		-663.312	1.139	0.002	0.000	0.005	2.778	2.778	0.279	OK	OK	160-1	0
160	2.68	COMB3	Combination		-673.633	1.139	0.002	0.000	0.000	-0.276	0.276	0.268	OK	OK	160-1	2.68
160	5.36	COMB3	Combination		-683.954	1.139	0.002	0.000	-0.005	-3.330	3.330	0.290	OK	OK	160-1	5.36
161	0	COMB3	Combination		-547.824	1.107	2.650	-0.060	9.620	2.704	9.993	0.276	OK	OK	161-1	0
161	2.68	COMB3	Combination		-558.145	1.107	2.650	-0.060	2.518	-0.262	2.532	0.236	OK	OK	161-1	2.68
161	5.36	COMB3	Combination		-568.465	1.107	2.650	-0.060	-4.584	-3.228	5.606	0.258	OK	OK	161-1	5.36
162	0	COMB3	Combination		-223.391	0.998	4.885	-0.104	17.735	2.430	17.901	0.194	OK	OK	162-1	0
162	2.68	COMB3	Combination		-233.712	0.998	4.885	-0.104	4.643	-0.244	4.649	0.120	OK	OK	162-1	2.68
162	5.36	COMB3	Combination		-244.033	0.998	4.885	-0.104	-8.449	-2.918	8.939	0.149	OK	OK	162-1	5.36
169	0	COMB3	Combination		-223.484	1.124	-5.047	0.105	-17.830	2.700	18.033	0.195	OK	OK	169-1	0
169	2.605	COMB3	Combination		-233.516	1.124	-5.047	0.105	-4.683	-0.229	4.688	0.120	OK	OK	169-1	2.605
169	5.21	COMB3	Combination		-243.548	1.124	-5.047	0.105	8.465	-3.158	9.035	0.150	OK	OK	169-1	5.21
170	0	COMB3	Combination		-548.338	1.240	-2.724	0.060	-9.623	2.984	10.075	0.276	OK	OK	170-1	0
170	2.605	COMB3	Combination		-558.370	1.240	-2.724	0.060	-2.528	-0.247	2.540	0.236	OK	OK	170-1	2.605
170	5.21	COMB3	Combination		-568.402	1.240	-2.724	0.060	4.567	-3.479	5.741	0.259	OK	OK	170-1	5.21
171	0	COMB3	Combination		-663.743	1.275	0.002	0.000	0.006	3.058	3.058	0.281	OK	OK	171-1	0
171	2.605	COMB3	Combination		-673.775	1.275	0.002	0.000	0.000	-0.262	0.262	0.268	OK	OK	171-1	2.605
171	5.21	COMB3	Combination		-683.807	1.275	0.002	0.000	-0.006	-3.583	3.583	0.292	OK	OK	171-1	5.21
172	0	COMB3	Combination		-548.336	1.241	2.728	-0.060	9.634	2.984	10.086	0.276	OK	OK	172-1	0
172	2.605	COMB3	Combination		-558.368	1.241	2.728	-0.060	2.528	-0.247	2.540	0.236	OK	OK	172-1	2.605
172	5.21	COMB3	Combination		-568.400	1.241	2.728	-0.060	-4.578	-3.479	5.750	0.259	OK	OK	172-1	5.21
173	0	COMB3	Combination		-223.487	1.125	5.051	-0.105	17.840	2.701	18.044	0.195	OK	OK	173-1	0
173	2.605	COMB3	Combination		-233.519	1.125	5.051	-0.105	4.682	-0.229	4.688	0.120	OK	OK	173-1	2.605
173	5.21	COMB3	Combination		-243.551	1.125	5.051	-0.105	-8.476	-3.158	9.045	0.150	OK	OK	173-1	5.21
180	0	COMB3	Combination		-220.997	0.941	-5.209	0.105	-17.889	1.873	17.987	0.193	OK	OK	180-1	0
180	2.53	COMB3	Combination		-230.740	0.941	-5.209	0.105	-4.712	-0.509	4.739	0.119	OK	OK	180-1	2.53
180	5.06	COMB3	Combination		-240.484	0.941	-5.209	0.105	8.466	-2.891	8.946	0.148	OK	OK	180-1	5.06
181	0	COMB3	Combination		-545.656	1.064	-2.802	0.061	-9.625	2.162	9.864	0.274	OK	OK	181-1	0
181	2.53	COMB3	Combination		-555.399	1.064	-2.802	0.061	-2.536	-0.529	2.590	0.235	OK	OK	181-1	2.53
181	5.06	COMB3	Combination		-565.143	1.064	-2.802	0.061	4.553	-3.220	5.576	0.256	OK	OK	181-1	5.06
182	0	COMB3	Combination		-660.822	1.097	0.002	0.000	0.006	2.228	2.228	0.275	OK	OK	182-1	0
182	2.53	COMB3	Combination		-670.565	1.097	0.002	0.000	0.000	-0.547	0.547	0.269	OK	OK	182-1	2.53
182	5.06	COMB3	Combination		-680.308	1.097	0.002	0.000	-0.006	-3.322	3.322	0.289	OK	OK	182-1	5.06
183	0	COMB3	Combination		-545.659	1.064	2.807	-0.061	9.637	2.164	9.877	0.274	OK	OK	183-1	0
183	2.53	COMB3	Combination		-555.402	1.064	2.807	-0.061	2.536	-0.529	2.590	0.235	OK	OK	183-1	2.53
183	5.06	COMB3	Combination		-565.145	1.064	2.807	-0.061	-4.565	-3.221	5.587	0.257	OK	OK	183-1	5.06
184	0	COMB3	Combination		-221.005	0.942	5.213	-0.105	17.900	1.875	17.998	0.193	OK	OK	184-1	0
184	2.53	COMB3	Combination		-230.748	0.942	5.213	-0.105	4.711	-0.509	4.738	0.119	OK	OK	184-1	2.53
184	5.06	COMB3	Combination		-240.491	0.942	5.213	-0.105	-8.478	-2.892	8.958	0.148	OK	OK	184-1	5.06
191	0	COMB3	Combination		-235.653	3.296	-5.544	0.110	-18.499	9.532	20.810	0.216	OK	OK	191-1	0
191	2.455	COMB3	Combination		-245.107	3.296	-5.544	0.110	-4.888	1.440	5.095	0.127	OK	OK	191-1	2.455
191	4.91	COMB3	Combination		-254.562	3.296	-5.544	0.110	8.724	-6.652	10.971	0.165	OK	OK	191-1	4.91
192	0	COMB3	Combination		-568.197	3.631	-2.947	0.062	-9.834	10.510	14.393	0.310	OK	OK	192-1	0
192	2.455	COMB3	Combination		-577.652	3.631	-2.947	0.062	-2.600	1.596	3.050	0.247	OK	OK	192-1	2.455
192	4.91	COMB3	Combination		-587.106	3.631	-2.947	0.062	4.635	-7.318	8.662	0.283	OK	OK	192-1	4.91
193	0	COMB3	Combination		-685.843	3.807	0.002	0.000	0.006	11.046	11.046	0.336	OK	OK	193-1	0
193	2.455	COMB3	Combination		-695.297	3.807	0.002	0.000	0.000	1.700	1.700	0.285	OK	OK	193-1	2.455
193	4.91	COMB3	Combination		-704.752	3.807	0.002	0.000	-0.006	-7.646	7.646	0.324	OK	OK	193-1	4.91
194	0	COMB3	Combination		-568.062	3.621	2.955	-0.063	9.856	10.478	14.385	0.309	OK	OK	194-1	0
194	2.455	COMB3	Combination		-577.516	3.621	2.955	-0.063	2.602	1.588	3.048	0.246	OK	OK	194-1	2.455

194	4.91	COMB3	Combination		-586.970	3.621	2.955	-0.063	-4.652	-7.302	8.658	0.283	OK	OK	194-1	4.91
195	0	COMB3	Combination		-235.627	3.287	5.546	-0.110	18.501	9.502	20.799	0.216	OK	OK	195-1	0
195	2.455	COMB3	Combination		-245.082	3.287	5.546	-0.110	4.885	1.432	5.090	0.127	OK	OK	195-1	2.455
195	4.91	COMB3	Combination		-254.536	3.287	5.546	-0.110	-8.732	-6.637	10.968	0.165	OK	OK	195-1	4.91
202	0	COMB3	Combination		-161.106	-11.882	-4.899	0.098	-15.870	-40.041	43.072	0.317	OK	OK	202-1	0
202	2.38	COMB3	Combination		-170.272	-11.882	-4.899	0.098	-4.211	-11.763	12.494	0.141	OK	OK	202-1	2.38
202	4.76	COMB3	Combination		-179.437	-11.882	-4.899	0.098	7.449	16.516	18.118	0.178	OK	OK	202-1	4.76
203	0	COMB3	Combination		-484.527	-14.768	-3.346	0.070	-10.839	-49.533	50.705	0.490	OK	OK	203-1	0
203	2.38	COMB3	Combination		-493.693	-14.768	-3.346	0.070	-2.876	-14.384	14.669	0.282	OK	OK	203-1	2.38
203	4.76	COMB3	Combination		-502.858	-14.768	-3.346	0.070	5.086	20.765	21.379	0.325	OK	OK	203-1	4.76
204	0	COMB3	Combination		-609.933	-16.644	0.005	0.000	0.014	-55.667	55.667	0.569	OK	OK	204-1	0
204	2.38	COMB3	Combination		-619.099	-16.644	0.005	0.000	0.002	-16.054	16.054	0.339	OK	OK	204-1	2.38
204	4.76	COMB3	Combination		-628.264	-16.644	0.005	0.000	-0.010	23.558	23.558	0.387	OK	OK	204-1	4.76
205	0	COMB3	Combination		-485.110	-14.717	3.319	-0.070	10.748	-49.367	50.523	0.489	OK	OK	205-1	0
205	2.38	COMB3	Combination		-494.276	-14.717	3.319	-0.070	2.849	-14.340	14.620	0.282	OK	OK	205-1	2.38
205	4.76	COMB3	Combination		-503.441	-14.717	3.319	-0.070	-5.050	20.687	21.295	0.324	OK	OK	205-1	4.76
206	0	COMB3	Combination		-166.875	-11.710	4.848	-0.097	15.702	-39.487	42.494	0.316	OK	OK	206-1	0
206	2.38	COMB3	Combination		-176.041	-11.710	4.848	-0.097	4.163	-11.617	12.340	0.142	OK	OK	206-1	2.38
206	4.76	COMB3	Combination		-185.207	-11.710	4.848	-0.097	-7.377	16.254	17.850	0.178	OK	OK	206-1	4.76
											122.183	0.968				

KOMBINASI 1Layan

P Min	135.767
P Max	723.116

KOMBINASI 2 Layan

P Min	126.479
P Max	718.889

KOMBINASI 3 Layan

P Min	161.106
P Max	717.077

TABLE: Element Forces – Frames (PILEHEAD Kombinasi 1Ultimate)												
Frame	Station	Output Case	Case Type	Step Type	P	V2	V3	T	M2	M3	Frame Elem	Elem Station
Text	m	Text	Text	Text	KN	KN	KN	KN-m	KN-m	KN-m	Text	m
10	0	COMB1U	Combination	Max	1.205	21.776	1.055	1.2603	0.0237	6.9736	10-1	0
10	0.5	COMB1U	Combination	Max	1.194	32.931	1.055	1.2603	0.4245	-6.4567	10-1	0.5
10	0.5	COMB1U	Combination	Max	2.304	89.53	4.403	9.9358	0.4758	0.618	10-2	0
10	1	COMB1U	Combination	Max	2.293	100.685	4.403	9.9358	1.8406	-44.5708	10-2	0.5
10	0	COMB1U	Combination	Min	-0.83	20.181	-0.802	-6.924	-0.0046	6.3934	10-1	0
10	0.5	COMB1U	Combination	Min	-0.841	31.336	-0.802	-6.924	-0.532	-6.7326	10-1	0.5
10	0.5	COMB1U	Combination	Min	-1.056	84.553	-2.736	-20.8317	-0.5397	0.193	10-2	0
10	1	COMB1U	Combination	Min	-1.067	95.708	-2.736	-20.8317	-2.7381	-47.2373	10-2	0.5
11	0	COMB1U	Combination	Max	-0.027	-142.967	5.429	27.7172	1.7098	-56.64	11-1	0
11	0.5	COMB1U	Combination	Max	-0.027	-131.812	5.429	27.7172	-0.8377	12.0861	11-1	0.5
11	0.5	COMB1U	Combination	Max	0.849	-80.68	3.308	17.2751	-0.7579	27.0883	11-2	0
11	1	COMB1U	Combination	Max	0.849	-69.525	3.308	17.2751	-1.3412	66.1454	11-2	0.5
11	1	COMB1U	Combination	Max	1.427	-36.303	1.778	8.4023	-1.2683	78.5754	11-3	0
11	1.5	COMB1U	Combination	Max	1.427	-25.148	1.778	8.4023	-1.8875	94.6049	11-3	0.5
11	1.5	COMB1U	Combination	Max	1.704	6.524	-0.087	0.1007	-1.8182	102.3976	11-4	0
11	2	COMB1U	Combination	Max	1.704	17.679	-0.087	0.1007	-1.7691	96.3471	11-4	0.5
11	2	COMB1U	Combination	Max	1.542	60.521	-1.438	1.639	-1.6982	98.0895	11-5	0
11	2.5	COMB1U	Combination	Max	1.542	71.676	-1.438	1.639	-0.9763	65.1572	11-5	0.5
11	2.5	COMB1U	Combination	Max	1.226	140.391	-0.685	10.4203	-0.9205	63.2751	11-6	0
11	3	COMB1U	Combination	Max	1.226	151.546	-0.685	10.4203	-0.4516	-9.0151	11-6	0.5
11	3	COMB1U	Combination	Max	1.027	278.376	3.621	20.3528	-0.3516	-11.1775	11-7	0
11	3.5	COMB1U	Combination	Max	1.027	289.531	3.621	20.3528	1.3753	-149.8058	11-7	0.5
11	0	COMB1U	Combination	Min	-4.498	-149.641	-2.065	-36.466	-2.2944	-62.1633	11-1	0
11	0.5	COMB1U	Combination	Min	-4.498	-138.486	-2.065	-36.466	-1.4285	9.837	11-1	0.5
11	0.5	COMB1U	Combination	Min	-3.755	-84.52	0.964	-26.3829	-1.4365	24.9861	11-2	0
11	1	COMB1U	Combination	Min	-3.755	-73.365	0.964	-26.3829	-2.9889	62.9518	11-2	0.5
11	1	COMB1U	Combination	Min	-3.158	-38.307	1.054	-17.1686	-3.0158	75.4901	11-3	0
11	1.5	COMB1U	Combination	Min	-3.158	-27.152	1.054	-17.1686	-3.8124	91.1884	11-3	0.5
11	1.5	COMB1U	Combination	Min	-2.786	5.819	-0.41	-8.1339	-3.8402	99.185	11-4	0
11	2	COMB1U	Combination	Min	-2.786	16.974	-0.41	-8.1339	-3.6407	93.4864	11-4	0.5
11	2	COMB1U	Combination	Min	-2.673	58.352	-2.322	-8.5643	-3.7075	95.6439	11-5	0
11	2.5	COMB1U	Combination	Min	-2.673	69.507	-2.322	-8.5643	-2.5493	63.5623	11-5	0.5
11	2.5	COMB1U	Combination	Min	-2.783	136.417	-3.144	-15.9199	-2.6297	61.6306	11-6	0
11	3	COMB1U	Combination	Min	-2.783	147.572	-3.144	-15.9199	-1.184	-10.0609	11-6	0.5
11	3	COMB1U	Combination	Min	-2.699	271.678	-3.617	-24.5506	-1.277	-12.8347	11-7	0
11	3.5	COMB1U	Combination	Min	-2.699	282.833	-3.617	-24.5506	-3.0059	-154.8106	11-7	0.5
12	0	COMB1U	Combination	Max	-0.71	-313.719	6.221	25.7652	1.2532	-153.3984	12-1	0
12	0.5	COMB1U	Combination	Max	-0.71	-302.564	6.221	25.7652	-1.8573	0.6731	12-1	0.5

12	0.5	COMB1U	Combination	Max	0.141	-171.067	5.27	16.872	-1.7351	23.1767	12-2	0
12	1	COMB1U	Combination	Max	0.141	-159.912	5.27	16.872	-3.4078	106.8666	12-2	0.5
12	1	COMB1U	Combination	Max	0.83	-78.262	3.369	9.0016	-3.2647	124.517	12-3	0
12	1.5	COMB1U	Combination	Max	0.83	-67.107	3.369	9.0016	-4.6838	161.5729	12-3	0.5
12	**1.5**	**COMB1U**	**Combination**	**Max**	**1.084**	**-0.935**	**0.111**	**0.9706**	**-4.5676**	**169.8921**	**12-4**	**0**
12	2	COMB1U	Combination	Max	1.084	10.22	0.111	0.9706	-4.6208	167.613	12-4	0.5
12	2	COMB1U	Combination	Max	0.71	81.681	-2.526	7.4969	-4.5161	163.4362	12-5	0
12	2.5	COMB1U	Combination	Max	0.71	92.836	-2.526	7.4969	-3.2454	120.0193	12-5	0.5
12	2.5	COMB1U	Combination	Max	-0.058	189.286	-2.44	15.4745	-3.1748	106.6764	12-6	0
12	3	COMB1U	Combination	Max	-0.058	200.442	-2.44	15.4745	-1.7914	10.2791	12-6	0.5
12	3	COMB1U	Combination	Max	-0.763	362.889	1.985	24.499	-1.7094	-6.1038	12-7	0
12	3.5	COMB1U	Combination	Max	-0.763	374.044	1.985	24.499	0.8395	-187.0851	12-7	0.5
12	0	COMB1U	Combination	Min	-4.571	-320.183	-1.001	-27.5615	-2.6629	-158.9487	12-1	0
12	0.5	COMB1U	Combination	Min	-4.571	-309.028	-1.001	-27.5615	-2.1623	-1.6466	12-1	0.5
12	0.5	COMB1U	Combination	Min	-3.342	-174.756	2.723	-17.9029	-2.2135	21.4683	12-2	0
12	1	COMB1U	Combination	Min	-3.342	-163.601	2.723	-17.9029	-4.5373	105.1124	12-2	0.5
12	1	COMB1U	Combination	Min	-2.321	-80.13	2.372	-9.5296	-4.6006	122.7718	12-3	0
12	1.5	COMB1U	Combination	Min	-2.321	-68.975	2.372	-9.5296	-6.0521	159.3343	12-3	0.5
12	1.5	COMB1U	Combination	Min	-1.809	-1.394	-0.403	-1.4261	-6.1354	167.7286	12-4	0
12	2	COMB1U	Combination	Min	-1.809	9.761	-0.403	-1.4261	-5.9361	165.5946	12-4	0.5
12	2	COMB1U	Combination	Min	-1.833	79.754	-3.537	-8.0112	-6.0569	161.3804	12-5	0
12	2.5	COMB1U	Combination	Min	-1.833	90.909	-3.537	-8.0112	-4.2959	118.5023	12-5	0.5
12	2.5	COMB1U	Combination	Min	-2.335	185.553	-5.011	-15.9006	-4.4291	105.1777	12-6	0
12	3	COMB1U	Combination	Min	-2.335	196.708	-5.011	-15.9006	-2.0872	8.5779	12-6	0.5
12	3	COMB1U	Combination	Min	-2.983	356.383	-5.299	-24.9327	-2.2118	-8.4264	12-7	0
12	3.5	COMB1U	Combination	Min	-2.983	367.538	-5.299	-24.9327	-3.1036	-192.6585	12-7	0.5
13	0	COMB1U	Combination	Max	-0.763	-367.536	5.298	24.9635	0.8392	-187.0843	13-1	0
13	0.5	COMB1U	Combination	Max	-0.763	-356.38	5.298	24.9635	-1.7092	-6.1042	13-1	0.5
13	0.5	COMB1U	Combination	Max	-0.058	-196.704	5.01	15.9323	-1.7915	10.2793	13-2	0
13	1	COMB1U	Combination	Max	-0.058	-185.549	5.01	15.9323	-3.1748	106.6741	13-2	0.5
13	1	COMB1U	Combination	Max	0.71	-90.902	3.536	8.0444	-3.2455	120.0184	13-3	0
13	1.5	COMB1U	Combination	Max	0.71	-79.747	3.536	8.0444	-4.516	163.4344	13-3	0.5
13	1.5	COMB1U	Combination	Max	1.083	-9.749	0.402	1.4072	-4.6207	167.6147	13-4	0
13	2	COMB1U	Combination	Max	1.083	1.406	0.402	1.4072	-4.5671	169.8918	13-4	0.5
13	2	COMB1U	Combination	Max	0.829	68.989	-2.374	9.5101	-4.6833	161.5794	13-5	0
13	2.5	COMB1U	Combination	Max	0.829	80.144	-2.374	9.5101	-3.2633	124.5167	13-5	0.5
13	2.5	COMB1U	Combination	Max	0.14	163.635	-2.727	17.8824	-3.4063	106.8845	13-6	0
13	3	COMB1U	Combination	Max	0.14	174.79	-2.727	17.8824	-1.7329	23.1453	13-6	0.5
13	3	COMB1U	Combination	Max	-0.718	309.103	1.007	27.5474	-1.8541	0.6531	13-7	0
13	3.5	COMB1U	Combination	Max	-0.718	320.258	1.007	27.5474	1.2536	-153.4443	13-7	0.5
13	0	COMB1U	Combination	Min	-2.983	-374.043	-1.985	-24.5135	-3.1038	-192.6598	13-1	0
13	0.5	COMB1U	Combination	Min	-2.983	-362.888	-1.985	-24.5135	-2.212	-8.428	13-1	0.5
13	0.5	COMB1U	Combination	Min	-2.337	-200.441	2.439	-15.4899	-2.0874	8.5769	13-2	0

13	1	COMB1U	Combination	Min	-2.337	-189.286	2.439	-15.4899	-4.4289	105.1768	13-2	0.5
13	1	COMB1U	Combination	Min	-1.838	-92.834	2.526	-7.5136	-4.2959	118.5019	13-3	0
13	1.5	COMB1U	Combination	Min	-1.838	-81.679	2.526	-7.5136	-6.0561	161.3765	13-3	0.5
13	1.5	COMB1U	Combination	Min	-1.817	-10.214	-0.113	-0.9353	-5.9357	165.5915	13-4	0
13	2	COMB1U	Combination	Min	-1.817	0.941	-0.113	-0.9353	-6.1339	167.7187	13-4	0.5
13	2	COMB1U	Combination	Min	-2.333	67.128	-3.372	-8.9661	-6.0507	159.3272	13-5	0
13	2.5	COMB1U	Combination	Min	-2.333	78.283	-3.372	-8.9661	-4.5976	122.7541	13-5	0.5
13	2.5	COMB1U	Combination	Min	-3.361	159.946	-5.269	-16.8379	-4.5349	105.0984	13-6	0
13	3	COMB1U	Combination	Min	-3.361	171.101	-5.269	-16.8379	-2.2102	21.4697	13-6	0.5
13	3	COMB1U	Combination	Min	-4.594	302.616	-6.216	-25.7438	-2.1593	-1.6067	13-7	0
13	3.5	COMB1U	Combination	Min	-4.594	313.771	-6.216	-25.7438	-2.6626	-158.9465	13-7	0.5
15	0	COMB1U	Combination	Max	2.291	-95.742	2.735	20.8136	1.8389	-44.6078	15-1	0
15	0.5	COMB1U	Combination	Max	2.303	-84.587	2.735	20.8136	0.4748	0.597	15-1	0.5
15	0.5	COMB1U	Combination	Max	1.194	-31.35	0.801	6.9134	0.4241	-6.4678	15-2	0
15	1	COMB1U	Combination	Max	1.205	-20.195	0.801	6.9134	0.0239	6.9787	15-2	0.5
15	0	COMB1U	Combination	Min	-1.078	-100.701	-4.4	-9.9231	-2.7359	-47.2252	15-1	0
15	0.5	COMB1U	Combination	Min	-1.067	-89.546	-4.4	-9.9231	-0.5392	0.214	15-1	0.5
15	0.5	COMB1U	Combination	Min	-0.844	-32.934	-1.054	-1.2534	-0.5315	-6.7291	15-2	0
15	1	COMB1U	Combination	Min	-0.833	-21.778	-1.054	-1.2534	-0.0046	6.3886	15-2	0.5
20	0	COMB1U	Combination	Max	1.025	-282.7	3.641	24.5326	1.3733	-149.7587	20-1	0
20	0.5	COMB1U	Combination	Max	1.025	-271.545	3.641	24.5326	-0.366	-11.1969	20-1	0.5
20	0.5	COMB1U	Combination	Max	1.24	-147.413	3.126	15.9723	-0.4616	-8.9868	20-2	0
20	1	COMB1U	Combination	Max	1.24	-136.258	3.126	15.9723	-0.9189	63.2284	20-2	0.5
20	1	COMB1U	Combination	Max	1.538	-69.373	2.28	8.5337	-0.9762	65.25	20-3	0
20	1.5	COMB1U	Combination	Max	1.538	-58.218	2.28	8.5337	-1.684	98.1111	20-3	0.5
20	1.5	COMB1U	Combination	Max	1.691	-16.993	0.441	8.1044	-1.7542	96.396	20-4	0
20	2	COMB1U	Combination	Max	1.691	-5.838	0.441	8.1044	-1.8168	102.4772	20-4	0.5
20	2	COMB1U	Combination	Max	1.449	27.025	-1.035	17.2378	-1.8849	94.5922	20-5	0
20	2.5	COMB1U	Combination	Max	1.449	38.18	-1.035	17.2378	-1.2734	78.6294	20-5	0.5
20	2.5	COMB1U	Combination	Max	0.847	73.277	-0.979	26.3569	-1.3477	66.1039	20-6	0
20	3	COMB1U	Combination	Max	0.847	84.432	-0.979	26.3569	-0.7628	27.0931	20-6	0.5
20	3	COMB1U	Combination	Max	-0.033	138.449	2.062	36.4763	-0.8411	12.1056	20-7	0
20	3.5	COMB1U	Combination	Max	-0.033	149.604	2.062	36.4763	1.7094	-56.6762	20-7	0.5
20	0	COMB1U	Combination	Min	-2.727	-289.422	-3.604	-20.3243	-3.0052	-154.8194	20-1	0
20	0.5	COMB1U	Combination	Min	-2.727	-278.267	-3.604	-20.3243	-1.2841	-12.8978	20-1	0.5
20	0.5	COMB1U	Combination	Min	-2.769	-151.366	0.67	-10.4876	-1.1899	-10.0146	20-2	0
20	1	COMB1U	Combination	Min	-2.769	-140.211	0.67	-10.4876	-2.6306	61.5825	20-2	0.5
20	1	COMB1U	Combination	Min	-2.698	-71.542	1.41	-1.617	-2.5509	63.5586	20-3	0
20	1.5	COMB1U	Combination	Min	-2.698	-60.387	1.41	-1.617	-3.6882	95.5774	20-3	0.5
20	1.5	COMB1U	Combination	Min	-2.806	-17.74	0.124	-0.0675	-3.6222	93.4523	20-4	0
20	2	COMB1U	Combination	Min	-2.806	-6.585	0.124	-0.0675	-3.8422	99.1602	20-4	0.5
20	2	COMB1U	Combination	Min	-3.144	25.067	-1.756	-8.449	-3.8115	91.1591	20-5	0
20	2.5	COMB1U	Combination	Min	-3.144	36.222	-1.756	-8.449	-3.0274	75.4983	20-5	0.5

20	2.5	COMB1U	Combination	Min	-3.776	69.445	-3.329	-17.2428	-3.0051	62.9274	20-6	0
20	3	COMB1U	Combination	Min	-3.776	80.6	-3.329	-17.2428	-1.4356	25.0001	20-6	0.5
20	3	COMB1U	Combination	Min	-4.514	131.744	-5.433	-27.7386	-1.4274	9.7691	20-7	0
20	3.5	COMB1U	Combination	Min	-4.514	142.899	-5.433	-27.7386	-2.2921	-62.1233	20-7	0.5
53	0	COMB1U	Combination	Max	2.018	16.883	1.322	5.0434	0.0201	7.0009	53-1	0
53	0.5	COMB1U	Combination	Max	2.007	28.038	1.322	5.0434	0.3403	-4.1871	53-1	0.5
53	0.5	COMB1U	Combination	Max	3.598	75.503	4.852	18.05	0.3817	4.8429	53-2	0
53	1	COMB1U	Combination	Max	3.587	86.658	4.852	18.05	1.831	-35.509	53-2	0.5
53	0	COMB1U	Combination	Min	-1.787	16.757	-0.641	-4.4329	-0.0079	6.8948	53-1	0
53	0.5	COMB1U	Combination	Min	-1.799	27.912	-0.641	-4.4329	-0.6688	-4.3148	53-1	0.5
53	0.5	COMB1U	Combination	Min	-2.621	74.909	-2.905	-16.3246	-0.6785	4.1627	53-2	0
53	1	COMB1U	Combination	Min	-2.632	86.064	-2.905	-16.3246	-3.1017	-36.2689	53-2	0.5
54	0	COMB1U	Combination	Max	1.564	-132.751	6.005	32.7152	1.6922	-45.5593	54-1	0
54	0.5	COMB1U	Combination	Max	1.564	-121.596	6.005	32.7152	-1.1282	18.0273	54-1	0.5
54	0.5	COMB1U	Combination	Max	2.475	-73.113	3.32	22.1788	-1.085	33.6579	54-2	0
54	1	COMB1U	Combination	Max	2.486	-61.958	3.32	22.1788	-1.6654	67.4305	54-2	0.5
54	1	COMB1U	Combination	Max	2.979	-26.336	1.554	12.3287	-1.642	82.0296	54-3	0
54	1.5	COMB1U	Combination	Max	2.967	-15.181	1.554	12.3287	-2.0511	92.4345	54-3	0.5
54	1.5	COMB1U	Combination	Max	3.084	24.734	-0.726	1.9856	-1.9959	105.922	54-4	0
54	2	COMB1U	Combination	Max	3.106	35.889	-0.726	1.9856	-1.3199	90.7692	54-4	0.5
54	2	COMB1U	Combination	Max	2.88	35.893	-0.51	1.9717	-1.3179	90.7692	54-5	0
54	2.5	COMB1U	Combination	Max	2.858	47.048	-0.51	1.9717	-1.0606	70.2909	54-5	0.5
54	2.5	COMB1U	Combination	Max	2.682	124.456	-0.505	14.3935	-1.0371	60.6141	54-6	0
54	3	COMB1U	Combination	Max	2.682	135.611	-0.505	14.3935	-0.5671	-3.5591	54-6	0.5
54	3	COMB1U	Combination	Max	2.466	261.783	3.633	25.4093	-0.4807	-9.0663	54-7	0
54	3.5	COMB1U	Combination	Max	2.466	272.938	3.633	25.4093	1.5501	-141.7956	54-7	0.5
54	0	COMB1U	Combination	Min	-6.689	-135.196	-2.088	-33.9048	-2.6494	-51.5024	54-1	0
54	0.5	COMB1U	Combination	Min	-6.689	-124.041	-2.088	-33.9048	-1.7873	13.3066	54-1	0.5
54	0.5	COMB1U	Combination	Min	-6.168	-74.986	0.891	-22.5175	-1.7756	29.6466	54-2	0
54	1	COMB1U	Combination	Min	-6.157	-63.831	0.891	-22.5175	-3.3006	64.3459	54-2	0.5
54	1	COMB1U	Combination	Min	-5.392	-28.036	0.683	-11.8891	-3.295	79.3406	54-3	0
54	1.5	COMB1U	Combination	Min	-5.403	-16.881	0.683	-11.8891	-4.0044	90.5439	54-3	0.5
54	1.5	COMB1U	Combination	Min	-5.038	22.843	-1.589	-0.5806	-4.0389	104.2605	54-4	0
54	2	COMB1U	Combination	Min	-5.015	33.998	-1.589	-0.5806	-3.5575	90.0473	54-4	0.5
54	2	COMB1U	Combination	Min	-5.069	33.986	-1.805	-0.5862	-3.5651	90.0473	54-5	0
54	2.5	COMB1U	Combination	Min	-5.091	45.141	-1.805	-0.5862	-2.6649	70.0085	54-5	0.5
54	2.5	COMB1U	Combination	Min	-4.678	122.734	-3.168	-12.1451	-2.7091	60.0733	54-6	0
54	3	COMB1U	Combination	Min	-4.678	133.89	-3.168	-12.1451	-1.3428	-4.9265	54-6	0.5
54	3	COMB1U	Combination	Min	-4.459	259.881	-4.186	-22.4695	-1.4267	-11.2274	54-7	0
54	3.5	COMB1U	Combination	Min	-4.459	271.036	-4.186	-22.4695	-3.181	-144.9074	54-7	0.5
55	0	COMB1U	Combination	Max	0.723	-306.089	6.427	28.1971	1.4125	-147.2201	55-1	0
55	0.5	COMB1U	Combination	Max	0.723	-294.934	6.427	28.1971	-1.8007	3.0359	55-1	0.5
55	0.5	COMB1U	Combination	Max	1.263	-166.73	5.114	18.4916	-1.6861	23.5714	55-2	0

55	1	COMB1U	Combination	Max	1.263	-155.575	5.114	18.4916	-3.2361	104.1946	55-2	0.5
55	1	COMB1U	Combination	Max	1.628	-76.042	3.473	10.0087	-3.1007	120.2542	55-3	0
55	1.5	COMB1U	Combination	Max	1.586	-64.887	3.03	10.0087	-4.4163	155.5175	55-4	0.33333
55	1.5	COMB1U	Combination	Max	1.587	-0.536	0.029	1.5587	-4.309	162.9256	55-5	0
55	2	COMB1U	Combination	Max	1.587	10.619	0.029	1.5587	-4.3164	160.4703	55-5	0.5
55	2	COMB1U	Combination	Max	1.113	78.681	-2.651	8.6531	-4.2273	156.4989	55-6	0
55	2.33333	COMB1U	Combination	Max	1.113	86.118	-2.651	8.6531	-3.3415	129.3641	55-6	0.33333
55	2.33333	COMB1U	Combination	Max	1.072	86.118	-2.219	8.6531	-3.3415	129.3641	55-7	0
55	2.5	COMB1U	Combination	Max	1.072	89.837	-2.219	8.6531	-2.9675	114.8672	55-7	0.16667
55	2.5	COMB1U	Combination	Max	0.294	181.73	-2.299	17.2692	-2.9128	102.2216	55-8	0
55	3	COMB1U	Combination	Max	0.294	192.885	-2.299	17.2692	-1.5851	9.113	55-8	0.5
55	3	COMB1U	Combination	Max	-0.369	347.599	2.211	27.1214	-1.5144	-6.6133	55-9	0
55	3.5	COMB1U	Combination	Max	-0.369	358.754	2.211	27.1214	1.2283	-182.4626	55-9	0.5
55	0	COMB1U	Combination	Min	-6.423	-307.502	-1.396	-28.9039	-2.8344	-150.9576	55-1	0
55	0.5	COMB1U	Combination	Min	-6.423	-296.347	-1.396	-28.9039	-2.1365	0.0045	55-1	0.5
55	0.5	COMB1U	Combination	Min	-5.178	-167.918	2.437	-18.632	-2.1795	21.3186	55-2	0
55	1	COMB1U	Combination	Min	-5.178	-156.762	2.437	-18.632	-4.405	102.4419	55-2	0.5
55	1	COMB1U	Combination	Min	-4.185	-77.087	1.908	-9.6975	-4.4572	118.9194	55-3	0
55	1.16667	COMB1U	Combination	Min	-4.185	-73.369	1.908	-9.6975	-4.963	131.447	55-3	0.16667
55	1.16667	COMB1U	Combination	Min	-4.144	-73.369	2.35	-9.6975	-4.963	131.447	55-4	0
55	1.5	COMB1U	Combination	Min	-4.144	-65.932	2.35	-9.6975	-5.8319	154.643	55-4	0.33333
55	1.5	COMB1U	Combination	Min	-3.579	-1.509	-0.464	-0.8265	-5.9068	162.4386	55-5	0
55	2	COMB1U	Combination	Min	-3.579	9.646	-0.464	-0.8265	-5.6822	160.3386	55-5	0.5
55	2	COMB1U	Combination	Min	-3.439	77.637	-3.324	-7.5291	-5.7963	155.9797	55-6	0
55	2.33333	COMB1U	Combination	Min	-3.439	85.074	-3.324	-7.5291	-4.6902	128.5294	55-6	0.33333
55	2.33333	COMB1U	Combination	Min	-3.398	85.074	-3.756	-7.5291	-4.6902	128.5294	55-7	0
55	2.5	COMB1U	Combination	Min	-3.398	88.792	-3.756	-7.5291	-4.0684	113.8746	55-7	0.16667
55	2.5	COMB1U	Combination	Min	-3.673	180.522	-4.97	-15.7804	-4.1974	100.8087	55-8	0
55	3	COMB1U	Combination	Min	-3.673	191.677	-4.97	-15.7804	-1.8904	7.2139	55-8	0.5
55	3	COMB1U	Combination	Min	-4.204	346.121	-5.641	-25.201	-2.0086	-9.2982	55-9	0
55	3.5	COMB1U	Combination	Min	-4.204	357.276	-5.641	-25.201	-3.0364	-185.8862	55-9	0.5
56	0	COMB1U	Combination	Max	-0.369	-357.278	5.641	25.4178	1.2279	-182.4646	56-1	0
56	0.5	COMB1U	Combination	Max	-0.369	-346.123	5.641	25.4178	-1.5149	-6.6142	56-1	0.5
56	0.5	COMB1U	Combination	Max	0.29	-191.685	4.971	16.0069	-1.5858	9.1047	56-2	0
56	1	COMB1U	Combination	Max	0.29	-180.53	4.971	16.0069	-2.9132	102.2178	56-2	0.5
56	1	COMB1U	Combination	Max	1.067	-88.819	3.757	7.7765	-2.9677	114.8491	56-3	0
56	1.16667	COMB1U	Combination	Max	1.067	-85.101	3.757	7.7765	-3.3415	129.3505	56-3	0.16667
56	1.16667	COMB1U	Combination	Max	1.109	-85.101	3.325	7.7765	-3.3415	129.3505	56-4	0
56	1.5	COMB1U	Combination	Max	1.109	-77.664	3.325	7.7765	-4.2267	156.4942	56-4	0.33333
56	1.5	COMB1U	Combination	Max	1.58	-9.724	0.457	0.5135	-4.316	160.4327	56-5	0
56	2	COMB1U	Combination	Max	1.58	1.431	0.457	0.5135	-4.3056	162.9229	56-5	0.5
56	2	COMB1U	Combination	Max	1.579	65.721	-2.368	9.3231	-4.4121	155.4364	56-6	0
56	2.33333	COMB1U	Combination	Max	1.579	73.158	-2.368	9.3231	-3.4815	132.6153	56-6	0.33333

56	2.33333	COMB1U	Combination	Max	1.62	73.158	-1.925	9.3231	-3.4815	132.6153	56-7	0
56	2.5	COMB1U	Combination	Max	1.62	76.876	-1.925	9.3231	-3.0875	120.2751	56-7	0.16667
56	2.5	COMB1U	Combination	Max	1.245	156.204	-2.476	18.158	-3.2236	104.0183	56-8	0
56	3	COMB1U	Combination	Max	1.245	167.36	-2.476	18.158	-1.6837	23.6659	56-8	0.5
56	3	COMB1U	Combination	Max	0.697	294.894	1.326	28.3367	-1.7975	2.6292	56-9	0
56	3.5	COMB1U	Combination	Max	0.697	306.049	1.326	28.3367	1.4316	-146.921	56-9	0.5
56	0	COMB1U	Combination	Min	-4.207	-358.755	-2.211	-27.3563	-3.0364	-185.8884	56-1	0
56	0.5	COMB1U	Combination	Min	-4.207	-347.6	-2.211	-27.3563	-2.0087	-9.3001	56-1	0.5
56	0.5	COMB1U	Combination	Min	-3.677	-192.891	2.299	-17.5145	-1.8905	7.2047	56-2	0
56	1	COMB1U	Combination	Min	-3.677	-181.736	2.299	-17.5145	-4.198	100.8025	56-2	0.5
56	1	COMB1U	Combination	Min	-3.405	-89.862	2.217	-8.9211	-4.0692	113.8542	56-3	0
56	1.16667	COMB1U	Combination	Min	-3.405	-86.143	2.217	-8.9211	-4.6912	128.5132	56-3	0.16667
56	1.16667	COMB1U	Combination	Min	-3.446	-86.143	2.649	-8.9211	-4.6912	128.5132	56-4	0
56	1.5	COMB1U	Combination	Min	-3.446	-78.706	2.649	-8.9211	-5.7976	155.972	56-4	0.33333
56	1.5	COMB1U	Combination	Min	-3.586	-10.694	-0.028	-1.2692	-5.6836	160.2984	56-5	0
56	2	COMB1U	Combination	Min	-3.586	0.461	-0.028	-1.2692	-5.9086	162.4398	56-5	0.5
56	2	COMB1U	Combination	Min	-4.153	64.682	-3.031	-9.6623	-5.8341	154.5643	56-6	0
56	2.33333	COMB1U	Combination	Min	-4.153	72.119	-3.031	-9.6623	-4.965	131.4389	56-6	0.33333
56	2.33333	COMB1U	Combination	Min	-4.194	72.119	-3.474	-9.6623	-4.965	131.4389	56-7	0
56	2.5	COMB1U	Combination	Min	-4.194	75.837	-3.474	-9.6623	-4.4591	118.9465	56-7	0.16667
56	2.5	COMB1U	Combination	Min	-5.176	155.034	-5.124	-18.0529	-4.4067	102.2667	56-8	0
56	3	COMB1U	Combination	Min	-5.176	166.189	-5.124	-18.0529	-2.1466	21.4224	56-8	0.5
56	3	COMB1U	Combination	Min	-6.41	293.522	-6.458	-27.6724	-2.1022	-0.4079	56-9	0
56	3.5	COMB1U	Combination	Min	-6.41	304.678	-6.458	-27.6724	-2.7653	-150.6436	56-9	0.5
57	0	COMB1U	Combination	Max	3.582	-85.657	2.908	16.1586	1.833	-35.4381	57-1	0
57	0.5	COMB1U	Combination	Max	3.593	-74.502	2.908	16.1586	0.382	4.7175	57-1	0.5
57	0.5	COMB1U	Combination	Max	2.009	-27.814	0.64	4.3982	0.3399	-4.1724	57-2	0
57	1	COMB1U	Combination	Max	2.021	-16.659	0.64	4.3982	0.0199	6.9681	57-2	0.5
57	0	COMB1U	Combination	Min	-2.614	-86.268	-4.818	-17.8711	-3.077	-36.1952	57-1	0
57	0.5	COMB1U	Combination	Min	-2.603	-75.113	-4.818	-17.8711	-0.6712	4.0343	57-1	0.5
57	0.5	COMB1U	Combination	Min	-1.796	-27.943	-1.307	-5.006	-0.6606	-4.2991	57-2	0
57	1	COMB1U	Combination	Min	-1.785	-16.788	-1.307	-5.006	-0.0071	6.8615	57-2	0.5
58	0	COMB1U	Combination	Max	2.381	-274.823	4.136	22.9831	1.5668	-142.7462	58-1	0
58	0.5	COMB1U	Combination	Max	2.381	-263.667	4.136	22.9831	-0.4374	-8.1235	58-1	0.5
58	0.5	COMB1U	Combination	Max	2.681	-143.655	3.203	13.2889	-0.5221	-5.7584	58-2	0
58	1	COMB1U	Combination	Max	2.681	-132.5	3.203	13.2889	-0.9771	63.3002	58-2	0.5
58	1	COMB1U	Combination	Max	2.843	-67.804	2.256	4.9125	-1.0042	65.1265	58-3	0
58	1.5	COMB1U	Combination	Max	2.865	-56.649	2.256	4.9125	-1.7917	96.7277	58-3	0.5
58	1.5	COMB1U	Combination	Max	3.218	-16.944	0.65	3.2288	-1.8481	95.145	58-4	0
58	2	COMB1U	Combination	Max	3.196	-5.789	0.65	3.2288	-1.9646	101.4708	58-4	0.5
58	2	COMB1U	Combination	Max	3.04	24.329	-0.832	12.9484	-2.0417	94.1755	58-5	0
58	2.5	COMB1U	Combination	Max	3.051	35.484	-0.832	12.9484	-1.5398	79.9282	58-5	0.5
58	2.5	COMB1U	Combination	Max	2.431	66.704	-0.814	22.8465	-1.5706	68.1349	58-6	0

58	3	COMB1U	Combination	Max	2.42	77.859	-0.814	22.8465	-1.0861	32.8806	58-6	0.5
58	3	COMB1U	Combination	Max	1.556	125.134	2.153	34.3171	-1.1292	18.2704	58-7	0
58	3.5	COMB1U	Combination	Max	1.556	136.289	2.153	34.3171	1.6935	-45.8788	58-7	0.5
58	0	COMB1U	Combination	Min	-4.378	-276.632	-3.726	-25.9649	-3.1113	-145.844	58-1	0
58	0.5	COMB1U	Combination	Min	-4.378	-265.477	-3.726	-25.9649	-1.3123	-10.317	58-1	0.5
58	0.5	COMB1U	Combination	Min	-4.636	-145.133	0.667	-15.6293	-1.22	-7.1199	58-2	0
58	1	COMB1U	Combination	Min	-4.636	-133.978	0.667	-15.6293	-2.7	62.6381	58-2	0.5
58	1	COMB1U	Combination	Min	-4.925	-69.13	1.571	-6.6365	-2.6377	64.9362	58-3	0
58	1.5	COMB1U	Combination	Min	-4.903	-57.975	1.571	-6.6365	-3.7635	96.2248	58-3	0.5
58	1.5	COMB1U	Combination	Min	-4.981	-18.25	0.232	-4.3127	-3.6889	94.212	58-4	0
58	2	COMB1U	Combination	Min	-5.003	-7.095	0.232	-4.3127	-4.0137	99.9057	58-4	0.5
58	2	COMB1U	Combination	Min	-5.397	22.866	-1.575	-13.3131	-3.9628	92.174	58-5	0
58	2.5	COMB1U	Combination	Min	-5.386	34.021	-1.575	-13.3131	-3.2616	77.2463	58-5	0.5
58	2.5	COMB1U	Combination	Min	-6.087	64.921	-3.282	-22.484	-3.2726	65.0207	58-6	0
58	3	COMB1U	Combination	Min	-6.098	76.076	-3.282	-22.484	-1.7089	28.8849	58-6	0.5
58	3	COMB1U	Combination	Min	-6.674	122.721	-5.996	-33.0998	-1.7193	13.538	58-7	0
58	3.5	COMB1U	Combination	Min	-6.674	133.876	-5.996	-33.0998	-2.6205	-51.8177	58-7	0.5
64	0	COMB1U	Combination	Max	2.772	16.909	1.335	5.0377	0.0187	7.0054	64-1	0
64	0.5	COMB1U	Combination	Max	2.761	28.064	1.335	5.0377	0.342	-4.218	64-1	0.5
64	0.5	COMB1U	Combination	Max	4.815	75.503	5.013	18.155	0.3792	4.811	64-2	0
64	1	COMB1U	Combination	Max	4.804	86.658	5.013	18.155	1.9227	-35.5581	64-2	0.5
64	0	COMB1U	Combination	Min	-2.548	16.777	-0.647	-4.5719	-0.0075	6.8295	64-1	0
64	0.5	COMB1U	Combination	Min	-2.559	27.932	-0.647	-4.5719	-0.6749	-4.3677	64-1	0.5
64	0.5	COMB1U	Combination	Min	-3.792	74.796	-3.092	-16.7026	-0.6833	3.8238	64-2	0
64	1	COMB1U	Combination	Min	-3.804	85.951	-3.092	-16.7026	-3.1873	-36.534	64-2	0.5
65	0	COMB1U	Combination	Max	3.214	-133.71	6.212	33.9061	1.774	-44.6842	65-1	0
65	0.5	COMB1U	Combination	Max	3.214	-122.555	6.212	33.9061	-1.1537	19.4131	65-1	0.5
65	0.5	COMB1U	Combination	Max	4.15	-75.882	3.336	23.0427	-1.1183	33.777	65-2	0
65	1	COMB1U	Combination	Max	4.161	-64.727	3.336	23.0427	-1.5558	69.0515	65-2	0.5
65	1	COMB1U	Combination	Max	4.829	-33.819	1.575	13.4023	-1.5414	80.6222	65-3	0
65	1.5	COMB1U	Combination	Max	4.818	-22.664	1.575	13.4023	-2.0332	94.7998	65-3	0.5
65	1.5	COMB1U	Combination	Max	4.941	7.472	-0.203	4.2887	-1.9655	101.871	65-4	0
65	2	COMB1U	Combination	Max	4.963	18.627	-0.203	4.2887	-1.8638	95.3465	65-4	0.5
65	2	COMB1U	Combination	Max	4.558	58.864	-1.678	6.5054	-1.8195	96.7952	65-5	0
65	2.5	COMB1U	Combination	Max	4.536	70.019	-1.678	6.5054	-0.979	64.8581	65-5	0.5
65	2.5	COMB1U	Combination	Max	4.321	135.141	-0.694	15.5681	-0.9741	63.2402	65-6	0
65	3	COMB1U	Combination	Max	4.321	146.296	-0.694	15.5681	-0.4997	-6.037	65-6	0.5
65	3	COMB1U	Combination	Max	3.906	266.833	3.944	26.358	-0.4278	-8.0897	65-7	0
65	3.5	COMB1U	Combination	Max	3.906	277.989	3.944	26.358	1.7088	-142.8426	65-7	0.5
65	0	COMB1U	Combination	Min	-8.375	-137.311	-2.377	-35.3296	-2.7287	-53.6597	65-1	0
65	0.5	COMB1U	Combination	Min	-8.375	-126.155	-2.377	-35.3296	-1.7187	12.1758	65-1	0.5
65	0.5	COMB1U	Combination	Min	-7.785	-78.636	0.692	-23.7018	-1.7036	27.6398	65-2	0
65	1	COMB1U	Combination	Min	-7.774	-67.481	0.692	-23.7018	-3.2804	64.0467	65-2	0.5

65	1	COMB1U	Combination	Min	-7.049	-36.099	0.832	-13.4044	-3.2686	76.2412	65-3	0
65	1.5	COMB1U	Combination	Min	-7.06	-24.944	0.832	-13.4044	-3.9805	91.4452	65-3	0.5
65	1.5	COMB1U	Combination	Min	-6.485	5.451	-0.646	-3.6629	-4.0261	99.1633	65-4	0
65	2	COMB1U	Combination	Min	-6.463	16.606	-0.646	-3.6629	-3.703	93.649	65-4	0.5
65	2	COMB1U	Combination	Min	-6.265	56.698	-2.323	-5.2996	-3.7722	95.8061	65-5	0
65	2.5	COMB1U	Combination	Min	-6.287	67.853	-2.323	-5.2996	-2.6126	64.3846	65-5	0.5
65	2.5	COMB1U	Combination	Min	-5.884	132.688	-3.301	-13.8055	-2.6679	62.0908	65-6	0
65	3	COMB1U	Combination	Min	-5.884	143.843	-3.301	-13.8055	-1.1445	-8.1239	65-6	0.5
65	3	COMB1U	Combination	Min	-5.393	263.928	-4.364	-23.9633	-1.2256	-11.4771	65-7	0
65	3.5	COMB1U	Combination	Min	-5.393	275.083	-4.364	-23.9633	-3.1522	-147.6825	65-7	0.5
66	0	COMB1U	Combination	Max	2.393	-304.526	6.627	28.2341	1.5616	-146.8326	66-1	0
66	0.5	COMB1U	Combination	Max	2.393	-293.371	6.627	28.2341	-1.7506	2.6415	66-1	0.5
66	0.5	COMB1U	Combination	Max	2.825	-165.9	5.14	18.3793	-1.6529	23.4831	66-2	0
66	1	COMB1U	Combination	Max	2.825	-154.745	5.14	18.3793	-3.1437	103.7432	66-2	0.5
66	1	COMB1U	Combination	Max	3.106	-75.509	3.441	9.7826	-3.0255	119.9267	66-3	0
66	1.16667	COMB1U	Combination	Max	3.106	-71.79	3.441	9.7826	-3.4076	132.224	66-3	0.16667
66	1.16667	COMB1U	Combination	Max	3.047	-71.79	2.999	9.7826	-3.4076	132.224	66-4	0
66	1.5	COMB1U	Combination	Max	3.047	-64.353	2.999	9.7826	-4.3149	154.9593	66-4	0.33333
66	2	COMB1U	Combination	Min	-3.933	77.43	-3.326	-8.0037	-5.7431	154.9624	66-6	0
66	2.33333	COMB1U	Combination	Min	-3.933	84.867	-3.326	-8.0037	-4.6359	127.3851	66-6	0.33333
66	2.33333	COMB1U	Combination	Min	-3.874	84.867	-3.758	-8.0037	-4.6359	127.3851	66-7	0
66	2.5	COMB1U	Combination	Min	-3.874	88.585	-3.758	-8.0037	-4.013	112.6668	66-7	0.16667
66	2.5	COMB1U	Combination	Min	-4.022	180.323	-5.019	-16.409	-4.1282	99.5063	66-8	0
66	3	COMB1U	Combination	Min	-4.022	191.478	-5.019	-16.409	-1.811	5.6276	66-8	0.5
66	3	COMB1U	Combination	Min	-4.567	346.025	-5.845	-26.0191	-1.9163	-11.1234	66-9	0
66	3.5	COMB1U	Combination	Min	-4.567	357.18	-5.845	-26.0191	-3.0643	-188.107	66-9	0.5
67	0	COMB1U	Combination	Max	0.767	-357.177	5.844	26.0635	1.4282	-182.6887	67-1	0
67	0.5	COMB1U	Combination	Max	0.767	-346.022	5.844	26.0635	-1.4444	-6.889	67-1	0.5
67	0.5	COMB1U	Combination	Max	1.407	-191.473	5.018	16.455	-1.5007	8.6435	67-2	0
67	1	COMB1U	Combination	Max	1.407	-180.318	5.018	16.455	-2.8324	101.6664	67-2	0.5
67	2.33333	COMB1U	Combination	Min	-5.029	71.824	-3.44	-9.7289	-4.9213	130.3146	67-7	0
67	2.5	COMB1U	Combination	Min	-5.029	75.543	-3.44	-9.7289	-4.4109	117.7751	67-7	0.16667
67	2.5	COMB1U	Combination	Min	-6.191	154.81	-5.14	-18.326	-4.3678	101.0358	67-8	0
67	3	COMB1U	Combination	Min	-6.191	165.965	-5.14	-18.326	-2.0779	19.9913	67-8	0.5
67	3	COMB1U	Combination	Min	-7.633	293.493	-6.626	-28.1998	-2.0418	-2.0367	67-9	0
67	3.5	COMB1U	Combination	Min	-7.633	304.648	-6.626	-28.1998	-2.8072	-152.6468	67-9	0.5
68	0	COMB1U	Combination	Min	-3.83	-86.707	-5.01	-18.122	-3.1855	-36.5603	68-1	0
68	0.5	COMB1U	Combination	Min	-3.819	-75.552	-5.01	-18.122	-0.6829	3.8233	68-1	0.5
69	0	COMB1U	Combination	Max	3.91	-274.835	4.369	23.9167	1.7075	-142.7994	69-1	0
69	0.5	COMB1U	Combination	Max	3.91	-263.68	4.369	23.9167	-0.4325	-8.1706	69-1	0.5
69	0.5	COMB1U	Combination	Max	4.316	-143.496	3.296	13.9273	-0.503	-5.9629	69-2	0
69	1	COMB1U	Combination	Max	4.316	-132.341	3.296	13.9273	-0.9736	63.1415	69-2	0.5
69	0	COMB1U	Combination	Min	-5.455	-277.755	-3.913	-26.308	-3.153	-147.646	69-1	0

69	0.5	COMB1U	Combination	Min	-5.455	-266.6	-3.913	-26.308	-1.2408	-11.5575	69-1	0.5
69	2.5	COMB1U	Combination	Min	-7.829	64.552	-3.342	-22.9855	-3.2852	63.9838	69-6	0
69	3	COMB1U	Combination	Min	-7.84	75.707	-3.342	-22.9855	-1.7049	27.6584	69-6	0.5
69	3	COMB1U	Combination	Min	-8.412	122.445	-6.216	-33.9388	-1.7178	12.1217	69-7	0
69	3.5	COMB1U	Combination	Min	-8.412	133.601	-6.216	-33.9388	-2.726	-53.6554	69-7	0.5
196	0.5	COMB1U	Combination	Max	3.961	84.621	8.391	30.3016	0.7047	7.5217	196-2	0
196	1	COMB1U	Combination	Max	3.95	95.776	8.391	30.3016	4.4767	-34.9946	196-2	0.5
196	0.5	COMB1U	Combination	Min	-1.612	77.495	-7.555	-23.9889	-0.9832	2.0359	196-2	0
196	1	COMB1U	Combination	Min	-1.623	88.65	-7.555	-23.9889	-5.1732	-42.0832	196-2	0.5
197	0	COMB1U	Combination	Max	3.382	-127.668	11.296	45.5034	4.3956	-26.7319	197-1	0
197	0.5	COMB1U	Combination	Max	3.382	-116.513	11.296	45.5034	-0.9508	34.3158	197-1	0.5
197	0.5	COMB1U	Combination	Max	3.073	-67.157	4.939	29.834	-0.9606	47.572	197-2	0
197	1	COMB1U	Combination	Max	3.084	-56.002	4.939	29.834	-1.1035	79.822	197-2	0.5
197	3	COMB1U	Combination	Max	3.955	284.593	7.568	40.4521	-0.2	-9.6375	197-7	0
197	3.5	COMB1U	Combination	Max	3.955	295.748	7.568	40.4521	4.5151	-143.9112	197-7	0.5
197	0	COMB1U	Combination	Min	-9.318	-152.176	-6.278	-57.3037	-4.7613	-79.2161	197-1	0
197	0.5	COMB1U	Combination	Min	-9.318	-141.021	-6.278	-57.3037	-1.9243	-5.9191	197-1	0.5
197	2.5	COMB1U	Combination	Min	-3.468	121.76	-4.943	-20.5697	-2.8594	52.1108	197-6	0
197	3	COMB1U	Combination	Min	-3.468	132.915	-4.943	-20.5697	-0.784	-19.3971	197-6	0.5
197	3	COMB1U	Combination	Min	-5.048	262.97	-9.656	-35.5118	-0.83	-29.8948	197-7	0
197	3.5	COMB1U	Combination	Min	-5.048	274.125	-9.656	-35.5118	-4.5013	-174.9802	197-7	0.5
198	0	COMB1U	Combination	Max	2.765	-310.619	11.681	37.192	4.5708	-148.9664	198-1	0
198	0.5	COMB1U	Combination	Max	2.765	-299.464	11.681	37.192	-1.2528	3.5543	198-1	0.5
198	0.5	COMB1U	Combination	Max	2.217	-167.028	6.755	23.4731	-1.1846	21.5284	198-2	0
198	1	COMB1U	Combination	Max	2.217	-155.873	6.755	23.4731	-2.2243	103.4085	198-2	0.5
198	3	COMB1U	Combination	Max	2.78	369.306	6.258	46.2671	-0.8316	-8.7444	198-9	0
198	**3.5**	**COMB1U**	**Combination**	**Max**	**2.78**	**380.461**	**6.258**	**46.2671**	**4.6114**	**-187.4302**	**198-9**	**0.5**
198	0	COMB1U	Combination	Min	-8.839	-327.01	-5.463	-52.0696	-4.3565	-183.1205	198-1	0
198	0.5	COMB1U	Combination	Min	-8.839	-315.854	-5.463	-52.0696	-1.6416	-22.4045	198-1	0.5
198	2.5	COMB1U	Combination	Min	-5.28	181.718	-6.78	-23.4363	-4.2971	86.4341	198-8	0
198	3	COMB1U	Combination	Min	-5.28	192.873	-6.78	-23.4363	-1.2921	-12.9176	198-8	0.5
198	3	COMB1U	Combination	Min	-7.43	351.794	-11.138	-36.3477	-1.3714	-33.0873	198-9	0
198	3.5	COMB1U	Combination	Min	-7.43	362.949	-11.138	-36.3477	-4.3746	-220.5292	198-9	0.5
199	0	COMB1U	Combination	Max	2.784	-362.977	11.14	36.602	4.6109	-187.4367	199-1	0
199	0.5	COMB1U	Combination	Max	2.784	-351.822	11.14	36.602	-0.8322	-8.7371	199-1	0.5
199	3	COMB1U	Combination	Max	2.699	314.287	5.394	51.1648	-1.2469	3.1812	199-9	0
199	3.5	COMB1U	Combination	Max	2.699	325.442	5.394	51.1648	4.5922	-148.7395	199-9	0.5
199	0	COMB1U	Combination	Min	-7.445	-380.48	-6.257	-46.7007	-4.374	-220.5514	199-1	0
199	0.5	COMB1U	Combination	Min	-7.445	-369.325	-6.257	-46.7007	-1.3724	-33.1	199-1	0.5
199	2.5	COMB1U	Combination	Min	-6.239	155.422	-6.765	-22.8549	-4.5784	88.2295	199-8	0
199	3	COMB1U	Combination	Min	-6.239	166.577	-6.765	-22.8549	-1.626	2.4605	199-8	0.5
199	3	COMB1U	Combination	Min	-8.779	298.264	-11.715	-36.4359	-1.6105	-22.8219	199-9	0
199	3.5	COMB1U	Combination	Min	-8.779	309.419	-11.715	-36.4359	-4.2894	-182.7542	199-9	0.5

200	0	COMB1U	Combination	Max	3.932	-88.145	7.57	23.7976	4.4853	-34.9152	200-1	0
200	0.5	COMB1U	Combination	Max	3.943	-76.99	7.57	23.7976	0.7058	7.4126	200-1	0.5
200	0	COMB1U	Combination	Min	-1.576	-95.371	-8.367	-29.9726	-5.157	-41.9554	200-1	0
200	0.5	COMB1U	Combination	Min	-1.565	-84.216	-8.367	-29.9726	-0.979	1.8972	200-1	0.5
201	0	COMB1U	Combination	Max	3.927	-278.329	9.593	36.2823	4.5442	-144.937	201-1	0
201	0.5	COMB1U	Combination	Max	3.927	-267.173	9.593	36.2823	-0.1517	-8.5615	201-1	0.5
201	0.5	COMB1U	Combination	Max	2.364	-143.609	5.01	22.2949	-0.189	-8.4909	201-2	0
201	1	COMB1U	Combination	Max	2.364	-132.454	5.01	22.2949	-0.3726	61.8177	201-2	0.5
201	1	COMB1U	Combination	Max	1.495	-65.743	2.866	9.994	-0.3173	63.1172	201-3	0
201	1.5	COMB1U	Combination	Max	1.517	-54.588	2.866	9.994	-1.1912	97.58	201-3	0.5
201	3	COMB1U	Combination	Max	3.4	142.167	6.353	58.0548	-0.9399	34.696	201-7	0
201	3.5	COMB1U	Combination	Max	3.4	153.322	6.353	58.0548	4.4051	-27.0773	201-7	0.5
201	0	COMB1U	Combination	Min	-5.01	-299.258	-7.647	-41.366	-4.4423	-175.9444	201-1	0
201	0.5	COMB1U	Combination	Min	-5.01	-288.103	-7.647	-41.366	-0.7197	-29.1043	201-1	0.5
201	2	COMB1U	Combination	Min	-4.829	16.886	-1.983	-16.6174	-4.6409	83.5247	201-5	0
201	2.5	COMB1U	Combination	Min	-4.818	28.041	-1.983	-16.6174	-3.7917	65.9307	201-5	0.5
201	2.5	COMB1U	Combination	Min	-6.9	59.607	-4.882	-30.2404	-3.8909	52.3228	201-6	0
201	3	COMB1U	Combination	Min	-6.911	70.762	-4.882	-30.2404	-1.8162	12.4264	201-6	0.5
201	3	COMB1U	Combination	Min	-9.311	117.91	-11.286	-46.0345	-1.864	-5.6552	201-7	0
201	3.5	COMB1U	Combination	Min	-9.311	129.065	-11.286	-46.0345	-4.7422	-79.4979	201-7	0.5
207	0	COMB1U	Combination	Max	0.778	15.179	3.039	7.1567	0.0095	4.4573	207-1	0
207	0.5	COMB1U	Combination	Max	0.767	26.334	3.039	7.1567	0.6669	-5.9208	207-1	0.5
207	0.5	COMB1U	Combination	Max	2.972	64.77	11.024	22.5569	0.6525	1.8429	207-2	0
207	1	COMB1U	Combination	Max	2.961	75.925	11.024	22.5569	2.9983	-33.3305	207-2	0.5
208	3	COMB1U	Combination	Max	3.736	271.025	12.514	47.3712	-0.0995	-11.5207	208-7	0
208	3.5	COMB1U	Combination	Max	3.736	282.18	12.514	47.3712	2.1353	-129.3819	208-7	0.5
208	0	COMB1U	Combination	Min	-9.73	-139.409	-10.745	-2.924	-6.8028	-83.5103	208-1	0
208	0.5	COMB1U	Combination	Min	-9.73	-128.253	-10.745	-2.924	-1.6602	-25.2995	208-1	0.5
209	2.5	COMB1U	Combination	Min	-7.596	192.42	-4.919	-21.4883	-3.8391	85.7435	209-8	0
209	3	COMB1U	Combination	Min	-7.596	203.575	-4.919	-21.4883	-2.4223	-23.8343	209-8	0.5
209	3	COMB1U	Combination	Min	-9.143	333.279	-5.768	-54.1492	-2.4496	-38.1474	209-9	0
209	**3.5**	**COMB1U**	**Combination**	**Min**	**-9.143**	**344.434**	**-5.768**	**-54.1492**	**-8.1338**	**-224.6897**	**209-9**	**0.5**
210	0	COMB1U	Combination	Max	3.345	-344.679	5.787	54.8586	1.5241	-180.0537	210-1	0
210	0.5	COMB1U	Combination	Max	3.345	-333.524	5.787	54.8586	-1.3076	-10.5029	210-1	0.5
210	3	COMB1U	Combination	Max	3.943	314.926	9.961	-14.6885	-1.4249	7.84	210-9	0
210	3.5	COMB1U	Combination	Max	3.943	326.081	9.961	-14.6885	2.079	-135.8918	210-9	0.5
210	**0**	**COMB1U**	**Combination**	**Min**	**-9.156**	**-378.903**	**-11.472**	**-16.0863**	**-8.1338**	**-224.681**	**210-1**	**0**
210	0.5	COMB1U	Combination	Min	-9.156	-367.748	-11.472	-16.0863	-2.4592	-38.0185	210-1	0.5
212	0	COMB1U	Combination	Min	-4.924	-281.432	-12.527	-45.9868	-7.6544	-170.1791	212-1	0
212	0.5	COMB1U	Combination	Min	-4.924	-270.277	-12.527	-45.9868	-1.4361	-33.0897	212-1	0.5
					V+	**380.461**	**12.514**	**M+**	**4.6114**	**169.8921**		
					V-	**-380.48**	**-12.527**	**M-**	**-8.1338**	**-224.6897**		

TABLE: Element Forces – Frames (PILEHEAD Kombinasi 2 Ultimate)												
Frame	Station	Output Case	Case Type	Step Type	P	V2	V3	T	M2	M3	Frame Elem	Elem Station
Text	m	Text	Text	Text	KN	KN	KN	KN-m	KN-m	KN-m	Text	m
10	0	COMB2UG	Combination	Max	2.507	21.292	1.641	-1.2029	0.0399	6.8518	10-1	0
10	0.5	COMB2UG	Combination	Max	2.495	32.447	1.641	-1.2029	0.7336	-6.5084	10-1	0.5
10	0.5	COMB2UG	Combination	Max	4.295	88.163	3.549	0.5772	0.8465	0.9138	10-2	0
10	1	COMB2UG	Combination	Max	4.284	99.318	3.549	0.5772	1.7763	-45.2461	10-2	0.5
10	0	COMB2UG	Combination	Min	-2.131	20.666	-1.388	-4.4608	-0.0208	6.5152	10-1	0
10	0.5	COMB2UG	Combination	Min	-2.142	31.821	-1.388	-4.4608	-0.8411	-6.6808	10-1	0.5
10	0.5	COMB2UG	Combination	Min	-3.047	85.92	-1.882	-11.473	-0.9104	-0.1028	10-2	0
10	1	COMB2UG	Combination	Min	-3.058	97.075	-1.882	-11.473	-2.6738	-46.5619	10-2	0.5
11	0	COMB2UG	Combination	Max	2.632	-143.627	3.396	8.7361	0.8896	-54.3717	11-1	0
11	0.5	COMB2UG	Combination	Max	2.632	-132.472	3.396	8.7361	-0.2527	14.6623	11-1	0.5
11	0.5	COMB2UG	Combination	Max	3.487	-80.767	2.706	4.6456	-0.083	29.1623	11-2	0
11	1	COMB2UG	Combination	Max	3.487	-69.612	2.706	4.6456	-0.9699	67.209	11-2	0.5
11	1	COMB2UG	Combination	Max	3.888	-35.987	1.811	1.4365	-0.7776	79.346	11-3	0
11	1.5	COMB2UG	Combination	Max	3.888	-24.832	1.811	1.4365	-1.5953	94.7509	11-3	0.5
11	1.5	COMB2UG	Combination	Max	3.928	7.159	0.275	-1.3895	-1.381	102.2841	11-4	0
11	2	COMB2UG	Combination	Max	3.928	18.314	0.275	-1.3895	-1.5149	95.9163	11-4	0.5
11	2	COMB2UG	Combination	Max	3.483	60.591	-1.237	-1.0604	-1.2795	97.4708	11-5	0
11	2.5	COMB2UG	Combination	Max	3.483	71.746	-1.237	-1.0604	-0.6507	64.7765	11-5	0.5
11	2.5	COMB2UG	Combination	Max	2.85	139.833	-1.098	1.6212	-0.4084	63.2341	11-6	0
11	3	COMB2UG	Combination	Max	2.85	150.988	-1.098	1.6212	0.2435	-8.4324	11-6	0.5
11	3	COMB2UG	Combination	Max	2.289	276.898	1.615	4.7532	0.5392	-10.2014	11-7	0
11	3.5	COMB2UG	Combination	Max	2.289	288.053	1.615	4.7532	1.0725	-149.5707	11-7	0.5
11	0	COMB2UG	Combination	Min	-7.157	-148.981	-0.033	-17.4849	-1.4742	-64.4316	11-1	0
11	0.5	COMB2UG	Combination	Min	-7.157	-137.826	-0.033	-17.4849	-2.0134	7.2607	11-1	0.5
11	0.5	COMB2UG	Combination	Min	-6.393	-84.433	1.565	-13.7534	-2.1113	22.9121	11-2	0
11	1	COMB2UG	Combination	Min	-6.393	-73.278	1.565	-13.7534	-3.3601	61.8882	11-2	0.5
11	1	COMB2UG	Combination	Min	-5.618	-38.624	1.021	-10.2027	-3.5065	74.7195	11-3	0
11	1.5	COMB2UG	Combination	Min	-5.618	-27.469	1.021	-10.2027	-4.1046	91.0424	11-3	0.5
11	1.5	COMB2UG	Combination	Min	-5.01	5.184	-0.772	-6.6438	-4.2775	99.2984	11-4	0
11	2	COMB2UG	Combination	Min	-5.01	16.339	-0.772	-6.6438	-3.895	93.9172	11-4	0.5
11	2	COMB2UG	Combination	Min	-4.613	58.282	-2.523	-5.8649	-4.1262	96.2626	11-5	0
11	2.5	COMB2UG	Combination	Min	-4.613	69.437	-2.523	-5.8649	-2.8749	63.9429	11-5	0.5
11	2.5	COMB2UG	Combination	Min	-4.407	136.975	-2.731	-7.1208	-3.1418	61.6716	11-6	0
11	3	COMB2UG	Combination	Min	-4.407	148.13	-2.731	-7.1208	-1.8791	-10.6437	11-6	0.5
11	3	COMB2UG	Combination	Min	-3.96	273.156	-1.611	-8.9509	-2.1678	-13.8107	11-7	0
11	3.5	COMB2UG	Combination	Min	-3.96	284.311	-1.611	-8.9509	-2.7031	-155.0458	11-7	0.5
12	0	COMB2UG	Combination	Max	0.698	-315.177	4.165	9.4958	0.3968	-152.7532	12-1	0

12	0.5	COMB2UG	Combination	Max	0.698	-304.022	4.165	9.4958	-1.6854	2.0486	12-1	0.5
12	0.5	COMB2UG	Combination	Max	1.186	-171.624	4.954	6.7323	-1.3608	24.1716	12-2	0
12	1	COMB2UG	Combination	Max	1.186	-160.469	4.954	6.7323	-3.549	107.4808	12-2	0.5
12	1	COMB2UG	Combination	Max	1.524	-78.244	3.727	4.2841	-3.173	124.8026	12-3	0
12	1.5	COMB2UG	Combination	Max	1.524	-67.089	3.727	4.2841	-4.9569	161.3532	12-3	0.5
12	1.5	COMB2UG	Combination	Max	1.407	-0.457	0.704	1.6867	-4.5873	169.3916	12-4	0
12	2	COMB2UG	Combination	Max	1.407	10.698	0.704	1.6867	-4.9376	166.9715	12-4	0.5
12	2	COMB2UG	Combination	Max	0.697	81.654	-2.145	3.4804	-4.579	163.0825	12-5	0
12	2.5	COMB2UG	Combination	Max	0.697	92.809	-2.145	3.4804	-3.4814	120.1741	12-5	0.5
12	2.5	COMB2UG	Combination	Max	-0.419	188.667	-2.718	5.8099	-3.1546	107.1646	12-6	0
12	3	COMB2UG	Combination	Max	-0.419	199.822	-2.718	5.8099	-1.642	11.0367	12-6	0.5
12	3	COMB2UG	Combination	Max	-1.26	361.352	-0.017	8.4657	-1.3325	-4.9763	12-7	0
12	3.5	COMB2UG	Combination	Max	-1.26	372.507	-0.017	8.4657	-0.0195	-186.7284	12-7	0.5
12	0	COMB2UG	Combination	Min	-5.978	-318.725	1.055	-11.2921	-1.8066	-159.5939	12-1	0
12	0.5	COMB2UG	Combination	Min	-5.978	-307.57	1.055	-11.2921	-2.3341	-3.0221	12-1	0.5
12	0.5	COMB2UG	Combination	Min	-4.387	-174.199	3.039	-7.7632	-2.5878	20.4734	12-2	0
12	1	COMB2UG	Combination	Min	-4.387	-163.044	3.039	-7.7632	-4.396	104.4982	12-2	0.5
12	1	COMB2UG	Combination	Min	-3.015	-80.148	2.014	-4.8121	-4.6923	122.4862	12-3	0
12	1.5	COMB2UG	Combination	Min	-3.015	-68.993	2.014	-4.8121	-5.779	159.5541	12-3	0.5
12	**1.5**	**COMB2UG**	**Combination**	**Min**	**-2.133**	**-1.872**	**-0.997**	**-2.1422**	**-6.1157**	**168.229**	**12-4**	**0**
12	2	COMB2UG	Combination	Min	-2.133	9.283	-0.997	-2.1422	-5.6193	166.2362	12-4	0.5
12	2	COMB2UG	Combination	Min	-1.82	79.781	-3.919	-3.9947	-5.994	161.7341	12-5	0
12	2.5	COMB2UG	Combination	Min	-1.82	90.936	-3.919	-3.9947	-4.06	118.3476	12-5	0.5
12	2.5	COMB2UG	Combination	Min	-1.973	186.172	-4.733	-6.236	-4.4492	104.6896	12-6	0
12	3	COMB2UG	Combination	Min	-1.973	197.327	-4.733	-6.236	-2.2366	7.8204	12-6	0.5
12	3	COMB2UG	Combination	Min	-2.486	357.919	-3.297	-8.8994	-2.5887	-9.5539	12-7	0
12	3.5	COMB2UG	Combination	Min	-2.486	369.075	-3.297	-8.8994	-2.2445	-193.0152	12-7	0.5
13	0	COMB2UG	Combination	Max	-1.26	-369.072	3.297	8.9135	-0.0196	-186.7294	13-1	0
13	0.5	COMB2UG	Combination	Max	-1.26	-357.917	3.297	8.9135	-1.3322	-4.9784	13-1	0.5
13	0.5	COMB2UG	Combination	Max	-0.421	-197.324	4.732	6.2503	-1.642	11.0352	13-2	0
13	1	COMB2UG	Combination	Max	-0.421	-186.169	4.732	6.2503	-3.1544	107.1613	13-2	0.5
13	1	COMB2UG	Combination	Max	0.695	-90.931	3.917	4.0093	-3.4812	120.1721	13-3	0
13	1.5	COMB2UG	Combination	Max	0.695	-79.776	3.917	4.0093	-4.5784	163.0787	13-3	0.5
13	1.5	COMB2UG	Combination	Max	1.404	-9.273	0.995	2.141	-4.9372	166.9705	13-4	0
13	2	COMB2UG	Combination	Max	1.404	1.882	0.995	2.141	-4.5864	169.389	13-4	0.5
13	2	COMB2UG	Combination	Max	1.519	69.009	-2.016	4.8105	-4.9558	161.3555	13-5	0
13	2.5	COMB2UG	Combination	Max	1.519	80.164	-2.016	4.8105	-3.1708	124.7969	13-5	0.5
13	2.5	COMB2UG	Combination	Max	1.179	163.079	-3.042	7.7604	-3.5472	107.4871	13-6	0
13	3	COMB2UG	Combination	Max	1.179	174.234	-3.042	7.7604	-1.3585	24.1517	13-6	0.5
13	3	COMB2UG	Combination	Max	0.683	307.64	-1.048	11.2894	-1.6822	2.0468	13-7	0
13	3.5	COMB2UG	Combination	Max	0.683	318.795	-1.048	11.2894	0.3978	-152.7835	13-7	0.5
13	0	COMB2UG	Combination	Min	-2.486	-372.507	0.017	-8.4636	-2.2449	-193.0147	13-1	0
13	0.5	COMB2UG	Combination	Min	-2.486	-361.352	0.017	-8.4636	-2.589	-9.5538	13-1	0.5

13	0.5	COMB2UG	Combination	Min	-1.975	-199.821	2.717	-5.8078	-2.2369	7.821	13-2	0
13	1	COMB2UG	Combination	Min	-1.975	-188.666	2.717	-5.8078	-4.4492	104.6896	13-2	0.5
13	1	COMB2UG	Combination	Min	-1.823	-92.805	2.144	-3.4785	-4.0602	118.3482	13-3	0
13	1.5	COMB2UG	Combination	Min	-1.823	-81.65	2.144	-3.4785	-5.9937	161.7322	13-3	0.5
13	1.5	COMB2UG	Combination	Min	-2.138	-10.69	-0.706	-1.6691	-5.6192	166.2357	13-4	0
13	2	COMB2UG	Combination	Min	-2.138	0.465	-0.706	-1.6691	-6.1146	168.2215	13-4	0.5
13	2	COMB2UG	Combination	Min	-3.023	67.107	-3.73	-4.2665	-5.7781	159.5511	13-5	0
13	2.5	COMB2UG	Combination	Min	-3.023	78.262	-3.73	-4.2665	-4.6902	122.4739	13-5	0.5
13	2.5	COMB2UG	Combination	Min	-4.401	160.502	-4.954	-6.7159	-4.394	104.4958	13-6	0
13	3	COMB2UG	Combination	Min	-4.401	171.657	-4.954	-6.7159	-2.5846	20.4633	13-6	0.5
13	3	COMB2UG	Combination	Min	-5.995	304.079	-4.161	-9.4857	-2.3312	-3.0003	13-7	0
13	3.5	COMB2UG	Combination	Min	-5.995	315.234	-4.161	-9.4857	-1.8069	-159.6073	13-7	0.5
15	0	COMB2UG	Combination	Max	4.279	-97.104	1.882	11.4652	1.7761	-45.2638	15-1	0
15	0.5	COMB2UG	Combination	Max	4.29	-85.949	1.882	11.4652	0.8461	0.9087	15-1	0.5
15	0.5	COMB2UG	Combination	Max	2.494	-31.831	1.387	4.4558	0.7333	-6.5138	15-2	0
15	1	COMB2UG	Combination	Max	2.505	-20.676	1.387	4.4558	0.0399	6.8537	15-2	0.5
15	0	COMB2UG	Combination	Min	-3.065	-99.339	-3.547	-0.5748	-2.6731	-46.5692	15-1	0
15	0.5	COMB2UG	Combination	Min	-3.054	-88.184	-3.547	-0.5748	-0.9105	-0.0977	15-1	0.5
15	0.5	COMB2UG	Combination	Min	-2.144	-32.453	-1.64	1.2042	-0.8407	-6.6832	15-2	0
15	1	COMB2UG	Combination	Min	-2.133	-21.297	-1.64	1.2042	-0.0206	6.5135	15-2	0.5
20	0	COMB2UG	Combination	Max	2.281	-284.181	1.632	8.9481	1.0715	-149.5435	20-1	0
20	0.5	COMB2UG	Combination	Max	2.281	-273.026	1.632	8.9481	0.5253	-10.2394	20-1	0.5
20	0.5	COMB2UG	Combination	Max	2.857	-147.951	2.718	7.1271	0.2347	-8.3963	20-2	0
20	1	COMB2UG	Combination	Max	2.857	-136.796	2.718	7.1271	-0.4058	63.182	20-2	0.5
20	1	COMB2UG	Combination	Max	3.48	-69.286	2.483	5.8531	-0.6515	64.8416	20-3	0
20	1.5	COMB2UG	Combination	Max	3.48	-58.131	2.483	5.8531	-1.265	97.4643	20-3	0.5
20	1.5	COMB2UG	Combination	Max	3.904	-16.357	0.804	6.6332	-1.4976	95.9278	20-4	0
20	2	COMB2UG	Combination	Max	3.904	-5.202	0.804	6.6332	-1.3804	102.3269	20-4	0.5
20	2	COMB2UG	Combination	Max	3.916	27.368	-0.996	10.2353	-1.5953	94.7267	20-5	0
20	2.5	COMB2UG	Combination	Max	3.916	38.523	-0.996	10.2353	-0.7844	79.3831	20-5	0.5
20	2.5	COMB2UG	Combination	Max	3.475	73.198	-1.581	13.7475	-0.9775	67.1722	20-6	0
20	3	COMB2UG	Combination	Max	3.475	84.353	-1.581	13.7475	-0.086	29.1718	20-6	0.5
20	3	COMB2UG	Combination	Max	2.623	137.782	0.028	17.4853	-0.2555	14.6482	20-7	0
20	3.5	COMB2UG	Combination	Max	2.623	148.937	0.028	17.4853	0.8898	-54.3825	20-7	0.5
20	0	COMB2UG	Combination	Min	-3.983	-287.941	-1.596	-4.7398	-2.7034	-155.0346	20-1	0
20	0.5	COMB2UG	Combination	Min	-3.983	-276.786	-1.596	-4.7398	-2.1754	-13.8553	20-1	0.5
20	0.5	COMB2UG	Combination	Min	-4.386	-150.828	1.079	-1.6424	-1.8861	-10.6051	20-2	0
20	1	COMB2UG	Combination	Min	-4.386	-139.673	1.079	-1.6424	-3.1437	61.6289	20-2	0.5
20	1	COMB2UG	Combination	Min	-4.641	-71.629	1.207	1.0636	-2.8756	63.967	20-3	0
20	1.5	COMB2UG	Combination	Min	-4.641	-60.474	1.207	1.0636	-4.1072	96.2243	20-3	0.5
20	1.5	COMB2UG	Combination	Min	-5.019	-18.377	-0.239	1.4037	-3.8787	93.9204	20-4	0
20	2	COMB2UG	Combination	Min	-5.019	-7.222	-0.239	1.4037	-4.2786	99.3106	20-4	0.5
20	2	COMB2UG	Combination	Min	-5.61	24.725	-1.796	-1.4465	-4.1012	91.0246	20-5	0

20	2.5	COMB2UG	Combination	Min	-5.61	35.88	-1.796	-1.4465	-3.5164	74.7445	20-5	0.5
20	2.5	COMB2UG	Combination	Min	-6.404	69.523	-2.728	-4.6333	-3.3753	61.8591	20-6	0
20	3	COMB2UG	Combination	Min	-6.404	80.678	-2.728	-4.6333	-2.1125	22.9213	20-6	0.5
20	3	COMB2UG	Combination	Min	-7.17	132.411	-3.399	-8.7476	-2.0129	7.2264	20-7	0
20	3.5	COMB2UG	Combination	Min	-7.17	143.566	-3.399	-8.7476	-1.4725	-64.417	20-7	0.5
53	0	COMB2UG	Combination	Max	4.691	16.851	1.816	2.2181	0.0356	7.0979	53-1	0
53	0.5	COMB2UG	Combination	Max	4.68	28.006	1.816	2.2181	0.6024	-4.1003	53-1	0.5
53	0.5	COMB2UG	Combination	Max	7.684	75.625	3.823	7.643	0.6981	5.5682	53-2	0
53	1	COMB2UG	Combination	Max	7.673	86.78	3.823	7.643	1.6258	-34.9759	53-2	0.5
53	0	COMB2UG	Combination	Min	-4.46	16.789	-1.134	-1.6077	-0.0234	6.7979	53-1	0
53	0.5	COMB2UG	Combination	Min	-4.471	27.944	-1.134	-1.6077	-0.9309	-4.4016	53-1	0.5
53	0.5	COMB2UG	Combination	Min	-6.707	74.787	-1.875	-5.9176	-0.9949	3.4374	53-2	0
53	1	COMB2UG	Combination	Min	-6.718	85.942	-1.875	-5.9176	-2.8965	-36.802	53-2	0.5
54	0	COMB2UG	Combination	Max	7.093	-130.454	3.807	12.7971	0.7038	-39.0057	54-1	0
54	0.5	COMB2UG	Combination	Max	7.093	-119.299	3.807	12.7971	-0.5932	23.4325	54-1	0.5
54	0.5	COMB2UG	Combination	Max	7.838	-71.175	2.727	9.0267	-0.4561	38.2196	54-2	0
54	1	COMB2UG	Combination	Max	7.849	-60.02	2.727	9.0267	-1.2951	71.0201	54-2	0.5
54	1	COMB2UG	Combination	Max	8.003	-24.442	1.462	5.576	-1.1236	85.1573	54-3	0
54	1.5	COMB2UG	Combination	Max	7.992	-13.287	1.462	5.576	-1.7364	94.5973	54-3	0.5
54	1.5	COMB2UG	Combination	Max	7.504	26.931	-0.667	1.947	-1.5969	107.8207	54-4	0
54	2	COMB2UG	Combination	Max	7.526	38.086	-0.667	1.947	-1.1674	91.5674	54-4	0.5
54	2	COMB2UG	Combination	Max	7.098	38.107	-0.694	1.9334	-1.1664	91.5674	54-5	0
54	2.5	COMB2UG	Combination	Max	7.076	49.262	-0.694	1.9334	-0.8117	70.582	54-5	0.5
54	2.5	COMB2UG	Combination	Max	6.171	126.293	-1.097	5.3232	-0.6453	61.219	54-6	0
54	3	COMB2UG	Combination	Max	6.171	137.448	-1.097	5.3232	0.0473	-2.0241	54-6	0.5
54	3	COMB2UG	Combination	Max	5.142	263.53	1.419	9.1218	0.3221	-6.6228	54-7	0
54	3.5	COMB2UG	Combination	Max	5.142	274.685	1.419	9.1218	1.1012	-138.4788	54-7	0.5
54	0	COMB2UG	Combination	Min	-12.218	-137.492	0.109	-13.9867	-1.6611	-58.056	54-1	0
54	0.5	COMB2UG	Combination	Min	-12.218	-126.337	0.109	-13.9867	-2.3224	7.9015	54-1	0.5
54	0.5	COMB2UG	Combination	Min	-11.531	-76.923	1.484	-9.3654	-2.4045	25.0849	54-2	0
54	1	COMB2UG	Combination	Min	-11.52	-65.768	1.484	-9.3654	-3.6709	60.7564	54-2	0.5
54	1	COMB2UG	Combination	Min	-10.416	-29.93	0.775	-5.1364	-3.8133	76.2129	54-3	0
54	1.5	COMB2UG	Combination	Min	-10.427	-18.774	0.775	-5.1364	-4.3191	88.3811	54-3	0.5
54	1.5	COMB2UG	Combination	Min	-9.457	20.646	-1.648	-0.542	-4.4379	102.3619	54-4	0
54	2	COMB2UG	Combination	Min	-9.435	31.801	-1.648	-0.542	-3.7099	89.2491	54-4	0.5
54	2	COMB2UG	Combination	Min	-9.286	31.772	-1.621	-0.5479	-3.7166	89.2491	54-5	0
54	2.5	COMB2UG	Combination	Min	-9.309	42.927	-1.621	-0.5479	-2.9138	69.7174	54-5	0.5
54	2.5	COMB2UG	Combination	Min	-8.167	120.898	-2.576	-3.0748	-3.101	59.4685	54-6	0
54	3	COMB2UG	Combination	Min	-8.167	132.053	-2.576	-3.0748	-1.9573	-6.4614	54-6	0.5
54	3	COMB2UG	Combination	Min	-7.135	258.134	-1.972	-6.1819	-2.2296	-13.6709	54-7	0
54	3.5	COMB2UG	Combination	Min	-7.135	269.289	-1.972	-6.1819	-2.7321	-148.2242	54-7	0.5
55	0	COMB2UG	Combination	Max	3.81	-304.97	4.101	10.3399	0.3871	-143.1825	55-1	0
55	0.5	COMB2UG	Combination	Max	3.81	-293.815	4.101	10.3399	-1.6628	6.5143	55-1	0.5

55	0.5	COMB2UG	Combination	Max	3.578	-165.584	4.684	7.2285	-1.361	26.1507	55-2	0
55	1	COMB2UG	Combination	Max	3.578	-154.429	4.684	7.2285	-3.3991	106.1689	55-2	0.5
55	1	COMB2UG	Combination	Max	3.29	-74.916	3.589	4.5536	-3.0512	121.7476	55-3	0
55	1.16667	COMB2UG	Combination	Max	3.29	-71.198	3.589	4.5536	-3.5931	133.9271	55-3	0.16667
55	1.16667	COMB2UG	Combination	Max	3.152	-71.197	3.435	4.5536	-3.5931	133.9271	55-4	0
55	1.5	COMB2UG	Combination	Max	3.152	-63.761	3.435	4.5536	-4.7121	156.4272	55-4	0.33333
55	1.5	COMB2UG	Combination	Max	2.456	0.588	0.583	1.9327	-4.3739	163.3941	55-5	0
55	2	COMB2UG	Combination	Max	2.456	11.743	0.583	1.9327	-4.6626	160.5189	55-5	0.5
55	2	COMB2UG	Combination	Max	1.309	79.827	-2.208	4.0409	-4.3425	156.9876	55-6	0
55	2.33333	COMB2UG	Combination	Max	1.309	87.264	-2.208	4.0409	-3.5996	130.2452	55-6	0.33333
55	2.33333	COMB2UG	Combination	Max	1.172	87.264	-2.089	4.0409	-3.5996	130.2452	55-7	0
55	2.5	COMB2UG	Combination	Max	1.172	90.982	-2.089	4.0409	-3.2372	115.9447	55-7	0.16667
55	2.5	COMB2UG	Combination	Max	-0.246	182.919	-2.689	6.6503	-2.9487	103.7812	55-8	0
55	3	COMB2UG	Combination	Max	-0.246	194.075	-2.689	6.6503	-1.4472	11.3077	55-8	0.5
55	3	COMB2UG	Combination	Max	-1.103	348.813	-0.043	9.7036	-1.1699	-3.5102	55-9	0
55	3.5	COMB2UG	Combination	Max	-1.103	359.968	-0.043	9.7036	0.2642	-178.7533	55-9	0.5
55	0	COMB2UG	Combination	Min	-9.511	-308.621	0.93	-11.0467	-1.809	-154.9952	55-1	0
55	0.5	COMB2UG	Combination	Min	-9.511	-297.466	0.93	-11.0467	-2.2744	-3.4739	55-1	0.5
55	0.5	COMB2UG	Combination	Min	-7.493	-169.063	2.867	-7.369	-2.5046	18.7394	55-2	0
55	1	COMB2UG	Combination	Min	-7.493	-157.908	2.867	-7.369	-4.2421	100.4676	55-2	0.5
55	1	COMB2UG	Combination	Min	-5.848	-78.213	1.791	-4.2424	-4.5067	117.426	55-3	0
55	1.16667	COMB2UG	Combination	Min	-5.848	-74.495	1.791	-4.2424	-4.8616	130.1482	55-3	0.16667
55	1.16667	COMB2UG	Combination	Min	-5.709	-74.495	1.946	-4.2424	-4.8616	130.1482	55-4	0
55	1.5	COMB2UG	Combination	Min	-5.709	-67.058	1.946	-4.2424	-5.536	153.7334	55-4	0.33333
55	1.5	COMB2UG	Combination	Min	-4.448	-2.633	-1.018	-1.2005	-5.8419	161.9701	55-5	0
55	2	COMB2UG	Combination	Min	-4.448	8.522	-1.018	-1.2005	-5.336	160.2899	55-5	0.5
55	2	COMB2UG	Combination	Min	-3.635	76.491	-3.767	-2.9169	-5.6811	155.4909	55-6	0
55	2.33333	COMB2UG	Combination	Min	-3.635	83.928	-3.767	-2.9169	-4.4322	127.6483	55-6	0.33333
55	2.33333	COMB2UG	Combination	Min	-3.498	83.928	-3.886	-2.9169	-4.4322	127.6483	55-7	0
55	2.5	COMB2UG	Combination	Min	-3.498	87.646	-3.886	-2.9169	-3.7986	112.7972	55-7	0.16667
55	2.5	COMB2UG	Combination	Min	-3.133	179.332	-4.58	-5.1616	-4.1615	99.249	55-8	0
55	3	COMB2UG	Combination	Min	-3.133	190.487	-4.58	-5.1616	-2.0283	5.0191	55-8	0.5
55	3	COMB2UG	Combination	Min	-3.47	344.907	-3.387	-7.7831	-2.3531	-12.4012	55-9	0
55	3.5	COMB2UG	Combination	Min	-3.47	356.062	-3.387	-7.7831	-2.0722	-189.5955	55-9	0.5
56	0	COMB2UG	Combination	Max	-1.101	-356.065	3.387	7.8385	0.2636	-178.7539	56-1	0
56	0.5	COMB2UG	Combination	Max	-1.101	-344.91	3.387	7.8385	-1.1708	-3.5092	56-1	0.5
56	0.5	COMB2UG	Combination	Max	-0.253	-190.497	4.58	5.2173	-1.4481	11.3015	56-2	0
56	1	COMB2UG	Combination	Max	-0.253	-179.342	4.58	5.2173	-2.95	103.7798	56-2	0.5
56	1	COMB2UG	Combination	Max	1.162	-87.676	3.886	2.9756	-3.2382	115.9288	56-3	0
56	1.16667	COMB2UG	Combination	Max	1.162	-83.957	3.886	2.9756	-3.6005	130.2342	56-3	0.16667
56	1.16667	COMB2UG	Combination	Max	1.298	-83.957	3.767	2.9756	-3.6005	130.2342	56-4	0
56	1.5	COMB2UG	Combination	Max	1.298	-76.52	3.767	2.9756	-4.3431	156.9862	56-4	0.33333
56	1.5	COMB2UG	Combination	Max	2.442	-8.604	1.013	1.0867	-4.6637	160.4839	56-5	0

56	2	COMB2UG	Combination	Max	2.442	2.551	1.013	1.0867	-4.3736	163.3868	56-5	0.5
56	2	COMB2UG	Combination	Max	3.133	66.839	-1.956	4.1041	-4.7107	156.3432	56-6	0
56	2.33333	COMB2UG	Combination	Max	3.133	74.275	-1.956	4.1041	-3.5872	133.9085	56-6	0.33333
56	2.33333	COMB2UG	Combination	Max	3.272	74.275	-1.802	4.1041	-3.5872	133.9085	56-7	0
56	2.5	COMB2UG	Combination	Max	3.272	77.993	-1.802	4.1041	-3.0432	121.7617	56-7	0.16667
56	2.5	COMB2UG	Combination	Max	3.552	157.331	-2.896	7.1917	-3.3925	105.9913	56-8	0
56	3	COMB2UG	Combination	Max	3.552	168.486	-2.896	7.1917	-1.3489	26.234	56-8	0.5
56	3	COMB2UG	Combination	Max	3.77	295.966	-0.978	10.8329	-1.6473	6.1139	56-9	0
56	3.5	COMB2UG	Combination	Max	3.77	307.121	-0.978	10.8329	0.4292	-142.9009	56-9	0.5
56	0	COMB2UG	Combination	Min	-3.474	-359.968	0.043	-9.777	-2.0721	-189.5991	56-1	0
56	0.5	COMB2UG	Combination	Min	-3.474	-348.813	0.043	-9.777	-2.3529	-12.4051	56-1	0.5
56	0.5	COMB2UG	Combination	Min	-3.133	-194.08	2.69	-6.7248	-2.0282	5.0079	56-2	0
56	1	COMB2UG	Combination	Min	-3.133	-182.925	2.69	-6.7248	-4.1613	99.2405	56-2	0.5
56	1	COMB2UG	Combination	Min	-3.499	-91.005	2.088	-4.1202	-3.7987	112.7745	56-3	0
56	1.16667	COMB2UG	Combination	Min	-3.499	-87.287	2.088	-4.1202	-4.4323	127.6296	56-3	0.16667
56	1.16667	COMB2UG	Combination	Min	-3.636	-87.287	2.207	-4.1202	-4.4323	127.6296	56-4	0
56	1.5	COMB2UG	Combination	Min	-3.636	-79.85	2.207	-4.1202	-5.6812	155.48	56-4	0.33333
56	1.5	COMB2UG	Combination	Min	-4.448	-11.814	-0.584	-1.8424	-5.3358	160.2472	56-5	0
56	2	COMB2UG	Combination	Min	-4.448	-0.659	-0.584	-1.8424	-5.8405	161.9759	56-5	0.5
56	2	COMB2UG	Combination	Min	-5.708	63.565	-3.443	-4.4433	-5.5355	153.6575	56-6	0
56	2.33333	COMB2UG	Combination	Min	-5.708	71.001	-3.443	-4.4433	-4.8592	130.1456	56-6	0.33333
56	2.33333	COMB2UG	Combination	Min	-5.846	71.002	-3.597	-4.4433	-4.8592	130.1456	56-7	0
56	2.5	COMB2UG	Combination	Min	-5.846	74.72	-3.597	-4.4433	-4.5034	117.4599	56-7	0.16667
56	2.5	COMB2UG	Combination	Min	-7.482	153.907	-4.704	-7.0866	-4.2377	100.2937	56-8	0
56	3	COMB2UG	Combination	Min	-7.482	165.062	-4.704	-7.0866	-2.4815	18.8543	56-8	0.5
56	3	COMB2UG	Combination	Min	-9.483	292.451	-4.154	-10.1686	-2.2525	-3.8925	56-9	0
56	3.5	COMB2UG	Combination	Min	-9.483	303.606	-4.154	-10.1686	-1.7629	-154.6637	56-9	0.5
57	0	COMB2UG	Combination	Max	7.683	-85.518	1.885	5.8618	1.6322	-34.9118	57-1	0
57	0.5	COMB2UG	Combination	Max	7.695	-74.363	1.885	5.8618	0.6999	5.4453	57-1	0.5
57	0.5	COMB2UG	Combination	Max	4.685	-27.843	1.136	1.596	0.6026	-4.0875	57-2	0
57	1	COMB2UG	Combination	Max	4.696	-16.688	1.136	1.596	0.0349	7.0656	57-2	0.5
57	0	COMB2UG	Combination	Min	-6.715	-86.407	-3.794	-7.5742	-2.8762	-36.7215	57-1	0
57	0.5	COMB2UG	Combination	Min	-6.704	-75.252	-3.794	-7.5742	-0.9891	3.3065	57-1	0.5
57	0.5	COMB2UG	Combination	Min	-4.472	-27.914	-1.803	-2.2038	-0.9233	-4.384	57-2	0
57	1	COMB2UG	Combination	Min	-4.46	-16.759	-1.803	-2.2038	-0.0221	6.7639	57-2	0.5
58	0	COMB2UG	Combination	Max	5.064	-273.191	1.905	6.3502	1.1417	-139.4456	58-1	0
58	0.5	COMB2UG	Combination	Max	5.064	-262.036	1.905	6.3502	0.402	-5.6383	58-1	0.5
58	0.5	COMB2UG	Combination	Max	6.082	-142.118	2.715	3.3566	0.1422	-4.2343	58-2	0
58	1	COMB2UG	Combination	Max	6.082	-130.963	2.715	3.3566	-0.5403	64.0426	58-2	0.5
58	1	COMB2UG	Combination	Max	6.893	-66.314	2.498	1.4492	-0.7501	65.3255	58-3	0
58	1.5	COMB2UG	Combination	Max	6.915	-55.159	2.498	1.4492	-1.422	97.2635	58-3	0.5
58	1.5	COMB2UG	Combination	Max	7.836	-15.453	0.964	1.7266	-1.6261	96.1911	58-4	0
58	2	COMB2UG	Combination	Max	7.814	-4.298	0.964	1.7266	-1.5864	103.2696	58-4	0.5

58	2	COMB2UG	Combination	Max	8.142	25.939	-0.825	5.5452	-1.7806	96.4693	58-5	0
58	2.5	COMB2UG	Combination	Max	8.153	37.094	-0.825	5.5452	-1.0812	83.0448	58-5	0.5
58	2.5	COMB2UG	Combination	Max	7.878	68.532	-1.434	9.4937	-1.2468	71.7586	58-6	0
58	3	COMB2UG	Combination	Max	7.867	79.687	-1.434	9.4937	-0.4467	37.4216	58-6	0.5
58	3	COMB2UG	Combination	Max	7.114	127.387	-0.083	14.1465	-0.5876	23.6876	58-7	0
58	3.5	COMB2UG	Combination	Max	7.114	138.542	-0.083	14.1465	0.7081	-39.3349	58-7	0.5
58	0	COMB2UG	Combination	Min	-7.062	-278.264	-1.494	-9.332	-2.6862	-149.1446	58-1	0
58	0.5	COMB2UG	Combination	Min	-7.062	-267.109	-1.494	-9.332	-2.1517	-12.8022	58-1	0.5
58	0.5	COMB2UG	Combination	Min	-8.037	-146.671	1.155	-5.6969	-1.8843	-8.6441	58-2	0
58	1	COMB2UG	Combination	Min	-8.037	-135.516	1.155	-5.6969	-3.1368	61.8957	58-2	0.5
58	1	COMB2UG	Combination	Min	-8.975	-70.621	1.329	-3.1732	-2.8918	64.7372	58-3	0
58	1.5	COMB2UG	Combination	Min	-8.953	-59.466	1.329	-3.1732	-4.1333	95.689	58-3	0.5
58	1.5	COMB2UG	Combination	Min	-9.599	-19.741	-0.081	-2.8105	-3.9109	93.166	58-4	0
58	2	COMB2UG	Combination	Min	-9.621	-8.586	-0.081	-2.8105	-4.3918	98.1069	58-4	0.5
58	2	COMB2UG	Combination	Min	-10.499	21.256	-1.582	-5.9099	-4.224	89.8802	58-5	0
58	2.5	COMB2UG	Combination	Min	-10.488	32.411	-1.582	-5.9099	-3.7202	74.1297	58-5	0.5
58	2.5	COMB2UG	Combination	Min	-11.534	63.093	-2.663	-9.1313	-3.5964	61.3971	58-6	0
58	3	COMB2UG	Combination	Min	-11.545	74.248	-2.663	-9.1313	-2.3483	24.3439	58-6	0.5
58	3	COMB2UG	Combination	Min	-12.232	120.467	-3.76	-12.9293	-2.2609	8.1209	58-7	0
58	3.5	COMB2UG	Combination	Min	-12.232	131.623	-3.76	-12.9293	-1.6351	-58.3615	58-7	0.5
64	0	COMB2UG	Combination	Max	6.624	16.887	1.746	2.1884	0.0308	7.1522	64-1	0
64	0.5	COMB2UG	Combination	Max	6.613	28.042	1.746	2.1884	0.5593	-4.0729	64-1	0.5
64	0.5	COMB2UG	Combination	Max	10.715	75.809	3.859	7.6109	0.6426	5.9515	64-2	0
64	1	COMB2UG	Combination	Max	10.703	86.964	3.859	7.6109	1.6031	-34.6903	64-2	0.5
64	0	COMB2UG	Combination	Min	-6.4	16.799	-1.058	-1.7227	-0.0196	6.6826	64-1	0
64	0.5	COMB2UG	Combination	Min	-6.411	27.954	-1.058	-1.7227	-0.8922	-4.5128	64-1	0.5
64	0.5	COMB2UG	Combination	Min	-9.692	74.489	-1.938	-6.1586	-0.9467	2.6833	64-2	0
64	1	COMB2UG	Combination	Min	-9.703	85.644	-1.938	-6.1586	-2.8677	-37.4018	64-2	0.5
65	0	COMB2UG	Combination	Max	11.405	-130.16	3.831	13.066	0.653	-34.4909	65-1	0
65	0.5	COMB2UG	Combination	Max	11.405	-119.005	3.831	13.066	-0.6682	27.8095	65-1	0.5
65	0.5	COMB2UG	Combination	Max	12.159	-73.04	2.66	9.1532	-0.548	40.8161	65-2	0
65	1	COMB2UG	Combination	Max	12.17	-61.885	2.66	9.1532	-1.3115	74.584	65-2	0.5
65	1	COMB2UG	Combination	Max	12.298	-31.331	1.549	5.7483	-1.1739	85.3622	65-3	0
65	1.5	COMB2UG	Combination	Max	12.286	-20.176	1.549	5.7483	-1.8555	98.2562	65-3	0.5
65	1.5	COMB2UG	Combination	Max	11.704	9.774	0.081	2.5931	-1.6942	104.5453	65-4	0
65	2	COMB2UG	Combination	Max	11.726	20.929	0.081	2.5931	-1.7344	96.8694	65-4	0.5
65	2	COMB2UG	Combination	Max	10.494	61.131	-1.467	2.9113	-1.5608	97.5316	65-5	0
65	2.5	COMB2UG	Combination	Max	10.471	72.286	-1.467	2.9113	-0.8216	65.1224	65-5	0.5
65	2.5	COMB2UG	Combination	Max	9.264	137.484	-1.284	5.5555	-0.66	64.3624	65-6	0
65	3	COMB2UG	Combination	Max	9.264	148.639	-1.284	5.5555	0.0995	-3.6424	65-6	0.5
65	3	COMB2UG	Combination	Max	7.815	269.364	1.563	9.3624	0.3214	-4.2362	65-7	0
65	3.5	COMB2UG	Combination	Max	7.815	280.519	1.563	9.3624	1.1622	-137.7242	65-7	0.5
65	0	COMB2UG	Combination	Min	-16.566	-140.861	0.004744	-14.4895	-1.6078	-63.853	65-1	0

65	0.5	COMB2UG	Combination	Min	-16.566	-129.706	0.004744	-14.4895	-2.2042	3.7793	65-1	0.5
65	0.5	COMB2UG	Combination	Min	-15.794	-81.478	1.368	-9.8122	-2.274	20.6008	65-2	0
65	1	COMB2UG	Combination	Min	-15.783	-70.323	1.368	-9.8122	-3.5246	58.5142	65-2	0.5
65	1	COMB2UG	Combination	Min	-14.517	-38.587	0.858	-5.7504	-3.6362	71.5012	65-3	0
65	1.5	COMB2UG	Combination	Min	-14.528	-27.432	0.858	-5.7504	-4.1582	87.9888	65-3	0.5
65	1.5	COMB2UG	Combination	Min	-13.248	3.148	-0.93	-1.9673	-4.2974	96.4891	65-4	0
65	2	COMB2UG	Combination	Min	-13.226	14.303	-0.93	-1.9673	-3.8324	92.1261	65-4	0.5
65	2	COMB2UG	Combination	Min	-12.2	54.431	-2.533	-1.7056	-4.0309	95.0697	65-5	0
65	2.5	COMB2UG	Combination	Min	-12.223	65.586	-2.533	-1.7056	-2.7699	64.1203	65-5	0.5
65	2.5	COMB2UG	Combination	Min	-10.827	130.345	-2.712	-3.7929	-2.982	60.9687	65-6	0
65	3	COMB2UG	Combination	Min	-10.827	141.5	-2.712	-3.7929	-1.7438	-10.5184	65-6	0.5
65	3	COMB2UG	Combination	Min	-9.302	261.398	-1.983	-6.9677	-1.9748	-15.3306	65-7	0
65	3.5	COMB2UG	Combination	Min	-9.302	272.553	-1.983	-6.9677	-2.6056	-152.8009	65-7	0.5
66	0	COMB2UG	Combination	Max	7.025	-302.825	4.125	10.0916	0.4239	-140.6353	66-1	0
66	0.5	COMB2UG	Combination	Max	7.025	-291.669	4.125	10.0916	-1.6344	7.9885	66-1	0.5
66	0.5	COMB2UG	Combination	Max	6.309	-164.13	4.596	6.949	-1.3812	27.4472	66-2	0
66	1	COMB2UG	Combination	Max	6.309	-152.975	4.596	6.949	-3.3499	106.7537	66-2	0.5
66	1	COMB2UG	Combination	Max	5.608	-73.744	3.48	4.2613	-3.0503	122.1944	66-3	0
66	1.16667	COMB2UG	Combination	Max	5.608	-70.026	3.48	4.2613	-3.5728	134.1821	66-3	0.16667
66	1.16667	COMB2UG	Combination	Max	5.409	-70.025	3.328	4.2613	-3.5728	134.1821	66-4	0
66	1.5	COMB2UG	Combination	Max	5.409	-62.589	3.328	4.2613	-4.6541	156.2982	66-4	0.33333
66	1.5	COMB2UG	Combination	Max	4.282	1.671	0.477	1.6267	-4.3687	163.0265	66-5	0
66	2	COMB2UG	Combination	Max	4.282	12.826	0.477	1.6267	-4.6056	159.8033	66-5	0.5
66	2	COMB2UG	Combination	Max	2.696	80.963	-2.324	3.941	-4.3378	156.5736	66-6	0
66	2.33333	COMB2UG	Combination	Max	2.696	88.4	-2.324	3.941	-3.5578	130.106	66-6	0.33333
66	2.33333	COMB2UG	Combination	Max	2.501	88.4	-2.204	3.941	-3.5578	130.106	66-7	0
66	2.5	COMB2UG	Combination	Max	2.501	92.119	-2.204	3.941	-3.1789	115.9428	66-7	0.16667
66	2.5	COMB2UG	Combination	Max	0.682	184.189	-2.801	6.6704	-2.9415	104.0802	66-8	0
66	3	COMB2UG	Combination	Max	0.682	195.345	-2.801	6.6704	-1.378	12.0362	66-8	0.5
66	3	COMB2UG	Combination	Max	-0.116	350.308	-0.046	9.8626	-1.1475	-2.1367	66-9	0
66	3.5	COMB2UG	Combination	Max	-0.116	361.463	-0.046	9.8626	0.3893	-176.9793	66-9	0.5
66	0	COMB2UG	Combination	Min	-12.219	-308.37	0.975	-11.2767	-1.6698	-158.801	66-1	0
66	0.5	COMB2UG	Combination	Min	-12.219	-297.215	0.975	-11.2767	-2.1612	-7.4051	66-1	0.5
66	0.5	COMB2UG	Combination	Min	-9.636	-169.57	2.959	-7.5495	-2.3528	16.0572	66-2	0
66	1	COMB2UG	Combination	Min	-9.636	-158.415	2.959	-7.5495	-4.1615	98.0235	66-2	0.5
66	1	COMB2UG	Combination	Min	-7.508	-78.959	1.876	-4.3708	-4.3859	115.5269	66-3	0
66	1.16667	COMB2UG	Combination	Min	-7.508	-75.241	1.876	-4.3708	-4.756	128.3702	66-3	0.16667
66	1.16667	COMB2UG	Combination	Min	-7.309	-75.242	2.028	-4.3708	-4.756	128.3702	66-4	0
66	1.5	COMB2UG	Combination	Min	-7.309	-67.805	2.028	-4.3708	-5.4601	152.1975	66-4	0.33333
66	1.5	COMB2UG	Combination	Min	-5.56	-3.443	-0.942	-1.2527	-5.7199	160.8016	66-5	0
66	2	COMB2UG	Combination	Min	-5.56	7.712	-0.942	-1.2527	-5.2503	159.3329	66-5	0.5
66	2	COMB2UG	Combination	Min	-4.274	75.636	-3.681	-3.0902	-5.5477	154.2366	66-6	0
66	2.33333	COMB2UG	Combination	Min	-4.274	83.073	-3.681	-3.0902	-4.3262	126.0253	66-6	0.33333

66	2.33333	COMB2UG	Combination	Min	-4.079	83.073	-3.801	-3.0902	-4.3262	126.0253	66-7	0
66	2.5	COMB2UG	Combination	Min	-4.079	86.791	-3.801	-3.0902	-3.7043	110.99	66-7	0.16667
66	2.5	COMB2UG	Combination	Min	-3.296	178.464	-4.496	-5.3485	-4.019	97.0962	66-8	0
66	3	COMB2UG	Combination	Min	-3.296	189.619	-4.496	-5.3485	-1.934	2.2358	66-8	0.5
66	3	COMB2UG	Combination	Min	-3.683	344.107	-3.404	-7.9873	-2.2135	-15.8738	66-9	0
66	3.5	COMB2UG	Combination	Min	-3.683	355.262	-3.404	-7.9873	-2.0252	-193.816	66-9	0.5
67	0	COMB2UG	Combination	Max	-0.118	-355.259	3.403	7.9982	0.3894	-176.98	67-1	0
67	0.5	COMB2UG	Combination	Max	-0.118	-344.104	3.403	7.9982	-1.147	-2.139	67-1	0.5
67	0.5	COMB2UG	Combination	Max	0.682	-189.614	4.495	5.3592	-1.3777	12.035	67-2	0
67	1	COMB2UG	Combination	Max	0.682	-178.459	4.495	5.3592	-2.9412	104.0763	67-2	0.5
67	1	COMB2UG	Combination	Max	2.5	-86.782	3.801	3.1011	-3.1785	115.9408	67-3	0
67	1.16667	COMB2UG	Combination	Max	2.5	-83.064	3.801	3.1011	-3.5574	130.1025	67-3	0.16667
67	1.16667	COMB2UG	Combination	Max	2.695	-83.064	3.681	3.1011	-3.5574	130.1025	67-4	0
67	1.5	COMB2UG	Combination	Max	2.695	-75.627	3.681	3.1011	-4.3373	156.5669	67-4	0.33333
67	1.5	COMB2UG	Combination	Max	4.278	-7.694	0.941	1.2312	-4.6053	159.801	67-5	0
67	2	COMB2UG	Combination	Max	4.278	3.461	0.941	1.2312	-4.3683	163.0178	67-5	0.5
67	2	COMB2UG	Combination	Max	5.401	67.842	-2.029	4.3488	-4.6535	156.2984	67-6	0
67	2.33333	COMB2UG	Combination	Max	5.401	75.278	-2.029	4.3488	-3.5717	134.1716	67-6	0.33333
67	2.33333	COMB2UG	Combination	Max	5.6	75.278	-1.877	4.3488	-3.5717	134.1716	67-7	0
67	2.5	COMB2UG	Combination	Max	5.6	78.996	-1.877	4.3488	-3.0488	122.1787	67-7	0.16667
67	2.5	COMB2UG	Combination	Max	6.295	158.487	-2.963	7.5274	-3.349	106.7574	67-8	0
67	3	COMB2UG	Combination	Max	6.295	169.642	-2.963	7.5274	-1.3806	27.4191	67-8	0.5
67	3	COMB2UG	Combination	Max	7.005	297.351	-0.97	11.2621	-1.633	8.0023	67-9	0
67	3.5	COMB2UG	Combination	Max	7.005	308.506	-0.97	11.2621	0.4246	-140.6792	67-9	0.5
67	0	COMB2UG	Combination	Min	-3.681	-361.461	0.046	-9.8774	-2.0257	-193.8173	67-1	0
67	0.5	COMB2UG	Combination	Min	-3.681	-350.305	0.046	-9.8774	-2.2139	-15.8762	67-1	0.5
67	0.5	COMB2UG	Combination	Min	-3.3	-195.341	2.801	-6.6852	-1.9343	2.2347	67-2	0
67	1	COMB2UG	Combination	Min	-3.3	-184.186	2.801	-6.6852	-4.019	97.0933	67-2	0.5
67	1	COMB2UG	Combination	Min	-4.086	-92.111	2.204	-3.9563	-3.7045	110.9891	67-3	0
67	1.16667	COMB2UG	Combination	Min	-4.086	-88.392	2.204	-3.9563	-4.3263	126.0231	67-3	0.16667
67	1.16667	COMB2UG	Combination	Min	-4.281	-88.392	2.324	-3.9563	-4.3263	126.0231	67-4	0
67	1.5	COMB2UG	Combination	Min	-4.281	-80.956	2.324	-3.9563	-5.5479	154.2317	67-4	0.33333
67	1.5	COMB2UG	Combination	Min	-5.57	-12.81	-0.476	-1.6097	-5.2505	159.3321	67-5	0
67	2	COMB2UG	Combination	Min	-5.57	-1.655	-0.476	-1.6097	-5.7198	160.7898	67-5	0.5
67	2	COMB2UG	Combination	Min	-7.325	62.621	-3.329	-4.2439	-5.4604	152.1954	67-6	0
67	2.33333	COMB2UG	Combination	Min	-7.325	70.058	-3.329	-4.2439	-4.7562	128.3557	67-6	0.33333
67	2.33333	COMB2UG	Combination	Min	-7.524	70.058	-3.481	-4.2439	-4.7562	128.3557	67-7	0
67	2.5	COMB2UG	Combination	Min	-7.524	73.776	-3.481	-4.2439	-4.386	115.5063	67-7	0.16667
67	2.5	COMB2UG	Combination	Min	-9.663	153.038	-4.596	-6.9313	-4.1613	98.0259	67-8	0
67	3	COMB2UG	Combination	Min	-9.663	164.193	-4.596	-6.9313	-2.3504	16.0243	67-8	0.5
67	3	COMB2UG	Combination	Min	-12.253	291.785	-4.123	-10.0801	-2.1594	-7.3826	67-9	0
67	3.5	COMB2UG	Combination	Min	-12.253	302.94	-4.123	-10.0801	-1.6705	-158.8463	67-9	0.5
68	0	COMB2UG	Combination	Max	10.697	-85.7	1.939	6.1492	1.6044	-34.716	68-1	0

68	0.5	COMB2UG	Combination	Max	10.708	-74.545	1.939	6.1492	0.6433	5.9489	68-1	0.5
68	0.5	COMB2UG	Combination	Max	6.612	-27.972	1.058	1.7169	0.5594	-4.0807	68-2	0
68	1	COMB2UG	Combination	Max	6.623	-16.817	1.058	1.7169	0.0306	7.1522	68-2	0.5
68	0	COMB2UG	Combination	Min	-9.722	-87.01	-3.858	-7.5989	-2.8668	-37.4303	68-1	0
68	0.5	COMB2UG	Combination	Min	-9.711	-75.855	-3.858	-7.5989	-0.9464	2.6823	68-1	0.5
68	0.5	COMB2UG	Combination	Min	-6.417	-28.057	-1.745	-2.1814	-0.8913	-4.5218	68-2	0
68	1	COMB2UG	Combination	Min	-6.406	-16.902	-1.745	-2.1814	-0.0193	6.6824	68-2	0.5
69	0	COMB2UG	Combination	Max	7.8	-272.291	1.999	6.9523	1.1612	-137.6799	69-1	0
69	0.5	COMB2UG	Combination	Max	7.8	-261.136	1.999	6.9523	0.3097	-4.3228	69-1	0.5
69	0.5	COMB2UG	Combination	Max	9.274	-141.125	2.706	3.8273	0.0925	-3.5662	69-2	0
69	1	COMB2UG	Combination	Max	9.274	-129.97	2.706	3.8273	-0.6565	64.2516	69-2	0.5
69	1	COMB2UG	Combination	Max	10.442	-65.265	2.498	1.6924	-0.8239	65.2182	69-3	0
69	1.5	COMB2UG	Combination	Max	10.464	-54.11	2.498	1.6924	-1.5444	97.5033	69-3	0.5
69	1.5	COMB2UG	Combination	Max	11.721	-14.328	0.952	1.9412	-1.7138	96.8625	69-4	0
69	2	COMB2UG	Combination	Max	11.699	-3.172	0.952	1.9412	-1.6921	104.6077	69-4	0.5
69	2	COMB2UG	Combination	Max	12.281	27.261	-0.822	5.7975	-1.8551	98.1967	69-5	0
69	2.5	COMB2UG	Combination	Max	12.293	38.416	-0.822	5.7975	-1.1807	85.4266	69-5	0.5
69	2.5	COMB2UG	Combination	Max	12.155	70.173	-1.383	9.7889	-1.3181	74.5131	69-6	0
69	3	COMB2UG	Combination	Max	12.143	81.328	-1.383	9.7889	-0.5489	40.8404	69-6	0.5
69	3	COMB2UG	Combination	Max	11.392	129.609	-0.011	14.5018	-0.6706	27.7588	69-7	0
69	3.5	COMB2UG	Combination	Max	11.392	140.764	-0.011	14.5018	0.6539	-34.4858	69-7	0.5
69	0	COMB2UG	Combination	Min	-9.345	-280.299	-1.543	-9.3435	-2.6067	-152.7655	69-1	0
69	0.5	COMB2UG	Combination	Min	-9.345	-269.144	-1.543	-9.3435	-1.983	-15.4052	69-1	0.5
69	0.5	COMB2UG	Combination	Min	-10.828	-148.342	1.259	-5.599	-1.7526	-10.447	69-2	0
69	1	COMB2UG	Combination	Min	-10.828	-137.187	1.259	-5.599	-2.9858	60.8916	69-2	0.5
69	1	COMB2UG	Combination	Min	-12.248	-72.078	1.43	-2.895	-2.77	64.1944	69-3	0
69	1.5	COMB2UG	Combination	Min	-12.226	-60.923	1.43	-2.895	-4.0132	95.0033	69-3	0.5
69	1.5	COMB2UG	Combination	Min	-13.276	-21.068	-0.044	-2.5708	-3.8202	92.1545	69-4	0
69	2	COMB2UG	Combination	Min	-13.298	-9.913	-0.044	-2.5708	-4.2959	96.5296	69-4	0.5
69	2	COMB2UG	Combination	Min	-14.508	19.93	-1.541	-5.7879	-4.1506	87.9628	69-5	0
69	2.5	COMB2UG	Combination	Min	-14.497	31.085	-1.541	-5.7879	-3.6436	71.5597	69-5	0.5
69	2.5	COMB2UG	Combination	Min	-15.819	61.695	-2.68	-9.1356	-3.5378	58.4556	69-6	0
69	3	COMB2UG	Combination	Min	-15.83	72.85	-2.68	-9.1356	-2.2756	20.6169	69-6	0.5
69	3	COMB2UG	Combination	Min	-16.595	118.889	-3.833	-13.0777	-2.2029	3.7282	69-7	0
69	3.5	COMB2UG	Combination	Min	-16.595	130.044	-3.833	-13.0777	-1.6053	-63.8537	69-7	0.5
196	0	COMB2UG	Combination	Max	1.951	18.973	1.521	3.9034	0.0228	9.0749	196-1	0
196	0.5	COMB2UG	Combination	Max	1.94	30.128	1.521	3.9034	0.4503	-3.1178	196-1	0.5
196	0.5	COMB2UG	Combination	Max	6.972	85.101	4.703	12.7741	0.4499	13.7675	196-2	0
196	1	COMB2UG	Combination	Max	6.961	96.256	4.703	12.7741	2.3653	-30.7958	196-2	0.5
196	0	COMB2UG	Combination	Min	-1.105	18.316	-0.886	-1.5395	-0.0116	6.3766	196-1	0
196	0.5	COMB2UG	Combination	Min	-1.116	29.472	-0.886	-1.5395	-0.7566	-5.6531	196-1	0.5
196	0.5	COMB2UG	Combination	Min	-4.623	77.015	-3.867	-6.4614	-0.7283	-4.2099	196-2	0
196	1	COMB2UG	Combination	Min	-4.635	88.17	-3.867	-6.4614	-3.0618	-46.282	196-2	0.5

197	0	COMB2UG	Combination	Max	13.641	-107.992	6.062	12.3717	1.5304	30.0404	197-1	0
197	0.5	COMB2UG	Combination	Max	13.641	-96.837	6.062	12.3717	-0.4946	81.2485	197-1	0.5
197	0.5	COMB2UG	Combination	Max	9.602	-50.205	3.358	7.8749	-0.5212	87.2855	197-2	0
197	1	COMB2UG	Combination	Max	9.613	-39.05	3.358	7.8749	-1.1653	110.0372	197-2	0.5
197	1	COMB2UG	Combination	Max	6.247	-1.778	1.773	3.7838	-1.216	119.5339	197-3	0
197	1.5	COMB2UG	Combination	Max	6.236	9.377	1.773	3.7838	-1.8657	117.7612	197-3	0.5
197	1.5	COMB2UG	Combination	Max	2.765	56.169	-0.583	-0.0493	-1.8961	128.6166	197-4	0
197	2	COMB2UG	Combination	Max	2.787	67.324	-0.583	-0.0493	-1.5179	97.7435	197-4	0.5
197	2	COMB2UG	Combination	Max	1.936	67.328	-0.481	-0.0617	-1.5071	97.7435	197-5	0
197	2.5	COMB2UG	Combination	Max	1.914	78.483	-0.481	-0.0617	-0.9803	71.7523	197-5	0.5
197	2.5	COMB2UG	Combination	Max	3.659	155.999	-1.129	7.1008	-0.9424	64.4905	197-6	0
197	3	COMB2UG	Combination	Max	3.659	167.155	-1.129	7.1008	-0.1485	8.4525	197-6	0.5
197	3	COMB2UG	Combination	Max	8.953	299.538	2.703	14.2434	-0.0485	12.5327	197-7	0
197	3.5	COMB2UG	Combination	Max	8.953	310.693	2.703	14.2434	1.9713	-114.2687	197-7	0.5
197	0	COMB2UG	Combination	Min	-19.578	-171.852	-1.044	-24.172	-1.8961	-135.9884	197-1	0
197	0.5	COMB2UG	Combination	Min	-19.578	-160.697	-1.044	-24.172	-2.3804	-52.8518	197-1	0.5
197	0.5	COMB2UG	Combination	Min	-13.505	-102.437	1.037	-16.8686	-2.3163	-26.5842	197-2	0
197	1	COMB2UG	Combination	Min	-13.494	-91.282	1.037	-16.8686	-3.8692	21.4074	197-2	0.5
197	1	COMB2UG	Combination	Min	-8.299	-51.349	0.325	-10.0701	-3.7881	41.8133	197-3	0
197	1.5	COMB2UG	Combination	Min	-8.31	-40.194	0.325	-10.0701	-4.1873	64.5717	197-3	0.5
197	1.5	COMB2UG	Combination	Min	-4.019	-0.748	-2.252	-2.7003	-4.164	81.6028	197-4	0
197	2	COMB2UG	Combination	Min	-3.996	10.407	-2.252	-2.7003	-3.1249	79.1879	197-4	0.5
197	2	COMB2UG	Combination	Min	-3.456	10.398	-2.353	-2.7064	-3.1246	79.1879	197-5	0
197	2.5	COMB2UG	Combination	Min	-3.479	21.553	-2.353	-2.7064	-2.2341	60.7387	197-5	0.5
197	2.5	COMB2UG	Combination	Min	-4.942	105.737	-3.358	-5.876	-2.3244	46.3331	197-6	0
197	3	COMB2UG	Combination	Min	-4.942	116.892	-3.358	-5.876	-0.8744	-34.0747	197-6	0.5
197	3	COMB2UG	Combination	Min	-10.046	248.025	-4.791	-9.3031	-0.9816	-52.065	197-7	0
197	3.5	COMB2UG	Combination	Min	-10.046	259.18	-4.791	-9.3031	-1.9575	-204.6226	197-7	0.5
198	0	COMB2UG	Combination	Max	11.062	-301.889	6.576	7.7965	1.8896	-115.8609	198-1	0
198	0.5	COMB2UG	Combination	Max	11.062	-290.734	6.576	7.7965	-1.3428	32.2947	198-1	0.5
198	0.5	COMB2UG	Combination	Max	6.939	-157.335	5.394	4.7344	-1.1942	42.9756	198-2	0
198	1	COMB2UG	Combination	Max	6.939	-146.18	5.394	4.7344	-2.8607	119.2007	198-2	0.5
198	1	COMB2UG	Combination	Max	4.25	-63.747	3.228	2.2904	-2.873	130.5302	198-3	0
198	1.16667	COMB2UG	Combination	Max	4.25	-60.029	3.228	2.2904	-3.3139	140.9238	198-3	0.16667
198	1.16667	COMB2UG	Combination	Max	3.72	-60.027	3.071	2.2904	-3.3139	140.9238	198-4	0
198	1.5	COMB2UG	Combination	Max	3.72	-52.591	3.071	2.2904	-4.2172	159.8511	198-4	0.33333
198	1.5	COMB2UG	Combination	Max	0.959	14.341	0.018	-0.0606	-4.1449	162.708	198-5	0
198	2	COMB2UG	Combination	Max	0.959	25.496	0.018	-0.0606	-3.9728	156.8337	198-5	0.5
198	2	COMB2UG	Combination	Max	1.697	97.277	-2.846	5.1556	-3.8202	157.1649	198-6	0
198	2.33333	COMB2UG	Combination	Max	1.697	104.714	-2.846	5.1556	-2.851	133.7719	198-6	0.33333
198	2.33333	COMB2UG	Combination	Max	2.292	104.714	-2.727	5.1556	-2.851	133.7719	198-7	0
198	2.5	COMB2UG	Combination	Max	2.292	108.433	-2.727	5.1556	-2.3853	121.1458	198-7	0.16667
198	2.5	COMB2UG	Combination	Max	5.055	205.439	-2.342	11.2442	-2.2602	112.9133	198-8	0

198	3	COMB2UG	Combination	Max	5.055	216.594	-2.342	11.2442	-0.9191	24.0413	198-8	0.5
198	3	COMB2UG	Combination	Max	9.486	379.147	1.444	18.148	-0.7748	17.8596	198-9	0
198	3.5	COMB2UG	Combination	Max	9.486	390.302	1.444	18.148	1.9672	-155.9061	198-9	0.5
198	0	COMB2UG	Combination	Min	-17.136	-335.74	-0.359	-22.6741	-1.6753	-216.2261	198-1	0
198	0.5	COMB2UG	Combination	Min	-17.136	-324.585	-0.359	-22.6741	-1.5515	-51.1449	198-1	0.5
198	0.5	COMB2UG	Combination	Min	-10.987	-189.714	2.526	-15.6562	-1.6469	-19.1429	198-2	0
198	1	COMB2UG	Combination	Min	-10.987	-178.559	2.526	-15.6562	-3.9405	72.5787	198-2	0.5
198	1	COMB2UG	Combination	Min	-6.641	-94.44	2.284	-9.3809	-3.8514	94.4766	198-3	0
198	1.16667	COMB2UG	Combination	Min	-6.641	-90.721	2.284	-9.3809	-4.3292	109.8278	198-3	0.16667
198	1.16667	COMB2UG	Combination	Min	-6.11	-90.723	2.441	-9.3809	-4.3292	109.8278	198-4	0
198	1.5	COMB2UG	Combination	Min	-6.11	-83.286	2.441	-9.3809	-5.2631	138.6718	198-4	0.33333
198	1.5	COMB2UG	Combination	Min	-2.67	-15.514	-0.597	-3.1355	-5.314	151.1416	198-5	0
198	2	COMB2UG	Combination	Min	-2.67	-4.359	-0.597	-3.1355	-5.1965	152.0248	198-5	0.5
198	2	COMB2UG	Combination	Min	-3.825	65.967	-3.544	-4.2934	-5.3862	142.78	198-6	0
198	2.33333	COMB2UG	Combination	Min	-3.825	73.404	-3.544	-4.2934	-4.2256	109.2792	198-6	0.33333
198	2.33333	COMB2UG	Combination	Min	-4.419	73.404	-3.663	-4.2934	-4.2256	109.2792	198-7	0
198	2.5	COMB2UG	Combination	Min	-4.419	77.122	-3.663	-4.2934	-3.6264	91.5993	198-7	0.16667
198	2.5	COMB2UG	Combination	Min	-8.465	171.529	-5.553	-6.0633	-3.8424	72.9196	198-8	0
198	3	COMB2UG	Combination	Min	-8.465	182.684	-5.553	-6.0633	-1.236	-32.2699	198-8	0.5
198	3	COMB2UG	Combination	Min	-14.136	341.954	-6.323	-8.2287	-1.4282	-59.6913	198-9	0
198	3.5	COMB2UG	Combination	Min	-14.136	353.109	-6.323	-8.2287	-1.7304	-252.0534	198-9	0.5
199	0	COMB2UG	Combination	Max	9.506	-353.151	6.326	8.2389	1.9658	-155.9102	199-1	0
199	0.5	COMB2UG	Combination	Max	9.506	-341.995	6.326	8.2389	-0.7744	17.8763	199-1	0.5
199	0.5	COMB2UG	Combination	Max	5.075	-182.729	5.555	6.0787	-0.9194	24.0586	199-2	0
199	1	COMB2UG	Combination	Max	5.075	-171.574	5.555	6.0787	-2.2593	112.9513	199-2	0.5
199	1	COMB2UG	Combination	Max	2.311	-77.188	3.664	4.3206	-2.3838	121.1731	199-3	0
199	1.16667	COMB2UG	Combination	Max	2.311	-73.469	3.664	4.3206	-2.8495	133.8103	199-3	0.16667
199	1.16667	COMB2UG	Combination	Max	1.717	-73.469	3.545	4.3206	-2.8495	133.8103	199-4	0
199	1.5	COMB2UG	Combination	Max	1.717	-66.033	3.545	4.3206	-3.8187	157.2254	199-4	0.33333
199	1.5	COMB2UG	Combination	Max	0.914	4.231	0.594	2.9094	-3.971	156.8573	199-5	0
199	2	COMB2UG	Combination	Max	0.914	15.386	0.594	2.9094	-4.1438	162.6817	199-5	0.5
199	2	COMB2UG	Combination	Max	3.655	82.984	-2.453	9.1281	-4.2188	159.7647	199-6	0
199	2.33333	COMB2UG	Combination	Max	3.655	90.421	-2.453	9.1281	-3.3105	140.8722	199-6	0.33333
199	2.33333	COMB2UG	Combination	Max	4.186	90.42	-2.296	9.1281	-3.3105	140.8722	199-7	0
199	2.5	COMB2UG	Combination	Max	4.186	94.138	-2.296	9.1281	-2.8674	130.496	199-7	0.16667
199	2.5	COMB2UG	Combination	Max	6.848	177.8	-2.567	15.354	-2.855	119.0281	199-8	0
199	3	COMB2UG	Combination	Max	6.848	188.955	-2.567	15.354	-1.1864	42.9521	199-8	0.5
199	3	COMB2UG	Combination	Max	10.912	322.642	0.276	22.3279	-1.3279	31.9653	199-9	0
199	3.5	COMB2UG	Combination	Max	10.912	333.797	0.276	22.3279	1.9097	-115.7781	199-9	0.5
199	0	COMB2UG	Combination	Min	-14.167	-390.306	-1.443	-18.3376	-1.7289	-252.0778	199-1	0
199	0.5	COMB2UG	Combination	Min	-14.167	-379.151	-1.443	-18.3376	-1.4302	-59.7134	199-1	0.5
199	0.5	COMB2UG	Combination	Min	-8.5	-216.602	2.343	-11.4349	-1.2369	-32.2922	199-2	0
199	1	COMB2UG	Combination	Min	-8.5	-205.447	2.343	-11.4349	-3.8461	72.9032	199-2	0.5

199	1	COMB2UG	Combination	Min	-4.46	-108.447	2.727	-5.351	-3.63	91.574	199-3	0
199	1.16667	COMB2UG	Combination	Min	-4.46	-104.729	2.727	-5.351	-4.2296	109.2562	199-3	0.16667
199	1.16667	COMB2UG	Combination	Min	-3.866	-104.728	2.846	-5.351	-4.2296	109.2562	199-4	0
199	1.5	COMB2UG	Combination	Min	-3.866	-97.292	2.846	-5.351	-5.3908	142.7614	199-4	0.33333
199	1.5	COMB2UG	Combination	Min	-2.649	-25.532	-0.019	0.1276	-5.2009	151.9819	199-5	0
199	2	COMB2UG	Combination	Min	-2.649	-14.377	-0.019	0.1276	-5.3159	151.2304	199-5	0.5
199	2	COMB2UG	Combination	Min	-6.071	52.489	-3.076	-2.1892	-5.2613	138.6608	199-6	0
199	2.33333	COMB2UG	Combination	Min	-6.071	59.925	-3.076	-2.1892	-4.3264	109.9168	199-6	0.33333
199	2.33333	COMB2UG	Combination	Min	-6.602	59.927	-3.234	-2.1892	-4.3264	109.9168	199-7	0
199	2.5	COMB2UG	Combination	Min	-6.602	63.645	-3.234	-2.1892	-3.8478	94.6155	199-7	0.16667
199	2.5	COMB2UG	Combination	Min	-10.914	145.884	-5.402	-4.584	-3.9366	72.4513	199-8	0
199	3	COMB2UG	Combination	Min	-10.914	157.039	-5.402	-4.584	-1.6207	-18.8923	199-8	0.5
199	3	COMB2UG	Combination	Min	-16.992	289.909	-6.597	-7.5991	-1.5296	-51.6059	199-9	0
199	3.5	COMB2UG	Combination	Min	-16.992	301.064	-6.597	-7.5991	-1.6069	-215.7157	199-9	0.5
200	**0**	**COMB2UG**	**Combination**	**Max**	**6.93**	**-87.505**	**3.883**	**6.4442**	**2.3764**	**-30.7651**	**200-1**	**0**
200	0.5	COMB2UG	Combination	Max	6.941	-76.35	3.883	6.4442	0.4526	13.6798	200-1	0.5
200	0.5	COMB2UG	Combination	Max	1.935	-29.305	0.892	1.546	0.4534	-3.1161	200-2	0
200	1	COMB2UG	Combination	Max	1.946	-18.15	0.892	1.546	0.0225	9.048	200-2	0.5
200	0	COMB2UG	Combination	Min	-4.574	-96.01	-4.68	-12.6192	-3.0481	-46.1055	200-1	0
200	0.5	COMB2UG	Combination	Min	-4.563	-84.855	-4.68	-12.6192	-0.7258	-4.37	200-1	0.5
200	0.5	COMB2UG	Combination	Min	-1.097	-30.067	-1.516	-3.8615	-0.7539	-5.6109	200-2	0
200	1	COMB2UG	Combination	Min	-1.086	-18.912	-1.516	-3.8615	-0.0108	6.3338	200-2	0.5
201	0	COMB2UG	Combination	Max	9.18	-264.326	4.696	9.509	2.0239	-115.4261	201-1	0
201	0.5	COMB2UG	Combination	Max	9.18	-253.171	4.696	9.509	0.0115	13.9484	201-1	0.5
201	0.5	COMB2UG	Combination	Max	4.158	-130.043	3.522	6.2517	-0.0728	6.1031	201-2	0
201	1	COMB2UG	Combination	Max	4.158	-118.888	3.522	6.2517	-0.8962	68.7236	201-2	0.5
201	1	COMB2UG	Combination	Max	1.507	-52.345	2.871	3.9709	-0.9444	65.3967	201-3	0
201	1.5	COMB2UG	Combination	Max	1.53	-41.19	2.871	3.9709	-1.9361	100.8118	201-3	0.5
201	1.5	COMB2UG	Combination	Max	3.951	0.517	1.464	4.6043	-1.9375	105.7673	201-4	0
201	2	COMB2UG	Combination	Max	3.928	11.672	1.464	4.6043	-1.88	122.6104	201-4	0.5
201	2	COMB2UG	Combination	Max	6.799	45.293	-0.451	10.8087	-1.8381	121.4212	201-5	0
201	2.5	COMB2UG	Combination	Max	6.81	56.448	-0.451	10.8087	-1.1378	117.1933	201-5	0.5
201	2.5	COMB2UG	Combination	Max	9.826	93.263	-0.978	17.1426	-1.1005	111.3145	201-6	0
201	3	COMB2UG	Combination	Max	9.815	104.418	-0.978	17.1426	-0.5002	86.2409	201-6	0.5
201	3	COMB2UG	Combination	Max	13.758	161.462	1.085	24.4973	-0.4706	81.7276	201-7	0
201	3.5	COMB2UG	Combination	Max	13.758	172.618	1.085	24.4973	1.5447	29.6228	201-7	0.5
201	0	COMB2UG	Combination	Min	-10.263	-313.26	-2.75	-14.5928	-1.9221	-205.4553	201-1	0
201	0.5	COMB2UG	Combination	Min	-10.263	-302.105	-2.75	-14.5928	-0.8829	-51.6142	201-1	0.5
201	0.5	COMB2UG	Combination	Min	-5.377	-173.571	1.193	-7.7917	-0.7812	-36.2969	201-2	0
201	1	COMB2UG	Combination	Min	-5.377	-162.416	1.193	-7.7917	-2.3151	47.312	201-2	0.5
201	1	COMB2UG	Combination	Min	-2.853	-92.827	1.639	-2.4973	-2.1938	56.6779	201-3	0
201	1.5	COMB2UG	Combination	Min	-2.83	-81.672	1.639	-2.4973	-3.4571	88.2714	201-3	0.5
201	1.5	COMB2UG	Combination	Min	-5.046	-39.264	-0.213	-0.4561	-3.4366	81.1495	201-4	0

201	2	COMB2UG	Combination	Min	-5.068	-28.108	-0.213	-0.4561	-4.1195	78.1022	201-4	0.5
201	2	COMB2UG	Combination	Min	-8.801	2.492	-1.831	-4.1162	-4.157	65.0498	201-5	0
201	2.5	COMB2UG	Combination	Min	-8.79	13.647	-1.831	-4.1162	-3.7162	39.8079	201-5	0.5
201	2.5	COMB2UG	Combination	Min	-13.671	43.644	-3.282	-7.9437	-3.7982	21.8338	201-6	0
201	3	COMB2UG	Combination	Min	-13.682	54.799	-3.282	-7.9437	-2.2687	-27.1239	201-6	0.5
201	3	COMB2UG	Combination	Min	-19.668	98.614	-6.018	-12.477	-2.3332	-52.6868	201-7	0
201	3.5	COMB2UG	Combination	Min	-19.668	109.77	-6.018	-12.477	-1.8818	-136.1979	201-7	0.5
207	0	COMB2UG	Combination	Max	1.816	13.937	1.8	4.1225	0.0076	2.9418	207-1	0
207	0.5	COMB2UG	Combination	Max	1.805	25.092	1.8	4.1225	0.0252	-6.8143	207-1	0.5
207	0.5	COMB2UG	Combination	Max	6.887	61.78	7.114	10.7108	-0.0263	2.332	207-2	0
207	1	COMB2UG	Combination	Max	6.876	72.935	7.114	10.7108	0.3282	-31.3459	207-2	0.5
207	0	COMB2UG	Combination	Min	-1.322	12.46	-0.094	-2.079	-0.0414	-0.4228	207-1	0
207	0.5	COMB2UG	Combination	Min	-1.333	23.615	-0.094	-2.079	-0.9122	-9.4424	207-1	0.5
207	0.5	COMB2UG	Combination	Min	-5.258	52.967	-0.813	-9.3517	-0.9232	-12.38	207-2	0
207	1	COMB2UG	Combination	Min	-5.269	64.122	-0.813	-9.3517	-4.4282	-41.6534	207-2	0.5
208	0	COMB2UG	Combination	Max	15.865	-80.457	1.571	58.0433	-0.3237	44.3904	208-1	0
208	0.5	COMB2UG	Combination	Max	15.865	-69.302	1.571	58.0433	-0.3424	84.4418	208-1	0.5
208	0.5	COMB2UG	Combination	Max	11.713	-41.639	1.574	52.5409	-0.4296	85.0278	208-2	0
208	1	COMB2UG	Combination	Max	11.725	-30.483	1.574	52.5409	0.0519	104.3884	208-2	0.5
208	1	COMB2UG	Combination	Max	8.768	-8.442	0.713	46.9805	-0.121	106.2398	208-3	0
208	1.5	COMB2UG	Combination	Max	8.757	2.713	0.713	46.9805	-0.0925	108.0851	208-3	0.5
208	1.5	COMB2UG	Combination	Max	5.901	27.31	0.139	39.6495	-0.0741	107.8144	208-4	0
208	2	COMB2UG	Combination	Max	5.923	38.465	0.139	39.6495	-0.1084	91.3706	208-4	0.5
208	2	COMB2UG	Combination	Max	2.656	81.243	-0.324	35.8738	-0.2754	87.7493	208-5	0
208	2.5	COMB2UG	Combination	Max	2.634	92.398	-0.324	35.8738	-0.0249	57.3715	208-5	0.5
208	2.5	COMB2UG	Combination	Max	2.014	166.271	1.627	34.5249	-0.0015	62.4602	208-6	0
208	3	COMB2UG	Combination	Max	2.014	177.427	1.627	34.5249	-0.2356	6.9519	208-6	0.5
208	3	COMB2UG	Combination	Max	7.378	285.136	7.52	25.8561	-0.2722	13.7082	208-7	0
208	3.5	COMB2UG	Combination	Max	7.378	296.291	7.52	25.8561	-0.6373	-96.4584	208-7	0.5
208	0	COMB2UG	Combination	Min	-22.491	-158.965	-5.643	27.308	-3.5711	-151.0334	208-1	0
208	0.5	COMB2UG	Combination	Min	-22.491	-147.81	-5.643	27.308	-1.516	-76.9513	208-1	0.5
208	0.5	COMB2UG	Combination	Min	-17.272	-109.167	-1.651	27.0927	-1.399	-59.4475	208-2	0
208	1	COMB2UG	Combination	Min	-17.261	-98.012	-1.651	27.0927	-1.8421	-8.9828	208-2	0.5
208	1	COMB2UG	Combination	Min	-13.066	-69.73	-0.198	27.4127	-1.8681	4.3276	208-3	0
208	1.5	COMB2UG	Combination	Min	-13.077	-58.575	-0.198	27.4127	-2.1545	35.9907	208-3	0.5
208	1.5	COMB2UG	Combination	Min	-9.413	-31.798	-0.706	27.1915	-2.0002	47.1607	208-4	0
208	2	COMB2UG	Combination	Min	-9.391	-20.643	-0.706	27.1915	-1.6823	60.2706	208-4	0.5
208	2	COMB2UG	Combination	Min	-5.525	20.295	-1.373	24.3544	-1.7829	68.4206	208-5	0
208	2.5	COMB2UG	Combination	Min	-5.547	31.45	-1.373	24.3544	-1.1846	42.4516	208-5	0.5
208	2.5	COMB2UG	Combination	Min	-3.749	101.609	-1.075	18.086	-1.1311	35.6095	208-6	0
208	3	COMB2UG	Combination	Min	-3.749	112.764	-1.075	18.086	-1.1732	-48.3997	208-6	0.5
208	3	COMB2UG	Combination	Min	-8.476	214.207	0.435	5.9533	-1.1973	-59.5615	208-7	0
208	3.5	COMB2UG	Combination	Min	-8.476	225.363	0.435	5.9533	-4.81	-204.6443	208-7	0.5

209	0	COMB2UG	Combination	Max	15.286	-286.21	1.777	68.4219	-0.76	-102.5582	209-1	0
209	0.5	COMB2UG	Combination	Max	15.286	-275.055	1.777	68.4219	-1.6408	37.7582	209-1	0.5
209	0.5	COMB2UG	Combination	Max	9.606	-168.012	3.075	50.9512	-1.5723	46.5667	209-2	0
209	1	COMB2UG	Combination	Max	9.606	-156.857	3.075	50.9512	-2.3372	128.5138	209-2	0.5
209	1	COMB2UG	Combination	Max	5.409	-68.952	2.089	39.1415	-2.2838	136.3861	209-3	0
209	1.16667	COMB2UG	Combination	Max	5.409	-65.233	2.089	39.1415	-2.4873	147.8246	209-3	0.16667
209	1.16667	COMB2UG	Combination	Max	4.844	-65.232	1.967	39.1415	-2.4873	147.8246	209-4	0
209	1.5	COMB2UG	Combination	Max	4.844	-57.795	1.967	39.1415	-2.9332	168.8415	209-4	0.33333
209	1.5	COMB2UG	Combination	Max	0.8	22.774	-0.199	28.0769	-2.8722	169.8028	209-5	0
209	2	COMB2UG	Combination	Max	0.8	33.929	-0.199	28.0769	-2.7214	164.0239	209-5	0.5
209	2	COMB2UG	Combination	Max	-1.007	118.515	-1.395	21.1554	-2.6231	164.5656	209-6	0
209	2.33333	COMB2UG	Combination	Max	-1.007	125.952	-1.395	21.1554	-2.1526	138.1474	209-6	0.33333
209	2.33333	COMB2UG	Combination	Max	-0.373	125.953	-1.26	21.1554	-2.1526	138.1474	209-7	0
209	2.5	COMB2UG	Combination	Max	-0.373	129.671	-1.26	21.1554	-1.9377	124.0086	209-7	0.16667
209	2.5	COMB2UG	Combination	Max	4.09	228.732	0.438	10.9524	-1.8372	118.1168	209-8	0
209	3	COMB2UG	Combination	Max	4.09	239.887	0.438	10.9524	-1.585	24.2787	209-8	0.5
209	3	COMB2UG	Combination	Max	10.361	376.37	6.551	-7.0503	-1.5404	18.7648	209-9	0
209	3.5	COMB2UG	Combination	Max	10.361	387.525	6.551	-7.0503	-1.3325	-146.2323	209-9	0.5
209	0	COMB2UG	Combination	Min	-22.707	-333.735	-4.693	40.6919	-4.5639	-216.2232	209-1	0
209	0.5	COMB2UG	Combination	Min	-22.707	-322.58	-4.693	40.6919	-2.225	-52.1446	209-1	0.5
209	0.5	COMB2UG	Combination	Min	-16.682	-213.521	0.128	28.4796	-2.3618	-27.6378	209-2	0
209	1	COMB2UG	Combination	Min	-16.682	-202.366	0.128	28.4796	-3.1981	75.6044	209-2	0.5
209	1	COMB2UG	Combination	Min	-12.55	-112.548	1.039	22.7786	-3.3068	93.2863	209-3	0
209	1.16667	COMB2UG	Combination	Min	-12.55	-108.83	1.039	22.7786	-3.6245	111.4779	209-3	0.16667
209	1.16667	COMB2UG	Combination	Min	-11.985	-108.831	1.161	22.7786	-3.6245	111.4779	209-4	0
209	1.5	COMB2UG	Combination	Min	-11.985	-101.394	1.161	22.7786	-4.2213	146.0031	209-4	0.33333
209	1.5	COMB2UG	Combination	Min	-7.831	-19.411	-0.323	18.9839	-4.3219	155.8089	209-5	0
209	2	COMB2UG	Combination	Min	-7.831	-8.256	-0.323	18.9839	-4.2119	154.329	209-5	0.5
209	2	COMB2UG	Combination	Min	-5.549	73.909	-2.345	7.4665	-4.2908	146.1597	209-6	0
209	2.33333	COMB2UG	Combination	Min	-5.549	81.346	-2.345	7.4665	-3.5144	105.9576	209-6	0.33333
209	2.33333	COMB2UG	Combination	Min	-6.183	81.345	-2.48	7.4665	-3.5144	105.9576	209-7	0
209	2.5	COMB2UG	Combination	Min	-6.183	85.063	-2.48	7.4665	-3.1059	84.9272	209-7	0.16667
209	2.5	COMB2UG	Combination	Min	-10.064	180.983	-2.946	-7.8655	-3.1819	69.6129	209-8	0
209	3	COMB2UG	Combination	Min	-10.064	192.138	-2.946	-7.8655	-2.1799	-46.9843	209-8	0.5
209	3	COMB2UG	Combination	Min	-16.149	324.417	-0.827	-30.4057	-2.2074	-67.5382	209-9	0
209	**3.5**	**COMB2UG**	**Combination**	**Min**	**-16.149**	**335.572**	**-0.827**	**-30.4057**	**-5.2772**	**-258.512**	**209-9**	**0.5**
210	0	COMB2UG	Combination	Max	10.348	-335.813	0.846	31.0787	-1.3323	-146.228	210-1	0
210	0.5	COMB2UG	Combination	Max	10.348	-324.658	0.846	31.0787	-1.5498	18.8899	210-1	0.5
210	0.5	COMB2UG	Combination	Max	4.066	-192.382	2.966	8.5509	-1.5944	24.4616	210-2	0
210	1	COMB2UG	Combination	Max	4.066	-181.227	2.966	8.5509	-1.8569	118.422	210-2	0.5
210	1	COMB2UG	Combination	Max	-0.408	-85.313	2.501	-6.7536	-1.9574	124.371	210-3	0
210	1.16667	COMB2UG	Combination	Max	-0.408	-81.594	2.501	-6.7536	-2.1759	138.5515	210-3	0.16667
210	1.16667	COMB2UG	Combination	Max	-1.042	-81.595	2.366	-6.7536	-2.1759	138.5515	210-4	0

210	1.5	COMB2UG	Combination	Max	-1.042	-74.158	2.366	-6.7536	-2.6535	165.053	210-4	0.33333
210	1.5	COMB2UG	Combination	Max	0.751	7.996	0.345	-18.262	-2.7519	164.5711	210-5	0
210	**2**	**COMB2UG**	**Combination**	**Max**	**0.751**	**19.151**	**0.345**	**-18.262**	**-2.9136**	**170.4906**	**210-5**	**0.5**
210	2	COMB2UG	Combination	Max	4.78	101.115	-1.142	-21.9996	-2.9744	169.5868	210-6	0
210	2.33333	COMB2UG	Combination	Max	4.78	108.552	-1.142	-21.9996	-2.5357	148.6707	210-6	0.33333
210	2.33333	COMB2UG	Combination	Max	5.345	108.551	-1.02	-21.9996	-2.5357	148.6707	210-7	0
210	2.5	COMB2UG	Combination	Max	5.345	112.269	-1.02	-21.9996	-2.3357	137.2825	210-7	0.16667
210	2.5	COMB2UG	Combination	Max	9.528	202.059	-0.11	-27.6252	-2.3884	129.465	210-8	0
210	3	COMB2UG	Combination	Max	9.528	213.214	-0.11	-27.6252	-1.6351	47.6827	210-8	0.5
210	3	COMB2UG	Combination	Max	15.198	322.215	4.716	-39.7361	-1.7038	38.9039	210-9	0
210	3.5	COMB2UG	Combination	Max	15.198	333.37	4.716	-39.7361	-0.8279	-101.1833	210-9	0.5
210	0	COMB2UG	Combination	Min	-16.159	-387.768	-6.532	7.6936	-5.2774	-258.5067	210-1	0
210	0.5	COMB2UG	Combination	Min	-16.159	-376.613	-6.532	7.6936	-2.217	-67.4113	210-1	0.5
210	0.5	COMB2UG	Combination	Min	-10.087	-240.135	-0.418	-10.2957	-2.1897	-46.8008	210-2	0
210	1	COMB2UG	Combination	Min	-10.087	-228.98	-0.418	-10.2957	-3.2011	69.9201	210-2	0.5
210	1	COMB2UG	Combination	Min	-6.22	-129.929	1.282	-20.4721	-3.1253	85.2911	210-3	0
210	1.16667	COMB2UG	Combination	Min	-6.22	-126.211	1.282	-20.4721	-3.5372	106.3645	210-3	0.16667
210	1.16667	COMB2UG	Combination	Min	-5.587	-126.21	1.417	-20.4721	-3.5372	106.3645	210-4	0
210	1.5	COMB2UG	Combination	Min	-5.587	-118.773	1.417	-20.4721	-4.3205	146.6523	210-4	0.33333
210	1.5	COMB2UG	Combination	Min	-7.883	-34.203	0.22	-27.3193	-4.2415	154.8786	210-5	0
210	2	COMB2UG	Combination	Min	-7.883	-23.048	0.22	-27.3193	-4.3623	156.4851	210-5	0.5
210	2	COMB2UG	Combination	Min	-12.051	57.494	-1.943	-38.3286	-4.2621	146.7409	210-6	0
210	2.33333	COMB2UG	Combination	Min	-12.051	64.931	-1.943	-38.3286	-3.6723	112.3082	210-6	0.33333
210	2.33333	COMB2UG	Combination	Min	-12.616	64.933	-2.066	-38.3286	-3.6723	112.3082	210-7	0
210	2.5	COMB2UG	Combination	Min	-12.616	68.651	-2.066	-38.3286	-3.3581	94.1628	210-7	0.16667
210	2.5	COMB2UG	Combination	Min	-16.764	156.505	-3.058	-50.0676	-3.2498	76.5446	210-8	0
210	3	COMB2UG	Combination	Min	-16.764	167.66	-3.058	-50.0676	-2.4195	-26.5329	210-8	0.5
210	3	COMB2UG	Combination	Min	-22.796	274.597	-1.767	-67.4525	-2.283	-50.9555	210-9	0
210	3.5	COMB2UG	Combination	Min	-22.796	285.752	-1.767	-67.4525	-4.6331	-214.8516	210-9	0.5
211	0	COMB2UG	Combination	Max	6.885	-63.061	0.761	9.9273	0.2961	-31.249	211-1	0
211	0.5	COMB2UG	Combination	Max	6.896	-51.906	0.761	9.9273	-0.0326	1.8744	211-1	0.5
211	0.5	COMB2UG	Combination	Max	1.805	-23.824	0.081	1.9995	0.0179	-7.069	211-2	0
211	1	COMB2UG	Combination	Max	1.816	-12.669	0.081	1.9995	0.0069	2.7831	211-2	0.5
211	0	COMB2UG	Combination	Min	-5.264	-71.826	-7.171	-10.1228	-4.4645	-41.5947	211-1	0
211	0.5	COMB2UG	Combination	Min	-5.253	-60.671	-7.171	-10.1228	-0.9308	-12.8518	211-1	0.5
211	0.5	COMB2UG	Combination	Min	-1.333	-25.284	-1.816	-4.1964	-0.9203	-9.7095	211-2	0
211	1	COMB2UG	Combination	Min	-1.322	-14.129	-1.816	-4.1964	-0.0419	-0.5851	211-2	0.5
212	0	COMB2UG	Combination	Max	7.327	-224.497	-0.472	-4.6058	-0.706	-94.8386	212-1	0
212	0.5	COMB2UG	Combination	Max	7.327	-213.341	-0.472	-4.6058	-0.3189	14.8723	212-1	0.5
212	0.5	COMB2UG	Combination	Max	1.953	-111.929	1.046	-16.5874	-0.2848	8.1826	212-2	0
212	1	COMB2UG	Combination	Max	1.953	-100.774	1.046	-16.5874	-0.0389	63.274	212-2	0.5
212	1	COMB2UG	Combination	Max	2.581	-30.67	1.363	-22.7529	-0.0598	58.3129	212-3	0
212	1.5	COMB2UG	Combination	Max	2.603	-19.515	1.363	-22.7529	-0.29	88.4209	212-3	0.5

212	1.5	COMB2UG	Combination	Max	5.881	21.207	0.66	-25.4989	-0.1284	91.8679	212-4	0
212	2	COMB2UG	Combination	Max	5.859	32.362	0.66	-25.4989	-0.0848	108.2287	212-4	0.5
212	2	COMB2UG	Combination	Max	8.703	58.962	0.192	-25.5321	-0.0976	108.2884	212-5	0
212	2.5	COMB2UG	Combination	Max	8.715	70.117	0.192	-25.5321	-0.1202	106.3879	212-5	0.5
212	2.5	COMB2UG	Combination	Max	11.672	98.526	1.661	-25.0163	0.0482	104.2067	212-6	0
212	3	COMB2UG	Combination	Max	11.661	109.681	1.661	-25.0163	-0.4338	84.6666	212-6	0.5
212	3	COMB2UG	Combination	Max	15.811	146.978	5.698	-25.926	-0.3457	83.7859	212-7	0
212	3.5	COMB2UG	Combination	Max	15.811	158.133	5.698	-25.926	-0.3576	44.189	212-7	0.5
212	0	COMB2UG	Combination	Min	-8.546	-295.585	-7.555	-24.4863	-4.8798	-203.0817	212-1	0
212	0.5	COMB2UG	Combination	Min	-8.546	-284.43	-7.555	-24.4863	-1.2532	-58.3291	212-1	0.5
212	0.5	COMB2UG	Combination	Min	-3.797	-176.846	-1.656	-33.0817	-1.2276	-47.1856	212-2	0
212	1	COMB2UG	Combination	Min	-3.797	-165.691	-1.656	-33.0817	-1.1683	36.5327	212-2	0.5
212	1	COMB2UG	Combination	Min	-5.605	-91.991	0.28	-34.2721	-1.2163	43.2826	212-3	0
212	1.5	COMB2UG	Combination	Min	-5.583	-80.836	0.28	-34.2721	-1.8075	68.9279	212-3	0.5
212	1.5	COMB2UG	Combination	Min	-9.452	-38.299	-0.156	-37.9389	-1.7148	60.841	212-4	0
212	2	COMB2UG	Combination	Min	-9.474	-27.144	-0.156	-37.9389	-2.0107	47.4491	212-4	0.5
212	2	COMB2UG	Combination	Min	-13.118	-2.58	-0.735	-45.1569	-2.1594	36.2949	212-5	0
212	2.5	COMB2UG	Combination	Min	-13.107	8.575	-0.735	-45.1569	-1.8654	4.4272	212-5	0.5
212	2.5	COMB2UG	Combination	Min	-17.323	30.846	-1.556	-50.4187	-1.842	-9.1064	212-6	0
212	3	COMB2UG	Combination	Min	-17.334	42.001	-1.556	-50.4187	-1.4124	-59.8299	212-6	0.5
212	3	COMB2UG	Combination	Min	-22.556	68.376	-1.519	-56.6823	-1.5272	-77.6379	212-7	0
212	3.5	COMB2UG	Combination	Min	-22.556	79.531	-1.519	-56.6823	-3.6052	-151.2957	212-7	0.5
					V+	**390.302**	**7.52**	**M+**	**2.3764**	**170.4906**		
					V-	**-390.306**	**-7.555**	**M-**	**-6.1157**	**-258.512**		

TABLE: Element Forces – Frames (PILEHEAD Kombinasi 3Ultimate)											
Frame	**Station**	**Output Case**	**Case Type**	**P**	**V2**	**V3**	**T**	**M2**	**M3**	**Frame Elem**	**Elem Station**
Text	m	Text	Text	KN	KN	KN	KN-m	KN-m	KN-m	Text	m
10	0	COMB3U	Combination	0.188	20.979	0.127	-2.8319	0.0096	6.6835	10-1	0
10	0.5	COMB3U	Combination	0.176	32.134	0.127	-2.8319	-0.0537	-6.5946	10-1	0.5
10	0.5	COMB3U	Combination	0.624	87.042	0.834	-5.4479	-0.0319	0.4055	10-2	0
10	1	COMB3U	Combination	0.613	98.197	0.834	-5.4479	-0.4487	-45.904	10-2	0.5
11	0	COMB3U	Combination	-2.263	-146.304	1.682	-4.3744	-0.2923	-59.4017	11-1	0
11	0.5	COMB3U	Combination	-2.263	-135.149	1.682	-4.3744	-1.1331	10.9615	11-1	0.5
11	0.5	COMB3U	Combination	-1.453	-82.6	2.136	-4.5539	-1.0972	26.0372	11-2	0
11	1	COMB3U	Combination	-1.453	-71.445	2.136	-4.5539	-2.165	64.5486	11-2	0.5
11	1	COMB3U	Combination	-0.865	-37.305	1.416	-4.3831	-2.142	77.0327	11-3	0
11	1.5	COMB3U	Combination	-0.865	-26.15	1.416	-4.3831	-2.85	92.8966	11-3	0.5
11	1.5	COMB3U	Combination	-0.541	6.172	-0.249	-4.0166	-2.8292	100.7913	11-4	0
11	2	COMB3U	Combination	-0.541	17.327	-0.249	-4.0166	-2.7049	94.9167	11-4	0.5

11	2	COMB3U	Combination	-0.565	59.436	-1.88	-3.4626	-2.7029	96.8667	11-5	0
11	2.5	COMB3U	Combination	-0.565	70.591	-1.88	-3.4626	-1.7628	64.3597	11-5	0.5
11	2.5	COMB3U	Combination	-0.778	138.404	-1.915	-2.7498	-1.7751	62.4528	11-6	0
11	3	COMB3U	Combination	-0.778	149.559	-1.915	-2.7498	-0.8178	-9.538	11-6	0.5
11	3	COMB3U	Combination	-0.836	275.027	0.002023	-2.0989	-0.8143	-12.0061	11-7	0
11	3.5	COMB3U	Combination	-0.836	286.182	0.002023	-2.0989	-0.8153	-152.3082	11-7	0.5
12	0	COMB3U	Combination	-2.64	-316.951	2.61	-0.8981	-0.7049	-156.1735	12-1	0
12	0.5	COMB3U	Combination	-2.64	-305.796	2.61	-0.8981	-2.0098	-0.4867	12-1	0.5
12	0.5	COMB3U	Combination	-1.6	-172.912	3.996	-0.5155	-1.9743	22.3225	12-2	0
12	1	COMB3U	Combination	-1.6	-161.757	3.996	-0.5155	-3.9725	105.9895	12-2	0.5
12	1	COMB3U	Combination	-0.745	-79.196	2.871	-0.264	-3.9326	123.6444	12-3	0
12	**1.5**	**COMB3U**	**Combination**	**-0.745**	**-68.041**	**2.871**	**-0.264**	**-5.3679**	**160.4536**	**12-3**	**0.5**
12	**1.5**	**COMB3U**	**Combination**	**-0.363**	**-1.165**	**-0.146**	**-0.2277**	**-5.3515**	**168.8103**	**12-4**	**0**
12	2	COMB3U	Combination	-0.363	9.99	-0.146	-0.2277	-5.2785	166.6038	12-4	0.5
12	2	COMB3U	Combination	-0.562	80.717	-3.032	-0.2572	-5.2865	162.4083	12-5	0
12	2.5	COMB3U	Combination	-0.562	91.873	-3.032	-0.2572	-3.7707	119.2608	12-5	0.5
12	2.5	COMB3U	Combination	-1.196	187.42	-3.725	-0.213	-3.8019	105.9271	12-6	0
12	3	COMB3U	Combination	-1.196	198.575	-3.725	-0.213	-1.9393	9.4285	12-6	0.5
12	3	COMB3U	Combination	-1.873	359.636	-1.657	-0.2168	-1.9606	-7.2651	12-7	0
12	3.5	COMB3U	Combination	-1.873	370.791	-1.657	-0.2168	-1.132	-189.8718	12-7	0.5
13	0	COMB3U	Combination	-1.873	-370.789	1.657	0.225	-1.1323	-189.872	13-1	0
13	0.5	COMB3U	Combination	-1.873	-359.634	1.657	0.225	-1.9606	-7.2661	13-1	0.5
13	0.5	COMB3U	Combination	-1.198	-198.572	3.725	0.2212	-1.9395	9.4281	13-2	0
13	1	COMB3U	Combination	-1.198	-187.417	3.725	0.2212	-3.8018	105.9254	13-2	0.5
13	1	COMB3U	Combination	-0.564	-91.868	3.031	0.2654	-3.7707	119.2601	13-3	0
13	1.5	COMB3U	Combination	-0.564	-80.713	3.031	0.2654	-5.2861	162.4054	13-3	0.5
13	1.5	COMB3U	Combination	-0.367	-9.982	0.145	0.2359	-5.2782	166.6031	13-4	0
13	2	COMB3U	Combination	-0.367	1.173	0.145	0.2359	-5.3505	168.8052	13-4	0.5
13	2	COMB3U	Combination	-0.752	68.058	-2.873	0.272	-5.367	160.4533	13-5	0
13	2.5	COMB3U	Combination	-0.752	79.213	-2.873	0.272	-3.9305	123.6354	13-5	0.5
13	2.5	COMB3U	Combination	-1.611	161.79	-3.998	0.5222	-3.9706	105.9915	13-6	0
13	3	COMB3U	Combination	-1.611	172.945	-3.998	0.5222	-1.9716	22.3075	13-6	0.5
13	3	COMB3U	Combination	-2.656	305.86	-2.604	0.9018	-2.0067	-0.4768	13-7	0
13	3.5	COMB3U	Combination	-2.656	317.015	-2.604	0.9018	-0.7045	-156.1954	13-7	0.5
15	0	COMB3U	Combination	0.607	-98.221	-0.833	5.4452	-0.4485	-45.9165	15-1	0
15	0.5	COMB3U	Combination	0.618	-87.066	-0.833	5.4452	-0.0322	0.4055	15-1	0.5
15	0.5	COMB3U	Combination	0.175	-32.142	-0.127	2.83	-0.0537	-6.5985	15-2	0
15	1	COMB3U	Combination	0.186	-20.987	-0.127	2.83	0.0096	6.6836	15-2	0.5
20	0	COMB3U	Combination	-0.851	-286.061	0.018	2.1041	-0.816	-152.2891	20-1	0
20	0.5	COMB3U	Combination	-0.851	-274.906	0.018	2.1041	-0.8251	-12.0473	20-1	0.5
20	0.5	COMB3U	Combination	-0.764	-149.39	1.898	2.7424	-0.8257	-9.5007	20-2	0
20	1	COMB3U	Combination	-0.764	-138.235	1.898	2.7424	-1.7747	62.4054	20-2	0.5
20	1	COMB3U	Combination	-0.58	-70.457	1.845	3.4584	-1.7635	64.4043	20-3	0

20	1.5	COMB3U	Combination	-0.58	-59.302	1.845	3.4584	-2.6861	96.8443	20-3	0.5
20	1.5	COMB3U	Combination	-0.557	-17.367	0.283	4.0184	-2.6882	94.9241	20-4	0
20	2	COMB3U	Combination	-0.557	-6.212	0.283	4.0184	-2.8295	100.8187	20-4	0.5
20	2	COMB3U	Combination	-0.847	26.046	-1.396	4.3944	-2.8482	92.8756	20-5	0
20	2.5	COMB3U	Combination	-0.847	37.201	-1.396	4.3944	-2.1504	77.0638	20-5	0.5
20	2.5	COMB3U	Combination	-1.465	71.361	-2.154	4.5571	-2.1764	64.5156	20-6	0
20	3	COMB3U	Combination	-1.465	82.516	-2.154	4.5571	-1.0992	26.0466	20-6	0.5
20	3	COMB3U	Combination	-2.274	135.097	-1.686	4.3688	-1.1342	10.9373	20-7	0
20	3.5	COMB3U	Combination	-2.274	146.252	-1.686	4.3688	-0.2913	-59.3998	20-7	0.5
53	0	COMB3U	Combination	0.115	16.82	0.341	0.3052	0.0061	6.9479	53-1	0
53	0.5	COMB3U	Combination	0.104	27.975	0.341	0.3052	-0.1643	-4.251	53-1	0.5
53	0.5	COMB3U	Combination	0.489	75.206	0.974	0.8627	-0.1484	4.5028	53-2	0
53	1	COMB3U	Combination	0.477	86.361	0.974	0.8627	-0.6353	-35.8889	53-2	0.5
54	0	COMB3U	Combination	-2.563	-133.973	1.958	-0.5948	-0.4786	-48.5309	54-1	0
54	0.5	COMB3U	Combination	-2.563	-122.818	1.958	-0.5948	-1.4578	15.667	54-1	0.5
54	0.5	COMB3U	Combination	-1.847	-74.049	2.105	-0.1693	-1.4303	31.6522	54-2	0
54	1	COMB3U	Combination	-1.835	-62.894	2.105	-0.1693	-2.483	65.8882	54-2	0.5
54	1	COMB3U	Combination	-1.207	-27.186	1.119	0.2198	-2.4685	80.6851	54-3	0
54	1.5	COMB3U	Combination	-1.218	-16.031	1.119	0.2198	-3.0278	91.4892	54-3	0.5
54	1.5	COMB3U	Combination	-0.977	23.788	-1.157	0.7025	-3.0174	105.0913	54-4	0
54	2	COMB3U	Combination	-0.954	34.944	-1.157	0.7025	-2.4387	90.4082	54-4	0.5
54	2	COMB3U	Combination	-1.094	34.939	-1.157	0.6928	-2.4415	90.4082	54-5	0
54	2.5	COMB3U	Combination	-1.117	46.095	-1.157	0.6928	-1.8627	70.1497	54-5	0.5
54	2.5	COMB3U	Combination	-0.998	123.595	-1.836	1.1242	-1.8731	60.3437	54-6	0
54	3	COMB3U	Combination	-0.998	134.75	-1.836	1.1242	-0.955	-4.2428	54-6	0.5
54	3	COMB3U	Combination	-0.996	260.832	-0.277	1.4699	-0.9537	-10.1468	54-7	0
54	3.5	COMB3U	Combination	-0.996	271.987	-0.277	1.4699	-0.8155	-143.3515	54-7	0.5
55	0	COMB3U	Combination	-2.85	-306.796	2.515	-0.3534	-0.711	-149.0889	55-1	0
55	0.5	COMB3U	Combination	-2.85	-295.641	2.515	-0.3534	-1.9686	1.5202	55-1	0.5
55	0.5	COMB3U	Combination	-1.957	-167.324	3.776	-0.0702	-1.9328	22.445	55-2	0
55	1	COMB3U	Combination	-1.957	-156.169	3.776	-0.0702	-3.8206	103.3183	55-2	0.5
55	1	COMB3U	Combination	-1.279	-76.565	2.69	0.1556	-3.7789	119.5868	55-3	0
55	1.16667	COMB3U	Combination	-1.279	-72.846	2.69	0.1556	-4.2273	132.0377	55-3	0.16667
55	1.16667	COMB3U	Combination	-1.279	-72.846	2.69	0.1556	-4.2273	132.0377	55-4	0
55	1.5	COMB3U	Combination	-1.279	-65.409	2.69	0.1556	-5.1241	155.0803	55-4	0.33333
55	1.5	COMB3U	Combination	-0.996	-1.022	-0.217	0.3661	-5.1079	162.6821	55-5	0
55	2	COMB3U	Combination	-0.996	10.133	-0.217	0.3661	-4.9993	160.4044	55-5	0.5
55	2	COMB3U	Combination	-1.163	78.159	-2.988	0.562	-5.0118	156.2393	55-6	0
55	2.33333	COMB3U	Combination	-1.163	85.596	-2.988	0.562	-4.0159	128.9468	55-6	0.33333
55	2.33333	COMB3U	Combination	-1.163	85.596	-2.988	0.562	-4.0159	128.9468	55-7	0
55	2.5	COMB3U	Combination	-1.163	89.314	-2.988	0.562	-3.5179	114.3709	55-7	0.16667
55	2.5	COMB3U	Combination	-1.69	181.126	-3.635	0.7444	-3.5551	101.5151	55-8	0
55	3	COMB3U	Combination	-1.69	192.281	-3.635	0.7444	-1.7377	8.1634	55-8	0.5

55	3	COMB3U	Combination	-2.286	346.86	-1.715	0.9602	-1.7615	-7.9557	55-9	0
55	3.5	COMB3U	Combination	-2.286	358.015	-1.715	0.9602	-0.904	-184.1744	55-9	0.5
56	0	COMB3U	Combination	-2.288	-358.016	1.715	-0.9692	-0.9042	-184.1765	56-1	0
56	0.5	COMB3U	Combination	-2.288	-346.861	1.715	-0.9692	-1.7618	-7.9571	56-1	0.5
56	0.5	COMB3U	Combination	-1.693	-192.288	3.635	-0.7538	-1.7382	8.1547	56-2	0
56	1	COMB3U	Combination	-1.693	-181.133	3.635	-0.7538	-3.5556	101.5102	56-2	0.5
56	1	COMB3U	Combination	-1.169	-89.34	2.987	-0.5723	-3.5185	114.3517	56-3	0
56	1.16667	COMB3U	Combination	-1.169	-85.622	2.987	-0.5723	-4.0164	128.9319	56-3	0.16667
56	1.16667	COMB3U	Combination	-1.169	-85.622	2.987	-0.5723	-4.0164	128.9319	56-4	0
56	1.5	COMB3U	Combination	-1.169	-78.185	2.987	-0.5723	-5.0121	156.2331	56-4	0.33333
56	1.5	COMB3U	Combination	-1.003	-10.209	0.215	-0.3779	-4.9998	160.3655	56-5	0
56	2	COMB3U	Combination	-1.003	0.946	0.215	-0.3779	-5.1071	162.6814	56-5	0.5
56	2	COMB3U	Combination	-1.287	65.202	-2.7	-0.1696	-5.1231	155.0004	56-6	0
56	2.33333	COMB3U	Combination	-1.287	72.638	-2.7	-0.1696	-4.2232	132.0271	56-6	0.33333
56	2.33333	COMB3U	Combination	-1.287	72.638	-2.7	-0.1696	-4.2232	132.0271	56-7	0
56	2.5	COMB3U	Combination	-1.287	76.357	-2.7	-0.1696	-3.7733	119.6108	56-7	0.16667
56	2.5	COMB3U	Combination	-1.965	155.619	-3.8	0.0525	-3.8151	103.1425	56-8	0
56	3	COMB3U	Combination	-1.965	166.774	-3.8	0.0525	-1.9152	22.5441	56-8	0.5
56	3	COMB3U	Combination	-2.857	294.208	-2.566	0.3321	-1.9499	1.1107	56-9	0
56	3.5	COMB3U	Combination	-2.857	305.363	-2.566	0.3321	-0.6669	-148.7823	56-9	0.5
57	0	COMB3U	Combination	0.484	-85.963	-0.955	-0.8562	-0.622	-35.8166	57-1	0
57	0.5	COMB3U	Combination	0.495	-74.808	-0.955	-0.8562	-0.1446	4.3759	57-1	0.5
57	0.5	COMB3U	Combination	0.107	-27.879	-0.334	-0.3039	-0.1604	-4.2357	57-2	0
57	1	COMB3U	Combination	0.118	-16.723	-0.334	-0.3039	0.0064	6.9148	57-2	0.5
58	0	COMB3U	Combination	-0.999	-275.727	0.205	-1.4909	-0.7722	-144.2951	58-1	0
58	0.5	COMB3U	Combination	-0.999	-264.572	0.205	-1.4909	-0.8748	-9.2202	58-1	0.5
58	0.5	COMB3U	Combination	-0.977	-144.394	1.935	-1.1702	-0.8711	-6.4392	58-2	0
58	1	COMB3U	Combination	-0.977	-133.239	1.935	-1.1702	-1.8385	62.9692	58-2	0.5
58	1	COMB3U	Combination	-1.041	-68.467	1.913	-0.862	-1.8209	65.0314	58-3	0
58	1.5	COMB3U	Combination	-1.019	-57.312	1.913	-0.862	-2.7776	96.4763	58-3	0.5
58	1.5	COMB3U	Combination	-0.881	-17.597	0.441	-0.542	-2.7685	94.6785	58-4	0
58	2	COMB3U	Combination	-0.904	-6.442	0.441	-0.542	-2.9891	100.6882	58-4	0.5
58	2	COMB3U	Combination	-1.179	23.597	-1.203	-0.1823	-3.0023	93.1747	58-5	0
58	2.5	COMB3U	Combination	-1.167	34.753	-1.203	-0.1823	-2.4007	78.5872	58-5	0.5
58	2.5	COMB3U	Combination	-1.828	65.813	-2.048	0.1812	-2.4216	66.5778	58-6	0
58	3	COMB3U	Combination	-1.839	76.968	-2.048	0.1812	-1.3975	30.8828	58-6	0.5
58	3	COMB3U	Combination	-2.559	123.927	-1.922	0.6086	-1.4243	15.9042	58-7	0
58	3.5	COMB3U	Combination	-2.559	135.082	-1.922	0.6086	-0.4635	-48.8482	58-7	0.5
64	0	COMB3U	Combination	0.112	16.843	0.344	0.2329	0.0056	6.9174	64-1	0
64	0.5	COMB3U	Combination	0.101	27.998	0.344	0.2329	-0.1664	-4.2928	64-1	0.5
64	0.5	COMB3U	Combination	0.511	75.149	0.96	0.7262	-0.1521	4.3174	64-2	0
64	1	COMB3U	Combination	0.5	86.304	0.96	0.7262	-0.6323	-36.0461	64-2	0.5
65	0	COMB3U	Combination	-2.581	-135.51	1.918	-0.7118	-0.4774	-49.172	65-1	0

65	0.5	COMB3U	Combination	-2.581	-124.355	1.918	-0.7118	-1.4362	15.7944	65-1	0.5
65	0.5	COMB3U	Combination	-1.818	-77.259	2.014	-0.3295	-1.411	30.7084	65-2	0
65	1	COMB3U	Combination	-1.806	-66.104	2.014	-0.3295	-2.4181	66.5491	65-2	0.5
65	1	COMB3U	Combination	-1.11	-34.959	1.204	-0.0011	-2.405	78.4317	65-3	0
65	1.5	COMB3U	Combination	-1.121	-23.804	1.204	-0.0011	-3.0069	93.1225	65-3	0.5
65	1.5	COMB3U	Combination	-0.772	6.461	-0.425	0.3129	-2.9958	100.5172	65-4	0
65	2	COMB3U	Combination	-0.75	17.616	-0.425	0.3129	-2.7834	94.4978	65-4	0.5
65	2	COMB3U	Combination	-0.853	57.781	-2	0.6029	-2.7958	96.3007	65-5	0
65	2.5	COMB3U	Combination	-0.876	68.936	-2	0.6029	-1.7958	64.6213	65-5	0.5
65	2.5	COMB3U	Combination	-0.781	133.914	-1.998	0.8813	-1.821	62.6655	65-6	0
65	3	COMB3U	Combination	-0.781	145.069	-1.998	0.8813	-0.8221	-7.0804	65-6	0.5
65	3	COMB3U	Combination	-0.743	265.381	-0.21	1.1973	-0.8267	-9.7834	65-7	0
65	3.5	COMB3U	Combination	-0.743	276.536	-0.21	1.1973	-0.7217	-145.2626	65-7	0.5
66	0	COMB3U	Combination	-2.597	-305.597	2.55	-0.5926	-0.623	-149.7182	66-1	0
66	0.5	COMB3U	Combination	-2.597	-294.442	2.55	-0.5926	-1.8978	0.2917	66-1	0.5
66	0.5	COMB3U	Combination	-1.664	-166.85	3.777	-0.3003	-1.867	21.7522	66-2	0
66	1	COMB3U	Combination	-1.664	-155.695	3.777	-0.3003	-3.7557	102.3886	66-2	0.5
66	1	COMB3U	Combination	-0.95	-76.352	2.678	-0.0548	-3.7181	118.8607	66-3	0
66	1.16667	COMB3U	Combination	-0.95	-72.633	2.678	-0.0548	-4.1644	131.2761	66-3	0.16667
66	1.16667	COMB3U	Combination	-0.95	-72.633	2.678	-0.0548	-4.1644	131.2761	66-4	0
66	1.5	COMB3U	Combination	-0.95	-65.197	2.678	-0.0548	-5.0571	154.2478	66-4	0.33333
66	1.5	COMB3U	Combination	-0.639	-0.886	-0.233	0.187	-5.0443	161.914	66-5	0
66	2	COMB3U	Combination	-0.639	10.269	-0.233	0.187	-4.928	159.5681	66-5	0.5
66	2	COMB3U	Combination	-0.789	78.3	-3.002	0.4254	-4.9428	155.4051	66-6	0
66	2.33333	COMB3U	Combination	-0.789	85.737	-3.002	0.4254	-3.942	128.0657	66-6	0.33333
66	2.33333	COMB3U	Combination	-0.789	85.737	-3.002	0.4254	-3.942	128.0657	66-7	0
66	2.5	COMB3U	Combination	-0.789	89.455	-3.002	0.4254	-3.4416	113.4664	66-7	0.16667
66	2.5	COMB3U	Combination	-1.307	181.327	-3.648	0.6609	-3.4802	100.5882	66-8	0
66	3	COMB3U	Combination	-1.307	192.482	-3.648	0.6609	-1.656	7.136	66-8	0.5
66	3	COMB3U	Combination	-1.899	347.207	-1.725	0.9376	-1.6805	-9.0052	66-9	0
66	3.5	COMB3U	Combination	-1.899	358.362	-1.725	0.9376	-0.818	-185.3977	66-9	0.5
67	0	COMB3U	Combination	-1.9	-358.36	1.725	-0.9396	-0.8181	-185.3987	67-1	0
67	0.5	COMB3U	Combination	-1.9	-347.205	1.725	-0.9396	-1.6805	-9.0076	67-1	0.5
67	0.5	COMB3U	Combination	-1.309	-192.477	3.648	-0.663	-1.656	7.1348	67-2	0
67	1	COMB3U	Combination	-1.309	-181.322	3.648	-0.663	-3.4801	100.5848	67-2	0.5
67	1	COMB3U	Combination	-0.793	-89.446	3.002	-0.4276	-3.4415	113.4649	67-3	0
67	1.16667	COMB3U	Combination	-0.793	-85.728	3.002	-0.4276	-3.9419	128.0628	67-3	0.16667
67	1.16667	COMB3U	Combination	-0.793	-85.728	3.002	-0.4276	-3.9419	128.0628	67-4	0
67	1.5	COMB3U	Combination	-0.793	-78.291	3.002	-0.4276	-4.9426	155.3993	67-4	0.33333
67	1.5	COMB3U	Combination	-0.646	-10.252	0.232	-0.1892	-4.9279	159.5666	67-5	0
67	2	COMB3U	Combination	-0.646	0.903	0.232	-0.1892	-5.0441	161.9038	67-5	0.5
67	2	COMB3U	Combination	-0.962	65.231	-2.679	0.0525	-5.0569	154.2469	67-6	0
67	2.33333	COMB3U	Combination	-0.962	72.668	-2.679	0.0525	-4.1639	131.2637	67-6	0.33333

67	2.33333	COMB3U	Combination	-0.962	72.668	-2.679	0.0525	-4.1639	131.2637	67-7	0
67	2.5	COMB3U	Combination	-0.962	76.386	-2.679	0.0525	-3.7174	118.8425	67-7	0.16667
67	2.5	COMB3U	Combination	-1.684	155.762	-3.779	0.298	-3.7552	102.3917	67-8	0
67	3	COMB3U	Combination	-1.684	166.917	-3.779	0.298	-1.8655	21.7217	67-8	0.5
67	3	COMB3U	Combination	-2.624	294.568	-2.546	0.591	-1.8962	0.3098	67-9	0
67	3.5	COMB3U	Combination	-2.624	305.723	-2.546	0.591	-0.623	-149.7628	67-9	0.5
68	0	COMB3U	Combination	0.487	-86.355	-0.959	-0.7248	-0.6312	-36.0732	68-1	0
68	0.5	COMB3U	Combination	0.498	-75.2	-0.959	-0.7248	-0.1515	4.3156	68-1	0.5
68	0.5	COMB3U	Combination	0.098	-28.014	-0.343	-0.2322	-0.166	-4.3012	68-2	0
68	1	COMB3U	Combination	0.109	-16.859	-0.343	-0.2322	0.0056	6.9173	68-2	0.5
69	0	COMB3U	Combination	-0.773	-276.295	0.228	-1.1956	-0.7227	-145.2227	69-1	0
69	0.5	COMB3U	Combination	-0.773	-265.14	0.228	-1.1956	-0.8366	-9.864	69-1	0.5
69	0.5	COMB3U	Combination	-0.777	-144.734	1.982	-0.8858	-0.83	-7.0066	69-2	0
69	1	COMB3U	Combination	-0.777	-133.579	1.982	-0.8858	-1.8211	62.5716	69-2	0.5
69	1	COMB3U	Combination	-0.903	-68.671	1.964	-0.6013	-1.7969	64.7063	69-3	0
69	1.5	COMB3U	Combination	-0.881	-57.516	1.964	-0.6013	-2.7788	96.2533	69-3	0.5
69	1.5	COMB3U	Combination	-0.777	-17.698	0.454	-0.3148	-2.767	94.5085	69-4	0
69	2	COMB3U	Combination	-0.8	-6.543	0.454	-0.3148	-2.994	100.5687	69-4	0.5
69	2	COMB3U	Combination	-1.113	23.596	-1.181	0.0048	-3.0029	93.0798	69-5	0
69	2.5	COMB3U	Combination	-1.102	34.751	-1.181	0.0048	-2.4122	78.4932	69-5	0.5
69	2.5	COMB3U	Combination	-1.832	65.934	-2.031	0.3266	-2.4279	66.4844	69-6	0
69	3	COMB3U	Combination	-1.844	77.089	-2.031	0.3266	-1.4123	30.7286	69-6	0.5
69	3	COMB3U	Combination	-2.602	124.249	-1.922	0.7121	-1.4367	15.7435	69-7	0
69	3.5	COMB3U	Combination	-2.602	135.404	-1.922	0.7121	-0.4757	-49.1697	69-7	0.5
196	0	COMB3U	Combination	0.423	18.645	0.317	1.182	0.0056	7.7257	196-1	0
196	0.5	COMB3U	Combination	0.412	29.8	0.317	1.182	-0.1531	-4.3854	196-1	0.5
196	0.5	COMB3U	Combination	1.174	81.058	0.418	3.1564	-0.1392	4.7788	196-2	0
196	1	COMB3U	Combination	1.163	92.213	0.418	3.1564	-0.3483	-38.5389	196-2	0.5
197	0	COMB3U	Combination	-2.968	-139.922	2.509	-5.9001	-0.1829	-52.974	197-1	0
197	0.5	COMB3U	Combination	-2.968	-128.767	2.509	-5.9001	-1.4375	14.1983	197-1	0.5
197	0.5	COMB3U	Combination	-1.952	-76.321	2.197	-4.4969	-1.4187	30.3506	197-2	0
197	1	COMB3U	Combination	-1.94	-65.166	2.197	-4.4969	-2.5173	65.7223	197-2	0.5
197	1	COMB3U	Combination	-1.026	-26.563	1.049	-3.1431	-2.5021	80.6736	197-3	0
197	1.5	COMB3U	Combination	-1.037	-15.408	1.049	-3.1431	-3.0265	91.1665	197-3	0.5
197	1.5	COMB3U	Combination	-0.627	27.71	-1.417	-1.3748	-3.0301	105.1097	197-4	0
197	2	COMB3U	Combination	-0.605	38.865	-1.417	-1.3748	-2.3214	88.4657	197-4	0.5
197	2	COMB3U	Combination	-0.76	38.863	-1.417	-1.3841	-2.3159	88.4657	197-5	0
197	2.5	COMB3U	Combination	-0.782	50.018	-1.417	-1.3841	-1.6072	66.2455	197-5	0.5
197	2.5	COMB3U	Combination	-0.641	130.868	-2.244	0.6124	-1.6334	55.4118	197-6	0
197	3	COMB3U	Combination	-0.641	142.023	-2.244	0.6124	-0.5114	-12.8111	197-6	0.5
197	3	COMB3U	Combination	-0.547	273.782	-1.044	2.4701	-0.515	-19.7662	197-7	0
197	3.5	COMB3U	Combination	-0.547	284.937	-1.044	2.4701	0.0069	-159.4457	197-7	0.5
198	0	COMB3U	Combination	-3.037	-318.814	3.109	-7.4388	0.1071	-166.0435	198-1	0

198	0.5	COMB3U	Combination	-3.037	-307.659	3.109	-7.4388	-1.4472	-9.4251	198-1	0.5
198	0.5	COMB3U	Combination	-2.024	-173.524	3.96	-5.4609	-1.4206	11.9164	198-2	0
198	1	COMB3U	Combination	-2.024	-162.369	3.96	-5.4609	-3.4006	95.8897	198-2	0.5
198	1	COMB3U	Combination	-1.195	-79.094	2.756	-3.5453	-3.3622	112.5034	198-3	0
198	1.16667	COMB3U	Combination	-1.195	-75.375	2.756	-3.5453	-3.8215	125.3758	198-3	0.16667
198	1.16667	COMB3U	Combination	-1.195	-75.375	2.756	-3.5453	-3.8215	125.3758	198-4	0
198	1.5	COMB3U	Combination	-1.195	-67.938	2.756	-3.5453	-4.7401	149.2614	198-4	0.33333
198	1.5	COMB3U	Combination	-0.855	-0.586	-0.29	-1.598	-4.7294	156.9248	198-5	0
198	2	COMB3U	Combination	-0.855	10.569	-0.29	-1.598	-4.5847	154.4293	198-5	0.5
198	2	COMB3U	Combination	-1.064	81.622	-3.195	0.4311	-4.6032	149.9725	198-6	0
198	2.33333	COMB3U	Combination	-1.064	89.059	-3.195	0.4311	-3.5383	121.5256	198-6	0.33333
198	2.33333	COMB3U	Combination	-1.064	89.059	-3.195	0.4311	-3.5383	121.5256	198-7	0
198	2.5	COMB3U	Combination	-1.064	92.777	-3.195	0.4311	-3.0058	106.3726	198-7	0.16667
198	2.5	COMB3U	Combination	-1.705	188.484	-3.947	2.5904	-3.0513	92.9164	198-8	0
198	3	COMB3U	Combination	-1.705	199.639	-3.947	2.5904	-1.0776	-4.1143	198-8	0.5
198	3	COMB3U	Combination	-2.325	360.55	-2.44	4.9597	-1.1015	-20.9158	198-9	0
198	3.5	COMB3U	Combination	-2.325	371.705	-2.44	4.9597	0.1184	-203.9797	198-9	0.5
199	**0**	**COMB3U**	**Combination**	**-2.331**	**-371.728**	**2.442**	**-5.0494**	**0.1185**	**-203.994**	**199-1**	**0**
199	0.5	COMB3U	Combination	-2.331	-360.573	2.442	-5.0494	-1.1023	-20.9186	199-1	0.5
199	0.5	COMB3U	Combination	-1.713	-199.666	3.949	-2.6781	-1.0782	-4.1168	199-2	0
199	1	COMB3U	Combination	-1.713	-188.51	3.949	-2.6781	-3.0527	92.9272	199-2	0.5
199	1	COMB3U	Combination	-1.074	-92.817	3.196	-0.5152	-3.0069	106.3736	199-3	0
199	1.16667	COMB3U	Combination	-1.074	-89.099	3.196	-0.5152	-3.5395	121.5332	199-3	0.16667
199	1.16667	COMB3U	Combination	-1.074	-89.099	3.196	-0.5152	-3.5395	121.5332	199-4	0
199	1.5	COMB3U	Combination	-1.074	-81.662	3.196	-0.5152	-4.6047	149.9934	199-4	0.33333
199	1.5	COMB3U	Combination	-0.867	-10.65	0.288	1.5185	-4.586	154.4196	199-5	0
199	2	COMB3U	Combination	-0.867	0.505	0.288	1.5185	-4.7298	156.956	199-5	0.5
199	2	COMB3U	Combination	-1.208	67.736	-2.765	3.4695	-4.74	149.2128	199-6	0
199	2.33333	COMB3U	Combination	-1.208	75.173	-2.765	3.4695	-3.8184	125.3945	199-6	0.33333
199	2.33333	COMB3U	Combination	-1.208	75.173	-2.765	3.4695	-3.8184	125.3945	199-7	0
199	2.5	COMB3U	Combination	-1.208	78.892	-2.765	3.4695	-3.3576	112.5558	199-7	0.16667
199	2.5	COMB3U	Combination	-2.033	161.842	-3.985	5.385	-3.3958	95.7397	199-8	0
199	3	COMB3U	Combination	-2.033	172.997	-3.985	5.385	-1.4035	12.0299	199-8	0.5
199	3	COMB3U	Combination	-3.04	306.276	-3.16	7.3644	-1.4287	-9.8203	199-9	0
199	**3.5**	**COMB3U**	**Combination**	**-3.04**	**317.431**	**-3.16**	**7.3644**	**0.1514**	**-165.7469**	**199-9**	**0.5**
200	0	COMB3U	Combination	1.178	-91.758	-0.398	-3.0875	-0.3359	-38.4353	200-1	0
200	0.5	COMB3U	Combination	1.189	-80.603	-0.398	-3.0875	-0.1366	4.6549	200-1	0.5
200	0.5	COMB3U	Combination	0.419	-29.686	-0.312	-1.1577	-0.1503	-4.3635	200-2	0
200	1	COMB3U	Combination	0.43	-18.531	-0.312	-1.1577	0.0059	7.6909	200-2	0.5
201	0	COMB3U	Combination	-0.542	-288.793	0.973	-2.5419	0.0509	-160.4407	201-1	0
201	0.5	COMB3U	Combination	-0.542	-277.638	0.973	-2.5419	-0.4357	-18.8329	201-1	0.5
201	0.5	COMB3U	Combination	-0.609	-151.807	2.357	-0.77	-0.427	-15.0969	201-2	0
201	1	COMB3U	Combination	-0.609	-140.652	2.357	-0.77	-1.6056	58.0178	201-2	0.5

201	1	COMB3U	Combination	-0.673	-72.586	2.255	0.7368	-1.5691	61.0373	201-3	0
201	1.5	COMB3U	Combination	-0.65	-61.431	2.255	0.7368	-2.6966	94.5416	201-3	0.5
201	1.5	COMB3U	Combination	-0.548	-19.373	0.625	2.0741	-2.6871	93.4584	201-4	0
201	2	COMB3U	Combination	-0.57	-8.218	0.625	2.0741	-2.9998	100.3563	201-4	0.5
201	2	COMB3U	Combination	-1.001	23.892	-1.141	3.3462	-2.9976	93.2355	201-5	0
201	2.5	COMB3U	Combination	-0.99	35.047	-1.141	3.3462	-2.427	78.5006	201-5	0.5
201	2.5	COMB3U	Combination	-1.922	68.454	-2.13	4.5994	-2.4494	66.5741	201-6	0
201	3	COMB3U	Combination	-1.934	79.609	-2.13	4.5994	-1.3845	29.5585	201-6	0.5
201	3	COMB3U	Combination	-2.955	130.038	-2.467	6.0102	-1.4019	14.5204	201-7	0
201	3.5	COMB3U	Combination	-2.955	141.194	-2.467	6.0102	-0.1686	-53.2876	201-7	0.5
207	0	COMB3U	Combination	0.247	13.198	0.853	1.0217	-0.0169	1.2595	207-1	0
207	0.5	COMB3U	Combination	0.236	24.353	0.853	1.0217	-0.4435	-8.1283	207-1	0.5
207	0.5	COMB3U	Combination	0.814	57.374	3.15	0.6795	-0.4748	-5.024	207-2	0
207	1	COMB3U	Combination	0.803	68.529	3.15	0.6795	-2.05	-36.4996	207-2	0.5
208	0	COMB3U	Combination	-3.313	-119.711	-2.036	42.6757	-1.9474	-53.3215	208-1	0
208	0.5	COMB3U	Combination	-3.313	-108.556	-2.036	42.6757	-0.9292	3.7452	208-1	0.5
208	0.5	COMB3U	Combination	-2.779	-75.403	-0.038	39.8168	-0.9143	12.7901	208-2	0
208	1	COMB3U	Combination	-2.768	-64.248	-0.038	39.8168	-0.8951	47.7028	208-2	0.5
208	1	COMB3U	Combination	-2.149	-39.086	0.258	37.1966	-0.9945	55.2837	208-3	0
208	1.5	COMB3U	Combination	-2.16	-27.931	0.258	37.1966	-1.1235	72.0379	208-3	0.5
208	1.5	COMB3U	Combination	-1.756	-2.244	-0.284	33.4205	-1.0371	77.4876	208-4	0
208	2	COMB3U	Combination	-1.734	8.911	-0.284	33.4205	-0.8953	75.8206	208-4	0.5
208	2	COMB3U	Combination	-1.434	50.769	-0.849	30.1141	-1.0291	78.0849	208-5	0
208	2.5	COMB3U	Combination	-1.457	61.924	-0.849	30.1141	-0.6048	49.9115	208-5	0.5
208	2.5	COMB3U	Combination	-0.868	133.94	0.276	26.3055	-0.5663	49.0349	208-6	0
208	3	COMB3U	Combination	-0.868	145.095	0.276	26.3055	-0.7044	-20.7239	208-6	0.5
208	3	COMB3U	Combination	-0.549	249.672	3.978	15.9047	-0.7348	-22.9267	208-7	0
208	3.5	COMB3U	Combination	-0.549	260.827	3.978	15.9047	-2.7236	-150.5514	208-7	0.5
209	0	COMB3U	Combination	-3.711	-309.973	-1.458	54.5569	-2.662	-159.3907	209-1	0
209	0.5	COMB3U	Combination	-3.711	-298.818	-1.458	54.5569	-1.9329	-7.1932	209-1	0.5
209	0.5	COMB3U	Combination	-3.538	-190.767	1.601	39.7154	-1.967	9.4645	209-2	0
209	1	COMB3U	Combination	-3.538	-179.612	1.601	39.7154	-2.7676	102.0591	209-2	0.5
209	1	COMB3U	Combination	-3.571	-90.75	1.564	30.9601	-2.7953	114.8362	209-3	0
209	1.16667	COMB3U	Combination	-3.571	-87.031	1.564	30.9601	-3.0559	129.6513	209-3	0.16667
209	1.16667	COMB3U	Combination	-3.571	-87.031	1.564	30.9601	-3.0559	129.6513	209-4	0
209	1.5	COMB3U	Combination	-3.571	-79.595	1.564	30.9601	-3.5773	157.4223	209-4	0.33333
209	1.5	COMB3U	Combination	-3.515	1.681	-0.261	23.5304	-3.5971	162.8058	209-5	0
209	2	COMB3U	Combination	-3.515	12.836	-0.261	23.5304	-3.4667	159.1764	209-5	0.5
209	2	COMB3U	Combination	-3.278	96.212	-1.87	14.311	-3.457	155.3626	209-6	0
209	2.33333	COMB3U	Combination	-3.278	103.649	-1.87	14.311	-2.8335	122.0525	209-6	0.33333
209	2.33333	COMB3U	Combination	-3.278	103.649	-1.87	14.311	-2.8335	122.0525	209-7	0
209	2.5	COMB3U	Combination	-3.278	107.367	-1.87	14.311	-2.5218	104.4679	209-7	0.16667
209	2.5	COMB3U	Combination	-2.987	204.858	-1.254	1.5435	-2.5096	93.8649	209-8	0

209	3	COMB3U	Combination	-2.987	216.013	-1.254	1.5435	-1.8825	-11.3528	209-8	0.5
209	3	COMB3U	Combination	-2.894	350.393	2.862	-18.728	-1.8739	-24.3867	209-9	0
209	3.5	COMB3U	Combination	-2.894	361.548	2.862	-18.728	-3.3049	-202.3721	209-9	0.5
210	0	COMB3U	Combination	-2.906	-361.791	-2.843	19.3862	-3.3048	-202.3674	210-1	0
210	0.5	COMB3U	Combination	-2.906	-350.636	-2.843	19.3862	-1.8834	-24.2607	210-1	0.5
210	0.5	COMB3U	Combination	-3.01	-216.259	1.274	-0.8724	-1.892	-11.1696	210-2	0
210	1	COMB3U	Combination	-3.01	-205.104	1.274	-0.8724	-2.529	94.1711	210-2	0.5
210	1	COMB3U	Combination	-3.314	-107.621	1.891	-13.6128	-2.5413	104.831	210-3	0
210	1.16667	COMB3U	Combination	-3.314	-103.902	1.891	-13.6128	-2.8566	122.458	210-3	0.16667
210	1.16667	COMB3U	Combination	-3.314	-103.902	1.891	-13.6128	-2.8566	122.458	210-4	0
210	1.5	COMB3U	Combination	-3.314	-96.466	1.891	-13.6128	-3.487	155.8527	210-4	0.33333
210	1.5	COMB3U	Combination	-3.566	-13.104	0.283	-22.7907	-3.4967	159.7249	210-5	0
210	2	COMB3U	Combination	-3.566	-1.948	0.283	-22.7907	-3.6379	163.4879	210-5	0.5
210	2	COMB3U	Combination	-3.635	79.305	-1.543	-30.1641	-3.6183	158.1639	210-6	0
210	2.33333	COMB3U	Combination	-3.635	86.742	-1.543	-30.1641	-3.104	130.4894	210-6	0.33333
210	2.33333	COMB3U	Combination	-3.635	86.742	-1.543	-30.1641	-3.104	130.4894	210-7	0
210	2.5	COMB3U	Combination	-3.635	90.46	-1.543	-30.1641	-2.8469	115.7226	210-7	0.16667
210	2.5	COMB3U	Combination	-3.618	179.282	-1.584	-38.8464	-2.8191	103.0048	210-8	0
210	3	COMB3U	Combination	-3.618	190.437	-1.584	-38.8464	-2.0273	10.5749	210-8	0.5
210	3	COMB3U	Combination	-3.799	298.406	1.474	-53.5943	-1.9934	-6.0258	210-9	0
210	3.5	COMB3U	Combination	-3.799	309.561	1.474	-53.5943	-2.7305	-158.0175	210-9	0.5
211	0	COMB3U	Combination	0.811	-67.444	-3.205	-0.0977	-2.0842	-36.4218	211-1	0
211	0.5	COMB3U	Combination	0.822	-56.289	-3.205	-0.0977	-0.4817	-5.4887	211-1	0.5
211	0.5	COMB3U	Combination	0.236	-24.554	-0.867	-1.0984	-0.4512	-8.3892	211-2	0
211	1	COMB3U	Combination	0.247	-13.399	-0.867	-1.0984	-0.0175	1.099	211-2	0.5
212	0	COMB3U	Combination	-0.61	-260.041	-4.014	-14.5461	-2.7929	-148.9601	212-1	0
212	0.5	COMB3U	Combination	-0.61	-248.886	-4.014	-14.5461	-0.7861	-21.7284	212-1	0.5
212	0.5	COMB3U	Combination	-0.922	-144.387	-0.305	-24.8346	-0.7562	-19.5015	212-2	0
212	1	COMB3U	Combination	-0.922	-133.232	-0.305	-24.8346	-0.6036	49.9034	212-2	0.5
212	1	COMB3U	Combination	-1.512	-61.331	0.821	-28.5125	-0.6381	50.7978	212-3	0
212	1.5	COMB3U	Combination	-1.49	-50.176	0.821	-28.5125	-1.0488	78.6744	212-3	0.5
212	1.5	COMB3U	Combination	-1.785	-8.546	0.252	-31.7189	-0.9216	76.3545	212-4	0
212	2	COMB3U	Combination	-1.808	2.609	0.252	-31.7189	-1.0477	77.8389	212-4	0.5
212	2	COMB3U	Combination	-2.207	28.191	-0.271	-35.3445	-1.1285	72.2917	212-5	0
212	2.5	COMB3U	Combination	-2.196	39.346	-0.271	-35.3445	-0.9928	55.4075	212-5	0.5
212	2.5	COMB3U	Combination	-2.825	64.686	0.052	-37.7175	-0.8969	47.5501	212-6	0
212	3	COMB3U	Combination	-2.836	75.841	0.052	-37.7175	-0.9231	12.4184	212-6	0.5
212	3	COMB3U	Combination	-3.372	107.677	2.09	-41.3041	-0.9365	3.074	212-7	0
212	3.5	COMB3U	Combination	-3.372	118.832	2.09	-41.3041	-1.9814	-53.5534	212-7	0.5
				V+	**371.705**	**3.996**	**M+**	**0.1514**	**168.8103**		
				V-	**-371.728**	**-4.014**	**M-**	**-5.3679**	**-203.994**		

TABLE: Element Forces - Area Shells (PLAT SLAB Kombinasi 1Ultimate)														
Area	Area Elem	Shell Type	Joint	Output Case	Case Type	Step Type	F11	F22	F12	M11	M22	M12	V13	V23
Text	Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
204	204	Shell-Thin	234	COMB1U	Combination	Max	0.56	2.78	0.7	0.397	-0.5194	-14.5125	4.51	-22.12
204	204	Shell-Thin	239	COMB1U	Combination	Max	1.24	2.62	1	-1.9818	-60.6816	-9.4856	-1.8	-22.12
204	204	Shell-Thin	240	COMB1U	Combination	Max	1.19	3.06	1.24	0.1877	-64.7675	-10.5498	-1.8	-23.57
204	204	Shell-Thin	241	COMB1U	Combination	Max	0.64	3.22	1.01	-0.6478	-0.8094	-15.5766	4.51	-23.57
204	204	Shell-Thin	234	COMB1U	Combination	Min	-0.46	-2.31	-2.37	0.3325	-0.8556	-15.0321	3.95	-24.82
204	204	Shell-Thin	239	COMB1U	Combination	Min	-0.23	-1.97	-2.52	-2.4046	-68.2546	-10.0609	-2.45	-24.82
204	204	Shell-Thin	240	COMB1U	Combination	Min	-0.14	-2.21	-2.67	-0.4536	-72.9764	-11.0301	-2.45	-26.73
204	204	Shell-Thin	241	COMB1U	Combination	Min	-0.51	-2.55	-2.6	-0.8535	-0.9737	-16.0013	3.95	-26.73
205	205	Shell-Thin	241	COMB1U	Combination	Max	0.64	3.22	1.25	0.6371	-0.5113	-17.5557	5.8	-23.72
205	205	Shell-Thin	240	COMB1U	Combination	Max	0.54	3.04	1.45	-1.8119	-65.1595	-10.6836	1.92	-23.72
205	205	Shell-Thin	242	COMB1U	Combination	Max	0.54	3.1	1.75	-1.3512	-71.7763	-11.7179	1.92	-26.29
205	205	Shell-Thin	243	COMB1U	Combination	Max	0.65	3.27	1.47	-0.7053	-0.9658	-18.5901	5.8	-26.29
205	205	Shell-Thin	241	COMB1U	Combination	Min	-0.51	-2.55	-2.97	0.334	-0.7774	-18.0023	4.86	-27.14
205	205	Shell-Thin	240	COMB1U	Combination	Min	-0.22	-2.34	-3.15	-3.3975	-73.5731	-11.037	0.62	-27.14
205	205	Shell-Thin	242	COMB1U	Combination	Min	-0.21	-2.37	-3.64	-2.3652	-79.6532	-12.0456	0.62	-29.33
205	205	Shell-Thin	243	COMB1U	Combination	Min	-0.52	-2.58	-3.38	-0.8877	-1.1182	-19.0109	4.86	-29.33
206	206	Shell-Thin	243	COMB1U	Combination	Max	0.65	3.27	1.71	0.3431	-0.7608	-20.654	5.47	-26.84
206	206	Shell-Thin	242	COMB1U	Combination	Max	0.14	3.11	1.97	-3.4449	-72.1892	-11.6811	9.94	-26.84
206	206	Shell-Thin	244	COMB1U	Combination	Max	0.16	2.95	2.13	-6.5875	-81.5625	-12.5699	9.94	-30.56
206	206	Shell-Thin	245	COMB1U	Combination	Max	0.62	3.11	1.87	-0.5747	-0.7624	-21.5429	5.47	-30.56
206	206	Shell-Thin	243	COMB1U	Combination	Min	-0.52	-2.58	-3.8	0.3192	-0.8721	-20.9992	5.38	-29.92
206	206	Shell-Thin	242	COMB1U	Combination	Min	-0.51	-2.51	-3.82	-4.8118	-80.1483	-12.0131	9.43	-29.92
206	206	Shell-Thin	244	COMB1U	Combination	Min	-0.48	-2.1	-4.36	-7.7623	-89.6402	-12.8721	9.43	-33.76
206	206	Shell-Thin	245	COMB1U	Combination	Min	-0.43	-2.16	-4.34	-0.5978	-0.8238	-21.8582	5.38	-33.76
207	207	Shell-Thin	245	COMB1U	Combination	Max	0.62	3.11	2.02	0.1492	-0.6131	-23.0781	4.99	-31.63
207	207	Shell-Thin	244	COMB1U	Combination	Max	0.28	3	2.31	-8.039	-81.8467	-12.5373	22.88	-31.63
207	207	Shell-Thin	246	COMB1U	Combination	Max	0.4	3.31	2.48	-17.2763	-94.3009	-12.9757	22.88	-36.74
207	207	Shell-Thin	247	COMB1U	Combination	Max	0.68	3.42	2.19	-0.2114	-0.2962	-23.5165	4.99	-36.74
207	207	Shell-Thin	245	COMB1U	Combination	Min	-0.43	-2.16	-4.78	0.1128	-0.6862	-23.4037	4.91	-34.84
207	207	Shell-Thin	244	COMB1U	Combination	Min	-0.49	-2.13	-4.46	-9.2701	-89.9479	-12.7587	22.68	-34.84
207	207	Shell-Thin	246	COMB1U	Combination	Min	-0.41	-1.47	-4.94	-18.5771	-102.3073	-13.1664	22.68	-39.91
207	207	Shell-Thin	247	COMB1U	Combination	Min	-0.3	-1.5	-5.25	-0.2419	-0.3707	-23.8114	4.91	-39.91
241	241	Shell-Thin	281	COMB1U	Combination	Max	1.04	4.18	6.08	-44.5446	-148.9912	8.5434	-2.74	-62.17
241	241	Shell-Thin	348	COMB1U	Combination	Max	0.83	4.14	5.87	0.7835	0.5541	15.4345	-5.22	-62.17
241	241	Shell-Thin	349	COMB1U	Combination	Max	0.81	4.04	6.04	-0.4711	0.39	14.2429	-5.22	-64.76
241	241	Shell-Thin	285	COMB1U	Combination	Max	1.06	4.08	6.26	-44.8632	-155.6832	7.3519	-2.74	-64.76

241	241	Shell-Thin	281	COMB1U	Combination	Min	0.62	0.44	-4.62	-46.1693	-156.4713	8.3945	-3.43	-65.11
241	241	Shell-Thin	348	COMB1U	Combination	Min	0.06588	0.33	-4.69	0.7617	0.4541	15.3566	-5.33	-65.11
241	241	Shell-Thin	349	COMB1U	Combination	Min	0.14	0.71	-4.83	-0.4895	0.3189	14.1704	-5.33	-67.83
241	241	Shell-Thin	285	COMB1U	Combination	Min	0.66	0.83	-4.76	-46.1688	-163.3377	7.2083	-3.43	-67.83
242	242	Shell-Thin	285	COMB1U	Combination	Max	0.8	4.04	5.93	-46.4372	-155.994	6.67	-3.8	-65.08
242	242	Shell-Thin	349	COMB1U	Combination	Max	0.81	4.04	6.13	0.3355	0.5546	12.5154	-2.74	-65.08
242	242	Shell-Thin	350	COMB1U	Combination	Max	0.78	3.88	6.35	0.1175	0.5507	11.2527	-2.74	-67.41
242	242	Shell-Thin	287	COMB1U	Combination	Max	0.81	3.87	6.16	-47.2082	-161.8036	5.4073	-3.8	-67.41
242	242	Shell-Thin	285	COMB1U	Combination	Min	0.24	0.74	-5.06	-47.8037	-163.6687	6.5972	-3.93	-68.15
242	242	Shell-Thin	349	COMB1U	Combination	Min	0.14	0.71	-4.97	0.3018	0.4739	12.404	-2.8	-68.15
242	242	Shell-Thin	350	COMB1U	Combination	Min	0.16	0.79	-5.02	0.0839	0.4711	11.1567	-2.8	-70.45
242	242	Shell-Thin	287	COMB1U	Combination	Min	0.22	0.81	-5.11	-48.5682	-169.4277	5.3499	-3.93	-70.45
243	243	Shell-Thin	287	COMB1U	Combination	Max	1.42	4	5.79	-46.5324	-161.6639	4.8047	-6.26	-67.28
243	243	Shell-Thin	350	COMB1U	Combination	Max	0.78	3.88	6.44	-0.239	0.4768	9.4612	-0.12	-67.28
243	243	Shell-Thin	351	COMB1U	Combination	Max	0.76	3.8	6.64	0.5934	0.6502	8.2216	-0.12	-69.39
243	243	Shell-Thin	323	COMB1U	Combination	Max	1.45	3.92	5.99	-48.7535	-166.6944	3.5697	-6.26	-69.39
243	243	Shell-Thin	287	COMB1U	Combination	Min	1.07	0.97	-5.4	-47.8415	-169.2869	4.745	-6.93	-70.34
243	243	Shell-Thin	350	COMB1U	Combination	Min	0.16	0.79	-5.1	-0.2591	0.4051	9.3271	-0.25	-70.34
243	243	Shell-Thin	351	COMB1U	Combination	Min	0.15	0.74	-5.12	0.5716	0.5507	8.0927	-0.25	-72.28
243	243	Shell-Thin	323	COMB1U	Combination	Min	1.01	0.92	-5.42	-50.3665	-174.0571	3.5059	-6.93	-72.28
244	244	Shell-Thin	323	COMB1U	Combination	Max	2.69	4.16	5.82	-46.6489	-166.2679	3.0124	-9.46	-69.16
244	244	Shell-Thin	351	COMB1U	Combination	Max	0.76	3.8	6.7	-0.4688	0.4416	6.3333	2.02	-69.16
244	244	Shell-Thin	352	COMB1U	Combination	Max	0.77	3.85	6.73	1.018	1.0752	5.0794	2.02	-70.96
244	244	Shell-Thin	325	COMB1U	Combination	Max	2.86	4.22	5.85	-50.7373	-170.4133	1.7447	-9.46	-70.96
244	244	Shell-Thin	323	COMB1U	Combination	Min	2.57	1.24	-5.55	-47.9167	-173.5727	2.9691	-11.07	-72.05
244	244	Shell-Thin	351	COMB1U	Combination	Min	0.15	0.74	-5.2	-0.6457	0.3034	6.2323	1.05	-72.05
244	244	Shell-Thin	352	COMB1U	Combination	Min	0.32	1.59	-5.32	0.7194	0.7904	4.966	1.05	-74.17
244	244	Shell-Thin	325	COMB1U	Combination	Min	2.59	2.1	-5.67	-52.7773	-178.0853	1.7166	-11.07	-74.17
245	245	Shell-Thin	325	COMB1U	Combination	Max	4.05	4.43	6.13	-48.786	-170.0203	1.458	-7.8	-70.92
245	245	Shell-Thin	352	COMB1U	Combination	Max	0.77	3.85	6.56	-0.2444	0.7822	2.8178	1.48	-70.92
245	245	Shell-Thin	238	COMB1U	Combination	Max	0.76	3.81	5.95	0.5342	1.5087	1.4641	1.48	-72.43
245	245	Shell-Thin	327	COMB1U	Combination	Max	4.28	4.39	5.64	-52.4326	-172.8949	0.1322	-7.8	-72.43
245	245	Shell-Thin	325	COMB1U	Combination	Min	3.62	2.34	-5.56	-49.8846	-177.5095	1.3469	-8.16	-73.93
245	245	Shell-Thin	352	COMB1U	Combination	Min	0.32	1.59	-5.43	-0.4482	0.5974	2.6319	0.86	-73.93
245	245	Shell-Thin	238	COMB1U	Combination	Min	0.56	2.81	-5.68	0.4714	1.1089	1.3073	0.86	-74.89
245	**245**	**Shell-Thin**	**327**	**COMB1U**	**Combination**	**Min**	**3.63**	**3.55**	**-5.92**	**-53.6888**	**-179.5611**	**-0.0056**	**-8.16**	**-74.89**
246	246	Shell-Thin	226	COMB1U	Combination	Max	1.92	-1.8	6.91	33.7424	80.454	2.9573	-33.45	104.41
246	246	Shell-Thin	327	COMB1U	Combination	Max	2.46	-1.63	5.76	-51.9002	-170.2314	0.0401	8.29	104.41
246	246	Shell-Thin	354	COMB1U	Combination	Max	2.69	-0.32	6.99	-48.9471	-170.8272	1.9635	8.29	104.98
246	246	Shell-Thin	356	COMB1U	Combination	Max	2.51	-0.49	8.14	16.1598	81.2679	5.0469	-33.45	104.98
246	246	Shell-Thin	226	COMB1U	Combination	Min	1.58	-10.71	-4.73	29.2661	66.9062	2.4697	-35.97	101.84
246	246	Shell-Thin	327	COMB1U	Combination	Min	1.38	-10.8	-5.49	-53.422	-178.2263	-0.2902	7.12	101.84
246	246	Shell-Thin	354	COMB1U	Combination	Min	1.91	-8.29	-5.28	-49.8055	-177.1156	1.7933	7.12	100.7

246	246	Shell-Thin	356	COMB1U	Combination	Min	1.75	-8.19	-4.52	11.0048	65.1701	4.387	-35.97	100.7
247	247	Shell-Thin	356	COMB1U	Combination	Max	3.74	-0.11	8.73	22.9648	82.5997	7.1951	-47.59	103.05
247	247	Shell-Thin	354	COMB1U	Combination	Max	1.64	-0.53	7.21	-50.9053	-171.2282	2.78	10.96	103.05
247	247	Shell-Thin	357	COMB1U	Combination	Max	2.1	1.78	7.24	-46.9238	-167.6446	3.5527	10.96	100.19
247	247	Shell-Thin	358	COMB1U	Combination	Max	4.2	2.2	8.76	-1.9241	79.0291	8.0417	-47.59	100.19
247	247	Shell-Thin	356	COMB1U	Combination	Min	2.99	-8.08	-3.98	20.8969	67.1777	7.0885	-49.55	99.57
247	247	Shell-Thin	354	COMB1U	Combination	Min	0.73	-8.53	-5.12	-52.6927	-177.6837	2.1541	9.64	99.57
247	247	Shell-Thin	357	COMB1U	Combination	Min	1.46	-4.86	-4.66	-48.2434	-175.2087	3.0007	9.64	97.82
247	247	Shell-Thin	358	COMB1U	Combination	Min	3.72	-4.41	-3.52	-4.6552	65.2592	7.8612	-49.55	97.82
248	248	Shell-Thin	358	COMB1U	Combination	Max	6.14	2.59	8.15	5.4264	80.5021	7.4914	-27.48	98.95
248	248	Shell-Thin	357	COMB1U	Combination	Max	0.92	1.55	6.97	-49.0275	-168.0711	4.312	6.96	98.95
248	248	Shell-Thin	359	COMB1U	Combination	Max	1.28	3.32	5.98	-46.5982	-161.9959	4.0968	6.96	94.3
248	248	Shell-Thin	360	COMB1U	Combination	Max	6.5	4.37	7.16	-9.0889	74.937	7.341	-27.48	94.3
248	248	Shell-Thin	358	COMB1U	Combination	Min	5.45	-4.06	-4	3.7364	66.9346	7.3095	-28.76	96.7
248	248	Shell-Thin	357	COMB1U	Combination	Min	-0.15	-5.18	-4.69	-50.6962	-175.6934	3.8603	6.01	96.7
248	248	Shell-Thin	359	COMB1U	Combination	Min	0.21	-3.38	-5.02	-47.97	-169.9338	3.7058	6.01	92.49
248	248	Shell-Thin	360	COMB1U	Combination	Min	5.81	-2.26	-4.32	-11.1968	62.1667	7.09	-28.76	92.49
249	249	Shell-Thin	360	COMB1U	Combination	Max	7.36	4.54	5.62	-6.723	75.4216	6.5342	3.53	93.98
249	249	Shell-Thin	359	COMB1U	Combination	Max	0.63	3.19	5.49	-47.2758	-162.1359	3.5398	2.79	93.98
249	249	Shell-Thin	361	COMB1U	Combination	Max	0.72	3.64	5.21	-46.5021	-156.3227	3.0531	2.79	90.62
249	249	Shell-Thin	362	COMB1U	Combination	Max	7.45	4.98	5.34	-5.6656	72.8307	6.0325	3.53	90.62
249	249	Shell-Thin	360	COMB1U	Combination	Min	6.71	-2.08	-5.25	-8.696	62.6555	6.3832	3.03	92.13
249	249	Shell-Thin	359	COMB1U	Combination	Min	-0.6	-3.54	-5.18	-48.6984	-170.075	3.4987	2.64	92.13
249	249	Shell-Thin	361	COMB1U	Combination	Min	-0.65	-3.77	-5.7	-47.9325	-164.3188	3.0238	2.64	88.78
249	249	Shell-Thin	362	COMB1U	Combination	Min	6.67	-2.31	-5.77	-7.653	60.0463	5.9232	3.03	88.78
1627	1627	Shell-Thin	3607	COMB1U	Combination	Max	3.13	1.46	1.58	-14.0042	53.4208	-7.826	37.86	78.36
1627	1627	Shell-Thin	3638	COMB1U	Combination	Max	-1.42	0.47	1.88	-40.8046	-143.5956	-3.8256	-8.66	78.36
1627	1627	Shell-Thin	3639	COMB1U	Combination	Max	-1.94	-1.18	1.56	-45.1354	-150.0589	-3.9909	-8.66	83.68
1627	1627	Shell-Thin	3608	COMB1U	Combination	Max	2.79	-0.19	1.26	4.4688	59.7655	-8.1462	37.86	83.68
1627	1627	Shell-Thin	3607	COMB1U	Combination	Min	2.82	-4.33	-5.8	-22.2631	7.5066	-8.528	26.73	63.84
1627	1627	Shell-Thin	3638	COMB1U	Combination	Min	-1.91	-5.2	-4.24	-43.4003	-153.0587	-4.755	-12.08	63.84
1627	1627	Shell-Thin	3639	COMB1U	Combination	Min	-2.61	-9.61	-5.66	-47.8879	-159.6534	-4.9739	-12.08	67.99
1627	1627	Shell-Thin	3608	COMB1U	Combination	Min	1.94	-8.74	-7.22	-6.8885	11.7667	-8.592	26.73	67.99
1628	1628	Shell-Thin	3608	COMB1U	Combination	Max	2.3	-0.45	0.74	-6.9589	57.4475	-8.7103	60.68	84.62
1628	1628	Shell-Thin	3639	COMB1U	Combination	Max	-1.34	-1.19	1.51	-40.4325	-149.2254	-3.1617	-16.39	84.62
1628	1628	Shell-Thin	3640	COMB1U	Combination	Max	-2.28	-3.14	1.65	-48.7911	-155.6792	-2.1689	-16.39	89.51
1628	1628	Shell-Thin	3609	COMB1U	Combination	Max	1.05	-2.4	0.88	24.1941	63.2395	-7.9579	60.68	89.51
1628	1628	Shell-Thin	3608	COMB1U	Combination	Min	0.87	-8.8	-7.96	-15.6683	10.0431	-9.1551	47.55	68.82
1628	1628	Shell-Thin	3639	COMB1U	Combination	Min	-2.26	-9.41	-6.13	-42.9288	-158.5545	-4.2353	-22.2	68.82
1628	1628	Shell-Thin	3640	COMB1U	Combination	Min	-3.41	-17.92	-6.24	-51.7758	-163.1263	-3.5283	-22.2	71.85
1628	1628	Shell-Thin	3609	COMB1U	Combination	Min	0.02904	-17.3	-8.07	9.3868	13.0321	-8.2078	47.55	71.85
1629	1629	Shell-Thin	3609	COMB1U	Combination	Max	2.73	-2.75	1.71	14.7797	62.1986	-4.8936	43.68	91.52
1629	1629	Shell-Thin	3640	COMB1U	Combination	Max	-2.56	-3.14	1.84	-44.2807	-154.6442	-1.8473	-12.38	91.52

1629	1629	Shell-Thin	3641	COMB1U	Combination	Max	-2.67	-4.25	1.92	-50.5928	-154.0876	0.6062	-12.38	90.82
1629	1629	Shell-Thin	3585	COMB1U	Combination	Max	1.42	-3.9	1.77	36.0416	60.0975	-2.671	43.68	90.82
1629	1629	Shell-Thin	3609	COMB1U	Combination	Min	-0.99	-16.83	-7.22	0.3842	10.3895	-6.4853	31.36	73.35
1629	1629	Shell-Thin	3640	COMB1U	Combination	Min	-2.65	-17.82	-5.28	-46.9422	-162.2925	-1.906	-18.89	73.35
1629	**1629**	**Shell-Thin**	**3641**	**COMB1U**	**Combination**	**Min**	**-3.92**	**-23.61**	**-2.66**	**-54.7384**	**-165.3834**	**0.2037**	**-18.89**	**75.14**
1629	1629	Shell-Thin	3585	COMB1U	Combination	Min	-1.05	-22.57	-4.59	18.165	12.6946	-4.1446	31.36	75.14
1630	1630	Shell-Thin	3634	COMB1U	Combination	Max	1.31	3.37	2.79	-38.8944	-119.73	7.7196	16.03	-70.06
1630	1630	Shell-Thin	3400	COMB1U	Combination	Max	-1.9	3.08	4.28	38.7901	79.4491	9.2331	-41.95	-70.06
1630	1630	Shell-Thin	3664	COMB1U	Combination	Max	-1.83	3.34	3.94	13.8491	84.1367	7.7464	-41.95	-72.35
1630	1630	Shell-Thin	3635	COMB1U	Combination	Max	0.52	3.46	2.45	-31.9911	-124.5178	6.0756	16.03	-72.35
1630	1630	Shell-Thin	3634	COMB1U	Combination	Min	-1.48	1.03	-1.61	-41.605	-126.7898	7.426	8.8	-86.02
1630	1630	Shell-Thin	3400	COMB1U	Combination	Min	-4.58	0.05996	-1.46	25.014	48.7322	7.8415	-52.78	-86.02
1630	1630	Shell-Thin	3664	COMB1U	Combination	Min	-5.41	-4.02	-1.49	2.9735	49.0096	6.1954	-52.78	-91.17
1630	1630	Shell-Thin	3635	COMB1U	Combination	Min	-1.46	-2.88	-1.63	-35.7062	-135.6539	5.9372	8.8	-91.17
1631	1631	Shell-Thin	3635	COMB1U	Combination	Max	0.0006115	3.5	3.35	-39.4777	-126.1563	6.3358	9.79	-72.48
1631	1631	Shell-Thin	3664	COMB1U	Combination	Max	-5	2.46	3.84	26.9084	86.146	5.2755	-48.71	-72.48
1631	1631	Shell-Thin	3665	COMB1U	Combination	Max	-5.92	2.05	4.98	-1.6739	86.3472	4.8268	-48.71	-76.69
1631	1631	Shell-Thin	3636	COMB1U	Combination	Max	-0.97	3.1	4.49	-36.1479	-133.2509	5.6023	9.79	-76.69
1631	1631	Shell-Thin	3635	COMB1U	Combination	Min	-1.49	-3.03	-1.61	-42.7068	-136.9129	4.8361	4.86	-90.48
1631	1631	Shell-Thin	3664	COMB1U	Combination	Min	-6.3	-3.95	-1.18	17.158	52.4492	5.1936	-57.2	-90.48
1631	1631	Shell-Thin	3665	COMB1U	Combination	Min	-6.38	-8.51	-1.35	-7.3518	55.8845	4.4596	-57.2	-92.58
1631	1631	Shell-Thin	3636	COMB1U	Combination	Min	-1.51	-7.59	-1.78	-38.8497	-141.9616	4.3867	4.86	-92.58
1632	1632	Shell-Thin	3636	COMB1U	Combination	Max	-1.2	3.08	3.9	-42.6443	-134.3725	4.6688	7.65	-76.78
1632	1632	Shell-Thin	3665	COMB1U	Combination	Max	-6.83	1.49	4.27	10.5799	88.7889	5.6844	-29.93	-76.78
1632	1632	Shell-Thin	3666	COMB1U	Combination	Max	-7.19	0.34	3.52	-7.0898	87.8356	5.9434	-29.93	-79.11
1632	1632	Shell-Thin	3637	COMB1U	Combination	Max	-1.41	1.94	3.15	-39.3955	-138.7946	4.7657	7.65	-79.11
1632	1632	Shell-Thin	3636	COMB1U	Combination	Min	-2.2	-7.76	-2.07	-44.9972	-143.3688	3.5086	3.75	-92.46
1632	1632	Shell-Thin	3665	COMB1U	Combination	Min	-9.22	-8.69	-1.49	3.8719	58.1383	5.131	-37.13	-92.46
1632	1632	Shell-Thin	3666	COMB1U	Combination	Min	-9.45	-10.46	-1.46	-11.4601	59.4236	5.1477	-37.13	-93.55
1632	1632	Shell-Thin	3637	COMB1U	Combination	Min	-2.57	-9.52	-2.04	-42.0182	-147.1648	3.6874	3.75	-93.55
1633	1633	Shell-Thin	3637	COMB1U	Combination	Max	-1.51	1.92	2.11	-42.56	-139.3535	4.405	0.19	-79.22
1633	1633	Shell-Thin	3666	COMB1U	Combination	Max	-7.68	0.18	2.27	-0.9055	89.1475	6.8005	0.96	-79.22
1633	1633	Shell-Thin	3667	COMB1U	Combination	Max	-7.69	-0.05084	2.47	-1.657	91.872	7.2226	0.96	-82.44
1633	1633	Shell-Thin	3638	COMB1U	Combination	Max	-1.46	1.69	2.3	-42.5634	-144.4849	4.7594	0.19	-82.44
1633	1633	Shell-Thin	3637	COMB1U	Combination	Min	-2.76	-9.56	-2.41	-44.8338	-147.8019	4.0481	-2.6	-93.81
1633	1633	Shell-Thin	3666	COMB1U	Combination	Min	-10.36	-10.58	-2.33	-6.4063	60.3593	6.3653	-5.33	-93.81
1633	1633	Shell-Thin	3667	COMB1U	Combination	Min	-10.34	-10.3	-2.22	-6.8979	63.2702	6.7221	-5.33	-97.03
1633	1633	Shell-Thin	3638	COMB1U	Combination	Min	-2.8	-9.28	-2.3	-45.0916	-153.1288	4.4726	-2.6	-97.03
1634	1634	Shell-Thin	3638	COMB1U	Combination	Max	-1.37	1.68	1.61	-40.9406	-144.2774	5.1639	-8.21	-82.65
1634	1634	Shell-Thin	3667	COMB1U	Combination	Max	-6.86	0.21	1.24	-5.0318	91.1625	8.3525	33.37	-82.65
1634	1634	Shell-Thin	3668	COMB1U	Combination	Max	-6.45	1.07	1.43	11.4598	97.7847	8.3578	33.37	-86.97
1634	1634	Shell-Thin	3639	COMB1U	Combination	Max	-1.1	2.55	1.8	-45.222	-150.4923	5.3282	-8.21	-86.97
1634	1634	Shell-Thin	3638	COMB1U	Combination	Min	-2.52	-9.2	-2.98	-43.3205	-152.6576	4.163	-12.16	-97.11

1634	1634	Shell-Thin	3667	COMB1U	Combination	Min	-9.28	-10.18	-3.03	-9.634	62.7575	7.6194	26.28	-97.11
1634	1634	Shell-Thin	3668	COMB1U	Combination	Min	-9.01	-7.65	-3.77	5.0289	67.4702	7.8663	26.28	-102.62
1634	1634	Shell-Thin	3639	COMB1U	Combination	Min	-2.11	-6.69	-3.72	-47.8961	-159.6943	4.2511	-12.16	-102.62
1635	1635	Shell-Thin	3639	COMB1U	Combination	Max	-0.73	2.56	1.75	-40.52	-149.6587	4.364	-16.49	-87.77
1635	1635	Shell-Thin	3668	COMB1U	Combination	Max	-5.6	1.66	1.46	1.9552	95.8902	8.9328	55.5	-87.77
1635	1635	Shell-Thin	3669	COMB1U	Combination	Max	-4.52	2.5	1.5	30.6326	101.2273	7.9341	55.5	-90.3
1635	1635	Shell-Thin	3640	COMB1U	Combination	Max	0.41	3.51	1.77	-48.384	-153.6437	3.6191	-16.49	-90.3
1635	1635	Shell-Thin	3639	COMB1U	Combination	Min	-1.53	-6.51	-4.19	-42.9361	-158.5955	3.225	-21.49	-103.66
1635	1635	Shell-Thin	3668	COMB1U	Combination	Min	-6.29	-7.53	-4.46	-3.4955	65.7589	8.6367	47.23	-103.66
1635	1635	Shell-Thin	3669	COMB1U	Combination	Min	-6.06	-1.83	-3.3	21.1866	68.0937	7.8572	47.23	-108.19
1635	1635	Shell-Thin	3640	COMB1U	Combination	Min	-1.37	-0.91	-3.03	-52.0679	-164.5867	2.1916	-21.49	-108.19
1636	1636	Shell-Thin	3640	COMB1U	Combination	Max	0.9	3.46	1.97	-43.8871	-152.6759	2.0568	-12.21	-91.51
1636	1636	Shell-Thin	3669	COMB1U	Combination	Max	-2.11	3.25	2.18	22.2276	100.3102	6.286	42.62	-91.51
1636	1636	Shell-Thin	3401	COMB1U	Combination	Max	-2.07	3.27	2.05	42.7532	99.087	3.9584	42.62	-94.34
1636	1636	Shell-Thin	3641	COMB1U	Combination	Max	1.79	3.91	1.85	-51.1219	-156.733	-0.0154	-12.21	-94.34
1636	1636	Shell-Thin	3640	COMB1U	Combination	Min	-1.37	-0.76	-2.08	-47.2209	-163.6857	1.9469	-19.49	-110.21
1636	1636	Shell-Thin	3669	COMB1U	Combination	Min	-5.62	-2	-3.18	11.1913	65.3308	4.6163	32.15	-110.21
1636	1636	Shell-Thin	3401	COMB1U	Combination	Min	-4.73	2.61	-3.71	29.4254	69.13	2.4418	32.15	-110.14
1636	1636	Shell-Thin	3641	COMB1U	Combination	Min	-1.33	3.42	-2.61	-54.455	-163.9663	-0.4831	-19.49	-110.14
1644	1644	Shell-Thin	3641	COMB1U	Combination	Max	1.78	3.91	2.62	-51.1107	-156.731	0.474	19.46	-94.34
1644	**1644**	**Shell-Thin**	**3401**	**COMB1U**	**Combination**	**Max**	**-2.07**	**3.27**	**3.72**	**42.7474**	**99.0849**	**-2.4589**	**-32.11**	**-94.34**
1644	1644	Shell-Thin	3670	COMB1U	Combination	Max	-2.11	3.26	3.19	22.2355	100.3249	-4.6333	-32.11	-91.5
1644	1644	Shell-Thin	3642	COMB1U	Combination	Max	0.89	3.47	2.09	-43.8912	-152.6669	-1.955	19.46	-91.5
1644	1644	Shell-Thin	3641	COMB1U	Combination	Min	-1.33	3.42	-1.85	-54.4453	-163.9641	-0.0123	12.22	-110.13
1644	1644	Shell-Thin	3401	COMB1U	Combination	Min	-4.73	2.61	-2.06	29.4193	69.1297	-3.9821	-42.6	-110.13
1644	1644	Shell-Thin	3670	COMB1U	Combination	Min	-5.61	-2	-2.18	11.1943	65.3107	-6.3088	-42.6	-110.21
1644	1644	Shell-Thin	3642	COMB1U	Combination	Min	-1.37	-0.76	-1.98	-47.2077	-163.6815	-2.0843	12.22	-110.21
1645	1645	Shell-Thin	3642	COMB1U	Combination	Max	0.41	3.52	3.04	-48.3663	-153.6307	-2.219	21.46	-90.28
1645	**1645**	**Shell-Thin**	**3670**	**COMB1U**	**Combination**	**Max**	**-4.52**	**2.51**	**3.31**	**30.6322**	**101.2389**	**-7.8737**	**-47.21**	**-90.28**
1645	1645	Shell-Thin	3671	COMB1U	Combination	Max	-5.6	1.69	4.47	1.9614	95.917	-8.6549	-47.21	-87.75
1645	1645	Shell-Thin	3643	COMB1U	Combination	Max	-0.74	2.59	4.2	-40.5176	-149.6378	-3.252	21.46	-87.75
1645	1645	Shell-Thin	3642	COMB1U	Combination	Min	-1.38	-0.91	-1.78	-52.037	-164.5786	-3.6259	16.5	-108.19
1645	1645	Shell-Thin	3670	COMB1U	Combination	Min	-6.04	-1.82	-1.5	21.1796	68.0731	-7.9552	-55.48	-108.19
1645	1645	Shell-Thin	3671	COMB1U	Combination	Min	-6.27	-7.53	-1.47	-3.4939	65.7185	-8.9492	-55.48	-103.66
1645	1645	Shell-Thin	3643	COMB1U	Combination	Min	-1.54	-6.51	-1.75	-42.8995	-158.5862	-4.368	16.5	-103.66
1646	1646	Shell-Thin	3643	COMB1U	Combination	Max	-1.12	2.58	3.73	-45.1987	-150.4675	-4.2774	12.13	-86.94
1646	1646	Shell-Thin	3671	COMB1U	Combination	Max	-6.44	1.1	3.78	11.4695	97.8115	-7.8815	-26.28	-86.94
1646	1646	Shell-Thin	3672	COMB1U	Combination	Max	-6.85	0.25	3.04	-5.0248	91.2094	-7.6302	-26.28	-82.61
1646	1646	Shell-Thin	3644	COMB1U	Combination	Max	-1.39	1.71	2.99	-40.9319	-144.2421	-4.189	12.13	-82.61
1646	1646	Shell-Thin	3643	COMB1U	Combination	Min	-2.11	-6.69	-1.79	-47.845	-159.6818	-5.3287	8.23	-102.61
1646	1646	Shell-Thin	3671	COMB1U	Combination	Min	-8.99	-7.65	-1.43	5.0232	67.429	-8.3742	-33.38	-102.61
1646	1646	Shell-Thin	3672	COMB1U	Combination	Min	-9.25	-10.17	-1.25	-9.6407	62.6912	-8.3684	-33.38	-97.11
1646	1646	Shell-Thin	3644	COMB1U	Combination	Min	-2.51	-9.19	-1.61	-43.2596	-152.6476	-5.16	8.23	-97.11

1647	1647	Shell-Thin	3644	COMB1U	Combination	Max	-1.49	1.72	2.29	-42.5358	-144.4462	-4.4975	2.63	-82.39
1647	1647	Shell-Thin	3672	COMB1U	Combination	Max	-7.69	-0.0116	2.22	-1.6298	91.9209	-6.7384	5.27	-82.39
1647	1647	Shell-Thin	3673	COMB1U	Combination	Max	-7.68	0.26	2.34	-0.9064	89.2172	-6.3652	5.27	-79.16
1647	1647	Shell-Thin	3645	COMB1U	Combination	Max	-1.52	1.99	2.41	-42.544	-139.2981	-4.0336	2.63	-79.16
1647	1647	Shell-Thin	3644	COMB1U	Combination	Min	-2.79	-9.27	-2.3	-45.022	-153.1168	-4.7506	-0.21	-97.03
1647	1647	Shell-Thin	3672	COMB1U	Combination	Min	-10.31	-10.29	-2.47	-6.8989	63.207	-7.2287	-0.99	-97.03
1647	1647	Shell-Thin	3673	COMB1U	Combination	Min	-10.33	-10.58	-2.25	-6.4254	60.265	-6.8162	-0.99	-93.82
1647	1647	Shell-Thin	3645	COMB1U	Combination	Min	-2.76	-9.57	-2.08	-44.7475	-147.7983	-4.4288	-0.21	-93.82
1648	1648	Shell-Thin	3645	COMB1U	Combination	Max	-1.43	2	2.05	-39.3683	-138.7383	-3.6669	-3.68	-79.05
1648	1648	Shell-Thin	3673	COMB1U	Combination	Max	-7.18	0.42	1.45	-7.0301	87.9184	-5.1649	36.94	-79.05
1648	1648	Shell-Thin	3674	COMB1U	Combination	Max	-6.82	1.56	1.48	10.5526	88.8795	-5.1475	36.94	-76.69
1648	1648	Shell-Thin	3646	COMB1U	Combination	Max	-1.22	3.14	2.08	-42.6195	-134.2966	-3.4802	-3.68	-76.69
1648	1648	Shell-Thin	3645	COMB1U	Combination	Min	-2.57	-9.53	-3.13	-41.9349	-147.1604	-4.7882	-7.66	-93.57
1648	1648	Shell-Thin	3673	COMB1U	Combination	Min	-9.41	-10.46	-3.47	-11.4443	59.3353	-5.9369	29.83	-93.57
1648	1648	Shell-Thin	3674	COMB1U	Combination	Min	-9.19	-8.67	-4.26	3.8286	58.0149	-5.6697	29.83	-92.49
1648	1648	Shell-Thin	3646	COMB1U	Combination	Min	-2.2	-7.74	-3.91	-44.882	-143.3716	-4.6904	-7.66	-92.49
1649	1649	Shell-Thin	3646	COMB1U	Combination	Max	-0.95	3.16	1.78	-36.1371	-133.177	-4.3403	-4.72	-76.62
1649	1649	Shell-Thin	3674	COMB1U	Combination	Max	-5.93	2.13	1.39	-1.5438	86.4691	-4.4707	56.71	-76.62
1649	1649	Shell-Thin	3675	COMB1U	Combination	Max	-5.02	2.63	1.21	26.788	86.2725	-5.192	56.71	-72.37
1649	1649	Shell-Thin	3647	COMB1U	Combination	Max	0.01362	3.65	1.59	-39.4421	-126.0504	-4.7773	-4.72	-72.37
1649	1649	Shell-Thin	3646	COMB1U	Combination	Min	-1.56	-7.57	-4.5	-38.7609	-141.9705	-5.6348	-9.75	-92.61
1649	1649	Shell-Thin	3674	COMB1U	Combination	Min	-6.33	-8.49	-4.98	-7.2881	55.7826	-4.8132	48.42	-92.61
1649	1649	Shell-Thin	3675	COMB1U	Combination	Min	-6.23	-3.98	-3.77	17.0822	52.2719	-5.2641	48.42	-90.51
1649	1649	Shell-Thin	3647	COMB1U	Combination	Min	-1.52	-3.06	-3.28	-42.5518	-136.9317	-6.3699	-9.75	-90.51
1657	1657	Shell-Thin	3650	COMB1U	Combination	Max	0.64	7.52	0.59	-0.4833	-48.8434	2.9889	1.08	28.99
1657	1657	Shell-Thin	3576	COMB1U	Combination	Max	0.69	7.36	0.32	4.7057	27.2316	4.109	8.76	28.99
1657	1657	Shell-Thin	3617	COMB1U	Combination	Max	-0.09041	6.26	0.23	2.4436	24.2316	5.0744	8.76	27.82
1657	1657	Shell-Thin	3651	COMB1U	Combination	Max	0.24	6.41	0.74	1.1176	-49.6196	3.5355	1.08	27.82
1657	1657	Shell-Thin	3650	COMB1U	Combination	Min	-0.11	-10.93	0.04845	-1.8757	-56.2015	-0.1203	-4.69	7.74
1657	1657	Shell-Thin	3576	COMB1U	Combination	Min	-0.47	-10.83	-0.45	-0.5384	-33.0824	2.0896	2.66	7.74
1657	1657	Shell-Thin	3617	COMB1U	Combination	Min	-0.76	-15.06	-0.88	-3.3203	-29.533	2.586	2.66	10.84
1657	1657	Shell-Thin	3651	COMB1U	Combination	Min	-0.78	-15.16	-0.62	-1.0068	-59.6849	0.7949	-4.69	10.84
1658	1658	Shell-Thin	3651	COMB1U	Combination	Max	0.62	6.51	0.3	-3.1975	-50.4773	3.1643	-0.36	30.09
1658	1658	Shell-Thin	3617	COMB1U	Combination	Max	2.37	5.96	0.12	13.5686	26.181	6.1453	16.33	30.09
1658	1658	Shell-Thin	3582	COMB1U	Combination	Max	1.81	5.54	0.32	7.0323	22.4583	6.4331	16.33	28.63
1658	1658	Shell-Thin	3619	COMB1U	Combination	Max	0.56	6.08	0.51	0.5969	-50.4165	3.7161	-0.36	28.63
1658	1658	Shell-Thin	3651	COMB1U	Combination	Min	-0.59	-15.14	-0.52	-3.5258	-60.194	1.3256	-6.54	11.37
1658	1658	Shell-Thin	3617	COMB1U	Combination	Min	-2.19	-14.56	-1.99	-1.5961	-28.9125	3.4957	7.02	11.37
1658	1658	Shell-Thin	3582	COMB1U	Combination	Min	-2.28	-17.43	-2.94	-5.7077	-29.7679	4.0541	7.02	11.64
1658	1658	Shell-Thin	3619	COMB1U	Combination	Min	-1.19	-18	-1.48	-2.8368	-61.8525	1.62	-6.54	11.64
									M+	**42.7532**	**101.2389**			
									M-	**-54.7384**	**-179.5612**			

TABLE: Element Forces - Area Shells (PLAT SLAB Kombinasi 2Ultimate)														
Area	Area Elem	Shell Type	Joint	Output Case	CaseType	Step Type	F11	F22	F12	M11	M22	M12	V13	V23
Text	Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
204	204	Shell-Thin	234	COMB2UG	Combination	Max	1.28	6.4	4	0.4194	-0.6312	-14.6085	4.49	-22.98
204	204	Shell-Thin	239	COMB2UG	Combination	Max	1.67	6.01	4.28	-2.0549	-63.1005	-9.588	-1.76	-22.98
204	204	Shell-Thin	240	COMB2UG	Combination	Max	1.75	5.8	5.37	0.0243	-67.3887	-10.6223	-1.76	-24.57
204	204	Shell-Thin	241	COMB2UG	Combination	Max	1.24	6.18	5.11	-0.6793	-0.8552	-15.6427	4.49	-24.57
204	204	Shell-Thin	234	COMB2UG	Combination	Min	-1.19	-5.93	-5.67	0.3101	-0.7438	-14.9361	3.97	-23.96
204	204	Shell-Thin	239	COMB2UG	Combination	Min	-0.66	-5.36	-5.79	-2.3315	-65.8357	-9.9585	-2.49	-23.96
204	204	Shell-Thin	240	COMB2UG	Combination	Min	-0.71	-4.94	-6.8	-0.2901	-70.3552	-10.9577	-2.49	-25.72
204	204	Shell-Thin	241	COMB2UG	Combination	Min	-1.1	-5.51	-6.7	-0.822	-0.928	-15.9353	3.97	-25.72
205	205	Shell-Thin	241	COMB2UG	Combination	Max	1.24	6.18	6.06	0.5754	-0.5757	-17.6193	5.61	-24.8
205	205	Shell-Thin	240	COMB2UG	Combination	Max	0.94	5.81	6.19	-2.2575	-67.8186	-10.7266	1.78	-24.8
205	205	Shell-Thin	242	COMB2UG	Combination	Max	1.03	5.38	7.12	-1.6611	-74.3158	-11.7529	1.78	-27.28
205	205	Shell-Thin	243	COMB2UG	Combination	Max	1.15	5.75	6.97	-0.7407	-1.0069	-18.6456	5.61	-27.28
205	205	Shell-Thin	241	COMB2UG	Combination	Min	-1.1	-5.51	-7.78	0.3956	-0.713	-17.9387	5.05	-26.07
205	205	Shell-Thin	240	COMB2UG	Combination	Min	-0.62	-5.11	-7.89	-2.9519	-70.914	-10.994	0.77	-26.07
205	205	Shell-Thin	242	COMB2UG	Combination	Min	-0.7	-4.65	-9.01	-2.0554	-77.1137	-12.0107	0.77	-28.35
205	205	Shell-Thin	243	COMB2UG	Combination	Min	-1.01	-5.06	-8.88	-0.8524	-1.0771	-18.9554	5.05	-28.35
206	206	Shell-Thin	243	COMB2UG	Combination	Max	1.15	5.75	7.82	0.356	-0.7974	-20.6856	5.51	-27.83
206	206	Shell-Thin	242	COMB2UG	Combination	Max	0.38	5.39	7.98	-3.8688	-74.738	-11.7211	9.97	-27.83
206	206	Shell-Thin	244	COMB2UG	Combination	Max	0.49	4.98	8.71	-6.9511	-84.1725	-12.6028	9.97	-31.6
206	206	Shell-Thin	245	COMB2UG	Combination	Max	1.07	5.34	8.56	-0.5651	-0.781	-21.5673	5.51	-31.6
206	206	Shell-Thin	243	COMB2UG	Combination	Min	-1.01	-5.06	-9.92	0.3063	-0.8356	-20.9676	5.34	-28.93
206	206	Shell-Thin	242	COMB2UG	Combination	Min	-0.75	-4.8	-9.83	-4.3879	-77.5995	-11.9731	9.4	-28.93
206	206	Shell-Thin	244	COMB2UG	Combination	Min	-0.81	-4.14	-10.94	-7.3987	-87.0302	-12.8392	9.4	-32.72
206	206	Shell-Thin	245	COMB2UG	Combination	Min	-0.88	-4.39	-11.04	-0.6074	-0.8051	-21.8337	5.34	-32.72
207	207	Shell-Thin	245	COMB2UG	Combination	Max	1.07	5.34	9.27	0.161	-0.6275	-23.1055	5.04	-32.67
207	207	Shell-Thin	244	COMB2UG	Combination	Max	0.36	5.05	9.51	-8.4327	-84.4485	-12.5501	22.99	-32.67
207	207	Shell-Thin	246	COMB2UG	Combination	Max	0.54	5.08	10.19	-17.6844	-96.9125	-12.9815	22.99	-37.78
207	207	Shell-Thin	247	COMB2UG	Combination	Max	1.07	5.37	9.94	-0.2029	-0.319	-23.5369	5.04	-37.78
207	207	Shell-Thin	245	COMB2UG	Combination	Min	-0.88	-4.39	-12.03	0.1011	-0.6717	-23.3762	4.86	-33.81
207	207	Shell-Thin	244	COMB2UG	Combination	Min	-0.57	-4.18	-11.67	-8.8764	-87.3461	-12.7458	22.57	-33.81
207	207	Shell-Thin	246	COMB2UG	Combination	Min	-0.56	-3.24	-12.65	-18.1691	-99.6956	-13.1605	22.57	-38.87
207	207	Shell-Thin	247	COMB2UG	Combination	Min	-0.69	-3.45	-13.01	-0.2504	-0.3479	-23.791	4.86	-38.87
241	241	Shell-Thin	281	COMB2UG	Combination	Max	0.93	4.62	18.18	-45.0526	-151.5033	8.5308	-2.79	-63.16
241	241	Shell-Thin	348	COMB2UG	Combination	Max	0.92	4.62	18.15	0.7949	0.5212	15.467	-5.19	-63.16
241	241	Shell-Thin	349	COMB2UG	Combination	Max	0.86	4.31	18.53	-0.4594	0.366	14.2772	-5.19	-65.8
241	241	Shell-Thin	285	COMB2UG	Combination	Max	1	4.31	18.56	-45.288	-158.2849	7.3409	-2.79	-65.8

241	241	Shell-Thin	281	COMB2UG	Combination	Min	0.73	0.00224	-16.72	-45.6613	-153.9592	8.4072	-3.38	-64.13
241	241	Shell-Thin	348	COMB2UG	Combination	Min	-0.0312	-0.16	-16.98	0.7503	0.4871	15.324	-5.36	-64.13
241	241	Shell-Thin	349	COMB2UG	Combination	Min	0.08886	0.44	-17.32	-0.5012	0.3429	14.1362	-5.36	-66.79
241	241	Shell-Thin	285	COMB2UG	Combination	Min	0.73	0.6	-17.06	-45.7441	-160.736	7.2193	-3.38	-66.79
242	242	Shell-Thin	285	COMB2UG	Combination	Max	0.64	4.26	18.5	-46.8682	-158.5876	6.6818	-3.67	-66.12
242	242	Shell-Thin	349	COMB2UG	Combination	Max	0.86	4.31	18.81	0.3451	0.5339	12.5369	-2.68	-66.12
242	242	Shell-Thin	350	COMB2UG	Combination	Max	0.77	3.87	19.17	0.1255	0.5285	11.279	-2.68	-68.46
242	242	Shell-Thin	287	COMB2UG	Combination	Max	0.67	3.82	18.87	-47.6484	-164.4227	5.4239	-3.67	-68.46
242	242	Shell-Thin	285	COMB2UG	Combination	Min	0.41	0.51	-17.63	-47.3727	-161.0751	6.5854	-4.06	-67.12
242	242	Shell-Thin	349	COMB2UG	Combination	Min	0.08886	0.44	-17.65	0.2922	0.4946	12.3825	-2.85	-67.12
242	242	Shell-Thin	350	COMB2UG	Combination	Min	0.16	0.79	-17.84	0.0759	0.4932	11.1304	-2.85	-69.4
242	242	Shell-Thin	287	COMB2UG	Combination	Min	0.36	0.86	-17.82	-48.128	-166.8086	5.3333	-4.06	-69.4
243	243	Shell-Thin	287	COMB2UG	Combination	Max	1.33	3.98	18.73	-46.9483	-164.2678	4.8199	-6.31	-68.33
243	243	Shell-Thin	350	COMB2UG	Combination	Max	0.77	3.87	19.41	-0.2268	0.4538	9.4735	-0.099	-68.33
243	243	Shell-Thin	351	COMB2UG	Combination	Max	0.68	3.42	19.7	0.6034	0.6164	8.2349	-0.099	-70.39
243	243	Shell-Thin	323	COMB2UG	Combination	Max	1.38	3.53	19.02	-49.2738	-169.2413	3.5827	-6.31	-70.39
243	243	Shell-Thin	287	COMB2UG	Combination	Min	1.16	1	-18.34	-47.4255	-166.683	4.7298	-6.88	-69.3
243	243	Shell-Thin	350	COMB2UG	Combination	Min	0.16	0.79	-18.06	-0.2713	0.428	9.3148	-0.27	-69.3
243	243	Shell-Thin	351	COMB2UG	Combination	Min	0.22	1.11	-18.17	0.5616	0.5845	8.0794	-0.27	-71.28
243	243	Shell-Thin	323	COMB2UG	Combination	Min	1.08	1.32	-18.45	-49.8462	-171.5102	3.4929	-6.88	-71.28
244	244	Shell-Thin	323	COMB2UG	Combination	Max	2.68	3.81	19	-47.0545	-168.7789	3.0311	-9.77	-70.16
244	244	Shell-Thin	351	COMB2UG	Combination	Max	0.68	3.42	19.83	-0.5071	0.4008	6.356	1.78	-70.16
244	244	Shell-Thin	352	COMB2UG	Combination	Max	0.68	3.39	19.9	0.9421	0.9889	5.0955	1.78	-72.07
244	244	Shell-Thin	325	COMB2UG	Combination	Max	2.84	3.78	19.07	-51.3703	-173.0863	1.7665	-9.77	-72.07
244	244	Shell-Thin	323	COMB2UG	Combination	Min	2.58	1.59	-18.73	-47.5111	-171.0618	2.9504	-10.76	-71.06
244	244	Shell-Thin	351	COMB2UG	Combination	Min	0.22	1.11	-18.33	-0.6074	0.3442	6.2097	1.29	-71.06
244	244	Shell-Thin	352	COMB2UG	Combination	Min	0.41	2.06	-18.49	0.7952	0.8767	4.9499	1.29	-73.06
244	244	Shell-Thin	325	COMB2UG	Combination	Min	2.6	2.54	-18.88	-52.1444	-175.4123	1.6948	-10.76	-73.06
245	245	Shell-Thin	325	COMB2UG	Combination	Max	3.92	4.01	19.36	-49.1192	-172.627	1.4553	-7.64	-71.98
245	245	Shell-Thin	352	COMB2UG	Combination	Max	0.68	3.39	19.81	-0.2783	0.7184	2.8016	1.42	-71.98
245	245	Shell-Thin	238	COMB2UG	Combination	Max	0.69	3.46	19.36	0.5576	1.3779	1.4562	1.42	-73.28
245	245	Shell-Thin	327	COMB2UG	Combination	Max	4.1	4.11	18.94	-52.7812	-175.2099	0.1182	-7.64	-73.28
245	245	Shell-Thin	325	COMB2UG	Combination	Min	3.75	2.75	-18.79	-49.5513	-174.9028	1.3497	-8.32	-72.88
245	245	Shell-Thin	352	COMB2UG	Combination	Min	0.41	2.06	-18.68	-0.4143	0.6613	2.6481	0.91	-72.88
245	245	Shell-Thin	238	COMB2UG	Combination	Min	0.63	3.16	-19.08	0.4479	1.2397	1.3152	0.91	-74.04
245	**245**	**Shell-Thin**	**327**	**COMB2UG**	**Combination**	**Min**	**3.81**	**3.84**	**-19.22**	**-53.3401**	**-177.2461**	**0.0084**	**-8.32**	**-74.04**
246	246	Shell-Thin	226	COMB2UG	Combination	Max	1.89	-4.9	20.05	32.4956	75.7761	2.7953	-33.48	103.57
246	246	Shell-Thin	327	COMB2UG	Combination	Max	2.13	-4.83	18.71	-52.3418	-173.0114	-0.0752	8.18	103.57
246	246	Shell-Thin	354	COMB2UG	Combination	Max	2.6	-1.97	19.53	-49.187	-172.9672	1.9144	8.18	103.51
246	246	Shell-Thin	356	COMB2UG	Combination	Max	2.39	-2.05	20.87	14.4612	75.699	4.8331	-33.48	103.51
246	246	Shell-Thin	226	COMB2UG	Combination	Min	1.61	-7.61	-17.86	30.5128	71.584	2.6317	-35.93	102.69
246	246	Shell-Thin	327	COMB2UG	Combination	Min	1.71	-7.6	-18.44	-52.9804	-175.4463	-0.1749	7.23	102.69
246	246	Shell-Thin	354	COMB2UG	Combination	Min	2	-6.64	-17.82	-49.5655	-174.9756	1.8424	7.23	102.17

246	246	Shell-Thin	356	COMB2UG	Combination	Min	1.87	-6.62	-17.25	12.7033	70.7389	4.6008	-35.93	102.17
1615	1615	Shell-Thin	3603	COMB2UG	Combination	Max	3.3	-3.44	8.74	16.2939	29.2142	-14.0021	26.69	59.29
1615	1615	Shell-Thin	3633	COMB2UG	Combination	Max	-1.47	-3.4	6.07	-30.6713	-111.7354	-6.7139	-1.09	59.29
1615	1615	Shell-Thin	3634	COMB2UG	Combination	Max	-1.67	-6.5	5.94	-30.7636	-119.4119	-5.214	-1.09	64.26
1615	1615	Shell-Thin	3584	COMB2UG	Combination	Max	2.86	-6.51	8.47	24.0088	29.9349	-12.1714	26.69	64.26
1615	1615	Shell-Thin	3603	COMB2UG	Combination	Min	-2.68	-12.62	-9.31	5.4506	10.6623	-16.0416	-19.93	53.45
1615	1615	Shell-Thin	3633	COMB2UG	Combination	Min	-2.72	-13.62	-7.16	-32.5296	-114.9017	-7.1629	-21.39	53.45
1615	1615	Shell-Thin	3634	COMB2UG	Combination	Min	-3.59	-15.85	-5.2	-40.4438	-124.4896	-5.5743	-21.39	55.97
1615	1615	Shell-Thin	3584	COMB2UG	Combination	Min	-3.31	-14.88	-7.21	4.3489	11.4142	-14.7838	-19.93	55.97
1616	1616	Shell-Thin	3627	COMB2UG	Combination	Max	2.74	7.91	1.47	-4.0084	-55.5544	3.1754	20.82	-29.4
1616	1616	Shell-Thin	3399	COMB2UG	Combination	Max	-1.08	7.29	2.09	26.8482	38.3026	5.2992	-14.77	-29.4
1616	1616	Shell-Thin	3658	COMB2UG	Combination	Max	-1.17	6.85	1.81	4.9081	37.2458	5.4851	-14.77	-31.46
1616	1616	Shell-Thin	3628	COMB2UG	Combination	Max	2.42	7.46	1.17	3.3836	-58.7098	3.5888	20.82	-31.46
1616	1616	Shell-Thin	3627	COMB2UG	Combination	Min	-1.44	-9.57	-1.34	-7.4519	-59.1999	2.2562	-0.51	-38.72
1616	1616	Shell-Thin	3399	COMB2UG	Combination	Min	-3.97	-10.22	-1.39	3.4616	23.2348	1.8969	-45.15	-38.72
1616	1616	Shell-Thin	3658	COMB2UG	Combination	Min	-4.25	-11.59	-1.77	-4.2088	24.9273	2.896	-45.15	-39.36
1616	1616	Shell-Thin	3628	COMB2UG	Combination	Min	-1.48	-10.93	-1.71	-4.3366	-62.194	3.0277	-0.51	-39.36
1617	1617	Shell-Thin	3628	COMB2UG	Combination	Max	2.32	7.49	1.53	-4.4994	-58.8896	4.5628	16.25	-30.76
1617	1617	Shell-Thin	3658	COMB2UG	Combination	Max	-3.07	6.42	1.84	21.6643	40.3173	5.6742	-17.53	-30.76
1617	1617	Shell-Thin	3659	COMB2UG	Combination	Max	-3.57	4.99	2.57	-1.4251	40.9651	7.2239	-17.53	-33.95
1617	1617	Shell-Thin	3629	COMB2UG	Combination	Max	1.91	6.05	2.55	1.9973	-64.6692	5.3554	16.25	-33.95
1617	1617	Shell-Thin	3628	COMB2UG	Combination	Min	-2.03	-11.09	-1.7	-6.5359	-64.0307	3.1327	-1.92	-40.23
1617	1617	Shell-Thin	3658	COMB2UG	Combination	Min	-5.13	-11.72	-1.87	-1.3919	25.7704	5.0874	-46.64	-40.23
1617	1617	Shell-Thin	3659	COMB2UG	Combination	Min	-5.08	-12.58	-1.93	-9.7782	27.972	5.825	-46.64	-42.39
1617	1617	Shell-Thin	3629	COMB2UG	Combination	Min	-2.09	-11.95	-2.04	-5.2535	-68.782	4.6274	-1.92	-42.39
1618	1618	Shell-Thin	3629	COMB2UG	Combination	Max	1.11	5.89	2.8	-5.4802	-64.9943	6.2415	4.72	-34.31
1618	**1618**	**Shell-Thin**	**3659**	**COMB2UG**	**Combination**	**Max**	**-3.45**	**4.88**	**2.81**	**11.4612**	**43.5247**	**9.6841**	**-8.22**	**-34.31**
1618	1618	Shell-Thin	3660	COMB2UG	Combination	Max	-3.83	3.29	3.08	-5.645	44.3263	11.3529	-8.22	-39.63
1618	1618	Shell-Thin	3630	COMB2UG	Combination	Max	0.78	4.3	3.15	-2.5888	-73.9619	7.8403	4.72	-39.63
1618	1618	Shell-Thin	3629	COMB2UG	Combination	Min	-2.53	-12.04	-2.69	-6.8373	-70.2692	4.8301	-8.46	-42.79
1618	1618	Shell-Thin	3659	COMB2UG	Combination	Min	-6.66	-12.76	-2.13	-5.635	28.8184	8.0099	-35.5	-42.79
1618	1618	Shell-Thin	3660	COMB2UG	Combination	Min	-6.52	-12.37	-2.45	-9.0641	33.1352	9.2942	-35.5	-45.79
1618	1618	Shell-Thin	3630	COMB2UG	Combination	Min	-2.44	-11.65	-3.09	-10.2745	-76.9909	6.1844	-8.46	-45.79
1619	1619	Shell-Thin	3630	COMB2UG	Combination	Max	-0.16	4.12	3.23	-8.4989	-73.9896	8.6076	-11.13	-40.56
1619	1619	Shell-Thin	3660	COMB2UG	Combination	Max	-3.5	3.31	2.9	4.2522	46.2828	13.6371	8.15	-40.56
1619	1619	Shell-Thin	3661	COMB2UG	Combination	Max	-3.53	3.2	3.5	-1.9403	50.1315	14.8355	8.15	-48.48
1619	1619	Shell-Thin	3631	COMB2UG	Combination	Max	-0.17	4.02	3.85	-13.2165	-86.2667	9.7813	-11.13	-48.48
1619	1619	Shell-Thin	3630	COMB2UG	Combination	Min	-2.39	-11.65	-3.62	-10.4168	-78.1737	7.0995	-22.29	-47.26
1619	1619	Shell-Thin	3660	COMB2UG	Combination	Min	-7.25	-12.48	-3.56	-8.2221	33.3265	11.5027	-18.35	-47.26
1619	1619	Shell-Thin	3661	COMB2UG	Combination	Min	-6.88	-10.68	-3.62	-5.242	40.5073	12.726	-18.35	-53.23
1619	1619	Shell-Thin	3631	COMB2UG	Combination	Min	-2.04	-9.85	-3.7	-20.524	-89.5847	8.3476	-22.29	-53.23
1627	1627	Shell-Thin	3607	COMB2UG	Combination	Max	3.27	0.37	7.72	-15.1263	37.4554	-7.3451	47.86	73.66
1627	1627	Shell-Thin	3638	COMB2UG	Combination	Max	-1.07	-0.66	7.34	-40.8239	-146.7558	-3.8903	-4.86	73.66

1627	1627	Shell-Thin	3639	COMB2UG	Combination	Max	-1.71	-2.96	6.54	-44.5795	-152.5765	-4.2277	-4.86	79.3
1627	1627	Shell-Thin	3608	COMB2UG	Combination	Max	2.79	-1.92	6.93	5.7654	44.1552	-7.7293	47.86	79.3
1627	1627	Shell-Thin	3607	COMB2UG	Combination	Min	2.68	-3.24	-11.95	-21.141	23.4721	-9.0089	16.73	68.54
1627	1627	Shell-Thin	3638	COMB2UG	Combination	Min	-2.26	-4.06	-9.7	-43.3811	-149.8986	-4.6903	-15.89	68.54
1627	1627	Shell-Thin	3639	COMB2UG	Combination	Min	-2.83	-7.83	-10.65	-48.4438	-157.1358	-4.737	-15.89	72.36
1627	1627	Shell-Thin	3608	COMB2UG	Combination	Min	1.95	-7.02	-12.89	-8.1851	27.3769	-9.0089	16.73	72.36
1628	1628	Shell-Thin	3608	COMB2UG	Combination	Max	2.67	-1.95	6.34	-9.7013	40.9538	-8.4058	71.41	80
1628	1628	Shell-Thin	3639	COMB2UG	Combination	Max	-1.11	-2.92	6.29	-40.4941	-152.1163	-3.2955	-11.28	80
1628	1628	Shell-Thin	3640	COMB2UG	Combination	Max	-2.11	-7.18	6.23	-47.2144	-157.9627	-2.0363	-11.28	84.28
1628	1628	Shell-Thin	3609	COMB2UG	Combination	Max	1.56	-6.21	6.28	26.5085	45.8903	-7.9479	71.41	84.28
1628	1628	Shell-Thin	3608	COMB2UG	Combination	Min	0.51	-7.3	-13.56	-12.9259	26.5368	-9.4597	36.82	73.44
1628	1628	Shell-Thin	3639	COMB2UG	Combination	Min	-2.49	-7.68	-10.91	-42.8672	-155.6636	-4.1015	-27.32	73.44
1628	1628	Shell-Thin	3640	COMB2UG	Combination	Min	-3.58	-13.87	-10.81	-53.3526	-160.8429	-3.6609	-27.32	77.08
1628	1628	Shell-Thin	3609	COMB2UG	Combination	Min	-0.48	-13.5	-13.46	7.0724	30.3813	-8.2178	36.82	77.08
1629	1629	Shell-Thin	3609	COMB2UG	Combination	Max	1.89	-6.34	7.62	11.7849	45.7523	-4.3381	57.36	85.52
1629	1629	Shell-Thin	3640	COMB2UG	Combination	Max	-2.53	-7.05	6.55	-43.6354	-156.8038	-1.8539	-5.9	85.52
1629	1629	Shell-Thin	3641	COMB2UG	Combination	Max	-2.79	-10.96	6.67	-49.0159	-157.4354	0.7142	-5.9	86.63
1629	1629	Shell-Thin	3585	COMB2UG	Combination	Max	0.76	-10.39	7.7	36.5148	44.8524	-1.8166	57.36	86.63
1629	1629	Shell-Thin	3609	COMB2UG	Combination	Min	-0.15	-13.23	-13.13	3.379	26.8359	-7.0407	17.67	79.34
1629	1629	Shell-Thin	3640	COMB2UG	Combination	Min	-2.68	-13.91	-9.99	-47.5875	-160.1329	-1.8994	-25.37	79.34
1629	1629	Shell-Thin	3641	COMB2UG	Combination	Min	-3.79	-16.89	-7.41	-56.3153	-162.0356	0.0958	-25.37	79.33
1629	1629	Shell-Thin	3585	COMB2UG	Combination	Min	-0.4	-16.08	-10.51	17.6918	27.9396	-4.999	17.67	79.33
1630	1630	Shell-Thin	3634	COMB2UG	Combination	Max	0.6	5.85	5.97	-37.6247	-121.8075	7.714	22.18	-74.49
1630	1630	Shell-Thin	3400	COMB2UG	Combination	Max	-2.59	5.31	7.43	40.04	70.1639	9.8874	-31.09	-74.49
1630	1630	Shell-Thin	3664	COMB2UG	Combination	Max	-2.76	4.13	7.23	11.0913	72.9998	8.1406	-31.09	-78.6
1630	1630	Shell-Thin	3635	COMB2UG	Combination	Max	0.18	4.62	5.77	-30.9614	-127.73	6.1389	22.18	-78.6
1630	1630	Shell-Thin	3634	COMB2UG	Combination	Min	-0.77	-1.44	-4.78	-42.8747	-124.7123	7.4316	2.65	-81.58
1630	1630	Shell-Thin	3400	COMB2UG	Combination	Min	-3.88	-2.17	-4.61	23.7641	58.0174	7.1871	-63.65	-81.58
1630	1630	Shell-Thin	3664	COMB2UG	Combination	Min	-4.48	-4.81	-4.78	5.7313	60.1466	5.8012	-63.65	-84.92
1630	1630	Shell-Thin	3635	COMB2UG	Combination	Min	-1.11	-4.04	-4.94	-36.7359	-132.4418	5.8739	2.65	-84.92
1631	1631	Shell-Thin	3635	COMB2UG	Combination	Max	0.18	4.68	6.66	-38.5785	-129.7241	6.2643	15.05	-77.95
1631	1631	Shell-Thin	3664	COMB2UG	Combination	Max	-5.11	3.5	7.23	29.8828	74.7493	5.3364	-40.07	-77.95
1631	1631	Shell-Thin	3665	COMB2UG	Combination	Max	-5.62	1.09	8.5	-3.186	75.9722	5.0944	-40.07	-81.5
1631	1631	Shell-Thin	3636	COMB2UG	Combination	Max	-0.53	2.26	7.96	-35.7386	-136.2193	5.3255	15.05	-81.5
1631	1631	Shell-Thin	3635	COMB2UG	Combination	Min	-1.68	-4.2	-4.93	-43.606	-133.3451	4.9076	-0.4	-85.01
1631	1631	Shell-Thin	3664	COMB2UG	Combination	Min	-6.2	-4.99	-4.57	14.1836	63.8458	5.1327	-65.83	-85.01
1631	1631	Shell-Thin	3665	COMB2UG	Combination	Min	-6.68	-7.54	-4.87	-5.8396	66.2595	4.1919	-65.83	-87.76
1631	1631	Shell-Thin	3636	COMB2UG	Combination	Min	-1.95	-6.76	-5.25	-39.2589	-138.9932	4.6635	-0.4	-87.76
1632	1632	Shell-Thin	3636	COMB2UG	Combination	Max	-1.1	2.17	7.73	-42.4138	-136.9622	4.4454	11.13	-81.39
1632	1632	Shell-Thin	3665	COMB2UG	Combination	Max	-7.52	0.72	8.11	12.4977	79.0785	5.9293	-22.45	-81.39
1632	1632	Shell-Thin	3666	COMB2UG	Combination	Max	-7.7	-1.4	7.77	-7.8351	77.9959	6.2258	-22.45	-83.97
1632	1632	Shell-Thin	3637	COMB2UG	Combination	Max	-1.48	0.05087	7.39	-38.998	-141.5723	4.6922	11.13	-83.97
1632	1632	Shell-Thin	3636	COMB2UG	Combination	Min	-2.3	-6.85	-5.9	-45.2277	-140.7791	3.732	0.27	-87.85

1632	1632	Shell-Thin	3665	COMB2UG	Combination	Min	-8.53	-7.93	-5.33	1.9541	67.8487	4.8861	-44.61	-87.85
1632	1632	Shell-Thin	3666	COMB2UG	Combination	Min	-8.94	-8.72	-5.72	-10.7148	69.2633	4.8654	-44.61	-88.69
1632	1632	Shell-Thin	3637	COMB2UG	Combination	Min	-2.5	-7.64	-6.28	-42.4158	-144.3871	3.761	0.27	-88.69
1633	1633	Shell-Thin	3637	COMB2UG	Combination	Max	-1.85	-0.0163	6.75	-42.5246	-142.031	4.6541	3.44	-83.94
1633	1633	Shell-Thin	3666	COMB2UG	Combination	Max	-8.4	-1.46	6.92	-0.2368	79.7656	7.2436	8.26	-83.94
1633	1633	Shell-Thin	3667	COMB2UG	Combination	Max	-8.47	-2.27	7.21	-1.2902	82.3649	7.6432	8.26	-87.11
1633	1633	Shell-Thin	3638	COMB2UG	Combination	Max	-1.71	-0.82	7.05	-42.2121	-146.9371	5.0334	3.44	-87.11
1633	1633	Shell-Thin	3637	COMB2UG	Combination	Min	-2.42	-7.63	-7.05	-44.8692	-145.1243	3.799	-5.84	-89.09
1633	1633	Shell-Thin	3666	COMB2UG	Combination	Min	-9.64	-8.93	-6.98	-7.075	69.7412	5.9222	-12.63	-89.09
1633	1633	Shell-Thin	3667	COMB2UG	Combination	Min	-9.56	-8.08	-6.97	-7.2647	72.7773	6.3015	-12.63	-92.35
1633	1633	Shell-Thin	3638	COMB2UG	Combination	Min	-2.55	-6.77	-7.04	-45.4428	-150.6766	4.1986	-5.84	-92.35
1634	1634	Shell-Thin	3638	COMB2UG	Combination	Max	-1.31	-0.83	6.4	-40.8837	-147.0616	5.1114	-4.66	-87.46
1634	1634	Shell-Thin	3667	COMB2UG	Combination	Max	-7.21	-1.98	6.13	-5.4895	81.4101	8.6609	40.82	-87.46
1634	1634	Shell-Thin	3668	COMB2UG	Combination	Max	-6.98	-1.28	6.1	13.0745	87.9668	8.6249	40.82	-91.54
1634	1634	Shell-Thin	3639	COMB2UG	Combination	Max	-0.84	-0.0580	6.37	-44.6374	-152.8658	5.1238	-4.66	-91.54
1634	1634	Shell-Thin	3638	COMB2UG	Combination	Min	-2.57	-6.69	-7.77	-43.3774	-149.8734	4.2156	-15.71	-92.29
1634	1634	Shell-Thin	3667	COMB2UG	Combination	Min	-8.93	-7.99	-7.92	-9.1763	72.5099	7.311	18.83	-92.29
1634	1634	Shell-Thin	3668	COMB2UG	Combination	Min	-8.47	-5.31	-8.44	3.4143	77.2881	7.5992	18.83	-98.05
1634	1634	Shell-Thin	3639	COMB2UG	Combination	Min	-2.37	-4.08	-8.3	-48.4808	-157.3208	4.4554	-15.71	-98.05
1635	1635	Shell-Thin	3639	COMB2UG	Combination	Max	-0.28	0.0193	6.12	-40.5549	-152.4054	4.1335	-11.11	-92.51
1635	1635	Shell-Thin	3668	COMB2UG	Combination	Max	-5.08	-0.79	6.02	0.2065	85.4147	9.2163	63.98	-92.51
1635	1635	Shell-Thin	3669	COMB2UG	Combination	Max	-4.41	1.31	6.09	33.2842	89.6655	7.9708	63.98	-95.73
1635	1635	Shell-Thin	3640	COMB2UG	Combination	Max	0.64	2.45	6.18	-47.0316	-157.049	3.6102	-11.11	-95.73
1635	1635	Shell-Thin	3639	COMB2UG	Combination	Min	-1.99	-3.97	-8.57	-42.9013	-155.8487	3.4555	-26.87	-98.92
1635	1635	Shell-Thin	3668	COMB2UG	Combination	Min	-6.81	-5.09	-9.01	-1.7468	76.2344	8.3532	38.74	-98.92
1635	1635	Shell-Thin	3669	COMB2UG	Combination	Min	-6.17	-0.63	-7.9	18.535	79.6555	7.8205	38.74	-102.76
1635	1635	Shell-Thin	3640	COMB2UG	Combination	Min	-1.6	0.15	-7.44	-53.4203	-161.1814	2.2005	-26.87	-102.76
1636	1636	Shell-Thin	3640	COMB2UG	Combination	Max	0.46	2.41	6.52	-43.4975	-156.1144	2.0996	-6.03	-97.79
1636	1636	Shell-Thin	3669	COMB2UG	Combination	Max	-3.08	1.77	6.87	19.6802	89.4911	6.7259	52.9	-97.79
1636	**1636**	**Shell-Thin**	**3401**	**COMB2UG**	**Combination**	**Max**	**-2.7**	**3.1**	**6.81**	**43.5264**	**89.6911**	**4.6861**	**52.9**	**-98.73**
1636	1636	Shell-Thin	3641	COMB2UG	Combination	Max	1.01	3.8	6.47	-49.2606	-158.6588	-0.0216	-6.03	-98.73
1636	1636	Shell-Thin	3640	COMB2UG	Combination	Min	-0.93	0.28	-6.63	-47.6104	-160.2472	1.904	-25.67	-103.93
1636	1636	Shell-Thin	3669	COMB2UG	Combination	Min	-4.65	-0.53	-7.88	13.7387	76.1499	4.1764	21.86	-103.93
1636	1636	Shell-Thin	3401	COMB2UG	Combination	Min	-4.1	2.78	-8.47	28.6522	78.5259	1.7141	21.86	-105.76
1636	**1636**	**Shell-Thin**	**3641**	**COMB2UG**	**Combination**	**Min**	**-0.56**	**3.53**	**-7.23**	**-56.3163**	**-162.0405**	**-0.4769**	**-25.67**	**-105.76**
1637	1637	Shell-Thin	3585	COMB2UG	Combination	Max	0.76	-10.39	10.53	36.4792	44.8454	5.0206	-17.47	86.62
1637	1637	Shell-Thin	3641	COMB2UG	Combination	Max	-2.8	-10.96	7.43	-49.0024	-157.4331	-0.1001	25.37	86.62
1637	1637	Shell-Thin	3642	COMB2UG	Combination	Max	-2.54	-7.05	10	-43.6363	-156.7967	1.8927	25.37	85.53
1637	1637	Shell-Thin	3610	COMB2UG	Combination	Max	1.89	-6.34	13.14	11.8438	45.7853	7.0624	-17.47	85.53
1637	1637	Shell-Thin	3585	COMB2UG	Combination	Min	-0.41	-16.08	-7.68	17.6558	27.9323	1.8379	-57.16	79.33
1637	1637	Shell-Thin	3641	COMB2UG	Combination	Min	-3.79	-16.9	-6.65	-56.308	-162.0337	-0.7213	5.89	79.33
1637	1637	Shell-Thin	3642	COMB2UG	Combination	Min	-2.67	-13.91	-6.54	-47.5778	-160.1276	1.8496	5.89	79.35
1637	1637	Shell-Thin	3610	COMB2UG	Combination	Min	-0.16	-13.22	-7.61	3.4382	26.8679	4.3598	-57.16	79.35

1638	1638	Shell-Thin	3610	COMB2UG	Combination	Max	1.55	-6.21	13.48	26.4975	45.9093	8.2408	-36.62	84.29
1638	1638	Shell-Thin	3642	COMB2UG	Combination	Max	-2.13	-7.18	10.83	-47.1894	-157.9518	3.6546	27.31	84.29
1638	1638	Shell-Thin	3643	COMB2UG	Combination	Max	-1.12	-2.91	10.92	-40.4823	-152.1001	4.096	27.31	80.02
1638	1638	Shell-Thin	3611	COMB2UG	Combination	Max	2.65	-1.94	13.57	-9.6172	41.0116	9.4841	-36.62	80.02
1638	1638	Shell-Thin	3610	COMB2UG	Combination	Min	-0.5	-13.49	-6.27	7.0614	30.3994	7.9682	-71.21	77.08
1638	1638	Shell-Thin	3642	COMB2UG	Combination	Min	-3.57	-13.87	-6.22	-53.3291	-160.8334	2.0338	11.28	77.08
1638	1638	Shell-Thin	3643	COMB2UG	Combination	Min	-2.49	-7.67	-6.27	-42.8401	-155.6504	3.2937	11.28	73.46
1638	1638	Shell-Thin	3611	COMB2UG	Combination	Min	0.49	-7.29	-6.33	-12.8415	26.5934	8.4263	-71.21	73.46
1639	1639	Shell-Thin	3611	COMB2UG	Combination	Max	2.76	-1.91	12.9	5.7807	44.199	9.0318	-16.53	79.32
1639	1639	Shell-Thin	3643	COMB2UG	Combination	Max	-1.73	-2.95	10.66	-44.544	-152.5568	4.7349	15.89	79.32
1639	1639	Shell-Thin	3644	COMB2UG	Combination	Max	-1.09	-0.65	9.72	-40.7996	-146.7308	4.6906	15.89	73.68
1639	1639	Shell-Thin	3612	COMB2UG	Combination	Max	3.24	0.38	11.97	-15.0149	37.539	9.0332	-16.53	73.68
1639	1639	Shell-Thin	3611	COMB2UG	Combination	Min	1.92	-7.01	-6.91	-8.1694	27.42	7.7533	-47.65	72.37
1639	1639	Shell-Thin	3643	COMB2UG	Combination	Min	-2.83	-7.82	-6.53	-48.4051	-157.1191	4.2254	4.87	72.37
1639	1639	Shell-Thin	3644	COMB2UG	Combination	Min	-2.25	-4.06	-7.33	-43.336	-149.8795	3.8888	4.87	68.57
1639	1639	Shell-Thin	3612	COMB2UG	Combination	Min	2.66	-3.23	-7.72	-21.0296	23.5544	7.371	-47.65	68.57
1640	1640	Shell-Thin	3612	COMB2UG	Combination	Max	4.99	0.23	9.97	-9.6228	39.3047	8.1606	17.61	73.85
1640	1640	Shell-Thin	3644	COMB2UG	Combination	Max	-1.49	-0.62	8.87	-42.107	-146.6035	4.3657	6.32	73.85
1640	1640	Shell-Thin	3645	COMB2UG	Combination	Max	-1.38	-0.64	7.96	-42.4283	-141.7002	3.9088	6.32	70.6
1640	1640	Shell-Thin	3613	COMB2UG	Combination	Max	5.14	0.3	9.05	-8.7834	36.7434	7.6705	17.61	70.6
1640	1640	Shell-Thin	3612	COMB2UG	Combination	Min	1.96	-2.87	-9.19	-19.2019	23.2326	6.4016	-12.14	68.13
1640	1640	Shell-Thin	3644	COMB2UG	Combination	Min	-2.24	-4.15	-7.86	-45.395	-150.6801	3.575	-3.16	68.13
1640	1640	Shell-Thin	3645	COMB2UG	Combination	Min	-2.22	-3.56	-8.77	-44.8176	-145.1678	3.0911	-3.16	65.73
1640	1640	Shell-Thin	3613	COMB2UG	Combination	Min	1.94	-2.36	-10.09	-18.6274	22.066	5.951	-12.14	65.73
1641	1641	Shell-Thin	3613	COMB2UG	Combination	Max	6.14	0.17	7.3	-17.1192	35.7724	6.7084	53.23	70.12
1641	1641	Shell-Thin	3645	COMB2UG	Combination	Max	-1.31	-0.59	7.19	-38.899	-141.2735	3.6572	0.28	70.12
1641	1641	Shell-Thin	3646	COMB2UG	Combination	Max	-1.75	-2.5	6.1	-42.3103	-136.6624	3.3	0.28	69.81
1641	1641	Shell-Thin	3614	COMB2UG	Combination	Max	5.83	-1.43	6.21	5.3185	37.1944	6.3055	53.23	69.81
1641	1641	Shell-Thin	3613	COMB2UG	Combination	Min	0.27	-2.36	-12	-23.003	20.4948	4.9454	21.75	65.7
1641	1641	Shell-Thin	3645	COMB2UG	Combination	Min	-2.01	-3.55	-9.4	-42.3585	-144.3967	2.8181	-10.54	65.7
1641	1641	Shell-Thin	3646	COMB2UG	Combination	Min	-2.49	-6.21	-10.24	-45.115	-140.6252	2.7283	-10.54	63.71
1641	1641	Shell-Thin	3614	COMB2UG	Combination	Min	-0.33	-5.34	-12.84	-8.9853	21.7167	4.9013	21.75	63.71
1642	1642	Shell-Thin	3614	COMB2UG	Combination	Max	5.83	-1.55	5.24	-13.5925	34.6405	5.4312	76.65	69.47
1642	1642	Shell-Thin	3646	COMB2UG	Combination	Max	-1.19	-2.45	5.44	-35.6549	-135.9188	4.0756	0.98	69.47
1642	1642	Shell-Thin	3647	COMB2UG	Combination	Max	-1.95	-5.41	5.06	-38.6953	-130.6178	4.9714	0.98	67.84
1642	1642	Shell-Thin	3615	COMB2UG	Combination	Max	4.95	-4.65	4.85	23.8187	35.4519	5.5688	76.65	67.84
1642	1642	Shell-Thin	3614	COMB2UG	Combination	Min	-2.09	-5.56	-13.57	-16.9815	18.8892	4.3018	40.93	63.86
1642	1642	Shell-Thin	3646	COMB2UG	Combination	Min	-2.14	-6.08	-10.46	-39.167	-138.8481	3.3498	-14.64	63.86
1642	1642	Shell-Thin	3647	COMB2UG	Combination	Min	-3.01	-11.26	-10.43	-43.4151	-132.9473	3.4863	-14.64	61.49
1642	1642	Shell-Thin	3615	COMB2UG	Combination	Min	-2.85	-10.61	-13.53	3.9321	19.2975	5.1965	40.93	61.49
1643	1643	Shell-Thin	3615	COMB2UG	Combination	Max	4.87	-4.84	5.52	3.225	34.6642	8.1449	74.28	68.61
1643	1643	Shell-Thin	3647	COMB2UG	Combination	Max	-1.65	-5.42	5.08	-31.1146	-128.3249	4.8527	-1.72	68.61
1643	1643	Shell-Thin	3626	COMB2UG	Combination	Max	-2.17	-6.43	4.96	-37.2961	-120.664	6.4105	-1.72	64.68

1643	1643	Shell-Thin	3586	COMB2UG	Combination	Max	3.82	-6.46	5.37	34.5846	31.0289	9.8871	74.28	64.68
1643	1643	Shell-Thin	3615	COMB2UG	Combination	Min	-3.04	-10.47	-13.62	-5.8152	14.0171	5.7752	31.53	61.29
1643	1643	Shell-Thin	3647	COMB2UG	Combination	Min	-2.76	-11.14	-9.5	-36.6732	-132.3757	4.5787	-21.01	61.29
1643	1643	Shell-Thin	3626	COMB2UG	Combination	Min	-3.41	-16	-6.8	-42.7565	-124.9305	6.1239	-21.01	58.04
1643	1643	Shell-Thin	3586	COMB2UG	Combination	Min	-3.16	-14.72	-10.88	14.8336	14.8022	7.136	31.53	58.04
1644	1644	Shell-Thin	3641	COMB2UG	Combination	Max	1	3.8	7.23	-49.2471	-158.6567	0.4613	25.65	-98.73
1644	1644	Shell-Thin	3401	COMB2UG	Combination	Max	-2.7	3.1	8.47	43.5187	89.6864	-1.7337	-21.84	-98.73
1644	1644	Shell-Thin	3670	COMB2UG	Combination	Max	-3.09	1.78	7.88	19.689	89.4969	-4.1957	-21.84	-97.78
1644	1644	Shell-Thin	3642	COMB2UG	Combination	Max	0.45	2.42	6.63	-43.4983	-156.107	-1.9188	25.65	-97.78
1644	1644	Shell-Thin	3641	COMB2UG	Combination	Min	-0.55	3.53	-6.47	-56.3089	-162.0384	0.000395	6.02	-105.75
1644	1644	Shell-Thin	3401	COMB2UG	Combination	Min	-4.1	2.78	-6.81	28.6479	78.5282	-4.7073	-52.88	-105.75
1644	1644	Shell-Thin	3670	COMB2UG	Combination	Min	-4.64	-0.52	-6.87	13.7408	76.1387	-6.7464	-52.88	-103.93
1644	1644	Shell-Thin	3642	COMB2UG	Combination	Min	-0.92	0.29	-6.52	-47.6006	-160.2414	-2.1205	6.02	-103.93
1645	1645	Shell-Thin	3642	COMB2UG	Combination	Max	0.63	2.46	7.44	-47.0065	-157.0378	-2.2207	26.85	-95.72
1645	1645	Shell-Thin	3670	COMB2UG	Combination	Max	-4.41	1.32	7.9	33.279	89.6635	-7.8382	-38.73	-95.72
1645	1645	Shell-Thin	3671	COMB2UG	Combination	Max	-5.08	-0.77	9.01	0.2073	85.4164	-8.3704	-38.73	-92.5
1645	1645	Shell-Thin	3643	COMB2UG	Combination	Max	-0.29	0.03625	8.57	-40.5431	-152.3892	-3.4745	26.85	-92.5
1645	1645	Shell-Thin	3642	COMB2UG	Combination	Min	-1.6	0.15	-6.18	-53.3968	-161.1715	-3.6241	11.11	-102.75
1645	1645	Shell-Thin	3670	COMB2UG	Combination	Min	-6.15	-0.62	-6.09	18.5329	79.6485	-7.9907	-63.97	-102.75
1645	1645	Shell-Thin	3671	COMB2UG	Combination	Min	-6.79	-5.07	-6.01	-1.7397	76.2191	-9.2337	-63.97	-98.91
1645	1645	Shell-Thin	3643	COMB2UG	Combination	Min	-1.98	-3.96	-6.12	-42.8741	-155.8348	-4.1455	11.11	-98.91
1646	1646	Shell-Thin	3643	COMB2UG	Combination	Max	-0.86	-0.0419	8.3	-44.6018	-152.8459	-4.4728	15.7	-91.52
1646	1646	Shell-Thin	3671	COMB2UG	Combination	Max	-6.98	-1.26	8.44	13.074	87.9662	-7.6144	-18.84	-91.52
1646	1646	Shell-Thin	3672	COMB2UG	Combination	Max	-7.2	-1.96	7.92	-5.4827	81.4215	-7.3233	-18.84	-87.44
1646	1646	Shell-Thin	3644	COMB2UG	Combination	Max	-1.33	-0.81	7.77	-40.8593	-147.0364	-4.2312	15.7	-87.44
1646	1646	Shell-Thin	3643	COMB2UG	Combination	Min	-2.37	-4.07	-6.36	-48.4419	-157.3034	-5.1333	4.67	-98.03
1646	1646	Shell-Thin	3671	COMB2UG	Combination	Min	-8.45	-5.3	-6.1	3.4187	77.2744	-8.6414	-40.82	-98.03
1646	1646	Shell-Thin	3672	COMB2UG	Combination	Min	-8.91	-7.97	-6.13	-9.1827	72.4791	-8.6753	-40.82	-92.28
1646	1646	Shell-Thin	3644	COMB2UG	Combination	Min	-2.57	-6.67	-6.4	-43.3322	-149.8533	-5.1177	4.67	-92.28
1647	1647	Shell-Thin	3644	COMB2UG	Combination	Max	-1.73	-0.8	7.03	-42.1681	-146.9092	-4.2122	5.86	-87.09
1647	1647	Shell-Thin	3672	COMB2UG	Combination	Max	-8.45	-2.25	6.96	-1.2816	82.3701	-6.314	12.57	-87.09
1647	1647	Shell-Thin	3673	COMB2UG	Combination	Max	-8.39	-1.42	6.99	-0.2406	79.7815	-5.9276	12.57	-83.9
1647	1647	Shell-Thin	3645	COMB2UG	Combination	Max	-1.86	0.02699	7.06	-42.4865	-141.9921	-3.7986	5.86	-83.9
1647	1647	Shell-Thin	3644	COMB2UG	Combination	Min	-2.55	-6.76	-7.04	-45.3897	-150.6538	-5.0359	-3.44	-92.33
1647	1647	Shell-Thin	3672	COMB2UG	Combination	Min	-9.54	-8.05	-7.21	-7.2471	72.7578	-7.6531	-8.29	-92.33
1647	1647	Shell-Thin	3673	COMB2UG	Combination	Min	-9.61	-8.91	-6.9	-7.0911	69.7007	-7.2537	-8.29	-89.08
1647	1647	Shell-Thin	3645	COMB2UG	Combination	Min	-2.43	-7.61	-6.73	-44.805	-145.1043	-4.6638	-3.44	-89.08
1648	1648	Shell-Thin	3645	COMB2UG	Combination	Max	-1.49	0.09334	6.29	-38.9513	-141.5364	-3.7565	-0.24	-83.93
1648	1648	Shell-Thin	3673	COMB2UG	Combination	Max	-7.68	-1.35	5.72	-7.8071	78.0213	-4.875	44.41	-83.93
1648	1648	Shell-Thin	3674	COMB2UG	Combination	Max	-7.5	0.78	5.33	12.462	79.0971	-4.8927	44.41	-81.35
1648	1648	Shell-Thin	3646	COMB2UG	Combination	Max	-1.1	2.22	5.9	-42.3601	-136.9115	-3.7224	-0.24	-81.35
1648	1648	Shell-Thin	3645	COMB2UG	Combination	Min	-2.52	-7.62	-7.37	-42.3519	-144.3624	-4.6985	-11.1	-88.68
1648	1648	Shell-Thin	3673	COMB2UG	Combination	Min	-8.92	-8.69	-7.74	-10.6673	69.2324	-6.2268	22.36	-88.68

1648	1648	Shell-Thin	3674	COMB2UG	Combination	Min	-8.51	-7.89	-8.1	1.9193	67.7973	-5.9245	22.36	-87.83
1648	1648	Shell-Thin	3646	COMB2UG	Combination	Min	-2.32	-6.81	-7.73	-45.1414	-140.7568	-4.4482	-11.1	-87.83
1649	1649	Shell-Thin	3646	COMB2UG	Combination	Max	-0.52	2.31	5.25	-35.7067	-136.1703	-4.6413	0.49	-81.46
1649	1649	Shell-Thin	3674	COMB2UG	Combination	Max	-5.61	1.14	4.89	-3.0418	76.0261	-4.1958	65.3	-81.46
1649	1649	Shell-Thin	3675	COMB2UG	Combination	Max	-5.1	3.6	4.6	29.7602	74.7744	-5.1298	65.3	-77.88
1649	1649	Shell-Thin	3647	COMB2UG	Combination	Max	0.2	4.76	4.93	-38.5035	-129.6532	-4.8772	0.49	-77.88
1649	1649	Shell-Thin	3646	COMB2UG	Combination	Min	-1.99	-6.72	-7.97	-39.1913	-138.9772	-5.3337	-14.96	-87.77
1649	1649	Shell-Thin	3674	COMB2UG	Combination	Min	-6.65	-7.5	-8.48	-5.7901	66.2257	-5.0881	39.82	-87.77
1649	1649	Shell-Thin	3675	COMB2UG	Combination	Min	-6.16	-4.95	-7.16	14.11	63.77	-5.3263	39.82	-85
1649	1649	Shell-Thin	3647	COMB2UG	Combination	Min	-1.71	-4.17	-6.62	-43.4904	-133.3289	-6.2701	-14.96	-85
1657	1657	Shell-Thin	3650	COMB2UG	Combination	Max	1.08	11.03	0.5	-0.3378	-49.8475	3.3795	5.5	23.04
1657	1657	Shell-Thin	3576	COMB2UG	Combination	Max	0.44	10.81	0.84	4.3087	7.9383	5.0683	14.03	23.04
1657	1657	Shell-Thin	3617	COMB2UG	Combination	Max	0.59	4.87	1.09	2.6516	6.4799	5.9458	14.03	22.63
1657	1657	Shell-Thin	3651	COMB2UG	Combination	Max	0.17	5.09	0.82	2.9979	-52.6176	4.1312	5.5	22.63
1657	1657	Shell-Thin	3650	COMB2UG	Combination	Min	-0.55	-14.44	0.14	-2.0212	-55.1974	-0.5109	-9.11	13.7
1657	1657	Shell-Thin	3576	COMB2UG	Combination	Min	-0.22	-14.28	-0.97	-0.1414	-13.7892	1.1303	-2.61	13.7
1657	1657	Shell-Thin	3617	COMB2UG	Combination	Min	-1.44	-13.67	-1.75	-3.5283	-11.7813	1.7146	-2.61	16.03
1657	1657	Shell-Thin	3651	COMB2UG	Combination	Min	-0.71	-13.83	-0.69	-2.8871	-56.6869	0.1992	-9.11	16.03
1658	1658	Shell-Thin	3651	COMB2UG	Combination	Max	1.15	5.35	0.66	-2.8695	-53.7513	3.3768	5.39	23.83
1658	1658	Shell-Thin	3617	COMB2UG	Combination	Max	2.96	4.6	2.01	12.7475	7.5804	7.667	25.04	23.83
1658	1658	Shell-Thin	3582	COMB2UG	Combination	Max	3.13	0.58	1.58	3.7611	6.0574	8.0395	25.04	23.54
1658	1658	Shell-Thin	3619	COMB2UG	Combination	Max	0.43	1.29	0.33	3.2279	-54.0793	3.8286	5.39	23.54
1658	1658	Shell-Thin	3651	COMB2UG	Combination	Min	-1.12	-13.97	-0.88	-3.8538	-56.92	1.1131	-12.29	17.63
1658	1658	Shell-Thin	3617	COMB2UG	Combination	Min	-2.78	-13.2	-3.88	-0.7751	-10.312	1.974	-1.69	17.63
1658	1658	Shell-Thin	3582	COMB2UG	Combination	Min	-3.6	-12.47	-4.2	-2.4365	-13.3671	2.4477	-1.69	16.74
1658	1658	Shell-Thin	3619	COMB2UG	Combination	Min	-1.05	-13.21	-1.3	-5.4678	-58.1896	1.5075	-12.29	16.74
									M+	**43.5264**	**89.6911**			
									M-	**-56.3163**	**-177.2462**			

TABLE: Element Forces - Area Shells (PLAT SLAB Kombinasi 3Ultimate)

Area	Area Elem	Shell Type	Joint	Output Case	Case Type	F11	F22	F12	M11	M22	M12	V13	V23
Text	Text	Text	Text	Text	Text	KN/m	KN/m	KN/m	KN-m/m	KN-m/m	KN-m/m	KN/m	KN/m
204	204	Shell-Thin	234	COMB3U	Combination	0.04673	0.23	-0.84	0.3648	-0.6875	-14.7723	4.23	-23.47
204	204	Shell-Thin	239	COMB3U	Combination	0.5	0.32	-0.76	-2.1932	-64.4681	-9.7733	-2.12	-23.47
204	204	Shell-Thin	240	COMB3U	Combination	0.52	0.43	-0.71	-0.1329	-68.8719	-10.79	-2.12	-25.15
204	204	Shell-Thin	241	COMB3U	Combination	0.067	0.34	-0.79	-0.7506	-0.8916	-15.789	4.23	-25.15
205	205	Shell-Thin	241	COMB3U	Combination	0.067	0.34	-0.86	0.4855	-0.6443	-17.779	5.33	-25.43
205	205	Shell-Thin	240	COMB3U	Combination	0.16	0.35	-0.85	-2.6047	-69.3663	-10.8603	1.27	-25.43
205	205	Shell-Thin	242	COMB3U	Combination	0.16	0.37	-0.94	-1.8582	-75.7147	-11.8818	1.27	-27.81
205	205	Shell-Thin	243	COMB3U	Combination	0.06967	0.35	-0.96	-0.7965	-1.042	-18.8005	5.33	-27.81
206	206	Shell-Thin	243	COMB3U	Combination	0.06967	0.35	-1.05	0.3312	-0.8165	-20.8266	5.43	-28.38

206	206	Shell-Thin	242	COMB3U	Combination	-0.19	0.3	-0.92	-4.1284	-76.1687	-11.8471	9.68	-28.38
206	206	Shell-Thin	244	COMB3U	Combination	-0.16	0.42	-1.12	-7.1749	-85.6014	-12.721	9.68	-32.16
206	206	Shell-Thin	245	COMB3U	Combination	0.09479	0.47	-1.24	-0.5863	-0.7931	-21.7005	5.43	-32.16
207	207	Shell-Thin	245	COMB3U	Combination	0.09479	0.47	-1.38	0.131	-0.6496	-23.2409	4.95	-33.24
207	207	Shell-Thin	244	COMB3U	Combination	-0.1	0.43	-1.08	-8.6546	-85.8973	-12.648	22.78	-33.24
207	207	Shell-Thin	246	COMB3U	Combination	-0.006099	0.92	-1.23	-17.9267	-98.3041	-13.071	22.78	-38.32
207	207	Shell-Thin	247	COMB3U	Combination	0.19	0.96	-1.53	-0.2266	-0.3334	-23.6639	4.95	-38.32
208	208	Shell-Thin	247	COMB3U	Combination	0.19	0.96	-1.56	-0.0416	-0.2964	-24.1909	4.42	-39.41
208	208	Shell-Thin	246	COMB3U	Combination	0.68	1.06	-1.02	-18.3486	-98.3884	-12.8313	19.44	-39.41
208	208	Shell-Thin	248	COMB3U	Combination	0.71	1.2	-1.08	-25.7962	-111.0544	-12.7357	19.44	-44.59
208	208	Shell-Thin	249	COMB3U	Combination	0.22	1.1	-1.63	0.0188	-0.0082	-24.0953	4.42	-44.59
209	209	Shell-Thin	249	COMB3U	Combination	0.22	1.1	-1.64	-0.0624	-0.0245	-23.8233	4.18	-45.24
209	209	Shell-Thin	248	COMB3U	Combination	1.82	1.42	-0.99	-25.6671	-111.0286	-12.4432	16.31	-45.24
209	209	Shell-Thin	250	COMB3U	Combination	1.93	1.98	-1	-31.5466	-123.4224	-12.0131	16.31	-50.33
209	209	Shell-Thin	251	COMB3U	Combination	0.33	1.66	-1.66	0.1231	0.3105	-23.3932	4.18	-50.33
210	210	Shell-Thin	251	COMB3U	Combination	0.33	1.66	-1.58	0.2165	0.3292	-22.4344	5.13	-50.81
210	210	Shell-Thin	250	COMB3U	Combination	2.78	2.15	-1.19	-31.756	-123.4642	-11.8252	12.44	-50.81
210	210	Shell-Thin	252	COMB3U	Combination	2.92	2.87	-0.88	-35.8558	-134.8974	-11.1702	12.44	-55.51
210	210	Shell-Thin	235	COMB3U	Combination	0.48	2.38	-1.27	-0.2274	0.6735	-21.7793	5.13	-55.51
211	211	Shell-Thin	239	COMB3U	Combination	-0.25	-3.41	-0.06997	-2.019	-63.5971	-2.5832	-2.92	34.78
211	211	Shell-Thin	223	COMB3U	Combination	0.52	-3.26	-0.69	14.2212	27.5777	0.2446	27.65	34.78
211	211	Shell-Thin	253	COMB3U	Combination	0.77	-2.01	-1.1	0.9597	27.202	1.0825	27.65	36.46
245	245	Shell-Thin	325	COMB3U	Combination	3.84	3.38	0.28	-49.3353	-173.7649	1.4025	-7.98	-72.43
245	245	Shell-Thin	352	COMB3U	Combination	0.54	2.72	0.56	-0.3463	0.6898	2.7248	1.17	-72.43
245	245	Shell-Thin	238	COMB3U	Combination	0.66	3.31	0.14	0.5028	1.3088	1.3857	1.17	-73.66
245	245	Shell-Thin	327	COMB3U	Combination	3.96	3.97	-0.14	-53.0607	-176.228	0.0633	-7.98	-73.66
246	246	Shell-Thin	226	COMB3U	Combination	1.75	-6.25	1.09	31.5042	73.6801	2.7135	-34.71	103.13
246	246	Shell-Thin	327	COMB3U	Combination	1.92	-6.22	0.14	-52.6611	-174.2289	-0.125	7.7	103.13
246	246	Shell-Thin	354	COMB3U	Combination	2.3	-4.3	0.85	-49.3763	-173.9714	1.8784	7.7	102.84
246	246	Shell-Thin	356	COMB3U	Combination	2.13	-4.34	1.81	13.5823	73.219	4.717	-34.71	102.84
247	247	Shell-Thin	356	COMB3U	Combination	3.36	-4.09	2.37	21.9308	74.8887	7.1418	-48.57	101.31
247	247	Shell-Thin	354	COMB3U	Combination	1.19	-4.53	1.04	-51.799	-174.4559	2.467	10.3	101.31
247	247	Shell-Thin	357	COMB3U	Combination	1.78	-1.54	1.29	-47.5836	-171.4266	3.2767	10.3	99
247	247	Shell-Thin	358	COMB3U	Combination	3.96	-1.1	2.62	-3.2896	72.1442	7.9515	-48.57	99
248	248	Shell-Thin	358	COMB3U	Combination	5.8	-0.73	2.07	4.5814	73.7184	7.4004	-28.12	97.83
248	248	Shell-Thin	357	COMB3U	Combination	0.39	-1.82	1.14	-49.8619	-171.8823	4.0862	6.48	97.83
248	248	Shell-Thin	359	COMB3U	Combination	0.74	-0.02901	0.48	-47.2841	-165.9649	3.9013	6.48	93.39
248	248	Shell-Thin	360	COMB3U	Combination	6.16	1.05	1.42	-10.1429	68.5519	7.2155	-28.12	93.39
249	249	Shell-Thin	360	COMB3U	Combination	7.04	1.23	0.19	-7.7095	69.0386	6.4587	3.28	93.05
249	249	Shell-Thin	359	COMB3U	Combination	0.01365	-0.18	0.15	-47.9871	-166.1055	3.5192	2.71	93.05
249	249	Shell-Thin	361	COMB3U	Combination	0.03542	-0.06616	-0.25	-47.2173	-160.3208	3.0384	2.71	89.7
249	249	Shell-Thin	362	COMB3U	Combination	7.06	1.34	-0.21	-6.6593	66.4385	5.9779	3.28	89.7
250	250	Shell-Thin	362	COMB3U	Combination	6.21	1.17	-1.49	-12.2513	65.3201	5.2018	33.98	89.61

250	250	Shell-Thin	361	COMB3U	Combination	0.37	0.001189	-0.56	-45.6154	-160.0004	2.6595	1.02	89.61
250	250	Shell-Thin	365	COMB3U	Combination	0.08835	-1.42	-1.24	-45.6144	-154.027	2.4231	1.02	87.13
250	250	Shell-Thin	366	COMB3U	Combination	5.92	-0.25	-2.17	4.2318	65.0829	4.9654	33.98	87.13
251	251	Shell-Thin	366	COMB3U	Combination	3.88	-0.66	-2.77	-7.017	62.8332	4.3218	52.56	87.36
251	251	Shell-Thin	365	COMB3U	Combination	1.16	-1.2	-1.49	-42.3893	-153.382	3.0373	3.8	87.36
251	251	Shell-Thin	367	COMB3U	Combination	0.7	-3.49	-1.31	-40.7472	-144.2315	3.4931	3.8	82.75
251	251	Shell-Thin	368	COMB3U	Combination	3.42	-2.95	-2.59	19.004	60.4478	4.7776	52.56	82.75
252	252	Shell-Thin	368	COMB3U	Combination	1.7	-3.29	-2.34	5.7493	57.7969	6.4732	46.63	83.05
252	252	Shell-Thin	367	COMB3U	Combination	1.63	-3.3	-1.09	-36.9444	-143.4709	3.5599	-0.46	83.05
252	252	Shell-Thin	252	COMB3U	Combination	1.3	-4.98	-0.3	-37.7555	-133.5076	4.8498	-0.46	77.95
252	252	Shell-Thin	227	COMB3U	Combination	1.36	-4.96	-1.56	28.4811	55.0132	7.7631	46.63	77.95
253	**253**	**Shell-Thin**	**327**	**COMB3U**	**Combination**	**3.96**	**3.97**	**0.14**	**-53.061**	**-176.2281**	**-0.0634**	**7.98**	**-73.66**
253	253	Shell-Thin	238	COMB3U	Combination	0.66	3.31	-0.14	0.5029	1.3088	-1.3858	-1.17	-73.66
253	253	Shell-Thin	371	COMB3U	Combination	0.54	2.72	-0.57	-0.3465	0.6898	-2.7249	-1.17	-72.43
253	253	Shell-Thin	354	COMB3U	Combination	3.84	3.38	-0.29	-49.3349	-173.7648	-1.4025	7.98	-72.43
254	254	Shell-Thin	354	COMB3U	Combination	2.72	3.16	-0.09712	-51.7577	-174.2493	-1.7307	10.27	-72.56
254	254	Shell-Thin	371	COMB3U	Combination	0.54	2.72	-0.71	0.8689	0.9328	-5.0228	-1.54	-72.56
254	254	Shell-Thin	372	COMB3U	Combination	0.45	2.27	-0.75	-0.5575	0.3724	-6.2829	-1.54	-70.61
254	254	Shell-Thin	357	COMB3U	Combination	2.63	2.7	-0.14	-47.2823	-169.9201	-2.9908	10.27	-70.61
1631	1631	Shell-Thin	3635	COMB3U	Combination	-0.75	0.24	0.87	-41.0922	-131.5346	5.5859	7.33	-81.48
1631	1631	Shell-Thin	3664	COMB3U	Combination	-5.65	-0.74	1.33	22.0332	69.2976	5.2346	-52.95	-81.48
1631	1631	Shell-Thin	3665	COMB3U	Combination	-6.15	-3.23	1.82	-4.5128	71.1158	4.6432	-52.95	-84.63
1631	1631	Shell-Thin	3636	COMB3U	Combination	-1.24	-2.25	1.36	-37.4988	-137.6063	4.9945	7.33	-84.63
1632	1632	Shell-Thin	3636	COMB3U	Combination	-1.7	-2.34	0.92	-43.8208	-138.8707	4.0887	5.7	-84.62
1632	1632	Shell-Thin	3665	COMB3U	Combination	-8.03	-3.6	1.39	7.2259	73.4636	5.4077	-33.53	-84.62
1632	1632	Shell-Thin	3666	COMB3U	Combination	-8.32	-5.06	1.03	-9.2749	73.6296	5.5456	-33.53	-86.33
1632	1632	Shell-Thin	3637	COMB3U	Combination	-1.99	-3.79	0.55	-40.7069	-142.9797	4.2266	5.7	-86.33
1633	1633	Shell-Thin	3637	COMB3U	Combination	-2.14	-3.82	-0.15	-43.6969	-143.5777	4.2266	-1.2	-86.51
1633	1633	Shell-Thin	3666	COMB3U	Combination	-9.02	-5.2	-0.03161	-3.6559	74.7534	6.5829	-2.19	-86.51
1633	1633	Shell-Thin	3667	COMB3U	Combination	-9.02	-5.17	0.12	-4.2775	77.5711	6.9723	-2.19	-89.73
1633	1633	Shell-Thin	3638	COMB3U	Combination	-2.13	-3.8	0.003673	-43.8275	-148.8069	4.616	-1.2	-89.73
1634	1634	Shell-Thin	3638	COMB3U	Combination	-1.94	-3.76	-0.69	-42.1305	-148.4675	4.6635	-10.19	-89.88
1634	1634	Shell-Thin	3667	COMB3U	Combination	-8.07	-4.98	-0.89	-7.3329	76.96	7.9859	29.83	-89.88
1634	1634	Shell-Thin	3668	COMB3U	Combination	-7.73	-3.29	-1.17	8.2444	82.6274	8.1121	29.83	-94.79
1634	1634	Shell-Thin	3639	COMB3U	Combination	-1.61	-2.07	-0.96	-46.5591	-155.0933	4.7896	-10.19	-94.79
1635	1635	Shell-Thin	3639	COMB3U	Combination	-1.13	-1.97	-1.22	-41.7281	-154.1271	3.7945	-18.99	-95.72
1635	1635	Shell-Thin	3668	COMB3U	Combination	-5.94	-2.94	-1.5	-0.7702	80.8245	8.7848	51.36	-95.72
1635	**1635**	**Shell-Thin**	**3669**	**COMB3U**	**Combination**	**-5.29**	**0.34**	**-0.9**	**25.9096**	**84.6605**	**7.8957**	**51.36**	**-99.24**
1635	1635	Shell-Thin	3640	COMB3U	Combination	-0.48	1.3	-0.63	-50.226	-159.1152	2.9054	-18.99	-99.24
1636	1636	Shell-Thin	3640	COMB3U	Combination	-0.24	1.35	-0.05389	-45.554	-158.1808	2.0018	-15.85	-100.8
1636	1636	Shell-Thin	3669	COMB3U	Combination	-3.86	0.62	-0.5	16.7095	82.8205	5.4511	37.38	-100.8
1636	**1636**	**Shell-Thin**	**3401**	**COMB3U**	**Combination**	**-3.4**	**2.94**	**-0.83**	**36.0893**	**84.1085**	**3.2001**	**37.38**	**-102.2**
1636	1636	Shell-Thin	3641	COMB3U	Combination	0.23	3.67	-0.38	-52.7884	-160.3496	-0.2492	-15.85	-102.2

1637	1637	Shell-Thin	3585	COMB3U	Combination	0.18	-13.23	1.42	27.0675	36.3888	3.4293	-37.32	82.98
1637	1637	Shell-Thin	3641	COMB3U	Combination	-3.29	-13.93	0.39	-52.6552	-159.7334	-0.4107	15.63	82.98
1637	1637	Shell-Thin	3642	COMB3U	Combination	-2.6	-10.48	1.73	-45.607	-158.4621	1.8711	15.63	82.44
1637	1637	Shell-Thin	3610	COMB3U	Combination	0.87	-9.78	2.77	7.641	36.3266	5.7111	-37.32	82.44
1638	1638	Shell-Thin	3610	COMB3U	Combination	0.53	-9.85	3.6	16.7795	38.1543	8.1045	-53.91	80.68
1638	1638	Shell-Thin	3642	COMB3U	Combination	-2.85	-10.53	2.31	-50.2592	-159.3926	2.8442	19.3	80.68
1638	1638	Shell-Thin	3643	COMB3U	Combination	-1.8	-5.29	2.32	-41.6612	-153.8753	3.6949	19.3	76.74
1638	1638	Shell-Thin	3611	COMB3U	Combination	1.57	-4.62	3.62	-11.2294	33.8025	8.9552	-53.91	76.74
1639	1639	Shell-Thin	3611	COMB3U	Combination	2.34	-4.46	2.99	-1.1943	35.8095	8.3926	-32.09	75.84
1639	1639	Shell-Thin	3643	COMB3U	Combination	-2.28	-5.39	2.07	-46.4745	-154.838	4.4802	10.38	75.84
1639	1639	Shell-Thin	3644	COMB3U	Combination	-1.67	-2.35	1.2	-42.0678	-148.3052	4.2897	10.38	71.13
1639	1639	Shell-Thin	3612	COMB3U	Combination	2.95	-1.43	2.12	-18.0222	30.5467	8.2021	-32.09	71.13
1640	1640	Shell-Thin	3612	COMB3U	Combination	3.48	-1.32	0.39	-14.4124	31.2687	7.2811	2.74	70.99
1640	1640	Shell-Thin	3644	COMB3U	Combination	-1.86	-2.39	0.51	-43.751	-148.6418	3.9703	1.58	70.99
1640	1640	Shell-Thin	3645	COMB3U	Combination	-1.8	-2.1	-0.4	-43.6229	-143.434	3.5	1.58	68.16
1640	1640	Shell-Thin	3613	COMB3U	Combination	3.54	-1.03	-0.52	-13.7054	29.4047	6.8107	2.74	68.16
1648	1648	Shell-Thin	3645	COMB3U	Combination	-2	-3.76	-0.54	-40.6516	-142.9494	-4.2275	-5.67	-86.31
1648	1648	Shell-Thin	3673	COMB3U	Combination	-8.3	-5.02	-1.01	-9.2372	73.6269	-5.5509	33.38	-86.31
1648	1648	Shell-Thin	3674	COMB3U	Combination	-8	-3.56	-1.39	7.1906	73.4472	-5.4086	33.38	-84.59
1648	1648	Shell-Thin	3646	COMB3U	Combination	-1.71	-2.3	-0.92	-43.7507	-138.8341	-4.0853	-5.67	-84.59
1649	1649	Shell-Thin	3646	COMB3U	Combination	-1.26	-2.21	-1.36	-37.449	-137.5738	-4.9875	-7.23	-84.61
1649	1649	Shell-Thin	3674	COMB3U	Combination	-6.13	-3.18	-1.8	-4.4159	71.1259	-4.642	52.56	-84.61
1649	1649	Shell-Thin	3675	COMB3U	Combination	-5.63	-0.68	-1.28	21.9351	69.2722	-5.2281	52.56	-81.44
1649	1649	Shell-Thin	3647	COMB3U	Combination	-0.75	0.3	-0.84	-40.9969	-131.4911	-5.5736	-7.23	-81.44
1650	1650	Shell-Thin	3647	COMB3U	Combination	-0.48	0.35	-0.37	-33.8356	-130.0588	-5.9938	-12.16	-81.76
1650	1650	Shell-Thin	3675	COMB3U	Combination	-3.6	-0.27	-1.13	8.6613	66.6174	-6.964	46.37	-81.76
1650	1650	Shell-Thin	3402	COMB3U	Combination	-3.22	1.64	-1.36	31.651	64.0425	-8.5246	46.37	-77.99
1650	1650	Shell-Thin	3626	COMB3U	Combination	-0.09381	2.26	-0.61	-40.1088	-123.2097	-7.5544	-12.16	-77.99
1651	1651	Shell-Thin	3578	COMB3U	Combination	0.09902	-1.87	0.04841	2.017	-3.3203	-2.985	-5.53	18.27
1651	1651	Shell-Thin	3648	COMB3U	Combination	0.27	-1.84	-0.32	-1.153	-52.6515	-1.3665	1.68	18.27
1651	1651	Shell-Thin	3649	COMB3U	Combination	-0.26	-4.5	-0.06412	0.0129	-54.8117	-2.0953	1.68	19.27
1651	1651	Shell-Thin	3616	COMB3U	Combination	-0.43	-4.53	0.31	-0.4222	-2.9679	-3.7138	-5.53	19.27
1652	1652	Shell-Thin	3616	COMB3U	Combination	0.07845	-4.43	0.92	5.93	-1.6974	-4.7137	-11.7	20.66
1652	1652	Shell-Thin	3649	COMB3U	Combination	0.03142	-4.44	0.11	-3.3608	-55.4865	-2.1608	3.35	20.66
1652	1652	Shell-Thin	3627	COMB3U	Combination	-0.29	-6.07	0.47	-1.1775	-56.2587	-2.5836	3.35	20.05
1652	1652	Shell-Thin	3583	COMB3U	Combination	-0.25	-6.06	1.28	0.5882	-4.0066	-5.1365	-11.7	20.05
1653	1653	Shell-Thin	3648	COMB3U	Combination	0.24	-1.97	-0.17	-1.6673	-55.223	-1.0612	2.87	-32.74
1653	1653	Shell-Thin	3391	COMB3U	Combination	-0.51	-2.12	0.41	3.442	32.0869	1.9161	-2.64	-32.74
1653	1653	Shell-Thin	3676	COMB3U	Combination	-0.38	-1.47	0.28	2.7159	27.3346	3.0022	-2.64	-29.97
1653	1653	Shell-Thin	3649	COMB3U	Combination	0.38	-1.31	-0.3	0.3618	-53.0669	0.025	2.87	-29.97
1654	1654	Shell-Thin	3649	COMB3U	Combination	0.67	-1.26	-0.13	-3.0118	-53.7417	1.1457	2.69	-31.92
1654	1654	Shell-Thin	3676	COMB3U	Combination	-1.46	-1.68	0.33	9.9437	28.7801	3.3816	-7.68	-31.92
1654	1654	Shell-Thin	3399	COMB3U	Combination	-1.37	-1.23	0.26	6.5525	29.0482	3.918	-7.68	-33.12

1654	1654	Shell-Thin	3627	COMB3U	Combination	0.76	-0.81	-0.2	-1.2208	-56.4753	1.6821	2.69	-33.12
1655	1655	Shell-Thin	3392	COMB3U	Combination	-0.5	-1.98	-0.42	3.4676	32.1375	-1.9006	2.73	-32.69
1655	1655	Shell-Thin	3650	COMB3U	Combination	0.24	-1.83	0.17	-1.6869	-55.0595	1.1036	-2.97	-32.69
1655	1655	Shell-Thin	3651	COMB3U	Combination	0.37	-1.18	0.33	0.4003	-52.9278	0.019	-2.97	-29.94
1655	1655	Shell-Thin	3677	COMB3U	Combination	-0.37	-1.33	-0.26	2.7046	27.3878	-2.9853	2.73	-29.94
1656	1656	Shell-Thin	3677	COMB3U	Combination	-1.44	-1.55	-0.31	10.0338	28.8536	-3.3585	7.99	-31.9
1656	1656	Shell-Thin	3651	COMB3U	Combination	0.65	-1.13	0.16	-3.0168	-53.6112	-1.1034	-2.81	-31.9
1656	1656	Shell-Thin	3619	COMB3U	Combination	0.74	-0.68	0.2	-1.1619	-56.3441	-1.6397	-2.81	-33.08
1656	1656	Shell-Thin	3398	COMB3U	Combination	-1.36	-1.1	-0.27	6.4886	29.0845	-3.8948	7.99	-33.08
1657	1657	Shell-Thin	3650	COMB3U	Combination	0.26	-1.71	0.32	-1.1795	-52.5224	1.4343	-1.8	18.37
1657	1657	Shell-Thin	3576	COMB3U	Combination	0.11	-1.74	-0.06641	2.0836	-2.9254	3.0993	5.71	18.37
1657	1657	Shell-Thin	3617	COMB3U	Combination	-0.43	-4.4	-0.33	-0.4384	-2.6507	3.8302	5.71	19.33
1657	1657	Shell-Thin	3651	COMB3U	Combination	-0.27	-4.37	0.06085	0.0554	-54.6522	2.1652	-1.8	19.33
1658	1658	Shell-Thin	3651	COMB3U	Combination	0.01541	-4.31	-0.11	-3.3617	-55.3357	2.2449	-3.45	20.73
1658	1658	Shell-Thin	3617	COMB3U	Combination	0.09002	-4.3	-0.94	5.9862	-1.3658	4.8205	11.68	20.73
1658	1658	Shell-Thin	3582	COMB3U	Combination	-0.24	-5.94	-1.31	0.6623	-3.6548	5.2436	11.68	20.14
1658	1658	Shell-Thin	3619	COMB3U	Combination	-0.31	-5.96	-0.48	-1.1199	-56.1345	2.6681	-3.45	20.14
								M+	**36.0893**	**84.6605**			
								M-	**-53.061**	**-176.2281**			

BAB IX
PENUTUP

9.1 Kesimpulan

Dari analisis Desain Ulang Jembatan THP Kenjeran Surabaya dengan menggunakan beton prategang bentang 40 M didapat hasil-hasil sebagai berikut :

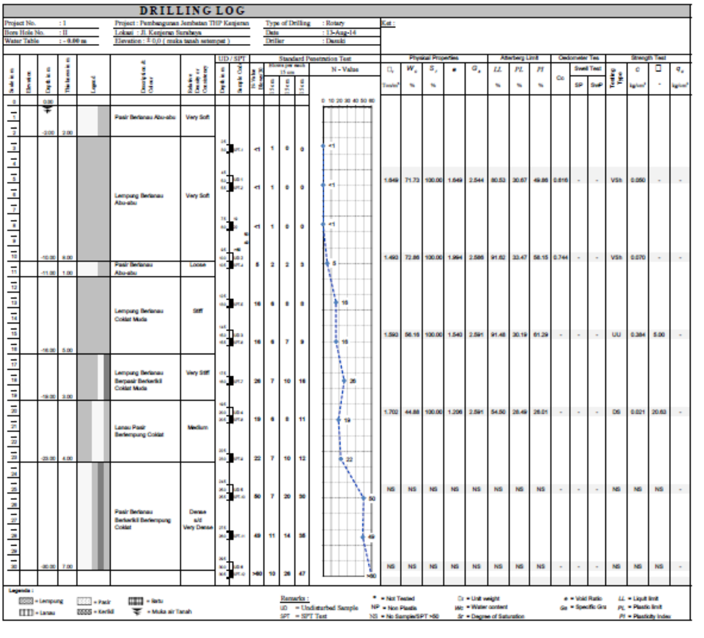
1. Jembatan THP Kenjeran dibagi menjadi 3 bentang dengan masing-masing bentang pertama pada STA 0+0.000 yaitu struktur *slab on pile* sepanjang 75, bentang kedua struktur utama beton prategang sepanjang 517 m dan bentang ketiga struktur *slab on pile* sepanjang 108 m, total panjang jembatan 700 m.
2. Dengan lebar jembatan 16 m maka direncanakan menggunakan 8 buah balok utama yaitu I Girder H210 dengan jarak as ke as sebesar 1,8 m dan 1,95 m.
3. Tiang sandaran dari beton bertulang dengan tinggi 1,2 m dan dimensi 10 x 25 cm.
4. Trotoar dibuat selebar 3.00 m dan railing pipa sebagai pembatas tepi dan trotoar diisi dengan beton rabat setebal 8 cm lalu ditutupi dengan tegel.
5. Pelat lantai kendaraan dari beton bertulang dengan tebal total 35 cm terdiri dari 10 cm beton pracetak dan 25 cm plat beton cast in situ.
6. Pilar jembatan direncanakan dengan 2 sistem kolom yaitu kolom berbentuk dinding sepanjang 10m untuk pilar 5-pilar 13 yang terletak pada bagian lurus jembatan dan sistem kolom bulat majemuk sebanyak 9 buah diameter 800 mm dan 950 mm untuk pilar 1 – pilar 4 terletak dibagian lengkungan jembatan.

7. Balok melintang (diafragma) dengan dimensi tinggi variable x 20 x 135 cm dan dimensi tinggi variable x 20 x 120 cm.
8. Gelagar utama pratekan menggunakan balok pratekan standard PT.WIKA dengan modifikasi tinggi balok 2.10 m.
9. Kabel tendon menggunakan material *7-wire strand grade* 1860 MPa Ø12.7 mm berjumlah 85 *strand.*
10. Gaya pratekan awal yang diberikan ke gelagar utama sepanjang 40,8 m sebesar 11704538.25 N dan terjadi kehilangan gaya prategang sebesar 22,41 % lebih besar dari kehilangan gaya rencana awal yaitu sebesar 20 %. Namun dalam kontrol tegangan pada fase servise tidak terjadi tegangan yang melampai batas tegangan tarik dan tekan pada balok girder maka dapat disimpulkan bahwa balok masih dalam keadaan aman untuk menahan beban-beban yang terjadi.
11. Lendutan total yang terjadi pada gelagar utama sebesar 37.252 mm bentang 40 m. Lendutan tersebut masih berada dibawah lendutan ijin sebesar 113.3 mm.
12. Pada jembatan untuk struktur *slab on pile* direncanakan dengan bentang per-6 m dan plat slab menggunakan sistem *half slab* yaitu setengah plat precast setebal 240 mm dan over topping setebal 110 mm.
13. Struktur utama beton prategang dan struktur *slab on pile* direncanakan menggunakan pondasi tiang pancang dengan kedalaman 24m.
14. Tiang pancang menggunakan tiang pancang beton (Spun pile) dengan diameter 600 mm type C produksi PT. WIKA.
15. Tumpuan perletakan menggunakan elastomer bearing pad berdimensi 330 x 600 x 68 mm.

9.2 Saran

1. Dalam penetapan posisi kabel tendon hendaknya memperhatikan kehilangan gaya yang terjadi pada kabel.
2. Saat pelaksanaan, setelah balok diangkat dan diletakkan diatas bearing pad, hendaknya balok diberi ikatan/bracing agar balok tidak guling mengingat dimensi balok yang cukup tinggi.
3. Untuk beban gempa disarankan menggunakan aturan SNI Gempa terbaru yaitu RSNI3 Perancangan Jembatan terhadap Beban Gempa 2013 dengan metode analisa gempa respon spectrum :

⇔ Analisa Gempa Respon Spectrum :



Gambar 9.1 Data tanah untuk menentukan jenis tanah

Tabel 9.1 Data tanah nilai SPT

Lapis tanah	Kedalaman	Ketebalan lapisan (meter)	Tanah	Nilai SPT
1	0-2	2	Lanau berlempung	1.0
2	2-10	8	Lempung berlanau pasir	4.0
3	10-11	1	Lanau pasir berkerikil	10.0
4	11-16	5	Lempung berlanau berpasir	16
5	16-19	3	Lempung lanau berpasir kerikil	23.0
6	19-23	4	Lanau pasir berlempung	22.0
7	23-30	7	Pasir berlanau berkerikil berlempung	60.0
Jumlah		30		

Tabel 9.2 Data penentuan kelas tanah

<table>
<tr><th>Lapis</th><th>N_{SPT}</th><th>Depth (m)</th><th>Tebal (m)</th><th>$N = Tebal/N_{SPT}$</th><th>∑N</th><th>N=30/∑N</th></tr>
<tr><td>1</td><td>1.0</td><td>0-2</td><td>2</td><td>2</td><td rowspan="7">4,74855</td><td rowspan="7">6,3177</td></tr>
<tr><td>2</td><td>4.0</td><td>2-10</td><td>8</td><td>2</td></tr>
<tr><td>3</td><td>10.0</td><td>10-11</td><td>1</td><td>0,1</td></tr>
<tr><td>4</td><td>16</td><td>11-16</td><td>5</td><td>0,3125</td></tr>
<tr><td>5</td><td>23.0</td><td>16-19</td><td>3</td><td>0,131</td></tr>
<tr><td>6</td><td>22.0</td><td>19-23</td><td>4</td><td>0,1818</td></tr>
<tr><td>7</td><td>43.0</td><td>23-24</td><td>1</td><td>0,02325</td></tr>
</table>

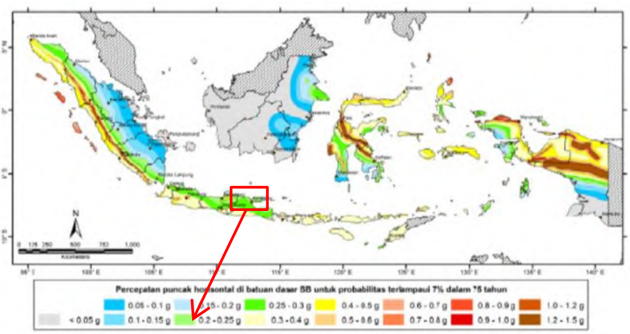
Dari **tabel 9.2** dapat ditarik kesimpulan bahwa dari data tanah didapat N < 15 yaitu 6,3177 merupakan tanah lunak yang dapat dibuktikan pada tabel kelas situs berikut :

Tabel 9.3 Kelas situs

Kelas Situs	$\bar{V}_s$ (m/s)	$\bar{N}$	$\bar{S}_u$ (kPa)
A. Batuan Keras	$\bar{V}_s \geq 1500$	N/A	N/A
B. Batuan	$750 < \bar{V}_s \leq 1500$	N/A	N/A
C. Tanah Sangat Padat dan Batuan Lunak	$350 < \bar{V}_s \leq 750$	$\bar{N} > 50$	$\bar{S}_u \geq 100$
D. Tanah Sedang	$175 < \bar{V}_s \leq 350$	$15 \leq \bar{N} \leq 50$	$50 \leq \bar{S}_u \leq 100$
E. Tanah Lunak	$\bar{V}_s < 175$	$\bar{N} < 15$	$\bar{S}_u < 50$
	Atau setiap profil lapisan tanah dengan ketebalan lebih dari 3 m dengan karakteristik sebagai berikut : 1. Indeks plastisitas, PI > 20, 2. Kadar air (w) $\geq$ 40%, dan 3. Kuat geser tak terdrainase $\bar{S}_u$ < 25 kPa		
F. Lokasi yang membutuhkan penyelidikan geoteknik dan analisis respons dinamik spesifik	Setiap profil lapisan tanah yang memiliki salah satu atau lebih dari karakteristik seperti : - Rentan dan berpotensi gagal terhadap beban gempa seperti likuifaksi, tanah lempung sangat sensitif, tanah tersementasi lemah - Lempung organik tinggi dan/atau gambut (dengan ketebalan > 3m) - Plastisitas tinggi (ketebalan H > 7.5m dengan PI > 75) - Lapisan lempung lunak/medium kaku dengan ketebalan H > 35m		

Catatan : N/A = tidak dapat digunakan

➢ Mencari nilai PGA

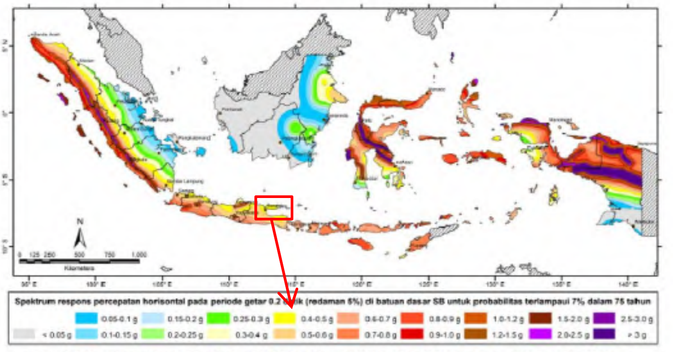


Gambar 4 - Peta percepatan puncak di batuan dasar (PGA) untuk probabilitas terlampaui 7% dalam 75 tahun

Nilai PGA didapat 0,2 – 0,25 g diambil :

Nilai PGA = 0,225 g

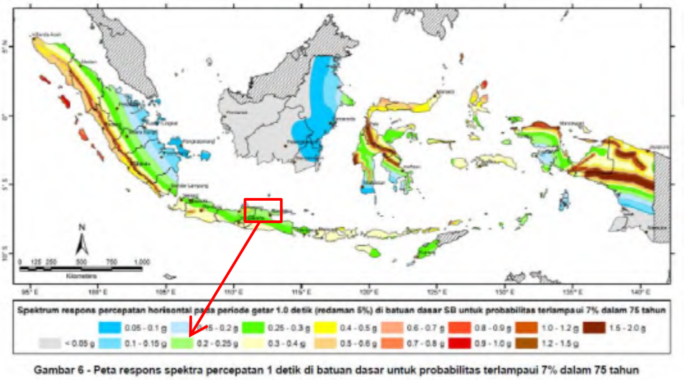
➢ Mencari nilai Ss dan S_1 :



Gambar 5 - Peta respons spektra percepatan 0.2 detik di batuan dasar untuk probabilitas terlampaui 7% dalam 75 tahun

Nilai Ss didapat 0,4 – 0,5 g diambil :

Nilai Ss = 0,455 g



Gambar 6 - Peta respons spektra percepatan 1 detik di batuan dasar untuk probabilitas terlampaui 7% dalam 75 tahun

Nilai S_1 didapat 0,2 – 0,25 g diambil :

Nilai S_1 = 0,225 g

➢ Mencari nilai F_{PGA}, Fa dan Fv.

Tabel 9.4 Faktor amplifikasi untuk periode 0 detik dan 0,2 detik (*F_{PGA}/F_a*)

Kelas situs	PGA ≤ 0,1 $S_s \le 0.25$	PGA = 0,2 $S_s = 0.5$	PGA = 0,3 $S_s = 0.75$	PGA = 0,4 $S_s = 1.0$	PGA > 0,5 $S_s \ge 1.25$
Batuan Keras (SA)	0.8	0.8	0.8	0.8	0.8
Batuan (SB)	1.0	1.0	1.0	1.0	1.0
Tanah Keras (SC)	1.2	1.2	1.1	1.0	1.0
Tanah Sedang (SD)	1.6	1.4	1.2	1.1	1.0
Tanah Lunak (SE)	2.5	1.7	1.2	0.9	0.9
Tanah Khusus (SF)	SS	SS	SS	SS	SS

Catatan : Untuk nilai-nilai antara dapat dilakukan interpolasi linier

Keterangan:

PGA adalah percepatan puncak batuan dasar mengacu pada Peta Gempa Indonesia 2010 (Gambar 1 atau Gambar 4).

S_s adalah parameter respons spektral percepatan gempa untuk periode pendek (*T*=0.2 detik) mengacu pada Peta Gempa Indonesia 2010 (Gambar 2 atau Gambar 5).

SS adalah lokasi yang memerlukan investigasi geoteknik dan analisis respons dinamik spesifik.

Diperoleh nilai faktor amplikasi untuk periode 0 detik dan 0,2 detik (Fa) yaitu 2.1, nilai faktor amplikasi untuk periode 0 detik dan 0,2 detik (F_{PGA}) yaitu 1.36 yang didapat dari perhitungan interpolasi linier.

Tabel 9.4 Besarnya nilai amplifikasi untuk periode 1 detik (Fv)

Kelas situs	$S_1 \le 0.1$	$S_1 = 0.2$	$S_1 = 0.3$	$S_1 = 0.4$	$S_1 \ge 0.5$
Batuan Keras (SA)	0.8	0.8	0.8	0.8	0.8
Batuan (SB)	1.0	1.0	1.0	1.0	1.0
Tanah Keras (SC)	1.7	1.6	1.5	1.4	1.3
Tanah Sedang (SD)	2.4	2.0	1.8	1.6	1.5
Tanah Lunak (SE)	3.5	3.2	2.8	2.4	2.4
Tanah Khusus (SF)	SS	SS	SS	SS	SS

Catatan : Untuk nilai-nilai antara dapat dilakukan interpolasi linier

Keterangan:

S_1 adalah parameter respons spektral percepatan gempa untuk periode 1 detik mengacu pada Peta Gempa Indonesia 2010 (Gambar 3 atau Gambar 6).

SS adalah lokasi yang memerlukan investigasi geoteknik dan analisis respons dinamik spesifik

Diperoleh nilai faktor amplikasi untuk periode 1 detik yaitu 2.933 yang didapat dari perhitungan interpolasi linier.

Kesimpulan :

Kondisi tanah = Tanah lunak

Percepatan batuan dasar pada periode pendek (S_s) = 0.455 g

Percepatan batuan dasar pada periode 1 detik (S_1) = 0.225 g

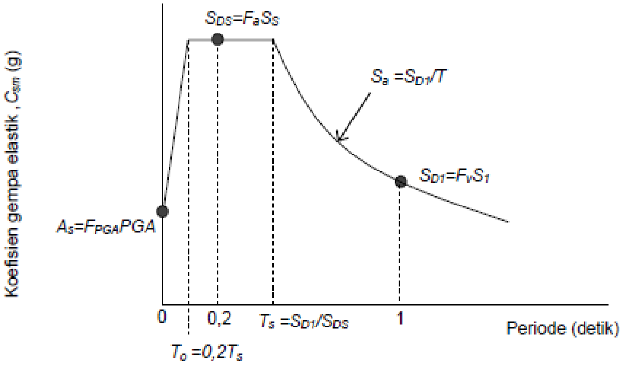
Peta percepatan puncak (PGA) dibatuan dasar = 0.225 g

Faktor amplifikasi percepatan pada periode pendek (Fa) = 2.1

Faktor amplifikasi percepatan pada periode pendek (F_{PGA}) = 1.36

Faktor amplifikasi percepatan pada periode 1 detik (Fv) = 2.933

Respon spectrum rencana :



Gambar 9.2 Bentuk tipikal respon spectra dipermukaan tanah

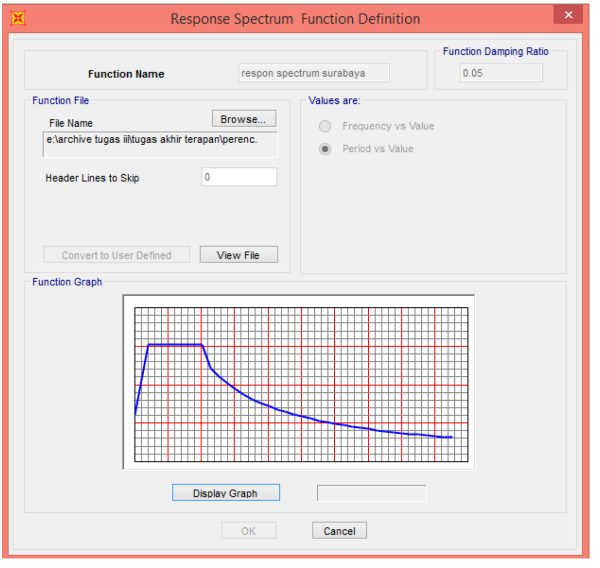
S_{D1}	= Fv x S_1	= 2.933 x 0,225	= 0.66
S_{DS}	= Fa x S_s	= 2.1 x 0.455	= 0.9555
T_s	= S_{D1}/ S_{DS}	= 0.66/0.9555	= 0.691
T_0	= 0.2 x T_s	= 0.2 x 0.691	= 0.1382
As	= F_{PGA} x PGA	= 1.36 x 0.225	= 0.306

Koefisien response gempa elastik:

1. C_{sm} = $(S_{DS} - A_s)\frac{T}{T0} + A_s$
2. C_{sm} = S_{DS}
3. C_{sm} = S_{D1} / T

T (detik)	T (detik)	C_{SM}
0	0	0.306
T0	0.1382	0.9555
Ts	0.691	0.9555
Ts+0.05	0.741	0.8907
Ts+0.1	0.791	0.8344
Ts+0.15	0.841	0.7848
Ts+0.2	0.891	0.7407
Ts+0.25	0.941	0.7014
Ts+0.3	0.991	0.6660
Ts+0.35	1.041	0.6340
Ts+0.4	1.091	0.6049
Ts+0.45	1.141	0.5784
Ts+0.5	1.191	0.5542
Ts+0.55	1.241	0.5318
Ts+0.6	1.291	0.5112
Ts+0.65	1.341	0.4922
Ts+0.7	1.391	0.4745
Ts+0.75	1.441	0.4580
Ts+0.8	1.491	0.4427
Ts+0.85	1.541	0.4283
Ts+0.9	1.591	0.4148
Ts+0.95	1.641	0.4022
Ts+1.00	1.691	0.3903
Ts+1.05	1.741	0.3791
Ts+1.10	1.791	0.3685
Ts+1.15	1.841	0.3585
Ts+1.20	1.891	0.3490
Ts+1.25	1.941	0.3400
Ts+1.30	1.991	0.3315
Ts+1.35	2.041	0.3234
Ts+1.40	2.091	0.3156
Ts+1.45	2.141	0.3083
Ts+1.50	2.191	0.3012

Grafik response spectrum setelah diinput ke SAP2000 :



Gambar 9.3 Grafik response spectrum rencana

- Kategori kinerja seismic

Tabel 9.5 Zona Gempa

Koefisien percepatan (S_{D1})	Zona gempa
$S_{D1} \leq 0,15$	1
$0,15 < S_{D1} \leq 0,30$	2
$0,30 < S_{D1} \leq 0,50$	3
$S_{D1} > 0,50$	4

Catatan : $S_{D1} = F_v \times S_1$

S_{D1} adalah nilai spektra permukaan tanah pada periode 1.0 detik

F_v adalah nilai faktor amplifikasi untuk periode 1 detik (F_v)

S_1 adalah parameter respons spektra percepatan gempa untuk periode 1.0 detik mengacu pada Peta Gempa Indonesia 2010 (Gambar 3 atau Gambar 6).

Didapatkan data berada dizona gempa 4 yaitu

S_{D1}= 0,66 > 0,50.

- Perhitungan gaya gempa rencana untuk zona gempa 4 :

  Gaya gempa modifikasi respons (R) diambil = 1.00 untuk seluruh jenis bangunan bawah dan hubungan antar elemen struktur.

  Tabel 9. Faktor modifikasi respon untuk bangunan bawah

Bangunan bawah	Kategori kepentingan		
	Sangat penting	Penting	Lainnya
Pilar tipe dinding	1,5	1,5	2,0
Tiang/kolom beton bertulang			
Tiang vertikal	1,5	2,0	3,0
Tiang miring	1,5	1,5	2,0
Kolom tunggal	1,5	2,0	3,0
Tiang baja dan komposit			
Tiang vertikal	1,5	3,5	5,0
Tiang miring	1,5	2,0	3,0
Kolom majemuk	1,5	3,5	5,0

  Catatan:
  Pilar tipe dinding dapat direncanakan sebagai kolom tunggal dalam arah sumbu lemah pilar

  Jadi, Respons modifikasi untuk struktur slab on pile diambil R = 1.00, dan untuk struktur I Girder digunakan R = 1.00

- Faktor pengali

  Untuk wilayah zona gempa 4 untuk tanah lunak untuk struktur slab on pile :

  I = 1,0
  R = 1,0
  g = 9.81 m/detik^2
  Faktor pengali = I/R x g
  = 1,0 / 1,0 x 9,81 = 9,81

  Untuk wilayah zona gempa 4 untuk tanah lunak untuk struktur I Girder :

  I = 1,0
  R = 1,0
  g = 9.81 m/detik^2
  Faktor pengali = I/R x g
  = 1,0 / 1,0 x 9,81 = 9,81

Dari hasil perhitungan SAP2000 didapatkan perubahan dari perhitungan sebelumnya :

1. Tiang pancang struktur slab on pile
    - Momen resultant yang terjadi : 89.86 Ton > 29 Ton untuk tiang pancang diameter 600 mm type C.
    - Kesimpulan : bahwa perubahan perhitungan gempa untuk struktur *slab on pile* menggunakan RSNI3 Perancangan Jembatan terhadap Beban Gempa 2013 tidak dapat memenuhi syarat.

2. Tiang pancang struktur pilar 2-4
    - Momen resultant yang terjadi : 125.40 Ton > 29 Ton untuk tiang pancang diameter 600 mm type C.
    - Kesimpulan : bahwa perubahan perhitungan gempa untuk struktur I Girder Pilar 2- pilar 3 menggunakan RSNI3 Perancangan Jembatan terhadap Beban Gempa 2013 tidak dapat memenuhi syarat.
    -
3. Tiang pancang struktur pilar 1
    - Momen resultant yang terjadi : 122.92 Ton > 29 Ton untuk tiang pancang diameter 600 mm type C.
    - Kesimpulan : bahwa perubahan perhitungan gempa untuk struktur I Girder Pilar 1 menggunakan RSNI3 Perancangan Jembatan terhadap Beban Gempa 2013 tidak dapat memenuhi syarat.

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BIODATA PENULIS

Penulis memiliki nama lengkap Rizka Febyanti. Penulis lahir dari orang tua bernama Drs. Syahrir Kila M.Si dan Rosdiana Hafid S.Sos. Penulis dilahirkan di Kota Ujung Pandang yang saat ini dikenal dengan nama Kota Makassar, Provinsi Sulawesi Selatan pada tanggal 28 Februari 1993, dan merupakan anak kedua dari 2 bersaudara. Penulis telah menempuh pendidikan formal dimulai dari TK Kalegowa, SDN Inpres Tetebatu, SMPN 1 Pallangga, dan SMKN 2 Makassar mengambil jurusan Teknik Gambar Bangunan. Setelah lulus dari SMKN 2 Makassar pada tahun 2011, penulis melanjutkan kuliah di Program Studi D-III Jurusan Teknik Sipil di Politeknik Negeri Ujung Pandang dengan mengambil konsentrasi Program Studi Teknik Konstruksi Gedung dan lulus pada tahun 2014. Setelah lulus penulis melanjutkan pendidikan di Lanjut Jenjang Diploma IV Teknik Sipil di Institut Teknologi Sepuluh Nopember Surabaya (ITS) pada tahun 2015 dengan mengambil konsentrasi studi di Bangunan Transportasi.

Motto penulis "*You only live once but if you do it right, once is totally enough*".

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