



**TUGAS AKHIR – MO 184804**

**ANALISA KAPABILITAS *PIPE LAY BARGE* HAFAR  
NEPTUNE PADA OPERASI *PIPELAYING* DI LADANG  
MINYAK DAN GAS *OFFSHORE NORTH WEST JAVA***

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**Institut Teknologi Sepuluh Nopember**

**Surabaya**

**2019**



**FINAL PROJECT – MO 184804**

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CAPABILITY IN PIPELAYING OPERATION AT OFFSHORE  
NORTH WEST JAVA OIL AND GAS FIELD**

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TUGAS AKHIR**

Ditujukan Untuk Memenuhi Salah Satu Syarat Memperoleh Gelar Sarjana Teknik (S.T.)

pada Program Studi S-1 Departemen Teknik Kelautan

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## **OPERASI *PIPELAYING* DI LADANG MINYAK DAN GAS *OFFSHORE* *NORTH WEST JAVA***

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### **ABSTRAK**

*Pipelaying* adalah suatu bagian dari instalasi pipa bawah laut dimana kegiatan penyambungan dan pelatakan pipa di dasar laut dilakukan. Faktor yang mempengaruhi adalah tinggi gelombang signifikan yang diperbolehkan pada saat instalasi pipa. Pada tugas akhir ini, akan dianalisa tinggi gelombang signifikan maksimal yang diperbolehkan untuk mengenai PLB saat proses *pipelaying* dengan adanya variasi diameter pipa yaitu 8 inch, 10 inch, dan 12 inch; variasi arah datang gelombang yakni  $0^\circ$ ,  $45^\circ$ ,  $90^\circ$ ,  $135^\circ$ , dan  $180^\circ$ ; dan variasi sudut stinger. Pertama, dilakukan analisa statis menggunakan software OFFPIPE. Kemudian, dilakukan permodelan PLB Hafar Neptune menggunakan software MOSES yang divalidasikan sesuai dengan codes ABS MODU. Outputnya adalah RAO dari PLB Hafar Neptune. Selanjutnya, dilakukan analisa dinamis dengan software OFFPIPE yang mana inputnya adalah analisa statis, RAO PLB Hafar Neptune, dan formulasi spektrum gelombang JONSWAP. Hasil dari analisa adalah tinggi gelombang signifikan yang diperbolehkan untuk mengenai PLB saat *pipelaying* adalah 3 meter untuk semua variasi diameter pipa. Untuk variasi arah data gelombang,  $H_s$  maksimal adalah 3 meter untuk arah datang  $0^\circ$  dan  $180^\circ$ , 2.5 meter untuk arah datang  $45^\circ$ , 1.5 meter untuk arah datang  $90^\circ$  dan  $135^\circ$ .

**Kata kunci:** Instalasi pipa bawah laut , s-lay, Pipe Lay Barge, Gelombang laut signifikan.

# **ANALYSIS OF PIPE LAY BARGE HAFAR NEPTUNE CAPABILITY IN PIPELAYING OPERATION AT OFFSHORE NORTH WEST JAVA OIL AND GAS FIELD**

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## **ABSTRACT**

Pipelaying is a part of an underwater pipeline installation where piping and leveling activities on the seabed are carried out. One of the influencing factors is the significant wave height allowed at the time of pipe installation. In this final project, the maximum significant wave height allowed for the PLB during the pipelaying process will be analyzed with the variation of pipe diameters, which are 8 inch, 10 inch, and 12 inch; variations in the direction of coming waves namely 0°, 45°, 90°, 135°, and 180°; and stinger angle variations. First, a static analysis is performed using OFFPIPE software. Then, Pipe Lay Barge Hafar Neptune modeling is done using MOSES software which is validated according to ABS MODU codes. The output is RAO from the Hafar Neptune PLB. Next, a dynamic analysis is performed with OFFPIPE software, where the input is static analysis, RAO of Pipe Lay Barge Hafar Neptune, and JONSWAP wave spectrum formulation. The results of the analysis are the significant wave heights that are allowed to hit the PLB when pipelaying is 3 meters for all pipe diameter variations. For variations in the direction of the wave data, the maximum  $H_s$  is 3 meters for 0° and 180°, 2.5 meters for 45°, 1.5 meters for 90° and 135°.

**Keywords:** Underwater pipeline installation, S-Lay, Pipe Lay Barge, Significant ocean wave.

## **KATA PENGANTAR**

Puji syukur kehadiran Tuhan Yang Maha Esa atas segala rahmat-Nya sehingga tugas akhir ini dapat tersusun hingga selesai. Penulis mengucapkan banyak terimakasih atas bantuan dari pihak yang telah berkontribusi dengan memberikan sumbangan dalam sebuah materi maupun gagasan pikirannya.

Harapan penulis, tugas akhir ini dapat menambah pengetahuan dan pengalaman bagi para pembaca, untuk ke depannya dapat diperbaiki bentuknya maupun menambah isi tugas akhir ini agar dikemudian harinya menjadi lebih baik lagi.

Karena keterbatasan pengetahuan maupun pengalaman penulis, maka penulis yakin masih banyak kekurangan dalam tugas akhir ini, oleh karena itu penulis sangat mengharapkan saran dan kritik yang membangun dari pembaca demi kesempurnaan tugas akhir ini.

Surabaya, 24 April  
2020

Penulis

## UCAPAN TERIMA KASIH

Tugas akhir ini tidak mungkin dapat terselesaikan tanpa bantuan banyak pihak. Untuk itu, penulis menyampaikan terima kasih kepada pihak-pihak yang membantu dan mendukung penulis selama proses pembuatan tugas akhir ini dari awal hingga akhir.

Semua pihak tersebut meliputi:

1. Kedua orang tua penulis Arif Budi Subekti dan Maria Muliana serta adik dari penulis Martinus Aditya Dwisadana yang selalu memberikan doa dan dukungan penuh kepada penulis selama berkuliah di Teknik Kelautan FTK ITS.
2. Bapak Prof. Ir. Eko Budi Djatmiko, M.Sc., Ph.D. selaku dosen pembimbing 1 yang telah memberikan banyak ilmu dan saran seputar bidang hidrodinamika bangunan terapung.
3. Bapak Ir. Imam Rochani, M.Sc. selaku dosen pembimbing 2 yang telah memberikan banyak ilmu dan saran mengenai bidang instalasi pipa bawah laut.
4. Bapak Drs. Mahmud Musta'in, Ph.D., selaku dosen wali penulis yang telah memberikan banyak bimbingan, saran, serta semangat selama penulis berkuliah di Teknik Kelautan ITS.
5. Teman-teman Kabinet KITA, Gerbong Squad, dan Kontrakan Bassel Army yang telah menemani penulis selama kuliah baik dalam suka maupun duka walaupun lebih banyak dukanya. Semoga kita selalu diberikan kesehatan dan kesuksesan.
6. Teman-teman penghuni Lab. OPRES yang selalu ada 24 jam sehari 7 hari seminggu untuk menemani penulis mengerjakan Tugas Akhir ini. Semoga dilancarkan segala urusan kedepannya.
7. Teman-teman ADHIWAMASTYA P-56 L-34 yang selama ini selalu ada dalam perkuliahan maupun di luar perkuliahan serta memberikan cerita-cerita tak terlupakan selama perkuliahan. See you on top.
8. Teman-teman Kerja Praktik di PT. PHE ONWJ, Mas Zulian, Mas Novian, Histro, dan Aziz serta manager dan mentor-mentor yang telah memberi banyak pengalaman seputar dunia kerja.

9. Adik-adik Revastra dan Navramerta, serta mas-mas Tritonous, Maelstrom, Valtameri, dan Varuna yang telah memberikan banyak ilmu seputar kuliah, KP, TA, dan dunia kerja serta menemani penulis selama berkuliah.
10. Seluruh dosen dan karyawan Teknik Kelautan FTK ITS yang selalu memberi dorongan kepada penulis untuk menyelesaikan tugas akhir ini.
11. Pihak-pihak lain yang tidak bisa penulis sebutkan satu persatu.



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# BAB I

## PENDAHULUAN

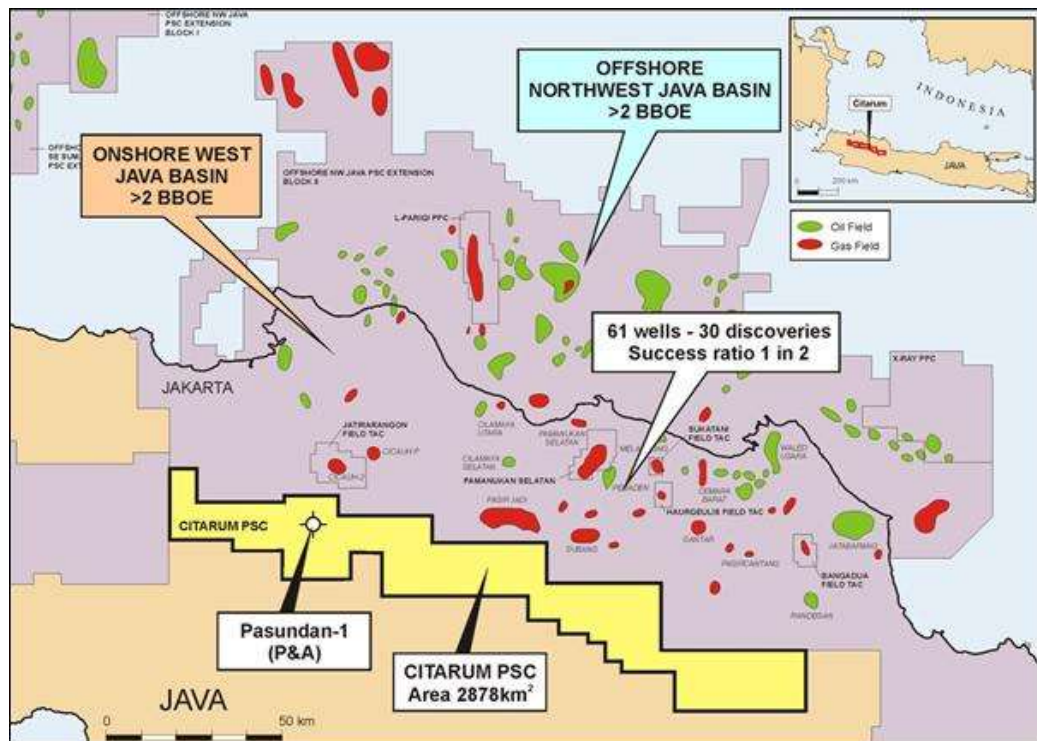
### 1.1 Latar Belakang

Pipa bawah laut merupakan salah satu sarana transportasi fluida yang paling ekonomis pada era ini (Guo, 2005). Fungsi utama dari pipa bawah laut adalah menyalurkan hidrokarbon yang diambil dari reservoir ke fasilitas penyimpanan atau pemrosesan yang ada di daratan. Salah satu fluida yang paling sering diangkut dengan menggunakan pipa bawah laut adalah gas alam. Maka, pipa bawah laut merupakan salah satu penopang utama dalam berjalannya industri minyak dan gas di Indonesia. Kebutuhan terhadap pipa bawah laut tergolong cukup tinggi melihat keadaan saat ini dimana cadangan minyak dan gas mulai banyak digali di area lepas pantai atau *offshore*. Sebelum pipa bawah laut dapat digunakan, maka pertama-tama harus dilakukan kegiatan instalasi pipa bawah laut terlebih dahulu. Ada beberapa jenis atau metode instalasi pipa bawah laut seperti *s-lay*, *j-lay*, *reel lay*, dan *towing*. Namun, yang paling umum digunakan pada perairan Indonesia terutama di laut Jawa bagian utara adalah instalasi dengan jenis *s-lay*.

Dalam proses instalasi pipa bawah laut ada beberapa kegiatan yang dilakukan. Namun, salah satu kegiatan utamanya adalah *pipelaying*. *Pipelaying* adalah suatu bagian dari instalasi pipa bawah laut dimana kegiatan penyambungan dan pelatakan pipa di dasar laut dilakukan. Untuk melakukan kegiatan ini, maka diperlukan suatu *vessel*. Ada beberapa jenis *vessel* yang dapat digunakan untuk kegiatan *pipelaying* seperti *pipe laying semisubmersibles*, *pipe laying ships and barges*, *pipe laying reel ships*, dan *towing or pulling vessels* (Soegiono, 2007). Yang difokuskan pada Tugas Akhir ini adalah *pipe laying ships and barges*, spesifiknya yang digunakan adalah *Pipe Lay Barge (PLB)*.

Ketika kegiatan *pipelaying* dilaksanakan, ada beberapa faktor yang mempengaruhi kapabilitas dari PLB. Yang dimaksud dengan kapabilitas disini adalah kemampuan PLB melakukan instalasi pipa secara aman. Salah satu faktor yang mempengaruhi adalah tinggi gelombang signifikan yang diperbolehkan pada saat instalasi pipa. Konfigurasi *roller* akan berpengaruh

terhadap bentuk *curvature* pada bagian *overbend*. Jika *curvature* salah atau *roller* tidak menopang pipa dengan benar, maka pipa akan terkena tegangan yang melebihi ketentuan yang mana dapat menyebabkan *buckling* pada pipa. Selanjutnya, jika tegangan yang di-*apply* oleh mesin *tensioner* tidak mencukupi, akan berpengaruh pada *curvature* pipa di bagian *sagbend* dan moment pada stinger. Kegagalan seperti deformasi plastis, *buckling*, dan *collapse* dapat mengenai pipa (Febrianti, 2017). Terakhir, jika tinggi gelombang yang mengenai PLB saat instalasi melewati batas amannya, maka kegiatan pipelaying harus dihentikan dan pipa harus dilepas. Ini akan berpengaruh ke penjadwalan proyek dan berpotensi menimbulkan kerugian bagi perusahaan. Pada Gambar 1.1, dijelaskan mengenai daerah ladang minyak dan gas *Offshore North West Java*. Untuk perencanaan suatu proyek, daerah ini akan dibagi menjadi beberapa wilayah seperti *Bravo*, *Foxtrot*, *Kilo*, dll. Kemudian, akan dibagi lagi menggunakan system grid untuk penjabaran data lingkungan yang lebih detail.



**Gambar 1.1** Ladang Minyak dan Gas Offshore North West Java (sumber: Google.com)

## 1.2 Rumusan Masalah

Permasalahan yang akan dibahas pada Tugas Akhir ini adalah:

1. Berapa tinggi maksimal gelombang signifikan yang diijinkan untuk mengenai *Pipe Lay Barge* pada saat operasi pipelaying pada pipa dengan diameter 8 inch, 10 inch, dan 12 inch?
2. Berapa tinggi maksimal gelombang signifikan yang diijinkan untuk mengenai *Pipe lay Barge* pada saat proses pipelaying pada arah datang gelombang  $0^{\circ}$ ,  $45^{\circ}$ ,  $90^{\circ}$ ,  $135^{\circ}$ , dan  $180^{\circ}$ ?

## 1.3 Tujuan

Dari permasalahan diatas, tujuan yang ingin dicapai dari Tugas Akhir ini adalah:

1. Mengetahui tinggi gelombang maksimal yang diperbolehkan untuk mengenai *Pipe Lay Barge* pada saat proses instalasi pipa berjalan pada pipa dengan diameter 8 inch, 10 inch, dan 12 inch.
2. Mengetahui tinggi gelombang maksimal yang diperbolehkan pada saat proses instalasi pipa berjalan pada arah datang gelombang  $0^{\circ}$ ,  $45^{\circ}$ ,  $90^{\circ}$ ,  $135^{\circ}$ , dan  $180^{\circ}$ ?

## 1.4 Manfaat

Dari tugas akhir ini diharapkan, dapat diketahui tinggi gelombang maksimal yang diperbolehkan pada saat instalasi pipa berjalan dengan variasi diameter pipa, diketahui tinggi gelombang maksimal yang diperbolehkan saat instalasi pipa berjalan pada arah datang gelombang  $0^{\circ}$ ,  $45^{\circ}$ ,  $90^{\circ}$ ,  $135^{\circ}$ , dan  $180^{\circ}$ , serta mengetahui korelasi antara sudut stinger dengan sudut wave slope sehingga tegangan pada stinger tidak melebihi ketentuan. Sehingga, hasil analisa dari Tugas Akhir ini dapat membantu untuk menjaga proses instalasi pipa bawah laut berjalan dengan aman.

### 1.5 Batasan Masalah

Adanya batasan masalah ditujukan untuk menghindari permasalahan semakin melebar dari topik yang dibahas, Sehingga, digunakan batasan-batasan sebagai berikut:

1. Instalasi pipa menggunakan metode S-Lay.
2. Arah datang gelombang diasumsikan pada  $0^0$ ,  $45^0$ ,  $90^0$ ,  $135^0$ , dan  $180^0$  terhadap *barge*.
3. Bangunan atas *barge* tidak dimodelkan.
4. Barge dalam kondisi *free floating*.
5. Analisa dilakukan pada pipa dengan diameter 8 inch, 10 inch, dan 12 inch.
6. Tinggi roller pada instalasi bersifat konstan.
7. Panjang stinger konstan.
8. Kondisi seabed diasumsikan datar
9. Analisa statis dan dinamis pada instalasi pipa menggunakan software OFFPIPE
10. Code yang digunakan untuk validasi model Pipe Lay Barge adalah ABS *Rules for Building and Classing Mobile Offshore Drilling Unit*.
11. Code yang digunakan untuk cek tegangan maksimum adalah DNV OS F-101 mengenai *Rules for Submarine Pipeline System*.

### 1.6 Sistematika Penulisan

Adapun sistematika penulisan dari Tugas Akhir ini adalah sebagai berikut:

#### 1. BAB I Pendahuluan

Menjelaskan tentang latar belakang disusunnya tugas akhir, perumusan masalah, tujuan, batasan masalah, manfaat, serta sistematika penulisan yang digunakan dalam tugas akhir ini.

#### 2. BAB II Tinjauan Pustaka dan Landasan Teori

Pada bab ini penulis akan membahas tinjauan pustaka dan dasar teori yang menjadi sumber referensi penulis dalam menyelesaikan tugas akhir ini. Secara rinci bab ini berisikan tinjauan pustaka yang menjadi acuan dari penelitian tugas akhir, yaitu dasar-dasar teori, rumus-rumus dan code/rules yang digunakan dalam penelitian tugas akhir ini dicantumkan dalam bab ini.

#### 3. BAB III Metodologi Penelitian

Menjelaskan tentang alur pengerjaan tugas akhir ini dengan tujuan untuk memecahkan masalah yang diangkat dalam bentuk diagram alir atau flow chart yang disusun secara sistematis yang dilengkapi pula dengan penjelasan mengenai prosedur penelitian yang dilakukan.

#### 4. BAB IV Hasil dan Pembahasan

Berupa merupakan pembahasan dari hasil analisa-analisa yang telah dilakukan pada penelitian yang meliputi analisa hasil dan pembahasan hasil analisa.

#### 5. BAB V Kesimpulan dan Saran

Kesimpulan penting yang diperoleh dari hasil analisa dan pembahasan yang telah dilakukan. Pada bab ini juga berisikan saran sebagai tindak lanjut penelitian untuk permasalahan terkait.

## BAB II TINJAUAN PUSTAKA DAN DASAR TEORI

### 2.1 Tinjauan Pustaka

Instalasi pipa merupakan kegiatan untuk memasang pipa yang akan menyambungkan satu platform dengan platform lainnya. Di dalam suatu proyek instalasi pipa, terdapat kegiatan yang disebut *pipelaying* atau penggelaran pipa. Namun pada umumnya, istilah *pipelaying* jarang digunakan dan untuk kegiatan penggelaran pipa lebih banyak disebut sebagai instalasi pipa bawah laut. Menurut Mousseli (1981), ada berbagai macam metode instalasi pipa bawah laut, yaitu *lay-barge*, *reel*, *bottom pull*, *tow*, serta metode lainnya. Penentuan Metode-metode ini melihat dari kondisi lingkungan seperti tinggi gelombang, kedalaman laut, dll. Selain itu, dilihat juga jenis pipa yang diinstal serta diameternya.

Selanjutnya, menurut Soegiono (2007), untuk metode instalasi dengan *lay-barge*, penyambungan pipa dilakukan di atas *barge* yang mana terdapat beberapa *working station* yang digunakan sebagai tempat pengelasan, NDT *check*, serta pemasangan *field joint coating*. Selain itu juga terdapat mesin *tensioner* yang berfungsi untuk menarik pipa dan juga memberikan *tension* kepada pipa supaya pipa tidak mengalami kerusakan atau mendapat tegangan yang berlebihan. Lalu, terdapat *stinger* yang merupakan alat penyangga yang berfungsi untuk membentuk lengkungan pada bagian atas atau biasa disebut *overbend*. Untuk metode instalasi pipa bawah laut menggunakan *lay-barge*, ada beberapa jenisnya, yaitu *s-lay*, *j-lay*, dan *reel lay*. Pada tugas akhir ini, analisa dilakukan pada metode instalasi *s-lay* yang mana menggunakan *lay-barge*

*Lay-barge* merupakan metode yang paling sering digunakan. Sejak ditemukannya *lay-barge* berbentuk kotak, banyak modifikasi yang telah dilakukan untuk meningkatkan *pipelaying* kapabilitas dari *lay-barge* (Mousseli, 1981). Salah satu jenis dari *lay-barge* adalah Pipe Lay Barge (PLB). PLB merupakan sebuah *barge* atau tongkang yang didalamnya berisi perlengkapan untuk melakukan proses penyambungan dan pelatakan pipa di dasar laut. Terdapat beberapa peralatan yang menopang fungsi PLB yaitu, *roller* yang berfungsi untuk menggerakkan pipa di dalam *barge*, *tensioner* yang berfungsi

untuk memberikan tegangan pada pipa, dan *stinger* sebagai penopang pipa di bagian buritan (belakang) PLB saat pipa memasuki bagian *overbend*.

Yang dimaksud dengan Analisa kapabilitas dari PLB adalah bagaimana PLB tetap dapat beroperasi jika dihadapkan pada kondisi gelombang laut di lapangan. Penelitian sebelumnya, pernah dilakukan oleh Putri (2017) mengenai tegangan pipa dengan variasi sudut stinger. Kemudian, oleh Febrianti, 2017 yang meneliti sampai ke perhitungan buckling pipa. Untuk analisa pengaruh Gerakan lay barge pada instalasi pipa bawah laut pada PLB, pernah dianalisa oleh Panambang (2007) dan Purnama (2007). Analisa dilakukan dari pemodelan barge yang terkena beban lingkungan yang kemudian responsnya menjadi input untuk mencari tegangan pada pipa saat instalasi. Untuk pengaruh gerakan *vessel* terhadap *stress* pada pipa, telah dilakukan penelitian oleh Gong (2014) yang menyatakan bahwa gerakan *pitch* merupakan gerakan yang mempengaruhi *stress* pada pipa. Sementara gerakan *roll*, *yaw*, dan *sway* berpengaruh terhadap *lateral displacement* pipa.

## **2.2 Dasar Teori**

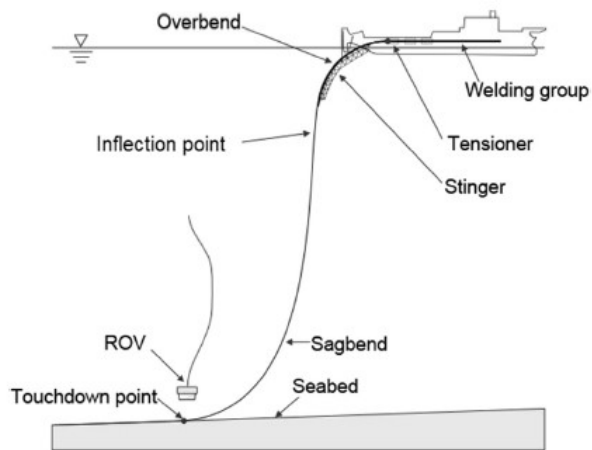
Dasar teori yang digunakan pada Tugas Akhir ini meliputi metode instalasi pipa bawah laut, teori dasar gerakan bangunan apung, RAO, spektrum gelombang, spektrum respon, tegangan pada pipa, analisa dinamis, arah pembebanan dan sistem koordinat software OFFPIPE, analisa pipelaying dengan software OFFPIPE, dan kode & standar yang dipakai untuk validasi hasil running software OFFPIPE.

### **2.2.1 Metode Instalasi Pipa Bawah Laut**

#### **1. Metode S-lay**

Metode s-lay adalah metode instalasi pipa yang sering digunakan dalam instalasi pipa bawah laut di air yang relatif dangkal. Metode ini disebut demikian karena profil dari segmen pipa antara *stinger* dan dasar laut membentuk huruf S memanjang selama peletakkan pipa. *Stinger* adalah struktur rangka yang dilengkapi dengan *roller* yang berguna untuk mendukung pipa selama instalasi dan juga menciptakan

kelengkungan pada pipa ketika berada di *overbending*. Radius kelengkungan dari *stinger* sesuai dengan *bending stress* maksimum. Pada *Lay-Barge* biasanya terdapat tempat untuk pengelasan pipa (*welding station*), mesin *tension*, NDT *station* untuk mengecek pengelasan dan *coating station*. Ketika pipa sudah dilas menjadi beberapa sambungan kemudian dilanjutkan proses pemasukan pipa ke laut, pada proses tersebut pipa akan terbantu masuk ke laut karena adanya gerakan *barge* akibat mekanisme jangkarnya. Beberapa *roller* ditempatkan diatas *stinger* dan *barge*. *Roller* ini membantu pipa ketika pipa bergerak dari barge masuk ke laut. *Roller* ditempatkan pada *stinger* dan pada *vessel*, bersamaan dengan *tensioner*, akan menciptakan kekuatan lengkungan pada pipa (Bai, 2001). *Tensioner* dalam metode *S-Lay* berfungsi menarik pipa yang akan di instalasi ke arah dalam *barge* untuk memastikan bahwa tegangan yang terjadi pada pipa tidak melebihi tegangan izin. Laut yang lebih dalam membutuhkan kekuatan *stinger* dan *tensioner* yang lebih besar. Untuk lebih jelasnya, metode instalasi s-lay ditampilkan pada Gambar 2.1.



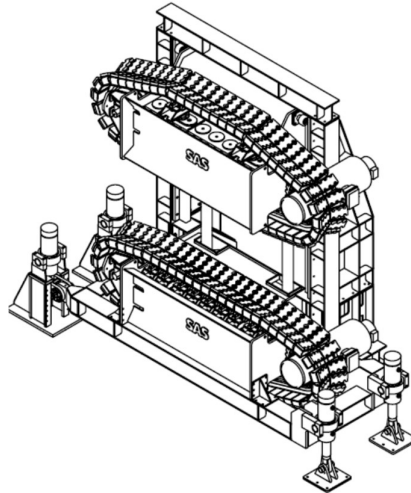
**Gambar 2. 1** Metode S-lay. (Bai, 2014)

Bagian pipa antara titik infleksi dan *stinger* disebut dengan wilayah *overbend*, sedangkan bagian pipa antara titik infleksi dengan dasar laut disebut wilayah *sagbend*.



- *Stinger*  
*Stinger* berfungsi sebagai penopang pipa pipa dapat meluncur ke bawah dari buritan pada barge sampai ke seabed. *Stinger* yang berada pada buritan kapal tersebut membentuk radius curvature yang disebabkan oleh lengkungan pada *stinger* itu sendiri maupun adanya sudut *stinger*. Selain itu, pada *stinger* tersebut dapat diubah-ubah kelengkungannya dengan menaik-turunkan roller-roller dengan menggunakan pin yang berada pada *stinger* hingga membentuk radius curvature yang diinginkan. Sudut *stinger* juga dapat dirubah untuk menyesuaikan dengan kondisi kedalaman seabed dan pipa. *Stinger* berbentuk melengkung yang merupakan bagian dari lingkaran dengan jari-jari yang biasa disebut radius curvature dan digunakan sebagai ukuran lengkung dari *stinger*.
- *Overbend*  
Daerah *overbend* biasanya dimulai dari *tensioner* pada *lay barge*, melalui *barge ramp*, dan turun ke *stinger* sampai titik *lift-off* dimana pipa tidak lagi didukung oleh *stinger*. Pada daerah *overbend* ini diharapkan total regangan akibat dari berat pipa sendiri, *moment bending* pada tumpuan, atau roller tidak melebihi desain faktor yaitu 0.205 % untuk analisa statis dan 0.305% untuk analisa dinamis (berdasarkan DNV OS-F101 2013 sec. 13).
- *Sagbend*  
Daerah *sagbend* biasanya dimulai dari titik *inflection* sampai titik *touch down* pada *seabed*. Tegangan pada *sagbend* di kontrol oleh jari-jari *stinger*, *departure angle* dan pengaturan *roller*. Tegangan diharapkan kurang dari 87% SMYS (berdasarkan DNV OS-F101 2013 sec. 13).
- Mesin *Tensioner*

*Tensioner* merupakan mesin penarik yang menarik pipa menuju *stinger*. Selain itu *tensioner* juga berfungsi sebagai pengontrol besar kurva yang terbentuk di *sagbend* dan mengatur momen pada *stinger*. Dengan mengatur beban-beban tersebut maka bentuk-bentuk kegagalan seperti deformasi *plastis*, *buckling* dan *collapse* dapat dihindari. *Tensioner* biasanya terdiri dari track bawah yang terhubung secara *loop*. Berikut Gambar 2.2



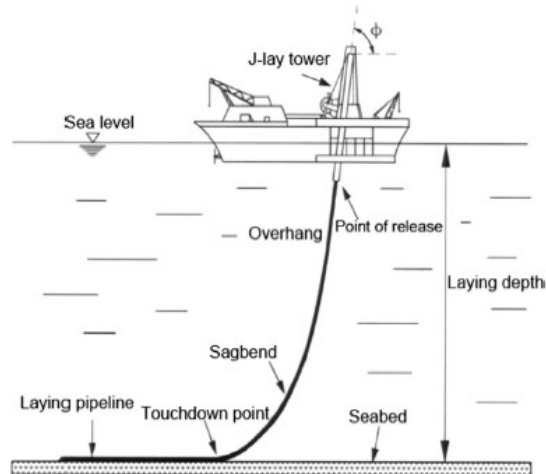
memperjelas sebuah tensioner pada salah satu *barge*:

**Gambar 2. 2** *General Arrangement* Mesin *Tensioner* (SAS, 2009)

## 2. Metode J-lay

Dalam metode ini digunakan untuk instalasi pipa bawah laut dengan kedalaman yang sangat dalam. Dalam metode ini, kapal menggunakan sebuah menara sentral, biasanya dikonversi dari kapal pengeboran hal

ini dilakukan cara pengelasan pada posisi vertikal dan peluncuran pipa dari menara sentral. Pada metode ini tidak ada daerah kritis pada tekukan atas (*overbend*) dan hanya ada pada bagian tekukan bawah (*sagbend*) sebagai daerah kritis. Kesulitan terbesar dalam metode ini adalah untuk melakukan pengelasan vertikal, meskipun membawa keuntungan dibandingkan dengan metode *S-Lay* untuk perairan dalam. Metode *J-Lay* memiliki tingkat produksi yang relatif rendah karena terbatasnya jumlah *work station*. Pada daerah *sagbend*, gerakan *surge* dan *heave* mempunyai pengaruh yang signifikan terhadap tegangan pada *pipeline* sedangkan gerakan *pitch* tidak signifikan pengaruhnya terhadap tegangan *bending* pada *pipeline*, (Brewer dan Dixon, 1969). Penjelasan tentang metode instalasi ini diperjelas dengan adanya Gambar 2.3 di bawah ini:

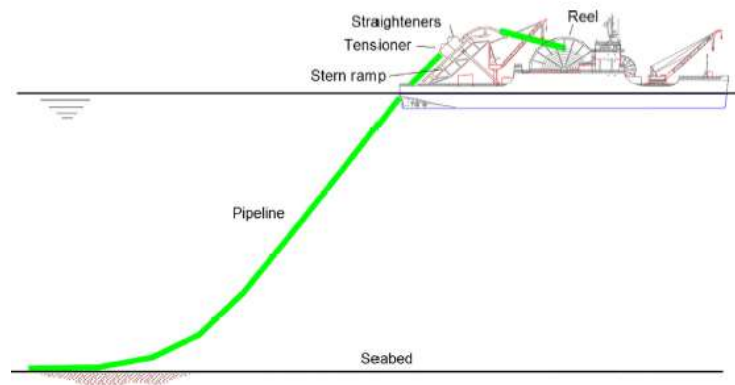


**Gambar 2.3** Metode J-lay (Bai, 2014)

### 3. Metode *Reel Lay*

Metode *reel lay* merupakan metode pemasangan pipa dengan cara menggulung pipa panjang pada sebuah gulungan berukuran yang sangat besar, kemudian pipa tersebut akan dipasang di dasar laut seperti pada pemasangan kabel bawah laut. Dalam metode ini umumnya pipa yang dinstal adalah pipa dengan diameter kecil atau pipa yang fleksibel. Pipa yang dipakai, tidak diselimuti dengan beton

(*concrete coating*) akan tetapi harus tetap didesain supaya stabil setelah proses instalasi, hal dimaksudkan agar pipa dapat digulung *reel*. Adapun selimut yang digunakan untuk melindungi pipa adalah bahan-bahan yang *flexibel* tanpa kerusakan seperti jenis bahan *epoxy*. Jika pipa ini dinstall secara *horizontal* maka akan berbentuk *S-Lay* namun jika dinstall secara vertikal maka akan berbentuk *J-Lay*. Metode ini lebih murah jika dibandingkan dengan metode lain ditinjau dari sisi waktu dan biaya, namun terbatas untuk pipa dengan ukuran diameter kecil. Penjelasan tentang metode instalasi ini diperjelas dengan adanya Gambar 2.4 di bawah ini:



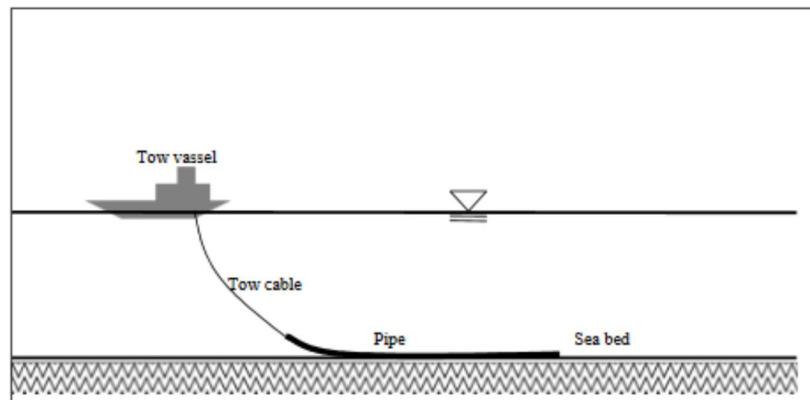
**Gambar 2. 4** Reel Lay (Bai, 2014)

#### 4. Metode *Towing*

Metode *towing* biasanya digunakan untuk proses instalasi pipa bawah laut dengan kondisi perairan laut yang relatif dangkal dan kondisi perairan yang tenang. Secara umum metode ini digunakan dengan cara menarik pipa yang sudah disiapkan di darat dan kemudian ditarik ke tempat instalasi dengan cara ditarik oleh *tug boat*. Masing-masing segmen antara 200-300 meter yang kemudian diberi akses menuju perairan melalui *launching ramp* atau *roller* yang dibangun sepanjang pantai menuju *surf zone*. Setelah segmen pipa yang telah siap (telah melewati pemeriksaan) ditarik ke laut dengan menggunakan *barge/tow vessel* yang berada 1000 meter atau lebih dari pantai. Metode *towing* biasanya dilengkapi dengan menggunakan pelampung atau *buoy* yang

dikenakan pada pipa untuk mempermudah pipa ditarik. Selain *bottom tow*, diperlukan minimal dua buah kapal, satu di depan dan satu di belakang. Dalam *controlled depth tow*, kecepatan kapal harus disesuaikan dengan kedalaman pipa yang diinginkan pada saat *towing*. Berdasarkan kedalaman dan keadaan perairannya *towing method* dibedakan menjadi beberapa metode berdasarkan posisi pipa terhadap dasar laut, sebagai berikut:

- Bottom Tow

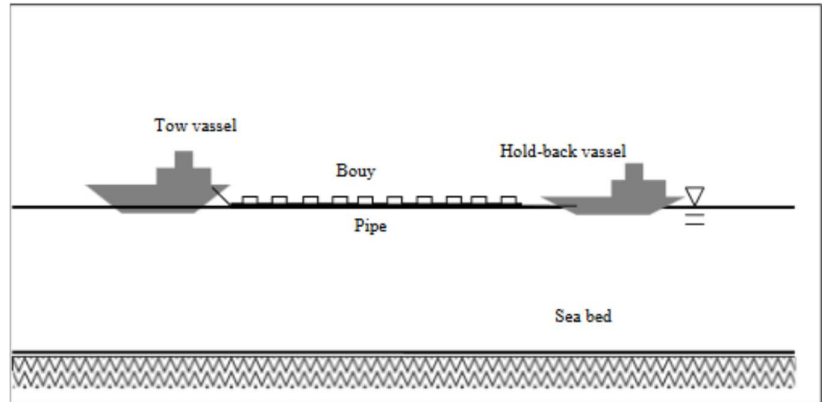


**Gambar 2. 5** Metode *Bottom Tow* (Zenalabidi, 2010)

Pada Gambar 2.5 diatas merupakan metode instalasi pipa yang akan dipasang yang telah disiapkan di darat (*onshore*) untuk menjalani seluruh proses fabrikasi. Selanjutnya pipa yang telah selesai menjalani proses fabrikasi di Tarik dengan kapal menuju tempat pemasangan. Selama proses mobilisasi pipa dari darat menuju tempat pemasangan terdapat kontrak antara pipa dengan dasar lautan. Selanjutnya langkah yang dilakukan ialah

pemasangan proteksi terhadap abrasi yang terjadi pada pipa. Disamping itu pengaruh arus laut dan gelombang menyebabkan kestabilan pipa mengalami gangguan umumnya installation contractor menggunakan pelapis dari concrete untuk menjaga kestabilan pipa selama pipa ditarik ke lokasi pemasangan.

- Surface Tow

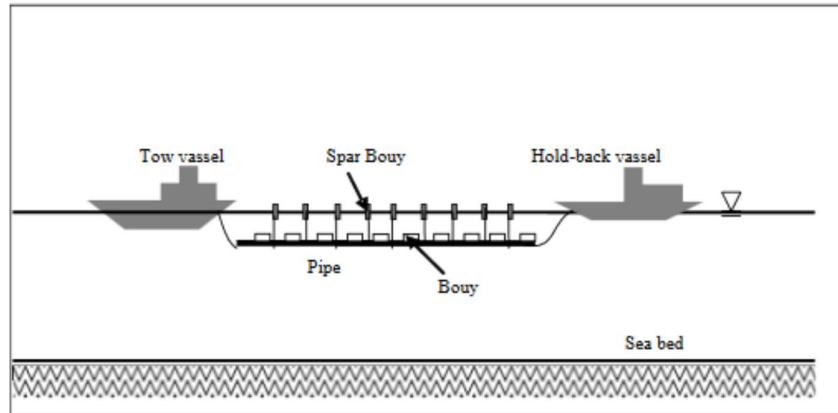


**Gambar 2. 6** Metode Surface Tow (Zenalabidi, 2010)

Pada Gambar 2.6 diatas, merupakan metode instalasi pipa sama dengan metode *bottom tow* dimana pipa yang akan dipasang yang telah disiapkan di darat untuk menjalani seluruh proses fabrikasi. Selanjutnya pipa yang telah selesai menjalani proses fabrikasi di tarik dengan kapal menuju tempat pemasangan. Selama proses mobilisasi pipa yang ditarik mengapung diatas permukaan laut dengan menggunakan tangki-tangki pengapung. Resiko yang dihadapi lebih besar karena pengaruh ombak dan arus laut sangat

besar terhadap pipa. Diantara seluruh metode *tow to side*, metode *surface tow* merupakan metode yang dapat digunakan untuk menarik pipa terpanjang.

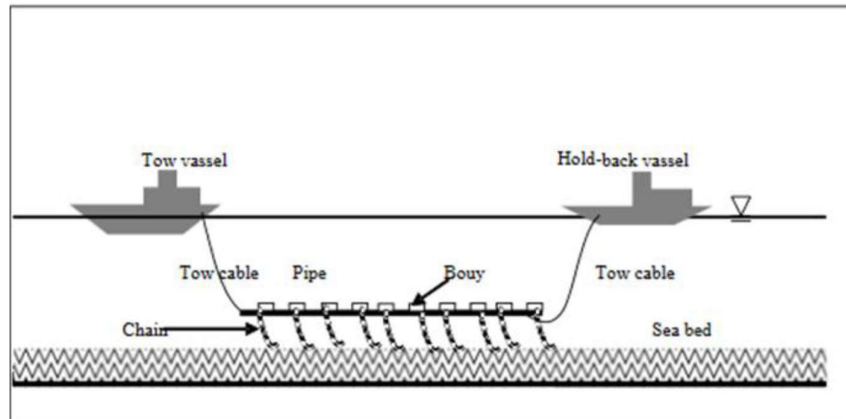
- Mid-depth Tow



**Gambar 2. 7** Metode *Mid-depth Tow* (Zenalabidi, 2010)

Pada metode Gambar 2.7, sebelumnya pipa yang ditarik melayang pada suatu kedalaman tertentu yang dapat diatur. Metode ini merupakan metode paling baik karena tidak menghadapi resiko abrasi, pengaruh ombak dan arus laut serta dapat melewati pipa lepas pantai yang sudah ada (*existing offshore pipeline*). Metode ini membutuhkan kapal penarik dan kapal triller untuk menjaga dan tegangan yang terjadi selama penarikan.

- Off-bottom Tow



**Gambar 2. 8** Metode *Off-bottom Tow* (Zenalabidi, 2010)

Pada Gambar 2.8 diatas merupakan metode instalasi sama dengan metode *bottom tow* dimana pipa yang akan dipasang yang telah disiapkan di darat (*onshore*) untuk menjalani seluruh proses fabrikasi. Selanjutnya pipa yang telah selesai menjalani proses fabrikasi di tarik dengan kapal menuju tempat pemasangan. Selama proses mobilisasi pipa dari darat menuju tempat pemasangan tidak terdapat kontak antara pipa dengan dasar lautan karena pipa melayang beberapa meter diatas dasar lautan. Selanjutnya langkah yang dilakukan ialah sistem *bouyancy* untuk pipeline system harus diperhitungkan berat dalam airnya.

### 2.2.2 Pipe Lay Barge

Perkembangan pipe lay barge sangatlah pesat. Sejak tahun 1950 sampai sekarang, sudah ada tiga generasi pipe lay barge yang ada. Generasi ketiga



sudah mempunyai kemampuan untuk melakukan kegiatan instalasi sampai kedalaman maksimal 600 m seperti di Selat Sicilia dan pada kondisi laut yang ganas seperti di laut utara. Pada dasarnya, pipe lay barge adalah sebuah saran apung yang mampu melakukan beberapa kegiatan seperti:

1. Seaborne work platform.
2. Mooring and positioning of barge.
3. Pipe delivery, transfer and storage.
4. Double ending of pipe, conveying to line up and line up.
5. Welding joints.
6. X-ray (NDT).
7. Field joint coating.
8. Tensioning of line during laying.
9. Support of line into water (using Stinger).
10. Survei and navigation.
11. Anchor handling boats.
12. Communication.
13. Personnel transfer by helicopter or crew boat.
14. Diver and ROV for underwater inspection.
15. Control center.
16. Akomodasi awak kapal.
17. Pembangkit listrik.
18. Bengkel pemeliharaan.

Tension pada pipeline dari barge sampai dasar laut selalu dijaga untuk mengurangi vertical bending dan kecenderungan terjadinya buckle (tekukan). Pipe lay barge juga sangat dipengaruhi oleh dynamic surge motion (gerak lambung) yang tergantung dari perbandingan antara panjang gelombang, panjang barge, dan kedalaman perairan. Gerak surge ini biasanya sangat sulit untuk diikuti oleh tensioner dan juru las. Jadi pipa harus dikunci pada posisi yang tetap terhadap barge. Oleh karena itu, tegangan pada pipa harus berulang-ulang ditambah atau dikurangi pada steady state force.

Dalam pengoperasiannya, pipe lay barge akan bergerak sepanjang satu panjang pipa (sekitar 12 meter) setiap 15 menit. Pada pipe lay barge generasi ketiga yang mempunyai teknologi pengelasan yang lebih canggih, kecepatannya akan semakin tinggi. Laju pemasangannya bisa mencapai 1 sampai 2 nautical miles per hari.

Tegangan yang terjadi pada pipa pada waktu instalasi tidak hanya ditentukan oleh axial tension tetapi juga berat pipa ketika tenggelam (submerged weight). Untuk menghindari terjadinya buckle, ada tiga tempat kritis yang dievaluasi, yaitu roller barge paling belakang (biasanya dekat dengan bagian buritan barge), stinger departure point, dan sagbend mendekati atau menyentuh bagian dasar laut. Tingkat tegangan paling tinggi biasanya terjadi pada roller paling belakang dekat buritan barge karena jarak antar roller yang terlalu lebar dan gaya reaksi roller yang besar. Tegangan ini dipengaruhi oleh tinggi roller pada barge serta curvature pipa pada barge serta sudut stinger.

### **2.2.3 Teori Dasar Gerakan Bangunan Apung**

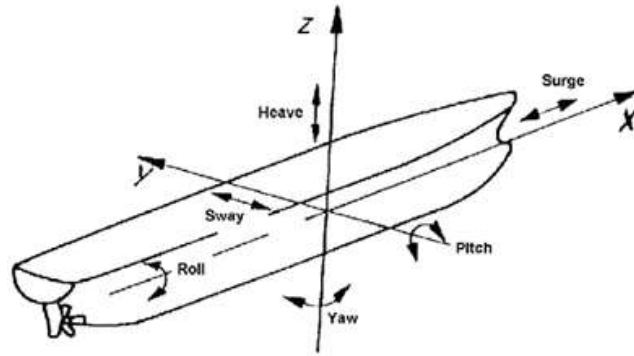
Bangunan apung (dalam hal ini *pipelay barge*) memiliki enam mode gerakan bebas (*Six Degree of Freedom*) yang terbagi menjadi dua kelompok, yaitu 3 mode gerakan translasional dan 3 mode gerakan rotasional dalam 3 arah sumbu (Bhattacharyya, 1978). Seperti yang ditunjukkan pada Gambar 2.9, berikut adalah penjelasan keenam mode gerakan tersebut:

#### **1. Mode Gerak Translasional**

- a. *Surge*, gerakan transversal arah sumbu x
- b. *Sway*, gerakan transversal arah sumbu y
- c. *Heave*, gerakan transversal arah sumbu z

#### **2. Mode Gerak Rotasional**

- a. *Roll*, gerakan rotasional arah sumbu x
- b. *Pitch*, gerakan rotasional arah sumbu y
- c. *Yaw*, gerakan rotasional arah sumbu z



**Gambar 2. 9** Enam Derajat Kebebasan Gerakan Struktur Terapung

Dari Gambar 2.9 di atas dapat diketahui bahwa hanya 3 macam Gerakan yang merupakan gerakan osilasi murni yaitu *heaving*, *rolling*, dan *pitching*, karena gerakan ini bekerja di bawah gaya atau momen pengembali ketika struktur itu terganggu dari posisi kesetimbangannya. Untuk gerakan *surging*, *swaying*, dan *yawing* struktur tidak kembali menuju posisi kesetimbangannya semula ketika terganggu, kecuali ada gaya atau momen pengembali yang menyebabkannya bekerja ke arah yang berlawanan.

#### 2.2.4 Response Amplitude Operator (RAO)

*Response Amplitude Operator* (RAO) atau disebut juga dengan *transfer function* merupakan fungsi respon yang terjadi akibat gelombang dalam rentang frekuensi mengenai struktur. RAO merupakan alat untuk mentransfer gaya gelombang menjadi respon gerakan dinamis struktur. RAO memuat informasi tentang karakteristik gerakan bangunan laut yang disajikan dalam bentuk grafik, dimana absisnya adalah parameter frekuensi, sedangkan ordinatnya adalah rasio antara amplitudo gerakan pada mode tertentu,  $\zeta_{k0}$ , dengan amplitudo gelombang,  $\zeta_0$ . Menurut Chakrabakti (1987), RAO dapat dicari dengan Persamaan 2.1 di bawah ini:

$$\text{RAO}(\omega) = \frac{\zeta_{k0}(\omega)}{\zeta_0(\omega)} \text{ (m/m)} \quad (2.1)$$

Dengan:

$\zeta k_0(\omega)$  = amplitudo struktur (m)

$\zeta_0(\omega)$  = amplitudo gelombang (m)

Respons gerakan RAO untuk gerakan translasi (*surge, sway, heave*) merupakan perbandingan langsung antara amplitudo gerakan dibandingkan dengan amplitudo gelombang insiden (keduanya dalam satuan panjang) (Djarmiko, 2012). Persamaan RAO untuk gerakan translasi sama dengan Persamaan 2.1 di atas.

Sedangkan untuk respons gerakan RAO untuk gerakan rotasi (*roll, pitch, yaw*) merupakan perbandingan antara amplitudo gerakan rotasi (dalam radian) dengan kemiringan gelombang, yakni yang merupakan perkalian antara gelombang ( $k_w = \omega^2/g$ ) dengan amplitudo gelombang insiden (Djarmiko, 2012):

$$\text{RAO}(\omega) = \frac{\zeta k_0(\omega)}{\zeta_0(\omega)} = \frac{\zeta k_0}{(\omega^2/g)\zeta_0} \text{ (rad/rad)}$$

(2.2)

### 2.2.5 Spektrum Gelombang

Spektrum gelombang laut diperlukan untuk mengetahui karakteristik dari gelombang di permukaan laut. Bentuk-bentuk spektrum gelombang laut dapat digunakan untuk menentukan periode puncak gelombang dan panjang gelombang. Spektrum gelombang laut yang sering digunakan antara lain spektrum Pierson- Moskowitz, spektrum JONSWAP (*Joint North Sea Wave Project*) dan spektrum ITTC ISSC. Bentuk spektrum gelombang laut dapat diketahui melalui data periode gelombang. Dengan mengumpulkan data frekuensi gelombang yang dapat dihitung dari periode gelombang ke dalam masing-masing fungsi kerapatan spektral, maka dapat diperoleh periode puncak spektrum. Melalui persamaan gelombang yang memberikan hubungan antara panjang gelombang dan suatu periode gelombang maka diperoleh panjang gelombang pada saat periode gelombang puncak.

Pada tugas akhir ini, dalam analisisnya akan diunakan spektrum gelombang JONSWAP. JONSWAP merupakan proyek yang dilakukan di perairan *North Sea*. Berdasarkan DNVGL RP-F109 (2017), formulasi spektrum JONSWAP merupakan modifikasi dari spektrum *Pierson-Moskowitz*. Spektrum JONSWAP mendeskripsikan angin yang mengakibatkan gelombang dengan kondisi *seastate* yang ekstrim. Kriteria dalam DNV RP-C205, bahwa spektrum JONSWAP dapat diaplikasikan untuk perairan dengan:

$$2.6 < T_p / (H_s)^{1/2} < 5$$

(2.3)

Persamaan spektrum JONSWAP (DNV RP-F109) dapat dilihat pada Persamaan 2.4:

$$S(\omega) = a \cdot g^2 \omega^2 \exp[-1.25(\omega/\omega_p)^4] \gamma^{\exp[0.5(\frac{\omega-\omega_p}{\sigma\omega})^2]}$$

(2.4)

Dengan:

$$a = \frac{5}{16} \frac{H_s^2 \omega_p^4}{g^2} (1 - 0.287 \ln \gamma)$$

$\sigma$  = Spectral Width Parameter

$$= 0.07 \text{ jika } \omega \leq \omega_p$$

$$= 0.09 \text{ jika } \omega > \omega_p$$

$\omega_p$  = Angular Spectral Frequency (rad/s)

$$= 2\pi/T_p$$

$\omega$  = Wave Frequency (rad/s)

$$= 2\pi/T$$

$H_s$  = Tinggi Gelombang Signifikan (m)

$T_p$  = Peak Periode (s)

$T$  = Periode Gelombang (s)

Nilai Peakedness Parameter dapat dicari dengan menggunakan Persamaan 2.5 di bawah ini:

$$\gamma = \begin{cases} 5 & \varphi \leq 3.6 \\ \exp(5.75 - 1.15\varphi) & 3.6 < \varphi < 5 ; \varphi = \frac{T_p}{\sqrt{H_s}} \\ 1 & \varphi \geq 5 \end{cases}$$

(2.5)

Formulasi spektrum JONSWAP sering digunakan dalam perancangan dan analisis bangunan lepas pantai yang beroperasi di Indonesia. Hal ini dikarenakan perairan di Indonesia adalah perairan kepulauan atau perairan tertutup. Namun, berdasarkan kajian-kajian yang ada, dalam melakukan analisis bangunan lepas pantai yang dioperasikan di Indonesia, maka nilai parameter  $\gamma$  yang dipakai sekitar 2 - 2,5 untuk mengurangi dominasi energi yang dikontribusikan oleh frekuensi gelombang tertentu saja (Djarmiko, 2012).

#### 2.2.6 Respons Bangunan Apung pada Gelombang Acak (Spektra Respons)

Respons bangunan apung pada khususnya kapal yang diakibatkan oleh eksitasi gelombang acak telah diperkenalkan pertama kali oleh St. Denis dan Pierson (1953). Gerakan bangunan apung dalam kondisi ideal dapat dihitung sebagai reaksi adanya eksitasi gelombang sinusoidal, dengan karakteristik tinggi atau amplitudo dengan frekuensi tertentu. Perhitungan kemudian dilakukan dengan mengambil amplitudo gelombang yang konstan, namun nilai frekuensinya divariasikan dengan interval kenaikan tertentu. Gelombang acak merupakan superposisi dari komponen-komponen pembentuknya yang berupa gelombang sinusoidal dalam jumlah tidak terhingga. Tiap-tiap komponen gelombang mempunyai tingkat energi tertentu yang dikontribusikan, yang kemudian secara keseluruhan diakumulasikan dalam bentuk spektrum energi gelombang (Djarmiko, 2012). Dalam analisis respons bangunan apung pada gelombang reguler dapat diketahui pengaruh interaksi hidrodinamik pada massa tambah, *potential damping*, dan gaya eksternal. Analisis tersebut menghasilkan respons struktur pada gelombang reguler. Respons struktur pada gelombang acak dapat dilakukan dengan mentransformasikan spektrum gelombang menjadi spektrum respons.

Spektrum respons didefinisikan sebagai respons kerapatan energi pada struktur akibat gelombang. Hal ini dapat dilakukan dengan mengalikan nilai pangkat kuadrat dari *Response Amplitude Operator* (RAO) dengan spektrum gelombang pada daerah struktur bangunan apung tersebut beroperasi. Persamaan respons struktur secara matematis dapat dituliskan seperti Persamaan 2.7 di bawah ini:

$$S_R = [RAO(\omega)]^2 \times S(\omega) \quad (2.6)$$

Dengan:

$S_R$  = Spektrum Repons ( $m^2$ -sec)

$S(\omega)$  = Spektrum Gelombang ( $m^2$ -sec)

$RAO(\omega)$  = Transfer Function

$\omega$  = Frekuensi Gelombang (rad/sec)

## 2.2.7 Tegangan pada Pipa

### 2.2.7.1 Tegangan Normal

Tegangan normal adalah tegangan yang bekerja dalam arah tegak lurus terhadap bidang dan dapat berupa tegangan tarik (*tensile stress*) atau tegangan tekan (*compressive stress*).

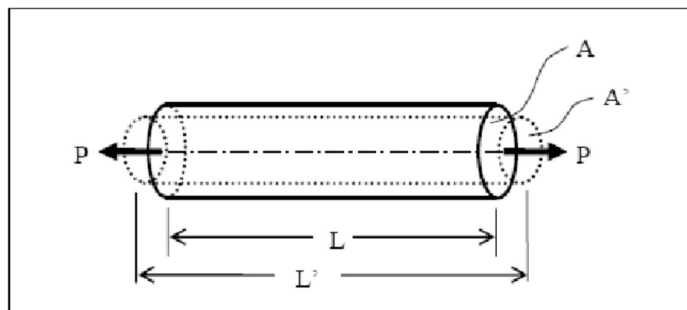
$$\sigma = \frac{P}{A} \quad (2.7)$$

Dengan:

$\sigma$  = Tegangan Normal ( $N/m^2$ )

P = Gaya Tarik / Tekan (N)

A = Luas Penampang Melintang ( $m^2$ )



**Gambar 2. 10** Pembebanan Aksi pada Batang Tubular

Pada Gambar 2.10 batang tubular dengan luas penampang A dan panjang L mengalami pembebanan *aksial* akibat gaya tarik P. Akibat gaya ini, batang akan mengalami perubahan panjang sebesar:

$$\Delta L = L' - L \quad (2.8)$$

Dengan:

$\Delta L$  = Pertambahan Panjang (m)

$L'$  = Panjang Batang Setelah Menerima Beban (m)

$L$  = Panjang Batang Awal (m)

Perbandingan antara pertambahan panjang ( $\Delta L$ ) dengan panjang mula-mula disebut sebagai regangan *aksial* dan dirumuskan sebagai berikut:

$$\varepsilon = \frac{\Delta L}{L} \quad (2.9)$$

Hal ini berarti jari-jari penampangnya juga mengalami perubahan dari R menjadi R'. Regangan ini disebut dengan regangan radial dan secara matematis dirumuskan sebagai berikut:

$$\varepsilon = \frac{R' - R}{R} \quad (2.10)$$

Dengan:

$\varepsilon$  = *aksial strain* (m)

R = jari-jari penampang mula-mula (m)

R' = jari-jari penampang setelah menerima beban (m)



Perbandingan antara regangan radial dengan regangan aksial disebut sebagai perbandingan *Poisson*. Secara matematis dirumuskan sebagai berikut:

$$\nu = \frac{\varepsilon'}{\varepsilon} \quad (2.11)$$

Dengan:

$\varepsilon$  = aksial strain (m)

$\varepsilon'$  = radial strain (m)

### 2.2.7.2 Tegangan pada *Overband*

*Overbend* terjadi terutama pada stinger dan pada sebagian *lay barge*. Peletakan penumpu *roller* didesain sehingga membentuk *radius curvature* tertentu dan diatur agar dapat mengontrol besar tegangan pada *overbend*. Besarmomen yang terjadi disepanjang *stinger* terdistribusi pada gambar. Besartegangan momen lentur yang terjadi pada *stinger* dapat dihitung dengan persamaan berikut:

$$\sigma a = \frac{ED}{2Rcv} \quad (2.12)$$

Dimana:

$\sigma a$  = Momen lentur (MPa)

E = Modulus Young

Rcv = Radius Kurvatur

Radius kurvatur minimum pada stinger ditentukan dengan persamaan sebagai berikut:

$$Rcv = \frac{ED}{2\pi y} \quad (2.13)$$

Dimana:

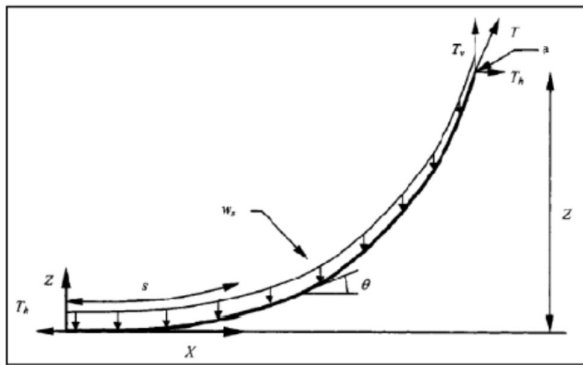
$\sigma a$  = Momen lentur (MPa)

E = Modulus Young

Rcv = Radius Kurvatur

### 2.2.7.3 Tegangan pada *Sagbend*

Ketika *pipeline* mencapai dasar laut pada saat instalasi, maka *pipeline* akan membentuk kurva tertentu secara alami akibat terjadinya defleksi yang besar. Bentuk kurva tersebut disebut dengan *sagbend*. Kurva *sagbend* sangat dipengaruhi oleh besar gaya aksial yang diberikan oleh *tensioner*. Model *catenary* merupakan model yang dapat digunakan dalam perhitungan hubungan antara gaya tarik *tensioner* dan bentuk kurva. Komponen horizontal dari gaya tarik nilainya konstan dari titik sentuh/jatuh di dasar laut hingga ke ujung *stinger*. Berikut Gambar 2.11 model *catenary* untuk memperjelas penjelasan sebelumnya:



**Gambar 2. 11** Model *Catanary* (Bai, 2014)

Pada titik jatuh di dasar laut, radius kurvatur merupakan yang terbesar dan nilainya dapat dihitung berdasarkan persamaan diatas dengan kondisi batas.

$$1/R = W_s / T_h$$

(2.14)

Hubungan antar kurvatur sagband dan regangan pada pipa sebagai berikut:

$$E = r / R$$

(2.15)

Persamaan catenary shape pada sagband dieksresikan sebagai berikut:

$$z = \frac{Th}{Ws} \left( \cosh \frac{XWs}{Th} - 1 \right)$$

(2.16)

Dimana:

X = Jarak horizontal dari touch down point

Z = Kedalaman

Th = Gaya horizontal pada dasar laut

Ws = Berat pipa tercelup perunit

Kemudian:

$$\frac{d\theta}{ds} = \frac{d^2z}{dx^2} \cos \theta = \frac{Ws}{Th} \cosh \frac{Xws}{Th} \cos \theta$$

(2.17)

Dimana:

$\theta$  = Sudut terhadap X axis

s = Panjang bentangan pipa

#### 2.2.7.4 Hoop Stress

Dalam pemilihan tebal pipa, pertimbangan tebal material untuk menahan perbedaan tekanan dari luar dan dari dalam yang disebut dengan *hoop stress* (Gambar 2.10) adalah sangat penting. Ilustrasi hoop stress ditampilkan pada gambar 2.12. Adapun formulasi untuk menghitung *hoop stress* berdasarkan DNV OS-F101 adalah seperti Persamaan 2.21 berikut:

$$\sigma_h = (P_i - P_e) \frac{D-t}{2t}$$

(2.18)

Dimana:

P<sub>i</sub> = Internal Pressure (MPa)

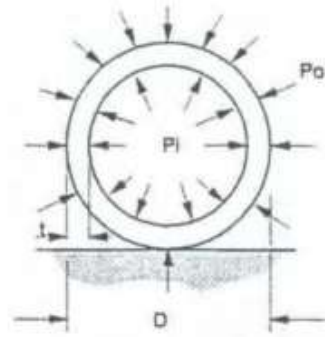
P<sub>e</sub> = External Pressure (MPa)

D = Outside Diameter of Linepipe (m)

t = Nominal Wall Thickness (m)

**HOOP STRESS**

$$S_h = \frac{(P_i - P_o)D}{2t}$$



**Gambar 2. 12** Ilustrasi Hoop Stress pada Pipa Bawah Laut. (Bai, 2014)

**2.2.7.5 Longitudinal Stress**

Tegangan longitudinal yang diilustrasikan pada Gambar 2.18 adalah tegangan yang dipengaruhi oleh gaya yang diakibatkan oleh beban lingkungan yang bekerja disepanjang pipa (horizontal). Ilustrasi longitudinal stress ada pada Gambar 2.13. Adapun formulasi untuk menghitung *longitudinal stress* berdasarkan DNV OS F-101 adalah seperti Persamaan 2.22 berikut:

$$\sigma_l = \frac{N}{\pi(D-t)t} + \frac{M}{\frac{\pi(D^4 - (D-2t)^4)}{32D}} \tag{2.19}$$

Dimana:

N = Pipe Wall Force (N)

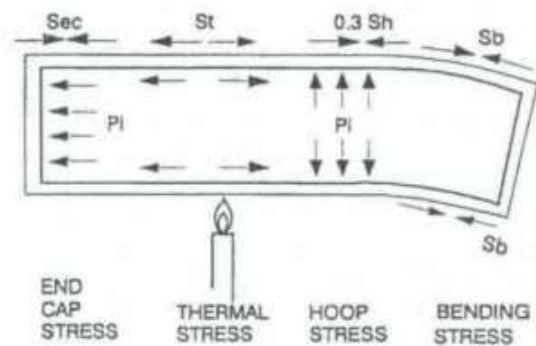
M = Bending Moment (kN-M)

D = Outside Diameter of Linepipe (m)

T = Nominal Wall Thickness (m)

**LONGITUDINAL STRESS**

$$S_l = 0.3S_h + S_b + S_t + S_{ec}$$



**Gambar 2. 13** Ilustrasi Longitudinal Stress pada Pipa. (Bai, 2014)

#### 2.2.7.6 Tegangan Ekuivalen (*Von-Misses Stress*)

Setelah mendapatkan hoop stress dan longitudinal stress maka tegangan ekuivalen dapat dicari. Untuk mencari tegangan ekuivalen, kita menggunakan formulasi Von Misses Stress yang terdapat dalam DNV OS-F101, seperti yang ditunjukkan pada Persamaan 2.23 di bawah ini:

$$\sigma_e = \sqrt{\sigma_h^2 + \sigma_l^2 - \sigma_h\sigma_l + 3\tau_{hl}^2}$$

(2.20)

Dimana:

$\sigma_e$  = Equivalent Stress (MPa)

$\sigma_l$  = Longitudinal Stress (MPa)

$\sigma_h$  = Hoop Stress (MPa)

$\tau_{hl}$  = Tangential Sheer Stress (MPa)

#### 2.2.8 Analisa Dinamis

Menurut Chakrabhakti ada dua pendekatan dasar yang dipertimbangkan dalam menganalisa masalah struktur terapung, yaitu dengan metode *frequency domain* dan *time domain*. *Frequency domain* biasanya dilakukan untuk penyelesaian yang sederhana. Solusi pada metode ini diperoleh melalui pendekatan persamaan diferensial. Keterbatasan dari metode ini adalah semua persamaan non-linier harus diubah dalam bentuk persamaan linier. Sedangkan untuk metode *time domain* menggunakan pendekatan integrasi numeris dari persamaan gerak dari semua sistem non-linier. Beberapa contoh persamaan yang menggunakan analisa non-linier adalah gaya drag, gaya pada *mooring*, dan viskositas *damping*.

Dalam *American Petroleum Institute 1987 API RP 2T* membagi Analisa dinamis kedalam 2 metode analisa domain, yaitu:

- a. *Frequency domain analysis* adalah simulasi kejadian pada saat tertentu dengan interval frekuensi yang telah ditentukan sebelumnya. Domain

frekuensi juga dapat digunakan untuk memperkirakan respon gelombang acak termasuk gerakan *platform* dan percepatan, gaya tendon dan sudut. Keuntungannya adalah lebih menghemat waktu perhitungan dan juga input atau output-nya sering digunakan oleh persancang. Kekurangan dari metode ini adalah semua persamaan non-linier harus diubah dalam bentuk linier.

- b. *Time domain analysis* adalah penyelesaian gerakan dinamis struktur berdasarkan fungsi waktu. Pendekatan yang digunakan dalam metode ini menggunakan prosedur integrasi waktu dan akan menghasilkan respon *time history* berdasarkan waktu  $x(t)$ .

Keuntungan dari metode *time domain* dibandingkan metode *frequency domain* adalah semua tipe non-linier (*matrix system* dan beban-beban eksternal) dapat dimodelkan dengan lebih tepat. Kekurangannya adalah memerlukan waktu yang panjang dalam pengerjaannya. Simulasi *time domain* dapat dikerjakan menurut beberapa skema integrasi. Untuk dapat mewakili kondisi sebenarnya simulasi dilakukan minimal tiga jam.

Dalam menyelesaikan persamaan tersebut menggunakan prosedur integrasi waktu, satu didapat solusi pada pola respon *time history* ( $t$ ). Pada umumnya semua matrik sistem (massa, *damping* dan kelakuan) dapat difungsikan sebagai *response* atau waktu, seperti pada kasus vektor beban (analisis non-linier) matrik system konstan memberikan analisis *linier*. *Output* dari analisis *time domain* adalah *respon time serie* dimana:

- a. Simulasi gelombang reguler dapat digunakan untuk memprediksikan *transfer function* dengan mengambil *respon respon amplitude* dengan *input amplitudo* gelombang.
- b. Spektrum respon dapat dihitung dari *time series*, memberikan informasi yang sama dengan analisis frekuensi domain.
- c. Respon ekstrim dapat diestimasi secara langsung dari puncak respon selama simulasi.

### 2.2.9 Analisa Pipelaying Menggunakan *Software OFFPIPE*

Permodelan sistem instalasi pipa di dalam *software offpipe* diawali dengan memasukkan data *properties* pipa yang telah diperoleh sebelumnya seperti *outside diameter*, *wall thickness*, berat pipa, dll. Setelah memodelkan *properties* pipa kemudian dimodelkan *laybarge* yang diawali dengan memasukkan data panjang, lebar, tinggi dan sarat *laybarge*. Permodelan *laybarge* di dalam *software offpipe* juga memasukkan jenis support yang akan digunakan selama proses instalasi seperti tensioner dan *simple pipe support*. Selain itu, juga diinput data kecepatan arus, tanah, serta kondisi sagbend. Untuk mencapai tujuan yang diinginkan, maka harus dilakukan analisa dinamis. Input dari Analisa dinamis selain yang sudah disebutkan diatas adanya waktu pembebanan, *wave spectrum* (menggunakan persamaan JONSWAP), dan RAO berbentuk *motion response*. Output dari analisa dinamis adalah tinggi gelombang maksimal yang diijinkan untuk mengenai pipe lay barge selama masa operasi. Tinggi gelombang dapat dipilih tinggi gelombang signifikan maupun maksimal tergantung dari data yang diinput.

### 2.2.10 Kode dan Standar

DNV OSF-101 edisi tahun 2013 merupakan panduan dan pedoman praktis untuk properti proses instalasi pipa bawah laut yang dikeluarkan oleh Lembaga independen terpercaya (*Det Norske Veritas*). DNV OS-F101 mengatur prosedur pemilihan material, fabrikasi, instalasi, inspeksi, pengujian, *commissioning*, operasi, perawatan, kualifikasi ulang dan pelepasan pipa (*abandonment*).

Format yang digunakan dalam DNV OS-F101 menggunakan *LRFD (Load and Resistance Factor Design)* dan *ASD (Allowable Stress Design)*. Selama proses instalasi maupun operasi sistem perpipaan lepas pantai menerima pembebanan yang bersifat fluktuatif baik dari beban lingkungan, beban insiden maupun beban instalasi. Dalam kondisi aktual, ketidakpastian beban tersebut diantisipasi dengan mengalikan faktor tertentu untuk beban yang terjadi.

Pada saat proses instalasi berlangsung, tegangan yang terjadi pada pipa tidak boleh melebihi tegangan yang diizinkan. Jenis material pipa yang digunakan dalam penelitian ini adalah *linepipe* API 5L X52. Berikut ini kriteria tegangan yang diizinkan berdasarkan DNV OS-F101:

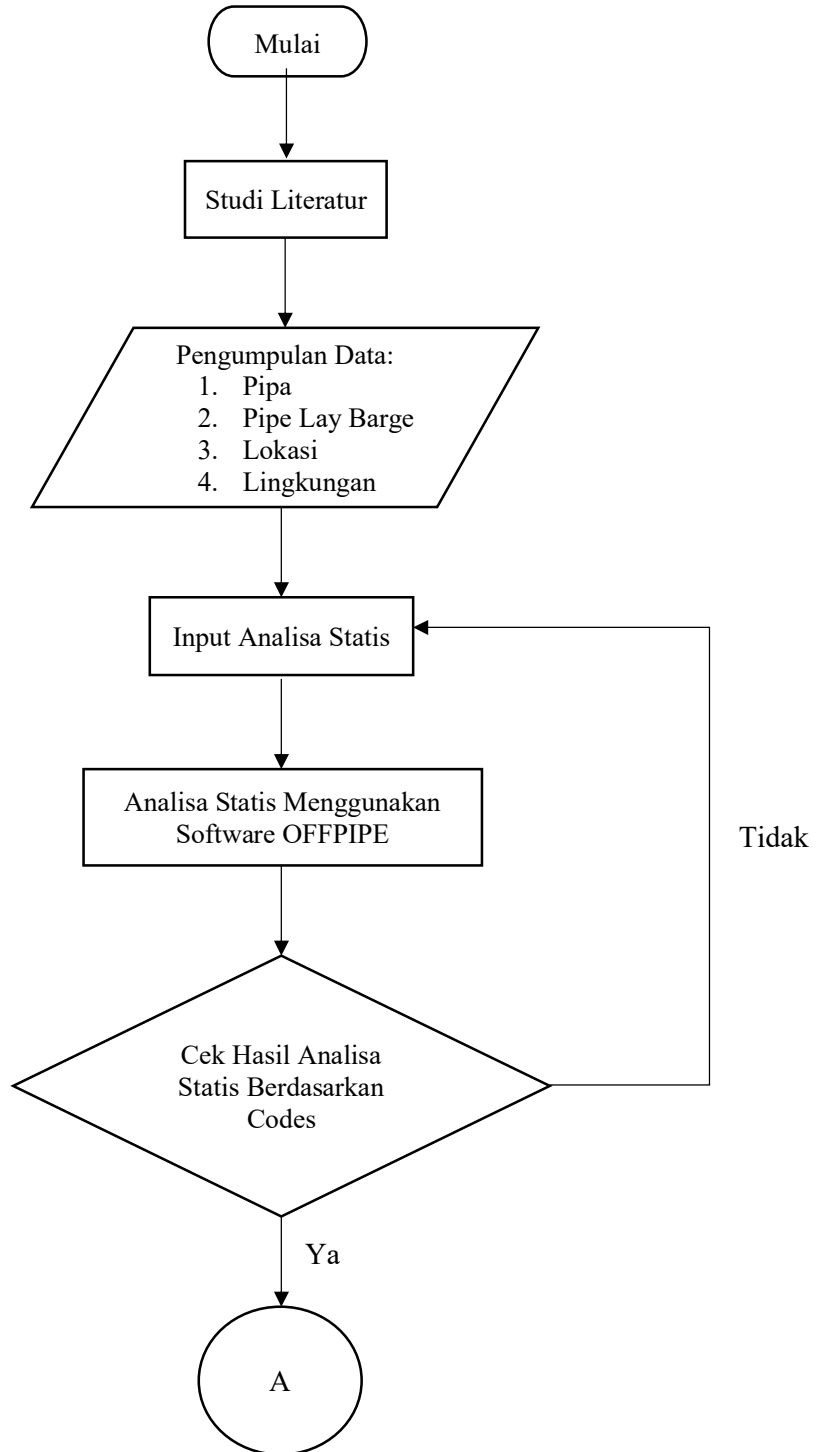
Tegangan yang diizinkan pada wilayah *sagbend* dan *stinger tip* dijelaskan pada Persamaan 2.24.

$$\sigma_e \leq 87\% \text{ SMYS} \quad (2.21)$$

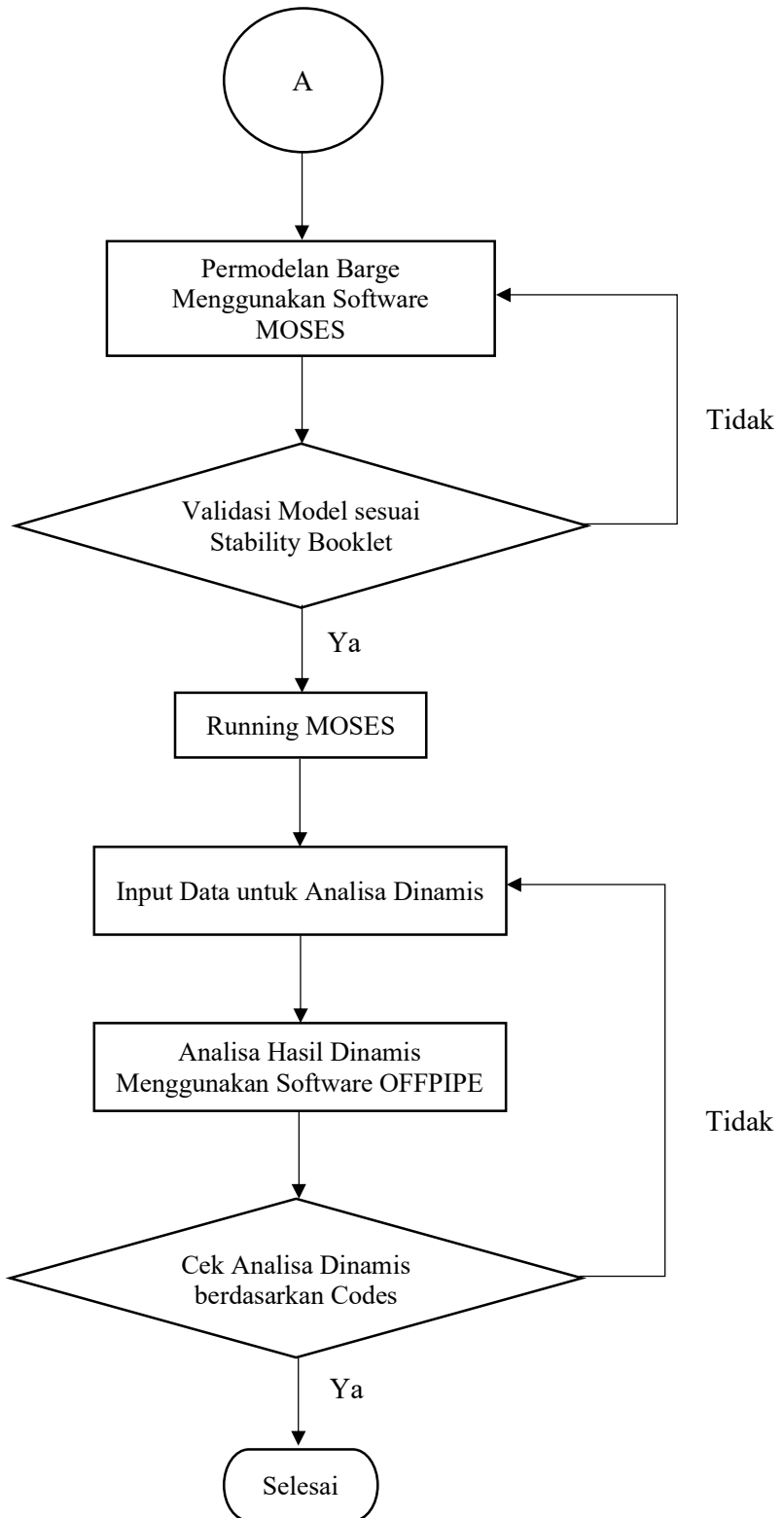


**BAB III  
METODOLOGI PENELITIAN**

**3.1 Diagram Alur**



**Gambar 3. 1** Diagram Alur Pengerjaan Tugas Akhir



**Gambar 3.1** Diagram Alur Pengerjaan Tugas Akhir (lanjutan)

### 3.2 Prosedur Penelitian

Pada Tugas Akhir ini akan dijelaskan masing-masing urutan langkah kerja yang dilakukan yang telah disusun dalam bentuk diagram alir pada halaman sebelumnya. Langkah-langkah yang dijalankan dalam kerja praktek ini adalah sebagai berikut:

#### 1. Studi litelatur dan tinjauan pustaka.

Studi literatur yang dilakukan dalam hal ini bertujuan untuk menyusun dasar teori, hal ini terkait pada literatur maupun jurnal-jurnal baik dari dalam maupun luar negeri yang terkait dengan pembahasan materi yang dikaji dalam studi ini. Buku, jurnal serta data tersebut digunakan sebagai pedoman dalam melakukan penelitian Tugas Akhir ini yang berhubungan dengan analisa pipa saat instalasi dengan metode *S-Lay*. Serta mempelajari *software* yang akan digunakan yaitu *software* OFFPIPE.

#### 2. Pengumpulan data.

Dilakukannya studi lapangan bertujuan untuk mencari data-data yang diperlukan pada pembahasan masalah yang akan dianalisa dalam studi ini. Studi lapangan dapat dilakukan dengan melakukan pengamatan langsung terhadap obyek yang akan dikaji atau hanya dengan melihat beberapa data yang terkait atau sesuai dengan masalah yang akan dikaji ataupun mencari beberapa data-data sebagai kegiatan persiapan untuk pelaksanaan studi ini. Data yang akan digunakan dimulai dari data desain pipa, data lingkungan dan *coating parameter*. Data-data yang dibutuhkan antara lain diameter pipeline, ketebalan pipeline, berat dan jenis material pipeline.

#### 3. Input data analisa statis.

Properti pipa, *coating*, konfigurasi *roller* pada *barge*, *stinger* serta besar *tension* yang diberikan oleh mesin *tensioner* akan diinput ke *software* OFFPIPE. Kurvatur pada *barge* serta besarnya sudut *stinger* akan diinput berdasarkan permodelan pada *software* AutoCAD.

#### 4. Analisa statis menggunakan *Software* OFFPIPE.

Tegangan pipa saat instalasi akan dianalisa. *Barge* berada pada kondisi statis atau diam. Output dari analisa ini adalah besarnya tegangan pada pipa, konfigurasi *roller* pada *barge* dan *stinger*, *touchdown point*, serta besarnya *tension* yang diberikan oleh mesin *tensioner*.

5. Cek hasil analisa statis sesuai Codes.

Berdasarkan DNV OS F-101, tegangan pada pipa tidak boleh melebihi 87%. Tabel 3.1 menjelaskan mengenai kriteria tegangan pada saat kondisi statis & dinamis berdasarkan DNV OS F-101 (*chapter three*):

**Tabel 3. 1** Kriteria tegangan menurut DNV OS F-101

Design Condition	Load Case	Allowable Stress (% SMYS)	
		Sagbend	Overbend
Statis	Beban pipa (selfweight)	87%	87%
Dinamis	Beban lingkungan (gelombang signifikan, pasang surut, arus, dan RAO)		

6. Permodelan *Pipe Lay Barge* menggunakan *Software* MOSES.

Membuat permodelan *Pipe Lay Barge* Hafar Neptune pada software MOSES berdasarkan data-data yang telah diperoleh. Permodelan ini adalah saat *barge* dalam kondisi *free floating*.

7. Verifikasi Model sesuai *Stability Booklet*.

Validasi *barge* dilakukan dengan membandingkan hasil permodelan *barge* antara *software* MOSES dan *Stability Booklet* yang ada. Apabila validasi tidak terpenuhi, maka harus dilakukan permodelan *barge* kembali dengan *software* MOSES hingga memenuhi syarat validasi. Berdasarkan ABS, kriteria validasi pada perbandingan *displacement* bernilai tidak lebih dari 2%. Analisis ini juga untuk mendapatkan karakteristik gerak kapal disetiap arah datang gelombang.

8. Running *Software* MOSES.

Running software MOSES ini bertujuan untuk mendapatkan RAO (*Response Amplitude Operator*) dari *Pipe Lay Barge* yang telah dimodelkan sebelumnya. Analisa adalah berbasis frekuensi. Diinput batasan serta interval frekuensi atau periode untuk mendapatkan RAO sesuai dengan arah gelombang yang mengenai *Pipe Lay Barge*.

### 9. Analisa dinamis menggunakan Software OFFPIPE

Output berupa RAO Motion Response dari software MOSES tadi menjadi input ke analisa dinamis menggunakan *software* OFFPIPE. Selain itu, hasil dari analisa statis, waktu pembebanan, serta *wave spectrum* (untuk pembebanan gelombang menggunakan persamaan JONSWAP) juga merupakan input untuk analisa dinamis. Yang diambil dari persamaan JONSWAP adalah *alpha* dan *gamma*. Parameter tersebut dibutuhkan oleh OFFPIPE untuk menentukan tinggi gelombang yang mengenai barge saat instalasi.

### 10. Cek hasil analisa dinamis sesuai Codes.

Hasil analisa dinamis adalah tinggi gelombang maksimal yang dapat mengenai barge saat proses instalasi pipa bawah laut berlangsung. Jika tinggi maksimal tersebut tercapai maka proses instalasi harus dihentikan. Sementara jika tinggi gelombang melebihi batas yang telah ditetapkan maka pipa harus dilepas dari PLB dan akan diangkat lagi jika tinggi gelombang sudah sesuai ketentuan (*abandonment & recovery procedure*). Yang perlu diperhatikan adalah besarnya tegangan pipa akibat pergerakan *barge* yang terkena gelombang. Kriterianya sama seperti pada analisa statis yaitu tidak boleh melebihi 87% SMYS (DNV OS F-101).

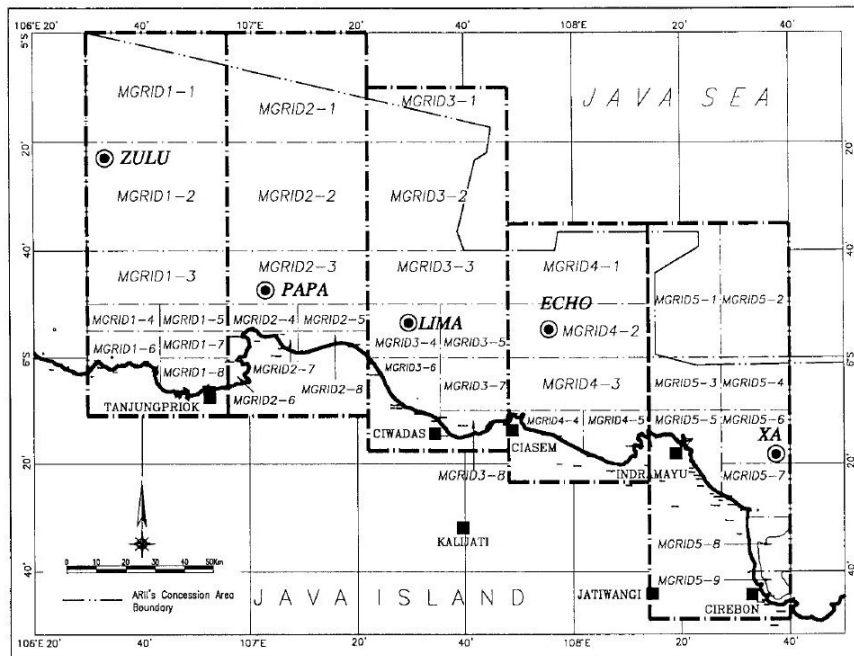
### 11. Kesimpulan hasil analisa.

Menyusun kesimpulan sesuai dengan permasalahan yang diangkat serta tujuan yang diharapkan.

## 3.3 Pengumpulan Data dan Identifikasi Data

### 3.3.1 Lokasi

Data yang digunakan dalam analisa penelitian ini merupakan data dari PT. Pertamina Hulu Energi *Offshore North West Java*, dimana data ini diambil di Lima Field, yang merupakan bagian dari ladang migas *Offshore North West Java*. Spesifiknya, pada MGRID 3-4. Untuk gambaran lokasi MGRID 3-4 ada pada Gambar 4.1 berikut ini.



Division of ONWJ Area into **Metocean Grids (MGRIDs)**

**Gambar 3. 2** Lokasi MGRD 3-4 Lima *Field* ONWJ (Sumber: Dokumen PT. X)

### 3.3.2 Lingkungan

#### 3.3.2.1 Metocean Parameter

Pada Tabel 3.2, akan dijelaskan mengenai ringkasan dari metocean parameter pada MGRID 3-4 Lima *Field*, ONWJ dengan kedalaman laut rata-rata sebesar 23 meter. Parameter yang disajikan adalah kecepatan angin, tinggi gelombang, wave steepness, water level, serta current speed pada masing-masing persenan kedalaman. Periode data yang disajikan adalah data 1 tahunan untuk kondisi instalasi serta data 100 tahunan untuk kondisi operasi.

**Tabel 3. 2** Ringkasan Metocean Parameters pada MGRID 3-4

Metocean Parameter			Return Periode (years)	
Item	Notation	Unit	1	100
<b>Wind Speed</b>				
60-minute mean	$U_{60}$	m/s	9.9	20.6
1-minute mean	$U_1$	m/s	12.3	25.7
3-seconds gust	$U_{gust}$	m/s	14.9	31.2
<b>Wave Height</b>				
Significant wave height	$H_s$	meters	1.8	3.6
Significant wave periode	$T_s$	s	6.3	8.3
Significant wave length	$L_s$	meters	60.9	97.1
Maximum individual wave height	$H_{max}$	meters	3.2	6.4
Maximum individual wave periode	$T_{max}$	s	6.6	9.4
Maximum individual wave length	$L_{max}$	meters	67.0	116.7
<b>Wave Steepness</b>				
Significant wave steepness	$(H/L)_s$		0.029	0.037
Maximum individual wave steepness	$(H/L)_{max}$		0.048	0.055
<b>Water Level</b>				
Astronomical tide: highest (above MSL)	HHWL	meters	0.53 *)	
lowest (below MSL)	LLWL	meters	0.61 *)	
Strom surge (above MSL)	$\eta$	meters	0.04	0.18
<b>Current Speed</b>				
At 0% of depth	$V_0$	m/s	0.79	1.22
10% of depth	$V_{10}$	m/s	0.69	1.00
20% of depth	$V_{20}$	m/s	0.61	0.84
30% of depth	$V_{30}$	m/s	0.55	0.72
40% of depth	$V_{40}$	m/s	0.51	0.63
50% of depth	$V_{50}$	m/s	0.48	0.57
60% of depth	$V_{60}$	m/s	0.46	0.52
70% of depth	$V_{70}$	m/s	0.44	0.49
80% of depth	$V_{80}$	m/s	0.43	0.46
90% of depth	$V_{90}$	m/s	0.42	0.45
100% of depth	$V_{100}$	m/s	0.42	0.43

### 3.3.2.2 Data Tanah

Data tanah yang ada di sepanjang daerah instalasi dapat dilihat pada

Tabel 3.3.

**Tabel 3. 3** Data Tanah pada MGRID 3-4

Description	Unit	Value
Soil Type	-	Very Soft Greenish Grey Clay
Undrained Shear Strength (Su)	kPa	2 – 6
Submerge Soil Density	(kN/m <sup>3</sup> )	4 – 7
Seabed Temperature	°C (°F)	28.9 (84)
Soil Conduct	W/m.K (BTU/hr.ft.F)	0.52 (0.30)
Longitudinal Coefficient of Friction	-	0.2

### 3.3.3 Data Teknis

#### 3.3.3.1 Data Pipa

Berikut akan dijelaskan dalam bentuk tabel mengenai data pipa yang digunakan pada analisa. Analisa akan dilakukan pada pipa dengan diameter 8 inch, 10 inch, dan 12 inch. Data spesifikasi pipa dapat dilihat pada Tabel 3.4 sampai Tabel 3.6.

**Tabel 3. 4** Data pipa dengan diameter 8 inch

Parameter		Units	Value
8"	Outer Diameter	mm	219.1
	Wall Thickness	mm	12.7
Corrosion allowance		mm	3
Material		-	API 5L Grade X52
SMYS		MPa (psi)	360 (52200)
SMTS		MPa (psi)	460 (66700)
Steel density		kg/m <sup>3</sup>	7850
Steel Young's modulus		MPa	2.07 x 10 <sup>5</sup>
Pipe Joint Length		m	12.2



Poisson Ratio	-	0.3
Coefficient of Thermal Expansion	1/°C	1.1 x 10 <sup>-5</sup>
Panjang pipa (instalasi)	km	1.2

**Tabel 3. 5** Data pipa dengan diameter 10 inch

Parameter		Units	Value
10"	Outer Diameter	mm	273.05
	Wall Thickness	mm	12.7
Corrosion allowance		mm	3
Material		-	API 5L Grade X52
SMYS		MPa (psi)	360 (52200)
SMTS		MPa (psi)	460 (66700)
Steel density		kg/m <sup>3</sup>	7850
Steel Young's modulus		MPa	2.07 x 10 <sup>5</sup>
Pipe Joint Length		m	12.2
Poisson Ratio		-	0.3
Coefficient of Thermal Expansion		1/°C	1.1 x 10 <sup>-5</sup>
Panjang pipa (instalasi)		km	6

**Tabel 3. 6** Data pipa dengan diameter 12 inch

Parameter		Units	Value
12"	Outer Diameter	mm	323.9
	Wall Thickness	mm	12.7
Corrosion allowance		mm	3
Material		-	API 5L Grade X52
SMYS		MPa (psi)	360 (52200)
SMTS		MPa (psi)	460 (66700)
Steel density		kg/m <sup>3</sup>	7850
Steel Young's modulus		MPa	2.07 x 10 <sup>5</sup>
Pipe Joint Length		m	12.2
Poisson Ratio		-	0.3
Coefficient of Thermal Expansion		1/°C	1.1 x 10 <sup>-5</sup>
Panjang pipa (instalasi)		km	9

### 3.3.3.2 Data Pipe Lay Barge

Untuk kegiatan instalasi, akan digunakan Pipe Lay Barge Hafar Neptune yang mana memiliki principal dimension yang dijelaskan pada Tabel 3.7. Kemudian, untuk spesifikasi Pipe Lay Barge Hafar Neptune ada pada Tabel 3.8. Dan untuk data konfigurasi roller pada barge, ada pada Tabel 3.9.

**Tabel 3. 7** Principal Dimension PLB Hafar Neptune

Data Kapal	Nilai	Satuan
LOA	85.34	m
Lebar PLB	24.34	m
Tinggi PLB	5.5	m
Sarat Air (Full Load)	3.25	m
Trim	0.5	deg

**Tabel 3. 8** Data Pipe Lay Barge

<b>Deskripsi</b>	<b>Parameter Barge</b>
Maximum Pipe tension Available	60 MT
No. of Tensioners Available on the Barge	2 nos
No. of Rollers on the Barge	7 nos
Length of Tensioner	6.5 m
Hitch X-Location (w.r.t stern)	0.497 m
Hitch Y-Loaction (w.r.t main deck)	-1.8 m
Laybarge Horizontal X-Coordinate Center of Motion (w.r.t stern)	-42.67 m
Laybarge Vertical Y-Coordinate Center of Motion (w.r.t main deck)	-2.75 m
Laybarge Lateral Z-Coordinate Center of Motion	0 m
Trim	0.5 deg

**Tabel 3. 9** Data Konfigurasi Roller pada Barge

<b>Barge Roller ID</b>	<b>Horizontal Distance from Barge Stern (m)</b>	<b>Height Relative to Main Deck (m)</b>
R2	64.22	1.838
R3	59.74	1.760
R4	48.24	1.560
T1	38.11	1.383
R5	33.44	1.302
T2	26.66	1.183
R6	21.34	1.092
R7	12.15	0.860
R8	-0.040	-0.260

Catatan:

1. Sudut trim barge adalah 0.5°.
2. “R” adalah Roller dan “T” adalah Tensioner.
3. R8 adalah Roller yang paling dekat dengan buritan barge.

### 3.3.3.3 Data Stinger

Data spesifikasi stinger yang digunakan untuk kegiatan instalasi dijelaskan pada Tabel 3.10. Untuk data konfigurasi roller pada stinger, disajikan pada Tabel 3.11.

**Tabel 3. 10** Data Stinger

<b>Decription</b>	<b>Stinger Parameters</b>
Number of Rollers on Stinger	6
Stinger Length	40.949 m
Stinger Roller Bed Length	2.0 m

**Tabel 3. 11** Data Konfigurasi Roller pada Stinger

<b>Stinger Roller ID</b>	<b>Horizontal Distance from Hitch (m)</b>	<b>BOP Elevation to center of stinger bottom chord (m)</b>
S1	-8.325	2.209
S2	-16.325	2.349
S3	-24.325	2.119
S4	-31.699	1.660
S5	-37.949	1.069
S6	-40.949	0.350

Catatan:

1. S1 adalah roller yang paling dekat dengan buritan barge.

**BAB IV**  
**HASIL ANALISA DAN PEMBAHASAN**

**4.1 Hasil Analisa Statis Instalasi Pipa Bawah Laut**

Analisa yang pertama dilakukan pada Tugas Akhir analisa statis untuk mendapatkan tegangan pipa pada 2 daerah kritis, fiksasi konfigurasi roller pada barge dan stinger, tegangan yang di-apply pada pipa oleh mesin tensioner, jarak touch down point dihitung dari bagian belakang kapal, serta besar sudut stinger. Pemodelan dalam proses instalasi akan menggunakan bantuan software OFFPIPE dimana pipe lay barge akan diasumsikan diam (statis). Tegangan yang akan di analisa pada pipa adalah pada saat proses instalasi dimulai dari daerah overbend dan sagbend. Daerah overbend saat pipa masih berada di atas laybarge sampai stinger (kecuali titik roller terakhir pada stinger), sedangkan daerah sagbend mulai titik roller terakhir pada stinger hingga pipa menyentuh titik touchdown pada seabed. Tahap permodelan instalasi dengan menggunakan bantuan software OFFPIPE adalah, pertama-tama dimodelkan laybarge dan stinger dengan menggunakan AutoCad sehingga didapatkan adanya koordinat x dan y pada roller barge dan stinger. Tahap kedua adalah memasukan data properties pipa seperti berat pipa saat di udara dan saat tercelup air, momen inertia pipa, cross sectional area, modulus elastisitas, serta SMYS pipa sesuai dengan data yang ada. Selain itu, data coating, barge, stinger, serta data lingkungan seperti arus dan kedalaman air juga dimasukan. Kemudian, didapat hasil seperti pada tabel-tabel berikut:

**Tabel 4. 1 Hasil Analisa Statis pada Pipa 8 inch**

OD	Water Depth	Lay Tension	Touch Down Tension	Touch Down Distance	Stinger Angle	Max Pipe Stress	
						Overbend	Sagbend
mm	m	kN	kN	m	deg	% SMYS	% SMYS
219.7	23	196.1330	167.82	112.10	13.5	70	21

**Tabel 4. 2 Hasil Analisa Statis pada Pipa 10 inch**

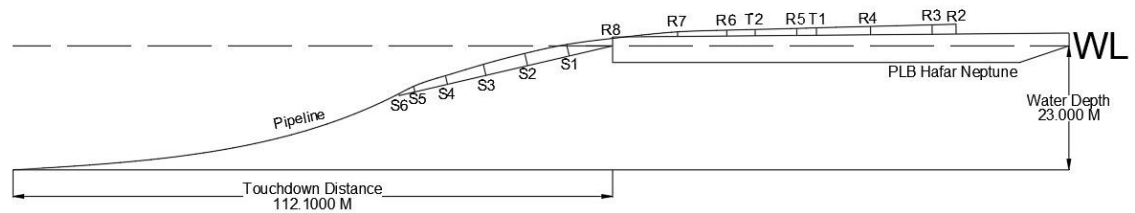
OD	Water Depth	Lay Tension	Touch Down Tension	Touch Down Distance	Stinger Angle	Max Pipe Stress	
						Overbend	Sagbend
mm	m	kN	kN	m	deg	% SMYS	% SMYS
273.1	23	196.1330	177.20	151.99	13.5	73	14

**Tabel 4. 3** Hasil Analisa Statis pada Pipa 12 inch

OD	Water Depth	Lay Tension	Touch Down Tension	Touch Down Distance	Stinger Angle	Max Pipe Stress	
						Overbend	Sagbend
mm	m	kN	kN	m	deg	% SMYS	% SMYS
323.9	23	196.1330	177.16	165.61	13.5	78	12

Sesuai dengan hasil analisa statis pada Tabel 4.1 sampai dengan Tabel 4.3, didapat bahwa lay tension yang dibutuhkan pada pipa 8 Inch adalah sebesar 196.133 kN atau sebesar 20 MT dengan *touchdown distance* sebesar 112.1 Meter. *Stress* pipa maksimal sebesar 70% SMYS pada daerah *overbend* dan 21% SMYS pada daerah *sagbend*. Gambar 4.1 merupakan hasil analisa statis pada pipa 8 Inch dimana dapat terlihat kurvatur pipa saat proses instalasi berlangsung.

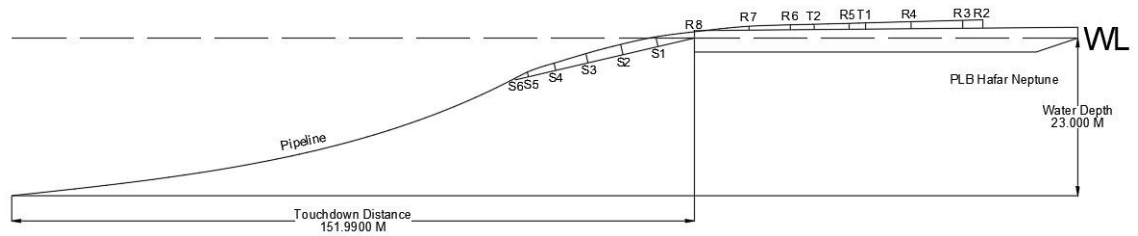
### Pipelaying 8 Inch



**Gambar 4. 1** Hasil Analisa Statis pada Pipa 8 Inch

Kemudian, untuk pipa 10 Inch dibutuhkan tension sebesar 196.133 kN atau sebesar 20 MT dengan *touchdown distance* sebesar 151.99 Meter. *Stress* maksimum sebesar 73% SMYS pada daerah *overbend* dan 14% SMYS pada daerah *sagbend*. Bentuk kurvatur pipa 10 Inch pada saat proses instalasi terdapat pada Gambar 4.2.

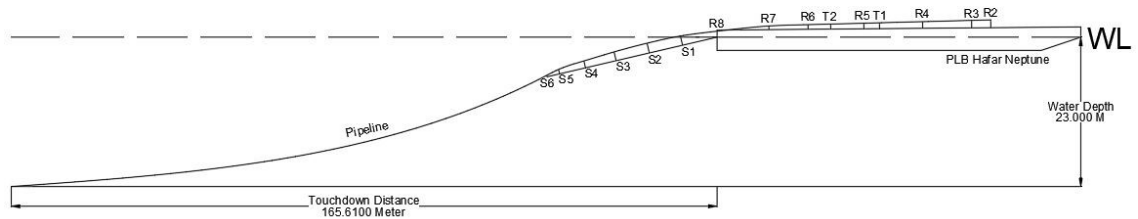
### Pipelaying 10 Inch



**Gambar 4. 2** Hasil Analisa Statis pada Pipa 10 Inch

Terakhir, untuk pipa 12 Inch dibutuhkan tension sebesar 196.1330 atau sebesar 20 MT dengan *touchdown distance* sebesar 165.61 Meter. *Stress* maksimum pada pipa adalah 78% SMYS pada daerah *overbend* dan 12% SMYS pada daerah *sagbend*. . Bentuk kurvatur pipa 12 Inch pada saat proses instalasi terdapat pada Gambar 4.3.

### Pipelaying 12 Inch



**Gambar 4. 3** Hasil Analisa Statis pada Pipa 12 Inch

Semua kebutuhan tension dapat terpenuhi oleh PLB Hafar Neptune karena kemampuan mesin tensioner yang dimiliki oleh barge adalah sebesar 30 MT untuk masing-masing mesin sehingga jika ditotal, barge memiliki kemampuan untuk memberikan tension kepada pipa sebesar 60 MT.

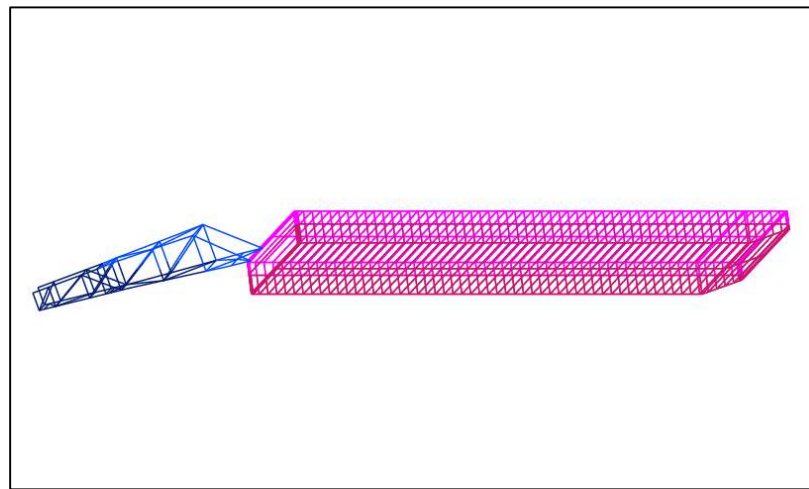
Semua hasil *stress* maksimal diatas masih dalam batas ijin tegangan maksimum yaitu 87% SMYS sesuai dengan ketentuan dari DNV OS F-101, Section 13 *simplified laying criteria*.

#### 4.2 Permodelan Pipe Lay Barge

Permodelan dilakukan dengan mengacu pada data General Arrangement (GA)

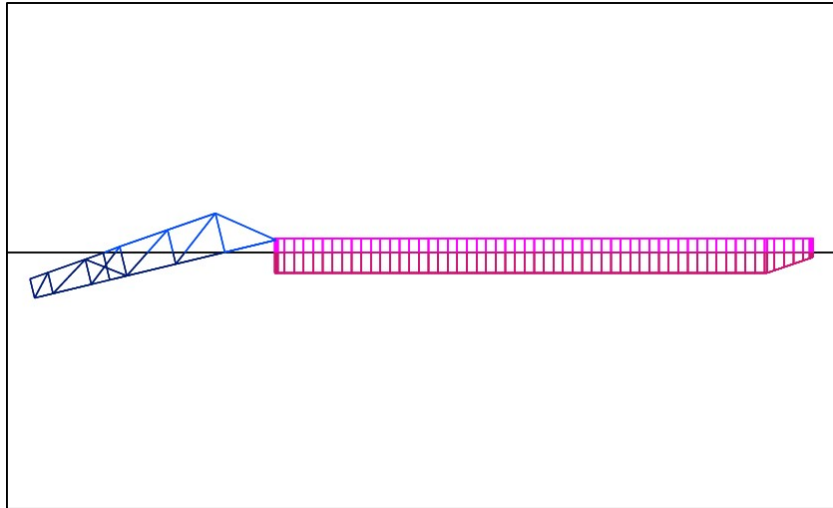
dan data-data lain yang dibutuhkan demi menunjang permodelan barge ini. Pertama dilakukan permodelan pada *AutoCad*, setelah mendapatkan permodelan yang sesuai, model tersebut di transfer ke *MOSES* dengan mendeskripsikan titik-titik koordinat untuk analisis lebih lanjut.

Pada permodelan pertama dengan *MOSES* akan dihasilkan *RAO motion* dan *wave drift* dari *laybarge* tanpa *mooring* untuk arah  $0^\circ$ ,  $45^\circ$ ,  $90^\circ$ ,  $135^\circ$ , dan  $180^\circ$  dalam gerak *surge*, *heave*, *sway*, *roll*, *pitch*, *yaw*. Hasil ini akan diinputkan ke software *OFFPIPE* untuk mendapatkan tegangan dari pipa. Dengan menggunakan software *MOSES* dilakukan permodelan barge. Untuk penentuan sudut stinger pada permodelan, akan menggunakan hasil analisa statis menggunakan software *OFFPIPE* yang mana dibutuhkan stinger dengan sudut  $13.5^\circ$ . Untuk permodelan barge dengan sudut stinger  $13.5^\circ$  ditunjukkan pada Gambar 4.4 sampai Gambar 4.7.

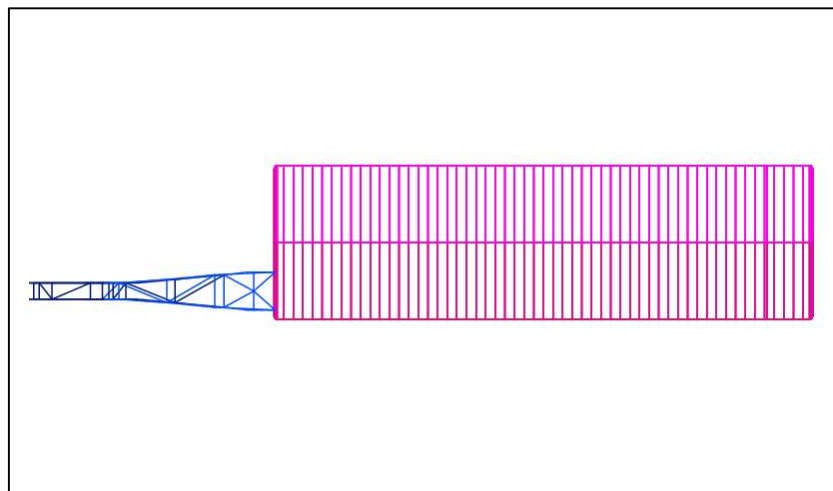


**Gambar 4. 4** Gambar Geometri PLB Tampak Isometri dengan Sudut Stinger  $13.5^\circ$

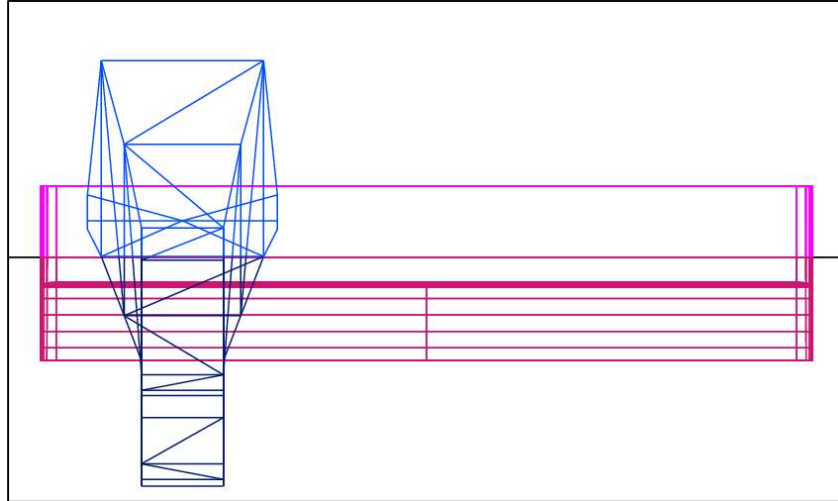




**Gambar 4. 5** Gambar PLB Tampak Samping dengan Sudut Stinger 13.5°



**Gambar 4. 6** Gambar PLB Tampak Atas dengan Sudut Stinger 13.5°



**Gambar 4. 7** Gambar PLB Tampak Depan dengan Sudut Stinger 13.5°

#### 4.3 Validasi Permodelan Pipe Lay Barge

Validasi dilakukan sebelum analisis RAO. Permodelan yang sudah di buat harus sesuai dengan kondisi sebenarnya. Kriteria validasi yang digunakan mengacu pada ABS MODU untuk validasi displacement bernilai maksimum 2% dan untuk parameter lainnya maksimal 1%. Hasil validasi di dapatkan dengan cara melakukan membandingkan hasil permodelan dari MOSES dengan hasil yang sudah ada pada stability booklet. Tabel 4.4 menjelaskan mengenai hasil validasi dengan parameter yang ada.

**Tabel 4. 4** Validasi Permodelan PLB Hafar Neptune

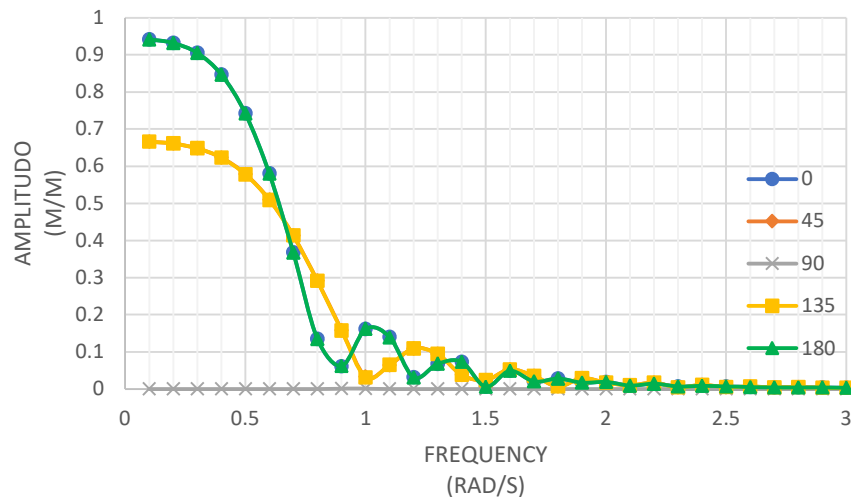
Parameter	Stability Booklet	Moses	Error	Ketentuan
Displacement	6707.63	6694.19	-0.20%	2%
LCB	41.312	44	6.51%	1% / 50 cm max
LCF	42.692	42.54	-0.36%	1% / 50 cm max
KMT	17.392	17.42	0.16%	1% / 5 cm max
BMT	15.74	15.77	0.19%	1% / 5 cm max
KML	194.278	193.22	-0.54%	1% / 50 cm max
BML	192.626	191.57	-0.55%	1% / 50 cm max

#### 4.4 RAO *Pipe Lay Barge Hafar Neptune*

Pada software MOSES, akan dihasilkan output berupa RAO untuk mengetahui karakteristik gerakan PLB Hafar Neptune yang telah dimodelkan sebelumnya. Selanjutnya, akan ditampilkan grafik RAO untuk masing-masing 6 derajat kebebasan (*six degree of freedom*) dan juga pada 5 arah pembebanan gelombang.

##### 4.4.1 Gerakan Surge

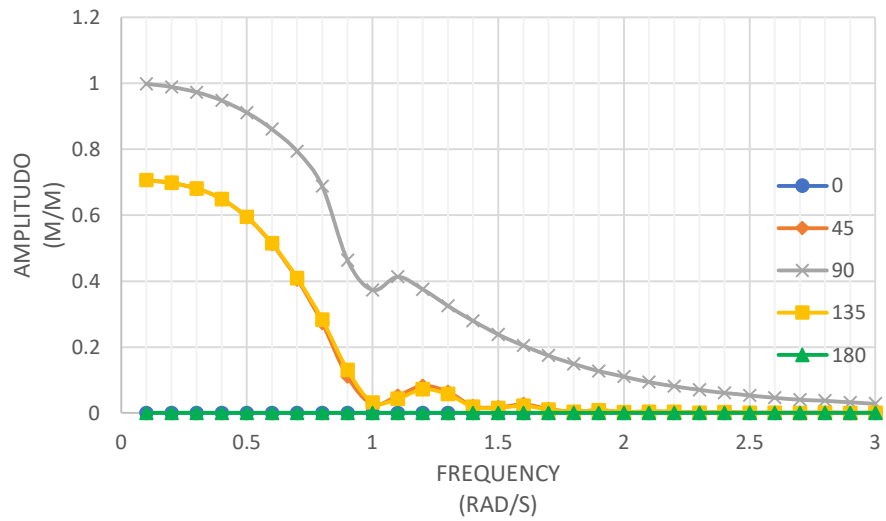
Pada Gambar 4.8, ditampilkan grafik RAO untuk gerakan surge pada PLB Hafar Neptune. Pada grafik ini, terlihat bahwa amplitudo tertinggi terdapat pada frekuensi 1 rad/s dan kemudian mengalami penurunan sampai frekuensi 1.2 – 1.4 rad/s. Kemudian mengalami kenaikan yang tidak terlalu tinggi pada frekuensi 1.3 rad/s untuk arah pembebanan  $0^\circ$  dan  $180^\circ$  dan naik pada frekuensi 1.6 untuk arah pembebanan  $45^\circ$ .



**Gambar 4. 8** Grafik RAO Gerak Surge pada PLB Hafar Neptune

##### 4.4.2 Gerakan Sway

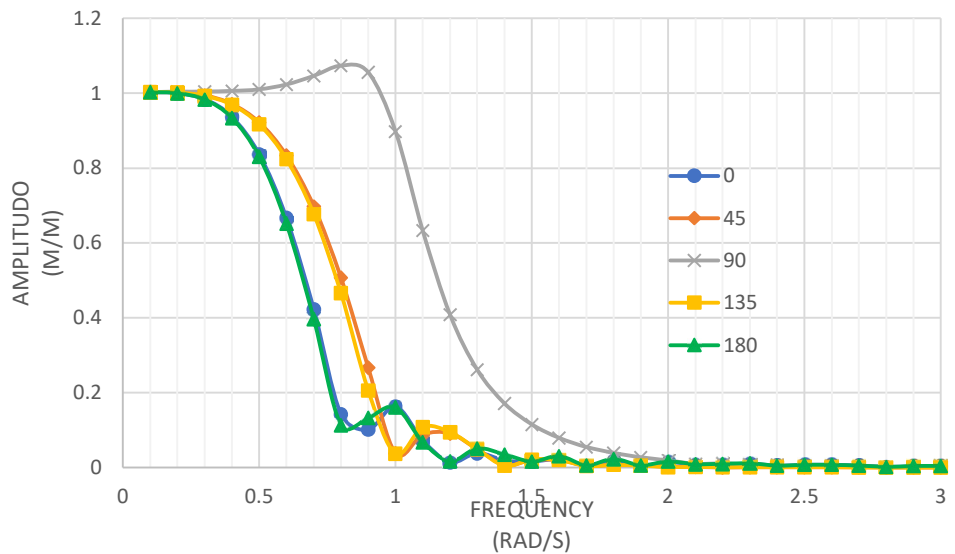
Pada Gambar 4.9, ditampilkan Grafik RAO untuk gerakan Sway pada PLB Hafar Neptune. Dapat dilihat bahwa amplitudo tertinggi terletak pada frekuensi 1 rad/s yakni untuk arah pembebanan  $45^\circ$ . Untuk arah pembebanan pada sudut  $90^\circ$ , akan ada penurunan dari frekuensi 1 – 1.3 rad/s dan diikuti dengan kenaikan amplitude pada frekuensi 1.4 – 1.6 rad/s.



**Gambar 4. 9** Grafik RAO Gerak Sway pada PLB Hafar Neptune

**4.4.3 Gerakan Heave**

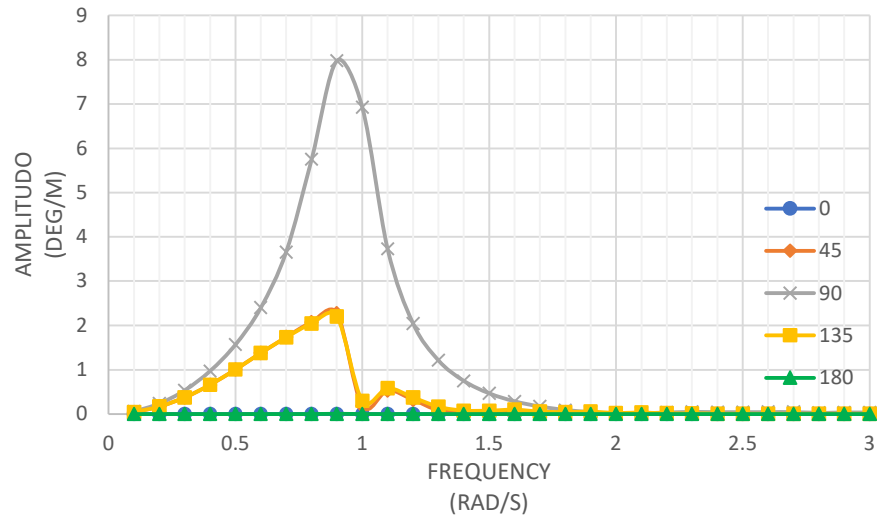
Gambar 4.10 menampilkan grafik RAO untuk gerak Heave pada PLB Hafar Neptune. Nilai amplitudo tertinggi terdapat pada frekuensi 1 rad/s, pada arah pembebanan gelombang 90°. Terlihat juga pada grafik bahwa RAO gerak heave pada arah pembebanan gelombang 90° akan mengalami penurunan sampai frekuensi 2.5 rad/s.



**Gambar 4. 10** Grafik RAO Gerak Heave pada PLB Hafar Neptune

#### 4.4.4 Gerakan Roll

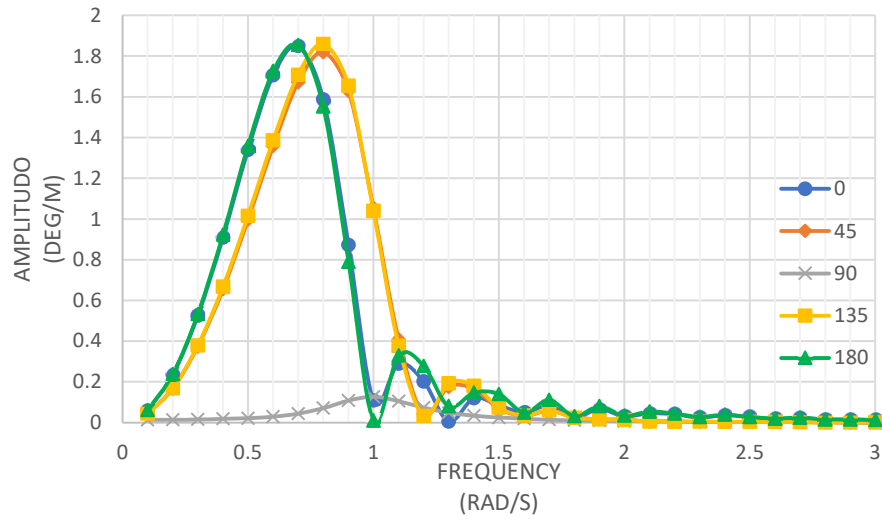
Pada Gambar 4.11, ditampilkan grafik RAO untuk gerak roll pada PLB Hafar Neptune. Ditunjukkan pada grafik bawah amplitude terbesar adalah pada arah pembebanan gelombang 90o yang dicapai pada frekuensi 1.1 rad/s. Kemudian, akan mengalami penurunan dari frekuensi 1.2 rad/s sampai 2.4 rad/s dan selanjutnya mengalami sedikit kenaikan sampai frekuensi 2.9 rad/s.



**Gambar 4. 11** Grafik RAO Gerak Roll pada PLB Hafar Neptune

#### 4.4.5 Gerakan Pitch

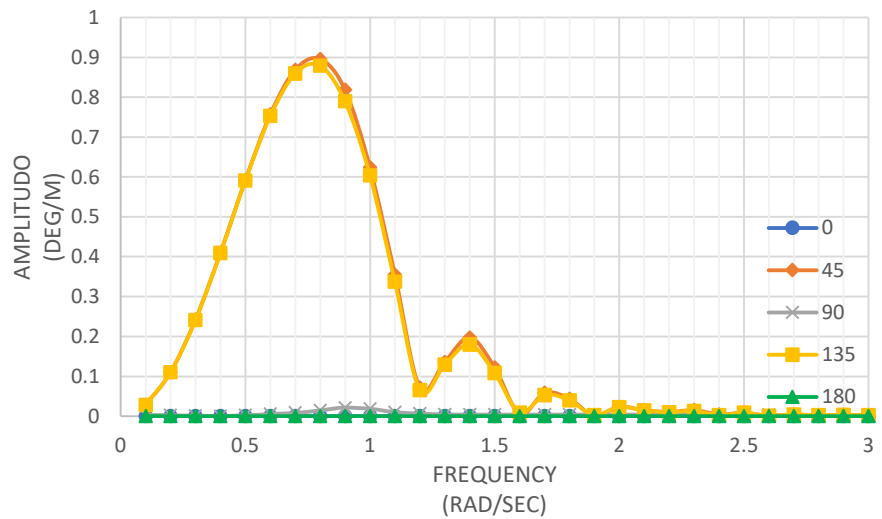
Pada Gambar 4.12 dapat dilihat grafik RAO untuk gerak pitch pada PLB Hafar Neptune. Nilai maksimum dari gerak ini, dicapai pada frekuensi 1 rad/s dengan arah pembebanan 45°. Kemudian akan mengalami penurunan yang cukup drastic sampai frekuensi 1.3 rad/s



**Gambar 4.12** Grafik RAO Gerak Pitch pada PLB Hafar Neptune

#### 4.4.6 Gerakan Yaw

Grafik RAO untuk gerak yaw pada PLB Hafar Neptune tersedia pada Gambar 4.13. Dapat dilihat bahwa amplitude maksimum adalah para arah pembebanan 45° yang terdapat pada frekuensi 1 rad/s. Untuk arah pembebanan 0°, 90°, dan 180° dapat dilihat bahwa nilai amplitudonya tidak terlalu besar dan rata-rata mendekati 0 deg/m.



**Gambar 4.13** Grafik RAO Gerak Yaw pada PLB Hafar Neptune

#### 4.4.7 Nilai Maksimum RAO Pipe Lay Barge Hafar Neptune

Nilai maksimum RAO dari tiap gerakan 6 derajat kebebasan pada PLB Hafar Neptune disajikan pada Tabel 4.5. Selain itu, arah datang gelombang untuk nilai maksimum RAO masing-masing gerakan juga dicantumkan. Untuk Gerakan *Surge*, RAO maksimalnya adalah 0.942 m/m pada frekuensi 0.1 rad/s dan arah datang gelombang 0°. Pada Gerakan *Sway*, RAO maksimalnya adalah 0.998 m/m pada frekuensi 0.1 rad/s dan arah datang gelombang 90°. Gerakan *Heave* mempunyai RAO maksimal sebesar 1.074 m/m pada frekuensi 0.8 rad/s dengan arah datang gelombang 90°. Untuk Gerakan *Roll*, RAO maksimalnya adalah 7.98 deg/m pada frekuensi 0.9 rad.s dengan arah datang gelombang 90°. Gerakan *Pitch* mempunyai RAO maksimal sebesar 1.86 deg/m pada frekuensi 0.8 dengan arah datang gelombang 135°. Terakhir, Gerakan *Yaw* mempunyai RAO maksimal 0.896 deg/s pada frekuensi 0.8 dengan arah datang gelombang 45°. Semua nilai RAO hasil running dari software MOSES akan menjadi input untuk Analisa dinamis menggunakan software OFFPIPE untuk menentukan tinggi gelombang maksimal yang diijinkan untuk mengenai PLB saat kegiatan *pipelaying* berlangsung.

**Tabel 4. 5** Nilai Maksimum RAO Pipe Lay Barge Hafar Neptune

<b>Gerakan</b>	<b>RAO Maksimal</b>	<b>Frekuensi (rad/s)</b>	<b>Arah Datang Gelombang</b>
Surge	0.942 m/m	0.1	0
Sway	0.998 m/m	0.1	90
Heave	1.074 m/m	0.8	90
Roll	7.98 deg/m	0.9	90
Pitch	1.86 deg/m	0.8	135
Yaw	0.896 deg/m	0.8	45

#### 4.5 Hasil Analisa Dinamis Instalasi Pipa Bawah Laut

Untuk mendapatkan tinggi gelombang maksimal yang mampu diterima barge saat kondisi operasi *pipelaying*, maka perlu dilakukan Analisa dinamis. Analisa dinamis, menggunakan input dari hasil analisa statis, yaitu konfigurasi roller pada barge dan stinger, sudut stinger, dan juga besar tensioner yang dikeluarkan mesin *tensioner*. Selain itu, juga di-input RAO

dari PLB Hafar Neptune dan spektrum gelombang yang mana menggunakan persamaan JONSWAP. Untuk input spektrum gelombang, yang dibutuhkan adalah parameter periode puncak dari gelombang ( $T_p$ ), koefisien alpha (persamaan Philip-morison), dan koefisien gamma. OFFPIPE akan mengkalkulasi tinggi gelombang maksimal serta besarnya tegangan pipa yang diterima saat kondisi dinamis. Sesuai dengan DNV OS F-101, besarnya tegangan pipa tidak boleh melebihi 87% SMYS pada kondisi analisa dinamis. Berikut akan dijelaskan hasil dari analisa dinamis menggunakan software OFFPIPE. Penjelasan akan dibagi sesuai dengan variasi diameter pipa, arah pembebanan gelombang, dan tinggi gelombang signifikan. Untuk variasi tinggi gelombang signifikan, akan diambil nilai 0.5 meter sampai 3 meter dengan increment 0.5 meter.

#### 4.5.1 Hasil Analisa Dinamis pada Pipa 8 inch

##### 4.5.1.1 Arah Datang Gelombang 0°

Pada Tabel 4.6, akan ditampilkan hasil analisa dinamis pipa 8" dengan arah datang gelombang 0°. Pada Tabel 4.6 dapat dilihat bahwa tegangan pipa masih dibawah batas 87% SMYS untuk semua variasi tinggi gelombang signifikan ( $H_s$ ).

**Tabel 4. 6** Hasil Analisa Dinamis Pipa 8" dengan Arah Datang Gelombang 0°.

Hs (m)	Tengan Pipa (% SMYS)	Tegangan Pipa (mPa)	Kriteria
0.5	71	255.6	PASS
1	72	262.8	PASS
1.5	74	270	PASS
2	75	270	PASS
2.5	75	270	PASS
3	76	273.6	PASS

##### 4.5.1.2 Arah Datang Gelombang 45°

Selanjutnya, untuk arah datang gelombang 45°, akan ditampilkan pada Tabel 4.7. Untuk  $H_s$  2.5 dan 3 meter,



tegangan pipa sudah diatas 87%, artinya adalah PLB tidak mampu mengakomodasi instalasi pipa pada tinggi gelombang signifikan tersebut. Jika ditemukan tinggi gelombang signifikan dengan nilai tersebut di lapangan, maka proses instalasi pipa harus dihentikan dan pipa harus dilepas atau abandon.

**Tabel 4. 7** Hasil Analisa Dinamis Pipa 8” dengan Arah Datang Gelombang 45°.

Hs (m)	Tengan Pipa (% SMYS)	Tegangan Pipa (mPa)	Kriteria
0.5	72	259.2	PASS
1	74	266.4	PASS
1.5	75	270	PASS
2	80	288	PASS
2.5	107	385.2	FAIL
3	153	550.8	FAIL

#### 4.5.1.3 Arah Datang Gelombang 90°

Pada arah datang gelombang 90°, didapati bahwa tegangan pipa sudah melewati batas pada Hs 1.5 meter. Hal ini dikarenakan amplitude RAO terbesar pada PLB Hafar Neptune terdapat pada arah datang gelombang 90°. Untuk hasil analisa dinamis pada arah datang gelombang 90°, dapat dilihat pada Tabel 4.8.

4. 8

Hs (m)	Tengan Pipa (% SMYS)	Tegangan Pipa (mPa)	Kriteria
0.5	70	252	PASS
1	72	259.2	PASS
1.5	86	309.6	PASS
2	116	417.6	FAIL
2.5	152	547.2	FAIL
3	164	590.4	FAIL

**Tabel**  
Hasil  
Analisa

Dinamis Pipa 8” dengan Arah Datang Gelombang 90°.

#### 4.5.1.4 Arah Datang Gelombang 135°

Berikutnya, untuk hasil analisis dinamis pada arah datang gelombang 135°, didapatkan bahwa tegangan pipa sudah melebihi batas pada Hs 2 meter yaitu sebesar 112% SMYS. Hasil ini ditampilkan pada Tabel 4.9.

**Tabel 4. 9** Hasil Analisa Dinamis Pipa 8” dengan Arah Datang Gelombang 135°.

Hs (m)	Tengan Pipa (% SMYS)	Tegangan Pipa (mPa)	Kriteria
0.5	73	262.8	PASS
1	75	270	PASS
1.5	76	273.6	PASS
2	112	403.2	FAIL
2.5	142	511.2	FAIL
3	171	615.6	FAIL

#### 4.5.1.5 Arah Datang Gelombang 180°

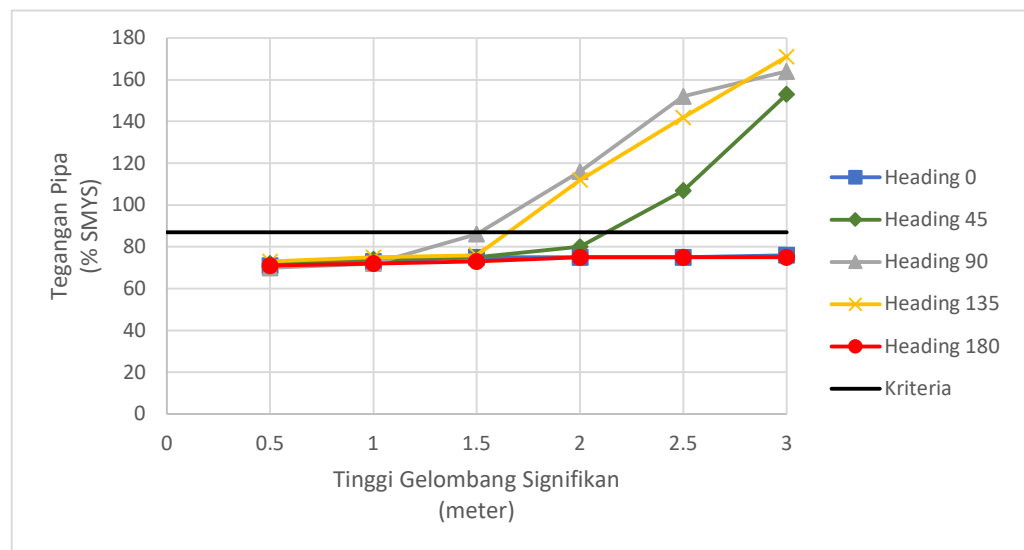
Terakhir adalah hasil analisa dinamis pada arah datang gelombang 180°, yang ditampilkan pada Tabel 4.10. Dari analisa ini didapat hasil tegangan tertinggi sebesar 75% SMYS atau 270 mPa pada tinggi Hs 3 meter. Artinya, PLB dapat tetap beroperasi jika ada tinggi Hs 3 meter di lapangan.

**Tabel 4. 10** Hasil Analisa Dinamis Pipa 8” dengan Arah Datang Gelombang 180°.

Hs (m)	Tengan Pipa (% SMYS)	Tegangan Pipa (mPa)	Kriteria
0.5	71	255.6	PASS
1	72	259.2	PASS
1.5	73	262.8	PASS
2	75	270	PASS
2.5	75	270	PASS
3	75	270	PASS

#### 4.5.1.6 Rangkuman Hasil Analisa Dinamis pada Pipa 8 inch

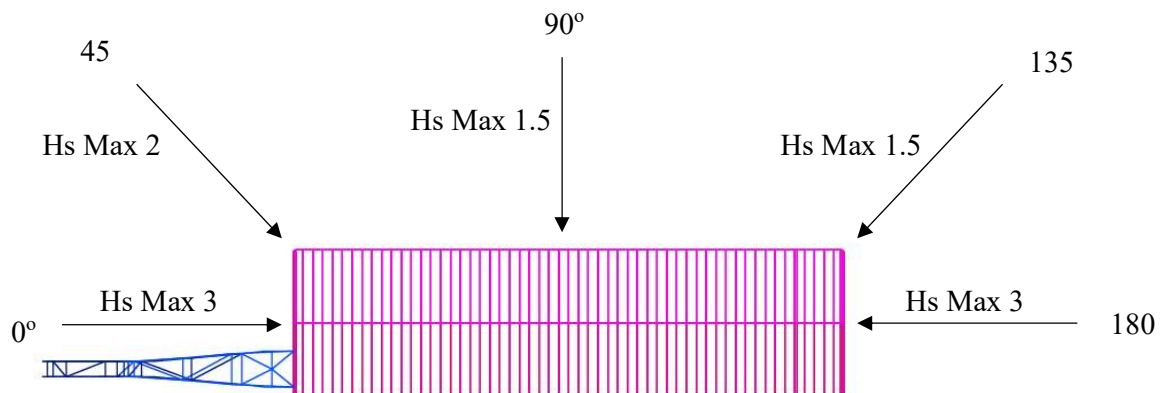
Gambar 4.14 adalah grafik yang merupakan rangkuman dari tegangan pipa pada masing-masing variasi arah datang gelombang pada pipa 8 inch. Terdapat garis kriteria yang



menunjukkan batas tegangan pipa maksimum pada operasi *pipelaying* kondisi dinamis dari codes DNV OS F-101. Dapat dilihat bahwa pada arah datang gelombang 0° dan 180°, tegangan pipa tidak melebihi batas sampai pada Hs 3 meter. Sementara, tegangan pipa sudah melebihi batas pada Hs 2 meter untuk arah datang gelombang 45° dan Hs 1.5 meter untuk arah datang gelombang 90° dan 135°.

**Gambar 4. 14** Grafik Rangkuman Tegangan Pipa pada Analisa Dinamis Instalasi Pipa 8 inch

Untuk visualisasi dari Analisa dinamis pada instalasi Pipa 8 Inch, dapat dilihat pada Gambar 4.15.



**Gambar 4. 15** Hasil Analisa Dinamis pada Instalasi Pipa 8 Inch

#### 4.5.2 Hasil Analisa Dinamis pada Pipa 10 inch

##### 4.5.2.1 Arah Datang Gelombang 0°

Pada Tabel 4.11, akan ditampilkan hasil analisa dinamis pipa 8" dengan arah datang gelombang 0°. Pada Tabel 4.6 dapat dilihat bahwa tegangan pipa masih dibawah batas 87% SMYS untuk semua variasi tinggi gelombang signifikan (Hs). Tegangan tertinggi adalah sebesar 80% SMYS yang timbul saat Hs sebesar 3 meter mengenai PLB Hafar Neptune.

**Tabel 4. 11** Hasil Analisa Dinamis Pipa 10” dengan Arah Datang Gelombang 0°.

Hs (m)	Tengan Pipa (% SMYS)	Tegangan Pipa (mPa)	Kriteria
0.5	77	277.2	PASS
1	77	277.2	PASS
1.5	78	280.8	PASS
2	78	280.8	PASS
2.5	79	284.4	PASS
3	80	288	PASS

#### 4.5.2.2 Arah Datang Gelombang 45°

Selanjutnya, untuk arah datang gelombang 45°, akan ditampilkan pada Tabel 4.12. Dapat dilihat bahwa tegangan pada pipa melebihi batas pada Hs 3 meter dan dinyatakan sebagai “FAIL” pada kolom kriteria.

**Tabel 4. 12** Hasil Analisa Dinamis Pipa 10” dengan Arah Datang Gelombang 45°.

Hs (m)	Tengan Pipa (% SMYS)	Tegangan Pipa (mPa)	Kriteria
0.5	77	277.2	PASS
1	78	280.8	PASS
1.5	79	284.4	PASS
2	80	288	PASS
2.5	85	306	PASS
3	108	388.8	FAIL

#### 4.5.2.3 Arah Datang Gelombang 90°

Pada arah datang gelombang 90°, didapati bahwa tegangan pipa sudah melewati batas pada Hs 2 meter. Untuk tegangan tertinggi ada pada Hs 3 meter yakni sebesar 160% SMYS. Untuk hasil analisa dinamis pada arah datang gelombang 90°, dapat dilihat pada Tabel 4.13.

**Tabel 4. 13** Hasil Analisa Dinamis Pipa 10” dengan Arah Datang Gelombang 90°.

Hs (m)	Tengan Pipa (% SMYS)	Tegangan Pipa (mPa)	Kriteria
0.5	77	277.2	PASS
1	79	284.4	PASS
1.5	79	284.4	PASS
2	93	334.8	FAIL
2.5	119	428.4	FAIL
3	160	576	FAIL

#### 4.5.2.4 Arah Datang Gelombang 135°

Berikutnya, untuk hasil analisis dinamis pada arah datang gelombang 135°, didapatkan bahwa tegangan pipa sudah melebihi batas pada Hs 2 meter yaitu sebesar 90% SMYS. Dan untuk tegangan tertingginya adalah sebesar 133% SMYS pada Hs 3 meter. Hasil ini ditampilkan pada Tabel 4.14.

**Tabel 4. 14** Hasil Analisa Dinamis Pipa 10” dengan Arah Datang Gelombang 135°.

Hs (m)	Tengan Pipa (% SMYS)	Tegangan Pipa (mPa)	Kriteria
0.5	79	284.4	PASS
1	79	284.4	PASS
1.5	80	288	PASS
2	90	324	FAIL
2.5	106	381.6	FAIL
3	133	478.8	FAIL

#### 4.5.2.5 Arah Datang Gelombang 180°

Terakhir adalah hasil analisa dinamis pada arah datang gelombang 180°, yang ditampilkan pada Tabel 4.15. Dari analisa ini didapat hasil tegangan tertinggi sebesar 91% SMYS pada tinggi Hs 3 meter. PLB Hafar Neptune masih

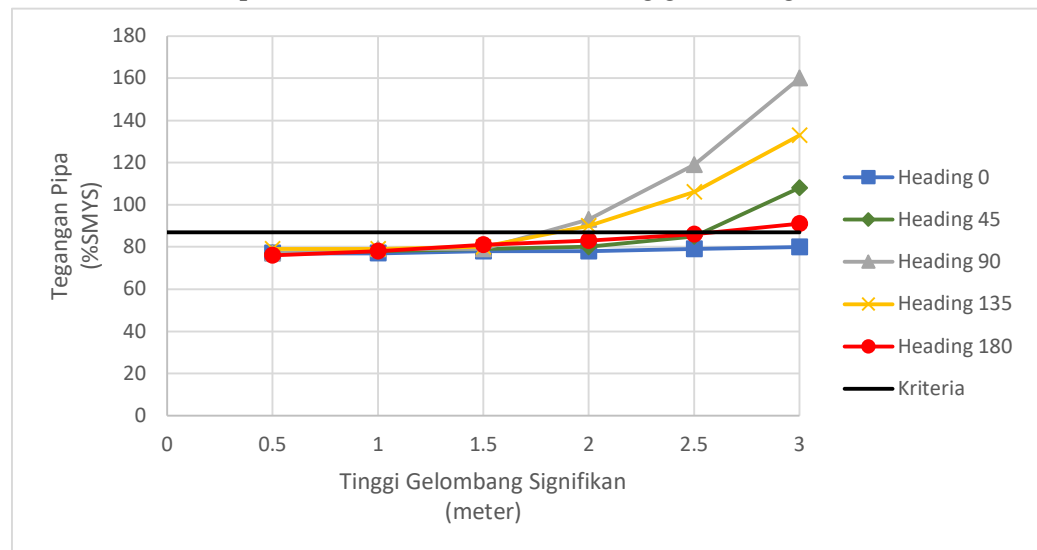
dapat melanjutkan operasi pipelaying walaupun terkena gelombang signifikan setinggi 2.5 meter.

**Tabel 4. 15** Hasil Analisa Dinamis Pipa 10” dengan Arah Datang Gelombang 180°.

Hs (m)	Tengan Pipa (% SMYS)	Tegangan Pipa (mPa)	Kriteria
0.5	76	273.6	PASS
1	78	280.8	PASS
1.5	81	291.6	PASS
2	83	298.8	PASS
2.5	86	309.6	PASS
3	91	327.6	FAIL

#### 4.5.2.6 Rangkuman Hasil Analisa Dinamis pada Pipa 10 inch

Gambar 4.12 adalah grafik yang merupakan rangkuman dari tegangan pipa pada masing-masing variasi arah datang gelombang pada pipa 10 inch. Garis berwarna hitam adalah garis kriteria yang menunjukkan batas tegangan pipa maksimum pada operasi *pipelaying* kondisi dinamis dari codes DNV OS F-101. Dapat dilihat bahwa pada arah datang gelombang 0°, tegangan pipa tidak melebihi batas sampai pada Hs 3 meter. Sementara, tegangan pipa sudah melebihi batas pada Hs 2 meter untuk arah datang gelombang 90° dan

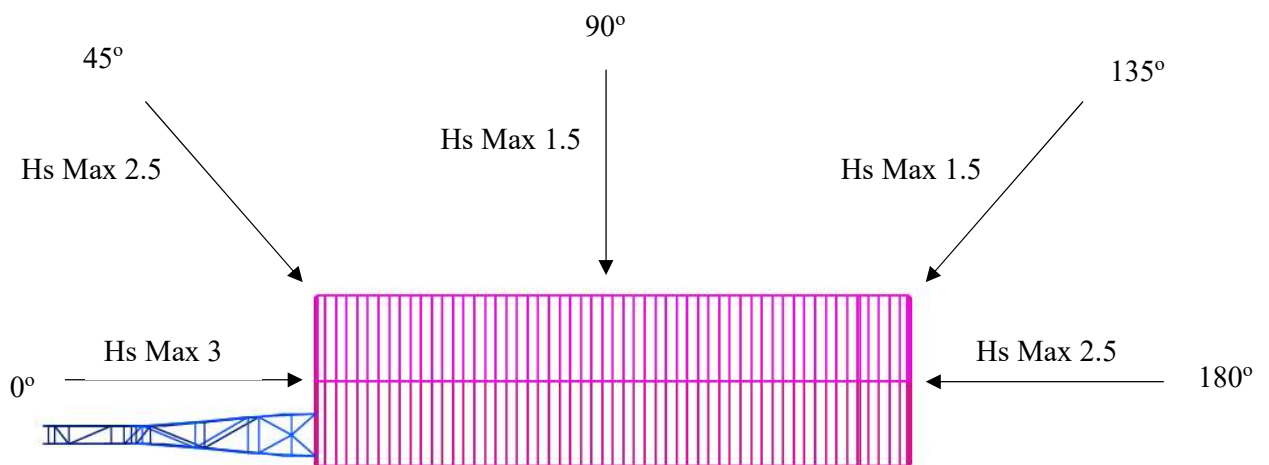




135°. Selain itu, tegangan pipa juga melewati batas pada Hs 3 meter untuk arah datang gelombang 45° dan 180°.

**Gambar 4. 16** Grafik Rangkuman Tegangan Pipa pada Analisa Dinamis Instalasi Pipa 10 inch

Untuk visualisasi dari Analisa dinamis pada instalasi Pipa 10 Inch, dapat dilihat pada Gambar 4.17.



**Gambar 4. 17** Hasil Analisa Dinamis pada Instalasi Pipa 10 Inch

#### 4.5.3 Hasil Analisa Dinamis pada Pipa 12 inch

##### 4.5.3.1 Arah Datang Gelombang 0°

Pada Tabel 4.16, akan ditampilkan hasil analisa dinamis pipa 8" dengan arah datang gelombang 0°. Pada Tabel 4.16 dapat

dilihat bahwa tegangan pipa masih dibawah batas 87% SMYS untuk semua variasi tinggi gelombang signifikan (Hs). Tegangan tertinggi adalah sebesar 87% SMYS untuk tinggi Hs 2.5 meter dan 3 meter.

**Tabel 4. 16** Hasil Analisa Dinamis Pipa 12” dengan Arah Datang Gelombang 0°.

Hs (m)	Tengan Pipa (% SMYS)	Tegangan Pipa (mPa)	Kriteria
0.5	83	298.8	PASS
1	84	302.4	PASS
1.5	84	302.4	PASS
2	85	306	PASS
2.5	87	313.2	PASS
3	87	313.2	PASS

#### 4.5.3.2 Arah Datang Gelombang 45°

Selanjutnya, untuk arah datang gelombang 45°, akan ditampilkan pada Tabel 4.17. Untuk Hs 2.5 dan 3 meter, tegangan pipa sudah diatas 87%, yaitu sebesar 88% SMYS pada Hs 2.5 meter dan 103% SMYS pada Hs 3 meter.

**Tabel 4. 17** Hasil Analisa Dinamis Pipa 12” dengan Arah Datang Gelombang 45°.

Hs (m)	Tengan Pipa (% SMYS)	Tegangan Pipa (mPa)	Kriteria
0.5	84	302.4	PASS
1	84	302.4	PASS
1.5	85	306	PASS
2	85	306	PASS
2.5	88	316.8	FAIL
3	103	370.8	FAIL

#### 4.5.3.3 Arah Datang Gelombang 90°

Pada arah datang gelombang 90°, didapati bahwa tegangan pipa sudah melewati batas pada Hs 1.5 meter. Tegangan tertinggi terdapat pada Hs 3 meter yakni sebesar 181%

SMYS. Untuk hasil analisa dinamis pada arah datang gelombang 90°, dapat dilihat pada Tabel 4.18.

**Tabel 4. 18** Hasil Analisa Dinamis Pipa 8” dengan Arah Datang Gelombang 90°.

Hs (m)	Tengan Pipa (% SMYS)	Tegangan Pipa (mPa)	Kriteria
0.5	83	298.8	PASS
1	84	302.4	PASS
1.5	84	302.4	PASS
2	99	356.4	FAIL
2.5	129	464.4	FAIL
3	181	651.6	FAIL

#### 4.5.3.4 Arah Datang Gelombang 135°

Berikutnya, untuk hasil analis dinamis pada arah datang gelombang 135°, didapatkan bahwa tegangan pipa sudah melebihi batas pada Hs 2 meter yaitu sebesar 93% SMYS. Ditemukan juga tegangan tertinggi pada Hs 3 meter sebesar 150% SMYS. Hasil analisa dinamis ini ditampilkan pada Tabel 4.19.

**Tabel 4. 19** Hasil Analisa Dinamis Pipa 12” dengan Arah Datang Gelombang 135°.

Hs (m)	Tengan Pipa (% SMYS)	Tegangan Pipa (mPa)	Kriteria
0.5	84	302.4	PASS
1	84	302.4	PASS
1.5	84	302.4	PASS
2	93	334.8	FAIL
2.5	140	504	FAIL
3	150	540	FAIL

#### 4.5.3.5 Arah Datang Gelombang 180°

Terakhir adalah hasil analisa dinamis pada arah datang gelombang 180°, yang ditampilkan pada Tabel 4.20. Dari analisa ini didapat hasil tegangan tertinggi sebesar 86% SMYS pada tinggi Hs 3 meter.

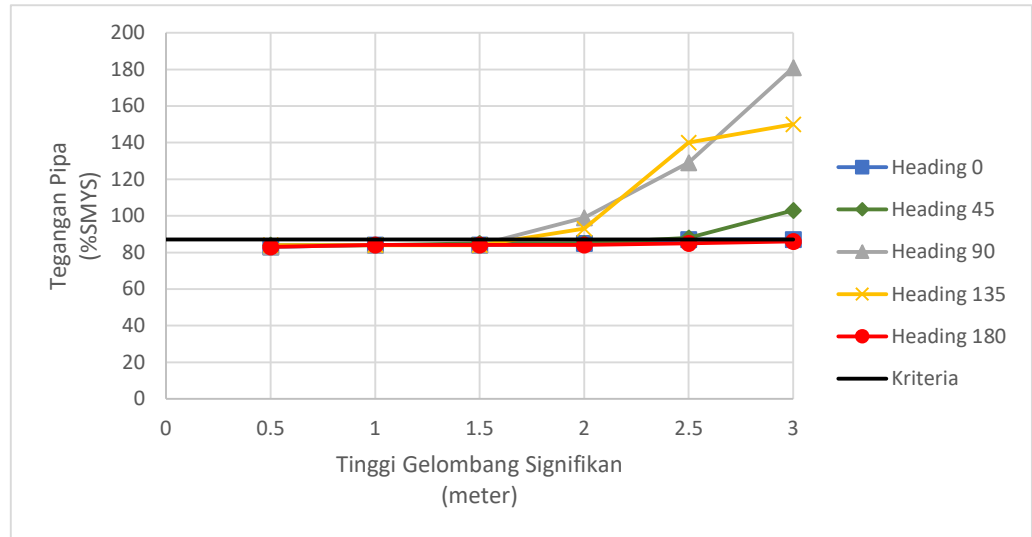
**Tabel 4. 20** Hasil Analisa Dinamis Pipa 12” dengan Arah Datang Gelombang 180°.

Hs (m)	Tengan Pipa (% SMYS)	Tegangan Pipa (mPa)	Kriteria
0.5	83	298.8	PASS
1	84	302.4	PASS
1.5	84	302.4	PASS
2	84	302.4	PASS
2.5	85	306	PASS
3	86	309.6	PASS

#### 4.5.3.6 Rangkuman Hasil Analisa Dinamis pada Pipa 12 inch

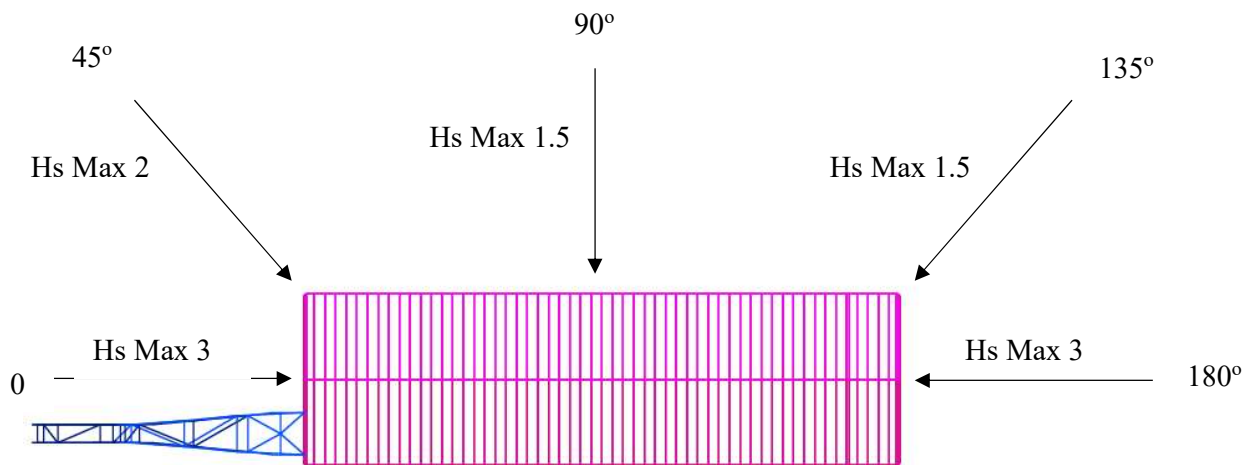
Gambar 4.13 adalah grafik yang merupakan rangkuman dari tegangan pipa pada masing-masing variasi arah datang gelombang pada pipa 12 inch. Garis berwarna hitam adalah garis kriteria yang menunjukkan batas tegangan pipa maksimum pada operasi *pipelaying* kondisi dinamis dari codes DNV OS F-101. Dapat dilihat bahwa pada arah datang gelombang 0° dan 180°, tegangan pipa tidak melebihi batas sampai pada Hs 3 meter. Sementara, tegangan pipa sudah melebihi batas pada Hs 2 meter untuk arah datang gelombang 90° dan 135°. Terakhir, tegangan pipa juga

melewati batas pada Hs 2.5 meter untuk arah datang gelombang 45°.



**Gambar 4. 18** Grafik Rangkuman Tegangan Pipa pada Analisa Dinamis Instalasi Pipa 12 inch

Untuk visualisasi dari Analisa dinamis pada instalasi Pipa 12 Inch, dapat dilihat pada Gambar 4.19.



**Gambar 4. 19** Hasil Analisa Dinamis pada Instalasi Pipa 12 Inch

## **BAB V PENUTUP**

### **5.1 Kesimpulan**

Berikut adalah beberapa kesimpulan yang dapat diambil berdasarkan analisa yang telah dilakukan.

1. Tinggi maksimal dari gelombang signifikan yang diijinkan untuk mengenai Pipe Lay Barge pada saat operasi pipelaying ada 3 Meter untuk instalasi pipa pada diameter 8 Inch, 10 Inch, dan 12 Inch.
2. Tinggi maksimal dari gelombang signifikan yang diijinkan untuk mengenai Pipe Lay Barge pada saat operasi pipelaying adalah 3 Meter untuk arah datang gelombang  $0^\circ$ , 2.5 Meter untuk arah datang gelombang  $45^\circ$ , 1.5 Meter untuk arah datang gelombang  $90^\circ$ , 1.5 Meter untuk arah datang gelombang  $135^\circ$ , dan 3 Meter untuk arah datang gelombang  $180^\circ$ .

### **5.2 Saran**

Berikut ada beberapa saran yang dapat penulis sampaikan untuk penelitian lebih lanjut.

1. Perlunya memperhitungan dan memodelkan system tambat untuk Pipe Lay Barge pada operasi pipelaying untuk mendapatkan motion Pipe Lay Barge yang lebih detail.
2. Perlu digunakan software lain untuk analisa tegangan pipa saat operasi pipelaying seperti OrcaFlex supaya efek hidrodinamis dari Pipe Lay Barge dapat dilihat lebih detail.

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**LAMPIRAN ANALISA STATIS OFFPIPE PADA PIPA 8  
INCH**

```

MMMMM      MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM
MMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM
MMM  MMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMM
MMM  MMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMM
MMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM
MMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM
MMMMMMMMMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM
MMMMM      MMMM      MMMM      MMMM      MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM  MMMM

```

```

*****
*
*           O F F P I P E - 3 -- OFFSHORE PIPELINE ANALYSIS SYSTEM
*
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*
*           VERSION NO. - 3.02EX
*           RELEASED ON - 03/08/2016
*           LICENSED TO - PT Timas Suplindo
*
*****
*
* OFFPIPE IS A NONLINEAR, 3-DIMENSIONAL FINITE ELEMENT METHOD BASED PROGRAM FOR THE
* STATIC AND DYNAMIC ANALYSIS OF PROBLEMS ARISING IN THE DESIGN OF MARINE PIPELINES.
* THIS VERSION OF OFFPIPE MAY BE USED FOR THE ANALYSIS OF OFFSHORE PIPELAYING OPER-
* ATIONS, DAVIT LIFTS, PIPELINES LYING ON AN UNEVEN SEABED, AND RISERS.
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*           6554 AUDEN                 FACSIMILE: (713) 664-0962
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*
*****

```

```

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX   PAGE   3
STATIC PIPE ANALYSIS 8 INCH
JOB NO. - LAYING                LICENSED BY - PT Timas Suplindo
USER ID - IK                    DATE - 4/28/2020  TIME - 1:39:54   CASE   1
=====

```

INPUT      DATA      ECHO

```

PRINTED OUTPUT SELECTED
=====
  STATIC PIPE FORCES AND STRESSES ...   YES
  STATIC SOLUTION SUMMARY .....       YES
  DYNAMIC PIPE FORCES AND STRESSES ..   NO
  DYNAMIC RANGE OF PIPE DATA .....    NO
  DYNAMIC TRACKING OF PIPE DATA .....  NO
  OVERBEND PIPE SUPPORT GEOMETRY ..... NO
  STINGER BALLAST SCHEDULE DATA ..... NO
  SUPPORT REACTIONS IN BARGE COORDS .  NO

  INTERNAL FORCES IN PIPE & CABLE ...   NO
  INTERNAL FORCES IN STINGER .....      NO
  PRINT PIPE STRAINS IN OUTPUT .....    NO
  DNV OS-F101 COMPLIANCE REPORT .....   NO
  API RP-1111 COMPLIANCE REPORT .....   NO
  PRINT DNV/API FACTORS & PARAMETERS    NO
  USE THICK WALL HOOP STRESS EQN. .... NO
  USE DNV 1981 FOR TOTAL PIPE STRESS    NO

  ENABLE/DISABLE WARNING MESSAGES ...  ENABLE
  GENERATE SPREAD SHEET PLOT FILE ...   NO
  GENERATE ASCII PLOT DATA FILES ....  NO

```

PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX ..... 1  
 PLOT NUMBER ..... 1  
 PLOT TYPE OPTION NUMBER ..... 1  
 DYNAMIC PROFILE TIME POINT ..... 0.000  
 DYNAMIC PROFILE TIME INCREMENT ..... 0.000  
 ORDINATE PARAMETER CODE NUMBER ..... 2  
 AXIS LABEL FOR ORDINATE ..... "PIPE ELEVATION Y COORDINATE "  
 ABSCISSA PARAMETER CODE NUMBER ..... 1  
 AXIS LABEL FOR ABSCISSA ..... "PIPE HORIZONTAL X COORDINATE "  
  
 PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS "  
 MINIMUM VERTICAL AXIS RANGE ..... 0.000  
 MAXIMUM VERTICAL AXIS RANGE ..... 0.000  
 MINIMUM HORIZONTAL AXIS RANGE ..... 0.000  
 MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 4  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 4/28/2020 TIME - 1:39:54 CASE 1

=====

INPUT DATA ECHO

PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX ..... 2  
 PLOT NUMBER ..... 1  
 PLOT TYPE OPTION NUMBER ..... 1  
 DYNAMIC PROFILE TIME POINT ..... 0.000  
 DYNAMIC PROFILE TIME INCREMENT ..... 0.000  
 ORDINATE PARAMETER CODE NUMBER ..... 15  
 AXIS LABEL FOR ORDINATE ..... "DNV YIELD STRESS PERCENTAGE "  
 ABSCISSA PARAMETER CODE NUMBER ..... 1  
 AXIS LABEL FOR ABSCISSA ..... "PIPELINE HORIZONTAL X COORDINATE"  
  
 PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS "  
 MINIMUM VERTICAL AXIS RANGE ..... 0.000  
 MAXIMUM VERTICAL AXIS RANGE ..... 0.000  
 MINIMUM HORIZONTAL AXIS RANGE ..... 0.000  
 MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000

PIPE PROPERTIES

=====

PROPERTY TABLE ROW NUMBER ..... 1  
 PIPE SECTION LENGTH ..... 0.000 METERS  
 STEEL MODULUS OF ELASTICITY ..... 207000. M-PASCAL  
 STEEL CROSS SECTIONAL AREA ..... 82.690 CM<sup>2</sup>  
 COATED PIPE AVG MOMENT OF INERTIA .. 4402.00 CM<sup>4</sup>  
 WEIGHT PER-UNIT-LENGTH IN AIR ..... 1649.63 N/M  
 WEIGHT PER-UNIT-LENGTH SUBMERGED .. 912.94 N/M  
 MAXIMUM ALLOWABLE PIPE STRAIN ..... 0.205000 PERCENT  
  
 STEEL OUTSIDE DIAMETER ..... 21.9100 CM  
 STEEL WALL THICKNESS ..... 1.2700 CM  
 YIELD STRESS ..... 360.00 M-PASCAL  
 STRESS/STRAIN INTENSE FACTOR ..... 0.0000  
 HYDRODYNAMIC OUTSIDE DIAMETER ..... 0.000 CM  
 DRAG COEFFICIENT ..... 0.0000  
 HYDRODYNAMIC TOTAL AREA ..... 0.000 CM<sup>2</sup>  
 ADDED MASS COEFFICIENT ..... 0.0000  
 POISSON'S RATIO ..... 0.3000  
 COEFFICIENT OF THERMAL EXPANSION .. 0.00001100 1/DEG C

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 5  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 4/28/2020 TIME - 1:39:54 CASE 1

=====

INPUT DATA ECHO

PIPE COATING PROPERTIES

=====

PIPE PROPERTY TABLE INDEX ..... 1  
 CORROSION COATING THICKNESS ..... 0.320 CM  
 CORROSION COATING WEIGHT DENSITY .. 9025.2 N/M<sup>3</sup>  
 CORROSION COATING ELASTIC MODULUS . 0.000 M-PASCAL  
 CONCRETE COATING THICKNESS ..... 4.000 CM  
 CONCRETE COATING WEIGHT DENSITY ... 29857. N/M<sup>3</sup>  
 CONCRETE COATING ELASTIC MODULUS .. 0.000 M-PASCAL  
 DESIRED PIPE SPECIFIC GRAVITY ..... 0.0000  
 CONCRETE STIFFENING EFFECTIVENESS . 0.000  
 NO NOT CALC. STRESS FOR BARE PIPE . NO

AVERAGE LENGTH OF PIPE JOINT ..... 12.200 METERS  
 EFFECTIVE FIELD JOINT LENGTH ..... 0.300 METERS  
 FIELD JOINT FILL WEIGHT DENSITY ... 10055.3 N/M^3  
 FIELD JOINT FILL ELASTIC MODULUS... 0.000 M-PASCAL  
 FIELD JOINT STIFFENING EFFECT. .... 0.000  
 FIELD JOINT BENDING MODEL ..... 0 IGNORE COATING STIFFNESS  
 WEIGHT DENSITY OF STEEL ..... 77008. N/M^3  
 WEIGHT DENSITY OF PIPE CONTENTS ... 0.0 N/M^3  
 REF. ELEVATION FOR STATIC HEAD .... 0.00 METERS  
 FREE FLOOD PIPE DURING PIPELAY ... NO

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 6  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 4/28/2020 TIME - 1:39:54 CASE 1  
 =====

INPUT DATA ECHO

PIPELAY VESSEL DESCRIPTION

=====  
 NUMBER OF PIPE NODES ..... 9  
 BARGE GEOMETRY SPECIFIED BY ..... 1 X-Y COORDINATES  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.000 METERS  
 ADJUST Y COORDINATES MANUALLY .... NO  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 PIPE ANGLE RELATIVE TO DECK ..... 0.0000 DEGREES  
 HEIGHT OF DECK ABOVE WATER ..... 2.400 METERS  
 LAYBARGE FORWARD (X) OFFSET ..... 0.000 METERS  
 BARGE TRIM ANGLE ..... 0.5000 DEGREES  
  
 STERN SHOE X COORDINATE ..... 0.000 METERS  
 STERN SHOE Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER X COORDINATE ..... 43.820 METERS  
 ROTATION CENTER Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER Z COORDINATE ..... 6.370 METERS  
 BARGE HEADING ..... 0.0000 DEGREES  
 BARGE OFFSET FROM RIGHT-OF-WAY .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT VERTICAL ANGLE ... 0.000 DEGREES  
 PIPE RAMP PIVOT Z COORDINATE ..... 0.000 METERS  
 PIPE RAMP HEADING ON DECK ..... 0.000 DEGREES  
 ROLE OF ALTERNATE WAVE ORIGIN .... 0 MOTIONS & WAVES AT CENTER OF MOTION  
 WAVE PHASE ORIGIN X COORDINATE .... 0.000  
 WAVE PHASE ORIGIN Y COORDINATE .... 0.000 METERS  
 WAVE PHASE ORIGIN Z COORDINATE .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE .....

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	DAVIT SPACING ( M )
64.220	1.838	1 SIMPLE SUPPORT	0.000
59.740	1.760	1 SIMPLE SUPPORT	0.000
48.240	1.560	1 SIMPLE SUPPORT	0.000
38.110	1.383	2 PIPE TENSIONER	0.000
33.440	1.302	1 SIMPLE SUPPORT	0.000
26.660	1.183	2 PIPE TENSIONER	0.000
21.340	1.092	7 USER DEFINED SPT	0.000
12.150	0.860	7 USER DEFINED SPT	0.000
-0.040	-0.260	8 USER DEFINED SPT	0.000

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 7  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 4/28/2020 TIME - 1:39:54 CASE 1  
 =====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====  
 SUPPORT PROPERTY TABLE INDEX ..... 2  
 SUPPORT ELEMENT TYPE ..... 2 TENSIONER  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
  
 BOTTOM ROLLER ANGLE TO HORIZONTAL . 0.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES

SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 7  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 1.600 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 8  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 4/28/2020 TIME - 1:39:54 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 8  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

STINGER DESCRIPTION

=====

NUMBER OF PIPE/STINGER NODES ..... 6  
 STINGER GEOMETRY SPECIFIED BY ..... 2 X-Y COORD AND MATCH PT  
 STINGER TYPE ..... 1 FIXED GEOMETRY OR RAMP  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.00 METERS  
 HITCH X-COORDINATE ..... 0.497 METERS  
 HITCH Y-COORDINATE ..... -1.800 METERS  
 HITCH ANGULAR ORIENTATION ..... 0.000 DEGREES

X COORDINATE OF LOCAL ORIGIN ..... 0.497 METERS  
 Y COORDINATE OF LOCAL ORIGIN ..... -1.800 METERS  
 ROTATION ABOUT STINGER HITCH ..... 13.500 DEGREES  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 TANGENT POINT ANGLE ..... 0.000 DEGREES

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	ELEMENT TYPE	ELEMENT LENGTH ( M )
-8.325	2.209	1 SIMPLE SUPPORT	2 HINGED END	0.000
-16.325	2.349	1 SIMPLE SUPPORT	1 FIXED END	0.000
-24.325	2.119	1 SIMPLE SUPPORT	1 FIXED END	0.000
-31.699	1.660	1 SIMPLE SUPPORT	1 FIXED END	0.000
-37.949	1.069	1 SIMPLE SUPPORT	1 FIXED END	0.000
-40.949	0.350	1 SIMPLE SUPPORT	1 FIXED END	0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 9  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 4/28/2020 TIME - 1:39:54 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

```

=====
SUPPORT PROPERTY TABLE INDEX ..... 1
SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT
SUPPORT INITIAL STATE FLAG ..... 0
TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M
VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M
STATIC VERTICAL DEFLECTION ..... 0.0000 CM
LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES
SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES
SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS
BED ROLLER LENGTH ..... 1.640 METERS
HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS
TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
    
```

CURRENT VELOCITIES

```

=====
WATER DEPTH (M )      CURRENT SPEED (M/S )      DIRECTION OF TRAVEL (DEG )
=====
0.000                0.790                0.000
11.500               0.480                0.000
23.000               0.420                0.000
    
```

PIPE TENSION DATA

```

=====
STATIC PIPE TENSION ON LAY VESSEL . 196.133 K-NEWTON
MINIMUM DYNAMIC PIPE TENSION ..... 0.000 K-NEWTON
MAXIMUM DYNAMIC PIPE TENSION ..... 0.000 K-NEWTON
STATIC HORIZONTAL BOTTOM TENSION .. 0.000 K-NEWTON
NO. OF VALUES FOR TENSION PROFILE . 0
VALUES ARE FOR PIPE SPAN ANALYSIS . NO
MAXIMUM PIPE PAYOUT SPEED ..... 0.000 M/SEC
MAXIMUM PIPE TAKEUP SPEED ..... 0.000 M/SEC
    
```

```

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 10
STATIC PIPE ANALYSIS 8 INCH
JOB NO. - LAYING          LICENSED BY - PT Timas Suplindo
USER ID - IK             DATE - 4/28/2020 TIME - 1:39:54 CASE 1
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INPUT DATA ECHO

SAGBEND GEOMETRY

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SAGBEND PIPE ELEMENT LENGTH ..... 2.000 METERS
WATER DEPTH ..... 23.00 METERS
X-COORDINATE AT SPECIFIED DEPTH . . 0.00 METERS
ESTIMATED SAGBEND X LENGTH ..... 0.00 METERS
ESTIMATED PIPE LENGTH ON SEABED ... 0.00 METERS
X-COORD OF PIPE FREE END ON SEABED 0.00 METERS
X-COORD POINT OF FIXITY ON SEABED . 0.00 METERS
MAXIMUM SLOPE (ANGLE) OF SEABED ... 0.000 DEGREES
DIRECTION OF MAXIMUM SLOPE ..... 0.000 DEGREES

PIPE/CABLE SPAN END CONDITION ..... 0 PIPE/CABLE RESTING ON SEABED
PIPE/CABLE SPAN LENGTH GIVEN BY ... 0 SPECIFIED PIPE/CABLE TENSION
ESTIMATED SPAN DEPTH AT FREE END .. 0.00 METERS
PIPE VERTICAL ANGLE AT FREE END ... 0.000 DEGREES
BOTTOM HINGE OFFSET ..... 0.000 METERS
BOTTOM HINGE MINIMUM ANGLE ..... 0.000 DEGREES
BOTTOM HINGE MAXIMUM ANGLE ..... 0.000 DEGREES
    
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SOIL ELEMENT PROPERTIES

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SOIL PROPERTY TABLE ROW INDEX .... 1
SOIL ELEMENT TYPE (FUTURE USE) .... 0
PIPE INDEX OR SEGMENT NUMBER ..... 0
LONGITUDINAL SOIL STIFFNESS ..... 0.00 KN/M^2
VERTICAL SOIL STIFFNESS ..... 0.00 KN/M^2
LATERAL SOIL STIFFNESS ..... 0.00 KN/M^2
DEFLECTION UNDER REFERENCE LOAD ... 0.0000 CM

LONGITUDINAL COEF. OF FRICTION .... 0.000
LATERAL COEFFICIENT OF FRICTION ... 0.600
NUMBER OF INTEGRATION POINTS ..... 0
    
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STATIC SOLUTION CONVERGED IN ( 11 ) ITERATIONS

END OF INPUT DATA

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	HORIZ ANGLE (DEG )	VERT ANGLE (DEG )	PIPE LENGTH (M )	TENSILE STRESS (MPA )	HOOP STRESS (MPA )	BENDING STRESSES VERT (MPA )	HORIZ (MPA )	TOTAL STRESS (MPA )	PERCNT YIELD (PCT )
=====													
1	LAYBARGE	64.20	4.42	0.00	0.000	1.471	0.00	0.00	0.00	0.29	0.00	0.29	0.08
3	LAYBARGE	59.72	4.30	0.00	0.000	1.590	4.48	-0.02	0.00	-26.68	0.00	26.71	7.42
5	LAYBARGE	48.23	4.00	0.00	0.000	1.461	15.98	-0.09	0.00	-36.95	0.00	37.04	10.29
7	TENSIONR	38.10	3.73	0.00	0.000	1.432	26.11	11.77	0.00	-13.49	0.00	25.26	7.02
9	LAYBARGE	33.43	3.61	0.00	0.000	1.535	30.78	11.75	0.00	-7.12	0.00	18.87	5.24
11	TENSIONR	26.65	3.43	0.00	0.000	1.482	37.57	23.62	0.00	-6.51	0.00	30.13	8.37
13	LAYBARGE	21.33	3.30	0.00	0.000	1.448	42.89	23.59	0.00	0.36	0.00	23.95	6.65
15	LAYBARGE	12.14	2.98	0.00	0.000	3.376	52.08	23.46	0.00	-227.47	0.00	250.94	69.71
17	LAYBARGE	-0.04	1.76	0.00	0.000	8.070	64.32	23.22	0.00	-216.46	0.00	239.68	66.58
20	STINGER	-8.10	0.35	0.00	0.000	11.521	72.51	22.97	0.00	-170.71	0.00	193.68	53.80
22	STINGER	-15.89	-1.45	0.00	0.000	14.427	80.51	22.68	-0.13	-156.58	0.00	179.32	49.81
24	STINGER	-23.60	-3.61	0.00	0.000	16.653	88.51	22.36	-0.31	-97.86	0.00	120.37	33.44
26	STINGER	-30.64	-5.84	0.00	0.000	18.611	95.90	21.99	-0.51	-136.61	0.00	158.86	44.13
28	STINGER	-36.57	-7.92	0.00	0.000	19.919	102.19	21.69	-0.69	-39.43	0.00	61.47	17.07
30	STINGER	-39.47	-8.98	0.00	0.000	20.028	105.27	21.52	-0.78	11.00	0.00	32.92	9.14
32	SAGBEND	-41.35	-9.66	0.00	0.000	19.908	107.27	21.42	-0.84	35.31	0.00	57.15	15.88
33	SAGBEND	-43.23	-10.34	0.00	0.000	19.681	109.27	21.31	-0.90	53.79	0.00	75.55	20.99
34	SAGBEND	-45.12	-11.01	0.00	0.000	19.372	111.27	21.20	-0.95	67.88	0.00	89.56	24.88
35	SAGBEND	-47.00	-11.67	0.00	0.000	19.000	113.27	21.10	-1.01	78.67	0.00	100.28	27.85
36	SAGBEND	-48.90	-12.31	0.00	0.000	18.581	115.27	20.99	-1.07	86.97	0.00	108.50	30.14
37	SAGBEND	-50.80	-12.94	0.00	0.000	18.125	117.27	20.89	-1.12	93.40	0.00	114.86	31.90
38	SAGBEND	-52.70	-13.55	0.00	0.000	17.639	119.27	20.80	-1.18	98.40	0.00	119.79	33.28
39	SAGBEND	-54.61	-14.15	0.00	0.000	17.132	121.27	20.70	-1.23	102.34	0.00	123.66	34.35
40	SAGBEND	-56.52	-14.73	0.00	0.000	16.607	123.27	20.61	-1.28	105.45	0.00	126.71	35.20
41	SAGBEND	-58.44	-15.29	0.00	0.000	16.067	125.27	20.52	-1.33	107.95	0.00	129.14	35.87
42	SAGBEND	-60.37	-15.84	0.00	0.000	15.517	127.27	20.44	-1.37	109.98	0.00	131.11	36.42
43	SAGBEND	-62.30	-16.36	0.00	0.000	14.957	129.27	20.35	-1.42	111.64	0.00	132.71	36.86
44	SAGBEND	-64.23	-16.87	0.00	0.000	14.389	131.27	20.27	-1.46	113.02	0.00	134.03	37.23
45	SAGBEND	-66.17	-17.36	0.00	0.000	13.815	133.27	20.20	-1.51	114.18	0.00	135.13	37.54
46	SAGBEND	-68.11	-17.83	0.00	0.000	13.236	135.27	20.12	-1.55	115.16	0.00	136.07	37.80
47	SAGBEND	-70.06	-18.27	0.00	0.000	12.651	137.27	20.05	-1.58	116.01	0.00	136.86	38.02
48	SAGBEND	-72.02	-18.70	0.00	0.000	12.063	139.27	19.98	-1.62	116.73	0.00	137.53	38.20
49	SAGBEND	-73.98	-19.11	0.00	0.000	11.472	141.27	19.92	-1.66	117.35	0.00	138.11	38.36
50	SAGBEND	-75.94	-19.50	0.00	0.000	10.878	143.27	19.86	-1.69	117.88	0.00	138.59	38.50
51	SAGBEND	-77.90	-19.86	0.00	0.000	10.281	145.27	19.80	-1.72	118.32	0.00	138.99	38.61
52	SAGBEND	-79.87	-20.21	0.00	0.000	9.682	147.27	19.75	-1.75	118.67	0.00	139.30	38.69
53	SAGBEND	-81.85	-20.54	0.00	0.000	9.082	149.27	19.70	-1.78	118.92	0.00	139.51	38.75
54	SAGBEND	-83.82	-20.84	0.00	0.000	8.481	151.27	19.65	-1.81	119.07	0.00	139.63	38.78
55	SAGBEND	-85.80	-21.13	0.00	0.000	7.879	153.27	19.60	-1.83	119.09	0.00	139.61	38.78
56	SAGBEND	-87.78	-21.39	0.00	0.000	7.278	155.27	19.56	-1.86	118.96	0.00	139.46	38.74
57	SAGBEND	-89.77	-21.63	0.00	0.000	6.677	157.27	19.52	-1.88	118.64	0.00	139.12	38.64
58	SAGBEND	-91.76	-21.86	0.00	0.000	6.079	159.27	19.49	-1.90	118.10	0.00	138.55	38.49
59	SAGBEND	-93.75	-22.06	0.00	0.000	5.484	161.27	19.46	-1.91	117.27	0.00	137.69	38.25

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	HORIZ ANGLE (DEG )	VERT ANGLE (DEG )	PIPE LENGTH (M )	TENSILE STRESS (MPA )	HOOP STRESS (MPA )	BENDING STRESSES VERT (MPA )	HORIZ (MPA )	TOTAL STRESS (MPA )	PERCNT YIELD (PCT )
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60	SAGBEND	-95.74	-22.24	0.00	0.000	4.895	163.27	19.43	-1.93	116.06	0.00	136.46	37.91
61	SAGBEND	-97.73	-22.40	0.00	0.000	4.312	165.27	19.40	-1.94	114.38	0.00	134.76	37.43
62	SAGBEND	-99.73	-22.54	0.00	0.000	3.740	167.27	19.38	-1.95	112.07	0.00	132.45	36.79
63	SAGBEND	-101.72	-22.66	0.00	0.000	3.181	169.27	19.37	-1.97	108.97	0.00	129.33	35.92
64	SAGBEND	-103.72	-22.76	0.00	0.000	2.641	171.27	19.35	-1.97	104.83	0.00	125.17	34.77
65	SAGBEND	-105.72	-22.84	0.00	0.000	2.124	173.27	19.34	-1.98	99.32	0.00	119.66	33.24
66	SAGBEND	-107.72	-22.91	0.00	0.000	1.640	175.27	19.33	-1.99	92.05	0.00	112.38	31.22
67	SAGBEND	-109.72	-22.96	0.00	0.000	1.198	177.27	19.32	-1.99	82.46	0.00	102.79	28.55
68	SAGBEND	-111.72	-22.99	0.00	0.000	0.812	179.27	19.32	-1.99	69.84	0.00	90.17	25.05
69	SEABED	-113.72	-23.02	0.00	0.000	0.498	181.27	19.32	-2.00	53.86	0.00	74.20	20.61
70	SEABED	-115.72	-23.03	0.00	0.000	0.268	183.27	19.32	-2.00	37.62	0.00	57.97	16.10
71	SEABED	-117.72	-23.04	0.00	0.000	0.114	185.27	19.32	-2.00	23.81	0.00	44.17	12.27
72	SEABED	-119.72	-23.04	0.00	0.000	0.021	187.27	19.32	-2.00	13.37	0.00	33.73	9.37
73	SEABED	-121.72	-23.04	0.00	0.000	-0.027	189.27	19.32	-2.00	6.20	0.00	26.57	7.38
74	SEABED	-123.72	-23.04	0.00	0.000	-0.046	191.27	19.32	-2.00	1.75	0.00	22.14	6.15
75	SEABED	-125.72	-23.04	0.00	0.000	-0.048	193.27	19.32	-2.00	-0.68	0.00	21.07	5.85
76	SEABED	-127.72	-23.03	0.00	0.000	-0.041	195.27	19.32	-2.00	-1.75	0.00	22.14	6.15
77	SEABED	-129.72	-23.03	0.00	0.000	-0.031	197.27	19.32	-2.00	-1.99	0.00	22.38	6.22
78	SEABED	-131.72	-23.03	0.00	0.000	-0.022	199.27	19.32	-2.00	-1.79	0.00	22.18	6.16



79	SEABED	-133.72	-23.03	0.00	0.000	-0.014	201.27	19.32	-2.00	-1.41	0.00	21.80	6.06
80	SEABED	-135.72	-23.03	0.00	0.000	-0.008	203.27	19.32	-2.00	-1.01	0.00	21.40	5.94
81	SEABED	-137.72	-23.03	0.00	0.000	-0.003	205.27	19.32	-2.00	-0.65	0.00	21.04	5.84
82	SEABED	-139.72	-23.03	0.00	0.000	-0.001	207.27	19.32	-2.00	-0.37	0.00	20.77	5.77
83	SEABED	-141.72	-23.03	0.00	0.000	0.000	209.27	19.32	-2.00	-0.18	0.00	20.58	5.72
84	SEABED	-143.72	-23.03	0.00	0.000	0.001	211.27	19.32	-2.00	-0.06	0.00	20.45	5.68
85	SEABED	-145.72	-23.03	0.00	0.000	0.001	213.27	19.32	-2.00	0.01	0.00	20.40	5.67
86	SEABED	-147.72	-23.03	0.00	0.000	0.001	215.27	19.32	-2.00	0.04	0.00	20.43	5.68
87	SEABED	-149.72	-23.03	0.00	0.000	0.001	217.27	19.32	-2.00	0.05	0.00	20.44	5.68
88	SEABED	-151.72	-23.03	0.00	0.000	0.001	219.27	19.32	-2.00	0.05	0.00	20.44	5.68
89	SEABED	-153.72	-23.03	0.00	0.000	0.000	221.27	19.32	-2.00	0.04	0.00	20.43	5.68
90	SEABED	-155.72	-23.03	0.00	0.000	0.000	223.27	19.32	-2.00	0.03	0.00	20.42	5.67
91	SEABED	-157.72	-23.03	0.00	0.000	0.000	225.27	19.32	-2.00	0.02	0.00	20.41	5.67
92	SEABED	-159.72	-23.03	0.00	0.000	0.000	227.27	19.32	-2.00	0.01	0.00	20.40	5.67
93	SEABED	-161.72	-23.03	0.00	0.000	0.000	229.27	19.32	-2.00	0.01	0.00	20.40	5.67
94	SEABED	-163.72	-23.03	0.00	0.000	0.000	231.27	19.32	-2.00	0.00	0.00	20.40	5.67
95	SEABED	-165.72	-23.03	0.00	0.000	0.000	233.27	19.32	-2.00	0.00	0.00	20.39	5.66
96	SEABED	-167.72	-23.03	0.00	0.000	0.000	235.27	19.32	-2.00	0.00	0.00	20.39	5.67
97	SEABED	-169.72	-23.03	0.00	0.000	0.000	237.27	19.32	-2.00	0.00	0.00	20.39	5.67
98	SEABED	-171.72	-23.03	0.00	0.000	0.000	239.27	19.32	-2.00	0.00	0.00	20.39	5.67
99	SEABED	-173.72	-23.03	0.00	0.000	0.000	241.27	19.32	-2.00	0.00	0.00	20.39	5.66

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 4/28/2020      TIME - 1:39:54      PAGE 13

PROJECT - STATIC PIPE ANALYSIS 8 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	COORDINATES			SUPPORT REACTION		SUPT VERT (M)	SEPARATIONS		PIPE TENSION		BENDING MOMENTS	
		X COORD (M)	Y COORD (M)	Z COORD (M)	VERT (KN)	HORIZ (KN)		HORIZ (M)	VERT (KN)	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
=====													
1	LAYBARGE	64.20	4.42	0.00	0.58	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.12
3	LAYBARGE	59.72	4.30	0.00	15.88	0.00	0.00	0.00	-0.20	-10.72	0.00	10.72	
5	LAYBARGE	48.23	4.00	0.00	19.27	0.00	0.00	0.00	-0.71	-14.85	0.00	14.85	
7	TENSIONR	38.10	3.73	0.00	12.14	0.00	0.00	0.00	96.94	-5.42	0.00	5.42	
9	LAYBARGE	33.43	3.61	0.00	8.50	0.00	0.00	0.00	96.74	-2.86	0.00	2.86	
11	TENSIONR	26.65	3.43	0.00	11.04	0.00	0.00	0.00	194.51	-2.61	0.00	2.61	
13	LAYBARGE	21.33	3.30	0.00	1.74	0.00	0.00	0.00	194.29	0.14	0.00	0.14	
15	LAYBARGE	12.14	2.98	0.00	41.63	0.00	0.00	0.00	193.23	-91.40	0.00	91.40	
17	LAYBARGE	-0.04	1.76	0.00	33.00	0.00	0.00	0.00	191.25	-86.98	0.00	86.98	
20	STINGER	-8.10	0.35	0.00	18.95	0.00	0.00	0.00	189.14	-68.59	0.00	68.59	
22	STINGER	-15.89	-1.45	0.00	18.87	0.00	0.00	0.00	187.29	-62.91	0.00	62.91	
24	STINGER	-23.60	-3.61	0.00	7.24	0.00	0.00	0.00	185.47	-39.32	0.00	39.32	
26	STINGER	-30.64	-5.84	0.00	21.03	0.00	0.00	0.00	183.33	-54.89	0.00	54.89	
28	STINGER	-36.57	-7.92	0.00	6.26	0.00	0.00	0.00	181.60	-15.84	0.00	15.84	
30	STINGER	-39.47	-8.98	0.00	0.00	0.00	0.41	0.00	180.66	4.42	0.00	4.42	
32	SAGBEND	-41.35	-9.66	0.00	0.00	0.00	0.00	0.00	180.02	14.19	0.00	14.19	
33	SAGBEND	-43.23	-10.34	0.00	0.00	0.00	0.00	0.00	179.39	21.61	0.00	21.61	
34	SAGBEND	-45.12	-11.01	0.00	0.00	0.00	0.00	0.00	178.76	27.28	0.00	27.28	
35	SAGBEND	-47.00	-11.67	0.00	0.00	0.00	0.00	0.00	178.15	31.61	0.00	31.61	
36	SAGBEND	-48.90	-12.31	0.00	0.00	0.00	0.00	0.00	177.55	34.95	0.00	34.95	
37	SAGBEND	-50.80	-12.94	0.00	0.00	0.00	0.00	0.00	176.96	37.53	0.00	37.53	
38	SAGBEND	-52.70	-13.55	0.00	0.00	0.00	0.00	0.00	176.39	39.54	0.00	39.54	
39	SAGBEND	-54.61	-14.15	0.00	0.00	0.00	0.00	0.00	175.84	41.12	0.00	41.12	
40	SAGBEND	-56.52	-14.73	0.00	0.00	0.00	0.00	0.00	175.31	42.37	0.00	42.37	
41	SAGBEND	-58.44	-15.29	0.00	0.00	0.00	0.00	0.00	174.79	43.38	0.00	43.38	
42	SAGBEND	-60.37	-15.84	0.00	0.00	0.00	0.00	0.00	174.29	44.19	0.00	44.19	
43	SAGBEND	-62.30	-16.36	0.00	0.00	0.00	0.00	0.00	173.80	44.86	0.00	44.86	
44	SAGBEND	-64.23	-16.87	0.00	0.00	0.00	0.00	0.00	173.34	45.41	0.00	45.41	
45	SAGBEND	-66.17	-17.36	0.00	0.00	0.00	0.00	0.00	172.89	45.88	0.00	45.88	
46	SAGBEND	-68.11	-17.83	0.00	0.00	0.00	0.00	0.00	172.46	46.27	0.00	46.27	
47	SAGBEND	-70.06	-18.27	0.00	0.00	0.00	0.00	0.00	172.05	46.61	0.00	46.61	
48	SAGBEND	-72.02	-18.70	0.00	0.00	0.00	0.00	0.00	171.66	46.90	0.00	46.90	
49	SAGBEND	-73.98	-19.11	0.00	0.00	0.00	0.00	0.00	171.29	47.15	0.00	47.15	
50	SAGBEND	-75.94	-19.50	0.00	0.00	0.00	0.00	0.00	170.93	47.36	0.00	47.36	
51	SAGBEND	-77.90	-19.86	0.00	0.00	0.00	0.00	0.00	170.59	47.54	0.00	47.54	
52	SAGBEND	-79.87	-20.21	0.00	0.00	0.00	0.00	0.00	170.28	47.68	0.00	47.68	
53	SAGBEND	-81.85	-20.54	0.00	0.00	0.00	0.00	0.00	169.98	47.78	0.00	47.78	
54	SAGBEND	-83.82	-20.84	0.00	0.00	0.00	0.00	0.00	169.70	47.84	0.00	47.84	
55	SAGBEND	-85.80	-21.13	0.00	0.00	0.00	0.00	0.00	169.44	47.85	0.00	47.85	
56	SAGBEND	-87.78	-21.39	0.00	0.00	0.00	0.00	0.00	169.20	47.80	0.00	47.80	
57	SAGBEND	-89.77	-21.63	0.00	0.00	0.00	0.00	0.00	168.98	47.67	0.00	47.67	
58	SAGBEND	-91.76	-21.86	0.00	0.00	0.00	0.00	0.00	168.78	47.45	0.00	47.45	
59	SAGBEND	-93.75	-22.06	0.00	0.00	0.00	0.00	0.00	168.60	47.12	0.00	47.12	

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 4/28/2020      TIME - 1:39:54      PAGE 14

PROJECT - STATIC PIPE ANALYSIS 8 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

=====

=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE	PIPE	COORDINATES			SUPPORT REACTION		SUPT	SEPARATIONS		PIPE		BENDING MOMENTS	
		X	Y	Z	VERT	HORIZ		HORIZ	VERT	VERT	HORIZ	TOTAL	
=====													



1	LAYBARGE	64.2	4.4	0.0	0.6	0.0	0.1	0.3	0.
3	LAYBARGE	59.7	4.3	0.0	15.9	0.0	10.7	26.7	7.
5	LAYBARGE	48.2	4.0	0.0	19.3	0.0	14.8	37.0	10.
7	TENSIONR	38.1	3.7	0.0	12.1	0.0	5.4	25.3	7.
9	LAYBARGE	33.4	3.6	0.0	8.5	0.0	2.9	18.9	5.
11	TENSIONR	26.7	3.4	0.0	11.0	0.0	2.6	30.1	8.
13	LAYBARGE	21.3	3.3	0.0	1.7	0.0	0.1	23.9	7.
15	LAYBARGE	12.1	3.0	0.0	41.6	0.0	91.4	250.9	70.
17	LAYBARGE	0.0	1.8	0.0	33.0	0.0	87.0	239.7	67.
20	STINGER	-8.1	0.4	0.0	18.9	0.0	68.6	193.7	54.
22	STINGER	-15.9	-1.4	0.0	18.9	0.0	62.9	179.3	50.
24	STINGER	-23.6	-3.6	0.0	7.2	0.0	39.3	120.4	33.

```

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 16
STATIC PIPE ANALYSIS 8 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 4/28/2020 TIME - 1:39:54 CASE 1
=====

```

STATIC SOLUTION SUMMARY

26	STINGER	-30.6	-5.8	0.0	21.0	0.0	54.9	158.9	44.
28	STINGER	-36.6	-7.9	0.0	6.3	0.0	15.8	61.5	17.
30	STINGER	-39.5	-9.0	0.0	0.0	0.0	4.4	32.9	9.
54	SAGBEND	-83.8	-20.8	0.0	0.0	0.0	47.8	139.6	39.
69	SEABED	-113.7	-23.0	0.0	1.0	0.0	21.6	74.2	21.

**LAMPIRAN ANALISA STATIS OFFPIPE PADA PIPA 10  
INCH**

```

MMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
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MMM  MMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
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MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
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MMMMMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM

```

```

*****
*
*           O F F P I P E - 3 -- OFFSHORE PIPELINE ANALYSIS SYSTEM
*
*   COPYRIGHT (C) 1983-2016, ROBERT C. MALAHY. ALL RIGHTS RESERVED WORLDWIDE.
*
*           VERSION NO. - 3.02EX
*           RELEASED ON - 03/08/2016
*           LICENSED TO - PT Timas Suplindo
*
*****
*
* OFFPIPE IS A NONLINEAR, 3-DIMENSIONAL FINITE ELEMENT METHOD BASED PROGRAM FOR THE
* STATIC AND DYNAMIC ANALYSIS OF PROBLEMS ARISING IN THE DESIGN OF MARINE PIPELINES.
* THIS VERSION OF OFFPIPE MAY BE USED FOR THE ANALYSIS OF OFFSHORE PIPELAYING OPER-
* ATIONS, DAVIT LIFTS, PIPELINES LYING ON AN UNEVEN SEABED, AND RISERS.
*
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*
*           ROBERT C. MALAHY           TELEPHONE: (713) 664-8635
*           6554 AUDEN                 FACSIMILE: (713) 664-0962
*           HOUSTON, TEXAS 77005
*           U.S.A.                     EMAIL: SUPPORT@OFFPIPE.COM
*
*****

```

```

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX  PAGE 3
STATIC PIPE ANALYSIS 10 INCH
JOB NO. - LAYING           LICENSED BY - PT Timas Suplindo
USER ID - IK              DATE - 4/28/2020  TIME - 1:40:50  CASE 1
=====

```

INPUT DATA ECHO

```

=====
PRINTED OUTPUT SELECTED
=====
STATIC PIPE FORCES AND STRESSES ... YES
STATIC SOLUTION SUMMARY ..... YES
DYNAMIC PIPE FORCES AND STRESSES .. NO
DYNAMIC RANGE OF PIPE DATA ..... NO
DYNAMIC TRACKING OF PIPE DATA ..... NO
OVERBEND PIPE SUPPORT GEOMETRY .... NO
STINGER BALLAST SCHEDULE DATA ..... NO
SUPPORT REACTIONS IN BARGE COORDS . NO

INTERNAL FORCES IN PIPE & CABLE ... NO
INTERNAL FORCES IN STINGER ..... NO
PRINT PIPE STRAINS IN OUTPUT ..... NO
DNV OS-F101 COMPLIANCE REPORT ..... NO
API RP-1111 COMPLIANCE REPORT ..... NO
PRINT DNV/API FACTORS & PARAMETERS NO
USE THICK WALL HOOP STRESS EQN. ... NO
USE DNV 1981 FOR TOTAL PIPE STRESS NO

ENABLE/DISABLE WARNING MESSAGES ... ENABLE
GENERATE SPREAD SHEET PLOT FILE ... NO
GENERATE ASCII PLOT DATA FILES .... NO

```

PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX ..... 1  
 PLOT NUMBER ..... 1  
 PLOT TYPE OPTION NUMBER ..... 1  
 DYNAMIC PROFILE TIME POINT ..... 0.000  
 DYNAMIC PROFILE TIME INCREMENT ..... 0.000  
 ORDINATE PARAMETER CODE NUMBER ..... 2  
 AXIS LABEL FOR ORDINATE ..... "PIPE ELEVATION Y COORDINATE "  
 ABSCISSA PARAMETER CODE NUMBER ..... 1  
 AXIS LABEL FOR ABSCISSA ..... "PIPE HORIZONTAL X COORDINATE "  
  
 PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS "  
 MINIMUM VERTICAL AXIS RANGE ..... 0.000  
 MAXIMUM VERTICAL AXIS RANGE ..... 0.000  
 MINIMUM HORIZONTAL AXIS RANGE ..... 0.000  
 MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 4  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 4/28/2020 TIME - 1:40:50 CASE 1  
 =====

INPUT DATA ECHO

PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX ..... 2  
 PLOT NUMBER ..... 1  
 PLOT TYPE OPTION NUMBER ..... 1  
 DYNAMIC PROFILE TIME POINT ..... 0.000  
 DYNAMIC PROFILE TIME INCREMENT ..... 0.000  
 ORDINATE PARAMETER CODE NUMBER ..... 15  
 AXIS LABEL FOR ORDINATE ..... "DNV YIELD STRESS PERCENTAGE "  
 ABSCISSA PARAMETER CODE NUMBER ..... 1  
 AXIS LABEL FOR ABSCISSA ..... "PIPELINE HORIZONTAL X COORDINATE"  
  
 PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS "  
 MINIMUM VERTICAL AXIS RANGE ..... 0.000  
 MAXIMUM VERTICAL AXIS RANGE ..... 0.000  
 MINIMUM HORIZONTAL AXIS RANGE ..... 0.000  
 MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000

PIPE PROPERTIES

=====

PROPERTY TABLE ROW NUMBER ..... 1  
 PIPE SECTION LENGTH ..... 0.000 METERS  
 STEEL MODULUS OF ELASTICITY ..... 207000. M-PASCAL  
 STEEL CROSS SECTIONAL AREA ..... 103.822 CM<sup>2</sup>  
 COATED PIPE AVG MOMENT OF INERTIA .. 8817.56 CM<sup>4</sup>  
 WEIGHT PER-UNIT-LENGTH IN AIR ..... 2022.01 N/M  
 WEIGHT PER-UNIT-LENGTH SUBMERGED .. 434.28 N/M  
 MAXIMUM ALLOWABLE PIPE STRAIN ..... 0.205000 PERCENT  
  
 STEEL OUTSIDE DIAMETER ..... 27.3050 CM  
 STEEL WALL THICKNESS ..... 1.2700 CM  
 YIELD STRESS ..... 360.00 M-PASCAL  
 STRESS/STRAIN INTENSE FACTOR ..... 0.0000  
 HYDRODYNAMIC OUTSIDE DIAMETER ..... 0.000 CM  
 DRAG COEFFICIENT ..... 0.0000  
 HYDRODYNAMIC TOTAL AREA ..... 0.000 CM<sup>2</sup>  
 ADDED MASS COEFFICIENT ..... 0.0000  
 POISSON'S RATIO ..... 0.3000  
 COEFFICIENT OF THERMAL EXPANSION .. 0.00001100 1/DEG C

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 5  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 4/28/2020 TIME - 1:40:50 CASE 1  
 =====

INPUT DATA ECHO

PIPE COATING PROPERTIES

=====

PIPE PROPERTY TABLE INDEX ..... 1  
 CORROSION COATING THICKNESS ..... 0.320 CM  
 CORROSION COATING WEIGHT DENSITY .. 9339.1 N/M<sup>3</sup>  
 CORROSION COATING ELASTIC MODULUS . 0.000 M-PASCAL  
 CONCRETE COATING THICKNESS ..... 4.000 CM  
 CONCRETE COATING WEIGHT DENSITY ... 29822. N/M<sup>3</sup>  
 CONCRETE COATING ELASTIC MODULUS .. 0.000 M-PASCAL  
 DESIRED PIPE SPECIFIC GRAVITY ..... 0.0000  
 CONCRETE STIFFENING EFFECTIVENESS . 0.000  
 NO NOT CALC. STRESS FOR BARE PIPE . NO

AVERAGE LENGTH OF PIPE JOINT ..... 12.200 METERS  
 EFFECTIVE FIELD JOINT LENGTH ..... 0.300 METERS  
 FIELD JOINT FILL WEIGHT DENSITY ... 10055.3 N/M^3  
 FIELD JOINT FILL ELASTIC MODULUS... 0.000 M-PASCAL  
 FIELD JOINT STIFFENING EFFECT. .... 0.000  
 FIELD JOINT BENDING MODEL ..... 0 IGNORE COATING STIFFNESS  
 WEIGHT DENSITY OF STEEL ..... 77008. N/M^3  
 WEIGHT DENSITY OF PIPE CONTENTS ... 0.0 N/M^3  
 REF. ELEVATION FOR STATIC HEAD .... 0.00 METERS  
 FREE FLOOD PIPE DURING PIPELAY ... NO

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 6  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 4/28/2020 TIME - 1:40:50 CASE 1  
 =====

INPUT DATA ECHO

PIPELAY VESSEL DESCRIPTION

=====  
 NUMBER OF PIPE NODES ..... 9  
 BARGE GEOMETRY SPECIFIED BY ..... 1 X-Y COORDINATES  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.000 METERS  
 ADJUST Y COORDINATES MANUALLY .... NO  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 PIPE ANGLE RELATIVE TO DECK ..... 0.0000 DEGREES  
 HEIGHT OF DECK ABOVE WATER ..... 2.400 METERS  
 LAYBARGE FORWARD (X) OFFSET ..... 0.000 METERS  
 BARGE TRIM ANGLE ..... 0.5000 DEGREES  
  
 STERN SHOE X COORDINATE ..... 0.000 METERS  
 STERN SHOE Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER X COORDINATE ..... 43.820 METERS  
 ROTATION CENTER Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER Z COORDINATE ..... 6.370 METERS  
 BARGE HEADING ..... 0.0000 DEGREES  
 BARGE OFFSET FROM RIGHT-OF-WAY .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT VERTICAL ANGLE ... 0.000 DEGREES  
 PIPE RAMP PIVOT Z COORDINATE ..... 0.000 METERS  
 PIPE RAMP HEADING ON DECK ..... 0.000 DEGREES  
 ROLE OF ALTERNATE WAVE ORIGIN .... 0 MOTIONS & WAVES AT CENTER OF MOTION  
 WAVE PHASE ORIGIN X COORDINATE .... 0.000  
 WAVE PHASE ORIGIN Y COORDINATE .... 0.000 METERS  
 WAVE PHASE ORIGIN Z COORDINATE .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE .....

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	DAVIT SPACING ( M )
64.220	1.838	1 SIMPLE SUPPORT	0.000
59.740	1.760	1 SIMPLE SUPPORT	0.000
48.240	1.560	1 SIMPLE SUPPORT	0.000
38.110	1.383	2 PIPE TENSIONER	0.000
33.440	1.302	1 SIMPLE SUPPORT	0.000
26.660	1.183	2 PIPE TENSIONER	0.000
21.340	1.092	7 USER DEFINED SPT	0.000
12.150	0.860	7 USER DEFINED SPT	0.000
-0.040	-0.260	8 USER DEFINED SPT	0.000

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 7  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 4/28/2020 TIME - 1:40:50 CASE 1  
 =====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====  
 SUPPORT PROPERTY TABLE INDEX ..... 2  
 SUPPORT ELEMENT TYPE ..... 2 TENSIONER  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
  
 BOTTOM ROLLER ANGLE TO HORIZONTAL . 0.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES

SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 7  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 1.600 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 8  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 4/28/2020 TIME - 1:40:50 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 8  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

STINGER DESCRIPTION

=====

NUMBER OF PIPE/STINGER NODES ..... 6  
 STINGER GEOMETRY SPECIFIED BY ..... 2 X-Y COORD AND MATCH PT  
 STINGER TYPE ..... 1 FIXED GEOMETRY OR RAMP  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.00 METERS  
 HITCH X-COORDINATE ..... 0.497 METERS  
 HITCH Y-COORDINATE ..... -1.800 METERS  
 HITCH ANGULAR ORIENTATION ..... 0.000 DEGREES

X COORDINATE OF LOCAL ORIGIN ..... 0.497 METERS  
 Y COORDINATE OF LOCAL ORIGIN ..... -1.800 METERS  
 ROTATION ABOUT STINGER HITCH ..... 13.500 DEGREES  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 TANGENT POINT ANGLE ..... 0.000 DEGREES

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	ELEMENT TYPE	ELEMENT LENGTH ( M )
-8.325	2.209	1 SIMPLE SUPPORT	2 HINGED END	0.000
-16.325	2.349	1 SIMPLE SUPPORT	1 FIXED END	0.000
-24.325	2.119	1 SIMPLE SUPPORT	1 FIXED END	0.000
-31.699	1.660	1 SIMPLE SUPPORT	1 FIXED END	0.000
-37.949	1.069	1 SIMPLE SUPPORT	1 FIXED END	0.000
-40.949	0.350	1 SIMPLE SUPPORT	1 FIXED END	0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 9  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 4/28/2020 TIME - 1:40:50 CASE 1

=====

INPUT DATA ECHO



SUPPORT ELEMENT PROPERTIES

```

=====
SUPPORT PROPERTY TABLE INDEX ..... 1
SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT
SUPPORT INITIAL STATE FLAG ..... 0
TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M
VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M
STATIC VERTICAL DEFLECTION ..... 0.0000 CM
LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES
SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES
SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS
BED ROLLER LENGTH ..... 1.640 METERS
HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS
TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
    
```

CURRENT VELOCITIES

```

=====
WATER DEPTH (M )      CURRENT SPEED (M/S )      DIRECTION OF TRAVEL (DEG )
=====
0.000                0.790                0.000
11.500               0.480                0.000
23.000               0.420                0.000
    
```

PIPE TENSION DATA

```

=====
STATIC PIPE TENSION ON LAY VESSEL . 196.133 K-NEWTON
MINIMUM DYNAMIC PIPE TENSION ..... 0.000 K-NEWTON
MAXIMUM DYNAMIC PIPE TENSION ..... 0.000 K-NEWTON
STATIC HORIZONTAL BOTTOM TENSION .. 0.000 K-NEWTON
NO. OF VALUES FOR TENSION PROFILE . 0
VALUES ARE FOR PIPE SPAN ANALYSIS . NO
MAXIMUM PIPE PAYOUT SPEED ..... 0.000 M/SEC
MAXIMUM PIPE TAKEUP SPEED ..... 0.000 M/SEC
    
```

```

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 10
STATIC PIPE ANALYSIS 10 INCH
JOB NO. - LAYING          LICENSED BY - PT Timas Suplindo
USER ID - IK             DATE - 4/28/2020 TIME - 1:40:50 CASE 1
=====
    
```

INPUT DATA ECHO

SAGBEND GEOMETRY

```

=====
SAGBEND PIPE ELEMENT LENGTH ..... 2.000 METERS
WATER DEPTH ..... 23.00 METERS
X-COORDINATE AT SPECIFIED DEPTH . . 0.00 METERS
ESTIMATED SAGBEND X LENGTH ..... 0.00 METERS
ESTIMATED PIPE LENGTH ON SEABED ... 0.00 METERS
X-COORD OF PIPE FREE END ON SEABED 0.00 METERS
X-COORD POINT OF FIXITY ON SEABED . 0.00 METERS
MAXIMUM SLOPE (ANGLE) OF SEABED ... 0.000 DEGREES
DIRECTION OF MAXIMUM SLOPE ..... 0.000 DEGREES

PIPE/CABLE SPAN END CONDITION ..... 0 PIPE/CABLE RESTING ON SEABED
PIPE/CABLE SPAN LENGTH GIVEN BY ... 0 SPECIFIED PIPE/CABLE TENSION
ESTIMATED SPAN DEPTH AT FREE END .. 0.00 METERS
PIPE VERTICAL ANGLE AT FREE END ... 0.000 DEGREES
BOTTOM HINGE OFFSET ..... 0.000 METERS
BOTTOM HINGE MINIMUM ANGLE ..... 0.000 DEGREES
BOTTOM HINGE MAXIMUM ANGLE ..... 0.000 DEGREES
    
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SOIL ELEMENT PROPERTIES

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SOIL PROPERTY TABLE ROW INDEX .... 1
SOIL ELEMENT TYPE (FUTURE USE) .... 0
PIPE INDEX OR SEGMENT NUMBER ..... 0
LONGITUDINAL SOIL STIFFNESS ..... 0.00 KN/M^2
VERTICAL SOIL STIFFNESS ..... 0.00 KN/M^2
LATERAL SOIL STIFFNESS ..... 0.00 KN/M^2
DEFLECTION UNDER REFERENCE LOAD ... 0.0000 CM

LONGITUDINAL COEF. OF FRICTION .... 0.000
LATERAL COEFFICIENT OF FRICTION ... 0.600
NUMBER OF INTEGRATION POINTS ..... 0
    
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STATIC SOLUTION CONVERGED IN ( 19 ) ITERATIONS

END OF INPUT DATA

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS VERT (MPA)	HORIZ STRESS (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
=====													
1	LAYBARGE	64.20	4.42	0.00	0.000	1.482	0.00	0.00	0.00	0.23	0.00	0.23	0.07
3	LAYBARGE	59.72	4.30	0.00	0.000	1.554	4.48	-0.02	0.00	-20.12	0.00	20.14	5.60
5	LAYBARGE	48.23	4.00	0.00	0.000	1.477	15.98	-0.08	0.00	-28.57	0.00	28.66	7.96
7	TENSIONR	38.10	3.73	0.00	0.000	1.453	26.11	9.31	0.00	-9.48	0.00	18.79	5.22
9	LAYBARGE	33.43	3.61	0.00	0.000	1.531	30.78	9.28	0.00	-9.06	0.00	18.34	5.10
11	TENSIONR	26.65	3.43	0.00	0.000	1.446	37.57	18.69	0.00	5.49	0.00	24.18	6.72
13	LAYBARGE	21.33	3.30	0.00	0.000	1.400	42.89	18.66	0.00	-7.74	0.00	26.40	7.33
15	LAYBARGE	12.14	2.98	0.00	0.000	3.342	52.08	18.53	0.00	-243.96	0.00	262.49	72.91
17	LAYBARGE	-0.04	1.76	0.00	0.000	8.131	64.32	18.29	0.00	-239.24	0.00	257.53	71.54
=====													
20	STINGER	-8.10	0.35	0.00	0.000	11.550	72.51	18.04	0.00	-208.75	0.00	226.79	63.00
22	STINGER	-15.89	-1.45	0.00	0.000	14.262	80.51	17.86	-0.16	-143.30	0.00	161.23	44.79
24	STINGER	-23.62	-3.53	0.00	0.000	15.582	88.51	17.67	-0.38	-30.33	0.00	48.20	13.39
26	STINGER	-30.74	-5.52	0.00	0.000	15.616	95.90	17.48	-0.60	19.62	0.00	37.40	10.39
28	STINGER	-36.76	-7.19	0.00	0.000	15.219	102.16	17.31	-0.78	40.89	0.00	58.59	16.28
30	STINGER	-39.67	-7.97	0.00	0.000	14.949	105.16	17.23	-0.86	47.29	0.00	64.96	18.04
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32	SAGBEND	-41.70	-8.51	0.00	0.000	14.739	107.27	17.18	-0.92	50.78	0.00	68.42	19.01
33	SAGBEND	-43.64	-9.02	0.00	0.000	14.527	109.27	17.13	-0.97	53.49	0.00	71.12	19.75
34	SAGBEND	-45.58	-9.52	0.00	0.000	14.306	111.27	17.08	-1.03	55.74	0.00	73.34	20.37
35	SAGBEND	-47.52	-10.01	0.00	0.000	14.076	113.27	17.03	-1.08	57.59	0.00	75.17	20.88
36	SAGBEND	-49.46	-10.49	0.00	0.000	13.839	115.27	16.99	-1.13	59.13	0.00	76.69	21.30
37	SAGBEND	-51.40	-10.96	0.00	0.000	13.596	117.27	16.94	-1.18	60.41	0.00	77.95	21.65
38	SAGBEND	-53.34	-11.43	0.00	0.000	13.349	119.27	16.89	-1.24	61.48	0.00	79.00	21.94
39	SAGBEND	-55.29	-11.89	0.00	0.000	13.098	121.27	16.85	-1.28	62.38	0.00	79.88	22.19
40	SAGBEND	-57.24	-12.34	0.00	0.000	12.843	123.27	16.80	-1.33	63.13	0.00	80.61	22.39
41	SAGBEND	-59.19	-12.78	0.00	0.000	12.586	125.27	16.76	-1.38	63.77	0.00	81.23	22.56
42	SAGBEND	-61.14	-13.21	0.00	0.000	12.326	127.27	16.72	-1.43	64.32	0.00	81.76	22.71
43	SAGBEND	-63.10	-13.63	0.00	0.000	12.064	129.27	16.68	-1.47	64.78	0.00	82.21	22.83
44	SAGBEND	-65.06	-14.04	0.00	0.000	11.800	131.27	16.63	-1.52	65.18	0.00	82.59	22.94
45	SAGBEND	-67.01	-14.45	0.00	0.000	11.535	133.27	16.59	-1.56	65.53	0.00	82.92	23.03
46	SAGBEND	-68.97	-14.84	0.00	0.000	11.269	135.27	16.56	-1.60	65.83	0.00	83.20	23.11
47	SAGBEND	-70.94	-15.23	0.00	0.000	11.001	137.27	16.52	-1.65	66.10	0.00	83.45	23.18
48	SAGBEND	-72.90	-15.61	0.00	0.000	10.732	139.27	16.48	-1.69	66.34	0.00	83.67	23.24
49	SAGBEND	-74.87	-15.97	0.00	0.000	10.463	141.27	16.44	-1.73	66.54	0.00	83.87	23.30
50	SAGBEND	-76.83	-16.33	0.00	0.000	10.193	143.27	16.41	-1.77	66.73	0.00	84.04	23.34
51	SAGBEND	-78.80	-16.68	0.00	0.000	9.922	145.27	16.37	-1.80	66.90	0.00	84.19	23.39
52	SAGBEND	-80.78	-17.02	0.00	0.000	9.650	147.27	16.34	-1.84	67.05	0.00	84.33	23.43
53	SAGBEND	-82.75	-17.35	0.00	0.000	9.378	149.27	16.31	-1.88	67.19	0.00	84.46	23.46
54	SAGBEND	-84.72	-17.67	0.00	0.000	9.105	151.27	16.28	-1.91	67.32	0.00	84.57	23.49
55	SAGBEND	-86.70	-17.98	0.00	0.000	8.831	153.27	16.25	-1.94	67.44	0.00	84.67	23.52
56	SAGBEND	-88.67	-18.29	0.00	0.000	8.558	155.27	16.22	-1.98	67.54	0.00	84.76	23.55
57	SAGBEND	-90.65	-18.58	0.00	0.000	8.283	157.27	16.19	-2.01	67.64	0.00	84.85	23.57
58	SAGBEND	-92.63	-18.86	0.00	0.000	8.009	159.27	16.16	-2.04	67.72	0.00	84.92	23.59
59	SAGBEND	-94.61	-19.14	0.00	0.000	7.734	161.27	16.13	-2.07	67.80	0.00	84.99	23.61

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS VERT (MPA)	HORIZ STRESS (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
=====													
60	SAGBEND	-96.60	-19.40	0.00	0.000	7.459	163.27	16.11	-2.10	67.87	0.00	85.04	23.62
61	SAGBEND	-98.58	-19.66	0.00	0.000	7.183	165.27	16.08	-2.12	67.93	0.00	85.09	23.64
62	SAGBEND	-100.56	-19.90	0.00	0.000	6.908	167.27	16.06	-2.15	67.97	0.00	85.12	23.65
63	SAGBEND	-102.55	-20.14	0.00	0.000	6.632	169.27	16.03	-2.18	68.00	0.00	85.15	23.65
64	SAGBEND	-104.54	-20.36	0.00	0.000	6.356	171.27	16.01	-2.20	68.02	0.00	85.16	23.65
65	SAGBEND	-106.53	-20.58	0.00	0.000	6.080	173.27	15.99	-2.22	68.03	0.00	85.15	23.65
66	SAGBEND	-108.52	-20.79	0.00	0.000	5.804	175.27	15.97	-2.25	68.01	0.00	85.13	23.65
67	SAGBEND	-110.51	-20.98	0.00	0.000	5.528	177.27	15.95	-2.27	67.98	0.00	85.09	23.63
68	SAGBEND	-112.50	-21.17	0.00	0.000	5.253	179.27	15.93	-2.29	67.92	0.00	85.02	23.62
69	SAGBEND	-114.49	-21.35	0.00	0.000	4.977	181.27	15.91	-2.31	67.83	0.00	84.92	23.59
70	SAGBEND	-116.48	-21.52	0.00	0.000	4.702	183.27	15.90	-2.33	67.70	0.00	84.79	23.55
71	SAGBEND	-118.48	-21.68	0.00	0.000	4.428	185.27	15.88	-2.34	67.53	0.00	84.61	23.50
72	SAGBEND	-120.47	-21.83	0.00	0.000	4.155	187.27	15.87	-2.36	67.31	0.00	84.38	23.44
73	SAGBEND	-122.46	-21.97	0.00	0.000	3.882	189.27	15.85	-2.37	67.03	0.00	84.10	23.36
74	SAGBEND	-124.46	-22.10	0.00	0.000	3.611	191.27	15.84	-2.39	66.68	0.00	83.74	23.26
75	SAGBEND	-126.46	-22.22	0.00	0.000	3.341	193.27	15.83	-2.40	66.23	0.00	83.29	23.14
76	SAGBEND	-128.45	-22.33	0.00	0.000	3.074	195.27	15.82	-2.41	65.68	0.00	82.73	22.98
77	SAGBEND	-130.45	-22.44	0.00	0.000	2.809	197.27	15.81	-2.42	65.00	0.00	82.05	22.79
78	SAGBEND	-132.45	-22.53	0.00	0.000	2.546	199.27	15.80	-2.43	64.16	0.00	81.20	22.56
79	SAGBEND	-134.45	-22.61	0.00	0.000	2.288	201.27	15.79	-2.44	63.12	0.00	80.16	22.27

80	SAGBEND	-136.45	-22.69	0.00	0.000	2.035	203.27	15.78	-2.45	61.85	0.00	78.89	21.91
81	SAGBEND	-138.44	-22.76	0.00	0.000	1.787	205.27	15.78	-2.46	60.30	0.00	77.34	21.48
82	SAGBEND	-140.44	-22.81	0.00	0.000	1.546	207.27	15.77	-2.47	58.40	0.00	75.44	20.95
83	SAGBEND	-142.44	-22.86	0.00	0.000	1.314	209.27	15.77	-2.47	56.09	0.00	73.12	20.31
84	SAGBEND	-144.44	-22.91	0.00	0.000	1.092	211.27	15.76	-2.48	53.26	0.00	70.29	19.53
85	SAGBEND	-146.44	-22.94	0.00	0.000	0.882	213.27	15.76	-2.48	49.81	0.00	66.84	18.57
86	SAGBEND	-148.44	-22.97	0.00	0.000	0.689	215.27	15.76	-2.48	45.60	0.00	62.64	17.40
87	SAGBEND	-150.44	-22.99	0.00	0.000	0.514	217.27	15.76	-2.48	40.47	0.00	57.51	15.98
88	SEABED	-152.44	-23.00	0.00	0.000	0.362	219.27	15.76	-2.49	34.23	0.00	51.27	14.24
89	SEABED	-154.44	-23.01	0.00	0.000	0.237	221.27	15.75	-2.49	27.15	0.00	44.20	12.28
90	SEABED	-156.44	-23.02	0.00	0.000	0.141	223.27	15.75	-2.49	20.24	0.00	37.30	10.36
91	SEABED	-158.44	-23.02	0.00	0.000	0.072	225.27	15.75	-2.49	14.17	0.00	31.25	8.68
92	SEABED	-160.44	-23.03	0.00	0.000	0.025	227.27	15.76	-2.49	9.22	0.00	26.31	7.31
93	SEABED	-162.44	-23.03	0.00	0.000	-0.005	229.27	15.76	-2.49	5.43	0.00	22.54	6.26
94	SEABED	-164.44	-23.02	0.00	0.000	-0.021	231.27	15.76	-2.49	2.71	0.00	19.82	5.51
95	SEABED	-166.44	-23.02	0.00	0.000	-0.028	233.27	15.76	-2.49	0.87	0.00	18.00	5.00
96	SEABED	-168.44	-23.02	0.00	0.000	-0.029	235.27	15.76	-2.49	-0.27	0.00	17.40	4.83
97	SEABED	-170.44	-23.02	0.00	0.000	-0.026	237.27	15.76	-2.49	-0.89	0.00	18.01	5.00
98	SEABED	-172.44	-23.02	0.00	0.000	-0.022	239.27	15.76	-2.49	-1.14	0.00	18.27	5.07
99	SEABED	-174.44	-23.02	0.00	0.000	-0.017	241.27	15.76	-2.49	-1.17	0.00	18.29	5.08
100	SEABED	-176.44	-23.02	0.00	0.000	-0.013	243.27	15.76	-2.49	-1.06	0.00	18.18	5.05
101	SEABED	-178.44	-23.02	0.00	0.000	-0.009	245.27	15.76	-2.49	-0.88	0.00	18.01	5.00
102	SEABED	-180.44	-23.02	0.00	0.000	-0.006	247.27	15.76	-2.49	-0.69	0.00	17.82	4.95
103	SEABED	-182.44	-23.02	0.00	0.000	-0.003	249.27	15.76	-2.49	-0.51	0.00	17.64	4.90

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 4/28/2020      TIME - 1:40:50      PAGE 13

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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=====														
STATIC PIPE COORDINATES, FORCES AND STRESSES														
=====														
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS (MPA)	VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCENT YIELD (PCT)
=====														
104	SEABED	-184.44	-23.02	0.00	0.000	-0.002	251.27	15.76	-2.49	-0.35	0.00	0.00	17.48	4.86
105	SEABED	-186.44	-23.02	0.00	0.000	0.000	253.27	15.76	-2.49	-0.22	0.00	0.00	17.36	4.82
106	SEABED	-188.44	-23.02	0.00	0.000	0.000	255.27	15.76	-2.49	-0.13	0.00	0.00	17.26	4.80
107	SEABED	-190.44	-23.02	0.00	0.000	0.001	257.27	15.76	-2.49	-0.06	0.00	0.00	17.19	4.78
108	SEABED	-192.44	-23.02	0.00	0.000	0.001	259.27	15.76	-2.49	-0.02	0.00	0.00	17.15	4.76
109	SEABED	-194.44	-23.02	0.00	0.000	0.001	261.27	15.76	-2.49	0.01	0.00	0.00	17.15	4.76
110	SEABED	-196.44	-23.02	0.00	0.000	0.001	263.27	15.76	-2.49	0.03	0.00	0.00	17.16	4.77
111	SEABED	-198.44	-23.02	0.00	0.000	0.001	265.27	15.76	-2.49	0.03	0.00	0.00	17.16	4.77
112	SEABED	-200.44	-23.02	0.00	0.000	0.000	267.27	15.76	-2.49	0.03	0.00	0.00	17.16	4.77
113	SEABED	-202.44	-23.02	0.00	0.000	0.000	269.27	15.76	-2.49	0.02	0.00	0.00	17.16	4.77
114	SEABED	-204.44	-23.02	0.00	0.000	0.000	271.27	15.76	-2.49	0.02	0.00	0.00	17.15	4.76
115	SEABED	-206.44	-23.02	0.00	0.000	0.000	273.27	15.76	-2.49	0.01	0.00	0.00	17.15	4.76
116	SEABED	-208.44	-23.02	0.00	0.000	0.000	275.27	15.76	-2.49	0.01	0.00	0.00	17.14	4.76
117	SEABED	-210.44	-23.02	0.00	0.000	0.000	277.27	15.76	-2.49	0.00	0.00	0.00	17.14	4.76
118	SEABED	-212.44	-23.02	0.00	0.000	0.000	279.27	15.76	-2.49	0.00	0.00	0.00	17.14	4.76

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 4/28/2020      TIME - 1:40:50      PAGE 14

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT REACTION VERT (KN)	HORIZ (KN)	SUPT LENGTH (M)	SEPARATIONS (M)	PIPE TENSION (KN)	VERT (KN-M)	BENDING MOMENTS (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)
=====													
1	LAYBARGE	64.20	4.42	0.00	0.74	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.15
3	LAYBARGE	59.72	4.30	0.00	19.39	0.00	0.00	0.00	-0.24	-13.00	0.00	0.00	13.00
5	LAYBARGE	48.23	4.00	0.00	23.76	0.00	0.00	0.00	-0.86	-18.46	0.00	0.00	18.46
7	TENSIONR	38.10	3.73	0.00	13.95	0.00	0.00	0.00	96.68	-6.13	0.00	0.00	6.13
9	LAYBARGE	33.43	3.61	0.00	12.74	0.00	0.00	0.00	96.43	-5.86	0.00	0.00	5.86
11	TENSIONR	26.65	3.43	0.00	9.46	0.00	0.00	0.00	194.14	3.55	0.00	0.00	3.55
13	LAYBARGE	21.33	3.30	0.00	0.00	0.00	0.01	0.00	193.88	-5.00	0.00	0.00	5.00
15	LAYBARGE	12.14	2.98	0.00	52.33	0.00	0.00	0.00	192.46	-157.64	0.00	0.00	157.64
17	LAYBARGE	-0.04	1.76	0.00	36.86	0.00	0.00	0.00	190.02	-154.59	0.00	0.00	154.59
20	STINGER	-8.10	0.35	0.00	23.77	0.00	0.00	0.00	187.38	-134.89	0.00	0.00	134.89
22	STINGER	-15.89	-1.45	0.00	15.41	0.00	0.00	0.00	186.32	-92.60	0.00	0.00	92.60
24	STINGER	-23.62	-3.53	0.00	0.00	0.00	0.08	0.00	185.66	-19.60	0.00	0.00	19.60
26	STINGER	-30.74	-5.52	0.00	0.00	0.00	0.32	0.00	184.80	12.68	0.00	0.00	12.68
28	STINGER	-36.76	-7.19	0.00	0.00	0.00	0.77	0.00	184.06	26.42	0.00	0.00	26.42
30	STINGER	-39.67	-7.97	0.00	0.00	0.00	1.47	0.00	183.71	30.56	0.00	0.00	30.56
32	SAGBEND	-41.70	-8.51	0.00	0.00	0.00	0.00	0.00	183.48	32.81	0.00	0.00	32.81
33	SAGBEND	-43.64	-9.02	0.00	0.00	0.00	0.00	0.00	183.25	34.57	0.00	0.00	34.57
34	SAGBEND	-45.58	-9.52	0.00	0.00	0.00	0.00	0.00	183.03	36.02	0.00	0.00	36.02
35	SAGBEND	-47.52	-10.01	0.00	0.00	0.00	0.00	0.00	182.82	37.21	0.00	0.00	37.21
36	SAGBEND	-49.46	-10.49	0.00	0.00	0.00	0.00	0.00	182.61	38.21	0.00	0.00	38.21
37	SAGBEND	-51.40	-10.96	0.00	0.00	0.00	0.00	0.00	182.40	39.04	0.00	0.00	39.04

38	SAGBEND	-53.34	-11.43	0.00	0.00	0.00	0.00	0.00	182.20	39.73	0.00	39.73
39	SAGBEND	-55.29	-11.89	0.00	0.00	0.00	0.00	0.00	182.00	40.31	0.00	40.31
40	SAGBEND	-57.24	-12.34	0.00	0.00	0.00	0.00	0.00	181.80	40.80	0.00	40.80
41	SAGBEND	-59.19	-12.78	0.00	0.00	0.00	0.00	0.00	181.61	41.21	0.00	41.21
42	SAGBEND	-61.14	-13.21	0.00	0.00	0.00	0.00	0.00	181.42	41.56	0.00	41.56
43	SAGBEND	-63.10	-13.63	0.00	0.00	0.00	0.00	0.00	181.24	41.86	0.00	41.86
44	SAGBEND	-65.06	-14.04	0.00	0.00	0.00	0.00	0.00	181.06	42.12	0.00	42.12
45	SAGBEND	-67.01	-14.45	0.00	0.00	0.00	0.00	0.00	180.88	42.35	0.00	42.35
46	SAGBEND	-68.97	-14.84	0.00	0.00	0.00	0.00	0.00	180.71	42.54	0.00	42.54
47	SAGBEND	-70.94	-15.23	0.00	0.00	0.00	0.00	0.00	180.54	42.71	0.00	42.71
48	SAGBEND	-72.90	-15.61	0.00	0.00	0.00	0.00	0.00	180.38	42.86	0.00	42.86
49	SAGBEND	-74.87	-15.97	0.00	0.00	0.00	0.00	0.00	180.22	43.00	0.00	43.00
50	SAGBEND	-76.83	-16.33	0.00	0.00	0.00	0.00	0.00	180.06	43.12	0.00	43.12
51	SAGBEND	-78.80	-16.68	0.00	0.00	0.00	0.00	0.00	179.91	43.23	0.00	43.23
52	SAGBEND	-80.78	-17.02	0.00	0.00	0.00	0.00	0.00	179.76	43.33	0.00	43.33
53	SAGBEND	-82.75	-17.35	0.00	0.00	0.00	0.00	0.00	179.62	43.42	0.00	43.42
54	SAGBEND	-84.72	-17.67	0.00	0.00	0.00	0.00	0.00	179.48	43.50	0.00	43.50
55	SAGBEND	-86.70	-17.98	0.00	0.00	0.00	0.00	0.00	179.34	43.58	0.00	43.58
56	SAGBEND	-88.67	-18.29	0.00	0.00	0.00	0.00	0.00	179.21	43.64	0.00	43.64
57	SAGBEND	-90.65	-18.58	0.00	0.00	0.00	0.00	0.00	179.08	43.71	0.00	43.71
58	SAGBEND	-92.63	-18.86	0.00	0.00	0.00	0.00	0.00	178.96	43.76	0.00	43.76
59	SAGBEND	-94.61	-19.14	0.00	0.00	0.00	0.00	0.00	178.84	43.81	0.00	43.81

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX    DATE - 4/28/2020    TIME - 1:40:50    PAGE 15  
PROJECT - STATIC PIPE ANALYSIS 10 INCH    JOB NO. - LAYING  
USER ID - IK    LICENSED BY - PT Timas Suplindo    CASE 1

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=====												
STATIC PIPE COORDINATES, FORCES AND STRESSES												
=====												
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS	
					VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	VERT (KN )	HORIZ (KN-M)	TOTAL (KN-M)	
=====												
60	SAGBEND	-96.60	-19.40	0.00	0.00	0.00	0.00	0.00	178.72	43.86	0.00	43.86
61	SAGBEND	-98.58	-19.66	0.00	0.00	0.00	0.00	0.00	178.61	43.89	0.00	43.89
62	SAGBEND	-100.56	-19.90	0.00	0.00	0.00	0.00	0.00	178.51	43.92	0.00	43.92
63	SAGBEND	-102.55	-20.14	0.00	0.00	0.00	0.00	0.00	178.40	43.94	0.00	43.94
64	SAGBEND	-104.54	-20.36	0.00	0.00	0.00	0.00	0.00	178.31	43.96	0.00	43.96
65	SAGBEND	-106.53	-20.58	0.00	0.00	0.00	0.00	0.00	178.21	43.96	0.00	43.96
66	SAGBEND	-108.52	-20.79	0.00	0.00	0.00	0.00	0.00	178.12	43.95	0.00	43.95
67	SAGBEND	-110.51	-20.98	0.00	0.00	0.00	0.00	0.00	178.04	43.93	0.00	43.93
68	SAGBEND	-112.50	-21.17	0.00	0.00	0.00	0.00	0.00	177.96	43.89	0.00	43.89
69	SAGBEND	-114.49	-21.35	0.00	0.00	0.00	0.00	0.00	177.88	43.83	0.00	43.83
70	SAGBEND	-116.48	-21.52	0.00	0.00	0.00	0.00	0.00	177.81	43.75	0.00	43.75
71	SAGBEND	-118.48	-21.68	0.00	0.00	0.00	0.00	0.00	177.74	43.64	0.00	43.64
72	SAGBEND	-120.47	-21.83	0.00	0.00	0.00	0.00	0.00	177.67	43.50	0.00	43.50
73	SAGBEND	-122.46	-21.97	0.00	0.00	0.00	0.00	0.00	177.61	43.32	0.00	43.32
74	SAGBEND	-124.46	-22.10	0.00	0.00	0.00	0.00	0.00	177.56	43.09	0.00	43.09
75	SAGBEND	-126.46	-22.22	0.00	0.00	0.00	0.00	0.00	177.50	42.80	0.00	42.80
76	SAGBEND	-128.45	-22.33	0.00	0.00	0.00	0.00	0.00	177.46	42.44	0.00	42.44
77	SAGBEND	-130.45	-22.44	0.00	0.00	0.00	0.00	0.00	177.41	42.00	0.00	42.00
78	SAGBEND	-132.45	-22.53	0.00	0.00	0.00	0.00	0.00	177.37	41.46	0.00	41.46
79	SAGBEND	-134.45	-22.61	0.00	0.00	0.00	0.00	0.00	177.34	40.79	0.00	40.79
80	SAGBEND	-136.45	-22.69	0.00	0.00	0.00	0.00	0.00	177.31	39.97	0.00	39.97
81	SAGBEND	-138.44	-22.76	0.00	0.00	0.00	0.00	0.00	177.28	38.97	0.00	38.97
82	SAGBEND	-140.44	-22.81	0.00	0.00	0.00	0.00	0.00	177.26	37.74	0.00	37.74
83	SAGBEND	-142.44	-22.86	0.00	0.00	0.00	0.00	0.00	177.24	36.24	0.00	36.24
84	SAGBEND	-144.44	-22.91	0.00	0.00	0.00	0.00	0.00	177.22	34.41	0.00	34.41
85	SAGBEND	-146.44	-22.94	0.00	0.00	0.00	0.00	0.00	177.21	32.18	0.00	32.18
86	SAGBEND	-148.44	-22.97	0.00	0.00	0.00	0.00	0.00	177.21	29.47	0.00	29.47
87	SAGBEND	-150.44	-22.99	0.00	0.00	0.00	0.00	0.00	177.20	26.15	0.00	26.15
88	SEABED	-152.44	-23.00	0.00	0.16	0.00	0.00	0.00	177.20	22.12	0.00	22.12
89	SEABED	-154.44	-23.01	0.00	0.59	0.00	0.00	0.00	177.20	17.54	0.00	17.54
90	SEABED	-156.44	-23.02	0.00	0.89	0.00	0.00	0.00	177.21	13.08	0.00	13.08
91	SEABED	-158.44	-23.02	0.00	1.05	0.00	0.00	0.00	177.21	9.16	0.00	9.16
92	SEABED	-160.44	-23.03	0.00	1.13	0.00	0.00	0.00	177.21	5.96	0.00	5.96
93	SEABED	-162.44	-23.03	0.00	1.14	0.00	0.00	0.00	177.21	3.51	0.00	3.51
94	SEABED	-164.44	-23.02	0.00	1.12	0.00	0.00	0.00	177.21	1.75	0.00	1.75
95	SEABED	-166.44	-23.02	0.00	1.08	0.00	0.00	0.00	177.21	0.56	0.00	0.56
96	SEABED	-168.44	-23.02	0.00	1.04	0.00	0.00	0.00	177.21	-0.17	0.00	0.17
97	SEABED	-170.44	-23.02	0.00	1.00	0.00	0.00	0.00	177.21	-0.57	0.00	0.57
98	SEABED	-172.44	-23.02	0.00	0.96	0.00	0.00	0.00	177.21	-0.74	0.00	0.74
99	SEABED	-174.44	-23.02	0.00	0.93	0.00	0.00	0.00	177.21	-0.75	0.00	0.75
100	SEABED	-176.44	-23.02	0.00	0.90	0.00	0.00	0.00	177.21	-0.68	0.00	0.68
101	SEABED	-178.44	-23.02	0.00	0.89	0.00	0.00	0.00	177.21	-0.57	0.00	0.57
102	SEABED	-180.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	-0.45	0.00	0.45
103	SEABED	-182.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	-0.33	0.00	0.33

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX    DATE - 4/28/2020    TIME - 1:40:50    PAGE 16  
PROJECT - STATIC PIPE ANALYSIS 10 INCH    JOB NO. - LAYING  
USER ID - IK    LICENSED BY - PT Timas Suplindo    CASE 1

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=====												
STATIC PIPE COORDINATES, FORCES AND STRESSES												
=====												

NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT REACTION		SUPT VERT (M)	SEPARATIONS HORIZ (M)	PIPE TENSION (KN)	BENDING MOMENTS		
					VERT (KN)	HORIZ (KN)				VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)
104	SEABED	-184.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.23	0.00	0.23
105	SEABED	-186.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.14	0.00	0.14
106	SEABED	-188.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.08	0.00	0.08
107	SEABED	-190.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.04	0.00	0.04
108	SEABED	-192.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.01	0.00	0.01
109	SEABED	-194.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	0.01	0.00	0.01
110	SEABED	-196.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02
111	SEABED	-198.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02
112	SEABED	-200.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02
113	SEABED	-202.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02
114	SEABED	-204.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.01	0.00	0.01
115	SEABED	-206.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.01	0.00	0.01
116	SEABED	-208.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.00	0.00	0.00
117	SEABED	-210.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.00	0.00	0.00
118	SEABED	-212.44	-23.02	0.00	0.00	0.00	0.00	0.00	177.21	0.00	0.00	0.00

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 17

STATIC PIPE ANALYSIS 10 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 4/28/2020 TIME - 1:40:50 CASE 1

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STATIC SOLUTION SUMMARY

PIPE PROPERTIES ( 1)

PIPE SECTION LENGTH ...	0.00 M	ELASTIC MODULUS .....	207000. MPA
OUTSIDE DIAMETER .....	27.305 CM	CROSS SECTIONAL AREA .	103.82 CM^2
WALL THICKNESS .....	1.270 CM	MOMENT OF INERTIA ....	8817.6 CM^4
WEIGHT/LENGTH IN AIR .	2022.01 N/M	YIELD STRESS .....	360.00 MPA
SUBMERGED WGHT/LENG ..	434.28 N/M	STRESS INTENS FACTOR .	1.000
SPECIFIC GRAVITY .....	1.274	STEEL DENSITY .....	77008.0 N/M3
WRAP COAT THICKNESS ...	0.320 CM	WRAP COAT DENSITY ....	9339.1 N/M3
CONCRETE THICKNESS ...	4.000 CM	CONCRETE DENSITY .....	29822.0 N/M3

BARGE DATA

TOTAL PIPE TENSION ...	196.13 KN	RADIUS OF CURVATURE ..	0.00 M
NUMBER OF TENSIONERS .	2	BARGE TRIM ANGLE .....	0.500 DEG
NO. OF PIPE SUPPORTS .	7	PIPE ANGLE AT STERN ..	8.131 DEG
BARGE HEADING .....	0.000 DEG	OFFSET FROM R.O.W. ...	0.00 M

STINGER DATA

NO. OF PIPE SUPPORTS .	6	PIPE DEPTH AT STERN ..	-7.97 M
NO. STINGER SECTIONS .	6	PIPE ANGLE AT STERN ..	14.949 DEG
RADIUS OF CURVATURE ..	0.00 M	STINGER STERN DEPTH ..	-9.34 M
STINGER LENGTH .....	41.37 M		

SAGBEND DATA

WATER DEPTH .....	23.00 M	TENSION AT TOUCHDOWN .	177.20 KN
TOUCHDOWN X-COORD. ...	-151.99 M	BOTTOM SLOPE ANGLE ...	0.000 DEG
PROJECTED SPAN LENGTH	112.32 M	PIPE LENGTH GAIN .....	2.63 M

===== SOLUTION SUMMARY =====

NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACT HORIZ (KN)	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	0.7	0.0	0.2	0.2	0.
3	LAYBARGE	59.7	4.3	0.0	19.4	0.0	13.0	20.1	6.
5	LAYBARGE	48.2	4.0	0.0	23.8	0.0	18.5	28.7	8.
7	TENSIONR	38.1	3.7	0.0	13.9	0.0	6.1	18.8	5.
9	LAYBARGE	33.4	3.6	0.0	12.7	0.0	5.9	18.3	5.
11	TENSIONR	26.7	3.4	0.0	9.5	0.0	3.5	24.2	7.
13	LAYBARGE	21.3	3.3	0.0	0.0	0.0	5.0	26.4	7.
15	LAYBARGE	12.1	3.0	0.0	52.3	0.0	157.6	262.5	73.
17	LAYBARGE	0.0	1.8	0.0	36.9	0.0	154.6	257.5	72.
20	STINGER	-8.1	0.4	0.0	23.8	0.0	134.9	226.8	63.
22	STINGER	-15.9	-1.4	0.0	15.4	0.0	92.6	161.2	45.
24	STINGER	-23.6	-3.5	0.0	0.0	0.0	19.6	48.2	13.

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 18

STATIC PIPE ANALYSIS 10 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 4/28/2020 TIME - 1:40:50 CASE 1

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STATIC SOLUTION SUMMARY

26	STINGER	-30.7	-5.5	0.0	0.0	0.0	12.7	37.4	10.
28	STINGER	-36.8	-7.2	0.0	0.0	0.0	26.4	58.6	16.

30	STINGER	-39.7	-8.0	0.0	0.0	0.0	30.6	65.0	18.
64	SAGBEND	-104.5	-20.4	0.0	0.0	0.0	44.0	85.2	24.
88	SEABED	-152.4	-23.0	0.0	0.2	0.0	22.1	51.3	14.

**LAMPIRAN ANALISA STATIS OFFPIPE PADA PIPA 12  
INCH**

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*
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*
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*
*           VERSION NO. - 3.02EX
*           RELEASED ON - 03/08/2016
*           LICENSED TO - PT Timas Suplindo
*
*****
*
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* STATIC AND DYNAMIC ANALYSIS OF PROBLEMS ARISING IN THE DESIGN OF MARINE PIPELINES.
* THIS VERSION OF OFFPIPE MAY BE USED FOR THE ANALYSIS OF OFFSHORE PIPELAYING OPER-
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*
*           ROBERT C. MALAHY           TELEPHONE: (713) 664-8635
*           6554 AUDEN                 FACSIMILE: (713) 664-0962
*           HOUSTON, TEXAS 77005
*           U.S.A.                      EMAIL: SUPPORT@OFFPIPE.COM
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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 3
STATIC PIPE ANALYSIS 12 INCH
JOB NO. - LAYING                 LICENSED BY - PT Timas Suplindo
USER ID - IK                     DATE - 4/28/2020 TIME - 1:41:14 CASE 1
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INPUT DATA ECHO

PRINTED OUTPUT SELECTED

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STATIC PIPE FORCES AND STRESSES ... YES
STATIC SOLUTION SUMMARY ..... YES
DYNAMIC PIPE FORCES AND STRESSES .. NO
DYNAMIC RANGE OF PIPE DATA ..... NO
DYNAMIC TRACKING OF PIPE DATA ..... NO
OVERBEND PIPE SUPPORT GEOMETRY .... NO
STINGER BALLAST SCHEDULE DATA ..... NO
SUPPORT REACTIONS IN BARGE COORDS . NO

INTERNAL FORCES IN PIPE & CABLE ... NO
INTERNAL FORCES IN STINGER ..... NO
PRINT PIPE STRAINS IN OUTPUT ..... NO
DNV OS-F101 COMPLIANCE REPORT ..... NO
API RP-1111 COMPLIANCE REPORT ..... NO
PRINT DNV/API FACTORS & PARAMETERS NO
USE THICK WALL HOOP STRESS EQN. ... NO
USE DNV 1981 FOR TOTAL PIPE STRESS NO

ENABLE/DISABLE WARNING MESSAGES ... ENABLE
GENERATE SPREAD SHEET PLOT FILE ... NO
GENERATE ASCII PLOT DATA FILES .... NO

```



PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX .....	1	
PLOT NUMBER .....	1	
PLOT TYPE OPTION NUMBER .....	1	
DYNAMIC PROFILE TIME POINT .....	0.000	
DYNAMIC PROFILE TIME INCREMENT .....	0.000	
ORDINATE PARAMETER CODE NUMBER .....	2	
AXIS LABEL FOR ORDINATE .....	"PIPE ELEVATION Y COORDINATE	"
ABSCISSA PARAMETER CODE NUMBER .....	1	
AXIS LABEL FOR ABSCISSA .....	"PIPE HORIZONTAL X COORDINATE	"
PLOT TITLE .....	"PIPELINE ELEVATION PROFILE AND PIPE STRESS	"
MINIMUM VERTICAL AXIS RANGE .....	0.000	
MAXIMUM VERTICAL AXIS RANGE .....	0.000	
MINIMUM HORIZONTAL AXIS RANGE .....	0.000	
MAXIMUM HORIZONTAL AXIS RANGE .....	0.000	

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 4  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 4/28/2020 TIME - 1:41:14 CASE 1

=====

INPUT DATA ECHO

PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX .....	2	
PLOT NUMBER .....	1	
PLOT TYPE OPTION NUMBER .....	1	
DYNAMIC PROFILE TIME POINT .....	0.000	
DYNAMIC PROFILE TIME INCREMENT .....	0.000	
ORDINATE PARAMETER CODE NUMBER .....	15	
AXIS LABEL FOR ORDINATE .....	"DNV YIELD STRESS PERCENTAGE	"
ABSCISSA PARAMETER CODE NUMBER .....	1	
AXIS LABEL FOR ABSCISSA .....	"PIPELINE HORIZONTAL X COORDINATE"	
PLOT TITLE .....	"PIPELINE ELEVATION PROFILE AND PIPE STRESS	"
MINIMUM VERTICAL AXIS RANGE .....	0.000	
MAXIMUM VERTICAL AXIS RANGE .....	0.000	
MINIMUM HORIZONTAL AXIS RANGE .....	0.000	
MAXIMUM HORIZONTAL AXIS RANGE .....	0.000	

PIPE PROPERTIES

=====

PROPERTY TABLE ROW NUMBER .....	1
PIPE SECTION LENGTH .....	0.000 METERS
STEEL MODULUS OF ELASTICITY .....	207000. M-PASCAL
STEEL CROSS SECTIONAL AREA .....	124.100 CM <sup>2</sup>
COATED PIPE AVG MOMENT OF INERTIA .....	15048.21 CM <sup>4</sup>
WEIGHT PER-UNIT-LENGTH IN AIR .....	2374.00 N/M
WEIGHT PER-UNIT-LENGTH SUBMERGED .....	368.27 N/M
MAXIMUM ALLOWABLE PIPE STRAIN .....	0.205000 PERCENT
STEEL OUTSIDE DIAMETER .....	32.3900 CM
STEEL WALL THICKNESS .....	1.2700 CM
YIELD STRESS .....	360.00 M-PASCAL
STRESS/STRAIN INTENSE FACTOR .....	0.0000
HYDRODYNAMIC OUTSIDE DIAMETER .....	0.000 CM
DRAG COEFFICIENT .....	0.0000
HYDRODYNAMIC TOTAL AREA .....	0.000 CM <sup>2</sup>
ADDED MASS COEFFICIENT .....	0.0000
POISSON'S RATIO .....	0.3000
COEFFICIENT OF THERMAL EXPANSION .....	0.00001100 1/DEG C

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 5  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 4/28/2020 TIME - 1:41:14 CASE 1

=====

INPUT DATA ECHO

PIPE COATING PROPERTIES

=====

PIPE PROPERTY TABLE INDEX .....	1
CORROSION COATING THICKNESS .....	0.320 CM
CORROSION COATING WEIGHT DENSITY .....	9025.2 N/M <sup>3</sup>
CORROSION COATING ELASTIC MODULUS .....	0.000 M-PASCAL
CONCRETE COATING THICKNESS .....	4.000 CM
CONCRETE COATING WEIGHT DENSITY .....	29858. N/M <sup>3</sup>
CONCRETE COATING ELASTIC MODULUS .....	0.000 M-PASCAL
DESIRED PIPE SPECIFIC GRAVITY .....	0.0000
CONCRETE STIFFENING EFFECTIVENESS .....	0.000
NO NOT CALC. STRESS FOR BARE PIPE .....	NO

AVERAGE LENGTH OF PIPE JOINT ..... 12.200 METERS  
 EFFECTIVE FIELD JOINT LENGTH ..... 0.300 METERS  
 FIELD JOINT FILL WEIGHT DENSITY ... 10055.3 N/M^3  
 FIELD JOINT FILL ELASTIC MODULUS... 0.000 M-PASCAL  
 FIELD JOINT STIFFENING EFFECT. .... 0.000  
 FIELD JOINT BENDING MODEL ..... 0 IGNORE COATING STIFFNESS  
 WEIGHT DENSITY OF STEEL ..... 77008. N/M^3  
 WEIGHT DENSITY OF PIPE CONTENTS ... 0.0 N/M^3  
 REF. ELEVATION FOR STATIC HEAD .... 0.00 METERS  
 FREE FLOOD PIPE DURING PIPELAY ... NO

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 6  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 4/28/2020 TIME - 1:41:14 CASE 1  
 =====

INPUT DATA ECHO

PIPELAY VESSEL DESCRIPTION

=====  
 NUMBER OF PIPE NODES ..... 9  
 BARGE GEOMETRY SPECIFIED BY ..... 1 X-Y COORDINATES  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.000 METERS  
 ADJUST Y COORDINATES MANUALLY .... NO  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 PIPE ANGLE RELATIVE TO DECK ..... 0.0000 DEGREES  
 HEIGHT OF DECK ABOVE WATER ..... 2.400 METERS  
 LAYBARGE FORWARD (X) OFFSET ..... 0.000 METERS  
 BARGE TRIM ANGLE ..... 0.5000 DEGREES  
  
 STERN SHOE X COORDINATE ..... 0.000 METERS  
 STERN SHOE Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER X COORDINATE ..... 43.820 METERS  
 ROTATION CENTER Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER Z COORDINATE ..... 6.370 METERS  
 BARGE HEADING ..... 0.0000 DEGREES  
 BARGE OFFSET FROM RIGHT-OF-WAY .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT VERTICAL ANGLE ... 0.000 DEGREES  
 PIPE RAMP PIVOT Z COORDINATE ..... 0.000 METERS  
 PIPE RAMP HEADING ON DECK ..... 0.000 DEGREES  
 ROLE OF ALTERNATE WAVE ORIGIN .... 0 MOTIONS & WAVES AT CENTER OF MOTION  
 WAVE PHASE ORIGIN X COORDINATE .... 0.000  
 WAVE PHASE ORIGIN Y COORDINATE .... 0.000 METERS  
 WAVE PHASE ORIGIN Z COORDINATE .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE .....

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	DAVIT SPACING ( M )
64.220	1.838	1 SIMPLE SUPPORT	0.000
59.740	1.760	1 SIMPLE SUPPORT	0.000
48.240	1.560	1 SIMPLE SUPPORT	0.000
38.110	1.383	2 PIPE TENSIONER	0.000
33.440	1.302	1 SIMPLE SUPPORT	0.000
26.660	1.183	2 PIPE TENSIONER	0.000
21.340	1.092	7 USER DEFINED SPT	0.000
12.150	0.860	7 USER DEFINED SPT	0.000
-0.040	-0.260	8 USER DEFINED SPT	0.000

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 7  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 4/28/2020 TIME - 1:41:14 CASE 1  
 =====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====  
 SUPPORT PROPERTY TABLE INDEX ..... 2  
 SUPPORT ELEMENT TYPE ..... 2 TENSIONER  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
  
 BOTTOM ROLLER ANGLE TO HORIZONTAL . 0.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES

SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 7  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 1.600 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 8  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 4/28/2020 TIME - 1:41:14 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 8  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

STINGER DESCRIPTION

=====

NUMBER OF PIPE/STINGER NODES ..... 6  
 STINGER GEOMETRY SPECIFIED BY ..... 2 X-Y COORD AND MATCH PT  
 STINGER TYPE ..... 1 FIXED GEOMETRY OR RAMP  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.00 METERS  
 HITCH X-COORDINATE ..... 0.497 METERS  
 HITCH Y-COORDINATE ..... -1.800 METERS  
 HITCH ANGULAR ORIENTATION ..... 0.000 DEGREES

X COORDINATE OF LOCAL ORIGIN ..... 0.497 METERS  
 Y COORDINATE OF LOCAL ORIGIN ..... -1.800 METERS  
 ROTATION ABOUT STINGER HITCH ..... 13.500 DEGREES  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 TANGENT POINT ANGLE ..... 0.000 DEGREES

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	ELEMENT TYPE	ELEMENT LENGTH ( M )
-8.325	2.209	1 SIMPLE SUPPORT	2 HINGED END	0.000
-16.325	2.349	1 SIMPLE SUPPORT	1 FIXED END	0.000
-24.325	2.119	1 SIMPLE SUPPORT	1 FIXED END	0.000
-31.699	1.660	1 SIMPLE SUPPORT	1 FIXED END	0.000
-37.949	1.069	1 SIMPLE SUPPORT	1 FIXED END	0.000
-40.949	0.350	1 SIMPLE SUPPORT	1 FIXED END	0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 9  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 4/28/2020 TIME - 1:41:14 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

```

=====
SUPPORT PROPERTY TABLE INDEX ..... 1
SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT
SUPPORT INITIAL STATE FLAG ..... 0
TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M
VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M
STATIC VERTICAL DEFLECTION ..... 0.0000 CM
LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES
SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES
SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS
BED ROLLER LENGTH ..... 1.640 METERS
HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS
TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
    
```

CURRENT VELOCITIES

```

=====
WATER DEPTH (M )   CURRENT SPEED (M/S )   DIRECTION OF TRAVEL (DEG )
=====
0.000             0.790             0.000
11.500           0.480             0.000
23.000           0.420             0.000
    
```

PIPE TENSION DATA

```

=====
STATIC PIPE TENSION ON LAY VESSEL . 196.133 K-NEWTON
MINIMUM DYNAMIC PIPE TENSION ..... 0.000 K-NEWTON
MAXIMUM DYNAMIC PIPE TENSION ..... 0.000 K-NEWTON
STATIC HORIZONTAL BOTTOM TENSION .. 0.000 K-NEWTON
NO. OF VALUES FOR TENSION PROFILE . 0
VALUES ARE FOR PIPE SPAN ANALYSIS . NO
MAXIMUM PIPE PAYOUT SPEED ..... 0.000 M/SEC
MAXIMUM PIPE TAKEUP SPEED ..... 0.000 M/SEC
    
```

```

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 10
STATIC PIPE ANALYSIS 12 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 4/28/2020 TIME - 1:41:14 CASE 1
=====
    
```

=====  
INPUT DATA ECHO

SAGBEND GEOMETRY

```

=====
SAGBEND PIPE ELEMENT LENGTH ..... 2.000 METERS
WATER DEPTH ..... 23.000 METERS
X-COORDINATE AT SPECIFIED DEPTH . . 0.00 METERS
ESTIMATED SAGBEND X LENGTH ..... 0.00 METERS
ESTIMATED PIPE LENGTH ON SEABED ... 0.00 METERS
X-COORD OF PIPE FREE END ON SEABED 0.00 METERS
X-COORD POINT OF FIXITY ON SEABED . 0.00 METERS
MAXIMUM SLOPE (ANGLE) OF SEABED ... 0.000 DEGREES
DIRECTION OF MAXIMUM SLOPE ..... 0.000 DEGREES

PIPE/CABLE SPAN END CONDITION ..... 0 PIPE/CABLE RESTING ON SEABED
PIPE/CABLE SPAN LENGTH GIVEN BY ... 0 SPECIFIED PIPE/CABLE TENSION
ESTIMATED SPAN DEPTH AT FREE END .. 0.00 METERS
PIPE VERTICAL ANGLE AT FREE END ... 0.000 DEGREES
BOTTOM HINGE OFFSET ..... 0.000 METERS
BOTTOM HINGE MINIMUM ANGLE ..... 0.000 DEGREES
BOTTOM HINGE MAXIMUM ANGLE ..... 0.000 DEGREES
    
```

SOIL ELEMENT PROPERTIES

```

=====
SOIL PROPERTY TABLE ROW INDEX .... 1
SOIL ELEMENT TYPE (FUTURE USE) .... 0
PIPE INDEX OR SEGMENT NUMBER ..... 0
LONGITUDINAL SOIL STIFFNESS ..... 0.00 KN/M^2
VERTICAL SOIL STIFFNESS ..... 0.00 KN/M^2
LATERAL SOIL STIFFNESS ..... 0.00 KN/M^2
DEFLECTION UNDER REFERENCE LOAD ... 0.0000 CM

LONGITUDINAL COEF. OF FRICTION .... 0.000
LATERAL COEFFICIENT OF FRICTION ... 0.600
NUMBER OF INTEGRATION POINTS ..... 0
    
```

STATIC SOLUTION CONVERGED IN ( 20 ) ITERATIONS

END OF INPUT DATA

=====

=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS VERT (MPA)	HORIZ STRESS (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
=====													
1	LAYBARGE	64.20	4.42	0.00	0.000	1.488	0.00	0.00	0.00	0.20	0.00	0.20	0.06
3	LAYBARGE	59.72	4.30	0.00	0.000	1.536	4.48	-0.02	0.00	-16.19	0.00	16.21	4.50
5	LAYBARGE	48.23	4.00	0.00	0.000	1.486	15.98	-0.08	0.00	-23.76	0.00	23.84	6.62
7	TENSIONR	38.10	3.73	0.00	0.000	1.461	26.11	7.77	0.00	-6.85	0.00	14.62	4.06
9	LAYBARGE	33.43	3.61	0.00	0.000	1.533	30.78	7.74	0.00	-12.10	0.00	19.84	5.51
11	TENSIONR	26.65	3.43	0.00	0.000	1.411	37.57	15.61	0.00	18.88	0.00	34.48	9.58
13	LAYBARGE	21.33	3.31	0.00	0.000	1.365	42.89	15.58	0.00	-20.01	0.00	35.60	9.89
15	LAYBARGE	12.14	2.98	0.00	0.000	3.340	52.08	15.44	0.00	-264.48	0.00	279.91	77.75
17	LAYBARGE	-0.04	1.76	0.00	0.000	8.172	64.32	15.20	0.00	-270.36	0.00	285.56	79.32
20	STINGER	-8.10	0.35	0.00	0.000	11.513	72.51	14.96	0.00	-231.86	0.00	246.82	68.56
22	STINGER	-15.90	-1.41	0.00	0.000	13.650	80.51	14.81	-0.18	-91.50	0.00	106.40	29.56
24	STINGER	-23.66	-3.36	0.00	0.000	14.356	88.51	14.63	-0.43	-19.12	0.00	33.97	9.44
26	STINGER	-30.82	-5.20	0.00	0.000	14.342	95.90	14.45	-0.67	17.80	0.00	32.59	9.05
28	STINGER	-36.87	-6.73	0.00	0.000	14.046	102.14	14.30	-0.86	36.27	0.00	51.01	14.17
30	STINGER	-39.78	-7.45	0.00	0.000	13.844	105.14	14.23	-0.96	42.48	0.00	57.20	15.89
32	SAGBEND	-41.85	-7.96	0.00	0.000	13.682	107.27	14.18	-1.02	46.13	0.00	60.83	16.90
33	SAGBEND	-43.79	-8.43	0.00	0.000	13.519	109.27	14.14	-1.08	49.05	0.00	63.74	17.70
34	SAGBEND	-45.74	-8.89	0.00	0.000	13.347	111.27	14.09	-1.14	51.57	0.00	66.24	18.40
35	SAGBEND	-47.69	-9.35	0.00	0.000	13.167	113.27	14.05	-1.20	53.75	0.00	68.40	19.00
36	SAGBEND	-49.63	-9.81	0.00	0.000	12.979	115.27	14.00	-1.26	55.63	0.00	70.27	19.52
37	SAGBEND	-51.58	-10.25	0.00	0.000	12.786	117.27	13.96	-1.31	57.25	0.00	71.88	19.97
38	SAGBEND	-53.53	-10.69	0.00	0.000	12.588	119.27	13.92	-1.37	58.66	0.00	73.27	20.35
39	SAGBEND	-55.49	-11.12	0.00	0.000	12.385	121.27	13.88	-1.43	59.87	0.00	74.47	20.69
40	SAGBEND	-57.44	-11.55	0.00	0.000	12.179	123.27	13.83	-1.48	60.93	0.00	75.52	20.98
41	SAGBEND	-59.40	-11.97	0.00	0.000	11.969	125.27	13.79	-1.53	61.85	0.00	76.42	21.23
42	SAGBEND	-61.35	-12.38	0.00	0.000	11.756	127.27	13.75	-1.59	62.65	0.00	77.21	21.45
43	SAGBEND	-63.31	-12.78	0.00	0.000	11.540	129.27	13.72	-1.64	63.35	0.00	77.90	21.64
44	SAGBEND	-65.27	-13.18	0.00	0.000	11.323	131.27	13.68	-1.69	63.96	0.00	78.50	21.81
45	SAGBEND	-67.23	-13.57	0.00	0.000	11.103	133.27	13.64	-1.74	64.50	0.00	79.02	21.95
46	SAGBEND	-69.20	-13.95	0.00	0.000	10.882	135.27	13.60	-1.79	64.97	0.00	79.48	22.08
47	SAGBEND	-71.16	-14.32	0.00	0.000	10.659	137.27	13.57	-1.84	65.38	0.00	79.89	22.19
48	SAGBEND	-73.13	-14.69	0.00	0.000	10.435	139.27	13.53	-1.88	65.75	0.00	80.24	22.29
49	SAGBEND	-75.10	-15.05	0.00	0.000	10.209	141.27	13.50	-1.93	66.07	0.00	80.55	22.38
50	SAGBEND	-77.07	-15.40	0.00	0.000	9.983	143.27	13.46	-1.97	66.36	0.00	80.83	22.45
51	SAGBEND	-79.04	-15.74	0.00	0.000	9.755	145.27	13.43	-2.02	66.62	0.00	81.07	22.52
52	SAGBEND	-81.01	-16.07	0.00	0.000	9.527	147.27	13.40	-2.06	66.84	0.00	81.29	22.58
53	SAGBEND	-82.98	-16.40	0.00	0.000	9.298	149.27	13.37	-2.10	67.05	0.00	81.48	22.63
54	SAGBEND	-84.96	-16.72	0.00	0.000	9.069	151.27	13.34	-2.14	67.23	0.00	81.65	22.68
55	SAGBEND	-86.93	-17.03	0.00	0.000	8.838	153.27	13.31	-2.18	67.39	0.00	81.81	22.72
56	SAGBEND	-88.91	-17.34	0.00	0.000	8.608	155.27	13.28	-2.22	67.53	0.00	81.94	22.76
57	SAGBEND	-90.89	-17.63	0.00	0.000	8.376	157.27	13.25	-2.26	67.66	0.00	82.06	22.79
58	SAGBEND	-92.87	-17.92	0.00	0.000	8.145	159.27	13.22	-2.30	67.77	0.00	82.16	22.82
59	SAGBEND	-94.85	-18.20	0.00	0.000	7.913	161.27	13.19	-2.33	67.87	0.00	82.25	22.85

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS VERT (MPA)	HORIZ STRESS (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
=====													
60	SAGBEND	-96.83	-18.47	0.00	0.000	7.681	163.27	13.17	-2.37	67.95	0.00	82.33	22.87
61	SAGBEND	-98.81	-18.73	0.00	0.000	7.448	165.27	13.14	-2.40	68.03	0.00	82.40	22.89
62	SAGBEND	-100.79	-18.99	0.00	0.000	7.215	167.27	13.12	-2.43	68.09	0.00	82.45	22.90
63	SAGBEND	-102.78	-19.23	0.00	0.000	6.983	169.27	13.09	-2.47	68.13	0.00	82.49	22.91
64	SAGBEND	-104.76	-19.47	0.00	0.000	6.749	171.27	13.07	-2.50	68.17	0.00	82.52	22.92
65	SAGBEND	-106.75	-19.70	0.00	0.000	6.516	173.27	13.05	-2.53	68.19	0.00	82.53	22.92
66	SAGBEND	-108.74	-19.93	0.00	0.000	6.283	175.27	13.03	-2.55	68.20	0.00	82.53	22.92
67	SAGBEND	-110.73	-20.14	0.00	0.000	6.050	177.27	13.01	-2.58	68.19	0.00	82.51	22.92
68	SAGBEND	-112.72	-20.35	0.00	0.000	5.817	179.27	12.99	-2.61	68.16	0.00	82.48	22.91
69	SAGBEND	-114.71	-20.55	0.00	0.000	5.584	181.27	12.97	-2.63	68.11	0.00	82.43	22.90
70	SAGBEND	-116.70	-20.74	0.00	0.000	5.351	183.27	12.95	-2.66	68.04	0.00	82.35	22.88
71	SAGBEND	-118.69	-20.92	0.00	0.000	5.118	185.27	12.93	-2.68	67.95	0.00	82.26	22.85
72	SAGBEND	-120.68	-21.10	0.00	0.000	4.886	187.27	12.91	-2.70	67.83	0.00	82.13	22.81
73	SAGBEND	-122.67	-21.26	0.00	0.000	4.655	189.27	12.90	-2.73	67.68	0.00	81.98	22.77
74	SAGBEND	-124.67	-21.42	0.00	0.000	4.423	191.27	12.88	-2.75	67.50	0.00	81.79	22.72
75	SAGBEND	-126.66	-21.57	0.00	0.000	4.193	193.27	12.87	-2.77	67.27	0.00	81.56	22.65
76	SAGBEND	-128.66	-21.71	0.00	0.000	3.963	195.27	12.85	-2.78	67.00	0.00	81.28	22.58
77	SAGBEND	-130.65	-21.85	0.00	0.000	3.735	197.27	12.84	-2.80	66.67	0.00	80.95	22.49
78	SAGBEND	-132.65	-21.97	0.00	0.000	3.507	199.27	12.83	-2.82	66.29	0.00	80.56	22.38
79	SAGBEND	-134.64	-22.09	0.00	0.000	3.281	201.27	12.82	-2.83	65.83	0.00	80.10	22.25

80	SAGBEND	-136.64	-22.20	0.00	0.000	3.057	203.27	12.81	-2.85	65.29	0.00	79.55	22.10
81	SAGBEND	-138.64	-22.30	0.00	0.000	2.835	205.27	12.80	-2.86	64.65	0.00	78.91	21.92
82	SAGBEND	-140.64	-22.40	0.00	0.000	2.615	207.27	12.79	-2.87	63.90	0.00	78.17	21.71
83	SAGBEND	-142.63	-22.49	0.00	0.000	2.398	209.27	12.78	-2.88	63.03	0.00	77.29	21.47
84	SAGBEND	-144.63	-22.57	0.00	0.000	2.184	211.27	12.77	-2.89	62.00	0.00	76.26	21.18
85	SAGBEND	-146.63	-22.64	0.00	0.000	1.974	213.27	12.77	-2.90	60.80	0.00	75.06	20.85
86	SAGBEND	-148.63	-22.71	0.00	0.000	1.769	215.27	12.76	-2.91	59.41	0.00	73.67	20.46
87	SAGBEND	-150.63	-22.76	0.00	0.000	1.568	217.27	12.75	-2.92	57.78	0.00	72.04	20.01
88	SAGBEND	-152.63	-22.81	0.00	0.000	1.374	219.27	12.75	-2.92	55.88	0.00	70.14	19.48
89	SAGBEND	-154.63	-22.86	0.00	0.000	1.186	221.27	12.75	-2.93	53.67	0.00	67.93	18.87
90	SAGBEND	-156.63	-22.90	0.00	0.000	1.007	223.27	12.74	-2.94	51.09	0.00	65.35	18.15
91	SAGBEND	-158.63	-22.93	0.00	0.000	0.837	225.27	12.74	-2.94	48.09	0.00	62.35	17.32
92	SAGBEND	-160.63	-22.96	0.00	0.000	0.679	227.27	12.74	-2.94	44.60	0.00	58.87	16.35
93	SAGBEND	-162.63	-22.98	0.00	0.000	0.533	229.27	12.74	-2.95	40.54	0.00	54.81	15.23
94	SAGBEND	-164.63	-22.99	0.00	0.000	0.402	231.27	12.73	-2.95	35.82	0.00	50.09	13.91
95	SEABED	-166.63	-23.01	0.00	0.000	0.289	233.27	12.73	-2.95	30.35	0.00	44.63	12.40
96	SEABED	-168.63	-23.01	0.00	0.000	0.195	235.27	12.73	-2.95	24.49	0.00	38.78	10.77
97	SEABED	-170.63	-23.02	0.00	0.000	0.121	237.27	12.73	-2.95	18.86	0.00	33.17	9.21
98	SEABED	-172.63	-23.02	0.00	0.000	0.065	239.27	12.73	-2.95	13.83	0.00	28.15	7.82
99	SEABED	-174.63	-23.02	0.00	0.000	0.026	241.27	12.73	-2.95	9.59	0.00	23.93	6.65
100	SEABED	-176.63	-23.02	0.00	0.000	-0.001	243.27	12.73	-2.95	6.17	0.00	20.54	5.71
101	SEABED	-178.63	-23.02	0.00	0.000	-0.017	245.27	12.73	-2.95	3.56	0.00	17.95	4.99
102	SEABED	-180.63	-23.02	0.00	0.000	-0.026	247.27	12.73	-2.95	1.65	0.00	16.07	4.46
103	SEABED	-182.63	-23.02	0.00	0.000	-0.029	249.27	12.73	-2.95	0.34	0.00	14.77	4.10

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 4/28/2020      TIME - 1:41:14      PAGE 13

PROJECT - STATIC PIPE ANALYSIS 12 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
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104	SEABED	-184.63	-23.02	0.00	0.000	-0.029	251.27	12.73	-2.95	-0.50	0.00	14.93	4.15
105	SEABED	-186.63	-23.02	0.00	0.000	-0.026	253.27	12.73	-2.95	-0.98	0.00	15.41	4.28
106	SEABED	-188.63	-23.02	0.00	0.000	-0.023	255.27	12.73	-2.95	-1.20	0.00	15.62	4.34
107	SEABED	-190.63	-23.02	0.00	0.000	-0.018	257.27	12.73	-2.95	-1.23	0.00	15.65	4.35
108	SEABED	-192.63	-23.02	0.00	0.000	-0.014	259.27	12.73	-2.95	-1.15	0.00	15.57	4.33
109	SEABED	-194.63	-23.02	0.00	0.000	-0.011	261.27	12.73	-2.95	-1.01	0.00	15.43	4.29
110	SEABED	-196.63	-23.02	0.00	0.000	-0.007	263.27	12.73	-2.95	-0.84	0.00	15.26	4.24
111	SEABED	-198.63	-23.02	0.00	0.000	-0.005	265.27	12.73	-2.95	-0.66	0.00	15.09	4.19
112	SEABED	-200.63	-23.02	0.00	0.000	-0.003	267.27	12.73	-2.95	-0.50	0.00	14.93	4.15
113	SEABED	-202.63	-23.02	0.00	0.000	-0.001	269.27	12.73	-2.95	-0.36	0.00	14.79	4.11
114	SEABED	-204.63	-23.02	0.00	0.000	0.000	271.27	12.73	-2.95	-0.24	0.00	14.68	4.08
115	SEABED	-206.63	-23.02	0.00	0.000	0.000	273.27	12.73	-2.95	-0.15	0.00	14.59	4.05
116	SEABED	-208.63	-23.02	0.00	0.000	0.001	275.27	12.73	-2.95	-0.08	0.00	14.52	4.03
117	SEABED	-210.63	-23.02	0.00	0.000	0.001	277.27	12.73	-2.95	-0.04	0.00	14.47	4.02
118	SEABED	-212.63	-23.02	0.00	0.000	0.001	279.27	12.73	-2.95	0.00	0.00	14.44	4.01
119	SEABED	-214.63	-23.02	0.00	0.000	0.001	281.27	12.73	-2.95	0.01	0.00	14.45	4.01
120	SEABED	-216.63	-23.02	0.00	0.000	0.001	283.27	12.73	-2.95	0.02	0.00	14.46	4.02
121	SEABED	-218.63	-23.02	0.00	0.000	0.001	285.27	12.73	-2.95	0.02	0.00	14.46	4.02
122	SEABED	-220.63	-23.02	0.00	0.000	0.001	287.27	12.73	-2.95	0.02	0.00	14.46	4.02
123	SEABED	-222.63	-23.02	0.00	0.000	0.001	289.27	12.73	-2.95	0.01	0.00	14.45	4.01
124	SEABED	-224.63	-23.02	0.00	0.000	0.001	291.27	12.73	-2.95	0.01	0.00	14.44	4.01
125	SEABED	-226.63	-23.02	0.00	0.000	0.001	293.27	12.73	-2.95	0.00	0.00	14.44	4.01

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 4/28/2020      TIME - 1:41:14      PAGE 14

PROJECT - STATIC PIPE ANALYSIS 12 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACTION HORIZ (KN)	SUPT VERT (M)	SEPARATIONS HORIZ (M)	PIPE TENSION (KN)	BENDING MOMENTS VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
=====													
1	LAYBARGE	64.20	4.42	0.00	0.92	0.00	0.00	0.00	0.00	0.19	0.00	0.19	
3	LAYBARGE	59.72	4.30	0.00	22.65	0.00	0.00	0.00	-0.28	-15.05	0.00	15.05	
5	LAYBARGE	48.23	4.00	0.00	28.12	0.00	0.00	0.00	-1.00	-22.08	0.00	22.08	
7	TENSIONR	38.10	3.73	0.00	14.79	0.00	0.00	0.00	96.44	-6.37	0.00	6.37	
9	LAYBARGE	33.43	3.61	0.00	19.43	0.00	0.00	0.00	96.15	-11.25	0.00	11.25	
11	TENSIONR	26.65	3.43	0.00	2.62	0.00	0.00	0.00	193.79	17.55	0.00	17.55	
13	LAYBARGE	21.33	3.31	0.00	0.00	0.00	0.01	0.00	193.49	-18.61	0.00	18.61	
15	LAYBARGE	12.14	2.98	0.00	63.66	0.00	0.00	0.00	191.66	-245.87	0.00	245.87	
17	LAYBARGE	-0.04	1.76	0.00	42.87	0.00	0.00	0.00	188.71	-251.34	0.00	251.34	
20	STINGER	-8.10	0.35	0.00	34.18	0.00	0.00	0.00	185.69	-215.55	0.00	215.55	
22	STINGER	-15.90	-1.41	0.00	0.00	0.00	0.03	0.00	185.01	-85.07	0.00	85.07	
24	STINGER	-23.66	-3.36	0.00	0.00	0.00	0.25	0.00	184.40	-17.78	0.00	17.78	
26	STINGER	-30.82	-5.20	0.00	0.00	0.00	0.66	0.00	183.73	16.55	0.00	16.55	
28	STINGER	-36.87	-6.73	0.00	0.00	0.00	1.25	0.00	183.15	33.72	0.00	33.72	
30	STINGER	-39.78	-7.45	0.00	0.00	0.00	2.03	0.00	182.88	39.49	0.00	39.49	

32	SAGBEND	-41.85	-7.96	0.00	0.00	0.00	0.00	0.00	182.69	42.88	0.00	42.88
33	SAGBEND	-43.79	-8.43	0.00	0.00	0.00	0.00	0.00	182.51	45.60	0.00	45.60
34	SAGBEND	-45.74	-8.89	0.00	0.00	0.00	0.00	0.00	182.34	47.95	0.00	47.95
35	SAGBEND	-47.69	-9.35	0.00	0.00	0.00	0.00	0.00	182.16	49.97	0.00	49.97
36	SAGBEND	-49.63	-9.81	0.00	0.00	0.00	0.00	0.00	181.99	51.71	0.00	51.71
37	SAGBEND	-51.58	-10.25	0.00	0.00	0.00	0.00	0.00	181.83	53.22	0.00	53.22
38	SAGBEND	-53.53	-10.69	0.00	0.00	0.00	0.00	0.00	181.66	54.53	0.00	54.53
39	SAGBEND	-55.49	-11.12	0.00	0.00	0.00	0.00	0.00	181.50	55.66	0.00	55.66
40	SAGBEND	-57.44	-11.55	0.00	0.00	0.00	0.00	0.00	181.34	56.64	0.00	56.64
41	SAGBEND	-59.40	-11.97	0.00	0.00	0.00	0.00	0.00	181.19	57.50	0.00	57.50
42	SAGBEND	-61.35	-12.38	0.00	0.00	0.00	0.00	0.00	181.03	58.24	0.00	58.24
43	SAGBEND	-63.31	-12.78	0.00	0.00	0.00	0.00	0.00	180.88	58.89	0.00	58.89
44	SAGBEND	-65.27	-13.18	0.00	0.00	0.00	0.00	0.00	180.74	59.46	0.00	59.46
45	SAGBEND	-67.23	-13.57	0.00	0.00	0.00	0.00	0.00	180.59	59.96	0.00	59.96
46	SAGBEND	-69.20	-13.95	0.00	0.00	0.00	0.00	0.00	180.45	60.40	0.00	60.40
47	SAGBEND	-71.16	-14.32	0.00	0.00	0.00	0.00	0.00	180.31	60.79	0.00	60.79
48	SAGBEND	-73.13	-14.69	0.00	0.00	0.00	0.00	0.00	180.18	61.13	0.00	61.13
49	SAGBEND	-75.10	-15.05	0.00	0.00	0.00	0.00	0.00	180.05	61.43	0.00	61.43
50	SAGBEND	-77.07	-15.40	0.00	0.00	0.00	0.00	0.00	179.92	61.69	0.00	61.69
51	SAGBEND	-79.04	-15.74	0.00	0.00	0.00	0.00	0.00	179.79	61.93	0.00	61.93
52	SAGBEND	-81.01	-16.07	0.00	0.00	0.00	0.00	0.00	179.67	62.14	0.00	62.14
53	SAGBEND	-82.98	-16.40	0.00	0.00	0.00	0.00	0.00	179.55	62.33	0.00	62.33
54	SAGBEND	-84.96	-16.72	0.00	0.00	0.00	0.00	0.00	179.43	62.50	0.00	62.50
55	SAGBEND	-86.93	-17.03	0.00	0.00	0.00	0.00	0.00	179.31	62.65	0.00	62.65
56	SAGBEND	-88.91	-17.34	0.00	0.00	0.00	0.00	0.00	179.20	62.78	0.00	62.78
57	SAGBEND	-90.89	-17.63	0.00	0.00	0.00	0.00	0.00	179.09	62.90	0.00	62.90
58	SAGBEND	-92.87	-17.92	0.00	0.00	0.00	0.00	0.00	178.99	63.00	0.00	63.00
59	SAGBEND	-94.85	-18.20	0.00	0.00	0.00	0.00	0.00	178.88	63.10	0.00	63.10

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 4/28/2020      TIME - 1:41:14      PAGE 15

PROJECT - STATIC PIPE ANALYSIS 12 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES												
NODE NO.	PIPE SECTION	COORDINATES			SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS	
		X COORD (M )	Y COORD (M )	Z COORD (M )	VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
60	SAGBEND	-96.83	-18.47	0.00	0.00	0.00	0.00	0.00	178.78	63.17	0.00	63.17
61	SAGBEND	-98.81	-18.73	0.00	0.00	0.00	0.00	0.00	178.69	63.24	0.00	63.24
62	SAGBEND	-100.79	-18.99	0.00	0.00	0.00	0.00	0.00	178.59	63.30	0.00	63.30
63	SAGBEND	-102.78	-19.23	0.00	0.00	0.00	0.00	0.00	178.50	63.34	0.00	63.34
64	SAGBEND	-104.76	-19.47	0.00	0.00	0.00	0.00	0.00	178.41	63.37	0.00	63.37
65	SAGBEND	-106.75	-19.70	0.00	0.00	0.00	0.00	0.00	178.33	63.39	0.00	63.39
66	SAGBEND	-108.74	-19.93	0.00	0.00	0.00	0.00	0.00	178.24	63.40	0.00	63.40
67	SAGBEND	-110.73	-20.14	0.00	0.00	0.00	0.00	0.00	178.17	63.39	0.00	63.39
68	SAGBEND	-112.72	-20.35	0.00	0.00	0.00	0.00	0.00	178.09	63.36	0.00	63.36
69	SAGBEND	-114.71	-20.55	0.00	0.00	0.00	0.00	0.00	178.02	63.32	0.00	63.32
70	SAGBEND	-116.70	-20.74	0.00	0.00	0.00	0.00	0.00	177.95	63.26	0.00	63.26
71	SAGBEND	-118.69	-20.92	0.00	0.00	0.00	0.00	0.00	177.88	63.17	0.00	63.17
72	SAGBEND	-120.68	-21.10	0.00	0.00	0.00	0.00	0.00	177.82	63.06	0.00	63.06
73	SAGBEND	-122.67	-21.26	0.00	0.00	0.00	0.00	0.00	177.75	62.92	0.00	62.92
74	SAGBEND	-124.67	-21.42	0.00	0.00	0.00	0.00	0.00	177.70	62.75	0.00	62.75
75	SAGBEND	-126.66	-21.57	0.00	0.00	0.00	0.00	0.00	177.64	62.54	0.00	62.54
76	SAGBEND	-128.66	-21.71	0.00	0.00	0.00	0.00	0.00	177.59	62.29	0.00	62.29
77	SAGBEND	-130.65	-21.85	0.00	0.00	0.00	0.00	0.00	177.54	61.98	0.00	61.98
78	SAGBEND	-132.65	-21.97	0.00	0.00	0.00	0.00	0.00	177.49	61.62	0.00	61.62
79	SAGBEND	-134.64	-22.09	0.00	0.00	0.00	0.00	0.00	177.45	61.20	0.00	61.20
80	SAGBEND	-136.64	-22.20	0.00	0.00	0.00	0.00	0.00	177.41	60.69	0.00	60.69
81	SAGBEND	-138.64	-22.30	0.00	0.00	0.00	0.00	0.00	177.38	60.10	0.00	60.10
82	SAGBEND	-140.64	-22.40	0.00	0.00	0.00	0.00	0.00	177.34	59.41	0.00	59.41
83	SAGBEND	-142.63	-22.49	0.00	0.00	0.00	0.00	0.00	177.31	58.59	0.00	58.59
84	SAGBEND	-144.63	-22.57	0.00	0.00	0.00	0.00	0.00	177.28	57.64	0.00	57.64
85	SAGBEND	-146.63	-22.64	0.00	0.00	0.00	0.00	0.00	177.26	56.53	0.00	56.53
86	SAGBEND	-148.63	-22.71	0.00	0.00	0.00	0.00	0.00	177.24	55.23	0.00	55.23
87	SAGBEND	-150.63	-22.76	0.00	0.00	0.00	0.00	0.00	177.22	53.71	0.00	53.71
88	SAGBEND	-152.63	-22.81	0.00	0.00	0.00	0.00	0.00	177.20	51.95	0.00	51.95
89	SAGBEND	-154.63	-22.86	0.00	0.00	0.00	0.00	0.00	177.19	49.89	0.00	49.89
90	SAGBEND	-156.63	-22.90	0.00	0.00	0.00	0.00	0.00	177.18	47.50	0.00	47.50
91	SAGBEND	-158.63	-22.93	0.00	0.00	0.00	0.00	0.00	177.17	44.71	0.00	44.71
92	SAGBEND	-160.63	-22.96	0.00	0.00	0.00	0.00	0.00	177.17	41.47	0.00	41.47
93	SAGBEND	-162.63	-22.98	0.00	0.00	0.00	0.00	0.00	177.16	37.69	0.00	37.69
94	SAGBEND	-164.63	-22.99	0.00	0.01	0.00	0.00	0.00	177.16	33.30	0.00	33.30
95	SEABED	-166.63	-23.01	0.00	0.23	0.00	0.00	0.00	177.16	28.21	0.00	28.21
96	SEABED	-168.63	-23.01	0.00	0.59	0.00	0.00	0.00	177.17	22.77	0.00	22.77
97	SEABED	-170.63	-23.02	0.00	0.82	0.00	0.00	0.00	177.17	17.53	0.00	17.53
98	SEABED	-172.63	-23.02	0.00	0.96	0.00	0.00	0.00	177.17	12.86	0.00	12.86
99	SEABED	-174.63	-23.02	0.00	1.02	0.00	0.00	0.00	177.17	8.91	0.00	8.91
100	SEABED	-176.63	-23.02	0.00	1.04	0.00	0.00	0.00	177.17	5.74	0.00	5.74
101	SEABED	-178.63	-23.02	0.00	1.03	0.00	0.00	0.00	177.17	3.31	0.00	3.31
102	SEABED	-180.63	-23.02	0.00	0.99	0.00	0.00	0.00	177.17	1.54	0.00	1.54
103	SEABED	-182.63	-23.02	0.00	0.95	0.00	0.00	0.00	177.17	0.31	0.00	0.31

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 4/28/2020      TIME - 1:41:14      PAGE 16

=====												
STATIC PIPE COORDINATES, FORCES AND STRESSES												
=====												
NODE NO.	PIPE SECTION	COORDINATES			SUPPORT REACTION			SUPT SEPARATIONS		PIPE BENDING MOMENTS		
		X COORD (M)	Y COORD (M)	Z COORD (M)	VERT (KN)	HORIZ (KN)	VERT (M)	HORIZ (M)	PIPE TENSION (KN)	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)
104	SEABED	-184.63	-23.02	0.00	0.91	0.00	0.00	0.00	177.17	-0.47	0.00	0.47
105	SEABED	-186.63	-23.02	0.00	0.87	0.00	0.00	0.00	177.17	-0.91	0.00	0.91
106	SEABED	-188.63	-23.02	0.00	0.83	0.00	0.00	0.00	177.17	-1.11	0.00	1.11
107	SEABED	-190.63	-23.02	0.00	0.80	0.00	0.00	0.00	177.17	-1.15	0.00	1.15
108	SEABED	-192.63	-23.02	0.00	0.78	0.00	0.00	0.00	177.17	-1.07	0.00	1.07
109	SEABED	-194.63	-23.02	0.00	0.76	0.00	0.00	0.00	177.17	-0.94	0.00	0.94
110	SEABED	-196.63	-23.02	0.00	0.75	0.00	0.00	0.00	177.17	-0.78	0.00	0.78
111	SEABED	-198.63	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	-0.62	0.00	0.62
112	SEABED	-200.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.46	0.00	0.46
113	SEABED	-202.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.33	0.00	0.33
114	SEABED	-204.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.23	0.00	0.23
115	SEABED	-206.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.14	0.00	0.14
116	SEABED	-208.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.08	0.00	0.08
117	SEABED	-210.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.03	0.00	0.03
118	SEABED	-212.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.00	0.00	0.00
119	SEABED	-214.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.01	0.00	0.01
120	SEABED	-216.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.02	0.00	0.02
121	SEABED	-218.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.02	0.00	0.02
122	SEABED	-220.63	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	0.02	0.00	0.02
123	SEABED	-222.63	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	0.01	0.00	0.01
124	SEABED	-224.63	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	0.00	0.00	0.00
125	SEABED	-226.63	-23.02	0.00	0.00	0.00	0.00	0.00	177.17	0.00	0.00	0.00

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 17  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 4/28/2020 TIME - 1:41:14 CASE 1

STATIC SOLUTION SUMMARY

PIPE PROPERTIES ( 1)

PIPE SECTION LENGTH ..	0.00 M	ELASTIC MODULUS .....	207000. MPA
OUTSIDE DIAMETER .....	32.390 CM	CROSS SECTIONAL AREA ..	124.10 CM^2
WALL THICKNESS .....	1.270 CM	MOMENT OF INERTIA ....	15048.2 CM^4
WEIGHT/LENGTH IN AIR ..	2374.00 N/M	YIELD STRESS .....	360.00 MPA
SUBMERGED WGHT/LENG ..	368.27 N/M	STRESS INTENS FACTOR ..	1.000
SPECIFIC GRAVITY .....	1.184	STEEL DENSITY .....	77008.0 N/M3
WRAP COAT THICKNESS ..	0.320 CM	WRAP COAT DENSITY ....	9025.2 N/M3
CONCRETE THICKNESS ...	4.000 CM	CONCRETE DENSITY .....	29858.0 N/M3

BARGE DATA

TOTAL PIPE TENSION ...	196.13 KN	RADIUS OF CURVATURE ..	0.00 M
NUMBER OF TENSIONERS ..	2	BARGE TRIM ANGLE .....	0.500 DEG
NO. OF PIPE SUPPORTS ..	7	PIPE ANGLE AT STERN ..	8.172 DEG
BARGE HEADING .....	0.000 DEG	OFFSET FROM R.O.W. ...	0.00 M

STINGER DATA

NO. OF PIPE SUPPORTS ..	6	PIPE DEPTH AT STERN ..	-7.45 M
NO. STINGER SECTIONS ..	6	PIPE ANGLE AT STERN ..	13.844 DEG
RADIUS OF CURVATURE ...	0.00 M	STINGER STERN DEPTH ..	-9.34 M
STINGER LENGTH .....	41.37 M		

SAGBEND DATA

WATER DEPTH .....	23.00 M	TENSION AT TOUCHDOWN ..	177.16 KN
TOUCHDOWN X-COORD. ...	-165.61 M	BOTTOM SLOPE ANGLE ...	0.000 DEG
PROJECTED SPAN LENGTH	125.83 M	PIPE LENGTH GAIN .....	2.44 M

===== SOLUTION SUMMARY =====

NODE NO.	PIPE SECTION	COORDINATES			SUPPORT REACT VERT (KN)	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)	
		X COORD (M)	Y COORD (M)	Z COORD (M)					
1	LAYBARGE	64.2	4.4	0.0	0.9	0.0	0.2	0.	
3	LAYBARGE	59.7	4.3	0.0	22.7	0.0	15.1	5.	
5	LAYBARGE	48.2	4.0	0.0	28.1	0.0	22.1	7.	
7	TENSIONR	38.1	3.7	0.0	14.8	0.0	6.4	4.	
9	LAYBARGE	33.4	3.6	0.0	19.4	0.0	11.2	6.	
11	TENSIONR	26.7	3.4	0.0	2.6	0.0	17.5	10.	
13	LAYBARGE	21.3	3.3	0.0	0.0	0.0	18.6	10.	
15	LAYBARGE	12.1	3.0	0.0	63.7	0.0	245.9	78.	
17	LAYBARGE	0.0	1.8	0.0	42.9	0.0	251.3	79.	
20	STINGER	-8.1	0.4	0.0	34.2	0.0	215.6	69.	
22	STINGER	-15.9	-1.4	0.0	0.0	0.0	85.1	106.4	30.



24 STINGER -23.7 -3.4 0.0 0.0 0.0 17.8 34.0 9.

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX	PAGE 18
STATIC PIPE ANALYSIS 12 INCH	
JOB NO. - LAYING	LICENSED BY - PT Timas Suplindo
USER ID - IK	DATE - 4/28/2020 TIME - 1:41:14 CASE 1

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STATIC SOLUTION SUMMARY

26 STINGER	-30.8	-5.2	0.0	0.0	0.0	16.5	32.6	9.
28 STINGER	-36.9	-6.7	0.0	0.0	0.0	33.7	51.0	14.
30 STINGER	-39.8	-7.5	0.0	0.0	0.0	39.5	57.2	16.
65 SAGBEND	-106.8	-19.7	0.0	0.0	0.0	63.4	82.5	23.
95 SEABED	-166.6	-23.0	0.0	0.2	0.0	28.2	44.6	12.

## **LAMPIRAN OUTPUT MOSES**

\*\*\* MOSES \*\*\*

17 April, 2020

Hydrodynamic Analysis of PLB Hafar Neptune

+++HYDROSTATIC PROPERTIES+++

Process = DEFAULT: Units = Degrees, Meters, M-Tons, and MPA Unless Stated

Results are in the Body System

For Body HULL

/--- Draft	Condition Trim	---//--- Displac- / --- Roll M-Tons		/--- Center Of Buoyancy --- / ---X--- ---Y--- ---Z---			W.P. Area	/ /C. Flotation / /--- ---X--- ---Y--- -KMT-			Metacentric Heights -KML- -BMT- -BML-		
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1857.634	47.24	0.00	0.00	0.00	0.00	0.00
0.25	0.00	0.00	485.27	46.49	-0.00	0.13	1917.786	46.01	0.00	200.72	2088.34	200.59	2088.22
0.50	0.00	0.00	980.40	46.09	-0.00	0.25	1942.654	45.50	0.00	100.83	1074.60	100.58	1074.35
0.75	0.00	0.00	1480.24	45.83	-0.00	0.38	1959.592	45.14	-0.00	67.58	730.72	67.20	730.34
1.00	0.00	0.00	1984.42	45.61	-0.00	0.50	1976.430	44.79	-0.00	51.07	559.46	50.56	558.95
1.25	0.00	0.00	2492.89	45.41	-0.00	0.63	1993.164	44.43	-0.00	41.23	456.97	40.60	456.34
1.50	0.00	0.00	3005.64	45.21	-0.00	0.76	2009.815	44.07	-0.00	34.72	388.82	33.96	388.06
1.75	0.00	0.00	3522.64	45.02	-0.00	0.89	2026.382	43.71	-0.00	30.11	340.25	29.22	339.37
2.00	0.00	0.00	4043.88	44.82	-0.00	1.01	2042.868	43.35	-0.00	26.68	303.92	25.67	302.90
2.25	0.00	0.00	4569.33	44.63	0.00	1.14	2059.281	42.99	0.00	24.05	275.73	22.90	274.59
2.50	0.00	0.00	5098.98	44.44	-0.00	1.27	2075.611	42.62	-0.00	21.96	253.24	20.69	251.97
2.75	0.00	0.00	5630.93	44.27	-0.00	1.40	2076.118	42.58	-0.00	20.15	229.74	18.75	228.34
3.00	0.00	0.00	6162.69	44.12	-0.00	1.52	2075.217	42.56	0.00	18.65	209.90	17.13	208.38
3.25	0.00	0.00	6694.19	44.00	-0.00	1.65	2074.233	42.54	-0.00	17.42	193.22	15.77	191.57

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*****
*** MOSES ***
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17 April, 2020
*****
Hydrodynamic Analysis of PLB Hafar Neptune
Response Amplitude Operator at CoG
* Draft = 3.2 Meters Trim Angle = 0.00 Deg. GMT = 12.1 Meters *
* Roll Gy. Radius = 8.4 Meters Pitch Gy. Radius = 24.6 Meters Yaw Gy. Radius = 24.6 Meters *
* Heading = 0.00 Deg. Forward Speed = 0.00 Knots Linearization Based on 1/ 20
*****

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+++MOTION RESPONSE OPERATORS+++

Process = DEFAULT: Units = Degrees, Meters, M-Tons, and MPA Unless Stated

Results are in the Body System

Of Point On Body HULL At X = 44.0 Y = 0.0Z = 5.4

ENCOUNTER		Surge /		Sway /		Heave /		Roll /		Pitch /		Yaw /	
Frequency	Period	Wave Ampl.		Wave Ampl.		Wave Ampl.		Wave Ampl.		Wave Ampl.		Wave Ampl.	
-(Rad/Sec)-	-(Sec)-	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase
0.1001	62.80	0.942	93	0.000	0	1.003	3	0.000	0	0.060	-99	0.000	0
0.2001	31.40	0.932	100	0.000	0	1.000	10	0.000	0	0.235	-83	0.000	0
0.3002	20.93	0.905	113	0.000	0	0.984	23	0.000	0	0.525	-69	0.000	0
0.4002	15.70	0.847	131	0.000	0	0.937	40	0.000	0	0.910	-52	0.000	0
0.5003	12.56	0.742	155	0.000	0	0.837	62	0.000	0	1.339	-31	0.000	0
0.6003	10.47	0.580	-176	0.000	0	0.667	88	0.000	0	1.706	-6	0.000	0
0.7004	8.97	0.368	-141	0.000	0	0.423	119	0.000	0	1.850	20	0.000	0
0.8004	7.85	0.135	-101	0.000	0	0.142	159	0.000	0	1.588	48	0.000	0
0.9005	6.98	0.061	115	0.000	0	0.101	-20	0.001	122	0.873	74	0.000	0
1.0000	6.28	0.161	168	0.000	0	0.163	23	0.001	51	0.109	61	0.000	0
1.1000	5.71	0.140	-135	0.000	0	0.073	69	0.000	0	0.289	-9	0.000	0
1.2000	5.24	0.032	-67	0.000	0	0.014	-60	0.000	0	0.202	46	0.000	0
1.3000	4.83	0.067	165	0.000	0	0.038	25	0.000	0	0.005	95	0.000	0
1.4000	4.49	0.073	-120	0.000	0	0.019	117	0.000	0	0.120	17	0.000	0
1.5000	4.19	0.006	30	0.000	0	0.016	-10	0.000	0	0.084	96	0.000	0
1.6000	3.93	0.049	-148	0.000	0	0.022	82	0.000	0	0.050	-3	0.000	0
1.7000	3.70	0.020	-44	0.000	0	0.005	-17	0.000	0	0.083	75	0.000	0
1.8000	3.49	0.028	-158	0.000	0	0.019	71	0.000	0	0.025	13	0.000	0
1.9000	3.31	0.017	-35	0.000	0	0.005	17	0.000	0	0.066	73	0.000	0
2.0000	3.14	0.019	-146	0.000	0	0.014	77	0.000	0	0.031	27	0.000	0
2.1011	2.99	0.009	17	0.000	0	0.008	32	0.000	0	0.045	82	0.000	0
2.2011	2.85	0.014	-101	0.000	0	0.008	89	0.000	0	0.041	44	0.000	0
2.3012	2.73	0.007	127	0.000	0	0.010	57	0.000	0	0.024	78	0.000	0
2.4012	2.62	0.008	-16	0.000	0	0.005	57	0.000	0	0.036	69	0.000	0
2.5013	2.51	0.007	-119	0.000	0	0.007	81	0.000	0	0.027	50	0.000	0
2.6013	2.42	0.005	135	0.000	0	0.007	63	0.000	0	0.018	70	0.000	0
2.7014	2.33	0.004	37	0.000	0	0.005	57	0.000	0	0.023	75	0.000	0
2.8014	2.24	0.004	-55	0.000	0	0.002	73	0.001	84	0.015	58	0.000	0
2.9015	2.17	0.004	-131	0.000	0	0.003	74	0.000	0	0.015	53	0.000	0
3.0015	2.09	0.003	171	0.000	0	0.003	65	0.000	0	0.012	57	0.000	0

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*                               *** MOSES ***
*                               -----
*                               17 April, 2020
*
* Hydrodynamic Analysis of PLB Hafar Neptune
* Response Amplitude Operator at CoG
* Draft = 3.2 Meters Trim Angle = 0.00 Deg. GMT = 12.1 Meters *
* Roll Gy. Radius = 8.4 Meters Pitch Gy. Radius = 24.6 Meters Yaw Gy. Radius = 24.6 Meters *
* Heading = 45.00 Deg. Forward Speed = 0.00 Knots Linearization Based on 1/ 20
*
    
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+++MOTION RESPONSE OPERATORS+++

Process = DEFAULT: Units = Degrees, Meters, M-Tons, and MPA Unless Stated

Results are in the Body System

Of Point On Body HULL At X = 44.0 Y = 0.0Z = 5.4

ENCOUNTER		Surge /		Sway /		Heave /		Roll /		Pitch /		Yaw /	
Frequency	Period	Wave Ampl.		Wave Ampl.		Wave Ampl.		Wave Ampl.		Wave Ampl.		Wave Ampl.	
-(Rad/Sec)-	-(Sec)-	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase
0.1001	62.80	0.666	92	0.706	92	1.003	2	0.041	92	0.043	-105	0.028	178
0.2001	31.40	0.661	97	0.698	97	1.002	7	0.166	97	0.167	-87	0.110	-173
0.3002	20.93	0.648	106	0.681	106	0.994	16	0.373	105	0.373	-76	0.242	-163
0.4002	15.70	0.623	119	0.649	119	0.971	29	0.658	117	0.655	-63	0.410	-150
0.5003	12.56	0.579	136	0.594	136	0.922	44	1.003	133	0.996	-48	0.592	-133
0.6003	10.47	0.510	156	0.513	156	0.834	63	1.375	152	1.358	-30	0.757	-111
0.7004	8.97	0.413	-179	0.405	179	0.698	84	1.736	173	1.672	-11	0.869	-85
0.8004	7.85	0.292	-151	0.273	-155	0.507	107	2.073	-167	1.819	8	0.896	-55
0.9005	6.98	0.158	-119	0.110	-133	0.267	130	2.273	-173	1.629	27	0.819	-21
1.0000	6.28	0.033	-77	0.027	-84	0.038	176	0.180	-54	1.054	47	0.624	17
1.1000	5.71	0.064	128	0.052	164	0.088	-14	0.531	-28	0.408	73	0.355	59
1.2000	5.24	0.109	173	0.082	-157	0.091	29	0.322	10	0.041	18	0.071	102
1.3000	4.83	0.094	-139	0.064	-111	0.049	80	0.085	46	0.175	-1	0.136	-21
1.4000	4.49	0.038	-85	0.021	-62	0.006	137	0.050	-34	0.165	46	0.197	31
1.5000	4.19	0.024	134	0.017	-174	0.020	10	0.058	25	0.068	92	0.122	88
1.6000	3.93	0.052	-161	0.026	-115	0.020	67	0.028	122	0.033	7	0.005	118
1.7000	3.70	0.035	-96	0.012	-46	0.005	109	0.012	-33	0.059	47	0.058	43
1.8000	3.49	0.007	109	0.004	-145	0.007	29	0.040	78	0.027	89	0.043	121
1.9000	3.31	0.029	-151	0.008	-58	0.006	79	0.031	139	0.016	36	0.001	-66
2.0000	3.14	0.017	-68	0.003	43	0.002	73	0.018	93	0.015	78	0.023	124
2.1011	2.99	0.010	158	0.004	-50	0.002	85	0.029	122	0.004	100	0.015	-132
2.2011	2.85	0.017	-100	0.004	51	0.000	0	0.017	130	0.005	115	0.010	133
2.3012	2.73	0.004	58	0.001	-50	0.001	172	0.013	135	0.003	-145	0.015	-124
2.4012	2.62	0.011	-119	0.003	62	0.001	-129	0.004	84	0.003	179	0.004	120
2.5013	2.51	0.004	21	0.000	0	0.001	-155	0.004	-163	0.004	-132	0.008	-103
2.6013	2.42	0.007	-124	0.001	105	0.001	-118	0.001	-99	0.003	-143	0.001	163
2.7014	2.33	0.004	37	0.000	0	0.001	-127	0.005	-67	0.003	-119	0.004	-36
2.8014	2.24	0.005	-109	0.001	-165	0.000	0	0.006	-49	0.001	-102	0.001	-102
2.9015	2.17	0.003	85	0.000	0	0.000	0	0.004	-37	0.000	0	0.003	44
3.0015	2.09	0.003	-68	0.001	-94	0.000	0	0.003	-51	0.000	0	0.002	-24

```

*****
*** MOSES ***
-----
17 April, 2020
*
* Hydrodynamic Analysis of PLB Hafar Neptune
* Response Amplitude Operator at CoG
*
* Draft = 3.2 Meters Trim Angle = 0.00 Deg. GMT = 12.1 Meters *
* Roll Gy. Radius = 8.4 Meters Pitch Gy. Radius = 24.6 Meters Yaw Gy. Radius = 24.6 Meters *
* Heading = 90.00 Deg. Forward Speed = 0.00 Knots Linearization Based on 1/20
*
*****
    
```

+++MOTION RESPONSE OPERATORS+++  
=====

Process = DEFAULT: Units = Degrees, Meters, M-Tons, and MPA Unless Stated

Results are in the Body System

Of Point On Body HULL At X = 44.0 Y = 0.0Z = 5.4

ENCOUNTER		Surge /		Sway /		Heave /		Roll /		Pitch /		Yaw /	
Frequency	Period	Wave Ampl.		Wave Ampl.		Wave Ampl.		Wave Ampl.		Wave Ampl.		Wave Ampl.	
-(Rad/Sec)-	-(Sec)-	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase
0.1001	62.80	0.000	0	0.998	90	1.003	0	0.058	90	0.013	179	0.003	90
0.2001	31.40	0.000	0	0.989	90	1.004	0	0.235	90	0.014	175	0.002	90
0.3002	20.93	0.000	0	0.973	90	1.004	0	0.534	90	0.015	169	0.001	92
0.4002	15.70	0.000	0	0.948	90	1.006	0	0.969	90	0.018	163	0.000	0
0.5003	12.56	0.000	0	0.911	90	1.010	0	1.566	89	0.022	155	0.002	-101
0.6003	10.47	0.000	0	0.861	90	1.023	0	2.401	89	0.029	148	0.005	-101
0.7004	8.97	0.000	0	0.794	90	1.046	-1	3.655	83	0.044	137	0.008	-109
0.8004	7.85	0.000	0	0.688	88	1.074	-6	5.752	69	0.071	120	0.014	-126
0.9005	6.98	0.001	90	0.463	90	1.056	-16	7.980	33	0.108	90	0.021	-167
1.0000	6.28	0.001	53	0.373	123	0.898	-29	6.928	-14	0.127	53	0.018	136
1.1000	5.71	0.000	0	0.413	133	0.633	-39	3.731	-37	0.105	21	0.010	98
1.2000	5.24	0.000	0	0.375	141	0.408	-40	2.045	-36	0.073	4	0.006	79
1.3000	4.83	0.000	0	0.325	153	0.261	-33	1.214	-25	0.049	0	0.004	63
1.4000	4.49	0.000	0	0.279	167	0.171	-21	0.749	-11	0.034	5	0.004	54
1.5000	4.19	0.000	0	0.238	-175	0.115	-6	0.466	4	0.025	15	0.004	54
1.6000	3.93	0.000	0	0.204	-157	0.079	12	0.286	23	0.019	30	0.004	61
1.7000	3.70	0.000	0	0.174	-136	0.055	33	0.168	44	0.014	48	0.004	75
1.8000	3.49	0.000	0	0.149	-113	0.039	56	0.091	67	0.011	69	0.004	92
1.9000	3.31	0.000	0	0.127	-89	0.027	81	0.042	92	0.009	92	0.004	113
2.0000	3.14	0.000	0	0.110	-63	0.019	108	0.003	137	0.007	117	0.004	134
2.1011	2.99	0.000	0	0.094	-35	0.010	136	0.018	-38	0.007	143	0.004	161
2.2011	2.85	0.000	0	0.081	-6	0.011	167	0.032	-7	0.005	174	0.004	-171
2.3012	2.73	0.000	0	0.070	23	0.008	-160	0.049	22	0.004	-155	0.004	-136
2.4012	2.62	0.000	0	0.061	58	0.006	-127	0.041	57	0.003	-122	0.003	-126
2.5013	2.51	0.000	0	0.053	91	0.003	-94	0.042	91	0.003	-89	0.003	-79
2.6013	2.42	0.000	0	0.046	127	0.004	-55	0.044	126	0.002	-52	0.003	-41
2.7014	2.33	0.000	0	0.040	163	0.002	-18	0.045	162	0.002	-15	0.003	-5
2.8014	2.24	0.000	0	0.037	-152	0.002	19	0.025	-153	0.001	22	0.002	28
2.9015	2.17	0.000	0	0.032	-115	0.001	60	0.034	-116	0.001	62	0.002	69
3.0015	2.09	0.000	0	0.028	-75	0.004	110	0.033	-75	0.000	0	0.002	109

```

*****
***      MOSES      ***
*****
17 April, 2020
*
* Hydrodynamic Analysis of PLB Hafar Neptune
* Response Amplitude Operator at CoG
*
* Draft = 3.2 Meters Trim Angle = 0.00 Deg. GMT = 12.1 Meters *
* Roll Gy. Radius = 8.4 Meters Pitch Gy. Radius = 24.6 Meters Yaw Gy. Radius = 24.6 Meters *
* Heading = 135.00 Deg. Forward Speed = 0.00 Knots Linearization Based on 1/20
*
*****
    
```

+++MOTION RESPONSE OPERATORS+++  
 =====

Process = DEFAULT: Units = Degrees, Meters, M-Tons, and MPA Unless Stated

Results are in the Body System

Of Point On Body HULL At X = 44.0 Y = 0.0Z = 5.4

ENCOUNTER		Surge /		Sway /		Heave /		Roll /		Pitch /		Yaw /	
Frequency	Period	Wave Ampl.		Wave Ampl.		Wave Ampl.		WaveAmpl.		WaveAmpl.		Wave Ampl.	
-(Rad/Sec)-	-(Sec)-	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase
0.1001	62.80	0.666	-91	0.706	88	1.003	-1	0.041	88	0.044	105	0.028	2
0.2001	31.40	0.661	-96	0.698	83	1.002	-6	0.166	83	0.169	88	0.110	-5
0.3002	20.93	0.648	-105	0.681	74	0.993	-16	0.373	74	0.379	76	0.241	-15
0.4002	15.70	0.623	-118	0.649	61	0.969	-29	0.658	62	0.667	62	0.409	-28
0.5003	12.56	0.578	-135	0.595	45	0.917	-46	1.003	46	1.016	45	0.591	-44
0.6003	10.47	0.509	-155	0.515	25	0.824	-68	1.375	27	1.387	24	0.753	-63
0.7004	8.97	0.413	-179	0.409	1	0.677	-96	1.729	3	1.709	-2	0.860	-85
0.8004	7.85	0.291	153	0.283	-27	0.466	-131	2.044	-27	1.860	-34	0.879	-109
0.9005	6.98	0.157	122	0.130	-67	0.206	-179	2.202	-86	1.654	-74	0.790	-136
1.0000	6.28	0.031	88	0.032	-90	0.037	21	0.300	-56	1.040	-118	0.604	-166
1.1000	5.71	0.065	-130	0.043	87	0.108	-66	0.582	-77	0.378	-158	0.337	158
1.2000	5.24	0.109	-172	0.072	39	0.094	-106	0.371	-100	0.033	-46	0.065	110
1.3000	4.83	0.094	140	0.057	-5	0.049	-140	0.164	-104	0.193	-56	0.129	-90
1.4000	4.49	0.038	87	0.019	-59	0.005	-147	0.076	-73	0.181	-92	0.180	-137
1.5000	4.19	0.024	-134	0.015	101	0.021	-50	0.077	-26	0.074	-126	0.108	173
1.6000	3.93	0.052	162	0.022	43	0.020	-92	0.099	-30	0.034	-27	0.009	51
1.7000	3.70	0.035	97	0.010	-11	0.004	-119	0.055	-45	0.060	-58	0.053	-91
1.8000	3.49	0.007	-108	0.004	149	0.007	-27	0.042	19	0.024	-89	0.039	-142
1.9000	3.31	0.029	152	0.008	89	0.005	-64	0.055	0	0.016	-15	0.002	76
2.0000	3.14	0.017	69	0.003	33	0.001	-15	0.023	13	0.013	-39	0.023	-47
2.1011	2.99	0.010	-157	0.004	178	0.002	5	0.031	35	0.005	18	0.014	-107
2.2011	2.85	0.017	101	0.004	107	0.001	25	0.018	35	0.003	36	0.010	34
2.3012	2.73	0.004	-57	0.001	-101	0.001	92	0.013	52	0.005	65	0.013	-44
2.4012	2.62	0.011	120	0.003	154	0.001	82	0.008	135	0.003	113	0.002	104
2.5013	2.51	0.005	-20	0.001	-38	0.001	121	0.004	102	0.004	101	0.008	6
2.6013	2.42	0.007	125	0.001	-146	0.001	111	0.006	167	0.003	135	0.001	162
2.7014	2.33	0.004	-36	0.000	0	0.000	0	0.004	-169	0.002	133	0.004	66
2.8014	2.24	0.005	110	0.001	-95	0.000	0	0.008	-151	0.001	-159	0.002	-129
2.9015	2.17	0.003	-84	0.000	0	0.000	0	0.004	-149	0.001	-150	0.003	101
3.0015	2.09	0.003	69	0.001	-73	0.000	0	0.003	-127	0.001	-79	0.002	-145

```

*****
*** MOSES ***
*****
17 April, 2020
*
* Hydrodynamic Analysis of PLB Hafar Neptune
* Response Amplitude Operator at CoG
*
* Draft = 3.2 Meters Trim Angle = 0.00 Deg. GMT = 12.1 Meters *
* Roll Gy. Radius = 8.4 Meters Pitch Gy. Radius = 24.6 Meters Yaw Gy. Radius = 24.6 Meters *
* Heading = 180.00 Deg. Forward Speed = 0.00 Knots Linearization Based on 1/ 20
*
*****
    
```

+++MOTION RESPONSE OPERATORS+++  
=====

Process = DEFAULT: Units = Degrees, Meters, M-Tons, and MPA Unless Stated

Results are in the Body System

Of Point On Body HULL At X = 44.0 Y = 0.0Z = 5.4

ENCOUNTER		Surge /		Sway /		Heave /		Roll /		Pitch /		Yaw /	
Frequency	Period	Wave Ampl.		Wave Ampl.		Wave Ampl.		WaveAmpl.		WaveAmpl.		Wave Ampl.	
-(Rad/Sec)-	-(Sec)-	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase	Ampl.	Phase
0.1001	62.80	0.942	-92	0.000	0	1.003	-2	0.000	0	0.061	100	0.000	0
0.2001	31.40	0.932	-99	0.000	0	1.000	-9	0.000	0	0.238	83	0.000	0
0.3002	20.93	0.905	-112	0.000	0	0.983	-23	0.000	0	0.532	69	0.000	0
0.4002	15.70	0.847	-130	0.000	0	0.934	-42	0.000	0	0.924	50	0.000	0
0.5003	12.56	0.742	-154	0.000	0	0.830	-67	0.000	0	1.359	25	0.000	0
0.6003	10.47	0.580	177	0.000	0	0.652	-98	0.000	0	1.727	-4	0.000	0
0.7004	8.97	0.367	143	0.000	0	0.397	-139	0.000	0	1.855	-42	0.000	0
0.8004	7.85	0.135	104	0.000	0	0.113	153	0.000	0	1.553	-87	0.000	0
0.9005	6.98	0.062	-118	0.000	0	0.133	-33	0.002	173	0.790	-140	0.000	0
1.0000	6.28	0.162	-167	0.000	0	0.161	-101	0.001	51	0.010	28	0.000	0
1.1000	5.71	0.139	136	0.000	0	0.068	-147	0.000	0	0.330	-65	0.000	0
1.2000	5.24	0.031	69	0.000	0	0.017	-66	0.000	0	0.279	-105	0.000	0
1.3000	4.83	0.068	-163	0.000	0	0.051	-77	0.000	0	0.080	-124	0.000	0
1.4000	4.49	0.073	121	0.000	0	0.035	-124	0.000	0	0.147	-56	0.000	0
1.5000	4.19	0.006	-31	0.000	0	0.016	-47	0.000	0	0.140	-107	0.000	0
1.6000	3.93	0.049	150	0.000	0	0.031	-95	0.000	0	0.049	-48	0.000	0
1.7000	3.70	0.020	44	0.000	0	0.006	-69	0.000	0	0.111	-86	0.000	0
1.8000	3.49	0.028	160	0.000	0	0.023	-82	0.000	0	0.032	-60	0.000	0
1.9000	3.31	0.017	35	0.000	0	0.006	-62	0.000	0	0.080	-81	0.000	0
2.0000	3.14	0.019	147	0.000	0	0.016	-84	0.000	0	0.034	-50	0.000	0
2.1011	2.99	0.009	-16	0.000	0	0.009	-48	0.000	0	0.054	-88	0.000	0
2.2011	2.85	0.014	102	0.000	0	0.010	-93	0.000	0	0.044	-52	0.000	0
2.3012	2.73	0.007	-126	0.000	0	0.011	-62	0.000	0	0.028	-83	0.000	0
2.4012	2.62	0.008	17	0.000	0	0.005	-66	0.000	0	0.039	-73	0.000	0
2.5013	2.51	0.007	120	0.000	0	0.007	-84	0.000	0	0.028	-55	0.000	0
2.6013	2.42	0.005	-134	0.000	0	0.007	-65	0.000	0	0.020	-73	0.000	0
2.7014	2.33	0.004	-36	0.000	0	0.005	-59	0.000	0	0.024	-75	0.000	0
2.8014	2.24	0.004	56	0.000	0	0.002	-81	0.001	-74	0.016	-64	0.000	0
2.9015	2.17	0.004	132	0.000	0	0.004	-77	0.000	0	0.015	-56	0.000	0
3.0015	2.09	0.003	-170	0.000	0	0.004	-66	0.000	0	0.012	-59	0.000	0



**LAMPIRAN ANALISA DINAMIS PADA PIPA 8 INCH  
HEADING 0°**

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*****
*
*           O F F P I P E - 3 -- OFFSHORE PIPELINE ANALYSIS SYSTEM
*
*   COPYRIGHT (C) 1983-2016, ROBERT C. MALAHY. ALL RIGHTS RESERVED WORLDWIDE.
*
*           VERSION NO. - 3.02EX
*           RELEASED ON - 03/08/2016
*           LICENSED TO - PT Timas Suplindo
*
*****
*
* OFFPIPE IS A NONLINEAR, 3-DIMENSIONAL FINITE ELEMENT METHOD BASED PROGRAM FOR THE
* STATIC AND DYNAMIC ANALYSIS OF PROBLEMS ARISING IN THE DESIGN OF MARINE PIPELINES.
* THIS VERSION OF OFFPIPE MAY BE USED FOR THE ANALYSIS OF OFFSHORE PIPELAYING OPER-
* ATIONS, DAVIT LIFTS, PIPELINES LYING ON AN UNEVEN SEABED, AND RISERS.
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*
*           ROBERT C. MALAHY           TELEPHONE: (713) 664-8635
*           6554 AUDEN                 FACSIMILE: (713) 664-0962
*           HOUSTON, TEXAS 77005
*           U.S.A.                     EMAIL: SUPPORT@OFFPIPE.COM
*
*****

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=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 3
STATIC PIPE ANALYSIS 8 INCH
JOB NO. - LAYING           LICENSED BY - PT Timas Suplindo
USER ID - IK              DATE - 5/2/2020 TIME - 0:31:0   CASE 1
=====

```

INPUT DATA ECHO

```

=====
PRINTED OUTPUT SELECTED
=====
STATIC PIPE FORCES AND STRESSES ... YES
STATIC SOLUTION SUMMARY ..... YES
DYNAMIC PIPE FORCES AND STRESSES ... YES
DYNAMIC RANGE OF PIPE DATA ..... NO
DYNAMIC TRACKING OF PIPE DATA ..... NO
OVERBEND PIPE SUPPORT GEOMETRY .... NO
STINGER BALLAST SCHEDULE DATA ..... NO
SUPPORT REACTIONS IN BARGE COORDS . NO

INTERNAL FORCES IN PIPE & CABLE ... NO
INTERNAL FORCES IN STINGER ..... NO
PRINT PIPE STRAINS IN OUTPUT ..... NO
DNV OS-F101 COMPLIANCE REPORT ..... NO
API RP-1111 COMPLIANCE REPORT ..... NO
PRINT DNV/API FACTORS & PARAMETERS NO
USE THICK WALL HOOP STRESS EQN. ... NO
USE DNV 1981 FOR TOTAL PIPE STRESS NO

ENABLE/DISABLE WARNING MESSAGES ... ENABLE
GENERATE SPREAD SHEET PLOT FILE ... NO
GENERATE ASCII PLOT DATA FILES .... NO

```

PROFILE PLOT TABLE ENTRIES

```
=====
PLOT TABLE INDEX ..... 1
PLOT NUMBER ..... 1
PLOT TYPE OPTION NUMBER ..... 1
DYNAMIC PROFILE TIME POINT ..... 0.000
DYNAMIC PROFILE TIME INCREMENT ..... 0.000
ORDINATE PARAMETER CODE NUMBER ..... 2
AXIS LABEL FOR ORDINATE ..... "PIPE ELEVATION Y COORDINATE"
ABSCISSA PARAMETER CODE NUMBER ..... 1
AXIS LABEL FOR ABSCISSA ..... "PIPE HORIZONTAL X COORDINATE"

PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS"
MINIMUM VERTICAL AXIS RANGE ..... 0.000
MAXIMUM VERTICAL AXIS RANGE ..... 0.000
MINIMUM HORIZONTAL AXIS RANGE ..... 0.000
MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000
=====
```

```
=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 4
STATIC PIPE ANALYSIS 8 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 5/2/2020 TIME - 0:31:0 CASE 1
=====
```

INPUT DATA ECHO

PROFILE PLOT TABLE ENTRIES

```
=====
PLOT TABLE INDEX ..... 2
PLOT NUMBER ..... 1
PLOT TYPE OPTION NUMBER ..... 1
DYNAMIC PROFILE TIME POINT ..... 0.000
DYNAMIC PROFILE TIME INCREMENT ..... 0.000
ORDINATE PARAMETER CODE NUMBER ..... 15
AXIS LABEL FOR ORDINATE ..... "DNV YIELD STRESS PERCENTAGE"
ABSCISSA PARAMETER CODE NUMBER ..... 1
AXIS LABEL FOR ABSCISSA ..... "PIPELINE HORIZONTAL X COORDINATE"

PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS"
MINIMUM VERTICAL AXIS RANGE ..... 0.000
MAXIMUM VERTICAL AXIS RANGE ..... 0.000
MINIMUM HORIZONTAL AXIS RANGE ..... 0.000
MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000
=====
```

PIPE PROPERTIES

```
=====
PROPERTY TABLE ROW NUMBER ..... 1
PIPE SECTION LENGTH ..... 0.000 METERS
STEEL MODULUS OF ELASTICITY ..... 207000. M-PASCAL
STEEL CROSS SECTIONAL AREA ..... 82.690 CM^2
COATED PIPE AVG MOMENT OF INERTIA .. 4402.00 CM^4
WEIGHT PER-UNIT-LENGTH IN AIR ..... 1649.63 N/M
WEIGHT PER-UNIT-LENGTH SUBMERGED .. 912.94 N/M
MAXIMUM ALLOWABLE PIPE STRAIN ..... 0.205000 PERCENT

STEEL OUTSIDE DIAMETER ..... 21.9100 CM
STEEL WALL THICKNESS ..... 1.2700 CM
YIELD STRESS ..... 360.00 M-PASCAL
STRESS/STRAIN INTENSE FACTOR ..... 0.0000
HYDRODYNAMIC OUTSIDE DIAMETER ..... 0.000 CM
DRAG COEFFICIENT ..... 0.0000
HYDRODYNAMIC TOTAL AREA ..... 0.000 CM^2
ADDED MASS COEFFICIENT ..... 0.0000
POISSON'S RATIO ..... 0.3000
COEFFICIENT OF THERMAL EXPANSION .. 0.00001100 1/DEG C
=====
```

```
=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 5
STATIC PIPE ANALYSIS 8 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 5/2/2020 TIME - 0:31:0 CASE 1
=====
```

INPUT DATA ECHO

PIPE COATING PROPERTIES

```
=====
PIPE PROPERTY TABLE INDEX ..... 1
CORROSION COATING THICKNESS ..... 0.320 CM
CORROSION COATING WEIGHT DENSITY .. 9025.2 N/M^3
CORROSION COATING ELASTIC MODULUS . 0.000 M-PASCAL
CONCRETE COATING THICKNESS ..... 4.000 CM
CONCRETE COATING WEIGHT DENSITY ... 29857. N/M^3
CONCRETE COATING ELASTIC MODULUS .. 0.000 M-PASCAL
DESIRED PIPE SPECIFIC GRAVITY ..... 0.0000
CONCRETE STIFFENING EFFECTIVENESS . 0.000
NO NOT CALC. STRESS FOR BARE PIPE . NO
=====
```

AVERAGE LENGTH OF PIPE JOINT ..... 12.200 METERS  
 EFFECTIVE FIELD JOINT LENGTH ..... 0.300 METERS  
 FIELD JOINT FILL WEIGHT DENSITY ... 10055.3 N/M^3  
 FIELD JOINT FILL ELASTIC MODULUS... 0.000 M-PASCAL  
 FIELD JOINT STIFFENING EFFECT. .... 0.000  
 FIELD JOINT BENDING MODEL ..... 0 IGNORE COATING STIFFNESS  
 WEIGHT DENSITY OF STEEL ..... 77008. N/M^3  
 WEIGHT DENSITY OF PIPE CONTENTS ... 0.0 N/M^3  
 REF. ELEVATION FOR STATIC HEAD .... 0.00 METERS  
 FREE FLOOD PIPE DURING PIPELAY ... NO

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 6  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 0:31:0 CASE 1  
 =====

INPUT DATA ECHO

PIPELAY VESSEL DESCRIPTION

=====  
 NUMBER OF PIPE NODES ..... 9  
 BARGE GEOMETRY SPECIFIED BY ..... 1 X-Y COORDINATES  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.000 METERS  
 ADJUST Y COORDINATES MANUALLY .... NO  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 PIPE ANGLE RELATIVE TO DECK ..... 0.0000 DEGREES  
 HEIGHT OF DECK ABOVE WATER ..... 2.400 METERS  
 LAYBARGE FORWARD (X) OFFSET ..... 0.000 METERS  
 BARGE TRIM ANGLE ..... 0.5000 DEGREES  
  
 STERN SHOE X COORDINATE ..... 0.000 METERS  
 STERN SHOE Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER X COORDINATE ..... 43.820 METERS  
 ROTATION CENTER Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER Z COORDINATE ..... 6.370 METERS  
 BARGE HEADING ..... 0.0000 DEGREES  
 BARGE OFFSET FROM RIGHT-OF-WAY .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT VERTICAL ANGLE ... 0.000 DEGREES  
 PIPE RAMP PIVOT Z COORDINATE ..... 0.000 METERS  
 PIPE RAMP HEADING ON DECK ..... 0.000 DEGREES  
 ROLE OF ALTERNATE WAVE ORIGIN .... 0 MOTIONS & WAVES AT CENTER OF MOTION  
 WAVE PHASE ORIGIN X COORDINATE .... 0.000  
 WAVE PHASE ORIGIN Y COORDINATE .... 0.000 METERS  
 WAVE PHASE ORIGIN Z COORDINATE .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE .....

NODE X COORD (M )	NODE Y COORD (M )	SUPPORT TYPE	DAVIT SPACING (M )
64.220	1.838	1 SIMPLE SUPPORT	0.000
59.740	1.760	1 SIMPLE SUPPORT	0.000
48.240	1.560	1 SIMPLE SUPPORT	0.000
38.110	1.383	2 PIPE TENSIONER	0.000
33.440	1.302	1 SIMPLE SUPPORT	0.000
26.660	1.183	2 PIPE TENSIONER	0.000
21.340	1.092	7 USER DEFINED SPT	0.000
12.150	0.860	7 USER DEFINED SPT	0.000
-0.040	-0.260	8 USER DEFINED SPT	0.000

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 7  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 0:31:0 CASE 1  
 =====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====  
 SUPPORT PROPERTY TABLE INDEX ..... 2  
 SUPPORT ELEMENT TYPE ..... 2 TENSIONER  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
  
 BOTTOM ROLLER ANGLE TO HORIZONTAL . 0.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES

SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 7  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 1.600 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 8  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 0:31: 0 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 8  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

STINGER DESCRIPTION

=====

NUMBER OF PIPE/STINGER NODES ..... 6  
 STINGER GEOMETRY SPECIFIED BY ..... 2 X-Y COORD AND MATCH PT  
 STINGER TYPE ..... 1 FIXED GEOMETRY OR RAMP  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.00 METERS  
 HITCH X-COORDINATE ..... 0.497 METERS  
 HITCH Y-COORDINATE ..... -1.800 METERS  
 HITCH ANGULAR ORIENTATION ..... 0.000 DEGREES

X COORDINATE OF LOCAL ORIGIN ..... 0.497 METERS  
 Y COORDINATE OF LOCAL ORIGIN ..... -1.800 METERS  
 ROTATION ABOUT STINGER HITCH ..... 13.500 DEGREES  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 TANGENT POINT ANGLE ..... 0.000 DEGREES

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	ELEMENT TYPE	ELEMENT LENGTH ( M )
-8.325	2.209	1 SIMPLE SUPPORT	2 HINGED END	0.000
-16.325	2.349	1 SIMPLE SUPPORT	1 FIXED END	0.000
-24.325	2.119	1 SIMPLE SUPPORT	1 FIXED END	0.000
-31.699	1.660	1 SIMPLE SUPPORT	1 FIXED END	0.000
-37.949	1.069	1 SIMPLE SUPPORT	1 FIXED END	0.000
-40.949	0.350	1 SIMPLE SUPPORT	1 FIXED END	0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 9  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 0:31: 0 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

```

=====
SUPPORT PROPERTY TABLE INDEX ..... 1
SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT
SUPPORT INITIAL STATE FLAG ..... 0
TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M
VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M
STATIC VERTICAL DEFLECTION ..... 0.0000 CM
LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES
SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES
SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS
BED ROLLER LENGTH ..... 1.640 METERS
HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS
TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
    
```

CURRENT VELOCITIES

```

=====
WATER DEPTH (M ) CURRENT SPEED (M/S ) DIRECTION OF TRAVEL (DEG )
=====
0.000 0.790 0.000
11.500 0.480 0.000
23.000 0.420 0.000
    
```

PIPE TENSION DATA

```

=====
STATIC PIPE TENSION ON LAY VESSEL . 196.133 K-NEWTON
MINIMUM DYNAMIC PIPE TENSION ..... 196.133 K-NEWTON
MAXIMUM DYNAMIC PIPE TENSION ..... 264.553 K-NEWTON
STATIC HORIZONTAL BOTTOM TENSION .. 0.000 K-NEWTON
NO. OF VALUES FOR TENSION PROFILE . 0
VALUES ARE FOR PIPE SPAN ANALYSIS . NO
MAXIMUM PIPE PAYOUT SPEED ..... 0.000 M/SEC
MAXIMUM PIPE TAKEUP SPEED ..... 0.000 M/SEC
    
```

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 10

STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 0:31: 0 CASE 1

=====  
 INPUT DATA ECHO

SAGBEND GEOMETRY

```

=====
SAGBEND PIPE ELEMENT LENGTH ..... 2.000 METERS
WATER DEPTH ..... 23.00 METERS
X-COORDINATE AT SPECIFIED DEPTH . . 0.00 METERS
ESTIMATED SAGBEND X LENGTH ..... 0.00 METERS
ESTIMATED PIPE LENGTH ON SEABED ... 0.00 METERS
X-COORD OF PIPE FREE END ON SEABED 0.00 METERS
X-COORD POINT OF FIXITY ON SEABED . 0.00 METERS
MAXIMUM SLOPE (ANGLE) OF SEABED ... 0.000 DEGREES
DIRECTION OF MAXIMUM SLOPE ..... 0.000 DEGREES

PIPE/CABLE SPAN END CONDITION ..... 0 PIPE/CABLE RESTING ON SEABED
PIPE/CABLE SPAN LENGTH GIVEN BY ... 0 SPECIFIED PIPE/CABLE TENSION
ESTIMATED SPAN DEPTH AT FREE END .. 0.00 METERS
PIPE VERTICAL ANGLE AT FREE END ... 0.000 DEGREES
BOTTOM HINGE OFFSET ..... 0.000 METERS
BOTTOM HINGE MINIMUM ANGLE ..... 0.000 DEGREES
BOTTOM HINGE MAXIMUM ANGLE ..... 0.000 DEGREES
    
```

SOIL ELEMENT PROPERTIES

```

=====
SOIL PROPERTY TABLE ROW INDEX ..... 1
SOIL ELEMENT TYPE (FUTURE USE) .... 0
PIPE INDEX OR SEGMENT NUMBER ..... 0
LONGITUDINAL SOIL STIFFNESS ..... 0.00 KN/M^2
VERTICAL SOIL STIFFNESS ..... 0.00 KN/M^2
LATERAL SOIL STIFFNESS ..... 0.00 KN/M^2
DEFLECTION UNDER REFERENCE LOAD ... 0.0000 CM

LONGITUDINAL COEF. OF FRICTION .... 0.000
LATERAL COEFFICIENT OF FRICTION ... 0.600
NUMBER OF INTEGRATION POINTS ..... 0
    
```

TIME INTEGRATION PARAMETERS

```

=====
TIME STEP LENGTH ..... 0.2000 SECONDS
MAXIMUM TIME OF INTEGRATION ..... 10860.000 SECONDS
SOLUTION SAMPLING TIME STEP ..... 0.400 SECONDS
    
```

SOLUTION SAMPLING STARTS AT TIME .. 60.000 SECONDS  
 DAMPING RATIO ..... 0.0000  
 NUMBER OF VARIABLE TIME STEPS ..... 0

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 11  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 0:31: 0 CASE 1

=====

INPUT DATA ECHO

WAVE PARAMETERS

=====

SEA STATE ROW INDEX ..... 1  
 WAVE HEIGHT (PEAK TO TROUGH) ..... 1.800 METERS  
 WAVE PERIOD ..... 6.300 SECONDS  
 WAVE DIRECTION OF TRAVEL ..... 0.000 DEGREES  
 WATER DEPTH FOR WAVE CALCULATIONS . 23.00 METERS  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0

WAVE SPECTRUM EQUATION

=====

SEA STATE ROW INDEX ..... 1  
 WAVE SPECTRUM EQUATION TYPE ..... 7 JONSWAP (CLASSIC)  
 NUMBER OF WAVES IN SPECTRUM ..... 20  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0  
 MINIMUM PERIOD IN SPECTRUM ..... 2.0933 SECONDS  
 MAXIMUM PERIOD IN SPECTRUM ..... 62.8000 SECONDS  
 START TIME FOR WAVE SPECTRUM ..... 0. SECONDS  
 DIRECTION OF WAVE TRAVEL ..... 0.000 DEGREES  
 1ST JONSWAP COEF. (ALPHA) ..... 0.012891  
 2ND JONSWAP COEF. (GAMMA) ..... 5.0000  
 PEAK WAVE PERIOD ..... 6.6150 SECONDS

VESSEL MOTION RAO TABLE

=====

SEA STATE NUMBER ..... 1  
 USE PHASE LAG FOR RAOs ..... NO  
 VESSEL MOTIONS SIGN CONVENTION .... 2 BENTLEY MOSES  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD

WAVE PERIOD (SECONDS)	----- SURGE AMPLITUDE (M/M )	----- / PHASE (DEG)	----- SWAY AMPLITUDE (M/M )	----- / PHASE (DEG)	----- HEAVE AMPLITUDE (M/M )	----- / PHASE (DEG)
2.0900	0.0030	171.00	0.0000	0.00	0.0030	65.00
2.1700	0.0040	-131.00	0.0000	0.00	0.0030	74.00
2.2400	0.0040	-55.00	0.0000	0.00	0.0020	73.00
2.3300	0.0040	37.00	0.0000	0.00	0.0050	57.00
2.4200	0.0050	135.00	0.0000	0.00	0.0070	63.00
2.5100	0.0070	-119.00	0.0000	0.00	0.0070	81.00
2.6200	0.0080	-16.00	0.0000	0.00	0.0050	57.00
2.7300	0.0070	127.00	0.0000	0.00	0.0100	57.00
2.8500	0.0140	-101.00	0.0000	0.00	0.0080	89.00
2.9900	0.0090	17.00	0.0000	0.00	0.0080	32.00
3.1400	0.0190	-146.00	0.0000	0.00	0.0140	77.00
3.3100	0.0170	-35.00	0.0000	0.00	0.0050	17.00

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 12  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 0:31: 0 CASE 1

=====

WAVE PERIOD	----- ROLL AMPLITUDE	----- / PHASE	----- PITCH AMPLITUDE	----- / PHASE	----- YAW AMPLITUDE	----- / PHASE
3.4900	0.0280	-158.00	0.0000	0.00	0.0190	71.00
3.7000	0.0200	-44.00	0.0000	0.00	0.0050	-17.00
3.9300	0.0490	-148.00	0.0000	0.00	0.0220	82.00
4.1900	0.0060	30.00	0.0000	0.00	0.0160	-10.00
4.4900	0.0730	-120.00	0.0000	0.00	0.0190	117.00
4.8300	0.0670	165.00	0.0000	0.00	0.0380	25.00
5.2400	0.0320	-67.00	0.0000	0.00	0.0140	-60.00
5.7100	0.1400	-135.00	0.0000	0.00	0.0730	69.00
6.2800	0.1610	168.00	0.0000	0.00	0.1630	23.00
6.9800	0.0610	115.00	0.0000	0.00	0.1010	-20.00
7.8500	0.1350	-101.00	0.0000	0.00	0.1420	159.00
8.9700	0.3680	-141.00	0.0000	0.00	0.4230	119.00
10.4700	0.5800	-176.00	0.0000	0.00	0.6670	88.00
12.5600	0.7420	155.00	0.0000	0.00	0.8370	62.00
15.7000	0.8470	131.00	0.0000	0.00	0.9370	40.00
20.9300	0.9050	113.00	0.0000	0.00	0.9840	23.00
31.4000	0.9320	100.00	0.0000	0.00	1.0000	10.00
62.8000	0.9420	93.00	0.0000	0.00	1.0030	3.00

=====

(SECONDS)	(DEG/M)	(DEG)	(DEG/M)	(DEG)	(DEG/M)	(DEG)
2.0900	0.0000	0.00	0.0120	57.00	0.0000	0.00
2.1700	0.0000	0.00	0.0150	53.00	0.0000	0.00
2.2400	0.0010	84.00	0.0150	58.00	0.0000	0.00
2.3300	0.0000	0.00	0.0230	75.00	0.0000	0.00
2.4200	0.0000	0.00	0.0180	70.00	0.0000	0.00
2.5100	0.0000	0.00	0.0270	50.00	0.0000	0.00
2.6200	0.0000	0.00	0.0360	69.00	0.0000	0.00
2.7300	0.0000	0.00	0.0240	78.00	0.0000	0.00
2.8500	0.0000	0.00	0.0410	44.00	0.0000	0.00
2.9900	0.0000	0.00	0.0450	82.00	0.0000	0.00
3.1400	0.0000	0.00	0.0310	27.00	0.0000	0.00
3.3100	0.0000	0.00	0.0660	73.00	0.0000	0.00
3.4900	0.0000	0.00	0.0250	13.00	0.0000	0.00
3.7000	0.0000	0.00	0.0830	75.00	0.0000	0.00
3.9300	0.0000	0.00	0.0500	-3.00	0.0000	0.00
4.1900	0.0000	0.00	0.0840	96.00	0.0000	0.00
4.4900	0.0000	0.00	0.1200	17.00	0.0000	0.00
4.8300	0.0000	0.00	0.0050	95.00	0.0000	0.00
5.2400	0.0000	0.00	0.2020	46.00	0.0000	0.00
5.7100	0.0000	0.00	0.2890	-9.00	0.0000	0.00
6.2800	0.0010	51.00	0.1090	61.00	0.0000	0.00
6.9800	0.0010	122.00	0.8730	74.00	0.0000	0.00

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 13

STATIC PIPE ANALYSIS 8 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/ 2/2020 TIME - 0:31: 0 CASE 1

=====

INPUT DATA ECHO

7.8500	0.0000	0.00	1.5880	48.00	0.0000	0.00
8.9700	0.0000	0.00	1.8500	20.00	0.0000	0.00
10.4700	0.0000	0.00	1.7060	-6.00	0.0000	0.00
12.5600	0.0000	0.00	1.3390	-31.00	0.0000	0.00
15.7000	0.0000	0.00	0.9100	-52.00	0.0000	0.00
20.9300	0.0000	0.00	0.5250	-69.00	0.0000	0.00
31.4000	0.0000	0.00	0.2350	-83.00	0.0000	0.00
62.8000	0.0000	0.00	0.0600	-99.00	0.0000	0.00

\*\*\*\*\* INFORMATIVE MESSAGE NO. - 94 \*\*\*\*\*

One or more of the phase angles in the RAO table have been adjusted to |  
minimize the difference in value between adjacent angles. If the phase |  
angles are arbitrarily restricted by the software used to calculate |  
the RAOs to a fixed range of values such as (0 to 2\*PI) or (-PI to |  
+PI), then phase angles that are actually close in value can differ by |  
as much as 2\*PI. These large differences can cause the phase angles |  
for RAOs that are between the values in the table (which must be |  
determined using interpolation) to be calculated incorrectly.

CONTROL SWITCHES

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MAX NUMBER STATIC ITERATIONS ..... 500

MAX DYNAMIC ITERATIONS PER STEP ... 500

BOUNDARY CONDITION LOGIC PARAMETER 5

TIME STEP STABILITY PARAMETER ..... 0

TYPE OF ANALYSIS ..... DYNAMIC

NUMBER OF PROBLEM DIMENSIONS ..... 3

DAVIT LIFT ANALYSIS ..... NO

STATIC SOLUTION CONVERGED IN ( 17 ) ITERATIONS

END OF INPUT DATA

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 0:31: 0 PAGE 14

PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING

USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES (MPA)		TOTAL PERCENT YIELD (PCT)	
										VERT	HORIZ		
1	LAYBARGE	64.20	4.42	0.00	0.000	1.471	0.00	0.00	0.00	0.29	0.00	0.29	0.08
3	LAYBARGE	59.72	4.30	0.00	0.000	1.590	4.48	-0.02	0.00	-26.68	0.00	26.71	7.42
5	LAYBARGE	48.23	4.00	0.00	0.000	1.461	15.98	-0.09	0.00	-36.95	0.00	37.04	10.29
7	TENSIONR	38.10	3.73	0.00	0.000	1.432	26.11	11.77	0.00	-13.49	0.00	25.26	7.02
9	LAYBARGE	33.43	3.61	0.00	0.000	1.535	30.78	11.75	0.00	-7.12	0.00	18.87	5.24
11	TENSIONR	26.65	3.43	0.00	0.000	1.482	37.57	23.62	0.00	-6.51	0.00	30.13	8.37
13	LAYBARGE	21.33	3.30	0.00	0.000	1.448	42.89	23.59	0.00	0.36	0.00	23.95	6.65
15	LAYBARGE	12.14	2.98	0.00	0.000	3.376	52.08	23.46	0.00	-227.47	0.00	250.94	69.71



17	LAYBARGE	-0.04	1.76	0.00	0.000	8.070	64.32	23.22	0.00	-216.46	0.00	239.68	66.58
20	STINGER	-8.10	0.35	0.00	0.000	11.521	72.51	22.97	0.00	-170.71	0.00	193.68	53.80
22	STINGER	-15.89	-1.45	0.00	0.000	14.427	80.51	22.68	-0.13	-156.58	0.00	179.32	49.81
24	STINGER	-23.60	-3.61	0.00	0.000	16.653	88.51	22.36	-0.31	-97.86	0.00	120.37	33.44
26	STINGER	-30.64	-5.84	0.00	0.000	18.611	95.90	21.99	-0.51	-136.61	0.00	158.86	44.13
28	STINGER	-36.57	-7.92	0.00	0.000	19.919	102.19	21.69	-0.69	-39.43	0.00	61.47	17.07
30	STINGER	-39.47	-8.98	0.00	0.000	20.028	105.27	21.52	-0.78	11.00	0.00	32.92	9.14
32	SAGBEND	-41.35	-9.66	0.00	0.000	19.908	107.27	21.42	-0.84	35.31	0.00	57.15	15.88
33	SAGBEND	-43.23	-10.34	0.00	0.000	19.681	109.27	21.31	-0.90	53.79	0.00	75.55	20.99
34	SAGBEND	-45.12	-11.01	0.00	0.000	19.372	111.27	21.20	-0.95	67.88	0.00	89.56	24.88
35	SAGBEND	-47.00	-11.67	0.00	0.000	19.000	113.27	21.10	-1.01	78.67	0.00	100.28	27.85
36	SAGBEND	-48.90	-12.31	0.00	0.000	18.581	115.27	20.99	-1.07	86.97	0.00	108.50	30.14
37	SAGBEND	-50.80	-12.94	0.00	0.000	18.125	117.27	20.89	-1.12	93.40	0.00	114.86	31.90
38	SAGBEND	-52.70	-13.55	0.00	0.000	17.639	119.27	20.80	-1.18	98.40	0.00	119.79	33.28
39	SAGBEND	-54.61	-14.15	0.00	0.000	17.132	121.27	20.70	-1.23	102.34	0.00	123.66	34.35
40	SAGBEND	-56.52	-14.73	0.00	0.000	16.607	123.27	20.61	-1.28	105.45	0.00	126.71	35.20
41	SAGBEND	-58.44	-15.29	0.00	0.000	16.067	125.27	20.52	-1.33	107.95	0.00	129.14	35.87
42	SAGBEND	-60.37	-15.84	0.00	0.000	15.517	127.27	20.44	-1.37	109.98	0.00	131.11	36.42
43	SAGBEND	-62.30	-16.36	0.00	0.000	14.957	129.27	20.35	-1.42	111.64	0.00	132.71	36.86
44	SAGBEND	-64.23	-16.87	0.00	0.000	14.389	131.27	20.27	-1.46	113.02	0.00	134.03	37.23
45	SAGBEND	-66.17	-17.36	0.00	0.000	13.815	133.27	20.20	-1.51	114.18	0.00	135.13	37.54
46	SAGBEND	-68.11	-17.83	0.00	0.000	13.236	135.27	20.12	-1.55	115.16	0.00	136.07	37.80
47	SAGBEND	-70.06	-18.27	0.00	0.000	12.651	137.27	20.05	-1.58	116.01	0.00	136.86	38.02
48	SAGBEND	-72.02	-18.70	0.00	0.000	12.063	139.27	19.98	-1.62	116.73	0.00	137.53	38.20
49	SAGBEND	-73.98	-19.11	0.00	0.000	11.472	141.27	19.92	-1.66	117.35	0.00	138.11	38.36
50	SAGBEND	-75.94	-19.50	0.00	0.000	10.878	143.27	19.86	-1.69	117.88	0.00	138.59	38.50
51	SAGBEND	-77.90	-19.86	0.00	0.000	10.281	145.27	19.80	-1.72	118.32	0.00	138.99	38.61
52	SAGBEND	-79.87	-20.21	0.00	0.000	9.682	147.27	19.75	-1.75	118.67	0.00	139.30	38.69
53	SAGBEND	-81.85	-20.54	0.00	0.000	9.082	149.27	19.70	-1.78	118.92	0.00	139.51	38.75
54	SAGBEND	-83.82	-20.84	0.00	0.000	8.481	151.27	19.65	-1.81	119.07	0.00	139.63	38.78
55	SAGBEND	-85.80	-21.13	0.00	0.000	7.879	153.27	19.60	-1.83	119.09	0.00	139.61	38.78
56	SAGBEND	-87.78	-21.39	0.00	0.000	7.278	155.27	19.56	-1.86	118.96	0.00	139.46	38.74
57	SAGBEND	-89.77	-21.63	0.00	0.000	6.677	157.27	19.52	-1.88	118.64	0.00	139.12	38.64
58	SAGBEND	-91.76	-21.86	0.00	0.000	6.079	159.27	19.49	-1.90	118.10	0.00	138.55	38.49
59	SAGBEND	-93.75	-22.06	0.00	0.000	5.484	161.27	19.46	-1.91	117.27	0.00	137.69	38.25

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX    DATE - 5/2/2020    TIME - 0:31:    0    PAGE 15

PROJECT - STATIC PIPE ANALYSIS 8 INCH    JOB NO. - LAYING

USER ID - IK    LICENSED BY - PT Timas Suplindo    CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERC YIELD (PCT)
=====													
60	SAGBEND	-95.74	-22.24	0.00	0.000	4.895	163.27	19.43	-1.93	116.06	0.00	136.46	37.91
61	SAGBEND	-97.73	-22.40	0.00	0.000	4.312	165.27	19.40	-1.94	114.38	0.00	134.76	37.43
62	SAGBEND	-99.73	-22.54	0.00	0.000	3.740	167.27	19.38	-1.95	112.07	0.00	132.45	36.79
63	SAGBEND	-101.72	-22.66	0.00	0.000	3.181	169.27	19.37	-1.97	108.97	0.00	129.33	35.92
64	SAGBEND	-103.72	-22.76	0.00	0.000	2.641	171.27	19.35	-1.97	104.83	0.00	125.17	34.77
65	SAGBEND	-105.72	-22.84	0.00	0.000	2.124	173.27	19.34	-1.98	99.32	0.00	119.66	33.24
66	SAGBEND	-107.72	-22.91	0.00	0.000	1.640	175.27	19.33	-1.99	92.05	0.00	112.38	31.22
67	SAGBEND	-109.72	-22.96	0.00	0.000	1.198	177.27	19.32	-1.99	82.46	0.00	102.79	28.55
68	SAGBEND	-111.72	-22.99	0.00	0.000	0.812	179.27	19.32	-1.99	69.84	0.00	90.17	25.05
69	SEABED	-113.72	-23.02	0.00	0.000	0.498	181.27	19.32	-2.00	53.86	0.00	74.20	20.61
70	SEABED	-115.72	-23.03	0.00	0.000	0.268	183.27	19.32	-2.00	37.62	0.00	57.97	16.10
71	SEABED	-117.72	-23.04	0.00	0.000	0.114	185.27	19.32	-2.00	23.81	0.00	44.17	12.27
72	SEABED	-119.72	-23.04	0.00	0.000	0.021	187.27	19.32	-2.00	13.37	0.00	33.73	9.37
73	SEABED	-121.72	-23.04	0.00	0.000	-0.027	189.27	19.32	-2.00	6.20	0.00	26.57	7.38
74	SEABED	-123.72	-23.04	0.00	0.000	-0.046	191.27	19.32	-2.00	1.75	0.00	22.14	6.15
75	SEABED	-125.72	-23.04	0.00	0.000	-0.048	193.27	19.32	-2.00	-0.68	0.00	21.07	5.85
76	SEABED	-127.72	-23.03	0.00	0.000	-0.041	195.27	19.32	-2.00	-1.75	0.00	22.14	6.15
77	SEABED	-129.72	-23.03	0.00	0.000	-0.031	197.27	19.32	-2.00	-1.99	0.00	22.38	6.22
78	SEABED	-131.72	-23.03	0.00	0.000	-0.022	199.27	19.32	-2.00	-1.79	0.00	22.18	6.16
79	SEABED	-133.72	-23.03	0.00	0.000	-0.014	201.27	19.32	-2.00	-1.41	0.00	21.80	6.06
80	SEABED	-135.72	-23.03	0.00	0.000	-0.008	203.27	19.32	-2.00	-1.01	0.00	21.40	5.94
81	SEABED	-137.72	-23.03	0.00	0.000	-0.003	205.27	19.32	-2.00	-0.65	0.00	21.04	5.84
82	SEABED	-139.72	-23.03	0.00	0.000	-0.001	207.27	19.32	-2.00	-0.37	0.00	20.77	5.77
83	SEABED	-141.72	-23.03	0.00	0.000	0.000	209.27	19.32	-2.00	-0.18	0.00	20.58	5.72
84	SEABED	-143.72	-23.03	0.00	0.000	0.001	211.27	19.32	-2.00	-0.06	0.00	20.45	5.68
85	SEABED	-145.72	-23.03	0.00	0.000	0.001	213.27	19.32	-2.00	0.01	0.00	20.40	5.67
86	SEABED	-147.72	-23.03	0.00	0.000	0.001	215.27	19.32	-2.00	0.04	0.00	20.43	5.68
87	SEABED	-149.72	-23.03	0.00	0.000	0.001	217.27	19.32	-2.00	0.05	0.00	20.44	5.68
88	SEABED	-151.72	-23.03	0.00	0.000	0.001	219.27	19.32	-2.00	0.05	0.00	20.44	5.68
89	SEABED	-153.72	-23.03	0.00	0.000	0.000	221.27	19.32	-2.00	0.04	0.00	20.43	5.68
90	SEABED	-155.72	-23.03	0.00	0.000	0.000	223.27	19.32	-2.00	0.03	0.00	20.42	5.67
91	SEABED	-157.72	-23.03	0.00	0.000	0.000	225.27	19.32	-2.00	0.02	0.00	20.41	5.67
92	SEABED	-159.72	-23.03	0.00	0.000	0.000	227.27	19.32	-2.00	0.01	0.00	20.40	5.67
93	SEABED	-161.72	-23.03	0.00	0.000	0.000	229.27	19.32	-2.00	0.01	0.00	20.40	5.67
94	SEABED	-163.72	-23.03	0.00	0.000	0.000	231.27	19.32	-2.00	0.00	0.00	20.40	5.67
95	SEABED	-165.72	-23.03	0.00	0.000	0.000	233.27	19.32	-2.00	0.00	0.00	20.39	5.66
96	SEABED	-167.72	-23.03	0.00	0.000	0.000	235.27	19.32	-2.00	0.00	0.00	20.39	5.67
97	SEABED	-169.72	-23.03	0.00	0.000	0.000	237.27	19.32	-2.00	0.00	0.00	20.39	5.67
98	SEABED	-171.72	-23.03	0.00	0.000	0.000	239.27	19.32	-2.00	0.00	0.00	20.39	5.67

99 SEABED -173.72 -23.03 0.00 0.000 0.000 241.27 19.32 -2.00 0.00 0.00 20.39 5.66

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 0:31: 0 PAGE 16
   
PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING
   
USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1
   
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STATIC PIPE COORDINATES, FORCES AND STRESSES												
=====												
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACTION HORIZ (KN )	SUPT VERT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)
=====												
1	LAYBARGE	64.20	4.42	0.00	0.58	0.00	0.00	0.00	0.00	0.12	0.00	0.12
3	LAYBARGE	59.72	4.30	0.00	15.88	0.00	0.00	0.00	-0.20	-10.72	0.00	10.72
5	LAYBARGE	48.23	4.00	0.00	19.27	0.00	0.00	0.00	-0.71	-14.85	0.00	14.85
7	TENSIONR	38.10	3.73	0.00	12.14	0.00	0.00	0.00	96.94	-5.42	0.00	5.42
9	LAYBARGE	33.43	3.61	0.00	8.50	0.00	0.00	0.00	96.74	-2.86	0.00	2.86
11	TENSIONR	26.65	3.43	0.00	11.04	0.00	0.00	0.00	194.51	-2.61	0.00	2.61
13	LAYBARGE	21.33	3.30	0.00	1.74	0.00	0.00	0.00	194.29	0.14	0.00	0.14
15	LAYBARGE	12.14	2.98	0.00	41.63	0.00	0.00	0.00	193.23	-91.40	0.00	91.40
17	LAYBARGE	-0.04	1.76	0.00	33.00	0.00	0.00	0.00	191.25	-86.98	0.00	86.98
20	STINGER	-8.10	0.35	0.00	18.95	0.00	0.00	0.00	189.14	-68.59	0.00	68.59
22	STINGER	-15.89	-1.45	0.00	18.87	0.00	0.00	0.00	187.29	-62.91	0.00	62.91
24	STINGER	-23.60	-3.61	0.00	7.24	0.00	0.00	0.00	185.47	-39.32	0.00	39.32
26	STINGER	-30.64	-5.84	0.00	21.03	0.00	0.00	0.00	183.33	-54.89	0.00	54.89
28	STINGER	-36.57	-7.92	0.00	6.26	0.00	0.00	0.00	181.60	-15.84	0.00	15.84
30	STINGER	-39.47	-8.98	0.00	0.00	0.00	0.41	0.00	180.66	4.42	0.00	4.42
32	SAGBEND	-41.35	-9.66	0.00	0.00	0.00	0.00	0.00	180.02	14.19	0.00	14.19
33	SAGBEND	-43.23	-10.34	0.00	0.00	0.00	0.00	0.00	179.39	21.61	0.00	21.61
34	SAGBEND	-45.12	-11.01	0.00	0.00	0.00	0.00	0.00	178.76	27.28	0.00	27.28
35	SAGBEND	-47.00	-11.67	0.00	0.00	0.00	0.00	0.00	178.15	31.61	0.00	31.61
36	SAGBEND	-48.90	-12.31	0.00	0.00	0.00	0.00	0.00	177.55	34.95	0.00	34.95
37	SAGBEND	-50.80	-12.94	0.00	0.00	0.00	0.00	0.00	176.96	37.53	0.00	37.53
38	SAGBEND	-52.70	-13.55	0.00	0.00	0.00	0.00	0.00	176.39	39.54	0.00	39.54
39	SAGBEND	-54.61	-14.15	0.00	0.00	0.00	0.00	0.00	175.84	41.12	0.00	41.12
40	SAGBEND	-56.52	-14.73	0.00	0.00	0.00	0.00	0.00	175.31	42.37	0.00	42.37
41	SAGBEND	-58.44	-15.29	0.00	0.00	0.00	0.00	0.00	174.79	43.38	0.00	43.38
42	SAGBEND	-60.37	-15.84	0.00	0.00	0.00	0.00	0.00	174.29	44.19	0.00	44.19
43	SAGBEND	-62.30	-16.36	0.00	0.00	0.00	0.00	0.00	173.80	44.86	0.00	44.86
44	SAGBEND	-64.23	-16.87	0.00	0.00	0.00	0.00	0.00	173.34	45.41	0.00	45.41
45	SAGBEND	-66.17	-17.36	0.00	0.00	0.00	0.00	0.00	172.89	45.88	0.00	45.88
46	SAGBEND	-68.11	-17.83	0.00	0.00	0.00	0.00	0.00	172.46	46.27	0.00	46.27
47	SAGBEND	-70.06	-18.27	0.00	0.00	0.00	0.00	0.00	172.05	46.61	0.00	46.61
48	SAGBEND	-72.02	-18.70	0.00	0.00	0.00	0.00	0.00	171.66	46.90	0.00	46.90
49	SAGBEND	-73.98	-19.11	0.00	0.00	0.00	0.00	0.00	171.29	47.15	0.00	47.15
50	SAGBEND	-75.94	-19.50	0.00	0.00	0.00	0.00	0.00	170.93	47.36	0.00	47.36
51	SAGBEND	-77.90	-19.86	0.00	0.00	0.00	0.00	0.00	170.59	47.54	0.00	47.54
52	SAGBEND	-79.87	-20.21	0.00	0.00	0.00	0.00	0.00	170.28	47.68	0.00	47.68
53	SAGBEND	-81.85	-20.54	0.00	0.00	0.00	0.00	0.00	169.98	47.78	0.00	47.78
54	SAGBEND	-83.82	-20.84	0.00	0.00	0.00	0.00	0.00	169.70	47.84	0.00	47.84
55	SAGBEND	-85.80	-21.13	0.00	0.00	0.00	0.00	0.00	169.44	47.85	0.00	47.85
56	SAGBEND	-87.78	-21.39	0.00	0.00	0.00	0.00	0.00	169.20	47.80	0.00	47.80
57	SAGBEND	-89.77	-21.63	0.00	0.00	0.00	0.00	0.00	168.98	47.67	0.00	47.67
58	SAGBEND	-91.76	-21.86	0.00	0.00	0.00	0.00	0.00	168.78	47.45	0.00	47.45
59	SAGBEND	-93.75	-22.06	0.00	0.00	0.00	0.00	0.00	168.60	47.12	0.00	47.12

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 0:31: 0 PAGE 17
   
PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING
   
USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1
   
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STATIC PIPE COORDINATES, FORCES AND STRESSES												
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NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACTION HORIZ (KN )	SUPT VERT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)
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60	SAGBEND	-95.74	-22.24	0.00	0.00	0.00	0.00	0.00	168.43	46.63	0.00	46.63
61	SAGBEND	-97.73	-22.40	0.00	0.00	0.00	0.00	0.00	168.29	45.96	0.00	45.96
62	SAGBEND	-99.73	-22.54	0.00	0.00	0.00	0.00	0.00	168.17	45.03	0.00	45.03
63	SAGBEND	-101.72	-22.66	0.00	0.00	0.00	0.00	0.00	168.06	43.79	0.00	43.79
64	SAGBEND	-103.72	-22.76	0.00	0.00	0.00	0.00	0.00	167.98	42.12	0.00	42.12
65	SAGBEND	-105.72	-22.84	0.00	0.00	0.00	0.00	0.00	167.91	39.91	0.00	39.91
66	SAGBEND	-107.72	-22.91	0.00	0.00	0.00	0.00	0.00	167.86	36.99	0.00	36.99
67	SAGBEND	-109.72	-22.96	0.00	0.00	0.00	0.00	0.00	167.83	33.13	0.00	33.13
68	SAGBEND	-111.72	-22.99	0.00	0.10	0.00	0.00	0.00	167.82	28.06	0.00	28.06
69	SEABED	-113.72	-23.02	0.00	0.98	0.00	0.00	0.00	167.82	21.64	0.00	21.64
70	SEABED	-115.72	-23.03	0.00	1.76	0.00	0.00	0.00	167.83	15.12	0.00	15.12
71	SEABED	-117.72	-23.04	0.00	2.15	0.00	0.00	0.00	167.84	9.57	0.00	9.57
72	SEABED	-119.72	-23.04	0.00	2.28	0.00	0.00	0.00	167.84	5.37	0.00	5.37
73	SEABED	-121.72	-23.04	0.00	2.28	0.00	0.00	0.00	167.84	2.49	0.00	2.49
74	SEABED	-123.72	-23.04	0.00	2.20	0.00	0.00	0.00	167.84	0.70	0.00	0.70
75	SEABED	-125.72	-23.04	0.00	2.11	0.00	0.00	0.00	167.84	-0.27	0.00	0.27

76	SEABED	-127.72	-23.03	0.00	2.02	0.00	0.00	0.00	167.84	-0.70	0.00	0.70
77	SEABED	-129.72	-23.03	0.00	1.94	0.00	0.00	0.00	167.84	-0.80	0.00	0.80
78	SEABED	-131.72	-23.03	0.00	1.89	0.00	0.00	0.00	167.84	-0.72	0.00	0.72
79	SEABED	-133.72	-23.03	0.00	1.85	0.00	0.00	0.00	167.84	-0.57	0.00	0.57
80	SEABED	-135.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	-0.40	0.00	0.40
81	SEABED	-137.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	-0.26	0.00	0.26
82	SEABED	-139.72	-23.03	0.00	1.81	0.00	0.00	0.00	167.84	-0.15	0.00	0.15
83	SEABED	-141.72	-23.03	0.00	1.81	0.00	0.00	0.00	167.84	-0.07	0.00	0.07
84	SEABED	-143.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	-0.02	0.00	0.02
85	SEABED	-145.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.00	0.00	0.00
86	SEABED	-147.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.02	0.00	0.02
87	SEABED	-149.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.02	0.00	0.02
88	SEABED	-151.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.02	0.00	0.02
89	SEABED	-153.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.01	0.00	0.01
90	SEABED	-155.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.01	0.00	0.01
91	SEABED	-157.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.01	0.00	0.01
92	SEABED	-159.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
93	SEABED	-161.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
94	SEABED	-163.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
95	SEABED	-165.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
96	SEABED	-167.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
97	SEABED	-169.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
98	SEABED	-171.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
99	SEABED	-173.72	-23.03	0.00	0.00	0.00	0.00	0.00	167.84	0.00	0.00	0.00

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 18

STATIC PIPE ANALYSIS 8 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/ 2/2020 TIME - 0:31:0 CASE 1

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STATIC SOLUTION SUMMARY

PIPE PROPERTIES ( 1)

PIPE SECTION LENGTH ..	0.00 M	ELASTIC MODULUS .....	207000. MPA
OUTSIDE DIAMETER .....	21.910 CM	CROSS SECTIONAL AREA ..	82.69 CM²
WALL THICKNESS .....	1.270 CM	MOMENT OF INERTIA .....	4402.0 CM⁴
WEIGHT/LENGTH IN AIR ..	1649.63 N/M	YIELD STRESS .....	360.00 MPA
SUBMERGED WGHT/LENG ..	912.94 N/M	STRESS INTENS FACTOR ..	1.000
SPECIFIC GRAVITY .....	2.239	STEEL DENSITY .....	77008.0 N/M3
WRAP COAT THICKNESS ..	0.320 CM	WRAP COAT DENSITY .....	9025.2 N/M3
CONCRETE THICKNESS ...	4.000 CM	CONCRETE DENSITY .....	29857.0 N/M3

BARGE DATA

TOTAL PIPE TENSION ...	196.13 KN	RADIUS OF CURVATURE ..	0.00 M
NUMBER OF TENSIONERS ..	2	BARGE TRIM ANGLE .....	0.500 DEG
NO. OF PIPE SUPPORTS ..	7	PIPE ANGLE AT STERN ..	8.070 DEG
BARGE HEADING .....	0.000 DEG	OFFSET FROM R.O.W. ...	0.00 M

STINGER DATA

NO. OF PIPE SUPPORTS ..	6	PIPE DEPTH AT STERN ..	-8.98 M
NO. STINGER SECTIONS ..	6	PIPE ANGLE AT STERN ..	20.028 DEG
RADIUS OF CURVATURE ...	0.00 M	STINGER STERN DEPTH ..	-9.34 M
STINGER LENGTH .....	41.37 M		

SAGBEND DATA

WATER DEPTH .....	23.00 M	TENSION AT TOUCHDOWN ..	167.82 KN
TOUCHDOWN X-COORD. ...	-112.10 M	BOTTOM SLOPE ANGLE ...	0.000 DEG
PROJECTED SPAN LENGTH	72.63 M	PIPE LENGTH GAIN .....	3.35 M

===== SOLUTION SUMMARY =====

NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACT HORIZ (KN)	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	0.6	0.0	0.1	0.3	0.
3	LAYBARGE	59.7	4.3	0.0	15.9	0.0	10.7	26.7	7.
5	LAYBARGE	48.2	4.0	0.0	19.3	0.0	14.8	37.0	10.
7	TENSIONR	38.1	3.7	0.0	12.1	0.0	5.4	25.3	7.
9	LAYBARGE	33.4	3.6	0.0	8.5	0.0	2.9	18.9	5.
11	TENSIONR	26.7	3.4	0.0	11.0	0.0	2.6	30.1	8.
13	LAYBARGE	21.3	3.3	0.0	1.7	0.0	0.1	23.9	7.
15	LAYBARGE	12.1	3.0	0.0	41.6	0.0	91.4	250.9	70.
17	LAYBARGE	0.0	1.8	0.0	33.0	0.0	87.0	239.7	67.
20	STINGER	-8.1	0.4	0.0	18.9	0.0	68.6	193.7	54.
22	STINGER	-15.9	-1.4	0.0	18.9	0.0	62.9	179.3	50.
24	STINGER	-23.6	-3.6	0.0	7.2	0.0	39.3	120.4	33.

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 19

STATIC PIPE ANALYSIS 8 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/ 2/2020 TIME - 0:31:0 CASE 1

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STATIC SOLUTION SUMMARY

26	STINGER	-30.6	-5.8	0.0	21.0	0.0	54.9	158.9	44.
28	STINGER	-36.6	-7.9	0.0	6.3	0.0	15.8	61.5	17.
30	STINGER	-39.5	-9.0	0.0	0.0	0.0	4.4	32.9	9.
54	SAGBEND	-83.8	-20.8	0.0	0.0	0.0	47.8	139.6	39.
69	SEABED	-113.7	-23.0	0.0	1.0	0.0	21.6	74.2	21.

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/2/2020 TIME - 0:31: 0 PAGE 20  
 PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING  
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

MAXIMUM DYNAMIC PIPE FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
1	LAYBARGE	64.19	4.41	0.00	0.000	1.470	0.00	0.00	0.00	0.33	0.00	0.33	0.09
3	LAYBARGE	59.72	4.30	0.00	0.000	1.590	4.48	-0.11	0.00	-28.95	0.00	28.96	8.04
5	LAYBARGE	48.22	4.00	0.00	0.000	1.460	15.98	-0.39	0.00	-38.23	0.00	38.36	10.66
7	TENSIONR	38.10	3.75	0.00	0.000	1.432	26.11	20.28	0.00	-14.08	0.00	33.83	9.40
9	LAYBARGE	33.43	3.62	0.00	0.000	1.534	30.78	20.31	0.00	-7.76	0.00	27.52	7.64
11	TENSIONR	26.65	3.44	0.00	0.000	1.482	37.57	32.67	0.00	-7.22	0.00	39.20	10.89
13	LAYBARGE	21.33	3.29	0.00	0.000	1.450	42.89	32.74	0.00	5.00	0.00	35.68	9.91
15	LAYBARGE	12.14	2.97	0.00	0.000	3.389	52.08	32.77	0.00	-239.71	-0.01	272.25	75.63
17	LAYBARGE	-0.04	1.74	0.00	0.000	8.052	64.32	32.73	0.00	-228.13	-0.01	260.39	72.33
20	STINGER	-8.11	0.32	0.00	0.000	11.527	72.51	32.59	-0.10	-180.51	-0.01	211.22	58.67
22	STINGER	-15.91	-1.48	0.00	0.000	14.408	80.51	32.37	-0.27	-172.07	-0.01	200.22	55.62
24	STINGER	-23.60	-3.64	0.00	0.000	16.730	88.51	32.14	-0.48	-138.47	0.00	169.33	47.03
26	STINGER	-30.64	-5.87	0.00	0.000	18.300	95.90	31.90	-0.69	-155.72	0.01	185.80	51.61
28	STINGER	-36.60	-7.88	0.00	0.000	18.743	102.19	31.67	-0.87	-182.53	0.01	204.55	56.82
30	STINGER	-39.48	-8.86	0.00	0.000	18.745	105.27	31.56	-0.96	90.41	0.05	120.48	33.47
32	SAGBEND	-41.32	-9.48	0.00	0.000	18.737	107.27	31.51	-1.01	98.05	0.04	127.67	35.46
33	SAGBEND	-43.21	-10.12	0.00	0.000	18.652	109.27	31.44	-1.06	110.36	0.03	139.27	38.69
34	SAGBEND	-45.11	-10.72	0.00	0.000	18.426	111.27	31.37	-1.12	117.97	0.02	146.80	40.78
35	SAGBEND	-47.01	-11.33	0.00	0.000	18.093	113.27	31.31	-1.17	126.94	0.01	155.19	43.11
36	SAGBEND	-48.91	-11.93	0.00	0.000	17.723	115.27	31.25	-1.23	136.85	-0.01	165.00	45.83
37	SAGBEND	-50.81	-12.52	0.00	0.000	17.341	117.27	31.19	-1.28	143.04	0.01	171.09	47.53
38	SAGBEND	-52.72	-13.09	0.00	0.000	16.949	119.27	31.13	-1.33	146.21	0.01	174.17	48.38
39	SAGBEND	-54.64	-13.64	0.00	0.000	16.516	121.27	31.08	-1.38	147.14	0.02	175.02	48.62
40	SAGBEND	-56.56	-14.18	0.00	0.000	16.042	123.27	31.02	-1.42	151.00	0.02	175.30	48.69
41	SAGBEND	-58.48	-14.71	0.00	0.000	15.555	125.27	30.97	-1.47	153.42	0.02	177.64	49.35
42	SAGBEND	-60.41	-15.21	0.00	0.000	15.081	127.27	30.92	-1.51	154.09	-0.02	178.25	49.51
43	SAGBEND	-62.34	-15.71	0.00	0.000	14.626	129.27	30.87	-1.55	153.40	-0.02	178.67	49.63
44	SAGBEND	-64.28	-16.18	0.00	0.000	14.164	131.27	30.83	-1.59	155.05	-0.02	180.25	50.07
45	SAGBEND	-66.22	-16.63	0.00	0.000	13.636	133.27	30.78	-1.63	155.47	-0.02	180.61	50.17
46	SAGBEND	-68.17	-17.07	0.00	0.000	13.102	135.27	30.74	-1.66	154.77	-0.02	179.85	49.96
47	SAGBEND	-70.12	-17.49	0.00	0.000	12.574	137.27	30.70	-1.69	153.12	-0.02	178.14	49.48
48	SAGBEND	-72.08	-17.90	0.00	0.000	12.041	139.27	30.66	-1.72	153.19	-0.02	175.63	48.78
49	SAGBEND	-74.04	-18.29	0.00	0.000	11.446	141.27	30.63	-1.75	153.11	-0.02	174.90	48.58
50	SAGBEND	-76.01	-18.68	0.00	0.000	10.886	143.27	30.59	-1.78	154.79	-0.02	174.65	48.51
51	SAGBEND	-77.97	-19.04	0.00	0.000	10.310	145.27	30.56	-1.81	156.01	-0.02	175.83	48.84
52	SAGBEND	-79.94	-19.39	0.00	0.000	9.801	147.27	30.53	-1.83	156.72	-0.02	176.49	49.02
53	SAGBEND	-81.91	-19.71	0.00	0.000	9.292	149.27	30.50	-1.86	156.83	-0.02	176.55	49.04
54	SAGBEND	-83.89	-20.02	0.00	0.000	8.779	151.27	30.48	-1.88	156.24	0.02	175.92	48.87
55	SAGBEND	-85.87	-20.31	0.00	0.000	8.260	153.27	30.45	-1.90	154.84	0.02	174.49	48.47
56	SAGBEND	-87.85	-20.58	0.00	0.000	7.732	155.27	30.43	-1.91	152.57	0.02	172.18	47.83
57	SAGBEND	-89.83	-20.84	0.00	0.000	7.250	157.27	30.41	-1.93	149.35	0.02	168.94	46.93
58	SAGBEND	-91.81	-21.08	0.00	0.000	6.761	159.27	30.39	-1.94	146.57	0.02	166.30	46.20
59	SAGBEND	-93.80	-21.31	0.00	0.000	6.275	161.27	30.38	-1.95	145.28	0.02	165.00	45.83

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/2/2020 TIME - 0:31: 0 PAGE 21  
 PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING  
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

MAXIMUM DYNAMIC PIPE FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
60	SAGBEND	-95.78	-21.52	0.00	0.000	5.795	163.27	30.37	-1.97	143.01	0.02	162.70	45.20
61	SAGBEND	-97.77	-21.71	0.00	0.000	5.320	165.27	30.35	-1.97	139.95	0.01	159.80	44.39
62	SAGBEND	-99.76	-21.88	0.00	0.000	4.830	167.27	30.35	-1.98	137.44	0.01	157.26	43.68
63	SAGBEND	-101.75	-22.03	0.00	0.000	4.355	169.27	30.34	-1.99	133.89	0.01	153.70	42.69
64	SAGBEND	-103.74	-22.17	0.00	0.000	3.908	171.27	30.34	-1.99	129.16	0.01	148.95	41.38
65	SAGBEND	-105.74	-22.29	0.00	0.000	3.485	173.27	30.33	-1.99	124.72	0.02	144.86	40.24
66	SAGBEND	-107.73	-22.40	0.00	0.000	3.091	175.27	30.33	-2.00	121.36	0.02	141.31	39.25
67	SAGBEND	-109.73	-22.50	0.00	0.000	2.736	177.27	30.34	-2.00	118.73	0.02	138.66	38.52
68	SAGBEND	-111.72	-22.58	0.00	0.000	2.411	179.27	30.34	-2.00	114.72	0.03	134.83	37.45
69	SAGBEND	-113.72	-22.66	0.00	0.000	2.115	181.27	30.35	-2.00	110.18	0.04	130.41	36.23

70	SAGBEND	-115.72	-22.73	0.00	0.000	1.878	183.27	30.36	-2.00	106.05	0.04	126.52	35.15
71	SAGBEND	-117.72	-22.80	0.00	0.000	1.654	185.27	30.37	-2.00	102.52	0.04	123.56	34.32
72	SAGBEND	-119.72	-22.85	0.00	0.000	1.430	187.27	30.38	-2.00	98.98	-0.04	121.39	33.72
73	SAGBEND	-121.72	-22.90	0.00	0.000	1.212	189.27	30.39	-2.00	95.64	-0.04	118.05	32.79
74	SAGBEND	-123.71	-22.94	0.00	0.000	0.996	191.27	30.41	-2.00	90.35	-0.03	112.77	31.33
75	SAGBEND	-125.71	-22.97	0.00	0.000	0.787	193.27	30.42	-2.00	82.66	-0.03	105.09	29.19
76	SAGBEND	-127.71	-22.99	0.00	0.000	0.589	195.27	30.44	-2.00	75.30	-0.03	96.00	26.67
77	SEABED	-129.71	-23.01	0.00	0.000	0.414	197.27	30.46	-2.00	66.78	-0.02	87.48	24.30
78	SEABED	-131.71	-23.02	0.00	0.000	0.269	199.27	30.48	-2.00	54.57	-0.02	75.26	20.91
79	SEABED	-133.71	-23.03	0.00	0.000	0.153	201.27	30.50	-2.00	40.24	-0.01	61.46	17.07
80	SEABED	-135.71	-23.04	0.00	0.000	0.069	203.27	30.51	-2.00	27.38	-0.01	50.55	14.04
81	SEABED	-137.71	-23.03	0.00	0.000	0.015	205.27	30.53	-2.00	17.16	0.00	41.99	11.66
82	SEABED	-139.71	-23.03	0.00	0.000	-0.017	207.27	30.55	-2.00	9.56	0.00	35.89	9.97
83	SEABED	-141.71	-23.03	0.00	0.000	-0.022	209.27	30.56	-2.00	4.41	0.00	32.58	9.05
84	SEABED	-143.71	-23.03	0.00	0.000	-0.020	211.27	30.58	-2.00	-2.07	0.00	32.62	9.06
85	SEABED	-145.71	-23.03	0.00	0.000	-0.019	213.27	30.60	-2.00	-1.97	0.00	32.50	9.03
86	SEABED	-147.71	-23.03	0.00	0.000	-0.015	215.27	30.61	-2.00	-1.80	0.00	32.32	8.98
87	SEABED	-149.71	-23.03	0.00	0.000	-0.011	217.27	30.63	-2.00	-1.64	0.00	32.15	8.93
88	SEABED	-151.71	-23.03	0.00	0.000	-0.007	219.27	30.64	-2.00	-1.40	0.00	32.00	8.89
89	SEABED	-153.71	-23.03	0.00	0.000	-0.004	221.27	30.66	-2.00	-1.07	0.00	31.89	8.86
90	SEABED	-155.71	-23.03	0.00	0.000	-0.002	223.27	30.68	-2.00	-0.75	0.00	31.81	8.84
91	SEABED	-157.71	-23.03	0.00	0.000	-0.001	225.27	30.69	-2.00	-0.49	0.00	31.77	8.82
92	SEABED	-159.71	-23.03	0.00	0.000	0.000	227.27	30.71	-2.00	-0.29	0.00	31.75	8.82
93	SEABED	-161.71	-23.03	0.00	0.000	0.000	229.27	30.72	-2.00	-0.16	0.00	31.79	8.83
94	SEABED	-163.71	-23.03	0.00	0.000	0.000	231.27	30.73	-2.00	0.09	0.00	31.81	8.84
95	SEABED	-165.71	-23.03	0.00	0.000	0.000	233.27	30.75	-2.00	0.08	0.00	31.83	8.84
96	SEABED	-167.71	-23.03	0.00	0.000	0.000	235.27	30.76	-2.00	0.05	0.00	31.83	8.84
97	SEABED	-169.71	-23.03	0.00	0.000	0.000	237.27	30.78	-2.00	0.03	0.00	31.84	8.84
98	SEABED	-171.71	-23.03	0.00	0.000	0.000	239.27	30.79	-2.00	0.02	0.00	31.84	8.85
99	SEABED	-173.71	-23.03	0.00	0.000	0.000	241.27	30.80	-2.00	0.00	0.00	31.85	8.85

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX    DATE - 5/2/2020    TIME - 0:31:0    PAGE 22  
PROJECT - STATIC PIPE ANALYSIS 8 INCH    JOB NO. - LAYING  
USER ID - IK    LICENSED BY - PT Timas Suplindo    CASE 1  
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MAXIMUM DYNAMIC PIPE FORCES AND STRESSES

NODE NO.	PIPE SECTION	COORD			SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS		
		X (M)	Y (M)	Z (M)	VERT (KN)	HORIZ (KN)	VERT (M)	HORIZ (M)	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)		
1	LAYBARGE	64.19	4.41	0.00	0.65	0.00	0.00	0.00	0.00	0.13	0.00	0.13	
3	LAYBARGE	59.72	4.30	0.00	16.89	0.00	0.00	0.00	-0.91	-11.63	0.00	11.63	
5	LAYBARGE	48.22	4.00	0.00	19.94	0.00	0.00	0.00	-3.22	-15.36	0.00	15.36	
7	TENSIONR	38.10	3.75	0.00	12.56	0.00	0.00	0.00	167.02	-5.66	0.00	5.66	
9	LAYBARGE	33.43	3.62	0.00	8.82	0.00	0.00	0.00	167.22	-3.12	0.00	3.12	
11	TENSIONR	26.65	3.44	0.00	11.52	0.00	0.00	0.00	269.04	-2.90	0.00	2.90	
13	LAYBARGE	21.33	3.29	0.00	3.08	0.00	0.00	0.00	269.64	2.01	0.00	2.01	
15	LAYBARGE	12.14	2.97	0.00	48.22	0.00	0.00	0.00	269.88	-96.32	0.00	96.32	
17	LAYBARGE	-0.04	1.74	0.00	40.02	0.00	0.00	0.00	269.55	-91.67	0.00	91.67	
20	STINGER	-8.11	0.32	0.00	26.17	0.00	0.00	0.00	268.48	-72.53	0.00	72.53	
22	STINGER	-15.91	-1.48	0.00	29.43	0.00	0.00	0.00	267.32	-69.14	0.00	69.14	
24	STINGER	-23.60	-3.64	0.00	26.79	0.00	0.00	0.00	266.31	-55.64	0.00	55.64	
26	STINGER	-30.64	-5.87	0.00	36.76	0.00	0.15	0.00	265.19	-62.57	0.00	62.57	
28	STINGER	-36.60	-7.88	0.00	30.39	-0.01	0.50	0.00	264.05	-73.34	0.00	73.34	
30	STINGER	-39.48	-8.86	0.00	0.00	0.01	1.14	0.00	263.51	36.33	0.02	36.33	
32	SAGBEND	-41.32	-9.48	0.00	0.00	0.00	0.00	0.00	263.24	39.40	0.02	39.40	
33	SAGBEND	-43.21	-10.12	0.00	0.00	0.00	0.00	0.00	262.91	44.34	0.01	44.34	
34	SAGBEND	-45.11	-10.72	0.00	0.00	0.00	0.00	0.00	262.59	47.40	0.01	47.40	
35	SAGBEND	-47.01	-11.33	0.00	0.00	0.00	0.00	0.00	262.28	51.01	0.01	51.01	
36	SAGBEND	-48.91	-11.93	0.00	0.00	0.00	0.00	0.00	261.98	54.99	0.00	54.99	
37	SAGBEND	-50.81	-12.52	0.00	0.00	0.00	0.00	0.00	261.70	57.47	0.00	57.47	
38	SAGBEND	-52.72	-13.09	0.00	0.00	0.00	0.00	0.00	261.42	58.75	0.01	58.75	
39	SAGBEND	-54.64	-13.64	0.00	0.00	0.00	0.00	0.00	261.16	59.12	0.01	59.12	
40	SAGBEND	-56.56	-14.18	0.00	0.00	0.00	0.00	0.00	260.91	60.67	0.01	60.67	
41	SAGBEND	-58.48	-14.71	0.00	0.00	0.00	0.00	0.00	260.67	61.65	0.01	61.65	
42	SAGBEND	-60.41	-15.21	0.00	0.00	0.00	0.00	0.00	260.44	61.92	-0.01	61.92	
43	SAGBEND	-62.34	-15.71	0.00	0.00	0.00	0.00	0.00	260.22	61.64	-0.01	61.64	
44	SAGBEND	-64.28	-16.18	0.00	0.00	0.00	0.00	0.00	260.01	62.30	-0.01	62.30	
45	SAGBEND	-66.22	-16.63	0.00	0.00	0.00	0.00	0.00	259.81	62.47	-0.01	62.47	
46	SAGBEND	-68.17	-17.07	0.00	0.00	0.00	0.00	0.00	259.62	62.19	-0.01	62.19	
47	SAGBEND	-70.12	-17.49	0.00	0.00	0.00	0.00	0.00	259.44	61.52	-0.01	61.52	
48	SAGBEND	-72.08	-17.90	0.00	0.00	0.00	0.00	0.00	259.28	61.55	-0.01	61.55	
49	SAGBEND	-74.04	-18.29	0.00	0.00	0.00	0.00	0.00	259.12	61.52	-0.01	61.52	
50	SAGBEND	-76.01	-18.68	0.00	0.00	0.00	0.00	0.00	258.98	62.19	-0.01	62.19	
51	SAGBEND	-77.97	-19.04	0.00	0.00	0.00	0.00	0.00	258.85	62.69	-0.01	62.69	
52	SAGBEND	-79.94	-19.39	0.00	0.00	0.00	0.00	0.00	258.72	62.97	-0.01	62.97	
53	SAGBEND	-81.91	-19.71	0.00	0.00	0.00	0.00	0.00	258.61	63.02	-0.01	63.02	
54	SAGBEND	-83.89	-20.02	0.00	0.00	0.00	0.00	0.00	258.51	62.78	0.01	62.78	
55	SAGBEND	-85.87	-20.31	0.00	0.00	0.00	0.00	0.00	258.43	62.22	0.01	62.22	
56	SAGBEND	-87.85	-20.58	0.00	0.00	0.00	0.00	0.00	258.35	61.30	0.01	61.30	
57	SAGBEND	-89.83	-20.84	0.00	0.00	0.00	0.00	0.00	258.29	60.01	0.01	60.01	

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX    DATE - 5/2/2020    TIME - 0:31:0    PAGE 23

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MAXIMUM DYNAMIC PIPE FORCES AND STRESSES												
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NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACTION HORIZ (KN )	SUPT VERT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	BENDING MOMENTS		
										VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)
58	SAGBEND	-91.81	-21.08	0.00	0.00	0.00	0.00	0.00	258.24	58.89	0.01	58.89
59	SAGBEND	-93.80	-21.31	0.00	0.00	0.00	0.00	0.00	258.21	58.38	0.01	58.38
60	SAGBEND	-95.78	-21.52	0.00	0.00	0.00	0.00	0.00	258.19	57.46	0.01	57.46
61	SAGBEND	-97.77	-21.71	0.00	0.00	0.00	0.00	0.00	258.18	56.23	0.01	56.23
62	SAGBEND	-99.76	-21.88	0.00	0.00	0.00	0.00	0.00	258.18	55.22	0.01	55.22
63	SAGBEND	-101.75	-22.03	0.00	0.00	0.00	0.00	0.00	258.19	53.80	0.01	53.80
64	SAGBEND	-103.74	-22.17	0.00	0.00	0.00	0.00	0.00	258.22	51.90	0.01	51.90
65	SAGBEND	-105.74	-22.29	0.00	0.21	0.00	0.00	0.00	258.26	50.11	0.01	50.11
66	SAGBEND	-107.73	-22.40	0.00	1.23	0.00	0.00	0.00	258.31	48.76	0.01	48.76
67	SAGBEND	-109.73	-22.50	0.00	1.97	0.00	0.00	0.00	258.37	47.71	0.01	47.71
68	SAGBEND	-111.72	-22.58	0.00	2.30	0.00	0.00	0.00	258.45	46.09	0.01	46.09
69	SAGBEND	-113.72	-22.66	0.00	2.39	0.00	0.00	0.00	258.53	44.27	0.01	44.27
70	SAGBEND	-115.72	-22.73	0.00	2.46	0.00	0.00	0.00	258.63	42.61	0.02	42.61
71	SAGBEND	-117.72	-22.80	0.00	2.46	0.00	0.00	0.00	258.74	41.19	0.02	41.19
72	SAGBEND	-119.72	-22.85	0.00	2.48	0.00	0.00	0.00	258.86	39.77	-0.01	39.77
73	SAGBEND	-121.72	-22.90	0.00	2.50	0.00	0.00	0.00	258.98	38.43	-0.02	38.43
74	SAGBEND	-123.71	-22.94	0.00	2.45	0.00	0.00	0.00	259.12	36.30	-0.01	36.30
75	SAGBEND	-125.71	-22.97	0.00	2.42	0.00	0.00	0.00	259.27	33.21	-0.01	33.21
76	SAGBEND	-127.71	-22.99	0.00	2.39	0.00	0.00	0.00	259.42	30.26	-0.01	30.26
77	SEABED	-129.71	-23.01	0.00	2.39	0.00	0.00	0.00	259.57	26.83	-0.01	26.83
78	SEABED	-131.71	-23.02	0.00	2.35	0.00	0.00	0.00	259.72	21.93	-0.01	21.93
79	SEABED	-133.71	-23.03	0.00	2.33	0.00	0.00	0.00	259.87	16.17	0.00	16.17
80	SEABED	-135.71	-23.04	0.00	2.31	0.00	0.00	0.00	260.01	11.00	0.00	11.00
81	SEABED	-137.71	-23.03	0.00	2.27	0.00	0.00	0.00	260.15	6.89	0.00	6.89
82	SEABED	-139.71	-23.03	0.00	2.24	0.00	0.00	0.00	260.29	3.84	0.00	3.84
83	SEABED	-141.71	-23.03	0.00	2.21	0.00	0.00	0.00	260.42	1.77	0.00	1.77
84	SEABED	-143.71	-23.03	0.00	2.13	0.00	0.00	0.00	260.56	-0.83	0.00	0.83
85	SEABED	-145.71	-23.03	0.00	2.05	0.00	0.00	0.00	260.69	-0.79	0.00	0.79
86	SEABED	-147.71	-23.03	0.00	1.97	0.00	0.00	0.00	260.83	-0.72	0.00	0.72
87	SEABED	-149.71	-23.03	0.00	1.92	0.00	0.00	0.00	260.96	-0.66	0.00	0.66
88	SEABED	-151.71	-23.03	0.00	1.88	0.00	0.00	0.00	261.09	-0.56	0.00	0.56
89	SEABED	-153.71	-23.03	0.00	1.85	0.00	0.00	0.00	261.21	-0.43	0.00	0.43
90	SEABED	-155.71	-23.03	0.00	1.83	0.00	0.00	0.00	261.34	-0.30	0.00	0.30
91	SEABED	-157.71	-23.03	0.00	1.83	0.00	0.00	0.00	261.46	-0.20	0.00	0.20
92	SEABED	-159.71	-23.03	0.00	1.83	0.00	0.00	0.00	261.59	-0.12	0.00	0.12
93	SEABED	-161.71	-23.03	0.00	1.83	0.00	0.00	0.00	261.71	-0.06	0.00	0.06
94	SEABED	-163.71	-23.03	0.00	1.83	0.00	0.00	0.00	261.83	0.04	0.00	0.04
95	SEABED	-165.71	-23.03	0.00	1.83	0.00	0.00	0.00	261.94	0.03	0.00	0.03
96	SEABED	-167.71	-23.03	0.00	1.83	0.00	0.00	0.00	262.06	0.02	0.00	0.02
97	SEABED	-169.71	-23.03	0.00	1.83	0.00	0.00	0.00	262.18	0.01	0.00	0.01
98	SEABED	-171.71	-23.03	0.00	1.83	0.00	0.00	0.00	262.29	0.01	0.00	0.01
99	SEABED	-173.71	-23.03	0.00	0.00	0.00	0.00	0.00	262.40	0.00	0.00	0.00

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 24

STATIC PIPE ANALYSIS 8 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/ 2/2020 TIME - 0:31: 0 CASE 1

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DYNAMIC SOLUTION SUMMARY

SEA STATE NUMBER ( 1)

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SEA STATE TYPE ..... WAVE SPECTRUM

NO. WAVE COMPONENTS .. 20

WAVE WATER DEPTH ..... 23.0 M

MAX. WAVE FREQUENCY .. 3.0015 RA/S

SPECTRUM START TIME .. 0. SECS

RAO SIGN CONVENTION .. BENTLEY MOSES

VESSEL RESPONSE TYPE . TABLE OF RAOS  
 WAVE TRAVEL DIRECTION 0.000 DEG  
 MIN. WAVE FREQUENCY .. 0.1001 RA/S  
 RANDOM PHASE SEED .... 0  
 NO. RAOS IN TABLE .... 30

SEA STATE DEFINITION

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WAVE SPECTRUM TYPE ... JONSWAP (CLASSIC)  
 JONSWAP COEFFICIENT .. 0.012891 JONSWAP PEAK FACTOR .. 5.000  
 PEAK WAVE FREQUENCY .. 0.9498 RA/S

CALCULATED WAVE HEIGHTS

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SIGNIFICANT WAVE HT. . . 2.915 M AVERAGE WAVE HEIGHT .. 1.870 M  
 MAXIMUM WAVE HEIGHT .. 5.778 M RMS WAVE HEIGHT ..... 2.088 M  
 TOTAL NUMBER OF WAVES 1919

===== SOLUTION SUMMARY =====

NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACT HORIZ (KN)	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
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1 LAYBARGE	64.2	4.4	0.0	0.7	0.0	0.1	0.3	0.
3 LAYBARGE	59.7	4.3	0.0	16.9	0.0	11.6	29.0	8.
5 LAYBARGE	48.2	4.0	0.0	19.9	0.0	15.4	38.4	11.
7 TENSIONR	38.1	3.7	0.0	12.6	0.0	5.7	33.8	9.
9 LAYBARGE	33.4	3.6	0.0	8.8	0.0	3.1	27.5	8.
11 TENSIONR	26.7	3.4	0.0	11.5	0.0	2.9	39.2	11.
13 LAYBARGE	21.3	3.3	0.0	3.1	0.0	2.0	35.7	10.
15 LAYBARGE	12.1	3.0	0.0	48.2	0.0	96.3	272.3	76.
17 LAYBARGE	0.0	1.7	0.0	40.0	0.0	91.7	260.4	72.
20 STINGER	-8.1	0.3	0.0	26.2	0.0	72.5	211.2	59.
22 STINGER	-15.9	-1.5	0.0	29.4	0.0	69.1	200.2	56.
24 STINGER	-23.6	-3.6	0.0	26.8	0.0	55.6	169.3	47.
26 STINGER	-30.6	-5.9	0.0	36.8	0.0	62.6	185.8	52.
28 STINGER	-36.6	-7.9	0.0	30.4	0.0	73.3	204.5	57.
30 STINGER	-39.5	-8.9	0.0	0.0	0.0	36.3	120.5	33.
45 SAGBEND	-66.2	-16.6	0.0	0.0	0.0	62.5	180.6	50.
69 SAGBEND	-113.7	-22.7	0.0	2.4	0.0	44.3	130.4	36.



**LAMPIRAN ANALISA DINAMIS PADA PIPA 8 INCH  
HEADING 45°**

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MMMMM      MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMM
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MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM
MMMMMMMMMM  MMM      MMM      MMM      MMM      MMMMMMMMM  MMM      MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMMMMM      MMM      MMM      MMM      MMM      MMMMMMMMM  MMM      MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM

```

```

*****
*
*               O F F P I P E - 3 -- OFFSHORE PIPELINE ANALYSIS SYSTEM
*
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*
*   VERSION NO. - 3.02EX
*   RELEASED ON - 03/08/2016
*   LICENSED TO - PT Timas Suplindo
*
*****
*
* OFFPIPE IS A NONLINEAR, 3-DIMENSIONAL FINITE ELEMENT METHOD BASED PROGRAM FOR THE
* STATIC AND DYNAMIC ANALYSIS OF PROBLEMS ARISING IN THE DESIGN OF MARINE PIPELINES.
* THIS VERSION OF OFFPIPE MAY BE USED FOR THE ANALYSIS OF OFFSHORE PIPELAYING OPER-
* ATIONS, DAVIT LIFTS, PIPELINES LYING ON AN UNEVEN SEABED, AND RISERS.
*
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*
*               ROBERT C. MALAHY           TELEPHONE: (713) 664-8635
*               6554 AUDEN                 FACSIMILE: (713) 664-0962
*               HOUSTON, TEXAS 77005
*               U.S.A.                     EMAIL: SUPPORT@OFFPIPE.COM
*
*****

```

```

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX   PAGE 3
STATIC PIPE ANALYSIS 8 INCH
JOB NO. - LAYING                LICENSED BY - PT Timas Suplindo
USER ID - IK                    DATE - 5/2/2020   TIME - 1:18:16   CASE 1
=====

```

INPUT      DATA      ECHO

```

PRINTED OUTPUT SELECTED
=====
STATIC PIPE FORCES AND STRESSES ... YES
STATIC SOLUTION SUMMARY ..... YES
DYNAMIC PIPE FORCES AND STRESSES .. YES
DYNAMIC RANGE OF PIPE DATA ..... NO
DYNAMIC TRACKING OF PIPE DATA ..... NO
OVERBEND PIPE SUPPORT GEOMETRY .... NO
STINGER BALLAST SCHEDULE DATA ..... NO
SUPPORT REACTIONS IN BARGE COORDS . NO

INTERNAL FORCES IN PIPE & CABLE ... NO
INTERNAL FORCES IN STINGER ..... NO
PRINT PIPE STRAINS IN OUTPUT ..... NO
DNV OS-F101 COMPLIANCE REPORT ..... NO
API RP-1111 COMPLIANCE REPORT ..... NO
PRINT DNV/API FACTORS & PARAMETERS NO
USE THICK WALL HOOP STRESS EQN. ... NO
USE DNV 1981 FOR TOTAL PIPE STRESS NO

ENABLE/DISABLE WARNING MESSAGES ... ENABLE
GENERATE SPREAD SHEET PLOT FILE ... NO
GENERATE ASCII PLOT DATA FILES .... NO

```

PROFILE PLOT TABLE ENTRIES

```

=====
PLOT TABLE INDEX ..... 1
PLOT NUMBER ..... 1
PLOT TYPE OPTION NUMBER ..... 1
DYNAMIC PROFILE TIME POINT ..... 0.000
DYNAMIC PROFILE TIME INCREMENT ..... 0.000
ORDINATE PARAMETER CODE NUMBER ..... 2
AXIS LABEL FOR ORDINATE ..... "PIPE ELEVATION Y COORDINATE "
ABSCISSA PARAMETER CODE NUMBER ..... 1
AXIS LABEL FOR ABSCISSA ..... "PIPE HORIZONTAL X COORDINATE "

PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS "
MINIMUM VERTICAL AXIS RANGE ..... 0.000
MAXIMUM VERTICAL AXIS RANGE ..... 0.000
MINIMUM HORIZONTAL AXIS RANGE ..... 0.000
MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000
=====

```

```

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 4
STATIC PIPE ANALYSIS 8 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 5/2/2020 TIME - 1:18:16 CASE 1
=====

```

INPUT DATA ECHO

PROFILE PLOT TABLE ENTRIES

```

=====
PLOT TABLE INDEX ..... 2
PLOT NUMBER ..... 1
PLOT TYPE OPTION NUMBER ..... 1
DYNAMIC PROFILE TIME POINT ..... 0.000
DYNAMIC PROFILE TIME INCREMENT ..... 0.000
ORDINATE PARAMETER CODE NUMBER ..... 15
AXIS LABEL FOR ORDINATE ..... "DNV YIELD STRESS PERCENTAGE "
ABSCISSA PARAMETER CODE NUMBER ..... 1
AXIS LABEL FOR ABSCISSA ..... "PIPELINE HORIZONTAL X COORDINATE"

PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS "
MINIMUM VERTICAL AXIS RANGE ..... 0.000
MAXIMUM VERTICAL AXIS RANGE ..... 0.000
MINIMUM HORIZONTAL AXIS RANGE ..... 0.000
MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000
=====

```

PIPE PROPERTIES

```

=====
PROPERTY TABLE ROW NUMBER ..... 1
PIPE SECTION LENGTH ..... 0.000 METERS
STEEL MODULUS OF ELASTICITY ..... 207000. M-PASCAL
STEEL CROSS SECTIONAL AREA ..... 82.690 CM^2
COATED PIPE AVG MOMENT OF INERTIA .. 4402.00 CM^4
WEIGHT PER-UNIT-LENGTH IN AIR ..... 1649.63 N/M
WEIGHT PER-UNIT-LENGTH SUBMERGED .. 912.94 N/M
MAXIMUM ALLOWABLE PIPE STRAIN ..... 0.205000 PERCENT

STEEL OUTSIDE DIAMETER ..... 21.9100 CM
STEEL WALL THICKNESS ..... 1.2700 CM
YIELD STRESS ..... 360.00 M-PASCAL
STRESS/STRAIN INTENSE FACTOR ..... 0.0000
HYDRODYNAMIC OUTSIDE DIAMETER ..... 0.000 CM
DRAG COEFFICIENT ..... 0.0000
HYDRODYNAMIC TOTAL AREA ..... 0.000 CM^2
ADDED MASS COEFFICIENT ..... 0.0000
POISSON'S RATIO ..... 0.3000
COEFFICIENT OF THERMAL EXPANSION .. 0.00001100 1/DEG C
=====

```

```

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 5
STATIC PIPE ANALYSIS 8 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 5/2/2020 TIME - 1:18:16 CASE 1
=====

```

INPUT DATA ECHO

PIPE COATING PROPERTIES

```

=====
PIPE PROPERTY TABLE INDEX ..... 1
CORROSION COATING THICKNESS ..... 0.320 CM
CORROSION COATING WEIGHT DENSITY .. 9025.2 N/M^3
CORROSION COATING ELASTIC MODULUS . 0.000 M-PASCAL
CONCRETE COATING THICKNESS ..... 4.000 CM
CONCRETE COATING WEIGHT DENSITY ... 29857. N/M^3
CONCRETE COATING ELASTIC MODULUS .. 0.000 M-PASCAL
DESIRED PIPE SPECIFIC GRAVITY ..... 0.0000
CONCRETE STIFFENING EFFECTIVENESS . 0.000
NO NOT CALC. STRESS FOR BARE PIPE . NO
=====

```

AVERAGE LENGTH OF PIPE JOINT ..... 12.200 METERS  
 EFFECTIVE FIELD JOINT LENGTH ..... 0.300 METERS  
 FIELD JOINT FILL WEIGHT DENSITY ... 10055.3 N/M^3  
 FIELD JOINT FILL ELASTIC MODULUS... 0.000 M-PASCAL  
 FIELD JOINT STIFFENING EFFECT. .... 0.000  
 FIELD JOINT BENDING MODEL ..... 0 IGNORE COATING STIFFNESS  
 WEIGHT DENSITY OF STEEL ..... 77008. N/M^3  
 WEIGHT DENSITY OF PIPE CONTENTS ... 0.0 N/M^3  
 REF. ELEVATION FOR STATIC HEAD .... 0.00 METERS  
 FREE FLOOD PIPE DURING PIPELAY ... NO

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 6  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 1:18:16 CASE 1  
 =====

INPUT DATA ECHO

PIPELAY VESSEL DESCRIPTION

=====  
 NUMBER OF PIPE NODES ..... 9  
 BARGE GEOMETRY SPECIFIED BY ..... 1 X-Y COORDINATES  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.000 METERS  
 ADJUST Y COORDINATES MANUALLY .... NO  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 PIPE ANGLE RELATIVE TO DECK ..... 0.0000 DEGREES  
 HEIGHT OF DECK ABOVE WATER ..... 2.400 METERS  
 LAYBARGE FORWARD (X) OFFSET ..... 0.000 METERS  
 BARGE TRIM ANGLE ..... 0.5000 DEGREES  
  
 STERN SHOE X COORDINATE ..... 0.000 METERS  
 STERN SHOE Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER X COORDINATE ..... 43.820 METERS  
 ROTATION CENTER Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER Z COORDINATE ..... 6.370 METERS  
 BARGE HEADING ..... 0.0000 DEGREES  
 BARGE OFFSET FROM RIGHT-OF-WAY .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT VERTICAL ANGLE ... 0.000 DEGREES  
 PIPE RAMP PIVOT Z COORDINATE ..... 0.000 METERS  
 PIPE RAMP HEADING ON DECK ..... 0.000 DEGREES  
 ROLE OF ALTERNATE WAVE ORIGIN .... 0 MOTIONS & WAVES AT CENTER OF MOTION  
 WAVE PHASE ORIGIN X COORDINATE .... 0.000  
 WAVE PHASE ORIGIN Y COORDINATE .... 0.000 METERS  
 WAVE PHASE ORIGIN Z COORDINATE .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE .....

NODE X COORD (M )	NODE Y COORD (M )	SUPPORT TYPE	DAVIT SPACING (M )
64.220	1.838	1 SIMPLE SUPPORT	0.000
59.740	1.760	1 SIMPLE SUPPORT	0.000
48.240	1.560	1 SIMPLE SUPPORT	0.000
38.110	1.383	2 PIPE TENSIONER	0.000
33.440	1.302	1 SIMPLE SUPPORT	0.000
26.660	1.183	2 PIPE TENSIONER	0.000
21.340	1.092	7 USER DEFINED SPT	0.000
12.150	0.860	7 USER DEFINED SPT	0.000
-0.040	-0.260	8 USER DEFINED SPT	0.000

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 7  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 1:18:16 CASE 1  
 =====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====  
 SUPPORT PROPERTY TABLE INDEX ..... 2  
 SUPPORT ELEMENT TYPE ..... 2 TENSIONER  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
  
 BOTTOM ROLLER ANGLE TO HORIZONTAL . 0.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES

SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 7  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 1.600 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 8  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 1:18:16 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 8  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

STINGER DESCRIPTION

=====

NUMBER OF PIPE/STINGER NODES ..... 6  
 STINGER GEOMETRY SPECIFIED BY ..... 2 X-Y COORD AND MATCH PT  
 STINGER TYPE ..... 1 FIXED GEOMETRY OR RAMP  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.00 METERS  
 HITCH X-COORDINATE ..... 0.497 METERS  
 HITCH Y-COORDINATE ..... -1.800 METERS  
 HITCH ANGULAR ORIENTATION ..... 0.000 DEGREES

X COORDINATE OF LOCAL ORIGIN ..... 0.497 METERS  
 Y COORDINATE OF LOCAL ORIGIN ..... -1.800 METERS  
 ROTATION ABOUT STINGER HITCH ..... 13.500 DEGREES  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 TANGENT POINT ANGLE ..... 0.000 DEGREES

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	ELEMENT TYPE	ELEMENT LENGTH ( M )
-8.325	2.209	1 SIMPLE SUPPORT	2 HINGED END	0.000
-16.325	2.349	1 SIMPLE SUPPORT	1 FIXED END	0.000
-24.325	2.119	1 SIMPLE SUPPORT	1 FIXED END	0.000
-31.699	1.660	1 SIMPLE SUPPORT	1 FIXED END	0.000
-37.949	1.069	1 SIMPLE SUPPORT	1 FIXED END	0.000
-40.949	0.350	1 SIMPLE SUPPORT	1 FIXED END	0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 9  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 1:18:16 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

```

=====
SUPPORT PROPERTY TABLE INDEX ..... 1
SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT
SUPPORT INITIAL STATE FLAG ..... 0
TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M
VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M
STATIC VERTICAL DEFLECTION ..... 0.0000 CM
LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES
SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES
SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS
BED ROLLER LENGTH ..... 1.640 METERS
HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS
TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
    
```

CURRENT VELOCITIES

```

=====
WATER DEPTH (M ) CURRENT SPEED (M/S ) DIRECTION OF TRAVEL (DEG )
=====
0.000 0.790 45.000
11.500 0.480 45.000
23.000 0.420 45.000
    
```

PIPE TENSION DATA

```

=====
STATIC PIPE TENSION ON LAY VESSEL . 196.133 K-NEWTON
MINIMUM DYNAMIC PIPE TENSION ..... 196.133 K-NEWTON
MAXIMUM DYNAMIC PIPE TENSION ..... 264.553 K-NEWTON
STATIC HORIZONTAL BOTTOM TENSION .. 0.000 K-NEWTON
NO. OF VALUES FOR TENSION PROFILE . 0
VALUES ARE FOR PIPE SPAN ANALYSIS . NO
MAXIMUM PIPE PAYOUT SPEED ..... 0.000 M/SEC
MAXIMUM PIPE TAKEUP SPEED ..... 0.000 M/SEC
    
```

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 10

STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 1:18:16 CASE 1

=====  
 INPUT DATA ECHO

SAGBEND GEOMETRY

```

=====
SAGBEND PIPE ELEMENT LENGTH ..... 2.000 METERS
WATER DEPTH ..... 23.00 METERS
X-COORDINATE AT SPECIFIED DEPTH . . 0.00 METERS
ESTIMATED SAGBEND X LENGTH ..... 0.00 METERS
ESTIMATED PIPE LENGTH ON SEABED ... 0.00 METERS
X-COORD OF PIPE FREE END ON SEABED 0.00 METERS
X-COORD POINT OF FIXITY ON SEABED . 0.00 METERS
MAXIMUM SLOPE (ANGLE) OF SEABED ... 0.000 DEGREES
DIRECTION OF MAXIMUM SLOPE ..... 0.000 DEGREES

PIPE/CABLE SPAN END CONDITION ..... 0 PIPE/CABLE RESTING ON SEABED
PIPE/CABLE SPAN LENGTH GIVEN BY ... 0 SPECIFIED PIPE/CABLE TENSION
ESTIMATED SPAN DEPTH AT FREE END .. 0.00 METERS
PIPE VERTICAL ANGLE AT FREE END ... 0.000 DEGREES
BOTTOM HINGE OFFSET ..... 0.000 METERS
BOTTOM HINGE MINIMUM ANGLE ..... 0.000 DEGREES
BOTTOM HINGE MAXIMUM ANGLE ..... 0.000 DEGREES
    
```

SOIL ELEMENT PROPERTIES

```

=====
SOIL PROPERTY TABLE ROW INDEX ..... 1
SOIL ELEMENT TYPE (FUTURE USE) .... 0
PIPE INDEX OR SEGMENT NUMBER ..... 0
LONGITUDINAL SOIL STIFFNESS ..... 0.00 KN/M^2
VERTICAL SOIL STIFFNESS ..... 0.00 KN/M^2
LATERAL SOIL STIFFNESS ..... 0.00 KN/M^2
DEFLECTION UNDER REFERENCE LOAD ... 0.0000 CM

LONGITUDINAL COEF. OF FRICTION .... 0.000
LATERAL COEFFICIENT OF FRICTION ... 0.600
NUMBER OF INTEGRATION POINTS ..... 0
    
```

TIME INTEGRATION PARAMETERS

```

=====
TIME STEP LENGTH ..... 0.2000 SECONDS
MAXIMUM TIME OF INTEGRATION ..... 10860.000 SECONDS
SOLUTION SAMPLING TIME STEP ..... 0.400 SECONDS
    
```

SOLUTION SAMPLING STARTS AT TIME .. 60.000 SECONDS  
 DAMPING RATIO ..... 0.0000  
 NUMBER OF VARIABLE TIME STEPS ..... 0

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 11  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 1:18:16 CASE 1

=====

INPUT DATA ECHO

WAVE PARAMETERS

=====

SEA STATE ROW INDEX ..... 1  
 WAVE HEIGHT (PEAK TO TROUGH) ..... 1.800 METERS  
 WAVE PERIOD ..... 6.300 SECONDS  
 WAVE DIRECTION OF TRAVEL ..... 45.000 DEGREES  
 WATER DEPTH FOR WAVE CALCULATIONS . 23.00 METERS  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0

WAVE SPECTRUM EQUATION

=====

SEA STATE ROW INDEX ..... 1  
 WAVE SPECTRUM EQUATION TYPE ..... 7 JONSWAP (CLASSIC)  
 NUMBER OF WAVES IN SPECTRUM ..... 20  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0  
 MINIMUM PERIOD IN SPECTRUM ..... 2.0933 SECONDS  
 MAXIMUM PERIOD IN SPECTRUM ..... 62.8000 SECONDS  
 START TIME FOR WAVE SPECTRUM ..... 0. SECONDS  
 DIRECTION OF WAVE TRAVEL ..... 0.000 DEGREES  
 1ST JONSWAP COEF. (ALPHA) ..... 0.005729  
 2ND JONSWAP COEF. (GAMMA) ..... 5.0000  
 PEAK WAVE PERIOD ..... 6.6150 SECONDS

VESSEL MOTION RAO TABLE

=====

SEA STATE NUMBER ..... 1  
 USE PHASE LAG FOR RAOs ..... NO  
 VESSEL MOTIONS SIGN CONVENTION .... 2 BENTLEY MOSES  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD

WAVE PERIOD (SECONDS)	----- /----- SURGE AMPLITUDE (M/M )	----- /----- PHASE (DEG)	----- /----- SWAY AMPLITUDE (M/M )	----- /----- PHASE (DEG)	----- /----- HEAVE AMPLITUDE (M/M )	----- /----- PHASE (DEG)
2.0900	0.0030	-68.00	0.0010	-94.00	0.0000	0.00
2.1700	0.0030	85.00	0.0000	0.00	0.0000	0.00
2.2400	0.0050	-109.00	0.0010	-165.00	0.0000	0.00
2.3300	0.0040	37.00	0.0000	0.00	0.0010	-127.00
2.4200	0.0070	-124.00	0.0010	105.00	0.0010	-118.00
2.5100	0.0040	21.00	0.0000	0.00	0.0010	-155.00
2.6200	0.0110	-119.00	0.0030	62.00	0.0010	-129.00
2.7300	0.0040	58.00	0.0010	-50.00	0.0010	172.00
2.8500	0.0170	-100.00	0.0040	51.00	0.0000	0.00
2.9900	0.0100	158.00	0.0040	-50.00	0.0020	85.00
3.1400	0.0170	-68.00	0.0030	43.00	0.0020	73.00
3.3100	0.0290	-151.00	0.0080	-58.00	0.0060	79.00

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 12  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 1:18:16 CASE 1

=====

WAVE PERIOD	----- /----- ROLL AMPLITUDE	----- /----- PHASE	----- /----- PITCH AMPLITUDE	----- /----- PHASE	----- /----- YAW AMPLITUDE	----- /----- PHASE
3.4900	0.0070	109.00	0.0040	-145.00	0.0070	29.00
3.7000	0.0350	-96.00	0.0120	-46.00	0.0050	109.00
3.9300	0.0520	-161.00	0.0260	-115.00	0.0200	67.00
4.1900	0.0240	134.00	0.0170	-174.00	0.0200	10.00
4.4900	0.0380	-85.00	0.0210	-62.00	0.0060	137.00
4.8300	0.0940	-139.00	0.0640	-111.00	0.0490	80.00
5.2400	0.1090	173.00	0.0820	-157.00	0.0910	29.00
5.7100	0.0640	128.00	0.0520	164.00	0.0880	-14.00
6.2800	0.0330	-77.00	0.0270	-84.00	0.0380	176.00
6.9800	0.1580	-119.00	0.1100	-133.00	0.2670	130.00
7.8500	0.2920	-151.00	0.2730	-155.00	0.5070	107.00
8.9700	0.4130	-179.00	0.4050	179.00	0.6980	84.00
10.4700	0.5100	156.00	0.5120	156.00	0.8340	63.00
12.5600	0.5790	136.00	0.5940	136.00	0.9220	44.00
15.7000	0.6230	119.00	0.6490	119.00	0.9710	29.00
20.9300	0.6480	106.00	0.6810	106.00	0.9940	16.00
31.4000	0.6610	97.00	0.6980	97.00	1.0020	7.00
62.8000	0.6660	92.00	0.7060	92.00	1.0030	2.00

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(SECONDS)	(DEG/M)	(DEG)	(DEG/M)	(DEG)	(DEG/M)	(DEG)
2.0900	0.0030	-51.00	0.0000	0.00	0.0020	-24.00
2.1700	0.0040	-37.00	0.0000	0.00	0.0030	44.00
2.2400	0.0060	-49.00	0.0010	-102.00	0.0010	-102.00
2.3300	0.0050	-67.00	0.0030	-119.00	0.0040	-36.00
2.4200	0.0010	-99.00	0.0030	-143.00	0.0010	163.00
2.5100	0.0040	-163.00	0.0040	-132.00	0.0080	-103.00
2.6200	0.0040	84.00	0.0030	179.00	0.0040	120.00
2.7300	0.0130	135.00	0.0030	-145.00	0.0150	-124.00
2.8500	0.0170	130.00	0.0050	115.00	0.0100	133.00
2.9900	0.0290	122.00	0.0040	100.00	0.0150	-132.00
3.1400	0.0180	93.00	0.0150	78.00	0.0230	124.00
3.3100	0.0310	139.00	0.0160	36.00	0.0010	-66.00
3.4900	0.0400	78.00	0.0270	89.00	0.0430	121.00
3.7000	0.0120	-33.00	0.0590	47.00	0.0580	43.00
3.9300	0.0280	122.00	0.0330	7.00	0.0050	118.00
4.1900	0.0580	25.00	0.0680	92.00	0.1220	88.00
4.4900	0.0500	-34.00	0.1650	46.00	0.1970	31.00
4.8300	0.0850	46.00	0.1750	-1.00	0.1360	-21.00
5.2400	0.3220	10.00	0.0410	18.00	0.0710	102.00
5.7100	0.5310	-28.00	0.4080	73.00	0.3550	59.00
6.2800	0.1800	-54.00	1.0540	47.00	0.6240	17.00
6.9800	2.2730	-173.00	1.6290	27.00	0.8190	-21.00

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 13

STATIC PIPE ANALYSIS 8 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/2/2020 TIME - 1:18:16 CASE 1

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INPUT DATA ECHO

7.8500	2.0730	-167.00	1.8190	8.00	0.8960	-55.00
8.9700	1.7360	173.00	1.6720	-11.00	0.8690	-85.00
10.4700	1.3750	152.00	1.3580	-30.00	0.7570	-111.00
12.5600	1.0030	133.00	0.9960	-48.00	0.5920	-133.00
15.7000	0.6580	117.00	0.6550	-63.00	0.4100	-150.00
20.9300	0.3730	105.00	0.3730	-76.00	0.2420	-163.00
31.4000	0.1660	97.00	0.1670	-87.00	0.1100	-173.00
62.8000	0.0410	92.00	0.0430	-105.00	0.0280	178.00

\*\*\*\*\* INFORMATIVE MESSAGE NO. - 94 \*\*\*\*\*

One or more of the phase angles in the RAO table have been adjusted to | minimize the difference in value between adjacent angles. If the phase | angles are arbitrarily restricted by the software used to calculate | the RAOs to a fixed range of values such as (0 to 2\*PI) or (-PI to | +PI), then phase angles that are actually close in value can differ by | as much as 2\*PI. These large differences can cause the phase angles | for RAOs that are between the values in the table (which must be | determined using interpolation) to be calculated incorrectly.

CONTROL SWITCHES

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MAX NUMBER STATIC ITERATIONS ..... 500

MAX DYNAMIC ITERATIONS PER STEP ... 500

BOUNDARY CONDITION LOGIC PARAMETER 5

TIME STEP STABILITY PARAMETER ..... 0

TYPE OF ANALYSIS ..... DYNAMIC

NUMBER OF PROBLEM DIMENSIONS ..... 3

DAVIT LIFT ANALYSIS ..... NO

STATIC SOLUTION CONVERGED IN ( 18 ) ITERATIONS

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 14

STATIC PIPE ANALYSIS 8 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/2/2020 TIME - 1:18:16 CASE 1

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\*\*\*\*\* WARNING: HIGH PRIORITY NO. - 25 \*\*\*\*\*

The Newtons method iteration failed to converge in ( 501 ) iterations in time step ( 5538 ) of the dynamic solution. The maximum residual force for the last iteration was ( 1.6987E-03 ). The corresponding maximum corrective displacement was ( 1.8961E-07 ).

END OF INPUT DATA

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STATIC PIPE		COORDINATES,					FORCES		AND STRESSES				
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS (MPA)	HORIZ STRESS (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
1	LAYBARGE	64.20	4.42	0.00	0.000	1.471	0.00	0.00	0.00	0.29	0.00	0.29	0.08
3	LAYBARGE	59.72	4.30	0.00	0.000	1.590	4.48	-0.02	0.00	-26.68	0.00	26.71	7.42
5	LAYBARGE	48.23	4.00	0.00	0.000	1.461	15.98	-0.09	0.00	-36.95	0.00	37.04	10.29
7	TENSIONR	38.10	3.73	0.00	0.000	1.432	26.11	11.77	0.00	-13.49	0.00	25.26	7.02
9	LAYBARGE	33.43	3.61	0.00	0.000	1.535	30.78	11.75	0.00	-7.12	0.00	18.87	5.24
11	TENSIONR	26.65	3.43	0.00	0.000	1.482	37.57	23.62	0.00	-6.51	0.00	30.13	8.37
13	LAYBARGE	21.33	3.30	0.00	0.000	1.448	42.89	23.59	0.00	0.36	0.00	23.95	6.65
15	LAYBARGE	12.14	2.98	0.00	0.000	3.376	52.08	23.46	0.00	-227.47	-0.01	250.94	69.71
17	LAYBARGE	-0.04	1.76	0.00	0.000	8.070	64.32	23.22	0.00	-216.45	0.03	239.68	66.58
20	STINGER	-8.10	0.35	0.00	-0.001	11.521	72.51	22.97	0.00	-170.73	-0.13	193.70	53.80
22	STINGER	-15.89	-1.45	0.00	0.000	14.427	80.51	22.68	-0.13	-156.61	-0.36	179.35	49.82
24	STINGER	-23.60	-3.61	0.00	0.001	16.653	88.51	22.36	-0.31	-97.93	-0.21	120.45	33.46
26	STINGER	-30.64	-5.84	0.00	-0.001	18.610	95.90	21.99	-0.51	-136.48	-0.40	158.73	44.09
28	STINGER	-36.57	-7.92	0.00	0.006	19.923	102.19	21.69	-0.69	-40.16	0.59	62.20	17.28
30	STINGER	-39.47	-8.98	0.00	-0.017	20.036	105.27	21.52	-0.78	10.57	-6.09	34.12	9.48
32	SAGBEND	-41.35	-9.66	0.00	-0.048	19.918	107.27	21.42	-0.84	35.05	-4.72	57.21	15.89
33	SAGBEND	-43.23	-10.34	0.00	-0.069	19.692	109.27	21.31	-0.90	53.65	-3.09	75.50	20.97
34	SAGBEND	-45.12	-11.01	0.01	-0.082	19.383	111.27	21.20	-0.95	67.83	-1.87	89.54	24.87
35	SAGBEND	-47.00	-11.67	0.01	-0.090	19.012	113.27	21.10	-1.01	78.69	-0.96	100.30	27.86
36	SAGBEND	-48.90	-12.31	0.01	-0.093	18.592	115.27	20.99	-1.07	87.04	-0.27	108.57	30.16
37	SAGBEND	-50.80	-12.94	0.01	-0.093	18.135	117.27	20.89	-1.12	93.51	0.23	114.96	31.93
38	SAGBEND	-52.70	-13.56	0.02	-0.090	17.650	119.27	20.80	-1.18	98.54	0.61	119.93	33.31
39	SAGBEND	-54.61	-14.15	0.02	-0.086	17.141	121.27	20.70	-1.23	102.49	0.89	123.82	34.39
40	SAGBEND	-56.52	-14.74	0.02	-0.081	16.615	123.27	20.61	-1.28	105.63	1.10	126.89	35.25
41	SAGBEND	-58.44	-15.30	0.03	-0.075	16.075	125.27	20.52	-1.33	108.14	1.25	129.33	35.93
42	SAGBEND	-60.36	-15.84	0.03	-0.068	15.523	127.27	20.43	-1.37	110.17	1.36	131.30	36.47
43	SAGBEND	-62.29	-16.37	0.03	-0.061	14.962	129.27	20.35	-1.42	111.84	1.44	132.91	36.92
44	SAGBEND	-64.23	-16.88	0.03	-0.053	14.394	131.27	20.27	-1.46	113.22	1.49	134.24	37.29
45	SAGBEND	-66.17	-17.36	0.03	-0.045	13.819	133.27	20.19	-1.51	114.38	1.53	135.34	37.60
46	SAGBEND	-68.11	-17.83	0.04	-0.037	13.238	135.27	20.12	-1.55	115.36	1.55	136.27	37.85
47	SAGBEND	-70.06	-18.28	0.04	-0.029	12.653	137.27	20.05	-1.59	116.20	1.56	137.06	38.07
48	SAGBEND	-72.02	-18.71	0.04	-0.021	12.064	139.27	19.98	-1.62	116.92	1.57	137.74	38.26
49	SAGBEND	-73.97	-19.11	0.04	-0.013	11.472	141.27	19.92	-1.66	117.54	1.57	138.31	38.42
50	SAGBEND	-75.94	-19.50	0.04	-0.005	10.877	143.27	19.86	-1.69	118.06	1.56	138.78	38.55
51	SAGBEND	-77.90	-19.87	0.04	0.003	10.279	145.27	19.80	-1.72	118.50	1.55	139.18	38.66
52	SAGBEND	-79.87	-20.22	0.04	0.011	9.679	147.27	19.75	-1.75	118.84	1.53	139.48	38.74
53	SAGBEND	-81.84	-20.54	0.04	0.019	9.078	149.27	19.70	-1.78	119.08	1.51	139.69	38.80
54	SAGBEND	-83.82	-20.85	0.04	0.027	8.476	151.27	19.65	-1.81	119.22	1.48	139.79	38.83
55	SAGBEND	-85.80	-21.13	0.04	0.034	7.874	153.27	19.60	-1.83	119.23	1.44	139.77	38.82
56	SAGBEND	-87.78	-21.40	0.03	0.041	7.272	155.27	19.56	-1.86	119.09	1.40	139.60	38.78
57	SAGBEND	-89.77	-21.64	0.03	0.048	6.671	157.27	19.52	-1.88	118.77	1.35	139.25	38.68
58	SAGBEND	-91.76	-21.86	0.03	0.055	6.072	159.27	19.49	-1.90	118.21	1.28	138.66	38.52
59	SAGBEND	-93.75	-22.06	0.03	0.061	5.477	161.27	19.46	-1.91	117.36	1.20	137.79	38.28

STATIC PIPE		COORDINATES,					FORCES		AND STRESSES				
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS (MPA)	HORIZ STRESS (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
60	SAGBEND	-95.74	-22.24	0.03	0.067	4.886	163.27	19.43	-1.93	116.14	1.09	136.55	37.93
61	SAGBEND	-97.73	-22.40	0.02	0.072	4.304	165.27	19.40	-1.94	114.43	0.94	134.82	37.45
62	SAGBEND	-99.73	-22.54	0.02	0.077	3.731	167.27	19.38	-1.95	112.11	0.76	132.48	36.80
63	SAGBEND	-101.72	-22.66	0.02	0.080	3.172	169.27	19.36	-1.97	108.98	0.52	129.34	35.93
64	SAGBEND	-103.72	-22.76	0.02	0.082	2.632	171.27	19.35	-1.97	104.80	0.21	125.15	34.76
65	SAGBEND	-105.72	-22.85	0.01	0.082	2.116	173.27	19.34	-1.98	99.26	-0.20	119.60	33.22
66	SAGBEND	-107.72	-22.91	0.01	0.080	1.632	175.27	19.33	-1.99	91.93	-0.73	112.27	31.19
67	SAGBEND	-109.72	-22.96	0.01	0.074	1.190	177.27	19.32	-1.99	82.28	-1.43	102.63	28.51
68	SAGBEND	-111.72	-23.00	0.01	0.065	0.805	179.27	19.32	-1.99	69.59	-2.28	89.96	24.99
69	SEABED	-113.72	-23.02	0.00	0.051	0.493	181.27	19.32	-2.00	53.56	-2.93	73.98	20.55
70	SEABED	-115.72	-23.03	0.00	0.037	0.264	183.27	19.32	-2.00	37.34	-2.81	57.79	16.05
71	SEABED	-117.72	-23.04	0.00	0.024	0.112	185.27	19.32	-2.00	23.59	-2.30	44.05	12.24
72	SEABED	-119.72	-23.04	0.00	0.014	0.020	187.27	19.32	-2.00	13.20	-1.68	33.68	9.35
73	SEABED	-121.72	-23.04	0.00	0.007	-0.027	189.27	19.32	-2.00	6.09	-1.11	26.57	7.38
74	SEABED	-123.72	-23.04	0.00	0.002	-0.046	191.27	19.32	-2.00	1.69	-0.66	22.20	6.17
75	SEABED	-125.72	-23.04	0.00	0.000	-0.048	193.27	19.32	-2.00	-0.71	-0.34	21.18	5.88
76	SEABED	-127.72	-23.03	0.00	-0.001	-0.041	195.27	19.32	-2.00	-1.76	-0.13	22.15	6.15
77	SEABED	-129.72	-23.03	0.00	-0.002	-0.031	197.27	19.32	-2.00	-1.99	-0.01	22.38	6.22
78	SEABED	-131.72	-23.03	0.00	-0.002	-0.022	199.27	19.32	-2.00	-1.79	0.05	22.17	6.16

79	SEABED	-133.72	-23.03	0.00	-0.001	-0.014	201.27	19.32	-2.00	-1.40	0.07	21.80	6.05
80	SEABED	-135.72	-23.03	0.00	-0.001	-0.007	203.27	19.32	-2.00	-1.00	0.07	21.39	5.94
81	SEABED	-137.72	-23.03	0.00	-0.001	-0.003	205.27	19.32	-2.00	-0.64	0.06	21.04	5.84
82	SEABED	-139.72	-23.03	0.00	0.000	-0.001	207.27	19.32	-2.00	-0.37	0.04	20.77	5.77
83	SEABED	-141.72	-23.03	0.00	0.000	0.001	209.27	19.32	-2.00	-0.18	0.03	20.57	5.72
84	SEABED	-143.72	-23.03	0.00	0.000	0.001	211.27	19.32	-2.00	-0.06	0.02	20.45	5.68
85	SEABED	-145.72	-23.03	0.00	0.000	0.001	213.27	19.32	-2.00	0.01	0.01	20.41	5.67
86	SEABED	-147.72	-23.03	0.00	0.000	0.001	215.27	19.32	-2.00	0.04	0.00	20.43	5.68
87	SEABED	-149.72	-23.03	0.00	0.000	0.001	217.27	19.32	-2.00	0.05	0.00	20.44	5.68
88	SEABED	-151.72	-23.03	0.00	0.000	0.001	219.27	19.32	-2.00	0.05	0.00	20.44	5.68
89	SEABED	-153.72	-23.03	0.00	0.000	0.000	221.27	19.32	-2.00	0.04	0.00	20.43	5.68
90	SEABED	-155.72	-23.03	0.00	0.000	0.000	223.27	19.32	-2.00	0.03	0.00	20.42	5.67
91	SEABED	-157.72	-23.03	0.00	0.000	0.000	225.27	19.32	-2.00	0.02	0.00	20.41	5.67
92	SEABED	-159.72	-23.03	0.00	0.000	0.000	227.27	19.32	-2.00	0.01	0.00	20.40	5.67
93	SEABED	-161.72	-23.03	0.00	0.000	0.000	229.27	19.32	-2.00	0.01	0.00	20.40	5.67
94	SEABED	-163.72	-23.03	0.00	0.000	0.000	231.27	19.32	-2.00	0.00	0.00	20.40	5.67
95	SEABED	-165.72	-23.03	0.00	0.000	0.000	233.27	19.32	-2.00	0.00	0.00	20.39	5.67
96	SEABED	-167.72	-23.03	0.00	0.000	0.000	235.27	19.32	-2.00	0.00	0.00	20.39	5.67
97	SEABED	-169.72	-23.03	0.00	0.000	0.000	237.27	19.32	-2.00	0.00	0.00	20.39	5.67
98	SEABED	-171.72	-23.03	0.00	0.000	0.000	239.27	19.32	-2.00	0.00	0.00	20.39	5.67
99	SEABED	-173.72	-23.03	0.00	0.000	0.000	241.27	19.32	-2.00	0.00	0.00	20.39	5.66

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 1:18:16      PAGE 17

PROJECT - STATIC PIPE ANALYSIS 8 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACTION HORIZ (KN )	SUPT VERT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	VERT (KN-M)	BENDING MOMENTS HORIZ (KN-M)	TOTAL (KN-M)	
=====													
1	LAYBARGE	64.20	4.42	0.00	0.58	0.00	0.00	0.00	0.00	0.12	0.00	0.12	
3	LAYBARGE	59.72	4.30	0.00	15.88	0.00	0.00	0.00	-0.20	-10.72	0.00	10.72	
5	LAYBARGE	48.23	4.00	0.00	19.27	0.00	0.00	0.00	-0.71	-14.85	0.00	14.85	
7	TENSIONR	38.10	3.73	0.00	12.14	0.01	0.00	0.00	96.94	-5.42	0.00	5.42	
9	LAYBARGE	33.43	3.61	0.00	8.50	0.00	0.00	0.00	96.74	-2.86	0.00	2.86	
11	TENSIONR	26.65	3.43	0.00	11.04	0.00	0.00	0.00	194.51	-2.61	0.00	2.61	
13	LAYBARGE	21.33	3.30	0.00	1.74	0.00	0.00	0.00	194.29	0.14	0.00	0.14	
15	LAYBARGE	12.14	2.98	0.00	41.63	0.00	0.00	0.00	193.23	-91.40	0.00	91.40	
17	LAYBARGE	-0.04	1.76	0.00	33.00	0.01	0.00	0.00	191.25	-86.97	0.01	86.97	
20	STINGER	-8.10	0.35	0.00	18.97	-0.12	0.00	0.00	189.14	-68.60	-0.05	68.60	
22	STINGER	-15.89	-1.45	0.00	18.90	-0.28	0.00	0.00	187.29	-62.93	-0.15	62.93	
24	STINGER	-23.60	-3.61	0.00	7.28	-0.22	0.00	0.00	185.47	-39.35	-0.08	39.35	
26	STINGER	-30.64	-5.84	0.00	20.98	-0.30	0.00	0.00	183.33	-54.84	-0.16	54.84	
28	STINGER	-36.57	-7.92	0.00	6.40	1.05	0.00	0.00	181.60	-16.14	0.24	16.14	
30	STINGER	-39.47	-8.98	0.00	0.00	-1.64	0.41	0.00	180.65	4.25	-2.45	4.90	
32	SAGBEND	-41.35	-9.66	0.00	0.00	0.00	0.00	0.00	180.02	14.08	-1.90	14.21	
33	SAGBEND	-43.23	-10.34	0.00	0.00	0.00	0.00	0.00	179.39	21.56	-1.24	21.59	
34	SAGBEND	-45.12	-11.01	0.01	0.00	0.00	0.00	0.00	178.76	27.26	-0.75	27.27	
35	SAGBEND	-47.00	-11.67	0.01	0.00	0.00	0.00	0.00	178.15	31.62	-0.38	31.62	
36	SAGBEND	-48.90	-12.31	0.01	0.00	0.00	0.00	0.00	177.55	34.97	-0.11	34.98	
37	SAGBEND	-50.80	-12.94	0.01	0.00	0.00	0.00	0.00	176.96	37.57	0.09	37.57	
38	SAGBEND	-52.70	-13.56	0.02	0.00	0.00	0.00	0.00	176.39	39.59	0.25	39.60	
39	SAGBEND	-54.61	-14.15	0.02	0.00	0.00	0.00	0.00	175.84	41.18	0.36	41.18	
40	SAGBEND	-56.52	-14.74	0.02	0.00	0.00	0.00	0.00	175.30	42.44	0.44	42.44	
41	SAGBEND	-58.44	-15.30	0.03	0.00	0.00	0.00	0.00	174.78	43.45	0.50	43.45	
42	SAGBEND	-60.36	-15.84	0.03	0.00	0.00	0.00	0.00	174.28	44.27	0.55	44.27	
43	SAGBEND	-62.29	-16.37	0.03	0.00	0.00	0.00	0.00	173.80	44.94	0.58	44.94	
44	SAGBEND	-64.23	-16.88	0.03	0.00	0.00	0.00	0.00	173.33	45.49	0.60	45.50	
45	SAGBEND	-66.17	-17.36	0.03	0.00	0.00	0.00	0.00	172.89	45.96	0.61	45.96	
46	SAGBEND	-68.11	-17.83	0.04	0.00	0.00	0.00	0.00	172.46	46.35	0.62	46.36	
47	SAGBEND	-70.06	-18.28	0.04	0.00	0.00	0.00	0.00	172.05	46.69	0.63	46.70	
48	SAGBEND	-72.02	-18.71	0.04	0.00	0.00	0.00	0.00	171.66	46.98	0.63	46.99	
49	SAGBEND	-73.97	-19.11	0.04	0.00	0.00	0.00	0.00	171.28	47.23	0.63	47.23	
50	SAGBEND	-75.94	-19.50	0.04	0.00	0.00	0.00	0.00	170.93	47.44	0.63	47.44	
51	SAGBEND	-77.90	-19.87	0.04	0.00	0.00	0.00	0.00	170.59	47.61	0.62	47.62	
52	SAGBEND	-79.87	-20.22	0.04	0.00	0.00	0.00	0.00	170.27	47.75	0.61	47.75	
53	SAGBEND	-81.84	-20.54	0.04	0.00	0.00	0.00	0.00	169.98	47.85	0.61	47.85	
54	SAGBEND	-83.82	-20.85	0.04	0.00	0.00	0.00	0.00	169.70	47.90	0.59	47.91	
55	SAGBEND	-85.80	-21.13	0.04	0.00	0.00	0.00	0.00	169.44	47.91	0.58	47.91	
56	SAGBEND	-87.78	-21.40	0.03	0.00	0.00	0.00	0.00	169.20	47.85	0.56	47.86	
57	SAGBEND	-89.77	-21.64	0.03	0.00	0.00	0.00	0.00	168.98	47.72	0.54	47.72	
58	SAGBEND	-91.76	-21.86	0.03	0.00	0.00	0.00	0.00	168.77	47.50	0.51	47.50	
59	SAGBEND	-93.75	-22.06	0.03	0.00	0.00	0.00	0.00	168.59	47.16	0.48	47.16	

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 1:18:16      PAGE 18

PROJECT - STATIC PIPE ANALYSIS 8 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
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NODE	PIPE	X	Y	Z	SUPPORT	REACTION	SUPT	SEPARATIONS	PIPE	BENDING MOMENTS			
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1	LAYBARGE	64.2	4.4	0.0	0.6	0.0	0.1	0.3	0.
3	LAYBARGE	59.7	4.3	0.0	15.9	0.0	10.7	26.7	7.
5	LAYBARGE	48.2	4.0	0.0	19.3	0.0	14.8	37.0	10.
7	TENSIONR	38.1	3.7	0.0	12.1	0.0	5.4	25.3	7.
9	LAYBARGE	33.4	3.6	0.0	8.5	0.0	2.9	18.9	5.
11	TENSIONR	26.7	3.4	0.0	11.0	0.0	2.6	30.1	8.
13	LAYBARGE	21.3	3.3	0.0	1.7	0.0	0.1	23.9	7.
15	LAYBARGE	12.1	3.0	0.0	41.6	0.0	91.4	250.9	70.
17	LAYBARGE	0.0	1.8	0.0	33.0	0.0	87.0	239.7	67.
20	STINGER	-8.1	0.4	0.0	19.0	-0.1	68.6	193.7	54.
22	STINGER	-15.9	-1.4	0.0	18.9	-0.3	62.9	179.4	50.
24	STINGER	-23.6	-3.6	0.0	7.3	-0.2	39.4	120.4	33.

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STATIC PIPE ANALYSIS 8 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/2/2020 TIME - 1:18:16 CASE 1

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STATIC SOLUTION SUMMARY

26	STINGER	-30.6	-5.8	0.0	21.0	-0.3	54.8	158.7	44.
28	STINGER	-36.6	-7.9	0.0	6.4	1.0	16.1	62.2	17.
30	STINGER	-39.5	-9.0	0.0	0.0	-1.6	4.9	34.1	9.
54	SAGBEND	-83.8	-20.8	0.0	0.0	0.0	47.9	139.8	39.
69	SEABED	-113.7	-23.0	0.0	1.0	-0.2	21.6	74.0	21.

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/2/2020 TIME - 1:18:16 PAGE 21

PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING

USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

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MAXIMUM DYNAMIC PIPE FORCES AND STRESSES

NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD
1	LAYBARGE	64.20	4.43	0.01	0.002	1.482	0.00	0.00	0.00	0.35	0.02	0.35	0.10
3	LAYBARGE	59.72	4.31	0.01	0.002	1.600	4.48	-0.11	0.00	-28.24	0.78	28.27	7.85
5	LAYBARGE	48.23	4.01	0.00	0.002	1.469	15.98	-0.38	0.00	-38.54	-0.69	38.72	10.75
7	TENSIONR	38.11	3.74	-0.01	0.002	1.442	26.11	20.16	0.00	-14.22	-0.38	33.89	9.41
9	LAYBARGE	33.44	3.62	0.00	0.002	1.545	30.78	20.15	0.00	-7.64	0.18	27.45	7.63
11	TENSIONR	26.67	3.44	0.00	0.002	1.490	37.57	32.57	0.00	-6.91	-0.35	39.18	10.88
13	LAYBARGE	21.35	3.30	0.00	0.002	1.461	42.89	32.63	0.00	4.67	-0.65	35.55	9.87
15	LAYBARGE	12.16	2.99	-0.01	0.011	3.417	52.08	32.63	0.00	-240.95	-8.15	273.31	75.92
17	LAYBARGE	-0.01	1.76	-0.02	0.022	8.072	64.32	32.55	0.00	-229.55	-7.87	262.06	72.80
20	STINGER	-8.08	0.36	-0.02	0.014	11.564	72.51	32.39	-0.13	-185.49	-7.75	210.60	58.50
22	STINGER	-15.88	-1.44	-0.02	0.007	14.416	80.51	32.18	-0.31	-178.14	-11.10	209.91	58.31
24	STINGER	-23.60	-3.59	-0.02	0.001	16.729	88.51	31.93	-0.52	-147.84	-9.04	177.66	49.35
26	STINGER	-30.66	-5.82	-0.02	-0.035	18.232	95.90	31.66	-0.73	-158.59	-14.52	188.30	52.31
28	STINGER	-36.62	-7.81	-0.02	0.018	18.691	102.19	31.41	-0.92	-258.38	-27.34	288.76	80.21
30	STINGER	-39.50	-8.79	-0.02	-0.209	18.779	105.27	31.29	-1.00	120.08	-223.23	256.97	71.38
32	SAGBEND	-41.33	-9.39	-0.02	-0.516	18.709	107.27	31.23	-1.05	124.75	-177.80	214.72	59.64
33	SAGBEND	-43.22	-10.02	-0.01	-0.545	18.529	109.27	31.15	-1.11	128.52	-123.52	188.37	52.32
34	SAGBEND	-45.12	-10.63	0.01	-0.490	18.257	111.27	31.08	-1.16	133.89	-88.89	177.76	49.38
35	SAGBEND	-47.02	-11.26	0.04	-0.426	17.951	113.27	31.01	-1.21	140.97	-66.63	173.09	48.08
36	SAGBEND	-48.92	-11.88	0.07	-0.387	17.607	115.27	30.95	-1.26	144.83	-52.35	175.69	48.80
37	SAGBEND	-50.83	-12.49	0.10	-0.374	17.198	117.27	30.88	-1.31	153.51	-40.52	183.93	51.09
38	SAGBEND	-52.74	-13.07	0.13	-0.360	16.755	119.27	30.82	-1.36	157.45	43.38	187.54	52.09
39	SAGBEND	-54.66	-13.63	0.16	-0.338	16.308	121.27	30.76	-1.41	158.00	50.90	187.81	52.17
40	SAGBEND	-56.58	-14.17	0.19	-0.312	15.849	123.27	30.70	-1.45	158.27	55.68	188.34	52.32
41	SAGBEND	-58.50	-14.70	0.22	-0.283	15.407	125.27	30.64	-1.49	160.12	58.36	190.07	52.80
42	SAGBEND	-60.42	-15.22	0.25	-0.274	14.917	127.27	30.59	-1.53	159.88	59.46	189.77	52.71
43	SAGBEND	-62.36	-15.71	0.28	-0.259	14.395	129.27	30.53	-1.57	158.17	59.43	188.08	52.24
44	SAGBEND	-64.30	-16.18	0.30	-0.243	13.916	131.27	30.48	-1.61	155.62	58.60	185.62	51.56
45	SAGBEND	-66.24	-16.63	0.30	-0.227	13.434	133.27	30.43	-1.65	152.75	57.25	186.30	51.75
46	SAGBEND	-68.19	-17.06	0.30	-0.242	12.870	135.27	30.39	-1.68	151.09	55.58	187.75	52.15
47	SAGBEND	-70.14	-17.47	0.31	-0.256	12.314	137.27	30.34	-1.71	152.27	53.69	188.39	52.33
48	SAGBEND	-72.09	-17.88	0.31	-0.269	11.760	139.27	30.30	-1.74	152.59	51.63	188.16	52.27
49	SAGBEND	-74.05	-18.26	0.30	-0.283	11.226	141.27	30.26	-1.77	152.09	49.40	187.12	51.98
50	SAGBEND	-76.01	-18.63	0.29	-0.318	10.703	143.27	30.23	-1.80	151.16	46.99	185.41	51.50
51	SAGBEND	-77.98	-18.97	0.27	-0.246	10.178	145.27	30.19	-1.82	149.72	46.00	183.24	50.90
52	SAGBEND	-79.95	-19.31	0.25	-0.131	9.679	147.27	30.16	-1.84	147.94	44.53	180.79	50.22
53	SAGBEND	-81.92	-19.62	0.23	-0.017	9.186	149.27	30.12	-1.86	146.24	42.02	178.75	49.65
54	SAGBEND	-83.90	-19.92	0.21	0.094	8.698	151.27	30.10	-1.88	144.20	-40.18	176.23	48.95
55	SAGBEND	-85.87	-20.20	0.19	0.201	8.205	153.27	30.07	-1.90	141.42	-40.61	172.97	48.05
56	SAGBEND	-87.85	-20.47	0.18	0.307	7.718	155.27	30.04	-1.92	138.69	-40.43	169.47	47.07
57	SAGBEND	-89.84	-20.73	0.16	0.426	7.248	157.27	30.02	-1.93	135.62	-40.52	165.93	46.09
58	SAGBEND	-91.82	-20.97	0.14	0.543	6.778	159.27	30.00	-1.95	132.32	-41.25	161.86	44.96
59	SAGBEND	-93.80	-21.20	0.12	0.655	6.308	161.27	29.98	-1.96	128.77	-41.70	157.54	43.76

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/2/2020 TIME - 1:18:16 PAGE 22 PROJECT -

STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING

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MAXIMUM DYNAMIC PIPE FORCES AND STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M )	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
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60	SAGBEND	-95.79	-21.40	0.11	0.684	5.811	163.27	29.97	-1.97	127.84	-41.73	152.12	42.26
61	SAGBEND	-97.78	-21.59	0.10	0.692	5.329	165.27	29.96	-1.98	127.22	-41.22	148.06	41.13
62	SAGBEND	-99.77	-21.77	0.09	0.675	4.857	167.27	29.95	-1.98	125.85	-39.99	146.66	40.74
63	SAGBEND	-101.76	-21.93	0.09	0.641	4.420	169.27	29.94	-1.99	123.58	-37.89	145.71	40.47
64	SAGBEND	-103.75	-22.08	0.08	0.590	4.009	171.27	29.93	-1.99	120.19	-34.75	142.93	39.70
65	SAGBEND	-105.74	-22.21	0.08	0.508	3.621	173.27	29.93	-1.99	117.57	-30.43	138.35	38.43
66	SAGBEND	-107.74	-22.33	0.08	0.399	3.263	175.27	29.93	-2.00	115.53	-29.16	136.27	37.85
67	SAGBEND	-109.73	-22.44	0.08	0.318	2.938	177.27	29.93	-2.00	112.98	-28.27	134.21	37.28
68	SAGBEND	-111.73	-22.53	0.08	0.233	2.640	179.27	29.94	-2.00	111.43	-27.16	132.72	36.87
69	SAGBEND	-113.73	-22.62	0.08	0.154	2.363	181.27	29.95	-2.00	110.02	-26.01	131.01	36.39
70	SAGBEND	-115.72	-22.69	0.09	0.094	2.098	183.27	29.96	-2.00	107.63	-24.50	128.39	35.66
71	SAGBEND	-117.72	-22.76	0.10	0.073	1.842	185.27	29.97	-2.00	104.07	-22.66	124.67	34.63
72	SAGBEND	-119.72	-22.82	0.10	0.068	1.592	187.27	29.99	-2.00	100.60	-20.53	121.81	33.84
73	SAGBEND	-121.72	-22.87	0.10	0.077	1.345	189.27	30.00	-2.00	97.61	-18.41	119.78	33.27
74	SAGBEND	-123.72	-22.92	0.10	0.126	1.124	191.27	30.02	-2.00	94.63	-16.28	116.79	32.44
75	SAGBEND	-125.71	-22.95	0.10	0.179	0.902	193.27	30.04	-2.00	89.87	-13.92	112.08	31.33
76	SAGBEND	-127.71	-22.98	0.10	0.238	0.697	195.27	30.06	-2.00	82.76	-10.92	105.24	29.23
77	SEABED	-129.71	-23.00	0.09	0.298	0.506	197.27	30.07	-2.00	72.74	-7.49	95.78	26.61
78	SEABED	-131.71	-23.02	0.08	0.332	0.336	199.27	30.09	-2.00	61.63	-4.74	83.17	23.10
79	SEABED	-133.71	-23.03	0.07	0.360	0.200	201.27	30.11	-2.00	47.95	-2.60	74.97	20.83
80	SEABED	-135.71	-23.03	0.06	0.372	0.097	203.27	30.12	-2.00	33.83	-1.11	63.20	18.33
81	SEABED	-137.71	-23.03	0.04	0.360	0.030	205.27	30.14	-2.00	21.69	-0.61	51.72	16.19
82	SEABED	-139.71	-23.04	0.03	0.318	-0.010	207.27	30.16	-2.00	12.41	-0.32	40.87	14.99
83	SEABED	-141.71	-23.03	0.02	0.259	-0.023	209.27	30.17	-2.00	5.97	-0.17	30.67	13.98
84	SEABED	-143.71	-23.03	0.01	0.187	-0.023	211.27	30.19	-2.00	-1.98	-0.10	20.96	12.99
85	SEABED	-145.71	-23.03	0.00	0.117	-0.021	213.27	30.20	-2.00	-1.95	-0.09	16.88	12.18
86	SEABED	-147.71	-23.03	0.00	0.061	-0.017	215.27	30.22	-2.00	-1.94	-0.08	12.94	11.59
87	SEABED	-149.71	-23.03	0.00	0.024	-0.013	217.27	30.23	-2.00	-1.87	-0.06	8.46	11.24
88	SEABED	-151.71	-23.03	0.00	0.001	-0.009	219.27	30.25	-2.00	-1.57	-0.05	3.71	9.92
89	SEABED	-153.71	-23.03	0.00	-0.006	-0.005	221.27	30.26	-2.00	-1.27	-0.39	3.35	8.99
90	SEABED	-155.71	-23.03	0.00	-0.006	-0.003	223.27	30.28	-2.00	-0.92	-1.51	3.89	8.86
91	SEABED	-157.71	-23.03	0.00	-0.007	-0.001	225.27	30.29	-2.00	-0.61	1.06	3.79	8.83
92	SEABED	-159.71	-23.03	0.00	-0.006	0.000	227.27	30.31	-2.00	-0.37	0.96	3.67	8.80
93	SEABED	-161.71	-23.03	0.00	-0.005	0.001	229.27	30.32	-2.00	-0.19	0.82	3.57	8.77
94	SEABED	-163.71	-23.03	0.00	-0.004	0.000	231.27	30.34	-2.00	-0.08	0.68	3.49	8.75
95	SEABED	-165.71	-23.03	0.00	-0.002	0.000	233.27	30.35	-2.00	0.07	0.55	3.44	8.73
96	SEABED	-167.71	-23.03	0.00	-0.001	0.000	235.27	30.36	-2.00	0.05	0.41	3.42	8.73
97	SEABED	-169.71	-23.03	0.00	0.000	0.000	237.27	30.38	-2.00	0.04	0.27	3.43	8.73
98	SEABED	-171.71	-23.03	0.00	0.000	0.000	239.27	30.39	-2.00	0.02	0.13	3.44	8.73
99	SEABED	-173.71	-23.03	0.00	0.000	0.000	241.27	30.40	-2.00	0.00	0.00	3.45	8.74

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 1:18:16 PAGE 23

PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING

USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

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MAXIMUM DYNAMIC PIPE FORCES AND STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION VERT (KN )	SEPARATIONS VERT (M )	PIPE TENSION (KN )	BENDING MOMENTS VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)			
=====													
1	LAYBARGE	64.20	4.43	0.01	0.69	-0.05	0.00	0.00	0.14	0.01			
3	LAYBARGE	59.72	4.31	0.01	16.88	0.49	0.00	0.00	-0.87	-11.35	0.31	11.35	
5	LAYBARGE	48.23	4.01	0.00	20.06	-0.35	0.00	0.00	-3.11	-15.48	-0.28	15.49	
7	TENSIONR	38.11	3.74	-0.01	12.62	0.23	0.00	0.00	166.01	-5.71	-0.15	5.72	
9	LAYBARGE	33.44	3.62	0.00	8.88	0.21	0.00	0.00	165.93	-3.07	0.07	3.07	
11	TENSIONR	26.67	3.44	0.00	11.60	0.16	0.00	0.00	268.24	-2.78	-0.14	2.78	
13	LAYBARGE	21.35	3.30	0.00	3.02	-0.60	0.00	0.00	268.69	1.88	-0.26	1.88	
15	LAYBARGE	12.16	2.99	-0.01	48.80	-1.51	0.00	0.00	268.69	-96.82	-3.28	96.84	
17	LAYBARGE	-0.01	1.76	-0.02	40.77	-1.58	0.00	0.00	268.03	-92.24	-3.16	92.27	
20	STINGER	-8.08	0.36	-0.02	26.50	-3.01	0.00	0.00	266.75	-74.53	-3.11	74.55	
22	STINGER	-15.88	-1.44	-0.02	31.98	-5.71	0.00	0.00	265.77	-71.58	-4.46	71.63	
24	STINGER	-23.60	-3.59	-0.02	33.95	-5.91	0.10	0.00	264.56	-59.40	-3.63	59.41	
26	STINGER	-30.66	-5.82	-0.02	38.57	-8.74	0.36	0.00	263.28	-63.72	-5.83	63.74	
28	STINGER	-36.62	-7.81	-0.02	51.72	40.88	0.82	0.00	261.98	-103.82	-10.98	103.85	
30	STINGER	-39.50	-8.79	-0.02	-2.26	-59.50	1.54	0.00	261.35	48.25	-89.70	91.08	
32	SAGBEND	-41.33	-9.39	-0.02	0.00	0.00	0.00	0.00	261.00	50.13	-71.44	74.05	
33	SAGBEND	-43.22	-10.02	-0.01	0.00	0.00	0.00	0.00	260.63	51.64	-49.63	64.19	
34	SAGBEND	-45.12	-10.63	0.01	0.00	0.00	0.00	0.00	260.27	53.80	-35.72	59.51	
35	SAGBEND	-47.02	-11.26	0.04	0.00	0.00	0.00	0.00	259.91	56.64	-26.77	57.67	
36	SAGBEND	-48.92	-11.88	0.07	0.00	0.00	0.00	0.00	259.57	58.19	-21.03	58.93	
37	SAGBEND	-50.83	-12.49	0.10	0.00	0.00	0.00	0.00	259.23	61.68	-16.28	62.28	
38	SAGBEND	-52.74	-13.07	0.13	0.00	0.00	0.00	0.00	258.91	63.27	-17.43	63.76	
39	SAGBEND	-54.66	-13.63	0.16	0.00	0.00	0.00	0.00	258.60	63.49	-20.45	63.91	
40	SAGBEND	-56.58	-14.17	0.19	0.00	0.00	0.00	0.00	258.31	63.59	-22.37	64.17	

41	SAGBEND	-58.50	-14.70	0.22	0.00	0.00	0.00	0.00	258.03	64.34	23.45	64.90
42	SAGBEND	-60.42	-15.22	0.25	0.00	0.00	0.00	0.00	257.76	64.24	23.89	64.81
43	SAGBEND	-62.36	-15.71	0.28	0.00	0.00	0.00	0.00	257.50	63.56	23.88	64.16
44	SAGBEND	-64.30	-16.18	0.30	0.00	0.00	0.00	0.00	257.25	62.53	23.54	63.20
45	SAGBEND	-66.24	-16.63	0.30	0.00	0.00	0.00	0.00	257.02	61.37	23.00	63.45
46	SAGBEND	-68.19	-17.06	0.30	0.00	0.00	0.00	0.00	256.80	60.71	22.33	64.06
47	SAGBEND	-70.14	-17.47	0.31	0.00	0.00	0.00	0.00	256.59	61.18	21.57	64.34
48	SAGBEND	-72.09	-17.88	0.31	0.00	0.00	0.00	0.00	256.39	61.31	20.74	64.28
49	SAGBEND	-74.05	-18.26	0.30	0.00	0.00	0.00	0.00	256.21	61.11	19.85	63.88
50	SAGBEND	-76.01	-18.63	0.29	0.00	0.00	0.00	0.00	256.03	60.74	18.88	63.22
51	SAGBEND	-77.98	-18.97	0.27	0.00	0.00	0.00	0.00	255.87	60.16	18.48	62.37
52	SAGBEND	-79.95	-19.31	0.25	0.00	0.00	0.00	0.00	255.73	59.44	17.89	61.40
53	SAGBEND	-81.92	-19.62	0.23	0.00	0.00	0.00	0.00	255.59	58.76	16.88	60.52
54	SAGBEND	-83.90	-19.92	0.21	0.00	0.00	0.00	0.00	255.47	57.94	-16.14	59.53
55	SAGBEND	-85.87	-20.20	0.19	0.00	0.00	0.00	0.00	255.35	56.83	-16.32	58.23
56	SAGBEND	-87.85	-20.47	0.18	0.00	0.00	0.00	0.00	255.26	55.73	-16.25	56.91
57	SAGBEND	-89.84	-20.73	0.16	0.00	0.00	0.00	0.00	255.17	54.49	-16.28	55.50

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX     DATE - 5/2/2020     TIME - 1:18:16     PAGE 24

PROJECT - STATIC PIPE ANALYSIS 8 INCH     JOB NO. - LAYING

USER ID - IK     LICENSED BY - PT Timas Suplindo     CASE 1

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MAXIMUM DYNAMIC PIPE FORCES AND STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACTION HORIZ (KN)	SUPT VERT (M)	SEPARATIONS HORIZ (M)	PIPE TENSION (KN)	VERT (KN-M)	BENDING MOMENTS HORIZ (KN-M)	TOTAL (KN-M)	
=====													
58	SAGBEND	-91.82	-20.97	0.14	0.00	0.00	0.00	0.00	255.10	53.17	-16.57	53.97	
59	SAGBEND	-93.80	-21.20	0.12	0.00	0.00	0.00	0.00	255.04	51.74	-16.75	52.25	
60	SAGBEND	-95.79	-21.40	0.11	0.00	0.00	0.00	0.00	255.00	51.37	-16.77	51.46	
61	SAGBEND	-97.78	-21.59	0.10	0.00	0.00	0.00	0.00	254.97	51.12	-16.56	51.20	
62	SAGBEND	-99.77	-21.77	0.09	0.00	0.00	0.00	0.00	254.96	50.57	-16.07	50.64	
63	SAGBEND	-101.76	-21.93	0.09	0.00	0.00	0.00	0.00	254.96	49.65	-15.22	49.70	
64	SAGBEND	-103.75	-22.08	0.08	0.00	0.00	0.00	0.00	254.98	48.29	-13.96	48.32	
65	SAGBEND	-105.74	-22.21	0.08	0.29	-0.19	0.00	0.00	255.01	47.24	-12.23	47.25	
66	SAGBEND	-107.74	-22.33	0.08	1.24	-0.82	0.00	0.00	255.06	46.42	-11.72	46.42	
67	SAGBEND	-109.73	-22.44	0.08	1.86	-1.24	0.00	0.00	255.12	45.40	-15.38	45.63	
68	SAGBEND	-111.73	-22.53	0.08	2.18	-1.45	0.00	0.00	255.20	44.77	-18.33	45.05	
69	SAGBEND	-113.73	-22.62	0.08	2.28	-1.52	0.00	0.00	255.29	44.21	-20.90	44.37	
70	SAGBEND	-115.72	-22.69	0.09	2.27	-1.51	0.00	0.00	255.40	43.25	-22.30	43.32	
71	SAGBEND	-117.72	-22.76	0.10	2.30	-1.50	0.00	0.00	255.52	41.82	-22.61	41.83	
72	SAGBEND	-119.72	-22.82	0.10	2.35	1.57	0.00	0.00	255.65	40.42	-22.27	40.48	
73	SAGBEND	-121.72	-22.87	0.10	2.41	1.61	0.00	0.00	255.79	39.22	-21.70	39.23	
74	SAGBEND	-123.72	-22.92	0.10	2.43	1.62	0.00	0.00	255.94	38.02	-20.97	38.03	
75	SAGBEND	-125.71	-22.95	0.10	2.41	1.61	0.00	0.00	256.09	36.11	-20.46	36.13	
76	SAGBEND	-127.71	-22.98	0.10	2.43	1.62	0.00	0.00	256.24	33.26	-19.79	33.37	
77	SEABED	-129.71	-23.00	0.09	2.38	1.58	0.00	0.00	256.38	29.23	19.89	29.57	
78	SEABED	-131.71	-23.02	0.08	2.37	1.53	0.00	0.00	256.52	24.76	-19.02	25.08	
79	SEABED	-133.71	-23.03	0.07	2.31	-1.51	0.00	0.00	256.66	19.27	-18.50	20.56	
80	SEABED	-135.71	-23.03	0.06	2.29	-1.50	0.00	0.00	256.79	13.59	-17.85	17.88	
81	SEABED	-137.71	-23.03	0.04	2.28	-1.48	0.00	0.00	256.93	8.71	-16.76	16.84	
82	SEABED	-139.71	-23.04	0.03	2.28	-1.48	0.00	0.00	257.06	4.99	-15.94	15.95	
83	SEABED	-141.71	-23.03	0.02	2.23	-1.42	0.00	0.00	257.20	2.40	-14.53	14.53	
84	SEABED	-143.71	-23.03	0.01	2.16	-1.21	0.00	0.00	257.33	-0.80	-12.66	12.66	
85	SEABED	-145.71	-23.03	0.00	2.08	-0.65	0.00	0.00	257.46	-0.78	-10.05	10.05	
86	SEABED	-147.71	-23.03	0.00	2.00	0.27	0.00	0.00	257.58	-0.78	-7.23	7.24	
87	SEABED	-149.71	-23.03	0.00	1.93	0.26	0.00	0.00	257.71	-0.75	-4.75	4.78	
88	SEABED	-151.71	-23.03	0.00	1.88	0.21	0.00	0.00	257.83	-0.63	-2.83	2.86	
89	SEABED	-153.71	-23.03	0.00	1.85	0.18	0.00	0.00	257.96	-0.51	-1.48	1.51	
90	SEABED	-155.71	-23.03	0.00	1.83	0.15	0.00	0.00	258.08	-0.37	-0.61	0.64	
91	SEABED	-157.71	-23.03	0.00	1.83	0.12	0.00	0.00	258.20	-0.25	0.42	0.46	
92	SEABED	-159.71	-23.03	0.00	1.83	0.09	0.00	0.00	258.32	-0.15	0.38	0.40	
93	SEABED	-161.71	-23.03	0.00	1.83	0.06	0.00	0.00	258.43	-0.08	0.33	0.33	
94	SEABED	-163.71	-23.03	0.00	1.83	0.04	0.00	0.00	258.55	-0.03	0.27	0.27	
95	SEABED	-165.71	-23.03	0.00	1.83	0.02	0.00	0.00	258.66	0.03	0.22	0.22	
96	SEABED	-167.71	-23.03	0.00	1.83	0.01	0.00	0.00	258.77	0.02	0.17	0.17	
97	SEABED	-169.71	-23.03	0.00	1.83	-0.01	0.00	0.00	258.88	0.01	0.11	0.11	
98	SEABED	-171.71	-23.03	0.00	1.83	0.00	0.00	0.00	258.99	0.01	0.05	0.05	
99	SEABED	-173.71	-23.03	0.00	0.00	0.00	0.00	0.00	259.10	0.00	0.00	0.00	

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX     PAGE 25

STATIC PIPE ANALYSIS 8 INCH

JOB NO. - LAYING     LICENSED BY - PT Timas Suplindo

DATE - 5/2/2020     TIME - 1:18:16     CASE 1

USER ID - IK

=====

DYNAMIC SOLUTION SUMMARY

SEA STATE NUMBER ( 1)

=====

SEA STATE TYPE ..... WAVE SPECTRUM

NO. WAVE COMPONENTS .. 20

WAVE WATER DEPTH ..... 23.0 M

MAX. WAVE FREQUENCY .. 3.0015 RA/S

VESSEL RESPONSE TYPE . TABLE OF RAOS  
WAVE TRAVEL DIRECTION 0.000 DEG  
MIN. WAVE FREQUENCY .. 0.1001 RA/S  
RANDOM PHASE SEED .... 0

SPECTRUM START TIME .. 0. SECS NO. RAOS IN TABLE .... 30  
 RAO SIGN CONVENTION .. BENTLEY MOSES

SEA STATE DEFINITION

=====

WAVE SPECTRUM TYPE ... JONSWAP (CLASSIC)  
 JONSWAP COEFFICIENT .. 0.005729 JONSWAP PEAK FACTOR .. 5.000  
 PEAK WAVE FREQUENCY .. 0.9498 RA/S

CALCULATED WAVE HEIGHTS

=====

SIGNIFICANT WAVE HT. . 1.946 M AVERAGE WAVE HEIGHT .. 1.243 M  
 MAXIMUM WAVE HEIGHT .. 3.695 M RMS WAVE HEIGHT ..... 1.387 M  
 TOTAL NUMBER OF WAVES 1919

===== SOLUTION SUMMARY =====

NODE	PIPE	X	Y	Z	SUPPORT	REACT	TOTAL	TOTAL	PCT
NO. SECTION		COORD	COORD	COORD	VERT	HORIZ	MOMENT	STRESS	YLD
		( M )	( M )	( M )	( KN )	( KN )	( KN-M)	( MPA )	( % )
1	LAYBARGE	64.2	4.4	0.0	0.7	0.0	0.1	0.4	0.
3	LAYBARGE	59.7	4.3	0.0	16.9	0.5	11.3	28.3	8.
5	LAYBARGE	48.2	4.0	0.0	20.1	-0.3	15.5	38.7	11.
7	TENSIONR	38.1	3.7	0.0	12.6	0.2	5.7	33.9	9.
9	LAYBARGE	33.4	3.6	0.0	8.9	0.2	3.1	27.5	8.
11	TENSIONR	26.7	3.4	0.0	11.6	0.2	2.8	39.2	11.
13	LAYBARGE	21.4	3.3	0.0	3.0	-0.6	1.9	35.5	10.
15	LAYBARGE	12.2	3.0	0.0	48.8	-1.5	96.8	273.3	76.
17	LAYBARGE	0.0	1.8	0.0	40.8	-1.6	92.3	262.1	73.
20	STINGER	-8.1	0.4	0.0	26.5	-3.0	74.6	210.6	59.
22	STINGER	-15.9	-1.4	0.0	32.0	-5.7	71.6	209.9	58.
24	STINGER	-23.6	-3.6	0.0	34.0	-5.9	59.4	177.7	49.
26	STINGER	-30.7	-5.8	0.0	38.6	-8.7	63.7	188.3	52.
28	STINGER	-36.6	-7.8	0.0	51.7	40.9	103.9	288.8	80.
30	STINGER	-39.5	-8.8	0.0	-2.3	-59.5	91.1	257.0	71.
32	SAGBEND	-41.3	-9.4	0.0	0.0	0.0	74.1	214.7	60.
69	SAGBEND	-113.7	-22.6	0.1	2.3	-1.5	44.4	131.0	36.



**LAMPIRAN ANALISA DINAMIS PADA PIPA 8 INCH  
HEADING 90°**

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*****
*
*           O F F P I P E - 3 -- OFFSHORE PIPELINE ANALYSIS SYSTEM
*
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*
*           VERSION NO. - 3.02EX
*           RELEASED ON - 03/08/2016
*           LICENSED TO - PT Timas Suplindo
*
*****
*
* OFFPIPE IS A NONLINEAR, 3-DIMENSIONAL FINITE ELEMENT METHOD BASED PROGRAM FOR THE
* STATIC AND DYNAMIC ANALYSIS OF PROBLEMS ARISING IN THE DESIGN OF MARINE PIPELINES.
* THIS VERSION OF OFFPIPE MAY BE USED FOR THE ANALYSIS OF OFFSHORE PIPELAYING OPER-
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*
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*
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*           6554 AUDEN                 FACSIMILE: (713) 664-0962
*           HOUSTON, TEXAS 77005
*           U.S.A.                     EMAIL: SUPPORT@OFFPIPE.COM
*
*****

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 3
STATIC PIPE ANALYSIS 8 INCH
JOB NO. - LAYING           LICENSED BY - PT Timas Suplindo
USER ID - IK              DATE - 5/2/2020 TIME - 1:36:1          CASE 1
=====

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INPUT DATA ECHO

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=====
PRINTED OUTPUT SELECTED
=====
STATIC PIPE FORCES AND STRESSES ... YES
STATIC SOLUTION SUMMARY ..... YES
DYNAMIC PIPE FORCES AND STRESSES ... YES
DYNAMIC RANGE OF PIPE DATA ..... NO
DYNAMIC TRACKING OF PIPE DATA ..... NO
OVERBEND PIPE SUPPORT GEOMETRY .... NO
STINGER BALLAST SCHEDULE DATA ..... NO
SUPPORT REACTIONS IN BARGE COORDS . NO

INTERNAL FORCES IN PIPE & CABLE ... NO
INTERNAL FORCES IN STINGER ..... NO
PRINT PIPE STRAINS IN OUTPUT ..... NO
DNV OS-F101 COMPLIANCE REPORT ..... NO
API RP-1111 COMPLIANCE REPORT ..... NO
PRINT DNV/API FACTORS & PARAMETERS NO
USE THICK WALL HOOP STRESS EQN. ... NO
USE DNV 1981 FOR TOTAL PIPE STRESS NO

ENABLE/DISABLE WARNING MESSAGES ... ENABLE
GENERATE SPREAD SHEET PLOT FILE ... NO
GENERATE ASCII PLOT DATA FILES .... NO

```

PROFILE PLOT TABLE ENTRIES

```
=====
PLOT TABLE INDEX ..... 1
PLOT NUMBER ..... 1
PLOT TYPE OPTION NUMBER ..... 1
DYNAMIC PROFILE TIME POINT ..... 0.000
DYNAMIC PROFILE TIME INCREMENT ..... 0.000
ORDINATE PARAMETER CODE NUMBER ..... 2
AXIS LABEL FOR ORDINATE ..... "PIPE ELEVATION Y COORDINATE"
ABSCISSA PARAMETER CODE NUMBER ..... 1
AXIS LABEL FOR ABSCISSA ..... "PIPE HORIZONTAL X COORDINATE"

PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS"
MINIMUM VERTICAL AXIS RANGE ..... 0.000
MAXIMUM VERTICAL AXIS RANGE ..... 0.000
MINIMUM HORIZONTAL AXIS RANGE ..... 0.000
MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000
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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 4
STATIC PIPE ANALYSIS 8 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 5/2/2020 TIME - 1:36:1 CASE 1
=====
```

INPUT DATA ECHO

PROFILE PLOT TABLE ENTRIES

```
=====
PLOT TABLE INDEX ..... 2
PLOT NUMBER ..... 1
PLOT TYPE OPTION NUMBER ..... 1
DYNAMIC PROFILE TIME POINT ..... 0.000
DYNAMIC PROFILE TIME INCREMENT ..... 0.000
ORDINATE PARAMETER CODE NUMBER ..... 15
AXIS LABEL FOR ORDINATE ..... "DNV YIELD STRESS PERCENTAGE"
ABSCISSA PARAMETER CODE NUMBER ..... 1
AXIS LABEL FOR ABSCISSA ..... "PIPELINE HORIZONTAL X COORDINATE"

PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS"
MINIMUM VERTICAL AXIS RANGE ..... 0.000
MAXIMUM VERTICAL AXIS RANGE ..... 0.000
MINIMUM HORIZONTAL AXIS RANGE ..... 0.000
MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000
=====
```

PIPE PROPERTIES

```
=====
PROPERTY TABLE ROW NUMBER ..... 1
PIPE SECTION LENGTH ..... 0.000 METERS
STEEL MODULUS OF ELASTICITY ..... 207000. M-PASCAL
STEEL CROSS SECTIONAL AREA ..... 82.690 CM^2
COATED PIPE AVG MOMENT OF INERTIA .. 4402.00 CM^4
WEIGHT PER-UNIT-LENGTH IN AIR ..... 1649.63 N/M
WEIGHT PER-UNIT-LENGTH SUBMERGED .. 912.94 N/M
MAXIMUM ALLOWABLE PIPE STRAIN ..... 0.205000 PERCENT

STEEL OUTSIDE DIAMETER ..... 21.9100 CM
STEEL WALL THICKNESS ..... 1.2700 CM
YIELD STRESS ..... 360.00 M-PASCAL
STRESS/STRAIN INTENSE FACTOR ..... 0.0000
HYDRODYNAMIC OUTSIDE DIAMETER ..... 0.000 CM
DRAG COEFFICIENT ..... 0.0000
HYDRODYNAMIC TOTAL AREA ..... 0.000 CM^2
ADDED MASS COEFFICIENT ..... 0.0000
POISSON'S RATIO ..... 0.3000
COEFFICIENT OF THERMAL EXPANSION .. 0.00001100 1/DEG C
=====
```

```
=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 5
STATIC PIPE ANALYSIS 8 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 5/2/2020 TIME - 1:36:1 CASE 1
=====
```

INPUT DATA ECHO

PIPE COATING PROPERTIES

```
=====
PIPE PROPERTY TABLE INDEX ..... 1
CORROSION COATING THICKNESS ..... 0.320 CM
CORROSION COATING WEIGHT DENSITY .. 9025.2 N/M^3
CORROSION COATING ELASTIC MODULUS . 0.000 M-PASCAL
CONCRETE COATING THICKNESS ..... 4.000 CM
CONCRETE COATING WEIGHT DENSITY ... 29857. N/M^3
CONCRETE COATING ELASTIC MODULUS .. 0.000 M-PASCAL
DESIRED PIPE SPECIFIC GRAVITY ..... 0.0000
CONCRETE STIFFENING EFFECTIVENESS . 0.000
NO NOT CALC. STRESS FOR BARE PIPE . NO
=====
```

AVERAGE LENGTH OF PIPE JOINT ..... 12.200 METERS  
 EFFECTIVE FIELD JOINT LENGTH ..... 0.300 METERS  
 FIELD JOINT FILL WEIGHT DENSITY ... 10055.3 N/M^3  
 FIELD JOINT FILL ELASTIC MODULUS... 0.000 M-PASCAL  
 FIELD JOINT STIFFENING EFFECT. .... 0.000  
 FIELD JOINT BENDING MODEL ..... 0 IGNORE COATING STIFFNESS  
 WEIGHT DENSITY OF STEEL ..... 77008. N/M^3  
 WEIGHT DENSITY OF PIPE CONTENTS ... 0.0 N/M^3  
 REF. ELEVATION FOR STATIC HEAD .... 0.00 METERS  
 FREE FLOOD PIPE DURING PIPELAY ... NO

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 6  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 1:36:1 CASE 1  
 =====

INPUT DATA ECHO

PIPELAY VESSEL DESCRIPTION

=====  
 NUMBER OF PIPE NODES ..... 9  
 BARGE GEOMETRY SPECIFIED BY ..... 1 X-Y COORDINATES  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.000 METERS  
 ADJUST Y COORDINATES MANUALLY .... NO  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 PIPE ANGLE RELATIVE TO DECK ..... 0.0000 DEGREES  
 HEIGHT OF DECK ABOVE WATER ..... 2.400 METERS  
 LAYBARGE FORWARD (X) OFFSET ..... 0.000 METERS  
 BARGE TRIM ANGLE ..... 0.5000 DEGREES  
  
 STERN SHOE X COORDINATE ..... 0.000 METERS  
 STERN SHOE Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER X COORDINATE ..... 43.820 METERS  
 ROTATION CENTER Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER Z COORDINATE ..... 6.370 METERS  
 BARGE HEADING ..... 0.0000 DEGREES  
 BARGE OFFSET FROM RIGHT-OF-WAY .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT VERTICAL ANGLE ... 0.000 DEGREES  
 PIPE RAMP PIVOT Z COORDINATE ..... 0.000 METERS  
 PIPE RAMP HEADING ON DECK ..... 0.000 DEGREES  
 ROLE OF ALTERNATE WAVE ORIGIN .... 0 MOTIONS & WAVES AT CENTER OF MOTION  
 WAVE PHASE ORIGIN X COORDINATE .... 0.000  
 WAVE PHASE ORIGIN Y COORDINATE .... 0.000 METERS  
 WAVE PHASE ORIGIN Z COORDINATE .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE .....

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	DAVIT SPACING ( M )
64.220	1.838	1 SIMPLE SUPPORT	0.000
59.740	1.760	1 SIMPLE SUPPORT	0.000
48.240	1.560	1 SIMPLE SUPPORT	0.000
38.110	1.383	2 PIPE TENSIONER	0.000
33.440	1.302	1 SIMPLE SUPPORT	0.000
26.660	1.183	2 PIPE TENSIONER	0.000
21.340	1.092	7 USER DEFINED SPT	0.000
12.150	0.860	7 USER DEFINED SPT	0.000
-0.040	-0.260	8 USER DEFINED SPT	0.000

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 7  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 1:36:1 CASE 1  
 =====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====  
 SUPPORT PROPERTY TABLE INDEX ..... 2  
 SUPPORT ELEMENT TYPE ..... 2 TENSIONER  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
  
 BOTTOM ROLLER ANGLE TO HORIZONTAL . 0.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES

SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 7  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 1.600 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 8  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 1:36: 1 CASE 1  
 =====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 8  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

STINGER DESCRIPTION

=====

NUMBER OF PIPE/STINGER NODES ..... 6  
 STINGER GEOMETRY SPECIFIED BY ..... 2 X-Y COORD AND MATCH PT  
 STINGER TYPE ..... 1 FIXED GEOMETRY OR RAMP  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.00 METERS  
 HITCH X-COORDINATE ..... 0.497 METERS  
 HITCH Y-COORDINATE ..... -1.800 METERS  
 HITCH ANGULAR ORIENTATION ..... 0.000 DEGREES

X COORDINATE OF LOCAL ORIGIN ..... 0.497 METERS  
 Y COORDINATE OF LOCAL ORIGIN ..... -1.800 METERS  
 ROTATION ABOUT STINGER HITCH ..... 13.500 DEGREES  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 TANGENT POINT ANGLE ..... 0.000 DEGREES

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	ELEMENT TYPE	ELEMENT LENGTH ( M )
-8.325	2.209	1 SIMPLE SUPPORT	2 HINGED END	0.000
-16.325	2.349	1 SIMPLE SUPPORT	1 FIXED END	0.000
-24.325	2.119	1 SIMPLE SUPPORT	1 FIXED END	0.000
-31.699	1.660	1 SIMPLE SUPPORT	1 FIXED END	0.000
-37.949	1.069	1 SIMPLE SUPPORT	1 FIXED END	0.000
-40.949	0.350	1 SIMPLE SUPPORT	1 FIXED END	0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 9  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 1:36: 1 CASE 1  
 =====

=====  
 INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

```

=====
SUPPORT PROPERTY TABLE INDEX ..... 1
SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT
SUPPORT INITIAL STATE FLAG ..... 0
TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M
VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M
STATIC VERTICAL DEFLECTION ..... 0.0000 CM
LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES
SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES
SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS
BED ROLLER LENGTH ..... 1.640 METERS
HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS
TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
    
```

CURRENT VELOCITIES

```

=====
WATER DEPTH (M ) CURRENT SPEED (M/S ) DIRECTION OF TRAVEL (DEG )
=====
0.000 0.790 90.000
11.500 0.480 90.000
23.000 0.420 90.000
    
```

PIPE TENSION DATA

```

=====
STATIC PIPE TENSION ON LAY VESSEL . 196.133 K-NEWTON
MINIMUM DYNAMIC PIPE TENSION ..... 196.133 K-NEWTON
MAXIMUM DYNAMIC PIPE TENSION ..... 264.553 K-NEWTON
STATIC HORIZONTAL BOTTOM TENSION .. 0.000 K-NEWTON
NO. OF VALUES FOR TENSION PROFILE . 0
VALUES ARE FOR PIPE SPAN ANALYSIS . NO
MAXIMUM PIPE PAYOUT SPEED ..... 0.000 M/SEC
MAXIMUM PIPE TAKEUP SPEED ..... 0.000 M/SEC
    
```

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 10

STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 1:36: 1 CASE 1

=====  
 INPUT DATA ECHO

SAGBEND GEOMETRY

```

=====
SAGBEND PIPE ELEMENT LENGTH ..... 2.000 METERS
WATER DEPTH ..... 23.00 METERS
X-COORDINATE AT SPECIFIED DEPTH . . 0.00 METERS
ESTIMATED SAGBEND X LENGTH ..... 0.00 METERS
ESTIMATED PIPE LENGTH ON SEABED ... 0.00 METERS
X-COORD OF PIPE FREE END ON SEABED 0.00 METERS
X-COORD POINT OF FIXITY ON SEABED . 0.00 METERS
MAXIMUM SLOPE (ANGLE) OF SEABED ... 0.000 DEGREES
DIRECTION OF MAXIMUM SLOPE ..... 0.000 DEGREES

PIPE/CABLE SPAN END CONDITION ..... 0 PIPE/CABLE RESTING ON SEABED
PIPE/CABLE SPAN LENGTH GIVEN BY ... 0 SPECIFIED PIPE/CABLE TENSION
ESTIMATED SPAN DEPTH AT FREE END .. 0.00 METERS
PIPE VERTICAL ANGLE AT FREE END ... 0.000 DEGREES
BOTTOM HINGE OFFSET ..... 0.000 METERS
BOTTOM HINGE MINIMUM ANGLE ..... 0.000 DEGREES
BOTTOM HINGE MAXIMUM ANGLE ..... 0.000 DEGREES
    
```

SOIL ELEMENT PROPERTIES

```

=====
SOIL PROPERTY TABLE ROW INDEX ..... 1
SOIL ELEMENT TYPE (FUTURE USE) .... 0
PIPE INDEX OR SEGMENT NUMBER ..... 0
LONGITUDINAL SOIL STIFFNESS ..... 0.00 KN/M^2
VERTICAL SOIL STIFFNESS ..... 0.00 KN/M^2
LATERAL SOIL STIFFNESS ..... 0.00 KN/M^2
DEFLECTION UNDER REFERENCE LOAD ... 0.0000 CM

LONGITUDINAL COEF. OF FRICTION .... 0.000
LATERAL COEFFICIENT OF FRICTION ... 0.600
NUMBER OF INTEGRATION POINTS ..... 0
    
```

TIME INTEGRATION PARAMETERS

```

=====
TIME STEP LENGTH ..... 0.2000 SECONDS
MAXIMUM TIME OF INTEGRATION ..... 10860.000 SECONDS
SOLUTION SAMPLING TIME STEP ..... 0.400 SECONDS
    
```

SOLUTION SAMPLING STARTS AT TIME .. 60.000 SECONDS  
 DAMPING RATIO ..... 0.0000  
 NUMBER OF VARIABLE TIME STEPS ..... 0

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 11  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 1:36: 1 CASE 1

=====

INPUT DATA ECHO

WAVE PARAMETERS

=====

SEA STATE ROW INDEX ..... 1  
 WAVE HEIGHT (PEAK TO TROUGH) ..... 1.800 METERS  
 WAVE PERIOD ..... 6.300 SECONDS  
 WAVE DIRECTION OF TRAVEL ..... 90.000 DEGREES  
 WATER DEPTH FOR WAVE CALCULATIONS . 23.00 METERS  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0

WAVE SPECTRUM EQUATION

=====

SEA STATE ROW INDEX ..... 1  
 WAVE SPECTRUM EQUATION TYPE ..... 7 JONSWAP (CLASSIC)  
 NUMBER OF WAVES IN SPECTRUM ..... 20  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0  
 MINIMUM PERIOD IN SPECTRUM ..... 2.0933 SECONDS  
 MAXIMUM PERIOD IN SPECTRUM ..... 62.8000 SECONDS  
 START TIME FOR WAVE SPECTRUM ..... 0. SECONDS  
 DIRECTION OF WAVE TRAVEL ..... 0.000 DEGREES  
 1ST JONSWAP COEF. (ALPHA) ..... 0.003223  
 2ND JONSWAP COEF. (GAMMA) ..... 5.0000  
 PEAK WAVE PERIOD ..... 6.6150 SECONDS

VESSEL MOTION RAO TABLE

=====

SEA STATE NUMBER ..... 1  
 USE PHASE LAG FOR RAOs ..... NO  
 VESSEL MOTIONS SIGN CONVENTION .... 2 BENTLEY MOSES  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD

WAVE PERIOD (SECONDS)	----- SURGE AMPLITUDE (M/M )	----- / PHASE (DEG)	----- SWAY AMPLITUDE (M/M )	----- / PHASE (DEG)	----- HEAVE AMPLITUDE (M/M )	----- / PHASE (DEG)
2.0900	0.0000	0.00	0.0280	-75.00	0.0040	110.00
2.1700	0.0000	0.00	0.0320	-115.00	0.0010	60.00
2.2400	0.0000	0.00	0.0370	-152.00	0.0020	19.00
2.3300	0.0000	0.00	0.0400	163.00	0.0020	-18.00
2.4200	0.0000	0.00	0.0460	127.00	0.0040	-55.00
2.5100	0.0000	0.00	0.0530	91.00	0.0030	-94.00
2.6200	0.0000	0.00	0.0610	58.00	0.0060	-127.00
2.7300	0.0000	0.00	0.0700	23.00	0.0080	-160.00
2.8500	0.0000	0.00	0.0810	-6.00	0.0110	167.00
2.9900	0.0000	0.00	0.0940	-35.00	0.0100	136.00
3.1400	0.0000	0.00	0.1100	-63.00	0.0190	108.00
3.3100	0.0000	0.00	0.1270	-89.00	0.0270	81.00

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 12  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 1:36: 1 CASE 1

=====

WAVE PERIOD	----- ROLL AMPLITUDE	----- / PHASE	----- PITCH AMPLITUDE	----- / PHASE	----- YAW AMPLITUDE	----- / PHASE
3.4900	0.0000	0.00	0.1490	-113.00	0.0390	56.00
3.7000	0.0000	0.00	0.1740	-136.00	0.0550	33.00
3.9300	0.0000	0.00	0.2040	-157.00	0.0790	12.00
4.1900	0.0000	0.00	0.2380	-175.00	0.1150	-6.00
4.4900	0.0000	0.00	0.2790	167.00	0.1710	-21.00
4.8300	0.0000	0.00	0.3250	153.00	0.2610	-33.00
5.2400	0.0000	0.00	0.3750	141.00	0.4080	-40.00
5.7100	0.0000	0.00	0.4130	133.00	0.6330	-39.00
6.2800	0.0010	90.00	0.3730	123.00	0.8980	-29.00
6.9800	0.0010	53.00	0.4630	90.00	1.0560	-16.00
7.8500	0.0000	0.00	0.6880	88.00	1.0740	-6.00
8.9700	0.0000	0.00	0.7940	90.00	1.0460	-1.00
10.4700	0.0000	0.00	0.8610	90.00	1.0230	0.00
12.5600	0.0000	0.00	0.9110	90.00	1.0100	0.00
15.7000	0.0000	0.00	0.9480	90.00	1.0060	0.00
20.9300	0.0000	0.00	0.9730	90.00	1.0040	0.00
31.4000	0.0000	0.00	0.9890	90.00	1.0040	0.00
62.8000	0.0000	0.00	0.9980	90.00	1.0300	0.00

=====

(SECONDS)	(DEG/M)	(DEG)	(DEG/M)	(DEG)	(DEG/M)	(DEG)
2.0900	0.0330	-75.00	0.0000	0.00	0.0020	109.00
2.1700	0.0340	-116.00	0.0010	62.00	0.0020	69.00
2.2400	0.0250	-153.00	0.0010	22.00	0.0020	28.00
2.3300	0.0450	162.00	0.0020	-15.00	0.0030	-5.00
2.4200	0.0440	126.00	0.0020	-52.00	0.0030	-41.00
2.5100	0.0420	91.00	0.0030	-89.00	0.0030	-79.00
2.6200	0.0410	57.00	0.0030	-122.00	0.0030	-126.00
2.7300	0.0490	22.00	0.0040	-155.00	0.0040	-136.00
2.8500	0.0320	-7.00	0.0050	174.00	0.0040	-171.00
2.9900	0.0180	-38.00	0.0070	143.00	0.0040	161.00
3.1400	0.0030	137.00	0.0070	117.00	0.0040	134.00
3.3100	0.0420	92.00	0.0090	92.00	0.0040	113.00
3.4900	0.0910	67.00	0.0110	69.00	0.0040	92.00
3.7000	0.1680	44.00	0.0140	48.00	0.0040	75.00
3.9300	0.2860	23.00	0.0190	30.00	0.0040	61.00
4.1900	0.4660	4.00	0.0250	15.00	0.0040	54.00
4.4900	0.7490	-11.00	0.0340	5.00	0.0040	54.00
4.8300	1.2140	-25.00	0.0490	0.00	0.0040	63.00
5.2400	2.0450	-36.00	0.0730	4.00	0.0060	79.00
5.7100	3.7310	-37.00	0.1050	21.00	0.0100	98.00
6.2800	6.9230	-14.00	0.1270	53.00	0.0180	136.00
6.9800	7.9800	33.00	0.1080	90.00	0.0210	-167.00

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 13

STATIC PIPE ANALYSIS 8 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/ 2/2020 TIME - 1:36: 1 CASE 1

=====

INPUT DATA ECHO

7.8500	5.7520	69.00	0.0710	120.00	0.0140	-126.00
8.9700	3.6550	83.00	0.0440	137.00	0.0080	-109.00
10.4700	2.4010	89.00	0.0290	148.00	0.0050	-101.00
12.5600	1.5660	89.00	0.0220	155.00	0.0020	-101.00
15.7000	0.9690	90.00	0.0180	163.00	0.0000	0.00
20.9300	0.5340	90.00	0.0150	169.00	0.0010	92.00
31.4000	0.2350	90.00	0.0140	175.00	0.0020	90.00
62.8000	0.0580	90.00	0.0130	179.00	0.0030	90.00

\*\*\*\*\* INFORMATIVE MESSAGE NO. - 94 \*\*\*\*\*

One or more of the phase angles in the RAO table have been adjusted to | minimize the difference in value between adjacent angles. If the phase | angles are arbitrarily restricted by the software used to calculate | the RAOs to a fixed range of values such as (0 to 2\*PI) or (-PI to | +PI), then phase angles that are actually close in value can differ by | as much as 2\*PI. These large differences can cause the phase angles | for RAOs that are between the values in the table (which must be | determined using interpolation) to be calculated incorrectly.

CONTROL SWITCHES

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MAX NUMBER STATIC ITERATIONS ..... 500

MAX DYNAMIC ITERATIONS PER STEP ... 500

BOUNDARY CONDITION LOGIC PARAMETER 5

TIME STEP STABILITY PARAMETER ..... 0

TYPE OF ANALYSIS ..... DYNAMIC

NUMBER OF PROBLEM DIMENSIONS ..... 3

DAVIT LIFT ANALYSIS ..... NO

STATIC SOLUTION CONVERGED IN ( 18 ) ITERATIONS

END OF INPUT DATA

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 1:36: 1 PAGE 14

PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING

USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES (MPA)		TOTAL STRESS (MPA)	PERCENT YIELD (PCT)
1	LAYBARGE	64.20	4.42	0.00	0.000	1.471	0.00	0.00	0.00	0.29	0.00	0.29	0.08
3	LAYBARGE	59.72	4.30	0.00	0.000	1.590	4.48	-0.02	0.00	-26.68	0.00	26.71	7.42
5	LAYBARGE	48.23	4.00	0.00	0.000	1.461	15.98	-0.09	0.00	-36.95	0.00	37.04	10.29
7	TENSIONR	38.10	3.73	0.00	0.000	1.432	26.11	11.77	0.00	-13.49	-0.01	25.26	7.02
9	LAYBARGE	33.43	3.61	0.00	0.000	1.535	30.78	11.75	0.00	-7.12	0.00	18.87	5.24
11	TENSIONR	26.65	3.43	0.00	0.000	1.482	37.57	23.62	0.00	-6.51	-0.01	30.13	8.37
13	LAYBARGE	21.33	3.30	0.00	0.000	1.448	42.89	23.59	0.00	0.36	0.00	23.95	6.65
15	LAYBARGE	12.14	2.98	0.00	0.000	3.376	52.08	23.46	0.00	-227.47	-0.02	250.94	69.70



17	LAYBARGE	-0.04	1.76	0.00	0.001	8.070	64.32	23.22	0.00	-216.46	0.06	239.69	66.58
20	STINGER	-8.10	0.35	0.00	-0.002	11.521	72.51	22.97	0.00	-170.70	-0.25	193.67	53.80
22	STINGER	-15.89	-1.45	0.00	0.000	14.427	80.51	22.68	-0.13	-156.55	-0.71	179.29	49.80
24	STINGER	-23.60	-3.61	0.00	0.001	16.653	88.51	22.36	-0.31	-97.78	-0.40	120.29	33.41
26	STINGER	-30.64	-5.84	0.00	-0.003	18.612	95.90	21.99	-0.51	-136.74	-0.78	158.99	44.16
28	STINGER	-36.57	-7.92	0.00	0.012	19.916	102.19	21.69	-0.69	-38.63	1.15	60.68	16.86
30	STINGER	-39.47	-8.98	0.00	-0.033	20.019	105.27	21.52	-0.78	11.42	-11.84	38.37	10.66
32	SAGBEND	-41.35	-9.66	0.00	-0.094	19.898	107.27	21.42	-0.84	35.54	-9.22	58.55	16.26
33	SAGBEND	-43.23	-10.34	0.01	-0.134	19.670	109.27	21.31	-0.90	53.87	-6.04	75.97	21.10
34	SAGBEND	-45.12	-11.01	0.01	-0.160	19.361	111.27	21.20	-0.95	67.86	-3.68	89.64	24.90
35	SAGBEND	-47.01	-11.66	0.02	-0.175	18.989	113.27	21.10	-1.01	78.57	-1.91	100.20	27.83
36	SAGBEND	-48.90	-12.31	0.02	-0.181	18.571	115.27	20.99	-1.07	86.82	-0.59	108.36	30.10
37	SAGBEND	-50.80	-12.94	0.03	-0.182	18.115	117.27	20.89	-1.12	93.21	0.40	114.67	31.85
38	SAGBEND	-52.70	-13.55	0.03	-0.178	17.631	119.27	20.80	-1.18	98.20	1.14	119.60	33.22
39	SAGBEND	-54.61	-14.15	0.04	-0.170	17.125	121.27	20.70	-1.23	102.12	1.69	123.46	34.29
40	SAGBEND	-56.52	-14.73	0.05	-0.160	16.601	123.27	20.61	-1.28	105.24	2.10	126.51	35.14
41	SAGBEND	-58.44	-15.29	0.05	-0.148	16.062	125.27	20.52	-1.33	107.74	2.40	128.95	35.82
42	SAGBEND	-60.37	-15.84	0.06	-0.135	15.513	127.27	20.44	-1.37	109.77	2.62	130.93	36.37
43	SAGBEND	-62.30	-16.36	0.06	-0.121	14.954	129.27	20.35	-1.42	111.44	2.78	132.54	36.82
44	SAGBEND	-64.23	-16.87	0.06	-0.106	14.387	131.27	20.27	-1.46	112.83	2.89	133.87	37.19
45	SAGBEND	-66.17	-17.35	0.07	-0.091	13.814	133.27	20.20	-1.51	114.00	2.97	134.99	37.50
46	SAGBEND	-68.12	-17.82	0.07	-0.075	13.235	135.27	20.12	-1.55	114.99	3.02	135.93	37.76
47	SAGBEND	-70.06	-18.27	0.07	-0.059	12.652	137.27	20.05	-1.58	115.85	3.05	136.74	37.98
48	SAGBEND	-72.02	-18.70	0.07	-0.043	12.065	139.27	19.99	-1.62	116.58	3.07	137.43	38.17
49	SAGBEND	-73.98	-19.11	0.08	-0.027	11.474	141.27	19.92	-1.66	117.22	3.07	138.01	38.34
50	SAGBEND	-75.94	-19.49	0.08	-0.012	10.881	143.27	19.86	-1.69	117.76	3.06	138.51	38.47
51	SAGBEND	-77.90	-19.86	0.08	0.004	10.284	145.27	19.80	-1.72	118.21	3.04	138.92	38.59
52	SAGBEND	-79.87	-20.21	0.08	0.020	9.686	147.27	19.75	-1.75	118.57	3.01	139.24	38.68
53	SAGBEND	-81.85	-20.53	0.07	0.035	9.086	149.27	19.70	-1.78	118.83	2.98	139.47	38.74
54	SAGBEND	-83.82	-20.84	0.07	0.050	8.486	151.27	19.65	-1.81	118.99	2.93	139.59	38.77
55	SAGBEND	-85.80	-21.12	0.07	0.065	7.884	153.27	19.60	-1.83	119.02	2.87	139.58	38.77
56	SAGBEND	-87.79	-21.39	0.07	0.079	7.283	155.27	19.56	-1.85	118.90	2.79	139.43	38.73
57	SAGBEND	-89.77	-21.63	0.07	0.093	6.683	157.27	19.52	-1.88	118.60	2.69	139.10	38.64
58	SAGBEND	-91.76	-21.85	0.06	0.107	6.085	159.27	19.49	-1.90	118.07	2.57	138.54	38.48
59	SAGBEND	-93.75	-22.06	0.06	0.119	5.490	161.27	19.46	-1.91	117.24	2.40	137.69	38.25

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/2/2020      TIME - 1:36:      1      PAGE 15

PROJECT - STATIC PIPE ANALYSIS 8 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE      1

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=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERC YIELD (PCT)
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60	SAGBEND	-95.74	-22.24	0.05	0.131	4.901	163.27	19.43	-1.93	116.05	2.20	136.47	37.91
61	SAGBEND	-97.73	-22.40	0.05	0.142	4.319	165.27	19.41	-1.94	114.37	1.92	134.78	37.44
62	SAGBEND	-99.73	-22.54	0.04	0.150	3.746	167.27	19.38	-1.95	112.08	1.57	132.47	36.80
63	SAGBEND	-101.72	-22.66	0.04	0.157	3.187	169.27	19.37	-1.97	109.00	1.11	129.36	35.93
64	SAGBEND	-103.72	-22.76	0.03	0.161	2.647	171.27	19.35	-1.97	104.87	0.52	125.22	34.78
65	SAGBEND	-105.72	-22.84	0.03	0.162	2.130	173.27	19.34	-1.98	99.39	-0.27	119.73	33.26
66	SAGBEND	-107.72	-22.91	0.02	0.158	1.645	175.27	19.33	-1.99	92.14	-1.29	112.48	31.24
67	SAGBEND	-109.72	-22.96	0.02	0.149	1.203	177.27	19.32	-1.99	82.58	-2.63	102.95	28.60
68	SAGBEND	-111.72	-22.99	0.01	0.131	0.816	179.27	19.32	-1.99	70.00	-4.28	90.47	25.13
69	SEABED	-113.72	-23.02	0.01	0.106	0.501	181.27	19.32	-2.00	54.05	-5.69	74.69	20.75
70	SEABED	-115.72	-23.03	0.00	0.076	0.270	183.27	19.32	-2.00	37.80	-5.64	58.56	16.27
71	SEABED	-117.72	-23.04	0.00	0.050	0.115	185.27	19.32	-2.00	23.95	-4.70	44.76	12.43
72	SEABED	-119.72	-23.04	0.00	0.029	0.022	187.27	19.32	-2.00	13.47	-3.49	34.28	9.52
73	SEABED	-121.72	-23.04	0.00	0.015	-0.026	189.27	19.32	-2.00	6.26	-2.35	27.06	7.52
74	SEABED	-123.72	-23.04	0.00	0.005	-0.046	191.27	19.32	-2.00	1.79	-1.42	22.67	6.30
75	SEABED	-125.72	-23.04	0.00	0.000	-0.048	193.27	19.32	-2.00	-0.66	-0.75	21.39	5.94
76	SEABED	-127.72	-23.03	0.00	-0.003	-0.041	195.27	19.32	-2.00	-1.74	-0.30	22.16	6.15
77	SEABED	-129.72	-23.03	0.00	-0.003	-0.032	197.27	19.32	-2.00	-1.99	-0.04	22.38	6.22
78	SEABED	-131.72	-23.03	0.00	-0.003	-0.022	199.27	19.32	-2.00	-1.79	0.09	22.18	6.16
79	SEABED	-133.72	-23.03	0.00	-0.003	-0.014	201.27	19.32	-2.00	-1.42	0.14	21.81	6.06
80	SEABED	-135.72	-23.03	0.00	-0.002	-0.008	203.27	19.32	-2.00	-1.01	0.14	21.41	5.95
81	SEABED	-137.72	-23.03	0.00	-0.001	-0.003	205.27	19.32	-2.00	-0.65	0.12	21.06	5.85
82	SEABED	-139.72	-23.03	0.00	-0.001	-0.001	207.27	19.32	-2.00	-0.38	0.09	20.78	5.77
83	SEABED	-141.72	-23.03	0.00	0.000	0.000	209.27	19.32	-2.00	-0.18	0.06	20.59	5.72
84	SEABED	-143.72	-23.03	0.00	0.000	0.001	211.27	19.32	-2.00	-0.06	0.04	20.47	5.68
85	SEABED	-145.72	-23.03	0.00	0.000	0.001	213.27	19.32	-2.00	0.01	0.02	20.41	5.67
86	SEABED	-147.72	-23.03	0.00	0.000	0.001	215.27	19.32	-2.00	0.04	0.01	20.43	5.68
87	SEABED	-149.72	-23.03	0.00	0.000	0.001	217.27	19.32	-2.00	0.05	0.00	20.44	5.68
88	SEABED	-151.72	-23.03	0.00	0.000	0.001	219.27	19.32	-2.00	0.05	0.00	20.44	5.68
89	SEABED	-153.72	-23.03	0.00	0.000	0.000	221.27	19.32	-2.00	0.04	0.00	20.43	5.68
90	SEABED	-155.72	-23.03	0.00	0.000	0.000	223.27	19.32	-2.00	0.03	0.00	20.42	5.67
91	SEABED	-157.72	-23.03	0.00	0.000	0.000	225.27	19.32	-2.00	0.02	0.00	20.41	5.67
92	SEABED	-159.72	-23.03	0.00	0.000	0.000	227.27	19.32	-2.00	0.01	0.00	20.40	5.67
93	SEABED	-161.72	-23.03	0.00	0.000	0.000	229.27	19.32	-2.00	0.01	0.00	20.40	5.67
94	SEABED	-163.72	-23.03	0.00	0.000	0.000	231.27	19.32	-2.00	0.00	0.00	20.40	5.67
95	SEABED	-165.72	-23.03	0.00	0.000	0.000	233.27	19.32	-2.00	0.00	0.00	20.39	5.67
96	SEABED	-167.72	-23.03	0.00	0.000	0.000	235.27	19.32	-2.00	0.00	0.00	20.39	5.67
97	SEABED	-169.72	-23.03	0.00	0.000	0.000	237.27	19.32	-2.00	0.00	0.00	20.39	5.67
98	SEABED	-171.72	-23.03	0.00	0.000	0.000	239.27	19.32	-2.00	0.00	0.00	20.39	5.67

99 SEABED -173.72 -23.03 0.00 0.000 0.000 241.27 19.32 -2.00 0.00 0.00 20.39 5.66

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 1:36: 1 PAGE 16

PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING

USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

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STATIC PIPE		COORDINATES,			FORCES AND				STRESSES			
NODE NO.	PIPE SECTION	X	Y	Z	SUPPORT REACTION	SUPT SEPARATIONS	PIPE TENSION	BENDING MOMENTS				
		COORD (M )	COORD (M )	COORD (M )	VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
1	LAYBARGE	64.20	4.42	0.00	0.58	0.00	0.00	0.00	0.12	0.00	0.12	
3	LAYBARGE	59.72	4.30	0.00	15.88	0.00	0.00	-0.20	-10.72	0.00	10.72	
5	LAYBARGE	48.23	4.00	0.00	19.27	0.00	0.00	-0.71	-14.85	0.00	14.85	
7	TENSIONR	38.10	3.73	0.00	12.14	0.01	0.00	96.94	-5.42	0.00	5.42	
9	LAYBARGE	33.43	3.61	0.00	8.50	0.00	0.00	96.74	-2.86	0.00	2.86	
11	TENSIONR	26.65	3.43	0.00	11.04	0.01	0.00	194.51	-2.61	0.00	2.61	
13	LAYBARGE	21.33	3.30	0.00	1.74	0.00	0.00	194.29	0.14	0.00	0.14	
15	LAYBARGE	12.14	2.98	0.00	41.63	0.00	0.00	193.23	-91.40	-0.01	91.40	
17	LAYBARGE	-0.04	1.76	0.00	33.00	0.02	0.00	191.25	-86.98	0.02	86.98	
20	STINGER	-8.10	0.35	0.00	18.94	-0.23	0.00	189.15	-68.59	-0.10	68.59	
22	STINGER	-15.89	-1.45	0.00	18.84	-0.55	0.00	187.29	-62.90	-0.28	62.90	
24	STINGER	-23.60	-3.61	0.00	7.18	-0.42	0.00	185.47	-39.29	-0.16	39.29	
26	STINGER	-30.64	-5.84	0.00	21.08	-0.58	0.00	183.33	-54.94	-0.31	54.94	
28	STINGER	-36.57	-7.92	0.00	6.09	2.04	0.00	181.61	-15.52	0.46	15.53	
30	STINGER	-39.47	-8.98	0.00	0.00	-3.18	0.41	180.65	4.59	-4.76	6.61	
32	SAGBEND	-41.35	-9.66	0.00	0.00	0.00	0.00	180.02	14.28	-3.70	14.75	
33	SAGBEND	-43.23	-10.34	0.01	0.00	0.00	0.00	179.39	21.65	-2.43	21.78	
34	SAGBEND	-45.12	-11.01	0.01	0.00	0.00	0.00	178.77	27.27	-1.48	27.31	
35	SAGBEND	-47.01	-11.66	0.02	0.00	0.00	0.00	178.15	31.57	-0.77	31.58	
36	SAGBEND	-48.90	-12.31	0.02	0.00	0.00	0.00	177.55	34.89	-0.24	34.89	
37	SAGBEND	-50.80	-12.94	0.03	0.00	0.00	0.00	176.97	37.45	0.16	37.45	
38	SAGBEND	-52.70	-13.55	0.03	0.00	0.00	0.00	176.40	39.46	0.46	39.46	
39	SAGBEND	-54.61	-14.15	0.04	0.00	0.00	0.00	175.85	41.03	0.68	41.04	
40	SAGBEND	-56.52	-14.73	0.05	0.00	0.00	0.00	175.31	42.29	0.84	42.29	
41	SAGBEND	-58.44	-15.29	0.05	0.00	0.00	0.00	174.79	43.29	0.96	43.30	
42	SAGBEND	-60.37	-15.84	0.06	0.00	0.00	0.00	174.29	44.11	1.05	44.12	
43	SAGBEND	-62.30	-16.36	0.06	0.00	0.00	0.00	173.81	44.78	1.12	44.79	
44	SAGBEND	-64.23	-16.87	0.06	0.00	0.00	0.00	173.34	45.33	1.16	45.35	
45	SAGBEND	-66.17	-17.35	0.07	0.00	0.00	0.00	172.90	45.80	1.19	45.82	
46	SAGBEND	-68.12	-17.82	0.07	0.00	0.00	0.00	172.47	46.21	1.21	46.22	
47	SAGBEND	-70.06	-18.27	0.07	0.00	0.00	0.00	172.06	46.55	1.23	46.56	
48	SAGBEND	-72.02	-18.70	0.07	0.00	0.00	0.00	171.66	46.84	1.23	46.86	
49	SAGBEND	-73.98	-19.11	0.08	0.00	0.00	0.00	171.29	47.10	1.23	47.11	
50	SAGBEND	-75.94	-19.49	0.08	0.00	0.00	0.00	170.94	47.32	1.23	47.33	
51	SAGBEND	-77.90	-19.86	0.08	0.00	0.00	0.00	170.60	47.50	1.22	47.51	
52	SAGBEND	-79.87	-20.21	0.08	0.00	0.00	0.00	170.28	47.64	1.21	47.66	
53	SAGBEND	-81.85	-20.53	0.07	0.00	0.00	0.00	169.98	47.75	1.20	47.76	
54	SAGBEND	-83.82	-20.84	0.07	0.00	0.00	0.00	169.70	47.81	1.18	47.83	
55	SAGBEND	-85.80	-21.12	0.07	0.00	0.00	0.00	169.44	47.82	1.15	47.84	
56	SAGBEND	-87.79	-21.39	0.07	0.00	0.00	0.00	169.20	47.78	1.12	47.79	
57	SAGBEND	-89.77	-21.63	0.07	0.00	0.00	0.00	168.98	47.65	1.08	47.67	
58	SAGBEND	-91.76	-21.85	0.06	0.00	0.00	0.00	168.78	47.44	1.03	47.45	
59	SAGBEND	-93.75	-22.06	0.06	0.00	0.00	0.00	168.60	47.11	0.97	47.12	

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 1:36: 1 PAGE 17

PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING

USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

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STATIC PIPE		COORDINATES,			FORCES AND				STRESSES			
NODE NO.	PIPE SECTION	X	Y	Z	SUPPORT REACTION	SUPT SEPARATIONS	PIPE TENSION	BENDING MOMENTS				
		COORD (M )	COORD (M )	COORD (M )	VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
60	SAGBEND	-95.74	-22.24	0.05	0.00	0.00	0.00	168.44	46.63	0.88	46.64	
61	SAGBEND	-97.73	-22.40	0.05	0.00	0.00	0.00	168.29	45.96	0.77	45.96	
62	SAGBEND	-99.73	-22.54	0.04	0.00	0.00	0.00	168.17	45.04	0.63	45.04	
63	SAGBEND	-101.72	-22.66	0.04	0.00	0.00	0.00	168.06	43.80	0.45	43.80	
64	SAGBEND	-103.72	-22.76	0.03	0.00	0.00	0.00	167.98	42.14	0.21	42.14	
65	SAGBEND	-105.72	-22.84	0.03	0.00	0.00	0.00	167.91	39.93	-0.11	39.93	
66	SAGBEND	-107.72	-22.91	0.02	0.00	0.00	0.00	167.86	37.02	-0.52	37.03	
67	SAGBEND	-109.72	-22.96	0.02	0.00	0.00	0.00	167.83	33.18	-1.06	33.20	
68	SAGBEND	-111.72	-22.99	0.01	0.10	-0.10	0.00	167.82	28.13	-1.72	28.18	
69	SEABED	-113.72	-23.02	0.01	0.97	-0.39	0.00	167.82	21.72	-2.29	21.84	
70	SEABED	-115.72	-23.03	0.00	1.75	-0.26	0.00	167.83	15.19	-2.27	15.36	
71	SEABED	-117.72	-23.04	0.00	2.15	-0.12	0.00	167.84	9.62	-1.89	9.81	
72	SEABED	-119.72	-23.04	0.00	2.28	-0.04	0.00	167.84	5.41	-1.40	5.59	
73	SEABED	-121.72	-23.04	0.00	2.28	0.01	0.00	167.84	2.52	-0.94	2.69	
74	SEABED	-123.72	-23.04	0.00	2.20	0.03	0.00	167.84	0.72	-0.57	0.92	
75	SEABED	-125.72	-23.04	0.00	2.11	0.04	0.00	167.84	-0.27	-0.30	0.40	

76	SEABED	-127.72	-23.03	0.00	2.02	0.03	0.00	0.00	167.84	-0.70	-0.12	0.71
77	SEABED	-129.72	-23.03	0.00	1.94	0.03	0.00	0.00	167.84	-0.80	-0.02	0.80
78	SEABED	-131.72	-23.03	0.00	1.89	0.02	0.00	0.00	167.84	-0.72	0.04	0.72
79	SEABED	-133.72	-23.03	0.00	1.85	0.01	0.00	0.00	167.84	-0.57	0.06	0.57
80	SEABED	-135.72	-23.03	0.00	1.83	0.01	0.00	0.00	167.84	-0.41	0.06	0.41
81	SEABED	-137.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	-0.26	0.05	0.27
82	SEABED	-139.72	-23.03	0.00	1.81	0.00	0.00	0.00	167.84	-0.15	0.04	0.16
83	SEABED	-141.72	-23.03	0.00	1.81	0.00	0.00	0.00	167.84	-0.07	0.02	0.08
84	SEABED	-143.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	-0.02	0.01	0.03
85	SEABED	-145.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.00	0.01	0.01
86	SEABED	-147.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.02	0.00	0.02
87	SEABED	-149.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.02	0.00	0.02
88	SEABED	-151.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.02	0.00	0.02
89	SEABED	-153.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.01	0.00	0.01
90	SEABED	-155.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.01	0.00	0.01
91	SEABED	-157.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.01	0.00	0.01
92	SEABED	-159.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
93	SEABED	-161.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
94	SEABED	-163.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
95	SEABED	-165.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
96	SEABED	-167.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
97	SEABED	-169.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
98	SEABED	-171.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
99	SEABED	-173.72	-23.03	0.00	0.00	0.00	0.00	0.00	167.84	0.00	0.00	0.00

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 18

STATIC PIPE ANALYSIS 8 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/ 2/2020 TIME - 1:36: 1 CASE 1

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STATIC SOLUTION SUMMARY

PIPE PROPERTIES ( 1)

PIPE SECTION LENGTH ..	0.00 M	ELASTIC MODULUS .....	207000. MPA
OUTSIDE DIAMETER .....	21.910 CM	CROSS SECTIONAL AREA ..	82.69 CM²
WALL THICKNESS .....	1.270 CM	MOMENT OF INERTIA ....	4402.0 CM⁴
WEIGHT/LENGTH IN AIR ..	1649.63 N/M	YIELD STRESS .....	360.00 MPA
SUBMERGED WGHT/LENG ..	912.94 N/M	STRESS INTENS FACTOR ..	1.000
SPECIFIC GRAVITY .....	2.239	STEEL DENSITY .....	77008.0 N/M3
WRAP COAT THICKNESS ..	0.320 CM	WRAP COAT DENSITY ....	9025.2 N/M3
CONCRETE THICKNESS ...	4.000 CM	CONCRETE DENSITY .....	29857.0 N/M3

BARGE DATA

TOTAL PIPE TENSION ...	196.13 KN	RADIUS OF CURVATURE ..	0.00 M
NUMBER OF TENSIONERS ..	2	BARGE TRIM ANGLE .....	0.500 DEG
NO. OF PIPE SUPPORTS ..	7	PIPE ANGLE AT STERN ..	8.070 DEG
BARGE HEADING .....	0.000 DEG	OFFSET FROM R.O.W. ...	0.00 M

STINGER DATA

NO. OF PIPE SUPPORTS ..	6	PIPE DEPTH AT STERN ..	-8.98 M
NO. STINGER SECTIONS ..	6	PIPE ANGLE AT STERN ..	20.019 DEG
RADIUS OF CURVATURE ...	0.00 M	STINGER STERN DEPTH ..	-9.34 M
STINGER LENGTH .....	41.37 M		

SAGBEND DATA

WATER DEPTH .....	23.00 M	TENSION AT TOUCHDOWN ..	167.82 KN
TOUCHDOWN X-COORD. ...	-112.12 M	BOTTOM SLOPE ANGLE ...	0.000 DEG
PROJECTED SPAN LENGTH	72.65 M	PIPE LENGTH GAIN .....	3.35 M

===== SOLUTION SUMMARY =====

NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACT HORIZ (KN)	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	0.6	0.0	0.1	0.3	0.
3	LAYBARGE	59.7	4.3	0.0	15.9	0.0	10.7	26.7	7.
5	LAYBARGE	48.2	4.0	0.0	19.3	0.0	14.8	37.0	10.
7	TENSIONR	38.1	3.7	0.0	12.1	0.0	5.4	25.3	7.
9	LAYBARGE	33.4	3.6	0.0	8.5	0.0	2.9	18.9	5.
11	TENSIONR	26.7	3.4	0.0	11.0	0.0	2.6	30.1	8.
13	LAYBARGE	21.3	3.3	0.0	1.7	0.0	0.1	23.9	7.
15	LAYBARGE	12.1	3.0	0.0	41.6	0.0	91.4	250.9	70.
17	LAYBARGE	0.0	1.8	0.0	33.0	0.0	87.0	239.7	67.
20	STINGER	-8.1	0.4	0.0	18.9	-0.2	68.6	193.7	54.
22	STINGER	-15.9	-1.4	0.0	18.8	-0.6	62.9	179.3	50.
24	STINGER	-23.6	-3.6	0.0	7.2	-0.4	39.3	120.3	33.

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 19

STATIC PIPE ANALYSIS 8 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/ 2/2020 TIME - 1:36: 1 CASE 1

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STATIC SOLUTION SUMMARY

26	STINGER	-30.6	-5.8	0.0	21.1	-0.6	54.9	159.0	44.
28	STINGER	-36.6	-7.9	0.0	6.1	2.0	15.5	60.7	17.
30	STINGER	-39.5	-9.0	0.0	0.0	-3.2	6.6	38.4	11.
54	SAGBEND	-83.8	-20.8	0.1	0.0	0.0	47.8	139.6	39.
69	SEABED	-113.7	-23.0	0.0	1.0	-0.4	21.8	74.7	21.

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/2/2020 TIME - 1:36: 1 PAGE 20  
 PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING  
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

MAXIMUM DYNAMIC PIPE FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
1	LAYBARGE	64.25	4.43	0.05	0.001	1.464	0.00	0.00	0.00	0.31	0.02	0.31	0.09
3	LAYBARGE	59.77	4.31	0.05	0.000	1.583	4.48	-0.07	0.00	-28.46	-2.29	28.49	7.91
5	LAYBARGE	48.27	4.01	0.05	0.001	1.455	15.98	-0.25	0.00	-39.09	-2.94	39.16	10.88
7	TENSIONR	38.15	3.75	0.04	0.001	1.425	26.11	20.07	0.00	-14.26	-1.29	34.02	9.45
9	LAYBARGE	33.48	3.63	0.04	0.000	1.528	30.78	20.04	0.00	-7.66	0.45	27.46	7.63
11	TENSIONR	26.70	3.45	0.03	0.001	1.476	37.57	32.10	0.00	-6.99	-0.60	38.96	10.82
13	LAYBARGE	21.38	3.31	0.03	0.000	1.441	42.89	32.09	0.00	2.35	-2.25	33.86	9.41
15	LAYBARGE	12.19	3.00	0.02	-0.001	3.372	52.08	31.98	0.00	-237.71	-27.67	270.22	75.06
17	LAYBARGE	0.01	1.78	0.00	0.009	8.024	64.32	31.75	0.00	-226.36	-27.14	258.75	71.87
20	STINGER	-8.05	0.37	0.01	0.006	11.472	72.51	31.49	-0.04	-175.76	-24.65	207.08	57.52
22	STINGER	-15.85	-1.43	0.03	0.009	14.359	80.51	31.21	-0.20	-161.96	-24.20	193.74	53.82
24	STINGER	-23.56	-3.58	0.04	0.019	16.614	88.51	30.87	-0.38	-115.93	-18.03	142.61	39.61
26	STINGER	-30.60	-5.81	0.05	-0.008	18.375	95.90	30.48	-0.58	-149.71	-18.46	179.43	49.84
28	STINGER	-36.54	-7.84	0.06	0.043	19.034	102.19	30.16	-0.76	-50.01	29.41	72.86	20.24
30	STINGER	-39.44	-8.84	0.06	-0.144	19.020	105.27	29.96	-0.85	59.81	-263.62	290.27	80.63
32	SAGBEND	-41.27	-9.46	0.06	-0.491	18.903	107.27	29.86	-0.91	69.82	-218.65	247.46	68.74
33	SAGBEND	-43.16	-10.10	0.07	-0.546	18.690	109.27	29.76	-0.96	75.64	-160.14	190.40	52.89
34	SAGBEND	-45.06	-10.73	0.10	-0.522	18.410	111.27	29.65	-1.02	85.87	-120.82	153.28	42.58
35	SAGBEND	-46.96	-11.34	0.13	-0.522	18.072	113.27	29.55	-1.08	93.81	-91.72	138.41	38.45
36	SAGBEND	-48.87	-11.94	0.17	-0.540	17.668	115.27	29.45	-1.13	100.98	-68.87	135.97	37.77
37	SAGBEND	-50.78	-12.53	0.21	-0.573	17.231	117.27	29.35	-1.18	106.24	-54.67	135.93	37.76
38	SAGBEND	-52.69	-13.10	0.24	-0.605	16.777	119.27	29.26	-1.23	110.41	-45.13	136.81	38.00
39	SAGBEND	-54.61	-13.66	0.27	-0.608	16.308	121.27	29.18	-1.28	113.44	46.28	139.81	38.84
40	SAGBEND	-56.53	-14.20	0.30	-0.580	15.826	123.27	29.10	-1.33	115.42	47.87	142.35	39.54
41	SAGBEND	-58.46	-14.72	0.34	-0.573	15.336	125.27	29.02	-1.38	117.14	49.17	144.22	40.06
42	SAGBEND	-60.39	-15.23	0.38	-0.563	14.833	127.27	28.94	-1.42	118.33	49.58	145.99	40.55
43	SAGBEND	-62.33	-15.73	0.41	-0.535	14.333	129.27	28.86	-1.46	119.45	49.24	147.01	40.84
44	SAGBEND	-64.27	-16.21	0.43	-0.512	13.817	131.27	28.79	-1.51	120.76	48.32	147.43	40.95
45	SAGBEND	-66.21	-16.68	0.44	-0.488	13.259	133.27	28.72	-1.55	121.74	46.94	148.27	41.19
46	SAGBEND	-68.16	-17.13	0.44	-0.452	12.722	135.27	28.65	-1.59	122.47	45.58	148.99	41.39
47	SAGBEND	-70.11	-17.57	0.44	-0.401	12.210	137.27	28.59	-1.62	123.12	44.85	149.25	41.46
48	SAGBEND	-72.07	-17.99	0.44	-0.354	11.706	139.27	28.52	-1.66	123.77	44.41	149.08	41.41
49	SAGBEND	-74.03	-18.38	0.44	-0.310	11.200	141.27	28.46	-1.69	124.24	43.75	148.54	41.26
50	SAGBEND	-75.99	-18.77	0.44	-0.288	10.707	143.27	28.40	-1.73	124.55	42.93	148.48	41.24
51	SAGBEND	-77.96	-19.13	0.44	-0.274	10.221	145.27	28.34	-1.76	124.68	42.22	148.28	41.19
52	SAGBEND	-79.93	-19.48	0.43	-0.259	9.729	147.27	28.29	-1.78	124.66	42.29	147.74	41.04
53	SAGBEND	-81.90	-19.80	0.43	-0.145	9.232	149.27	28.23	-1.81	124.46	42.24	147.12	40.87
54	SAGBEND	-83.87	-20.11	0.43	-0.005	8.735	151.27	28.18	-1.83	124.08	42.06	146.37	40.66
55	SAGBEND	-85.85	-20.41	0.43	0.133	8.244	153.27	28.13	-1.86	123.52	41.75	145.50	40.42
56	SAGBEND	-87.83	-20.68	0.44	0.269	7.764	155.27	28.09	-1.88	122.74	41.33	144.55	40.15
57	SAGBEND	-89.82	-20.94	0.45	0.310	7.256	157.27	28.04	-1.90	121.72	42.02	143.30	39.81
58	SAGBEND	-91.80	-21.18	0.45	0.299	6.740	159.27	28.00	-1.91	120.56	43.22	141.98	39.44
59	SAGBEND	-93.79	-21.40	0.45	0.295	6.226	161.27	27.97	-1.93	119.02	44.63	140.45	39.01

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/2/2020 TIME - 1:36: 1 PAGE 21  
 PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING  
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

MAXIMUM DYNAMIC PIPE FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
60	SAGBEND	-95.78	-21.61	0.45	0.293	5.722	163.27	27.94	-1.94	117.09	45.67	138.40	38.44
61	SAGBEND	-97.77	-21.80	0.45	0.287	5.232	165.27	27.91	-1.96	115.81	45.94	138.26	38.41
62	SAGBEND	-99.76	-21.97	0.45	0.281	4.748	167.27	27.89	-1.97	116.00	45.66	139.57	38.77
63	SAGBEND	-101.75	-22.13	0.45	0.277	4.272	169.27	27.87	-1.97	115.36	44.63	140.04	38.90
64	SAGBEND	-103.75	-22.27	0.44	0.276	3.804	171.27	27.86	-1.98	113.75	42.38	139.37	38.71
65	SAGBEND	-105.74	-22.40	0.44	0.290	3.364	173.27	27.84	-1.99	112.71	40.56	137.38	38.16
66	SAGBEND	-107.74	-22.51	0.44	0.324	2.944	175.27	27.83	-1.99	110.60	39.43	133.98	37.22
67	SAGBEND	-109.73	-22.60	0.43	0.364	2.551	177.27	27.82	-1.99	107.58	37.98	130.52	36.26
68	SAGBEND	-111.73	-22.68	0.42	0.412	2.192	179.27	27.82	-2.00	104.69	36.50	127.06	35.29
69	SAGBEND	-113.73	-22.75	0.41	0.453	1.873	181.27	27.81	-2.00	100.30	34.02	123.89	34.41

70	SAGBEND	-115.73	-22.81	0.40	0.515	1.592	183.27	27.81	-2.00	96.77	35.26	119.85	33.29
71	SAGBEND	-117.72	-22.86	0.39	0.547	1.340	185.27	27.81	-2.00	92.33	38.95	113.83	31.62
72	SAGBEND	-119.72	-22.91	0.37	0.603	1.113	187.27	27.81	-2.00	85.44	43.67	110.20	30.61
73	SAGBEND	-121.72	-22.94	0.35	0.684	0.907	189.27	27.81	-2.00	80.45	-46.03	104.67	29.07
74	SAGBEND	-123.72	-22.97	0.33	0.768	0.719	191.27	27.81	-2.00	73.83	-48.83	99.21	27.56
75	SAGBEND	-125.72	-22.99	0.30	0.843	0.544	193.27	27.82	-2.00	67.98	-51.21	92.89	25.80
76	SEABED	-127.72	-23.01	0.28	0.923	0.384	195.27	27.83	-2.00	59.95	-51.55	85.46	23.74
77	SEABED	-129.72	-23.02	0.25	0.979	0.245	197.27	27.84	-2.00	48.93	-52.38	80.39	22.33
78	SEABED	-131.72	-23.03	0.21	0.994	0.137	199.27	27.85	-2.00	36.48	-54.25	80.53	22.37
79	SEABED	-133.72	-23.03	0.17	0.968	0.060	201.27	27.86	-2.00	24.85	-53.31	81.03	22.51
80	SEABED	-135.71	-23.03	0.14	0.898	0.010	203.27	27.87	-2.00	15.42	-53.33	79.65	22.12
81	SEABED	-137.71	-23.03	0.11	0.795	-0.017	205.27	27.88	-2.00	8.51	-52.49	78.46	21.80
82	SEABED	-139.71	-23.03	0.08	0.689	-0.020	207.27	27.89	-2.00	3.89	-51.58	77.73	21.59
83	SEABED	-141.71	-23.03	0.06	0.580	-0.018	209.27	27.90	-2.00	-2.05	-50.28	76.01	21.11
84	SEABED	-143.72	-23.03	0.04	0.465	-0.015	211.27	27.91	-2.00	-1.75	-48.24	73.67	20.46
85	SEABED	-145.72	-23.03	0.02	0.354	-0.012	213.27	27.92	-2.00	-1.61	-44.24	69.67	19.35
86	SEABED	-147.72	-23.03	0.01	0.254	-0.009	215.27	27.93	-2.00	-1.33	-39.58	65.40	18.17
87	SEABED	-149.72	-23.03	0.01	0.166	-0.006	217.27	27.94	-2.00	-1.14	-33.55	59.37	16.49
88	SEABED	-151.72	-23.03	0.00	0.095	-0.004	219.27	27.95	-2.00	-0.88	-25.55	51.37	14.27
89	SEABED	-153.72	-23.03	0.00	0.043	-0.002	221.27	27.96	-2.00	-0.62	-17.69	43.51	12.09
90	SEABED	-155.72	-23.03	0.00	0.011	0.000	223.27	27.97	-2.00	-0.41	-11.16	36.98	10.27
91	SEABED	-157.72	-23.03	0.00	-0.007	0.000	225.27	27.98	-2.00	-0.24	-6.28	32.11	8.92
92	SEABED	-159.72	-23.03	0.00	-0.009	0.000	227.27	27.99	-2.00	-0.12	-2.97	29.62	8.23
93	SEABED	-161.72	-23.03	0.00	-0.009	0.000	229.27	28.00	-2.00	0.07	1.21	29.63	8.23
94	SEABED	-163.72	-23.03	0.00	-0.008	0.000	231.27	28.01	-2.00	0.06	1.07	29.49	8.19
95	SEABED	-165.72	-23.03	0.00	-0.007	0.000	233.27	28.02	-2.00	0.05	0.94	29.50	8.19
96	SEABED	-167.72	-23.03	0.00	-0.005	0.000	235.27	28.03	-2.00	0.03	0.84	29.36	8.15
97	SEABED	-169.72	-23.03	0.00	-0.004	0.000	237.27	28.03	-2.00	0.02	0.60	29.14	8.09
98	SEABED	-171.72	-23.03	0.00	-0.003	0.000	239.27	28.04	-2.00	0.01	0.31	29.10	8.08
99	SEABED	-173.72	-23.03	0.00	-0.002	0.000	241.27	28.05	-2.00	0.00	0.00	29.10	8.08

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX    DATE - 5/2/2020    TIME - 1:36:    1    PAGE 22

PROJECT - STATIC PIPE ANALYSIS 8 INCH    JOB NO. - LAYING

USER ID - IK    LICENSED BY - PT Timas Suplindo    CASE 1

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MAXIMUM DYNAMIC PIPE FORCES AND STRESSES													
NODE NO.	PIPE SECTION	COORD			SUPPORT VERT (KN)	REACTION HORIZ (KN)	SUPT VERT (M)	SEPARATIONS HORIZ (M)	PIPE TENSION (KN)	BENDING MOMENTS			TOTAL (KN-M)
		X (M)	Y (M)	Z (M)						VERT (KN-M)	HORIZ (KN-M)		
1	LAYBARGE	64.25	4.43	0.05	0.60	-0.05	0.00	0.00	0.00	0.12	0.01	0.12	
3	LAYBARGE	59.77	4.31	0.05	16.84	-1.34	0.00	0.00	-0.58	-11.44	-0.92	11.45	
5	LAYBARGE	48.27	4.01	0.05	20.42	-1.57	0.00	0.00	-2.04	-15.71	-1.18	15.72	
7	TENSIONR	38.15	3.75	0.04	12.92	-0.94	0.00	0.00	165.24	-5.73	-0.52	5.74	
9	LAYBARGE	33.48	3.63	0.04	9.06	0.65	0.00	0.00	165.03	-3.08	0.18	3.08	
11	TENSIONR	26.70	3.45	0.03	11.73	0.67	0.00	0.00	264.35	-2.81	-0.24	2.81	
13	LAYBARGE	21.38	3.31	0.03	2.34	-1.92	0.00	0.00	264.26	0.94	-0.90	1.02	
15	LAYBARGE	12.19	3.00	0.02	47.66	-3.86	0.00	0.00	263.34	-95.51	-11.12	95.73	
17	LAYBARGE	0.01	1.78	0.00	39.30	-3.04	0.00	0.00	261.49	-90.95	-10.90	91.21	
20	STINGER	-8.05	0.37	0.01	23.39	-3.10	0.00	0.00	259.45	-70.62	-9.90	70.66	
22	STINGER	-15.85	-1.43	0.03	23.52	-4.70	0.00	0.00	257.78	-65.08	-9.72	65.36	
24	STINGER	-23.56	-3.58	0.04	15.20	-4.09	0.00	0.00	255.85	-46.58	-7.24	46.72	
26	STINGER	-30.60	-5.81	0.05	29.52	-7.47	0.00	0.00	253.51	-60.16	-7.42	60.16	
28	STINGER	-36.54	-7.84	0.06	8.92	50.42	0.12	0.00	251.64	-20.10	11.82	20.10	
30	STINGER	-39.44	-8.84	0.06	6.94	-68.25	0.64	0.00	250.36	24.03	-105.93	106.41	
32	SAGBEND	-41.27	-9.46	0.06	0.00	0.00	0.00	0.00	249.81	28.05	-87.85	89.22	
33	SAGBEND	-43.16	-10.10	0.07	0.00	0.00	0.00	0.00	249.20	30.39	-64.34	67.15	
34	SAGBEND	-45.06	-10.73	0.10	0.00	0.00	0.00	0.00	248.58	34.50	-48.55	52.89	
35	SAGBEND	-46.96	-11.34	0.13	0.00	0.00	0.00	0.00	247.96	37.69	-36.86	44.39	
36	SAGBEND	-48.87	-11.94	0.17	0.00	0.00	0.00	0.00	247.35	40.57	-27.67	43.16	
37	SAGBEND	-50.78	-12.53	0.21	0.00	0.00	0.00	0.00	246.76	42.69	-21.97	43.33	
38	SAGBEND	-52.69	-13.10	0.24	0.00	0.00	0.00	0.00	246.18	44.36	-18.14	44.38	
39	SAGBEND	-54.61	-13.66	0.27	0.00	0.00	0.00	0.00	245.62	45.58	18.60	45.75	
40	SAGBEND	-56.53	-14.20	0.30	0.00	0.00	0.00	0.00	245.08	46.38	19.23	46.79	
41	SAGBEND	-58.46	-14.72	0.34	0.00	0.00	0.00	0.00	244.57	47.07	19.76	47.86	
42	SAGBEND	-60.39	-15.23	0.38	0.00	0.00	0.00	0.00	244.07	47.55	19.92	48.60	
43	SAGBEND	-62.33	-15.73	0.41	0.00	0.00	0.00	0.00	243.59	48.00	19.79	49.21	
44	SAGBEND	-64.27	-16.21	0.43	0.00	0.00	0.00	0.00	243.12	48.52	19.41	49.65	
45	SAGBEND	-66.21	-16.68	0.44	0.00	0.00	0.00	0.00	242.68	48.92	18.86	50.01	
46	SAGBEND	-68.16	-17.13	0.44	0.00	0.00	0.00	0.00	242.26	49.21	18.32	50.32	
47	SAGBEND	-70.11	-17.57	0.44	0.00	0.00	0.00	0.00	241.86	49.47	18.02	50.45	
48	SAGBEND	-72.07	-17.99	0.44	0.00	0.00	0.00	0.00	241.47	49.73	17.84	50.40	
49	SAGBEND	-74.03	-18.38	0.44	0.00	0.00	0.00	0.00	241.10	49.92	17.58	50.45	
50	SAGBEND	-75.99	-18.77	0.44	0.00	0.00	0.00	0.00	240.75	50.04	17.25	50.52	
51	SAGBEND	-77.96	-19.13	0.44	0.00	0.00	0.00	0.00	240.43	50.10	16.97	50.46	
52	SAGBEND	-79.93	-19.48	0.43	0.00	0.00	0.00	0.00	240.13	50.09	16.99	50.26	
53	SAGBEND	-81.90	-19.80	0.43	0.00	0.00	0.00	0.00	239.85	50.01	16.97	50.18	
54	SAGBEND	-83.87	-20.11	0.43	0.00	0.00	0.00	0.00	239.59	49.86	16.90	50.02	
55	SAGBEND	-85.85	-20.41	0.43	0.00	0.00	0.00	0.00	239.35	49.63	16.78	49.76	
56	SAGBEND	-87.83	-20.68	0.44	0.00	0.00	0.00	0.00	239.12	49.32	16.61	49.39	
57	SAGBEND	-89.82	-20.94	0.45	0.00	0.00	0.00	0.00	238.92	48.91	16.89	48.92	

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX    DATE - 5/2/2020    TIME - 1:36:    1    PAGE 23

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MAXIMUM DYNAMIC PIPE FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACTION HORIZ (KN )	SUPT VERT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	BENDING MOMENTS			
										VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
58	SAGBEND	-91.80	-21.18	0.45	0.00	0.00	0.00	0.00	238.73	48.44	17.36	48.45	
59	SAGBEND	-93.79	-21.40	0.45	0.00	0.00	0.00	0.00	238.56	47.82	17.93	47.83	
60	SAGBEND	-95.78	-21.61	0.45	0.00	0.00	0.00	0.00	238.41	47.05	18.35	47.05	
61	SAGBEND	-97.77	-21.80	0.45	0.00	0.00	0.00	0.00	238.27	46.54	18.46	47.36	
62	SAGBEND	-99.76	-21.97	0.45	0.00	0.00	0.00	0.00	238.15	46.61	18.35	47.87	
63	SAGBEND	-101.75	-22.13	0.45	0.00	0.00	0.00	0.00	238.05	46.35	17.93	48.07	
64	SAGBEND	-103.75	-22.27	0.44	0.00	0.00	0.00	0.00	237.96	45.71	17.03	47.81	
65	SAGBEND	-105.74	-22.40	0.44	0.00	0.00	0.00	0.00	237.88	45.29	16.30	47.02	
66	SAGBEND	-107.74	-22.51	0.44	0.00	0.00	0.00	0.00	237.82	44.44	15.84	45.65	
67	SAGBEND	-109.73	-22.60	0.43	0.09	0.09	0.00	0.00	237.78	43.23	15.26	44.27	
68	SAGBEND	-111.73	-22.68	0.42	0.95	0.61	0.00	0.00	237.74	42.07	14.67	42.88	
69	SAGBEND	-113.73	-22.75	0.41	1.75	1.10	0.00	0.00	237.72	40.30	13.67	41.71	
70	SAGBEND	-115.73	-22.81	0.40	2.14	1.33	0.00	0.00	237.72	38.88	14.17	40.09	
71	SAGBEND	-117.72	-22.86	0.39	2.28	1.46	0.00	0.00	237.73	37.10	15.65	37.68	
72	SAGBEND	-119.72	-22.91	0.37	2.30	1.50	0.00	0.00	237.75	34.33	17.55	35.51	
73	SAGBEND	-121.72	-22.94	0.35	2.30	-1.52	0.00	0.00	237.77	32.32	-18.50	33.29	
74	SAGBEND	-123.72	-22.97	0.33	2.31	-1.51	0.00	0.00	237.79	29.66	-19.62	30.22	
75	SAGBEND	-125.72	-22.99	0.30	2.35	-1.51	0.00	0.00	237.80	27.32	-20.58	27.64	
76	SEABED	-127.72	-23.01	0.28	2.34	-1.51	0.00	0.00	237.87	24.09	-20.71	24.12	
77	SEABED	-129.72	-23.02	0.25	2.34	-1.55	0.00	0.00	237.96	19.66	-21.05	21.59	
78	SEABED	-131.72	-23.03	0.21	2.32	-1.54	0.00	0.00	238.06	14.66	-21.80	21.92	
79	SEABED	-133.72	-23.03	0.17	2.27	-1.51	0.00	0.00	238.15	9.98	-21.42	21.51	
80	SEABED	-135.71	-23.03	0.14	2.23	-1.49	0.00	0.00	238.24	6.19	-21.43	21.45	
81	SEABED	-137.71	-23.03	0.11	2.18	-1.45	0.00	0.00	238.33	3.42	-21.09	21.10	
82	SEABED	-139.71	-23.03	0.08	2.13	-1.42	0.00	0.00	238.41	1.56	-20.73	20.73	
83	SEABED	-141.71	-23.03	0.06	2.07	-1.38	0.00	0.00	238.50	-0.82	-20.20	20.20	
84	SEABED	-143.72	-23.03	0.04	2.01	-1.34	0.00	0.00	238.58	-0.70	-19.38	19.39	
85	SEABED	-145.72	-23.03	0.02	1.95	-1.30	0.00	0.00	238.67	-0.65	-17.78	17.78	
86	SEABED	-147.72	-23.03	0.01	1.90	-1.27	0.00	0.00	238.75	-0.53	-15.90	15.91	
87	SEABED	-149.72	-23.03	0.01	1.87	-1.08	0.00	0.00	238.83	-0.46	-13.48	13.49	
88	SEABED	-151.72	-23.03	0.00	1.85	-0.48	0.00	0.00	238.91	-0.35	-10.27	10.27	
89	SEABED	-153.72	-23.03	0.00	1.83	0.28	0.00	0.00	238.99	-0.25	-7.11	7.11	
90	SEABED	-155.72	-23.03	0.00	1.83	0.23	0.00	0.00	239.07	-0.16	-4.48	4.49	
91	SEABED	-157.72	-23.03	0.00	1.83	0.23	0.00	0.00	239.15	-0.10	-2.52	2.53	
92	SEABED	-159.72	-23.03	0.00	1.83	0.20	0.00	0.00	239.23	-0.05	-1.19	1.19	
93	SEABED	-161.72	-23.03	0.00	1.83	0.17	0.00	0.00	239.30	0.03	0.48	0.49	
94	SEABED	-163.72	-23.03	0.00	1.83	0.13	0.00	0.00	239.38	0.02	0.43	0.43	
95	SEABED	-165.72	-23.03	0.00	1.83	0.09	0.00	0.00	239.45	0.02	0.38	0.38	
96	SEABED	-167.72	-23.03	0.00	1.83	0.06	0.00	0.00	239.52	0.01	0.34	0.34	
97	SEABED	-169.72	-23.03	0.00	1.83	0.03	0.00	0.00	239.60	0.01	0.24	0.24	
98	SEABED	-171.72	-23.03	0.00	1.83	0.02	0.00	0.00	239.67	0.00	0.13	0.13	
99	SEABED	-173.72	-23.03	0.00	0.00	0.00	0.00	0.00	239.74	0.00	0.00	0.00	

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 24

STATIC PIPE ANALYSIS 8 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/ 2/2020 TIME - 1:36: 1 CASE 1

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DYNAMIC SOLUTION SUMMARY

SEA STATE NUMBER ( 1 )

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SEA STATE TYPE ..... WAVE SPECTRUM

NO. WAVE COMPONENTS .. 20

WAVE WATER DEPTH ..... 23.0 M

MAX. WAVE FREQUENCY .. 3.0015 RA/S

SPECTRUM START TIME .. 0. SECS

RAO SIGN CONVENTION .. BENTLEY MOSES

VESSEL RESPONSE TYPE . TABLE OF RAOS  
 WAVE TRAVEL DIRECTION 0.000 DEG  
 MIN. WAVE FREQUENCY .. 0.1001 RA/S  
 RANDOM PHASE SEED .... 0  
 NO. RAOS IN TABLE .... 30

SEA STATE DEFINITION

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WAVE SPECTRUM TYPE ... JONSWAP (CLASSIC)  
 JONSWAP COEFFICIENT .. 0.003223 JONSWAP PEAK FACTOR .. 5.000  
 PEAK WAVE FREQUENCY .. 0.9498 RA/S

CALCULATED WAVE HEIGHTS

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SIGNIFICANT WAVE HT. . 1.451 M AVERAGE WAVE HEIGHT .. 0.945 M  
 MAXIMUM WAVE HEIGHT .. 2.576 M RMS WAVE HEIGHT ..... 1.046 M  
 TOTAL NUMBER OF WAVES 1900

===== SOLUTION SUMMARY =====

NODE	PIPE	X	Y	Z	SUPPORT	REACT	TOTAL	TOTAL	PCT
NO.	SECTION	COORD	COORD	COORD	VERT	HORIZ	MOMENT	STRESS	YLD
		(M)	(M)	(M)	(KN)	(KN)	(KN-M)	(MPA)	(%)
=====									

1 LAYBARGE	64.3	4.4	0.1	0.6	0.0	0.1	0.3	0.
3 LAYBARGE	59.8	4.3	0.1	16.8	-1.3	11.4	28.5	8.
5 LAYBARGE	48.3	4.0	0.0	20.4	-1.6	15.7	39.2	11.
7 TENSIONR	38.1	3.7	0.0	12.9	-0.9	5.7	34.0	9.
9 LAYBARGE	33.5	3.6	0.0	9.1	0.6	3.1	27.5	8.
11 TENSIONR	26.7	3.4	0.0	11.7	0.7	2.8	39.0	11.
13 LAYBARGE	21.4	3.3	0.0	2.3	-1.9	1.0	33.9	9.
15 LAYBARGE	12.2	3.0	0.0	47.7	-3.9	95.7	270.2	75.
17 LAYBARGE	0.0	1.8	0.0	39.3	-3.0	91.2	258.7	72.
20 STINGER	-8.1	0.4	0.0	23.4	-3.1	70.7	207.1	58.
22 STINGER	-15.8	-1.4	0.0	23.5	-4.7	65.4	193.7	54.
24 STINGER	-23.6	-3.6	0.0	15.2	-4.1	46.7	142.6	40.
26 STINGER	-30.6	-5.8	0.1	29.5	-7.5	60.2	179.4	50.
28 STINGER	-36.5	-7.8	0.1	8.9	50.4	20.1	72.9	20.
30 STINGER	-39.4	-8.8	0.1	6.9	-68.2	106.4	290.3	81.
32 SAGBEND	-41.3	-9.5	0.1	0.0	0.0	89.2	247.5	69.
69 SAGBEND	-113.7	-22.8	0.4	1.7	1.1	41.7	123.9	34.



**LAMPIRAN ANALISA DINAMIS PADA PIPA 8 INCH  
HEADING 135°**

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MMMMM      MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMM
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*
*           O F F P I P E - 3 -- OFFSHORE PIPELINE ANALYSIS SYSTEM
*
*   COPYRIGHT (C) 1983-2016, ROBERT C. MALAHY. ALL RIGHTS RESERVED WORLDWIDE.
*
*           VERSION NO. - 3.02EX
*           RELEASED ON - 03/08/2016
*           LICENSED TO - PT Timas Suplindo
*
*****
*
* OFFPIPE IS A NONLINEAR, 3-DIMENSIONAL FINITE ELEMENT METHOD BASED PROGRAM FOR THE
* STATIC AND DYNAMIC ANALYSIS OF PROBLEMS ARISING IN THE DESIGN OF MARINE PIPELINES.
* THIS VERSION OF OFFPIPE MAY BE USED FOR THE ANALYSIS OF OFFSHORE PIPELAYING OPER-
* ATIONS, DAVIT LIFTS, PIPELINES LYING ON AN UNEVEN SEABED, AND RISERS.
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*
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*           6554 AUDEN                 FACSIMILE: (713) 664-0962
*           HOUSTON, TEXAS 77005
*           U.S.A.                     EMAIL: SUPPORT@OFFPIPE.COM
*
*****

```

```

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX   PAGE   3
STATIC PIPE ANALYSIS 8 INCH
JOB NO. - LAYING                LICENSED BY - PT Timas Suplindo
USER ID - IK                    DATE - 5/2/2020   TIME - 2:8:7       CASE   1
=====

```

INPUT      DATA      ECHO

```

PRINTED OUTPUT SELECTED
=====
STATIC PIPE FORCES AND STRESSES ... YES
STATIC SOLUTION SUMMARY ..... YES
DYNAMIC PIPE FORCES AND STRESSES .. YES
DYNAMIC RANGE OF PIPE DATA ..... NO
DYNAMIC TRACKING OF PIPE DATA ..... NO
OVERBEND PIPE SUPPORT GEOMETRY .... NO
STINGER BALLAST SCHEDULE DATA ..... NO
SUPPORT REACTIONS IN BARGE COORDS. . NO

INTERNAL FORCES IN PIPE & CABLE ... NO
INTERNAL FORCES IN STINGER ..... NO
PRINT PIPE STRAINS IN OUTPUT ..... NO
DNV OS-F101 COMPLIANCE REPORT ..... NO
API RP-1111 COMPLIANCE REPORT ..... NO
PRINT DNV/API FACTORS & PARAMETERS NO
USE THICK WALL HOOP STRESS EQN. ... NO
USE DNV 1981 FOR TOTAL PIPE STRESS NO

ENABLE/DISABLE WARNING MESSAGES ... ENABLE
GENERATE SPREAD SHEET PLOT FILE ... NO
GENERATE ASCII PLOT DATA FILES .... NO

```

PROFILE PLOT TABLE ENTRIES

```
=====
PLOT TABLE INDEX ..... 1
PLOT NUMBER ..... 1
PLOT TYPE OPTION NUMBER ..... 1
DYNAMIC PROFILE TIME POINT ..... 0.000
DYNAMIC PROFILE TIME INCREMENT .... 0.000
ORDINATE PARAMETER CODE NUMBER .... 2
AXIS LABEL FOR ORDINATE ..... "PIPE ELEVATION Y COORDINATE  "
ABSCISSA PARAMETER CODE NUMBER .... 1
AXIS LABEL FOR ABSCISSA ..... "PIPE HORIZONTAL X COORDINATE  "

PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS  "
MINIMUM VERTICAL AXIS RANGE ..... 0.000
MAXIMUM VERTICAL AXIS RANGE ..... 0.000
MINIMUM HORIZONTAL AXIS RANGE ..... 0.000
MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000
=====
```

```
=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 4
STATIC PIPE ANALYSIS 8 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 5/2/2020 TIME - 2:8:7 CASE 1
=====
```

INPUT DATA ECHO

PROFILE PLOT TABLE ENTRIES

```
=====
PLOT TABLE INDEX ..... 2
PLOT NUMBER ..... 1
PLOT TYPE OPTION NUMBER ..... 1
DYNAMIC PROFILE TIME POINT ..... 0.000
DYNAMIC PROFILE TIME INCREMENT .... 0.000
ORDINATE PARAMETER CODE NUMBER .... 15
AXIS LABEL FOR ORDINATE ..... "DNV YIELD STRESS PERCENTAGE  "
ABSCISSA PARAMETER CODE NUMBER .... 1
AXIS LABEL FOR ABSCISSA ..... "PIPELINE HORIZONTAL X COORDINATE"

PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS  "
MINIMUM VERTICAL AXIS RANGE ..... 0.000
MAXIMUM VERTICAL AXIS RANGE ..... 0.000
MINIMUM HORIZONTAL AXIS RANGE ..... 0.000
MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000
=====
```

PIPE PROPERTIES

```
=====
PROPERTY TABLE ROW NUMBER ..... 1
PIPE SECTION LENGTH ..... 0.000 METERS
STEEL MODULUS OF ELASTICITY ..... 207000. M-PASCAL
STEEL CROSS SECTIONAL AREA ..... 82.690 CM^2
COATED PIPE AVG MOMENT OF INERTIA . 4402.00 CM^4
WEIGHT PER-UNIT-LENGTH IN AIR ..... 1649.63 N/M
WEIGHT PER-UNIT-LENGTH SUBMERGED .. 912.94 N/M
MAXIMUM ALLOWABLE PIPE STRAIN ..... 0.205000 PERCENT

STEEL OUTSIDE DIAMETER ..... 21.9100 CM
STEEL WALL THICKNESS ..... 1.2700 CM
YIELD STRESS ..... 360.00 M-PASCAL
STRESS/STRAIN INTENSE FACTOR ..... 0.0000
HYDRODYNAMIC OUTSIDE DIAMETER ..... 0.000 CM
DRAG COEFFICIENT ..... 0.0000
HYDRODYNAMIC TOTAL AREA ..... 0.000 CM^2
ADDED MASS COEFFICIENT ..... 0.0000
POISSON'S RATIO ..... 0.3000
COEFFICIENT OF THERMAL EXPANSION .. 0.00001100 1/DEG C
=====
```

```
=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 5
STATIC PIPE ANALYSIS 8 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 5/2/2020 TIME - 2:8:7 CASE 1
=====
```

INPUT DATA ECHO

PIPE COATING PROPERTIES

```
=====
PIPE PROPERTY TABLE INDEX ..... 1
CORROSION COATING THICKNESS ..... 0.320 CM
CORROSION COATING WEIGHT DENSITY .. 9025.2 N/M^3
CORROSION COATING ELASTIC MODULUS . 0.000 M-PASCAL
CONCRETE COATING THICKNESS ..... 4.000 CM
CONCRETE COATING WEIGHT DENSITY ... 29857. N/M^3
CONCRETE COATING ELASTIC MODULUS .. 0.000 M-PASCAL
DESIRED PIPE SPECIFIC GRAVITY ..... 0.0000
CONCRETE STIFFENING EFFECTIVENESS . 0.000
NO NOT CALC. STRESS FOR BARE PIPE . NO
=====
```

AVERAGE LENGTH OF PIPE JOINT ..... 12.200 METERS  
 EFFECTIVE FIELD JOINT LENGTH ..... 0.300 METERS  
 FIELD JOINT FILL WEIGHT DENSITY ... 10055.3 N/M^3  
 FIELD JOINT FILL ELASTIC MODULUS... 0.000 M-PASCAL  
 FIELD JOINT STIFFENING EFFECT. .... 0.000  
 FIELD JOINT BENDING MODEL ..... 0 IGNORE COATING STIFFNESS  
 WEIGHT DENSITY OF STEEL ..... 77008. N/M^3  
 WEIGHT DENSITY OF PIPE CONTENTS ... 0.0 N/M^3  
 REF. ELEVATION FOR STATIC HEAD .... 0.00 METERS  
 FREE FLOOD PIPE DURING PIPELAY ... NO

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 6  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:8:7 CASE 1  
 =====

INPUT DATA ECHO

PIPELAY VESSEL DESCRIPTION

=====  
 NUMBER OF PIPE NODES ..... 9  
 BARGE GEOMETRY SPECIFIED BY ..... 1 X-Y COORDINATES  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.000 METERS  
 ADJUST Y COORDINATES MANUALLY .... NO  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 PIPE ANGLE RELATIVE TO DECK ..... 0.0000 DEGREES  
 HEIGHT OF DECK ABOVE WATER ..... 2.400 METERS  
 LAYBARGE FORWARD (X) OFFSET ..... 0.000 METERS  
 BARGE TRIM ANGLE ..... 0.5000 DEGREES  
  
 STERN SHOE X COORDINATE ..... 0.000 METERS  
 STERN SHOE Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER X COORDINATE ..... 43.820 METERS  
 ROTATION CENTER Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER Z COORDINATE ..... 6.370 METERS  
 BARGE HEADING ..... 0.0000 DEGREES  
 BARGE OFFSET FROM RIGHT-OF-WAY .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT VERTICAL ANGLE ... 0.000 DEGREES  
 PIPE RAMP PIVOT Z COORDINATE ..... 0.000 METERS  
 PIPE RAMP HEADING ON DECK ..... 0.000 DEGREES  
 ROLE OF ALTERNATE WAVE ORIGIN .... 0 MOTIONS & WAVES AT CENTER OF MOTION  
 WAVE PHASE ORIGIN X COORDINATE .... 0.000  
 WAVE PHASE ORIGIN Y COORDINATE .... 0.000 METERS  
 WAVE PHASE ORIGIN Z COORDINATE .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE .....

NODE X COORD (M )	NODE Y COORD (M )	SUPPORT TYPE	DAVIT SPACING (M )
64.220	1.838	1 SIMPLE SUPPORT	0.000
59.740	1.760	1 SIMPLE SUPPORT	0.000
48.240	1.560	1 SIMPLE SUPPORT	0.000
38.110	1.383	2 PIPE TENSIONER	0.000
33.440	1.302	1 SIMPLE SUPPORT	0.000
26.660	1.183	2 PIPE TENSIONER	0.000
21.340	1.092	7 USER DEFINED SPT	0.000
12.150	0.860	7 USER DEFINED SPT	0.000
-0.040	-0.260	8 USER DEFINED SPT	0.000

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 7  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:8:7 CASE 1  
 =====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====  
 SUPPORT PROPERTY TABLE INDEX ..... 2  
 SUPPORT ELEMENT TYPE ..... 2 TENSIONER  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
  
 BOTTOM ROLLER ANGLE TO HORIZONTAL . 0.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL .... 0.000 DEGREES

SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 7  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 1.600 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 8  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 2: 8: 7 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 8  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

STINGER DESCRIPTION

=====

NUMBER OF PIPE/STINGER NODES ..... 6  
 STINGER GEOMETRY SPECIFIED BY ..... 2 X-Y COORD AND MATCH PT  
 STINGER TYPE ..... 1 FIXED GEOMETRY OR RAMP  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.00 METERS  
 HITCH X-COORDINATE ..... 0.497 METERS  
 HITCH Y-COORDINATE ..... -1.800 METERS  
 HITCH ANGULAR ORIENTATION ..... 0.000 DEGREES

X COORDINATE OF LOCAL ORIGIN ..... 0.497 METERS  
 Y COORDINATE OF LOCAL ORIGIN ..... -1.800 METERS  
 ROTATION ABOUT STINGER HITCH ..... 13.500 DEGREES  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 TANGENT POINT ANGLE ..... 0.000 DEGREES

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	ELEMENT TYPE	ELEMENT LENGTH ( M )
-8.325	2.209	1 SIMPLE SUPPORT	2 HINGED END	0.000
-16.325	2.349	1 SIMPLE SUPPORT	1 FIXED END	0.000
-24.325	2.119	1 SIMPLE SUPPORT	1 FIXED END	0.000
-31.699	1.660	1 SIMPLE SUPPORT	1 FIXED END	0.000
-37.949	1.069	1 SIMPLE SUPPORT	1 FIXED END	0.000
-40.949	0.350	1 SIMPLE SUPPORT	1 FIXED END	0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 9  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 2: 8: 7 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

```

=====
SUPPORT PROPERTY TABLE INDEX ..... 1
SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT
SUPPORT INITIAL STATE FLAG ..... 0
TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M
VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M
STATIC VERTICAL DEFLECTION ..... 0.0000 CM
LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES
SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES
SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS
BED ROLLER LENGTH ..... 1.640 METERS
HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS
TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
    
```

CURRENT VELOCITIES

```

=====
WATER DEPTH (M ) CURRENT SPEED (M/S ) DIRECTION OF TRAVEL (DEG )
=====
0.000 0.790 135.000
11.500 0.480 135.000
23.000 0.420 135.000
    
```

PIPE TENSION DATA

```

=====
STATIC PIPE TENSION ON LAY VESSEL . 196.133 K-NEWTON
MINIMUM DYNAMIC PIPE TENSION ..... 196.133 K-NEWTON
MAXIMUM DYNAMIC PIPE TENSION ..... 264.553 K-NEWTON
STATIC HORIZONTAL BOTTOM TENSION .. 0.000 K-NEWTON
NO. OF VALUES FOR TENSION PROFILE . 0
VALUES ARE FOR PIPE SPAN ANALYSIS . NO
MAXIMUM PIPE PAYOUT SPEED ..... 0.000 M/SEC
MAXIMUM PIPE TAKEUP SPEED ..... 0.000 M/SEC
    
```

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 10

STATIC PIPE ANALYSIS 8 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 2: 8: 7 CASE 1

=====  
 INPUT DATA ECHO

SAGBEND GEOMETRY

```

=====
SAGBEND PIPE ELEMENT LENGTH ..... 2.000 METERS
WATER DEPTH ..... 23.00 METERS
X-COORDINATE AT SPECIFIED DEPTH . . 0.00 METERS
ESTIMATED SAGBEND X LENGTH ..... 0.00 METERS
ESTIMATED PIPE LENGTH ON SEABED ... 0.00 METERS
X-COORD OF PIPE FREE END ON SEABED 0.00 METERS
X-COORD POINT OF FIXITY ON SEABED . 0.00 METERS
MAXIMUM SLOPE (ANGLE) OF SEABED ... 0.000 DEGREES
DIRECTION OF MAXIMUM SLOPE ..... 0.000 DEGREES

PIPE/CABLE SPAN END CONDITION ..... 0 PIPE/CABLE RESTING ON SEABED
PIPE/CABLE SPAN LENGTH GIVEN BY ... 0 SPECIFIED PIPE/CABLE TENSION
ESTIMATED SPAN DEPTH AT FREE END .. 0.00 METERS
PIPE VERTICAL ANGLE AT FREE END ... 0.000 DEGREES
BOTTOM HINGE OFFSET ..... 0.000 METERS
BOTTOM HINGE MINIMUM ANGLE ..... 0.000 DEGREES
BOTTOM HINGE MAXIMUM ANGLE ..... 0.000 DEGREES
    
```

SOIL ELEMENT PROPERTIES

```

=====
SOIL PROPERTY TABLE ROW INDEX ..... 1
SOIL ELEMENT TYPE (FUTURE USE) .... 0
PIPE INDEX OR SEGMENT NUMBER ..... 0
LONGITUDINAL SOIL STIFFNESS ..... 0.00 KN/M^2
VERTICAL SOIL STIFFNESS ..... 0.00 KN/M^2
LATERAL SOIL STIFFNESS ..... 0.00 KN/M^2
DEFLECTION UNDER REFERENCE LOAD ... 0.0000 CM

LONGITUDINAL COEF. OF FRICTION .... 0.000
LATERAL COEFFICIENT OF FRICTION ... 0.600
NUMBER OF INTEGRATION POINTS ..... 0
    
```

TIME INTEGRATION PARAMETERS

```

=====
TIME STEP LENGTH ..... 0.2000 SECONDS
MAXIMUM TIME OF INTEGRATION ..... 10860.000 SECONDS
SOLUTION SAMPLING TIME STEP ..... 0.400 SECONDS
    
```

SOLUTION SAMPLING STARTS AT TIME .. 60.000 SECONDS  
 DAMPING RATIO ..... 0.0000  
 NUMBER OF VARIABLE TIME STEPS ..... 0

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 11  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 2: 8: 7 CASE 1

=====

INPUT DATA ECHO

WAVE PARAMETERS

=====

SEA STATE ROW INDEX ..... 1  
 WAVE HEIGHT (PEAK TO TROUGH) ..... 1.800 METERS  
 WAVE PERIOD ..... 6.300 SECONDS  
 WAVE DIRECTION OF TRAVEL ..... 135.000 DEGREES  
 WATER DEPTH FOR WAVE CALCULATIONS . 23.00 METERS  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0

WAVE SPECTRUM EQUATION

=====

SEA STATE ROW INDEX ..... 1  
 WAVE SPECTRUM EQUATION TYPE ..... 7 JONSWAP (CLASSIC)  
 NUMBER OF WAVES IN SPECTRUM ..... 20  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0  
 MINIMUM PERIOD IN SPECTRUM ..... 2.0933 SECONDS  
 MAXIMUM PERIOD IN SPECTRUM ..... 62.8000 SECONDS  
 START TIME FOR WAVE SPECTRUM ..... 0. SECONDS  
 DIRECTION OF WAVE TRAVEL ..... 0.000 DEGREES  
 1ST JONSWAP COEF. (ALPHA) ..... 0.003223  
 2ND JONSWAP COEF. (GAMMA) ..... 5.0000  
 PEAK WAVE PERIOD ..... 6.6150 SECONDS

VESSEL MOTION RAO TABLE

=====

SEA STATE NUMBER ..... 1  
 USE PHASE LAG FOR RAOs ..... NO  
 VESSEL MOTIONS SIGN CONVENTION .... 2 BENTLEY MOSES  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD

WAVE PERIOD (SECONDS)	-----/ SURGE AMPLITUDE (M/M )	-----/ PHASE (DEG)	-----/ SWAY AMPLITUDE (M/M )	-----/ PHASE (DEG)	-----/ HEAVE AMPLITUDE (M/M )	-----/ PHASE (DEG)
2.0900	0.0030	69.00	0.0010	-73.00	0.0000	0.00
2.1700	0.0030	-84.00	0.0000	0.00	0.0000	0.00
2.2400	0.0050	110.00	0.0010	-95.00	0.0000	0.00
2.3300	0.0040	-36.00	0.0000	0.00	0.0000	0.00
2.4200	0.0070	125.00	0.0010	-146.00	0.0010	111.00
2.5100	0.0050	-20.00	0.0010	-38.00	0.0010	121.00
2.6200	0.0110	120.00	0.0030	154.00	0.0010	82.00
2.7300	0.0040	-57.00	0.0010	-101.00	0.0010	92.00
2.8500	0.0170	101.00	0.0040	107.00	0.0010	25.00
2.9900	0.0100	-157.00	0.0040	178.00	0.0020	5.00
3.1400	0.0170	69.00	0.0030	33.00	0.0010	-15.00
3.3100	0.0290	152.00	0.0080	89.00	0.0050	-64.00

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 12  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 2: 8: 7 CASE 1

=====

WAVE PERIOD	-----/ ROLL AMPLITUDE	-----/ PHASE	-----/ PITCH AMPLITUDE	-----/ PHASE	-----/ YAW AMPLITUDE	-----/ PHASE
3.4900	0.0070	-108.00	0.0040	149.00	0.0070	-27.00
3.7000	0.0340	97.00	0.0100	-11.00	0.0040	-119.00
3.9300	0.0520	162.00	0.0220	43.00	0.0200	-92.00
4.1900	0.0240	-134.00	0.0150	101.00	0.0210	-50.00
4.4900	0.0380	87.00	0.0190	-59.00	0.0050	-147.00
4.8300	0.0940	140.00	0.0570	-5.00	0.0490	-140.00
5.2400	0.1090	-172.00	0.0720	39.00	0.0940	-106.00
5.7100	0.0650	-130.00	0.0430	87.00	0.1080	-66.00
6.2800	0.0310	87.00	0.0320	-90.00	0.0370	21.00
6.9800	0.1570	140.00	0.1300	-67.00	0.2060	-179.00
7.8500	0.2910	153.00	0.2830	-27.00	0.4660	-131.00
8.9700	0.4130	-179.00	0.4090	1.00	0.6770	-96.00
10.4700	0.5090	-155.00	0.5150	25.00	0.8240	-68.00
12.5600	0.5780	-135.00	0.5950	45.00	0.9170	-46.00
15.7000	0.6230	-118.00	0.6490	61.00	0.9690	-29.00
20.9300	0.6480	-105.00	0.6810	74.00	0.9930	-16.00
31.4000	0.6610	-96.00	0.6980	83.00	1.0020	-6.00
62.8000	0.6660	-91.00	0.7060	88.00	1.0030	-1.00

=====

WAVE PERIOD /-----/ ROLL AMPLITUDE /-----/ PHASE /-----/ PITCH AMPLITUDE /-----/ PHASE /-----/ YAW AMPLITUDE /-----/ PHASE

(SECONDS)	(DEG/M)	(DEG)	(DEG/M)	(DEG)	(DEG/M)	(DEG)
2.0900	0.0030	-127.00	0.0010	-79.00	0.0020	-145.00
2.1700	0.0040	-149.00	0.0010	-150.00	0.0030	101.00
2.2400	0.0080	-151.00	0.0010	-159.00	0.0020	-129.00
2.3300	0.0040	-169.00	0.0020	133.00	0.0040	66.00
2.4200	0.0060	167.00	0.0030	135.00	0.0010	162.00
2.5100	0.0040	102.00	0.0040	101.00	0.0080	6.00
2.6200	0.0080	135.00	0.0030	113.00	0.0020	104.00
2.7300	0.0130	52.00	0.0050	65.00	0.0130	-44.00
2.8500	0.0180	35.00	0.0030	36.00	0.0100	34.00
2.9900	0.0310	35.00	0.0050	18.00	0.0140	-107.00
3.1400	0.0230	13.00	0.0130	-39.00	0.0230	-47.00
3.3100	0.0550	0.00	0.0160	-15.00	0.0020	76.00
3.4900	0.0420	19.00	0.0240	-89.00	0.0390	-142.00
3.7000	0.0550	-45.00	0.0600	-58.00	0.0530	-91.00
3.9300	0.0990	-30.00	0.0340	-27.00	0.0090	51.00
4.1900	0.0770	-26.00	0.0740	-126.00	0.1080	173.00
4.4900	0.0760	-73.00	0.1810	-92.00	0.1800	-137.00
4.8300	0.1640	-104.00	0.1930	-56.00	0.1290	-90.00
5.2400	0.3710	-100.00	0.0330	-46.00	0.0650	110.00
5.7100	0.5820	-77.00	0.3780	-158.00	0.3370	158.00
6.2800	0.3000	-56.00	1.0400	-118.00	0.6040	-166.00
6.9800	2.2020	-86.00	1.6540	-74.00	0.7900	-136.00

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 13  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 2: 8: 7 CASE 1

INPUT DATA ECHO

7.8500	2.0440	-27.00	1.8600	-34.00	0.8790	-109.00
8.9700	1.7290	3.00	1.7090	-2.00	0.8600	-85.00
10.4700	1.3750	27.00	1.3870	24.00	0.7530	-63.00
12.5600	1.0030	46.00	1.0160	45.00	0.5910	-44.00
15.7000	0.6580	62.00	0.6670	62.00	0.4090	-28.00
20.9300	0.3730	74.00	0.3790	76.00	0.2410	-15.00
31.4000	0.1660	83.00	0.1690	88.00	0.1100	-5.00
62.8000	0.0410	88.00	0.0440	105.00	0.0280	2.00

\*\*\*\*\* INFORMATIVE MESSAGE NO. - 94 \*\*\*\*\*

One or more of the phase angles in the RAO table have been adjusted to |  
 minimize the difference in value between adjacent angles. If the phase |  
 angles are arbitrarily restricted by the software used to calculate |  
 the RAOs to a fixed range of values such as (0 to 2\*PI) or (-PI to |  
 +PI), then phase angles that are actually close in value can differ by |  
 as much as 2\*PI. These large differences can cause the phase angles |  
 for RAOs that are between the values in the table (which must be |  
 determined using interpolation) to be calculated incorrectly.

CONTROL SWITCHES

MAX NUMBER STATIC ITERATIONS ..... 500  
 MAX DYNAMIC ITERATIONS PER STEP ... 500  
 BOUNDARY CONDITION LOGIC PARAMETER 5  
 TIME STEP STABILITY PARAMETER ..... 0  
 TYPE OF ANALYSIS ..... DYNAMIC  
 NUMBER OF PROBLEM DIMENSIONS ..... 3  
 DAVIT LIFT ANALYSIS ..... NO

STATIC SOLUTION CONVERGED IN ( 18 ) ITERATIONS

END OF INPUT DATA

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 2:8: 7 PAGE 14  
 PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING  
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES (MPA)		TOTAL PERCENT YIELD (PCT)	
1	LAYBARGE	64.20	4.42	0.00	0.000	1.471	0.00	0.00	0.00	0.29	0.00	0.29	0.08
3	LAYBARGE	59.72	4.30	0.00	0.000	1.590	4.48	-0.02	0.00	-26.68	0.00	26.71	7.42
5	LAYBARGE	48.23	4.00	0.00	0.000	1.461	15.98	-0.09	0.00	-36.95	0.00	37.04	10.29
7	TENSIONR	38.10	3.73	0.00	0.000	1.432	26.11	11.77	0.00	-13.49	0.00	25.26	7.02
9	LAYBARGE	33.43	3.61	0.00	0.000	1.535	30.78	11.75	0.00	-7.12	0.00	18.87	5.24
11	TENSIONR	26.65	3.43	0.00	0.000	1.482	37.57	23.62	0.00	-6.51	0.00	30.13	8.37
13	LAYBARGE	21.33	3.30	0.00	0.000	1.448	42.89	23.59	0.00	0.36	0.00	23.95	6.65
15	LAYBARGE	12.14	2.98	0.00	0.000	3.376	52.08	23.46	0.00	-227.47	-0.01	250.94	69.70



17	LAYBARGE	-0.04	1.76	0.00	0.000	8.070	64.32	23.22	0.00	-216.47	0.03	239.69	66.58
20	STINGER	-8.10	0.35	0.00	-0.001	11.521	72.51	22.97	0.00	-170.66	-0.13	193.63	53.79
22	STINGER	-15.89	-1.45	0.00	0.000	14.427	80.51	22.68	-0.13	-156.48	-0.36	179.22	49.78
24	STINGER	-23.60	-3.61	0.00	0.001	16.652	88.51	22.36	-0.31	-97.62	-0.21	120.13	33.37
26	STINGER	-30.64	-5.84	0.00	-0.001	18.614	95.90	21.99	-0.51	-136.99	-0.40	159.24	44.23
28	STINGER	-36.57	-7.92	0.00	0.006	19.908	102.19	21.69	-0.69	-37.10	0.59	59.14	16.43
30	STINGER	-39.47	-8.98	0.00	-0.017	20.002	105.27	21.52	-0.78	12.27	-6.08	35.61	9.89
32	SAGBEND	-41.35	-9.66	0.00	-0.048	19.877	107.27	21.42	-0.84	36.01	-4.72	58.16	16.15
33	SAGBEND	-43.23	-10.34	0.00	-0.069	19.648	109.27	21.31	-0.90	54.08	-3.09	75.93	21.09
34	SAGBEND	-45.12	-11.00	0.01	-0.082	19.338	111.27	21.20	-0.95	67.87	-1.87	89.58	24.88
35	SAGBEND	-47.01	-11.66	0.01	-0.089	18.967	113.27	21.10	-1.01	78.45	-0.96	100.06	27.80
36	SAGBEND	-48.90	-12.30	0.01	-0.093	18.549	115.27	20.99	-1.07	86.60	-0.28	108.14	30.04
37	SAGBEND	-50.80	-12.93	0.01	-0.093	18.095	117.27	20.89	-1.12	92.93	0.23	114.39	31.77
38	SAGBEND	-52.70	-13.55	0.02	-0.091	17.613	119.27	20.80	-1.17	97.86	0.61	119.25	33.13
39	SAGBEND	-54.61	-14.14	0.02	-0.087	17.108	121.27	20.70	-1.23	101.75	0.89	123.08	34.19
40	SAGBEND	-56.53	-14.72	0.02	-0.081	16.586	123.27	20.61	-1.28	104.85	1.09	126.11	35.03
41	SAGBEND	-58.44	-15.28	0.03	-0.075	16.050	125.27	20.52	-1.33	107.34	1.24	128.54	35.70
42	SAGBEND	-60.37	-15.83	0.03	-0.068	15.502	127.27	20.44	-1.37	109.37	1.35	130.50	36.25
43	SAGBEND	-62.30	-16.35	0.03	-0.061	14.945	129.27	20.35	-1.42	111.04	1.43	132.12	36.70
44	SAGBEND	-64.23	-16.86	0.03	-0.053	14.380	131.27	20.27	-1.46	112.44	1.49	133.46	37.07
45	SAGBEND	-66.17	-17.35	0.03	-0.045	13.809	133.27	20.20	-1.50	113.62	1.52	134.58	37.38
46	SAGBEND	-68.12	-17.81	0.04	-0.037	13.232	135.27	20.12	-1.54	114.63	1.55	135.54	37.65
47	SAGBEND	-70.07	-18.26	0.04	-0.029	12.651	137.27	20.05	-1.58	115.49	1.56	136.36	37.88
48	SAGBEND	-72.02	-18.69	0.04	-0.021	12.066	139.27	19.99	-1.62	116.25	1.57	137.06	38.07
49	SAGBEND	-73.98	-19.10	0.04	-0.013	11.477	141.27	19.92	-1.66	116.89	1.56	137.66	38.24
50	SAGBEND	-75.94	-19.49	0.04	-0.005	10.885	143.27	19.86	-1.69	117.45	1.56	138.18	38.38
51	SAGBEND	-77.91	-19.85	0.04	0.003	10.290	145.27	19.80	-1.72	117.92	1.55	138.60	38.50
52	SAGBEND	-79.88	-20.20	0.04	0.011	9.693	147.27	19.75	-1.75	118.30	1.53	138.94	38.59
53	SAGBEND	-81.85	-20.53	0.04	0.019	9.095	149.27	19.70	-1.78	118.58	1.51	139.19	38.66
54	SAGBEND	-83.83	-20.83	0.04	0.026	8.495	151.27	19.65	-1.81	118.76	1.48	139.33	38.70
55	SAGBEND	-85.81	-21.12	0.04	0.034	7.895	153.27	19.60	-1.83	118.81	1.45	139.35	38.71
56	SAGBEND	-87.79	-21.38	0.03	0.041	7.295	155.27	19.56	-1.85	118.71	1.41	139.22	38.67
57	SAGBEND	-89.77	-21.63	0.03	0.048	6.695	157.27	19.53	-1.88	118.43	1.36	138.91	38.59
58	SAGBEND	-91.76	-21.85	0.03	0.055	6.098	159.27	19.49	-1.89	117.92	1.29	138.38	38.44
59	SAGBEND	-93.75	-22.05	0.03	0.061	5.504	161.27	19.46	-1.91	117.12	1.20	137.55	38.21

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/2/2020      TIME - 2:8:      7      PAGE 15

PROJECT - STATIC PIPE ANALYSIS 8 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCT YIELD
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60	SAGBEND	-95.74	-22.23	0.03	0.067	4.915	163.27	19.43	-1.93	115.96	1.10	136.37	37.88
61	SAGBEND	-97.74	-22.39	0.02	0.072	4.333	165.27	19.41	-1.94	114.31	0.96	134.70	37.42
62	SAGBEND	-99.73	-22.53	0.02	0.077	3.761	167.27	19.38	-1.95	112.06	0.77	132.43	36.79
63	SAGBEND	-101.73	-22.66	0.02	0.080	3.202	169.27	19.37	-1.96	109.01	0.54	129.37	35.94
64	SAGBEND	-103.72	-22.76	0.02	0.082	2.661	171.27	19.35	-1.97	104.93	0.23	125.28	34.80
65	SAGBEND	-105.72	-22.84	0.01	0.082	2.144	173.27	19.34	-1.98	99.51	-0.18	119.85	33.29
66	SAGBEND	-107.72	-22.91	0.01	0.080	1.659	175.27	19.33	-1.99	92.34	-0.71	112.68	31.30
67	SAGBEND	-109.72	-22.96	0.01	0.075	1.215	177.27	19.32	-1.99	82.87	-1.40	103.22	28.67
68	SAGBEND	-111.72	-22.99	0.01	0.066	0.826	179.27	19.32	-1.99	70.41	-2.25	90.78	25.22
69	SEABED	-113.72	-23.02	0.00	0.052	0.510	181.27	19.32	-2.00	54.54	-2.92	74.96	20.82
70	SEABED	-115.72	-23.03	0.00	0.037	0.276	183.27	19.32	-2.00	38.25	-2.83	58.70	16.31
71	SEABED	-117.72	-23.04	0.00	0.024	0.119	185.27	19.32	-2.00	24.32	-2.33	44.78	12.44
72	SEABED	-119.72	-23.04	0.00	0.014	0.024	187.27	19.32	-2.00	13.73	-1.71	34.20	9.50
73	SEABED	-121.72	-23.04	0.00	0.007	-0.025	189.27	19.32	-2.00	6.44	-1.14	26.91	7.48
74	SEABED	-123.72	-23.04	0.00	0.002	-0.045	191.27	19.32	-2.00	1.89	-0.68	22.40	6.22
75	SEABED	-125.72	-23.04	0.00	0.000	-0.048	193.27	19.32	-2.00	-0.61	-0.35	21.09	5.86
76	SEABED	-127.72	-23.03	0.00	-0.001	-0.042	195.27	19.32	-2.00	-1.72	-0.14	22.12	6.14
77	SEABED	-129.72	-23.03	0.00	-0.002	-0.032	197.27	19.32	-2.00	-1.99	-0.01	22.38	6.22
78	SEABED	-131.72	-23.03	0.00	-0.002	-0.022	199.27	19.32	-2.00	-1.80	0.05	22.19	6.16
79	SEABED	-133.72	-23.03	0.00	-0.001	-0.014	201.27	19.32	-2.00	-1.43	0.07	21.82	6.06
80	SEABED	-135.72	-23.03	0.00	-0.001	-0.008	203.27	19.32	-2.00	-1.02	0.07	21.41	5.95
81	SEABED	-137.72	-23.03	0.00	-0.001	-0.004	205.27	19.32	-2.00	-0.66	0.06	21.06	5.85
82	SEABED	-139.72	-23.03	0.00	0.000	-0.001	207.27	19.32	-2.00	-0.38	0.04	20.78	5.77
83	SEABED	-141.72	-23.03	0.00	0.000	0.000	209.27	19.32	-2.00	-0.19	0.03	20.58	5.72
84	SEABED	-143.72	-23.03	0.00	0.000	0.001	211.27	19.32	-2.00	-0.06	0.02	20.46	5.68
85	SEABED	-145.72	-23.03	0.00	0.000	0.001	213.27	19.32	-2.00	0.01	0.01	20.40	5.67
86	SEABED	-147.72	-23.03	0.00	0.000	0.001	215.27	19.32	-2.00	0.04	0.00	20.43	5.68
87	SEABED	-149.72	-23.03	0.00	0.000	0.001	217.27	19.32	-2.00	0.05	0.00	20.44	5.68
88	SEABED	-151.72	-23.03	0.00	0.000	0.001	219.27	19.32	-2.00	0.05	0.00	20.44	5.68
89	SEABED	-153.72	-23.03	0.00	0.000	0.000	221.27	19.32	-2.00	0.04	0.00	20.43	5.68
90	SEABED	-155.72	-23.03	0.00	0.000	0.000	223.27	19.32	-2.00	0.03	0.00	20.42	5.67
91	SEABED	-157.72	-23.03	0.00	0.000	0.000	225.27	19.32	-2.00	0.02	0.00	20.41	5.67
92	SEABED	-159.72	-23.03	0.00	0.000	0.000	227.27	19.32	-2.00	0.01	0.00	20.40	5.67
93	SEABED	-161.72	-23.03	0.00	0.000	0.000	229.27	19.32	-2.00	0.01	0.00	20.40	5.67
94	SEABED	-163.72	-23.03	0.00	0.000	0.000	231.27	19.32	-2.00	0.00	0.00	20.40	5.67
95	SEABED	-165.72	-23.03	0.00	0.000	0.000	233.27	19.32	-2.00	0.00	0.00	20.39	5.67
96	SEABED	-167.72	-23.03	0.00	0.000	0.000	235.27	19.32	-2.00	0.00	0.00	20.39	5.67
97	SEABED	-169.72	-23.03	0.00	0.000	0.000	237.27	19.32	-2.00	0.00	0.00	20.39	5.67
98	SEABED	-171.72	-23.03	0.00	0.000	0.000	239.27	19.32	-2.00	0.00	0.00	20.39	5.67

99 SEABED -173.72 -23.03 0.00 0.000 0.000 241.27 19.32 -2.00 0.00 0.00 20.39 5.66

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 2:8: 7 PAGE 16

PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING

USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

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		STATIC PIPE		COORDINATES,			FORCES AND			STRESSES			
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACTION HORIZ (KN )	SUPT VERT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
1	LAYBARGE	64.20	4.42	0.00	0.58	0.00	0.00	0.00	0.00	0.12	0.00	0.12	
3	LAYBARGE	59.72	4.30	0.00	15.88	0.00	0.00	0.00	-0.20	-10.72	0.00	10.72	
5	LAYBARGE	48.23	4.00	0.00	19.27	0.00	0.00	0.00	-0.71	-14.85	0.00	14.85	
7	TENSIONR	38.10	3.73	0.00	12.14	0.01	0.00	0.00	96.94	-5.42	0.00	5.42	
9	LAYBARGE	33.43	3.61	0.00	8.50	0.00	0.00	0.00	96.74	-2.86	0.00	2.86	
11	TENSIONR	26.65	3.43	0.00	11.04	0.00	0.00	0.00	194.51	-2.61	0.00	2.61	
13	LAYBARGE	21.33	3.30	0.00	1.74	0.00	0.00	0.00	194.29	0.14	0.00	0.14	
15	LAYBARGE	12.14	2.98	0.00	41.63	0.00	0.00	0.00	193.23	-91.40	0.00	91.40	
17	LAYBARGE	-0.04	1.76	0.00	33.00	0.01	0.00	0.00	191.25	-86.98	0.01	86.98	
20	STINGER	-8.10	0.35	0.00	18.91	-0.12	0.00	0.00	189.15	-68.57	-0.05	68.57	
22	STINGER	-15.89	-1.45	0.00	18.78	-0.28	0.00	0.00	187.29	-62.88	-0.15	62.88	
24	STINGER	-23.60	-3.61	0.00	7.08	-0.22	0.00	0.00	185.47	-39.22	-0.08	39.22	
26	STINGER	-30.64	-5.84	0.00	21.18	-0.30	0.00	0.00	183.33	-55.05	-0.16	55.05	
28	STINGER	-36.57	-7.92	0.00	5.78	1.05	0.00	0.00	181.61	-14.91	0.24	14.91	
30	STINGER	-39.47	-8.98	0.00	0.00	-1.64	0.41	0.00	180.66	4.93	-2.44	5.50	
32	SAGBEND	-41.35	-9.66	0.00	0.00	0.00	0.00	0.00	180.02	14.47	-1.90	14.59	
33	SAGBEND	-43.23	-10.34	0.00	0.00	0.00	0.00	0.00	179.39	21.73	-1.24	21.76	
34	SAGBEND	-45.12	-11.00	0.01	0.00	0.00	0.00	0.00	178.77	27.27	-0.75	27.28	
35	SAGBEND	-47.01	-11.66	0.01	0.00	0.00	0.00	0.00	178.15	31.52	-0.39	31.53	
36	SAGBEND	-48.90	-12.30	0.01	0.00	0.00	0.00	0.00	177.55	34.80	-0.11	34.80	
37	SAGBEND	-50.80	-12.93	0.01	0.00	0.00	0.00	0.00	176.97	37.34	0.09	37.34	
38	SAGBEND	-52.70	-13.55	0.02	0.00	0.00	0.00	0.00	176.40	39.32	0.24	39.32	
39	SAGBEND	-54.61	-14.14	0.02	0.00	0.00	0.00	0.00	175.85	40.89	0.36	40.89	
40	SAGBEND	-56.53	-14.72	0.02	0.00	0.00	0.00	0.00	175.32	42.13	0.44	42.13	
41	SAGBEND	-58.44	-15.28	0.03	0.00	0.00	0.00	0.00	174.80	43.13	0.50	43.13	
42	SAGBEND	-60.37	-15.83	0.03	0.00	0.00	0.00	0.00	174.30	43.95	0.54	43.95	
43	SAGBEND	-62.30	-16.35	0.03	0.00	0.00	0.00	0.00	173.82	44.62	0.58	44.62	
44	SAGBEND	-64.23	-16.86	0.03	0.00	0.00	0.00	0.00	173.35	45.18	0.60	45.18	
45	SAGBEND	-66.17	-17.35	0.03	0.00	0.00	0.00	0.00	172.90	45.65	0.61	45.66	
46	SAGBEND	-68.12	-17.81	0.04	0.00	0.00	0.00	0.00	172.47	46.06	0.62	46.06	
47	SAGBEND	-70.07	-18.26	0.04	0.00	0.00	0.00	0.00	172.06	46.41	0.63	46.41	
48	SAGBEND	-72.02	-18.69	0.04	0.00	0.00	0.00	0.00	171.67	46.71	0.63	46.71	
49	SAGBEND	-73.98	-19.10	0.04	0.00	0.00	0.00	0.00	171.30	46.97	0.63	46.97	
50	SAGBEND	-75.94	-19.49	0.04	0.00	0.00	0.00	0.00	170.94	47.19	0.63	47.20	
51	SAGBEND	-77.91	-19.85	0.04	0.00	0.00	0.00	0.00	170.61	47.38	0.62	47.39	
52	SAGBEND	-79.88	-20.20	0.04	0.00	0.00	0.00	0.00	170.29	47.53	0.61	47.54	
53	SAGBEND	-81.85	-20.53	0.04	0.00	0.00	0.00	0.00	169.99	47.65	0.61	47.65	
54	SAGBEND	-83.83	-20.83	0.04	0.00	0.00	0.00	0.00	169.71	47.72	0.60	47.72	
55	SAGBEND	-85.81	-21.12	0.04	0.00	0.00	0.00	0.00	169.45	47.74	0.58	47.74	
56	SAGBEND	-87.79	-21.38	0.03	0.00	0.00	0.00	0.00	169.21	47.70	0.57	47.70	
57	SAGBEND	-89.77	-21.63	0.03	0.00	0.00	0.00	0.00	168.99	47.59	0.54	47.59	
58	SAGBEND	-91.76	-21.85	0.03	0.00	0.00	0.00	0.00	168.79	47.38	0.52	47.39	
59	SAGBEND	-93.75	-22.05	0.03	0.00	0.00	0.00	0.00	168.60	47.06	0.48	47.06	

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 2:8: 7 PAGE 17

PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING

USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

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		STATIC PIPE		COORDINATES,			FORCES AND			STRESSES			
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACTION HORIZ (KN )	SUPT VERT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
60	SAGBEND	-95.74	-22.23	0.03	0.00	0.00	0.00	0.00	168.44	46.59	0.44	46.59	
61	SAGBEND	-97.74	-22.39	0.02	0.00	0.00	0.00	0.00	168.30	45.93	0.38	45.93	
62	SAGBEND	-99.73	-22.53	0.02	0.00	0.00	0.00	0.00	168.17	45.03	0.31	45.03	
63	SAGBEND	-101.73	-22.66	0.02	0.00	0.00	0.00	0.00	168.07	43.80	0.22	43.80	
64	SAGBEND	-103.72	-22.76	0.02	0.00	0.00	0.00	0.00	167.98	42.16	0.09	42.16	
65	SAGBEND	-105.72	-22.84	0.01	0.00	0.00	0.00	0.00	167.91	39.98	-0.07	39.98	
66	SAGBEND	-107.72	-22.91	0.01	0.00	0.00	0.00	0.00	167.87	37.10	-0.28	37.10	
67	SAGBEND	-109.72	-22.96	0.01	0.00	0.00	0.00	0.00	167.83	33.30	-0.56	33.30	
68	SAGBEND	-111.72	-22.99	0.01	0.08	-0.06	0.00	0.00	167.82	28.29	-0.90	28.30	
69	SEABED	-113.72	-23.02	0.00	0.94	-0.20	0.00	0.00	167.82	21.92	-1.18	21.95	
70	SEABED	-115.72	-23.03	0.00	1.74	-0.12	0.00	0.00	167.83	15.37	-1.14	15.41	
71	SEABED	-117.72	-23.04	0.00	2.14	-0.06	0.00	0.00	167.84	9.77	-0.94	9.82	
72	SEABED	-119.72	-23.04	0.00	2.28	-0.02	0.00	0.00	167.84	5.52	-0.69	5.56	
73	SEABED	-121.72	-23.04	0.00	2.28	0.01	0.00	0.00	167.84	2.59	-0.46	2.63	
74	SEABED	-123.72	-23.04	0.00	2.21	0.02	0.00	0.00	167.84	0.76	-0.27	0.81	
75	SEABED	-125.72	-23.04	0.00	2.11	0.02	0.00	0.00	167.84	-0.25	-0.14	0.28	

76	SEABED	-127.72	-23.03	0.00	2.02	0.02	0.00	0.00	167.84	-0.69	-0.05	0.69
77	SEABED	-129.72	-23.03	0.00	1.95	0.01	0.00	0.00	167.84	-0.80	0.00	0.80
78	SEABED	-131.72	-23.03	0.00	1.89	0.01	0.00	0.00	167.84	-0.72	0.02	0.72
79	SEABED	-133.72	-23.03	0.00	1.85	0.01	0.00	0.00	167.84	-0.57	0.03	0.57
80	SEABED	-135.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	-0.41	0.03	0.41
81	SEABED	-137.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	-0.27	0.02	0.27
82	SEABED	-139.72	-23.03	0.00	1.81	0.00	0.00	0.00	167.84	-0.15	0.02	0.16
83	SEABED	-141.72	-23.03	0.00	1.81	0.00	0.00	0.00	167.84	-0.08	0.01	0.08
84	SEABED	-143.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	-0.03	0.01	0.03
85	SEABED	-145.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.00	0.00	0.00
86	SEABED	-147.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.02	0.00	0.02
87	SEABED	-149.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.02	0.00	0.02
88	SEABED	-151.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.02	0.00	0.02
89	SEABED	-153.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.01	0.00	0.01
90	SEABED	-155.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.01	0.00	0.01
91	SEABED	-157.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.01	0.00	0.01
92	SEABED	-159.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
93	SEABED	-161.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
94	SEABED	-163.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
95	SEABED	-165.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
96	SEABED	-167.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
97	SEABED	-169.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
98	SEABED	-171.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
99	SEABED	-173.72	-23.03	0.00	0.00	0.00	0.00	0.00	167.84	0.00	0.00	0.00

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 18

STATIC PIPE ANALYSIS 8 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/ 2/2020 TIME - 2: 8: 7 CASE 1

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STATIC SOLUTION SUMMARY

PIPE PROPERTIES ( 1)

PIPE SECTION LENGTH ..	0.00 M	ELASTIC MODULUS .....	207000. MPA
OUTSIDE DIAMETER .....	21.910 CM	CROSS SECTIONAL AREA ..	82.69 CM²
WALL THICKNESS .....	1.270 CM	MOMENT OF INERTIA ....	4402.0 CM⁴
WEIGHT/LENGTH IN AIR ..	1649.63 N/M	YIELD STRESS .....	360.00 MPA
SUBMERGED WGHT/LENG ..	912.94 N/M	STRESS INTENS FACTOR ..	1.000
SPECIFIC GRAVITY .....	2.239	STEEL DENSITY .....	77008.0 N/M3
WRAP COAT THICKNESS ..	0.320 CM	WRAP COAT DENSITY ....	9025.2 N/M3
CONCRETE THICKNESS ...	4.000 CM	CONCRETE DENSITY .....	29857.0 N/M3

BARGE DATA

TOTAL PIPE TENSION ...	196.13 KN	RADIUS OF CURVATURE ..	0.00 M
NUMBER OF TENSIONERS ..	2	BARGE TRIM ANGLE .....	0.500 DEG
NO. OF PIPE SUPPORTS ..	7	PIPE ANGLE AT STERN ..	8.070 DEG
BARGE HEADING .....	0.000 DEG	OFFSET FROM R.O.W. ...	0.00 M

STINGER DATA

NO. OF PIPE SUPPORTS ..	6	PIPE DEPTH AT STERN ..	-8.98 M
NO. STINGER SECTIONS ..	6	PIPE ANGLE AT STERN ..	20.002 DEG
RADIUS OF CURVATURE ...	0.00 M	STINGER STERN DEPTH ..	-9.34 M
STINGER LENGTH .....	41.37 M		

SAGBEND DATA

WATER DEPTH .....	23.00 M	TENSION AT TOUCHDOWN ..	167.82 KN
TOUCHDOWN X-COORD. ...	-112.19 M	BOTTOM SLOPE ANGLE ...	0.000 DEG
PROJECTED SPAN LENGTH	72.72 M	PIPE LENGTH GAIN .....	3.35 M

===== SOLUTION SUMMARY =====

NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACT HORIZ (KN)	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	0.6	0.0	0.1	0.3	0.
3	LAYBARGE	59.7	4.3	0.0	15.9	0.0	10.7	26.7	7.
5	LAYBARGE	48.2	4.0	0.0	19.3	0.0	14.8	37.0	10.
7	TENSIONR	38.1	3.7	0.0	12.1	0.0	5.4	25.3	7.
9	LAYBARGE	33.4	3.6	0.0	8.5	0.0	2.9	18.9	5.
11	TENSIONR	26.7	3.4	0.0	11.0	0.0	2.6	30.1	8.
13	LAYBARGE	21.3	3.3	0.0	1.7	0.0	0.1	23.9	7.
15	LAYBARGE	12.1	3.0	0.0	41.6	0.0	91.4	250.9	70.
17	LAYBARGE	0.0	1.8	0.0	33.0	0.0	87.0	239.7	67.
20	STINGER	-8.1	0.4	0.0	18.9	-0.1	68.6	193.6	54.
22	STINGER	-15.9	-1.4	0.0	18.8	-0.3	62.9	179.2	50.
24	STINGER	-23.6	-3.6	0.0	7.1	-0.2	39.2	120.1	33.

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 19

STATIC PIPE ANALYSIS 8 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/ 2/2020 TIME - 2: 8: 7 CASE 1

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STATIC SOLUTION SUMMARY

26	STINGER	-30.6	-5.8	0.0	21.2	-0.3	55.0	159.2	44.
28	STINGER	-36.6	-7.9	0.0	5.8	1.0	14.9	59.1	16.
30	STINGER	-39.5	-9.0	0.0	0.0	-1.6	5.5	35.6	10.
55	SAGBEND	-85.8	-21.1	0.0	0.0	0.0	47.7	139.3	39.
69	SEABED	-113.7	-23.0	0.0	0.9	-0.2	21.9	75.0	21.

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/2/2020 TIME - 2:8: 7 PAGE 20  
 PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING  
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

MAXIMUM DYNAMIC PIPE FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
1	LAYBARGE	64.21	4.41	0.00	-0.008	1.467	0.00	0.00	0.00	0.33	-0.02	0.33	0.09
3	LAYBARGE	59.74	4.29	0.00	-0.008	1.586	4.48	-0.10	0.00	-27.76	0.55	27.77	7.72
5	LAYBARGE	48.24	4.00	0.00	-0.008	1.457	15.98	-0.36	0.00	-37.61	0.45	37.82	10.51
7	TENSIONR	38.11	3.73	0.01	-0.008	1.429	26.11	20.20	0.00	-14.23	-0.36	33.94	9.43
9	LAYBARGE	33.45	3.62	0.01	-0.008	1.531	30.78	20.21	0.00	-7.63	-0.17	27.66	7.68
11	TENSIONR	26.67	3.44	0.01	-0.008	1.478	37.57	32.60	0.00	-7.06	-0.29	39.47	10.96
13	LAYBARGE	21.35	3.31	0.01	-0.008	1.445	42.89	32.67	0.00	4.39	0.38	35.78	9.94
15	LAYBARGE	12.16	3.00	0.01	-0.008	3.388	52.08	32.68	0.00	-241.87	-7.12	274.55	76.26
17	LAYBARGE	-0.01	1.76	0.01	-0.013	8.033	64.32	32.62	0.00	-228.08	-7.09	260.66	72.41
20	STINGER	-8.08	0.35	0.02	-0.026	11.548	72.51	32.54	-0.12	-177.32	-6.19	208.56	57.93
22	STINGER	-15.87	-1.45	0.02	-0.031	14.388	80.51	32.34	-0.30	-173.60	-5.55	206.01	57.22
24	STINGER	-23.58	-3.60	0.02	-0.021	16.750	88.51	32.10	-0.50	-138.55	-6.50	169.63	47.12
26	STINGER	-30.63	-5.82	0.03	-0.035	18.319	95.90	31.82	-0.71	-151.40	-10.33	181.59	50.44
28	STINGER	-36.58	-7.79	0.04	0.019	18.629	102.19	31.58	-0.89	-194.87	27.89	226.03	62.79
30	STINGER	-39.48	-8.76	0.04	-0.127	18.661	105.27	31.44	-0.97	100.00	-226.21	265.12	73.65
32	SAGBEND	-41.34	-9.39	0.04	-0.445	18.611	107.27	31.40	-1.02	105.05	-180.69	205.66	57.13
33	SAGBEND	-43.23	-10.03	0.05	-0.490	18.430	109.27	31.34	-1.07	110.59	-128.27	170.76	47.43
34	SAGBEND	-45.13	-10.66	0.06	-0.473	18.217	111.27	31.28	-1.12	117.41	-88.79	161.77	44.94
35	SAGBEND	-47.03	-11.28	0.08	-0.433	17.930	113.27	31.22	-1.18	125.63	-63.23	162.04	45.01
36	SAGBEND	-48.93	-11.89	0.11	-0.381	17.567	115.27	31.16	-1.23	130.79	-46.62	165.15	45.88
37	SAGBEND	-50.84	-12.47	0.13	-0.361	17.163	117.27	31.10	-1.27	133.80	-37.66	166.63	46.29
38	SAGBEND	-52.75	-13.03	0.16	-0.330	16.750	119.27	31.04	-1.32	135.58	35.41	166.47	46.24
39	SAGBEND	-54.66	-13.57	0.18	-0.316	16.335	121.27	30.99	-1.36	139.94	42.41	170.99	47.50
40	SAGBEND	-56.58	-14.11	0.21	-0.293	15.872	123.27	30.93	-1.41	142.53	46.88	173.79	48.28
41	SAGBEND	-58.50	-14.64	0.24	-0.250	15.397	125.27	30.88	-1.45	143.27	49.80	174.78	48.55
42	SAGBEND	-60.44	-15.15	0.27	-0.210	14.924	127.27	30.83	-1.49	142.65	52.03	174.48	48.47
43	SAGBEND	-62.37	-15.64	0.29	-0.191	14.462	129.27	30.78	-1.53	141.18	53.06	174.71	48.53
44	SAGBEND	-64.31	-16.11	0.30	-0.169	13.979	131.27	30.73	-1.57	139.33	53.07	174.75	48.54
45	SAGBEND	-66.25	-16.56	0.31	-0.165	13.447	133.27	30.69	-1.60	137.74	52.23	174.98	48.60
46	SAGBEND	-68.20	-17.00	0.31	-0.182	12.948	135.27	30.64	-1.64	137.48	51.14	174.25	48.40
47	SAGBEND	-70.15	-17.41	0.31	-0.184	12.431	137.27	30.60	-1.67	137.24	50.51	173.63	48.23
48	SAGBEND	-72.10	-17.82	0.31	-0.178	11.919	139.27	30.56	-1.70	137.20	50.01	172.82	48.01
49	SAGBEND	-74.06	-18.20	0.30	-0.171	11.450	141.27	30.52	-1.73	136.69	49.09	171.58	47.66
50	SAGBEND	-76.02	-18.58	0.29	-0.183	10.976	143.27	30.49	-1.76	135.82	47.79	170.08	47.24
51	SAGBEND	-77.99	-18.94	0.27	-0.205	10.482	145.27	30.45	-1.78	134.75	46.18	168.46	46.79
52	SAGBEND	-79.96	-19.29	0.27	-0.145	9.981	147.27	30.42	-1.81	133.59	44.31	167.25	46.46
53	SAGBEND	-81.93	-19.62	0.26	-0.014	9.477	149.27	30.39	-1.83	132.47	42.22	166.76	46.32
54	SAGBEND	-83.90	-19.94	0.25	0.117	8.970	151.27	30.36	-1.85	132.21	39.98	165.96	46.10
55	SAGBEND	-85.87	-20.25	0.24	0.250	8.457	153.27	30.33	-1.87	131.54	37.75	164.77	45.77
56	SAGBEND	-87.85	-20.54	0.23	0.334	7.961	155.27	30.31	-1.89	130.39	35.87	163.12	45.31
57	SAGBEND	-89.83	-20.81	0.22	0.375	7.486	157.27	30.29	-1.91	128.77	-34.60	161.02	44.73
58	SAGBEND	-91.81	-21.07	0.20	0.403	7.036	159.27	30.27	-1.92	126.72	-34.76	158.48	44.02
59	SAGBEND	-93.80	-21.31	0.17	0.430	6.578	161.27	30.25	-1.94	124.34	-34.45	155.55	43.21

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/2/2020 TIME - 2:8: 7 PAGE 21  
 PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING  
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

MAXIMUM DYNAMIC PIPE FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
60	SAGBEND	-95.78	-21.53	0.15	0.456	6.103	163.27	30.24	-1.95	121.55	-33.86	152.26	42.29
61	SAGBEND	-97.77	-21.73	0.13	0.480	5.606	165.27	30.23	-1.96	118.31	-32.81	148.63	41.29
62	SAGBEND	-99.76	-21.92	0.11	0.502	5.113	167.27	30.22	-1.97	116.67	-31.18	144.63	40.18
63	SAGBEND	-101.75	-22.09	0.08	0.535	4.625	169.27	30.21	-1.98	116.56	-29.59	140.19	38.94
64	SAGBEND	-103.74	-22.24	0.07	0.552	4.145	171.27	30.21	-1.98	115.99	-29.00	136.77	37.99
65	SAGBEND	-105.74	-22.37	0.05	0.555	3.676	173.27	30.20	-1.99	114.93	-27.98	135.95	37.76
66	SAGBEND	-107.73	-22.49	0.04	0.545	3.222	175.27	30.20	-1.99	114.00	-26.23	135.04	37.51
67	SAGBEND	-109.73	-22.59	0.03	0.504	2.789	177.27	30.21	-1.99	112.59	-23.56	133.47	37.07
68	SAGBEND	-111.72	-22.68	0.02	0.430	2.381	179.27	30.21	-2.00	110.46	-24.01	131.30	36.47
69	SAGBEND	-113.72	-22.76	0.02	0.354	2.010	181.27	30.22	-2.00	107.53	-33.48	128.22	35.62

70	SAGBEND	-115.72	-22.82	0.01	0.268	1.692	183.27	30.24	-2.00	104.19	-41.00	124.91	34.70
71	SAGBEND	-117.72	-22.87	0.01	0.207	1.406	185.27	30.25	-2.00	101.11	-46.35	121.60	33.78
72	SAGBEND	-119.72	-22.92	0.01	0.139	1.146	187.27	30.27	-2.00	96.95	-49.81	117.47	32.63
73	SAGBEND	-121.72	-22.96	0.01	0.063	0.907	189.27	30.28	-2.00	91.09	-51.09	111.63	31.01
74	SAGBEND	-123.72	-22.99	0.01	0.036	0.689	191.27	30.30	-2.00	83.03	-51.88	103.78	28.83
75	SEABED	-125.72	-23.01	0.01	0.014	0.491	193.27	30.32	-2.00	73.68	-51.19	94.71	26.31
76	SEABED	-127.72	-23.02	0.01	0.023	0.317	195.27	30.34	-2.00	61.46	-50.59	83.24	23.12
77	SEABED	-129.72	-23.03	0.01	0.041	0.178	197.27	30.36	-2.00	46.33	-48.59	76.47	21.24
78	SEABED	-131.72	-23.04	0.01	0.052	0.081	199.27	30.37	-2.00	31.71	-46.12	73.21	20.34
79	SEABED	-133.72	-23.04	0.01	0.057	0.017	201.27	30.39	-2.00	19.64	-43.20	70.53	19.59
80	SEABED	-135.72	-23.04	0.01	0.057	-0.018	203.27	30.41	-2.00	10.71	-39.54	65.57	18.21
81	SEABED	-137.72	-23.03	0.00	0.051	-0.025	205.27	30.42	-2.00	4.70	-34.58	59.27	16.46
82	SEABED	-139.72	-23.03	0.00	0.041	-0.023	207.27	30.44	-2.00	-2.05	-27.12	51.94	14.43
83	SEABED	-141.72	-23.03	0.00	0.027	-0.021	209.27	30.46	-2.00	-2.02	-19.27	45.27	12.58
84	SEABED	-143.72	-23.03	0.00	0.015	-0.017	211.27	30.47	-2.00	-1.91	-12.47	39.98	11.11
85	SEABED	-145.72	-23.03	0.00	-0.002	-0.013	213.27	30.49	-2.00	-1.82	-7.26	36.19	10.05
86	SEABED	-147.72	-23.03	0.00	-0.001	-0.008	215.27	30.51	-2.00	-1.55	-3.64	33.69	9.36
87	SEABED	-149.72	-23.03	0.00	-0.002	-0.005	217.27	30.52	-2.00	-1.19	-1.34	32.20	8.94
88	SEABED	-151.72	-23.03	0.00	-0.001	-0.002	219.27	30.54	-2.00	-0.82	1.11	32.07	8.91
89	SEABED	-153.72	-23.03	0.00	0.000	-0.001	221.27	30.55	-2.00	-0.51	1.14	32.16	8.93
90	SEABED	-155.72	-23.03	0.00	-0.001	0.000	223.27	30.57	-2.00	-0.28	1.03	32.22	8.95
91	SEABED	-157.72	-23.03	0.00	-0.001	0.001	225.27	30.58	-2.00	-0.13	0.81	32.17	8.94
92	SEABED	-159.72	-23.03	0.00	-0.001	0.001	227.27	30.60	-2.00	0.07	0.63	32.08	8.91
93	SEABED	-161.72	-23.03	0.00	-0.001	0.000	229.27	30.61	-2.00	0.07	0.46	31.97	8.88
94	SEABED	-163.72	-23.03	0.00	0.000	0.000	231.27	30.62	-2.00	0.06	0.32	31.88	8.86
95	SEABED	-165.72	-23.03	0.00	0.000	0.000	233.27	30.64	-2.00	0.05	0.20	31.82	8.84
96	SEABED	-167.72	-23.03	0.00	0.000	0.000	235.27	30.65	-2.00	0.03	0.11	31.77	8.83
97	SEABED	-169.72	-23.03	0.00	0.000	0.000	237.27	30.67	-2.00	0.02	0.06	31.75	8.82
98	SEABED	-171.72	-23.03	0.00	0.000	0.000	239.27	30.68	-2.00	0.01	0.02	31.74	8.82
99	SEABED	-173.72	-23.03	0.00	0.000	0.000	241.27	30.69	-2.00	0.00	0.00	31.74	8.82

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX    DATE - 5/2/2020    TIME - 2:8:7    PAGE 22

PROJECT - STATIC PIPE ANALYSIS 8 INCH    JOB NO. - LAYING

USER ID - IK    LICENSED BY - PT Timas Suplindo    CASE 1

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=====													
MAXIMUM DYNAMIC PIPE FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACTION HORIZ (KN)	SUPT VERT (M)	SEPARATIONS HORIZ (M)	PIPE TENSION (KN)	PIPE VERT (KN-M)	HORIZ (KN-M)	TOTAL BENDING MOMENTS (KN-M)	
=====													
1	LAYBARGE	64.21	4.41	0.00	0.64	0.04	0.00	0.00	0.00	0.13	-0.01	0.13	
3	LAYBARGE	59.74	4.29	0.00	16.27	0.34	0.00	0.00	-0.84	-11.15	0.22	11.15	
5	LAYBARGE	48.24	4.00	0.00	19.62	0.23	0.00	0.00	-2.97	-15.11	0.18	15.11	
7	TENSIONR	38.11	3.73	0.01	12.67	0.18	0.00	0.00	166.34	-5.72	-0.15	5.72	
9	LAYBARGE	33.45	3.62	0.01	8.95	-0.19	0.00	0.00	166.47	-3.07	-0.07	3.07	
11	TENSIONR	26.67	3.44	0.01	11.65	0.15	0.00	0.00	268.50	-2.84	-0.12	2.84	
13	LAYBARGE	21.35	3.31	0.01	3.04	0.36	0.00	0.00	269.03	1.76	0.15	1.76	
15	LAYBARGE	12.16	3.00	0.01	49.14	-1.47	0.00	0.00	269.14	-97.19	-2.86	97.21	
17	LAYBARGE	-0.01	1.76	0.01	39.88	-1.75	0.00	0.00	268.60	-91.65	-2.85	91.65	
20	STINGER	-8.08	0.35	0.02	24.62	-2.21	0.00	0.00	268.43	-71.25	-2.49	71.25	
22	STINGER	-15.87	-1.45	0.02	28.54	-3.96	0.00	0.00	267.49	-69.75	-2.23	69.76	
24	STINGER	-23.58	-3.60	0.02	27.12	-3.21	0.00	0.00	266.38	-55.67	-2.61	55.72	
26	STINGER	-30.63	-5.82	0.03	33.65	-7.60	0.16	0.00	264.95	-60.84	-4.15	60.85	
28	STINGER	-36.58	-7.79	0.04	37.85	42.58	0.55	0.00	263.70	-78.30	11.20	78.89	
30	STINGER	-39.48	-8.76	0.04	1.49	-61.71	1.24	0.00	262.90	40.18	-90.89	97.57	
32	SAGBEND	-41.34	-9.39	0.04	0.00	0.00	0.00	0.00	262.71	42.21	-72.60	73.71	
33	SAGBEND	-43.23	-10.03	0.05	0.00	0.00	0.00	0.00	262.44	44.44	-51.54	56.55	
34	SAGBEND	-45.13	-10.66	0.06	0.00	0.00	0.00	0.00	262.15	47.18	-35.68	53.22	
35	SAGBEND	-47.03	-11.28	0.08	0.00	0.00	0.00	0.00	261.84	50.48	-25.41	53.16	
36	SAGBEND	-48.93	-11.89	0.11	0.00	0.00	0.00	0.00	261.54	52.55	-18.73	54.44	
37	SAGBEND	-50.84	-12.47	0.13	0.00	0.00	0.00	0.00	261.24	53.76	-15.13	55.06	
38	SAGBEND	-52.75	-13.03	0.16	0.00	0.00	0.00	0.00	260.95	54.48	14.23	55.21	
39	SAGBEND	-54.66	-13.57	0.18	0.00	0.00	0.00	0.00	260.67	56.23	17.04	57.08	
40	SAGBEND	-56.58	-14.11	0.21	0.00	0.00	0.00	0.00	260.40	57.27	18.84	58.24	
41	SAGBEND	-58.50	-14.64	0.24	0.00	0.00	0.00	0.00	260.14	57.57	20.01	58.66	
42	SAGBEND	-60.44	-15.15	0.27	0.00	0.00	0.00	0.00	259.89	57.32	20.90	58.57	
43	SAGBEND	-62.37	-15.64	0.29	0.00	0.00	0.00	0.00	259.65	56.73	21.32	58.76	
44	SAGBEND	-64.31	-16.11	0.30	0.00	0.00	0.00	0.00	259.42	55.98	21.32	58.85	
45	SAGBEND	-66.25	-16.56	0.31	0.00	0.00	0.00	0.00	259.20	55.35	20.99	58.97	
46	SAGBEND	-68.20	-17.00	0.31	0.00	0.00	0.00	0.00	258.99	55.24	20.55	58.71	
47	SAGBEND	-70.15	-17.41	0.31	0.00	0.00	0.00	0.00	258.79	55.14	20.29	58.52	
48	SAGBEND	-72.10	-17.82	0.31	0.00	0.00	0.00	0.00	258.60	55.13	20.09	58.22	
49	SAGBEND	-74.06	-18.20	0.30	0.00	0.00	0.00	0.00	258.42	54.92	19.72	57.75	
50	SAGBEND	-76.02	-18.58	0.29	0.00	0.00	0.00	0.00	258.26	54.58	19.20	57.16	
51	SAGBEND	-77.99	-18.94	0.27	0.00	0.00	0.00	0.00	258.10	54.14	18.56	56.53	
52	SAGBEND	-79.96	-19.29	0.27	0.00	0.00	0.00	0.00	257.96	53.68	17.80	55.93	
53	SAGBEND	-81.93	-19.62	0.26	0.00	0.00	0.00	0.00	257.82	53.23	16.97	55.76	
54	SAGBEND	-83.90	-19.94	0.25	0.00	0.00	0.00	0.00	257.70	53.12	16.06	55.45	
55	SAGBEND	-85.87	-20.25	0.24	0.00	0.00	0.00	0.00	257.60	52.85	15.17	54.99	
56	SAGBEND	-87.85	-20.54	0.23	0.00	0.00	0.00	0.00	257.50	52.39	14.41	54.34	
57	SAGBEND	-89.83	-20.81	0.22	0.00	0.00	0.00	0.00	257.42	51.74	-13.90	53.51	

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX    DATE - 5/2/2020    TIME - 2:8:7    PAGE 23

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MAXIMUM DYNAMIC PIPE FORCES AND STRESSES												
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NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACTION HORIZ (KN )	SUPT VERT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)
=====												
58	SAGBEND	-91.81	-21.07	0.20	0.00	0.00	0.00	0.00	257.35	50.92	-13.97	52.50
59	SAGBEND	-93.80	-21.31	0.17	0.00	0.00	0.00	0.00	257.29	49.96	-13.84	51.33
60	SAGBEND	-95.78	-21.53	0.15	0.00	0.00	0.00	0.00	257.25	48.84	-13.60	50.02
61	SAGBEND	-97.77	-21.73	0.13	0.00	0.00	0.00	0.00	257.22	47.54	-13.18	48.57
62	SAGBEND	-99.76	-21.92	0.11	0.00	0.00	0.00	0.00	257.21	46.88	-12.53	47.08
63	SAGBEND	-101.75	-22.09	0.08	0.00	0.00	0.00	0.00	257.21	46.83	-11.89	46.97
64	SAGBEND	-103.74	-22.24	0.07	0.00	0.00	0.00	0.00	257.23	46.61	-11.65	46.68
65	SAGBEND	-105.74	-22.37	0.05	0.00	0.00	0.00	0.00	257.27	46.18	-11.24	46.38
66	SAGBEND	-107.73	-22.49	0.04	0.00	0.00	0.00	0.00	257.32	45.81	-10.54	46.02
67	SAGBEND	-109.73	-22.59	0.03	0.14	-0.09	0.00	0.00	257.38	45.24	-9.47	45.40
68	SAGBEND	-111.72	-22.68	0.02	1.04	-0.69	0.00	0.00	257.47	44.38	-9.65	44.46
69	SAGBEND	-113.72	-22.76	0.02	1.75	-1.17	0.00	0.00	257.57	43.21	-13.45	43.21
70	SAGBEND	-115.72	-22.82	0.01	2.10	-1.40	0.00	0.00	257.69	41.86	-16.47	41.87
71	SAGBEND	-117.72	-22.87	0.01	2.22	-1.48	0.00	0.00	257.82	40.63	-18.62	40.63
72	SAGBEND	-119.72	-22.92	0.01	2.22	-1.48	0.00	0.00	257.97	38.96	-20.01	38.98
73	SAGBEND	-121.72	-22.96	0.01	2.26	1.51	0.00	0.00	258.12	36.60	-20.53	36.63
74	SAGBEND	-123.72	-22.99	0.01	2.31	1.54	0.00	0.00	258.27	33.36	-20.85	33.40
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75	SEABED	-125.72	-23.01	0.01	2.34	1.56	0.00	0.00	258.42	29.61	-20.57	29.74
76	SEABED	-127.72	-23.02	0.01	2.32	1.55	0.00	0.00	258.57	24.69	-20.33	25.13
77	SEABED	-129.72	-23.03	0.01	2.31	-1.54	0.00	0.00	258.71	18.61	-19.53	19.67
78	SEABED	-131.72	-23.04	0.01	2.30	-1.51	0.00	0.00	258.86	12.74	-18.53	18.55
79	SEABED	-133.72	-23.04	0.01	2.30	-1.52	0.00	0.00	259.00	7.89	17.36	17.37
80	SEABED	-135.72	-23.04	0.01	2.27	-1.43	0.00	0.00	259.14	4.30	-15.89	15.90
81	SEABED	-137.72	-23.03	0.00	2.23	-1.20	0.00	0.00	259.27	1.89	-13.89	13.90
82	SEABED	-139.72	-23.03	0.00	2.16	-0.61	0.00	0.00	259.41	-0.82	-10.90	10.91
83	SEABED	-141.72	-23.03	0.00	2.07	0.29	0.00	0.00	259.55	-0.81	-7.74	7.77
84	SEABED	-143.72	-23.03	0.00	1.99	0.28	0.00	0.00	259.68	-0.77	-5.01	5.04
85	SEABED	-145.72	-23.03	0.00	1.92	0.27	0.00	0.00	259.81	-0.73	-2.92	2.95
86	SEABED	-147.72	-23.03	0.00	1.88	0.23	0.00	0.00	259.94	-0.62	-1.46	1.49
87	SEABED	-149.72	-23.03	0.00	1.85	0.18	0.00	0.00	260.07	-0.48	-0.54	0.57
88	SEABED	-151.72	-23.03	0.00	1.83	0.14	0.00	0.00	260.19	-0.33	0.45	0.45
89	SEABED	-153.72	-23.03	0.00	1.83	0.10	0.00	0.00	260.32	-0.21	0.46	0.47
90	SEABED	-155.72	-23.03	0.00	1.83	0.06	0.00	0.00	260.44	-0.11	0.41	0.42
91	SEABED	-157.72	-23.03	0.00	1.83	0.04	0.00	0.00	260.56	-0.05	0.33	0.33
92	SEABED	-159.72	-23.03	0.00	1.83	0.02	0.00	0.00	260.68	0.03	0.25	0.25
93	SEABED	-161.72	-23.03	0.00	1.83	-0.01	0.00	0.00	260.80	0.03	0.19	0.19
94	SEABED	-163.72	-23.03	0.00	1.83	-0.01	0.00	0.00	260.92	0.02	0.13	0.13
95	SEABED	-165.72	-23.03	0.00	1.83	-0.01	0.00	0.00	261.03	0.02	0.08	0.08
96	SEABED	-167.72	-23.03	0.00	1.83	-0.01	0.00	0.00	261.14	0.01	0.05	0.05
97	SEABED	-169.72	-23.03	0.00	1.83	0.00	0.00	0.00	261.26	0.01	0.02	0.02
98	SEABED	-171.72	-23.03	0.00	1.83	0.00	0.00	0.00	261.37	0.00	0.01	0.01
99	SEABED	-173.72	-23.03	0.00	0.00	0.00	0.00	0.00	261.48	0.00	0.00	0.00

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 24

STATIC PIPE ANALYSIS 8 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/ 2/2020 TIME - 2: 8: 7 CASE 1

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DYNAMIC SOLUTION SUMMARY

SEA STATE NUMBER ( 1 )

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SEA STATE TYPE ..... WAVE SPECTRUM

NO. WAVE COMPONENTS .. 20

WAVE WATER DEPTH ..... 23.0 M

MAX. WAVE FREQUENCY .. 3.0015 RA/S

SPECTRUM START TIME .. 0. SECS

RAO SIGN CONVENTION .. BENTLEY MOSES

VESSEL RESPONSE TYPE . TABLE OF RAOS  
 WAVE TRAVEL DIRECTION 0.000 DEG  
 MIN. WAVE FREQUENCY .. 0.1001 RA/S  
 RANDOM PHASE SEED .... 0  
 NO. RAOS IN TABLE .... 30

SEA STATE DEFINITION

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WAVE SPECTRUM TYPE ... JONSWAP (CLASSIC)  
 JONSWAP COEFFICIENT .. 0.003223 JONSWAP PEAK FACTOR .. 5.000  
 PEAK WAVE FREQUENCY .. 0.9498 RA/S

CALCULATED WAVE HEIGHTS

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SIGNIFICANT WAVE HT. . 1.456 M AVERAGE WAVE HEIGHT .. 0.939 M  
 MAXIMUM WAVE HEIGHT .. 2.710 M RMS WAVE HEIGHT ..... 1.044 M  
 TOTAL NUMBER OF WAVES 1911

===== SOLUTION SUMMARY =====

NODE	PIPE	X	Y	Z	SUPPORT	REACT	TOTAL	TOTAL	PCT
NO.	SECTION	COORD	COORD	COORD	VERT	HORIZ	MOMENT	STRESS	YLD
		(M)	(M)	(M)	(KN)	(KN)	(KN-M)	(MPA)	(%)
=====									

1 LAYBARGE	64.2	4.4	0.0	0.6	0.0	0.1	0.3	0.
3 LAYBARGE	59.7	4.3	0.0	16.3	0.3	11.2	27.8	8.
5 LAYBARGE	48.2	4.0	0.0	19.6	0.2	15.1	37.8	11.
7 TENSIONR	38.1	3.7	0.0	12.7	0.2	5.7	33.9	9.
9 LAYBARGE	33.4	3.6	0.0	8.9	-0.2	3.1	27.7	8.
11 TENSIONR	26.7	3.4	0.0	11.6	0.2	2.8	39.5	11.
13 LAYBARGE	21.4	3.3	0.0	3.0	0.4	1.8	35.8	10.
15 LAYBARGE	12.2	3.0	0.0	49.1	-1.5	97.2	274.5	76.
17 LAYBARGE	0.0	1.8	0.0	39.9	-1.7	91.6	260.7	72.
20 STINGER	-8.1	0.4	0.0	24.6	-2.2	71.3	208.6	58.
22 STINGER	-15.9	-1.4	0.0	28.5	-4.0	69.8	206.0	57.
24 STINGER	-23.6	-3.6	0.0	27.1	-3.2	55.7	169.6	47.
26 STINGER	-30.6	-5.8	0.0	33.6	-7.6	60.9	181.6	50.
28 STINGER	-36.6	-7.8	0.0	37.8	42.6	78.9	226.0	63.
30 STINGER	-39.5	-8.8	0.0	1.5	-61.7	97.6	265.1	74.
32 SAGBEND	-41.3	-9.4	0.0	0.0	0.0	73.7	205.7	57.
69 SAGBEND	-113.7	-22.8	0.0	1.7	-1.2	43.2	128.2	36.



**LAMPIRAN ANALISA DINAMIS PADA PIPA 8 INCH  
HEADING 180°**

```

MMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMMMMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMM

```

```

*****
*
*           O F F P I P E - 3 -- OFFSHORE PIPELINE ANALYSIS SYSTEM
*
*   COPYRIGHT (C) 1983-2016, ROBERT C. MALAHY. ALL RIGHTS RESERVED WORLDWIDE.
*
*           VERSION NO. - 3.02EX
*           RELEASED ON - 03/08/2016
*           LICENSED TO - PT Timas Suplindo
*
*****
*
* OFFPIPE IS A NONLINEAR, 3-DIMENSIONAL FINITE ELEMENT METHOD BASED PROGRAM FOR THE
* STATIC AND DYNAMIC ANALYSIS OF PROBLEMS ARISING IN THE DESIGN OF MARINE PIPELINES.
* THIS VERSION OF OFFPIPE MAY BE USED FOR THE ANALYSIS OF OFFSHORE PIPELAYING OPER-
* ATIONS, DAVIT LIFTS, PIPELINES LYING ON AN UNEVEN SEABED, AND RISERS.
*
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*
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*           6554 AUDEN                 FACSIMILE: (713) 664-0962
*           HOUSTON, TEXAS 77005
*           U.S.A.                     EMAIL: SUPPORT@OFFPIPE.COM
*
*****

```

```

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 3
STATIC PIPE ANALYSIS 8 INCH
JOB NO. - LAYING           LICENSED BY - PT Timas Suplindo
USER ID - IK              DATE - 5/2/2020 TIME - 2:12:44           CASE 1
=====

```

INPUT DATA ECHO

```

=====
PRINTED OUTPUT SELECTED
=====
STATIC PIPE FORCES AND STRESSES ... YES
STATIC SOLUTION SUMMARY ..... YES
DYNAMIC PIPE FORCES AND STRESSES ... YES
DYNAMIC RANGE OF PIPE DATA ..... NO
DYNAMIC TRACKING OF PIPE DATA ..... NO
OVERBEND PIPE SUPPORT GEOMETRY .... NO
STINGER BALLAST SCHEDULE DATA ..... NO
SUPPORT REACTIONS IN BARGE COORDS . NO

INTERNAL FORCES IN PIPE & CABLE ... NO
INTERNAL FORCES IN STINGER ..... NO
PRINT PIPE STRAINS IN OUTPUT ..... NO
DNV OS-F101 COMPLIANCE REPORT ..... NO
API RP-1111 COMPLIANCE REPORT ..... NO
PRINT DNV/API FACTORS & PARAMETERS NO
USE THICK WALL HOOP STRESS EQN. ... NO
USE DNV 1981 FOR TOTAL PIPE STRESS NO

ENABLE/DISABLE WARNING MESSAGES ... ENABLE
GENERATE SPREAD SHEET PLOT FILE ... NO
GENERATE ASCII PLOT DATA FILES .... NO

```

PROFILE PLOT TABLE ENTRIES

```
=====
PLOT TABLE INDEX ..... 1
PLOT NUMBER ..... 1
PLOT TYPE OPTION NUMBER ..... 1
DYNAMIC PROFILE TIME POINT ..... 0.000
DYNAMIC PROFILE TIME INCREMENT ..... 0.000
ORDINATE PARAMETER CODE NUMBER ..... 2
AXIS LABEL FOR ORDINATE ..... "PIPE ELEVATION Y COORDINATE"
ABSCISSA PARAMETER CODE NUMBER ..... 1
AXIS LABEL FOR ABSCISSA ..... "PIPE HORIZONTAL X COORDINATE"

PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS"
MINIMUM VERTICAL AXIS RANGE ..... 0.000
MAXIMUM VERTICAL AXIS RANGE ..... 0.000
MINIMUM HORIZONTAL AXIS RANGE ..... 0.000
MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000
=====
```

```
=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 4
STATIC PIPE ANALYSIS 8 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 5/2/2020 TIME - 2:12:44 CASE 1
=====
```

INPUT DATA ECHO

PROFILE PLOT TABLE ENTRIES

```
=====
PLOT TABLE INDEX ..... 2
PLOT NUMBER ..... 1
PLOT TYPE OPTION NUMBER ..... 1
DYNAMIC PROFILE TIME POINT ..... 0.000
DYNAMIC PROFILE TIME INCREMENT ..... 0.000
ORDINATE PARAMETER CODE NUMBER ..... 15
AXIS LABEL FOR ORDINATE ..... "DNV YIELD STRESS PERCENTAGE"
ABSCISSA PARAMETER CODE NUMBER ..... 1
AXIS LABEL FOR ABSCISSA ..... "PIPELINE HORIZONTAL X COORDINATE"

PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS"
MINIMUM VERTICAL AXIS RANGE ..... 0.000
MAXIMUM VERTICAL AXIS RANGE ..... 0.000
MINIMUM HORIZONTAL AXIS RANGE ..... 0.000
MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000
=====
```

PIPE PROPERTIES

```
=====
PROPERTY TABLE ROW NUMBER ..... 1
PIPE SECTION LENGTH ..... 0.000 METERS
STEEL MODULUS OF ELASTICITY ..... 207000. M-PASCAL
STEEL CROSS SECTIONAL AREA ..... 82.690 CM^2
COATED PIPE AVG MOMENT OF INERTIA .. 4402.00 CM^4
WEIGHT PER-UNIT-LENGTH IN AIR ..... 1649.63 N/M
WEIGHT PER-UNIT-LENGTH SUBMERGED .. 912.94 N/M
MAXIMUM ALLOWABLE PIPE STRAIN ..... 0.205000 PERCENT

STEEL OUTSIDE DIAMETER ..... 21.9100 CM
STEEL WALL THICKNESS ..... 1.2700 CM
YIELD STRESS ..... 360.00 M-PASCAL
STRESS/STRAIN INTENSE FACTOR ..... 0.0000
HYDRODYNAMIC OUTSIDE DIAMETER ..... 0.000 CM
DRAG COEFFICIENT ..... 0.0000
HYDRODYNAMIC TOTAL AREA ..... 0.000 CM^2
ADDED MASS COEFFICIENT ..... 0.0000
POISSON'S RATIO ..... 0.3000
COEFFICIENT OF THERMAL EXPANSION .. 0.00001100 1/DEG C
=====
```

```
=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 5
STATIC PIPE ANALYSIS 8 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 5/2/2020 TIME - 2:12:44 CASE 1
=====
```

INPUT DATA ECHO

PIPE COATING PROPERTIES

```
=====
PIPE PROPERTY TABLE INDEX ..... 1
CORROSION COATING THICKNESS ..... 0.320 CM
CORROSION COATING WEIGHT DENSITY .. 9025.2 N/M^3
CORROSION COATING ELASTIC MODULUS . 0.000 M-PASCAL
CONCRETE COATING THICKNESS ..... 4.000 CM
CONCRETE COATING WEIGHT DENSITY ... 29857. N/M^3
CONCRETE COATING ELASTIC MODULUS .. 0.000 M-PASCAL
DESIRED PIPE SPECIFIC GRAVITY ..... 0.0000
CONCRETE STIFFENING EFFECTIVENESS . 0.000
NO NOT CALC. STRESS FOR BARE PIPE . NO
=====
```

AVERAGE LENGTH OF PIPE JOINT ..... 12.200 METERS  
 EFFECTIVE FIELD JOINT LENGTH ..... 0.300 METERS  
 FIELD JOINT FILL WEIGHT DENSITY ... 10055.3 N/M^3  
 FIELD JOINT FILL ELASTIC MODULUS... 0.000 M-PASCAL  
 FIELD JOINT STIFFENING EFFECT. .... 0.000  
 FIELD JOINT BENDING MODEL ..... 0 IGNORE COATING STIFFNESS  
 WEIGHT DENSITY OF STEEL ..... 77008. N/M^3  
 WEIGHT DENSITY OF PIPE CONTENTS ... 0.0 N/M^3  
 REF. ELEVATION FOR STATIC HEAD .... 0.00 METERS  
 FREE FLOOD PIPE DURING PIPELAY ... NO

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 6  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:12:44 CASE 1  
 =====

INPUT DATA ECHO

PIPELAY VESSEL DESCRIPTION

=====  
 NUMBER OF PIPE NODES ..... 9  
 BARGE GEOMETRY SPECIFIED BY ..... 1 X-Y COORDINATES  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.000 METERS  
 ADJUST Y COORDINATES MANUALLY .... NO  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 PIPE ANGLE RELATIVE TO DECK ..... 0.0000 DEGREES  
 HEIGHT OF DECK ABOVE WATER ..... 2.400 METERS  
 LAYBARGE FORWARD (X) OFFSET ..... 0.000 METERS  
 BARGE TRIM ANGLE ..... 0.5000 DEGREES  
  
 STERN SHOE X COORDINATE ..... 0.000 METERS  
 STERN SHOE Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER X COORDINATE ..... 43.820 METERS  
 ROTATION CENTER Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER Z COORDINATE ..... 6.370 METERS  
 BARGE HEADING ..... 0.0000 DEGREES  
 BARGE OFFSET FROM RIGHT-OF-WAY .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT VERTICAL ANGLE ... 0.000 DEGREES  
 PIPE RAMP PIVOT Z COORDINATE ..... 0.000 METERS  
 PIPE RAMP HEADING ON DECK ..... 0.000 DEGREES  
 ROLE OF ALTERNATE WAVE ORIGIN .... 0 MOTIONS & WAVES AT CENTER OF MOTION  
 WAVE PHASE ORIGIN X COORDINATE .... 0.000  
 WAVE PHASE ORIGIN Y COORDINATE .... 0.000 METERS  
 WAVE PHASE ORIGIN Z COORDINATE .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE .....

NODE X COORD (M )	NODE Y COORD (M )	SUPPORT TYPE	DAVIT SPACING (M )
64.220	1.838	1 SIMPLE SUPPORT	0.000
59.740	1.760	1 SIMPLE SUPPORT	0.000
48.240	1.560	1 SIMPLE SUPPORT	0.000
38.110	1.383	2 PIPE TENSIONER	0.000
33.440	1.302	1 SIMPLE SUPPORT	0.000
26.660	1.183	2 PIPE TENSIONER	0.000
21.340	1.092	7 USER DEFINED SPT	0.000
12.150	0.860	7 USER DEFINED SPT	0.000
-0.040	-0.260	8 USER DEFINED SPT	0.000

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 7  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:12:44 CASE 1  
 =====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====  
 SUPPORT PROPERTY TABLE INDEX ..... 2  
 SUPPORT ELEMENT TYPE ..... 2 TENSIONER  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
  
 BOTTOM ROLLER ANGLE TO HORIZONTAL . 0.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES

SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 7  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 1.600 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 8  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 2:12:44 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 8  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

STINGER DESCRIPTION

=====

NUMBER OF PIPE/STINGER NODES ..... 6  
 STINGER GEOMETRY SPECIFIED BY ..... 2 X-Y COORD AND MATCH PT  
 STINGER TYPE ..... 1 FIXED GEOMETRY OR RAMP  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.00 METERS  
 HITCH X-COORDINATE ..... 0.497 METERS  
 HITCH Y-COORDINATE ..... -1.800 METERS  
 HITCH ANGULAR ORIENTATION ..... 0.000 DEGREES

X COORDINATE OF LOCAL ORIGIN ..... 0.497 METERS  
 Y COORDINATE OF LOCAL ORIGIN ..... -1.800 METERS  
 ROTATION ABOUT STINGER HITCH ..... 13.500 DEGREES  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 TANGENT POINT ANGLE ..... 0.000 DEGREES

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	ELEMENT TYPE	ELEMENT LENGTH ( M )
-8.325	2.209	1 SIMPLE SUPPORT	2 HINGED END	0.000
-16.325	2.349	1 SIMPLE SUPPORT	1 FIXED END	0.000
-24.325	2.119	1 SIMPLE SUPPORT	1 FIXED END	0.000
-31.699	1.660	1 SIMPLE SUPPORT	1 FIXED END	0.000
-37.949	1.069	1 SIMPLE SUPPORT	1 FIXED END	0.000
-40.949	0.350	1 SIMPLE SUPPORT	1 FIXED END	0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 9  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 2:12:44 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

```

=====
SUPPORT PROPERTY TABLE INDEX ..... 1
SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT
SUPPORT INITIAL STATE FLAG ..... 0
TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M
VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M
STATIC VERTICAL DEFLECTION ..... 0.0000 CM
LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES
SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES
SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS
BED ROLLER LENGTH ..... 1.640 METERS
HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS
TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
    
```

CURRENT VELOCITIES

```

=====
WATER DEPTH (M ) CURRENT SPEED (M/S ) DIRECTION OF TRAVEL (DEG )
=====
0.000 0.790 180.000
11.500 0.480 180.000
23.000 0.420 180.000
    
```

PIPE TENSION DATA

```

=====
STATIC PIPE TENSION ON LAY VESSEL . 196.133 K-NEWTON
MINIMUM DYNAMIC PIPE TENSION ..... 196.133 K-NEWTON
MAXIMUM DYNAMIC PIPE TENSION ..... 264.553 K-NEWTON
STATIC HORIZONTAL BOTTOM TENSION .. 0.000 K-NEWTON
NO. OF VALUES FOR TENSION PROFILE . 0
VALUES ARE FOR PIPE SPAN ANALYSIS . NO
MAXIMUM PIPE PAYOUT SPEED ..... 0.000 M/SEC
MAXIMUM PIPE TAKEUP SPEED ..... 0.000 M/SEC
    
```

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 10

STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 2:12:44 CASE 1

=====  
 INPUT DATA ECHO

SAGBEND GEOMETRY

```

=====
SAGBEND PIPE ELEMENT LENGTH ..... 2.000 METERS
WATER DEPTH ..... 23.00 METERS
X-COORDINATE AT SPECIFIED DEPTH . . 0.00 METERS
ESTIMATED SAGBEND X LENGTH ..... 0.00 METERS
ESTIMATED PIPE LENGTH ON SEABED ... 0.00 METERS
X-COORD OF PIPE FREE END ON SEABED 0.00 METERS
X-COORD POINT OF FIXITY ON SEABED . 0.00 METERS
MAXIMUM SLOPE (ANGLE) OF SEABED ... 0.000 DEGREES
DIRECTION OF MAXIMUM SLOPE ..... 0.000 DEGREES

PIPE/CABLE SPAN END CONDITION ..... 0 PIPE/CABLE RESTING ON SEABED
PIPE/CABLE SPAN LENGTH GIVEN BY ... 0 SPECIFIED PIPE/CABLE TENSION
ESTIMATED SPAN DEPTH AT FREE END .. 0.00 METERS
PIPE VERTICAL ANGLE AT FREE END ... 0.000 DEGREES
BOTTOM HINGE OFFSET ..... 0.000 METERS
BOTTOM HINGE MINIMUM ANGLE ..... 0.000 DEGREES
BOTTOM HINGE MAXIMUM ANGLE ..... 0.000 DEGREES
    
```

SOIL ELEMENT PROPERTIES

```

=====
SOIL PROPERTY TABLE ROW INDEX ..... 1
SOIL ELEMENT TYPE (FUTURE USE) .... 0
PIPE INDEX OR SEGMENT NUMBER ..... 0
LONGITUDINAL SOIL STIFFNESS ..... 0.00 KN/M^2
VERTICAL SOIL STIFFNESS ..... 0.00 KN/M^2
LATERAL SOIL STIFFNESS ..... 0.00 KN/M^2
DEFLECTION UNDER REFERENCE LOAD ... 0.0000 CM

LONGITUDINAL COEF. OF FRICTION .... 0.000
LATERAL COEFFICIENT OF FRICTION ... 0.600
NUMBER OF INTEGRATION POINTS ..... 0
    
```

TIME INTEGRATION PARAMETERS

```

=====
TIME STEP LENGTH ..... 0.2000 SECONDS
MAXIMUM TIME OF INTEGRATION ..... 10860.000 SECONDS
SOLUTION SAMPLING TIME STEP ..... 0.400 SECONDS
    
```

SOLUTION SAMPLING STARTS AT TIME .. 60.000 SECONDS  
 DAMPING RATIO ..... 0.0000  
 NUMBER OF VARIABLE TIME STEPS ..... 0

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 11  
 STATIC PIPE ANALYSIS 8 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 2:12:44 CASE 1

=====

INPUT DATA ECHO

WAVE PARAMETERS

=====

SEA STATE ROW INDEX ..... 1  
 WAVE HEIGHT (PEAK TO TROUGH) ..... 1.800 METERS  
 WAVE PERIOD ..... 6.300 SECONDS  
 WAVE DIRECTION OF TRAVEL ..... 180.000 DEGREES  
 WATER DEPTH FOR WAVE CALCULATIONS . 23.00 METERS  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0

WAVE SPECTRUM EQUATION

=====

SEA STATE ROW INDEX ..... 1  
 WAVE SPECTRUM EQUATION TYPE ..... 7 JONSWAP (CLASSIC)  
 NUMBER OF WAVES IN SPECTRUM ..... 20  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0  
 MINIMUM PERIOD IN SPECTRUM ..... 2.0933 SECONDS  
 MAXIMUM PERIOD IN SPECTRUM ..... 62.8000 SECONDS  
 START TIME FOR WAVE SPECTRUM ..... 0. SECONDS  
 DIRECTION OF WAVE TRAVEL ..... 0.000 DEGREES  
 1ST JONSWAP COEF. (ALPHA) ..... 0.012891  
 2ND JONSWAP COEF. (GAMMA) ..... 5.0000  
 PEAK WAVE PERIOD ..... 6.6150 SECONDS

VESSEL MOTION RAO TABLE

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SEA STATE NUMBER ..... 1  
 USE PHASE LAG FOR RAOs ..... NO  
 VESSEL MOTIONS SIGN CONVENTION .... 2 BENTLEY MOSES  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD

WAVE PERIOD (SECONDS)	----- SURGE AMPLITUDE (M/M )	----- / PHASE (DEG)	----- / SWAY AMPLITUDE (M/M )	----- / PHASE (DEG)	----- / HEAVE AMPLITUDE (M/M )	----- / PHASE (DEG)
2.0900	0.0030	-170.00	0.0000	0.00	0.0040	-66.00
2.1700	0.0040	132.00	0.0000	0.00	0.0040	-77.00
2.2400	0.0040	56.00	0.0000	0.00	0.0020	-81.00
2.3300	0.0040	-36.00	0.0000	0.00	0.0050	-59.00
2.4200	0.0050	-134.00	0.0000	0.00	0.0070	-65.00
2.5100	0.0070	120.00	0.0000	0.00	0.0070	-84.00
2.6200	0.0080	17.00	0.0000	0.00	0.0050	-66.00
2.7300	0.0070	-126.00	0.0000	0.00	0.0110	-62.00
2.8500	0.0140	102.00	0.0000	0.00	0.0100	-93.00
2.9900	0.0090	-16.00	0.0000	0.00	0.0090	-48.00
3.1400	0.0190	147.00	0.0000	0.00	0.0160	-84.00
3.3100	0.0170	35.00	0.0000	0.00	0.0060	-62.00

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 USER ID - IK DATE - 5/ 2/2020 TIME - 2:12:44 CASE 1

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WAVE PERIOD	----- ROLL AMPLITUDE	----- / PHASE	----- / PITCH AMPLITUDE	----- / PHASE	----- YAW AMPLITUDE	----- / PHASE
3.4900	0.0280	160.00	0.0000	0.00	0.0230	-82.00
3.7000	0.0200	44.00	0.0000	0.00	0.0060	-69.00
3.9300	0.0490	150.00	0.0000	0.00	0.0310	-95.00
4.1900	0.0060	-31.00	0.0000	0.00	0.0160	-47.00
4.4900	0.0730	121.00	0.0000	0.00	0.0350	-124.00
4.8300	0.0680	-163.00	0.0000	0.00	0.0510	-77.00
5.2400	0.0310	69.00	0.0000	0.00	0.0170	-66.00
5.7100	0.1390	136.00	0.0000	0.00	0.0680	-147.00
6.2800	0.1620	-167.00	0.0000	0.00	0.1610	-101.00
6.9800	0.0620	-118.00	0.0000	0.00	0.1330	-33.00
7.8500	0.1350	104.00	0.0000	0.00	0.1130	153.00
8.9700	0.3670	143.00	0.0000	0.00	0.3970	-139.00
10.4700	0.5800	177.00	0.0000	0.00	0.6520	-98.00
12.5600	0.7420	-154.00	0.0000	0.00	0.8300	-67.00
15.7000	0.8470	-130.00	0.0000	0.00	0.9340	-42.00
20.9300	0.9050	-112.00	0.0000	0.00	0.9830	-23.00
31.4000	0.9320	-99.00	0.0000	0.00	1.0000	-9.00
62.8000	0.9420	-92.00	0.0000	0.00	1.0030	-2.00

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(SECONDS)	(DEG/M)	(DEG)	(DEG/M)	(DEG)	(DEG/M)	(DEG)
2.0900	0.0000	0.00	0.0120	-59.00	0.0000	0.00
2.1700	0.0000	0.00	0.0150	-56.00	0.0000	0.00
2.2400	0.0010	-74.00	0.0160	-64.00	0.0000	0.00
2.3300	0.0000	0.00	0.0240	-75.00	0.0000	0.00
2.4200	0.0000	0.00	0.0200	-73.00	0.0000	0.00
2.5100	0.0000	0.00	0.0280	-55.00	0.0000	0.00
2.6200	0.0000	0.00	0.0390	-73.00	0.0000	0.00
2.7300	0.0000	0.00	0.0280	-83.00	0.0000	0.00
2.8500	0.0000	0.00	0.0440	-52.00	0.0000	0.00
2.9900	0.0000	0.00	0.0540	-88.00	0.0000	0.00
3.1400	0.0000	0.00	0.0340	-50.00	0.0000	0.00
3.3100	0.0000	0.00	0.0800	-81.00	0.0000	0.00
3.4900	0.0000	0.00	0.0320	-50.00	0.0000	0.00
3.7000	0.0000	0.00	0.1110	-86.00	0.0000	0.00
3.9300	0.0000	0.00	0.0490	-48.00	0.0000	0.00
4.1900	0.0000	0.00	0.1400	-107.00	0.0000	0.00
4.4900	0.0000	0.00	0.1470	-56.00	0.0000	0.00
4.8300	0.0000	0.00	0.0800	-124.00	0.0000	0.00
5.2400	0.0000	0.00	0.2790	-105.00	0.0000	0.00
5.7100	0.0000	0.00	0.3300	-65.00	0.0000	0.00
6.2800	0.0010	51.00	0.0100	28.00	0.0000	0.00
6.9800	0.0020	173.00	0.7900	-140.00	0.0000	0.00

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 STATIC PIPE ANALYSIS 8 INCH  
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INPUT DATA ECHO

7.8500	0.0000	0.00	1.5530	-87.00	0.0000	0.00
8.9700	0.0000	0.00	1.8550	-42.00	0.0000	0.00
10.4700	0.0000	0.00	1.7270	-4.00	0.0000	0.00
12.5600	0.0000	0.00	1.3590	25.00	0.0000	0.00
15.7000	0.0000	0.00	0.9240	50.00	0.0000	0.00
20.9300	0.0000	0.00	0.5320	69.00	0.0000	0.00
31.4000	0.0000	0.00	0.2380	83.00	0.0000	0.00
62.8000	0.0000	0.00	0.0610	100.00	0.0000	0.00

\*\*\*\*\* INFORMATIVE MESSAGE NO. - 94 \*\*\*\*\*

One or more of the phase angles in the RAO table have been adjusted to minimize the difference in value between adjacent angles. If the phase angles are arbitrarily restricted by the software used to calculate the RAOs to a fixed range of values such as (0 to 2\*PI) or (-PI to +PI), then phase angles that are actually close in value can differ by as much as 2\*PI. These large differences can cause the phase angles for RAOs that are between the values in the table (which must be determined using interpolation) to be calculated incorrectly.

CONTROL SWITCHES

MAX NUMBER STATIC ITERATIONS ..... 500  
 MAX DYNAMIC ITERATIONS PER STEP ... 500  
 BOUNDARY CONDITION LOGIC PARAMETER 5  
 TIME STEP STABILITY PARAMETER ..... 0  
 TYPE OF ANALYSIS ..... DYNAMIC  
 NUMBER OF PROBLEM DIMENSIONS ..... 3  
 DAVIT LIFT ANALYSIS ..... NO

STATIC SOLUTION CONVERGED IN ( 17 ) ITERATIONS

END OF INPUT DATA

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 2:12:44 PAGE 14  
 PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING  
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES (MPA)		TOTAL STRESS (MPA)	PERCENT YIELD (PCT)
1	LAYBARGE	64.20	4.42	0.00	0.000	1.471	0.00	0.00	0.00	0.29	0.00	0.29	0.08
3	LAYBARGE	59.72	4.30	0.00	0.000	1.590	4.48	-0.02	0.00	-26.68	0.00	26.71	7.42
5	LAYBARGE	48.23	4.00	0.00	0.000	1.461	15.98	-0.09	0.00	-36.95	0.00	37.04	10.29
7	TENSIONR	38.10	3.73	0.00	0.000	1.432	26.11	11.77	0.00	-13.49	0.00	25.26	7.02
9	LAYBARGE	33.43	3.61	0.00	0.000	1.535	30.78	11.75	0.00	-7.12	0.00	18.87	5.24
11	TENSIONR	26.65	3.43	0.00	0.000	1.482	37.57	23.62	0.00	-6.51	0.00	30.13	8.37
13	LAYBARGE	21.33	3.30	0.00	0.000	1.448	42.89	23.59	0.00	0.36	0.00	23.95	6.65
15	LAYBARGE	12.14	2.98	0.00	0.000	3.376	52.08	23.46	0.00	-227.47	0.00	250.94	69.70



17	LAYBARGE	-0.04	1.76	0.00	0.000	8.070	64.32	23.22	0.00	-216.47	0.00	239.69	66.58
20	STINGER	-8.10	0.35	0.00	0.000	11.521	72.51	22.97	0.00	-170.68	0.00	193.65	53.79
22	STINGER	-15.89	-1.45	0.00	0.000	14.427	80.51	22.68	-0.13	-156.52	0.00	179.26	49.79
24	STINGER	-23.60	-3.61	0.00	0.000	16.653	88.51	22.36	-0.31	-97.69	0.00	120.20	33.39
26	STINGER	-30.64	-5.84	0.00	0.000	18.613	95.90	21.99	-0.51	-136.87	0.00	159.12	44.20
28	STINGER	-36.57	-7.92	0.00	0.000	19.912	102.19	21.69	-0.69	-37.83	0.00	59.86	16.63
30	STINGER	-39.47	-8.98	0.00	0.000	20.010	105.27	21.52	-0.78	11.84	0.00	33.76	9.38
32	SAGBEND	-41.35	-9.66	0.00	0.000	19.887	107.27	21.42	-0.84	35.75	0.00	57.59	16.00
33	SAGBEND	-43.23	-10.34	0.00	0.000	19.659	109.27	21.31	-0.90	53.94	0.00	75.70	21.03
34	SAGBEND	-45.12	-11.01	0.00	0.000	19.349	111.27	21.20	-0.95	67.82	0.00	89.51	24.86
35	SAGBEND	-47.01	-11.66	0.00	0.000	18.979	113.27	21.10	-1.01	78.47	0.00	100.08	27.80
36	SAGBEND	-48.90	-12.31	0.00	0.000	18.561	115.27	20.99	-1.07	86.67	0.00	108.20	30.06
37	SAGBEND	-50.80	-12.93	0.00	0.000	18.106	117.27	20.89	-1.12	93.03	0.00	114.49	31.80
38	SAGBEND	-52.70	-13.55	0.00	0.000	17.623	119.27	20.80	-1.17	98.00	0.00	119.39	33.16
39	SAGBEND	-54.61	-14.15	0.00	0.000	17.117	121.27	20.70	-1.23	101.91	0.00	123.23	34.23
40	SAGBEND	-56.52	-14.73	0.00	0.000	16.594	123.27	20.61	-1.28	105.02	0.00	126.28	35.08
41	SAGBEND	-58.44	-15.29	0.00	0.000	16.057	125.27	20.52	-1.33	107.52	0.00	128.71	35.75
42	SAGBEND	-60.37	-15.83	0.00	0.000	15.509	127.27	20.44	-1.37	109.56	0.00	130.69	36.30
43	SAGBEND	-62.30	-16.36	0.00	0.000	14.951	129.27	20.35	-1.42	111.24	0.00	132.30	36.75
44	SAGBEND	-64.23	-16.86	0.00	0.000	14.385	131.27	20.27	-1.46	112.64	0.00	133.65	37.12
45	SAGBEND	-66.17	-17.35	0.00	0.000	13.813	133.27	20.20	-1.50	113.82	0.00	134.77	37.44
46	SAGBEND	-68.12	-17.82	0.00	0.000	13.235	135.27	20.12	-1.55	114.82	0.00	135.73	37.70
47	SAGBEND	-70.07	-18.27	0.00	0.000	12.653	137.27	20.05	-1.58	115.69	0.00	136.54	37.93
48	SAGBEND	-72.02	-18.69	0.00	0.000	12.066	139.27	19.99	-1.62	116.44	0.00	137.24	38.12
49	SAGBEND	-73.98	-19.10	0.00	0.000	11.476	141.27	19.92	-1.66	117.08	0.00	137.84	38.29
50	SAGBEND	-75.94	-19.49	0.00	0.000	10.883	143.27	19.86	-1.69	117.64	0.00	138.35	38.43
51	SAGBEND	-77.91	-19.86	0.00	0.000	10.288	145.27	19.80	-1.72	118.10	0.00	138.77	38.55
52	SAGBEND	-79.88	-20.20	0.00	0.000	9.690	147.27	19.75	-1.75	118.47	0.00	139.10	38.64
53	SAGBEND	-81.85	-20.53	0.00	0.000	9.091	149.27	19.70	-1.78	118.75	0.00	139.34	38.71
54	SAGBEND	-83.82	-20.84	0.00	0.000	8.490	151.27	19.65	-1.81	118.91	0.00	139.48	38.74
55	SAGBEND	-85.80	-21.12	0.00	0.000	7.889	153.27	19.60	-1.83	118.96	0.00	139.48	38.75
56	SAGBEND	-87.79	-21.39	0.00	0.000	7.289	155.27	19.56	-1.85	118.85	0.00	139.35	38.71
57	SAGBEND	-89.77	-21.63	0.00	0.000	6.689	157.27	19.52	-1.88	118.55	0.00	139.03	38.62
58	SAGBEND	-91.76	-21.85	0.00	0.000	6.091	159.27	19.49	-1.90	118.03	0.00	138.48	38.47
59	SAGBEND	-93.75	-22.05	0.00	0.000	5.496	161.27	19.46	-1.91	117.22	0.00	137.64	38.23

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/2/2020      TIME - 2:12:44      PAGE 15

PROJECT - STATIC PIPE ANALYSIS 8 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCT YIELD (PCT)
=====													
60	SAGBEND	-95.74	-22.24	0.00	0.000	4.907	163.27	19.43	-1.93	116.03	0.00	136.44	37.90
61	SAGBEND	-97.73	-22.40	0.00	0.000	4.325	165.27	19.41	-1.94	114.37	0.00	134.76	37.43
62	SAGBEND	-99.73	-22.54	0.00	0.000	3.752	167.27	19.38	-1.95	112.09	0.00	132.47	36.80
63	SAGBEND	-101.73	-22.66	0.00	0.000	3.193	169.27	19.37	-1.96	109.02	0.00	129.38	35.94
64	SAGBEND	-103.72	-22.76	0.00	0.000	2.652	171.27	19.35	-1.97	104.91	0.00	125.26	34.79
65	SAGBEND	-105.72	-22.84	0.00	0.000	2.136	173.27	19.34	-1.98	99.45	0.00	119.79	33.27
66	SAGBEND	-107.72	-22.91	0.00	0.000	1.650	175.27	19.33	-1.99	92.22	0.00	112.56	31.27
67	SAGBEND	-109.72	-22.96	0.00	0.000	1.207	177.27	19.32	-1.99	82.70	0.00	103.03	28.62
68	SAGBEND	-111.72	-22.99	0.00	0.000	0.820	179.27	19.32	-1.99	70.16	0.00	90.50	25.14
69	SEABED	-113.72	-23.02	0.00	0.000	0.505	181.27	19.32	-2.00	54.24	0.00	74.58	20.72
70	SEABED	-115.72	-23.03	0.00	0.000	0.272	183.27	19.32	-2.00	37.97	0.00	58.32	16.20
71	SEABED	-117.72	-23.04	0.00	0.000	0.117	185.27	19.32	-2.00	24.09	0.00	44.45	12.35
72	SEABED	-119.72	-23.04	0.00	0.000	0.023	187.27	19.32	-2.00	13.57	0.00	33.93	9.43
73	SEABED	-121.72	-23.04	0.00	0.000	-0.026	189.27	19.32	-2.00	6.33	0.00	26.71	7.42
74	SEABED	-123.72	-23.04	0.00	0.000	-0.046	191.27	19.32	-2.00	1.83	0.00	22.21	6.17
75	SEABED	-125.72	-23.04	0.00	0.000	-0.048	193.27	19.32	-2.00	-0.64	0.00	21.03	5.84
76	SEABED	-127.72	-23.03	0.00	0.000	-0.041	195.27	19.32	-2.00	-1.74	0.00	22.12	6.15
77	SEABED	-129.72	-23.03	0.00	0.000	-0.032	197.27	19.32	-2.00	-1.99	0.00	22.38	6.22
78	SEABED	-131.72	-23.03	0.00	0.000	-0.022	199.27	19.32	-2.00	-1.80	0.00	22.19	6.16
79	SEABED	-133.72	-23.03	0.00	0.000	-0.014	201.27	19.32	-2.00	-1.42	0.00	21.81	6.06
80	SEABED	-135.72	-23.03	0.00	0.000	-0.008	203.27	19.32	-2.00	-1.01	0.00	21.40	5.95
81	SEABED	-137.72	-23.03	0.00	0.000	-0.004	205.27	19.32	-2.00	-0.66	0.00	21.05	5.85
82	SEABED	-139.72	-23.03	0.00	0.000	-0.001	207.27	19.32	-2.00	-0.38	0.00	20.77	5.77
83	SEABED	-141.72	-23.03	0.00	0.000	0.000	209.27	19.32	-2.00	-0.19	0.00	20.58	5.72
84	SEABED	-143.72	-23.03	0.00	0.000	0.001	211.27	19.32	-2.00	-0.06	0.00	20.46	5.68
85	SEABED	-145.72	-23.03	0.00	0.000	0.001	213.27	19.32	-2.00	0.01	0.00	20.40	5.67
86	SEABED	-147.72	-23.03	0.00	0.000	0.001	215.27	19.32	-2.00	0.04	0.00	20.43	5.68
87	SEABED	-149.72	-23.03	0.00	0.000	0.001	217.27	19.32	-2.00	0.05	0.00	20.44	5.68
88	SEABED	-151.72	-23.03	0.00	0.000	0.001	219.27	19.32	-2.00	0.05	0.00	20.44	5.68
89	SEABED	-153.72	-23.03	0.00	0.000	0.000	221.27	19.32	-2.00	0.04	0.00	20.43	5.68
90	SEABED	-155.72	-23.03	0.00	0.000	0.000	223.27	19.32	-2.00	0.03	0.00	20.42	5.67
91	SEABED	-157.72	-23.03	0.00	0.000	0.000	225.27	19.32	-2.00	0.02	0.00	20.41	5.67
92	SEABED	-159.72	-23.03	0.00	0.000	0.000	227.27	19.32	-2.00	0.01	0.00	20.40	5.67
93	SEABED	-161.72	-23.03	0.00	0.000	0.000	229.27	19.32	-2.00	0.01	0.00	20.40	5.67
94	SEABED	-163.72	-23.03	0.00	0.000	0.000	231.27	19.32	-2.00	0.00	0.00	20.40	5.67
95	SEABED	-165.72	-23.03	0.00	0.000	0.000	233.27	19.32	-2.00	0.00	0.00	20.39	5.67
96	SEABED	-167.72	-23.03	0.00	0.000	0.000	235.27	19.32	-2.00	0.00	0.00	20.39	5.67
97	SEABED	-169.72	-23.03	0.00	0.000	0.000	237.27	19.32	-2.00	0.00	0.00	20.39	5.67
98	SEABED	-171.72	-23.03	0.00	0.000	0.000	239.27	19.32	-2.00	0.00	0.00	20.39	5.67

99 SEABED -173.72 -23.03 0.00 0.000 0.000 241.27 19.32 -2.00 0.00 0.00 20.39 5.66

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 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 2:12:44 PAGE 16
 PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1
 =====

STATIC PIPE COORDINATES, FORCES AND STRESSES												
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACTION HORIZ (KN )	SUPT VERT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	BENDING MOMENTS		
										VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)
1	LAYBARGE	64.20	4.42	0.00	0.58	0.00	0.00	0.00	0.00	0.12	0.00	0.12
3	LAYBARGE	59.72	4.30	0.00	15.88	0.00	0.00	0.00	-0.20	-10.72	0.00	10.72
5	LAYBARGE	48.23	4.00	0.00	19.27	0.00	0.00	0.00	-0.71	-14.85	0.00	14.85
7	TENSIONR	38.10	3.73	0.00	12.14	0.00	0.00	0.00	96.94	-5.42	0.00	5.42
9	LAYBARGE	33.43	3.61	0.00	8.50	0.00	0.00	0.00	96.74	-2.86	0.00	2.86
11	TENSIONR	26.65	3.43	0.00	11.04	0.00	0.00	0.00	194.51	-2.61	0.00	2.61
13	LAYBARGE	21.33	3.30	0.00	1.74	0.00	0.00	0.00	194.29	0.14	0.00	0.14
15	LAYBARGE	12.14	2.98	0.00	41.63	0.00	0.00	0.00	193.23	-91.40	0.00	91.40
17	LAYBARGE	-0.04	1.76	0.00	33.00	0.00	0.00	0.00	191.25	-86.98	0.00	86.98
20	STINGER	-8.10	0.35	0.00	18.93	0.00	0.00	0.00	189.14	-68.58	0.00	68.58
22	STINGER	-15.89	-1.45	0.00	18.81	0.00	0.00	0.00	187.29	-62.89	0.00	62.89
24	STINGER	-23.60	-3.61	0.00	7.13	0.00	0.00	0.00	185.47	-39.25	0.00	39.25
26	STINGER	-30.64	-5.84	0.00	21.13	0.00	0.00	0.00	183.33	-54.99	0.00	54.99
28	STINGER	-36.57	-7.92	0.00	5.92	0.00	0.00	0.00	181.61	-15.20	0.00	15.20
30	STINGER	-39.47	-8.98	0.00	0.00	0.00	0.41	0.00	180.66	4.76	0.00	4.76
32	SAGBEND	-41.35	-9.66	0.00	0.00	0.00	0.00	0.00	180.02	14.36	0.00	14.36
33	SAGBEND	-43.23	-10.34	0.00	0.00	0.00	0.00	0.00	179.39	21.67	0.00	21.67
34	SAGBEND	-45.12	-11.01	0.00	0.00	0.00	0.00	0.00	178.77	27.25	0.00	27.25
35	SAGBEND	-47.01	-11.66	0.00	0.00	0.00	0.00	0.00	178.15	31.53	0.00	31.53
36	SAGBEND	-48.90	-12.31	0.00	0.00	0.00	0.00	0.00	177.55	34.83	0.00	34.83
37	SAGBEND	-50.80	-12.93	0.00	0.00	0.00	0.00	0.00	176.97	37.38	0.00	37.38
38	SAGBEND	-52.70	-13.55	0.00	0.00	0.00	0.00	0.00	176.40	39.38	0.00	39.38
39	SAGBEND	-54.61	-14.15	0.00	0.00	0.00	0.00	0.00	175.85	40.95	0.00	40.95
40	SAGBEND	-56.52	-14.73	0.00	0.00	0.00	0.00	0.00	175.31	42.20	0.00	42.20
41	SAGBEND	-58.44	-15.29	0.00	0.00	0.00	0.00	0.00	174.79	43.20	0.00	43.20
42	SAGBEND	-60.37	-15.83	0.00	0.00	0.00	0.00	0.00	174.29	44.02	0.00	44.02
43	SAGBEND	-62.30	-16.36	0.00	0.00	0.00	0.00	0.00	173.81	44.70	0.00	44.70
44	SAGBEND	-64.23	-16.86	0.00	0.00	0.00	0.00	0.00	173.35	45.26	0.00	45.26
45	SAGBEND	-66.17	-17.35	0.00	0.00	0.00	0.00	0.00	172.90	45.73	0.00	45.73
46	SAGBEND	-68.12	-17.82	0.00	0.00	0.00	0.00	0.00	172.47	46.14	0.00	46.14
47	SAGBEND	-70.07	-18.27	0.00	0.00	0.00	0.00	0.00	172.06	46.49	0.00	46.49
48	SAGBEND	-72.02	-18.69	0.00	0.00	0.00	0.00	0.00	171.67	46.79	0.00	46.79
49	SAGBEND	-73.98	-19.10	0.00	0.00	0.00	0.00	0.00	171.29	47.05	0.00	47.05
50	SAGBEND	-75.94	-19.49	0.00	0.00	0.00	0.00	0.00	170.94	47.27	0.00	47.27
51	SAGBEND	-77.91	-19.86	0.00	0.00	0.00	0.00	0.00	170.60	47.45	0.00	47.45
52	SAGBEND	-79.88	-20.20	0.00	0.00	0.00	0.00	0.00	170.28	47.60	0.00	47.60
53	SAGBEND	-81.85	-20.53	0.00	0.00	0.00	0.00	0.00	169.99	47.71	0.00	47.71
54	SAGBEND	-83.82	-20.84	0.00	0.00	0.00	0.00	0.00	169.71	47.78	0.00	47.78
55	SAGBEND	-85.80	-21.12	0.00	0.00	0.00	0.00	0.00	169.45	47.80	0.00	47.80
56	SAGBEND	-87.79	-21.39	0.00	0.00	0.00	0.00	0.00	169.21	47.75	0.00	47.75
57	SAGBEND	-89.77	-21.63	0.00	0.00	0.00	0.00	0.00	168.98	47.64	0.00	47.64
58	SAGBEND	-91.76	-21.85	0.00	0.00	0.00	0.00	0.00	168.78	47.43	0.00	47.43
59	SAGBEND	-93.75	-22.05	0.00	0.00	0.00	0.00	0.00	168.60	47.10	0.00	47.10

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 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 2:12:44 PAGE 17
 PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1
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STATIC PIPE COORDINATES, FORCES AND STRESSES												
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACTION HORIZ (KN )	SUPT VERT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	BENDING MOMENTS		
										VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)
60	SAGBEND	-95.74	-22.24	0.00	0.00	0.00	0.00	0.00	168.44	46.62	0.00	46.62
61	SAGBEND	-97.73	-22.40	0.00	0.00	0.00	0.00	0.00	168.29	45.96	0.00	45.96
62	SAGBEND	-99.73	-22.54	0.00	0.00	0.00	0.00	0.00	168.17	45.04	0.00	45.04
63	SAGBEND	-101.73	-22.66	0.00	0.00	0.00	0.00	0.00	168.06	43.81	0.00	43.81
64	SAGBEND	-103.72	-22.76	0.00	0.00	0.00	0.00	0.00	167.98	42.15	0.00	42.15
65	SAGBEND	-105.72	-22.84	0.00	0.00	0.00	0.00	0.00	167.91	39.96	0.00	39.96
66	SAGBEND	-107.72	-22.91	0.00	0.00	0.00	0.00	0.00	167.86	37.06	0.00	37.06
67	SAGBEND	-109.72	-22.96	0.00	0.00	0.00	0.00	0.00	167.83	33.23	0.00	33.23
68	SAGBEND	-111.72	-22.99	0.00	0.09	0.00	0.00	0.00	167.82	28.19	0.00	28.19
69	SEABED	-113.72	-23.02	0.00	0.96	0.00	0.00	0.00	167.82	21.80	0.00	21.80
70	SEABED	-115.72	-23.03	0.00	1.75	0.00	0.00	0.00	167.83	15.26	0.00	15.26
71	SEABED	-117.72	-23.04	0.00	2.14	0.00	0.00	0.00	167.84	9.68	0.00	9.68
72	SEABED	-119.72	-23.04	0.00	2.28	0.00	0.00	0.00	167.84	5.45	0.00	5.45
73	SEABED	-121.72	-23.04	0.00	2.28	0.00	0.00	0.00	167.84	2.54	0.00	2.54
74	SEABED	-123.72	-23.04	0.00	2.21	0.00	0.00	0.00	167.84	0.73	0.00	0.73
75	SEABED	-125.72	-23.04	0.00	2.11	0.00	0.00	0.00	167.84	-0.26	0.00	0.26

76	SEABED	-127.72	-23.03	0.00	2.02	0.00	0.00	0.00	167.84	-0.70	0.00	0.70
77	SEABED	-129.72	-23.03	0.00	1.94	0.00	0.00	0.00	167.84	-0.80	0.00	0.80
78	SEABED	-131.72	-23.03	0.00	1.89	0.00	0.00	0.00	167.84	-0.72	0.00	0.72
79	SEABED	-133.72	-23.03	0.00	1.85	0.00	0.00	0.00	167.84	-0.57	0.00	0.57
80	SEABED	-135.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	-0.41	0.00	0.41
81	SEABED	-137.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	-0.26	0.00	0.26
82	SEABED	-139.72	-23.03	0.00	1.81	0.00	0.00	0.00	167.84	-0.15	0.00	0.15
83	SEABED	-141.72	-23.03	0.00	1.81	0.00	0.00	0.00	167.84	-0.07	0.00	0.07
84	SEABED	-143.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	-0.03	0.00	0.03
85	SEABED	-145.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.00	0.00	0.00
86	SEABED	-147.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.02	0.00	0.02
87	SEABED	-149.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.02	0.00	0.02
88	SEABED	-151.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.02	0.00	0.02
89	SEABED	-153.72	-23.03	0.00	1.82	0.00	0.00	0.00	167.84	0.01	0.00	0.01
90	SEABED	-155.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.01	0.00	0.01
91	SEABED	-157.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.01	0.00	0.01
92	SEABED	-159.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
93	SEABED	-161.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
94	SEABED	-163.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
95	SEABED	-165.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
96	SEABED	-167.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
97	SEABED	-169.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
98	SEABED	-171.72	-23.03	0.00	1.83	0.00	0.00	0.00	167.84	0.00	0.00	0.00
99	SEABED	-173.72	-23.03	0.00	0.00	0.00	0.00	0.00	167.84	0.00	0.00	0.00

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 18

STATIC PIPE ANALYSIS 8 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/ 2/2020 TIME - 2:12:44 CASE 1

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STATIC SOLUTION SUMMARY

PIPE PROPERTIES ( 1)

PIPE SECTION LENGTH ..	0.00 M	ELASTIC MODULUS .....	207000. MPA
OUTSIDE DIAMETER .....	21.910 CM	CROSS SECTIONAL AREA ..	82.69 CM²
WALL THICKNESS .....	1.270 CM	MOMENT OF INERTIA ....	4402.0 CM⁴
WEIGHT/LENGTH IN AIR ..	1649.63 N/M	YIELD STRESS .....	360.00 MPA
SUBMERGED WGHT/LENG ..	912.94 N/M	STRESS INTENS FACTOR ..	1.000
SPECIFIC GRAVITY .....	2.239	STEEL DENSITY .....	77008.0 N/M3
WRAP COAT THICKNESS ..	0.320 CM	WRAP COAT DENSITY ....	9025.2 N/M3
CONCRETE THICKNESS ...	4.000 CM	CONCRETE DENSITY .....	29857.0 N/M3

BARGE DATA

TOTAL PIPE TENSION ...	196.13 KN	RADIUS OF CURVATURE ..	0.00 M
NUMBER OF TENSIONERS ..	2	BARGE TRIM ANGLE .....	0.500 DEG
NO. OF PIPE SUPPORTS ..	7	PIPE ANGLE AT STERN ..	8.070 DEG
BARGE HEADING .....	0.000 DEG	OFFSET FROM R.O.W. ...	0.00 M

STINGER DATA

NO. OF PIPE SUPPORTS ..	6	PIPE DEPTH AT STERN ..	-8.98 M
NO. STINGER SECTIONS ..	6	PIPE ANGLE AT STERN ..	20.010 DEG
RADIUS OF CURVATURE ...	0.00 M	STINGER STERN DEPTH ..	-9.34 M
STINGER LENGTH .....	41.37 M		

SAGBEND DATA

WATER DEPTH .....	23.00 M	TENSION AT TOUCHDOWN ..	167.82 KN
TOUCHDOWN X-COORD. ...	-112.15 M	BOTTOM SLOPE ANGLE ...	0.000 DEG
PROJECTED SPAN LENGTH	72.68 M	PIPE LENGTH GAIN .....	3.35 M

===== SOLUTION SUMMARY =====

NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACT HORIZ (KN)	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	0.6	0.0	0.1	0.3	0.
3	LAYBARGE	59.7	4.3	0.0	15.9	0.0	10.7	26.7	7.
5	LAYBARGE	48.2	4.0	0.0	19.3	0.0	14.8	37.0	10.
7	TENSIONR	38.1	3.7	0.0	12.1	0.0	5.4	25.3	7.
9	LAYBARGE	33.4	3.6	0.0	8.5	0.0	2.9	18.9	5.
11	TENSIONR	26.7	3.4	0.0	11.0	0.0	2.6	30.1	8.
13	LAYBARGE	21.3	3.3	0.0	1.7	0.0	0.1	23.9	7.
15	LAYBARGE	12.1	3.0	0.0	41.6	0.0	91.4	250.9	70.
17	LAYBARGE	0.0	1.8	0.0	33.0	0.0	87.0	239.7	67.
20	STINGER	-8.1	0.4	0.0	18.9	0.0	68.6	193.7	54.
22	STINGER	-15.9	-1.4	0.0	18.8	0.0	62.9	179.3	50.
24	STINGER	-23.6	-3.6	0.0	7.1	0.0	39.3	120.2	33.

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 19

STATIC PIPE ANALYSIS 8 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/ 2/2020 TIME - 2:12:44 CASE 1

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STATIC SOLUTION SUMMARY

26	STINGER	-30.6	-5.8	0.0	21.1	0.0	55.0	159.1	44.
28	STINGER	-36.6	-7.9	0.0	5.9	0.0	15.2	59.9	17.
30	STINGER	-39.5	-9.0	0.0	0.0	0.0	4.8	33.8	9.
55	SAGBEND	-85.8	-21.1	0.0	0.0	0.0	47.8	139.5	39.
69	SEABED	-113.7	-23.0	0.0	1.0	0.0	21.8	74.6	21.

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/2/2020 TIME - 2:12:44 PAGE 20  
 PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING  
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

MAXIMUM DYNAMIC PIPE FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
1	LAYBARGE	64.22	4.41	0.00	0.000	1.489	0.00	0.00	0.00	0.33	0.00	0.33	0.09
3	LAYBARGE	59.74	4.29	0.00	0.000	1.608	4.48	-0.10	0.00	-28.05	0.00	28.06	7.79
5	LAYBARGE	48.24	4.01	0.00	0.000	1.478	15.98	-0.35	0.00	-38.18	0.00	38.23	10.62
7	TENSIONR	38.11	3.73	0.00	0.000	1.450	26.11	20.29	0.00	-14.04	0.00	34.00	9.44
9	LAYBARGE	33.44	3.61	0.00	0.000	1.553	30.78	20.30	0.00	-7.50	0.00	27.55	7.65
11	TENSIONR	26.66	3.45	0.00	0.000	1.500	37.57	32.28	0.00	-6.80	0.00	38.87	10.80
13	LAYBARGE	21.34	3.31	0.00	0.000	1.465	42.89	32.29	0.00	2.98	0.00	34.40	9.56
15	LAYBARGE	12.16	2.99	0.00	0.000	3.402	52.08	32.23	0.00	-240.05	-0.01	271.71	75.48
17	LAYBARGE	-0.02	1.76	0.00	0.000	8.028	64.32	32.07	0.00	-229.59	-0.01	260.50	72.36
20	STINGER	-8.08	0.35	0.00	0.000	11.568	72.51	31.86	-0.08	-186.80	-0.01	216.63	60.17
22	STINGER	-15.88	-1.45	0.00	0.000	14.393	80.51	31.59	-0.25	-172.63	0.01	202.46	56.24
24	STINGER	-23.59	-3.61	0.00	0.000	16.741	88.51	31.29	-0.46	-138.95	0.01	169.34	47.04
26	STINGER	-30.63	-5.84	0.00	0.000	18.388	95.90	30.98	-0.67	-149.71	0.01	178.37	49.55
28	STINGER	-36.59	-7.84	0.00	0.000	18.898	102.19	30.69	-0.85	-131.54	-0.01	153.95	42.76
30	STINGER	-39.48	-8.82	0.00	0.000	18.810	105.27	30.55	-0.93	81.64	-0.07	111.78	31.05
32	SAGBEND	-41.28	-9.43	0.00	0.000	18.667	107.27	30.47	-0.98	88.13	-0.06	117.37	32.60
33	SAGBEND	-43.18	-10.06	0.00	0.000	18.436	109.27	30.38	-1.04	95.93	-0.04	125.61	34.89
34	SAGBEND	-45.08	-10.68	0.00	0.000	18.136	111.27	30.29	-1.09	103.41	-0.03	132.93	36.92
35	SAGBEND	-46.98	-11.28	0.00	0.000	17.832	113.27	30.20	-1.14	111.34	-0.03	138.74	38.54
36	SAGBEND	-48.89	-11.87	0.00	0.000	17.477	115.27	30.12	-1.19	118.26	-0.02	144.66	40.18
37	SAGBEND	-50.80	-12.45	0.00	0.000	17.086	117.27	30.04	-1.24	122.99	0.02	149.23	41.45
38	SAGBEND	-52.71	-13.01	0.00	0.000	16.659	119.27	29.95	-1.29	128.92	0.02	154.37	42.88
39	SAGBEND	-54.63	-13.58	0.00	0.000	16.207	121.27	29.88	-1.34	133.11	-0.02	158.49	44.02
40	SAGBEND	-56.55	-14.14	0.00	0.000	15.740	123.27	29.80	-1.39	135.42	-0.02	160.72	44.64
41	SAGBEND	-58.48	-14.68	0.00	0.000	15.262	125.27	29.73	-1.43	139.91	-0.03	165.25	45.90
42	SAGBEND	-60.41	-15.19	0.00	0.000	14.778	127.27	29.66	-1.47	144.21	-0.03	169.46	47.07
43	SAGBEND	-62.35	-15.67	0.00	0.000	14.303	129.27	29.59	-1.52	147.07	-0.03	172.24	47.85
44	SAGBEND	-64.29	-16.14	0.00	0.000	13.851	131.27	29.52	-1.56	148.76	-0.03	173.86	48.29
45	SAGBEND	-66.23	-16.60	0.00	0.000	13.442	133.27	29.46	-1.60	149.53	-0.03	174.57	48.49
46	SAGBEND	-68.18	-17.03	0.00	0.000	12.970	135.27	29.39	-1.63	150.99	-0.03	174.59	48.50
47	SAGBEND	-70.13	-17.46	0.00	0.000	12.490	137.27	29.34	-1.67	151.86	-0.03	174.10	48.36
48	SAGBEND	-72.08	-17.87	0.00	0.000	12.005	139.27	29.28	-1.70	151.59	-0.03	173.23	48.12
49	SAGBEND	-74.04	-18.26	0.00	0.000	11.515	141.27	29.22	-1.73	150.20	-0.02	172.05	47.79
50	SAGBEND	-76.00	-18.64	0.00	0.000	11.020	143.27	29.17	-1.76	147.81	-0.02	170.58	47.38
51	SAGBEND	-77.97	-19.01	0.00	0.000	10.519	145.27	29.12	-1.79	144.60	-0.02	168.85	46.90
52	SAGBEND	-79.94	-19.36	0.00	0.000	10.007	147.27	29.08	-1.82	142.16	-0.02	166.82	46.34
53	SAGBEND	-81.91	-19.69	0.00	0.000	9.447	149.27	29.03	-1.84	141.91	-0.02	165.05	45.85
54	SAGBEND	-83.89	-20.00	0.00	0.000	8.894	151.27	28.99	-1.87	142.68	-0.02	165.78	46.05
55	SAGBEND	-85.86	-20.30	0.00	0.000	8.376	153.27	28.96	-1.89	142.72	-0.02	165.79	46.05
56	SAGBEND	-87.84	-20.58	0.00	0.000	7.861	155.27	28.92	-1.91	141.96	-0.02	165.01	45.84
57	SAGBEND	-89.83	-20.84	0.00	0.000	7.348	157.27	28.89	-1.92	140.33	-0.02	163.35	45.38
58	SAGBEND	-91.81	-21.08	0.00	0.000	6.794	159.27	28.86	-1.94	137.77	-0.02	160.77	44.66
59	SAGBEND	-93.80	-21.30	0.00	0.000	6.244	161.27	28.83	-1.95	135.95	-0.02	157.20	43.67

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/2/2020 TIME - 2:12:44 PAGE 21  
 PROJECT - STATIC PIPE ANALYSIS 8 INCH JOB NO. - LAYING  
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

MAXIMUM DYNAMIC PIPE FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
60	SAGBEND	-95.78	-21.51	0.00	0.000	5.753	163.27	28.81	-1.96	134.63	0.01	154.49	42.91
61	SAGBEND	-97.77	-21.70	0.00	0.000	5.277	165.27	28.79	-1.97	132.98	0.01	152.82	42.45
62	SAGBEND	-99.76	-21.88	0.00	0.000	4.810	167.27	28.77	-1.98	131.23	0.01	151.12	41.98
63	SAGBEND	-101.75	-22.04	0.00	0.000	4.355	169.27	28.75	-1.98	129.07	0.01	148.95	41.37
64	SAGBEND	-103.75	-22.18	0.00	0.000	3.915	171.27	28.74	-1.99	125.78	0.02	145.63	40.45
65	SAGBEND	-105.74	-22.30	0.00	0.000	3.495	173.27	28.73	-1.99	121.89	0.02	142.30	39.53
66	SAGBEND	-107.73	-22.40	0.00	0.000	3.090	175.27	28.72	-2.00	118.26	0.03	138.52	38.48
67	SAGBEND	-109.73	-22.50	0.00	0.000	2.723	177.27	28.72	-2.00	114.47	0.04	134.68	37.41
68	SAGBEND	-111.73	-22.58	0.00	0.000	2.395	179.27	28.72	-2.00	110.54	0.04	131.16	36.43
69	SAGBEND	-113.72	-22.65	0.00	0.000	2.099	181.27	28.72	-2.00	107.12	0.04	127.74	35.48

70	SAGBEND	-115.72	-22.72	0.00	0.000	1.842	183.27	28.72	-2.00	103.81	0.04	124.51	34.59
71	SAGBEND	-117.72	-22.78	0.00	0.000	1.603	185.27	28.72	-2.00	99.21	0.04	119.91	33.31
72	SAGBEND	-119.72	-22.83	0.00	0.000	1.395	187.27	28.73	-2.00	94.90	0.04	115.75	32.15
73	SAGBEND	-121.72	-22.88	0.00	0.000	1.200	189.27	28.74	-2.00	91.41	-0.04	112.81	31.34
74	SAGBEND	-123.72	-22.92	0.00	0.000	1.014	191.27	28.75	-2.00	87.15	-0.04	108.55	30.15
75	SAGBEND	-125.72	-22.95	0.00	0.000	0.833	193.27	28.76	-2.00	80.80	-0.04	102.11	28.36
76	SAGBEND	-127.72	-22.98	0.00	0.000	0.659	195.27	28.77	-2.00	73.08	-0.03	93.98	26.11
77	SAGBEND	-129.72	-23.00	0.00	0.000	0.493	197.27	28.77	-2.00	65.39	-0.03	88.18	24.49
78	SEABED	-131.72	-23.01	0.00	0.000	0.344	199.27	28.78	-2.00	55.72	-0.03	80.96	22.49
79	SEABED	-133.72	-23.03	0.00	0.000	0.217	201.27	28.79	-2.00	45.31	-0.02	70.56	19.60
80	SEABED	-135.72	-23.03	0.00	0.000	0.117	203.27	28.80	-2.00	33.34	-0.02	58.61	16.28
81	SEABED	-137.72	-23.03	0.00	0.000	0.049	205.27	28.81	-2.00	22.45	-0.02	47.73	13.26
82	SEABED	-139.72	-23.03	0.00	0.000	0.006	207.27	28.82	-2.00	13.76	-0.01	39.05	10.85
83	SEABED	-141.72	-23.03	0.00	0.000	-0.019	209.27	28.82	-2.00	7.47	-0.01	32.78	9.11
84	SEABED	-143.72	-23.03	0.00	0.000	-0.020	211.27	28.83	-2.00	3.32	0.00	30.49	8.47
85	SEABED	-145.72	-23.03	0.00	0.000	-0.018	213.27	28.84	-2.00	-1.98	0.00	30.42	8.45
86	SEABED	-147.72	-23.03	0.00	0.000	-0.015	215.27	28.85	-2.00	-1.76	0.00	30.28	8.41
87	SEABED	-149.72	-23.03	0.00	0.000	-0.011	217.27	28.85	-2.00	-1.61	0.00	30.27	8.41
88	SEABED	-151.72	-23.03	0.00	0.000	-0.008	219.27	28.86	-2.00	-1.44	0.00	30.10	8.36
89	SEABED	-153.72	-23.03	0.00	0.000	-0.005	221.27	28.87	-2.00	-1.13	0.00	29.93	8.31
90	SEABED	-155.72	-23.03	0.00	0.000	-0.003	223.27	28.88	-2.00	-0.81	0.00	29.93	8.31
91	SEABED	-157.72	-23.03	0.00	0.000	-0.001	225.27	28.88	-2.00	-0.59	0.00	29.94	8.32
92	SEABED	-159.72	-23.03	0.00	0.000	0.000	227.27	28.89	-2.00	-0.39	0.00	29.95	8.32
93	SEABED	-161.72	-23.03	0.00	0.000	0.000	229.27	28.90	-2.00	-0.24	0.00	29.95	8.32
94	SEABED	-163.72	-23.03	0.00	0.000	0.000	231.27	28.90	-2.00	-0.13	0.00	29.96	8.32
95	SEABED	-165.72	-23.03	0.00	0.000	0.000	233.27	28.91	-2.00	0.07	0.00	29.96	8.32
96	SEABED	-167.72	-23.03	0.00	0.000	0.000	235.27	28.92	-2.00	0.05	0.00	29.97	8.32
97	SEABED	-169.72	-23.03	0.00	0.000	0.000	237.27	28.92	-2.00	0.03	0.00	29.98	8.33
98	SEABED	-171.72	-23.03	0.00	0.000	0.000	239.27	28.93	-2.00	0.02	0.00	29.98	8.33
99	SEABED	-173.72	-23.03	0.00	0.000	0.000	241.27	28.94	-2.00	0.00	0.00	29.99	8.33

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PROJECT - STATIC PIPE ANALYSIS 8 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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MAXIMUM DYNAMIC PIPE FORCES AND STRESSES

NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS		
					VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	(KN )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
1	LAYBARGE	64.22	4.41	0.00	0.66	0.00	0.00	0.00	0.00	0.13	0.00	0.13	
3	LAYBARGE	59.74	4.29	0.00	16.70	0.00	0.00	0.00	-0.82	-11.27	0.00	11.27	
5	LAYBARGE	48.24	4.01	0.00	19.91	0.00	0.00	0.00	-2.92	-15.34	0.00	15.34	
7	TENSIONR	38.11	3.73	0.00	12.58	0.00	0.00	0.00	167.07	-5.64	0.00	5.64	
9	LAYBARGE	33.44	3.61	0.00	8.79	0.00	0.00	0.00	167.19	-3.01	0.00	3.01	
11	TENSIONR	26.66	3.45	0.00	11.42	0.00	0.00	0.00	265.79	-2.73	0.00	2.73	
13	LAYBARGE	21.34	3.31	0.00	2.66	0.00	0.00	0.00	265.92	1.20	0.00	1.20	
15	LAYBARGE	12.16	2.99	0.00	48.10	0.00	0.00	0.00	265.39	-96.45	0.00	96.45	
17	LAYBARGE	-0.02	1.76	0.00	43.65	0.00	0.00	0.00	264.07	-92.25	0.00	92.25	
20	STINGER	-8.08	0.35	0.00	31.01	0.00	0.00	0.00	262.38	-75.06	0.00	75.06	
22	STINGER	-15.88	-1.45	0.00	31.37	0.00	0.00	0.00	260.86	-69.36	0.00	69.36	
24	STINGER	-23.59	-3.61	0.00	26.54	0.00	0.00	0.00	259.26	-55.83	0.00	55.83	
26	STINGER	-30.63	-5.84	0.00	29.32	0.00	0.02	0.00	257.56	-60.15	0.00	60.15	
28	STINGER	-36.59	-7.84	0.00	20.17	0.01	0.27	0.00	255.93	-52.86	0.00	52.86	
30	STINGER	-39.48	-8.82	0.00	0.00	0.02	0.88	0.00	255.13	32.80	-0.03	32.80	
32	SAGBEND	-41.28	-9.43	0.00	0.00	0.00	0.00	0.00	254.67	35.41	-0.02	35.41	
33	SAGBEND	-43.18	-10.06	0.00	0.00	0.00	0.00	0.00	254.16	38.54	-0.02	38.54	
34	SAGBEND	-45.08	-10.68	0.00	0.00	0.00	0.00	0.00	253.66	41.55	-0.01	41.55	
35	SAGBEND	-46.98	-11.28	0.00	0.00	0.00	0.00	0.00	253.17	44.74	-0.01	44.74	
36	SAGBEND	-48.89	-11.87	0.00	0.00	0.00	0.00	0.00	252.69	47.52	-0.01	47.52	
37	SAGBEND	-50.80	-12.45	0.00	0.00	0.00	0.00	0.00	252.23	49.42	0.01	49.42	
38	SAGBEND	-52.71	-13.01	0.00	0.00	0.00	0.00	0.00	251.78	51.80	0.01	51.80	
39	SAGBEND	-54.63	-13.58	0.00	0.00	0.00	0.00	0.00	251.34	53.49	-0.01	53.49	
40	SAGBEND	-56.55	-14.14	0.00	0.00	0.00	0.00	0.00	250.91	54.41	-0.01	54.41	
41	SAGBEND	-58.48	-14.68	0.00	0.00	0.00	0.00	0.00	250.50	56.22	-0.01	56.22	
42	SAGBEND	-60.41	-15.19	0.00	0.00	0.00	0.00	0.00	250.10	57.94	-0.01	57.94	
43	SAGBEND	-62.35	-15.67	0.00	0.00	0.00	0.00	0.00	249.71	59.09	-0.01	59.09	
44	SAGBEND	-64.29	-16.14	0.00	0.00	0.00	0.00	0.00	249.34	59.77	-0.01	59.77	
45	SAGBEND	-66.23	-16.60	0.00	0.00	0.00	0.00	0.00	248.99	60.08	-0.01	60.08	
46	SAGBEND	-68.18	-17.03	0.00	0.00	0.00	0.00	0.00	248.64	60.67	-0.01	60.67	
47	SAGBEND	-70.13	-17.46	0.00	0.00	0.00	0.00	0.00	248.32	61.02	-0.01	61.02	
48	SAGBEND	-72.08	-17.87	0.00	0.00	0.00	0.00	0.00	248.00	60.91	-0.01	60.91	
49	SAGBEND	-74.04	-18.26	0.00	0.00	0.00	0.00	0.00	247.71	60.35	-0.01	60.35	
50	SAGBEND	-76.00	-18.64	0.00	0.00	0.00	0.00	0.00	247.43	59.39	-0.01	59.39	
51	SAGBEND	-77.97	-19.01	0.00	0.00	0.00	0.00	0.00	247.16	58.10	-0.01	58.10	
52	SAGBEND	-79.94	-19.36	0.00	0.00	0.00	0.00	0.00	246.91	57.12	-0.01	57.12	
53	SAGBEND	-81.91	-19.69	0.00	0.00	0.00	0.00	0.00	246.68	57.02	-0.01	57.02	
54	SAGBEND	-83.89	-20.00	0.00	0.00	0.00	0.00	0.00	246.46	57.33	-0.01	57.33	
55	SAGBEND	-85.86	-20.30	0.00	0.00	0.00	0.00	0.00	246.26	57.35	-0.01	57.35	
56	SAGBEND	-87.84	-20.58	0.00	0.00	0.00	0.00	0.00	246.07	57.04	-0.01	57.04	
57	SAGBEND	-89.83	-20.84	0.00	0.00	0.00	0.00	0.00	245.90	56.39	-0.01	56.39	

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 2:12:44      PAGE 23

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MAXIMUM DYNAMIC PIPE FORCES AND STRESSES												
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NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACTION HORIZ (KN )	SUPT VERT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	BENDING MOMENTS		
										VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)
58	SAGBEND	-91.81	-21.08	0.00	0.00	0.00	0.00	0.00	245.75	55.36	-0.01	55.36
59	SAGBEND	-93.80	-21.30	0.00	0.00	0.00	0.00	0.00	245.61	54.63	-0.01	54.63
60	SAGBEND	-95.78	-21.51	0.00	0.00	0.00	0.00	0.00	245.50	54.10	0.01	54.10
61	SAGBEND	-97.77	-21.70	0.00	0.00	0.00	0.00	0.00	245.39	53.43	0.01	53.43
62	SAGBEND	-99.76	-21.88	0.00	0.00	0.00	0.00	0.00	245.31	52.73	0.01	52.73
63	SAGBEND	-101.75	-22.04	0.00	0.00	0.00	0.00	0.00	245.24	51.86	0.01	51.86
64	SAGBEND	-103.75	-22.18	0.00	0.00	0.00	0.00	0.00	245.19	50.54	0.01	50.54
65	SAGBEND	-105.74	-22.30	0.00	0.02	0.00	0.00	0.00	245.15	48.98	0.01	48.98
66	SAGBEND	-107.73	-22.40	0.00	0.72	0.00	0.00	0.00	245.13	47.52	0.01	47.52
67	SAGBEND	-109.73	-22.50	0.00	1.65	0.00	0.00	0.00	245.12	45.99	0.02	45.99
68	SAGBEND	-111.73	-22.58	0.00	2.14	0.00	0.00	0.00	245.14	44.41	0.02	44.41
69	SAGBEND	-113.72	-22.65	0.00	2.32	0.00	0.00	0.00	245.16	43.04	0.02	43.04
70	SAGBEND	-115.72	-22.72	0.00	2.40	0.00	0.00	0.00	245.20	41.71	0.02	41.71
71	SAGBEND	-117.72	-22.78	0.00	2.42	0.00	0.00	0.00	245.26	39.86	0.02	39.86
72	SAGBEND	-119.72	-22.83	0.00	2.43	0.00	0.00	0.00	245.32	38.13	0.02	38.13
73	SAGBEND	-121.72	-22.88	0.00	2.42	0.00	0.00	0.00	245.40	36.73	-0.02	36.73
74	SAGBEND	-123.72	-22.92	0.00	2.43	0.00	0.00	0.00	245.48	35.02	-0.02	35.02
75	SAGBEND	-125.72	-22.95	0.00	2.40	0.00	0.00	0.00	245.55	32.47	-0.01	32.47
76	SAGBEND	-127.72	-22.98	0.00	2.40	0.00	0.00	0.00	245.62	29.36	-0.01	29.36
77	SAGBEND	-129.72	-23.00	0.00	2.37	0.00	0.00	0.00	245.69	26.27	-0.01	26.27
78	SEABED	-131.72	-23.01	0.00	2.36	0.00	0.00	0.00	245.76	22.39	-0.01	22.39
79	SEABED	-133.72	-23.03	0.00	2.33	0.00	0.00	0.00	245.83	18.20	-0.01	18.20
80	SEABED	-135.72	-23.03	0.00	2.30	0.00	0.00	0.00	245.90	13.40	-0.01	13.40
81	SEABED	-137.72	-23.03	0.00	2.26	0.00	0.00	0.00	245.96	9.02	-0.01	9.02
82	SEABED	-139.72	-23.03	0.00	2.22	0.00	0.00	0.00	246.03	5.53	0.00	5.53
83	SEABED	-141.72	-23.03	0.00	2.20	0.00	0.00	0.00	246.09	3.00	0.00	3.00
84	SEABED	-143.72	-23.03	0.00	2.13	0.00	0.00	0.00	246.16	1.33	0.00	1.33
85	SEABED	-145.72	-23.03	0.00	2.05	0.00	0.00	0.00	246.22	-0.80	0.00	0.80
86	SEABED	-147.72	-23.03	0.00	1.99	0.00	0.00	0.00	246.28	-0.71	0.00	0.71
87	SEABED	-149.72	-23.03	0.00	1.94	0.00	0.00	0.00	246.35	-0.65	0.00	0.65
88	SEABED	-151.72	-23.03	0.00	1.89	0.00	0.00	0.00	246.41	-0.58	0.00	0.58
89	SEABED	-153.72	-23.03	0.00	1.86	0.00	0.00	0.00	246.47	-0.45	0.00	0.45
90	SEABED	-155.72	-23.03	0.00	1.84	0.00	0.00	0.00	246.53	-0.33	0.00	0.33
91	SEABED	-157.72	-23.03	0.00	1.83	0.00	0.00	0.00	246.59	-0.24	0.00	0.24
92	SEABED	-159.72	-23.03	0.00	1.83	0.00	0.00	0.00	246.64	-0.16	0.00	0.16
93	SEABED	-161.72	-23.03	0.00	1.83	0.00	0.00	0.00	246.70	-0.10	0.00	0.10
94	SEABED	-163.72	-23.03	0.00	1.83	0.00	0.00	0.00	246.76	-0.05	0.00	0.05
95	SEABED	-165.72	-23.03	0.00	1.83	0.00	0.00	0.00	246.81	0.03	0.00	0.03
96	SEABED	-167.72	-23.03	0.00	1.83	0.00	0.00	0.00	246.87	0.02	0.00	0.02
97	SEABED	-169.72	-23.03	0.00	1.83	0.00	0.00	0.00	246.92	0.01	0.00	0.01
98	SEABED	-171.72	-23.03	0.00	1.83	0.00	0.00	0.00	246.98	0.01	0.00	0.01
99	SEABED	-173.72	-23.03	0.00	0.00	0.00	0.00	0.00	247.03	0.00	0.00	0.00

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 24

STATIC PIPE ANALYSIS 8 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/ 2/2020 TIME - 2:12:44 CASE 1

=====

DYNAMIC SOLUTION SUMMARY

SEA STATE NUMBER ( 1)

=====

SEA STATE TYPE ..... WAVE SPECTRUM

NO. WAVE COMPONENTS .. 20

WAVE WATER DEPTH ..... 23.0 M

MAX. WAVE FREQUENCY .. 3.0015 RA/S

SPECTRUM START TIME .. 0. SECS

RAO SIGN CONVENTION .. BENTLEY MOSES

VESSEL RESPONSE TYPE . TABLE OF RAOS  
 WAVE TRAVEL DIRECTION 0.000 DEG  
 MIN. WAVE FREQUENCY .. 0.1001 RA/S  
 RANDOM PHASE SEED .... 0  
 NO. RAOS IN TABLE .... 30

SEA STATE DEFINITION

=====

WAVE SPECTRUM TYPE ... JONSWAP (CLASSIC)  
 JONSWAP COEFFICIENT .. 0.012891 JONSWAP PEAK FACTOR .. 5.000  
 PEAK WAVE FREQUENCY .. 0.9498 RA/S

CALCULATED WAVE HEIGHTS

=====

SIGNIFICANT WAVE HT. . . 2.918 M AVERAGE WAVE HEIGHT .. 1.874 M  
 MAXIMUM WAVE HEIGHT .. 5.385 M RMS WAVE HEIGHT ..... 2.085 M  
 TOTAL NUMBER OF WAVES 1913

===== SOLUTION SUMMARY =====

NODE	PIPE	X	Y	Z	SUPPORT	REACT	TOTAL	TOTAL	PCT
NO.	SECTION	COORD	COORD	COORD	VERT	HORIZ	MOMENT	STRESS	YLD
		(M)	(M)	(M)	(KN)	(KN)	(KN-M)	(MPA)	(%)
=====									

1 LAYBARGE	64.2	4.4	0.0	0.7	0.0	0.1	0.3	0.
3 LAYBARGE	59.7	4.3	0.0	16.7	0.0	11.3	28.1	8.
5 LAYBARGE	48.2	4.0	0.0	19.9	0.0	15.3	38.2	11.
7 TENSIONR	38.1	3.7	0.0	12.6	0.0	5.6	34.0	9.
9 LAYBARGE	33.4	3.6	0.0	8.8	0.0	3.0	27.6	8.
11 TENSIONR	26.7	3.4	0.0	11.4	0.0	2.7	38.9	11.
13 LAYBARGE	21.3	3.3	0.0	2.7	0.0	1.2	34.4	10.
15 LAYBARGE	12.2	3.0	0.0	48.1	0.0	96.5	271.7	75.
17 LAYBARGE	0.0	1.8	0.0	43.7	0.0	92.3	260.5	72.
20 STINGER	-8.1	0.4	0.0	31.0	0.0	75.1	216.6	60.
22 STINGER	-15.9	-1.5	0.0	31.4	0.0	69.4	202.5	56.
24 STINGER	-23.6	-3.6	0.0	26.5	0.0	55.8	169.3	47.
26 STINGER	-30.6	-5.8	0.0	29.3	0.0	60.2	178.4	50.
28 STINGER	-36.6	-7.8	0.0	20.2	0.0	52.9	153.9	43.
30 STINGER	-39.5	-8.8	0.0	0.0	0.0	32.8	111.8	31.
46 SAGBEND	-68.2	-17.0	0.0	0.0	0.0	60.7	174.6	48.
69 SAGBEND	-113.7	-22.7	0.0	2.3	0.0	43.0	127.7	35.



**LAMPIRAN ANALISA DINAMIS PADA PIPA 10 INCH  
HEADING 0°**

```

MMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
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MMMMMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMM  MMMMMMMMMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM

```

```

*****
*
*           O F F P I P E - 3 -- OFFSHORE PIPELINE ANALYSIS SYSTEM
*
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*
*           VERSION NO. - 3.02EX
*           RELEASED ON - 03/08/2016
*           LICENSED TO - PT Timas Suplindo
*
*****
*
* OFFPIPE IS A NONLINEAR, 3-DIMENSIONAL FINITE ELEMENT METHOD BASED PROGRAM FOR THE
* STATIC AND DYNAMIC ANALYSIS OF PROBLEMS ARISING IN THE DESIGN OF MARINE PIPELINES.
* THIS VERSION OF OFFPIPE MAY BE USED FOR THE ANALYSIS OF OFFSHORE PIPELAYING OPER-
* ATIONS, DAVIT LIFTS, PIPELINES LYING ON AN UNEVEN SEABED, AND RISERS.
*
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*
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*           6554 AUDEN                 FACSIMILE: (713) 664-0962
*           HOUSTON, TEXAS 77005
*           U.S.A.                     EMAIL: SUPPORT@OFFPIPE.COM
*
*****

```

```

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 3
STATIC PIPE ANALYSIS 10 INCH
JOB NO. - LAYING           LICENSED BY - PT Timas Suplindo
USER ID - IK              DATE - 5/2/2020 TIME - 2:34:53           CASE 1
=====

```

INPUT DATA ECHO

```

=====
PRINTED OUTPUT SELECTED
=====
STATIC PIPE FORCES AND STRESSES ... YES
STATIC SOLUTION SUMMARY ..... YES
DYNAMIC PIPE FORCES AND STRESSES .. NO
DYNAMIC RANGE OF PIPE DATA ..... NO
DYNAMIC TRACKING OF PIPE DATA ..... NO
OVERBEND PIPE SUPPORT GEOMETRY .... NO
STINGER BALLAST SCHEDULE DATA ..... NO
SUPPORT REACTIONS IN BARGE COORDS . NO

INTERNAL FORCES IN PIPE & CABLE ... NO
INTERNAL FORCES IN STINGER ..... NO
PRINT PIPE STRAINS IN OUTPUT ..... NO
DNV OS-F101 COMPLIANCE REPORT ..... NO
API RP-1111 COMPLIANCE REPORT ..... NO
PRINT DNV/API FACTORS & PARAMETERS NO
USE THICK WALL HOOP STRESS EQN. ... NO
USE DNV 1981 FOR TOTAL PIPE STRESS NO

ENABLE/DISABLE WARNING MESSAGES ... ENABLE
GENERATE SPREAD SHEET PLOT FILE ... NO
GENERATE ASCII PLOT DATA FILES .... NO

```

PROFILE PLOT TABLE ENTRIES

```
=====
PLOT TABLE INDEX ..... 1
PLOT NUMBER ..... 1
PLOT TYPE OPTION NUMBER ..... 1
DYNAMIC PROFILE TIME POINT ..... 0.000
DYNAMIC PROFILE TIME INCREMENT .... 0.000
ORDINATE PARAMETER CODE NUMBER .... 2
AXIS LABEL FOR ORDINATE ..... "PIPE ELEVATION Y COORDINATE  "
ABSCISSA PARAMETER CODE NUMBER .... 1
AXIS LABEL FOR ABSCISSA ..... "PIPE HORIZONTAL X COORDINATE  "

PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS  "
MINIMUM VERTICAL AXIS RANGE ..... 0.000
MAXIMUM VERTICAL AXIS RANGE ..... 0.000
MINIMUM HORIZONTAL AXIS RANGE ..... 0.000
MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000
=====
```

```
=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 4
STATIC PIPE ANALISYS 10 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 5/2/2020 TIME - 2:34:53 CASE 1
=====
```

INPUT DATA ECHO

PROFILE PLOT TABLE ENTRIES

```
=====
PLOT TABLE INDEX ..... 2
PLOT NUMBER ..... 1
PLOT TYPE OPTION NUMBER ..... 1
DYNAMIC PROFILE TIME POINT ..... 0.000
DYNAMIC PROFILE TIME INCREMENT .... 0.000
ORDINATE PARAMETER CODE NUMBER .... 15
AXIS LABEL FOR ORDINATE ..... "DNV YIELD STRESS PERCENTAGE  "
ABSCISSA PARAMETER CODE NUMBER .... 1
AXIS LABEL FOR ABSCISSA ..... "PIPELINE HORIZONTAL X COORDINATE"

PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS  "
MINIMUM VERTICAL AXIS RANGE ..... 0.000
MAXIMUM VERTICAL AXIS RANGE ..... 0.000
MINIMUM HORIZONTAL AXIS RANGE ..... 0.000
MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000
=====
```

PIPE PROPERTIES

```
=====
PROPERTY TABLE ROW NUMBER ..... 1
PIPE SECTION LENGTH ..... 0.000 METERS
STEEL MODULUS OF ELASTICITY ..... 207000. M-PASCAL
STEEL CROSS SECTIONAL AREA ..... 103.822 CM^2
COATED PIPE AVG MOMENT OF INERTIA . 8817.56 CM^4
WEIGHT PER-UNIT-LENGTH IN AIR ..... 2022.01 N/M
WEIGHT PER-UNIT-LENGTH SUBMERGED .. 434.28 N/M
MAXIMUM ALLOWABLE PIPE STRAIN ..... 0.205000 PERCENT

STEEL OUTSIDE DIAMETER ..... 27.3050 CM
STEEL WALL THICKNESS ..... 1.2700 CM
YIELD STRESS ..... 360.00 M-PASCAL
STRESS/STRAIN INTENSE FACTOR ..... 0.0000
HYDRODYNAMIC OUTSIDE DIAMETER ..... 0.000 CM
DRAG COEFFICIENT ..... 0.0000
HYDRODYNAMIC TOTAL AREA ..... 0.000 CM^2
ADDED MASS COEFFICIENT ..... 0.0000
POISSON'S RATIO ..... 0.3000
COEFFICIENT OF THERMAL EXPANSION .. 0.00001100 1/DEG C
=====
```

```
=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 5
STATIC PIPE ANALISYS 10 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 5/2/2020 TIME - 2:34:53 CASE 1
=====
```

INPUT DATA ECHO

PIPE COATING PROPERTIES

```
=====
PIPE PROPERTY TABLE INDEX ..... 1
CORROSION COATING THICKNESS ..... 0.320 CM
CORROSION COATING WEIGHT DENSITY .. 9339.1 N/M^3
CORROSION COATING ELASTIC MODULUS . 0.000 M-PASCAL
CONCRETE COATING THICKNESS ..... 4.000 CM
CONCRETE COATING WEIGHT DENSITY ... 29822. N/M^3
CONCRETE COATING ELASTIC MODULUS .. 0.000 M-PASCAL
DESIRED PIPE SPECIFIC GRAVITY ..... 0.0000
CONCRETE STIFFENING EFFECTIVENESS . 0.000
NO NOT CALC. STRESS FOR BARE PIPE . NO
=====
```

AVERAGE LENGTH OF PIPE JOINT ..... 12.200 METERS  
 EFFECTIVE FIELD JOINT LENGTH ..... 0.300 METERS  
 FIELD JOINT FILL WEIGHT DENSITY ... 10055.3 N/M^3  
 FIELD JOINT FILL ELASTIC MODULUS... 0.000 M-PASCAL  
 FIELD JOINT STIFFENING EFFECT. .... 0.000  
 FIELD JOINT BENDING MODEL ..... 0 IGNORE COATING STIFFNESS  
 WEIGHT DENSITY OF STEEL ..... 77008. N/M^3  
 WEIGHT DENSITY OF PIPE CONTENTS ... 0.0 N/M^3  
 REF. ELEVATION FOR STATIC HEAD .... 0.00 METERS  
 FREE FLOOD PIPE DURING PIPELAY ... NO

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 6  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:34:53 CASE 1  
 =====

INPUT DATA ECHO

PIPELAY VESSEL DESCRIPTION

=====  
 NUMBER OF PIPE NODES ..... 9  
 BARGE GEOMETRY SPECIFIED BY ..... 1 X-Y COORDINATES  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.000 METERS  
 ADJUST Y COORDINATES MANUALLY .... NO  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 PIPE ANGLE RELATIVE TO DECK ..... 0.0000 DEGREES  
 HEIGHT OF DECK ABOVE WATER ..... 2.400 METERS  
 LAYBARGE FORWARD (X) OFFSET ..... 0.000 METERS  
 BARGE TRIM ANGLE ..... 0.5000 DEGREES  
  
 STERN SHOE X COORDINATE ..... 0.000 METERS  
 STERN SHOE Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER X COORDINATE ..... 43.820 METERS  
 ROTATION CENTER Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER Z COORDINATE ..... 6.370 METERS  
 BARGE HEADING ..... 0.0000 DEGREES  
 BARGE OFFSET FROM RIGHT-OF-WAY .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT VERTICAL ANGLE ... 0.000 DEGREES  
 PIPE RAMP PIVOT Z COORDINATE ..... 0.000 METERS  
 PIPE RAMP HEADING ON DECK ..... 0.000 DEGREES  
 ROLE OF ALTERNATE WAVE ORIGIN .... 0 MOTIONS & WAVES AT CENTER OF MOTION  
 WAVE PHASE ORIGIN X COORDINATE ... 0.000  
 WAVE PHASE ORIGIN Y COORDINATE ... 0.000 METERS  
 WAVE PHASE ORIGIN Z COORDINATE ... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE .....

NODE X COORD (M )	NODE Y COORD (M )	SUPPORT TYPE	DAVIT SPACING (M )
64.220	1.838	1 SIMPLE SUPPORT	0.000
59.740	1.760	1 SIMPLE SUPPORT	0.000
48.240	1.560	1 SIMPLE SUPPORT	0.000
38.110	1.383	2 PIPE TENSIONER	0.000
33.440	1.302	1 SIMPLE SUPPORT	0.000
26.660	1.183	2 PIPE TENSIONER	0.000
21.340	1.092	7 USER DEFINED SPT	0.000
12.150	0.860	7 USER DEFINED SPT	0.000
-0.040	-0.260	8 USER DEFINED SPT	0.000

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 7  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:34:53 CASE 1  
 =====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====  
 SUPPORT PROPERTY TABLE INDEX ..... 2  
 SUPPORT ELEMENT TYPE ..... 2 TENSIONER  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
  
 BOTTOM ROLLER ANGLE TO HORIZONTAL . 0.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES

SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 7  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 1.600 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 8  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 2:34:53 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 8  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

STINGER DESCRIPTION

=====

NUMBER OF PIPE/STINGER NODES ..... 6  
 STINGER GEOMETRY SPECIFIED BY ..... 2 X-Y COORD AND MATCH PT  
 STINGER TYPE ..... 1 FIXED GEOMETRY OR RAMP  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.00 METERS  
 HITCH X-COORDINATE ..... 0.497 METERS  
 HITCH Y-COORDINATE ..... -1.800 METERS  
 HITCH ANGULAR ORIENTATION ..... 0.000 DEGREES

X COORDINATE OF LOCAL ORIGIN ..... 0.497 METERS  
 Y COORDINATE OF LOCAL ORIGIN ..... -1.800 METERS  
 ROTATION ABOUT STINGER HITCH ..... 13.500 DEGREES  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 TANGENT POINT ANGLE ..... 0.000 DEGREES

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	ELEMENT TYPE	ELEMENT LENGTH ( M )
-8.325	2.209	1 SIMPLE SUPPORT	2 HINGED END	0.000
-16.325	2.349	1 SIMPLE SUPPORT	1 FIXED END	0.000
-24.325	2.119	1 SIMPLE SUPPORT	1 FIXED END	0.000
-31.699	1.660	1 SIMPLE SUPPORT	1 FIXED END	0.000
-37.949	1.069	1 SIMPLE SUPPORT	1 FIXED END	0.000
-40.949	0.350	1 SIMPLE SUPPORT	1 FIXED END	0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 9  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 2:34:53 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

```

=====
SUPPORT PROPERTY TABLE INDEX ..... 1
SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT
SUPPORT INITIAL STATE FLAG ..... 0
TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M
VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M
STATIC VERTICAL DEFLECTION ..... 0.0000 CM
LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES
SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES
SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS
BED ROLLER LENGTH ..... 1.640 METERS
HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS
TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
    
```

CURRENT VELOCITIES

```

=====
WATER DEPTH (M ) CURRENT SPEED (M/S ) DIRECTION OF TRAVEL (DEG )
=====
0.000 0.790 0.000
11.500 0.480 0.000
23.000 0.420 0.000
    
```

PIPE TENSION DATA

```

=====
STATIC PIPE TENSION ON LAY VESSEL . 196.133 K-NEWTON
MINIMUM DYNAMIC PIPE TENSION ..... 196.133 K-NEWTON
MAXIMUM DYNAMIC PIPE TENSION ..... 264.553 K-NEWTON
STATIC HORIZONTAL BOTTOM TENSION .. 0.000 K-NEWTON
NO. OF VALUES FOR TENSION PROFILE . 0
VALUES ARE FOR PIPE SPAN ANALYSIS . NO
MAXIMUM PIPE PAYOUT SPEED ..... 0.000 M/SEC
MAXIMUM PIPE TAKEUP SPEED ..... 0.000 M/SEC
    
```

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 10

STATIC PIPE ANALYSIS 10 INCH

JOB NO. - LAYING

LICENSED BY - PT Timas Suplindo

USER ID - IK

DATE - 5/ 2/2020 TIME - 2:34:53

CASE 1

=====  
INPUT DATA ECHO

SAGBEND GEOMETRY

```

=====
SAGBEND PIPE ELEMENT LENGTH ..... 2.000 METERS
WATER DEPTH ..... 23.00 METERS
X-COORDINATE AT SPECIFIED DEPTH . . 0.00 METERS
ESTIMATED SAGBEND X LENGTH ..... 0.00 METERS
ESTIMATED PIPE LENGTH ON SEABED ... 0.00 METERS
X-COORD OF PIPE FREE END ON SEABED 0.00 METERS
X-COORD POINT OF FIXITY ON SEABED . 0.00 METERS
MAXIMUM SLOPE (ANGLE) OF SEABED ... 0.000 DEGREES
DIRECTION OF MAXIMUM SLOPE ..... 0.000 DEGREES

PIPE/CABLE SPAN END CONDITION ..... 0 PIPE/CABLE RESTING ON SEABED
PIPE/CABLE SPAN LENGTH GIVEN BY ... 0 SPECIFIED PIPE/CABLE TENSION
ESTIMATED SPAN DEPTH AT FREE END .. 0.00 METERS
PIPE VERTICAL ANGLE AT FREE END ... 0.000 DEGREES
BOTTOM HINGE OFFSET ..... 0.000 METERS
BOTTOM HINGE MINIMUM ANGLE ..... 0.000 DEGREES
BOTTOM HINGE MAXIMUM ANGLE ..... 0.000 DEGREES
    
```

SOIL ELEMENT PROPERTIES

```

=====
SOIL PROPERTY TABLE ROW INDEX ..... 1
SOIL ELEMENT TYPE (FUTURE USE) .... 0
PIPE INDEX OR SEGMENT NUMBER ..... 0
LONGITUDINAL SOIL STIFFNESS ..... 0.00 KN/M^2
VERTICAL SOIL STIFFNESS ..... 0.00 KN/M^2
LATERAL SOIL STIFFNESS ..... 0.00 KN/M^2
DEFLECTION UNDER REFERENCE LOAD ... 0.0000 CM

LONGITUDINAL COEF. OF FRICTION .... 0.000
LATERAL COEFFICIENT OF FRICTION ... 0.600
NUMBER OF INTEGRATION POINTS ..... 0
    
```

TIME INTEGRATION PARAMETERS

```

=====
TIME STEP LENGTH ..... 0.2000 SECONDS
MAXIMUM TIME OF INTEGRATION ..... 10860.000 SECONDS
SOLUTION SAMPLING TIME STEP ..... 0.400 SECONDS
    
```

SOLUTION SAMPLING STARTS AT TIME .. 60.000 SECONDS  
 DAMPING RATIO ..... 0.0000  
 NUMBER OF VARIABLE TIME STEPS ..... 0

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 11  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:34:53 CASE 1

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INPUT DATA ECHO

WAVE PARAMETERS

=====

SEA STATE ROW INDEX ..... 1  
 WAVE HEIGHT (PEAK TO TROUGH) ..... 1.800 METERS  
 WAVE PERIOD ..... 6.300 SECONDS  
 WAVE DIRECTION OF TRAVEL ..... 0.000 DEGREES  
 WATER DEPTH FOR WAVE CALCULATIONS .. 23.00 METERS  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0

WAVE SPECTRUM EQUATION

=====

SEA STATE ROW INDEX ..... 1  
 WAVE SPECTRUM EQUATION TYPE ..... 7 JONSWAP (CLASSIC)  
 NUMBER OF WAVES IN SPECTRUM ..... 20  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0  
 MINIMUM PERIOD IN SPECTRUM ..... 2.0933 SECONDS  
 MAXIMUM PERIOD IN SPECTRUM ..... 62.8000 SECONDS  
 START TIME FOR WAVE SPECTRUM ..... 0. SECONDS  
 DIRECTION OF WAVE TRAVEL ..... 0.000 DEGREES  
 1ST JONSWAP COEF. (ALPHA) ..... 0.012891  
 2ND JONSWAP COEF. (GAMMA) ..... 5.0000  
 PEAK WAVE PERIOD ..... 6.6150 SECONDS

VESSEL MOTION RAO TABLE

=====

SEA STATE NUMBER ..... 1  
 USE PHASE LAG FOR RAOs ..... NO  
 VESSEL MOTIONS SIGN CONVENTION .... 2 BENTLEY MOSES  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD

WAVE PERIOD (SECONDS)	----- SURGE AMPLITUDE (M/M )	----- / PHASE (DEG)	----- SWAY AMPLITUDE (M/M )	----- / PHASE (DEG)	----- HEAVE AMPLITUDE (M/M )	----- / PHASE (DEG)
2.0900	0.0030	171.00	0.0000	0.00	0.0030	65.00
2.1700	0.0040	-131.00	0.0000	0.00	0.0030	74.00
2.2400	0.0040	-55.00	0.0000	0.00	0.0020	73.00
2.3300	0.0040	37.00	0.0000	0.00	0.0050	57.00
2.4200	0.0050	135.00	0.0000	0.00	0.0070	63.00
2.5100	0.0070	-119.00	0.0000	0.00	0.0070	81.00
2.6200	0.0080	-16.00	0.0000	0.00	0.0050	57.00
2.7300	0.0070	127.00	0.0000	0.00	0.0100	57.00
2.8500	0.0140	-101.00	0.0000	0.00	0.0080	89.00
2.9900	0.0090	17.00	0.0000	0.00	0.0080	32.00
3.1400	0.0190	-146.00	0.0000	0.00	0.0140	77.00
3.3100	0.0170	-35.00	0.0000	0.00	0.0050	17.00

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 12  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:34:53 CASE 1

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WAVE PERIOD	----- ROLL AMPLITUDE	----- / PHASE	----- PITCH AMPLITUDE	----- / PHASE	----- YAW AMPLITUDE	----- / PHASE
3.4900	0.0280	-158.00	0.0000	0.00	0.0190	71.00
3.7000	0.0200	-44.00	0.0000	0.00	0.0050	-17.00
3.9300	0.0490	-148.00	0.0000	0.00	0.0220	82.00
4.1900	0.0060	30.00	0.0000	0.00	0.0160	-10.00
4.4900	0.0730	-120.00	0.0000	0.00	0.0190	117.00
4.8300	0.0670	165.00	0.0000	0.00	0.0380	25.00
5.2400	0.0320	-67.00	0.0000	0.00	0.0140	-60.00
5.7100	0.1400	-135.00	0.0000	0.00	0.0730	69.00
6.2800	0.1610	168.00	0.0000	0.00	0.1630	23.00
6.9800	0.0610	115.00	0.0000	0.00	0.1010	-20.00
7.8500	0.1350	-101.00	0.0000	0.00	0.1420	159.00
8.9700	0.3680	-141.00	0.0000	0.00	0.4230	119.00
10.4700	0.5800	-176.00	0.0000	0.00	0.6670	88.00
12.5600	0.7420	155.00	0.0000	0.00	0.8370	62.00
15.7000	0.8470	131.00	0.0000	0.00	0.9370	40.00
20.9300	0.9050	113.00	0.0000	0.00	0.9840	23.00
31.4000	0.9320	100.00	0.0000	0.00	1.0000	10.00
62.8000	0.9420	93.00	0.0000	0.00	1.0030	3.00

=====

(SECONDS)	(DEG/M)	(DEG)	(DEG/M)	(DEG)	(DEG/M)	(DEG)
2.0900	0.0000	0.00	0.0120	57.00	0.0000	0.00
2.1700	0.0000	0.00	0.0150	53.00	0.0000	0.00
2.2400	0.0010	84.00	0.0150	58.00	0.0000	0.00
2.3300	0.0000	0.00	0.0230	75.00	0.0000	0.00
2.4200	0.0000	0.00	0.0180	70.00	0.0000	0.00
2.5100	0.0000	0.00	0.0270	50.00	0.0000	0.00
2.6200	0.0000	0.00	0.0360	69.00	0.0000	0.00
2.7300	0.0000	0.00	0.0240	78.00	0.0000	0.00
2.8500	0.0000	0.00	0.0410	44.00	0.0000	0.00
2.9900	0.0000	0.00	0.0450	82.00	0.0000	0.00
3.1400	0.0000	0.00	0.0310	27.00	0.0000	0.00
3.3100	0.0000	0.00	0.0660	73.00	0.0000	0.00
3.4900	0.0000	0.00	0.0250	13.00	0.0000	0.00
3.7000	0.0000	0.00	0.0830	75.00	0.0000	0.00
3.9300	0.0000	0.00	0.0500	-3.00	0.0000	0.00
4.1900	0.0000	0.00	0.0840	96.00	0.0000	0.00
4.4900	0.0000	0.00	0.1200	17.00	0.0000	0.00
4.8300	0.0000	0.00	0.0050	95.00	0.0000	0.00
5.2400	0.0000	0.00	0.2020	46.00	0.0000	0.00
5.7100	0.0000	0.00	0.2890	-9.00	0.0000	0.00
6.2800	0.0010	51.00	0.1090	61.00	0.0000	0.00
6.9800	0.0010	122.00	0.8730	74.00	0.0000	0.00

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 13  
 STATIC PIPE ANALYSIS 10 INCH  
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 USER ID - IK DATE - 5/ 2/2020 TIME - 2:34:53 CASE 1

INPUT DATA ECHO

7.8500	0.0000	0.00	1.5880	48.00	0.0000	0.00
8.9700	0.0000	0.00	1.8500	20.00	0.0000	0.00
10.4700	0.0000	0.00	1.7060	-6.00	0.0000	0.00
12.5600	0.0000	0.00	1.3390	-31.00	0.0000	0.00
15.7000	0.0000	0.00	0.9100	-52.00	0.0000	0.00
20.9300	0.0000	0.00	0.5250	-69.00	0.0000	0.00
31.4000	0.0000	0.00	0.2350	-83.00	0.0000	0.00
62.8000	0.0000	0.00	0.0600	-99.00	0.0000	0.00

\*\*\*\*\* INFORMATIVE MESSAGE NO. - 94 \*\*\*\*\*

One or more of the phase angles in the RAO table have been adjusted to minimize the difference in value between adjacent angles. If the phase angles are arbitrarily restricted by the software used to calculate the RAOs to a fixed range of values such as (0 to 2\*PI) or (-PI to +PI), then phase angles that are actually close in value can differ by as much as 2\*PI. These large differences can cause the phase angles for RAOs that are between the values in the table (which must be determined using interpolation) to be calculated incorrectly.

CONTROL SWITCHES

MAX NUMBER STATIC ITERATIONS ..... 500  
 MAX DYNAMIC ITERATIONS PER STEP ... 500  
 BOUNDARY CONDITION LOGIC PARAMETER 5  
 TIME STEP STABILITY PARAMETER ..... 0  
 TYPE OF ANALYSIS ..... DYNAMIC  
 NUMBER OF PROBLEM DIMENSIONS ..... 3  
 DAVIT LIFT ANALYSIS ..... NO

STATIC SOLUTION CONVERGED IN ( 40 ) ITERATIONS

END OF INPUT DATA

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 2:34:53 PAGE 14  
 PROJECT - STATIC PIPE ANALYSIS 10 INCH JOB NO. - LAYING  
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES (MPA)		TOTAL STRESS (MPA)	PERCENT YIELD (PCT)
1	LAYBARGE	64.20	4.42	0.00	0.000	1.482	0.00	0.00	0.00	0.23	0.00	0.23	0.07
3	LAYBARGE	59.72	4.30	0.00	0.000	1.554	4.48	-0.02	0.00	-20.12	0.00	20.14	5.60
5	LAYBARGE	48.23	4.00	0.00	0.000	1.477	15.98	-0.08	0.00	-28.57	0.00	28.66	7.96
7	TENSIONR	38.10	3.73	0.00	0.000	1.453	26.11	9.31	0.00	-9.48	0.00	18.79	5.22
9	LAYBARGE	33.43	3.61	0.00	0.000	1.531	30.78	9.28	0.00	-9.06	0.00	18.34	5.10
11	TENSIONR	26.65	3.43	0.00	0.000	1.446	37.57	18.69	0.00	5.49	0.00	24.18	6.72
13	LAYBARGE	21.33	3.30	0.00	0.000	1.400	42.89	18.66	0.00	-7.74	0.00	26.40	7.33
15	LAYBARGE	12.14	2.98	0.00	0.000	3.342	52.08	18.53	0.00	-243.96	0.00	262.49	72.91



17	LAYBARGE	-0.04	1.76	0.00	0.000	8.131	64.32	18.29	0.00	-239.24	0.00	257.53	71.54
20	STINGER	-8.10	0.35	0.00	0.000	11.550	72.51	18.04	0.00	-208.75	0.00	226.79	63.00
22	STINGER	-15.89	-1.45	0.00	0.000	14.262	80.51	17.86	-0.16	-143.30	0.00	161.23	44.79
24	STINGER	-23.62	-3.53	0.00	0.000	15.582	88.51	17.67	-0.38	-30.33	0.00	48.20	13.39
26	STINGER	-30.74	-5.52	0.00	0.000	15.616	95.90	17.48	-0.60	19.62	0.00	37.40	10.39
28	STINGER	-36.79	-7.20	0.00	0.000	15.216	102.19	17.31	-0.78	40.96	0.00	58.66	16.30
30	STINGER	-39.69	-7.98	0.00	0.000	14.947	105.19	17.23	-0.86	47.33	0.00	65.00	18.06
32	SAGBEND	-41.70	-8.51	0.00	0.000	14.739	107.27	17.18	-0.92	50.78	0.00	68.42	19.01
33	SAGBEND	-43.64	-9.02	0.00	0.000	14.527	109.27	17.13	-0.97	53.49	0.00	71.12	19.75
34	SAGBEND	-45.58	-9.52	0.00	0.000	14.306	111.27	17.08	-1.03	55.74	0.00	73.34	20.37
35	SAGBEND	-47.52	-10.01	0.00	0.000	14.076	113.27	17.03	-1.08	57.59	0.00	75.17	20.88
36	SAGBEND	-49.46	-10.49	0.00	0.000	13.839	115.27	16.99	-1.13	59.13	0.00	76.69	21.30
37	SAGBEND	-51.40	-10.96	0.00	0.000	13.596	117.27	16.94	-1.18	60.41	0.00	77.95	21.65
38	SAGBEND	-53.34	-11.43	0.00	0.000	13.349	119.27	16.89	-1.24	61.48	0.00	79.00	21.94
39	SAGBEND	-55.29	-11.89	0.00	0.000	13.098	121.27	16.85	-1.28	62.38	0.00	79.88	22.19
40	SAGBEND	-57.24	-12.34	0.00	0.000	12.843	123.27	16.80	-1.33	63.13	0.00	80.61	22.39
41	SAGBEND	-59.19	-12.78	0.00	0.000	12.586	125.27	16.76	-1.38	63.77	0.00	81.23	22.56
42	SAGBEND	-61.14	-13.21	0.00	0.000	12.326	127.27	16.72	-1.43	64.32	0.00	81.76	22.71
43	SAGBEND	-63.10	-13.63	0.00	0.000	12.064	129.27	16.68	-1.47	64.78	0.00	82.21	22.83
44	SAGBEND	-65.06	-14.04	0.00	0.000	11.800	131.27	16.63	-1.52	65.18	0.00	82.59	22.94
45	SAGBEND	-67.01	-14.45	0.00	0.000	11.535	133.27	16.59	-1.56	65.53	0.00	82.92	23.03
46	SAGBEND	-68.97	-14.84	0.00	0.000	11.269	135.27	16.56	-1.60	65.83	0.00	83.20	23.11
47	SAGBEND	-70.94	-15.23	0.00	0.000	11.001	137.27	16.52	-1.65	66.10	0.00	83.45	23.18
48	SAGBEND	-72.90	-15.61	0.00	0.000	10.732	139.27	16.48	-1.69	66.34	0.00	83.67	23.24
49	SAGBEND	-74.87	-15.97	0.00	0.000	10.463	141.27	16.44	-1.73	66.54	0.00	83.87	23.30
50	SAGBEND	-76.83	-16.33	0.00	0.000	10.193	143.27	16.41	-1.77	66.73	0.00	84.04	23.34
51	SAGBEND	-78.80	-16.68	0.00	0.000	9.922	145.27	16.37	-1.80	66.90	0.00	84.19	23.39
52	SAGBEND	-80.78	-17.02	0.00	0.000	9.650	147.27	16.34	-1.84	67.05	0.00	84.33	23.43
53	SAGBEND	-82.75	-17.35	0.00	0.000	9.378	149.27	16.31	-1.88	67.19	0.00	84.46	23.46
54	SAGBEND	-84.72	-17.67	0.00	0.000	9.105	151.27	16.28	-1.91	67.32	0.00	84.57	23.49
55	SAGBEND	-86.70	-17.98	0.00	0.000	8.831	153.27	16.25	-1.94	67.44	0.00	84.67	23.52
56	SAGBEND	-88.67	-18.29	0.00	0.000	8.558	155.27	16.22	-1.98	67.54	0.00	84.76	23.55
57	SAGBEND	-90.65	-18.58	0.00	0.000	8.283	157.27	16.19	-2.01	67.64	0.00	84.85	23.57
58	SAGBEND	-92.63	-18.86	0.00	0.000	8.009	159.27	16.16	-2.04	67.72	0.00	84.92	23.59
59	SAGBEND	-94.61	-19.14	0.00	0.000	7.734	161.27	16.13	-2.07	67.80	0.00	84.99	23.61

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/2/2020      TIME - 2:34:53      PAGE 15

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	HORIZ ANGLE (DEG )	VERT ANGLE (DEG )	PIPE LENGTH (M )	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCT YIELD (PCT)
=====													
60	SAGBEND	-96.60	-19.40	0.00	0.000	7.459	163.27	16.11	-2.10	67.87	0.00	85.04	23.62
61	SAGBEND	-98.58	-19.66	0.00	0.000	7.183	165.27	16.08	-2.12	67.93	0.00	85.09	23.64
62	SAGBEND	-100.56	-19.90	0.00	0.000	6.908	167.27	16.06	-2.15	67.97	0.00	85.12	23.65
63	SAGBEND	-102.55	-20.14	0.00	0.000	6.632	169.27	16.03	-2.18	68.00	0.00	85.15	23.65
64	SAGBEND	-104.54	-20.36	0.00	0.000	6.356	171.27	16.01	-2.20	68.02	0.00	85.16	23.65
65	SAGBEND	-106.53	-20.58	0.00	0.000	6.080	173.27	15.99	-2.22	68.03	0.00	85.15	23.65
66	SAGBEND	-108.52	-20.79	0.00	0.000	5.804	175.27	15.97	-2.25	68.01	0.00	85.13	23.65
67	SAGBEND	-110.51	-20.98	0.00	0.000	5.528	177.27	15.95	-2.27	67.98	0.00	85.09	23.63
68	SAGBEND	-112.50	-21.17	0.00	0.000	5.253	179.27	15.93	-2.29	67.92	0.00	85.02	23.62
69	SAGBEND	-114.49	-21.35	0.00	0.000	4.977	181.27	15.91	-2.31	67.83	0.00	84.92	23.59
70	SAGBEND	-116.48	-21.52	0.00	0.000	4.702	183.27	15.90	-2.33	67.70	0.00	84.79	23.55
71	SAGBEND	-118.48	-21.68	0.00	0.000	4.428	185.27	15.88	-2.34	67.53	0.00	84.61	23.50
72	SAGBEND	-120.47	-21.83	0.00	0.000	4.155	187.27	15.87	-2.36	67.31	0.00	84.38	23.44
73	SAGBEND	-122.46	-21.97	0.00	0.000	3.882	189.27	15.85	-2.37	67.03	0.00	84.10	23.36
74	SAGBEND	-124.46	-22.10	0.00	0.000	3.611	191.27	15.84	-2.39	66.68	0.00	83.74	23.26
75	SAGBEND	-126.46	-22.22	0.00	0.000	3.341	193.27	15.83	-2.40	66.23	0.00	83.29	23.14
76	SAGBEND	-128.45	-22.33	0.00	0.000	3.074	195.27	15.82	-2.41	65.68	0.00	82.73	22.98
77	SAGBEND	-130.45	-22.44	0.00	0.000	2.809	197.27	15.81	-2.42	65.00	0.00	82.05	22.79
78	SAGBEND	-132.45	-22.53	0.00	0.000	2.546	199.27	15.80	-2.43	64.16	0.00	81.20	22.56
79	SAGBEND	-134.45	-22.61	0.00	0.000	2.288	201.27	15.79	-2.44	63.12	0.00	80.16	22.27
80	SAGBEND	-136.45	-22.69	0.00	0.000	2.035	203.27	15.78	-2.45	61.85	0.00	78.89	21.91
81	SAGBEND	-138.44	-22.76	0.00	0.000	1.787	205.27	15.78	-2.46	60.30	0.00	77.34	21.48
82	SAGBEND	-140.44	-22.81	0.00	0.000	1.546	207.27	15.77	-2.47	58.40	0.00	75.44	20.95
83	SAGBEND	-142.44	-22.86	0.00	0.000	1.314	209.27	15.77	-2.47	56.09	0.00	73.12	20.31
84	SAGBEND	-144.44	-22.91	0.00	0.000	1.092	211.27	15.76	-2.48	53.26	0.00	70.29	19.53
85	SAGBEND	-146.44	-22.94	0.00	0.000	0.882	213.27	15.76	-2.48	49.81	0.00	66.84	18.57
86	SAGBEND	-148.44	-22.97	0.00	0.000	0.689	215.27	15.76	-2.48	45.60	0.00	62.64	17.40
87	SAGBEND	-150.44	-22.99	0.00	0.000	0.514	217.27	15.76	-2.48	40.47	0.00	57.51	15.98
88	SEABED	-152.44	-23.00	0.00	0.000	0.362	219.27	15.76	-2.49	34.23	0.00	51.27	14.24
89	SEABED	-154.44	-23.01	0.00	0.000	0.237	221.27	15.75	-2.49	27.15	0.00	44.20	12.28
90	SEABED	-156.44	-23.02	0.00	0.000	0.141	223.27	15.75	-2.49	20.24	0.00	37.30	10.36
91	SEABED	-158.44	-23.02	0.00	0.000	0.072	225.27	15.75	-2.49	14.17	0.00	31.25	8.68
92	SEABED	-160.44	-23.03	0.00	0.000	0.025	227.27	15.76	-2.49	9.22	0.00	26.31	7.31
93	SEABED	-162.44	-23.03	0.00	0.000	-0.005	229.27	15.76	-2.49	5.43	0.00	22.54	6.26
94	SEABED	-164.44	-23.02	0.00	0.000	-0.021	231.27	15.76	-2.49	2.71	0.00	19.82	5.51
95	SEABED	-166.44	-23.02	0.00	0.000	-0.028	233.27	15.76	-2.49	0.87	0.00	18.00	5.00
96	SEABED	-168.44	-23.02	0.00	0.000	-0.029	235.27	15.76	-2.49	-0.27	0.00	17.40	4.83
97	SEABED	-170.44	-23.02	0.00	0.000	-0.026	237.27	15.76	-2.49	-0.89	0.00	18.01	5.00
98	SEABED	-172.44	-23.02	0.00	0.000	-0.022	239.27	15.76	-2.49	-1.14	0.00	18.27	5.07

99	SEABED	-174.44	-23.02	0.00	0.000	-0.017	241.27	15.76	-2.49	-1.17	0.00	18.29	5.08
100	SEABED	-176.44	-23.02	0.00	0.000	-0.013	243.27	15.76	-2.49	-1.06	0.00	18.18	5.05
101	SEABED	-178.44	-23.02	0.00	0.000	-0.009	245.27	15.76	-2.49	-0.88	0.00	18.01	5.00
102	SEABED	-180.44	-23.02	0.00	0.000	-0.006	247.27	15.76	-2.49	-0.69	0.00	17.82	4.95
103	SEABED	-182.44	-23.02	0.00	0.000	-0.003	249.27	15.76	-2.49	-0.51	0.00	17.64	4.90

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX     DATE - 5/ 2/2020     TIME - 2:34:53     PAGE 16

PROJECT - STATIC PIPE ANALYSIS 10 INCH     JOB NO. - LAYING

USER ID - IK     LICENSED BY - PT Timas Suplindo     CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES														
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
NO	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	HORIZ ANGLE (DEG )	VERT ANGLE (DEG )	PIPE LENGTH (M )	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ STRESS (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)	
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	
104	SEABED	-184.44	-23.02	0.00	0.000	-0.002	251.27	15.76	-2.49	-0.35	0.00	17.48	4.86	
105	SEABED	-186.44	-23.02	0.00	0.000	0.000	253.27	15.76	-2.49	-0.22	0.00	17.36	4.82	
106	SEABED	-188.44	-23.02	0.00	0.000	0.000	255.27	15.76	-2.49	-0.13	0.00	17.26	4.80	
107	SEABED	-190.44	-23.02	0.00	0.000	0.001	257.27	15.76	-2.49	-0.06	0.00	17.19	4.78	
108	SEABED	-192.44	-23.02	0.00	0.000	0.001	259.27	15.76	-2.49	-0.02	0.00	17.15	4.76	
109	SEABED	-194.44	-23.02	0.00	0.000	0.001	261.27	15.76	-2.49	0.01	0.00	17.15	4.76	
110	SEABED	-196.44	-23.02	0.00	0.000	0.001	263.27	15.76	-2.49	0.03	0.00	17.16	4.77	
111	SEABED	-198.44	-23.02	0.00	0.000	0.001	265.27	15.76	-2.49	0.03	0.00	17.16	4.77	
112	SEABED	-200.44	-23.02	0.00	0.000	0.000	267.27	15.76	-2.49	0.03	0.00	17.16	4.77	
113	SEABED	-202.44	-23.02	0.00	0.000	0.000	269.27	15.76	-2.49	0.02	0.00	17.16	4.77	
114	SEABED	-204.44	-23.02	0.00	0.000	0.000	271.27	15.76	-2.49	0.02	0.00	17.15	4.76	
115	SEABED	-206.44	-23.02	0.00	0.000	0.000	273.27	15.76	-2.49	0.01	0.00	17.15	4.76	
116	SEABED	-208.44	-23.02	0.00	0.000	0.000	275.27	15.76	-2.49	0.01	0.00	17.14	4.76	
117	SEABED	-210.44	-23.02	0.00	0.000	0.000	277.27	15.76	-2.49	0.00	0.00	17.14	4.76	
118	SEABED	-212.44	-23.02	0.00	0.000	0.000	279.27	15.76	-2.49	0.00	0.00	17.14	4.76	

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX     DATE - 5/ 2/2020     TIME - 2:34:53     PAGE 17

PROJECT - STATIC PIPE ANALYSIS 10 INCH     JOB NO. - LAYING

USER ID - IK     LICENSED BY - PT Timas Suplindo     CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES														
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
NO	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACTION HORIZ (KN )	SUPT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	BENDING MOMENTS VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)		
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====		
1	LAYBARGE	64.20	4.42	0.00	0.74	0.00	0.00	0.00	0.00	0.15	0.00	0.15		
3	LAYBARGE	59.72	4.30	0.00	19.39	0.00	0.00	0.00	-0.24	-13.00	0.00	13.00		
5	LAYBARGE	48.23	4.00	0.00	23.76	0.00	0.00	0.00	-0.86	-18.46	0.00	18.46		
7	TENSIONR	38.10	3.73	0.00	13.95	0.00	0.00	0.00	96.68	-6.13	0.00	6.13		
9	LAYBARGE	33.43	3.61	0.00	12.74	0.00	0.00	0.00	96.43	-5.86	0.00	5.86		
11	TENSIONR	26.65	3.43	0.00	9.46	0.00	0.00	0.00	194.14	3.55	0.00	3.55		
13	LAYBARGE	21.33	3.30	0.00	0.00	0.00	0.01	0.00	193.88	-5.00	0.00	5.00		
15	LAYBARGE	12.14	2.98	0.00	52.33	0.00	0.00	0.00	192.46	-157.64	0.00	157.64		
17	LAYBARGE	-0.04	1.76	0.00	36.86	0.00	0.00	0.00	190.02	-154.59	0.00	154.59		
20	STINGER	-8.10	0.35	0.00	23.77	0.00	0.00	0.00	187.38	-134.89	0.00	134.89		
22	STINGER	-15.89	-1.45	0.00	15.41	0.00	0.00	0.00	186.32	-92.60	0.00	92.60		
24	STINGER	-23.62	-3.53	0.00	0.00	0.00	0.08	0.00	185.66	-19.60	0.00	19.60		
26	STINGER	-30.74	-5.52	0.00	0.00	0.00	0.32	0.00	184.80	12.68	0.00	12.68		
28	STINGER	-36.79	-7.20	0.00	0.00	0.00	0.77	0.00	184.06	26.47	0.00	26.47		
30	STINGER	-39.69	-7.98	0.00	0.00	0.00	1.47	0.00	183.71	30.58	0.00	30.58		
32	SAGBEND	-41.70	-8.51	0.00	0.00	0.00	0.00	0.00	183.48	32.81	0.00	32.81		
33	SAGBEND	-43.64	-9.02	0.00	0.00	0.00	0.00	0.00	183.25	34.57	0.00	34.57		
34	SAGBEND	-45.58	-9.52	0.00	0.00	0.00	0.00	0.00	183.03	36.02	0.00	36.02		
35	SAGBEND	-47.52	-10.01	0.00	0.00	0.00	0.00	0.00	182.82	37.21	0.00	37.21		
36	SAGBEND	-49.46	-10.49	0.00	0.00	0.00	0.00	0.00	182.61	38.21	0.00	38.21		
37	SAGBEND	-51.40	-10.96	0.00	0.00	0.00	0.00	0.00	182.40	39.04	0.00	39.04		
38	SAGBEND	-53.34	-11.43	0.00	0.00	0.00	0.00	0.00	182.20	39.73	0.00	39.73		
39	SAGBEND	-55.29	-11.89	0.00	0.00	0.00	0.00	0.00	182.00	40.31	0.00	40.31		
40	SAGBEND	-57.24	-12.34	0.00	0.00	0.00	0.00	0.00	181.80	40.80	0.00	40.80		
41	SAGBEND	-59.19	-12.78	0.00	0.00	0.00	0.00	0.00	181.61	41.21	0.00	41.21		
42	SAGBEND	-61.14	-13.21	0.00	0.00	0.00	0.00	0.00	181.42	41.56	0.00	41.56		
43	SAGBEND	-63.10	-13.63	0.00	0.00	0.00	0.00	0.00	181.24	41.86	0.00	41.86		
44	SAGBEND	-65.06	-14.04	0.00	0.00	0.00	0.00	0.00	181.06	42.12	0.00	42.12		
45	SAGBEND	-67.01	-14.45	0.00	0.00	0.00	0.00	0.00	180.88	42.35	0.00	42.35		
46	SAGBEND	-68.97	-14.84	0.00	0.00	0.00	0.00	0.00	180.71	42.54	0.00	42.54		
47	SAGBEND	-70.94	-15.23	0.00	0.00	0.00	0.00	0.00	180.54	42.71	0.00	42.71		
48	SAGBEND	-72.90	-15.61	0.00	0.00	0.00	0.00	0.00	180.38	42.86	0.00	42.86		
49	SAGBEND	-74.87	-15.97	0.00	0.00	0.00	0.00	0.00	180.22	43.00	0.00	43.00		
50	SAGBEND	-76.83	-16.33	0.00	0.00	0.00	0.00	0.00	180.06	43.12	0.00	43.12		
51	SAGBEND	-78.80	-16.68	0.00	0.00	0.00	0.00	0.00	179.91	43.23	0.00	43.23		
52	SAGBEND	-80.78	-17.02	0.00	0.00	0.00	0.00	0.00	179.76	43.33	0.00	43.33		
53	SAGBEND	-82.75	-17.35	0.00	0.00	0.00	0.00	0.00	179.62	43.42	0.00	43.42		
54	SAGBEND	-84.72	-17.67	0.00	0.00	0.00	0.00	0.00	179.48	43.50	0.00	43.50		
55	SAGBEND	-86.70	-17.98	0.00	0.00	0.00	0.00	0.00	179.34	43.58	0.00	43.58		
56	SAGBEND	-88.67	-18.29	0.00	0.00	0.00	0.00	0.00	179.21	43.64	0.00	43.64		
57	SAGBEND	-90.65	-18.58	0.00	0.00	0.00	0.00	0.00	179.08	43.71	0.00	43.71		

58	SAGBEND	-92.63	-18.86	0.00	0.00	0.00	0.00	0.00	178.96	43.76	0.00	43.76
59	SAGBEND	-94.61	-19.14	0.00	0.00	0.00	0.00	0.00	178.84	43.81	0.00	43.81

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 2:34:53      PAGE 18

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES

NODE NO.	PIPE SECTION	COORDINATES			SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS		
		X COORD (M)	Y COORD (M)	Z COORD (M)	VERT (KN)	HORIZ (KN)	VERT (M)	HORIZ (M)	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)		
60	SAGBEND	-96.60	-19.40	0.00	0.00	0.00	0.00	0.00	178.72	43.86	0.00	43.86	
61	SAGBEND	-98.58	-19.66	0.00	0.00	0.00	0.00	0.00	178.61	43.89	0.00	43.89	
62	SAGBEND	-100.56	-19.90	0.00	0.00	0.00	0.00	0.00	178.51	43.92	0.00	43.92	
63	SAGBEND	-102.55	-20.14	0.00	0.00	0.00	0.00	0.00	178.40	43.94	0.00	43.94	
64	SAGBEND	-104.54	-20.36	0.00	0.00	0.00	0.00	0.00	178.31	43.96	0.00	43.96	
65	SAGBEND	-106.53	-20.58	0.00	0.00	0.00	0.00	0.00	178.21	43.96	0.00	43.96	
66	SAGBEND	-108.52	-20.79	0.00	0.00	0.00	0.00	0.00	178.12	43.95	0.00	43.95	
67	SAGBEND	-110.51	-20.98	0.00	0.00	0.00	0.00	0.00	178.04	43.93	0.00	43.93	
68	SAGBEND	-112.50	-21.17	0.00	0.00	0.00	0.00	0.00	177.96	43.89	0.00	43.89	
69	SAGBEND	-114.49	-21.35	0.00	0.00	0.00	0.00	0.00	177.88	43.83	0.00	43.83	
70	SAGBEND	-116.48	-21.52	0.00	0.00	0.00	0.00	0.00	177.81	43.75	0.00	43.75	
71	SAGBEND	-118.48	-21.68	0.00	0.00	0.00	0.00	0.00	177.74	43.64	0.00	43.64	
72	SAGBEND	-120.47	-21.83	0.00	0.00	0.00	0.00	0.00	177.67	43.50	0.00	43.50	
73	SAGBEND	-122.46	-21.97	0.00	0.00	0.00	0.00	0.00	177.61	43.32	0.00	43.32	
74	SAGBEND	-124.46	-22.10	0.00	0.00	0.00	0.00	0.00	177.56	43.09	0.00	43.09	
75	SAGBEND	-126.46	-22.22	0.00	0.00	0.00	0.00	0.00	177.50	42.80	0.00	42.80	
76	SAGBEND	-128.45	-22.33	0.00	0.00	0.00	0.00	0.00	177.46	42.44	0.00	42.44	
77	SAGBEND	-130.45	-22.44	0.00	0.00	0.00	0.00	0.00	177.41	42.00	0.00	42.00	
78	SAGBEND	-132.45	-22.53	0.00	0.00	0.00	0.00	0.00	177.37	41.46	0.00	41.46	
79	SAGBEND	-134.45	-22.61	0.00	0.00	0.00	0.00	0.00	177.34	40.79	0.00	40.79	
80	SAGBEND	-136.45	-22.69	0.00	0.00	0.00	0.00	0.00	177.31	39.97	0.00	39.97	
81	SAGBEND	-138.44	-22.76	0.00	0.00	0.00	0.00	0.00	177.28	38.97	0.00	38.97	
82	SAGBEND	-140.44	-22.81	0.00	0.00	0.00	0.00	0.00	177.26	37.74	0.00	37.74	
83	SAGBEND	-142.44	-22.86	0.00	0.00	0.00	0.00	0.00	177.24	36.24	0.00	36.24	
84	SAGBEND	-144.44	-22.91	0.00	0.00	0.00	0.00	0.00	177.22	34.41	0.00	34.41	
85	SAGBEND	-146.44	-22.94	0.00	0.00	0.00	0.00	0.00	177.21	32.18	0.00	32.18	
86	SAGBEND	-148.44	-22.97	0.00	0.00	0.00	0.00	0.00	177.21	29.47	0.00	29.47	
87	SAGBEND	-150.44	-22.99	0.00	0.00	0.00	0.00	0.00	177.20	26.15	0.00	26.15	
88	SEABED	-152.44	-23.00	0.00	0.16	0.00	0.00	0.00	177.20	22.12	0.00	22.12	
89	SEABED	-154.44	-23.01	0.00	0.59	0.00	0.00	0.00	177.20	17.54	0.00	17.54	
90	SEABED	-156.44	-23.02	0.00	0.89	0.00	0.00	0.00	177.21	13.08	0.00	13.08	
91	SEABED	-158.44	-23.02	0.00	1.05	0.00	0.00	0.00	177.21	9.16	0.00	9.16	
92	SEABED	-160.44	-23.03	0.00	1.13	0.00	0.00	0.00	177.21	5.96	0.00	5.96	
93	SEABED	-162.44	-23.03	0.00	1.14	0.00	0.00	0.00	177.21	3.51	0.00	3.51	
94	SEABED	-164.44	-23.02	0.00	1.12	0.00	0.00	0.00	177.21	1.75	0.00	1.75	
95	SEABED	-166.44	-23.02	0.00	1.08	0.00	0.00	0.00	177.21	0.56	0.00	0.56	
96	SEABED	-168.44	-23.02	0.00	1.04	0.00	0.00	0.00	177.21	-0.17	0.00	0.17	
97	SEABED	-170.44	-23.02	0.00	1.00	0.00	0.00	0.00	177.21	-0.57	0.00	0.57	
98	SEABED	-172.44	-23.02	0.00	0.96	0.00	0.00	0.00	177.21	-0.74	0.00	0.74	
99	SEABED	-174.44	-23.02	0.00	0.93	0.00	0.00	0.00	177.21	-0.75	0.00	0.75	
100	SEABED	-176.44	-23.02	0.00	0.90	0.00	0.00	0.00	177.21	-0.68	0.00	0.68	
101	SEABED	-178.44	-23.02	0.00	0.89	0.00	0.00	0.00	177.21	-0.57	0.00	0.57	
102	SEABED	-180.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	-0.45	0.00	0.45	
103	SEABED	-182.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	-0.33	0.00	0.33	

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 2:34:53      PAGE 19

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

=====

STATIC PIPE COORDINATES, FORCES AND STRESSES

NODE NO.	PIPE SECTION	COORDINATES			SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS		
		X COORD (M)	Y COORD (M)	Z COORD (M)	VERT (KN)	HORIZ (KN)	VERT (M)	HORIZ (M)	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)		
104	SEABED	-184.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.23	0.00	0.23	
105	SEABED	-186.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.14	0.00	0.14	
106	SEABED	-188.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.08	0.00	0.08	
107	SEABED	-190.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.04	0.00	0.04	
108	SEABED	-192.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.01	0.00	0.01	
109	SEABED	-194.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	0.01	0.00	0.01	
110	SEABED	-196.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02	
111	SEABED	-198.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02	
112	SEABED	-200.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02	
113	SEABED	-202.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02	
114	SEABED	-204.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.01	0.00	0.01	
115	SEABED	-206.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.01	0.00	0.01	
116	SEABED	-208.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.00	0.00	0.00	
117	SEABED	-210.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.00	0.00	0.00	
118	SEABED	-212.44	-23.02	0.00	0.00	0.00	0.00	0.00	177.21	0.00	0.00	0.00	

STATIC SOLUTION SUMMARY

PIPE PROPERTIES ( 1 )

PIPE SECTION LENGTH ...	0.00 M	ELASTIC MODULUS .....	207000. MPA
OUTSIDE DIAMETER .....	27.305 CM	CROSS SECTIONAL AREA .	103.82 CM^2
WALL THICKNESS .....	1.270 CM	MOMENT OF INERTIA ....	8817.6 CM^4
WEIGHT/LENGTH IN AIR .	2022.01 N/M	YIELD STRESS .....	360.00 MPA
SUBMERGED WGHT/LENG ..	434.28 N/M	STRESS INTENS FACTOR .	1.000
SPECIFIC GRAVITY .....	1.274	STEEL DENSITY .....	77008.0 N/M3
WRAP COAT THICKNESS ..	0.320 CM	WRAP COAT DENSITY ....	9339.1 N/M3
CONCRETE THICKNESS ...	4.000 CM	CONCRETE DENSITY .....	29822.0 N/M3

BARGE DATA

TOTAL PIPE TENSION ...	196.13 KN	RADIUS OF CURVATURE ..	0.00 M
NUMBER OF TENSIONERS .	2	BARGE TRIM ANGLE .....	0.500 DEG
NO. OF PIPE SUPPORTS .	7	PIPE ANGLE AT STERN ..	8.131 DEG
BARGE HEADING .....	0.000 DEG	OFFSET FROM R.O.W. ...	0.00 M

STINGER DATA

NO. OF PIPE SUPPORTS .	6	PIPE DEPTH AT STERN ..	-7.98 M
NO. STINGER SECTIONS .	6	PIPE ANGLE AT STERN ..	14.947 DEG
RADIUS OF CURVATURE ..	0.00 M	STINGER STERN DEPTH ..	-9.34 M
STINGER LENGTH .....	41.37 M		

SAGBEND DATA

WATER DEPTH .....	23.00 M	TENSION AT TOUCHDOWN .	177.20 KN
TOUCHDOWN X-COORD. ...	-151.99 M	BOTTOM SLOPE ANGLE ...	0.000 DEG
PROJECTED SPAN LENGTH	112.30 M	PIPE LENGTH GAIN .....	2.63 M

===== SOLUTION SUMMARY =====

NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACT HORIZ (KN)	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	0.7	0.0	0.2	0.2	0.
3	LAYBARGE	59.7	4.3	0.0	19.4	0.0	13.0	20.1	6.
5	LAYBARGE	48.2	4.0	0.0	23.8	0.0	18.5	28.7	8.
7	TENSIONR	38.1	3.7	0.0	13.9	0.0	6.1	18.8	5.
9	LAYBARGE	33.4	3.6	0.0	12.7	0.0	5.9	18.3	5.
11	TENSIONR	26.7	3.4	0.0	9.5	0.0	3.5	24.2	7.
13	LAYBARGE	21.3	3.3	0.0	0.0	0.0	5.0	26.4	7.
15	LAYBARGE	12.1	3.0	0.0	52.3	0.0	157.6	262.5	73.
17	LAYBARGE	0.0	1.8	0.0	36.9	0.0	154.6	257.5	72.
20	STINGER	-8.1	0.4	0.0	23.8	0.0	134.9	226.8	63.
22	STINGER	-15.9	-1.4	0.0	15.4	0.0	92.6	161.2	45.
24	STINGER	-23.6	-3.5	0.0	0.0	0.0	19.6	48.2	13.

STATIC SOLUTION SUMMARY

26	STINGER	-30.7	-5.5	0.0	0.0	0.0	12.7	37.4	10.
28	STINGER	-36.8	-7.2	0.0	0.0	0.0	26.5	58.7	16.
30	STINGER	-39.7	-8.0	0.0	0.0	0.0	30.6	65.0	18.
64	SAGBEND	-104.5	-20.4	0.0	0.0	0.0	44.0	85.2	24.
88	SEABED	-152.4	-23.0	0.0	0.2	0.0	22.1	51.3	14.

DYNAMIC SOLUTION SUMMARY

SEA STATE NUMBER ( 1 )

SEA STATE TYPE .....	WAVE SPECTRUM
NO. WAVE COMPONENTS ..	20
WAVE WATER DEPTH .....	23.0 M
MAX. WAVE FREQUENCY ..	3.0015 RA/S

VESSEL RESPONSE TYPE . TABLE OF RAOS  
WAVE TRAVEL DIRECTION 0.000 DEG  
MIN. WAVE FREQUENCY .. 0.1001 RA/S  
RANDOM PHASE SEED .... 0

SPECTRUM START TIME .. 0. SECS NO. RAOS IN TABLE .... 30  
 RAO SIGN CONVENTION .. BENTLEY MOSES

SEA STATE DEFINITION

=====

WAVE SPECTRUM TYPE ... JONSWAP (CLASSIC)  
 JONSWAP COEFFICIENT .. 0.012891 JONSWAP PEAK FACTOR .. 5.000  
 PEAK WAVE FREQUENCY .. 0.9498 RA/S

CALCULATED WAVE HEIGHTS

=====

SIGNIFICANT WAVE HT. . 2.893 M AVERAGE WAVE HEIGHT .. 1.874 M  
 MAXIMUM WAVE HEIGHT .. 5.737 M RMS WAVE HEIGHT ..... 2.081 M  
 TOTAL NUMBER OF WAVES 1914

===== SOLUTION SUMMARY =====

NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACT HORIZ (KN )	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	0.9	0.0	0.2	0.3	0.
3	LAYBARGE	59.7	4.3	0.0	20.6	0.0	14.1	21.8	6.
5	LAYBARGE	48.2	4.0	0.0	24.7	0.0	19.2	29.8	8.
7	TENSIONR	38.1	3.7	0.0	14.5	0.0	6.6	25.6	7.
9	LAYBARGE	33.4	3.6	0.0	13.9	0.0	7.3	25.3	7.
11	TENSIONR	26.6	3.4	0.0	11.6	0.0	5.8	32.0	9.
13	LAYBARGE	21.3	3.3	0.0	0.0	0.0	6.7	35.7	10.
15	LAYBARGE	12.1	3.0	0.0	60.0	0.0	165.3	281.0	78.
17	LAYBARGE	0.0	1.7	0.0	56.1	0.0	171.8	289.5	80.
20	STINGER	-8.1	0.3	0.0	44.6	0.0	154.2	260.8	72.
22	STINGER	-15.9	-1.4	0.0	42.4	0.0	135.0	233.5	65.
24	STINGER	-23.6	-3.4	0.0	33.3	0.0	96.4	173.5	48.
26	STINGER	-30.8	-5.2	0.0	23.1	0.0	58.9	115.7	32.
28	STINGER	-36.8	-6.8	0.0	0.0	0.0	78.3	144.8	40.
30	STINGER	-39.7	-7.5	0.0	0.0	0.0	82.1	150.5	42.
88	SEABED	-152.4	-22.7	0.0	1.6	0.0	43.4	85.0	24.

=====

**LAMPIRAN ANALISA DINAMIS PADA PIPA 10 INCH  
HEADING 45°**

```

MMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
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MMM  MMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMMMMMM
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MMMMMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMM  MMMMMMMMMM  MMMMMMMMMM
MMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMM  MMMMMMMMMM  MMMMMMMMMM

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*****
*
*           O F F P I P E - 3 -- OFFSHORE PIPELINE ANALYSIS SYSTEM
*
*   COPYRIGHT (C) 1983-2016, ROBERT C. MALAHY. ALL RIGHTS RESERVED WORLDWIDE.
*
*           VERSION NO. - 3.02EX
*           RELEASED ON - 03/08/2016
*           LICENSED TO - PT Timas Suplindo
*
*****
*
* OFFPIPE IS A NONLINEAR, 3-DIMENSIONAL FINITE ELEMENT METHOD BASED PROGRAM FOR THE
* STATIC AND DYNAMIC ANALYSIS OF PROBLEMS ARISING IN THE DESIGN OF MARINE PIPELINES.
* THIS VERSION OF OFFPIPE MAY BE USED FOR THE ANALYSIS OF OFFSHORE PIPELAYING OPER-
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*
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*           U.S.A.                     EMAIL: SUPPORT@OFFPIPE.COM
*
*****

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=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX   PAGE   3
STATIC PIPE ANALYSIS 10 INCH
JOB NO. - LAYING                 LICENSED BY - PT Timas Suplindo
USER ID - IK                     DATE - 5/2/2020   TIME - 2:42:16   CASE   1
=====

```

```

INPUT    DATA    ECHO

```

```

=====
PRINTED OUTPUT SELECTED
=====
STATIC PIPE FORCES AND STRESSES ... YES
STATIC SOLUTION SUMMARY ..... YES
DYNAMIC PIPE FORCES AND STRESSES .. NO
DYNAMIC RANGE OF PIPE DATA ..... NO
DYNAMIC TRACKING OF PIPE DATA ..... NO
OVERBEND PIPE SUPPORT GEOMETRY .... NO
STINGER BALLAST SCHEDULE DATA ..... NO
SUPPORT REACTIONS IN BARGE COORDS . NO

INTERNAL FORCES IN PIPE & CABLE ... NO
INTERNAL FORCES IN STINGER ..... NO
PRINT PIPE STRAINS IN OUTPUT ..... NO
DNV OS-F101 COMPLIANCE REPORT ..... NO
API RP-1111 COMPLIANCE REPORT ..... NO
PRINT DNV/API FACTORS & PARAMETERS NO
USE THICK WALL HOOP STRESS EQN. ... NO
USE DNV 1981 FOR TOTAL PIPE STRESS NO

ENABLE/DISABLE WARNING MESSAGES ... ENABLE
GENERATE SPREAD SHEET PLOT FILE ... NO
GENERATE ASCII PLOT DATA FILES .... NO

```



PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX .....	1	
PLOT NUMBER .....	1	
PLOT TYPE OPTION NUMBER .....	1	
DYNAMIC PROFILE TIME POINT .....	0.000	
DYNAMIC PROFILE TIME INCREMENT .....	0.000	
ORDINATE PARAMETER CODE NUMBER .....	2	
AXIS LABEL FOR ORDINATE .....	"PIPE ELEVATION Y COORDINATE	"
ABSCISSA PARAMETER CODE NUMBER .....	1	
AXIS LABEL FOR ABSCISSA .....	"PIPE HORIZONTAL X COORDINATE	"
PLOT TITLE .....	"PIPELINE ELEVATION PROFILE AND PIPE STRESS	"
MINIMUM VERTICAL AXIS RANGE .....	0.000	
MAXIMUM VERTICAL AXIS RANGE .....	0.000	
MINIMUM HORIZONTAL AXIS RANGE .....	0.000	
MAXIMUM HORIZONTAL AXIS RANGE .....	0.000	

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 4  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:42:16 CASE 1

=====

INPUT DATA ECHO

PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX .....	2	
PLOT NUMBER .....	1	
PLOT TYPE OPTION NUMBER .....	1	
DYNAMIC PROFILE TIME POINT .....	0.000	
DYNAMIC PROFILE TIME INCREMENT .....	0.000	
ORDINATE PARAMETER CODE NUMBER .....	15	
AXIS LABEL FOR ORDINATE .....	"DNV YIELD STRESS PERCENTAGE	"
ABSCISSA PARAMETER CODE NUMBER .....	1	
AXIS LABEL FOR ABSCISSA .....	"PIPELINE HORIZONTAL X COORDINATE"	
PLOT TITLE .....	"PIPELINE ELEVATION PROFILE AND PIPE STRESS	"
MINIMUM VERTICAL AXIS RANGE .....	0.000	
MAXIMUM VERTICAL AXIS RANGE .....	0.000	
MINIMUM HORIZONTAL AXIS RANGE .....	0.000	
MAXIMUM HORIZONTAL AXIS RANGE .....	0.000	

PIPE PROPERTIES

=====

PROPERTY TABLE ROW NUMBER .....	1
PIPE SECTION LENGTH .....	0.000 METERS
STEEL MODULUS OF ELASTICITY .....	207000. M-PASCAL
STEEL CROSS SECTIONAL AREA .....	103.822 CM <sup>2</sup>
COATED PIPE AVG MOMENT OF INERTIA .....	8817.56 CM <sup>4</sup>
WEIGHT PER-UNIT-LENGTH IN AIR .....	2022.01 N/M
WEIGHT PER-UNIT-LENGTH SUBMERGED .....	434.28 N/M
MAXIMUM ALLOWABLE PIPE STRAIN .....	0.205000 PERCENT
STEEL OUTSIDE DIAMETER .....	27.3050 CM
STEEL WALL THICKNESS .....	1.2700 CM
YIELD STRESS .....	360.00 M-PASCAL
STRESS/STRAIN INTENSE FACTOR .....	0.0000
HYDRODYNAMIC OUTSIDE DIAMETER .....	0.000 CM
DRAG COEFFICIENT .....	0.0000
HYDRODYNAMIC TOTAL AREA .....	0.000 CM <sup>2</sup>
ADDED MASS COEFFICIENT .....	0.0000
POISSON'S RATIO .....	0.3000
COEFFICIENT OF THERMAL EXPANSION .....	0.00001100 1/DEG C

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 5  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:42:16 CASE 1

=====

INPUT DATA ECHO

PIPE COATING PROPERTIES

=====

PIPE PROPERTY TABLE INDEX .....	1
CORROSION COATING THICKNESS .....	0.320 CM
CORROSION COATING WEIGHT DENSITY .....	9339.1 N/M <sup>3</sup>
CORROSION COATING ELASTIC MODULUS .....	0.000 M-PASCAL
CONCRETE COATING THICKNESS .....	4.000 CM
CONCRETE COATING WEIGHT DENSITY .....	29822. N/M <sup>3</sup>
CONCRETE COATING ELASTIC MODULUS .....	0.000 M-PASCAL
DESIRED PIPE SPECIFIC GRAVITY .....	0.0000
CONCRETE STIFFENING EFFECTIVENESS .....	0.000
NO NOT CALC. STRESS FOR BARE PIPE .....	NO

AVERAGE LENGTH OF PIPE JOINT ..... 12.200 METERS  
 EFFECTIVE FIELD JOINT LENGTH ..... 0.300 METERS  
 FIELD JOINT FILL WEIGHT DENSITY ... 10055.3 N/M^3  
 FIELD JOINT FILL ELASTIC MODULUS... 0.000 M-PASCAL  
 FIELD JOINT STIFFENING EFFECT. .... 0.000  
 FIELD JOINT BENDING MODEL ..... 0 IGNORE COATING STIFFNESS  
 WEIGHT DENSITY OF STEEL ..... 77008. N/M^3  
 WEIGHT DENSITY OF PIPE CONTENTS ... 0.0 N/M^3  
 REF. ELEVATION FOR STATIC HEAD .... 0.00 METERS  
 FREE FLOOD PIPE DURING PIPELAY ... NO

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 6  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:42:16 CASE 1  
 =====

INPUT DATA ECHO

PIPELAY VESSEL DESCRIPTION

=====  
 NUMBER OF PIPE NODES ..... 9  
 BARGE GEOMETRY SPECIFIED BY ..... 1 X-Y COORDINATES  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.000 METERS  
 ADJUST Y COORDINATES MANUALLY .... NO  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 PIPE ANGLE RELATIVE TO DECK ..... 0.0000 DEGREES  
 HEIGHT OF DECK ABOVE WATER ..... 2.400 METERS  
 LAYBARGE FORWARD (X) OFFSET ..... 0.000 METERS  
 BARGE TRIM ANGLE ..... 0.5000 DEGREES  
  
 STERN SHOE X COORDINATE ..... 0.000 METERS  
 STERN SHOE Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER X COORDINATE ..... 43.820 METERS  
 ROTATION CENTER Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER Z COORDINATE ..... 6.370 METERS  
 BARGE HEADING ..... 0.0000 DEGREES  
 BARGE OFFSET FROM RIGHT-OF-WAY .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT VERTICAL ANGLE ... 0.000 DEGREES  
 PIPE RAMP PIVOT Z COORDINATE ..... 0.000 METERS  
 PIPE RAMP HEADING ON DECK ..... 0.000 DEGREES  
 ROLE OF ALTERNATE WAVE ORIGIN .... 0 MOTIONS & WAVES AT CENTER OF MOTION  
 WAVE PHASE ORIGIN X COORDINATE .... 0.000  
 WAVE PHASE ORIGIN Y COORDINATE .... 0.000 METERS  
 WAVE PHASE ORIGIN Z COORDINATE .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE .....

NODE X COORD (M )	NODE Y COORD (M )	SUPPORT TYPE	DAVIT SPACING (M )
64.220	1.838	1 SIMPLE SUPPORT	0.000
59.740	1.760	1 SIMPLE SUPPORT	0.000
48.240	1.560	1 SIMPLE SUPPORT	0.000
38.110	1.383	2 PIPE TENSIONER	0.000
33.440	1.302	1 SIMPLE SUPPORT	0.000
26.660	1.183	2 PIPE TENSIONER	0.000
21.340	1.092	7 USER DEFINED SPT	0.000
12.150	0.860	7 USER DEFINED SPT	0.000
-0.040	-0.260	8 USER DEFINED SPT	0.000

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 7  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:42:16 CASE 1  
 =====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====  
 SUPPORT PROPERTY TABLE INDEX ..... 2  
 SUPPORT ELEMENT TYPE ..... 2 TENSIONER  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
  
 BOTTOM ROLLER ANGLE TO HORIZONTAL . 0.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL .... 0.000 DEGREES

SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 7  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 1.600 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 8  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 2:42:16 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 8  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

STINGER DESCRIPTION

=====

NUMBER OF PIPE/STINGER NODES ..... 6  
 STINGER GEOMETRY SPECIFIED BY ..... 2 X-Y COORD AND MATCH PT  
 STINGER TYPE ..... 1 FIXED GEOMETRY OR RAMP  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.00 METERS  
 HITCH X-COORDINATE ..... 0.497 METERS  
 HITCH Y-COORDINATE ..... -1.800 METERS  
 HITCH ANGULAR ORIENTATION ..... 0.000 DEGREES

X COORDINATE OF LOCAL ORIGIN ..... 0.497 METERS  
 Y COORDINATE OF LOCAL ORIGIN ..... -1.800 METERS  
 ROTATION ABOUT STINGER HITCH ..... 13.500 DEGREES  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 TANGENT POINT ANGLE ..... 0.000 DEGREES

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	ELEMENT TYPE	ELEMENT LENGTH ( M )
-8.325	2.209	1 SIMPLE SUPPORT	2 HINGED END	0.000
-16.325	2.349	1 SIMPLE SUPPORT	1 FIXED END	0.000
-24.325	2.119	1 SIMPLE SUPPORT	1 FIXED END	0.000
-31.699	1.660	1 SIMPLE SUPPORT	1 FIXED END	0.000
-37.949	1.069	1 SIMPLE SUPPORT	1 FIXED END	0.000
-40.949	0.350	1 SIMPLE SUPPORT	1 FIXED END	0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 9  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 2:42:16 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

```

=====
SUPPORT PROPERTY TABLE INDEX ..... 1
SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT
SUPPORT INITIAL STATE FLAG ..... 0
TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M
VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M
STATIC VERTICAL DEFLECTION ..... 0.0000 CM
LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES
SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES
SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS
BED ROLLER LENGTH ..... 1.640 METERS
HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS
TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
    
```

CURRENT VELOCITIES

```

=====
WATER DEPTH (M ) CURRENT SPEED (M/S ) DIRECTION OF TRAVEL (DEG )
=====
0.000 0.790 45.000
11.500 0.480 45.000
23.000 0.420 45.000
    
```

PIPE TENSION DATA

```

=====
STATIC PIPE TENSION ON LAY VESSEL . 196.133 K-NEWTON
MINIMUM DYNAMIC PIPE TENSION ..... 196.133 K-NEWTON
MAXIMUM DYNAMIC PIPE TENSION ..... 294.199 K-NEWTON
STATIC HORIZONTAL BOTTOM TENSION .. 0.000 K-NEWTON
NO. OF VALUES FOR TENSION PROFILE . 0
VALUES ARE FOR PIPE SPAN ANALYSIS . NO
MAXIMUM PIPE PAYOUT SPEED ..... 0.000 M/SEC
MAXIMUM PIPE TAKEUP SPEED ..... 0.000 M/SEC
    
```

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 10

STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 2:42:16 CASE 1

=====  
 INPUT DATA ECHO

SAGBEND GEOMETRY

```

=====
SAGBEND PIPE ELEMENT LENGTH ..... 2.000 METERS
WATER DEPTH ..... 23.00 METERS
X-COORDINATE AT SPECIFIED DEPTH . . 0.00 METERS
ESTIMATED SAGBEND X LENGTH ..... 0.00 METERS
ESTIMATED PIPE LENGTH ON SEABED ... 0.00 METERS
X-COORD OF PIPE FREE END ON SEABED 0.00 METERS
X-COORD POINT OF FIXITY ON SEABED . 0.00 METERS
MAXIMUM SLOPE (ANGLE) OF SEABED ... 0.000 DEGREES
DIRECTION OF MAXIMUM SLOPE ..... 0.000 DEGREES

PIPE/CABLE SPAN END CONDITION ..... 0 PIPE/CABLE RESTING ON SEABED
PIPE/CABLE SPAN LENGTH GIVEN BY ... 0 SPECIFIED PIPE/CABLE TENSION
ESTIMATED SPAN DEPTH AT FREE END .. 0.00 METERS
PIPE VERTICAL ANGLE AT FREE END ... 0.000 DEGREES
BOTTOM HINGE OFFSET ..... 0.000 METERS
BOTTOM HINGE MINIMUM ANGLE ..... 0.000 DEGREES
BOTTOM HINGE MAXIMUM ANGLE ..... 0.000 DEGREES
    
```

SOIL ELEMENT PROPERTIES

```

=====
SOIL PROPERTY TABLE ROW INDEX ..... 1
SOIL ELEMENT TYPE (FUTURE USE) .... 0
PIPE INDEX OR SEGMENT NUMBER ..... 0
LONGITUDINAL SOIL STIFFNESS ..... 0.00 KN/M^2
VERTICAL SOIL STIFFNESS ..... 0.00 KN/M^2
LATERAL SOIL STIFFNESS ..... 0.00 KN/M^2
DEFLECTION UNDER REFERENCE LOAD ... 0.0000 CM

LONGITUDINAL COEF. OF FRICTION .... 0.000
LATERAL COEFFICIENT OF FRICTION ... 0.600
NUMBER OF INTEGRATION POINTS ..... 0
    
```

TIME INTEGRATION PARAMETERS

```

=====
TIME STEP LENGTH ..... 0.2000 SECONDS
MAXIMUM TIME OF INTEGRATION ..... 10860.000 SECONDS
SOLUTION SAMPLING TIME STEP ..... 0.400 SECONDS
    
```

SOLUTION SAMPLING STARTS AT TIME .. 60.000 SECONDS  
 DAMPING RATIO ..... 0.0000  
 NUMBER OF VARIABLE TIME STEPS ..... 0

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 11  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:42:16 CASE 1

=====

INPUT DATA ECHO

WAVE PARAMETERS

=====

SEA STATE ROW INDEX ..... 1  
 WAVE HEIGHT (PEAK TO TROUGH) ..... 1.800 METERS  
 WAVE PERIOD ..... 6.300 SECONDS  
 WAVE DIRECTION OF TRAVEL ..... 45.000 DEGREES  
 WATER DEPTH FOR WAVE CALCULATIONS .. 23.00 METERS  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0

WAVE SPECTRUM EQUATION

=====

SEA STATE ROW INDEX ..... 1  
 WAVE SPECTRUM EQUATION TYPE ..... 7 JONSWAP (CLASSIC)  
 NUMBER OF WAVES IN SPECTRUM ..... 20  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0  
 MINIMUM PERIOD IN SPECTRUM ..... 2.0933 SECONDS  
 MAXIMUM PERIOD IN SPECTRUM ..... 62.8000 SECONDS  
 START TIME FOR WAVE SPECTRUM ..... 0. SECONDS  
 DIRECTION OF WAVE TRAVEL ..... 0.000 DEGREES  
 1ST JONSWAP COEF. (ALPHA) ..... 0.008952  
 2ND JONSWAP COEF. (GAMMA) ..... 5.0000  
 PEAK WAVE PERIOD ..... 6.6150 SECONDS

VESSEL MOTION RAO TABLE

=====

SEA STATE NUMBER ..... 1  
 USE PHASE LAG FOR RAOs ..... NO  
 VESSEL MOTIONS SIGN CONVENTION .... 2 BENTLEY MOSES  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD

WAVE PERIOD (SECONDS)	----- / SURGE AMPLITUDE (M/M)	----- / PHASE (DEG)	----- / SWAY AMPLITUDE (M/M)	----- / PHASE (DEG)	----- / HEAVE AMPLITUDE (M/M)	----- / PHASE (DEG)
2.0900	0.0030	-68.00	0.0010	-94.00	0.0000	0.00
2.1700	0.0030	85.00	0.0000	0.00	0.0000	0.00
2.2400	0.0050	-109.00	0.0010	-165.00	0.0000	0.00
2.3300	0.0040	37.00	0.0000	0.00	0.0010	-127.00
2.4200	0.0070	-124.00	0.0010	105.00	0.0010	-118.00
2.5100	0.0040	21.00	0.0000	0.00	0.0010	-155.00
2.6200	0.0110	-119.00	0.0030	62.00	0.0010	-129.00
2.7300	0.0040	58.00	0.0010	-50.00	0.0010	172.00
2.8500	0.0170	-100.00	0.0040	51.00	0.0000	0.00
2.9900	0.0100	158.00	0.0040	-50.00	0.0020	85.00
3.1400	0.0170	-68.00	0.0030	43.00	0.0020	73.00
3.3100	0.0290	-151.00	0.0080	-58.00	0.0060	79.00

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 12  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:42:16 CASE 1

=====

WAVE PERIOD	----- / ROLL AMPLITUDE	----- / PHASE	----- / PITCH AMPLITUDE	----- / PHASE	----- / YAW AMPLITUDE	----- / PHASE
3.4900	0.0070	109.00	0.0040	-145.00	0.0070	29.00
3.7000	0.0350	-96.00	0.0120	-46.00	0.0050	109.00
3.9300	0.0520	-161.00	0.0260	-115.00	0.0200	67.00
4.1900	0.0240	134.00	0.0170	-174.00	0.0200	10.00
4.4900	0.0380	-85.00	0.0210	-62.00	0.0060	137.00
4.8300	0.0940	-139.00	0.0640	-111.00	0.0490	80.00
5.2400	0.1090	173.00	0.0820	-157.00	0.0910	29.00
5.7100	0.0640	128.00	0.0520	164.00	0.0880	-14.00
6.2800	0.0330	-77.00	0.0270	-84.00	0.0380	176.00
6.9800	0.1580	-119.00	0.1100	-133.00	0.2670	130.00
7.8500	0.2920	-151.00	0.2730	-155.00	0.5070	107.00
8.9700	0.4130	-179.00	0.4050	179.00	0.6980	84.00
10.4700	0.5100	156.00	0.5120	156.00	0.8340	63.00
12.5600	0.5790	136.00	0.5940	136.00	0.9220	44.00
15.7000	0.6230	119.00	0.6490	119.00	0.9710	29.00
20.9300	0.6480	106.00	0.6810	106.00	0.9940	16.00
31.4000	0.6610	97.00	0.6980	97.00	1.0020	7.00
62.8000	0.6660	92.00	0.7060	92.00	1.0030	2.00

=====

(SECONDS)	(DEG/M )	(DEG)	(DEG/M )	(DEG)	(DEG/M )	(DEG)
2.0900	0.0030	-51.00	0.0000	0.00	0.0020	-24.00
2.1700	0.0040	-37.00	0.0000	0.00	0.0030	44.00
2.2400	0.0060	-49.00	0.0010	-102.00	0.0010	-102.00
2.3300	0.0050	-67.00	0.0030	-119.00	0.0040	-36.00
2.4200	0.0010	-99.00	0.0030	-143.00	0.0010	163.00
2.5100	0.0040	-163.00	0.0040	-132.00	0.0080	-103.00
2.6200	0.0040	84.00	0.0030	179.00	0.0040	120.00
2.7300	0.0130	135.00	0.0030	-145.00	0.0150	-124.00
2.8500	0.0170	130.00	0.0050	115.00	0.0100	133.00
2.9900	0.0290	122.00	0.0040	100.00	0.0150	-132.00
3.1400	0.0180	93.00	0.0150	78.00	0.0230	124.00
3.3100	0.0310	139.00	0.0160	36.00	0.0010	-66.00
3.4900	0.0400	78.00	0.0270	89.00	0.0430	121.00
3.7000	0.0120	-33.00	0.0590	47.00	0.0580	43.00
3.9300	0.0280	122.00	0.0330	7.00	0.0050	118.00
4.1900	0.0580	25.00	0.0680	92.00	0.1220	88.00
4.4900	0.0500	-34.00	0.1650	46.00	0.1970	31.00
4.8300	0.0850	46.00	0.1750	-1.00	0.1360	-21.00
5.2400	0.3220	10.00	0.0410	18.00	0.0710	102.00
5.7100	0.5310	-28.00	0.4080	73.00	0.3550	59.00
6.2800	0.1800	-54.00	1.0540	47.00	0.6240	17.00
6.9800	2.2730	-173.00	1.6290	27.00	0.8190	-21.00

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 13
STATIC PIPE ANALYSIS 10 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 5/ 2/2020 TIME - 2:42:16 CASE 1
=====

INPUT DATA ECHO

7.8500	2.0730	-167.00	1.8190	8.00	0.8960	-55.00
8.9700	1.7360	173.00	1.6720	-11.00	0.8690	-85.00
10.4700	1.3750	152.00	1.3580	-30.00	0.7570	-111.00
12.5600	1.0030	133.00	0.9960	-48.00	0.5920	-133.00
15.7000	0.6580	117.00	0.6550	-63.00	0.4100	-150.00
20.9300	0.3730	105.00	0.3730	-76.00	0.2420	-163.00
31.4000	0.1660	97.00	0.1670	-87.00	0.1100	-173.00
62.8000	0.0410	92.00	0.0430	-105.00	0.0280	178.00

\*\*\*\*\* INFORMATIVE MESSAGE NO. - 94 \*\*\*\*\*

One or more of the phase angles in the RAO table have been adjusted to |
minimize the difference in value between adjacent angles. If the phase |
angles are arbitrarily restricted by the software used to calculate |
the RAOs to a fixed range of values such as (0 to 2\*PI) or (-PI to |
+PI), then phase angles that are actually close in value can differ by |
as much as 2\*PI. These large differences can cause the phase angles |
for RAOs that are between the values in the table (which must be |
determined using interpolation) to be calculated incorrectly.

CONTROL SWITCHES

=====
MAX NUMBER STATIC ITERATIONS ..... 500
MAX DYNAMIC ITERATIONS PER STEP ... 500
BOUNDARY CONDITION LOGIC PARAMETER 5
TIME STEP STABILITY PARAMETER ..... 0
TYPE OF ANALYSIS ..... DYNAMIC
NUMBER OF PROBLEM DIMENSIONS ..... 3
DAVIT LIFT ANALYSIS ..... NO

STATIC SOLUTION CONVERGED IN ( 48 ) ITERATIONS

END OF INPUT DATA

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 2:42:16 PAGE 14
PROJECT - STATIC PIPE ANALYSIS 10 INCH JOB NO. - LAYING
USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1
=====

STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	HORIZ ANGLE (DEG )	VERT ANGLE (DEG )	PIPE LENGTH (M )	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES (MPA)		TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
1	LAYBARGE	64.20	4.42	0.00	0.000	1.482	0.00	0.00	0.00	0.23	0.00	0.23	0.07
3	LAYBARGE	59.72	4.30	0.00	0.000	1.554	4.48	-0.02	0.00	-20.12	0.00	20.14	5.60
5	LAYBARGE	48.23	4.00	0.00	0.000	1.477	15.98	-0.08	0.00	-28.57	0.00	28.66	7.96
7	TENSIONR	38.10	3.73	0.00	0.000	1.453	26.11	9.31	0.00	-9.48	0.00	18.79	5.22
9	LAYBARGE	33.43	3.61	0.00	0.000	1.531	30.78	9.28	0.00	-9.06	0.00	18.34	5.10
11	TENSIONR	26.65	3.43	0.00	0.000	1.446	37.57	18.69	0.00	5.48	0.00	24.17	6.71
13	LAYBARGE	21.33	3.30	0.00	0.000	1.400	42.89	18.66	0.00	-7.74	0.00	26.40	7.33
15	LAYBARGE	12.14	2.98	0.00	0.000	3.342	52.08	18.53	0.00	-243.94	-0.01	262.47	72.91

17	LAYBARGE	-0.04	1.76	0.00	0.000	8.131	64.32	18.29	0.00	-239.31	0.02	257.61	71.56
20	STINGER	-8.10	0.35	0.00	-0.001	11.548	72.51	18.04	0.00	-208.37	-0.09	226.41	62.89
22	STINGER	-15.89	-1.45	0.00	0.000	14.270	80.51	17.85	-0.16	-145.06	-0.29	162.99	45.28
24	STINGER	-23.62	-3.53	0.00	0.001	15.608	88.51	17.67	-0.38	-30.82	-0.08	48.69	13.52
26	STINGER	-30.73	-5.53	0.00	-0.002	15.645	95.90	17.48	-0.60	19.67	-0.58	37.46	10.41
28	STINGER	-36.79	-7.21	0.00	0.009	15.243	102.19	17.31	-0.78	41.21	1.27	58.93	16.37
30	STINGER	-39.69	-7.99	0.00	-0.019	14.972	105.19	17.23	-0.86	47.63	-10.15	66.37	18.43
32	SAGBEND	-41.70	-8.52	0.00	-0.063	14.763	107.27	17.18	-0.92	51.10	-8.67	69.47	19.30
33	SAGBEND	-43.64	-9.03	0.00	-0.095	14.550	109.27	17.13	-0.98	53.82	-6.55	71.84	19.96
34	SAGBEND	-45.57	-9.53	0.01	-0.119	14.327	111.27	17.08	-1.03	56.07	-4.83	73.88	20.52
35	SAGBEND	-47.51	-10.02	0.01	-0.136	14.095	113.27	17.03	-1.08	57.93	-3.44	75.61	21.00
36	SAGBEND	-49.45	-10.50	0.02	-0.148	13.857	115.27	16.98	-1.14	59.47	-2.32	77.07	21.41
37	SAGBEND	-51.40	-10.98	0.02	-0.156	13.613	117.27	16.94	-1.19	60.75	-1.42	78.30	21.75
38	SAGBEND	-53.34	-11.44	0.03	-0.160	13.364	119.27	16.89	-1.24	61.82	-0.69	79.34	22.04
39	SAGBEND	-55.29	-11.90	0.03	-0.162	13.112	121.27	16.85	-1.29	62.71	-0.09	80.21	22.28
40	SAGBEND	-57.24	-12.35	0.04	-0.161	12.856	123.27	16.80	-1.33	63.46	0.39	80.94	22.48
41	SAGBEND	-59.19	-12.79	0.04	-0.158	12.597	125.27	16.76	-1.38	64.10	0.78	81.56	22.66
42	SAGBEND	-61.14	-13.22	0.05	-0.155	12.336	127.27	16.72	-1.43	64.64	1.09	82.08	22.80
43	SAGBEND	-63.09	-13.65	0.05	-0.149	12.073	129.27	16.67	-1.47	65.10	1.34	82.53	22.93
44	SAGBEND	-65.05	-14.06	0.06	-0.143	11.808	131.27	16.63	-1.52	65.49	1.55	82.92	23.03
45	SAGBEND	-67.01	-14.46	0.06	-0.137	11.542	133.27	16.59	-1.56	65.84	1.71	83.24	23.12
46	SAGBEND	-68.97	-14.86	0.07	-0.129	11.274	135.27	16.55	-1.61	66.13	1.84	83.53	23.20
47	SAGBEND	-70.93	-15.25	0.07	-0.122	11.005	137.27	16.52	-1.65	66.40	1.94	83.78	23.27
48	SAGBEND	-72.90	-15.62	0.08	-0.113	10.735	139.27	16.48	-1.69	66.63	2.02	83.99	23.33
49	SAGBEND	-74.86	-15.99	0.08	-0.105	10.465	141.27	16.44	-1.73	66.83	2.08	84.18	23.38
50	SAGBEND	-76.83	-16.35	0.08	-0.096	10.193	143.27	16.41	-1.77	67.01	2.13	84.35	23.43
51	SAGBEND	-78.80	-16.70	0.09	-0.087	9.921	145.27	16.37	-1.80	67.18	2.17	84.50	23.47
52	SAGBEND	-80.77	-17.04	0.09	-0.078	9.648	147.27	16.34	-1.84	67.32	2.19	84.63	23.51
53	SAGBEND	-82.74	-17.37	0.09	-0.069	9.375	149.27	16.31	-1.88	67.46	2.21	84.75	23.54
54	SAGBEND	-84.72	-17.69	0.09	-0.060	9.101	151.27	16.27	-1.91	67.58	2.22	84.86	23.57
55	SAGBEND	-86.69	-18.00	0.10	-0.051	8.827	153.27	16.24	-1.95	67.69	2.23	84.96	23.60
56	SAGBEND	-88.67	-18.30	0.10	-0.042	8.552	155.27	16.21	-1.98	67.79	2.23	85.04	23.62
57	SAGBEND	-90.65	-18.60	0.10	-0.033	8.277	157.27	16.19	-2.01	67.88	2.23	85.12	23.64
58	SAGBEND	-92.63	-18.88	0.10	-0.024	8.001	159.27	16.16	-2.04	67.95	2.22	85.19	23.66
59	SAGBEND	-94.61	-19.15	0.10	-0.014	7.725	161.27	16.13	-2.07	68.03	2.21	85.25	23.68

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/2/2020      TIME - 2:42:16      PAGE 15

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS VERT (MPA)	HORIZ STRESS (MPA)	TOTAL STRESS (MPA)	PERCENT YIELD (PCT)
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60	SAGBEND	-96.59	-19.42	0.10	-0.005	7.449	163.27	16.10	-2.10	68.09	2.20	85.29	23.69
61	SAGBEND	-98.58	-19.67	0.10	0.004	7.173	165.27	16.08	-2.13	68.14	2.19	85.33	23.70
62	SAGBEND	-100.56	-19.92	0.10	0.012	6.896	167.27	16.06	-2.15	68.17	2.18	85.36	23.71
63	SAGBEND	-102.55	-20.15	0.10	0.021	6.620	169.27	16.03	-2.18	68.20	2.16	85.38	23.72
64	SAGBEND	-104.53	-20.38	0.10	0.030	6.343	171.27	16.01	-2.20	68.21	2.14	85.38	23.72
65	SAGBEND	-106.52	-20.60	0.10	0.039	6.066	173.27	15.99	-2.23	68.21	2.12	85.36	23.71
66	SAGBEND	-108.51	-20.80	0.10	0.047	5.790	175.27	15.97	-2.25	68.18	2.10	85.33	23.70
67	SAGBEND	-110.50	-21.00	0.10	0.056	5.513	177.27	15.95	-2.27	68.14	2.07	85.28	23.69
68	SAGBEND	-112.49	-21.19	0.09	0.064	5.237	179.27	15.93	-2.29	68.07	2.04	85.20	23.67
69	SAGBEND	-114.48	-21.36	0.09	0.072	4.961	181.27	15.91	-2.31	67.97	2.00	85.09	23.64
70	SAGBEND	-116.48	-21.53	0.09	0.081	4.686	183.27	15.90	-2.33	67.83	1.96	84.95	23.60
71	SAGBEND	-118.47	-21.69	0.09	0.088	4.411	185.27	15.88	-2.34	67.65	1.91	84.76	23.54
72	SAGBEND	-120.47	-21.84	0.08	0.096	4.137	187.27	15.87	-2.36	67.42	1.85	84.52	23.48
73	SAGBEND	-122.46	-21.98	0.08	0.103	3.864	189.27	15.85	-2.38	67.13	1.78	84.22	23.39
74	SAGBEND	-124.46	-22.11	0.08	0.111	3.592	191.27	15.84	-2.39	66.76	1.70	83.84	23.29
75	SAGBEND	-126.45	-22.23	0.07	0.117	3.322	193.27	15.83	-2.40	66.30	1.60	83.37	23.16
76	SAGBEND	-128.45	-22.34	0.07	0.124	3.055	195.27	15.82	-2.41	65.73	1.49	82.80	23.00
77	SAGBEND	-130.45	-22.44	0.06	0.129	2.789	197.27	15.81	-2.43	65.03	1.34	82.09	22.80
78	SAGBEND	-132.45	-22.54	0.06	0.134	2.527	199.27	15.80	-2.44	64.16	1.17	81.22	22.56
79	SAGBEND	-134.44	-22.62	0.05	0.139	2.269	201.27	15.79	-2.44	63.10	0.97	80.15	22.26
80	SAGBEND	-136.44	-22.69	0.05	0.142	2.016	203.27	15.78	-2.45	61.81	0.72	78.85	21.90
81	SAGBEND	-138.44	-22.76	0.04	0.145	1.768	205.27	15.78	-2.46	60.22	0.42	77.26	21.46
82	SAGBEND	-140.44	-22.82	0.04	0.146	1.527	207.27	15.77	-2.47	58.28	0.05	75.32	20.92
83	SAGBEND	-142.44	-22.87	0.03	0.145	1.296	209.27	15.77	-2.47	55.92	-0.39	72.96	20.27
84	SAGBEND	-144.44	-22.91	0.03	0.142	1.074	211.27	15.76	-2.48	53.04	-0.93	70.08	19.47
85	SAGBEND	-146.44	-22.94	0.02	0.137	0.866	213.27	15.76	-2.48	49.52	-1.59	66.58	18.50
86	SAGBEND	-148.44	-22.97	0.02	0.129	0.674	215.27	15.76	-2.48	45.24	-2.35	62.34	17.32
87	SAGBEND	-150.44	-22.99	0.01	0.118	0.500	217.27	15.76	-2.48	40.03	-3.20	57.19	15.89
88	SEABED	-152.44	-23.00	0.01	0.103	0.350	219.27	15.76	-2.49	33.68	-4.17	50.98	14.16
89	SEABED	-154.44	-23.01	0.01	0.085	0.228	221.27	15.75	-2.49	26.57	-4.82	44.06	12.24
90	SEABED	-156.44	-23.02	0.00	0.065	0.135	223.27	15.75	-2.49	19.71	-4.72	37.33	10.37
91	SEABED	-158.44	-23.02	0.00	0.047	0.067	225.27	15.75	-2.49	13.73	-4.15	31.42	8.73
92	SEABED	-160.44	-23.03	0.00	0.032	0.022	227.27	15.75	-2.49	8.87	-3.38	26.58	7.38
93	SEABED	-162.44	-23.03	0.00	0.020	-0.006	229.27	15.76	-2.49	5.17	-2.58	22.88	6.36
94	SEABED	-164.44	-23.02	0.00	0.011	-0.022	231.27	15.76	-2.49	2.52	-1.85	20.24	5.62
95	SEABED	-166.44	-23.02	0.00	0.004	-0.028	233.27	15.76	-2.49	0.75	-1.23	18.57	5.16
96	SEABED	-168.44	-23.02	0.00	0.000	-0.029	235.27	15.76	-2.49	-0.34	-0.75	17.95	4.99
97	SEABED	-170.44	-23.02	0.00	-0.002	-0.026	237.27	15.76	-2.49	-0.92	-0.40	18.13	5.04
98	SEABED	-172.44	-23.02	0.00	-0.003	-0.022	239.27	15.76	-2.49	-1.15	-0.16	18.29	5.08

99	SEABED	-174.44	-23.02	0.00	-0.003	-0.017	241.27	15.76	-2.49	-1.16	0.00	18.29	5.08
100	SEABED	-176.44	-23.02	0.00	-0.003	-0.013	243.27	15.76	-2.49	-1.04	0.08	18.18	5.05
101	SEABED	-178.44	-23.02	0.00	-0.003	-0.009	245.27	15.76	-2.49	-0.87	0.12	18.00	5.00
102	SEABED	-180.44	-23.02	0.00	-0.002	-0.006	247.27	15.76	-2.49	-0.67	0.13	17.82	4.95
103	SEABED	-182.44	-23.02	0.00	-0.002	-0.003	249.27	15.76	-2.49	-0.49	0.12	17.64	4.90

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 2:42:16      PAGE 16

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M )	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ STRESS (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
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104	SEABED	-184.44	-23.02	0.00	-0.001	-0.001	251.27	15.76	-2.49	-0.34	0.11	17.49	4.86
105	SEABED	-186.44	-23.02	0.00	-0.001	0.000	253.27	15.76	-2.49	-0.21	0.08	17.36	4.82
106	SEABED	-188.44	-23.02	0.00	0.000	0.000	255.27	15.76	-2.49	-0.12	0.06	17.27	4.80
107	SEABED	-190.44	-23.02	0.00	0.000	0.001	257.27	15.76	-2.49	-0.06	0.04	17.21	4.78
108	SEABED	-192.44	-23.02	0.00	0.000	0.001	259.27	15.76	-2.49	-0.01	0.03	17.17	4.77
109	SEABED	-194.44	-23.02	0.00	0.000	0.001	261.27	15.76	-2.49	0.01	0.02	17.16	4.77
110	SEABED	-196.44	-23.02	0.00	0.000	0.001	263.27	15.76	-2.49	0.03	0.01	17.16	4.77
111	SEABED	-198.44	-23.02	0.00	0.000	0.001	265.27	15.76	-2.49	0.03	0.00	17.17	4.77
112	SEABED	-200.44	-23.02	0.00	0.000	0.000	267.27	15.76	-2.49	0.03	0.00	17.16	4.77
113	SEABED	-202.44	-23.02	0.00	0.000	0.000	269.27	15.76	-2.49	0.02	0.00	17.16	4.77
114	SEABED	-204.44	-23.02	0.00	0.000	0.000	271.27	15.76	-2.49	0.02	0.00	17.15	4.76
115	SEABED	-206.44	-23.02	0.00	0.000	0.000	273.27	15.76	-2.49	0.01	0.00	17.15	4.76
116	SEABED	-208.44	-23.02	0.00	0.000	0.000	275.27	15.76	-2.49	0.01	0.00	17.14	4.76
117	SEABED	-210.44	-23.02	0.00	0.000	0.000	277.27	15.76	-2.49	0.00	0.00	17.14	4.76
118	SEABED	-212.44	-23.02	0.00	0.000	0.000	279.27	15.76	-2.49	0.00	0.00	17.14	4.76

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 2:42:16      PAGE 17

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACTION HORIZ (KN )	SUPT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	BENDING MOMENTS VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
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1	LAYBARGE	64.20	4.42	0.00	0.74	0.00	0.00	0.00	0.00	0.15	0.00	0.15	
3	LAYBARGE	59.72	4.30	0.00	19.39	0.00	0.00	0.00	-0.24	-13.00	0.00	13.00	
5	LAYBARGE	48.23	4.00	0.00	23.76	0.00	0.00	0.00	-0.86	-18.46	0.00	18.46	
7	TENSIONR	38.10	3.73	0.00	13.95	0.00	0.00	0.00	96.68	-6.13	0.00	6.13	
9	LAYBARGE	33.43	3.61	0.00	12.74	0.00	0.00	0.00	96.43	-5.85	0.00	5.85	
11	TENSIONR	26.65	3.43	0.00	9.46	0.00	0.00	0.00	194.14	3.54	0.00	3.54	
13	LAYBARGE	21.33	3.30	0.00	0.00	0.00	0.01	0.00	193.88	-5.00	0.00	5.00	
15	LAYBARGE	12.14	2.98	0.00	52.33	0.00	0.00	0.00	192.46	-157.63	0.00	157.63	
17	LAYBARGE	-0.04	1.76	0.00	36.91	0.01	0.00	0.00	190.02	-154.64	0.01	154.64	
20	STINGER	-8.10	0.35	0.00	23.56	-0.14	0.00	0.00	187.38	-134.65	-0.06	134.65	
22	STINGER	-15.89	-1.45	0.00	15.81	-0.35	0.00	0.00	186.32	-93.73	-0.19	93.73	
24	STINGER	-23.62	-3.53	0.00	0.00	-0.21	0.08	0.00	185.66	-19.92	-0.05	19.92	
26	STINGER	-30.73	-5.53	0.00	0.00	-0.58	0.32	0.00	184.80	12.71	-0.37	12.72	
28	STINGER	-36.79	-7.21	0.00	0.00	3.14	0.76	0.00	184.05	26.63	0.82	26.64	
30	STINGER	-39.69	-7.99	0.00	0.00	-4.00	1.46	0.00	183.71	30.78	-6.56	31.47	
32	SAGBEND	-41.70	-8.52	0.00	0.00	0.00	0.00	0.00	183.47	33.02	-5.60	33.49	
33	SAGBEND	-43.64	-9.03	0.00	0.00	0.00	0.00	0.00	183.25	34.78	-4.23	35.04	
34	SAGBEND	-45.57	-9.53	0.01	0.00	0.00	0.00	0.00	183.03	36.23	-3.12	36.37	
35	SAGBEND	-47.51	-10.02	0.01	0.00	0.00	0.00	0.00	182.81	37.43	-2.22	37.50	
36	SAGBEND	-49.45	-10.50	0.02	0.00	0.00	0.00	0.00	182.60	38.43	-1.50	38.46	
37	SAGBEND	-51.40	-10.98	0.02	0.00	0.00	0.00	0.00	182.39	39.25	-0.92	39.27	
38	SAGBEND	-53.34	-11.44	0.03	0.00	0.00	0.00	0.00	182.19	39.94	-0.44	39.95	
39	SAGBEND	-55.29	-11.90	0.03	0.00	0.00	0.00	0.00	181.99	40.52	-0.06	40.52	
40	SAGBEND	-57.24	-12.35	0.04	0.00	0.00	0.00	0.00	181.79	41.01	0.25	41.01	
41	SAGBEND	-59.19	-12.79	0.04	0.00	0.00	0.00	0.00	181.60	41.42	0.50	41.42	
42	SAGBEND	-61.14	-13.22	0.05	0.00	0.00	0.00	0.00	181.41	41.77	0.70	41.77	
43	SAGBEND	-63.09	-13.65	0.05	0.00	0.00	0.00	0.00	181.23	42.07	0.87	42.07	
44	SAGBEND	-65.05	-14.06	0.06	0.00	0.00	0.00	0.00	181.05	42.32	1.00	42.33	
45	SAGBEND	-67.01	-14.46	0.06	0.00	0.00	0.00	0.00	180.87	42.54	1.11	42.56	
46	SAGBEND	-68.97	-14.86	0.07	0.00	0.00	0.00	0.00	180.70	42.73	1.19	42.75	
47	SAGBEND	-70.93	-15.25	0.07	0.00	0.00	0.00	0.00	180.53	42.90	1.25	42.92	
48	SAGBEND	-72.90	-15.62	0.08	0.00	0.00	0.00	0.00	180.37	43.05	1.31	43.07	
49	SAGBEND	-74.86	-15.99	0.08	0.00	0.00	0.00	0.00	180.21	43.18	1.35	43.21	
50	SAGBEND	-76.83	-16.35	0.08	0.00	0.00	0.00	0.00	180.05	43.30	1.38	43.32	
51	SAGBEND	-78.80	-16.70	0.09	0.00	0.00	0.00	0.00	179.90	43.41	1.40	43.43	
52	SAGBEND	-80.77	-17.04	0.09	0.00	0.00	0.00	0.00	179.75	43.50	1.42	43.53	
53	SAGBEND	-82.74	-17.37	0.09	0.00	0.00	0.00	0.00	179.61	43.59	1.43	43.61	
54	SAGBEND	-84.72	-17.69	0.09	0.00	0.00	0.00	0.00	179.47	43.67	1.44	43.69	
55	SAGBEND	-86.69	-18.00	0.10	0.00	0.00	0.00	0.00	179.33	43.74	1.44	43.76	
56	SAGBEND	-88.67	-18.30	0.10	0.00	0.00	0.00	0.00	179.20	43.80	1.44	43.83	
57	SAGBEND	-90.65	-18.60	0.10	0.00	0.00	0.00	0.00	179.07	43.86	1.44	43.88	



58	SAGBEND	-92.63	-18.88	0.10	0.00	0.00	0.00	0.00	178.95	43.91	1.44	43.93
59	SAGBEND	-94.61	-19.15	0.10	0.00	0.00	0.00	0.00	178.83	43.96	1.43	43.98

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 2:42:16      PAGE 18

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES												
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NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS	
					VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
60	SAGBEND	-96.59	-19.42	0.10	0.00	0.00	0.00	0.00	178.72	44.00	1.42	44.02
61	SAGBEND	-98.58	-19.67	0.10	0.00	0.00	0.00	0.00	178.61	44.03	1.42	44.05
62	SAGBEND	-100.56	-19.92	0.10	0.00	0.00	0.00	0.00	178.50	44.05	1.41	44.08
63	SAGBEND	-102.55	-20.15	0.10	0.00	0.00	0.00	0.00	178.40	44.07	1.40	44.09
64	SAGBEND	-104.53	-20.38	0.10	0.00	0.00	0.00	0.00	178.30	44.08	1.38	44.10
65	SAGBEND	-106.52	-20.60	0.10	0.00	0.00	0.00	0.00	178.21	44.07	1.37	44.10
66	SAGBEND	-108.51	-20.80	0.10	0.00	0.00	0.00	0.00	178.12	44.06	1.35	44.08
67	SAGBEND	-110.50	-21.00	0.10	0.00	0.00	0.00	0.00	178.03	44.03	1.34	44.05
68	SAGBEND	-112.49	-21.19	0.09	0.00	0.00	0.00	0.00	177.95	43.99	1.32	44.01
69	SAGBEND	-114.48	-21.36	0.09	0.00	0.00	0.00	0.00	177.87	43.92	1.29	43.94
70	SAGBEND	-116.48	-21.53	0.09	0.00	0.00	0.00	0.00	177.80	43.83	1.27	43.85
71	SAGBEND	-118.47	-21.69	0.09	0.00	0.00	0.00	0.00	177.73	43.72	1.23	43.73
72	SAGBEND	-120.47	-21.84	0.08	0.00	0.00	0.00	0.00	177.67	43.57	1.20	43.58
73	SAGBEND	-122.46	-21.98	0.08	0.00	0.00	0.00	0.00	177.61	43.38	1.15	43.39
74	SAGBEND	-124.46	-22.11	0.08	0.00	0.00	0.00	0.00	177.55	43.14	1.10	43.15
75	SAGBEND	-126.45	-22.23	0.07	0.00	0.00	0.00	0.00	177.50	42.84	1.04	42.85
76	SAGBEND	-128.45	-22.34	0.07	0.00	0.00	0.00	0.00	177.45	42.47	0.96	42.48
77	SAGBEND	-130.45	-22.44	0.06	0.00	0.00	0.00	0.00	177.41	42.02	0.87	42.03
78	SAGBEND	-132.45	-22.54	0.06	0.00	0.00	0.00	0.00	177.37	41.46	0.76	41.47
79	SAGBEND	-134.44	-22.62	0.05	0.00	0.00	0.00	0.00	177.34	40.78	0.63	40.78
80	SAGBEND	-136.44	-22.69	0.05	0.00	0.00	0.00	0.00	177.30	39.94	0.47	39.94
81	SAGBEND	-138.44	-22.76	0.04	0.00	0.00	0.00	0.00	177.28	38.91	0.27	38.92
82	SAGBEND	-140.44	-22.82	0.04	0.00	0.00	0.00	0.00	177.26	37.66	0.03	37.66
83	SAGBEND	-142.44	-22.87	0.03	0.00	0.00	0.00	0.00	177.24	36.14	-0.25	36.14
84	SAGBEND	-144.44	-22.91	0.03	0.00	0.00	0.00	0.00	177.22	34.27	-0.60	34.28
85	SAGBEND	-146.44	-22.94	0.02	0.00	0.00	0.00	0.00	177.21	32.00	-1.03	32.02
86	SAGBEND	-148.44	-22.97	0.02	0.00	0.00	0.00	0.00	177.21	29.23	-1.52	29.27
87	SAGBEND	-150.44	-22.99	0.01	0.00	0.00	0.00	0.00	177.20	25.86	-2.07	25.95
88	SEABED	-152.44	-23.00	0.01	0.19	-0.15	0.00	0.00	177.20	21.77	-2.69	21.93
89	SEABED	-154.44	-23.01	0.01	0.62	-0.31	0.00	0.00	177.20	17.17	-3.11	17.45
90	SEABED	-156.44	-23.02	0.00	0.90	-0.21	0.00	0.00	177.21	12.74	-3.05	13.10
91	SEABED	-158.44	-23.02	0.00	1.06	-0.12	0.00	0.00	177.21	8.87	-2.68	9.27
92	SEABED	-160.44	-23.03	0.00	1.13	-0.05	0.00	0.00	177.21	5.73	-2.18	6.14
93	SEABED	-162.44	-23.03	0.00	1.14	-0.01	0.00	0.00	177.21	3.34	-1.67	3.74
94	SEABED	-164.44	-23.02	0.00	1.12	0.02	0.00	0.00	177.21	1.63	-1.19	2.02
95	SEABED	-166.44	-23.02	0.00	1.08	0.03	0.00	0.00	177.21	0.48	-0.80	0.93
96	SEABED	-168.44	-23.02	0.00	1.04	0.03	0.00	0.00	177.21	-0.22	-0.49	0.53
97	SEABED	-170.44	-23.02	0.00	0.99	0.03	0.00	0.00	177.21	-0.59	-0.26	0.65
98	SEABED	-172.44	-23.02	0.00	0.95	0.03	0.00	0.00	177.21	-0.74	-0.10	0.75
99	SEABED	-174.44	-23.02	0.00	0.92	0.02	0.00	0.00	177.21	-0.75	0.00	0.75
100	SEABED	-176.44	-23.02	0.00	0.90	0.02	0.00	0.00	177.21	-0.68	0.05	0.68
101	SEABED	-178.44	-23.02	0.00	0.88	0.01	0.00	0.00	177.21	-0.56	0.08	0.57
102	SEABED	-180.44	-23.02	0.00	0.87	0.01	0.00	0.00	177.21	-0.44	0.09	0.44
103	SEABED	-182.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	-0.32	0.08	0.33

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 2:42:16      PAGE 19

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

=====

=====												
STATIC PIPE COORDINATES, FORCES AND STRESSES												
=====												
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS	
					VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
104	SEABED	-184.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.22	0.07	0.23
105	SEABED	-186.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.14	0.05	0.15
106	SEABED	-188.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.08	0.04	0.09
107	SEABED	-190.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.04	0.03	0.05
108	SEABED	-192.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.01	0.02	0.02
109	SEABED	-194.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	0.01	0.01	0.01
110	SEABED	-196.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.01	0.02
111	SEABED	-198.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02
112	SEABED	-200.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02
113	SEABED	-202.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02
114	SEABED	-204.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.01	0.00	0.01
115	SEABED	-206.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.01	0.00	0.01
116	SEABED	-208.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.00	0.00	0.00
117	SEABED	-210.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.00	0.00	0.00
118	SEABED	-212.44	-23.02	0.00	0.00	0.00	0.00	0.00	177.21	0.00	0.00	0.00

STATIC SOLUTION SUMMARY

PIPE PROPERTIES ( 1 )

PIPE SECTION LENGTH ...	0.00 M	ELASTIC MODULUS .....	207000. MPA
OUTSIDE DIAMETER .....	27.305 CM	CROSS SECTIONAL AREA .	103.82 CM^2
WALL THICKNESS .....	1.270 CM	MOMENT OF INERTIA ....	8817.6 CM^4
WEIGHT/LENGTH IN AIR .	2022.01 N/M	YIELD STRESS .....	360.00 MPA
SUBMERGED WGHT/LENG ..	434.28 N/M	STRESS INTENS FACTOR .	1.000
SPECIFIC GRAVITY .....	1.274	STEEL DENSITY .....	77008.0 N/M3
WRAP COAT THICKNESS ..	0.320 CM	WRAP COAT DENSITY ....	9339.1 N/M3
CONCRETE THICKNESS ...	4.000 CM	CONCRETE DENSITY .....	29822.0 N/M3

BARGE DATA

TOTAL PIPE TENSION ...	196.13 KN	RADIUS OF CURVATURE ..	0.00 M
NUMBER OF TENSIONERS .	2	BARGE TRIM ANGLE .....	0.500 DEG
NO. OF PIPE SUPPORTS .	7	PIPE ANGLE AT STERN ..	8.131 DEG
BARGE HEADING .....	0.000 DEG	OFFSET FROM R.O.W. ...	0.00 M

STINGER DATA

NO. OF PIPE SUPPORTS .	6	PIPE DEPTH AT STERN ..	-7.99 M
NO. STINGER SECTIONS .	6	PIPE ANGLE AT STERN ..	14.972 DEG
RADIUS OF CURVATURE ..	0.00 M	STINGER STERN DEPTH ..	-9.34 M
STINGER LENGTH .....	41.37 M		

SAGBEND DATA

WATER DEPTH .....	23.00 M	TENSION AT TOUCHDOWN .	177.20 KN
TOUCHDOWN X-COORD. ...	-151.82 M	BOTTOM SLOPE ANGLE ...	0.000 DEG
PROJECTED SPAN LENGTH	112.13 M	PIPE LENGTH GAIN .....	2.63 M

SOLUTION SUMMARY

NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACT HORIZ (KN)	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	0.7	0.0	0.2	0.2	0.
3	LAYBARGE	59.7	4.3	0.0	19.4	0.0	13.0	20.1	6.
5	LAYBARGE	48.2	4.0	0.0	23.8	0.0	18.5	28.7	8.
7	TENSIONR	38.1	3.7	0.0	13.9	0.0	6.1	18.8	5.
9	LAYBARGE	33.4	3.6	0.0	12.7	0.0	5.9	18.3	5.
11	TENSIONR	26.7	3.4	0.0	9.5	0.0	3.5	24.2	7.
13	LAYBARGE	21.3	3.3	0.0	0.0	0.0	5.0	26.4	7.
15	LAYBARGE	12.1	3.0	0.0	52.3	0.0	157.6	262.5	73.
17	LAYBARGE	0.0	1.8	0.0	36.9	0.0	154.6	257.6	72.
20	STINGER	-8.1	0.4	0.0	23.6	-0.1	134.6	226.4	63.
22	STINGER	-15.9	-1.4	0.0	15.8	-0.3	93.7	163.0	45.
24	STINGER	-23.6	-3.5	0.0	0.0	-0.2	19.9	48.7	14.

STATIC SOLUTION SUMMARY

26 STINGER	-30.7	-5.5	0.0	0.0	-0.6	12.7	37.5	10.
28 STINGER	-36.8	-7.2	0.0	0.0	3.1	26.6	58.9	16.
30 STINGER	-39.7	-8.0	0.0	0.0	-4.0	31.5	66.4	18.
64 SAGBEND	-104.5	-20.4	0.1	0.0	0.0	44.1	85.4	24.
88 SEABED	-152.4	-23.0	0.0	0.2	-0.2	21.9	51.0	14.

DYNAMIC SOLUTION SUMMARY

SEA STATE NUMBER ( 1 )

SEA STATE TYPE .....	WAVE SPECTRUM
NO. WAVE COMPONENTS ..	20
WAVE WATER DEPTH .....	23.0 M
MAX. WAVE FREQUENCY ..	3.0015 RA/S



SPECTRUM START TIME .. 0. SECS NO. RAOS IN TABLE .... 30  
 RAO SIGN CONVENTION .. BENTLEY MOSES

SEA STATE DEFINITION

=====

WAVE SPECTRUM TYPE ... JONSWAP (CLASSIC)  
 JONSWAP COEFFICIENT .. 0.008952 JONSWAP PEAK FACTOR .. 5.000  
 PEAK WAVE FREQUENCY .. 0.9498 RA/S

CALCULATED WAVE HEIGHTS

=====

SIGNIFICANT WAVE HT. . 2.413 M AVERAGE WAVE HEIGHT .. 1.572 M  
 MAXIMUM WAVE HEIGHT .. 4.851 M RMS WAVE HEIGHT ..... 1.741 M  
 TOTAL NUMBER OF WAVES 1907

===== SOLUTION SUMMARY =====

NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACT HORIZ (KN)	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	1.0	0.1	0.2	0.3	0.
3	LAYBARGE	59.7	4.3	0.0	20.9	0.8	13.9	21.6	6.
5	LAYBARGE	48.2	4.0	0.0	24.9	-0.6	19.4	30.2	8.
7	TENSIONR	38.1	3.7	0.0	15.0	-0.3	6.8	28.6	8.
9	LAYBARGE	33.5	3.6	0.0	14.5	0.3	7.7	28.3	8.
11	TENSIONR	26.7	3.4	0.0	11.8	0.4	7.1	35.6	10.
13	LAYBARGE	21.4	3.3	0.0	0.0	-1.1	7.3	39.3	11.
15	LAYBARGE	12.2	3.0	0.0	63.7	-2.0	168.9	288.6	80.
17	LAYBARGE	0.0	1.8	0.0	60.2	-3.3	177.3	292.8	81.
20	STINGER	-8.1	0.4	0.0	50.7	-5.4	153.9	265.8	74.
22	STINGER	-15.9	-1.3	0.0	61.9	-9.9	145.5	252.9	70.
24	STINGER	-23.7	-3.2	0.0	54.3	-10.8	108.5	195.6	54.
26	STINGER	-30.9	-5.0	0.0	58.1	14.0	115.0	205.5	57.
28	STINGER	-36.9	-6.6	0.0	16.0	86.0	103.4	187.5	52.
30	STINGER	-39.8	-7.3	0.0	-5.1	-107.7	182.4	308.5	86.
88	SEABED	-152.4	-22.6	0.3	1.9	-1.2	48.2	91.4	25.

**LAMPIRAN ANALISA DINAMIS PADA PIPA 10 INCH  
HEADING 90°**

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MMMMM      MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMM
MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM
MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM
MMM      MMM      MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMM      MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMM      MMM      MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMM      MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM      MMM
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MMMMMM      MMM      MMM      MMM      MMM      MMMMMMMMM  MMM      MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM

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*
*               O F F P I P E - 3 -- OFFSHORE PIPELINE ANALYSIS SYSTEM
*
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*
*   VERSION NO. - 3.02EX
*   RELEASED ON - 03/08/2016
*   LICENSED TO - PT Timas Suplindo
*
*****
*
* OFFPIPE IS A NONLINEAR, 3-DIMENSIONAL FINITE ELEMENT METHOD BASED PROGRAM FOR THE
* STATIC AND DYNAMIC ANALYSIS OF PROBLEMS ARISING IN THE DESIGN OF MARINE PIPELINES.
* THIS VERSION OF OFFPIPE MAY BE USED FOR THE ANALYSIS OF OFFSHORE PIPELAYING OPER-
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*           6554 AUDEN                 FACSIMILE: (713) 664-0962
*           HOUSTON, TEXAS 77005
*           U.S.A.                     EMAIL: SUPPORT@OFFPIPE.COM
*
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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX   PAGE 3
STATIC PIPE ANALYSIS 10 INCH
JOB NO. - LAYING                LICENSED BY - PT Timas Suplindo
USER ID - IK                    DATE - 5/2/2020   TIME - 2:56:48   CASE 1
=====

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INPUT DATA ECHO

```

PRINTED OUTPUT SELECTED
=====
STATIC PIPE FORCES AND STRESSES ... YES
STATIC SOLUTION SUMMARY ..... YES
DYNAMIC PIPE FORCES AND STRESSES .. NO
DYNAMIC RANGE OF PIPE DATA ..... NO
DYNAMIC TRACKING OF PIPE DATA ..... NO
OVERBEND PIPE SUPPORT GEOMETRY .... NO
STINGER BALLAST SCHEDULE DATA ..... NO
SUPPORT REACTIONS IN BARGE COORDS. . NO

INTERNAL FORCES IN PIPE & CABLE ... NO
INTERNAL FORCES IN STINGER ..... NO
PRINT PIPE STRAINS IN OUTPUT ..... NO
DNV OS-F101 COMPLIANCE REPORT ..... NO
API RP-1111 COMPLIANCE REPORT ..... NO
PRINT DNV/API FACTORS & PARAMETERS NO
USE THICK WALL HOOP STRESS EQN. ... NO
USE DNV 1981 FOR TOTAL PIPE STRESS NO

ENABLE/DISABLE WARNING MESSAGES ... ENABLE
GENERATE SPREAD SHEET PLOT FILE ... NO
GENERATE ASCII PLOT DATA FILES .... NO

```

PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX .....	1	
PLOT NUMBER .....	1	
PLOT TYPE OPTION NUMBER .....	1	
DYNAMIC PROFILE TIME POINT .....	0.000	
DYNAMIC PROFILE TIME INCREMENT .....	0.000	
ORDINATE PARAMETER CODE NUMBER .....	2	
AXIS LABEL FOR ORDINATE .....	"PIPE ELEVATION Y COORDINATE	"
ABSCISSA PARAMETER CODE NUMBER .....	1	
AXIS LABEL FOR ABSCISSA .....	"PIPE HORIZONTAL X COORDINATE	"
PLOT TITLE .....	"PIPELINE ELEVATION PROFILE AND PIPE STRESS	"
MINIMUM VERTICAL AXIS RANGE .....	0.000	
MAXIMUM VERTICAL AXIS RANGE .....	0.000	
MINIMUM HORIZONTAL AXIS RANGE .....	0.000	
MAXIMUM HORIZONTAL AXIS RANGE .....	0.000	

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 4  
 STATIC PIPE ANALISYS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:56:48 CASE 1

=====

INPUT DATA ECHO

PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX .....	2	
PLOT NUMBER .....	1	
PLOT TYPE OPTION NUMBER .....	1	
DYNAMIC PROFILE TIME POINT .....	0.000	
DYNAMIC PROFILE TIME INCREMENT .....	0.000	
ORDINATE PARAMETER CODE NUMBER .....	15	
AXIS LABEL FOR ORDINATE .....	"DNV YIELD STRESS PERCENTAGE	"
ABSCISSA PARAMETER CODE NUMBER .....	1	
AXIS LABEL FOR ABSCISSA .....	"PIPELINE HORIZONTAL X COORDINATE"	
PLOT TITLE .....	"PIPELINE ELEVATION PROFILE AND PIPE STRESS	"
MINIMUM VERTICAL AXIS RANGE .....	0.000	
MAXIMUM VERTICAL AXIS RANGE .....	0.000	
MINIMUM HORIZONTAL AXIS RANGE .....	0.000	
MAXIMUM HORIZONTAL AXIS RANGE .....	0.000	

PIPE PROPERTIES

=====

PROPERTY TABLE ROW NUMBER .....	1
PIPE SECTION LENGTH .....	0.000 METERS
STEEL MODULUS OF ELASTICITY .....	207000. M-PASCAL
STEEL CROSS SECTIONAL AREA .....	103.822 CM <sup>2</sup>
COATED PIPE AVG MOMENT OF INERTIA .....	8817.56 CM <sup>4</sup>
WEIGHT PER-UNIT-LENGTH IN AIR .....	2022.01 N/M
WEIGHT PER-UNIT-LENGTH SUBMERGED .....	434.28 N/M
MAXIMUM ALLOWABLE PIPE STRAIN .....	0.205000 PERCENT
STEEL OUTSIDE DIAMETER .....	27.3050 CM
STEEL WALL THICKNESS .....	1.2700 CM
YIELD STRESS .....	360.00 M-PASCAL
STRESS/STRAIN INTENSE FACTOR .....	0.0000
HYDRODYNAMIC OUTSIDE DIAMETER .....	0.000 CM
DRAG COEFFICIENT .....	0.0000
HYDRODYNAMIC TOTAL AREA .....	0.000 CM <sup>2</sup>
ADDED MASS COEFFICIENT .....	0.0000
POISSON'S RATIO .....	0.3000
COEFFICIENT OF THERMAL EXPANSION .....	0.00001100 1/DEG C

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 5  
 STATIC PIPE ANALISYS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:56:48 CASE 1

=====

INPUT DATA ECHO

PIPE COATING PROPERTIES

=====

PIPE PROPERTY TABLE INDEX .....	1
CORROSION COATING THICKNESS .....	0.320 CM
CORROSION COATING WEIGHT DENSITY .....	9339.1 N/M <sup>3</sup>
CORROSION COATING ELASTIC MODULUS .....	0.000 M-PASCAL
CONCRETE COATING THICKNESS .....	4.000 CM
CONCRETE COATING WEIGHT DENSITY .....	29822. N/M <sup>3</sup>
CONCRETE COATING ELASTIC MODULUS .....	0.000 M-PASCAL
DESIRED PIPE SPECIFIC GRAVITY .....	0.0000
CONCRETE STIFFENING EFFECTIVENESS .....	0.000
NO NOT CALC. STRESS FOR BARE PIPE .....	NO

AVERAGE LENGTH OF PIPE JOINT ..... 12.200 METERS  
 EFFECTIVE FIELD JOINT LENGTH ..... 0.300 METERS  
 FIELD JOINT FILL WEIGHT DENSITY ... 10055.3 N/M^3  
 FIELD JOINT FILL ELASTIC MODULUS... 0.000 M-PASCAL  
 FIELD JOINT STIFFENING EFFECT. .... 0.000  
 FIELD JOINT BENDING MODEL ..... 0 IGNORE COATING STIFFNESS  
 WEIGHT DENSITY OF STEEL ..... 77008. N/M^3  
 WEIGHT DENSITY OF PIPE CONTENTS ... 0.0 N/M^3  
 REF. ELEVATION FOR STATIC HEAD .... 0.00 METERS  
 FREE FLOOD PIPE DURING PIPELAY ... NO

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 6  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:56:48 CASE 1  
 =====

INPUT DATA ECHO

PIPELAY VESSEL DESCRIPTION

=====  
 NUMBER OF PIPE NODES ..... 9  
 BARGE GEOMETRY SPECIFIED BY ..... 1 X-Y COORDINATES  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.000 METERS  
 ADJUST Y COORDINATES MANUALLY .... NO  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 PIPE ANGLE RELATIVE TO DECK ..... 0.0000 DEGREES  
 HEIGHT OF DECK ABOVE WATER ..... 2.400 METERS  
 LAYBARGE FORWARD (X) OFFSET ..... 0.000 METERS  
 BARGE TRIM ANGLE ..... 0.5000 DEGREES  
  
 STERN SHOE X COORDINATE ..... 0.000 METERS  
 STERN SHOE Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER X COORDINATE ..... 43.820 METERS  
 ROTATION CENTER Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER Z COORDINATE ..... 6.370 METERS  
 BARGE HEADING ..... 0.0000 DEGREES  
 BARGE OFFSET FROM RIGHT-OF-WAY .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT VERTICAL ANGLE ... 0.000 DEGREES  
 PIPE RAMP PIVOT Z COORDINATE ..... 0.000 METERS  
 PIPE RAMP HEADING ON DECK ..... 0.000 DEGREES  
 ROLE OF ALTERNATE WAVE ORIGIN .... 0 MOTIONS & WAVES AT CENTER OF MOTION  
 WAVE PHASE ORIGIN X COORDINATE .... 0.000  
 WAVE PHASE ORIGIN Y COORDINATE .... 0.000 METERS  
 WAVE PHASE ORIGIN Z COORDINATE .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE .....

NODE X COORD (M )	NODE Y COORD (M )	SUPPORT TYPE	DAVIT SPACING (M )
64.220	1.838	1 SIMPLE SUPPORT	0.000
59.740	1.760	1 SIMPLE SUPPORT	0.000
48.240	1.560	1 SIMPLE SUPPORT	0.000
38.110	1.383	2 PIPE TENSIONER	0.000
33.440	1.302	1 SIMPLE SUPPORT	0.000
26.660	1.183	2 PIPE TENSIONER	0.000
21.340	1.092	7 USER DEFINED SPT	0.000
12.150	0.860	7 USER DEFINED SPT	0.000
-0.040	-0.260	8 USER DEFINED SPT	0.000

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 7  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:56:48 CASE 1  
 =====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====  
 SUPPORT PROPERTY TABLE INDEX ..... 2  
 SUPPORT ELEMENT TYPE ..... 2 TENSIONER  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
  
 BOTTOM ROLLER ANGLE TO HORIZONTAL . 0.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES



SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 7  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 1.600 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 8  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 2:56:48 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 8  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

STINGER DESCRIPTION

=====

NUMBER OF PIPE/STINGER NODES ..... 6  
 STINGER GEOMETRY SPECIFIED BY ..... 2 X-Y COORD AND MATCH PT  
 STINGER TYPE ..... 1 FIXED GEOMETRY OR RAMP  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.00 METERS  
 HITCH X-COORDINATE ..... 0.497 METERS  
 HITCH Y-COORDINATE ..... -1.800 METERS  
 HITCH ANGULAR ORIENTATION ..... 0.000 DEGREES

X COORDINATE OF LOCAL ORIGIN ..... 0.497 METERS  
 Y COORDINATE OF LOCAL ORIGIN ..... -1.800 METERS  
 ROTATION ABOUT STINGER HITCH ..... 13.500 DEGREES  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 TANGENT POINT ANGLE ..... 0.000 DEGREES

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	ELEMENT TYPE	ELEMENT LENGTH ( M )
-8.325	2.209	1 SIMPLE SUPPORT	2 HINGED END	0.000
-16.325	2.349	1 SIMPLE SUPPORT	1 FIXED END	0.000
-24.325	2.119	1 SIMPLE SUPPORT	1 FIXED END	0.000
-31.699	1.660	1 SIMPLE SUPPORT	1 FIXED END	0.000
-37.949	1.069	1 SIMPLE SUPPORT	1 FIXED END	0.000
-40.949	0.350	1 SIMPLE SUPPORT	1 FIXED END	0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 9  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 2:56:48 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

```

=====
SUPPORT PROPERTY TABLE INDEX ..... 1
SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT
SUPPORT INITIAL STATE FLAG ..... 0
TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M
VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M
STATIC VERTICAL DEFLECTION ..... 0.0000 CM
LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES
SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES
SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS
BED ROLLER LENGTH ..... 1.640 METERS
HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS
TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
    
```

CURRENT VELOCITIES

```

=====
WATER DEPTH (M ) CURRENT SPEED (M/S ) DIRECTION OF TRAVEL (DEG )
=====
0.000 0.790 90.000
11.500 0.480 90.000
23.000 0.420 90.000
    
```

PIPE TENSION DATA

```

=====
STATIC PIPE TENSION ON LAY VESSEL . 196.133 K-NEWTON
MINIMUM DYNAMIC PIPE TENSION ..... 196.133 K-NEWTON
MAXIMUM DYNAMIC PIPE TENSION ..... 294.199 K-NEWTON
STATIC HORIZONTAL BOTTOM TENSION .. 0.000 K-NEWTON
NO. OF VALUES FOR TENSION PROFILE . 0
VALUES ARE FOR PIPE SPAN ANALYSIS . NO
MAXIMUM PIPE PAYOUT SPEED ..... 0.000 M/SEC
MAXIMUM PIPE TAKEUP SPEED ..... 0.000 M/SEC
    
```

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 10

STATIC PIPE ANALYSIS 10 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 2:56:48 CASE 1

=====  
 INPUT DATA ECHO

SAGBEND GEOMETRY

```

=====
SAGBEND PIPE ELEMENT LENGTH ..... 2.000 METERS
WATER DEPTH ..... 23.00 METERS
X-COORDINATE AT SPECIFIED DEPTH . . 0.00 METERS
ESTIMATED SAGBEND X LENGTH ..... 0.00 METERS
ESTIMATED PIPE LENGTH ON SEABED ... 0.00 METERS
X-COORD OF PIPE FREE END ON SEABED 0.00 METERS
X-COORD POINT OF FIXITY ON SEABED . 0.00 METERS
MAXIMUM SLOPE (ANGLE) OF SEABED ... 0.000 DEGREES
DIRECTION OF MAXIMUM SLOPE ..... 0.000 DEGREES

PIPE/CABLE SPAN END CONDITION ..... 0 PIPE/CABLE RESTING ON SEABED
PIPE/CABLE SPAN LENGTH GIVEN BY ... 0 SPECIFIED PIPE/CABLE TENSION
ESTIMATED SPAN DEPTH AT FREE END .. 0.00 METERS
PIPE VERTICAL ANGLE AT FREE END ... 0.000 DEGREES
BOTTOM HINGE OFFSET ..... 0.000 METERS
BOTTOM HINGE MINIMUM ANGLE ..... 0.000 DEGREES
BOTTOM HINGE MAXIMUM ANGLE ..... 0.000 DEGREES
    
```

SOIL ELEMENT PROPERTIES

```

=====
SOIL PROPERTY TABLE ROW INDEX ..... 1
SOIL ELEMENT TYPE (FUTURE USE) .... 0
PIPE INDEX OR SEGMENT NUMBER ..... 0
LONGITUDINAL SOIL STIFFNESS ..... 0.00 KN/M^2
VERTICAL SOIL STIFFNESS ..... 0.00 KN/M^2
LATERAL SOIL STIFFNESS ..... 0.00 KN/M^2
DEFLECTION UNDER REFERENCE LOAD ... 0.0000 CM

LONGITUDINAL COEF. OF FRICTION .... 0.000
LATERAL COEFFICIENT OF FRICTION ... 0.600
NUMBER OF INTEGRATION POINTS ..... 0
    
```

TIME INTEGRATION PARAMETERS

```

=====
TIME STEP LENGTH ..... 0.2000 SECONDS
MAXIMUM TIME OF INTEGRATION ..... 10860.000 SECONDS
SOLUTION SAMPLING TIME STEP ..... 0.400 SECONDS
    
```

SOLUTION SAMPLING STARTS AT TIME .. 60.000 SECONDS  
 DAMPING RATIO ..... 0.0000  
 NUMBER OF VARIABLE TIME STEPS ..... 0

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 11  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:56:48 CASE 1

=====

INPUT DATA ECHO

WAVE PARAMETERS

=====

SEA STATE ROW INDEX ..... 1  
 WAVE HEIGHT (PEAK TO TROUGH) ..... 1.800 METERS  
 WAVE PERIOD ..... 6.300 SECONDS  
 WAVE DIRECTION OF TRAVEL ..... 90.000 DEGREES  
 WATER DEPTH FOR WAVE CALCULATIONS . 23.00 METERS  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0

WAVE SPECTRUM EQUATION

=====

SEA STATE ROW INDEX ..... 1  
 WAVE SPECTRUM EQUATION TYPE ..... 7 JONSWAP (CLASSIC)  
 NUMBER OF WAVES IN SPECTRUM ..... 20  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0  
 MINIMUM PERIOD IN SPECTRUM ..... 2.0933 SECONDS  
 MAXIMUM PERIOD IN SPECTRUM ..... 62.8000 SECONDS  
 START TIME FOR WAVE SPECTRUM ..... 0. SECONDS  
 DIRECTION OF WAVE TRAVEL ..... 0.000 DEGREES  
 1ST JONSWAP COEF. (ALPHA) ..... 0.003223  
 2ND JONSWAP COEF. (GAMMA) ..... 5.0000  
 PEAK WAVE PERIOD ..... 6.6150 SECONDS

VESSEL MOTION RAO TABLE

=====

SEA STATE NUMBER ..... 1  
 USE PHASE LAG FOR RAOs ..... NO  
 VESSEL MOTIONS SIGN CONVENTION .... 2 BENTLEY MOSES  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD

WAVE PERIOD (SECONDS)	----- SURGE AMPLITUDE (M/M )	----- / PHASE (DEG)	----- SWAY AMPLITUDE (M/M )	----- / PHASE (DEG)	----- HEAVE AMPLITUDE (M/M )	----- / PHASE (DEG)
2.0900	0.0000	0.00	0.0280	-75.00	0.0040	110.00
2.1700	0.0000	0.00	0.0320	-115.00	0.0010	60.00
2.2400	0.0000	0.00	0.0370	-152.00	0.0020	19.00
2.3300	0.0000	0.00	0.0400	163.00	0.0020	-18.00
2.4200	0.0000	0.00	0.0460	127.00	0.0040	-55.00
2.5100	0.0000	0.00	0.0530	91.00	0.0030	-94.00
2.6200	0.0000	0.00	0.0610	58.00	0.0060	-127.00
2.7300	0.0000	0.00	0.0700	23.00	0.0080	-160.00
2.8500	0.0000	0.00	0.0810	-6.00	0.0110	167.00
2.9900	0.0000	0.00	0.0940	-35.00	0.0100	136.00
3.1400	0.0000	0.00	0.1100	-63.00	0.0190	108.00
3.3100	0.0000	0.00	0.1270	-89.00	0.0270	81.00

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 12  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 2:56:48 CASE 1

=====

WAVE PERIOD	----- ROLL AMPLITUDE	----- / PHASE	----- PITCH AMPLITUDE	----- / PHASE	----- YAW AMPLITUDE	----- / PHASE
3.4900	0.0000	0.00	0.1490	-113.00	0.0390	56.00
3.7000	0.0000	0.00	0.1740	-136.00	0.0550	33.00
3.9300	0.0000	0.00	0.2040	-157.00	0.0790	12.00
4.1900	0.0000	0.00	0.2380	-175.00	0.1150	-6.00
4.4900	0.0000	0.00	0.2790	167.00	0.1710	-21.00
4.8300	0.0000	0.00	0.3250	153.00	0.2610	-33.00
5.2400	0.0000	0.00	0.3750	141.00	0.4080	-40.00
5.7100	0.0000	0.00	0.4130	133.00	0.6330	-39.00
6.2800	0.0010	90.00	0.3730	123.00	0.8980	-29.00
6.9800	0.0010	53.00	0.4630	90.00	1.0560	-16.00
7.8500	0.0000	0.00	0.6880	88.00	1.0740	-6.00
8.9700	0.0000	0.00	0.7940	90.00	1.0460	-1.00
10.4700	0.0000	0.00	0.8610	90.00	1.0230	0.00
12.5600	0.0000	0.00	0.9110	90.00	1.0100	0.00
15.7000	0.0000	0.00	0.9480	90.00	1.0060	0.00
20.9300	0.0000	0.00	0.9730	90.00	1.0040	0.00
31.4000	0.0000	0.00	0.9890	90.00	1.0040	0.00
62.8000	0.0000	0.00	0.9980	90.00	1.0300	0.00

=====

(SECONDS)	(DEG/M)	(DEG)	(DEG/M)	(DEG)	(DEG/M)	(DEG)
2.0900	0.0330	-75.00	0.0000	0.00	0.0020	109.00
2.1700	0.0340	-116.00	0.0010	62.00	0.0020	69.00
2.2400	0.0250	-153.00	0.0010	22.00	0.0020	28.00
2.3300	0.0450	162.00	0.0020	-15.00	0.0030	-5.00
2.4200	0.0440	126.00	0.0020	-52.00	0.0030	-41.00
2.5100	0.0420	91.00	0.0030	-89.00	0.0030	-79.00
2.6200	0.0410	57.00	0.0030	-122.00	0.0030	-126.00
2.7300	0.0490	22.00	0.0040	-155.00	0.0040	-136.00
2.8500	0.0320	-7.00	0.0050	174.00	0.0040	-171.00
2.9900	0.0180	-38.00	0.0070	143.00	0.0040	161.00
3.1400	0.0030	137.00	0.0070	117.00	0.0040	134.00
3.3100	0.0420	92.00	0.0090	92.00	0.0040	113.00
3.4900	0.0910	67.00	0.0110	69.00	0.0040	92.00
3.7000	0.1680	44.00	0.0140	48.00	0.0040	75.00
3.9300	0.2860	23.00	0.0190	30.00	0.0040	61.00
4.1900	0.4660	4.00	0.0250	15.00	0.0040	54.00
4.4900	0.7490	-11.00	0.0340	5.00	0.0040	54.00
4.8300	1.2140	-25.00	0.0490	0.00	0.0040	63.00
5.2400	2.0450	-36.00	0.0730	4.00	0.0060	79.00
5.7100	3.7310	-37.00	0.1050	21.00	0.0100	98.00
6.2800	6.9230	-14.00	0.1270	53.00	0.0180	136.00
6.9800	7.9800	33.00	0.1080	90.00	0.0210	-167.00

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 13  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 2:56:48 CASE 1

INPUT DATA ECHO

7.8500	5.7520	69.00	0.0710	120.00	0.0140	-126.00
8.9700	3.6550	83.00	0.0440	137.00	0.0080	-109.00
10.4700	2.4010	89.00	0.0290	148.00	0.0050	-101.00
12.5600	1.5660	89.00	0.0220	155.00	0.0020	-101.00
15.7000	0.9690	90.00	0.0180	163.00	0.0000	0.00
20.9300	0.5340	90.00	0.0150	169.00	0.0010	92.00
31.4000	0.2350	90.00	0.0140	175.00	0.0020	90.00
62.8000	0.0580	90.00	0.0130	179.00	0.0030	90.00

\*\*\*\*\* INFORMATIVE MESSAGE NO. - 94 \*\*\*\*\*

One or more of the phase angles in the RAO table have been adjusted to minimize the difference in value between adjacent angles. If the phase angles are arbitrarily restricted by the software used to calculate the RAOs to a fixed range of values such as (0 to 2\*PI) or (-PI to +PI), then phase angles that are actually close in value can differ by as much as 2\*PI. These large differences can cause the phase angles for RAOs that are between the values in the table (which must be determined using interpolation) to be calculated incorrectly.

CONTROL SWITCHES

MAX NUMBER STATIC ITERATIONS ..... 500  
 MAX DYNAMIC ITERATIONS PER STEP ... 500  
 BOUNDARY CONDITION LOGIC PARAMETER 5  
 TIME STEP STABILITY PARAMETER ..... 0  
 TYPE OF ANALYSIS ..... DYNAMIC  
 NUMBER OF PROBLEM DIMENSIONS ..... 3  
 DAVIT LIFT ANALYSIS ..... NO

STATIC SOLUTION CONVERGED IN ( 44 ) ITERATIONS

END OF INPUT DATA

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 2:56:48 PAGE 14  
 PROJECT - STATIC PIPE ANALYSIS 10 INCH JOB NO. - LAYING  
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES (MPA)		TOTAL STRESS (MPA)	PERCENT YIELD (PCT)
1	LAYBARGE	64.20	4.42	0.00	0.000	1.482	0.00	0.00	0.00	0.23	0.00	0.23	0.07
3	LAYBARGE	59.72	4.30	0.00	0.000	1.554	4.48	-0.02	0.00	-20.12	0.00	20.14	5.60
5	LAYBARGE	48.23	4.00	0.00	0.000	1.477	15.98	-0.08	0.00	-28.57	0.00	28.66	7.96
7	TENSIONR	38.10	3.73	0.00	0.000	1.453	26.11	9.31	0.00	-9.48	0.00	18.79	5.22
9	LAYBARGE	33.43	3.61	0.00	0.000	1.531	30.78	9.28	0.00	-9.06	0.00	18.35	5.10
11	TENSIONR	26.65	3.43	0.00	0.000	1.446	37.57	18.69	0.00	5.49	0.00	24.18	6.72
13	LAYBARGE	21.33	3.30	0.00	0.000	1.400	42.89	18.66	0.00	-7.74	0.00	26.41	7.33
15	LAYBARGE	12.14	2.98	0.00	0.000	3.342	52.08	18.53	0.00	-243.98	-0.01	262.51	72.92

17	LAYBARGE	-0.04	1.76	0.00	0.000	8.130	64.32	18.29	0.00	-239.18	0.04	257.47	71.52
20	STINGER	-8.10	0.35	0.00	-0.001	11.552	72.51	18.04	0.00	-209.06	-0.17	227.09	63.08
22	STINGER	-15.89	-1.45	0.00	0.000	14.255	80.51	17.86	-0.16	-141.89	-0.56	159.82	44.40
24	STINGER	-23.62	-3.53	0.00	0.002	15.562	88.51	17.67	-0.38	-30.02	-0.15	47.89	13.30
26	STINGER	-30.74	-5.52	0.00	-0.005	15.595	95.90	17.48	-0.60	19.48	-1.15	37.29	10.36
28	STINGER	-36.79	-7.19	0.00	0.018	15.198	102.19	17.31	-0.78	40.68	2.53	58.47	16.24
30	STINGER	-39.69	-7.97	0.00	-0.039	14.930	105.19	17.23	-0.86	47.04	-20.19	68.86	19.13
32	SAGBEND	-41.71	-8.50	0.00	-0.126	14.724	107.27	17.18	-0.92	50.48	-17.27	71.00	19.72
33	SAGBEND	-43.64	-9.01	0.01	-0.189	14.513	109.27	17.13	-0.97	53.19	-13.07	72.40	20.11
34	SAGBEND	-45.58	-9.51	0.02	-0.236	14.293	111.27	17.08	-1.03	55.44	-9.67	73.87	20.52
35	SAGBEND	-47.52	-10.00	0.02	-0.271	14.064	113.27	17.03	-1.08	57.30	-6.92	75.29	20.91
36	SAGBEND	-49.46	-10.48	0.03	-0.295	13.829	115.27	16.99	-1.13	58.84	-4.70	76.59	21.27
37	SAGBEND	-51.40	-10.95	0.04	-0.311	13.587	117.27	16.94	-1.18	60.13	-2.91	77.74	21.59
38	SAGBEND	-53.35	-11.42	0.05	-0.320	13.341	119.27	16.89	-1.23	61.21	-1.46	78.74	21.87
39	SAGBEND	-55.29	-11.88	0.07	-0.323	13.091	121.27	16.85	-1.28	62.11	-0.28	79.61	22.11
40	SAGBEND	-57.24	-12.32	0.08	-0.322	12.837	123.27	16.80	-1.33	62.88	0.68	80.36	22.32
41	SAGBEND	-59.19	-12.76	0.09	-0.318	12.581	125.27	16.76	-1.38	63.53	1.45	81.00	22.50
42	SAGBEND	-61.15	-13.20	0.10	-0.310	12.322	127.27	16.72	-1.43	64.08	2.08	81.55	22.65
43	SAGBEND	-63.10	-13.62	0.11	-0.301	12.061	129.27	16.68	-1.47	64.56	2.59	82.03	22.79
44	SAGBEND	-65.06	-14.03	0.12	-0.289	11.798	131.27	16.64	-1.52	64.97	2.99	82.44	22.90
45	SAGBEND	-67.02	-14.44	0.13	-0.276	11.534	133.27	16.60	-1.56	65.32	3.32	82.79	23.00
46	SAGBEND	-68.98	-14.83	0.14	-0.262	11.268	135.27	16.56	-1.60	65.64	3.58	83.10	23.08
47	SAGBEND	-70.94	-15.22	0.15	-0.246	11.002	137.27	16.52	-1.64	65.91	3.79	83.37	23.16
48	SAGBEND	-72.90	-15.59	0.15	-0.230	10.734	139.27	16.48	-1.69	66.16	3.95	83.61	23.23
49	SAGBEND	-74.87	-15.96	0.16	-0.214	10.465	141.27	16.45	-1.73	66.37	4.08	83.82	23.28
50	SAGBEND	-76.84	-16.32	0.17	-0.197	10.195	143.27	16.41	-1.76	66.57	4.18	84.01	23.34
51	SAGBEND	-78.81	-16.67	0.18	-0.179	9.925	145.27	16.38	-1.80	66.75	4.26	84.18	23.38
52	SAGBEND	-80.78	-17.01	0.18	-0.162	9.654	147.27	16.34	-1.84	66.91	4.31	84.33	23.42
53	SAGBEND	-82.75	-17.34	0.19	-0.144	9.382	149.27	16.31	-1.87	67.06	4.35	84.46	23.46
54	SAGBEND	-84.72	-17.66	0.19	-0.126	9.110	151.27	16.28	-1.91	67.19	4.38	84.58	23.50
55	SAGBEND	-86.70	-17.97	0.20	-0.108	8.837	153.27	16.25	-1.94	67.32	4.40	84.70	23.53
56	SAGBEND	-88.68	-18.28	0.20	-0.090	8.564	155.27	16.22	-1.98	67.43	4.40	84.80	23.55
57	SAGBEND	-90.66	-18.57	0.20	-0.072	8.290	157.27	16.19	-2.01	67.53	4.41	84.89	23.58
58	SAGBEND	-92.63	-18.85	0.20	-0.054	8.016	159.27	16.16	-2.04	67.63	4.40	84.97	23.60
59	SAGBEND	-94.62	-19.13	0.21	-0.036	7.741	161.27	16.13	-2.07	67.71	4.39	85.04	23.62

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/2/2020      TIME - 2:56:48      PAGE 15

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCT YIELD (PCT)
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60	SAGBEND	-96.60	-19.39	0.21	-0.018	7.466	163.27	16.11	-2.10	67.78	4.37	85.10	23.64
61	SAGBEND	-98.58	-19.65	0.21	0.000	7.191	165.27	16.08	-2.12	67.85	4.35	85.15	23.65
62	SAGBEND	-100.57	-19.89	0.21	0.018	6.916	167.27	16.06	-2.15	67.90	4.33	85.19	23.66
63	SAGBEND	-102.55	-20.13	0.21	0.035	6.640	169.27	16.03	-2.18	67.94	4.30	85.22	23.67
64	SAGBEND	-104.54	-20.36	0.20	0.053	6.365	171.27	16.01	-2.20	67.96	4.27	85.23	23.68
65	SAGBEND	-106.53	-20.57	0.20	0.070	6.089	173.27	15.99	-2.22	67.97	4.23	85.23	23.67
66	SAGBEND	-108.52	-20.78	0.20	0.088	5.813	175.27	15.97	-2.25	67.96	4.19	85.21	23.67
67	SAGBEND	-110.51	-20.98	0.20	0.105	5.538	177.27	15.95	-2.27	67.93	4.14	85.17	23.66
68	SAGBEND	-112.50	-21.17	0.19	0.121	5.262	179.27	15.93	-2.29	67.88	4.09	85.10	23.64
69	SAGBEND	-114.49	-21.34	0.19	0.138	4.987	181.27	15.92	-2.31	67.79	4.02	85.00	23.61
70	SAGBEND	-116.48	-21.51	0.18	0.154	4.712	183.27	15.90	-2.33	67.67	3.95	84.87	23.58
71	SAGBEND	-118.48	-21.67	0.18	0.170	4.438	185.27	15.88	-2.34	67.51	3.86	84.70	23.53
72	SAGBEND	-120.47	-21.82	0.17	0.185	4.165	187.27	15.87	-2.36	67.30	3.76	84.47	23.46
73	SAGBEND	-122.47	-21.96	0.16	0.201	3.892	189.27	15.85	-2.37	67.02	3.64	84.19	23.38
74	SAGBEND	-124.46	-22.09	0.16	0.215	3.621	191.27	15.84	-2.39	66.67	3.49	83.82	23.28
75	SAGBEND	-126.46	-22.22	0.15	0.229	3.351	193.27	15.83	-2.40	66.23	3.31	83.37	23.16
76	SAGBEND	-128.46	-22.33	0.14	0.242	3.084	195.27	15.82	-2.41	65.69	3.10	82.81	23.00
77	SAGBEND	-130.45	-22.43	0.13	0.254	2.819	197.27	15.81	-2.42	65.01	2.85	82.12	22.81
78	SAGBEND	-132.45	-22.53	0.12	0.265	2.557	199.27	15.80	-2.43	64.18	2.54	81.28	22.58
79	SAGBEND	-134.45	-22.61	0.11	0.275	2.298	201.27	15.79	-2.44	63.16	2.17	80.24	22.29
80	SAGBEND	-136.45	-22.69	0.10	0.283	2.044	203.27	15.78	-2.45	61.90	1.73	78.96	21.93
81	SAGBEND	-138.45	-22.75	0.09	0.288	1.796	205.27	15.78	-2.46	60.36	1.18	77.41	21.50
82	SAGBEND	-140.45	-22.81	0.08	0.292	1.555	207.27	15.77	-2.47	58.48	0.52	75.52	20.98
83	SAGBEND	-142.44	-22.86	0.07	0.293	1.322	209.27	15.77	-2.47	56.18	-0.28	73.22	20.34
84	SAGBEND	-144.44	-22.90	0.06	0.290	1.100	211.27	15.76	-2.48	53.38	-1.25	70.42	19.56
85	SAGBEND	-146.44	-22.94	0.05	0.282	0.890	213.27	15.76	-2.48	49.95	-2.43	67.05	18.62
86	SAGBEND	-148.44	-22.97	0.04	0.270	0.696	215.27	15.76	-2.48	45.78	-3.79	62.97	17.49
87	SAGBEND	-150.44	-22.99	0.03	0.251	0.520	217.27	15.76	-2.48	40.69	-5.30	58.08	16.13
88	SEABED	-152.44	-23.00	0.03	0.226	0.367	219.27	15.76	-2.49	34.50	-7.01	52.25	14.51
89	SEABED	-154.44	-23.01	0.02	0.194	0.241	221.27	15.76	-2.49	27.43	-8.68	45.82	12.73
90	SEABED	-156.44	-23.02	0.01	0.157	0.144	223.27	15.75	-2.49	20.50	-9.50	39.65	11.02
91	SEABED	-158.44	-23.02	0.01	0.119	0.074	225.27	15.75	-2.49	14.39	-9.04	34.06	9.46
92	SEABED	-160.44	-23.03	0.00	0.085	0.026	227.27	15.75	-2.49	9.40	-7.80	29.29	8.14
93	SEABED	-162.44	-23.03	0.00	0.056	-0.004	229.27	15.76	-2.49	5.56	-6.25	25.46	7.07
94	SEABED	-164.44	-23.03	0.00	0.034	-0.020	231.27	15.76	-2.49	2.80	-4.70	22.57	6.27
95	SEABED	-166.44	-23.02	0.00	0.018	-0.028	233.27	15.76	-2.49	0.93	-3.32	20.56	5.71
96	SEABED	-168.44	-23.02	0.00	0.007	-0.029	235.27	15.76	-2.49	-0.23	-2.18	19.31	5.36
97	SEABED	-170.44	-23.02	0.00	0.000	-0.027	237.27	15.76	-2.49	-0.87	-1.30	18.69	5.19
98	SEABED	-172.44	-23.02	0.00	-0.004	-0.022	239.27	15.76	-2.49	-1.14	-0.66	18.44	5.12

99	SEABED	-174.44	-23.02	0.00	-0.006	-0.018	241.27	15.76	-2.49	-1.17	-0.23	18.32	5.09
100	SEABED	-176.44	-23.02	0.00	-0.006	-0.013	243.27	15.76	-2.49	-1.06	0.04	18.19	5.05
101	SEABED	-178.44	-23.02	0.00	-0.006	-0.009	245.27	15.76	-2.49	-0.89	0.19	18.04	5.01
102	SEABED	-180.44	-23.02	0.00	-0.005	-0.006	247.27	15.76	-2.49	-0.70	0.25	17.87	4.96
103	SEABED	-182.44	-23.02	0.00	-0.004	-0.003	249.27	15.76	-2.49	-0.51	0.26	17.71	4.92

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 2:56:48      PAGE 16

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M )	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ STRESS (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
104	SEABED	-184.44	-23.02	0.00	-0.003	-0.002	251.27	15.76	-2.49	-0.36	0.24	17.56	4.88
105	SEABED	-186.44	-23.02	0.00	-0.002	0.000	253.27	15.76	-2.49	-0.23	0.20	17.43	4.84
106	SEABED	-188.44	-23.02	0.00	-0.001	0.000	255.27	15.76	-2.49	-0.13	0.15	17.34	4.82
107	SEABED	-190.44	-23.02	0.00	-0.001	0.001	257.27	15.76	-2.49	-0.06	0.11	17.26	4.80
108	SEABED	-192.44	-23.02	0.00	0.000	0.001	259.27	15.76	-2.49	-0.02	0.08	17.21	4.78
109	SEABED	-194.44	-23.02	0.00	0.000	0.001	261.27	15.76	-2.49	0.01	0.05	17.18	4.77
110	SEABED	-196.44	-23.02	0.00	0.000	0.001	263.27	15.76	-2.49	0.02	0.03	17.17	4.77
111	SEABED	-198.44	-23.02	0.00	0.000	0.001	265.27	15.76	-2.49	0.03	0.01	17.17	4.77
112	SEABED	-200.44	-23.02	0.00	0.000	0.000	267.27	15.76	-2.49	0.03	0.00	17.16	4.77
113	SEABED	-202.44	-23.02	0.00	0.000	0.000	269.27	15.76	-2.49	0.02	0.00	17.16	4.77
114	SEABED	-204.44	-23.02	0.00	0.000	0.000	271.27	15.76	-2.49	0.02	0.00	17.15	4.77
115	SEABED	-206.44	-23.02	0.00	0.000	0.000	273.27	15.76	-2.49	0.01	-0.01	17.15	4.76
116	SEABED	-208.44	-23.02	0.00	0.000	0.000	275.27	15.76	-2.49	0.01	0.00	17.14	4.76
117	SEABED	-210.44	-23.02	0.00	0.000	0.000	277.27	15.76	-2.49	0.00	0.00	17.14	4.76
118	SEABED	-212.44	-23.02	0.00	0.000	0.000	279.27	15.76	-2.49	0.00	0.00	17.14	4.76

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 2:56:48      PAGE 17

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACTION HORIZ (KN )	SUPT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	BENDING MOMENTS VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
1	LAYBARGE	64.20	4.42	0.00	0.74	0.00	0.00	0.00	0.00	0.15	0.00	0.15	
3	LAYBARGE	59.72	4.30	0.00	19.39	0.00	0.00	0.00	-0.24	-13.00	0.00	13.00	
5	LAYBARGE	48.23	4.00	0.00	23.76	0.00	0.00	0.00	-0.86	-18.46	0.00	18.46	
7	TENSIONR	38.10	3.73	0.00	13.95	0.00	0.00	0.00	96.68	-6.13	0.00	6.13	
9	LAYBARGE	33.43	3.61	0.00	12.75	0.00	0.00	0.00	96.44	-5.86	0.00	5.86	
11	TENSIONR	26.65	3.43	0.00	9.46	0.00	0.00	0.00	194.14	3.55	0.00	3.55	
13	LAYBARGE	21.33	3.30	0.00	0.00	0.00	0.01	0.00	193.88	-5.00	0.00	5.00	
15	LAYBARGE	12.14	2.98	0.00	52.34	-0.01	0.00	0.00	192.46	-157.65	-0.01	157.65	
17	LAYBARGE	-0.04	1.76	0.00	36.82	0.03	0.00	0.00	190.02	-154.55	0.03	154.55	
20	STINGER	-8.10	0.35	0.00	23.94	-0.26	0.00	0.00	187.38	-135.09	-0.11	135.09	
22	STINGER	-15.89	-1.45	0.00	15.07	-0.67	0.00	0.00	186.33	-91.69	-0.36	91.69	
24	STINGER	-23.62	-3.53	0.00	0.00	-0.40	0.08	0.00	185.66	-19.40	-0.09	19.40	
26	STINGER	-30.74	-5.52	0.00	0.00	-1.15	0.33	0.00	184.80	12.59	-0.74	12.61	
28	STINGER	-36.79	-7.19	0.00	0.00	6.25	0.78	0.00	184.06	26.29	1.64	26.34	
30	STINGER	-39.69	-7.97	0.00	0.00	-7.95	1.48	0.00	183.71	30.39	-13.05	33.08	
32	SAGBEND	-41.71	-8.50	0.00	0.00	0.00	0.00	0.00	183.48	32.62	-11.16	34.48	
33	SAGBEND	-43.64	-9.01	0.01	0.00	0.00	0.00	0.00	183.26	34.37	-8.44	35.40	
34	SAGBEND	-45.58	-9.51	0.02	0.00	0.00	0.00	0.00	183.04	35.82	-6.25	36.36	
35	SAGBEND	-47.52	-10.00	0.02	0.00	0.00	0.00	0.00	182.83	37.02	-4.47	37.29	
36	SAGBEND	-49.46	-10.48	0.03	0.00	0.00	0.00	0.00	182.61	38.02	-3.04	38.14	
37	SAGBEND	-51.40	-10.95	0.04	0.00	0.00	0.00	0.00	182.41	38.85	-1.88	38.90	
38	SAGBEND	-53.35	-11.42	0.05	0.00	0.00	0.00	0.00	182.20	39.55	-0.94	39.56	
39	SAGBEND	-55.29	-11.88	0.07	0.00	0.00	0.00	0.00	182.00	40.14	-0.18	40.14	
40	SAGBEND	-57.24	-12.32	0.08	0.00	0.00	0.00	0.00	181.81	40.63	0.44	40.63	
41	SAGBEND	-59.19	-12.76	0.09	0.00	0.00	0.00	0.00	181.62	41.05	0.94	41.06	
42	SAGBEND	-61.15	-13.20	0.10	0.00	0.00	0.00	0.00	181.43	41.41	1.34	41.43	
43	SAGBEND	-63.10	-13.62	0.11	0.00	0.00	0.00	0.00	181.24	41.71	1.67	41.75	
44	SAGBEND	-65.06	-14.03	0.12	0.00	0.00	0.00	0.00	181.06	41.98	1.93	42.02	
45	SAGBEND	-67.02	-14.44	0.13	0.00	0.00	0.00	0.00	180.89	42.21	2.15	42.27	
46	SAGBEND	-68.98	-14.83	0.14	0.00	0.00	0.00	0.00	180.71	42.41	2.31	42.48	
47	SAGBEND	-70.94	-15.22	0.15	0.00	0.00	0.00	0.00	180.55	42.59	2.45	42.66	
48	SAGBEND	-72.90	-15.59	0.15	0.00	0.00	0.00	0.00	180.38	42.75	2.56	42.83	
49	SAGBEND	-74.87	-15.96	0.16	0.00	0.00	0.00	0.00	180.22	42.89	2.64	42.97	
50	SAGBEND	-76.84	-16.32	0.17	0.00	0.00	0.00	0.00	180.07	43.02	2.70	43.10	
51	SAGBEND	-78.81	-16.67	0.18	0.00	0.00	0.00	0.00	179.91	43.13	2.75	43.22	
52	SAGBEND	-80.78	-17.01	0.18	0.00	0.00	0.00	0.00	179.77	43.24	2.79	43.33	
53	SAGBEND	-82.75	-17.34	0.19	0.00	0.00	0.00	0.00	179.62	43.33	2.81	43.42	
54	SAGBEND	-84.72	-17.66	0.19	0.00	0.00	0.00	0.00	179.48	43.42	2.83	43.51	
55	SAGBEND	-86.70	-17.97	0.20	0.00	0.00	0.00	0.00	179.35	43.50	2.84	43.59	
56	SAGBEND	-88.68	-18.28	0.20	0.00	0.00	0.00	0.00	179.22	43.57	2.85	43.67	
57	SAGBEND	-90.66	-18.57	0.20	0.00	0.00	0.00	0.00	179.09	43.64	2.85	43.73	

58	SAGBEND	-92.63	-18.85	0.20	0.00	0.00	0.00	0.00	0.00	178.96	43.70	2.84	43.79
59	SAGBEND	-94.62	-19.13	0.21	0.00	0.00	0.00	0.00	0.00	178.85	43.75	2.84	43.85

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 2:56:48      PAGE 18

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS		TOTAL (KN-M)
					VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	VERT (KN )	HORIZ (KN-M)	HORIZ (KN-M)		
=====													
60	SAGBEND	-96.60	-19.39	0.21	0.00	0.00	0.00	0.00	178.73	43.80	2.83	43.89	
61	SAGBEND	-98.58	-19.65	0.21	0.00	0.00	0.00	0.00	178.62	43.84	2.81	43.93	
62	SAGBEND	-100.57	-19.89	0.21	0.00	0.00	0.00	0.00	178.51	43.88	2.80	43.96	
63	SAGBEND	-102.55	-20.13	0.21	0.00	0.00	0.00	0.00	178.41	43.90	2.78	43.99	
64	SAGBEND	-104.54	-20.36	0.20	0.00	0.00	0.00	0.00	178.31	43.92	2.76	44.00	
65	SAGBEND	-106.53	-20.57	0.20	0.00	0.00	0.00	0.00	178.22	43.92	2.74	44.01	
66	SAGBEND	-108.52	-20.78	0.20	0.00	0.00	0.00	0.00	178.13	43.92	2.71	44.00	
67	SAGBEND	-110.51	-20.98	0.20	0.00	0.00	0.00	0.00	178.04	43.90	2.68	43.98	
68	SAGBEND	-112.50	-21.17	0.19	0.00	0.00	0.00	0.00	177.96	43.86	2.64	43.94	
69	SAGBEND	-114.49	-21.34	0.19	0.00	0.00	0.00	0.00	177.88	43.81	2.60	43.88	
70	SAGBEND	-116.48	-21.51	0.18	0.00	0.00	0.00	0.00	177.81	43.73	2.55	43.80	
71	SAGBEND	-118.48	-21.67	0.18	0.00	0.00	0.00	0.00	177.74	43.62	2.50	43.69	
72	SAGBEND	-120.47	-21.82	0.17	0.00	0.00	0.00	0.00	177.68	43.49	2.43	43.55	
73	SAGBEND	-122.47	-21.96	0.16	0.00	0.00	0.00	0.00	177.62	43.31	2.35	43.37	
74	SAGBEND	-124.46	-22.09	0.16	0.00	0.00	0.00	0.00	177.56	43.08	2.25	43.14	
75	SAGBEND	-126.46	-22.22	0.15	0.00	0.00	0.00	0.00	177.51	42.80	2.14	42.85	
76	SAGBEND	-128.46	-22.33	0.14	0.00	0.00	0.00	0.00	177.46	42.45	2.01	42.49	
77	SAGBEND	-130.45	-22.43	0.13	0.00	0.00	0.00	0.00	177.42	42.01	1.84	42.05	
78	SAGBEND	-132.45	-22.53	0.12	0.00	0.00	0.00	0.00	177.38	41.47	1.64	41.51	
79	SAGBEND	-134.45	-22.61	0.11	0.00	0.00	0.00	0.00	177.34	40.81	1.41	40.84	
80	SAGBEND	-136.45	-22.69	0.10	0.00	0.00	0.00	0.00	177.31	40.00	1.12	40.01	
81	SAGBEND	-138.45	-22.75	0.09	0.00	0.00	0.00	0.00	177.28	39.00	0.76	39.01	
82	SAGBEND	-140.45	-22.81	0.08	0.00	0.00	0.00	0.00	177.26	37.79	0.34	37.79	
83	SAGBEND	-142.44	-22.86	0.07	0.00	0.00	0.00	0.00	177.24	36.30	-0.18	36.30	
84	SAGBEND	-144.44	-22.90	0.06	0.00	0.00	0.00	0.00	177.23	34.49	-0.81	34.50	
85	SAGBEND	-146.44	-22.94	0.05	0.00	0.00	0.00	0.00	177.21	32.28	-1.57	32.32	
86	SAGBEND	-148.44	-22.97	0.04	0.00	0.00	0.00	0.00	177.21	29.58	-2.45	29.68	
87	SAGBEND	-150.44	-22.99	0.03	0.00	0.00	0.00	0.00	177.20	26.30	-3.43	26.52	
88	SEABED	-152.44	-23.00	0.03	0.15	-0.10	0.00	0.00	177.20	22.29	-4.53	22.75	
89	SEABED	-154.44	-23.01	0.02	0.57	-0.38	0.00	0.00	177.20	17.72	-5.61	18.59	
90	SEABED	-156.44	-23.02	0.01	0.88	-0.54	0.00	0.00	177.21	13.25	-6.14	14.60	
91	SEABED	-158.44	-23.02	0.01	1.05	-0.36	0.00	0.00	177.21	9.30	-5.84	10.98	
92	SEABED	-160.44	-23.03	0.00	1.13	-0.20	0.00	0.00	177.21	6.07	-5.04	7.89	
93	SEABED	-162.44	-23.03	0.00	1.14	-0.08	0.00	0.00	177.21	3.60	-4.04	5.41	
94	SEABED	-164.44	-23.03	0.00	1.12	-0.01	0.00	0.00	177.21	1.81	-3.04	3.54	
95	SEABED	-166.44	-23.02	0.00	1.09	0.04	0.00	0.00	177.21	0.60	-2.15	2.23	
96	SEABED	-168.44	-23.02	0.00	1.04	0.06	0.00	0.00	177.21	-0.15	-1.41	1.42	
97	SEABED	-170.44	-23.02	0.00	1.00	0.06	0.00	0.00	177.21	-0.56	-0.84	1.01	
98	SEABED	-172.44	-23.02	0.00	0.96	0.06	0.00	0.00	177.21	-0.73	-0.43	0.85	
99	SEABED	-174.44	-23.02	0.00	0.93	0.05	0.00	0.00	177.21	-0.76	-0.15	0.77	
100	SEABED	-176.44	-23.02	0.00	0.90	0.04	0.00	0.00	177.21	-0.69	0.03	0.69	
101	SEABED	-178.44	-23.02	0.00	0.89	0.03	0.00	0.00	177.21	-0.58	0.12	0.59	
102	SEABED	-180.44	-23.02	0.00	0.87	0.02	0.00	0.00	177.21	-0.45	0.16	0.48	
103	SEABED	-182.44	-23.02	0.00	0.87	0.01	0.00	0.00	177.21	-0.33	0.17	0.37	

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 2:56:48      PAGE 19

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS		TOTAL (KN-M)
					VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	VERT (KN )	HORIZ (KN-M)	HORIZ (KN-M)		
=====													
104	SEABED	-184.44	-23.02	0.00	0.86	0.01	0.00	0.00	177.21	-0.23	0.15	0.28	
105	SEABED	-186.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.15	0.13	0.19	
106	SEABED	-188.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.08	0.10	0.13	
107	SEABED	-190.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.04	0.07	0.08	
108	SEABED	-192.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.01	0.05	0.05	
109	SEABED	-194.44	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	0.01	0.03	0.03	
110	SEABED	-196.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.02	0.02	
111	SEABED	-198.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.01	0.02	
112	SEABED	-200.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02	
113	SEABED	-202.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02	
114	SEABED	-204.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.01	0.00	0.01	
115	SEABED	-206.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.01	0.00	0.01	
116	SEABED	-208.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.00	0.00	0.01	
117	SEABED	-210.44	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.00	0.00	0.00	
118	SEABED	-212.44	-23.02	0.00	0.00	0.00	0.00	0.00	177.21	0.00	0.00	0.00	

STATIC SOLUTION SUMMARY

PIPE PROPERTIES ( 1 )

PIPE SECTION LENGTH ...	0.00 M	ELASTIC MODULUS .....	207000. MPA
OUTSIDE DIAMETER .....	27.305 CM	CROSS SECTIONAL AREA ..	103.82 CM^2
WALL THICKNESS .....	1.270 CM	MOMENT OF INERTIA ....	8817.6 CM^4
WEIGHT/LENGTH IN AIR ..	2022.01 N/M	YIELD STRESS .....	360.00 MPA
SUBMERGED WGHT/LENG ..	434.28 N/M	STRESS INTENS FACTOR ..	1.000
SPECIFIC GRAVITY .....	1.274	STEEL DENSITY .....	77008.0 N/M3
WRAP COAT THICKNESS ..	0.320 CM	WRAP COAT DENSITY ....	9339.1 N/M3
CONCRETE THICKNESS ...	4.000 CM	CONCRETE DENSITY .....	29822.0 N/M3

BARGE DATA

TOTAL PIPE TENSION ...	196.13 KN	RADIUS OF CURVATURE ..	0.00 M
NUMBER OF TENSIONERS ..	2	BARGE TRIM ANGLE .....	0.500 DEG
NO. OF PIPE SUPPORTS ..	7	PIPE ANGLE AT STERN ..	8.130 DEG
BARGE HEADING .....	0.000 DEG	OFFSET FROM R.O.W. ...	0.00 M

STINGER DATA

NO. OF PIPE SUPPORTS ..	6	PIPE DEPTH AT STERN ..	-7.97 M
NO. STINGER SECTIONS ..	6	PIPE ANGLE AT STERN ..	14.930 DEG
RADIUS OF CURVATURE ..	0.00 M	STINGER STERN DEPTH ..	-9.34 M
STINGER LENGTH .....	41.37 M		

SAGBEND DATA

WATER DEPTH .....	23.00 M	TENSION AT TOUCHDOWN ..	177.20 KN
TOUCHDOWN X-COORD. ...	-152.07 M	BOTTOM SLOPE ANGLE ...	0.000 DEG
PROJECTED SPAN LENGTH	112.38 M	PIPE LENGTH GAIN .....	2.63 M

SOLUTION SUMMARY

NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACT HORIZ (KN)	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	0.7	0.0	0.2	0.2	0.
3	LAYBARGE	59.7	4.3	0.0	19.4	0.0	13.0	20.1	6.
5	LAYBARGE	48.2	4.0	0.0	23.8	0.0	18.5	28.7	8.
7	TENSIONR	38.1	3.7	0.0	13.9	0.0	6.1	18.8	5.
9	LAYBARGE	33.4	3.6	0.0	12.7	0.0	5.9	18.3	5.
11	TENSIONR	26.7	3.4	0.0	9.5	0.0	3.5	24.2	7.
13	LAYBARGE	21.3	3.3	0.0	0.0	0.0	5.0	26.4	7.
15	LAYBARGE	12.1	3.0	0.0	52.3	0.0	157.7	262.5	73.
17	LAYBARGE	0.0	1.8	0.0	36.8	0.0	154.6	257.5	72.
20	STINGER	-8.1	0.4	0.0	23.9	-0.3	135.1	227.1	63.
22	STINGER	-15.9	-1.4	0.0	15.1	-0.7	91.7	159.8	44.
24	STINGER	-23.6	-3.5	0.0	0.0	-0.4	19.4	47.9	13.

STATIC SOLUTION SUMMARY

26 STINGER	-30.7	-5.5	0.0	0.0	-1.1	12.6	37.3	10.
28 STINGER	-36.8	-7.2	0.0	0.0	6.2	26.3	58.5	16.
30 STINGER	-39.7	-8.0	0.0	0.0	-7.9	33.1	68.9	19.
64 SAGBEND	-104.5	-20.4	0.2	0.0	0.0	44.0	85.2	24.
88 SEABED	-152.4	-23.0	0.0	0.1	-0.1	22.7	52.2	15.

DYNAMIC SOLUTION SUMMARY

SEA STATE NUMBER ( 1 )

SEA STATE TYPE .....	WAVE SPECTRUM
NO. WAVE COMPONENTS ..	20
WAVE WATER DEPTH .....	23.0 M
MAX. WAVE FREQUENCY ..	3.0015 RA/S

VESSEL RESPONSE TYPE . TABLE OF RAOS

WAVE TRAVEL DIRECTION	0.000 DEG
MIN. WAVE FREQUENCY ..	0.1001 RA/S
RANDOM PHASE SEED ....	0

SPECTRUM START TIME ..	0. SECS	NO. RAOS IN TABLE ....	30
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RAO SIGN CONVENTION ... BENTLEY MOSES

SEA STATE DEFINITION

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WAVE SPECTRUM TYPE ...	JONSWAP (CLASSIC)		
JONSWAP COEFFICIENT ..	0.003223	JONSWAP PEAK FACTOR ..	5.000
PEAK WAVE FREQUENCY ..	0.9498 RA/S		

CALCULATED WAVE HEIGHTS

=====

SIGNIFICANT WAVE HT. .	1.458 M	AVERAGE WAVE HEIGHT ..	0.939 M
MAXIMUM WAVE HEIGHT ..	2.815 M	RMS WAVE HEIGHT .....	1.044 M
TOTAL NUMBER OF WAVES	1906		

===== SOLUTION SUMMARY =====

NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACT HORIZ (KN )	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	0.8	0.1	0.2	0.3	0.
3	LAYBARGE	59.7	4.3	0.0	20.5	1.5	13.8	21.4	6.
5	LAYBARGE	48.2	4.0	0.0	25.1	1.8	19.5	30.3	8.
7	TENSIONR	38.1	3.7	0.0	15.0	1.1	6.7	29.0	8.
9	LAYBARGE	33.4	3.6	0.0	13.3	0.7	6.5	28.1	8.
11	TENSIONR	26.7	3.4	0.0	11.1	1.1	5.1	35.0	10.
13	LAYBARGE	21.3	3.3	0.0	0.4	-2.6	6.4	37.1	10.
15	LAYBARGE	12.1	3.0	0.0	62.1	-5.3	165.8	284.9	79.
17	LAYBARGE	0.0	1.8	0.0	45.9	-3.6	161.1	277.2	77.
20	STINGER	-8.1	0.4	0.0	40.5	-3.8	150.4	259.0	72.
22	STINGER	-15.9	-1.4	0.0	27.1	-5.6	112.7	201.4	56.
24	STINGER	-23.7	-3.4	0.1	-0.4	-3.2	16.8	52.9	15.
26	STINGER	-30.8	-5.3	0.1	0.9	-10.3	34.6	81.7	23.
28	STINGER	-36.8	-6.8	0.1	-8.2	75.7	47.1	99.4	28.
30	STINGER	-39.7	-7.5	0.1	8.6	-91.3	151.4	253.8	70.
88	SEABED	-152.4	-22.7	0.5	0.0	0.0	44.5	86.5	24.

**LAMPIRAN ANALISA DINAMIS PADA PIPA 10 INCH  
HEADING 135°**

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*
*           O F F P I P E - 3 -- OFFSHORE PIPELINE ANALYSIS SYSTEM
*
*   COPYRIGHT (C) 1983-2016, ROBERT C. MALAHY. ALL RIGHTS RESERVED WORLDWIDE.
*
*           VERSION NO. - 3.02EX
*           RELEASED ON - 03/08/2016
*           LICENSED TO - PT Timas Suplindo
*
*****
*
* OFFPIPE IS A NONLINEAR, 3-DIMENSIONAL FINITE ELEMENT METHOD BASED PROGRAM FOR THE
* STATIC AND DYNAMIC ANALYSIS OF PROBLEMS ARISING IN THE DESIGN OF MARINE PIPELINES.
* THIS VERSION OF OFFPIPE MAY BE USED FOR THE ANALYSIS OF OFFSHORE PIPELAYING OPER-
* ATIONS, DAVIT LIFTS, PIPELINES LYING ON AN UNEVEN SEABED, AND RISERS.
*
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*
*           ROBERT C. MALAHY           TELEPHONE: (713) 664-8635
*           6554 AUDEN                 FACSIMILE: (713) 664-0962
*           HOUSTON, TEXAS 77005
*           U.S.A.                     EMAIL: SUPPORT@OFFPIPE.COM
*
*****

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 3
STATIC PIPE ANALYSIS 10 INCH
JOB NO. - LAYING           LICENSED BY - PT Timas Suplindo
USER ID - IK              DATE - 5/2/2020 TIME - 4:14:27           CASE 1
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INPUT DATA ECHO

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PRINTED OUTPUT SELECTED
=====
STATIC PIPE FORCES AND STRESSES ... YES
STATIC SOLUTION SUMMARY ..... YES
DYNAMIC PIPE FORCES AND STRESSES .. NO
DYNAMIC RANGE OF PIPE DATA ..... NO
DYNAMIC TRACKING OF PIPE DATA ..... NO
OVERBEND PIPE SUPPORT GEOMETRY .... NO
STINGER BALLAST SCHEDULE DATA ..... NO
SUPPORT REACTIONS IN BARGE COORDS . NO

INTERNAL FORCES IN PIPE & CABLE ... NO
INTERNAL FORCES IN STINGER ..... NO
PRINT PIPE STRAINS IN OUTPUT ..... NO
DNV OS-F101 COMPLIANCE REPORT ..... NO
API RP-1111 COMPLIANCE REPORT ..... NO
PRINT DNV/API FACTORS & PARAMETERS NO
USE THICK WALL HOOP STRESS EQN. ... NO
USE DNV 1981 FOR TOTAL PIPE STRESS NO

ENABLE/DISABLE WARNING MESSAGES ... ENABLE
GENERATE SPREAD SHEET PLOT FILE ... NO
GENERATE ASCII PLOT DATA FILES .... NO

```

PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX .....	1	
PLOT NUMBER .....	1	
PLOT TYPE OPTION NUMBER .....	1	
DYNAMIC PROFILE TIME POINT .....	0.000	
DYNAMIC PROFILE TIME INCREMENT .....	0.000	
ORDINATE PARAMETER CODE NUMBER .....	2	
AXIS LABEL FOR ORDINATE .....	"PIPE ELEVATION Y COORDINATE	"
ABSCISSA PARAMETER CODE NUMBER .....	1	
AXIS LABEL FOR ABSCISSA .....	"PIPE HORIZONTAL X COORDINATE	"
PLOT TITLE .....	"PIPELINE ELEVATION PROFILE AND PIPE STRESS	"
MINIMUM VERTICAL AXIS RANGE .....	0.000	
MAXIMUM VERTICAL AXIS RANGE .....	0.000	
MINIMUM HORIZONTAL AXIS RANGE .....	0.000	
MAXIMUM HORIZONTAL AXIS RANGE .....	0.000	

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 4  
 STATIC PIPE ANALISYS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 4:14:27 CASE 1

=====

INPUT DATA ECHO

PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX .....	2	
PLOT NUMBER .....	1	
PLOT TYPE OPTION NUMBER .....	1	
DYNAMIC PROFILE TIME POINT .....	0.000	
DYNAMIC PROFILE TIME INCREMENT .....	0.000	
ORDINATE PARAMETER CODE NUMBER .....	15	
AXIS LABEL FOR ORDINATE .....	"DNV YIELD STRESS PERCENTAGE	"
ABSCISSA PARAMETER CODE NUMBER .....	1	
AXIS LABEL FOR ABSCISSA .....	"PIPELINE HORIZONTAL X COORDINATE"	
PLOT TITLE .....	"PIPELINE ELEVATION PROFILE AND PIPE STRESS	"
MINIMUM VERTICAL AXIS RANGE .....	0.000	
MAXIMUM VERTICAL AXIS RANGE .....	0.000	
MINIMUM HORIZONTAL AXIS RANGE .....	0.000	
MAXIMUM HORIZONTAL AXIS RANGE .....	0.000	

PIPE PROPERTIES

=====

PROPERTY TABLE ROW NUMBER .....	1
PIPE SECTION LENGTH .....	0.000 METERS
STEEL MODULUS OF ELASTICITY .....	207000. M-PASCAL
STEEL CROSS SECTIONAL AREA .....	103.822 CM <sup>2</sup>
COATED PIPE AVG MOMENT OF INERTIA .....	8817.56 CM <sup>4</sup>
WEIGHT PER-UNIT-LENGTH IN AIR .....	2022.01 N/M
WEIGHT PER-UNIT-LENGTH SUBMERGED .....	434.28 N/M
MAXIMUM ALLOWABLE PIPE STRAIN .....	0.205000 PERCENT
STEEL OUTSIDE DIAMETER .....	27.3050 CM
STEEL WALL THICKNESS .....	1.2700 CM
YIELD STRESS .....	360.00 M-PASCAL
STRESS/STRAIN INTENSE FACTOR .....	0.0000
HYDRODYNAMIC OUTSIDE DIAMETER .....	0.000 CM
DRAG COEFFICIENT .....	0.0000
HYDRODYNAMIC TOTAL AREA .....	0.000 CM <sup>2</sup>
ADDED MASS COEFFICIENT .....	0.0000
POISSON'S RATIO .....	0.3000
COEFFICIENT OF THERMAL EXPANSION .....	0.00001100 1/DEG C

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 5  
 STATIC PIPE ANALISYS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 4:14:27 CASE 1

=====

INPUT DATA ECHO

PIPE COATING PROPERTIES

=====

PIPE PROPERTY TABLE INDEX .....	1
CORROSION COATING THICKNESS .....	0.320 CM
CORROSION COATING WEIGHT DENSITY .....	9339.1 N/M <sup>3</sup>
CORROSION COATING ELASTIC MODULUS .....	0.000 M-PASCAL
CONCRETE COATING THICKNESS .....	4.000 CM
CONCRETE COATING WEIGHT DENSITY .....	29822. N/M <sup>3</sup>
CONCRETE COATING ELASTIC MODULUS .....	0.000 M-PASCAL
DESIRED PIPE SPECIFIC GRAVITY .....	0.0000
CONCRETE STIFFENING EFFECTIVENESS .....	0.000
NO NOT CALC. STRESS FOR BARE PIPE .....	NO

AVERAGE LENGTH OF PIPE JOINT ..... 12.200 METERS  
 EFFECTIVE FIELD JOINT LENGTH ..... 0.300 METERS  
 FIELD JOINT FILL WEIGHT DENSITY ... 10055.3 N/M^3  
 FIELD JOINT FILL ELASTIC MODULUS... 0.000 M-PASCAL  
 FIELD JOINT STIFFENING EFFECT. .... 0.000  
 FIELD JOINT BENDING MODEL ..... 0 IGNORE COATING STIFFNESS  
 WEIGHT DENSITY OF STEEL ..... 77008. N/M^3  
 WEIGHT DENSITY OF PIPE CONTENTS ... 0.0 N/M^3  
 REF. ELEVATION FOR STATIC HEAD .... 0.00 METERS  
 FREE FLOOD PIPE DURING PIPELAY ... NO

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 6  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 4:14:27 CASE 1  
 =====

INPUT DATA ECHO

PIPELAY VESSEL DESCRIPTION

=====  
 NUMBER OF PIPE NODES ..... 9  
 BARGE GEOMETRY SPECIFIED BY ..... 1 X-Y COORDINATES  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.000 METERS  
 ADJUST Y COORDINATES MANUALLY .... NO  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 PIPE ANGLE RELATIVE TO DECK ..... 0.0000 DEGREES  
 HEIGHT OF DECK ABOVE WATER ..... 2.400 METERS  
 LAYBARGE FORWARD (X) OFFSET ..... 0.000 METERS  
 BARGE TRIM ANGLE ..... 0.5000 DEGREES  
  
 STERN SHOE X COORDINATE ..... 0.000 METERS  
 STERN SHOE Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER X COORDINATE ..... 43.820 METERS  
 ROTATION CENTER Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER Z COORDINATE ..... 6.370 METERS  
 BARGE HEADING ..... 0.0000 DEGREES  
 BARGE OFFSET FROM RIGHT-OF-WAY .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT VERTICAL ANGLE ... 0.000 DEGREES  
 PIPE RAMP PIVOT Z COORDINATE ..... 0.000 METERS  
 PIPE RAMP HEADING ON DECK ..... 0.000 DEGREES  
 ROLE OF ALTERNATE WAVE ORIGIN .... 0 MOTIONS & WAVES AT CENTER OF MOTION  
 WAVE PHASE ORIGIN X COORDINATE .... 0.000  
 WAVE PHASE ORIGIN Y COORDINATE .... 0.000 METERS  
 WAVE PHASE ORIGIN Z COORDINATE .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE .....

NODE X COORD (M )	NODE Y COORD (M )	SUPPORT TYPE	DAVIT SPACING (M )
64.220	1.838	1 SIMPLE SUPPORT	0.000
59.740	1.760	1 SIMPLE SUPPORT	0.000
48.240	1.560	1 SIMPLE SUPPORT	0.000
38.110	1.383	2 PIPE TENSIONER	0.000
33.440	1.302	1 SIMPLE SUPPORT	0.000
26.660	1.183	2 PIPE TENSIONER	0.000
21.340	1.092	7 USER DEFINED SPT	0.000
12.150	0.860	7 USER DEFINED SPT	0.000
-0.040	-0.260	8 USER DEFINED SPT	0.000

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 7  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 4:14:27 CASE 1  
 =====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====  
 SUPPORT PROPERTY TABLE INDEX ..... 2  
 SUPPORT ELEMENT TYPE ..... 2 TENSIONER  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
  
 BOTTOM ROLLER ANGLE TO HORIZONTAL . 0.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES

SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 7  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 1.600 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 8  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 4:14:27 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 8  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

STINGER DESCRIPTION

=====

NUMBER OF PIPE/STINGER NODES ..... 6  
 STINGER GEOMETRY SPECIFIED BY ..... 2 X-Y COORD AND MATCH PT  
 STINGER TYPE ..... 1 FIXED GEOMETRY OR RAMP  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.00 METERS  
 HITCH X-COORDINATE ..... 0.497 METERS  
 HITCH Y-COORDINATE ..... -1.800 METERS  
 HITCH ANGULAR ORIENTATION ..... 0.000 DEGREES

X COORDINATE OF LOCAL ORIGIN ..... 0.497 METERS  
 Y COORDINATE OF LOCAL ORIGIN ..... -1.800 METERS  
 ROTATION ABOUT STINGER HITCH ..... 13.500 DEGREES  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 TANGENT POINT ANGLE ..... 0.000 DEGREES

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	ELEMENT TYPE	ELEMENT LENGTH ( M )
-8.325	2.209	1 SIMPLE SUPPORT	2 HINGED END	0.000
-16.325	2.349	1 SIMPLE SUPPORT	1 FIXED END	0.000
-24.325	2.119	1 SIMPLE SUPPORT	1 FIXED END	0.000
-31.699	1.660	1 SIMPLE SUPPORT	1 FIXED END	0.000
-37.949	1.069	1 SIMPLE SUPPORT	1 FIXED END	0.000
-40.949	0.350	1 SIMPLE SUPPORT	1 FIXED END	0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 9  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 4:14:27 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

```

=====
SUPPORT PROPERTY TABLE INDEX ..... 1
SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT
SUPPORT INITIAL STATE FLAG ..... 0
TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M
VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M
STATIC VERTICAL DEFLECTION ..... 0.0000 CM
LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES
SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES
SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS
BED ROLLER LENGTH ..... 1.640 METERS
HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS
TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
    
```

CURRENT VELOCITIES

```

=====
WATER DEPTH (M ) CURRENT SPEED (M/S ) DIRECTION OF TRAVEL (DEG )
=====
0.000 0.790 135.000
11.500 0.480 135.000
23.000 0.420 135.000
    
```

PIPE TENSION DATA

```

=====
STATIC PIPE TENSION ON LAY VESSEL . 196.133 K-NEWTON
MINIMUM DYNAMIC PIPE TENSION ..... 196.133 K-NEWTON
MAXIMUM DYNAMIC PIPE TENSION ..... 294.199 K-NEWTON
STATIC HORIZONTAL BOTTOM TENSION .. 0.000 K-NEWTON
NO. OF VALUES FOR TENSION PROFILE . 0
VALUES ARE FOR PIPE SPAN ANALYSIS . NO
MAXIMUM PIPE PAYOUT SPEED ..... 0.000 M/SEC
MAXIMUM PIPE TAKEUP SPEED ..... 0.000 M/SEC
    
```

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 10

STATIC PIPE ANALYSIS 10 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 4:14:27 CASE 1

=====  
 INPUT DATA ECHO

SAGBEND GEOMETRY

```

=====
SAGBEND PIPE ELEMENT LENGTH ..... 2.000 METERS
WATER DEPTH ..... 23.00 METERS
X-COORDINATE AT SPECIFIED DEPTH . . 0.00 METERS
ESTIMATED SAGBEND X LENGTH ..... 0.00 METERS
ESTIMATED PIPE LENGTH ON SEABED ... 0.00 METERS
X-COORD OF PIPE FREE END ON SEABED 0.00 METERS
X-COORD POINT OF FIXITY ON SEABED . 0.00 METERS
MAXIMUM SLOPE (ANGLE) OF SEABED ... 0.000 DEGREES
DIRECTION OF MAXIMUM SLOPE ..... 0.000 DEGREES

PIPE/CABLE SPAN END CONDITION ..... 0 PIPE/CABLE RESTING ON SEABED
PIPE/CABLE SPAN LENGTH GIVEN BY ... 0 SPECIFIED PIPE/CABLE TENSION
ESTIMATED SPAN DEPTH AT FREE END .. 0.00 METERS
PIPE VERTICAL ANGLE AT FREE END ... 0.000 DEGREES
BOTTOM HINGE OFFSET ..... 0.000 METERS
BOTTOM HINGE MINIMUM ANGLE ..... 0.000 DEGREES
BOTTOM HINGE MAXIMUM ANGLE ..... 0.000 DEGREES
    
```

SOIL ELEMENT PROPERTIES

```

=====
SOIL PROPERTY TABLE ROW INDEX ..... 1
SOIL ELEMENT TYPE (FUTURE USE) .... 0
PIPE INDEX OR SEGMENT NUMBER ..... 0
LONGITUDINAL SOIL STIFFNESS ..... 0.00 KN/M^2
VERTICAL SOIL STIFFNESS ..... 0.00 KN/M^2
LATERAL SOIL STIFFNESS ..... 0.00 KN/M^2
DEFLECTION UNDER REFERENCE LOAD ... 0.0000 CM

LONGITUDINAL COEF. OF FRICTION .... 0.000
LATERAL COEFFICIENT OF FRICTION ... 0.600
NUMBER OF INTEGRATION POINTS ..... 0
    
```

TIME INTEGRATION PARAMETERS

```

=====
TIME STEP LENGTH ..... 0.2000 SECONDS
MAXIMUM TIME OF INTEGRATION ..... 10860.000 SECONDS
SOLUTION SAMPLING TIME STEP ..... 0.400 SECONDS
    
```

SOLUTION SAMPLING STARTS AT TIME .. 60.000 SECONDS  
DAMPING RATIO ..... 0.0000  
NUMBER OF VARIABLE TIME STEPS ..... 0

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 11  
STATIC PIPE ANALYSIS 10 INCH  
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
USER ID - IK DATE - 5/2/2020 TIME - 4:14:27 CASE 1

=====

INPUT DATA ECHO

WAVE PARAMETERS

=====

SEA STATE ROW INDEX ..... 1  
WAVE HEIGHT (PEAK TO TROUGH) ..... 1.800 METERS  
WAVE PERIOD ..... 6.300 SECONDS  
WAVE DIRECTION OF TRAVEL ..... 135.000 DEGREES  
WATER DEPTH FOR WAVE CALCULATIONS .. 23.00 METERS  
SEED FOR RANDOM WAVE PHASE ANGLE .. 0

WAVE SPECTRUM EQUATION

=====

SEA STATE ROW INDEX ..... 1  
WAVE SPECTRUM EQUATION TYPE ..... 7 JONSWAP (CLASSIC)  
NUMBER OF WAVES IN SPECTRUM ..... 20  
USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD  
SEED FOR RANDOM WAVE PHASE ANGLE .. 0  
MINIMUM PERIOD IN SPECTRUM ..... 2.0933 SECONDS  
MAXIMUM PERIOD IN SPECTRUM ..... 62.8000 SECONDS  
START TIME FOR WAVE SPECTRUM ..... 0. SECONDS  
DIRECTION OF WAVE TRAVEL ..... 0.000 DEGREES  
1ST JONSWAP COEF. (ALPHA) ..... 0.003223  
2ND JONSWAP COEF. (GAMMA) ..... 5.0000  
PEAK WAVE PERIOD ..... 6.6150 SECONDS

VESSEL MOTION RAO TABLE

=====

SEA STATE NUMBER ..... 1  
USE PHASE LAG FOR RAO ..... NO  
VESSEL MOTIONS SIGN CONVENTION .... 2 BENTLEY MOSES  
USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD

WAVE PERIOD (SECONDS)	/----- SURGE AMPLITUDE (M/M )	-----/ / PHASE (DEG)	-----/ / SWAY AMPLITUDE (M/M )	-----/ / PHASE (DEG)	/----- HEAVE AMPLITUDE (M/M )	-----/ PHASE (DEG)
2.0900	0.0030	69.00	0.0010	-73.00	0.0000	0.00
2.1700	0.0030	-84.00	0.0000	0.00	0.0000	0.00
2.2400	0.0050	110.00	0.0010	-95.00	0.0000	0.00
2.3300	0.0040	-36.00	0.0000	0.00	0.0000	0.00
2.4200	0.0070	125.00	0.0010	-146.00	0.0010	111.00
2.5100	0.0050	-20.00	0.0010	-38.00	0.0010	121.00
2.6200	0.0110	120.00	0.0030	154.00	0.0010	82.00
2.7300	0.0040	-57.00	0.0010	-101.00	0.0010	92.00
2.8500	0.0170	101.00	0.0040	107.00	0.0010	25.00
2.9900	0.0100	-157.00	0.0040	178.00	0.0020	5.00
3.1400	0.0170	69.00	0.0030	33.00	0.0010	-15.00
3.3100	0.0290	152.00	0.0080	89.00	0.0050	-64.00

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 12  
STATIC PIPE ANALYSIS 10 INCH  
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
USER ID - IK DATE - 5/2/2020 TIME - 4:14:27 CASE 1

=====

WAVE PERIOD	/----- ROLL AMPLITUDE	-----/ / PHASE	-----/ / PITCH AMPLITUDE	-----/ / PHASE	----- YAW AMPLITUDE	-----/ PHASE
3.4900	0.0070	-108.00	0.0040	149.00	0.0070	-27.00
3.7000	0.0340	97.00	0.0100	-11.00	0.0040	-119.00
3.9300	0.0520	162.00	0.0220	43.00	0.0200	-92.00
4.1900	0.0240	-134.00	0.0150	101.00	0.0210	-50.00
4.4900	0.0380	87.00	0.0190	-59.00	0.0050	-147.00
4.8300	0.0940	140.00	0.0570	-5.00	0.0490	-140.00
5.2400	0.1090	-172.00	0.0720	39.00	0.0940	-106.00
5.7100	0.0650	-130.00	0.0430	87.00	0.1080	-66.00
6.2800	0.0310	87.00	0.0320	-90.00	0.0370	21.00
6.9800	0.1570	140.00	0.1300	-67.00	0.2060	-179.00
7.8500	0.2910	153.00	0.2830	-27.00	0.4660	-131.00
8.9700	0.4130	-179.00	0.4090	1.00	0.6770	-96.00
10.4700	0.5090	-155.00	0.5150	25.00	0.8240	-68.00
12.5600	0.5780	-135.00	0.5950	45.00	0.9170	-46.00
15.7000	0.6230	-118.00	0.6490	61.00	0.9690	-29.00
20.9300	0.6480	-105.00	0.6810	74.00	0.9930	-16.00
31.4000	0.6610	-96.00	0.6980	83.00	1.0020	-6.00
62.8000	0.6660	-91.00	0.7060	88.00	1.0030	-1.00

=====



(SECONDS)	(DEG/M )	(DEG)	(DEG/M )	(DEG)	(DEG/M )	(DEG)
2.0900	0.0030	-127.00	0.0010	-79.00	0.0020	-145.00
2.1700	0.0040	-149.00	0.0010	-150.00	0.0030	101.00
2.2400	0.0080	-151.00	0.0010	-159.00	0.0020	-129.00
2.3300	0.0040	-169.00	0.0020	133.00	0.0040	66.00
2.4200	0.0060	167.00	0.0030	135.00	0.0010	162.00
2.5100	0.0040	102.00	0.0040	101.00	0.0080	6.00
2.6200	0.0080	135.00	0.0030	113.00	0.0020	104.00
2.7300	0.0130	52.00	0.0050	65.00	0.0130	-44.00
2.8500	0.0180	35.00	0.0030	36.00	0.0100	34.00
2.9900	0.0310	35.00	0.0050	18.00	0.0140	-107.00
3.1400	0.0230	13.00	0.0130	-39.00	0.0230	-47.00
3.3100	0.0550	0.00	0.0160	-15.00	0.0020	76.00
3.4900	0.0420	19.00	0.0240	-89.00	0.0390	-142.00
3.7000	0.0550	-45.00	0.0600	-58.00	0.0530	-91.00
3.9300	0.0990	-30.00	0.0340	-27.00	0.0090	51.00
4.1900	0.0770	-26.00	0.0740	-126.00	0.1080	173.00
4.4900	0.0760	-73.00	0.1810	-92.00	0.1800	-137.00
4.8300	0.1640	-104.00	0.1930	-56.00	0.1290	-90.00
5.2400	0.3710	-100.00	0.0330	-46.00	0.0650	110.00
5.7100	0.5820	-77.00	0.3780	-158.00	0.3370	158.00
6.2800	0.3000	-56.00	1.0400	-118.00	0.6040	-166.00
6.9800	2.2020	-86.00	1.6540	-74.00	0.7900	-136.00

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 13  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 4:14:27 CASE 1

INPUT DATA ECHO

7.8500	2.0440	-27.00	1.8600	-34.00	0.8790	-109.00
8.9700	1.7290	3.00	1.7090	-2.00	0.8600	-85.00
10.4700	1.3750	27.00	1.3870	24.00	0.7530	-63.00
12.5600	1.0030	46.00	1.0160	45.00	0.5910	-44.00
15.7000	0.6580	62.00	0.6670	62.00	0.4090	-28.00
20.9300	0.3730	74.00	0.3790	76.00	0.2410	-15.00
31.4000	0.1660	83.00	0.1690	88.00	0.1100	-5.00
62.8000	0.0410	88.00	0.0440	105.00	0.0280	2.00

\*\*\*\*\* INFORMATIVE MESSAGE NO. - 94 \*\*\*\*\*

One or more of the phase angles in the RAO table have been adjusted to |  
 minimize the difference in value between adjacent angles. If the phase |  
 angles are arbitrarily restricted by the software used to calculate |  
 the RAOs to a fixed range of values such as (0 to 2\*PI) or (-PI to |  
 +PI), then phase angles that are actually close in value can differ by |  
 as much as 2\*PI. These large differences can cause the phase angles |  
 for RAOs that are between the values in the table (which must be |  
 determined using interpolation) to be calculated incorrectly.

CONTROL SWITCHES

MAX NUMBER STATIC ITERATIONS ..... 500  
 MAX DYNAMIC ITERATIONS PER STEP ... 500  
 BOUNDARY CONDITION LOGIC PARAMETER 5  
 TIME STEP STABILITY PARAMETER ..... 0  
 TYPE OF ANALYSIS ..... DYNAMIC  
 NUMBER OF PROBLEM DIMENSIONS ..... 3  
 DAVIT LIFT ANALYSIS ..... NO

STATIC SOLUTION CONVERGED IN ( 44 ) ITERATIONS

END OF INPUT DATA

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 4:14:27 PAGE 14  
 PROJECT - STATIC PIPE ANALYSIS 10 INCH JOB NO. - LAYING  
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

STATIC PIPE COORDINATES, FORCES AND STRESSES

NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	HORIZ ANGLE (DEG )	VERT ANGLE (DEG )	PIPE LENGTH (M )	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES (MPA)	TOTAL STRESS (MPA)	PERCENT YIELD (PCT)
1	LAYBARGE	64.20	4.42	0.00	0.000	1.482	0.00	0.00	0.00	0.23	0.00	0.23
3	LAYBARGE	59.72	4.30	0.00	0.000	1.554	4.48	-0.02	0.00	-20.12	0.00	20.14
5	LAYBARGE	48.23	4.00	0.00	0.000	1.477	15.98	-0.08	0.00	-28.57	0.00	28.66
7	TENSIONR	38.10	3.73	0.00	0.000	1.453	26.11	9.31	0.00	-9.48	0.00	18.79
9	LAYBARGE	33.43	3.61	0.00	0.000	1.531	30.78	9.28	0.00	-9.07	0.00	18.35
11	TENSIONR	26.65	3.43	0.00	0.000	1.446	37.57	18.69	0.00	5.50	0.00	24.19
13	LAYBARGE	21.33	3.30	0.00	0.000	1.400	42.89	18.66	0.00	-7.75	0.00	26.41
15	LAYBARGE	12.14	2.98	0.00	0.000	3.343	52.08	18.53	0.00	-244.01	-0.01	262.54

17	LAYBARGE	-0.04	1.76	0.00	0.000	8.129	64.32	18.29	0.00	-239.04	0.02	257.33	71.48
20	STINGER	-8.10	0.35	0.00	-0.001	11.556	72.51	18.04	0.00	-209.74	-0.09	227.78	63.27
22	STINGER	-15.89	-1.45	0.00	0.000	14.240	80.51	17.86	-0.16	-138.70	-0.29	156.63	43.51
24	STINGER	-23.62	-3.52	0.00	0.001	15.516	88.51	17.67	-0.38	-29.21	-0.08	47.08	13.08
26	STINGER	-30.74	-5.51	0.00	-0.002	15.545	95.90	17.48	-0.60	19.29	-0.58	37.07	10.30
28	STINGER	-36.80	-7.17	0.00	0.009	15.153	102.19	17.31	-0.78	40.15	1.28	57.87	16.08
30	STINGER	-39.69	-7.95	0.00	-0.019	14.889	105.18	17.24	-0.86	46.42	-10.17	65.19	18.11
32	SAGBEND	-41.71	-8.48	0.00	-0.063	14.685	107.27	17.18	-0.92	49.84	-8.69	68.24	18.96
33	SAGBEND	-43.65	-8.99	0.00	-0.095	14.477	109.27	17.13	-0.97	52.54	-6.56	70.57	19.60
34	SAGBEND	-45.58	-9.48	0.01	-0.119	14.259	111.27	17.08	-1.03	54.78	-4.84	72.60	20.17
35	SAGBEND	-47.52	-9.97	0.01	-0.136	14.033	113.27	17.04	-1.08	56.64	-3.46	74.33	20.65
36	SAGBEND	-49.47	-10.45	0.02	-0.148	13.800	115.27	16.99	-1.13	58.20	-2.34	75.81	21.06
37	SAGBEND	-51.41	-10.93	0.02	-0.156	13.561	117.27	16.94	-1.18	59.50	-1.43	77.06	21.40
38	SAGBEND	-53.35	-11.39	0.03	-0.160	13.318	119.27	16.90	-1.23	60.59	-0.70	78.12	21.70
39	SAGBEND	-55.30	-11.85	0.03	-0.162	13.070	121.27	16.85	-1.28	61.51	-0.11	79.01	21.95
40	SAGBEND	-57.25	-12.30	0.04	-0.161	12.819	123.27	16.81	-1.33	62.29	0.37	79.78	22.16
41	SAGBEND	-59.20	-12.74	0.04	-0.159	12.565	125.27	16.76	-1.38	62.96	0.76	80.42	22.34
42	SAGBEND	-61.15	-13.17	0.05	-0.155	12.308	127.27	16.72	-1.42	63.53	1.07	80.98	22.49
43	SAGBEND	-63.11	-13.59	0.05	-0.150	12.049	129.27	16.68	-1.47	64.02	1.33	81.46	22.63
44	SAGBEND	-65.07	-14.00	0.06	-0.144	11.789	131.27	16.64	-1.51	64.44	1.53	81.87	22.74
45	SAGBEND	-67.03	-14.41	0.06	-0.138	11.527	133.27	16.60	-1.56	64.82	1.69	82.23	22.84
46	SAGBEND	-68.99	-14.80	0.07	-0.130	11.263	135.27	16.56	-1.60	65.14	1.82	82.54	22.93
47	SAGBEND	-70.95	-15.19	0.07	-0.123	10.998	137.27	16.52	-1.64	65.43	1.93	82.82	23.00
48	SAGBEND	-72.91	-15.56	0.08	-0.114	10.732	139.27	16.48	-1.68	65.69	2.01	83.06	23.07
49	SAGBEND	-74.88	-15.93	0.08	-0.106	10.465	141.27	16.45	-1.72	65.92	2.07	83.28	23.13
50	SAGBEND	-76.85	-16.29	0.08	-0.097	10.197	143.27	16.41	-1.76	66.13	2.12	83.48	23.19
51	SAGBEND	-78.81	-16.64	0.09	-0.088	9.929	145.27	16.38	-1.80	66.33	2.16	83.65	23.24
52	SAGBEND	-80.79	-16.98	0.09	-0.080	9.659	147.27	16.34	-1.84	66.50	2.18	83.82	23.28
53	SAGBEND	-82.76	-17.31	0.09	-0.071	9.389	149.27	16.31	-1.87	66.66	2.20	83.96	23.32
54	SAGBEND	-84.73	-17.63	0.10	-0.061	9.119	151.27	16.28	-1.91	66.81	2.22	84.10	23.36
55	SAGBEND	-86.71	-17.95	0.10	-0.052	8.847	153.27	16.25	-1.94	66.95	2.22	84.22	23.40
56	SAGBEND	-88.68	-18.25	0.10	-0.043	8.575	155.27	16.22	-1.97	67.08	2.23	84.34	23.43
57	SAGBEND	-90.66	-18.54	0.10	-0.034	8.303	157.27	16.19	-2.00	67.19	2.22	84.44	23.46
58	SAGBEND	-92.64	-18.83	0.10	-0.025	8.030	159.27	16.16	-2.03	67.30	2.22	84.53	23.48
59	SAGBEND	-94.62	-19.10	0.10	-0.016	7.757	161.27	16.14	-2.06	67.40	2.21	84.62	23.51

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/2/2020      TIME - 4:14:27      PAGE 15

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERC YIELD (PCT)
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60	SAGBEND	-96.61	-19.37	0.10	-0.007	7.484	163.27	16.11	-2.09	67.48	2.21	84.69	23.53
61	SAGBEND	-98.59	-19.62	0.10	0.002	7.210	165.27	16.08	-2.12	67.56	2.19	84.76	23.54
62	SAGBEND	-100.57	-19.87	0.10	0.011	6.935	167.27	16.06	-2.15	67.62	2.18	84.81	23.56
63	SAGBEND	-102.56	-20.10	0.10	0.020	6.661	169.27	16.04	-2.17	67.68	2.17	84.85	23.57
64	SAGBEND	-104.55	-20.33	0.10	0.029	6.386	171.27	16.01	-2.20	67.71	2.15	84.88	23.58
65	SAGBEND	-106.54	-20.55	0.10	0.038	6.112	173.27	15.99	-2.22	67.74	2.13	84.90	23.58
66	SAGBEND	-108.52	-20.76	0.10	0.046	5.837	175.27	15.97	-2.24	67.74	2.11	84.89	23.58
67	SAGBEND	-110.51	-20.96	0.10	0.055	5.562	177.27	15.95	-2.26	67.73	2.08	84.87	23.57
68	SAGBEND	-112.51	-21.15	0.09	0.063	5.287	179.27	15.93	-2.29	67.68	2.05	84.82	23.56
69	SAGBEND	-114.50	-21.32	0.09	0.071	5.013	181.27	15.92	-2.30	67.61	2.02	84.74	23.54
70	SAGBEND	-116.49	-21.49	0.09	0.080	4.739	183.27	15.90	-2.32	67.51	1.98	84.62	23.51
71	SAGBEND	-118.48	-21.66	0.09	0.088	4.465	185.27	15.88	-2.34	67.36	1.93	84.47	23.46
72	SAGBEND	-120.48	-21.81	0.08	0.095	4.192	187.27	15.87	-2.36	67.17	1.87	84.26	23.41
73	SAGBEND	-122.47	-21.95	0.08	0.103	3.921	189.27	15.86	-2.37	66.91	1.81	84.00	23.33
74	SAGBEND	-124.47	-22.08	0.08	0.110	3.650	191.27	15.84	-2.39	66.58	1.73	83.66	23.24
75	SAGBEND	-126.47	-22.20	0.07	0.117	3.380	193.27	15.83	-2.40	66.16	1.63	83.24	23.12
76	SAGBEND	-128.46	-22.32	0.07	0.123	3.113	195.27	15.82	-2.41	65.64	1.52	82.71	22.98
77	SAGBEND	-130.46	-22.42	0.06	0.129	2.848	197.27	15.81	-2.42	65.00	1.38	82.06	22.79
78	SAGBEND	-132.46	-22.51	0.06	0.134	2.586	199.27	15.80	-2.43	64.19	1.22	81.25	22.57
79	SAGBEND	-134.46	-22.60	0.05	0.139	2.328	201.27	15.79	-2.44	63.20	1.02	80.25	22.29
80	SAGBEND	-136.45	-22.68	0.05	0.143	2.074	203.27	15.78	-2.45	61.99	0.78	79.03	21.95
81	SAGBEND	-138.45	-22.75	0.04	0.145	1.825	205.27	15.78	-2.46	60.49	0.48	77.53	21.54
82	SAGBEND	-140.45	-22.80	0.04	0.146	1.583	207.27	15.77	-2.46	58.67	0.13	75.70	21.03
83	SAGBEND	-142.45	-22.86	0.03	0.146	1.350	209.27	15.77	-2.47	56.43	-0.31	73.47	20.41
84	SAGBEND	-144.45	-22.90	0.03	0.144	1.126	211.27	15.76	-2.47	53.70	-0.83	70.74	19.65
85	SAGBEND	-146.45	-22.93	0.02	0.139	0.915	213.27	15.76	-2.48	50.37	-1.47	67.43	18.73
86	SAGBEND	-148.45	-22.96	0.02	0.132	0.718	215.27	15.76	-2.48	46.31	-2.21	63.39	17.61
87	SAGBEND	-150.45	-22.98	0.02	0.121	0.540	217.27	15.76	-2.48	41.35	-3.03	58.50	16.25
88	SEABED	-152.45	-23.00	0.01	0.107	0.384	219.27	15.76	-2.49	35.30	-3.97	52.57	14.60
89	SEABED	-154.45	-23.01	0.01	0.089	0.255	221.27	15.76	-2.49	28.29	-4.76	45.74	12.70
90	SEABED	-156.45	-23.02	0.00	0.070	0.155	223.27	15.75	-2.49	21.31	-4.81	38.90	10.81
91	SEABED	-158.45	-23.02	0.00	0.051	0.081	225.27	15.75	-2.49	15.08	-4.31	32.75	9.10
92	SEABED	-160.45	-23.02	0.00	0.035	0.031	227.27	15.75	-2.49	9.94	-3.57	27.65	7.68
93	SEABED	-162.45	-23.03	0.00	0.022	-0.001	229.27	15.76	-2.49	5.97	-2.76	23.68	6.58
94	SEABED	-164.45	-23.03	0.00	0.012	-0.019	231.27	15.76	-2.49	3.08	-2.01	20.79	5.77
95	SEABED	-166.45	-23.02	0.00	0.006	-0.027	233.27	15.76	-2.49	1.11	-1.36	18.88	5.24
96	SEABED	-168.45	-23.02	0.00	0.001	-0.029	235.27	15.76	-2.49	-0.12	-0.85	17.99	5.00
97	SEABED	-170.45	-23.02	0.00	-0.001	-0.027	237.27	15.76	-2.49	-0.81	-0.47	18.07	5.02
98	SEABED	-172.45	-23.02	0.00	-0.003	-0.023	239.27	15.76	-2.49	-1.12	-0.20	18.26	5.07

99	SEABED	-174.45	-23.02	0.00	-0.003	-0.018	241.27	15.76	-2.49	-1.17	-0.03	18.30	5.08
100	SEABED	-176.45	-23.02	0.00	-0.003	-0.014	243.27	15.76	-2.49	-1.08	0.07	18.21	5.06
101	SEABED	-178.45	-23.02	0.00	-0.003	-0.010	245.27	15.76	-2.49	-0.91	0.12	18.05	5.01
102	SEABED	-180.45	-23.02	0.00	-0.002	-0.006	247.27	15.76	-2.49	-0.72	0.13	17.86	4.96
103	SEABED	-182.45	-23.02	0.00	-0.002	-0.004	249.27	15.76	-2.49	-0.54	0.13	17.68	4.91

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USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES														
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
NO	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M )	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ STRESS (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)	
104	SEABED	-184.45	-23.02	0.00	-0.001	-0.002	251.27	15.76	-2.49	-0.37	0.11	17.52	4.87	
105	SEABED	-186.45	-23.02	0.00	-0.001	-0.001	253.27	15.76	-2.49	-0.24	0.09	17.39	4.83	
106	SEABED	-188.45	-23.02	0.00	0.000	0.000	255.27	15.76	-2.49	-0.14	0.07	17.29	4.80	
107	SEABED	-190.45	-23.02	0.00	0.000	0.001	257.27	15.76	-2.49	-0.07	0.05	17.22	4.78	
108	SEABED	-192.45	-23.02	0.00	0.000	0.001	259.27	15.76	-2.49	-0.02	0.03	17.17	4.77	
109	SEABED	-194.45	-23.02	0.00	0.000	0.001	261.27	15.76	-2.49	0.01	0.02	17.16	4.77	
110	SEABED	-196.45	-23.02	0.00	0.000	0.001	263.27	15.76	-2.49	0.02	0.01	17.16	4.77	
111	SEABED	-198.45	-23.02	0.00	0.000	0.001	265.27	15.76	-2.49	0.03	0.00	17.16	4.77	
112	SEABED	-200.45	-23.02	0.00	0.000	0.000	267.27	15.76	-2.49	0.03	0.00	17.16	4.77	
113	SEABED	-202.45	-23.02	0.00	0.000	0.000	269.27	15.76	-2.49	0.02	0.00	17.16	4.77	
114	SEABED	-204.45	-23.02	0.00	0.000	0.000	271.27	15.76	-2.49	0.02	0.00	17.15	4.77	
115	SEABED	-206.45	-23.02	0.00	0.000	0.000	273.27	15.76	-2.49	0.01	0.00	17.15	4.76	
116	SEABED	-208.45	-23.02	0.00	0.000	0.000	275.27	15.76	-2.49	0.01	0.00	17.14	4.76	
117	SEABED	-210.45	-23.02	0.00	0.000	0.000	277.27	15.76	-2.49	0.00	0.00	17.14	4.76	
118	SEABED	-212.45	-23.02	0.00	0.000	0.000	279.27	15.76	-2.49	0.00	0.00	17.14	4.76	

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 4:14:27      PAGE 17

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
NO	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACTION HORIZ (KN )	SUPT VERT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	BENDING MOMENTS VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
1	LAYBARGE	64.20	4.42	0.00	0.74	0.00	0.00	0.00	0.00	0.15	0.00	0.15	
3	LAYBARGE	59.72	4.30	0.00	19.39	0.00	0.00	0.00	-0.24	-13.00	0.00	13.00	
5	LAYBARGE	48.23	4.00	0.00	23.76	0.00	0.00	0.00	-0.86	-18.46	0.00	18.46	
7	TENSIONR	38.10	3.73	0.00	13.95	0.00	0.00	0.00	96.68	-6.13	0.00	6.13	
9	LAYBARGE	33.43	3.61	0.00	12.75	0.00	0.00	0.00	96.43	-5.86	0.00	5.86	
11	TENSIONR	26.65	3.43	0.00	9.45	0.00	0.00	0.00	194.14	3.56	0.00	3.56	
13	LAYBARGE	21.33	3.30	0.00	0.00	0.00	0.01	0.00	193.88	-5.00	0.00	5.00	
15	LAYBARGE	12.14	2.98	0.00	52.35	0.00	0.00	0.00	192.46	-157.68	0.00	157.68	
17	LAYBARGE	-0.04	1.76	0.00	36.74	0.01	0.00	0.00	190.02	-154.46	0.01	154.46	
20	STINGER	-8.10	0.35	0.00	24.33	-0.14	0.00	0.00	187.37	-135.53	-0.06	135.53	
22	STINGER	-15.89	-1.45	0.00	14.34	-0.35	0.00	0.00	186.34	-89.62	-0.19	89.62	
24	STINGER	-23.62	-3.52	0.00	0.00	-0.21	0.09	0.00	185.66	-18.88	-0.05	18.88	
26	STINGER	-30.74	-5.51	0.00	0.00	-0.59	0.34	0.00	184.81	12.46	-0.38	12.47	
28	STINGER	-36.80	-7.17	0.00	0.00	3.15	0.79	0.00	184.07	25.94	0.83	25.96	
30	STINGER	-39.69	-7.95	0.00	0.00	-4.01	1.50	0.00	183.72	30.00	-6.57	30.71	
32	SAGBEND	-41.71	-8.48	0.00	0.00	0.00	0.00	0.00	183.49	32.21	-5.61	32.69	
33	SAGBEND	-43.65	-8.99	0.00	0.00	0.00	0.00	0.00	183.27	33.95	-4.24	34.21	
34	SAGBEND	-45.58	-9.48	0.01	0.00	0.00	0.00	0.00	183.05	35.40	-3.13	35.54	
35	SAGBEND	-47.52	-9.97	0.01	0.00	0.00	0.00	0.00	182.84	36.60	-2.23	36.67	
36	SAGBEND	-49.47	-10.45	0.02	0.00	0.00	0.00	0.00	182.62	37.61	-1.51	37.64	
37	SAGBEND	-51.41	-10.93	0.02	0.00	0.00	0.00	0.00	182.42	38.45	-0.93	38.46	
38	SAGBEND	-53.35	-11.39	0.03	0.00	0.00	0.00	0.00	182.21	39.15	-0.46	39.16	
39	SAGBEND	-55.30	-11.85	0.03	0.00	0.00	0.00	0.00	182.01	39.75	-0.07	39.75	
40	SAGBEND	-57.25	-12.30	0.04	0.00	0.00	0.00	0.00	181.82	40.25	0.24	40.25	
41	SAGBEND	-59.20	-12.74	0.04	0.00	0.00	0.00	0.00	181.63	40.68	0.49	40.69	
42	SAGBEND	-61.15	-13.17	0.05	0.00	0.00	0.00	0.00	181.44	41.05	0.69	41.06	
43	SAGBEND	-63.11	-13.59	0.05	0.00	0.00	0.00	0.00	181.26	41.37	0.86	41.38	
44	SAGBEND	-65.07	-14.00	0.06	0.00	0.00	0.00	0.00	181.08	41.64	0.99	41.65	
45	SAGBEND	-67.03	-14.41	0.06	0.00	0.00	0.00	0.00	180.90	41.88	1.09	41.90	
46	SAGBEND	-68.99	-14.80	0.07	0.00	0.00	0.00	0.00	180.73	42.09	1.18	42.11	
47	SAGBEND	-70.95	-15.19	0.07	0.00	0.00	0.00	0.00	180.56	42.28	1.25	42.30	
48	SAGBEND	-72.91	-15.56	0.08	0.00	0.00	0.00	0.00	180.40	42.45	1.30	42.47	
49	SAGBEND	-74.88	-15.93	0.08	0.00	0.00	0.00	0.00	180.23	42.60	1.34	42.62	
50	SAGBEND	-76.85	-16.29	0.08	0.00	0.00	0.00	0.00	180.08	42.74	1.37	42.76	
51	SAGBEND	-78.81	-16.64	0.09	0.00	0.00	0.00	0.00	179.93	42.86	1.39	42.88	
52	SAGBEND	-80.79	-16.98	0.09	0.00	0.00	0.00	0.00	179.78	42.97	1.41	43.00	
53	SAGBEND	-82.76	-17.31	0.09	0.00	0.00	0.00	0.00	179.63	43.08	1.42	43.10	
54	SAGBEND	-84.73	-17.63	0.10	0.00	0.00	0.00	0.00	179.49	43.17	1.43	43.20	
55	SAGBEND	-86.71	-17.95	0.10	0.00	0.00	0.00	0.00	179.36	43.26	1.44	43.29	
56	SAGBEND	-88.68	-18.25	0.10	0.00	0.00	0.00	0.00	179.23	43.34	1.44	43.37	
57	SAGBEND	-90.66	-18.54	0.10	0.00	0.00	0.00	0.00	179.10	43.42	1.44	43.44	

58	SAGBEND	-92.64	-18.83	0.10	0.00	0.00	0.00	0.00	178.98	43.49	1.44	43.51
59	SAGBEND	-94.62	-19.10	0.10	0.00	0.00	0.00	0.00	178.86	43.55	1.43	43.57

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 4:14:27      PAGE 18

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES												
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NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS	
					VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
60	SAGBEND	-96.61	-19.37	0.10	0.00	0.00	0.00	0.00	178.74	43.61	1.43	43.63
61	SAGBEND	-98.59	-19.62	0.10	0.00	0.00	0.00	0.00	178.63	43.66	1.42	43.68
62	SAGBEND	-100.57	-19.87	0.10	0.00	0.00	0.00	0.00	178.52	43.70	1.41	43.72
63	SAGBEND	-102.56	-20.10	0.10	0.00	0.00	0.00	0.00	178.42	43.73	1.40	43.75
64	SAGBEND	-104.55	-20.33	0.10	0.00	0.00	0.00	0.00	178.32	43.76	1.39	43.78
65	SAGBEND	-106.54	-20.55	0.10	0.00	0.00	0.00	0.00	178.23	43.77	1.38	43.79
66	SAGBEND	-108.52	-20.76	0.10	0.00	0.00	0.00	0.00	178.14	43.77	1.36	43.80
67	SAGBEND	-110.51	-20.96	0.10	0.00	0.00	0.00	0.00	178.05	43.76	1.34	43.78
68	SAGBEND	-112.51	-21.15	0.09	0.00	0.00	0.00	0.00	177.97	43.74	1.33	43.76
69	SAGBEND	-114.50	-21.32	0.09	0.00	0.00	0.00	0.00	177.89	43.69	1.30	43.71
70	SAGBEND	-116.49	-21.49	0.09	0.00	0.00	0.00	0.00	177.82	43.62	1.28	43.64
71	SAGBEND	-118.48	-21.66	0.09	0.00	0.00	0.00	0.00	177.75	43.53	1.25	43.55
72	SAGBEND	-120.48	-21.81	0.08	0.00	0.00	0.00	0.00	177.68	43.40	1.21	43.42
73	SAGBEND	-122.47	-21.95	0.08	0.00	0.00	0.00	0.00	177.62	43.24	1.17	43.25
74	SAGBEND	-124.47	-22.08	0.08	0.00	0.00	0.00	0.00	177.56	43.02	1.12	43.04
75	SAGBEND	-126.47	-22.20	0.07	0.00	0.00	0.00	0.00	177.51	42.75	1.06	42.77
76	SAGBEND	-128.46	-22.32	0.07	0.00	0.00	0.00	0.00	177.46	42.42	0.98	42.43
77	SAGBEND	-130.46	-22.42	0.06	0.00	0.00	0.00	0.00	177.42	42.00	0.89	42.01
78	SAGBEND	-132.46	-22.51	0.06	0.00	0.00	0.00	0.00	177.38	41.48	0.79	41.49
79	SAGBEND	-134.46	-22.60	0.05	0.00	0.00	0.00	0.00	177.34	40.84	0.66	40.85
80	SAGBEND	-136.45	-22.68	0.05	0.00	0.00	0.00	0.00	177.31	40.05	0.50	40.06
81	SAGBEND	-138.45	-22.75	0.04	0.00	0.00	0.00	0.00	177.28	39.09	0.31	39.09
82	SAGBEND	-140.45	-22.80	0.04	0.00	0.00	0.00	0.00	177.26	37.91	0.08	37.91
83	SAGBEND	-142.45	-22.86	0.03	0.00	0.00	0.00	0.00	177.24	36.47	-0.20	36.47
84	SAGBEND	-144.45	-22.90	0.03	0.00	0.00	0.00	0.00	177.23	34.70	-0.54	34.71
85	SAGBEND	-146.45	-22.93	0.02	0.00	0.00	0.00	0.00	177.21	32.55	-0.95	32.56
86	SAGBEND	-148.45	-22.96	0.02	0.00	0.00	0.00	0.00	177.21	29.92	-1.43	29.96
87	SAGBEND	-150.45	-22.98	0.02	0.00	0.00	0.00	0.00	177.20	26.72	-1.96	26.79
88	SEABED	-152.45	-23.00	0.01	0.10	-0.10	0.00	0.00	177.20	22.81	-2.57	22.96
89	SEABED	-154.45	-23.01	0.01	0.53	-0.30	0.00	0.00	177.20	18.28	-3.07	18.54
90	SEABED	-156.45	-23.02	0.00	0.85	-0.23	0.00	0.00	177.21	13.77	-3.11	14.11
91	SEABED	-158.45	-23.02	0.00	1.03	-0.13	0.00	0.00	177.21	9.74	-2.79	10.13
92	SEABED	-160.45	-23.02	0.00	1.12	-0.06	0.00	0.00	177.21	6.42	-2.31	6.83
93	SEABED	-162.45	-23.03	0.00	1.14	-0.02	0.00	0.00	177.21	3.86	-1.78	4.25
94	SEABED	-164.45	-23.03	0.00	1.13	0.01	0.00	0.00	177.21	1.99	-1.30	2.38
95	SEABED	-166.45	-23.02	0.00	1.09	0.03	0.00	0.00	177.21	0.72	-0.88	1.14
96	SEABED	-168.45	-23.02	0.00	1.05	0.03	0.00	0.00	177.21	-0.08	-0.55	0.56
97	SEABED	-170.45	-23.02	0.00	1.00	0.03	0.00	0.00	177.21	-0.53	-0.30	0.61
98	SEABED	-172.45	-23.02	0.00	0.96	0.03	0.00	0.00	177.21	-0.72	-0.13	0.73
99	SEABED	-174.45	-23.02	0.00	0.93	0.02	0.00	0.00	177.21	-0.76	-0.02	0.76
100	SEABED	-176.45	-23.02	0.00	0.91	0.02	0.00	0.00	177.21	-0.70	0.04	0.70
101	SEABED	-178.45	-23.02	0.00	0.89	0.01	0.00	0.00	177.21	-0.59	0.08	0.59
102	SEABED	-180.45	-23.02	0.00	0.88	0.01	0.00	0.00	177.21	-0.47	0.09	0.47
103	SEABED	-182.45	-23.02	0.00	0.87	0.01	0.00	0.00	177.21	-0.35	0.08	0.36

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 4:14:27      PAGE 19

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES												
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NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS	
					VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
104	SEABED	-184.45	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.24	0.07	0.25
105	SEABED	-186.45	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.16	0.06	0.17
106	SEABED	-188.45	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.09	0.04	0.10
107	SEABED	-190.45	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.04	0.03	0.05
108	SEABED	-192.45	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.01	0.02	0.02
109	SEABED	-194.45	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	0.01	0.01	0.01
110	SEABED	-196.45	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.01	0.02
111	SEABED	-198.45	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02
112	SEABED	-200.45	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02
113	SEABED	-202.45	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02
114	SEABED	-204.45	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.01	0.00	0.01
115	SEABED	-206.45	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.01	0.00	0.01
116	SEABED	-208.45	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.00	0.00	0.00
117	SEABED	-210.45	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.00	0.00	0.00
118	SEABED	-212.45	-23.02	0.00	0.00	0.00	0.00	0.00	177.21	0.00	0.00	0.00

STATIC SOLUTION SUMMARY

PIPE PROPERTIES ( 1 )

PIPE SECTION LENGTH ...	0.00 M	ELASTIC MODULUS .....	207000. MPA
OUTSIDE DIAMETER .....	27.305 CM	CROSS SECTIONAL AREA ..	103.82 CM^2
WALL THICKNESS .....	1.270 CM	MOMENT OF INERTIA ....	8817.6 CM^4
WEIGHT/LENGTH IN AIR ..	2022.01 N/M	YIELD STRESS .....	360.00 MPA
SUBMERGED WGHT/LENG ..	434.28 N/M	STRESS INTENS FACTOR ..	1.000
SPECIFIC GRAVITY .....	1.274	STEEL DENSITY .....	77008.0 N/M3
WRAP COAT THICKNESS ..	0.320 CM	WRAP COAT DENSITY ....	9339.1 N/M3
CONCRETE THICKNESS ...	4.000 CM	CONCRETE DENSITY .....	29822.0 N/M3

BARGE DATA

TOTAL PIPE TENSION ...	196.13 KN	RADIUS OF CURVATURE ..	0.00 M
NUMBER OF TENSIONERS ..	2	BARGE TRIM ANGLE .....	0.500 DEG
NO. OF PIPE SUPPORTS ..	7	PIPE ANGLE AT STERN ..	8.129 DEG
BARGE HEADING .....	0.000 DEG	OFFSET FROM R.O.W. ...	0.00 M

STINGER DATA

NO. OF PIPE SUPPORTS ..	6	PIPE DEPTH AT STERN ..	-7.95 M
NO. STINGER SECTIONS ..	6	PIPE ANGLE AT STERN ..	14.889 DEG
RADIUS OF CURVATURE ..	0.00 M	STINGER STERN DEPTH ..	-9.34 M
STINGER LENGTH .....	41.37 M		

SAGBEND DATA

WATER DEPTH .....	23.00 M	TENSION AT TOUCHDOWN ..	177.20 KN
TOUCHDOWN X-COORD ...	-152.32 M	BOTTOM SLOPE ANGLE ...	0.000 DEG
PROJECTED SPAN LENGTH	112.62 M	PIPE LENGTH GAIN .....	2.62 M

SOLUTION SUMMARY

NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACT HORIZ (KN)	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	0.7	0.0	0.2	0.2	0.
3	LAYBARGE	59.7	4.3	0.0	19.4	0.0	13.0	20.1	6.
5	LAYBARGE	48.2	4.0	0.0	23.8	0.0	18.5	28.7	8.
7	TENSIONR	38.1	3.7	0.0	13.9	0.0	6.1	18.8	5.
9	LAYBARGE	33.4	3.6	0.0	12.7	0.0	5.9	18.3	5.
11	TENSIONR	26.7	3.4	0.0	9.5	0.0	3.6	24.2	7.
13	LAYBARGE	21.3	3.3	0.0	0.0	0.0	5.0	26.4	7.
15	LAYBARGE	12.1	3.0	0.0	52.4	0.0	157.7	262.5	73.
17	LAYBARGE	0.0	1.8	0.0	36.7	0.0	154.5	257.3	71.
20	STINGER	-8.1	0.4	0.0	24.3	-0.1	135.5	227.8	63.
22	STINGER	-15.9	-1.4	0.0	14.3	-0.3	89.6	156.6	44.
24	STINGER	-23.6	-3.5	0.0	0.0	-0.2	18.9	47.1	13.

STATIC SOLUTION SUMMARY

26 STINGER	-30.7	-5.5	0.0	0.0	-0.6	12.5	37.1	10.
28 STINGER	-36.8	-7.2	0.0	0.0	3.1	26.0	57.9	16.
30 STINGER	-39.7	-8.0	0.0	0.0	-4.0	30.7	65.2	18.
65 SAGBEND	-106.5	-20.5	0.1	0.0	0.0	43.8	84.9	24.
88 SEABED	-152.4	-23.0	0.0	0.1	-0.1	23.0	52.6	15.

DYNAMIC SOLUTION SUMMARY

SEA STATE NUMBER ( 1 )

SEA STATE TYPE .....	WAVE SPECTRUM
NO. WAVE COMPONENTS ..	20
WAVE WATER DEPTH .....	23.0 M
MAX. WAVE FREQUENCY ..	3.0015 RA/S

VESSEL RESPONSE TYPE . TABLE OF RAO  
 WAVE TRAVEL DIRECTION 0.000 DEG  
 MIN. WAVE FREQUENCY .. 0.1001 RA/S  
 RANDOM PHASE SEED .... 0

SPECTRUM START TIME .. 0. SECS NO. RAO'S IN TABLE .... 30  
 RAO SIGN CONVENTION .. BENTLEY MOSES

SEA STATE DEFINITION

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WAVE SPECTRUM TYPE ... JONSWAP (CLASSIC)  
 JONSWAP COEFFICIENT .. 0.003223 JONSWAP PEAK FACTOR .. 5.000  
 PEAK WAVE FREQUENCY .. 0.9498 RA/S

CALCULATED WAVE HEIGHTS

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SIGNIFICANT WAVE HT. . 1.454 M AVERAGE WAVE HEIGHT .. 0.935 M  
 MAXIMUM WAVE HEIGHT .. 2.756 M RMS WAVE HEIGHT ..... 1.042 M  
 TOTAL NUMBER OF WAVES 1921

===== SOLUTION SUMMARY =====

NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACT HORIZ (KN )	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	0.9	0.0	0.2	0.3	0.
3	LAYBARGE	59.7	4.3	0.0	19.9	-0.4	13.6	21.0	6.
5	LAYBARGE	48.2	4.0	0.0	24.2	-0.3	18.8	29.3	8.
7	TENSIONR	38.1	3.7	0.0	14.7	-0.1	6.5	28.7	8.
9	LAYBARGE	33.4	3.6	0.0	13.4	0.3	6.7	28.4	8.
11	TENSIONR	26.6	3.4	0.0	11.8	0.2	5.3	35.3	10.
13	LAYBARGE	21.3	3.3	0.0	0.0	-0.5	6.8	38.6	11.
15	LAYBARGE	12.1	3.0	0.0	63.1	-1.8	167.0	287.3	80.
17	LAYBARGE	0.0	1.8	0.0	54.3	-2.0	171.9	284.6	79.
20	STINGER	-8.1	0.4	0.0	44.1	-2.9	152.2	263.5	73.
22	STINGER	-15.9	-1.3	0.0	38.6	-4.9	130.1	228.6	64.
24	STINGER	-23.7	-3.3	0.0	26.7	-4.4	91.2	168.0	47.
26	STINGER	-30.8	-5.1	0.0	10.7	8.4	51.1	103.2	29.
28	STINGER	-36.9	-6.6	0.0	-2.1	70.0	57.1	114.8	32.
30	STINGER	-39.8	-7.3	0.0	2.2	-91.6	151.5	261.0	72.
88	SEABED	-152.5	-22.7	0.2	0.0	0.0	43.7	85.1	24.

**LAMPIRAN ANALISA DINAMIS PADA PIPA 10 INCH  
HEADING 180°**

```

MMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMMMMMMMMM  MMMMMMMMMMMM  MMMMMMMMMMMM  MMMMMMMMMMMM  MMMMMMMMMMMM  MMMMMMMMMMMM  MMMMMMMMMMMM  MMMMMMMMMMMM  MMMMMMMMMMMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMM  MMMMMMMMMM  MMMMMMMMMMMM  MMMMMMMMMMMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMMMMMMMMM  MMMMMMMMMMMM  MMMMMMMMMMMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
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MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMMMMMMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMMMMMMMMMMM  MMMMMMMMMMMM
MMMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMMMMMMMMM

```

```

*****
*
*           O F F P I P E - 3 -- OFFSHORE PIPELINE ANALYSIS SYSTEM
*
*   COPYRIGHT (C) 1983-2016, ROBERT C. MALAHY. ALL RIGHTS RESERVED WORLDWIDE.
*
*           VERSION NO. - 3.02EX
*           RELEASED ON - 03/08/2016
*           LICENSED TO - PT Timas Suplindo
*
*****
*
* OFFPIPE IS A NONLINEAR, 3-DIMENSIONAL FINITE ELEMENT METHOD BASED PROGRAM FOR THE
* STATIC AND DYNAMIC ANALYSIS OF PROBLEMS ARISING IN THE DESIGN OF MARINE PIPELINES.
* THIS VERSION OF OFFPIPE MAY BE USED FOR THE ANALYSIS OF OFFSHORE PIPELAYING OPER-
* ATIONS, DAVIT LIFTS, PIPELINES LYING ON AN UNEVEN SEABED, AND RISERS.
*
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*
*           ROBERT C. MALAHY           TELEPHONE: (713) 664-8635
*           6554 AUDEN                 FACSIMILE: (713) 664-0962
*           HOUSTON, TEXAS 77005
*           U.S.A.                     EMAIL: SUPPORT@OFFPIPE.COM
*
*****

```

```

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX  PAGE 3
STATIC PIPE ANALYSIS 10 INCH
JOB NO. - LAYING           LICENSED BY - PT Timas Suplindo
USER ID - IK              DATE - 5/2/2020  TIME - 4:37:27  CASE 1
=====

```

INPUT DATA ECHO

```

=====
PRINTED OUTPUT SELECTED
=====
STATIC PIPE FORCES AND STRESSES ... YES
STATIC SOLUTION SUMMARY ..... YES
DYNAMIC PIPE FORCES AND STRESSES .. NO
DYNAMIC RANGE OF PIPE DATA ..... NO
DYNAMIC TRACKING OF PIPE DATA ..... NO
OVERBEND PIPE SUPPORT GEOMETRY .... NO
STINGER BALLAST SCHEDULE DATA ..... NO
SUPPORT REACTIONS IN BARGE COORDS . NO

INTERNAL FORCES IN PIPE & CABLE ... NO
INTERNAL FORCES IN STINGER ..... NO
PRINT PIPE STRAINS IN OUTPUT ..... NO
DNV OS-F101 COMPLIANCE REPORT ..... NO
API RP-1111 COMPLIANCE REPORT ..... NO
PRINT DNV/API FACTORS & PARAMETERS NO
USE THICK WALL HOOP STRESS EQN. ... NO
USE DNV 1981 FOR TOTAL PIPE STRESS NO

ENABLE/DISABLE WARNING MESSAGES ... ENABLE
GENERATE SPREAD SHEET PLOT FILE ... NO
GENERATE ASCII PLOT DATA FILES .... NO

```



PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX ..... 1  
 PLOT NUMBER ..... 1  
 PLOT TYPE OPTION NUMBER ..... 1  
 DYNAMIC PROFILE TIME POINT ..... 0.000  
 DYNAMIC PROFILE TIME INCREMENT ..... 0.000  
 ORDINATE PARAMETER CODE NUMBER ..... 2  
 AXIS LABEL FOR ORDINATE ..... "PIPE ELEVATION Y COORDINATE"  
 ABSCISSA PARAMETER CODE NUMBER ..... 1  
 AXIS LABEL FOR ABSCISSA ..... "PIPE HORIZONTAL X COORDINATE"  
  
 PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS"  
 MINIMUM VERTICAL AXIS RANGE ..... 0.000  
 MAXIMUM VERTICAL AXIS RANGE ..... 0.000  
 MINIMUM HORIZONTAL AXIS RANGE ..... 0.000  
 MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 4  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 4:37:27 CASE 1

=====

INPUT DATA ECHO

PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX ..... 2  
 PLOT NUMBER ..... 1  
 PLOT TYPE OPTION NUMBER ..... 1  
 DYNAMIC PROFILE TIME POINT ..... 0.000  
 DYNAMIC PROFILE TIME INCREMENT ..... 0.000  
 ORDINATE PARAMETER CODE NUMBER ..... 15  
 AXIS LABEL FOR ORDINATE ..... "DNV YIELD STRESS PERCENTAGE"  
 ABSCISSA PARAMETER CODE NUMBER ..... 1  
 AXIS LABEL FOR ABSCISSA ..... "PIPELINE HORIZONTAL X COORDINATE"  
  
 PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS"  
 MINIMUM VERTICAL AXIS RANGE ..... 0.000  
 MAXIMUM VERTICAL AXIS RANGE ..... 0.000  
 MINIMUM HORIZONTAL AXIS RANGE ..... 0.000  
 MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000

PIPE PROPERTIES

=====

PROPERTY TABLE ROW NUMBER ..... 1  
 PIPE SECTION LENGTH ..... 0.000 METERS  
 STEEL MODULUS OF ELASTICITY ..... 207000. M-PASCAL  
 STEEL CROSS SECTIONAL AREA ..... 103.822 CM<sup>2</sup>  
 COATED PIPE AVG MOMENT OF INERTIA .. 8817.56 CM<sup>4</sup>  
 WEIGHT PER-UNIT-LENGTH IN AIR ..... 2022.01 N/M  
 WEIGHT PER-UNIT-LENGTH SUBMERGED .. 434.28 N/M  
 MAXIMUM ALLOWABLE PIPE STRAIN ..... 0.205000 PERCENT  
  
 STEEL OUTSIDE DIAMETER ..... 27.3050 CM  
 STEEL WALL THICKNESS ..... 1.2700 CM  
 YIELD STRESS ..... 360.00 M-PASCAL  
 STRESS/STRAIN INTENSE FACTOR ..... 0.0000  
 HYDRODYNAMIC OUTSIDE DIAMETER ..... 0.000 CM  
 DRAG COEFFICIENT ..... 0.0000  
 HYDRODYNAMIC TOTAL AREA ..... 0.000 CM<sup>2</sup>  
 ADDED MASS COEFFICIENT ..... 0.0000  
 POISSON'S RATIO ..... 0.3000  
 COEFFICIENT OF THERMAL EXPANSION .. 0.00001100 1/DEG C

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 5  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 4:37:27 CASE 1

=====

INPUT DATA ECHO

PIPE COATING PROPERTIES

=====

PIPE PROPERTY TABLE INDEX ..... 1  
 CORROSION COATING THICKNESS ..... 0.320 CM  
 CORROSION COATING WEIGHT DENSITY .. 9339.1 N/M<sup>3</sup>  
 CORROSION COATING ELASTIC MODULUS . 0.000 M-PASCAL  
 CONCRETE COATING THICKNESS ..... 4.000 CM  
 CONCRETE COATING WEIGHT DENSITY ... 29822. N/M<sup>3</sup>  
 CONCRETE COATING ELASTIC MODULUS .. 0.000 M-PASCAL  
 DESIRED PIPE SPECIFIC GRAVITY ..... 0.0000  
 CONCRETE STIFFENING EFFECTIVENESS . 0.000  
 NO NOT CALC. STRESS FOR BARE PIPE . NO

AVERAGE LENGTH OF PIPE JOINT ..... 12.200 METERS  
 EFFECTIVE FIELD JOINT LENGTH ..... 0.300 METERS  
 FIELD JOINT FILL WEIGHT DENSITY ... 10055.3 N/M^3  
 FIELD JOINT FILL ELASTIC MODULUS... 0.000 M-PASCAL  
 FIELD JOINT STIFFENING EFFECT. .... 0.000  
 FIELD JOINT BENDING MODEL ..... 0 IGNORE COATING STIFFNESS  
 WEIGHT DENSITY OF STEEL ..... 77008. N/M^3  
 WEIGHT DENSITY OF PIPE CONTENTS ... 0.0 N/M^3  
 REF. ELEVATION FOR STATIC HEAD .... 0.00 METERS  
 FREE FLOOD PIPE DURING PIPELAY ... NO

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 6  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 4:37:27 CASE 1  
 =====

INPUT DATA ECHO

PIPELAY VESSEL DESCRIPTION

=====  
 NUMBER OF PIPE NODES ..... 9  
 BARGE GEOMETRY SPECIFIED BY ..... 1 X-Y COORDINATES  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.000 METERS  
 ADJUST Y COORDINATES MANUALLY .... NO  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 PIPE ANGLE RELATIVE TO DECK ..... 0.0000 DEGREES  
 HEIGHT OF DECK ABOVE WATER ..... 2.400 METERS  
 LAYBARGE FORWARD (X) OFFSET ..... 0.000 METERS  
 BARGE TRIM ANGLE ..... 0.5000 DEGREES  
  
 STERN SHOE X COORDINATE ..... 0.000 METERS  
 STERN SHOE Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER X COORDINATE ..... 43.820 METERS  
 ROTATION CENTER Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER Z COORDINATE ..... 6.370 METERS  
 BARGE HEADING ..... 0.0000 DEGREES  
 BARGE OFFSET FROM RIGHT-OF-WAY .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT VERTICAL ANGLE ... 0.000 DEGREES  
 PIPE RAMP PIVOT Z COORDINATE ..... 0.000 METERS  
 PIPE RAMP HEADING ON DECK ..... 0.000 DEGREES  
 ROLE OF ALTERNATE WAVE ORIGIN .... 0 MOTIONS & WAVES AT CENTER OF MOTION  
 WAVE PHASE ORIGIN X COORDINATE .... 0.000  
 WAVE PHASE ORIGIN Y COORDINATE .... 0.000 METERS  
 WAVE PHASE ORIGIN Z COORDINATE .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE .....

NODE X COORD (M )	NODE Y COORD (M )	SUPPORT TYPE	DAVIT SPACING (M )
64.220	1.838	1 SIMPLE SUPPORT	0.000
59.740	1.760	1 SIMPLE SUPPORT	0.000
48.240	1.560	1 SIMPLE SUPPORT	0.000
38.110	1.383	2 PIPE TENSIONER	0.000
33.440	1.302	1 SIMPLE SUPPORT	0.000
26.660	1.183	2 PIPE TENSIONER	0.000
21.340	1.092	7 USER DEFINED SPT	0.000
12.150	0.860	7 USER DEFINED SPT	0.000
-0.040	-0.260	8 USER DEFINED SPT	0.000

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 7  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 4:37:27 CASE 1  
 =====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====  
 SUPPORT PROPERTY TABLE INDEX ..... 2  
 SUPPORT ELEMENT TYPE ..... 2 TENSIONER  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
  
 BOTTOM ROLLER ANGLE TO HORIZONTAL . 0.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES

SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 7  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 1.600 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 8  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 4:37:27 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 8  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

STINGER DESCRIPTION

=====

NUMBER OF PIPE/STINGER NODES ..... 6  
 STINGER GEOMETRY SPECIFIED BY ..... 2 X-Y COORD AND MATCH PT  
 STINGER TYPE ..... 1 FIXED GEOMETRY OR RAMP  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.00 METERS  
 HITCH X-COORDINATE ..... 0.497 METERS  
 HITCH Y-COORDINATE ..... -1.800 METERS  
 HITCH ANGULAR ORIENTATION ..... 0.000 DEGREES

X COORDINATE OF LOCAL ORIGIN ..... 0.497 METERS  
 Y COORDINATE OF LOCAL ORIGIN ..... -1.800 METERS  
 ROTATION ABOUT STINGER HITCH ..... 13.500 DEGREES  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 TANGENT POINT ANGLE ..... 0.000 DEGREES

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	ELEMENT TYPE	ELEMENT LENGTH ( M )
-8.325	2.209	1 SIMPLE SUPPORT	2 HINGED END	0.000
-16.325	2.349	1 SIMPLE SUPPORT	1 FIXED END	0.000
-24.325	2.119	1 SIMPLE SUPPORT	1 FIXED END	0.000
-31.699	1.660	1 SIMPLE SUPPORT	1 FIXED END	0.000
-37.949	1.069	1 SIMPLE SUPPORT	1 FIXED END	0.000
-40.949	0.350	1 SIMPLE SUPPORT	1 FIXED END	0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 9  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 4:37:27 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

```

=====
SUPPORT PROPERTY TABLE INDEX ..... 1
SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT
SUPPORT INITIAL STATE FLAG ..... 0
TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M
VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M
STATIC VERTICAL DEFLECTION ..... 0.0000 CM
LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES
SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES
SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS
BED ROLLER LENGTH ..... 1.640 METERS
HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS
TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
    
```

CURRENT VELOCITIES

```

=====
WATER DEPTH (M ) CURRENT SPEED (M/S ) DIRECTION OF TRAVEL (DEG )
=====
0.000 0.790 180.000
11.500 0.480 180.000
23.000 0.420 180.000
    
```

PIPE TENSION DATA

```

=====
STATIC PIPE TENSION ON LAY VESSEL . 196.133 K-NEWTON
MINIMUM DYNAMIC PIPE TENSION ..... 0.000 K-NEWTON
MAXIMUM DYNAMIC PIPE TENSION ..... 0.000 K-NEWTON
STATIC HORIZONTAL BOTTOM TENSION .. 0.000 K-NEWTON
NO. OF VALUES FOR TENSION PROFILE . 0
VALUES ARE FOR PIPE SPAN ANALYSIS . NO
MAXIMUM PIPE PAYOUT SPEED ..... 0.000 M/SEC
MAXIMUM PIPE TAKEUP SPEED ..... 0.000 M/SEC
    
```

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 10

STATIC PIPE ANALYSIS 10 INCH

JOB NO. - LAYING

LICENSED BY - PT Timas Suplindo

USER ID - IK

DATE - 5/ 2/2020 TIME - 4:37:27

CASE 1

=====  
INPUT DATA ECHO

SAGBEND GEOMETRY

```

=====
SAGBEND PIPE ELEMENT LENGTH ..... 2.000 METERS
WATER DEPTH ..... 23.00 METERS
X-COORDINATE AT SPECIFIED DEPTH . . 0.00 METERS
ESTIMATED SAGBEND X LENGTH ..... 0.00 METERS
ESTIMATED PIPE LENGTH ON SEABED ... 0.00 METERS
X-COORD OF PIPE FREE END ON SEABED 0.00 METERS
X-COORD POINT OF FIXITY ON SEABED . 0.00 METERS
MAXIMUM SLOPE (ANGLE) OF SEABED ... 0.000 DEGREES
DIRECTION OF MAXIMUM SLOPE ..... 0.000 DEGREES

PIPE/CABLE SPAN END CONDITION ..... 0 PIPE/CABLE RESTING ON SEABED
PIPE/CABLE SPAN LENGTH GIVEN BY ... 0 SPECIFIED PIPE/CABLE TENSION
ESTIMATED SPAN DEPTH AT FREE END .. 0.00 METERS
PIPE VERTICAL ANGLE AT FREE END ... 0.000 DEGREES
BOTTOM HINGE OFFSET ..... 0.000 METERS
BOTTOM HINGE MINIMUM ANGLE ..... 0.000 DEGREES
BOTTOM HINGE MAXIMUM ANGLE ..... 0.000 DEGREES
    
```

SOIL ELEMENT PROPERTIES

```

=====
SOIL PROPERTY TABLE ROW INDEX ..... 1
SOIL ELEMENT TYPE (FUTURE USE) .... 0
PIPE INDEX OR SEGMENT NUMBER ..... 0
LONGITUDINAL SOIL STIFFNESS ..... 0.00 KN/M^2
VERTICAL SOIL STIFFNESS ..... 0.00 KN/M^2
LATERAL SOIL STIFFNESS ..... 0.00 KN/M^2
DEFLECTION UNDER REFERENCE LOAD ... 0.0000 CM

LONGITUDINAL COEF. OF FRICTION .... 0.000
LATERAL COEFFICIENT OF FRICTION ... 0.600
NUMBER OF INTEGRATION POINTS ..... 0
    
```

TIME INTEGRATION PARAMETERS

```

=====
TIME STEP LENGTH ..... 0.2000 SECONDS
MAXIMUM TIME OF INTEGRATION ..... 10860.000 SECONDS
SOLUTION SAMPLING TIME STEP ..... 0.400 SECONDS
    
```

SOLUTION SAMPLING STARTS AT TIME .. 60.000 SECONDS  
 DAMPING RATIO ..... 0.0000  
 NUMBER OF VARIABLE TIME STEPS ..... 0

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 11  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 4:37:27 CASE 1

=====

INPUT DATA ECHO

WAVE PARAMETERS

=====

SEA STATE ROW INDEX ..... 1  
 WAVE HEIGHT (PEAK TO TROUGH) ..... 1.800 METERS  
 WAVE PERIOD ..... 6.300 SECONDS  
 WAVE DIRECTION OF TRAVEL ..... 180.000 DEGREES  
 WATER DEPTH FOR WAVE CALCULATIONS . 23.00 METERS  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0

WAVE SPECTRUM EQUATION

=====

SEA STATE ROW INDEX ..... 1  
 WAVE SPECTRUM EQUATION TYPE ..... 7 JONSWAP (CLASSIC)  
 NUMBER OF WAVES IN SPECTRUM ..... 20  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0  
 MINIMUM PERIOD IN SPECTRUM ..... 2.0933 SECONDS  
 MAXIMUM PERIOD IN SPECTRUM ..... 62.8000 SECONDS  
 START TIME FOR WAVE SPECTRUM ..... 0. SECONDS  
 DIRECTION OF WAVE TRAVEL ..... 180.000 DEGREES  
 1ST JONSWAP COEF. (ALPHA) ..... 0.008952  
 2ND JONSWAP COEF. (GAMMA) ..... 5.0000  
 PEAK WAVE PERIOD ..... 6.6150 SECONDS

VESSEL MOTION RAO TABLE

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SEA STATE NUMBER ..... 1  
 USE PHASE LAG FOR RAOs ..... NO  
 VESSEL MOTIONS SIGN CONVENTION .... 2 BENTLEY MOSES  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD

WAVE PERIOD (SECONDS)	----- SURGE AMPLITUDE (M/M )	----- / PHASE (DEG)	----- / SWAY AMPLITUDE (M/M )	----- / PHASE (DEG)	----- / HEAVE AMPLITUDE (M/M )	----- / PHASE (DEG)
2.0900	0.0030	-170.00	0.0000	0.00	0.0040	-66.00
2.1700	0.0040	132.00	0.0000	0.00	0.0040	-77.00
2.2400	0.0040	56.00	0.0000	0.00	0.0020	-81.00
2.3300	0.0040	-36.00	0.0000	0.00	0.0050	-59.00
2.4200	0.0050	-134.00	0.0000	0.00	0.0070	-65.00
2.5100	0.0070	120.00	0.0000	0.00	0.0070	-84.00
2.6200	0.0080	17.00	0.0000	0.00	0.0050	-66.00
2.7300	0.0070	-126.00	0.0000	0.00	0.0110	-62.00
2.8500	0.0140	102.00	0.0000	0.00	0.0100	-93.00
2.9900	0.0090	-16.00	0.0000	0.00	0.0090	-48.00
3.1400	0.0190	147.00	0.0000	0.00	0.0160	-84.00
3.3100	0.0170	35.00	0.0000	0.00	0.0060	-62.00

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 12  
 STATIC PIPE ANALYSIS 10 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 4:37:27 CASE 1

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WAVE PERIOD	----- ROLL AMPLITUDE	----- / PHASE	----- / PITCH AMPLITUDE	----- / PHASE	----- YAW AMPLITUDE	----- / PHASE
3.4900	0.0280	160.00	0.0000	0.00	0.0230	-82.00
3.7000	0.0200	44.00	0.0000	0.00	0.0060	-69.00
3.9300	0.0490	150.00	0.0000	0.00	0.0310	-95.00
4.1900	0.0060	-31.00	0.0000	0.00	0.0160	-47.00
4.4900	0.0730	121.00	0.0000	0.00	0.0350	-124.00
4.8300	0.0680	-163.00	0.0000	0.00	0.0510	-77.00
5.2400	0.0310	69.00	0.0000	0.00	0.0170	-66.00
5.7100	0.1390	136.00	0.0000	0.00	0.0680	-147.00
6.2800	0.1620	-167.00	0.0000	0.00	0.1610	-101.00
6.9800	0.0620	-118.00	0.0000	0.00	0.1330	-33.00
7.8500	0.1350	104.00	0.0000	0.00	0.1130	153.00
8.9700	0.3670	143.00	0.0000	0.00	0.3970	-139.00
10.4700	0.5800	177.00	0.0000	0.00	0.6520	-98.00
12.5600	0.7420	-154.00	0.0000	0.00	0.8300	-67.00
15.7000	0.8470	-130.00	0.0000	0.00	0.9340	-42.00
20.9300	0.9050	-112.00	0.0000	0.00	0.9830	-23.00
31.4000	0.9320	-99.00	0.0000	0.00	1.0000	-9.00
62.8000	0.9420	-92.00	0.0000	0.00	1.0030	-2.00

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(SECONDS)	(DEG/M)	(DEG)	(DEG/M)	(DEG)	(DEG/M)	(DEG)
2.0900	0.0000	0.00	0.0120	-59.00	0.0000	0.00
2.1700	0.0000	0.00	0.0150	-56.00	0.0000	0.00
2.2400	0.0010	-74.00	0.0160	-64.00	0.0000	0.00
2.3300	0.0000	0.00	0.0240	-75.00	0.0000	0.00
2.4200	0.0000	0.00	0.0200	-73.00	0.0000	0.00
2.5100	0.0000	0.00	0.0280	-55.00	0.0000	0.00
2.6200	0.0000	0.00	0.0390	-73.00	0.0000	0.00
2.7300	0.0000	0.00	0.0280	-83.00	0.0000	0.00
2.8500	0.0000	0.00	0.0440	-52.00	0.0000	0.00
2.9900	0.0000	0.00	0.0540	-88.00	0.0000	0.00
3.1400	0.0000	0.00	0.0340	-50.00	0.0000	0.00
3.3100	0.0000	0.00	0.0800	-81.00	0.0000	0.00
3.4900	0.0000	0.00	0.0320	-50.00	0.0000	0.00
3.7000	0.0000	0.00	0.1110	-86.00	0.0000	0.00
3.9300	0.0000	0.00	0.0490	-48.00	0.0000	0.00
4.1900	0.0000	0.00	0.1400	-107.00	0.0000	0.00
4.4900	0.0000	0.00	0.1470	-56.00	0.0000	0.00
4.8300	0.0000	0.00	0.0800	-124.00	0.0000	0.00
5.2400	0.0000	0.00	0.2790	-105.00	0.0000	0.00
5.7100	0.0000	0.00	0.3300	-65.00	0.0000	0.00
6.2800	0.0010	51.00	0.0100	28.00	0.0000	0.00
6.9800	0.0020	173.00	0.7900	-140.00	0.0000	0.00

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 13  
 STATIC PIPE ANALYSIS 10 INCH  
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INPUT DATA ECHO

7.8500	0.0000	0.00	1.5530	-87.00	0.0000	0.00
8.9700	0.0000	0.00	1.8550	-42.00	0.0000	0.00
10.4700	0.0000	0.00	1.7270	-4.00	0.0000	0.00
12.5600	0.0000	0.00	1.3590	25.00	0.0000	0.00
15.7000	0.0000	0.00	0.9240	50.00	0.0000	0.00
20.9300	0.0000	0.00	0.5320	69.00	0.0000	0.00
31.4000	0.0000	0.00	0.2380	83.00	0.0000	0.00
62.8000	0.0000	0.00	0.0610	100.00	0.0000	0.00

\*\*\*\*\* INFORMATIVE MESSAGE NO. - 94 \*\*\*\*\*

One or more of the phase angles in the RAO table have been adjusted to minimize the difference in value between adjacent angles. If the phase angles are arbitrarily restricted by the software used to calculate the RAOs to a fixed range of values such as (0 to 2\*PI) or (-PI to +PI), then phase angles that are actually close in value can differ by as much as 2\*PI. These large differences can cause the phase angles for RAOs that are between the values in the table (which must be determined using interpolation) to be calculated incorrectly.

CONTROL SWITCHES

MAX NUMBER STATIC ITERATIONS ..... 500  
 MAX DYNAMIC ITERATIONS PER STEP ... 500  
 BOUNDARY CONDITION LOGIC PARAMETER 5  
 TIME STEP STABILITY PARAMETER ..... 0  
 TYPE OF ANALYSIS ..... DYNAMIC  
 NUMBER OF PROBLEM DIMENSIONS ..... 3  
 DAVIT LIFT ANALYSIS ..... NO

STATIC SOLUTION CONVERGED IN ( 41 ) ITERATIONS

END OF INPUT DATA

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 4:37:27 PAGE 14  
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 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

STATIC PIPE COORDINATES, FORCES AND STRESSES

NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES (MPA)	TOTAL STRESS (MPA)	PERCENT YIELD (PCT)
1	LAYBARGE	64.20	4.42	0.00	0.000	1.482	0.00	0.00	0.00	0.23	0.00	0.23
3	LAYBARGE	59.72	4.30	0.00	0.000	1.554	4.48	-0.02	0.00	-20.12	0.00	20.14
5	LAYBARGE	48.23	4.00	0.00	0.000	1.477	15.98	-0.08	0.00	-28.57	0.00	28.66
7	TENSIONR	38.10	3.73	0.00	0.000	1.453	26.11	9.31	0.00	-9.48	0.00	18.79
9	LAYBARGE	33.43	3.61	0.00	0.000	1.531	30.78	9.28	0.00	-9.06	0.00	18.35
11	TENSIONR	26.65	3.43	0.00	0.000	1.446	37.57	18.69	0.00	5.50	0.00	24.19
13	LAYBARGE	21.33	3.30	0.00	0.000	1.400	42.89	18.66	0.00	-7.74	0.00	26.41
15	LAYBARGE	12.14	2.98	0.00	0.000	3.342	52.08	18.53	0.00	-243.99	0.00	262.52

17	LAYBARGE	-0.04	1.76	0.00	0.000	8.130	64.32	18.29	0.00	-239.12	0.00	257.41	71.50
20	STINGER	-8.10	0.35	0.00	0.000	11.554	72.51	18.04	0.00	-209.37	0.00	227.41	63.17
22	STINGER	-15.89	-1.45	0.00	0.000	14.248	80.51	17.86	-0.16	-140.44	0.00	158.38	43.99
24	STINGER	-23.62	-3.53	0.00	0.000	15.541	88.51	17.67	-0.38	-29.70	0.00	47.56	13.21
26	STINGER	-30.74	-5.52	0.00	0.000	15.574	95.90	17.48	-0.60	19.34	0.00	37.12	10.31
28	STINGER	-36.80	-7.18	0.00	0.000	15.180	102.19	17.31	-0.78	40.39	0.00	58.09	16.14
30	STINGER	-39.69	-7.96	0.00	0.000	14.914	105.19	17.24	-0.86	46.71	0.00	64.38	17.88
32	SAGBEND	-41.71	-8.50	0.00	0.000	14.709	107.27	17.18	-0.92	50.14	0.00	67.79	18.83
33	SAGBEND	-43.64	-9.00	0.00	0.000	14.499	109.27	17.13	-0.97	52.86	0.00	70.48	19.58
34	SAGBEND	-45.58	-9.50	0.00	0.000	14.280	111.27	17.08	-1.03	55.10	0.00	72.71	20.20
35	SAGBEND	-47.52	-9.99	0.00	0.000	14.053	113.27	17.03	-1.08	56.97	0.00	74.55	20.71
36	SAGBEND	-49.46	-10.47	0.00	0.000	13.819	115.27	16.99	-1.13	58.53	0.00	76.09	21.14
37	SAGBEND	-51.40	-10.94	0.00	0.000	13.578	117.27	16.94	-1.18	59.83	0.00	77.37	21.49
38	SAGBEND	-53.35	-11.41	0.00	0.000	13.333	119.27	16.89	-1.23	60.92	0.00	78.44	21.79
39	SAGBEND	-55.30	-11.86	0.00	0.000	13.084	121.27	16.85	-1.28	61.84	0.00	79.34	22.04
40	SAGBEND	-57.25	-12.31	0.00	0.000	12.832	123.27	16.81	-1.33	62.62	0.00	80.10	22.25
41	SAGBEND	-59.20	-12.75	0.00	0.000	12.577	125.27	16.76	-1.38	63.28	0.00	80.74	22.43
42	SAGBEND	-61.15	-13.18	0.00	0.000	12.319	127.27	16.72	-1.42	63.84	0.00	81.29	22.58
43	SAGBEND	-63.11	-13.61	0.00	0.000	12.059	129.27	16.68	-1.47	64.33	0.00	81.75	22.71
44	SAGBEND	-65.06	-14.02	0.00	0.000	11.797	131.27	16.64	-1.52	64.75	0.00	82.16	22.82
45	SAGBEND	-67.02	-14.42	0.00	0.000	11.533	133.27	16.60	-1.56	65.12	0.00	82.51	22.92
46	SAGBEND	-68.98	-14.82	0.00	0.000	11.269	135.27	16.56	-1.60	65.44	0.00	82.81	23.00
47	SAGBEND	-70.94	-15.21	0.00	0.000	11.003	137.27	16.52	-1.64	65.73	0.00	83.08	23.08
48	SAGBEND	-72.91	-15.58	0.00	0.000	10.735	139.27	16.48	-1.68	65.98	0.00	83.32	23.14
49	SAGBEND	-74.87	-15.95	0.00	0.000	10.467	141.27	16.45	-1.72	66.21	0.00	83.53	23.20
50	SAGBEND	-76.84	-16.31	0.00	0.000	10.198	143.27	16.41	-1.76	66.41	0.00	83.72	23.26
51	SAGBEND	-78.81	-16.66	0.00	0.000	9.928	145.27	16.38	-1.80	66.60	0.00	83.89	23.30
52	SAGBEND	-80.78	-17.00	0.00	0.000	9.658	147.27	16.34	-1.84	66.77	0.00	84.05	23.35
53	SAGBEND	-82.75	-17.33	0.00	0.000	9.387	149.27	16.31	-1.87	66.93	0.00	84.19	23.39
54	SAGBEND	-84.73	-17.65	0.00	0.000	9.115	151.27	16.28	-1.91	67.07	0.00	84.32	23.42
55	SAGBEND	-86.70	-17.96	0.00	0.000	8.843	153.27	16.25	-1.94	67.20	0.00	84.44	23.45
56	SAGBEND	-88.68	-18.27	0.00	0.000	8.570	155.27	16.22	-1.97	67.32	0.00	84.54	23.48
57	SAGBEND	-90.66	-18.56	0.00	0.000	8.296	157.27	16.19	-2.01	67.43	0.00	84.64	23.51
58	SAGBEND	-92.64	-18.84	0.00	0.000	8.023	159.27	16.16	-2.04	67.53	0.00	84.73	23.54
59	SAGBEND	-94.62	-19.12	0.00	0.000	7.749	161.27	16.13	-2.07	67.62	0.00	84.81	23.56

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/2/2020      TIME - 4:37:27      PAGE 15

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERC YIELD (PCT)
=====													
60	SAGBEND	-96.60	-19.38	0.00	0.000	7.474	163.27	16.11	-2.09	67.70	0.00	84.88	23.58
61	SAGBEND	-98.59	-19.64	0.00	0.000	7.199	165.27	16.08	-2.12	67.77	0.00	84.93	23.59
62	SAGBEND	-100.57	-19.88	0.00	0.000	6.924	167.27	16.06	-2.15	67.83	0.00	84.98	23.61
63	SAGBEND	-102.56	-20.12	0.00	0.000	6.649	169.27	16.04	-2.17	67.87	0.00	85.02	23.62
64	SAGBEND	-104.54	-20.35	0.00	0.000	6.374	171.27	16.01	-2.20	67.90	0.00	85.04	23.62
65	SAGBEND	-106.53	-20.56	0.00	0.000	6.098	173.27	15.99	-2.22	67.92	0.00	85.04	23.62
66	SAGBEND	-108.52	-20.77	0.00	0.000	5.823	175.27	15.97	-2.24	67.91	0.00	85.03	23.62
67	SAGBEND	-110.51	-20.97	0.00	0.000	5.547	177.27	15.95	-2.27	67.89	0.00	85.00	23.61
68	SAGBEND	-112.50	-21.16	0.00	0.000	5.272	179.27	15.93	-2.29	67.84	0.00	84.94	23.59
69	SAGBEND	-114.49	-21.34	0.00	0.000	4.997	181.27	15.92	-2.31	67.76	0.00	84.85	23.57
70	SAGBEND	-116.49	-21.51	0.00	0.000	4.722	183.27	15.90	-2.32	67.64	0.00	84.73	23.54
71	SAGBEND	-118.48	-21.67	0.00	0.000	4.448	185.27	15.88	-2.34	67.49	0.00	84.56	23.49
72	SAGBEND	-120.47	-21.82	0.00	0.000	4.175	187.27	15.87	-2.36	67.28	0.00	84.35	23.43
73	SAGBEND	-122.47	-21.96	0.00	0.000	3.902	189.27	15.85	-2.37	67.01	0.00	84.07	23.35
74	SAGBEND	-124.47	-22.09	0.00	0.000	3.631	191.27	15.84	-2.39	66.66	0.00	83.73	23.26
75	SAGBEND	-126.46	-22.21	0.00	0.000	3.362	193.27	15.83	-2.40	66.23	0.00	83.29	23.14
76	SAGBEND	-128.46	-22.32	0.00	0.000	3.094	195.27	15.82	-2.41	65.70	0.00	82.75	22.99
77	SAGBEND	-130.46	-22.43	0.00	0.000	2.829	197.27	15.81	-2.42	65.03	0.00	82.08	22.80
78	SAGBEND	-132.45	-22.52	0.00	0.000	2.567	199.27	15.80	-2.43	64.20	0.00	81.25	22.57
79	SAGBEND	-134.45	-22.61	0.00	0.000	2.308	201.27	15.79	-2.44	63.19	0.00	80.23	22.29
80	SAGBEND	-136.45	-22.68	0.00	0.000	2.054	203.27	15.78	-2.45	61.95	0.00	78.98	21.94
81	SAGBEND	-138.45	-22.75	0.00	0.000	1.806	205.27	15.78	-2.46	60.42	0.00	77.46	21.52
82	SAGBEND	-140.45	-22.81	0.00	0.000	1.565	207.27	15.77	-2.47	58.56	0.00	75.59	21.00
83	SAGBEND	-142.45	-22.86	0.00	0.000	1.332	209.27	15.77	-2.47	56.28	0.00	73.31	20.36
84	SAGBEND	-144.45	-22.90	0.00	0.000	1.109	211.27	15.76	-2.48	53.49	0.00	70.53	19.59
85	SAGBEND	-146.45	-22.94	0.00	0.000	0.898	213.27	15.76	-2.48	50.10	0.00	67.13	18.65
86	SAGBEND	-148.45	-22.96	0.00	0.000	0.703	215.27	15.76	-2.48	45.96	0.00	63.00	17.50
87	SAGBEND	-150.45	-22.99	0.00	0.000	0.527	217.27	15.76	-2.48	40.92	0.00	57.95	16.10
88	SEABED	-152.45	-23.00	0.00	0.000	0.373	219.27	15.76	-2.49	34.77	0.00	51.81	14.39
89	SEABED	-154.45	-23.01	0.00	0.000	0.246	221.27	15.75	-2.49	27.71	0.00	44.76	12.43
90	SEABED	-156.45	-23.02	0.00	0.000	0.148	223.27	15.75	-2.49	20.77	0.00	37.83	10.51
91	SEABED	-158.45	-23.02	0.00	0.000	0.076	225.27	15.75	-2.49	14.62	0.00	31.69	8.80
92	SEABED	-160.45	-23.03	0.00	0.000	0.028	227.27	15.75	-2.49	9.58	0.00	26.66	7.41
93	SEABED	-162.45	-23.03	0.00	0.000	-0.003	229.27	15.76	-2.49	5.70	0.00	22.80	6.33
94	SEABED	-164.45	-23.03	0.00	0.000	-0.020	231.27	15.76	-2.49	2.89	0.00	20.00	5.56
95	SEABED	-166.45	-23.02	0.00	0.000	-0.028	233.27	15.76	-2.49	0.99	0.00	18.11	5.03
96	SEABED	-168.45	-23.02	0.00	0.000	-0.029	235.27	15.76	-2.49	-0.20	0.00	17.33	4.81
97	SEABED	-170.45	-23.02	0.00	0.000	-0.027	237.27	15.76	-2.49	-0.85	0.00	17.98	4.99
98	SEABED	-172.45	-23.02	0.00	0.000	-0.023	239.27	15.76	-2.49	-1.13	0.00	18.26	5.07

99	SEABED	-174.45	-23.02	0.00	0.000	-0.018	241.27	15.76	-2.49	-1.17	0.00	18.30	5.08
100	SEABED	-176.45	-23.02	0.00	0.000	-0.013	243.27	15.76	-2.49	-1.07	0.00	18.20	5.05
101	SEABED	-178.45	-23.02	0.00	0.000	-0.009	245.27	15.76	-2.49	-0.90	0.00	18.03	5.01
102	SEABED	-180.45	-23.02	0.00	0.000	-0.006	247.27	15.76	-2.49	-0.71	0.00	17.84	4.95
103	SEABED	-182.45	-23.02	0.00	0.000	-0.003	249.27	15.76	-2.49	-0.52	0.00	17.65	4.90

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 4:37:27      PAGE 16

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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=====													
STATIC    PIPE    COORDINATES,    FORCES    AND    STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M )	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ STRESS (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
=====													
104	SEABED	-184.45	-23.02	0.00	0.000	-0.002	251.27	15.76	-2.49	-0.36	0.00	17.49	4.86
105	SEABED	-186.45	-23.02	0.00	0.000	-0.001	253.27	15.76	-2.49	-0.23	0.00	17.37	4.82
106	SEABED	-188.45	-23.02	0.00	0.000	0.000	255.27	15.76	-2.49	-0.13	0.00	17.27	4.80
107	SEABED	-190.45	-23.02	0.00	0.000	0.001	257.27	15.76	-2.49	-0.06	0.00	17.20	4.78
108	SEABED	-192.45	-23.02	0.00	0.000	0.001	259.27	15.76	-2.49	-0.02	0.00	17.15	4.76
109	SEABED	-194.45	-23.02	0.00	0.000	0.001	261.27	15.76	-2.49	0.01	0.00	17.15	4.76
110	SEABED	-196.45	-23.02	0.00	0.000	0.001	263.27	15.76	-2.49	0.02	0.00	17.16	4.77
111	SEABED	-198.45	-23.02	0.00	0.000	0.001	265.27	15.76	-2.49	0.03	0.00	17.16	4.77
112	SEABED	-200.45	-23.02	0.00	0.000	0.000	267.27	15.76	-2.49	0.03	0.00	17.16	4.77
113	SEABED	-202.45	-23.02	0.00	0.000	0.000	269.27	15.76	-2.49	0.02	0.00	17.16	4.77
114	SEABED	-204.45	-23.02	0.00	0.000	0.000	271.27	15.76	-2.49	0.02	0.00	17.15	4.76
115	SEABED	-206.45	-23.02	0.00	0.000	0.000	273.27	15.76	-2.49	0.01	0.00	17.15	4.76
116	SEABED	-208.45	-23.02	0.00	0.000	0.000	275.27	15.76	-2.49	0.01	0.00	17.14	4.76
117	SEABED	-210.45	-23.02	0.00	0.000	0.000	277.27	15.76	-2.49	0.00	0.00	17.14	4.76
118	SEABED	-212.45	-23.02	0.00	0.000	0.000	279.27	15.76	-2.49	0.00	0.00	17.14	4.76

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 4:37:27      PAGE 17

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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=====													
STATIC    PIPE    COORDINATES,    FORCES    AND    STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACTION HORIZ (KN )	SUPT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	BENDING MOMENTS VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
=====													
1	LAYBARGE	64.20	4.42	0.00	0.74	0.00	0.00	0.00	0.00	0.15	0.00	0.15	
3	LAYBARGE	59.72	4.30	0.00	19.39	0.00	0.00	0.00	-0.24	-13.00	0.00	13.00	
5	LAYBARGE	48.23	4.00	0.00	23.76	0.00	0.00	0.00	-0.86	-18.46	0.00	18.46	
7	TENSIONR	38.10	3.73	0.00	13.95	0.00	0.00	0.00	96.68	-6.13	0.00	6.13	
9	LAYBARGE	33.43	3.61	0.00	12.75	0.00	0.00	0.00	96.43	-5.86	0.00	5.86	
11	TENSIONR	26.65	3.43	0.00	9.46	0.00	0.00	0.00	194.14	3.55	0.00	3.55	
13	LAYBARGE	21.33	3.30	0.00	0.00	0.00	0.01	0.00	193.88	-5.00	0.00	5.00	
15	LAYBARGE	12.14	2.98	0.00	52.35	0.00	0.00	0.00	192.46	-157.67	0.00	157.67	
17	LAYBARGE	-0.04	1.76	0.00	36.78	0.00	0.00	0.00	190.02	-154.51	0.00	154.51	
20	STINGER	-8.10	0.35	0.00	24.12	0.00	0.00	0.00	187.37	-135.29	0.00	135.29	
22	STINGER	-15.89	-1.45	0.00	14.74	0.00	0.00	0.00	186.33	-90.75	0.00	90.75	
24	STINGER	-23.62	-3.53	0.00	0.00	0.00	0.08	0.00	185.66	-19.19	0.00	19.19	
26	STINGER	-30.74	-5.52	0.00	0.00	0.00	0.33	0.00	184.80	12.49	0.00	12.49	
28	STINGER	-36.80	-7.18	0.00	0.00	0.00	0.78	0.00	184.06	26.10	0.00	26.10	
30	STINGER	-39.69	-7.96	0.00	0.00	0.00	1.49	0.00	183.72	30.18	0.00	30.18	
32	SAGBEND	-41.71	-8.50	0.00	0.00	0.00	0.00	0.00	183.48	32.40	0.00	32.40	
33	SAGBEND	-43.64	-9.00	0.00	0.00	0.00	0.00	0.00	183.26	34.15	0.00	34.15	
34	SAGBEND	-45.58	-9.50	0.00	0.00	0.00	0.00	0.00	183.04	35.61	0.00	35.61	
35	SAGBEND	-47.52	-9.99	0.00	0.00	0.00	0.00	0.00	182.83	36.81	0.00	36.81	
36	SAGBEND	-49.46	-10.47	0.00	0.00	0.00	0.00	0.00	182.62	37.82	0.00	37.82	
37	SAGBEND	-51.40	-10.94	0.00	0.00	0.00	0.00	0.00	182.41	38.66	0.00	38.66	
38	SAGBEND	-53.35	-11.41	0.00	0.00	0.00	0.00	0.00	182.21	39.37	0.00	39.37	
39	SAGBEND	-55.30	-11.86	0.00	0.00	0.00	0.00	0.00	182.01	39.96	0.00	39.96	
40	SAGBEND	-57.25	-12.31	0.00	0.00	0.00	0.00	0.00	181.81	40.46	0.00	40.46	
41	SAGBEND	-59.20	-12.75	0.00	0.00	0.00	0.00	0.00	181.62	40.89	0.00	40.89	
42	SAGBEND	-61.15	-13.18	0.00	0.00	0.00	0.00	0.00	181.43	41.26	0.00	41.26	
43	SAGBEND	-63.11	-13.61	0.00	0.00	0.00	0.00	0.00	181.25	41.57	0.00	41.57	
44	SAGBEND	-65.06	-14.02	0.00	0.00	0.00	0.00	0.00	181.07	41.84	0.00	41.84	
45	SAGBEND	-67.02	-14.42	0.00	0.00	0.00	0.00	0.00	180.89	42.08	0.00	42.08	
46	SAGBEND	-68.98	-14.82	0.00	0.00	0.00	0.00	0.00	180.72	42.29	0.00	42.29	
47	SAGBEND	-70.94	-15.21	0.00	0.00	0.00	0.00	0.00	180.55	42.47	0.00	42.47	
48	SAGBEND	-72.91	-15.58	0.00	0.00	0.00	0.00	0.00	180.39	42.64	0.00	42.64	
49	SAGBEND	-74.87	-15.95	0.00	0.00	0.00	0.00	0.00	180.23	42.78	0.00	42.78	
50	SAGBEND	-76.84	-16.31	0.00	0.00	0.00	0.00	0.00	180.07	42.92	0.00	42.92	
51	SAGBEND	-78.81	-16.66	0.00	0.00	0.00	0.00	0.00	179.92	43.04	0.00	43.04	
52	SAGBEND	-80.78	-17.00	0.00	0.00	0.00	0.00	0.00	179.77	43.15	0.00	43.15	
53	SAGBEND	-82.75	-17.33	0.00	0.00	0.00	0.00	0.00	179.63	43.25	0.00	43.25	
54	SAGBEND	-84.73	-17.65	0.00	0.00	0.00	0.00	0.00	179.49	43.34	0.00	43.34	
55	SAGBEND	-86.70	-17.96	0.00	0.00	0.00	0.00	0.00	179.35	43.42	0.00	43.42	
56	SAGBEND	-88.68	-18.27	0.00	0.00	0.00	0.00	0.00	179.22	43.50	0.00	43.50	
57	SAGBEND	-90.66	-18.56	0.00	0.00	0.00	0.00	0.00	179.09	43.57	0.00	43.57	



58	SAGBEND	-92.64	-18.84	0.00	0.00	0.00	0.00	0.00	178.97	43.64	0.00	43.64
59	SAGBEND	-94.62	-19.12	0.00	0.00	0.00	0.00	0.00	178.85	43.70	0.00	43.70

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 4:37:27      PAGE 18

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES												
=====												
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS	
					VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	VERT (KN )	HORIZ (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)
=====												
60	SAGBEND	-96.60	-19.38	0.00	0.00	0.00	0.00	0.00	178.73	43.75	0.00	43.75
61	SAGBEND	-98.59	-19.64	0.00	0.00	0.00	0.00	0.00	178.62	43.79	0.00	43.79
62	SAGBEND	-100.57	-19.88	0.00	0.00	0.00	0.00	0.00	178.52	43.83	0.00	43.83
63	SAGBEND	-102.56	-20.12	0.00	0.00	0.00	0.00	0.00	178.41	43.86	0.00	43.86
64	SAGBEND	-104.54	-20.35	0.00	0.00	0.00	0.00	0.00	178.31	43.88	0.00	43.88
65	SAGBEND	-106.53	-20.56	0.00	0.00	0.00	0.00	0.00	178.22	43.89	0.00	43.89
66	SAGBEND	-108.52	-20.77	0.00	0.00	0.00	0.00	0.00	178.13	43.89	0.00	43.89
67	SAGBEND	-110.51	-20.97	0.00	0.00	0.00	0.00	0.00	178.04	43.87	0.00	43.87
68	SAGBEND	-112.50	-21.16	0.00	0.00	0.00	0.00	0.00	177.96	43.84	0.00	43.84
69	SAGBEND	-114.49	-21.34	0.00	0.00	0.00	0.00	0.00	177.88	43.78	0.00	43.78
70	SAGBEND	-116.49	-21.51	0.00	0.00	0.00	0.00	0.00	177.81	43.71	0.00	43.71
71	SAGBEND	-118.48	-21.67	0.00	0.00	0.00	0.00	0.00	177.74	43.61	0.00	43.61
72	SAGBEND	-120.47	-21.82	0.00	0.00	0.00	0.00	0.00	177.68	43.47	0.00	43.47
73	SAGBEND	-122.47	-21.96	0.00	0.00	0.00	0.00	0.00	177.62	43.30	0.00	43.30
74	SAGBEND	-124.47	-22.09	0.00	0.00	0.00	0.00	0.00	177.56	43.08	0.00	43.08
75	SAGBEND	-126.46	-22.21	0.00	0.00	0.00	0.00	0.00	177.51	42.80	0.00	42.80
76	SAGBEND	-128.46	-22.32	0.00	0.00	0.00	0.00	0.00	177.46	42.45	0.00	42.45
77	SAGBEND	-130.46	-22.43	0.00	0.00	0.00	0.00	0.00	177.42	42.02	0.00	42.02
78	SAGBEND	-132.45	-22.52	0.00	0.00	0.00	0.00	0.00	177.38	41.49	0.00	41.49
79	SAGBEND	-134.45	-22.61	0.00	0.00	0.00	0.00	0.00	177.34	40.83	0.00	40.83
80	SAGBEND	-136.45	-22.68	0.00	0.00	0.00	0.00	0.00	177.31	40.03	0.00	40.03
81	SAGBEND	-138.45	-22.75	0.00	0.00	0.00	0.00	0.00	177.28	39.04	0.00	39.04
82	SAGBEND	-140.45	-22.81	0.00	0.00	0.00	0.00	0.00	177.26	37.84	0.00	37.84
83	SAGBEND	-142.45	-22.86	0.00	0.00	0.00	0.00	0.00	177.24	36.36	0.00	36.36
84	SAGBEND	-144.45	-22.90	0.00	0.00	0.00	0.00	0.00	177.22	34.57	0.00	34.57
85	SAGBEND	-146.45	-22.94	0.00	0.00	0.00	0.00	0.00	177.21	32.37	0.00	32.37
86	SAGBEND	-148.45	-22.96	0.00	0.00	0.00	0.00	0.00	177.21	29.70	0.00	29.70
87	SAGBEND	-150.45	-22.99	0.00	0.00	0.00	0.00	0.00	177.20	26.44	0.00	26.44
88	SEABED	-152.45	-23.00	0.00	0.13	0.00	0.00	0.00	177.20	22.47	0.00	22.47
89	SEABED	-154.45	-23.01	0.00	0.56	0.00	0.00	0.00	177.20	17.91	0.00	17.91
90	SEABED	-156.45	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	13.42	0.00	13.42
91	SEABED	-158.45	-23.02	0.00	1.04	0.00	0.00	0.00	177.21	9.45	0.00	9.45
92	SEABED	-160.45	-23.03	0.00	1.12	0.00	0.00	0.00	177.21	6.19	0.00	6.19
93	SEABED	-162.45	-23.03	0.00	1.14	0.00	0.00	0.00	177.21	3.68	0.00	3.68
94	SEABED	-164.45	-23.03	0.00	1.12	0.00	0.00	0.00	177.21	1.87	0.00	1.87
95	SEABED	-166.45	-23.02	0.00	1.09	0.00	0.00	0.00	177.21	0.64	0.00	0.64
96	SEABED	-168.45	-23.02	0.00	1.04	0.00	0.00	0.00	177.21	-0.13	0.00	0.13
97	SEABED	-170.45	-23.02	0.00	1.00	0.00	0.00	0.00	177.21	-0.55	0.00	0.55
98	SEABED	-172.45	-23.02	0.00	0.96	0.00	0.00	0.00	177.21	-0.73	0.00	0.73
99	SEABED	-174.45	-23.02	0.00	0.93	0.00	0.00	0.00	177.21	-0.76	0.00	0.76
100	SEABED	-176.45	-23.02	0.00	0.90	0.00	0.00	0.00	177.21	-0.69	0.00	0.69
101	SEABED	-178.45	-23.02	0.00	0.89	0.00	0.00	0.00	177.21	-0.58	0.00	0.58
102	SEABED	-180.45	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	-0.46	0.00	0.46
103	SEABED	-182.45	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	-0.34	0.00	0.34

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 4:37:27      PAGE 19

PROJECT - STATIC PIPE ANALYSIS 10 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES												
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NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS	
					VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	VERT (KN )	HORIZ (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)
=====												
104	SEABED	-184.45	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.23	0.00	0.23
105	SEABED	-186.45	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.15	0.00	0.15
106	SEABED	-188.45	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.09	0.00	0.09
107	SEABED	-190.45	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.04	0.00	0.04
108	SEABED	-192.45	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	-0.01	0.00	0.01
109	SEABED	-194.45	-23.02	0.00	0.86	0.00	0.00	0.00	177.21	0.01	0.00	0.01
110	SEABED	-196.45	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02
111	SEABED	-198.45	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02
112	SEABED	-200.45	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02
113	SEABED	-202.45	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.02	0.00	0.02
114	SEABED	-204.45	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.01	0.00	0.01
115	SEABED	-206.45	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.01	0.00	0.01
116	SEABED	-208.45	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.00	0.00	0.00
117	SEABED	-210.45	-23.02	0.00	0.87	0.00	0.00	0.00	177.21	0.00	0.00	0.00
118	SEABED	-212.45	-23.02	0.00	0.00	0.00	0.00	0.00	177.21	0.00	0.00	0.00

STATIC SOLUTION SUMMARY

PIPE PROPERTIES ( 1 )

PIPE SECTION LENGTH ...	0.00 M	ELASTIC MODULUS .....	207000. MPA
OUTSIDE DIAMETER .....	27.305 CM	CROSS SECTIONAL AREA ..	103.82 CM^2
WALL THICKNESS .....	1.270 CM	MOMENT OF INERTIA ....	8817.6 CM^4
WEIGHT/LENGTH IN AIR ..	2022.01 N/M	YIELD STRESS .....	360.00 MPA
SUBMERGED WGHT/LENG ..	434.28 N/M	STRESS INTENS FACTOR ..	1.000
SPECIFIC GRAVITY .....	1.274	STEEL DENSITY .....	77008.0 N/M3
WRAP COAT THICKNESS ..	0.320 CM	WRAP COAT DENSITY ....	9339.1 N/M3
CONCRETE THICKNESS ...	4.000 CM	CONCRETE DENSITY .....	29822.0 N/M3

BARGE DATA

TOTAL PIPE TENSION ...	196.13 KN	RADIUS OF CURVATURE ..	0.00 M
NUMBER OF TENSIONERS ..	2	BARGE TRIM ANGLE .....	0.500 DEG
NO. OF PIPE SUPPORTS ..	7	PIPE ANGLE AT STERN ..	8.130 DEG
BARGE HEADING .....	0.000 DEG	OFFSET FROM R.O.W. ...	0.00 M

STINGER DATA

NO. OF PIPE SUPPORTS ..	6	PIPE DEPTH AT STERN ..	-7.96 M
NO. STINGER SECTIONS ..	6	PIPE ANGLE AT STERN ..	14.914 DEG
RADIUS OF CURVATURE ..	0.00 M	STINGER STERN DEPTH ..	-9.34 M
STINGER LENGTH .....	41.37 M		

SAGBEND DATA

WATER DEPTH .....	23.00 M	TENSION AT TOUCHDOWN ..	177.20 KN
TOUCHDOWN X-COORD. ...	-152.15 M	BOTTOM SLOPE ANGLE ...	0.000 DEG
PROJECTED SPAN LENGTH	112.46 M	PIPE LENGTH GAIN .....	2.62 M

SOLUTION SUMMARY

NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACT HORIZ (KN)	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	0.7	0.0	0.2	0.2	0.
3	LAYBARGE	59.7	4.3	0.0	19.4	0.0	13.0	20.1	6.
5	LAYBARGE	48.2	4.0	0.0	23.8	0.0	18.5	28.7	8.
7	TENSIONR	38.1	3.7	0.0	13.9	0.0	6.1	18.8	5.
9	LAYBARGE	33.4	3.6	0.0	12.7	0.0	5.9	18.3	5.
11	TENSIONR	26.7	3.4	0.0	9.5	0.0	3.6	24.2	7.
13	LAYBARGE	21.3	3.3	0.0	0.0	0.0	5.0	26.4	7.
15	LAYBARGE	12.1	3.0	0.0	52.3	0.0	157.7	262.5	73.
17	LAYBARGE	0.0	1.8	0.0	36.8	0.0	154.5	257.4	72.
20	STINGER	-8.1	0.4	0.0	24.1	0.0	135.3	227.4	63.
22	STINGER	-15.9	-1.4	0.0	14.7	0.0	90.8	158.4	44.
24	STINGER	-23.6	-3.5	0.0	0.0	0.0	19.2	47.6	13.

STATIC SOLUTION SUMMARY

26 STINGER	-30.7	-5.5	0.0	0.0	0.0	12.5	37.1	10.
28 STINGER	-36.8	-7.2	0.0	0.0	0.0	26.1	58.1	16.
30 STINGER	-39.7	-8.0	0.0	0.0	0.0	30.2	64.4	18.
65 SAGBEND	-106.5	-20.6	0.0	0.0	0.0	43.9	85.0	24.
88 SEABED	-152.4	-23.0	0.0	0.1	0.0	22.5	51.8	14.

DYNAMIC SOLUTION SUMMARY

SEA STATE NUMBER ( 1 )

SEA STATE TYPE .....	WAVE SPECTRUM
NO. WAVE COMPONENTS ..	20
WAVE WATER DEPTH .....	23.0 M
MAX. WAVE FREQUENCY ..	3.0015 RA/S

VESSEL RESPONSE TYPE . TABLE OF RAOS  
 WAVE TRAVEL DIRECTION 180.000 DEG  
 MIN. WAVE FREQUENCY .. 0.1001 RA/S  
 RANDOM PHASE SEED .... 0

SPECTRUM START TIME .. 0. SECS NO. RAOS IN TABLE ..... 30  
 RAO SIGN CONVENTION .. BENTLEY MOSES

SEA STATE DEFINITION

=====

WAVE SPECTRUM TYPE ... JONSWAP (CLASSIC)  
 JONSWAP COEFFICIENT .. 0.008952 JONSWAP PEAK FACTOR .. 5.000  
 PEAK WAVE FREQUENCY .. 0.9498 RA/S

CALCULATED WAVE HEIGHTS

=====

SIGNIFICANT WAVE HT. . . 2.415 M AVERAGE WAVE HEIGHT .. 1.574 M  
 MAXIMUM WAVE HEIGHT .. 3.769 M RMS WAVE HEIGHT ..... 1.740 M  
 TOTAL NUMBER OF WAVES 1899

===== SOLUTION SUMMARY =====

NODE	PIPE	X	Y	Z	SUPPORT	REACT	TOTAL	TOTAL	PCT
NO.	SECTION	COORD	COORD	COORD	VERT	HORIZ	MOMENT	STRESS	YLD
		(M)	(M)	(M)	(KN)	(KN)	(KN-M)	(MPA)	(%)
1	LAYBARGE	64.2	4.4	0.0	0.8	0.0	0.2	0.3	0.
3	LAYBARGE	59.7	4.3	0.0	20.2	0.0	13.5	21.0	6.
5	LAYBARGE	48.2	4.0	0.0	24.5	0.0	19.0	29.5	8.
7	TENSIONR	38.1	3.7	0.0	14.5	0.0	6.3	40.8	11.
9	LAYBARGE	33.4	3.6	0.0	13.0	0.0	6.3	39.6	11.
11	TENSIONR	26.7	3.4	0.0	10.5	0.0	5.0	44.1	12.
13	LAYBARGE	21.3	3.3	0.0	0.0	0.0	6.7	46.3	13.
15	LAYBARGE	12.2	3.0	0.0	70.0	0.0	171.3	305.0	85.
17	LAYBARGE	0.0	1.8	0.0	54.9	0.0	167.6	299.3	83.
20	STINGER	-8.1	0.3	0.0	38.3	0.0	149.3	255.0	71.
22	STINGER	-15.9	-1.5	0.0	37.9	0.0	132.3	238.4	66.
24	STINGER	-23.6	-3.5	0.0	19.3	0.0	83.5	151.1	42.
26	STINGER	-30.7	-5.4	0.0	0.0	0.0	45.3	84.7	24.
28	STINGER	-36.8	-7.0	0.0	0.0	0.0	55.1	112.7	31.
30	STINGER	-39.7	-7.7	0.0	0.0	0.0	63.0	124.9	35.
88	SEABED	-152.5	-22.9	0.0	3.8	0.0	70.2	122.7	34.

**LAMPIRAN ANALISA DINAMIS PADA PIPA 12 INCH  
HEADING 0°**

```

MMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMMMMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMM  MMMMMMMMMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM

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*****
*
*           O F F P I P E - 3 -- OFFSHORE PIPELINE ANALYSIS SYSTEM
*
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*
*           VERSION NO. - 3.02EX
*           RELEASED ON - 03/08/2016
*           LICENSED TO - PT Timas Suplindo
*
*****
*
* OFFPIPE IS A NONLINEAR, 3-DIMENSIONAL FINITE ELEMENT METHOD BASED PROGRAM FOR THE
* STATIC AND DYNAMIC ANALYSIS OF PROBLEMS ARISING IN THE DESIGN OF MARINE PIPELINES.
* THIS VERSION OF OFFPIPE MAY BE USED FOR THE ANALYSIS OF OFFSHORE PIPELAYING OPER-
* ATIONS, DAVIT LIFTS, PIPELINES LYING ON AN UNEVEN SEABED, AND RISERS.
*
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*
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*           6554 AUDEN                 FACSIMILE: (713) 664-0962
*           HOUSTON, TEXAS 77005
*           U.S.A.                     EMAIL: SUPPORT@OFFPIPE.COM
*
*****

```

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=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 3
STATIC PIPE ANALYSIS 12 INCH
JOB NO. - LAYING           LICENSED BY - PT Timas Suplindo
USER ID - IK              DATE - 5/2/2020 TIME - 4:48:41 CASE 1
=====

```

INPUT DATA ECHO

```

=====
PRINTED OUTPUT SELECTED
=====
STATIC PIPE FORCES AND STRESSES ... YES
STATIC SOLUTION SUMMARY ..... YES
DYNAMIC PIPE FORCES AND STRESSES .. NO
DYNAMIC RANGE OF PIPE DATA ..... NO
DYNAMIC TRACKING OF PIPE DATA ..... NO
OVERBEND PIPE SUPPORT GEOMETRY .... NO
STINGER BALLAST SCHEDULE DATA ..... NO
SUPPORT REACTIONS IN BARGE COORDS . NO

INTERNAL FORCES IN PIPE & CABLE ... NO
INTERNAL FORCES IN STINGER ..... NO
PRINT PIPE STRAINS IN OUTPUT ..... NO
DNV OS-F101 COMPLIANCE REPORT ..... NO
API RP-1111 COMPLIANCE REPORT ..... NO
PRINT DNV/API FACTORS & PARAMETERS NO
USE THICK WALL HOOP STRESS EQN. ... NO
USE DNV 1981 FOR TOTAL PIPE STRESS NO

ENABLE/DISABLE WARNING MESSAGES ... ENABLE
GENERATE SPREAD SHEET PLOT FILE ... NO
GENERATE ASCII PLOT DATA FILES .... NO

```

PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX .....	1	
PLOT NUMBER .....	1	
PLOT TYPE OPTION NUMBER .....	1	
DYNAMIC PROFILE TIME POINT .....	0.000	
DYNAMIC PROFILE TIME INCREMENT .....	0.000	
ORDINATE PARAMETER CODE NUMBER .....	2	
AXIS LABEL FOR ORDINATE .....	"PIPE ELEVATION Y COORDINATE	"
ABSCISSA PARAMETER CODE NUMBER .....	1	
AXIS LABEL FOR ABSCISSA .....	"PIPE HORIZONTAL X COORDINATE	"
PLOT TITLE .....	"PIPELINE ELEVATION PROFILE AND PIPE STRESS	"
MINIMUM VERTICAL AXIS RANGE .....	0.000	
MAXIMUM VERTICAL AXIS RANGE .....	0.000	
MINIMUM HORIZONTAL AXIS RANGE .....	0.000	
MAXIMUM HORIZONTAL AXIS RANGE .....	0.000	

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 4  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 4:48:41 CASE 1

=====

INPUT DATA ECHO

PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX .....	2	
PLOT NUMBER .....	1	
PLOT TYPE OPTION NUMBER .....	1	
DYNAMIC PROFILE TIME POINT .....	0.000	
DYNAMIC PROFILE TIME INCREMENT .....	0.000	
ORDINATE PARAMETER CODE NUMBER .....	15	
AXIS LABEL FOR ORDINATE .....	"DNV YIELD STRESS PERCENTAGE	"
ABSCISSA PARAMETER CODE NUMBER .....	1	
AXIS LABEL FOR ABSCISSA .....	"PIPELINE HORIZONTAL X COORDINATE"	
PLOT TITLE .....	"PIPELINE ELEVATION PROFILE AND PIPE STRESS	"
MINIMUM VERTICAL AXIS RANGE .....	0.000	
MAXIMUM VERTICAL AXIS RANGE .....	0.000	
MINIMUM HORIZONTAL AXIS RANGE .....	0.000	
MAXIMUM HORIZONTAL AXIS RANGE .....	0.000	

PIPE PROPERTIES

=====

PROPERTY TABLE ROW NUMBER .....	1
PIPE SECTION LENGTH .....	0.000 METERS
STEEL MODULUS OF ELASTICITY .....	207000. M-PASCAL
STEEL CROSS SECTIONAL AREA .....	124.100 CM <sup>2</sup>
COATED PIPE AVG MOMENT OF INERTIA .....	15048.21 CM <sup>4</sup>
WEIGHT PER-UNIT-LENGTH IN AIR .....	2374.00 N/M
WEIGHT PER-UNIT-LENGTH SUBMERGED .....	368.27 N/M
MAXIMUM ALLOWABLE PIPE STRAIN .....	0.205000 PERCENT
STEEL OUTSIDE DIAMETER .....	32.3900 CM
STEEL WALL THICKNESS .....	1.2700 CM
YIELD STRESS .....	360.00 M-PASCAL
STRESS/STRAIN INTENSE FACTOR .....	0.0000
HYDRODYNAMIC OUTSIDE DIAMETER .....	0.000 CM
DRAG COEFFICIENT .....	0.0000
HYDRODYNAMIC TOTAL AREA .....	0.000 CM <sup>2</sup>
ADDED MASS COEFFICIENT .....	0.0000
POISSON'S RATIO .....	0.3000
COEFFICIENT OF THERMAL EXPANSION .....	0.00001100 1/DEG C

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 5  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 4:48:41 CASE 1

=====

INPUT DATA ECHO

PIPE COATING PROPERTIES

=====

PIPE PROPERTY TABLE INDEX .....	1
CORROSION COATING THICKNESS .....	0.320 CM
CORROSION COATING WEIGHT DENSITY .....	9025.2 N/M <sup>3</sup>
CORROSION COATING ELASTIC MODULUS .....	0.000 M-PASCAL
CONCRETE COATING THICKNESS .....	4.000 CM
CONCRETE COATING WEIGHT DENSITY .....	29858. N/M <sup>3</sup>
CONCRETE COATING ELASTIC MODULUS .....	0.000 M-PASCAL
DESIRED PIPE SPECIFIC GRAVITY .....	0.0000
CONCRETE STIFFENING EFFECTIVENESS .....	0.000
NO NOT CALC. STRESS FOR BARE PIPE .....	NO

AVERAGE LENGTH OF PIPE JOINT ..... 12.200 METERS  
 EFFECTIVE FIELD JOINT LENGTH ..... 0.300 METERS  
 FIELD JOINT FILL WEIGHT DENSITY ... 10055.3 N/M^3  
 FIELD JOINT FILL ELASTIC MODULUS... 0.000 M-PASCAL  
 FIELD JOINT STIFFENING EFFECT. .... 0.000  
 FIELD JOINT BENDING MODEL ..... 0 IGNORE COATING STIFFNESS  
 WEIGHT DENSITY OF STEEL ..... 77008. N/M^3  
 WEIGHT DENSITY OF PIPE CONTENTS ... 0.0 N/M^3  
 REF. ELEVATION FOR STATIC HEAD .... 0.00 METERS  
 FREE FLOOD PIPE DURING PIPELAY ... NO

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 6  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 4:48:41 CASE 1  
 =====

INPUT DATA ECHO

PIPELAY VESSEL DESCRIPTION

=====  
 NUMBER OF PIPE NODES ..... 9  
 BARGE GEOMETRY SPECIFIED BY ..... 1 X-Y COORDINATES  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.000 METERS  
 ADJUST Y COORDINATES MANUALLY .... NO  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 PIPE ANGLE RELATIVE TO DECK ..... 0.0000 DEGREES  
 HEIGHT OF DECK ABOVE WATER ..... 2.400 METERS  
 LAYBARGE FORWARD (X) OFFSET ..... 0.000 METERS  
 BARGE TRIM ANGLE ..... 0.5000 DEGREES  
  
 STERN SHOE X COORDINATE ..... 0.000 METERS  
 STERN SHOE Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER X COORDINATE ..... 43.820 METERS  
 ROTATION CENTER Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER Z COORDINATE ..... 6.370 METERS  
 BARGE HEADING ..... 0.0000 DEGREES  
 BARGE OFFSET FROM RIGHT-OF-WAY .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT VERTICAL ANGLE ... 0.000 DEGREES  
 PIPE RAMP PIVOT Z COORDINATE ..... 0.000 METERS  
 PIPE RAMP HEADING ON DECK ..... 0.000 DEGREES  
 ROLE OF ALTERNATE WAVE ORIGIN .... 0 MOTIONS & WAVES AT CENTER OF MOTION  
 WAVE PHASE ORIGIN X COORDINATE .... 0.000  
 WAVE PHASE ORIGIN Y COORDINATE .... 0.000 METERS  
 WAVE PHASE ORIGIN Z COORDINATE .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE .....

NODE X COORD (M )	NODE Y COORD (M )	SUPPORT TYPE	DAVIT SPACING (M )
64.220	1.838	1 SIMPLE SUPPORT	0.000
59.740	1.760	1 SIMPLE SUPPORT	0.000
48.240	1.560	1 SIMPLE SUPPORT	0.000
38.110	1.383	2 PIPE TENSIONER	0.000
33.440	1.302	1 SIMPLE SUPPORT	0.000
26.660	1.183	2 PIPE TENSIONER	0.000
21.340	1.092	7 USER DEFINED SPT	0.000
12.150	0.860	7 USER DEFINED SPT	0.000
-0.040	-0.260	8 USER DEFINED SPT	0.000

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 7  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 4:48:41 CASE 1  
 =====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====  
 SUPPORT PROPERTY TABLE INDEX ..... 2  
 SUPPORT ELEMENT TYPE ..... 2 TENSIONER  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
  
 BOTTOM ROLLER ANGLE TO HORIZONTAL . 0.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES

SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 7  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 1.600 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 8  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 4:48:41 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 8  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

STINGER DESCRIPTION

=====

NUMBER OF PIPE/STINGER NODES ..... 6  
 STINGER GEOMETRY SPECIFIED BY ..... 2 X-Y COORD AND MATCH PT  
 STINGER TYPE ..... 1 FIXED GEOMETRY OR RAMP  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.00 METERS  
 HITCH X-COORDINATE ..... 0.497 METERS  
 HITCH Y-COORDINATE ..... -1.800 METERS  
 HITCH ANGULAR ORIENTATION ..... 0.000 DEGREES

X COORDINATE OF LOCAL ORIGIN ..... 0.497 METERS  
 Y COORDINATE OF LOCAL ORIGIN ..... -1.800 METERS  
 ROTATION ABOUT STINGER HITCH ..... 13.300 DEGREES  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 TANGENT POINT ANGLE ..... 0.000 DEGREES

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	ELEMENT TYPE	ELEMENT LENGTH ( M )
-8.325	2.209	1 SIMPLE SUPPORT	2 HINGED END	0.000
-16.325	2.349	1 SIMPLE SUPPORT	1 FIXED END	0.000
-24.325	2.119	1 SIMPLE SUPPORT	1 FIXED END	0.000
-31.699	1.660	1 SIMPLE SUPPORT	1 FIXED END	0.000
-37.949	1.069	1 SIMPLE SUPPORT	1 FIXED END	0.000
-40.949	0.350	1 SIMPLE SUPPORT	1 FIXED END	0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 9  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 4:48:41 CASE 1

=====

INPUT DATA ECHO



SUPPORT ELEMENT PROPERTIES

```

=====
SUPPORT PROPERTY TABLE INDEX ..... 1
SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT
SUPPORT INITIAL STATE FLAG ..... 0
TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M
VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M
STATIC VERTICAL DEFLECTION ..... 0.0000 CM
LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES
SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES
SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS
BED ROLLER LENGTH ..... 1.640 METERS
HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS
TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
    
```

CURRENT VELOCITIES

```

=====
WATER DEPTH (M ) CURRENT SPEED (M/S ) DIRECTION OF TRAVEL (DEG )
=====
0.000 0.790 0.000
11.500 0.480 0.000
23.000 0.420 0.000
    
```

PIPE TENSION DATA

```

=====
STATIC PIPE TENSION ON LAY VESSEL . 196.133 K-NEWTON
MINIMUM DYNAMIC PIPE TENSION ..... 196.133 K-NEWTON
MAXIMUM DYNAMIC PIPE TENSION ..... 294.199 K-NEWTON
STATIC HORIZONTAL BOTTOM TENSION .. 0.000 K-NEWTON
NO. OF VALUES FOR TENSION PROFILE . 0
VALUES ARE FOR PIPE SPAN ANALYSIS . NO
MAXIMUM PIPE PAYOUT SPEED ..... 0.000 M/SEC
MAXIMUM PIPE TAKEUP SPEED ..... 0.000 M/SEC
    
```

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 10

STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 4:48:41 CASE 1

=====  
 INPUT DATA ECHO

SAGBEND GEOMETRY

```

=====
SAGBEND PIPE ELEMENT LENGTH ..... 2.000 METERS
WATER DEPTH ..... 23.00 METERS
X-COORDINATE AT SPECIFIED DEPTH . . 0.00 METERS
ESTIMATED SAGBEND X LENGTH ..... 0.00 METERS
ESTIMATED PIPE LENGTH ON SEABED ... 0.00 METERS
X-COORD OF PIPE FREE END ON SEABED 0.00 METERS
X-COORD POINT OF FIXITY ON SEABED . 0.00 METERS
MAXIMUM SLOPE (ANGLE) OF SEABED ... 0.000 DEGREES
DIRECTION OF MAXIMUM SLOPE ..... 0.000 DEGREES

PIPE/CABLE SPAN END CONDITION ..... 0 PIPE/CABLE RESTING ON SEABED
PIPE/CABLE SPAN LENGTH GIVEN BY ... 0 SPECIFIED PIPE/CABLE TENSION
ESTIMATED SPAN DEPTH AT FREE END .. 0.00 METERS
PIPE VERTICAL ANGLE AT FREE END ... 0.000 DEGREES
BOTTOM HINGE OFFSET ..... 0.000 METERS
BOTTOM HINGE MINIMUM ANGLE ..... 0.000 DEGREES
BOTTOM HINGE MAXIMUM ANGLE ..... 0.000 DEGREES
    
```

SOIL ELEMENT PROPERTIES

```

=====
SOIL PROPERTY TABLE ROW INDEX ..... 1
SOIL ELEMENT TYPE (FUTURE USE) .... 0
PIPE INDEX OR SEGMENT NUMBER ..... 0
LONGITUDINAL SOIL STIFFNESS ..... 0.00 KN/M^2
VERTICAL SOIL STIFFNESS ..... 0.00 KN/M^2
LATERAL SOIL STIFFNESS ..... 0.00 KN/M^2
DEFLECTION UNDER REFERENCE LOAD ... 0.0000 CM

LONGITUDINAL COEF. OF FRICTION .... 0.000
LATERAL COEFFICIENT OF FRICTION ... 0.600
NUMBER OF INTEGRATION POINTS ..... 0
    
```

TIME INTEGRATION PARAMETERS

```

=====
TIME STEP LENGTH ..... 0.2000 SECONDS
MAXIMUM TIME OF INTEGRATION ..... 10860.000 SECONDS
SOLUTION SAMPLING TIME STEP ..... 0.400 SECONDS
    
```

SOLUTION SAMPLING STARTS AT TIME .. 60.000 SECONDS  
 DAMPING RATIO ..... 0.0000  
 NUMBER OF VARIABLE TIME STEPS ..... 0

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 11  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 4:48:41 CASE 1

=====

INPUT DATA ECHO

WAVE PARAMETERS

=====

SEA STATE ROW INDEX ..... 1  
 WAVE HEIGHT (PEAK TO TROUGH) ..... 1.800 METERS  
 WAVE PERIOD ..... 6.300 SECONDS  
 WAVE DIRECTION OF TRAVEL ..... 0.000 DEGREES  
 WATER DEPTH FOR WAVE CALCULATIONS .. 23.00 METERS  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0

WAVE SPECTRUM EQUATION

=====

SEA STATE ROW INDEX ..... 1  
 WAVE SPECTRUM EQUATION TYPE ..... 7 JONSWAP (CLASSIC)  
 NUMBER OF WAVES IN SPECTRUM ..... 20  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0  
 MINIMUM PERIOD IN SPECTRUM ..... 2.0933 SECONDS  
 MAXIMUM PERIOD IN SPECTRUM ..... 62.8000 SECONDS  
 START TIME FOR WAVE SPECTRUM ..... 0. SECONDS  
 DIRECTION OF WAVE TRAVEL ..... 0.000 DEGREES  
 1ST JONSWAP COEF. (ALPHA) ..... 0.012891  
 2ND JONSWAP COEF. (GAMMA) ..... 5.0000  
 PEAK WAVE PERIOD ..... 6.6150 SECONDS

VESSEL MOTION RAO TABLE

=====

SEA STATE NUMBER ..... 1  
 USE PHASE LAG FOR RAOs ..... NO  
 VESSEL MOTIONS SIGN CONVENTION .... 2 BENTLEY MOSES  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD

WAVE PERIOD (SECONDS)	----- SURGE AMPLITUDE (M/M )	----- / PHASE (DEG)	----- / SWAY AMPLITUDE (M/M )	----- / PHASE (DEG)	----- / HEAVE AMPLITUDE (M/M )	----- / PHASE (DEG)
2.0900	0.0030	171.00	0.0000	0.00	0.0030	65.00
2.1700	0.0040	-131.00	0.0000	0.00	0.0030	74.00
2.2400	0.0040	-55.00	0.0000	0.00	0.0020	73.00
2.3300	0.0040	37.00	0.0000	0.00	0.0050	57.00
2.4200	0.0050	135.00	0.0000	0.00	0.0070	63.00
2.5100	0.0070	-119.00	0.0000	0.00	0.0070	81.00
2.6200	0.0080	-16.00	0.0000	0.00	0.0050	57.00
2.7300	0.0070	127.00	0.0000	0.00	0.0100	57.00
2.8500	0.0140	-101.00	0.0000	0.00	0.0080	89.00
2.9900	0.0090	17.00	0.0000	0.00	0.0080	32.00
3.1400	0.0190	-146.00	0.0000	0.00	0.0140	77.00
3.3100	0.0170	-35.00	0.0000	0.00	0.0050	17.00

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 12  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 4:48:41 CASE 1

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WAVE PERIOD	----- ROLL AMPLITUDE	----- / PHASE	----- / PITCH AMPLITUDE	----- / PHASE	----- YAW AMPLITUDE	----- / PHASE
3.4900	0.0280	-158.00	0.0000	0.00	0.0190	71.00
3.7000	0.0200	-44.00	0.0000	0.00	0.0050	-17.00
3.9300	0.0490	-148.00	0.0000	0.00	0.0220	82.00
4.1900	0.0060	30.00	0.0000	0.00	0.0160	-10.00
4.4900	0.0730	-120.00	0.0000	0.00	0.0190	117.00
4.8300	0.0670	165.00	0.0000	0.00	0.0380	25.00
5.2400	0.0320	-67.00	0.0000	0.00	0.0140	-60.00
5.7100	0.1400	-135.00	0.0000	0.00	0.0730	69.00
6.2800	0.1610	168.00	0.0000	0.00	0.1630	23.00
6.9800	0.0610	115.00	0.0000	0.00	0.1010	-20.00
7.8500	0.1350	-101.00	0.0000	0.00	0.1420	159.00
8.9700	0.3680	-141.00	0.0000	0.00	0.4230	119.00
10.4700	0.5800	-176.00	0.0000	0.00	0.6670	88.00
12.5600	0.7420	155.00	0.0000	0.00	0.8370	62.00
15.7000	0.8470	131.00	0.0000	0.00	0.9370	40.00
20.9300	0.9050	113.00	0.0000	0.00	0.9840	23.00
31.4000	0.9320	100.00	0.0000	0.00	1.0000	10.00
62.8000	0.9420	93.00	0.0000	0.00	1.0030	3.00

=====

(SECONDS)	(DEG/M)	(DEG)	(DEG/M)	(DEG)	(DEG/M)	(DEG)
2.0900	0.0000	0.00	0.0120	57.00	0.0000	0.00
2.1700	0.0000	0.00	0.0150	53.00	0.0000	0.00
2.2400	0.0010	84.00	0.0150	58.00	0.0000	0.00
2.3300	0.0000	0.00	0.0230	75.00	0.0000	0.00
2.4200	0.0000	0.00	0.0180	70.00	0.0000	0.00
2.5100	0.0000	0.00	0.0270	50.00	0.0000	0.00
2.6200	0.0000	0.00	0.0360	69.00	0.0000	0.00
2.7300	0.0000	0.00	0.0240	78.00	0.0000	0.00
2.8500	0.0000	0.00	0.0410	44.00	0.0000	0.00
2.9900	0.0000	0.00	0.0450	82.00	0.0000	0.00
3.1400	0.0000	0.00	0.0310	27.00	0.0000	0.00
3.3100	0.0000	0.00	0.0660	73.00	0.0000	0.00
3.4900	0.0000	0.00	0.0250	13.00	0.0000	0.00
3.7000	0.0000	0.00	0.0830	75.00	0.0000	0.00
3.9300	0.0000	0.00	0.0500	-3.00	0.0000	0.00
4.1900	0.0000	0.00	0.0840	96.00	0.0000	0.00
4.4900	0.0000	0.00	0.1200	17.00	0.0000	0.00
4.8300	0.0000	0.00	0.0050	95.00	0.0000	0.00
5.2400	0.0000	0.00	0.2020	46.00	0.0000	0.00
5.7100	0.0000	0.00	0.2890	-9.00	0.0000	0.00
6.2800	0.0010	51.00	0.1090	61.00	0.0000	0.00
6.9800	0.0010	122.00	0.8730	74.00	0.0000	0.00

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 13

STATIC PIPE ANALYSIS 12 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/2/2020 TIME - 4:48:41 CASE 1

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INPUT DATA ECHO

7.8500	0.0000	0.00	1.5880	48.00	0.0000	0.00
8.9700	0.0000	0.00	1.8500	20.00	0.0000	0.00
10.4700	0.0000	0.00	1.7060	-6.00	0.0000	0.00
12.5600	0.0000	0.00	1.3390	-31.00	0.0000	0.00
15.7000	0.0000	0.00	0.9100	-52.00	0.0000	0.00
20.9300	0.0000	0.00	0.5250	-69.00	0.0000	0.00
31.4000	0.0000	0.00	0.2350	-83.00	0.0000	0.00
62.8000	0.0000	0.00	0.0600	-99.00	0.0000	0.00

\*\*\*\*\* INFORMATIVE MESSAGE NO. - 94 \*\*\*\*\*

One or more of the phase angles in the RAO table have been adjusted to | minimize the difference in value between adjacent angles. If the phase | angles are arbitrarily restricted by the software used to calculate | the RAOs to a fixed range of values such as (0 to 2\*PI) or (-PI to | +PI), then phase angles that are actually close in value can differ by | as much as 2\*PI. These large differences can cause the phase angles | for RAOs that are between the values in the table (which must be | determined using interpolation) to be calculated incorrectly.

CONTROL SWITCHES

=====

MAX NUMBER STATIC ITERATIONS ..... 500

MAX DYNAMIC ITERATIONS PER STEP ... 500

BOUNDARY CONDITION LOGIC PARAMETER 5

TIME STEP STABILITY PARAMETER ..... 0

TYPE OF ANALYSIS ..... DYNAMIC

NUMBER OF PROBLEM DIMENSIONS ..... 3

DAVIT LIFT ANALYSIS ..... NO

STATIC SOLUTION CONVERGED IN ( 46 ) ITERATIONS

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 14

STATIC PIPE ANALYSIS 12 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/2/2020 TIME - 4:48:41 CASE 1

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\*\*\*\*\* WARNING: HIGH PRIORITY NO. - 25 \*\*\*\*\*

The Newtons method iteration failed to converge in ( 501 ) iterations in time step ( 31411 ) of the dynamic solution. The maximum residual force for the last iteration was ( 8.7491E+01 ). The corresponding maximum corrective displacement was ( 2.6373E-02 ).

\*\*\*\*\* WARNING: HIGH PRIORITY NO. - 25 \*\*\*\*\*

The Newtons method iteration failed to converge in ( 501 ) iterations in time step ( 42193 ) of the dynamic solution. The maximum residual force for the last iteration was ( 7.0762E+01 ). The corresponding maximum corrective displacement was ( 3.4118E-02 ).

END OF INPUT DATA

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/2/2020 TIME - 4:48:41 PAGE 15  
 PROJECT - STATIC PIPE ANALYSIS 12 INCH JOB NO. - LAYING  
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/2/2020 TIME - 4:48:41 PAGE 15													
PROJECT - STATIC PIPE ANALYSIS 12 INCH JOB NO. - LAYING													
USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1													
=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
=====													
1	LAYBARGE	64.20	4.42	0.00	0.000	1.488	0.00	0.00	0.00	0.20	0.00	0.20	0.06
3	LAYBARGE	59.72	4.30	0.00	0.000	1.536	4.48	-0.02	0.00	-16.18	0.00	16.21	4.50
5	LAYBARGE	48.23	4.00	0.00	0.000	1.486	15.98	-0.08	0.00	-23.77	0.00	23.86	6.63
7	TENSIONR	38.10	3.73	0.00	0.000	1.461	26.11	7.77	0.00	-6.80	0.00	14.57	4.05
9	LAYBARGE	33.43	3.61	0.00	0.000	1.534	30.78	7.74	0.00	-12.52	0.00	20.27	5.63
11	TENSIONR	26.65	3.43	0.00	0.000	1.405	37.57	15.61	0.00	20.42	0.00	36.03	10.01
13	LAYBARGE	21.33	3.31	0.00	0.000	1.354	42.89	15.58	0.00	-20.67	0.00	36.26	10.07
15	LAYBARGE	12.14	2.98	0.00	0.000	3.375	52.08	15.43	0.00	-269.30	0.00	284.73	79.09
17	LAYBARGE	-0.04	1.76	0.00	0.000	8.042	64.32	15.21	0.00	-249.88	0.00	265.09	73.64
20	STINGER	-8.10	0.38	0.00	0.000	11.308	72.50	14.95	0.00	-242.38	0.00	257.34	71.48
22	STINGER	-15.91	-1.36	0.00	0.000	13.556	80.51	14.81	-0.17	-97.03	0.00	111.93	31.09
24	STINGER	-23.67	-3.30	0.00	0.000	14.318	88.51	14.63	-0.42	-22.11	0.00	36.96	10.27
26	STINGER	-30.83	-5.14	0.00	0.000	14.334	95.90	14.46	-0.66	16.11	0.00	30.90	8.58
28	STINGER	-36.92	-6.68	0.00	0.000	14.049	102.18	14.31	-0.86	35.33	0.00	50.07	13.91
30	STINGER	-39.82	-7.40	0.00	0.000	13.851	105.17	14.24	-0.95	41.72	0.00	56.44	15.68
32	SAGBEND	-41.86	-7.90	0.00	0.000	13.695	107.27	14.19	-1.01	45.41	0.00	60.11	16.70
33	SAGBEND	-43.80	-8.37	0.00	0.000	13.535	109.27	14.14	-1.07	48.44	0.00	63.13	17.53
34	SAGBEND	-45.74	-8.84	0.00	0.000	13.364	111.27	14.10	-1.13	51.05	0.00	65.72	18.25
35	SAGBEND	-47.69	-9.29	0.00	0.000	13.186	113.27	14.05	-1.19	53.29	0.00	67.95	18.88
36	SAGBEND	-49.64	-9.75	0.00	0.000	13.000	115.27	14.01	-1.25	55.24	0.00	69.88	19.41
37	SAGBEND	-51.59	-10.19	0.00	0.000	12.808	117.27	13.97	-1.31	56.91	0.00	71.54	19.87
38	SAGBEND	-53.54	-10.63	0.00	0.000	12.611	119.27	13.92	-1.36	58.36	0.00	72.98	20.27
39	SAGBEND	-55.49	-11.07	0.00	0.000	12.410	121.27	13.88	-1.42	59.62	0.00	74.22	20.62
40	SAGBEND	-57.45	-11.49	0.00	0.000	12.204	123.27	13.84	-1.47	60.71	0.00	75.30	20.92
41	SAGBEND	-59.40	-11.91	0.00	0.000	11.994	125.27	13.80	-1.53	61.66	0.00	76.24	21.18
42	SAGBEND	-61.36	-12.33	0.00	0.000	11.782	127.27	13.76	-1.58	62.49	0.00	77.05	21.40
43	SAGBEND	-63.32	-12.73	0.00	0.000	11.567	129.27	13.72	-1.63	63.21	0.00	77.76	21.60
44	SAGBEND	-65.28	-13.13	0.00	0.000	11.350	131.27	13.68	-1.68	63.84	0.00	78.38	21.77
45	SAGBEND	-67.24	-13.52	0.00	0.000	11.131	133.27	13.64	-1.73	64.39	0.00	78.92	21.92
46	SAGBEND	-69.20	-13.90	0.00	0.000	10.910	135.27	13.61	-1.78	64.88	0.00	79.39	22.05
47	SAGBEND	-71.17	-14.27	0.00	0.000	10.687	137.27	13.57	-1.83	65.30	0.00	79.81	22.17
48	SAGBEND	-73.13	-14.64	0.00	0.000	10.463	139.27	13.54	-1.88	65.68	0.00	80.17	22.27
49	SAGBEND	-75.10	-15.00	0.00	0.000	10.238	141.27	13.50	-1.92	66.01	0.00	80.49	22.36
50	SAGBEND	-77.07	-15.35	0.00	0.000	10.012	143.27	13.47	-1.97	66.31	0.00	80.78	22.44
51	SAGBEND	-79.04	-15.70	0.00	0.000	9.784	145.27	13.43	-2.01	66.57	0.00	81.03	22.51
52	SAGBEND	-81.01	-16.03	0.00	0.000	9.556	147.27	13.40	-2.06	66.80	0.00	81.25	22.57
53	SAGBEND	-82.98	-16.36	0.00	0.000	9.328	149.27	13.37	-2.10	67.01	0.00	81.45	22.62
54	SAGBEND	-84.96	-16.68	0.00	0.000	9.098	151.27	13.34	-2.14	67.19	0.00	81.62	22.67
55	SAGBEND	-86.93	-16.99	0.00	0.000	8.868	153.27	13.31	-2.18	67.36	0.00	81.78	22.72
56	SAGBEND	-88.91	-17.30	0.00	0.000	8.637	155.27	13.28	-2.22	67.51	0.00	81.92	22.75
57	SAGBEND	-90.89	-17.59	0.00	0.000	8.406	157.27	13.25	-2.26	67.64	0.00	82.04	22.79
58	SAGBEND	-92.87	-17.88	0.00	0.000	8.175	159.27	13.22	-2.29	67.75	0.00	82.14	22.82
59	SAGBEND	-94.85	-18.16	0.00	0.000	7.943	161.27	13.20	-2.33	67.85	0.00	82.24	22.84

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/2/2020 TIME - 4:48:41 PAGE 16  
 PROJECT - STATIC PIPE ANALYSIS 12 INCH JOB NO. - LAYING  
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/2/2020 TIME - 4:48:41 PAGE 16													
PROJECT - STATIC PIPE ANALYSIS 12 INCH JOB NO. - LAYING													
USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1													
=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
=====													
60	SAGBEND	-96.83	-18.43	0.00	0.000	7.711	163.27	13.17	-2.36	67.94	0.00	82.32	22.87
61	SAGBEND	-98.81	-18.70	0.00	0.000	7.478	165.27	13.14	-2.40	68.01	0.00	82.38	22.88
62	SAGBEND	-100.79	-18.95	0.00	0.000	7.246	167.27	13.12	-2.43	68.08	0.00	82.44	22.90
63	SAGBEND	-102.78	-19.20	0.00	0.000	7.013	169.27	13.10	-2.46	68.13	0.00	82.48	22.91
64	SAGBEND	-104.77	-19.44	0.00	0.000	6.780	171.27	13.07	-2.49	68.16	0.00	82.51	22.92
65	SAGBEND	-106.75	-19.68	0.00	0.000	6.546	173.27	13.05	-2.52	68.19	0.00	82.53	22.92
66	SAGBEND	-108.74	-19.90	0.00	0.000	6.313	175.27	13.03	-2.55	68.19	0.00	82.53	22.92
67	SAGBEND	-110.73	-20.12	0.00	0.000	6.080	177.27	13.01	-2.58	68.19	0.00	82.51	22.92
68	SAGBEND	-112.72	-20.32	0.00	0.000	5.847	179.27	12.99	-2.61	68.16	0.00	82.48	22.91
69	SAGBEND	-114.71	-20.52	0.00	0.000	5.614	181.27	12.97	-2.63	68.12	0.00	82.43	22.90

70	SAGBEND	-116.70	-20.71	0.00	0.000	5.381	183.27	12.95	-2.66	68.05	0.00	82.36	22.88
71	SAGBEND	-118.69	-20.90	0.00	0.000	5.149	185.27	12.93	-2.68	67.96	0.00	82.27	22.85
72	SAGBEND	-120.68	-21.07	0.00	0.000	4.916	187.27	12.92	-2.70	67.85	0.00	82.15	22.82
73	SAGBEND	-122.67	-21.24	0.00	0.000	4.685	189.27	12.90	-2.72	67.70	0.00	82.00	22.78
74	SAGBEND	-124.67	-21.40	0.00	0.000	4.453	191.27	12.88	-2.74	67.52	0.00	81.81	22.73
75	SAGBEND	-126.66	-21.55	0.00	0.000	4.223	193.27	12.87	-2.76	67.30	0.00	81.59	22.66
76	SAGBEND	-128.66	-21.69	0.00	0.000	3.993	195.27	12.86	-2.78	67.04	0.00	81.32	22.59
77	SAGBEND	-130.65	-21.83	0.00	0.000	3.764	197.27	12.84	-2.80	66.72	0.00	81.00	22.50
78	SAGBEND	-132.65	-21.96	0.00	0.000	3.537	199.27	12.83	-2.81	66.34	0.00	80.62	22.39
79	SAGBEND	-134.64	-22.08	0.00	0.000	3.311	201.27	12.82	-2.83	65.89	0.00	80.16	22.27
80	SAGBEND	-136.64	-22.19	0.00	0.000	3.086	203.27	12.81	-2.84	65.36	0.00	79.63	22.12
81	SAGBEND	-138.64	-22.29	0.00	0.000	2.864	205.27	12.80	-2.86	64.74	0.00	79.00	21.95
82	SAGBEND	-140.64	-22.39	0.00	0.000	2.644	207.27	12.79	-2.87	64.00	0.00	78.27	21.74
83	SAGBEND	-142.63	-22.48	0.00	0.000	2.426	209.27	12.78	-2.88	63.15	0.00	77.41	21.50
84	SAGBEND	-144.63	-22.56	0.00	0.000	2.212	211.27	12.77	-2.89	62.14	0.00	76.40	21.22
85	SAGBEND	-146.63	-22.63	0.00	0.000	2.001	213.27	12.77	-2.90	60.97	0.00	75.23	20.90
86	SAGBEND	-148.63	-22.70	0.00	0.000	1.795	215.27	12.76	-2.91	59.60	0.00	73.86	20.52
87	SAGBEND	-150.63	-22.76	0.00	0.000	1.594	217.27	12.75	-2.92	58.00	0.00	72.26	20.07
88	SAGBEND	-152.63	-22.81	0.00	0.000	1.399	219.27	12.75	-2.92	56.14	0.00	70.40	19.56
89	SAGBEND	-154.63	-22.85	0.00	0.000	1.210	221.27	12.75	-2.93	53.97	0.00	68.23	18.95
90	SAGBEND	-156.63	-22.89	0.00	0.000	1.030	223.27	12.74	-2.93	51.45	0.00	65.71	18.25
91	SAGBEND	-158.63	-22.93	0.00	0.000	0.859	225.27	12.74	-2.94	48.51	0.00	62.77	17.44
92	SAGBEND	-160.63	-22.95	0.00	0.000	0.699	227.27	12.74	-2.94	45.09	0.00	59.35	16.49
93	SAGBEND	-162.63	-22.97	0.00	0.000	0.551	229.27	12.74	-2.95	41.10	0.00	55.37	15.38
94	SAGBEND	-164.63	-22.99	0.00	0.000	0.418	231.27	12.73	-2.95	36.47	0.00	50.75	14.10
95	SEABED	-166.63	-23.00	0.00	0.000	0.303	233.27	12.73	-2.95	31.09	0.00	45.37	12.60
96	SEABED	-168.63	-23.01	0.00	0.000	0.206	235.27	12.73	-2.95	25.25	0.00	39.54	10.98
97	SEABED	-170.63	-23.02	0.00	0.000	0.130	237.27	12.73	-2.95	19.56	0.00	33.86	9.41
98	SEABED	-172.63	-23.02	0.00	0.000	0.072	239.27	12.73	-2.95	14.44	0.00	28.76	7.99
99	SEABED	-174.63	-23.02	0.00	0.000	0.030	241.27	12.73	-2.95	10.09	0.00	24.43	6.79
100	SEABED	-176.63	-23.02	0.00	0.000	0.002	243.27	12.73	-2.95	6.57	0.00	20.94	5.82
101	SEABED	-178.63	-23.02	0.00	0.000	-0.016	245.27	12.73	-2.95	3.86	0.00	18.25	5.07
102	SEABED	-180.63	-23.02	0.00	0.000	-0.025	247.27	12.73	-2.95	1.86	0.00	16.27	4.52
103	SEABED	-182.63	-23.02	0.00	0.000	-0.029	249.27	12.73	-2.95	0.48	0.00	14.91	4.14

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX    DATE - 5/2/2020    TIME - 4:48:41    PAGE 17

PROJECT - STATIC PIPE ANALYSIS 12 INCH    JOB NO. - LAYING

USER ID - IK    LICENSED BY - PT Timas Suplindo    CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCENT YIELD (PCT)
104	SEABED	-184.63	-23.02	0.00	0.000	-0.029	251.27	12.73	-2.95	-0.42	0.00	14.85	4.12
105	SEABED	-186.63	-23.02	0.00	0.000	-0.027	253.27	12.73	-2.95	-0.94	0.00	15.36	4.27
106	SEABED	-188.63	-23.02	0.00	0.000	-0.023	255.27	12.73	-2.95	-1.18	0.00	15.60	4.33
107	SEABED	-190.63	-23.02	0.00	0.000	-0.019	257.27	12.73	-2.95	-1.24	0.00	15.66	4.35
108	SEABED	-192.63	-23.02	0.00	0.000	-0.015	259.27	12.73	-2.95	-1.17	0.00	15.59	4.33
109	SEABED	-194.63	-23.02	0.00	0.000	-0.011	261.27	12.73	-2.95	-1.03	0.00	15.45	4.29
110	SEABED	-196.63	-23.02	0.00	0.000	-0.008	263.27	12.73	-2.95	-0.86	0.00	15.28	4.25
111	SEABED	-198.63	-23.02	0.00	0.000	-0.005	265.27	12.73	-2.95	-0.68	0.00	15.11	4.20
112	SEABED	-200.63	-23.02	0.00	0.000	-0.003	267.27	12.73	-2.95	-0.52	0.00	14.95	4.15
113	SEABED	-202.63	-23.02	0.00	0.000	-0.002	269.27	12.73	-2.95	-0.38	0.00	14.81	4.11
114	SEABED	-204.63	-23.02	0.00	0.000	-0.001	271.27	12.73	-2.95	-0.26	0.00	14.69	4.08
115	SEABED	-206.63	-23.02	0.00	0.000	0.000	273.27	12.73	-2.95	-0.16	0.00	14.60	4.05
116	SEABED	-208.63	-23.02	0.00	0.000	0.001	275.27	12.73	-2.95	-0.09	0.00	14.53	4.03
117	SEABED	-210.63	-23.02	0.00	0.000	0.001	277.27	12.73	-2.95	-0.04	0.00	14.48	4.02
118	SEABED	-212.63	-23.02	0.00	0.000	0.001	279.27	12.73	-2.95	-0.01	0.00	14.44	4.01
119	SEABED	-214.63	-23.02	0.00	0.000	0.001	281.27	12.73	-2.95	0.01	0.00	14.45	4.01
120	SEABED	-216.63	-23.02	0.00	0.000	0.001	283.27	12.73	-2.95	0.02	0.00	14.46	4.02
121	SEABED	-218.63	-23.02	0.00	0.000	0.001	285.27	12.73	-2.95	0.03	0.00	14.46	4.02
122	SEABED	-220.63	-23.02	0.00	0.000	0.001	287.27	12.73	-2.95	0.02	0.00	14.46	4.02
123	SEABED	-222.63	-23.02	0.00	0.000	0.001	289.27	12.73	-2.95	0.02	0.00	14.45	4.02
124	SEABED	-224.63	-23.02	0.00	0.000	0.001	291.27	12.73	-2.95	0.01	0.00	14.45	4.01
125	SEABED	-226.63	-23.02	0.00	0.000	0.000	293.27	12.73	-2.95	0.00	0.00	14.44	4.01
126	SEABED	-228.63	-23.02	0.00	0.000	0.000	295.27	12.73	-2.95	0.00	0.00	14.44	4.01

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PROJECT - STATIC PIPE ANALYSIS 12 INCH    JOB NO. - LAYING

USER ID - IK    LICENSED BY - PT Timas Suplindo    CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT REACTION VERT (KN)	HORIZ (KN)	SUPT VERT (M)	SEPARATIONS HORIZ (M)	PIPE TENSION (KN)	VERT (KN-M)	BENDING MOMENTS HORIZ (KN-M)	TOTAL (KN-M)	
1	LAYBARGE	64.20	4.42	0.00	0.92	0.00	0.00	0.00	0.00	0.19	0.00	0.19	
3	LAYBARGE	59.72	4.30	0.00	22.65	0.00	0.00	0.00	-0.28	-15.05	0.00	15.05	
5	LAYBARGE	48.23	4.00	0.00	28.14	0.00	0.00	0.00	-1.00	-22.10	0.00	22.10	
7	TENSIONR	38.10	3.73	0.00	14.66	0.00	0.00	0.00	96.44	-6.32	0.00	6.32	
9	LAYBARGE	33.43	3.61	0.00	19.86	0.00	0.00	0.00	96.15	-11.64	0.00	11.64	

11	TENSIONR	26.65	3.43	0.00	1.86	0.00	0.00	0.00	193.79	18.99	0.00	18.99
13	LAYBARGE	21.33	3.31	0.00	0.00	0.00	0.01	0.00	193.49	-19.22	0.00	19.22
15	LAYBARGE	12.14	2.98	0.00	66.22	0.00	0.00	0.00	191.62	-250.35	0.00	250.35
17	LAYBARGE	-0.04	1.76	0.00	36.24	0.00	0.00	0.00	188.88	-232.31	0.00	232.31
20	STINGER	-8.10	0.38	0.00	39.10	0.00	0.00	0.00	185.68	-225.33	0.00	225.33
22	STINGER	-15.91	-1.36	0.00	0.00	0.00	0.03	0.00	185.01	-90.21	0.00	90.21
24	STINGER	-23.67	-3.30	0.00	0.00	0.00	0.23	0.00	184.42	-20.56	0.00	20.56
26	STINGER	-30.83	-5.14	0.00	0.00	0.00	0.61	0.00	183.75	14.97	0.00	14.97
28	STINGER	-36.92	-6.68	0.00	0.00	0.00	1.18	0.00	183.17	32.84	0.00	32.84
30	STINGER	-39.82	-7.40	0.00	0.00	0.00	1.94	0.00	182.90	38.79	0.00	38.79
32	SAGBEND	-41.86	-7.90	0.00	0.00	0.00	0.00	0.00	182.71	42.22	0.00	42.22
33	SAGBEND	-43.80	-8.37	0.00	0.00	0.00	0.00	0.00	182.53	45.03	0.00	45.03
34	SAGBEND	-45.74	-8.84	0.00	0.00	0.00	0.00	0.00	182.36	47.46	0.00	47.46
35	SAGBEND	-47.69	-9.29	0.00	0.00	0.00	0.00	0.00	182.19	49.55	0.00	49.55
36	SAGBEND	-49.64	-9.75	0.00	0.00	0.00	0.00	0.00	182.02	51.35	0.00	51.35
37	SAGBEND	-51.59	-10.19	0.00	0.00	0.00	0.00	0.00	181.85	52.91	0.00	52.91
38	SAGBEND	-53.54	-10.63	0.00	0.00	0.00	0.00	0.00	181.68	54.26	0.00	54.26
39	SAGBEND	-55.49	-11.07	0.00	0.00	0.00	0.00	0.00	181.52	55.43	0.00	55.43
40	SAGBEND	-57.45	-11.49	0.00	0.00	0.00	0.00	0.00	181.36	56.44	0.00	56.44
41	SAGBEND	-59.40	-11.91	0.00	0.00	0.00	0.00	0.00	181.21	57.32	0.00	57.32
42	SAGBEND	-61.36	-12.33	0.00	0.00	0.00	0.00	0.00	181.05	58.09	0.00	58.09
43	SAGBEND	-63.32	-12.73	0.00	0.00	0.00	0.00	0.00	180.90	58.76	0.00	58.76
44	SAGBEND	-65.28	-13.13	0.00	0.00	0.00	0.00	0.00	180.76	59.35	0.00	59.35
45	SAGBEND	-67.24	-13.52	0.00	0.00	0.00	0.00	0.00	180.61	59.86	0.00	59.86
46	SAGBEND	-69.20	-13.90	0.00	0.00	0.00	0.00	0.00	180.47	60.31	0.00	60.31
47	SAGBEND	-71.17	-14.27	0.00	0.00	0.00	0.00	0.00	180.33	60.71	0.00	60.71
48	SAGBEND	-73.13	-14.64	0.00	0.00	0.00	0.00	0.00	180.20	61.06	0.00	61.06
49	SAGBEND	-75.10	-15.00	0.00	0.00	0.00	0.00	0.00	180.06	61.37	0.00	61.37
50	SAGBEND	-77.07	-15.35	0.00	0.00	0.00	0.00	0.00	179.93	61.64	0.00	61.64
51	SAGBEND	-79.04	-15.70	0.00	0.00	0.00	0.00	0.00	179.81	61.89	0.00	61.89
52	SAGBEND	-81.01	-16.03	0.00	0.00	0.00	0.00	0.00	179.68	62.10	0.00	62.10
53	SAGBEND	-82.98	-16.36	0.00	0.00	0.00	0.00	0.00	179.56	62.30	0.00	62.30
54	SAGBEND	-84.96	-16.68	0.00	0.00	0.00	0.00	0.00	179.44	62.47	0.00	62.47
55	SAGBEND	-86.93	-16.99	0.00	0.00	0.00	0.00	0.00	179.33	62.62	0.00	62.62
56	SAGBEND	-88.91	-17.30	0.00	0.00	0.00	0.00	0.00	179.21	62.76	0.00	62.76
57	SAGBEND	-90.89	-17.59	0.00	0.00	0.00	0.00	0.00	179.11	62.88	0.00	62.88
58	SAGBEND	-92.87	-17.88	0.00	0.00	0.00	0.00	0.00	179.00	62.99	0.00	62.99
59	SAGBEND	-94.85	-18.16	0.00	0.00	0.00	0.00	0.00	178.90	63.08	0.00	63.08

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX    DATE - 5/ 2/2020    TIME - 4:48:41    PAGE 19

PROJECT - STATIC PIPE ANALYSIS 12 INCH    JOB NO. - LAYING

USER ID - IK    LICENSED BY - PT Timas Suplindo    CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES												
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NODE NO.	PIPE SECTION	COORDINATES			SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS	
		X COORD (M )	Y COORD (M )	Z COORD (M )	VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	(KN )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)
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60	SAGBEND	-96.83	-18.43	0.00	0.00	0.00	0.00	0.00	178.79	63.16	0.00	63.16
61	SAGBEND	-98.81	-18.70	0.00	0.00	0.00	0.00	0.00	178.70	63.23	0.00	63.23
62	SAGBEND	-100.79	-18.95	0.00	0.00	0.00	0.00	0.00	178.60	63.29	0.00	63.29
63	SAGBEND	-102.78	-19.20	0.00	0.00	0.00	0.00	0.00	178.51	63.33	0.00	63.33
64	SAGBEND	-104.77	-19.44	0.00	0.00	0.00	0.00	0.00	178.42	63.37	0.00	63.37
65	SAGBEND	-106.75	-19.68	0.00	0.00	0.00	0.00	0.00	178.34	63.39	0.00	63.39
66	SAGBEND	-108.74	-19.90	0.00	0.00	0.00	0.00	0.00	178.26	63.40	0.00	63.40
67	SAGBEND	-110.73	-20.12	0.00	0.00	0.00	0.00	0.00	178.18	63.39	0.00	63.39
68	SAGBEND	-112.72	-20.32	0.00	0.00	0.00	0.00	0.00	178.10	63.37	0.00	63.37
69	SAGBEND	-114.71	-20.52	0.00	0.00	0.00	0.00	0.00	178.03	63.33	0.00	63.33
70	SAGBEND	-116.70	-20.71	0.00	0.00	0.00	0.00	0.00	177.96	63.27	0.00	63.27
71	SAGBEND	-118.69	-20.90	0.00	0.00	0.00	0.00	0.00	177.89	63.18	0.00	63.18
72	SAGBEND	-120.68	-21.07	0.00	0.00	0.00	0.00	0.00	177.82	63.08	0.00	63.08
73	SAGBEND	-122.67	-21.24	0.00	0.00	0.00	0.00	0.00	177.76	62.94	0.00	62.94
74	SAGBEND	-124.67	-21.40	0.00	0.00	0.00	0.00	0.00	177.70	62.77	0.00	62.77
75	SAGBEND	-126.66	-21.55	0.00	0.00	0.00	0.00	0.00	177.65	62.57	0.00	62.57
76	SAGBEND	-128.66	-21.69	0.00	0.00	0.00	0.00	0.00	177.60	62.32	0.00	62.32
77	SAGBEND	-130.65	-21.83	0.00	0.00	0.00	0.00	0.00	177.55	62.03	0.00	62.03
78	SAGBEND	-132.65	-21.96	0.00	0.00	0.00	0.00	0.00	177.50	61.67	0.00	61.67
79	SAGBEND	-134.64	-22.08	0.00	0.00	0.00	0.00	0.00	177.46	61.26	0.00	61.26
80	SAGBEND	-136.64	-22.19	0.00	0.00	0.00	0.00	0.00	177.42	60.76	0.00	60.76
81	SAGBEND	-138.64	-22.29	0.00	0.00	0.00	0.00	0.00	177.38	60.18	0.00	60.18
82	SAGBEND	-140.64	-22.39	0.00	0.00	0.00	0.00	0.00	177.35	59.50	0.00	59.50
83	SAGBEND	-142.63	-22.48	0.00	0.00	0.00	0.00	0.00	177.32	58.70	0.00	58.70
84	SAGBEND	-144.63	-22.56	0.00	0.00	0.00	0.00	0.00	177.29	57.77	0.00	57.77
85	SAGBEND	-146.63	-22.63	0.00	0.00	0.00	0.00	0.00	177.26	56.68	0.00	56.68
86	SAGBEND	-148.63	-22.70	0.00	0.00	0.00	0.00	0.00	177.24	55.41	0.00	55.41
87	SAGBEND	-150.63	-22.76	0.00	0.00	0.00	0.00	0.00	177.22	53.92	0.00	53.92
88	SAGBEND	-152.63	-22.81	0.00	0.00	0.00	0.00	0.00	177.20	52.19	0.00	52.19
89	SAGBEND	-154.63	-22.85	0.00	0.00	0.00	0.00	0.00	177.19	50.18	0.00	50.18
90	SAGBEND	-156.63	-22.89	0.00	0.00	0.00	0.00	0.00	177.18	47.83	0.00	47.83
91	SAGBEND	-158.63	-22.93	0.00	0.00	0.00	0.00	0.00	177.17	45.10	0.00	45.10
92	SAGBEND	-160.63	-22.95	0.00	0.00	0.00	0.00	0.00	177.17	41.91	0.00	41.91
93	SAGBEND	-162.63	-22.97	0.00	0.00	0.00	0.00	0.00	177.16	38.21	0.00	38.21
94	SAGBEND	-164.63	-22.99	0.00	0.00	0.00	0.00	0.00	177.16	33.91	0.00	33.91
95	SEABED	-166.63	-23.00	0.00	0.19	0.00	0.00	0.00	177.16	28.91	0.00	28.91

96	SEABED	-168.63	-23.01	0.00	0.55	0.00	0.00	0.00	177.17	23.47	0.00	23.47
97	SEABED	-170.63	-23.02	0.00	0.79	0.00	0.00	0.00	177.17	18.18	0.00	18.18
98	SEABED	-172.63	-23.02	0.00	0.94	0.00	0.00	0.00	177.17	13.42	0.00	13.42
99	SEABED	-174.63	-23.02	0.00	1.02	0.00	0.00	0.00	177.17	9.38	0.00	9.38
100	SEABED	-176.63	-23.02	0.00	1.04	0.00	0.00	0.00	177.17	6.11	0.00	6.11
101	SEABED	-178.63	-23.02	0.00	1.03	0.00	0.00	0.00	177.17	3.59	0.00	3.59
102	SEABED	-180.63	-23.02	0.00	1.00	0.00	0.00	0.00	177.17	1.73	0.00	1.73
103	SEABED	-182.63	-23.02	0.00	0.96	0.00	0.00	0.00	177.17	0.44	0.00	0.44

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX    DATE - 5/ 2/2020    TIME - 4:48:41    PAGE 20

PROJECT - STATIC PIPE ANALYSIS 12 INCH    JOB NO. - LAYING

USER ID - IK    LICENSED BY - PT Timas Suplindo    CASE 1

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=====												
STATIC PIPE COORDINATES, FORCES AND STRESSES												
=====												
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACTION HORIZ (KN)	SUPT VERT (M)	SEPARATIONS HORIZ (M)	PIPE TENSION (KN)	BENDING MOMENTS		
										VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)
104	SEABED	-184.63	-23.02	0.00	0.92	0.00	0.00	0.00	177.17	-0.39	0.00	0.39
105	SEABED	-186.63	-23.02	0.00	0.87	0.00	0.00	0.00	177.17	-0.87	0.00	0.87
106	SEABED	-188.63	-23.02	0.00	0.84	0.00	0.00	0.00	177.17	-1.10	0.00	1.10
107	SEABED	-190.63	-23.02	0.00	0.81	0.00	0.00	0.00	177.17	-1.15	0.00	1.15
108	SEABED	-192.63	-23.02	0.00	0.78	0.00	0.00	0.00	177.17	-1.09	0.00	1.09
109	SEABED	-194.63	-23.02	0.00	0.76	0.00	0.00	0.00	177.17	-0.96	0.00	0.96
110	SEABED	-196.63	-23.02	0.00	0.75	0.00	0.00	0.00	177.17	-0.80	0.00	0.80
111	SEABED	-198.63	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	-0.64	0.00	0.64
112	SEABED	-200.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.48	0.00	0.48
113	SEABED	-202.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.35	0.00	0.35
114	SEABED	-204.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.24	0.00	0.24
115	SEABED	-206.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.15	0.00	0.15
116	SEABED	-208.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.08	0.00	0.08
117	SEABED	-210.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.04	0.00	0.04
118	SEABED	-212.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.00	0.00	0.00
119	SEABED	-214.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.01	0.00	0.01
120	SEABED	-216.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.02	0.00	0.02
121	SEABED	-218.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.02	0.00	0.02
122	SEABED	-220.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.02	0.00	0.02
123	SEABED	-222.63	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	0.02	0.00	0.02
124	SEABED	-224.63	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	0.01	0.00	0.01
125	SEABED	-226.63	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	0.00	0.00	0.00
126	SEABED	-228.63	-23.02	0.00	0.00	0.00	0.00	0.00	177.17	0.00	0.00	0.00

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX    PAGE 21

STATIC PIPE ANALYSIS 12 INCH

JOB NO. - LAYING    LICENSED BY - PT Timas Suplindo

USER ID - IK    DATE - 5/ 2/2020    TIME - 4:48:41    CASE 1

=====

STATIC SOLUTION SUMMARY

PIPE PROPERTIES ( 1 )

PIPE SECTION LENGTH ..	0.00 M	ELASTIC MODULUS .....	207000. MPA
OUTSIDE DIAMETER .....	32.390 CM	CROSS SECTIONAL AREA ..	124.10 CM^2
WALL THICKNESS .....	1.270 CM	MOMENT OF INERTIA .....	15048.2 CM^4
WEIGHT/LENGTH IN AIR ..	2374.00 N/M	YIELD STRESS .....	360.00 MPA
SUBMERGED WGH/LENG ..	368.27 N/M	STRESS INTENS FACTOR ..	1.000
SPECIFIC GRAVITY .....	1.184	STEEL DENSITY .....	77008.0 N/M3
WRAP COAT THICKNESS ..	0.320 CM	WRAP COAT DENSITY .....	9025.2 N/M3
CONCRETE THICKNESS ...	4.000 CM	CONCRETE DENSITY .....	29858.0 N/M3

BARGE DATA

TOTAL PIPE TENSION ...	196.13 KN	RADIUS OF CURVATURE ..	0.00 M
NUMBER OF TENSIONERS .	2	BARGE TRIM ANGLE .....	0.500 DEG
NO. OF PIPE SUPPORTS .	7	PIPE ANGLE AT STERN ..	8.042 DEG
BARGE HEADING .....	0.000 DEG	OFFSET FROM R.O.W. ...	0.00 M

STINGER DATA

NO. OF PIPE SUPPORTS .	6	PIPE DEPTH AT STERN ..	-7.40 M
NO. STINGER SECTIONS .	6	PIPE ANGLE AT STERN ..	13.851 DEG
RADIUS OF CURVATURE ..	0.00 M	STINGER STERN DEPTH ..	-9.21 M
STINGER LENGTH .....	41.37 M		

SAGBEND DATA

WATER DEPTH .....	23.00 M	TENSION AT TOUCHDOWN .	177.16 KN
TOUCHDOWN X-COORD. ...	-165.87 M	BOTTOM SLOPE ANGLE ...	0.000 DEG
PROJECTED SPAN LENGTH	126.04 M	PIPE LENGTH GAIN .....	2.44 M

===== SOLUTION SUMMARY =====

NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACT HORIZ (KN)	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
104	SEABED	-184.63	-23.02	0.00	0.92	0.00	0.00	177.17	0.00
105	SEABED	-186.63	-23.02	0.00	0.87	0.00	0.00	177.17	0.00
106	SEABED	-188.63	-23.02	0.00	0.84	0.00	0.00	177.17	0.00
107	SEABED	-190.63	-23.02	0.00	0.81	0.00	0.00	177.17	0.00
108	SEABED	-192.63	-23.02	0.00	0.78	0.00	0.00	177.17	0.00
109	SEABED	-194.63	-23.02	0.00	0.76	0.00	0.00	177.17	0.00
110	SEABED	-196.63	-23.02	0.00	0.75	0.00	0.00	177.17	0.00
111	SEABED	-198.63	-23.02	0.00	0.74	0.00	0.00	177.17	0.00
112	SEABED	-200.63	-23.02	0.00	0.73	0.00	0.00	177.17	0.00
113	SEABED	-202.63	-23.02	0.00	0.73	0.00	0.00	177.17	0.00
114	SEABED	-204.63	-23.02	0.00	0.73	0.00	0.00	177.17	0.00
115	SEABED	-206.63	-23.02	0.00	0.73	0.00	0.00	177.17	0.00
116	SEABED	-208.63	-23.02	0.00	0.73	0.00	0.00	177.17	0.00
117	SEABED	-210.63	-23.02	0.00	0.73	0.00	0.00	177.17	0.00
118	SEABED	-212.63	-23.02	0.00	0.73	0.00	0.00	177.17	0.00
119	SEABED	-214.63	-23.02	0.00	0.73	0.00	0.00	177.17	0.00
120	SEABED	-216.63	-23.02	0.00	0.73	0.00	0.00	177.17	0.00
121	SEABED	-218.63	-23.02	0.00	0.73	0.00	0.00	177.17	0.00
122	SEABED	-220.63	-23.02	0.00	0.73	0.00	0.00	177.17	0.00
123	SEABED	-222.63	-23.02	0.00	0.74	0.00	0.00	177.17	0.00
124	SEABED	-224.63	-23.02	0.00	0.74	0.00	0.00	177.17	0.00
125	SEABED	-226.63	-23.02	0.00	0.74	0.00	0.00	177.17	0.00
126	SEABED	-228.63	-23.02	0.00	0.00	0.00	0.00	177.17	0.00

1 LAYBARGE	64.2	4.4	0.0	0.9	0.0	0.2	0.2	0.
3 LAYBARGE	59.7	4.3	0.0	22.6	0.0	15.0	16.2	5.
5 LAYBARGE	48.2	4.0	0.0	28.1	0.0	22.1	23.9	7.
7 TENSIONR	38.1	3.7	0.0	14.7	0.0	6.3	14.6	4.
9 LAYBARGE	33.4	3.6	0.0	19.9	0.0	11.6	20.3	6.
11 TENSIONR	26.7	3.4	0.0	1.9	0.0	19.0	36.0	10.
13 LAYBARGE	21.3	3.3	0.0	0.0	0.0	19.2	36.3	10.
15 LAYBARGE	12.1	3.0	0.0	66.2	0.0	250.4	284.7	79.
17 LAYBARGE	0.0	1.8	0.0	36.2	0.0	232.3	265.1	74.
20 STINGER	-8.1	0.4	0.0	39.1	0.0	225.3	257.3	71.
22 STINGER	-15.9	-1.4	0.0	0.0	0.0	90.2	111.9	31.
24 STINGER	-23.7	-3.3	0.0	0.0	0.0	20.6	37.0	10.

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 22  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 4:48:41 CASE 1

STATIC SOLUTION SUMMARY

26 STINGER	-30.8	-5.1	0.0	0.0	0.0	15.0	30.9	9.
28 STINGER	-36.9	-6.7	0.0	0.0	0.0	32.8	50.1	14.
30 STINGER	-39.8	-7.4	0.0	0.0	0.0	38.8	56.4	16.
66 SAGBEND	-108.7	-19.9	0.0	0.0	0.0	63.4	82.5	23.
95 SEABED	-166.6	-23.0	0.0	0.2	0.0	28.9	45.4	13.

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 23  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 4:48:41 CASE 1

DYNAMIC SOLUTION SUMMARY

SEA STATE NUMBER ( 1 )

SEA STATE TYPE ..... WAVE SPECTRUM  
 NO. WAVE COMPONENTS .. 20  
 WAVE WATER DEPTH ..... 23.0 M  
 MAX. WAVE FREQUENCY .. 3.0015 RA/S  
 SPECTRUM START TIME .. 0. SECS  
 RAO SIGN CONVENTION .. BENTLEY MOSES  
 WAVE TRAVEL DIRECTION .. 0.000 DEG  
 MIN. WAVE FREQUENCY .. 0.1001 RA/S VESSEL RESPONSE TYPE . TABLE OF RAOS  
 RANDOM PHASE SEED .... 0  
 NO. RAOS IN TABLE .. 30  
 SEA STATE DEFINITION  
 WAVE SPECTRUM TYPE ... JONSWAP (CLASSIC)  
 JONSWAP COEFFICIENT .. 0.012891 JONSWAP PEAK FACTOR .. 5.000  
 PEAK WAVE FREQUENCY .. 0.9498 RA/S

CALCULATED WAVE HEIGHTS

SIGNIFICANT WAVE HT. .	2.884 M	AVERAGE WAVE HEIGHT ..	1.894 M
MAXIMUM WAVE HEIGHT ..	5.256 M	RMS WAVE HEIGHT .....	2.090 M
TOTAL NUMBER OF WAVES	1891		

SOLUTION SUMMARY

NODE PIPE	X	Y	Z	SUPPORT	REACT	TOTAL	TOTAL	PCT
NO. SECTION	COORD	COORD	COORD	VERT	HORIZ	MOMENT	STRESS	YLD
	(M )	(M )	(M )	(KN )	(KN )	(KN-M)	(MPA )	(%)
1 LAYBARGE	64.2	4.4	0.0	1.1	0.0	0.2	0.2	0.
3 LAYBARGE	59.7	4.3	0.0	23.9	0.0	16.2	17.4	5.
5 LAYBARGE	48.2	4.0	0.0	29.1	0.0	22.9	24.8	7.
7 TENSIONR	38.1	3.7	0.0	15.6	0.0	7.0	22.8	6.
9 LAYBARGE	33.4	3.6	0.0	22.2	0.0	14.2	28.6	8.
11 TENSIONR	26.7	3.4	0.0	4.7	0.0	24.3	44.8	12.
13 LAYBARGE	21.3	3.3	0.0	0.0	0.0	22.0	47.2	13.
15 LAYBARGE	12.2	3.0	0.0	78.5	0.0	265.8	306.3	85.
17 LAYBARGE	0.0	1.7	0.0	78.6	0.0	270.4	315.0	87.
20 STINGER	-8.1	0.4	0.0	63.9	0.0	255.4	298.0	83.
22 STINGER	-15.9	-1.3	0.0	50.7	0.0	214.5	253.6	70.
24 STINGER	-23.7	-3.1	0.0	22.4	0.0	128.4	160.8	45.
26 STINGER	-30.8	-4.8	0.0	0.0	0.0	101.1	131.8	37.
28 STINGER	-36.9	-6.2	0.0	0.0	0.0	124.5	155.9	43.
30 STINGER	-39.8	-6.8	0.0	0.0	0.0	128.8	160.4	45.
95 SEABED	-166.6	-22.6	0.0	2.6	0.0	65.7	85.1	24.



**LAMPIRAN ANALISA DINAMIS PADA PIPA 12 INCH  
HEADING 45°**

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*****
*
*           O F F P I P E - 3 -- OFFSHORE PIPELINE ANALYSIS SYSTEM
*
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*
*           VERSION NO. - 3.02EX
*           RELEASED ON - 03/08/2016
*           LICENSED TO - PT Timas Suplindo
*
*****
*
* OFFPIPE IS A NONLINEAR, 3-DIMENSIONAL FINITE ELEMENT METHOD BASED PROGRAM FOR THE
* STATIC AND DYNAMIC ANALYSIS OF PROBLEMS ARISING IN THE DESIGN OF MARINE PIPELINES.
* THIS VERSION OF OFFPIPE MAY BE USED FOR THE ANALYSIS OF OFFSHORE PIPELAYING OPER-
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*           6554 AUDEN                 FACSIMILE: (713) 664-0962
*           HOUSTON, TEXAS 77005
*           U.S.A.                     EMAIL: SUPPORT@OFFPIPE.COM
*
*****

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 3
STATIC PIPE ANALYSIS 12 INCH
JOB NO. - LAYING           LICENSED BY - PT Timas Suplindo
USER ID - IK              DATE - 5/2/2020 TIME - 5:19:20      CASE 1
=====

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INPUT DATA ECHO

```

=====
PRINTED OUTPUT SELECTED
=====
STATIC PIPE FORCES AND STRESSES ... YES
STATIC SOLUTION SUMMARY ..... YES
DYNAMIC PIPE FORCES AND STRESSES .. NO
DYNAMIC RANGE OF PIPE DATA ..... NO
DYNAMIC TRACKING OF PIPE DATA ..... NO
OVERBEND PIPE SUPPORT GEOMETRY .... NO
STINGER BALLAST SCHEDULE DATA ..... NO
SUPPORT REACTIONS IN BARGE COORDS . NO

INTERNAL FORCES IN PIPE & CABLE ... NO
INTERNAL FORCES IN STINGER ..... NO
PRINT PIPE STRAINS IN OUTPUT ..... NO
DNV OS-F101 COMPLIANCE REPORT ..... NO
API RP-1111 COMPLIANCE REPORT ..... NO
PRINT DNV/API FACTORS & PARAMETERS NO
USE THICK WALL HOOP STRESS EQN. ... NO
USE DNV 1981 FOR TOTAL PIPE STRESS NO

ENABLE/DISABLE WARNING MESSAGES ... ENABLE
GENERATE SPREAD SHEET PLOT FILE ... NO
GENERATE ASCII PLOT DATA FILES .... NO

```

PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX .....	1	
PLOT NUMBER .....	1	
PLOT TYPE OPTION NUMBER .....	1	
DYNAMIC PROFILE TIME POINT .....	0.000	
DYNAMIC PROFILE TIME INCREMENT .....	0.000	
ORDINATE PARAMETER CODE NUMBER .....	2	
AXIS LABEL FOR ORDINATE .....	"PIPE ELEVATION Y COORDINATE	"
ABSCISSA PARAMETER CODE NUMBER .....	1	
AXIS LABEL FOR ABSCISSA .....	"PIPE HORIZONTAL X COORDINATE	"
PLOT TITLE .....	"PIPELINE ELEVATION PROFILE AND PIPE STRESS	"
MINIMUM VERTICAL AXIS RANGE .....	0.000	
MAXIMUM VERTICAL AXIS RANGE .....	0.000	
MINIMUM HORIZONTAL AXIS RANGE .....	0.000	
MAXIMUM HORIZONTAL AXIS RANGE .....	0.000	

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 4  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 5:19:20 CASE 1

=====

INPUT DATA ECHO

PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX .....	2	
PLOT NUMBER .....	1	
PLOT TYPE OPTION NUMBER .....	1	
DYNAMIC PROFILE TIME POINT .....	0.000	
DYNAMIC PROFILE TIME INCREMENT .....	0.000	
ORDINATE PARAMETER CODE NUMBER .....	15	
AXIS LABEL FOR ORDINATE .....	"DNV YIELD STRESS PERCENTAGE	"
ABSCISSA PARAMETER CODE NUMBER .....	1	
AXIS LABEL FOR ABSCISSA .....	"PIPELINE HORIZONTAL X COORDINATE"	
PLOT TITLE .....	"PIPELINE ELEVATION PROFILE AND PIPE STRESS	"
MINIMUM VERTICAL AXIS RANGE .....	0.000	
MAXIMUM VERTICAL AXIS RANGE .....	0.000	
MINIMUM HORIZONTAL AXIS RANGE .....	0.000	
MAXIMUM HORIZONTAL AXIS RANGE .....	0.000	

PIPE PROPERTIES

=====

PROPERTY TABLE ROW NUMBER .....	1
PIPE SECTION LENGTH .....	0.000 METERS
STEEL MODULUS OF ELASTICITY .....	207000. M-PASCAL
STEEL CROSS SECTIONAL AREA .....	124.100 CM <sup>2</sup>
COATED PIPE AVG MOMENT OF INERTIA .....	15048.21 CM <sup>4</sup>
WEIGHT PER-UNIT-LENGTH IN AIR .....	2374.00 N/M
WEIGHT PER-UNIT-LENGTH SUBMERGED .....	368.27 N/M
MAXIMUM ALLOWABLE PIPE STRAIN .....	0.205000 PERCENT
STEEL OUTSIDE DIAMETER .....	32.3900 CM
STEEL WALL THICKNESS .....	1.2700 CM
YIELD STRESS .....	360.00 M-PASCAL
STRESS/STRAIN INTENSE FACTOR .....	0.0000
HYDRODYNAMIC OUTSIDE DIAMETER .....	0.000 CM
DRAG COEFFICIENT .....	0.0000
HYDRODYNAMIC TOTAL AREA .....	0.000 CM <sup>2</sup>
ADDED MASS COEFFICIENT .....	0.0000
POISSON'S RATIO .....	0.3000
COEFFICIENT OF THERMAL EXPANSION .....	0.00001100 1/DEG C

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 5  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 5:19:20 CASE 1

=====

INPUT DATA ECHO

PIPE COATING PROPERTIES

=====

PIPE PROPERTY TABLE INDEX .....	1
CORROSION COATING THICKNESS .....	0.320 CM
CORROSION COATING WEIGHT DENSITY .....	9025.2 N/M <sup>3</sup>
CORROSION COATING ELASTIC MODULUS .....	0.000 M-PASCAL
CONCRETE COATING THICKNESS .....	4.000 CM
CONCRETE COATING WEIGHT DENSITY .....	29858. N/M <sup>3</sup>
CONCRETE COATING ELASTIC MODULUS .....	0.000 M-PASCAL
DESIRED PIPE SPECIFIC GRAVITY .....	0.0000
CONCRETE STIFFENING EFFECTIVENESS .....	0.000
NO NOT CALC. STRESS FOR BARE PIPE .....	NO

AVERAGE LENGTH OF PIPE JOINT ..... 12.200 METERS  
 EFFECTIVE FIELD JOINT LENGTH ..... 0.300 METERS  
 FIELD JOINT FILL WEIGHT DENSITY ... 10055.3 N/M^3  
 FIELD JOINT FILL ELASTIC MODULUS... 0.000 M-PASCAL  
 FIELD JOINT STIFFENING EFFECT. .... 0.000  
 FIELD JOINT BENDING MODEL ..... 0 IGNORE COATING STIFFNESS  
 WEIGHT DENSITY OF STEEL ..... 77008. N/M^3  
 WEIGHT DENSITY OF PIPE CONTENTS ... 0.0 N/M^3  
 REF. ELEVATION FOR STATIC HEAD .... 0.00 METERS  
 FREE FLOOD PIPE DURING PIPELAY ... NO

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 6  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 5:19:20 CASE 1  
 =====

INPUT DATA ECHO

PIPELAY VESSEL DESCRIPTION

=====  
 NUMBER OF PIPE NODES ..... 9  
 BARGE GEOMETRY SPECIFIED BY ..... 1 X-Y COORDINATES  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.000 METERS  
 ADJUST Y COORDINATES MANUALLY .... NO  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 PIPE ANGLE RELATIVE TO DECK ..... 0.0000 DEGREES  
 HEIGHT OF DECK ABOVE WATER ..... 2.400 METERS  
 LAYBARGE FORWARD (X) OFFSET ..... 0.000 METERS  
 BARGE TRIM ANGLE ..... 0.5000 DEGREES  
  
 STERN SHOE X COORDINATE ..... 0.000 METERS  
 STERN SHOE Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER X COORDINATE ..... 43.820 METERS  
 ROTATION CENTER Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER Z COORDINATE ..... 6.370 METERS  
 BARGE HEADING ..... 0.0000 DEGREES  
 BARGE OFFSET FROM RIGHT-OF-WAY .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT VERTICAL ANGLE ... 0.000 DEGREES  
 PIPE RAMP PIVOT Z COORDINATE ..... 0.000 METERS  
 PIPE RAMP HEADING ON DECK ..... 0.000 DEGREES  
 ROLE OF ALTERNATE WAVE ORIGIN .... 0 MOTIONS & WAVES AT CENTER OF MOTION  
 WAVE PHASE ORIGIN X COORDINATE .... 0.000  
 WAVE PHASE ORIGIN Y COORDINATE .... 0.000 METERS  
 WAVE PHASE ORIGIN Z COORDINATE .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE .....

NODE X COORD (M )	NODE Y COORD (M )	SUPPORT TYPE	DAVIT SPACING (M )
64.220	1.838	1 SIMPLE SUPPORT	0.000
59.740	1.760	1 SIMPLE SUPPORT	0.000
48.240	1.560	1 SIMPLE SUPPORT	0.000
38.110	1.383	2 PIPE TENSIONER	0.000
33.440	1.302	1 SIMPLE SUPPORT	0.000
26.660	1.183	2 PIPE TENSIONER	0.000
21.340	1.092	7 USER DEFINED SPT	0.000
12.150	0.860	7 USER DEFINED SPT	0.000
-0.040	-0.260	8 USER DEFINED SPT	0.000

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 7  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 5:19:20 CASE 1  
 =====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====  
 SUPPORT PROPERTY TABLE INDEX ..... 2  
 SUPPORT ELEMENT TYPE ..... 2 TENSIONER  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
  
 BOTTOM ROLLER ANGLE TO HORIZONTAL . 0.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES

SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 7  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 1.600 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 8  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 5:19:20 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 8  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

STINGER DESCRIPTION

=====

NUMBER OF PIPE/STINGER NODES ..... 6  
 STINGER GEOMETRY SPECIFIED BY ..... 2 X-Y COORD AND MATCH PT  
 STINGER TYPE ..... 1 FIXED GEOMETRY OR RAMP  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.00 METERS  
 HITCH X-COORDINATE ..... 0.497 METERS  
 HITCH Y-COORDINATE ..... -1.800 METERS  
 HITCH ANGULAR ORIENTATION ..... 0.000 DEGREES

X COORDINATE OF LOCAL ORIGIN ..... 0.497 METERS  
 Y COORDINATE OF LOCAL ORIGIN ..... -1.800 METERS  
 ROTATION ABOUT STINGER HITCH ..... 13.300 DEGREES  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 TANGENT POINT ANGLE ..... 0.000 DEGREES

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	ELEMENT TYPE	ELEMENT LENGTH ( M )
-8.325	2.209	1 SIMPLE SUPPORT	2 HINGED END	0.000
-16.325	2.349	1 SIMPLE SUPPORT	1 FIXED END	0.000
-24.325	2.119	1 SIMPLE SUPPORT	1 FIXED END	0.000
-31.699	1.660	1 SIMPLE SUPPORT	1 FIXED END	0.000
-37.949	1.069	1 SIMPLE SUPPORT	1 FIXED END	0.000
-40.949	0.350	1 SIMPLE SUPPORT	1 FIXED END	0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 9  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
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=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

```

=====
SUPPORT PROPERTY TABLE INDEX ..... 1
SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT
SUPPORT INITIAL STATE FLAG ..... 0
TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M
VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M
STATIC VERTICAL DEFLECTION ..... 0.0000 CM
LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES
SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES
SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS
BED ROLLER LENGTH ..... 1.640 METERS
HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS
TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
    
```

CURRENT VELOCITIES

```

=====
WATER DEPTH (M ) CURRENT SPEED (M/S ) DIRECTION OF TRAVEL (DEG )
=====
0.000 0.790 45.000
11.500 0.480 45.000
23.000 0.420 45.000
    
```

PIPE TENSION DATA

```

=====
STATIC PIPE TENSION ON LAY VESSEL . 196.133 K-NEWTON
MINIMUM DYNAMIC PIPE TENSION ..... 196.133 K-NEWTON
MAXIMUM DYNAMIC PIPE TENSION ..... 294.199 K-NEWTON
STATIC HORIZONTAL BOTTOM TENSION .. 0.000 K-NEWTON
NO. OF VALUES FOR TENSION PROFILE . 0
VALUES ARE FOR PIPE SPAN ANALYSIS . NO
MAXIMUM PIPE PAYOUT SPEED ..... 0.000 M/SEC
MAXIMUM PIPE TAKEUP SPEED ..... 0.000 M/SEC
    
```

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 10

STATIC PIPE ANALYSIS 12 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 5:19:20 CASE 1

=====  
 INPUT DATA ECHO

SAGBEND GEOMETRY

```

=====
SAGBEND PIPE ELEMENT LENGTH ..... 2.000 METERS
WATER DEPTH ..... 23.00 METERS
X-COORDINATE AT SPECIFIED DEPTH . . 0.00 METERS
ESTIMATED SAGBEND X LENGTH ..... 0.00 METERS
ESTIMATED PIPE LENGTH ON SEABED ... 0.00 METERS
X-COORD OF PIPE FREE END ON SEABED 0.00 METERS
X-COORD POINT OF FIXITY ON SEABED . 0.00 METERS
MAXIMUM SLOPE (ANGLE) OF SEABED ... 0.000 DEGREES
DIRECTION OF MAXIMUM SLOPE ..... 0.000 DEGREES

PIPE/CABLE SPAN END CONDITION ..... 0 PIPE/CABLE RESTING ON SEABED
PIPE/CABLE SPAN LENGTH GIVEN BY ... 0 SPECIFIED PIPE/CABLE TENSION
ESTIMATED SPAN DEPTH AT FREE END .. 0.00 METERS
PIPE VERTICAL ANGLE AT FREE END ... 0.000 DEGREES
BOTTOM HINGE OFFSET ..... 0.000 METERS
BOTTOM HINGE MINIMUM ANGLE ..... 0.000 DEGREES
BOTTOM HINGE MAXIMUM ANGLE ..... 0.000 DEGREES
    
```

SOIL ELEMENT PROPERTIES

```

=====
SOIL PROPERTY TABLE ROW INDEX ..... 1
SOIL ELEMENT TYPE (FUTURE USE) .... 0
PIPE INDEX OR SEGMENT NUMBER ..... 0
LONGITUDINAL SOIL STIFFNESS ..... 0.00 KN/M^2
VERTICAL SOIL STIFFNESS ..... 0.00 KN/M^2
LATERAL SOIL STIFFNESS ..... 0.00 KN/M^2
DEFLECTION UNDER REFERENCE LOAD ... 0.0000 CM

LONGITUDINAL COEF. OF FRICTION .... 0.000
LATERAL COEFFICIENT OF FRICTION ... 0.600
NUMBER OF INTEGRATION POINTS ..... 0
    
```

TIME INTEGRATION PARAMETERS

```

=====
TIME STEP LENGTH ..... 0.2000 SECONDS
MAXIMUM TIME OF INTEGRATION ..... 10860.000 SECONDS
SOLUTION SAMPLING TIME STEP ..... 0.400 SECONDS
    
```

SOLUTION SAMPLING STARTS AT TIME .. 60.000 SECONDS  
 DAMPING RATIO ..... 0.0000  
 NUMBER OF VARIABLE TIME STEPS ..... 0

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 11  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 5:19:20 CASE 1

=====

INPUT DATA ECHO

WAVE PARAMETERS

=====

SEA STATE ROW INDEX ..... 1  
 WAVE HEIGHT (PEAK TO TROUGH) ..... 1.800 METERS  
 WAVE PERIOD ..... 6.300 SECONDS  
 WAVE DIRECTION OF TRAVEL ..... 45.000 DEGREES  
 WATER DEPTH FOR WAVE CALCULATIONS . 23.00 METERS  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0

WAVE SPECTRUM EQUATION

=====

SEA STATE ROW INDEX ..... 1  
 WAVE SPECTRUM EQUATION TYPE ..... 7 JONSWAP (CLASSIC)  
 NUMBER OF WAVES IN SPECTRUM ..... 20  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0  
 MINIMUM PERIOD IN SPECTRUM ..... 2.0933 SECONDS  
 MAXIMUM PERIOD IN SPECTRUM ..... 62.8000 SECONDS  
 START TIME FOR WAVE SPECTRUM ..... 0. SECONDS  
 DIRECTION OF WAVE TRAVEL ..... 0.000 DEGREES  
 1ST JONSWAP COEF. (ALPHA) ..... 0.005729  
 2ND JONSWAP COEF. (GAMMA) ..... 5.0000  
 PEAK WAVE PERIOD ..... 6.6150 SECONDS

VESSEL MOTION RAO TABLE

=====

SEA STATE NUMBER ..... 1  
 USE PHASE LAG FOR RAOs ..... NO  
 VESSEL MOTIONS SIGN CONVENTION .... 2 BENTLEY MOSES  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD

WAVE PERIOD (SECONDS)	----- SURGE AMPLITUDE (M/M )	----- / PHASE (DEG)	----- SWAY AMPLITUDE (M/M )	----- / PHASE (DEG)	----- HEAVE AMPLITUDE (M/M )	----- / PHASE (DEG)
2.0900	0.0030	-68.00	0.0010	-94.00	0.0000	0.00
2.1700	0.0030	85.00	0.0000	0.00	0.0000	0.00
2.2400	0.0050	-109.00	0.0010	-165.00	0.0000	0.00
2.3300	0.0040	37.00	0.0000	0.00	0.0010	-127.00
2.4200	0.0070	-124.00	0.0010	105.00	0.0010	-118.00
2.5100	0.0040	21.00	0.0000	0.00	0.0010	-155.00
2.6200	0.0110	-119.00	0.0030	62.00	0.0010	-129.00
2.7300	0.0040	58.00	0.0010	-50.00	0.0010	172.00
2.8500	0.0170	-100.00	0.0040	51.00	0.0000	0.00
2.9900	0.0100	158.00	0.0040	-50.00	0.0020	85.00
3.1400	0.0170	-68.00	0.0030	43.00	0.0020	73.00
3.3100	0.0290	-151.00	0.0080	-58.00	0.0060	79.00

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 12  
 STATIC PIPE ANALYSIS 12 INCH  
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WAVE PERIOD	----- ROLL AMPLITUDE	----- / PHASE	----- PITCH AMPLITUDE	----- / PHASE	----- YAW AMPLITUDE	----- / PHASE
3.4900	0.0070	109.00	0.0040	-145.00	0.0070	29.00
3.7000	0.0350	-96.00	0.0120	-46.00	0.0050	109.00
3.9300	0.0520	-161.00	0.0260	-115.00	0.0200	67.00
4.1900	0.0240	134.00	0.0170	-174.00	0.0200	10.00
4.4900	0.0380	-85.00	0.0210	-62.00	0.0060	137.00
4.8300	0.0940	-139.00	0.0640	-111.00	0.0490	80.00
5.2400	0.1090	173.00	0.0820	-157.00	0.0910	29.00
5.7100	0.0640	128.00	0.0520	164.00	0.0880	-14.00
6.2800	0.0330	-77.00	0.0270	-84.00	0.0380	176.00
6.9800	0.1580	-119.00	0.1100	-133.00	0.2670	130.00
7.8500	0.2920	-151.00	0.2730	-155.00	0.5070	107.00
8.9700	0.4130	-179.00	0.4050	179.00	0.6980	84.00
10.4700	0.5100	156.00	0.5120	156.00	0.8340	63.00
12.5600	0.5790	136.00	0.5940	136.00	0.9220	44.00
15.7000	0.6230	119.00	0.6490	119.00	0.9710	29.00
20.9300	0.6480	106.00	0.6810	106.00	0.9940	16.00
31.4000	0.6610	97.00	0.6980	97.00	1.0020	7.00
62.8000	0.6660	92.00	0.7060	92.00	1.0030	2.00

=====

(SECONDS)	(DEG/M)	(DEG)	(DEG/M)	(DEG)	(DEG/M)	(DEG)
2.0900	0.0030	-51.00	0.0000	0.00	0.0020	-24.00
2.1700	0.0040	-37.00	0.0000	0.00	0.0030	44.00
2.2400	0.0060	-49.00	0.0010	-102.00	0.0010	-102.00
2.3300	0.0050	-67.00	0.0030	-119.00	0.0040	-36.00
2.4200	0.0010	-99.00	0.0030	-143.00	0.0010	163.00
2.5100	0.0040	-163.00	0.0040	-132.00	0.0080	-103.00
2.6200	0.0040	84.00	0.0030	179.00	0.0040	120.00
2.7300	0.0130	135.00	0.0030	-145.00	0.0150	-124.00
2.8500	0.0170	130.00	0.0050	115.00	0.0100	133.00
2.9900	0.0290	122.00	0.0040	100.00	0.0150	-132.00
3.1400	0.0180	93.00	0.0150	78.00	0.0230	124.00
3.3100	0.0310	139.00	0.0160	36.00	0.0010	-66.00
3.4900	0.0400	78.00	0.0270	89.00	0.0430	121.00
3.7000	0.0120	-33.00	0.0590	47.00	0.0580	43.00
3.9300	0.0280	122.00	0.0330	7.00	0.0050	118.00
4.1900	0.0580	25.00	0.0680	92.00	0.1220	88.00
4.4900	0.0500	-34.00	0.1650	46.00	0.1970	31.00
4.8300	0.0850	46.00	0.1750	-1.00	0.1360	-21.00
5.2400	0.3220	10.00	0.0410	18.00	0.0710	102.00
5.7100	0.5310	-28.00	0.4080	73.00	0.3550	59.00
6.2800	0.1800	-54.00	1.0540	47.00	0.6240	17.00
6.9800	2.2730	-173.00	1.6290	27.00	0.8190	-21.00

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 13  
 STATIC PIPE ANALYSIS 12 INCH  
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INPUT DATA ECHO

7.8500	2.0730	-167.00	1.8190	8.00	0.8960	-55.00
8.9700	1.7360	173.00	1.6720	-11.00	0.8690	-85.00
10.4700	1.3750	152.00	1.3580	-30.00	0.7570	-111.00
12.5600	1.0030	133.00	0.9960	-48.00	0.5920	-133.00
15.7000	0.6580	117.00	0.6550	-63.00	0.4100	-150.00
20.9300	0.3730	105.00	0.3730	-76.00	0.2420	-163.00
31.4000	0.1660	97.00	0.1670	-87.00	0.1100	-173.00
62.8000	0.0410	92.00	0.0430	-105.00	0.0280	178.00

\*\*\*\*\* INFORMATIVE MESSAGE NO. - 94 \*\*\*\*\*

One or more of the phase angles in the RAO table have been adjusted to |  
 minimize the difference in value between adjacent angles. If the phase |  
 angles are arbitrarily restricted by the software used to calculate |  
 the RAOs to a fixed range of values such as (0 to 2\*PI) or (-PI to |  
 +PI), then phase angles that are actually close in value can differ by |  
 as much as 2\*PI. These large differences can cause the phase angles |  
 for RAOs that are between the values in the table (which must be |  
 determined using interpolation) to be calculated incorrectly.

CONTROL SWITCHES

MAX NUMBER STATIC ITERATIONS ..... 500  
 MAX DYNAMIC ITERATIONS PER STEP ... 500  
 BOUNDARY CONDITION LOGIC PARAMETER 5  
 TIME STEP STABILITY PARAMETER ..... 0  
 TYPE OF ANALYSIS ..... DYNAMIC  
 NUMBER OF PROBLEM DIMENSIONS ..... 3  
 DAVIT LIFT ANALYSIS ..... NO

STATIC SOLUTION CONVERGED IN ( 50 ) ITERATIONS

END OF INPUT DATA

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 5:19:20 PAGE 14  
 PROJECT - STATIC PIPE ANALYSIS 12 INCH JOB NO. - LAYING  
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES (MPA)		TOTAL STRESS (MPA)	PERCENT YIELD (PCT)
1	LAYBARGE	64.20	4.42	0.00	0.000	1.488	0.00	0.00	0.00	0.20	0.00	0.20	0.06
3	LAYBARGE	59.72	4.30	0.00	0.000	1.536	4.48	-0.02	0.00	-16.18	0.00	16.21	4.50
5	LAYBARGE	48.23	4.00	0.00	0.000	1.486	15.98	-0.08	0.00	-23.78	0.00	23.86	6.63
7	TENSIONR	38.10	3.73	0.00	0.000	1.461	26.11	7.77	0.00	-6.80	0.00	14.57	4.05
9	LAYBARGE	33.43	3.61	0.00	0.000	1.534	30.78	7.74	0.00	-12.53	0.00	20.28	5.63
11	TENSIONR	26.65	3.43	0.00	0.000	1.405	37.57	15.61	0.00	20.46	0.00	36.07	10.02
13	LAYBARGE	21.33	3.31	0.00	0.000	1.354	42.89	15.58	0.00	-20.69	0.00	36.27	10.08
15	LAYBARGE	12.14	2.98	0.00	0.000	3.376	52.08	15.43	0.00	-269.41	-0.01	284.84	79.12



17	LAYBARGE	-0.04	1.76	0.00	0.000	8.039	64.32	15.21	0.00	-249.48	0.02	264.69	73.52
20	STINGER	-8.10	0.38	0.00	0.000	11.318	72.50	14.95	0.00	-244.64	-0.06	259.60	72.11
22	STINGER	-15.90	-1.37	0.00	0.000	13.587	80.51	14.81	-0.18	-97.92	-0.24	112.82	31.34
24	STINGER	-23.67	-3.31	0.00	0.001	14.356	88.51	14.63	-0.42	-22.20	-0.02	37.05	10.29
26	STINGER	-30.83	-5.15	0.00	-0.002	14.369	95.90	14.46	-0.66	16.37	-0.64	31.17	8.66
28	STINGER	-36.91	-6.70	0.00	0.009	14.081	102.18	14.31	-0.86	35.73	1.55	50.50	14.03
30	STINGER	-39.82	-7.42	0.00	-0.018	13.881	105.17	14.23	-0.95	42.17	-11.81	58.51	16.25
32	SAGBEND	-41.85	-7.92	0.00	-0.062	13.724	107.27	14.19	-1.02	45.87	-10.60	61.78	17.16
33	SAGBEND	-43.79	-8.39	0.00	-0.096	13.562	109.27	14.14	-1.08	48.91	-8.50	64.33	17.87
34	SAGBEND	-45.74	-8.86	0.01	-0.122	13.390	111.27	14.10	-1.14	51.52	-6.72	66.63	18.51
35	SAGBEND	-47.69	-9.32	0.01	-0.143	13.210	113.27	14.05	-1.19	53.77	-5.21	68.68	19.08
36	SAGBEND	-49.63	-9.77	0.02	-0.159	13.022	115.27	14.01	-1.25	55.71	-3.93	70.49	19.58
37	SAGBEND	-51.58	-10.22	0.02	-0.171	12.829	117.27	13.96	-1.31	57.38	-2.85	72.08	20.02
38	SAGBEND	-53.53	-10.66	0.03	-0.179	12.630	119.27	13.92	-1.37	58.83	-1.93	73.47	20.41
39	SAGBEND	-55.49	-11.09	0.04	-0.185	12.427	121.27	13.88	-1.42	60.08	-1.15	74.69	20.75
40	SAGBEND	-57.44	-11.52	0.04	-0.188	12.219	123.27	13.84	-1.48	61.16	-0.49	75.75	21.04
41	SAGBEND	-59.40	-11.94	0.05	-0.188	12.009	125.27	13.80	-1.53	62.11	0.07	76.68	21.30
42	SAGBEND	-61.35	-12.35	0.05	-0.187	11.795	127.27	13.76	-1.58	62.93	0.55	77.49	21.53
43	SAGBEND	-63.31	-12.76	0.06	-0.184	11.578	129.27	13.72	-1.64	63.64	0.95	78.20	21.72
44	SAGBEND	-65.27	-13.15	0.07	-0.181	11.360	131.27	13.68	-1.69	64.26	1.29	78.81	21.89
45	SAGBEND	-67.23	-13.54	0.07	-0.176	11.139	133.27	13.64	-1.74	64.81	1.59	79.35	22.04
46	SAGBEND	-69.20	-13.93	0.08	-0.170	10.916	135.27	13.61	-1.79	65.29	1.83	79.83	22.17
47	SAGBEND	-71.16	-14.30	0.08	-0.163	10.692	137.27	13.57	-1.83	65.71	2.04	80.24	22.29
48	SAGBEND	-73.13	-14.67	0.09	-0.155	10.467	139.27	13.53	-1.88	66.08	2.21	80.60	22.39
49	SAGBEND	-75.09	-15.03	0.10	-0.147	10.240	141.27	13.50	-1.93	66.40	2.36	80.92	22.48
50	SAGBEND	-77.06	-15.38	0.10	-0.139	10.013	143.27	13.46	-1.97	66.69	2.48	81.20	22.56
51	SAGBEND	-79.03	-15.72	0.10	-0.130	9.784	145.27	13.43	-2.02	66.94	2.58	81.45	22.63
52	SAGBEND	-81.00	-16.06	0.11	-0.121	9.555	147.27	13.40	-2.06	67.17	2.66	81.67	22.69
53	SAGBEND	-82.98	-16.39	0.11	-0.112	9.325	149.27	13.37	-2.10	67.37	2.73	81.86	22.74
54	SAGBEND	-84.95	-16.71	0.12	-0.102	9.094	151.27	13.34	-2.14	67.55	2.78	82.03	22.79
55	SAGBEND	-86.93	-17.02	0.12	-0.093	8.863	153.27	13.31	-2.18	67.70	2.83	82.18	22.83
56	SAGBEND	-88.90	-17.32	0.12	-0.083	8.631	155.27	13.28	-2.22	67.84	2.86	82.31	22.86
57	SAGBEND	-90.88	-17.62	0.13	-0.073	8.399	157.27	13.25	-2.26	67.97	2.88	82.43	22.90
58	SAGBEND	-92.86	-17.91	0.13	-0.063	8.166	159.27	13.22	-2.30	68.07	2.90	82.53	22.92
59	SAGBEND	-94.84	-18.19	0.13	-0.053	7.933	161.27	13.19	-2.33	68.17	2.91	82.61	22.95

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/2/2020      TIME - 5:19:20      PAGE 15

PROJECT - STATIC PIPE ANALYSIS 12 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERC YIELD (PCT)
=====													
60	SAGBEND	-96.82	-18.46	0.13	-0.043	7.700	163.27	13.17	-2.37	68.25	2.92	82.68	22.97
61	SAGBEND	-98.81	-18.72	0.13	-0.033	7.467	165.27	13.14	-2.40	68.31	2.92	82.74	22.98
62	SAGBEND	-100.79	-18.98	0.13	-0.023	7.233	167.27	13.12	-2.43	68.37	2.91	82.79	23.00
63	SAGBEND	-102.77	-19.23	0.13	-0.012	6.999	169.27	13.09	-2.47	68.41	2.91	82.82	23.01
64	SAGBEND	-104.76	-19.47	0.14	-0.002	6.765	171.27	13.07	-2.50	68.43	2.89	82.84	23.01
65	SAGBEND	-106.75	-19.70	0.14	0.007	6.531	173.27	13.05	-2.53	68.45	2.88	82.85	23.01
66	SAGBEND	-108.73	-19.92	0.13	0.017	6.297	175.27	13.03	-2.55	68.45	2.86	82.84	23.01
67	SAGBEND	-110.72	-20.14	0.13	0.027	6.063	177.27	13.01	-2.58	68.43	2.84	82.81	23.00
68	SAGBEND	-112.71	-20.34	0.13	0.037	5.829	179.27	12.99	-2.61	68.39	2.81	82.77	22.99
69	SAGBEND	-114.70	-20.54	0.13	0.046	5.595	181.27	12.97	-2.63	68.34	2.78	82.71	22.98
70	SAGBEND	-116.69	-20.73	0.13	0.056	5.362	183.27	12.95	-2.66	68.26	2.74	82.63	22.95
71	SAGBEND	-118.68	-20.92	0.13	0.065	5.128	185.27	12.93	-2.68	68.16	2.70	82.52	22.92
72	SAGBEND	-120.68	-21.09	0.12	0.075	4.896	187.27	12.91	-2.70	68.04	2.66	82.39	22.89
73	SAGBEND	-122.67	-21.26	0.12	0.084	4.663	189.27	12.90	-2.73	67.88	2.61	82.22	22.84
74	SAGBEND	-124.66	-21.42	0.12	0.092	4.431	191.27	12.88	-2.75	67.68	2.55	82.02	22.78
75	SAGBEND	-126.66	-21.57	0.12	0.101	4.200	193.27	12.87	-2.77	67.45	2.48	81.78	22.72
76	SAGBEND	-128.65	-21.71	0.11	0.109	3.970	195.27	12.85	-2.78	67.17	2.41	81.50	22.64
77	SAGBEND	-130.65	-21.85	0.11	0.118	3.741	197.27	12.84	-2.80	66.84	2.32	81.15	22.54
78	SAGBEND	-132.64	-21.97	0.10	0.125	3.513	199.27	12.83	-2.82	66.44	2.22	80.75	22.43
79	SAGBEND	-134.64	-22.09	0.10	0.133	3.287	201.27	12.82	-2.83	65.97	2.10	80.28	22.30
80	SAGBEND	-136.64	-22.20	0.09	0.140	3.062	203.27	12.81	-2.85	65.42	1.97	79.72	22.14
81	SAGBEND	-138.63	-22.30	0.09	0.146	2.839	205.27	12.80	-2.86	64.78	1.82	79.07	21.96
82	SAGBEND	-140.63	-22.40	0.08	0.152	2.619	207.27	12.79	-2.87	64.02	1.64	78.31	21.75
83	SAGBEND	-142.63	-22.49	0.08	0.157	2.401	209.27	12.78	-2.88	63.14	1.44	77.42	21.50
84	SAGBEND	-144.63	-22.57	0.07	0.162	2.187	211.27	12.77	-2.89	62.11	1.21	76.38	21.22
85	SAGBEND	-146.63	-22.64	0.07	0.166	1.977	213.27	12.77	-2.90	60.90	0.94	75.17	20.88
86	SAGBEND	-148.63	-22.70	0.06	0.168	1.771	215.27	12.76	-2.91	59.50	0.63	73.76	20.49
87	SAGBEND	-150.62	-22.76	0.06	0.170	1.570	217.27	12.75	-2.92	57.86	0.26	72.12	20.03
88	SAGBEND	-152.62	-22.81	0.05	0.170	1.376	219.27	12.75	-2.92	55.95	-0.16	70.21	19.50
89	SAGBEND	-154.62	-22.86	0.04	0.169	1.188	221.27	12.75	-2.93	53.73	-0.65	68.00	18.89
90	SAGBEND	-156.62	-22.90	0.04	0.166	1.008	223.27	12.74	-2.94	51.15	-1.21	65.42	18.17
91	SAGBEND	-158.62	-22.93	0.03	0.160	0.839	225.27	12.74	-2.94	48.15	-1.84	62.44	17.35
92	SAGBEND	-160.62	-22.96	0.03	0.153	0.680	227.27	12.74	-2.94	44.65	-2.51	58.99	16.38
93	SAGBEND	-162.62	-22.98	0.02	0.143	0.534	229.27	12.74	-2.95	40.59	-3.23	54.98	15.27
94	SAGBEND	-164.62	-22.99	0.02	0.131	0.403	231.27	12.73	-2.95	35.86	-4.03	50.36	13.99
95	SEABED	-166.62	-23.01	0.01	0.115	0.289	233.27	12.73	-2.95	30.39	-4.91	45.06	12.52
96	SEABED	-168.62	-23.01	0.01	0.097	0.196	235.27	12.73	-2.95	24.52	-5.56	39.44	10.95
97	SEABED	-170.62	-23.02	0.01	0.078	0.121	237.27	12.73	-2.95	18.89	-5.57	34.00	9.44
98	SEABED	-172.62	-23.02	0.00	0.060	0.066	239.27	12.73	-2.95	13.85	-5.11	29.09	8.08

99	SEABED	-174.62	-23.02	0.00	0.044	0.026	241.27	12.73	-2.95	9.60	-4.40	24.90	6.92
100	SEABED	-176.62	-23.02	0.00	0.030	-0.001	243.27	12.73	-2.95	6.19	-3.59	21.52	5.98
101	SEABED	-178.62	-23.02	0.00	0.019	-0.017	245.27	12.73	-2.95	3.57	-2.80	18.92	5.25
102	SEABED	-180.62	-23.02	0.00	0.011	-0.026	247.27	12.73	-2.95	1.66	-2.07	17.05	4.74
103	SEABED	-182.62	-23.02	0.00	0.005	-0.029	249.27	12.73	-2.95	0.34	-1.45	15.91	4.42

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX    DATE - 5/ 2/2020    TIME - 5:19:20    PAGE 16

PROJECT - STATIC PIPE ANALYSIS 12 INCH    JOB NO. - LAYING

USER ID - IK    LICENSED BY - PT Timas Suplindo    CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M )	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ STRESS (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
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104	SEABED	-184.62	-23.02	0.00	0.001	-0.029	251.27	12.73	-2.95	-0.50	-0.95	15.50	4.30
105	SEABED	-186.62	-23.02	0.00	-0.002	-0.026	253.27	12.73	-2.95	-0.98	-0.56	15.55	4.32
106	SEABED	-188.62	-23.02	0.00	-0.003	-0.023	255.27	12.73	-2.95	-1.20	-0.28	15.65	4.35
107	SEABED	-190.62	-23.02	0.00	-0.004	-0.018	257.27	12.73	-2.95	-1.23	-0.08	15.66	4.35
108	SEABED	-192.62	-23.02	0.00	-0.004	-0.014	259.27	12.73	-2.95	-1.15	0.05	15.58	4.33
109	SEABED	-194.62	-23.02	0.00	-0.004	-0.011	261.27	12.73	-2.95	-1.01	0.13	15.44	4.29
110	SEABED	-196.62	-23.02	0.00	-0.003	-0.007	263.27	12.73	-2.95	-0.84	0.16	15.28	4.24
111	SEABED	-198.62	-23.02	0.00	-0.003	-0.005	265.27	12.73	-2.95	-0.66	0.17	15.11	4.20
112	SEABED	-200.62	-23.02	0.00	-0.002	-0.003	267.27	12.73	-2.95	-0.50	0.16	14.95	4.15
113	SEABED	-202.62	-23.02	0.00	-0.002	-0.001	269.27	12.73	-2.95	-0.36	0.14	14.82	4.12
114	SEABED	-204.62	-23.02	0.00	-0.001	0.000	271.27	12.73	-2.95	-0.24	0.12	14.70	4.08
115	SEABED	-206.62	-23.02	0.00	-0.001	0.000	273.27	12.73	-2.95	-0.15	0.09	14.61	4.06
116	SEABED	-208.62	-23.02	0.00	0.000	0.001	275.27	12.73	-2.95	-0.08	0.07	14.54	4.04
117	SEABED	-210.62	-23.02	0.00	0.000	0.001	277.27	12.73	-2.95	-0.03	0.05	14.50	4.03
118	SEABED	-212.62	-23.02	0.00	0.000	0.001	279.27	12.73	-2.95	0.00	0.03	14.47	4.02
119	SEABED	-214.62	-23.02	0.00	0.000	0.001	281.27	12.73	-2.95	0.02	0.02	14.46	4.02
120	SEABED	-216.62	-23.02	0.00	0.000	0.001	283.27	12.73	-2.95	0.03	0.01	14.47	4.02
121	SEABED	-218.62	-23.02	0.00	0.000	0.001	285.27	12.73	-2.95	0.03	0.01	14.46	4.02
122	SEABED	-220.62	-23.02	0.00	0.000	0.001	287.27	12.73	-2.95	0.02	0.00	14.46	4.02
123	SEABED	-222.62	-23.02	0.00	0.000	0.001	289.27	12.73	-2.95	0.02	0.00	14.45	4.02
124	SEABED	-224.62	-23.02	0.00	0.000	0.000	291.27	12.73	-2.95	0.01	0.00	14.45	4.01
125	SEABED	-226.62	-23.02	0.00	0.000	0.000	293.27	12.73	-2.95	0.00	0.00	14.44	4.01
126	SEABED	-228.62	-23.02	0.00	0.000	0.000	295.27	12.73	-2.95	0.00	0.00	14.44	4.01

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX    DATE - 5/ 2/2020    TIME - 5:19:20    PAGE 17

PROJECT - STATIC PIPE ANALYSIS 12 INCH    JOB NO. - LAYING

USER ID - IK    LICENSED BY - PT Timas Suplindo    CASE 1

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=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION VERT (KN )	HORIZ (KN )	SUPT VERT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	BENDING MOMENTS VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
=====													
1	LAYBARGE	64.20	4.42	0.00	0.92	0.00	0.00	0.00	0.00	0.19	0.00	0.19	
3	LAYBARGE	59.72	4.30	0.00	22.65	0.00	0.00	0.00	-0.28	-15.05	0.00	15.05	
5	LAYBARGE	48.23	4.00	0.00	28.14	0.00	0.00	0.00	-1.00	-22.10	0.00	22.10	
7	TENSIONR	38.10	3.73	0.00	14.65	0.00	0.00	0.00	96.44	-6.32	0.00	6.32	
9	LAYBARGE	33.43	3.61	0.00	19.87	0.00	0.00	0.00	96.15	-11.65	0.00	11.65	
11	TENSIONR	26.65	3.43	0.00	1.85	0.00	0.00	0.00	193.79	19.02	0.00	19.02	
13	LAYBARGE	21.33	3.31	0.00	0.00	0.00	0.01	0.00	193.49	-19.23	0.00	19.23	
15	LAYBARGE	12.14	2.98	0.00	66.28	0.00	0.00	0.00	191.61	-250.46	0.00	250.46	
17	LAYBARGE	-0.04	1.76	0.00	35.86	0.02	0.00	0.00	188.89	-231.93	0.02	231.93	
20	STINGER	-8.10	0.38	0.00	39.70	-0.15	0.00	0.00	185.66	-227.44	-0.06	227.44	
22	STINGER	-15.90	-1.37	0.00	0.00	-0.40	0.02	0.00	185.01	-91.03	-0.22	91.04	
24	STINGER	-23.67	-3.31	0.00	0.00	-0.20	0.22	0.00	184.42	-20.64	-0.02	20.64	
26	STINGER	-30.83	-5.15	0.00	0.00	-0.88	0.60	0.00	183.75	15.22	-0.60	15.23	
28	STINGER	-36.91	-6.70	0.00	0.00	5.33	1.16	0.00	183.16	33.22	1.44	33.25	
30	STINGER	-39.82	-7.42	0.00	0.00	-6.31	1.93	0.00	182.89	39.20	-10.98	40.71	
32	SAGBEND	-41.85	-7.92	0.00	0.00	0.00	0.00	0.00	182.70	42.65	-9.86	43.77	
33	SAGBEND	-43.79	-8.39	0.00	0.00	0.00	0.00	0.00	182.52	45.47	-7.90	46.15	
34	SAGBEND	-45.74	-8.86	0.01	0.00	0.00	0.00	0.00	182.35	47.90	-6.25	48.30	
35	SAGBEND	-47.69	-9.32	0.01	0.00	0.00	0.00	0.00	182.18	49.99	-4.84	50.22	
36	SAGBEND	-49.63	-9.77	0.02	0.00	0.00	0.00	0.00	182.01	51.79	-3.65	51.92	
37	SAGBEND	-51.58	-10.22	0.02	0.00	0.00	0.00	0.00	181.84	53.35	-2.65	53.41	
38	SAGBEND	-53.53	-10.66	0.03	0.00	0.00	0.00	0.00	181.68	54.69	-1.79	54.72	
39	SAGBEND	-55.49	-11.09	0.04	0.00	0.00	0.00	0.00	181.51	55.85	-1.07	55.86	
40	SAGBEND	-57.44	-11.52	0.04	0.00	0.00	0.00	0.00	181.35	56.86	-0.46	56.86	
41	SAGBEND	-59.40	-11.94	0.05	0.00	0.00	0.00	0.00	181.20	57.74	0.06	57.74	
42	SAGBEND	-61.35	-12.35	0.05	0.00	0.00	0.00	0.00	181.05	58.50	0.51	58.50	
43	SAGBEND	-63.31	-12.76	0.06	0.00	0.00	0.00	0.00	180.89	59.16	0.88	59.17	
44	SAGBEND	-65.27	-13.15	0.07	0.00	0.00	0.00	0.00	180.75	59.74	1.20	59.76	
45	SAGBEND	-67.23	-13.54	0.07	0.00	0.00	0.00	0.00	180.60	60.25	1.47	60.27	
46	SAGBEND	-69.20	-13.93	0.08	0.00	0.00	0.00	0.00	180.46	60.70	1.70	60.72	
47	SAGBEND	-71.16	-14.30	0.08	0.00	0.00	0.00	0.00	180.32	61.09	1.89	61.12	
48	SAGBEND	-73.13	-14.67	0.09	0.00	0.00	0.00	0.00	180.19	61.43	2.06	61.46	
49	SAGBEND	-75.09	-15.03	0.10	0.00	0.00	0.00	0.00	180.05	61.73	2.19	61.77	

50	SAGBEND	-77.06	-15.38	0.10	0.00	0.00	0.00	0.00	0.00	179.92	62.00	2.30	62.04
51	SAGBEND	-79.03	-15.72	0.10	0.00	0.00	0.00	0.00	0.00	179.80	62.24	2.40	62.28
52	SAGBEND	-81.00	-16.06	0.11	0.00	0.00	0.00	0.00	0.00	179.67	62.45	2.47	62.49
53	SAGBEND	-82.98	-16.39	0.11	0.00	0.00	0.00	0.00	0.00	179.55	62.63	2.54	62.68
54	SAGBEND	-84.95	-16.71	0.12	0.00	0.00	0.00	0.00	0.00	179.43	62.80	2.59	62.85
55	SAGBEND	-86.93	-17.02	0.12	0.00	0.00	0.00	0.00	0.00	179.32	62.94	2.63	63.00
56	SAGBEND	-88.90	-17.32	0.12	0.00	0.00	0.00	0.00	0.00	179.20	63.07	2.66	63.13
57	SAGBEND	-90.88	-17.62	0.13	0.00	0.00	0.00	0.00	0.00	179.10	63.19	2.68	63.24
58	SAGBEND	-92.86	-17.91	0.13	0.00	0.00	0.00	0.00	0.00	178.99	63.29	2.70	63.34
59	SAGBEND	-94.84	-18.19	0.13	0.00	0.00	0.00	0.00	0.00	178.89	63.37	2.71	63.43

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 5:19:20      PAGE 18

PROJECT - STATIC PIPE ANALYSIS 12 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS		TOTAL (KN-M)
					VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	VERT (KN )	VERT (KN-M)	HORIZ (KN-M)		
60	SAGBEND	-96.82	-18.46	0.13	0.00	0.00	0.00	0.00	178.79	63.45	2.71	63.50	
61	SAGBEND	-98.81	-18.72	0.13	0.00	0.00	0.00	0.00	178.69	63.51	2.71	63.57	
62	SAGBEND	-100.79	-18.98	0.13	0.00	0.00	0.00	0.00	178.59	63.56	2.71	63.61	
63	SAGBEND	-102.77	-19.23	0.13	0.00	0.00	0.00	0.00	178.50	63.59	2.70	63.65	
64	SAGBEND	-104.76	-19.47	0.14	0.00	0.00	0.00	0.00	178.41	63.62	2.69	63.68	
65	SAGBEND	-106.75	-19.70	0.14	0.00	0.00	0.00	0.00	178.33	63.63	2.68	63.69	
66	SAGBEND	-108.73	-19.92	0.13	0.00	0.00	0.00	0.00	178.25	63.63	2.66	63.69	
67	SAGBEND	-110.72	-20.14	0.13	0.00	0.00	0.00	0.00	178.17	63.61	2.64	63.67	
68	SAGBEND	-112.71	-20.34	0.13	0.00	0.00	0.00	0.00	178.09	63.58	2.61	63.64	
69	SAGBEND	-114.70	-20.54	0.13	0.00	0.00	0.00	0.00	178.02	63.53	2.58	63.58	
70	SAGBEND	-116.69	-20.73	0.13	0.00	0.00	0.00	0.00	177.95	63.46	2.55	63.51	
71	SAGBEND	-118.68	-20.92	0.13	0.00	0.00	0.00	0.00	177.88	63.37	2.51	63.42	
72	SAGBEND	-120.68	-21.09	0.12	0.00	0.00	0.00	0.00	177.82	63.25	2.47	63.30	
73	SAGBEND	-122.67	-21.26	0.12	0.00	0.00	0.00	0.00	177.76	63.10	2.42	63.15	
74	SAGBEND	-124.66	-21.42	0.12	0.00	0.00	0.00	0.00	177.70	62.92	2.37	62.97	
75	SAGBEND	-126.66	-21.57	0.12	0.00	0.00	0.00	0.00	177.64	62.71	2.31	62.75	
76	SAGBEND	-128.65	-21.71	0.11	0.00	0.00	0.00	0.00	177.59	62.45	2.24	62.49	
77	SAGBEND	-130.65	-21.85	0.11	0.00	0.00	0.00	0.00	177.54	62.14	2.15	62.17	
78	SAGBEND	-132.64	-21.97	0.10	0.00	0.00	0.00	0.00	177.50	61.77	2.06	61.80	
79	SAGBEND	-134.64	-22.09	0.10	0.00	0.00	0.00	0.00	177.45	61.33	1.96	61.36	
80	SAGBEND	-136.64	-22.20	0.09	0.00	0.00	0.00	0.00	177.41	60.82	1.83	60.85	
81	SAGBEND	-138.63	-22.30	0.09	0.00	0.00	0.00	0.00	177.38	60.22	1.69	60.25	
82	SAGBEND	-140.63	-22.40	0.08	0.00	0.00	0.00	0.00	177.34	59.52	1.53	59.54	
83	SAGBEND	-142.63	-22.49	0.08	0.00	0.00	0.00	0.00	177.31	58.70	1.34	58.71	
84	SAGBEND	-144.63	-22.57	0.07	0.00	0.00	0.00	0.00	177.28	57.74	1.12	57.75	
85	SAGBEND	-146.63	-22.64	0.07	0.00	0.00	0.00	0.00	177.26	56.62	0.87	56.62	
86	SAGBEND	-148.63	-22.70	0.06	0.00	0.00	0.00	0.00	177.24	55.31	0.58	55.31	
87	SAGBEND	-150.62	-22.76	0.06	0.00	0.00	0.00	0.00	177.22	53.79	0.24	53.79	
88	SAGBEND	-152.62	-22.81	0.05	0.00	0.00	0.00	0.00	177.20	52.02	-0.15	52.02	
89	SAGBEND	-154.62	-22.86	0.04	0.00	0.00	0.00	0.00	177.19	49.95	-0.60	49.96	
90	SAGBEND	-156.62	-22.90	0.04	0.00	0.00	0.00	0.00	177.18	47.55	-1.13	47.57	
91	SAGBEND	-158.62	-22.93	0.03	0.00	0.00	0.00	0.00	177.17	44.76	-1.71	44.79	
92	SAGBEND	-160.62	-22.96	0.03	0.00	0.00	0.00	0.00	177.17	41.51	-2.33	41.58	
93	SAGBEND	-162.62	-22.98	0.02	0.00	0.00	0.00	0.00	177.16	37.73	-3.01	37.85	
94	SAGBEND	-164.62	-22.99	0.02	0.01	0.00	0.00	0.00	177.16	33.34	-3.75	33.55	
95	SEABED	-166.62	-23.01	0.01	0.23	-0.16	0.00	0.00	177.16	28.25	-4.56	28.62	
96	SEABED	-168.62	-23.01	0.01	0.58	-0.36	0.00	0.00	177.17	22.80	-5.16	23.38	
97	SEABED	-170.62	-23.02	0.01	0.82	-0.28	0.00	0.00	177.17	17.56	-5.18	18.30	
98	SEABED	-172.62	-23.02	0.00	0.96	-0.17	0.00	0.00	177.17	12.88	-4.75	13.73	
99	SEABED	-174.62	-23.02	0.00	1.02	-0.09	0.00	0.00	177.17	8.93	-4.09	9.82	
100	SEABED	-176.62	-23.02	0.00	1.04	-0.03	0.00	0.00	177.17	5.75	-3.34	6.65	
101	SEABED	-178.62	-23.02	0.00	1.03	0.00	0.00	0.00	177.17	3.32	-2.60	4.21	
102	SEABED	-180.62	-23.02	0.00	0.99	0.03	0.00	0.00	177.17	1.54	-1.93	2.47	
103	SEABED	-182.62	-23.02	0.00	0.95	0.04	0.00	0.00	177.17	0.32	-1.35	1.39	

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 5:19:20      PAGE 19

PROJECT - STATIC PIPE ANALYSIS 12 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS		TOTAL (KN-M)
					VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	VERT (KN )	VERT (KN-M)	HORIZ (KN-M)		
104	SEABED	-184.62	-23.02	0.00	0.91	0.04	0.00	0.00	177.17	-0.47	-0.88	1.00	
105	SEABED	-186.62	-23.02	0.00	0.87	0.04	0.00	0.00	177.17	-0.91	-0.52	1.05	
106	SEABED	-188.62	-23.02	0.00	0.83	0.04	0.00	0.00	177.17	-1.11	-0.26	1.14	
107	SEABED	-190.62	-23.02	0.00	0.80	0.03	0.00	0.00	177.17	-1.15	-0.07	1.15	
108	SEABED	-192.62	-23.02	0.00	0.78	0.03	0.00	0.00	177.17	-1.07	0.05	1.07	
109	SEABED	-194.62	-23.02	0.00	0.76	0.02	0.00	0.00	177.17	-0.94	0.12	0.95	
110	SEABED	-196.62	-23.02	0.00	0.75	0.01	0.00	0.00	177.17	-0.78	0.15	0.79	
111	SEABED	-198.62	-23.02	0.00	0.74	0.01	0.00	0.00	177.17	-0.62	0.16	0.64	

112	SEABED	-200.62	-23.02	0.00	0.73	0.01	0.00	0.00	177.17	-0.47	0.15	0.49
113	SEABED	-202.62	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.33	0.13	0.36
114	SEABED	-204.62	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.23	0.11	0.25
115	SEABED	-206.62	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.14	0.09	0.16
116	SEABED	-208.62	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.08	0.07	0.10
117	SEABED	-210.62	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.03	0.05	0.06
118	SEABED	-212.62	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.00	0.03	0.03
119	SEABED	-214.62	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.02	0.02	0.03
120	SEABED	-216.62	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.02	0.01	0.03
121	SEABED	-218.62	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.03	0.01	0.03
122	SEABED	-220.62	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.02	0.00	0.02
123	SEABED	-222.62	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	0.02	0.00	0.02
124	SEABED	-224.62	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	0.01	0.00	0.01
125	SEABED	-226.62	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	0.00	0.00	0.00
126	SEABED	-228.62	-23.02	0.00	0.00	0.00	0.00	0.00	177.17	0.00	0.00	0.00

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 20

STATIC PIPE ANALYSIS 12 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/2/2020 TIME - 5:19:20 CASE 1

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STATIC SOLUTION SUMMARY

PIPE PROPERTIES ( 1)

PIPE SECTION LENGTH ..	0.00 M	ELASTIC MODULUS .....	207000. MPA
OUTSIDE DIAMETER .....	32.390 CM	CROSS SECTIONAL AREA ..	124.10 CM^2
WALL THICKNESS .....	1.270 CM	MOMENT OF INERTIA .....	15048.2 CM^4
WEIGHT/LENGTH IN AIR ..	2374.00 N/M	YIELD STRESS .....	360.00 MPA
SUBMERGED WGT/LENG ..	368.27 N/M	STRESS INTENS FACTOR ..	1.000
SPECIFIC GRAVITY .....	1.184	STEEL DENSITY .....	77008.0 N/M3
WRAP COAT THICKNESS ..	0.320 CM	WRAP COAT DENSITY .....	9025.2 N/M3
CONCRETE THICKNESS ...	4.000 CM	CONCRETE DENSITY .....	29858.0 N/M3

BARGE DATA

TOTAL PIPE TENSION ...	196.13 KN	RADIUS OF CURVATURE ..	0.00 M
NUMBER OF TENSIONERS ..	2	BARGE TRIM ANGLE .....	0.500 DEG
NO. OF PIPE SUPPORTS ..	7	PIPE ANGLE AT STERN ..	8.039 DEG
BARGE HEADING .....	0.000 DEG	OFFSET FROM R.O.W. ...	0.00 M

STINGER DATA

NO. OF PIPE SUPPORTS ..	6	PIPE DEPTH AT STERN ..	-7.42 M
NO. STINGER SECTIONS ..	6	PIPE ANGLE AT STERN ..	13.881 DEG
RADIUS OF CURVATURE ...	0.00 M	STINGER STERN DEPTH ..	-9.21 M
STINGER LENGTH .....	41.37 M		

SAGBEND DATA

WATER DEPTH .....	23.00 M	TENSION AT TOUCHDOWN ..	177.16 KN
TOUCHDOWN X-COORD. ...	-165.61 M	BOTTOM SLOPE ANGLE ...	0.000 DEG
PROJECTED SPAN LENGTH	125.79 M	PIPE LENGTH GAIN .....	2.44 M

===== SOLUTION SUMMARY =====

NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACT HORIZ (KN)	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	0.9	0.0	0.2	0.2	0.
3	LAYBARGE	59.7	4.3	0.0	22.6	0.0	15.0	16.2	5.
5	LAYBARGE	48.2	4.0	0.0	28.1	0.0	22.1	23.9	7.
7	TENSIONR	38.1	3.7	0.0	14.7	0.0	6.3	14.6	4.
9	LAYBARGE	33.4	3.6	0.0	19.9	0.0	11.7	20.3	6.
11	TENSIONR	26.7	3.4	0.0	1.8	0.0	19.0	36.1	10.
13	LAYBARGE	21.3	3.3	0.0	0.0	0.0	19.2	36.3	10.
15	LAYBARGE	12.1	3.0	0.0	66.3	0.0	250.5	284.8	79.
17	LAYBARGE	0.0	1.8	0.0	35.9	0.0	231.9	264.7	74.
20	STINGER	-8.1	0.4	0.0	39.7	-0.1	227.4	259.6	72.
22	STINGER	-15.9	-1.4	0.0	0.0	-0.4	91.0	112.8	31.
24	STINGER	-23.7	-3.3	0.0	0.0	-0.2	20.6	37.0	10.

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 21

STATIC PIPE ANALYSIS 12 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/2/2020 TIME - 5:19:20 CASE 1

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STATIC SOLUTION SUMMARY

26	STINGER	-30.8	-5.1	0.0	0.0	-0.9	15.2	31.2	9.
28	STINGER	-36.9	-6.7	0.0	0.0	5.3	33.2	50.5	14.
30	STINGER	-39.8	-7.4	0.0	0.0	-6.3	40.7	58.5	16.
65	SAGBEND	-106.7	-19.7	0.1	0.0	0.0	63.7	82.8	23.
95	SEABED	-166.6	-23.0	0.0	0.2	-0.2	28.6	45.1	13.

DYNAMIC SOLUTION SUMMARY

SEA STATE NUMBER ( 1 )

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SEA STATE TYPE ..... WAVE SPECTRUM
NO. WAVE COMPONENTS .. 20
WAVE WATER DEPTH ..... 23.0 M
MAX. WAVE FREQUENCY .. 3.0015 RA/S
SPECTRUM START TIME .. 0. SECS
RAO SIGN CONVENTION .. BENTLEY MOSES

VESSEL RESPONSE TYPE . TABLE OF RAOS

WAVE TRAVEL DIRECTION 0.000 DEG
MIN. WAVE FREQUENCY .. 0.1001 RA/S
RANDOM PHASE SEED .... 0
NO. RAOS IN TABLE .... 30

SEA STATE DEFINITION

=====
WAVE SPECTRUM TYPE ... JONSWAP (CLASSIC)
JONSWAP COEFFICIENT .. 0.005729 JONSWAP PEAK FACTOR .. 5.000
PEAK WAVE FREQUENCY .. 0.9498 RA/S

CALCULATED WAVE HEIGHTS

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SIGNIFICANT WAVE HT. . 1.931 M AVERAGE WAVE HEIGHT .. 1.241 M
MAXIMUM WAVE HEIGHT .. 3.388 M RMS WAVE HEIGHT ..... 1.382 M
TOTAL NUMBER OF WAVES 1930

===== SOLUTION SUMMARY =====

NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACT HORIZ (KN )	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	1.1	-0.1	0.2	0.2	0.
3	LAYBARGE	59.7	4.3	0.0	24.0	-0.7	15.8	17.0	5.
5	LAYBARGE	48.2	4.0	0.0	29.2	-0.5	22.9	24.7	7.
7	TENSIONR	38.1	3.7	0.0	15.9	-0.2	7.1	22.8	6.
9	LAYBARGE	33.4	3.6	0.0	22.2	0.4	14.3	28.5	8.
11	TENSIONR	26.7	3.4	0.0	4.4	-0.7	24.7	45.4	13.
13	LAYBARGE	21.3	3.3	0.0	0.0	-1.0	21.8	46.9	13.
15	LAYBARGE	12.1	3.0	0.0	77.9	-2.1	265.7	305.5	85.
17	LAYBARGE	0.0	1.8	0.0	68.9	2.1	265.9	300.9	84.
20	STINGER	-8.1	0.4	0.0	69.2	-4.0	256.2	299.4	83.
22	STINGER	-15.9	-1.2	0.0	59.0	-7.6	217.2	257.1	71.
24	STINGER	-23.7	-3.1	0.0	44.0	-8.3	153.3	187.6	52.
26	STINGER	-30.9	-4.8	0.0	2.7	14.5	111.3	143.9	40.
28	STINGER	-36.9	-6.3	0.0	3.3	96.9	118.7	149.7	42.
30	STINGER	-39.8	-7.0	0.0	-4.5	-114.1	207.6	245.4	68.
95	SEABED	-166.6	-22.7	0.2	2.3	-1.5	73.1	92.6	26.

**LAMPIRAN ANALISA DINAMIS PADA PIPA 12 INCH  
HEADING 90°**

```

MMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM
MMMMMMMMMM  MMMMMMMMMMMM  MMMMMMMMMMMM  MMMMMMMMMMMM  MMMMMMMMMMMM  MMMMMMMMMMMM  MMMMMMMMMMMM  MMMMMMMMMMMM  MMMMMMMMMMMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMM  MMMMMMMMMM  MMMMMMMMMMMM  MMMMMMMMMMMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM  MMM
MMMMMMMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMMMMMMMMMMM  MMMMMMMMMMMM
MMMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMM  MMM  MMM  MMM  MMMMMMMMMM  MMMMMMMMMM  MMMMMMMMMM

```

```

*****
*
*           O F F P I P E - 3 -- OFFSHORE PIPELINE ANALYSIS SYSTEM
*
*   COPYRIGHT (C) 1983-2016, ROBERT C. MALAHY. ALL RIGHTS RESERVED WORLDWIDE.
*
*           VERSION NO. - 3.02EX
*           RELEASED ON - 03/08/2016
*           LICENSED TO - PT Timas Suplindo
*
*****
*
* OFFPIPE IS A NONLINEAR, 3-DIMENSIONAL FINITE ELEMENT METHOD BASED PROGRAM FOR THE
* STATIC AND DYNAMIC ANALYSIS OF PROBLEMS ARISING IN THE DESIGN OF MARINE PIPELINES.
* THIS VERSION OF OFFPIPE MAY BE USED FOR THE ANALYSIS OF OFFSHORE PIPELAYING OPER-
* ATIONS, DAVIT LIFTS, PIPELINES LYING ON AN UNEVEN SEABED, AND RISERS.
*
* OFFPIPE AND ITS ASSOCIATED DOCUMENTATION ARE THE PROPERTY OF ROBERT C. MALAHY AND
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*
*           ROBERT C. MALAHY           TELEPHONE: (713) 664-8635
*           6554 AUDEN                 FACSIMILE: (713) 664-0962
*           HOUSTON, TEXAS 77005
*           U.S.A.                     EMAIL: SUPPORT@OFFPIPE.COM
*
*****

```

```

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 3
STATIC PIPE ANALYSIS 12 INCH
JOB NO. - LAYING           LICENSED BY - PT Timas Suplindo
USER ID - IK              DATE - 5/2/2020 TIME - 5:27:37           CASE 1
=====

```

INPUT DATA ECHO

```

=====
PRINTED OUTPUT SELECTED
=====
STATIC PIPE FORCES AND STRESSES ... YES
STATIC SOLUTION SUMMARY ..... YES
DYNAMIC PIPE FORCES AND STRESSES .. NO
DYNAMIC RANGE OF PIPE DATA ..... NO
DYNAMIC TRACKING OF PIPE DATA ..... NO
OVERBEND PIPE SUPPORT GEOMETRY .... NO
STINGER BALLAST SCHEDULE DATA ..... NO
SUPPORT REACTIONS IN BARGE COORDS . NO

INTERNAL FORCES IN PIPE & CABLE ... NO
INTERNAL FORCES IN STINGER ..... NO
PRINT PIPE STRAINS IN OUTPUT ..... NO
DNV OS-F101 COMPLIANCE REPORT ..... NO
API RP-1111 COMPLIANCE REPORT ..... NO
PRINT DNV/API FACTORS & PARAMETERS NO
USE THICK WALL HOOP STRESS EQN. ... NO
USE DNV 1981 FOR TOTAL PIPE STRESS NO

ENABLE/DISABLE WARNING MESSAGES ... ENABLE
GENERATE SPREAD SHEET PLOT FILE ... NO
GENERATE ASCII PLOT DATA FILES .... NO

```

PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX .....	1	
PLOT NUMBER .....	1	
PLOT TYPE OPTION NUMBER .....	1	
DYNAMIC PROFILE TIME POINT .....	0.000	
DYNAMIC PROFILE TIME INCREMENT .....	0.000	
ORDINATE PARAMETER CODE NUMBER .....	2	
AXIS LABEL FOR ORDINATE .....	"PIPE ELEVATION Y COORDINATE	"
ABSCISSA PARAMETER CODE NUMBER .....	1	
AXIS LABEL FOR ABSCISSA .....	"PIPE HORIZONTAL X COORDINATE	"
PLOT TITLE .....	"PIPELINE ELEVATION PROFILE AND PIPE STRESS	"
MINIMUM VERTICAL AXIS RANGE .....	0.000	
MAXIMUM VERTICAL AXIS RANGE .....	0.000	
MINIMUM HORIZONTAL AXIS RANGE .....	0.000	
MAXIMUM HORIZONTAL AXIS RANGE .....	0.000	

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 4  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 5:27:37 CASE 1

=====

INPUT DATA ECHO

PROFILE PLOT TABLE ENTRIES

=====

PLOT TABLE INDEX .....	2	
PLOT NUMBER .....	1	
PLOT TYPE OPTION NUMBER .....	1	
DYNAMIC PROFILE TIME POINT .....	0.000	
DYNAMIC PROFILE TIME INCREMENT .....	0.000	
ORDINATE PARAMETER CODE NUMBER .....	15	
AXIS LABEL FOR ORDINATE .....	"DNV YIELD STRESS PERCENTAGE	"
ABSCISSA PARAMETER CODE NUMBER .....	1	
AXIS LABEL FOR ABSCISSA .....	"PIPELINE HORIZONTAL X COORDINATE"	
PLOT TITLE .....	"PIPELINE ELEVATION PROFILE AND PIPE STRESS	"
MINIMUM VERTICAL AXIS RANGE .....	0.000	
MAXIMUM VERTICAL AXIS RANGE .....	0.000	
MINIMUM HORIZONTAL AXIS RANGE .....	0.000	
MAXIMUM HORIZONTAL AXIS RANGE .....	0.000	

PIPE PROPERTIES

=====

PROPERTY TABLE ROW NUMBER .....	1
PIPE SECTION LENGTH .....	0.000 METERS
STEEL MODULUS OF ELASTICITY .....	207000. M-PASCAL
STEEL CROSS SECTIONAL AREA .....	124.100 CM <sup>2</sup>
COATED PIPE AVG MOMENT OF INERTIA .....	15048.21 CM <sup>4</sup>
WEIGHT PER-UNIT-LENGTH IN AIR .....	2374.00 N/M
WEIGHT PER-UNIT-LENGTH SUBMERGED .....	368.27 N/M
MAXIMUM ALLOWABLE PIPE STRAIN .....	0.205000 PERCENT
STEEL OUTSIDE DIAMETER .....	32.3900 CM
STEEL WALL THICKNESS .....	1.2700 CM
YIELD STRESS .....	360.00 M-PASCAL
STRESS/STRAIN INTENSE FACTOR .....	0.0000
HYDRODYNAMIC OUTSIDE DIAMETER .....	0.000 CM
DRAG COEFFICIENT .....	0.0000
HYDRODYNAMIC TOTAL AREA .....	0.000 CM <sup>2</sup>
ADDED MASS COEFFICIENT .....	0.0000
POISSON'S RATIO .....	0.3000
COEFFICIENT OF THERMAL EXPANSION .....	0.00001100 1/DEG C

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 5  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 5:27:37 CASE 1

=====

INPUT DATA ECHO

PIPE COATING PROPERTIES

=====

PIPE PROPERTY TABLE INDEX .....	1
CORROSION COATING THICKNESS .....	0.320 CM
CORROSION COATING WEIGHT DENSITY .....	9025.2 N/M <sup>3</sup>
CORROSION COATING ELASTIC MODULUS .....	0.000 M-PASCAL
CONCRETE COATING THICKNESS .....	4.000 CM
CONCRETE COATING WEIGHT DENSITY .....	29858. N/M <sup>3</sup>
CONCRETE COATING ELASTIC MODULUS .....	0.000 M-PASCAL
DESIRED PIPE SPECIFIC GRAVITY .....	0.0000
CONCRETE STIFFENING EFFECTIVENESS .....	0.000
NO NOT CALC. STRESS FOR BARE PIPE .....	NO



AVERAGE LENGTH OF PIPE JOINT ..... 12.200 METERS  
 EFFECTIVE FIELD JOINT LENGTH ..... 0.300 METERS  
 FIELD JOINT FILL WEIGHT DENSITY ... 10055.3 N/M^3  
 FIELD JOINT FILL ELASTIC MODULUS... 0.000 M-PASCAL  
 FIELD JOINT STIFFENING EFFECT. .... 0.000  
 FIELD JOINT BENDING MODEL ..... 0 IGNORE COATING STIFFNESS  
 WEIGHT DENSITY OF STEEL ..... 77008. N/M^3  
 WEIGHT DENSITY OF PIPE CONTENTS ... 0.0 N/M^3  
 REF. ELEVATION FOR STATIC HEAD .... 0.00 METERS  
 FREE FLOOD PIPE DURING PIPELAY ... NO

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 6  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 5:27:37 CASE 1  
 =====

INPUT DATA ECHO

PIPELAY VESSEL DESCRIPTION

=====  
 NUMBER OF PIPE NODES ..... 9  
 BARGE GEOMETRY SPECIFIED BY ..... 1 X-Y COORDINATES  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.000 METERS  
 ADJUST Y COORDINATES MANUALLY .... NO  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 PIPE ANGLE RELATIVE TO DECK ..... 0.0000 DEGREES  
 HEIGHT OF DECK ABOVE WATER ..... 2.400 METERS  
 LAYBARGE FORWARD (X) OFFSET ..... 0.000 METERS  
 BARGE TRIM ANGLE ..... 0.5000 DEGREES  
  
 STERN SHOE X COORDINATE ..... 0.000 METERS  
 STERN SHOE Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER X COORDINATE ..... 43.820 METERS  
 ROTATION CENTER Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER Z COORDINATE ..... 6.370 METERS  
 BARGE HEADING ..... 0.0000 DEGREES  
 BARGE OFFSET FROM RIGHT-OF-WAY .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT VERTICAL ANGLE ... 0.000 DEGREES  
 PIPE RAMP PIVOT Z COORDINATE ..... 0.000 METERS  
 PIPE RAMP HEADING ON DECK ..... 0.000 DEGREES  
 ROLE OF ALTERNATE WAVE ORIGIN .... 0 MOTIONS & WAVES AT CENTER OF MOTION  
 WAVE PHASE ORIGIN X COORDINATE .... 0.000  
 WAVE PHASE ORIGIN Y COORDINATE .... 0.000 METERS  
 WAVE PHASE ORIGIN Z COORDINATE .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE .....

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	DAVIT SPACING ( M )
64.220	1.838	1 SIMPLE SUPPORT	0.000
59.740	1.760	1 SIMPLE SUPPORT	0.000
48.240	1.560	1 SIMPLE SUPPORT	0.000
38.110	1.383	2 PIPE TENSIONER	0.000
33.440	1.302	1 SIMPLE SUPPORT	0.000
26.660	1.183	2 PIPE TENSIONER	0.000
21.340	1.092	7 USER DEFINED SPT	0.000
12.150	0.860	7 USER DEFINED SPT	0.000
-0.040	-0.260	8 USER DEFINED SPT	0.000

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 7  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 5:27:37 CASE 1  
 =====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====  
 SUPPORT PROPERTY TABLE INDEX ..... 2  
 SUPPORT ELEMENT TYPE ..... 2 TENSIONER  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
  
 BOTTOM ROLLER ANGLE TO HORIZONTAL . 0.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES

SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 7  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 1.600 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 8  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 5:27:37 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 8  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

STINGER DESCRIPTION

=====

NUMBER OF PIPE/STINGER NODES ..... 6  
 STINGER GEOMETRY SPECIFIED BY ..... 2 X-Y COORD AND MATCH PT  
 STINGER TYPE ..... 1 FIXED GEOMETRY OR RAMP  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.00 METERS  
 HITCH X-COORDINATE ..... 0.497 METERS  
 HITCH Y-COORDINATE ..... -1.800 METERS  
 HITCH ANGULAR ORIENTATION ..... 0.000 DEGREES

X COORDINATE OF LOCAL ORIGIN ..... 0.497 METERS  
 Y COORDINATE OF LOCAL ORIGIN ..... -1.800 METERS  
 ROTATION ABOUT STINGER HITCH ..... 13.300 DEGREES  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 TANGENT POINT ANGLE ..... 0.000 DEGREES

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	ELEMENT TYPE	ELEMENT LENGTH ( M )
-8.325	2.209	1 SIMPLE SUPPORT	2 HINGED END	0.000
-16.325	2.349	1 SIMPLE SUPPORT	1 FIXED END	0.000
-24.325	2.119	1 SIMPLE SUPPORT	1 FIXED END	0.000
-31.699	1.660	1 SIMPLE SUPPORT	1 FIXED END	0.000
-37.949	1.069	1 SIMPLE SUPPORT	1 FIXED END	0.000
-40.949	0.350	1 SIMPLE SUPPORT	1 FIXED END	0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 9  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 5:27:37 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

```

=====
SUPPORT PROPERTY TABLE INDEX ..... 1
SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT
SUPPORT INITIAL STATE FLAG ..... 0
TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M
VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M
STATIC VERTICAL DEFLECTION ..... 0.0000 CM
LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES
SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES
SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS
BED ROLLER LENGTH ..... 1.640 METERS
HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS
TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
    
```

CURRENT VELOCITIES

```

=====
WATER DEPTH (M ) CURRENT SPEED (M/S ) DIRECTION OF TRAVEL (DEG )
=====
0.000 0.790 90.000
11.500 0.480 90.000
23.000 0.420 90.000
    
```

PIPE TENSION DATA

```

=====
STATIC PIPE TENSION ON LAY VESSEL . 196.133 K-NEWTON
MINIMUM DYNAMIC PIPE TENSION ..... 196.133 K-NEWTON
MAXIMUM DYNAMIC PIPE TENSION ..... 294.199 K-NEWTON
STATIC HORIZONTAL BOTTOM TENSION .. 0.000 K-NEWTON
NO. OF VALUES FOR TENSION PROFILE . 0
VALUES ARE FOR PIPE SPAN ANALYSIS . NO
MAXIMUM PIPE PAYOUT SPEED ..... 0.000 M/SEC
MAXIMUM PIPE TAKEUP SPEED ..... 0.000 M/SEC
    
```

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 10

STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 5:27:37 CASE 1

=====  
 INPUT DATA ECHO

SAGBEND GEOMETRY

```

=====
SAGBEND PIPE ELEMENT LENGTH ..... 2.000 METERS
WATER DEPTH ..... 23.00 METERS
X-COORDINATE AT SPECIFIED DEPTH . . 0.00 METERS
ESTIMATED SAGBEND X LENGTH ..... 0.00 METERS
ESTIMATED PIPE LENGTH ON SEABED ... 0.00 METERS
X-COORD OF PIPE FREE END ON SEABED 0.00 METERS
X-COORD POINT OF FIXITY ON SEABED . 0.00 METERS
MAXIMUM SLOPE (ANGLE) OF SEABED ... 0.000 DEGREES
DIRECTION OF MAXIMUM SLOPE ..... 0.000 DEGREES

PIPE/CABLE SPAN END CONDITION ..... 0 PIPE/CABLE RESTING ON SEABED
PIPE/CABLE SPAN LENGTH GIVEN BY ... 0 SPECIFIED PIPE/CABLE TENSION
ESTIMATED SPAN DEPTH AT FREE END .. 0.00 METERS
PIPE VERTICAL ANGLE AT FREE END ... 0.000 DEGREES
BOTTOM HINGE OFFSET ..... 0.000 METERS
BOTTOM HINGE MINIMUM ANGLE ..... 0.000 DEGREES
BOTTOM HINGE MAXIMUM ANGLE ..... 0.000 DEGREES
    
```

SOIL ELEMENT PROPERTIES

```

=====
SOIL PROPERTY TABLE ROW INDEX ..... 1
SOIL ELEMENT TYPE (FUTURE USE) .... 0
PIPE INDEX OR SEGMENT NUMBER ..... 0
LONGITUDINAL SOIL STIFFNESS ..... 0.00 KN/M^2
VERTICAL SOIL STIFFNESS ..... 0.00 KN/M^2
LATERAL SOIL STIFFNESS ..... 0.00 KN/M^2
DEFLECTION UNDER REFERENCE LOAD ... 0.0000 CM

LONGITUDINAL COEF. OF FRICTION .... 0.000
LATERAL COEFFICIENT OF FRICTION ... 0.600
NUMBER OF INTEGRATION POINTS ..... 0
    
```

TIME INTEGRATION PARAMETERS

```

=====
TIME STEP LENGTH ..... 0.2000 SECONDS
MAXIMUM TIME OF INTEGRATION ..... 10860.000 SECONDS
SOLUTION SAMPLING TIME STEP ..... 0.400 SECONDS
    
```

SOLUTION SAMPLING STARTS AT TIME .. 60.000 SECONDS  
 DAMPING RATIO ..... 0.0000  
 NUMBER OF VARIABLE TIME STEPS ..... 0

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 11  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 5:27:37 CASE 1

=====

INPUT DATA ECHO

WAVE PARAMETERS

=====

SEA STATE ROW INDEX ..... 1  
 WAVE HEIGHT (PEAK TO TROUGH) ..... 1.800 METERS  
 WAVE PERIOD ..... 6.300 SECONDS  
 WAVE DIRECTION OF TRAVEL ..... 90.000 DEGREES  
 WATER DEPTH FOR WAVE CALCULATIONS . 23.00 METERS  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0

WAVE SPECTRUM EQUATION

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SEA STATE ROW INDEX ..... 1  
 WAVE SPECTRUM EQUATION TYPE ..... 7 JONSWAP (CLASSIC)  
 NUMBER OF WAVES IN SPECTRUM ..... 20  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0  
 MINIMUM PERIOD IN SPECTRUM ..... 2.0933 SECONDS  
 MAXIMUM PERIOD IN SPECTRUM ..... 62.8000 SECONDS  
 START TIME FOR WAVE SPECTRUM ..... 0. SECONDS  
 DIRECTION OF WAVE TRAVEL ..... 0.000 DEGREES  
 1ST JONSWAP COEF. (ALPHA) ..... 0.003223  
 2ND JONSWAP COEF. (GAMMA) ..... 5.0000  
 PEAK WAVE PERIOD ..... 6.6150 SECONDS

VESSEL MOTION RAO TABLE

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SEA STATE NUMBER ..... 1  
 USE PHASE LAG FOR RAOs ..... NO  
 VESSEL MOTIONS SIGN CONVENTION .... 2 BENTLEY MOSES  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD

WAVE PERIOD (SECONDS)	----- / SURGE AMPLITUDE (M/M )	----- / PHASE (DEG)	----- / SWAY AMPLITUDE (M/M )	----- / PHASE (DEG)	----- / HEAVE AMPLITUDE (M/M )	----- / PHASE (DEG)
2.0900	0.0000	0.00	0.0280	-75.00	0.0040	110.00
2.1700	0.0000	0.00	0.0320	-115.00	0.0010	60.00
2.2400	0.0000	0.00	0.0370	-152.00	0.0020	19.00
2.3300	0.0000	0.00	0.0400	163.00	0.0020	-18.00
2.4200	0.0000	0.00	0.0460	127.00	0.0040	-55.00
2.5100	0.0000	0.00	0.0530	91.00	0.0030	-94.00
2.6200	0.0000	0.00	0.0610	58.00	0.0060	-127.00
2.7300	0.0000	0.00	0.0700	23.00	0.0080	-160.00
2.8500	0.0000	0.00	0.0810	-6.00	0.0110	167.00
2.9900	0.0000	0.00	0.0940	-35.00	0.0100	136.00
3.1400	0.0000	0.00	0.1100	-63.00	0.0190	108.00
3.3100	0.0000	0.00	0.1270	-89.00	0.0270	81.00

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 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 5:27:37 CASE 1

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WAVE PERIOD	----- / ROLL AMPLITUDE	----- / PHASE	----- / PITCH AMPLITUDE	----- / PHASE	----- / YAW AMPLITUDE	----- / PHASE
3.4900	0.0000	0.00	0.1490	-113.00	0.0390	56.00
3.7000	0.0000	0.00	0.1740	-136.00	0.0550	33.00
3.9300	0.0000	0.00	0.2040	-157.00	0.0790	12.00
4.1900	0.0000	0.00	0.2380	-175.00	0.1150	-6.00
4.4900	0.0000	0.00	0.2790	167.00	0.1710	-21.00
4.8300	0.0000	0.00	0.3250	153.00	0.2610	-33.00
5.2400	0.0000	0.00	0.3750	141.00	0.4080	-40.00
5.7100	0.0000	0.00	0.4130	133.00	0.6330	-39.00
6.2800	0.0010	90.00	0.3730	123.00	0.8980	-29.00
6.9800	0.0010	53.00	0.4630	90.00	1.0560	-16.00
7.8500	0.0000	0.00	0.6880	88.00	1.0740	-6.00
8.9700	0.0000	0.00	0.7940	90.00	1.0460	-1.00
10.4700	0.0000	0.00	0.8610	90.00	1.0230	0.00
12.5600	0.0000	0.00	0.9110	90.00	1.0100	0.00
15.7000	0.0000	0.00	0.9480	90.00	1.0060	0.00
20.9300	0.0000	0.00	0.9730	90.00	1.0040	0.00
31.4000	0.0000	0.00	0.9890	90.00	1.0040	0.00
62.8000	0.0000	0.00	0.9980	90.00	1.0300	0.00

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(SECONDS)	(DEG/M)	(DEG)	(DEG/M)	(DEG)	(DEG/M)	(DEG)
2.0900	0.0330	-75.00	0.0000	0.00	0.0020	109.00
2.1700	0.0340	-116.00	0.0010	62.00	0.0020	69.00
2.2400	0.0250	-153.00	0.0010	22.00	0.0020	28.00
2.3300	0.0450	162.00	0.0020	-15.00	0.0030	-5.00
2.4200	0.0440	126.00	0.0020	-52.00	0.0030	-41.00
2.5100	0.0420	91.00	0.0030	-89.00	0.0030	-79.00
2.6200	0.0410	57.00	0.0030	-122.00	0.0030	-126.00
2.7300	0.0490	22.00	0.0040	-155.00	0.0040	-136.00
2.8500	0.0320	-7.00	0.0050	174.00	0.0040	-171.00
2.9900	0.0180	-38.00	0.0070	143.00	0.0040	161.00
3.1400	0.0030	137.00	0.0070	117.00	0.0040	134.00
3.3100	0.0420	92.00	0.0090	92.00	0.0040	113.00
3.4900	0.0910	67.00	0.0110	69.00	0.0040	92.00
3.7000	0.1680	44.00	0.0140	48.00	0.0040	75.00
3.9300	0.2860	23.00	0.0190	30.00	0.0040	61.00
4.1900	0.4660	4.00	0.0250	15.00	0.0040	54.00
4.4900	0.7490	-11.00	0.0340	5.00	0.0040	54.00
4.8300	1.2140	-25.00	0.0490	0.00	0.0040	63.00
5.2400	2.0450	-36.00	0.0730	4.00	0.0060	79.00
5.7100	3.7310	-37.00	0.1050	21.00	0.0100	98.00
6.2800	6.9230	-14.00	0.1270	53.00	0.0180	136.00
6.9800	7.9800	33.00	0.1080	90.00	0.0210	-167.00

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 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 5:27:37 CASE 1

INPUT DATA ECHO

7.8500	5.7520	69.00	0.0710	120.00	0.0140	-126.00
8.9700	3.6550	83.00	0.0440	137.00	0.0080	-109.00
10.4700	2.4010	89.00	0.0290	148.00	0.0050	-101.00
12.5600	1.5660	89.00	0.0220	155.00	0.0020	-101.00
15.7000	0.9690	90.00	0.0180	163.00	0.0000	0.00
20.9300	0.5340	90.00	0.0150	169.00	0.0010	92.00
31.4000	0.2350	90.00	0.0140	175.00	0.0020	90.00
62.8000	0.0580	90.00	0.0130	179.00	0.0030	90.00

\*\*\*\*\* INFORMATIVE MESSAGE NO. - 94 \*\*\*\*\*

One or more of the phase angles in the RAO table have been adjusted to |  
 minimize the difference in value between adjacent angles. If the phase |  
 angles are arbitrarily restricted by the software used to calculate |  
 the RAOs to a fixed range of values such as (0 to 2\*PI) or (-PI to |  
 +PI), then phase angles that are actually close in value can differ by |  
 as much as 2\*PI. These large differences can cause the phase angles |  
 for RAOs that are between the values in the table (which must be |  
 determined using interpolation) to be calculated incorrectly.

CONTROL SWITCHES

MAX NUMBER STATIC ITERATIONS ..... 500  
 MAX DYNAMIC ITERATIONS PER STEP ... 500  
 BOUNDARY CONDITION LOGIC PARAMETER 5  
 TIME STEP STABILITY PARAMETER ..... 0  
 TYPE OF ANALYSIS ..... DYNAMIC  
 NUMBER OF PROBLEM DIMENSIONS ..... 3  
 DAVIT LIFT ANALYSIS ..... NO

STATIC SOLUTION CONVERGED IN ( 49 ) ITERATIONS

END OF INPUT DATA

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 5:27:37 PAGE 14  
 PROJECT - STATIC PIPE ANALYSIS 12 INCH JOB NO. - LAYING  
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES (MPA)		TOTAL STRESS (MPA)	PERCENT YIELD (PCT)
1	LAYBARGE	64.20	4.42	0.00	0.000	1.488	0.00	0.00	0.00	0.20	0.00	0.20	0.06
3	LAYBARGE	59.72	4.30	0.00	0.000	1.536	4.48	-0.02	0.00	-16.18	0.00	16.21	4.50
5	LAYBARGE	48.23	4.00	0.00	0.000	1.486	15.98	-0.08	0.00	-23.77	0.00	23.86	6.63
7	TENSIONR	38.10	3.73	0.00	0.000	1.461	26.11	7.77	0.00	-6.80	0.00	14.57	4.05
9	LAYBARGE	33.43	3.61	0.00	0.000	1.534	30.78	7.74	0.00	-12.52	0.00	20.26	5.63
11	TENSIONR	26.65	3.43	0.00	0.000	1.405	37.57	15.61	0.00	20.40	0.00	36.01	10.00
13	LAYBARGE	21.33	3.31	0.00	0.000	1.355	42.89	15.58	0.00	-20.66	0.00	36.25	10.07
15	LAYBARGE	12.14	2.98	0.00	0.000	3.374	52.08	15.43	0.00	-269.22	-0.01	284.65	79.07

17	LAYBARGE	-0.04	1.76	0.00	0.000	8.044	64.32	15.21	0.00	-250.17	0.03	265.39	73.72
20	STINGER	-8.10	0.38	0.00	-0.001	11.301	72.50	14.96	0.00	-240.77	-0.12	255.73	71.03
22	STINGER	-15.91	-1.36	0.00	0.000	13.534	80.51	14.81	-0.17	-96.45	-0.47	111.35	30.93
24	STINGER	-23.67	-3.30	0.00	0.002	14.293	88.51	14.63	-0.42	-22.14	-0.03	36.98	10.27
26	STINGER	-30.83	-5.13	0.00	-0.005	14.311	95.90	14.46	-0.66	15.82	-1.29	30.67	8.52
28	STINGER	-36.92	-6.67	0.00	0.018	14.030	102.18	14.31	-0.85	34.96	3.13	49.84	13.85
30	STINGER	-39.83	-7.39	0.00	-0.037	13.834	105.17	14.24	-0.95	41.36	-23.67	62.37	17.33
32	SAGBEND	-41.86	-7.89	0.00	-0.124	13.679	107.27	14.19	-1.01	45.05	-21.29	64.52	17.92
33	SAGBEND	-43.80	-8.36	0.01	-0.192	13.520	109.27	14.14	-1.07	48.07	-17.10	65.71	18.25
34	SAGBEND	-45.75	-8.82	0.02	-0.245	13.351	111.27	14.10	-1.13	50.68	-13.55	67.13	18.65
35	SAGBEND	-47.69	-9.28	0.02	-0.288	13.174	113.27	14.05	-1.19	52.93	-10.54	68.63	19.06
36	SAGBEND	-49.64	-9.73	0.03	-0.320	12.989	115.27	14.01	-1.25	54.88	-7.99	70.10	19.47
37	SAGBEND	-51.59	-10.18	0.05	-0.344	12.798	117.27	13.97	-1.31	56.57	-5.83	71.49	19.86
38	SAGBEND	-53.54	-10.62	0.06	-0.361	12.602	119.27	13.92	-1.36	58.03	-4.00	72.78	20.22
39	SAGBEND	-55.50	-11.05	0.07	-0.372	12.402	121.27	13.88	-1.42	59.29	-2.45	73.94	20.54
40	SAGBEND	-57.45	-11.48	0.08	-0.379	12.197	123.27	13.84	-1.47	60.39	-1.13	74.99	20.83
41	SAGBEND	-59.41	-11.90	0.10	-0.381	11.989	125.27	13.80	-1.53	61.35	-0.01	75.93	21.09
42	SAGBEND	-61.36	-12.31	0.11	-0.379	11.778	127.27	13.76	-1.58	62.19	0.95	76.76	21.32
43	SAGBEND	-63.32	-12.71	0.12	-0.374	11.564	129.27	13.72	-1.63	62.92	1.76	77.49	21.53
44	SAGBEND	-65.28	-13.11	0.14	-0.367	11.347	131.27	13.68	-1.68	63.56	2.45	78.15	21.71
45	SAGBEND	-67.24	-13.50	0.15	-0.357	11.129	133.27	13.65	-1.73	64.12	3.03	78.72	21.87
46	SAGBEND	-69.21	-13.88	0.16	-0.346	10.909	135.27	13.61	-1.78	64.62	3.53	79.23	22.01
47	SAGBEND	-71.17	-14.26	0.17	-0.333	10.687	137.27	13.57	-1.83	65.05	3.95	79.68	22.13
48	SAGBEND	-73.14	-14.63	0.18	-0.318	10.464	139.27	13.54	-1.88	65.44	4.30	80.07	22.24
49	SAGBEND	-75.10	-14.98	0.19	-0.303	10.240	141.27	13.50	-1.92	65.78	4.60	80.43	22.34
50	SAGBEND	-77.07	-15.34	0.20	-0.286	10.014	143.27	13.47	-1.97	66.09	4.84	80.74	22.43
51	SAGBEND	-79.04	-15.68	0.21	-0.269	9.788	145.27	13.44	-2.01	66.36	5.05	81.01	22.50
52	SAGBEND	-81.01	-16.02	0.22	-0.251	9.560	147.27	13.40	-2.05	66.60	5.22	81.26	22.57
53	SAGBEND	-82.99	-16.34	0.23	-0.233	9.332	149.27	13.37	-2.10	66.82	5.36	81.48	22.63
54	SAGBEND	-84.96	-16.66	0.24	-0.214	9.103	151.27	13.34	-2.14	67.01	5.48	81.67	22.69
55	SAGBEND	-86.94	-16.98	0.24	-0.195	8.874	153.27	13.31	-2.18	67.19	5.57	81.84	22.73
56	SAGBEND	-88.91	-17.28	0.25	-0.176	8.644	155.27	13.28	-2.22	67.34	5.64	81.99	22.78
57	SAGBEND	-90.89	-17.58	0.26	-0.156	8.413	157.27	13.25	-2.25	67.48	5.70	82.13	22.81
58	SAGBEND	-92.87	-17.87	0.26	-0.136	8.182	159.27	13.22	-2.29	67.61	5.74	82.24	22.85
59	SAGBEND	-94.85	-18.15	0.27	-0.116	7.951	161.27	13.20	-2.33	67.72	5.77	82.35	22.87

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 5:27:37      PAGE 15

PROJECT - STATIC PIPE ANALYSIS 12 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	HORIZ ANGLE (DEG )	VERT ANGLE (DEG )	PIPE LENGTH (M )	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERC YIELD (PCT)
=====													
60	SAGBEND	-96.83	-18.42	0.27	-0.096	7.719	163.27	13.17	-2.36	67.81	5.78	82.44	22.90
61	SAGBEND	-98.81	-18.69	0.27	-0.076	7.487	165.27	13.15	-2.40	67.90	5.79	82.51	22.92
62	SAGBEND	-100.80	-18.94	0.28	-0.057	7.255	167.27	13.12	-2.43	67.97	5.79	82.57	22.94
63	SAGBEND	-102.78	-19.19	0.28	-0.037	7.022	169.27	13.10	-2.46	68.02	5.78	82.62	22.95
64	SAGBEND	-104.77	-19.43	0.28	-0.017	6.790	171.27	13.07	-2.49	68.07	5.77	82.66	22.96
65	SAGBEND	-106.75	-19.66	0.28	0.003	6.557	173.27	13.05	-2.52	68.10	5.74	82.68	22.97
66	SAGBEND	-108.74	-19.89	0.28	0.023	6.324	175.27	13.03	-2.55	68.11	5.71	82.68	22.97
67	SAGBEND	-110.73	-20.10	0.28	0.042	6.091	177.27	13.01	-2.58	68.11	5.68	82.67	22.96
68	SAGBEND	-112.72	-20.31	0.27	0.062	5.858	179.27	12.99	-2.60	68.09	5.63	82.65	22.96
69	SAGBEND	-114.71	-20.51	0.27	0.081	5.625	181.27	12.97	-2.63	68.05	5.58	82.60	22.94
70	SAGBEND	-116.70	-20.70	0.27	0.100	5.393	183.27	12.95	-2.65	68.00	5.52	82.53	22.93
71	SAGBEND	-118.69	-20.89	0.27	0.119	5.160	185.27	12.93	-2.68	67.91	5.45	82.44	22.90
72	SAGBEND	-120.68	-21.06	0.26	0.138	4.928	187.27	12.92	-2.70	67.80	5.38	82.32	22.87
73	SAGBEND	-122.68	-21.23	0.26	0.156	4.697	189.27	12.90	-2.72	67.67	5.29	82.17	22.82
74	SAGBEND	-124.67	-21.39	0.25	0.174	4.465	191.27	12.89	-2.74	67.49	5.19	81.98	22.77
75	SAGBEND	-126.66	-21.54	0.24	0.192	4.235	193.27	12.87	-2.76	67.28	5.07	81.75	22.71
76	SAGBEND	-128.66	-21.69	0.24	0.209	4.005	195.27	12.86	-2.78	67.02	4.94	81.48	22.63
77	SAGBEND	-130.65	-21.82	0.23	0.225	3.777	197.27	12.84	-2.80	66.71	4.79	81.16	22.54
78	SAGBEND	-132.65	-21.95	0.22	0.242	3.549	199.27	12.83	-2.81	66.33	4.61	80.77	22.44
79	SAGBEND	-134.65	-22.07	0.21	0.257	3.323	201.27	12.82	-2.83	65.89	4.41	80.31	22.31
80	SAGBEND	-136.64	-22.18	0.20	0.272	3.099	203.27	12.81	-2.84	65.37	4.19	79.77	22.16
81	SAGBEND	-138.64	-22.29	0.19	0.286	2.876	205.27	12.80	-2.86	64.75	3.92	79.14	21.98
82	SAGBEND	-140.64	-22.38	0.18	0.299	2.656	207.27	12.79	-2.87	64.03	3.62	78.40	21.78
83	SAGBEND	-142.64	-22.47	0.17	0.310	2.438	209.27	12.78	-2.88	63.18	3.26	77.53	21.54
84	SAGBEND	-144.63	-22.55	0.16	0.321	2.224	211.27	12.77	-2.89	62.19	2.86	76.52	21.25
85	SAGBEND	-146.63	-22.63	0.15	0.330	2.013	213.27	12.77	-2.90	61.03	2.39	75.34	20.93
86	SAGBEND	-148.63	-22.69	0.14	0.337	1.807	215.27	12.76	-2.91	59.67	1.84	73.96	20.54
87	SAGBEND	-150.63	-22.75	0.13	0.342	1.605	217.27	12.76	-2.92	58.09	1.21	72.36	20.10
88	SAGBEND	-152.63	-22.81	0.11	0.345	1.410	219.27	12.75	-2.92	56.25	0.47	70.51	19.59
89	SAGBEND	-154.63	-22.85	0.10	0.345	1.221	221.27	12.75	-2.93	54.10	-0.38	68.36	18.99
90	SAGBEND	-156.63	-22.89	0.09	0.343	1.040	223.27	12.74	-2.93	51.60	-1.37	65.88	18.30
91	SAGBEND	-158.63	-22.92	0.08	0.336	0.868	225.27	12.74	-2.94	48.69	-2.52	63.01	17.50
92	SAGBEND	-160.63	-22.95	0.07	0.325	0.708	227.27	12.74	-2.94	45.29	-3.78	59.72	16.59
93	SAGBEND	-162.63	-22.97	0.06	0.310	0.559	229.27	12.74	-2.95	41.35	-5.14	55.93	15.54
94	SAGBEND	-164.63	-22.99	0.05	0.290	0.426	231.27	12.73	-2.95	36.76	-6.61	51.62	14.34
95	SEABED	-166.63	-23.00	0.04	0.265	0.309	233.27	12.73	-2.95	31.42	-8.23	46.76	12.99
96	SEABED	-168.63	-23.01	0.03	0.234	0.211	235.27	12.73	-2.95	25.58	-9.79	41.68	11.58
97	SEABED	-170.63	-23.02	0.02	0.198	0.134	237.27	12.73	-2.95	19.88	-10.82	36.93	10.26
98	SEABED	-172.63	-23.02	0.01	0.161	0.075	239.27	12.73	-2.95	14.71	-10.98	32.67	9.07

99	SEABED	-174.63	-23.02	0.01	0.124	0.032	241.27	12.73	-2.95	10.32	-10.23	28.85	8.01
100	SEABED	-176.63	-23.02	0.00	0.091	0.003	243.27	12.73	-2.95	6.75	-8.91	25.52	7.09
101	SEABED	-178.63	-23.02	0.00	0.063	-0.015	245.27	12.73	-2.95	3.99	-7.36	22.72	6.31
102	SEABED	-180.63	-23.02	0.00	0.041	-0.025	247.27	12.73	-2.95	1.96	-5.78	20.47	5.69
103	SEABED	-182.63	-23.02	0.00	0.024	-0.029	249.27	12.73	-2.95	0.54	-4.33	18.75	5.21

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX    DATE - 5/ 2/2020    TIME - 5:27:37    PAGE 16

PROJECT - STATIC PIPE ANALYSIS 12 INCH    JOB NO. - LAYING

USER ID - IK    LICENSED BY - PT Timas Suplindo    CASE 1

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STATIC    PIPE    COORDINATES,    FORCES    AND    STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M )	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ STRESS (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
=====													
104	SEABED	-184.63	-23.02	0.00	0.011	-0.029	251.27	12.73	-2.95	-0.38	-3.07	17.49	4.86
105	SEABED	-186.63	-23.02	0.00	0.002	-0.027	253.27	12.73	-2.95	-0.92	-2.04	16.64	4.62
106	SEABED	-188.63	-23.02	0.00	-0.003	-0.023	255.27	12.73	-2.95	-1.17	-1.24	16.12	4.48
107	SEABED	-190.63	-23.02	0.00	-0.006	-0.019	257.27	12.73	-2.95	-1.24	-0.64	15.81	4.39
108	SEABED	-192.63	-23.02	0.00	-0.008	-0.015	259.27	12.73	-2.95	-1.17	-0.22	15.61	4.34
109	SEABED	-194.63	-23.02	0.00	-0.008	-0.011	261.27	12.73	-2.95	-1.04	0.06	15.46	4.30
110	SEABED	-196.63	-23.02	0.00	-0.007	-0.008	263.27	12.73	-2.95	-0.87	0.23	15.32	4.26
111	SEABED	-198.63	-23.02	0.00	-0.006	-0.005	265.27	12.73	-2.95	-0.69	0.31	15.19	4.22
112	SEABED	-200.63	-23.02	0.00	-0.005	-0.003	267.27	12.73	-2.95	-0.53	0.33	15.05	4.18
113	SEABED	-202.63	-23.02	0.00	-0.004	-0.002	269.27	12.73	-2.95	-0.38	0.32	14.93	4.15
114	SEABED	-204.63	-23.02	0.00	-0.003	-0.001	271.27	12.73	-2.95	-0.26	0.29	14.82	4.12
115	SEABED	-206.63	-23.02	0.00	-0.002	0.000	273.27	12.73	-2.95	-0.17	0.24	14.73	4.09
116	SEABED	-208.63	-23.02	0.00	-0.001	0.001	275.27	12.73	-2.95	-0.09	0.19	14.65	4.07
117	SEABED	-210.63	-23.02	0.00	-0.001	0.001	277.27	12.73	-2.95	-0.04	0.15	14.59	4.05
118	SEABED	-212.63	-23.02	0.00	0.000	0.001	279.27	12.73	-2.95	-0.01	0.11	14.54	4.04
119	SEABED	-214.63	-23.02	0.00	0.000	0.001	281.27	12.73	-2.95	0.01	0.08	14.51	4.03
120	SEABED	-216.63	-23.02	0.00	0.000	0.001	283.27	12.73	-2.95	0.02	0.05	14.49	4.03
121	SEABED	-218.63	-23.02	0.00	0.000	0.001	285.27	12.73	-2.95	0.03	0.03	14.48	4.02
122	SEABED	-220.63	-23.02	0.00	0.000	0.001	287.27	12.73	-2.95	0.02	0.02	14.47	4.02
123	SEABED	-222.63	-23.02	0.00	0.000	0.001	289.27	12.73	-2.95	0.02	0.01	14.46	4.02
124	SEABED	-224.63	-23.02	0.00	0.000	0.001	291.27	12.73	-2.95	0.01	0.00	14.45	4.01
125	SEABED	-226.63	-23.02	0.00	0.000	0.000	293.27	12.73	-2.95	0.00	0.00	14.44	4.01
126	SEABED	-228.63	-23.02	0.00	0.000	0.000	295.27	12.73	-2.95	0.00	0.00	14.44	4.01

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX    DATE - 5/ 2/2020    TIME - 5:27:37    PAGE 17

PROJECT - STATIC PIPE ANALYSIS 12 INCH    JOB NO. - LAYING

USER ID - IK    LICENSED BY - PT Timas Suplindo    CASE 1

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=====													
STATIC    PIPE    COORDINATES,    FORCES    AND    STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION VERT (KN )	HORIZ (KN )	SUPT VERT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	BENDING MOMENTS VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
=====													
1	LAYBARGE	64.20	4.42	0.00	0.92	0.00	0.00	0.00	0.00	0.19	0.00	0.19	
3	LAYBARGE	59.72	4.30	0.00	22.65	0.00	0.00	0.00	-0.28	-15.05	0.00	15.05	
5	LAYBARGE	48.23	4.00	0.00	28.14	0.00	0.00	0.00	-1.00	-22.10	0.00	22.10	
7	TENSIONR	38.10	3.73	0.00	14.66	0.00	0.00	0.00	96.44	-6.32	0.00	6.32	
9	LAYBARGE	33.43	3.61	0.00	19.85	0.00	0.00	0.00	96.15	-11.64	0.00	11.64	
11	TENSIONR	26.65	3.43	0.00	1.88	0.00	0.00	0.00	193.79	18.96	0.00	18.96	
13	LAYBARGE	21.33	3.31	0.00	0.00	0.00	0.01	0.00	193.50	-19.21	0.00	19.21	
15	LAYBARGE	12.14	2.98	0.00	66.18	-0.01	0.00	0.00	191.62	-250.28	-0.01	250.28	
17	LAYBARGE	-0.04	1.76	0.00	36.51	0.03	0.00	0.00	188.88	-232.58	0.03	232.58	
20	STINGER	-8.10	0.38	0.00	38.67	-0.29	0.00	0.00	185.69	-223.83	-0.12	223.83	
22	STINGER	-15.91	-1.36	0.00	0.00	-0.78	0.03	0.00	185.02	-89.67	-0.43	89.67	
24	STINGER	-23.67	-3.30	0.00	0.00	-0.38	0.23	0.00	184.43	-20.58	-0.03	20.58	
26	STINGER	-30.83	-5.13	0.00	0.00	-1.75	0.62	0.00	183.76	14.71	-1.20	14.76	
28	STINGER	-36.92	-6.67	0.00	0.00	10.70	1.19	0.00	183.18	32.50	2.91	32.63	
30	STINGER	-39.83	-7.39	0.00	0.00	-12.64	1.96	0.00	182.90	38.45	-22.01	44.30	
32	SAGBEND	-41.86	-7.89	0.00	0.00	0.00	0.00	0.00	182.71	41.88	-19.79	46.32	
33	SAGBEND	-43.80	-8.36	0.01	0.00	0.00	0.00	0.00	182.54	44.69	-15.90	47.43	
34	SAGBEND	-45.75	-8.82	0.02	0.00	0.00	0.00	0.00	182.36	47.12	-12.60	48.77	
35	SAGBEND	-47.69	-9.28	0.02	0.00	0.00	0.00	0.00	182.19	49.21	-9.80	50.18	
36	SAGBEND	-49.64	-9.73	0.03	0.00	0.00	0.00	0.00	182.02	51.02	-7.43	51.56	
37	SAGBEND	-51.59	-10.18	0.05	0.00	0.00	0.00	0.00	181.86	52.59	-5.42	52.87	
38	SAGBEND	-53.54	-10.62	0.06	0.00	0.00	0.00	0.00	181.69	53.94	-3.72	54.07	
39	SAGBEND	-55.50	-11.05	0.07	0.00	0.00	0.00	0.00	181.53	55.12	-2.27	55.17	
40	SAGBEND	-57.45	-11.48	0.08	0.00	0.00	0.00	0.00	181.37	56.14	-1.05	56.15	
41	SAGBEND	-59.41	-11.90	0.10	0.00	0.00	0.00	0.00	181.22	57.04	-0.01	57.04	
42	SAGBEND	-61.36	-12.31	0.11	0.00	0.00	0.00	0.00	181.06	57.81	0.88	57.82	
43	SAGBEND	-63.32	-12.71	0.12	0.00	0.00	0.00	0.00	180.91	58.49	1.64	58.52	
44	SAGBEND	-65.28	-13.11	0.14	0.00	0.00	0.00	0.00	180.77	59.09	2.28	59.13	
45	SAGBEND	-67.24	-13.50	0.15	0.00	0.00	0.00	0.00	180.62	59.61	2.82	59.68	
46	SAGBEND	-69.21	-13.88	0.16	0.00	0.00	0.00	0.00	180.48	60.07	3.28	60.16	
47	SAGBEND	-71.17	-14.26	0.17	0.00	0.00	0.00	0.00	180.34	60.48	3.67	60.59	
48	SAGBEND	-73.14	-14.63	0.18	0.00	0.00	0.00	0.00	180.20	60.84	4.00	60.97	
49	SAGBEND	-75.10	-14.98	0.19	0.00	0.00	0.00	0.00	180.07	61.16	4.27	61.31	

50	SAGBEND	-77.07	-15.34	0.20	0.00	0.00	0.00	0.00	0.00	179.94	61.44	4.50	61.61
51	SAGBEND	-79.04	-15.68	0.21	0.00	0.00	0.00	0.00	0.00	179.81	61.69	4.69	61.87
52	SAGBEND	-81.01	-16.02	0.22	0.00	0.00	0.00	0.00	0.00	179.69	61.92	4.85	62.11
53	SAGBEND	-82.99	-16.34	0.23	0.00	0.00	0.00	0.00	0.00	179.57	62.12	4.98	62.32
54	SAGBEND	-84.96	-16.66	0.24	0.00	0.00	0.00	0.00	0.00	179.45	62.30	5.09	62.51
55	SAGBEND	-86.94	-16.98	0.24	0.00	0.00	0.00	0.00	0.00	179.33	62.46	5.18	62.68
56	SAGBEND	-88.91	-17.28	0.25	0.00	0.00	0.00	0.00	0.00	179.22	62.61	5.24	62.83
57	SAGBEND	-90.89	-17.58	0.26	0.00	0.00	0.00	0.00	0.00	179.11	62.74	5.29	62.96
58	SAGBEND	-92.87	-17.87	0.26	0.00	0.00	0.00	0.00	0.00	179.01	62.85	5.33	63.08
59	SAGBEND	-94.85	-18.15	0.27	0.00	0.00	0.00	0.00	0.00	178.90	62.95	5.36	63.18

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 5:27:37      PAGE 18

PROJECT - STATIC PIPE ANALYSIS 12 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS		
					VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	VERT (KN )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
60	SAGBEND	-96.83	-18.42	0.27	0.00	0.00	0.00	0.00	178.80	63.04	5.38	63.27	
61	SAGBEND	-98.81	-18.69	0.27	0.00	0.00	0.00	0.00	178.70	63.12	5.38	63.35	
62	SAGBEND	-100.80	-18.94	0.28	0.00	0.00	0.00	0.00	178.61	63.19	5.38	63.41	
63	SAGBEND	-102.78	-19.19	0.28	0.00	0.00	0.00	0.00	178.52	63.24	5.38	63.47	
64	SAGBEND	-104.77	-19.43	0.28	0.00	0.00	0.00	0.00	178.43	63.28	5.36	63.51	
65	SAGBEND	-106.75	-19.66	0.28	0.00	0.00	0.00	0.00	178.34	63.31	5.34	63.53	
66	SAGBEND	-108.74	-19.89	0.28	0.00	0.00	0.00	0.00	178.26	63.32	5.31	63.54	
67	SAGBEND	-110.73	-20.10	0.28	0.00	0.00	0.00	0.00	178.18	63.32	5.28	63.54	
68	SAGBEND	-112.72	-20.31	0.27	0.00	0.00	0.00	0.00	178.11	63.30	5.24	63.52	
69	SAGBEND	-114.71	-20.51	0.27	0.00	0.00	0.00	0.00	178.03	63.27	5.19	63.48	
70	SAGBEND	-116.70	-20.70	0.27	0.00	0.00	0.00	0.00	177.96	63.21	5.13	63.42	
71	SAGBEND	-118.69	-20.89	0.27	0.00	0.00	0.00	0.00	177.89	63.14	5.07	63.34	
72	SAGBEND	-120.68	-21.06	0.26	0.00	0.00	0.00	0.00	177.83	63.04	5.00	63.23	
73	SAGBEND	-122.68	-21.23	0.26	0.00	0.00	0.00	0.00	177.77	62.91	4.92	63.10	
74	SAGBEND	-124.67	-21.39	0.25	0.00	0.00	0.00	0.00	177.71	62.74	4.82	62.93	
75	SAGBEND	-126.66	-21.54	0.24	0.00	0.00	0.00	0.00	177.65	62.54	4.71	62.72	
76	SAGBEND	-128.66	-21.69	0.24	0.00	0.00	0.00	0.00	177.60	62.30	4.59	62.47	
77	SAGBEND	-130.65	-21.82	0.23	0.00	0.00	0.00	0.00	177.55	62.01	4.45	62.17	
78	SAGBEND	-132.65	-21.95	0.22	0.00	0.00	0.00	0.00	177.51	61.67	4.29	61.82	
79	SAGBEND	-134.65	-22.07	0.21	0.00	0.00	0.00	0.00	177.46	61.26	4.10	61.39	
80	SAGBEND	-136.64	-22.18	0.20	0.00	0.00	0.00	0.00	177.42	60.77	3.89	60.90	
81	SAGBEND	-138.64	-22.29	0.19	0.00	0.00	0.00	0.00	177.38	60.20	3.65	60.31	
82	SAGBEND	-140.64	-22.38	0.18	0.00	0.00	0.00	0.00	177.35	59.53	3.36	59.82	
83	SAGBEND	-142.64	-22.47	0.17	0.00	0.00	0.00	0.00	177.32	58.74	3.03	58.82	
84	SAGBEND	-144.63	-22.55	0.16	0.00	0.00	0.00	0.00	177.29	57.82	2.66	57.88	
85	SAGBEND	-146.63	-22.63	0.15	0.00	0.00	0.00	0.00	177.27	56.74	2.22	56.78	
86	SAGBEND	-148.63	-22.69	0.14	0.00	0.00	0.00	0.00	177.24	55.48	1.71	55.50	
87	SAGBEND	-150.63	-22.75	0.13	0.00	0.00	0.00	0.00	177.22	54.01	1.12	54.02	
88	SAGBEND	-152.63	-22.81	0.11	0.00	0.00	0.00	0.00	177.21	52.29	0.44	52.29	
89	SAGBEND	-154.63	-22.85	0.10	0.00	0.00	0.00	0.00	177.19	50.30	-0.35	50.30	
90	SAGBEND	-156.63	-22.89	0.09	0.00	0.00	0.00	0.00	177.18	47.97	-1.27	47.99	
91	SAGBEND	-158.63	-22.92	0.08	0.00	0.00	0.00	0.00	177.17	45.26	-2.34	45.32	
92	SAGBEND	-160.63	-22.95	0.07	0.00	0.00	0.00	0.00	177.17	42.11	-3.52	42.26	
93	SAGBEND	-162.63	-22.97	0.06	0.00	0.00	0.00	0.00	177.17	38.44	-4.78	38.74	
94	SAGBEND	-164.63	-22.99	0.05	0.00	0.00	0.00	0.00	177.16	34.17	-6.15	34.72	
95	SEABED	-166.63	-23.00	0.04	0.17	-0.11	0.00	0.00	177.16	29.21	-7.65	30.20	
96	SEABED	-168.63	-23.01	0.03	0.53	-0.35	0.00	0.00	177.17	23.78	-9.11	25.47	
97	SEABED	-170.63	-23.02	0.02	0.78	-0.52	0.00	0.00	177.17	18.48	-10.06	21.04	
98	SEABED	-172.63	-23.02	0.01	0.94	-0.54	0.00	0.00	177.17	13.68	-10.21	17.07	
99	SEABED	-174.63	-23.02	0.01	1.01	-0.37	0.00	0.00	177.17	9.59	-9.51	13.51	
100	SEABED	-176.63	-23.02	0.00	1.04	-0.20	0.00	0.00	177.17	6.28	-8.29	10.40	
101	SEABED	-178.63	-23.02	0.00	1.03	-0.08	0.00	0.00	177.17	3.71	-6.84	7.78	
102	SEABED	-180.63	-23.02	0.00	1.00	0.00	0.00	0.00	177.17	1.82	-5.37	5.67	
103	SEABED	-182.63	-23.02	0.00	0.96	0.05	0.00	0.00	177.17	0.50	-4.02	4.05	

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 5:27:37      PAGE 19

PROJECT - STATIC PIPE ANALYSIS 12 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS		
					VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	VERT (KN )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
104	SEABED	-184.63	-23.02	0.00	0.92	0.07	0.00	0.00	177.17	-0.35	-2.86	2.88	
105	SEABED	-186.63	-23.02	0.00	0.88	0.08	0.00	0.00	177.17	-0.85	-1.90	2.08	
106	SEABED	-188.63	-23.02	0.00	0.84	0.08	0.00	0.00	177.17	-1.09	-1.15	1.58	
107	SEABED	-190.63	-23.02	0.00	0.81	0.08	0.00	0.00	177.17	-1.15	-0.59	1.29	
108	SEABED	-192.63	-23.02	0.00	0.78	0.06	0.00	0.00	177.17	-1.09	-0.20	1.11	
109	SEABED	-194.63	-23.02	0.00	0.76	0.05	0.00	0.00	177.17	-0.97	0.06	0.97	
110	SEABED	-196.63	-23.02	0.00	0.75	0.04	0.00	0.00	177.17	-0.81	0.21	0.84	
111	SEABED	-198.63	-23.02	0.00	0.74	0.03	0.00	0.00	177.17	-0.65	0.29	0.71	



112	SEABED	-200.63	-23.02	0.00	0.73	0.02	0.00	0.00	177.17	-0.49	0.31	0.58
113	SEABED	-202.63	-23.02	0.00	0.73	0.01	0.00	0.00	177.17	-0.36	0.30	0.46
114	SEABED	-204.63	-23.02	0.00	0.73	0.01	0.00	0.00	177.17	-0.24	0.27	0.36
115	SEABED	-206.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.15	0.22	0.27
116	SEABED	-208.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.09	0.18	0.20
117	SEABED	-210.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.04	0.14	0.14
118	SEABED	-212.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.01	0.10	0.10
119	SEABED	-214.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.01	0.07	0.07
120	SEABED	-216.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.02	0.05	0.05
121	SEABED	-218.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.02	0.03	0.04
122	SEABED	-220.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.02	0.02	0.03
123	SEABED	-222.63	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	0.02	0.01	0.02
124	SEABED	-224.63	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	0.01	0.00	0.01
125	SEABED	-226.63	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	0.00	0.00	0.00
126	SEABED	-228.63	-23.02	0.00	0.00	0.00	0.00	0.00	177.17	0.00	0.00	0.00

=====  
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 20  
STATIC PIPE ANALYSIS 12 INCH  
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
USER ID - IK DATE - 5/2/2020 TIME - 5:27:37 CASE 1  
=====

STATIC SOLUTION SUMMARY

PIPE PROPERTIES ( 1 )

PIPE SECTION LENGTH ..	0.00 M	ELASTIC MODULUS .....	207000. MPA
OUTSIDE DIAMETER .....	32.390 CM	CROSS SECTIONAL AREA ..	124.10 CM²
WALL THICKNESS .....	1.270 CM	MOMENT OF INERTIA .....	15048.2 CM⁴
WEIGHT/LENGTH IN AIR ..	2374.00 N/M	YIELD STRESS .....	360.00 MPA
SUBMERGED WGT/LENG ..	368.27 N/M	STRESS INTENS FACTOR ..	1.000
SPECIFIC GRAVITY .....	1.184	STEEL DENSITY .....	77008.0 N/M3
WRAP COAT THICKNESS ..	0.320 CM	WRAP COAT DENSITY .....	9025.2 N/M3
CONCRETE THICKNESS ...	4.000 CM	CONCRETE DENSITY .....	29858.0 N/M3

BARGE DATA

TOTAL PIPE TENSION ...	196.13 KN	RADIUS OF CURVATURE ..	0.00 M
NUMBER OF TENSIONERS ..	2	BARGE TRIM ANGLE .....	0.500 DEG
NO. OF PIPE SUPPORTS ..	7	PIPE ANGLE AT STERN ..	8.044 DEG
BARGE HEADING .....	0.000 DEG	OFFSET FROM R.O.W. ...	0.00 M

STINGER DATA

NO. OF PIPE SUPPORTS ..	6	PIPE DEPTH AT STERN ..	-7.39 M
NO. STINGER SECTIONS ..	6	PIPE ANGLE AT STERN ..	13.834 DEG
RADIUS OF CURVATURE ...	0.00 M	STINGER STERN DEPTH ..	-9.21 M
STINGER LENGTH .....	41.37 M		

SAGBEND DATA

WATER DEPTH .....	23.00 M	TENSION AT TOUCHDOWN ..	177.16 KN
TOUCHDOWN X-COORD. ...	-165.98 M	BOTTOM SLOPE ANGLE ...	0.000 DEG
PROJECTED SPAN LENGTH	126.16 M	PIPE LENGTH GAIN .....	2.43 M

===== SOLUTION SUMMARY =====

NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACT HORIZ (KN)	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	0.9	0.0	0.2	0.2	0.
3	LAYBARGE	59.7	4.3	0.0	22.6	0.0	15.0	16.2	5.
5	LAYBARGE	48.2	4.0	0.0	28.1	0.0	22.1	23.9	7.
7	TENSIONR	38.1	3.7	0.0	14.7	0.0	6.3	14.6	4.
9	LAYBARGE	33.4	3.6	0.0	19.9	0.0	11.6	20.3	6.
11	TENSIONR	26.7	3.4	0.0	1.9	0.0	19.0	36.0	10.
13	LAYBARGE	21.3	3.3	0.0	0.0	0.0	19.2	36.2	10.
15	LAYBARGE	12.1	3.0	0.0	66.2	0.0	250.3	284.7	79.
17	LAYBARGE	0.0	1.8	0.0	36.5	0.0	232.6	265.4	74.
20	STINGER	-8.1	0.4	0.0	38.7	-0.3	223.8	255.7	71.
22	STINGER	-15.9	-1.4	0.0	0.0	-0.8	89.7	111.4	31.
24	STINGER	-23.7	-3.3	0.0	0.0	-0.4	20.6	37.0	10.

=====  
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 21  
STATIC PIPE ANALYSIS 12 INCH  
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
USER ID - IK DATE - 5/2/2020 TIME - 5:27:37 CASE 1  
=====

STATIC SOLUTION SUMMARY

26	STINGER	-30.8	-5.1	0.0	0.0	-1.8	14.8	30.7	9.
28	STINGER	-36.9	-6.7	0.0	0.0	10.7	32.6	49.8	14.
30	STINGER	-39.8	-7.4	0.0	0.0	-12.6	44.3	62.4	17.
66	SAGBEND	-108.7	-19.9	0.3	0.0	0.0	63.5	82.7	23.
95	SEABED	-166.6	-23.0	0.0	0.2	-0.1	30.2	46.8	13.

DYNAMIC SOLUTION SUMMARY

SEA STATE NUMBER ( 1 )

=====
SEA STATE TYPE ..... WAVE SPECTRUM
NO. WAVE COMPONENTS .. 20
WAVE WATER DEPTH ..... 23.0 M
MAX. WAVE FREQUENCY .. 3.0015 RA/S
SPECTRUM START TIME .. 0. SECS
RAO SIGN CONVENTION .. BENTLEY MOSES

VESSEL RESPONSE TYPE . TABLE OF RAOS
WAVE TRAVEL DIRECTION 0.000 DEG
MIN. WAVE FREQUENCY .. 0.1001 RA/S
RANDOM PHASE SEED .... 0
NO. RAOS IN TABLE .... 30

SEA STATE DEFINITION

=====
WAVE SPECTRUM TYPE ... JONSWAP (CLASSIC)
JONSWAP COEFFICIENT .. 0.003223 JONSWAP PEAK FACTOR .. 5.000
PEAK WAVE FREQUENCY .. 0.9498 RA/S

CALCULATED WAVE HEIGHTS

=====
SIGNIFICANT WAVE HT. . 1.455 M AVERAGE WAVE HEIGHT .. 0.933 M
MAXIMUM WAVE HEIGHT .. 2.520 M RMS WAVE HEIGHT ..... 1.040 M
TOTAL NUMBER OF WAVES 1917

===== SOLUTION SUMMARY =====

NODE	PIPE	X COORD ( M )	Y COORD ( M )	Z COORD ( M )	SUPPORT VERT ( KN )	REACT HORIZ ( KN )	TOTAL MOMENT ( KN-M)	TOTAL STRESS ( MPA )	PCT YLD ( % )
1	LAYBARGE	64.2	4.4	0.0	1.0	0.1	0.2	0.2	0.
3	LAYBARGE	59.7	4.3	0.0	23.9	-1.7	16.0	17.3	5.
5	LAYBARGE	48.2	4.0	0.0	29.7	1.9	23.3	25.2	7.
7	TENSIONR	38.1	3.8	0.0	15.8	-1.5	6.9	23.0	6.
9	LAYBARGE	33.4	3.6	0.0	20.4	1.1	12.4	28.4	8.
11	TENSIONR	26.6	3.5	0.0	4.3	-2.3	20.5	44.8	12.
13	LAYBARGE	21.3	3.3	0.0	0.4	-2.9	21.2	45.7	13.
15	LAYBARGE	12.1	3.0	0.0	75.5	-6.5	259.6	302.7	84.
17	LAYBARGE	0.0	1.8	0.0	61.4	4.1	259.0	293.8	82.
20	STINGER	-8.1	0.4	0.0	55.7	-5.9	251.5	292.5	81.
22	STINGER	-15.9	-1.3	0.0	17.3	-4.8	131.7	164.4	46.
24	STINGER	-23.7	-3.1	0.0	-0.5	3.7	34.1	51.7	14.
26	STINGER	-30.9	-4.9	0.1	1.1	-13.7	49.6	76.1	21.
28	STINGER	-36.9	-6.3	0.1	-9.8	103.6	71.2	99.5	28.
30	STINGER	-39.9	-7.0	0.1	9.9	-119.5	211.8	243.6	68.
95	SEABED	-166.6	-22.8	0.4	0.0	0.0	61.8	81.1	23.

**LAMPIRAN ANALISA DINAMIS PADA PIPA 12 INCH  
HEADING 135°**

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*****
*
*           O F F P I P E - 3 -- OFFSHORE PIPELINE ANALYSIS SYSTEM
*
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*
*           VERSION NO. - 3.02EX
*           RELEASED ON - 03/08/2016
*           LICENSED TO - PT Timas Suplindo
*
*****
*
* OFFPIPE IS A NONLINEAR, 3-DIMENSIONAL FINITE ELEMENT METHOD BASED PROGRAM FOR THE
* STATIC AND DYNAMIC ANALYSIS OF PROBLEMS ARISING IN THE DESIGN OF MARINE PIPELINES.
* THIS VERSION OF OFFPIPE MAY BE USED FOR THE ANALYSIS OF OFFSHORE PIPELAYING OPER-
* ATIONS, DAVIT LIFTS, PIPELINES LYING ON AN UNEVEN SEABED, AND RISERS.
*
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*           HOUSTON, TEXAS 77005
*           U.S.A.                     EMAIL: SUPPORT@OFFPIPE.COM
*
*****

```

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=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX  PAGE 3
STATIC PIPE ANALYSIS 12 INCH
JOB NO. - LAYING           LICENSED BY - PT Timas Suplindo
USER ID - IK              DATE - 5/2/2020  TIME - 5:34:7          CASE 1
=====

```

INPUT DATA ECHO

```

=====
PRINTED OUTPUT SELECTED
=====
STATIC PIPE FORCES AND STRESSES ... YES
STATIC SOLUTION SUMMARY ..... YES
DYNAMIC PIPE FORCES AND STRESSES .. NO
DYNAMIC RANGE OF PIPE DATA ..... NO
DYNAMIC TRACKING OF PIPE DATA ..... NO
OVERBEND PIPE SUPPORT GEOMETRY .... NO
STINGER BALLAST SCHEDULE DATA ..... NO
SUPPORT REACTIONS IN BARGE COORDS . NO

INTERNAL FORCES IN PIPE & CABLE ... NO
INTERNAL FORCES IN STINGER ..... NO
PRINT PIPE STRAINS IN OUTPUT ..... NO
DNV OS-F101 COMPLIANCE REPORT ..... NO
API RP-1111 COMPLIANCE REPORT ..... NO
PRINT DNV/API FACTORS & PARAMETERS NO
USE THICK WALL HOOP STRESS EQN. ... NO
USE DNV 1981 FOR TOTAL PIPE STRESS NO

ENABLE/DISABLE WARNING MESSAGES ... ENABLE
GENERATE SPREAD SHEET PLOT FILE ... NO
GENERATE ASCII PLOT DATA FILES .... NO

```

PROFILE PLOT TABLE ENTRIES

```
=====
PLOT TABLE INDEX ..... 1
PLOT NUMBER ..... 1
PLOT TYPE OPTION NUMBER ..... 1
DYNAMIC PROFILE TIME POINT ..... 0.000
DYNAMIC PROFILE TIME INCREMENT .... 0.000
ORDINATE PARAMETER CODE NUMBER .... 2
AXIS LABEL FOR ORDINATE ..... "PIPE ELEVATION Y COORDINATE  "
ABSCISSA PARAMETER CODE NUMBER .... 1
AXIS LABEL FOR ABSCISSA ..... "PIPE HORIZONTAL X COORDINATE  "

PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS  "
MINIMUM VERTICAL AXIS RANGE ..... 0.000
MAXIMUM VERTICAL AXIS RANGE ..... 0.000
MINIMUM HORIZONTAL AXIS RANGE ..... 0.000
MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000
=====
```

```
=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 4
STATIC PIPE ANALYSIS 12 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 5/2/2020 TIME - 5:34:7 CASE 1
=====
```

INPUT DATA ECHO

PROFILE PLOT TABLE ENTRIES

```
=====
PLOT TABLE INDEX ..... 2
PLOT NUMBER ..... 1
PLOT TYPE OPTION NUMBER ..... 1
DYNAMIC PROFILE TIME POINT ..... 0.000
DYNAMIC PROFILE TIME INCREMENT .... 0.000
ORDINATE PARAMETER CODE NUMBER .... 15
AXIS LABEL FOR ORDINATE ..... "DNV YIELD STRESS PERCENTAGE  "
ABSCISSA PARAMETER CODE NUMBER .... 1
AXIS LABEL FOR ABSCISSA ..... "PIPELINE HORIZONTAL X COORDINATE"

PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS  "
MINIMUM VERTICAL AXIS RANGE ..... 0.000
MAXIMUM VERTICAL AXIS RANGE ..... 0.000
MINIMUM HORIZONTAL AXIS RANGE ..... 0.000
MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000
=====
```

PIPE PROPERTIES

```
=====
PROPERTY TABLE ROW NUMBER ..... 1
PIPE SECTION LENGTH ..... 0.000 METERS
STEEL MODULUS OF ELASTICITY ..... 207000. M-PASCAL
STEEL CROSS SECTIONAL AREA ..... 124.100 CM^2
COATED PIPE AVG MOMENT OF INERTIA . 15048.21 CM^4
WEIGHT PER-UNIT-LENGTH IN AIR ..... 2374.00 N/M
WEIGHT PER-UNIT-LENGTH SUBMERGED .. 368.27 N/M
MAXIMUM ALLOWABLE PIPE STRAIN ..... 0.205000 PERCENT

STEEL OUTSIDE DIAMETER ..... 32.3900 CM
STEEL WALL THICKNESS ..... 1.2700 CM
YIELD STRESS ..... 360.00 M-PASCAL
STRESS/STRAIN INTENSE FACTOR ..... 0.0000
HYDRODYNAMIC OUTSIDE DIAMETER ..... 0.000 CM
DRAG COEFFICIENT ..... 0.0000
HYDRODYNAMIC TOTAL AREA ..... 0.000 CM^2
ADDED MASS COEFFICIENT ..... 0.0000
POISSON'S RATIO ..... 0.3000
COEFFICIENT OF THERMAL EXPANSION .. 0.00001100 1/DEG C
=====
```

```
=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 5
STATIC PIPE ANALYSIS 12 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 5/2/2020 TIME - 5:34:7 CASE 1
=====
```

INPUT DATA ECHO

PIPE COATING PROPERTIES

```
=====
PIPE PROPERTY TABLE INDEX ..... 1
CORROSION COATING THICKNESS ..... 0.320 CM
CORROSION COATING WEIGHT DENSITY .. 9025.2 N/M^3
CORROSION COATING ELASTIC MODULUS . 0.000 M-PASCAL
CONCRETE COATING THICKNESS ..... 4.000 CM
CONCRETE COATING WEIGHT DENSITY ... 29858. N/M^3
CONCRETE COATING ELASTIC MODULUS .. 0.000 M-PASCAL
DESIRED PIPE SPECIFIC GRAVITY ..... 0.0000
CONCRETE STIFFENING EFFECTIVENESS . 0.000
NO NOT CALC. STRESS FOR BARE PIPE . NO
=====
```

AVERAGE LENGTH OF PIPE JOINT ..... 12.200 METERS  
 EFFECTIVE FIELD JOINT LENGTH ..... 0.300 METERS  
 FIELD JOINT FILL WEIGHT DENSITY ... 10055.3 N/M^3  
 FIELD JOINT FILL ELASTIC MODULUS... 0.000 M-PASCAL  
 FIELD JOINT STIFFENING EFFECT. .... 0.000  
 FIELD JOINT BENDING MODEL ..... 0 IGNORE COATING STIFFNESS  
 WEIGHT DENSITY OF STEEL ..... 77008. N/M^3  
 WEIGHT DENSITY OF PIPE CONTENTS ... 0.0 N/M^3  
 REF. ELEVATION FOR STATIC HEAD .... 0.00 METERS  
 FREE FLOOD PIPE DURING PIPELAY ... NO

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 6  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 5:34:7 CASE 1  
 =====

INPUT DATA ECHO

PIPELAY VESSEL DESCRIPTION

=====  
 NUMBER OF PIPE NODES ..... 9  
 BARGE GEOMETRY SPECIFIED BY ..... 1 X-Y COORDINATES  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.000 METERS  
 ADJUST Y COORDINATES MANUALLY .... NO  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 PIPE ANGLE RELATIVE TO DECK ..... 0.0000 DEGREES  
 HEIGHT OF DECK ABOVE WATER ..... 2.400 METERS  
 LAYBARGE FORWARD (X) OFFSET ..... 0.000 METERS  
 BARGE TRIM ANGLE ..... 0.5000 DEGREES  
  
 STERN SHOE X COORDINATE ..... 0.000 METERS  
 STERN SHOE Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER X COORDINATE ..... 43.820 METERS  
 ROTATION CENTER Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER Z COORDINATE ..... 6.370 METERS  
 BARGE HEADING ..... 0.0000 DEGREES  
 BARGE OFFSET FROM RIGHT-OF-WAY .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT VERTICAL ANGLE ... 0.000 DEGREES  
 PIPE RAMP PIVOT Z COORDINATE ..... 0.000 METERS  
 PIPE RAMP HEADING ON DECK ..... 0.000 DEGREES  
 ROLE OF ALTERNATE WAVE ORIGIN .... 0 MOTIONS & WAVES AT CENTER OF MOTION  
 WAVE PHASE ORIGIN X COORDINATE .... 0.000  
 WAVE PHASE ORIGIN Y COORDINATE .... 0.000 METERS  
 WAVE PHASE ORIGIN Z COORDINATE .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE .....

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	DAVIT SPACING ( M )
64.220	1.838	1 SIMPLE SUPPORT	0.000
59.740	1.760	1 SIMPLE SUPPORT	0.000
48.240	1.560	1 SIMPLE SUPPORT	0.000
38.110	1.383	2 PIPE TENSIONER	0.000
33.440	1.302	1 SIMPLE SUPPORT	0.000
26.660	1.183	2 PIPE TENSIONER	0.000
21.340	1.092	7 USER DEFINED SPT	0.000
12.150	0.860	7 USER DEFINED SPT	0.000
-0.040	-0.260	8 USER DEFINED SPT	0.000

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 7  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 5:34:7 CASE 1  
 =====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====  
 SUPPORT PROPERTY TABLE INDEX ..... 2  
 SUPPORT ELEMENT TYPE ..... 2 TENSIONER  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
  
 BOTTOM ROLLER ANGLE TO HORIZONTAL . 0.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES

SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 7  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 1.600 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 8  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 5:34: 7 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 8  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

STINGER DESCRIPTION

=====

NUMBER OF PIPE/STINGER NODES ..... 6  
 STINGER GEOMETRY SPECIFIED BY ..... 2 X-Y COORD AND MATCH PT  
 STINGER TYPE ..... 1 FIXED GEOMETRY OR RAMP  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.00 METERS  
 HITCH X-COORDINATE ..... 0.497 METERS  
 HITCH Y-COORDINATE ..... -1.800 METERS  
 HITCH ANGULAR ORIENTATION ..... 0.000 DEGREES

X COORDINATE OF LOCAL ORIGIN ..... 0.497 METERS  
 Y COORDINATE OF LOCAL ORIGIN ..... -1.800 METERS  
 ROTATION ABOUT STINGER HITCH ..... 13.300 DEGREES  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 TANGENT POINT ANGLE ..... 0.000 DEGREES

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	ELEMENT TYPE	ELEMENT LENGTH ( M )
-8.325	2.209	1 SIMPLE SUPPORT	2 HINGED END	0.000
-16.325	2.349	1 SIMPLE SUPPORT	1 FIXED END	0.000
-24.325	2.119	1 SIMPLE SUPPORT	1 FIXED END	0.000
-31.699	1.660	1 SIMPLE SUPPORT	1 FIXED END	0.000
-37.949	1.069	1 SIMPLE SUPPORT	1 FIXED END	0.000
-40.949	0.350	1 SIMPLE SUPPORT	1 FIXED END	0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 9  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 5:34: 7 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

```

=====
SUPPORT PROPERTY TABLE INDEX ..... 1
SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT
SUPPORT INITIAL STATE FLAG ..... 0
TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M
VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M
STATIC VERTICAL DEFLECTION ..... 0.0000 CM
LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES
SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES
SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS
BED ROLLER LENGTH ..... 1.640 METERS
HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS
TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
    
```

CURRENT VELOCITIES

```

=====
WATER DEPTH (M ) CURRENT SPEED (M/S ) DIRECTION OF TRAVEL (DEG )
=====
0.000 0.790 135.000
11.500 0.480 135.000
23.000 0.420 135.000
    
```

PIPE TENSION DATA

```

=====
STATIC PIPE TENSION ON LAY VESSEL . 196.133 K-NEWTON
MINIMUM DYNAMIC PIPE TENSION ..... 196.133 K-NEWTON
MAXIMUM DYNAMIC PIPE TENSION ..... 294.199 K-NEWTON
STATIC HORIZONTAL BOTTOM TENSION .. 0.000 K-NEWTON
NO. OF VALUES FOR TENSION PROFILE . 0
VALUES ARE FOR PIPE SPAN ANALYSIS . NO
MAXIMUM PIPE PAYOUT SPEED ..... 0.000 M/SEC
MAXIMUM PIPE TAKEUP SPEED ..... 0.000 M/SEC
    
```

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 10

STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 5:34: 7 CASE 1

=====  
 INPUT DATA ECHO

SAGBEND GEOMETRY

```

=====
SAGBEND PIPE ELEMENT LENGTH ..... 2.000 METERS
WATER DEPTH ..... 23.00 METERS
X-COORDINATE AT SPECIFIED DEPTH . . 0.00 METERS
ESTIMATED SAGBEND X LENGTH ..... 0.00 METERS
ESTIMATED PIPE LENGTH ON SEABED ... 0.00 METERS
X-COORD OF PIPE FREE END ON SEABED 0.00 METERS
X-COORD POINT OF FIXITY ON SEABED . 0.00 METERS
MAXIMUM SLOPE (ANGLE) OF SEABED ... 0.000 DEGREES
DIRECTION OF MAXIMUM SLOPE ..... 0.000 DEGREES

PIPE/CABLE SPAN END CONDITION ..... 0 PIPE/CABLE RESTING ON SEABED
PIPE/CABLE SPAN LENGTH GIVEN BY ... 0 SPECIFIED PIPE/CABLE TENSION
ESTIMATED SPAN DEPTH AT FREE END .. 0.00 METERS
PIPE VERTICAL ANGLE AT FREE END ... 0.000 DEGREES
BOTTOM HINGE OFFSET ..... 0.000 METERS
BOTTOM HINGE MINIMUM ANGLE ..... 0.000 DEGREES
BOTTOM HINGE MAXIMUM ANGLE ..... 0.000 DEGREES
    
```

SOIL ELEMENT PROPERTIES

```

=====
SOIL PROPERTY TABLE ROW INDEX ..... 1
SOIL ELEMENT TYPE (FUTURE USE) .... 0
PIPE INDEX OR SEGMENT NUMBER ..... 0
LONGITUDINAL SOIL STIFFNESS ..... 0.00 KN/M^2
VERTICAL SOIL STIFFNESS ..... 0.00 KN/M^2
LATERAL SOIL STIFFNESS ..... 0.00 KN/M^2
DEFLECTION UNDER REFERENCE LOAD ... 0.0000 CM

LONGITUDINAL COEF. OF FRICTION .... 0.000
LATERAL COEFFICIENT OF FRICTION ... 0.600
NUMBER OF INTEGRATION POINTS ..... 0
    
```

TIME INTEGRATION PARAMETERS

```

=====
TIME STEP LENGTH ..... 0.2000 SECONDS
MAXIMUM TIME OF INTEGRATION ..... 10860.000 SECONDS
SOLUTION SAMPLING TIME STEP ..... 0.400 SECONDS
    
```



SOLUTION SAMPLING STARTS AT TIME .. 60.000 SECONDS  
 DAMPING RATIO ..... 0.0000  
 NUMBER OF VARIABLE TIME STEPS ..... 0

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 11  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 5:34:7 CASE 1

=====

INPUT DATA ECHO

WAVE PARAMETERS

=====

SEA STATE ROW INDEX ..... 1  
 WAVE HEIGHT (PEAK TO TROUGH) ..... 1.800 METERS  
 WAVE PERIOD ..... 6.300 SECONDS  
 WAVE DIRECTION OF TRAVEL ..... 135.000 DEGREES  
 WATER DEPTH FOR WAVE CALCULATIONS .. 23.00 METERS  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0

WAVE SPECTRUM EQUATION

=====

SEA STATE ROW INDEX ..... 1  
 WAVE SPECTRUM EQUATION TYPE ..... 7 JONSWAP (CLASSIC)  
 NUMBER OF WAVES IN SPECTRUM ..... 20  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0  
 MINIMUM PERIOD IN SPECTRUM ..... 2.0933 SECONDS  
 MAXIMUM PERIOD IN SPECTRUM ..... 62.8000 SECONDS  
 START TIME FOR WAVE SPECTRUM ..... 0. SECONDS  
 DIRECTION OF WAVE TRAVEL ..... 0.000 DEGREES  
 1ST JONSWAP COEF. (ALPHA) ..... 0.003223  
 2ND JONSWAP COEF. (GAMMA) ..... 5.0000  
 PEAK WAVE PERIOD ..... 6.6150 SECONDS

VESSEL MOTION RAO TABLE

=====

SEA STATE NUMBER ..... 1  
 USE PHASE LAG FOR RAOs ..... NO  
 VESSEL MOTIONS SIGN CONVENTION .... 2 BENTLEY MOSES  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD

WAVE PERIOD (SECONDS)	----- SURGE AMPLITUDE (M/M )	----- / PHASE (DEG)	----- SWAY AMPLITUDE (M/M )	----- / PHASE (DEG)	----- HEAVE AMPLITUDE (M/M )	----- / PHASE (DEG)
2.0900	0.0030	69.00	0.0010	-73.00	0.0000	0.00
2.1700	0.0030	-84.00	0.0000	0.00	0.0000	0.00
2.2400	0.0050	110.00	0.0010	-95.00	0.0000	0.00
2.3300	0.0040	-36.00	0.0000	0.00	0.0000	0.00
2.4200	0.0070	125.00	0.0010	-146.00	0.0010	111.00
2.5100	0.0050	-20.00	0.0010	-38.00	0.0010	121.00
2.6200	0.0110	120.00	0.0030	154.00	0.0010	82.00
2.7300	0.0040	-57.00	0.0010	-101.00	0.0010	92.00
2.8500	0.0170	101.00	0.0040	107.00	0.0010	25.00
2.9900	0.0100	-157.00	0.0040	178.00	0.0020	5.00
3.1400	0.0170	69.00	0.0030	33.00	0.0010	-15.00
3.3100	0.0290	152.00	0.0080	89.00	0.0050	-64.00

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 12  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 5:34:7 CASE 1

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WAVE PERIOD	----- ROLL AMPLITUDE	----- / PHASE	----- PITCH AMPLITUDE	----- / PHASE	----- YAW AMPLITUDE	----- / PHASE
3.4900	0.0070	-108.00	0.0040	149.00	0.0070	-27.00
3.7000	0.0340	97.00	0.0100	-11.00	0.0040	-119.00
3.9300	0.0520	162.00	0.0220	43.00	0.0200	-92.00
4.1900	0.0240	-134.00	0.0150	101.00	0.0210	-50.00
4.4900	0.0380	87.00	0.0190	-59.00	0.0050	-147.00
4.8300	0.0940	140.00	0.0570	-5.00	0.0490	-140.00
5.2400	0.1090	-172.00	0.0720	39.00	0.0940	-106.00
5.7100	0.0650	-130.00	0.0430	87.00	0.1080	-66.00
6.2800	0.0310	87.00	0.0320	-90.00	0.0370	21.00
6.9800	0.1570	140.00	0.1300	-67.00	0.2060	-179.00
7.8500	0.2910	153.00	0.2830	-27.00	0.4660	-131.00
8.9700	0.4130	-179.00	0.4090	1.00	0.6770	-96.00
10.4700	0.5090	-155.00	0.5150	25.00	0.8240	-68.00
12.5600	0.5780	-135.00	0.5950	45.00	0.9170	-46.00
15.7000	0.6230	-118.00	0.6490	61.00	0.9690	-29.00
20.9300	0.6480	-105.00	0.6810	74.00	0.9930	-16.00
31.4000	0.6610	-96.00	0.6980	83.00	1.0020	-6.00
62.8000	0.6660	-91.00	0.7060	88.00	1.0030	-1.00

=====

(SECONDS)	(DEG/M)	(DEG)	(DEG/M)	(DEG)	(DEG/M)	(DEG)
2.0900	0.0030	-127.00	0.0010	-79.00	0.0020	-145.00
2.1700	0.0040	-149.00	0.0010	-150.00	0.0030	101.00
2.2400	0.0080	-151.00	0.0010	-159.00	0.0020	-129.00
2.3300	0.0040	-169.00	0.0020	133.00	0.0040	66.00
2.4200	0.0060	167.00	0.0030	135.00	0.0010	162.00
2.5100	0.0040	102.00	0.0040	101.00	0.0080	6.00
2.6200	0.0080	135.00	0.0030	113.00	0.0020	104.00
2.7300	0.0130	52.00	0.0050	65.00	0.0130	-44.00
2.8500	0.0180	35.00	0.0030	36.00	0.0100	34.00
2.9900	0.0310	35.00	0.0050	18.00	0.0140	-107.00
3.1400	0.0230	13.00	0.0130	-39.00	0.0230	-47.00
3.3100	0.0550	0.00	0.0160	-15.00	0.0020	76.00
3.4900	0.0420	19.00	0.0240	-89.00	0.0390	-142.00
3.7000	0.0550	-45.00	0.0600	-58.00	0.0530	-91.00
3.9300	0.0990	-30.00	0.0340	-27.00	0.0090	51.00
4.1900	0.0770	-26.00	0.0740	-126.00	0.1080	173.00
4.4900	0.0760	-73.00	0.1810	-92.00	0.1800	-137.00
4.8300	0.1640	-104.00	0.1930	-56.00	0.1290	-90.00
5.2400	0.3710	-100.00	0.0330	-46.00	0.0650	110.00
5.7100	0.5820	-77.00	0.3780	-158.00	0.3370	158.00
6.2800	0.3000	-56.00	1.0400	-118.00	0.6040	-166.00
6.9800	2.2020	-86.00	1.6540	-74.00	0.7900	-136.00

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 13
STATIC PIPE ANALYSIS 12 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 5/ 2/2020 TIME - 5:34: 7 CASE 1
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INPUT DATA ECHO

7.8500	2.0440	-27.00	1.8600	-34.00	0.8790	-109.00
8.9700	1.7290	3.00	1.7090	-2.00	0.8600	-85.00
10.4700	1.3750	27.00	1.3870	24.00	0.7530	-63.00
12.5600	1.0030	46.00	1.0160	45.00	0.5910	-44.00
15.7000	0.6580	62.00	0.6670	62.00	0.4090	-28.00
20.9300	0.3730	74.00	0.3790	76.00	0.2410	-15.00
31.4000	0.1660	83.00	0.1690	88.00	0.1100	-5.00
62.8000	0.0410	88.00	0.0440	105.00	0.0280	2.00

\*\*\*\*\* INFORMATIVE MESSAGE NO. - 94 \*\*\*\*\*

One or more of the phase angles in the RAO table have been adjusted to | minimize the difference in value between adjacent angles. If the phase | angles are arbitrarily restricted by the software used to calculate | the RAOs to a fixed range of values such as (0 to 2\*PI) or (-PI to | +PI), then phase angles that are actually close in value can differ by | as much as 2\*PI. These large differences can cause the phase angles | for RAOs that are between the values in the table (which must be | determined using interpolation) to be calculated incorrectly.

CONTROL SWITCHES

=====
MAX NUMBER STATIC ITERATIONS ..... 500
MAX DYNAMIC ITERATIONS PER STEP ... 500
BOUNDARY CONDITION LOGIC PARAMETER 5
TIME STEP STABILITY PARAMETER ..... 0
TYPE OF ANALYSIS ..... DYNAMIC
NUMBER OF PROBLEM DIMENSIONS ..... 3
DAVIT LIFT ANALYSIS ..... NO
=====

STATIC SOLUTION CONVERGED IN ( 50 ) ITERATIONS

END OF INPUT DATA

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 5:34: 7 PAGE 14
PROJECT - STATIC PIPE ANALYSIS 12 INCH JOB NO. - LAYING
USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1
=====

STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES (MPA)		TOTAL PERCENT YIELD (PCT)	
1	LAYBARGE	64.20	4.42	0.00	0.000	1.488	0.00	0.00	0.00	0.20	0.00	0.20	0.06
3	LAYBARGE	59.72	4.30	0.00	0.000	1.536	4.48	-0.02	0.00	-16.18	0.00	16.21	4.50
5	LAYBARGE	48.23	4.00	0.00	0.000	1.486	15.98	-0.08	0.00	-23.77	0.00	23.85	6.63
7	TENSIONR	38.10	3.73	0.00	0.000	1.461	26.11	7.77	0.00	-6.80	0.00	14.57	4.05
9	LAYBARGE	33.43	3.61	0.00	0.000	1.534	30.78	7.74	0.00	-12.50	0.00	20.24	5.62
11	TENSIONR	26.65	3.43	0.00	0.000	1.405	37.57	15.61	0.00	20.34	0.00	35.95	9.99
13	LAYBARGE	21.33	3.31	0.00	0.000	1.355	42.89	15.58	0.00	-20.64	0.00	36.22	10.06
15	LAYBARGE	12.14	2.98	0.00	0.000	3.373	52.08	15.43	0.00	-269.03	-0.01	284.46	79.02

17	LAYBARGE	-0.04	1.76	0.00	0.000	8.049	64.32	15.21	0.00	-250.88	0.02	266.09	73.91
20	STINGER	-8.10	0.38	0.00	0.000	11.284	72.50	14.96	0.00	-236.86	-0.06	251.82	69.95
22	STINGER	-15.91	-1.36	0.00	0.000	13.480	80.51	14.81	-0.17	-94.96	-0.24	109.86	30.52
24	STINGER	-23.68	-3.29	0.00	0.001	14.230	88.51	14.63	-0.42	-22.06	-0.02	36.91	10.25
26	STINGER	-30.84	-5.11	0.00	-0.003	14.251	95.90	14.46	-0.65	15.28	-0.65	30.08	8.36
28	STINGER	-36.93	-6.64	0.00	0.009	13.977	102.18	14.31	-0.85	34.18	1.58	48.96	13.60
30	STINGER	-39.83	-7.36	0.00	-0.018	13.786	105.17	14.24	-0.94	40.51	-11.88	56.94	15.82
32	SAGBEND	-41.87	-7.86	0.00	-0.062	13.634	107.27	14.19	-1.01	44.18	-10.67	60.15	16.71
33	SAGBEND	-43.81	-8.32	0.00	-0.096	13.478	109.27	14.15	-1.07	47.20	-8.56	62.66	17.40
34	SAGBEND	-45.76	-8.79	0.01	-0.123	13.312	111.27	14.10	-1.13	49.81	-6.77	64.94	18.04
35	SAGBEND	-47.70	-9.25	0.01	-0.144	13.137	113.27	14.06	-1.19	52.07	-5.26	66.99	18.61
36	SAGBEND	-49.65	-9.70	0.02	-0.160	12.956	115.27	14.01	-1.24	54.03	-3.97	68.82	19.12
37	SAGBEND	-51.60	-10.14	0.02	-0.172	12.768	117.27	13.97	-1.30	55.73	-2.89	70.43	19.57
38	SAGBEND	-53.55	-10.58	0.03	-0.181	12.575	119.27	13.93	-1.36	57.21	-1.97	71.86	19.96
39	SAGBEND	-55.51	-11.01	0.04	-0.186	12.377	121.27	13.89	-1.41	58.49	-1.19	73.11	20.31
40	SAGBEND	-57.46	-11.44	0.04	-0.189	12.175	123.27	13.85	-1.47	59.61	-0.53	74.21	20.61
41	SAGBEND	-59.42	-11.86	0.05	-0.190	11.969	125.27	13.81	-1.52	60.59	0.03	75.17	20.88
42	SAGBEND	-61.37	-12.27	0.05	-0.189	11.761	127.27	13.77	-1.57	61.45	0.51	76.01	21.12
43	SAGBEND	-63.33	-12.67	0.06	-0.186	11.549	129.27	13.73	-1.62	62.20	0.92	76.76	21.32
44	SAGBEND	-65.29	-13.07	0.07	-0.183	11.335	131.27	13.69	-1.68	62.86	1.26	77.41	21.50
45	SAGBEND	-67.25	-13.46	0.07	-0.178	11.120	133.27	13.65	-1.73	63.44	1.55	77.99	21.66
46	SAGBEND	-69.22	-13.84	0.08	-0.172	10.902	135.27	13.61	-1.77	63.95	1.80	78.49	21.80
47	SAGBEND	-71.18	-14.21	0.09	-0.165	10.682	137.27	13.58	-1.82	64.41	2.01	78.94	21.93
48	SAGBEND	-73.15	-14.58	0.09	-0.158	10.461	139.27	13.54	-1.87	64.81	2.19	79.34	22.04
49	SAGBEND	-75.11	-14.94	0.10	-0.150	10.239	141.27	13.51	-1.92	65.17	2.33	79.70	22.14
50	SAGBEND	-77.08	-15.29	0.10	-0.142	10.016	143.27	13.47	-1.96	65.49	2.46	80.01	22.23
51	SAGBEND	-79.05	-15.64	0.11	-0.133	9.791	145.27	13.44	-2.00	65.78	2.56	80.29	22.30
52	SAGBEND	-81.03	-15.97	0.11	-0.124	9.566	147.27	13.41	-2.05	66.04	2.64	80.55	22.37
53	SAGBEND	-83.00	-16.30	0.11	-0.115	9.339	149.27	13.38	-2.09	66.28	2.71	80.77	22.44
54	SAGBEND	-84.97	-16.62	0.12	-0.105	9.112	151.27	13.35	-2.13	66.49	2.77	80.98	22.49
55	SAGBEND	-86.95	-16.93	0.12	-0.095	8.885	153.27	13.31	-2.17	66.68	2.81	81.16	22.54
56	SAGBEND	-88.92	-17.24	0.12	-0.086	8.656	155.27	13.29	-2.21	66.85	2.85	81.32	22.59
57	SAGBEND	-90.90	-17.54	0.13	-0.076	8.427	157.27	13.26	-2.25	67.00	2.88	81.47	22.63
58	SAGBEND	-92.88	-17.83	0.13	-0.066	8.198	159.27	13.23	-2.29	67.14	2.89	81.60	22.67
59	SAGBEND	-94.86	-18.11	0.13	-0.056	7.968	161.27	13.20	-2.32	67.27	2.91	81.72	22.70

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/2/2020      TIME - 5:34:      7      PAGE 15

PROJECT - STATIC PIPE ANALYSIS 12 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERCT YIELD (PCT)
=====													
60	SAGBEND	-96.84	-18.38	0.13	-0.046	7.738	163.27	13.18	-2.36	67.38	2.92	81.82	22.73
61	SAGBEND	-98.82	-18.65	0.14	-0.036	7.507	165.27	13.15	-2.39	67.48	2.92	81.91	22.75
62	SAGBEND	-100.81	-18.90	0.14	-0.025	7.276	167.27	13.13	-2.42	67.57	2.92	81.99	22.78
63	SAGBEND	-102.79	-19.15	0.14	-0.015	7.045	169.27	13.10	-2.46	67.64	2.91	82.06	22.79
64	SAGBEND	-104.78	-19.39	0.14	-0.005	6.814	171.27	13.08	-2.49	67.70	2.90	82.11	22.81
65	SAGBEND	-106.76	-19.63	0.14	0.005	6.582	173.27	13.06	-2.52	67.74	2.89	82.15	22.82
66	SAGBEND	-108.75	-19.85	0.14	0.014	6.351	175.27	13.03	-2.55	67.77	2.87	82.17	22.82
67	SAGBEND	-110.74	-20.07	0.14	0.024	6.119	177.27	13.01	-2.57	67.79	2.85	82.18	22.83
68	SAGBEND	-112.73	-20.28	0.14	0.034	5.887	179.27	12.99	-2.60	67.79	2.83	82.17	22.82
69	SAGBEND	-114.72	-20.48	0.13	0.044	5.655	181.27	12.97	-2.63	67.76	2.80	82.14	22.82
70	SAGBEND	-116.71	-20.67	0.13	0.053	5.424	183.27	12.95	-2.65	67.72	2.77	82.09	22.82
71	SAGBEND	-118.70	-20.86	0.13	0.063	5.192	185.27	12.94	-2.67	67.66	2.73	82.02	22.78
72	SAGBEND	-120.69	-21.03	0.13	0.072	4.961	187.27	12.92	-2.70	67.57	2.69	81.92	22.76
73	SAGBEND	-122.69	-21.20	0.13	0.081	4.730	189.27	12.90	-2.72	67.45	2.64	81.79	22.72
74	SAGBEND	-124.68	-21.36	0.12	0.090	4.500	191.27	12.89	-2.74	67.29	2.59	81.63	22.68
75	SAGBEND	-126.67	-21.52	0.12	0.099	4.270	193.27	12.87	-2.76	67.10	2.53	81.43	22.62
76	SAGBEND	-128.67	-21.66	0.12	0.108	4.041	195.27	12.86	-2.78	66.86	2.46	81.19	22.55
77	SAGBEND	-130.66	-21.80	0.11	0.116	3.813	197.27	12.85	-2.79	66.57	2.38	80.89	22.47
78	SAGBEND	-132.66	-21.93	0.11	0.124	3.585	199.27	12.83	-2.81	66.22	2.28	80.54	22.37
79	SAGBEND	-134.66	-22.05	0.10	0.132	3.360	201.27	12.82	-2.83	65.80	2.18	80.11	22.25
80	SAGBEND	-136.65	-22.16	0.10	0.139	3.136	203.27	12.81	-2.84	65.31	2.05	79.61	22.11
81	SAGBEND	-138.65	-22.27	0.09	0.146	2.913	205.27	12.80	-2.85	64.72	1.91	79.02	21.95
82	SAGBEND	-140.65	-22.37	0.09	0.152	2.693	207.27	12.79	-2.87	64.03	1.75	78.32	21.76
83	SAGBEND	-142.65	-22.46	0.08	0.158	2.475	209.27	12.78	-2.88	63.22	1.56	77.50	21.53
84	SAGBEND	-144.64	-22.54	0.08	0.162	2.261	211.27	12.78	-2.89	62.27	1.34	76.54	21.26
85	SAGBEND	-146.64	-22.61	0.07	0.167	2.050	213.27	12.77	-2.90	61.15	1.09	75.42	20.95
86	SAGBEND	-148.64	-22.68	0.07	0.170	1.843	215.27	12.76	-2.91	59.84	0.79	74.11	20.58
87	SAGBEND	-150.64	-22.74	0.06	0.172	1.641	217.27	12.76	-2.92	58.32	0.45	72.57	20.16
88	SAGBEND	-152.64	-22.80	0.05	0.173	1.444	219.27	12.75	-2.92	56.53	0.06	70.79	19.66
89	SAGBEND	-154.64	-22.84	0.05	0.172	1.254	221.27	12.75	-2.93	54.45	-0.40	68.71	19.09
90	SAGBEND	-156.64	-22.88	0.04	0.170	1.072	223.27	12.74	-2.93	52.03	-0.93	66.30	18.42
91	SAGBEND	-158.64	-22.92	0.04	0.166	0.899	225.27	12.74	-2.94	49.21	-1.55	63.49	17.64
92	SAGBEND	-160.64	-22.95	0.03	0.159	0.736	227.27	12.74	-2.94	45.92	-2.24	60.24	16.73
93	SAGBEND	-162.64	-22.97	0.02	0.150	0.585	229.27	12.74	-2.94	42.09	-2.97	56.46	15.68
94	SAGBEND	-164.64	-22.99	0.02	0.139	0.449	231.27	12.73	-2.95	37.64	-3.78	52.10	14.47
95	SEABED	-166.64	-23.00	0.01	0.125	0.329	233.27	12.73	-2.95	32.45	-4.67	47.06	13.07
96	SEABED	-168.64	-23.01	0.01	0.107	0.228	235.27	12.73	-2.95	26.66	-5.50	41.51	11.53
97	SEABED	-170.64	-23.02	0.01	0.088	0.146	237.27	12.73	-2.95	20.89	-5.77	35.97	9.99
98	SEABED	-172.64	-23.02	0.00	0.068	0.084	239.27	12.73	-2.95	15.61	-5.46	30.85	8.57

99	SEABED	-174.64	-23.02	0.00	0.051	0.039	241.27	12.73	-2.95	11.07	-4.80	26.40	7.33
100	SEABED	-176.64	-23.02	0.00	0.036	0.008	243.27	12.73	-2.95	7.35	-4.00	22.72	6.31
101	SEABED	-178.64	-23.02	0.00	0.023	-0.012	245.27	12.73	-2.95	4.45	-3.17	19.84	5.51
102	SEABED	-180.64	-23.02	0.00	0.014	-0.024	247.27	12.73	-2.95	2.29	-2.40	17.71	4.92
103	SEABED	-182.64	-23.02	0.00	0.007	-0.029	249.27	12.73	-2.95	0.77	-1.72	16.29	4.53

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 5:34:      7      PAGE 16

PROJECT - STATIC PIPE ANALYSIS 12 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M )	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS VERT (MPA)	HORIZ STRESS (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
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104	SEABED	-184.64	-23.02	0.00	0.002	-0.029	251.27	12.73	-2.95	-0.24	-1.16	15.60	4.33
105	SEABED	-186.64	-23.02	0.00	-0.001	-0.028	253.27	12.73	-2.95	-0.84	-0.71	15.52	4.31
106	SEABED	-188.64	-23.02	0.00	-0.003	-0.024	255.27	12.73	-2.95	-1.14	-0.38	15.62	4.34
107	SEABED	-190.64	-23.02	0.00	-0.004	-0.020	257.27	12.73	-2.95	-1.24	-0.15	15.66	4.35
108	SEABED	-192.64	-23.02	0.00	-0.004	-0.016	259.27	12.73	-2.95	-1.19	0.01	15.61	4.34
109	SEABED	-194.64	-23.02	0.00	-0.004	-0.012	261.27	12.73	-2.95	-1.07	0.11	15.49	4.30
110	SEABED	-196.64	-23.02	0.00	-0.003	-0.009	263.27	12.73	-2.95	-0.90	0.16	15.34	4.26
111	SEABED	-198.64	-23.02	0.00	-0.003	-0.006	265.27	12.73	-2.95	-0.73	0.17	15.17	4.21
112	SEABED	-200.64	-23.02	0.00	-0.002	-0.004	267.27	12.73	-2.95	-0.56	0.17	15.01	4.17
113	SEABED	-202.64	-23.02	0.00	-0.002	-0.002	269.27	12.73	-2.95	-0.41	0.15	14.87	4.13
114	SEABED	-204.64	-23.02	0.00	-0.001	-0.001	271.27	12.73	-2.95	-0.28	0.13	14.74	4.10
115	SEABED	-206.64	-23.02	0.00	-0.001	0.000	273.27	12.73	-2.95	-0.18	0.11	14.64	4.07
116	SEABED	-208.64	-23.02	0.00	-0.001	0.001	275.27	12.73	-2.95	-0.10	0.08	14.57	4.05
117	SEABED	-210.64	-23.02	0.00	0.000	0.001	277.27	12.73	-2.95	-0.05	0.06	14.51	4.03
118	SEABED	-212.64	-23.02	0.00	0.000	0.001	279.27	12.73	-2.95	-0.01	0.04	14.48	4.02
119	SEABED	-214.64	-23.02	0.00	0.000	0.001	281.27	12.73	-2.95	0.01	0.03	14.47	4.02
120	SEABED	-216.64	-23.02	0.00	0.000	0.001	283.27	12.73	-2.95	0.02	0.02	14.46	4.02
121	SEABED	-218.64	-23.02	0.00	0.000	0.001	285.27	12.73	-2.95	0.03	0.01	14.46	4.02
122	SEABED	-220.64	-23.02	0.00	0.000	0.001	287.27	12.73	-2.95	0.02	0.00	14.46	4.02
123	SEABED	-222.64	-23.02	0.00	0.000	0.001	289.27	12.73	-2.95	0.02	0.00	14.46	4.02
124	SEABED	-224.64	-23.02	0.00	0.000	0.001	291.27	12.73	-2.95	0.01	0.00	14.45	4.01
125	SEABED	-226.64	-23.02	0.00	0.000	0.001	293.27	12.73	-2.95	0.00	0.00	14.44	4.01
126	SEABED	-228.64	-23.02	0.00	0.000	0.001	295.27	12.73	-2.95	0.00	0.00	14.44	4.01

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 5:34:      7      PAGE 17

PROJECT - STATIC PIPE ANALYSIS 12 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION VERT (KN )	HORIZ REACTION (KN )	SUPT VERT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	BENDING MOMENTS VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
=====													
1	LAYBARGE	64.20	4.42	0.00	0.92	0.00	0.00	0.00	0.00	0.19	0.00	0.19	
3	LAYBARGE	59.72	4.30	0.00	22.65	0.00	0.00	0.00	-0.28	-15.05	0.00	15.05	
5	LAYBARGE	48.23	4.00	0.00	28.14	0.00	0.00	0.00	-1.00	-22.10	0.00	22.10	
7	TENSIONR	38.10	3.73	0.00	14.66	0.00	0.00	0.00	96.44	-6.33	0.00	6.33	
9	LAYBARGE	33.43	3.61	0.00	19.84	0.00	0.00	0.00	96.15	-11.62	0.00	11.62	
11	TENSIONR	26.65	3.43	0.00	1.91	0.00	0.00	0.00	193.79	18.91	0.00	18.91	
13	LAYBARGE	21.33	3.31	0.00	0.00	0.00	0.01	0.00	193.49	-19.18	0.00	19.18	
15	LAYBARGE	12.14	2.98	0.00	66.08	0.00	0.00	0.00	191.62	-250.10	0.00	250.10	
17	LAYBARGE	-0.04	1.76	0.00	37.16	0.02	0.00	0.00	188.87	-233.23	0.02	233.23	
20	STINGER	-8.10	0.38	0.00	37.64	-0.15	0.00	0.00	185.72	-220.20	-0.06	220.20	
22	STINGER	-15.91	-1.36	0.00	0.00	-0.40	0.03	0.00	185.02	-88.28	-0.22	88.29	
24	STINGER	-23.68	-3.29	0.00	0.00	-0.20	0.25	0.00	184.43	-20.51	-0.02	20.51	
26	STINGER	-30.84	-5.11	0.00	0.00	-0.89	0.64	0.00	183.76	14.20	-0.61	14.21	
28	STINGER	-36.93	-6.64	0.00	0.00	5.37	1.22	0.00	183.19	31.77	1.47	31.81	
30	STINGER	-39.83	-7.36	0.00	0.00	-6.35	1.99	0.00	182.91	37.66	-11.04	39.25	
32	SAGBEND	-41.87	-7.86	0.00	0.00	0.00	0.00	0.00	182.73	41.07	-9.92	42.26	
33	SAGBEND	-43.81	-8.32	0.00	0.00	0.00	0.00	0.00	182.55	43.88	-7.96	44.60	
34	SAGBEND	-45.76	-8.79	0.01	0.00	0.00	0.00	0.00	182.38	46.31	-6.30	46.73	
35	SAGBEND	-47.70	-9.25	0.01	0.00	0.00	0.00	0.00	182.21	48.41	-4.89	48.65	
36	SAGBEND	-49.65	-9.70	0.02	0.00	0.00	0.00	0.00	182.04	50.23	-3.69	50.36	
37	SAGBEND	-51.60	-10.14	0.02	0.00	0.00	0.00	0.00	181.87	51.81	-2.68	51.88	
38	SAGBEND	-53.55	-10.58	0.03	0.00	0.00	0.00	0.00	181.71	53.18	-1.83	53.21	
39	SAGBEND	-55.51	-11.01	0.04	0.00	0.00	0.00	0.00	181.55	54.38	-1.11	54.39	
40	SAGBEND	-57.46	-11.44	0.04	0.00	0.00	0.00	0.00	181.39	55.42	-0.49	55.42	
41	SAGBEND	-59.42	-11.86	0.05	0.00	0.00	0.00	0.00	181.23	56.33	0.03	56.33	
42	SAGBEND	-61.37	-12.27	0.05	0.00	0.00	0.00	0.00	181.08	57.13	0.47	57.13	
43	SAGBEND	-63.33	-12.67	0.06	0.00	0.00	0.00	0.00	180.93	57.82	0.85	57.83	
44	SAGBEND	-65.29	-13.07	0.07	0.00	0.00	0.00	0.00	180.78	58.44	1.17	58.45	
45	SAGBEND	-67.25	-13.46	0.07	0.00	0.00	0.00	0.00	180.64	58.98	1.44	59.00	
46	SAGBEND	-69.22	-13.84	0.08	0.00	0.00	0.00	0.00	180.49	59.45	1.67	59.48	
47	SAGBEND	-71.18	-14.21	0.09	0.00	0.00	0.00	0.00	180.36	59.88	1.87	59.91	
48	SAGBEND	-73.15	-14.58	0.09	0.00	0.00	0.00	0.00	180.22	60.25	2.03	60.29	
49	SAGBEND	-75.11	-14.94	0.10	0.00	0.00	0.00	0.00	180.09	60.59	2.17	60.63	

50	SAGBEND	-77.08	-15.29	0.10	0.00	0.00	0.00	0.00	0.00	179.96	60.89	2.28	60.93
51	SAGBEND	-79.05	-15.64	0.11	0.00	0.00	0.00	0.00	0.00	179.83	61.16	2.38	61.20
52	SAGBEND	-81.03	-15.97	0.11	0.00	0.00	0.00	0.00	0.00	179.71	61.40	2.46	61.45
53	SAGBEND	-83.00	-16.30	0.11	0.00	0.00	0.00	0.00	0.00	179.58	61.61	2.52	61.67
54	SAGBEND	-84.97	-16.62	0.12	0.00	0.00	0.00	0.00	0.00	179.47	61.81	2.57	61.86
55	SAGBEND	-86.95	-16.93	0.12	0.00	0.00	0.00	0.00	0.00	179.35	61.99	2.62	62.04
56	SAGBEND	-88.92	-17.24	0.12	0.00	0.00	0.00	0.00	0.00	179.24	62.15	2.65	62.20
57	SAGBEND	-90.90	-17.54	0.13	0.00	0.00	0.00	0.00	0.00	179.13	62.29	2.67	62.35
58	SAGBEND	-92.88	-17.83	0.13	0.00	0.00	0.00	0.00	0.00	179.02	62.42	2.69	62.48
59	SAGBEND	-94.86	-18.11	0.13	0.00	0.00	0.00	0.00	0.00	178.92	62.54	2.70	62.60

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 5:34:      7      PAGE 18

PROJECT - STATIC PIPE ANALYSIS 12 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS		
					VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	(KN )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
=====													
60	SAGBEND	-96.84	-18.38	0.13	0.00	0.00	0.00	0.00	178.82	62.64	2.71	62.70	
61	SAGBEND	-98.82	-18.65	0.14	0.00	0.00	0.00	0.00	178.72	62.73	2.71	62.79	
62	SAGBEND	-100.81	-18.90	0.14	0.00	0.00	0.00	0.00	178.62	62.81	2.71	62.87	
63	SAGBEND	-102.79	-19.15	0.14	0.00	0.00	0.00	0.00	178.53	62.88	2.71	62.94	
64	SAGBEND	-104.78	-19.39	0.14	0.00	0.00	0.00	0.00	178.44	62.93	2.70	62.99	
65	SAGBEND	-106.76	-19.63	0.14	0.00	0.00	0.00	0.00	178.36	62.98	2.69	63.03	
66	SAGBEND	-108.75	-19.85	0.14	0.00	0.00	0.00	0.00	178.27	63.01	2.67	63.06	
67	SAGBEND	-110.74	-20.07	0.14	0.00	0.00	0.00	0.00	178.19	63.02	2.65	63.08	
68	SAGBEND	-112.73	-20.28	0.14	0.00	0.00	0.00	0.00	178.12	63.02	2.63	63.07	
69	SAGBEND	-114.72	-20.48	0.13	0.00	0.00	0.00	0.00	178.04	63.00	2.61	63.05	
70	SAGBEND	-116.71	-20.67	0.13	0.00	0.00	0.00	0.00	177.97	62.96	2.58	63.01	
71	SAGBEND	-118.70	-20.86	0.13	0.00	0.00	0.00	0.00	177.90	62.90	2.54	62.95	
72	SAGBEND	-120.69	-21.03	0.13	0.00	0.00	0.00	0.00	177.84	62.81	2.50	62.86	
73	SAGBEND	-122.69	-21.20	0.13	0.00	0.00	0.00	0.00	177.78	62.70	2.46	62.75	
74	SAGBEND	-124.68	-21.36	0.12	0.00	0.00	0.00	0.00	177.72	62.56	2.41	62.60	
75	SAGBEND	-126.67	-21.52	0.12	0.00	0.00	0.00	0.00	177.66	62.38	2.35	62.42	
76	SAGBEND	-128.67	-21.66	0.12	0.00	0.00	0.00	0.00	177.61	62.16	2.28	62.20	
77	SAGBEND	-130.66	-21.80	0.11	0.00	0.00	0.00	0.00	177.56	61.89	2.21	61.93	
78	SAGBEND	-132.66	-21.93	0.11	0.00	0.00	0.00	0.00	177.51	61.56	2.12	61.60	
79	SAGBEND	-134.66	-22.05	0.10	0.00	0.00	0.00	0.00	177.47	61.17	2.02	61.21	
80	SAGBEND	-136.65	-22.16	0.10	0.00	0.00	0.00	0.00	177.43	60.71	1.91	60.74	
81	SAGBEND	-138.65	-22.27	0.09	0.00	0.00	0.00	0.00	177.39	60.17	1.78	60.20	
82	SAGBEND	-140.65	-22.37	0.09	0.00	0.00	0.00	0.00	177.36	59.53	1.62	59.55	
83	SAGBEND	-142.65	-22.46	0.08	0.00	0.00	0.00	0.00	177.32	58.77	1.45	58.79	
84	SAGBEND	-144.64	-22.54	0.08	0.00	0.00	0.00	0.00	177.29	57.89	1.25	57.90	
85	SAGBEND	-146.64	-22.61	0.07	0.00	0.00	0.00	0.00	177.27	56.85	1.01	56.86	
86	SAGBEND	-148.64	-22.68	0.07	0.00	0.00	0.00	0.00	177.25	55.63	0.74	55.64	
87	SAGBEND	-150.64	-22.74	0.06	0.00	0.00	0.00	0.00	177.23	54.21	0.42	54.21	
88	SAGBEND	-152.64	-22.80	0.05	0.00	0.00	0.00	0.00	177.21	52.56	0.05	52.56	
89	SAGBEND	-154.64	-22.84	0.05	0.00	0.00	0.00	0.00	177.20	50.62	-0.37	50.63	
90	SAGBEND	-156.64	-22.88	0.04	0.00	0.00	0.00	0.00	177.18	48.37	-0.87	48.38	
91	SAGBEND	-158.64	-22.92	0.04	0.00	0.00	0.00	0.00	177.18	45.75	-1.44	45.77	
92	SAGBEND	-160.64	-22.95	0.03	0.00	0.00	0.00	0.00	177.17	42.69	-2.08	42.74	
93	SAGBEND	-162.64	-22.97	0.02	0.00	0.00	0.00	0.00	177.16	39.13	-2.76	39.23	
94	SAGBEND	-164.64	-22.99	0.02	0.00	0.00	0.00	0.00	177.16	34.99	-3.51	35.16	
95	SEABED	-166.64	-23.00	0.01	0.11	-0.07	0.00	0.00	177.16	30.17	-4.34	30.48	
96	SEABED	-168.64	-23.01	0.01	0.47	-0.33	0.00	0.00	177.17	24.78	-5.11	25.31	
97	SEABED	-170.64	-23.02	0.01	0.74	-0.33	0.00	0.00	177.17	19.42	-5.36	20.15	
98	SEABED	-172.64	-23.02	0.00	0.91	-0.21	0.00	0.00	177.17	14.51	-5.07	15.37	
99	SEABED	-174.64	-23.02	0.00	1.00	-0.12	0.00	0.00	177.17	10.29	-4.47	11.22	
100	SEABED	-176.64	-23.02	0.00	1.04	-0.05	0.00	0.00	177.17	6.83	-3.72	7.78	
101	SEABED	-178.64	-23.02	0.00	1.03	-0.01	0.00	0.00	177.17	4.13	-2.95	5.08	
102	SEABED	-180.64	-23.02	0.00	1.01	0.02	0.00	0.00	177.17	2.13	-2.23	3.08	
103	SEABED	-182.64	-23.02	0.00	0.97	0.04	0.00	0.00	177.17	0.71	-1.60	1.75	

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 5:34:      7      PAGE 19

PROJECT - STATIC PIPE ANALYSIS 12 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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=====													
STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS		
					VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	(KN )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
=====													
104	SEABED	-184.64	-23.02	0.00	0.93	0.04	0.00	0.00	177.17	-0.22	-1.08	1.10	
105	SEABED	-186.64	-23.02	0.00	0.88	0.04	0.00	0.00	177.17	-0.78	-0.66	1.02	
106	SEABED	-188.64	-23.02	0.00	0.85	0.04	0.00	0.00	177.17	-1.06	-0.36	1.12	
107	SEABED	-190.64	-23.02	0.00	0.81	0.03	0.00	0.00	177.17	-1.15	-0.14	1.16	
108	SEABED	-192.64	-23.02	0.00	0.79	0.03	0.00	0.00	177.17	-1.11	0.01	1.11	
109	SEABED	-194.64	-23.02	0.00	0.77	0.02	0.00	0.00	177.17	-0.99	0.10	1.00	
110	SEABED	-196.64	-23.02	0.00	0.75	0.02	0.00	0.00	177.17	-0.84	0.15	0.85	
111	SEABED	-198.64	-23.02	0.00	0.74	0.01	0.00	0.00	177.17	-0.67	0.16	0.69	

112	SEABED	-200.64	-23.02	0.00	0.73	0.01	0.00	0.00	177.17	-0.52	0.16	0.54
113	SEABED	-202.64	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.38	0.14	0.41
114	SEABED	-204.64	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.26	0.12	0.29
115	SEABED	-206.64	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.17	0.10	0.20
116	SEABED	-208.64	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.10	0.08	0.12
117	SEABED	-210.64	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.05	0.06	0.07
118	SEABED	-212.64	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.01	0.04	0.04
119	SEABED	-214.64	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.01	0.03	0.03
120	SEABED	-216.64	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.02	0.02	0.03
121	SEABED	-218.64	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.02	0.01	0.03
122	SEABED	-220.64	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.02	0.00	0.02
123	SEABED	-222.64	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	0.02	0.00	0.02
124	SEABED	-224.64	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	0.01	0.00	0.01
125	SEABED	-226.64	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	0.00	0.00	0.00
126	SEABED	-228.64	-23.02	0.00	0.00	0.00	0.00	0.00	177.17	0.00	0.00	0.00

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 20

STATIC PIPE ANALYSIS 12 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/2/2020 TIME - 5:34:7 CASE 1

=====

STATIC SOLUTION SUMMARY

PIPE PROPERTIES ( 1)

PIPE SECTION LENGTH ..	0.00 M	ELASTIC MODULUS .....	207000. MPA
OUTSIDE DIAMETER .....	32.390 CM	CROSS SECTIONAL AREA ..	124.10 CM^2
WALL THICKNESS .....	1.270 CM	MOMENT OF INERTIA .....	15048.2 CM^4
WEIGHT/LENGTH IN AIR ..	2374.00 N/M	YIELD STRESS .....	360.00 MPA
SUBMERGED WGT/LENG ..	368.27 N/M	STRESS INTENS FACTOR ..	1.000
SPECIFIC GRAVITY .....	1.184	STEEL DENSITY .....	77008.0 N/M3
WRAP COAT THICKNESS ..	0.320 CM	WRAP COAT DENSITY .....	9025.2 N/M3
CONCRETE THICKNESS ...	4.000 CM	CONCRETE DENSITY .....	29858.0 N/M3

BARGE DATA

TOTAL PIPE TENSION ...	196.13 KN	RADIUS OF CURVATURE ..	0.00 M
NUMBER OF TENSIONERS ..	2	BARGE TRIM ANGLE .....	0.500 DEG
NO. OF PIPE SUPPORTS ..	7	PIPE ANGLE AT STERN ..	8.049 DEG
BARGE HEADING .....	0.000 DEG	OFFSET FROM R.O.W. ...	0.00 M

STINGER DATA

NO. OF PIPE SUPPORTS ..	6	PIPE DEPTH AT STERN ..	-7.36 M
NO. STINGER SECTIONS ..	6	PIPE ANGLE AT STERN ..	13.786 DEG
RADIUS OF CURVATURE ...	0.00 M	STINGER STERN DEPTH ..	-9.21 M
STINGER LENGTH .....	41.37 M		

SAGBEND DATA

WATER DEPTH .....	23.00 M	TENSION AT TOUCHDOWN ..	177.16 KN
TOUCHDOWN X-COORD. ...	-166.36 M	BOTTOM SLOPE ANGLE ...	0.000 DEG
PROJECTED SPAN LENGTH	126.53 M	PIPE LENGTH GAIN .....	2.43 M

===== SOLUTION SUMMARY =====

NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACT HORIZ (KN)	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	0.9	0.0	0.2	0.2	0.
3	LAYBARGE	59.7	4.3	0.0	22.6	0.0	15.0	16.2	5.
5	LAYBARGE	48.2	4.0	0.0	28.1	0.0	22.1	23.9	7.
7	TENSIONR	38.1	3.7	0.0	14.7	0.0	6.3	14.6	4.
9	LAYBARGE	33.4	3.6	0.0	19.8	0.0	11.6	20.2	6.
11	TENSIONR	26.7	3.4	0.0	1.9	0.0	18.9	35.9	10.
13	LAYBARGE	21.3	3.3	0.0	0.0	0.0	19.2	36.2	10.
15	LAYBARGE	12.1	3.0	0.0	66.1	0.0	250.1	284.5	79.
17	LAYBARGE	0.0	1.8	0.0	37.2	0.0	233.2	266.1	74.
20	STINGER	-8.1	0.4	0.0	37.6	-0.1	220.2	251.8	70.
22	STINGER	-15.9	-1.4	0.0	0.0	-0.4	88.3	109.9	31.
24	STINGER	-23.7	-3.3	0.0	0.0	-0.2	20.5	36.9	10.

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 21

STATIC PIPE ANALYSIS 12 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo

USER ID - IK DATE - 5/2/2020 TIME - 5:34:7 CASE 1

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STATIC SOLUTION SUMMARY

26	STINGER	-30.8	-5.1	0.0	0.0	-0.9	14.2	30.1	8.
28	STINGER	-36.9	-6.6	0.0	0.0	5.4	31.8	49.0	14.
30	STINGER	-39.8	-7.4	0.0	0.0	-6.4	39.2	56.9	16.
67	SAGBEND	-110.7	-20.1	0.1	0.0	0.0	63.1	82.2	23.
95	SEABED	-166.6	-23.0	0.0	0.1	-0.1	30.5	47.1	13.

DYNAMIC SOLUTION SUMMARY

SEA STATE NUMBER ( 1 )

=====
SEA STATE TYPE ..... WAVE SPECTRUM
NO. WAVE COMPONENTS .. 20
WAVE WATER DEPTH ..... 23.0 M
MAX. WAVE FREQUENCY .. 3.0015 RA/S
SPECTRUM START TIME .. 0. SECS
RAO SIGN CONVENTION .. BENTLEY MOSES

VESSEL RESPONSE TYPE . TABLE OF RAOS
WAVE TRAVEL DIRECTION 0.000 DEG
MIN. WAVE FREQUENCY .. 0.1001 RA/S
RANDOM PHASE SEED .... 0
NO. RAOS IN TABLE .... 30

SEA STATE DEFINITION

=====
WAVE SPECTRUM TYPE ... JONSWAP (CLASSIC)
JONSWAP COEFFICIENT .. 0.003223 JONSWAP PEAK FACTOR .. 5.000
PEAK WAVE FREQUENCY .. 0.9498 RA/S

CALCULATED WAVE HEIGHTS

=====
SIGNIFICANT WAVE HT. . 1.456 M AVERAGE WAVE HEIGHT .. 0.927 M
MAXIMUM WAVE HEIGHT .. 2.687 M RMS WAVE HEIGHT ..... 1.037 M
TOTAL NUMBER OF WAVES 1929

===== SOLUTION SUMMARY =====

NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACT HORIZ (KN )	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	1.1	-0.1	0.2	0.2	0.
3	LAYBARGE	59.7	4.3	0.0	23.2	-0.5	15.6	16.8	5.
5	LAYBARGE	48.2	4.0	0.0	28.7	-0.3	22.6	24.4	7.
7	TENSIONR	38.1	3.7	0.0	15.5	-0.1	6.9	22.8	6.
9	LAYBARGE	33.4	3.6	0.0	22.4	0.4	14.3	28.4	8.
11	TENSIONR	26.6	3.4	0.0	4.7	-0.4	23.9	45.6	13.
13	LAYBARGE	21.3	3.3	0.0	0.0	-0.5	21.6	46.8	13.
15	LAYBARGE	12.1	3.0	0.0	76.3	2.0	263.6	303.2	84.
17	LAYBARGE	0.0	1.7	0.0	65.4	-2.2	261.8	301.6	84.
20	STINGER	-8.1	0.4	0.0	60.4	-3.1	253.9	295.9	82.
22	STINGER	-15.9	-1.2	0.0	44.5	-4.8	211.4	249.8	69.
24	STINGER	-23.7	-3.0	0.0	8.9	-4.4	86.9	116.1	32.
26	STINGER	-30.9	-4.7	0.0	0.3	12.4	75.8	105.6	29.
28	STINGER	-36.9	-6.1	0.0	-2.4	85.1	88.6	119.4	33.
30	STINGER	-39.8	-6.8	0.0	2.5	-100.0	180.5	216.5	60.
95	SEABED	-166.6	-22.7	0.3	2.2	-1.4	73.0	92.5	26.

**LAMPIRAN ANALISA DINAMIS PADA PIPA 12 INCH  
HEADING 180°**



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*
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*
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*
*           VERSION NO. - 3.02EX
*           RELEASED ON - 03/08/2016
*           LICENSED TO - PT Timas Suplindo
*
*****
*
* OFFPIPE IS A NONLINEAR, 3-DIMENSIONAL FINITE ELEMENT METHOD BASED PROGRAM FOR THE
* STATIC AND DYNAMIC ANALYSIS OF PROBLEMS ARISING IN THE DESIGN OF MARINE PIPELINES.
* THIS VERSION OF OFFPIPE MAY BE USED FOR THE ANALYSIS OF OFFSHORE PIPELAYING OPER-
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*           6554 AUDEN                 FACSIMILE: (713) 664-0962
*           HOUSTON, TEXAS 77005
*           U.S.A.                     EMAIL: SUPPORT@OFFPIPE.COM
*
*****

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 3
STATIC PIPE ANALYSIS 12 INCH
JOB NO. - LAYING           LICENSED BY - PT Timas Suplindo
USER ID - IK              DATE - 5/2/2020 TIME - 5:41:9           CASE 1
=====

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INPUT DATA ECHO

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=====
PRINTED OUTPUT SELECTED
=====
STATIC PIPE FORCES AND STRESSES ... YES
STATIC SOLUTION SUMMARY ..... YES
DYNAMIC PIPE FORCES AND STRESSES .. NO
DYNAMIC RANGE OF PIPE DATA ..... NO
DYNAMIC TRACKING OF PIPE DATA ..... NO
OVERBEND PIPE SUPPORT GEOMETRY .... NO
STINGER BALLAST SCHEDULE DATA ..... NO
SUPPORT REACTIONS IN BARGE COORDS . NO

INTERNAL FORCES IN PIPE & CABLE ... NO
INTERNAL FORCES IN STINGER ..... NO
PRINT PIPE STRAINS IN OUTPUT ..... NO
DNV OS-F101 COMPLIANCE REPORT ..... NO
API RP-1111 COMPLIANCE REPORT ..... NO
PRINT DNV/API FACTORS & PARAMETERS NO
USE THICK WALL HOOP STRESS EQN. ... NO
USE DNV 1981 FOR TOTAL PIPE STRESS NO

ENABLE/DISABLE WARNING MESSAGES ... ENABLE
GENERATE SPREAD SHEET PLOT FILE ... NO
GENERATE ASCII PLOT DATA FILES .... NO

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PROFILE PLOT TABLE ENTRIES

```

=====
PLOT TABLE INDEX ..... 1
PLOT NUMBER ..... 1
PLOT TYPE OPTION NUMBER ..... 1
DYNAMIC PROFILE TIME POINT ..... 0.000
DYNAMIC PROFILE TIME INCREMENT ..... 0.000
ORDINATE PARAMETER CODE NUMBER ..... 2
AXIS LABEL FOR ORDINATE ..... "PIPE ELEVATION Y COORDINATE"
ABSCISSA PARAMETER CODE NUMBER ..... 1
AXIS LABEL FOR ABSCISSA ..... "PIPE HORIZONTAL X COORDINATE"

PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS"
MINIMUM VERTICAL AXIS RANGE ..... 0.000
MAXIMUM VERTICAL AXIS RANGE ..... 0.000
MINIMUM HORIZONTAL AXIS RANGE ..... 0.000
MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000
=====

```

```

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 4
STATIC PIPE ANALYSIS 12 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 5/2/2020 TIME - 5:41:9 CASE 1
=====

```

INPUT DATA ECHO

PROFILE PLOT TABLE ENTRIES

```

=====
PLOT TABLE INDEX ..... 2
PLOT NUMBER ..... 1
PLOT TYPE OPTION NUMBER ..... 1
DYNAMIC PROFILE TIME POINT ..... 0.000
DYNAMIC PROFILE TIME INCREMENT ..... 0.000
ORDINATE PARAMETER CODE NUMBER ..... 15
AXIS LABEL FOR ORDINATE ..... "DNV YIELD STRESS PERCENTAGE"
ABSCISSA PARAMETER CODE NUMBER ..... 1
AXIS LABEL FOR ABSCISSA ..... "PIPELINE HORIZONTAL X COORDINATE"

PLOT TITLE ..... "PIPELINE ELEVATION PROFILE AND PIPE STRESS"
MINIMUM VERTICAL AXIS RANGE ..... 0.000
MAXIMUM VERTICAL AXIS RANGE ..... 0.000
MINIMUM HORIZONTAL AXIS RANGE ..... 0.000
MAXIMUM HORIZONTAL AXIS RANGE ..... 0.000
=====

```

PIPE PROPERTIES

```

=====
PROPERTY TABLE ROW NUMBER ..... 1
PIPE SECTION LENGTH ..... 0.000 METERS
STEEL MODULUS OF ELASTICITY ..... 207000. M-PASCAL
STEEL CROSS SECTIONAL AREA ..... 124.100 CM^2
COATED PIPE AVG MOMENT OF INERTIA ..... 15048.21 CM^4
WEIGHT PER-UNIT-LENGTH IN AIR ..... 2374.00 N/M
WEIGHT PER-UNIT-LENGTH SUBMERGED .. 368.27 N/M
MAXIMUM ALLOWABLE PIPE STRAIN ..... 0.205000 PERCENT

STEEL OUTSIDE DIAMETER ..... 32.3900 CM
STEEL WALL THICKNESS ..... 1.2700 CM
YIELD STRESS ..... 360.00 M-PASCAL
STRESS/STRAIN INTENSE FACTOR ..... 0.0000
HYDRODYNAMIC OUTSIDE DIAMETER ..... 0.000 CM
DRAG COEFFICIENT ..... 0.0000
HYDRODYNAMIC TOTAL AREA ..... 0.000 CM^2
ADDED MASS COEFFICIENT ..... 0.0000
POISSON'S RATIO ..... 0.3000
COEFFICIENT OF THERMAL EXPANSION .. 0.00001100 1/DEG C
=====

```

```

=====
OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 5
STATIC PIPE ANALYSIS 12 INCH
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo
USER ID - IK DATE - 5/2/2020 TIME - 5:41:9 CASE 1
=====

```

INPUT DATA ECHO

PIPE COATING PROPERTIES

```

=====
PIPE PROPERTY TABLE INDEX ..... 1
CORROSION COATING THICKNESS ..... 0.320 CM
CORROSION COATING WEIGHT DENSITY .. 9025.2 N/M^3
CORROSION COATING ELASTIC MODULUS . 0.000 M-PASCAL
CONCRETE COATING THICKNESS ..... 4.000 CM
CONCRETE COATING WEIGHT DENSITY ... 29858. N/M^3
CONCRETE COATING ELASTIC MODULUS .. 0.000 M-PASCAL
DESIRED PIPE SPECIFIC GRAVITY ..... 0.0000
CONCRETE STIFFENING EFFECTIVENESS . 0.000
NO NOT CALC. STRESS FOR BARE PIPE . NO
=====

```

AVERAGE LENGTH OF PIPE JOINT ..... 12.200 METERS  
 EFFECTIVE FIELD JOINT LENGTH ..... 0.300 METERS  
 FIELD JOINT FILL WEIGHT DENSITY ... 10055.3 N/M^3  
 FIELD JOINT FILL ELASTIC MODULUS... 0.000 M-PASCAL  
 FIELD JOINT STIFFENING EFFECT. .... 0.000  
 FIELD JOINT BENDING MODEL ..... 0 IGNORE COATING STIFFNESS  
 WEIGHT DENSITY OF STEEL ..... 77008. N/M^3  
 WEIGHT DENSITY OF PIPE CONTENTS ... 0.0 N/M^3  
 REF. ELEVATION FOR STATIC HEAD .... 0.00 METERS  
 FREE FLOOD PIPE DURING PIPELAY ... NO

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 6  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 5:41:9 CASE 1  
 =====

INPUT DATA ECHO

PIPELAY VESSEL DESCRIPTION

=====  
 NUMBER OF PIPE NODES ..... 9  
 BARGE GEOMETRY SPECIFIED BY ..... 1 X-Y COORDINATES  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.000 METERS  
 ADJUST Y COORDINATES MANUALLY .... NO  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 PIPE ANGLE RELATIVE TO DECK ..... 0.0000 DEGREES  
 HEIGHT OF DECK ABOVE WATER ..... 2.400 METERS  
 LAYBARGE FORWARD (X) OFFSET ..... 0.000 METERS  
 BARGE TRIM ANGLE ..... 0.5000 DEGREES  
  
 STERN SHOE X COORDINATE ..... 0.000 METERS  
 STERN SHOE Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER X COORDINATE ..... 43.820 METERS  
 ROTATION CENTER Y COORDINATE ..... 0.000 METERS  
 ROTATION CENTER Z COORDINATE ..... 6.370 METERS  
 BARGE HEADING ..... 0.0000 DEGREES  
 BARGE OFFSET FROM RIGHT-OF-WAY .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT VERTICAL ANGLE ... 0.000 DEGREES  
 PIPE RAMP PIVOT Z COORDINATE ..... 0.000 METERS  
 PIPE RAMP HEADING ON DECK ..... 0.000 DEGREES  
 ROLE OF ALTERNATE WAVE ORIGIN .... 0 MOTIONS & WAVES AT CENTER OF MOTION  
 WAVE PHASE ORIGIN X COORDINATE .... 0.000  
 WAVE PHASE ORIGIN Y COORDINATE .... 0.000 METERS  
 WAVE PHASE ORIGIN Z COORDINATE .... 0.000 METERS  
  
 PIPE RAMP PIVOT X COORDINATE ..... 0.000 METERS  
 PIPE RAMP PIVOT Y COORDINATE .....

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	DAVIT SPACING ( M )
64.220	1.838	1 SIMPLE SUPPORT	0.000
59.740	1.760	1 SIMPLE SUPPORT	0.000
48.240	1.560	1 SIMPLE SUPPORT	0.000
38.110	1.383	2 PIPE TENSIONER	0.000
33.440	1.302	1 SIMPLE SUPPORT	0.000
26.660	1.183	2 PIPE TENSIONER	0.000
21.340	1.092	7 USER DEFINED SPT	0.000
12.150	0.860	7 USER DEFINED SPT	0.000
-0.040	-0.260	8 USER DEFINED SPT	0.000

=====  
 OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 7  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 5:41:9 CASE 1  
 =====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====  
 SUPPORT PROPERTY TABLE INDEX ..... 2  
 SUPPORT ELEMENT TYPE ..... 2 TENSIONER  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
  
 BOTTOM ROLLER ANGLE TO HORIZONTAL . 0.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES

SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 7  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 1.600 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 8  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 5:41: 9 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

=====

SUPPORT PROPERTY TABLE INDEX ..... 8  
 SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT  
 SUPPORT INITIAL STATE FLAG ..... 0  
 TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M  
 VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M  
 STATIC VERTICAL DEFLECTION ..... 0.0000 CM  
 LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES  
 SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES  
 SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS  
 BED ROLLER LENGTH ..... 2.050 METERS  
 HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS  
 TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG  
 TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG

STINGER DESCRIPTION

=====

NUMBER OF PIPE/STINGER NODES ..... 6  
 STINGER GEOMETRY SPECIFIED BY ..... 2 X-Y COORD AND MATCH PT  
 STINGER TYPE ..... 1 FIXED GEOMETRY OR RAMP  
 OVERBEND PIPE SUPPORT RADIUS ..... 0.00 METERS  
 HITCH X-COORDINATE ..... 0.497 METERS  
 HITCH Y-COORDINATE ..... -1.800 METERS  
 HITCH ANGULAR ORIENTATION ..... 0.000 DEGREES

X COORDINATE OF LOCAL ORIGIN ..... 0.497 METERS  
 Y COORDINATE OF LOCAL ORIGIN ..... -1.800 METERS  
 ROTATION ABOUT STINGER HITCH ..... 13.300 DEGREES  
 TANGENT POINT X-COORDINATE ..... 0.000 METERS  
 TANGENT POINT Y-COORDINATE ..... 0.000 METERS  
 TANGENT POINT ANGLE ..... 0.000 DEGREES

NODE X COORD ( M )	NODE Y COORD ( M )	SUPPORT TYPE	ELEMENT TYPE	ELEMENT LENGTH ( M )
-8.325	2.209	1 SIMPLE SUPPORT	2 HINGED END	0.000
-16.325	2.349	1 SIMPLE SUPPORT	1 FIXED END	0.000
-24.325	2.119	1 SIMPLE SUPPORT	1 FIXED END	0.000
-31.699	1.660	1 SIMPLE SUPPORT	1 FIXED END	0.000
-37.949	1.069	1 SIMPLE SUPPORT	1 FIXED END	0.000
-40.949	0.350	1 SIMPLE SUPPORT	1 FIXED END	0.000

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 9  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 5:41: 9 CASE 1

=====

INPUT DATA ECHO

SUPPORT ELEMENT PROPERTIES

```

=====
SUPPORT PROPERTY TABLE INDEX ..... 1
SUPPORT ELEMENT TYPE ..... 1 SIMPLE SUPPORT
SUPPORT INITIAL STATE FLAG ..... 0
TENSIONER AXIAL STIFFNESS (F/L) ... 0.000E+00 KN/M
VERTICAL STIFFNESS (F/L) ..... 0.000E+00 KN/M
STATIC VERTICAL DEFLECTION ..... 0.0000 CM
LATERAL STIFFNESS (F/L) ..... 0.000E+00 KN/M

BOTTOM ROLLER ANGLE TO HORIZONTAL . 28.000 DEGREES
SIDE ROLLER ANGLE TO VERTICAL ..... 0.000 DEGREES
SIDE ROLLER OFFSET FROM C.L. .... 0.000 METERS
BED ROLLER LENGTH ..... 1.640 METERS
HEIGHT OF TOP ROLLER ABOVE BED .... 0.000 METERS
TENSIONER X-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
TENSIONER Y-AXIS ROTATIONAL STIF. . 0.000 KN/DEG
    
```

CURRENT VELOCITIES

```

=====
WATER DEPTH (M ) CURRENT SPEED (M/S ) DIRECTION OF TRAVEL (DEG )
=====
0.000 0.790 180.000
11.500 0.480 180.000
23.000 0.420 180.000
    
```

PIPE TENSION DATA

```

=====
STATIC PIPE TENSION ON LAY VESSEL . 196.133 K-NEWTON
MINIMUM DYNAMIC PIPE TENSION ..... 196.133 K-NEWTON
MAXIMUM DYNAMIC PIPE TENSION ..... 294.199 K-NEWTON
STATIC HORIZONTAL BOTTOM TENSION .. 0.000 K-NEWTON
NO. OF VALUES FOR TENSION PROFILE . 0
VALUES ARE FOR PIPE SPAN ANALYSIS . NO
MAXIMUM PIPE PAYOUT SPEED ..... 0.000 M/SEC
MAXIMUM PIPE TAKEUP SPEED ..... 0.000 M/SEC
    
```

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 10

STATIC PIPE ANALYSIS 12 INCH

JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 5:41: 9 CASE 1

=====  
 INPUT DATA ECHO

SAGBEND GEOMETRY

```

=====
SAGBEND PIPE ELEMENT LENGTH ..... 2.000 METERS
WATER DEPTH ..... 23.00 METERS
X-COORDINATE AT SPECIFIED DEPTH . . 0.00 METERS
ESTIMATED SAGBEND X LENGTH ..... 0.00 METERS
ESTIMATED PIPE LENGTH ON SEABED ... 0.00 METERS
X-COORD OF PIPE FREE END ON SEABED 0.00 METERS
X-COORD POINT OF FIXITY ON SEABED . 0.00 METERS
MAXIMUM SLOPE (ANGLE) OF SEABED ... 0.000 DEGREES
DIRECTION OF MAXIMUM SLOPE ..... 0.000 DEGREES

PIPE/CABLE SPAN END CONDITION ..... 0 PIPE/CABLE RESTING ON SEABED
PIPE/CABLE SPAN LENGTH GIVEN BY ... 0 SPECIFIED PIPE/CABLE TENSION
ESTIMATED SPAN DEPTH AT FREE END .. 0.00 METERS
PIPE VERTICAL ANGLE AT FREE END ... 0.000 DEGREES
BOTTOM HINGE OFFSET ..... 0.000 METERS
BOTTOM HINGE MINIMUM ANGLE ..... 0.000 DEGREES
BOTTOM HINGE MAXIMUM ANGLE ..... 0.000 DEGREES
    
```

SOIL ELEMENT PROPERTIES

```

=====
SOIL PROPERTY TABLE ROW INDEX ..... 1
SOIL ELEMENT TYPE (FUTURE USE) .... 0
PIPE INDEX OR SEGMENT NUMBER ..... 0
LONGITUDINAL SOIL STIFFNESS ..... 0.00 KN/M^2
VERTICAL SOIL STIFFNESS ..... 0.00 KN/M^2
LATERAL SOIL STIFFNESS ..... 0.00 KN/M^2
DEFLECTION UNDER REFERENCE LOAD ... 0.0000 CM

LONGITUDINAL COEF. OF FRICTION .... 0.000
LATERAL COEFFICIENT OF FRICTION ... 0.600
NUMBER OF INTEGRATION POINTS ..... 0
    
```

TIME INTEGRATION PARAMETERS

```

=====
TIME STEP LENGTH ..... 0.2000 SECONDS
MAXIMUM TIME OF INTEGRATION ..... 10860.000 SECONDS
SOLUTION SAMPLING TIME STEP ..... 0.400 SECONDS
    
```

SOLUTION SAMPLING STARTS AT TIME .. 60.000 SECONDS  
 DAMPING RATIO ..... 0.0000  
 NUMBER OF VARIABLE TIME STEPS ..... 0

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 11  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 5:41:9 CASE 1

=====

INPUT DATA ECHO

WAVE PARAMETERS

=====

SEA STATE ROW INDEX ..... 1  
 WAVE HEIGHT (PEAK TO TROUGH) ..... 1.800 METERS  
 WAVE PERIOD ..... 6.300 SECONDS  
 WAVE DIRECTION OF TRAVEL ..... 180.000 DEGREES  
 WATER DEPTH FOR WAVE CALCULATIONS . 23.00 METERS  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0

WAVE SPECTRUM EQUATION

=====

SEA STATE ROW INDEX ..... 1  
 WAVE SPECTRUM EQUATION TYPE ..... 7 JONSWAP (CLASSIC)  
 NUMBER OF WAVES IN SPECTRUM ..... 20  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD  
 SEED FOR RANDOM WAVE PHASE ANGLE .. 0  
 MINIMUM PERIOD IN SPECTRUM ..... 2.0933 SECONDS  
 MAXIMUM PERIOD IN SPECTRUM ..... 62.8000 SECONDS  
 START TIME FOR WAVE SPECTRUM ..... 0. SECONDS  
 DIRECTION OF WAVE TRAVEL ..... 0.000 DEGREES  
 1ST JONSWAP COEF. (ALPHA) ..... 0.012891  
 2ND JONSWAP COEF. (GAMMA) ..... 5.0000  
 PEAK WAVE PERIOD ..... 6.6150 SECONDS

VESSEL MOTION RAO TABLE

=====

SEA STATE NUMBER ..... 1  
 USE PHASE LAG FOR RAOs ..... NO  
 VESSEL MOTIONS SIGN CONVENTION .... 2 BENTLEY MOSES  
 USE WAVE FREQUENCY OR PERIOD ..... 1 PERIOD

WAVE PERIOD (SECONDS)	----- SURGE AMPLITUDE (M/M )	----- / PHASE (DEG)	----- / SWAY AMPLITUDE (M/M )	----- / PHASE (DEG)	----- / HEAVE AMPLITUDE (M/M )	----- / PHASE (DEG)
2.0900	0.0030	-170.00	0.0000	0.00	0.0040	-66.00
2.1700	0.0040	132.00	0.0000	0.00	0.0040	-77.00
2.2400	0.0040	56.00	0.0000	0.00	0.0020	-81.00
2.3300	0.0040	-36.00	0.0000	0.00	0.0050	-59.00
2.4200	0.0050	-134.00	0.0000	0.00	0.0070	-65.00
2.5100	0.0070	120.00	0.0000	0.00	0.0070	-84.00
2.6200	0.0080	17.00	0.0000	0.00	0.0050	-66.00
2.7300	0.0070	-126.00	0.0000	0.00	0.0110	-62.00
2.8500	0.0140	102.00	0.0000	0.00	0.0100	-93.00
2.9900	0.0090	-16.00	0.0000	0.00	0.0090	-48.00
3.1400	0.0190	147.00	0.0000	0.00	0.0160	-84.00
3.3100	0.0170	35.00	0.0000	0.00	0.0060	-62.00

=====

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 12  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/2/2020 TIME - 5:41:9 CASE 1

=====

WAVE PERIOD	----- ROLL AMPLITUDE	----- / PHASE	----- / PITCH AMPLITUDE	----- / PHASE	----- YAW AMPLITUDE	----- / PHASE
3.4900	0.0280	160.00	0.0000	0.00	0.0230	-82.00
3.7000	0.0200	44.00	0.0000	0.00	0.0060	-69.00
3.9300	0.0490	150.00	0.0000	0.00	0.0310	-95.00
4.1900	0.0060	-31.00	0.0000	0.00	0.0160	-47.00
4.4900	0.0730	121.00	0.0000	0.00	0.0350	-124.00
4.8300	0.0680	-163.00	0.0000	0.00	0.0510	-77.00
5.2400	0.0310	69.00	0.0000	0.00	0.0170	-66.00
5.7100	0.1390	136.00	0.0000	0.00	0.0680	-147.00
6.2800	0.1620	-167.00	0.0000	0.00	0.1610	-101.00
6.9800	0.0620	-118.00	0.0000	0.00	0.1330	-33.00
7.8500	0.1350	104.00	0.0000	0.00	0.1130	153.00
8.9700	0.3670	143.00	0.0000	0.00	0.3970	-139.00
10.4700	0.5800	177.00	0.0000	0.00	0.6520	-98.00
12.5600	0.7420	-154.00	0.0000	0.00	0.8300	-67.00
15.7000	0.8470	-130.00	0.0000	0.00	0.9340	-42.00
20.9300	0.9050	-112.00	0.0000	0.00	0.9830	-23.00
31.4000	0.9320	-99.00	0.0000	0.00	1.0000	-9.00
62.8000	0.9420	-92.00	0.0000	0.00	1.0030	-2.00

=====

(SECONDS)	(DEG/M)	(DEG)	(DEG/M)	(DEG)	(DEG/M)	(DEG)
2.0900	0.0000	0.00	0.0120	-59.00	0.0000	0.00
2.1700	0.0000	0.00	0.0150	-56.00	0.0000	0.00
2.2400	0.0010	-74.00	0.0160	-64.00	0.0000	0.00
2.3300	0.0000	0.00	0.0240	-75.00	0.0000	0.00
2.4200	0.0000	0.00	0.0200	-73.00	0.0000	0.00
2.5100	0.0000	0.00	0.0280	-55.00	0.0000	0.00
2.6200	0.0000	0.00	0.0390	-73.00	0.0000	0.00
2.7300	0.0000	0.00	0.0280	-83.00	0.0000	0.00
2.8500	0.0000	0.00	0.0440	-52.00	0.0000	0.00
2.9900	0.0000	0.00	0.0540	-88.00	0.0000	0.00
3.1400	0.0000	0.00	0.0340	-50.00	0.0000	0.00
3.3100	0.0000	0.00	0.0800	-81.00	0.0000	0.00
3.4900	0.0000	0.00	0.0320	-50.00	0.0000	0.00
3.7000	0.0000	0.00	0.1110	-86.00	0.0000	0.00
3.9300	0.0000	0.00	0.0490	-48.00	0.0000	0.00
4.1900	0.0000	0.00	0.1400	-107.00	0.0000	0.00
4.4900	0.0000	0.00	0.1470	-56.00	0.0000	0.00
4.8300	0.0000	0.00	0.0800	-124.00	0.0000	0.00
5.2400	0.0000	0.00	0.2790	-105.00	0.0000	0.00
5.7100	0.0000	0.00	0.3300	-65.00	0.0000	0.00
6.2800	0.0010	51.00	0.0100	28.00	0.0000	0.00
6.9800	0.0020	173.00	0.7900	-140.00	0.0000	0.00

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 13  
 STATIC PIPE ANALYSIS 12 INCH  
 JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
 USER ID - IK DATE - 5/ 2/2020 TIME - 5:41: 9 CASE 1

INPUT DATA ECHO

7.8500	0.0000	0.00	1.5530	-87.00	0.0000	0.00
8.9700	0.0000	0.00	1.8550	-42.00	0.0000	0.00
10.4700	0.0000	0.00	1.7270	-4.00	0.0000	0.00
12.5600	0.0000	0.00	1.3590	25.00	0.0000	0.00
15.7000	0.0000	0.00	0.9240	50.00	0.0000	0.00
20.9300	0.0000	0.00	0.5320	69.00	0.0000	0.00
31.4000	0.0000	0.00	0.2380	83.00	0.0000	0.00
62.8000	0.0000	0.00	0.0610	100.00	0.0000	0.00

\*\*\*\*\* INFORMATIVE MESSAGE NO. - 94 \*\*\*\*\*

One or more of the phase angles in the RAO table have been adjusted to minimize the difference in value between adjacent angles. If the phase angles are arbitrarily restricted by the software used to calculate the RAOs to a fixed range of values such as (0 to 2\*PI) or (-PI to +PI), then phase angles that are actually close in value can differ by as much as 2\*PI. These large differences can cause the phase angles for RAOs that are between the values in the table (which must be determined using interpolation) to be calculated incorrectly.

CONTROL SWITCHES

MAX NUMBER STATIC ITERATIONS ..... 500  
 MAX DYNAMIC ITERATIONS PER STEP ... 500  
 BOUNDARY CONDITION LOGIC PARAMETER 5  
 TIME STEP STABILITY PARAMETER ..... 0  
 TYPE OF ANALYSIS ..... DYNAMIC  
 NUMBER OF PROBLEM DIMENSIONS ..... 3  
 DAVIT LIFT ANALYSIS ..... NO

STATIC SOLUTION CONVERGED IN ( 47 ) ITERATIONS

END OF INPUT DATA

OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX DATE - 5/ 2/2020 TIME - 5:41: 9 PAGE 14  
 PROJECT - STATIC PIPE ANALYSIS 12 INCH JOB NO. - LAYING  
 USER ID - IK LICENSED BY - PT Timas Suplindo CASE 1

STATIC PIPE COORDINATES, FORCES AND STRESSES

NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESSES (MPA)	TOTAL STRESS (MPA)	PERCENT YIELD (PCT)
1	LAYBARGE	64.20	4.42	0.00	0.000	1.488	0.00	0.00	0.00	0.20	0.00	0.20
3	LAYBARGE	59.72	4.30	0.00	0.000	1.536	4.48	-0.02	0.00	-16.18	0.00	16.21
5	LAYBARGE	48.23	4.00	0.00	0.000	1.486	15.98	-0.08	0.00	-23.77	0.00	23.85
7	TENSIONR	38.10	3.73	0.00	0.000	1.461	26.11	7.77	0.00	-6.80	0.00	14.57
9	LAYBARGE	33.43	3.61	0.00	0.000	1.534	30.78	7.74	0.00	-12.51	0.00	20.25
11	TENSIONR	26.65	3.43	0.00	0.000	1.405	37.57	15.61	0.00	20.37	0.00	35.98
13	LAYBARGE	21.33	3.31	0.00	0.000	1.355	42.89	15.58	0.00	-20.65	0.00	36.24
15	LAYBARGE	12.14	2.98	0.00	0.000	3.374	52.08	15.43	0.00	-269.14	0.00	284.57

17	LAYBARGE	-0.04	1.76	0.00	0.000	8.046	64.32	15.21	0.00	-250.47	0.00	265.69	73.80
20	STINGER	-8.10	0.38	0.00	0.000	11.294	72.50	14.96	0.00	-239.10	0.00	254.06	70.57
22	STINGER	-15.91	-1.36	0.00	0.000	13.511	80.51	14.81	-0.17	-95.85	0.00	110.74	30.76
24	STINGER	-23.67	-3.29	0.00	0.000	14.267	88.51	14.63	-0.42	-22.16	0.00	37.00	10.28
26	STINGER	-30.83	-5.12	0.00	0.000	14.287	95.90	14.46	-0.66	15.53	0.00	30.32	8.42
28	STINGER	-36.92	-6.66	0.00	0.000	14.009	102.18	14.31	-0.85	34.57	0.00	49.31	13.70
30	STINGER	-39.83	-7.38	0.00	0.000	13.816	105.17	14.24	-0.95	40.94	0.00	55.66	15.46
32	SAGBEND	-41.86	-7.87	0.00	0.000	13.662	107.27	14.19	-1.01	44.62	0.00	59.33	16.48
33	SAGBEND	-43.81	-8.34	0.00	0.000	13.504	109.27	14.15	-1.07	47.65	0.00	62.34	17.32
34	SAGBEND	-45.75	-8.81	0.00	0.000	13.337	111.27	14.10	-1.13	50.27	0.00	64.94	18.04
35	SAGBEND	-47.70	-9.27	0.00	0.000	13.161	113.27	14.06	-1.19	52.53	0.00	67.19	18.66
36	SAGBEND	-49.65	-9.72	0.00	0.000	12.978	115.27	14.01	-1.25	54.49	0.00	69.13	19.20
37	SAGBEND	-51.60	-10.16	0.00	0.000	12.789	117.27	13.97	-1.30	56.19	0.00	70.82	19.67
38	SAGBEND	-53.55	-10.60	0.00	0.000	12.594	119.27	13.93	-1.36	57.66	0.00	72.28	20.08
39	SAGBEND	-55.50	-11.04	0.00	0.000	12.394	121.27	13.88	-1.41	58.94	0.00	73.55	20.43
40	SAGBEND	-57.45	-11.46	0.00	0.000	12.191	123.27	13.84	-1.47	60.06	0.00	74.65	20.74
41	SAGBEND	-59.41	-11.88	0.00	0.000	11.984	125.27	13.80	-1.52	61.03	0.00	75.61	21.00
42	SAGBEND	-61.37	-12.29	0.00	0.000	11.774	127.27	13.76	-1.58	61.88	0.00	76.45	21.24
43	SAGBEND	-63.33	-12.70	0.00	0.000	11.561	129.27	13.72	-1.63	62.63	0.00	77.18	21.44
44	SAGBEND	-65.29	-13.10	0.00	0.000	11.345	131.27	13.69	-1.68	63.28	0.00	77.82	21.62
45	SAGBEND	-67.25	-13.48	0.00	0.000	11.128	133.27	13.65	-1.73	63.86	0.00	78.38	21.77
46	SAGBEND	-69.21	-13.87	0.00	0.000	10.909	135.27	13.61	-1.78	64.36	0.00	78.88	21.91
47	SAGBEND	-71.17	-14.24	0.00	0.000	10.688	137.27	13.57	-1.83	64.81	0.00	79.32	22.03
48	SAGBEND	-73.14	-14.61	0.00	0.000	10.466	139.27	13.54	-1.87	65.21	0.00	79.70	22.14
49	SAGBEND	-75.11	-14.97	0.00	0.000	10.242	141.27	13.50	-1.92	65.56	0.00	80.04	22.23
50	SAGBEND	-77.08	-15.32	0.00	0.000	10.017	143.27	13.47	-1.96	65.88	0.00	80.35	22.32
51	SAGBEND	-79.05	-15.66	0.00	0.000	9.791	145.27	13.44	-2.01	66.16	0.00	80.62	22.39
52	SAGBEND	-81.02	-16.00	0.00	0.000	9.565	147.27	13.40	-2.05	66.41	0.00	80.86	22.46
53	SAGBEND	-82.99	-16.33	0.00	0.000	9.337	149.27	13.37	-2.09	66.64	0.00	81.08	22.52
54	SAGBEND	-84.97	-16.65	0.00	0.000	9.109	151.27	13.34	-2.13	66.84	0.00	81.27	22.58
55	SAGBEND	-86.94	-16.96	0.00	0.000	8.880	153.27	13.31	-2.17	67.03	0.00	81.45	22.62
56	SAGBEND	-88.92	-17.27	0.00	0.000	8.651	155.27	13.28	-2.21	67.19	0.00	81.60	22.67
57	SAGBEND	-90.90	-17.56	0.00	0.000	8.421	157.27	13.25	-2.25	67.34	0.00	81.74	22.71
58	SAGBEND	-92.87	-17.85	0.00	0.000	8.190	159.27	13.23	-2.29	67.47	0.00	81.86	22.74
59	SAGBEND	-94.85	-18.13	0.00	0.000	7.959	161.27	13.20	-2.32	67.59	0.00	81.97	22.77

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/2/2020      TIME - 5:41: 9      PAGE 15

PROJECT - STATIC PIPE ANALYSIS 12 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
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NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M)	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS VERT (MPA)	HORIZ (MPA)	TOTAL STRESS (MPA)	PERC YIELD (PCT)
=====													
60	SAGBEND	-96.84	-18.41	0.00	0.000	7.728	163.27	13.17	-2.36	67.69	0.00	82.07	22.80
61	SAGBEND	-98.82	-18.67	0.00	0.000	7.496	165.27	13.15	-2.39	67.78	0.00	82.15	22.82
62	SAGBEND	-100.80	-18.93	0.00	0.000	7.264	167.27	13.12	-2.43	67.86	0.00	82.22	22.84
63	SAGBEND	-102.79	-19.18	0.00	0.000	7.032	169.27	13.10	-2.46	67.92	0.00	82.28	22.85
64	SAGBEND	-104.77	-19.42	0.00	0.000	6.800	171.27	13.08	-2.49	67.97	0.00	82.32	22.87
65	SAGBEND	-106.76	-19.65	0.00	0.000	6.567	173.27	13.05	-2.52	68.01	0.00	82.35	22.87
66	SAGBEND	-108.75	-19.88	0.00	0.000	6.335	175.27	13.03	-2.55	68.03	0.00	82.36	22.88
67	SAGBEND	-110.73	-20.09	0.00	0.000	6.102	177.27	13.01	-2.58	68.03	0.00	82.36	22.88
68	SAGBEND	-112.72	-20.30	0.00	0.000	5.869	179.27	12.99	-2.60	68.02	0.00	82.34	22.88
69	SAGBEND	-114.71	-20.50	0.00	0.000	5.637	181.27	12.97	-2.63	67.99	0.00	82.31	22.86
70	SAGBEND	-116.70	-20.69	0.00	0.000	5.404	183.27	12.95	-2.65	67.94	0.00	82.25	22.85
71	SAGBEND	-118.70	-20.88	0.00	0.000	5.172	185.27	12.93	-2.68	67.86	0.00	82.17	22.82
72	SAGBEND	-120.69	-21.05	0.00	0.000	4.940	187.27	12.92	-2.70	67.76	0.00	82.06	22.79
73	SAGBEND	-122.68	-21.22	0.00	0.000	4.709	189.27	12.90	-2.72	67.63	0.00	81.92	22.76
74	SAGBEND	-124.67	-21.38	0.00	0.000	4.478	191.27	12.89	-2.74	67.46	0.00	81.75	22.71
75	SAGBEND	-126.67	-21.53	0.00	0.000	4.247	193.27	12.87	-2.76	67.25	0.00	81.54	22.65
76	SAGBEND	-128.66	-21.68	0.00	0.000	4.018	195.27	12.86	-2.78	67.00	0.00	81.28	22.58
77	SAGBEND	-130.66	-21.81	0.00	0.000	3.789	197.27	12.84	-2.80	66.69	0.00	80.97	22.49
78	SAGBEND	-132.65	-21.94	0.00	0.000	3.562	199.27	12.83	-2.81	66.33	0.00	80.60	22.39
79	SAGBEND	-134.65	-22.06	0.00	0.000	3.336	201.27	12.82	-2.83	65.89	0.00	80.16	22.27
80	SAGBEND	-136.65	-22.18	0.00	0.000	3.111	203.27	12.81	-2.84	65.38	0.00	79.65	22.12
81	SAGBEND	-138.64	-22.28	0.00	0.000	2.889	205.27	12.80	-2.86	64.77	0.00	79.04	21.95
82	SAGBEND	-140.64	-22.38	0.00	0.000	2.668	207.27	12.79	-2.87	64.06	0.00	78.32	21.76
83	SAGBEND	-142.64	-22.47	0.00	0.000	2.451	209.27	12.78	-2.88	63.22	0.00	77.48	21.52
84	SAGBEND	-144.64	-22.55	0.00	0.000	2.236	211.27	12.77	-2.89	62.24	0.00	76.50	21.25
85	SAGBEND	-146.64	-22.62	0.00	0.000	2.025	213.27	12.77	-2.90	61.09	0.00	75.35	20.93
86	SAGBEND	-148.64	-22.69	0.00	0.000	1.819	215.27	12.76	-2.91	59.75	0.00	74.01	20.56
87	SAGBEND	-150.64	-22.75	0.00	0.000	1.617	217.27	12.76	-2.92	58.18	0.00	72.44	20.12
88	SAGBEND	-152.63	-22.80	0.00	0.000	1.421	219.27	12.75	-2.92	56.36	0.00	70.61	19.62
89	SAGBEND	-154.63	-22.85	0.00	0.000	1.232	221.27	12.75	-2.93	54.23	0.00	68.49	19.02
90	SAGBEND	-156.63	-22.89	0.00	0.000	1.050	223.27	12.74	-2.93	51.75	0.00	66.01	18.34
91	SAGBEND	-158.63	-22.92	0.00	0.000	0.878	225.27	12.74	-2.94	48.86	0.00	63.12	17.53
92	SAGBEND	-160.63	-22.95	0.00	0.000	0.717	227.27	12.74	-2.94	45.50	0.00	59.77	16.60
93	SAGBEND	-162.63	-22.97	0.00	0.000	0.568	229.27	12.74	-2.95	41.59	0.00	55.86	15.52
94	SAGBEND	-164.63	-22.99	0.00	0.000	0.433	231.27	12.73	-2.95	37.05	0.00	51.32	14.25
95	SEABED	-166.63	-23.00	0.00	0.000	0.315	233.27	12.73	-2.95	31.76	0.00	46.04	12.79
96	SEABED	-168.63	-23.01	0.00	0.000	0.216	235.27	12.73	-2.95	25.93	0.00	40.22	11.17
97	SEABED	-170.63	-23.02	0.00	0.000	0.138	237.27	12.73	-2.95	20.20	0.00	34.50	9.58
98	SEABED	-172.63	-23.02	0.00	0.000	0.078	239.27	12.73	-2.95	15.00	0.00	29.32	8.14



99	SEABED	-174.63	-23.02	0.00	0.000	0.034	241.27	12.73	-2.95	10.55	0.00	24.89	6.91
100	SEABED	-176.63	-23.02	0.00	0.000	0.005	243.27	12.73	-2.95	6.94	0.00	21.30	5.92
101	SEABED	-178.63	-23.02	0.00	0.000	-0.014	245.27	12.73	-2.95	4.14	0.00	18.52	5.14
102	SEABED	-180.63	-23.02	0.00	0.000	-0.025	247.27	12.73	-2.95	2.06	0.00	16.47	4.58
103	SEABED	-182.63	-23.02	0.00	0.000	-0.029	249.27	12.73	-2.95	0.61	0.00	15.04	4.18

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 5:41:      9      PAGE 16

PROJECT - STATIC PIPE ANALYSIS 12 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	HORIZ ANGLE (DEG)	VERT ANGLE (DEG)	PIPE LENGTH (M )	TENSILE STRESS (MPA)	HOOP STRESS (MPA)	BENDING STRESS VERT (MPA)	HORIZ STRESS (MPA)	TOTAL STRESS (MPA)	PERCNT YIELD (PCT)
=====													
104	SEABED	-184.63	-23.02	0.00	0.000	-0.029	251.27	12.73	-2.95	-0.34	0.00	14.77	4.10
105	SEABED	-186.63	-23.02	0.00	0.000	-0.027	253.27	12.73	-2.95	-0.89	0.00	15.32	4.25
106	SEABED	-188.63	-23.02	0.00	0.000	-0.024	255.27	12.73	-2.95	-1.16	0.00	15.58	4.33
107	SEABED	-190.63	-23.02	0.00	0.000	-0.019	257.27	12.73	-2.95	-1.24	0.00	15.66	4.35
108	SEABED	-192.63	-23.02	0.00	0.000	-0.015	259.27	12.73	-2.95	-1.18	0.00	15.60	4.33
109	SEABED	-194.63	-23.02	0.00	0.000	-0.011	261.27	12.73	-2.95	-1.05	0.00	15.47	4.30
110	SEABED	-196.63	-23.02	0.00	0.000	-0.008	263.27	12.73	-2.95	-0.88	0.00	15.30	4.25
111	SEABED	-198.63	-23.02	0.00	0.000	-0.005	265.27	12.73	-2.95	-0.70	0.00	15.13	4.20
112	SEABED	-200.63	-23.02	0.00	0.000	-0.003	267.27	12.73	-2.95	-0.54	0.00	14.97	4.16
113	SEABED	-202.63	-23.02	0.00	0.000	-0.002	269.27	12.73	-2.95	-0.39	0.00	14.82	4.12
114	SEABED	-204.63	-23.02	0.00	0.000	-0.001	271.27	12.73	-2.95	-0.27	0.00	14.70	4.08
115	SEABED	-206.63	-23.02	0.00	0.000	0.000	273.27	12.73	-2.95	-0.17	0.00	14.61	4.06
116	SEABED	-208.63	-23.02	0.00	0.000	0.001	275.27	12.73	-2.95	-0.10	0.00	14.53	4.04
117	SEABED	-210.63	-23.02	0.00	0.000	0.001	277.27	12.73	-2.95	-0.04	0.00	14.48	4.02
118	SEABED	-212.63	-23.02	0.00	0.000	0.001	279.27	12.73	-2.95	-0.01	0.00	14.45	4.01
119	SEABED	-214.63	-23.02	0.00	0.000	0.001	281.27	12.73	-2.95	0.01	0.00	14.45	4.01
120	SEABED	-216.63	-23.02	0.00	0.000	0.001	283.27	12.73	-2.95	0.02	0.00	14.46	4.02
121	SEABED	-218.63	-23.02	0.00	0.000	0.001	285.27	12.73	-2.95	0.03	0.00	14.46	4.02
122	SEABED	-220.63	-23.02	0.00	0.000	0.001	287.27	12.73	-2.95	0.02	0.00	14.46	4.02
123	SEABED	-222.63	-23.02	0.00	0.000	0.001	289.27	12.73	-2.95	0.02	0.00	14.45	4.02
124	SEABED	-224.63	-23.02	0.00	0.000	0.001	291.27	12.73	-2.95	0.01	0.00	14.45	4.01
125	SEABED	-226.63	-23.02	0.00	0.000	0.000	293.27	12.73	-2.95	0.00	0.00	14.44	4.01
126	SEABED	-228.63	-23.02	0.00	0.000	0.000	295.27	12.73	-2.95	0.00	0.00	14.44	4.01

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX      DATE - 5/ 2/2020      TIME - 5:41:      9      PAGE 17

PROJECT - STATIC PIPE ANALYSIS 12 INCH      JOB NO. - LAYING

USER ID - IK      LICENSED BY - PT Timas Suplindo      CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
=====													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION VERT (KN )	REACTION HORIZ (KN )	SUPT VERT (M )	SEPARATIONS HORIZ (M )	PIPE TENSION (KN )	BENDING MOMENTS VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
=====													
1	LAYBARGE	64.20	4.42	0.00	0.92	0.00	0.00	0.00	0.00	0.19	0.00	0.19	
3	LAYBARGE	59.72	4.30	0.00	22.65	0.00	0.00	0.00	-0.28	-15.05	0.00	15.05	
5	LAYBARGE	48.23	4.00	0.00	28.14	0.00	0.00	0.00	-1.00	-22.10	0.00	22.10	
7	TENSIONR	38.10	3.73	0.00	14.66	0.00	0.00	0.00	96.44	-6.32	0.00	6.32	
9	LAYBARGE	33.43	3.61	0.00	19.85	0.00	0.00	0.00	96.15	-11.63	0.00	11.63	
11	TENSIONR	26.65	3.43	0.00	1.89	0.00	0.00	0.00	193.79	18.94	0.00	18.94	
13	LAYBARGE	21.33	3.31	0.00	0.00	0.00	0.01	0.00	193.49	-19.20	0.00	19.20	
15	LAYBARGE	12.14	2.98	0.00	66.13	0.00	0.00	0.00	191.62	-250.21	0.00	250.21	
17	LAYBARGE	-0.04	1.76	0.00	36.79	0.00	0.00	0.00	188.88	-232.85	0.00	232.85	
20	STINGER	-8.10	0.38	0.00	38.23	0.00	0.00	0.00	185.70	-222.28	0.00	222.28	
22	STINGER	-15.91	-1.36	0.00	0.00	0.00	0.03	0.00	185.02	-89.11	0.00	89.11	
24	STINGER	-23.67	-3.29	0.00	0.00	0.00	0.24	0.00	184.43	-20.60	0.00	20.60	
26	STINGER	-30.83	-5.12	0.00	0.00	0.00	0.63	0.00	183.76	14.44	0.00	14.44	
28	STINGER	-36.92	-6.66	0.00	0.00	0.00	1.20	0.00	183.18	32.14	0.00	32.14	
30	STINGER	-39.83	-7.38	0.00	0.00	0.00	1.97	0.00	182.91	38.06	0.00	38.06	
32	SAGBEND	-41.86	-7.87	0.00	0.00	0.00	0.00	0.00	182.72	41.49	0.00	41.49	
33	SAGBEND	-43.81	-8.34	0.00	0.00	0.00	0.00	0.00	182.54	44.30	0.00	44.30	
34	SAGBEND	-45.75	-8.81	0.00	0.00	0.00	0.00	0.00	182.37	46.73	0.00	46.73	
35	SAGBEND	-47.70	-9.27	0.00	0.00	0.00	0.00	0.00	182.20	48.84	0.00	48.84	
36	SAGBEND	-49.65	-9.72	0.00	0.00	0.00	0.00	0.00	182.03	50.66	0.00	50.66	
37	SAGBEND	-51.60	-10.16	0.00	0.00	0.00	0.00	0.00	181.86	52.24	0.00	52.24	
38	SAGBEND	-53.55	-10.60	0.00	0.00	0.00	0.00	0.00	181.70	53.61	0.00	53.61	
39	SAGBEND	-55.50	-11.04	0.00	0.00	0.00	0.00	0.00	181.53	54.80	0.00	54.80	
40	SAGBEND	-57.45	-11.46	0.00	0.00	0.00	0.00	0.00	181.38	55.84	0.00	55.84	
41	SAGBEND	-59.41	-11.88	0.00	0.00	0.00	0.00	0.00	181.22	56.74	0.00	56.74	
42	SAGBEND	-61.37	-12.29	0.00	0.00	0.00	0.00	0.00	181.07	57.53	0.00	57.53	
43	SAGBEND	-63.33	-12.70	0.00	0.00	0.00	0.00	0.00	180.92	58.22	0.00	58.22	
44	SAGBEND	-65.29	-13.10	0.00	0.00	0.00	0.00	0.00	180.77	58.83	0.00	58.83	
45	SAGBEND	-67.25	-13.48	0.00	0.00	0.00	0.00	0.00	180.63	59.36	0.00	59.36	
46	SAGBEND	-69.21	-13.87	0.00	0.00	0.00	0.00	0.00	180.48	59.84	0.00	59.84	
47	SAGBEND	-71.17	-14.24	0.00	0.00	0.00	0.00	0.00	180.34	60.25	0.00	60.25	
48	SAGBEND	-73.14	-14.61	0.00	0.00	0.00	0.00	0.00	180.21	60.62	0.00	60.62	
49	SAGBEND	-75.11	-14.97	0.00	0.00	0.00	0.00	0.00	180.08	60.95	0.00	60.95	

50	SAGBEND	-77.08	-15.32	0.00	0.00	0.00	0.00	0.00	0.00	179.95	61.24	0.00	61.24
51	SAGBEND	-79.05	-15.66	0.00	0.00	0.00	0.00	0.00	0.00	179.82	61.51	0.00	61.51
52	SAGBEND	-81.02	-16.00	0.00	0.00	0.00	0.00	0.00	0.00	179.69	61.74	0.00	61.74
53	SAGBEND	-82.99	-16.33	0.00	0.00	0.00	0.00	0.00	0.00	179.57	61.95	0.00	61.95
54	SAGBEND	-84.97	-16.65	0.00	0.00	0.00	0.00	0.00	0.00	179.45	62.14	0.00	62.14
55	SAGBEND	-86.94	-16.96	0.00	0.00	0.00	0.00	0.00	0.00	179.34	62.31	0.00	62.31
56	SAGBEND	-88.92	-17.27	0.00	0.00	0.00	0.00	0.00	0.00	179.23	62.46	0.00	62.46
57	SAGBEND	-90.90	-17.56	0.00	0.00	0.00	0.00	0.00	0.00	179.12	62.60	0.00	62.60
58	SAGBEND	-92.87	-17.85	0.00	0.00	0.00	0.00	0.00	0.00	179.01	62.72	0.00	62.72
59	SAGBEND	-94.85	-18.13	0.00	0.00	0.00	0.00	0.00	0.00	178.91	62.83	0.00	62.83

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX    DATE - 5/ 2/2020    TIME - 5:41: 9    PAGE 18

PROJECT - STATIC PIPE ANALYSIS 12 INCH    JOB NO. - LAYING

USER ID - IK    LICENSED BY - PT Timas Suplindo    CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS		
					VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	(KN )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
60	SAGBEND	-96.84	-18.41	0.00	0.00	0.00	0.00	0.00	0.00	178.81	62.93	0.00	62.93
61	SAGBEND	-98.82	-18.67	0.00	0.00	0.00	0.00	0.00	0.00	178.71	63.01	0.00	63.01
62	SAGBEND	-100.80	-18.93	0.00	0.00	0.00	0.00	0.00	0.00	178.61	63.08	0.00	63.08
63	SAGBEND	-102.79	-19.18	0.00	0.00	0.00	0.00	0.00	0.00	178.52	63.14	0.00	63.14
64	SAGBEND	-104.77	-19.42	0.00	0.00	0.00	0.00	0.00	0.00	178.43	63.19	0.00	63.19
65	SAGBEND	-106.76	-19.65	0.00	0.00	0.00	0.00	0.00	0.00	178.35	63.22	0.00	63.22
66	SAGBEND	-108.75	-19.88	0.00	0.00	0.00	0.00	0.00	0.00	178.26	63.24	0.00	63.24
67	SAGBEND	-110.73	-20.09	0.00	0.00	0.00	0.00	0.00	0.00	178.18	63.25	0.00	63.25
68	SAGBEND	-112.72	-20.30	0.00	0.00	0.00	0.00	0.00	0.00	178.11	63.24	0.00	63.24
69	SAGBEND	-114.71	-20.50	0.00	0.00	0.00	0.00	0.00	0.00	178.03	63.21	0.00	63.21
70	SAGBEND	-116.70	-20.69	0.00	0.00	0.00	0.00	0.00	0.00	177.96	63.16	0.00	63.16
71	SAGBEND	-118.70	-20.88	0.00	0.00	0.00	0.00	0.00	0.00	177.90	63.09	0.00	63.09
72	SAGBEND	-120.69	-21.05	0.00	0.00	0.00	0.00	0.00	0.00	177.83	62.99	0.00	62.99
73	SAGBEND	-122.68	-21.22	0.00	0.00	0.00	0.00	0.00	0.00	177.77	62.87	0.00	62.87
74	SAGBEND	-124.67	-21.38	0.00	0.00	0.00	0.00	0.00	0.00	177.71	62.71	0.00	62.71
75	SAGBEND	-126.67	-21.53	0.00	0.00	0.00	0.00	0.00	0.00	177.65	62.52	0.00	62.52
76	SAGBEND	-128.66	-21.68	0.00	0.00	0.00	0.00	0.00	0.00	177.60	62.28	0.00	62.28
77	SAGBEND	-130.66	-21.81	0.00	0.00	0.00	0.00	0.00	0.00	177.55	62.00	0.00	62.00
78	SAGBEND	-132.65	-21.94	0.00	0.00	0.00	0.00	0.00	0.00	177.51	61.66	0.00	61.66
79	SAGBEND	-134.65	-22.06	0.00	0.00	0.00	0.00	0.00	0.00	177.46	61.26	0.00	61.26
80	SAGBEND	-136.65	-22.18	0.00	0.00	0.00	0.00	0.00	0.00	177.42	60.78	0.00	60.78
81	SAGBEND	-138.64	-22.28	0.00	0.00	0.00	0.00	0.00	0.00	177.38	60.21	0.00	60.21
82	SAGBEND	-140.64	-22.38	0.00	0.00	0.00	0.00	0.00	0.00	177.35	59.55	0.00	59.55
83	SAGBEND	-142.64	-22.47	0.00	0.00	0.00	0.00	0.00	0.00	177.32	58.77	0.00	58.77
84	SAGBEND	-144.64	-22.55	0.00	0.00	0.00	0.00	0.00	0.00	177.29	57.86	0.00	57.86
85	SAGBEND	-146.64	-22.62	0.00	0.00	0.00	0.00	0.00	0.00	177.26	56.79	0.00	56.79
86	SAGBEND	-148.64	-22.69	0.00	0.00	0.00	0.00	0.00	0.00	177.24	55.54	0.00	55.54
87	SAGBEND	-150.64	-22.75	0.00	0.00	0.00	0.00	0.00	0.00	177.22	54.09	0.00	54.09
88	SAGBEND	-152.63	-22.80	0.00	0.00	0.00	0.00	0.00	0.00	177.21	52.39	0.00	52.39
89	SAGBEND	-154.63	-22.85	0.00	0.00	0.00	0.00	0.00	0.00	177.19	50.41	0.00	50.41
90	SAGBEND	-156.63	-22.89	0.00	0.00	0.00	0.00	0.00	0.00	177.18	48.11	0.00	48.11
91	SAGBEND	-158.63	-22.92	0.00	0.00	0.00	0.00	0.00	0.00	177.17	45.43	0.00	45.43
92	SAGBEND	-160.63	-22.95	0.00	0.00	0.00	0.00	0.00	0.00	177.17	42.30	0.00	42.30
93	SAGBEND	-162.63	-22.97	0.00	0.00	0.00	0.00	0.00	0.00	177.16	38.67	0.00	38.67
94	SAGBEND	-164.63	-22.99	0.00	0.00	0.00	0.00	0.00	0.00	177.16	34.44	0.00	34.44
95	SEABED	-166.63	-23.00	0.00	0.15	0.00	0.00	0.00	0.00	177.16	29.52	0.00	29.52
96	SEABED	-168.63	-23.01	0.00	0.51	0.00	0.00	0.00	0.00	177.17	24.11	0.00	24.11
97	SEABED	-170.63	-23.02	0.00	0.77	0.00	0.00	0.00	0.00	177.17	18.78	0.00	18.78
98	SEABED	-172.63	-23.02	0.00	0.93	0.00	0.00	0.00	0.00	177.17	13.94	0.00	13.94
99	SEABED	-174.63	-23.02	0.00	1.01	0.00	0.00	0.00	0.00	177.17	9.81	0.00	9.81
100	SEABED	-176.63	-23.02	0.00	1.04	0.00	0.00	0.00	0.00	177.17	6.45	0.00	6.45
101	SEABED	-178.63	-23.02	0.00	1.03	0.00	0.00	0.00	0.00	177.17	3.84	0.00	3.84
102	SEABED	-180.63	-23.02	0.00	1.00	0.00	0.00	0.00	0.00	177.17	1.92	0.00	1.92
103	SEABED	-182.63	-23.02	0.00	0.96	0.00	0.00	0.00	0.00	177.17	0.57	0.00	0.57

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX    DATE - 5/ 2/2020    TIME - 5:41: 9    PAGE 19

PROJECT - STATIC PIPE ANALYSIS 12 INCH    JOB NO. - LAYING

USER ID - IK    LICENSED BY - PT Timas Suplindo    CASE 1

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STATIC PIPE COORDINATES, FORCES AND STRESSES													
NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT REACTION		SUPT SEPARATIONS		PIPE TENSION		BENDING MOMENTS		
					VERT (KN )	HORIZ (KN )	VERT (M )	HORIZ (M )	(KN )	VERT (KN-M)	HORIZ (KN-M)	TOTAL (KN-M)	
104	SEABED	-184.63	-23.02	0.00	0.92	0.00	0.00	0.00	0.00	177.17	-0.31	0.00	0.31
105	SEABED	-186.63	-23.02	0.00	0.88	0.00	0.00	0.00	0.00	177.17	-0.83	0.00	0.83
106	SEABED	-188.63	-23.02	0.00	0.84	0.00	0.00	0.00	0.00	177.17	-1.08	0.00	1.08
107	SEABED	-190.63	-23.02	0.00	0.81	0.00	0.00	0.00	0.00	177.17	-1.15	0.00	1.15
108	SEABED	-192.63	-23.02	0.00	0.78	0.00	0.00	0.00	0.00	177.17	-1.10	0.00	1.10
109	SEABED	-194.63	-23.02	0.00	0.76	0.00	0.00	0.00	0.00	177.17	-0.97	0.00	0.97
110	SEABED	-196.63	-23.02	0.00	0.75	0.00	0.00	0.00	0.00	177.17	-0.82	0.00	0.82
111	SEABED	-198.63	-23.02	0.00	0.74	0.00	0.00	0.00	0.00	177.17	-0.65	0.00	0.65

112	SEABED	-200.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.50	0.00	0.50
113	SEABED	-202.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.36	0.00	0.36
114	SEABED	-204.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.25	0.00	0.25
115	SEABED	-206.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.16	0.00	0.16
116	SEABED	-208.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.09	0.00	0.09
117	SEABED	-210.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.04	0.00	0.04
118	SEABED	-212.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	-0.01	0.00	0.01
119	SEABED	-214.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.01	0.00	0.01
120	SEABED	-216.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.02	0.00	0.02
121	SEABED	-218.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.02	0.00	0.02
122	SEABED	-220.63	-23.02	0.00	0.73	0.00	0.00	0.00	177.17	0.02	0.00	0.02
123	SEABED	-222.63	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	0.02	0.00	0.02
124	SEABED	-224.63	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	0.01	0.00	0.01
125	SEABED	-226.63	-23.02	0.00	0.74	0.00	0.00	0.00	177.17	0.00	0.00	0.00
126	SEABED	-228.63	-23.02	0.00	0.00	0.00	0.00	0.00	177.17	0.00	0.00	0.00

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 20  
STATIC PIPE ANALYSIS 12 INCH  
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
USER ID - IK DATE - 5/2/2020 TIME - 5:41:9 CASE 1  
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STATIC SOLUTION SUMMARY

PIPE PROPERTIES ( 1)

PIPE SECTION LENGTH ..	0.00 M	ELASTIC MODULUS .....	207000. MPA
OUTSIDE DIAMETER .....	32.390 CM	CROSS SECTIONAL AREA ..	124.10 CM²
WALL THICKNESS .....	1.270 CM	MOMENT OF INERTIA .....	15048.2 CM⁴
WEIGHT/LENGTH IN AIR ..	2374.00 N/M	YIELD STRESS .....	360.00 MPA
SUBMERGED WGT/LENG .....	368.27 N/M	STRESS INTENS FACTOR ..	1.000
SPECIFIC GRAVITY .....	1.184	STEEL DENSITY .....	77008.0 N/M3
WRAP COAT THICKNESS ..	0.320 CM	WRAP COAT DENSITY .....	9025.2 N/M3
CONCRETE THICKNESS ...	4.000 CM	CONCRETE DENSITY .....	29858.0 N/M3

BARGE DATA

TOTAL PIPE TENSION ...	196.13 KN	RADIUS OF CURVATURE ..	0.00 M
NUMBER OF TENSIONERS ..	2	BARGE TRIM ANGLE .....	0.500 DEG
NO. OF PIPE SUPPORTS ..	7	PIPE ANGLE AT STERN ..	8.046 DEG
BARGE HEADING .....	0.000 DEG	OFFSET FROM R.O.W. ...	0.00 M

STINGER DATA

NO. OF PIPE SUPPORTS ..	6	PIPE DEPTH AT STERN ..	-7.38 M
NO. STINGER SECTIONS ..	6	PIPE ANGLE AT STERN ..	13.816 DEG
RADIUS OF CURVATURE ..	0.00 M	STINGER STERN DEPTH ..	-9.21 M
STINGER LENGTH .....	41.37 M		

SAGBEND DATA

WATER DEPTH .....	23.00 M	TENSION AT TOUCHDOWN ..	177.16 KN
TOUCHDOWN X-COORD. ...	-166.11 M	BOTTOM SLOPE ANGLE ...	0.000 DEG
PROJECTED SPAN LENGTH	126.28 M	PIPE LENGTH GAIN .....	2.43 M

===== SOLUTION SUMMARY =====

NODE NO.	PIPE SECTION	X COORD (M)	Y COORD (M)	Z COORD (M)	SUPPORT VERT (KN)	REACT HORIZ (KN)	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	0.9	0.0	0.2	0.2	0.
3	LAYBARGE	59.7	4.3	0.0	22.6	0.0	15.0	16.2	5.
5	LAYBARGE	48.2	4.0	0.0	28.1	0.0	22.1	23.9	7.
7	TENSIONR	38.1	3.7	0.0	14.7	0.0	6.3	14.6	4.
9	LAYBARGE	33.4	3.6	0.0	19.8	0.0	11.6	20.3	6.
11	TENSIONR	26.7	3.4	0.0	1.9	0.0	18.9	36.0	10.
13	LAYBARGE	21.3	3.3	0.0	0.0	0.0	19.2	36.2	10.
15	LAYBARGE	12.1	3.0	0.0	66.1	0.0	250.2	284.6	79.
17	LAYBARGE	0.0	1.8	0.0	36.8	0.0	232.9	265.7	74.
20	STINGER	-8.1	0.4	0.0	38.2	0.0	222.3	254.1	71.
22	STINGER	-15.9	-1.4	0.0	0.0	0.0	89.1	110.7	31.
24	STINGER	-23.7	-3.3	0.0	0.0	0.0	20.6	37.0	10.

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OFFPIPE-3 OFFSHORE PIPELINE ANALYSIS SYSTEM - VERSION NO. - 3.02EX PAGE 21  
STATIC PIPE ANALYSIS 12 INCH  
JOB NO. - LAYING LICENSED BY - PT Timas Suplindo  
USER ID - IK DATE - 5/2/2020 TIME - 5:41:9 CASE 1  
=====

STATIC SOLUTION SUMMARY

26	STINGER	-30.8	-5.1	0.0	0.0	0.0	14.4	30.3	8.
28	STINGER	-36.9	-6.7	0.0	0.0	0.0	32.1	49.3	14.
30	STINGER	-39.8	-7.4	0.0	0.0	0.0	38.1	55.7	15.
66	SAGBEND	-108.7	-19.9	0.0	0.0	0.0	63.2	82.4	23.
95	SEABED	-166.6	-23.0	0.0	0.1	0.0	29.5	46.0	13.

DYNAMIC SOLUTION SUMMARY

SEA STATE NUMBER ( 1 )

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SEA STATE TYPE ..... WAVE SPECTRUM
RAO SIGN CONVENTION .. BENTLEY MOS

NO. WAVE COMPONENTS .. 20
WAVE WATER DEPTH ..... 23.0 M
MAX. WAVE FREQUENCY .. 3.0015 RA/S
SPECTRUM START TIME .. 0. SECS

SEA STATE DEFINITION

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WAVE SPECTRUM TYPE ... JONSWAP (CLASSIC)
JONSWAP COEFFICIENT .. 0.012891 JONSWAP PEAK FACTOR .. 5.000
PEAK WAVE FREQUENCY .. 0.9498 RA/S

CALCULATED WAVE HEIGHTS

=====
SIGNIFICANT WAVE HT. . 2.916 M AVERAGE WAVE HEIGHT .. 1.870 M
MAXIMUM WAVE HEIGHT .. 5.248 M RMS WAVE HEIGHT ..... 2.081 M
TOTAL NUMBER OF WAVES 1917

===== SOLUTION SUMMARY =====

NODE NO.	PIPE SECTION	X COORD (M )	Y COORD (M )	Z COORD (M )	SUPPORT VERT (KN )	REACT HORIZ (KN )	TOTAL MOMENT (KN-M)	TOTAL STRESS (MPA)	PCT YLD (%)
1	LAYBARGE	64.2	4.4	0.0	1.1	0.0	0.2	0.2	0.
3	LAYBARGE	59.7	4.3	0.0	23.8	0.0	15.8	17.0	5.
5	LAYBARGE	48.2	4.0	0.0	29.1	0.0	22.9	24.7	7.
7	TENSIONR	38.1	3.7	0.0	15.9	0.0	7.2	22.9	6.
9	LAYBARGE	33.4	3.6	0.0	21.4	0.0	13.6	28.5	8.
11	TENSIONR	26.6	3.4	0.0	4.7	0.0	22.7	45.1	13.
13	LAYBARGE	21.3	3.3	0.0	0.0	0.0	21.3	46.3	13.
15	LAYBARGE	12.1	3.0	0.0	76.7	0.0	262.4	304.2	84.
17	LAYBARGE	-0.1	1.8	0.0	72.3	0.0	266.3	310.0	86.
20	STINGER	-8.1	0.4	0.0	62.9	0.0	256.1	298.6	83.
22	STINGER	-15.9	-1.3	0.0	34.1	0.0	175.2	210.9	59.
24	STINGER	-23.7	-3.1	0.0	0.0	0.0	61.2	88.3	25.
26	STINGER	-30.9	-4.8	0.0	0.0	0.0	76.0	99.8	28.
28	STINGER	-36.9	-6.2	0.0	0.0	0.0	87.5	112.1	31.
30	STINGER	-39.8	-6.8	0.0	0.0	0.0	90.2	117.8	33.
95	SEABED	-166.6	-22.5	0.0	1.5	0.0	70.2	89.7	25.

## BIODATA PENULIS



Penulis Tugas Akhir ini bernama Ignasius Krisna Armanda. Penulis lahir di Bekasi, 29 April 1998. Penulis menempuh Pendidikan di TK Kid's School, SD Don Bosco 2, SMP Don Bosco 2, SMAN 21 Jakarta. Pada tahun 2016, penulis melanjutkan Pendidikan Strata 1 di Departemen Teknik Kelautan FTK ITS melalui jalur mandiri atau PKM. Selama masa perkuliahan, penulis aktif di beberapa organisasi dan Unit Kegiatan Mahasiswa (UKM). Penulis aktif di UKM Maritime Challenge ITS sebagai staff di Departemen Pengembangan Sumber Daya Mahasiswa (PSDM). Penulis juga aktif di Himpunan Mahasiswa Teknik Kelautan FTK ITS (HIMATEKLA FTK ITS) sebagai staff di Departemen Dalam Negeri selama periode 2017-2019, kemudian melanjutkan sebagai Ketua Departemen Dalam Negeri selama periode 2019-2020. Selain itu, penulis juga mendapat kesempatan untuk melaksanakan Kerja Praktik di PT Pertamina Hulu Energi Offshore North West Java (PT PHE ONWJ) selama 2 bulan. Disitu, penulis mengerjakan project instalasi pipa bawah laut untuk pipa carbon steel. Penulis telah menyelesaikan Tugas Akhir yang berjudul “ANALISA KAPABILITAS *PIPE LAY BARGE* HAFAR NEPTUNE PADA OPERASI *PIPELAYING* DI LADANG MINYAK DAN GAS *OFFSHORE NORTH WEST JAVA*” sebagai syarat akhir kelulusan.

Kontak Penulis

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