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**ANALISIS STABILITAS LERENG  
MENGUNAKAN SOFTWARE GEO-SLOPE  
dan PERKUATAN LERENG DENGAN ANGKUR**

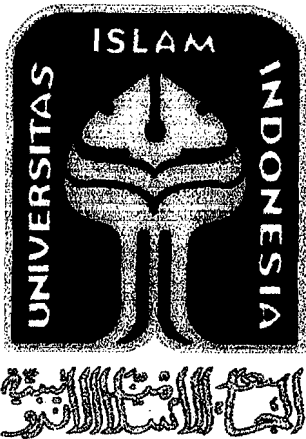
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disusun oleh:

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• Sub. manual  
• Software geo-slope

**JURUSAN TEKNIK SIPIL  
FAKULTAS TEKNIK SIPIL DAN PERENCANAAN  
UNIVERSITAS ISLAM INDONESIA  
YOGYAKARTA  
2005**

**LEMBAR PENGESAHAN**

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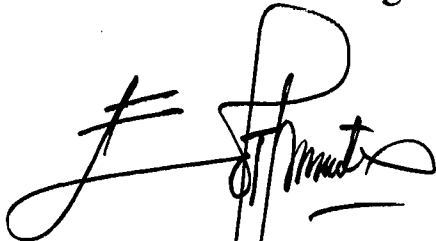
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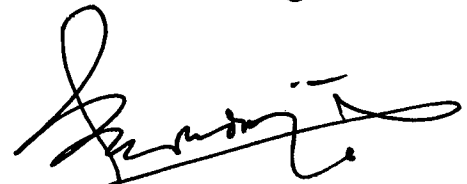
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Tanggal: 05-07-'05

Dosen Pembimbing II



Ir. H. Ibnu Sudarmadji, MT.

Tanggal: 07/7 '05

*"Dan yang indah adalah: memahaminya melalui lebih dari memahaminya diri sendiri. Niscaya 1000 perkembangan akan dimenangkan."*

*(Sun Tzu: Strategi Perang China)*

*"Jika gunanya hidup lama namun tak berarti banyak, mengapa dilahirkan: jika lebih baik jika hidup singkat namun bermakna, mengapa dunia akan mengingat kita, dalam sebulan, sebulan bahkan sebulan kedepan?"*

*(Miyamoto Musashi: Samurai)*

*"Wahai orang-orang beriman! Jadikanlah sabar dan shalat sebagai penolongmu, sesungguhnya Allah beserta orang-orang yang sabar"*

*(Q.S. 2: 153)*

*"Dan telah membentur pendengaranmu, penglihatanmu, dan hati, agar kamu bersyukur." (Q.S. 16: 78)*

*"Dan janganlah kamu sekali-kali mengatakan terhadap sesuatu, 'Sesungguhnya aku akan mengesakan itu esok pagi, kecuali menguapkannya' (Q.S. 18: 23-24)*

*"Dan telah membentur pendengaranmu, penglihatanmu, dan hati, agar kamu bersyukur." (Q.S. 16: 78)*



menjadi makhluk yang lebih baik. Kami kita sama-sama menyangka Bumi kita  
sitas kehidupannya dan andinya dalam membentarkan aku, menempha aku

Alhamdul selamtu penghuni Bumi.....

juwa dan menghayati dunia

bangsa dan menyunjikan kepada dunia belaka besar bangsa kita. Besar akan  
Sesama Sytit angkatan 2000. mari kita bersama-sama berjuang membentarkan

Alhamdul karaman sepeyangan-ku.....

semua hambatan angler ilmu pengetahuan yang menyebarkan juwa yang kering.  
sitas pengeluhannya yang tak terbatas, kesabarananya dalam membimbing dan

Alhamdul dosen-ku.....

sengakan muatan fanaa maupun nilai-nilai muatan hujara

sitas keikhlasan waktunya dan kasih sayang yang tak terbatas di setiap

Alhamdul keluarga-ku.....

depan

sitas kesempitan di masa lalu, semangat di masa kini dan impian di masa

Alhamdul Tuhan-ku.....

福  
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## KATA PENGANTAR

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Assalamu'alaikum wr. wb.

Puji serta syukur dipanjatkan kehadirat Allah SWT yang telah melimpahkan rahmat dan hidayah-Nya dan yang telah membukakan hati serta pikiran penulis sehingga dapat dengan lancar menyelesaikan tugas akhir yang berjudul *Analisis Stabilitas Lereng menggunakan Software Geo-Slope dan Perkuatan Lereng dengan Angkur*. Shalawat serta salam tidak lupa pula dihaturkan kepada Nabi kita bersama Muhammad SAW pembawa risalah petunjuk untuk mencapai kebahagiaan baik di dunia maupun di akhirat.

Tugas akhir ini disusun untuk memenuhi syarat mencapai gelar Sarjana Teknik pada Jurusan Teknik Sipil, Fakultas Teknik Sipil dan Perencanaan, Universitas Islam Indonesia. Dengan penelitian ini diharapkan dapat mendatangkan manfaat bagi masyarakat umumnya dan perkembangan ilmu pengetahuan pada khususnya.

Dalam penulisan tugas akhir ini tidak terlepas dari banyaknya bantuan moril maupun materil dari berbagai pihak, pada kesempatan ini, dengan tulus dan ikhlas penulis mengucapkan terimakasih yang sebesar-besarnya kepada:

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Yogyakarta, Juni 2005

Penulis

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## DAFTAR NOTASI

$\gamma$  = berat volume tanah ( $\text{kN/m}^3$ )

$SF_{\min}$  = safety factor minimum (faktor aman minimum)

SF = faktor aman

$\Delta V$  = perubahan volume ( $\text{m}^3$ )

$V$  = volume awal ( $\text{m}^3$ )

$\mu$  = angka Poisson

$E$  = modulus elastis

$\sigma_x, \sigma_y, \sigma_z$  = tegangan-tegangan dalam arah x, y dan z. ( $\text{kN/m}^2$ )

$\Delta\sigma$  = tambahan tegangan (*stress increment*), ( $\text{kN/m}^2$ )

$\Delta\sigma_z$  = tambahan tegangan vertikal arah z ( $\text{kN/m}^2$ )

$\Delta\sigma_r$  = tambahan tegangan mendatar dalam arah radial ( $\text{kN/m}^2$ )

$\Delta\sigma_\theta$  = tambahan tegangan mendatar arah tangensial ( $\text{kN/m}^2$ )

$\tau_{rz}$  = tegangan geser ( $\text{kN/m}^2$ )

$P$  = beban titik (kN)

$\pi$  = nilai ketentuan (3,14)

$z$  = jarak arah vertikal (m)

$A$  = Luasan ( $\text{m}^2$ )

$I_B$  = pengaruh beban titik untuk teori Boussinesq

$I_W$  = pengaruh beban titik untuk teori Wastergaard.

$\Delta\sigma_x$  = tambahan tegangan vertikal arah x ( $\text{kN/m}^2$ )

$x$  = jarak arah mendatar (m)

$Q/m$  = beban /satuan panjang ( beban garis )

$Q$  = beban terbagi merata ( $\text{kN/m}^2$ )

$\tau$  = tahanan geser maksimum yang dapat dikerahkan oleh tanah ( $\text{kN/m}^2$ )

$\tau_d$  = tegangan geser yang terjadi akibat gaya berat tanah yang akan longsor ( $\text{kN/m}^2$ )

$c$  = kohesi tanah ( $\text{kN/m}^2$ )

$\sigma$  = tegangan normal pada bidang runtuh ( $\text{kN/m}^2$ )

$\phi$  = sudut gesek dalam tanah (derajat)

$\tau_d$  = tegangan geser yang terjadi akibat beban tanah dan beban lain pada bidang longsornya ( $\text{kN/m}^2$ )

$c_d$  = kohesi dalam yang terjadi atau yang dibutuhkan untuk keseimbangan bidang longsornya ( $\text{kN/m}^2$ )

$\phi_d$  = sudut gesek dalam yang terjadi atau yang dibutuhkan untuk keseimbangan pada bidang longsornya ( $\text{kN/m}^2$ )

$SF_c$  = faktor aman pada komponen kohesi

$SF_\phi$  = faktor aman pada komponen gesekan

$X_r$  dan  $X_1$  = gaya geser ( $\text{kN/m}^2$ )

$E_r$  dan  $E_1$  = gaya normal efektif ( $\text{kN/m}^2$ )



$T_i$  = resultan gaya geser efektif

$N_i$  = resultan gaya normal efektif

$U_1$  dan  $U_r$  = Tekanan air pori bekerja di kedua sisi irisan ( $\text{kN/m}^2$ )

$U_f$  = tekanan air pori bekerja pada dasar irisan. ( $\text{kN/m}^2$ )

$u$  = tekanan air pori ( $\text{kN/m}^2$ )

$c'$  = kohesi tanah efektif ( $\text{kN/m}^2$ )

$\phi'$  = sudut gesek dalam tanah efektif (derajat)

$b_i$  = lebar irisan ke- $i$  (m)

$W_i$  = berat irisan tanah ke- $i$  (kN)

$\theta_i$  = sudut yang didefinisikan dalam (derajat)

$u_i$  = tekanan air pori pada irisan ke- $i$  ( $\text{kN/m}^2$ )

$r_u$  = rasio tekanan pori

$b$  = lebar irisan (m)

$\gamma$  = berat volume tanah ( $\text{kN/m}^3$ )

$h$  = tinggi irisan rata-rata (m)

$M_f$  = nilai untuk mempermudah hitungan secara manual (cara Bishop)

$Q_f$  = kapasitas beban ultimit angkur ( $\text{kN/m}^2$ )

$A$  = rasio tekanan normal pada daerah pertemuan terhadap tekanan efektif akibat tanah di

Atasnya

$B$  = faktor daya dukung

$h$  = kedalaman lapisan tanah di atasnya (m)

$L$  = panjang angkur terjepit (m)

$D$  = diameter angkur terjepit (mm)

$d$  = diameter lubang bor (mm)

$\gamma_w$  = berat unit air ( $\text{kN/m}^3$ )

$C_v$  = koefisien konsolidasi

$D_z$  = tebal lapisan lempung (m)

$\Delta p$  = kelebihan tekanan air pori ( $\text{kN/m}^2$ )

$t$  = waktu saat konsolidasi masih berlangsung (detik)

$H$  = Jarak lintasan drainasi terpanjang. (m)

$U_i$  = Distribusi kelebihan tekanan air pori awal yang bentuknya dapat berupa lengkungsinus, atau bentuk- lainnya.

$T_v$  = faktor waktu (*time factor*).

## INTISARI

Terhitung dari awal musim hujan 2003/2004 hingga bulan Mei 2004, bencana alam terbanyak yang terjadi di Indonesia adalah banjir dan tanah longsor, tercatat sebanyak 174 kejadian dengan korban jiwa 334 orang meninggal, 142 orang hilang dan 109.973 orang mengungsi. Dengan kerusakan dan kerugian materil yang tidak terhitung. Karenanya, diperlukannya penelitian tentang kelongsoran dan solusi mengatasinya, sehingga diharapkan dapat mengurangi intensitas terjadinya bencana tanah longsor yang menimbulkan kerugian yang tidak sedikit.

Dari latar belakang di atas, telah dilakukan analisis pada model lereng yang dipengaruhi oleh perubahan elevasi muka air tanah, kemiringan dan pembebanan dengan menggunakan *software* Geo-Slope versi 5 dari Geo-Slope International Ltd., sedangkan metode yang digunakannya adalah Metode Irisan Bishop. Semua pemodelan lereng mempunyai properties tanah yang sama, yaitu memiliki dua lapisan tanah yang berbeda. Jenis tanah pada lapisan atas adalah pasir berlanau ( $\gamma_1 = 10,56$  kN/m<sup>3</sup>,  $\phi_1 = 28^\circ$ ,  $c_1 = 4,2$  kPa) dan untuk lapisan bawah adalah pasir berkerikil ( $\gamma_2 = 14,87$  kN/m<sup>3</sup>,  $\phi_2 = 38^\circ$ ,  $c_2 = 3,5$  kPa).

Suatu lereng dikatakan aman terhadap kelongsoran, jika angka aman (*safety factor*) pada lereng tersebut lebih besar dari 1,00 (SF>1,00). Pada pemodelan lereng dengan elevasi muka air tanah yang berubah didapatkan fakta bahwa semakin tinggi muka air tanah pada suatu lereng maka angka keamanannya (*safety factor*) semakin kecil. Angka keamanan terkecil yang didapat adalah 0,101 yaitu pada lereng dengan elevasi muka air tanah pada +0 m dari puncak lereng. Pada pemodelan lereng dengan kemiringan lereng yang berubah didapatkan fakta bahwa semakin kecil sudut kemiringan (landai) suatu lereng maka angka keamanannya (*safety factor*) akan semakin besar. Angka keamanan terkecil yang didapat adalah 0,209 yaitu pada lereng dengan kemiringan 70°. Pada pemodelan lereng dengan jumlah pembebanan pada puncak lereng yang berubah didapatkan fakta bahwa semakin besar beban yang bekerja pada puncak lereng maka angka keamanannya (*safety factor*) semakin kecil. Angka keamanan terkecil yang didapat adalah 0,189 yaitu pada lereng yang mengalami pembebanan sebesar 200 kN/m<sup>2</sup> pada puncak lereng. Dianalisis pula besarnya kenaikan angka aman pada lereng jika menggunakan perkuatan angkur. Didapatkan fakta bahwa dengan penggunaan 6 buah angkur yang dipasang horizontal dan dengan jarak tertentu, meningkatkan angka aman hingga 551,8%.

## BAB I

### PENDAHULUAN

#### 1.1. Latar Belakang

Terjadinya berbagai bencana alam yang terjadi di negara ini selalu menyisakan duka bagi rakyat. Meski banyak retorika yang dibangun untuk mengatasi hal ini, baik pada masa Orde Baru maupun pada masa Orde Reformasi. Namun, seringkali tidak diikuti dengan tindakan dan kebijakan nyata. Baik dalam hal pencegahan maupun penanganan pada setiap bencana yang terjadi. Hal ini dapat dilihat dari poling yang dilakukan oleh Yellow Pages ([www.Yellowpages.com/Yellowpolling](http://www.Yellowpages.com/Yellowpolling)) pada tanggal 7 Desember 2004, yang menghasilkan 71,31 % berpendapat bahwa pemerintah cenderung lambat dalam menangani setiap bencana yang terjadi, dan 17,21 % berpendapat bahwa pemerintah bereaksi secara cepat dan baik, sedangkan sisanya 11,48 % tidak ada tanggapan.

Berdasarkan data, bencana alam yang terjadi di Indonesia sejak tahun 1998 hingga pertengahan tahun 2003 dapat dilihat sebagai berikut:

Tabel 1.1. Jenis dan frekuensi kejadian berbagai bencana alam di Indonesia.

Jenis	Jumlah kejadian	Korban jiwa	Kerugian (juta rupiah)
Banjir	302	1066	191.312
Longsor	245	645	13.928
Gempa bumi	38	306	100.000
Gunung berapi	16	2	n.a
Angin topan	46	3	4.015
<b>jumlah</b>	<b>647</b>	<b>2022</b>	

Sumber: Bakornas PB

Sehingga dapat dilihat bahwa bencana alam banjir dan tanah longsor mendominasi hingga mencapai 85 % dari jumlah bencana alam keseluruhan yang terjadi.

Sedangkan pada kurun waktu dari awal musim hujan 2003/2004 hingga tanggal 5 Mei 2004, tercatat jumlah bencana alam banjir dan longsor di seluruh Indonesia terjadi sebanyak 174 kejadian, yang menelan korban 334 orang meninggal, 142 orang hilang dan 109.973 orang mengungsi, serta puluhan ribu rumah dan fasilitas umum yang tergenang dan hancur. Sedangkan di Jawa Tengah sendiri terjadi 37 kali kasus banjir dan tanah longsor, yaitu urutan ke-2 terbanyak setelah Jawa Timur yang dilanda banjir dan tanah longsor sebanyak 47 kali (sumber: Dep. Kimpraswil). Untuk lebih detilnya jumlah kejadian, korban jiwa dan kerugian yang ditimbulkan bencana banjir dan tanah longsor di setiap propinsi dapat dilihat pada lampiran 1.

Banjir dan tanah longsor memang fenomena alam yang sulit diduga dan dihadapi. Penyebab banjir dan tanah longsor adalah dampak sekunder dari cuaca ekstrim berupa curah hujan diatas normal yang terjadi pada suatu kawasan. Namun, apabila dilihat dari perspektif kausalitas, dapat ditarik suatu hubungan sebab akibat terjadinya bencana banjir yang seringkali disertai tanah longsor, dengan rusaknya fungsi kawasan hutan. Hal ini telah dibuktikan dengan data riil berdasarkan pencitraan satelit pengindraan jauh, ternyata pada setiap daerah banjir dan tanah longsor ditemukan kawasan lahan terbuka akibat penggundulan hutan dan perubahan fungsi lahan. Rusaknya fungsi kawasan hutan yang disebabkan penebangan liar dan perambahan menyebabkan fungsi ekologis hutan dan lahan menurun dan itu semua adalah ulah manusia sendiri.

Berkaitan dengan penggundulan dan perambahan hutan, di Jawa Tengah sendiri tercatat 179 Ha lahan hutan rusak akibat perambahan hutan pada tahun 1996, dan berkembang menjadi 2.809 Ha pada tahun 1999. sehingga 10 kabupaten di Jawa Tengah digolongkan daerah rawan tanah longsor, daerah tersebut antara lain:

Kebumen, Banyumas, Banjarnegara, Purworejo, Wonosobo, Magelang, Semarang, Kudus, Temanggung dan Cilacap. Sedangkan di Jawa Barat tercatat luas hutan pada

tahun 1990 adalah seluas 791.519 Ha atau sekitar 22 % dari luas keseluruhan Jawa Barat, jumlah tersebut menyusut drastic hingga 32.802 Ha pada tahun 2002 atau hanya 9 % dari luas keseluruhan Jawa Barat yaitu 3.555.502 Ha. Jumlah tersebut diperkirakan akan terus bertambah, dan jabar akan terus menjadi wilayah yang rawan terhadap banjir dan tanah longsor ( sumber: [www.WALHI.com](http://www.WALHI.com) ).

Secara teknis kelongsoran suatu lereng dipengaruhi oleh gaya- gaya yang bekerja pada lereng tersebut, antara lain gaya berat atau gaya air dan gaya gempa. Gaya-gaya ini menghasilkan tegangan geser pada seluruh massa tanah, dan suatu gerakan akan terjadi kecuali tahanan geser pada setiap permukaan runtuh yang mungkin terjadi lebih besar dari tegangan geser yang bekerja. Tahanan geser tergantung pada kuat geser tanah dan faktor-faktor alamiah lainnya, seperti terdapatnya air dari rembesan dan atau infiltrasi curah hujan serta akar-akar, serpihan-serpihan es, tanah beku, ataupun bantuan yang telah mengalami gangguan di sepanjang permukaan gelincirnya. Binatang, rayap ataupun akar-akar yang membusuk dapat menghasilkan mekanisme keruntuhan progresif yang menyebabkan suatu keruntuhan lereng/longsor.

Pada kaitannya dengan penjelasan di atas, bangunan kampus D3 Ekonomi, Universitas Islam Indonesia yang berada di Jalan Kaliurang km 14,5, adalah bangunan yang cukup tinggi (4 lantai), sedangkan bangunan yang tinggi cenderung lemah terhadap momen guling. Dengan lebar bangunan yang tetap, dan agar momen guling dapat diredam, maka pada kampus D3 Ekonomi tersebut dibuat suatu struktur yang dapat meredam momen guling tersebut, yaitu struktur *basement*. Ketika proyek pembangunan kampus ini berlangsung, tanah yang digali secara umum adalah sejenis

*sandy clay* (data lab UII) yang didominasi oleh pasir. Dengan keadaan seperti ini maka resiko kelongsoran tanahnya menjadi cukup besar.

Dari latar belakang tersebut di atas, maka peneliti tertarik untuk melakukan pengkajian ulang sekaligus mempelajari tentang fenomena kelongsoran lereng. Khususnya pada proyek galian pondasi dan *basement* yang sudah dilakukan pada pembangunan kampus D3 Ekonomi UII. Sehingga diharapkan dapat berguna untuk analisis stabilitas lereng di tempat lain namun dengan properties tanah yang serupa.

## 1.2 Rumusan Masalah

Dari penjelasan latar belakang di atas dapat dirumuskan beberapa masalah sebagai berikut:

1. Bagaimanakah pengaruh dari elevasi muka air tanah, kemiringan, dan pembebanan terhadap perubahan bidang longsor (*slip surface*) dan angka keamanan (*safety factor*) jika dianalisis menggunakan Geo-Slopc.
2. Bagaimanakah pengaruh penggunaan perkuatan angkur pada lereng terhadap angka aman (*safety factor*).

## 1.3 Tujuan Penelitian

Adapun tujuan yang diharapkan dapat tercapai adalah sebagai berikut ini:

1. Mengetahui pengaruh elevasi muka air tanah, kemiringan, dan pembebanan terhadap perubahan bidang kelongsoran (*slip surface*) dan angka keamanan (*safety factor*) menggunakan program Geo-Slope versi 5 dari Geo-Slope International Ltd.
2. Menghitung besarnya angka aman (*safety factor*) dari lereng yang menggunakan perkuatan angkur.

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#### 1.4 Batasan Masalah

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Berdasarkan uraian di atas dan mengingat banyaknya faktor penyebab yang mempengaruhi stabilitas lereng, dan agar penelitian ini tidak menyimpang dan sesuai dengan tujuan yang ingin dicapai, maka diperlukan adanya batasan masalah, antara lain:

1. Analisis stabilitas lereng menggunakan variabel bebas (*independent*);
  - a. Untuk analisis perubahan elevasi muka air tanah, maka pembebanan dan kemiringan lereng konstan.
  - b. Untuk analisis perubahan beban pada lereng, maka elevasi muka air tanah dan kemiringan lereng konstan.
  - c. Untuk analisis perubahan kemiringan lereng, maka elevasi muka air tanah dan pembebanan konstan.
2. Akan dicoba perkuatan lereng menggunakan angkur pada setiap model yang dibuat, sehingga hasilnya dapat dibandingkan dengan yang tanpa perkuatan.
3. Variabel tergantung (*dependent*) adalah bidang longsor (*slip surface*) dan angka keamanan (*safety factor*).
4. Longsoran yang ditinjau adalah *Rotational Slide*.
5. Kelongsoran lereng terjadi di sepanjang permukaan bidang longsor tertentu dan dianggap sebagai masalah bidang dua dimensi.
6. Lereng mempunyai dua lapis tanah yang berbeda.
7. Beban gempa tidak diperhitungkan.
8. Analisis menggunakan *software* Geo-Slope versi 5 dari Geo-Slope International Ltd.

### **1.5 Manfaat Penelitian**

Dari hasil penelitian yang diperoleh, diharapkan dapat memberikan manfaat berikut ini:

1. Memberikan pemahaman tentang perilaku bidang longsor pada lereng.
2. Menambah pengetahuan tentang faktor-faktor yang dapat mendukung dan mengurangi stabilitas suatu lereng.
3. Memberikan gambaran kepada masyarakat yang akan mendirikan suatu bangunan di daerah lereng agar pembangunannya dilakukan di luar bidang longsor.
4. Merangsang pihak lain untuk melakukan penelitian berikutnya tentang stabilitas lereng ditinjau dari faktor internal ataupun eksternal, khususnya bagi mahasiswa Teknik Sipil di Indonesia.



## BAB II

### TINJAUAN PUSTAKA

Untuk menghindari duplikasi, di bawah ini beberapa penelitian yang pernah dilakukan, yang dipergunakan sebagai tinjauan pustaka dari penelitian ini:

**2.1. Ratih Wijayanti dan Maryanto (2000)** Yang penelitiannya berjudul *Analisis stabilisasi lereng dengan perkuatan Geotekstil pada jalan tol seksi C Semarang*.

Penelitian mereka mengambil topik tentang stabilitas lereng dengan perkuatan Geotekstil menggunakan analisis program computer *MRSS*. Dalam penelitian ini dijelaskan pada lereng yang curam kelongsoran akan mungkin terjadi. Dan untuk mencegah kelongsoran tersebut, maka dibuatlah konstruksi perkuatan tanah (lereng). Salah satunya dengan menggunakan geotekstil. Studi kasus ini menganalisis Faktor keamanan lereng tanpa dan dengan perkuatan geotekstil, dan lereng dengan terasiring. Hasil yang didapat menunjukkan bahwa pada lereng dengan perkuatan Geotekstil mempunyai Faktor keamanan lebih besar daripada tanpa perkuatan maupun lereng dengan terasiring. Dengan  $\gamma = 17,774 \text{ kN/m}^3$ , hasil dari penelitian mereka didapatkan kenyataan bahwa pada sudut kemiringan lereng yang sama, adanya perkuatan lereng dengan Geotekstil meningkatkan faktor aman berkisar antara 441% - 562,9% daripada faktor keamanan stabilitas lereng tanpa perkuatan geotekstil. Sedangkan pada lereng dengan adanya terasiring akan meningkatkan faktor keamanan berkisar antara 21% - 46%. Dan untuk spasi vertikal yang sama, penurunan sudut kemiringan lereng dari  $75^\circ$  menjadi  $45^\circ$  akan meningkatkan faktor keamanan antara 22,7% sampai dengan 112,5%.

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**2.2. Lalu Ardian Bagus N. dan Sri Wahyuni (2002).** Penelitiannya berjudul

*Stabilitas lereng dan biaya alat berat pada penggalian tanah (studi kasus pada*

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*proyek pembangunan gedung D3 ekonomi UII Yogyakarta ).* Kedua peneliti ini menghitung faktor keamanan lereng dengan metode Fellinius. Analisis stabilitas lereng cara Fellinius (1927) menganggap gaya-gaya yang bekerja pada sisi kanan-kiri dari sembarang irisan mempunyai resultan nol pada arah tegak lurus bidang longsornya. Hasil penelitian ini menunjukkan bahwa semakin besar sudut kemiringan lereng pada galian, maka SF juga akan semakin besar, hal ini disebabkan oleh naiknya tegangan geser tanah akibat bertambahnya berat tanah pada bidang longsor. Lereng yang diteliti mempunyai 2 lapisan tanah yang berbeda dengan tinggi yang sama yaitu 2 m, mempunyai  $\gamma$  pada lapisan tanah atas  $15,87 \text{ kN/m}^3$  dan  $\gamma$  pada lapisan tanah bawah  $13,87 \text{ kN/m}^3$ . Dari penelitian mereka di atas didapatkan kesimpulan bahwa dari hasil hitungan stabilitas lereng, berdasarkan tanah pada BH 1 galian akan aman bila digali dengan sudut kemiringan  $60^\circ$ , dan berdasarkan tanah pada BH 11 galian akan aman bila digali dengan sudut kemiringan  $75^\circ$ .

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**2.3. Arif Rochman Hakim dan Choir Munajad (2004).** Kedua peneliti ini

mengambil penelitian dengan judul *Studi Eksperimental kelongsoran lereng tanah dan Analisis stabilitas lereng dengan menggunakan metode kesetimbangan.*

Berdasarkan hasil penelitian yang telah dilakukan terhadap tanah yang diambil dari Desa Plipir Kecamatan Purworejo didapatkan hasil bahwa berdasarkan data hasil pengujian data hasil pengujian sifat fisik dan mekanik tanah dengan sistem klasifikasi tanah *Unified Classification System* (USCS), maka secara fisik tanah yang diambil dari desa Plipir termasuk golongan berbutir halus dan secara mekanik tanah tersebut termasuk golongan tanah lanau tak organik atau pasir halus diatome, lanau elastis

(MH). Lereng yang diteliti terdiri dari 3 lapisan tanah berbeda dengan nilai berat jenis tanah masing-masing sebesar  $\gamma_1 = 1,1 \text{ ton/m}^3$ ,  $\gamma_2 = 1,26 \text{ ton/m}^3$  dan  $\gamma_3 = 1,33 \text{ ton/m}^3$ .

Kemudian, berdasarkan hasil analisis stabilitas lereng menggunakan program Geo-Slope didapatkan nilai aman minimum ( $SF_{\min}$ ) adalah sebagai berikut ini :

a.  $SF_{\min}^{\text{Bishop}} = 1,111$

b.  $SF_{\min}^{\text{Janbu}} = 1,232$

c.  $SF_{\min}^{\text{Ordinary}} = 1,292$

Berdasarkan hasil tersebut, dapat disimpulkan lereng aman terhadap longsor tanpa adanya pengaruh intensitas hujan.

**2.4. Ari Eko Tulus Kurniawan dan M. Ali Ayudin AR. (2003).** Judul penelitiannya adalah *Studi Tentang Stabilitas Lereng Berdasarkan Metode Fellinius dan Metode Bishop Terhadap Variasi Tebal Pias dan Sudut Kemiringan (Studi kasus proyek gedung kampus D3 Ekonomi UII, Yogyakarta)*. Analisis Stabilitas Lereng pada penelitian ini menggunakan Metode Irisan yaitu metode Fellinius dan Metode Bishop yang Disederhanakan, dengan penggunaan aplikasi program Excel dan Geo-Slope. Lereng yang diteliti terdiri dari 3 lapisan tanah yang berbeda, mempunyai  $\gamma$  pada lapisan tanah atas  $10,56 \text{ kN/m}^3$ , lapisan tanah tengah  $14,87 \text{ kN/m}^3$  dan  $\gamma$  pada lapisan tanah bawah  $14,35 \text{ kN/m}^3$ . Hasil yang didapat dari penelitian ini adalah bahwa nilai F dari program Excel dengan menggunakan Metode Fellinius dan metode Bishop untuk sudut  $45^\circ$ ,  $60^\circ$ ,  $75^\circ$  dan  $90^\circ$  mempunyai nilai di atas 1. nilai F ini dianggap belum minimum, karena hanya dihitung dengan R dan sudut AOC yang tetap untuk setiap kemiringan. Sedangkan untuk perhitungan menggunakan program Geo-Slope didapatkan hasil:

Tabel 2.1. Nilai *Safety Factor* dengan metode Bishop dan Metode Fellinius akibat pengaruh dari kemiringan lereng ( $\gamma_1 = 10,56 \text{ kN/m}^3$ ,  $\gamma_2 = 14.87 \text{ kN/m}^3$  dan  $\gamma_2 = 14.35 \text{ kN/m}^3$ ).

Sudut Kemiringan	<i>Safety Factor</i>	
	Metode Bishop	Metode Fellinius
45°	1,305	1,258
60°	0,988	0,974
75°	0,756	0,775

Sehingga dapat disimpulkan bahwa nilai  $F$  yang paling aman adalah pada kemiringan 45°, karena nilai  $F$  yang paling aman adalah  $F > 1$ .

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**BAB III**

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**LANDASAN TEORI**

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**3.1 Tinjauan Umum**

Pada permukaan tanah yang tidak horizontal, komponen gravitasi cenderung untuk menggerakkan tanah kebawah. Jika komponen gravitasi sedemikian besar sehingga perlawanan terhadap geseran yang dapat dikerahkan oleh tanah pada bidang longsonya terlampaui, maka akan terjadi kelongsoran lereng (*slip*). Analisis stabilitas pada permukaan tanah yang miring ini, disebut analisis stabilitas lereng. Analisis ini sering digunakan dalam perancangan-perancangan bangunan seperti: jalan kereta api, jalan raya, bandara, bendungan urugan tanah, saluran dan lain-lainnya. Umumnya, analisis stabilisasi dilakukan untuk mengecek keamanan dari lereng alam, lereng galian dan lereng urugan tanah.

Analisis stabilitas lereng tidak mudah, karena terdapat banyak faktor yang sangat mempengaruhi hasil hitungan. Faktor-faktor tersebut misalnya, kondisi tanah yang berlapis-lapis, kuat geser tanah yang anisotropis, aliran rembesan air dalam tanah dan lain-lainnya. Terzaghi (1950) membagi penyebab longsor lereng terjadi dari akibat pengaruh dalam (*internal effect*) dan pengaruh luar (*external effect*). Pengaruh luar, yaitu pengaruh yang menyebabkan bertambahnya gaya geser dengan tanpa adanya perubahan kuat geser tanah. Contohnya, akibat perbuatan manusia mempertajam kemiringan lereng, memperdalam galian tanah ataupun faktor alam seperti erosi sungai. Pengaruh dalam, yaitu longsor yang terjadi dengan tanpa

## 3.2 Lereng

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Lereng merupakan suatu permukaan tanah yang memiliki perbedaan elevasi cukup besar pada kedua titik yang berjarak relatif kecil sehingga menimbulkan sudut tertentu terhadap bidang horizontal dan tidak dilindungi.

### 3.2.1. Bentuk lereng

Lereng atau talud dapat terjadi secara alamiah atau buatan. Berikut ini adalah macam-macam lereng menurut kejadiannya;

#### 1. Lereng Alam

Lereng alam terbentuk karena proses alam. Lereng-lereng alam yang telah ada selama bertahun-tahun dapat tiba-tiba runtuh dikarenakan adanya perubahan topografi, gempa, aliran air tanah, hilangnya kuat geser, perubahan tegangan, dan cuaca. Biasanya keruntuhan-keruntuhan tersebut tidak dipahami secara baik karena sedikitnya studi yang dilakukan pada lereng-lereng alam itu.

Mengetahui adanya bidang runtuh lama pada lereng alam dapat memudahkan untuk memahami dan memprediksi perilaku lereng tersebut. Selain sering kali disebabkan oleh aktivitas tektonik dan longsoran tanah sebelumnya, bidang runtuh juga dapat disebabkan oleh pengaruh sungai glacial dan fenomena glacial seperti pengembangan/pemuaian tanah lempung yang tidak seragam.

#### 2. Lereng buatan tanah asli

Lereng ini dibuat dari tanah asli dengan memotong tanah tersebut untuk pembuatan jalan atau saluran air untuk irigasi

#### 3. Lereng buatan tanah yang di padatkan

Tanah di padatkan untuk tanggul-tanggul jalan raya atau bendungan.

### 3.2.2. Penyebab kelongsoran lereng

Pada penjelasan di depan telah disebutkan dua penyebab utama kelongsoran

lereng yaitu akibat pengaruh dalam (*internal effect*) dan akibat pengaruh luar (*external effect*). Namun secara rinci beberapa penyebab kelongsoran suatu lereng adalah sebagai berikut:

1. Penambahan beban pada lereng. Tambahan beban lereng dapat berupa bangunan baru, tambahan beban oleh air yang masuk ke pori-pori tanah maupun yang menggenangi di permukaan tanah dan beban dinamis oleh tumbuh-tumbuhan yang tertiuap angin dan lain-lain.
2. Penggalian dan pemotongan tanah pada kaki lereng.
3. Penggalian yang mempertajam kemiringan lereng.
4. Perubahan posisi muka air secara cepat (*rapid drawdown*) (pada bendungan, sungai dan lain-lain).
5. Kenaikan tekanan lateral oleh air (air yang mengisi retakan akan mendorong tanah ke arah lateral).
6. Gempa bumi.
7. Penurunan tahanan geser tanah pembentuk lereng oleh akibat kenaikan kadar air, kenaikan tekanan air pori, tekanan rembesan oleh genangan air di dalam tanah, tanah pada lereng mengandung lempung yang mudah kembang susut dan lain-lain.

Selain beberapa bentuk penyebab di atas, kelongsoran lereng juga terjadi akibat adanya beberapa pengaruh. Antara lain:

1. Pengaruh Iklim

Di dekat permukaan tanah, kuat geser tanah berubah dari waktu ke waktu bergantung pada iklim. Beberapa jenis tanah mengembang saat musim hujan,

dan menyusut pada musim kemarau. Pada musim hujan kuat geser tanah ini menjadi sangat rendah dibandingkan dengan musim kemarau. Oleh karena itu,

kuat geser tanah yang dipakai pada analisis stabilitas lereng harus didasarkan pada kuat geser tanah yang terendah yaitu pada musim hujan, atau kuat geser pada saat tanah jenuh air.

## 2. Pengaruh Air

Pengaruh aliran air atau rembesan menjadi faktor sangat penting dalam stabilitas lereng, namun pengaruh ini sulit diidentifikasi dengan baik. Telah diketahui bahwa rembesan air yang terjadi di dalam tanah menyebabkan gaya rembesan yang sangat berpengaruh pada stabilitas lereng.

Erosi permukaan lereng dapat menyebabkan terkikisnya tanah permukaan yang mengurangi tinggi lereng, sehingga menambah stabilitas lereng. Sebaliknya, erosi yang memotong kaki lereng dapat menambah tinggi lereng, sehingga mengurangi stabilitas lereng.

Jika pada lereng terjadi penurunan muka air tanah dalam lereng atau di dekat lereng, contohnya penurunan muka air mendadak pada saluran atau sungai, maka terjadi pengurangan gaya angkat air pada massa tanah, yang menambah beban lereng. Kenaikan beban menyebabkan kenaikan tegangan geser, yang bila tahanan geser tanah terlampaui akan mengakibatkan longsoran lereng. Hal ini banyak terjadi pada lereng yang tanahnya berpermeabilitas rendah.

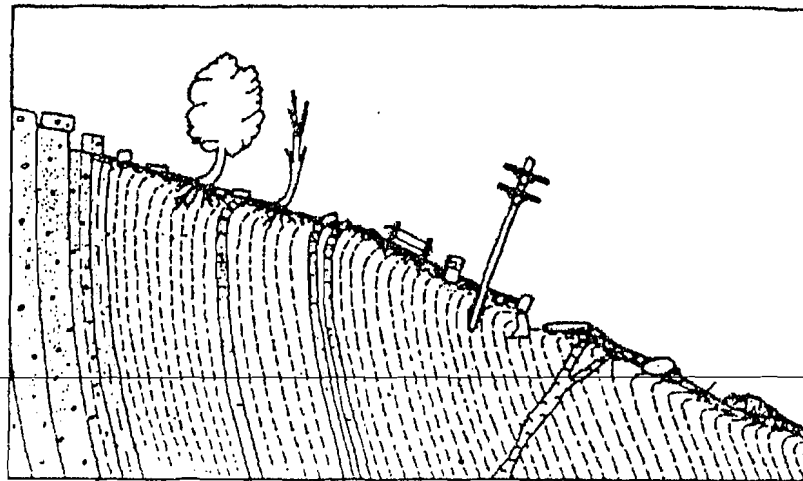
Gaya geser yang terjadi pada volume konstan dapat diikuti oleh berkurangnya gaya intergranuler dan naiknya tekanan air pori. Kelongsoran tanah dapat terjadi, bila pengurangan gaya intergranuler tanah besar, menyebabkan masa tanah dalam kedudukan *liquefaction* (tegangan efektif nol), sehingga tanah dapat mengalir seperti cairan.



### 3. Pengaruh Rangkak (*creep*)

Di dekat permukaan tanah yang miring, tanah dipengaruhi siklus kembang susut. Siklus ini dapat terjadi oleh akibat perubahan temperatur, perubahan dari musim kemarau ke musim hujan, dan di daerah dingin dapat diakibatkan oleh pengaruh pembekuan air. Saat tanah mengembang, tanah naik sehingga melawan gaya-gaya gravitasi. Saat tanah menyusut, tanah turun dibantu oleh gaya gravitasi. Hasil dari gerakan keduanya adalah gerakan perlahan lereng turun ke arah bawah.

Kedalaman zona rangkak bervariasi dari beberapa sentimeter sampai beberapa meter bergantung pada sifat tanah dan kondisi iklim. Kenampakan gerakan lereng akibat rangkak diilustrasikan oleh Taylor (1962) dalam **Gambar 3.1**.



**Gambar 3.1.** Kenampakan lereng akibat rangkak (*creep*) (Taylor, 1962).

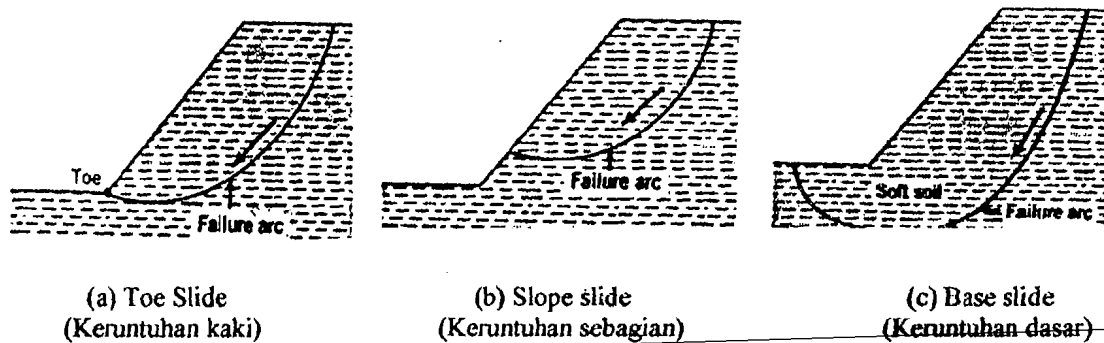
Seperti ditunjukkan pada gambar di atas, rangkak dapat menyebabkan hal-hal berikut:

1. Blok batuan bergerak.
2. Pohon-pohon melengkung ke atas.
3. Bagian bawah lereng melengkung dan menarik batuan.
4. Bangunan menara, monumen dan lain-lain miring.

5. Dinding penahan tanah dan fondasi bergerak dan retak.
6. Jalan raya dan rel keluar dari alurnya.
7. batu-batu besar menggelinding dan lain-lain.

Apabila terjadi suatu kelongsoran dalam tanah lempung, seringkali didapat merupakan sepanjang suatu busur lingkaran, dan karenanya bentuk inilah yang dianggap terjadi pada waktu mempelajari stabilitas suatu lereng. Busur lingkaran ini dapat memotong permukaan lereng, melalui titik kaki lereng (*toe*), atau memotong dasar lereng (*deep-started*) dan menyebabkan pengangkatan pada dasar. Ramalan bidang gelincir yang paling mungkin terjadi, sangat tergantung pada pengalaman, berdasarkan pada studi kasus-kasus yang telah lalu.

Beberapa tipe keruntuhan lereng dapat dilihat pada Gambar 3.2 di bawah ini:



Gambar 3.2 Tipe-tipe keruntuhan pada lereng (Craig, 1989)

### 3.2.3. Angka Keamanan (*Safety Factor*)

Dalam analisis kemantapan lereng dengan permukaan gelincir yang diasumsikan sebagai lengkungan lingkaran, maka gaya yang mendorong massa tanah di atas lengkungan lingkaran sehingga menggelincir harus dibandingkan dengan gaya geser sepanjang lengkungan lingkaran yang menahan longsoran itu.

Karena gaya dorong dan gaya tahan berbeda sehubungan dengan kedudukan dan jari-jari lengkungan lingkaran, maka harus dilakukan analisa kemantapan dengan mengubah-ubah kedudukan dan jari-jari lengkungan lingkaran untuk beberapa harga dengan cara coba-coba. Berbagai metode diusulkan untuk perbandingan antara gaya dorong dan gaya penahan. Sehingga angka aman adalah :

$$SF = \frac{\text{gaya penahan}}{\text{gaya yang menggelincirkan}}$$

Bila faktor keamanan didapat 1, ini berarti bahwa lereng sudah hampir dalam bahaya keruntuhan lereng/longsor. Akibatnya, untuk mendapatkan lereng yang dimantapkan maka persamaan berikut harus digunakan,

$$SF \geq 1,0$$

Dalam banyak hal, harus dipertimbangkan pula perbedaan antara anggapan-anggapan yang tak terelakan yang digunakan dalam perhitungan, termasuk semua kesalahan dari konstanta-konstanta mekanika tanah dengan harga sebenarnya dari lapisan tanah, sehingga biasanya digunakan  $SF \geq 1,25$ .

Studi-studi menyeluruh tentang keruntuhan lereng (dengan kemiringan 1:2 dan tinggi 40 ft) menunjukkan bahwa:

**Tabel 3.1.** Pengaruh jenis lereng terhadap besarnya  $SF$

Jenis lereng	$SF$
tanpa tekanan air pori, tanpa lapisan tanah lemah, tanpa tanah keras	2,071 – 2,085
Tanpa tekanan air pori, dengan lapisan tanah lemah dan tanah keras	1,338 – 1,394
Dengan $R_u = 0,25$ , tanpa lapisan tanah lemah, tanpa tanah keras	1,756 – 1,772
Dengan $R_u = 0,25$ , dengan lapisan tanah lemah dan tanah keras	1,081 – 1,137
Dengan garis muka air tanah, tanpa lapisan tanah lemah, tanpa tanah keras	1,827 – 1,838
Dengan garis muka air tanah, dengan lapisan tanah lemah dan tanah keras	1,212 – 1,265

Dalam penelitiannya, Bishop (1955) mendapatkan data hubungan tentang angka aman dan kejadian keruntuhan.

**Tabel 3.2.** Hubungan angka keamanan dengan kejadian keruntuhan

Angka aman ( $SF$ )	Kejadian
$F \leq 1,07$	Keruntuhan biasa terjadi
$1,07 < F \leq 1,25$	Keruntuhan pernah terjadi
$F > 1,25$	Keruntuhan jarang terjadi

#### 3.2.4. Perbaikan stabilitas lereng

Banyak cara dapat dilakukan untuk menambah stabilitas lereng, antara lain: pemotongan lereng, pembuatan berm, menurunkan muka air tanah, pemasangan tiang-tiang dan lain-lainnya. Beberapa cara perbaikan stabilitas lereng diilustrasikan pada Gambar 3.3.

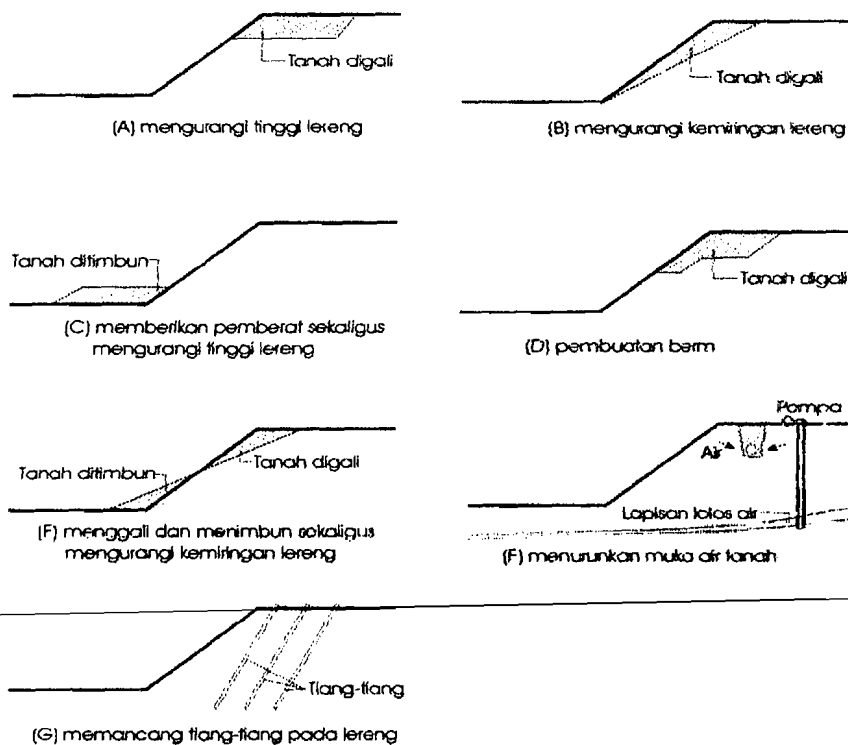
Umumnya metode perbaikan stabilitas lereng dapat dibagi dalam tiga kelompok, yaitu:

1. Metode geometri, yaitu perbaikan lereng dengan cara merubah geometri lereng, antara lain dengan cara:
  - a. Mengurangi tinggi lereng, dapat dilakukan dengan cara pemotongan lereng di bagian atas atau penimbunan di kaki lereng.
  - b. Pembuatan berm, dilakukan dengan cara memotong bagian puncak lereng menjadi berundak-undak, hal ini bertujuan untuk mengurangi tinggi lereng sehingga massa tanah pada bagian atas lereng berkurang yang mengakibatkan tegangan yang dipikul lereng pun berkurang.
  - c. Pengurangan kemiringan lereng.
  - d. Menggali di bagian atas dan menimbun di bagian bawah sekaligus mengurangi kemiringan lereng.

2. Metode hidrologi, yaitu dengan cara menurunkan muka air tanah atau menurunkan kadar air tanah pada lereng.

3. Metode-metode kimia dan mekanis, antara lain dengan cara:

- a. Menambah kuat geser tanah dengan menambahkan bahan kimia tertentu, seperti: *grouting* semen, belerang, kapur, karbid dan lain-lain.
- b. Menambahkan bahan tertentu di dalam tanah untuk menambah kekuatan dukung tanah, seperti: memasang tiang-tiang, menambahkan ankur, geotekstil, dll.



Gambar 3.3. Beberapa metode perbaikan stabilitas lereng (Christady, H, 1994).

### 3.3 Distribusi Tegangan di Dalam Tanah

Hitungan tegangan-tegangan yang terjadi di dalam tanah berguna untuk analisis tegangan-regangan (*stress-strain*) dan penurunan (*settlement*). Sifat-sifat tegangan-regangan dan penurunan bergantung pada sifat tegangan-regangan tanah bila mengalami pembebanan.

Tegangan-tegangan di dalam massa tanah dapat disebabkan oleh beban yang bekerja di permukaan maupun oleh beban akibat berat sendiri tanah. Tegangan yang berasal dari beban pada permukaan tanah berkurang bila kedalaman bertambah. Sebaliknya, tegangan yang berasal dari berat sendiri tanah bertambah bila kedalamannya bertambah.

Regangan volumetric pada material yang bersifat elastis dapat dinyatakan oleh persamaan:

$$\frac{\Delta V}{V} = \frac{1-2\mu}{E} (\sigma_x + \sigma_y + \sigma_z) \quad (3.1)$$

dengan:

$\Delta V$  = perubahan volume ( $m^3$ )

$V$  = volume awal ( $m^3$ )

$\mu$  = angka Poisson

$E$  = modulus elastis

$\sigma_x, \sigma_y, \sigma_z$  = tegangan-tegangan dalam arah x, y dan z. ( $kN/m^2$ )

Dalam persamaan 3.1, bila pembebanan yang mengakibatkan penurunan terjadi pada kondisi tanpa drainasi (*undrained*), yaitu penurunan terjadi pada volume konstan, maka  $\Delta V/V = 0$ . Untuk kondisi ini,  $\mu = 0,5$ . Jika pembebanan menyebabkan perubahan volume (seperti contohnya penurunan akibat proses konsolidasi), dengan  $\Delta V/V > 0$ , maka  $\mu < 0,5$ .

### 3.3.1. Beban Titik

Analisis tegangan yang terjadi di dalam massa tanah akibat pengaruh beban titik di permukaan telah diberikan oleh Boussinesq (1885). anggapan-anggapan yang dipakai pada teori Boussinesq adalah:

1. Tanah merupakan bahan yang bersifat elastis, homogen, isotropis, dan semi tak terhingga (*semi-infinite*).
2. Tanah tidak mempunyai berat.
3. Hubungan tegangan-regangan mengikuti Hukum Hooke.
4. Distribusi tegangan akibat beban yang diterapkan tidak tergantung pada jenis tanah.
5. Distribusi tegangan simetri terhadap sumbu z (vertikal).
6. Perubahan volume tanah diabaikan.
7. Tanah tidak sedang mengalami tegangan sebelum beban Q diterapkan.

Telah diamati bahwa tegangan vertikal tidak bergantung pada modulus elastis (E) dan angka Poisson ( $\mu$ ). Akan tetapi, tekanan lateral bergantung pada angka Poisson dan tidak bergantung pada modulus elastis. Dalam hitungan-hitungan distribusi tegangan akibat beban struktur, tegangan yang terjadi biasanya dinyatakan dalam istilah tambahan tegangan (*stress increment*), yaitu  $\Delta\sigma$ . Karena pada kenyataannya, tegangan yang diakibatkan oleh beban struktur merupakan tambahan tegangan pada tekanan *overburden* (tekanan vertikal akibat berat tanahnya sendiri). Jadi, sebenarnya tanah sudah menderita tegangan sebelum beban struktur bekerja.

Teori Boussinesq untuk tambahan tegangan vertikal akibat beban titik dianalisis dengan meninjau sistem tegangan pada koordinat silinder (Gambar 3.4.). Dalam teori ini, tambahan tegangan vertikal ( $\Delta\sigma_z$ ) pada suatu titik A di dalam tanah akibat beban titik Q di permukaan dinyatakan oleh persamaan:

$$\Delta\sigma_z = \frac{3Q}{2\pi z^2} \left( \frac{1}{1 + (r/z)^2} \right)^{5/2} \quad (3.2)$$

Tambahan tegangan mendatar dalam arah radial:

$$\Delta\sigma_r = \frac{Q}{2\pi} \left( \frac{3r^2z}{(r^2+z^2)^{5/2}} - \frac{1-2\mu}{r^2+z^2+z(r^2+z^2)^{1/2}} \right) \quad (3.3)$$

Tambahan tegangan mendatar arah Tangensial:

$$\Delta\sigma_\theta = -\frac{Q}{2\pi} (1-2\mu) \left( \frac{z}{(r^2+z^2)^{3/2}} - \frac{1}{r^2+z^2+z(r^2+z^2)^{1/2}} \right) \quad (3.4)$$

Tegangan geser:

$$\tau_{rz} = \frac{3Q}{2\pi} \left( \frac{rz^2}{(r^2+z^2)^{5/2}} \right) \quad (3.5)$$

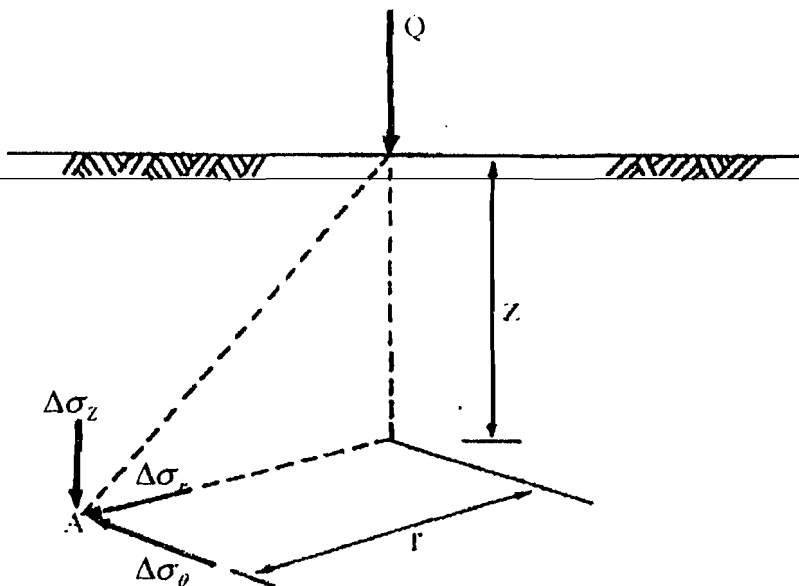
dengan:

Q = Beban titik (kN)

$\mu$  = Angka Poisson

z = Distribusi tegangan simetri terhadap sumbu vertikal (m)

r = Jarak horizontal dari z ke titik A



Gambar 3.4. Tegangan akibat beban titik (Christady, H, 1994).



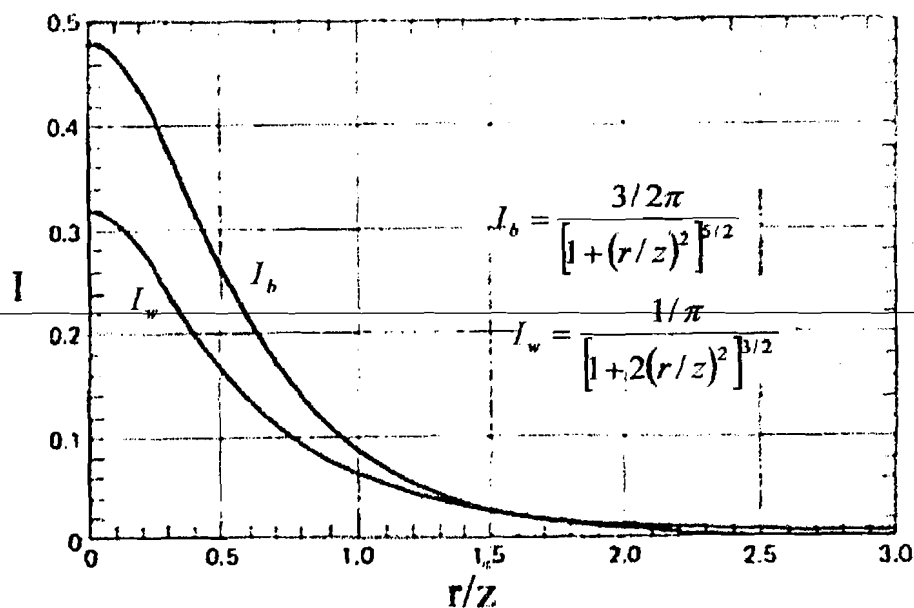
Bila  $\mu = 0,50$ , maka suku persamaan kedua dari persamaan 3.3 sama dengan nol, dan pada persamaan 3.4, nilai  $\sigma_\theta = 0$ . Jika faktor pengaruh untuk beban titik untuk teori Boussinesq didefinisikan sebagai:

$$I_B = \frac{3}{2\pi} \left( \frac{1}{1+(r/z)^2} \right)^{5/2} \quad (3.6)$$

maka persamaan 3.2 akan menjadi:

$$\Delta\sigma_z = \frac{Q}{z^2} I_B \quad (3.7)$$

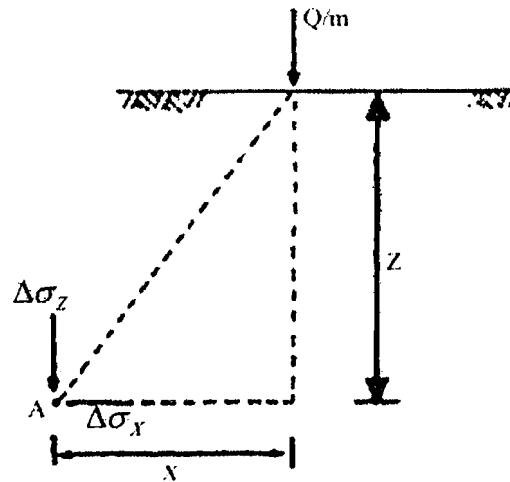
Nilai  $I_B$  yang disajikan dalam bentuk grafik diberikan dalam Grafik 3.1. Dalam gambar ini, nilai pengaruh beban titik ( $I_B$ ) untuk teori Boussinesq digambarkan bersama-sama dengan faktor pengaruh beban titik ( $I_w$ ) untuk teori Wastergaard.



**Grafik 3.1.** Faktor pengaruh untuk beban titik didasarkan teori Boussinesq ( $I_B$ ) dan teori Wastergaard ( $I_w$ ). (Taylor, 1948)

### 3.3.2. Beban Garis

Tambahan tegangan akibat beban garis  $Q$  per satuan panjang (Gambar 3.5) pada sembarang titik di dalam tanah dinyatakan oleh persamaan sebagai berikut:



**Gambar 3.5.** Tambahan tegangan akibat beban garis (Christady. H, 1994)

Tambahan tegangan vertikal arah sumbu-z:

$$\Delta\sigma_z = \frac{2Q}{\pi} \frac{z^3}{(x^2 + z^2)^2} \quad (3.8)$$

Tambahan tegangan mendatar arah sumbu-x:

$$\Delta\sigma_x = \frac{2Q}{\pi} \frac{x^2 z}{(x^2 + z^2)^2} \quad (3.9)$$

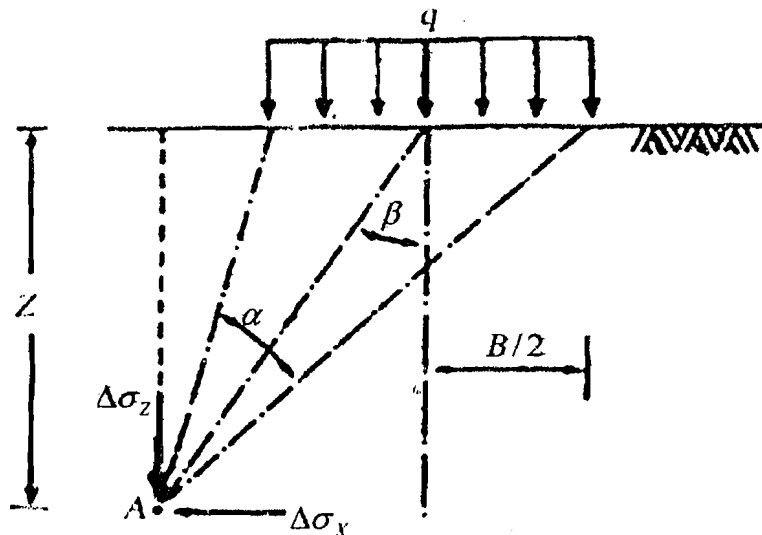
Tegangan geser:

$$\tau_{xz} = \frac{2Q}{\pi} \frac{xz^2}{(x^2 + z^2)^2} \quad (3.10)$$

### 3.3.3. Beban Terbagi Rata Memanjang

Tegangan pada titik A di dalam tanah akibat beban terbagi rata  $q$  yang

berbentuk jalur memanjang (Gambar 3.6) dinyatakan oleh persamaan berikut ini:



Gambar 3.6. Tegangan akibat beban terbagi rata memanjang (Christady. H, 1994)

Tambahan tegangan vertikal pada arah sumbu-z:

$$\Delta\sigma_z = \frac{q}{\pi}(\alpha + \sin \alpha \cos 2\beta) \quad (3.11)$$

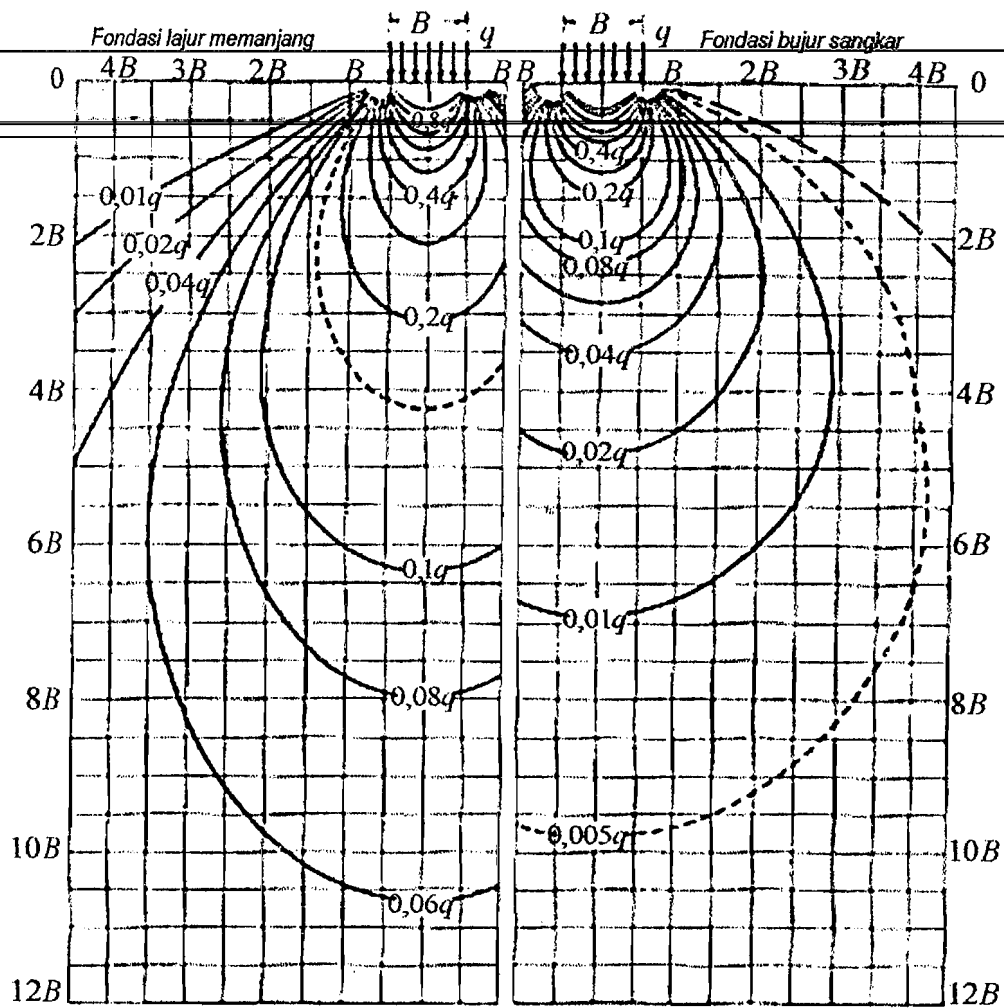
Tambahan tegangan mendatar pada arah sumbu-x:

$$\Delta\sigma_x = \frac{q}{\pi}(\alpha - \sin \alpha \cos 2\beta) \quad (3.12)$$

Tegangan geser:

$$\tau_{xz} = \frac{q}{\pi}(\sin \alpha \cos 2\beta) \quad (3.13)$$

dengan  $\alpha$  dan  $\beta$  dalam radial, yaitu sudut yang ditunjukkan dalam Gambar 3.6. Isobar tegangan yang menunjukkan tempat kedudukan titik-titik yang mempunyai tegangan vertikal yang sama ditunjukkan dalam Grafik 3.2.



**Grafik 3.2.** Isobar tegangan untuk beban terbagi rata memanjang dan bujur sangkar didasarkan teori Boussinesq. (Taylor, 1948)

### 3.4 Teori Analisis Stabilitas Lereng

Dalam prakteknya, analisis stabilitas lereng didasarkan pada konsep keseimbangan plastis batas (*limit plastic equilibrium*). Adapun maksud analisis stabilitas adalah untuk menentukan faktor aman dari bidang longsor yang potensial.

Faktor aman didefinisikan sebagai nilai banding antara gaya yang menahan dan gaya yang menggerakkan, atau:

$$SF = \frac{\tau}{\tau_d} \quad (3.14)$$

keterangan:

$\tau$  = tahanan geser maksimum yang dapat dikerahkan oleh tanah ( $\text{kN/m}^2$ )

$\tau_d$  = tegangan geser yang terjadi akibat gaya berat tanah yang akan longsor ( $\text{kN/m}^2$ )

$SF$  = faktor aman

Menurut teori Mohr-Coulomb, tahanan geser ( $\tau$ ) yang dapat dikerahkan oleh tanah, di sepanjang bidang longsohnya, dinyatakan oleh:

$$\tau = c + \sigma \tan \varphi \quad (3.15)$$

keterangan:

$\tau$  = tahanan geser ( $\text{kN/m}^2$ )

$c$  = kohesi ( $\text{kN/m}^2$ )

$\sigma$  = tegangan normal pada bidang runtuh ( $\text{kN/m}^2$ )

$\varphi$  = sudut gesek dalam tanah (derajat)

Nilai-nilai  $c$  dan  $\varphi$  adalah parameter kuat geser tanah di sepanjang bidang longsor.

Dengan cara yang sama, dapat dituliskan persamaan tegangan geser yang terjadi ( $\tau_d$ ) akibat beban tanah dan beban-beban lain pada bidang longsohnya:

$$\tau_d = c_d + \sigma \tan \varphi_d \quad (3.16)$$

Dengan  $c_d$  dan  $\varphi_d$  adalah kohesi dan sudut gesek dalam yang terjadi atau yang dibutuhkan untuk keseimbangan pada bidang longsornya.

Jika persamaan 3.15 dan 3.16 disubstitusikan ke persamaan 3.14, akan diperoleh persamaan faktor aman:

$$SF = \frac{c + \sigma \operatorname{tg} \varphi}{c_d + \sigma \operatorname{tg} \varphi_d} \quad (3.17)$$

Yang dapat dituliskan juga dalam bentuk:

$$c_d + \sigma \operatorname{tg} \varphi_d = \frac{c}{F} + \sigma \frac{\operatorname{tg} \varphi}{F} \quad (3.18)$$

Untuk maksud memberikan faktor aman terhadap masing-masing komponen kuat geser, faktor aman dapat dinyatakan oleh:

$$SF_c = \frac{c}{c_d} \quad (3.19)$$

$$SF_\varphi = \frac{\operatorname{tg} \varphi}{\operatorname{tg} \varphi_d} \quad (3.20)$$

keterangan:

$SF_c$  = faktor aman pada komponen kohesi

$SF_\varphi$  = faktor aman pada komponen gesekan

### 3.5 Metode Stabilitas lereng

Suatu analisis stabilitas lereng berisi perkiraan dari model keruntuhan dan kuat gesernya. Model keruntuhan akan memerlukan peramalan dari berat/beban yang harus ditahan termasuk pengaruh air. Perkiraan air membutuhkan pertimbangan mengenai gaya-gaya rembesan dan berat satuan jenuh serta efektif. Bentuk model keruntuhan biasanya dapat ditentukan dengan cukup baik walaupun untuk pusat

rotasi, ia mungkin memerlukan beberapa kali percobaan untuk mendapatkan kasus terburuk.

Dalam beberapa aplikasi, tujuan utama analisis stabilitas lereng adalah untuk memperoleh desain konstruksi-konstruksi tanah yang aman dan ekonomis. Beberapa tujuan analisis stabilitas lereng adalah:

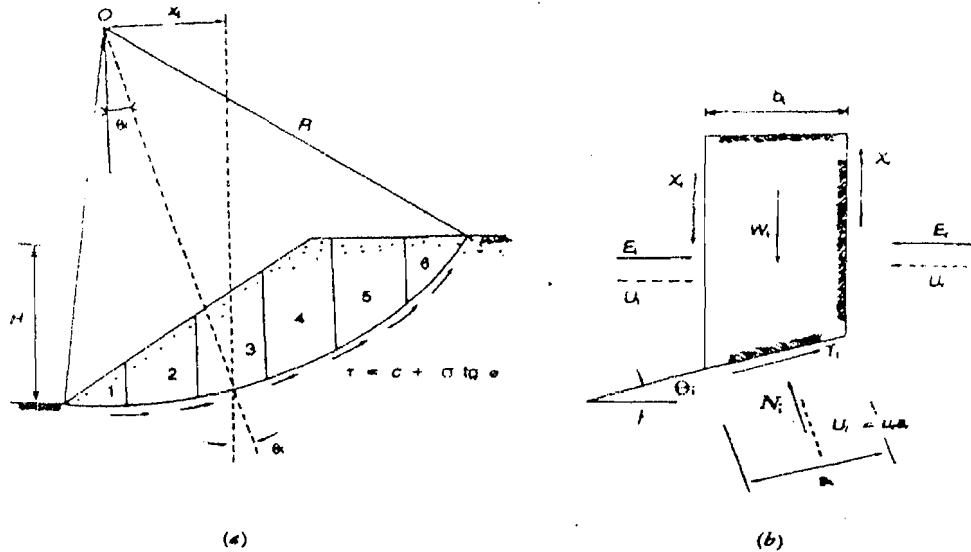
1. Memahami pembangunan dan pembentukan lereng alam dan lereng buatan.
2. Menganalisis stabilitas lereng untuk kondisi jangka pendek (biasanya selama kegiatan konstruksi) juga kondisi jangka panjang.
3. Untuk mengetahui kemungkinan keruntuhan lereng alam maupun buatan.
4. Menganalisis keruntuhan dan memahami mekanisme keruntuhannya serta pengaruhnya pada lingkungan sekitar.
5. Melakukan desain ulang terhadap lereng yang telah runtuh, termasuk merencanakan dan mendesain lereng dalam upaya tindakan pencegahan.
6. Mempelajari efek beban akibat gempa pada lereng dan tanggul.

### 3.5.1. Metode Irisan (*Method of Slice*)

Untuk tanah yang tidak homogen dan aliran rembesan terjadi di dalam tanah tidak menentu, cara yang paling cocok adalah dengan metode irisan (*method of slice*).

Gaya normal yang bekerja pada suatu titik di lingkaran bidang longsor, terutama dipengaruhi oleh berat tanah di atas titik tersebut. Dalam metode irisan, massa tanah yang longsor dipecah-pecah menjadi beberapa irisan vertikal. Kemudian, keseimbangan di tiap-tiap irisan diperhatikan. Gambar 3.7 memperlihatkan satu irisan dengan gaya-gaya yang bekerja padanya. Gaya-gaya ini terdiri dari gaya geser ( $X_r$  dan  $X_l$ ) dan gaya normal efektif ( $E_r$  dan  $E_l$ ) di sepanjang sisi irisannya, dan juga resultan gaya geser efektif ( $T_i$ ) dan resultan gaya normal efektif ( $N_i$ ) yang bekerja di sepanjang

dasar irisan. Tekanan air pori ( $U_l$  dan  $U_r$ ) bekerja di kedua sisi irisan, dan tekanan air pori  $U_i$  bekerja pada dasarnya. Dianggap tekanan air pori sudah diketahui sebelumnya.



Gambar 3.7. Gaya-gaya yang bekerja pada irisan (Christady, H, 1994).

### 3.5.2. Metode Bishop Disederhanakan (*Simplified Bishop Method*)

Metode Bishop disederhanakan (Bishop, 1955) menganggap bahwa gaya-gaya yang bekerja pada sisi-sisi irisan mempunyai resultan nol pada arah vertikal.

Persamaan kuat geser dalam tinjauan tegangan efektif yang dapat dikerahkan tanah, hingga tercapainya kondisi keseimbangan batas dengan memperhatikan faktor aman, adalah:

$$\tau = \frac{c'}{F'} + (\sigma - u) \frac{\tan \phi'}{F'} \quad (3.21)$$

dengan  $\sigma$  adalah tegangan normal total pada bidang longsor dan  $u$  adalah tekanan air pori, sedangkan untuk tanah yang tidak kohesif, maka rumus kuat geser yang berlaku adalah:

$$\tau = \sigma_n \tan \phi \quad (3.21a)$$



Kuat geser untuk tanah yang kohesif adalah:

$$\tau = c \quad (3.21b)$$

Untuk irisan ke- $i$ , nilai  $T_i = \tau a_i$ , yaitu gaya geser yang dikerahkan tanah pada bidang longsor untuk keseimbangan batas. Karena itu:

$$T = \frac{c' a_i}{F} + (N_i - u_i a_i) \frac{tg \varphi'}{F} \quad (3.22)$$

Kondisi keseimbangan momen dengan pusat rotasi  $O$  antara berat massa tanah yang akan longsor dengan gaya geser total yang dikerahkan tanah pada dasar bidang longsor, dinyatakan oleh persamaan (Gambar 3.7):

$$\sum W_i x_i = \sum T_i R \quad (3.23)$$

dengan  $x_i$  adalah jarak  $W_i$  ke pusat rotasi  $O$ . dari persamaan 3.21 dan 3.23, dapat diperoleh:

$$F = \frac{R \sum_{i=1}^{i=n} [c' a_i + (N_i - u_i a_i) tg \varphi']}{\sum_{i=1}^{i=n} W_i x_i} \quad (3.24)$$

Pada kondisi keseimbangan vertikal, jika  $X_i = X_i$  dan  $X_r = X_{i+r}$ :

$$N_i \cos \theta_i + T_i \sin \theta_i = W_i + X_i - X_{i+1}$$

$$N_i = \frac{W_i + X_i - X_{i+1} - T_i \sin \theta_i}{\cos \theta_i} \quad (3.25)$$

dengan  $N_i' = N_i - u_i a_i$ , substitusi persamaan 3.22 ke persamaan 3.25, dapat diperoleh persamaan:

$$N_i = \frac{W_i + X_i - X_{i+1} - u_i a_i \cos \theta_i - c' a_i \sin \theta_i / F}{\cos \theta_i + \sin \theta_i tg \varphi' / F} \quad (3.26)$$

Substitusi Persamaan 3.26 ke Persamaan 3.24, diperoleh:

$$SF = \frac{R \sum_{i=1}^{i=n} \left( \frac{c' a_i + \text{tg } \varphi' \frac{W_i + X_i + X_{i+1} - u_i a_i \cos \theta_i - c' a_i \sin \theta_i / F}{\cos \theta_i + \sin \theta_i \text{tg } \varphi' / F} \right)}{\sum_{i=1}^{i=n} W_i x_i} \quad (3.27)$$

(3.27)

Untuk penyederhanaan dianggap  $X_i - X_{i+1} = 0$  dan dengan mengambil:

$$x_i = R \sin \theta_i \quad (3.28)$$

$$b_i = a_i \cos \theta_i \quad (3.29)$$

Substitusi persamaan 3.28 dan 3.29 ke persamaan 3.27, diperoleh persamaan faktor aman:

$$SF = \frac{\sum_{i=1}^{i=n} [c' b_i + (W_i - u_i b_i) \text{tg } \varphi'] \left( \frac{1}{\cos \theta_i (1 + \text{tg } \theta_i \text{tg } \varphi' / F)} \right)}{\sum_{i=1}^{i=n} W_i \sin \theta_i} \quad (3.30)$$

dengan:

$SF$  = faktor aman

$c'$  = kohesi tanah efektif ( $\text{kN/m}^2$ )

$\varphi'$  = sudut gesek dalam tanah efektif (derajat)

$b_i$  = lebar irisan ke- $i$  (m)

$W_i$  = berat irisan tanah ke- $i$  (kN)

$\theta_i$  = sudut yang didefinisikan dalam Gambar 3.7 (derajat)

$u_i$  = tekanan air pori pada irisan ke- $i$  ( $\text{kN/m}^2$ )

Rasio tekanan pori (*pore pressure ratio*) didefinisikan sebagai:

$$r_u = \frac{ub}{W} = \frac{u}{\gamma h} \quad (3.31)$$

dengan:

$r_u$  = rasio tekanan pori

$u$  = tekanan air pori ( $\text{kN/m}^2$ )

$b$  = lebar irisan (m)

$\gamma$  = berat volume tanah ( $\text{kN/m}^3$ )

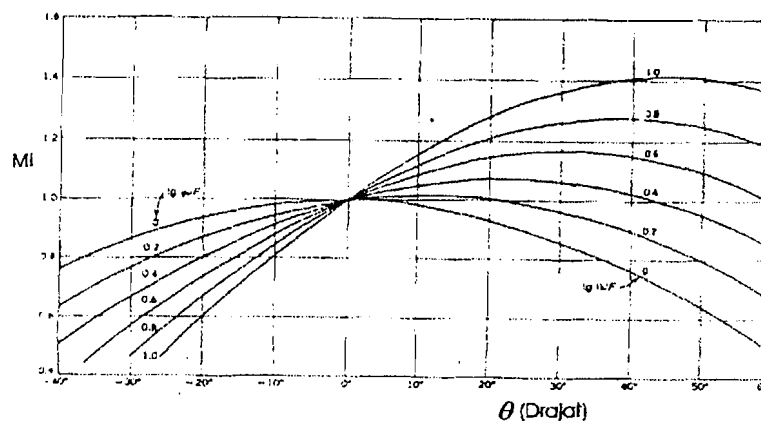
$h$  = tinggi irisan rata-rata (m)

Dari substitusi persamaan 3.31 ke persamaan 3.30 bentuk lain dari persamaan faktor aman untuk analisis stabilitas lereng cara Bishop:

$$SF = \frac{\sum_{i=1}^{i=n} [c' b_i + W_i (1 - r_u) \gamma \varphi'] \left( \frac{1}{\cos \theta_i (1 + \text{tg } \theta_i \text{ tg } \varphi' / F)} \right)}{\sum_{i=1}^{i=n} W_i \sin \theta_i} \quad (3.32)$$

Persamaan faktor aman Bishop ini lebih sulit pemakaiannya dibandingkan dengan metode lainnya. Lagi pula membutuhkan cara coba-coba (*trial and error*), karena nilai faktor aman  $F$  nampak di kedua sisi persamaannya. Akan tetapi, cara ini telah terbukti menghasilkan nilai faktor aman yang mendekati hasil hitungan dengan cara lain yang lebih teliti. Untuk mempermudah hitungan secara manual, Grafik 3.3 dapat digunakan untuk menentukan fungsi  $M_i$ , dengan:

$$M_i = \cos \theta_i (1 + \text{tg } \theta_i \text{ tg } \varphi' / F) \quad (3.33)$$



Grafik 3.3. Diagram untuk menentukan  $M_i$ , (Janbu dkk, 1956)

Lokasi lingkaran longsor kritis dari metode Bishop (1955), biasanya mendekati dengan hasil pengamatan di lapangan. Karena itu, walaupun metode Bishop lebih susah dalam perhitungannya, namun metode inilah yang lebih disukai.

Dalam praktek, diperlukan cara coba-coba dalam menemukan bidang longsor dengan nilai faktor aman yang terkecil. Jika bidang longsor dianggap lingkaran, maka lebih baik kalau dibuat kotak-kotak di mana tiap titik potong garis-garisnya merupakan tempat kedudukan pusat lingkaran longsor. Pada titik-titik potong garis yang merupakan pusat lingkaran longsor, dituliskan nilai faktor aman terkecil pada titik tersebut. Perlu diketahui bahwa pada tiap titik pusat lingkaran harus dilakukan pula hitungan faktor aman untuk menentukan nilai faktor aman yang terkecil dari bidang longsor dengan pusat lingkaran pada titik tersebut, yaitu dengan cara mengubah jari-jari lingkarannya. Kemudian, setelah faktor aman terkecil pada tiap-tiap titik pada kotaknya diperoleh, digambarkan garis kontur yang menunjukkan tempat kedudukan dari titik-titik pusat lingkaran yang mempunyai faktor aman yang sama.

Hitungan secara manual memerlukan waktu sangat lama. Pada saat ini telah banyak program-program komputer untuk hitungan faktor aman stabilitas lereng.

Salahsatunya adalah program Geo-Slope.

### 3.6 Program GEO-SLOPE (SLOPE/W)

SLOPE/W adalah sebuah program yang di operasikan *under* Microsoft Windows 98. SLOPE/W menggunakan teori keseimbangan batas (*limit equilibrium theory*) untuk menghitung faktor aman lereng tanah maupun batuan serta dapat di gunakan untuk analisis dan desain di bidang sipil (geoteknik).

4. *Points* digunakan untuk menentukan koordinat dalam pembuatan permodelan lereng.

5. *Line* untuk mendefinisikan batas tiap lapisan tanah.

### 3.6.2. SLOPE/W SOLVE dan SLOPE/W CONTOUR

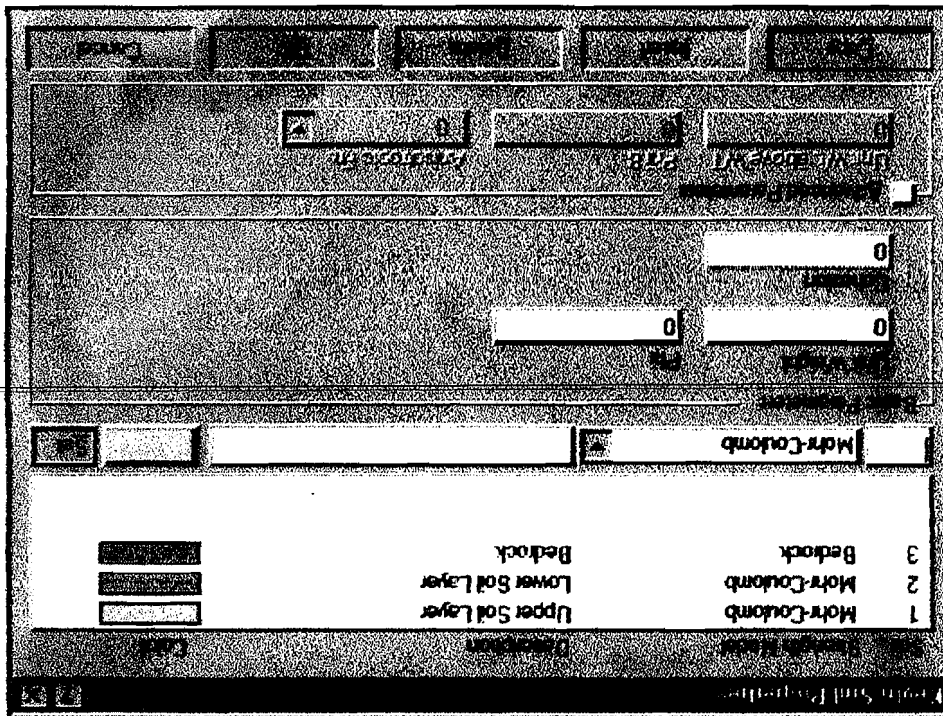
SLOPE/W SOLVE merupakan langkah eksekusi (*running*) program untuk menghitung nilai faktor aman (SF) dari kasus yang didefinisikan dalam DEFINE. Sedangkan dalam SLOPE/W CONTOUR dapat ditampilkan hasil analisis serta grafis diantaranya berupa gambar bidang longsor. SOLVE dan CONTOUR dapat dinamakan sebagai *executable program* terdiri ataupun dapat secara praktis di-*run* dengan menu Tool; CONTOUR dalam DEFINE. Untuk menampilkan hasil analisis dengan metode yang di pakai berikut nilai SF-nya digunakan tombol di Toolbar yang telah disediakan.

### 3.6.3. Proses Analisis Program GEO-SLOPE

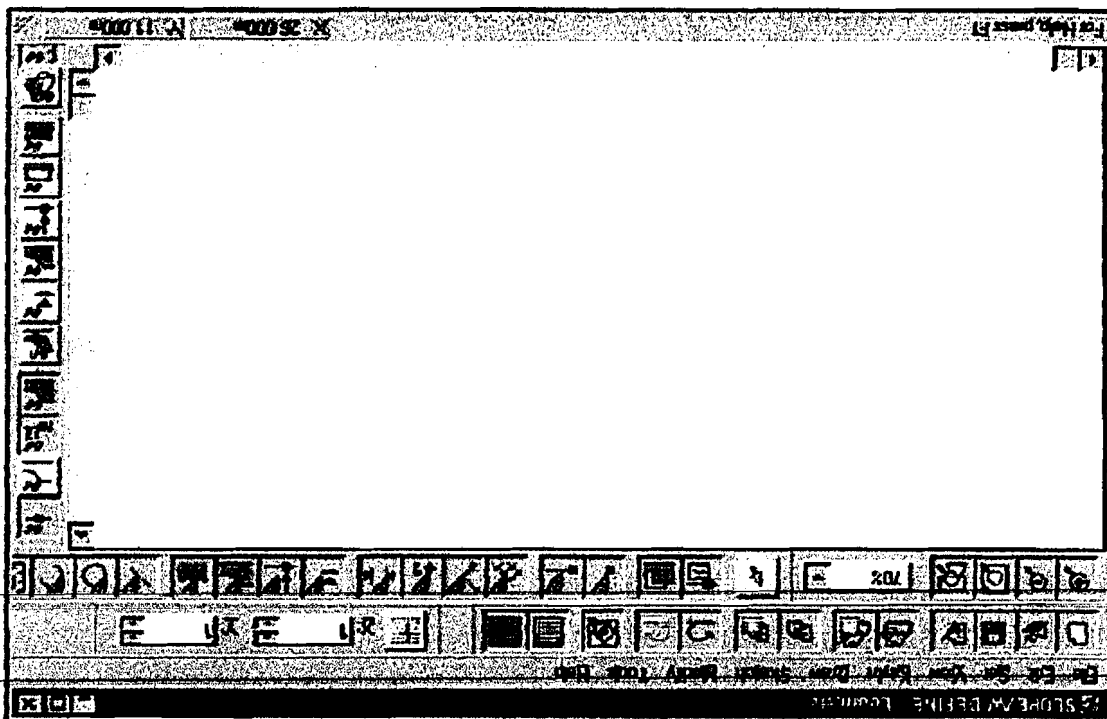
#### A. Input data dan Proses analisis

Langkah awal dalam proses analisis yaitu dengan memasukan input data yang terdapat pada menu *Key-In (soil properties)*. Input data yang di butuhkan yaitu parameter tanah yang berupa kohesi, sudut gesek dalam, serta kepadatan tanah. Dalam menu tersebut juga didefinisikan jumlah lapisan tanah, jenis tanah yang di gunakan. Tampilan menu tersebut dapat dilihat pada Gambar 3.8 dan 3.9 di bawah ini.

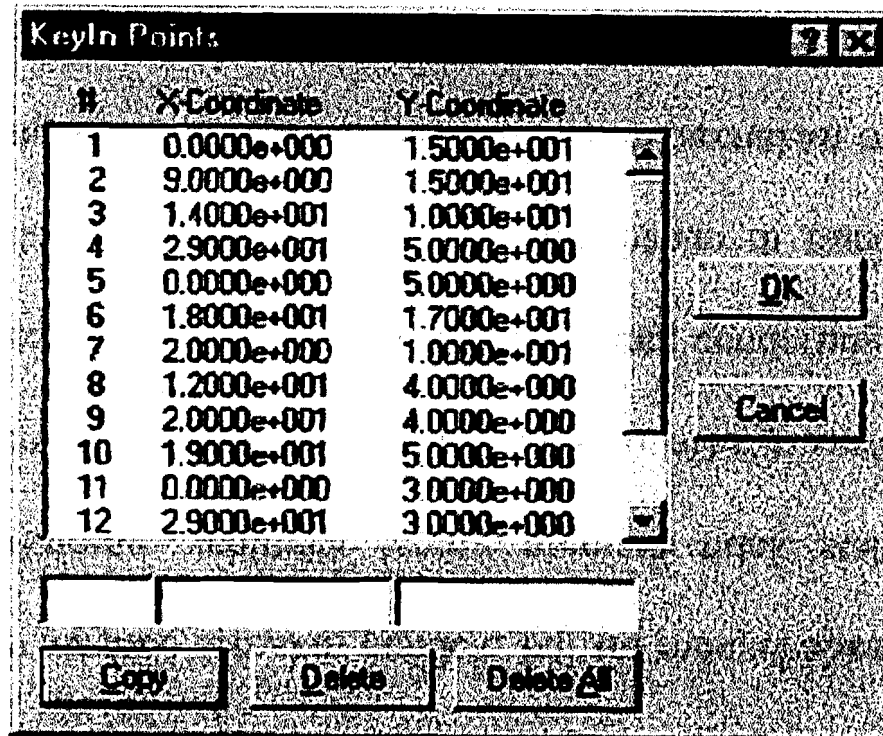
Gambar 3.9. Soil Properties dalam menu Key-In



Gambar 3.8. Tampilan awal SLOPE/W DEFINE

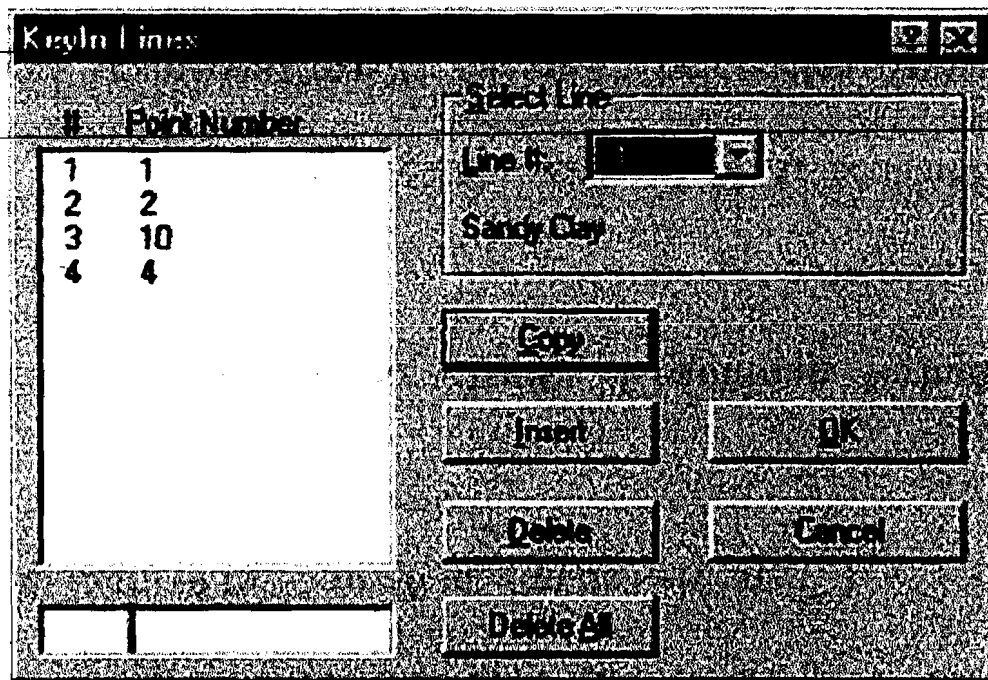


Langkah selanjutnya dalam proses analisis ini mendefinisikan titik-titik koordinat yang terdapat dalam menu *Key-In (point)*. Titik ini digunakan untuk menentukan titik akhir dari bagian garis, *grid* titik pusat dan semua data lain yang diperlukan dalam SLOPE/W.



Gambar 3.10. *Points* dalam menu *Key-In*

Langkah selanjutnya yaitu mendefinisikan batas tiap lapis tanah yang terdapat dalam menu *Key-In lines*.



Gambar 3.11. Lines dalam menu Key-In

Setelah proses input data selesai, langkah selanjutnya yaitu mendefinisikan pusat dan radius untuk bidang longsor berbentuk lingkaran dan komposit yang terdapat dalam menu *key-in (slip surface)*. Cara praktis untuk mendefinisikan *grid* dan *radius lines* dengan menu *draw slip surface (grid)* dan *draw slip surface (radius)*.



**Key-In Slip Surface**

**Grid Corner Points**

Upper Left:

Lower Left:  Lower Right:

**# of Grid Increments**

X:  Y:

**Radius Corner Points**

Upper Left:  Upper Right:

Lower Left:  Lower Right:

**# of Radius Increments:**

**Projection Angles**

Use Left (Active) Angle of:

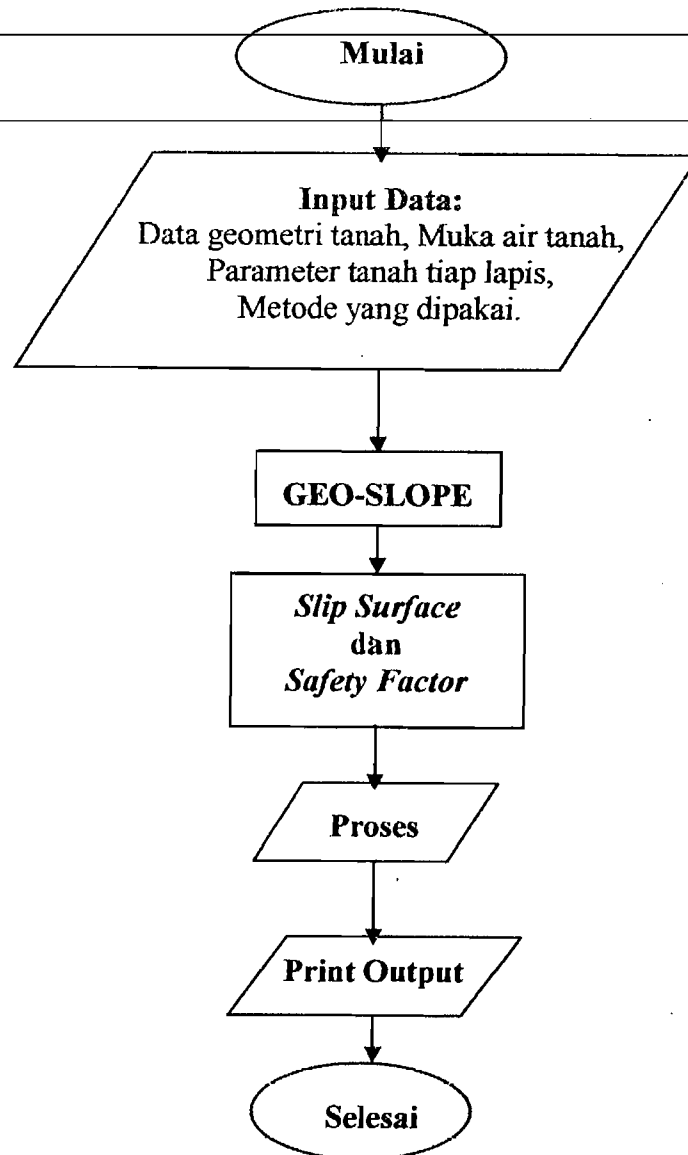
Use Right (Passive) Angle of:

Gambar 3.12. Slip Surface Grid dan Radius dalam menu Key-In

#### B. Hasil Analisis (Out put)

Dari hasil *running* program yang terdapat dalam menu SOLVE, didapatkan hasil nilai faktor aman (SF). Untuk menampilkan hasil analisis kita dapat menggunakan menu *Tools Contour* dalam *Define*.

Untuk lebih jelasnya tentang urutan pengerjaan menggunakan program Geo-Slope, diilustrasikan pada bagan alir Geo-Slope di bawah ini:



Gambar 3.13. Bagan Alir Geo-Slope

### 3.7 Perkuatan Lereng dengan Angkur Tanah

---

Pada point 3.2.4 di depan telah disebutkan beberapa jenis metode perbaikan yang dapat dilakukan untuk menambah stabilitas suatu lereng. Metode-metode perbaikan tersebut dibagi 3 kelompok. Yaitu metode hidrologi, geometri dan mekanis atau kimiawi. Pada penelitian kami, ada beberapa model lereng yang diberi perkuatan. Jenis perkuatan yang digunakan adalah angkur tanah. Sehingga, pada bagian ini akan dijelaskan sedikit tentang pengankuran tanah.

Sebuah angkur tanah lazimnya terdiri dari sebuah kabel atau batang baja bermutu tinggi, yang disebut tendon, di mana salah satu ujungnya ditanamkan dengan kuat pada suatu massa adukan semen atau tanah yang diberi adukan semen (*digrout*) dan ujung yang lain diangkurkan pada sebuah pelat dudukan (*bearing plate*) pada unit struktur yang disangga. Penerapan utama dari angkur tanah ini adalah pada konstruksi batang pengikat (*tie-back*) untuk dinding-dinding diafragma atau turap. Penerapan lainnya adalah pada struktur yang mengalami guling, gelincir, atau pengapungan, dalam rangka memperoleh reaksi untuk uji pembebanan di lapangan dan pada pembebanan awal (*pre-loading*) atau mereduksi penurunan. Angkur tanah dapat dibangun di pasir (termasuk pasir berkerikil dan pasir berlanau) dan lempung kaku, dan angkur tersebut dapat digunakan untuk situasi-situasi dimana diperlukan penyangga temporer maupun permanen.

Panjang tendon yang *digrout*, melalui mana gaya disalurkan ke tanah di sekitarnya, disebut panjang angkur terjepit (*fixed anchor length*). Panjang tendon antara angkur jepit dengan pelat dudukannya disebut panjang angkur bebas (*free anchor length*): tidak terdapat gaya yang disalurkan ke tanah di sepanjang bagian ini. Untuk angkur sementara, tendonnya biasanya diminyaki dan dibungkus dengan pita plastik pada seluruh panjang bebasnya. Ini akan memungkinkan tendon untuk

bergerak dengan bebas dan melindungi tendon dari karat. Untuk angkur permanent, tendon lazimnya diminyaki dan dilapisi dengan polythene di pabrik. Di lapangan, tendon tersebut dikupas dan minyaknya dikeringkan pada bagian yang akan dijepit (panjang angkur terjepit).

Beban ultimit yang dapat dipikul oleh sebuah angkur tergantung pada tahanan tanah (pada prinsipnya friksi kulit) yang termobilisasi didekat panjang angkur terjepit. (ini diasumsikan bahwa tidak akan terdapat keruntuhan sebelumnya pada pertemuan antara adukan dan tendon atau pada tendon itu sendiri). Angkur-angkur biasanya diprategang untuk mereduksi gerakan yang diperlukan untuk memobilisasi tahanan tanah. Tiap angkur perlu diuji dengan uji pembebanan setelah dipasang: angkur sementara biasanya diuji sampai 1,2 kali beban kerja dan angkur permanen sampai 1,5 kali beban kerja. Akhirnya dilakukan proses pemberian prategang pada angkur-angkur tersebut. Perpindahan akibat rangkakan akan terjadi pada angkur tanah dengan pembebanan konstan. Koefisien rangkakan, yang didefinisikan sebagai perpindahan tiap satuan log waktu, dapat ditentukan dengan uji pembebanan. Telah diusulkan bahwa koefisien ini tidak boleh lebih besar dari 1 mm untuk 1,5 kali beban kerja.

Sebuah penyelidikan tanah yang cukup luas perlu dilakukan di lokasi-lokasi dimana angkur-angkur tanah akan dimanfaatkan. Profil tanah harus ditentukan secara teliti, dimana setiap variasi pada elevasi dan tebal lapisan tanah tersebut sangat penting untuk diketahui. Pada pasir, distribusi ukuran partikel perlu ditentukan, agar permeabilitas dan ekseptabilitas adukan semen dapat diperkirakan. Kerapatan relative pasir juga perlu diketahui untuk membuat suatu perkiraan nilai  $\phi'$ . Pada lempung

### 3.7.1. Angkur pada pasir

Secara umum urutan pembangunannya adalah sebagai berikut. Sebuah lobang bor berselubung (*cased*) (dengan diameter sekitar 75 – 125 mm) dibuat sepanjang kedalaman yang diperlukan. Tendon kemudian diatur dalam lubang tersebut dan adukan semen disuntikan dengan tekanan tertentu pada seluruh panjang angkur terjepit sambil mencabut selubung lubang bor. Adukan tersebut berpenetrasi ke tanah di sekeliling lubang bor, sejauh jarak tertentu yang tergantung pada permeabilitas tanah dan tekanan suntikan, membentuk suatu zona tanah yang di-grout, di mana diameternya dapat mencapai empat kali diameter lubang bor (gambar 3.14). Ini perlu dilakukan dengan sangat hati-hati untuk memastikan bahwa tekanan suntikan tidak melebihi tekanan akibat tanah di atas angkur, bila tidak maka akan terjadi tonjolan (*heaving*) atau celah-celah pada tanah. Ketika adukan tersebut telah mencapai kekuatan yang memadai, ujung lain dari tendon diangkurkan pada pelat dudukan. Ruang antara selongsong tendon dan sisi-sisi lubang bor, pada seluruh panjang angkur bebas, biasanya diisi dengan adukan semen (dengan tekanan rendah) sehingga memberikan tambahan perlindungan terhadap karat pada tendon.

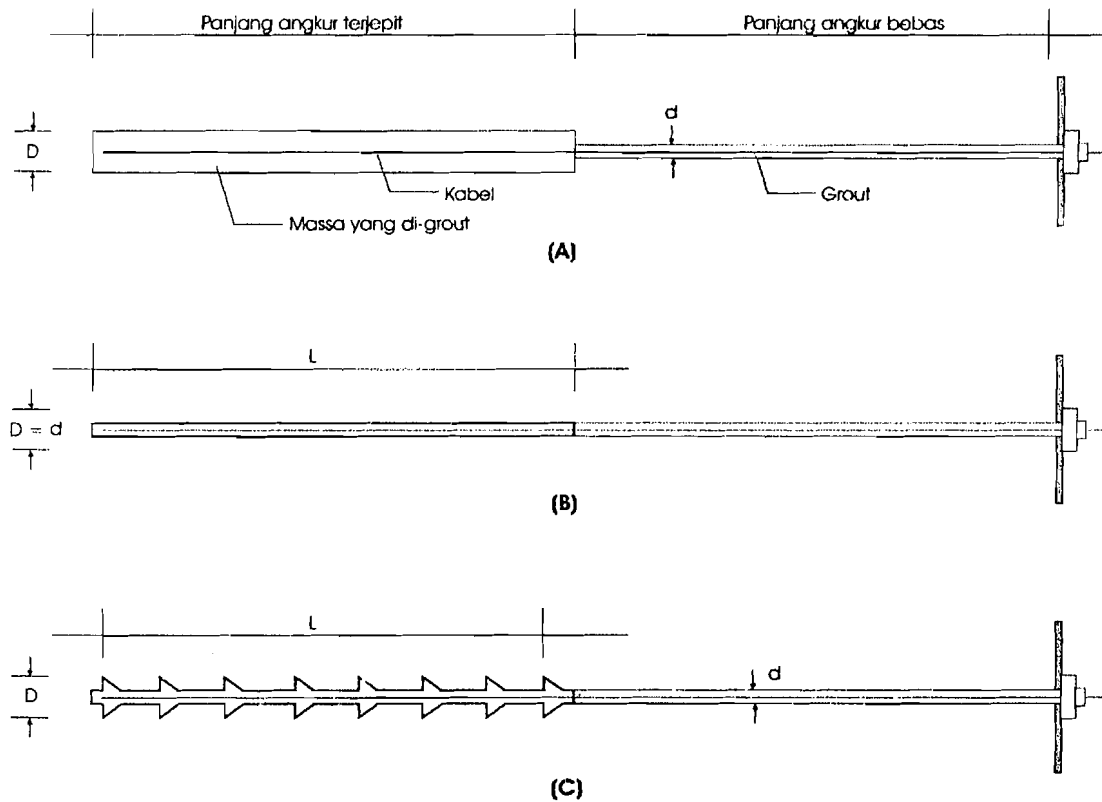
Tahanan ultimit dari sebuah angkur untuk tercabut keluar sama dengan jumlah tahanan sisi dan tahanan ujung dari massa yang di-grout. Persamaan teoritis berikut ini diusulkan oleh Littlejohn (1970):

$$Q_f = A\gamma' \left( h + \frac{L}{2} \right) \pi D L \tan \phi' + B\gamma' h \frac{\pi}{4} (D^2 - d^2) \quad (3.34)$$

di mana  $Q_f$  = kapasitas beban ultimit angkur,  $A$  = rasio tekanan normal pada daerah pertemuan terhadap tekanan efektif akibat tanah di atasnya,  $B$  = faktor daya dukung,  $h$  = kedalaman lapisan tanah di atasnya,  $L$  = panjang angkur terjepit,  $D$  = diameter angkur terjepit, dan  $d$  = diameter lubang bor.

Sedangkan besarnya gaya yang harus ditahan oleh keseluruhan angkur adalah:

$$F = \frac{\lambda - 1}{\lambda} W \left( \frac{\sin \phi}{\cos(\phi + \alpha)} \right) \quad (3.35)$$



**Gambar 3.14.** Jenis-jenis angkur tanah: (a) massa yang di-grout yang dibentuk dengan suntikan tekanan, (b) silinder adukan semen, (c) angkur dengan pelebaran ujung majemuk (Craig, 1989).

Telah diusulkan bahwa nilai  $A$  lazimnya berada dalam rentang 1 sampai 2. Faktor  $B$  analog dengan faktor daya dukung  $Nq$  dalam kasus tiang pancang dan telah diusulkan bahwa rasio  $Nq/B$  berada dalam rentang 1,3 sampai 1,4, dengan memakai nilai  $Nq$  dari Berezantzev, Khristoforov, dan Golubkov. Tetapi, persamaan di atas tidak cukup mewakili semua faktor yang relevan dalam sebuah permasalahan yang kompleks. Tahanan ultimit juga tergantung pada rincian teknik pemasangan dan sejumlah rumus empiris yang telah diusulkan oleh kontraktor-kontraktor khusus, yang layak untuk dipakai dengan teknik-teknik utama mereka.



## BAB IV

### METODE PENELITIAN

#### 4.1 Tinjauan Umum

Pada penelitian ini akan dicari pengaruh elevasi muka air tanah, kemiringan lereng, dan pembebanan terhadap stabilitas lereng yang diperkirakan menjadi faktor pemicu terjadinya bencana tanah longsor yang sering kali terjadi. Analisis dilakukan menggunakan *software* Geo-Slope, yaitu suatu program aplikasi geoteknik khususnya yang membahas tentang stabilitas lereng. Adapun input data yang diperlukan dalam program tersebut meliputi beberapa variabel spesifikasi kondisi tanah pada lereng yang diamati, seperti geometri lereng, berat unit tanah, sudut gesek dalam, kohesi, elevasi muka air tanah, sedangkan metode yang dipakai adalah Metode Bishop. Juga akan dicoba menambahkan perkuatan angkur pada lereng dengan  $SF < 1,00$  yang mengalami kelongsoran kaki. Dari analisis tersebut, diharapkan dapat ditentukan kondisi mana yang menghasilkan faktor keamanan (*safety factor*) yang paling baik, sehingga pada perencanaan kekuatan stabilitas lereng dapat dijadikan sebagai bahan acuan untuk kondisi tanah dan nilai pembebanan tertentu. Adapun program kerja penelitian sesuai dengan bagan alir pada Gambar 4.2.

#### 4.2. Pemodelan Lereng

Pemodelan yang dimaksud adalah penggunaan beberapa variasi elevasi muka air tanah, kemiringan lereng, dan perubahan beban pada puncak lereng untuk mencari hubungannya terhadap perubahan *slip surface* dengan bantuan program aplikasi Geo-Slope.

Dalam pemodelan ini digunakan geometri lereng yang sama untuk setiap kasus untuk mengetahui perubahan yang signifikan untuk berbagai keadaan geometri lereng, sedangkan lereng yang diteliti adalah lereng dengan dua lapis tanah yang mempunyai karakteristik berbeda. Untuk jelasnya dapat dilihat pada Gambar 4.1.

#### 4.3. Teknik Penelitian

Secara garis besar teknik penelitian pada penelitian ini adalah sebagai berikut:

1. Mencari dan mempelajari literatur yang berhubungan dengan topik penelitian.
2. Mengumpulkan data dan referensi yang diperlukan untuk mendukung penelitian.
3. Merumuskan permasalahan yang ada untuk stabilitas lereng.
4. Menentukan parameter yang berpengaruh dengan analisis stabilitas lereng.
5. Merencanakan dan membuat pemodelan lereng dengan menggunakan *software* Geo-Slope.
6. Pada pemodelan lereng yang mengalami kelongsoran kaki akan ditambahkan perkuatan angkur yang prosesnya juga dibantu oleh *software* Geo-Slope.
7. Pembahasan hasil yang didapat dari pemodelan lereng untuk setiap parameter pada analisis stabilitas lereng.
8. Kesimpulan dan saran.

#### 4.4. Data Properties Lereng

Properties tanah yang digunakan adalah tanah yang berada di lingkungan kampus terpadu Universitas Islam Indonesia, lebih tepatnya lagi tanah di sekitar kampus D3 Ekonomi UII, Yogyakarta. Yang didapatkan dari penelitian saudara Ari eko Tulus K dan M. All Ayudin AR. (2003).



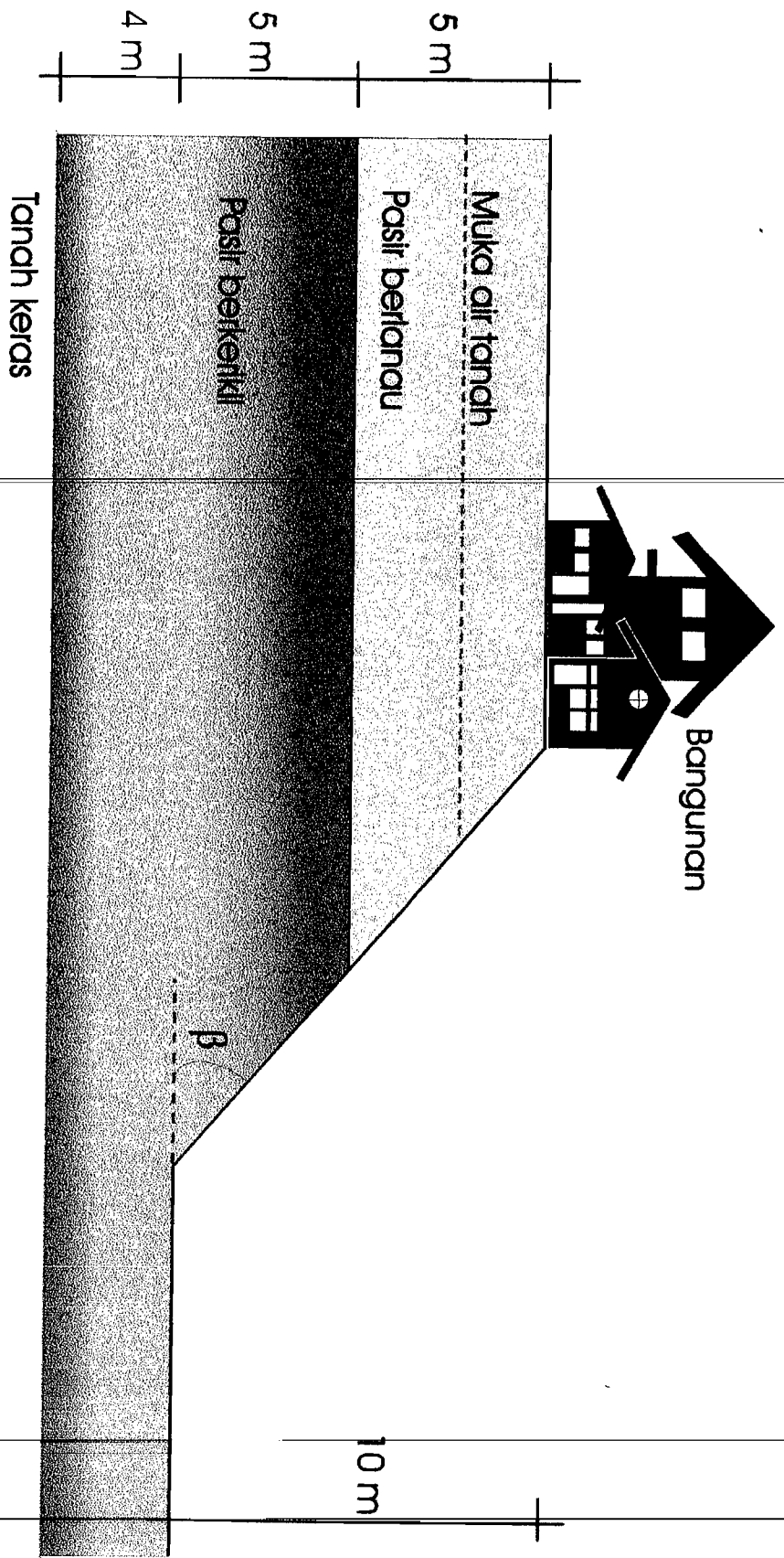
Untuk setiap model lereng akan menggunakan properties tanah sebagai berikut:

Lapisan tanah atas ( $\gamma_1 = 10,56 \text{ kN/m}^3$ ,  $\phi_1 = 28^\circ$ ,  $c_1 = 4,2 \text{ kPa}$ ) dan untuk lapisan tanah

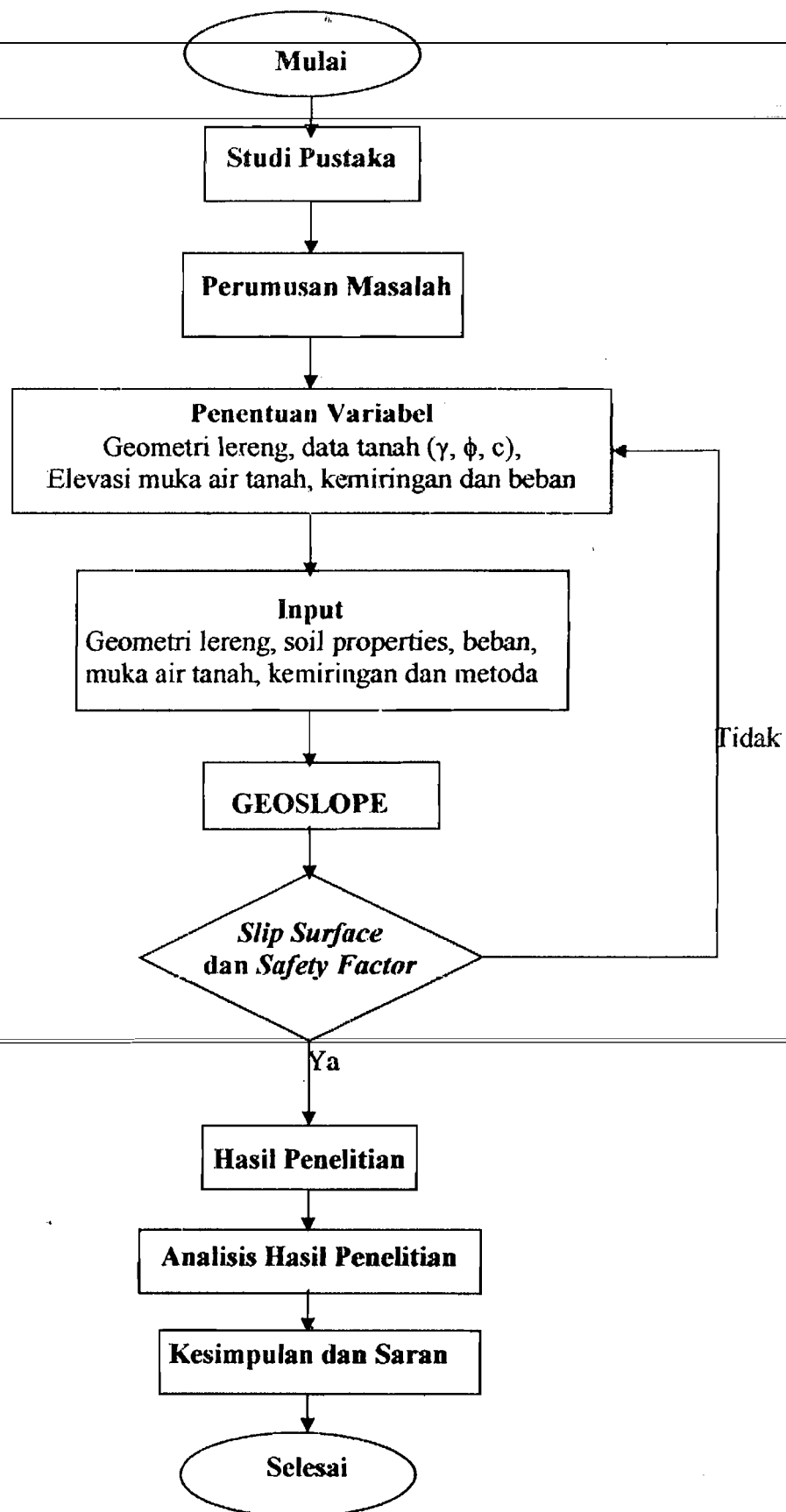
bawah ( $\gamma_2 = 14,87 \text{ kN/m}^3$ ,  $\phi_2 = 38^\circ$ ,  $c_2 = 3,5 \text{ kPa}$ )

1. Untuk mengetahui pengaruh perubahan elevasi muka air tanah, dipakai kemiringan lereng ( $\beta$ ) =  $45^\circ$ , dan beban terbagi rata ( $Q$ ) pada puncak lereng sebesar  $20 \text{ kN/m}^2$ . Sedangkan variable elevasi muka air tanah adalah  $h = +0\text{m}$ ,  $1\text{m}$ ,  $-2\text{m}$ ,  $-3\text{m}$ ,  $-4\text{m}$ ,  $-5\text{m}$ ,  $-6\text{m}$ ,  $-7\text{m}$ ,  $-8\text{m}$ ,  $-9\text{m}$  dan  $-10\text{m}$  dari puncak lereng.
2. Untuk mengetahui pengaruh kemiringan lereng, dipakai variabel kemiringan lereng adalah  $\alpha = 30^\circ$ ,  $40^\circ$ ,  $50^\circ$ ,  $60^\circ$  dan  $70^\circ$ , sedangkan elevasi muka air tanah pada  $-6\text{m}$  dari puncak lereng, dan juga  $Q = 20 \text{ kN/m}^2$  pada puncak lereng.
3. Untuk mengetahui pengaruh pembebanan, dipakai kemiringan lereng ( $\beta$ ) =  $45^\circ$  dan elevasi muka air tanah pada  $-6\text{m}$  dari puncak lereng. sedangkan variable nilai pembebanan adalah  $Q = 10 \text{ kN/m}^2$ ,  $25 \text{ kN/m}^2$ ,  $50 \text{ kN/m}^2$ ,  $75 \text{ kN/m}^2$ ,  $100 \text{ kN/m}^2$  dan  $200 \text{ kN/m}^2$ , juga akan ditambah dengan beban titik ( $P$ ) =  $1 \text{ kPa}$ ,  $1,5 \text{ kPa}$ ,  $2 \text{ kPa}$ ,  $2,5 \text{ kPa}$  dan  $3 \text{ kPa}$  yang diletakan pada jarak  $0,5 \text{ m}$ ,  $1 \text{ m}$  dan  $1,5 \text{ m}$  dari tepi lereng.
4. Untuk setiap model akan dicoba menggunakan perkuatan angkur, dengan tahanan ultimit tiap angkur ( $Q_f$ ) =  $300 \text{ kN/m}^2$ .

Untuk jelasnya, kondisi aktual lereng yang dijadikan sebagai objek penelitian diilustrasikan pada Gambar 4.1:



Gambar 4.1. Kondisi aktual lereng



Gambar 4.2 Bagan alir program kerja penelitian

## BAB V

### HASIL PENELITIAN

#### 5.1. Tinjauan Umum

Berdasarkan pemodelan lereng yang dibuat oleh penulis untuk mengetahui kecenderungan perilaku kelongsoran lereng terhadap variasi geometri dan properti tanah yang terdiri dari kemiringan, elevasi muka air tanah, dan pembebanan. Maka akan di peroleh suatu bidang longsor (*slip surface*) dan angka keamanan (*safety factor*).

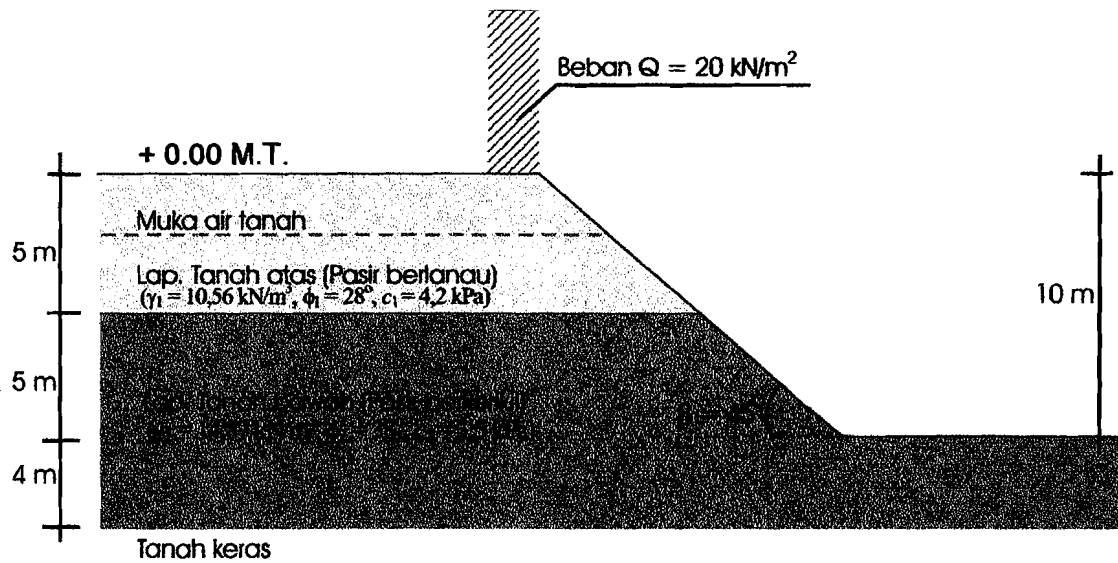
Dalam analisis kelongsoran lereng ini dipakai metode Bishop dengan menggunakan program GEO-SLOPE versi 5, dari Geo-Slope International Ltd.

#### 5.2. Stabilitas Lereng akibat Pengaruh Elevasi Muka Air Tanah

Analisis dilakukan dengan memasukkan data elevasi muka air tanah. Analisis dilakukan terhadap sebelas model lereng dengan variasi elevasi muka air tanah dimulai dari elevasi +0m, -1m, -2m, -3m, -4m, -5m, -6m, -7m, -8m, -9m dan -10m diukur dari puncak lereng.

Sedangkan parameter tetap tanah yang diteliti diambil berdasarkan penelitian yang dilakukan oleh saudara Ari Eko Tulus K. dan Ali Ayudin AR. (2003) pada lokasi sekitar kampus D3 ekonomi, Universitas Islam Indonesia, Yogyakarta. Pada penelitian mereka diperoleh jenis tanah pasir berlanau (lapisan tanah atas) dan Pasir berkerikil (lapisan tanah bawah) dari lereng yang dipakai untuk keseluruhan model antara,  $\gamma$  lapisan tanah atas  $10,56 \text{ kN/m}^3$ ,  $\gamma$  lapisan tanah bawah  $14,87 \text{ kN/m}^3$ , dan

kemiringan lerengnya adalah  $45^\circ$ , juga akan ditambahkan beban ( $Q$ ) pada puncak lereng sebesar  $20 \text{ kN/m}^2$ . Pemodelan lereng akibat pengaruh elevasi muka air tanah diilustrasikan pada Gambar 5.1.



**Gambar 5.1.** Pemodelan lereng akibat pengaruh muka air tanah

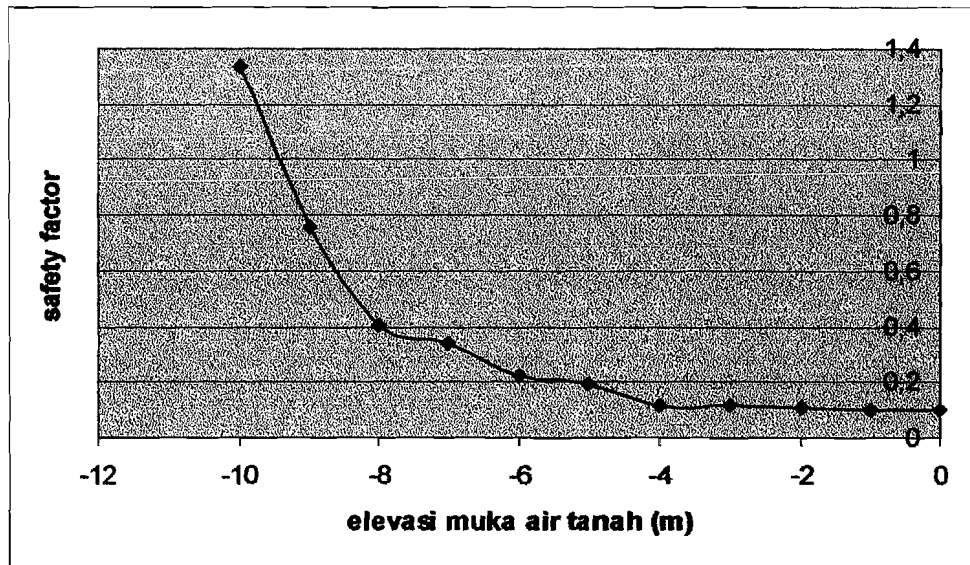
Dari kesebelas pemodelan tersebut diperoleh bidang longsor dan angka keamanan yang berbeda, sedangkan perubahan *Slip Surface* akibat pengaruh elevasi muka air tanah dapat dilihat pada gambar-gambar di lampiran 2.

Pada perubahan angka keamanan akibat pengaruh elevasi muka air tanah dapat dilihat pada Tabel 5.1.

**Tabel 5.1.** Perubahan *safety factor* dan jenis keruntuhan akibat pengaruh elevasi muka air tanah.

muka air tanah (m)	safety factor	Jenis keruntuhan
$\pm 0.00$	0.101	Keruntuhan sebagian
- 1.00	0.102	Keruntuhan sebagian
- 2.00	0.107	Keruntuhan sebagian
- 3.00	0.116	Keruntuhan sebagian
- 4.00	0.118	Keruntuhan sebagian
- 5.00	0.198	Keruntuhan sebagian
- 6.00	0.223	Keruntuhan sebagian
- 7.00	0.340	Keruntuhan sebagian
- 8.00	0.405	Keruntuhan dasar
- 9.00	0.756	Keruntuhan dasar
- 10.00	1.333	Keruntuhan dasar

Dari hasil yang didapat dan ditabelkan di atas, dapat dibuat grafik hubungan antara *safety factor* dengan elevasi muka air tanah.

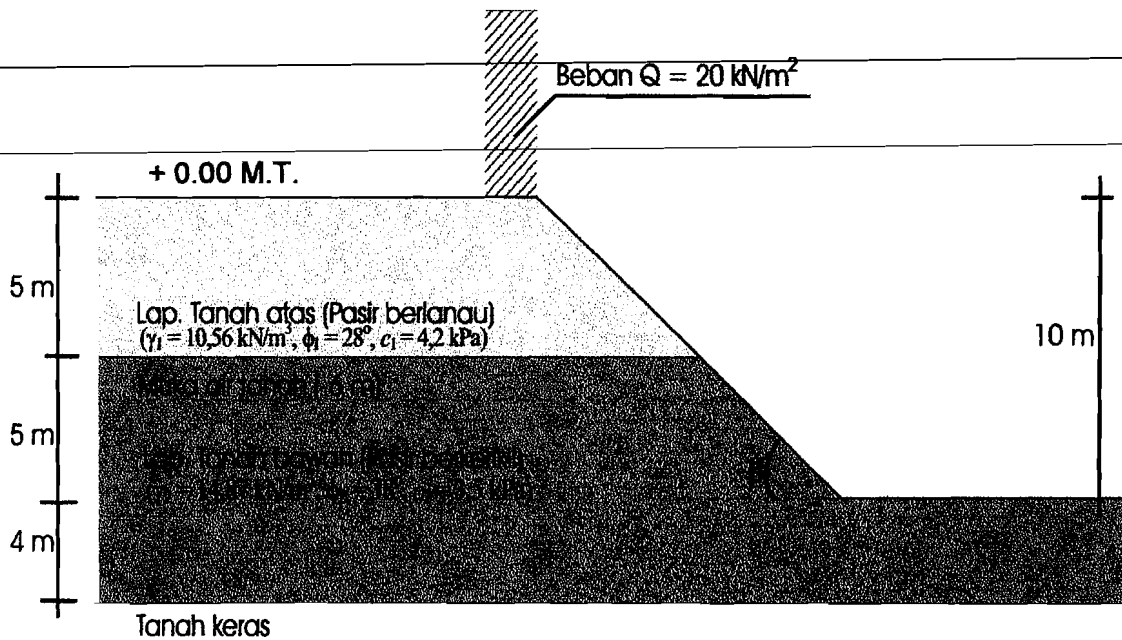


Grafik 5.1. Hubungan antara *safety factor* dengan elevasi muka air tanah.

### 5.3. Stabilitas Lereng Akibat Pengaruh Kemiringan ( $\beta$ )

Analisis dilakukan dengan memasukkan data geometri lereng dan parameter-parameternya. Untuk semua model, parameter tanah diambil sama. Analisis dilakukan terhadap lima model lereng yang akan diselidiki *slip surface* dan *safety factornya*, dimulai dari lereng dengan kemiringan  $30^\circ$ ,  $40^\circ$ ,  $50^\circ$ ,  $60^\circ$  dan  $70^\circ$ .

Parameter tetap dari lereng yang dipakai untuk keseluruhan model antara lain beban ( $Q$ ) pada puncak lereng  $20 \text{ kN/m}^2$ ,  $\gamma$  lapisan tanah atas  $10,56 \text{ kN/m}^3$  dan  $\gamma$  lapisan tanah bawah  $14,87 \text{ kN/m}^3$ , juga muka air tanah berada pada elevasi  $-6 \text{ m}$  dari puncak lereng. Pemodelan lereng akibat pengaruh kemiringan lereng ( $\beta$ ) diilustrasikan pada Gambar 5.2.



**Gambar 5.2.** Pemodelan lereng akibat pengaruh kemiringan lereng

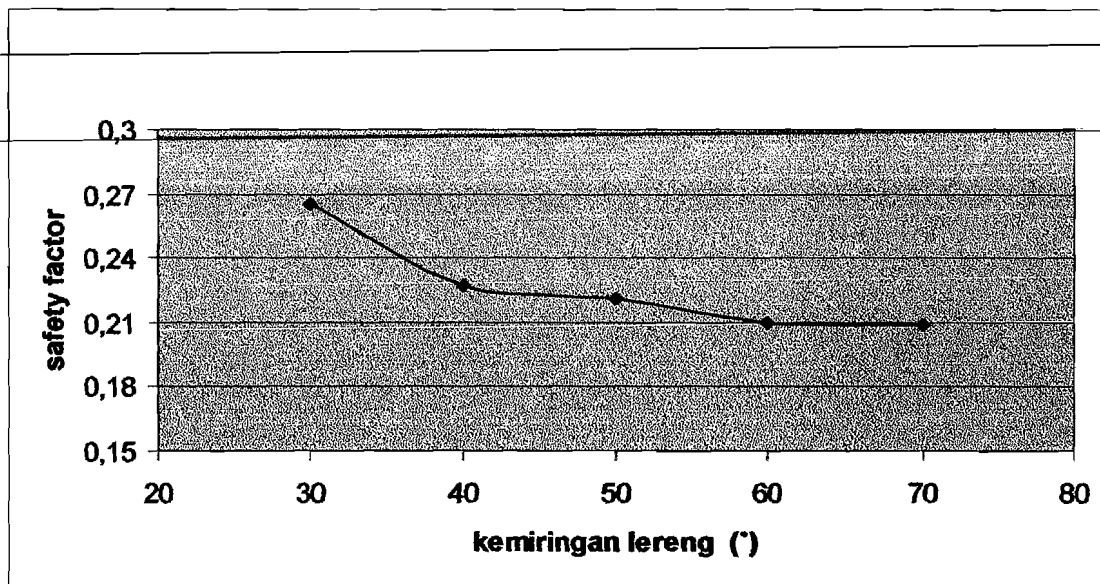
Dari kelima pemodelan lereng tersebut diperoleh bidang longsor dan angka keamanan yang berbeda-beda. Perubahan *Slip Surface* akibat pengaruh kemiringan lereng dapat dilihat pada gambar-gambar lampiran 3.

Perubahan angka keamanan akibat pengaruh kemiringan lereng dapat dilihat pada Tabel 5.2.

**Tabel 5.2.** Perubahan *safety factor* dan jenis keruntuhan akibat pengaruh kemiringan lereng ( $\beta$ ).

Kemiringan ( $^\circ$ )	<i>safety factor</i>	Jenis keruntuhan
30	0.265	Keruntuhan sebagian
40	0.227	Keruntuhan sebagian
50	0.221	Keruntuhan sebagian
60	0.210	Keruntuhan sebagian
70	0.209	Keruntuhan sebagian

Dari hasil yang didapat dan ditabelkan di atas, dapat dibuat grafik hubungan antara *safety factor* dengan kemiringan lereng ( $\beta$ ).



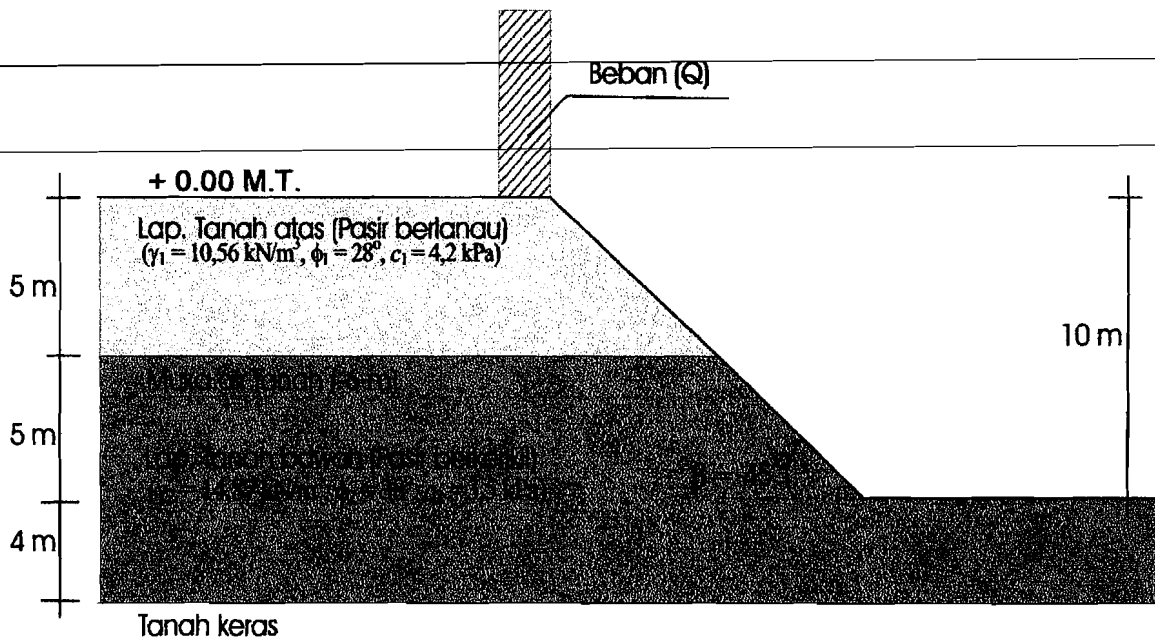
**Grafik 5.2.** Hubungan antara *safety factor* dengan kemiringan lereng ( $\beta$ )

#### 5.4. Stabilitas Lereng Akibat Pengaruh Pembebanan pada puncak lereng

Analisis dilakukan dengan memasukkan data besarnya beban pada tanah. Analisis dilakukan terhadap enam model lereng dengan variasi pembebanan pada tanah dimulai dengan beban terbagi rata (Q) sebesar  $10 \text{ kN/m}^2$ ,  $25 \text{ kN/m}^2$ ,  $50 \text{ kN/m}^2$ ,  $75 \text{ kN/m}^2$ ,  $100 \text{ kN/m}^2$  dan  $200 \text{ kN/m}^2$ . Kemudian ditambah dengan variasi beban titik (P) sebesar  $1 \text{ kPa}$ ,  $1,5 \text{ kPa}$ ,  $2 \text{ kPa}$ ,  $2,5 \text{ kPa}$  dan  $3 \text{ kPa}$  pada jarak  $0,5 \text{ m}$ ,  $1 \text{ m}$  dan  $1,5 \text{ m}$  dari tepi lereng.

Parameter tetap dari lereng yang dipakai untuk keseluruhan model antara lain kemiringan lereng adalah  $45^\circ$ ,  $\gamma$  lapisan tanah atas  $10,56 \text{ kN/m}^3$  dan  $\gamma$  lapisan tanah bawah  $14,87 \text{ kN/m}^3$ , juga muka air tanah berada pada elevasi  $-6 \text{ m}$  dari puncak lereng. Pemodelan lereng akibat pengaruh pembebanan (Q) diilustrasikan pada Gambar 5.3.





**Gambar 5.3.** Pemodelan lereng dipengaruhi oleh pembebanan

Dari kelima pemodelan tersebut diperoleh bidang longsor dan angka keamanan yang berbeda. Perubahan *Slip Surface* akibat pengaruh pembebanan pada puncak lereng dapat dilihat pada gambar-gambar di lampiran 4.

#### 5.4.1. Angka Aman Akibat Pengaruh Beban Terbagi Rata

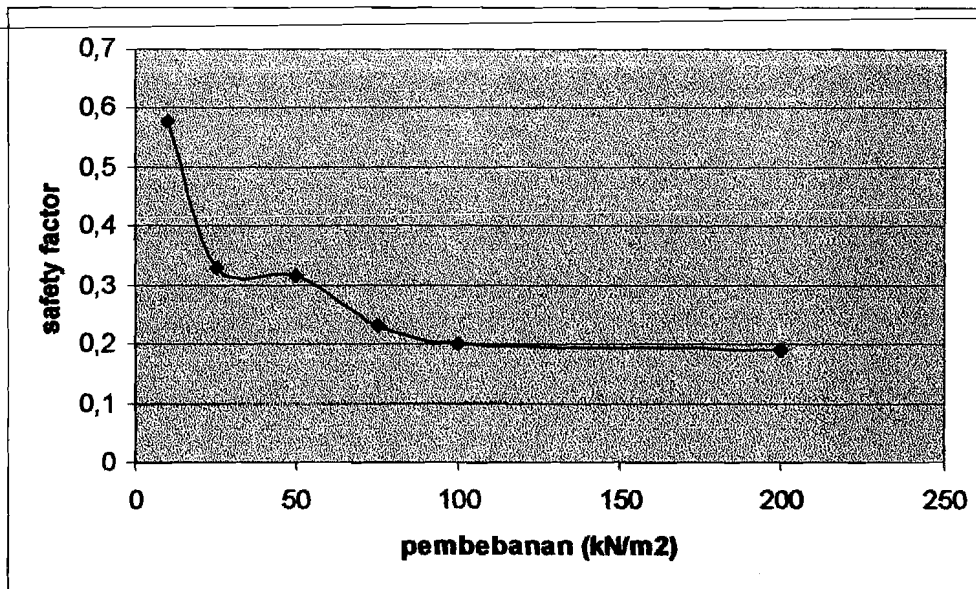
Perubahan angka keamanan akibat pengaruh pembebanan pada puncak lereng

dapat dilihat pada Tabel 5.3.

**Tabel 5.3.** Perubahan *safety factor* dan jenis keruntuhan akibat pengaruh pembebanan

Beban (kN/m <sup>2</sup> )	safety factor	Jenis keruntuhan
10	0.576	Keruntuhan sebagian
25	0.330	Keruntuhan sebagian
50	0.315	Keruntuhan sebagian
75	0.231	Keruntuhan kaki
100	0.200	Keruntuhan kaki
200	0.189	Keruntuhan kaki

Dari hasil yang didapat dan ditabelkan di atas, dapat dibuat grafik hubungan antara *safety factor* dengan pembebanan.



Grafik 5.3. Hubungan antara *safety factor* dengan pembebanan

#### 5.4.2. Angka Aman Akibat Pengaruh Beban Titik

Untuk lereng yang dipengaruhi beban titik (P) pada puncak lereng, hasilnya adalah seperti yang disajikan pada Tabel 5.4.

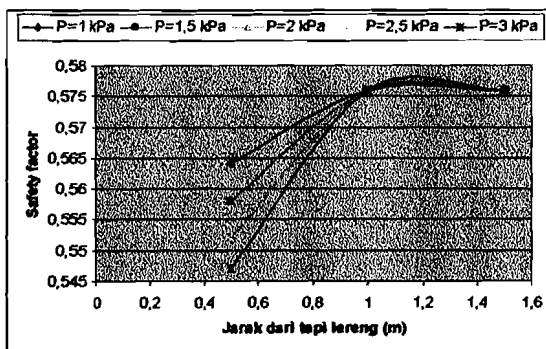
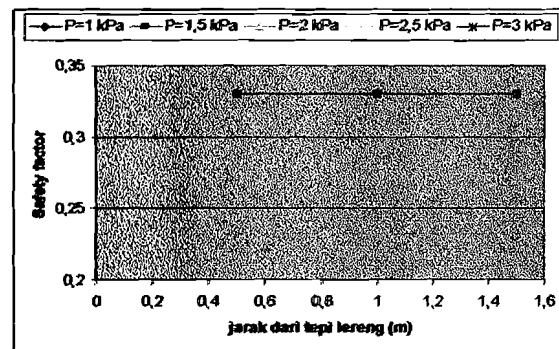
Tabel 5.4. Perubahan *safety factor* akibat pengaruh beban titik dan posisi beban

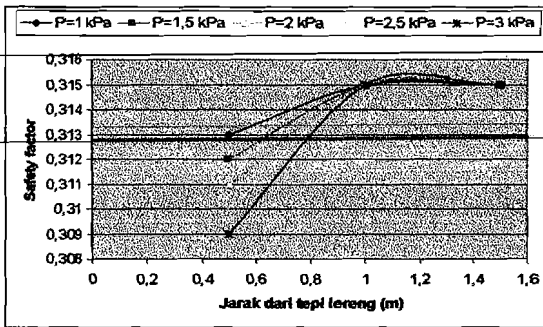
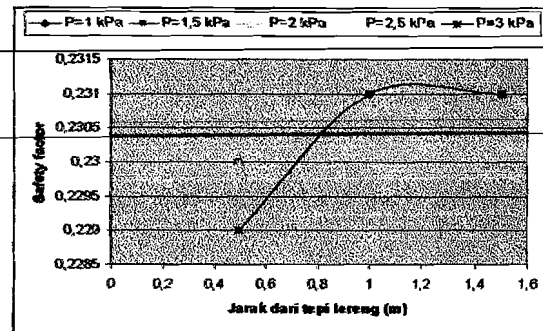
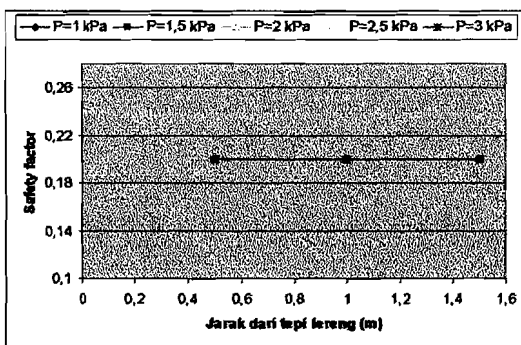
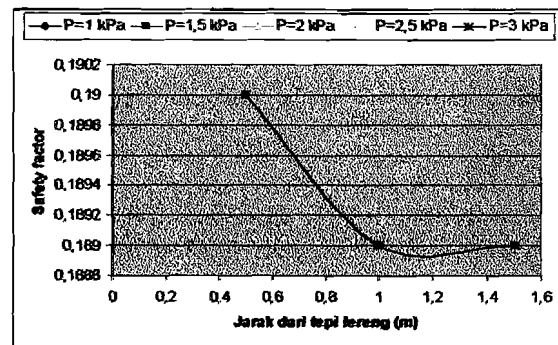
Lereng dengan beban terbagi rata (Q) = 10 kN/m <sup>2</sup>					
Jarak dari tepi lereng (m)	Beban titik (P)				
	1 kPa	1,5 kPa	2 kPa	2,5 kPa	3 kPa
0,5	0,564	0,558	0,552	0,547	0,547
1	0,576	0,576	0,576	0,576	0,576
1,5	0,576	0,576	0,576	0,576	0,576
Lereng dengan beban terbagi rata (Q) = 25 kN/m <sup>2</sup>					
Jarak dari tepi lereng (m)	Beban titik (P)				
	1 kPa	1,5 kPa	2 kPa	2,5 kPa	3 kPa
0,5	0,330	0,330	0,330	0,330	0,330
1	0,330	0,330	0,330	0,330	0,330
1,5	0,330	0,330	0,330	0,330	0,330

Lanjutan Tabel 5.4.

Lereng dengan beban terbagi rata (Q) = 50 kN/m <sup>2</sup>					
Jarak dari tepi lereng (m)	Beban titik (P)				
	1 kPa	1,5 kPa	2 kPa	2,5 kPa	3 kPa
0,5	0,313	0,312	0,311	0,310	0,309
1	0,315	0,315	0,315	0,315	0,315
1,5	0,315	0,315	0,315	0,315	0,315
Lereng dengan beban terbagi rata (Q) = 75 kN/m <sup>2</sup>					
Jarak dari tepi lereng (m)	Beban titik (P)				
	1 kPa	1,5 kPa	2 kPa	2,5 kPa	3 kPa
0,5	0,230	0,230	0,230	0,230	0,229
1	0,231	0,231	0,231	0,231	0,231
1,5	0,231	0,231	0,231	0,231	0,231
Lereng dengan beban terbagi rata (Q) = 100 kN/m <sup>2</sup>					
Jarak dari tepi lereng (m)	Beban titik (P)				
	1 kPa	1,5 kPa	2 kPa	2,5 kPa	3 kPa
0,5	0,200	0,200	0,200	0,200	0,200
1	0,200	0,200	0,200	0,200	0,200
1,5	0,200	0,200	0,200	0,200	0,200
Lereng dengan beban terbagi rata (Q) = 200 kN/m <sup>2</sup>					
Jarak dari tepi lereng (m)	Beban titik (P)				
	1 kPa	1,5 kPa	2 kPa	2,5 kPa	3 kPa
0,5	0,190	0,190	0,190	0,190	0,190
1	0,189	0,189	0,189	0,189	0,189
1,5	0,189	0,189	0,189	0,189	0,189

Jika dari tabel di atas dibuat grafiknya, maka perbandingan *safety factor* dengan pembebanan adalah sebagai berikut:

(a) Lereng dengan Q = 10 kN/m<sup>2</sup>(b) Lereng dengan Q = 10 kN/m<sup>2</sup>

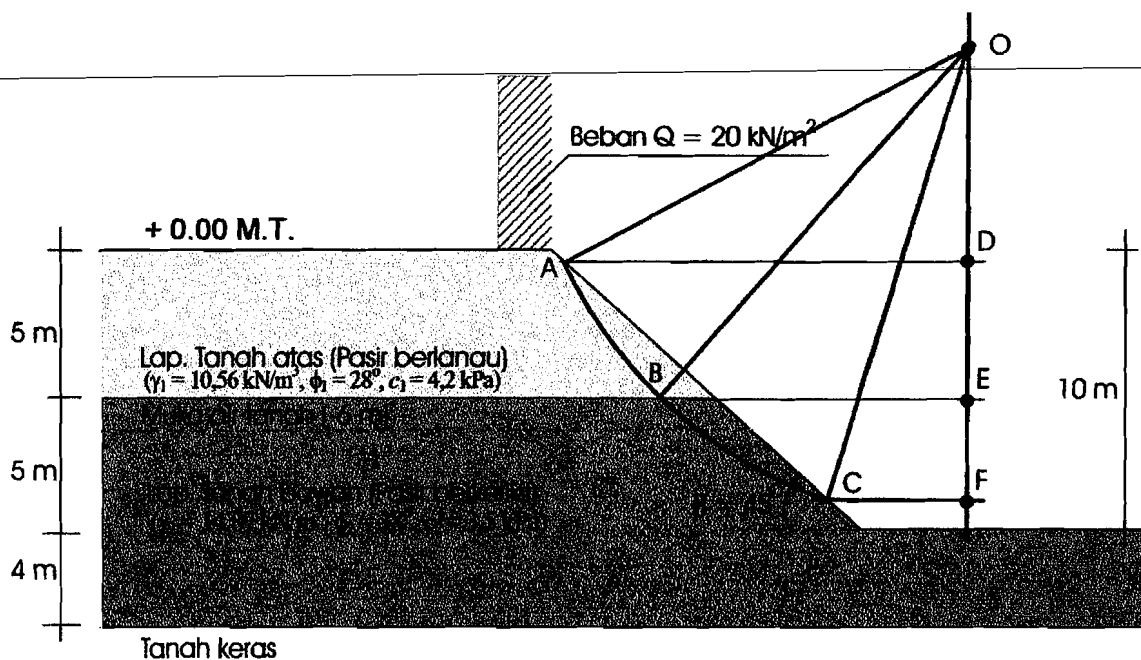
(c) Lereng dengan  $Q = 50 \text{ kN/m}^2$ (d) Lereng dengan  $Q = 75 \text{ kN/m}^2$ (e) Lereng dengan  $Q = 100 \text{ kN/m}^2$ (f) Lereng dengan  $Q = 200 \text{ kN/m}^2$ 

**Grafik 5.4.** Hubungan antara *safety factor* dengan perubahan beban titik dan perletakkannya pada lereng dengan perubahan beban terbagi rata ( $Q = 10 \text{ kN/m}^2$  hingga  $Q = 200 \text{ kN/m}^2$ ).

Untuk jenis keruntuhan, antara lereng yang hanya mengalami pembebanan oleh beban terbagi rata saja dan lereng dengan ditambah beban titik, adalah sama.

Untuk lereng dengan  $Q = 10, 25$  dan  $50 \text{ kN/m}^2$  yang ditambah beban titik ( $P$ ) mengalami keruntuhan sebagian dan untuk lereng dengan  $Q = 75, 100$  dan  $200 \text{ kN/m}^2$  yang ditambah beban titik ( $P$ ) mengalami kelongsoran kaki.

### 5.5. Perhitungan Model Lereng akibat MAT pada -6.00 m.



**Gambar 5.4.** Properties tanah pada pemodelan lereng dengan MAT pada -6.00 m

Untuk koordinat dapat dilihat pada lampiran 2 G.

$$\text{Koordinat O} = (35 : 24,5)$$

$$\text{Koordinat A} = (15,4 : 13,6)$$

$$\text{Koordinat B} = (18,8 : 9)$$

$$\text{Koordinat C} = (24,6 : 4,6)$$

$$\text{Koordinat D} = (35 : 13,6)$$

$$\text{Koordinat E} = (35 : 9)$$

$$\text{Koordinat F} = (35 : 4,6)$$

$$L \overline{AD} = (35 - 15,4) = 19,6 \text{ m}$$

$$L \overline{BE} = (35 - 18,8) = 16,2 \text{ m}$$

$$L \overline{CF} = (35 - 24,6) = 10,4 \text{ m}$$

$$L \overline{EO} = (24,5 - 9) = 15,5 \text{ m}$$

$$L \overline{FO} = (24,5 - 4,6) = 19,9 \text{ m}$$

$$L \overline{DO} = (24,5 - 13,6) = 10,9 \text{ m}$$

$$\text{Panjang } L \overline{OA} = \sqrt{L \overline{AD}^2 + L \overline{DO}^2} = \sqrt{(19,6)^2 + (10,9)^2} = 22,4 \text{ m}$$

$$\text{Panjang } L \overline{BO} = \sqrt{L \overline{BE}^2 + L \overline{EO}^2} = \sqrt{(16,2)^2 + (15,5)^2} = 22,4 \text{ m}$$

$$\text{Panjang } L \overline{CO} = \sqrt{L \overline{CF}^2 + L \overline{FO}^2} = \sqrt{(10,4)^2 + (19,9)^2} = 22,4 \text{ m}$$

$$\angle AOD = \arctan \frac{L \overline{AD}}{L \overline{DO}} = \arctan \frac{19,6}{10,9} = 60,92^\circ$$

$$\angle BOE = \arctan \frac{\overline{LBE}}{\overline{LEO}} = \arctan \frac{16,2}{15,5} = 46,26^\circ$$

$$\angle COF = \arctan \frac{\overline{LCF}}{\overline{LFO}} = \arctan \frac{10,4}{19,9} = 27,59^\circ$$

$$\begin{aligned} L \overline{AB} &= \frac{\angle AOD - \angle BOE}{360} \times 2\pi \times R \\ &= \frac{60,92 - 46,26}{360} \times 2(3,14) \times 22,4 = 5,655 \text{ m} \end{aligned}$$

$$\begin{aligned} L \overline{BC} &= \frac{\angle BOE - \angle COF}{360} \times 2\pi \times R \\ &= \frac{46,26 - 27,59}{360} \times 2(3,14) \times 22,4 = 7,299 \text{ m} \end{aligned}$$

$$\begin{aligned} L \overline{CF} &= \frac{\angle COF}{360} \times 2\pi \times R \\ &= \frac{27,59}{360} \times 2(3,14) \times 22,4 = 10,786 \text{ m} \end{aligned}$$

$$\begin{array}{ll} \varphi_1 = 28^\circ & \varphi_2 = 38^\circ \\ C_1 = 4,2 \text{ kPa} & C_2 = 3,5 \text{ kPa} \end{array}$$

$$\begin{aligned} \text{Lebar total pias Lapisan I} &= (5,7313)^2 - (\overline{EO} - \overline{DO})^2 \\ &= (32,847) - (15,5 - 10,9)^2 = (32,847) - (4,6)^2 \\ &= 11,687 \end{aligned}$$

$$\text{Panjang pias Lapisan I} = \sqrt{11,687} = 3,4186 \text{ m}$$

$$\text{Lebar tiap pias} = \frac{3,4186}{8} = 0,427 \text{ m}$$

$$\begin{aligned} \text{Lebar pias lapisan II} &= (7,29910)^2 - (\overline{LEF})^2 \\ &= (7,29910)^2 - (4,4)^2 \\ &= 33,9168 \text{ m} \end{aligned}$$

$$\text{Panjang pias Lapisan II} = \sqrt{33,9168} = 5,8238 \text{ m}$$

$$\text{Lebar tiap pias} = \frac{5,8238}{13} = 0,4479 \text{ m}$$

Hitungan untuk pias I dengan metode Bishop

$$x_1 = \frac{1}{2} \times B_1 = \frac{1}{2} \times 0,427 = 0,2135$$

$$\theta_1 = \arcsin \frac{x_1}{R} = \frac{0,2135}{22,4} = 0,546^\circ$$

$$y_1 = \frac{x_1}{\tan \theta_1} = \frac{0,2135}{\tan 0,546} = 22,3989 \text{ m}$$

$$h_1 = (x_1 \tan \alpha) - (LOF - y_1)$$

$$h_1 = (0,2135 \tan 45) - (22,4 - 22,3989) = 0,2124 \text{ m}$$

$$W = (B_1 \times h_1 \times \gamma_1) + (B_1 \times h_2 \times \gamma_2)$$

$$= (0,427 \times 0,2124 \times 10,56) + (0,427 \times 0 \times 14,87) = 0,9577 \text{ kN/m}$$

$$C \times B_1 = 4,2 \times 0,427 = 1,7934$$

$$W \sin \theta_1 = 0,9577 \sin(0,546) = 0,0091 \text{ kN/m}$$

$$W \tan \varphi_1 = 0,9577 \tan 28 = 0,5092 \text{ kN/m}$$

$$(C_1 \times B_1) + W \tan \varphi_1 = 1,7934 + 0,5092 = 2,3026 \text{ kN/m}$$

Untuk mencari SF dilakukan dengan iterasi yang berulang (*trial and error*)

Dicari M dengan SF coba-coba,

SF<sub>0</sub> = 0,2 didapat

$$M_1 = \cos \theta_1 \left( 1 + \frac{\tan \theta_1 \times \tan \varphi_1}{F_o} \right) = \cos 0,546 \left( 1 + \frac{\tan 0,546 \times \tan 28}{0,2} \right) = 1,025$$

$$SF_1 = \left( \sum (cb + W \tan \varphi) \right) / m_1 / \left( \sum W \sin \theta \right) = 0,210$$

$$SF_1 = 0,210 \text{ didapat } M_2 = 1,0240$$

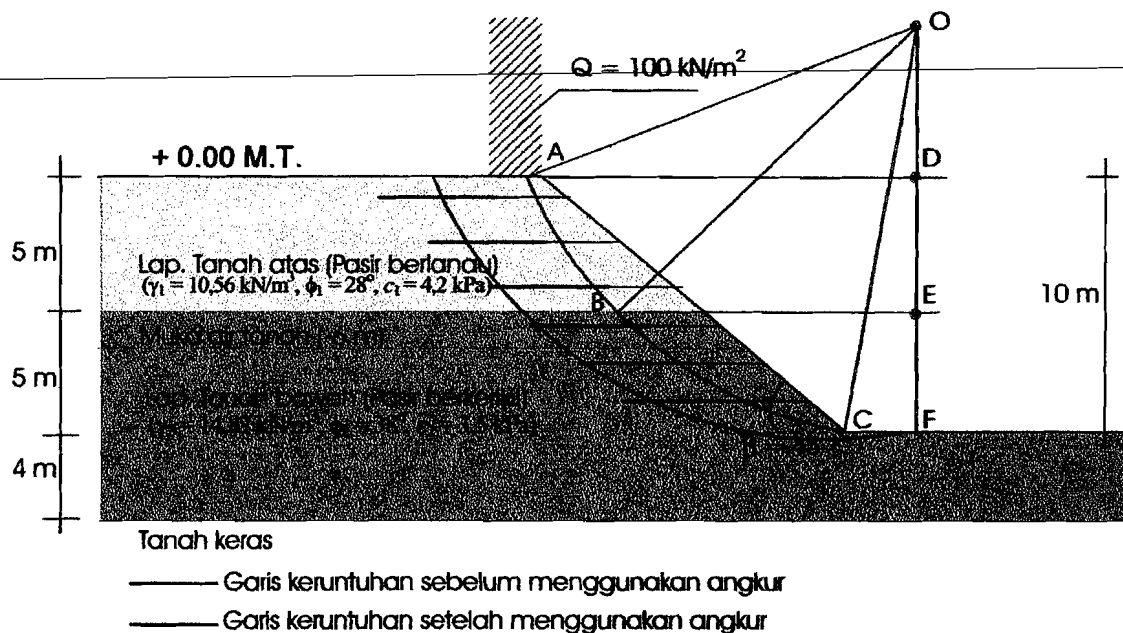
$$SF_2 = \left( \sum (cb + W \tan \varphi) \right) / m_2 / \left( \sum W \sin \theta \right) = 0,220$$

$$SF_2 = 0,220 \text{ didapat } M_3 = 1,0229$$

$$SF_3 = \left( \sum (cb + W \tan \varphi) \right) / m_3 / \left( \sum W \sin \theta \right) = 0,230$$

Karena nilai SF<sub>3</sub> mendekati SF<sub>2</sub>, iterasi dihentikan dan didapat nilai SF = 0,220

## 5.6. Perhitungan Lereng dengan Perkuatan Angkur



**Gambar 5.5.** Properties tanah pada pemodelan lereng dengan  $Q = 100 \text{ kN/m}^2$

Diketahui :

Data-data tanah lapisan atas, ( $\gamma_1 = 10,56 \text{ kN/m}^3$ ,  $\phi_1 = 28^\circ$ ,  $c_1 = 4,2 \text{ kPa}$ ) dan untuk lapisan tanah bawah, ( $\gamma_2 = 14,87 \text{ kN/m}^3$ ,  $\phi_2 = 38^\circ$ ,  $c_2 = 3,5 \text{ kPa}$ ).

Data-data angkur:

A = Rasio tekanan normal pada daerah pertemuan terhadap tekanan efektif akibat tanah di atasnya, diusulkan 1-2 (Craig, 1987), digunakan 1,5.

$\gamma$  = Berat volume tanah, digunakan yang terbesar  $14,87 \text{ kN/m}^3$

h = Tinggi rencana tanah di atas angkur, digunakan 1,5 m

L = Panjang angkur terjepit, digunakan 4 m

D = Diameter angkur terjepit yang besarnya mencapai 4 kali diameter lubang bor (Craig, 1987), digunakan 0,3 m

d = Diameter lubang bor diusulkan 75–125 mm (Craig, 1987), digunakan 0,1 m

$\phi$  = Sudut gesek dalam, digunakan yang terbesar,  $38^\circ$

B = Faktor daya dukung, diperoleh 63,576.

Seperti yang dijelaskan pada pembahasan tentang angkur di depan, nilai B adalah berdasarkan analog dengan faktor daya dukung  $Nq$  dalam kasus tiang pancang dan telah diusulkan bahwa rasio  $Nq/B$  berada dalam rentang 1,3 – 1,4, dengan memakai nilai  $Nq$  dari Berezantzev, Khristoforov dan Golubkov.



**Tabel 5.5.** Tabel hubungan antara  $\phi$  dan  $Nq$  berdasarkan teori Berezantzev, Khristoforov dan Golubkov

$\phi$	28°	30°	32°	34°	36°	38°	40°
$Nq$	12	17	25	40	58	89	40
	(9)	(14)	(22)	(37)	(56)	(88)	(136)

Dari tabel di atas, dengan  $\phi = 38^\circ$  didapatkan  $Nq$  sebesar 89, jika besarnya  $Nq/B$  dipakai 1,4. maka,  $1,4 = 89/B$  menghasilkan nilai  $B$  sebesar 63,576.

Untuk panjang angkur keseluruhan adalah mengikuti bentuk bidang longsor, namun pada kasus ini panjang angkur keseluruhan adalah 8 m.

Penyelesaian:

Menghitung bidang longsor sebelum menggunakan perkuatan angkur:

Koordinat O = ( 33 : 21,6)

Koordinat A = ( 14,8 : 14,9)

Koordinat B = ( 18 : 9 )

Koordinat C = ( 24,6 : 4 )

Koordinat D = ( 33 : 14 )

Koordinat E = ( 33 : 9 )

Koordinat F = ( 33 : 4 )

$$L \overline{AD} = ( 33 - 14,9 ) = 18,1 \text{ m}$$

$$L \overline{BE} = ( 33 - 18 ) = 15 \text{ m}$$

$$L \overline{CF} = ( 33 - 24,6 ) = 8,4 \text{ m}$$

$$L \overline{EO} = ( 21,6 - 9 ) = 12,6 \text{ m}$$

$$L \overline{FO} = ( 21,6 - 4 ) = 17,6 \text{ m}$$

$$L \overline{DO} = ( 21,6 - 14 ) = 7,6 \text{ m}$$

$$\text{Panjang } L \overline{OA} = \sqrt{L\overline{AD}^2 + L\overline{DO}^2} = \sqrt{(18,1)^2 + (7,5)^2} = 19,5 \text{ m}$$

$$\text{Panjang } L \overline{BO} = \sqrt{L\overline{BE}^2 + L\overline{EO}^2} = \sqrt{(15)^2 + (12,6)^2} = 19,5 \text{ m}$$

$$\text{Panjang } L \overline{CO} = \sqrt{L\overline{CF}^2 + L\overline{FO}^2} = \sqrt{(8,4)^2 + (17,6)^2} = 19,5 \text{ m}$$

$$\angle \text{AOD} = \arctan \frac{L\overline{AD}}{L\overline{DO}} = \arctan \frac{18,1}{7,6} = 67,22^\circ$$

$$\angle \text{BOE} = \arctan \frac{L\overline{BE}}{L\overline{EO}} = \arctan \frac{15}{12,6} = 49,96^\circ$$

$$\angle COF = \arctan \frac{\overline{LCF}}{\overline{LFO}} = \arctan \frac{8,4}{17,6} = 25,51^\circ$$

$$\begin{aligned} L \overline{AB} &= \frac{\angle AOD - \angle BOE}{360} \times 2\pi \times R \\ &= \frac{67,22 - 49,96}{360} \times 2(3,14) \times 19,5 = 5,875 \text{ m} \end{aligned}$$

$$\begin{aligned} L \overline{BC} &= \frac{\angle BOE - \angle COF}{360} \times 2\pi \times R \\ &= \frac{49,96 - 25,51}{360} \times 2(3,14) \times 19,5 = 8,32 \text{ m} \end{aligned}$$

$$\begin{aligned} L \overline{CF} &= \frac{\angle COF}{360} \times 2\pi \times R \\ &= \frac{25,51}{360} \times 2(3,14) \times 19,5 = 8,68 \text{ m} \end{aligned}$$

$$\varphi_1 = 28^\circ$$

$$C_1 = 4,2 \text{ kPa}$$

$$\varphi_2 = 38^\circ$$

$$C_2 = 3,5 \text{ kPa}$$

$$\begin{aligned} \text{Lebar total pias Lapisan I} &= (5,875)^2 - (\overline{EO} - \overline{DO})^2 \\ &= (34,518) - (12,6 - 7,6)^2 = (32,847) - (5)^2 \\ &= 9,518 \text{ m} \end{aligned}$$

$$\text{Panjang pias Lapisan I} = \sqrt{9,518} = 3,085 \text{ m}$$

$$\text{Lebar tiap pias} = \frac{3,085}{6} = 0,514 \text{ m}$$

$$\begin{aligned} \text{Lebar pias lapisan II} &= (8,32)^2 - (\overline{LEF})^2 \\ &= (8,32)^2 - (5)^2 \\ &= 44,22 \text{ m} \end{aligned}$$

$$\text{Panjang pias Lapisan II} = \sqrt{44,22} = 6,649 \text{ m}$$

$$\text{Lebar tiap pias} = \frac{6,649}{14} = 0,474 \text{ m}$$

Hitungan untuk pias I dengan metode Bishop

$$x_1 = \frac{1}{2} \times B_1 = \frac{1}{2} \times 0,514 = 0,257$$

$$\theta_1 = \arcsin \frac{x_1}{R} = \frac{0,257}{19,5} = 0,755^\circ$$

$$y_1 = \frac{x_1}{\tan \theta_1} = \frac{0,257}{\tan 0,755} = 19,498 \text{ m}$$

$$h_1 = (x_1 \tan \alpha) - (LOF - y_1)$$

$$h_1 = (0,257 \tan 45) - (19,5 - 19,498) = 0,257 \text{ m}$$

$$W = (B_1 \times h_1 \times \gamma_1) + (B_1 \times h_2 \times \gamma_2)$$

$$= (0,514 \times 0,257 \times 10,56) + ((100 \times 0,514 \times 5) \times 10,56) + (0,514 \times 0 \times 14,87) = 2715,314 \text{ kN}$$

$$C \times B_1 = 4,2 \times 0,514 = 2,1588$$

$$W \sin \theta_1 = 2715,3 \sin (0,755) = 35,779 \text{ kN/m}$$

$$W \tan \varphi_1 = 2715,3 \tan 28 = 1443,75 \text{ kN/m}$$

$$(C_1 \times B_1) + W \tan \varphi_1 = 2,1588 + 1443,75 = 1445,90 \text{ kN/m}$$

Untuk mencari SF dilakukan dengan iterasi yang berulang (*trial and error*)

Dicari M dengan SF coba-coba

SF<sub>0</sub> = 1,11 didapat

$$M_1 = \cos \theta_1 \left( 1 + \frac{\tan \theta_1 \times \tan \varphi_1}{F_o} \right) = \cos 0,755 \left( 1 + \frac{\tan 0,755 \times \tan 28}{1,11} \right) = 1,0062$$

$$SF_1 = \left( \sum (cb + W \tan \varphi) \right) / m_1 / \left( \sum W \sin \theta \right) = 0,180$$

$$SF_1 = 0,180 \text{ didapat } M_2 = 1,0388$$

$$SF_2 = \left( \sum (cb + W \tan \varphi) \right) / m_2 / \left( \sum W \sin \theta \right) = 0,195$$

$$SF_2 = 0,195 \text{ didapat } M_3 = 1,0358$$

$$SF_3 = \left( \sum (cb + W \tan \varphi) \right) / m_3 / \left( \sum W \sin \theta \right) = 0,250$$

Karena nilai SF<sub>3</sub> mendekati SF<sub>2</sub>, iterasi dihentikan dan didapat nilai SF = 0,195

Sehingga nilai angka aman tanpa perkuatan (SF<sub>u</sub>) = 0,195

Angka aman yang ingin dicapai SF<sub>p</sub> > 1,0 --- diambil SF<sub>p</sub> = 1,1

$$\lambda = \frac{SF_p}{SF_u} = \frac{1,1}{0,195} = 5,641$$

Sehingga gaya yang harus ditahan angkur adalah:

$$F = \frac{\lambda - 1}{\lambda} W \left( \frac{\sin \phi}{\cos(\phi + \alpha)} \right)$$

$\alpha$  = adalah sudut yang terbentuk antara angkur terhadap bidang horizontal ( $\alpha = 0$ )

$$\text{sehingga: } F = \frac{5,641 + 1}{5,641} 2715,314 \left( \frac{\sin 38}{\cos 38} \right) = 1745,058 \text{ kN/m}^2$$

Tahanan ultimit yang mampu di tahan oleh sebuah angkur:

$$Q_f = A\gamma' \left( h + \frac{L}{2} \right) \pi DL \tan \phi' + B\gamma' h \frac{\pi}{4} (D^2 - d^2)$$

$$\begin{aligned} Q_f &= 1,5 \times 14,87 \left( 1,5 + \frac{4}{2} \right) 3,14 \times 0,3 \times 4 \tan 38 + 63,578 \times 14,87 \times 1,5 \frac{3,14}{4} (0,3^2 - 0,1^2) \\ &= 318,872 \text{ kN/m}^2 \sim 300 \text{ kN/m}^2 \text{ (dibulatkan ke bawah)} \end{aligned}$$

$$\text{Jumlah angkur yang digunakan} = \frac{\text{Tinggi lereng}}{\text{Tinggi rencana lapisan diatas angkur}}$$

$$= \frac{10}{1,5} = 6,66 \text{ buah}$$

dicoba menggunakan angkur sebanyak 6 buah, sehingga gaya yang dapat ditahan oleh 6 buah angkur adalah:

$$6 \times 300 = 1800 \text{ kN/m}^2 > F = 1745,058 \text{ kN/m}^2 \quad \text{ok!}$$

## BAB VI

### PEMBAHASAN DAN SOLUSI

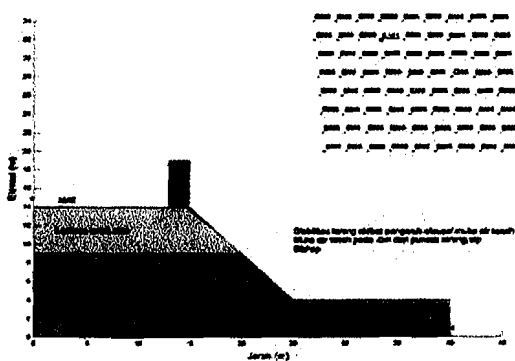
#### 6.1 Tinjauan Umum

Dalam analisis stabilitas lereng menggunakan program Geo-Slope, dimana angka keamanan (SF) dihitung dengan memasukkan data parameter-parameter tanah dan geometri lereng yang dianalisis. Dari data parameter tersebut, penulis dapat mengetahui kecenderungan perilaku lereng akibat pengaruh kemiringan, elevasi muka air tanah, dan pembebanan pada puncak lereng, yang ditunjukkan dengan perubahan *slip surface* terhadap *safety factor*.

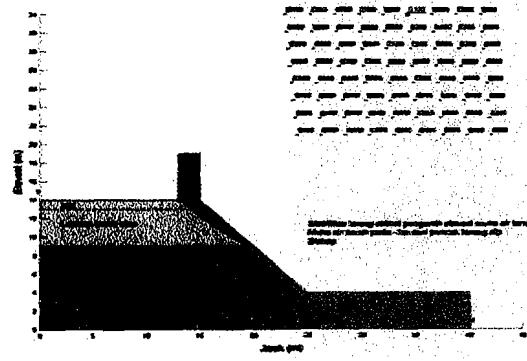
#### 6.2 Pembahasan

##### 6.2.1. Analisis Hubungan Angka Keamanan terhadap Pengaruh Elevasi Muka Air Tanah

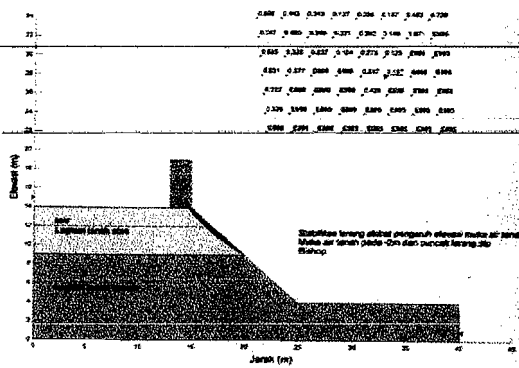
Untuk mengetahui seberapa besar pengaruh muka air tanah terhadap angka keamanan pada lereng, maka dilakukan pemodelan dengan variabel tinggi muka air tanah. Hasil aplikasi dari program Geo-Slope yang berupa angka aman (*safety factor*) dan bidang longsor (*slip surface*) dapat dilihat pada Gambar 6.1 di bawah ini:



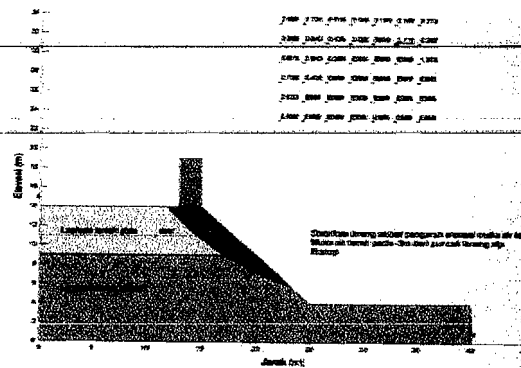
(a) Lereng dengan MAT  $\pm$  0.00 m



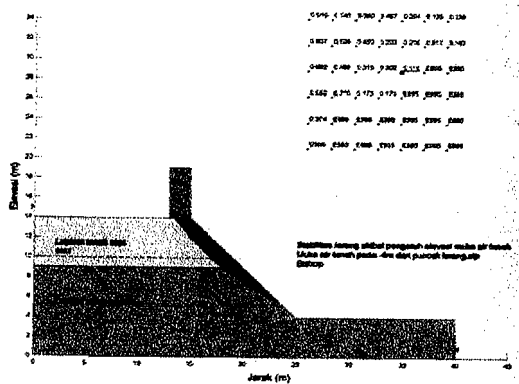
(b) Lereng dengan MAT - 1.00 m



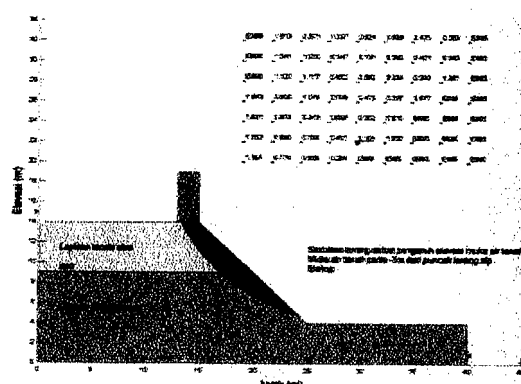
(c) Lereng dengan MAT - 2.00 m



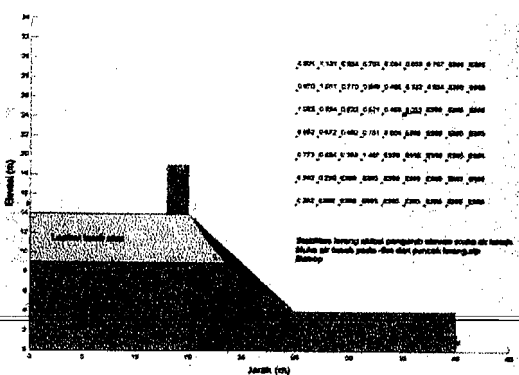
(d) Lereng dengan MAT - 3.00 m



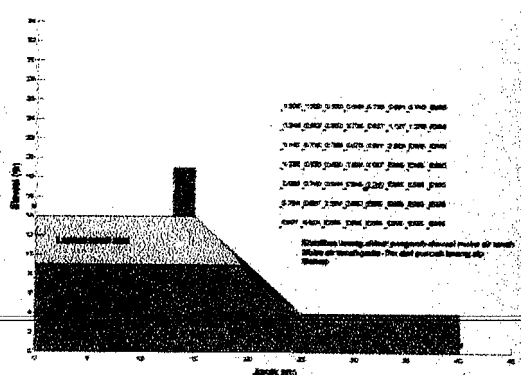
(e) Lereng dengan MAT - 4.00 m



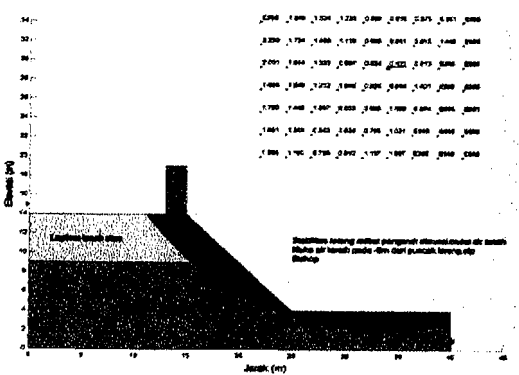
(f) Lereng dengan MAT - 5.00 m



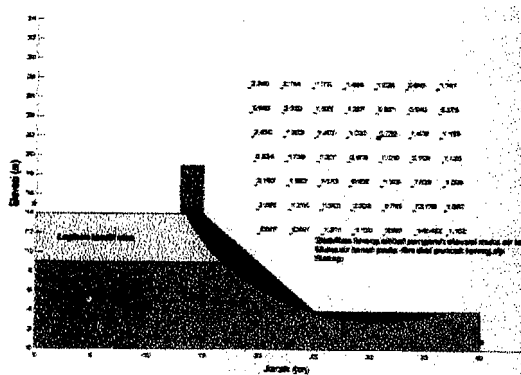
(g) Lereng dengan MAT - 6.00 m



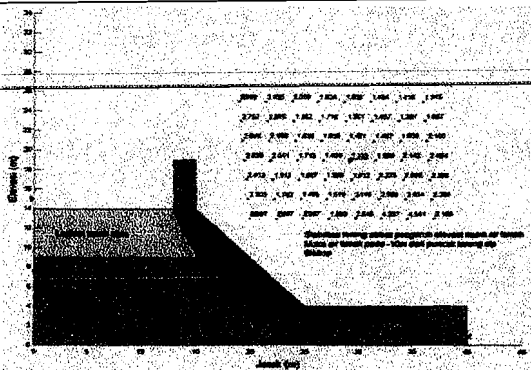
(h) Lereng dengan MAT - 7.00 m



(i) Lereng dengan MAT - 8.00 m



(j) Lereng dengan MAT - 9.00 m



(k) Lereng dengan MAT - 10.00 m

**Gambar 6.1.** Hasil analisis menggunakan Geo-Slope pada lereng yang dipengaruhi perubahan elevasi muka air tanah (dari +0.00 m hingga -10.00 m dari puncak lereng)

Untuk lebih jelasnya, hasil dari analisis menggunakan Geo-Slope dapat dilihat pada gambar-gambar di lampiran 2, sedangkan dari gambar di atas didapatkan nilai angka aman, jenis keruntuhan dan dimensi bidang longsor yang ditabelkan pada Tabel 6.1 di bawah ini.

**Tabel 6.1.** Perubahan *safety factor* dan dimensi *Slip Surface* akibat pengaruh elevasi muka air tanah.

muka air tanah (m)	<i>safety factor</i>	Jenis keruntuhan	Dimensi <i>Slip Surface</i>
			Lebar x pjg lengkung longsor
± 0.00	0.101	Keruntuhan sebagian	0.24381 x 3.5825
- 1.00	0.102	Keruntuhan sebagian	1.75 x 9.23905
- 2.00	0.107	Keruntuhan sebagian	0.31971 x 7.43088
- 3.00	0.116	Keruntuhan sebagian	3.14285 x 14.21136
- 4.00	0.118	Keruntuhan sebagian	1.46624 x 13.1257
- 5.00	0.198	Keruntuhan sebagian	1.62452 x 14.6065
- 6.00	0.223	Keruntuhan sebagian	0 x 12.61195
- 7.00	0.340	Keruntuhan sebagian	0 x 7.98138
- 8.00	0.405	Keruntuhan dasar	3.7524 x 32.86
- 9.00	0.756	Keruntuhan dasar	1.567 x 27.771
- 10.00	1.333	Keruntuhan dasar	2.03379 x 29.94697

Pada model lereng dengan elevasi muka air tanah pada -8, -9 dan -10 m dari puncak lereng didapatkan bidang longsor yang jauh melewati kaki lereng, dengan kata lain terjadi keruntuhan dasar. Sehingga, sangat tidak dianjurkan masyarakat

untuk mendirikan bangunan pada daerah kaki lereng. Namun, untuk kasus lereng dengan elevasi muka air tanah pada -10 m, lereng cenderung stabil, dikarenakan angka aman yang cukup besar.

Pada Grafik 5.1 dapat diketahui bahwa angka keamanan menurun dengan naiknya elevasi muka air tanah, hal ini dikarenakan: air tanah akan mengisi pori diantara butiran-butiran tanah dan akan mengikis sedimen yang ada di sekitar butiran, akibatnya kontak antar-butiran tanah akan berkurang dan tegangan efektif dari tanah juga akan berkurang, sehingga stabilitas lereng juga akan ikut menurun. Dengan naiknya muka air tanah, maka pori akan terisi air, hal ini menyebabkan massa tanah akan bertambah berat. Dengan bertambahnya massa tanah, maka tanah akan mempunyai kecenderungan bergerak ke bawah (longsor) akibat adanya pengaruh gaya gravitasi. Pada lereng dengan muka air tanah pada -9 dan -10 m angka aman naik dengan pesat, karena tanah di atasnya yang cenderung lebih ringan dibandingkan tanah yang berada di bawahnya yang lebih berat karena dipengaruhi oleh massa air ( $\gamma_w$ ).

a. Konsolidasi Satu Dimensi (*One Dimensional Consolidation*)

Cara menentukan distribusi kelebihan tekanan air pori (*pore water pressure*) dalam lapisan yang sedang berkonsolidasi, pada sembarang waktu sesudah bekerjanya beban, beserta drajat konsolidasi ditunjukkan oleh Terzaghi (1925). Teori ini disebut *teori konsolidasi satu dimensi Terzaghi*. Beberapa anggapan dalam analisis konsolidasi satu dimensi, adalah:

1. Tanah adalah homogen.
2. Tanah lempung dalam keadaan jenuh sempurna.
3. Partikel padat dan air tidak mudah mampat.





Persamaan tersebut dimudahkan dengan substitusi nilai:

$$C_v = \frac{k}{\gamma_w m_v} \quad (6.3)$$

dengan  $C_v$  adalah koefisien konsolidasi, maka akan diperoleh persamaan:

$$\frac{\delta u}{\delta t} = C_v \frac{\delta^2 u}{\delta z^2} \quad (6.4)$$

Persamaan 6.4 adalah dasar persamaan teori konsolidasi Terzaghi. Kondisi batas untuk menentukan konsolidasi lapisan tanah yang mengijinkan drainasi ke arah atas dan bawah adalah (Gambar 6.2):

1. Saat  $t = 0$ , pada lapisan lempung, setebal  $dz$ , kelebihan tekanan hidrostatik (kelebihan tekanan air pori) sama dengan  $\Delta p$ .
2. Untuk sembarang waktu ( $t$ ) saat konsolidasi masih berlangsung, pada permukaan drainasi  $z = 2H$  dan  $z = 0$ , kelebihan tekanan hidrostatik adalah 0.
3. Sesudah waktu yang lama, pada sembarang kedalaman  $z$ , kelebihan tekanan hidrostatik sama dengan nol.

Pada kondisi tanah yang memungkinkan drainasi ke atas dan ke bawah, penyelesaian dari Persamaan 6.4 dengan  $C_v$  konstan dan pada kondisi awal  $u_i$  sebagai fungsi  $z$ , adalah:

$$u = \sum_{n=1}^{n=\infty} \left( \frac{1}{H} \int_0^{2H} u_i \sin \frac{n\pi z}{2H} dz \right) \left\{ \sin \frac{n\pi z}{2H} \right\} \exp \frac{-n^2 \pi^2 C_v t}{4H^2} \quad (6.5)$$

dengan:

$H$  = Jarak lintasan drainasi terpanjang.

$U_i$  = Distribusi kelebihan tekanan air pori awal yang bentuknya dapat berupa lengkung Sinus, atau bentuk-bentuk lainnya.

Untuk kasus tertentu dimana  $u_i$  konstan di seluruh lapisan lempung, maka:

$$u = \sum_{n=1}^{\infty} \frac{2u_i}{n\pi} (1 - \cos n\pi) \left\{ \sin \frac{n\pi z}{2H} \right\} \exp \frac{-n^2 \pi^2 C_v t}{4H^2} \quad (6.6)$$

Diselesaikan dengan cara substitusi:

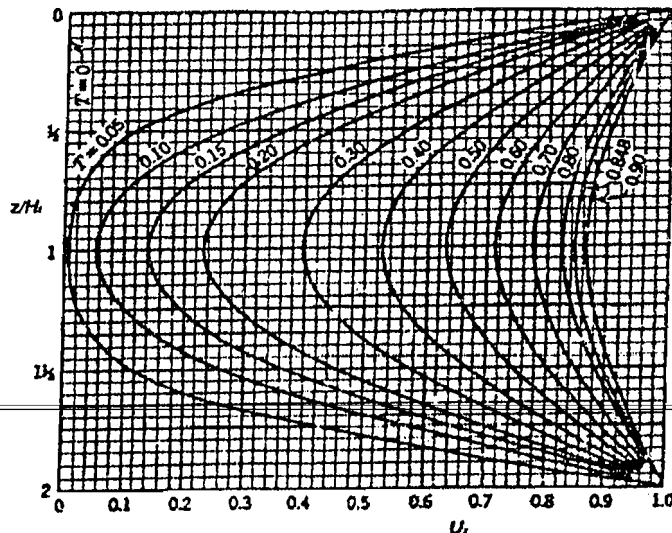
$$n = 2m + 1 \quad \text{dan} \quad M = (\pi/2)(2m + 1)$$

dan 
$$T_v = \frac{C_v t}{H^2} \quad (6.7)$$

dengan  $T_v$  adalah besaran tanpa dimensi, yang disebut faktor waktu (*time factor*).

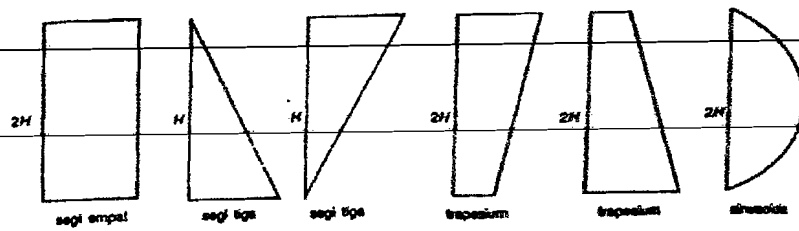
Dari substitusi Persamaan 6.7 ke Persamaan 6.6, maka:

$$u = \sum_{m=0}^{\infty} \frac{2u_i}{M} \left( \sin \frac{Mz}{H} \right) \exp (-M^2 T_v) \quad (6.8)$$



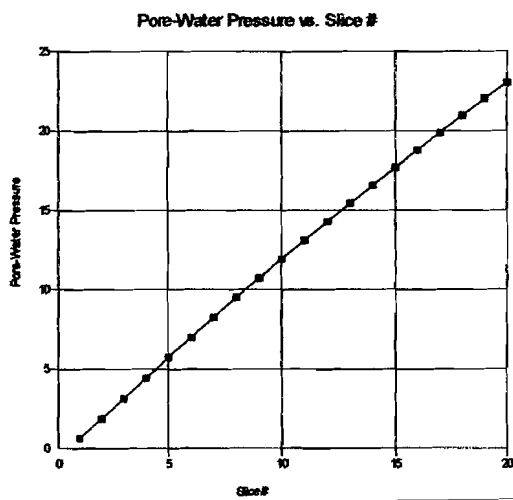
**Grafik 6.1.** Hubungan drajat konsolidasi  $U_z$  pada kedalaman tertentu terhadap faktor waktu  $T_v$ . (Christady, H, 2003)

Perkembangan proses konsolidasi dapat ditentukan dengan menggambar kurva-kurva  $u$  terhadap  $z$  pada waktu  $t$  yang berlainan. Kurva-kurva ini disebut isokron (*isochrone*) yang bentuknya tergantung pada distribusi kelebihan tekanan air pori dan kondisi drainasi lapisan lempung (drainasi dobel atau tunggal).

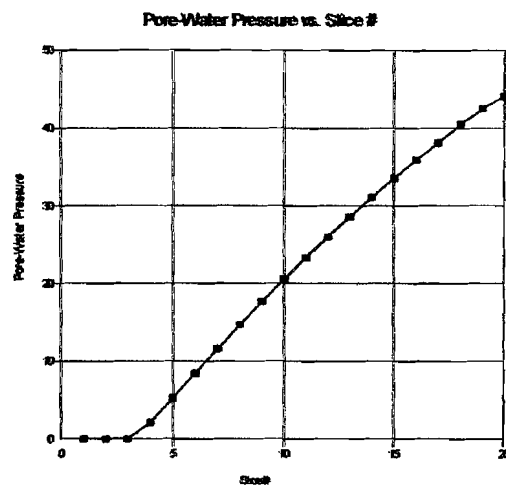


Gambar 6.3. Macam-macam diagram tekanan air pori awal. (Christady. H, 2003).

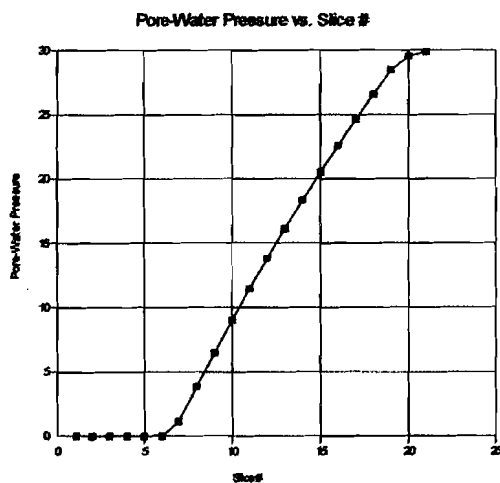
Di bawah ini adalah grafik perbandingan tekanan air pori yang terjadi pada setiap irisan untuk keseluruhan model lereng yang dipengaruhi perubahan elevasi muka air tanah, sedangkan grafik perbandingan antara tegangan geser pada tiap irisan dapat dilihat pada lampiran 2.



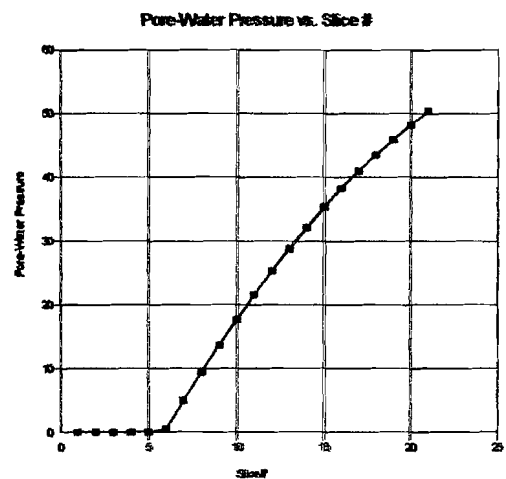
(a) MAT pada  $\pm 0.00$  m



(b) MAT pada - 1.00 m

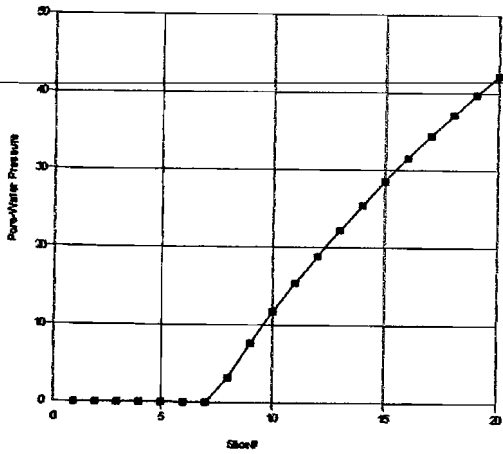


(c) MAT pada - 2.00 m



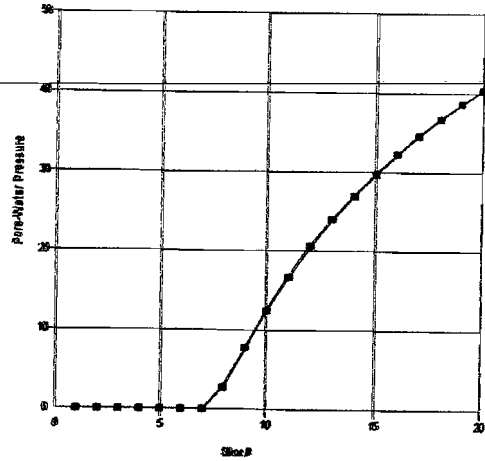
(d) MAT pada - 3.00 m

Pore-Water Pressure vs. Slice #



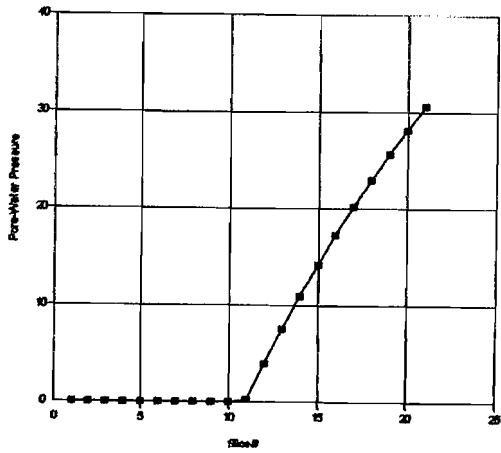
(e) MAT pada - 4.00 m

Pore-Water Pressure vs. Slice #



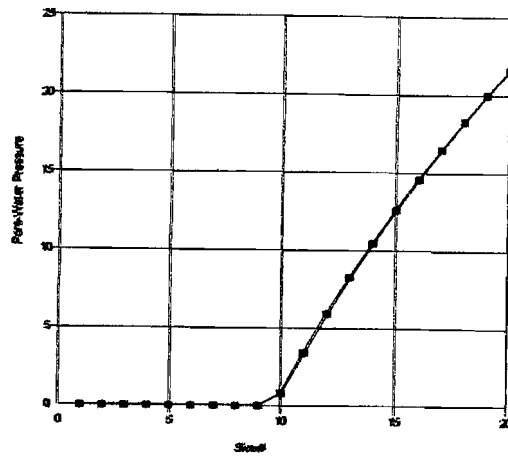
(f) MAT pada - 5.00 m

Pore-Water Pressure vs. Slice #



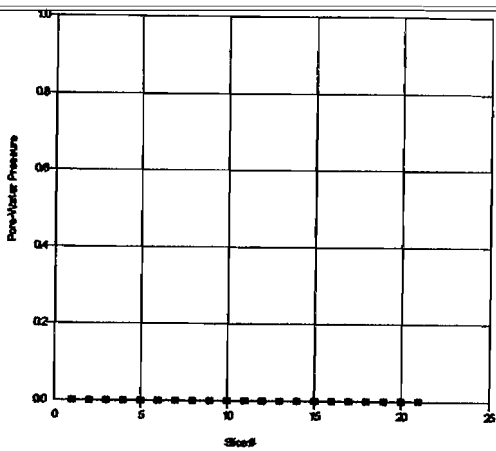
(g) MAT pada - 6.00 m

Pore-Water Pressure vs. Slice #



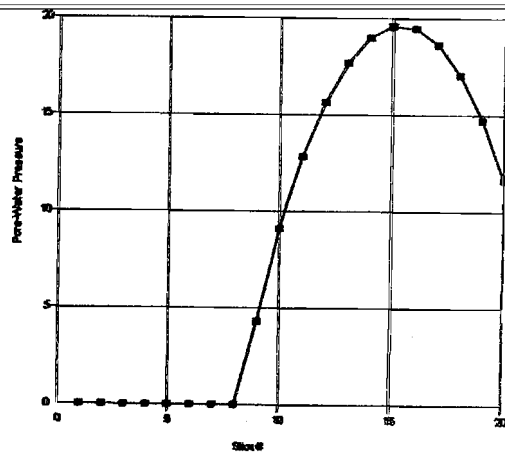
(h) MAT pada - 7.00 m

Pore-Water Pressure vs. Slice #

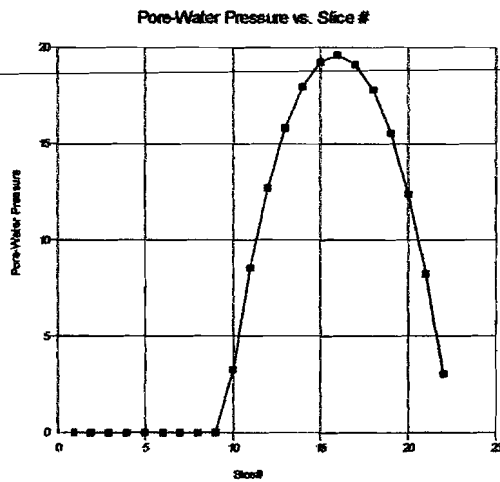


(i) MAT pada - 8.00 m

Pore-Water Pressure vs. Slice #



(j) MAT pada - 9.00 m

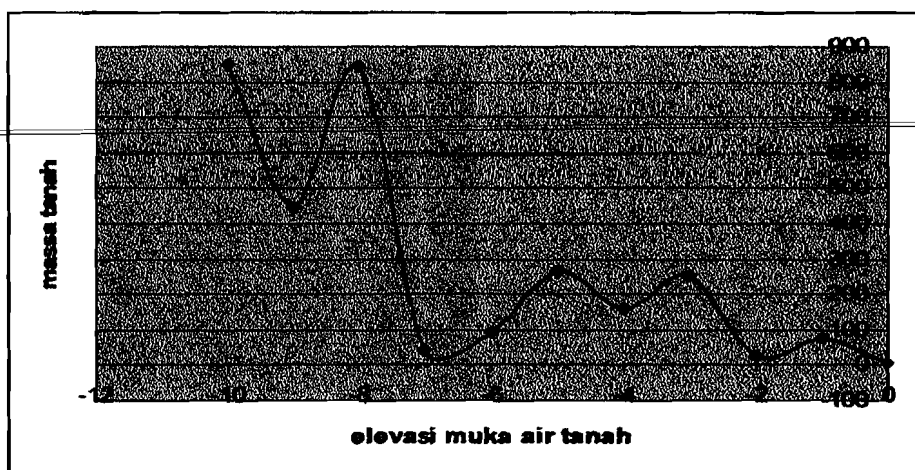


(k) MAT pada -10.00 m

**Grafik 6.2.** Perbandingan tekanan air pori (*pore water pressure*) di setiap irisan pada model lereng dengan perubahan elevasi muka air tanah (dari +0.00 m hingga -10.00 m dari puncak lereng).

Dari grafik di atas, dapat diketahui bahwa tekanan air pori konstan pada irisan yang berada di atas muka air tanah (tidak terpengaruh), sedangkan pada irisan yang berada di bawah muka air tanah, nilai tekanan air porinya akan terus naik.

Untuk pengaruh perubahan elevasi muka air tanah terhadap massa tanah dapat dilihat pada Grafik 6.3.



**Grafik 6.3.** Perbandingan massa tanah dengan elevasi muka air tanah

Berdasarkan analisis menggunakan program Geo-Slope, didapat gambar-gambar keruntuhan lereng dipengaruhi elevasi muka air tanah yaitu pada lampiran 2a

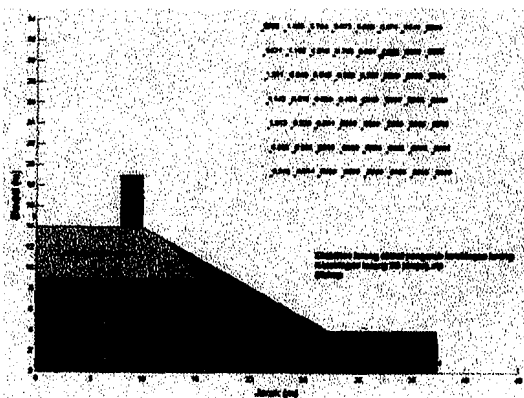
sampai dengan 2i. Pada gambar tersebut suatu lereng dikatakan aman atau stabil apabila kekuatan geser yang dimiliki lereng lebih besar dari gaya geser yang terjadi.

Pada lereng dengan elevasi muka air tanah pada -8 m, -9 m dan 10 m, posisi slip surface memotong bagian dasar ujung kaki lereng. Dengan kata lain, tanah di bawah tinggi (level) ujung kaki lereng tidak mampu memikul berat bahan yang ada di atasnya, maka keruntuhan terjadi di sepanjang permukaan yang terletak di bawah ujung kaki dari lereng, keruntuhan semacam ini disebut keruntuhan dasar (*base failure*), sedangkan keruntuhan sebagian (*slope failure*) terjadi ketika slip surface memotong lereng pada atau di atas ujung kaki lereng, seperti terlihat pada gambar lereng dengan elevasi muka air tanah pada +0 m, -1 m, -2 m, -3 m, -4 m, -5 m, -6 m dan -7 m.

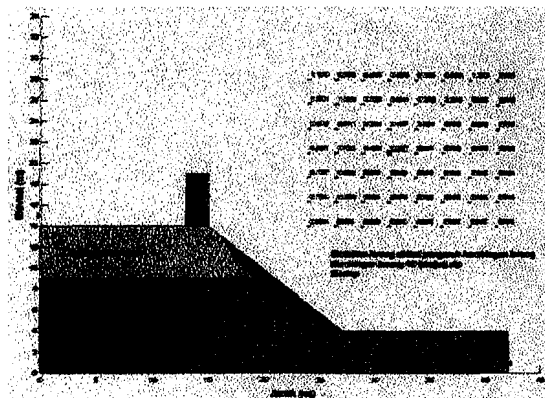
### 6.2.2. Analisis Hubungan Angka Keamanan terhadap Pengaruh Kemiringan Lereng ( $\beta$ )

Untuk mengetahui seberapa besar pengaruh kemiringan lereng terhadap angka keamanan, maka dilakukan pemodelan dengan variabel sudut kemiringan lereng.

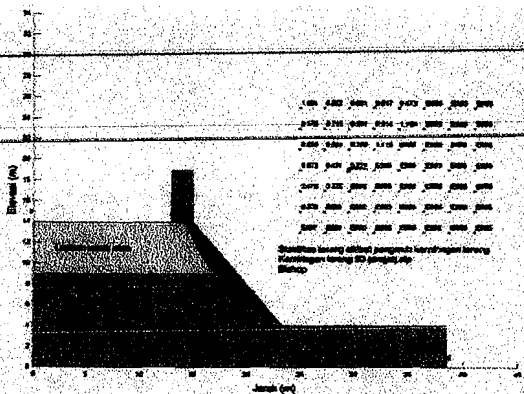
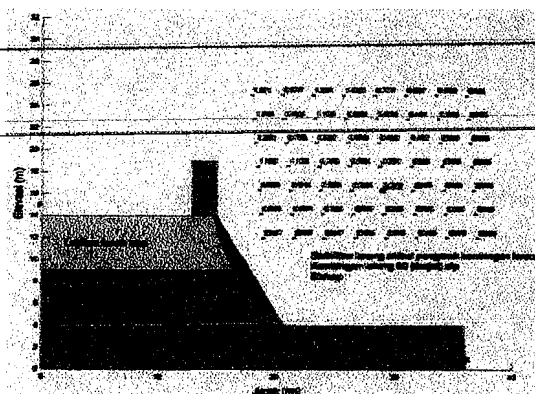
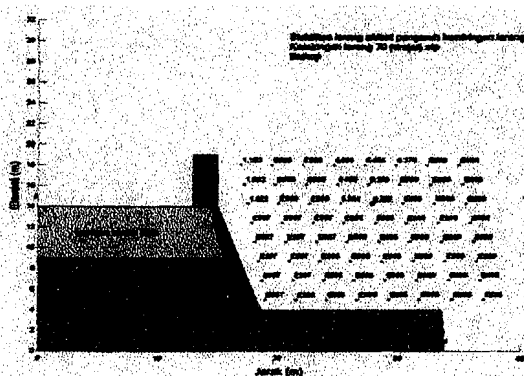
Hasil aplikasi dari program Geo-Slope yang berupa angka aman (*safety factor*) dan bidang longsor (*slip surface*) dapat dilihat pada Gambar 6.4 di bawah ini:



(a) Lereng dengan kemiringan  $30^{\circ}$



(b) Lereng dengan kemiringan  $40^{\circ}$

(c) Lereng dengan kemiringan  $50^{\circ}$ (d) Lereng dengan kemiringan  $60^{\circ}$ (e) Lereng dengan kemiringan  $70^{\circ}$ 

**Gambar 6.4.** Hasil analisis menggunakan Geo-Slope pada lereng yang dipengaruhi perubahan kemiringan ( $\beta = 30^{\circ}$  hingga  $\beta=70^{\circ}$ ).

Untuk lebih jelasnya, hasil dari analisis menggunakan Geo-Slope dapat dilihat pada gambar-gambar di lampiran 3, sedangkan dari gambar di atas didapatkan nilai angka aman, jenis keruntuhan dan dimensi bidang longsor yang ditabalkan pada Tabel 6.2 di bawah ini.

**Tabel 6.2.** Perubahan *safety factor* dan Dimensi *Slip Surface* akibat pengaruh kemiringan lereng ( $\beta$ ).

Kemiringan ( $^{\circ}$ )	<i>safety factor</i>	Jenis keruntuhan	Dimensi <i>Slip Surface</i>
			Lebar x pjg lengkung longsor
30	0.265	Keruntuhan sebagian	0 x 16.6656
40	0.227	Keruntuhan sebagian	0 x 12.8456
50	0.221	Keruntuhan sebagian	0.62758 x 13.36904
60	0.210	Keruntuhan sebagian	0.18976 x 10.8235
70	0.209	Keruntuhan sebagian	0.4255 x 9.72623



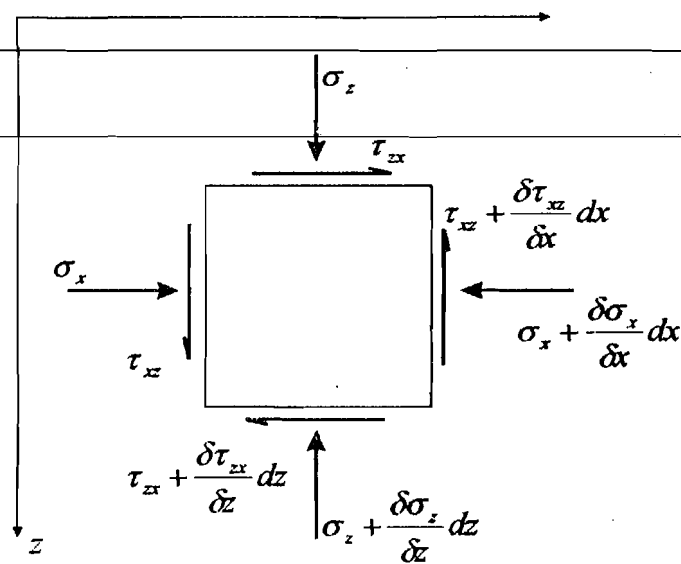
~~Walaupun panjang lengkung bidang longsor cenderung lebih panjang, namun~~  
pada lereng dengan kemiringan 30° dan 40° masyarakat akan aman jika mendirikan  
bangunan di puncak lereng, dikarenakan bidang longsor yang tidak menyentuh  
puncak lereng dan angka aman yang cenderung lebih besar, sedangkan pada lereng  
dengan kemiringan 50°, 60° dan 70°, adalah berbahaya jika mendirikan bangunan di  
puncak lereng karena dapat terbawa longsor.

a. Tegangan Normal ( $\sigma_n$ )

Tegangan dan perpindahan pada massa tanah dapat diakibatkan oleh adanya pembebanan. Banyak persoalan dapat diselesaikan dengan analisis dalam dua dimensi, yaitu hanya tegangan dan perpindahan dalam satu bidang yang diperhitungkan. Tegangan normal total dan tegangan geser pada arah  $x$  dan  $z$  pada suatu elemen tanah diilustrasikan pada Gambar 6.5, di mana tegangan-tegangan mempunyai tanda positif sesuai dengan arah sumbu  $x$  dan  $z$ . Besarnya tegangan-tegangan tersebut berbeda pada setiap potongan. Besarnya perubahan tegangan normal pada sumbu  $x$  dan  $z$  berturut-turut adalah  $\delta\sigma_x/\delta x$  dan  $\delta\sigma_z/\delta z$ ; besarnya perubahan tegangan gesernya adalah  $\delta\tau_{xz}/\delta x$  dan  $\delta\tau_{zx}/\delta z$ . Setiap elemen dari suatu massa tanah harus dalam keadaan keseimbangan statis. Dengan menyamakan momen-momen terhadap titik pusat elemen, dan mengabaikan diferensiasi orde tinggi, didapatkan bahwa  $\tau_{xz} = \tau_{zx}$ . Dengan menyamakan gaya-gaya pada arah  $x$  dan  $z$ , didapatkan persamaan-persamaan berikut:

$$\frac{\delta\sigma_x}{\delta x} + \frac{\delta\tau_{zx}}{\delta z} - X = 0 \quad (6.9a)$$

$$\frac{\delta\tau_{xz}}{\delta x} + \frac{\delta\sigma_z}{\delta z} - Z = 0 \quad (6.9b)$$



Gambar 6.5. Keadaan tegangan dua-dimensi pada suatu elemen (Craig, 1989).

Untuk tegangan pada setiap titik pada bidang longsor, dengan muka air tanah pada permukaan adalah:

$$\sigma = \gamma_{sat} z \cos^2 \beta \quad (6.10)$$

dengan  $z$  adalah tinggi bidang longsor dan  $\beta$  adalah kemiringan lereng.

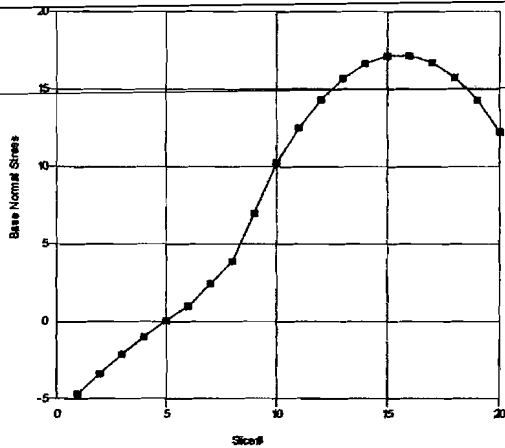
Sedangkan untuk tegangan normal pada dasar tiap irisan adalah:

$$\sigma_n = \frac{N}{B} \quad (6.11)$$

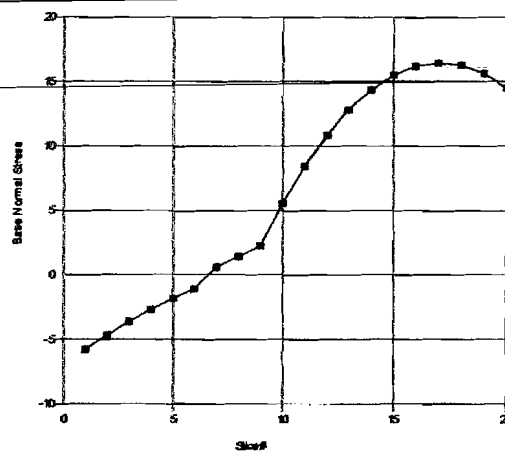
dengan  $N$  = gaya normal total pada dasar irisan, dan  $B$  = lebar dasar irisan.

Di bawah ini adalah grafik perbandingan tegangan normal pada dasar yang terjadi pada setiap irisan untuk keseluruhan model lereng yang dipengaruhi perubahan kemiringan lereng ( $\beta$ ), sedangkan grafik perbandingan antara tegangan geser pada tiap irisan dapat dilihat pada lampiran 3.

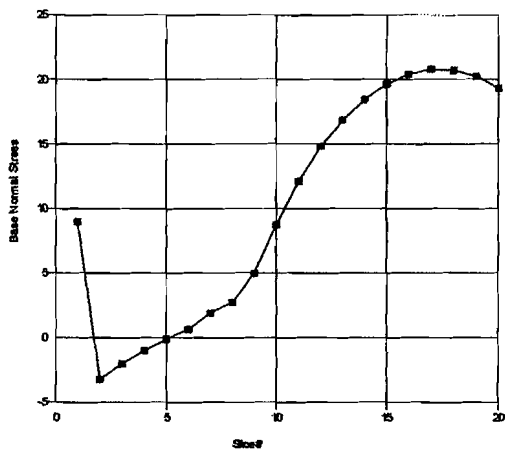
Base Normal Stress vs. Slice #

(a) Lereng dengan kemiringan  $30^{\circ}$ 

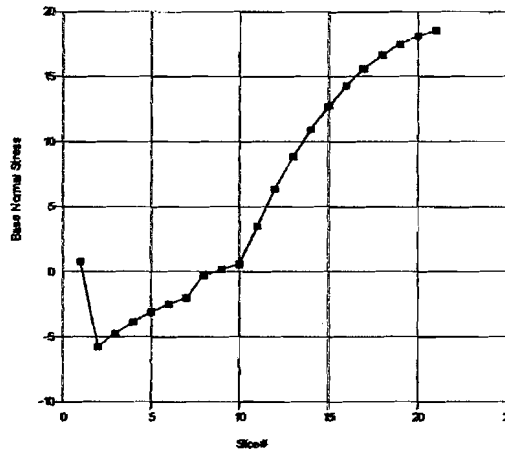
Base Normal Stress vs. Slice #

(b) Lereng dengan kemiringan  $40^{\circ}$ 

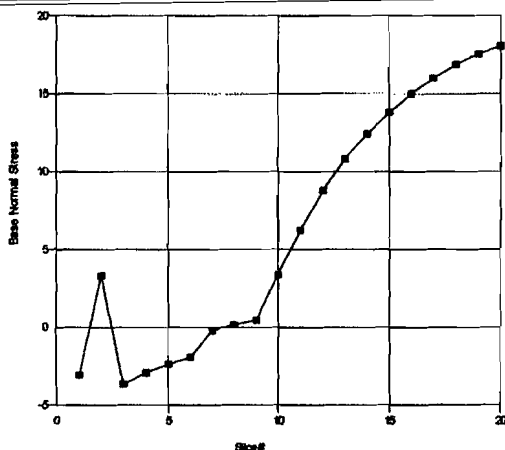
Base Normal Stress vs. Slice #

(c) Lereng dengan kemiringan  $50^{\circ}$ 

Base Normal Stress vs. Slice #

(d) Lereng dengan kemiringan  $60^{\circ}$ 

Base Normal Stress vs. Slice #

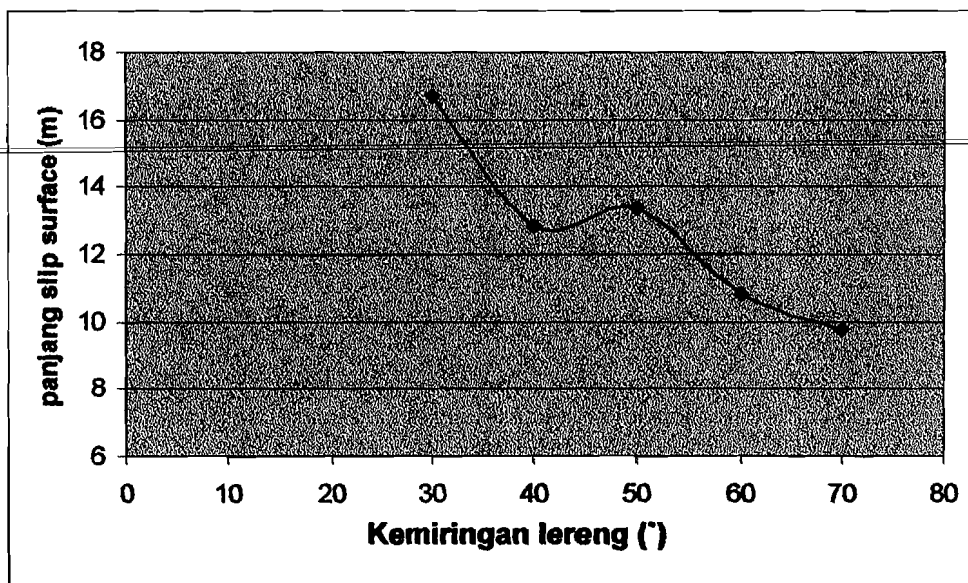
(e) Lereng dengan kemiringan  $70^{\circ}$ 

**Grafik 6.4.** Perbandingan tegangan normal pada dasar (*Base normal stress*) tiap irisan pada model lereng dengan perubahan kemiringan lereng ( $\beta=30^{\circ}$  hingga  $\beta=70^{\circ}$ ).

Dari grafik di atas, diketahui bahwa besarnya tegangan normal pada dasar irisan terus naik. Namun nilai tegangan normal akan jauh lebih besar jika irisan tersebut dipengaruhi beban di atasnya.

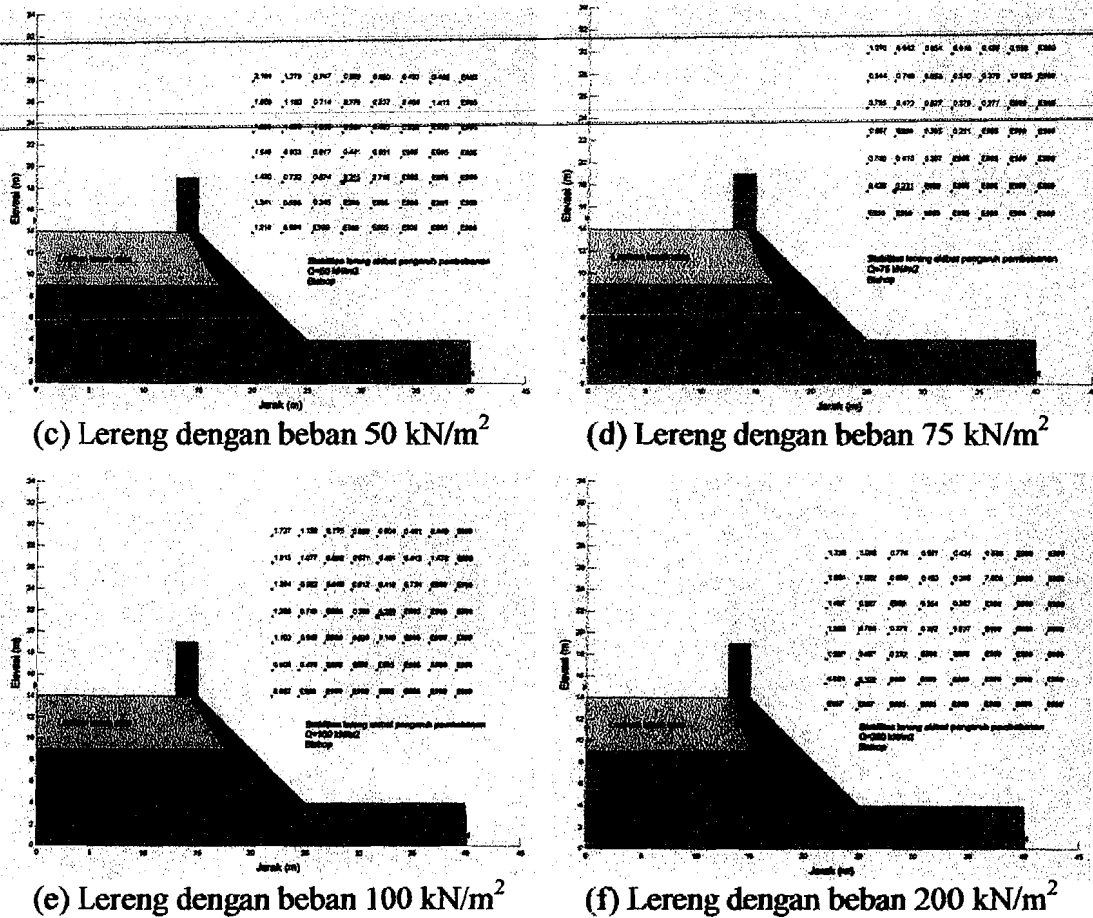
Pada Grafik 5.2, dapat dilihat bahwa angka keamanan (*safety factor*) menurun dengan bertambahnya sudut kemiringan lereng, dan juga dipengaruhi oleh bidang longsor yang tidak sampai bagian atas lereng, sehingga beban yang bekerja di puncak lereng tidak berpengaruh, dan juga dikarenakan semakin besar sudut kemiringan lereng (lereng semakin curam) maka *slip surface* semakin pendek, hal ini menyebabkan tahanan gesek (*friction*) menjadi berkurang, sehingga lereng menjadi tidak stabil, sebaliknya pada lereng yang memiliki sudut kemiringan kecil (landai) *slip surface* semakin panjang maka tahanan gesek (*friction*) besar, sehingga lereng cenderung stabil.

Perubahan panjang *slip surface* akibat pengaruh kemiringan dapat dilihat pada Grafik 6.5 berikut ini.



Grafik 6.5. Perbandingan kemiringan lereng dengan panjang *slip surface*





**Gambar 6.6.** Hasil analisis menggunakan Geo-Slope pada lereng yang dipengaruhi perubahan beban terbagi rata saja ( $Q = 10 \text{ kN/m}^2$  hingga  $Q = 200 \text{ kN/m}^2$ ).

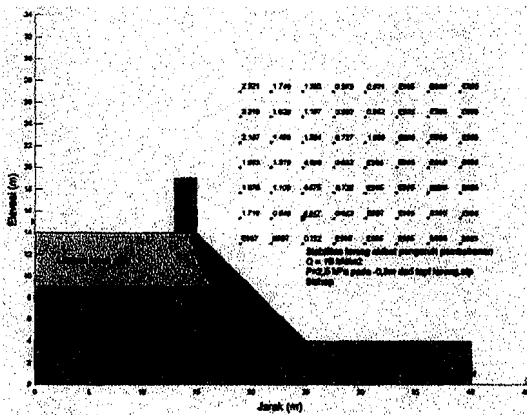
Untuk lebih jelasnya, hasil dari analisis menggunakan Geo-Slope dapat dilihat pada gambar-gambar di lampiran 4, sedangkan dari gambar di atas didapatkan nilai angka aman, jenis keruntuhan dan dimensi bidang longsor yang ditabelkan pada Tabel 6.3 di bawah ini.

**Tabel 6.3.** Perubahan *safety factor* dan Dimensi *Slip Surface* akibat pengaruh perubahan beban terbagi rata ( $Q$ ) saja.

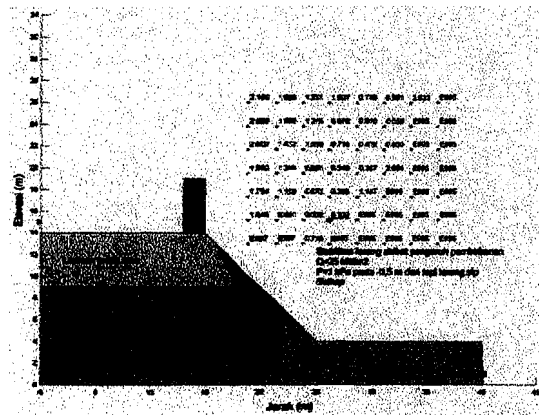
Beban (kN/m <sup>2</sup> )	<i>safety factor</i>	Jenis keruntuhan	Dimensi <i>Slip Surface</i>
			Lebar x pig lengkung longsor
10	0.576	Keruntuhan sebagian	0.52266 x 14.1458
25	0.330	Keruntuhan sebagian	0 x 11.155
50	0.315	Keruntuhan sebagian	0.76158 x 14.6608
75	0.231	Keruntuhan kaki	0.727 x 15.3739
100	0.200	Keruntuhan kaki	0.45065 x 14.8171
200	0.189	Keruntuhan kaki	1.42962 x 17.3562

Dari tabel di atas diketahui bahwa tidak aman jika mendirikan suatu bangunan di puncak – tepi lereng. Dikarenakan bidang longsor yang mencapai 1,5 m dari tepi lereng. Namun akan aman jika bangunan tersebut berupa beban terbagi rata dengan lebar yang besar, sehingga titik berat bangunan berada di luar daerah bidang longsor.

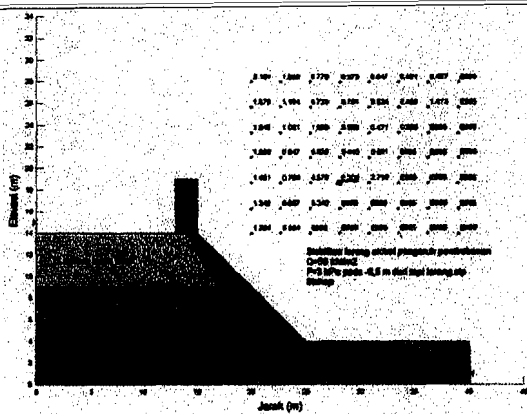
Untuk hasil aplikasi dari program Geo-Slope yang berupa angka aman (*safety factor*) dan bidang longsor (*slip surface*) pada lereng yang selain dipengaruhi perubahan beban terbagi rata juga dipengaruhi perubahan beban titik dapat dilihat pada Gambar 6.7 di bawah ini:



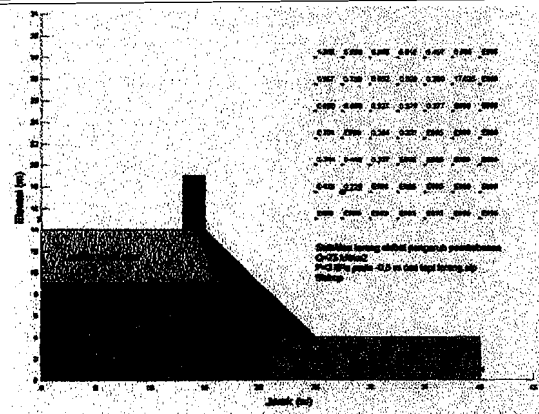
(a) Lereng dengan  $Q=10 \text{ kN/m}^2$  dan  $P= 2,5 \text{ kPa}$  pada 0,5m dari tepi lereng



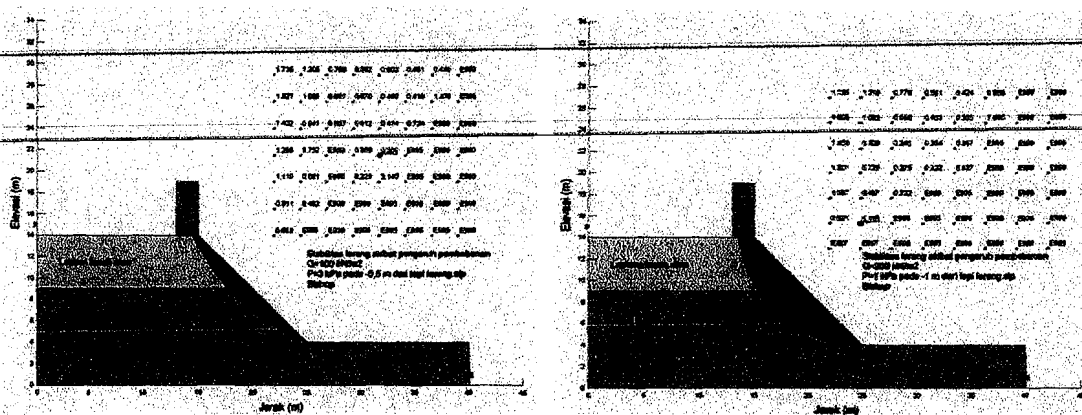
(b) Lereng dengan  $Q=25 \text{ kN/m}^2$  dan  $P= 1 \text{ kPa}$  pada 0,5m dari tepi lereng



(c) Lereng dengan  $Q=50 \text{ kN/m}^2$  dan  $P= 3 \text{ kPa}$  pada 0,5m dari tepi lereng



(d) Lereng dengan  $Q=75 \text{ kN/m}^2$  dan  $P= 3 \text{ kPa}$  pada 0,5m dari tepi lereng



(e) Lereng dengan  $Q=100 \text{ kN/m}^2$  dan  $P=3 \text{ kPa}$  pada  $0,5 \text{ m}$  dari tepi lereng

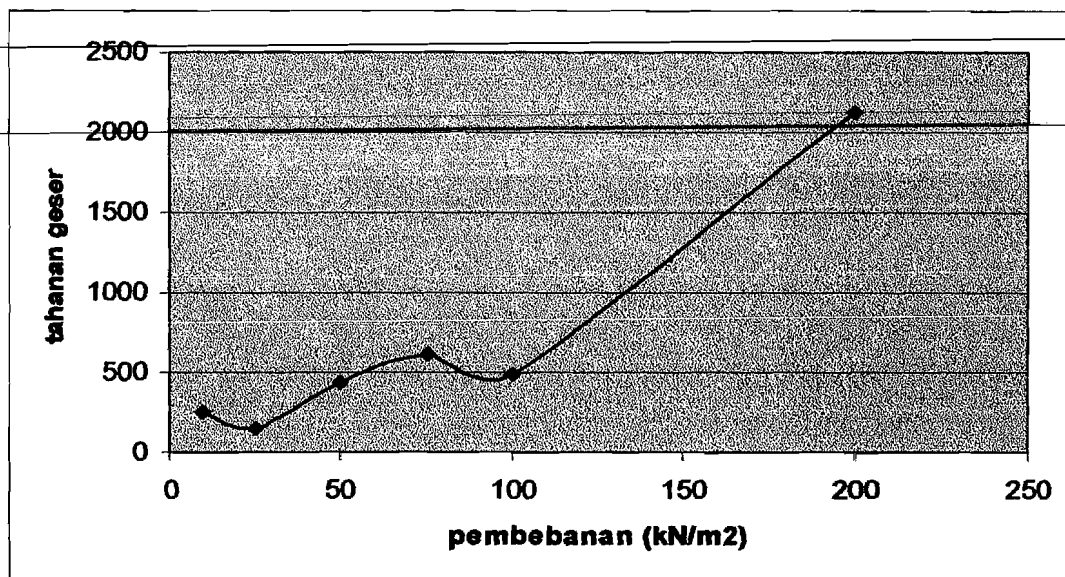
(f) Lereng dengan  $Q=200 \text{ kN/m}^2$  dan  $P=1 \text{ kPa}$  pada  $1 \text{ m}$  dari tepi lereng

**Gambar 6.7.** Sebagian hasil analisis menggunakan Geo-Slope pada lereng yang dipengaruhi perubahan beban terbagi rata dan beban titik.

Untuk keseluruhan hasil analisis menggunakan Geo-Slope pada lereng yang dipengaruhi perubahan beban terbagi rata dan beban titik dapat dilihat pada lampiran 4. Dari Gambar 6.7 di atas juga secara keseluruhan nilai angka amannya di tabelkan pada Tabel 5.4.

Pada Grafik 5.3 dapat dilihat bahwa angka keamanan (SF) cenderung menurun seiring bertambahnya beban. Bila tanah mengalami tekanan yang diakibatkan oleh beban, maka angka pori tanah akan berkurang, selain itu tekanan akibat beban juga dapat mengakibatkan perubahan sifat mekanik tanah, seperti menambah tahanan geser tanah. Pertambahan tahanan geser tanah akibat pengaruh beban dapat dilihat pada Grafik 6.6 di bawah ini.





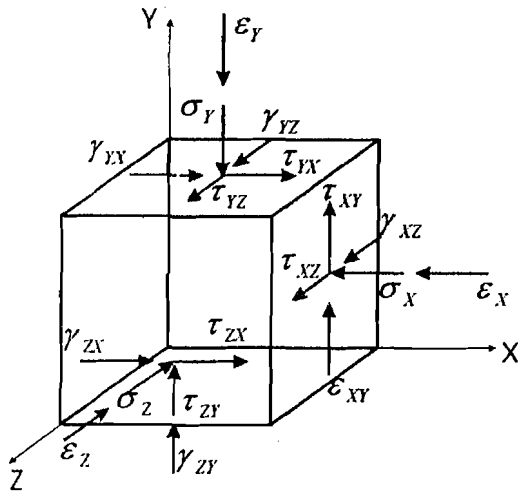
**Grafik 6.6.** Perbandingan antara besarnya pembebanan dengan tahanan geser

Pada Grafik 6.6 di atas, tahanan geser tanah cenderung bertambah jika beban yang bekerja pada lereng tanah diperbesar. Angka keamanan (*safety factor*) merupakan perbandingan antara kuat geser (*shear strength*) yang dimiliki tanah dengan tegangan geser (*shear stress*) yang bekerja pada tanah tersebut. Apabila tegangan geser yang terjadi lebih besar dari kuat geser yang dimiliki tanah/lereng, maka lereng tersebut akan runtuh (*failure*).

a. Tegangan dan Regangan umum pada sebuah titik

Gambar 6.8 memperlihatkan tegangan-tegangan pada elemen berbeda dengan enam sisi di dalam suatu massa tanah. Sedangkan pada Gambar 6.9 memperlihatkan orientasi dari elemen pada Gambar 6.8 sedemikian sehingga tidak ada timbul tegangan-tegangan geser pada sisi-sisi elemen. Orientasi ini menghasilkan sumbu-sumbu utama dan tegangan-tegangan normal pada bagian depan yang merupakan *tegangan-tegangan utama*; dengan analogi terdapat pula kumpulan sumbu-sumbu utama untuk *regangan-regangan utama*.

Diperlihatkan pada Gambar 6.9a keadaan tegangan tekan secara umum yang ada di dalam tanah sebelum bekerjanya beban pada tanah yang mengakibatkan pertambahan dalam tegangan  $\Delta\sigma_i$ . Sebaliknya Gambar 6.9b menunjukkan keadaan tegangan setelah mengalami pertambahan tegangan  $\Delta\sigma_i$ .



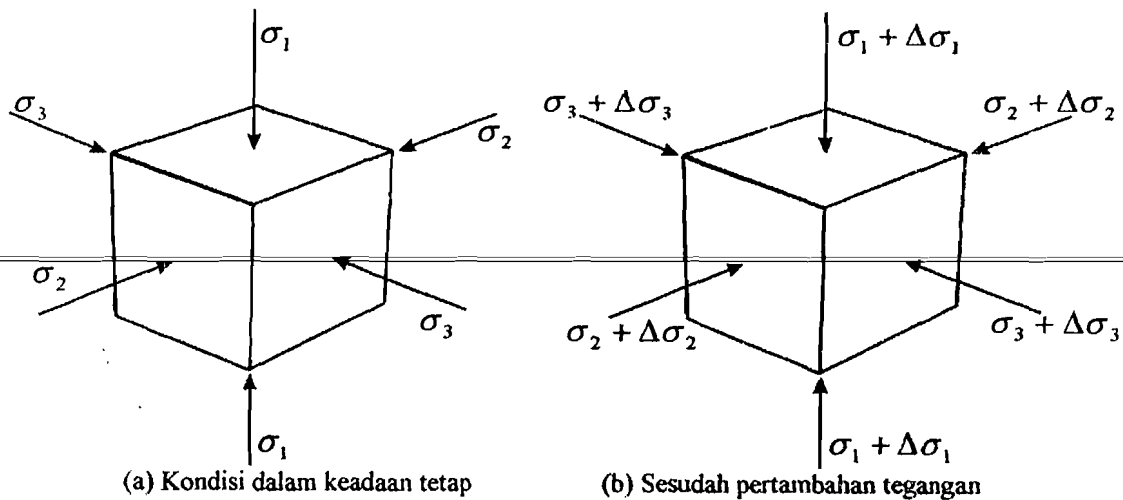
Subskripsi umum :

$\Gamma_{xy}, \Gamma_{xz}$  = tegangan geser atau regangan geser yang normal pada sumbu x dan berarah ke sumbu z.

$\Gamma_{yx}$  = tegangan geser yang normal terhadap sumbu y dan berarah ke sumbu x.

$\sigma_{x,cx}$  = tegangan atau regangan normal yang sejajar dengan sumbu x

**Gambar 6.8.** Tegangan dan regangan pada elemen tanah dengan sumbu koordinat yang diperlihatkan sesuai dengan apa yang dikehendaki (Bowles, 1986)



**Gambar 6.9.** Elemen tanah yang mengalami pertambahan tegangan utama (Bowles, 1986)

Biasanya kita ingin mengetahui deformasi akibat bekerjanya pertambahan tegangan ini. Deformasi berhubungan dengan regangan sebagai:

$$\text{Deformasi } \delta = \int_0^M \epsilon \, dM \tag{6.12}$$

di mana  $M$  dapat berupa suatu panjang atau volume dengan  $\varepsilon$  merupakan regangan linier atau regangan volumetric yang berkaitan dengan itu.

Regangan dihasilkan dari suatu tegangan yang didefinisikan sebagai:

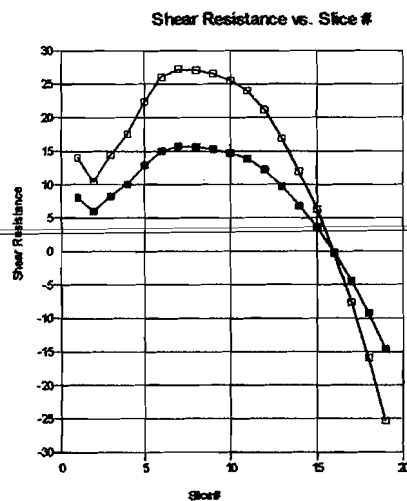
$$\sigma = \frac{\text{Gaya}}{\text{Luas}} \quad (6.13)$$

sedangkan rumus kuat geser tanah adalah:

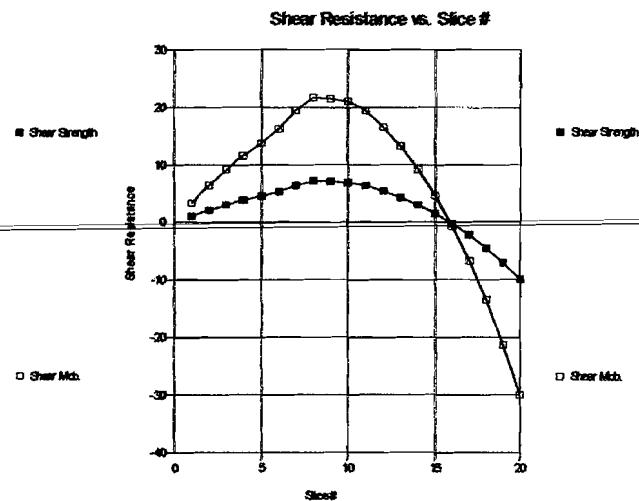
$$s = c' + (\sigma_n - u) \tan \phi' \quad (6.14)$$

dengan  $c'$  = kohesi efektif,  $\phi'$  = sudut gesek dalam efektif,  $\sigma_n$  = tegangan normal total dan  $u$  = tekanan air pori.

Di bawah ini adalah grafik perbandingan tegangan geser yang terjadi pada setiap irisan untuk keseluruhan model lereng yang dipengaruhi perubahan beban terbagi rata ( $Q$ ). Sedangkan untuk grafik yang juga dipengaruhi oleh beban titik dapat dilihat pada lampiran 4.

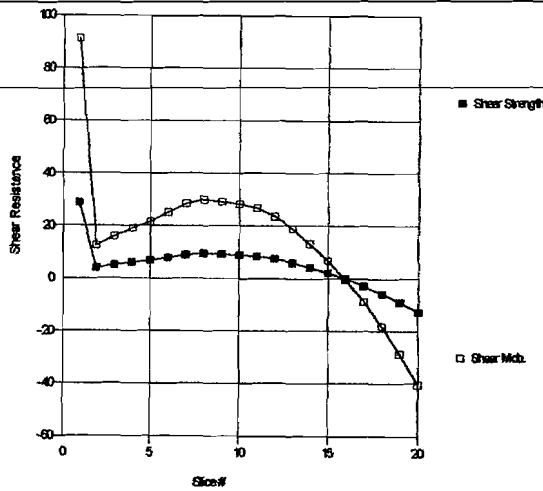


(a) Lereng dengan  $Q = 10 \text{ kN/m}^2$



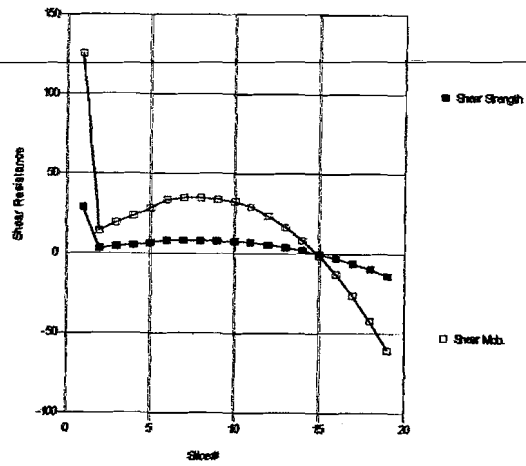
(b) Lereng dengan  $Q = 25 \text{ kN/m}^2$

Shear Resistance vs. Slice #



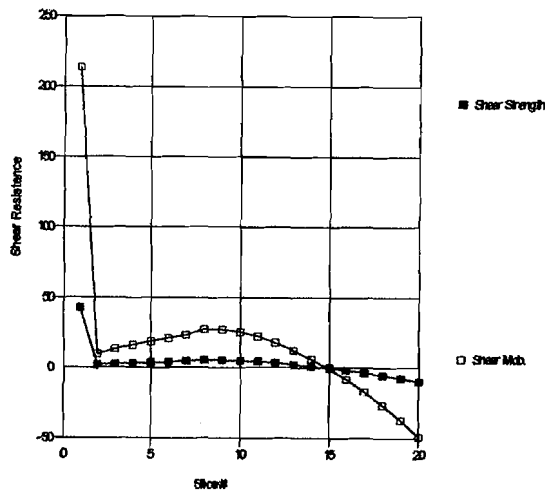
(c) Lereng dengan  $Q = 50 \text{ kN/m}^2$

Shear Resistance vs. Slice #



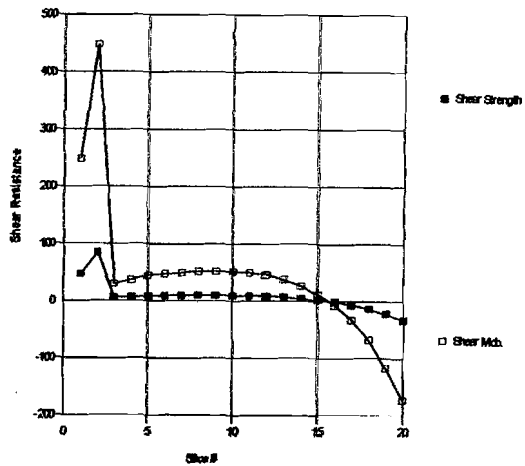
(d) Lereng dengan  $Q = 75 \text{ kN/m}^2$

Shear Resistance vs. Slice #



(e) Lereng dengan  $Q = 100 \text{ kN/m}^2$

Shear Resistance vs. Slice #



(f) Lereng dengan  $Q = 200 \text{ kN/m}^2$

■ : Shear Strength

□ : Shear Mob.

Grafik 6.7. Perbandingan tegangan geser tiap irisan pada model lereng dengan perubahan beban terbagi rata ( $Q = 10 \text{ kN/m}^2$  hingga  $Q = 200 \text{ kN/m}^2$ ).

### 6.3 Solusi

Sebagian besar model lereng di atas mempunyai angka aman yang kecil ( $SF < 1$ ), sehingga diperlukan cara-cara perbaikan stabilitas pada lereng tersebut sebagai usaha untuk meningkatkan angka aman. Usaha perbaikan stabilitas lereng dilakukan berdasarkan jenis keruntuhannya. Di bawah ini adalah sedikit penjelasan tentang metode perbaikan stabilitas lereng yang akan dilakukan:

1. Keruntuhan sebagian: metode perbaikannya adalah dengan metode geometri, yaitu dengan cara membuat *berm*. Metode pembuatan *berm* adalah sama seperti pembuatan terasering, dengan cara memotong lereng menjadi berundak.
2. Keruntuhan kaki: metode yang dilakukan adalah metode mekanis, pada kasus ini dilakukan dengan cara menanamkan perkuatan angkur secara horizontal atau diagonal ke dalam badan lereng.
3. Keruntuhan dasar: metode yang dilakukan adalah metode mekanis, dengan cara menanamkan tiang-tiang pancang secara vertikal pada bagian dasar lereng.

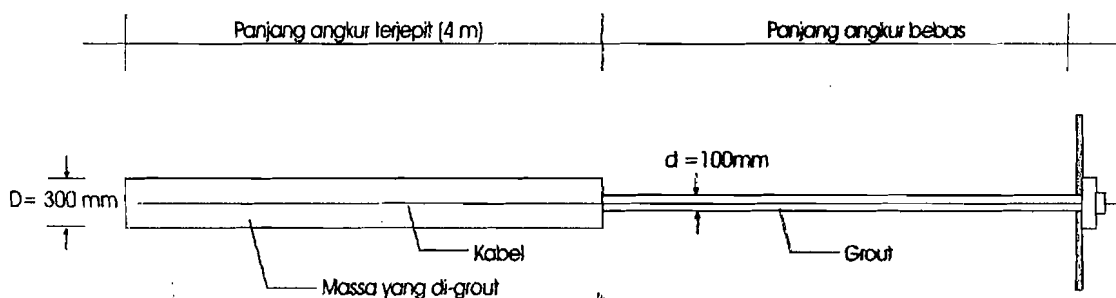
Pada bagian ini yang akan dianalisis adalah perbaikan menggunakan perkuatan angkur saja, yaitu perkuatan yang dilakukan pada lereng dengan keruntuhan yang mencapai kaki lereng (*toe*).

Analisis dilakukan dengan cara menambahkan angkur pada semua model lereng di atas. Angkur yang digunakan adalah angkur dengan tahanan ultimit tiap angkur ( $Q_f$ ) = 300 kN/m<sup>2</sup>, sehingga terjadi perubahan pada angka aman (*Safety factor*) dan bidang longsor (*Slip Surface*). Nilai  $Q_f$  didapat dari rumus:

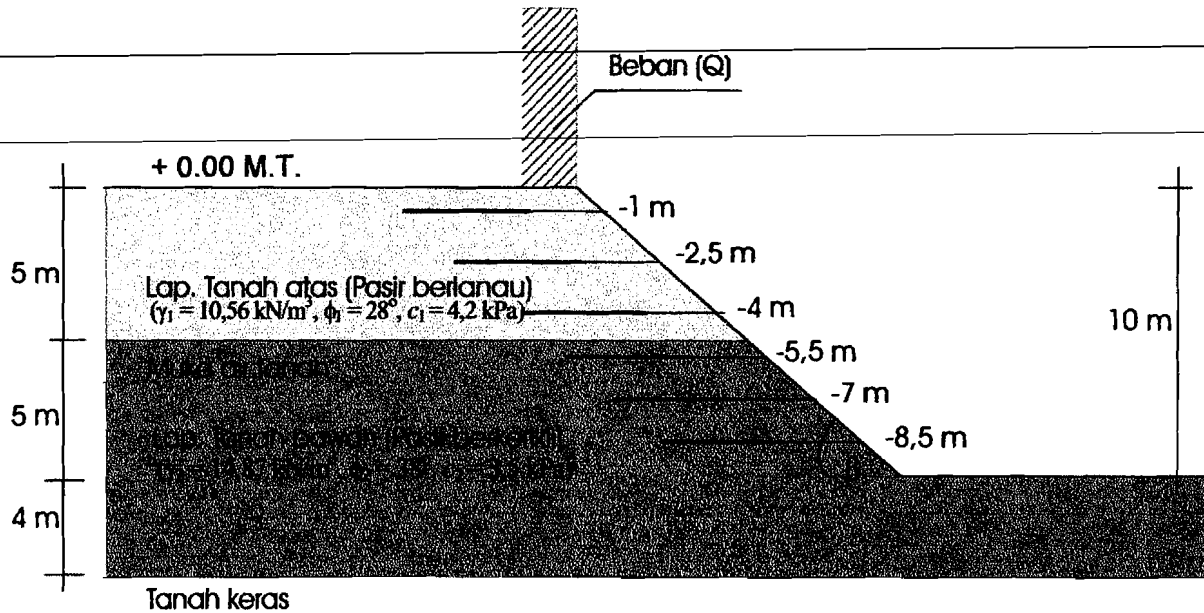
$$Q_f = A\gamma' \left( h + \frac{L}{2} \right) \pi DL \tan \phi' + B\gamma' h \frac{\pi}{4} (D^2 - d^2) \quad (6.15)$$

Rumus diatas adalah untuk tanah berpasir, dengan  $Q_f$  = kapasitas beban ultimit angkur,  $A$  = rasio tekanan normal pada daerah pertemuan terhadap tekanan efektif akibat tanah diatasnya (diusulkan antara 1 – 2) (diambil = 1,5),  $B$  = faktor daya dukung yang merupakan analog dari faktor daya dukung  $N_q$  dalam kasus tiang pancang diusulkan bahwa rasio  $N_q/B$  antara 1,3 - 1,4 (dari Berezantzev, Khristoforov, dan Golubkov dengan  $\phi = 38^\circ$  didapat  $N_q = 89$ , sehingga nilai  $B = 63,87$ ),  $h$  = kedalaman lapisan tanah diatas angkur (diambil 1,5 m),  $L$  = panjang angkur terjepit (4 m),  $d$  = diameter lubang bor (sekitar 75 – 125 mm, diambil 100 mm),  $D$  = diameter angkur terjepit (mencapai 4 kali dari lubang bor, dipakai  $3d = 300$  mm), sedangkan properties tanah ( $\phi$  dan  $\gamma$ ) digunakan yang terbesar, dan untuk panjang angkur bebas disesuaikan dengan lebar bidang keruntuhan.

Angkur yang digunakan adalah berupa kabel yang kemudian disebut tendon, di mana salah satu ujungnya ditanamkan dengan kuat pada suatu massa adukan semen atau tanah yang diberi adukan semen (digROUT). Adukan semen dimasukan kedalam tanah dengan cara disuntikan melewati lubang bor, penyuntikan dilakukan dengan tekanan tertentu pada seluruh panjang angkur terjepit sambil mencabut selubung lubang bor. Jenis angkur yang digunakan diilustrasikan pada Gambar 6.10. sedangkan pemodelan lereng dengan perkuatan angkur diilustrasikan pada Gambar 6.11.



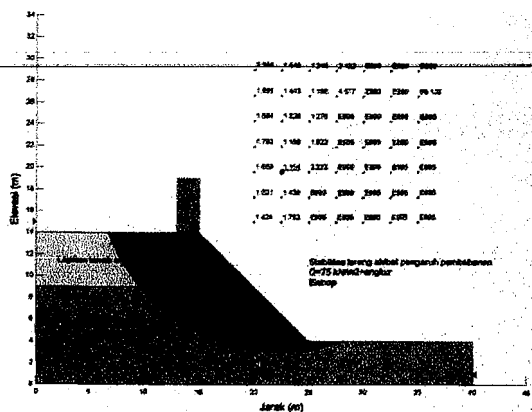
**Gambar 6.10.** Jenis dan dimensi angkur



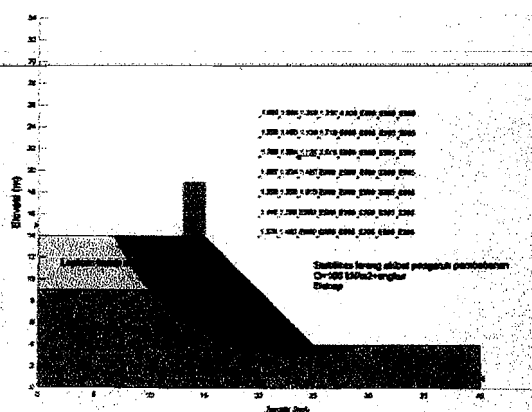
**Gambar 6.11.** Pemodelan lereng dengan perkuatan angkur

Jumlah angkur yang digunakan disesuaikan hingga mencapai  $SF > 1,00$ , pada kasus lereng dengan besarnya beban terbagi rata ( $Q$ ) =  $100 \text{ kN/m}^2$  dan  $200 \text{ kN/m}^2$  digunakan jumlah angkur sebanyak 6 buah, sedangkan pada lereng dengan  $Q = 75 \text{ kN/m}^2$  jumlah angkur yang digunakan adalah sebanyak 5 buah, dikarenakan cukup dapat meningkatkan angka aman hingga  $> 1,00$ . yang membedakan untuk setiap model lereng adalah panjang angkur bebas, karena disesuaikan dengan lebar bidang kelongsoran (*slip surface*).

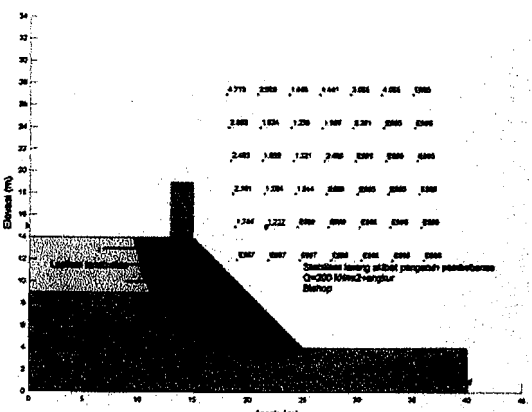
Sebagian hasil aplikasi dari program Geo-Slope yang berupa angka aman (*safety factor*) dan bidang longsor (*slip surface*) pada lereng yang selain dipengaruhi perubahan beban terbagi rata juga dipengaruhi perubahan beban titik dapat dilihat pada Gambar 6.12. Untuk lebih lengkapnya hasil analisis menggunakan Geo-Slope dapat dilihat pada lampiran 5.



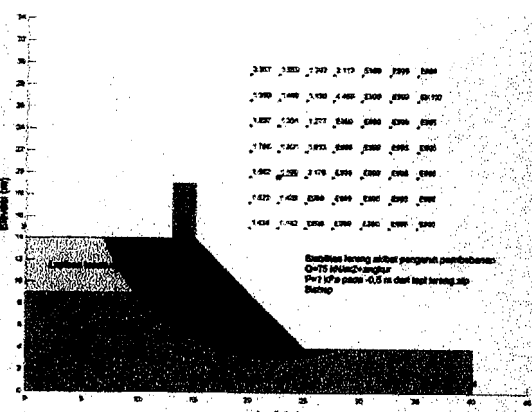
(a) Lereng dengan  $Q= 75 \text{ kN/m}^2$



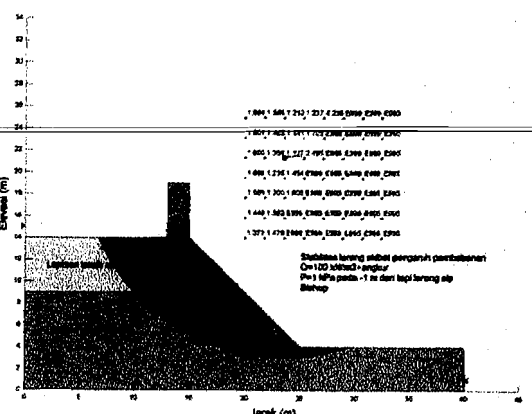
(b) Lereng dengan  $Q= 100 \text{ kN/m}^2$



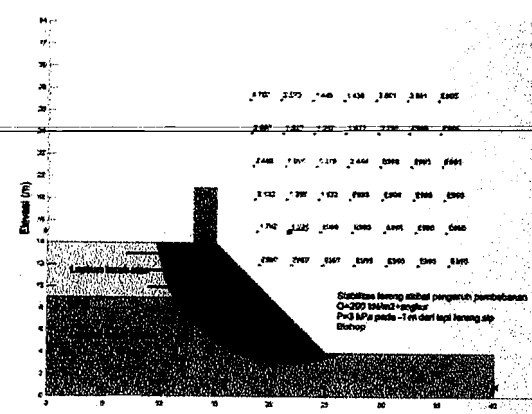
(c) Lereng dengan  $Q= 200 \text{ kN/m}^2$



(d) Lereng dengan  $Q= 75 \text{ kN/m}^2$  dan  $P= 1 \text{ kPa}$  pada 0,5 m dari tepi lereng



(e) Lereng dengan  $Q= 100 \text{ kN/m}^2$  dan  $P= 1 \text{ kPa}$  pada 1m dari tepi lereng



(f) Lereng dengan  $Q= 200 \text{ kN/m}^2$  dan  $P= 3 \text{ kPa}$  pada 1m dari tepi lereng

**Gambar 6.12.** Sebagian hasil analisis menggunakan Geo-Slope pada lereng yang diperkuat dengan angkur



Dari gambar di atas juga besarnya perubahan angka aman dengan penggunaan angkur dapat dilihat pada Tabel 6.4.

**Tabel 6.4.** Persentase Perubahan *safety factor* akibat pengaruh penggunaan angkur ( $\beta = 45^\circ$ ) pada lereng dengan perubahan beban terbagi rata saja.

Model lereng	Safety factor		% kenaikan angka aman
	Tanpa angkur	Dengan angkur	
Beban (kN/m <sup>2</sup> )			
75	0.231	1.164	403.8961
100	0.200	1.128	464
200	0.189	1.232	551.8519

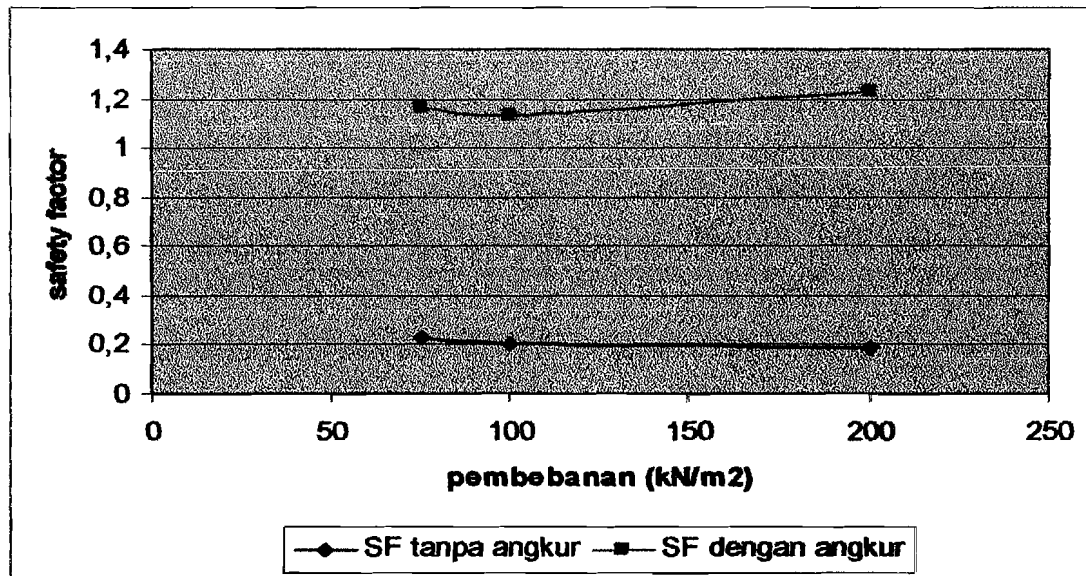
**Tabel 6.5.** Persentase Perubahan *safety factor* akibat pengaruh penggunaan angkur ( $\beta = 45^\circ$ ) pada lereng dengan perubahan beban terbagi rata dan beban titik.

Lereng dengan beban terbagi rata (Q) = 75 kN/m <sup>2</sup>					
Jarak dari tepi lereng (m)	Beban titik (P)				
	1 kPa	1,5 kPa	2 kPa	2,5 kPa	3 kPa
0,5	1,166	1,167	1,167	1,168	1,169
1	1,165	1,166	1,166	1,167	1,167
1,5	1,165	1,165	1,165	1,165	1,165
Lereng dengan beban terbagi rata (Q) = 100 kN/m <sup>2</sup>					
Jarak dari tepi lereng (m)	Beban titik (P)				
	1 kPa	1,5 kPa	2 kPa	2,5 kPa	3 kPa
0,5	1,128	1,128	1,129	1,130	1,130
1	1,127	1,128	1,128	1,128	1,129
1,5	1,127	1,127	1,127	1,127	1,127
Lereng dengan beban terbagi rata (Q) = 200 kN/m <sup>2</sup>					
Jarak dari tepi lereng (m)	Beban titik (P)				
	1 kPa	1,5 kPa	2 kPa	2,5 kPa	3 kPa
0,5	1,231	1,230	1,230	1,230	1,229
1	1,230	1,230	1,229	1,229	1,228
1,5	1,230	1,229	1,228	1,227	1,226

Untuk hasil analisis menggunakan Geo-Slope dapat dilihat pada lampiran 5. begitu juga grafik perbandingan tegangan gesernya.

Trend peningkatan *Safety factor* pada lereng dengan perkuatan ankur dapat

dilihat pada Grafik 6.8.



Grafik 6.8. Persentase kenaikan *safety factor* akibat penggunaan perkuatan ankur

Dari data di atas, terbukti bahwa penggunaan perkuatan ankur sangat efektif untuk menaikkan stabilitas suatu lereng. Kenaikan angka aman setelah menggunakan perkuatan ankur mencapai 5 kali lipat dari angka aman sebelum menggunakan perkuatan ankur.

Di bawah ini adalah macam-macam lereng yang sudah dianalisis jenis keruntuhan, sehingga didapat metode perbaikan stabilitasnya.

Tabel 6.6. Metode perbaikan lereng berdasarkan jenis keruntuhannya

Model lereng	Jenis keruntuhan	Solusi
Kemiringan (°)		
30	Keruntuhan sebagian	Pembuatan <i>Berm</i>
40	Keruntuhan sebagian	Pembuatan <i>Berm</i>
50	Keruntuhan sebagian	Pembuatan <i>Berm</i>
60	Keruntuhan sebagian	Pembuatan <i>Berm</i>
70	Keruntuhan sebagian	Pembuatan <i>Berm</i>
muka air tanah (m)		
+0	Keruntuhan sebagian	Pembuatan <i>Berm</i>
-1	Keruntuhan sebagian	Pembuatan <i>Berm</i>
-2	Keruntuhan sebagian	Pembuatan <i>Berm</i>
-3	Keruntuhan sebagian	Pembuatan <i>Berm</i>
-4	Keruntuhan sebagian	Pembuatan <i>Berm</i>
-5	Keruntuhan sebagian	Pembuatan <i>Berm</i>
-6	Keruntuhan sebagian	Pembuatan <i>Berm</i>
-7	Keruntuhan sebagian	Pembuatan <i>Berm</i>
-8	Keruntuhan dasar	Tiang pancang vertikal
-9	Keruntuhan dasar	Tiang pancang vertikal
-10	Keruntuhan dasar	Tiang pancang vertikal
Beban (kN/m <sup>2</sup> )		
10	Keruntuhan sebagian	Pembuatan <i>Berm</i>
25	Keruntuhan sebagian	Pembuatan <i>Berm</i>
50	Keruntuhan sebagian	Pembuatan <i>Berm</i>
75	Keruntuhan kaki	Perkuatan angkur
100	Keruntuhan kaki	Perkuatan angkur
200	Keruntuhan kaki	Perkuatan angkur

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## BAB VII

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### KESIMPULAN DAN SARAN

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#### 7.1. Kesimpulan

Dari penelitian yang kami lakukan terhadap beberapa model lereng berikut parameter-parameternya, maka dapat ditarik beberapa kesimpulan sebagai berikut:

1. Untuk stabilitas lereng akibat pengaruh elevasi muka air tanah:
  - a. Air tanah akan mengisi pori antar butiran tanah, mengikis sedimen yang ada di sekitar butiran sehingga mengurangi kontak antar butiran tanah dan mengurangi tegangan efektif tanah.
  - b. Pori tanah yang terisi air akan mengakibatkan massa tanah naik, sehingga tanah yang bertambah berat cenderung bergerak kebawah yang mengakibatkan kelongsoran.
  - c. Angka aman (*safety factor*) akan menurun seiring naiknya elevasi muka air tanah.
2. Untuk stabilitas lereng akibat pengaruh kemiringan lereng ( $\beta$ ):
  - a. Lereng dengan sudut kemiringan yang besar (curam) memiliki bidang longsor (*slip surface*) yang lebih pendek, sehingga tahanan gesek (*friction*) juga akan berkurang. Sebaliknya, lereng dengan sudut kemiringan yang lebih kecil (landai) akan mempunyai bidang longsor yang semakin panjang, sehingga tahanan geseknya juga akan bertambah.
  - b. Lereng dengan kemiringan yang lebih kecil (landai) akan lebih stabil, karena angka aman (*safety factor*) yang lebih besar.

3. Untuk stabilitas lereng akibat pengaruh pembebanan:
  - a. Tekanan akibat pembebanan mengakibatkan angka pori tanah menjadi berkurang.
  - b. Semakin besar pembebanan akan mengakibatkan bertambahnya tegangan geser (*shear stress*) pada tanah. Jika tegangan geser (*shear stress*) lebih besar dari kuat geser (*shear strength*) yang dimiliki tanah, maka lereng akan runtuh (*failure*).
  - c. Pembebanan yang semakin besar akan mengakibatkan berkurangnya angka aman (*safety factor*).
4. Angka aman yang didapat dari semua model adalah angka aman minimum, sehingga untuk angka aman yang  $< 1,00$  sangat dianjurkan untuk dilakukan perbaikan stabilitas lereng.
5. Terbukti penggunaan perkuatan ankur pada lereng yang mengalami keruntuhan kaki dapat meningkatkan angka aman hingga 551,8 % bila dibandingkan dengan lereng tanpa perkuatan ankur.

## 7.2. Saran

Dari analisis yang telah dilakukan, disarankan beberapa hal di bawah ini.

1. Masyarakat yang akan mendirikan bangunan di daerah lereng, sebaiknya dihindari membangun di daerah puncak-tepi lereng dan dasar lereng. Kecuali sudah ada pengujian terhadap angka keamanan pada lereng tersebut,
2. Perlunya perbaikan stabilitas lereng, sehingga lereng akan aman dari keruntuhan dan tidak menimbulkan bahaya longsor.

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**KARTU PESERTA TUGAS AKHIR**

NO	NAMA	NO.MHS.	BID.STUDI
1	Surahman	00 511 262	Teknik Sipil
2	Jaja Subagja	00 511 221	Teknik Sipil

**JUDUL TUGAS AKHIR**

Analisa lereng akibat pengaruh elevasi muka air tanah kemiringan dan  
 Pembebanan dengan software Geo- Slope

PERIODE KE : II ( Des 04 - Mei 05 )  
 TAHUN : 2004 - 2005

**Berlaku mulai Tgl : 21-Dec-04 – Akhir Mei 05**

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

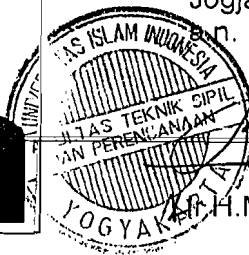
Dosen Pembimbing I : Edy Purwanto, Dr, Ir, CES, DEA

: Ibnu Sudarmadji, Ir, H, MT



Jogjakarta ,21-Dec-04

n. Dekan



H. H. Munadhir, MS

Seminar : \_\_\_\_\_  
 Sidang : \_\_\_\_\_  
 Pendadaran : \_\_\_\_\_





UNTUK DOSEN

KARTU PRESENSI KONSULTASI  
TUGAS AKHIR MAHASISWA

PERIODE KE : II ( Des 04 - Mei 05 )

Berlaku mulai Tgl : 21-Dec-04 – Akhir Mei 05

NO	N A M A	NO.MHS.	BID.STUDI
1.	Surahman	00 511 262	Teknik Sipil
2.	Jaja Subagja	00 511 221	Teknik Sipil

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Dosen Pembimbing II : Ibnu Sudarmadji,Ir,H,MT



Jogjakarta , 21-Dec-04  
 a.n. Dekan



H. Munadhir, MS

Catatan :

Seminar : \_\_\_\_\_  
 Sidang : \_\_\_\_\_  
 Pendadaran : \_\_\_\_\_

12/05 - Perbaiki hitungan justuabn Angkur & f<sub>ti</sub>  
 05 - ...  
 31/05 - acc untuk ...  
 05 - Waktu sidang di usahale  
 - program Geoslope di fampisler  
 14/05 : Perbaiki Topi  
 08/05 : acc, konsultasi Topi ke ...  
 09/05 : DP I



UNIVERSITAS ISLAM INDONESIA  
FAKULTAS TEKNIK SIPIL DAN PERENCANAAN  
JURUSAN TEKNIK SIPIL  
JL. KALIURANG KM.14,5 SLEMAN YOGYAKARTA

## BERITA ACARA SEMINAR TUGAS AKHIR

Pada hari dan tanggal ini telah diselenggarakan seminar Tugas Akhir Jurusan Teknik Sipil. Adapun rincian selengkapnya adalah sebagai berikut :

### Waktu Penyelenggaraan

Hari : JUMAT      Tanggal : 25-02-05 Jam : 13.00      TA Periode Ke : 11      Tahun : 2005

### TUGAS AKHIR

JUDUL

ANALISIS LERENG AKIBAT PENGARUH ELEVASI MUKA AIR TANAH, KEMIRINGAN & PEMBEBANAN DENGAN SOFTWARE GEO SLOPE

Nama Mahasiswa

Nomor Mahasiswa

JAJA SUBAGJA

00 511 221

SURAHMAN

00 511 262

Dosen Pembimbing I : EDY PURWANTO, Dr. Ir., CES, DEA.

Dosen Pembimbing II : IBNU SUDARMADJI, Ir., H., MT .

Berita acara ini ditandatangani oleh pihak-pihak yang berkepentingan dan disyahkan oleh Dosen Pembimbing Tugas Akhir

### Dosen Pembimbing

Pembimbing I

Pembimbing II

(  
DR. EDY Purwanto)

(  
.....)

### Catatan :

- Setelah selesai seminar Berita Acara Ini diserahkan diloket Praktik Kerja / Tugas Akhir.
- Kalau Tidak Diserahkan Dianggap Belum Seminar

## DAFTAR HADIR SEMINAR PROPOSAL TUGAS AKHIR

1. Hari / Tanggal : JUMAT / 25 FEBRUARI 2005
2. Judul Tugas Akhir : ANALISIS KERENS AKIBAT PENGARUH ELEVASI MUKA AIR TANAH, KEMIRINGAN, & PEMBEBANAN DENGAN SOFTWARE GEOSLOPE
3. Penyaji :
1. Nama : JATA SUBAGJA No. Mhs. 00 511 221
2. Nama : SURAHMAN No. Mhs. 00 511 262
4. Sub Program Studi :

No.	Nama	Mhs.	Tanda Tangan.
1.	Amirudin Azis	00 511 126	
2.	Cosmita Dikaria	00 511 271	
3.	Sunarto	96 310 871	
4.	Dicky A. Betyanan	005 12 140	
5.	MARFUAH MULIASARI	00 511 134	
6.	RAFAEL B	00 511 287	
7.	WENDRA HIRSAT	00 511 289	
8.	Pipit I	00 141	
9.	Chun. k	00 511 204	
10.	Anton Budi Garma	00 511 256	
11.	Syamsul Hidayat	00 511 182	
12.	Danar Aziz	00 511 018	
13.	Imam Hadi	00 511 142	
14.	Rina Indriani	00 511 153	
15.	Agustin Nural. A.	00 511 146	
16.	<del>SUPREMO</del>	<del>01 511 225</del>	<del></del>
17.	Wahid Eko P.	01 511 239	
18.	Yeni P	00 511 333	
19.	Yulio. H	00 511 338	
20.	EMIL ADLY	00 511 261	
21.	Ardu Novianto	00 511 024	

Dosen Pembimbing I

Dosen Pembimbing II

Dosen Tamu :

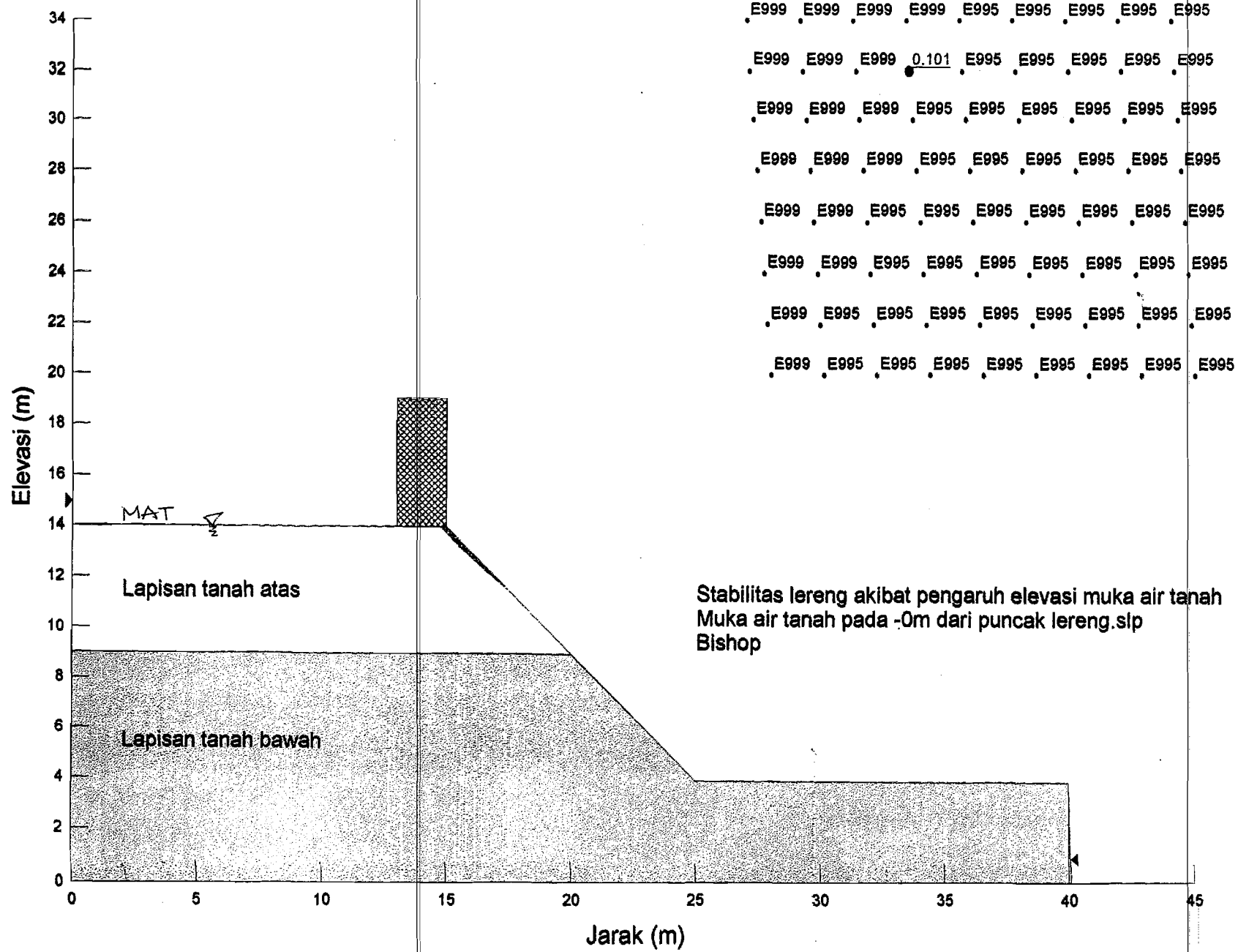
1. ....
2. ....
3. ....

4. ....
5. ....
6. ....

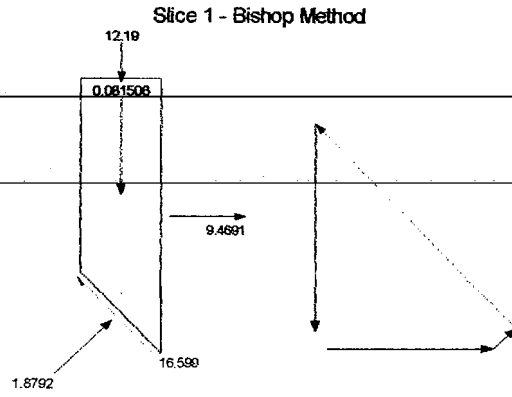
**REKAPITULASI KEJADIAN BANJIR DAN TANAH LONGSOR  
MUSIM HUJAN 2003/2004 SAMPAI DENGAN TANGGAL 05 MEI 2004**

No	Propinsi	Kejadian	Meninggal	Hilang	Mengungsi	Tergenang								Rusak/Roboh/Hanyut							
		(Frekuensi)	(Orang)	(Orang)	(Orang)	Perkumim an	Rumah	Fasilitas Umum	Jalan	Jembat an	Sawah	Perkebu nan	Perikana n	Rumah	Fasilitas Umum	Jalan	Jembat an	Bendun g	Saluran	Tanggul	Bang SDA,Irig asi
						(Ha)	(buah)	(buah)	(Km)	(buah)	(Ha)	(Ha)	(Ha)	(buah)	(buah)	(Km)	(buah)	(buah)	(m)	(m)	(Buah)
	<b>Total Indonesia</b>	<b>174</b>	<b>334</b>	<b>142</b>	<b>109,973</b>	<b>20,888</b>	<b>66,568</b>	<b>449</b>	<b>173</b>	<b>1</b>	<b>87,307</b>	<b>5,22</b>	<b>1,565</b>	<b>7,121</b>	<b>686</b>	<b>238</b>	<b>56</b>	<b>60</b>	<b>12,001</b>	<b>8,692</b>	<b>220</b>
	<b>Wilayah Barat</b>	<b>20</b>	<b>217</b>	<b>94</b>	<b>22,448</b>	<b>16,186</b>	<b>10,771</b>	<b>68</b>	<b>88</b>	<b>0</b>	<b>58,438</b>	<b>2,8</b>	<b>745</b>	<b>2,197</b>	<b>559</b>	<b>127</b>	<b>3</b>	<b>3</b>	<b>4,001</b>	<b>0</b>	<b>0</b>
1	NAD	4	5	0	20	14,75	2	0	86	0	9,59	2,8	745	1,302	9	0	0	0	0	0	0
2	Sumatera Utara	2	157	90	0	0	0	0	0	0	0	0	0	402	443	0	0	1	4	0	0
3	Sumatera Barat	3	45	4	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0
4	Sumatera Selatan	3	3	1	0	0	100	0	0	0	28	0	0	129	4	0	0	0	0	0	0
5	Riau	4	4	0	2,446	0	5,763	68	0	0	0	0	0	34	0	0	0	0	0	0	0
6	Jambi	3	3	0	0	930	4,4	0	0	0	46,81	0	0	300	100	127	0	0	0	0	0
7	Bengkulu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Lampung	1	0	0	0	508	508	0	0	0	10	0	0	0	3	0	3	2	1	0	0
9	Bangka Belitung	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Wilayah Tengah</b>	<b>129</b>	<b>69</b>	<b>17</b>	<b>80,527</b>	<b>4,693</b>	<b>37,224</b>	<b>78</b>	<b>81</b>	<b>1</b>	<b>16,157</b>	<b>1,853</b>	<b>820</b>	<b>2,364</b>	<b>43</b>	<b>74</b>	<b>43</b>	<b>53</b>	<b>3</b>	<b>5,954</b>	<b>220</b>
10	DKI. Jakarta	7	3	0	25,662	615	11,297	0	16	0	0	0	0	0	0	0	0	0	0	0	0
11	Banten	12	0	0	8,125	1,896	4,836	0	4	0	2,53	70	0	192	0	0	0	0	0	0	0
12	Jawa Barat	16	21	4	4,447	0	7,348	15	0	0	1,953	0	260	1,316	14	20	11	17	500	353	2
13	D.I.Yogyakarta	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Jawa Tengah	37	38	0	39,383	860	9,001	44	17	1	5,6	93	560	359	18	9	5	5	440	2,863	0
15	Jawa Timur	47	6	13	84	522	3,695	11	39	0	2,714	1,69	0	489	11	40	27	31	2,06	2,738	218
16	Kalimantan Barat	2	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
17	Kalimantan Timur	1	0	0	0	75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	Kalimantan Selatan	6	1	0	2,826	725	1,047	6	0	0	3,36	0	0	8	0	5	0	0	0	0	0
	<b>Wilayah Timur</b>	<b>25</b>	<b>48</b>	<b>30</b>	<b>7</b>	<b>6</b>	<b>8,571</b>	<b>308</b>	<b>8</b>	<b>0</b>	<b>14,712</b>	<b>567</b>	<b>0</b>	<b>2,56</b>	<b>84</b>	<b>37</b>	<b>10</b>	<b>4</b>	<b>5</b>	<b>2,738</b>	<b>0</b>
19	Gorontalo	1	0	0	0	0	0	0	0	0	3,36	0	0	0	0	0	0	0	0	0	0
20	Bali	2	1	0	0	0	4,101	143	0	0	0	0	0	1,008	38	0	1	4	0	2,6	0
21	NTB	5	1	0	0	5	2,807	154	0	0	302	0	0	724	24	5	0	0	0	136	0
22	NTT	5	0	0	0	0	552	0	1	0	0	0	0	0	0	0	0	0	0	0	0
23	Sulawesi Selatan	5	15	30	7	0	1,011	2	4	0	500	367	0	500	9	6	2	0	5	0	0
24	Sulawesi Utara	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	Sulawesi Tengah	6	0	0	0	0	100	6	1	0	10,55	200	0	120	0	6	4	0	0	0	0
26	Irian Jaya	1	31	0	0	0	0	0	0	0	0	0	0	208	13	20	3	0	0	0	0

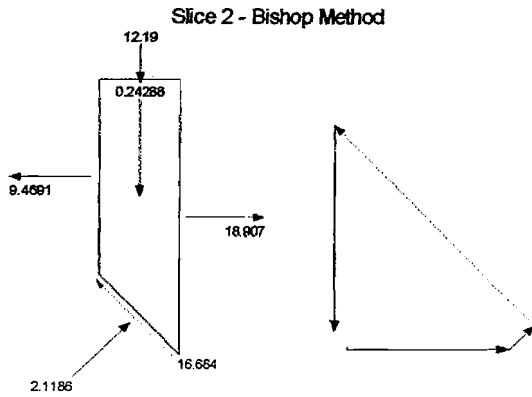
Sumber : Dep.Kimpraswil



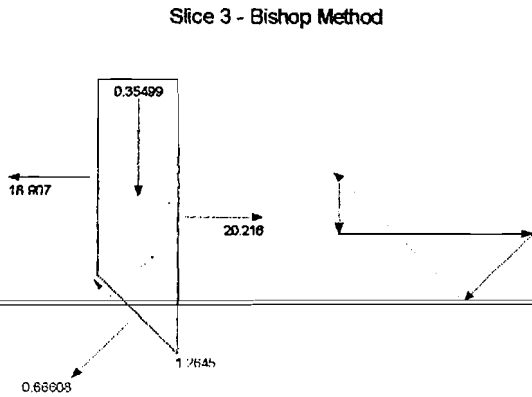
Slice 1 - Bishop Method	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,73699
Pore Water Pressure	0,62089
Pore Water Force	0,10995
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,12191
Mid-Height	0,063315
Base Length	0,17547
Base Angle	45,993
Polygon Closure Error	1,2449
Anisotropic Strength Modifier	1
Weight	0,081506
Base Shear Force	16,599
Base Normal Force	1,8792
Right Side Normal Force	9,4691
Surface Pressure Load	12,19



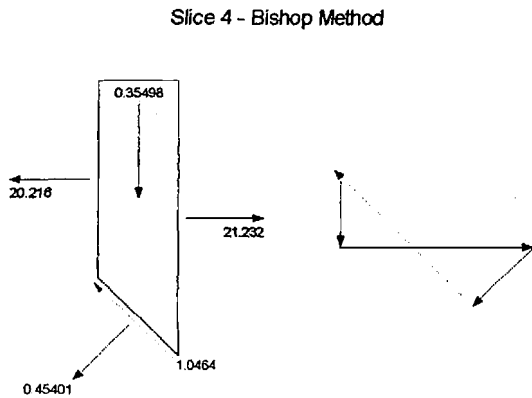
Slice 2 - Bishop Method	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,73187
Pore Water Pressure	1,8503
Pore Water Force	0,32243
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,1219
Mid-Height	0,16867
Base Length	0,17425
Base Angle	45,609
Polygon Closure Error	1,1679
Anisotropic Strength Modifier	1
Weight	0,24268
Base Shear Force	16,684
Base Normal Force	2,1186
Left Side Normal Force	9,4691
Right Side Normal Force	18,907
Surface Pressure Load	12,19



Slice 3 - Bishop Method	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,79693
Pore Water Pressure	3,1216
Pore Water Force	0,59232
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,13369
Mid-Height	0,25148
Base Length	0,18975
Base Angle	45,205
Polygon Closure Error	0,07654
Anisotropic Strength Modifier	1
Weight	0,35499
Base Shear Force	1,2645
Base Normal Force	0,66608
Left Side Normal Force	18,907
Right Side Normal Force	20,216

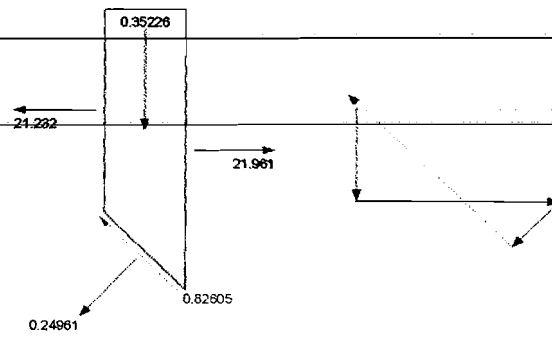


Slice 4 - Bishop Method	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,7912
Pore Water Pressure	4,4324
Pore Water Force	0,83499
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,13369
Mid-Height	0,25145
Base Length	0,18838
Base Angle	44,791
Polygon Closure Error	0,068016
Anisotropic Strength Modifier	1
Weight	0,35498
Base Shear Force	1,0464
Base Normal Force	0,45401
Left Side Normal Force	20,216
Right Side Normal Force	21,232



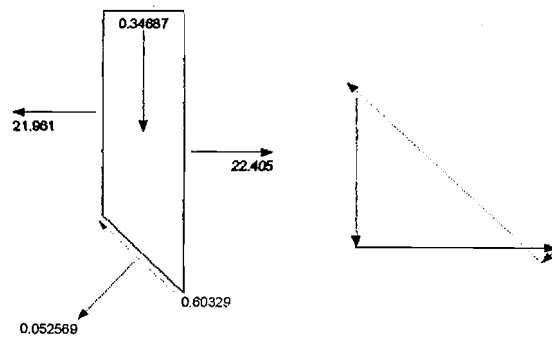
Slice 5 - Bishop Method	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,78554
Pore Water Pressure	5,7252
Pore Water Force	1,0708
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,13368
Mid-Height	0,24952
Base Length	0,18703
Base Angle	44,378
Polygon Closure Error	0,053693
Anisotropic Strength Modifier	1
Weight	0,35226
Base Shear Force	0,82605
Base Normal Force	0,24961
Left Side Normal Force	21,232
Right Side Normal Force	21,961

Slice 5 - Bishop Method



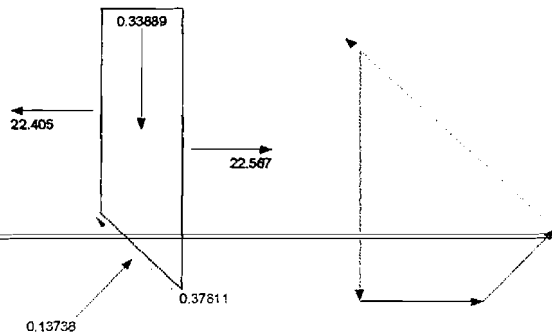
Slice 6 - Bishop Method	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,78013
Pore Water Pressure	6,9983
Pore Water Force	1,2999
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,13369
Mid-Height	0,24571
Base Length	0,18574
Base Angle	43,966
Polygon Closure Error	0,039214
Anisotropic Strength Modifier	1
Weight	0,34687
Base Shear Force	0,60329
Base Normal Force	0,052569
Left Side Normal Force	21,961
Right Side Normal Force	22,405

Slice 6 - Bishop Method



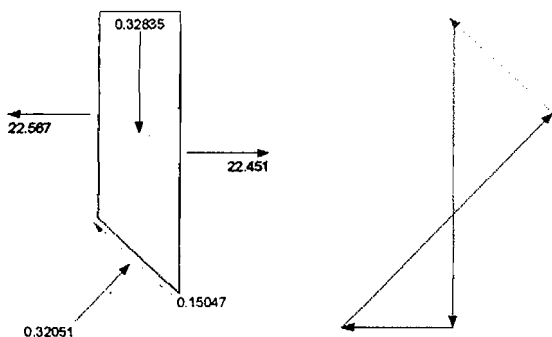
Slice 7 - Bishop Method	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,77481
Pore Water Pressure	8,2541
Pore Water Force	1,5227
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,13369
Mid-Height	0,24005
Base Length	0,18448
Base Angle	43,557
Polygon Closure Error	0,026468
Anisotropic Strength Modifier	1
Weight	0,33889
Base Shear Force	0,37811
Base Normal Force	0,13738
Left Side Normal Force	22,405
Right Side Normal Force	22,567

Slice 7 - Bishop Method



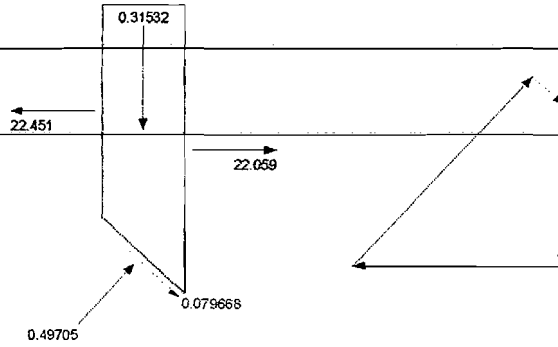
Slice 8 - Bishop Method	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,76968
Pore Water Pressure	9,4916
Pore Water Force	1,7394
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,13369
Mid-Height	0,23259
Base Length	0,18326
Base Angle	43,154
Polygon Closure Error	0,008209
Anisotropic Strength Modifier	1
Weight	0,32835
Base Shear Force	0,15047
Base Normal Force	0,32051
Left Side Normal Force	22,567
Right Side Normal Force	22,451

Slice 8 - Bishop Method



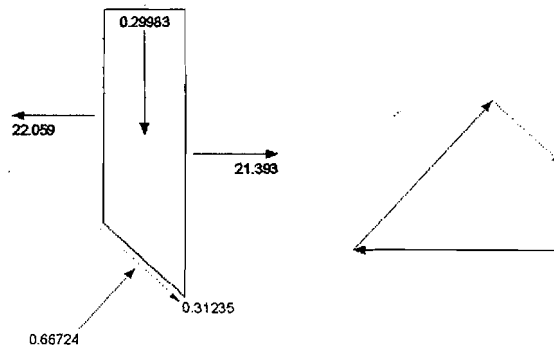
<b>Slice 9 - Bishop Method</b>	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,76464
Pore Water Pressure	10,713
Pore Water Force	1,9503
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,13369
Mid-Height	0,22335
Base Length	0,18206
Base Angle	42,75
Polygon Closure Error	0,002485
Anisotropic Strength Modifier	1
Weight	0,31532
Base Shear Force	0,079668
Base Normal Force	0,49705
Left Side Normal Force	22,451
Right Side Normal Force	22,059

Slice 9 - Bishop Method



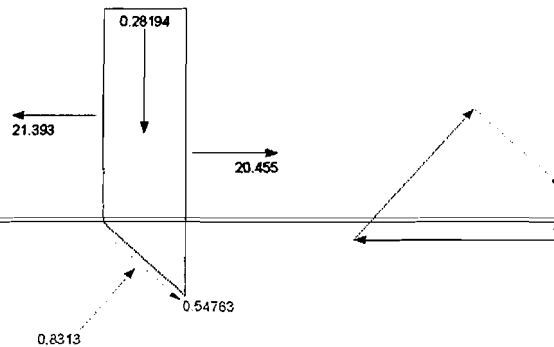
<b>Slice 10 - Bishop Method</b>	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,75973
Pore Water Pressure	11,916
Pore Water Force	2,1555
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,13368
Mid-Height	0,21238
Base Length	0,18089
Base Angle	42,352
Polygon Closure Error	0,016681
Anisotropic Strength Modifier	1
Weight	0,29983
Base Shear Force	0,31235
Base Normal Force	0,66724
Left Side Normal Force	22,059
Right Side Normal Force	21,393

Slice 10 - Bishop Method



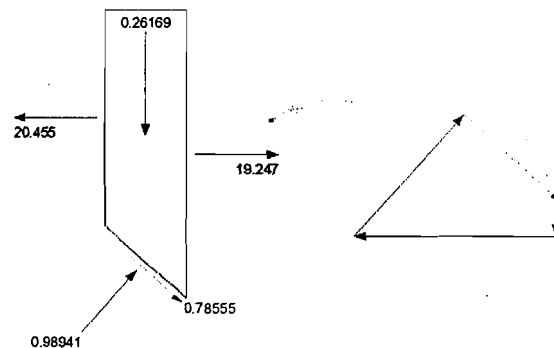
<b>Slice 11 - Bishop Method</b>	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,75502
Pore Water Pressure	13,103
Pore Water Force	2,3554
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,13369
Mid-Height	0,19971
Base Length	0,17977
Base Angle	41,954
Polygon Closure Error	0,03283
Anisotropic Strength Modifier	1
Weight	0,28194
Base Shear Force	0,54763
Base Normal Force	0,8313
Left Side Normal Force	21,393
Right Side Normal Force	20,455

Slice 11 - Bishop Method



<b>Slice 12 - Bishop Method</b>	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,75038
Pore Water Pressure	14,273
Pore Water Force	2,55
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,13369
Mid-Height	0,18537
Base Length	0,17866
Base Angle	41,558
Polygon Closure Error	0,05436
Anisotropic Strength Modifier	1
Weight	0,26169
Base Shear Force	0,78555
Base Normal Force	0,98941
Left Side Normal Force	20,455
Right Side Normal Force	19,247

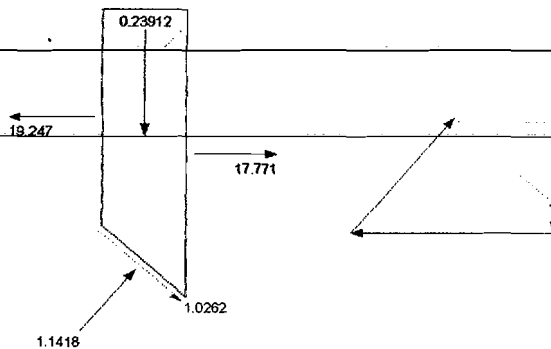
Slice 12 - Bishop Method





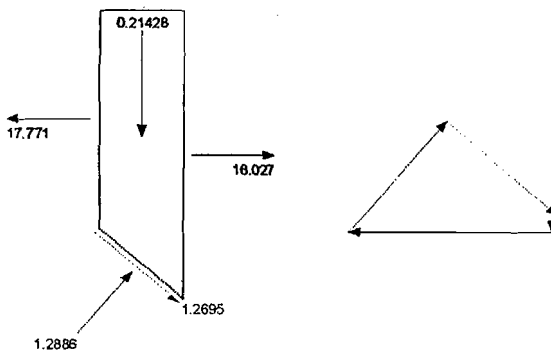
Slice 13 - Bishop Method	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,74585
Pore Water Pressure	15,428
Pore Water Force	2,7397
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,13369
Mid-Height	0,16938
Base Length	0,17758
Base Angle	41,164
Polygon Closure Error	0,06642
Anisotropic Strength Modifier	1
Weight	0,23912
Base Shear Force	1,0262
Base Normal Force	1,1418
Left Side Normal Force	19,247
Right Side Normal Force	17,771

Slice 13 - Bishop Method



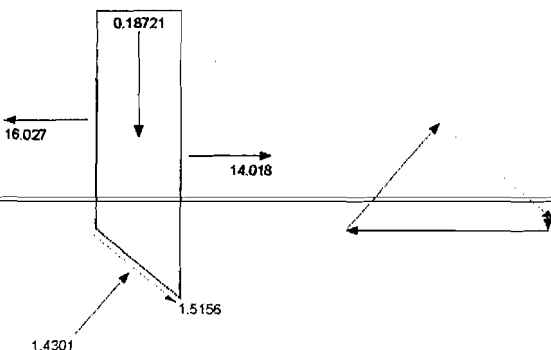
Slice 14 - Bishop Method	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,74148
Pore Water Pressure	16,565
Pore Water Force	2,9245
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,13369
Mid-Height	0,15179
Base Length	0,17654
Base Angle	40,776
Polygon Closure Error	0,06976
Anisotropic Strength Modifier	1
Weight	0,21428
Base Shear Force	1,2695
Base Normal Force	1,2886
Left Side Normal Force	17,771
Right Side Normal Force	16,027

Slice 14 - Bishop Method



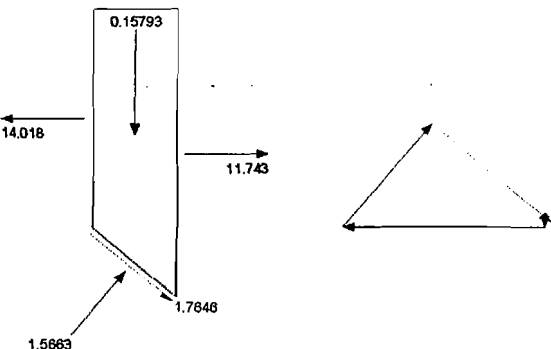
Slice 15 - Bishop Method	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,73716
Pore Water Pressure	17,689
Pore Water Force	3,1047
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,13368
Mid-Height	0,13261
Base Length	0,17551
Base Angle	40,39
Polygon Closure Error	0,090405
Anisotropic Strength Modifier	1
Weight	0,18721
Base Shear Force	1,5156
Base Normal Force	1,4301
Left Side Normal Force	16,027
Right Side Normal Force	14,018

Slice 15 - Bishop Method



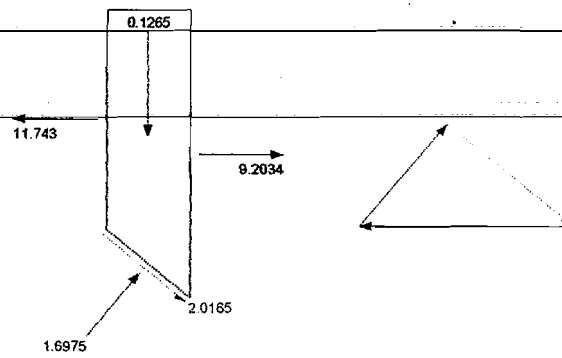
Slice 16 - Bishop Method	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,73298
Pore Water Pressure	18,797
Pore Water Force	3,2804
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,13369
Mid-Height	0,11187
Base Length	0,17452
Base Angle	40
Polygon Closure Error	0,11375
Anisotropic Strength Modifier	1
Weight	0,15793
Base Shear Force	1,7646
Base Normal Force	1,5663
Left Side Normal Force	14,018
Right Side Normal Force	11,743

Slice 16 - Bishop Method



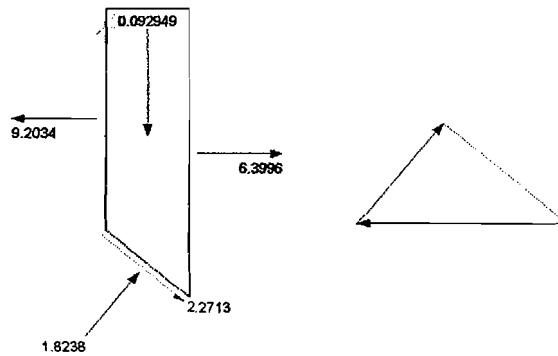
Slice 17 - Bishop Method	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,72893
Pore Water Pressure	19,889
Pore Water Force	3,4518
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,13369
Mid-Height	0,089607
Base Length	0,17355
Base Angle	39,618
Polygon Closure Error	0,10158
Anisotropic Strength Modifier	1
Weight	0,1265
Base Shear Force	2,0165
Base Normal Force	1,6975
Left Side Normal Force	11,743
Right Side Normal Force	9,2034

Slice 17 - Bishop Method



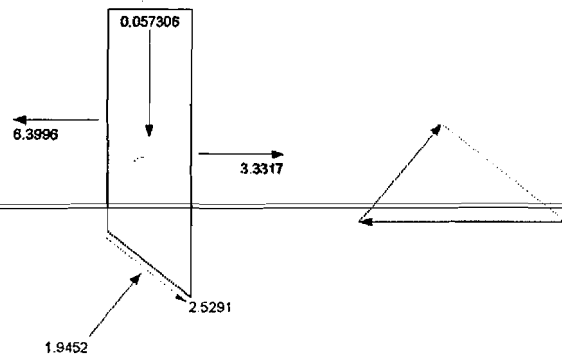
Slice 18 - Bishop Method	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,72495
Pore Water Pressure	20,967
Pore Water Force	3,6191
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,13369
Mid-Height	0,06584
Base Length	0,17261
Base Angle	39,237
Polygon Closure Error	0,14019
Anisotropic Strength Modifier	1
Weight	0,092949
Base Shear Force	2,2713
Base Normal Force	1,8238
Left Side Normal Force	9,2034
Right Side Normal Force	6,3996

Slice 18 - Bishop Method



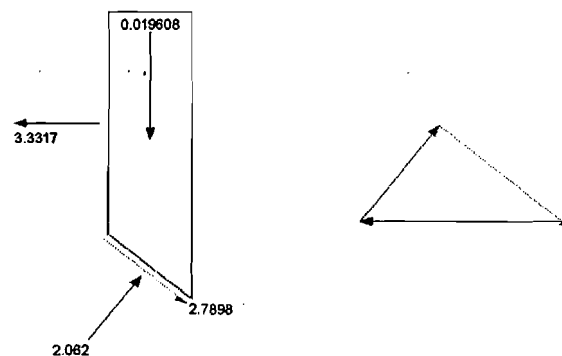
Slice 19 - Bishop Method	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,72106
Pore Water Pressure	22,031
Pore Water Force	3,7823
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,13369
Mid-Height	0,040592
Base Length	0,17168
Base Angle	38,857
Polygon Closure Error	0,13806
Anisotropic Strength Modifier	1
Weight	0,057306
Base Shear Force	2,5291
Base Normal Force	1,9452
Left Side Normal Force	6,3996
Right Side Normal Force	3,3317

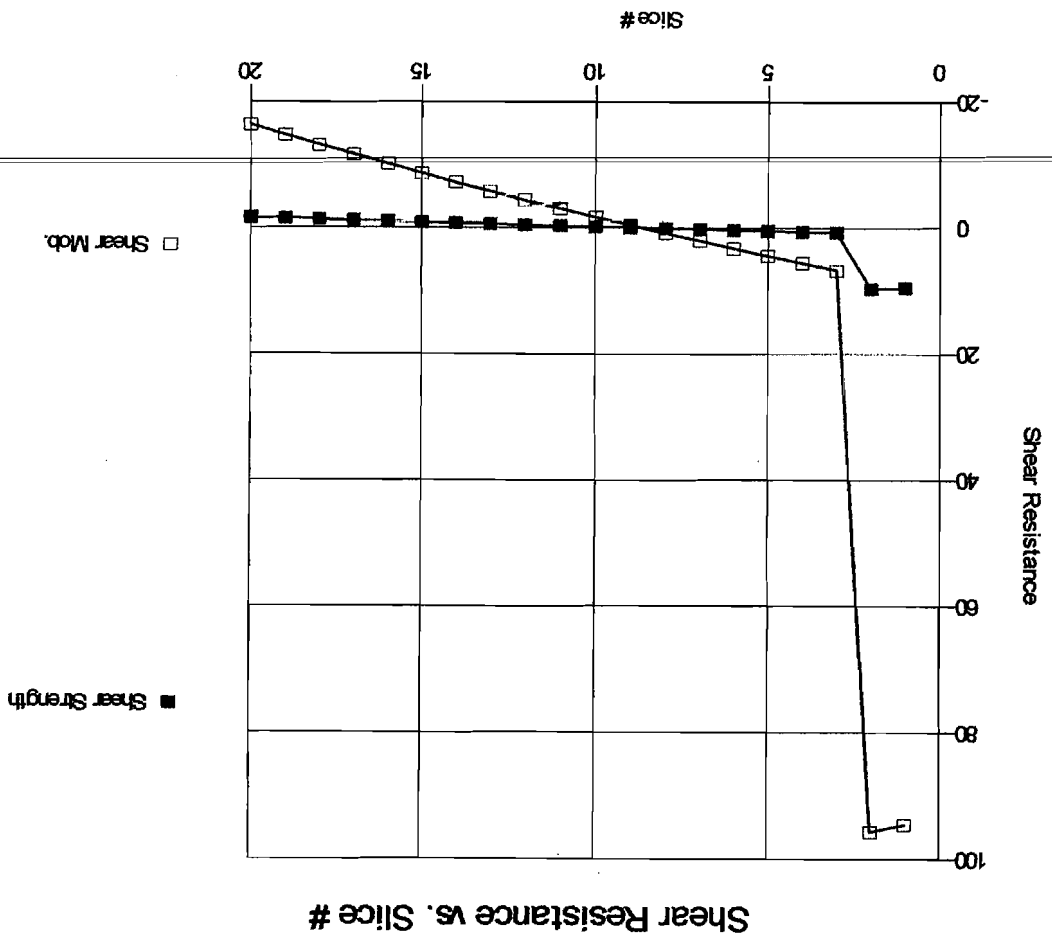
Slice 19 - Bishop Method

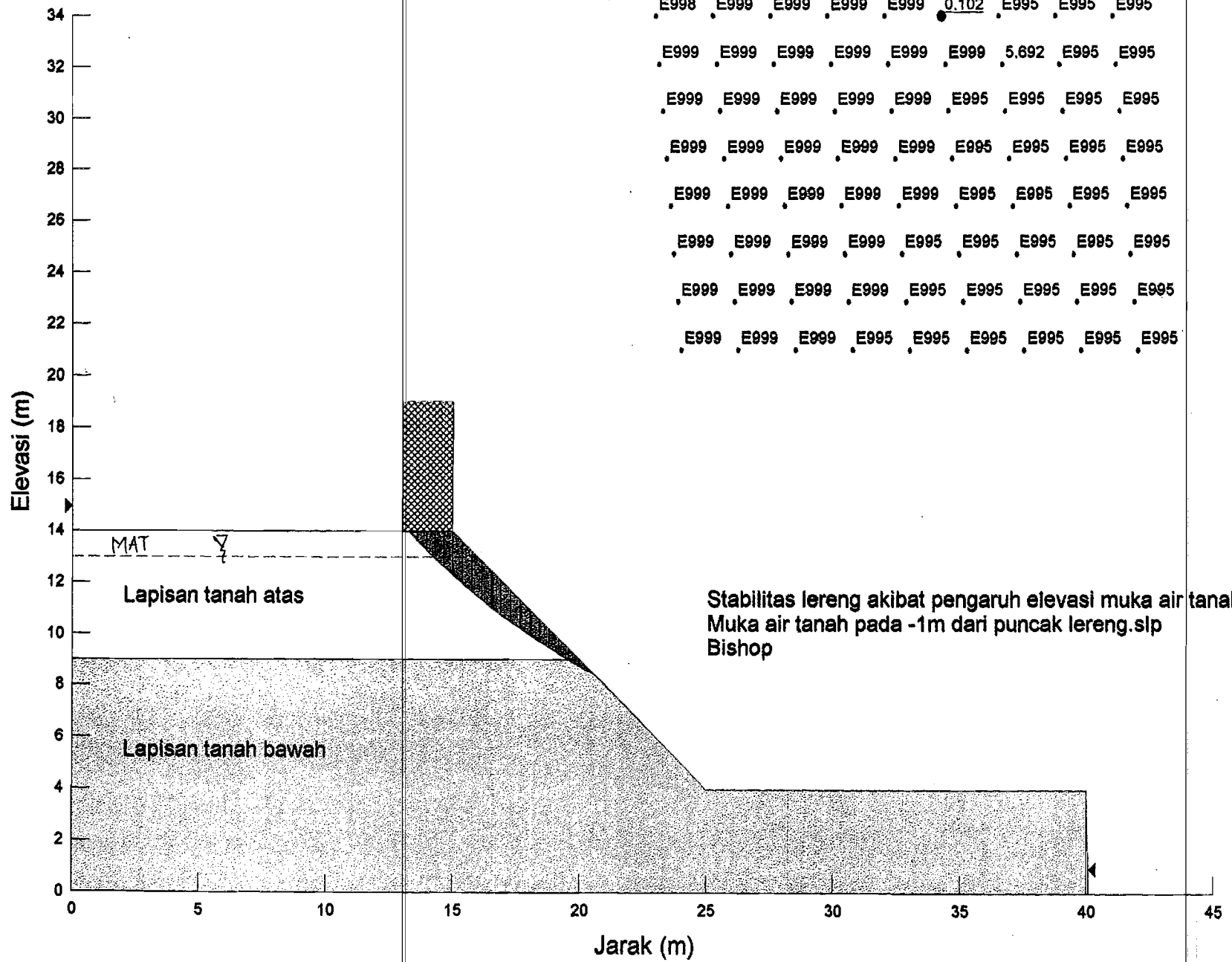


Slice 20 - Bishop Method	
Factor of Safety	0,101
Phi Angle	28
C (Strength)	4,2
C (Force)	0,71722
Pore Water Pressure	23,081
Pore Water Force	3,9414
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,13368
Mid-Height	0,013889
Base Length	0,17077
Base Angle	38,48
Polygon Closure Error	0,16858
Anisotropic Strength Modifier	1
Weight	0,019608
Base Shear Force	2,7898
Base Normal Force	2,082
Left Side Normal Force	3,3317
Right Side Normal Force	3,3317

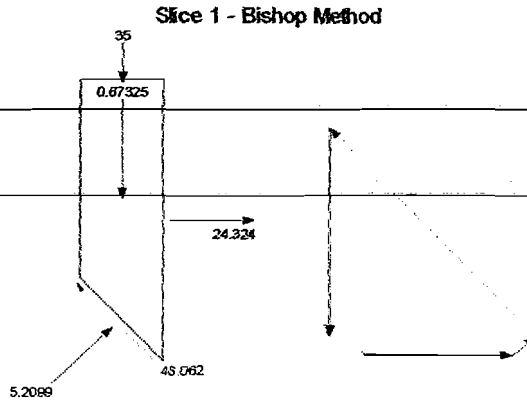
Slice 20 - Bishop Method



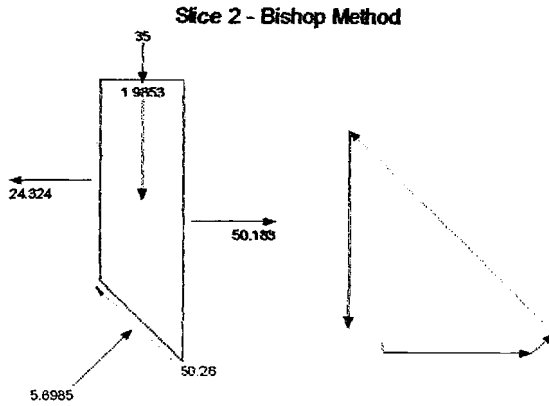




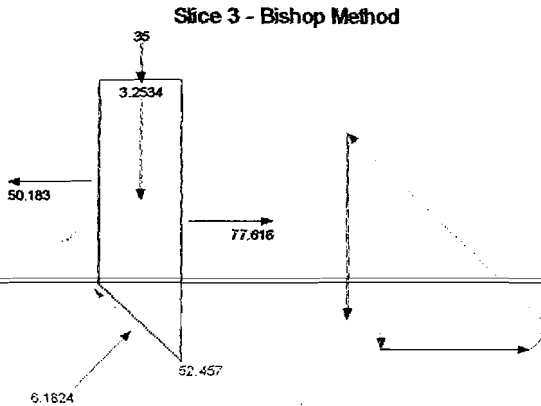
Slice 1 - Bishop Method	
Factor of Safety	0,102
Phi Angle	28
C (Strength)	4,2
C (Force)	2,1124
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,35
Mid-Height	0,18216
Base Length	0,50294
Base Angle	45,901
Polygon Closure Error	6,0078
Anisotropic Strength Modifier	1
Weight	0,67325
Base Shear Force	48,062
Base Normal Force	5,2099
Right Side Normal Force	24,324
Surface Pressure Load	35



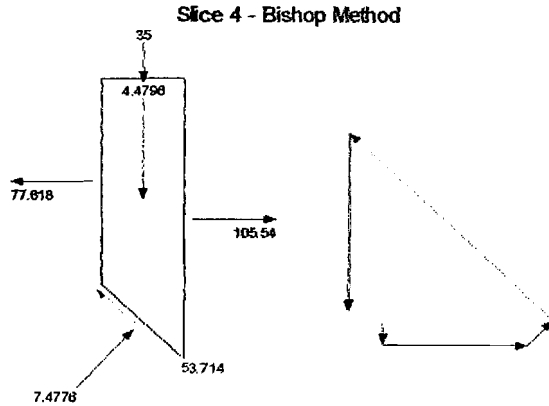
Slice 2 - Bishop Method	
Factor of Safety	0,102
Phi Angle	28
C (Strength)	4,2
C (Force)	2,0768
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,35
Mid-Height	0,53715
Base Length	0,49424
Base Angle	44,915
Polygon Closure Error	6,5338
Anisotropic Strength Modifier	1
Weight	1,9853
Base Shear Force	50,26
Base Normal Force	5,6985
Left Side Normal Force	24,324
Right Side Normal Force	50,183
Surface Pressure Load	35



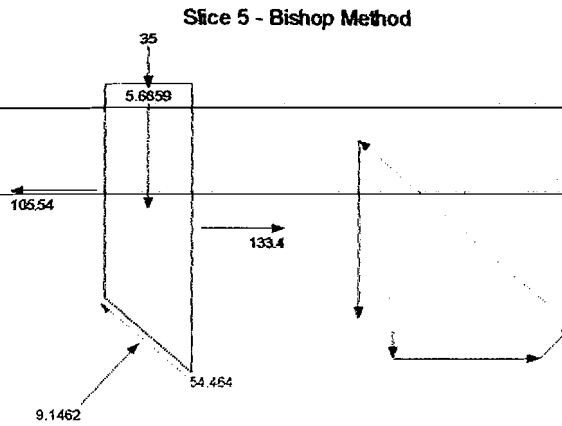
Slice 3 - Bishop Method	
Factor of Safety	0,102
Phi Angle	28
C (Strength)	4,2
C (Force)	2,0417
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,35
Mid-Height	0,88024
Base Length	0,48613
Base Angle	43,947
Polygon Closure Error	6,5571
Anisotropic Strength Modifier	1
Weight	3,2534
Base Shear Force	52,457
Base Normal Force	6,1824
Left Side Normal Force	50,183
Right Side Normal Force	77,618
Surface Pressure Load	35



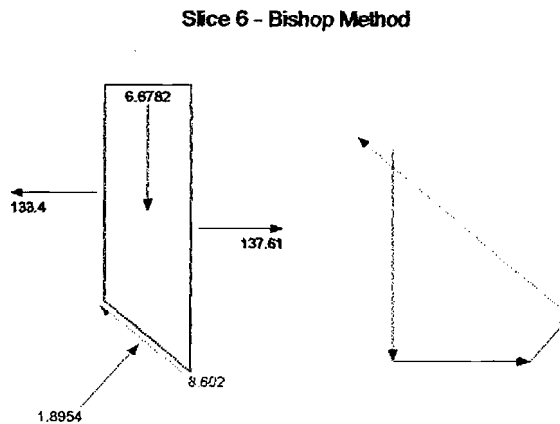
Slice 4 - Bishop Method	
Factor of Safety	0,102
Phi Angle	28
C (Strength)	4,2
C (Force)	2,0098
Pore Water Pressure	2,0792
Pore Water Force	0,99494
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,35
Mid-Height	1,212
Base Length	0,47852
Base Angle	42,994
Polygon Closure Error	6,9828
Anisotropic Strength Modifier	1
Weight	4,4796
Base Shear Force	53,714
Base Normal Force	7,4776
Left Side Normal Force	77,618
Right Side Normal Force	105,54
Surface Pressure Load	35



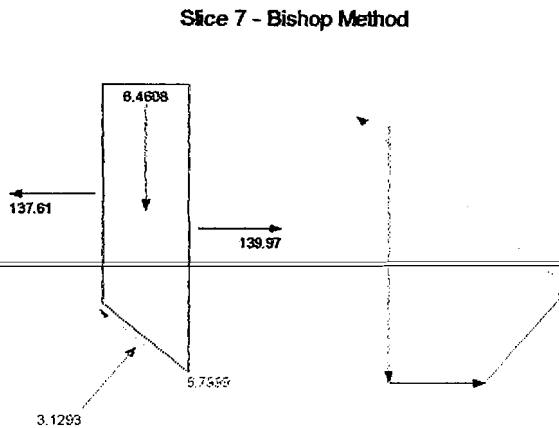
Slice 5 - Bishop Method	
Factor of Safety	0,102
Phi Angle	28
C (Strength)	4,2
C (Force)	1,9798
Pore Water Pressure	5,227
Pore Water Force	2,4639
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,35
Mid-Height	1,533
Base Length	0,47138
Base Angle	42,055
Polygon Closure Error	6,808
Anisotropic Strength Modifier	1
Weight	5,6659
Base Shear Force	54,464
Base Normal Force	9,1462
Left Side Normal Force	105,54
Right Side Normal Force	133,4
Surface Pressure Load	35



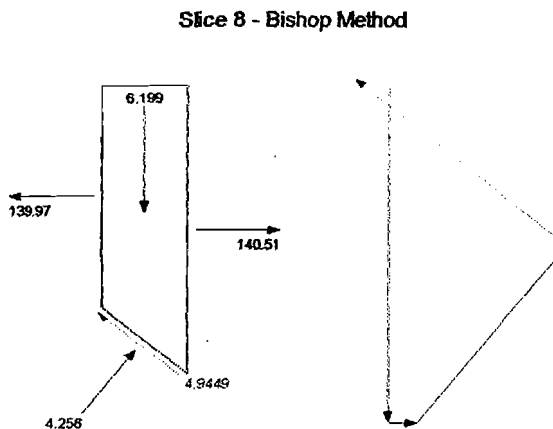
Slice 6 - Bishop Method	
Factor of Safety	0,102
Phi Angle	28
C (Strength)	4,2
C (Force)	2,1145
Pore Water Pressure	8,3996
Pore Water Force	4,2287
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,37942
Mid-Height	1,6668
Base Length	0,50344
Base Angle	41,092
Polygon Closure Error	1,1183
Anisotropic Strength Modifier	1
Weight	6,6782
Base Shear Force	8,602
Base Normal Force	1,8954
Left Side Normal Force	133,4
Right Side Normal Force	137,61



Slice 7 - Bishop Method	
Factor of Safety	0,102
Phi Angle	28
C (Strength)	4,2
C (Force)	2,0835
Pore Water Pressure	11,588
Pore Water Force	5,7486
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,37942
Mid-Height	1,6125
Base Length	0,49606
Base Angle	40,105
Polygon Closure Error	0,84999
Anisotropic Strength Modifier	1
Weight	6,4608
Base Shear Force	6,7999
Base Normal Force	3,1293
Left Side Normal Force	137,61
Right Side Normal Force	139,97

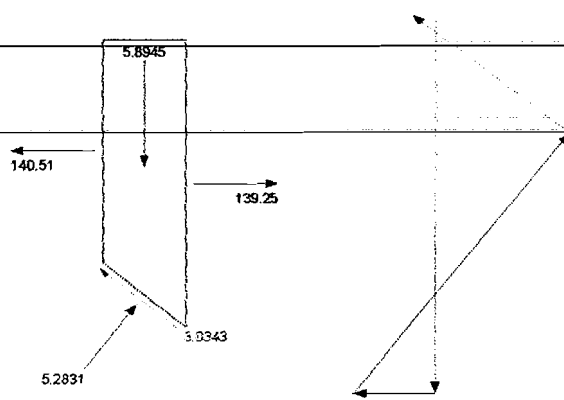


Slice 8 - Bishop Method	
Factor of Safety	0,102
Phi Angle	28
C (Strength)	4,2
C (Force)	2,0544
Pore Water Pressure	14,668
Pore Water Force	7,175
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,37943
Mid-Height	1,5472
Base Length	0,48915
Base Angle	39,131
Polygon Closure Error	0,6199
Anisotropic Strength Modifier	1
Weight	6,199
Base Shear Force	4,9449
Base Normal Force	4,256
Left Side Normal Force	139,97
Right Side Normal Force	140,51



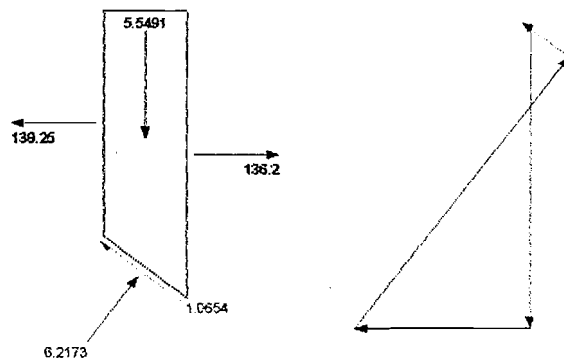
<b>Slice 9 - Bishop Method</b>	
Factor of Safety	0,102
Phi Angle	28
C (Strength)	4,2
C (Force)	2,027
Pore Water Pressure	17,644
Pore Water Force	8,5157
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,37942
Mid-Height	1,4712
Base Length	0,48263
Base Angle	38,172
Polygon Closure Error	0,35367
Anisotropic Strength Modifier	1
Weight	5,8945
Base Shear Force	3,0343
Base Normal Force	5,2831
Left Side Normal Force	140,51
Right Side Normal Force	139,25

Slice 9 - Bishop Method



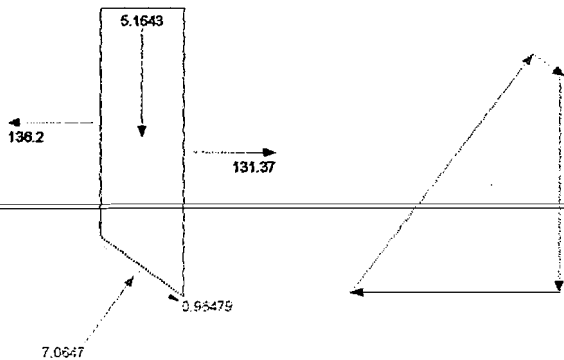
<b>Slice 10 - Bishop Method</b>	
Factor of Safety	0,102
Phi Angle	28
C (Strength)	4,2
C (Force)	2,0013
Pore Water Pressure	20,52
Pore Water Force	9,7777
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,37942
Mid-Height	1,385
Base Length	0,47649
Base Angle	37,224
Polygon Closure Error	0,15543
Anisotropic Strength Modifier	1
Weight	5,5491
Base Shear Force	1,0654
Base Normal Force	6,2173
Left Side Normal Force	139,25
Right Side Normal Force	136,2

Slice 10 - Bishop Method



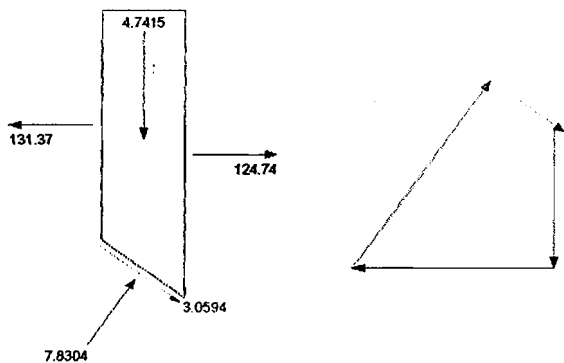
<b>Slice 11 - Bishop Method</b>	
Factor of Safety	0,102
Phi Angle	28
C (Strength)	4,2
C (Force)	1,977
Pore Water Pressure	23,299
Pore Water Force	10,967
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,37942
Mid-Height	1,2889
Base Length	0,47071
Base Angle	36,288
Polygon Closure Error	0,10597
Anisotropic Strength Modifier	1
Weight	5,1643
Base Shear Force	0,96479
Base Normal Force	7,0647
Left Side Normal Force	136,2
Right Side Normal Force	131,37

Slice 11 - Bishop Method



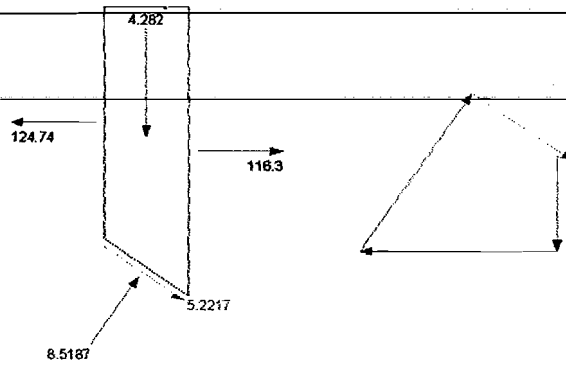
<b>Slice 12 - Bishop Method</b>	
Factor of Safety	0,102
Phi Angle	28
C (Strength)	4,2
C (Force)	1,9541
Pore Water Pressure	25,985
Pore Water Force	12,09
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,37942
Mid-Height	1,1834
Base Length	0,46527
Base Angle	35,365
Polygon Closure Error	0,35237
Anisotropic Strength Modifier	1
Weight	4,7415
Base Shear Force	3,0594
Base Normal Force	7,8304
Left Side Normal Force	131,37
Right Side Normal Force	124,74

Slice 12 - Bishop Method



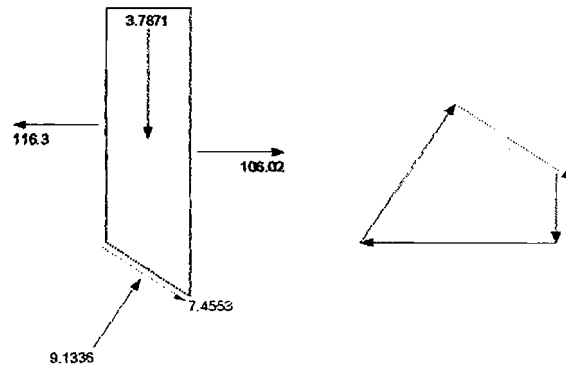
Slice 13 - Bishop Method	
Factor of Safety	0,102
Phi Angle	28
C (Strength)	4,2
C (Force)	1,9325
Pore Water Pressure	28,582
Pore Water Force	13,151
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,37942
Mid-Height	1,0687
Base Length	0,46011
Base Angle	34,449
Polygon Closure Error	0,6389
Anisotropic Strength Modifier	1
Weight	4,282
Base Shear Force	5,2217
Base Normal Force	8,5187
Left Side Normal Force	124,74
Right Side Normal Force	118,3

Slice 13 - Bishop Method



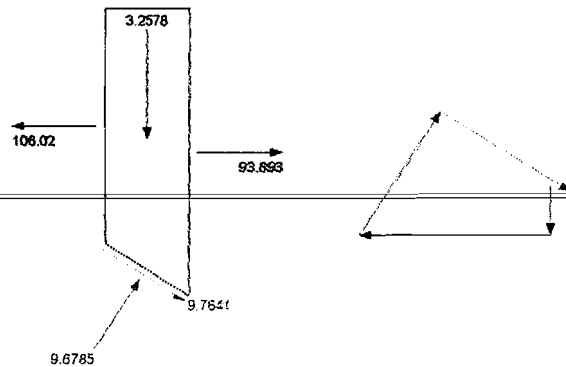
Slice 14 - Bishop Method	
Factor of Safety	0,102
Phi Angle	28
C (Strength)	4,2
C (Force)	1,912
Pore Water Pressure	31,091
Pore Water Force	14,154
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,37942
Mid-Height	0,94519
Base Length	0,45524
Base Angle	33,546
Polygon Closure Error	0,9252
Anisotropic Strength Modifier	1
Weight	3,7871
Base Shear Force	7,4553
Base Normal Force	9,1336
Left Side Normal Force	116,3
Right Side Normal Force	106,02

Slice 14 - Bishop Method



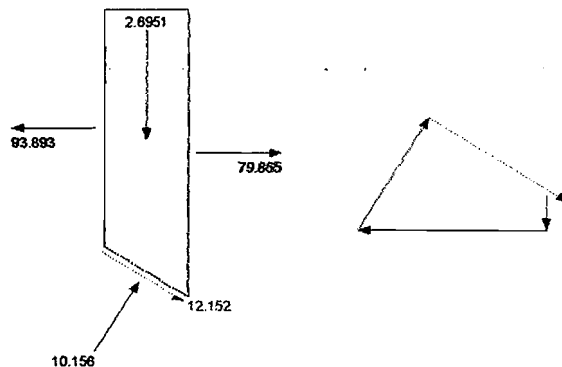
Slice 15 - Bishop Method	
Factor of Safety	0,102
Phi Angle	28
C (Strength)	4,2
C (Force)	1,8927
Pore Water Pressure	33,517
Pore Water Force	15,104
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,37942
Mid-Height	0,81308
Base Length	0,45063
Base Angle	32,651
Polygon Closure Error	1,2127
Anisotropic Strength Modifier	1
Weight	3,2578
Base Shear Force	9,7641
Base Normal Force	9,6785
Left Side Normal Force	106,02
Right Side Normal Force	93,893

Slice 15 - Bishop Method



Slice 16 - Bishop Method	
Factor of Safety	0,102
Phi Angle	28
C (Strength)	4,2
C (Force)	1,8743
Pore Water Pressure	35,859
Pore Water Force	16,003
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,37943
Mid-Height	0,67266
Base Length	0,44627
Base Angle	31,764
Polygon Closure Error	1,6132
Anisotropic Strength Modifier	1
Weight	2,6951
Base Shear Force	12,152
Base Normal Force	10,156
Left Side Normal Force	93,893
Right Side Normal Force	79,865

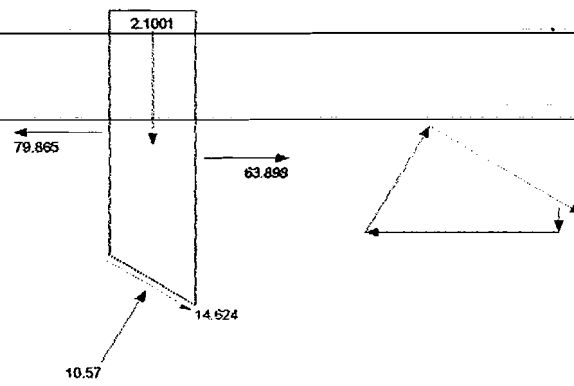
Slice 16 - Bishop Method





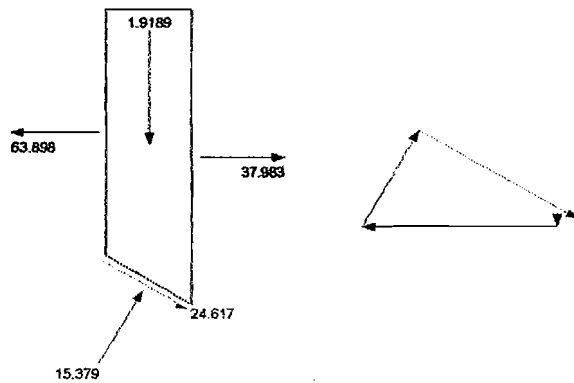
Slice 17 - Bishop Method	
Factor of Safety	0,102
Phi Angle	28
C (Strength)	4,2
C (Force)	1,8569
Pore Water Pressure	38,125
Pore Water Force	16,856
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,37942
Mid-Height	0,52415
Base Length	0,44212
Base Angle	30,887
Polygon Closure Error	1,916
Anisotropic Strength Modifier	1
Weight	2,1001
Base Shear Force	14,624
Base Normal Force	10,57
Left Side Normal Force	79,865
Right Side Normal Force	63,898

Slice 17 - Bishop Method



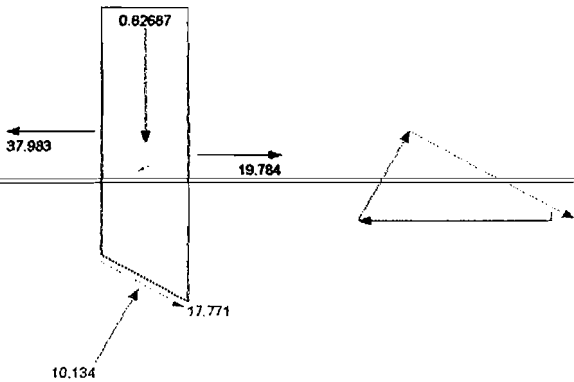
Slice 18 - Bishop Method	
Factor of Safety	0,102
Phi Angle	38
C (Strength)	3,5
C (Force)	1,8052
Pore Water Pressure	40,504
Pore Water Force	20,891
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,44694
Mid-Height	0,3535
Base Length	0,51577
Base Angle	29,941
Polygon Closure Error	2,7211
Anisotropic Strength Modifier	1
Weight	1,9189
Base Shear Force	24,617
Base Normal Force	15,379
Left Side Normal Force	63,898
Right Side Normal Force	37,983

Slice 18 - Bishop Method



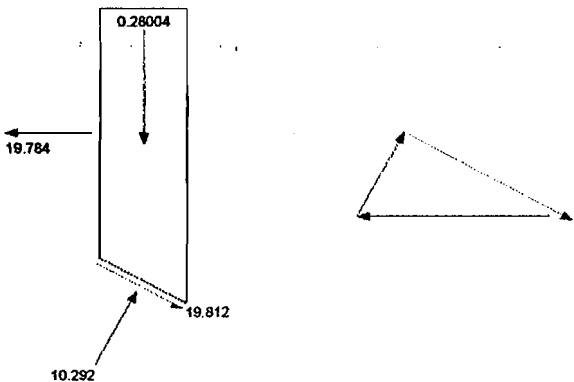
Slice 19 - Bishop Method	
Factor of Safety	0,102
Phi Angle	38
C (Strength)	3,5
C (Force)	1,1445
Pore Water Pressure	42,537
Pore Water Force	13,909
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,28569
Mid-Height	0,19464
Base Length	0,32699
Base Angle	29,108
Polygon Closure Error	2,1839
Anisotropic Strength Modifier	1
Weight	0,82687
Base Shear Force	17,771
Base Normal Force	10,134
Left Side Normal Force	37,983
Right Side Normal Force	19,784

Slice 19 - Bishop Method

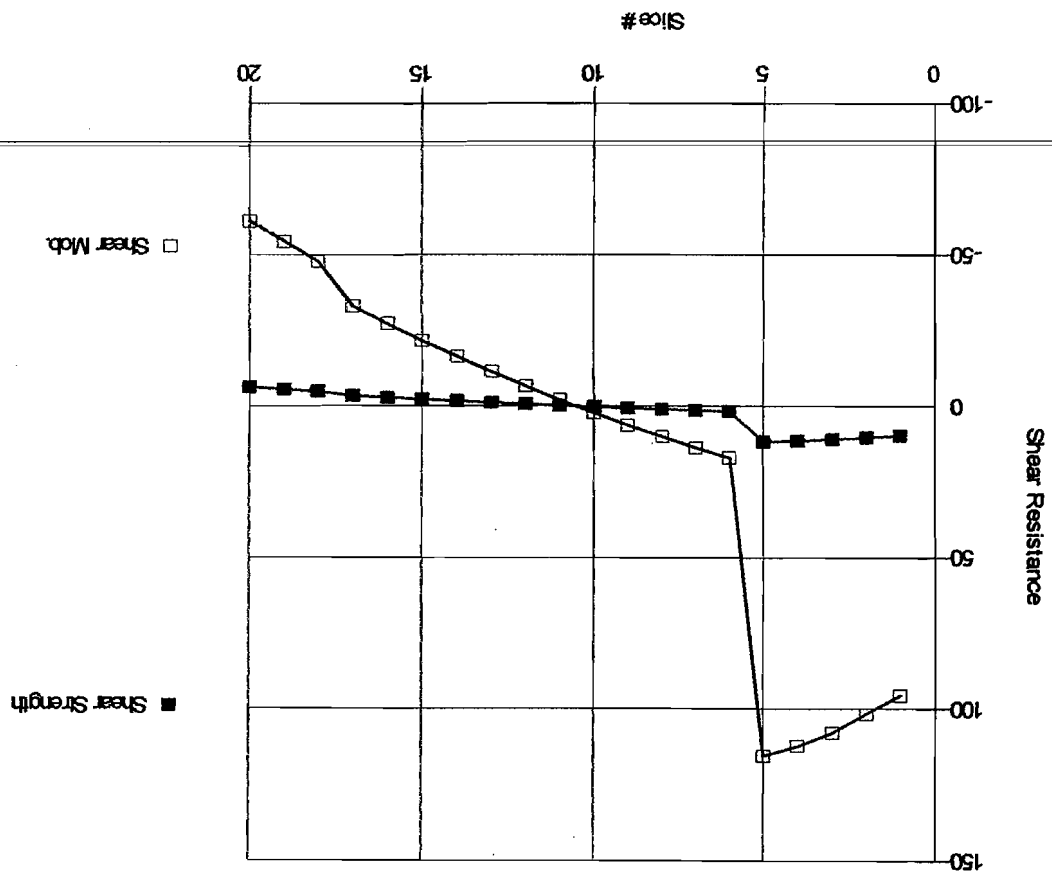


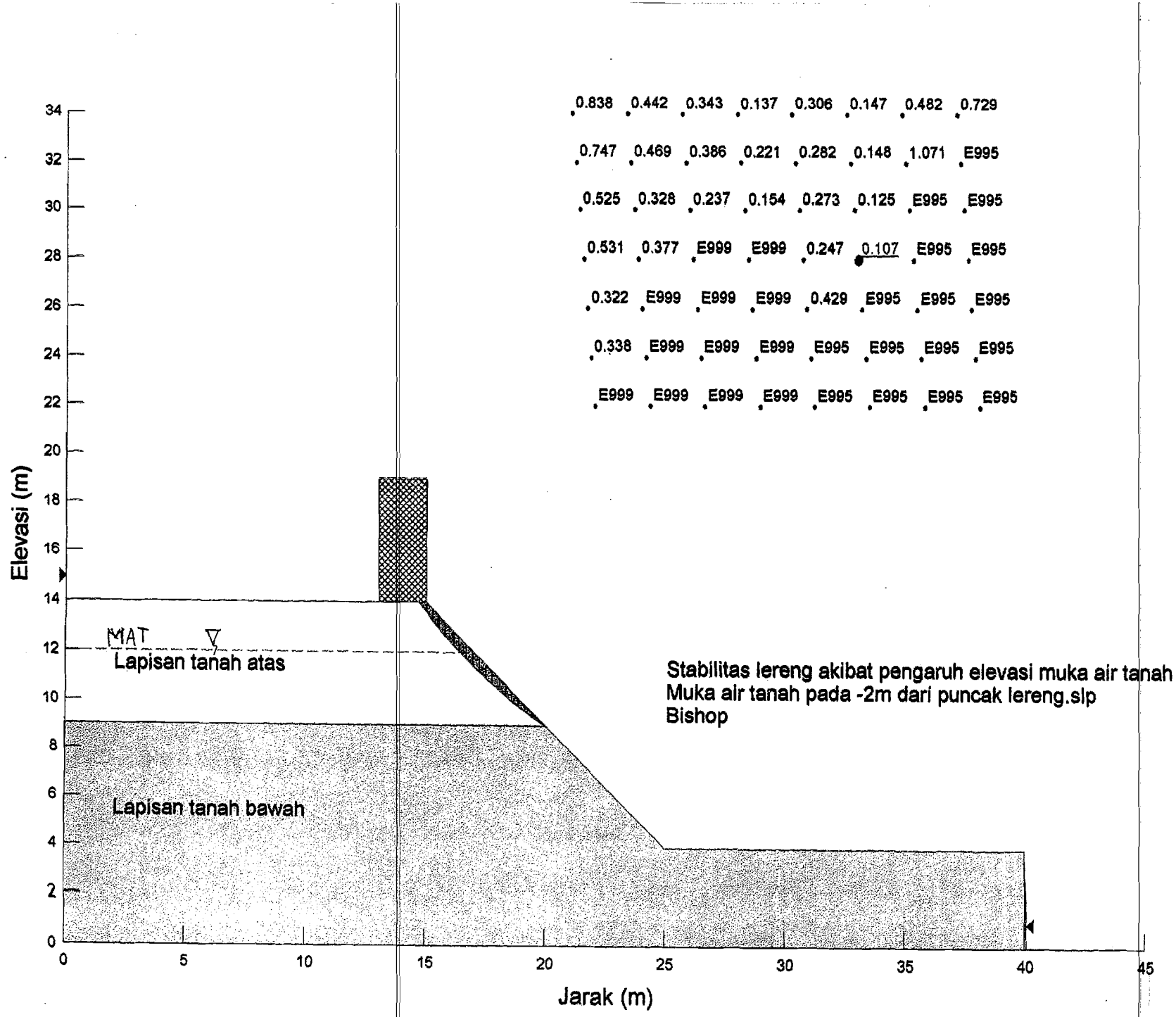
Slice 20 - Bishop Method	
Factor of Safety	0,102
Phi Angle	38
C (Strength)	3,5
C (Force)	1,1374
Pore Water Pressure	44,079
Pore Water Force	14,324
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,28568
Mid-Height	0,06592
Base Length	0,32496
Base Angle	28,465
Polygon Closure Error	2,4785
Anisotropic Strength Modifier	1
Weight	0,28004
Base Shear Force	19,812
Base Normal Force	10,292
Left Side Normal Force	19,784

Slice 20 - Bishop Method

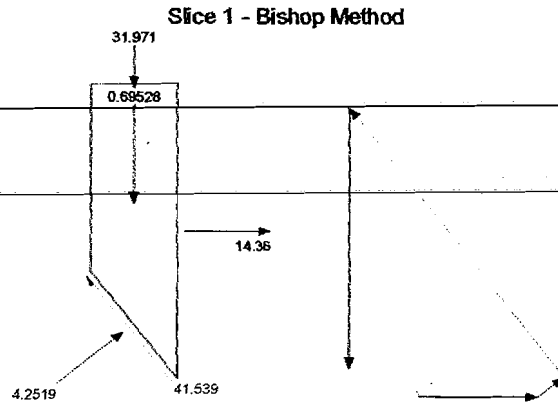


Shear Resistance vs. Slice #

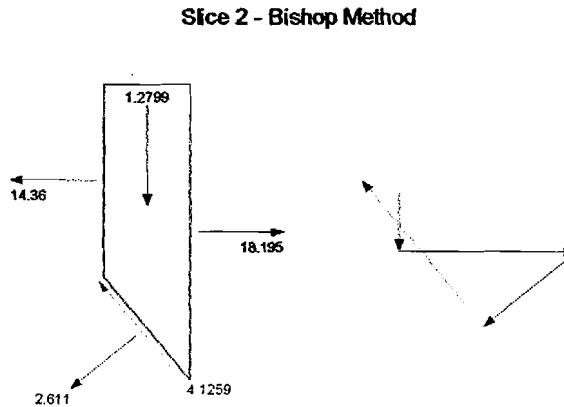




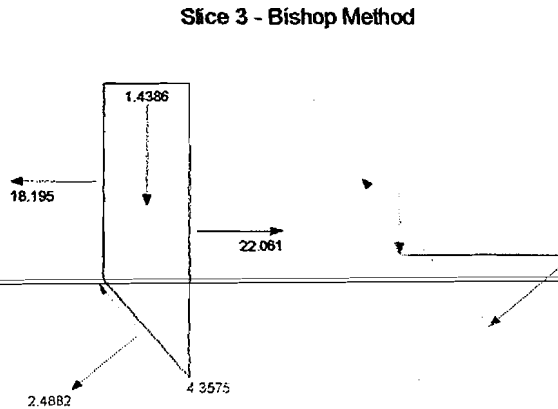
<b>Slice 1 - Bishop Method</b>	
Factor of Safety	0,107
Phi Angle	28
C (Strength)	4,2
C (Force)	2,1743
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,31971
Mid-Height	0,20594
Base Length	0,51768
Base Angle	51,86
Polygon Closure Error	8,5155
Anisotropic Strength Modifier	1
Weight	0,69528
Base Shear Force	41,539
Base Normal Force	4,2519
Right Side Normal Force	14,36
Surface Pressure Load	31,971



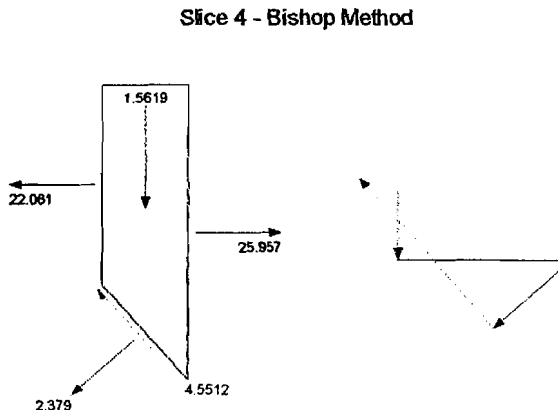
<b>Slice 2 - Bishop Method</b>	
Factor of Safety	0,107
Phi Angle	28
C (Strength)	4,2
C (Force)	1,8288
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27595
Mid-Height	0,43922
Base Length	0,43543
Base Angle	50,673
Polygon Closure Error	0,82518
Anisotropic Strength Modifier	1
Weight	1,2799
Base Shear Force	4,1259
Base Normal Force	2,611
Left Side Normal Force	14,36
Right Side Normal Force	18,195



<b>Slice 3 - Bishop Method</b>	
Factor of Safety	0,107
Phi Angle	28
C (Strength)	4,2
C (Force)	1,7882
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27595
Mid-Height	0,49369
Base Length	0,42577
Base Angle	49,6
Polygon Closure Error	0,8715
Anisotropic Strength Modifier	1
Weight	1,4386
Base Shear Force	4,3575
Base Normal Force	2,4882
Left Side Normal Force	18,195
Right Side Normal Force	22,061

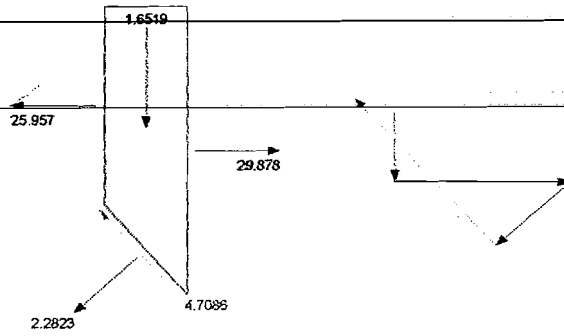


<b>Slice 4 - Bishop Method</b>	
Factor of Safety	0,107
Phi Angle	28
C (Strength)	4,2
C (Force)	1,7509
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27695
Mid-Height	0,536
Base Length	0,41687
Base Angle	48,551
Polygon Closure Error	0,91024
Anisotropic Strength Modifier	1
Weight	1,5619
Base Shear Force	4,5512
Base Normal Force	2,379
Left Side Normal Force	22,061
Right Side Normal Force	25,957



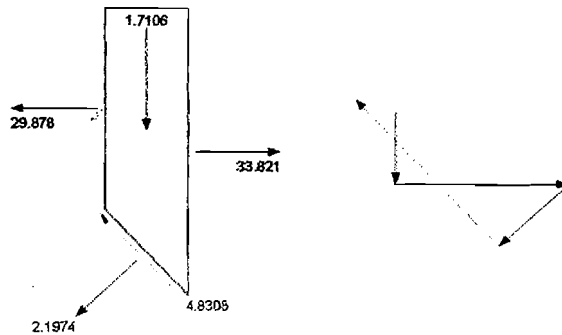
Slice 5 - Bishop Method	
Factor of Safety	0,107
Phi Angle	28
C (Strength)	4,2
C (Force)	1,7162
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27595
Mid-Height	0,56689
Base Length	0,40863
Base Angle	47,522
Polygon Closure Error	0,96526
Anisotropic Strength Modifier	1
Weight	1,6519
Base Shear Force	4,7086
Base Normal Force	2,2823
Left Side Normal Force	25,957
Right Side Normal Force	29,878

Slice 5 - Bishop Method



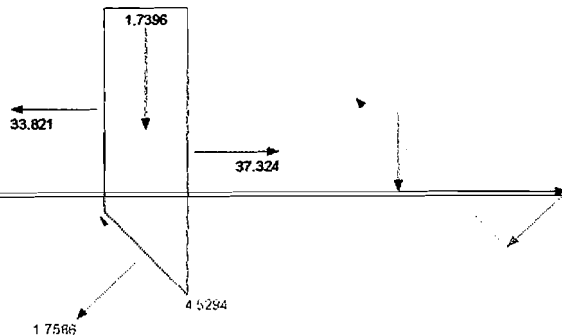
Slice 6 - Bishop Method	
Factor of Safety	0,107
Phi Angle	28
C (Strength)	4,2
C (Force)	1,6841
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27595
Mid-Height	0,58702
Base Length	0,40098
Base Angle	46,514
Polygon Closure Error	0,99031
Anisotropic Strength Modifier	1
Weight	1,7106
Base Shear Force	4,8308
Base Normal Force	2,1974
Left Side Normal Force	29,878
Right Side Normal Force	33,821

Slice 6 - Bishop Method



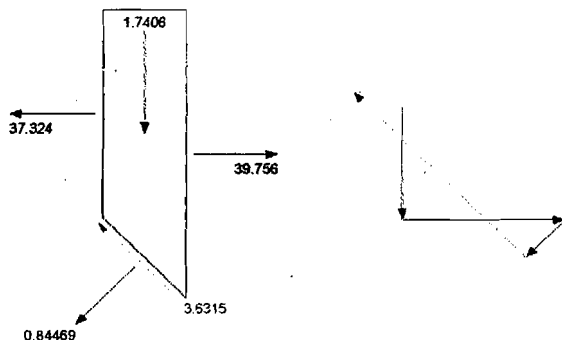
Slice 7 - Bishop Method	
Factor of Safety	0,107
Phi Angle	28
C (Strength)	4,2
C (Force)	1,6542
Pore Water Pressure	1,125
Pore Water Force	0,44311
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27595
Mid-Height	0,59699
Base Length	0,39387
Base Angle	45,523
Polygon Closure Error	0,95117
Anisotropic Strength Modifier	1
Weight	1,7396
Base Shear Force	4,5294
Base Normal Force	1,7588
Left Side Normal Force	33,821
Right Side Normal Force	37,324

Slice 7 - Bishop Method



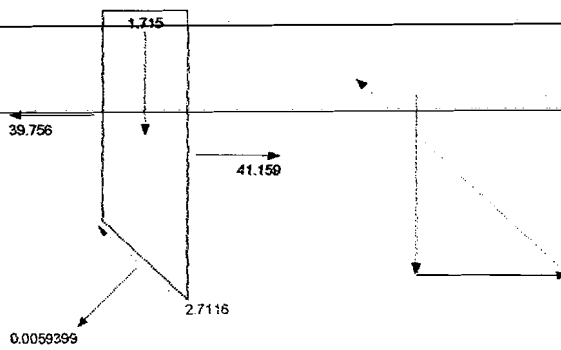
Slice 8 - Bishop Method	
Factor of Safety	0,107
Phi Angle	28
C (Strength)	4,2
C (Force)	1,6264
Pore Water Pressure	3,8347
Pore Water Force	1,4849
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27595
Mid-Height	0,59733
Base Length	0,38723
Base Angle	44,551
Polygon Closure Error	0,78077
Anisotropic Strength Modifier	1
Weight	1,7406
Base Shear Force	3,6315
Base Normal Force	0,84469
Left Side Normal Force	37,324
Right Side Normal Force	39,756

Slice 8 - Bishop Method



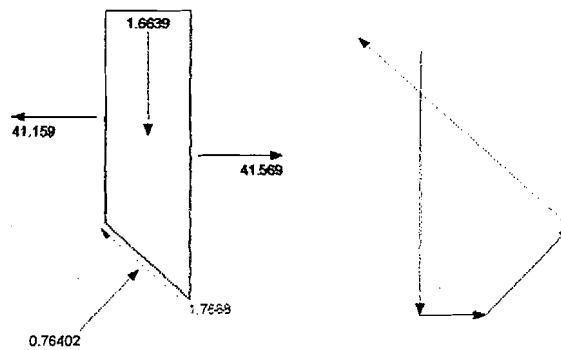
Slice 9 - Bishop Method	
Factor of Safety	0,107
Phi Angle	28
C (Strength)	4,2
C (Force)	1,6002
Pore Water Pressure	6,4547
Pore Water Force	2,4593
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27595
Mid-Height	0,58852
Base Length	0,38101
Base Angle	43,593
Polygon Closure Error	0,56944
Anisotropic Strength Modifier	1
Weight	1,715
Base Shear Force	2,7116
Base Normal Force	0,00594
Left Side Normal Force	39,756
Right Side Normal Force	41,159

Slice 9 - Bishop Method



Slice 10 - Bishop Method	
Factor of Safety	0,107
Phi Angle	28
C (Strength)	4,2
C (Force)	1,5758
Pore Water Pressure	8,9888
Pore Water Force	3,3726
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27595
Mid-Height	0,57099
Base Length	0,3752
Base Angle	42,653
Polygon Closure Error	0,38914
Anisotropic Strength Modifier	1
Weight	1,6639
Base Shear Force	1,7688
Base Normal Force	0,76402
Left Side Normal Force	41,159
Right Side Normal Force	41,569

Slice 10 - Bishop Method



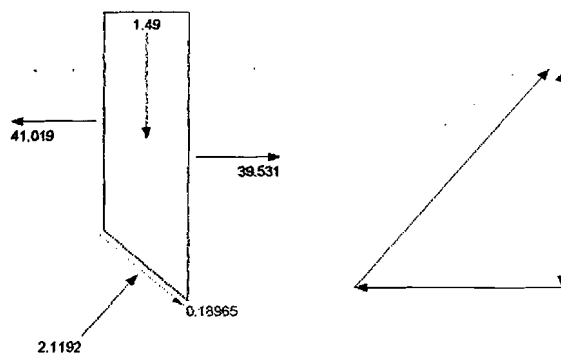
Slice 11 - Bishop Method	
Factor of Safety	0,107
Phi Angle	28
C (Strength)	4,2
C (Force)	1,5528
Pore Water Pressure	11,442
Pore Water Force	4,2303
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27594
Mid-Height	0,54514
Base Length	0,36972
Base Angle	41,725
Polygon Closure Error	0,15885
Anisotropic Strength Modifier	1
Weight	1,5885
Base Shear Force	0,80203
Base Normal Force	1,4708
Left Side Normal Force	41,569
Right Side Normal Force	41,019

Slice 11 - Bishop Method



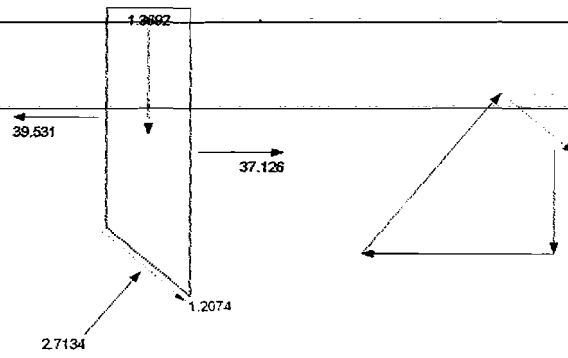
Slice 12 - Bishop Method	
Factor of Safety	0,107
Phi Angle	28
C (Strength)	4,2
C (Force)	1,5313
Pore Water Pressure	13,816
Pore Water Force	5,0372
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27595
Mid-Height	0,51132
Base Length	0,36458
Base Angle	40,809
Polygon Closure Error	0,021192
Anisotropic Strength Modifier	1
Weight	1,49
Base Shear Force	0,18965
Base Normal Force	2,1192
Left Side Normal Force	41,019
Right Side Normal Force	39,531

Slice 12 - Bishop Method



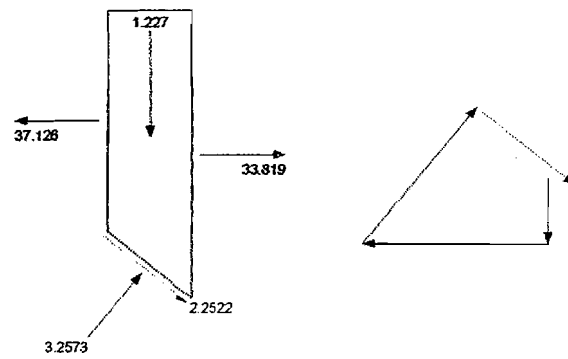
<b>Slice 13 - Bishop Method</b>	
Factor of Safety	0,107
Phi Angle	28
C (Strength)	4,2
C (Force)	1,5109
Pore Water Pressure	16,116
Pore Water Force	5,7975
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27595
Mid-Height	0,46986
Base Length	0,35974
Base Angle	39,907
Polygon Closure Error	0,24421
Anisotropic Strength Modifier	1
Weight	1,3692
Base Shear Force	1,2074
Base Normal Force	2,7134
Left Side Normal Force	39,531
Right Side Normal Force	37,126

Slice 13 - Bishop Method



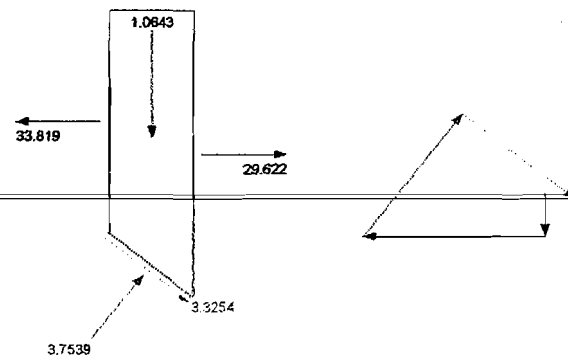
<b>Slice 14 - Bishop Method</b>	
Factor of Safety	0,107
Phi Angle	28
C (Strength)	4,2
C (Force)	1,4917
Pore Water Pressure	18,344
Pore Water Force	6,515
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27595
Mid-Height	0,42107
Base Length	0,35516
Base Angle	39,016
Polygon Closure Error	0,46298
Anisotropic Strength Modifier	1
Weight	1,227
Base Shear Force	2,2522
Base Normal Force	3,2573
Left Side Normal Force	37,126
Right Side Normal Force	33,819

Slice 14 - Bishop Method



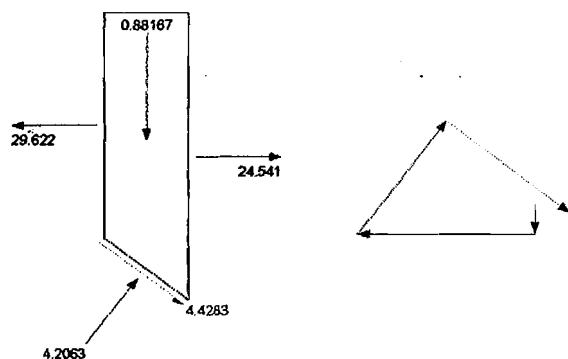
<b>Slice 15 - Bishop Method</b>	
Factor of Safety	0,107
Phi Angle	28
C (Strength)	4,2
C (Force)	1,4736
Pore Water Pressure	20,502
Pore Water Force	7,193
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27595
Mid-Height	0,36522
Base Length	0,35085
Base Angle	38,138
Polygon Closure Error	0,69251
Anisotropic Strength Modifier	1
Weight	1,0643
Base Shear Force	3,3254
Base Normal Force	3,7539
Left Side Normal Force	33,819
Right Side Normal Force	29,622

Slice 15 - Bishop Method



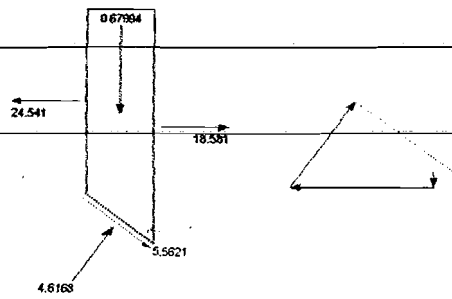
<b>Slice 16 - Bishop Method</b>	
Factor of Safety	0,107
Phi Angle	28
C (Strength)	4,2
C (Force)	1,4564
Pore Water Pressure	22,594
Pore Water Force	7,8345
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27595
Mid-Height	0,30256
Base Length	0,34675
Base Angle	37,269
Polygon Closure Error	0,93998
Anisotropic Strength Modifier	1
Weight	0,88167
Base Shear Force	4,4283
Base Normal Force	4,2063
Left Side Normal Force	29,622
Right Side Normal Force	24,541

Slice 16 - Bishop Method



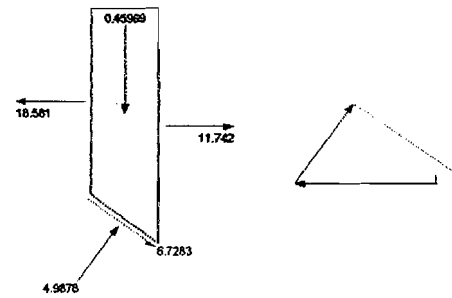
Slice 17 - Bishop Method	
Factor of Safety	0,107
Phi Angle	28
C (Strength)	4,2
C (Force)	1,4401
Pore Water Pressure	24,624
Pore Water Force	8,4422
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27595
Mid-Height	0,23333
Base Length	0,34288
Base Angle	36,41
Polygon Closure Error	1,2218
Anisotropic Strength Modifier	1
Weight	0,67994
Base Shear Force	5,5621
Base Normal Force	4,6168
Left Side Normal Force	24,541
Right Side Normal Force	18,581

Slice 17 - Bishop Method



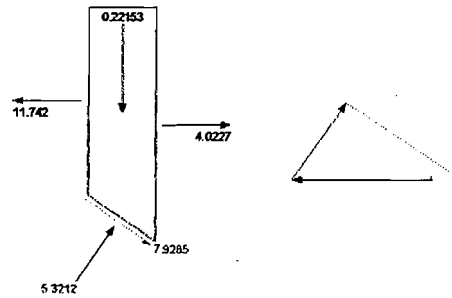
Slice 18 - Bishop Method	
Factor of Safety	0,107
Phi Angle	28
C (Strength)	4,2
C (Force)	1,4247
Pore Water Pressure	26,586
Pore Water Force	9,0183
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27595
Mid-Height	0,15775
Base Length	0,33921
Base Angle	35,56
Polygon Closure Error	1,4704
Anisotropic Strength Modifier	1
Weight	0,45969
Base Shear Force	6,7283
Base Normal Force	4,9878
Left Side Normal Force	18,581
Right Side Normal Force	11,742

Slice 18 - Bishop Method



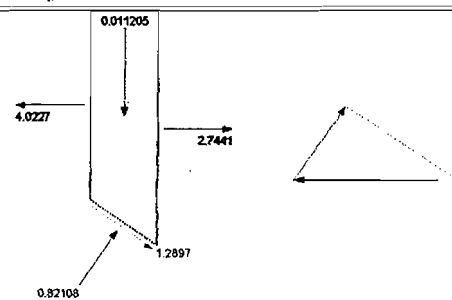
Slice 19 - Bishop Method	
Factor of Safety	0,107
Phi Angle	28
C (Strength)	4,2
C (Force)	1,4101
Pore Water Pressure	28,491
Pore Water Force	9,5652
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27595
Mid-Height	0,076021
Base Length	0,33573
Base Angle	34,719
Polygon Closure Error	1,8238
Anisotropic Strength Modifier	1
Weight	0,22153
Base Shear Force	7,9285
Base Normal Force	5,3212
Left Side Normal Force	11,742
Right Side Normal Force	4,0227

Slice 19 - Bishop Method



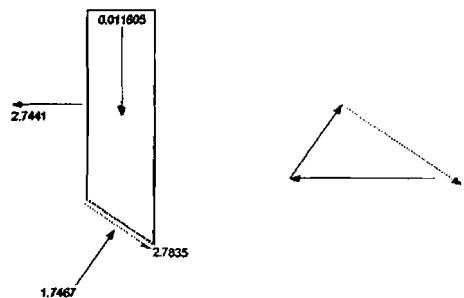
Slice 20 - Bishop Method	
Factor of Safety	0,107
Phi Angle	38
C (Strength)	3,5
C (Force)	0,13935
Pore Water Pressure	29,53
Pore Water Force	1,1757
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,032909
Mid-Height	0,027668
Base Length	0,039814
Base Angle	34,25
Polygon Closure Error	0,25149
Anisotropic Strength Modifier	1
Weight	0,011205
Base Shear Force	1,2897
Base Normal Force	0,82108
Left Side Normal Force	4,0227
Right Side Normal Force	2,7441

Slice 20 - Bishop Method



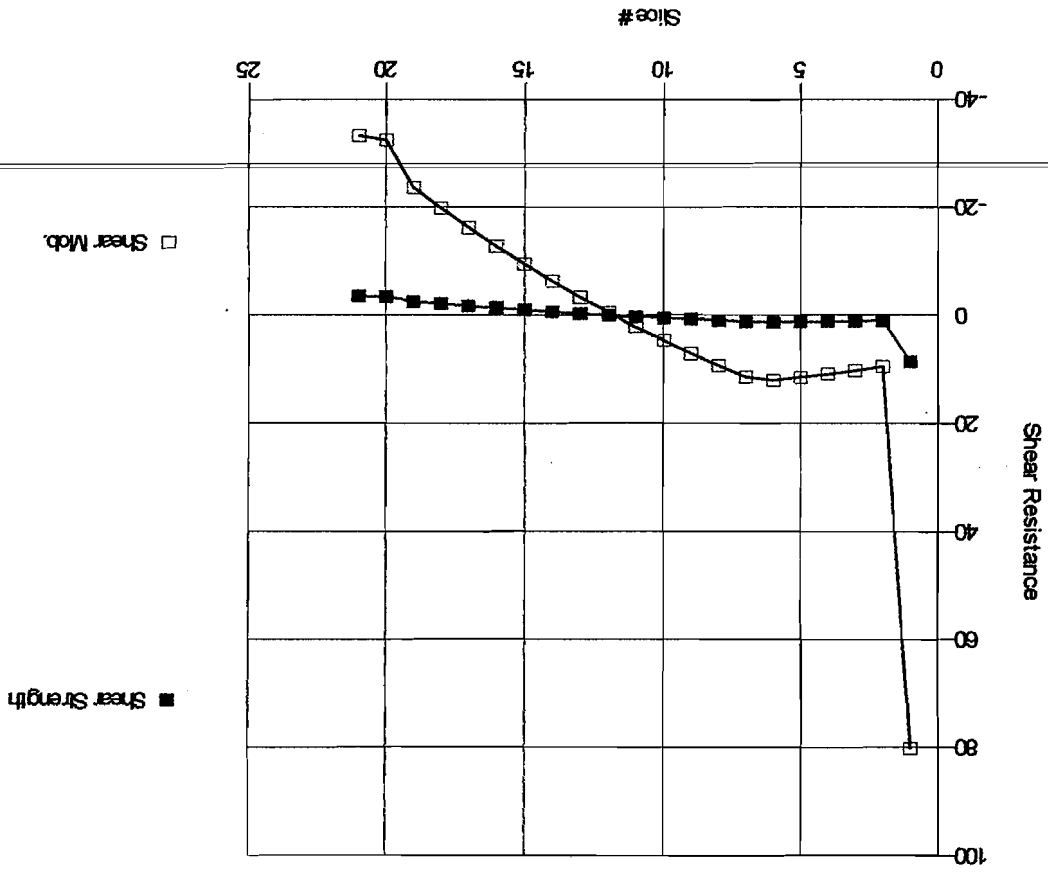
Slice 21 - Bishop Method	
Factor of Safety	0,107
Phi Angle	38
C (Strength)	3,5
C (Force)	0,2932
Pore Water Pressure	28,872
Pore Water Force	2,5024
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,06937
Mid-Height	0,01125
Base Length	0,083772
Base Angle	34,097
Polygon Closure Error	0,54278
Anisotropic Strength Modifier	1
Weight	0,011605
Base Shear Force	2,7835
Base Normal Force	1,7467
Left Side Normal Force	2,7441

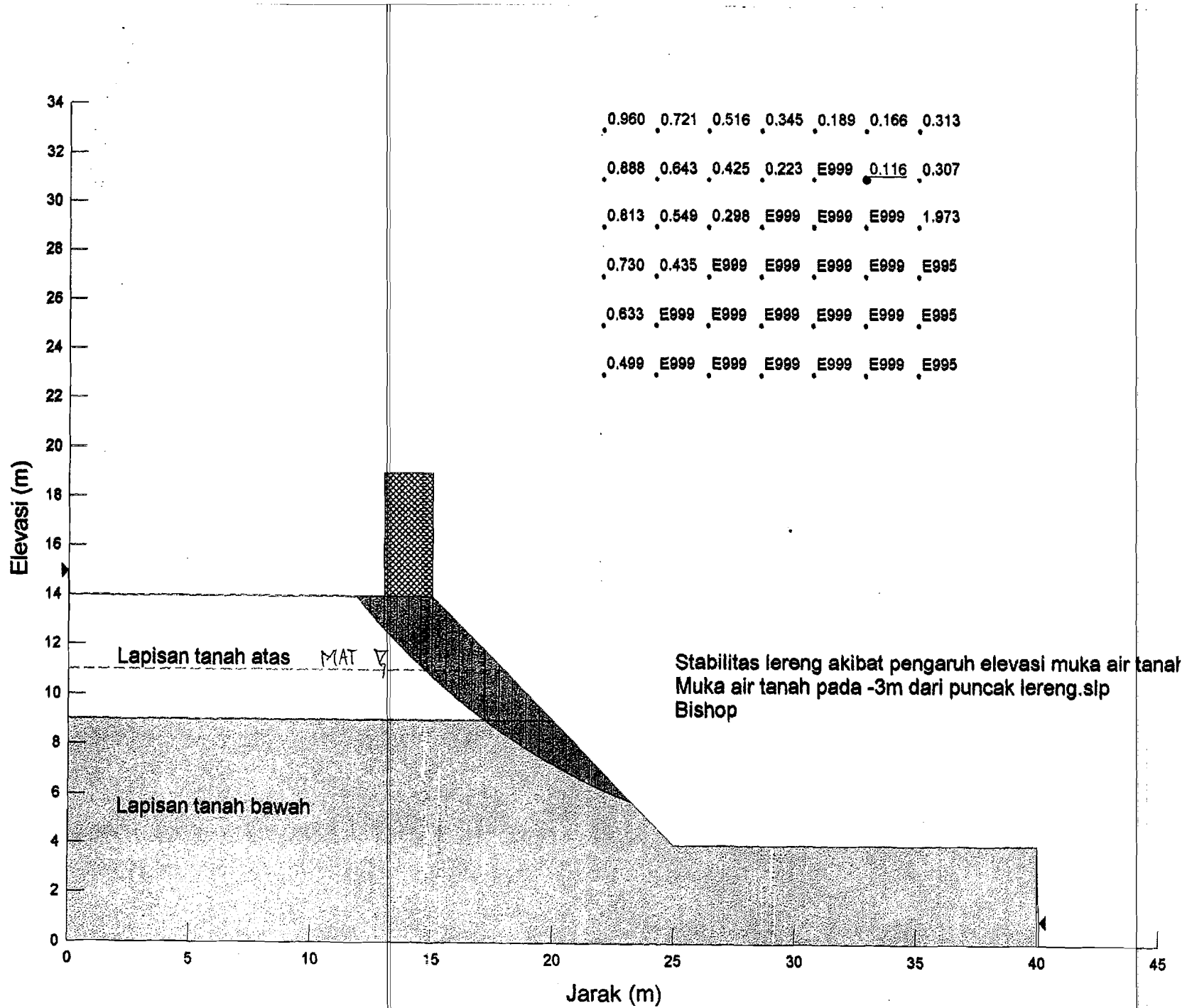
Slice 21 - Bishop Method





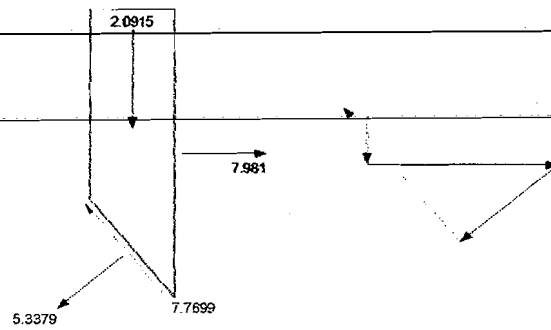
Shear Resistance vs. Slice #





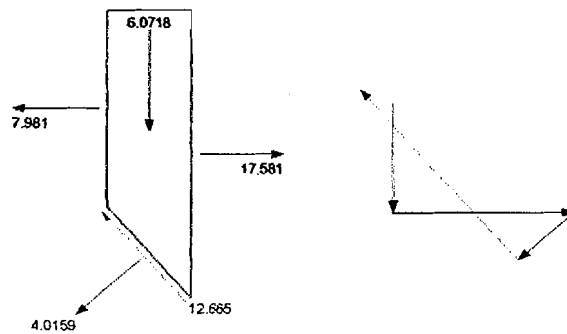
Slice 1 - Bishop Method	
Factor of Safety	0,116
Phi Angle	28
C (Strength)	4,2
C (Force)	3,7363
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,57143
Mid-Height	0,3466
Base Length	0,8896
Base Angle	50,033
Polygon Closure Error	1,0774
Anisotropic Strength Modifier	1
Weight	2,0915
Base Shear Force	7,7699
Base Normal Force	5,3379
Right Side Normal Force	7,981

Slice 1 - Bishop Method



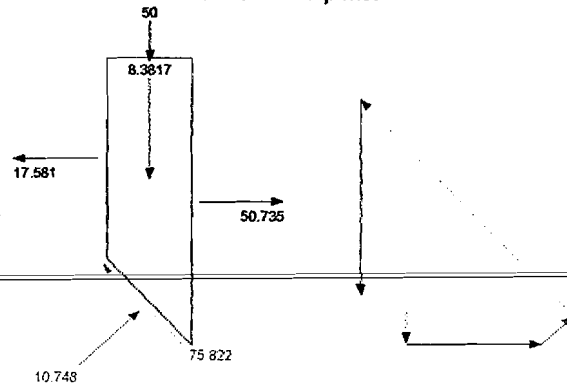
Slice 2 - Bishop Method	
Factor of Safety	0,116
Phi Angle	28
C (Strength)	4,2
C (Force)	3,5993
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,57142
Mid-Height	1,0062
Base Length	0,85697
Base Angle	48,18
Polygon Closure Error	1,8997
Anisotropic Strength Modifier	1
Weight	6,0718
Base Shear Force	12,665
Base Normal Force	4,0159
Left Side Normal Force	7,981
Right Side Normal Force	17,581

Slice 2 - Bishop Method



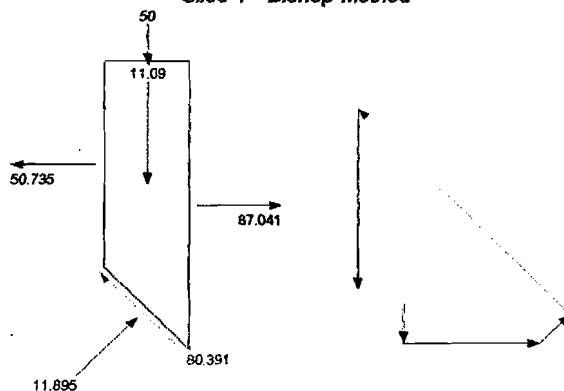
Slice 3 - Bishop Method	
Factor of Safety	0,116
Phi Angle	28
C (Strength)	4,2
C (Force)	3,0508
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,5
Mid-Height	1,5874
Base Length	0,72637
Base Angle	46,5
Polygon Closure Error	11,752
Anisotropic Strength Modifier	1
Weight	8,3817
Base Shear Force	75,822
Base Normal Force	10,748
Left Side Normal Force	17,581
Right Side Normal Force	50,735
Surface Pressure Load	50

Slice 3 - Bishop Method

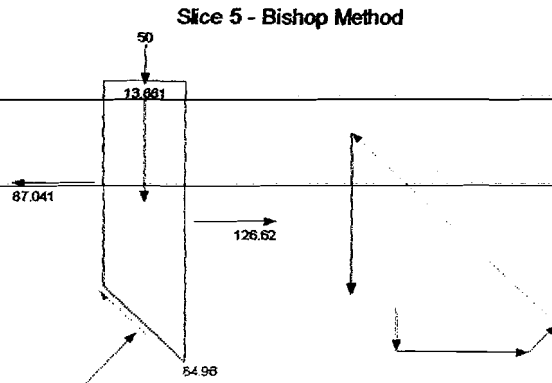


Slice 4 - Bishop Method	
Factor of Safety	0,116
Phi Angle	28
C (Strength)	4,2
C (Force)	2,9688
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,5
Mid-Height	2,1004
Base Length	0,70685
Base Angle	44,979
Polygon Closure Error	12,863
Anisotropic Strength Modifier	1
Weight	11,09
Base Shear Force	80,391
Base Normal Force	11,895
Left Side Normal Force	50,735
Right Side Normal Force	87,041
Surface Pressure Load	50

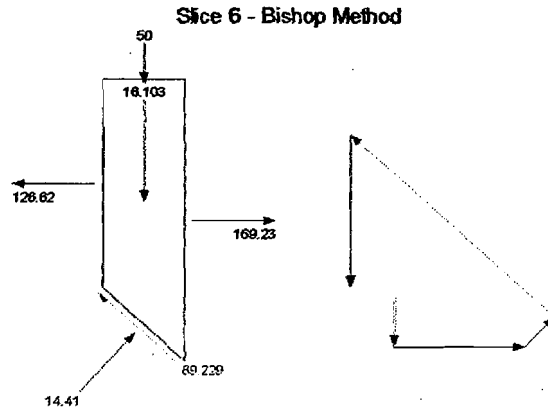
Slice 4 - Bishop Method



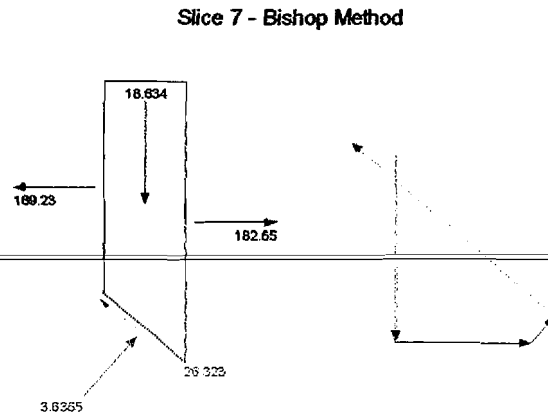
Slice 5 - Bishop Method	
Factor of Safety	0,116
Phi Angle	28
C (Strength)	4,2
C (Force)	2,895
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,5
Mid-Height	2,5872
Base Length	0,68928
Base Angle	43,498
Polygon Closure Error	14,018
Anisotropic Strength Modifier	1
Weight	13,661
Base Shear Force	84,96
Base Normal Force	13,027
Left Side Normal Force	87,041
Right Side Normal Force	126,62
Surface Pressure Load	50



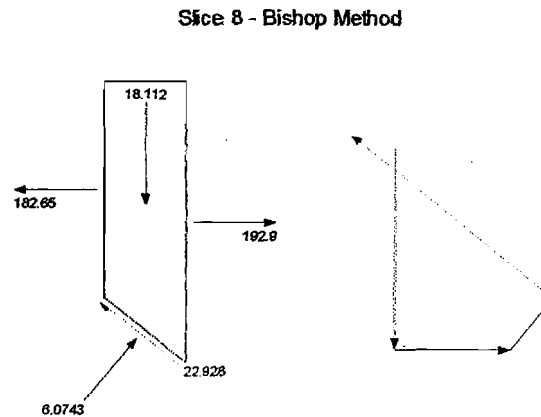
Slice 6 - Bishop Method	
Factor of Safety	0,116
Phi Angle	28
C (Strength)	4,2
C (Force)	2,8281
Pore Water Pressure	0,48807
Pore Water Force	0,32865
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,5
Mid-Height	3,0498
Base Length	0,67336
Base Angle	42,052
Polygon Closure Error	14,277
Anisotropic Strength Modifier	1
Weight	16,103
Base Shear Force	89,229
Base Normal Force	14,41
Left Side Normal Force	126,62
Right Side Normal Force	169,23
Surface Pressure Load	50



Slice 7 - Bishop Method	
Factor of Safety	0,116
Phi Angle	28
C (Strength)	4,2
C (Force)	3,0148
Pore Water Pressure	4,9924
Pore Water Force	3,5836
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,54521
Mid-Height	3,2304
Base Length	0,71781
Base Angle	40,576
Polygon Closure Error	4,4749
Anisotropic Strength Modifier	1
Weight	18,634
Base Shear Force	26,323
Base Normal Force	3,6365
Left Side Normal Force	169,23
Right Side Normal Force	182,65

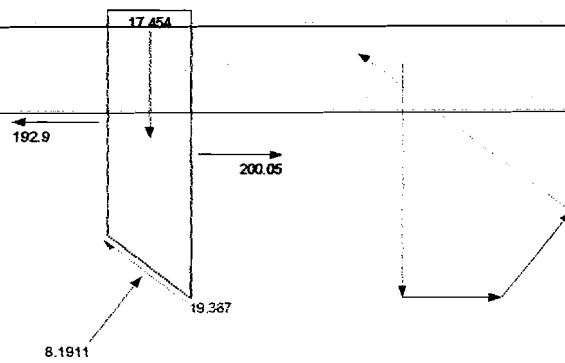


Slice 8 - Bishop Method	
Factor of Safety	0,116
Phi Angle	28
C (Strength)	4,2
C (Force)	2,9494
Pore Water Pressure	9,4502
Pore Water Force	6,6364
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,54522
Mid-Height	3,1458
Base Length	0,70225
Base Angle	39,069
Polygon Closure Error	4,0124
Anisotropic Strength Modifier	1
Weight	18,112
Base Shear Force	22,928
Base Normal Force	6,0743
Left Side Normal Force	182,65
Right Side Normal Force	192,9



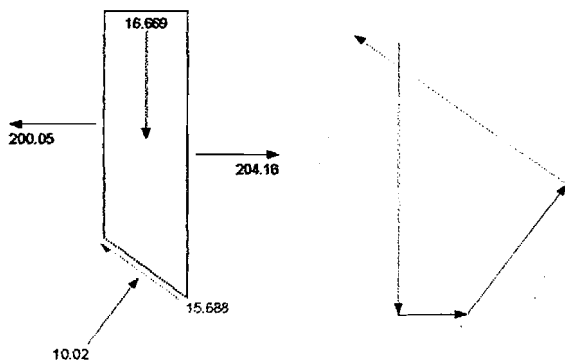
Slice 9 - Bishop Method	
Factor of Safety	0,116
Phi Angle	28
C (Strength)	4,2
C (Force)	2,89
Pore Water Pressure	13,677
Pore Water Force	9,4112
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,54521
Mid-Height	3,0316
Base Length	0,68809
Base Angle	37,594
Polygon Closure Error	3,2958
Anisotropic Strength Modifier	1
Weight	17,454
Base Shear Force	19,387
Base Normal Force	8,1911
Left Side Normal Force	192,9
Right Side Normal Force	200,05

Slice 9 - Bishop Method



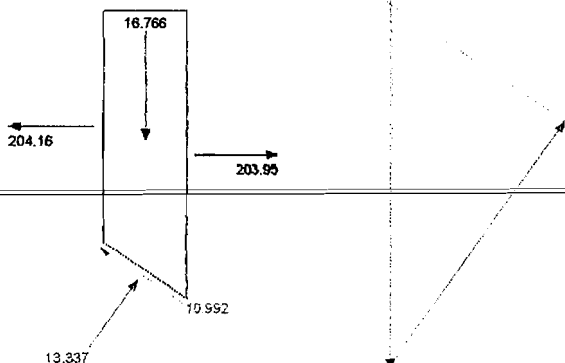
Slice 10 - Bishop Method	
Factor of Safety	0,116
Phi Angle	28
C (Strength)	4,2
C (Force)	2,8358
Pore Water Pressure	17,687
Pore Water Force	11,942
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,54522
Mid-Height	2,8952
Base Length	0,67519
Base Angle	36,147
Polygon Closure Error	2,667
Anisotropic Strength Modifier	1
Weight	16,669
Base Shear Force	15,688
Base Normal Force	10,02
Left Side Normal Force	200,05
Right Side Normal Force	204,16

Slice 10 - Bishop Method



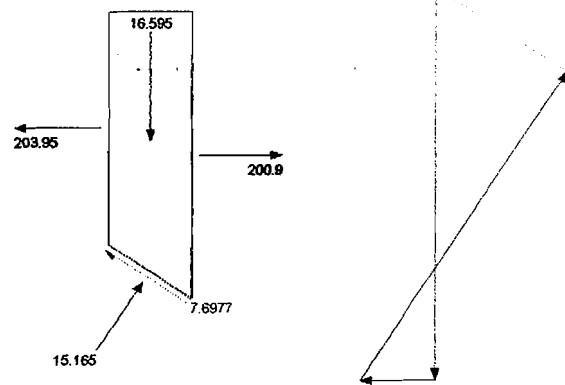
Slice 11 - Bishop Method	
Factor of Safety	0,116
Phi Angle	38
C (Strength)	3,5
C (Force)	2,4004
Pore Water Pressure	21,555
Pore Water Force	14,783
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,56383
Mid-Height	2,7351
Base Length	0,68583
Base Angle	34,703
Polygon Closure Error	1,5928
Anisotropic Strength Modifier	1
Weight	16,766
Base Shear Force	10,992
Base Normal Force	13,337
Left Side Normal Force	204,16
Right Side Normal Force	203,95

Slice 11 - Bishop Method



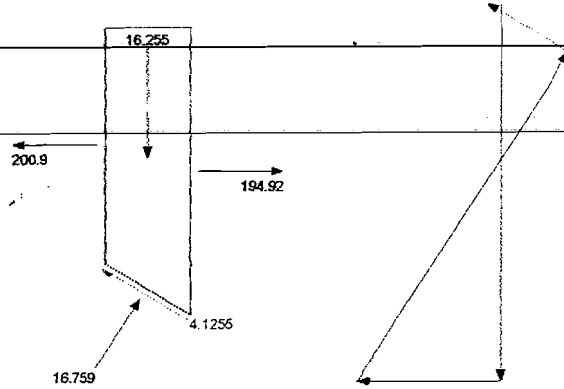
Slice 12 - Bishop Method	
Factor of Safety	0,116
Phi Angle	38
C (Strength)	3,5
C (Force)	2,36
Pore Water Pressure	25,282
Pore Water Force	17,047
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,56383
Mid-Height	2,5513
Base Length	0,67428
Base Angle	33,26
Polygon Closure Error	1,0787
Anisotropic Strength Modifier	1
Weight	16,595
Base Shear Force	7,6977
Base Normal Force	15,165
Left Side Normal Force	203,95
Right Side Normal Force	200,9

Slice 12 - Bishop Method



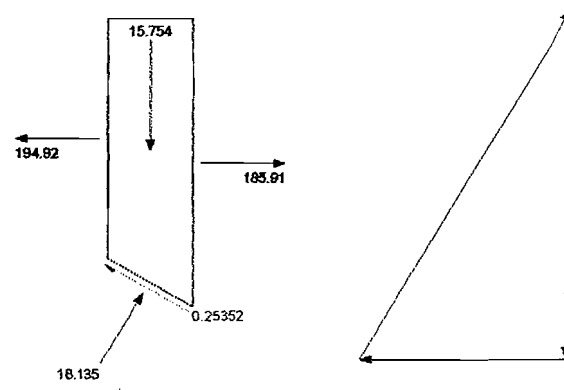
Slice 13 - Bishop Method	
Factor of Safety	0,116
Phi Angle	38
C (Strength)	3,5
C (Force)	2,3229
Pore Water Pressure	28,811
Pore Water Force	19,122
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,56382
Mid-Height	2,3473
Base Length	0,66369
Base Angle	31,841
Polygon Closure Error	0,58657
Anisotropic Strength Modifier	1
Weight	16,255
Base Shear Force	4,1255
Base Normal Force	16,759
Left Side Normal Force	200,9
Right Side Normal Force	194,92

Slice 13 - Bishop Method



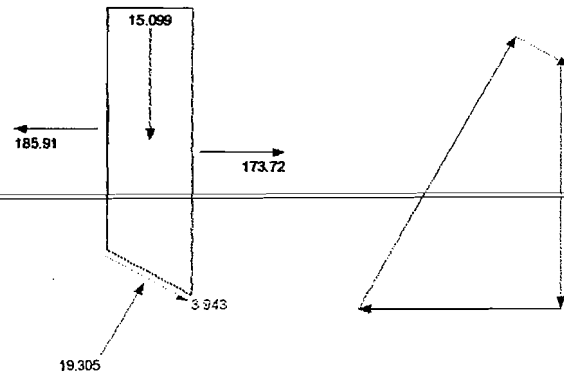
Slice 14 - Bishop Method	
Factor of Safety	0,116
Phi Angle	38
C (Strength)	3,5
C (Force)	2,289
Pore Water Pressure	32,152
Pore Water Force	21,027
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,56383
Mid-Height	2,1241
Base Length	0,65399
Base Angle	30,442
Polygon Closure Error	0,090675
Anisotropic Strength Modifier	1
Weight	15,754
Base Shear Force	0,25352
Base Normal Force	18,135
Left Side Normal Force	194,92
Right Side Normal Force	185,91

Slice 14 - Bishop Method



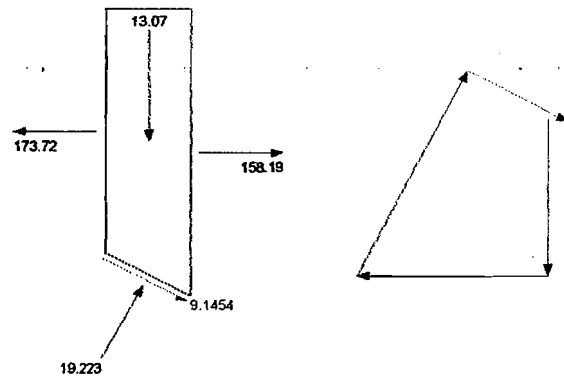
Slice 15 - Bishop Method	
Factor of Safety	0,116
Phi Angle	38
C (Strength)	3,5
C (Force)	2,2577
Pore Water Pressure	35,312
Pore Water Force	22,778
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,56383
Mid-Height	1,8826
Base Length	0,64505
Base Angle	29,064
Polygon Closure Error	0,48263
Anisotropic Strength Modifier	1
Weight	15,099
Base Shear Force	3,943
Base Normal Force	19,305
Left Side Normal Force	185,91
Right Side Normal Force	173,72

Slice 15 - Bishop Method



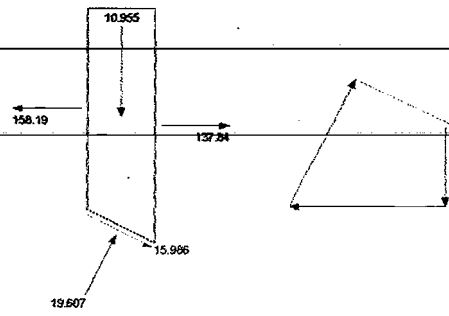
Slice 16 - Bishop Method	
Factor of Safety	0,116
Phi Angle	38
C (Strength)	3,5
C (Force)	2,1334
Pore Water Pressure	38,237
Pore Water Force	23,307
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,53952
Mid-Height	1,6291
Base Length	0,60954
Base Angle	27,733
Polygon Closure Error	1,5378
Anisotropic Strength Modifier	1
Weight	13,07
Base Shear Force	9,1454
Base Normal Force	19,223
Left Side Normal Force	173,72
Right Side Normal Force	158,19

Slice 16 - Bishop Method



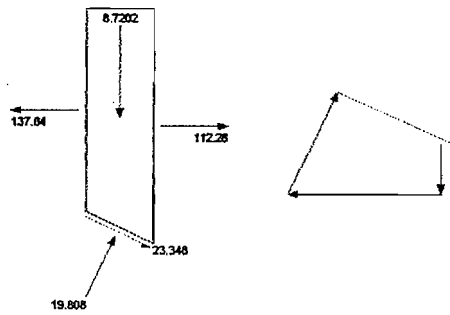
Slice 17 - Bishop Method	
Factor of Safety	0,116
Phi Angle	38
C (Strength)	3,5
C (Force)	2,109
Pore Water Pressure	40,944
Pore Water Force	24,672
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,53952
Mid-Height	1,3655
Base Length	0,60258
Base Angle	26,447
Polygon Closure Error	2,5438
Anisotropic Strength Modifier	1
Weight	10,955
Base Shear Force	15,986
Base Normal Force	19,607
Left Side Normal Force	158,19
Right Side Normal Force	137,84

Slice 17 - Bishop Method



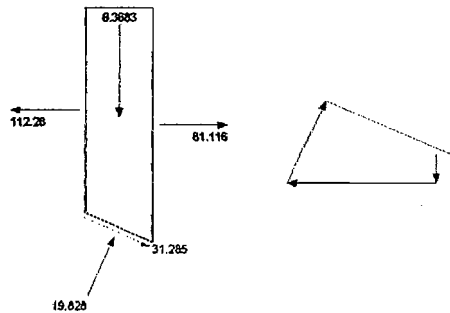
Slice 18 - Bishop Method	
Factor of Safety	0,116
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0865
Pore Water Pressure	43,502
Pore Water Force	25,934
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,53953
Mid-Height	1,0869
Base Length	0,59615
Base Angle	25,174
Polygon Closure Error	3,7062
Anisotropic Strength Modifier	1
Weight	8,7202
Base Shear Force	23,348
Base Normal Force	19,808
Left Side Normal Force	137,84
Right Side Normal Force	112,28

Slice 18 - Bishop Method



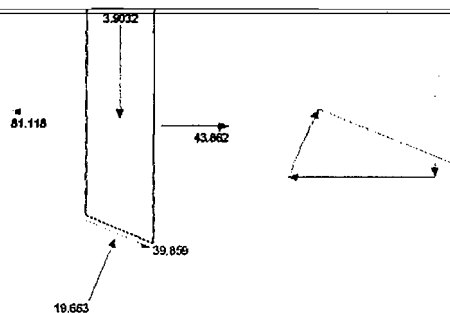
Slice 19 - Bishop Method	
Factor of Safety	0,116
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0657
Pore Water Pressure	45,919
Pore Water Force	27,101
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,53952
Mid-Height	0,79379
Base Length	0,59019
Base Angle	23,916
Polygon Closure Error	5,3184
Anisotropic Strength Modifier	1
Weight	6,3683
Base Shear Force	31,285
Base Normal Force	19,828
Left Side Normal Force	112,28
Right Side Normal Force	81,116

Slice 19 - Bishop Method



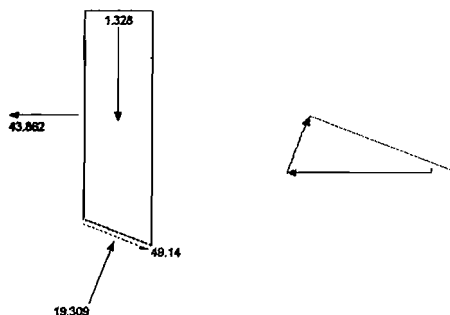
Slice 20 - Bishop Method	
Factor of Safety	0,116
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0464
Pore Water Pressure	48,196
Pore Water Force	28,18
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,53952
Mid-Height	0,48652
Base Length	0,58469
Base Angle	22,869
Polygon Closure Error	6,9753
Anisotropic Strength Modifier	1
Weight	3,9032
Base Shear Force	39,859
Base Normal Force	19,663
Left Side Normal Force	81,116
Right Side Normal Force	43,862

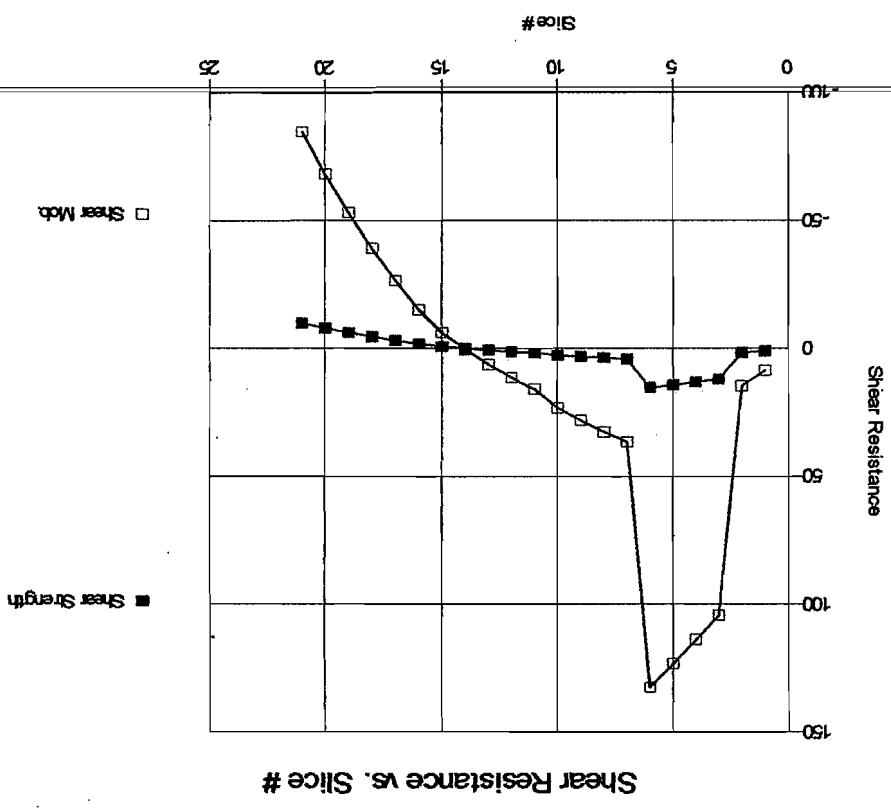
Slice 20 - Bishop Method



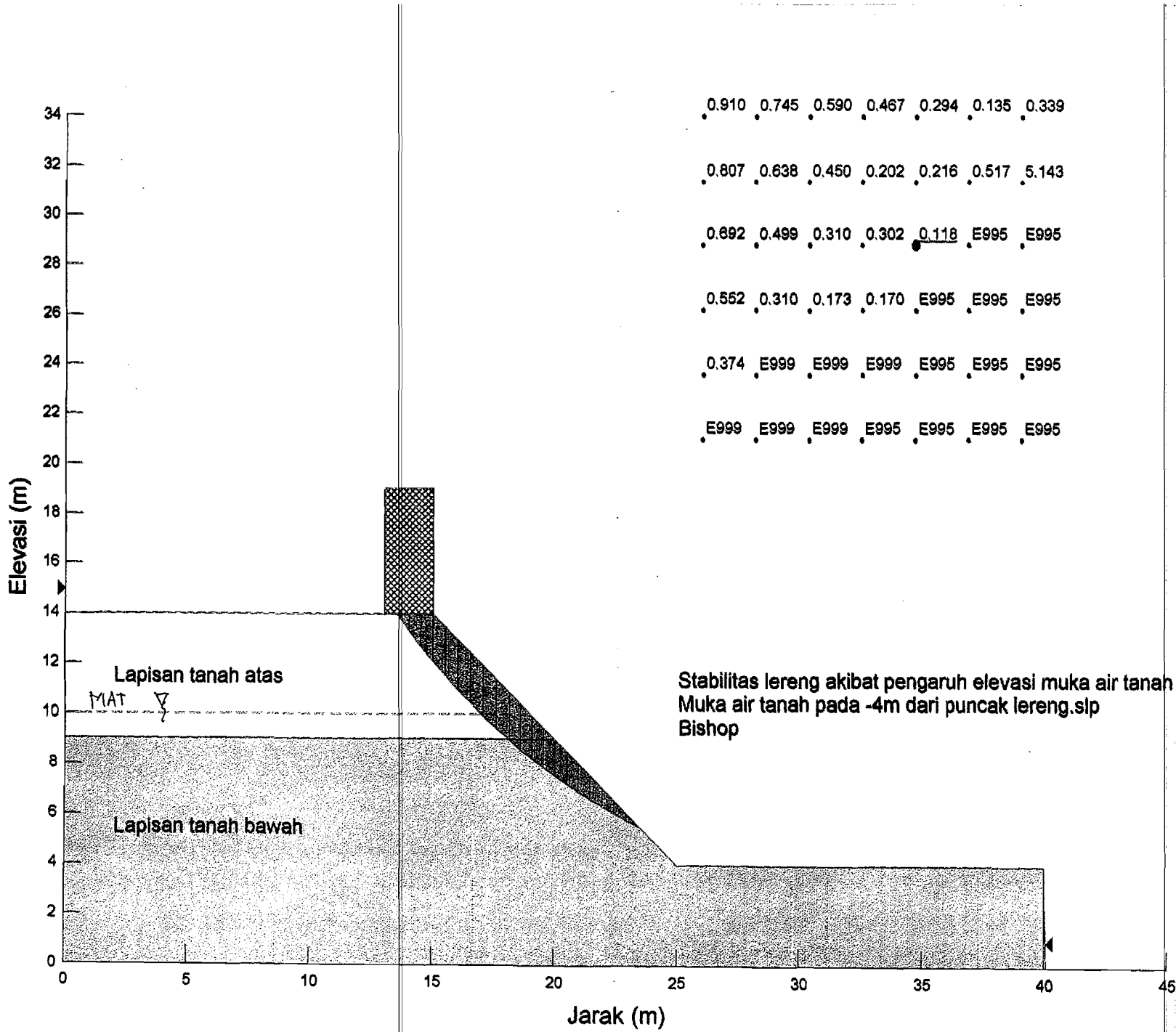
Slice 21 - Bishop Method	
Factor of Safety	0,116
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0286
Pore Water Pressure	50,34
Pore Water Force	29,177
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,53952
Mid-Height	0,16553
Base Length	0,5796
Base Angle	21,434
Polygon Closure Error	8,8452
Anisotropic Strength Modifier	1
Weight	1,328
Base Shear Force	49,14
Base Normal Force	19,309
Left Side Normal Force	43,862
Right Side Normal Force	48,14

Slice 21 - Bishop Method

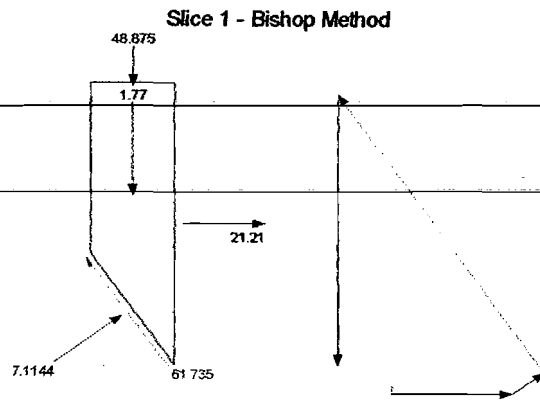




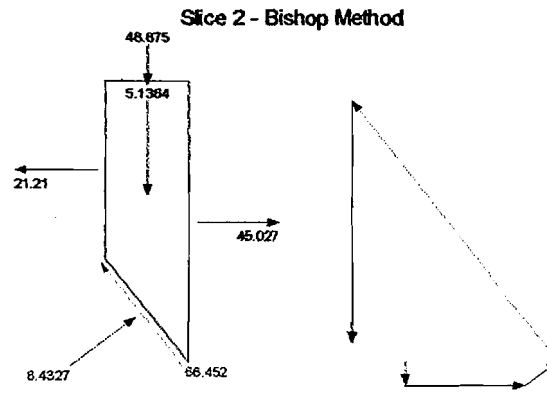




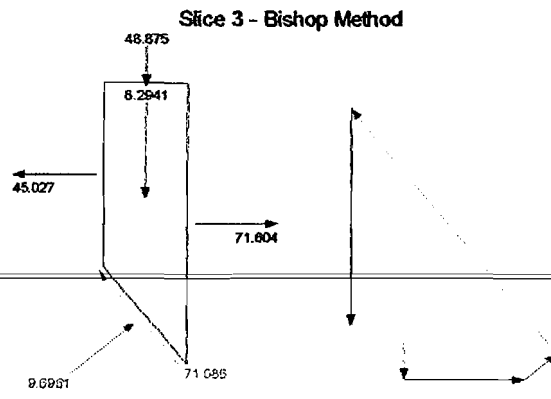
Slice 1 - Bishop Method	
Factor of Safety	0,118
Phi Angle	28
C (Strength)	4,2
C (Force)	3,4982
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48874
Mid-Height	0,34295
Base Length	0,83292
Base Angle	54,071
Polygon Closure Error	9,8776
Anisotropic Strength Modifier	1
Weight	1,77
Base Shear Force	61,735
Base Normal Force	7,1144
Right Side Normal Force	21,21
Surface Pressure Load	48,875



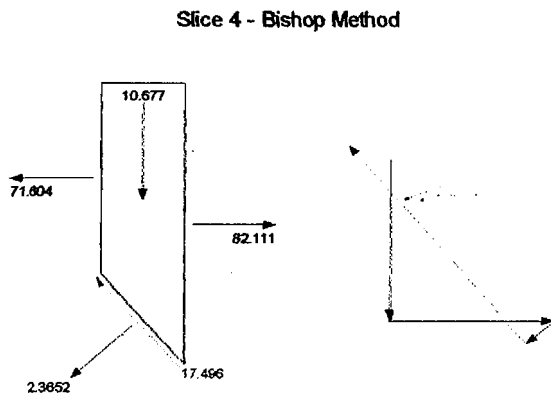
Slice 2 - Bishop Method	
Factor of Safety	0,118
Phi Angle	28
C (Strength)	4,2
C (Force)	3,3536
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48875
Mid-Height	0,99521
Base Length	0,79848
Base Angle	52,258
Polygon Closure Error	10,965
Anisotropic Strength Modifier	1
Weight	5,1364
Base Shear Force	66,452
Base Normal Force	8,4327
Left Side Normal Force	21,21
Right Side Normal Force	45,027
Surface Pressure Load	48,875



Slice 3 - Bishop Method	
Factor of Safety	0,118
Phi Angle	28
C (Strength)	4,2
C (Force)	3,2285
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48875
Mid-Height	1,607
Base Length	0,76869
Base Angle	50,519
Polygon Closure Error	12,085
Anisotropic Strength Modifier	1
Weight	8,2941
Base Shear Force	71,086
Base Normal Force	9,6961
Left Side Normal Force	45,027
Right Side Normal Force	71,604
Surface Pressure Load	48,875

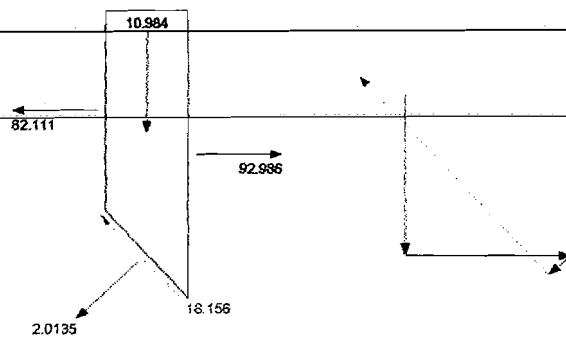


Slice 4 - Bishop Method	
Factor of Safety	0,118
Phi Angle	28
C (Strength)	4,2
C (Force)	3,321
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,52097
Mid-Height	1,9407
Base Length	0,79071
Base Angle	48,787
Polygon Closure Error	2,7994
Anisotropic Strength Modifier	1
Weight	10,677
Base Shear Force	17,496
Base Normal Force	2,3652
Left Side Normal Force	71,604
Right Side Normal Force	82,111



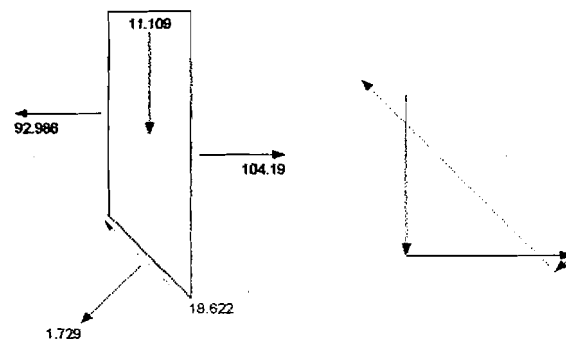
Slice 5 - Bishop Method	
Factor of Safety	0,118
Phi Angle	28
C (Strength)	4,2
C (Force)	3,2119
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,52097
Mid-Height	1,9966
Base Length	0,76474
Base Angle	47,06
Polygon Closure Error	3,1773
Anisotropic Strength Modifier	1
Weight	10,984
Base Shear Force	18,156
Base Normal Force	2,0135
Left Side Normal Force	82,111
Right Side Normal Force	92,986

Slice 5 - Bishop Method



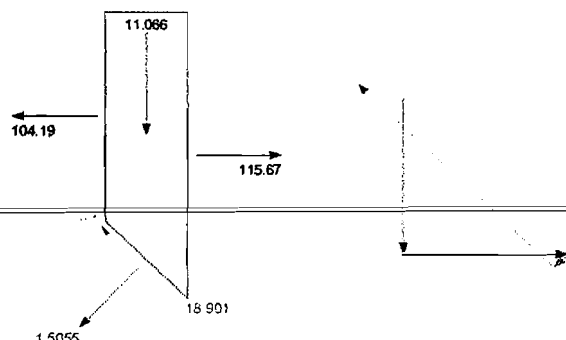
Slice 6 - Bishop Method	
Factor of Safety	0,118
Phi Angle	28
C (Strength)	4,2
C (Force)	3,1155
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,52096
Mid-Height	2,0192
Base Length	0,74179
Base Angle	45,388
Polygon Closure Error	3,0726
Anisotropic Strength Modifier	1
Weight	11,109
Base Shear Force	18,622
Base Normal Force	1,729
Left Side Normal Force	92,986
Right Side Normal Force	104,19

Slice 6 - Bishop Method



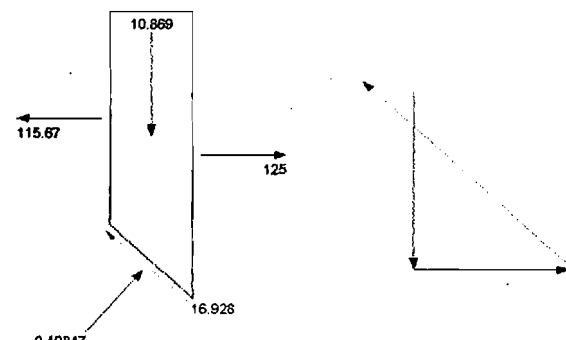
Slice 7 - Bishop Method	
Factor of Safety	0,118
Phi Angle	28
C (Strength)	4,2
C (Force)	3,0297
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,52097
Mid-Height	2,0115
Base Length	0,72135
Base Angle	43,762
Polygon Closure Error	3,2132
Anisotropic Strength Modifier	1
Weight	11,066
Base Shear Force	18,901
Base Normal Force	1,5055
Left Side Normal Force	104,19
Right Side Normal Force	115,67

Slice 7 - Bishop Method



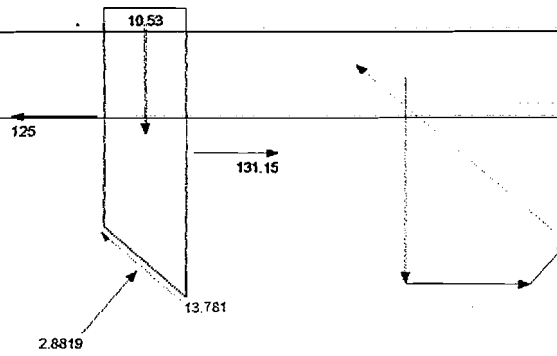
Slice 8 - Bishop Method	
Factor of Safety	0,118
Phi Angle	28
C (Strength)	4,2
C (Force)	2,9527
Pore Water Pressure	3,1391
Pore Water Force	2,2069
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,52097
Mid-Height	1,9757
Base Length	0,70303
Base Angle	42,181
Polygon Closure Error	3,047
Anisotropic Strength Modifier	1
Weight	10,869
Base Shear Force	16,928
Base Normal Force	0,40847
Left Side Normal Force	115,67
Right Side Normal Force	125

Slice 8 - Bishop Method



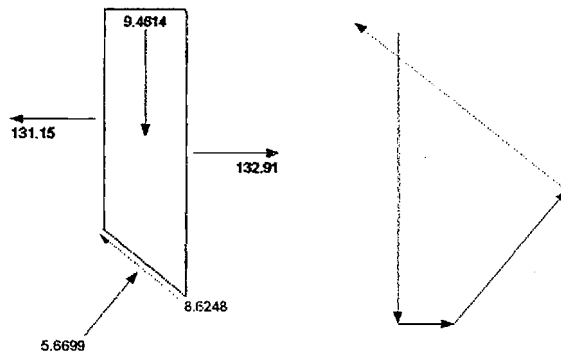
Slice 9 - Bishop Method	
Factor of Safety	0,118
Phi Angle	28
C (Strength)	4,2
C (Force)	2,8834
Pore Water Pressure	7,6442
Pore Water Force	5,248
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,52097
Mid-Height	1,9141
Base Length	0,68653
Base Angle	40,637
Polygon Closure Error	2,5495
Anisotropic Strength Modifier	1
Weight	10,53
Base Shear Force	13,781
Base Normal Force	2,8819
Left Side Normal Force	125
Right Side Normal Force	131,15

Slice 9 - Bishop Method



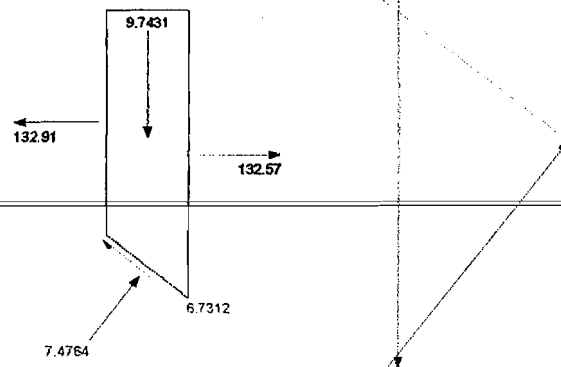
Slice 10 - Bishop Method	
Factor of Safety	0,118
Phi Angle	38
C (Strength)	3,5
C (Force)	2,1163
Pore Water Pressure	11,704
Pore Water Force	7,0767
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,46855
Mid-Height	1,8333
Base Length	0,60466
Base Angle	39,204
Polygon Closure Error	1,3719
Anisotropic Strength Modifier	1
Weight	9,4614
Base Shear Force	8,6248
Base Normal Force	5,6699
Left Side Normal Force	131,15
Right Side Normal Force	132,91

Slice 10 - Bishop Method



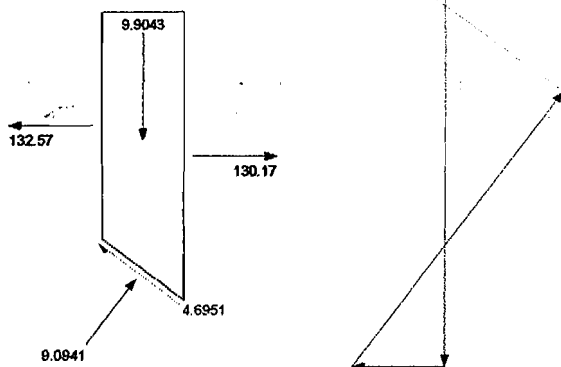
Slice 11 - Bishop Method	
Factor of Safety	0,118
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0775
Pore Water Pressure	15,364
Pore Water Force	9,1194
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,46855
Mid-Height	1,7379
Base Length	0,59357
Base Angle	37,873
Polygon Closure Error	1,023
Anisotropic Strength Modifier	1
Weight	9,7431
Base Shear Force	6,7312
Base Normal Force	7,4764
Left Side Normal Force	132,91
Right Side Normal Force	132,57

Slice 11 - Bishop Method



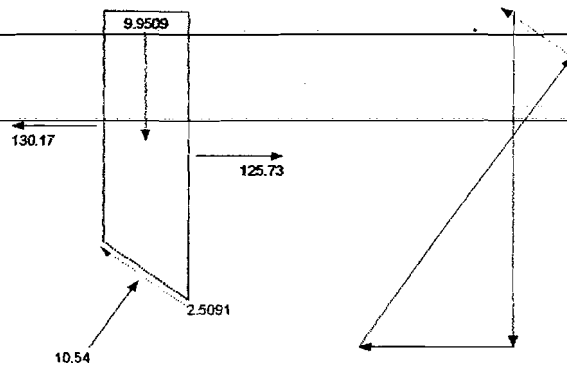
Slice 12 - Bishop Method	
Factor of Safety	0,118
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0418
Pore Water Pressure	18,854
Pore Water Force	10,999
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,46854
Mid-Height	1,6252
Base Length	0,58337
Base Angle	36,567
Polygon Closure Error	0,6933
Anisotropic Strength Modifier	1
Weight	9,9043
Base Shear Force	4,6951
Base Normal Force	9,0941
Left Side Normal Force	132,57
Right Side Normal Force	130,17

Slice 12 - Bishop Method



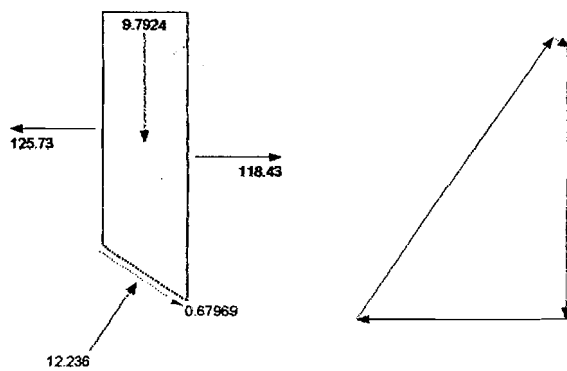
Slice 13 - Bishop Method	
Factor of Safety	0,118
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0009
Pore Water Pressure	22,182
Pore Water Force	12,732
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,46855
Mid-Height	1,4961
Base Length	0,57397
Base Angle	35,281
Polygon Closure Error	0,3689
Anisotropic Strength Modifier	1
Weight	9,9509
Base Shear Force	2,5091
Base Normal Force	10,54
Left Side Normal Force	130,17
Right Side Normal Force	125,73

Slice 13 - Bishop Method



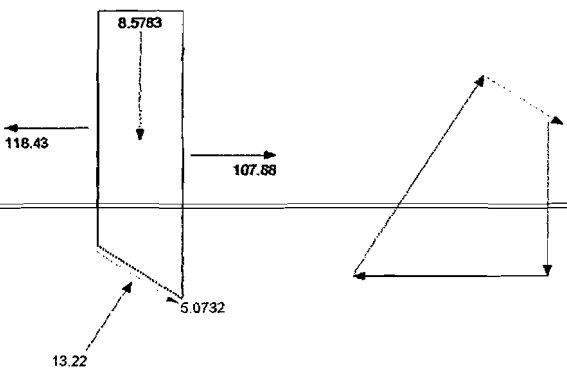
Slice 14 - Bishop Method	
Factor of Safety	0,118
Phi Angle	38
C (Strength)	3,5
C (Force)	2,062
Pore Water Pressure	25,423
Pore Water Force	14,978
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48848
Mid-Height	1,3481
Base Length	0,56914
Base Angle	33,99
Polygon Closure Error	0,06118
Anisotropic Strength Modifier	1
Weight	9,7924
Base Shear Force	0,67969
Base Normal Force	12,236
Left Side Normal Force	125,73
Right Side Normal Force	118,43

Slice 14 - Bishop Method



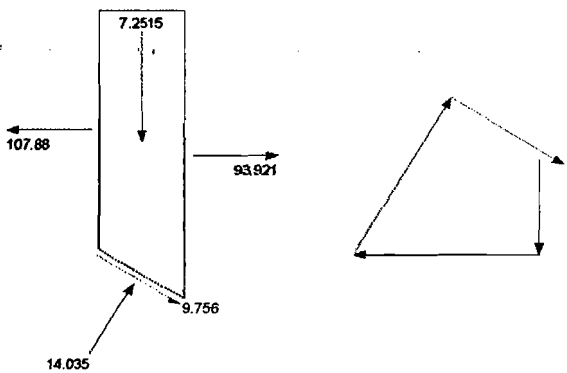
Slice 15 - Bishop Method	
Factor of Safety	0,118
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0314
Pore Water Pressure	28,576
Pore Water Force	16,586
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48847
Mid-Height	1,181
Base Length	0,58041
Base Angle	32,691
Polygon Closure Error	0,7932
Anisotropic Strength Modifier	1
Weight	8,5783
Base Shear Force	5,0732
Base Normal Force	13,22
Left Side Normal Force	118,43
Right Side Normal Force	107,88

Slice 15 - Bishop Method



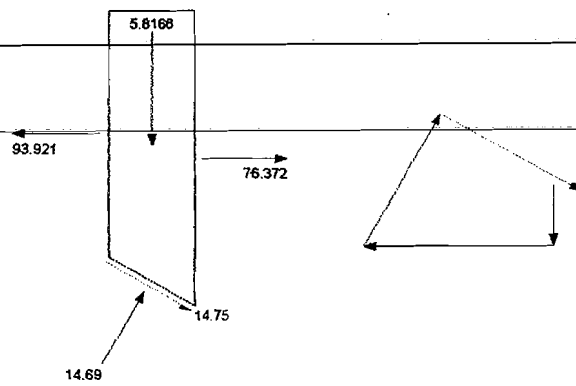
Slice 16 - Bishop Method	
Factor of Safety	0,118
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0033
Pore Water Pressure	31,575
Pore Water Force	18,072
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48848
Mid-Height	0,99833
Base Length	0,57236
Base Angle	31,411
Polygon Closure Error	1,6842
Anisotropic Strength Modifier	1
Weight	7,2515
Base Shear Force	9,756
Base Normal Force	14,035
Left Side Normal Force	107,88
Right Side Normal Force	93,921

Slice 16 - Bishop Method



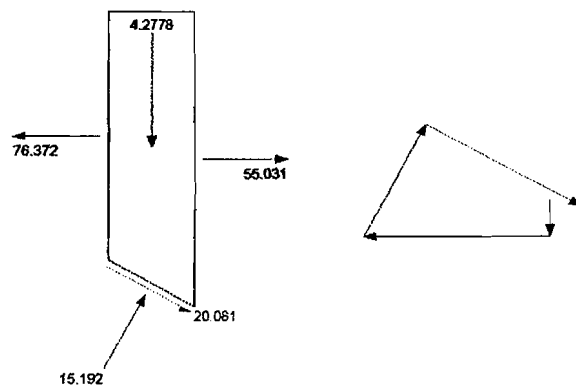
Slice 17 - Bishop Method	
Factor of Safety	0,118
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9771
Pore Water Pressure	34,428
Pore Water Force	19,448
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48847
Mid-Height	0,80078
Base Length	0,56488
Base Angle	30,149
Polygon Closure Error	2,4569
Anisotropic Strength Modifier	1
Weight	5,8166
Base Shear Force	14,75
Base Normal Force	14,69
Left Side Normal Force	93,921
Right Side Normal Force	76,372

Slice 17 - Bishop Method



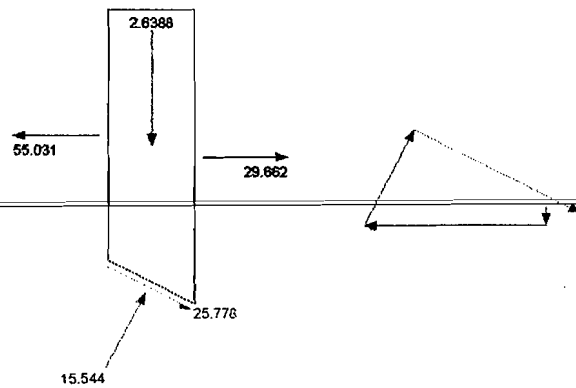
Slice 18 - Bishop Method	
Factor of Safety	0,118
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9529
Pore Water Pressure	37,14
Pore Water Force	20,723
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48848
Mid-Height	0,58893
Base Length	0,55797
Base Angle	28,901
Polygon Closure Error	3,4146
Anisotropic Strength Modifier	1
Weight	4,2778
Base Shear Force	20,081
Base Normal Force	15,192
Left Side Normal Force	76,372
Right Side Normal Force	55,031

Slice 18 - Bishop Method



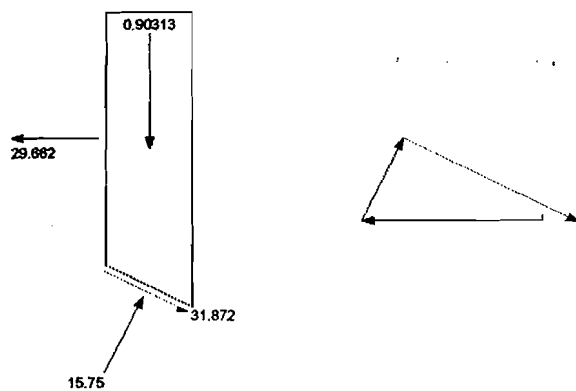
Slice 19 - Bishop Method	
Factor of Safety	0,118
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9304
Pore Water Pressure	39,719
Pore Water Force	21,907
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48847
Mid-Height	0,36329
Base Length	0,55154
Base Angle	27,07
Polygon Closure Error	4,64
Anisotropic Strength Modifier	1
Weight	2,6388
Base Shear Force	25,778
Base Normal Force	15,544
Left Side Normal Force	55,031
Right Side Normal Force	29,662

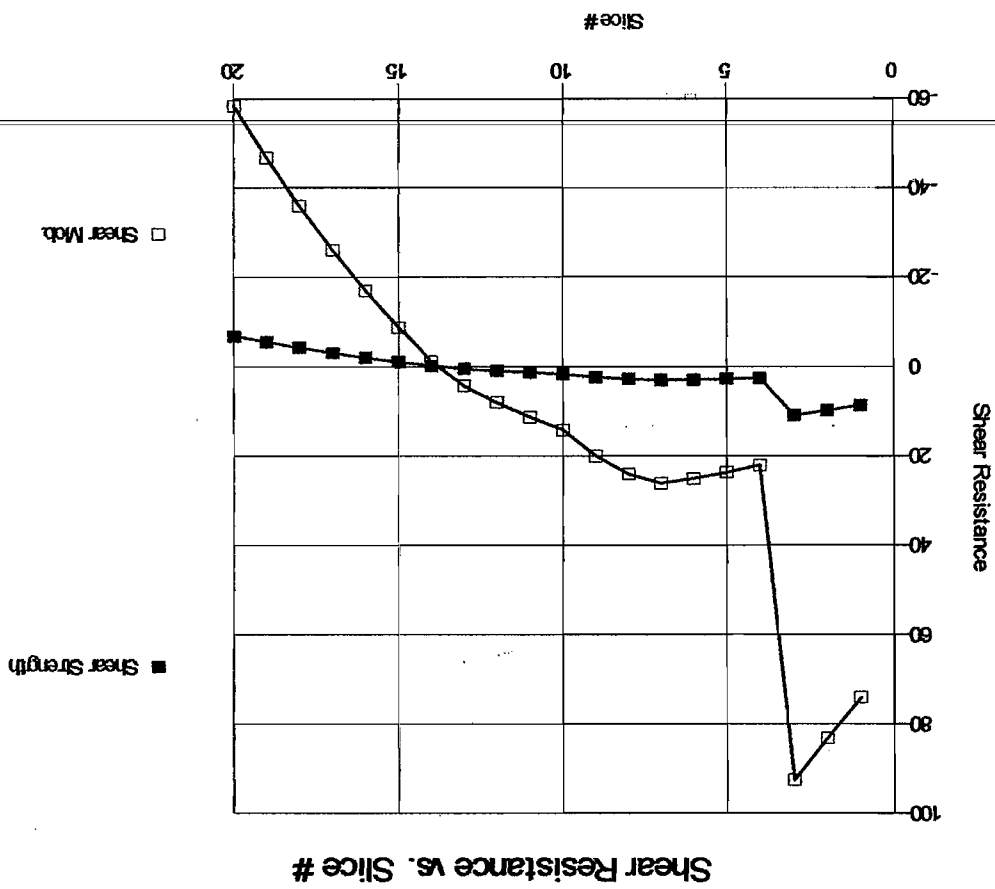
Slice 19 - Bishop Method

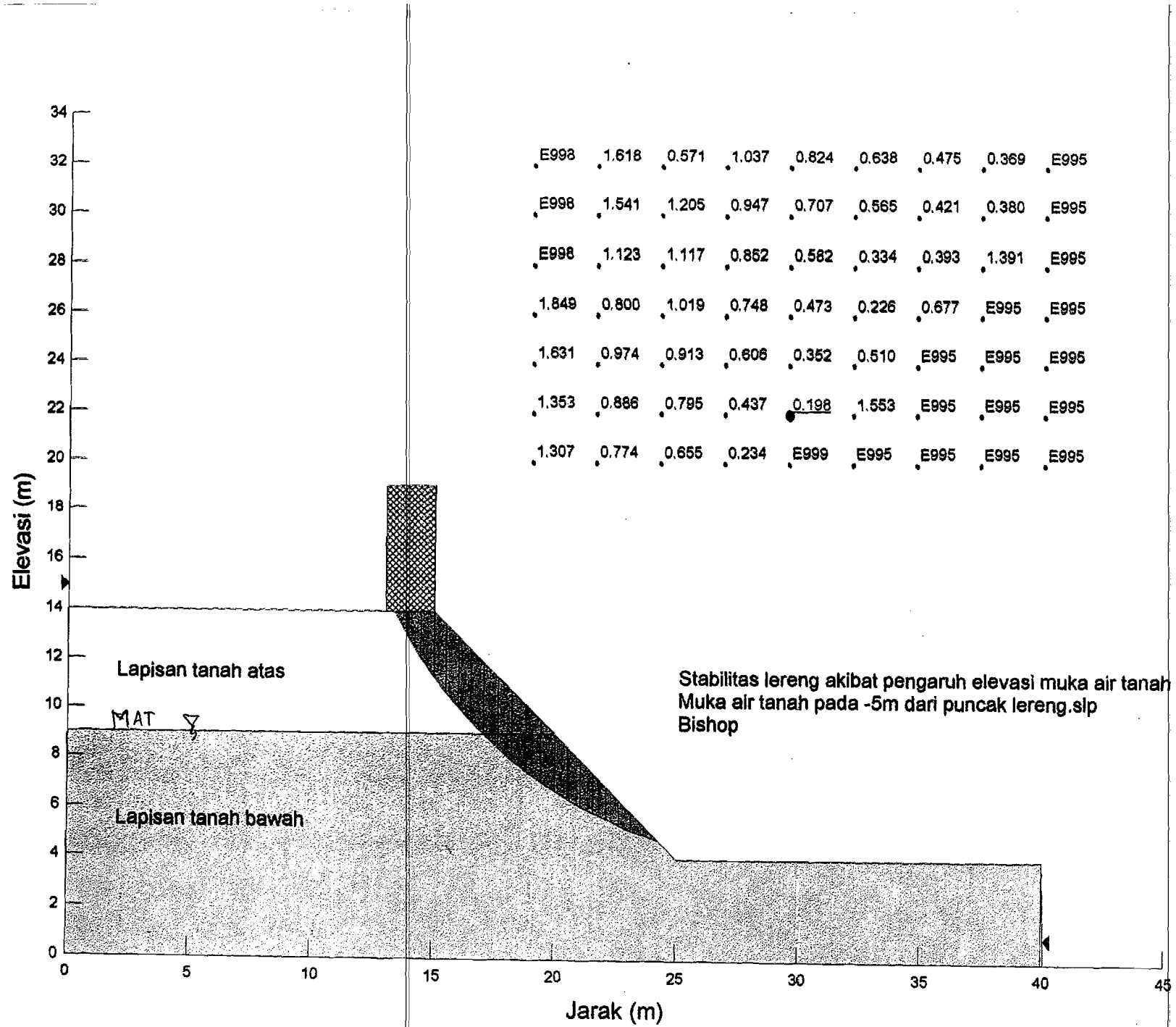


Slice 20 - Bishop Method	
Factor of Safety	0,118
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9096
Pore Water Pressure	42,165
Pore Water Force	23,005
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48848
Mid-Height	0,12434
Base Length	0,5456
Base Angle	26,451
Polygon Closure Error	5,737
Anisotropic Strength Modifier	1
Weight	0,90313
Base Shear Force	31,872
Base Normal Force	15,75
Left Side Normal Force	29,662

Slice 20 - Bishop Method

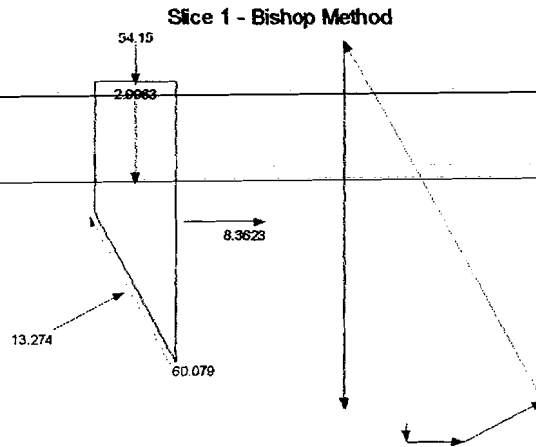




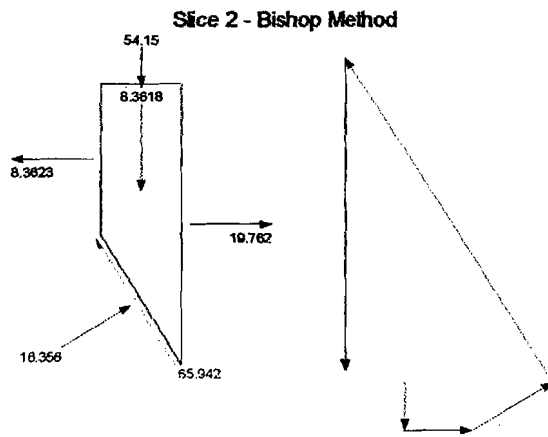




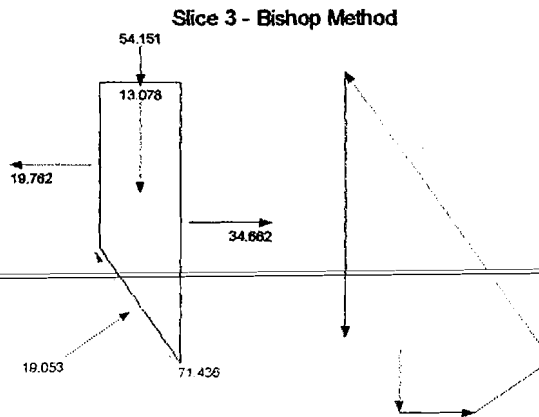
Slice 1 - Bishop Method	
Factor of Safety	0,198
Phi Angle	28
C (Strength)	4,2
C (Force)	4,8111
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,54151
Mid-Height	0,52398
Base Length	1,1455
Base Angle	61,789
Polygon Closure Error	8,7115
Anisotropic Strength Modifier	1
Weight	2,9963
Base Shear Force	60,079
Base Normal Force	13,274
Right Side Normal Force	8,3623
Surface Pressure Load	54,15



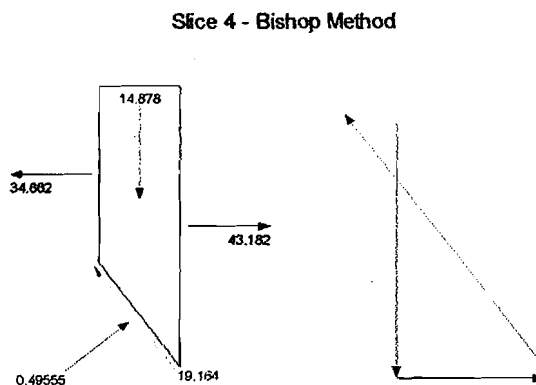
Slice 2 - Bishop Method	
Factor of Safety	0,198
Phi Angle	28
C (Strength)	4,2
C (Force)	4,3311
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,5415
Mid-Height	1,4623
Base Length	1,0312
Base Angle	58,324
Polygon Closure Error	9,8913
Anisotropic Strength Modifier	1
Weight	8,3618
Base Shear Force	65,942
Base Normal Force	16,356
Left Side Normal Force	8,3623
Right Side Normal Force	19,762
Surface Pressure Load	54,15



Slice 3 - Bishop Method	
Factor of Safety	0,198
Phi Angle	28
C (Strength)	4,2
C (Force)	3,9824
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,54151
Mid-Height	2,2871
Base Length	0,94818
Base Angle	55,173
Polygon Closure Error	-10,715
Anisotropic Strength Modifier	1
Weight	13,078
Base Shear Force	71,436
Base Normal Force	19,053
Left Side Normal Force	19,762
Right Side Normal Force	34,662
Surface Pressure Load	54,151

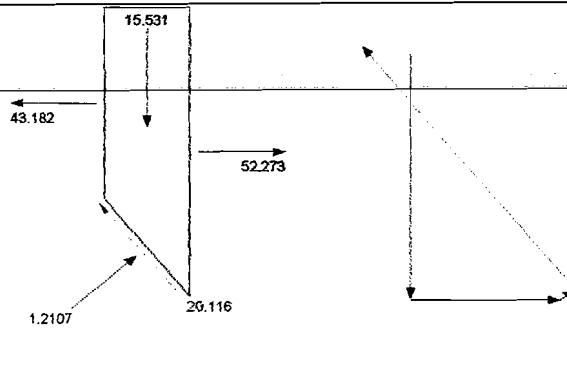


Slice 4 - Bishop Method	
Factor of Safety	0,198
Phi Angle	28
C (Strength)	4,2
C (Force)	3,5224
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,51253
Mid-Height	2,749
Base Length	0,83866
Base Angle	52,329
Polygon Closure Error	2,9704
Anisotropic Strength Modifier	1
Weight	14,878
Base Shear Force	19,164
Base Normal Force	0,49555
Left Side Normal Force	34,662
Right Side Normal Force	43,182



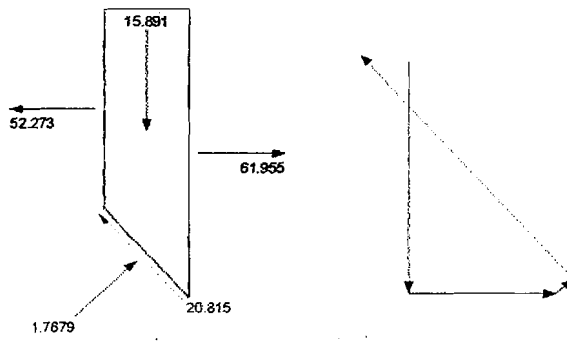
Slice 5 - Bishop Method	
Factor of Safety	0,198
Phi Angle	28
C (Strength)	4,2
C (Force)	3,9303
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,51252
Mid-Height	2,8697
Base Length	0,79294
Base Angle	49,733
Polygon Closure Error	3,0174
Anisotropic Strength Modifier	1
Weight	15,531
Base Shear Force	20,116
Base Normal Force	1,2107
Left Side Normal Force	43,182
Right Side Normal Force	52,273

Slice 5 - Bishop Method



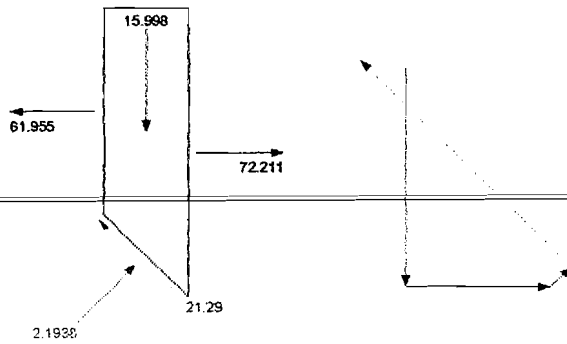
Slice 6 - Bishop Method	
Factor of Safety	0,198
Phi Angle	28
C (Strength)	4,2
C (Force)	3,1723
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,51253
Mid-Height	2,9381
Base Length	0,7553
Base Angle	47,267
Polygon Closure Error	3,2263
Anisotropic Strength Modifier	1
Weight	15,891
Base Shear Force	20,815
Base Normal Force	1,7679
Left Side Normal Force	52,273
Right Side Normal Force	61,955

Slice 6 - Bishop Method



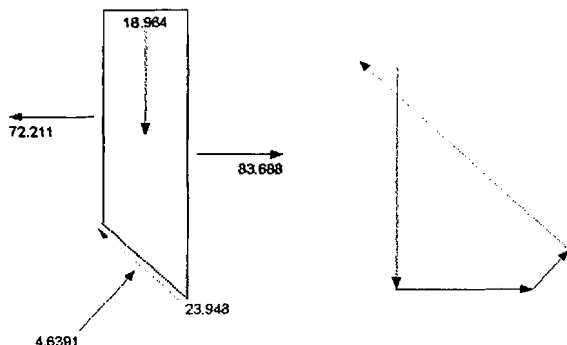
Slice 7 - Bishop Method	
Factor of Safety	0,198
Phi Angle	28
C (Strength)	4,2
C (Force)	3,0396
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,51252
Mid-Height	2,9558
Base Length	0,72373
Base Angle	44,914
Polygon Closure Error	3,3
Anisotropic Strength Modifier	1
Weight	15,998
Base Shear Force	21,29
Base Normal Force	2,1938
Left Side Normal Force	61,955
Right Side Normal Force	72,211

Slice 7 - Bishop Method



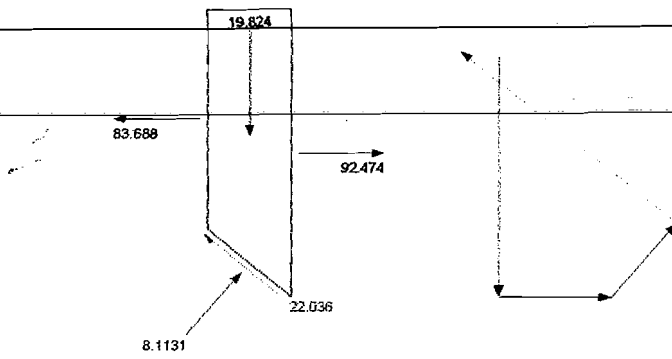
Slice 8 - Bishop Method	
Factor of Safety	0,198
Phi Angle	38
C (Strength)	3,5
C (Force)	2,8002
Pore Water Pressure	2,7092
Pore Water Force	2,1675
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,58998
Mid-Height	2,9311
Base Length	0,80006
Base Angle	42,488
Polygon Closure Error	3,233
Anisotropic Strength Modifier	1
Weight	18,964
Base Shear Force	23,948
Base Normal Force	4,6381
Left Side Normal Force	72,211
Right Side Normal Force	83,688

Slice 8 - Bishop Method



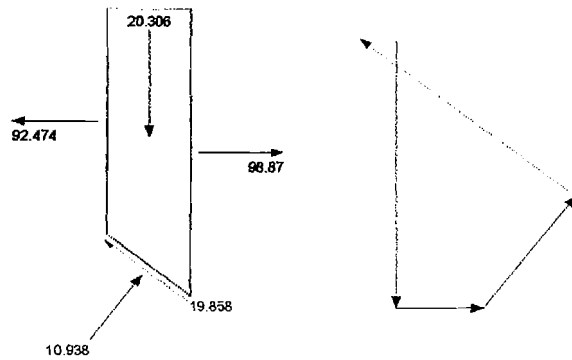
Slice 9 - Bishop Method	
Factor of Safety	0,198
Phi Angle	38
C (Strength)	3,5
C (Force)	2,6951
Pore Water Pressure	7,7796
Pore Water Force	5,9906
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,58998
Mid-Height	2,8581
Base Length	0,77004
Base Angle	39,989
Polygon Closure Error	3,085
Anisotropic Strength Modifier	1
Weight	19,824
Base Shear Force	22,036
Base Normal Force	8,1131
Left Side Normal Force	83,688
Right Side Normal Force	92,474

Slice 9 - Bishop Method



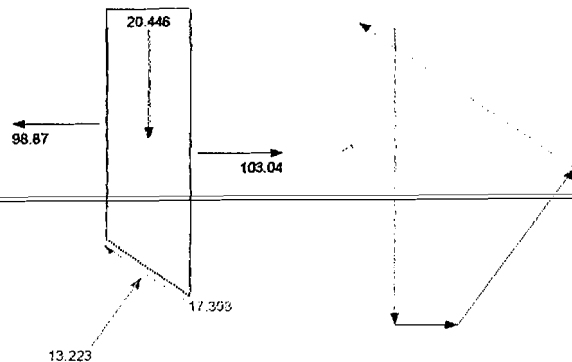
Slice 10 - Bishop Method	
Factor of Safety	0,198
Phi Angle	38
C (Strength)	3,5
C (Force)	2,6055
Pore Water Pressure	12,427
Pore Water Force	9,2514
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,58998
Mid-Height	2,7421
Base Length	0,74444
Base Angle	37,579
Polygon Closure Error	2,7413
Anisotropic Strength Modifier	1
Weight	20,306
Base Shear Force	19,858
Base Normal Force	10,938
Left Side Normal Force	92,474
Right Side Normal Force	98,87

Slice 10 - Bishop Method



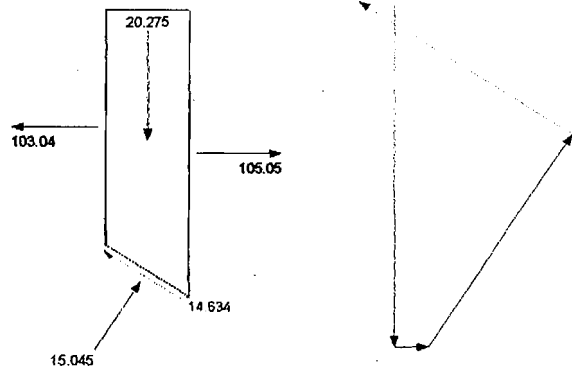
Slice 11 - Bishop Method	
Factor of Safety	0,198
Phi Angle	38
C (Strength)	3,5
C (Force)	2,5284
Pore Water Pressure	16,693
Pore Water Force	12,059
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,58998
Mid-Height	2,5871
Base Length	0,72239
Base Angle	35,244
Polygon Closure Error	2,4535
Anisotropic Strength Modifier	1
Weight	20,446
Base Shear Force	17,398
Base Normal Force	13,223
Left Side Normal Force	98,87
Right Side Normal Force	103,04

Slice 11 - Bishop Method



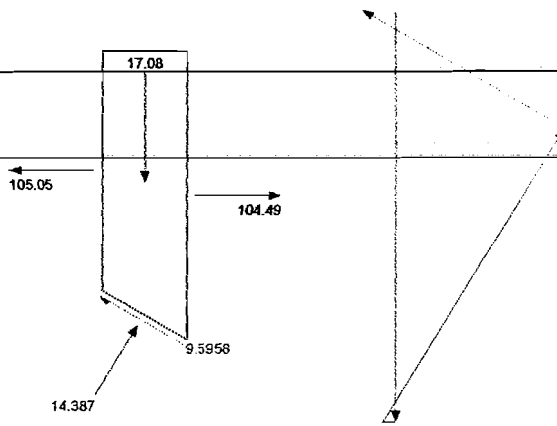
Slice 12 - Bishop Method	
Factor of Safety	0,198
Phi Angle	38
C (Strength)	3,5
C (Force)	2,4614
Pore Water Pressure	20,612
Pore Water Force	14,496
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,58998
Mid-Height	2,3968
Base Length	0,70327
Base Angle	32,975
Polygon Closure Error	2,1289
Anisotropic Strength Modifier	1
Weight	20,275
Base Shear Force	14,634
Base Normal Force	15,045
Left Side Normal Force	103,04
Right Side Normal Force	105,05

Slice 12 - Bishop Method



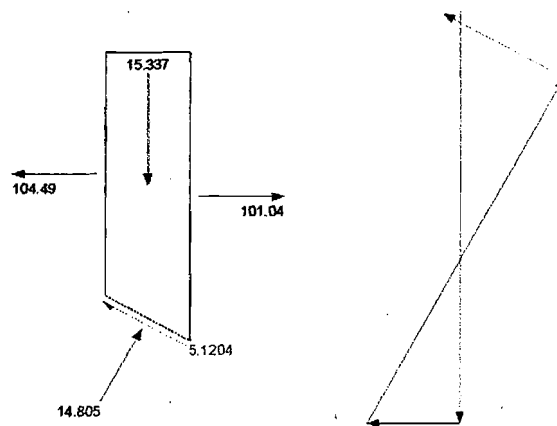
Slice 13 - Bishop Method	
Factor of Safety	0,198
Phi Angle	38
C (Strength)	3,5
C (Force)	2,1425
Pore Water Pressure	24,019
Pore Water Force	14,703
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,52537
Mid-Height	2,1863
Base Length	0,61215
Base Angle	30,881
Polygon Closure Error	1,3664
Anisotropic Strength Modifier	1
Weight	17,08
Base Shear Force	9,5958
Base Normal Force	14,387
Left Side Normal Force	105,05
Right Side Normal Force	104,49

Slice 13 - Bishop Method



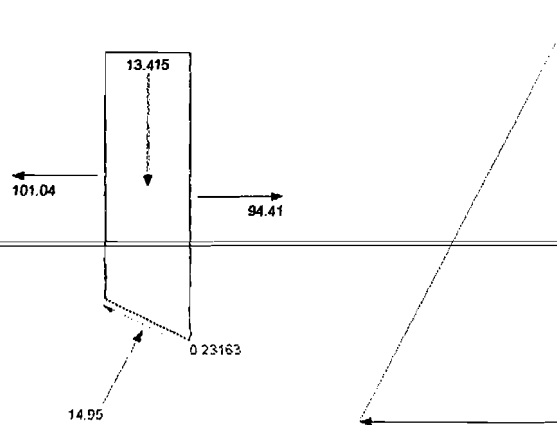
Slice 14 - Bishop Method	
Factor of Safety	0,198
Phi Angle	38
C (Strength)	3,5
C (Force)	2,1014
Pore Water Pressure	26,982
Pore Water Force	16,2
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,52537
Mid-Height	1,9632
Base Length	0,6004
Base Angle	28,951
Polygon Closure Error	0,61348
Anisotropic Strength Modifier	1
Weight	15,337
Base Shear Force	5,1204
Base Normal Force	14,805
Left Side Normal Force	104,49
Right Side Normal Force	101,04

Slice 14 - Bishop Method



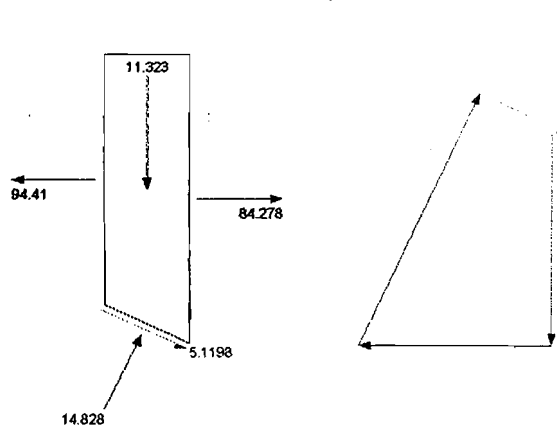
Slice 15 - Bishop Method	
Factor of Safety	0,198
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0647
Pore Water Pressure	29,722
Pore Water Force	17,534
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,52536
Mid-Height	1,7172
Base Length	0,58992
Base Angle	27,057
Polygon Closure Error	0
Anisotropic Strength Modifier	1
Weight	13,415
Base Shear Force	0,23163
Base Normal Force	14,95
Left Side Normal Force	101,04
Right Side Normal Force	94,41

Slice 15 - Bishop Method



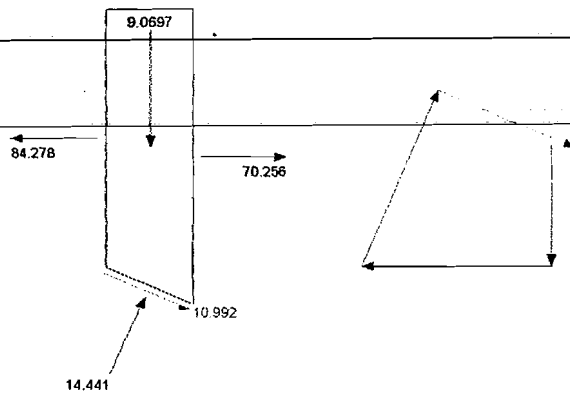
Slice 16 - Bishop Method	
Factor of Safety	0,198
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0321
Pore Water Pressure	32,249
Pore Water Force	18,724
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,52537
Mid-Height	1,4494
Base Length	0,5806
Base Angle	25,193
Polygon Closure Error	0,81554
Anisotropic Strength Modifier	1
Weight	11,323
Base Shear Force	5,1198
Base Normal Force	14,828
Left Side Normal Force	94,41
Right Side Normal Force	84,278

Slice 16 - Bishop Method



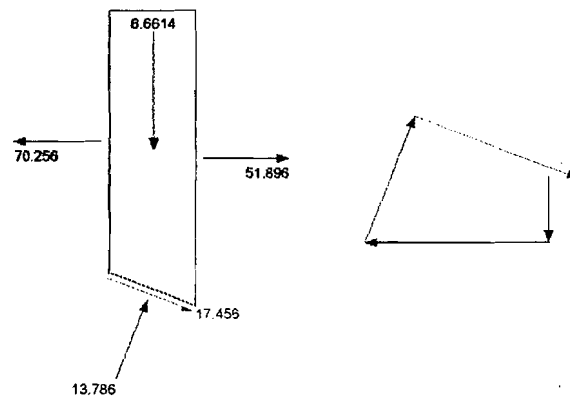
Slice 17 - Bishop Method	
Factor of Safety	0,198
Phi Angle	38
C (Strength)	3,5
C (Force)	2,003
Pore Water Pressure	34,573
Pore Water Force	19,785
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,52537
Mid-Height	1,161
Base Length	0,57227
Base Angle	23,359
Polygon Closure Error	1,7329
Anisotropic Strength Modifier	1
Weight	9,0697
Base Shear Force	10,992
Base Normal Force	14,441
Left Side Normal Force	84,278
Right Side Normal Force	70,256

Slice 17 - Bishop Method



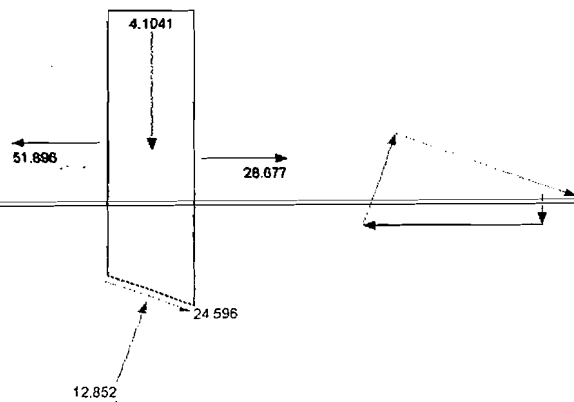
Slice 18 - Bishop Method	
Factor of Safety	0,198
Phi Angle	38
C (Strength)	3,5
C (Force)	1,977
Pore Water Pressure	36,702
Pore Water Force	20,731
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,52537
Mid-Height	0,85269
Base Length	0,56485
Base Angle	21,549
Polygon Closure Error	2,8458
Anisotropic Strength Modifier	1
Weight	6,6614
Base Shear Force	17,456
Base Normal Force	13,786
Left Side Normal Force	70,256
Right Side Normal Force	51,896

Slice 18 - Bishop Method



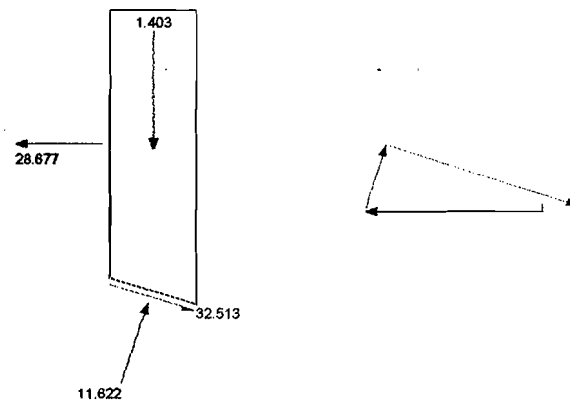
Slice 19 - Bishop Method	
Factor of Safety	0,198
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9538
Pore Water Pressure	38,643
Pore Water Force	21,572
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,52536
Mid-Height	0,52534
Base Length	0,55824
Base Angle	19,762
Polygon Closure Error	4,3043
Anisotropic Strength Modifier	1
Weight	4,1041
Base Shear Force	24,596
Base Normal Force	12,852
Left Side Normal Force	51,896
Right Side Normal Force	28,677

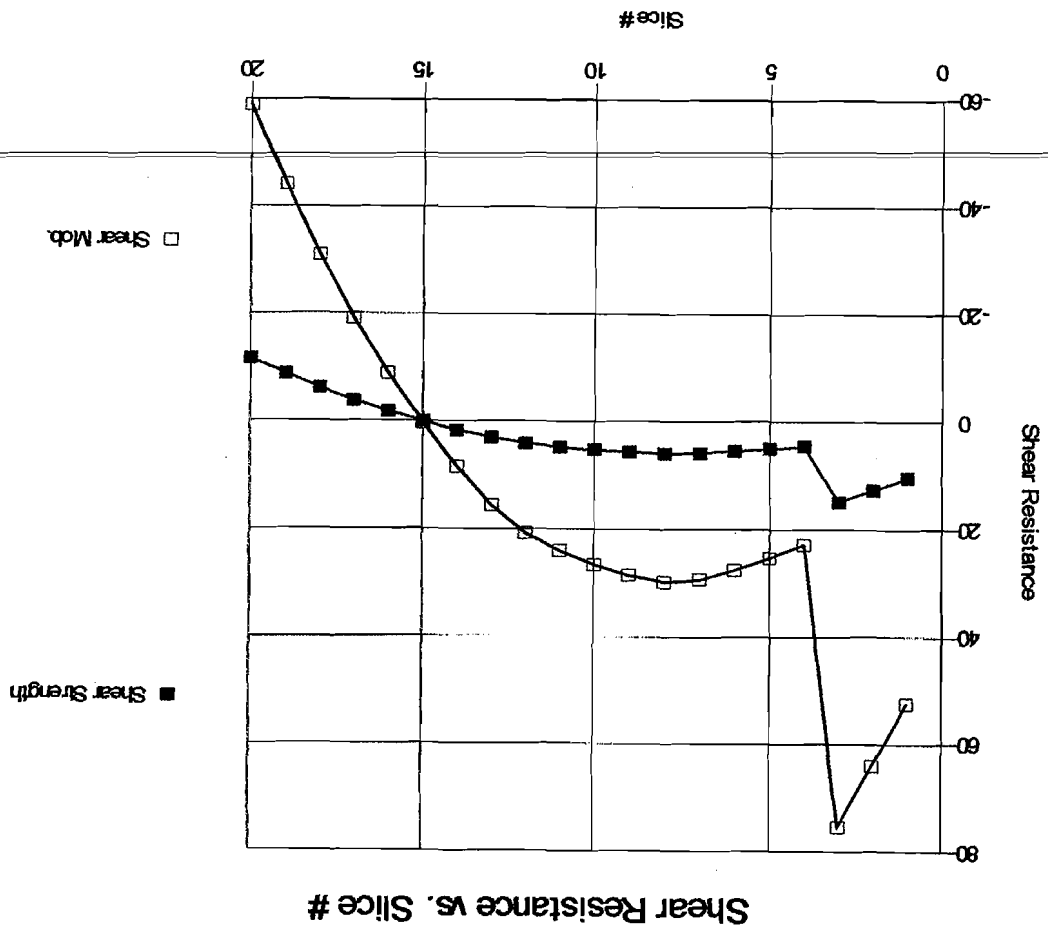
Slice 19 - Bishop Method

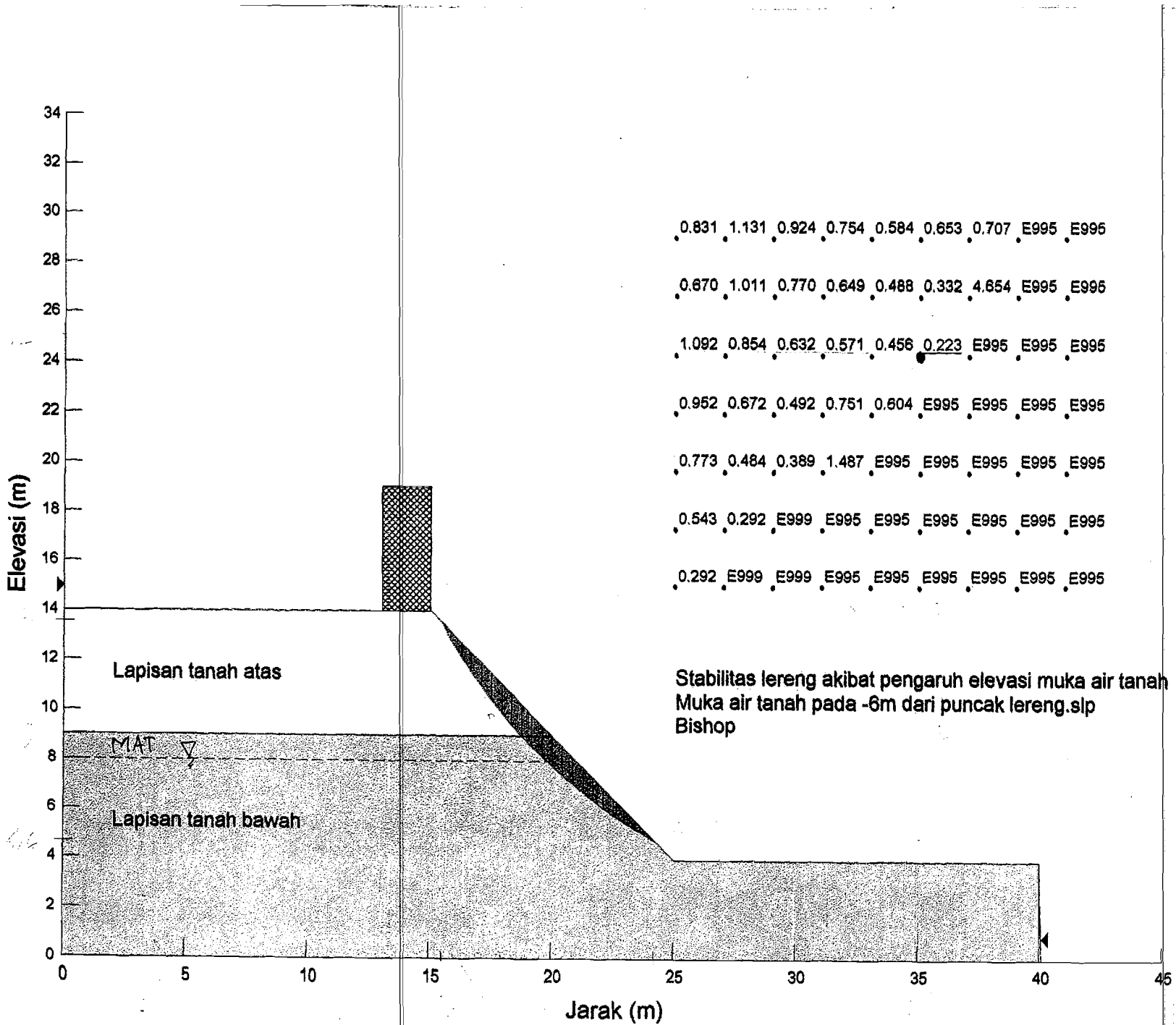


Slice 20 - Bishop Method	
Factor of Safety	0,198
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9333
Pore Water Pressure	40,405
Pore Water Force	22,319
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,52537
Mid-Height	0,17959
Base Length	0,55239
Base Angle	17,993
Polygon Closure Error	5,6898
Anisotropic Strength Modifier	1
Weight	1,403
Base Shear Force	32,513
Base Normal Force	11,622
Left Side Normal Force	28,677

Slice 20 - Bishop Method

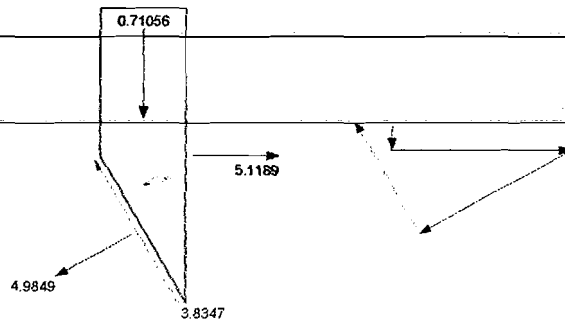






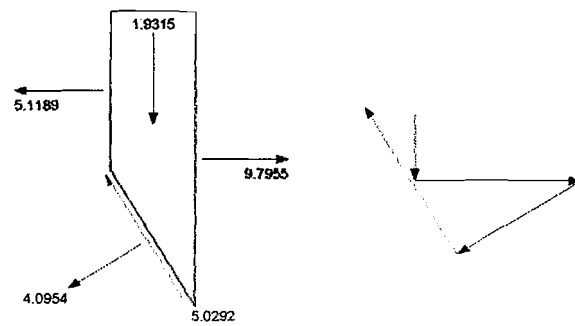
Slice 1 - Bishop Method	
Factor of Safety	0,223
Phi Angle	28
C (Strength)	4,2
C (Force)	3,5068
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,41612
Mid-Height	0,1617
Base Length	0,83495
Base Angle	60,107
Polygon Closure Error	1,075
Anisotropic Strength Modifier	1
Weight	0,71056
Base Shear Force	3,8347
Base Normal Force	4,9849
Right Side Normal Force	5,1189

Slice 1 - Bishop Method



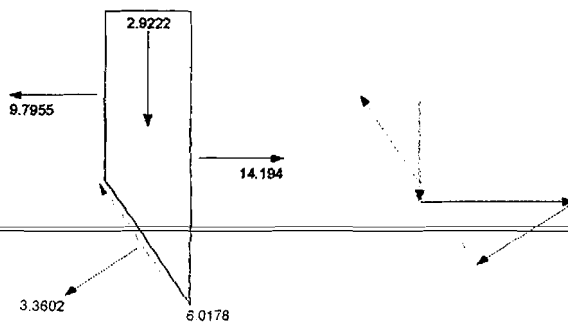
Slice 2 - Bishop Method	
Factor of Safety	0,223
Phi Angle	28
C (Strength)	4,2
C (Force)	3,3007
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,41612
Mid-Height	0,43955
Base Length	0,78587
Base Angle	58,028
Polygon Closure Error	1,4333
Anisotropic Strength Modifier	1
Weight	1,9315
Base Shear Force	5,0292
Base Normal Force	4,0954
Left Side Normal Force	5,1189
Right Side Normal Force	9,7955

Slice 2 - Bishop Method



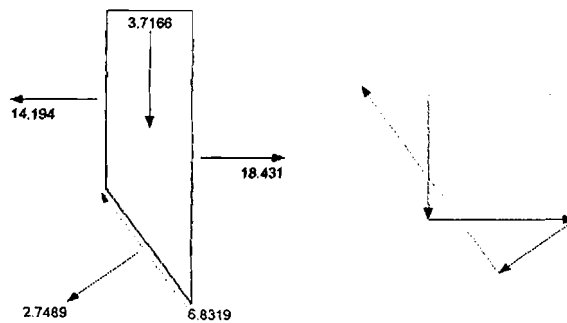
Slice 3 - Bishop Method	
Factor of Safety	0,223
Phi Angle	28
C (Strength)	4,2
C (Force)	3,1306
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,41613
Mid-Height	0,665
Base Length	0,74538
Base Angle	56,063
Polygon Closure Error	1,7151
Anisotropic Strength Modifier	1
Weight	2,9222
Base Shear Force	6,0178
Base Normal Force	3,3602
Left Side Normal Force	9,7955
Right Side Normal Force	14,194

Slice 3 - Bishop Method



Slice 4 - Bishop Method	
Factor of Safety	0,223
Phi Angle	28
C (Strength)	4,2
C (Force)	2,9874
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,41612
Mid-Height	0,84579
Base Length	0,71129
Base Angle	54,195
Polygon Closure Error	1,9471
Anisotropic Strength Modifier	1
Weight	3,7166
Base Shear Force	6,8319
Base Normal Force	2,7489
Left Side Normal Force	14,194
Right Side Normal Force	18,431

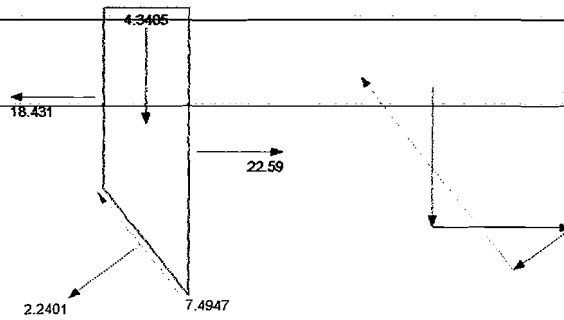
Slice 4 - Bishop Method





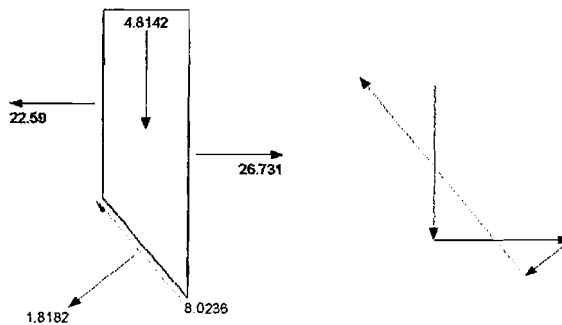
Slice 5 - Bishop Method	
Factor of Safety	0,223
Phi Angle	28
C (Strength)	4,2
C (Force)	2,8649
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,41612
Mid-Height	0,98778
Base Length	0,68213
Base Angle	52,408
Polygon Closure Error	2,1735
Anisotropic Strength Modifier	1
Weight	4,3405
Base Shear Force	7,4947
Base Normal Force	2,2401
Left Side Normal Force	18,431
Right Side Normal Force	22,59

Slice 5 - Bishop Method



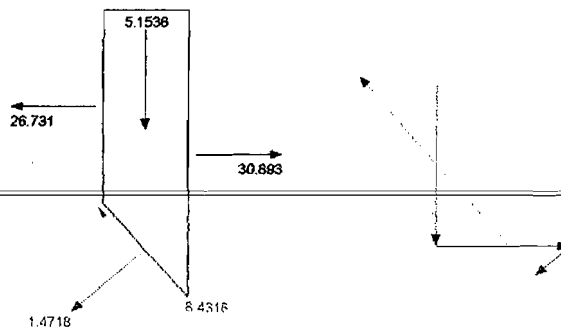
Slice 6 - Bishop Method	
Factor of Safety	0,223
Phi Angle	28
C (Strength)	4,2
C (Force)	2,7587
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,41612
Mid-Height	1,0956
Base Length	0,65684
Base Angle	50,69
Polygon Closure Error	2,2867
Anisotropic Strength Modifier	1
Weight	4,8142
Base Shear Force	8,0236
Base Normal Force	1,8182
Left Side Normal Force	22,59
Right Side Normal Force	26,731

Slice 6 - Bishop Method



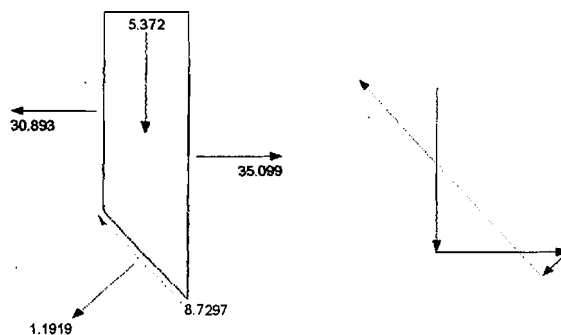
Slice 7 - Bishop Method	
Factor of Safety	0,223
Phi Angle	28
C (Strength)	4,2
C (Force)	2,6658
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,41613
Mid-Height	1,1728
Base Length	0,63471
Base Angle	49,033
Polygon Closure Error	2,4452
Anisotropic Strength Modifier	1
Weight	5,1536
Base Shear Force	8,4316
Base Normal Force	1,4718
Left Side Normal Force	26,731
Right Side Normal Force	30,893

Slice 7 - Bishop Method



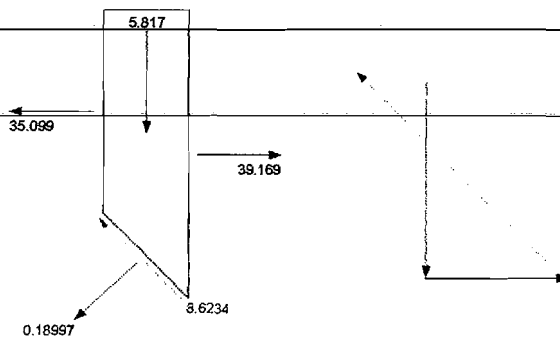
Slice 8 - Bishop Method	
Factor of Safety	0,223
Phi Angle	28
C (Strength)	4,2
C (Force)	2,5835
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,41611
Mid-Height	1,2225
Base Length	0,61511
Base Angle	47,431
Polygon Closure Error	2,5316
Anisotropic Strength Modifier	1
Weight	5,372
Base Shear Force	8,7297
Base Normal Force	1,1919
Left Side Normal Force	30,893
Right Side Normal Force	35,099

Slice 8 - Bishop Method



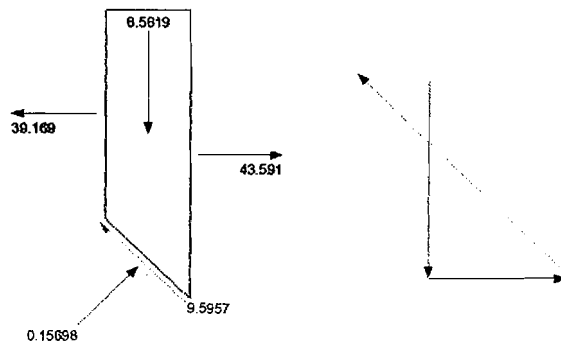
Slice 9 - Bishop Method	
Factor of Safety	0,223
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0744
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,41261
Mid-Height	1,2471
Base Length	0,5927
Base Angle	45,88
Polygon Closure Error	2,0265
Anisotropic Strength Modifier	1
Weight	5,817
Base Shear Force	8,6234
Base Normal Force	0,18997
Left Side Normal Force	35,099
Right Side Normal Force	39,169

Slice 9 - Bishop Method



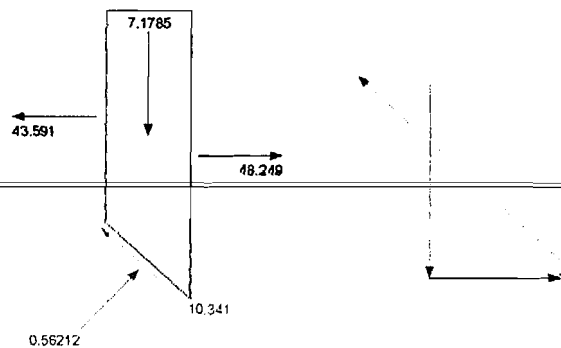
Slice 10 - Bishop Method	
Factor of Safety	0,223
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0205
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,4126
Mid-Height	1,2489
Base Length	0,5773
Base Angle	44,38
Polygon Closure Error	2,303
Anisotropic Strength Modifier	1
Weight	6,5619
Base Shear Force	9,5957
Base Normal Force	0,15698
Left Side Normal Force	39,169
Right Side Normal Force	43,591

Slice 10 - Bishop Method



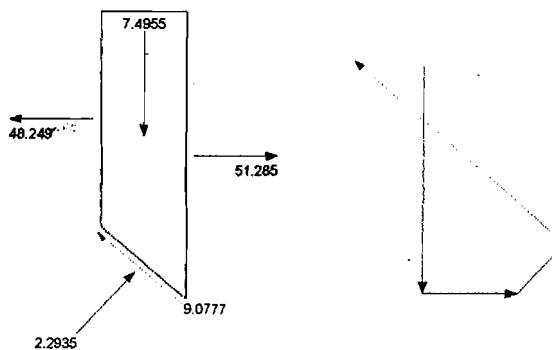
Slice 11 - Bishop Method	
Factor of Safety	0,223
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9719
Pore Water Pressure	0,23051
Pore Water Force	0,12987
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,41261
Mid-Height	1,2298
Base Length	0,5634
Base Angle	42,916
Polygon Closure Error	2,5852
Anisotropic Strength Modifier	1
Weight	7,1785
Base Shear Force	10,341
Base Normal Force	0,56212
Left Side Normal Force	43,591
Right Side Normal Force	48,249

Slice 11 - Bishop Method



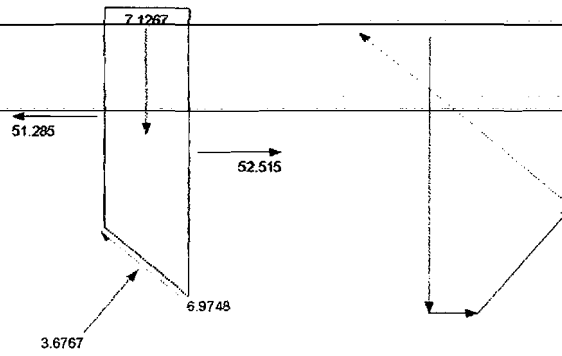
Slice 12 - Bishop Method	
Factor of Safety	0,223
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9774
Pore Water Pressure	3,948
Pore Water Force	2,2294
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,42335
Mid-Height	1,1907
Base Length	0,56498
Base Angle	41,469
Polygon Closure Error	2,2694
Anisotropic Strength Modifier	1
Weight	7,4955
Base Shear Force	9,0777
Base Normal Force	2,2935
Left Side Normal Force	48,249
Right Side Normal Force	51,285

Slice 12 - Bishop Method



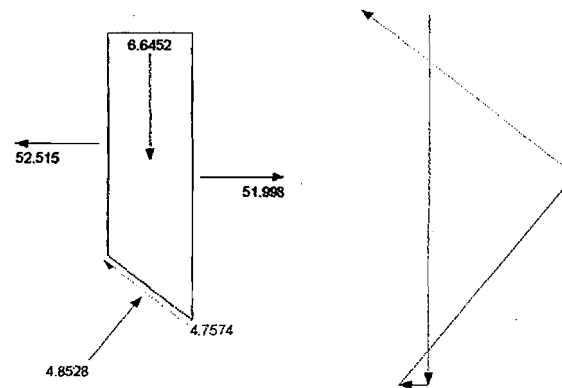
Slice 13 - Bishop Method	
Factor of Safety	0,223
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9352
Pore Water Pressure	7,5233
Pore Water Force	4,1598
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,42334
Mid-Height	1,1321
Base Length	0,55292
Base Angle	40,036
Polygon Closure Error	1,746
Anisotropic Strength Modifier	1
Weight	7,1267
Base Shear Force	6,9748
Base Normal Force	3,6767
Left Side Normal Force	51,285
Right Side Normal Force	52,515

Slice 13 - Bishop Method



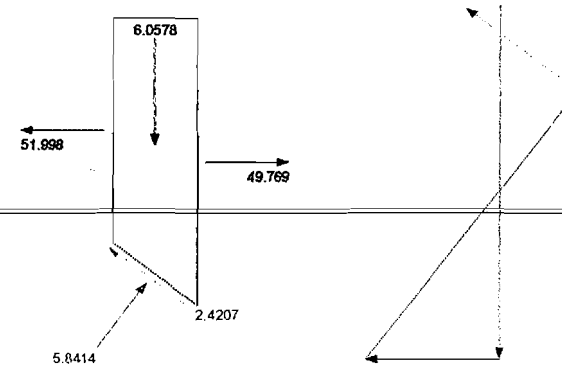
Slice 14 - Bishop Method	
Factor of Safety	0,223
Phi Angle	38
C (Strength)	3,5
C (Force)	1,8968
Pore Water Pressure	10,925
Pore Water Force	5,9206
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,42335
Mid-Height	1,0558
Base Length	0,54193
Base Angle	38,63
Polygon Closure Error	1,1629
Anisotropic Strength Modifier	1
Weight	6,6452
Base Shear Force	4,7574
Base Normal Force	4,8528
Left Side Normal Force	52,515
Right Side Normal Force	51,998

Slice 14 - Bishop Method



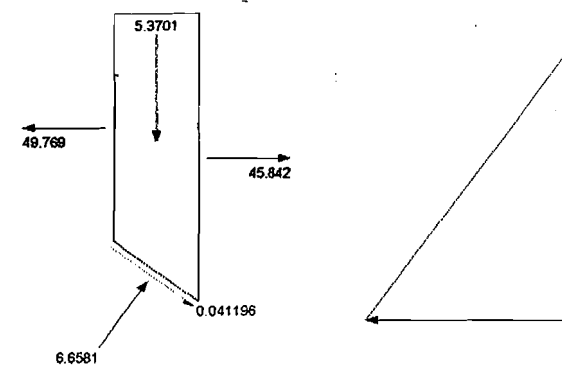
Slice 15 - Bishop Method	
Factor of Safety	0,223
Phi Angle	38
C (Strength)	3,5
C (Force)	1,8615
Pore Water Pressure	14,162
Pore Water Force	7,532
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,42334
Mid-Height	0,96229
Base Length	0,53186
Base Angle	37,254
Polygon Closure Error	0,57549
Anisotropic Strength Modifier	1
Weight	6,0578
Base Shear Force	2,4207
Base Normal Force	5,8414
Left Side Normal Force	51,998
Right Side Normal Force	49,769

Slice 15 - Bishop Method



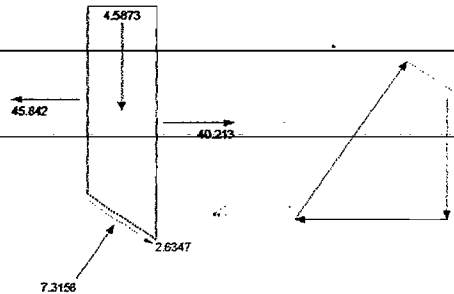
Slice 16 - Bishop Method	
Factor of Safety	0,223
Phi Angle	38
C (Strength)	3,5
C (Force)	1,8292
Pore Water Pressure	17,242
Pore Water Force	9,0112
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,42335
Mid-Height	0,85305
Base Length	0,52263
Base Angle	35,9
Polygon Closure Error	0,033291
Anisotropic Strength Modifier	1
Weight	5,3701
Base Shear Force	0,041196
Base Normal Force	6,6581
Left Side Normal Force	49,769
Right Side Normal Force	45,842

Slice 16 - Bishop Method



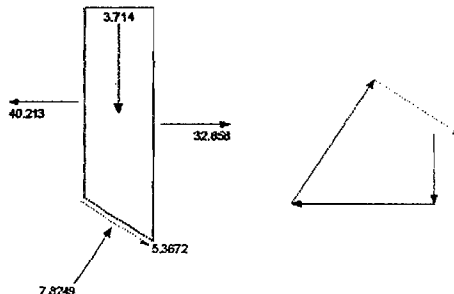
Slice 17 - Bishop Method	
Factor of Safety	0,223
Phi Angle	38
C (Strength)	3,5
C (Force)	1,7884
Pore Water Pressure	20,174
Pore Water Force	10,372
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,42334
Mid-Height	0,72871
Base Length	0,51412
Base Angle	34,571
Polygon Closure Error	0,695
Anisotropic Strength Modifier	1
Weight	4,5873
Base Shear Force	2,6347
Base Normal Force	7,3158
Left Side Normal Force	45,842
Right Side Normal Force	40,213

Slice 17 - Bishop Method



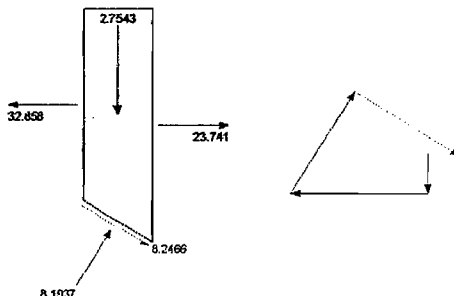
Slice 18 - Bishop Method	
Factor of Safety	0,223
Phi Angle	38
C (Strength)	3,5
C (Force)	1,772
Pore Water Pressure	22,965
Pore Water Force	11,627
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,42335
Mid-Height	0,58998
Base Length	0,50629
Base Angle	33,261
Polygon Closure Error	1,4085
Anisotropic Strength Modifier	1
Weight	3,714
Base Shear Force	5,3672
Base Normal Force	7,8249
Left Side Normal Force	40,213
Right Side Normal Force	32,858

Slice 18 - Bishop Method



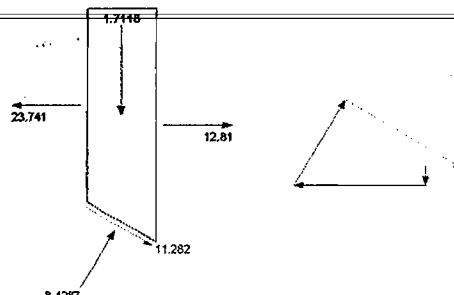
Slice 19 - Bishop Method	
Factor of Safety	0,223
Phi Angle	38
C (Strength)	3,5
C (Force)	1,7467
Pore Water Pressure	25,623
Pore Water Force	12,787
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,42334
Mid-Height	0,43753
Base Length	0,49904
Base Angle	31,972
Polygon Closure Error	2,0969
Anisotropic Strength Modifier	1
Weight	2,7543
Base Shear Force	8,2466
Base Normal Force	8,1937
Left Side Normal Force	32,858
Right Side Normal Force	23,741

Slice 19 - Bishop Method



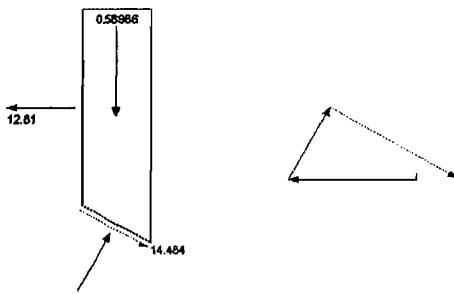
Slice 20 - Bishop Method	
Factor of Safety	0,223
Phi Angle	38
C (Strength)	3,5
C (Force)	1,7232
Pore Water Pressure	28,151
Pore Water Force	13,86
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,42335
Mid-Height	0,27193
Base Length	0,49235
Base Angle	30,7
Polygon Closure Error	3,0461
Anisotropic Strength Modifier	1
Weight	1,7118
Base Shear Force	11,282
Base Normal Force	8,4287
Left Side Normal Force	23,741
Right Side Normal Force	12,81

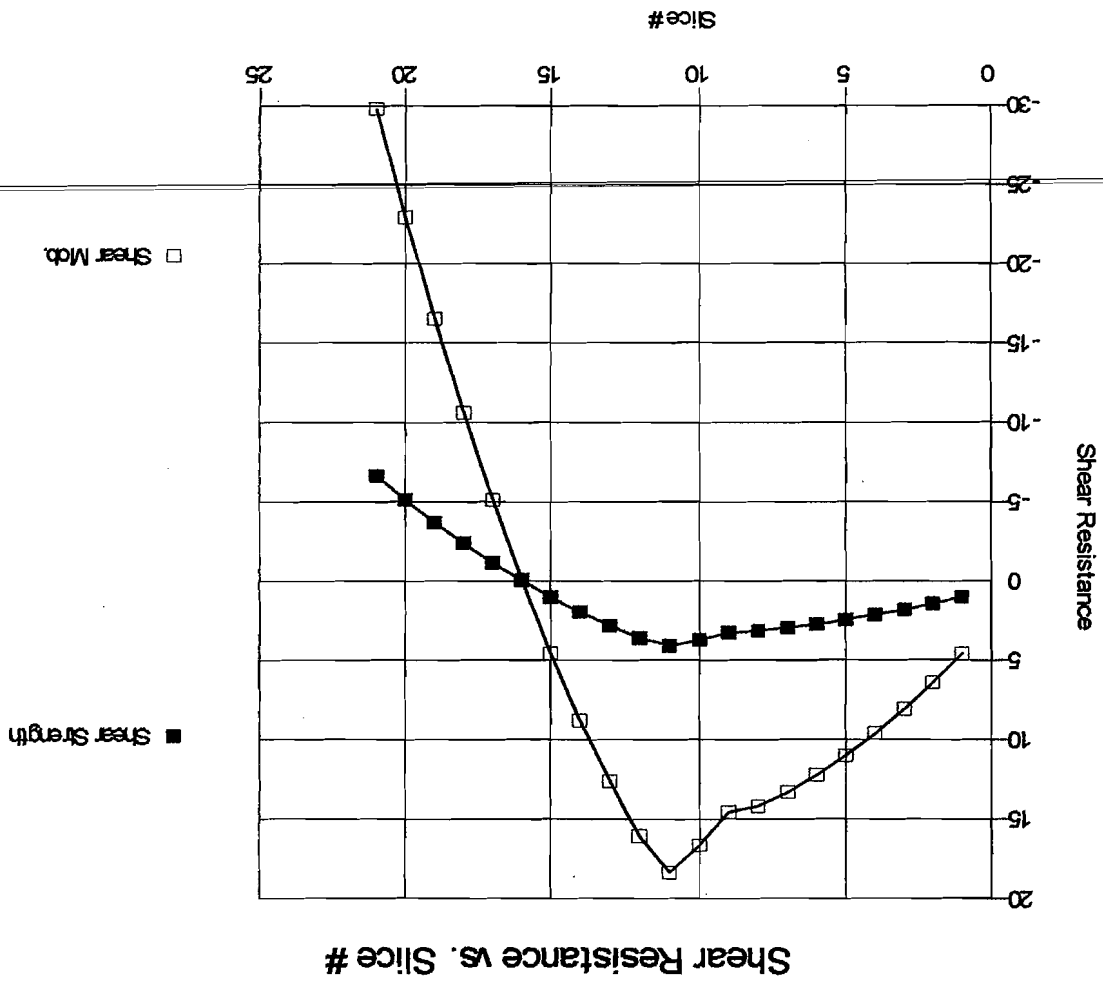
Slice 20 - Bishop Method

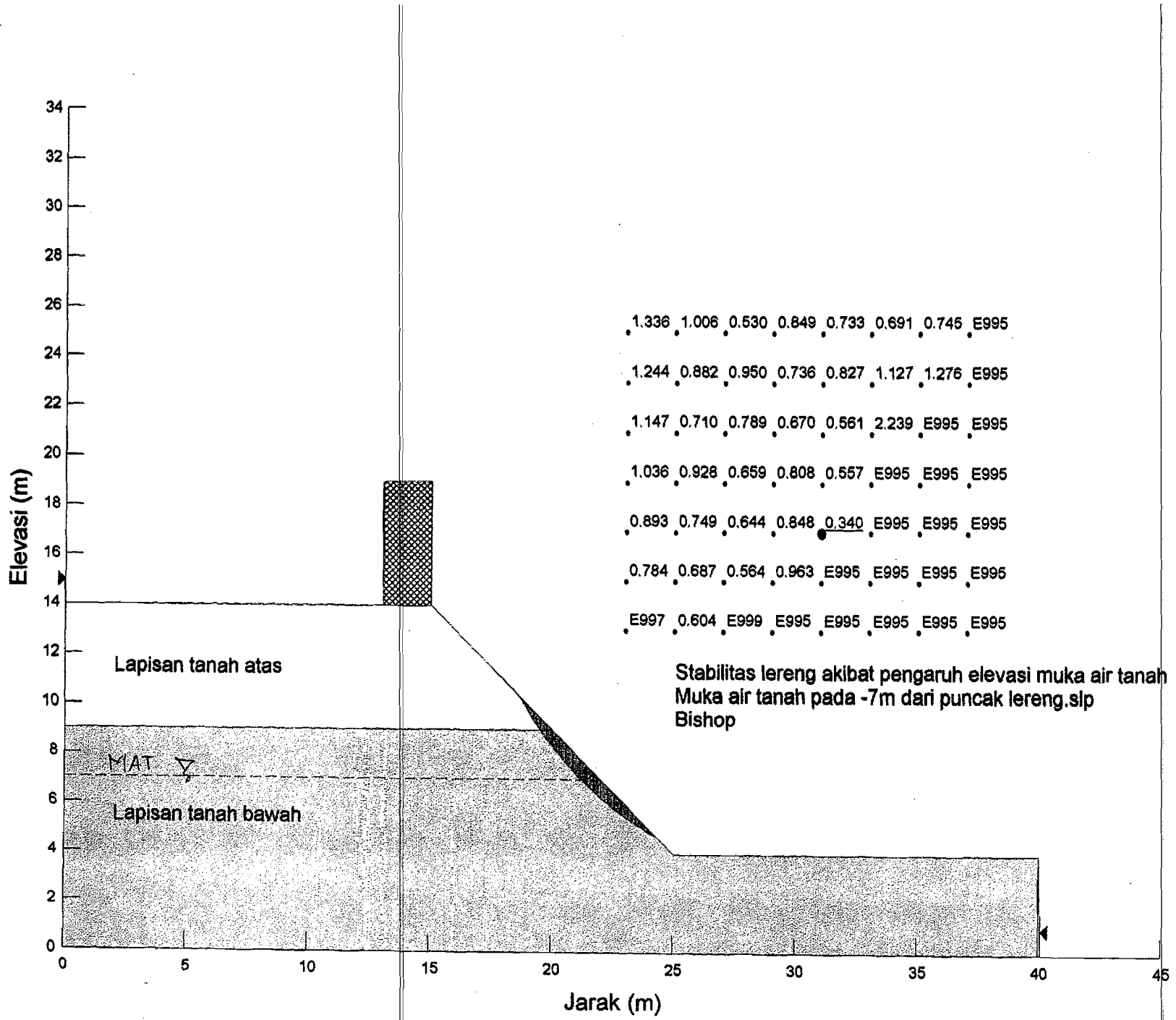


Slice 21 - Bishop Method	
Factor of Safety	0,223
Phi Angle	38
C (Strength)	3,5
C (Force)	1,7015
Pore Water Pressure	30,555
Pore Water Force	14,854
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,42335
Mid-Height	0,0937
Base Length	0,48615
Base Angle	29,445
Polygon Closure Error	3,9831
Anisotropic Strength Modifier	1
Weight	0,58986
Base Shear Force	14,484
Base Normal Force	8,5351
Left Side Normal Force	12,81
Right Side Normal Force	12,81

Slice 21 - Bishop Method

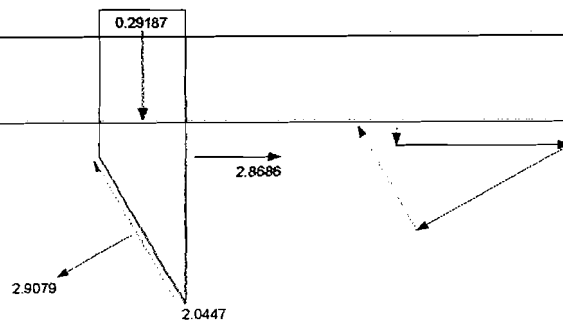






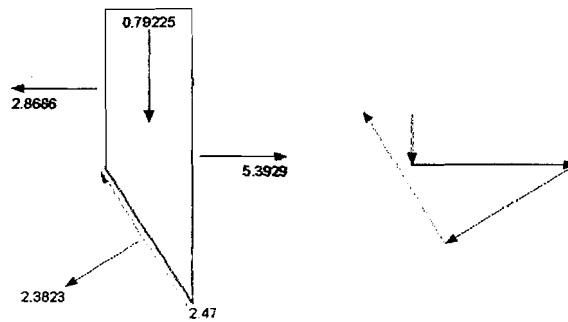
Slice 1 - Bishop Method	
Factor of Safety	0,34
Phi Angle	28
C (Strength)	4,2
C (Force)	2,2416
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,26492
Mid-Height	0,10433
Base Length	0,53372
Base Angle	60,24
Polygon Closure Error	0,65428
Anisotropic Strength Modifier	1
Weight	0,29187
Base Shear Force	2,0447
Base Normal Force	2,9079
Right Side Normal Force	2,8686

Slice 1 - Bishop Method



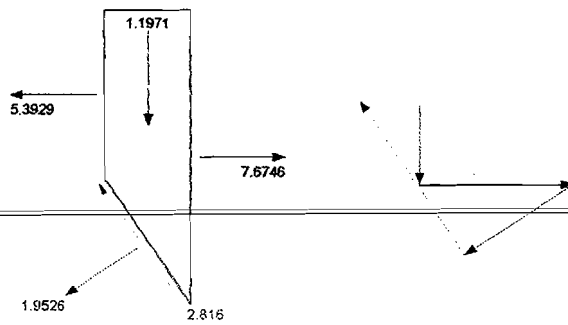
Slice 2 - Bishop Method	
Factor of Safety	0,34
Phi Angle	28
C (Strength)	4,2
C (Force)	2,1069
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,26492
Mid-Height	0,28319
Base Length	0,50163
Base Angle	58,122
Polygon Closure Error	0,76991
Anisotropic Strength Modifier	1
Weight	0,79225
Base Shear Force	2,47
Base Normal Force	2,3823
Left Side Normal Force	2,8686
Right Side Normal Force	5,3929

Slice 2 - Bishop Method



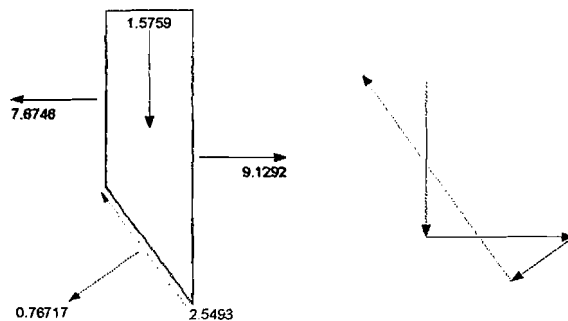
Slice 3 - Bishop Method	
Factor of Safety	0,34
Phi Angle	28
C (Strength)	4,2
C (Force)	1,9961
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,26491
Mid-Height	0,42791
Base Length	0,47526
Base Angle	56,123
Polygon Closure Error	0,88704
Anisotropic Strength Modifier	1
Weight	1,1971
Base Shear Force	2,816
Base Normal Force	1,9526
Left Side Normal Force	5,3929
Right Side Normal Force	7,6746

Slice 3 - Bishop Method



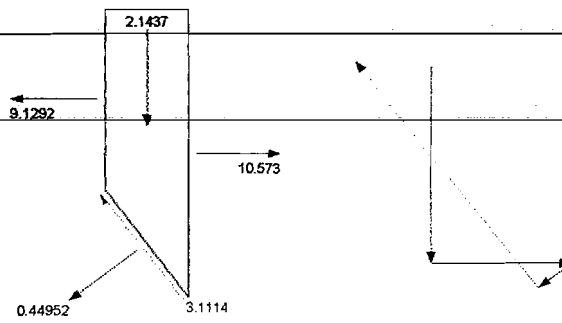
Slice 4 - Bishop Method	
Factor of Safety	0,34
Phi Angle	38
C (Strength)	3,5
C (Force)	1,4666
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,24457
Mid-Height	0,53966
Base Length	0,41903
Base Angle	54,292
Polygon Closure Error	0,63732
Anisotropic Strength Modifier	1
Weight	1,5759
Base Shear Force	2,5493
Base Normal Force	0,76717
Left Side Normal Force	7,6746
Right Side Normal Force	9,1292

Slice 4 - Bishop Method



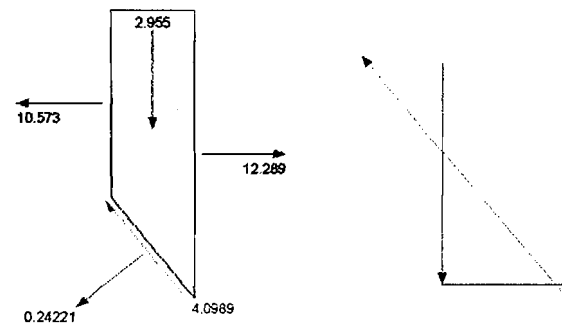
Slice 5 - Bishop Method	
Factor of Safety	0,34
Phi Angle	38
C (Strength)	3,5
C (Force)	1,4096
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,24456
Mid-Height	0,62492
Base Length	0,40276
Base Angle	52,611
Polygon Closure Error	0,79341
Anisotropic Strength Modifier	1
Weight	2,1437
Base Shear Force	3,1114
Base Normal Force	0,44952
Left Side Normal Force	9,1292
Right Side Normal Force	10,573

Slice 5 - Bishop Method



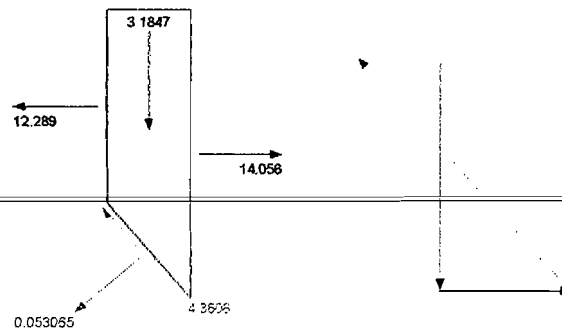
Slice 6 - Bishop Method	
Factor of Safety	0,34
Phi Angle	38
C (Strength)	3,5
C (Force)	1,5836
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,28559
Mid-Height	0,69582
Base Length	0,45246
Base Angle	50,861
Polygon Closure Error	1,0452
Anisotropic Strength Modifier	1
Weight	2,955
Base Shear Force	4,0989
Base Normal Force	0,24221
Left Side Normal Force	10,573
Right Side Normal Force	12,289

Slice 6 - Bishop Method



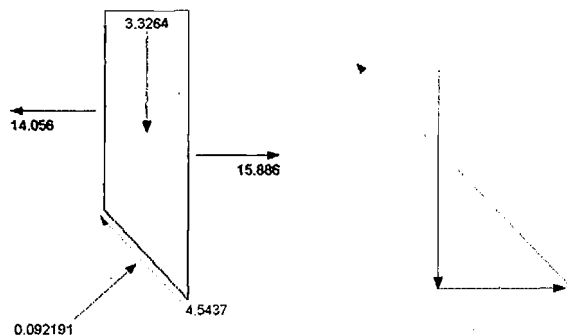
Slice 7 - Bishop Method	
Factor of Safety	0,34
Phi Angle	38
C (Strength)	3,5
C (Force)	1,525
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,2856
Mid-Height	0,7499
Base Length	0,4357
Base Angle	49,043
Polygon Closure Error	1,112
Anisotropic Strength Modifier	1
Weight	3,1847
Base Shear Force	4,3608
Base Normal Force	0,053065
Left Side Normal Force	12,289
Right Side Normal Force	14,056

Slice 7 - Bishop Method



Slice 8 - Bishop Method	
Factor of Safety	0,34
Phi Angle	38
C (Strength)	3,5
C (Force)	1,4737
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,28559
Mid-Height	0,78327
Base Length	0,42105
Base Angle	47,291
Polygon Closure Error	1,2041
Anisotropic Strength Modifier	1
Weight	3,3264
Base Shear Force	4,5437
Base Normal Force	0,092191
Left Side Normal Force	14,056
Right Side Normal Force	15,886

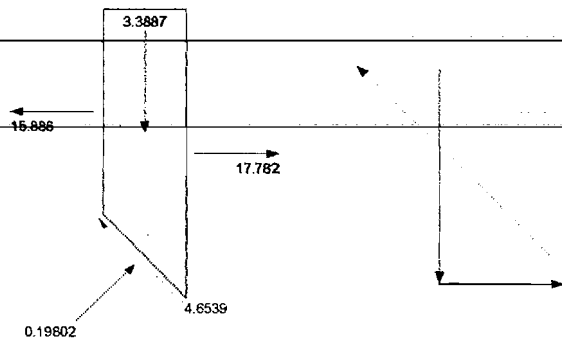
Slice 8 - Bishop Method





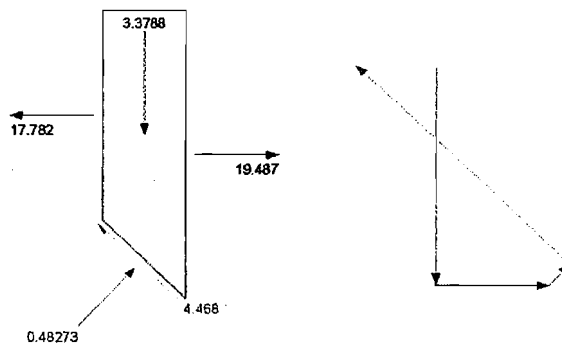
Slice 9 - Bishop Method	
Factor of Safety	0,34
Phi Angle	38
C (Strength)	3,5
C (Force)	1,4285
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,28559
Mid-Height	0,79795
Base Length	0,40814
Base Angle	45,594
Polygon Closure Error	1,2333
Anisotropic Strength Modifier	1
Weight	3,3887
Base Shear Force	4,6539
Base Normal Force	0,19802
Left Side Normal Force	15,886
Right Side Normal Force	17,782

Slice 9 - Bishop Method



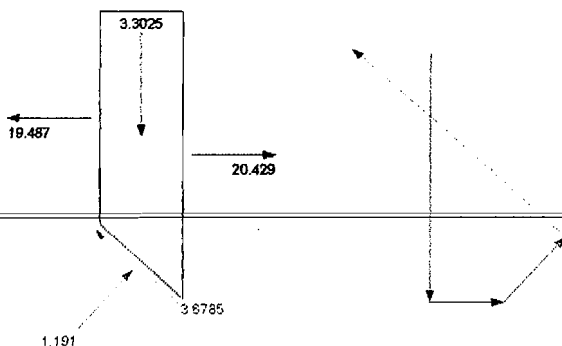
Slice 10 - Bishop Method	
Factor of Safety	0,34
Phi Angle	38
C (Strength)	3,5
C (Force)	1,3883
Pore Water Pressure	0,79217
Pore Water Force	0,31423
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,2856
Mid-Height	0,79561
Base Length	0,39667
Base Angle	43,948
Polygon Closure Error	1,184
Anisotropic Strength Modifier	1
Weight	3,3788
Base Shear Force	4,468
Base Normal Force	0,48273
Left Side Normal Force	17,782
Right Side Normal Force	19,487

Slice 10 - Bishop Method



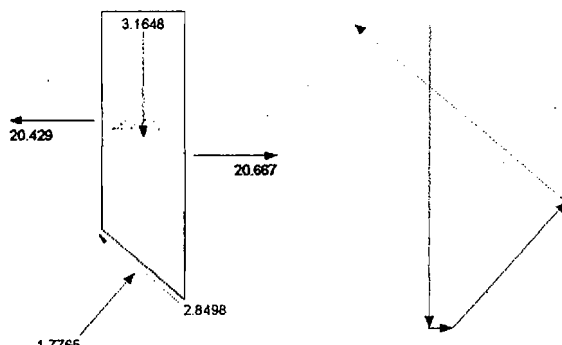
Slice 11 - Bishop Method	
Factor of Safety	0,34
Phi Angle	38
C (Strength)	3,5
C (Force)	1,3524
Pore Water Pressure	3,417
Pore Water Force	1,3203
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,28559
Mid-Height	0,77764
Base Length	0,3864
Base Angle	42,344
Polygon Closure Error	0,9748
Anisotropic Strength Modifier	1
Weight	3,3025
Base Shear Force	3,6785
Base Normal Force	1,191
Left Side Normal Force	19,487
Right Side Normal Force	20,429

Slice 11 - Bishop Method



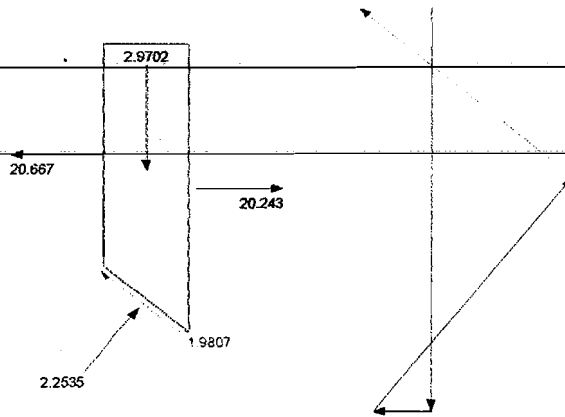
Slice 12 - Bishop Method	
Factor of Safety	0,34
Phi Angle	38
C (Strength)	3,5
C (Force)	1,3201
Pore Water Pressure	5,9001
Pore Water Force	2,2253
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,28559
Mid-Height	0,74524
Base Length	0,37716
Base Angle	40,782
Polygon Closure Error	0,75955
Anisotropic Strength Modifier	1
Weight	3,1648
Base Shear Force	2,8498
Base Normal Force	1,7765
Left Side Normal Force	20,429
Right Side Normal Force	20,667

Slice 12 - Bishop Method



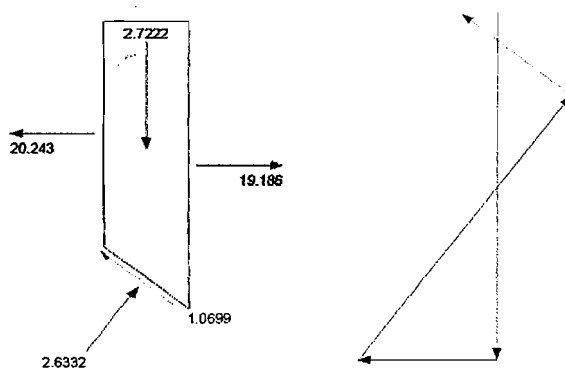
<b>Slice 13 - Bishop Method</b>	
Factor of Safety	0,34
Phi Angle	38
C (Strength)	3,5
C (Force)	1,2909
Pore Water Pressure	8,2514
Pore Water Force	3,0433
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,28559
Mid-Height	0,6994
Base Length	0,36882
Base Angle	39,255
Polygon Closure Error	0,51978
Anisotropic Strength Modifier	1
Weight	2,9702
Base Shear Force	1,9807
Base Normal Force	2,2535
Left Side Normal Force	20,667
Right Side Normal Force	20,243

Slice 13 - Bishop Method



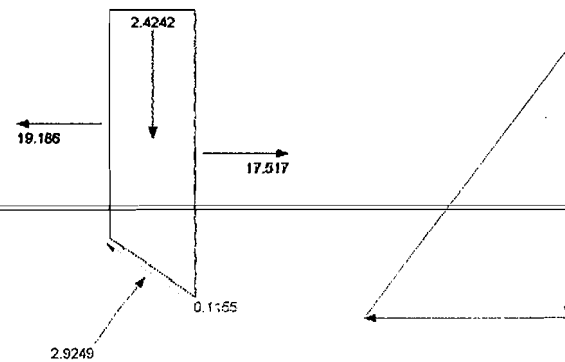
<b>Slice 14 - Bishop Method</b>	
Factor of Safety	0,34
Phi Angle	38
C (Strength)	3,5
C (Force)	1,2644
Pore Water Pressure	10,479
Pore Water Force	3,7857
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,2856
Mid-Height	0,64102
Base Length	0,36125
Base Angle	37,76
Polygon Closure Error	0,27222
Anisotropic Strength Modifier	1
Weight	2,7222
Base Shear Force	1,0699
Base Normal Force	2,6332
Left Side Normal Force	20,243
Right Side Normal Force	19,186

Slice 14 - Bishop Method



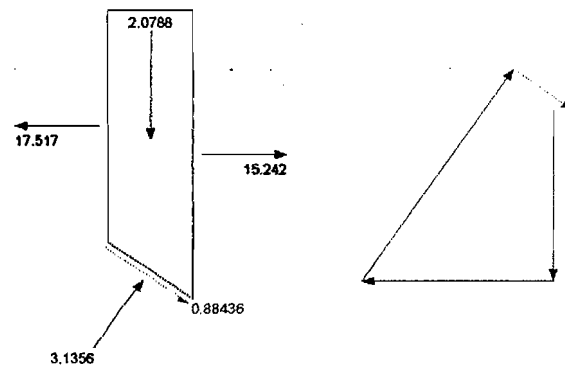
<b>Slice 15 - Bishop Method</b>	
Factor of Safety	0,34
Phi Angle	38
C (Strength)	3,5
C (Force)	1,2402
Pore Water Pressure	12,592
Pore Water Force	4,462
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,28559
Mid-Height	0,57083
Base Length	0,35435
Base Angle	36,297
Polygon Closure Error	0,014624
Anisotropic Strength Modifier	1
Weight	2,4242
Base Shear Force	0,1155
Base Normal Force	2,9249
Left Side Normal Force	19,186
Right Side Normal Force	17,517

Slice 15 - Bishop Method



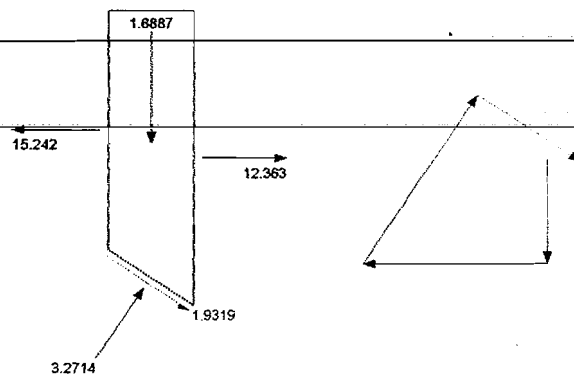
<b>Slice 16 - Bishop Method</b>	
Factor of Safety	0,34
Phi Angle	38
C (Strength)	3,5
C (Force)	1,2182
Pore Water Pressure	14,596
Pore Water Force	5,0799
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,28559
Mid-Height	0,48951
Base Length	0,34804
Base Angle	34,86
Polygon Closure Error	0,21949
Anisotropic Strength Modifier	1
Weight	2,0788
Base Shear Force	0,88436
Base Normal Force	3,1356
Left Side Normal Force	17,517
Right Side Normal Force	15,242

Slice 16 - Bishop Method



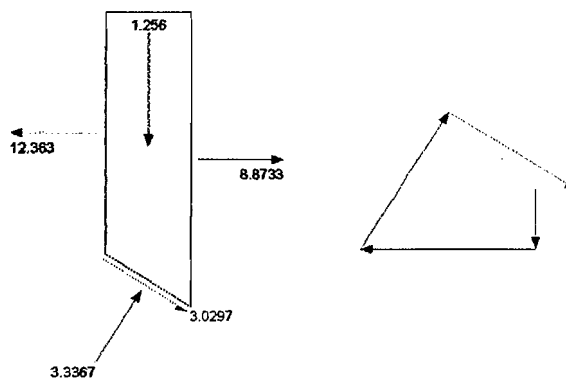
Slice 17 - Bishop Method	
Factor of Safety	0,34
Phi Angle	38
C (Strength)	3,5
C (Force)	1,198
Pore Water Pressure	16,495
Pore Water Force	5,646
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,2856
Mid-Height	0,39764
Base Length	0,34228
Base Angle	33,446
Polygon Closure Error	0,52342
Anisotropic Strength Modifier	1
Weight	1,6887
Base Shear Force	1,9319
Base Normal Force	3,2714
Left Side Normal Force	15,242
Right Side Normal Force	12,363

Slice 17 - Bishop Method



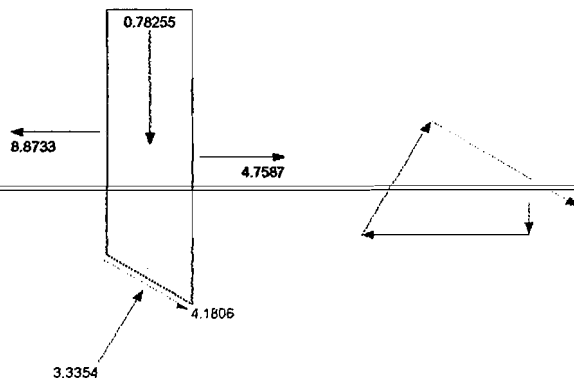
Slice 18 - Bishop Method	
Factor of Safety	0,34
Phi Angle	38
C (Strength)	3,5
C (Force)	1,1794
Pore Water Pressure	18,297
Pore Water Force	6,1656
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,28559
Mid-Height	0,29574
Base Length	0,33697
Base Angle	32,057
Polygon Closure Error	0,82008
Anisotropic Strength Modifier	1
Weight	1,256
Base Shear Force	3,0297
Base Normal Force	3,3367
Left Side Normal Force	12,363
Right Side Normal Force	8,8733

Slice 18 - Bishop Method



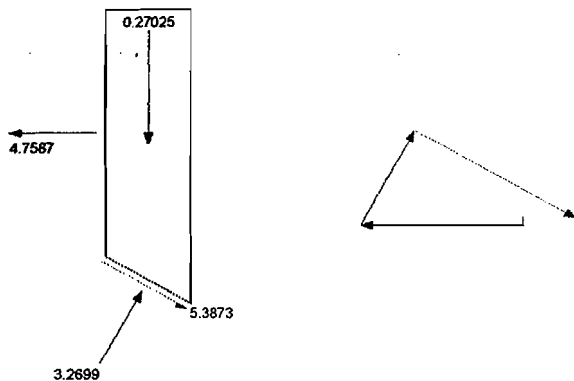
Slice 19 - Bishop Method	
Factor of Safety	0,34
Phi Angle	38
C (Strength)	3,5
C (Force)	1,1623
Pore Water Pressure	20,005
Pore Water Force	6,6435
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,28559
Mid-Height	0,18427
Base Length	0,3321
Base Angle	30,688
Polygon Closure Error	1,1706
Anisotropic Strength Modifier	1
Weight	0,78255
Base Shear Force	4,1806
Base Normal Force	3,3354
Left Side Normal Force	8,8733
Right Side Normal Force	4,7587

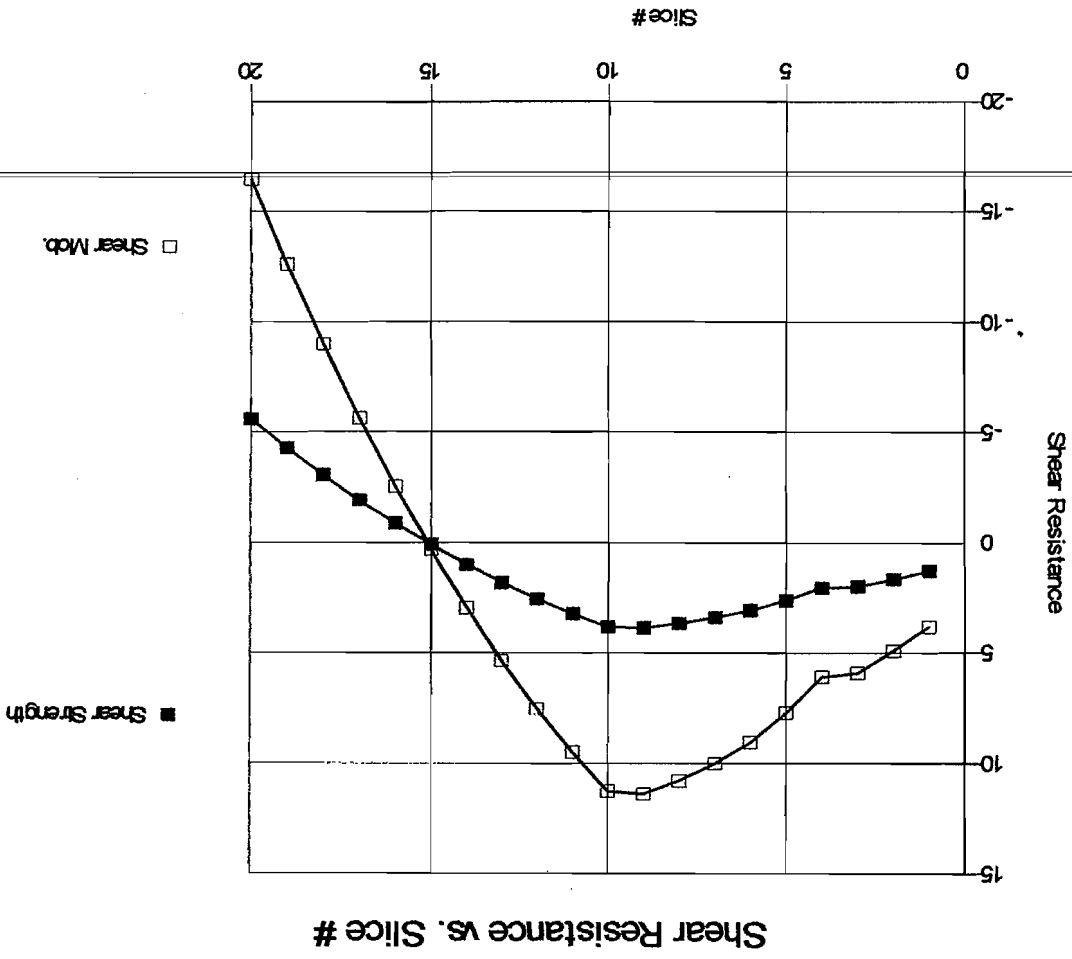
Slice 19 - Bishop Method

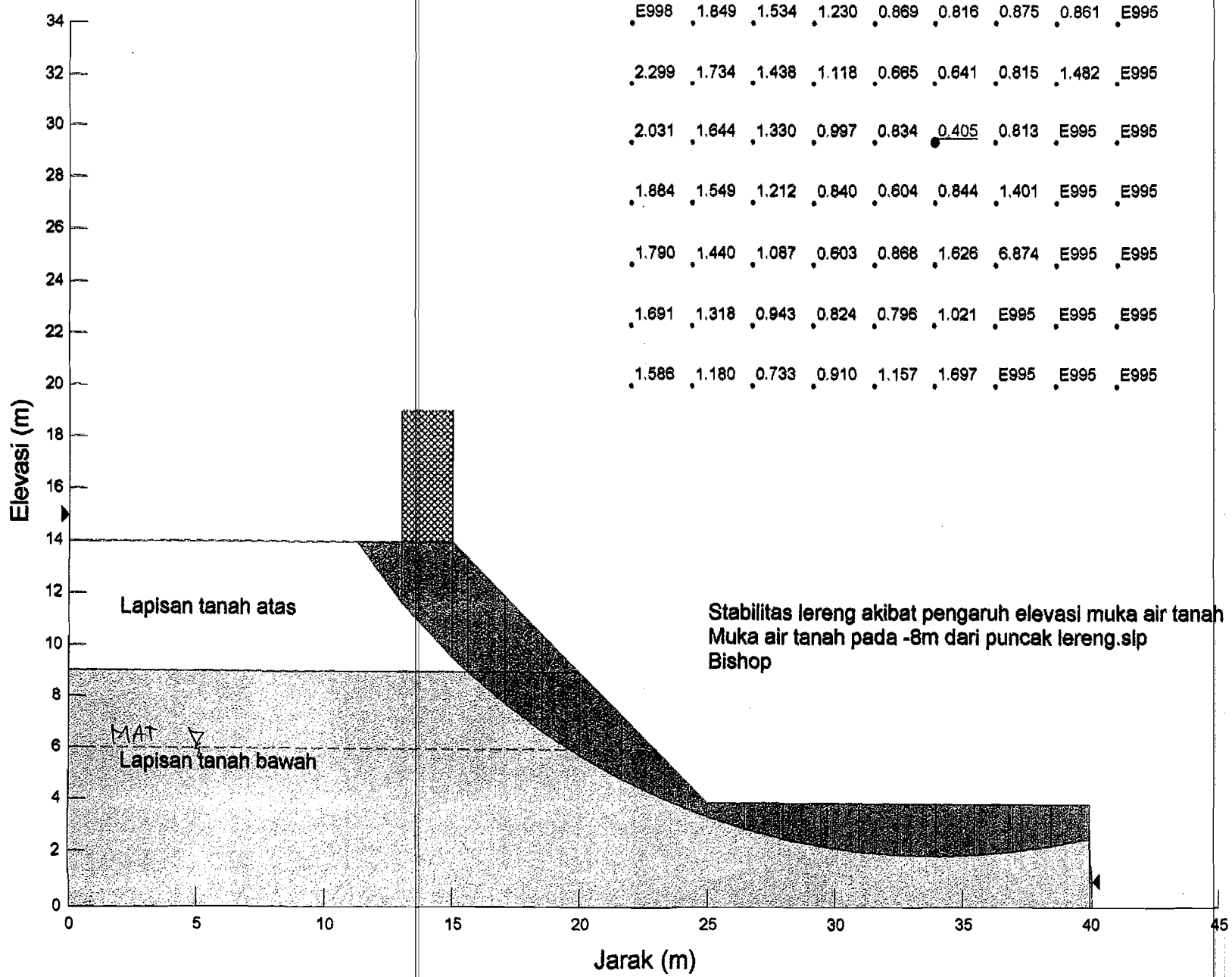


Slice 20 - Bishop Method	
Factor of Safety	0,34
Phi Angle	38
C (Strength)	3,5
C (Force)	1,1466
Pore Water Pressure	21,622
Pore Water Force	7,0833
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,28558
Mid-Height	0,063636
Base Length	0,32759
Base Angle	29,338
Polygon Closure Error	1,5354
Anisotropic Strength Modifier	1
Weight	0,27025
Base Shear Force	5,3873
Base Normal Force	3,2699
Left Side Normal Force	4,7587

Slice 20 - Bishop Method

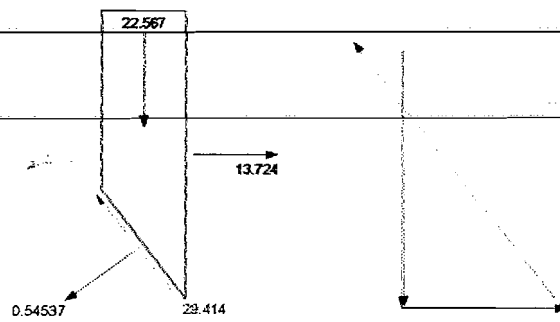






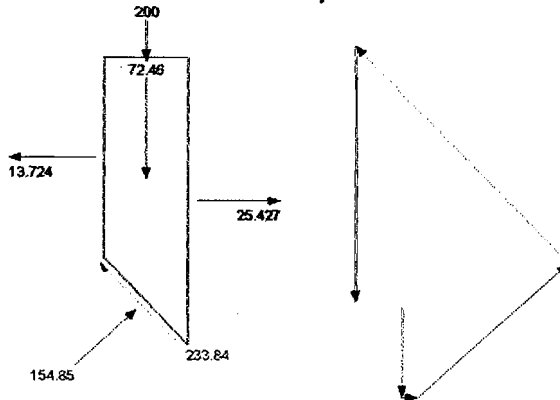
Slice 1 - Bishop Method	
Factor of Safety	0,405
Phi Angle	28
C (Strength)	4,2
C (Force)	12,183
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,7524
Mid-Height	1,2195
Base Length	2,9008
Base Angle	52,835
Polygon Closure Error	4,265
Anisotropic Strength Modifier	1
Weight	22,567
Base Shear Force	29,414
Base Normal Force	0,54537
Right Side Normal Force	13,724

Slice 1 - Bishop Method



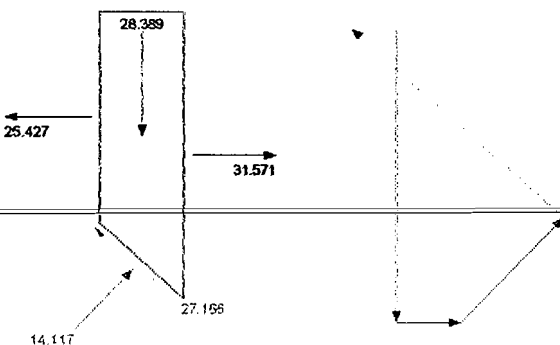
Slice 2 - Bishop Method	
Factor of Safety	0,405
Phi Angle	28
C (Strength)	4,2
C (Force)	12,256
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	2
Mid-Height	3,4309
Base Length	2,918
Base Angle	46,733
Polygon Closure Error	36,245
Anisotropic Strength Modifier	1
Weight	72,46
Base Shear Force	233,84
Base Normal Force	154,85
Left Side Normal Force	13,724
Right Side Normal Force	25,427
Surface Pressure Load	200

Slice 2 - Bishop Method



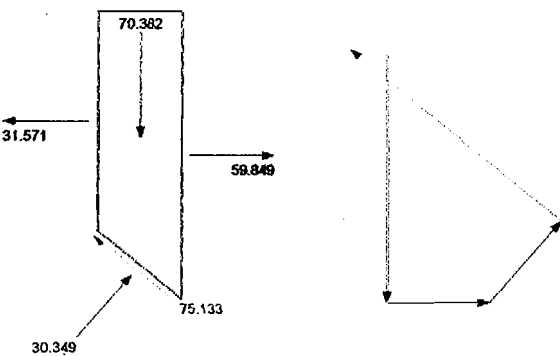
Slice 3 - Bishop Method	
Factor of Safety	0,405
Phi Angle	28
C (Strength)	4,2
C (Force)	3,4832
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,60846
Mid-Height	4,4183
Base Length	0,82933
Base Angle	42,804
Polygon Closure Error	4,2583
Anisotropic Strength Modifier	1
Weight	28,389
Base Shear Force	27,166
Base Normal Force	14,117
Left Side Normal Force	25,427
Right Side Normal Force	31,571

Slice 3 - Bishop Method



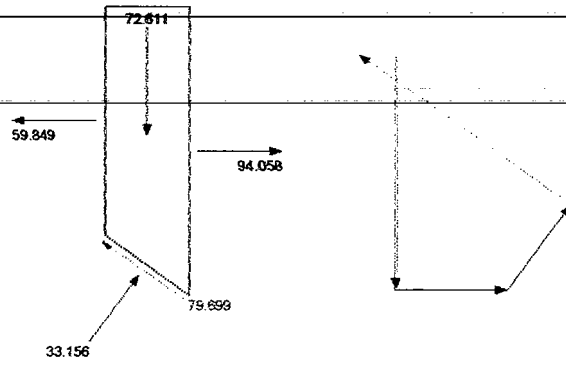
Slice 4 - Bishop Method	
Factor of Safety	0,405
Phi Angle	38
C (Strength)	3,5
C (Force)	6,6817
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,4638
Mid-Height	4,2941
Base Length	1,9091
Base Angle	39,934
Polygon Closure Error	10,143
Anisotropic Strength Modifier	1
Weight	70,382
Base Shear Force	75,133
Base Normal Force	30,349
Left Side Normal Force	31,571
Right Side Normal Force	59,849

Slice 4 - Bishop Method



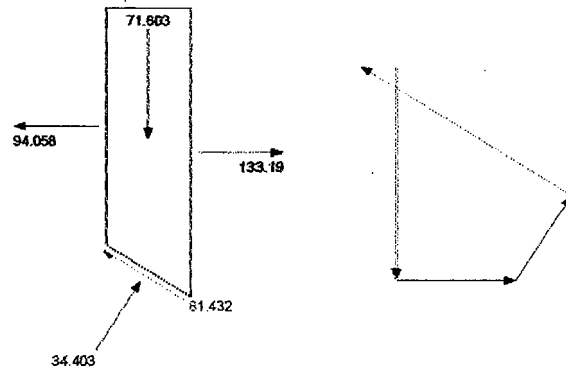
<b>Slice 5 - Bishop Method</b>	
Factor of Safety	0,405
Phi Angle	38
C (Strength)	3,5
C (Force)	6,3358
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,4639
Mid-Height	3,9722
Base Length	1,8102
Base Angle	36,035
Polygon Closure Error	11,158
Anisotropic Strength Modifier	1
Weight	72,611
Base Shear Force	79,699
Base Normal Force	33,156
Left Side Normal Force	59,849
Right Side Normal Force	94,058

Slice 5 - Bishop Method



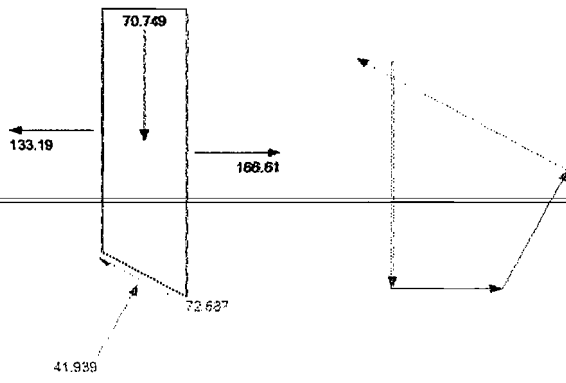
<b>Slice 6 - Bishop Method</b>	
Factor of Safety	0,405
Phi Angle	38
C (Strength)	3,5
C (Force)	6,0628
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,4639
Mid-Height	3,5016
Base Length	1,7322
Base Angle	32,321
Polygon Closure Error	11,808
Anisotropic Strength Modifier	1
Weight	71,603
Base Shear Force	81,432
Base Normal Force	34,403
Left Side Normal Force	94,058
Right Side Normal Force	133,19

Slice 6 - Bishop Method



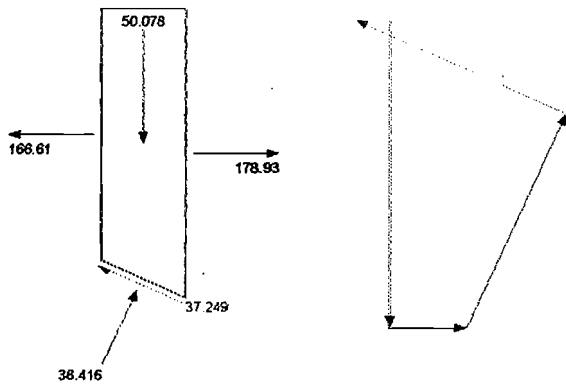
<b>Slice 7 - Bishop Method</b>	
Factor of Safety	0,405
Phi Angle	38
C (Strength)	3,5
C (Force)	6,6388
Pore Water Pressure	6,7487
Pore Water Force	12,801
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,6667
Mid-Height	2,8547
Base Length	1,8068
Base Angle	28,517
Polygon Closure Error	10,903
Anisotropic Strength Modifier	1
Weight	70,749
Base Shear Force	72,687
Base Normal Force	41,939
Left Side Normal Force	133,19
Right Side Normal Force	166,61

Slice 7 - Bishop Method



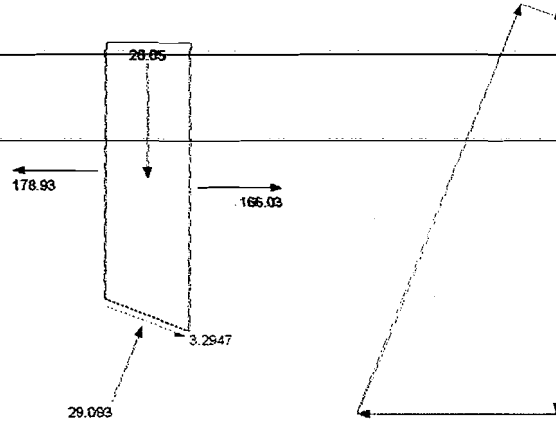
<b>Slice 8 - Bishop Method</b>	
Factor of Safety	0,405
Phi Angle	38
C (Strength)	3,5
C (Force)	6,416
Pore Water Pressure	14,916
Pore Water Force	27,343
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,6667
Mid-Height	2,0208
Base Length	1,8331
Base Angle	24,607
Polygon Closure Error	5,5086
Anisotropic Strength Modifier	1
Weight	50,078
Base Shear Force	37,249
Base Normal Force	38,416
Left Side Normal Force	166,61
Right Side Normal Force	178,93

Slice 8 - Bishop Method



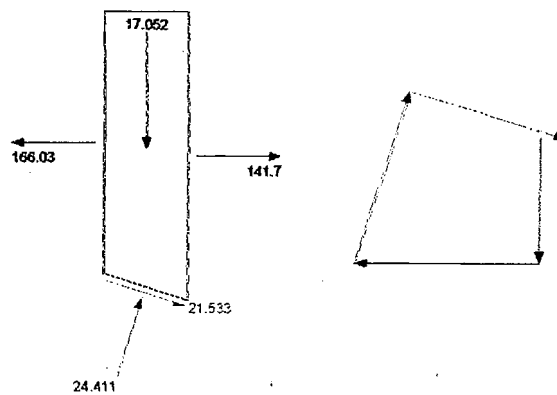
Slice 9 - Bishop Method	
Factor of Safety	0,405
Phi Angle	38
C (Strength)	3,5
C (Force)	6,2407
Pore Water Pressure	21,754
Pore Water Force	38,788
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,6667
Mid-Height	1,0511
Base Length	1,7831
Base Angle	20,816
Polygon Closure Error	0,43639
Anisotropic Strength Modifier	1
Weight	26,05
Base Shear Force	3,2947
Base Normal Force	29,093
Left Side Normal Force	178,93
Right Side Normal Force	166,03

Slice 9 - Bishop Method



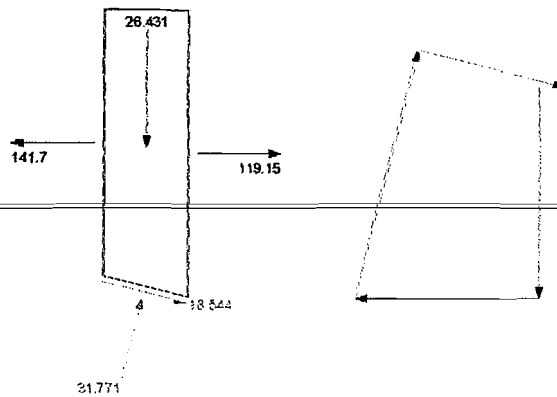
Slice 10 - Bishop Method	
Factor of Safety	0,405
Phi Angle	38
C (Strength)	3,5
C (Force)	5,4988
Pore Water Pressure	27,115
Pore Water Force	42,6
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,5
Mid-Height	0,76447
Base Length	1,5711
Base Angle	17,3
Polygon Closure Error	3,4175
Anisotropic Strength Modifier	1
Weight	17,052
Base Shear Force	21,533
Base Normal Force	24,411
Left Side Normal Force	166,03
Right Side Normal Force	141,7

Slice 10 - Bishop Method



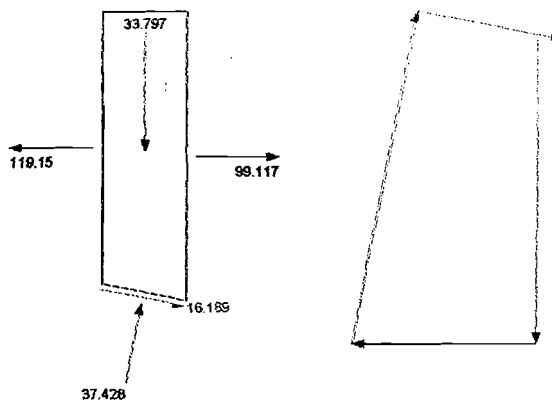
Slice 11 - Bishop Method

Slice 11 - Bishop Method	
Factor of Safety	0,405
Phi Angle	38
C (Strength)	3,5
C (Force)	5,4115
Pore Water Pressure	31,239
Pore Water Force	48,3
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,5
Mid-Height	1,185
Base Length	1,5461
Base Angle	14,033
Polygon Closure Error	3,0182
Anisotropic Strength Modifier	1
Weight	26,431
Base Shear Force	18,544
Base Normal Force	31,771
Left Side Normal Force	141,7
Right Side Normal Force	119,15



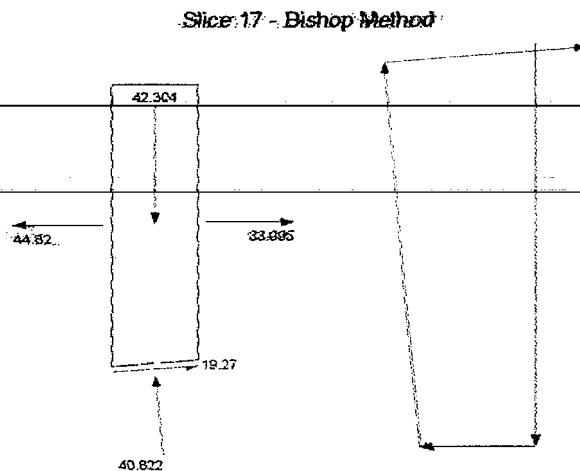
Slice 12 - Bishop Method

Slice 12 - Bishop Method	
Factor of Safety	0,405
Phi Angle	38
C (Strength)	3,5
C (Force)	5,3449
Pore Water Pressure	34,478
Pore Water Force	52,652
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,5
Mid-Height	1,5152
Base Length	1,5271
Base Angle	10,811
Polygon Closure Error	2,62
Anisotropic Strength Modifier	1
Weight	33,797
Base Shear Force	16,189
Base Normal Force	37,428
Left Side Normal Force	119,15
Right Side Normal Force	99,117

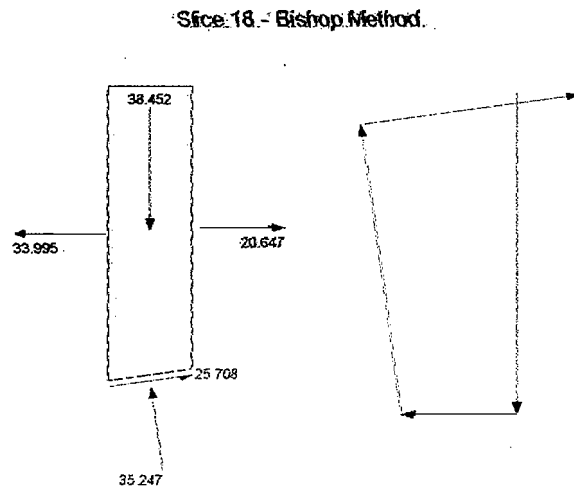




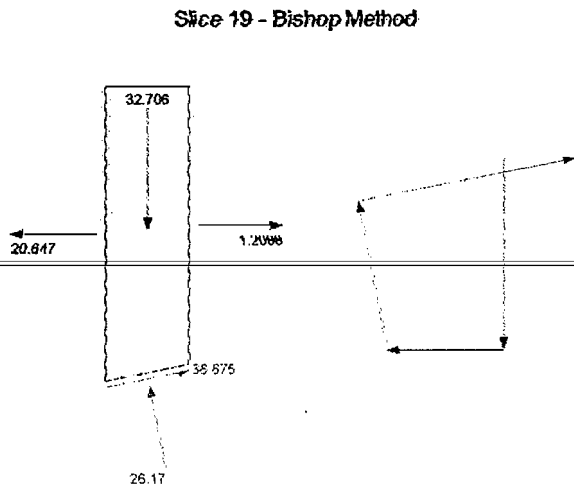
<b>Slice 17 - Bishop Method</b>	
Factor of Safety	0,405
Phi Angle	38
C (Strength)	3,5
C (Force)	5,2699
Pore Water Pressure	38,219
Pore Water Force	57,546
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,5
Mid-Height	1,8966
Base Length	1,5057
Base Angle	4,9866
Polygon Closure Error	4,865
Anisotropic Strength Modifier	1
Weight	42,304
Base Shear Force	19,27
Base Normal Force	40,822
Left Side Normal Force	44,82
Right Side Normal Force	33,995



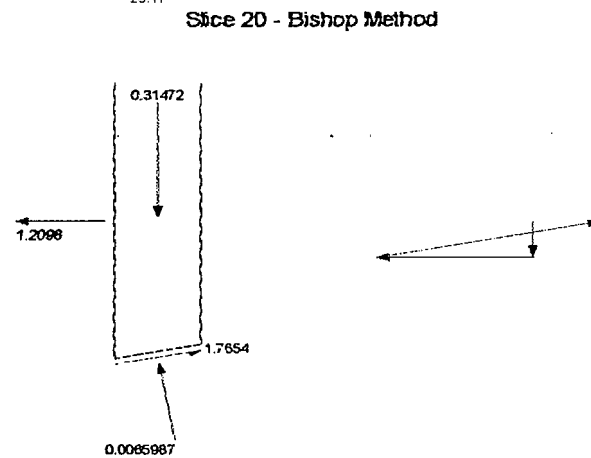
<b>Slice 18 - Bishop Method</b>	
Factor of Safety	0,405
Phi Angle	38
C (Strength)	3,5
C (Force)	5,3036
Pore Water Pressure	36,525
Pore Water Force	55,347
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,5
Mid-Height	1,7209
Base Length	1,5153
Base Angle	8,1534
Polygon Closure Error	7,1136
Anisotropic Strength Modifier	1
Weight	38,452
Base Shear Force	25,708
Base Normal Force	35,247
Left Side Normal Force	33,995
Right Side Normal Force	20,647



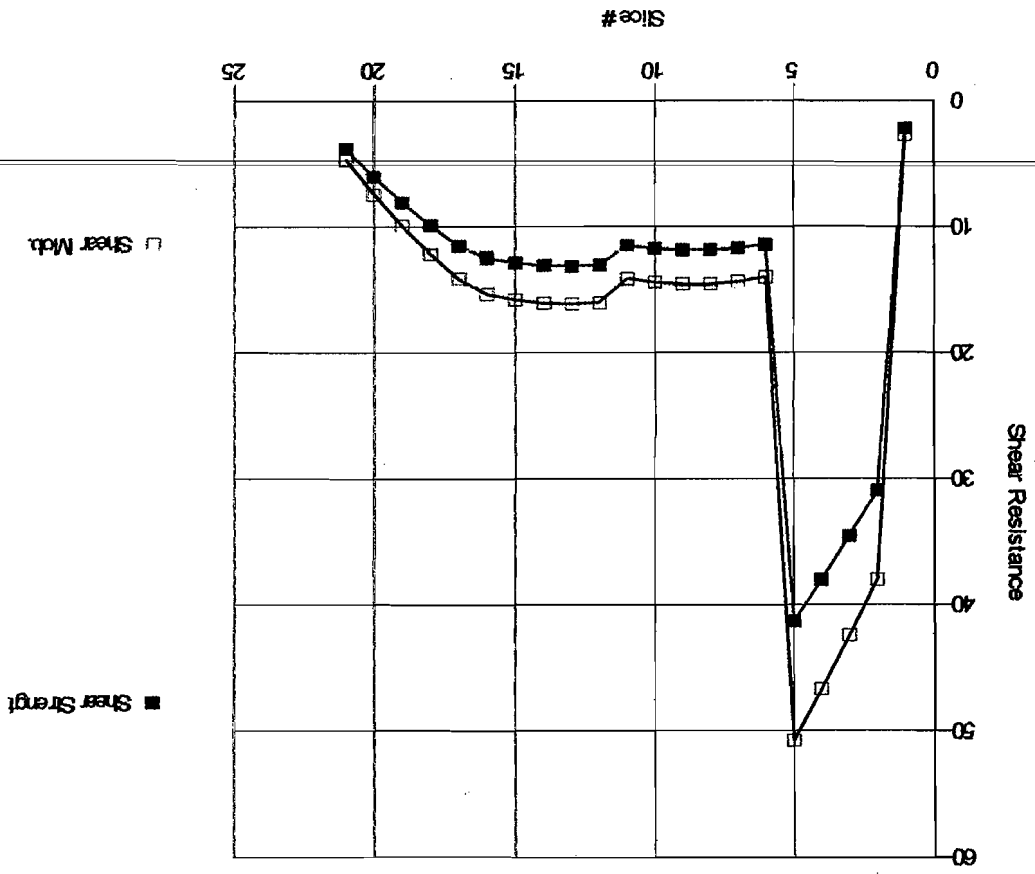
<b>Slice 19 - Bishop Method</b>	
Factor of Safety	0,405
Phi Angle	38
C (Strength)	3,5
C (Force)	5,3548
Pore Water Pressure	33,998
Pore Water Force	52,014
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,5
Mid-Height	1,4863
Base Length	1,5299
Base Angle	11,345
Polygon Closure Error	11,736
Anisotropic Strength Modifier	1
Weight	32,706
Base Shear Force	36,675
Base Normal Force	26,17
Left Side Normal Force	20,647
Right Side Normal Force	1,2098

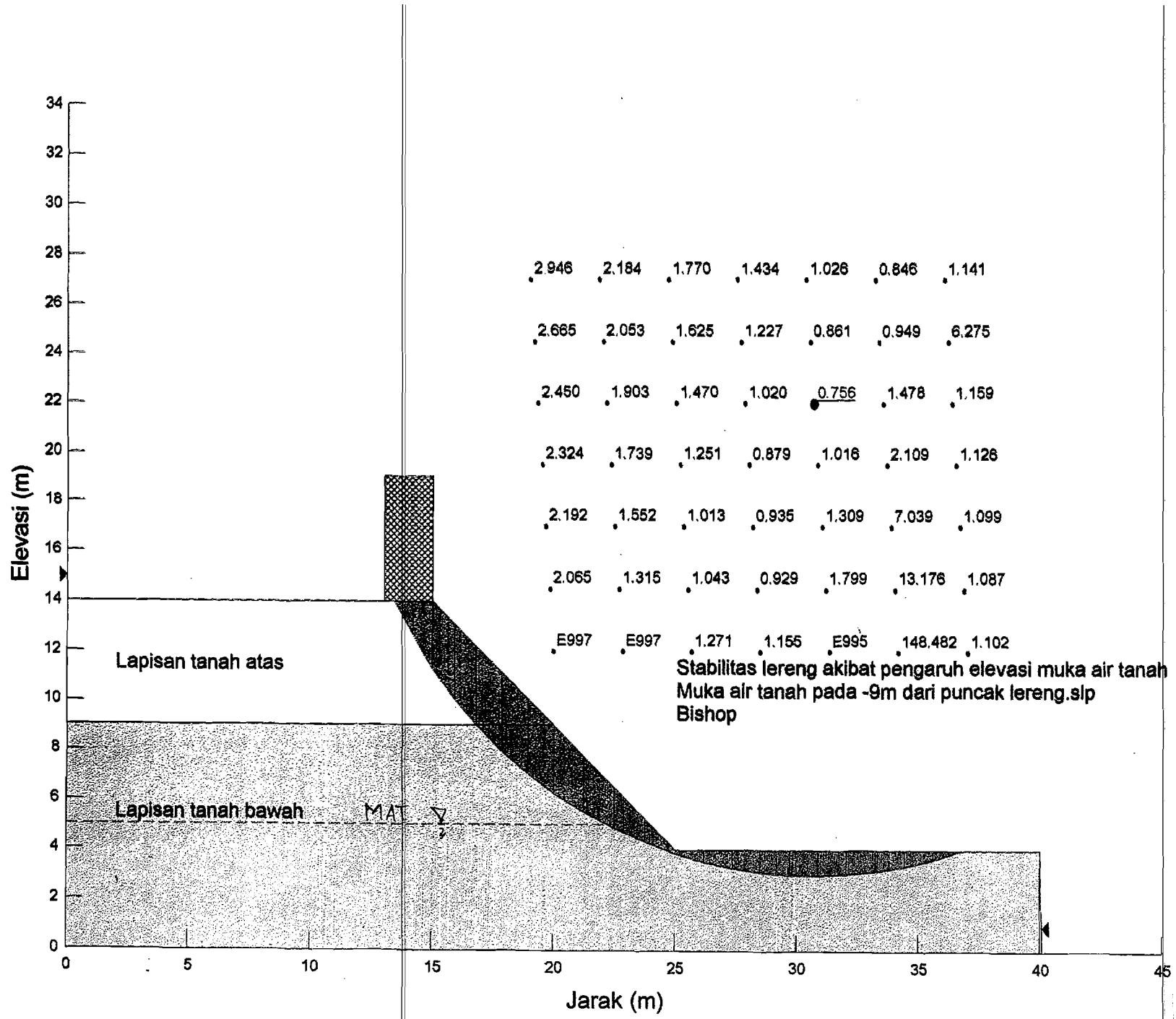


<b>Slice 20 - Bishop Method</b>	
Factor of Safety	0,405
Phi Angle	38
C (Strength)	3,5
C (Force)	0,11551
Pore Water Pressure	32,38
Pore Water Force	1,0686
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,032471
Mid-Height	0,65174
Base Length	0,033002
Base Angle	10,297
Polygon Closure Error	0,52079
Anisotropic Strength Modifier	1
Weight	0,31472
Base Shear Force	1,7854
Base Normal Force	0,0065987
Left Side Normal Force	1,2098

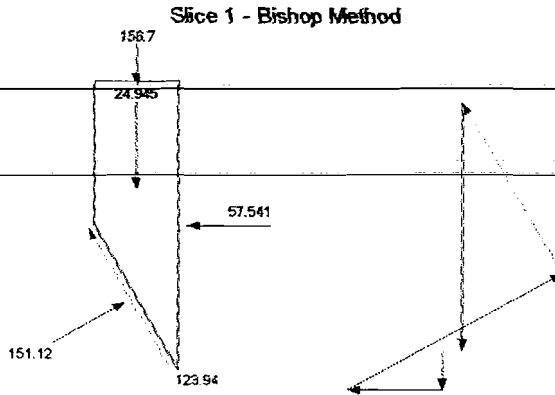


Shear Resistance vs. Slice #

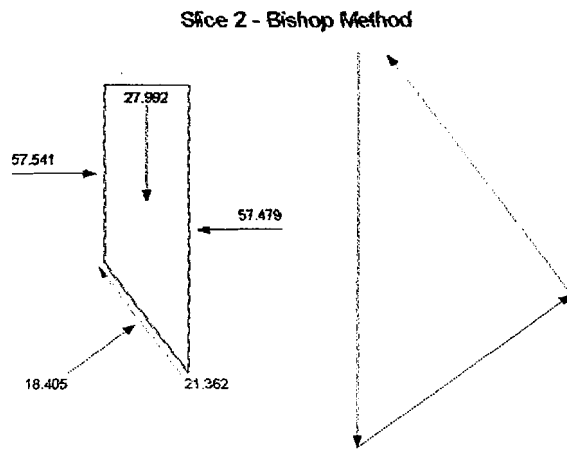




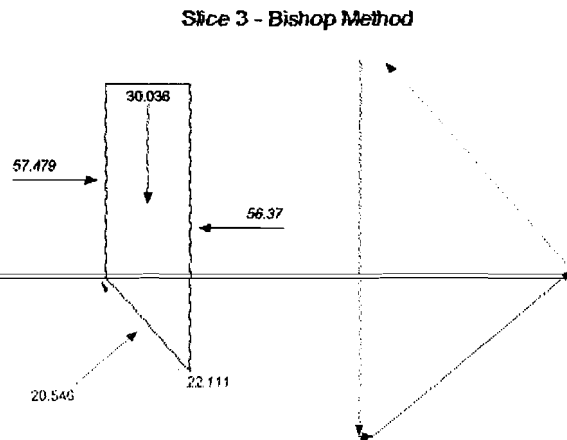
Slice 1 - Bishop Method	
Factor of Safety	0,756
Phi Angle	28
C (Strength)	4,2
C (Force)	13,292
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,567
Mid-Height	1,5075
Base Length	3,1649
Base Angle	60,322
Polygon Closure Error	11,752
Anisotropic Strength Modifier	1
Weight	24,945
Base Shear Force	123,94
Base Normal Force	151,12
Right Side Normal Force	57,541
Surface Pressure Load	156,7



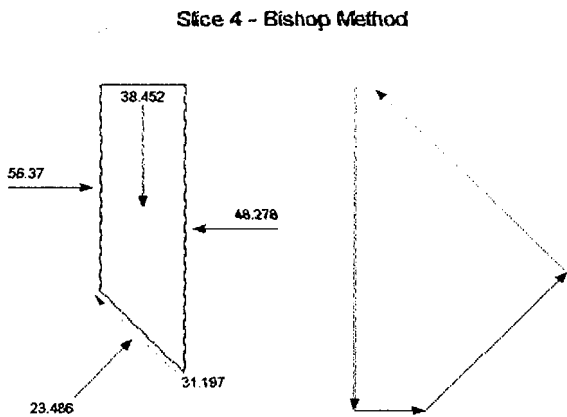
Slice 2 - Bishop Method	
Factor of Safety	0,756
Phi Angle	28
C (Strength)	4,2
C (Force)	6,3554
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,90513
Mid-Height	2,9286
Base Length	1,5132
Base Angle	53,262
Polygon Closure Error	1,9594
Anisotropic Strength Modifier	1
Weight	27,992
Base Shear Force	21,362
Base Normal Force	18,405
Left Side Normal Force	57,541
Right Side Normal Force	57,479



Slice 3 - Bishop Method	
Factor of Safety	0,756
Phi Angle	28
C (Strength)	4,2
C (Force)	5,7833
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,90513
Mid-Height	3,1424
Base Length	1,377
Base Angle	48,803
Polygon Closure Error	1,9523
Anisotropic Strength Modifier	1
Weight	30,036
Base Shear Force	22,111
Base Normal Force	20,546
Left Side Normal Force	57,479
Right Side Normal Force	56,37

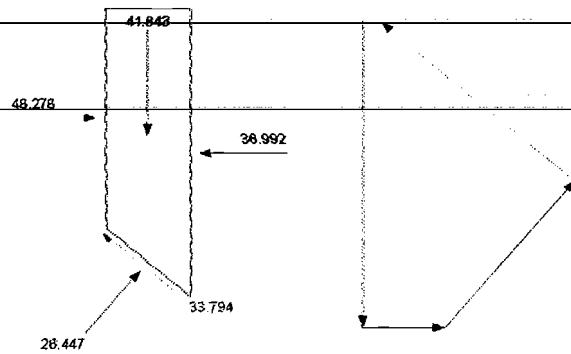


Slice 4 - Bishop Method	
Factor of Safety	0,756
Phi Angle	38
C (Strength)	3,5
C (Force)	5,2242
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,0632
Mid-Height	3,2025
Base Length	1,4926
Base Angle	44,575
Polygon Closure Error	2,3071
Anisotropic Strength Modifier	1
Weight	38,452
Base Shear Force	31,197
Base Normal Force	23,486
Left Side Normal Force	56,37
Right Side Normal Force	48,278



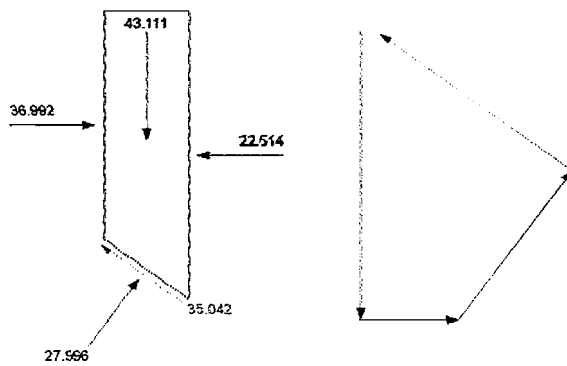
Slice 5 - Bishop Method	
Factor of Safety	0,756
Phi Angle	38
C (Strength)	3,5
C (Force)	4,8739
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,0832
Mid-Height	3,1088
Base Length	1,3925
Base Angle	40,224
Polygon Closure Error	2,5106
Anisotropic Strength Modifier	1
Weight	41,843
Base Shear Force	33,794
Base Normal Force	26,447
Left Side Normal Force	48,278
Right Side Normal Force	36,992

Slice 5 - Bishop Method



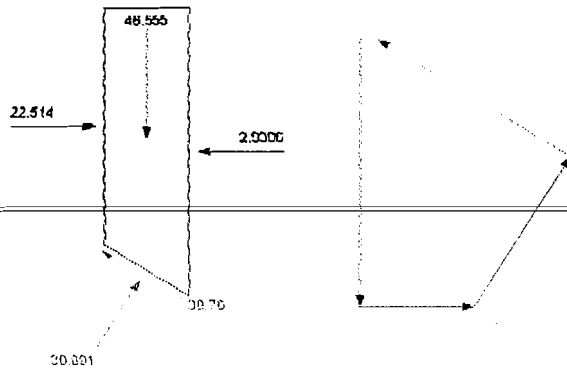
Slice 6 - Bishop Method	
Factor of Safety	0,756
Phi Angle	38
C (Strength)	3,5
C (Force)	4,608
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,0832
Mid-Height	2,8808
Base Length	1,3168
Base Angle	36,138
Polygon Closure Error	2,8022
Anisotropic Strength Modifier	1
Weight	43,111
Base Shear Force	35,042
Base Normal Force	27,996
Left Side Normal Force	36,992
Right Side Normal Force	22,514

Slice 6 - Bishop Method



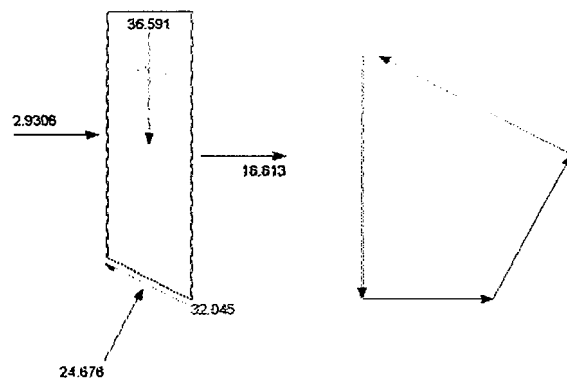
Slice 7 - Bishop Method	
Factor of Safety	0,756
Phi Angle	38
C (Strength)	3,5
C (Force)	5,1551
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,25
Mid-Height	2,5046
Base Length	1,4729
Base Angle	31,932
Polygon Closure Error	3,0261
Anisotropic Strength Modifier	1
Weight	46,555
Base Shear Force	38,76
Base Normal Force	30,891
Left Side Normal Force	22,514
Right Side Normal Force	2,9308

Slice 7 - Bishop Method



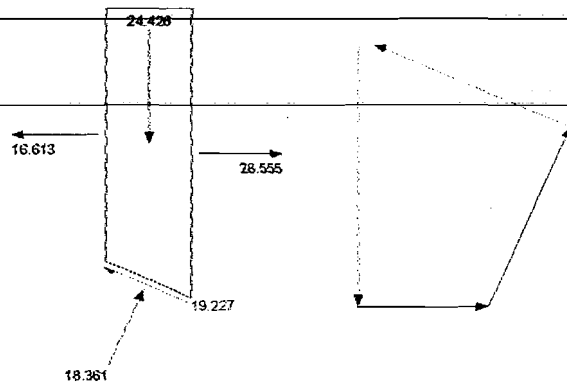
Slice 8 - Bishop Method	
Factor of Safety	0,756
Phi Angle	38
C (Strength)	3,5
C (Force)	4,936
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,25
Mid-Height	1,9686
Base Length	1,4103
Base Angle	27,583
Polygon Closure Error	2,3784
Anisotropic Strength Modifier	1
Weight	36,591
Base Shear Force	32,045
Base Normal Force	24,678
Left Side Normal Force	2,9306
Right Side Normal Force	16,613

Slice 8 - Bishop Method



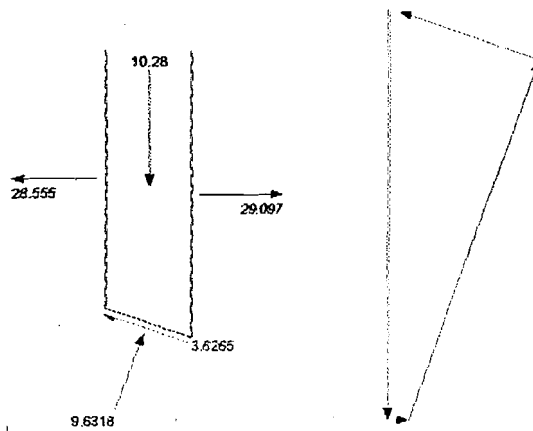
Slice 9 - Bishop Method	
Factor of Safety	0,756
Phi Angle	38
C (Strength)	3,5
C (Force)	4,7672
Pore Water Pressure	4,3075
Pore Water Force	5,867
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,25
Mid-Height	1,3141
Base Length	1,362
Base Angle	23,402
Polygon Closure Error	1,4656
Anisotropic Strength Modifier	1
Weight	24,426
Base Shear Force	19,227
Base Normal Force	18,361
Left Side Normal Force	16,613
Right Side Normal Force	28,555

Slice 9 - Bishop Method



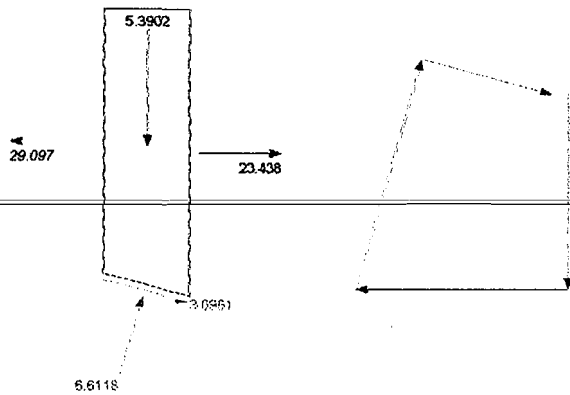
Slice 10 - Bishop Method	
Factor of Safety	0,756
Phi Angle	38
C (Strength)	3,5
C (Force)	4,6369
Pore Water Pressure	9,103
Pore Water Force	12,06
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,25
Mid-Height	0,55305
Base Length	1,3248
Base Angle	19,35
Polygon Closure Error	0,257
Anisotropic Strength Modifier	1
Weight	10,28
Base Shear Force	3,6265
Base Normal Force	9,6318
Left Side Normal Force	28,555
Right Side Normal Force	29,097

Slice 10 - Bishop Method



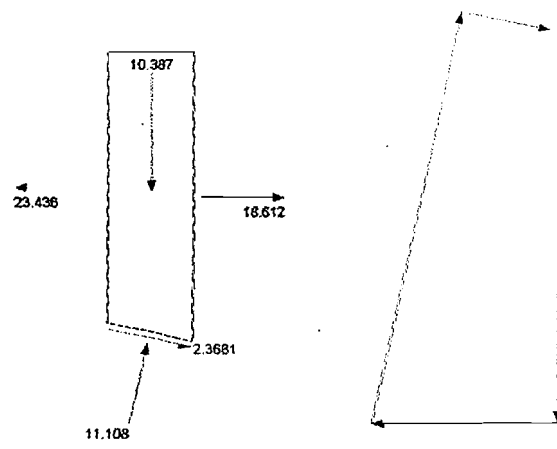
Slice 11 - Bishop Method	
Factor of Safety	0,756
Phi Angle	38
C (Strength)	3,5
C (Force)	4,2678
Pore Water Pressure	12,835
Pore Water Force	15,65
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,1749
Mid-Height	0,30852
Base Length	1,2194
Base Angle	15,513
Polygon Closure Error	0,39671
Anisotropic Strength Modifier	1
Weight	5,3902
Base Shear Force	3,6961
Base Normal Force	6,6118
Left Side Normal Force	29,097
Right Side Normal Force	23,436

Slice 11 - Bishop Method



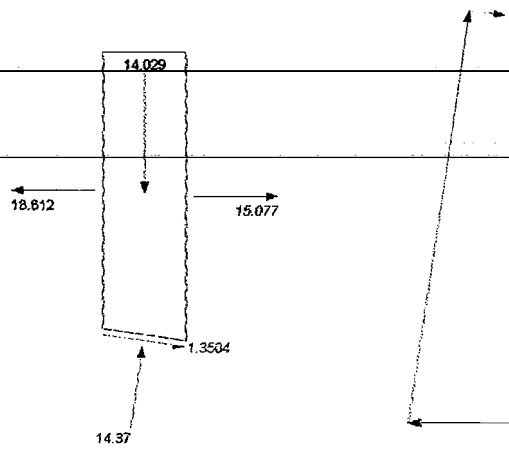
Slice 12 - Bishop Method	
Factor of Safety	0,756
Phi Angle	38
C (Strength)	3,5
C (Force)	4,2021
Pore Water Pressure	15,641
Pore Water Force	18,778
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,1749
Mid-Height	0,59454
Base Length	1,2006
Base Angle	11,864
Polygon Closure Error	0,22216
Anisotropic Strength Modifier	1
Weight	10,387
Base Shear Force	2,3681
Base Normal Force	11,108
Left Side Normal Force	23,436
Right Side Normal Force	18,612

Slice 12 - Bishop Method



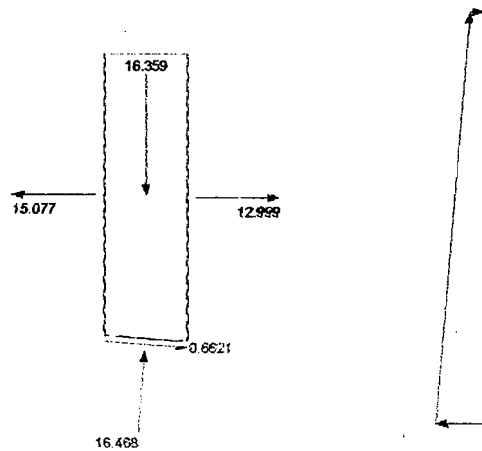
Slice 13 - Bishop Method	
Factor of Safety	0,756
Phi Angle	38
C (Strength)	3,5
C (Force)	4,1554
Pore Water Pressure	17,684
Pore Water Force	20,996
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,1749
Mid-Height	0,80295
Base Length	1,1873
Base Angle	8,2631
Polygon Closure Error	0,2874
Anisotropic Strength Modifier	1
Weight	14,029
Base Shear Force	1,3504
Base Normal Force	14,37
Left Side Normal Force	18,612
Right Side Normal Force	15,077

Slice 13 - Bishop Method



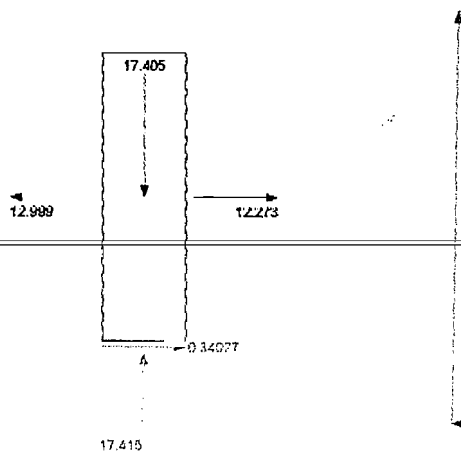
Slice 14 - Bishop Method	
Factor of Safety	0,756
Phi Angle	38
C (Strength)	3,5
C (Force)	4,1262
Pore Water Pressure	18,992
Pore Water Force	22,39
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,1749
Mid-Height	0,93631
Base Length	1,1789
Base Angle	4,6948
Polygon Closure Error	0,16468
Anisotropic Strength Modifier	1
Weight	16,359
Base Shear Force	0,6621
Base Normal Force	16,468
Left Side Normal Force	15,077
Right Side Normal Force	12,999

Slice 14 - Bishop Method



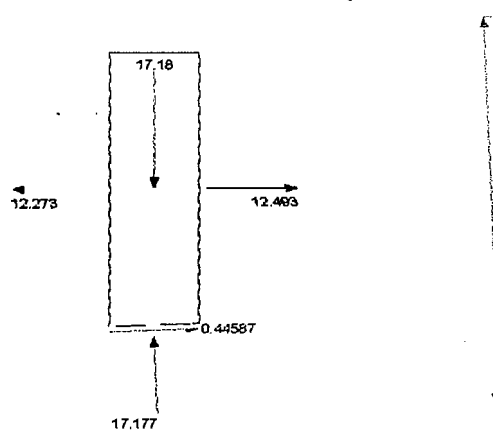
Slice 15 - Bishop Method	
Factor of Safety	0,756
Phi Angle	38
C (Strength)	3,5
C (Force)	4,1131
Pore Water Pressure	19,58
Pore Water Force	23,01
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,1749
Mid-Height	0,99621
Base Length	1,1752
Base Angle	1,1448
Polygon Closure Error	0,26123
Anisotropic Strength Modifier	1
Weight	17,405
Base Shear Force	0,34027
Base Normal Force	17,415
Left Side Normal Force	12,999
Right Side Normal Force	12,273

Slice 15 - Bishop Method



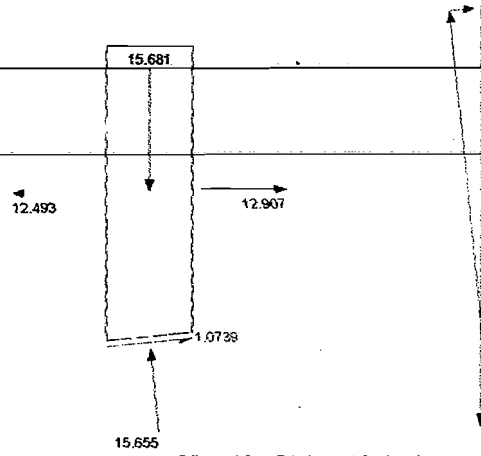
Slice 16 - Bishop Method	
Factor of Safety	0,756
Phi Angle	38
C (Strength)	3,5
C (Force)	4,1159
Pore Water Pressure	19,454
Pore Water Force	22,877
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,1749
Mid-Height	0,98334
Base Length	1,176
Base Angle	2,4009
Polygon Closure Error	0,1718
Anisotropic Strength Modifier	1
Weight	17,18
Base Shear Force	0,44587
Base Normal Force	17,177
Left Side Normal Force	12,273
Right Side Normal Force	12,493

Slice 16 - Bishop Method



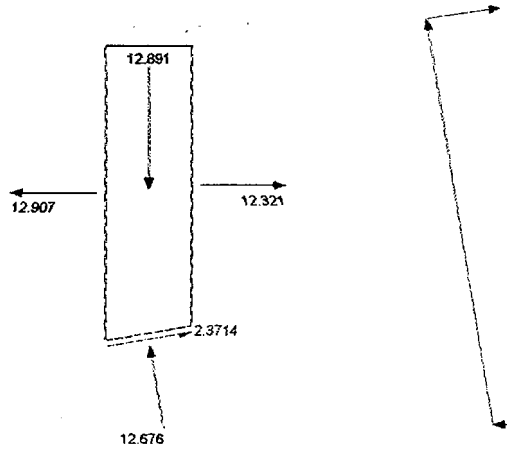
Slice 17 - Bishop Method	
Factor of Safety	0,756
Phi Angle	38
C (Strength)	3,5
C (Force)	4,1346
Pore Water Pressure	18,612
Pore Water Force	21,987
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,1749
Mid-Height	0,89755
Base Length	1,1813
Base Angle	5,9556
Polygon Closure Error	0,23521
Anisotropic Strength Modifier	1
Weight	15,681
Base Shear Force	1,0739
Base Normal Force	15,655
Left Side Normal Force	12,493
Right Side Normal Force	12,907

Slice 17 - Bishop Method



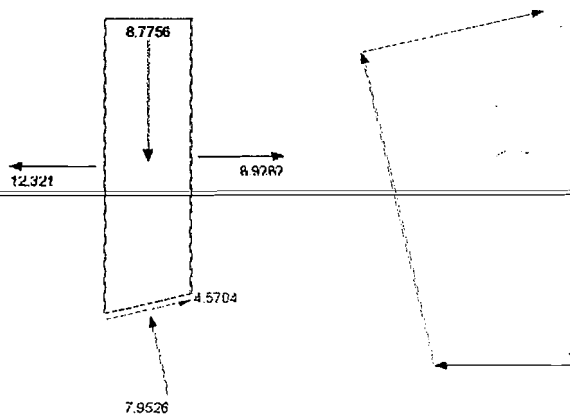
Slice 18 - Bishop Method	
Factor of Safety	0,756
Phi Angle	38
C (Strength)	3,5
C (Force)	4,1699
Pore Water Pressure	17,046
Pore Water Force	20,308
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,1749
Mid-Height	0,73783
Base Length	1,1914
Base Angle	9,5338
Polygon Closure Error	0,38673
Anisotropic Strength Modifier	1
Weight	12,891
Base Shear Force	2,3714
Base Normal Force	12,676
Left Side Normal Force	12,907
Right Side Normal Force	12,321

Slice 18 - Bishop Method



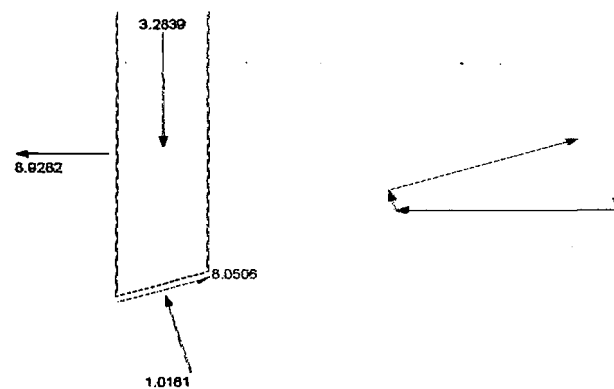
Slice 19 - Bishop Method	
Factor of Safety	0,756
Phi Angle	38
C (Strength)	3,5
C (Force)	4,223
Pore Water Pressure	14,735
Pore Water Force	17,779
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,1749
Mid-Height	0,50229
Base Length	1,2088
Base Angle	13,15
Polygon Closure Error	0,74593
Anisotropic Strength Modifier	1
Weight	8,7756
Base Shear Force	4,5704
Base Normal Force	7,9526
Left Side Normal Force	12,321
Right Side Normal Force	8,9282

Slice 19 - Bishop Method

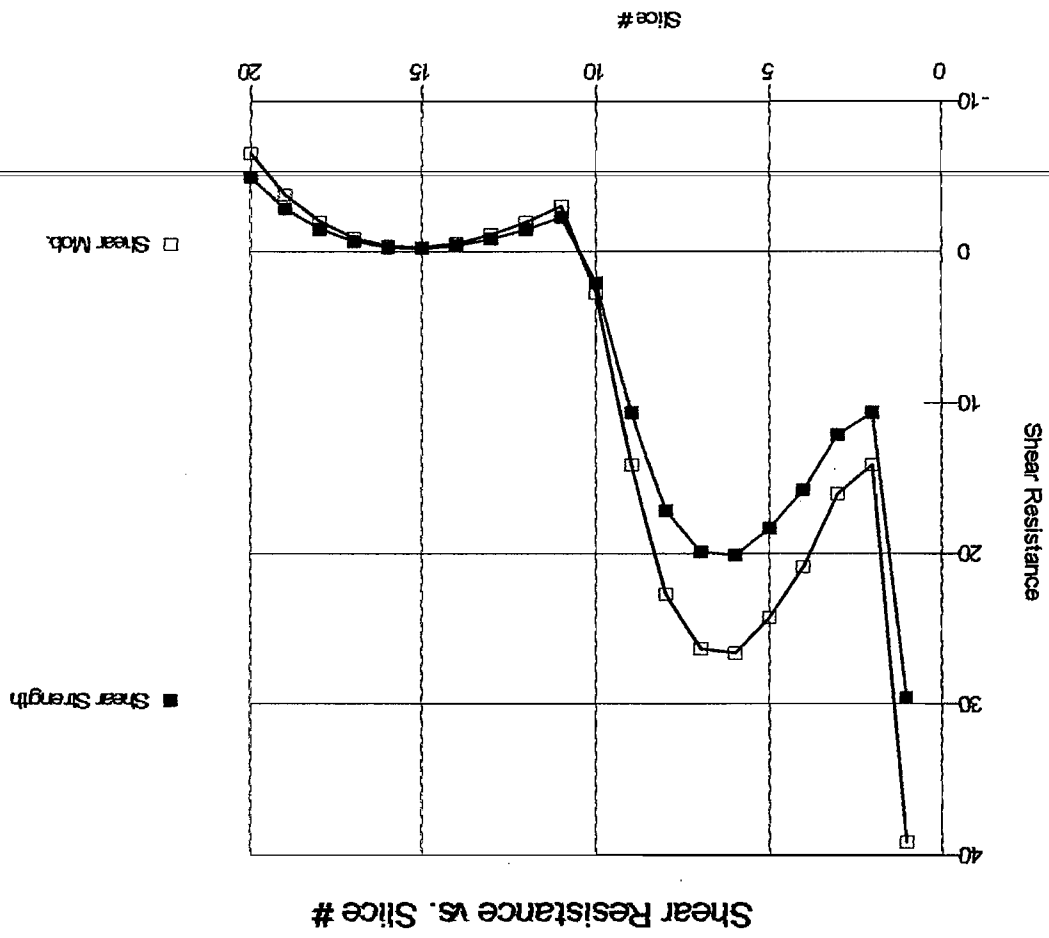


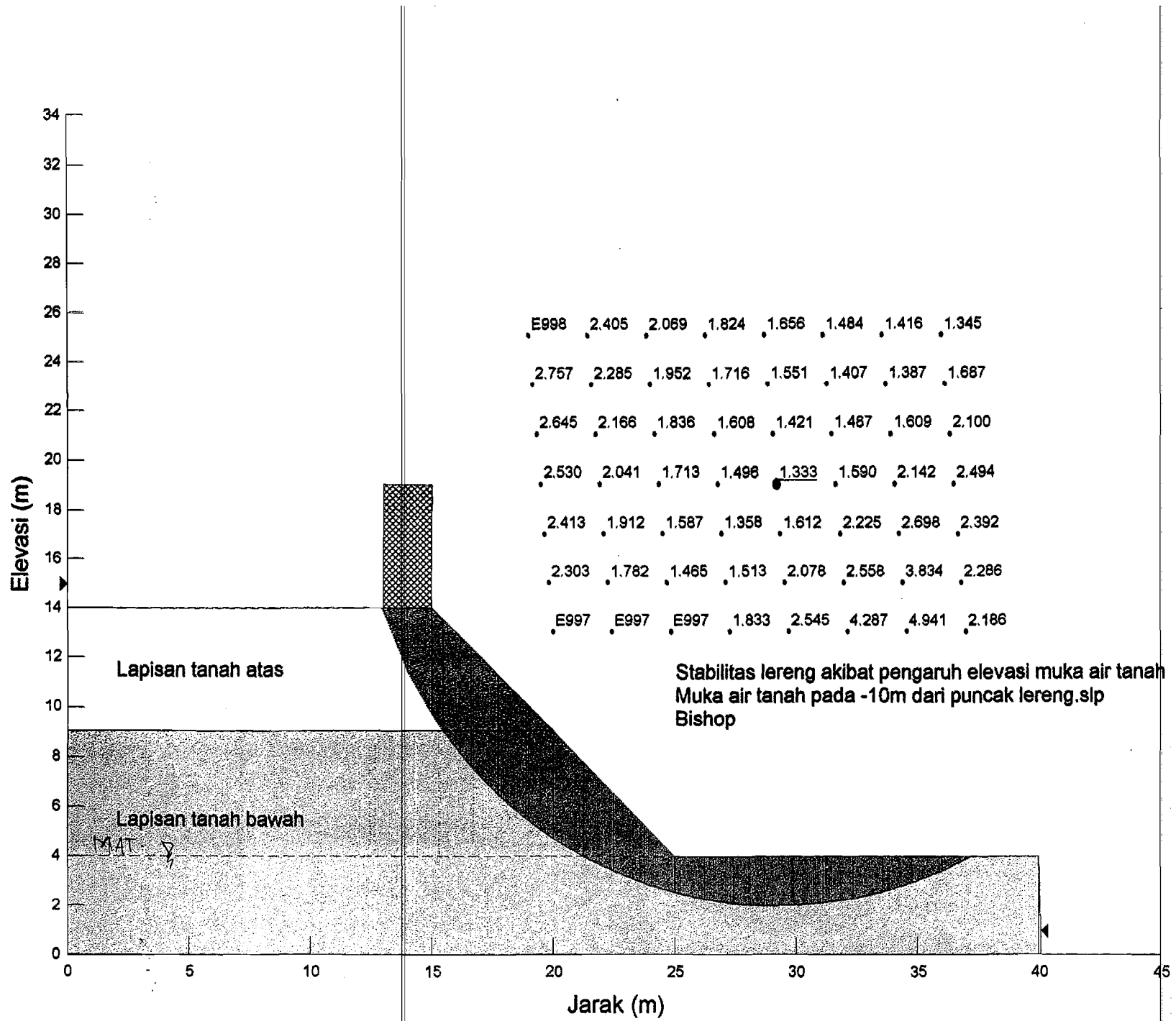
Slice 20 - Bishop Method	
Factor of Safety	0,756
Phi Angle	38
C (Strength)	3,5
C (Force)	4,2961
Pore Water Pressure	11,653
Pore Water Force	14,303
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,1749
Mid-Height	0,18796
Base Length	1,2275
Base Angle	16,821
Polygon Closure Error	1,5178
Anisotropic Strength Modifier	1
Weight	3,2839
Base Shear Force	8,0506
Base Normal Force	1,0161
Left Side Normal Force	8,9282

Slice 20 - Bishop Method



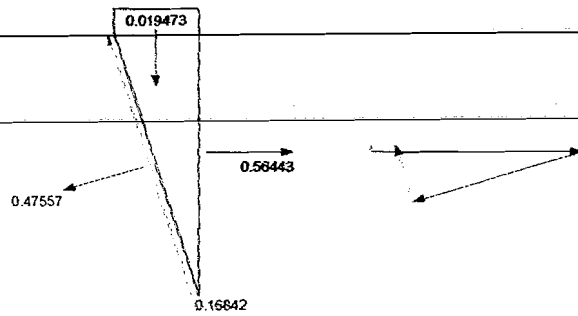






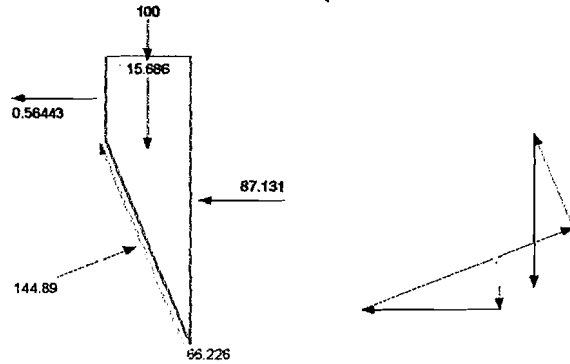
Slice 1 - Bishop Method	
Factor of Safety	1,333
Phi Angle	28
C (Strength)	4,2
C (Force)	0,47733
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,03379
Mid-Height	0,054575
Base Length	0,11365
Base Angle	72,704
Polygon Closure Error	0,064909
Anisotropic Strength Modifier	1
Weight	0,019473
Base Shear Force	0,16842
Base Normal Force	0,47557
Right Side Normal Force	0,56443

Slice 1 - Bishop Method



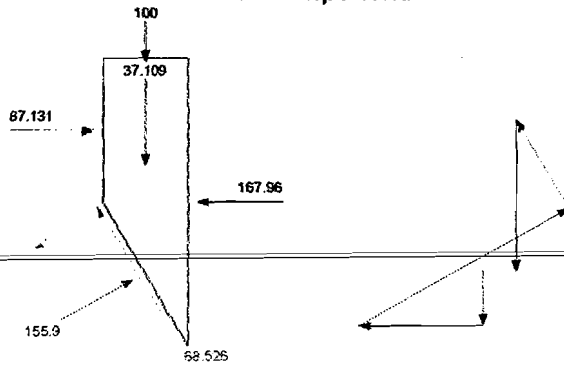
Slice 2 - Bishop Method	
Factor of Safety	1,333
Phi Angle	28
C (Strength)	4,2
C (Force)	11,216
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1
Mid-Height	1,4855
Base Length	2,6704
Base Angle	68,008
Polygon Closure Error	21,733
Anisotropic Strength Modifier	1
Weight	15,686
Base Shear Force	66,226
Base Normal Force	144,89
Left Side Normal Force	0,56443
Right Side Normal Force	87,131
Surface Pressure Load	100

Slice 2 - Bishop Method



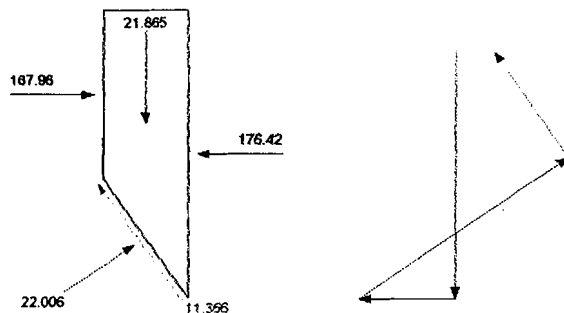
Slice 3 - Bishop Method	
Factor of Safety	1,333
Phi Angle	28
C (Strength)	4,2
C (Force)	8,4302
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1
Mid-Height	3,5141
Base Length	2,0072
Base Angle	60,119
Polygon Closure Error	21,046
Anisotropic Strength Modifier	1
Weight	37,109
Base Shear Force	68,526
Base Normal Force	155,9
Left Side Normal Force	87,131
Right Side Normal Force	167,96
Surface Pressure Load	100

Slice 3 - Bishop Method



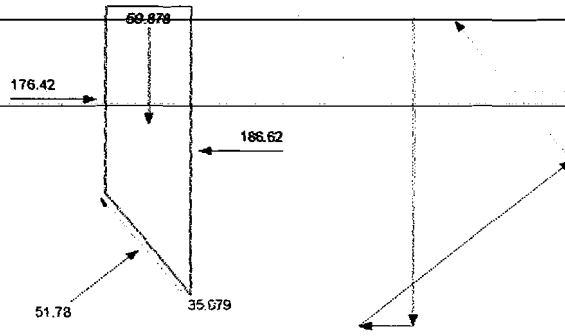
Slice 4 - Bishop Method	
Factor of Safety	1,333
Phi Angle	28
C (Strength)	4,2
C (Force)	3,4486
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,46656
Mid-Height	4,4379
Base Length	0,82062
Base Angle	55,351
Polygon Closure Error	3,3009
Anisotropic Strength Modifier	1
Weight	21,865
Base Shear Force	11,366
Base Normal Force	22,006
Left Side Normal Force	167,96
Right Side Normal Force	176,42

Slice 4 - Bishop Method



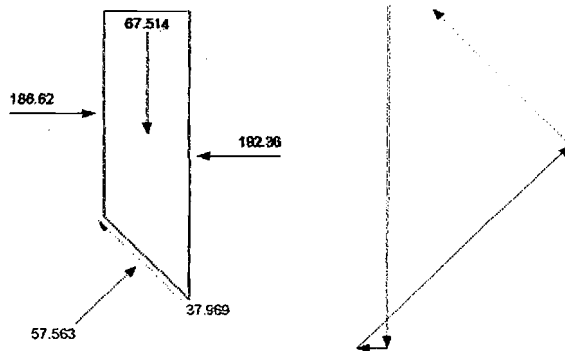
Slice 5 - Bishop Method	
Factor of Safety	1,333
Phi Angle	38
C (Strength)	3,5
C (Force)	6,2946
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,1334
Mid-Height	4,7027
Base Length	1,7984
Base Angle	50,936
Polygon Closure Error	7,7841
Anisotropic Strength Modifier	1
Weight	59,878
Base Shear Force	35,079
Base Normal Force	51,78
Left Side Normal Force	176,42
Right Side Normal Force	186,62

Slice 5 - Bishop Method



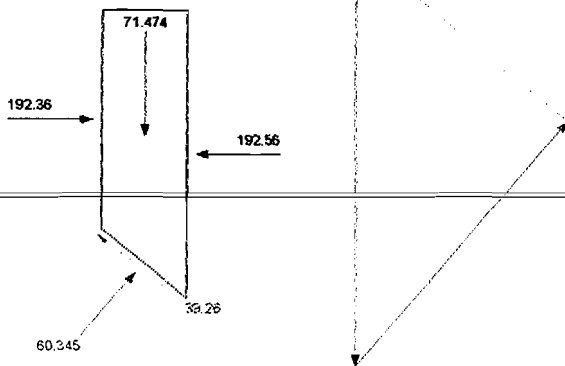
Slice 6 - Bishop Method	
Factor of Safety	1,333
Phi Angle	38
C (Strength)	3,5
C (Force)	5,6288
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,1334
Mid-Height	4,8273
Base Length	1,6082
Base Angle	45,193
Polygon Closure Error	8,4392
Anisotropic Strength Modifier	1
Weight	67,514
Base Shear Force	37,969
Base Normal Force	57,563
Left Side Normal Force	186,62
Right Side Normal Force	192,36

Slice 6 - Bishop Method



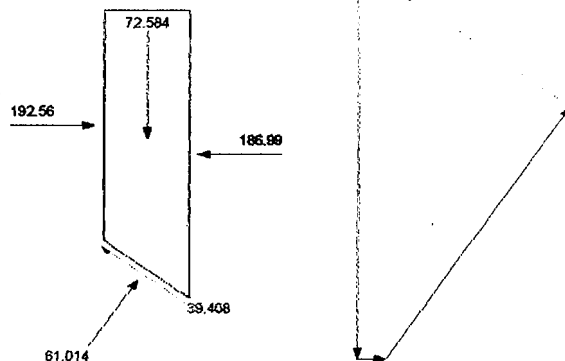
Slice 7 - Bishop Method	
Factor of Safety	1,333
Phi Angle	38
C (Strength)	3,5
C (Force)	5,1773
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,1334
Mid-Height	4,7337
Base Length	1,4792
Base Angle	39,988
Polygon Closure Error	8,5769
Anisotropic Strength Modifier	1
Weight	71,474
Base Shear Force	39,26
Base Normal Force	60,345
Left Side Normal Force	192,36
Right Side Normal Force	192,56

Slice 7 - Bishop Method



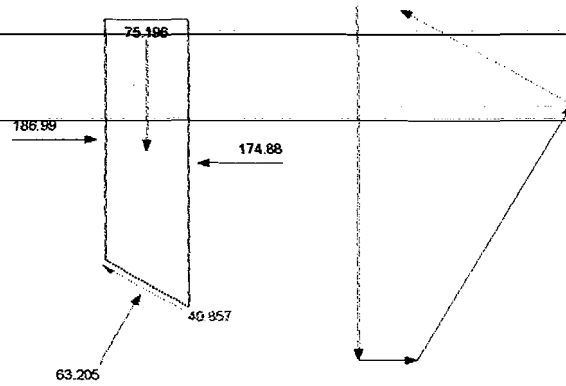
Slice 8 - Bishop Method	
Factor of Safety	1,333
Phi Angle	38
C (Strength)	3,5
C (Force)	4,8519
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,1334
Mid-Height	4,4711
Base Length	1,3863
Base Angle	35,158
Polygon Closure Error	8,3472
Anisotropic Strength Modifier	1
Weight	72,584
Base Shear Force	39,408
Base Normal Force	61,014
Left Side Normal Force	192,56
Right Side Normal Force	186,99

Slice 8 - Bishop Method



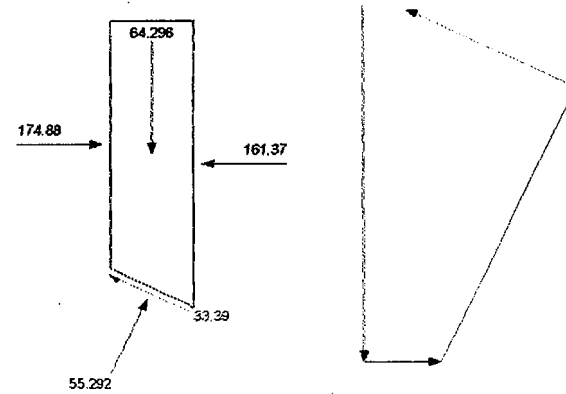
Slice 9 - Bishop Method	
Factor of Safety	1,333
Phi Angle	38
C (Strength)	3,5
C (Force)	5,0713
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,25
Mid-Height	4,0455
Base Length	1,4489
Base Angle	30,379
Polygon Closure Error	8,6475
Anisotropic Strength Modifier	1
Weight	75,196
Base Shear Force	40,857
Base Normal Force	63,205
Left Side Normal Force	186,99
Right Side Normal Force	174,88

Slice 9 - Bishop Method



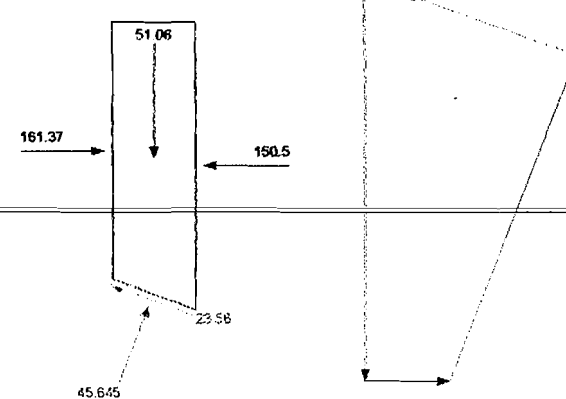
Slice 10 - Bishop Method	
Factor of Safety	1,333
Phi Angle	38
C (Strength)	3,5
C (Force)	4,8512
Pore Water Pressure	3,2775
Pore Water Force	4,5428
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,25
Mid-Height	3,4591
Base Length	1,3861
Base Angle	25,6
Polygon Closure Error	7,394
Anisotropic Strength Modifier	1
Weight	64,296
Base Shear Force	33,39
Base Normal Force	55,292
Left Side Normal Force	174,88
Right Side Normal Force	161,37

Slice 10 - Bishop Method



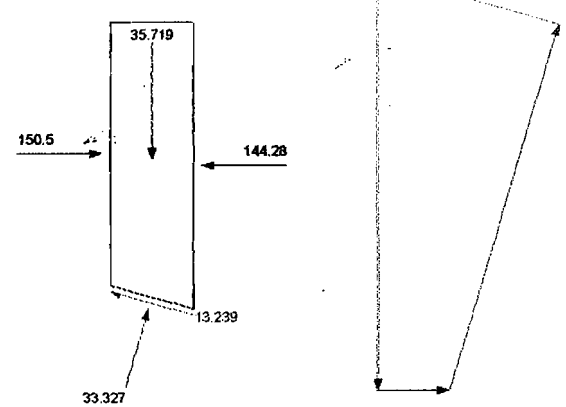
Slice 11 - Bishop Method	
Factor of Safety	1,333
Phi Angle	38
C (Strength)	3,5
C (Force)	4,8886
Pore Water Pressure	8,5542
Pore Water Force	11,454
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,25
Mid-Height	2,747
Base Length	1,339
Base Angle	21,006
Polygon Closure Error	5,106
Anisotropic Strength Modifier	1
Weight	51,06
Base Shear Force	23,56
Base Normal Force	45,645
Left Side Normal Force	161,37
Right Side Normal Force	150,5

Slice 11 - Bishop Method



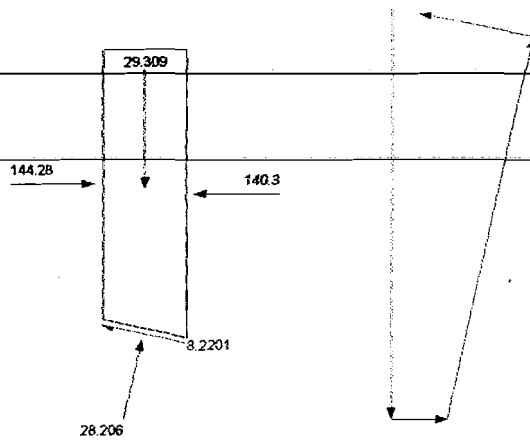
Slice 12 - Bishop Method	
Factor of Safety	1,333
Phi Angle	38
C (Strength)	3,5
C (Force)	4,5641
Pore Water Pressure	12,72
Pore Water Force	16,587
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,25
Mid-Height	1,9217
Base Length	1,304
Base Angle	16,551
Polygon Closure Error	2,8575
Anisotropic Strength Modifier	1
Weight	35,719
Base Shear Force	13,239
Base Normal Force	33,327
Left Side Normal Force	150,5
Right Side Normal Force	144,28

Slice 12 - Bishop Method



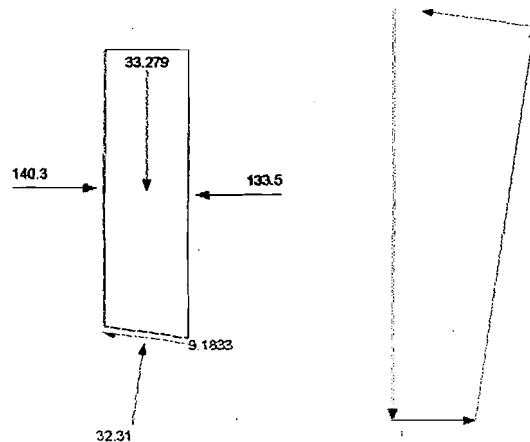
Slice 13 - Bishop Method	
Factor of Safety	1,333
Phi Angle	38
C (Strength)	3,5
C (Force)	4,3746
Pore Water Pressure	15,829
Pore Water Force	19,784
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,2214
Mid-Height	1,6137
Base Length	1,2499
Base Angle	12,246
Polygon Closure Error	1,9051
Anisotropic Strength Modifier	1
Weight	29,309
Base Shear Force	8,2201
Base Normal Force	28,206
Left Side Normal Force	144,28
Right Side Normal Force	140,3

Slice 13 - Bishop Method



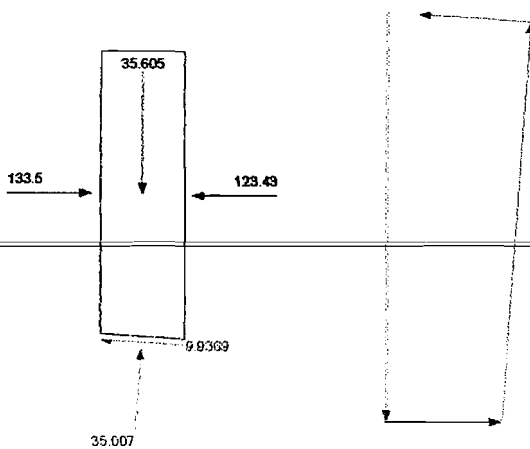
Slice 14 - Bishop Method	
Factor of Safety	1,333
Phi Angle	38
C (Strength)	3,5
C (Force)	4,3177
Pore Water Pressure	17,973
Pore Water Force	22,172
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,2214
Mid-Height	1,8323
Base Length	1,2336
Base Angle	8,0605
Polygon Closure Error	2,1631
Anisotropic Strength Modifier	1
Weight	33,279
Base Shear Force	9,1833
Base Normal Force	32,31
Left Side Normal Force	140,3
Right Side Normal Force	133,5

Slice 14 - Bishop Method



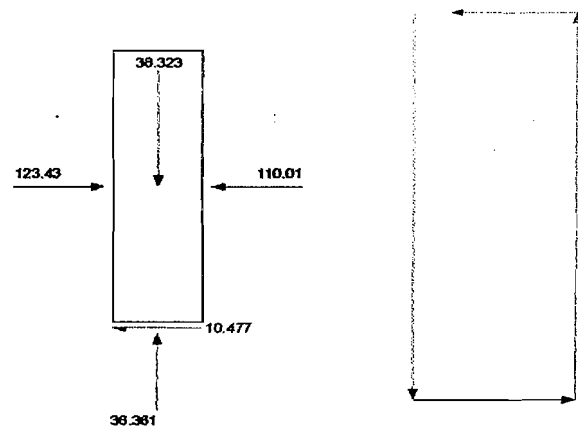
Slice 15 - Bishop Method	
Factor of Safety	1,333
Phi Angle	38
C (Strength)	3,5
C (Force)	4,285
Pore Water Pressure	19,229
Pore Water Force	23,542
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,2214
Mid-Height	1,9603
Base Length	1,2243
Base Angle	3,9177
Polygon Closure Error	2,8704
Anisotropic Strength Modifier	1
Weight	35,605
Base Shear Force	9,9369
Base Normal Force	35,007
Left Side Normal Force	133,5
Right Side Normal Force	123,43

Slice 15 - Bishop Method



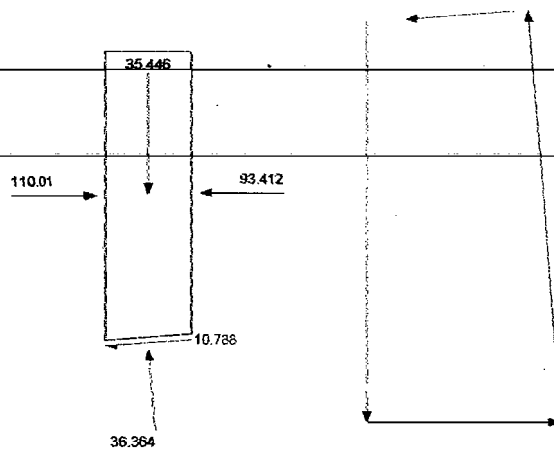
Slice 16 - Bishop Method	
Factor of Safety	1,333
Phi Angle	38
C (Strength)	3,5
C (Force)	4,275
Pore Water Pressure	19,617
Pore Water Force	23,961
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,2214
Mid-Height	1,9999
Base Length	1,2214
Base Angle	0,20475
Polygon Closure Error	3,0907
Anisotropic Strength Modifier	1
Weight	36,323
Base Shear Force	10,477
Base Normal Force	36,361
Left Side Normal Force	123,43
Right Side Normal Force	110,01

Slice 16 - Bishop Method



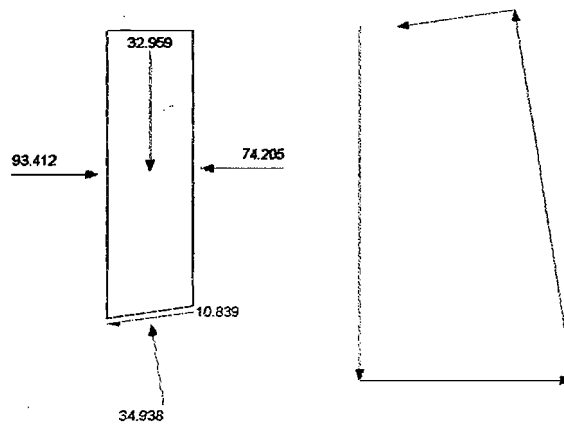
Slice 17 - Bishop Method	
Factor of Safety	1,333
Phi Angle	38
C (Strength)	3,5
C (Force)	4,2872
Pore Water Pressure	19,143
Pore Water Force	23,449
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,2214
Mid-Height	1,9516
Base Length	1,2249
Base Angle	4,3282
Polygon Closure Error	3,2728
Anisotropic Strength Modifier	1
Weight	35,446
Base Shear Force	10,788
Base Normal Force	36,364
Left Side Normal Force	110,01
Right Side Normal Force	93,412

Slice 17 - Bishop Method



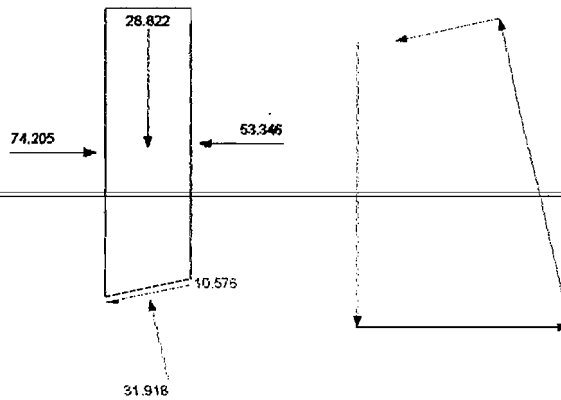
Slice 18 - Bishop Method	
Factor of Safety	1,333
Phi Angle	38
C (Strength)	3,5
C (Force)	4,3222
Pore Water Pressure	17,8
Pore Water Force	21,982
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,2214
Mid-Height	1,8146
Base Length	1,2349
Base Angle	8,4743
Polygon Closure Error	3,3191
Anisotropic Strength Modifier	1
Weight	32,959
Base Shear Force	10,839
Base Normal Force	34,938
Left Side Normal Force	93,412
Right Side Normal Force	74,205

Slice 18 - Bishop Method



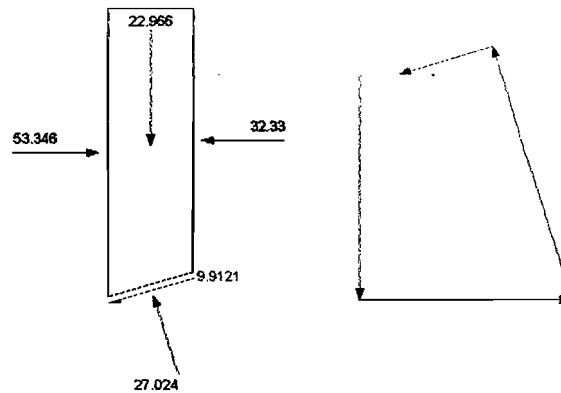
Slice 19 - Bishop Method	
Factor of Safety	1,333
Phi Angle	38
C (Strength)	3,5
C (Force)	4,3816
Pore Water Pressure	15,566
Pore Water Force	19,487
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,2214
Mid-Height	1,5869
Base Length	1,2519
Base Angle	12,666
Polygon Closure Error	3,6706
Anisotropic Strength Modifier	1
Weight	28,822
Base Shear Force	10,576
Base Normal Force	31,918
Left Side Normal Force	74,205
Right Side Normal Force	53,346

Slice 19 - Bishop Method



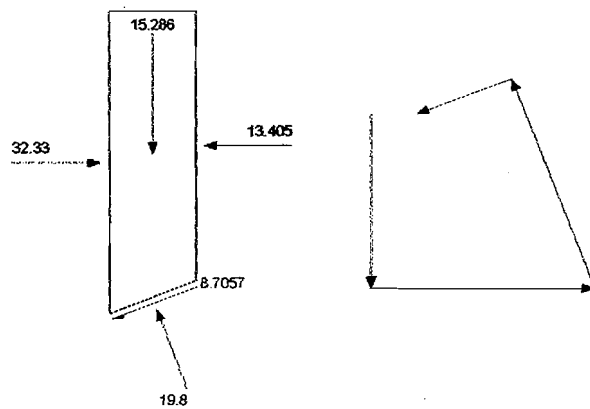
Slice 20 - Bishop Method	
Factor of Safety	1,333
Phi Angle	38
C (Strength)	3,5
C (Force)	4,4686
Pore Water Pressure	12,403
Pore Water Force	15,836
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,2214
Mid-Height	1,2645
Base Length	1,2767
Base Angle	16,928
Polygon Closure Error	3,7834
Anisotropic Strength Modifier	1
Weight	22,966
Base Shear Force	9,9121
Base Normal Force	27,024
Left Side Normal Force	53,346
Right Side Normal Force	32,33

Slice 20 - Bishop Method



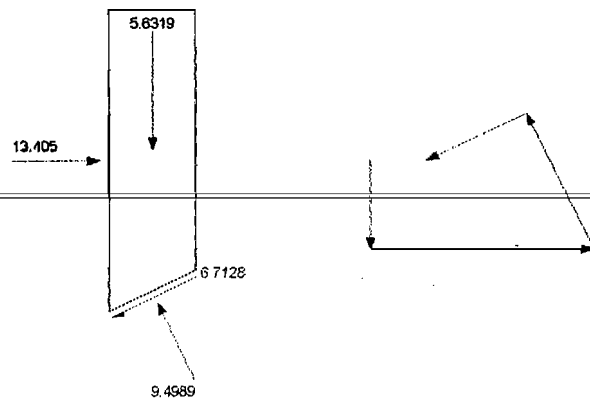
Slice 21 - Bishop Method	
Factor of Safety	1,333
Phi Angle	38
C (Strength)	3,5
C (Force)	4,5881
Pore Water Pressure	8,2562
Pore Water Force	10,823
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,2214
Mid-Height	0,84164
Base Length	1,3109
Base Angle	21,29
Polygon Closure Error	3,762
Anisotropic Strength Modifier	1
Weight	15,286
Base Shear Force	8,7057
Base Normal Force	19,8
Left Side Normal Force	32,33
Right Side Normal Force	13,405

Slice 21 - Bishop Method

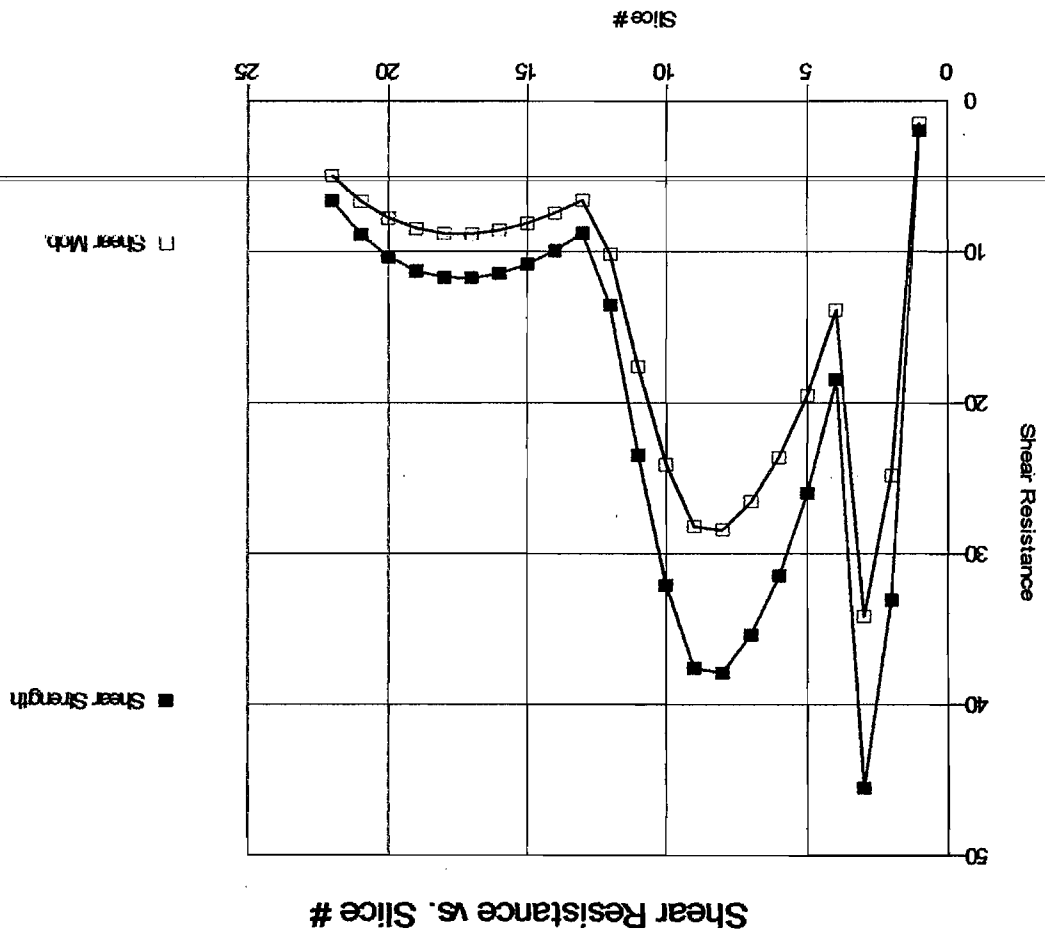


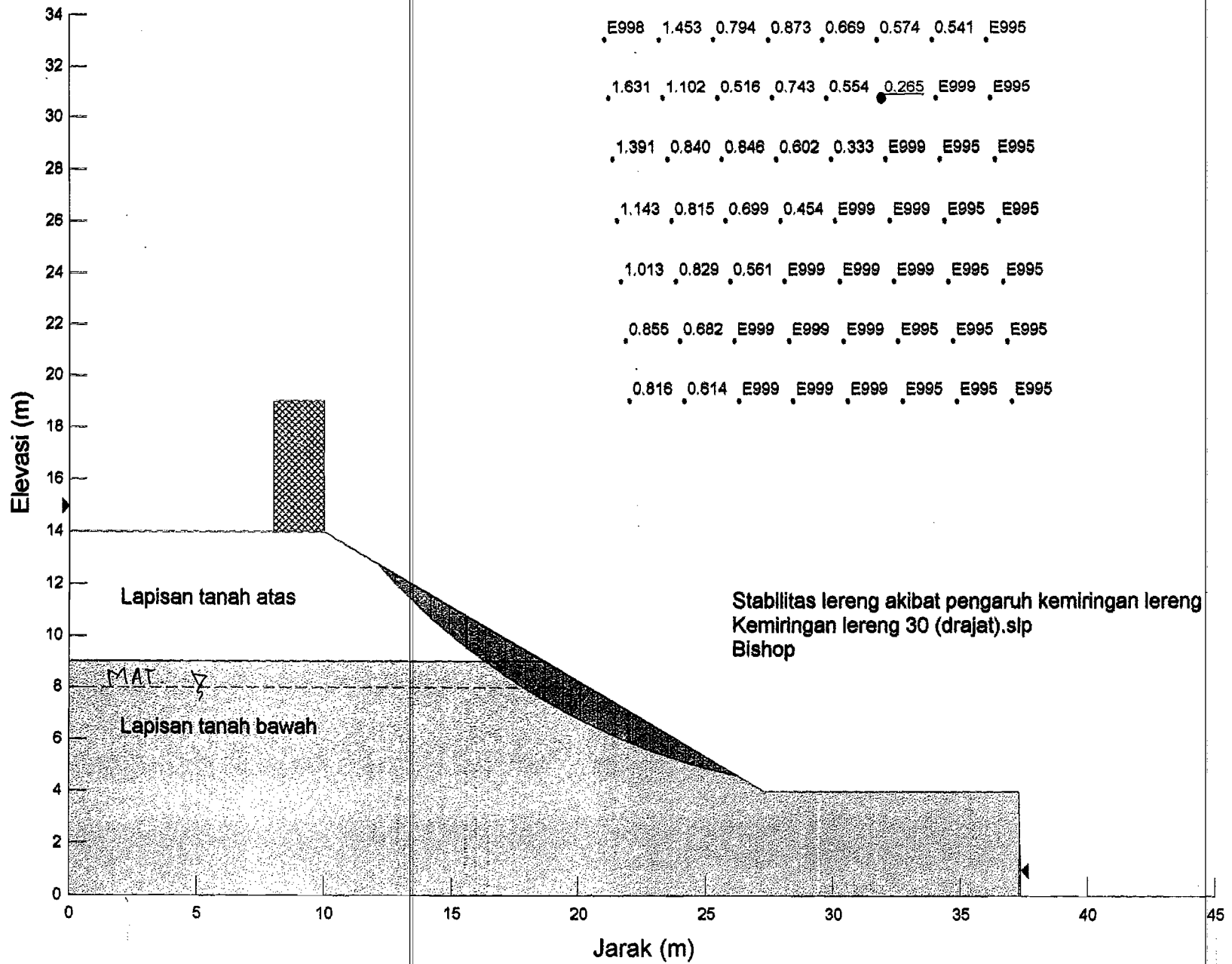
Slice 22 - Bishop Method	
Factor of Safety	1,333
Phi Angle	38
C (Strength)	3,5
C (Force)	4,7478
Pore Water Pressure	3,0418
Pore Water Force	4,1262
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,2214
Mid-Height	0,31008
Base Length	1,3565
Base Angle	25,786
Polygon Closure Error	3,2842
Anisotropic Strength Modifier	1
Weight	5,6319
Base Shear Force	6,7128
Base Normal Force	9,4989
Left Side Normal Force	13,405

Slice 22 - Bishop Method



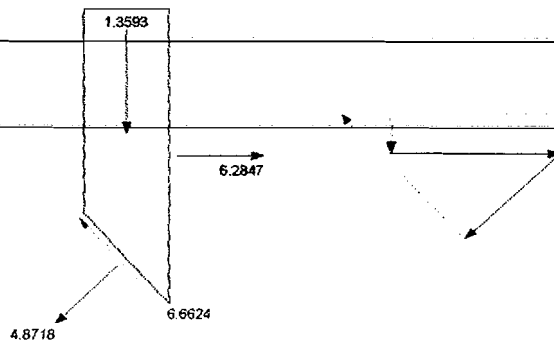






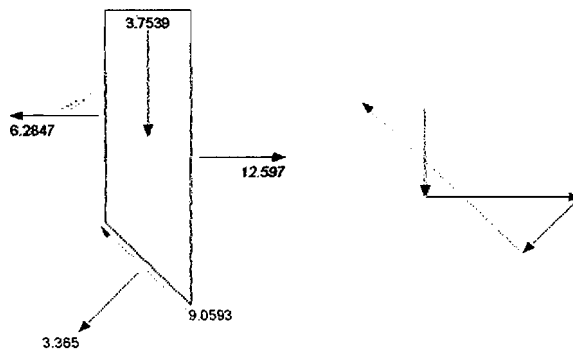
Slice 1 - Bishop Method	
Factor of Safety	0,265
Phi Angle	28
C (Strength)	4,2
C (Force)	4,3528
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,70905
Mid-Height	0,18155
Base Length	1,0364
Base Angle	46,831
Polygon Closure Error	1,7988
Anisotropic Strength Modifier	1
Weight	1,3593
Base Shear Force	6,6624
Base Normal Force	4,8718
Right Side Normal Force	6,2847

Slice 1 - Bishop Method



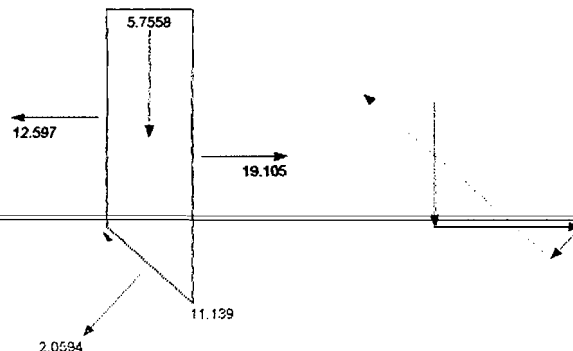
Slice 2 - Bishop Method	
Factor of Safety	0,265
Phi Angle	28
C (Strength)	4,2
C (Force)	4,1858
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,70904
Mid-Height	0,50135
Base Length	0,99661
Base Angle	44,647
Polygon Closure Error	2,4913
Anisotropic Strength Modifier	1
Weight	3,7539
Base Shear Force	9,0593
Base Normal Force	3,365
Left Side Normal Force	6,2847
Right Side Normal Force	12,597

Slice 2 - Bishop Method



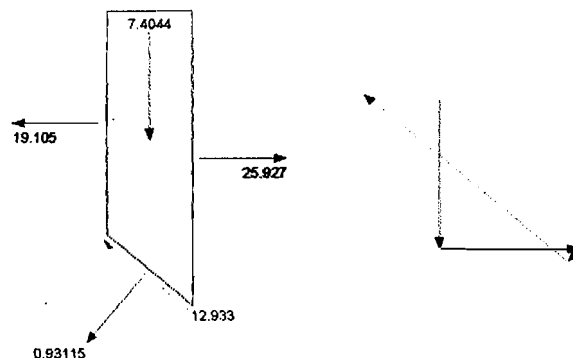
Slice 3 - Bishop Method	
Factor of Safety	0,265
Phi Angle	28
C (Strength)	4,2
C (Force)	4,0419
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,70905
Mid-Height	0,76872
Base Length	0,96236
Base Angle	42,542
Polygon Closure Error	3,0632
Anisotropic Strength Modifier	1
Weight	5,7558
Base Shear Force	11,139
Base Normal Force	2,0594
Left Side Normal Force	12,597
Right Side Normal Force	19,105

Slice 3 - Bishop Method



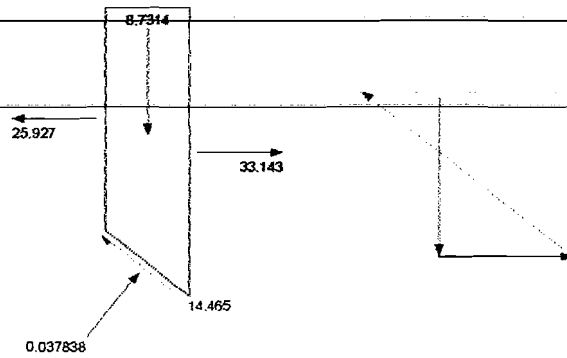
Slice 4 - Bishop Method	
Factor of Safety	0,265
Phi Angle	28
C (Strength)	4,2
C (Force)	3,9167
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,70904
Mid-Height	0,8889
Base Length	0,93254
Base Angle	40,507
Polygon Closure Error	3,6212
Anisotropic Strength Modifier	1
Weight	7,4044
Base Shear Force	12,933
Base Normal Force	0,93115
Left Side Normal Force	19,105
Right Side Normal Force	25,927

Slice 4 - Bishop Method



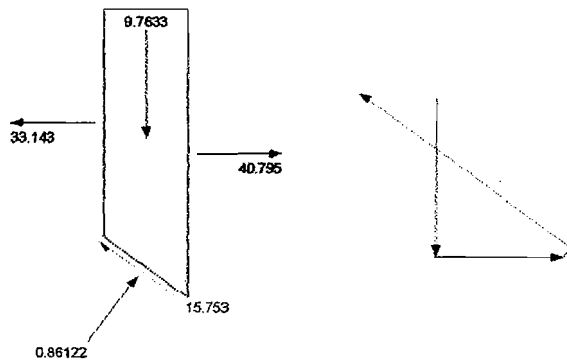
Slice 5 - Bishop Method	
Factor of Safety	0,265
Phi Angle	28
C (Strength)	4,2
C (Force)	3,8068
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,70904
Mid-Height	1,1661
Base Length	0,90639
Base Angle	38,531
Polygon Closure Error	4,1225
Anisotropic Strength Modifier	1
Weight	8,7314
Base Shear Force	14,465
Base Normal Force	0,037838
Left Side Normal Force	25,927
Right Side Normal Force	33,143

Slice 5 - Bishop Method



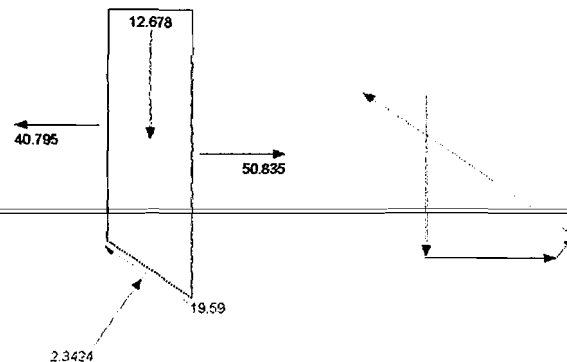
Slice 6 - Bishop Method	
Factor of Safety	0,265
Phi Angle	28
C (Strength)	4,2
C (Force)	3,7098
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,70905
Mid-Height	1,3039
Base Length	0,88329
Base Angle	36,608
Polygon Closure Error	4,5684
Anisotropic Strength Modifier	1
Weight	9,7633
Base Shear Force	15,753
Base Normal Force	0,86122
Left Side Normal Force	33,143
Right Side Normal Force	40,795

Slice 6 - Bishop Method



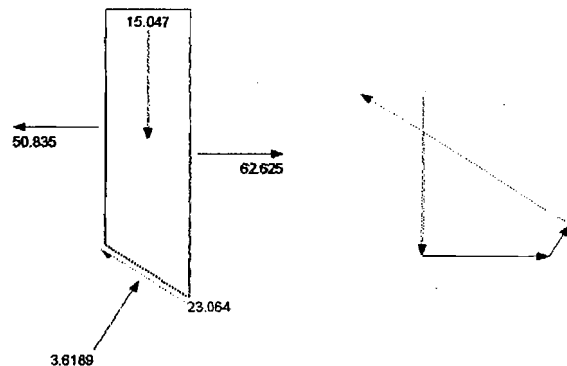
Slice 7 - Bishop Method	
Factor of Safety	0,265
Phi Angle	38
C (Strength)	3,5
C (Force)	3,3528
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,78823
Mid-Height	1,4099
Base Length	0,95794
Base Angle	34,63
Polygon Closure Error	4,7996
Anisotropic Strength Modifier	1
Weight	12,678
Base Shear Force	19,59
Base Normal Force	2,3424
Left Side Normal Force	40,795
Right Side Normal Force	50,835

Slice 7 - Bishop Method



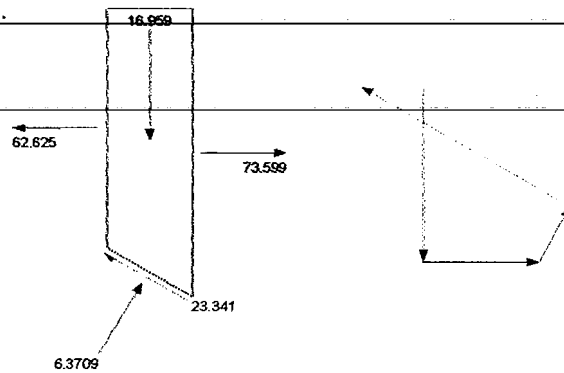
Slice 8 - Bishop Method	
Factor of Safety	0,265
Phi Angle	38
C (Strength)	3,5
C (Force)	3,2745
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,78822
Mid-Height	1,4807
Base Length	0,93558
Base Angle	32,596
Polygon Closure Error	5,766
Anisotropic Strength Modifier	1
Weight	15,047
Base Shear Force	23,064
Base Normal Force	3,6189
Left Side Normal Force	50,835
Right Side Normal Force	62,625

Slice 8 - Bishop Method



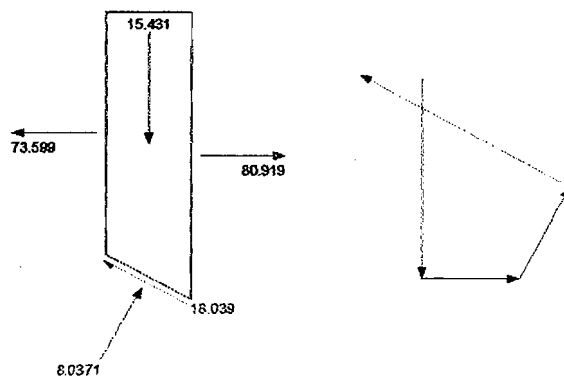
<b>Slice 9 - Bishop Method</b>	
Factor of Safety	0,265
Phi Angle	38
C (Strength)	3,5
C (Force)	3,2054
Pore Water Pressure	2,8058
Pore Water Force	2,5696
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,78823
Mid-Height	1,5126
Base Length	0,91582
Base Angle	30,607
Polygon Closure Error	5,952
Anisotropic Strength Modifier	1
Weight	16,959
Base Shear Force	23,341
Base Normal Force	6,3709
Left Side Normal Force	62,625
Right Side Normal Force	73,599

**Slice 9 - Bishop Method**



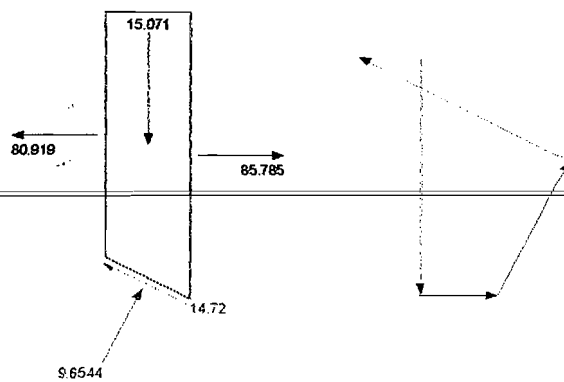
<b>Slice 10 - Bishop Method</b>	
Factor of Safety	0,265
Phi Angle	38
C (Strength)	3,5
C (Force)	2,7499
Pore Water Pressure	6,9346
Pore Water Force	5,4484
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,68864
Mid-Height	1,5069
Base Length	0,78568
Base Angle	28,779
Polygon Closure Error	4,6901
Anisotropic Strength Modifier	1
Weight	15,431
Base Shear Force	18,039
Base Normal Force	8,0371
Left Side Normal Force	73,599
Right Side Normal Force	80,919

**Slice 10 - Bishop Method**



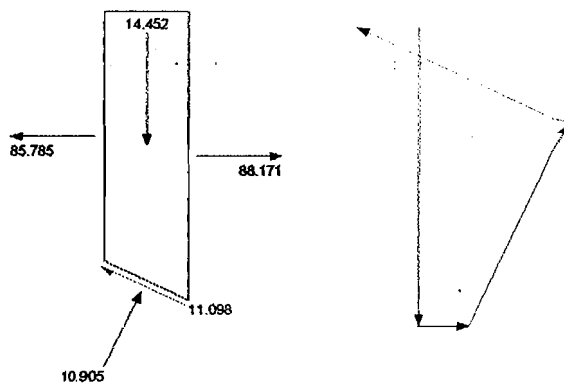
<b>Slice 11 - Bishop Method</b>	
Factor of Safety	0,265
Phi Angle	38
C (Strength)	3,5
C (Force)	2,7078
Pore Water Pressure	10,516
Pore Water Force	8,1352
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,68864
Mid-Height	1,4717
Base Length	0,77359
Base Angle	27,103
Polygon Closure Error	3,8431
Anisotropic Strength Modifier	1
Weight	15,071
Base Shear Force	14,72
Base Normal Force	9,6544
Left Side Normal Force	80,919
Right Side Normal Force	85,785

**Slice 11 - Bishop Method**



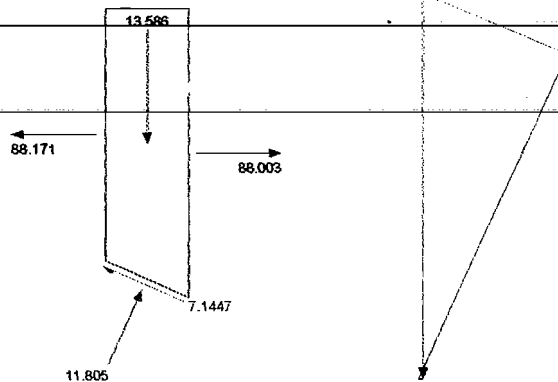
<b>Slice 12 - Bishop Method</b>	
Factor of Safety	0,265
Phi Angle	38
C (Strength)	3,5
C (Force)	2,6693
Pore Water Pressure	13,85
Pore Water Force	10,563
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,68864
Mid-Height	1,4113
Base Length	0,76267
Base Angle	25,453
Polygon Closure Error	2,9627
Anisotropic Strength Modifier	1
Weight	14,452
Base Shear Force	11,098
Base Normal Force	10,905
Left Side Normal Force	85,785
Right Side Normal Force	88,171

**Slice 12 - Bishop Method**



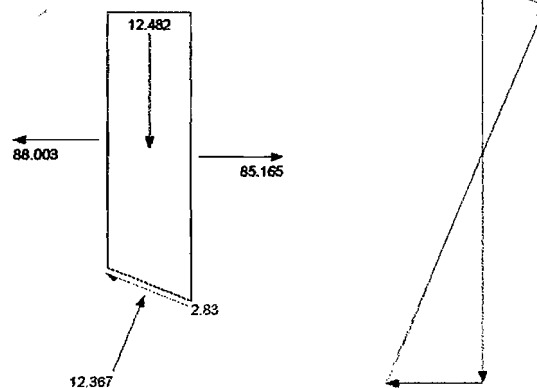
Slice 13 - Bishop Method	
Factor of Safety	0,265
Phi Angle	38
C (Strength)	3,5
C (Force)	2,6348
Pore Water Pressure	16,948
Pore Water Force	12,758
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,68864
Mid-Height	1,3268
Base Length	0,75279
Base Angle	23,825
Polygon Closure Error	1,97
Anisotropic Strength Modifier	1
Weight	13,586
Base Shear Force	7,1447
Base Normal Force	11,805
Left Side Normal Force	88,171
Right Side Normal Force	88,003

Slice 13 - Bishop Method



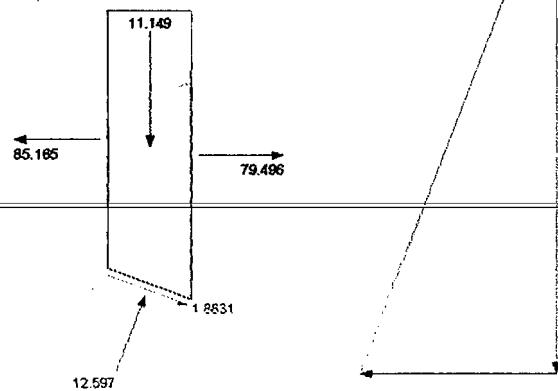
Slice 14 - Bishop Method	
Factor of Safety	0,265
Phi Angle	38
C (Strength)	3,5
C (Force)	2,6035
Pore Water Pressure	19,817
Pore Water Force	14,741
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,68864
Mid-Height	1,219
Base Length	0,74387
Base Angle	22,217
Polygon Closure Error	0,74892
Anisotropic Strength Modifier	1
Weight	12,482
Base Shear Force	2,83
Base Normal Force	12,367
Left Side Normal Force	88,003
Right Side Normal Force	85,165

Slice 14 - Bishop Method



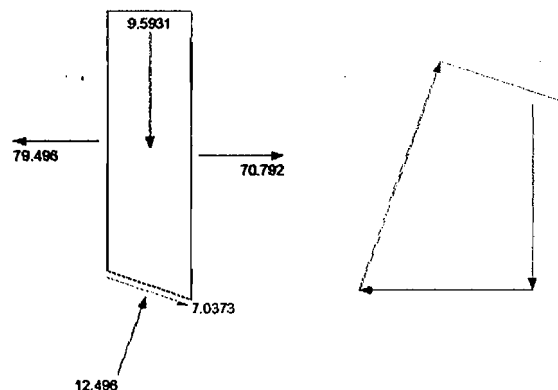
Slice 15 - Bishop Method	
Factor of Safety	0,265
Phi Angle	38
C (Strength)	3,5
C (Force)	2,5753
Pore Water Pressure	22,466
Pore Water Force	16,531
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,68864
Mid-Height	1,0887
Base Length	0,73581
Base Angle	20,627
Polygon Closure Error	0,44089
Anisotropic Strength Modifier	1
Weight	11,149
Base Shear Force	1,8831
Base Normal Force	12,597
Left Side Normal Force	85,165
Right Side Normal Force	79,496

Slice 15 - Bishop Method



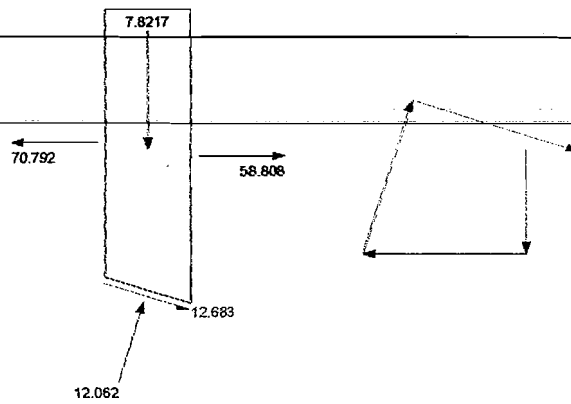
Slice 16 - Bishop Method	
Factor of Safety	0,265
Phi Angle	38
C (Strength)	3,5
C (Force)	2,5499
Pore Water Pressure	24,903
Pore Water Force	18,143
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,68864
Mid-Height	0,93682
Base Length	0,72856
Base Angle	19,054
Polygon Closure Error	1,9369
Anisotropic Strength Modifier	1
Weight	9,5931
Base Shear Force	7,0373
Base Normal Force	12,496
Left Side Normal Force	79,496
Right Side Normal Force	70,792

Slice 16 - Bishop Method



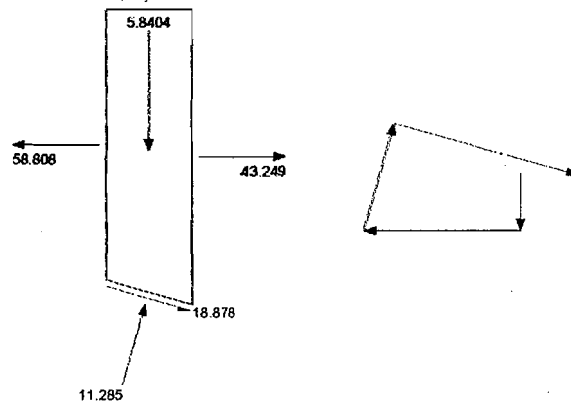
Slice 17 - Bishop Method	
Factor of Safety	0,265
Phi Angle	38
C (Strength)	3,5
C (Force)	2,5272
Pore Water Pressure	27,132
Pore Water Force	19,591
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,68865
Mid-Height	0,76384
Base Length	0,72205
Base Angle	17,495
Polygon Closure Error	3,7415
Anisotropic Strength Modifier	1
Weight	7,8217
Base Shear Force	12,683
Base Normal Force	12,062
Left Side Normal Force	70,792
Right Side Normal Force	58,808

Slice 17 - Bishop Method



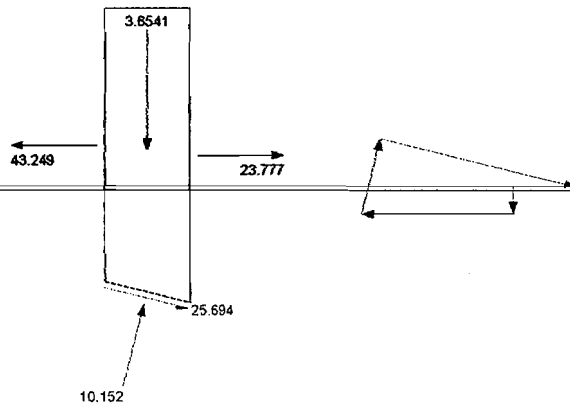
Slice 18 - Bishop Method	
Factor of Safety	0,265
Phi Angle	38
C (Strength)	3,5
C (Force)	2,5068
Pore Water Pressure	29,162
Pore Water Force	20,886
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,68864
Mid-Height	0,57035
Base Length	0,71621
Base Angle	15,95
Polygon Closure Error	5,6634
Anisotropic Strength Modifier	1
Weight	5,8404
Base Shear Force	18,878
Base Normal Force	11,285
Left Side Normal Force	58,808
Right Side Normal Force	43,249

Slice 18 - Bishop Method



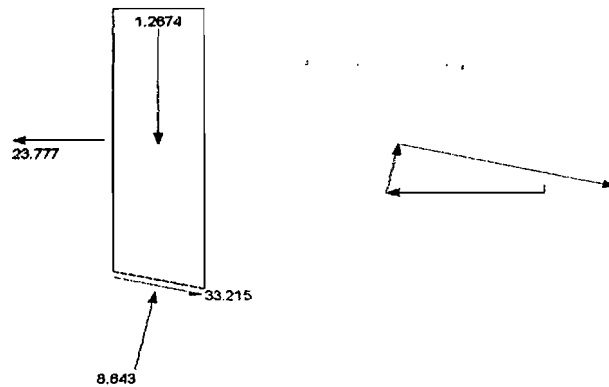
Slice 19 - Bishop Method	
Factor of Safety	0,265
Phi Angle	38
C (Strength)	3,5
C (Force)	2,4886
Pore Water Pressure	30,994
Pore Water Force	22,038
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,68864
Mid-Height	0,35685
Base Length	0,71103
Base Angle	14,417
Polygon Closure Error	7,8367
Anisotropic Strength Modifier	1
Weight	3,6541
Base Shear Force	25,694
Base Normal Force	10,152
Left Side Normal Force	43,249
Right Side Normal Force	23,777

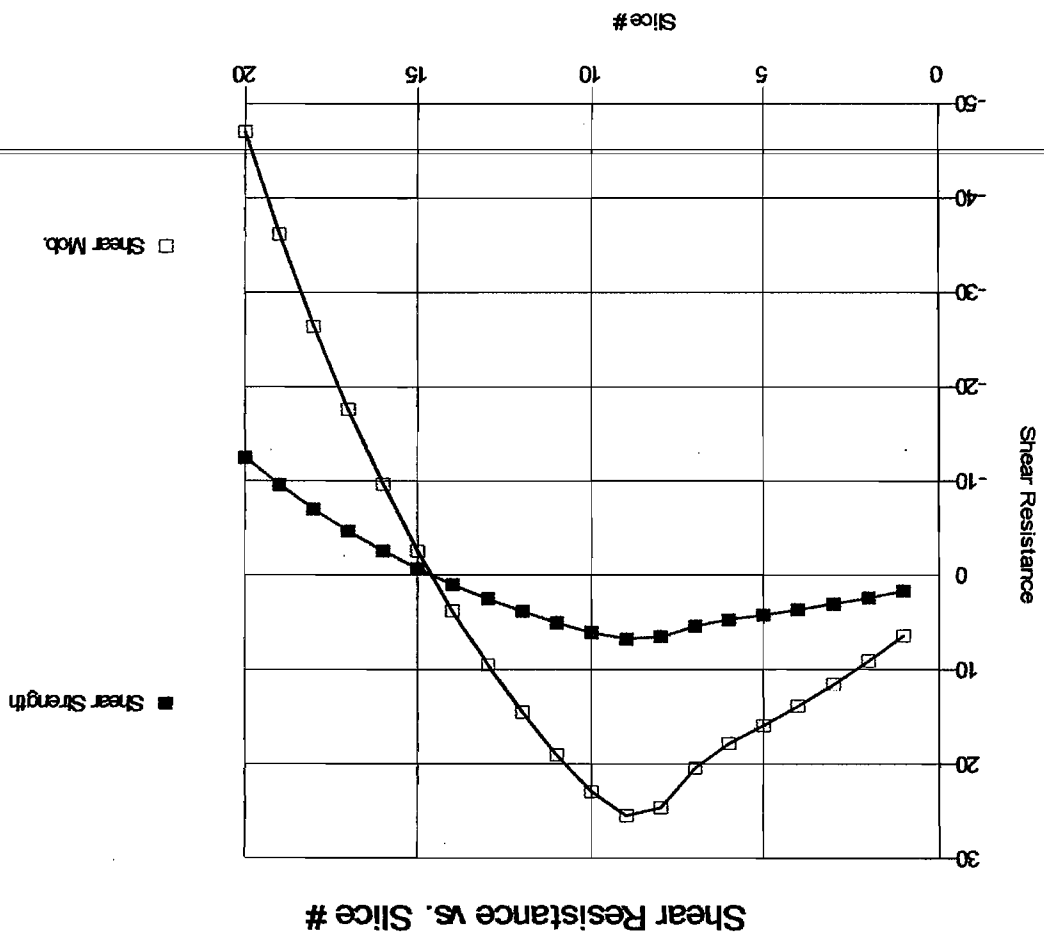
Slice 19 - Bishop Method



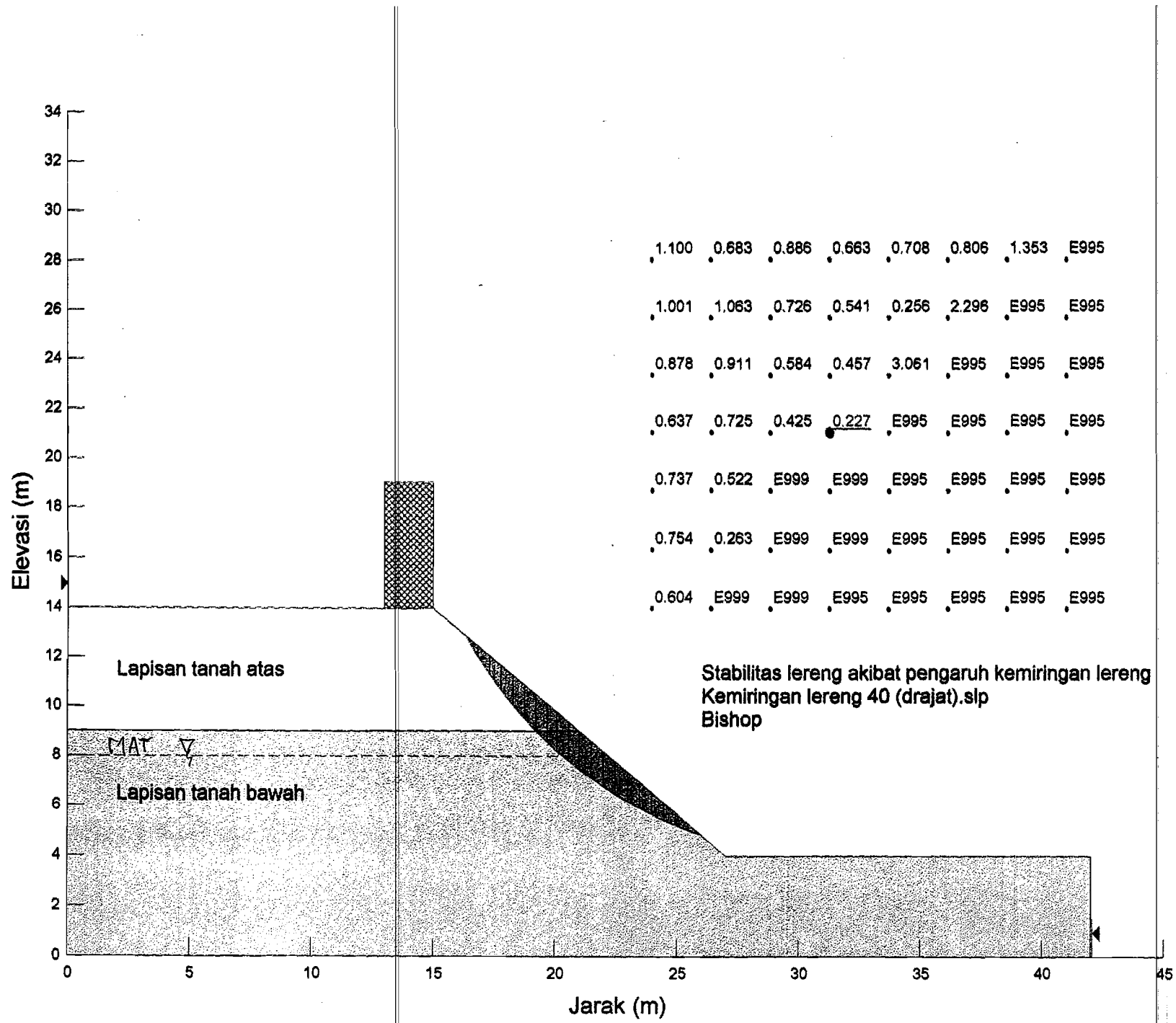
Slice 20 - Bishop Method	
Factor of Safety	0,265
Phi Angle	38
C (Strength)	3,5
C (Force)	2,4726
Pore Water Pressure	32,636
Pore Water Force	23,056
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,68864
Mid-Height	0,12376
Base Length	0,70645
Base Angle	12,894
Polygon Closure Error	10,297
Anisotropic Strength Modifier	1
Weight	1,2674
Base Shear Force	33,215
Base Normal Force	8,643
Left Side Normal Force	23,777

Slice 20 - Bishop Method



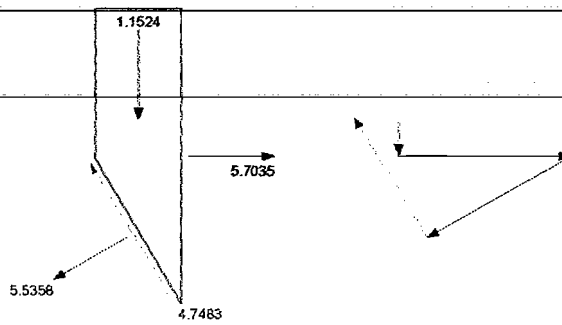






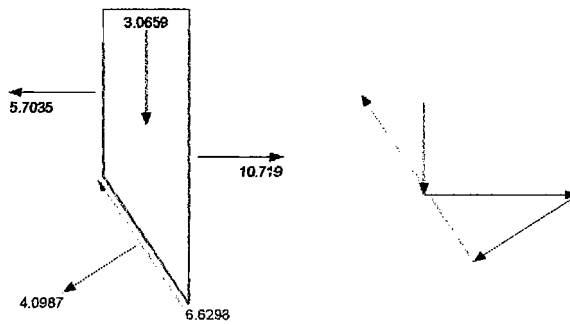
Slice 1 - Bishop Method	
Factor of Safety	0,227
Phi Angle	28
C (Strength)	4,2
C (Force)	4,0217
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48142
Mid-Height	0,22668
Base Length	0,95755
Base Angle	59,817
Polygon Closure Error	1,4259
Anisotropic Strength Modifier	1
Weight	1,1524
Base Shear Force	4,7483
Base Normal Force	5,5358
Right Side Normal Force	5,7035

Slice 1 - Bishop Method



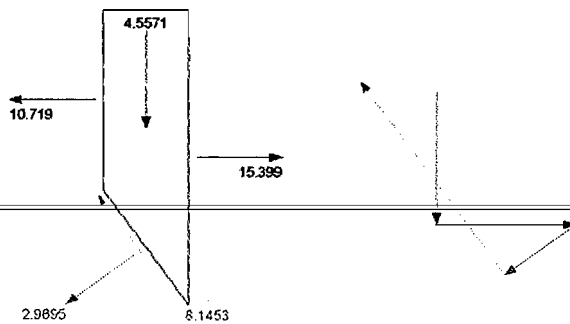
Slice 2 - Bishop Method	
Factor of Safety	0,227
Phi Angle	28
C (Strength)	4,2
C (Force)	3,6853
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48142
Mid-Height	0,60307
Base Length	0,87745
Base Angle	56,725
Polygon Closure Error	1,9889
Anisotropic Strength Modifier	1
Weight	3,0659
Base Shear Force	6,6298
Base Normal Force	4,0987
Left Side Normal Force	5,7035
Right Side Normal Force	10,719

Slice 2 - Bishop Method



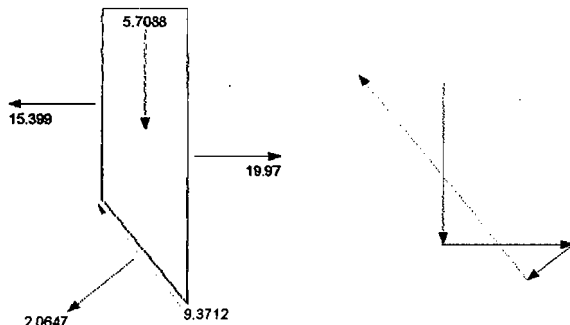
Slice 3 - Bishop Method	
Factor of Safety	0,227
Phi Angle	28
C (Strength)	4,2
C (Force)	3,4293
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48142
Mid-Height	0,8964
Base Length	0,81649
Base Angle	53,87
Polygon Closure Error	2,4843
Anisotropic Strength Modifier	1
Weight	4,5571
Base Shear Force	8,1453
Base Normal Force	2,9695
Left Side Normal Force	10,719
Right Side Normal Force	15,399

Slice 3 - Bishop Method



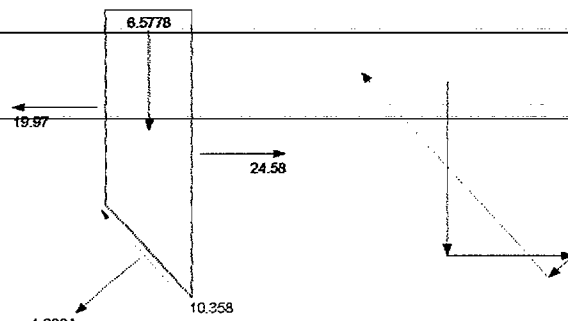
Slice 4 - Bishop Method	
Factor of Safety	0,227
Phi Angle	28
C (Strength)	4,2
C (Force)	3,2268
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48143
Mid-Height	1,1229
Base Length	0,76829
Base Angle	51,198
Polygon Closure Error	2,9051
Anisotropic Strength Modifier	1
Weight	5,7088
Base Shear Force	9,3712
Base Normal Force	2,0647
Left Side Normal Force	15,399
Right Side Normal Force	19,97

Slice 4 - Bishop Method



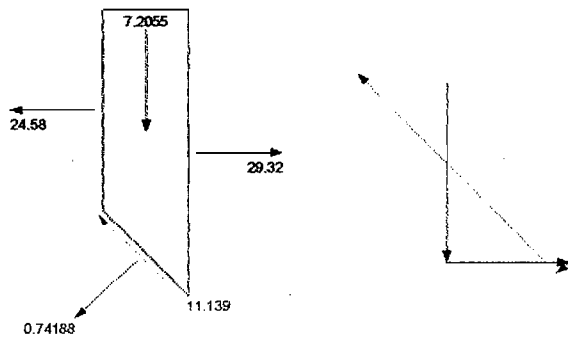
Slice 5 - Bishop Method	
Factor of Safety	0,227
Phi Angle	28
C (Strength)	4,2
C (Force)	3,0621
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48142
Mid-Height	1,2939
Base Length	0,72907
Base Angle	48,676
Polygon Closure Error	3,1592
Anisotropic Strength Modifier	1
Weight	6,5778
Base Shear Force	10,358
Base Normal Force	1,3334
Left Side Normal Force	19,97
Right Side Normal Force	24,58

Slice 5 - Bishop Method



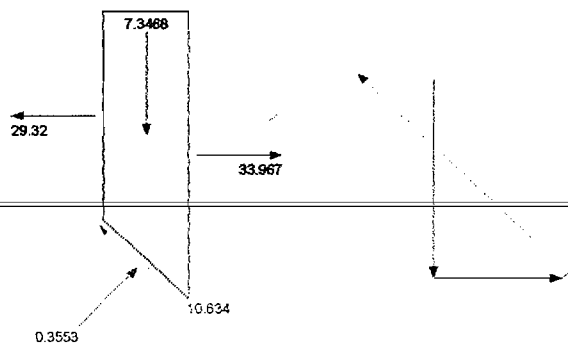
Slice 6 - Bishop Method	
Factor of Safety	0,227
Phi Angle	28
C (Strength)	4,2
C (Force)	2,9252
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48142
Mid-Height	1,4173
Base Length	0,89647
Base Angle	46,273
Polygon Closure Error	3,4531
Anisotropic Strength Modifier	1
Weight	7,2055
Base Shear Force	11,139
Base Normal Force	0,74188
Left Side Normal Force	24,58
Right Side Normal Force	29,32

Slice 6 - Bishop Method



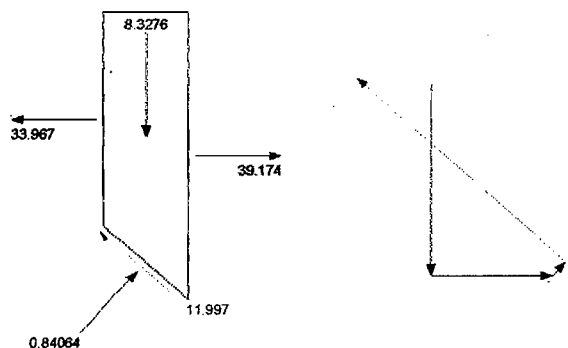
Slice 7 - Bishop Method	
Factor of Safety	0,227
Phi Angle	38
C (Strength)	3,5
C (Force)	2,1383
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,43897
Mid-Height	1,4966
Base Length	0,61086
Base Angle	44,069
Polygon Closure Error	2,7648
Anisotropic Strength Modifier	1
Weight	7,3468
Base Shear Force	10,634
Base Normal Force	0,3553
Left Side Normal Force	29,32
Right Side Normal Force	33,967

Slice 7 - Bishop Method



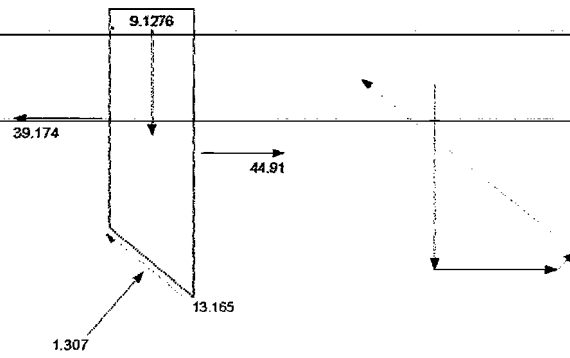
Slice 8 - Bishop Method	
Factor of Safety	0,227
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0688
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,43897
Mid-Height	1,5408
Base Length	0,5911
Base Angle	42,044
Polygon Closure Error	3,1792
Anisotropic Strength Modifier	1
Weight	8,3276
Base Shear Force	11,997
Base Normal Force	0,84064
Left Side Normal Force	33,967
Right Side Normal Force	39,174

Slice 8 - Bishop Method



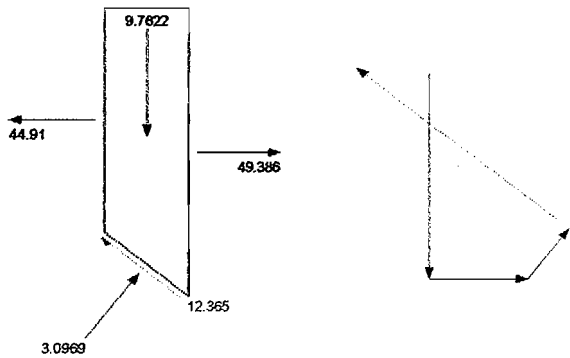
Slice 9 - Bishop Method	
Factor of Safety	0,227
Phi Angle	38
C (Strength)	3,5
C (Force)	2,008
Pore Water Pressure	0,084898
Pore Water Force	0,048707
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,43897
Mid-Height	1,5574
Base Length	0,57371
Base Angle	40,081
Polygon Closure Error	3,5545
Anisotropic Strength Modifier	1
Weight	9,1276
Base Shear Force	13,165
Base Normal Force	1,307
Left Side Normal Force	39,174
Right Side Normal Force	44,91

Slice 9 - Bishop Method



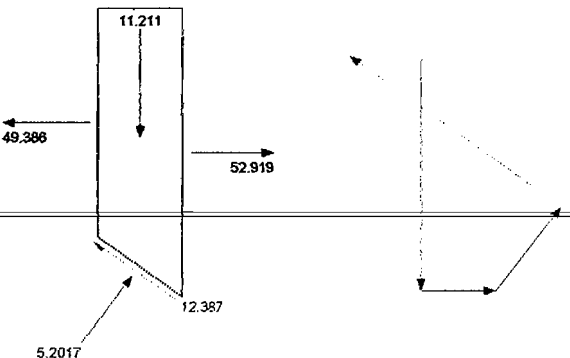
Slice 10 - Bishop Method	
Factor of Safety	0,227
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9543
Pore Water Pressure	3,5861
Pore Water Force	2,0024
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,43897
Mid-Height	1,5488
Base Length	0,55838
Base Angle	38,173
Polygon Closure Error	3,4004
Anisotropic Strength Modifier	1
Weight	9,7622
Base Shear Force	12,365
Base Normal Force	3,0969
Left Side Normal Force	44,91
Right Side Normal Force	49,386

Slice 10 - Bishop Method



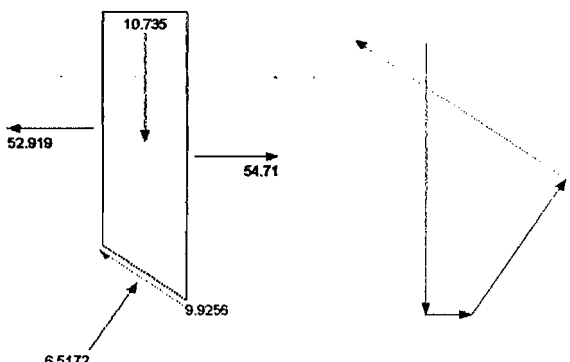
Slice 11 - Bishop Method	
Factor of Safety	0,227
Phi Angle	38
C (Strength)	3,5
C (Force)	2,1605
Pore Water Pressure	7,0713
Pore Water Force	4,3649
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49817
Mid-Height	1,5134
Base Length	0,61727
Base Angle	36,191
Polygon Closure Error	3,4064
Anisotropic Strength Modifier	1
Weight	11,211
Base Shear Force	12,387
Base Normal Force	5,2017
Left Side Normal Force	49,386
Right Side Normal Force	52,919

Slice 11 - Bishop Method



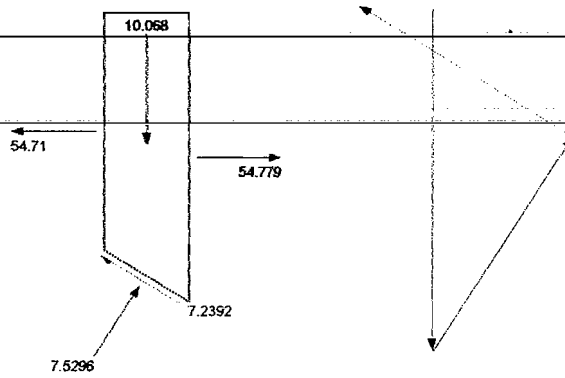
Slice 12 - Bishop Method	
Factor of Safety	0,227
Phi Angle	38
C (Strength)	3,5
C (Force)	2,1065
Pore Water Pressure	10,513
Pore Water Force	6,3271
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49816
Mid-Height	1,4492
Base Length	0,60188
Base Angle	34,137
Polygon Closure Error	2,7911
Anisotropic Strength Modifier	1
Weight	10,735
Base Shear Force	9,9256
Base Normal Force	6,5172
Left Side Normal Force	52,919
Right Side Normal Force	54,71

Slice 12 - Bishop Method



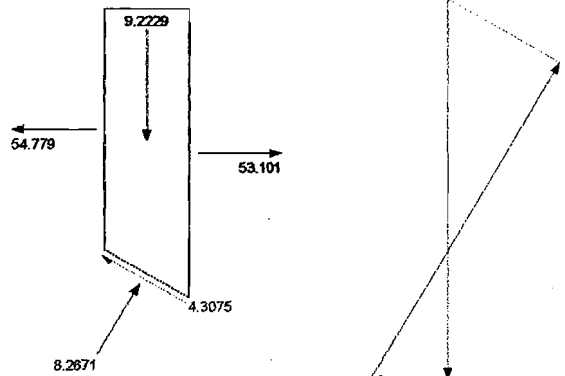
Slice 13 - Bishop Method	
Factor of Safety	0,227
Phi Angle	38
C (Strength)	3,5
C (Force)	2,069
Pore Water Pressure	13,701
Pore Water Force	8,0598
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49817
Mid-Height	1,3591
Base Length	0,58827
Base Angle	32,131
Polygon Closure Error	2,0639
Anisotropic Strength Modifier	1
Weight	10,068
Base Shear Force	7,2392
Base Normal Force	7,5296
Left Side Normal Force	54,71
Right Side Normal Force	54,779

Slice 13 - Bishop Method



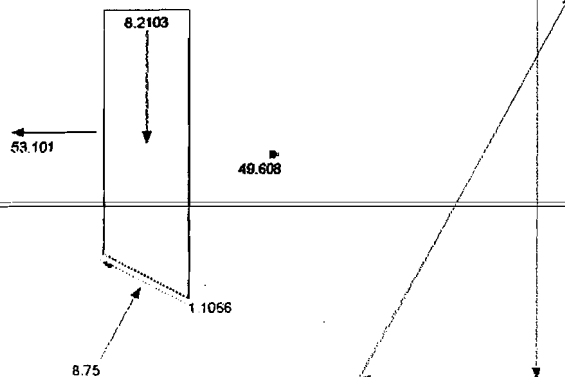
Slice 14 - Bishop Method	
Factor of Safety	0,227
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0167
Pore Water Pressure	16,653
Pore Water Force	9,5959
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49816
Mid-Height	1,245
Base Length	0,57621
Base Angle	30,169
Polygon Closure Error	1,2451
Anisotropic Strength Modifier	1
Weight	9,2229
Base Shear Force	4,3075
Base Normal Force	8,2671
Left Side Normal Force	54,779
Right Side Normal Force	53,101

Slice 14 - Bishop Method



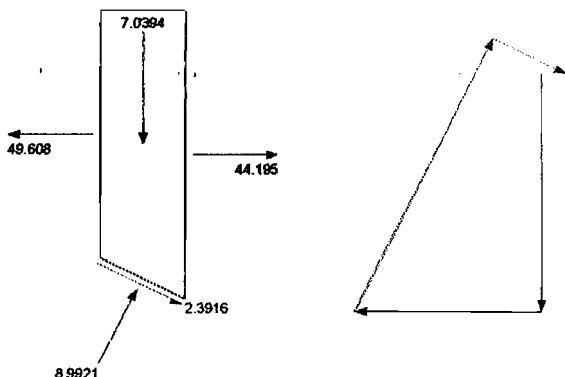
Slice 15 - Bishop Method	
Factor of Safety	0,227
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9793
Pore Water Pressure	19,385
Pore Water Force	10,962
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49817
Mid-Height	1,1083
Base Length	0,5655
Base Angle	28,245
Polygon Closure Error	0,30625
Anisotropic Strength Modifier	1
Weight	8,2103
Base Shear Force	1,1066
Base Normal Force	8,75
Left Side Normal Force	53,101
Right Side Normal Force	49,608

Slice 15 - Bishop Method



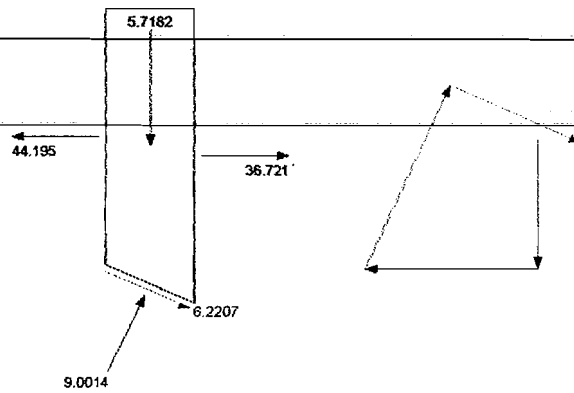
Slice 16 - Bishop Method	
Factor of Safety	0,227
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9458
Pore Water Pressure	21,905
Pore Water Force	12,178
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49816
Mid-Height	0,95028
Base Length	0,55595
Base Angle	26,355
Polygon Closure Error	0,67441
Anisotropic Strength Modifier	1
Weight	7,0394
Base Shear Force	2,3916
Base Normal Force	8,9921
Left Side Normal Force	49,608
Right Side Normal Force	44,195

Slice 16 - Bishop Method



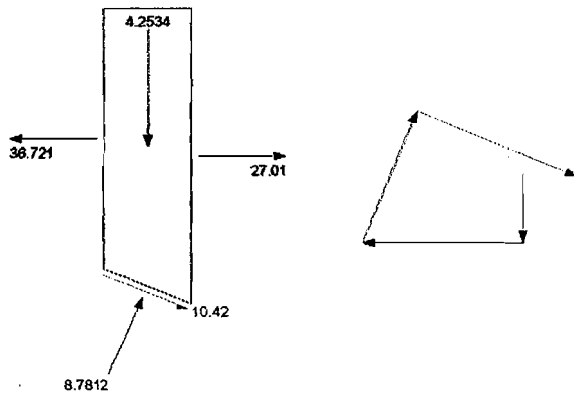
Slice 17 - Bishop Method	
Factor of Safety	0,227
Phi Angle	38
C (Strength)	3,5
C (Force)	1,916
Pore Water Pressure	24,227
Pore Water Force	13,263
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49817
Mid-Height	0,77192
Base Length	0,54744
Base Angle	24,495
Polygon Closure Error	1,8453
Anisotropic Strength Modifier	1
Weight	5,7182
Base Shear Force	6,2207
Base Normal Force	9,0014
Left Side Normal Force	44,195
Right Side Normal Force	36,721

Slice 17 - Bishop Method



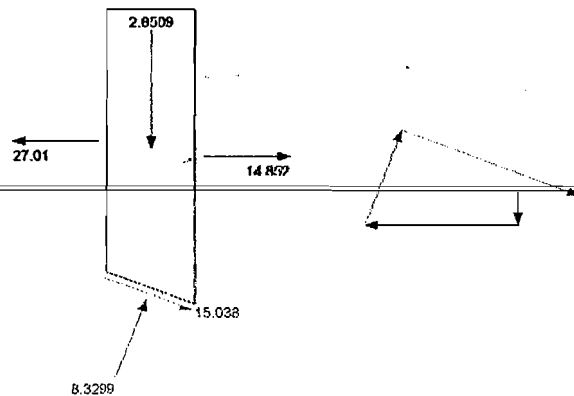
Slice 18 - Bishop Method	
Factor of Safety	0,227
Phi Angle	38
C (Strength)	3,5
C (Force)	1,8895
Pore Water Pressure	28,359
Pore Water Force	14,23
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49816
Mid-Height	0,57418
Base Length	0,53984
Base Angle	22,663
Polygon Closure Error	3,2302
Anisotropic Strength Modifier	1
Weight	4,2534
Base Shear Force	10,42
Base Normal Force	8,7812
Left Side Normal Force	36,721
Right Side Normal Force	27,01

Slice 18 - Bishop Method



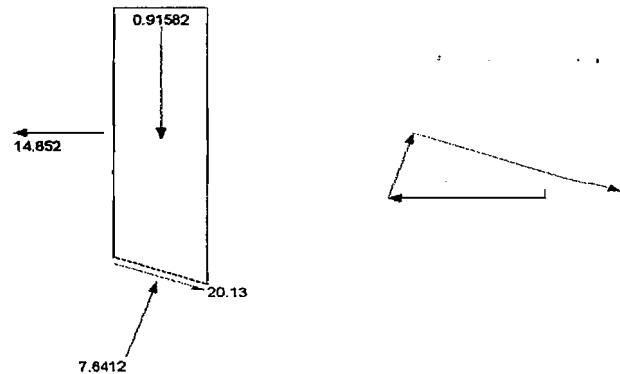
Slice 19 - Bishop Method	
Factor of Safety	0,227
Phi Angle	38
C (Strength)	3,5
C (Force)	1,8658
Pore Water Pressure	28,308
Pore Water Force	15,091
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49817
Mid-Height	0,36785
Base Length	0,5331
Base Angle	20,855
Polygon Closure Error	4,8122
Anisotropic Strength Modifier	1
Weight	2,6509
Base Shear Force	15,038
Base Normal Force	8,3299
Left Side Normal Force	27,01
Right Side Normal Force	14,852

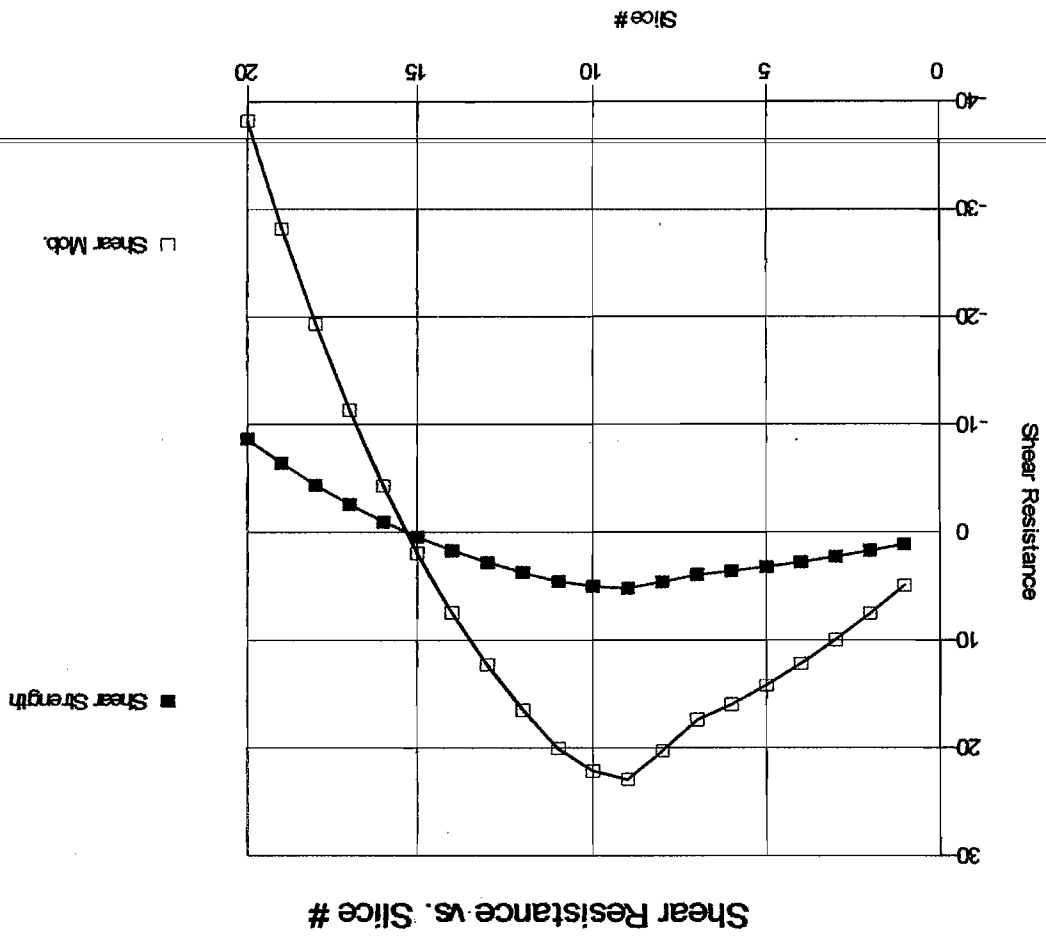
Slice 19 - Bishop Method

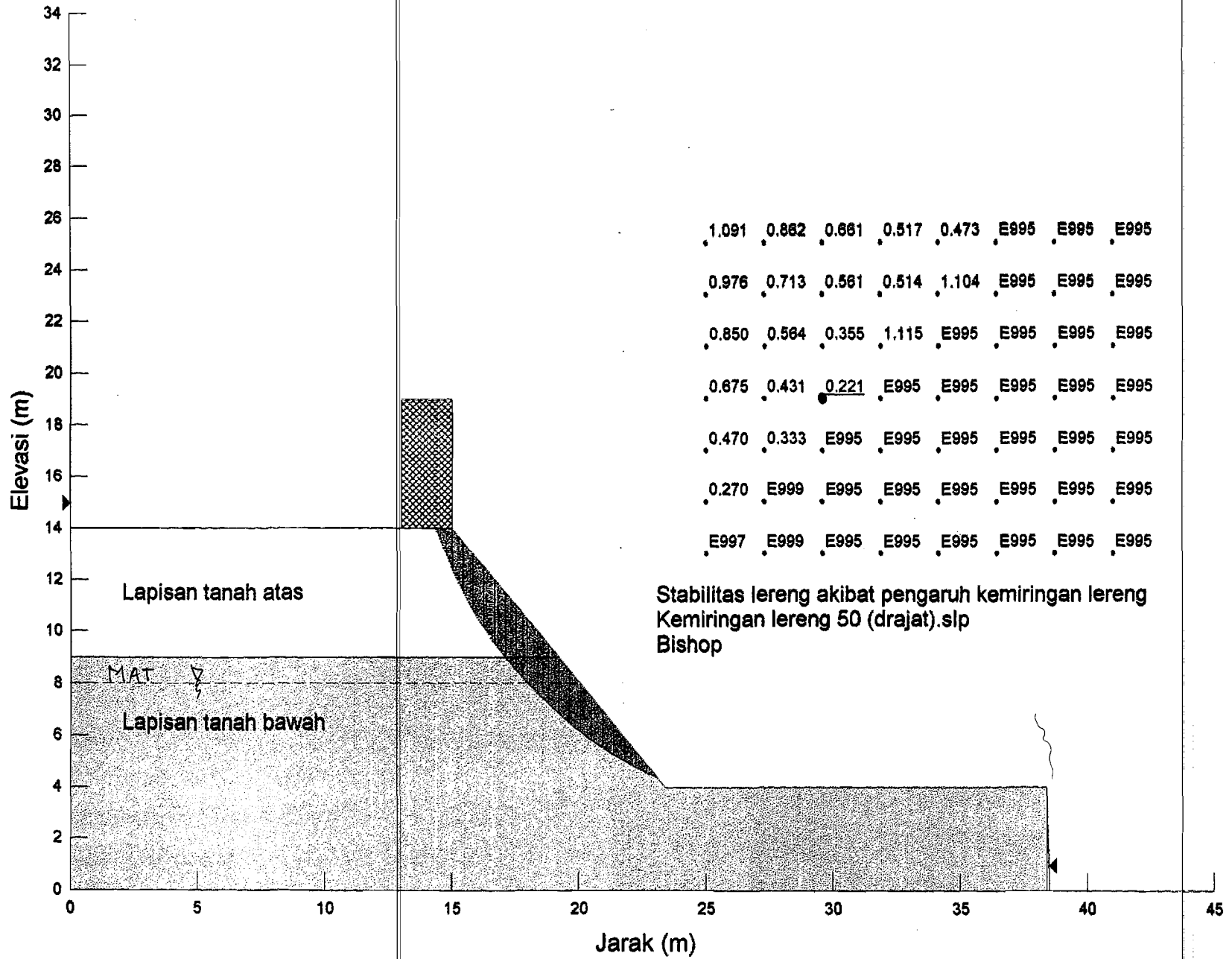


Slice 20 - Bishop Method	
Factor of Safety	0,227
Phi Angle	38
C (Strength)	3,5
C (Force)	1,8448
Pore Water Pressure	30,084
Pore Water Force	15,857
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49816
Mid-Height	0,12363
Base Length	0,52708
Base Angle	19,07
Polygon Closure Error	6,6429
Anisotropic Strength Modifier	1
Weight	0,91582
Base Shear Force	20,13
Base Normal Force	7,6412
Left Side Normal Force	14,852

Slice 20 - Bishop Method

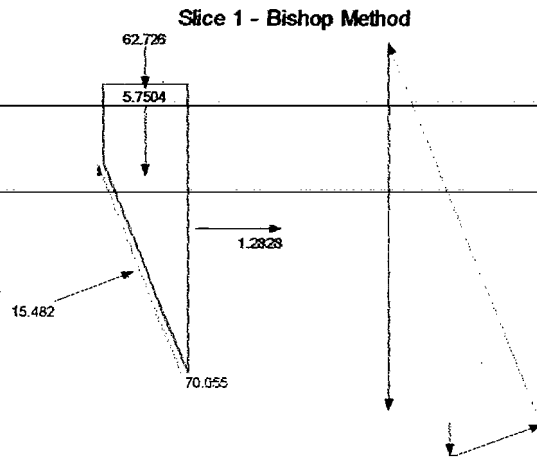




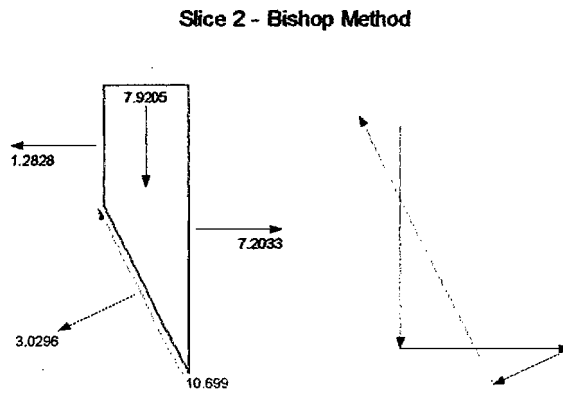




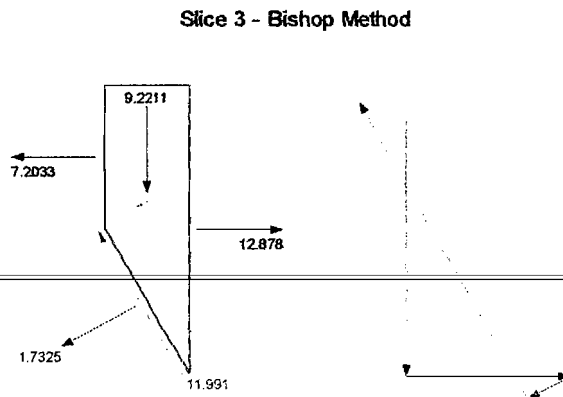
Slice 1 - Bishop Method	
Factor of Safety	0,221
Phi Angle	28
C (Strength)	4,2
C (Force)	7,2518
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,62728
Mid-Height	0,86814
Base Length	1,7266
Base Angle	68,697
Polygon Closure Error	10,158
Anisotropic Strength Modifier	1
Weight	5,7504
Base Shear Force	70,055
Base Normal Force	15,482
Right Side Normal Force	1,2828
Surface Pressure Load	62,728



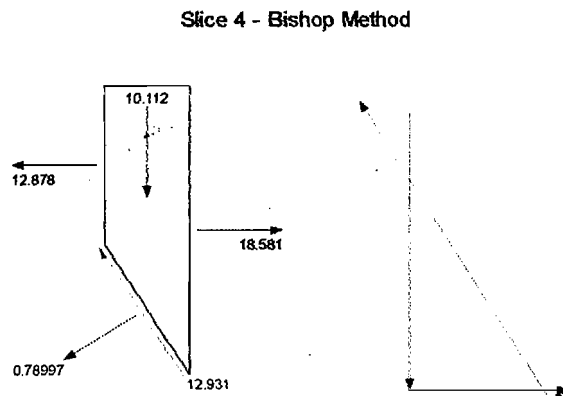
Slice 2 - Bishop Method	
Factor of Safety	0,221
Phi Angle	28
C (Strength)	4,2
C (Force)	3,9755
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,41629
Mid-Height	1,8018
Base Length	0,94855
Base Angle	63,909
Polygon Closure Error	1,4444
Anisotropic Strength Modifier	1
Weight	7,9205
Base Shear Force	10,699
Base Normal Force	3,0296
Left Side Normal Force	1,2828
Right Side Normal Force	7,2033



Slice 3 - Bishop Method	
Factor of Safety	0,221
Phi Angle	28
C (Strength)	4,2
C (Force)	3,5717
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,41628
Mid-Height	2,0976
Base Length	0,8504
Base Angle	60,692
Polygon Closure Error	1,6787
Anisotropic Strength Modifier	1
Weight	9,2211
Base Shear Force	11,991
Base Normal Force	1,7325
Left Side Normal Force	7,2033
Right Side Normal Force	12,878

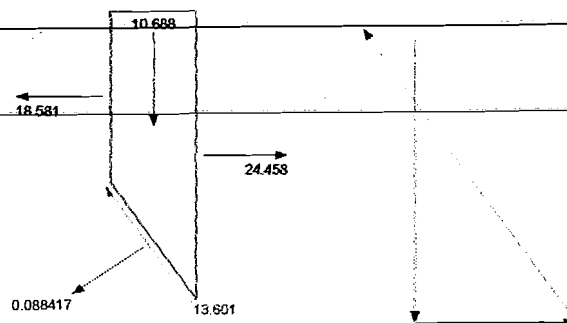


Slice 4 - Bishop Method	
Factor of Safety	0,221
Phi Angle	28
C (Strength)	4,2
C (Force)	3,2784
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,41629
Mid-Height	2,3004
Base Length	0,78058
Base Angle	57,771
Polygon Closure Error	1,8103
Anisotropic Strength Modifier	1
Weight	10,112
Base Shear Force	12,931
Base Normal Force	0,78997
Left Side Normal Force	12,878
Right Side Normal Force	18,581



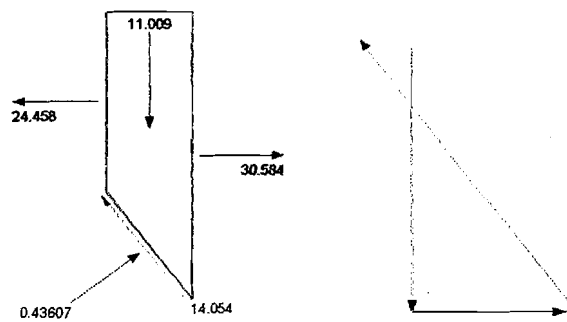
Slice 5 - Bishop Method	
Factor of Safety	0,221
Phi Angle	28
C (Strength)	4,2
C (Force)	3,0537
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,41629
Mid-Height	2,4313
Base Length	0,72706
Base Angle	55,071
Polygon Closure Error	1,9041
Anisotropic Strength Modifier	1
Weight	10,688
Base Shear Force	13,601
Base Normal Force	0,088417
Left Side Normal Force	18,581
Right Side Normal Force	24,458

Slice 5 - Bishop Method



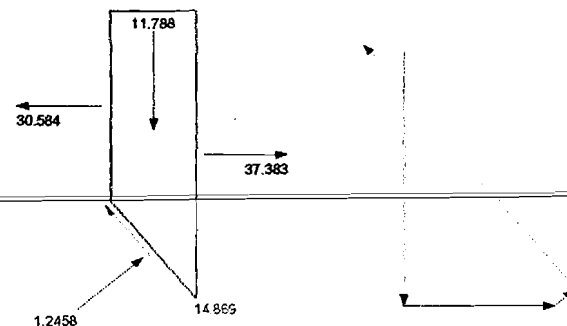
Slice 6 - Bishop Method	
Factor of Safety	0,221
Phi Angle	28
C (Strength)	4,2
C (Force)	2,8749
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,41628
Mid-Height	2,5042
Base Length	0,6845
Base Angle	52,544
Polygon Closure Error	2,1081
Anisotropic Strength Modifier	1
Weight	11,009
Base Shear Force	14,054
Base Normal Force	0,43607
Left Side Normal Force	24,458
Right Side Normal Force	30,584

Slice 6 - Bishop Method



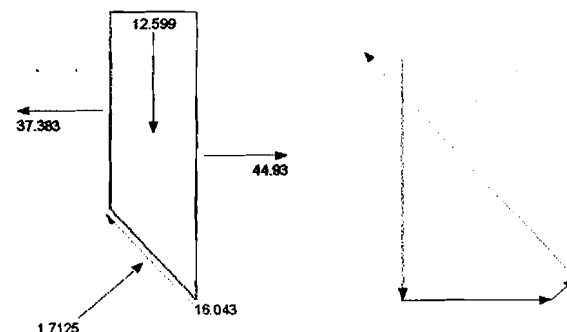
Slice 7 - Bishop Method	
Factor of Safety	0,221
Phi Angle	38
C (Strength)	3,5
C (Force)	2,3136
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,42372
Mid-Height	2,5289
Base Length	0,68103
Base Angle	50,134
Polygon Closure Error	1,8586
Anisotropic Strength Modifier	1
Weight	11,788
Base Shear Force	14,869
Base Normal Force	1,2458
Left Side Normal Force	30,584
Right Side Normal Force	37,383

Slice 7 - Bishop Method



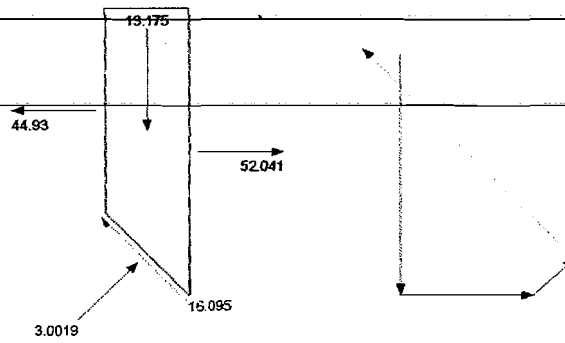
Slice 8 - Bishop Method	
Factor of Safety	0,221
Phi Angle	38
C (Strength)	3,5
C (Force)	2,2086
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,42371
Mid-Height	2,5113
Base Length	0,63104
Base Angle	47,821
Polygon Closure Error	2,0054
Anisotropic Strength Modifier	1
Weight	12,599
Base Shear Force	16,043
Base Normal Force	1,7125
Left Side Normal Force	37,383
Right Side Normal Force	44,93

Slice 8 - Bishop Method



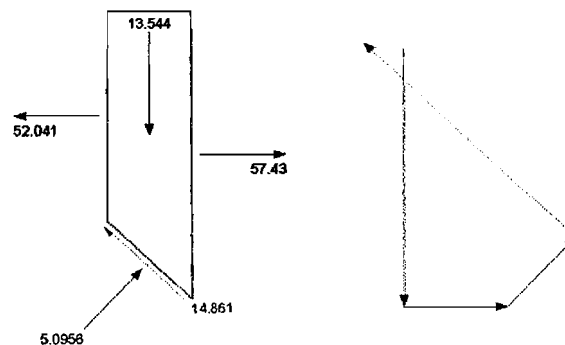
Slice 9 - Bishop Method	
Factor of Safety	0,221
Phi Angle	38
C (Strength)	3,5
C (Force)	2,1198
Pore Water Pressure	1,9172
Pore Water Force	1,1612
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,42371
Mid-Height	2,4565
Base Length	0,60566
Base Angle	45,606
Polygon Closure Error	2,0119
Anisotropic Strength Modifier	1
Weight	13,175
Base Shear Force	16,095
Base Normal Force	3,0019
Left Side Normal Force	44,93
Right Side Normal Force	52,041

Slice 9 - Bishop Method



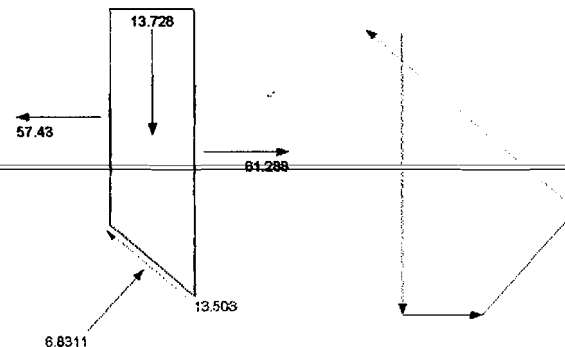
Slice 10 - Bishop Method	
Factor of Safety	0,221
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0437
Pore Water Pressure	6,0053
Pore Water Force	3,5065
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,42372
Mid-Height	2,369
Base Length	0,58391
Base Angle	43,476
Polygon Closure Error	2,0062
Anisotropic Strength Modifier	1
Weight	13,544
Base Shear Force	14,861
Base Normal Force	5,0958
Left Side Normal Force	52,041
Right Side Normal Force	57,43

Slice 10 - Bishop Method



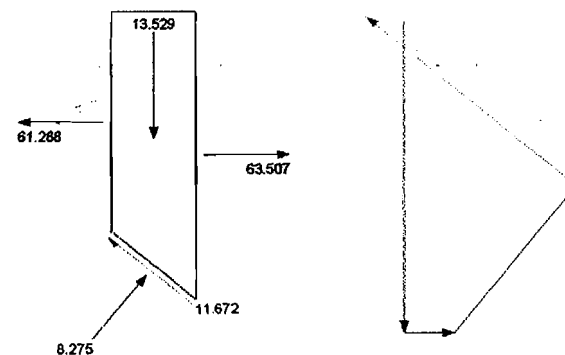
Slice 11 - Bishop Method	
Factor of Safety	0,221
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9776
Pore Water Pressure	9,8052
Pore Water Force	5,5402
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,42371
Mid-Height	2,252
Base Length	0,56563
Base Angle	41,419
Polygon Closure Error	1,718
Anisotropic Strength Modifier	1
Weight	13,728
Base Shear Force	13,508
Base Normal Force	6,8311
Left Side Normal Force	57,43
Right Side Normal Force	61,288

Slice 11 - Bishop Method



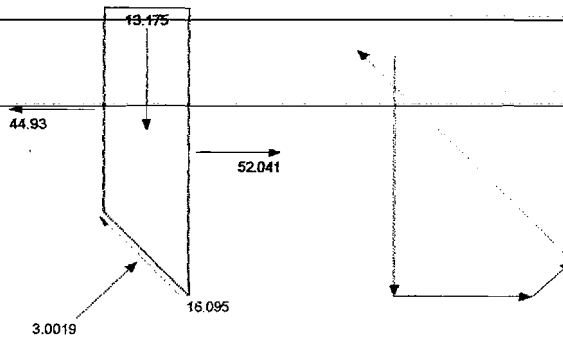
Slice 12 - Bishop Method	
Factor of Safety	0,221
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9562
Pore Water Pressure	13,376
Pore Water Force	7,4762
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,43185
Mid-Height	2,1068
Base Length	0,55891
Base Angle	39,408
Polygon Closure Error	1,5558
Anisotropic Strength Modifier	1
Weight	13,529
Base Shear Force	11,672
Base Normal Force	8,275
Left Side Normal Force	61,288
Right Side Normal Force	63,507

Slice 12 - Bishop Method



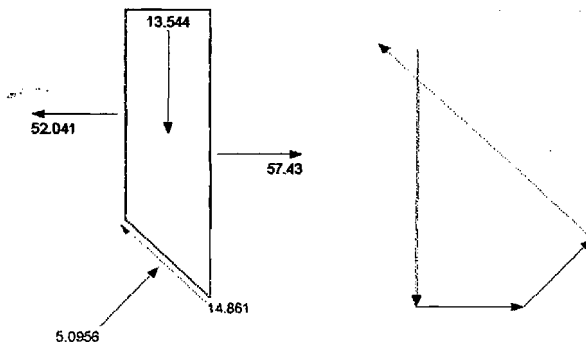
Slice 9 - Bishop Method	
Factor of Safety	0,221
Phi Angle	38
C (Strength)	3,5
C (Force)	2,1198
Pore Water Pressure	1,9172
Pore Water Force	1,1612
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,42371
Mid-Height	2,4565
Base Length	0,60566
Base Angle	45,606
Polygon Closure Error	2,0119
Anisotropic Strength Modifier	1
Weight	13,175
Base Shear Force	16,095
Base Normal Force	3,0019
Left Side Normal Force	44,93
Right Side Normal Force	52,041

Slice 9 - Bishop Method



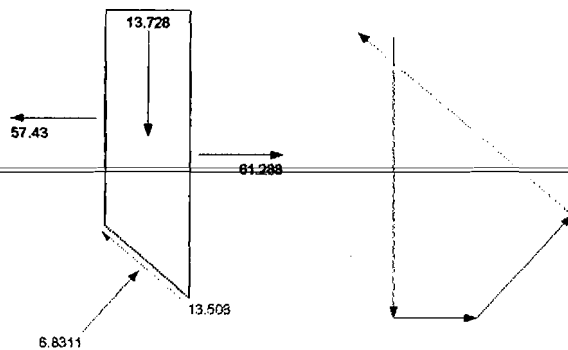
Slice 10 - Bishop Method	
Factor of Safety	0,221
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0437
Pore Water Pressure	6,0053
Pore Water Force	3,5065
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,42372
Mid-Height	2,369
Base Length	0,58391
Base Angle	43,476
Polygon Closure Error	2,0062
Anisotropic Strength Modifier	1
Weight	13,544
Base Shear Force	14,861
Base Normal Force	5,0956
Left Side Normal Force	52,041
Right Side Normal Force	57,43

Slice 10 - Bishop Method



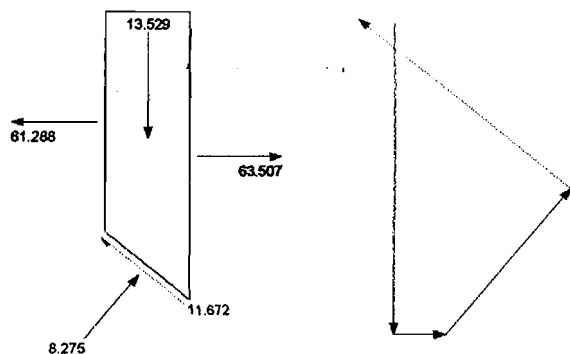
Slice 11 - Bishop Method	
Factor of Safety	0,221
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9776
Pore Water Pressure	9,8052
Pore Water Force	5,5402
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,42371
Mid-Height	2,252
Base Length	0,56503
Base Angle	41,419
Polygon Closure Error	1,716
Anisotropic Strength Modifier	1
Weight	13,728
Base Shear Force	13,508
Base Normal Force	6,8311
Left Side Normal Force	57,43
Right Side Normal Force	61,288

Slice 11 - Bishop Method



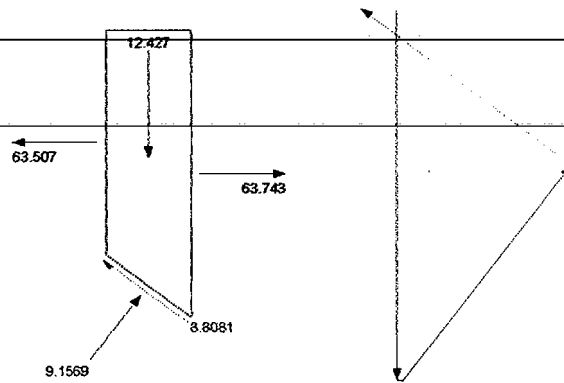
Slice 12 - Bishop Method	
Factor of Safety	0,221
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9562
Pore Water Pressure	13,376
Pore Water Force	7,4762
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,43185
Mid-Height	2,1068
Base Length	0,55891
Base Angle	39,406
Polygon Closure Error	1,5558
Anisotropic Strength Modifier	1
Weight	13,529
Base Shear Force	11,672
Base Normal Force	8,275
Left Side Normal Force	61,288
Right Side Normal Force	63,507

Slice 12 - Bishop Method



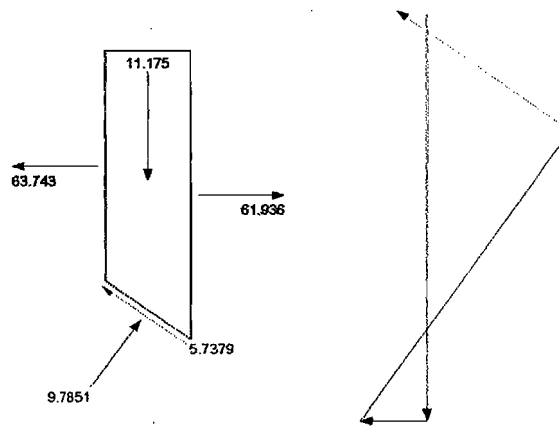
<b>Slice 13 - Bishop Method</b>	
Factor of Safety	0,221
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9034
Pore Water Pressure	16,735
Pore Water Force	9,1009
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,43185
Mid-Height	1,9352
Base Length	0,54384
Base Angle	37,432
Polygon Closure Error	1,1806
Anisotropic Strength Modifier	1
Weight	12,427
Base Shear Force	8,8081
Base Normal Force	9,1569
Left Side Normal Force	63,507
Right Side Normal Force	63,743

Slice 13 - Bishop Method



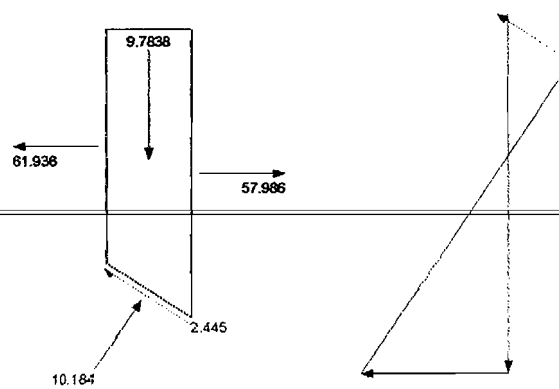
<b>Slice 14 - Bishop Method</b>	
Factor of Safety	0,221
Phi Angle	38
C (Strength)	3,5
C (Force)	1,8568
Pore Water Pressure	19,864
Pore Water Force	10,538
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,43185
Mid-Height	1,7402
Base Length	0,53051
Base Angle	35,508
Polygon Closure Error	0,78225
Anisotropic Strength Modifier	1
Weight	11,175
Base Shear Force	5,7379
Base Normal Force	9,7851
Left Side Normal Force	63,743
Right Side Normal Force	61,936

Slice 14 - Bishop Method



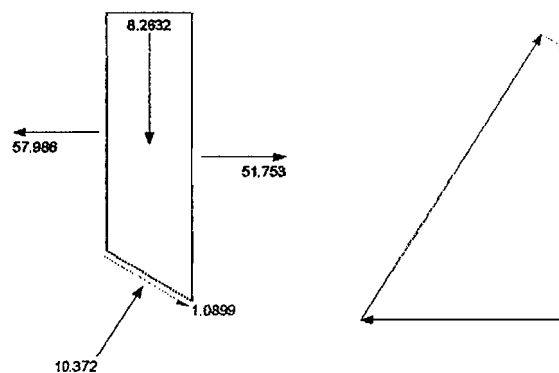
<b>Slice 15 - Bishop Method</b>	
Factor of Safety	0,221
Phi Angle	38
C (Strength)	3,5
C (Force)	1,8153
Pore Water Pressure	22,782
Pore Water Force	11,816
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,43184
Mid-Height	1,5238
Base Length	0,51864
Base Angle	33,63
Polygon Closure Error	0,30552
Anisotropic Strength Modifier	1
Weight	9,7838
Base Shear Force	2,445
Base Normal Force	10,184
Left Side Normal Force	61,936
Right Side Normal Force	57,986

Slice 15 - Bishop Method



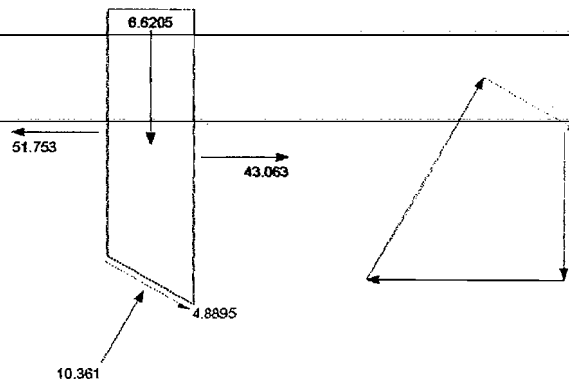
<b>Slice 16 - Bishop Method</b>	
Factor of Safety	0,221
Phi Angle	38
C (Strength)	3,5
C (Force)	1,7783
Pore Water Pressure	25,502
Pore Water Force	12,957
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,43185
Mid-Height	1,2868
Base Length	0,50807
Base Angle	31,791
Polygon Closure Error	0,10372
Anisotropic Strength Modifier	1
Weight	8,2632
Base Shear Force	1,0899
Base Normal Force	10,372
Left Side Normal Force	57,986
Right Side Normal Force	51,753

Slice 16 - Bishop Method



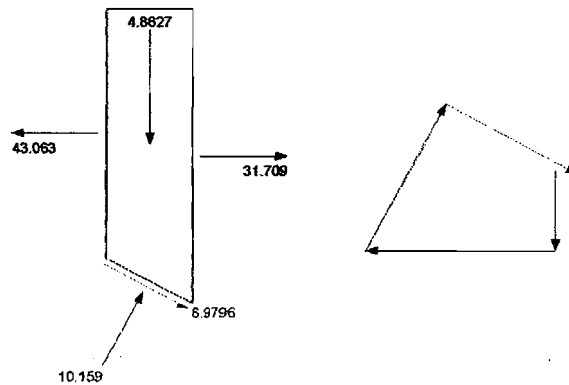
Slice 17 - Bishop Method	
Factor of Safety	0,221
Phi Angle	38
C (Strength)	3,5
C (Force)	1,7454
Pore Water Pressure	28,035
Pore Water Force	13,978
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,43185
Mid-Height	1,031
Base Length	0,4986
Base Angle	29,988
Polygon Closure Error	0,67347
Anisotropic Strength Modifier	1
Weight	6,6205
Base Shear Force	4,8895
Base Normal Force	10,361
Left Side Normal Force	51,753
Right Side Normal Force	43,063

Slice 17 - Bishop Method



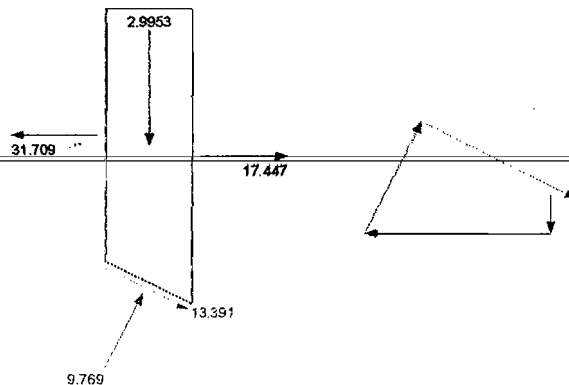
Slice 18 - Bishop Method	
Factor of Safety	0,221
Phi Angle	38
C (Strength)	3,5
C (Force)	1,7153
Pore Water Pressure	30,392
Pore Water Force	14,895
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,43185
Mid-Height	0,75724
Base Length	0,4901
Base Angle	28,218
Polygon Closure Error	1,3057
Anisotropic Strength Modifier	1
Weight	4,8627
Base Shear Force	8,9796
Base Normal Force	10,159
Left Side Normal Force	43,063
Right Side Normal Force	31,709

Slice 18 - Bishop Method



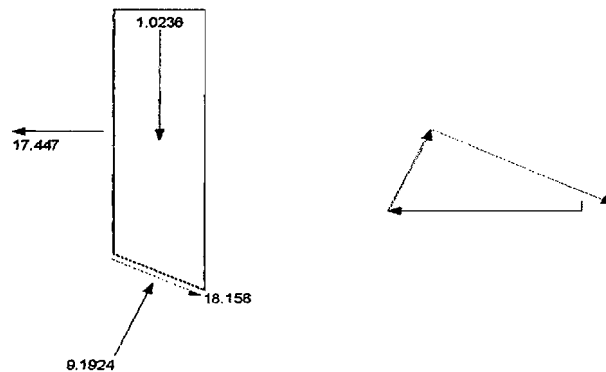
Slice 19 - Bishop Method	
Factor of Safety	0,221
Phi Angle	38
C (Strength)	3,5
C (Force)	1,6886
Pore Water Pressure	32,581
Pore Water Force	15,719
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,43185
Mid-Height	0,46645
Base Length	0,48245
Base Angle	26,477
Polygon Closure Error	1,9254
Anisotropic Strength Modifier	1
Weight	2,9953
Base Shear Force	13,391
Base Normal Force	9,769
Left Side Normal Force	31,709
Right Side Normal Force	17,447

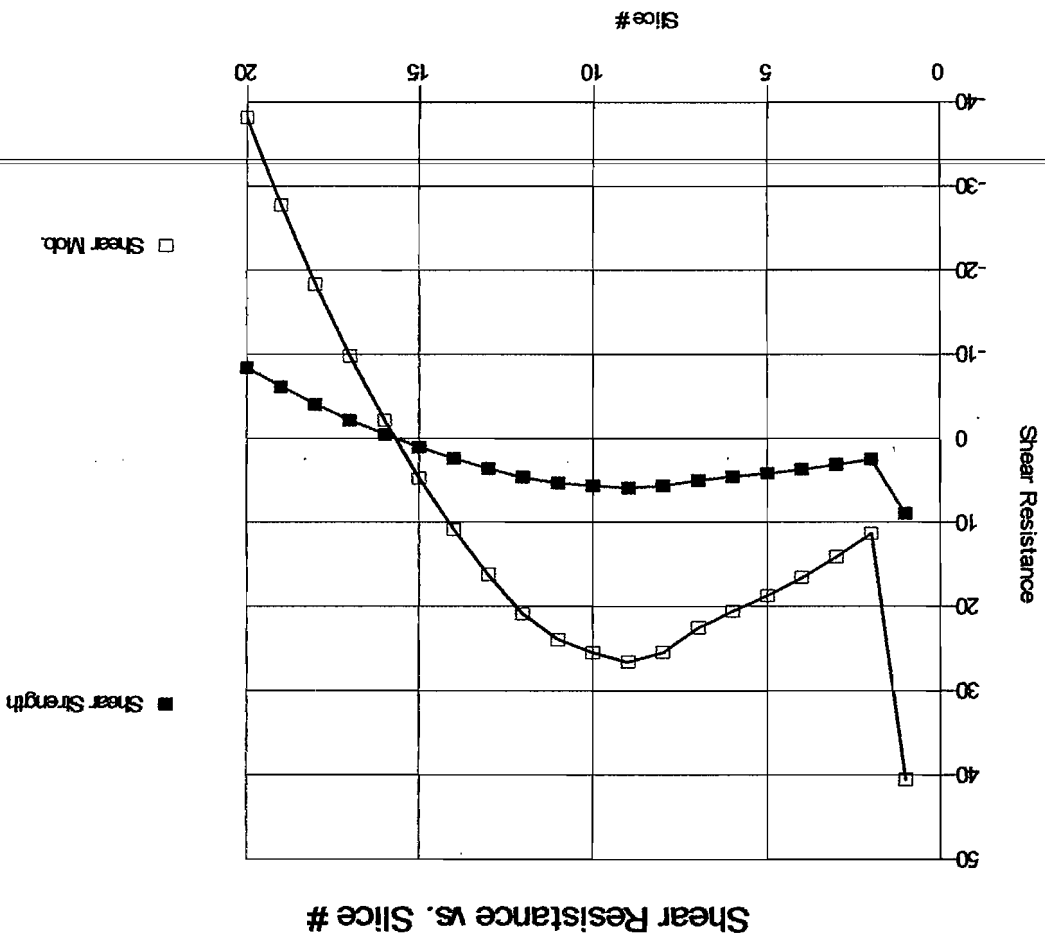
Slice 19 - Bishop Method

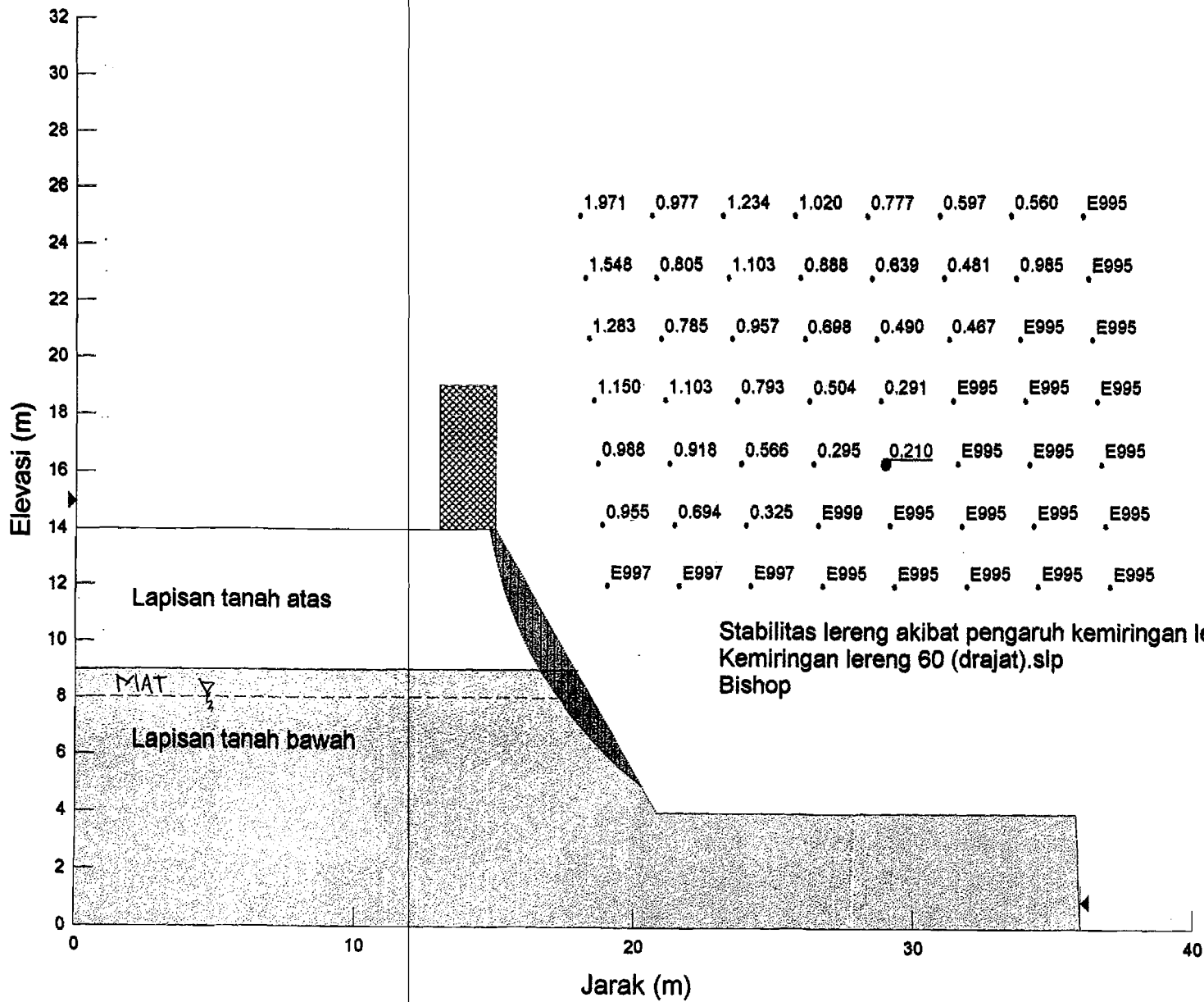


Slice 20 - Bishop Method	
Factor of Safety	0,221
Phi Angle	38
C (Strength)	3,5
C (Force)	1,6645
Pore Water Pressure	34,614
Pore Water Force	16,461
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,43184
Mid-Height	0,1594
Base Length	0,47556
Base Angle	24,762
Polygon Closure Error	2,8145
Anisotropic Strength Modifier	1
Weight	1,0236
Base Shear Force	18,158
Base Normal Force	9,1924
Left Side Normal Force	17,447

Slice 20 - Bishop Method



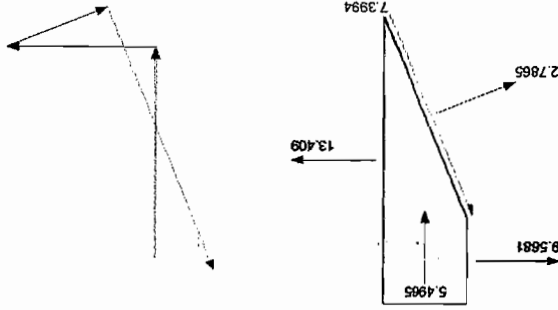






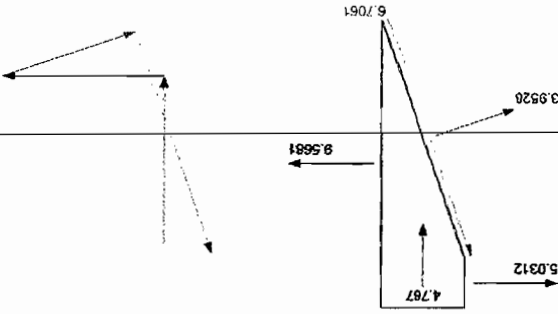
Factor of Safety	0,21
Phi Angle	28
C (Strength)	4,2
C (Force)	3,038
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27285
Mid-Height	1,9077
Base Length	0,72333
Base Angle	67,839
Polygon Closure Error	1,5169
Anisotropic Strength Modifier	1
Weight	5,4965
Base Shear Force	7,3994
Base Normal Force	2,7865
Left Side Normal Force	9,5681
Right Side Normal Force	13,409

Slice 4 - Bishop Method



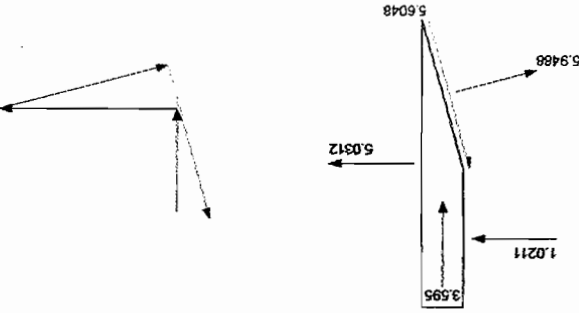
Factor of Safety	0,21
Phi Angle	28
C (Strength)	4,2
C (Force)	3,5121
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27284
Mid-Height	1,6545
Base Length	0,83621
Base Angle	70,957
Polygon Closure Error	1,3748
Weight	4,767
Base Shear Force	6,7061
Base Normal Force	3,9528
Left Side Normal Force	5,0312
Right Side Normal Force	9,5681

Slice 3 - Bishop Method



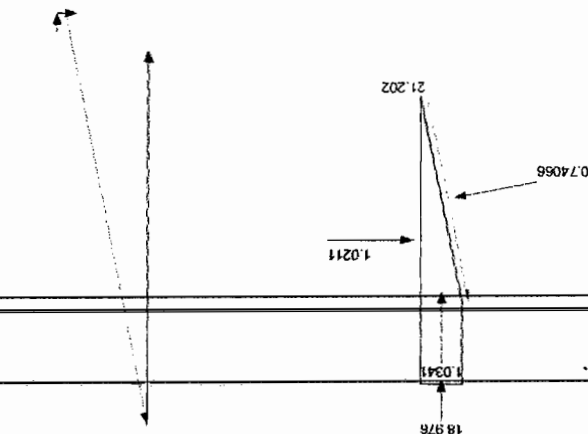
Factor of Safety	0,21
Phi Angle	28
C (Strength)	4,2
C (Force)	4,3412
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27285
Mid-Height	1,2477
Base Length	1,0336
Base Angle	74,694
Polygon Closure Error	1,1499
Anisotropic Strength Modifier	1
Weight	3,595
Base Shear Force	5,6048
Base Normal Force	5,9488
Left Side Normal Force	1,0211
Right Side Normal Force	5,0312

Slice 2 - Bishop Method



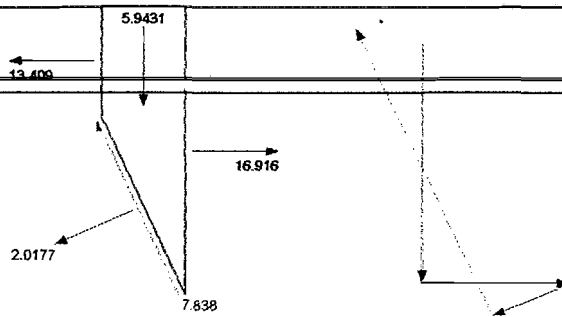
Factor of Safety	0,21
Phi Angle	28
C (Strength)	4,2
C (Force)	4,0659
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,18976
Mid-Height	0,51605
Base Length	0,96806
Base Angle	78,696
Polygon Closure Error	4,5584
Anisotropic Strength Modifier	1
Weight	1,0341
Base Shear Force	21,202
Base Normal Force	0,74086
Right Side Normal Force	1,0211
Surface Pressure Load	18,976

Slice 1 - Bishop Method



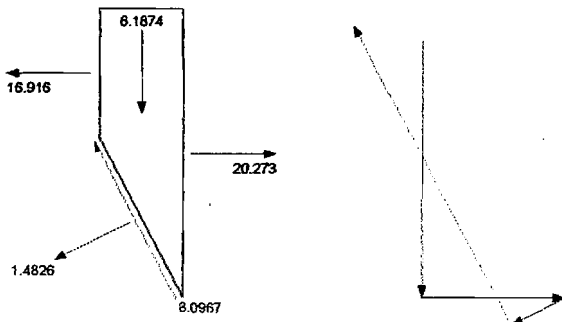
Slice 5 - Bishop Method	
Factor of Safety	0,21
Phi Angle	28
C (Strength)	4,2
C (Force)	2,7215
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27284
Mid-Height	2,0627
Base Length	0,64798
Base Angle	65,098
Polygon Closure Error	1,6068
Anisotropic Strength Modifier	1
Weight	5,9431
Base Shear Force	7,838
Base Normal Force	2,0177
Left Side Normal Force	13,409
Right Side Normal Force	16,916

Slice 5 - Bishop Method



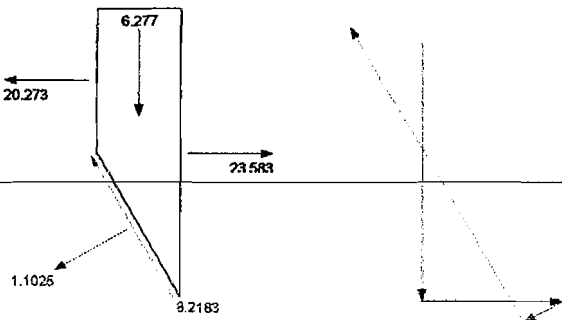
Slice 6 - Bishop Method	
Factor of Safety	0,21
Phi Angle	28
C (Strength)	4,2
C (Force)	2,4918
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27285
Mid-Height	2,1475
Base Length	0,59323
Base Angle	62,617
Polygon Closure Error	1,6598
Anisotropic Strength Modifier	1
Weight	6,1874
Base Shear Force	8,0967
Base Normal Force	1,4826
Left Side Normal Force	16,916
Right Side Normal Force	20,273

Slice 6 - Bishop Method



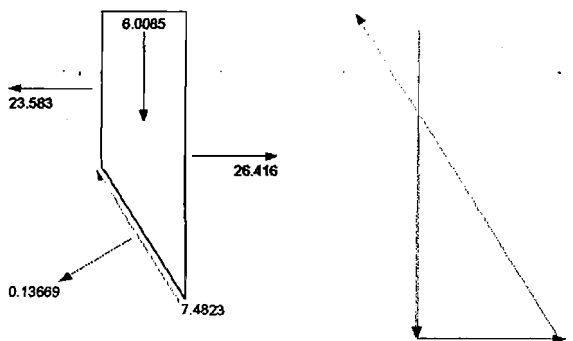
Slice 7 - Bishop Method	
Factor of Safety	0,21
Phi Angle	28
C (Strength)	4,2
C (Force)	2,315
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,27285
Mid-Height	2,1786
Base Length	0,5512
Base Angle	60,329
Polygon Closure Error	1,6848
Anisotropic Strength Modifier	1
Weight	6,277
Base Shear Force	8,2183
Base Normal Force	1,1025
Left Side Normal Force	20,273
Right Side Normal Force	23,583

Slice 7 - Bishop Method



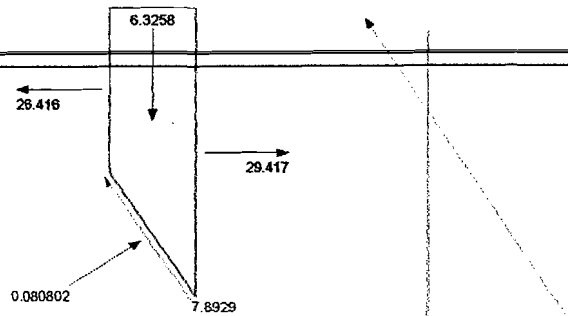
Slice 8 - Bishop Method	
Factor of Safety	0,21
Phi Angle	38
C (Strength)	3,5
C (Force)	1,6808
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,25258
Mid-Height	2,1678
Base Length	0,48024
Base Angle	58,268
Polygon Closure Error	1,2346
Anisotropic Strength Modifier	1
Weight	6,0085
Base Shear Force	7,4823
Base Normal Force	0,13669
Left Side Normal Force	23,583
Right Side Normal Force	26,416

Slice 8 - Bishop Method



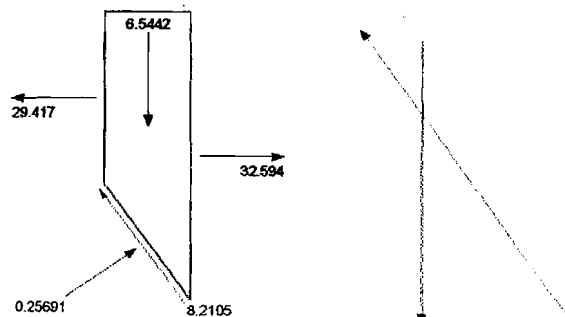
Slice 9 - Bishop Method	
Factor of Safety	0,21
Phi Angle	38
C (Strength)	3,5
C (Force)	1,5973
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,25259
Mid-Height	2,126
Base Length	0,45638
Base Angle	56,395
Polygon Closure Error	1,3023
Anisotropic Strength Modifier	1
Weight	6,3258
Base Shear Force	7,8929
Base Normal Force	0,080802
Left Side Normal Force	26,416
Right Side Normal Force	29,417

Slice 9 - Bishop Method



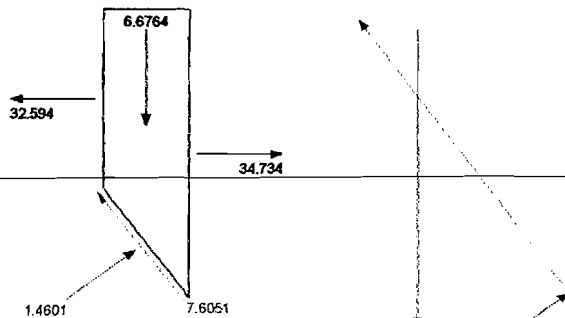
Slice 10 - Bishop Method	
Factor of Safety	0,21
Phi Angle	38
C (Strength)	3,5
C (Force)	1,5285
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,25258
Mid-Height	2,0579
Base Length	0,43615
Base Angle	54,612
Polygon Closure Error	1,3958
Anisotropic Strength Modifier	1
Weight	6,5442
Base Shear Force	8,2105
Base Normal Force	0,25691
Left Side Normal Force	29,417
Right Side Normal Force	32,594

Slice 10 - Bishop Method



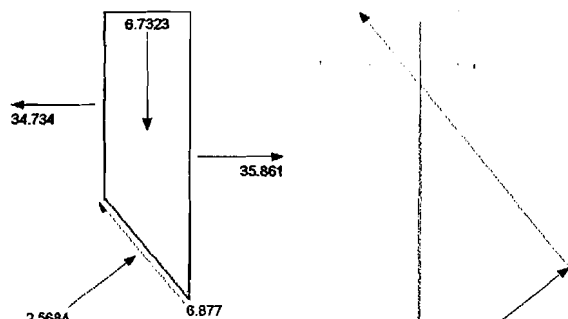
Slice 11 - Bishop Method	
Factor of Safety	0,21
Phi Angle	38
C (Strength)	3,5
C (Force)	1,4657
Pore Water Pressure	3,0764
Pore Water Force	1,2883
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,25259
Mid-Height	1,9669
Base Length	0,41877
Base Angle	52,902
Polygon Closure Error	1,2929
Anisotropic Strength Modifier	1
Weight	6,6764
Base Shear Force	7,6051
Base Normal Force	1,4601
Left Side Normal Force	32,594
Right Side Normal Force	34,734

Slice 11 - Bishop Method



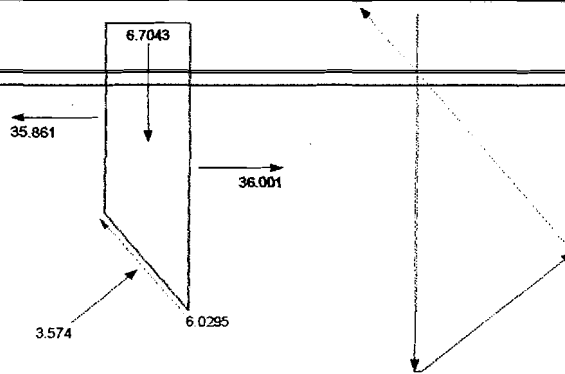
Slice 12 - Bishop Method	
Factor of Safety	0,21
Phi Angle	38
C (Strength)	3,5
C (Force)	1,4128
Pore Water Pressure	6,2555
Pore Water Force	2,5248
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,25258
Mid-Height	1,8558
Base Length	0,40361
Base Angle	51,26
Polygon Closure Error	1,2379
Anisotropic Strength Modifier	1
Weight	6,7323
Base Shear Force	6,877
Base Normal Force	2,5684
Left Side Normal Force	34,734
Right Side Normal Force	35,861

Slice 12 - Bishop Method



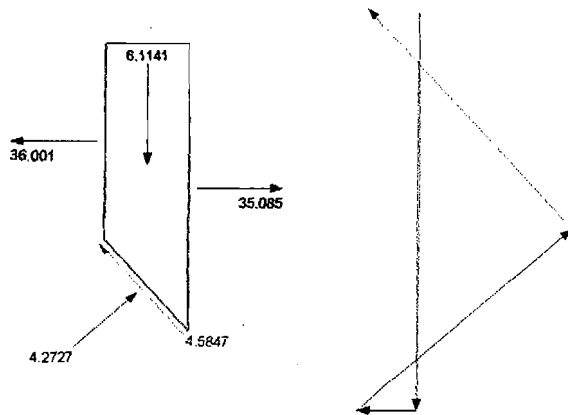
Slice 13 - Bishop Method	
Factor of Safety	0,21
Phi Angle	38
C (Strength)	3,5
C (Force)	1,4139
Pore Water Pressure	9,308
Pore Water Force	3,7602
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,26158
Mid-Height	1,7236
Base Length	0,40398
Base Angle	49,646
Polygon Closure Error	1,0392
Anisotropic Strength Modifier	1
Weight	6,7043
Base Shear Force	6,0295
Base Normal Force	3,574
Left Side Normal Force	35,861
Right Side Normal Force	36,001

Slice 13 - Bishop Method



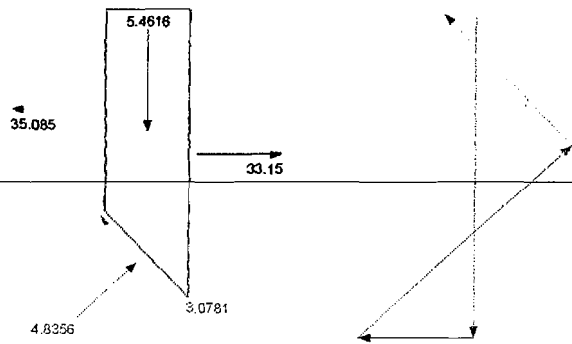
Slice 14 - Bishop Method	
Factor of Safety	0,21
Phi Angle	38
C (Strength)	3,5
C (Force)	1,3697
Pore Water Pressure	12,243
Pore Water Force	4,7913
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,26159
Mid-Height	1,5718
Base Length	0,39136
Base Angle	48,055
Polygon Closure Error	0,76426
Anisotropic Strength Modifier	1
Weight	6,1141
Base Shear Force	4,5847
Base Normal Force	4,2727
Left Side Normal Force	36,001
Right Side Normal Force	35,085

Slice 14 - Bishop Method



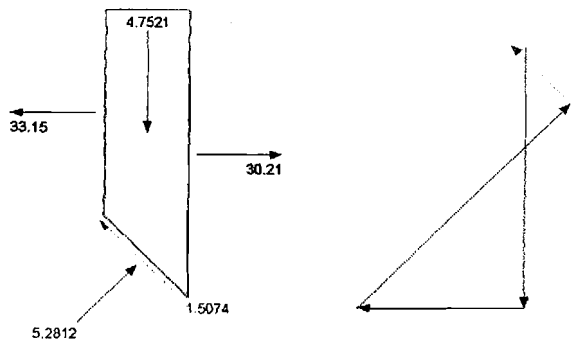
Slice 15 - Bishop Method	
Factor of Safety	0,21
Phi Angle	38
C (Strength)	3,5
C (Force)	1,3304
Pore Water Pressure	15,021
Pore Water Force	5,7096
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,26159
Mid Height	1,4041
Base Length	0,38011
Base Angle	46,513
Polygon Closure Error	0,51885
Anisotropic Strength Modifier	1
Weight	5,4616
Base Shear Force	3,0781
Base Normal Force	4,8356
Left Side Normal Force	35,085
Right Side Normal Force	33,15

Slice 15 - Bishop Method



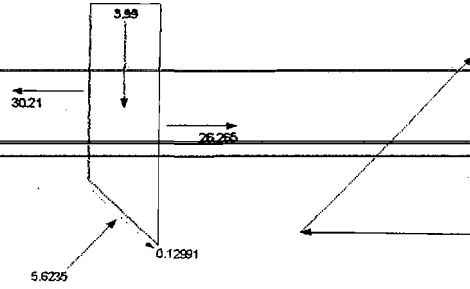
Slice 16 - Bishop Method	
Factor of Safety	0,21
Phi Angle	38
C (Strength)	3,5
C (Force)	1,2951
Pore Water Pressure	17,656
Pore Water Force	6,533
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,26158
Mid-Height	1,2217
Base Length	0,37003
Base Angle	45,015
Polygon Closure Error	0,26406
Anisotropic Strength Modifier	1
Weight	4,7521
Base Shear Force	1,5074
Base Normal Force	5,2812
Left Side Normal Force	33,15
Right Side Normal Force	30,21

Slice 16 - Bishop Method



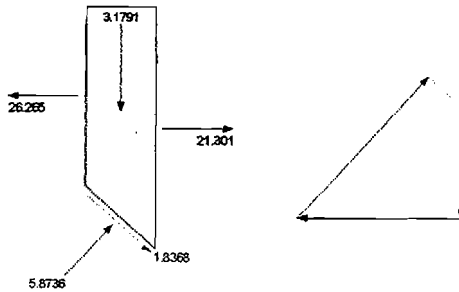
Slice 17 - Bishop Method	
Factor of Safety	0,21
Phi Angle	38
C (Strength)	3,5
C (Force)	1,2633
Pore Water Pressure	20,157
Pore Water Force	7,2754
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,26159
Mid-Height	1,0258
Base Length	0,36994
Base Angle	43,553
Polygon Closure Error	0,028117
Anisotropic Strength Modifier	1
Weight	3,99
Base Shear Force	0,12991
Base Normal Force	5,6235
Left Side Normal Force	30,21
Right Side Normal Force	26,265

Slice 17 - Bishop Method



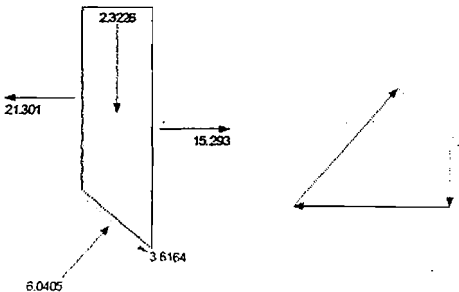
Slice 18 - Bishop Method	
Factor of Safety	0,21
Phi Angle	38
C (Strength)	3,5
C (Force)	1,2344
Pore Water Pressure	22,536
Pore Water Force	7,9483
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,26158
Mid-Height	0,81729
Base Length	0,3527
Base Angle	42,127
Polygon Closure Error	0,29368
Anisotropic Strength Modifier	1
Weight	3,1791
Base Shear Force	1,8368
Base Normal Force	5,8736
Left Side Normal Force	26,265
Right Side Normal Force	21,301

Slice 18 - Bishop Method



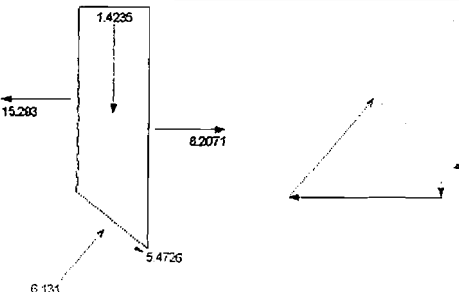
Slice 19 - Bishop Method	
Factor of Safety	0,21
Phi Angle	38
C (Strength)	3,5
C (Force)	1,2082
Pore Water Pressure	24,799
Pore Water Force	8,5608
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,26159
Mid-Height	0,59711
Base Length	0,34521
Base Angle	40,731
Polygon Closure Error	0,66445
Anisotropic Strength Modifier	1
Weight	2,3226
Base Shear Force	3,6164
Base Normal Force	6,0405
Left Side Normal Force	21,301
Right Side Normal Force	15,293

Slice 19 - Bishop Method



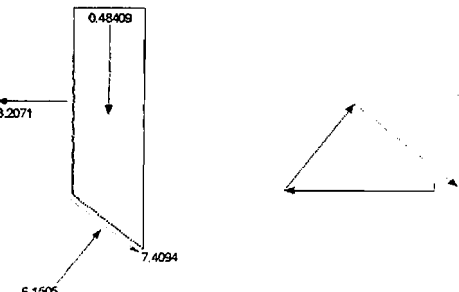
Slice 20 - Bishop Method	
Factor of Safety	0,21
Phi Angle	38
C (Strength)	3,5
C (Force)	1,1842
Pore Water Pressure	26,956
Pore Water Force	9,1204
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,26158
Mid-Height	0,36595
Base Length	0,33835
Base Angle	39,366
Polygon Closure Error	0,99203
Anisotropic Strength Modifier	1
Weight	1,4235
Base Shear Force	5,4726
Base Normal Force	6,131
Left Side Normal Force	15,293
Right Side Normal Force	8,2071

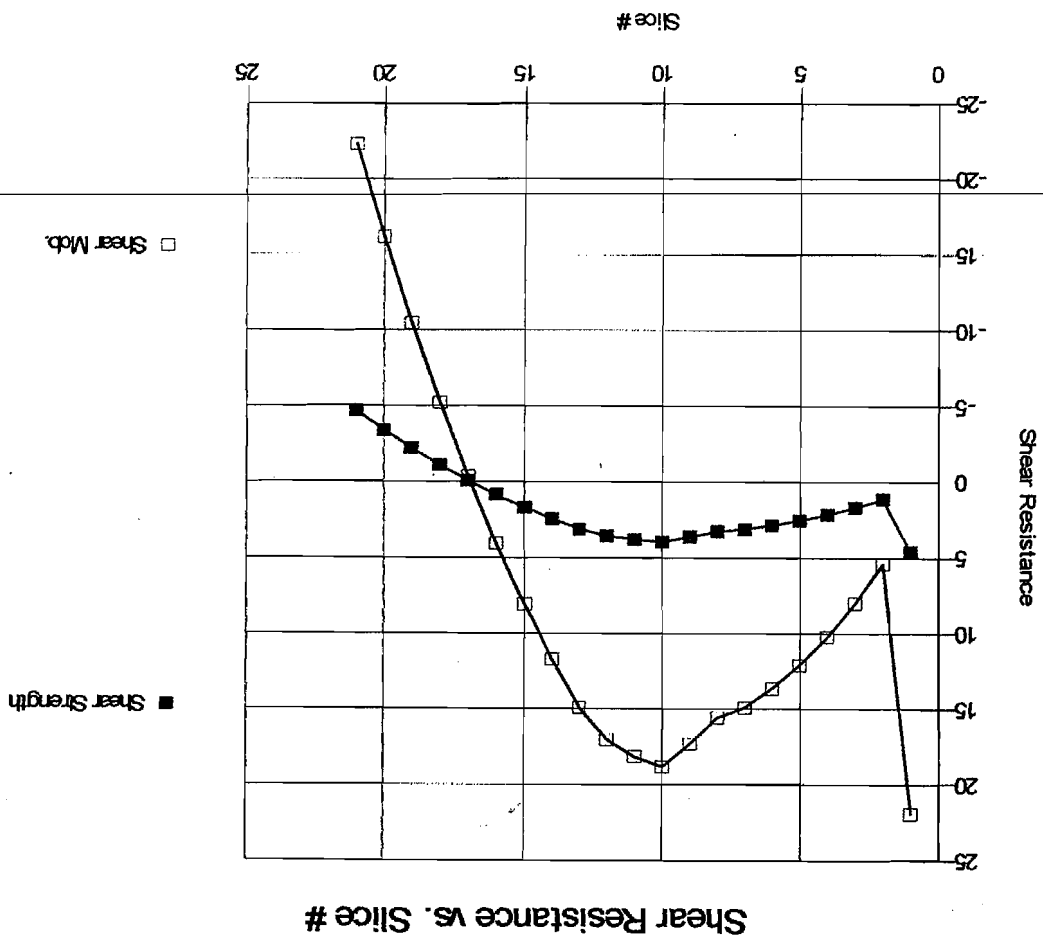
Slice 20 - Bishop Method

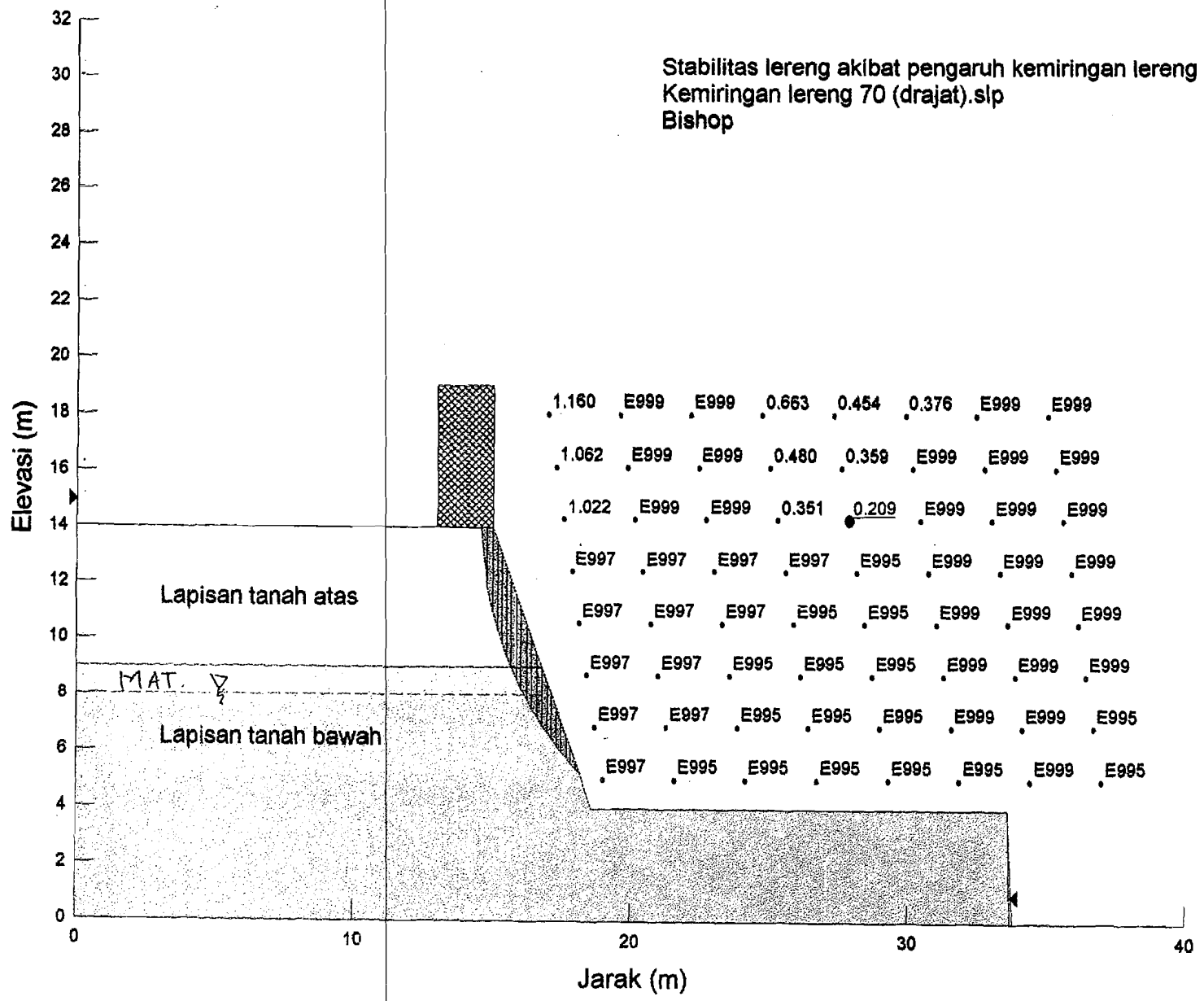


Slice 21 - Bishop Method	
Factor of Safety	0,21
Phi Angle	38
C (Strength)	3,5
C (Force)	1,1623
Pore Water Pressure	29,01
Pore Water Force	9,6333
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,26159
Mid-Height	0,12445
Base Length	0,33207
Base Angle	38,024
Polygon Closure Error	1,3131
Anisotropic Strength Modifier	1
Weight	0,48409
Base Shear Force	7,4094
Base Normal Force	6,1505
Left Side Normal Force	8,2071

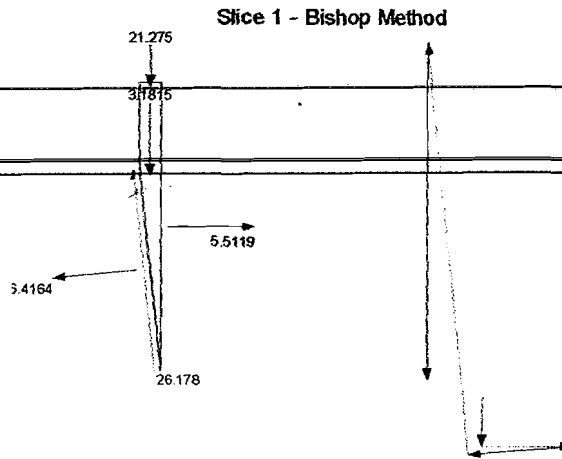
Slice 21 - Bishop Method



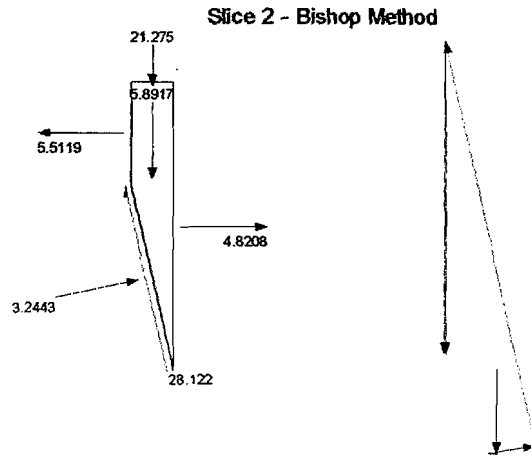




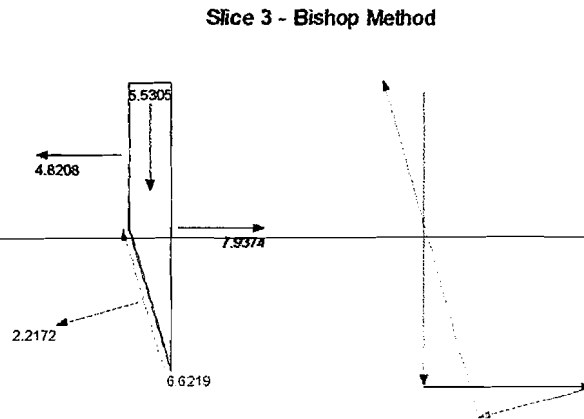
Slice 1 - Bishop Method	
Factor of Safety	0,209
Phi Angle	28
C (Strength)	4,2
C (Force)	8,8621
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,21275
Mid-Height	1,4161
Base Length	2,11
Base Angle	84,213
Polygon Closure Error	3,534
Anisotropic Strength Modifier	1
Weight	3,1815
Base Shear Force	26,178
Base Normal Force	6,4164
Right Side Normal Force	5,5119
Surface Pressure Load	21,275



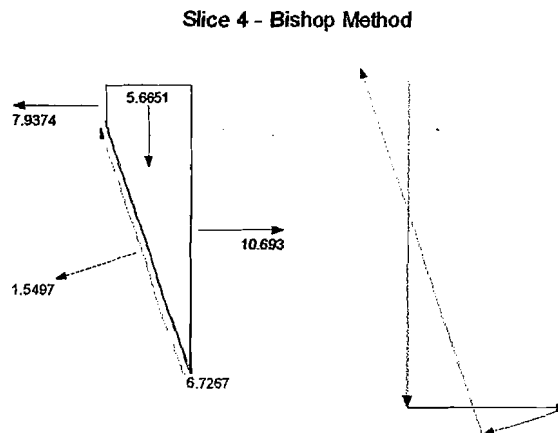
Slice 2 - Bishop Method	
Factor of Safety	0,209
Phi Angle	28
C (Strength)	4,2
C (Force)	4,1391
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,21275
Mid-Height	2,6224
Base Length	0,98551
Base Angle	77,533
Polygon Closure Error	3,5152
Anisotropic Strength Modifier	1
Weight	5,8917
Base Shear Force	28,122
Base Normal Force	3,2443
Left Side Normal Force	5,5119
Right Side Normal Force	4,8208
Surface Pressure Load	21,275



Slice 3 - Bishop Method	
Factor of Safety	0,209
Phi Angle	28
C (Strength)	4,2
C (Force)	2,5598
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,16704
Mid-Height	3,1353
Base Length	0,60947
Base Angle	74,093
Polygon Closure Error	0,79463
Anisotropic Strength Modifier	1
Weight	5,5305
Base Shear Force	6,6219
Base Normal Force	2,2172
Left Side Normal Force	4,8208
Right Side Normal Force	7,9374



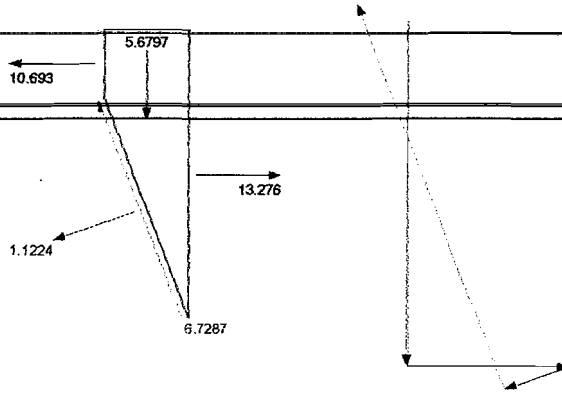
Slice 4 - Bishop Method	
Factor of Safety	0,209
Phi Angle	28
C (Strength)	4,2
C (Force)	2,2268
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,16704
Mid-Height	3,2116
Base Length	0,53018
Base Angle	71,635
Polygon Closure Error	0,84084
Anisotropic Strength Modifier	1
Weight	5,6651
Base Shear Force	6,7267
Base Normal Force	1,5497
Left Side Normal Force	7,9374
Right Side Normal Force	10,693





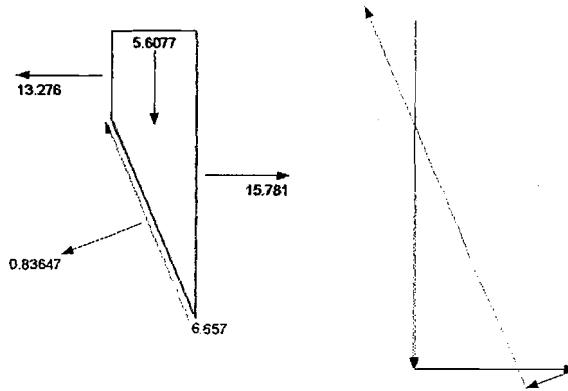
Slice 5 - Bishop Method	
Factor of Safety	0,209
Phi Angle	28
C (Strength)	4,2
C (Force)	2
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,16704
Mid-Height	3,2199
Base Length	0,4762
Base Angle	69,465
Polygon Closure Error	0,84109
Anisotropic Strength Modifier	1
Weight	5,6797
Base Shear Force	6,7287
Base Normal Force	1,1224
Left Side Normal Force	10,693
Right Side Normal Force	13,276

Slice 5 - Bishop Method



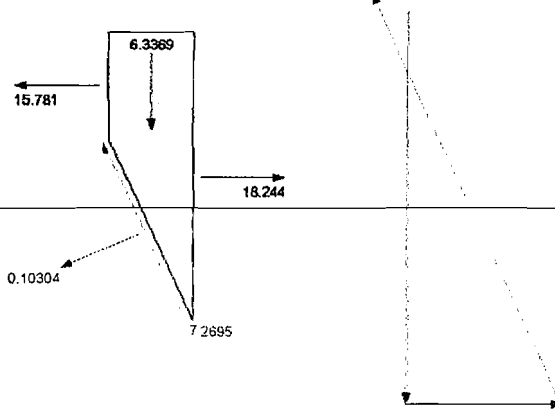
Slice 6 - Bishop Method	
Factor of Safety	0,209
Phi Angle	28
C (Strength)	4,2
C (Force)	1,8331
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,16704
Mid-Height	3,1791
Base Length	0,43645
Base Angle	67,497
Polygon Closure Error	0,83213
Anisotropic Strength Modifier	1
Weight	5,6077
Base Shear Force	6,657
Base Normal Force	0,83647
Left Side Normal Force	13,276
Right Side Normal Force	15,781

Slice 6 - Bishop Method



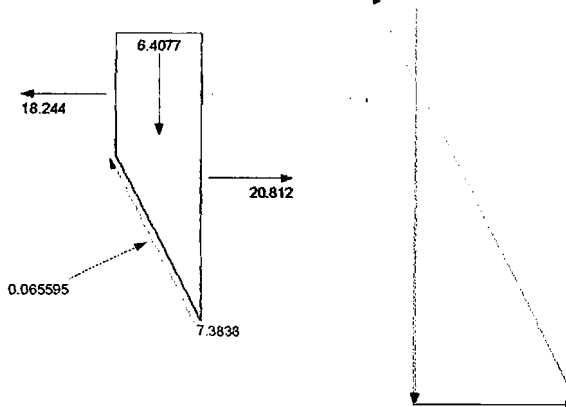
Slice 7 - Bishop Method	
Factor of Safety	0,209
Phi Angle	38
C (Strength)	3,5
C (Force)	1,5966
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,18864
Mid-Height	3,0944
Base Length	0,45616
Base Angle	65,573
Polygon Closure Error	0,61791
Anisotropic Strength Modifier	1
Weight	6,3369
Base Shear Force	7,2695
Base Normal Force	0,10304
Left Side Normal Force	15,781
Right Side Normal Force	18,244

Slice 7 - Bishop Method



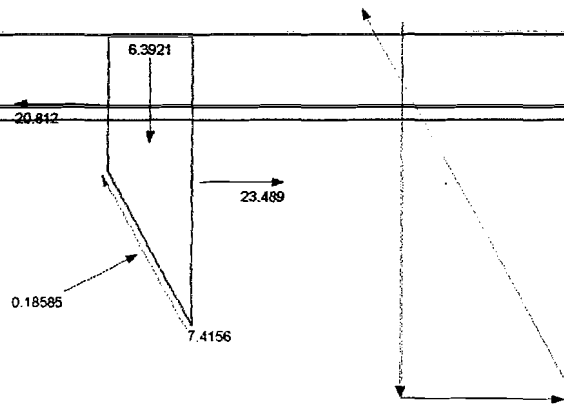
Slice 8 - Bishop Method	
Factor of Safety	0,209
Phi Angle	38
C (Strength)	3,5
C (Force)	1,4887
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,18864
Mid-Height	2,9678
Base Length	0,42533
Base Angle	63,672
Polygon Closure Error	0,70146
Anisotropic Strength Modifier	1
Weight	6,4077
Base Shear Force	7,3838
Base Normal Force	0,065595
Left Side Normal Force	18,244
Right Side Normal Force	20,812

Slice 8 - Bishop Method



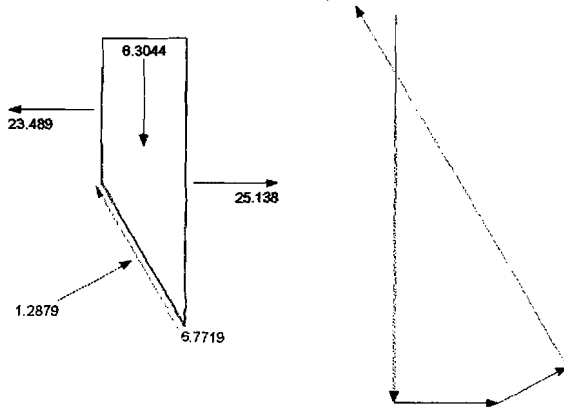
Slice 9 - Bishop Method	
Factor of Safety	0,209
Phi Angle	38
C (Strength)	3,5
C (Force)	1,4013
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,18864
Mid-Height	2,8103
Base Length	0,40038
Base Angle	61,891
Polygon Closure Error	0,6674
Anisotropic Strength Modifier	1
Weight	6,3921
Base Shear Force	7,4156
Base Normal Force	0,18585
Left Side Normal Force	20,812
Right Side Normal Force	23,489

Slice 9 - Bishop Method



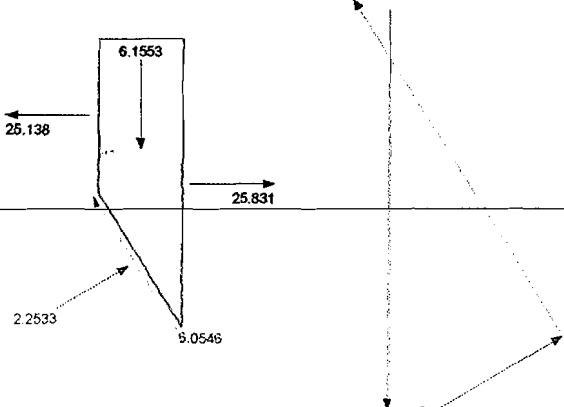
Slice 10 - Bishop Method	
Factor of Safety	0,209
Phi Angle	38
C (Strength)	3,5
C (Force)	1,3289
Pore Water Pressure	3,1108
Pore Water Force	1,1811
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,18864
Mid-Height	2,6272
Base Length	0,37968
Base Angle	60,209
Polygon Closure Error	0,64333
Anisotropic Strength Modifier	1
Weight	6,3044
Base Shear Force	6,7719
Base Normal Force	1,2879
Left Side Normal Force	23,489
Right Side Normal Force	25,138

Slice 10 - Bishop Method



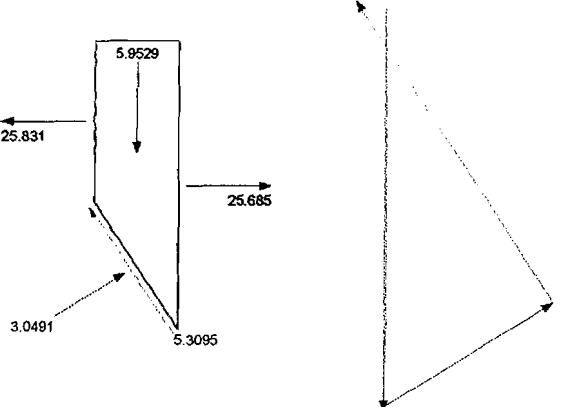
Slice 11 - Bishop Method	
Factor of Safety	0,209
Phi Angle	38
C (Strength)	3,5
C (Force)	1,2676
Pore Water Pressure	6,2389
Pore Water Force	2,2595
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,18864
Mid-Height	2,4222
Base Length	0,36216
Base Angle	58,609
Polygon Closure Error	0,55398
Anisotropic Strength Modifier	1
Weight	6,1553
Base Shear Force	6,0546
Base Normal Force	2,2533
Left Side Normal Force	25,138
Right Side Normal Force	25,831

Slice 11 - Bishop Method



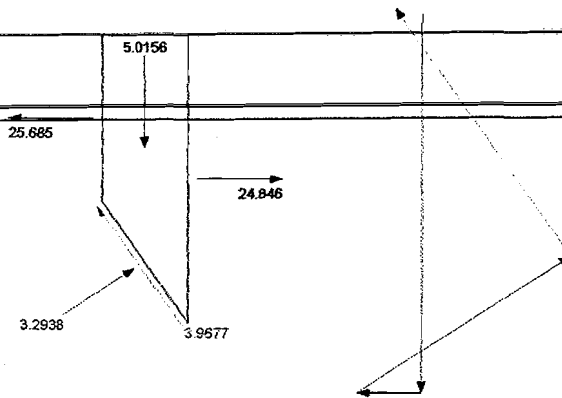
Slice 12 - Bishop Method	
Factor of Safety	0,209
Phi Angle	38
C (Strength)	3,5
C (Force)	1,2149
Pore Water Pressure	9,1808
Pore Water Force	3,1867
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,18864
Mid-Height	2,1981
Base Length	0,3471
Base Angle	57,08
Polygon Closure Error	0,44647
Anisotropic Strength Modifier	1
Weight	5,9529
Base Shear Force	5,3095
Base Normal Force	3,0491
Left Side Normal Force	25,831
Right Side Normal Force	25,685

Slice 12 - Bishop Method



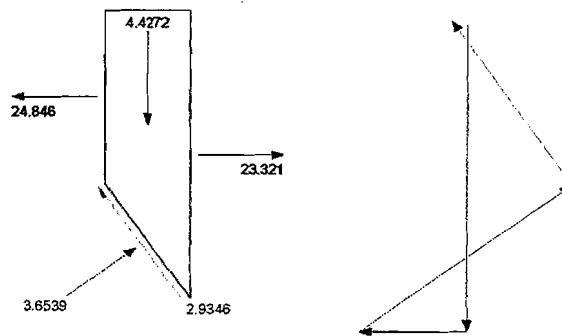
Slice 13 - Bishop Method	
Factor of Safety	0,209
Phi Angle	38
C (Strength)	3,5
C (Force)	1,0634
Pore Water Pressure	11,835
Pore Water Force	3,5058
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,17132
Mid-Height	1,9688
Base Length	0,30383
Base Angle	55,677
Polygon Closure Error	0,35109
Anisotropic Strength Modifier	1
Weight	5,0156
Base Shear Force	3,9677
Base Normal Force	3,2938
Left Side Normal Force	25,685
Right Side Normal Force	24,846

Slice 13 - Bishop Method



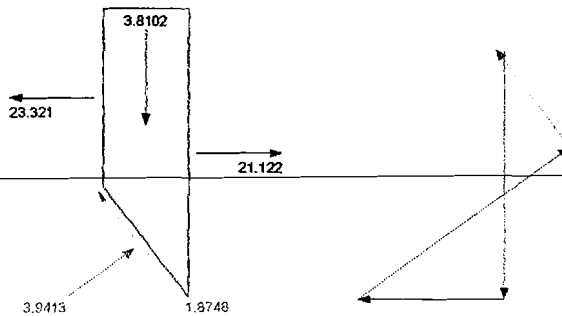
Slice 14 - Bishop Method	
Factor of Safety	0,209
Phi Angle	38
C (Strength)	3,5
C (Force)	1,0297
Pore Water Pressure	14,237
Pore Water Force	4,1885
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,17132
Mid-Height	1,7378
Base Length	0,29421
Base Angle	54,387
Polygon Closure Error	0,22136
Anisotropic Strength Modifier	1
Weight	4,4272
Base Shear Force	2,9346
Base Normal Force	3,6539
Left Side Normal Force	24,846
Right Side Normal Force	23,321

Slice 14 - Bishop Method



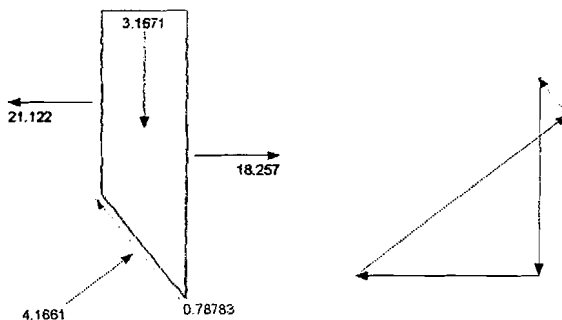
Slice 15 - Bishop Method	
Factor of Safety	0,209
Phi Angle	38
C (Strength)	3,5
C (Force)	0,99952
Pore Water Pressure	16,529
Pore Water Force	4,7202
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,17132
Mid-Height	1,4956
Base Length	0,28558
Base Angle	53,137
Polygon Closure Error	0,13795
Anisotropic Strength Modifier	1
Weight	3,8102
Base Shear Force	1,8748
Base Normal Force	3,9413
Left Side Normal Force	23,321
Right Side Normal Force	21,122

Slice 15 - Bishop Method



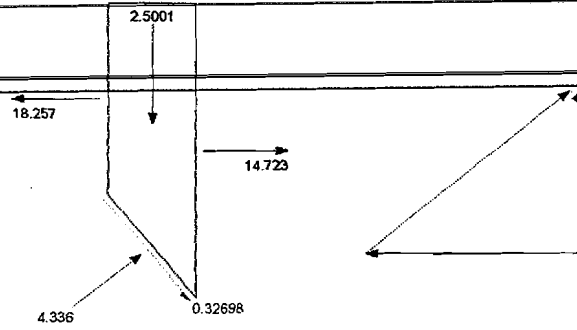
Slice 16 - Bishop Method	
Factor of Safety	0,209
Phi Angle	38
C (Strength)	3,5
C (Force)	0,97228
Pore Water Pressure	18,72
Pore Water Force	5,2002
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,17133
Mid-Height	1,2432
Base Length	0,27779
Base Angle	51,92
Polygon Closure Error	0,041661
Anisotropic Strength Modifier	1
Weight	3,1671
Base Shear Force	0,78783
Base Normal Force	4,1661
Left Side Normal Force	21,122
Right Side Normal Force	18,257

Slice 16 - Bishop Method



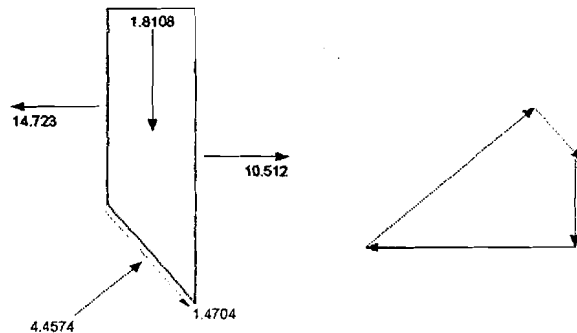
Slice 17 - Bishop Method	
Factor of Safety	0,209
Phi Angle	38
C (Strength)	3,5
C (Force)	0,94749
Pore Water Pressure	20,82
Pore Water Force	5,6361
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,17132
Mid-Height	0,98135
Base Length	0,27071
Base Angle	50,739
Polygon Closure Error	0
Anisotropic Strength Modifier	1
Weight	2,5001
Base Shear Force	0,32698
Base Normal Force	4,336
Left Side Normal Force	18,257
Right Side Normal Force	14,723

Slice 17 - Bishop Method



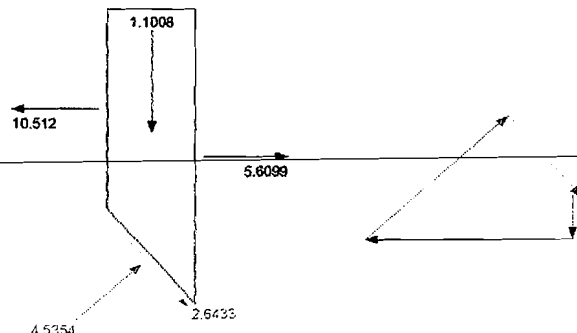
Slice 18 - Bishop Method	
Factor of Safety	0,209
Phi Angle	38
C (Strength)	3,5
C (Force)	0,9249
Pore Water Pressure	22,833
Pore Water Force	6,0338
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,17132
Mid-Height	0,71078
Base Length	0,26426
Base Angle	49,586
Polygon Closure Error	0,13372
Anisotropic Strength Modifier	1
Weight	1,8108
Base Shear Force	1,4704
Base Normal Force	4,4574
Left Side Normal Force	14,723
Right Side Normal Force	10,512

Slice 18 - Bishop Method



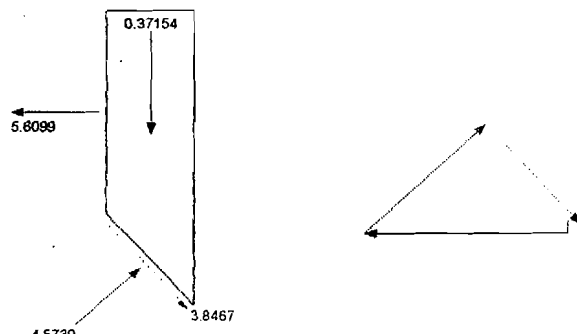
Slice 19 - Bishop Method	
Factor of Safety	0,209
Phi Angle	38
C (Strength)	3,5
C (Force)	0,90419
Pore Water Pressure	24,767
Pore Water Force	6,3983
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,17132
Mid-Height	0,4321
Base Length	0,25834
Base Angle	48,459
Polygon Closure Error	0,19608
Anisotropic Strength Modifier	1
Weight	1,1008
Base Shear Force	2,6433
Base Normal Force	4,5354
Left Side Normal Force	10,512
Right Side Normal Force	5,6099

Slice 19 - Bishop Method

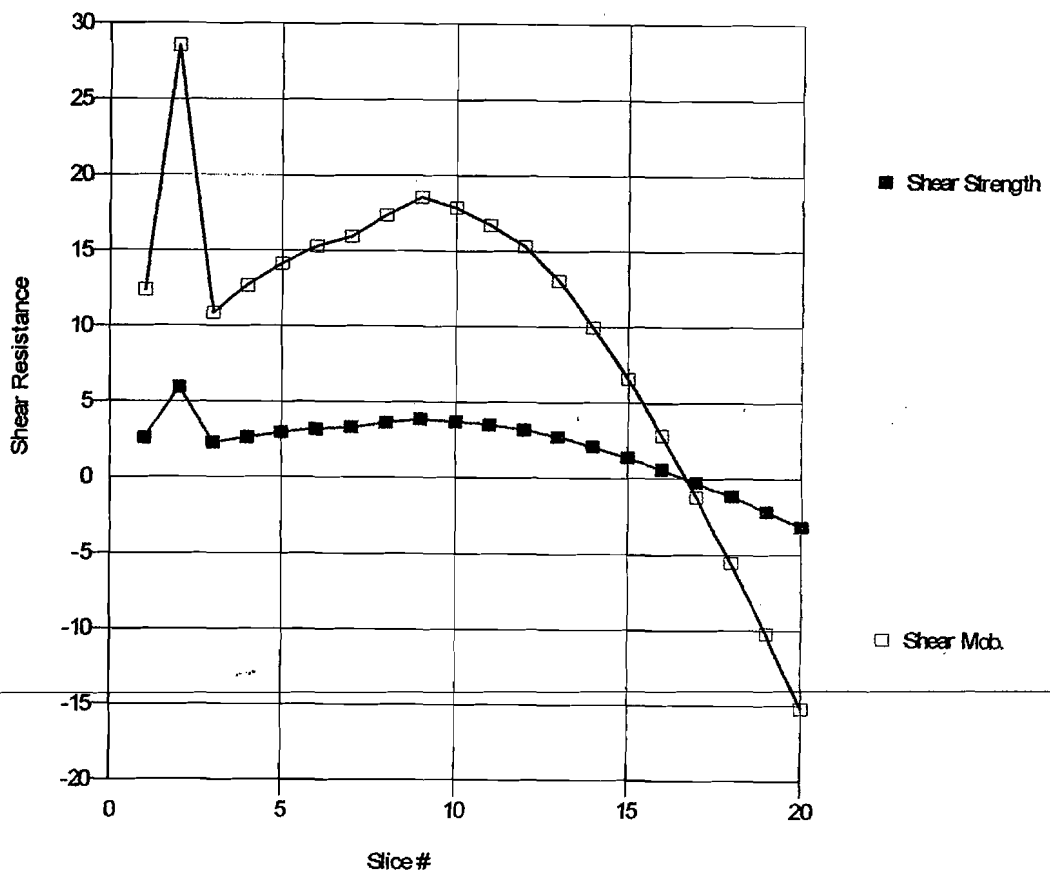


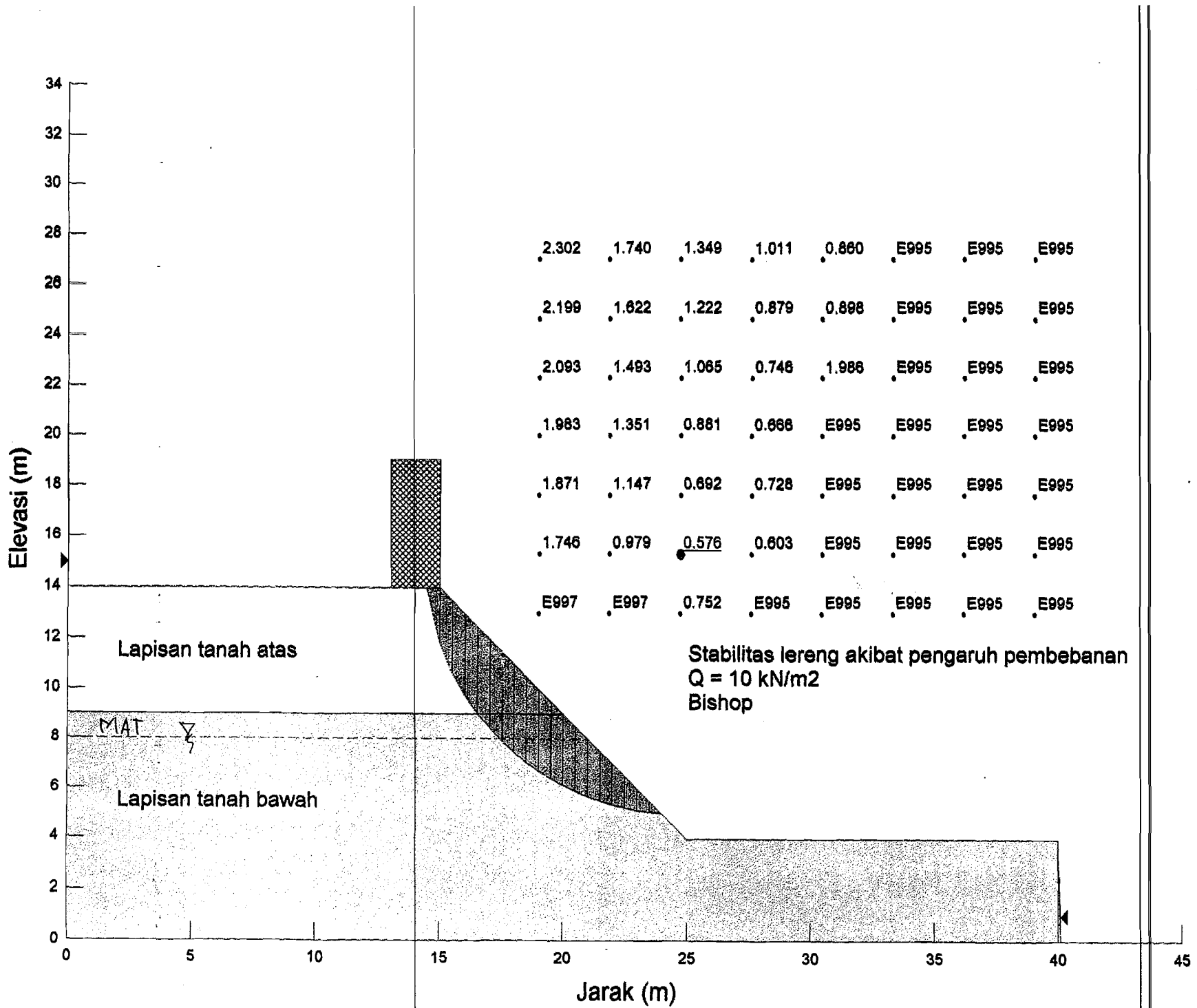
Slice 20 - Bishop Method	
Factor of Safety	0,209
Phi Angle	38
C (Strength)	3,5
C (Force)	0,88513
Pore Water Pressure	26,627
Pore Water Force	6,7337
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,17133
Mid-Height	0,14584
Base Length	0,25289
Base Angle	47,353
Polygon Closure Error	0,33659
Anisotropic Strength Modifier	1
Weight	0,37154
Base Shear Force	3,8467
Base Normal Force	4,5739
Left Side Normal Force	5,6099

Slice 20 - Bishop Method

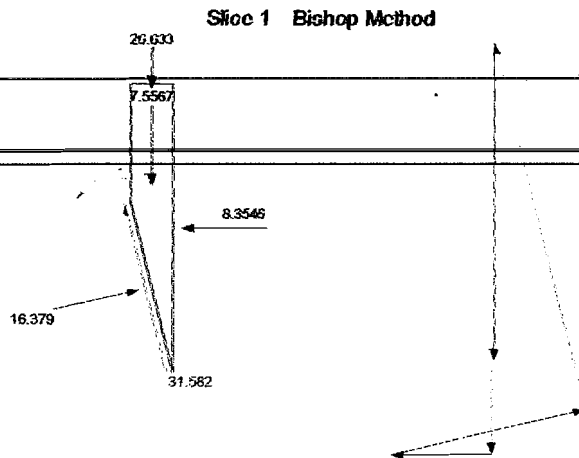


Shear Resistance vs. Slice #

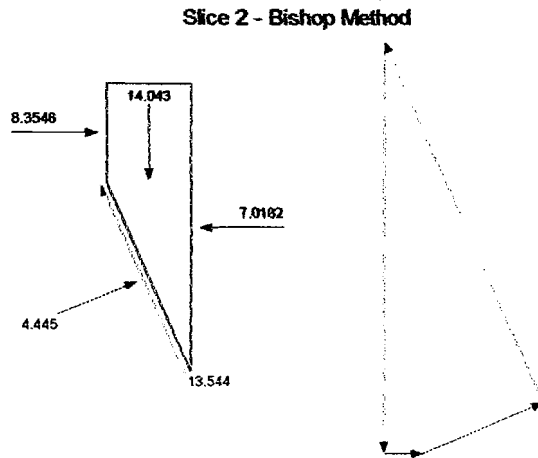




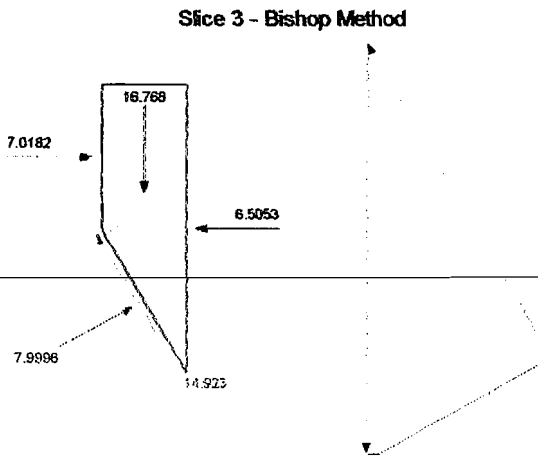
Slice 1 - Bishop Method	
Factor of Safety	0,576
Phi Angle	28
C (Strength)	4,2
C (Force)	9,4642
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,53266
Mid-Height	1,3434
Base Length	2,2534
Base Angle	76,327
Polygon Closure Error	0,47373
Anisotropic Strength Modifier	1
Weight	7,5567
Base Shear Force	31,582
Base Normal Force	16,379
Right Side Normal Force	8,3546
Surface Pressure Load	26,633



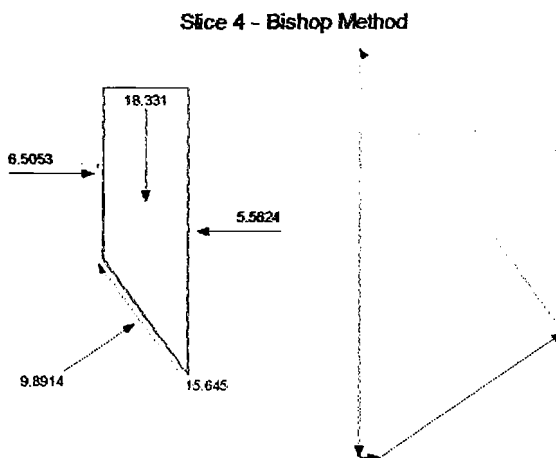
Slice 2 - Bishop Method	
Factor of Safety	0,576
Phi Angle	28
C (Strength)	4,2
C (Force)	5,4347
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,51644
Mid-Height	2,575
Base Length	1,294
Base Angle	66,477
Polygon Closure Error	0,070215
Anisotropic Strength Modifier	1
Weight	14,043
Base Shear Force	13,544
Base Normal Force	4,445
Left Side Normal Force	8,3546
Right Side Normal Force	7,0182



Slice 3 - Bishop Method	
Factor of Safety	0,576
Phi Angle	28
C (Strength)	4,2
C (Force)	4,3409
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,51644
Mid-Height	3,0748
Base Length	1,0335
Base Angle	60,021
Polygon Closure Error	0
Anisotropic Strength Modifier	1
Weight	16,768
Base Shear Force	14,923
Base Normal Force	7,9996
Left Side Normal Force	7,0182
Right Side Normal Force	6,5053

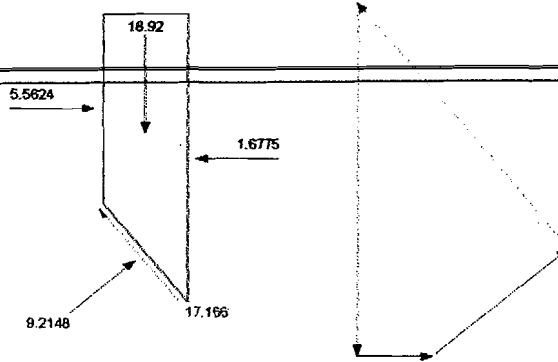


Slice 4 - Bishop Method	
Factor of Safety	0,576
Phi Angle	28
C (Strength)	4,2
C (Force)	3,7515
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,51644
Mid-Height	3,3612
Base Length	0,89322
Base Angle	54,677
Polygon Closure Error	0,091655
Anisotropic Strength Modifier	1
Weight	18,331
Base Shear Force	15,645
Base Normal Force	9,8914
Left Side Normal Force	6,5053
Right Side Normal Force	5,5624



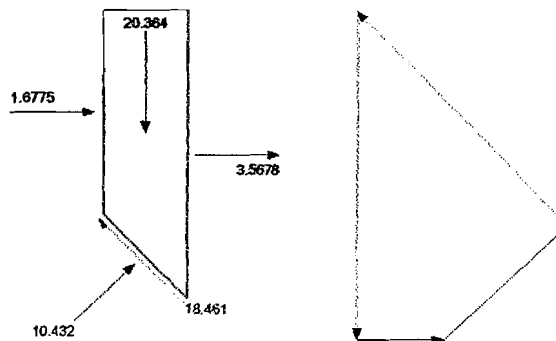
Slice 5 - Bishop Method	
Factor of Safety	0,576
Phi Angle	38
C (Strength)	3,5
C (Force)	2,6881
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49295
Mid-Height	3,5098
Base Length	0,76803
Base Angle	50,071
Polygon Closure Error	0,0946
Anisotropic Strength Modifier	1
Weight	18,92
Base Shear Force	17,166
Base Normal Force	9,2148
Left Side Normal Force	5,5624
Right Side Normal Force	1,6775

Slice 5 - Bishop Method



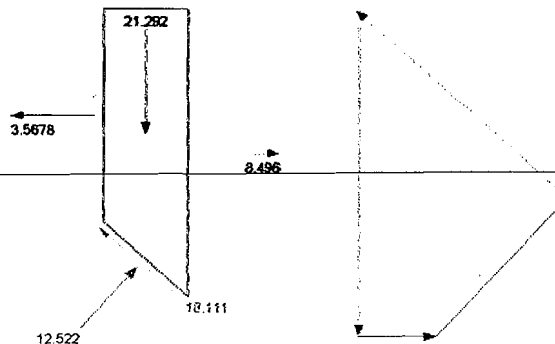
Slice 6 - Bishop Method	
Factor of Safety	0,576
Phi Angle	38
C (Strength)	3,5
C (Force)	2,4826
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49296
Mid-Height	3,564
Base Length	0,70931
Base Angle	45,974
Polygon Closure Error	0,10182
Anisotropic Strength Modifier	1
Weight	20,364
Base Shear Force	18,461
Base Normal Force	10,432
Left Side Normal Force	1,6775
Right Side Normal Force	3,5678

Slice 6 - Bishop Method



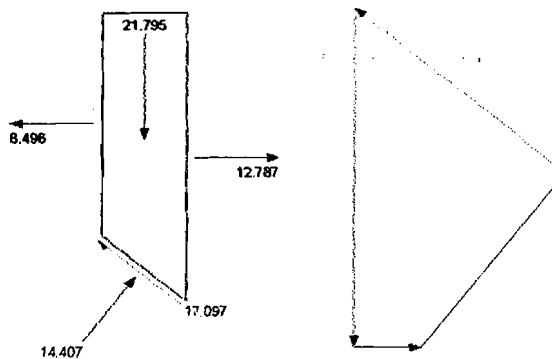
Slice 7 - Bishop Method	
Factor of Safety	0,576
Phi Angle	38
C (Strength)	3,5
C (Force)	2,3276
Pore Water Pressure	3,2308
Pore Water Force	2,1486
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49295
Mid-Height	3,5477
Base Length	0,66504
Base Angle	42,163
Polygon Closure Error	0,21292
Anisotropic Strength Modifier	1
Weight	21,292
Base Shear Force	18,111
Base Normal Force	12,522
Left Side Normal Force	3,5678
Right Side Normal Force	8,496

Slice 7 - Bishop Method



Slice 8 - Bishop Method	
Factor of Safety	0,576
Phi Angle	38
C (Strength)	3,5
C (Force)	2,2068
Pore Water Pressure	7,3374
Pore Water Force	4,6263
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49296
Mid-Height	3,4734
Base Length	0,63051
Base Angle	38,57
Polygon Closure Error	0
Anisotropic Strength Modifier	1
Weight	21,795
Base Shear Force	17,097
Base Normal Force	14,407
Left Side Normal Force	8,496
Right Side Normal Force	12,787

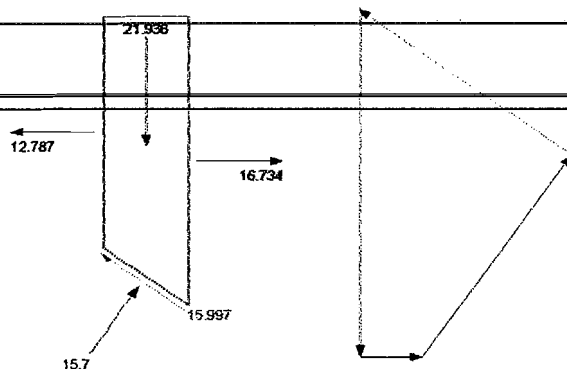
Slice 8 - Bishop Method





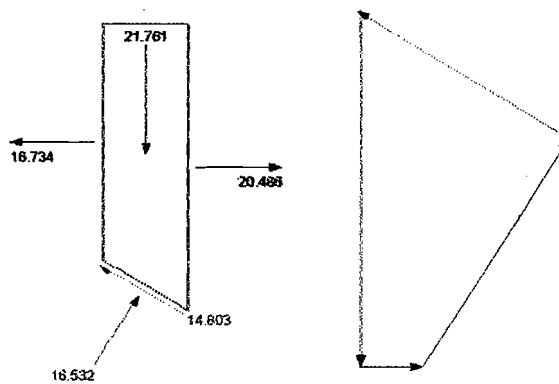
Slice 9 - Bishop Method	
Factor of Safety	0,576
Phi Angle	38
C (Strength)	3,5
C (Force)	2,1101
Pore Water Pressure	10,96
Pore Water Force	6,6077
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49295
Mid-Height	3,3498
Base Length	0,6029
Base Angle	35,151
Polygon Closure Error	0,10968
Anisotropic Strength Modifier	1
Weight	21,936
Base Shear Force	15,997
Base Normal Force	15,7
Left Side Normal Force	12,787
Right Side Normal Force	16,734

Slice 9 - Bishop Method



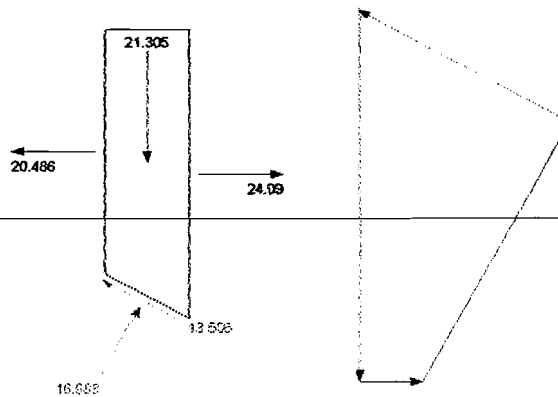
Slice 10 - Bishop Method	
Factor of Safety	0,576
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0316
Pore Water Pressure	14,159
Pore Water Force	8,2189
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49296
Mid-Height	3,183
Base Length	0,58048
Base Angle	31,869
Polygon Closure Error	0,21761
Anisotropic Strength Modifier	1
Weight	21,761
Base Shear Force	14,803
Base Normal Force	16,532
Left Side Normal Force	16,734
Right Side Normal Force	20,486

Slice 10 - Bishop Method



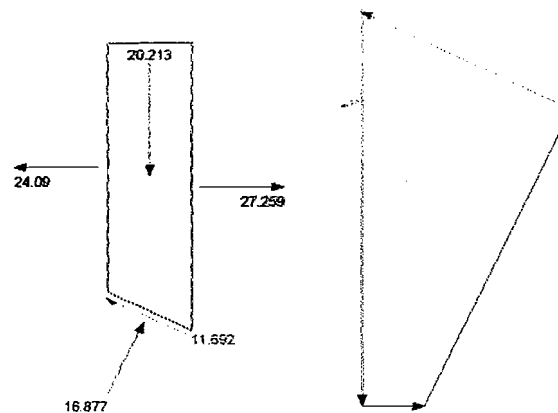
Slice 11 - Bishop Method	
Factor of Safety	0,576
Phi Angle	38
C (Strength)	3,5
C (Force)	1,967
Pore Water Pressure	16,982
Pore Water Force	9,5437
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49295
Mid-Height	2,9778
Base Length	0,562
Base Angle	28,702
Polygon Closure Error	0,10652
Anisotropic Strength Modifier	1
Weight	21,305
Base Shear Force	13,508
Base Normal Force	16,983
Left Side Normal Force	20,486
Right Side Normal Force	24,09

Slice 11 - Bishop Method

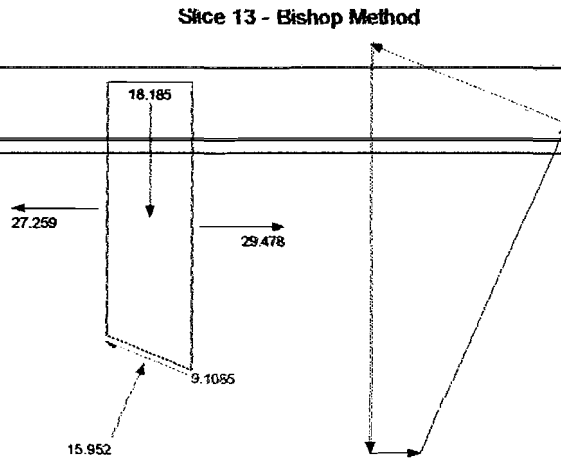


Slice 12 - Bishop Method	
Factor of Safety	0,576
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9279
Pore Water Pressure	19,469
Pore Water Force	10,724
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49668
Mid-Height	2,7368
Base Length	0,55082
Base Angle	25,616
Polygon Closure Error	0,20213
Anisotropic Strength Modifier	1
Weight	20,213
Base Shear Force	11,692
Base Normal Force	16,877
Left Side Normal Force	24,09
Right Side Normal Force	27,259

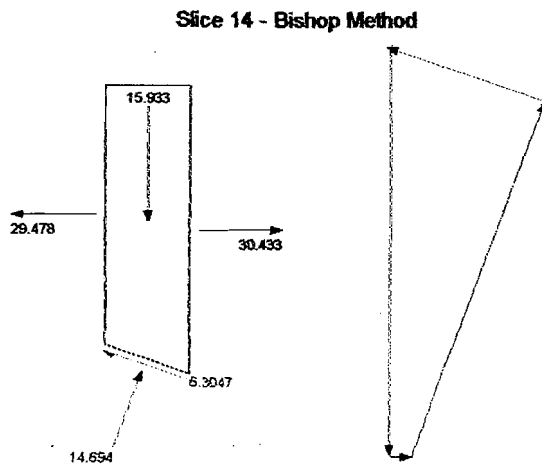
Slice 12 - Bishop Method



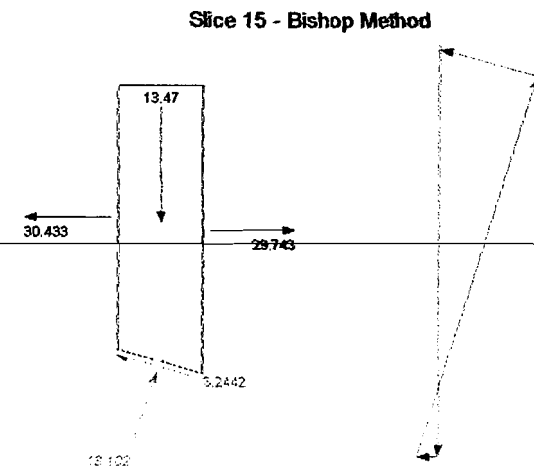
Slice 13 - Bishop Method	
Factor of Safety	0,578
Phi Angle	38
C (Strength)	3,5
C (Force)	1,8829
Pore Water Pressure	21,65
Pore Water Force	11,647
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49667
Mid-Height	2,4622
Base Length	0,53797
Base Angle	22,598
Polygon Closure Error	0,090925
Anisotropic Strength Modifier	1
Weight	18,185
Base Shear Force	9,1085
Base Normal Force	15,952
Left Side Normal Force	27,259
Right Side Normal Force	29,478



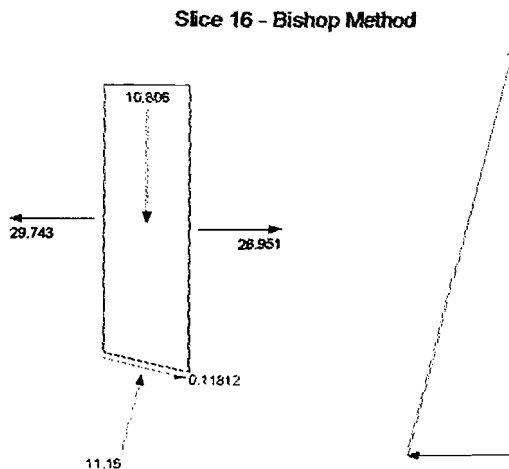
Slice 14 - Bishop Method	
Factor of Safety	0,576
Phi Angle	38
C (Strength)	3,5
C (Force)	1,8458
Pore Water Pressure	23,53
Pore Water Force	12,409
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49668
Mid-Height	2,1573
Base Length	0,52737
Base Angle	19,643
Polygon Closure Error	0,15933
Anisotropic Strength Modifier	1
Weight	15,933
Base Shear Force	6,3047
Base Normal Force	14,694
Left Side Normal Force	29,478
Right Side Normal Force	30,433



Slice 15 - Bishop Method	
Factor of Safety	0,576
Phi Angle	38
C (Strength)	3,5
C (Force)	1,8153
Pore Water Pressure	25,13
Pore Water Force	13,034
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49667
Mid-Height	1,8238
Base Length	0,51866
Base Angle	16,743
Polygon Closure Error	0,1347
Anisotropic Strength Modifier	1
Weight	13,47
Base Shear Force	3,2442
Base Normal Force	13,102
Left Side Normal Force	30,433
Right Side Normal Force	29,743

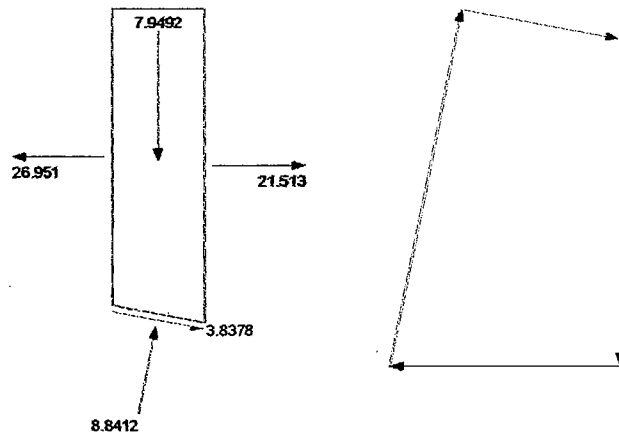


Slice 16 - Bishop Method	
Factor of Safety	0,576
Phi Angle	38
C (Strength)	3,5
C (Force)	1,7907
Pore Water Pressure	26,464
Pore Water Force	13,54
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49688
Mid-Height	1,4631
Base Length	0,51163
Base Angle	13,887
Polygon Closure Error	0,0558
Anisotropic Strength Modifier	1
Weight	10,806
Base Shear Force	0,11812
Base Normal Force	11,16
Left Side Normal Force	29,743
Right Side Normal Force	26,951



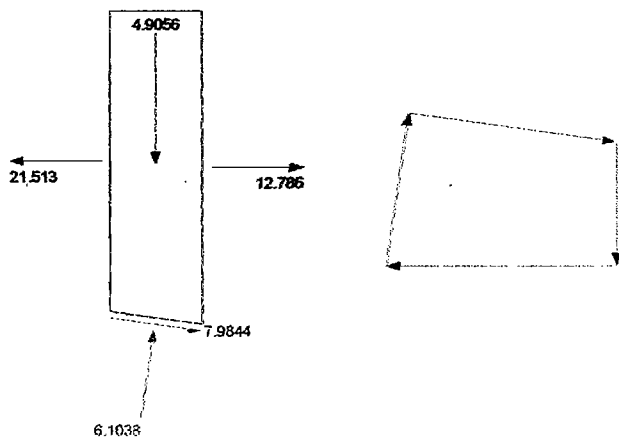
Slice 17 - Bishop Method	
Factor of Safety	0,576
Phi Angle	38
C (Strength)	3,5
C (Force)	1,7713
Pore Water Pressure	27,541
Pore Water Force	13,938
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49667
Mid-Height	1,0763
Base Length	0,50608
Base Angle	11,065
Polygon Closure Error	0,044206
Anisotropic Strength Modifier	1
Weight	7,9492
Base Shear Force	3,8378
Base Normal Force	8,8412
Left Side Normal Force	26,951
Right Side Normal Force	21,513

Slice 17 - Bishop Method



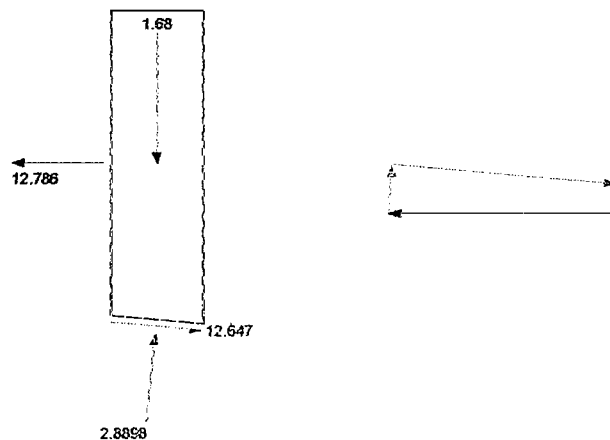
Slice 18 - Bishop Method	
Factor of Safety	0,576
Phi Angle	38
C (Strength)	3,5
C (Force)	1,7567
Pore Water Pressure	28,37
Pore Water Force	14,239
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49668
Mid-Height	0,66422
Base Length	0,5019
Base Angle	8,2699
Polygon Closure Error	0,043635
Anisotropic Strength Modifier	1
Weight	4,9056
Base Shear Force	7,9844
Base Normal Force	6,1038
Left Side Normal Force	21,513
Right Side Normal Force	12,786

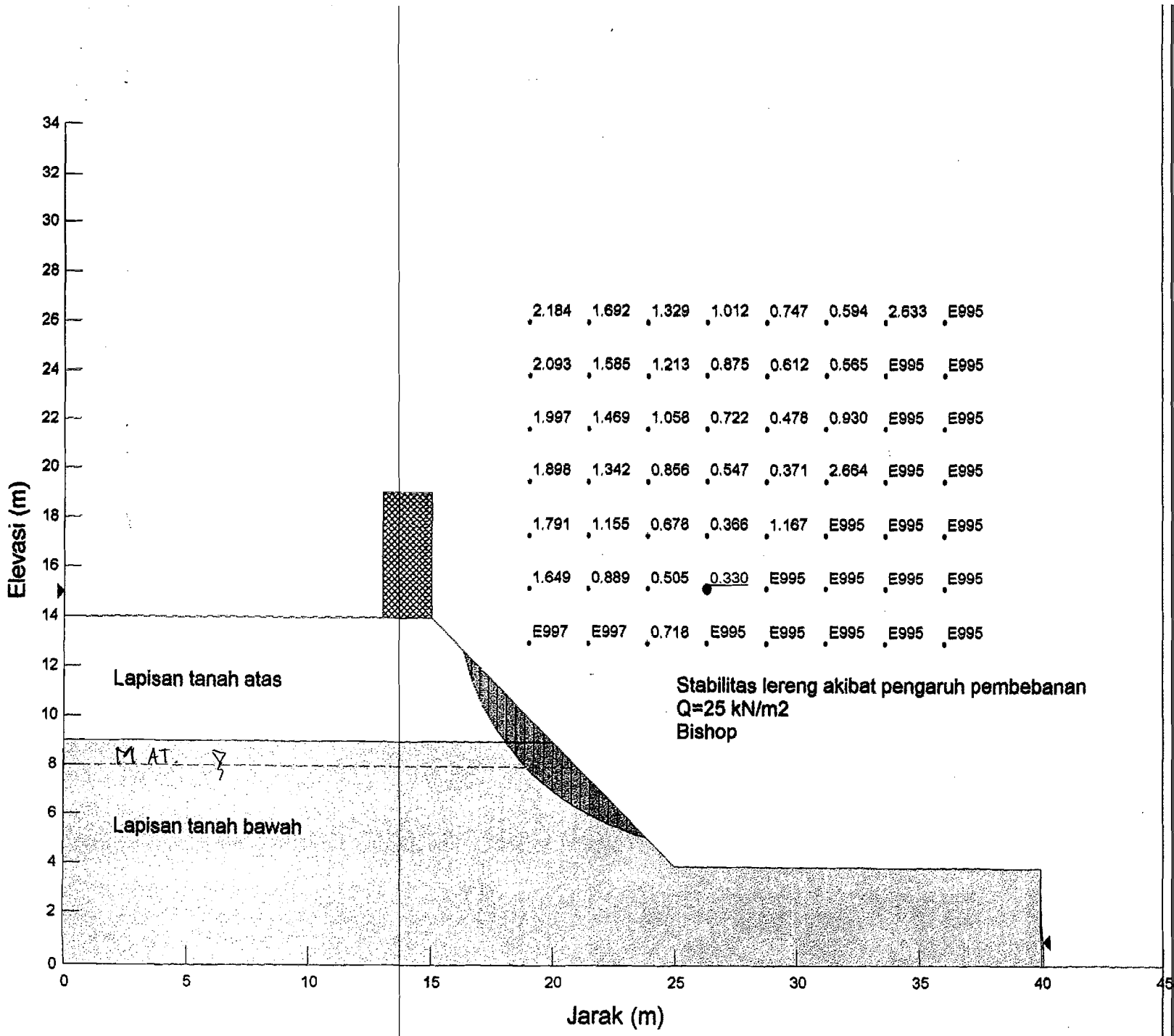
Slice 18 - Bishop Method



Slice 19 - Bishop Method	
Factor of Safety	0,576
Phi Angle	38
C (Strength)	3,5
C (Force)	1,7464
Pore Water Pressure	28,958
Pore Water Force	14,449
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49668
Mid-Height	0,22747
Base Length	0,49897
Base Angle	5,4953
Polygon Closure Error	0
Anisotropic Strength Modifier	1
Weight	1,68
Base Shear Force	12,647
Base Normal Force	2,8898
Left Side Normal Force	12,786

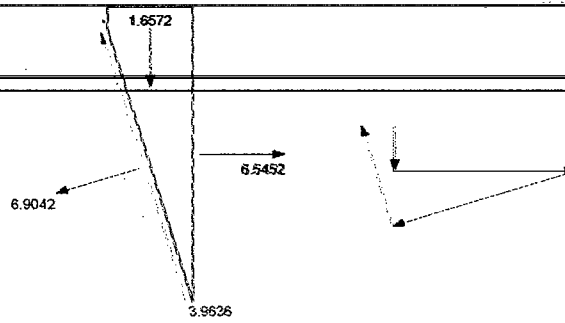
Slice 19 - Bishop Method





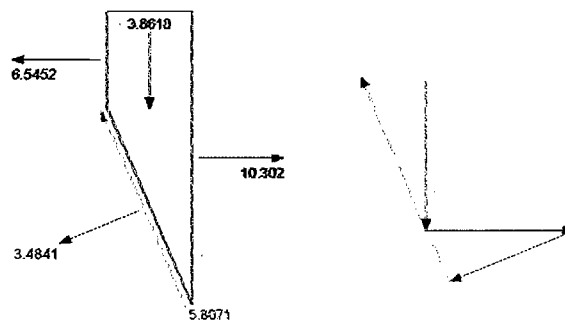
Slice 1 - Bishop Method	
Factor of Safety	0,33
Phi Angle	28
C (Strength)	4,2
C (Force)	4,9749
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,35058
Mid-Height	0,44763
Base Length	1,1845
Base Angle	72,784
Polygon Closure Error	1,2082
Anisotropic Strength Modifier	1
Weight	1,6572
Base Shear Force	3,9636
Base Normal Force	6,9042
Right Side Normal Force	6,5452

Slice 1 - Bishop Method



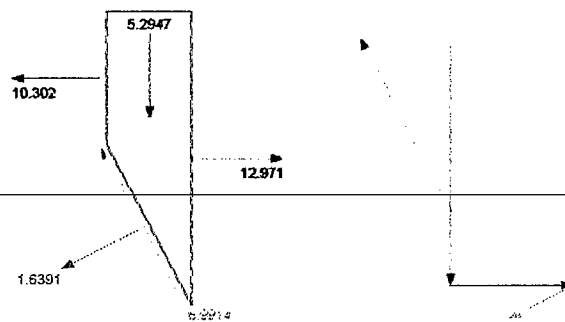
Slice 2 - Bishop Method	
Factor of Safety	0,33
Phi Angle	28
C (Strength)	4,2
C (Force)	3,7658
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,35058
Mid-Height	1,0431
Base Length	0,89662
Base Angle	66,983
Polygon Closure Error	1,6841
Anisotropic Strength Modifier	1
Weight	3,8618
Base Shear Force	5,8071
Base Normal Force	3,4841
Left Side Normal Force	6,5452
Right Side Normal Force	10,302

Slice 2 - Bishop Method



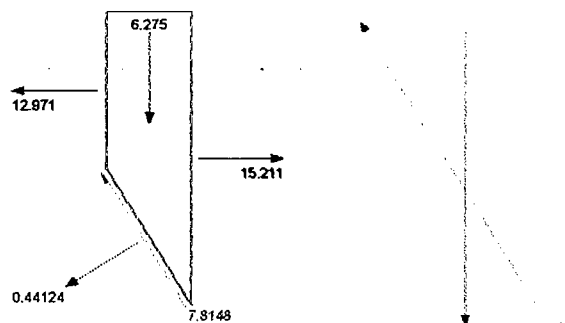
Slice 3 - Bishop Method	
Factor of Safety	0,33
Phi Angle	28
C (Strength)	4,2
C (Force)	3,1767
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,35058
Mid-Height	1,4302
Base Length	0,75613
Base Angle	62,377
Polygon Closure Error	1,9576
Anisotropic Strength Modifier	1
Weight	5,2947
Base Shear Force	6,9914
Base Normal Force	1,6391
Left Side Normal Force	10,302
Right Side Normal Force	12,971

Slice 3 - Bishop Method



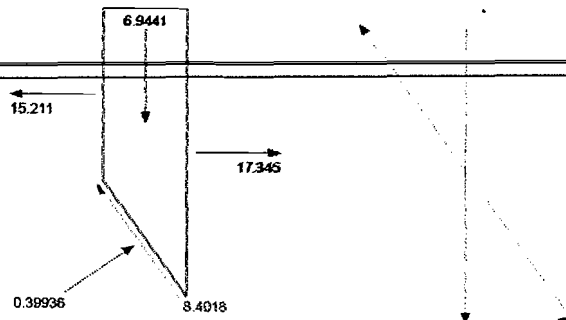
Slice 4 - Bishop Method	
Factor of Safety	0,33
Phi Angle	28
C (Strength)	4,2
C (Force)	2,8105
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,35058
Mid-Height	1,695
Base Length	0,66916
Base Angle	58,405
Polygon Closure Error	2,1881
Anisotropic Strength Modifier	1
Weight	6,275
Base Shear Force	7,8148
Base Normal Force	0,44124
Left Side Normal Force	12,971
Right Side Normal Force	15,211

Slice 4 - Bishop Method



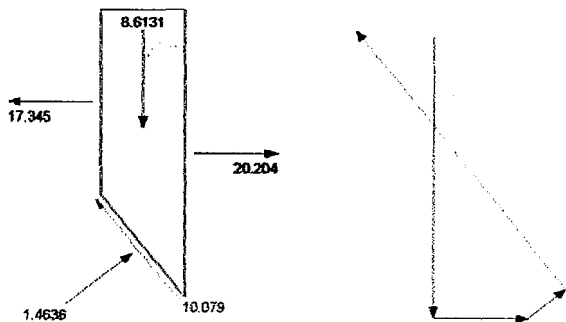
<b>Slice 5 - Bishop Method</b>	
Factor of Safety	0,33
Phi Angle	28
C (Strength)	4,2
C (Force)	2,5571
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,35058
Mid-Height	1,8757
Base Length	0,60884
Base Angle	54,843
Polygon Closure Error	2,4365
Anisotropic Strength Modifier	1
Weight	6,9441
Base Shear Force	8,4018
Base Normal Force	0,39936
Left Side Normal Force	15,211
Right Side Normal Force	17,345

Slice 5 - Bishop Method



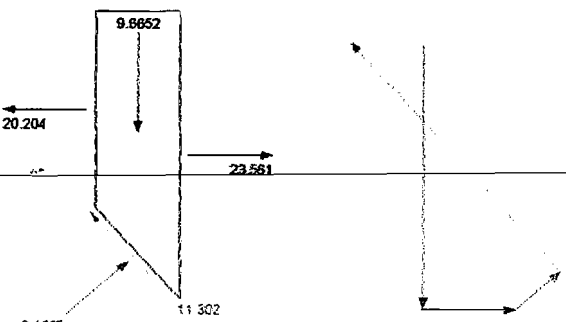
<b>Slice 6 - Bishop Method</b>	
Factor of Safety	0,33
Phi Angle	38
C (Strength)	3,5
C (Force)	2,1789
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,3883
Mid-Height	1,9982
Base Length	0,62255
Base Angle	51,411
Polygon Closure Error	2,3182
Anisotropic Strength Modifier	1
Weight	8,6131
Base Shear Force	10,079
Base Normal Force	1,4636
Left Side Normal Force	17,345
Right Side Normal Force	20,204

Slice 6 - Bishop Method



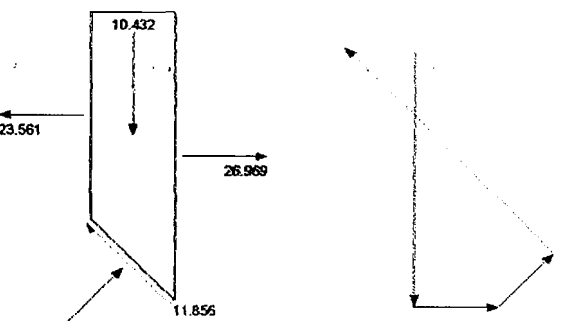
<b>Slice 7 - Bishop Method</b>	
Factor of Safety	0,33
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0333
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,38829
Mid-Height	2,0678
Base Length	0,58095
Base Angle	48,058
Polygon Closure Error	2,5995
Anisotropic Strength Modifier	1
Weight	9,6652
Base Shear Force	11,302
Base Normal Force	2,1663
Left Side Normal Force	20,204
Right Side Normal Force	23,561

Slice 7 - Bishop Method



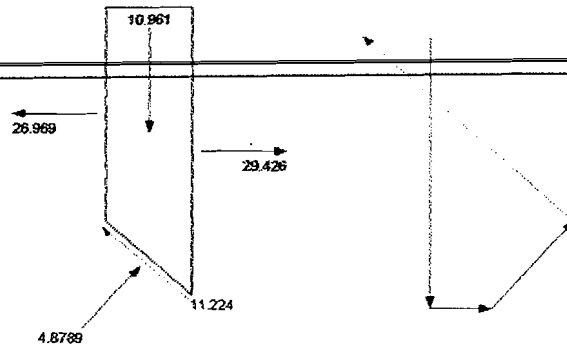
<b>Slice 8 - Bishop Method</b>	
Factor of Safety	0,33
Phi Angle	38
C (Strength)	3,5
C (Force)	1,919
Pore Water Pressure	1,1519
Pore Water Force	0,63159
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,38829
Mid-Height	2,0882
Base Length	0,54828
Base Angle	44,912
Polygon Closure Error	2,7862
Anisotropic Strength Modifier	1
Weight	10,432
Base Shear Force	11,856
Base Normal Force	3,178
Left Side Normal Force	23,561
Right Side Normal Force	26,969

Slice 8 - Bishop Method



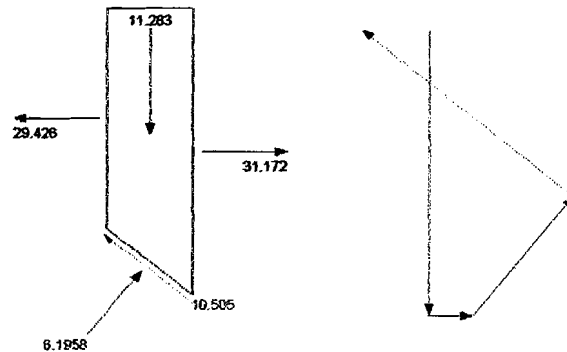
Slice 9 - Bishop Method	
Factor of Safety	0,33
Phi Angle	38
C (Strength)	3,5
C (Force)	1,8267
Pore Water Pressure	4,7536
Pore Water Force	2,481
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,3883
Mid-Height	2,0671
Base Length	0,52192
Base Angle	41,929
Polygon Closure Error	2,6938
Anisotropic Strength Modifier	1
Weight	10,961
Base Shear Force	11,224
Base Normal Force	4,8789
Left Side Normal Force	26,969
Right Side Normal Force	29,426

Slice 9 - Bishop Method



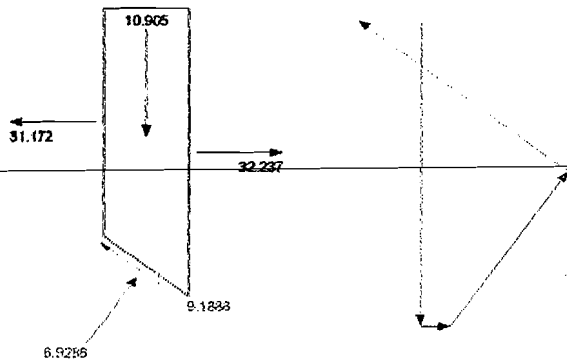
Slice 10 - Bishop Method	
Factor of Safety	0,33
Phi Angle	38
C (Strength)	3,5
C (Force)	1,7507
Pore Water Pressure	8,005
Pore Water Force	4,0042
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,38829
Mid-Height	2,0103
Base Length	0,50021
Base Angle	39,081
Polygon Closure Error	2,5951
Anisotropic Strength Modifier	1
Weight	11,283
Base Shear Force	10,505
Base Normal Force	6,1958
Left Side Normal Force	29,426
Right Side Normal Force	31,172

Slice 10 - Bishop Method



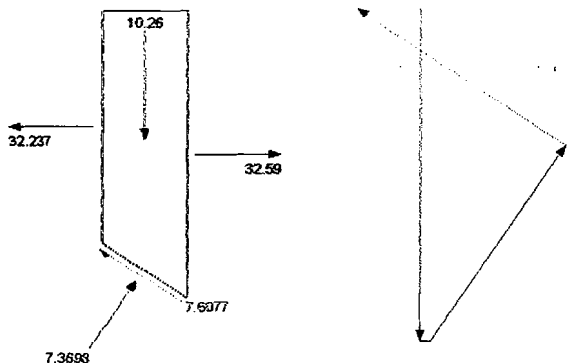
Slice 11 - Bishop Method	
Factor of Safety	0,33
Phi Angle	38
C (Strength)	3,5
C (Force)	1,6575
Pore Water Pressure	10,923
Pore Water Force	5,173
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,38134
Mid-Height	1,923
Base Length	0,47358
Base Angle	36,367
Polygon Closure Error	2,2355
Anisotropic Strength Modifier	1
Weight	10,905
Base Shear Force	9,1888
Base Normal Force	6,9286
Left Side Normal Force	31,172
Right Side Normal Force	32,237

Slice 11 - Bishop Method



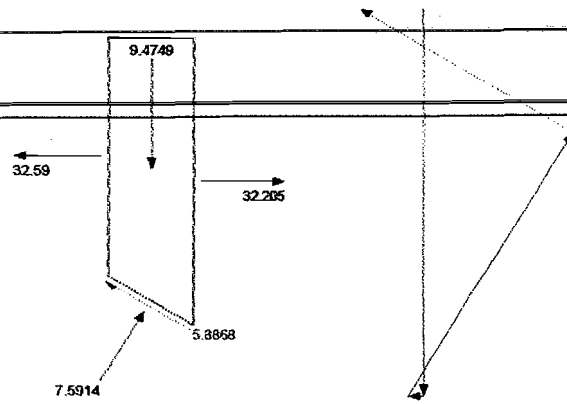
Slice 12 - Bishop Method	
Factor of Safety	0,33
Phi Angle	38
C (Strength)	3,5
C (Force)	1,6056
Pore Water Pressure	13,548
Pore Water Force	6,2149
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,38134
Mid-Height	1,8093
Base Length	0,45874
Base Angle	33,77
Polygon Closure Error	1,9494
Anisotropic Strength Modifier	1
Weight	10,26
Base Shear Force	7,6077
Base Normal Force	7,3698
Left Side Normal Force	32,237
Right Side Normal Force	32,59

Slice 12 - Bishop Method



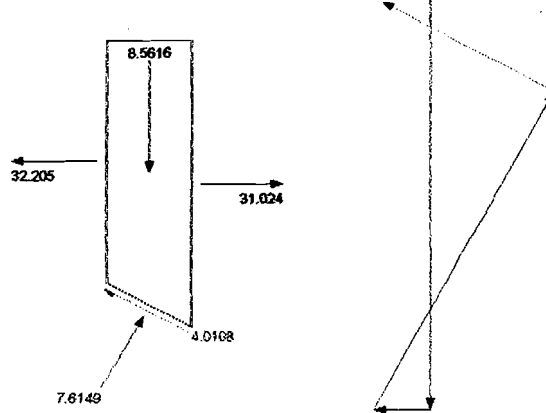
Slice 13 - Bishop Method	
Factor of Safety	0,33
Phi Angle	38
C (Strength)	3,5
C (Force)	1,5612
Pore Water Pressure	15,93
Pore Water Force	7,1057
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,38135
Mid-Height	1,6709
Base Length	0,44606
Base Angle	31,248
Polygon Closure Error	1,516
Anisotropic Strength Modifier	1
Weight	9,4749
Base Shear Force	5,8868
Base Normal Force	7,5914
Left Side Normal Force	32,59
Right Side Normal Force	32,205

Slice 13 - Bishop Method



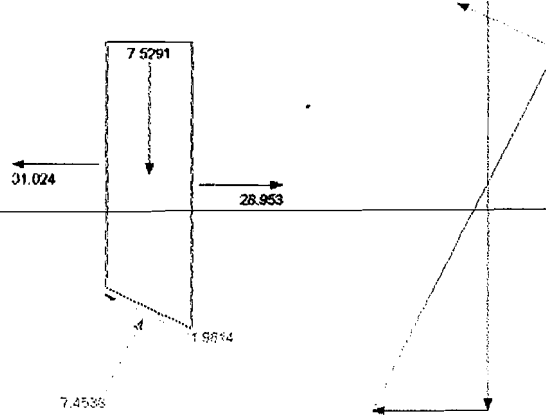
Slice 14 - Bishop Method	
Factor of Safety	0,33
Phi Angle	38
C (Strength)	3,5
C (Force)	1,523
Pore Water Pressure	18,091
Pore Water Force	7,872
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,38134
Mid-Height	1,5098
Base Length	0,43514
Base Angle	28,793
Polygon Closure Error	0,98458
Anisotropic Strength Modifier	1
Weight	8,5616
Base Shear Force	4,0108
Base Normal Force	7,8149
Left Side Normal Force	32,205
Right Side Normal Force	31,024

Slice 14 - Bishop Method



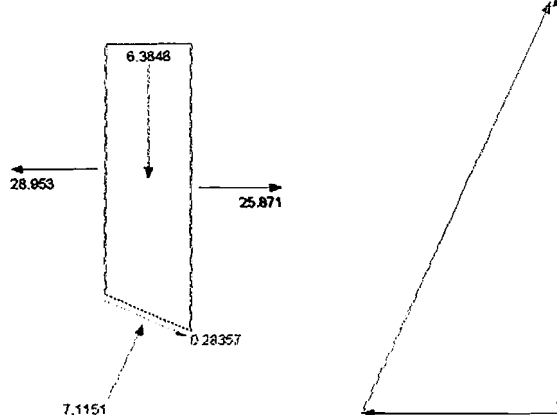
Slice 15 - Bishop Method	
Factor of Safety	0,33
Phi Angle	38
C (Strength)	3,5
C (Force)	1,49
Pore Water Pressure	20,045
Pore Water Force	8,5335
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,38134
Mid-Height	1,3277
Base Length	0,42572
Base Angle	26,394
Polygon Closure Error	0,52704
Anisotropic Strength Modifier	1
Weight	7,5291
Base Shear Force	1,9614
Base Normal Force	7,4538
Left Side Normal Force	31,024
Right Side Normal Force	28,953

Slice 15 - Bishop Method



Slice 16 - Bishop Method	
Factor of Safety	0,33
Phi Angle	38
C (Strength)	3,5
C (Force)	1,4615
Pore Water Pressure	21,806
Pore Water Force	9,1055
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,38134
Mid-Height	1,128
Base Length	0,41757
Base Angle	24,044
Polygon Closure Error	0,035575
Anisotropic Strength Modifier	1
Weight	6,3848
Base Shear Force	0,28357
Base Normal Force	7,1151
Left Side Normal Force	28,953
Right Side Normal Force	25,871

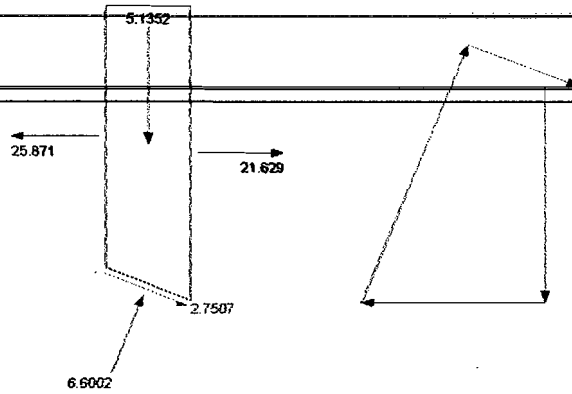
Slice 16 - Bishop Method





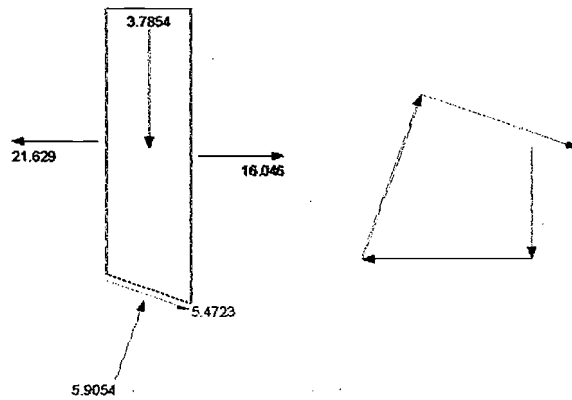
Slice 17 - Bishop Method	
Factor of Safety	0,33
Phi Angle	38
C (Strength)	3,5
C (Force)	1,4369
Pore Water Pressure	23,385
Pore Water Force	9,6001
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,38134
Mid-Height	0,90559
Base Length	0,41053
Base Angle	21,737
Polygon Closure Error	0,75902
Anisotropic Strength Modifier	1
Weight	5,1352
Base Shear Force	2,7507
Base Normal Force	6,6002
Left Side Normal Force	25,871
Right Side Normal Force	21,629

Slice 17 - Bishop Method



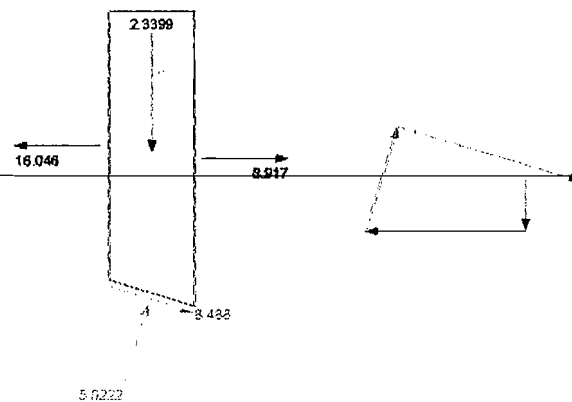
Slice 18 - Bishop Method	
Factor of Safety	0,33
Phi Angle	38
C (Strength)	3,5
C (Force)	1,4156
Pore Water Pressure	24,791
Pore Water Force	10,027
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,38135
Mid-Height	0,66756
Base Length	0,40447
Base Angle	19,465
Polygon Closure Error	1,5059
Anisotropic Strength Modifier	1
Weight	3,7854
Base Shear Force	5,4723
Base Normal Force	5,9054
Left Side Normal Force	21,629
Right Side Normal Force	16,046

Slice 18 - Bishop Method



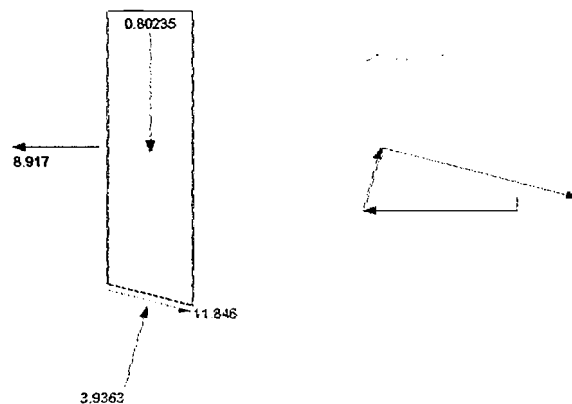
Slice 19 - Bishop Method	
Factor of Safety	0,33
Phi Angle	38
C (Strength)	3,5
C (Force)	1,3974
Pore Water Pressure	26,029
Pore Water Force	10,392
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,38134
Mid-Height	0,41265
Base Length	0,39925
Base Angle	17,226
Polygon Closure Error	2,4615
Anisotropic Strength Modifier	1
Weight	2,3399
Base Shear Force	8,488
Base Normal Force	5,0222
Left Side Normal Force	16,046
Right Side Normal Force	8,917

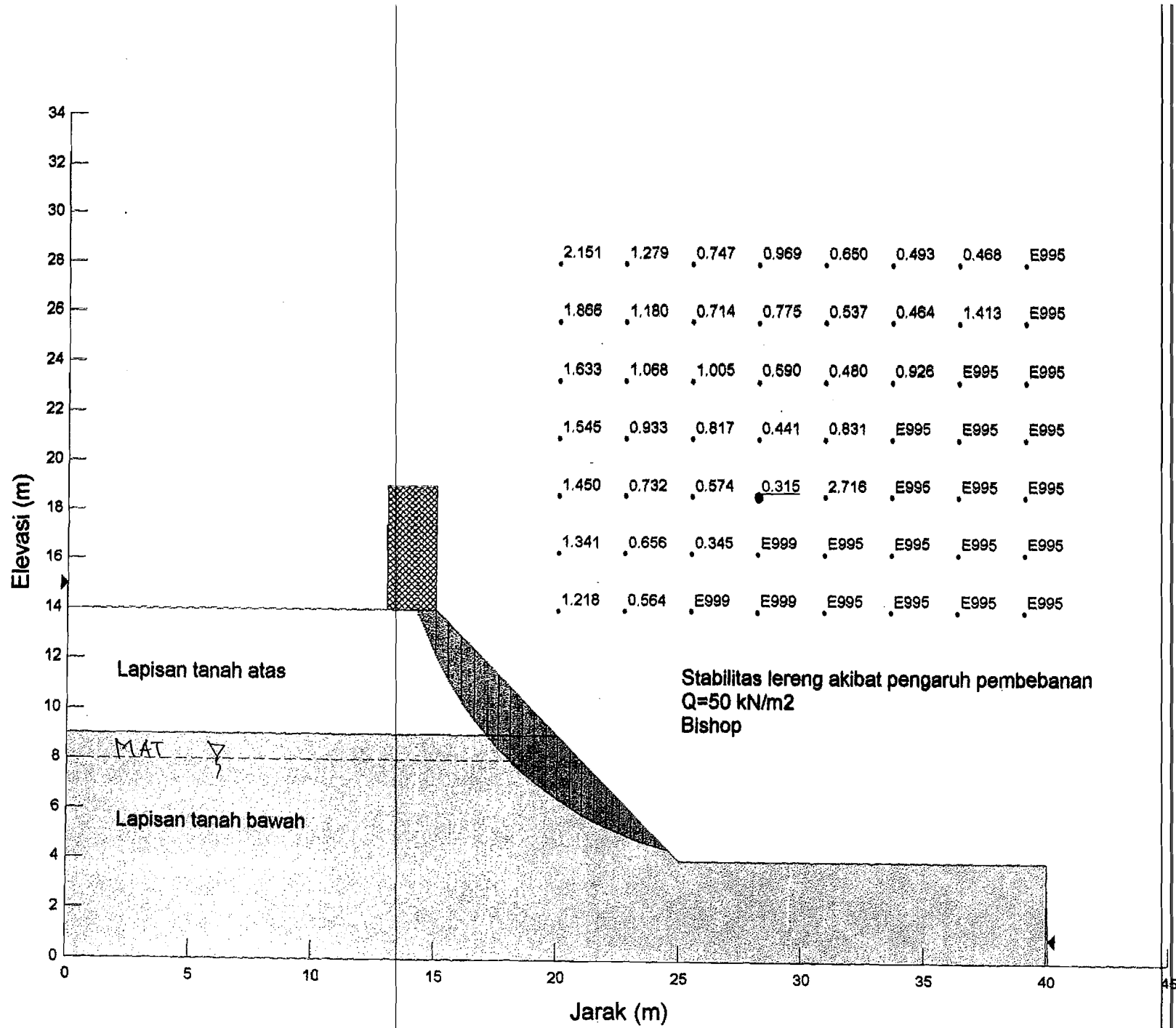
Slice 19 - Bishop Method



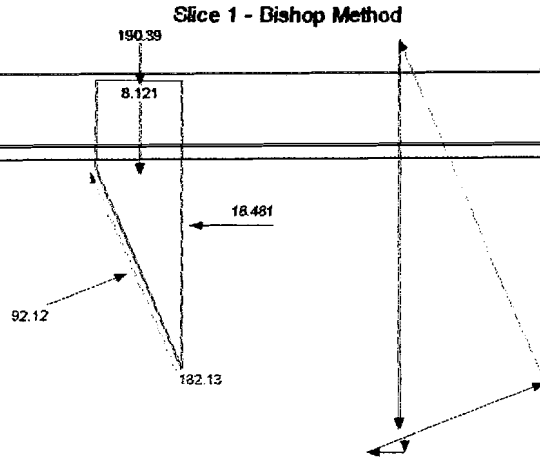
Slice 20 - Bishop Method	
Factor of Safety	0,33
Phi Angle	38
C (Strength)	3,5
C (Force)	1,3819
Pore Water Pressure	27,111
Pore Water Force	10,704
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,38134
Mid-Height	0,14149
Base Length	0,39482
Base Angle	15,014
Polygon Closure Error	3,5538
Anisotropic Strength Modifier	1
Weight	0,80235
Base Shear Force	11,846
Base Normal Force	3,9363
Left Side Normal Force	8,917

Slice 20 - Bishop Method

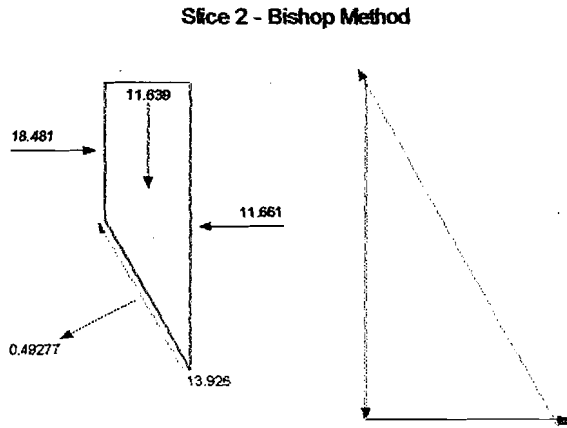




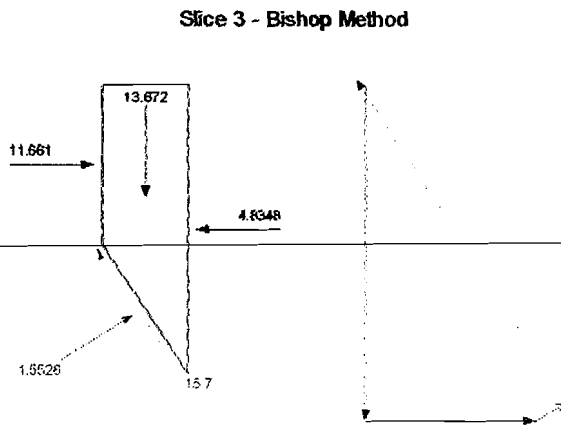
Slice 1 - Bishop Method	
Factor of Safety	0,315
Phi Angle	28
C (Strength)	4,2
C (Force)	8,3756
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,76158
Mid-Height	1,0098
Base Length	1,9942
Base Angle	67,549
Polygon Closure Error	4,7597
Anisotropic Strength Modifier	1
Weight	8,121
Base Shear Force	182,13
Base Normal Force	92,12
Right Side Normal Force	18,481
Surface Pressure Load	190,39



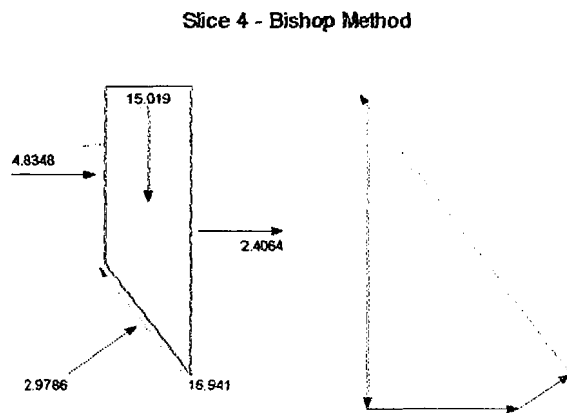
Slice 2 - Bishop Method	
Factor of Safety	0,315
Phi Angle	28
C (Strength)	4,2
C (Force)	4,6472
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,52815
Mid-Height	2,087
Base Length	1,1065
Base Angle	61,489
Polygon Closure Error	0,41778
Anisotropic Strength Modifier	1
Weight	11,639
Base Shear Force	13,926
Base Normal Force	0,49277
Left Side Normal Force	18,481
Right Side Normal Force	11,661



Slice 3 - Bishop Method	
Factor of Safety	0,315
Phi Angle	28
C (Strength)	4,2
C (Force)	4,1185
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,52815
Mid-Height	2,4514
Base Length	0,98059
Base Angle	57,411
Polygon Closure Error	0,471
Anisotropic Strength Modifier	1
Weight	13,672
Base Shear Force	15,7
Base Normal Force	1,5526
Left Side Normal Force	11,661
Right Side Normal Force	4,8348

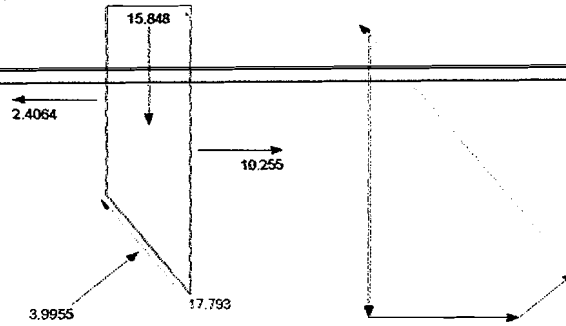


Slice 4 - Bishop Method	
Factor of Safety	0,315
Phi Angle	28
C (Strength)	4,2
C (Force)	3,7515
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,52815
Mid-Height	2,6928
Base Length	0,8932
Base Angle	53,751
Polygon Closure Error	0,50823
Anisotropic Strength Modifier	1
Weight	15,019
Base Shear Force	16,941
Base Normal Force	2,9786
Left Side Normal Force	4,8348
Right Side Normal Force	2,4064



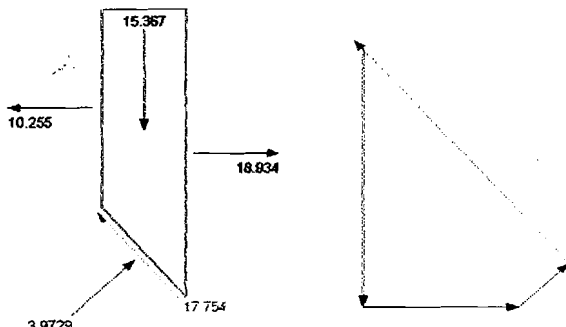
<b>Slice 5 - Bishop Method</b>	
Factor of Safety	0,315
Phi Angle	28
C (Strength)	4,2
C (Force)	3,4791
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,52815
Mid-Height	2,8416
Base Length	0,82835
Base Angle	50,388
Polygon Closure Error	0,62275
Anisotropic Strength Modifier	1
Weight	15,848
Base Shear Force	17,793
Base Normal Force	3,9955
Left Side Normal Force	2,4064
Right Side Normal Force	10,255

Slice 5 - Bishop Method



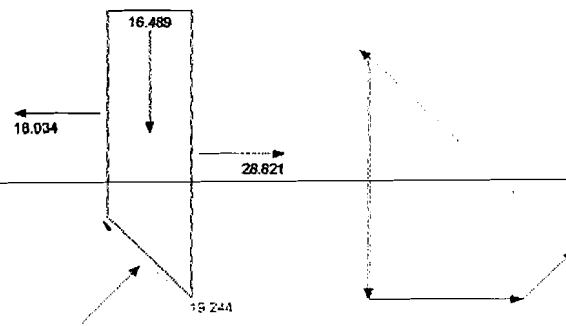
<b>Slice 6 - Bishop Method</b>	
Factor of Safety	0,315
Phi Angle	38
C (Strength)	3,5
C (Force)	2,4875
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48123
Mid-Height	2,9146
Base Length	0,71071
Base Angle	47,381
Polygon Closure Error	0,53262
Anisotropic Strength Modifier	1
Weight	15,367
Base Shear Force	17,754
Base Normal Force	3,9729
Left Side Normal Force	10,255
Right Side Normal Force	18,934

Slice 6 - Bishop Method



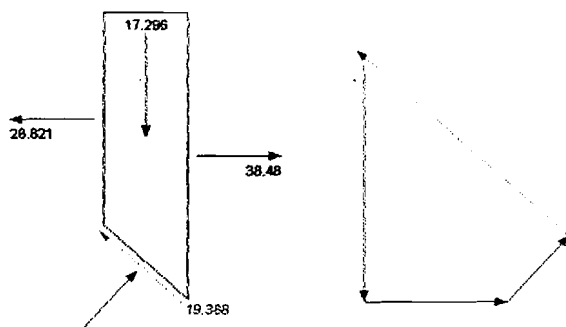
<b>Slice 7 - Bishop Method</b>	
Factor of Safety	0,315
Phi Angle	38
C (Strength)	3,5
C (Force)	2,3684
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48123
Mid-Height	2,9319
Base Length	0,67669
Base Angle	44,671
Polygon Closure Error	0,57732
Anisotropic Strength Modifier	1
Weight	16,489
Base Shear Force	19,244
Base Normal Force	4,726
Left Side Normal Force	18,934
Right Side Normal Force	28,821

Slice 7 - Bishop Method



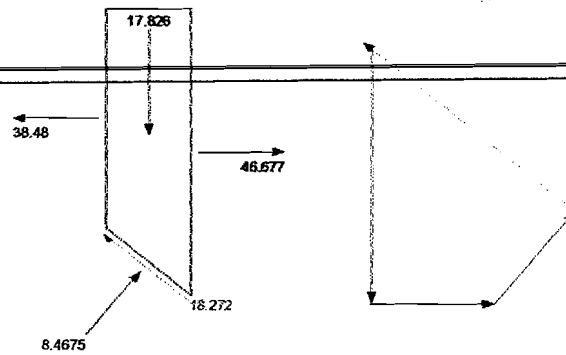
<b>Slice 8 - Bishop Method</b>	
Factor of Safety	0,315
Phi Angle	38
C (Strength)	3,5
C (Force)	2,2694
Pore Water Pressure	2,1659
Pore Water Force	1,4044
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48124
Mid-Height	2,9052
Base Length	0,64841
Base Angle	42,082
Polygon Closure Error	0,67858
Anisotropic Strength Modifier	1
Weight	17,296
Base Shear Force	19,388
Base Normal Force	6,3153
Left Side Normal Force	28,821
Right Side Normal Force	38,48

Slice 8 - Bishop Method



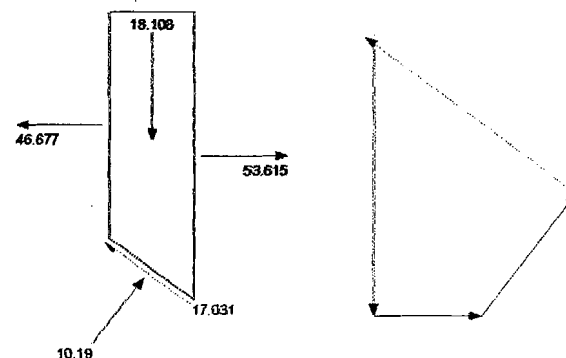
<b>Slice 8 - Bishop Method</b>	
Factor of Safety	0,315
Phi Angle	38
C (Strength)	3,5
C (Force)	2,1858
Pore Water Pressure	6,244
Pore Water Force	3,8995
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48123
Mid-Height	2,8397
Base Length	0,62452
Base Angle	39,596
Polygon Closure Error	0,63952
Anisotropic Strength Modifier	1
Weight	17,826
Base Shear Force	18,272
Base Normal Force	8,4675
Left Side Normal Force	38,48
Right Side Normal Force	46,677

**Slice 9 - Bishop Method**



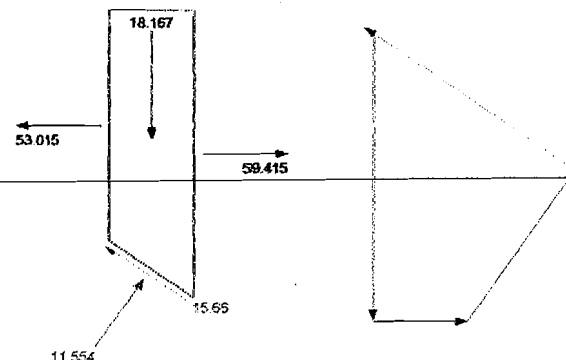
<b>Slice 10 - Bishop Method</b>	
Factor of Safety	0,315
Phi Angle	38
C (Strength)	3,5
C (Force)	2,1144
Pore Water Pressure	9,9828
Pore Water Force	6,0309
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48123
Mid-Height	2,7397
Base Length	0,60413
Base Angle	37,196
Polygon Closure Error	0,54324
Anisotropic Strength Modifier	1
Weight	18,108
Base Shear Force	17,031
Base Normal Force	10,19
Left Side Normal Force	46,677
Right Side Normal Force	53,615

**Slice 10 - Bishop Method**



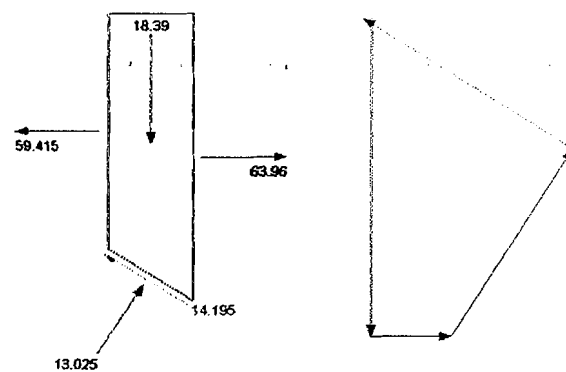
<b>Slice 11 - Bishop Method</b>	
Factor of Safety	0,315
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0529
Pore Water Pressure	13,415
Pore Water Force	7,8685
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,48124
Mid-Height	2,8084
Base Length	0,58655
Base Angle	34,87
Polygon Closure Error	0,54501
Anisotropic Strength Modifier	1
Weight	18,167
Base Shear Force	15,66
Base Normal Force	11,554
Left Side Normal Force	53,615
Right Side Normal Force	59,415

**Slice 11 - Bishop Method**



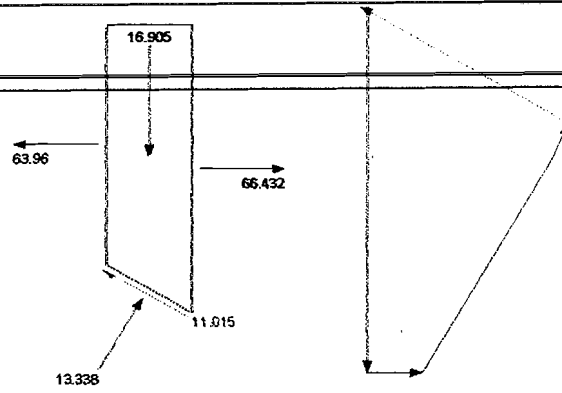
<b>Slice 12 - Bishop Method</b>	
Factor of Safety	0,315
Phi Angle	38
C (Strength)	3,5
C (Force)	2,1011
Pore Water Pressure	16,644
Pore Water Force	9,9919
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,50602
Mid-Height	2,444
Base Length	0,60033
Base Angle	32,552
Polygon Closure Error	0,45975
Anisotropic Strength Modifier	1
Weight	18,39
Base Shear Force	14,195
Base Normal Force	13,025
Left Side Normal Force	59,415
Right Side Normal Force	63,96

**Slice 12 - Bishop Method**



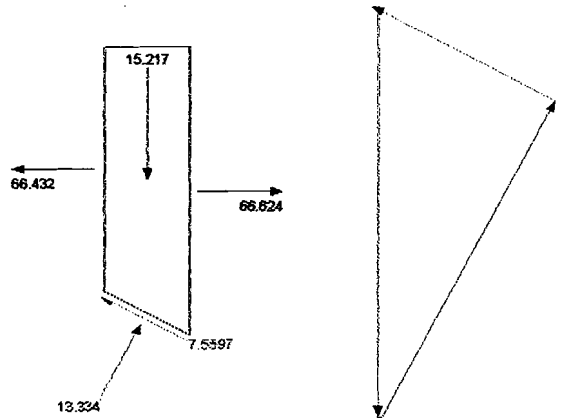
Slice 13 - Bishop Method	
Factor of Safety	0,315
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0499
Pore Water Pressure	19,672
Pore Water Force	11,522
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,50602
Mid-Height	2,2467
Base Length	0,58569
Base Angle	30,235
Polygon Closure Error	0,3381
Anisotropic Strength Modifier	1
Weight	16,905
Base Shear Force	11,015
Base Normal Force	13,338
Left Side Normal Force	63,96
Right Side Normal Force	66,432

Slice 13 - Bishop Method



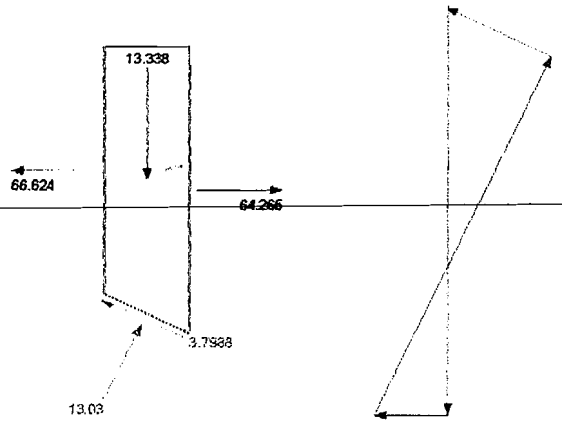
Slice 14 - Bishop Method	
Factor of Safety	0,315
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0053
Pore Water Pressure	22,433
Pore Water Force	12,853
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,50602
Mid-Height	2,0223
Base Length	0,57295
Base Angle	27,971
Polygon Closure Error	0,22825
Anisotropic Strength Modifier	1
Weight	15,217
Base Shear Force	7,5597
Base Normal Force	13,334
Left Side Normal Force	66,432
Right Side Normal Force	66,624

Slice 14 - Bishop Method



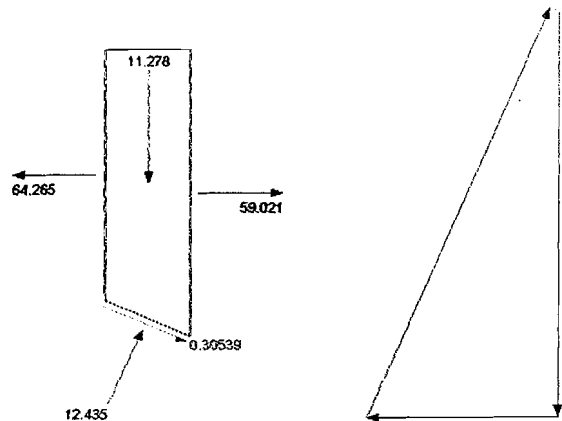
Slice 15 - Bishop Method	
Factor of Safety	0,315
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9664
Pore Water Pressure	24,947
Pore Water Force	14,018
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,50602
Mid-Height	1,7725
Base Length	0,56183
Base Angle	25,755
Polygon Closure Error	0,06869
Anisotropic Strength Modifier	1
Weight	13,338
Base Shear Force	3,7988
Base Normal Force	13,03
Left Side Normal Force	66,624
Right Side Normal Force	64,265

Slice 15 - Bishop Method



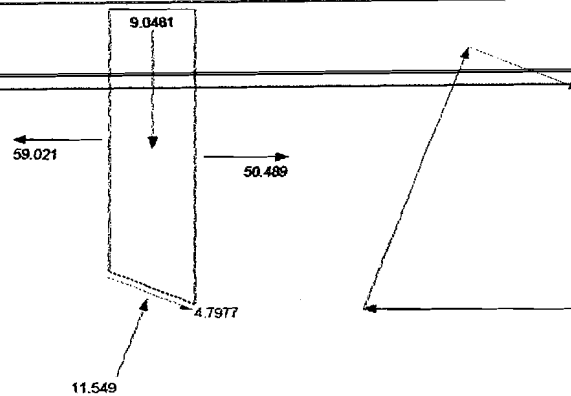
Slice 16 - Bishop Method	
Factor of Safety	0,315
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9324
Pore Water Pressure	27,226
Pore Water Force	15,032
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,50602
Mid-Height	1,4989
Base Length	0,55212
Base Angle	23,579
Polygon Closure Error	0,062175
Anisotropic Strength Modifier	1
Weight	11,278
Base Shear Force	0,30539
Base Normal Force	12,435
Left Side Normal Force	64,265
Right Side Normal Force	59,021

Slice 16 - Bishop Method



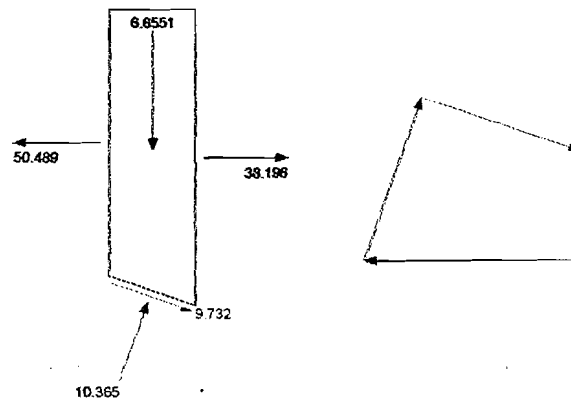
Slice 17 - Bishop Method	
Factor of Safety	0,315
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9027
Pore Water Pressure	29,281
Pore Water Force	45,948
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,50602
Mid-Height	1,2025
Base Length	0,54363
Base Angle	21,438
Polygon Closure Error	0,17323
Anisotropic Strength Modifier	1
Weight	9,0481
Base Shear Force	4,7977
Base Normal Force	11,549
Left Side Normal Force	59,021
Right Side Normal Force	50,489

Slice 17 - Bishop Method



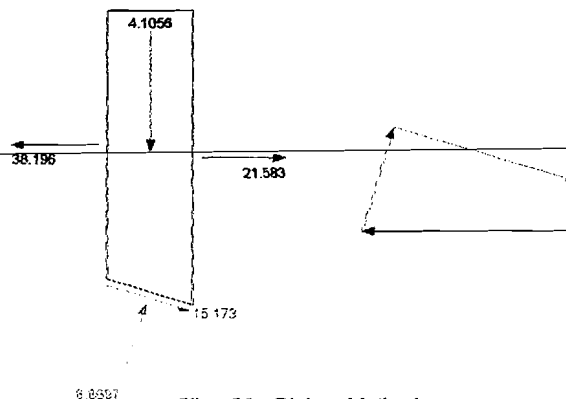
Slice 18 - Bishop Method	
Factor of Safety	0,315
Phi Angle	38
C (Strength)	3,5
C (Force)	1,8769
Pore Water Pressure	31,126
Pore Water Force	16,691
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,50602
Mid-Height	0,88445
Base Length	0,53625
Base Angle	19,329
Polygon Closure Error	0,24586
Anisotropic Strength Modifier	1
Weight	6,6551
Base Shear Force	9,732
Base Normal Force	10,365
Left Side Normal Force	50,489
Right Side Normal Force	38,196

Slice 18 - Bishop Method



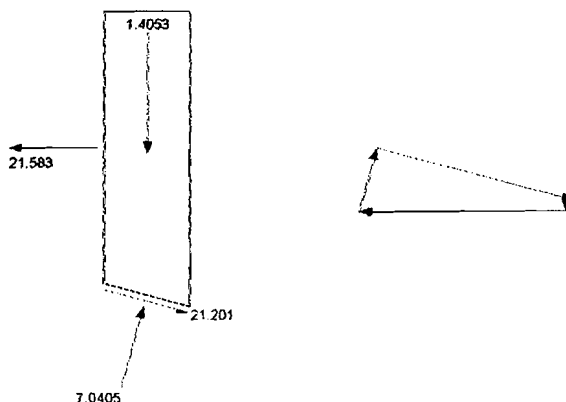
Slice 19 - Bishop Method	
Factor of Safety	0,315
Phi Angle	38
C (Strength)	3,5
C (Force)	1,8545
Pore Water Pressure	32,764
Pore Water Force	17,36
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,50602
Mid-Height	0,54563
Base Length	0,52984
Base Angle	17,246
Polygon Closure Error	0,33226
Anisotropic Strength Modifier	1
Weight	4,1056
Base Shear Force	15,173
Base Normal Force	8,8697
Left Side Normal Force	38,196
Right Side Normal Force	21,583

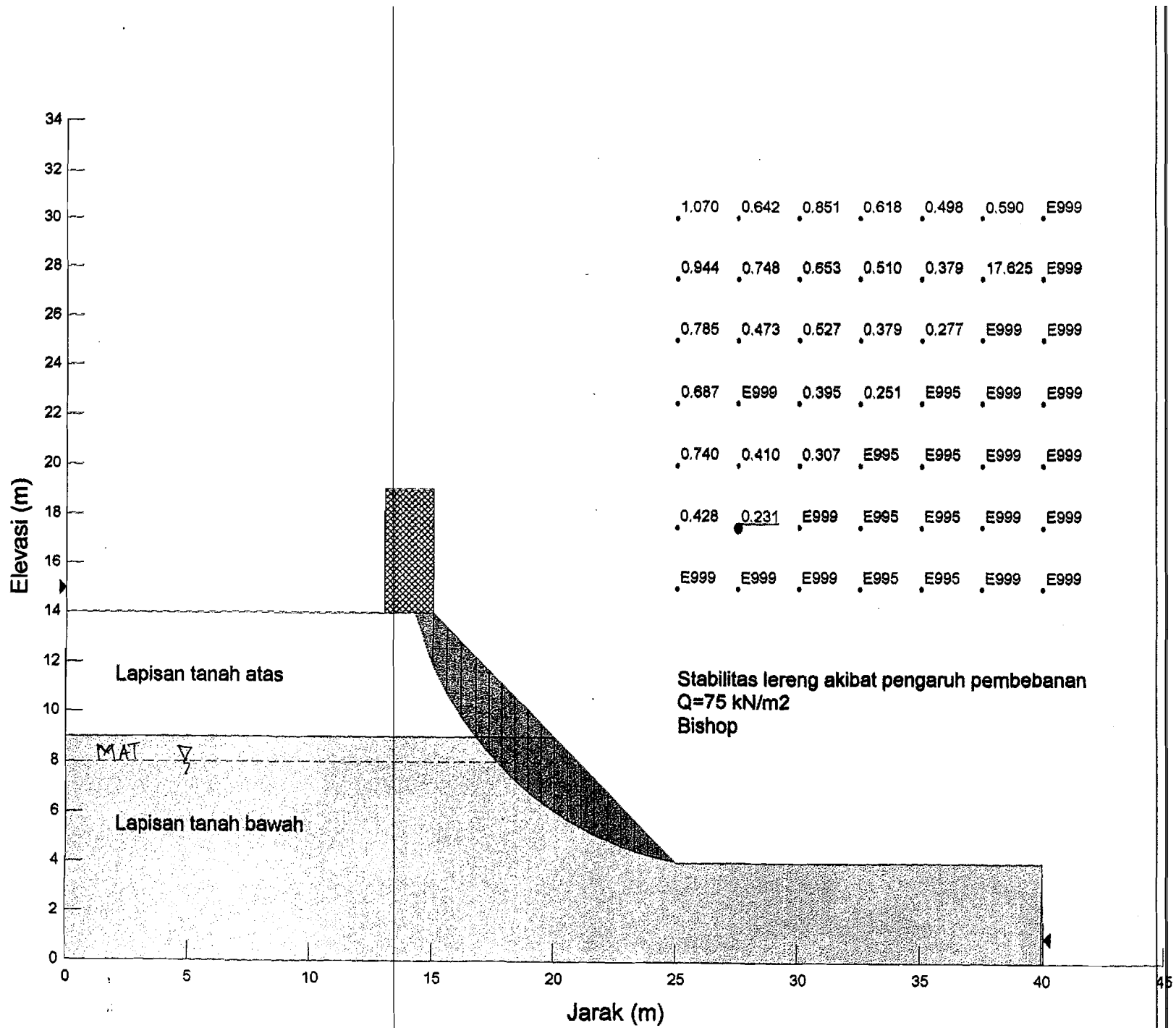
Slice 19 - Bishop Method



Slice 20 - Bishop Method	
Factor of Safety	0,315
Phi Angle	38
C (Strength)	3,5
C (Force)	1,8352
Pore Water Pressure	34,207
Pore Water Force	17,936
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,50602
Mid-Height	0,18676
Base Length	0,52433
Base Angle	15,187
Polygon Closure Error	0,75541
Anisotropic Strength Modifier	1
Weight	1,4053
Base Shear Force	21,201
Base Normal Force	7,0405
Left Side Normal Force	21,583
Right Side Normal Force	21,201

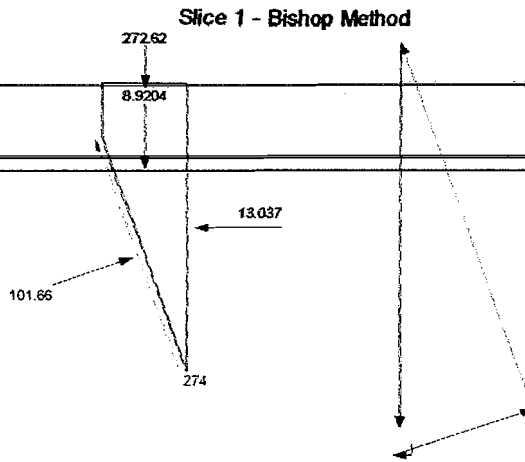
Slice 20 - Bishop Method



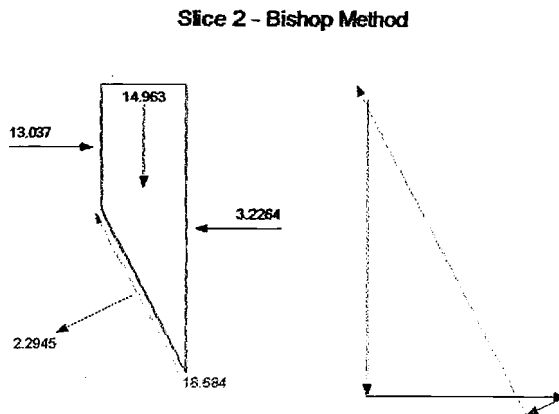




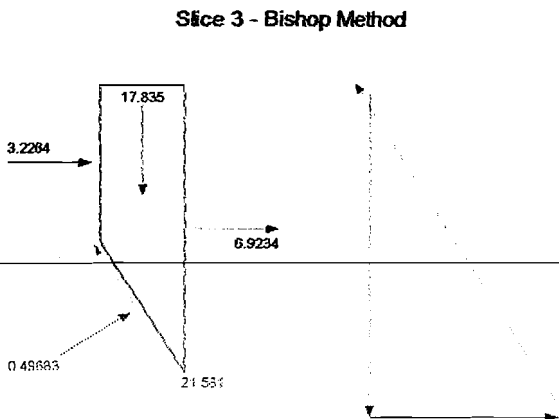
Slice 1 - Bishop Method	
Factor of Safety	0,231
Phi Angle	28
C (Strength)	4,2
C (Force)	9,1892
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,727
Mid-Height	1,162
Base Length	2,1879
Base Angle	70,593
Polygon Closure Error	13,7
Anisotropic Strength Modifier	1
Weight	8,9204
Base Shear Force	274
Base Normal Force	101,66
Right Side Normal Force	13,037
Surface Pressure Load	272,62



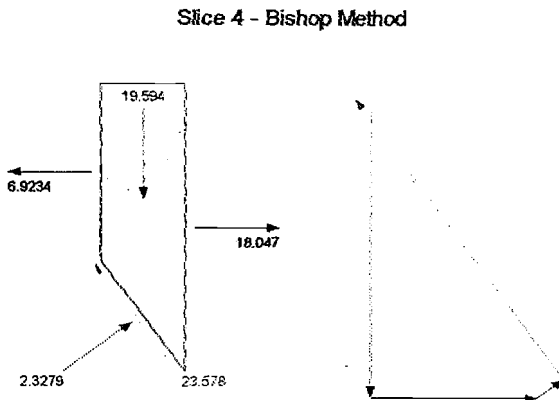
Slice 2 - Bishop Method	
Factor of Safety	0,231
Phi Angle	28
C (Strength)	4,2
C (Force)	5,5312
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,59279
Mid-Height	2,3903
Base Length	1,3169
Base Angle	63,248
Polygon Closure Error	0,9342
Anisotropic Strength Modifier	1
Weight	14,963
Base Shear Force	18,684
Base Normal Force	2,2945
Left Side Normal Force	13,037
Right Side Normal Force	3,2264



Slice 3 - Bishop Method	
Factor of Safety	0,231
Phi Angle	28
C (Strength)	4,2
C (Force)	4,7165
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,59279
Mid-Height	2,8491
Base Length	1,123
Base Angle	58,138
Polygon Closure Error	1,079
Anisotropic Strength Modifier	1
Weight	17,835
Base Shear Force	21,581
Base Normal Force	0,49683
Left Side Normal Force	3,2264
Right Side Normal Force	6,9234

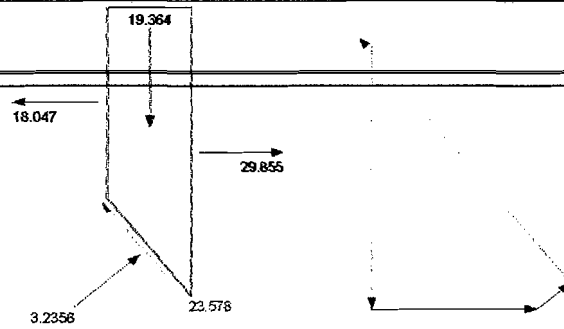


Slice 4 - Bishop Method	
Factor of Safety	0,231
Phi Angle	28
C (Strength)	4,2
C (Force)	4,2045
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,59279
Mid-Height	3,1301
Base Length	1,0011
Base Angle	53,689
Polygon Closure Error	1,1789
Anisotropic Strength Modifier	1
Weight	19,594
Base Shear Force	23,578
Base Normal Force	2,3279
Left Side Normal Force	6,9234
Right Side Normal Force	18,047



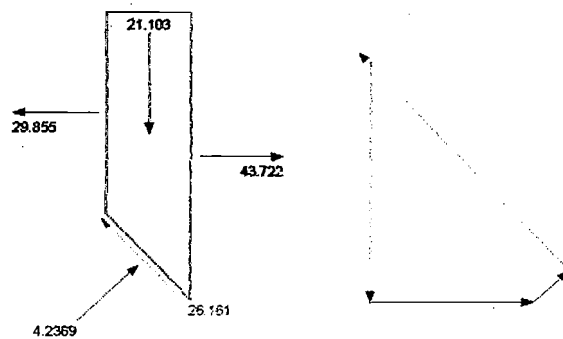
Slice 5 - Bishop Method	
Factor of Safety	0,231
Phi Angle	38
C (Strength)	3,5
C (Force)	2,9145
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,53694
Mid-Height	3,2812
Base Length	0,83272
Base Angle	49,849
Polygon Closure Error	1,061
Anisotropic Strength Modifier	1
Weight	19,364
Base Shear Force	23,578
Base Normal Force	3,2356
Left Side Normal Force	18,047
Right Side Normal Force	29,855

Slice 5 - Bishop Method



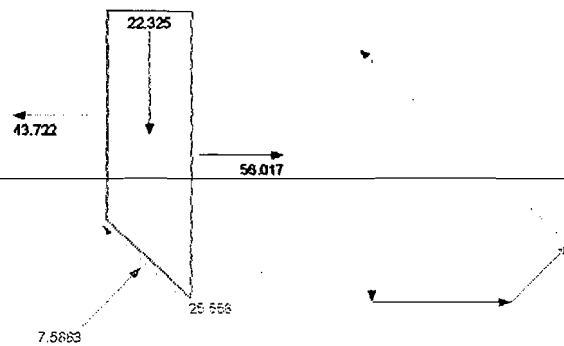
Slice 6 - Bishop Method	
Factor of Safety	0,231
Phi Angle	38
C (Strength)	3,5
C (Force)	2,7287
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,53694
Mid-Height	3,3434
Base Length	0,77964
Base Angle	46,473
Polygon Closure Error	1,308
Anisotropic Strength Modifier	1
Weight	21,103
Base Shear Force	26,161
Base Normal Force	4,2369
Left Side Normal Force	29,855
Right Side Normal Force	43,722

Slice 6 - Bishop Method



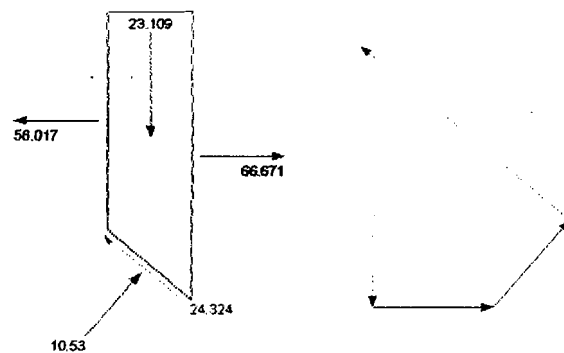
Slice 7 - Bishop Method	
Factor of Safety	0,231
Phi Angle	38
C (Strength)	3,5
C (Force)	2,582
Pore Water Pressure	4,5271
Pore Water Force	3,3397
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,53693
Mid-Height	3,3408
Base Length	0,73772
Base Angle	43,296
Polygon Closure Error	1,2779
Anisotropic Strength Modifier	1
Weight	22,325
Base Shear Force	25,558
Base Normal Force	7,5863
Left Side Normal Force	43,722
Right Side Normal Force	56,017

Slice 7 - Bishop Method



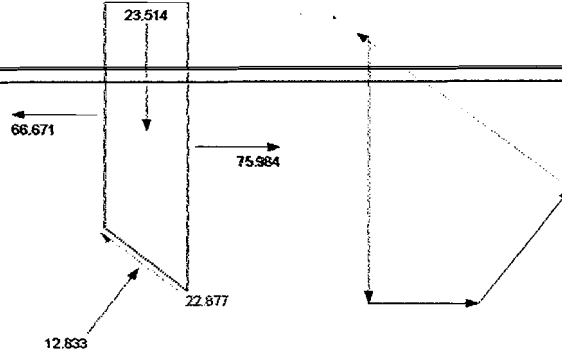
Slice 8 - Bishop Method	
Factor of Safety	0,231
Phi Angle	38
C (Strength)	3,5
C (Force)	2,4633
Pore Water Pressure	9,2302
Pore Water Force	6,4961
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,53694
Mid-Height	3,2834
Base Length	0,70379
Base Angle	40,277
Polygon Closure Error	1,2162
Anisotropic Strength Modifier	1
Weight	23,109
Base Shear Force	24,324
Base Normal Force	10,53
Left Side Normal Force	56,017
Right Side Normal Force	66,671

Slice 8 - Bishop Method



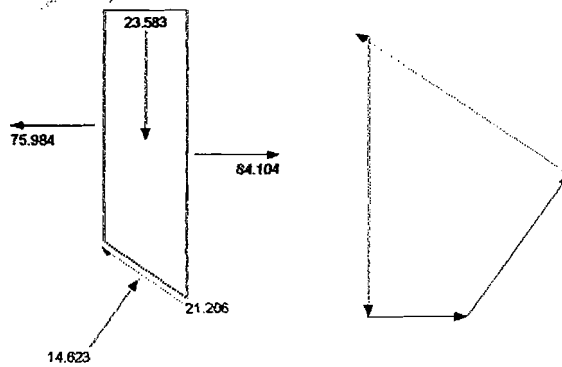
Slice 9 - Bishop Method	
Factor of Safety	0,231
Phi Angle	38
C (Strength)	3,5
C (Force)	2,3652
Pore Water Pressure	13,467
Pore Water Force	9,4008
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,53694
Mid-Height	3,1785
Base Length	0,67578
Base Angle	37,388
Polygon Closure Error	1,0581
Anisotropic Strength Modifier	1
Weight	23,514
Base Shear Force	22,877
Base Normal Force	12,833
Left Side Normal Force	66,671
Right Side Normal Force	75,984

Slice 9 - Bishop Method



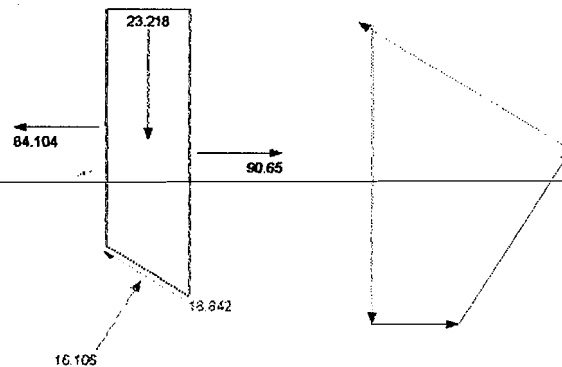
Slice 10 - Bishop Method	
Factor of Safety	0,231
Phi Angle	38
C (Strength)	3,5
C (Force)	2,2833
Pore Water Pressure	17,291
Pore Water Force	11,28
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,53694
Mid-Height	3,0314
Base Length	0,65236
Base Angle	34,606
Polygon Closure Error	1,0612
Anisotropic Strength Modifier	1
Weight	23,583
Base Shear Force	21,206
Base Normal Force	14,623
Left Side Normal Force	75,984
Right Side Normal Force	84,104

Slice 10 - Bishop Method



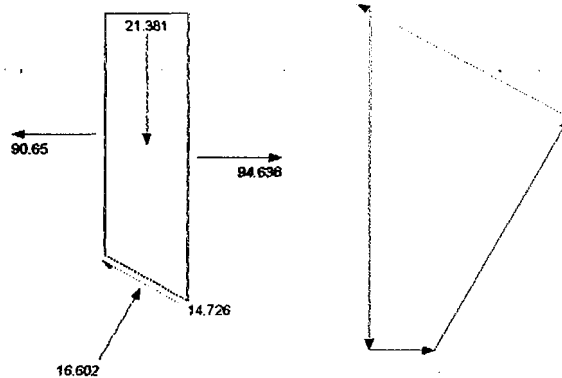
Slice 11 - Bishop Method	
Factor of Safety	0,231
Phi Angle	38
C (Strength)	3,5
C (Force)	2,2629
Pore Water Pressure	20,78
Pore Water Force	13,435
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,54897
Mid-Height	2,8443
Base Length	0,64654
Base Angle	31,887
Polygon Closure Error	1,0448
Anisotropic Strength Modifier	1
Weight	23,218
Base Shear Force	18,842
Base Normal Force	16,106
Left Side Normal Force	84,104
Right Side Normal Force	90,65

Slice 11 - Bishop Method



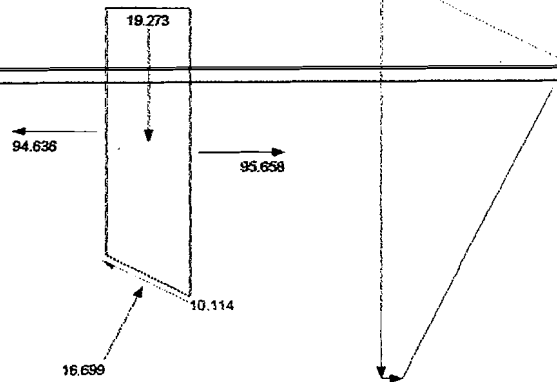
Slice 12 - Bishop Method	
Factor of Safety	0,231
Phi Angle	38
C (Strength)	3,5
C (Force)	2,2015
Pore Water Pressure	23,958
Pore Water Force	15,069
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,54897
Mid-Height	2,6192
Base Length	0,62699
Base Angle	29,216
Polygon Closure Error	0,74834
Anisotropic Strength Modifier	1
Weight	21,381
Base Shear Force	14,726
Base Normal Force	16,602
Left Side Normal Force	90,65
Right Side Normal Force	94,636

Slice 12 - Bishop Method



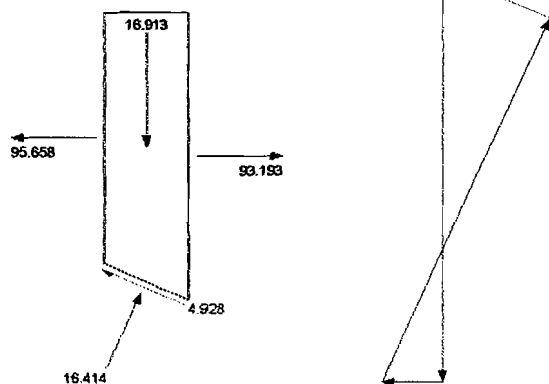
Slice 13 - Bishop Method	
Factor of Safety	0,231
Phi Angle	38
C (Strength)	3,5
C (Force)	2,1491
Pore Water Pressure	26,808
Pore Water Force	16,461
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,54897
Mid-Height	2,361
Base Length	0,61402
Base Angle	26,613
Polygon Closure Error	0,48182
Anisotropic Strength Modifier	1
Weight	19,273
Base Shear Force	10,114
Base Normal Force	16,699
Left Side Normal Force	94,636
Right Side Normal Force	95,658

Slice 13 - Bishop Method



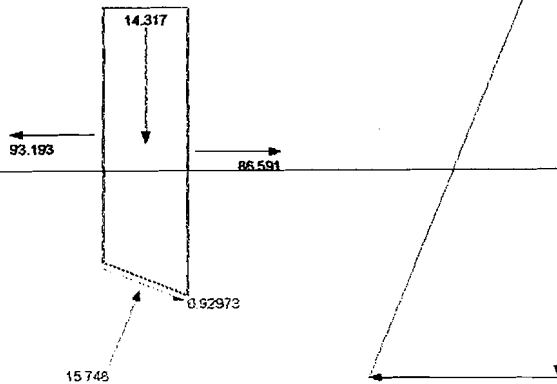
Slice 14 - Bishop Method	
Factor of Safety	0,231
Phi Angle	38
C (Strength)	3,5
C (Force)	2,1044
Pore Water Pressure	29,358
Pore Water Force	17,651
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,54897
Mid-Height	2,0719
Base Length	0,60124
Base Angle	24,068
Polygon Closure Error	0,16913
Anisotropic Strength Modifier	1
Weight	16,913
Base Shear Force	4,928
Base Normal Force	16,414
Left Side Normal Force	95,658
Right Side Normal Force	93,193

Slice 14 - Bishop Method



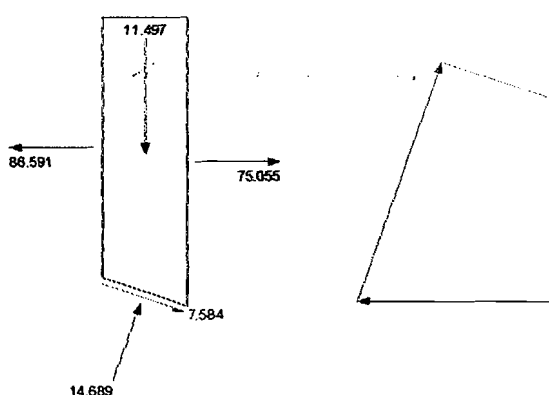
Slice 15 - Bishop Method	
Factor of Safety	0,231
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0662
Pore Water Pressure	31,623
Pore Water Force	18,668
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,54898
Mid-Height	1,7539
Base Length	0,59033
Base Angle	21,573
Polygon Closure Error	0
Anisotropic Strength Modifier	1
Weight	14,317
Base Shear Force	0,92973
Base Normal Force	15,748
Left Side Normal Force	93,193
Right Side Normal Force	86,591

Slice 15 - Bishop Method



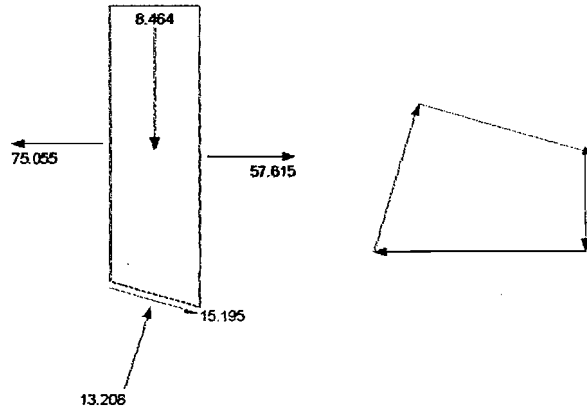
Slice 16 - Bishop Method	
Factor of Safety	0,231
Phi Angle	38
C (Strength)	3,5
C (Force)	2,0336
Pore Water Pressure	33,618
Pore Water Force	19,533
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,54897
Mid-Height	1,4084
Base Length	0,58102
Base Angle	19,12
Polygon Closure Error	0,36722
Anisotropic Strength Modifier	1
Weight	11,497
Base Shear Force	7,584
Base Normal Force	14,689
Left Side Normal Force	86,591
Right Side Normal Force	75,055

Slice 16 - Bishop Method



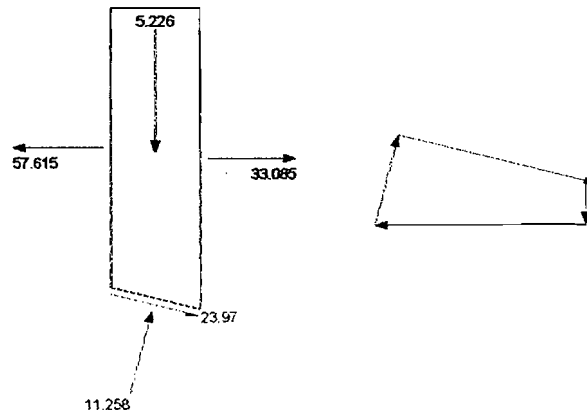
Slice 17 - Bishop Method	
Factor of Safety	0,231
Phi Angle	38
C (Strength)	3,5
C (Force)	2,006
Pore Water Pressure	35,359
Pore Water Force	20,266
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,54897
Mid-Height	1,0368
Base Length	0,57315
Base Angle	16,704
Polygon Closure Error	0,7848
Anisotropic Strength Modifier	1
Weight	8,464
Base Shear Force	15,195
Base Normal Force	13,208
Left Side Normal Force	75,055
Right Side Normal Force	57,615

Slice 17 - Bishop Method



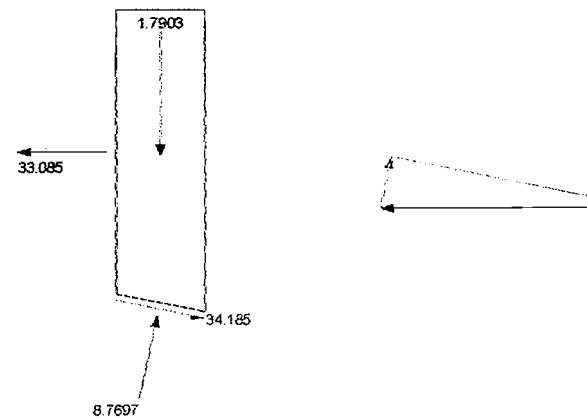
Slice 18 - Bishop Method	
Factor of Safety	0,231
Phi Angle	38
C (Strength)	3,5
C (Force)	1,983
Pore Water Pressure	36,852
Pore Water Force	20,879
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,54897
Mid-Height	0,64019
Base Length	0,56657
Base Angle	14,317
Polygon Closure Error	1,2265
Anisotropic Strength Modifier	1
Weight	5,226
Base Shear Force	23,97
Base Normal Force	11,258
Left Side Normal Force	57,615
Right Side Normal Force	33,085

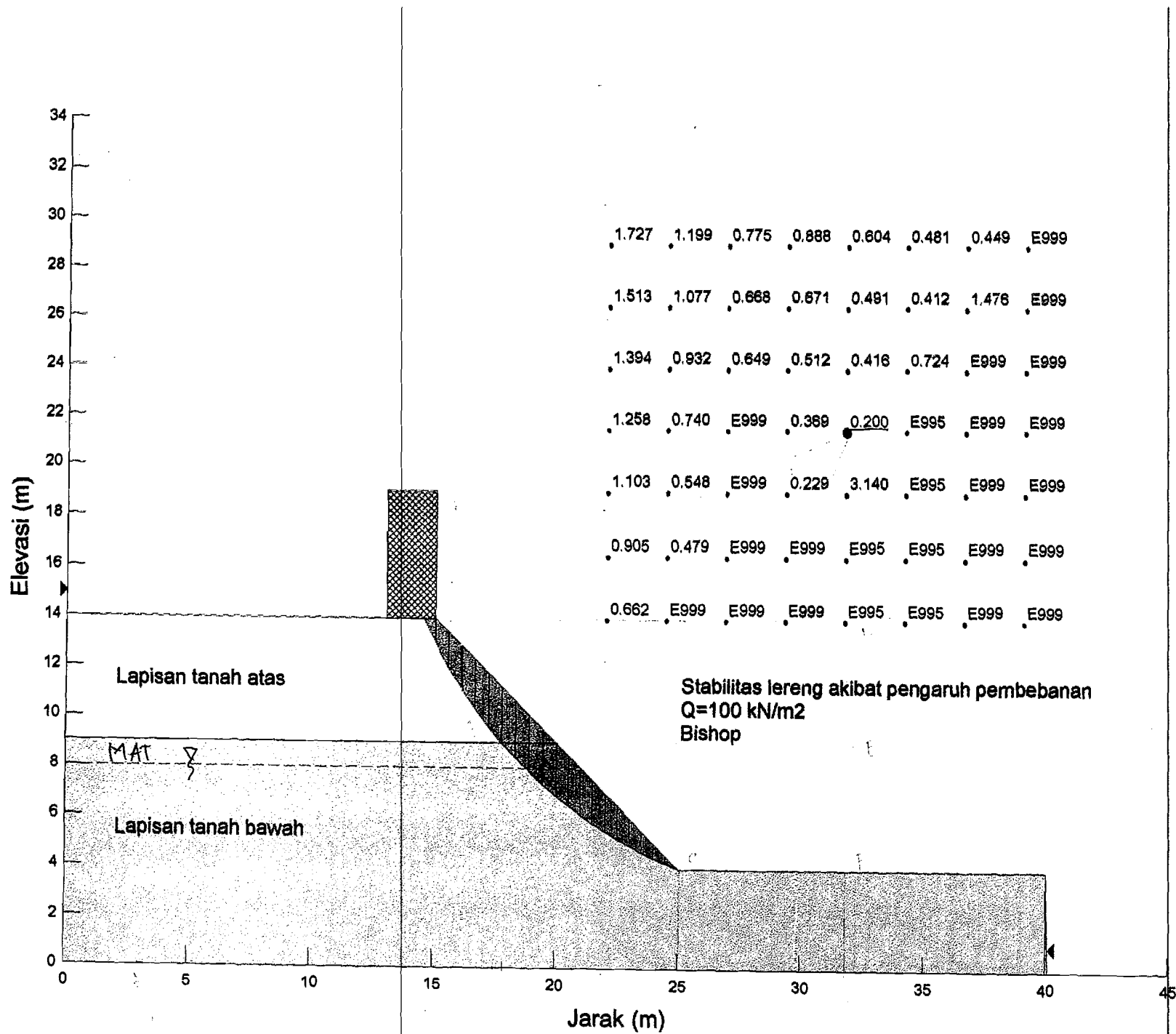
Slice 18 - Bishop Method



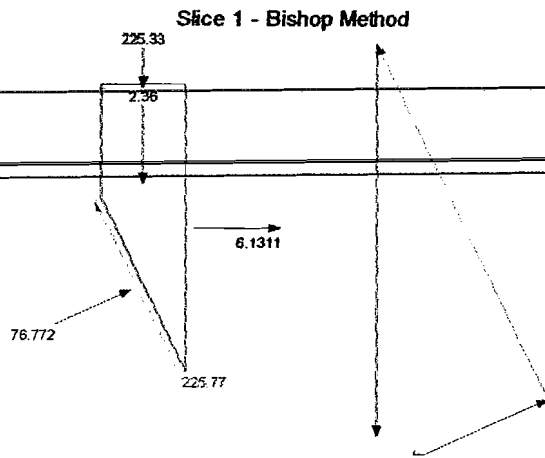
Slice 19 - Bishop Method	
Factor of Safety	0,231
Phi Angle	38
C (Strength)	3,5
C (Force)	1,964
Pore Water Pressure	38,109
Pore Water Force	21,385
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,54898
Mid-Height	0,21931
Base Length	0,56115
Base Angle	11,956
Polygon Closure Error	2,0511
Anisotropic Strength Modifier	1
Weight	1,7903
Base Shear Force	34,185
Base Normal Force	8,7697
Left Side Normal Force	33,085

Slice 19 - Bishop Method

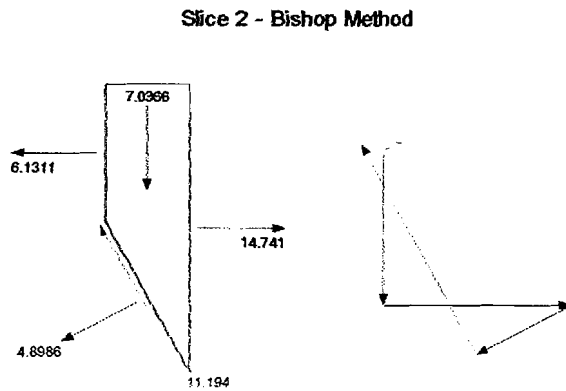




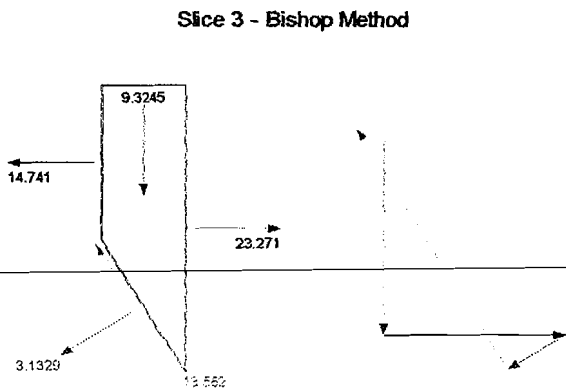
Slice 1 - Bishop Method	
Factor of Safety	0,2
Phi Angle	28
C (Strength)	4,2
C (Force)	4,4421
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,45065
Mid-Height	0,49591
Base Length	1,0576
Base Angle	64,78
Polygon Closure Error	22,577
Anisotropic Strength Modifier	1
Weight	2,36
Base Shear Force	225,77
Base Normal Force	76,772
Right Side Normal Force	6,1311
Surface Pressure Load	225,33



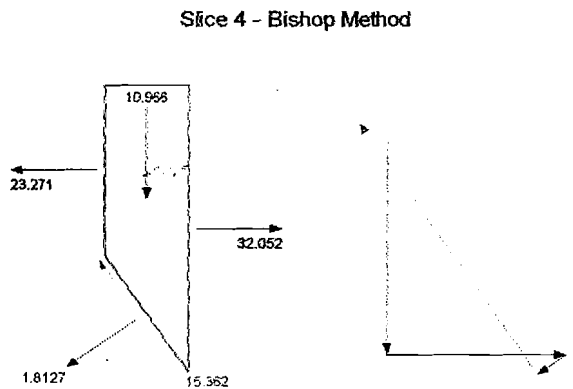
Slice 2 - Bishop Method	
Factor of Safety	0,2
Phi Angle	28
C (Strength)	4,2
C (Force)	4,8481
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,55262
Mid-Height	1,2058
Base Length	1,1543
Base Angle	61,397
Polygon Closure Error	1,1194
Anisotropic Strength Modifier	1
Weight	7,0366
Base Shear Force	11,194
Base Normal Force	4,8986
Left Side Normal Force	6,1311
Right Side Normal Force	14,741



Slice 3 - Bishop Method	
Factor of Safety	0,2
Phi Angle	28
C (Strength)	4,2
C (Force)	4,3842
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,55263
Mid-Height	1,5978
Base Length	1,0438
Base Angle	58,034
Polygon Closure Error	1,3562
Anisotropic Strength Modifier	1
Weight	9,3245
Base Shear Force	13,562
Base Normal Force	3,1329
Left Side Normal Force	14,741
Right Side Normal Force	23,271

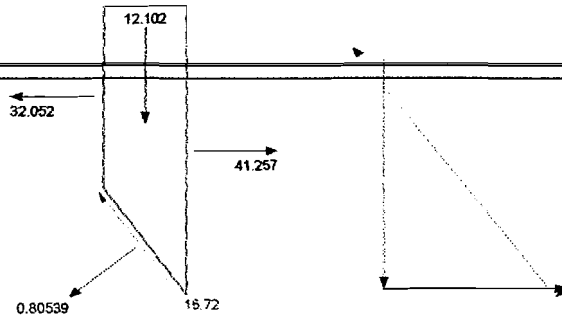


Slice 4 - Bishop Method	
Factor of Safety	0,2
Phi Angle	28
C (Strength)	4,2
C (Force)	4,0431
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,55262
Mid-Height	1,8791
Base Length	0,96263
Base Angle	54,965
Polygon Closure Error	1,4594
Anisotropic Strength Modifier	1
Weight	10,966
Base Shear Force	15,362
Base Normal Force	1,8127
Left Side Normal Force	23,271
Right Side Normal Force	32,052



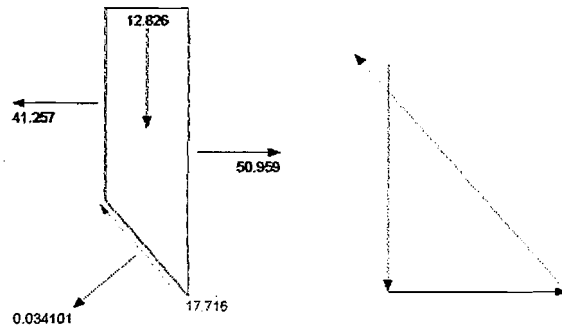
Slice 5 - Bishop Method	
Factor of Safety	0,2
Phi Angle	28
C (Strength)	4,2
C (Force)	3,7796
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,55262
Mid-Height	2,0738
Base Length	0,89995
Base Angle	52,117
Polygon Closure Error	1,672
Anisotropic Strength Modifier	1
Weight	12,102
Base Shear Force	16,72
Base Normal Force	0,80539
Left Side Normal Force	32,052
Right Side Normal Force	41,257

Slice 5 - Bishop Method



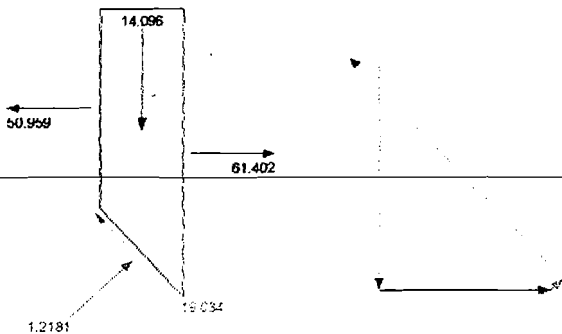
Slice 6 - Bishop Method	
Factor of Safety	0,2
Phi Angle	28
C (Strength)	4,2
C (Force)	3,5695
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,55263
Mid-Height	2,1978
Base Length	0,84988
Base Angle	49,44
Polygon Closure Error	1,9488
Anisotropic Strength Modifier	1
Weight	12,826
Base Shear Force	17,716
Base Normal Force	0,034101
Left Side Normal Force	41,257
Right Side Normal Force	50,959

Slice 6 - Bishop Method



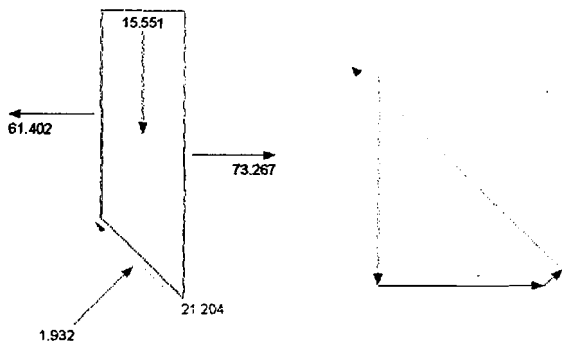
Slice 7 - Bishop Method	
Factor of Safety	0,2
Phi Angle	38
C (Strength)	3,5
C (Force)	2,8639
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,55922
Mid-Height	2,2825
Base Length	0,81827
Base Angle	46,889
Polygon Closure Error	1,8082
Anisotropic Strength Modifier	1
Weight	14,096
Base Shear Force	19,034
Base Normal Force	1,2181
Left Side Normal Force	50,959
Right Side Normal Force	61,402

Slice 7 - Bishop Method



Slice 8 - Bishop Method	
Factor of Safety	0,2
Phi Angle	38
C (Strength)	3,5
C (Force)	2,7413
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,55922
Mid-Height	2,2753
Base Length	0,78323
Base Angle	44,439
Polygon Closure Error	2,0144
Anisotropic Strength Modifier	1
Weight	15,551
Base Shear Force	21,204
Base Normal Force	1,932
Left Side Normal Force	61,402
Right Side Normal Force	73,267

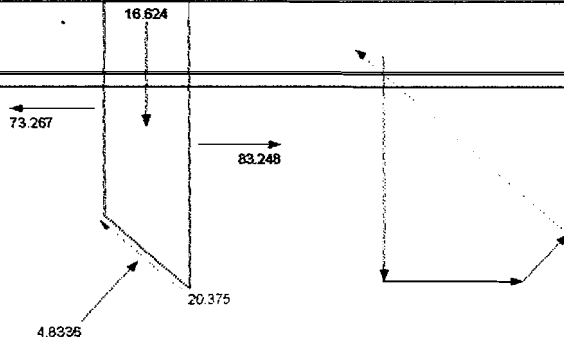
Slice 8 - Bishop Method





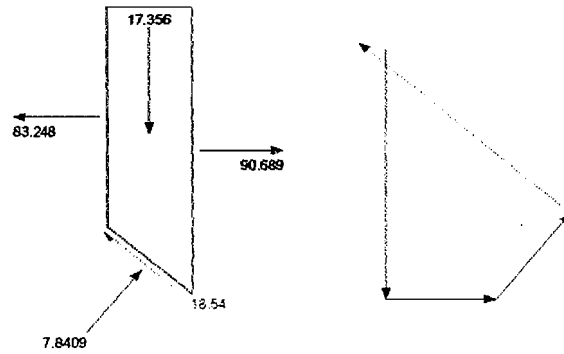
Slice 9 - Bishop Method	
Factor of Safety	0,2
Phi Angle	38
C (Strength)	3,5
C (Force)	2,6375
Pore Water Pressure	3,9563
Pore Water Force	2,9813
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,55922
Mid-Height	2,2422
Base Length	0,75356
Base Angle	42,089
Polygon Closure Error	2,0375
Anisotropic Strength Modifier	1
Weight	16,624
Base Shear Force	20,375
Base Normal Force	4,8336
Left Side Normal Force	73,267
Right Side Normal Force	83,248

Slice 9 - Bishop Method



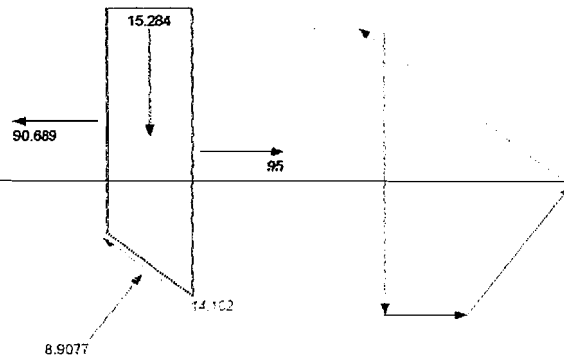
Slice 10 - Bishop Method	
Factor of Safety	0,2
Phi Angle	38
C (Strength)	3,5
C (Force)	2,5484
Pore Water Pressure	8,715
Pore Water Force	6,3456
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,55922
Mid-Height	2,1682
Base Length	0,72812
Base Angle	39,823
Polygon Closure Error	1,854
Anisotropic Strength Modifier	1
Weight	17,356
Base Shear Force	18,54
Base Normal Force	7,8409
Left Side Normal Force	83,248
Right Side Normal Force	90,689

Slice 10 - Bishop Method



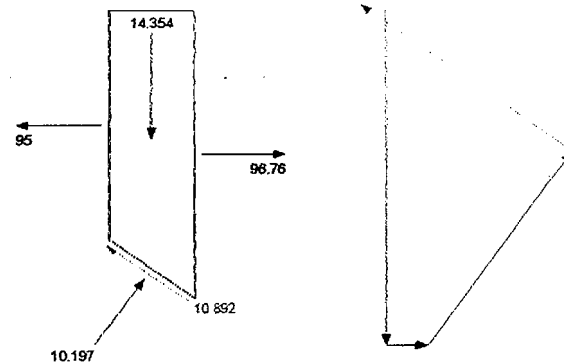
Slice 11 - Bishop Method	
Factor of Safety	0,2
Phi Angle	38
C (Strength)	3,5
C (Force)	2,204
Pore Water Pressure	12,879
Pore Water Force	8,1107
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49793
Mid-Height	2,0643
Base Length	0,62971
Base Angle	37,746
Polygon Closure Error	1,3756
Anisotropic Strength Modifier	1
Weight	15,284
Base Shear Force	14,102
Base Normal Force	8,9077
Left Side Normal Force	90,689
Right Side Normal Force	95

Slice 11 - Bishop Method



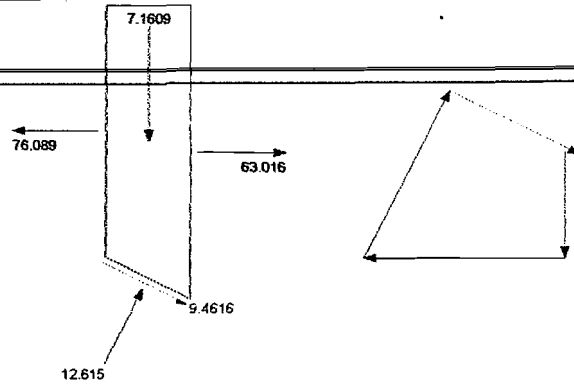
Slice 12 - Bishop Method	
Factor of Safety	0,2
Phi Angle	38
C (Strength)	3,5
C (Force)	2,1499
Pore Water Pressure	16,531
Pore Water Force	10,154
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49792
Mid-Height	1,9387
Base Length	0,61425
Base Angle	35,844
Polygon Closure Error	1,0766
Anisotropic Strength Modifier	1
Weight	14,354
Base Shear Force	10,892
Base Normal Force	10,197
Left Side Normal Force	95
Right Side Normal Force	96,76

Slice 12 - Bishop Method



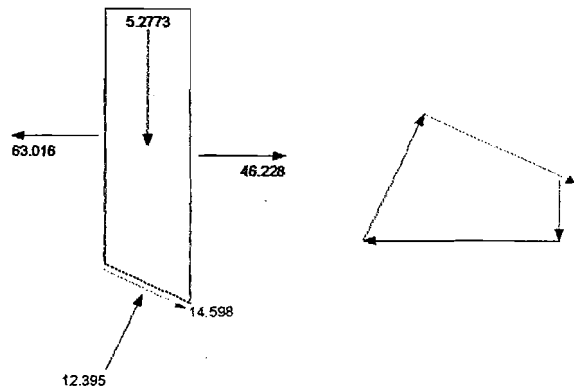
Slice 17 - Bishop Method	
Factor of Safety	0,2
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9544
Pore Water Pressure	31,42
Pore Water Force	17,545
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49793
Mid-Height	0,96715
Base Length	0,55841
Base Angle	26,913
Polygon Closure Error	0,91511
Anisotropic Strength Modifier	1
Weight	7,1609
Base Shear Force	9,4616
Base Normal Force	12,615
Left Side Normal Force	76,089
Right Side Normal Force	63,016

Slice 17 - Bishop Method



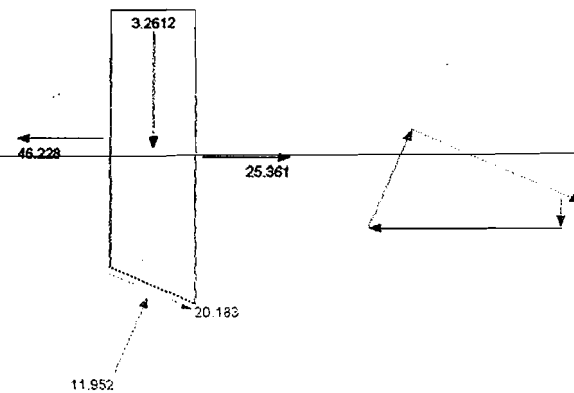
Slice 18 - Bishop Method	
Factor of Safety	0,2
Phi Angle	38
C (Strength)	3,5
C (Force)	1,9263
Pore Water Pressure	33,808
Pore Water Force	18,607
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49792
Mid-Height	0,71274
Base Length	0,55037
Base Angle	25,217
Polygon Closure Error	1,5109
Anisotropic Strength Modifier	1
Weight	5,2773
Base Shear Force	14,598
Base Normal Force	12,395
Left Side Normal Force	63,016
Right Side Normal Force	46,228

Slice 18 - Bishop Method



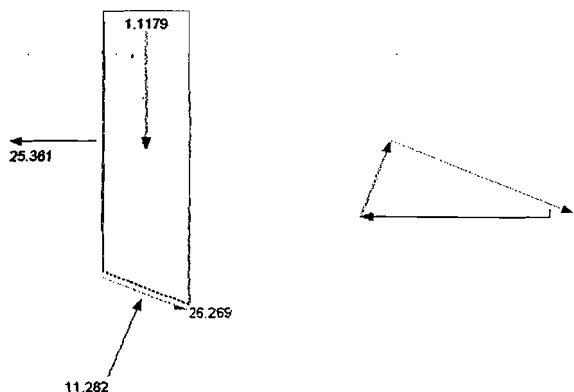
Slice 19 - Bishop Method	
Factor of Safety	0,2
Phi Angle	38
C (Strength)	3,5
C (Force)	1,801
Pore Water Pressure	36,02
Pore Water Force	19,564
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49793
Mid-Height	0,44045
Base Length	0,54315
Base Angle	23,544
Polygon Closure Error	2,191
Anisotropic Strength Modifier	1
Weight	3,2612
Base Shear Force	20,183
Base Normal Force	11,952
Left Side Normal Force	46,228
Right Side Normal Force	25,361

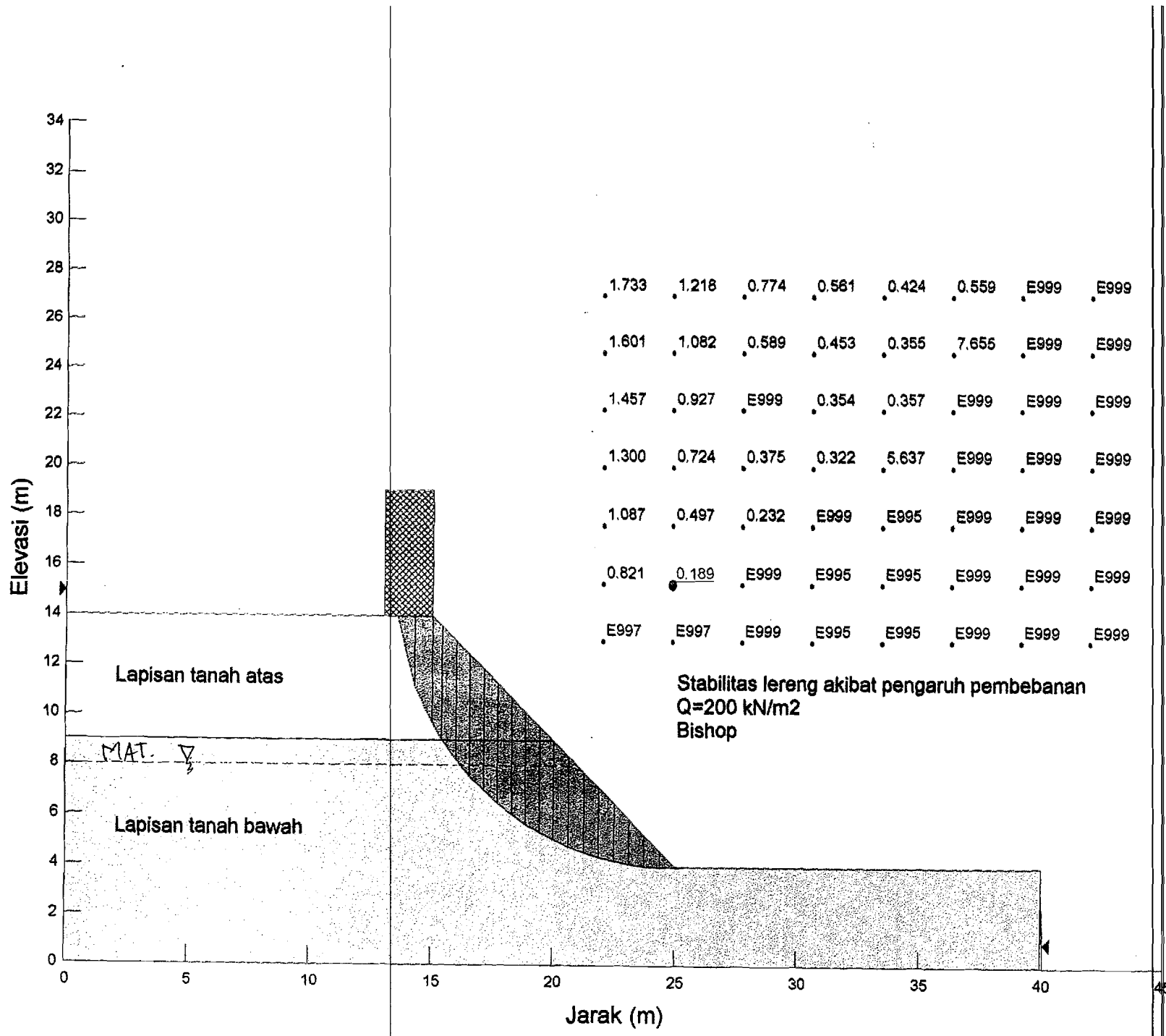
Slice 19 - Bishop Method



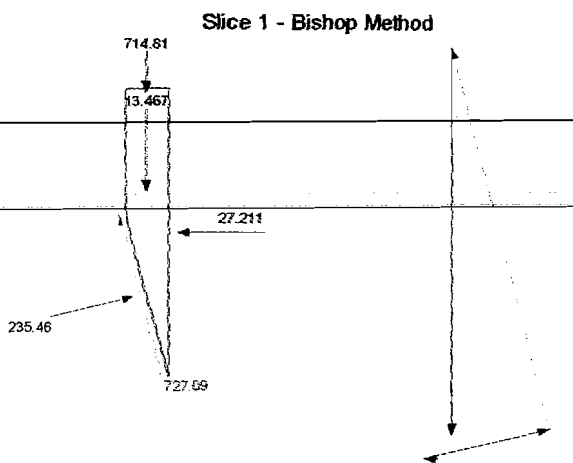
Slice 20 - Bishop Method	
Factor of Safety	0,2
Phi Angle	38
C (Strength)	3,5
C (Force)	1,8782
Pore Water Pressure	38,064
Pore Water Force	20,426
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,49792
Mid-Height	0,15098
Base Length	0,53662
Base Angle	21,893
Polygon Closure Error	3,0209
Anisotropic Strength Modifier	1
Weight	1,1179
Base Shear Force	26,269
Base Normal Force	11,282
Left Side Normal Force	25,361

Slice 20 - Bishop Method

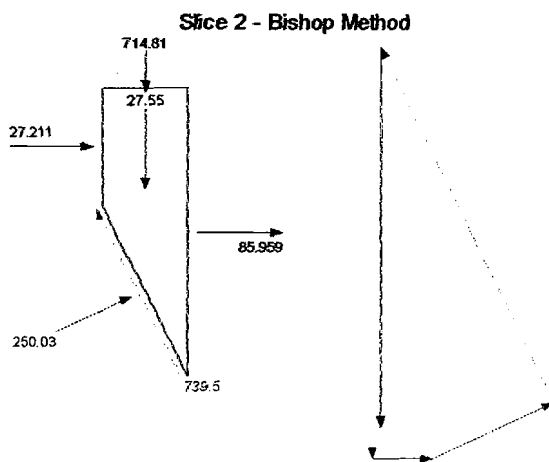




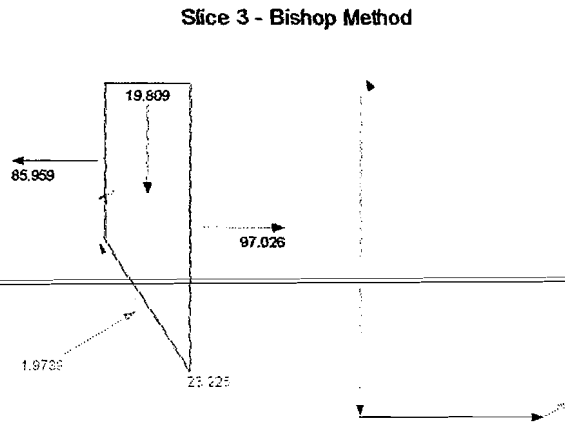
Slice 1 - Bishop Method	
Factor of Safety	0,189
Phi Angle	28
C (Strength)	4,2
C (Force)	12,293
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,71481
Mid-Height	1,784
Base Length	2,9269
Base Angle	75,864
Polygon Closure Error	39,99
Anisotropic Strength Modifier	1
Weight	13,467
Base Shear Force	727,09
Base Normal Force	235,46
Right Side Normal Force	27,211
Surface Pressure Load	714,81



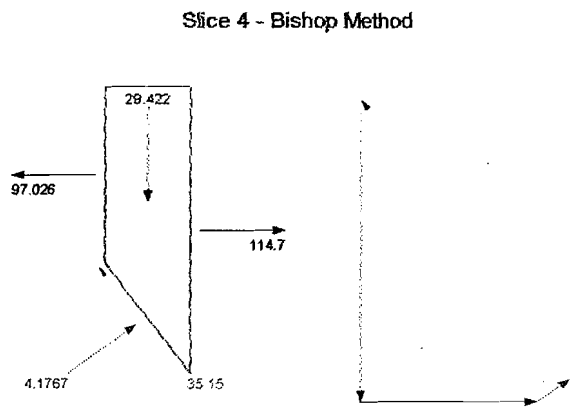
Slice 2 - Bishop Method	
Factor of Safety	0,189
Phi Angle	28
C (Strength)	4,2
C (Force)	6,9246
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,71481
Mid-Height	3,6498
Base Length	1,6487
Base Angle	64,307
Polygon Closure Error	33,278
Anisotropic Strength Modifier	1
Weight	27,55
Base Shear Force	739,5
Base Normal Force	250,03
Left Side Normal Force	27,211
Right Side Normal Force	85,959
Surface Pressure Load	714,81



Slice 3 - Bishop Method	
Factor of Safety	0,189
Phi Angle	28
C (Strength)	4,2
C (Force)	3,3427
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,4201
Mid-Height	4,4651
Base Length	0,79589
Base Angle	58,141
Polygon Closure Error	0,81287
Anisotropic Strength Modifier	1
Weight	19,809
Base Shear Force	23,225
Base Normal Force	1,9739
Left Side Normal Force	85,959
Right Side Normal Force	97,026

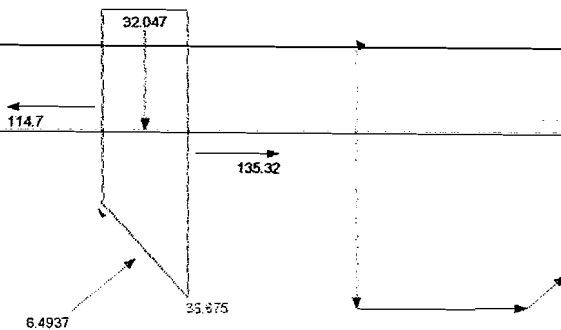


Slice 4 - Bishop Method	
Factor of Safety	0,189
Phi Angle	38
C (Strength)	3,5
C (Force)	3,3842
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,57249
Mid-Height	4,7006
Base Length	0,96692
Base Angle	53,696
Polygon Closure Error	1,2303
Anisotropic Strength Modifier	1
Weight	29,422
Base Shear Force	35,15
Base Normal Force	4,1767
Left Side Normal Force	97,026
Right Side Normal Force	114,7



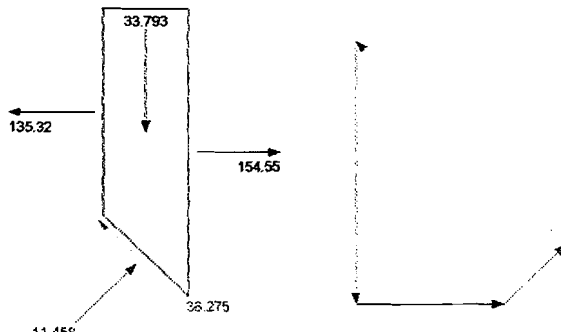
Slice 5 - Bishop Method	
Factor of Safety	0,189
Phi Angle	38
C (Strength)	3,5
C (Force)	3,0576
Pore Water Pressure	1,1964
Pore Water Force	1,0452
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,57249
Mid-Height	4,8431
Base Length	0,87359
Base Angle	49,055
Polygon Closure Error	1,3536
Anisotropic Strength Modifier	1
Weight	32,047
Base Shear Force	38,675
Base Normal Force	6,4937
Left Side Normal Force	114,7
Right Side Normal Force	135,32

Slice 5 - Bishop Method



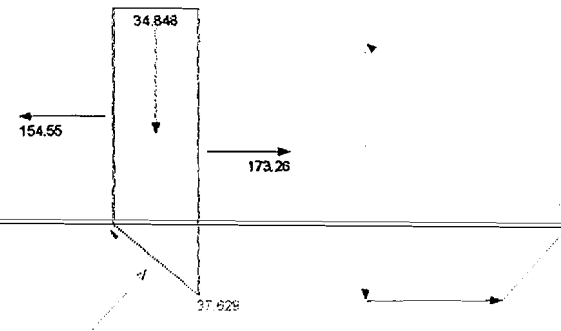
Slice 6 - Bishop Method	
Factor of Safety	0,189
Phi Angle	38
C (Strength)	3,5
C (Force)	2,8247
Pore Water Pressure	7,1962
Pore Water Force	5,8077
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,57248
Mid-Height	4,8823
Base Length	0,80705
Base Angle	44,818
Polygon Closure Error	0,95688
Anisotropic Strength Modifier	1
Weight	33,793
Base Shear Force	38,275
Base Normal Force	11,458
Left Side Normal Force	135,32
Right Side Normal Force	154,55

Slice 6 - Bishop Method



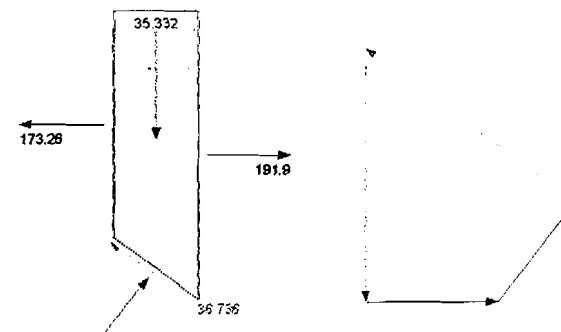
Slice 7 - Bishop Method	
Factor of Safety	0,189
Phi Angle	38
C (Strength)	3,5
C (Force)	2,6499
Pore Water Pressure	12,398
Pore Water Force	9,387
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,57249
Mid-Height	4,8402
Base Length	0,75712
Base Angle	40,874
Polygon Closure Error	0,94073
Anisotropic Strength Modifier	1
Weight	34,848
Base Shear Force	37,629
Base Normal Force	15,104
Left Side Normal Force	154,55
Right Side Normal Force	173,26

Slice 7 - Bishop Method



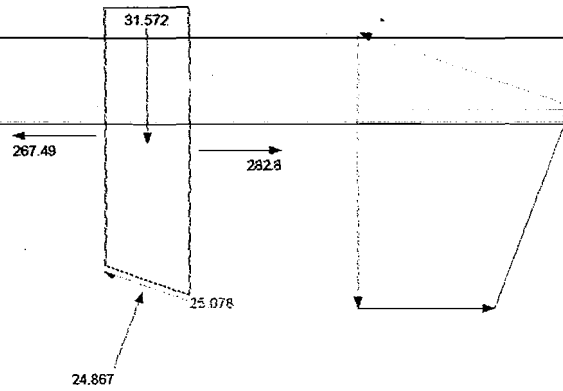
Slice 8 - Bishop Method	
Factor of Safety	0,189
Phi Angle	38
C (Strength)	3,5
C (Force)	2,514
Pore Water Pressure	16,944
Pore Water Force	12,171
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,57249
Mid-Height	4,7311
Base Length	0,7183
Base Angle	37,155
Polygon Closure Error	0,9184
Anisotropic Strength Modifier	1
Weight	35,332
Base Shear Force	36,736
Base Normal Force	17,846
Left Side Normal Force	173,26
Right Side Normal Force	191,9

Slice 8 - Bishop Method



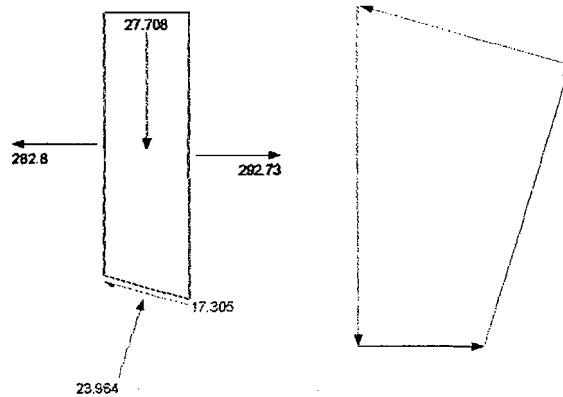
<b>Slice 13 - Bishop Method</b>	
Factor of Safety	0,189
Phi Angle	38
C (Strength)	3,5
C (Force)	2,3306
Pore Water Pressure	32,707
Pore Water Force	21,779
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,625
Mid-Height	3,3971
Base Length	0,66589
Base Angle	20,184
Polygon Closure Error	0,31572
Anisotropic Strength Modifier	1
Weight	31,572
Base Shear Force	25,078
Base Normal Force	24,867
Left Side Normal Force	267,49
Right Side Normal Force	282,8

**Slice 13 - Bishop Method**



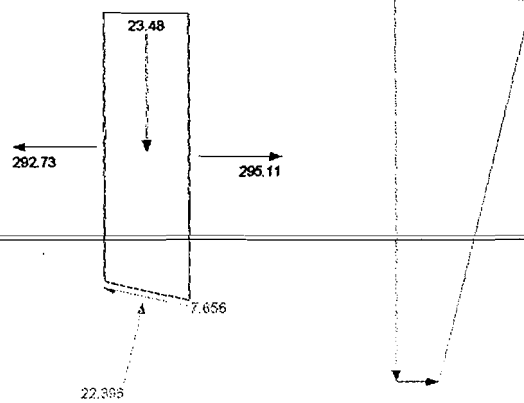
<b>Slice 14 - Bishop Method</b>	
Factor of Safety	0,189
Phi Angle	38
C (Strength)	3,5
C (Force)	2,2857
Pore Water Pressure	34,759
Pore Water Force	22,7
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,625
Mid-Height	2,9814
Base Length	0,65307
Base Angle	16,858
Polygon Closure Error	0,27708
Anisotropic Strength Modifier	1
Weight	27,708
Base Shear Force	17,305
Base Normal Force	23,964
Left Side Normal Force	282,8
Right Side Normal Force	292,73

**Slice 14 - Bishop Method**



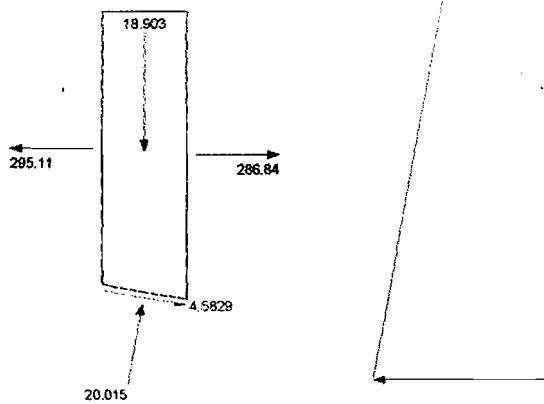
<b>Slice 15 - Bishop Method</b>	
Factor of Safety	0,189
Phi Angle	38
C (Strength)	3,5
C (Force)	2,2505
Pore Water Pressure	36,427
Pore Water Force	23,423
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,625
Mid-Height	2,5264
Base Length	0,64301
Base Angle	13,591
Polygon Closure Error	0,1174
Anisotropic Strength Modifier	1
Weight	23,48
Base Shear Force	7,656
Base Normal Force	22,396
Left Side Normal Force	292,73
Right Side Normal Force	295,11

**Slice 15 - Bishop Method**



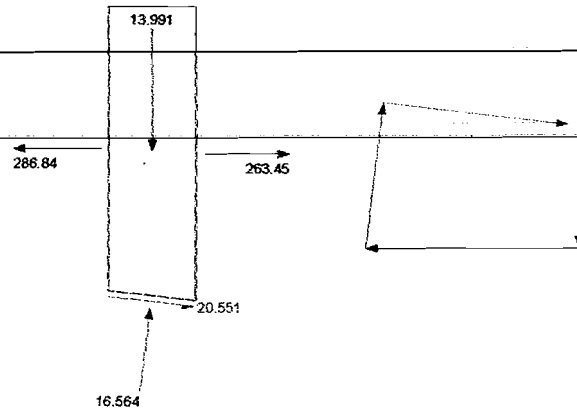
<b>Slice 16 - Bishop Method</b>	
Factor of Safety	0,189
Phi Angle	38
C (Strength)	3,5
C (Force)	2,2238
Pore Water Pressure	37,727
Pore Water Force	23,971
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,625
Mid-Height	2,034
Base Length	0,63537
Base Angle	10,368
Polygon Closure Error	0,30022
Anisotropic Strength Modifier	1
Weight	18,903
Base Shear Force	4,5829
Base Normal Force	20,015
Left Side Normal Force	295,11
Right Side Normal Force	286,84

**Slice 16 - Bishop Method**



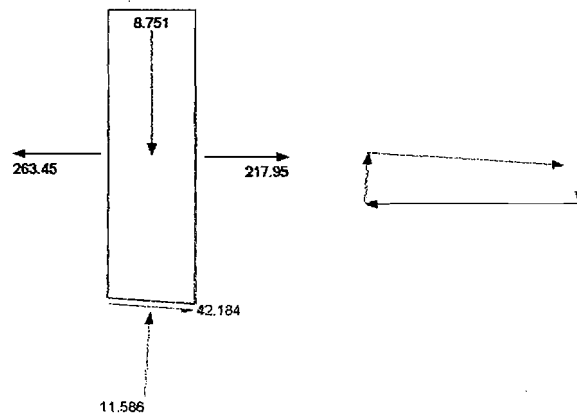
Slice 17 - Bishop Method	
Factor of Safety	0,189
Phi Angle	38
C (Strength)	3,5
C (Force)	2,2048
Pore Water Pressure	38,674
Pore Water Force	24,362
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,625
Mid-Height	1,5054
Base Length	0,62994
Base Angle	7,1783
Polygon Closure Error	1,1695
Anisotropic Strength Modifier	1
Weight	13,991
Base Shear Force	20,551
Base Normal Force	16,564
Left Side Normal Force	286,84
Right Side Normal Force	263,45

Slice 17 - Bishop Method



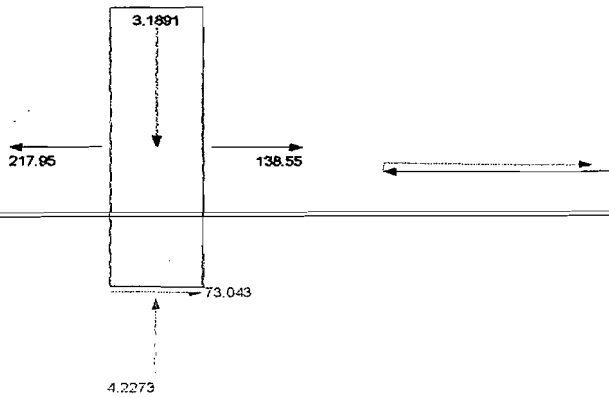
Slice 18 - Bishop Method	
Factor of Safety	0,189
Phi Angle	38
C (Strength)	3,5
C (Force)	2,1929
Pore Water Pressure	39,273
Pore Water Force	24,606
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,625
Mid-Height	0,9416
Base Length	0,62653
Base Angle	4,0108
Polygon Closure Error	2,9575
Anisotropic Strength Modifier	1
Weight	8,751
Base Shear Force	42,184
Base Normal Force	11,586
Left Side Normal Force	263,45
Right Side Normal Force	217,95

Slice 18 - Bishop Method



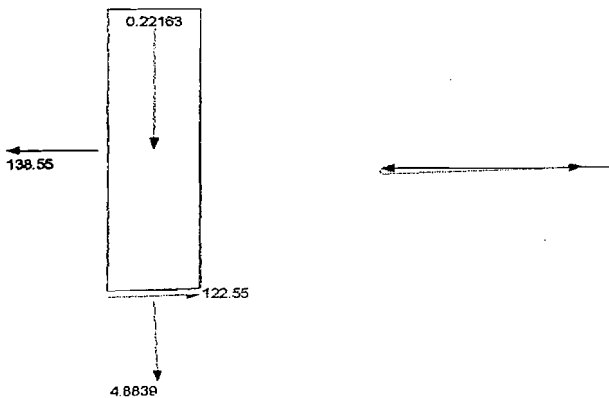
Slice 19 - Bishop Method	
Factor of Safety	0,189
Phi Angle	38
C (Strength)	3,5
C (Force)	2,1877
Pore Water Pressure	39,533
Pore Water Force	24,711
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,625
Mid-Height	0,34315
Base Length	0,62507
Base Angle	0,85562
Polygon Closure Error	7,146
Anisotropic Strength Modifier	1
Weight	3,1891
Base Shear Force	73,043
Base Normal Force	4,2273
Left Side Normal Force	217,95
Right Side Normal Force	138,55

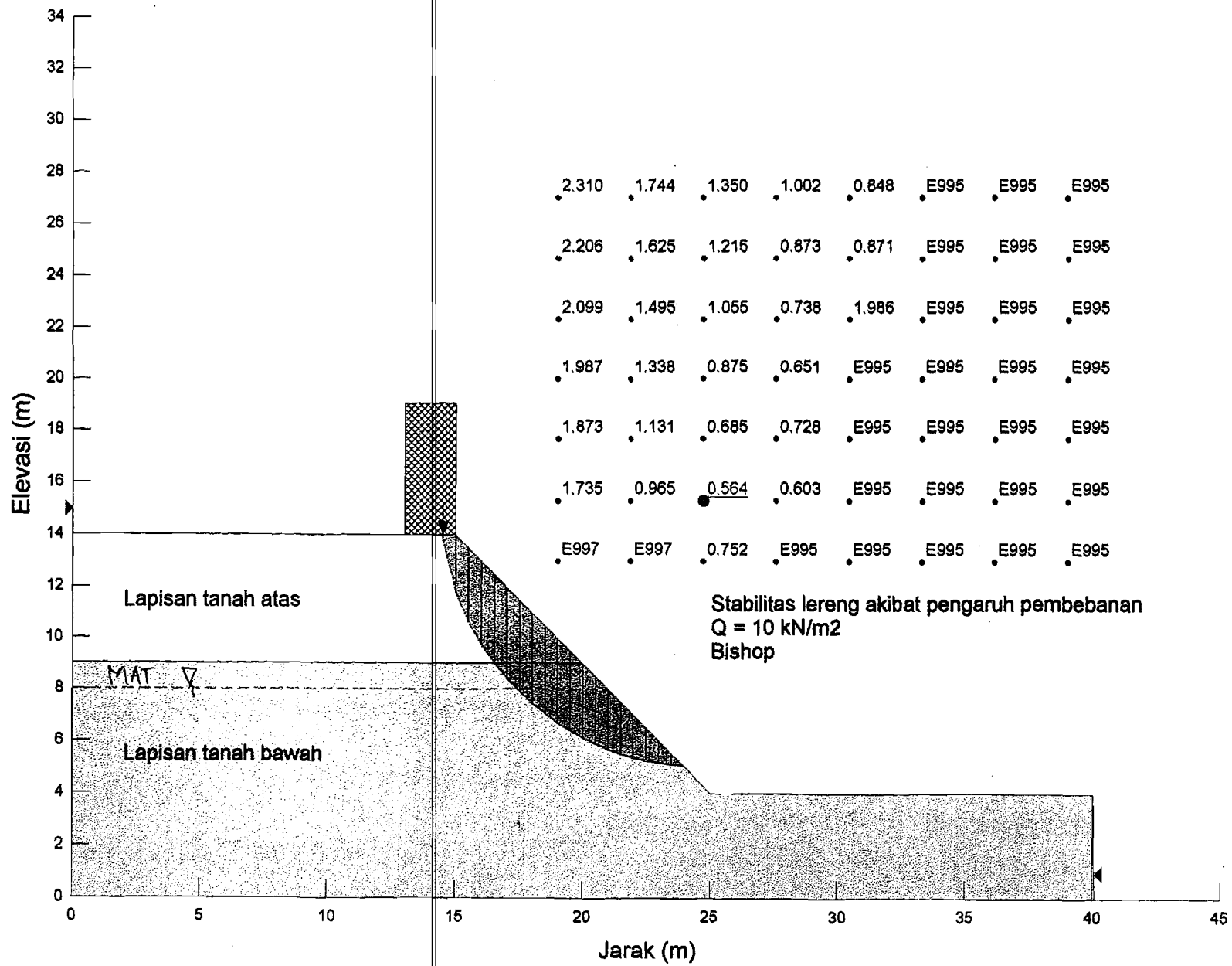
Slice 19 - Bishop Method



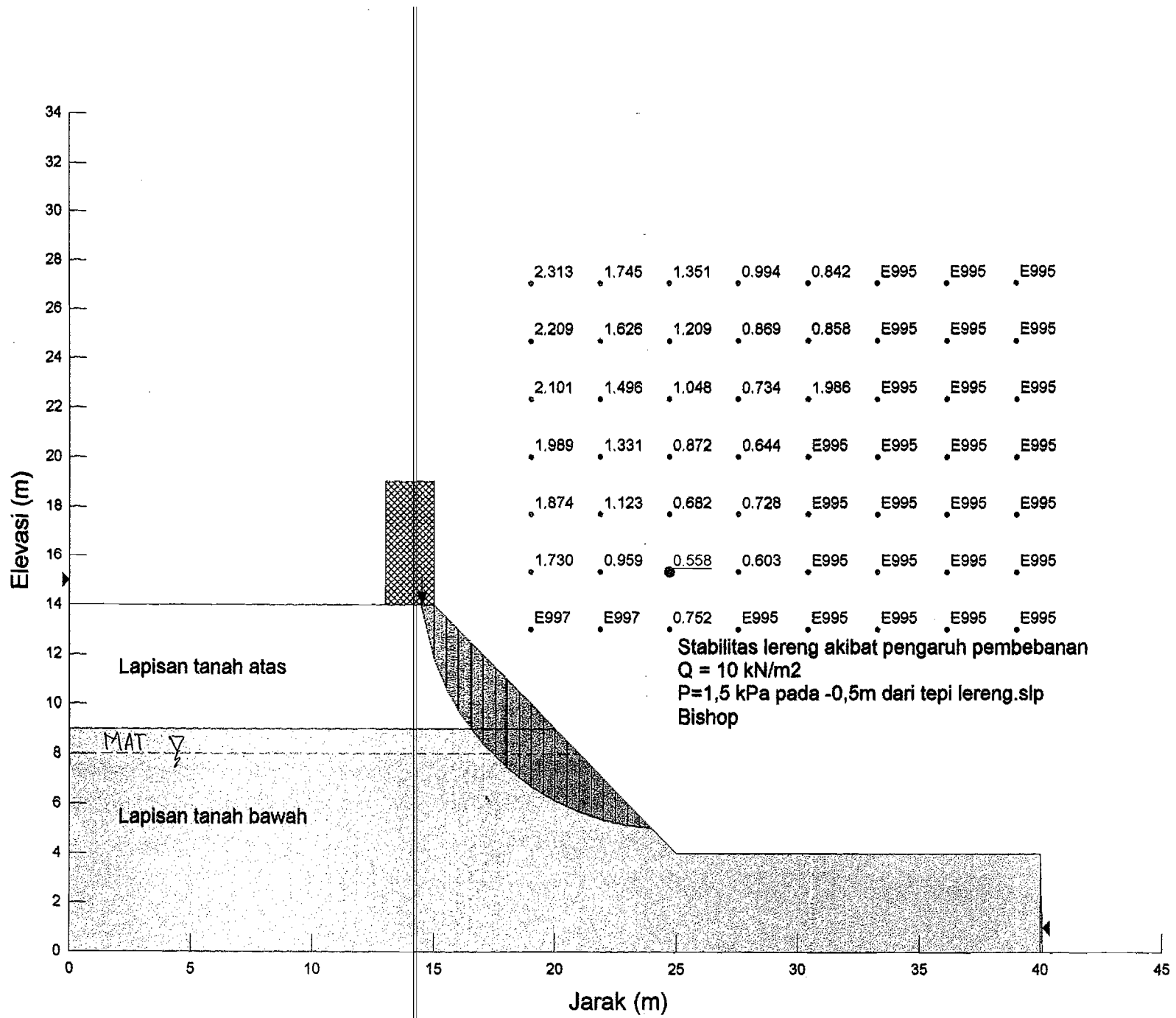
Slice 20 - Bishop Method	
Factor of Safety	0,189
Phi Angle	38
C (Strength)	3,5
C (Force)	2,4813
Pore Water Pressure	39,442
Pore Water Force	27,962
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,70827
Mid-Height	0,021043
Base Length	0,70895
Base Angle	2,5075
Polygon Closure Error	16,628
Anisotropic Strength Modifier	1
Weight	0,22163
Base Shear Force	122,55
Base Normal Force	4,8839
Left Side Normal Force	138,55

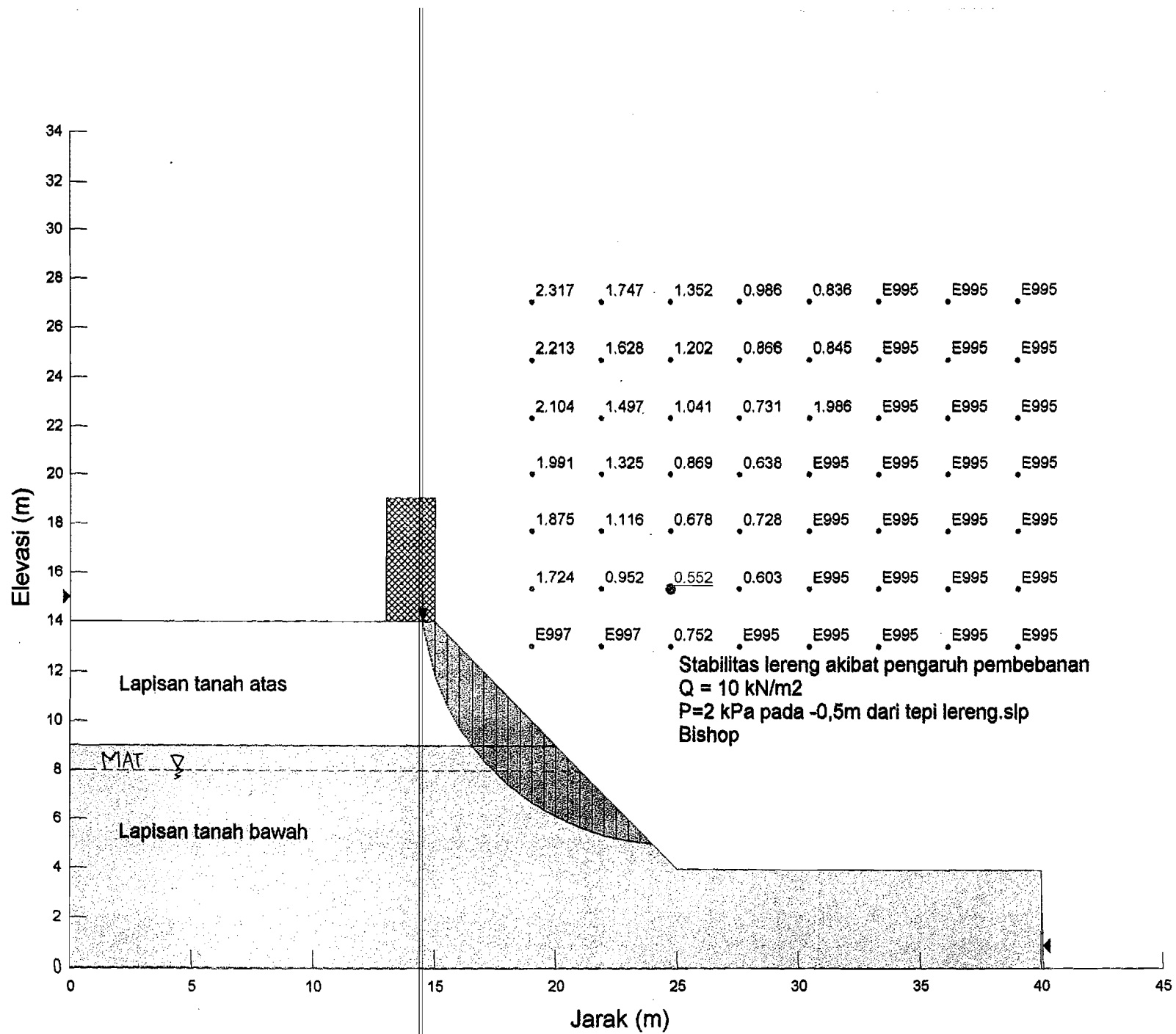
Slice 20 - Bishop Method

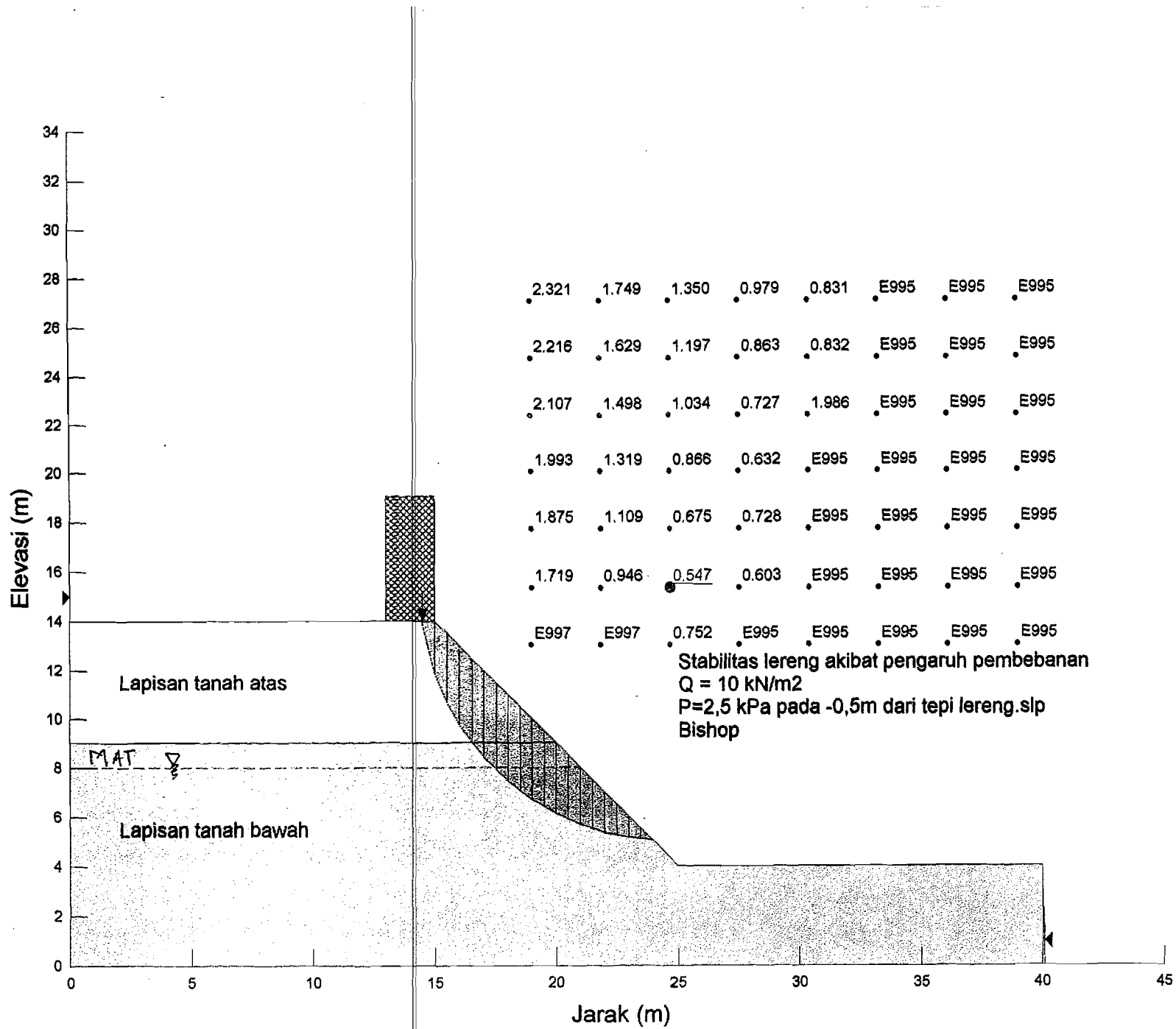


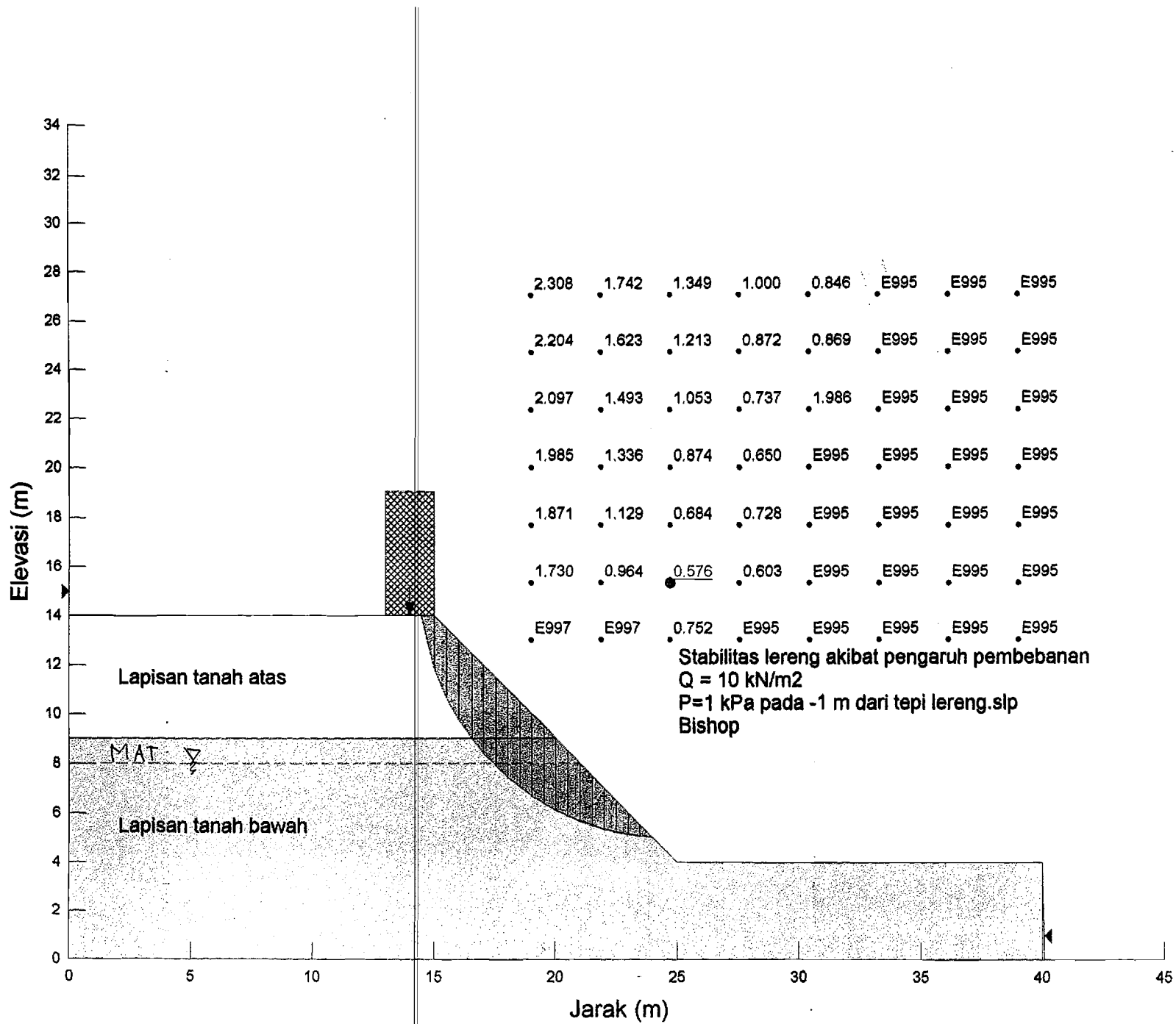


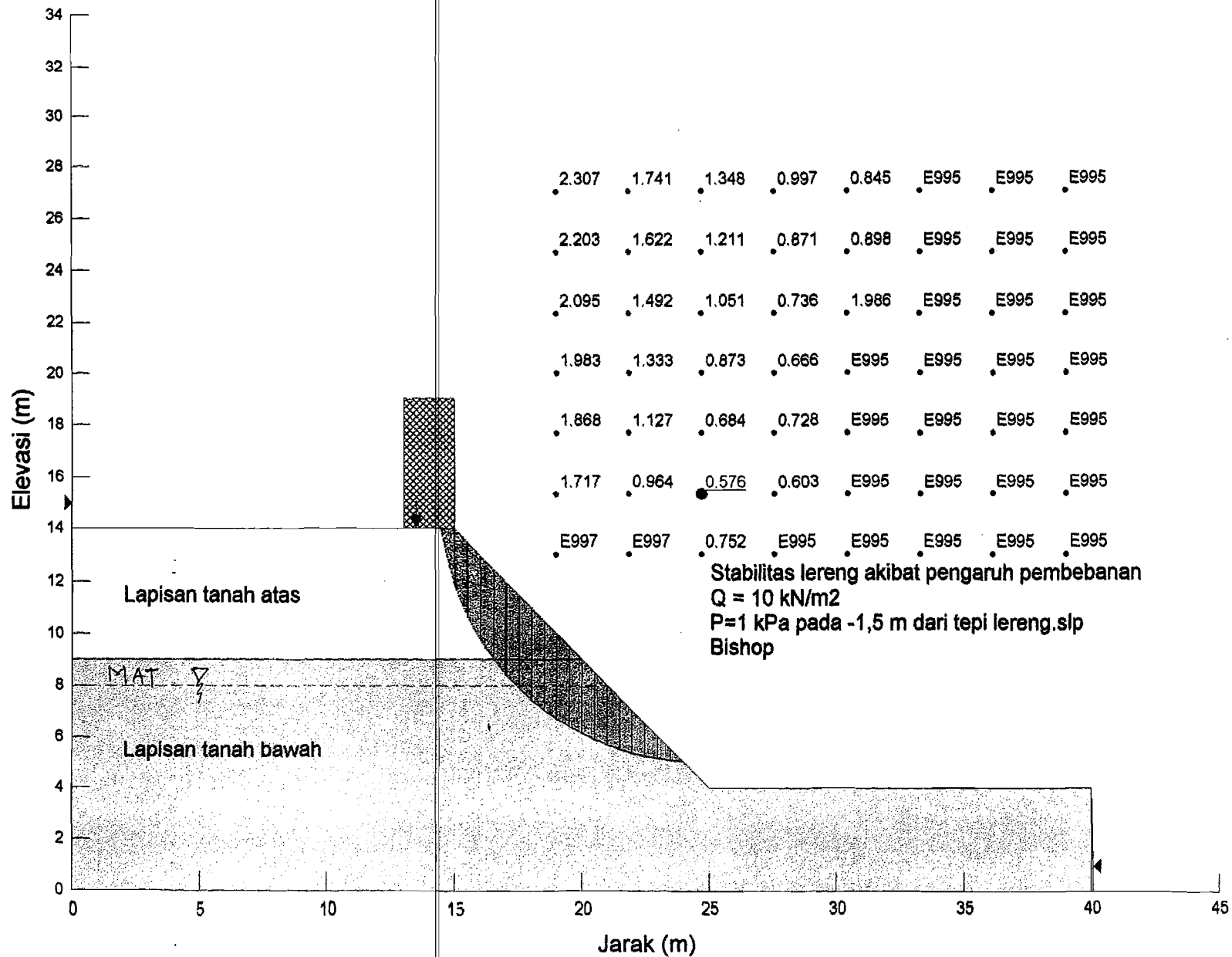


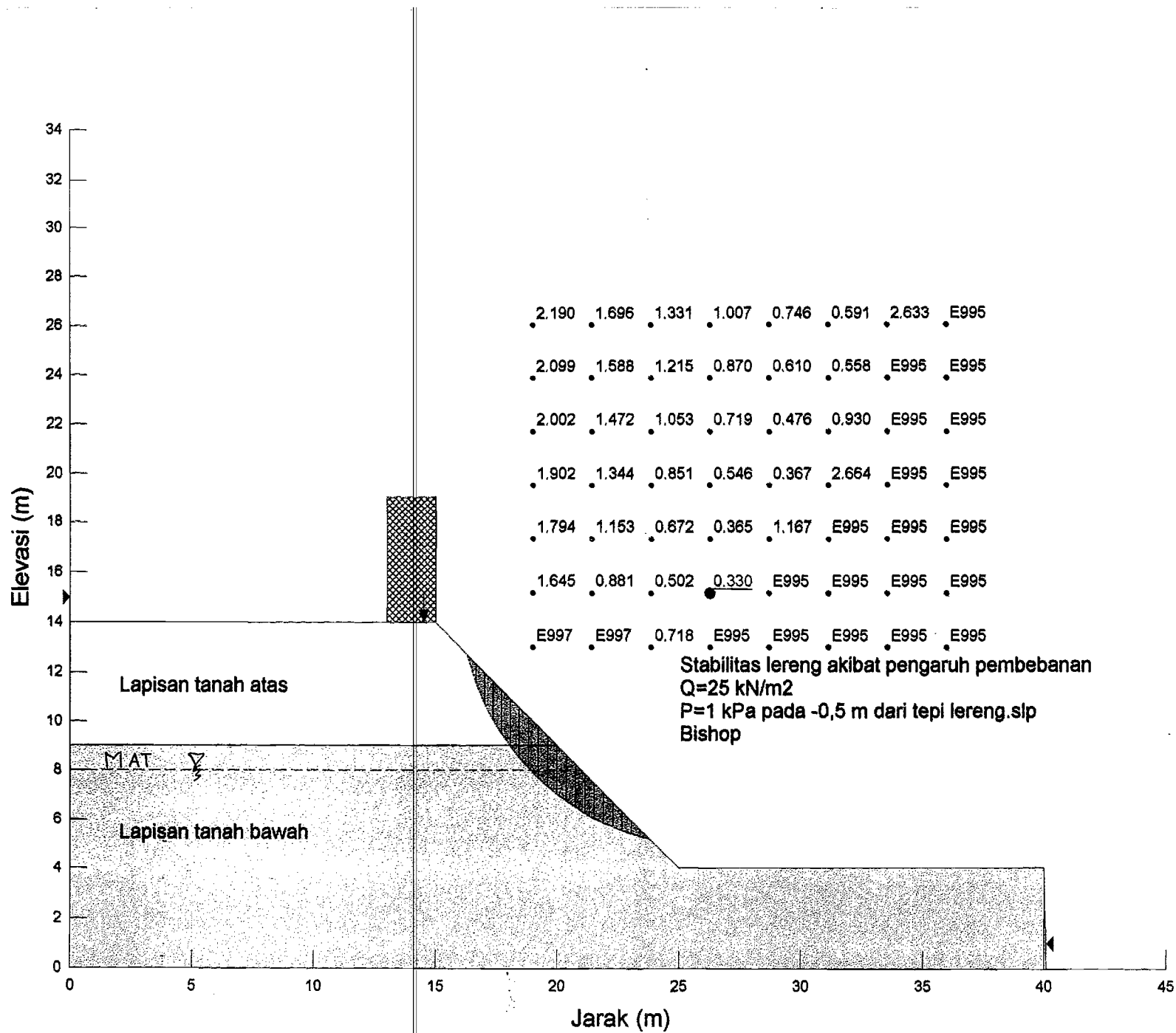


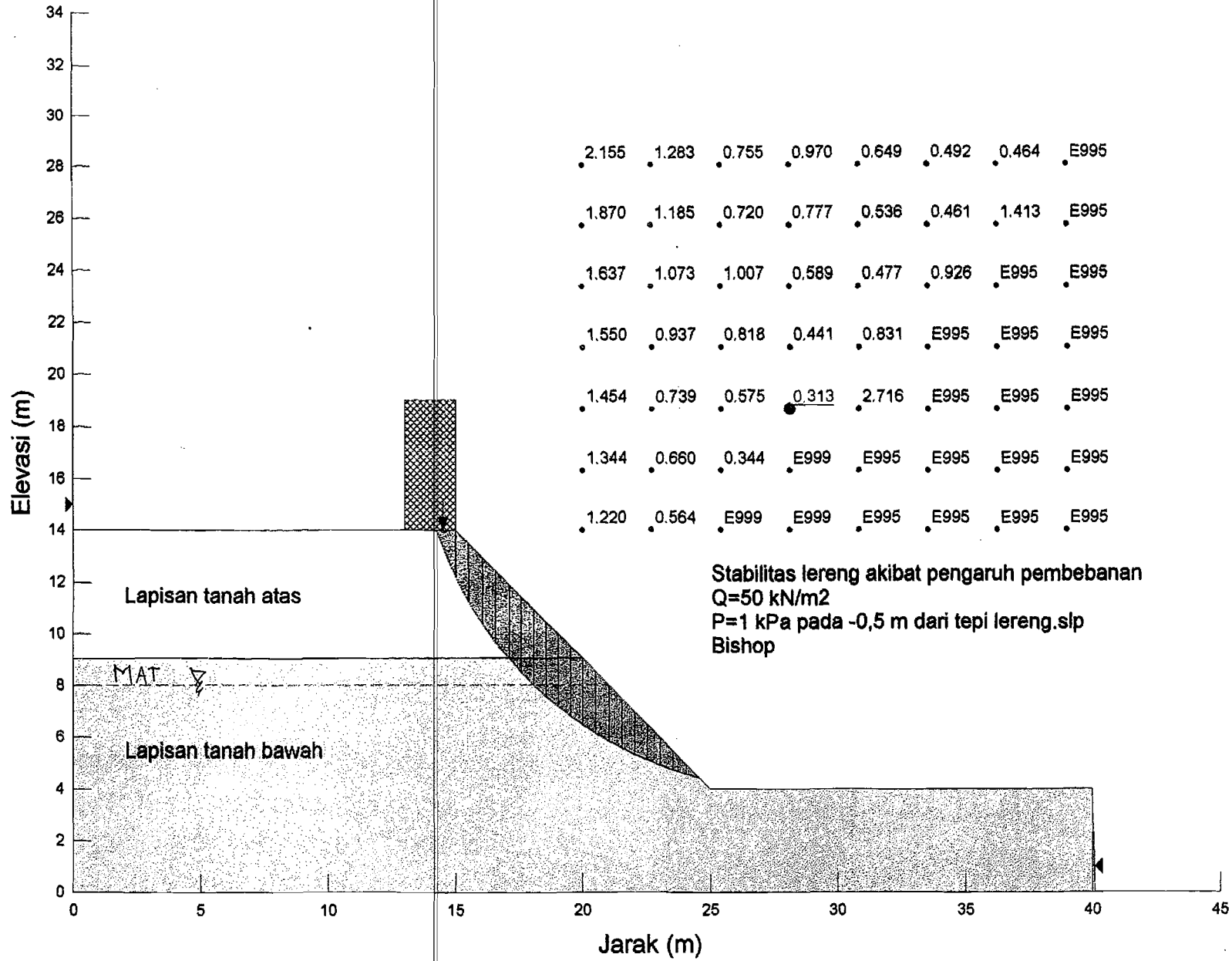


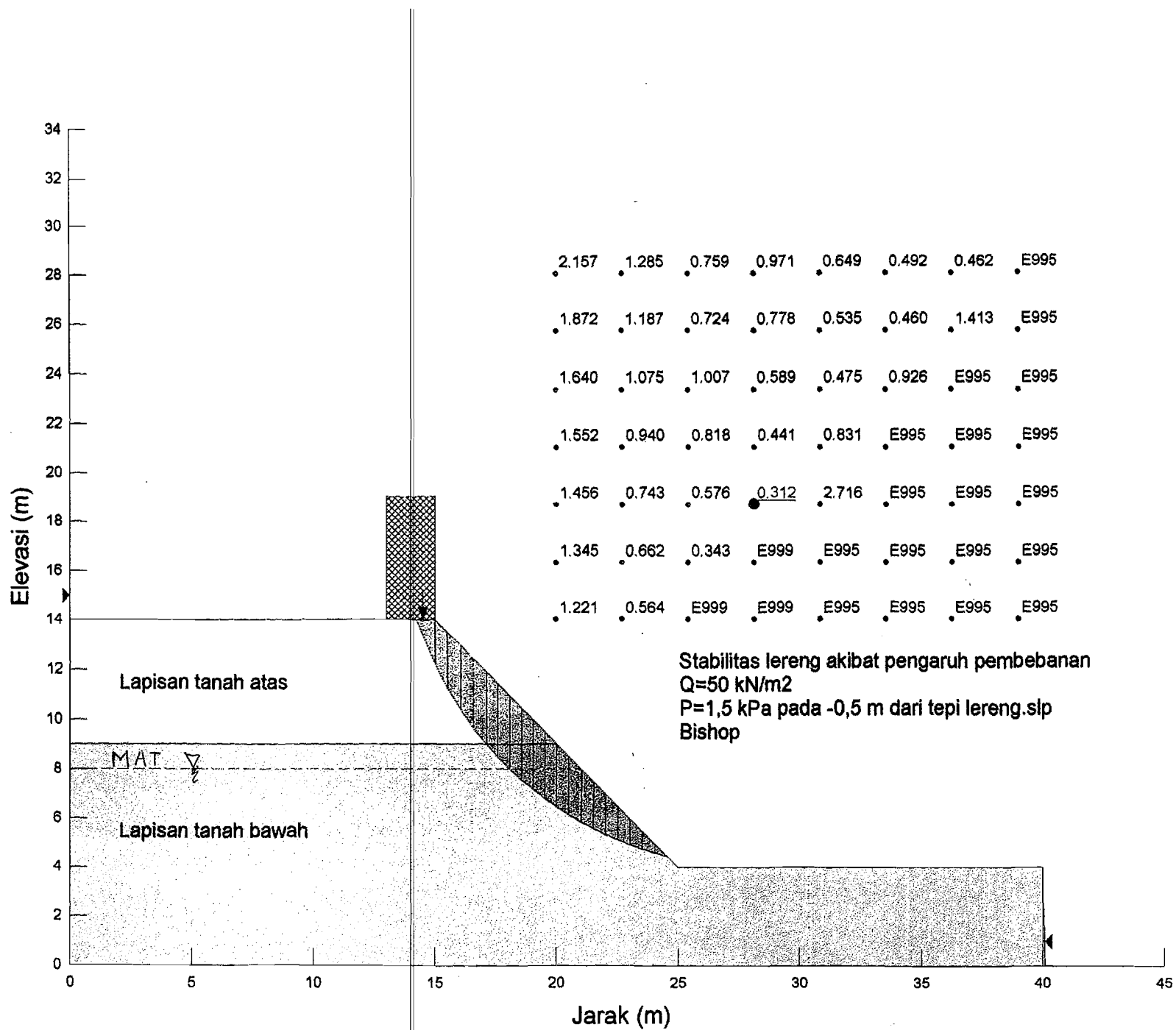




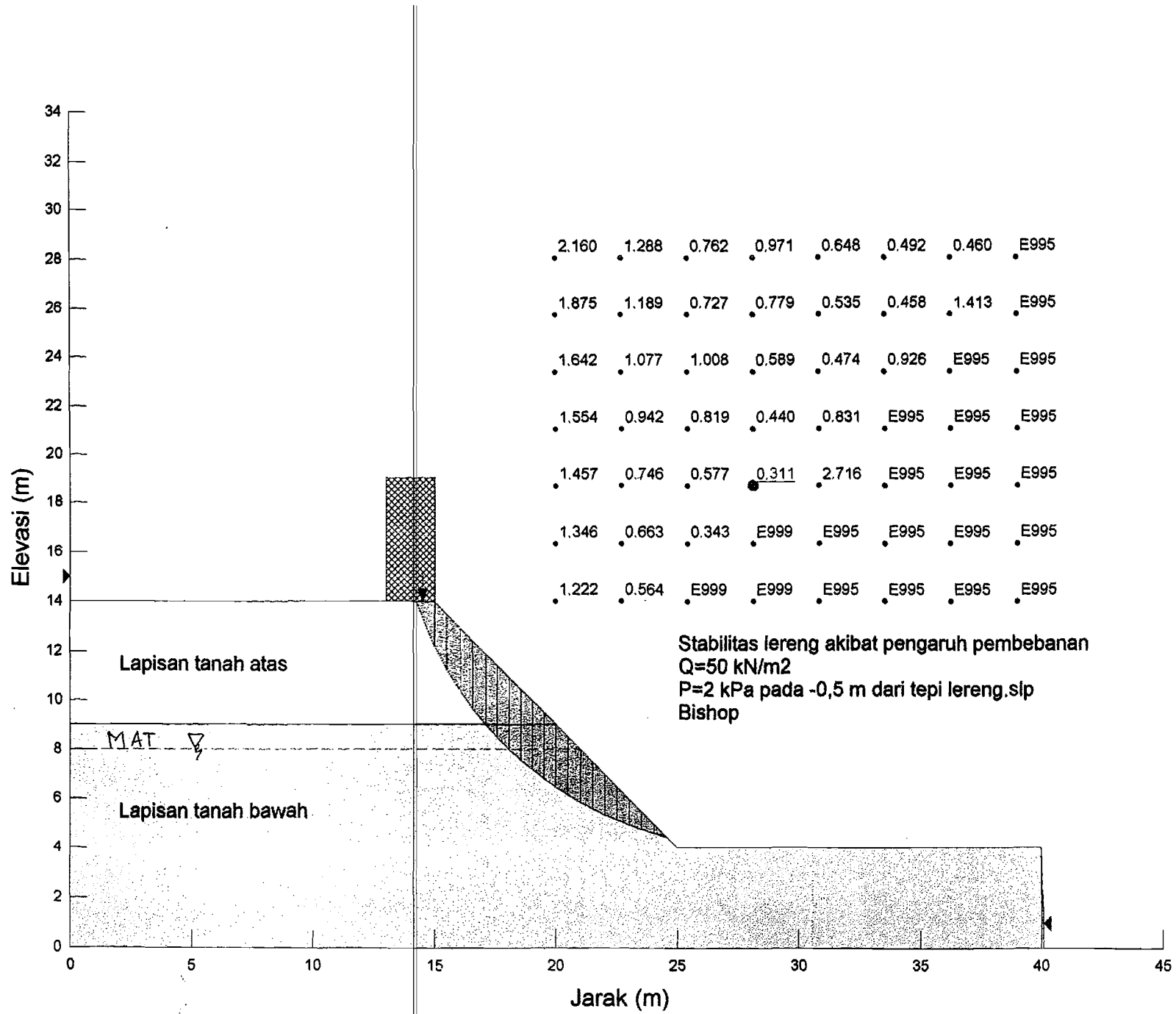


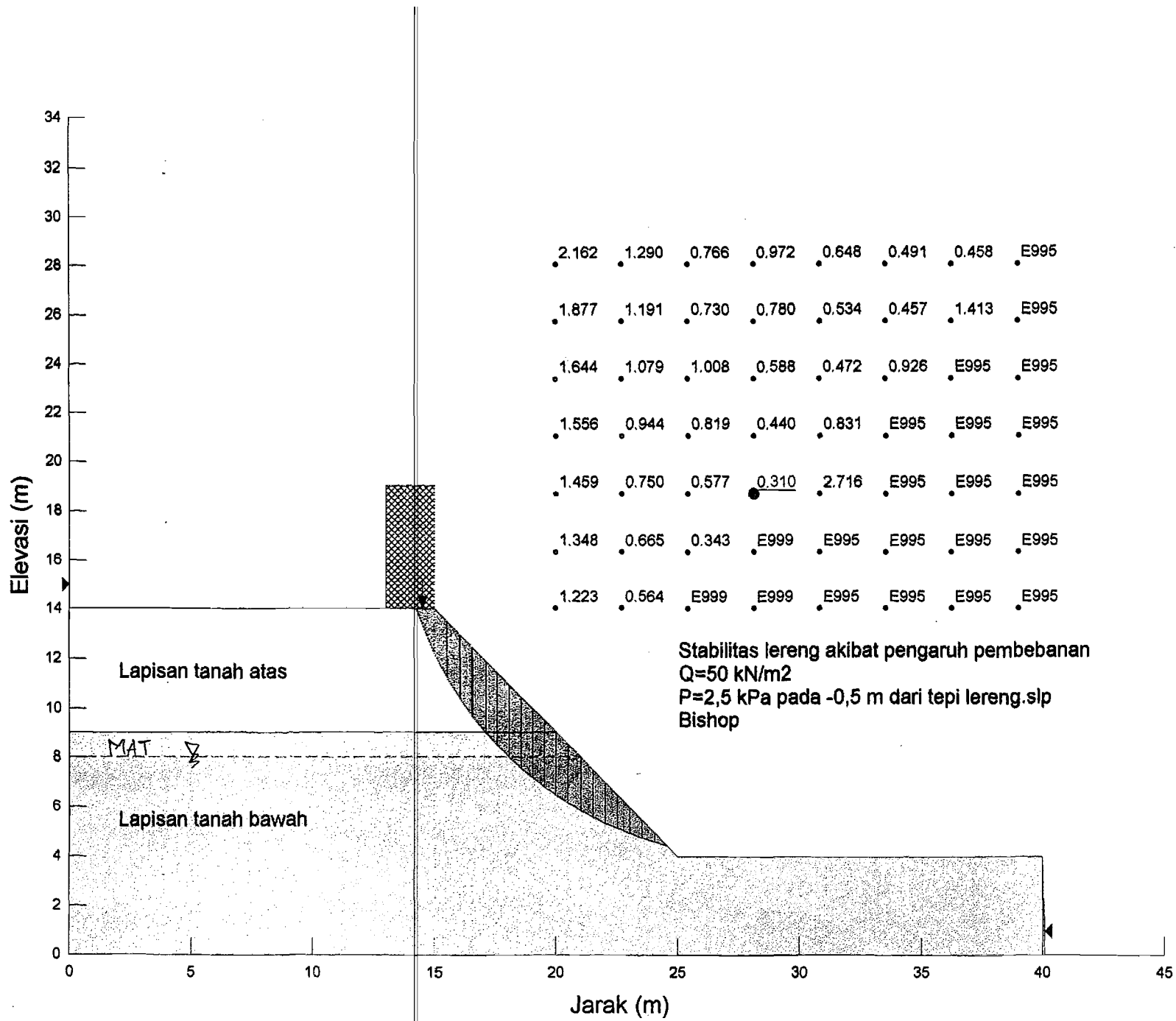


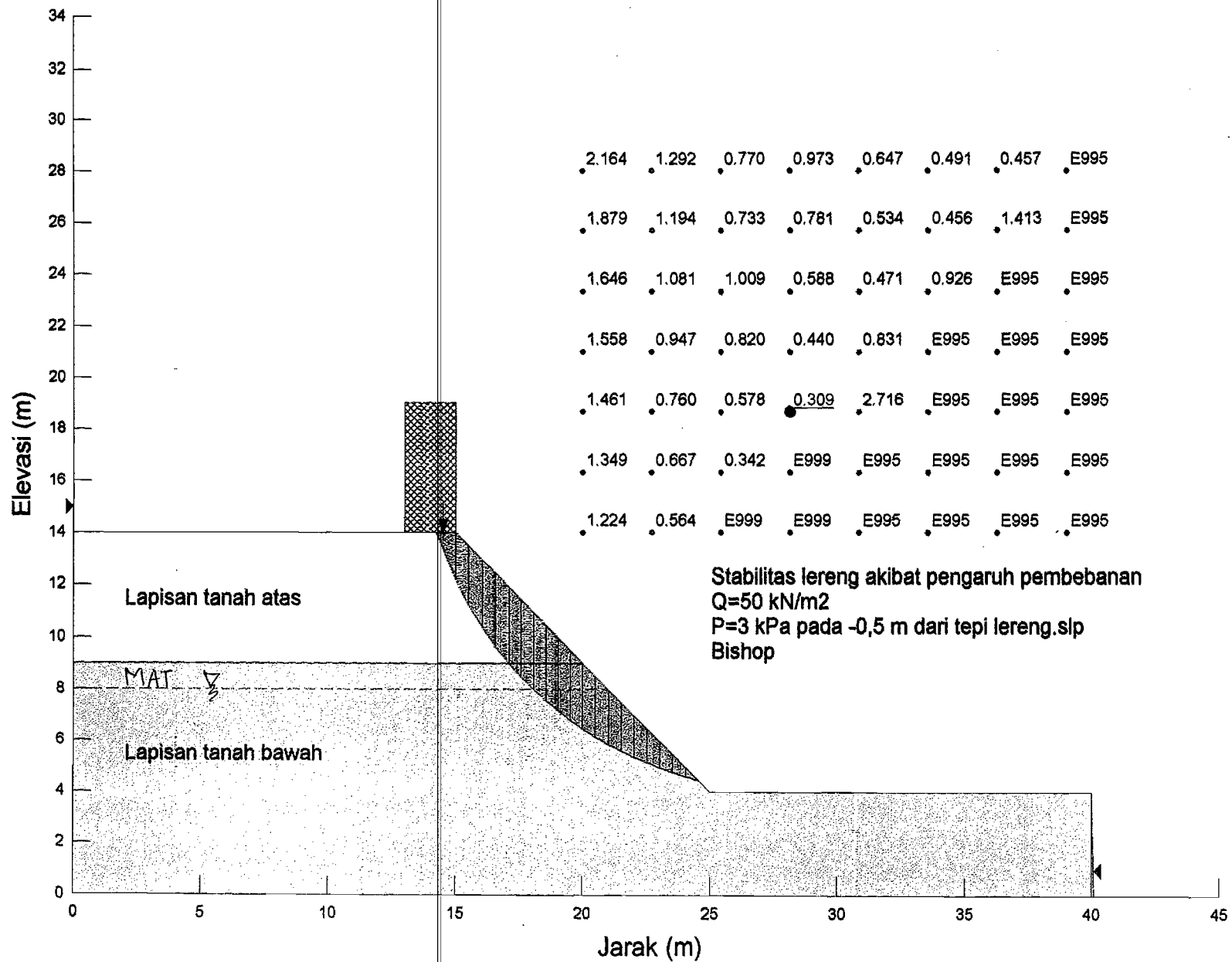


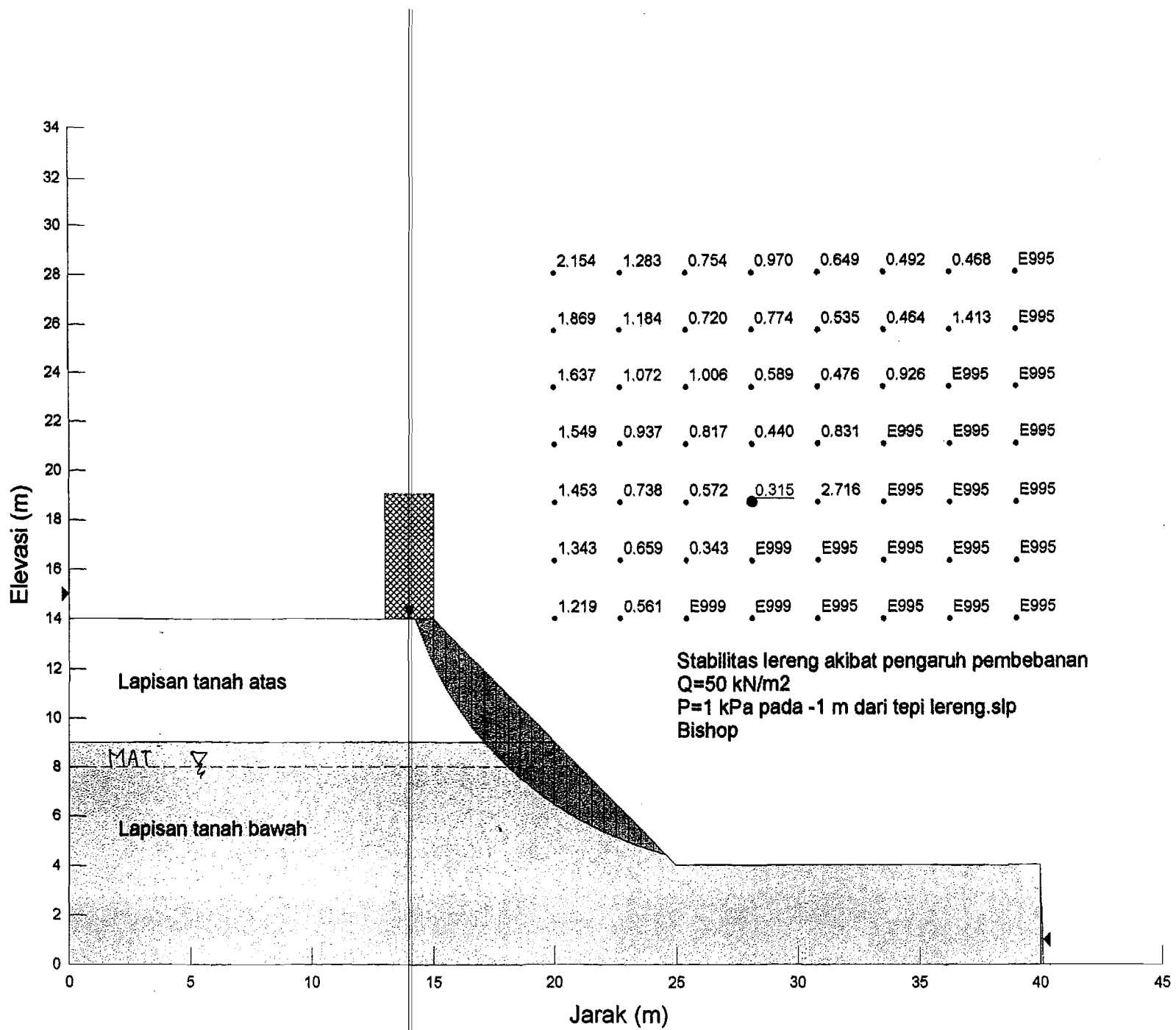


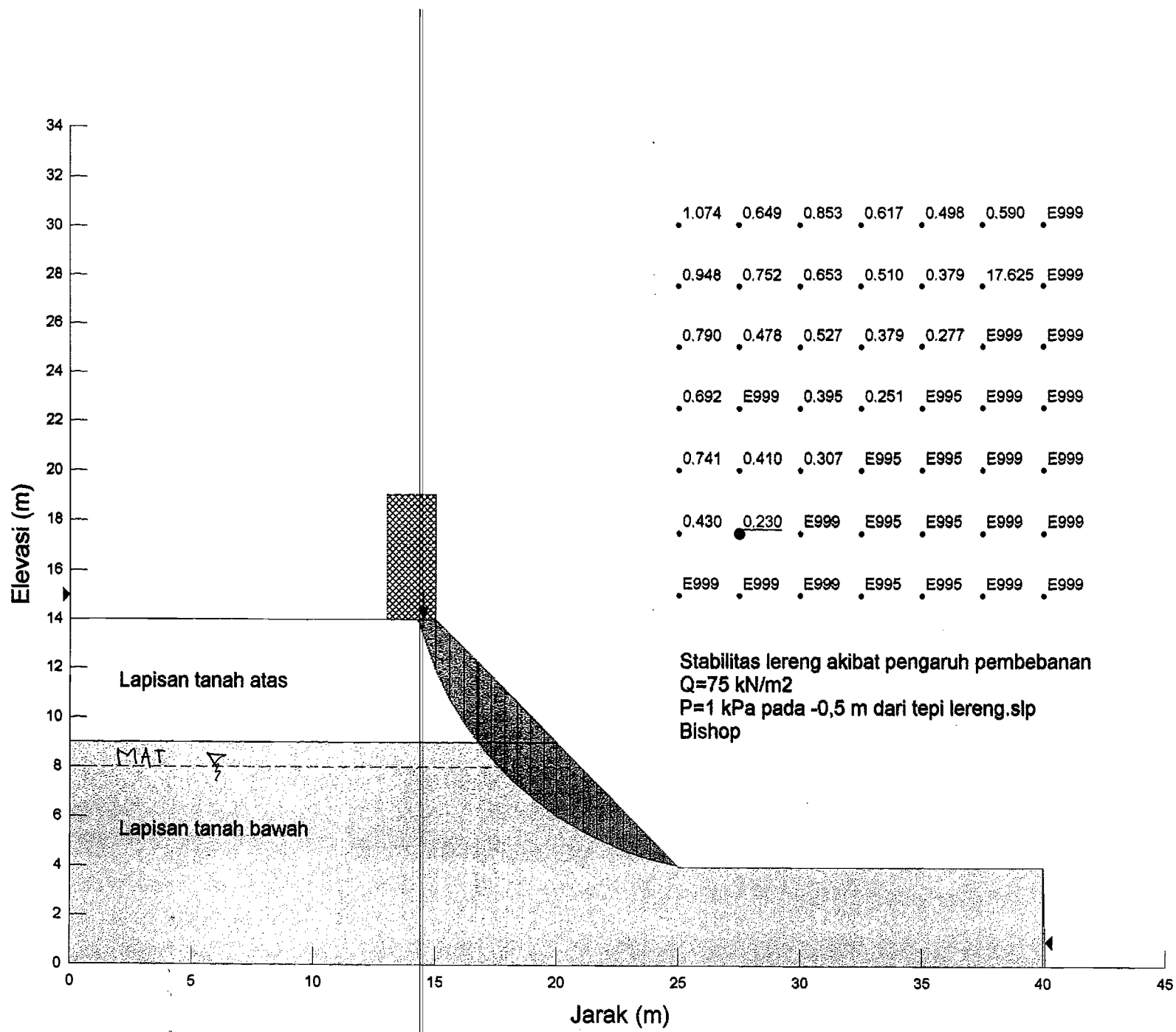


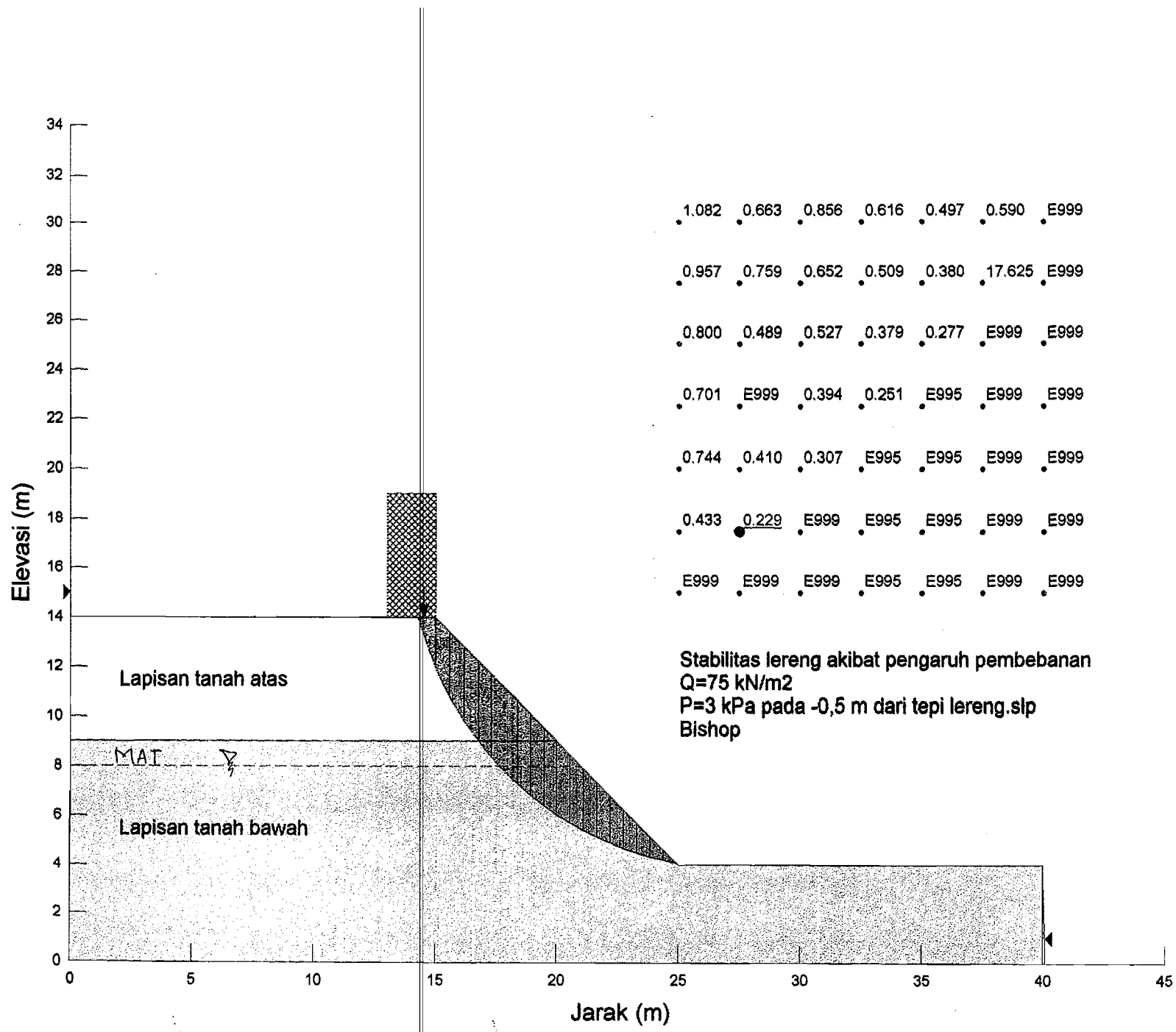


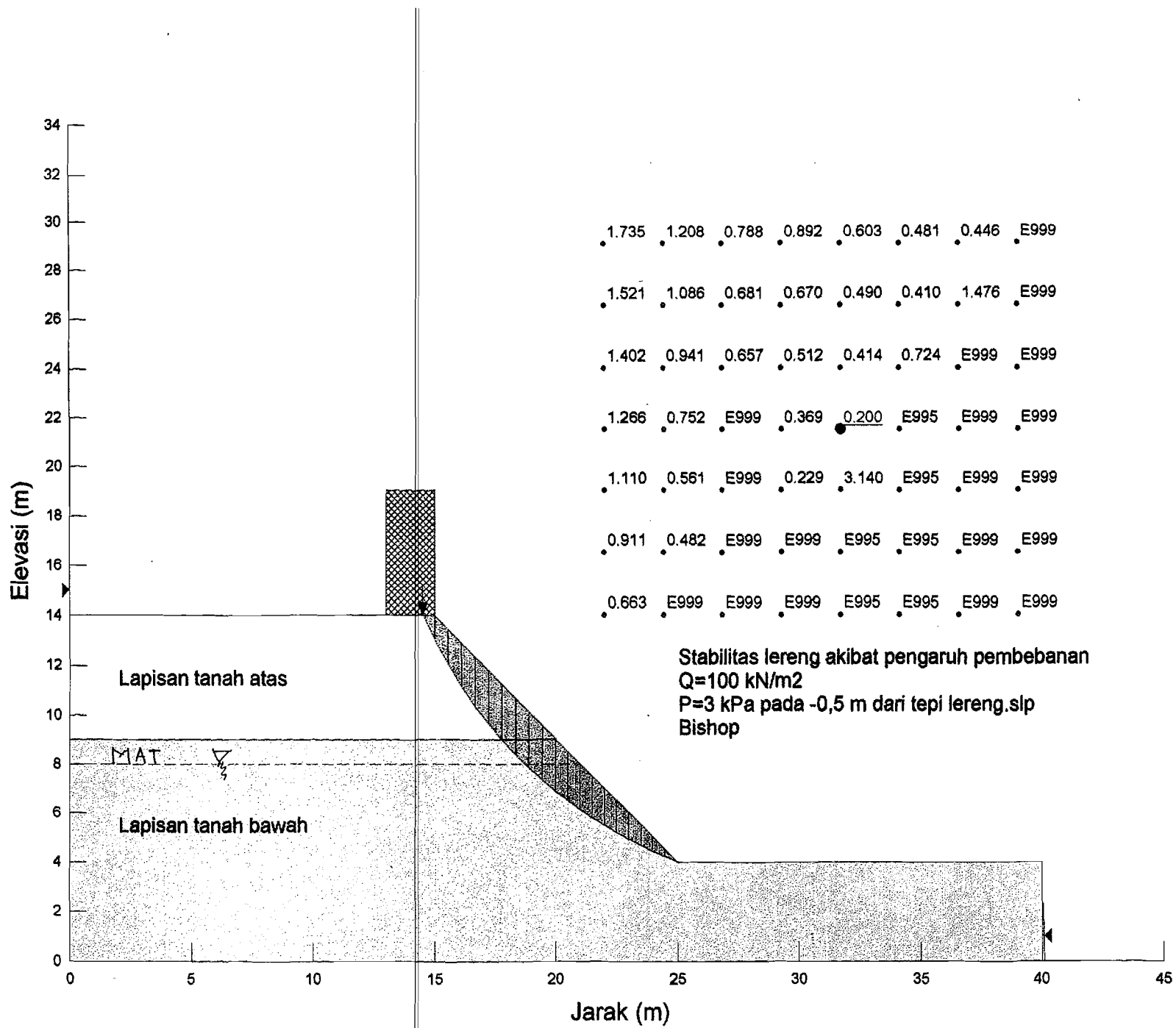


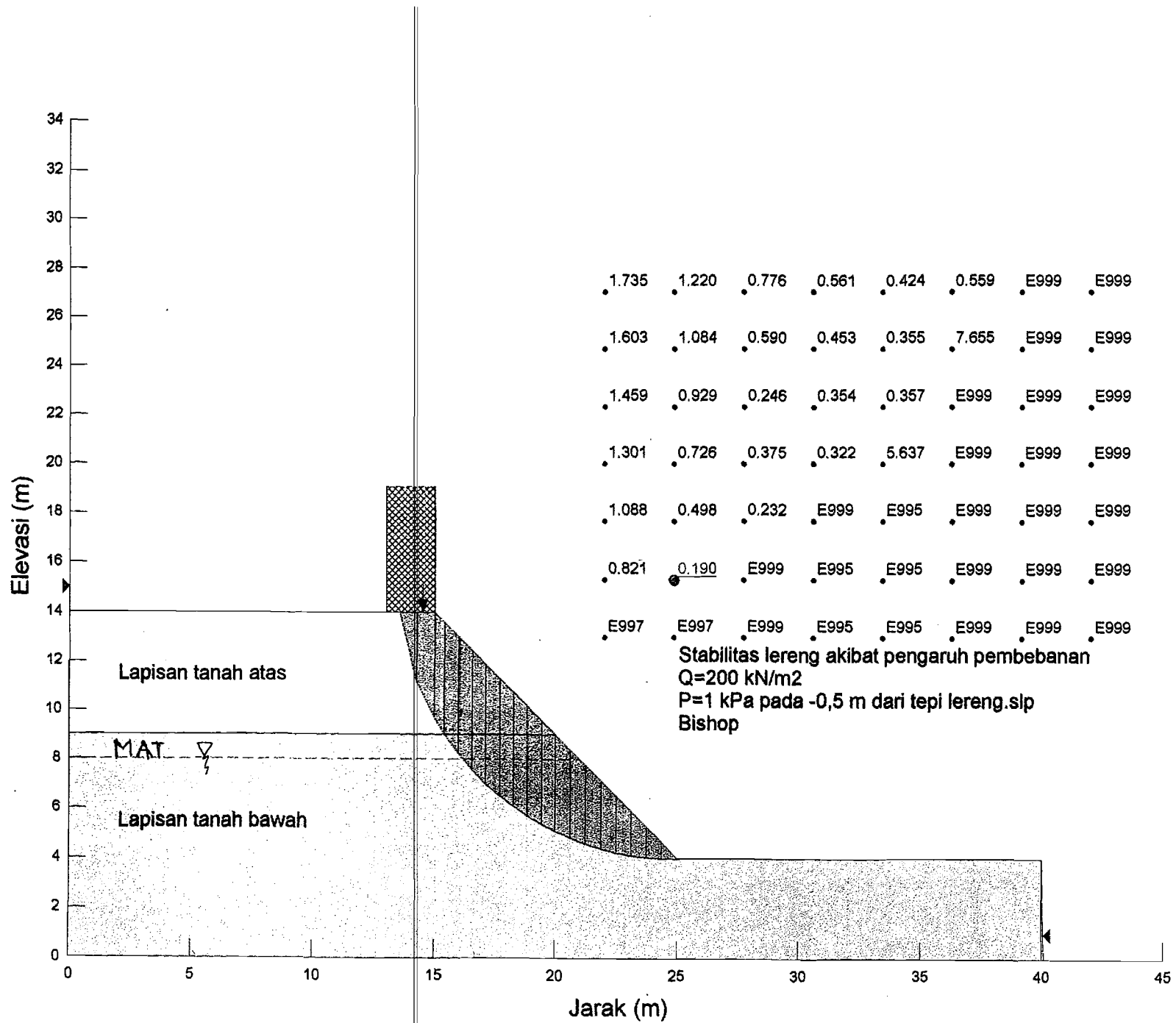




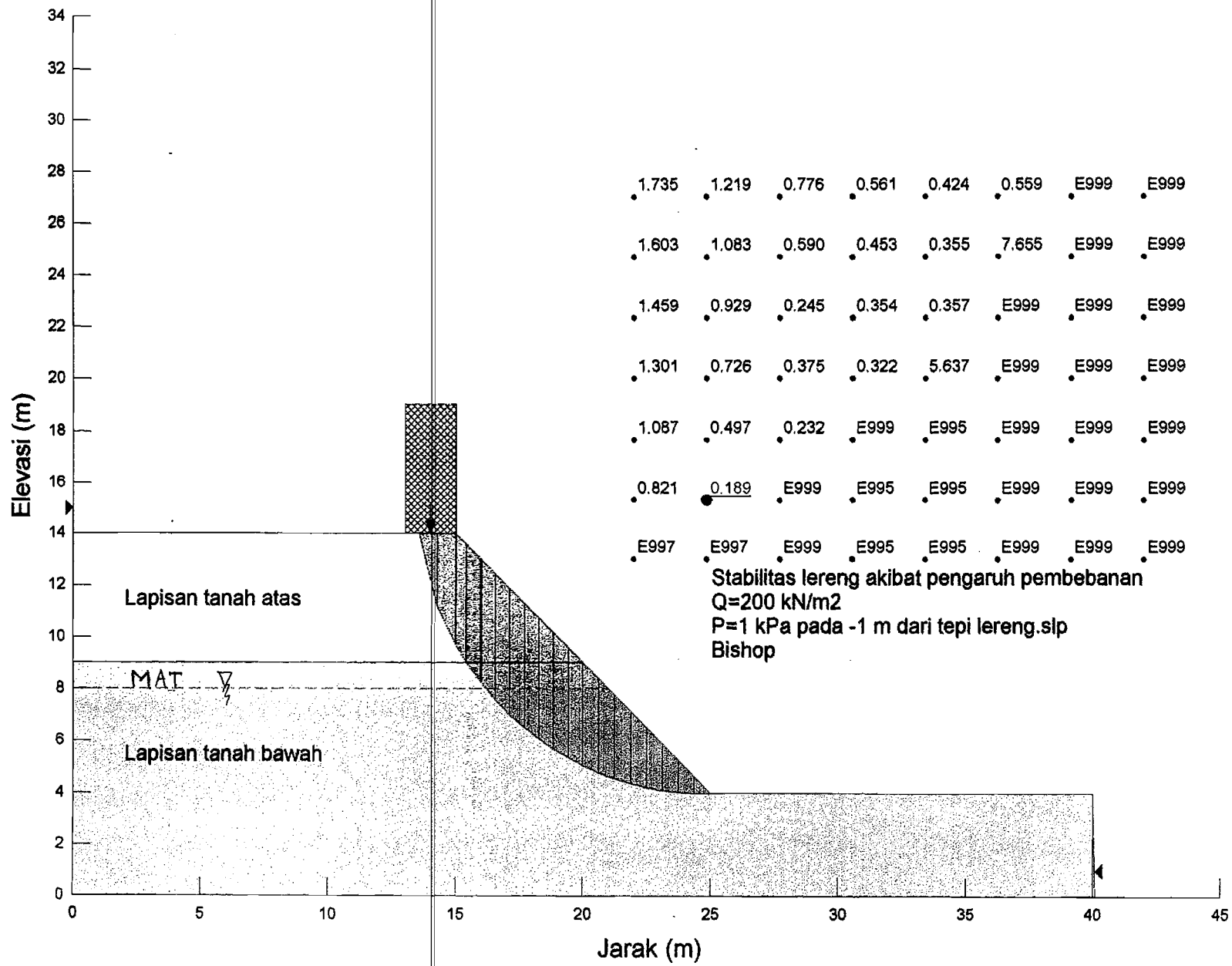


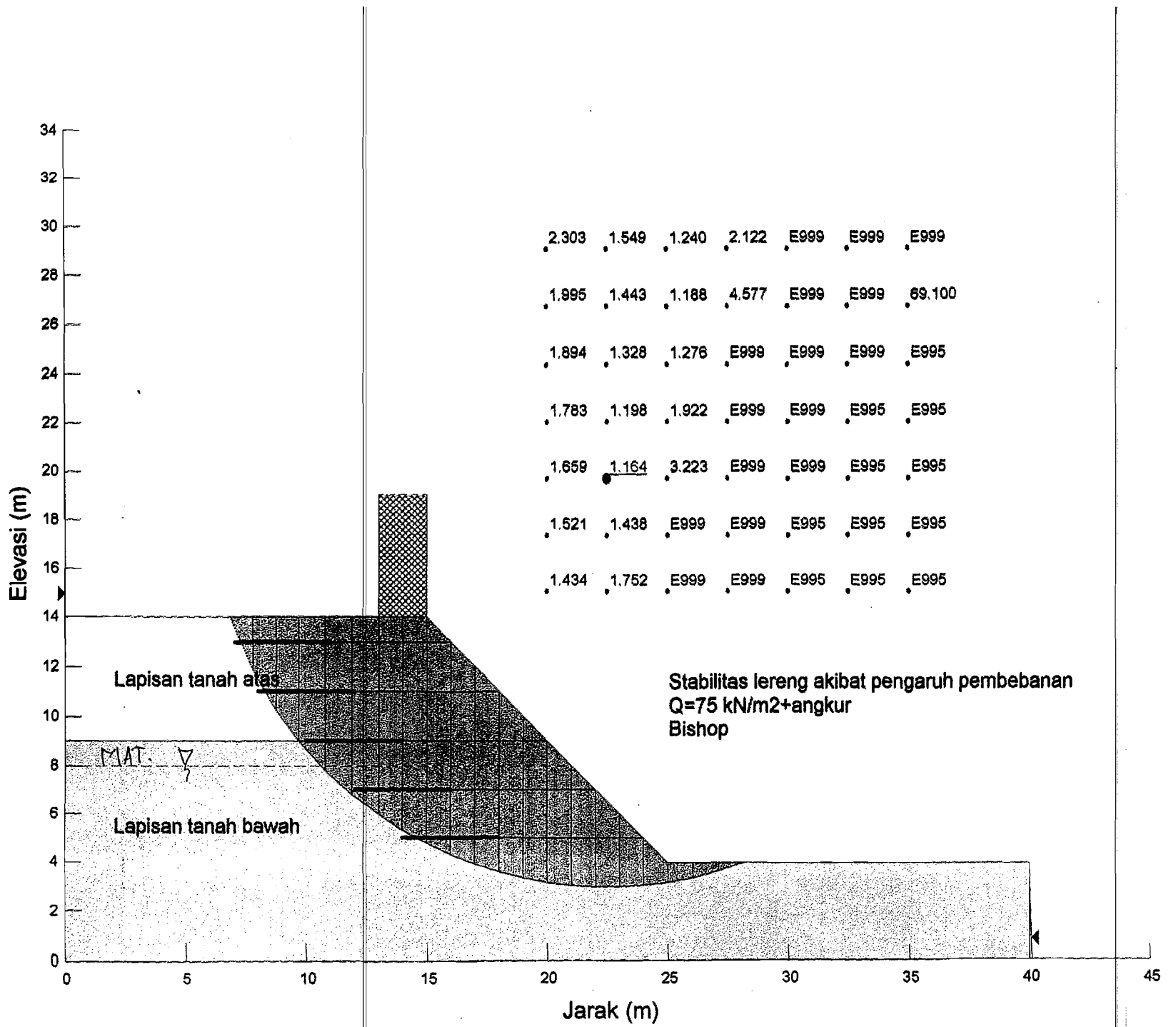


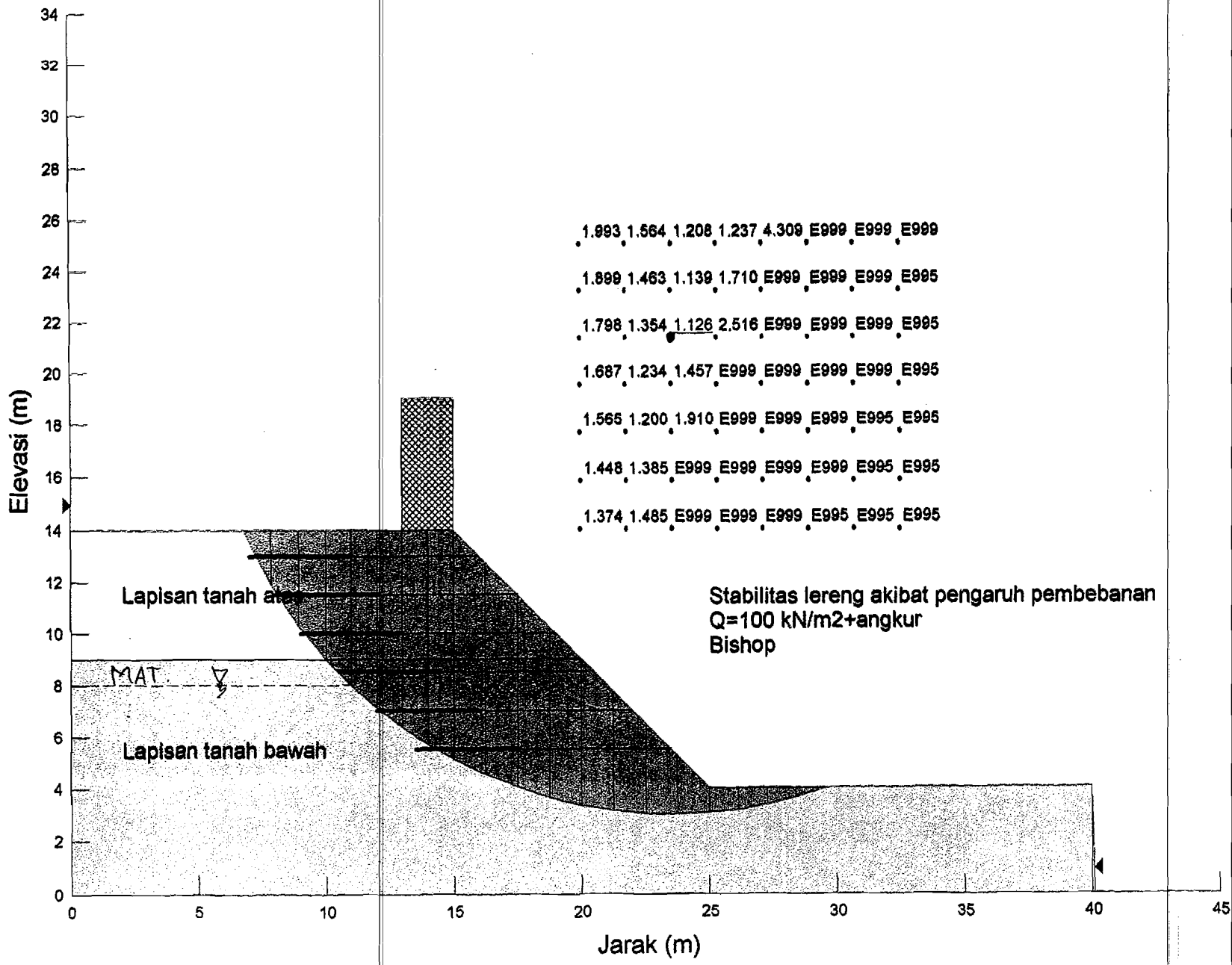






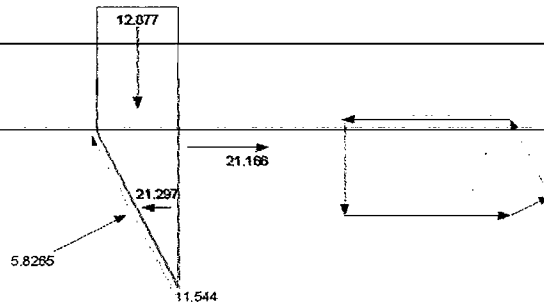






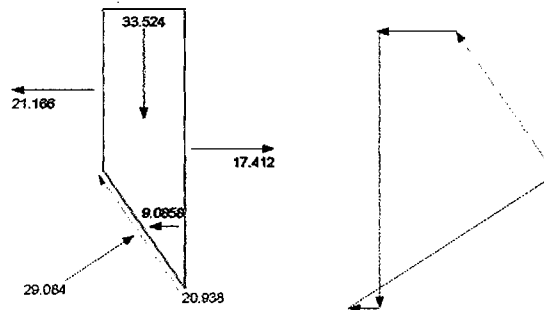
<b>Slice 1 - Bishop Method</b>	
Factor of Safety	1,126
Phi Angle	28
C (Strength)	4,2
C (Force)	9,8966
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,0794
Mid-Height	1,1297
Base Length	2,3563
Base Angle	62,737
Polygon Closure Error	0,31945
Anisotropic Strength Modifier	1
Weight	12,877
Base Shear Force	11,544
Base Normal Force	5,8265
Right Side Normal Force	21,166
Anchor Load	21,297

Slice 1 - Bishop Method



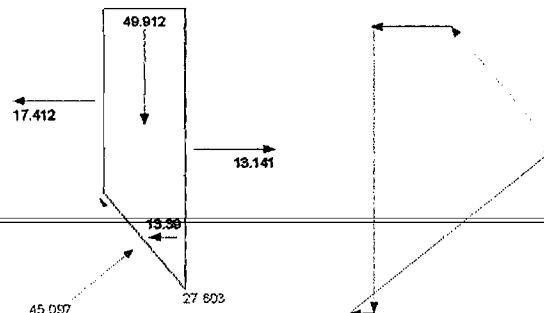
<b>Slice 2 - Bishop Method</b>	
Factor of Safety	1,126
Phi Angle	28
C (Strength)	4,2
C (Force)	8,1138
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,0794
Mid-Height	2,9412
Base Length	1,9319
Base Angle	56,032
Polygon Closure Error	0,33524
Anisotropic Strength Modifier	1
Weight	33,524
Base Shear Force	20,938
Base Normal Force	29,084
Left Side Normal Force	21,166
Right Side Normal Force	17,412
Anchor Load	9,0858

Slice 2 - Bishop Method



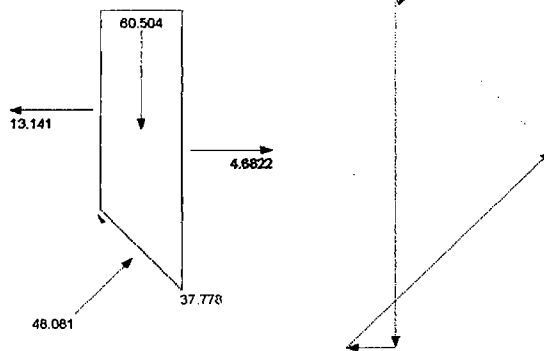
<b>Slice 3 - Bishop Method</b>	
Factor of Safety	1,126
Phi Angle	28
C (Strength)	4,2
C (Force)	7,1071
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,0794
Mid-Height	4,379
Base Length	1,6922
Base Angle	50,367
Polygon Closure Error	0,49912
Anisotropic Strength Modifier	1
Weight	49,912
Base Shear Force	27,603
Base Normal Force	45,097
Left Side Normal Force	17,412
Right Side Normal Force	13,141
Anchor Load	13,39

Slice 3 - Bishop Method

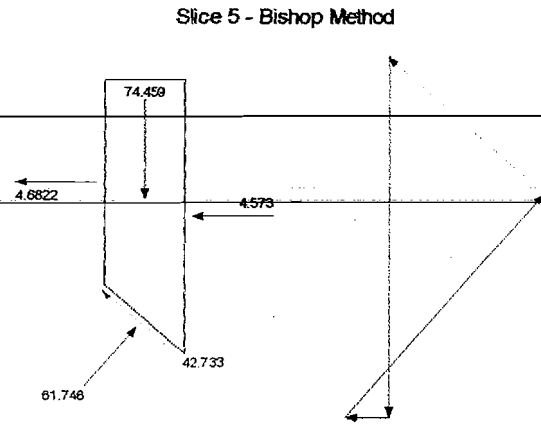


<b>Slice 4 - Bishop Method</b>	
Factor of Safety	1,126
Phi Angle	38
C (Strength)	3,5
C (Force)	4,982
Pore Water Pressure	0
Pore Water Force	0
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,99774
Mid-Height	5,5273
Base Length	1,4234
Base Angle	45,497
Polygon Closure Error	0,60504
Anisotropic Strength Modifier	1
Weight	60,504
Base Shear Force	37,778
Base Normal Force	48,081
Left Side Normal Force	13,141
Right Side Normal Force	4,6822

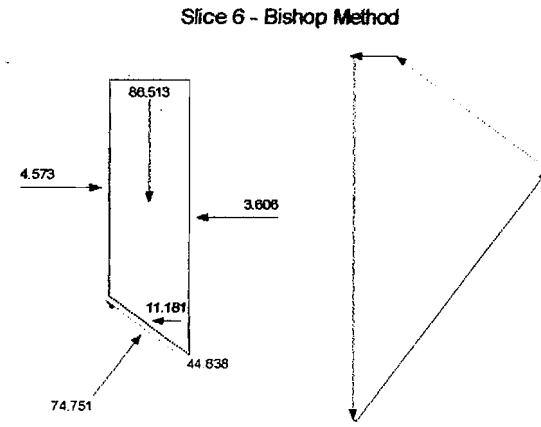
Slice 4 - Bishop Method



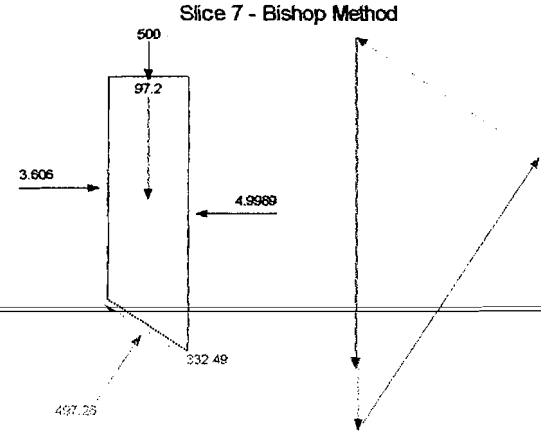
Slice 5 - Bishop Method	
Factor of Safety	1,126
Phi Angle	30
C (Strength)	3,5
C (Force)	4,6412
Pore Water Pressure	4,5895
Pore Water Force	6,0859
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,99775
Mid-Height	6,4679
Base Length	1,3261
Base Angle	41,2
Polygon Closure Error	0,37229
Anisotropic Strength Modifier	1
Weight	74,459
Base Shear Force	42,733
Base Normal Force	61,746
Left Side Normal Force	4,6822
Right Side Normal Force	4,573



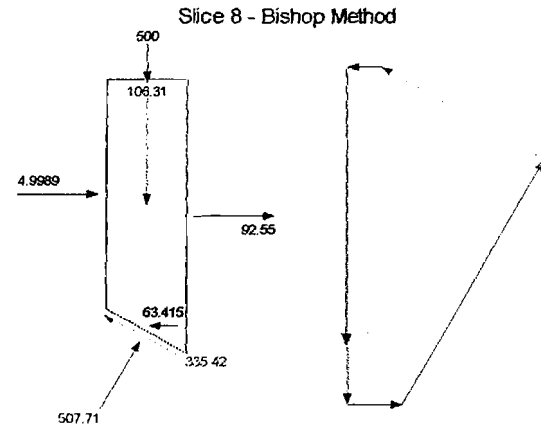
Slice 6 - Bishop Method	
Factor of Safety	1,126
Phi Angle	38
C (Strength)	3,5
C (Force)	4,3824
Pore Water Pressure	12,559
Pore Water Force	15,725
Pore Air Pressure	0
Pore Air Force	0
Slice Width	0,99774
Mid-Height	7,2803
Base Length	1,2521
Base Angle	37,17
Polygon Closure Error	0,86513
Anisotropic Strength Modifier	1
Weight	86,513
Base Shear Force	44,838
Base Normal Force	74,751
Left Side Normal Force	4,573
Right Side Normal Force	3,606
Anchor Load	11,181



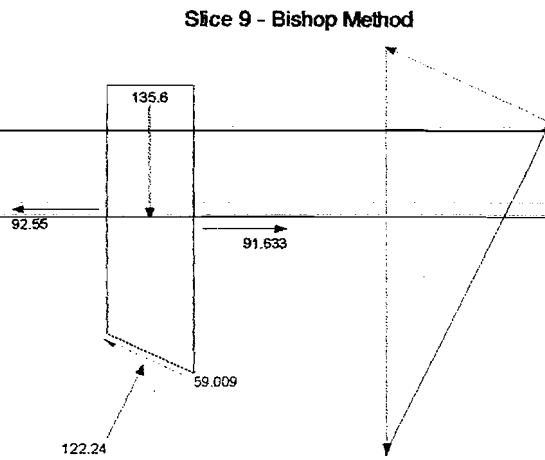
Slice 7 - Bishop Method	
Factor of Safety	1,126
Phi Angle	38
C (Strength)	3,5
C (Force)	4,1896
Pore Water Pressure	19,479
Pore Water Force	23,317
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1
Mid-Height	7,9859
Base Length	1,197
Base Angle	33,343
Polygon Closure Error	5
Anisotropic Strength Modifier	1
Weight	97,2
Base Shear Force	332,49
Base Normal Force	497,26
Left Side Normal Force	3,606
Right Side Normal Force	4,9989
Surface Pressure Load	500



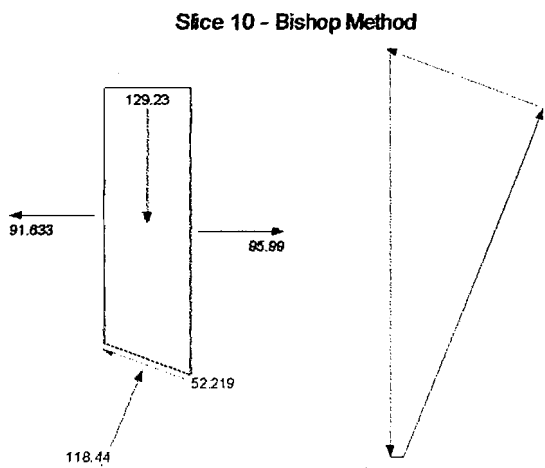
Slice 8 - Bishop Method	
Factor of Safety	1,126
Phi Angle	38
C (Strength)	3,5
C (Force)	4,0282
Pore Water Pressure	25,486
Pore Water Force	29,333
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1
Mid-Height	8,5984
Base Length	1,1509
Base Angle	29,673
Polygon Closure Error	2,5385
Anisotropic Strength Modifier	1
Weight	106,31
Base Shear Force	335,42
Base Normal Force	507,71
Left Side Normal Force	4,9989
Right Side Normal Force	92,55
Anchor Load	63,415
Surface Pressure Load	500



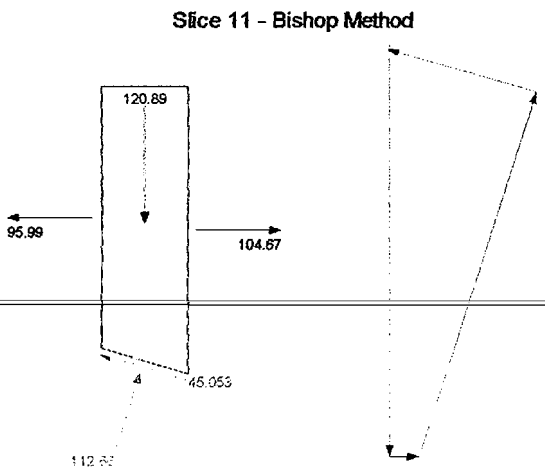
Slice 9 - Bishop Method	
Factor of Safety	1,126
Phi Angle	38
C (Strength)	3,5
C (Force)	4,8555
Pore Water Pressure	31,275
Pore Water Force	43,388
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,25
Mid-Height	8,5633
Base Length	1,3873
Base Angle	25,706
Polygon Closure Error	0,678
Anisotropic Strength Modifier	1
Weight	135,6
Base Shear Force	59,009
Base Normal Force	122,24
Left Side Normal Force	92,55
Right Side Normal Force	91,633



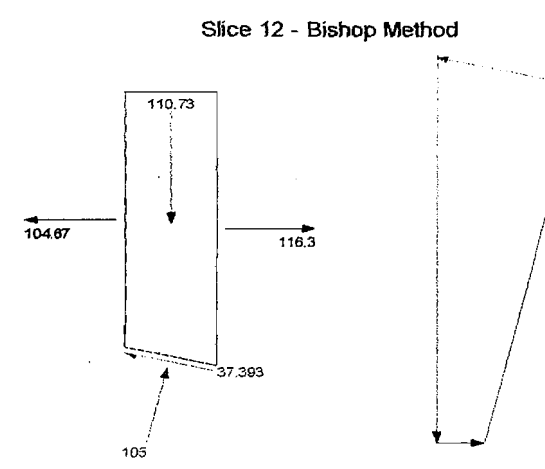
Slice 10 - Bishop Method	
Factor of Safety	1,126
Phi Angle	38
C (Strength)	3,5
C (Force)	4,7002
Pore Water Pressure	36,62
Pore Water Force	49,178
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,25
Mid-Height	7,8583
Base Length	1,3429
Base Angle	21,439
Polygon Closure Error	1,2923
Anisotropic Strength Modifier	1
Weight	129,23
Base Shear Force	52,219
Base Normal Force	118,44
Left Side Normal Force	91,633
Right Side Normal Force	95,99



Slice 11 - Bishop Method	
Factor of Safety	1,126
Phi Angle	38
C (Strength)	3,5
C (Force)	4,5821
Pore Water Pressure	40,926
Pore Water Force	53,58
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,25
Mid-Height	7,0473
Base Length	1,3092
Base Angle	17,294
Polygon Closure Error	1,2089
Anisotropic Strength Modifier	1
Weight	120,89
Base Shear Force	45,053
Base Normal Force	112,66
Left Side Normal Force	95,99
Right Side Normal Force	104,67

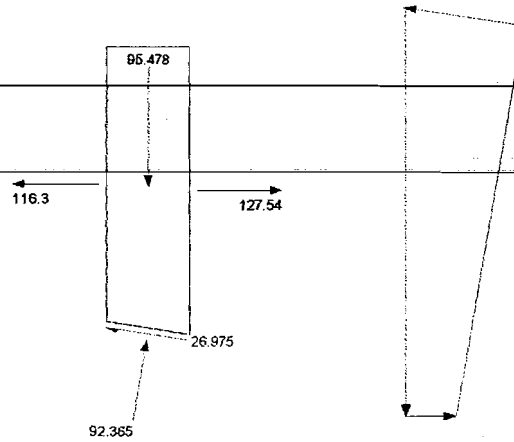


Slice 12 - Bishop Method	
Factor of Safety	1,126
Phi Angle	38
C (Strength)	3,5
C (Force)	4,4945
Pore Water Pressure	44,271
Pore Water Force	56,85
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,25
Mid-Height	6,1383
Base Length	1,2841
Base Angle	13,24
Polygon Closure Error	1,1073
Anisotropic Strength Modifier	1
Weight	110,73
Base Shear Force	37,393
Base Normal Force	105
Left Side Normal Force	104,67
Right Side Normal Force	116,3



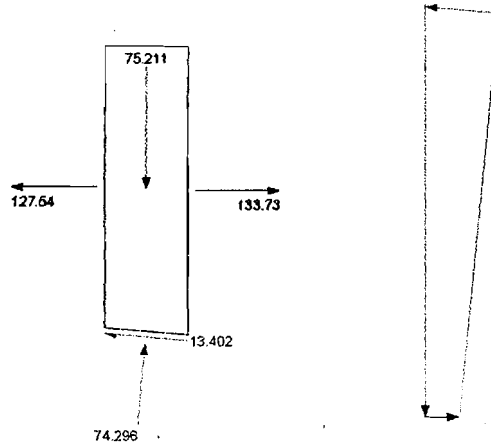
Slice 13 - Bishop Method	
Factor of Safety	1,126
Phi Angle	38
C (Strength)	3,5
C (Force)	4,4327
Pore Water Pressure	48,707
Pore Water Force	59,154
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,25
Mid-Height	5,1367
Base Length	1,2665
Base Angle	9,2539
Polygon Closure Error	0,47739
Anisotropic Strength Modifier	1
Weight	95,478
Base Shear Force	26,975
Base Normal Force	92,365
Left Side Normal Force	116,3
Right Side Normal Force	127,54

Slice 13 - Bishop Method



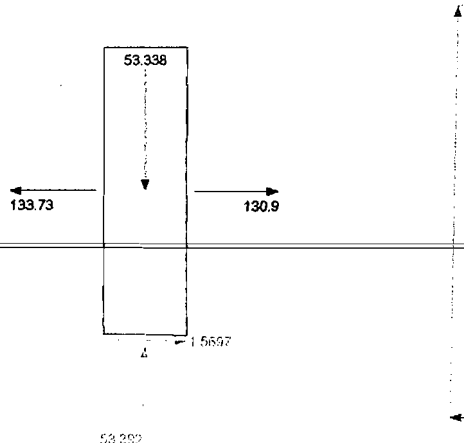
Slice 14 - Bishop Method	
Factor of Safety	1,126
Phi Angle	38
C (Strength)	3,5
C (Force)	4,3939
Pore Water Pressure	48,273
Pore Water Force	60,602
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,25
Mid-Height	4,0463
Base Length	1,2554
Base Angle	5,3124
Polygon Closure Error	0,37605
Anisotropic Strength Modifier	1
Weight	75,211
Base Shear Force	13,402
Base Normal Force	74,296
Left Side Normal Force	127,54
Right Side Normal Force	133,73

Slice 14 - Bishop Method



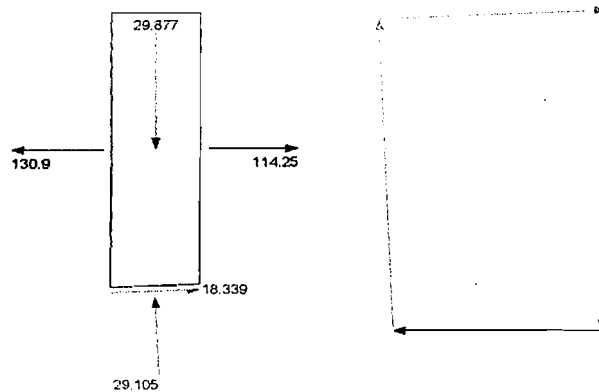
Slice 15 - Bishop Method	
Factor of Safety	1,126
Phi Angle	38
C (Strength)	3,5
C (Force)	4,3763
Pore Water Pressure	48,991
Pore Water Force	61,257
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,25
Mid-Height	2,8696
Base Length	1,2504
Base Angle	1,3961
Polygon Closure Error	0,53392
Anisotropic Strength Modifier	1
Weight	53,338
Base Shear Force	1,5697
Base Normal Force	53,392
Left Side Normal Force	133,73
Right Side Normal Force	130,9

Slice 15 - Bishop Method



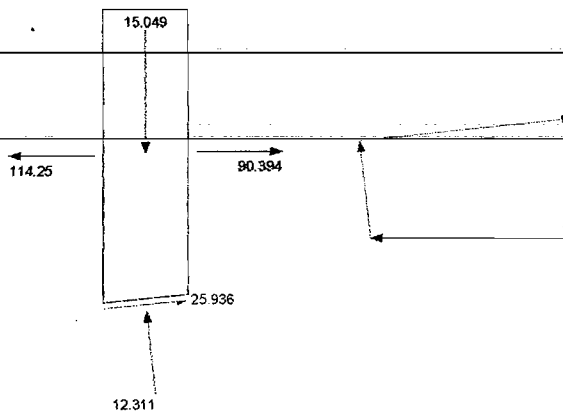
Slice 16 - Bishop Method	
Factor of Safety	1,126
Phi Angle	38
C (Strength)	3,5
C (Force)	4,3792
Pore Water Pressure	48,871
Pore Water Force	61,148
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,25
Mid-Height	1,6074
Base Length	1,2512
Base Angle	2,5136
Polygon Closure Error	0,29877
Anisotropic Strength Modifier	1
Weight	29,877
Base Shear Force	18,339
Base Normal Force	29,105
Left Side Normal Force	130,9
Right Side Normal Force	114,25

Slice 16 - Bishop Method



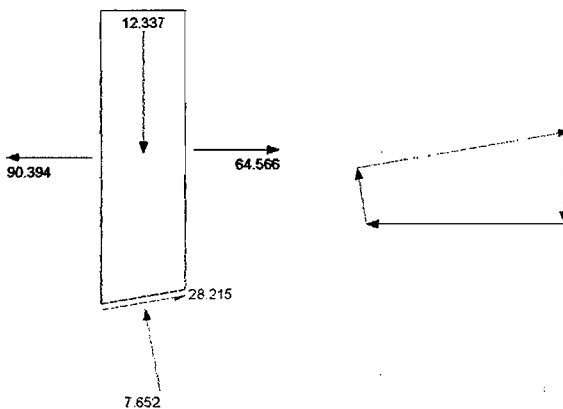
Slice 17 - Bishop Method	
Factor of Safety	1,126
Phi Angle	38
C (Strength)	3,5
C (Force)	3,9995
Pore Water Pressure	47,973
Pore Water Force	54,819
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,1359
Mid-Height	0,89096
Base Length	1,1427
Base Angle	6,255
Polygon Closure Error	0,6484
Anisotropic Strength Modifier	1
Weight	15,049
Base Shear Force	25,936
Base Normal Force	12,311
Left Side Normal Force	114,25
Right Side Normal Force	90,394

Slice 17 - Bishop Method



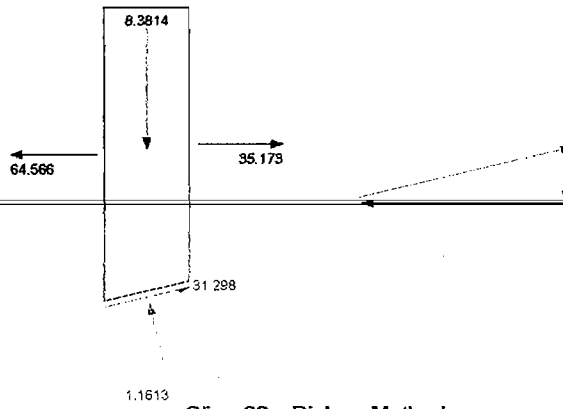
Slice 18 - Bishop Method	
Factor of Safety	1,126
Phi Angle	38
C (Strength)	3,5
C (Force)	4,035
Pore Water Pressure	46,399
Pore Water Force	53,492
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,1359
Mid-Height	0,73042
Base Length	1,1529
Base Angle	9,8428
Polygon Closure Error	0,70538
Anisotropic Strength Modifier	1
Weight	12,337
Base Shear Force	28,215
Base Normal Force	7,652
Left Side Normal Force	90,394
Right Side Normal Force	64,566

Slice 18 - Bishop Method



Slice 19 - Bishop Method	
Factor of Safety	1,126
Phi Angle	38
C (Strength)	3,5
C (Force)	4,0881
Pore Water Pressure	44,102
Pore Water Force	51,512
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,1359
Mid-Height	0,49621
Base Length	1,168
Base Angle	13,47
Polygon Closure Error	0,93894
Anisotropic Strength Modifier	1
Weight	8,3814
Base Shear Force	31,298
Base Normal Force	1,1613
Left Side Normal Force	64,566
Right Side Normal Force	35,173

Slice 19 - Bishop Method



Slice 20 - Bishop Method	
Factor of Safety	1,126
Phi Angle	38
C (Strength)	3,5
C (Force)	4,1607
Pore Water Pressure	41,053
Pore Water Force	48,803
Pore Air Pressure	0
Pore Air Force	0
Slice Width	1,1359
Mid-Height	0,18539
Base Length	1,1888
Base Angle	17,153
Polygon Closure Error	0,88582
Anisotropic Strength Modifier	1
Weight	3,1314
Base Shear Force	35,433
Base Normal Force	7,6022
Left Side Normal Force	35,173

Slice 20 - Bishop Method

