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 Project: Implementation of REDWIN models in OC6
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Calibration foundation models for the WAS-XL monopile

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Review and reference page

1 Introduction

This technical note documents the calibration of REDWIN foundation model 2 and distributed p-y springs for the WAS-XL monopile in clay with a length over diameter ratio (L/D) of 5. The calibration files will be used by the OC6 Phase II participants to verify the correct implementation of foundation models.

2 Soil conditions for the WAS-XL monopile

The soil condition consists of the following layers (illustrated in Figure 2-1):

- ↗ 3 m shallow medium dense sand layer
- ↗ Over consolidated clay layer

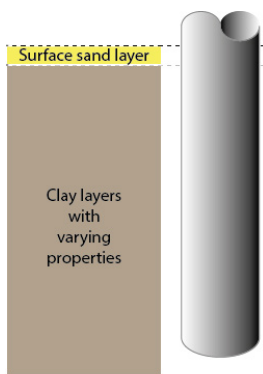


Figure 2-1 Illustration of soil profile

2.1 Sand layer

The 3 m shallow sand layer has a relative density of 50% and an effective unit weight, γ' , of 10 kN/m³. The stiffness and strength properties of the sand layer has been decided based on correlations in literature (Brinkgreve et al., 2010).

2.2 Clay layers

The clay layers have an OCR of 4, a plasticity index, I_p , of 30% and an effective unit weight, γ' , of 10 kN/m³. The strength anisotropy factors and failure strains are summarised in Table 2-1. These values are based on Drammen clay (Andersen, 2015).

Table 2-1 Anisotropy factors and failure strains for clay layers

s_u^C/s_u^{DSS}	-	1.5
s_u^E/s_u^{DSS}	-	0.72
γ_f^C	%	10
$\gamma_f^E, \gamma_f^{DSS}$	%	15

The clay has a linearly increasing shear strength with depth, s_u^C/σ_v' , of 1. The G_{max} profile is shown in Figure 2-2.

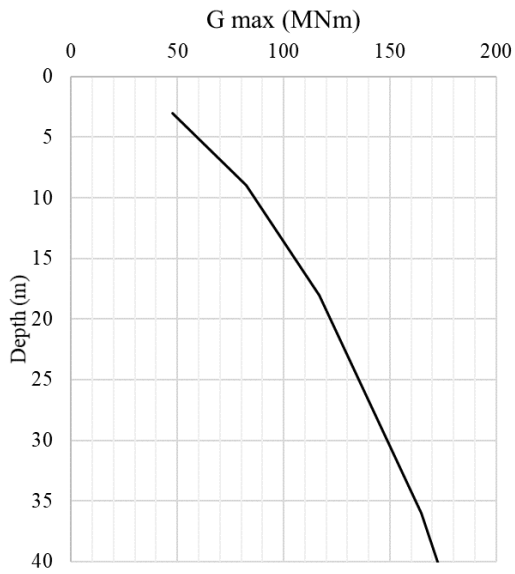


Figure 2-2 G_{max} with depth of the soil (black)

3 Finite element model

3D Finite Element Analyses (FEA) are performed to develop the required input files for the REDWIN foundation model. Representative soil material models are chosen for the soil layers to compute the initial foundation stiffness and nonlinear load-displacement backbone curves for horizontal and moment loading. The analyses are performed using the finite element program Plaxis3D 2018 (Brinkgreve et al., 2018).

3.1 Foundation geometry and material parameters

The monopile is modelled with the following geometry:

- ↗ Outer diameter of 9 m
- ↗ Wall thickness of 110 mm
- ↗ Length of 45 m below seabed

The monopile is modelled as a solid pile with an equivalent stiffness. The equivalent stiffness is calculated as the ratio of the bending stiffness for a hollow pile and a solid pile, assuming a steel Young's modulus of 210 000 MPa. It is modelled as a linear elastic material with an equivalent stiffness, E' , of 19.79E6 kPa and a Poisson's ratio, ν , of 0.3. Half of the pile is modelled due to symmetry.

A dummy pile is modelled in the centre of the monopile to be able to extract forces along the pile. It is modelled as a beam element with equivalent area of 1.536 m² and moment of inertia of 15.18 m⁴, corresponding to half of the pile.

The zone between the pile and soil is modelled with interface elements with the Mohr-Coulomb material model. The interface is modelled with $0.72 * s_{u}^{DSS}$ of the adjacent soil, according to curve A in Figure 14 (OCR=4) in (Andersen, 2002). The interface is extended below the pile tip. The right-hand side of the pile allows no tension cut-off, while the left-hand side allows tension cut-off.

The loads are applied at a rigid body surface at the pile head.

3.2 Dimensions, boundary conditions and mesh

The FE model is shown in Figure 3-1. It has dimensions in the x-, y-, and z-direction as listed in Table 3-1. Based on the observed failure mechanism, it is concluded that these dimensions are sufficiently large to avoid unwanted boundary effects. The default static boundary conditions of Plaxis3D are applied, which entails fully fixed boundary at the base of the model and roller boundaries (fixed in the normal direction) at the vertical sides.

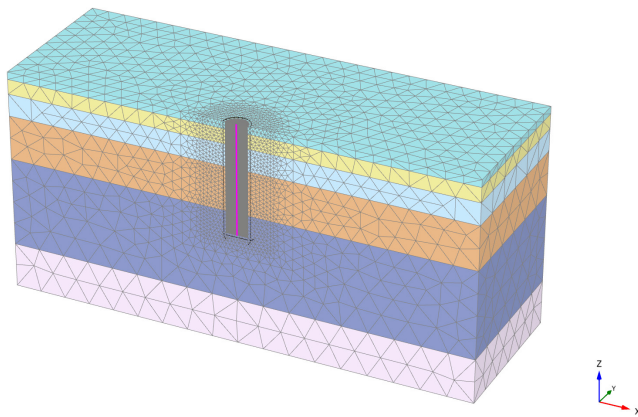


Figure 3-1 FE model

Table 3-1 Overall dimensions of FE model

X _{min} (m)	X _{max} (m)	Y _{min} (m)	Y _{max} (m)	Z _{min} (m)	Z _{max} (m)
-10.5*D	10.5*D	0	7*D	-10D	0

Plaxis3D uses 10-node tetrahedral elements to model the soil volume and 6-node triangular elements with five degrees of freedom per node for plate elements. The mesh consists of roughly 40 000 elements and 60 000 nodes, with enhanced mesh refinements near the pile. This mesh was found to be sufficiently detailed for the purpose of these analyses. In addition to the soil and plate elements, 12-node zero-thickness interface elements are employed between the monopile and the surrounding soil.

3.3 Soil material models and properties

3.3.1 Sand layer

The 3 m shallow sand layer is assumed to be drained and is modelled with the Hardening Soil (HS) material model, which is an effective-stress based model (Schanz et al., 1999). The main features of the HS model are:

- Yield criterion – two-surface yield criterion with isotropic hardening. A cone described relative to the Mohr-Coulomb surface and a "cap" or spherical surface controlled by the volumetric effective pre-consolidation stress.
- Strength – defined by Mohr-Coulomb failure. Parameters are cohesion, friction angle and dilation angle.
- Stiffness during loading – stress dependent stiffness according to power law. Follows hyperbolic hardening in deviatoric loading.
- Stiffness during unloading/reloading – Isotropic nonlinear elastic behaviour. Both effective stress and strain dependent.

The HS-model input parameters for the sand layer are shown in Table 3-2.

Table 3-2 Assumed parameters for the sand layer (0-3m depth)

Parameter	Unit	Value
Drainage type		Drained
Submerged weight γ'	kN/m ³	10
E_{50}^{ref}	kPa	30 000
E_{oed}^{ref}	kPa	30 000
E_{ur}^{ref}	kPa	90 000
Power m	-	0.54
Cohesion c'_{ref}	kPa	0
Friction angle ϕ'	deg	34.25
Dilatancy angle ψ	deg	4.25
$\gamma_{0.7}$	-	0.00015
G_0^{ref}	kPa	94000
R_f	-	0.9
Tension cut-off	-	on

3.3.2 Clay layer

The clay layers are modelled with the NGI-ADP material model (Grimstad, Andresen, and Jostad 2012). The NGI-ADP model is a total stress-based elasto-plastic model with anisotropic undrained shear strengths featuring stress-path dependent non-linear stress-strain response during virgin loading. ADP stands for Active, Direct simple shear and Passive stresses or strain paths. The main features of the NGI-ADP model are:

- Yield criterion – translated, slightly approximated, Tresca criterion.
- Strength – direct input of undrained shear strengths in active, passive and direct simple shear loading i.e. s_u^A , s_u^P and s_u^{DSS} , respectively.
- Stiffness during loading – undrained deviatoric stiffness defined by failure shear strains at characteristic strengths, the undrained shear strengths, the unloading/reloading shear modulus and an asymptotic hardening function.
- Stiffness during unloading/reloading – isotropic, elastic behaviour is assumed, controlled by the unloading/reloading shear modulus, G_{ur} , which in turn, in this model, is a function of the undrained shear strength.

The NGI-ADP material input parameters assumed for the clay layers are shown in Table 3-3.

Table 3-3 Assumed parameters for the clay layers

Depth m	γ' kN/m ³	G_{ur}/s_u^A	γ_f^C %	γ_f^E %	γ_f^{DSS} %	z_{ref} m	$s_u^A_{ref}$ kPa	$s_u^A_{inc}$ kPa/m	s_u^P/s_u^A	s_u^{DSS}/s_u^A
3-9	10	1252	10	15	15	-3	30	10	0.48	0.67
9-18	10	782.2	10	15	15	-9	90	10	0.48	0.67
18-36	10	553.1	10	15	15	-18	180	10	0.48	0.67
36-72	10	391.1	10	15	15	-36	360	10	0.48	0.67
72-100	10	299.5	10	15	15	-72	720	10	0.48	0.67

3.4 Calculation phases

The calculation procedure consists of the following phases:

1. Initial phase: generating the in-situ stresses based on the earth pressure coefficient, K_0 .
2. Pushover analysis in separate phases, with the following loads applied to the pile head at seabed:
 - a. Moment load (M) applied until failure (for $H = 0$), from which the $M - u_M - \theta_M$ curves are obtained, as illustrated in Figure 3-2a.
 - b. Horizontal load (H) applied until failure (for $M = 0$), from which $H - u_H - \theta_H$ curves are obtained, as illustrated in Figure 3-2b.

In addition, a small vertical load is applied to obtain the elastic vertical stiffness. The resulting load-displacement and moment-rotation curves are stored from each analysis for later use in setting up the REDWIN input files.

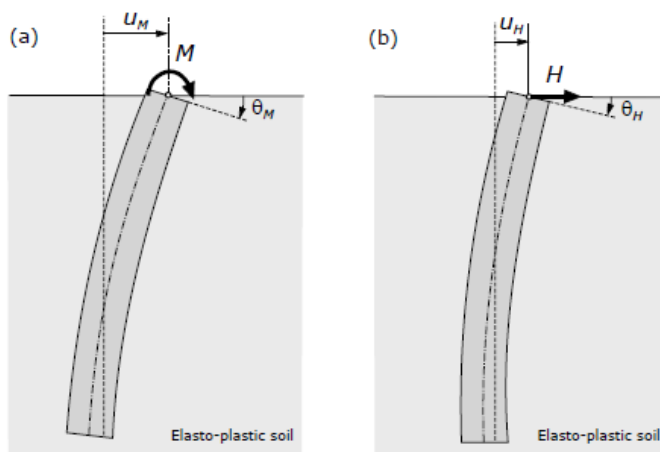


Figure 3-2 Load cases in FEA to determine load-displacement curves at seabed for REDWIN model 2: (a) overturning moment, (b) horizontal load

4 Calibration of REDWIN model 2

REDWIN model 2 requires two main types of user input: (1) the coefficients of the elastic stiffness matrix, D , at seabed, and (2) two load-displacement curves from nonlinear pushover analyses. In addition, a few numerical parameters must be specified. The elastic stiffness matrix is used to predict the elastic foundation response, and the nonlinear load-displacement curves are employed to derive the shape and size of the yield surfaces and the hardening law in the multi-surface plasticity model. This last derivation is performed internally by the model. This section presents the generated elastic stiffness matrix and the derived load-displacement curves.

4.1 Input

4.1.1 Elastic stiffness matrix

The following elastic foundation stiffness matrix is derived for the soil conditions and pile dimensions described in Section 2:

$$K_{seabed\ 6 \times 6} = \begin{bmatrix} 6.336198\ E9 & 0 & 0 & 0 & -5.015421\ E10 & 0 \\ 0 & 6.336198\ E9 & 0 & 5.015421\ E10 & 0 & 0 \\ 0 & 0 & 1.119691\ E10 & 0 & 0 & 0 \\ 0 & 5.015421\ E10 & 0 & 8.111942\ E11 & 0 & 0 \\ -5.015421\ E10 & 0 & 0 & 0 & 8.111942\ E11 & 0 \\ 0 & 0 & 0 & 0 & 0 & 2.552673\ E11 \end{bmatrix}$$

Note that the units are N and m. The numerical values correctly formatted can be found in Appendix A.

4.1.2 Load-displacement curves

The load-displacement curves describing lateral response of the foundation at seabed are displayed in Figure 4-1. The numerical values correctly formatted can be found in Appendix A.

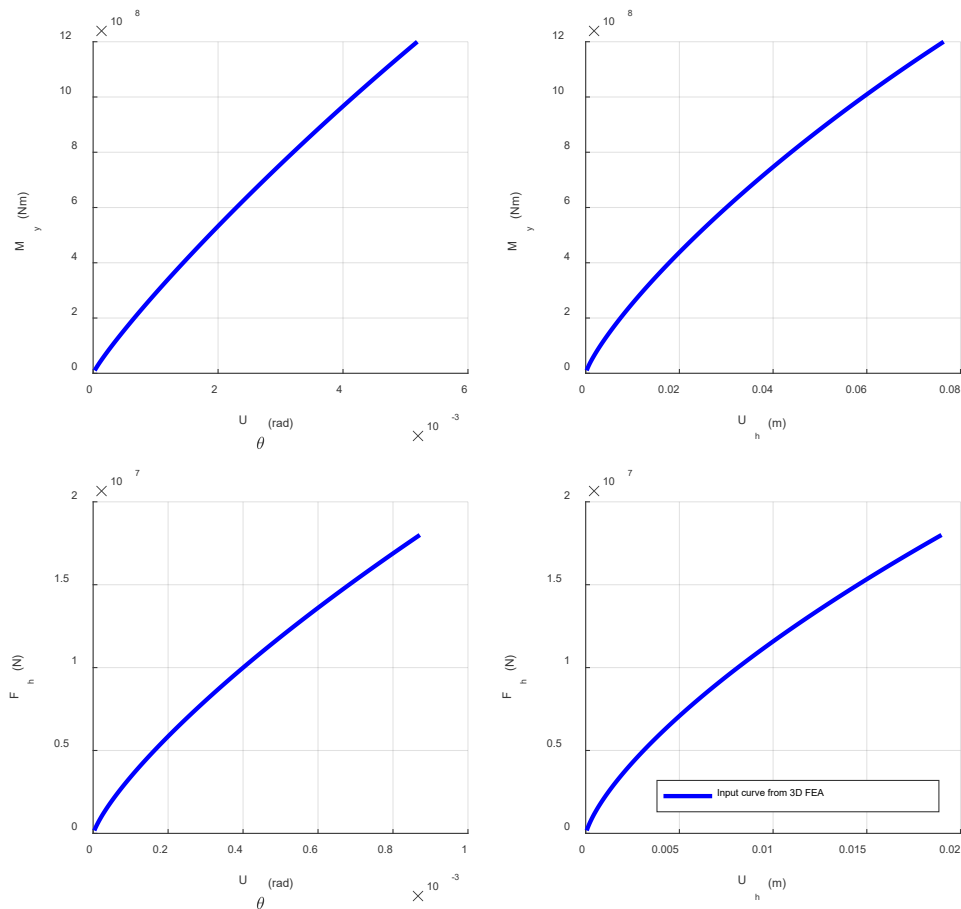


Figure 4-1 Load-displacement curves describing lateral response of the foundation at seabed

4.2 Model performance

The REDWIN model input files have been tested to verify that the model reproduces the input curves, and to ensure that the calibration covers the expected load range. Both load- and displacement-controlled tests have been performed.

4.2.1 Comparison against 3D FEA

The calibration of REDWIN model 2 has been verified by comparing the model output to the input load-displacement curves from 3D FEA in two load-controlled tests. The comparison is plotted in Figure 4-2. In addition, Figure 4-3 displays a zoom in at the representative load levels for the WAS-XL monopile. REDWIN model 2 agrees well with the input curves, especially from relatively small load levels up to the representative load levels. At higher load levels, the agreement is a bit poorer, due to the assumption included in the model formulation related to the shape of the yield surfaces.

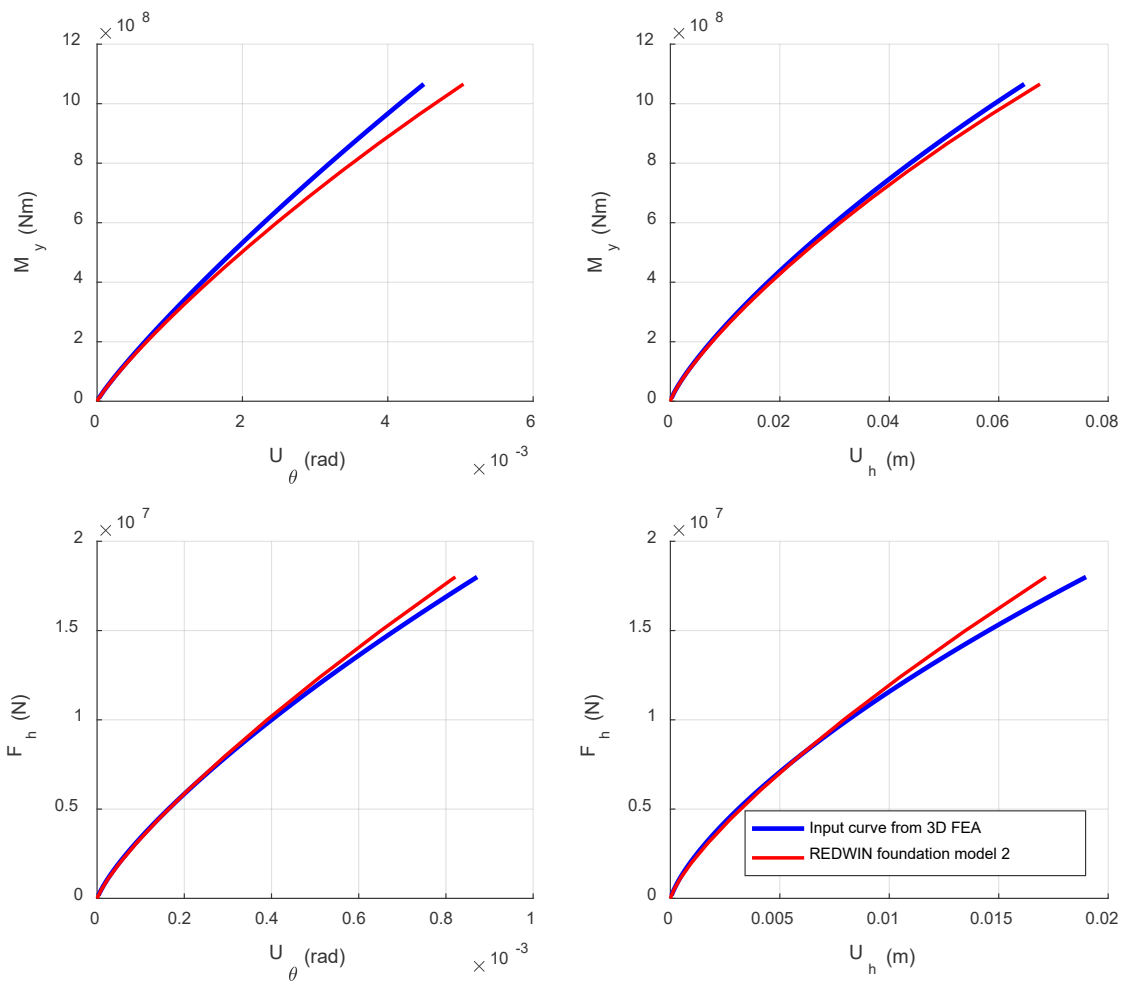


Figure 4-2 Comparison between REDWIN model 2 and the input load-displacement curves derived from 3D FEA

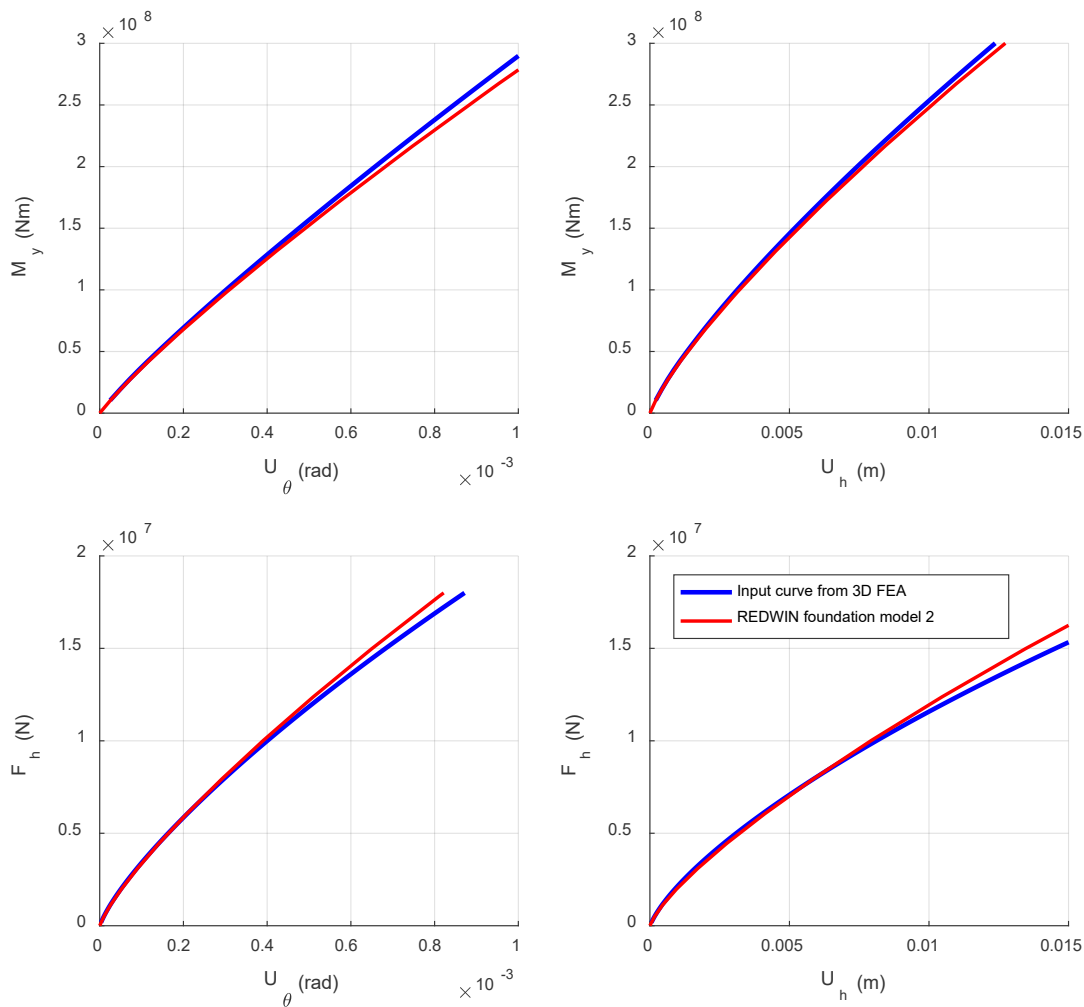


Figure 4-3 Comparison between REDWIN model 2 and the input load-displacement curves derived from 3D FEA for the expected load range

4.2.2 Model performance for a simple cyclic history

The performance of REDWIN model 2 has been tested by running simple displacement-controlled cyclic histories. Figure 4-4 plots one of the applied displacement histories and Figure 4-5 plots the response computed with REDWIN model 2. REDWIN model 2 shows the expected hysteretic behaviour at the representative load range.

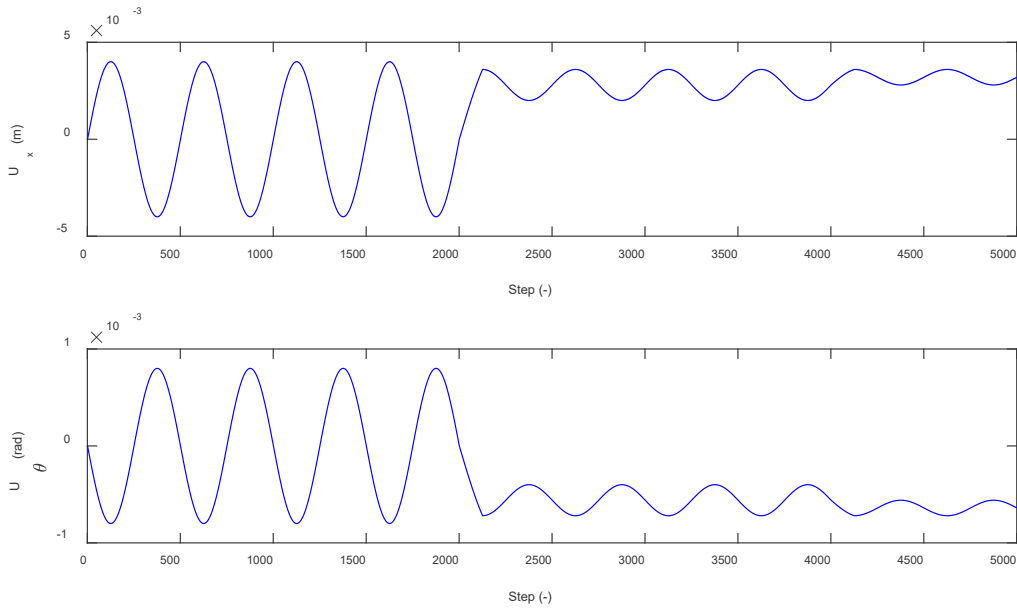


Figure 4-4 Applied displacement history

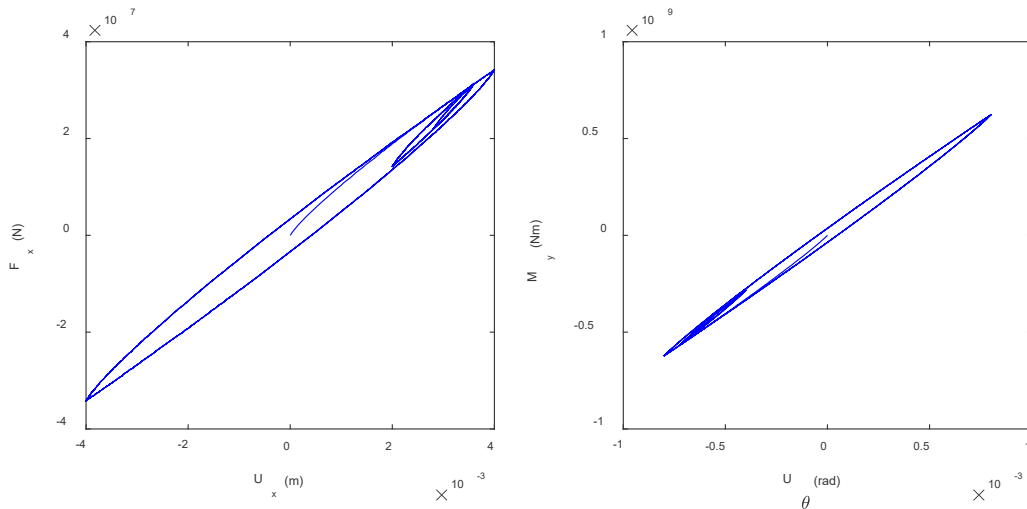


Figure 4-5 Hysteretic loops computed with REDWIN model 2

4.2.3 Model performance for WAS-XL load histories

In addition to simple displacement-controlled cyclic load histories, the performance of REDWIN model 2 has been checked for representative displacement histories computed for the WAS-XL monopile. Figure 4-6 (top) plots an example of a horizontal displacement history computed in WAS-XL, used as input signal; while Figure 4-6 (bottom) plots the force computed with REDWIN model 2. The performance of REDWIN model 2 seems adequate.

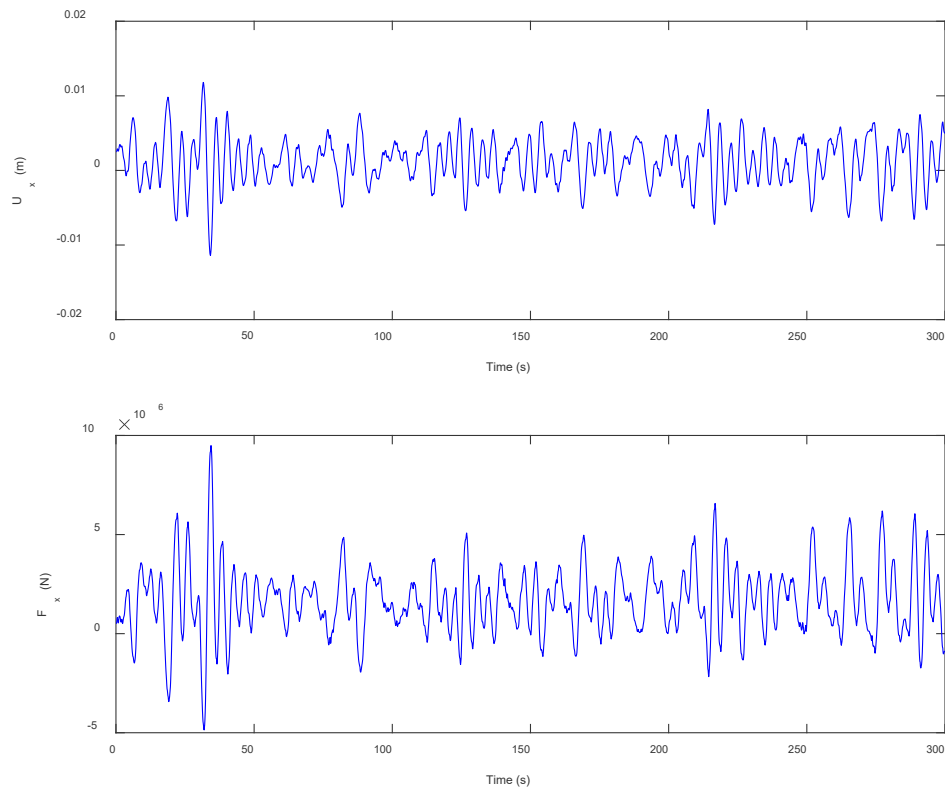


Figure 4-6 Performance of REDWIN model 2 for representative displacement histories for the WAS-XL monopile. Top: input displacement history at seabed; bottom: response computed with REDWIN model 2.

5 Calibration of distributed p-y springs

5.1 Methodology

A series of non-linear p-y springs distributed along the length of the monopile have been calibrated for the WAS-XL monopile with $L/D = 5$. The p-y springs relate the lateral soil resistance of each cross-section, p , to the lateral pile displacement, y . The p-y springs are calibrated following an optimization procedure, where the results from the FEA documented in Section 3 are used as target. Initially, each p-y spring follows the p-y curve formulation proposed by Zhang and Andersen (2017). During the calibration process, a set of modifiers is applied to the p and y values derived from Zhang and Andersen (2017) until the error to the load-displacement response from FEA is minimized. For more details on this procedure, the reader is referred to Aamodt (2019).

5.2 Input

Figure 5-1 displays some of the optimized non-linear p-y springs at different depths along the monopile. The numerical values can be found in Appendix B.

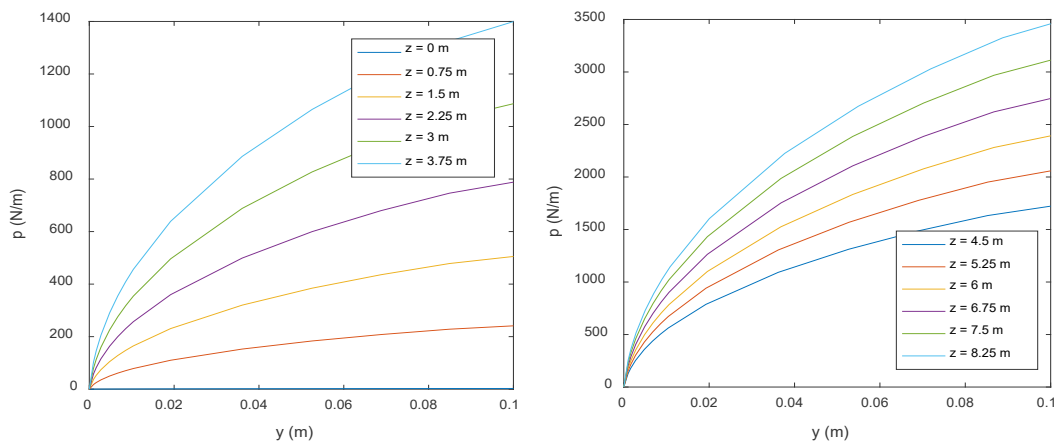


Figure 5-1 Optimized non-linear p-y springs at different depths along the monopile

5.3 Model performance

The optimized non-linear p-y springs have been tested to verify that they reproduce the curves from 3D FEA. Figure 5-1 plots the comparison; while Figure 5-2 displays a zoom in at representative load levels for the WAS-XL monopile. While the overall agreement is very good, the optimized p-y springs compute a slightly lower foundation stiffness.

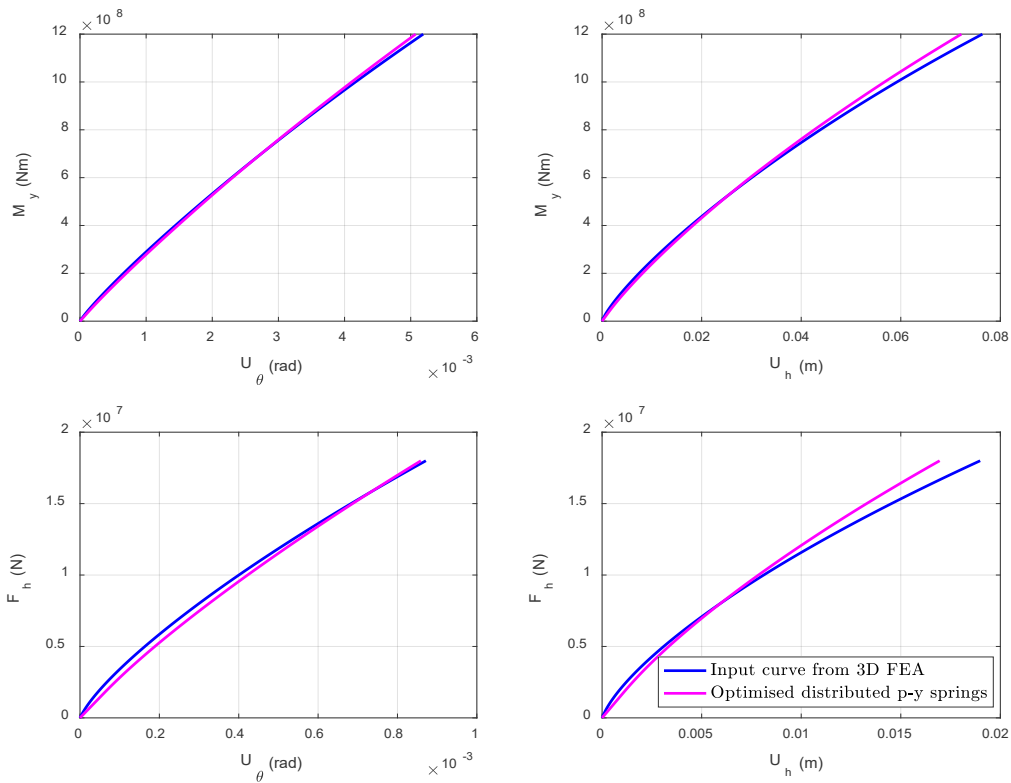


Figure 5-2 Comparison between the optimised distributed p-y springs and the input load-displacement curves derived from 3D FEA

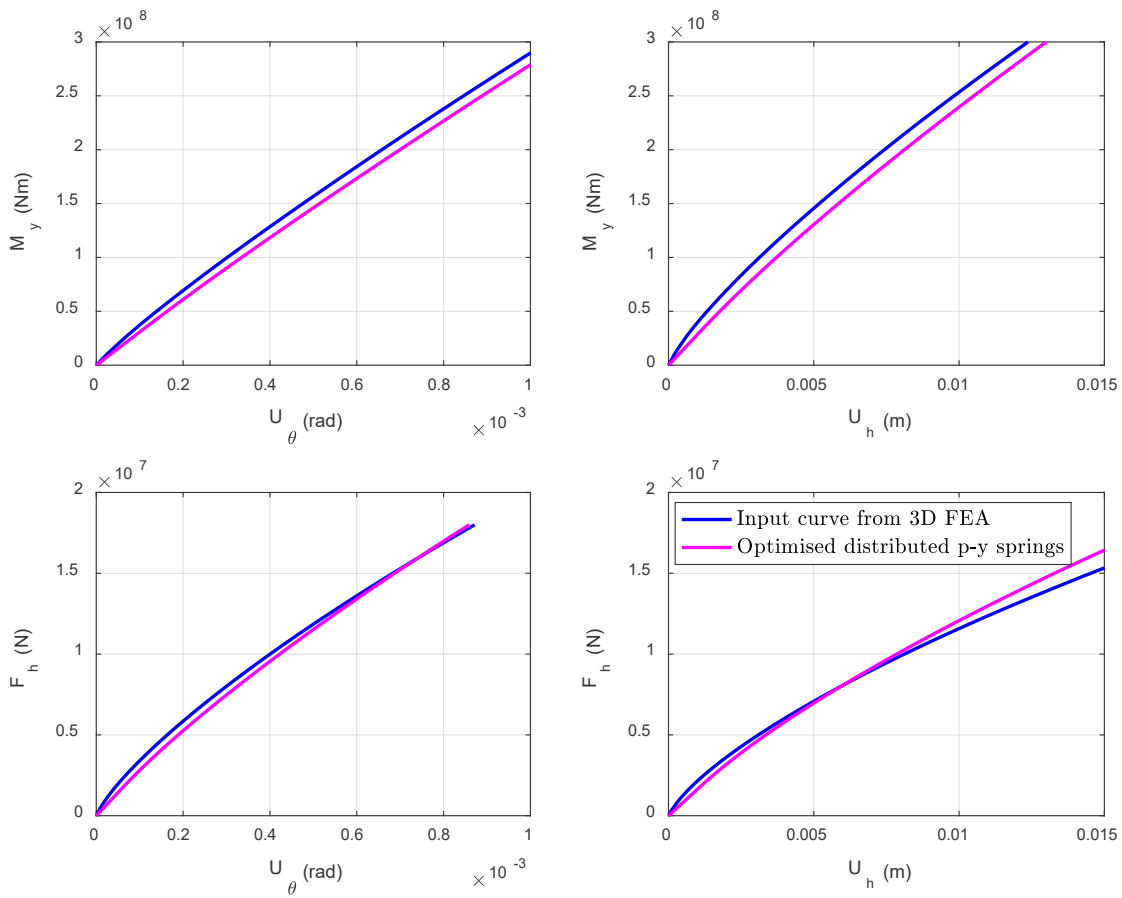


Figure 5-3 Comparison between the optimised distributed p-y springs and the input load-displacement curves derived from 3D FEA for the expected load range

6 References

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Zhang, Y. & Andersen, K.H. (2017). Scaling of lateral pile response in clay from laboratory stress-strain curves. *Marine Structures*, 53, 124-135.

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Appendix A

INPUT FILES FOR REDWIN MODEL 2

Contents

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A3	LDISPFIL	2

A1 Introduction

The REDWIN foundation models read the required model input (model parameters and load-displacement curves) from two text files: PROPSFILE and LDISPFILE. The file name and path of these two files are specified by the calling program (the simulation software) using the modes. The input files for the WAS-XL monopile in the correct format are presented below.

A2 PROPSFILE

```

REDWINmodel 2 Input File. Valid for REDWINmodel2-2.0, 04-Apr-2020 11:18:35
----- Coefficients of the elastic stiffness matrix at seabed -----
 6.336198e+09      K11 = K22      - Elastic horizontal stiffness at seabed
-5.015421e+10      K15 = -K24      - Elastic horizontal-rotational cross stiffness at seabed
-5.015421e+10      K51 = -K42      - Elastic rotational-horizontal cross stiffness at seabed
 8.111942e+11      K55 = K44      - Elastic rotational stiffness at seabed
 1.119691e+10      K33      - Elastic vertical stiffness at seabed
 2.552673e+11      K66      - Elastic torsional stiffness at seabed
----- Settings -----
 20      Ns      - Number of yield surfaces (recommended value = 15-25)
 20      iMax    - Num. of iterations before activating sub-stepping
              (recommended value = 10-20)
 1.000000e-06    tol    - Convergence tolerance (recommended value = 1.0e-06)

=====
NOTE: Do not add or remove any lines in this file!
=====
    
```

A3 LDISPFILE

```

REDWINmodel 2 Input File. Valid for REDWINmodel2-2.0, 04-Apr-2020 11:18:35
----- Number of data points in each curve -----
200      NM      - Number of rows in the Moment - Hor. displacement - Rotation curve (H = 0)
200      NH      - Number of rows in the Hor. load - Hor. displacement - Rotation curve (M = 0)
----- Moment - Horizontal displacement - Rotation (in radians) curve at seabed -----
-----
Moment      Hor. Displ.      Rotation
0.000000e+00    0.000000e+00    0.000000e+00
1.039356e+07    2.085540e-04    2.509320e-05
1.922284e+07    4.227170e-04    4.859630e-05
2.746240e+07    6.383650e-04    7.140280e-05
3.506780e+07    8.557040e-04    9.342370e-05
4.218780e+07    1.074400e-03    1.148120e-04
4.899800e+07    1.293970e-03    1.357760e-04
5.561000e+07    1.514100e-03    1.564600e-04
6.207540e+07    1.734640e-03    1.769330e-04
6.841120e+07    1.955520e-03    1.972190e-04
7.462260e+07    2.176730e-03    2.173250e-04
8.071460e+07    2.398270e-03    2.372570e-04
8.669460e+07    2.620120e-03    2.570230e-04
9.257280e+07    2.842250e-03    2.766380e-04
9.835900e+07    3.064640e-03    2.961130e-04
1.040622e+08    3.287260e-03    3.154630e-04
1.096898e+08    3.510080e-03    3.346960e-04
1.152472e+08    3.733080e-03    3.538230e-04
1.207392e+08    3.956250e-03    3.728460e-04
1.261702e+08    4.179590e-03    3.917740e-04
1.315460e+08    4.403080e-03    4.106120e-04
    
```

1.368692e+08	4.626720e-03	4.293650e-04
1.421424e+08	4.850490e-03	4.480350e-04
1.473706e+08	5.074400e-03	4.666290e-04
1.525566e+08	5.298430e-03	4.851510e-04
1.577030e+08	5.522570e-03	5.036050e-04
1.628122e+08	5.746830e-03	5.219940e-04
1.678852e+08	5.971190e-03	5.403200e-04
1.729224e+08	6.195650e-03	5.585850e-04
1.779256e+08	6.420210e-03	5.767900e-04
1.828962e+08	6.644870e-03	5.949380e-04
1.878344e+08	6.869610e-03	6.130300e-04
1.927408e+08	7.094440e-03	6.310680e-04
1.976160e+08	7.319360e-03	6.490520e-04
2.024600e+08	7.544360e-03	6.669840e-04
2.072740e+08	7.769430e-03	6.848640e-04
2.120580e+08	7.994590e-03	7.026940e-04
2.168140e+08	8.219820e-03	7.204760e-04
2.215420e+08	8.445120e-03	7.382100e-04
2.262440e+08	8.670500e-03	7.558980e-04
2.309180e+08	8.895950e-03	7.735410e-04
2.355660e+08	9.121460e-03	7.911410e-04
2.401900e+08	9.347030e-03	8.086970e-04
2.447900e+08	9.572670e-03	8.262110e-04
2.493660e+08	9.798370e-03	8.436850e-04
2.539180e+08	1.002410e-02	8.611180e-04
2.584500e+08	1.024990e-02	8.785130e-04
2.629600e+08	1.047580e-02	8.958700e-04
2.674480e+08	1.070170e-02	9.131910e-04
2.719180e+08	1.092770e-02	9.304750e-04
2.719180e+08	1.092770e-02	9.304750e-04
2.807980e+08	1.137980e-02	9.649380e-04
2.896000e+08	1.183220e-02	9.992630e-04
2.983300e+08	1.228470e-02	1.033450e-03
3.069880e+08	1.273740e-02	1.067520e-03
3.155820e+08	1.319020e-02	1.101460e-03
3.241100e+08	1.364330e-02	1.135280e-03
3.283500e+08	1.386990e-02	1.152150e-03
3.367860e+08	1.432310e-02	1.185800e-03
3.451600e+08	1.477660e-02	1.219350e-03
3.534780e+08	1.523020e-02	1.252780e-03
3.617380e+08	1.568390e-02	1.286110e-03
3.699460e+08	1.613780e-02	1.319340e-03
3.781000e+08	1.659180e-02	1.352460e-03
3.862040e+08	1.704600e-02	1.385500e-03
3.942560e+08	1.750020e-02	1.418440e-03
4.022600e+08	1.795460e-02	1.451280e-03
4.102180e+08	1.840920e-02	1.484040e-03
4.181280e+08	1.886380e-02	1.516710e-03
4.220680e+08	1.909120e-02	1.533020e-03
4.299120e+08	1.954600e-02	1.565560e-03
4.377140e+08	2.000090e-02	1.598020e-03
4.454720e+08	2.045590e-02	1.630390e-03
4.531880e+08	2.091110e-02	1.662690e-03
4.608640e+08	2.136630e-02	1.694910e-03
4.685020e+08	2.182170e-02	1.727050e-03
4.761000e+08	2.227710e-02	1.759120e-03
4.836600e+08	2.273270e-02	1.791110e-03
4.911820e+08	2.318830e-02	1.823030e-03
4.986680e+08	2.364400e-02	1.854880e-03
5.061180e+08	2.409990e-02	1.886650e-03
5.135320e+08	2.455580e-02	1.918360e-03
5.172260e+08	2.478380e-02	1.934190e-03
5.245900e+08	2.523980e-02	1.965790e-03
5.319180e+08	2.569590e-02	1.997330e-03
5.392140e+08	2.615220e-02	2.028800e-03
5.464780e+08	2.660850e-02	2.060210e-03
5.537100e+08	2.706480e-02	2.091550e-03
5.609080e+08	2.752130e-02	2.122830e-03

5.680760e+08	2.797780e-02	2.154050e-03
5.752160e+08	2.843450e-02	2.185210e-03
5.823260e+08	2.889120e-02	2.216310e-03
5.894060e+08	2.934790e-02	2.247340e-03
5.964560e+08	2.980480e-02	2.278320e-03
5.999700e+08	3.003320e-02	2.293790e-03
6.069760e+08	3.049020e-02	2.324680e-03
6.139560e+08	3.094720e-02	2.355520e-03
6.209080e+08	3.140430e-02	2.386300e-03
6.278320e+08	3.186140e-02	2.417030e-03
6.347280e+08	3.231870e-02	2.447690e-03
6.415980e+08	3.277600e-02	2.478310e-03
6.484420e+08	3.323330e-02	2.508870e-03
6.552600e+08	3.369070e-02	2.539380e-03
6.620500e+08	3.414820e-02	2.569830e-03
6.688140e+08	3.460580e-02	2.600240e-03
6.755540e+08	3.506340e-02	2.630590e-03
6.789140e+08	3.529220e-02	2.645740e-03
6.856160e+08	3.574990e-02	2.676020e-03
6.922940e+08	3.620770e-02	2.706240e-03
6.989480e+08	3.666550e-02	2.736420e-03
7.055760e+08	3.712340e-02	2.766540e-03
7.121800e+08	3.758130e-02	2.796620e-03
7.187620e+08	3.803940e-02	2.826640e-03
7.253200e+08	3.849740e-02	2.856620e-03
7.318520e+08	3.895550e-02	2.886550e-03
7.383620e+08	3.941370e-02	2.916430e-03
7.448520e+08	3.987190e-02	2.946270e-03
7.513180e+08	4.033020e-02	2.976060e-03
7.577620e+08	4.078860e-02	3.005800e-03
7.609760e+08	4.101770e-02	3.020660e-03
7.673860e+08	4.147620e-02	3.050330e-03
7.737740e+08	4.193460e-02	3.079960e-03
7.801420e+08	4.239320e-02	3.109550e-03
7.864880e+08	4.285170e-02	3.139090e-03
7.928140e+08	4.331030e-02	3.168590e-03
7.991160e+08	4.376900e-02	3.198040e-03
8.053960e+08	4.422780e-02	3.227450e-03
8.116560e+08	4.468650e-02	3.256810e-03
8.178980e+08	4.514540e-02	3.286140e-03
8.241200e+08	4.560420e-02	3.315420e-03
8.303200e+08	4.606310e-02	3.344660e-03
8.334120e+08	4.629260e-02	3.359260e-03
8.395800e+08	4.675160e-02	3.388430e-03
8.457300e+08	4.721070e-02	3.417570e-03
8.518600e+08	4.766980e-02	3.446660e-03
8.579700e+08	4.812890e-02	3.475710e-03
8.640620e+08	4.858810e-02	3.504720e-03
8.701340e+08	4.904730e-02	3.533690e-03
8.761900e+08	4.950660e-02	3.562620e-03
8.822260e+08	4.996590e-02	3.591520e-03
8.882440e+08	5.042530e-02	3.620370e-03
8.942440e+08	5.088470e-02	3.649180e-03
9.002240e+08	5.134420e-02	3.677950e-03
9.061880e+08	5.180370e-02	3.706690e-03
9.091620e+08	5.203350e-02	3.721040e-03
9.150980e+08	5.249300e-02	3.749720e-03
9.210140e+08	5.295260e-02	3.778370e-03
9.269120e+08	5.341230e-02	3.806970e-03
9.327900e+08	5.387200e-02	3.835530e-03
9.386500e+08	5.433170e-02	3.864050e-03
9.444920e+08	5.479150e-02	3.892540e-03
9.503180e+08	5.525130e-02	3.920990e-03
9.561220e+08	5.571120e-02	3.949400e-03
9.619080e+08	5.617110e-02	3.977770e-03
9.676760e+08	5.663110e-02	4.006100e-03
9.734280e+08	5.709110e-02	4.034400e-03
9.762980e+08	5.732110e-02	4.048540e-03

9.820240e+08	5.778110e-02	4.076780e-03
9.877340e+08	5.824120e-02	4.104990e-03
9.934260e+08	5.870140e-02	4.133160e-03
9.990980e+08	5.916150e-02	4.161290e-03
1.004754e+09	5.962180e-02	4.189390e-03
1.010392e+09	6.008200e-02	4.217450e-03
1.016012e+09	6.054230e-02	4.245470e-03
1.021614e+09	6.100270e-02	4.273460e-03
1.027202e+09	6.146300e-02	4.301410e-03
1.032772e+09	6.192350e-02	4.329320e-03
1.038326e+09	6.238390e-02	4.357200e-03
1.041098e+09	6.261420e-02	4.371130e-03
1.046626e+09	6.307470e-02	4.398960e-03
1.052140e+09	6.353520e-02	4.426750e-03
1.057638e+09	6.399580e-02	4.454510e-03
1.063120e+09	6.445650e-02	4.482230e-03
1.068586e+09	6.491710e-02	4.509920e-03
1.074038e+09	6.537780e-02	4.537580e-03
1.079474e+09	6.583860e-02	4.565200e-03
1.084898e+09	6.629930e-02	4.592800e-03
1.090306e+09	6.676020e-02	4.620360e-03
1.095696e+09	6.722100e-02	4.647890e-03
1.101074e+09	6.768190e-02	4.675380e-03
1.106434e+09	6.814280e-02	4.702840e-03
1.109110e+09	6.837330e-02	4.716560e-03
1.114446e+09	6.883430e-02	4.743970e-03
1.119768e+09	6.929530e-02	4.771350e-03
1.125076e+09	6.975630e-02	4.798690e-03
1.130372e+09	7.021740e-02	4.826010e-03
1.135652e+09	7.067850e-02	4.853290e-03
1.140916e+09	7.113970e-02	4.880540e-03
1.146168e+09	7.160090e-02	4.907770e-03
1.151406e+09	7.206210e-02	4.934960e-03
1.156632e+09	7.252340e-02	4.962120e-03
1.161844e+09	7.298460e-02	4.989250e-03
1.167040e+09	7.344600e-02	5.016350e-03
1.169632e+09	7.367660e-02	5.029890e-03
1.174806e+09	7.413800e-02	5.056940e-03
1.179966e+09	7.459940e-02	5.083960e-03
1.185114e+09	7.506080e-02	5.110950e-03
1.190248e+09	7.552230e-02	5.137920e-03
1.195366e+09	7.598380e-02	5.164850e-03
1.200000e+09	7.640300e-02	5.189280e-03

----- Horizontal Load - Horizontal displacement - Rotation (radians) curve at seabed -----

Hor. Load	Hor. Displ.	Rotation
0.000000e+00	0.000000e+00	0.000000e+00
1.758156e+05	5.434320e-05	3.191960e-06
3.414300e+05	1.088750e-04	6.407050e-06
4.923000e+05	1.637020e-04	9.623900e-06
6.337100e+05	2.187290e-04	1.283210e-05
7.681160e+05	2.738740e-04	1.602500e-05
8.950960e+05	3.291770e-04	1.919740e-05
1.018308e+06	3.844950e-04	2.235450e-05
1.136352e+06	4.398400e-04	2.548820e-05
1.247398e+06	4.953550e-04	2.859450e-05
1.357410e+06	5.508720e-04	3.169600e-05
1.465010e+06	6.064020e-04	3.478450e-05
1.569666e+06	6.619520e-04	3.785620e-05
1.671532e+06	7.175210e-04	4.091140e-05
1.771022e+06	7.731060e-04	4.395200e-05
1.868520e+06	8.287040e-04	4.698060e-05
1.964258e+06	8.843140e-04	4.999830e-05
2.058360e+06	9.399350e-04	5.300560e-05
2.150880e+06	9.955670e-04	5.600270e-05
2.241920e+06	1.051210e-03	5.898990e-05
2.331620e+06	1.106860e-03	6.196740e-05
2.420000e+06	1.162520e-03	6.493550e-05
2.507180e+06	1.218200e-03	6.789450e-05

2.593220e+06	1.273880e-03	7.084470e-05
2.678200e+06	1.329570e-03	7.378680e-05
2.762120e+06	1.385280e-03	7.672060e-05
2.845060e+06	1.440990e-03	7.964640e-05
2.927060e+06	1.496710e-03	8.256440e-05
3.008160e+06	1.552430e-03	8.547510e-05
3.088440e+06	1.608170e-03	8.837840e-05
3.167900e+06	1.663910e-03	9.127470e-05
3.246580e+06	1.719670e-03	9.416410e-05
3.324540e+06	1.775430e-03	9.704710e-05
3.401780e+06	1.831190e-03	9.992360e-05
3.478340e+06	1.886960e-03	1.027940e-04
3.554240e+06	1.942740e-03	1.056580e-04
3.629520e+06	1.998530e-03	1.085160e-04
3.704160e+06	2.054320e-03	1.113680e-04
3.778200e+06	2.110120e-03	1.142150e-04
3.851680e+06	2.165920e-03	1.170560e-04
3.924580e+06	2.221730e-03	1.198920e-04
3.996940e+06	2.277550e-03	1.227230e-04
4.068780e+06	2.333370e-03	1.255480e-04
4.140120e+06	2.389190e-03	1.283680e-04
4.210960e+06	2.445020e-03	1.311840e-04
4.281320e+06	2.500860e-03	1.339950e-04
4.351200e+06	2.556700e-03	1.368010e-04
4.420620e+06	2.612540e-03	1.396030e-04
4.489620e+06	2.668390e-03	1.424000e-04
4.558200e+06	2.724240e-03	1.451930e-04
4.558200e+06	2.724240e-03	1.451930e-04
4.694080e+06	2.835960e-03	1.507660e-04
4.828340e+06	2.947690e-03	1.563220e-04
4.961140e+06	3.059440e-03	1.618610e-04
5.092540e+06	3.171200e-03	1.673840e-04
5.222560e+06	3.282980e-03	1.728920e-04
5.351300e+06	3.394780e-03	1.783840e-04
5.478800e+06	3.506580e-03	1.838630e-04
5.605100e+06	3.618410e-03	1.893270e-04
5.730240e+06	3.730240e-03	1.947770e-04
5.792400e+06	3.786160e-03	1.974980e-04
5.915900e+06	3.898010e-03	2.029290e-04
6.038320e+06	4.009880e-03	2.083480e-04
6.159700e+06	4.121750e-03	2.137540e-04
6.280080e+06	4.233630e-03	2.191480e-04
6.399500e+06	4.345530e-03	2.245320e-04
6.518000e+06	4.457430e-03	2.299040e-04
6.635560e+06	4.569340e-03	2.352650e-04
6.752260e+06	4.681260e-03	2.406150e-04
6.868100e+06	4.793190e-03	2.459540e-04
6.983140e+06	4.905130e-03	2.512830e-04
7.097340e+06	5.017080e-03	2.566020e-04
7.210780e+06	5.129030e-03	2.619100e-04
7.323460e+06	5.241000e-03	2.672080e-04
7.435380e+06	5.352970e-03	2.724960e-04
7.546580e+06	5.464950e-03	2.777750e-04
7.657080e+06	5.576930e-03	2.830450e-04
7.766880e+06	5.688920e-03	2.883050e-04
7.821520e+06	5.744920e-03	2.909320e-04
7.930320e+06	5.856930e-03	2.961790e-04
8.038460e+06	5.968940e-03	3.014180e-04
8.145960e+06	6.080960e-03	3.066480e-04
8.252840e+06	6.192980e-03	3.118690e-04
8.359100e+06	6.305010e-03	3.170830e-04
8.464760e+06	6.417050e-03	3.222880e-04
8.569820e+06	6.529100e-03	3.274850e-04
8.674300e+06	6.641150e-03	3.326750e-04
8.778220e+06	6.753210e-03	3.378570e-04
8.881580e+06	6.865270e-03	3.430310e-04
8.984420e+06	6.977340e-03	3.481980e-04
9.086720e+06	7.089420e-03	3.533580e-04

9.188500e+06	7.201500e-03	3.585100e-04
9.289760e+06	7.313590e-03	3.636550e-04
9.390500e+06	7.425690e-03	3.687930e-04
9.490720e+06	7.537790e-03	3.739240e-04
9.590460e+06	7.649900e-03	3.790490e-04
9.689680e+06	7.762010e-03	3.841670e-04
9.739100e+06	7.818070e-03	3.867230e-04
9.837600e+06	7.930190e-03	3.918310e-04
9.935620e+06	8.042320e-03	3.969320e-04
1.003318e+07	8.154450e-03	4.020270e-04
1.013028e+07	8.266590e-03	4.071160e-04
1.022692e+07	8.378730e-03	4.121990e-04
1.032314e+07	8.490880e-03	4.172750e-04
1.041892e+07	8.603040e-03	4.223450e-04
1.051430e+07	8.715200e-03	4.274100e-04
1.060924e+07	8.827360e-03	4.324680e-04
1.070380e+07	8.939530e-03	4.375210e-04
1.079796e+07	9.051700e-03	4.425670e-04
1.089170e+07	9.163880e-03	4.476080e-04
1.098506e+07	9.276060e-03	4.526430e-04
1.107804e+07	9.388250e-03	4.576730e-04
1.117064e+07	9.500440e-03	4.626970e-04
1.126286e+07	9.612630e-03	4.677160e-04
1.135472e+07	9.724830e-03	4.727290e-04
1.144622e+07	9.837030e-03	4.777360e-04
1.149184e+07	9.893140e-03	4.802380e-04
1.158278e+07	1.000530e-02	4.852380e-04
1.167340e+07	1.011760e-02	4.902320e-04
1.176366e+07	1.022980e-02	4.952220e-04
1.185358e+07	1.034200e-02	5.002060e-04
1.194318e+07	1.045420e-02	5.051860e-04
1.203244e+07	1.056650e-02	5.101610e-04
1.212136e+07	1.067870e-02	5.151310e-04
1.220998e+07	1.079090e-02	5.200960e-04
1.229824e+07	1.090320e-02	5.250560e-04
1.238618e+07	1.101540e-02	5.300120e-04
1.247386e+07	1.112770e-02	5.349620e-04
1.256122e+07	1.123990e-02	5.399080e-04
1.264828e+07	1.135220e-02	5.448500e-04
1.273504e+07	1.146440e-02	5.497860e-04
1.282148e+07	1.157670e-02	5.547190e-04
1.290762e+07	1.168900e-02	5.596460e-04
1.299350e+07	1.180120e-02	5.645690e-04
1.303632e+07	1.185740e-02	5.670290e-04
1.312176e+07	1.196960e-02	5.719460e-04
1.320692e+07	1.208190e-02	5.768580e-04
1.329180e+07	1.219420e-02	5.817660e-04
1.337642e+07	1.230650e-02	5.866690e-04
1.346076e+07	1.241880e-02	5.915690e-04
1.354482e+07	1.253110e-02	5.964640e-04
1.362862e+07	1.264340e-02	6.013540e-04
1.371216e+07	1.275560e-02	6.062410e-04
1.379544e+07	1.286790e-02	6.111230e-04
1.387848e+07	1.298030e-02	6.160010e-04
1.396124e+07	1.309260e-02	6.208760e-04
1.404376e+07	1.320490e-02	6.257460e-04
1.412604e+07	1.331720e-02	6.306120e-04
1.420806e+07	1.342950e-02	6.354740e-04
1.428984e+07	1.354180e-02	6.403330e-04
1.437138e+07	1.365410e-02	6.451870e-04
1.445268e+07	1.376640e-02	6.500380e-04
1.453374e+07	1.387880e-02	6.548850e-04
1.457416e+07	1.393490e-02	6.573070e-04
1.465488e+07	1.404730e-02	6.621480e-04
1.473534e+07	1.415960e-02	6.669850e-04
1.481558e+07	1.427190e-02	6.718190e-04
1.489558e+07	1.438430e-02	6.766490e-04
1.497538e+07	1.449660e-02	6.814750e-04

1.505494e+07	1.460900e-02	6.862980e-04
1.513430e+07	1.472130e-02	6.911170e-04
1.521344e+07	1.483370e-02	6.959320e-04
1.529234e+07	1.494600e-02	7.007440e-04
1.537104e+07	1.505840e-02	7.055520e-04
1.544952e+07	1.517070e-02	7.103570e-04
1.552780e+07	1.528310e-02	7.151590e-04
1.560584e+07	1.539540e-02	7.199570e-04
1.568370e+07	1.550780e-02	7.247510e-04
1.576136e+07	1.562020e-02	7.295420e-04
1.583880e+07	1.573250e-02	7.343300e-04
1.591602e+07	1.584490e-02	7.391140e-04
1.599306e+07	1.595730e-02	7.438950e-04
1.603152e+07	1.601350e-02	7.462840e-04
1.610826e+07	1.612580e-02	7.510600e-04
1.618482e+07	1.623820e-02	7.558330e-04
1.626118e+07	1.635060e-02	7.606020e-04
1.633736e+07	1.646300e-02	7.653680e-04
1.641334e+07	1.657540e-02	7.701310e-04
1.648912e+07	1.668780e-02	7.748900e-04
1.656474e+07	1.680020e-02	7.796470e-04
1.664016e+07	1.691250e-02	7.844000e-04
1.671538e+07	1.702490e-02	7.891500e-04
1.679042e+07	1.713730e-02	7.938980e-04
1.686528e+07	1.724970e-02	7.986420e-04
1.693996e+07	1.736210e-02	8.033830e-04
1.701446e+07	1.747450e-02	8.081210e-04
1.708880e+07	1.758700e-02	8.128560e-04
1.716294e+07	1.769940e-02	8.175880e-04
1.723690e+07	1.781180e-02	8.223170e-04
1.731068e+07	1.792420e-02	8.270430e-04
1.734750e+07	1.798040e-02	8.294050e-04
1.742104e+07	1.809280e-02	8.341260e-04
1.749440e+07	1.820520e-02	8.388450e-04
1.756758e+07	1.831760e-02	8.435610e-04
1.764062e+07	1.843010e-02	8.482740e-04
1.771344e+07	1.854250e-02	8.529840e-04
1.778614e+07	1.865490e-02	8.576910e-04
1.785866e+07	1.876730e-02	8.623950e-04
1.793100e+07	1.887980e-02	8.670960e-04
1.800000e+07	1.898730e-02	8.715880e-04

Appendix B

OPTIMIZED NON-LINEAR P-Y SPRINGS



Tabulated_py-curves

Total_p-y_elements

61

Depth [m]

0

Number_of_points

22

p [N/m] y[m]

0.00 0.000000
 259.08 0.001846
 366.20 0.003032
 517.38 0.005129
 730.22 0.008935
 892.56 0.012521
 1028.59 0.015992
 1147.72 0.019390
 1607.21 0.035788
 2229.23 0.067292
 2678.72 0.098047
 3035.85 0.128399
 3332.47 0.158489
 4320.08 0.306783
 4884.00 0.453235
 5236.73 0.598768
 5464.52 0.743759
 5611.95 0.888400
 5705.04 1.032805
 5760.11 1.177044
 5796.00 1.465200
 5796.00 144.025200

Depth [m]

-7.500000e-01

Number_of_points

22

p [N/m] y[m]

0.00 0.000000
 17750.48 0.000989
 25090.43 0.001624
 35447.81 0.002748
 50030.91 0.004787
 61153.28 0.006708
 70473.62 0.008567
 78635.88 0.010388
 110117.70 0.019172
 152735.10 0.036049
 183532.00 0.052525
 208000.00 0.068785
 228322.90 0.084905
 295989.20 0.164348
 334625.80 0.242804
 358793.10 0.320769
 374400.00 0.398442
 384501.30 0.475928
 390878.90 0.553288
 394652.30 0.630559
 397111.20 0.784929

397111.20 77.156360

Depth [m]
 -1.500000e+00
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 37187.46 0.000989
 52564.75 0.001624
 74263.59 0.002748
 104815.40 0.004787
 128116.90 0.006708
 147643.10 0.008567
 164743.10 0.010388
 230697.80 0.019172
 319981.80 0.036049
 384501.80 0.052525
 435762.50 0.068785
 478339.20 0.084905
 620101.00 0.164348
 701045.00 0.242804
 751675.90 0.320769
 784372.60 0.398442
 805534.80 0.475928
 818896.00 0.553288
 826801.30 0.630559
 831952.70 0.784929
 831952.70 77.156360

Depth [m]
 -2.250000e+00
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 58008.15 0.000989
 81994.93 0.001624
 115842.60 0.002748
 163499.90 0.004787
 199847.50 0.006708
 230306.20 0.008567
 256980.20 0.010388
 359861.90 0.019172
 499134.70 0.036049
 599778.40 0.052525
 679739.20 0.068785
 746153.90 0.084905
 967285.80 0.164348
 1093549.00 0.242804
 1172528.00 0.320769
 1223531.00 0.398442
 1256541.00 0.475928
 1277383.00 0.553288
 1289714.00 0.630559
 1297750.00 0.784929
 1297750.00 77.156360

Depth [m]
 -3
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 79989.11 0.000989
 113065.20 0.001624
 159738.70 0.002748
 225454.70 0.004787
 275575.50 0.006708
 317575.80 0.008567
 354357.50 0.010388
 496224.00 0.019172
 688271.20 0.036049
 827051.80 0.052525
 937312.10 0.068785
 1028893.00 0.084905
 1333818.00 0.164348
 1507927.00 0.242804
 1616832.00 0.320769
 1687162.00 0.398442
 1732681.00 0.475928
 1761421.00 0.553288
 1778425.00 0.630559
 1789505.00 0.784929
 1789505.00 77.156360

Depth [m]
 -3.750000e+00
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 102995.30 0.000989
 145584.60 0.001624
 205682.30 0.002748
 290299.30 0.004787
 354835.70 0.006708
 408916.00 0.008567
 456276.70 0.010388
 638946.50 0.019172
 886229.70 0.036049
 1064926.00 0.052525
 1206899.00 0.068785
 1324820.00 0.084905
 1717447.00 0.164348
 1941632.00 0.242804
 2081860.00 0.320769
 2172418.00 0.398442
 2231029.00 0.475928
 2268035.00 0.553288
 2289930.00 0.630559
 2304197.00 0.784929
 2304197.00 77.156360

Depth [m]
 -4.500000e+00
 Number_of_points

22
 p [N/m] y[m]
 0.00 0.000000
 126932.80 0.000993
 179420.40 0.001631
 253485.50 0.002759
 357768.60 0.004805
 437304.10 0.006733
 503953.40 0.008600
 562321.30 0.010428
 787445.90 0.019246
 1092201.00 0.036189
 1312429.00 0.052728
 1487398.00 0.069051
 1632726.00 0.085233
 2116604.00 0.164984
 2392893.00 0.243744
 2565712.00 0.322010
 2677316.00 0.399984
 2749550.00 0.477770
 2795156.00 0.555429
 2822139.00 0.632999
 2839723.00 0.787965
 2839723.00 77.454880

Depth [m]
 -5.250000e+00
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 151730.70 0.000994
 214472.40 0.001632
 303007.10 0.002760
 427663.10 0.004808
 522736.90 0.006737
 602407.00 0.008605
 672177.80 0.010434
 941283.30 0.019258
 1305576.00 0.036210
 1568828.00 0.052759
 1777980.00 0.069092
 1951699.00 0.085284
 2530109.00 0.165082
 2860374.00 0.243888
 3066956.00 0.322201
 3200363.00 0.400221
 3286708.00 0.478053
 3341224.00 0.555758
 3373479.00 0.633374
 3394498.00 0.788433
 3394498.00 77.500810

Depth [m]
 -6
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000



177333.00 0.001010
250661.50 0.001659
354135.20 0.002806
499825.10 0.004888
610941.20 0.006849
704054.40 0.008748
785598.00 0.010607
1100111.00 0.019577
1525873.00 0.036811
1833545.00 0.053635
2077988.00 0.070239
2281020.00 0.086699
2957029.00 0.167821
3343021.00 0.247935
3584460.00 0.327547
3740378.00 0.406862
3841293.00 0.485985
3905007.00 0.564980
3942705.00 0.643884
3967270.00 0.801515
3967270.00 78.786740

Depth [m]
-6.750000e+00
Number_of_points
22
p [N/m] y[m]
0.00 0.000000
203694.00 0.001010
287922.90 0.001659
406778.10 0.002806
574125.10 0.004888
701758.90 0.006849
808713.60 0.008748
902378.80 0.010607
1263645.00 0.019577
1752697.00 0.036811
2106105.00 0.053635
2386885.00 0.070239
2620098.00 0.086699
3396597.00 0.167821
3839967.00 0.247935
4117297.00 0.327547
4296393.00 0.406862
4412309.00 0.485985
4485495.00 0.564980
4528796.00 0.643884
4557013.00 0.801515
4557013.00 78.786740

Depth [m]
-7.500000e+00
Number_of_points
22
p [N/m] y[m]
0.00 0.000000
230774.90 0.001010
326202.00 0.001659
460858.90 0.002806

650454.60 0.004888
 795057.10 0.006849
 916231.30 0.008748
 1022349.00 0.010607
 1431646.00 0.019577
 1985717.00 0.036811
 2386110.00 0.053635
 2704219.00 0.070239
 2968438.00 0.086699
 3848172.00 0.167821
 4350488.00 0.247935
 4664688.00 0.327547
 4867595.00 0.406862
 4998922.00 0.485985
 5081838.00 0.564980
 5130895.00 0.643884
 5162864.00 0.801515
 5162864.00 78.786740

Depth [m]
 -8.250000e+00
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 258542.80 0.001034
 365452.10 0.001698
 516311.50 0.002873
 728720.20 0.005004
 890721.90 0.007013
 1026476.00 0.008957
 1145363.00 0.010861
 1603908.00 0.020045
 2224647.00 0.037691
 2673217.00 0.054917
 3029603.00 0.071918
 3325614.00 0.088771
 4311201.00 0.171832
 4873958.00 0.253861
 5225965.00 0.335375
 5453286.00 0.416586
 5600414.00 0.497600
 5693307.00 0.578483
 5748268.00 0.659272
 5784083.00 0.820671
 5784083.00 80.669730

Depth [m]
 -9
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 286968.80 0.001027
 405632.40 0.001686
 573078.30 0.002852
 808840.70 0.004967
 988654.10 0.006961
 1139334.00 0.008891

1271292.00 0.010780
 1780252.00 0.019897
 2469240.00 0.037412
 2967129.00 0.054510
 3362699.00 0.071385
 3691255.00 0.088114
 4785204.00 0.170560
 5409835.00 0.251982
 5800543.00 0.332893
 6052858.00 0.413502
 6216163.00 0.493917
 6319269.00 0.574201
 6380272.00 0.654393
 6420025.00 0.814597
 6420025.00 80.072680

Depth [m]
 -9.750000e+00
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 316027.40 0.001027
 446707.10 0.001686
 631108.70 0.002852
 890744.50 0.004967
 1088766.00 0.006961
 1254704.00 0.008891
 1400024.00 0.010780
 1960522.00 0.019897
 2719278.00 0.037412
 3267583.00 0.054510
 3703208.00 0.071385
 4065034.00 0.088114
 5269758.00 0.170560
 5957639.00 0.251982
 6387911.00 0.332893
 6665775.00 0.413502
 6845616.00 0.493917
 6959163.00 0.574201
 7026343.00 0.654393
 7070122.00 0.814597
 7070122.00 80.072680

Depth [m]
 -1.050000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 345696.10 0.001030
 488644.00 0.001692
 690357.20 0.002862
 974367.70 0.004986
 1190979.00 0.006987
 1372496.00 0.008924
 1531459.00 0.010820
 2144576.00 0.019971
 2974564.00 0.037552

3574344.00 0.054714
 4050866.00 0.071651
 4446660.00 0.088443
 5764483.00 0.171196
 6516942.00 0.252921
 6987609.00 0.334134
 7291558.00 0.415044
 7488283.00 0.495759
 7612490.00 0.576342
 7685977.00 0.656833
 7733865.00 0.817634
 7733865.00 80.371210

Depth [m]
 -1.125000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 375954.40 0.001047
 531414.20 0.001719
 750783.20 0.002908
 1059653.00 0.005066
 1295224.00 0.007099
 1492628.00 0.009067
 1665505.00 0.010993
 2332288.00 0.020290
 3234923.00 0.038152
 3887201.00 0.055589
 4405432.00 0.072798
 4835870.00 0.089858
 6269040.00 0.173935
 7087361.00 0.256968
 7599224.00 0.339480
 7929778.00 0.421685
 8143721.00 0.503691
 8278800.00 0.585563
 8358720.00 0.667342
 8410799.00 0.830716
 8410799.00 81.657140

Depth [m]
 -12
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 406783.70 0.001041
 574991.70 0.001710
 812349.60 0.002893
 1146547.00 0.005039
 1401436.00 0.007062
 1615028.00 0.009019
 1802081.00 0.010936
 2523542.00 0.020184
 3500196.00 0.037952
 4205963.00 0.055297
 4766690.00 0.072416
 5232425.00 0.089386

6783119.00 0.173022
 7668545.00 0.255619
 8222382.00 0.337698
 8580042.00 0.419471
 8811530.00 0.501047
 8957685.00 0.582489
 9044158.00 0.663839
 9100509.00 0.826355
 9100509.00 81.228500

Depth [m]
 -1.275000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 438167.20 0.001061
 619352.50 0.001743
 875022.60 0.002948
 1235004.00 0.005136
 1509557.00 0.007197
 1739628.00 0.009192
 1941112.00 0.011145
 2718234.00 0.020570
 3770237.00 0.038678
 4530454.00 0.056355
 5134442.00 0.073801
 5636108.00 0.091096
 7306438.00 0.176332
 8260175.00 0.260509
 8856741.00 0.344158
 9241995.00 0.427495
 9491342.00 0.510632
 9648773.00 0.593632
 9741918.00 0.676538
 9802616.00 0.842163
 9802616.00 82.782340

Depth [m]
 -1.350000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 470089.30 0.001078
 664474.60 0.001770
 938771.10 0.002994
 1324978.00 0.005215
 1619534.00 0.007308
 1866366.00 0.009335
 2082529.00 0.011318
 2916267.00 0.020890
 4044912.00 0.039279
 4860514.00 0.057230
 5508504.00 0.074947
 6046719.00 0.092511
 7838739.00 0.179071
 8861959.00 0.264556
 9501987.00 0.349504

9915308.00 0.434136
 10182820.00 0.518564
 10351720.00 0.602854
 10451650.00 0.687047
 10516770.00 0.855245
 10516770.00 84.068280

Depth [m]
 -1.425000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 502535.60 0.001076
 710337.70 0.001767
 1003567.00 0.002988
 1416430.00 0.005205
 1731317.00 0.007294
 1995186.00 0.009317
 2226269.00 0.011296
 3117553.00 0.020850
 4324099.00 0.039204
 5195995.00 0.057121
 5888710.00 0.074804
 6464073.00 0.092334
 8379782.00 0.178729
 9473626.00 0.264050
 10157830.00 0.348836
 10599680.00 0.433306
 10885660.00 0.517572
 11066210.00 0.601701
 11173040.00 0.685733
 11242660.00 0.853610
 11242660.00 83.907540

Depth [m]
 -15
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 535492.90 0.001092
 756923.10 0.001794
 1069383.00 0.003034
 1509323.00 0.005285
 1844860.00 0.007406
 2126034.00 0.009460
 2372272.00 0.011470
 3322008.00 0.021169
 4607682.00 0.039805
 5536758.00 0.057996
 6274903.00 0.075950
 6888000.00 0.093749
 8929344.00 0.181468
 10094920.00 0.268097
 10824000.00 0.354182
 11294830.00 0.439947
 11599560.00 0.525504
 11791960.00 0.610922

11905790.00 0.696242
 11979970.00 0.866692
 11979970.00 85.193480

Depth [m]
 -1.575000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 568948.70 0.001092
 804213.10 0.001794
 1136194.00 0.003034
 1603620.00 0.005285
 1960121.00 0.007406
 2258862.00 0.009460
 2520483.00 0.011470
 3529556.00 0.021169
 4895554.00 0.039805
 5882677.00 0.057996
 6666938.00 0.075950
 7318339.00 0.093749
 9487220.00 0.181468
 10725620.00 0.268097
 11500250.00 0.354182
 12000490.00 0.439947
 12324260.00 0.525504
 12528680.00 0.610922
 12649630.00 0.696242
 12728440.00 0.866692
 12728440.00 85.193480

Depth [m]
 -1.650000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 602891.50 0.001117
 852191.40 0.001834
 1203978.00 0.003103
 1699290.00 0.005405
 2077059.00 0.007574
 2393623.00 0.009674
 2670852.00 0.011729
 3740124.00 0.021648
 5187617.00 0.040706
 6233629.00 0.059309
 7064679.00 0.077670
 7754942.00 0.095872
 10053220.00 0.185576
 11365500.00 0.274167
 12186340.00 0.362201
 12716420.00 0.449908
 13059510.00 0.537403
 13276120.00 0.624754
 13404290.00 0.712006
 13487800.00 0.886315
 13487800.00 87.122390

Depth [m]
 -1.725000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 637310.30 0.001117
 900842.60 0.001834
 1272712.00 0.003103
 1796302.00 0.005405
 2195638.00 0.007574
 2530274.00 0.009674
 2823330.00 0.011729
 3953647.00 0.021648
 5483776.00 0.040706
 6589505.00 0.059309
 7467999.00 0.077670
 8197668.00 0.095872
 10627150.00 0.185576
 12014350.00 0.274167
 12882050.00 0.362201
 13442400.00 0.449908
 13805070.00 0.537403
 14034050.00 0.624754
 14169530.00 0.712006
 14257820.00 0.886315
 14257820.00 87.122390

Depth [m]
 -18
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 672194.90 0.001117
 950152.40 0.001834
 1342377.00 0.003103
 1894627.00 0.005405
 2315821.00 0.007574
 2668774.00 0.009674
 2977871.00 0.011729
 4170059.00 0.021648
 5783943.00 0.040706
 6950197.00 0.059309
 7876777.00 0.077670
 8646386.00 0.095872
 11208850.00 0.185576
 12671980.00 0.274167
 13587180.00 0.362201
 14178200.00 0.449908
 14560720.00 0.537403
 14802240.00 0.624754
 14945130.00 0.712006
 15038250.00 0.886315
 15038250.00 87.122390

Depth [m]

```
-1.875000e+01
Number_of_points
22
p [N/m] y[m]
0.00 0.000000
707535.80 0.001150
1000107.00 0.001888
1412953.00 0.003194
1994237.00 0.005564
2437576.00 0.007797
2809085.00 0.009959
3134434.00 0.012076
4389300.00 0.022288
6088035.00 0.041907
7315605.00 0.061060
8290901.00 0.079963
9100972.00 0.098702
11798160.00 0.191055
13338220.00 0.282260
14301530.00 0.372894
14923620.00 0.463189
15326260.00 0.553267
15580470.00 0.643197
15730880.00 0.733025
15828890.00 0.912480
15828890.00 89.694270
```

```
Depth [m]
-1.950000e+01
Number_of_points
22
p [N/m] y[m]
0.00 0.000000
743323.60 0.001156
1050693.00 0.001899
1484422.00 0.003212
2095108.00 0.005594
2560871.00 0.007839
2951172.00 0.010013
3292977.00 0.012140
4611316.00 0.022407
6395974.00 0.042133
7685636.00 0.061389
8710263.00 0.080393
9561309.00 0.099233
12394920.00 0.192082
14012880.00 0.283778
15024910.00 0.374899
15678470.00 0.465679
16101480.00 0.556241
16368550.00 0.646656
16526560.00 0.736966
16629530.00 0.917385
16629530.00 90.176490
```

```
Depth [m]
-2.025000e+01
Number_of_points
22
```

p [N/m] y[m]
 0.00 0.000000
 778407.80 0.001162
 1100285.00 0.001909
 1554485.00 0.003229
 2193995.00 0.005624
 2681741.00 0.007881
 3090464.00 0.010066
 3448402.00 0.012205
 4828965.00 0.022527
 6697858.00 0.042358
 8048390.00 0.061717
 9121379.00 0.080823
 10012590.00 0.099763
 12979950.00 0.193109
 14674270.00 0.285295
 15734080.00 0.376903
 16418480.00 0.468170
 16861450.00 0.559216
 17141130.00 0.650114
 17306600.00 0.740907
 17414430.00 0.922291
 17414430.00 90.658720

Depth [m]
 -21
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 807219.90 0.001163
 1141011.00 0.001910
 1612023.00 0.003232
 2275203.00 0.005629
 2781004.00 0.007888
 3204855.00 0.010075
 3576042.00 0.012216
 5007706.00 0.022547
 6945774.00 0.042396
 8346295.00 0.061772
 9458999.00 0.080894
 10383200.00 0.099852
 13460390.00 0.193280
 15217430.00 0.285548
 16316460.00 0.377238
 17026200.00 0.468585
 17485560.00 0.559712
 17775590.00 0.650690
 17947190.00 0.741564
 18059010.00 0.923109
 18059010.00 90.739090

Depth [m]
 -2.175000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 836032.10 0.001290

1181737.00 0.002119
 1669561.00 0.003585
 2356412.00 0.006244
 2880266.00 0.008750
 3319246.00 0.011176
 3703682.00 0.013551
 5186446.00 0.025011
 7193689.00 0.047028
 8644199.00 0.068521
 9796620.00 0.089733
 10753810.00 0.110761
 13940830.00 0.214398
 15760580.00 0.316747
 16898840.00 0.418454
 17633920.00 0.519782
 18109680.00 0.620866
 18410060.00 0.721784
 18587780.00 0.822587
 18703590.00 1.023967
 18703590.00 100.653200

Depth [m]
 -2.250000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 864844.20 0.001361
 1222463.00 0.002236
 1727099.00 0.003782
 2437621.00 0.006588
 2979529.00 0.009232
 3433637.00 0.011792
 3831321.00 0.014298
 5365186.00 0.026389
 7441605.00 0.049620
 8942104.00 0.072297
 10134240.00 0.094678
 11124420.00 0.116866
 14421280.00 0.226214
 16303740.00 0.334204
 17481230.00 0.441516
 18241630.00 0.548429
 18733790.00 0.655083
 19044520.00 0.761564
 19228370.00 0.867922
 19348170.00 1.080401
 19348170.00 106.200500

Depth [m]
 -2.325000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 893656.30 0.001378
 1263190.00 0.002263
 1784637.00 0.003829
 2518830.00 0.006670

3078791.00 0.009346
 3548028.00 0.011938
 3958961.00 0.014474
 5543926.00 0.026714
 7689521.00 0.050231
 9240009.00 0.073188
 10471860.00 0.095846
 11495030.00 0.118307
 14901720.00 0.229003
 16846900.00 0.338324
 18063610.00 0.446960
 18849350.00 0.555191
 19357900.00 0.663160
 19678990.00 0.770953
 19868960.00 0.878623
 19992750.00 1.093722
 19992750.00 107.509900

Depth [m]
 -24
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 922468.40 0.001429
 1303916.00 0.002347
 1842175.00 0.003971
 2600039.00 0.006917
 3178054.00 0.009693
 3662419.00 0.012381
 4086601.00 0.015011
 5722666.00 0.027706
 7937436.00 0.052096
 9537913.00 0.075906
 10809480.00 0.099404
 11865630.00 0.122699
 15382160.00 0.237506
 17390050.00 0.350886
 18646000.00 0.463555
 19457070.00 0.575804
 19982010.00 0.687783
 20313450.00 0.799578
 20509550.00 0.911246
 20637330.00 1.134331
 20637330.00 111.501700

Depth [m]
 -2.475000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 951280.60 0.001471
 1344642.00 0.002416
 1899713.00 0.004088
 2681248.00 0.007120
 3277316.00 0.009977
 3776810.00 0.012744
 4214241.00 0.015451

5901407.00 0.028518
 8185352.00 0.053624
 9835818.00 0.078131
 11147100.00 0.102318
 12236240.00 0.126296
 15862600.00 0.244468
 17933210.00 0.361171
 19228380.00 0.477144
 20064780.00 0.592683
 20606130.00 0.707944
 20947920.00 0.823016
 21150140.00 0.937957
 21281920.00 1.167581
 21281920.00 114.770100

Depth [m]
 -2.55000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 980092.70 0.001801
 1385368.00 0.002958
 1957251.00 0.005004
 2762457.00 0.008715
 3376579.00 0.012213
 3891201.00 0.015599
 4341881.00 0.018914
 6080147.00 0.034909
 8433268.00 0.065640
 10133720.00 0.095639
 11484720.00 0.125247
 12606850.00 0.154598
 16343050.00 0.299250
 18476360.00 0.442106
 19810760.00 0.584067
 20672500.00 0.725497
 21230240.00 0.866586
 21582380.00 1.007445
 21790730.00 1.148143
 21926500.00 1.429224
 21926500.00 140.488900

Depth [m]
 -2.62500e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 1008905.00 0.001871
 1426094.00 0.003073
 2014789.00 0.005198
 2843666.00 0.009055
 3475841.00 0.012688
 4005592.00 0.016206
 4469520.00 0.019650
 6258887.00 0.036267
 8681184.00 0.068194
 10431630.00 0.099360

11822340.00 0.130119
 12977460.00 0.160612
 16823490.00 0.310892
 19019520.00 0.459305
 20393150.00 0.606788
 21280220.00 0.753720
 21854350.00 0.900298
 22216850.00 1.046637
 22431320.00 1.192808
 22571080.00 1.484823
 22571080.00 145.954100

Depth [m]

-27

Number_of_points

22

p [N/m] y[m]

0.00 0.000000
 1037717.00 0.001885
 1466820.00 0.003095
 2072327.00 0.005236
 2924875.00 0.009121
 3575104.00 0.012782
 4119983.00 0.016325
 4597160.00 0.019794
 6437627.00 0.036533
 8929099.00 0.068694
 10729530.00 0.100089
 12159960.00 0.131074
 13348070.00 0.161791
 17303930.00 0.313174
 19562680.00 0.462677
 20975530.00 0.611243
 21887930.00 0.759254
 22478460.00 0.906908
 22851310.00 1.054321
 23071910.00 1.201566
 23215660.00 1.495725
 23215660.00 147.025700

Depth [m]

-2.775000e+01

Number_of_points

22

p [N/m] y[m]

0.00 0.000000
 1066529.00 0.001885
 1507546.00 0.003095
 2129865.00 0.005236
 3006084.00 0.009121
 3674366.00 0.012782
 4234374.00 0.016325
 4724800.00 0.019794
 6616367.00 0.036533
 9177015.00 0.068694
 11027440.00 0.100089
 12497580.00 0.131074
 13718670.00 0.161791
 17784370.00 0.313174

20105830.00 0.462677
 21557910.00 0.611243
 22495650.00 0.759254
 23102580.00 0.906908
 23485770.00 1.054321
 23712500.00 1.201566
 23860240.00 1.495725
 23860240.00 147.025700

Depth [m]
 -2.850000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 1095341.00 0.001846
 1548273.00 0.003032
 2187403.00 0.005129
 3087293.00 0.008935
 3773629.00 0.012521
 4348765.00 0.015992
 4852440.00 0.019390
 6795108.00 0.035788
 9424931.00 0.067292
 11325340.00 0.098047
 12835200.00 0.128399
 14089280.00 0.158489
 18264810.00 0.306783
 20648990.00 0.453235
 22140300.00 0.598768
 23103370.00 0.743759
 23726690.00 0.888400
 24120240.00 1.032805
 24353090.00 1.177044
 24504820.00 1.465200
 24504820.00 144.025200

Depth [m]
 -2.925000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 1124153.00 0.001846
 1588999.00 0.003032
 2244941.00 0.005129
 3168502.00 0.008935
 3872891.00 0.012521
 4463156.00 0.015992
 4980079.00 0.019390
 6973848.00 0.035788
 9672847.00 0.067292
 11623250.00 0.098047
 13172820.00 0.128399
 14459890.00 0.158489
 18745260.00 0.306783
 21192150.00 0.453235
 22722680.00 0.598768
 23711080.00 0.743759

24350800.00 0.888400
 24754700.00 1.032805
 24993680.00 1.177044
 25149400.00 1.465200
 25149400.00 144.025200

Depth [m]
 -30
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 1152965.00 0.001846
 1629725.00 0.003032
 2302479.00 0.005129
 3249710.00 0.008935
 3972154.00 0.012521
 4577547.00 0.015992
 5107719.00 0.019390
 7152588.00 0.035788
 9920762.00 0.067292
 11921150.00 0.098047
 13510440.00 0.128399
 14830500.00 0.158489
 19225700.00 0.306783
 21735300.00 0.453235
 23305070.00 0.598768
 24318800.00 0.743759
 24974920.00 0.888400
 25389170.00 1.032805
 25634270.00 1.177044
 25793980.00 1.465200
 25793980.00 144.025200

Depth [m]
 -3.075000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 1181778.00 0.001846
 1670451.00 0.003032
 2360017.00 0.005129
 3330919.00 0.008935
 4071416.00 0.012521
 4691938.00 0.015992
 5235359.00 0.019390
 7331328.00 0.035788
 10168680.00 0.067292
 12219050.00 0.098047
 13848060.00 0.128399
 15201100.00 0.158489
 19706140.00 0.306783
 22278460.00 0.453235
 23887450.00 0.598768
 24926520.00 0.743759
 25599030.00 0.888400
 26023630.00 1.032805
 26274860.00 1.177044



26438560.00 1.465200
26438560.00 144.025200

Depth [m]
-3.150000e+01
Number_of_points
22
p [N/m] y[m]
0.00 0.000000
1210590.00 0.001846
1711177.00 0.003032
2417555.00 0.005129
3412128.00 0.008935
4170679.00 0.012521
4806329.00 0.015992
5362999.00 0.019390
7510068.00 0.035788
10416590.00 0.067292
12516960.00 0.098047
14185680.00 0.128399
15571710.00 0.158489
20186580.00 0.306783
22821610.00 0.453235
24469830.00 0.598768
25534230.00 0.743759
26223140.00 0.888400
26658100.00 1.032805
26915440.00 1.177044
27083140.00 1.465200
27083140.00 144.025200

Depth [m]
-3.225000e+01
Number_of_points
22
p [N/m] y[m]
0.00 0.000000
1239402.00 0.001846
1751903.00 0.003032
2475093.00 0.005129
3493337.00 0.008935
4269941.00 0.012521
4920720.00 0.015992
5490639.00 0.019390
7688809.00 0.035788
10664510.00 0.067292
12814860.00 0.098047
14523310.00 0.128399
15942320.00 0.158489
20667030.00 0.306783
23364770.00 0.453235
25052220.00 0.598768
26141950.00 0.743759
26847250.00 0.888400
27292560.00 1.032805
27556030.00 1.177044
27727720.00 1.465200
27727720.00 144.025200

Depth [m]
 -33
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 1268214.00 0.001846
 1792630.00 0.003032
 2532631.00 0.005129
 3574546.00 0.008935
 4369203.00 0.012521
 5035111.00 0.015992
 5618278.00 0.019390
 7867549.00 0.035788
 10912430.00 0.067292
 13112770.00 0.098047
 14860930.00 0.128399
 16312930.00 0.158489
 21147470.00 0.306783
 23907930.00 0.453235
 25634600.00 0.598768
 26749670.00 0.743759
 27471370.00 0.888400
 27927030.00 1.032805
 28196620.00 1.177044
 28372310.00 1.465200
 28372310.00 144.025200

Depth [m]
 -3.375000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 1297026.00 0.001846
 1833356.00 0.003032
 2590169.00 0.005129
 3655755.00 0.008935
 4468466.00 0.012521
 5149502.00 0.015992
 5745918.00 0.019390
 8046289.00 0.035788
 11160340.00 0.067292
 13410670.00 0.098047
 15198550.00 0.128399
 16683540.00 0.158489
 21627910.00 0.306783
 24451080.00 0.453235
 26216990.00 0.598768
 27357380.00 0.743759
 28095480.00 0.888400
 28561490.00 1.032805
 28837210.00 1.177044
 29016890.00 1.465200
 29016890.00 144.025200

Depth [m]
 -3.450000e+01


```

Number_of_points
22
p [N/m] y[m]
0.00 0.000000
1325838.00 0.001846
1874082.00 0.003032
2647707.00 0.005129
3736964.00 0.008935
4567728.00 0.012521
5263893.00 0.015992
5873558.00 0.019390
8225029.00 0.035788
11408260.00 0.067292
13708580.00 0.098047
15536170.00 0.128399
17054140.00 0.158489
22108350.00 0.306783
24994240.00 0.453235
26799370.00 0.598768
27965100.00 0.743759
28719590.00 0.888400
29195960.00 1.032805
29477800.00 1.177044
29661470.00 1.465200
29661470.00 144.025200
  
```

```

Depth [m]
-3.525000e+01
Number_of_points
22
p [N/m] y[m]
0.00 0.000000
1354650.00 0.001846
1914808.00 0.003032
2705245.00 0.005129
3818173.00 0.008935
4666991.00 0.012521
5378284.00 0.015992
6001198.00 0.019390
8403770.00 0.035788
11656170.00 0.067292
14006480.00 0.098047
15873790.00 0.128399
17424750.00 0.158489
22588790.00 0.306783
25537390.00 0.453235
27381750.00 0.598768
28572820.00 0.743759
29343710.00 0.888400
29830420.00 1.032805
30118390.00 1.177044
30306050.00 1.465200
30306050.00 144.025200
  
```

```

Depth [m]
-36
Number_of_points
22
p [N/m] y[m]
  
```

0.00 0.000000
 1383462.00 0.001846
 1955534.00 0.003032
 2762783.00 0.005129
 3899382.00 0.008935
 4766253.00 0.012521
 5492675.00 0.015992
 6128837.00 0.019390
 8582510.00 0.035788
 11904090.00 0.067292
 14304390.00 0.098047
 16211410.00 0.128399
 17795360.00 0.158489
 23069240.00 0.306783
 26080550.00 0.453235
 27964140.00 0.598768
 29180530.00 0.743759
 29967820.00 0.888400
 30464890.00 1.032805
 30758980.00 1.177044
 30950630.00 1.465200
 30950630.00 144.025200

Depth [m]
 -3.675000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 1412275.00 0.001846
 1996260.00 0.003032
 2820321.00 0.005129
 3980591.00 0.008935
 4865516.00 0.012521
 5607066.00 0.015992
 6256477.00 0.019390
 8761250.00 0.035788
 12152000.00 0.067292
 14602290.00 0.098047
 16549030.00 0.128399
 18165970.00 0.158489
 23549680.00 0.306783
 26623710.00 0.453235
 28546520.00 0.598768
 29788250.00 0.743759
 30591930.00 0.888400
 31099350.00 1.032805
 31399570.00 1.177044
 31595210.00 1.465200
 31595210.00 144.025200

Depth [m]
 -3.750000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 1441087.00 0.001846
 2036986.00 0.003032

2877859.00 0.005129
 4061800.00 0.008935
 4964778.00 0.012521
 5721457.00 0.015992
 6384117.00 0.019390
 8939990.00 0.035788
 12399920.00 0.067292
 14900200.00 0.098047
 16886650.00 0.128399
 18536580.00 0.158489
 24030120.00 0.306783
 27166860.00 0.453235
 29128910.00 0.598768
 30395970.00 0.743759
 31216040.00 0.888400
 31733820.00 1.032805
 32040160.00 1.177044
 32239790.00 1.465200
 32239790.00 144.025200

Depth [m]
 -3.825000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 1469899.00 0.001846
 2077713.00 0.003032
 2935397.00 0.005129
 4143009.00 0.008935
 5064041.00 0.012521
 5835848.00 0.015992
 6511757.00 0.019390
 9118730.00 0.035788
 12647840.00 0.067292
 15198100.00 0.098047
 17224270.00 0.128399
 18907180.00 0.158489
 24510560.00 0.306783
 27710020.00 0.453235
 29711290.00 0.598768
 31003680.00 0.743759
 31840160.00 0.888400
 32368280.00 1.032805
 32680750.00 1.177044
 32884370.00 1.465200
 32884370.00 144.025200

Depth [m]
 -39
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 1498711.00 0.001846
 2118439.00 0.003032
 2992935.00 0.005129
 4224217.00 0.008935
 5163303.00 0.012521

5950239.00 0.015992
 6639397.00 0.019390
 9297471.00 0.035788
 12895750.00 0.067292
 15496000.00 0.098047
 17561890.00 0.128399
 19277790.00 0.158489
 24991010.00 0.306783
 28253180.00 0.453235
 30293670.00 0.598768
 31611400.00 0.743759
 32464270.00 0.888400
 33002750.00 1.032805
 33321340.00 1.177044
 33528950.00 1.465200
 33528950.00 144.025200

Depth [m]
 -3.975000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 1527523.00 0.001846
 2159165.00 0.003032
 3050473.00 0.005129
 4305426.00 0.008935
 5262566.00 0.012521
 6064631.00 0.015992
 6767036.00 0.019390
 9476211.00 0.035788
 13143670.00 0.067292
 15793910.00 0.098047
 17899510.00 0.128399
 19648400.00 0.158489
 25471450.00 0.306783
 28796330.00 0.453235
 30876060.00 0.598768
 32219120.00 0.743759
 33088380.00 0.888400
 33637210.00 1.032805
 33961930.00 1.177044
 34173530.00 1.465200
 34173530.00 144.025200

Depth [m]
 -4.050000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 1556335.00 0.001846
 2199891.00 0.003032
 3108011.00 0.005129
 4386635.00 0.008935
 5361828.00 0.012521
 6179022.00 0.015992
 6894676.00 0.019390
 9654951.00 0.035788

13391580.00 0.067292
 16091810.00 0.098047
 18237130.00 0.128399
 20019010.00 0.158489
 25951890.00 0.306783
 29339490.00 0.453235
 31458440.00 0.598768
 32826830.00 0.743759
 33712490.00 0.888400
 34271680.00 1.032805
 34602520.00 1.177044
 34818110.00 1.465200
 34818110.00 144.025200

Depth [m]
 -4.125000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 1585147.00 0.001846
 2240617.00 0.003032
 3165549.00 0.005129
 4467844.00 0.008935
 5461091.00 0.012521
 6293413.00 0.015992
 7022316.00 0.019390
 9833691.00 0.035788
 13639500.00 0.067292
 16389720.00 0.098047
 18574750.00 0.128399
 20389620.00 0.158489
 26432330.00 0.306783
 29882640.00 0.453235
 32040830.00 0.598768
 33434550.00 0.743759
 34336610.00 0.888400
 34906140.00 1.032805
 35243110.00 1.177044
 35462700.00 1.465200
 35462700.00 144.025200

Depth [m]
 -42
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 1613960.00 0.001846
 2281343.00 0.003032
 3223087.00 0.005129
 4549053.00 0.008935
 5560353.00 0.012521
 6407804.00 0.015992
 7149956.00 0.019390
 10012430.00 0.035788
 13887410.00 0.067292
 16687620.00 0.098047
 18912370.00 0.128399

20760220.00 0.158489
 26912770.00 0.306783
 30425800.00 0.453235
 32623210.00 0.598768
 34042270.00 0.743759
 34960720.00 0.888400
 35540610.00 1.032805
 35883700.00 1.177044
 36107280.00 1.465200
 36107280.00 144.025200

Depth [m]
 -4.275000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 1642772.00 0.001846
 2322069.00 0.003032
 3280625.00 0.005129
 4630262.00 0.008935
 5659616.00 0.012521
 6522195.00 0.015992
 7277596.00 0.019390
 10191170.00 0.035788
 14135330.00 0.067292
 16985530.00 0.098047
 19249990.00 0.128399
 21130830.00 0.158489
 27393220.00 0.306783
 30968960.00 0.453235
 33205590.00 0.598768
 34649980.00 0.743759
 35584830.00 0.888400
 36175070.00 1.032805
 36524290.00 1.177044
 36751860.00 1.465200
 36751860.00 144.025200

Depth [m]
 -4.350000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 1671584.00 0.001846
 2362796.00 0.003032
 3338163.00 0.005129
 4711471.00 0.008935
 5758878.00 0.012521
 6636586.00 0.015992
 7405235.00 0.019390
 10369910.00 0.035788
 14383250.00 0.067292
 17283430.00 0.098047
 19587610.00 0.128399
 21501440.00 0.158489
 27873660.00 0.306783
 31512110.00 0.453235

33787980.00 0.598768
 35257700.00 0.743759
 36208950.00 0.888400
 36809540.00 1.032805
 37164880.00 1.177044
 37396440.00 1.465200
 37396440.00 144.025200

Depth [m]
 -4.425000e+01
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 1700396.00 0.001846
 2403522.00 0.003032
 3395701.00 0.005129
 4792680.00 0.008935
 5858140.00 0.012521
 6750977.00 0.015992
 7532875.00 0.019390
 10548650.00 0.035788
 14631160.00 0.067292
 17581340.00 0.098047
 19925230.00 0.128399
 21872050.00 0.158489
 28354100.00 0.306783
 32055270.00 0.453235
 34370360.00 0.598768
 35865420.00 0.743759
 36833060.00 0.888400
 37444000.00 1.032805
 37805470.00 1.177044
 38041020.00 1.465200
 38041020.00 144.025200

Depth [m]
 -45
 Number_of_points
 22
 p [N/m] y[m]
 0.00 0.000000
 1729208.00 0.001846
 2444248.00 0.003032
 3453239.00 0.005129
 4873889.00 0.008935
 5957403.00 0.012521
 6865368.00 0.015992
 7660515.00 0.019390
 10727390.00 0.035788
 14879080.00 0.067292
 17879240.00 0.098047
 20262850.00 0.128399
 22242660.00 0.158489
 28834540.00 0.306783
 32598420.00 0.453235
 34952750.00 0.598768
 36473130.00 0.743759
 37457170.00 0.888400



38078460.00 1.032805
38446060.00 1.177044
38685600.00 1.465200
38685600.00 144.025200

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