3659925 2018

# NOTITIE

C1

- 8 MEI 2018

Behoort bij besluit d.d.:

27 JULI 2018

☒ Gemeente
☒ Amsterdam
☒

CRUX

CRUX Engineering BV
Pedro de Medinalaan 3c
NL-1086 XK Amsterdam
Tel: +31 (0)20 - 494 30 70
Fax: +31 (0)20 - 494 30 71
info@cruxbv.nl
www.cruxbv.nl

AAN

CONTACTPERSOON

| DATUM | PROJECTNUMMER | DOCUMENTNUMMER | VERSIE | PAGINA'S |
|---|---|---|---|---|
| 5 maart 2018 | 17499 | NT17499a1 | 1 | 8 |

ONDERWERP **Funderingsadvies Generaal Vetterstraat 78-B te Amsterdam**

OPGESTELD

GECONTROLEERD

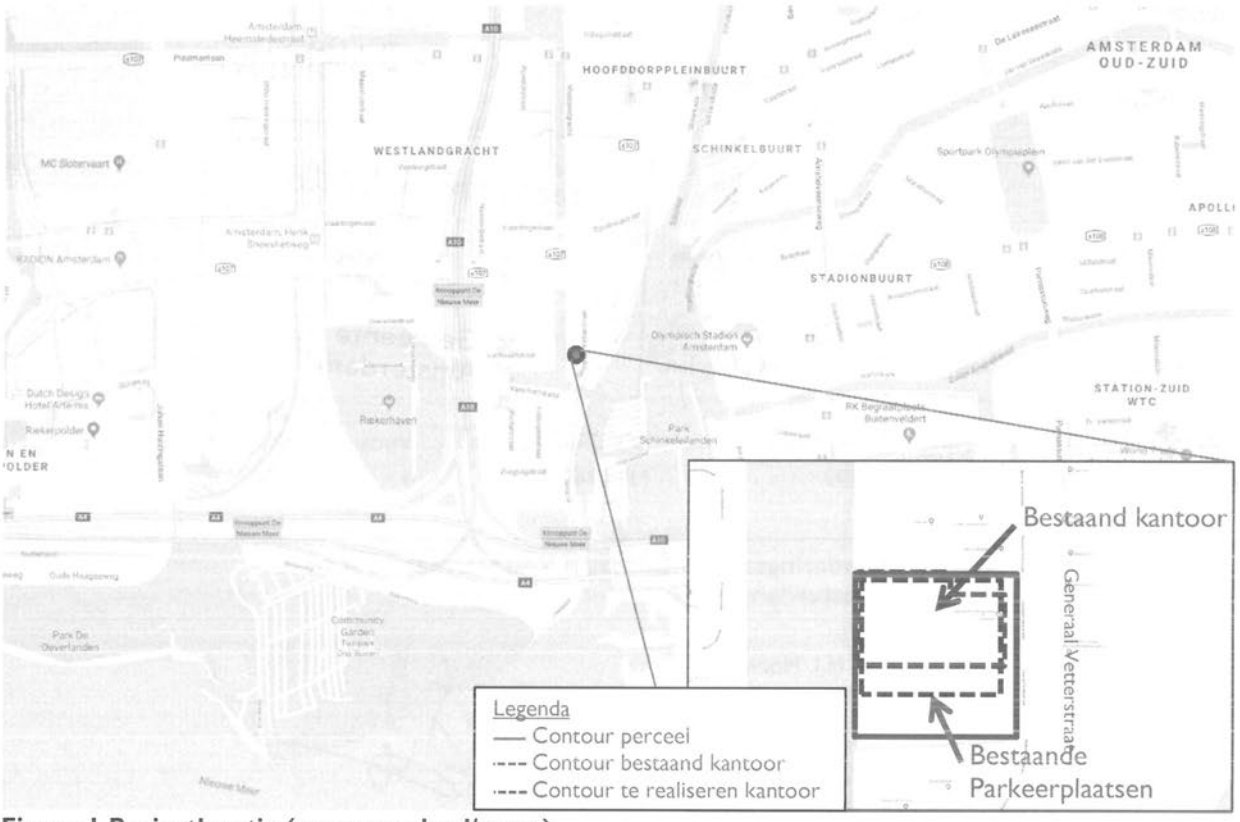
VRIJGAVE

BIJLAGEN
Bijlage 1 Grondonderzoek, ref[1]
Bijlage 2 Berekening zwel
Bijlage 3 Uitvoer D-Foundation druk
Bijlage 4 Uitvoer D-Foundation trek, rekenwaarde
Bijlage 5 Uitvoer D-Foundation trek representatief

| VERSIE | DATUM | OPMERKING |
|---|---|---|
| 1 | 05-03-2018 | - |
| | | |
| | | |

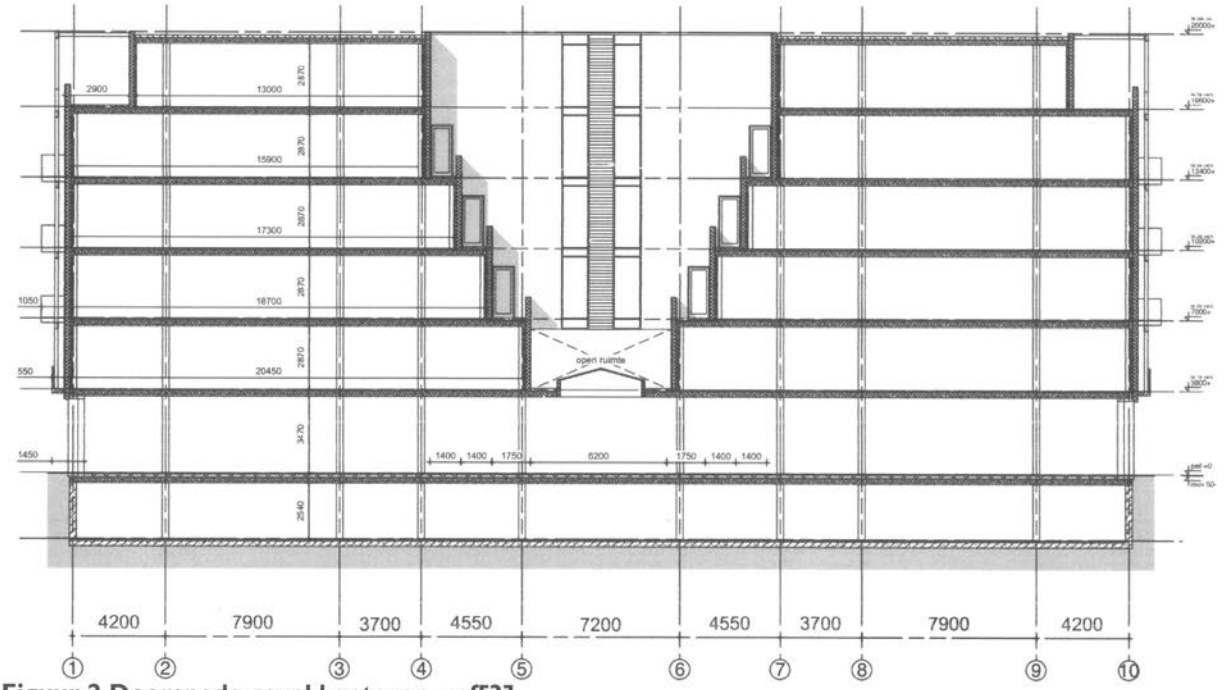
## 1 INLEIDING

Ten behoeve van realisatie van een nieuw kantoorgebouw met ondergrondse parkeerkelder aan de Generaal Vetterstraat 78-B in Amsterdam heeft CRUX Engineering BV een funderingsadvies opgesteld, zoals aangeboden in offerte OF17499a1 van 3 november 2017. In Figuur 1 is de locatie van het te realiseren gebouw weergegeven.




**Figuur 1 Projectlocatie (www.google.nl/maps)**

Ten behoeve van de bouw wordt het huidige kantoorpand gesloopt. Het nieuw te bouwen kantoorgebouw gaat uit 6 verdiepingen bestaan met daaronder een parkeerkelder, zie Figuur 2. De onderzijde van de kelder bevindt zich op NAP-2,6m. In Figuur 1 is een bovenaanzicht van de situatie weergegeven. In dit figuur is te zien dat een gedeelte van het nieuw te realiseren pand zich gedeeltelijk ter plaatse van het huidige kantoorpand bevindt en het overige deel op een parkeerplaats.




**Figuur 2 Doorsnede gevel kantoren, ref[3]**

# 2 UITGANGSPUNTEN

## 2.1 Documenten

De volgende documenten zijn gebruikt voor de berekeningen:

[1] Inpijn-Blokpoel ingenieursbureau; grondonderzoek *Geotechnisch onderzoek aan de Generaal vetterstraat 76-78 te Amsterdam*; documentnummer 06P003913-RG-01; d.d. 29 januari 2018;

[2] Duyts bouwconstructies BV; rapport *constructieve uitgangspunten bedrijfsgebouw*; 217416_RAPPORT_01A; d.d. 8 februari 2018;

[3] Gietermans & Van Dijk Architecten; tekeningen *Generaal Vetterstraat 78*; gevels en plattegronden; werknummer P7035; d.d. 21 december 2017

[4] Duyts bouwconstructies BV; e-mail *Generaal Vetterstraat 78-B te Amsterdam*; Bijlage tekening ifc Generaal_Vetterstraat_78_constructie.ifc; d.d. 7 februari 2018;

[5] SBR CUR net; Handboek funderingen - Deel B; ISBN 978-90-5367-462-8; d.d. 3 december 2015.

*CRUX staat niet in voor de juistheid en/of volledigheid van de door derden verstrekte informatie en gegevens.*

## 2.2 Programmatuur

De paalberekeningen zijn uitgevoerd met D-Foundation – model Bearing Piles, programma voor berekening van druk- en trekpalen volgens Eurocode en CUR 2001-4, versie 8.2, Deltares Systems.

De met DFoundation behaalde resultaten zijn verwerkt in een bij CRUX intern opgezet en gevalideerd spreadsheet.

## 2.3 Uitgevoerd grondonderzoek, grondopbouw en grondwaterstand

Op 20 januari 2018 is door Inpijn-Blokpoel [1] op locatie grondonderzoek uitgevoerd, zie Bijlage 1. Dit grondonderzoek bestaat uit 5 sonderingen en één grondboring. Het grondonderzoek is op de parkeerplaatsen uitgevoerd. Na de sloop van het huidige kantoorpand worden aanvullende sonderingen uitgevoerd op de locatie van het nieuw te bouwen kantoorgebouw. In Tabel 1 is de globale bodemopbouw gegeven.

**Tabel 1 Globale bodemopbouw**

| Grondsoort [-] | Bovenzijde grondlaag [NAP...m] |
|---|---|
| Topzandlaag | +0,85 à 0,79 (MV) |
| Hollandveen | -2,6 à -3,0 |
| Oude Zeeklei | -5,0 à -5,4 |
| Wadzand | -7,5 à -7,7 |
| Hydrobiaklei | -10,0 à -10,5 |
| Basisveen | -11,0 à -11,5 |
| Eerste Zandlaag | -11,0 à -12,0 |
| Tweede Zandlaag | -17,0 à -18,5 |
| * De maximaal verkende diepte is NAP-24,0m à NAP-26,0m | |

De freatische grondwaterstand is aangehouden op NAP-0,5m conform ref[2].

# 3 FUNDERINGSADVIES

## 3.1 Paalsystemen

Aangezien het te realiseren kantoorgebouw zich op korte afstand van bestaande bebouwing bevindt, is voor trillingsarme paalsystemen gekozen. Hierbij is gekozen voor een Fundex Groutinjectiepaal en een Drilling Push Aside schroefpaal (DPA-paal). Beide systemen zijn in de grond gevormde palen. Voor de uitvoerbaarheid van deze paalsystemen dient contact opgenomen te worden met een deskundig aannemer.

**Tabel 2 Beschouwd paalsysteem drukbelasting**

| Paalsysteem en afmetingen | Inbrengmethode | Typering | LZ-gedrag | Paalfactoren |
|---|---|---|---|---|
| Fundex GI-palen<br><br>Schacht casing / punt :<br>Ø380 mm / 450 mm<br>Ø460 mm / 560 mm | Schroevend, inclusief groutinjectie | In de grond gevormd, grondverdringend | type I | αp = 0,63<br>αs = 0,009<br>αt = 0,009<br>s = 1,0<br>β = 1,0 |
| DPA-palen<br><br>Schacht paal:<br>Ø410 mm<br>Ø460 mm | Schroevend | In de grond gevormd, grondverdringend | type I** | αp = 0,56*<br>αs = 0,010*<br>αt = 0,009*<br>s = 1,0<br>β = 1,0 |

* De DPA paal dient minimaal 2,5 m in de funderingszandlaag te worden aangebracht. Indien de paal minder dan 2,5m de funderingszandlaag penetreert, moeten lagere ontwerpfactoren in rekening worden gebracht conform het type avegaarpaal, ref[5]

** Het last-vervormingsgedrag van DPA-palen is conform ref [5] op basis van proefbelastingen aanzienlijk gunstiger ten opzichte van de traditionele avegaarpalen ('type 2' van EC7). Het paaltype vertoont echter een minder stijf gedrag dan de grondverdringende palen dient onder 'type 1' van de EC7 zijn ondergebracht. Doormiddel van het bepalen van de rekenwaarde lage veerstijfheid wordt het minder stijve gedrag meegenomen.

## 3.2 Zwelbelasting

### 3.2.1 Algemeen

Het ontgraven van de bouwkuip leidt tot een afname van de effectieve verticale korrelspanning in de onderliggende grondlagen. Deze afname van de korrelspanning gaat in de onderliggende lagen gepaard met een toename van het volume onder toetreding van water. Met zwel wordt over het algemeen volumevergroting van cohesieve lagen bedoeld.

Zwel kan leiden tot een heffing van de bouwkuipbodem na het ontgraven. De rijzende lagen kunnen een belasting uitoefenen op de constructievloer en de trekpalen waarmee deze in de diepe zandlagen wordt verankerd. Ook kunnen de lagen via schuifkrachten de belasting direct op de funderingspalen overdragen indien het rijzingsproces nog niet ten einde is bij het installeren van de funderingspalen. In deze paragraaf wordt ingegaan op de effecten van de zwel op de constructieonderdelen.

### 3.2.2 Zwel op funderingspalen

Als conservatief uitgangspunt is door CRUX aangenomen dat de funderingspalen worden geïnstalleerd voordat de bouwkuip volledig wordt ontgraven en worden derhalve door de opwaarts bewegende grondlagen belast. De krachten zijn afkomstig van de schuifweerstand tussen de palen en de grond.

In Tabel 3 de representatieve zwelbelasting gepresenteerd. Hierbij zijn alleen de lagen boven de Eerste Zandlaag in rekening gebracht. De zwelbelasting op de palen is bepaald op basis van CUR ontwerprichtlijn zwelbelastingen op funderingen. De zwelbelastingen dienen meegenomen te worden in de toetsing van de trekcapaciteit van de palen. Ook dienen de palen gewapend te worden op de totale trekbelasting.

**Tabel 3 Representatieve zwelbelasting**

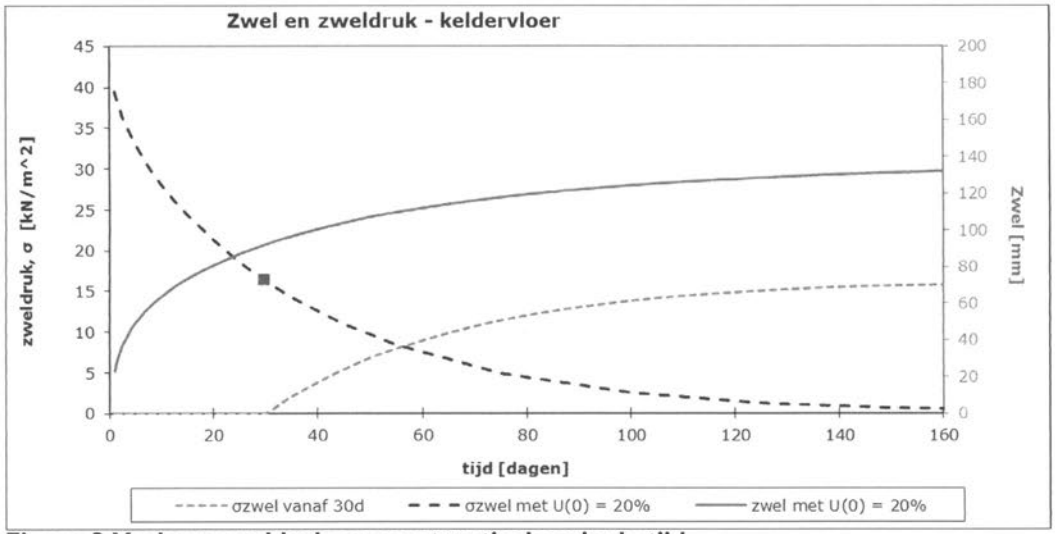
| Paalafmeting (schacht- / puntdiameter) [mm / mm] | $F_{zwel;rep}$ [kN] |
|---|---|
| Fundex Groutinjectiepaal Ø380/450 | 63 |
| Fundex Groutinjectiepaal Ø460/560 | 76 |
| DPA-paal Ø410 | 61 |
| DPA-paal Ø460 | 69 |

### 3.2.3 Zwel op constructievloer

In CUR202 wordt voor de constructievloer welke door zwel belast worden aangenomen dat de vloer de zwelbelasting volledig tegengaat. De vloer wordt in dit geval dus als plaatsvast beschouwd. Zwel van de grondlagen is een tijdsafhankelijk proces waarbij voor de eindwaarde vaak een periode van 30 jaar wordt gehanteerd. Door consolidatie (toe- of afstromen van water) treedt het grootste deel van de zwel echter binnen enkele maanden op.
Aangezien de vloer als plaatsvast wordt beschouwd, is op het moment van storten van de betonvloer de reeds opgetreden zwel als eindzwel te beschouwen. Dit betekent dat de zwelbelasting even groot is als de belasting die nodig is om de (verdere) rijzing van de lagen tegen te gaan.
In de CUR richtlijn wordt de situatie verder beschouwd als 1-dimensionaal en wordt het effect van de palen verwaarloosd, waardoor de volledige belasting direct op de vloer werkt. In de CUR-richtlijn wordt voor het versneld toestromen van water bij zwel een minimum factor 5 à 15 ten opzichte van een "normale" consolidatie gehanteerd. Voor de verhouding is in dit geval en factor 8 gehanteerd.

Tijdens het ontgraven van de bouwkuip treedt al een groot deel van de zwel op. Analoog aan de ophogingen, waar 50% van de ophoogtijd kan worden gezien als zettingstijd, kan dit bij zwel ook minimaal worden gehanteerd. Omdat zwel veel sneller optreedt, is dit een conservatief uitgangspunt.

In verband met de consolidatietijd van de zwelperiode is voor verschillende momenten in de tijd de zwelkracht op de vloer berekend. De berekende zwelkrachten zijn weergegeven in Figuur 3. De berekening is opgenomen in Bijlage 2.




**Figuur 3 Verloop zweldruk op constructievloer in de tijd**

Opmerkingen bij de figuur:
Een inschatting zal gemaakt moeten worden na hoeveel dagen de constructievloer gestort zal worden vanaf start ontgraven. start ontgraving dient halverwege de ontgravingsperiode gekozen te worden (bv. Bij 4 weken ontgravingsduur wordt 2 weken aangehouden voor het aantal in rekening te brengen dagen).

Opgemerkt wordt dat de waarden uit Figuur 3 een bovengrens van de optredende zweldruk betreffen waarbij het effect van het verplaatsen van de paalkop ten gevolge van de belasting vanuit de betonvloer door waterdruk na uitschakelen bemaling niet is verdisconteerd.

## 3.3 Berekening drukpalen

### 3.3.1 Uitgangspunten

Voor de berekening van het verticaal draagvermogen van de palen zijn de volgende uitgangspunten gehanteerd:

- Berekening volgens NEN-9997-1 op basis van sonderingen;
- De grondlaag indeling in DFoundation is gebeurd op basis van de CUR-rule methode;
- Bij het bepalen van de schachtwrijving is voor de diameter van de fundexpaal met groutinjectie gezien het toepassen van groutinjectie uitgegaan van $\varnothing_{schacht} = (\varnothing_{punt} + \varnothing_{schacht;casing})/2$;
- Paalpuntniveau in de Tweede Zandlaag, vanaf ca. NAP -17,0 à 18,5 m;
- De positieve schachtwrijving wordt ontleend aan het zandpakket vanaf circa NAP -11,0 à -12,0 m;
- Negatieve kleef wordt gezien de ontgraving niet meegenomen;
- In de berekeningen wordt rekening gehouden met reductie van de gemeten conusweerstanden ten gevolge van een ontgraving tot maximaal NAP -2,6m;
- De stijfheid van de constructie van de bovenbouw bepaalt mede de waarde van de factoren ξ (ksi) die onzekerheid in het grondonderzoek en de mogelijkheid van herverdeling van belasting over meerdere palen in rekening brengt. In het ontwerp van een slappe fundering uitgegaan;
- Aangehouden factoren ξ (ksi) en veiligheidsfactoren:
    - De draagkracht is op twee manieren berekend: het gemiddelde van de sonderingen waarbij de factor ξ3 van toepassing is, en de slechtste van de groep sonderingen waarbij ξ4 van toepassing is. De laagste draagkracht is maatgevend. Hierbij moet wel gelden dat de variatiecoëfficiënt <= 12% is. De factor ξ is mede afhankelijk van het aantal sonderingen dat als groep bij elkaar genomen wordt. Sonderingen welke op een afstand < 25m van een gebouwdeel zijn gesitueerd mogen meegenomen worden in de bepaling van de ξ. In deze fase van het ontwerp wordt uitgegaan van een maximale groep van 4 sonderingen in verband met het nog uit te voeren grondonderzoek;
    - $\gamma_b, \gamma_s = 1,2$

### 3.3.2 Paaldrukdraagvermogen en veerstijfheid

De veerstijfheid bij statische belasting heeft betrekking op het eigen gewicht en het permanent aanwezige deel van de veranderlijke belasting. De paalkopzakking bestaat uit een gedeelte paalzakking ten gevolge van mobiliseren grondweerstand ($s_b$) en een gedeelte elastische verkorting ($s_{el}$) van de paal. De paalpuntzakking is berekend volgens de standaard last-zakkingsdiagrammen uit de Eurocode. De aangehouden elasticiteitsmodulus van de paal voor de berekening van de elastische verkorting is E = 15.000 N/mm$^2$ voor in de grond gevormde palen. Bij het bepalen van de elastische verkorting is voor de schachtdiameter van de Fundex Groutinjectiepalen uitgegaan van $\varnothing_{schacht} = (\varnothing_{punt} + \varnothing_{schacht;casing})/2$. Opgemerkt wordt dat de puntzakking t.g.v. mobilisatie van de grondweerstand niet lineair verloopt. Bij toenemende belasting neemt de zakking meer dan evenredig toe en de veerstijfheid neemt dus af. In deze fase van het ontwerp is voor de paalbelasting uitgegaan van 70% van het representatieve paaldraagvermogen.

In Tabel 4 is het paaldraagvermogen op druk voor de paalsystemen met een paalpuntniveau van NAP-18,0m tot NAP-21,5m weergegeven. Daarnaast zijn de aan te houden veerconstanten voor een statische belasting op de drukpalen samengevat. In de weergegeven stijfheid is de elastische verkorting van de paal meegenomen. Als Bijlage 3 is de uitvoer van de berekening toegevoegd.

*Bij de bepaling van de rekenwaarde van de lage en hoge veerstijfheid dient bepaald te worden door respectievelijk deling en vermenigvuldiging met $\sqrt{2}$.*

**Tabel 4 Paaldraagvermogen op druk en paalveerconstante inclusief elastische verkorting**

| PPN | Fundex Groutinjectiepaal | | | | DPA-paal | | | |
|---|---|---|---|---|---|---|---|---|
| | Ø380/450 | | Ø460/560 | | Ø410 | | Ø460 | |
| [NAP...m] | $R_{c;net;d}$ [kN] | $K_{v;1}$ [MN/m] | $R_{c;net;d}$ [kN] | $K_{v;1}$ [MN/m] | $R_{c;net;d}$ [kN] | $K_{v;1}$ [MN/m] | $R_{c;net;d}$ [kN] | $K_{v;1}$ [MN/m] |
| -18,0 | 1045 | 91 | 1462 | 118 | 925 | 93 | 1095 | 102 |
| -18,5 | 1323 | 97 | 1863 | 126 | 1151 | 97 | 1366 | 106 |
| -19,0 | 1393 | 102 | 1942 | 134 | 1222 | 100 | 1447 | 113 |
| -19,5 | 2101 | 100 | 2722 | 128 | 1375 | 99 | 2170 | 111 |
| -20,0 ND* | 2071 | 100 | 2077 | 132 | 1573 | 95 | 2136 | 112 |
| -20,5 | 1504 | 103 | 2078 | 138 | 1363 | 101 | 1594 | 115 |
| -21,0 | 1473 | 106 | 2052 | 141 | 1345 | 102 | 1586 | 117 |
| -21,5 | 1433 | 108 | 1972 | 145 | 1334 | 102 | 1564 | 120 |
| * Niet dieper funderen in verband met een afnemend draagvermogen | | | | | | | | |

De in Tabel 4 gepresenteerde waarden betreft de rekenwaarde van het uitwendige geotechnische paaldrukdraagvermogen. Door de constructeur dient te worden gecontroleerd of de bijbehorende paalschachtspanningen, met andere woorden het inwendige constructieve draagvermogen, toelaatbaar zijn.

Geadviseerd wordt om voor alle paalsystemen en afmetingen op NAP-19,5m of NAP-20,0m te funderen.

## 3.4 Berekening trekpalen

### 3.4.1 Uitgangspunten

Voor de berekeningen van de trekpalen zijn de volgende aanvullende uitgangspunten gehanteerd:

- Door CRUX is aangenomen dat de funderingspalen in de eindsituatie niet op trek belast worden. Hiermee is de belastingvariatiefactor $\gamma_{m;var;qc}$ gelijk aan 1,0;
- Positieve schachtwrijving voor de palen wordt ontleend aan de zandlagen vanaf ca. NAP-11,0m à -12,0 m;
- In de berekening zijn alleen middenpalen beschouwd met een maatgevend paalstramien van 2x2m;
- Veiligheidsfactor $\gamma_s$ is gelijk aan 1,35.

### 3.4.2 Paaldraagvermogen op trek en veerstijfheid

In Tabel 5 is een samenvatting gegeven van het trekdraagvermogen exclusief zwelbelasting op de palen en de zwelbelasting uit de vloer en de veerstijfheden inclusief elastische verlening. Als Bijlage 4 en Bijlage 5 is de uitvoer van de berekening toegevoegd.

Indien de palen voorafgaand aan het ontgraven worden geïnstalleerd treedt zwel langs de palen op. Hier is geen rekening mee gehouden in het trekdraagvermogen in Tabel 5. Daarnaast is ook geen rekening gehouden met de reductie van het trekdraagvermogen ten gevolge van de zwelbelasting op de vloer. De zwelbelasting op de vloer en de palen dient door de constructeur verdisconteerd te worden in het paaldraagvermogen. Zie voorgaande paragraaf 3.2 voor de zwelbelasting.

*Bij de bepaling van de rekenwaarde van de lage en hoge veerstijfheid dient bepaald te worden door respectievelijk deling en vermenigvuldiging met $\sqrt{2}$.*

**Tabel 5 Paaldraagvermogen op trek excl. zwelbelasting - paalveerconstante inclusief elastische verlenging**

| PPN | Fundex Groutinjectiepaal | | | | DPA-paal | | | |
|---|---|---|---|---|---|---|---|---|
| | Ø380/450 | | Ø460/560 | | Ø410 | | Ø460 | |
| [NAP...m] | $R_{t;d}$ [kN] | $K_{v;1}$ [MN/m] | $R_{t;d}$ [kN] | $K_{v;1}$ [MN/m] | $R_{t;d}$ [kN] | $K_{v;1}$ [MN/m] | $R_{t;d}$ [kN] | $K_{v;1}$ [MN/m] |
| -18,0 | 315 | 52 | 358 | 58 | 313 | 52 | 337 | 55 |
| -18,5 | 340 | 53 | 376 | 59 | 338 | 53 | 363 | 57 |
| -19,0 | 365 | 54 | 392 | 61 | 363 | 54 | 388 | 58 |
| -19,5 | 389 | 55 | 408 | 62 | 386 | 55 | 411 | 59 |
| -20,0 ND* | 412 | 56 | 424 | 63 | 409 | 55 | 427 | 60 |
| -20,5 | 433 | 57 | 439 | 64 | 431 | 56 | 443 | 61 |
| -21,0 | 454 | 57 | 455 | 65 | 451 | 57 | 459 | 61 |
| -21,5 | 474 | 58 | 471 | 66 | 471 | 57 | 475 | 62 |
| * Niet dieper funderen in verband met een afnemend drukdraagvermogen | | | | | | | | |

De in gepresenteerde waarden betreft de rekenwaarde van het uitwendige geotechnische paaldrukdraagvermogen. Door de constructeur dient te worden gecontroleerd of de bijbehorende paalschachtspanningen, met andere woorden het inwendige constructieve draagvermogen, toelaatbaar zijn.

Geadviseerd wordt om voor alle paalsystemen en afmetingen op NAP-19,5m of NAP-20,0m te funderen.

# 4 CONCLUSIES EN AANBEVELINGEN

Ten behoeve van realisatie van een nieuw kantoorgebouw met ondergrondse parkeerkelder aan de Generaal Vetterstraat 78-B in Amsterdam is in deze notitie een funderingsadvies opgesteld voor twee trillingsarme paalsystemen in verband met de belendende panden.

Het advies is opgesteld aan de hand van sonderingen op een gedeelte van het terrein zonder bebouwing. Na de sloop van het huidige kantoor worden aanvullende sonderingen ter plaatse van het toekomstige kantoorgebouw gemaakt. De in deze notitie berekende paaldraagvermogens en veerstijfheden dienen gecontroleerd te worden aan de hand van deze sonderingen.

Uitgaande van een Fundex groutinjectie kan een drukdraagvermogen van 2071kN en 2077kN worden bereikt met een diameter van respectievelijk Ø219/310mm en Ø355/450mm en een paalpuntniveau NAP-20,0m.
Het bijbehorende trekdraagvermogen is 412kN en 424kN exclusief de zwelbelasting bij een hart op hart afstand van 2m. De bijbehorende zwelbelasting is 63kN voor de afmeting Ø219/310mm en 76kN per paal voor Ø355/450mm. Daarnaast dient rekening gehouden te worden met een zwelbelasting op de vloer, conform Tabel 3. Indien een kleinere hart op hart afstand wordt toegepast neemt het trekdraagvermogen af.

Uitgaande van een DPA-paal kan een drukdraagvermogen van 1573kN en 2136kN worden bereikt met een diameter van respectievelijk Ø410mm en Ø460mm en een paalpuntniveau NAP-20,0m.
Het bijbehorende trekdraagvermogen is 409kN en 427kN exclusief zwelbelasting bij een hart op hart afstand van 2m. De bijbehorende zwelbelasting is 61kN per paal voor de afmeting Ø410mm en 69kN per paal voor Ø460mm. Daarnaast dient rekening gehouden te worden met een zwelbelasting op de vloer conform Tabel 3. Indien een kleinere hart op hart afstand wordt toegepast neemt het trekdraagvermogen af.

Voor de uitvoering wordt aanbevolen om de uitvoerbaarheid van de paalsystemen door een deskundig aannemer te laten controleren.

Mocht u naar aanleiding van deze notitie nog vragen hebben dan kunt u contact opnemen met ing. H.J. Honing.

**Bijlage 1 Grondonderzoek, ref[1]**


B
INPIJN-BLOKPOEL
ingenieursbureau
Geotechniek - Milieutechniek

# Geotechnisch onderzoek aan de Generaal Vetterstraat 76-78 te Amsterdam

| | |
|---|---|
| ***Betreft*** | Resultaten geotechnisch onderzoek |
| ***Opdrachtnummer*** | 06P003913 |
| ***Documentnummer*** | 06P003913-RG-01 |
| ***Opdrachtgever*** | Crux Engineering B.V.<br>Pedro de Medinalaan 3c<br>1086 XK Amsterdam |

| | | | |
|---|---|---|---|
| *Opgesteld door* | : | Paraaf : | |
| *Gezien* | : | | Paraaf : |
| *Status* | : | | |
| *Codering* | : | | |
| *Datum rapport* | : | | |

**INPIJN-BLOKPOEL Ingenieursbureau**
Mercuriusweg 18
2741 TA WADDINXVEEN

T 0182-610013
F 0182-626016
E west@inpijn-blokpoel.com

# INHOUDSOPGAVE

**1. INLEIDING** ..... **1**

**2. ONDERZOEK** ..... **1**

2.1 SONDERINGEN ..... 1
2.2 BORING ..... 1
2.3 INMETING EN WATERPASSING ..... 1
2.4 FOTO'S ..... 2

**BIJLAGEN:**

A) Situatietekening en foto's
B) Waterpasstaat
C) Sondeergrafieken
D) Boorstaat
E) Verklaring codering

**VERZENDLIJST**

1 x Crux Engineering B.V. te Amsterdam t.a.v.

**INPIJN-BLOKPOEL Ingenieursbureau**
Mercuriusweg 18
2741 TA WADDINXVEEN

T 0182-610013
F 0182-626016
E west@inpijn-blokpoel.com

## 1. INLEIDING

Ten behoeve van het project "Geotechnisch onderzoek aan de Generaal Vetterstraat 76-78 te Amsterdam" is door ons bureau op verzoek van Crux Engineering B.V. uit Amsterdam een geotechnisch onderzoek verricht. Voorliggend rapport bevat een beschrijving en de resultaten van het onderzoek.

## 2. ONDERZOEK

### 2.1 Sonderingen

Er zijn 5 sonderingen gemaakt met een elektrische conus conform NEN-EN-ISO 22476-1. Bij de sonderingen is naast de conusweerstand tevens de plaatselijke wrijving gemeten en geregistreerd. De relatie tussen conusweerstand en plaatselijke wrijving, het wrijvingsgetal, geeft een indicatie van de verschillende grondsoorten onder het grondwaterniveau. De sonderingen zijn uitgevoerd door een sondeertruck.

Sonderingen DKM-01 en DKM-02 konden niet uitgevoerd worden omdat er op de geplande sondeerlocatie een hek staat.

De ondergrond is ter plaatse van DKM-03, DKM-05, DKM-08 en DKM-09 voorgeboord in verband met de mogelijke aanwezigheid van kabels en/of leidingen; de aangetroffen grondslag is geclassificeerd en weergegeven in een voorboorstaat. Hiervoor wordt verwezen naar bijlage D.

De ondergrond is ter plaatse van DKM-06 80cm voorgedrukt in verband met verhardingen op de sondeerlocatie.

Voor de grafieken van de sonderingen wordt verwezen naar bijlage C; de locatie van de sondeerpunten is aangegeven op de situatietekening SIT-01, toegevoegd onder bijlage A. Voor een verklaring van de op de tekening gebruikte tekens wordt verwezen naar de "Verklaring Codering" die onder bijlage E aan dit rapport is toegevoegd.

### 2.2 Boring

Er is een boring uitgevoerd. In het boorgat is naar de grondwaterstand gepeild. Voor het profiel van de boring wordt verwezen naar bijlage D; de locatie van het boorpunt is aangegeven op de situatietekening SIT-01, toegevoegd onder bijlage A. Voor een verklaring van de op de tekening en de boorprofielen gebruikte tekens wordt verwezen naar de "Verklaring Codering" die onder bijlage E aan dit rapport is toegevoegd.

### 2.3 Inmeting en waterpassing

Met behulp van een GNSS meetsysteem zijn de locaties van de onderzoekspunten uitgezet in RD-coördinaten en is de hoogte van het maaiveld ter plaatse van ieder onderzoekspunt bepaald ten opzichte van NAP.
De gemeten hoogte is gecontroleerd aan de hand van een NAP-referentieniveau in de omgeving van het werk. Voor de omschrijving van het referentiepunt en voor de resultaten van de inmeting en waterpassing wordt verwezen naar de inmeet- en waterpasstaat bijlage B.

## 2.4 Foto's

Tijdens de uitvoering van het veldwerk zijn enkele foto's gemaakt. Voor de foto's en een tekening waarop met pijlen is aangegeven vanuit welke positie en in welke richting de foto's zijn gemaakt wordt verwezen naar bijlage A.

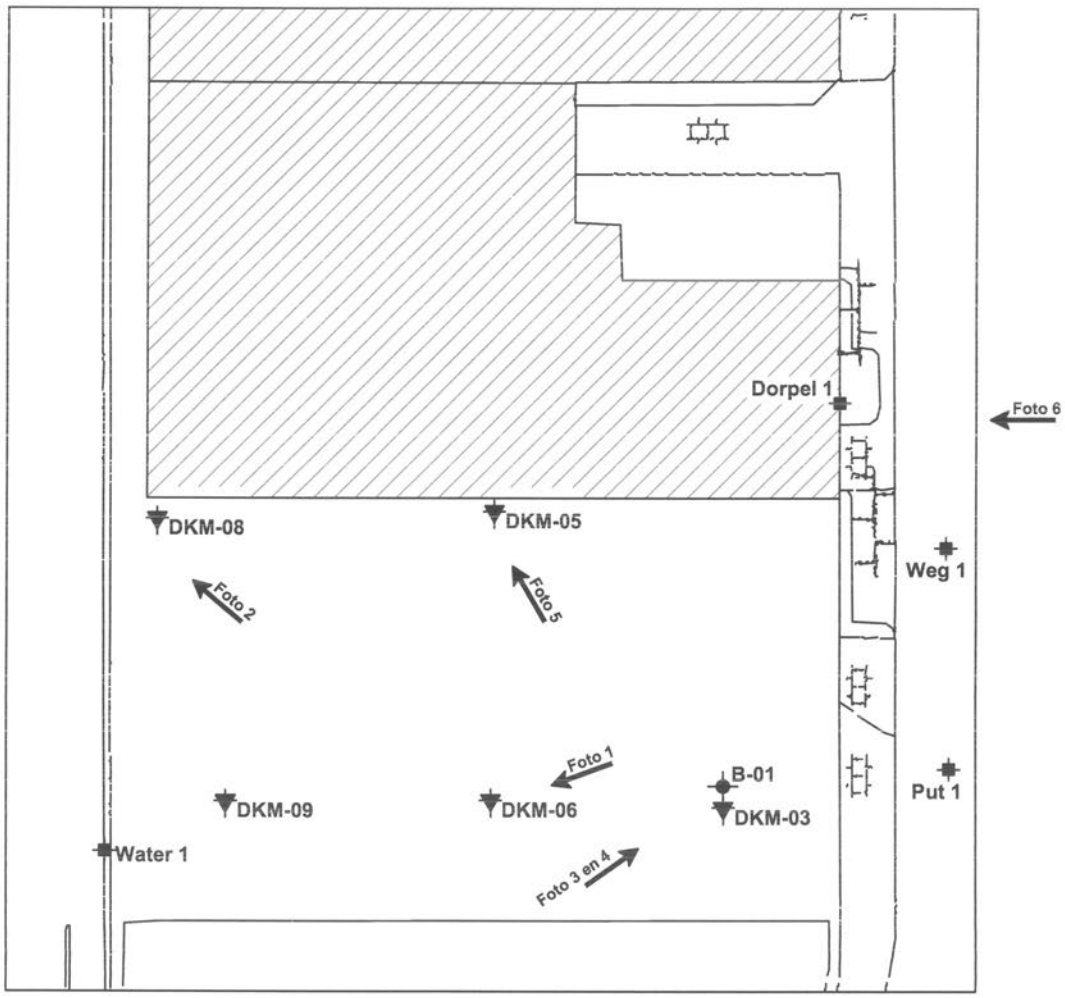
INPIJN-BLOKPOEL Ingenieursbureau
Mercuriusweg 18
2741 TA WADDINXVEEN

T 0182-610013
F 0182-626016
E west@inpijn-blokpoel.com

# Bijlage A

INPIJN-BLOKPOEL Ingenieursbureau
Mercuriusweg 18
2741 TA WADDINXVEEN

T 0182-610013
F 0182-626016
E west@inpijn-blokpoel.com




Bestaande bebouwing

0 5 10 15 20 25m

N

| | |
|---|---|
| Bron: E-mail digitale tekening | |
| Bureau + vestigingsplaats: KLIC | |
| Tekening- / bladnummer: -- | |
| Datum laatste bewerking: -- | |

INPIJN-BLOKPOEL Ingenieursbureau

| | | | |
|---|---|---|---|
| Opdrachtomschrijving / locatie: Geotechnisch onderzoek aan de Generaal Vetterstraat 76-78 te Amsterdam | Opdrachtnummer: 06P0039133 | Bijlage: SIT-01 | |
| | Bewerkt: tfn | Datum: 29-01-2018 | |
| Omschrijving tekening: Situatietekening | X, Y: RD/dGPS | Schaal: 1 : 500 | Formaat: A4 |

Deze situatietekening dient om inzicht te geven in de locatie van de meet- en onderzoekspunten.
De tekening dient niet voor andere doeleinden te worden gebruikt.

N:\Opdrachten\06\00\Veldwerk\Tekeningen\06P003913-SIT-01-tfn

Opdracht : 06P003913
Project : Geotechnisch onderzoek aan de Generaal Vetterstraat 76-78 te Amsterdam



1. Locatie DKM-06




2. Locatie DKM-08



3. B-01



4. Locatie B-01




5. Locatie DKM-05



6. Dorpel 1

**INPIJN-BLOKPOEL ingenieursbureau**
Mercuriusweg 18
2741 TA WADDINXVEEN

Telefoon: 0182-610013

Fax: 0182-626016

# Bijlage B

INPIJN-BLOKPOEL Ingenieursbureau
Mercuriusweg 18
2741 TA WADDINXVEEN

T 0182-610013
F 0182-626016
E west@inpijn-blokpoel.com

Opdracht : 06P003913
Project : Geotechnisch onderzoek aan de Generaal Vetterstraat 76-78 te Amsterdam

## WATERPASSTAAT

Meetmethode : Uitgezet en gewaterpast middels dGPS
Datum meting : 20 januari 2018
Hoogte (Z) t.o.v. : NAP

| *Meetpunten* | *x-coördinaat [m]* | *y-coördinaat [m]* | *z-coördinaat (hoogte) [m t.o.v. NAP]* |
|---|---|---|---|
| DKM-01 (niet uitgevoerd) | -- | -- | -- |
| DKM-02 (niet uitgevoerd) | -- | -- | -- |
| DKM-03 | 118.155,8 | 484.051,6 | 0,84 |
| DKM-05 | -- | -- | 0,84 |
| DKM-06 | 118.140,0 | 484.052,1 | 0,85 |
| DKM-08 | -- | -- | 0,85 |
| DKM-09 | 118.121,9 | 484.052,0 | 0,79 |
| B-01 | -- | -- | 0,83 |
| Grondwaterstand B-01 (20-01-2018) | -- | -- | -0,51 |
| Put 1 | 118.171,1 | 484.054,1 | 0,69 |
| Weg 1 | 118.170,9 | 484.069,2 | 0,66 |
| Dorpel 1 | -- | -- | 0,77 |
| Water 1 (20-01-2018) | 118.113,7 | 484.048,6 | -0,48 |

*Opmerking:*
*--Indien geen -x- en -y-coördinaten zijn gepresenteerd dan is de NAP-hoogte terrestrisch ingemeten.*

**Let op:**
Deze waterpasstaat dient om inzicht te geven in de hoogteligging en locaties van de meet- en onderzoekspunten ten opzichte van een referentiepunt. De resultaten dienen niet voor andere doeleinden te worden gebruikt.

**INPIJN-BLOKPOEL** ingenieursbureau
Mercuriusweg 18
2741 TA WADDINXVEEN

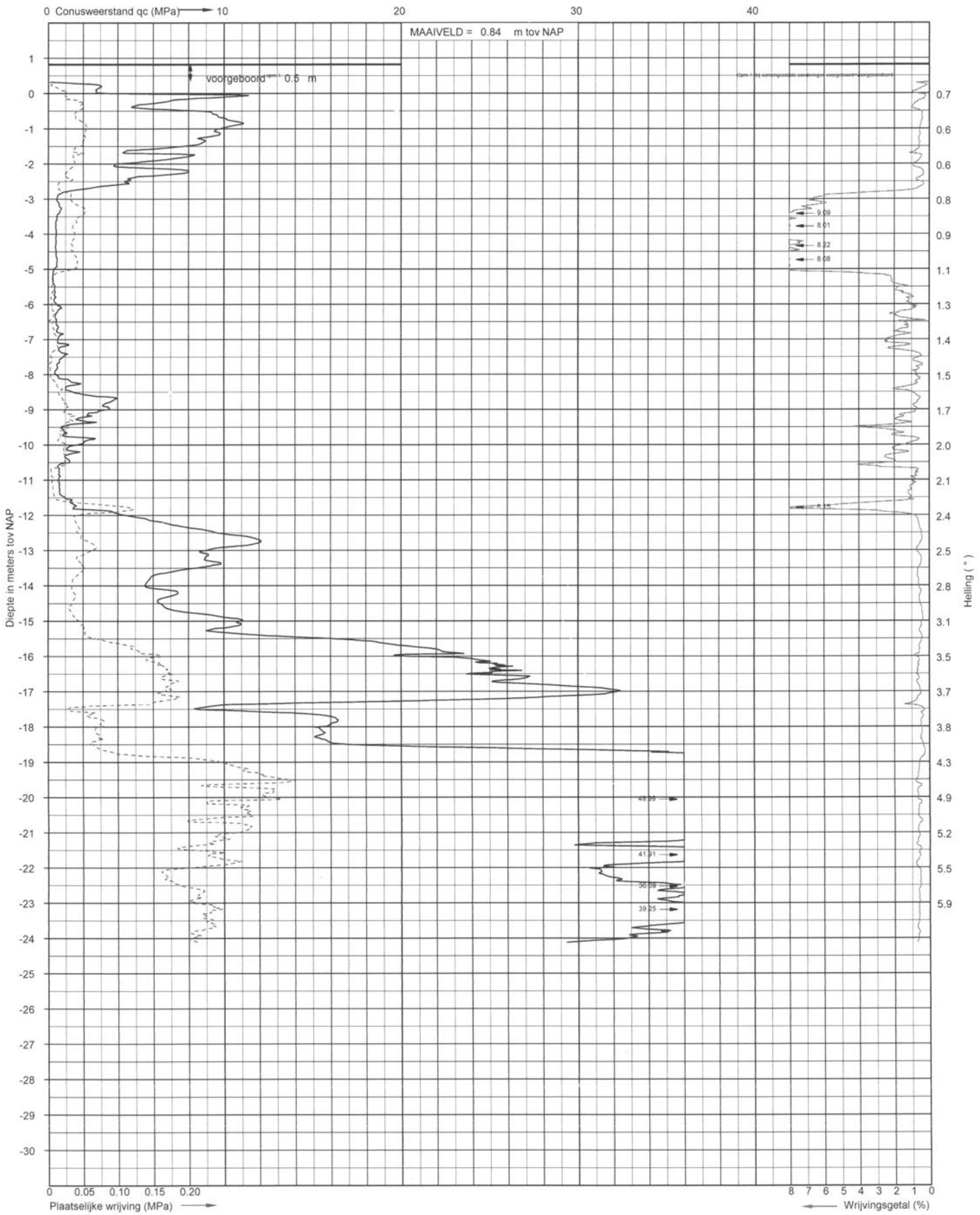
T 0182-610013
F 0182-626016
E west@inpijn-blokpoel.com

# Bijlage C

INPIJN-BLOKPOEL Ingenieursbureau
Mercuriusweg 18
2741 TA WADDINXVEEN

T 0182-610013
F 0182-626016
E west@inpijn-blokpoel.com

Opdracht: 06P003913
Project: Geotechnisch onderzoek aan de Generaal Vetterstraat 76-78 te Amsterdam




Sondering volgens NEN-EN-ISO 22476-1
Sondeerklasse
Conusnummer: I-CFXY-10

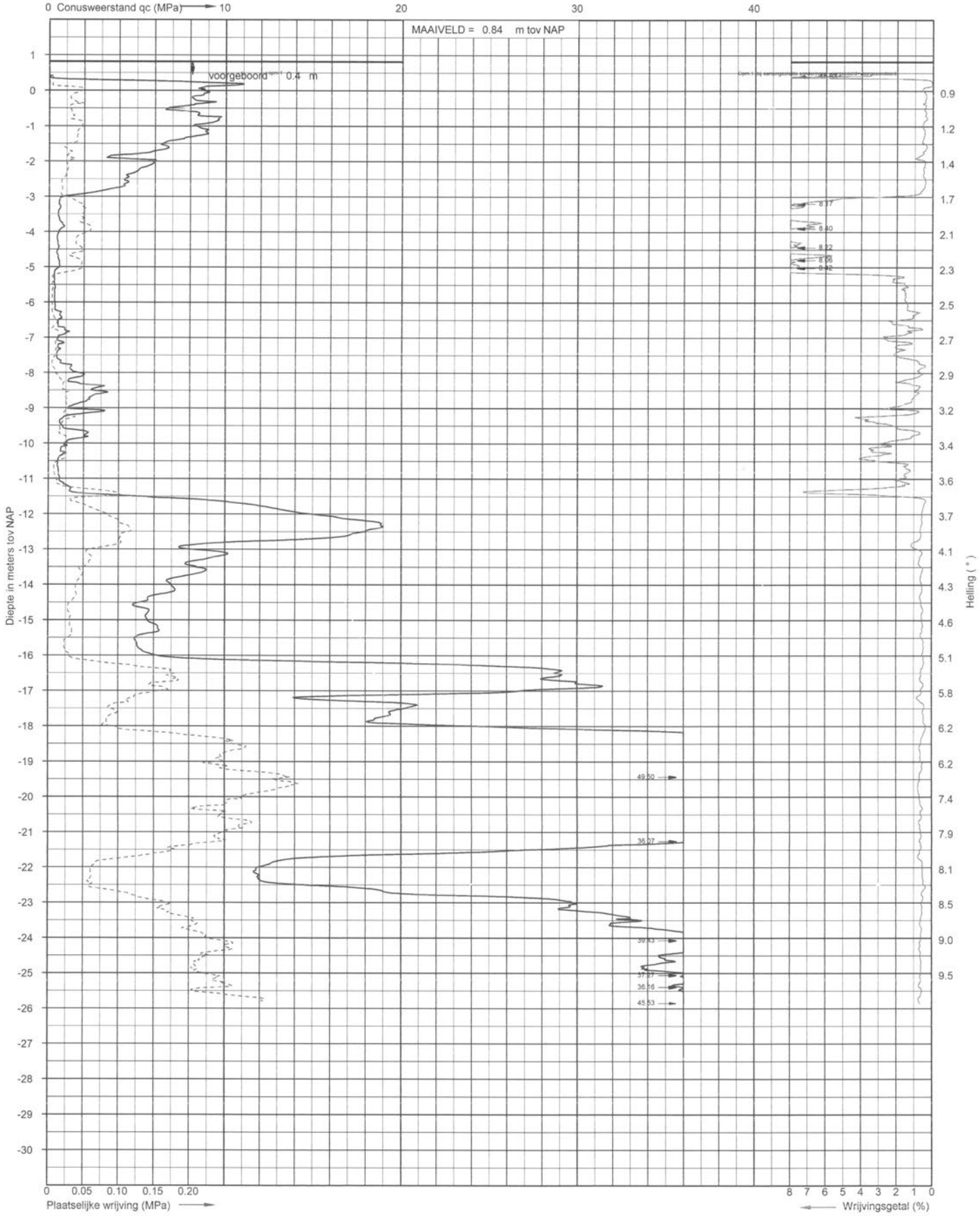
Uitvoerder: S9
Datum: 20-1-2018

X: 118155,775
Y: 484051,619

**Sondering 3**

INPIJN-BLOKPOEL Ingenieursbureau

Opdracht: 06P003913
Project: Geotechnisch onderzoek aan de Generaal Vetterstraat 76-78 te Amsterdam




Sondering volgens NEN-EN-ISO 22476-1
Sondeerklasse
Conusnummer: I-CFXY-10

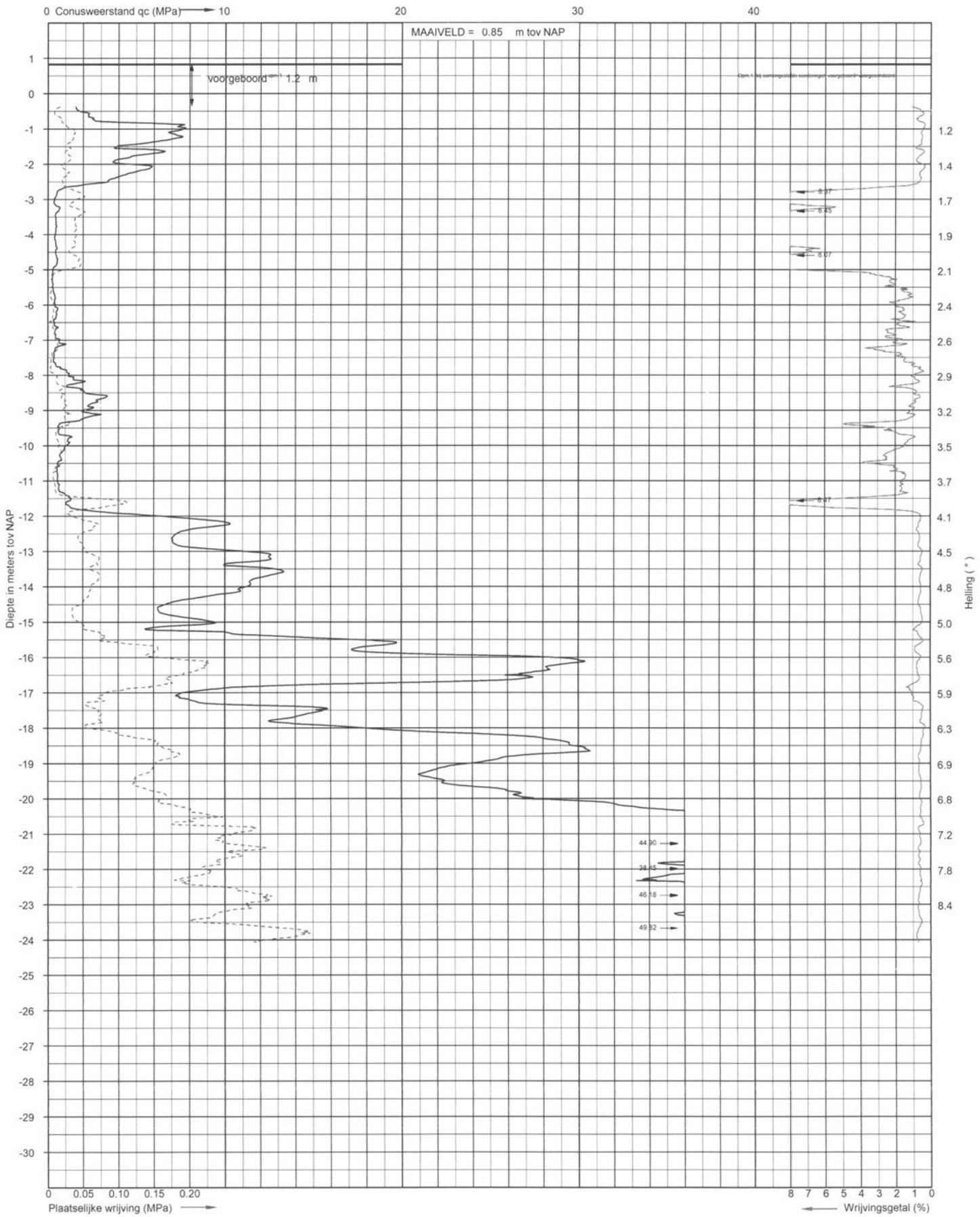
Uitvoerder: S9
Datum: 20-1-2018

X: 0.000
Y: 0.000

**Sondering**

INPIJN-BLOKPOEL Ingenieursbureau

Opdracht: 06P003913
Project: Geotechnisch onderzoek aan de Generaal Vetterstraat 76-78 te Amsterdam




Sondering volgens NEN-EN-ISO 22476-1
Sondeerklasse
Conusnummer: I-CFXY-10

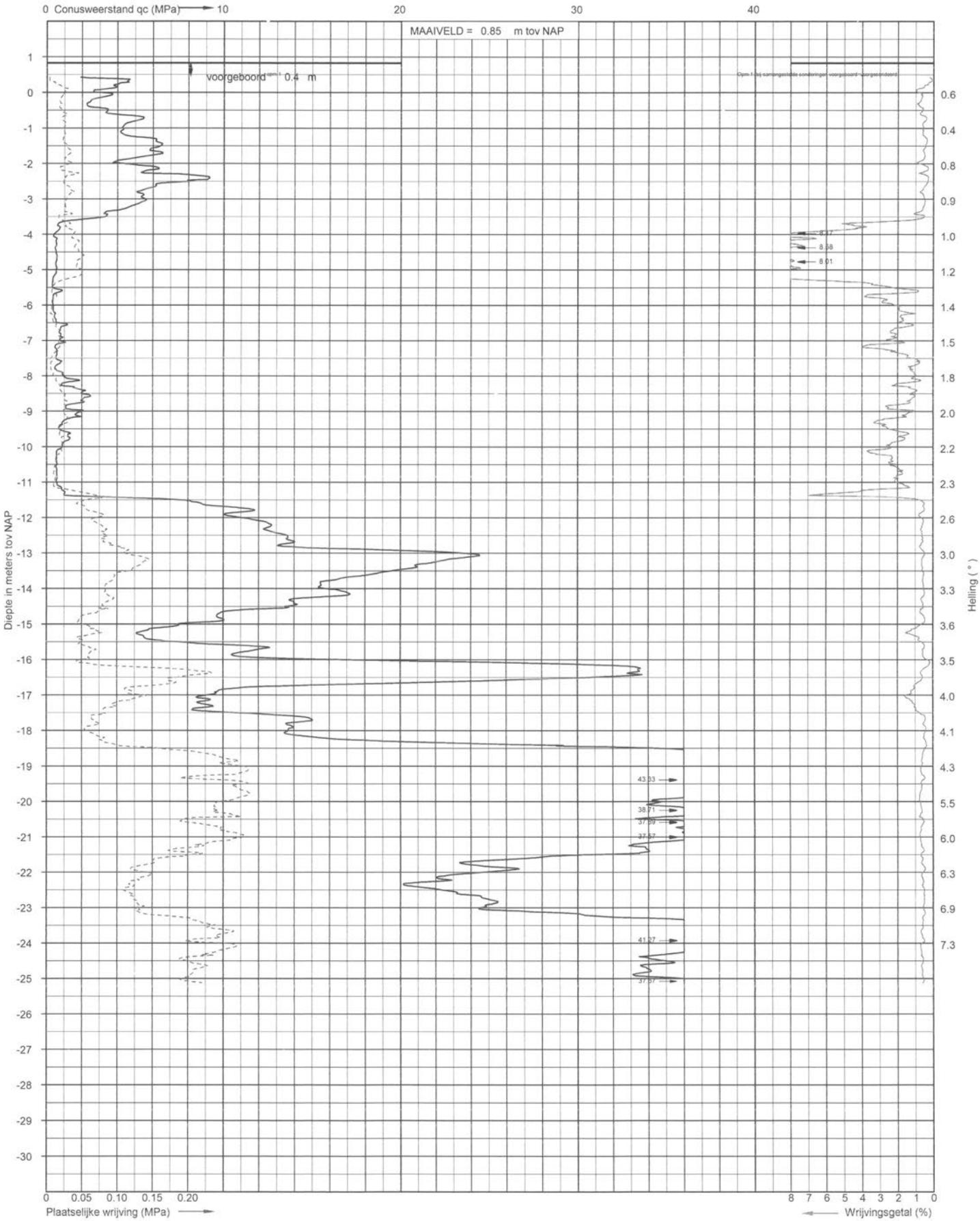
Uitvoerder: S9
Datum: 20-1-2018

X: 118139.992
Y: 484052.092

**Sondering**

INPIJN-BLOKPOEL Ingenieursbureau

Opdracht: 06P003913
Project: Geotechnisch onderzoek aan de Generaal Vetterstraat 76-78 te Amsterdam




Sondering volgens NEN-EN-ISO 22476-1
Sondeerklasse
Conusnummer: I-CFXY-10

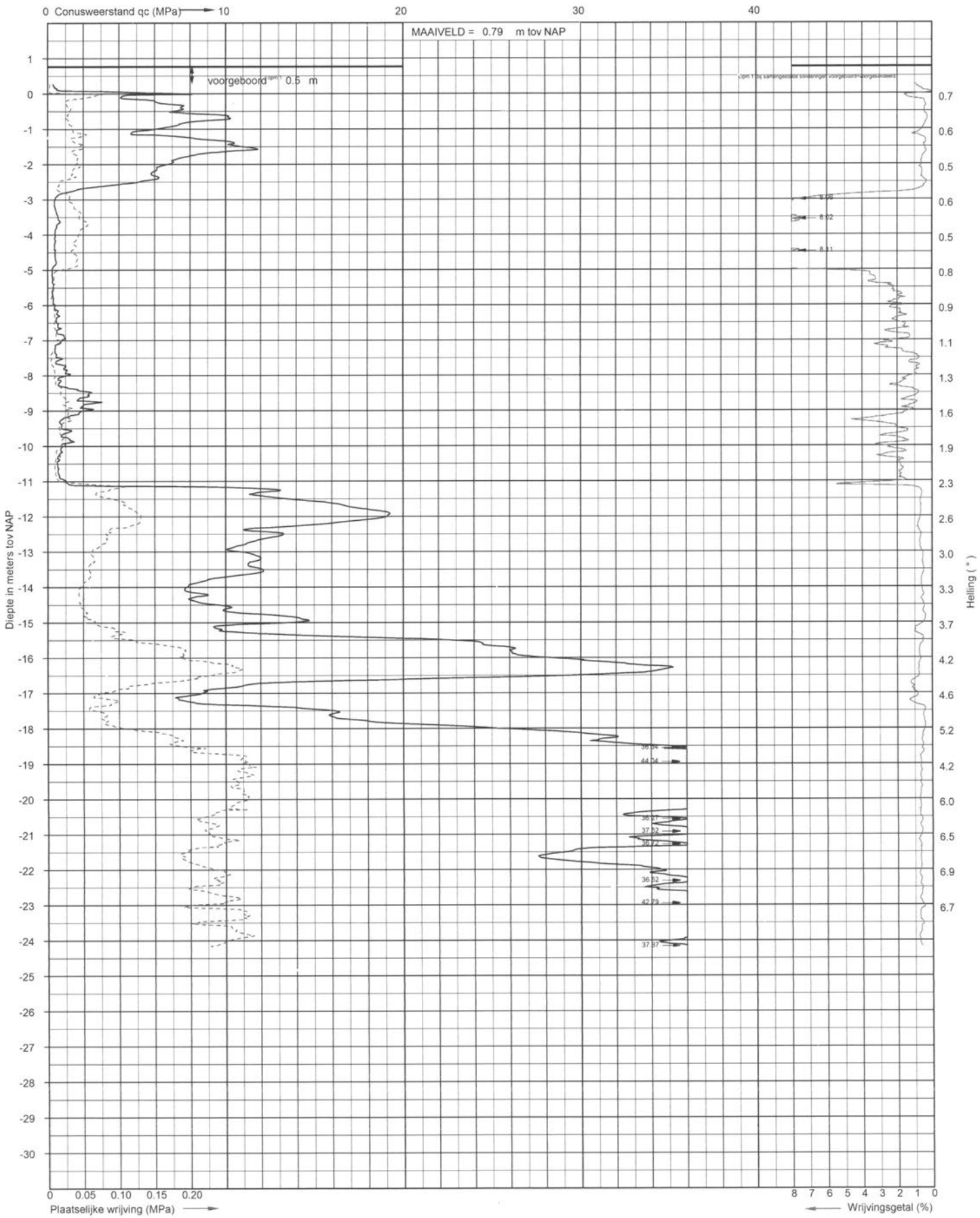
Uitvoerder: S9
Datum: 20-1-2018

X: 0.000
Y: 0.000

**Sondering**

INPIJN-BLOKPOEL Ingenieursbureau

Opdracht: 06P003913
Project: Geotechnisch onderzoek aan de Generaal Vetterstraat 76-78 te Amsterdam




Sondering volgens NEN-EN-ISO 22476-1
Sondeerklasse
Conusnummer: I-CFXY-10

Uitvoerder: S9
Datum: 20-1-2018

X: 118121.897
Y: 484051.978

**Sondering**

INPIJN-BLOKPOEL Ingenieursbureau

# Bijlage D

INPIJN-BLOKPOEL Ingenieursbureau
Mercuriusweg 18
2741 TA WADDINXVEEN

T 0182-610013
F 0182-626016
E west@inpijn-blokpoel.com

| oring | | oring o gen | | S | i i ie o gen |
|---|---|---|---|---|---|
| Uitvoering op: | 20-01-2018 | Maaiveldhoogte [m]: | 0,83 | N.A.P. | |
| Uitvoering door: | MEK | Grondwaterstand [cm-mv]: | 134 | | |
| Uitgevoerd nabij: | DKM-03 | | | | |



# Bijlage E

INPIJN-BLOKPOEL Ingenieursbureau
Mercuriusweg 18
2741 TA WADDINXVEEN

T 0182-610013
F 0182-626016
E west@inpijn-blokpoel.com

# VERKLARING CODERING BORINGEN
**(conform NEN 5104)**

### GRIND
- grind, siltig
- grind, zwak zandig
- grind, matig zandig
- grind, sterk zandig
- grind, uiterst zandig

### ZAND
- zand, kleiig
- zand, zwak siltig
- zand, matig siltig
- zand, sterk siltig
- zand, uiterst siltig

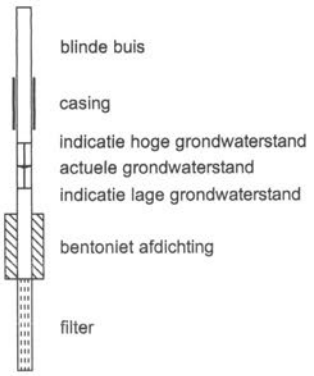
### VEEN
- veen, mineraalarm
- veen, zwak kleiig
- veen, sterk kleiig
- veen, zwak zandig
- veen, sterk zandig

### LEEM
- leem, zwak zandig
- leem, sterk zandig

### SLIB
- slib

### KLEI
- klei, zwak siltig
- klei, matig siltig
- klei, sterk siltig
- klei, uiterst siltig
- klei, zwak zandig
- klei, matig zandig
- klei, sterk zandig

### TOEVOEGINGEN
- zwak humeus
- matig humeus
- sterk humeus
- zwak grindig
- matig grindig
- sterk grindig

### PEILBUIS



### GRONDMONSTERS
- geroerd monster
- ongeroerd monster

### OVERIG
- bijzonder bestanddeel
- indicatie hoge grondwaterstand
- actuele grondwaterstand
- indicatie lage grondwaterstand

# LEGENDA TEKENINGEN

### SONDERINGEN
- D — Sondering met meting conusweerstand
- DKM — Diepsondering met plaatselijke kleef
- DKP — Sondering met waterspanning
- DKM — Seismische sondering
- DKM — Sondering met bolconus
- hM — Handsondering
- SD — Slagsondering
- Niet uitgevoerde sonderingen

### BORINGEN en PEILBUIZEN
- B — Boring
- B — Boring met peilbuis
- Niet uitgevoerde boring
- B — Boring eerdere fase

### MONITORING
- SCM-01 — Scheurmeter
- Deformatiebout
- Trillingsmeter
- PDP- — Plaatdrukproef
- ZB- — Zakbaak
- WSM- — Waterspanningsmeter
- HLM- — Hellingmeter

### ANDERE SYMBOLEN
- foto 1 — Positie en richting foto
- Meetpunt
- 0-punt lokaal assenstelsel

### KLEUR CODERING ONDERZOEKSFASE
- D- — Sondering Fase 02
- D- — Sondering Fase 03
- D- — Sondering Fase 04

## ADVISERING GEOTECHNIEK

Paalfundering
Fundering op staal

Bouwputontwerp
Bemaling
Grondkerende constructie
Taludstabiliteit

Bouwrijp maken terrein
Grondbalans
Drainage
Afkoppelen en infiltreren
Geo-hydrologische studie

Toezicht heiwerk

Funderingsrenovatie
Schade expertise

Pijpleidingen
Gestuurde boringen

Trillingsanalyse
Geluidsanalyse

## VELDWERK

Sonderen
Boren
Pompproeven
Peilbuizen

Landmeetkundig werk
Nauwkeurigheidswaterpassing
DGPS-metingen
Inmeten palenplan

Trillingsmeting
Geluidsmeting
Akoestische paalcontrole
Geo-monitoring

Heibegeleiding
Toezicht bouwputten

## LABORATORIUM

Classificatie proeven
Mechanische eigenschappen
Chemische analyse

## MILIEU-ONDERZOEK

Verkennend-, nader- en
saneringsonderzoek
Advisering
Projectbegeleiding
Akoestisch onderzoek
Partijkeuringen besluit bodemkwaliteit (Bbk)

**INPIJN-BLOKPOEL**
**ingenieursbureau**

**Ingenieursbureau Inpijn-Blokpoel West B.V.**
Mercuriusweg 18
2741 TA Waddinxveen
telefoon (0182) 61 00 13

e-mail west@inpijn-blokpoel.com

*Tevens vestigingen:*
Son, Hoofddorp en Groningen

www.inpijn-blokpoel.com

MGMT. SYS. RvA C 174

SGS

VCA CHECKLIST AANNEMERS

*Op de opdrachten voor het uitvoeren en rapporteren van technische werkzaamheden, zijn van toepassing de "A.L.U.W.-2015". Deze zijn gedeponeerd ter Griffie van de Arrondissementsrechtbank te 's-Hertogenbosch. Voor adviesopdrachten geldt de "D.N.R.-2005". Inschrijving Handelsregister K.v.K.nummer 17076128.*

# Bijlage 2 Berekening zwel

| | |
|---|---|
| **Sheet** | **Zwelbelasting - analytische berekening V001** |
| **Project** | Generaal Vetterstraat 78-B te Amsterdam |
| **Projectnummer** | 17499 |
| **Fase** | Fundex Groutinjectie 380/450 |
| **Onderdeel** | keldervloer |
| **Datum** | 1-3-2018 |
| **Opsteller** | hon |

**Berekening zwel agv ontgraving**
Berekend wordt: de primaire zwel in de loop der tijd (consolidatie) en de secundaire zwel in de loop der tijd. Aan de hand hiervan wordt de zweldruk bepaald die op zal bouwen na aanleg van een vloer op een bepaald moment.

De resterende zweldruk wordt berekend volgens analytische methoden uit CUR202; zwel op palen volgens slipmethode; zwel op vloer volgens Koppejan.

Uitgangspunten: Horizontaal oneindige ontgraving / Zwellende grondlagen worden gecombineerd tot één laag met gemiddelde cv;zwel.

CRUX

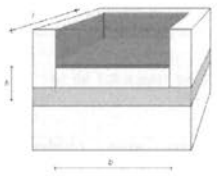
P:\17xx\17499 Duyts Advies Generaal Vetterstraat A' dam\04 REKEN\zet\[SH17499a1 Zwelbelasting - analytische berekening v001tj.xlsm]Fundex 380450

## 1. Invoer

### 1.1 Algemeen

| | | | |
|---|---|---|---|
| Veiligheidsklasse | RC 2 | | |
| $\gamma_{water}$ | 10 | [kN/m³] | |
| $t_{eind}$ | 10000 | [dagen] | periode voor bepaling eindzwel |
| $t_{zwel}$ | 30 | [dagen] | periode van vrije zwel; $t_{zwel} = \frac{1}{2} \times t_{ontgraven} + t_{aat} + t_{start}$ |
| $\eta$ | 1 | [-] | modelfactor afh. van geometrie, zie figuur |

$\gamma_{zwel;vloer}$ = 1,35 [-] partiële factor zweldruk op vloer
$\gamma_{zwel;paal}$ = 1,00 [-] partiële factor zweldruk enkele paal (alleenstaande paal, volledige slip)



1D als h << b; $\eta$ = 1
2D als l >> b; $\eta$ = 2
3D als b ≈ l; $\eta$ = 3

### 1.2 Initiële gegevens

| | | | |
|---|---|---|---|
| maaiveld | +0,85 | [NAP .. m] | |
| freatische GWS | -0,50 | [NAP .. m] | check PDF blz 60 |
| onderkant zwellende lagen | -12,00 | [NAP .. m] | |

### 1.3 Fasering

| Fase | ontgraven | aanbrengen palen | start bemalen | aanbrengen vloer | leegpompen kuip |
|---|---|---|---|---|---|
| Tijdstip [dagen] | 0 | 0 | 15 | 15 | 0 |

### 1.4 Ontgraving

| | | | |
|---|---|---|---|
| ontgravingsniveau | -2,60 | [NAP .. m] | |
| waterstand in ontgraving | -3,10 | [NAP .. m] | |
| extra belasting | 0,0 | [kPa] | |
| Rekenen met spreiding? | Nee | | spreiding conform Boussinesq |
| Breedte bouwkuip | 50,0 | [m] | |
| Onderzijde damwand | -12,00 | [NAP .. m] | voor grondlagen boven ok wand wordt geen spreiding meegenomen! |

$\Delta u$ = 26,0 [kPa] verandering waterspanning

### 1.5 Paalgegevens

| | | | |
|---|---|---|---|
| paaltype | in de grond gevormd | | |
| paalvorm | rond | | |
| diameter schacht | 0,42 | [m] | |
| hoh X-richting | 2,00 | [m] | |
| hoh Y-richting | 2,00 | [m] | |

factor $\delta$ / $\varphi$ = 1,00 [-]
O = 1,319 [m] schachtomtrek
$A_{stramien}$ = 4,00 [m²] stramienoppervlak

### 1.6 Grondprofiel

| laag | type | head [NAP .. m] | bk [NAP .. m] | $\gamma_d$ [kN/m³] | $\gamma_{sat}$ [kN/m³] | $\phi$ [°] | OCR [-] | $A_p$ [-] | $A_s$ [-] | cv [m²/s] | cv;zwel / cv [-] | cv;zwel [m²/s] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aanvullaag (zand) | Zand, n.c. | -0,50 | +0,85 | 18,10 | 18,10 | 28,0 | 1,0 | 823 | 3854 | 0,100 | 8,0 | 0,800 |
| Hollandveen | Veen, n.c. | -0,50 | -2,60 | 10,50 | 10,50 | 17,0 | 1,0 | 183 | 559 | 8,00E-07 | 8,0 | 6,40E-06 |
| Oude Zeeklei | Klei, n.c. | -0,50 | -5,40 | 16,20 | 16,20 | 26,0 | 1,0 | 565 | 2379 | 6,00E-07 | 8,0 | 4,80E-06 |
| Oude Zeeklei | Klei, n.c. | -0,50 | -7,20 | 16,20 | 16,20 | 26,0 | 1,0 | 565 | 2379 | 6,00E-07 | 8,0 | 4,80E-06 |
| Wadzand | Zand, n.c. | -0,50 | -9,00 | 17,90 | 17,90 | 27,0 | 1,0 | 396 | 1832 | 1,00E-04 | 4,0 | 4,00E-04 |
| Hydrobiaklei | Klei, n.c. | 99 | -10,00 | 15,20 | 15,20 | 26,0 | 1,0 | 464 | 1845 | 1,00E-06 | 8,0 | 8,00E-06 |
| Basisveen | Veen, n.c. | 99 | -11,00 | 11,70 | 11,70 | 18,0 | 1,0 | 232 | 758 | 2,00E-08 | 8,0 | 1,60E-07 |
| 1ste zandlaag | Zand, n.c. | -3,10 | -12,00 | 17,70 | 19,70 | 32,0 | 1,0 | 1130 | 5786 | 1,00E-04 | 8,0 | 8,00E-04 |
| 2e zandlaag | Zand, n.c. | -3,10 | -17,00 | 16,90 | 18,90 | 33,0 | 1,0 | 965 | 4722 | 1,00E-04 | 8,0 | 8,00E-04 |

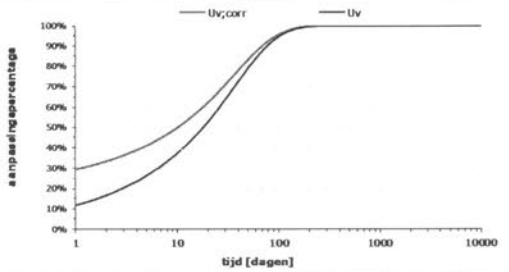
bij head 99 invullen voor interpolatie over de betreffende grondlaag

legen cellen grondlagen [weergeven] [+] legen cellen grondlagen weergeven

## 2. Numerieke uitvoer

**ALGEMEEN**

| | | | |
|---|---|---|---|
| $\sigma'_{v;ontgniv}$ = | 41,4 | [kPa] | initiële korrelspanning op ontgravingsniveau |
| $\Delta p'$ = | -41,4 | [kPa] | delta P waarmee gerekend wordt om zwel te bepalen |
| afstromen = | 2 | -zijdig | |
| $d_{zwel}$ = | 9,40 | [m] | dikte zwellende grondlagen |
| h = | 4,70 | [m] | afstroomlengte (2-zijdige afstromen) |
| $c_{v;zwel;eq}$ = | 2,765E-06 | [m²/s] | |
| U(0) = | 20 | [%] | directe aanpassing |




**VRIJE ZWEL OP PAAL EN WAND (slipmethode)**
- bovengrens slipmethode, alleenstaande paal met volledige slip
- aanpassing U = 0%

**ONTGRAVEN GRONDPROFIEL**

| laag | bk [NAP .. m] | ok [NAP .. m] | dikte [m] | $\phi$ [°] | OCR [-] | $K_0$ [-] | $\sigma'_{v;mid;init.}$ [kPa] | $\sigma'_{v;mid;ontgr.}$ [kPa] | $\delta$ [°] | $K_0 \times \tan(\delta)$ [-] | $F_{zwel;repd}$ [kN] | $\Sigma F_{zwel;rep}$ [kN] | $\Sigma F_{zwel;rep;red}$ [%] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hollandveen | -2,60 | -5,40 | 2,80 | 17,0 | 1,0 | 0,71 | 42,1 | 0,7 | 17,0 | 2,72 | 7,0 | 7 | 7 |
| Oude Zeeklei | -5,40 | -7,20 | 1,80 | 26,0 | 1,0 | 0,56 | 48,4 | 7,0 | 26,0 | 0,92 | 15,3 | 22 | 22 |
| Oude Zeeklei | -7,20 | -9,00 | 1,80 | 26,0 | 1,0 | 0,56 | 59,6 | 18,1 | 26,0 | 0,63 | 27,3 | 50 | 42 |
| Wadzand | -9,00 | -10,00 | 1,00 | 27,0 | 1,0 | 0,55 | 69,1 | 27,7 | 27,0 | 0,55 | 20,2 | 70 | 51 |
| Hydrobiaklei | -10,00 | -11,00 | 1,00 | 26,0 | 1,0 | 0,56 | 82,2 | 40,7 | 26,0 | 0,50 | 26,7 | 97 | 58 |
| Basisveen | -11,00 | -12,00 | 1,00 | 18,0 | 1,0 | 0,69 | 98,6 | 57,2 | 18,0 | 0,46 | 34,7 | 131 | 63 |

| | | | | | | |
|---|---|---|---|---|---|---|
| $F_{zwel;rep}$ = | 131 | [kN] | representatieve zwelbelasting ... | $F_{zwel;rep}$ = | 63 | [kN] | representatieve zwelbelasting incl. reductie |
| $F_{zwel;d}$ = | 131 | [kN] | rekenwaarde zwelbelasting | $F_{zwel;d}$ = | 63 | [kN] | rekenwaarde zwelbelasting incl. reductie |

| | |
|---|---|
| **Sheet** | **Zwelbelasting - analytische berekening V001** |
| **Project** | Generaal Vetterstraat 78-B te Amsterdam |
| **Projectnummer** | 17499 |
| **Fase** | Fundex Groutinjectie 460/560 |
| **Onderdeel** | keldervloer |
| **Datum** | 1-3-2018 |
| **Opsteller** | hon |

**Berekening zwel agv ontgraving**
Berekend wordt: de primaire zwel in de loop der tijd (consolidatie) en de secundaire zwel in de loop der tijd. Aan de hand hiervan wordt de zweldruk bepaald die op zal bouwen na aanleg van een vloer op een bepaald moment.

De resterende zweldruk wordt berekend volgens analytische methoden uit CUR202; zwel op palen volgens slipmethode; zwel op vloer volgens Koppejan.

Uitgangspunten: Horizontaal oneindige ontgraving / Zwellende grondlagen worden gecombineerd tot één laag met gemiddelde cv;zwel.

CRUX

P:\V\to\V499 Duyts Advies Generaal Vetterstraat A'dam\04 REK\Excel\[SH V499a1Zwelbelasting - analytische berekening v001tjs.xlsm]Fu Ok 460560

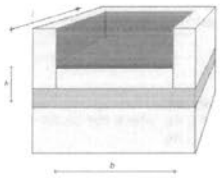
## 1. Invoer

### 1.1 Algemeen

| | | | |
|---|---|---|---|
| Veiligheidsklasse | RC 2 | | |
| $\gamma_{water}$ | 10 | [kN/m³] | |
| $t_{eind}$ | 10000 | [dagen] | periode voor bepaling eindzwel |
| $t_{zwel}$ | 30 | [dagen] | periode van vrije zwel; $t_{zwel} = \frac{1}{2} \times t_{ontgraven} + t_{aan} + t_{stort}$ |
| $\eta$ | 1 | [-] | modelfactor afh. van geometrie, zie figuur |

$\gamma_{zwel;vloer}$ = 1,35 [-] partiële factor zweldruk op vloer

$\gamma_{zwel;paal}$ = 1,00 [-] partiële factor zweldruk enkele paal (alleenstaande paal, volledige slip)



1D als h << b; $\eta$ = 1
2D als l >> b; $\eta$ = 2
3D als b ≈ l; $\eta$ = 3

### 1.2 Initiële gegevens

| | | |
|---|---|---|
| maaiveld | +0,85 | [NAP .. m] |
| freatische GWS | -0,50 | [NAP .. m] check PDF blz 60 |
| onderkant zwellende lagen | -12,00 | [NAP .. m] |

### 1.3 Fasering

| Fase | ontgraven | aanbrengen palen | start bemalen | aanbrengen vloer | leegpompen kuip |
|---|---|---|---|---|---|
| Tijdstip [dagen] | 0 | 0 | 15 | 15 | 0 |

### 1.4 Ontgraving

| | | |
|---|---|---|
| ontgravingsniveau | -2,60 | [NAP .. m] |
| waterstand in ontgraving | -3,10 | [NAP .. m] |
| extra belasting | 0,0 | [kPa] |

$\Delta u$ = 26,0 [kPa] verandering waterspanning

| | | |
|---|---|---|
| Rekenen met spreiding? | Nee | spreiding conform Boussinesq |
| Breedte bouwkuip | 50,0 | [m] |
| Onderzijde damwand | -12,00 | [NAP .. m] voor grondlagen boven ok wand wordt geen spreiding meegenomen! |

### 1.5 Paalgegevens

| | | |
|---|---|---|
| paaltype | in de grond gevormd | |
| paalvorm | rond | |
| diameter schacht | 0,51 | [m] |
| hoh X-richting | 2,00 | [m] |
| hoh Y-richting | 2,00 | [m] |

factor $\delta$ / $\varphi$ = 1,00 [-]

O = 1,602 [m] schachtomtrek

$A_{stramien}$ = 4,00 [m²] stramienoppervlak

### 1.6 Grondprofiel

| laag | type | head [NAP .. m] | bk [NAP .. m] | $\gamma_d$ [kN/m³] | $\gamma_{sat}$ [kN/m³] | $\phi$ [°] | OCR [-] | $A_p$ [-] | $A_s$ [-] | Cv [m²/s] | Cv;zwel / Cv [-] | Cv;zwel [m²/s] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aanvullaag (zand) | Zand, n.c. | -0,50 | +0,85 | 18,10 | 18,10 | 28,0 | 1,0 | 823 | 3854 | 0,100 | 8,0 | 0,800 |
| Hollandveen | Veen, n.c. | -0,50 | -2,60 | 10,50 | 10,50 | 17,0 | 1,0 | 183 | 559 | 8,00E-07 | 8,0 | 6,40E-06 |
| Oude Zeeklei | Klei, n.c. | -0,50 | -5,40 | 16,20 | 16,20 | 26,0 | 1,0 | 565 | 2379 | 6,00E-07 | 8,0 | 4,80E-06 |
| Oude Zeeklei | Klei, n.c. | -0,50 | -7,20 | 16,20 | 16,20 | 26,0 | 1,0 | 565 | 2379 | 6,00E-07 | 8,0 | 4,80E-06 |
| Wadzand | Zand, n.c. | -0,50 | -9,00 | 17,90 | 17,90 | 27,0 | 1,0 | 396 | 1832 | 1,00E-04 | 4,0 | 4,00E-04 |
| Hydrobiaklei | Klei, n.c. | 99 | -10,00 | 15,20 | 15,20 | 26,0 | 1,0 | 464 | 1845 | 1,00E-06 | 8,0 | 8,00E-06 |
| Basisveen | Veen, n.c. | 99 | -11,00 | 11,70 | 11,70 | 18,0 | 1,0 | 232 | 758 | 2,00E-08 | 8,0 | 1,60E-07 |
| 1ste zandlaag | Zand, n.c. | -3,10 | -12,00 | 17,70 | 19,70 | 32,0 | 1,0 | 1130 | 5786 | 1,00E-04 | 8,0 | 8,00E-04 |
| 2e zandlaag | Zand, n.c. | -3,10 | -17,00 | 16,90 | 18,90 | 33,0 | 1,0 | 965 | 4722 | 1,00E-04 | 8,0 | 8,00E-04 |

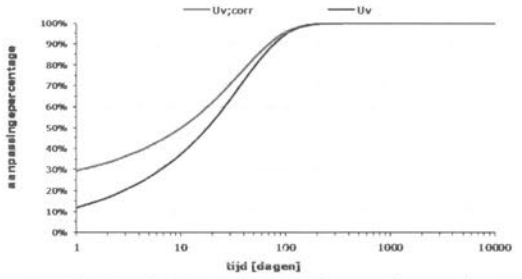
bij head 99 invullen voor interpolatie over de betreffende grondlaag

legen cellen grondlagen weergeven [+] legen cellen grondlagen weergeven

## 2. Numerieke uitvoer

### ALGEMEEN

| | | | |
|---|---|---|---|
| $\sigma'_{v;ontgniv}$ = | 41,4 | [kPa] | initiële korrelspanning op ontgravingsniveau |
| $\Delta p'$ = | -41,4 | [kPa] | delta P waarmee gerekend wordt om zwel te bepalen |
| afstromen = | 2 | -zijdig | |
| $d_{zwel}$ = | 9,40 | [m] | dikte zwellende grondlagen |
| h = | 4,70 | [m] | afstroomlengte (2-zijdige afstromen) |
| $C_{v;zwel;eq}$ = | 2,765E-06 | [m²/s] | |
| U(0) = | 20 | [%] | directe aanpassing |




### VRIJE ZWEL OP PAAL EN WAND (slipmethode)

- bovengrens slipmethode, alleenstaande paal met volledige slip
- aanpassing U = 0%

### ONTGRAVEN GRONDPROFIEL

| laag | bk [NAP .. m] | ok [NAP .. m] | dikte [m] | $\phi$ [°] | OCR [-] | $K_0$ [-] | $\sigma'_{v;mid;init.}$ [kPa] | $\sigma'_{v;mid;ontgr.}$ [kPa] | $\delta$ [°] | $K_0 \times \tan(\delta)$ [-] | $F_{zwel;rep;i}$ [kN] | $\Sigma F_{zwel;rep}$ [kN] | $\Sigma F_{zwel;rep;red}$ [%] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hollandveen | -2,60 | -5,40 | 2,80 | 17,0 | 1,0 | 0,71 | 42,1 | 0,7 | 17,0 | 2,72 | 8,5 | 9 | 9 |
| Oude Zeeklei | -5,40 | -7,20 | 1,80 | 26,0 | 1,0 | 0,56 | 48,4 | 7,0 | 26,0 | 0,92 | 18,6 | 27 | 27 |
| Oude Zeeklei | -7,20 | -9,00 | 1,80 | 26,0 | 1,0 | 0,56 | 59,6 | 18,1 | 26,0 | 0,63 | 33,2 | 60 | 51 |
| Wadzand | -9,00 | -10,00 | 1,00 | 27,0 | 1,0 | 0,55 | 69,1 | 27,7 | 27,0 | 0,55 | 24,5 | 85 | 62 |
| Hydrobiaklei | -10,00 | -11,00 | 1,00 | 26,0 | 1,0 | 0,56 | 82,2 | 40,7 | 26,0 | 0,50 | 32,4 | 117 | 71 |
| Basisveen | -11,00 | -12,00 | 1,00 | 18,0 | 1,0 | 0,69 | 98,6 | 57,2 | 18,0 | 0,46 | 42,1 | 159 | 76 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

| | | | | | | |
|---|---|---|---|---|---|---|
| $F_{zwel;rep}$ = | 159 | [kN] | representatieve zwelbelasting ... | $F_{zwel;rep}$ = | 76 | [kN] representatieve zwelbelasting incl. reductie |
| $F_{zwel;d}$ = | 159 | [kN] | rekenwaarde zwelbelasting | $F_{zwel;d}$ = | 76 | [kN] rekenwaarde zwelbelasting incl. reductie |

| | |
|---|---|
| **Sheet** | **Zwelbelasting - analytische berekening V001** |
| **Project** | Generaal Vetterstraat 78-B te Amsterdam |
| **Projectnummer** | 17499 |
| **Fase** | DPA 410 |
| **Onderdeel** | keldervloer |
| **Datum** | 1-3-2018 |
| **Opsteller** | hon |

**Berekening zwel agv ontgraving**
Berekend wordt: de primaire zwel in de loop der tijd (consolidatie) en de secundaire zwel in de loop der tijd. Aan de hand hiervan wordt de zweldruk bepaald die op zal bouwen na aanleg van een vloer op een bepaald moment.

De resterende zweldruk wordt berekend volgens analytische methoden uit CUR202; zwel op palen volgens slipmethode; zwel op vloer volgens Koppejan.

Uitgangspunten: Horizontaal oneindige ontgraving / Zwellende grondlagen worden gecombineerd tot één laag met gemiddelde cv;zwel.

CRUX

P:\Wtx\V400 Duyts Advies Generaal Vetterstraat A'dam\04 REK\Excel\[SH V400ut Zwelbelasting - analytische berekening v001tjt.xlsm]DPA 410

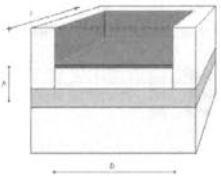
## 1. Invoer

### 1.1 Algemeen

| | | | |
|---|---|---|---|
| Veiligheidsklasse | RC 2 | | |
| $\gamma_{water}$ | 10 | [kN/m³] | |
| $t_{eind}$ | 10000 | [dagen] | periode voor bepaling eindzwel |
| $t_{zwel}$ | 30 | [dagen] | periode van vrije zwel; $t_{zwel} = \frac{1}{2} \times t_{ontgraven} + t_{mat} + t_{stort}$ |
| $\eta$ | 1 | [-] | modelfactor afh. van geometrie, zie figuur |

$\gamma_{zwel;vloer}$ = 1,35 [-] partiële factor zweldruk op vloer

$\gamma_{zwel;paal}$ = 1,00 [-] partiële factor zweldruk enkele paal (alleenstaande paal, volledige slip)



1D als h << b; η = 1
2D als l >> b; η = 2
3D als b ≈ l; η = 3

### 1.2 Initiële gegevens

| | | | |
|---|---|---|---|
| maaiveld | +0,85 | [NAP .. m] | |
| freatische GWS | -0,50 | [NAP .. m] | check PDF blz 60 |
| onderkant zwellende lagen | -12,00 | [NAP .. m] | |

### 1.3 Fasering

| Fase | ontgraven | aanbrengen palen | start bemalen | aanbrengen vloer | leegpompen kuip |
|---|---|---|---|---|---|
| Tijdstip [dagen] | 0 | 0 | 15 | 15 | 0 |

### 1.4 Ontgraving

| | | | |
|---|---|---|---|
| ontgravingsniveau | -2,60 | [NAP .. m] | |
| waterstand in ontgraving | -3,10 | [NAP .. m] | |
| extra belasting | 0,0 | [kPa] | |
| Rekenen met spreiding? | Nee | | spreiding conform Boussinesq |
| Breedte bouwkuip | 50,0 | [m] | |
| Onderzijde damwand | -12,00 | [NAP .. m] | voor grondlagen boven ok wand wordt geen spreiding meegenomen! |

Δu = 26,0 [kPa] verandering waterspanning

### 1.5 Paalgegevens

| | | | |
|---|---|---|---|
| paaltype | in de grond gevormd | | |
| paalvorm | rond | | |
| diameter schacht | 0,41 | [m] | |
| hoh X-richting | 2,00 | [m] | |
| hoh Y-richting | 2,00 | [m] | |

factor δ / φ = 1,00 [-]

O = 1,288 [m] schachtomtrek

$A_{stramien}$ = 4,00 [m²] stramienoppervlak

### 1.6 Grondprofiel

| laag | type | head [NAP .. m] | bk [NAP .. m] | $\gamma_d$ [kN/m³] | $\gamma_{sat}$ [kN/m³] | φ [°] | OCR [-] | $A_p$ [-] | $A_s$ [-] | Cv [m²/s] | Cv;zwel / Cv [-] | Cv;zwel [m²/s] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aanvullaag (zand) | Zand, n.c. | -0,50 | +0,85 | 18,10 | 18,10 | 28,0 | 1,0 | 823 | 3854 | 0,100 | 8,0 | 0,800 |
| Hollandveen | Veen, n.c. | -0,50 | -2,60 | 10,50 | 10,50 | 17,0 | 1,0 | 183 | 559 | 8,00E-07 | 8,0 | 6,40E-06 |
| Oude Zeeklei | Klei, n.c. | -0,50 | -5,40 | 16,20 | 16,20 | 26,0 | 1,0 | 565 | 2379 | 6,00E-07 | 8,0 | 4,80E-06 |
| Oude Zeeklei | Klei, n.c. | -0,50 | -7,20 | 16,20 | 16,20 | 26,0 | 1,0 | 565 | 2379 | 6,00E-07 | 8,0 | 4,80E-06 |
| Wadzand | Zand, n.c. | -0,50 | -9,00 | 17,90 | 17,90 | 27,0 | 1,0 | 396 | 1832 | 1,00E-04 | 4,0 | 4,00E-04 |
| Hydrobiaklei | Klei, n.c. | 99 | -10,00 | 15,20 | 15,20 | 26,0 | 1,0 | 464 | 1845 | 1,00E-06 | 8,0 | 8,00E-06 |
| Basisveen | Veen, n.c. | 99 | -11,00 | 11,70 | 11,70 | 18,0 | 1,0 | 232 | 758 | 2,00E-08 | 8,0 | 1,60E-07 |
| 1ste zandlaag | Zand, n.c. | -3,10 | -12,00 | 17,70 | 19,70 | 32,0 | 1,0 | 1130 | 5786 | 1,00E-04 | 8,0 | 8,00E-04 |
| 2e zandlaag | Zand, n.c. | -3,10 | -17,00 | 16,90 | 18,90 | 33,0 | 1,0 | 965 | 4722 | 1,00E-04 | 8,0 | 8,00E-04 |

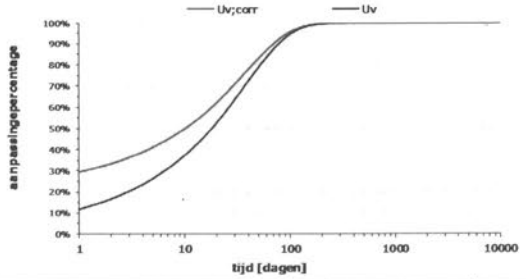
bij head 99 invullen voor interpolatie over de betreffende grondlaag

legen cellen grondlagen weergeven [+] legen cellen grondlagen weergeven

## 2. Numerieke uitvoer

**ALGEMEEN**

| | | | |
|---|---|---|---|
| $\sigma'_{v;ontgniv}$ = | 41,4 | [kPa] | initiële korrelspanning op ontgravingsniveau |
| Δp' = | -41,4 | [kPa] | delta P waarmee gerekend wordt om zwel te bepalen |
| afstromen = | 2 | -zijdig | |
| $d_{zwel}$ = | 9,40 | [m] | dikte zwellende grondlagen |
| h = | 4,70 | [m] | afstroomlengte (2-zijdige afstromen) |
| $c_{v;zwel;eq}$ = | 2,765E-06 | [m²/s] | |
| U(0) = | 20 | [%] | directe aanpassing |




**VRIJE ZWEL OP PAAL EN WAND (slipmethode)**
- bovengrens slipmethode, alleenstaande paal met volledige slip
- aanpassing U = 0%

**ONTGRAVEN GRONDPROFIEL**

| laag | bk [NAP .. m] | ok [NAP .. m] | dikte [m] | φ [°] | OCR [-] | $K_0$ [-] | $\sigma'_{v;mid;init.}$ [kPa] | $\sigma'_{v;mid;ontgr.}$ [kPa] | δ [°] | $K_0$ x tan(δ) [-] | $F_{zwel;rep;i}$ [kN] | $\Sigma F_{zwel;rep}$ [kN] | $\Sigma F_{zwel;rep;red}$ [%] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hollandveen | -2,60 | -5,40 | 2,80 | 17,0 | 1,0 | 0,71 | 42,1 | 0,7 | 17,0 | 2,72 | 6,9 | 7 | 7 |
| Oude Zeeklei | -5,40 | -7,20 | 1,80 | 26,0 | 1,0 | 0,56 | 48,4 | 7,0 | 26,0 | 0,92 | 14,9 | 22 | 22 |
| Oude Zeeklei | -7,20 | -9,00 | 1,80 | 26,0 | 1,0 | 0,56 | 59,6 | 18,1 | 26,0 | 0,63 | 26,7 | 48 | 41 |
| Wadzand | -9,00 | -10,00 | 1,00 | 27,0 | 1,0 | 0,55 | 69,1 | 27,7 | 27,0 | 0,55 | 19,7 | 68 | 50 |
| Hydrobiaklei | -10,00 | -11,00 | 1,00 | 26,0 | 1,0 | 0,56 | 82,2 | 40,7 | 26,0 | 0,50 | 26,1 | 94 | 57 |
| Basisveen | -11,00 | -12,00 | 1,00 | 18,0 | 1,0 | 0,69 | 98,6 | 57,2 | 18,0 | 0,46 | 33,8 | 128 | 61 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

$F_{zwel;rep}$ = 128 [kN] representatieve zwelbelasting ...
$F_{zwel;d}$ = 128 [kN] rekenwaarde zwelbelasting

$F_{zwel;rep}$ = 61 [kN] representatieve zwelbelasting incl. reductie
$F_{zwel;d}$ = 61 [kN] rekenwaarde zwelbelasting incl. reductie

| | |
|---|---|
| **Sheet** | **Zwelbelasting - analytische berekening V001** |
| **Project** | Generaal Vetterstraat 78-B te Amsterdam |
| **Projectnummer** | 17499 |
| **Fase** | DPA 460 |
| **Onderdeel** | keldervloer |
| **Datum** | 1-3-2018 |
| **Opsteller** | hon |

**Berekening zwel agv ontgraving**
Berekend wordt: de primaire zwel in de loop der tijd (consolidatie) en de secundaire zwel in de loop der tijd. Aan de hand hiervan wordt de zweldruk bepaald die op zal bouwen na aanleg van een vloer op een bepaald moment.

De resterende zweldruk wordt berekend volgens analytische methoden uit CUR202; zwel op palen volgens slipmethode; zwel op vloer volgens Koppejan.

Uitgangspunten: Horizontaal oneindige ontgraving / Zwellende grondlagen worden gecombineerd tot één laag met gemiddelde cv;zwel.

CRUX

P:\Projecten\17499 Duijts Advies Generaal Vetterstraat A'dam\04 RENOExcel\[SH 17499a1Zwelbelasting - analytische berekening v001tjd.xlsm]DPA 460

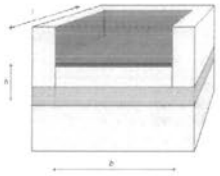
## 1. Invoer

### 1.1 Algemeen

| | | | |
|---|---|---|---|
| Veiligheidsklasse | RC 2 | | |
| $\gamma_{water}$ | 10 | [kN/m³] | |
| $t_{eind}$ | 10000 | [dagen] | periode voor bepaling eindzwel |
| $t_{zwel}$ | 30 | [dagen] | periode van vrije zwel; $t_{zwel} = \frac{1}{2} \times t_{ontgraven} + t_{wal} + t_{stat}$ |
| $\eta$ | 1 | [-] | modelfactor afh. van geometrie, zie figuur |

$\gamma_{zwel;vloer}$ = 1,35 [-] partiële factor zweldruk op vloer

$\gamma_{zwel;paal}$ = 1,00 [-] partiële factor zweldruk enkele paal (alleenstaande paal, volledige slip)



1D als h << b; $\eta$ = 1
2D als l >> b; $\eta$ = 2
3D als b ≈ l; $\eta$ = 3

### 1.2 Initiële gegevens

| | | | |
|---|---|---|---|
| maaiveld | +0,85 | [NAP .. m] | |
| freatische GWS | -0,50 | [NAP .. m] | check PDF blz 60 |
| onderkant zwellende lagen | -12,00 | [NAP .. m] | |

### 1.3 Fasering

| Fase | ontgraven | aanbrengen palen | start bemalen | aanbrengen vloer | leegpompen kuip |
|---|---|---|---|---|---|
| Tijdstip [dagen] | 0 | 0 | 15 | 15 | 0 |

### 1.4 Ontgraving

| | | | |
|---|---|---|---|
| ontgravingsniveau | -2,60 | [NAP .. m] | |
| waterstand in ontgraving | -3,10 | [NAP .. m] | |
| extra belasting | 0,0 | [kPa] | |
| Rekenen met spreiding? | Nee | | spreiding conform Boussinesq |
| Breedte bouwkuip | 50,0 | [m] | |
| Onderzijde damwand | -12,00 | [NAP .. m] | voor grondlagen boven ok wand wordt geen spreiding meegenomen! |

$\Delta u$ = 26,0 [kPa] verandering waterspanning

### 1.5 Paalgegevens

| | | | |
|---|---|---|---|
| paaltype | in de grond gevormd | | |
| paalvorm | rond | | |
| diameter schacht | 0,46 | [m] | |
| hoh X-richting | 2,00 | [m] | |
| hoh Y-richting | 2,00 | [m] | |

factor $\delta$ / $\varphi$ = 1,00 [-]

O = 1,445 [m] schachtomtrek

$A_{stramien}$ = 4,00 [m²] stramienoppervlak

### 1.6 Grondprofiel

| laag | type | head [NAP .. m] | bk [NAP .. m] | $\gamma_d$ [kN/m³] | $\gamma_{sat}$ [kN/m³] | $\phi$ [°] | OCR [-] | $A_p$ [-] | $A_s$ [-] | Cv [m²/s] | Cv;zwel / Cv [-] | Cv;zwel [m²/s] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aanvullaag (zand) | Zand, n.c. | -0,50 | +0,85 | 18,10 | 18,10 | 28,0 | 1,0 | 823 | 3854 | 0,100 | 8,0 | 0,800 |
| Hollandveen | Veen, n.c. | -0,50 | -2,60 | 10,50 | 10,50 | 17,0 | 1,0 | 183 | 559 | 8,00E-07 | 8,0 | 6,40E-06 |
| Oude Zeeklei | Klei, n.c. | -0,50 | -5,40 | 16,20 | 16,20 | 26,0 | 1,0 | 565 | 2379 | 6,00E-07 | 8,0 | 4,80E-06 |
| Oude Zeeklei | Klei, n.c. | -0,50 | -7,20 | 16,20 | 16,20 | 26,0 | 1,0 | 565 | 2379 | 6,00E-07 | 8,0 | 4,80E-06 |
| Wadzand | Zand, n.c. | -0,50 | -9,00 | 17,90 | 17,90 | 27,0 | 1,0 | 396 | 1832 | 1,00E-04 | 4,0 | 4,00E-04 |
| Hydrobiaklei | Klei, n.c. | 99 | -10,00 | 15,20 | 15,20 | 26,0 | 1,0 | 464 | 1845 | 1,00E-06 | 8,0 | 8,00E-06 |
| Basisveen | Veen, n.c. | 99 | -11,00 | 11,70 | 11,70 | 18,0 | 1,0 | 232 | 758 | 2,00E-08 | 8,0 | 1,60E-07 |
| 1ste zandlaag | Zand, n.c. | -3,10 | -12,00 | 17,70 | 19,70 | 32,0 | 1,0 | 1130 | 5786 | 1,00E-04 | 8,0 | 8,00E-04 |
| 2e zandlaag | Zand, n.c. | -3,10 | -17,00 | 16,90 | 18,90 | 33,0 | 1,0 | 965 | 4722 | 1,00E-04 | 8,0 | 8,00E-04 |

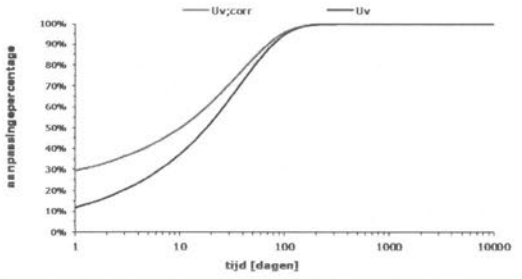
bij head 99 invullen voor interpolatie over de betreffende grondlaag

legen cellen grondlagen [weergeven] [+] legen cellen grondlagen weergeven

## 2. Numerieke uitvoer

### ALGEMEEN

| | | | |
|---|---|---|---|
| $\sigma'_{v;ontgniv}$ = | 41,4 | [kPa] | initiële korrelspanning op ontgravingsniveau |
| $\Delta p'$ = | -41,4 | [kPa] | delta P waarmee gerekend wordt om zwel te bepalen |
| afstromen = | 2 | -zijdig | |
| $d_{zwel}$ = | 9,40 | [m] | dikte zwellende grondlagen |
| h = | 4,70 | [m] | afstroomlengte (2-zijdige afstromen) |
| $C_{v;zwel;eq}$ = | 2,765E-06 | [m²/s] | |
| U(0) = | 20 | [%] | directe aanpassing |




### VRIJE ZWEL OP PAAL EN WAND (slipmethode)

- bovengrens slipmethode, alleenstaande paal met volledige slip
- aanpassing U = 0%

### ONTGRAVEN GRONDPROFIEL

| laag | bk [NAP .. m] | ok [NAP .. m] | dikte [m] | $\phi$ [°] | OCR [-] | $K_0$ [-] | $\sigma'_{v;mid;init.}$ [kPa] | $\sigma'_{v;mid;ontgr.}$ [kPa] | $\delta$ [°] | $K_0$ x tan($\delta$) [-] | $F_{zwel;rep;i}$ [kN] | $\Sigma F_{zwel;rep}$ [kN] | $\Sigma F_{zwel;rep;red}$ [%] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hollandveen | -2,60 | -5,40 | 2,80 | 17,0 | 1,0 | 0,71 | 42,1 | 0,7 | 17,0 | 2,72 | 7,7 | 8 | 8 |
| Oude Zeeklei | -5,40 | -7,20 | 1,80 | 26,0 | 1,0 | 0,56 | 48,4 | 7,0 | 26,0 | 0,92 | 16,7 | 24 | 24 |
| Oude Zeeklei | -7,20 | -9,00 | 1,80 | 26,0 | 1,0 | 0,56 | 59,6 | 18,1 | 26,0 | 0,63 | 29,9 | 54 | 46 |
| Wadzand | -9,00 | -10,00 | 1,00 | 27,0 | 1,0 | 0,55 | 69,1 | 27,7 | 27,0 | 0,55 | 22,1 | 76 | 56 |
| Hydrobiaklei | -10,00 | -11,00 | 1,00 | 26,0 | 1,0 | 0,56 | 82,2 | 40,7 | 26,0 | 0,50 | 29,3 | 106 | 64 |
| Basisveen | -11,00 | -12,00 | 1,00 | 18,0 | 1,0 | 0,69 | 98,6 | 57,2 | 18,0 | 0,46 | 38,0 | 144 | 69 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

$F_{zwel;rep}$ = 144 [kN] representatieve zwelbelasting

$F_{zwel;d}$ = 144 [kN] rekenwaarde zwelbelasting

$F_{zwel;rep}$ = 69 [kN] representatieve zwelbelasting incl. reductie

$F_{zwel;d}$ = 69 [kN] rekenwaarde zwelbelasting incl. reductie

**ZWEL OP VLOER**

EINDZWEL (t = 10000d na ontgraven)

| laag | bk | ok | dikte | $A_p$ | $A_s$ | $c_{v;zwel}$ / $c_v$ | $c_{v;zwel}$ | $\sigma'_{v;mid;init}$ | $\Delta\sigma'_{v;mid;ontgr.}$ | $w_{zw;prim}$ | $w_{zw;sec}$ | $w_{z;totaal}$ | Reductie |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | [NAP .. m] | [NAP .. m] | [m] | [-] | [-] | [-] | [$m^2$/s] | [kPa] | [kPa] | [m] | [m] | [m] | [%] |
| Hollandveen | -2,60 | -5,40 | 2,80 | 183 | 559 | 8,0 | 6,40E-06 | 42,1 | -41,4 | -0,063 | -0,082 | -0,145 | |
| Oude Zeeklei | -5,40 | -7,20 | 1,80 | 565 | 2379 | 8,0 | 4,80E-06 | 48,4 | -41,4 | -0,006 | -0,006 | -0,012 | |
| Oude Zeeklei | -7,20 | -9,00 | 1,80 | 565 | 2379 | 8,0 | 4,80E-06 | 59,6 | -41,4 | -0,004 | -0,004 | -0,007 | 27,6 |
| Wadzand | -9,00 | -10,00 | 1,00 | 396 | 1832 | 4,0 | 4,00E-04 | 69,1 | -41,4 | -0,002 | -0,002 | -0,004 | 55,0 |
| Hydrobiaklei | -10,00 | -11,00 | 1,00 | 464 | 1845 | 8,0 | 8,00E-06 | 82,2 | -41,4 | -0,002 | -0,002 | -0,003 | 72,8 |
| Basisveen | -11,00 | -12,00 | 1,00 | 232 | 758 | 8,0 | 1,60E-07 | 98,6 | -41,4 | -0,002 | -0,003 | -0,005 | 86,9 |

***Ongehinderde eindzwel*** met U(0) = 20%

| $t_{hydro}$ | $U_{eind}$ | Σ $w_{primair}$ | Σ $w_{secundair}$ | Σ $w_{totaal}$ |
|---|---|---|---|---|
| [dagen] | [%] | [mm] | [mm] | [mm] |
| 185 | 100,0 | -79 | -98 | -177 |

met modelfactor η = 1

| $\sigma_{zwel;k}$ | γ | $\sigma_{zwel;d}$ |
|---|---|---|
| [kPa] | [-] | [kPa] |
| 41,4 | 1,35 | 56,0 |

***Opgetreden vrije zwel*** met U(0) = 20%

| tot t | $U_{v;corr}$ | $w_{primair}(t)$ | $w_{secundair}(t)$ | w(t) |
|---|---|---|---|---|
| [dagen] | [%] | [mm] | [mm] | [mm] |
| 30 | 70,9 | -56 | -36 | -92 |

met modelfactor η = 1

| $\sigma_{zwel;k}$ | γ | $\sigma_{zwel;d}$ |
|---|---|---|
| [kPa] | [-] | [kPa] |
| 29,4 | 1,35 | 39,7 |

***Opbouw zweldruk op vloer*** met U(0) = 20%

| vanaf t | $U_{v;corr;rest}$ | $w_{primair}(t)$ | $w_{secundair}(t)$ | w(t) |
|---|---|---|---|---|
| [dagen] | [%] | [mm] | [mm] | [mm] |
| 30 | 29,1 | -23 | -62 | -85 |

met modelfactor η = 1

| $\sigma_{zwel;k}$ | γ | $\sigma_{zwel;d}$ |
|---|---|---|
| [kPa] | [-] | [kPa] |
| 12,1 | 1,35 | 16,3 |

## Bijlage 3 Uitvoer D-Foundation druk

# Deformation

Design and Verification according to Eurocode 7 of Bearing/Tension Piles and Shallow Foundations
Developed by Deltares

| | |
|---|---|
| Company: | CRUX Engineering B.V. |
| Date of report: | 5-3-2018 |
| Time of report: | 13:58:25 |
| Date of calculation: | 5-3-2018 |
| Time of calculation: | 13:57:44 |
| Filename: | P:\..\04 REK\GEO\Paal\DFoua1 Drukdraagvermogen kelder -2,6 |
| Project identification: | |
| | D-Foundations DFoua1 Drukdraagvermogen kelder -2,6 |



## Contents


1 Table of Contents 2
2 Input Data 3
2.1 General Input Data 3
2.2 General Report Data 3
2.3 Application Area Model Bearing Piles 3
2.4 Superstructure 3
2.5 General CPT Data 3
2.5.1 View of CPT's in Foundation Plan 3
2.6 Soil Data 4
2.6.1 Soil Profile 3 4
2.6.2 Soil Profile 5 5
2.6.3 Soil Profile 6 6
2.6.4 Soil Profile 8 7
2.6.5 Soil Profile 9 9
2.7 Pile Types 10
2.7.1 Pile type : fundex 460-560 10
2.7.2 Pile type : fundex 380-450 10
2.7.3 Pile type : DPA 360 11
2.7.4 Pile type : DPA 410 11
2.7.5 Pile type : DPA 460 12
2.8 Foundation Plan 12
2.8.1 View of Foundation Plan 13
2.9 Excavation Data 13
2.10 Overruled Parameters 14
2.11 Model Options 14
2.12 Model Options 14
3 Bearing Piles (EC7-NL): Results of the Option Preliminary Design, Indication Bearing Capacity 15
3.1 Errors and Warnings 15
3.2 Remarks 15
3.3 Calculation Parameters 15
3.3.1 Pile Factors 15
3.3.2 Pile type : fundex 460-560 15
3.3.3 Pile type : DPA 410 16
3.3.4 Pile type : fundex 380-450 17
3.3.5 Pile type : DPA 460 17
3.4 Results Bearing Forces for Pile type : fundex 460-560 18
3.5 Results Bearing Forces for Pile type : DPA 410 19
3.6 Results Bearing Forces for Pile type : fundex 380-450 19
3.7 Results Bearing Forces for Pile type : DPA 460 20
3.8 Summary Net Bearing Capacity in kN 21

n

ener n

Model Bearing Piles (EC7-NL)

ener e or

Geotechnical consultant :
Design engineer superstructure :
Principal :
Title 1 :
Title 2 :
Title 3 : D-Foundations DFoua1 Drukdraagvermogen kelder -2,6
Number of project :
Location of project :

3 i ion re ode e ring ie

The verifications performed by the model BEARING PILES of D-FOUNDATIONS concern pile foundations on which axial static or quasi-static loads cause pressures in the piles. The calculations of pile forces and pile displacements are based on Cone Penetration Tests. Possible rise of (tension-)piles and horizontal displacements of piles and/or pile groups are not taken into account.

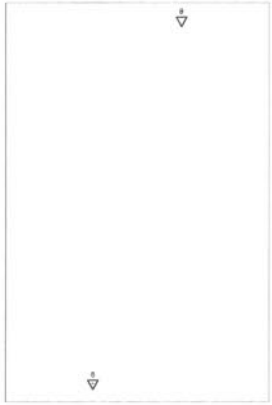
### 2.4 Superstructure

Rigidity of the superstructure : Non-Rigid

### 2.5 General CPT Data

Number of CPT's : 5
Timing of CPT's : CPT - Install - Excavation

#### 2.5.1 View of CPT's in Foundation Plan









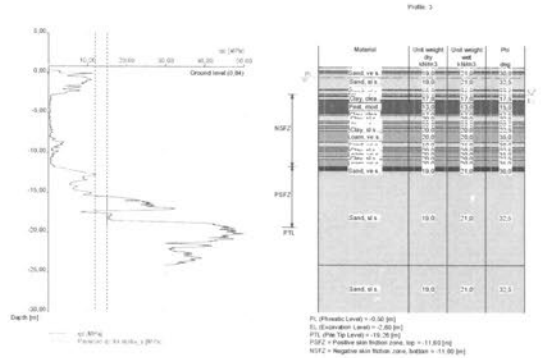

| Number/Name CPT | Pile tip level [m R.L.] | Top of pos. friction zone [m R.L.] | Bottom of neg. friction zone [m R.L.] | X-coor-dinate [m] | Y-coor-dinate [m] |
|---|---|---|---|---|---|
| 1: 3 | -19,26 | -11,60 | -11,60 | 118155,78 | 484051,62 |
| 2: 5 | -19,26 | -11,40 | -11,40 | 0,00 | 0,00 |
| 3: 6 | -19,26 | -11,60 | -11,60 | 118139,99 | 484052,09 |
| 4: 8 | -19,26 | -11,40 | -11,40 | 0,00 | 0,00 |
| 5: 9 | -19,26 | -11,00 | -11,00 | 118121,90 | 484051,98 |

### 2.6 Soil Data

Number of soil profiles (= number of CPT's) : 5

#### 2.6.1 Soil Profile 3

Belonging to CPT 3
Surface level in [m. reference level] : 0,84
Phreatic level in [m. reference level] : -0,50
Pile tip level in [m. reference level] : -19,26
Top of positive skin friction zone in [m. reference level] : -11,60
Bottom of negative skin friction zone in [m. reference level] : -11,60
OCR-value foundation layer : 1,00
Expected groundlevel settlement in [m] : 0,00
Number of layers in profile : 30

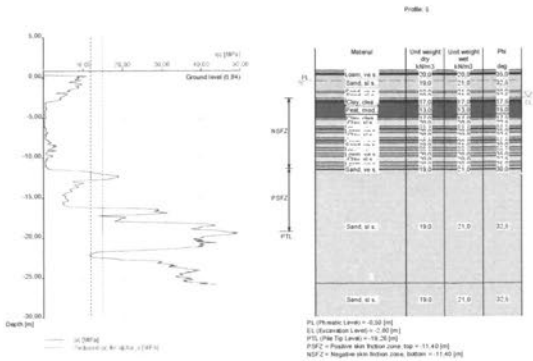


| Number layer | Top layer [m R.L.] | Gamma [kN/m3] | Gamma;sat [kN/m3] | Phi [deg] | Soil Type | Median (Sand/Gravel) [mm] |
|---|---|---|---|---|---|---|
| 1 | 0,840 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 2 | 0,340 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 3 | 0,240 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 4 | 0,040 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |
| 5 | -1,960 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 6 | -2,060 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |
| 7 | -2,560 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 8 | -2,760 | 20,00 | 20,00 | 22,50 | Clay | -- |

| Number layer | Top layer [m R.L.] | Gamma [kN/m3] | Gamma;sat [kN/m3] | Phi [deg] | Soil Type | Median (Sand/Gravel) [mm] |
|---|---|---|---|---|---|---|
| 9 | -2,860 | 17,00 | 17,00 | 17,50 | Clay | -- |
| 10 | -3,260 | 13,00 | 13,00 | 15,00 | Peat | -- |
| 11 | -5,000 | 17,00 | 17,00 | 17,50 | Clay | -- |
| 12 | -5,220 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 13 | -5,939 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 14 | -6,239 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 15 | -6,539 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 16 | -6,839 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 17 | -7,139 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 18 | -8,559 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 19 | -9,178 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 20 | -9,478 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 21 | -9,678 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 22 | -10,378 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 23 | -10,697 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 24 | -11,597 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 25 | -11,697 | 17,00 | 17,00 | 17,50 | Clay | -- |
| 26 | -11,797 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 27 | -11,916 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 28 | -12,016 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 29 | -12,116 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |
| 30 | -24,024 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |

### 2.6.2 Soil Profile 5

| | |
|---|---|
| Belonging to CPT | 5 |
| Surface level in [m. reference level] : | 0,84 |
| Phreatic level in [m. reference level] : | -0,50 |
| Pile tip level in [m. reference level] : | -19,26 |
| Top of positive skin friction zone in [m. reference level] : | -11,40 |
| Bottom of negative skin friction zone in [m. reference level] : | -11,40 |
| OCR-value foundation layer : | 1,00 |
| Expected groundlevel settlement in [m] : | 0,00 |
| Number of layers in profile : | 30 |



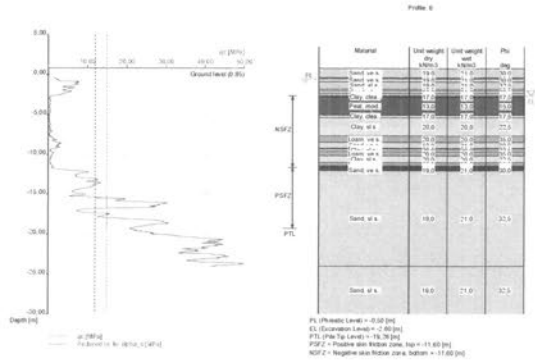




| Number layer | Top layer [m R.L.] | Gamma [kN/m3] | Gamma;sat [kN/m3] | Phi [deg] | Soil Type | Median (Sand/Gravel) [mm] |
|---|---|---|---|---|---|---|
| 1 | 0,840 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 2 | 0,440 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 3 | 0,340 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 4 | 0,240 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |
| 5 | -1,760 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 6 | -1,960 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |
| 7 | -2,679 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 8 | -2,879 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 9 | -2,979 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 10 | -3,079 | 17,00 | 17,00 | 17,50 | Clay | -- |
| 11 | -3,179 | 13,00 | 13,00 | 15,00 | Peat | -- |
| 12 | -5,118 | 17,00 | 17,00 | 17,50 | Clay | -- |
| 13 | -5,318 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 14 | -6,157 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 15 | -6,457 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 16 | -6,557 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 17 | -6,976 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 18 | -7,595 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 19 | -7,895 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 20 | -7,995 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 21 | -8,295 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 22 | -8,814 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 23 | -9,233 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 24 | -9,533 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 25 | -9,952 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 26 | -10,671 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 27 | -11,190 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 28 | -11,509 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 29 | -11,609 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |
| 30 | -25,770 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |

### 2.6.3 Soil Profile 6

| | |
|---|---|
| Belonging to CPT | 6 |
| Surface level in [m. reference level] : | 0,85 |
| Phreatic level in [m. reference level] : | -0,50 |
| Pile tip level in [m. reference level] : | -19,26 |
| Top of positive skin friction zone in [m. reference level] : | -11,60 |
| Bottom of negative skin friction zone in [m. reference level] : | -11,60 |
| OCR-value foundation layer : | 1,00 |
| Expected groundlevel settlement in [m] : | 0,00 |
| Number of layers in profile : | 27 |



| Number layer | Top layer [m R.L.] | Gamma [kN/m3] | Gamma;sat [kN/m3] | Phi [deg] | Soil Type | Median (Sand/Gravel) [mm] |
|---|---|---|---|---|---|---|
| 1 | 0,850 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 2 | -0,350 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 3 | -0,450 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 4 | -0,850 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |
| 5 | -1,750 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 6 | -1,970 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |
| 7 | -2,289 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 8 | -2,589 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 9 | -2,689 | 17,00 | 17,00 | 17,50 | Clay | -- |
| 10 | -2,789 | 13,00 | 13,00 | 15,00 | Peat | -- |
| 11 | -5,008 | 17,00 | 17,00 | 17,50 | Clay | -- |
| 12 | -5,308 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 13 | -7,646 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 14 | -8,465 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 15 | -9,184 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 16 | -9,303 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 17 | -9,603 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 18 | -10,122 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 19 | -10,960 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 20 | -11,379 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 21 | -11,479 | 17,00 | 17,00 | 17,50 | Clay | -- |
| 22 | -11,579 | 13,00 | 13,00 | 15,00 | Peat | -- |
| 23 | -11,679 | 17,00 | 17,00 | 17,50 | Clay | -- |
| 24 | -11,798 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 25 | -11,898 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 26 | -11,998 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |
| 27 | -23,987 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |

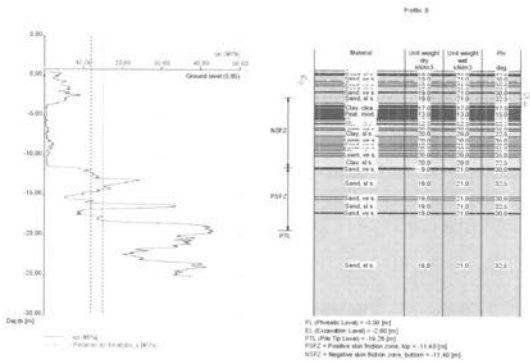
### 2.6.4 Soil Profile 8

| | |
|---|---|
| Belonging to CPT | 8 |
| Surface level in [m. reference level] : | 0,85 |
| Phreatic level in [m. reference level] : | -0,50 |





| | |
|---|---|
| Pile tip level in [m. reference level] : | -19,26 |
| Top of positive skin friction zone in [m. reference level] : | -11,40 |
| Bottom of negative skin friction zone in [m. reference level] : | -11,40 |
| OCR-value foundation layer : | 1,00 |
| Expected groundlevel settlement in [m] : | 0,00 |
| Number of layers in profile : | 33 |

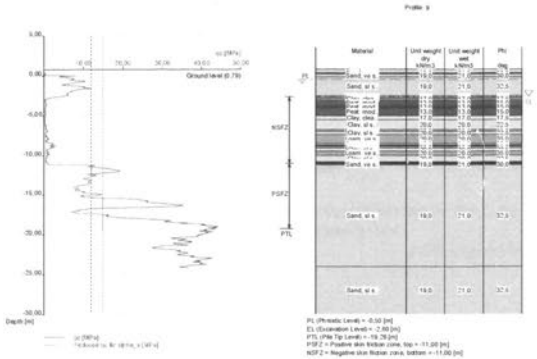


| Number layer | Top layer [m R.L.] | Gamma [kN/m3] | Gamma;sat [kN/m3] | Phi [deg] | Soil Type | Median (Sand/Gravel) [mm] |
|---|---|---|---|---|---|---|
| 1 | 0,850 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |
| 2 | 0,450 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |
| 3 | 0,350 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |
| 4 | 0,250 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 5 | -0,650 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |
| 6 | -0,950 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 7 | -1,150 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |
| 8 | -1,850 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 9 | -1,950 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |
| 10 | -3,250 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 11 | -3,550 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 12 | -3,650 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 13 | -3,750 | 17,00 | 17,00 | 17,50 | Clay | -- |
| 14 | -3,950 | 13,00 | 13,00 | 15,00 | Peat | -- |
| 15 | -5,289 | 17,00 | 17,00 | 17,50 | Clay | -- |
| 16 | -5,489 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 17 | -5,789 | 17,00 | 17,00 | 17,50 | Clay | -- |
| 18 | -5,889 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 19 | -6,389 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 20 | -6,689 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 21 | -7,389 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 22 | -8,428 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 23 | -8,628 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 24 | -9,228 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 25 | -9,528 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 26 | -9,947 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 27 | -11,366 | 20,00 | 20,00 | 35,00 | Loam | -- |

| Number layer | Top layer [m R.L.] | Gamma [kN/m3] | Gamma;sat [kN/m3] | Phi [deg] | Soil Type | Median (Sand/Gravel) [mm] |
|---|---|---|---|---|---|---|
| 28 | -11,466 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 29 | -11,566 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |
| 30 | -15,061 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 31 | -15,380 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |
| 32 | -17,037 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 33 | -17,137 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |

### 2.6.5 Soil Profile

| | |
|---|---|
| Belonging to CPT | 9 |
| Surface level in [m. reference level] : | 0,79 |
| Phreatic level in [m. reference level] : | -0,50 |
| Pile tip level in [m. reference level] : | -19,26 |
| Top of positive skin friction zone in [m. reference level] : | -11,00 |
| Bottom of negative skin friction zone in [m. reference level] : | -11,00 |
| OCR-value foundation layer : | 1,00 |
| Expected groundlevel settlement in [m] : | 0,00 |
| Number of layers in profile : | 28 |



| Number layer | Top layer [m R.L.] | Gamma [kN/m3] | Gamma;sat [kN/m3] | Phi [deg] | Soil Type | Median (Sand/Gravel) [mm] |
|---|---|---|---|---|---|---|
| 1 | 0,790 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 2 | 0,290 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 3 | 0,190 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 4 | -0,210 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |
| 5 | -2,510 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 6 | -2,710 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 7 | -2,810 | 17,00 | 17,00 | 17,50 | Clay | -- |
| 8 | -3,010 | 13,00 | 13,00 | 15,00 | Peat | -- |
| 9 | -3,810 | 13,00 | 13,00 | 15,00 | Peat | -- |
| 10 | -4,010 | 13,00 | 13,00 | 15,00 | Peat | -- |
| 11 | -5,010 | 17,00 | 17,00 | 17,50 | Clay | -- |
| 12 | -5,510 | 20,00 | 20,00 | 22,50 | Clay | -- |





| Number layer | Top layer [m R.L.] | Gamma [kN/m3] | Gamma;sat [kN/m3] | Phi [deg] | Soil Type | Median (Sand/Gravel) [mm] |
|---|---|---|---|---|---|---|
| 13 | -6,790 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 14 | -7,009 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 15 | -7,409 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 16 | -8,509 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 17 | -8,709 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 18 | -8,809 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 19 | -8,909 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 20 | -9,109 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 21 | -9,509 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 22 | -10,028 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 23 | -10,828 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 24 | -10,928 | 20,00 | 20,00 | 22,50 | Clay | -- |
| 25 | -11,028 | 20,00 | 20,00 | 35,00 | Loam | -- |
| 26 | -11,128 | 19,00 | 21,00 | 30,00 | Sand | 0,200 |
| 27 | -11,228 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |
| 28 | -24,059 | 19,00 | 21,00 | 32,50 | Sand | 0,200 |

## 2.7 Pile Types

### 2.7.1 Pile type : funde 460-560

| | |
|---|---|
| Pile type : | User defined (vibrating) |

Note: This user defined pile type is considered not to be of a in place formed type.
Hence the characteristic value of the friction angle at the pile shaft (delta) will be taken as 0.75 * phi.

Pile type for determination of execution factor alpha_s in sand/gravel:
Screw pile, cast in place, lost tip

Pile type for determination of exectution factor alpha_s in clay/loam/peat:
User defined

| | |
|---|---|
| alpha_s clay/loam/peat : | 0,0000 |

Evidence to support chosen alpha_s should be provided.

Pile type for determination of pile class factor alpha_p :
Screw pile, cast in place, lost tip

| | |
|---|---|
| Pile type for use in load/settlement curve : | 1 |
| Materialtype for pile : | Concrete |
| Slip layer : | None |
| Pile shape : | Round pile with lost tip |
| beta (user defined : Pile tip, shape factor) : | 1,00 |
| s (user defined : factor for the influence of the shape of the crosssection of the pile base) : | 1,00 |

Pile dimensions :

| | |
|---|---|
| Diameter at tip [m] : | 0,560 |
| Diameter shaft [m] : | 0,510 |
| Effective heigth enlarged base [m] : | 0,000 |

### 2.7.2 Pile type : funde 380-450

| | |
|---|---|
| Pile type : | User defined (vibrating) |

Note: This user defined pile type is considered not to be of a in place formed type.
Hence the characteristic value of the friction angle at the pile shaft (delta) will be taken as 0.75 * phi.

Pile type for determination of execution factor alpha_s in sand/gravel:
Screw pile, cast in place, with grout

Pile type for determination of exectution factor alpha_s in clay/loam/peat:
User defined

| | |
|---|---|
| alpha_s clay/loam/peat : | 0,0000 |

Evidence to support chosen alpha_s should be provided.

Pile type for determination of pile class factor alpha_p :
Screw pile, cast in place, with grout

| | |
|---|---|
| Pile type for use in load/settlement curve : | 1 |
| Materialtype for pile : | Concrete |
| Slip layer : | None |
| Pile shape : | Round pile with lost tip |
| beta (user defined : Pile tip, shape factor) : | 1,00 |
| s (user defined : factor for the influence of the shape of the crosssection of the pile base) : | 1,00 |

Pile dimensions :

| | |
|---|---|
| Diameter at tip [m] : | 0,450 |
| Diameter shaft [m] : | 0,415 |
| Effective heigth enlarged base [m] : | 0,000 |

### 2.7.3 Pile type : DP 360

Pile type : User defined (vibrating)
Note: This user defined pile type is considered to be of a in place formed type.
Hence the characteristic value of the friction angle at the pile shaft (delta) will be taken as 1.0 * phi.

Pile type for determination of execution factor alpha_s in sand/gravel:
User defined
alpha_s Sand : 0,0100
Evidence to support chosen alpha_s should be provided.

Pile type for determination of exectution factor alpha_s in clay/loam/peat:
User defined
alpha_s clay/loam/peat : 0,0000
Evidence to support chosen alpha_s should be provided.

Pile type for determination of pile class factor alpha_p :
User defined
alpha_p : 0,5600
Evidence to support chosen alpha_p should be provided.

| | |
|---|---|
| Pile type for use in load/settlement curve : | 1 |
| Materialtype for pile : | Concrete |
| Slip layer : | None |
| Pile shape : | Round pile |
| beta (user defined : Pile tip, shape factor) : | 1,00 |
| s (user defined : factor for the influence of the shape of the crosssection of the pile base) : | 1,00 |

Pile dimensions :
Diameter [m] : 0,360

### 2.7.4 Pile type : DP 410

Pile type : User defined (vibrating)
Note: This user defined pile type is considered to be of a in place formed type.
Hence the characteristic value of the friction angle at the pile shaft (delta) will be taken as 1.0 * phi.

Pile type for determination of execution factor alpha_s in sand/gravel:
User defined
alpha_s Sand : 0,0100
Evidence to support chosen alpha_s should be provided.

Pile type for determination of exectution factor alpha_s in clay/loam/peat:
User defined
alpha_s clay/loam/peat : 0,0000





Evidence to support chosen alpha_s should be provided.

Pile type for determination of pile class factor alpha_p :
User defined
alpha_p : 0,5600
Evidence to support chosen alpha_p should be provided.

| | |
|---|---|
| Pile type for use in load/settlement curve : | 1 |
| Materialtype for pile : | Concrete |
| Slip layer : | None |
| Pile shape : | Round pile |
| beta (user defined : Pile tip, shape factor) : | 1,00 |
| s (user defined : factor for the influence of the shape of the crosssection of the pile base) : | 1,00 |

Pile dimensions :
Diameter [m] : 0,410

### 2.7.5 Pile type : DP 460

Pile type : User defined (vibrating)
Note: This user defined pile type is considered to be of a in place formed type.
Hence the characteristic value of the friction angle at the pile shaft (delta) will be taken as 1.0 * phi.

Pile type for determination of execution factor alpha_s in sand/gravel:
User defined
alpha_s Sand : 0,0100
Evidence to support chosen alpha_s should be provided.

Pile type for determination of exectution factor alpha_s in clay/loam/peat:
User defined
alpha_s clay/loam/peat : 0,0000
Evidence to support chosen alpha_s should be provided.

Pile type for determination of pile class factor alpha_p :
User defined
alpha_p : 0,5600
Evidence to support chosen alpha_p should be provided.

| | |
|---|---|
| Pile type for use in load/settlement curve : | 1 |
| Materialtype for pile : | Concrete |
| Slip layer : | None |
| Pile shape : | Round pile |
| beta (user defined : Pile tip, shape factor) : | 1,00 |
| s (user defined : factor for the influence of the shape of the crosssection of the pile base) : | 1,00 |

Pile dimensions :
Diameter [m] : 0,460

## 2.8 Foundation Plan

| | |
|---|---|
| Number of piles : | 1 |
| Number of collaborating piles* : | 1 |

* : 0 = not defined, 1 = non rigid superstructure, >1 = rigid superstructure

### 2.8.1 View of Foundation Plan



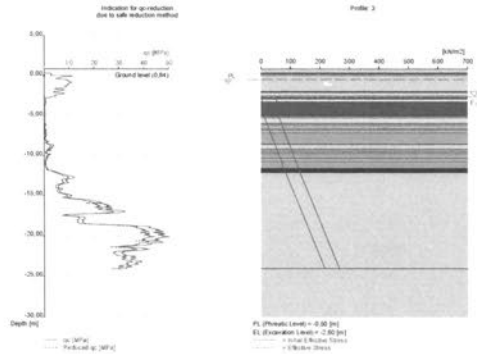

| Pile nr/name | X-coor-dinate [m] | Y-coor-dinate [m] | Fc;d (STR/GEO) [kN] | Fc;d (SLS) [kN] | P0 [kN/m2] | Pile head level [m R.L.] |
|---|---|---|---|---|---|---|
| 1: 1 | -5,00 | -5,00 | 0,00 | 0,00 | 0,00 | -2,60 |

## 2. Excavation Data

Excavation level in [m. reference level] : -2,60
Reduction model : Safe (NEN)







## 2.10 Overruled Parameters

User defined gamma;b [-] : 1,20
User defined gamma;s [-] : 1,20

## 2.11 Model Options

Use pilegroup for negative skin friction (standard)
Do not create intermediate results file
Use reduction for continuous flight auger piles (standard)
Use the influence of excavations (standard).

## 2.12 Model Options

Selected pile types :
- -fundex 460-560
- -DPA 410
- -fundex 380-450
- -DPA 460

Selected profiles :
- -3
- -5
- -6
- -8
- -9

Trajectory
- -begin [m] : -18,00
- -end [m] : -21,50
- -interval [m] : 0,50

# 3 Bearing Piles EC7-□□: Results of t□e □ption Preliminar□ Design, ndication Bearing Ca

## 3.1 Errors and □arnings

Warning : The factor gamma;b (NEN 9997-1:2016) is user defined. Evidence to support this from the NEN deviating value has to be provided.
Warning : The factor gamma;s (NEN 9997-1:2016) is user defined. Evidence to support this from the NEN deviating value has to be provided.
Pile Type fundex 460-560: Warning : The factor Beta (NEN 9997-1:2016 art. 7.6.2.3(g)) is user defined. Evidence to support this from the NEN deviating value has to be provided.
Pile Type fundex 460-560: Warning : The factor s (NEN 9997-1:2016 art. 7.6.2.3(h)) is user defined. Evidence to support this from the NEN deviating value has to be provided.
Pile Type DPA 410: Warning : The factor Beta (NEN 9997-1:2016 art. 7.6.2.3(g)) is user defined. Evidence to support this from the NEN deviating value has to be provided.
Pile Type DPA 410: Warning : The factor s (NEN 9997-1:2016 art. 7.6.2.3(h)) is user defined. Evidence to support this from the NEN deviating value has to be provided.
Pile Type fundex 380-450: Warning : The factor Beta (NEN 9997-1:2016 art. 7.6.2.3(g)) is user defined. Evidence to support this from the NEN deviating value has to be provided.
Pile Type fundex 380-450: Warning : The factor s (NEN 9997-1:2016 art. 7.6.2.3(h)) is user defined. Evidence to support this from the NEN deviating value has to be provided.
Pile Type DPA 460: Warning : The factor Beta (NEN 9997-1:2016 art. 7.6.2.3(g)) is user defined. Evidence to support this from the NEN deviating value has to be provided.
Pile Type DPA 460: Warning : The factor s (NEN 9997-1:2016 art. 7.6.2.3(h)) is user defined. Evidence to support this from the NEN deviating value has to be provided.

## 3.2 Remarks

When checking the survey and testing of soil according to NEN 9997-1:2016 art. 3.2.3 lid (e), the program uses the provided CPT test level. It does NOT take into account possible different pile tip levels. When different pile tip levels are used in this calculation, the user itself must check for possibly required additional survey and testing of soil.

Note : The calculations performed are based on a single pile for limit state STR/GEO (= ultimate limit state).
Due to the nature of preliminary design, a single pile is always assumed. A possible pileplan is disregarded when using the preliminary design option. Hence a non rigid superstructure is assumed and pile group effects are not considered.

## 3.3 Calculation Parameters

### 3.3.1 Pile Factors

| | |
|---|---|
| gamma;b (Limit State STR/GEO, user defined) : | 1,20 |
| gamma;s (Limit State STR/GEO, user defined) : | 1,20 |
| xi3 (NEN 9997-1:2016, table A.10a, for N = 5) : | 1,28 |
| xi4 (NEN 9997-1:2016, table A.10a, for N = 5) : | 1,03 |

### 3.3.2 Pile t□pe : funde□ 460-560

Pile type : User defined (vibrating)
Note: This user defined pile type is considered not to be of a in place formed type.
Hence the characteristic value of the friction angle at the pile shaft (delta) will be taken as 0.75 * phi.

Pile type for determination of execution factor alpha_s in sand/gravel:
Screw pile, cast in place, lost tip

Pile type for determination of exectution factor alpha_s in clay/loam/peat:
User defined
alpha_s clay/loam/peat : 0,0000
Evidence to support chosen alpha_s should be provided.

Pile type for determination of pile class factor alpha_p :
Screw pile, cast in place, lost tip





Pile type for use in load/settlement curve : 1
Materialtype for pile : Concrete
Slip layer : None
Pile shape : Round pile with lost tip
beta (user defined : Pile tip, shape factor) : 1,00
s (user defined : factor for the influence of the shape of the crosssection of the pile base) : 1,00

Pile dimensions :
Diameter at tip [m] : 0,560
Diameter shaft [m] : 0,510
Effective heigth enlarged base [m] : 0,000

| CPT | Alpha_s Sand/ Gravel | Alpha_s Clay/Loam Peat | Alpha_p |
|---|---|---|---|
| 3 | 0,0090 | -- | 0,6300 |
| 5 | 0,0090 | -- | 0,6300 |
| 6 | 0,0090 | -- | 0,6300 |
| 8 | 0,0090 | -- | 0,6300 |
| 9 | 0,0090 | -- | 0,6300 |

### 3.3.3 Pile t□pe : DP□ 410

Pile type : User defined (vibrating)
Note: This user defined pile type is considered to be of a in place formed type.
Hence the characteristic value of the friction angle at the pile shaft (delta) will be taken as 1.0 * phi.

Pile type for determination of execution factor alpha_s in sand/gravel:
User defined
alpha_s Sand : 0,0100
Evidence to support chosen alpha_s should be provided.

Pile type for determination of exectution factor alpha_s in clay/loam/peat:
User defined
alpha_s clay/loam/peat : 0,0000
Evidence to support chosen alpha_s should be provided.

Pile type for determination of pile class factor alpha_p :
User defined
alpha_p : 0,5600
Evidence to support chosen alpha_p should be provided.

Pile type for use in load/settlement curve : 1
Materialtype for pile : Concrete
Slip layer : None
Pile shape : Round pile
beta (user defined : Pile tip, shape factor) : 1,00
s (user defined : factor for the influence of the shape of the crosssection of the pile base) : 1,00

Pile dimensions :
Diameter [m] : 0,410

| CPT | Alpha_s Sand/ Gravel | Alpha_s Clay/Loam Peat | Alpha_p |
|---|---|---|---|
| 3 | 0,0100 | -- | 0,5600 |
| 5 | 0,0100 | -- | 0,5600 |
| 6 | 0,0100 | -- | 0,5600 |
| 8 | 0,0100 | -- | 0,5600 |
| 9 | 0,0100 | -- | 0,5600 |

### 3.3.4 Pile type : funde 380-450

Pile type : User defined (vibrating)
Note: This user defined pile type is considered not to be of a in place formed type.
Hence the characteristic value of the friction angle at the pile shaft (delta) will be taken as 0.75 * phi.

Pile type for determination of execution factor alpha_s in sand/gravel:
Screw pile, cast in place, with grout

Pile type for determination of exectution factor alpha_s in clay/loam/peat:
User defined
alpha_s clay/loam/peat : 0,0000
Evidence to support chosen alpha_s should be provided.

Pile type for determination of pile class factor alpha_p :
Screw pile, cast in place, with grout

Pile type for use in load/settlement curve : 1
Materialtype for pile : Concrete
Slip layer : None
Pile shape : Round pile with lost tip
beta (user defined : Pile tip, shape factor) : 1,00
s (user defined : factor for the influence of the
shape of the crosssection of the pile base) : 1,00

Pile dimensions :
Diameter at tip [m] : 0,450
Diameter shaft [m] : 0,415
Effective heigth enlarged base [m] : 0,000

| CPT | Alpha_s Sand/ Gravel | Alpha_s Clay/Loam Peat | Alpha_p |
|---|---|---|---|
| 3 | 0,0090 | -- | 0,6300 |
| 5 | 0,0090 | -- | 0,6300 |
| 6 | 0,0090 | -- | 0,6300 |
| 8 | 0,0090 | -- | 0,6300 |
| 9 | 0,0090 | -- | 0,6300 |

### 3.3.5 Pile type : DP 460

Pile type : User defined (vibrating)
Note: This user defined pile type is considered to be of a in place formed type.
Hence the characteristic value of the friction angle at the pile shaft (delta) will be taken as 1.0 * phi.

Pile type for determination of execution factor alpha_s in sand/gravel:
User defined
alpha_s Sand : 0,0100
Evidence to support chosen alpha_s should be provided.

Pile type for determination of exectution factor alpha_s in clay/loam/peat:
User defined
alpha_s clay/loam/peat : 0,0000
Evidence to support chosen alpha_s should be provided.

Pile type for determination of pile class factor alpha_p :
User defined
alpha_p : 0,5600
Evidence to support chosen alpha_p should be provided.

Pile type for use in load/settlement curve : 1
Materialtype for pile : Concrete
Slip layer : None
Pile shape : Round pile





beta (user defined : Pile tip, shape factor) : 1,00
s (user defined : factor for the influence of the
shape of the crosssection of the pile base) : 1,00

Pile dimensions :
Diameter [m] : 0,460

| CPT | Alpha_s Sand/ Gravel | Alpha_s Clay/Loam Peat | Alpha_p |
|---|---|---|---|
| 3 | 0,0100 | -- | 0,5600 |
| 5 | 0,0100 | -- | 0,5600 |
| 6 | 0,0100 | -- | 0,5600 |
| 8 | 0,0100 | -- | 0,5600 |
| 9 | 0,0100 | -- | 0,5600 |

### 3.4 Results Bearing Forces for Pile type : funde 460-560

| CPT name | Level [m R.L.] | Rb;cal;max [kN] | Rs;cal;max [kN] | Rc;cal;max [kN] | Rc;d [kN] | F;nsf;rep [kN] | Fnsf;d [kN] | Rc;net;d [kN] |
|---|---|---|---|---|---|---|---|---|
| 3 | -18.00 | 1588 | 851 | 2439 | 1588 | 0 | 0 | 1588 |
| 3 | -18.50 | 2808 | 945 | 3753 | 2443 | 0 | 0 | 2443 |
| 3 | -19.00 | 3593 | 1061 | 4654 | 3030 | 0 | 0 | 3030 |
| 3 | -19.50 | 3506 | 1169 | 4675 | 3044 | 0 | 0 | 3044 |
| 3 | -20.00 | 3569 | 1277 | 4846 | 3155 | 0 | 0 | 3155 |
| 3 | -20.50 | 3669 | 1385 | 5054 | 3290 | 0 | 0 | 3290 |
| 3 | -21.00 | 3695 | 1493 | 5188 | 3378 | 0 | 0 | 3378 |
| 3 | -21.50 | 3695 | 1602 | 5297 | 3449 | 0 | 0 | 3449 |
| 5 | -18.00 | 3097 | 822 | 3919 | 2551 | 0 | 0 | 2551 |
| 5 | -18.50 | 3470 | 930 | 4400 | 2865 | 0 | 0 | 2865 |
| 5 | -19.00 | 3695 | 1038 | 4733 | 3081 | 0 | 0 | 3081 |
| 5 | -19.50 | 2590 | 1146 | 3736 | 2432 | 0 | 0 | 2432 |
| 5 | -20.00 | 2209 | 1255 | 3464 | 2255 | 0 | 0 | 2255 |
| 5 | -20.50 | 2103 | 1363 | 3466 | 2257 | 0 | 0 | 2257 |
| 5 | -21.00 | 1952 | 1471 | 3423 | 2229 | 0 | 0 | 2229 |
| 5 | -21.50 | 1711 | 1579 | 3290 | 2142 | 0 | 0 | 2142 |
| 6 | -18.00 | 2051 | 838 | 2889 | 1881 | 0 | 0 | 1881 |
| 6 | -18.50 | 2162 | 946 | 3108 | 2023 | 0 | 0 | 2023 |
| 6 | -19.00 | 2185 | 1054 | 3239 | 2109 | 0 | 0 | 2109 |
| 6 | -19.50 | 2530 | 1162 | 3692 | 2404 | 0 | 0 | 2404 |
| 6 | -20.00 | 3237 | 1270 | 4507 | 2934 | 0 | 0 | 2934 |
| 6 | -20.50 | 3695 | 1379 | 5074 | 3303 | 0 | 0 | 3303 |
| 6 | -21.00 | 3695 | 1487 | 5182 | 3374 | 0 | 0 | 3374 |
| 6 | -21.50 | 3695 | 1595 | 5290 | 3444 | 0 | 0 | 3444 |
| 8 | -18.00 | 1643 | 941 | 2584 | 1682 | 0 | 0 | 1682 |
| 8 | -18.50 | 3098 | 1040 | 4138 | 2694 | 0 | 0 | 2694 |
| 8 | -19.00 | 3272 | 1148 | 4420 | 2878 | 0 | 0 | 2878 |
| 8 | -19.50 | 2913 | 1256 | 4169 | 2714 | 0 | 0 | 2714 |
| 8 | -20.00 | 2862 | 1365 | 4227 | 2752 | 0 | 0 | 2752 |
| 8 | -20.50 | 2761 | 1473 | 4234 | 2757 | 0 | 0 | 2757 |
| 8 | -21.00 | 2782 | 1581 | 4363 | 2840 | 0 | 0 | 2840 |
| 8 | -21.50 | 2763 | 1689 | 4452 | 2898 | 0 | 0 | 2898 |
| 9 | -18.00 | 2604 | 1063 | 3667 | 2387 | 0 | 0 | 2387 |
| 9 | -18.50 | 3228 | 1171 | 4399 | 2864 | 0 | 0 | 2864 |
| 9 | -19.00 | 3391 | 1280 | 4671 | 3041 | 0 | 0 | 3041 |
| 9 | -19.50 | 3247 | 1388 | 4635 | 3018 | 0 | 0 | 3018 |
| 9 | -20.00 | 3355 | 1496 | 4851 | 3158 | 0 | 0 | 3158 |
| 9 | -20.50 | 3485 | 1604 | 5089 | 3313 | 0 | 0 | 3313 |
| 9 | -21.00 | 3590 | 1712 | 5302 | 3452 | 0 | 0 | 3452 |
| 9 | -21.50 | 3695 | 1820 | 5515 | 3590 | 0 | 0 | 3590 |

* Rc;net;d = Rc;d - Fnsf;d

### 3.5 Results Bearing Forces for Pile type : DP 410

| CPT name | Level [m R.L.] | Rb;cal;max [kN] | Rs;cal;max [kN] | Rc;cal;max [kN] | Rc;d [kN] | F;nsf;rep [kN] | Fnsf;d [kN] | Rc;net;d [kN] |
|---|---|---|---|---|---|---|---|---|
| 3 | -18.00 | 783 | 760 | 1543 | 1005 | 0 | 0 | 1005 |
| 3 | -18.50 | 1266 | 844 | 2110 | 1374 | 0 | 0 | 1374 |
| 3 | -19.00 | 1875 | 948 | 2823 | 1838 | 0 | 0 | 1838 |
| 3 | -19.50 | 1980 | 1044 | 3024 | 1969 | 0 | 0 | 1969 |
| 3 | -20.00 | 1839 | 1141 | 2980 | 1940 | 0 | 0 | 1940 |
| 3 | -20.50 | 1890 | 1237 | 3127 | 2036 | 0 | 0 | 2036 |
| 3 | -21.00 | 1944 | 1334 | 3278 | 2134 | 0 | 0 | 2134 |
| 3 | -21.50 | 1980 | 1431 | 3411 | 2221 | 0 | 0 | 2221 |
| 5 | -18.00 | 1468 | 734 | 2202 | 1434 | 0 | 0 | 1434 |
| 5 | -18.50 | 1748 | 831 | 2579 | 1679 | 0 | 0 | 1679 |
| 5 | -19.00 | 1980 | 927 | 2907 | 1893 | 0 | 0 | 1893 |
| 5 | -19.50 | 1980 | 1024 | 3004 | 1956 | 0 | 0 | 1956 |
| 5 | -20.00 | 1502 | 1121 | 2623 | 1708 | 0 | 0 | 1708 |
| 5 | -20.50 | 1057 | 1217 | 2274 | 1480 | 0 | 0 | 1480 |
| 5 | -21.00 | 930 | 1314 | 2244 | 1461 | 0 | 0 | 1461 |
| 5 | -21.50 | 815 | 1410 | 2225 | 1449 | 0 | 0 | 1449 |
| 6 | -18.00 | 1002 | 748 | 1750 | 1139 | 0 | 0 | 1139 |
| 6 | -18.50 | 1075 | 845 | 1920 | 1250 | 0 | 0 | 1250 |
| 6 | -19.00 | 1097 | 942 | 2039 | 1327 | 0 | 0 | 1327 |
| 6 | -19.50 | 1255 | 1038 | 2293 | 1493 | 0 | 0 | 1493 |
| 6 | -20.00 | 1594 | 1135 | 2729 | 1777 | 0 | 0 | 1777 |
| 6 | -20.50 | 1928 | 1231 | 3159 | 2057 | 0 | 0 | 2057 |
| 6 | -21.00 | 1980 | 1328 | 3308 | 2154 | 0 | 0 | 2154 |
| 6 | -21.50 | 1980 | 1425 | 3405 | 2217 | 0 | 0 | 2217 |
| 8 | -18.00 | 748 | 840 | 1588 | 1034 | 0 | 0 | 1034 |
| 8 | -18.50 | 1543 | 929 | 2472 | 1609 | 0 | 0 | 1609 |
| 8 | -19.00 | 1655 | 1026 | 2681 | 1745 | 0 | 0 | 1745 |
| 8 | -19.50 | 1757 | 1122 | 2879 | 1874 | 0 | 0 | 1874 |
| 8 | -20.00 | 1607 | 1219 | 2826 | 1840 | 0 | 0 | 1840 |
| 8 | -20.50 | 1502 | 1316 | 2818 | 1835 | 0 | 0 | 1835 |
| 8 | -21.00 | 1416 | 1412 | 2828 | 1841 | 0 | 0 | 1841 |
| 8 | -21.50 | 1396 | 1509 | 2905 | 1891 | 0 | 0 | 1891 |
| 9 | -18.00 | 1253 | 950 | 2203 | 1434 | 0 | 0 | 1434 |
| 9 | -18.50 | 1657 | 1046 | 2703 | 1760 | 0 | 0 | 1760 |
| 9 | -19.00 | 1717 | 1143 | 2860 | 1862 | 0 | 0 | 1862 |
| 9 | -19.50 | 1810 | 1240 | 3050 | 1986 | 0 | 0 | 1986 |
| 9 | -20.00 | 1735 | 1336 | 3071 | 1999 | 0 | 0 | 1999 |
| 9 | -20.50 | 1818 | 1433 | 3251 | 2117 | 0 | 0 | 2117 |
| 9 | -21.00 | 1864 | 1529 | 3393 | 2209 | 0 | 0 | 2209 |
| 9 | -21.50 | 1844 | 1626 | 3470 | 2259 | 0 | 0 | 2259 |

* Rc;net;d = Rc;d - Fnsf;d

### 3.6 Results Bearing Forces for Pile type : funde 380-450

| CPT name | Level [m R.L.] | Rb;cal;max [kN] | Rs;cal;max [kN] | Rc;cal;max [kN] | Rc;d [kN] | F;nsf;rep [kN] | Fnsf;d [kN] | Rc;net;d [kN] |
|---|---|---|---|---|---|---|---|---|
| 3 | -18.00 | 1051 | 692 | 1743 | 1135 | 0 | 0 | 1135 |
| 3 | -18.50 | 1739 | 769 | 2508 | 1633 | 0 | 0 | 1633 |
| 3 | -19.00 | 2386 | 863 | 3249 | 2115 | 0 | 0 | 2115 |
| 3 | -19.50 | 2384 | 951 | 3335 | 2171 | 0 | 0 | 2171 |
| 3 | -20.00 | 2386 | 1039 | 3425 | 2230 | 0 | 0 | 2230 |
| 3 | -20.50 | 2386 | 1127 | 3513 | 2287 | 0 | 0 | 2287 |
| 3 | -21.00 | 2386 | 1215 | 3601 | 2344 | 0 | 0 | 2344 |
| 3 | -21.50 | 2386 | 1303 | 3689 | 2402 | 0 | 0 | 2402 |
| 5 | -18.00 | 1985 | 669 | 2654 | 1728 | 0 | 0 | 1728 |
| 5 | -18.50 | 2327 | 757 | 3084 | 2008 | 0 | 0 | 2008 |
| 5 | -19.00 | 2386 | 845 | 3231 | 2104 | 0 | 0 | 2104 |
| 5 | -19.50 | 2386 | 933 | 3319 | 2161 | 0 | 0 | 2161 |
| 5 | -20.00 | 1667 | 1021 | 2688 | 1750 | 0 | 0 | 1750 |
| 5 | -20.50 | 1399 | 1109 | 2508 | 1633 | 0 | 0 | 1633 |





| CPT name | Level [m R.L.] | Rb;cal;max [kN] | Rs;cal;max [kN] | Rc;cal;max [kN] | Rc;d [kN] | F;nsf;rep [kN] | Fnsf;d [kN] | Rc;net;d [kN] |
|---|---|---|---|---|---|---|---|---|
| 5 | -21.00 | 1260 | 1197 | 2457 | 1600 | 0 | 0 | 1600 |
| 5 | -21.50 | 1105 | 1285 | 2390 | 1556 | 0 | 0 | 1556 |
| 6 | -18.00 | 1346 | 682 | 2028 | 1320 | 0 | 0 | 1320 |
| 6 | -18.50 | 1437 | 770 | 2207 | 1437 | 0 | 0 | 1437 |
| 6 | -19.00 | 1466 | 858 | 2324 | 1513 | 0 | 0 | 1513 |
| 6 | -19.50 | 1678 | 946 | 2624 | 1708 | 0 | 0 | 1708 |
| 6 | -20.00 | 2129 | 1034 | 3163 | 2059 | 0 | 0 | 2059 |
| 6 | -20.50 | 2386 | 1122 | 3508 | 2284 | 0 | 0 | 2284 |
| 6 | -21.00 | 2386 | 1210 | 3596 | 2341 | 0 | 0 | 2341 |
| 6 | -21.50 | 2386 | 1298 | 3684 | 2398 | 0 | 0 | 2398 |
| 8 | -18.00 | 1029 | 765 | 1794 | 1168 | 0 | 0 | 1168 |
| 8 | -18.50 | 2069 | 846 | 2915 | 1898 | 0 | 0 | 1898 |
| 8 | -19.00 | 2215 | 934 | 3149 | 2050 | 0 | 0 | 2050 |
| 8 | -19.50 | 2319 | 1022 | 3341 | 2175 | 0 | 0 | 2175 |
| 8 | -20.00 | 2016 | 1110 | 3126 | 2035 | 0 | 0 | 2035 |
| 8 | -20.50 | 1905 | 1198 | 3103 | 2020 | 0 | 0 | 2020 |
| 8 | -21.00 | 1889 | 1286 | 3175 | 2067 | 0 | 0 | 2067 |
| 8 | -21.50 | 1865 | 1374 | 3239 | 2109 | 0 | 0 | 2109 |
| 9 | -18.00 | 1692 | 865 | 2557 | 1665 | 0 | 0 | 1665 |
| 9 | -18.50 | 2230 | 953 | 3183 | 2072 | 0 | 0 | 2072 |
| 9 | -19.00 | 2282 | 1041 | 3323 | 2163 | 0 | 0 | 2163 |
| 9 | -19.50 | 2386 | 1129 | 3515 | 2288 | 0 | 0 | 2288 |
| 9 | -20.00 | 2284 | 1217 | 3501 | 2279 | 0 | 0 | 2279 |
| 9 | -20.50 | 2386 | 1305 | 3691 | 2403 | 0 | 0 | 2403 |
| 9 | -21.00 | 2386 | 1393 | 3779 | 2460 | 0 | 0 | 2460 |
| 9 | -21.50 | 2386 | 1481 | 3867 | 2518 | 0 | 0 | 2518 |

* Rc;net;d = Rc;d - Fnsf;d

### 3.7 Results Bearing Forces for Pile type : DP 460

| CPT name | Level [m R.L.] | Rb;cal;max [kN] | Rs;cal;max [kN] | Rc;cal;max [kN] | Rc;d [kN] | F;nsf;rep [kN] | Fnsf;d [kN] | Rc;net;d [kN] |
|---|---|---|---|---|---|---|---|---|
| 3 | -18.00 | 973 | 853 | 1826 | 1189 | 0 | 0 | 1189 |
| 3 | -18.50 | 1614 | 947 | 2561 | 1667 | 0 | 0 | 1667 |
| 3 | -19.00 | 2334 | 1063 | 3397 | 2212 | 0 | 0 | 2212 |
| 3 | -19.50 | 2176 | 1172 | 3348 | 2180 | 0 | 0 | 2180 |
| 3 | -20.00 | 2263 | 1280 | 3543 | 2307 | 0 | 0 | 2307 |
| 3 | -20.50 | 2301 | 1388 | 3689 | 2402 | 0 | 0 | 2402 |
| 3 | -21.00 | 2378 | 1497 | 3875 | 2523 | 0 | 0 | 2523 |
| 3 | -21.50 | 2478 | 1605 | 4083 | 2658 | 0 | 0 | 2658 |
| 5 | -18.00 | 1838 | 824 | 2662 | 1733 | 0 | 0 | 1733 |
| 5 | -18.50 | 2152 | 932 | 3084 | 2008 | 0 | 0 | 2008 |
| 5 | -19.00 | 2432 | 1041 | 3473 | 2261 | 0 | 0 | 2261 |
| 5 | -19.50 | 2433 | 1149 | 3582 | 2332 | 0 | 0 | 2332 |
| 5 | -20.00 | 1515 | 1257 | 2772 | 1805 | 0 | 0 | 1805 |
| 5 | -20.50 | 1292 | 1366 | 2658 | 1730 | 0 | 0 | 1730 |
| 5 | -21.00 | 1171 | 1474 | 2645 | 1722 | 0 | 0 | 1722 |
| 5 | -21.50 | 1026 | 1582 | 2608 | 1698 | 0 | 0 | 1698 |
| 6 | -18.00 | 1248 | 840 | 2088 | 1359 | 0 | 0 | 1359 |
| 6 | -18.50 | 1330 | 948 | 2278 | 1483 | 0 | 0 | 1483 |
| 6 | -19.00 | 1357 | 1056 | 2413 | 1571 | 0 | 0 | 1571 |
| 6 | -19.50 | 1558 | 1165 | 2723 | 1773 | 0 | 0 | 1773 |
| 6 | -20.00 | 1979 | 1273 | 3252 | 2117 | 0 | 0 | 2117 |
| 6 | -20.50 | 2321 | 1382 | 3703 | 2411 | 0 | 0 | 2411 |
| 6 | -21.00 | 2450 | 1490 | 3940 | 2565 | 0 | 0 | 2565 |
| 6 | -21.50 | 2493 | 1598 | 4091 | 2663 | 0 | 0 | 2663 |
| 8 | -18.00 | 953 | 943 | 1896 | 1234 | 0 | 0 | 1234 |
| 8 | -18.50 | 1917 | 1042 | 2959 | 1926 | 0 | 0 | 1926 |
| 8 | -19.00 | 2049 | 1151 | 3200 | 2083 | 0 | 0 | 2083 |
| 8 | -19.50 | 2145 | 1259 | 3404 | 2216 | 0 | 0 | 2216 |
| 8 | -20.00 | 1862 | 1368 | 3230 | 2103 | 0 | 0 | 2103 |
| 8 | -20.50 | 1738 | 1476 | 3214 | 2092 | 0 | 0 | 2092 |
| 8 | -21.00 | 1745 | 1584 | 3329 | 2167 | 0 | 0 | 2167 |

| CPT name | Level [m R.L.] | Rb;cal;max [kN] | Rs;cal;max [kN] | Rc;cal;max [kN] | Rc;d [kN] | F;nsf;rep [kN] | Fnsf;d [kN] | Rc;net;d [kN] |
|---|---|---|---|---|---|---|---|---|
| 8 | -21.50 | 1727 | 1693 | 3420 | 2227 | 0 | 0 | 2227 |
| 9 | -18.00 | 1570 | 1066 | 2636 | 1716 | 0 | 0 | 1716 |
| 9 | -18.50 | 2031 | 1174 | 3205 | 2087 | 0 | 0 | 2087 |
| 9 | -19.00 | 2112 | 1282 | 3394 | 2210 | 0 | 0 | 2210 |
| 9 | -19.50 | 2217 | 1391 | 3608 | 2349 | 0 | 0 | 2349 |
| 9 | -20.00 | 2109 | 1499 | 3608 | 2349 | 0 | 0 | 2349 |
| 9 | -20.50 | 2208 | 1608 | 3816 | 2484 | 0 | 0 | 2484 |
| 9 | -21.00 | 2290 | 1716 | 4006 | 2608 | 0 | 0 | 2608 |
| 9 | -21.50 | 2320 | 1824 | 4144 | 2698 | 0 | 0 | 2698 |

* Rc;net;d = Rc;d - Fnsf;d

### 3.8 Summar et Bearing Capacit in k

| CPT name | Groundlevel [m R.L.] | Level [m R.L.] | fundex 460-560 Rc;net;d [kN] | DPA 410 Rc;net;d [kN] | fundex 380-450 Rc;net;d [kN] | DPA 460 Rc;net;d [kN] |
|---|---|---|---|---|---|---|
| 3 | 0,84 | -18,00 | 1588,00 | 1005,00 | 1135,00 | 1189,0 |
| 3 | 0,84 | -18,50 | 2443,00 | 1374,00 | 1633,00 | 1667,0 |
| 3 | 0,84 | -19,00 | 3030,00 | 1838,00 | 2115,00 | 2212,0 |
| 3 | 0,84 | -19,50 | 3044,00 | 1969,00 | 2171,00 | 2180,0 |
| 3 | 0,84 | -20,00 | 3155,00 | 1940,00 | 2230,00 | 2307,0 |
| 3 | 0,84 | -20,50 | 3290,00 | 2036,00 | 2287,00 | 2402,0 |
| 3 | 0,84 | -21,00 | 3378,00 | 2134,00 | 2344,00 | 2523,0 |
| 3 | 0,84 | -21,50 | 3449,00 | 2221,00 | 2402,00 | 2658,0 |
| 5 | 0,84 | -18,00 | 2551,00 | 1434,00 | 1728,00 | 1733,0 |
| 5 | 0,84 | -18,50 | 2865,00 | 1679,00 | 2008,00 | 2008,0 |
| 5 | 0,84 | -19,00 | 3081,00 | 1893,00 | 2104,00 | 2261,0 |
| 5 | 0,84 | -19,50 | 2432,00 | 1956,00 | 2161,00 | 2332,0 |
| 5 | 0,84 | -20,00 | 2255,00 | 1708,00 | 1750,00 | 1805,0 |
| 5 | 0,84 | -20,50 | 2257,00 | 1480,00 | 1633,00 | 1730,0 |
| 5 | 0,84 | -21,00 | 2229,00 | 1461,00 | 1600,00 | 1722,0 |
| 5 | 0,84 | -21,50 | 2142,00 | 1449,00 | 1556,00 | 1698,0 |
| 6 | 0,85 | -18,00 | 1881,00 | 1139,00 | 1320,00 | 1359,0 |
| 6 | 0,85 | -18,50 | 2023,00 | 1250,00 | 1437,00 | 1483,0 |
| 6 | 0,85 | -19,00 | 2109,00 | 1327,00 | 1513,00 | 1571,0 |
| 6 | 0,85 | -19,50 | 2404,00 | 1493,00 | 1708,00 | 1773,0 |
| 6 | 0,85 | -20,00 | 2934,00 | 1777,00 | 2059,00 | 2117,0 |
| 6 | 0,85 | -20,50 | 3303,00 | 2057,00 | 2284,00 | 2411,0 |
| 6 | 0,85 | -21,00 | 3374,00 | 2154,00 | 2341,00 | 2565,0 |
| 6 | 0,85 | -21,50 | 3444,00 | 2217,00 | 2398,00 | 2663,0 |
| 8 | 0,85 | -18,00 | 1682,00 | 1034,00 | 1168,00 | 1234,0 |
| 8 | 0,85 | -18,50 | 2694,00 | 1609,00 | 1898,00 | 1926,0 |
| 8 | 0,85 | -19,00 | 2878,00 | 1745,00 | 2050,00 | 2083,0 |
| 8 | 0,85 | -19,50 | 2714,00 | 1874,00 | 2175,00 | 2216,0 |
| 8 | 0,85 | -20,00 | 2752,00 | 1840,00 | 2035,00 | 2103,0 |
| 8 | 0,85 | -20,50 | 2757,00 | 1835,00 | 2020,00 | 2092,0 |
| 8 | 0,85 | -21,00 | 2840,00 | 1841,00 | 2067,00 | 2167,0 |
| 8 | 0,85 | -21,50 | 2898,00 | 1891,00 | 2109,00 | 2227,0 |
| 9 | 0,79 | -18,00 | 2387,00 | 1434,00 | 1665,00 | 1716,0 |
| 9 | 0,79 | -18,50 | 2864,00 | 1760,00 | 2072,00 | 2087,0 |
| 9 | 0,79 | -19,00 | 3041,00 | 1862,00 | 2163,00 | 2210,0 |
| 9 | 0,79 | -19,50 | 3018,00 | 1986,00 | 2288,00 | 2349,0 |
| 9 | 0,79 | -20,00 | 3158,00 | 1999,00 | 2279,00 | 2349,0 |
| 9 | 0,79 | -20,50 | 3313,00 | 2117,00 | 2403,00 | 2484,0 |
| 9 | 0,79 | -21,00 | 3452,00 | 2209,00 | 2460,00 | 2608,0 |
| 9 | 0,79 | -21,50 | 3590,00 | 2259,00 | 2518,00 | 2698,0 |

* Rc;net;d = Rc;d - Fnsf;d

## End of Report

**Bijlage 4 Uitvoer D-Foundation trek, rekenwaarde**

# Report for D-Foundations 17.1

Design and Verification according to Eurocode 7 of Bearing/Tension Piles and Shallow Foundations
Developed by Deltares

| | |
|---|---|
| Company: | CRUX Engineering B.V. |
| Date of report: | 5-3-2018 |
| Time of report: | 14:02:47 |
| Date of calculation: | 5-3-2018 |
| Time of calculation: | 14:01:03 |
| Filename: | P:\..\04 REK\GEO\Paal\DFoub1 Trekdraagvermogen kelder -2,6 |
| Project identification: | |
| | D-Foundations DFoub1 Trekdraagvermogen kelder -2,6 |



## 1 Table of Contents


1 Table of Contents 2
2 Input Data 4
2.1 General Input Data 4
2.2 General Report Data 4
2.3 Application Area Model Tension Piles (EC7-NL) 4
2.4 General CPT Data 4
2.4.1 View of CPT's in Foundation Plan 4
2.5 Soil Data 5
2.5.1 Soil Profile 3 5
2.5.2 Soil Profile 5 6
2.5.3 Soil Profile 6 7
2.5.4 Soil Profile 8 8
2.5.5 Soil Profile 9 9
2.6 Pile Types 11
2.6.1 Pile type : fundex 380/450 11
2.6.2 Pile type : fundex 460/560 11
2.6.3 Pile type : DPA 360 12
2.6.4 Pile type : DPA 410 12
2.6.5 Pile type : DPA 460 12
2.6.6 Pile type : fundex 406/560 12
2.7 Foundation Plan 13
2.7.1 View of Foundation Plan 13
2.8 Excavation Data 13
2.9 Optional Parameters 14
2.10 Overruled Parameters 14
2.11 Model Options 14
2.12 Model Options 14
3 Tension Piles (EC7-NL): Indication Bearing Capacity 16
3.1 Errors and Warnings 16
3.2 Remarks 16
3.3 Calculation Parameters 16
3.3.1 Pile Factors 16
3.3.2 Pile type : fundex 460/560 16
3.3.3 Pile type : DPA 410 16
3.3.4 Pile type : DPA 460 17
3.3.5 Pile type : fundex 380/450 17
3.4 Results for all CPT's 17
3.4.1 Results for pile type : fundex 460/560 17
3.4.1.1 Pile group 1 17
3.4.1.2 Pile group 2 17
3.4.1.3 Pile group 3 18
3.4.1.4 Pile group 4 18
3.4.2 Results for pile type : DPA 410 18
3.4.2.1 Pile group 1 18
3.4.2.2 Pile group 2 19
3.4.2.3 Pile group 3 19
3.4.2.4 Pile group 4 19
3.4.3 Results for pile type : DPA 460 19
3.4.3.1 Pile group 1 20
3.4.3.2 Pile group 2 20
3.4.3.3 Pile group 3 20
3.4.3.4 Pile group 4 20
3.4.4 Results for pile type : fundex 380/450 21
3.4.4.1 Pile group 1 21
3.4.4.2 Pile group 2 21
3.4.4.3 Pile group 3 21
3.4.4.4 Pile group 4 22
3.5 INDICATIVE: Results using Ksi3 22
3.5.1 Results for pile type : fundex 460/560 22
3.5.1.1 Pile group 1 22
3.5.1.2 Pile group 2 23
3.5.1.3 Pile group 3 24
3.5.1.4 Pile group 4 25

3.5.2 Results for pile type : DPA 410 26
3.5.2.1 Pile group 1 26
3.5.2.2 Pile group 2 27
3.5.2.3 Pile group 3 28
3.5.2.4 Pile group 4 29
3.5.3 Results for pile type : DPA 460 30
3.5.3.1 Pile group 1 30
3.5.3.2 Pile group 2 31
3.5.3.3 Pile group 3 32
3.5.3.4 Pile group 4 33
3.5.4 Results for pile type : fundex 380/450 34
3.5.4.1 Pile group 1 34
3.5.4.2 Pile group 2 35
3.5.4.3 Pile group 3 36
3.5.4.4 Pile group 4 37





# 2 nput Data

## 2.1 General nput Data

| | |
|---|---|
| Model | Tension Piles (EC7-NL) |

## 2.2 General Report Data

| | |
|---|---|
| Geotechnical consultant : | |
| Design engineer superstructure : | |
| Principal : | |
| Title 1 : | |
| Title 2 : | |
| Title 3 : | D-Foundations DFoub1 Trekdraagvermogen kelder -2,6 |
| Number of project : | |
| Location of project : | |

## 2.3 pplication rea odel Tension Piles EC7-

The design and verifications performed by the TENSION PILES (EC7-NL) model of D-FOUNDATIONS concern pile foundations on which axial static or quasi-static loads cause tensile forces in the piles. Pilegroup effects are taken into account. Calculation of pile forces is based on Cone Penetration Tests. Pile capacities are based on the NEN 9997-1:2016, chapter 7 and where pile/safety factors are concerned, on Dutch Standards NEN 9997-1:2016. Horizontal displacements of piles are not taken into account. Vertical displacements of piles are not calculated. Design of Tension piles based on NEN 9997-1:2016 is limited to piles with lengths between 7 and 50 m and a minimum Length over (equivalent) diameter ratio of 13.5.

## 2.4 General CPT Data

| | |
|---|---|
| Number of CPT's : | 5 |
| Timing of CPT's : | CPT - Install - Excavation |

### 2.4.1 View of CPT's in Foundation Plan



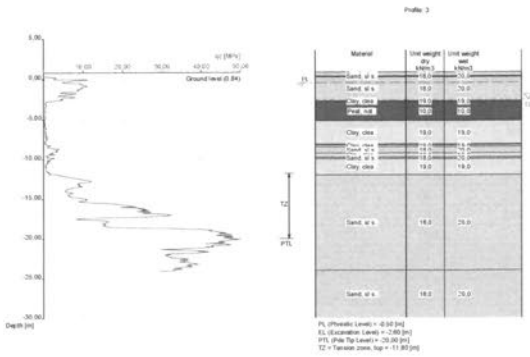
| Number/name CPT | X-coor-dinate [m] | Y-coor-dinate [m] |
|---|---|---|
| 1: 3 | 118155,78 | 484051,62 |
| 2: 5 | 0,00 | 0,00 |
| 3: 6 | 118139,99 | 484052,09 |
| 4: 8 | 0,00 | 0,00 |
| 5: 9 | 118121,90 | 484051,98 |

## 2.5 Soil Data

Number of soil profiles (= number of CPT's) : 5

### 2.5.1 Soil Profile 3

| | |
|---|---|
| Belonging to CPT | 3 |
| Surface level in [m. reference level] : | 0,84 |
| Phreatic level in [m. reference level] : | -0,50 |
| Top of tension zone [m. reference level]: | -11,80 |
| Pile tip level in [m. reference level] : | -20,00 |
| Number of layers in profile : | 14 |



| Number layer | Top layer [m R.L.] | Soil Type | Gamma [kN/m3] | Gamma sat [kN/m3] | Min. Void Ratio [%] | Max. Void Ratio [%] | Median [mm] | Max. Cone resistance [kPa] | Use Max. Cone resistance |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0,840 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 2 | 0,340 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 3 | 0,240 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 4 | -2,760 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 5 | -2,860 | Peat | 10,00 | 10,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 6 | -5,220 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 7 | -8,139 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 8 | -8,239 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 9 | -8,459 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 10 | -9,278 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 11 | -9,778 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |



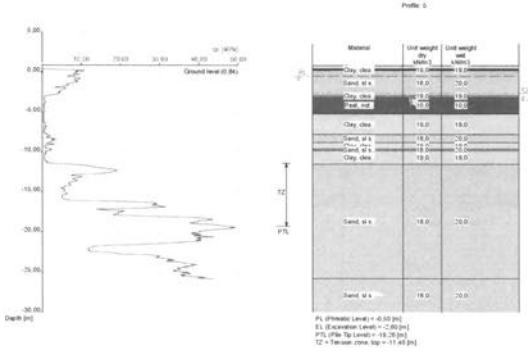


| Number layer | Top layer [m R.L.] | Soil Type | Gamma [kN/m3] | Gamma sat [kN/m3] | Min. Void Ratio [%] | Max. Void Ratio [%] | Median [mm] | Max. Cone resistance [kPa] | Use Max. Cone resistance |
|---|---|---|---|---|---|---|---|---|---|
| 12 | -9,978 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 13 | -12,016 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 14 | -24,024 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |

| Number layer | Top layer [m R.L.] | Soil Type | Phi [deg] | Addit. PP at top [kN/m2] | Addit. PP at bottom [kN/m2] | OCR value [-] | Use Tension |
|---|---|---|---|---|---|---|---|
| 1 | 0,840 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 2 | 0,340 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 3 | 0,240 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 4 | -2,760 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 5 | -2,860 | Peat | 15,00 | 0,00 | 0,00 | 1,000 | False |
| 6 | -5,220 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 7 | -8,139 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 8 | -8,239 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 9 | -8,459 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 10 | -9,278 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 11 | -9,778 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 12 | -9,978 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 13 | -12,016 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 14 | -24,024 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |

### 2.5.2 Soil Profile 5

| | |
|---|---|
| Belonging to CPT | 5 |
| Surface level in [m. reference level] : | 0,84 |
| Phreatic level in [m. reference level] : | -0,50 |
| Top of tension zone [m. reference level]: | -11,40 |
| Pile tip level in [m. reference level] : | -19,26 |
| Number of layers in profile : | 13 |



| Number layer | Top layer [m R.L.] | Soil Type | Gamma [kN/m3] | Gamma sat [kN/m3] | Min. Void Ratio [%] | Max. Void Ratio [%] | Median [mm] | Max. Cone resistance [kPa] | Use Max. Cone resistance |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0,840 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 2 | 0,440 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 3 | 0,340 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 4 | 0,240 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 5 | -2,879 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 6 | -3,079 | Peat | 10,00 | 10,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 7 | -5,218 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 8 | -7,795 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 9 | -8,814 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 10 | -9,633 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 11 | -9,852 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 12 | -11,509 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 13 | -25,770 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |

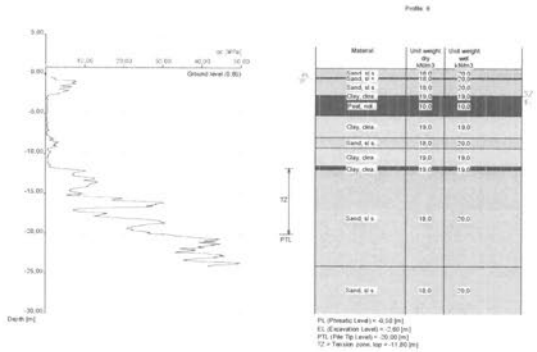
| Number layer | Top layer [m R.L.] | Soil Type | Phi [deg] | Addit. PP at top [kN/m2] | Addit. PP at bottom [kN/m2] | OCR value [-] | Use Tension |
|---|---|---|---|---|---|---|---|
| 1 | 0,840 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 2 | 0,440 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 3 | 0,340 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 4 | 0,240 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 5 | -2,879 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 6 | -3,079 | Peat | 15,00 | 0,00 | 0,00 | 1,000 | False |
| 7 | -5,218 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 8 | -7,795 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 9 | -8,814 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 10 | -9,633 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 11 | -9,852 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 12 | -11,509 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 13 | -25,770 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |

### 2.5.3 Soil Profile 6

| | |
|---|---|
| Belonging to CPT | 6 |
| Surface level in [m. reference level] : | 0,85 |
| Phreatic level in [m. reference level] : | -0,50 |
| Top of tension zone [m. reference level]: | -11,80 |
| Pile tip level in [m. reference level] : | -20,00 |
| Number of layers in profile : | 12 |







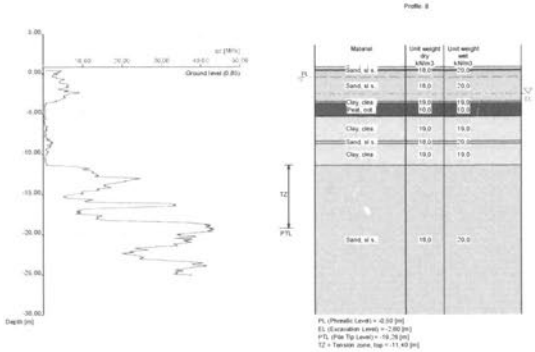
| Number layer | Top layer [m R.L.] | Soil Type | Gamma [kN/m3] | Gamma sat [kN/m3] | Min. Void Ratio [%] | Max. Void Ratio [%] | Median [mm] | Max. Cone resistance [kPa] | Use Max. Cone resistance |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0,850 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 2 | -0,350 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 3 | -0,450 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 4 | -2,589 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 5 | -2,689 | Peat | 10,00 | 10,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 6 | -5,108 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 7 | -7,865 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 8 | -9,184 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 9 | -11,479 | Peat | 10,00 | 10,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 10 | -11,798 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 11 | -11,898 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 12 | -23,987 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |

| Number layer | Top layer [m R.L.] | Soil Type | Phi [deg] | Addit. PP at top [kN/m2] | Addit. PP at bottom [kN/m2] | OCR value [-] | Use Tension |
|---|---|---|---|---|---|---|---|
| 1 | 0,850 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 2 | -0,350 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 3 | -0,450 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 4 | -2,589 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 5 | -2,689 | Peat | 15,00 | 0,00 | 0,00 | 1,000 | False |
| 6 | -5,108 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 7 | -7,865 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 8 | -9,184 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 9 | -11,479 | Peat | 15,00 | 0,00 | 0,00 | 1,000 | False |
| 10 | -11,798 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 11 | -11,898 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 12 | -23,987 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |

### 2.5.4 Soil Profile 8

| | |
|---|---|
| Belonging to CPT | 8 |
| Surface level in [m. reference level] : | 0,85 |

| | |
|---|---|
| Phreatic level in [m. reference level] : | -0,50 |
| Top of tension zone [m. reference level]: | -11,40 |
| Pile tip level in [m. reference level] : | -19,26 |
| Number of layers in profile : | 9 |



| Number layer | Top layer [m R.L.] | Soil Type | Gamma [kN/m3] | Gamma sat [kN/m3] | Min. Void Ratio [%] | Max. Void Ratio [%] | Median [mm] | Max. Cone resistance [kPa] | Use Max. Cone resistance |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0,850 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 2 | 0,450 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 3 | 0,350 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 4 | -3,550 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 5 | -3,750 | Peat | 10,00 | 10,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 6 | -5,389 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 7 | -8,428 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 8 | -8,728 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 9 | -11,466 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |

| Number layer | Top layer [m R.L.] | Soil Type | Phi [deg] | Addit. PP at top [kN/m2] | Addit. PP at bottom [kN/m2] | OCR value [-] | Use Tension |
|---|---|---|---|---|---|---|---|
| 1 | 0,850 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 2 | 0,450 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 3 | 0,350 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 4 | -3,550 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 5 | -3,750 | Peat | 15,00 | 0,00 | 0,00 | 1,000 | False |
| 6 | -5,389 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 7 | -8,428 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 8 | -8,728 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 9 | -11,466 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |

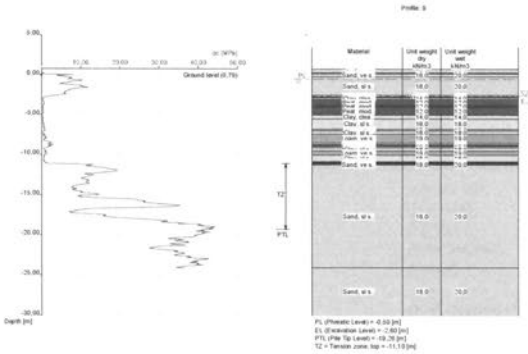
**2.5.5 Soil Profile**

| | |
|---|---|
| Belonging to CPT | 9 |
| Surface level in [m. reference level] : | 0,79 |
| Phreatic level in [m. reference level] : | -0,50 |
| Top of tension zone [m. reference level]: | -11,10 |





| | |
|---|---|
| Pile tip level in [m. reference level] : | -19,26 |
| Number of layers in profile : | 28 |



| Number layer | Top layer [m R.L.] | Soil Type | Gamma [kN/m3] | Gamma sat [kN/m3] | Min. Void Ratio [%] | Max. Void Ratio [%] | Median [mm] | Max. Cone resistance [kPa] | Use Max. Cone resistance |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0,790 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 2 | 0,290 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 3 | 0,190 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 4 | -0,210 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 5 | -2,510 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 6 | -2,710 | Loam | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 7 | -2,810 | Clay | 14,00 | 14,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 8 | -3,010 | Peat | 12,00 | 12,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 9 | -3,810 | Peat | 12,00 | 12,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 10 | -4,010 | Peat | 12,00 | 12,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 11 | -5,010 | Clay | 14,00 | 14,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 12 | -5,510 | Clay | 18,00 | 18,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 13 | -6,790 | Loam | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 14 | -7,009 | Clay | 18,00 | 18,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 15 | -7,409 | Loam | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 16 | -8,509 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 17 | -8,709 | Loam | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 18 | -8,809 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 19 | -8,909 | Loam | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 20 | -9,109 | Clay | 18,00 | 18,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 21 | -9,509 | Loam | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 22 | -10,028 | Clay | 18,00 | 18,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 23 | -10,828 | Loam | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 24 | -10,928 | Clay | 18,00 | 18,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 25 | -11,028 | Loam | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 26 | -11,128 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 27 | -11,228 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 28 | -24,059 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |

| Number layer | Top layer [m R.L.] | Soil Type | Phi [deg] | Addit. PP at top [kN/m2] | Addit. PP at bottom [kN/m2] | OCR value [-] | Use Tension |
|---|---|---|---|---|---|---|---|
| 1 | 0,790 | Sand | 25,00 | 0,00 | 0,00 | 1,000 | True |
| 2 | 0,290 | Sand | 25,00 | 0,00 | 0,00 | 1,000 | True |
| 3 | 0,190 | Sand | 25,00 | 0,00 | 0,00 | 1,000 | True |
| 4 | -0,210 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 5 | -2,510 | Sand | 25,00 | 0,00 | 0,00 | 1,000 | True |
| 6 | -2,710 | Loam | 27,50 | 0,00 | 0,00 | 1,000 | True |
| 7 | -2,810 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 8 | -3,010 | Peat | 15,00 | 0,00 | 0,00 | 1,000 | False |
| 9 | -3,810 | Peat | 15,00 | 0,00 | 0,00 | 1,000 | False |
| 10 | -4,010 | Peat | 15,00 | 0,00 | 0,00 | 1,000 | False |
| 11 | -5,010 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 12 | -5,510 | Clay | 22,50 | 0,00 | 0,00 | 1,000 | True |
| 13 | -6,790 | Loam | 27,50 | 0,00 | 0,00 | 1,000 | True |
| 14 | -7,009 | Clay | 22,50 | 0,00 | 0,00 | 1,000 | True |
| 15 | -7,409 | Loam | 27,50 | 0,00 | 0,00 | 1,000 | True |
| 16 | -8,509 | Sand | 25,00 | 0,00 | 0,00 | 1,000 | True |
| 17 | -8,709 | Loam | 27,50 | 0,00 | 0,00 | 1,000 | True |
| 18 | -8,809 | Sand | 25,00 | 0,00 | 0,00 | 1,000 | True |
| 19 | -8,909 | Loam | 27,50 | 0,00 | 0,00 | 1,000 | True |
| 20 | -9,109 | Clay | 22,50 | 0,00 | 0,00 | 1,000 | True |
| 21 | -9,509 | Loam | 27,50 | 0,00 | 0,00 | 1,000 | True |
| 22 | -10,028 | Clay | 22,50 | 0,00 | 0,00 | 1,000 | True |
| 23 | -10,828 | Loam | 27,50 | 0,00 | 0,00 | 1,000 | True |
| 24 | -10,928 | Clay | 22,50 | 0,00 | 0,00 | 1,000 | True |
| 25 | -11,028 | Loam | 27,50 | 0,00 | 0,00 | 1,000 | True |
| 26 | -11,128 | Sand | 25,00 | 0,00 | 0,00 | 1,000 | True |
| 27 | -11,228 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 28 | -24,059 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |

## 2.6 Pile Types

Note : if alpha;t is not user defined, the next rules apply :
- alpha;t according to table 7.g and table 7.h of NEN 9997-1:2016
- for clay: alpha;t depends on the CPT-value and relative depth
- for peat: alpha;t = 0
- for sand/gravel: alpha;t also depends on the median

Number of pile types : 6

### 2.6.1 Pile type : funde 380/450

Pile type for shaft friction factor (alpha;t) sand/gravel : Screw pile, cast in place, lost tip

Pile type for shaft friction factor (alpha;t) clay : User defined
Shaft friction factor clay [-] : 0,0000
Materialtype for pile : Concrete
Pile shape : Round pile with lost tip

Pile dimensions :
- Diameter at tip [m] : 0,450
- Diameter shaft [m] : 0,415
- Effective heigth enlarged base [m] : 0,000

### 2.6.2 Pile type : funde 460/560

Pile type for shaft friction factor (alpha;t) sand/gravel : Screw pile, cast in place, lost tip

Pile type for shaft friction factor (alpha;t) clay : User defined
Shaft friction factor clay [-] : 0,0000
Materialtype for pile : Concrete
Pile shape : Round pile with lost tip





Pile dimensions :
- Diameter at tip [m] : 0,560
- Diameter shaft [m] : 0,510
- Effective heigth enlarged base [m] : 0,000

### 2.6.3 Pile type : DP 360

Pile type for shaft friction factor (alpha;t) sand/gravel : User defined (vibrating)

Shaft friction factor sand/gravel [-] : 0,0090
Pile type for shaft friction factor (alpha;t) clay : User defined
Shaft friction factor clay [-] : 0,0000
Materialtype for pile : Concrete
Pile shape : Round pile

Pile dimensions :
- Diameter [m] : 0,360

### 2.6.4 Pile type : DP 410

Pile type for shaft friction factor (alpha;t) sand/gravel : User defined (vibrating)

Shaft friction factor sand/gravel [-] : 0,0090
Pile type for shaft friction factor (alpha;t) clay : User defined
Shaft friction factor clay [-] : 0,0000
Materialtype for pile : Concrete
Pile shape : Round pile

Pile dimensions :
- Diameter [m] : 0,410

### 2.6.5 Pile type : DP 460

Pile type for shaft friction factor (alpha;t) sand/gravel : User defined (vibrating)

Shaft friction factor sand/gravel [-] : 0,0090
Pile type for shaft friction factor (alpha;t) clay : User defined
Shaft friction factor clay [-] : 0,0000
Materialtype for pile : Concrete
Pile shape : Round pile

Pile dimensions :
- Diameter [m] : 0,460

### 2.6.6 Pile type : funde 406/560

Pile type for shaft friction factor (alpha;t) sand/gravel : Screw pile, cast in place, lost tip

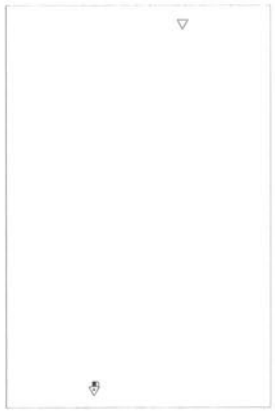
Pile type for shaft friction factor (alpha;t) clay : User defined
Shaft friction factor clay [-] : 0,0000
Materialtype for pile : Concrete
Pile shape : Round pile with lost tip

Pile dimensions :
- Diameter at tip [m] : 0,560
- Diameter shaft [m] : 0,483
- Effective heigth enlarged base [m] : 0,000

## 2.7 Foundation Plan

Number of piles : 9
Number of collaborating piles* : 1
* : 0 = not defined, 1 = non rigid superstructure, >1 = rigid superstructure

### 2.7.1 View of Foundation Plan




| Pile nr./code | X-coor-dinate [m] | Y-coor-dinate [m] | Maximum load [kN] | Minimum load [kN] | Pile head level [m R.L.] | Use alternat. loads | Factor Gamma;var |
|---|---|---|---|---|---|---|---|
| 1: 1 | 0,00 | 0,00 | 0,00 | 0,00 | -2,60 | False | n.a. |
| 2: 2 | 0,00 | 2,00 | 0,00 | 0,00 | -2,60 | False | n.a. |
| 3: 3 | 2,00 | 0,00 | 0,00 | 0,00 | -2,60 | False | n.a. |
| 4: 4 | -2,00 | -2,00 | 0,00 | 0,00 | -2,60 | False | n.a. |
| 5: 5 | 2,00 | -2,00 | 0,00 | 0,00 | -2,60 | False | n.a. |
| 6: 6 | -2,00 | 2,00 | 0,00 | 0,00 | -2,60 | False | n.a. |
| 7: 7 | -2,00 | 0,00 | 0,00 | 0,00 | -2,60 | False | n.a. |
| 8: 9 | 2,00 | 2,00 | 0,00 | 0,00 | -2,60 | False | n.a. |
| 9: 10 | 0,00 | -2,00 | 0,00 | 0,00 | -2,60 | False | n.a. |

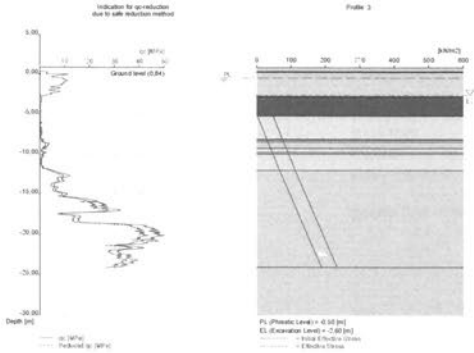
Note regarding the loads: tension forces are positive, compressive forces are negative
Note 2: See OVERRULED PARAMETERS for gamma;var

## 2.8 E□cavation Data

Excavation level in [m. reference level] : -2,60
Reduction model : Safe (NEN)







## 2.□□□ptional Parameters

Unit weight water [kN/m3] : 9,81
Surcharge [kN/m2] : 0,00

## 2.10 □verruled Parameters

| | |
|---|---|
| User defined gamma;var [-] | 1,00 |
| User defined Factor xi3 [-] : | 1,28 |
| User defined Factor xi4 [-] : | 1,03 |
| User defined gamma;st [-] | 1,35 |

## 2.11 □odel □ptions

Suppress compaction
If compaction is used, according to NEN 9997-1:2016 CPT's should be made after installation to verify this assumption
Use the influence of excavations (standard).
Suppress excess pore pressure

## 2.12 □odel □ptions

Selected pile types :
-fundex 460/560
-DPA 410
-DPA 460
-fundex 380/450

Selected profiles :
-3
-5
-6
-8
-9
Trajectory
-begin [m] : -18,00

| | |
|---|---|
| -end [m] : | -21,75 |
| -interval [m] : | 0,50 |





# 3 Tension Piles EC7- : ndication Bearing Capacit

## 3.1 Errors and arnings

Warning : The factor xi3 (NEN 9997-1:2016) is user defined. Evidence to support this from the NEN deviating value has to be provided.
Warning : The factor xi4 (NEN 9997-1:2016) is user defined. Evidence to support this from the NEN deviating value has to be provided.
Warning : The factor gamma;st (NEN 9997-1:2016) is user defined. Evidence to support this from the NEN deviating value has to be provided.
Warning : The factor gamma;var (NEN 9997-1:2016) is user defined. Evidence to support this from the NEN deviating value has to be provided.
At pile type fundex 460/560 :
Due to the use of a low vibrating pile type, the reduction of CPT-value due to the excavation is done using NEN 9997-1:2016.

At pile type fundex 380/450 :
Due to the use of a low vibrating pile type, the reduction of CPT-value due to the excavation is done using NEN 9997-1:2016.

When reviewing the following results, warnings listed above should be considered.

## 3.2 Remarks

When calculating the max. mobilized soil weight, the topangle is used according to NEN 9997-1:2016.

## 3.3 Calculation Parameters

### 3.3.1 Pile Factors

| | |
|---|---|
| xi3 (user defined) : | 1,28 |
| xi4 (user defined) : | 1,03 |
| User defined gamma;var [-] | 1,000 |
| User defined gamma;st [-] | 1,350 |
| Factor gamma;gamma according to NEN 9997-1:2016 table A.2 [-] | |
| Above excavation level | 1,0 |
| Below excavation level | 1,1 |

### 3.3.2 Pile t pe : funde 460 560

| | |
|---|---|
| Pile type for shaft friction factor (alpha;t) sand/gravel : | Screw pile, cast in place, lost tip |
| Pile type for shaft friction factor (alpha;t) clay : | User defined |
| Shaft friction factor clay [-] : | 0,0000 |
| Materialtype for pile : | Concrete |
| Pile shape : | Round pile with lost tip |
| Pile dimensions : | |
| Diameter at tip [m] : | 0,560 |
| Diameter shaft [m] : | 0,510 |
| Effective heigth enlarged base [m] : | 0,000 |

### 3.3.3 Pile t pe : DP 410

| | |
|---|---|
| Pile type for shaft friction factor (alpha;t) sand/gravel : | User defined (vibrating) |
| Shaft friction factor sand/gravel [-] : | 0,0090 |
| Pile type for shaft friction factor (alpha;t) clay : | User defined |
| Shaft friction factor clay [-] : | 0,0000 |
| Materialtype for pile : | Concrete |
| Pile shape : | Round pile |

Pile dimensions :
Diameter [m] : 0,410

### 3.3.4 Pile type : DP 460

Pile type for shaft friction factor (alpha;t) sand/gravel : User defined (vibrating)

Shaft friction factor sand/gravel [-] : 0,0090
Pile type for shaft friction factor (alpha;t) clay : User defined
Shaft friction factor clay [-] : 0,0000
Materialtype for pile : Concrete
Pile shape : Round pile

Pile dimensions :
Diameter [m] : 0,460

### 3.3.5 Pile type : funde 380/450

Pile type for shaft friction factor (alpha;t) sand/gravel : Screw pile, cast in place, lost tip

Pile type for shaft friction factor (alpha;t) clay : User defined
Shaft friction factor clay [-] : 0,0000
Materialtype for pile : Concrete
Pile shape : Round pile with lost tip

Pile dimensions :
Diameter at tip [m] : 0,450
Diameter shaft [m] : 0,415
Effective heigth enlarged base [m] : 0,000

## 3.4 Results for all CPT's

### 3.4.1 Results for pile type : funde 460/560

3.4.1.1 Pile group 1

Number of piles belonging to this pile group : 1
Names of piles belonging to this pile group
1

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 360,04 | 358,07 | 358,07 | Ksi3 |
| -18,50 | 375,93 | 381,91 | 375,93 | Ksi4 |
| -19,00 | 391,82 | 405,61 | 391,82 | Ksi4 |
| -19,50 | 407,71 | 423,93 | 407,71 | Ksi4 |
| -20,00 | 423,60 | 439,82 | 423,60 | Ksi4 |
| -20,50 | 439,49 | 455,71 | 439,49 | Ksi4 |
| -21,00 | 455,38 | 471,60 | 455,38 | Ksi4 |
| -21,50 | 471,27 | 487,49 | 471,27 | Ksi4 |

3.4.1.2 Pile group 2

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
2
10





| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 403,59 | 388,88 | 388,88 | Ksi3 |
| -18,50 | 439,28 | 419,71 | 419,71 | Ksi3 |
| -19,00 | 472,56 | 450,87 | 450,87 | Ksi3 |
| -19,50 | 504,06 | 480,64 | 480,64 | Ksi3 |
| -20,00 | 534,29 | 509,30 | 509,30 | Ksi3 |
| -20,50 | 563,61 | 537,07 | 537,07 | Ksi3 |
| -21,00 | 592,26 | 564,14 | 564,14 | Ksi3 |
| -21,50 | 620,42 | 590,63 | 590,63 | Ksi3 |

3.4.1.3 Pile group 3

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
3
7

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 403,59 | 388,88 | 388,88 | Ksi3 |
| -18,50 | 439,28 | 419,71 | 419,71 | Ksi3 |
| -19,00 | 472,56 | 450,87 | 450,87 | Ksi3 |
| -19,50 | 504,06 | 480,64 | 480,64 | Ksi3 |
| -20,00 | 534,29 | 509,30 | 509,30 | Ksi3 |
| -20,50 | 563,61 | 537,07 | 537,07 | Ksi3 |
| -21,00 | 592,26 | 564,14 | 564,14 | Ksi3 |
| -21,50 | 620,42 | 590,63 | 590,63 | Ksi3 |

3.4.1.4 Pile group 4

Number of piles belonging to this pile group : 4
Names of piles belonging to this pile group
4
5
6
9

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 465,02 | 439,15 | 439,15 | Ksi3 |
| -18,50 | 514,14 | 479,04 | 479,04 | Ksi3 |
| -19,00 | 561,57 | 520,32 | 520,32 | Ksi3 |
| -19,50 | 607,74 | 560,64 | 560,64 | Ksi3 |
| -20,00 | 652,99 | 600,18 | 600,18 | Ksi3 |
| -20,50 | 697,57 | 639,08 | 639,08 | Ksi3 |
| -21,00 | 741,64 | 677,48 | 677,48 | Ksi3 |
| -21,50 | 785,34 | 715,47 | 715,47 | Ksi3 |

### 3.4.2 Results for pile type : DP 410

3.4.2.1 Pile group 1

Number of piles belonging to this pile group : 1
Names of piles belonging to this pile group
1

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 324,89 | 312,53 | 312,53 | Ksi3 |
| -18,50 | 353,39 | 337,52 | 337,52 | Ksi3 |
| -19,00 | 379,47 | 362,64 | 362,64 | Ksi3 |
| -19,50 | 403,53 | 386,41 | 386,41 | Ksi3 |
| -20,00 | 425,93 | 409,01 | 409,01 | Ksi3 |

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -20,50 | 446,57 | 430,60 | 430,60 | Ksi3 |
| -21,00 | 462,77 | 451,31 | 451,31 | Ksi3 |
| -21,50 | 478,96 | 471,28 | 471,28 | Ksi3 |

3.4.2.2 Pile group 2

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
2
10

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 348,36 | 331,55 | 331,55 | Ksi3 |
| -18,50 | 382,43 | 360,17 | 360,17 | Ksi3 |
| -19,00 | 414,54 | 389,39 | 389,39 | Ksi3 |
| -19,50 | 445,04 | 417,53 | 417,53 | Ksi3 |
| -20,00 | 474,24 | 444,72 | 444,72 | Ksi3 |
| -20,50 | 502,40 | 471,10 | 471,10 | Ksi3 |
| -21,00 | 529,73 | 496,80 | 496,80 | Ksi3 |
| -21,50 | 556,41 | 521,90 | 521,90 | Ksi3 |

3.4.2.3 Pile group 3

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
3
7

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 348,36 | 331,55 | 331,55 | Ksi3 |
| -18,50 | 382,43 | 360,17 | 360,17 | Ksi3 |
| -19,00 | 414,54 | 389,39 | 389,39 | Ksi3 |
| -19,50 | 445,04 | 417,53 | 417,53 | Ksi3 |
| -20,00 | 474,24 | 444,72 | 444,72 | Ksi3 |
| -20,50 | 502,40 | 471,10 | 471,10 | Ksi3 |
| -21,00 | 529,73 | 496,80 | 496,80 | Ksi3 |
| -21,50 | 556,41 | 521,90 | 521,90 | Ksi3 |

3.4.2.4 Pile group 4

Number of piles belonging to this pile group : 4
Names of piles belonging to this pile group
4
5
6
9

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 388,47 | 364,21 | 364,21 | Ksi3 |
| -18,50 | 431,64 | 398,88 | 398,88 | Ksi3 |
| -19,00 | 473,44 | 434,90 | 434,90 | Ksi3 |
| -19,50 | 514,12 | 470,18 | 470,18 | Ksi3 |
| -20,00 | 553,89 | 504,80 | 504,80 | Ksi3 |
| -20,50 | 592,93 | 538,86 | 538,86 | Ksi3 |
| -21,00 | 631,38 | 572,43 | 572,43 | Ksi3 |
| -21,50 | 669,35 | 605,59 | 605,59 | Ksi3 |

**3.4.3 Results for pile t pe : DP 460**





3.4.3.1 Pile group 1

Number of piles belonging to this pile group : 1
Names of piles belonging to this pile group
1

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 347,50 | 337,23 | 337,23 | Ksi3 |
| -18,50 | 375,50 | 362,53 | 362,53 | Ksi3 |
| -19,00 | 395,13 | 387,68 | 387,68 | Ksi3 |
| -19,50 | 411,18 | 411,15 | 411,15 | Ksi3 |
| -20,00 | 427,23 | 432,69 | 427,23 | Ksi4 |
| -20,50 | 443,27 | 453,25 | 443,27 | Ksi4 |
| -21,00 | 459,32 | 473,00 | 459,32 | Ksi4 |
| -21,50 | 475,37 | 491,24 | 475,37 | Ksi4 |

3.4.3.2 Pile group 2

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
2
10

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 377,25 | 361,29 | 361,29 | Ksi3 |
| -18,50 | 412,30 | 391,18 | 391,18 | Ksi3 |
| -19,00 | 445,12 | 421,53 | 421,53 | Ksi3 |
| -19,50 | 476,19 | 450,63 | 450,63 | Ksi3 |
| -20,00 | 505,94 | 478,67 | 478,67 | Ksi3 |
| -20,50 | 534,68 | 505,84 | 505,84 | Ksi3 |
| -21,00 | 562,65 | 532,28 | 532,28 | Ksi3 |
| -21,50 | 590,04 | 558,14 | 558,14 | Ksi3 |

3.4.3.3 Pile group 3

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
3
7

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 377,25 | 361,29 | 361,29 | Ksi3 |
| -18,50 | 412,30 | 391,18 | 391,18 | Ksi3 |
| -19,00 | 445,12 | 421,53 | 421,53 | Ksi3 |
| -19,50 | 476,19 | 450,63 | 450,63 | Ksi3 |
| -20,00 | 505,94 | 478,67 | 478,67 | Ksi3 |
| -20,50 | 534,68 | 505,84 | 505,84 | Ksi3 |
| -21,00 | 562,65 | 532,28 | 532,28 | Ksi3 |
| -21,50 | 590,04 | 558,14 | 558,14 | Ksi3 |

3.4.3.4 Pile group 4

Number of piles belonging to this pile group : 4
Names of piles belonging to this pile group
4
5
6
9

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 427,52 | 402,31 | 402,31 | Ksi3 |
| -18,50 | 473,78 | 439,70 | 439,70 | Ksi3 |
| -19,00 | 518,48 | 478,46 | 478,46 | Ksi3 |
| -19,50 | 561,97 | 516,36 | 516,36 | Ksi3 |
| -20,00 | 604,51 | 553,52 | 553,52 | Ksi3 |
| -20,50 | 646,32 | 590,07 | 590,07 | Ksi3 |
| -21,00 | 687,58 | 626,10 | 626,10 | Ksi3 |
| -21,50 | 728,40 | 661,72 | 661,72 | Ksi3 |

**3.4.4 Results for pile t pe : funde 380 450**

3.4.4.1 Pile group 1

Number of piles belonging to this pile group : 1
Names of piles belonging to this pile group
1

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 327,31 | 315,13 | 315,13 | Ksi3 |
| -18,50 | 355,79 | 340,18 | 340,18 | Ksi3 |
| -19,00 | 381,81 | 365,32 | 365,32 | Ksi3 |
| -19,50 | 405,78 | 389,09 | 389,09 | Ksi3 |
| -20,00 | 428,07 | 411,68 | 411,68 | Ksi3 |
| -20,50 | 446,27 | 433,24 | 433,24 | Ksi3 |
| -21,00 | 462,45 | 453,92 | 453,92 | Ksi3 |
| -21,50 | 478,63 | 473,84 | 473,84 | Ksi3 |

3.4.4.2 Pile group 2

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
2
10

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 351,37 | 334,62 | 334,62 | Ksi3 |
| -18,50 | 385,56 | 363,38 | 363,38 | Ksi3 |
| -19,00 | 417,75 | 392,74 | 392,74 | Ksi3 |
| -19,50 | 448,32 | 420,99 | 420,99 | Ksi3 |
| -20,00 | 477,58 | 448,28 | 448,28 | Ksi3 |
| -20,50 | 505,81 | 474,75 | 474,75 | Ksi3 |
| -21,00 | 533,21 | 500,53 | 500,53 | Ksi3 |
| -21,50 | 559,95 | 525,72 | 525,72 | Ksi3 |

3.4.4.3 Pile group 3

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
3
7

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 351,37 | 334,62 | 334,62 | Ksi3 |
| -18,50 | 385,56 | 363,38 | 363,38 | Ksi3 |
| -19,00 | 417,75 | 392,74 | 392,74 | Ksi3 |
| -19,50 | 448,32 | 420,99 | 420,99 | Ksi3 |
| -20,00 | 477,58 | 448,28 | 448,28 | Ksi3 |
| -20,50 | 505,81 | 474,75 | 474,75 | Ksi3 |
| -21,00 | 533,21 | 500,53 | 500,53 | Ksi3 |





| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -21,50 | 559,95 | 525,72 | 525,72 | Ksi3 |

3.4.4.4 Pile group 4

Number of piles belonging to this pile group : 4
Names of piles belonging to this pile group
4
5
6
9

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 392,45 | 368,08 | 368,08 | Ksi3 |
| -18,50 | 435,94 | 403,03 | 403,03 | Ksi3 |
| -19,00 | 478,04 | 439,34 | 439,34 | Ksi3 |
| -19,50 | 519,01 | 474,89 | 474,89 | Ksi3 |
| -20,00 | 559,07 | 509,77 | 509,77 | Ksi3 |
| -20,50 | 598,39 | 544,09 | 544,09 | Ksi3 |
| -21,00 | 637,12 | 577,91 | 577,91 | Ksi3 |
| -21,50 | 675,38 | 611,32 | 611,32 | Ksi3 |

**3.5 D C T VE: Results using si3**

**3.5.1 Results for pile t pe : funde 460 560**

3.5.1.1 Pile group 1

Number of piles belonging to this pile group : 1
Names of piles belonging to this pile group
1

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 354,46 | 371,24 | 37,78 | 0,00 |
| 3 | -18,50 | 376,50 | 387,13 | 39,00 | 0,00 |
| 3 | -19,00 | 401,88 | 403,02 | 40,23 | 0,00 |
| 3 | -19,50 | 418,91 | 418,91 | 41,46 | 0,00 |
| 3 | -20,00 | 434,80 | 434,80 | 42,68 | 0,00 |
| 3 | -20,50 | 450,69 | 450,69 | 43,91 | 0,00 |
| 3 | -21,00 | 466,58 | 466,58 | 45,14 | 0,00 |
| 3 | -21,50 | 482,47 | 482,47 | 46,36 | 0,00 |
| 5 | -18,00 | 351,42 | 380,67 | 37,78 | 0,00 |
| 5 | -18,50 | 379,98 | 396,56 | 39,00 | 0,00 |
| 5 | -19,00 | 406,20 | 412,45 | 40,23 | 0,00 |
| 5 | -19,50 | 428,34 | 428,34 | 41,46 | 0,00 |
| 5 | -20,00 | 444,23 | 444,23 | 42,68 | 0,00 |
| 5 | -20,50 | 460,13 | 460,13 | 43,91 | 0,00 |
| 5 | -21,00 | 476,01 | 476,01 | 45,14 | 0,00 |
| 5 | -21,50 | 491,90 | 491,90 | 46,36 | 0,00 |
| 6 | -18,00 | 335,74 | 360,04 | 37,78 | 0,00 |
| 6 | -18,50 | 364,13 | 375,93 | 39,00 | 0,00 |
| 6 | -19,00 | 390,08 | 391,82 | 40,23 | 0,00 |
| 6 | -19,50 | 407,71 | 407,71 | 41,46 | 0,00 |
| 6 | -20,00 | 423,60 | 423,60 | 42,68 | 0,00 |
| 6 | -20,50 | 439,49 | 439,49 | 43,91 | 0,00 |
| 6 | -21,00 | 455,38 | 455,38 | 45,14 | 0,00 |
| 6 | -21,50 | 471,27 | 471,27 | 46,36 | 0,00 |
| 8 | -18,00 | 374,79 | 395,43 | 37,78 | 0,00 |
| 8 | -18,50 | 399,10 | 411,32 | 39,00 | 0,00 |
| 8 | -19,00 | 424,19 | 427,21 | 40,23 | 0,00 |

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 8 | -19,50 | 443,10 | 443,10 | 41,46 | 0,00 |
| 8 | -20,00 | 458,99 | 458,99 | 42,68 | 0,00 |
| 8 | -20,50 | 474,88 | 474,88 | 43,91 | 0,00 |
| 8 | -21,00 | 490,77 | 490,77 | 45,14 | 0,00 |
| 8 | -21,50 | 506,66 | 506,66 | 46,36 | 0,00 |
| 9 | -18,00 | 373,93 | 373,93 | 37,78 | 0,00 |
| 9 | -18,50 | 389,82 | 389,82 | 39,00 | 0,00 |
| 9 | -19,00 | 405,71 | 405,71 | 40,23 | 0,00 |
| 9 | -19,50 | 421,60 | 421,60 | 41,46 | 0,00 |
| 9 | -20,00 | 437,49 | 437,49 | 42,68 | 0,00 |
| 9 | -20,50 | 453,38 | 453,38 | 43,91 | 0,00 |
| 9 | -21,00 | 469,27 | 469,27 | 45,14 | 0,00 |
| 9 | -21,50 | 485,16 | 485,16 | 46,36 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.1.2 Pile group 2

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
2
10

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 380,56 | 987,67 | 37,78 | 0,00 |
| 3 | -18,50 | 407,32 | 1070,10 | 39,00 | 0,00 |
| 3 | -19,00 | 438,96 | 1157,34 | 40,23 | 0,00 |
| 3 | -19,50 | 469,19 | 1249,57 | 41,46 | 0,00 |
| 3 | -20,00 | 498,20 | 1346,96 | 42,68 | 0,00 |
| 3 | -20,50 | 526,26 | 1449,71 | 43,91 | 0,00 |
| 3 | -21,00 | 553,56 | 1557,99 | 45,14 | 0,00 |
| 3 | -21,50 | 580,25 | 1671,99 | 46,36 | 0,00 |
| 5 | -18,00 | 375,92 | 1042,98 | 37,78 | 0,00 |
| 5 | -18,50 | 410,08 | 1128,45 | 39,00 | 0,00 |
| 5 | -19,00 | 442,35 | 1218,84 | 40,23 | 0,00 |
| 5 | -19,50 | 473,07 | 1314,32 | 41,46 | 0,00 |
| 5 | -20,00 | 502,54 | 1415,09 | 42,68 | 0,00 |
| 5 | -20,50 | 531,00 | 1521,31 | 43,91 | 0,00 |
| 5 | -21,00 | 558,64 | 1633,17 | 45,14 | 0,00 |
| 5 | -21,50 | 585,63 | 1750,86 | 46,36 | 0,00 |
| 6 | -18,00 | 359,64 | 946,78 | 37,78 | 0,00 |
| 6 | -18,50 | 393,71 | 1026,81 | 39,00 | 0,00 |
| 6 | -19,00 | 425,81 | 1111,51 | 40,23 | 0,00 |
| 6 | -19,50 | 456,31 | 1201,07 | 41,46 | 0,00 |
| 6 | -20,00 | 485,52 | 1295,68 | 42,68 | 0,00 |
| 6 | -20,50 | 513,72 | 1395,51 | 43,91 | 0,00 |
| 6 | -21,00 | 541,11 | 1500,74 | 45,14 | 0,00 |
| 6 | -21,50 | 567,87 | 1611,56 | 46,36 | 0,00 |
| 8 | -18,00 | 406,88 | 1153,85 | 37,78 | 0,00 |
| 8 | -18,50 | 436,57 | 1245,10 | 39,00 | 0,00 |
| 8 | -19,00 | 468,03 | 1341,44 | 40,23 | 0,00 |
| 8 | -19,50 | 498,09 | 1443,04 | 41,46 | 0,00 |





| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 8 | -20,00 | 527,01 | 1550,09 | 42,68 | 0,00 |
| 8 | -20,50 | 555,02 | 1662,76 | 43,91 | 0,00 |
| 8 | -21,00 | 582,29 | 1781,26 | 45,14 | 0,00 |
| 8 | -21,50 | 608,98 | 1905,74 | 46,36 | 0,00 |
| 9 | -18,00 | 421,42 | 1026,15 | 37,78 | 0,00 |
| 9 | -18,50 | 450,89 | 1110,35 | 39,00 | 0,00 |
| 9 | -19,00 | 479,19 | 1199,38 | 40,23 | 0,00 |
| 9 | -19,50 | 506,56 | 1293,42 | 41,46 | 0,00 |
| 9 | -20,00 | 533,24 | 1392,67 | 42,68 | 0,00 |
| 9 | -20,50 | 559,37 | 1497,30 | 43,91 | 0,00 |
| 9 | -21,00 | 585,08 | 1607,50 | 45,14 | 0,00 |
| 9 | -21,50 | 610,44 | 1723,44 | 46,36 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.1.3 Pile group 3

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
3
7

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 380,56 | 987,67 | 37,78 | 0,00 |
| 3 | -18,50 | 407,32 | 1070,10 | 39,00 | 0,00 |
| 3 | -19,00 | 438,96 | 1157,34 | 40,23 | 0,00 |
| 3 | -19,50 | 469,19 | 1249,57 | 41,46 | 0,00 |
| 3 | -20,00 | 498,20 | 1346,96 | 42,68 | 0,00 |
| 3 | -20,50 | 526,26 | 1449,71 | 43,91 | 0,00 |
| 3 | -21,00 | 553,56 | 1557,99 | 45,14 | 0,00 |
| 3 | -21,50 | 580,25 | 1671,99 | 46,36 | 0,00 |
| 5 | -18,00 | 375,92 | 1042,98 | 37,78 | 0,00 |
| 5 | -18,50 | 410,08 | 1128,45 | 39,00 | 0,00 |
| 5 | -19,00 | 442,35 | 1218,84 | 40,23 | 0,00 |
| 5 | -19,50 | 473,07 | 1314,32 | 41,46 | 0,00 |
| 5 | -20,00 | 502,54 | 1415,09 | 42,68 | 0,00 |
| 5 | -20,50 | 531,00 | 1521,31 | 43,91 | 0,00 |
| 5 | -21,00 | 558,64 | 1633,17 | 45,14 | 0,00 |
| 5 | -21,50 | 585,63 | 1750,86 | 46,36 | 0,00 |
| 6 | -18,00 | 359,64 | 946,78 | 37,78 | 0,00 |
| 6 | -18,50 | 393,71 | 1026,81 | 39,00 | 0,00 |
| 6 | -19,00 | 425,81 | 1111,51 | 40,23 | 0,00 |
| 6 | -19,50 | 456,31 | 1201,07 | 41,46 | 0,00 |
| 6 | -20,00 | 485,52 | 1295,68 | 42,68 | 0,00 |
| 6 | -20,50 | 513,72 | 1395,51 | 43,91 | 0,00 |
| 6 | -21,00 | 541,11 | 1500,74 | 45,14 | 0,00 |
| 6 | -21,50 | 567,87 | 1611,56 | 46,36 | 0,00 |
| 8 | -18,00 | 406,88 | 1153,85 | 37,78 | 0,00 |
| 8 | -18,50 | 436,57 | 1245,10 | 39,00 | 0,00 |
| 8 | -19,00 | 468,03 | 1341,44 | 40,23 | 0,00 |
| 8 | -19,50 | 498,09 | 1443,04 | 41,46 | 0,00 |
| 8 | -20,00 | 527,01 | 1550,09 | 42,68 | 0,00 |

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 8 | -20,50 | 555,02 | 1662,76 | 43,91 | 0,00 |
| 8 | -21,00 | 582,29 | 1781,26 | 45,14 | 0,00 |
| 8 | -21,50 | 608,98 | 1905,74 | 46,36 | 0,00 |
| 9 | -18,00 | 421,42 | 1026,15 | 37,78 | 0,00 |
| 9 | -18,50 | 450,89 | 1110,35 | 39,00 | 0,00 |
| 9 | -19,00 | 479,19 | 1199,38 | 40,23 | 0,00 |
| 9 | -19,50 | 506,56 | 1293,42 | 41,46 | 0,00 |
| 9 | -20,00 | 533,24 | 1392,67 | 42,68 | 0,00 |
| 9 | -20,50 | 559,37 | 1497,30 | 43,91 | 0,00 |
| 9 | -21,00 | 585,08 | 1607,50 | 45,14 | 0,00 |
| 9 | -21,50 | 610,44 | 1723,44 | 46,36 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.1.4 Pile group 4

Number of piles belonging to this pile group : 4
Names of piles belonging to this pile group
4
5
6
9

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 425,39 | 2486,08 | 37,78 | 0,00 |
| 3 | -18,50 | 459,78 | 2751,91 | 39,00 | 0,00 |
| 3 | -19,00 | 501,38 | 3036,95 | 40,23 | 0,00 |
| 3 | -19,50 | 542,03 | 3341,93 | 41,46 | 0,00 |
| 3 | -20,00 | 581,84 | 3667,60 | 42,68 | 0,00 |
| 3 | -20,50 | 620,96 | 4014,67 | 43,91 | 0,00 |
| 3 | -21,00 | 659,54 | 4383,89 | 45,14 | 0,00 |
| 3 | -21,50 | 697,68 | 4775,97 | 46,36 | 0,00 |
| 5 | -18,00 | 417,87 | 2669,37 | 37,78 | 0,00 |
| 5 | -18,50 | 461,26 | 2947,36 | 39,00 | 0,00 |
| 5 | -19,00 | 503,35 | 3244,99 | 40,23 | 0,00 |
| 5 | -19,50 | 544,35 | 3563,00 | 41,46 | 0,00 |
| 5 | -20,00 | 584,47 | 3902,13 | 42,68 | 0,00 |
| 5 | -20,50 | 623,87 | 4263,10 | 43,91 | 0,00 |
| 5 | -21,00 | 662,70 | 4646,64 | 45,14 | 0,00 |
| 5 | -21,50 | 701,06 | 5053,48 | 46,36 | 0,00 |
| 6 | -18,00 | 400,57 | 2367,55 | 37,78 | 0,00 |
| 6 | -18,50 | 443,90 | 2623,75 | 39,00 | 0,00 |
| 6 | -19,00 | 485,85 | 2898,65 | 40,23 | 0,00 |
| 6 | -19,50 | 526,69 | 3192,99 | 41,46 | 0,00 |
| 6 | -20,00 | 566,63 | 3507,49 | 42,68 | 0,00 |
| 6 | -20,50 | 605,85 | 3842,88 | 43,91 | 0,00 |
| 6 | -21,00 | 644,50 | 4199,89 | 45,14 | 0,00 |
| 6 | -21,50 | 682,68 | 4579,26 | 46,36 | 0,00 |
| 8 | -18,00 | 460,94 | 3053,49 | 37,78 | 0,00 |
| 8 | -18,50 | 499,18 | 3354,58 | 39,00 | 0,00 |
| 8 | -19,00 | 540,68 | 3676,01 | 40,23 | 0,00 |
| 8 | -19,50 | 581,19 | 4018,50 | 41,46 | 0,00 |





| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 8 | -20,00 | 620,91 | 4382,77 | 42,68 | 0,00 |
| 8 | -20,50 | 659,98 | 4769,57 | 43,91 | 0,00 |
| 8 | -21,00 | 698,53 | 5179,62 | 45,14 | 0,00 |
| 8 | -21,50 | 736,65 | 5613,65 | 46,36 | 0,00 |
| 9 | -18,00 | 490,97 | 2629,20 | 37,78 | 0,00 |
| 9 | -18,50 | 531,06 | 2902,07 | 39,00 | 0,00 |
| 9 | -19,00 | 570,32 | 3194,27 | 40,23 | 0,00 |
| 9 | -19,50 | 608,93 | 3506,54 | 41,46 | 0,00 |
| 9 | -20,00 | 647,04 | 3839,62 | 42,68 | 0,00 |
| 9 | -20,50 | 684,75 | 4194,22 | 43,91 | 0,00 |
| 9 | -21,00 | 722,15 | 4571,09 | 45,14 | 0,00 |
| 9 | -21,50 | 759,29 | 4970,95 | 46,36 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

**3.5.2 Results for pile t pe : DP 410**

3.5.2.1 Pile group 1

Number of piles belonging to this pile group : 1
Names of piles belonging to this pile group
1

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 306,29 | 377,02 | 24,41 | 0,00 |
| 3 | -18,50 | 328,16 | 393,21 | 25,21 | 0,00 |
| 3 | -19,00 | 353,90 | 409,40 | 26,00 | 0,00 |
| 3 | -19,50 | 378,26 | 425,60 | 26,79 | 0,00 |
| 3 | -20,00 | 401,37 | 441,79 | 27,59 | 0,00 |
| 3 | -20,50 | 423,40 | 457,98 | 28,38 | 0,00 |
| 3 | -21,00 | 444,49 | 474,18 | 29,17 | 0,00 |
| 3 | -21,50 | 464,78 | 490,37 | 29,96 | 0,00 |
| 5 | -18,00 | 301,77 | 386,63 | 24,41 | 0,00 |
| 5 | -18,50 | 329,85 | 402,83 | 25,21 | 0,00 |
| 5 | -19,00 | 356,25 | 419,02 | 26,00 | 0,00 |
| 5 | -19,50 | 381,19 | 435,21 | 26,79 | 0,00 |
| 5 | -20,00 | 404,85 | 451,40 | 27,59 | 0,00 |
| 5 | -20,50 | 427,39 | 467,60 | 28,38 | 0,00 |
| 5 | -21,00 | 448,95 | 483,79 | 29,17 | 0,00 |
| 5 | -21,50 | 469,68 | 499,98 | 29,96 | 0,00 |
| 6 | -18,00 | 288,67 | 365,61 | 24,41 | 0,00 |
| 6 | -18,50 | 316,55 | 381,80 | 25,21 | 0,00 |
| 6 | -19,00 | 342,70 | 398,00 | 26,00 | 0,00 |
| 6 | -19,50 | 367,33 | 414,19 | 26,79 | 0,00 |
| 6 | -20,00 | 390,65 | 430,38 | 27,59 | 0,00 |
| 6 | -20,50 | 412,84 | 446,57 | 28,38 | 0,00 |
| 6 | -21,00 | 434,06 | 462,77 | 29,17 | 0,00 |
| 6 | -21,50 | 454,44 | 478,96 | 29,96 | 0,00 |
| 8 | -18,00 | 327,37 | 401,67 | 24,41 | 0,00 |
| 8 | -18,50 | 351,33 | 417,87 | 25,21 | 0,00 |
| 8 | -19,00 | 376,63 | 434,06 | 26,00 | 0,00 |

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 8 | -19,50 | 400,60 | 450,25 | 26,79 | 0,00 |
| 8 | -20,00 | 423,43 | 466,44 | 27,59 | 0,00 |
| 8 | -20,50 | 445,25 | 482,63 | 28,38 | 0,00 |
| 8 | -21,00 | 466,20 | 498,83 | 29,17 | 0,00 |
| 8 | -21,50 | 486,40 | 515,02 | 29,96 | 0,00 |
| 9 | -18,00 | 338,57 | 379,76 | 24,41 | 0,00 |
| 9 | -18,50 | 361,74 | 395,95 | 25,21 | 0,00 |
| 9 | -19,00 | 383,71 | 412,14 | 26,00 | 0,00 |
| 9 | -19,50 | 404,66 | 428,34 | 26,79 | 0,00 |
| 9 | -20,00 | 424,75 | 444,53 | 27,59 | 0,00 |
| 9 | -20,50 | 444,11 | 460,72 | 28,38 | 0,00 |
| 9 | -21,00 | 462,87 | 476,92 | 29,17 | 0,00 |
| 9 | -21,50 | 481,12 | 493,11 | 29,96 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for sand and gravel are adjusted for the coarsness of the actual soil (sand when D50 > 0.6mm; gravel when D50 > 2 mm).
Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.2.2 Pile group 2

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
2
10

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 322,91 | 982,70 | 24,41 | 0,00 |
| 3 | -18,50 | 347,77 | 1064,63 | 25,21 | 0,00 |
| 3 | -19,00 | 377,49 | 1151,32 | 26,00 | 0,00 |
| 3 | -19,50 | 406,09 | 1242,97 | 26,79 | 0,00 |
| 3 | -20,00 | 433,68 | 1339,76 | 27,59 | 0,00 |
| 3 | -20,50 | 460,40 | 1441,87 | 28,38 | 0,00 |
| 3 | -21,00 | 486,39 | 1549,49 | 29,17 | 0,00 |
| 3 | -21,50 | 511,75 | 1662,79 | 29,96 | 0,00 |
| 5 | -18,00 | 317,44 | 1037,67 | 24,41 | 0,00 |
| 5 | -18,50 | 349,09 | 1122,62 | 25,21 | 0,00 |
| 5 | -19,00 | 379,35 | 1212,45 | 26,00 | 0,00 |
| 5 | -19,50 | 408,42 | 1307,34 | 26,79 | 0,00 |
| 5 | -20,00 | 436,44 | 1407,47 | 27,59 | 0,00 |
| 5 | -20,50 | 463,56 | 1513,04 | 28,38 | 0,00 |
| 5 | -21,00 | 489,91 | 1624,21 | 29,17 | 0,00 |
| 5 | -21,50 | 515,61 | 1741,18 | 29,96 | 0,00 |
| 6 | -18,00 | 303,93 | 942,00 | 24,41 | 0,00 |
| 6 | -18,50 | 335,43 | 1021,54 | 25,21 | 0,00 |
| 6 | -19,00 | 365,49 | 1105,72 | 26,00 | 0,00 |
| 6 | -19,50 | 394,31 | 1194,74 | 26,79 | 0,00 |
| 6 | -20,00 | 422,07 | 1288,76 | 27,59 | 0,00 |
| 6 | -20,50 | 448,92 | 1387,97 | 28,38 | 0,00 |
| 6 | -21,00 | 475,00 | 1492,56 | 29,17 | 0,00 |
| 6 | -21,50 | 500,43 | 1602,70 | 29,96 | 0,00 |
| 8 | -18,00 | 347,84 | 1147,84 | 24,41 | 0,00 |
| 8 | -18,50 | 375,25 | 1238,54 | 25,21 | 0,00 |





| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 8 | -19,00 | 404,65 | 1334,28 | 26,00 | 0,00 |
| 8 | -19,50 | 432,96 | 1435,26 | 26,79 | 0,00 |
| 8 | -20,00 | 460,33 | 1541,65 | 27,59 | 0,00 |
| 8 | -20,50 | 486,90 | 1653,64 | 28,38 | 0,00 |
| 8 | -21,00 | 512,78 | 1771,42 | 29,17 | 0,00 |
| 8 | -21,50 | 538,07 | 1895,16 | 29,96 | 0,00 |
| 9 | -18,00 | 365,61 | 1020,93 | 24,41 | 0,00 |
| 9 | -18,50 | 393,29 | 1104,61 | 25,21 | 0,00 |
| 9 | -19,00 | 420,00 | 1193,09 | 26,00 | 0,00 |
| 9 | -19,50 | 445,88 | 1286,56 | 26,79 | 0,00 |
| 9 | -20,00 | 471,09 | 1385,20 | 27,59 | 0,00 |
| 9 | -20,50 | 495,73 | 1489,19 | 28,38 | 0,00 |
| 9 | -21,00 | 519,90 | 1598,71 | 29,17 | 0,00 |
| 9 | -21,50 | 543,66 | 1713,95 | 29,96 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for sand and gravel are adjusted for the coarsness of the actual soil (sand when D50 > 0.6mm; gravel when D50 > 2 mm).
Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.2.3 Pile group 3

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
3
7

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 322,91 | 982,70 | 24,41 | 0,00 |
| 3 | -18,50 | 347,77 | 1064,63 | 25,21 | 0,00 |
| 3 | -19,00 | 377,49 | 1151,32 | 26,00 | 0,00 |
| 3 | -19,50 | 406,09 | 1242,97 | 26,79 | 0,00 |
| 3 | -20,00 | 433,68 | 1339,76 | 27,59 | 0,00 |
| 3 | -20,50 | 460,40 | 1441,87 | 28,38 | 0,00 |
| 3 | -21,00 | 486,39 | 1549,49 | 29,17 | 0,00 |
| 3 | -21,50 | 511,75 | 1662,79 | 29,96 | 0,00 |
| 5 | -18,00 | 317,44 | 1037,67 | 24,41 | 0,00 |
| 5 | -18,50 | 349,09 | 1122,62 | 25,21 | 0,00 |
| 5 | -19,00 | 379,35 | 1212,45 | 26,00 | 0,00 |
| 5 | -19,50 | 408,42 | 1307,34 | 26,79 | 0,00 |
| 5 | -20,00 | 436,44 | 1407,47 | 27,59 | 0,00 |
| 5 | -20,50 | 463,56 | 1513,04 | 28,38 | 0,00 |
| 5 | -21,00 | 489,91 | 1624,21 | 29,17 | 0,00 |
| 5 | -21,50 | 515,61 | 1741,18 | 29,96 | 0,00 |
| 6 | -18,00 | 303,93 | 942,00 | 24,41 | 0,00 |
| 6 | -18,50 | 335,43 | 1021,54 | 25,21 | 0,00 |
| 6 | -19,00 | 365,49 | 1105,72 | 26,00 | 0,00 |
| 6 | -19,50 | 394,31 | 1194,74 | 26,79 | 0,00 |
| 6 | -20,00 | 422,07 | 1288,76 | 27,59 | 0,00 |
| 6 | -20,50 | 448,92 | 1387,97 | 28,38 | 0,00 |
| 6 | -21,00 | 475,00 | 1492,56 | 29,17 | 0,00 |
| 6 | -21,50 | 500,43 | 1602,70 | 29,96 | 0,00 |
| 8 | -18,00 | 347,84 | 1147,84 | 24,41 | 0,00 |

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 8 | -18,50 | 375,25 | 1238,54 | 25,21 | 0,00 |
| 8 | -19,00 | 404,65 | 1334,28 | 26,00 | 0,00 |
| 8 | -19,50 | 432,96 | 1435,26 | 26,79 | 0,00 |
| 8 | -20,00 | 460,33 | 1541,65 | 27,59 | 0,00 |
| 8 | -20,50 | 486,90 | 1653,64 | 28,38 | 0,00 |
| 8 | -21,00 | 512,78 | 1771,42 | 29,17 | 0,00 |
| 8 | -21,50 | 538,07 | 1895,16 | 29,96 | 0,00 |
| 9 | -18,00 | 365,61 | 1020,93 | 24,41 | 0,00 |
| 9 | -18,50 | 393,29 | 1104,61 | 25,21 | 0,00 |
| 9 | -19,00 | 420,00 | 1193,09 | 26,00 | 0,00 |
| 9 | -19,50 | 445,88 | 1286,56 | 26,79 | 0,00 |
| 9 | -20,00 | 471,09 | 1385,20 | 27,59 | 0,00 |
| 9 | -20,50 | 495,73 | 1489,19 | 28,38 | 0,00 |
| 9 | -21,00 | 519,90 | 1598,71 | 29,17 | 0,00 |
| 9 | -21,50 | 543,66 | 1713,95 | 29,96 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for sand and gravel are adjusted for the coarsness of the actual soil (sand when D50 > 0.6mm; gravel when D50 > 2 mm).
Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.2.4 Pile group 4

Number of piles belonging to this pile group : 4
Names of piles belonging to this pile group
4
5
6
9

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 351,79 | 2450,49 | 24,41 | 0,00 |
| 3 | -18,50 | 381,70 | 2713,37 | 25,21 | 0,00 |
| 3 | -19,00 | 418,03 | 2995,33 | 26,00 | 0,00 |
| 3 | -19,50 | 453,64 | 3297,11 | 26,79 | 0,00 |
| 3 | -20,00 | 488,55 | 3619,44 | 27,59 | 0,00 |
| 3 | -20,50 | 522,85 | 3963,06 | 28,38 | 0,00 |
| 3 | -21,00 | 556,63 | 4328,69 | 29,17 | 0,00 |
| 3 | -21,50 | 589,97 | 4717,06 | 29,96 | 0,00 |
| 5 | -18,00 | 344,56 | 2631,90 | 24,41 | 0,00 |
| 5 | -18,50 | 382,27 | 2906,86 | 25,21 | 0,00 |
| 5 | -19,00 | 419,03 | 3201,34 | 26,00 | 0,00 |
| 5 | -19,50 | 454,96 | 3516,07 | 26,79 | 0,00 |
| 5 | -20,00 | 490,16 | 3851,79 | 27,59 | 0,00 |
| 5 | -20,50 | 524,74 | 4209,23 | 28,38 | 0,00 |
| 5 | -21,00 | 558,78 | 4589,11 | 29,17 | 0,00 |
| 5 | -21,50 | 592,35 | 4992,17 | 29,96 | 0,00 |
| 6 | -18,00 | 330,35 | 2333,36 | 24,41 | 0,00 |
| 6 | -18,50 | 367,96 | 2586,70 | 25,21 | 0,00 |
| 6 | -19,00 | 404,58 | 2858,61 | 26,00 | 0,00 |
| 6 | -19,50 | 440,33 | 3149,83 | 26,79 | 0,00 |
| 6 | -20,00 | 475,35 | 3461,09 | 27,59 | 0,00 |
| 6 | -20,50 | 509,74 | 3793,11 | 28,38 | 0,00 |





| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 6 | -21,00 | 543,59 | 4146,63 | 29,17 | 0,00 |
| 6 | -21,50 | 576,98 | 4522,38 | 29,96 | 0,00 |
| 8 | -18,00 | 383,00 | 3012,36 | 24,41 | 0,00 |
| 8 | -18,50 | 416,13 | 3310,32 | 25,21 | 0,00 |
| 8 | -19,00 | 452,28 | 3628,47 | 26,00 | 0,00 |
| 8 | -19,50 | 487,67 | 3967,56 | 26,79 | 0,00 |
| 8 | -20,00 | 522,42 | 4328,31 | 27,59 | 0,00 |
| 8 | -20,50 | 556,60 | 4711,46 | 28,38 | 0,00 |
| 8 | -21,00 | 590,30 | 5117,73 | 29,17 | 0,00 |
| 8 | -21,50 | 623,59 | 5547,85 | 29,96 | 0,00 |
| 9 | -18,00 | 411,37 | 2592,46 | 24,41 | 0,00 |
| 9 | -18,50 | 446,33 | 2862,35 | 25,21 | 0,00 |
| 9 | -19,00 | 480,60 | 3151,45 | 26,00 | 0,00 |
| 9 | -19,50 | 514,31 | 3460,50 | 26,79 | 0,00 |
| 9 | -20,00 | 547,53 | 3790,22 | 27,59 | 0,00 |
| 9 | -20,50 | 580,36 | 4141,35 | 28,38 | 0,00 |
| 9 | -21,00 | 612,84 | 4514,61 | 29,17 | 0,00 |
| 9 | -21,50 | 645,05 | 4910,74 | 29,96 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for sand and gravel are adjusted for the coarsness of the actual soil (sand when D50 > 0.6mm; gravel when D50 > 2 mm).
Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

**3.5.3 Results for pile t pe : DP 460**

3.5.3.1 Pile group 1

Number of piles belonging to this pile group : 1
Names of piles belonging to this pile group
1

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 331,73 | 374,33 | 30,73 | 0,00 |
| 3 | -18,50 | 353,89 | 390,38 | 31,73 | 0,00 |
| 3 | -19,00 | 379,71 | 406,43 | 32,73 | 0,00 |
| 3 | -19,50 | 403,90 | 422,48 | 33,73 | 0,00 |
| 3 | -20,00 | 426,65 | 438,53 | 34,72 | 0,00 |
| 3 | -20,50 | 448,19 | 454,58 | 35,72 | 0,00 |
| 3 | -21,00 | 468,72 | 470,63 | 36,72 | 0,00 |
| 3 | -21,50 | 486,68 | 486,68 | 37,72 | 0,00 |
| 5 | -18,00 | 327,79 | 383,86 | 30,73 | 0,00 |
| 5 | -18,50 | 356,39 | 399,91 | 31,73 | 0,00 |
| 5 | -19,00 | 382,98 | 415,96 | 32,73 | 0,00 |
| 5 | -19,50 | 407,82 | 432,01 | 33,73 | 0,00 |
| 5 | -20,00 | 431,18 | 448,06 | 34,72 | 0,00 |
| 5 | -20,50 | 453,28 | 464,11 | 35,72 | 0,00 |
| 5 | -21,00 | 474,31 | 480,16 | 36,72 | 0,00 |
| 5 | -21,50 | 494,46 | 496,21 | 37,72 | 0,00 |
| 6 | -18,00 | 313,38 | 363,03 | 30,73 | 0,00 |
| 6 | -18,50 | 341,78 | 379,08 | 31,73 | 0,00 |
| 6 | -19,00 | 368,08 | 395,13 | 32,73 | 0,00 |

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 6 | -19,50 | 392,60 | 411,18 | 33,73 | 0,00 |
| 6 | -20,00 | 415,61 | 427,23 | 34,72 | 0,00 |
| 6 | -20,50 | 437,34 | 443,27 | 35,72 | 0,00 |
| 6 | -21,00 | 458,01 | 459,32 | 36,72 | 0,00 |
| 6 | -21,50 | 475,37 | 475,37 | 37,72 | 0,00 |
| 8 | -18,00 | 352,61 | 398,77 | 30,73 | 0,00 |
| 8 | -18,50 | 376,95 | 414,82 | 31,73 | 0,00 |
| 8 | -19,00 | 402,36 | 430,87 | 32,73 | 0,00 |
| 8 | -19,50 | 426,22 | 446,92 | 33,73 | 0,00 |
| 8 | -20,00 | 448,75 | 462,97 | 34,72 | 0,00 |
| 8 | -20,50 | 470,16 | 479,02 | 35,72 | 0,00 |
| 8 | -21,00 | 490,63 | 495,07 | 36,72 | 0,00 |
| 8 | -21,50 | 510,31 | 511,12 | 37,72 | 0,00 |
| 9 | -18,00 | 360,63 | 377,05 | 30,73 | 0,00 |
| 9 | -18,50 | 383,64 | 393,10 | 31,73 | 0,00 |
| 9 | -19,00 | 405,28 | 409,15 | 32,73 | 0,00 |
| 9 | -19,50 | 425,20 | 425,20 | 33,73 | 0,00 |
| 9 | -20,00 | 441,25 | 441,25 | 34,72 | 0,00 |
| 9 | -20,50 | 457,30 | 457,30 | 35,72 | 0,00 |
| 9 | -21,00 | 473,35 | 473,35 | 36,72 | 0,00 |
| 9 | -21,50 | 489,40 | 489,40 | 37,72 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for sand and gravel are adjusted for the coarsness of the actual soil (sand when D50 > 0.6mm; gravel when D50 > 2 mm).
Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.3.2 Pile group 2

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
2
10

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 352,78 | 985,37 | 30,73 | 0,00 |
| 3 | -18,50 | 378,75 | 1067,56 | 31,73 | 0,00 |
| 3 | -19,00 | 409,61 | 1154,53 | 32,73 | 0,00 |
| 3 | -19,50 | 439,17 | 1246,48 | 33,73 | 0,00 |
| 3 | -20,00 | 467,60 | 1343,58 | 34,72 | 0,00 |
| 3 | -20,50 | 495,10 | 1446,02 | 35,72 | 0,00 |
| 3 | -21,00 | 521,81 | 1553,97 | 36,72 | 0,00 |
| 3 | -21,50 | 547,89 | 1667,63 | 37,72 | 0,00 |
| 5 | -18,00 | 347,61 | 1040,52 | 30,73 | 0,00 |
| 5 | -18,50 | 380,73 | 1125,74 | 31,73 | 0,00 |
| 5 | -19,00 | 412,20 | 1215,85 | 32,73 | 0,00 |
| 5 | -19,50 | 442,26 | 1311,05 | 33,73 | 0,00 |
| 5 | -20,00 | 471,16 | 1411,50 | 34,72 | 0,00 |
| 5 | -20,50 | 499,06 | 1517,40 | 35,72 | 0,00 |
| 5 | -21,00 | 526,15 | 1628,93 | 36,72 | 0,00 |
| 5 | -21,50 | 552,56 | 1746,27 | 37,72 | 0,00 |
| 6 | -18,00 | 332,69 | 944,57 | 30,73 | 0,00 |
| 6 | -18,50 | 365,67 | 1024,36 | 31,73 | 0,00 |





| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 6 | -19,00 | 396,94 | 1108,82 | 32,73 | 0,00 |
| 6 | -19,50 | 426,76 | 1198,11 | 33,73 | 0,00 |
| 6 | -20,00 | 455,38 | 1292,43 | 34,72 | 0,00 |
| 6 | -20,50 | 483,01 | 1391,96 | 35,72 | 0,00 |
| 6 | -21,00 | 509,83 | 1496,87 | 36,72 | 0,00 |
| 6 | -21,50 | 535,98 | 1607,36 | 37,72 | 0,00 |
| 8 | -18,00 | 378,52 | 1151,04 | 30,73 | 0,00 |
| 8 | -18,50 | 407,22 | 1242,02 | 31,73 | 0,00 |
| 8 | -19,00 | 437,81 | 1338,07 | 32,73 | 0,00 |
| 8 | -19,50 | 467,13 | 1439,37 | 33,73 | 0,00 |
| 8 | -20,00 | 495,40 | 1546,10 | 34,72 | 0,00 |
| 8 | -20,50 | 522,78 | 1658,44 | 35,72 | 0,00 |
| 8 | -21,00 | 549,43 | 1776,58 | 36,72 | 0,00 |
| 8 | -21,50 | 575,48 | 1900,70 | 37,72 | 0,00 |
| 9 | -18,00 | 394,84 | 1023,73 | 30,73 | 0,00 |
| 9 | -18,50 | 423,52 | 1107,68 | 31,73 | 0,00 |
| 9 | -19,00 | 451,11 | 1196,44 | 32,73 | 0,00 |
| 9 | -19,50 | 477,82 | 1290,20 | 33,73 | 0,00 |
| 9 | -20,00 | 503,81 | 1389,15 | 34,72 | 0,00 |
| 9 | -20,50 | 529,23 | 1493,47 | 35,72 | 0,00 |
| 9 | -21,00 | 554,19 | 1603,34 | 36,72 | 0,00 |
| 9 | -21,50 | 578,77 | 1718,94 | 37,72 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for sand and gravel are adjusted for the coarsness of the actual soil (sand when D50 > 0.6mm; gravel when D50 > 2 mm).
Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.3.3 Pile group 3

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
3
7

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 352,78 | 985,37 | 30,73 | 0,00 |
| 3 | -18,50 | 378,75 | 1067,56 | 31,73 | 0,00 |
| 3 | -19,00 | 409,61 | 1154,53 | 32,73 | 0,00 |
| 3 | -19,50 | 439,17 | 1246,48 | 33,73 | 0,00 |
| 3 | -20,00 | 467,60 | 1343,58 | 34,72 | 0,00 |
| 3 | -20,50 | 495,10 | 1446,02 | 35,72 | 0,00 |
| 3 | -21,00 | 521,81 | 1553,97 | 36,72 | 0,00 |
| 3 | -21,50 | 547,89 | 1667,63 | 37,72 | 0,00 |
| 5 | -18,00 | 347,61 | 1040,52 | 30,73 | 0,00 |
| 5 | -18,50 | 380,73 | 1125,74 | 31,73 | 0,00 |
| 5 | -19,00 | 412,20 | 1215,85 | 32,73 | 0,00 |
| 5 | -19,50 | 442,26 | 1311,05 | 33,73 | 0,00 |
| 5 | -20,00 | 471,16 | 1411,50 | 34,72 | 0,00 |
| 5 | -20,50 | 499,06 | 1517,40 | 35,72 | 0,00 |
| 5 | -21,00 | 526,15 | 1628,93 | 36,72 | 0,00 |
| 5 | -21,50 | 552,56 | 1746,27 | 37,72 | 0,00 |
| 6 | -18,00 | 332,69 | 944,57 | 30,73 | 0,00 |

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 6 | -18,50 | 365,67 | 1024,36 | 31,73 | 0,00 |
| 6 | -19,00 | 396,94 | 1108,82 | 32,73 | 0,00 |
| 6 | -19,50 | 426,76 | 1198,11 | 33,73 | 0,00 |
| 6 | -20,00 | 455,38 | 1292,43 | 34,72 | 0,00 |
| 6 | -20,50 | 483,01 | 1391,96 | 35,72 | 0,00 |
| 6 | -21,00 | 509,83 | 1496,87 | 36,72 | 0,00 |
| 6 | -21,50 | 535,98 | 1607,36 | 37,72 | 0,00 |
| 8 | -18,00 | 378,52 | 1151,04 | 30,73 | 0,00 |
| 8 | -18,50 | 407,22 | 1242,02 | 31,73 | 0,00 |
| 8 | -19,00 | 437,81 | 1338,07 | 32,73 | 0,00 |
| 8 | -19,50 | 467,13 | 1439,37 | 33,73 | 0,00 |
| 8 | -20,00 | 495,40 | 1546,10 | 34,72 | 0,00 |
| 8 | -20,50 | 522,78 | 1658,44 | 35,72 | 0,00 |
| 8 | -21,00 | 549,43 | 1776,58 | 36,72 | 0,00 |
| 8 | -21,50 | 575,48 | 1900,70 | 37,72 | 0,00 |
| 9 | -18,00 | 394,84 | 1023,73 | 30,73 | 0,00 |
| 9 | -18,50 | 423,52 | 1107,68 | 31,73 | 0,00 |
| 9 | -19,00 | 451,11 | 1196,44 | 32,73 | 0,00 |
| 9 | -19,50 | 477,82 | 1290,20 | 33,73 | 0,00 |
| 9 | -20,00 | 503,81 | 1389,15 | 34,72 | 0,00 |
| 9 | -20,50 | 529,23 | 1493,47 | 35,72 | 0,00 |
| 9 | -21,00 | 554,19 | 1603,34 | 36,72 | 0,00 |
| 9 | -21,50 | 578,77 | 1718,94 | 37,72 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for sand and gravel are adjusted for the coarsness of the actual soil (sand when D50 > 0.6mm; gravel when D50 > 2 mm).
Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.3.4 Pile group 4

Number of piles belonging to this pile group : 4
Names of piles belonging to this pile group
4
5
6
9

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 389,20 | 2468,43 | 30,73 | 0,00 |
| 3 | -18,50 | 421,45 | 2732,78 | 31,73 | 0,00 |
| 3 | -19,00 | 460,54 | 3016,28 | 32,73 | 0,00 |
| 3 | -19,50 | 498,78 | 3319,68 | 33,73 | 0,00 |
| 3 | -20,00 | 536,22 | 3643,68 | 34,72 | 0,00 |
| 3 | -20,50 | 573,00 | 3989,03 | 35,72 | 0,00 |
| 3 | -21,00 | 609,24 | 4356,45 | 36,72 | 0,00 |
| 3 | -21,50 | 645,02 | 4746,69 | 37,72 | 0,00 |
| 5 | -18,00 | 381,74 | 2650,78 | 30,73 | 0,00 |
| 5 | -18,50 | 422,44 | 2927,25 | 31,73 | 0,00 |
| 5 | -19,00 | 462,00 | 3223,31 | 32,73 | 0,00 |
| 5 | -19,50 | 500,58 | 3539,70 | 33,73 | 0,00 |
| 5 | -20,00 | 538,35 | 3877,12 | 34,72 | 0,00 |
| 5 | -20,50 | 575,42 | 4236,33 | 35,72 | 0,00 |





| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 5 | -21,00 | 611,92 | 4618,05 | 36,72 | 0,00 |
| 5 | -21,50 | 647,93 | 5023,01 | 37,72 | 0,00 |
| 6 | -18,00 | 365,97 | 2350,59 | 30,73 | 0,00 |
| 6 | -18,50 | 406,57 | 2605,36 | 31,73 | 0,00 |
| 6 | -19,00 | 445,98 | 2878,78 | 32,73 | 0,00 |
| 6 | -19,50 | 484,39 | 3171,56 | 33,73 | 0,00 |
| 6 | -20,00 | 521,97 | 3484,44 | 34,72 | 0,00 |
| 6 | -20,50 | 558,85 | 3818,16 | 35,72 | 0,00 |
| 6 | -21,00 | 595,15 | 4173,43 | 36,72 | 0,00 |
| 6 | -21,50 | 630,98 | 4550,99 | 37,72 | 0,00 |
| 8 | -18,00 | 422,66 | 3033,07 | 30,73 | 0,00 |
| 8 | -18,50 | 458,45 | 3332,60 | 31,73 | 0,00 |
| 8 | -19,00 | 497,38 | 3652,40 | 32,73 | 0,00 |
| 8 | -19,50 | 535,43 | 3993,19 | 33,73 | 0,00 |
| 8 | -20,00 | 572,74 | 4355,71 | 34,72 | 0,00 |
| 8 | -20,50 | 609,44 | 4740,69 | 35,72 | 0,00 |
| 8 | -21,00 | 645,62 | 5148,85 | 36,72 | 0,00 |
| 8 | -21,50 | 681,36 | 5580,93 | 37,72 | 0,00 |
| 9 | -18,00 | 451,98 | 2610,97 | 30,73 | 0,00 |
| 9 | -18,50 | 489,58 | 2882,35 | 31,73 | 0,00 |
| 9 | -19,00 | 526,41 | 3173,01 | 32,73 | 0,00 |
| 9 | -19,50 | 562,62 | 3483,67 | 33,73 | 0,00 |
| 9 | -20,00 | 598,33 | 3815,08 | 34,72 | 0,00 |
| 9 | -20,50 | 633,62 | 4167,95 | 35,72 | 0,00 |
| 9 | -21,00 | 668,59 | 4543,02 | 36,72 | 0,00 |
| 9 | -21,50 | 703,28 | 4941,02 | 37,72 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for sand and gravel are adjusted for the coarsness of the actual soil (sand when D50 > 0.6mm; gravel when D50 > 2 mm).
Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

**3.5.4 Results for pile t pe : funde 380 450**

3.5.4.1 Pile group 1

Number of piles belonging to this pile group : 1
Names of piles belonging to this pile group
1

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 308,95 | 376,77 | 25,01 | 0,00 |
| 3 | -18,50 | 330,88 | 392,95 | 25,83 | 0,00 |
| 3 | -19,00 | 356,65 | 409,13 | 26,64 | 0,00 |
| 3 | -19,50 | 381,02 | 425,31 | 27,45 | 0,00 |
| 3 | -20,00 | 404,11 | 441,49 | 28,26 | 0,00 |
| 3 | -20,50 | 426,11 | 457,67 | 29,07 | 0,00 |
| 3 | -21,00 | 447,16 | 473,84 | 29,89 | 0,00 |
| 3 | -21,50 | 467,40 | 490,02 | 30,70 | 0,00 |
| 5 | -18,00 | 304,48 | 386,38 | 25,01 | 0,00 |
| 5 | -18,50 | 332,63 | 402,56 | 25,83 | 0,00 |
| 5 | -19,00 | 359,08 | 418,73 | 26,64 | 0,00 |

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 5 | -19,50 | 384,04 | 434,91 | 27,45 | 0,00 |
| 5 | -20,00 | 407,69 | 451,09 | 28,26 | 0,00 |
| 5 | -20,50 | 430,21 | 467,27 | 29,07 | 0,00 |
| 5 | -21,00 | 451,74 | 483,45 | 29,89 | 0,00 |
| 5 | -21,50 | 472,42 | 499,63 | 30,70 | 0,00 |
| 6 | -18,00 | 291,25 | 365,37 | 25,01 | 0,00 |
| 6 | -18,50 | 319,21 | 381,55 | 25,83 | 0,00 |
| 6 | -19,00 | 345,39 | 397,73 | 26,64 | 0,00 |
| 6 | -19,50 | 370,04 | 413,91 | 27,45 | 0,00 |
| 6 | -20,00 | 393,35 | 430,09 | 28,26 | 0,00 |
| 6 | -20,50 | 415,51 | 446,27 | 29,07 | 0,00 |
| 6 | -21,00 | 436,69 | 462,45 | 29,89 | 0,00 |
| 6 | -21,50 | 457,03 | 478,63 | 30,70 | 0,00 |
| 8 | -18,00 | 330,03 | 401,40 | 25,01 | 0,00 |
| 8 | -18,50 | 354,05 | 417,58 | 25,83 | 0,00 |
| 8 | -19,00 | 379,38 | 433,76 | 26,64 | 0,00 |
| 8 | -19,50 | 403,37 | 449,94 | 27,45 | 0,00 |
| 8 | -20,00 | 426,18 | 466,12 | 28,26 | 0,00 |
| 8 | -20,50 | 447,98 | 482,30 | 29,07 | 0,00 |
| 8 | -21,00 | 468,90 | 498,48 | 29,89 | 0,00 |
| 8 | -21,50 | 489,06 | 514,65 | 30,70 | 0,00 |
| 9 | -18,00 | 340,94 | 379,51 | 25,01 | 0,00 |
| 9 | -18,50 | 364,12 | 395,69 | 25,83 | 0,00 |
| 9 | -19,00 | 386,07 | 411,87 | 26,64 | 0,00 |
| 9 | -19,50 | 406,99 | 428,04 | 27,45 | 0,00 |
| 9 | -20,00 | 427,05 | 444,22 | 28,26 | 0,00 |
| 9 | -20,50 | 446,37 | 460,40 | 29,07 | 0,00 |
| 9 | -21,00 | 465,09 | 476,58 | 29,89 | 0,00 |
| 9 | -21,50 | 483,30 | 492,76 | 30,70 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.4.2 Pile group 2

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
2
10

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 326,00 | 982,99 | 25,01 | 0,00 |
| 3 | -18,50 | 350,98 | 1064,94 | 25,83 | 0,00 |
| 3 | -19,00 | 380,83 | 1151,66 | 26,64 | 0,00 |
| 3 | -19,50 | 409,54 | 1243,34 | 27,45 | 0,00 |
| 3 | -20,00 | 437,23 | 1340,16 | 28,26 | 0,00 |
| 3 | -20,50 | 464,05 | 1442,31 | 29,07 | 0,00 |
| 3 | -21,00 | 490,12 | 1549,96 | 29,89 | 0,00 |
| 3 | -21,50 | 515,56 | 1663,29 | 30,70 | 0,00 |
| 5 | -18,00 | 320,54 | 1037,98 | 25,01 | 0,00 |
| 5 | -18,50 | 352,36 | 1122,95 | 25,83 | 0,00 |
| 5 | -19,00 | 382,76 | 1212,81 | 26,64 | 0,00 |
| 5 | -19,50 | 411,94 | 1307,73 | 27,45 | 0,00 |





| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 5 | -20,00 | 440,07 | 1407,90 | 28,26 | 0,00 |
| 5 | -20,50 | 467,29 | 1513,49 | 29,07 | 0,00 |
| 5 | -21,00 | 493,72 | 1624,71 | 29,89 | 0,00 |
| 5 | -21,50 | 519,50 | 1741,72 | 30,70 | 0,00 |
| 6 | -18,00 | 306,88 | 942,27 | 25,01 | 0,00 |
| 6 | -18,50 | 338,55 | 1021,84 | 25,83 | 0,00 |
| 6 | -19,00 | 368,75 | 1106,05 | 26,64 | 0,00 |
| 6 | -19,50 | 397,69 | 1195,09 | 27,45 | 0,00 |
| 6 | -20,00 | 425,56 | 1289,14 | 28,26 | 0,00 |
| 6 | -20,50 | 452,50 | 1388,39 | 29,07 | 0,00 |
| 6 | -21,00 | 478,66 | 1493,01 | 29,89 | 0,00 |
| 6 | -21,50 | 504,17 | 1603,19 | 30,70 | 0,00 |
| 8 | -18,00 | 351,02 | 1148,18 | 25,01 | 0,00 |
| 8 | -18,50 | 378,57 | 1238,90 | 25,83 | 0,00 |
| 8 | -19,00 | 408,10 | 1334,68 | 26,64 | 0,00 |
| 8 | -19,50 | 436,53 | 1435,69 | 27,45 | 0,00 |
| 8 | -20,00 | 464,01 | 1542,12 | 28,26 | 0,00 |
| 8 | -20,50 | 490,67 | 1654,15 | 29,07 | 0,00 |
| 8 | -21,00 | 516,64 | 1771,96 | 29,89 | 0,00 |
| 8 | -21,50 | 542,01 | 1895,73 | 30,70 | 0,00 |
| 9 | -18,00 | 368,66 | 1021,23 | 25,01 | 0,00 |
| 9 | -18,50 | 396,45 | 1104,94 | 25,83 | 0,00 |
| 9 | -19,00 | 423,26 | 1193,45 | 26,64 | 0,00 |
| 9 | -19,50 | 449,24 | 1286,94 | 27,45 | 0,00 |
| 9 | -20,00 | 474,53 | 1385,61 | 28,26 | 0,00 |
| 9 | -20,50 | 499,26 | 1489,64 | 29,07 | 0,00 |
| 9 | -21,00 | 523,51 | 1599,19 | 29,89 | 0,00 |
| 9 | -21,50 | 547,36 | 1714,47 | 30,70 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.4.3 Pile group 3

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
3
7

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 326,00 | 982,99 | 25,01 | 0,00 |
| 3 | -18,50 | 350,98 | 1064,94 | 25,83 | 0,00 |
| 3 | -19,00 | 380,83 | 1151,66 | 26,64 | 0,00 |
| 3 | -19,50 | 409,54 | 1243,34 | 27,45 | 0,00 |
| 3 | -20,00 | 437,23 | 1340,16 | 28,26 | 0,00 |
| 3 | -20,50 | 464,05 | 1442,31 | 29,07 | 0,00 |
| 3 | -21,00 | 490,12 | 1549,96 | 29,89 | 0,00 |
| 3 | -21,50 | 515,56 | 1663,29 | 30,70 | 0,00 |
| 5 | -18,00 | 320,54 | 1037,98 | 25,01 | 0,00 |
| 5 | -18,50 | 352,36 | 1122,95 | 25,83 | 0,00 |
| 5 | -19,00 | 382,76 | 1212,81 | 26,64 | 0,00 |
| 5 | -19,50 | 411,94 | 1307,73 | 27,45 | 0,00 |
| 5 | -20,00 | 440,07 | 1407,90 | 28,26 | 0,00 |

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 5 | -20,50 | 467,29 | 1513,49 | 29,07 | 0,00 |
| 5 | -21,00 | 493,72 | 1624,71 | 29,89 | 0,00 |
| 5 | -21,50 | 519,50 | 1741,72 | 30,70 | 0,00 |
| 6 | -18,00 | 306,88 | 942,27 | 25,01 | 0,00 |
| 6 | -18,50 | 338,55 | 1021,84 | 25,83 | 0,00 |
| 6 | -19,00 | 368,75 | 1106,05 | 26,64 | 0,00 |
| 6 | -19,50 | 397,69 | 1195,09 | 27,45 | 0,00 |
| 6 | -20,00 | 425,56 | 1289,14 | 28,26 | 0,00 |
| 6 | -20,50 | 452,50 | 1388,39 | 29,07 | 0,00 |
| 6 | -21,00 | 478,66 | 1493,01 | 29,89 | 0,00 |
| 6 | -21,50 | 504,17 | 1603,19 | 30,70 | 0,00 |
| 8 | -18,00 | 351,02 | 1148,18 | 25,01 | 0,00 |
| 8 | -18,50 | 378,57 | 1238,90 | 25,83 | 0,00 |
| 8 | -19,00 | 408,10 | 1334,68 | 26,64 | 0,00 |
| 8 | -19,50 | 436,53 | 1435,69 | 27,45 | 0,00 |
| 8 | -20,00 | 464,01 | 1542,12 | 28,26 | 0,00 |
| 8 | -20,50 | 490,67 | 1654,15 | 29,07 | 0,00 |
| 8 | -21,00 | 516,64 | 1771,96 | 29,89 | 0,00 |
| 8 | -21,50 | 542,01 | 1895,73 | 30,70 | 0,00 |
| 9 | -18,00 | 368,66 | 1021,23 | 25,01 | 0,00 |
| 9 | -18,50 | 396,45 | 1104,94 | 25,83 | 0,00 |
| 9 | -19,00 | 423,26 | 1193,45 | 26,64 | 0,00 |
| 9 | -19,50 | 449,24 | 1286,94 | 27,45 | 0,00 |
| 9 | -20,00 | 474,53 | 1385,61 | 28,26 | 0,00 |
| 9 | -20,50 | 499,26 | 1489,64 | 29,07 | 0,00 |
| 9 | -21,00 | 523,51 | 1599,19 | 29,89 | 0,00 |
| 9 | -21,50 | 547,36 | 1714,47 | 30,70 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.4.4 Pile group 4

Number of piles belonging to this pile group : 4
Names of piles belonging to this pile group
4
5
6
9

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 355,59 | 2452,30 | 25,01 | 0,00 |
| 3 | -18,50 | 385,74 | 2715,32 | 25,83 | 0,00 |
| 3 | -19,00 | 422,36 | 2997,44 | 26,64 | 0,00 |
| 3 | -19,50 | 458,25 | 3299,38 | 27,45 | 0,00 |
| 3 | -20,00 | 493,41 | 3621,88 | 28,26 | 0,00 |
| 3 | -20,50 | 527,97 | 3965,67 | 29,07 | 0,00 |
| 3 | -21,00 | 562,01 | 4331,48 | 29,89 | 0,00 |
| 3 | -21,50 | 595,60 | 4720,04 | 30,70 | 0,00 |
| 5 | -18,00 | 348,33 | 2633,80 | 25,01 | 0,00 |
| 5 | -18,50 | 386,35 | 2908,91 | 25,83 | 0,00 |
| 5 | -19,00 | 423,40 | 3203,55 | 26,64 | 0,00 |
| 5 | -19,50 | 459,61 | 3518,45 | 27,45 | 0,00 |





| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 5 | -20,00 | 495,08 | 3854,34 | 28,26 | 0,00 |
| 5 | -20,50 | 529,91 | 4211,95 | 29,07 | 0,00 |
| 5 | -21,00 | 564,21 | 4592,02 | 29,89 | 0,00 |
| 5 | -21,50 | 598,04 | 4995,27 | 30,70 | 0,00 |
| 6 | -18,00 | 333,96 | 2335,10 | 25,01 | 0,00 |
| 6 | -18,50 | 371,88 | 2588,58 | 25,83 | 0,00 |
| 6 | -19,00 | 408,79 | 2860,64 | 26,64 | 0,00 |
| 6 | -19,50 | 444,83 | 3152,02 | 27,45 | 0,00 |
| 6 | -20,00 | 480,11 | 3463,44 | 28,26 | 0,00 |
| 6 | -20,50 | 514,76 | 3795,63 | 29,07 | 0,00 |
| 6 | -21,00 | 548,86 | 4149,33 | 29,89 | 0,00 |
| 6 | -21,50 | 582,50 | 4525,26 | 30,70 | 0,00 |
| 8 | -18,00 | 387,03 | 3014,45 | 25,01 | 0,00 |
| 8 | -18,50 | 420,44 | 3312,56 | 25,83 | 0,00 |
| 8 | -19,00 | 456,88 | 3630,88 | 26,64 | 0,00 |
| 8 | -19,50 | 492,55 | 3970,14 | 27,45 | 0,00 |
| 8 | -20,00 | 527,56 | 4331,07 | 28,26 | 0,00 |
| 8 | -20,50 | 562,00 | 4714,40 | 29,07 | 0,00 |
| 8 | -21,00 | 595,96 | 5120,86 | 29,89 | 0,00 |
| 8 | -21,50 | 629,50 | 5551,18 | 30,70 | 0,00 |
| 9 | -18,00 | 415,51 | 2594,32 | 25,01 | 0,00 |
| 9 | -18,50 | 450,74 | 2864,36 | 25,83 | 0,00 |
| 9 | -19,00 | 485,28 | 3153,62 | 26,64 | 0,00 |
| 9 | -19,50 | 519,24 | 3462,83 | 27,45 | 0,00 |
| 9 | -20,00 | 552,72 | 3792,72 | 28,26 | 0,00 |
| 9 | -20,50 | 585,80 | 4144,02 | 29,07 | 0,00 |
| 9 | -21,00 | 618,53 | 4517,47 | 29,89 | 0,00 |
| 9 | -21,50 | 650,99 | 4913,79 | 30,70 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

## End of Report

## Bijlage 5 Uitvoer D-Foundation trek representatief

# Report for D-Foundations 17.1

Design and Verification according to Eurocode 7 of Bearing/Tension Piles and Shallow Foundations
Developed by Deltares

| | |
|---|---|
| Company: | CRUX Engineering B.V. |
| Date of report: | 5-3-2018 |
| Time of report: | 14:03:49 |
| Date of calculation: | 5-3-2018 |
| Time of calculation: | 14:03:26 |
| Filename: | P:\..\04 REK\GEO\Paal\DFouc1 Trekdraagvermogen kelder -2,6_BGT |
| Project identification: | |
| | D-Foundations DFouc1 Trekdraagvermogen kelder -2,6_BGT |



## 1 Table of Contents


1 Table of Contents 2
2 Input Data 4
2.1 General Input Data 4
2.2 General Report Data 4
2.3 Application Area Model Tension Piles (EC7-NL) 4
2.4 General CPT Data 4
2.4.1 View of CPT's in Foundation Plan 4
2.5 Soil Data 5
2.5.1 Soil Profile 3 5
2.5.2 Soil Profile 5 6
2.5.3 Soil Profile 6 7
2.5.4 Soil Profile 8 8
2.5.5 Soil Profile 9 9
2.6 Pile Types 11
2.6.1 Pile type : fundex 380/450 11
2.6.2 Pile type : fundex 460/560 11
2.6.3 Pile type : DPA 360 12
2.6.4 Pile type : DPA 410 12
2.6.5 Pile type : DPA 460 12
2.6.6 Pile type : fundex 406/560 12
2.6.7 Pile type : Round 510 13
2.7 Foundation Plan 13
2.7.1 View of Foundation Plan 13
2.8 Excavation Data 14
2.9 Optional Parameters 14
2.10 Overruled Parameters 14
2.11 Model Options 14
2.12 Model Options 14
3 Tension Piles (EC7-NL): Indication Bearing Capacity 16
3.1 Errors and Warnings 16
3.2 Remarks 16
3.3 Calculation Parameters 16
3.3.1 Pile Factors 16
3.3.2 Pile type : fundex 380/450 16
3.3.3 Pile type : fundex 460/560 16
3.3.4 Pile type : DPA 410 17
3.3.5 Pile type : DPA 460 17
3.3.6 Pile type : Round 510 17
3.4 Results for all CPT's 17
3.4.1 Results for pile type : fundex 380/450 17
3.4.1.1 Pile group 1 17
3.4.1.2 Pile group 2 18
3.4.1.3 Pile group 3 18
3.4.1.4 Pile group 4 18
3.4.2 Results for pile type : fundex 460/560 19
3.4.2.1 Pile group 1 19
3.4.2.2 Pile group 2 19
3.4.2.3 Pile group 3 19
3.4.2.4 Pile group 4 19
3.4.3 Results for pile type : DPA 410 20
3.4.3.1 Pile group 1 20
3.4.3.2 Pile group 2 20
3.4.3.3 Pile group 3 20
3.4.3.4 Pile group 4 21
3.4.4 Results for pile type : DPA 460 21
3.4.4.1 Pile group 1 21
3.4.4.2 Pile group 2 21
3.4.4.3 Pile group 3 22
3.4.4.4 Pile group 4 22
3.4.5 Results for pile type : Round 510 22
3.4.5.1 Pile group 1 22
3.4.5.2 Pile group 2 22
3.4.5.3 Pile group 3 23

3.4.5.4 Pile group 4 23
3.5 INDICATIVE: Results using Ksi3 23
3.5.1 Results for pile type : fundex 380/450 23
3.5.1.1 Pile group 1 23
3.5.1.2 Pile group 2 24
3.5.1.3 Pile group 3 25
3.5.1.4 Pile group 4 26
3.5.2 Results for pile type : fundex 460/560 27
3.5.2.1 Pile group 1 27
3.5.2.2 Pile group 2 28
3.5.2.3 Pile group 3 29
3.5.2.4 Pile group 4 30
3.5.3 Results for pile type : DPA 410 31
3.5.3.1 Pile group 1 31
3.5.3.2 Pile group 2 32
3.5.3.3 Pile group 3 33
3.5.3.4 Pile group 4 34
3.5.4 Results for pile type : DPA 460 35
3.5.4.1 Pile group 1 35
3.5.4.2 Pile group 2 36
3.5.4.3 Pile group 3 37
3.5.4.4 Pile group 4 38
3.5.5 Results for pile type : Round 510 39
3.5.5.1 Pile group 1 39
3.5.5.2 Pile group 2 40
3.5.5.3 Pile group 3 41
3.5.5.4 Pile group 4 42





# 2 Input Data

## 2.1 General Input Data

| | |
|---|---|
| Model | Tension Piles (EC7-NL) |

## 2.2 General Report Data

| | |
|---|---|
| Geotechnical consultant : | |
| Design engineer superstructure : | |
| Principal : | |
| Title 1 : | |
| Title 2 : | |
| Title 3 : | D-Foundations DFouc1 Trekdraagvermogen kelder -2,6_BGT |
| Number of project : | |
| Location of project : | |

## 2.3 Application Area Model Tension Piles (EC7-NL)

The design and verifications performed by the TENSION PILES (EC7-NL) model of D-FOUNDATIONS concern pile foundations on which axial static or quasi-static loads cause tensile forces in the piles. Pilegroup effects are taken into account. Calculation of pile forces is based on Cone Penetration Tests. Pile capacities are based on the NEN 9997-1:2016, chapter 7 and where pile/safety factors are concerned, on Dutch Standards NEN 9997-1:2016. Horizontal displacements of piles are not taken into account. Vertical displacements of piles are not calculated. Design of Tension piles based on NEN 9997-1:2016 is limited to piles with lengths between 7 and 50 m and a minimum Length over (equivalent) diameter ratio of 13.5.

## 2.4 General CPT Data

| | |
|---|---|
| Number of CPT's : | 5 |
| Timing of CPT's : | CPT - Install - Excavation |

### 2.4.1 View of CPT's in Foundation Plan



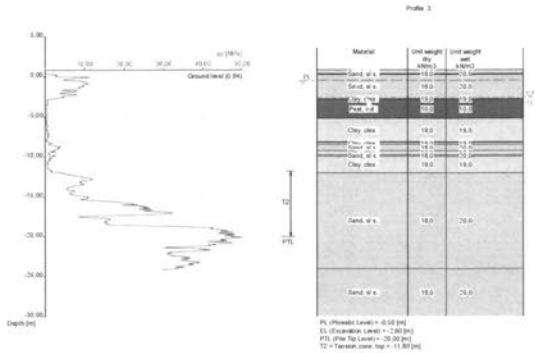
| Number/name CPT | X-coor-dinate [m] | Y-coor-dinate [m] |
|---|---|---|
| 1: 3 | 118155,78 | 484051,62 |
| 2: 5 | 0,00 | 0,00 |
| 3: 6 | 118139,99 | 484052,09 |
| 4: 8 | 0,00 | 0,00 |
| 5: 9 | 118121,90 | 484051,98 |

## 2.5 Soil Data

Number of soil profiles (= number of CPT's) : 5

### 2.5.1 Soil Profile 3

| | |
|---|---|
| Belonging to CPT | 3 |
| Surface level in [m. reference level] : | 0,84 |
| Phreatic level in [m. reference level] : | -0,50 |
| Top of tension zone [m. reference level]: | -11,80 |
| Pile tip level in [m. reference level] : | -20,00 |
| Number of layers in profile : | 14 |



| Number layer | Top layer [m R.L.] | Soil Type | Gamma [kN/m3] | Gamma sat [kN/m3] | Min. Void Ratio [%] | Max. Void Ratio [%] | Median [mm] | Max. Cone resistance [kPa] | Use Max. Cone resistance |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0,840 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 2 | 0,340 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 3 | 0,240 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 4 | -2,760 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 5 | -2,860 | Peat | 10,00 | 10,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 6 | -5,220 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 7 | -8,139 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 8 | -8,239 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 9 | -8,459 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 10 | -9,278 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 11 | -9,778 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |



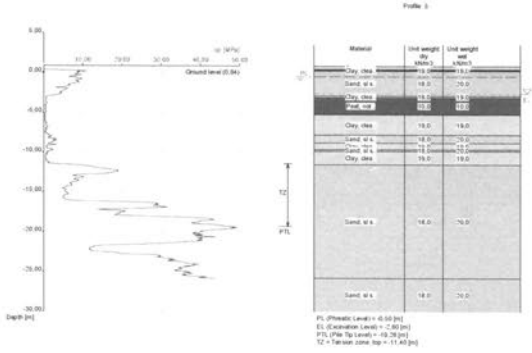


| Number layer | Top layer [m R.L.] | Soil Type | Gamma [kN/m3] | Gamma sat [kN/m3] | Min. Void Ratio [%] | Max. Void Ratio [%] | Median [mm] | Max. Cone resistance [kPa] | Use Max. Cone resistance |
|---|---|---|---|---|---|---|---|---|---|
| 12 | -9,978 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 13 | -12,016 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 14 | -24,024 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |

| Number layer | Top layer [m R.L.] | Soil Type | Phi [deg] | Addit. PP at top [kN/m2] | Addit. PP at bottom [kN/m2] | OCR value [-] | Use Tension |
|---|---|---|---|---|---|---|---|
| 1 | 0,840 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 2 | 0,340 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 3 | 0,240 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 4 | -2,760 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 5 | -2,860 | Peat | 15,00 | 0,00 | 0,00 | 1,000 | False |
| 6 | -5,220 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 7 | -8,139 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 8 | -8,239 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 9 | -8,459 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 10 | -9,278 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 11 | -9,778 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 12 | -9,978 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 13 | -12,016 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 14 | -24,024 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |

### 2.5.2 Soil Profile 5

| | |
|---|---|
| Belonging to CPT | 5 |
| Surface level in [m. reference level] : | 0,84 |
| Phreatic level in [m. reference level] : | -0,50 |
| Top of tension zone [m. reference level]: | -11,40 |
| Pile tip level in [m. reference level] : | -19,26 |
| Number of layers in profile : | 13 |



| Number layer | Top layer [m R.L.] | Soil Type | Gamma [kN/m3] | Gamma sat [kN/m3] | Min. Void Ratio [%] | Max. Void Ratio [%] | Median [mm] | Max. Cone resistance [kPa] | Use Max. Cone resistance |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0,840 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 2 | 0,440 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 3 | 0,340 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 4 | 0,240 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 5 | -2,879 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 6 | -3,079 | Peat | 10,00 | 10,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 7 | -5,218 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 8 | -7,795 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 9 | -8,814 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 10 | -9,633 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 11 | -9,852 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 12 | -11,509 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 13 | -25,770 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |

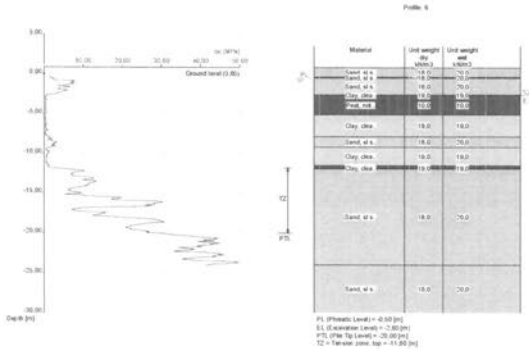
| Number layer | Top layer [m R.L.] | Soil Type | Phi [deg] | Addit. PP at top [kN/m2] | Addit. PP at bottom [kN/m2] | OCR value [-] | Use Tension |
|---|---|---|---|---|---|---|---|
| 1 | 0,840 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 2 | 0,440 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 3 | 0,340 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 4 | 0,240 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 5 | -2,879 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 6 | -3,079 | Peat | 15,00 | 0,00 | 0,00 | 1,000 | False |
| 7 | -5,218 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 8 | -7,795 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 9 | -8,814 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 10 | -9,633 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 11 | -9,852 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 12 | -11,509 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 13 | -25,770 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |

### 2.5.3 Soil Profile 6

| | |
|---|---|
| Belonging to CPT | 6 |
| Surface level in [m. reference level] : | 0,85 |
| Phreatic level in [m. reference level] : | -0,50 |
| Top of tension zone [m. reference level]: | -11,80 |
| Pile tip level in [m. reference level] : | -20,00 |
| Number of layers in profile : | 12 |







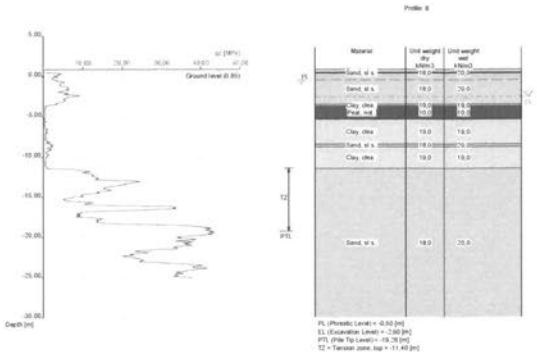
| Number layer | Top layer [m R.L.] | Soil Type | Gamma [kN/m3] | Gamma sat [kN/m3] | Min. Void Ratio [%] | Max. Void Ratio [%] | Median [mm] | Max. Cone resistance [kPa] | Use Max. Cone resistance |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0,850 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 2 | -0,350 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 3 | -0,450 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 4 | -2,589 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 5 | -2,689 | Peat | 10,00 | 10,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 6 | -5,108 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 7 | -7,865 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 8 | -9,184 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 9 | -11,479 | Peat | 10,00 | 10,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 10 | -11,798 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 11 | -11,898 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 12 | -23,987 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |

| Number layer | Top layer [m R.L.] | Soil Type | Phi [deg] | Addit. PP at top [kN/m2] | Addit. PP at bottom [kN/m2] | OCR value [-] | Use Tension |
|---|---|---|---|---|---|---|---|
| 1 | 0,850 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 2 | -0,350 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 3 | -0,450 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 4 | -2,589 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 5 | -2,689 | Peat | 15,00 | 0,00 | 0,00 | 1,000 | False |
| 6 | -5,108 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 7 | -7,865 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 8 | -9,184 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 9 | -11,479 | Peat | 15,00 | 0,00 | 0,00 | 1,000 | False |
| 10 | -11,798 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 11 | -11,898 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 12 | -23,987 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |

### 2.5.4 Soil Profile 8

| | |
|---|---|
| Belonging to CPT | 8 |
| Surface level in [m. reference level] : | 0,85 |

| | |
|---|---|
| Phreatic level in [m. reference level] : | -0,50 |
| Top of tension zone [m. reference level]: | -11,40 |
| Pile tip level in [m. reference level] : | -19,26 |
| Number of layers in profile : | 9 |



| Number layer | Top layer [m R.L.] | Soil Type | Gamma [kN/m3] | Gamma sat [kN/m3] | Min. Void Ratio [%] | Max. Void Ratio [%] | Median [mm] | Max. Cone resistance [kPa] | Use Max. Cone resistance |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0,850 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 2 | 0,450 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 3 | 0,350 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 4 | -3,550 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 5 | -3,750 | Peat | 10,00 | 10,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 6 | -5,389 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 7 | -8,428 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 8 | -8,728 | Clay | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 9 | -11,466 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |

| Number layer | Top layer [m R.L.] | Soil Type | Phi [deg] | Addit. PP at top [kN/m2] | Addit. PP at bottom [kN/m2] | OCR value [-] | Use Tension |
|---|---|---|---|---|---|---|---|
| 1 | 0,850 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 2 | 0,450 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 3 | 0,350 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 4 | -3,550 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 5 | -3,750 | Peat | 15,00 | 0,00 | 0,00 | 1,000 | False |
| 6 | -5,389 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 7 | -8,428 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 8 | -8,728 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 9 | -11,466 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |

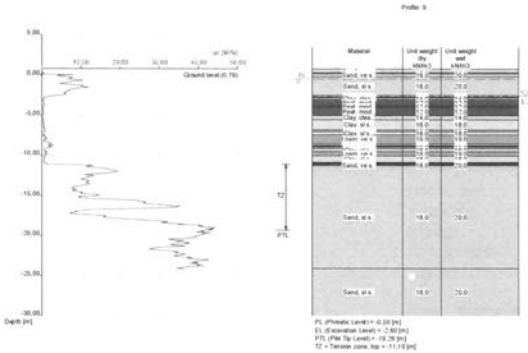
**2.5.5 Soil Profile**

| | |
|---|---|
| Belonging to CPT | 9 |
| Surface level in [m. reference level] : | 0,79 |
| Phreatic level in [m. reference level] : | -0,50 |
| Top of tension zone [m. reference level]: | -11,10 |





| | |
|---|---|
| Pile tip level in [m. reference level] : | -19,26 |
| Number of layers in profile : | 28 |



| Number layer | Top layer [m R.L.] | Soil Type | Gamma [kN/m3] | Gamma sat [kN/m3] | Min. Void Ratio [%] | Max. Void Ratio [%] | Median [mm] | Max. Cone resistance [kPa] | Use Max. Cone resistance |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0,790 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 2 | 0,290 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 3 | 0,190 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 4 | -0,210 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 5 | -2,510 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 6 | -2,710 | Loam | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 7 | -2,810 | Clay | 14,00 | 14,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 8 | -3,010 | Peat | 12,00 | 12,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 9 | -3,810 | Peat | 12,00 | 12,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 10 | -4,010 | Peat | 12,00 | 12,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 11 | -5,010 | Clay | 14,00 | 14,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 12 | -5,510 | Clay | 18,00 | 18,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 13 | -6,790 | Loam | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 14 | -7,009 | Clay | 18,00 | 18,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 15 | -7,409 | Loam | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 16 | -8,509 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 17 | -8,709 | Loam | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 18 | -8,809 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 19 | -8,909 | Loam | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 20 | -9,109 | Clay | 18,00 | 18,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 21 | -9,509 | Loam | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 22 | -10,028 | Clay | 18,00 | 18,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 23 | -10,828 | Loam | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 24 | -10,928 | Clay | 18,00 | 18,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 25 | -11,028 | Loam | 19,00 | 19,00 | 0,40 | 0,80 | | 12/15 | Standa... |
| 26 | -11,128 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 27 | -11,228 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |
| 28 | -24,059 | Sand | 18,00 | 20,00 | 0,40 | 0,80 | 0,200 | 12/15 | Standa... |

| Number layer | Top layer [m R.L.] | Soil Type | Phi [deg] | Addit. PP at top [kN/m2] | Addit. PP at bottom [kN/m2] | OCR value [-] | Use Tension |
|---|---|---|---|---|---|---|---|
| 1 | 0,790 | Sand | 25,00 | 0,00 | 0,00 | 1,000 | True |
| 2 | 0,290 | Sand | 25,00 | 0,00 | 0,00 | 1,000 | True |
| 3 | 0,190 | Sand | 25,00 | 0,00 | 0,00 | 1,000 | True |
| 4 | -0,210 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 5 | -2,510 | Sand | 25,00 | 0,00 | 0,00 | 1,000 | True |
| 6 | -2,710 | Loam | 27,50 | 0,00 | 0,00 | 1,000 | True |
| 7 | -2,810 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 8 | -3,010 | Peat | 15,00 | 0,00 | 0,00 | 1,000 | False |
| 9 | -3,810 | Peat | 15,00 | 0,00 | 0,00 | 1,000 | False |
| 10 | -4,010 | Peat | 15,00 | 0,00 | 0,00 | 1,000 | False |
| 11 | -5,010 | Clay | 17,50 | 0,00 | 0,00 | 1,000 | True |
| 12 | -5,510 | Clay | 22,50 | 0,00 | 0,00 | 1,000 | True |
| 13 | -6,790 | Loam | 27,50 | 0,00 | 0,00 | 1,000 | True |
| 14 | -7,009 | Clay | 22,50 | 0,00 | 0,00 | 1,000 | True |
| 15 | -7,409 | Loam | 27,50 | 0,00 | 0,00 | 1,000 | True |
| 16 | -8,509 | Sand | 25,00 | 0,00 | 0,00 | 1,000 | True |
| 17 | -8,709 | Loam | 27,50 | 0,00 | 0,00 | 1,000 | True |
| 18 | -8,809 | Sand | 25,00 | 0,00 | 0,00 | 1,000 | True |
| 19 | -8,909 | Loam | 27,50 | 0,00 | 0,00 | 1,000 | True |
| 20 | -9,109 | Clay | 22,50 | 0,00 | 0,00 | 1,000 | True |
| 21 | -9,509 | Loam | 27,50 | 0,00 | 0,00 | 1,000 | True |
| 22 | -10,028 | Clay | 22,50 | 0,00 | 0,00 | 1,000 | True |
| 23 | -10,828 | Loam | 27,50 | 0,00 | 0,00 | 1,000 | True |
| 24 | -10,928 | Clay | 22,50 | 0,00 | 0,00 | 1,000 | True |
| 25 | -11,028 | Loam | 27,50 | 0,00 | 0,00 | 1,000 | True |
| 26 | -11,128 | Sand | 25,00 | 0,00 | 0,00 | 1,000 | True |
| 27 | -11,228 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |
| 28 | -24,059 | Sand | 27,00 | 0,00 | 0,00 | 1,000 | True |

## 2.6 Pile Types

Note : if alpha;t is not user defined, the next rules apply :
- alpha;t according to table 7.g and table 7.h of NEN 9997-1:2016
- for clay: alpha;t depends on the CPT-value and relative depth
- for peat: alpha;t = 0
- for sand/gravel: alpha;t also depends on the median

Number of pile types : 7

### 2.6.1 Pile type : funde 380/450

Pile type for shaft friction factor (alpha;t) sand/gravel : Screw pile, cast in place, lost tip

Pile type for shaft friction factor (alpha;t) clay : User defined
Shaft friction factor clay [-] : 0,0000
Materialtype for pile : Concrete
Pile shape : Round pile with lost tip

Pile dimensions :
- Diameter at tip [m] : 0,450
- Diameter shaft [m] : 0,415
- Effective heigth enlarged base [m] : 0,000

### 2.6.2 Pile type : funde 460/560

Pile type for shaft friction factor (alpha;t) sand/gravel : Screw pile, cast in place, lost tip

Pile type for shaft friction factor (alpha;t) clay : User defined
Shaft friction factor clay [-] : 0,0000
Materialtype for pile : Concrete
Pile shape : Round pile with lost tip





Pile dimensions :
- Diameter at tip [m] : 0,560
- Diameter shaft [m] : 0,510
- Effective heigth enlarged base [m] : 0,000

### 2.6.3 Pile type : DP 360

Pile type for shaft friction factor (alpha;t) sand/gravel : User defined (vibrating)

Shaft friction factor sand/gravel [-] : 0,0090
Pile type for shaft friction factor (alpha;t) clay : User defined
Shaft friction factor clay [-] : 0,0000
Materialtype for pile : Concrete
Pile shape : Round pile

Pile dimensions :
- Diameter [m] : 0,360

### 2.6.4 Pile type : DP 410

Pile type for shaft friction factor (alpha;t) sand/gravel : User defined (vibrating)

Shaft friction factor sand/gravel [-] : 0,0090
Pile type for shaft friction factor (alpha;t) clay : User defined
Shaft friction factor clay [-] : 0,0000
Materialtype for pile : Concrete
Pile shape : Round pile

Pile dimensions :
- Diameter [m] : 0,410

### 2.6.5 Pile type : DP 460

Pile type for shaft friction factor (alpha;t) sand/gravel : User defined (vibrating)

Shaft friction factor sand/gravel [-] : 0,0090
Pile type for shaft friction factor (alpha;t) clay : User defined
Shaft friction factor clay [-] : 0,0000
Materialtype for pile : Concrete
Pile shape : Round pile

Pile dimensions :
- Diameter [m] : 0,460

### 2.6.6 Pile type : funde 406/560

Pile type for shaft friction factor (alpha;t) sand/gravel : Screw pile, cast in place, lost tip

Pile type for shaft friction factor (alpha;t) clay : User defined
Shaft friction factor clay [-] : 0,0000
Materialtype for pile : Concrete
Pile shape : Round pile with lost tip

Pile dimensions :
- Diameter at tip [m] : 0,560
- Diameter shaft [m] : 0,483
- Effective heigth enlarged base [m] : 0,000

### 2.6.7 Pile type : Round 510

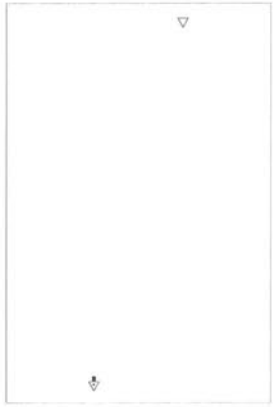
| | |
|---|---|
| Pile type for shaft friction factor (alpha;t) sand/gravel : | Screw pile, cast in place, with grout |
| Pile type for shaft friction factor (alpha;t) clay : | User defined |
| Shaft friction factor clay [-] : | 0,0000 |
| Materialtype for pile : | Concrete |
| Pile shape : | Round pile |
| Pile dimensions : | |
| Diameter [m] : | 0,510 |

## 2.7 Foundation Plan

| | |
|---|---|
| Number of piles : | 9 |
| Number of collaborating piles* : | 1 |

* : 0 = not defined, 1 = non rigid superstructure, >1 = rigid superstructure

### 2.7.1 View of Foundation Plan




| Pile nr./code | X-coordinate [m] | Y-coordinate [m] | Maximum load [kN] | Minimum load [kN] | Pile head level [m R.L.] | Use alternat. loads | Factor Gamma;var |
|---|---|---|---|---|---|---|---|
| 1: 1 | 0,00 | 0,00 | 0,00 | 0,00 | -2,60 | False | n.a. |
| 2: 2 | 0,00 | 2,00 | 0,00 | 0,00 | -2,60 | False | n.a. |
| 3: 3 | 2,00 | 0,00 | 0,00 | 0,00 | -2,60 | False | n.a. |
| 4: 4 | -2,00 | -2,00 | 0,00 | 0,00 | -2,60 | False | n.a. |
| 5: 5 | 2,00 | -2,00 | 0,00 | 0,00 | -2,60 | False | n.a. |
| 6: 6 | -2,00 | 2,00 | 0,00 | 0,00 | -2,60 | False | n.a. |
| 7: 7 | -2,00 | 0,00 | 0,00 | 0,00 | -2,60 | False | n.a. |
| 8: 8 | 2,00 | 2,00 | 0,00 | 0,00 | -2,60 | False | n.a. |
| 9: 9 | 0,00 | -2,00 | 0,00 | 0,00 | -2,60 | False | n.a. |

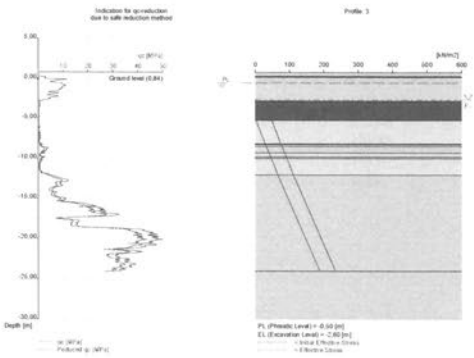




Note regarding the loads: tension forces are positive, compressive forces are negative
Note 2: See OVERRULED PARAMETERS for gamma;var

## 2.8 Excavation Data

| | |
|---|---|
| Excavation level in [m. reference level] : | -2,60 |
| Reduction model : | Safe (NEN) |



## 2.9 Optional Parameters

| | |
|---|---|
| Unit weight water [kN/m3] : | 9,81 |
| Surcharge [kN/m2] : | 0,00 |

## 2.10 Overruled Parameters

| | |
|---|---|
| User defined gamma;var [-] | 1,00 |
| User defined Factor xi3 [-] : | 1,28 |
| User defined Factor xi4 [-] : | 1,03 |
| User defined gamma;st [-] | 1,00 |

## 2.11 Model Options

Suppress compaction
If compaction is used, according to NEN 9997-1:2016 CPT's should be made after installation to verify this assumption
Use the influence of excavations (standard).
Suppress excess pore pressure

## 2.12 Model Options

Selected pile types :
-fundex 380/450
-fundex 460/560
-DPA 410
-DPA 460
-Round 510

Selected profiles :
- -3
- -5
- -6
- -8
- -9

Trajectory

| | |
|---|---|
| -begin [m] : | -18,00 |
| -end [m] : | -21,50 |
| -interval [m] : | 0,50 |





# 3 Tension Piles EC7- : ndication Bearing Capacit

## 3.1 Errors and arnings

Warning : The factor xi3 (NEN 9997-1:2016) is user defined. Evidence to support this from the NEN deviating value has to be provided.
Warning : The factor xi4 (NEN 9997-1:2016) is user defined. Evidence to support this from the NEN deviating value has to be provided.
Warning : The factor gamma;st (NEN 9997-1:2016) is user defined. Evidence to support this from the NEN deviating value has to be provided.
Warning : The factor gamma;var (NEN 9997-1:2016) is user defined. Evidence to support this from the NEN deviating value has to be provided.
At pile type fundex 380/450 :
Due to the use of a low vibrating pile type, the reduction of CPT-value due to the excavation is done using NEN 9997-1:2016.

At pile type fundex 460/560 :
Due to the use of a low vibrating pile type, the reduction of CPT-value due to the excavation is done using NEN 9997-1:2016.

At pile type Round 510 :
Due to the use of a low vibrating pile type, the reduction of CPT-value due to the excavation is done using NEN 9997-1:2016.

When reviewing the following results, warnings listed above should be considered.

## 3.2 Remarks

When calculating the max. mobilized soil weight, the topangle is used according to NEN 9997-1:2016.

## 3.3 Calculation Parameters

### 3.3.1 Pile Factors

| | |
|---|---|
| xi3 (user defined) : | 1,28 |
| xi4 (user defined) : | 1,03 |
| User defined gamma;var [-] | 1,000 |
| User defined gamma;st [-] | 1,000 |
| Factor gamma;gamma according to NEN 9997-1:2016 table A.2 [-] | |
| Above excavation level | 1,0 |
| Below excavation level | 1,1 |

### 3.3.2 Pile t pe : funde 380/450

| | |
|---|---|
| Pile type for shaft friction factor (alpha;t) sand/gravel : | Screw pile, cast in place, lost tip |
| Pile type for shaft friction factor (alpha;t) clay : | User defined |
| Shaft friction factor clay [-] : | 0,0000 |
| Materialtype for pile : | Concrete |
| Pile shape : | Round pile with lost tip |
| Pile dimensions : | |
| Diameter at tip [m] : | 0,450 |
| Diameter shaft [m] : | 0,415 |
| Effective heigth enlarged base [m] : | 0,000 |

### 3.3.3 Pile t pe : funde 460/560

| | |
|---|---|
| Pile type for shaft friction factor (alpha;t) sand/gravel : | Screw pile, cast in place, lost tip |
| Pile type for shaft friction factor (alpha;t) clay : | User defined |

| | |
|---|---|
| Shaft friction factor clay [-] : | 0,0000 |
| Materialtype for pile : | Concrete |
| Pile shape : | Round pile with lost tip |
| Pile dimensions : | |
| Diameter at tip [m] : | 0,560 |
| Diameter shaft [m] : | 0,510 |
| Effective heigth enlarged base [m] : | 0,000 |

### 3.3.4 Pile type : DP 410

| | |
|---|---|
| Pile type for shaft friction factor (alpha;t) sand/gravel : | User defined (vibrating) |
| Shaft friction factor sand/gravel [-] : | 0,0090 |
| Pile type for shaft friction factor (alpha;t) clay : | User defined |
| Shaft friction factor clay [-] : | 0,0000 |
| Materialtype for pile : | Concrete |
| Pile shape : | Round pile |
| Pile dimensions : | |
| Diameter [m] : | 0,410 |

### 3.3.5 Pile type : DP 460

| | |
|---|---|
| Pile type for shaft friction factor (alpha;t) sand/gravel : | User defined (vibrating) |
| Shaft friction factor sand/gravel [-] : | 0,0090 |
| Pile type for shaft friction factor (alpha;t) clay : | User defined |
| Shaft friction factor clay [-] : | 0,0000 |
| Materialtype for pile : | Concrete |
| Pile shape : | Round pile |
| Pile dimensions : | |
| Diameter [m] : | 0,460 |

### 3.3.6 Pile type : Round 510

| | |
|---|---|
| Pile type for shaft friction factor (alpha;t) sand/gravel : | Screw pile, cast in place, with grout |
| Pile type for shaft friction factor (alpha;t) clay : | User defined |
| Shaft friction factor clay [-] : | 0,0000 |
| Materialtype for pile : | Concrete |
| Pile shape : | Round pile |
| Pile dimensions : | |
| Diameter [m] : | 0,510 |

## 3.4 Results for all CPT's

### 3.4.1 Results for pile type : funde 380 450

3.4.1.1 Pile group 1

Number of piles belonging to this pile group : 1
Names of piles belonging to this pile group
1





| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 365,37 | 363,18 | 363,18 | Ksi3 |
| -18,50 | 381,55 | 386,87 | 381,55 | Ksi4 |
| -19,00 | 397,73 | 410,24 | 397,73 | Ksi4 |
| -19,50 | 413,91 | 430,38 | 413,91 | Ksi4 |
| -20,00 | 430,09 | 446,60 | 430,09 | Ksi4 |
| -20,50 | 446,27 | 462,78 | 446,27 | Ksi4 |
| -21,00 | 462,45 | 478,96 | 462,45 | Ksi4 |
| -21,50 | 478,63 | 495,14 | 478,63 | Ksi4 |

3.4.1.2 Pile group 2

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
2
9

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 412,80 | 398,82 | 398,82 | Ksi3 |
| -18,50 | 449,12 | 430,35 | 430,35 | Ksi3 |
| -19,00 | 482,85 | 462,11 | 462,11 | Ksi3 |
| -19,50 | 514,79 | 492,40 | 492,40 | Ksi3 |
| -20,00 | 545,51 | 521,52 | 521,52 | Ksi3 |
| -20,50 | 575,38 | 549,75 | 549,75 | Ksi3 |
| -21,00 | 604,65 | 577,28 | 577,28 | Ksi3 |
| -21,50 | 633,48 | 604,26 | 604,26 | Ksi3 |

3.4.1.3 Pile group 3

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
3
7

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 412,80 | 398,82 | 398,82 | Ksi3 |
| -18,50 | 449,12 | 430,35 | 430,35 | Ksi3 |
| -19,00 | 482,85 | 462,11 | 462,11 | Ksi3 |
| -19,50 | 514,79 | 492,40 | 492,40 | Ksi3 |
| -20,00 | 545,51 | 521,52 | 521,52 | Ksi3 |
| -20,50 | 575,38 | 549,75 | 549,75 | Ksi3 |
| -21,00 | 604,65 | 577,28 | 577,28 | Ksi3 |
| -21,50 | 633,48 | 604,26 | 604,26 | Ksi3 |

3.4.1.4 Pile group 4

Number of piles belonging to this pile group : 4
Names of piles belonging to this pile group
4
5
6
8

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 484,56 | 457,66 | 457,66 | Ksi3 |
| -18,50 | 536,30 | 499,67 | 499,67 | Ksi3 |
| -19,00 | 586,24 | 543,13 | 543,13 | Ksi3 |
| -19,50 | 634,89 | 585,55 | 585,55 | Ksi3 |
| -20,00 | 682,64 | 627,15 | 627,15 | Ksi3 |
| -20,50 | 729,75 | 668,11 | 668,11 | Ksi3 |
| -21,00 | 776,39 | 708,56 | 708,56 | Ksi3 |

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -21,50 | 822,69 | 748,61 | 748,61 | Ksi3 |

**3.4.2 Results for pile type : funde 460/560**

3.4.2.1 Pile group 1

Number of piles belonging to this pile group : 1
Names of piles belonging to this pile group
1

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 360,04 | 376,26 | 360,04 | Ksi4 |
| -18,50 | 375,93 | 392,15 | 375,93 | Ksi4 |
| -19,00 | 391,82 | 408,04 | 391,82 | Ksi4 |
| -19,50 | 407,71 | 423,93 | 407,71 | Ksi4 |
| -20,00 | 423,60 | 439,82 | 423,60 | Ksi4 |
| -20,50 | 439,49 | 455,71 | 439,49 | Ksi4 |
| -21,00 | 455,38 | 471,60 | 455,38 | Ksi4 |
| -21,50 | 471,27 | 487,49 | 471,27 | Ksi4 |

3.4.2.2 Pile group 2

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
2
9

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 461,36 | 450,99 | 450,99 | Ksi3 |
| -18,50 | 498,74 | 483,76 | 483,76 | Ksi3 |
| -19,00 | 533,53 | 516,61 | 516,61 | Ksi3 |
| -19,50 | 566,85 | 547,97 | 547,97 | Ksi3 |
| -20,00 | 599,32 | 578,29 | 578,29 | Ksi3 |
| -20,50 | 631,24 | 607,89 | 607,89 | Ksi3 |
| -21,00 | 662,76 | 636,98 | 636,98 | Ksi3 |
| -21,50 | 693,96 | 665,68 | 665,68 | Ksi3 |

3.4.2.3 Pile group 3

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
3
7

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 461,36 | 450,99 | 450,99 | Ksi3 |
| -18,50 | 498,74 | 483,76 | 483,76 | Ksi3 |
| -19,00 | 533,53 | 516,61 | 516,61 | Ksi3 |
| -19,50 | 566,85 | 547,97 | 547,97 | Ksi3 |
| -20,00 | 599,32 | 578,29 | 578,29 | Ksi3 |
| -20,50 | 631,24 | 607,89 | 607,89 | Ksi3 |
| -21,00 | 662,76 | 636,98 | 636,98 | Ksi3 |
| -21,50 | 693,96 | 665,68 | 665,68 | Ksi3 |

3.4.2.4 Pile group 4

Number of piles belonging to this pile group : 4
Names of piles belonging to this pile group
4
5





6
8

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 565,76 | 537,52 | 537,52 | Ksi3 |
| -18,50 | 624,27 | 585,02 | 585,02 | Ksi3 |
| -19,00 | 680,90 | 634,13 | 634,13 | Ksi3 |
| -19,50 | 736,43 | 682,18 | 682,18 | Ksi3 |
| -20,00 | 791,27 | 729,46 | 729,46 | Ksi3 |
| -20,50 | 845,64 | 776,18 | 776,18 | Ksi3 |
| -21,00 | 899,64 | 822,51 | 822,51 | Ksi3 |
| -21,50 | 953,35 | 868,53 | 868,53 | Ksi3 |

**3.4.3 Results for pile type : DP 410**

3.4.3.1 Pile group 1

Number of piles belonging to this pile group : 1
Names of piles belonging to this pile group
1

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 365,61 | 361,33 | 361,33 | Ksi3 |
| -18,50 | 381,80 | 385,12 | 381,80 | Ksi4 |
| -19,00 | 398,00 | 408,58 | 398,00 | Ksi4 |
| -19,50 | 414,19 | 429,99 | 414,19 | Ksi4 |
| -20,00 | 430,38 | 446,91 | 430,38 | Ksi4 |
| -20,50 | 446,57 | 463,10 | 446,57 | Ksi4 |
| -21,00 | 462,77 | 479,30 | 462,77 | Ksi4 |
| -21,50 | 478,96 | 495,49 | 478,96 | Ksi4 |

3.4.3.2 Pile group 2

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
2
9

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 409,94 | 395,76 | 395,76 | Ksi3 |
| -18,50 | 446,19 | 427,21 | 427,21 | Ksi3 |
| -19,00 | 479,88 | 458,90 | 458,90 | Ksi3 |
| -19,50 | 511,77 | 489,12 | 489,12 | Ksi3 |
| -20,00 | 542,41 | 518,18 | 518,18 | Ksi3 |
| -20,50 | 572,19 | 546,34 | 546,34 | Ksi3 |
| -21,00 | 601,36 | 573,80 | 573,80 | Ksi3 |
| -21,50 | 630,08 | 600,70 | 600,70 | Ksi3 |

3.4.3.3 Pile group 3

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
3
7

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 409,94 | 395,76 | 395,76 | Ksi3 |
| -18,50 | 446,19 | 427,21 | 427,21 | Ksi3 |
| -19,00 | 479,88 | 458,90 | 458,90 | Ksi3 |
| -19,50 | 511,77 | 489,12 | 489,12 | Ksi3 |
| -20,00 | 542,41 | 518,18 | 518,18 | Ksi3 |

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -20,50 | 572,19 | 546,34 | 546,34 | Ksi3 |
| -21,00 | 601,36 | 573,80 | 573,80 | Ksi3 |
| -21,50 | 630,08 | 600,70 | 600,70 | Ksi3 |

3.4.3.4 Pile group 4

Number of piles belonging to this pile group : 4
Names of piles belonging to this pile group
4
5
6
8

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 480,09 | 453,26 | 453,26 | Ksi3 |
| -18,50 | 531,48 | 494,97 | 494,97 | Ksi3 |
| -19,00 | 581,06 | 538,12 | 538,12 | Ksi3 |
| -19,50 | 629,35 | 580,24 | 580,24 | Ksi3 |
| -20,00 | 676,74 | 621,54 | 621,54 | Ksi3 |
| -20,50 | 723,48 | 662,19 | 662,19 | Ksi3 |
| -21,00 | 769,74 | 702,34 | 702,34 | Ksi3 |
| -21,50 | 815,65 | 742,07 | 742,07 | Ksi3 |

**3.4.4 Results for pile type : DP 460**

3.4.4.1 Pile group 1

Number of piles belonging to this pile group : 1
Names of piles belonging to this pile group
1

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 363,03 | 377,06 | 363,03 | Ksi4 |
| -18,50 | 379,08 | 395,46 | 379,08 | Ksi4 |
| -19,00 | 395,13 | 411,51 | 395,13 | Ksi4 |
| -19,50 | 411,18 | 427,56 | 411,18 | Ksi4 |
| -20,00 | 427,23 | 443,61 | 427,23 | Ksi4 |
| -20,50 | 443,27 | 459,66 | 443,27 | Ksi4 |
| -21,00 | 459,32 | 475,71 | 459,32 | Ksi4 |
| -21,50 | 475,37 | 491,76 | 475,37 | Ksi4 |

3.4.4.2 Pile group 2

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
2
9

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 437,05 | 424,83 | 424,83 | Ksi3 |
| -18,50 | 473,86 | 457,02 | 457,02 | Ksi3 |
| -19,00 | 508,04 | 489,34 | 489,34 | Ksi3 |
| -19,50 | 540,54 | 520,15 | 520,15 | Ksi3 |
| -20,00 | 572,00 | 549,82 | 549,82 | Ksi3 |
| -20,50 | 602,76 | 578,66 | 578,66 | Ksi3 |
| -21,00 | 633,04 | 606,88 | 606,88 | Ksi3 |
| -21,50 | 662,98 | 634,63 | 634,63 | Ksi3 |





3.4.4.3 Pile group 3

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
3
7

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 437,05 | 424,83 | 424,83 | Ksi3 |
| -18,50 | 473,86 | 457,02 | 457,02 | Ksi3 |
| -19,00 | 508,04 | 489,34 | 489,34 | Ksi3 |
| -19,50 | 540,54 | 520,15 | 520,15 | Ksi3 |
| -20,00 | 572,00 | 549,82 | 549,82 | Ksi3 |
| -20,50 | 602,76 | 578,66 | 578,66 | Ksi3 |
| -21,00 | 633,04 | 606,88 | 606,88 | Ksi3 |
| -21,50 | 662,98 | 634,63 | 634,63 | Ksi3 |

3.4.4.4 Pile group 4

Number of piles belonging to this pile group : 4
Names of piles belonging to this pile group
4
5
6
8

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 523,81 | 496,30 | 496,30 | Ksi3 |
| -18,50 | 578,77 | 540,97 | 540,97 | Ksi3 |
| -19,00 | 631,85 | 587,14 | 587,14 | Ksi3 |
| -19,50 | 683,71 | 632,24 | 632,24 | Ksi3 |
| -20,00 | 734,77 | 676,52 | 676,52 | Ksi3 |
| -20,50 | 785,28 | 720,20 | 720,20 | Ksi3 |
| -21,00 | 835,39 | 763,41 | 763,41 | Ksi3 |
| -21,50 | 885,20 | 806,27 | 806,27 | Ksi3 |

**3.4.5 Results for pile type : Round 510**

3.4.5.1 Pile group 1

Number of piles belonging to this pile group : 1
Names of piles belonging to this pile group
1

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 360,04 | 376,26 | 360,04 | Ksi4 |
| -18,50 | 375,93 | 392,15 | 375,93 | Ksi4 |
| -19,00 | 391,82 | 408,04 | 391,82 | Ksi4 |
| -19,50 | 407,71 | 423,93 | 407,71 | Ksi4 |
| -20,00 | 423,60 | 439,82 | 423,60 | Ksi4 |
| -20,50 | 439,49 | 455,71 | 439,49 | Ksi4 |
| -21,00 | 455,38 | 471,60 | 455,38 | Ksi4 |
| -21,50 | 471,27 | 487,49 | 471,27 | Ksi4 |

3.4.5.2 Pile group 2

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
2
9

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 461,36 | 450,99 | 450,99 | Ksi3 |
| -18,50 | 498,74 | 483,76 | 483,76 | Ksi3 |
| -19,00 | 533,53 | 516,61 | 516,61 | Ksi3 |
| -19,50 | 566,85 | 547,97 | 547,97 | Ksi3 |
| -20,00 | 599,32 | 578,29 | 578,29 | Ksi3 |
| -20,50 | 631,24 | 607,89 | 607,89 | Ksi3 |
| -21,00 | 662,76 | 636,98 | 636,98 | Ksi3 |
| -21,50 | 693,96 | 665,68 | 665,68 | Ksi3 |

3.4.5.3 Pile group 3

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
3
7

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 461,36 | 450,99 | 450,99 | Ksi3 |
| -18,50 | 498,74 | 483,76 | 483,76 | Ksi3 |
| -19,00 | 533,53 | 516,61 | 516,61 | Ksi3 |
| -19,50 | 566,85 | 547,97 | 547,97 | Ksi3 |
| -20,00 | 599,32 | 578,29 | 578,29 | Ksi3 |
| -20,50 | 631,24 | 607,89 | 607,89 | Ksi3 |
| -21,00 | 662,76 | 636,98 | 636,98 | Ksi3 |
| -21,50 | 693,96 | 665,68 | 665,68 | Ksi3 |

3.4.5.4 Pile group 4

Number of piles belonging to this pile group : 4
Names of piles belonging to this pile group
4
5
6
8

| Level [m R.L.] | Rt;d min [kN] | Rt;d avg [kN] | Rt;d [kN] | Ksi used [-] |
|---|---|---|---|---|
| -18,00 | 565,76 | 537,52 | 537,52 | Ksi3 |
| -18,50 | 624,27 | 585,02 | 585,02 | Ksi3 |
| -19,00 | 680,90 | 634,13 | 634,13 | Ksi3 |
| -19,50 | 736,43 | 682,18 | 682,18 | Ksi3 |
| -20,00 | 791,27 | 729,46 | 729,46 | Ksi3 |
| -20,50 | 845,64 | 776,18 | 776,18 | Ksi3 |
| -21,00 | 899,64 | 822,51 | 822,51 | Ksi3 |
| -21,50 | 953,35 | 868,53 | 868,53 | Ksi3 |

## 3.5 D C T VE: Results using si3

### 3.5.1 Results for pile t pe : funde 380 450

3.5.1.1 Pile group 1

Number of piles belonging to this pile group : 1
Names of piles belonging to this pile group
1

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 359,40 | 376,77 | 25,01 | 0,00 |





| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,50 | 381,05 | 392,95 | 25,83 | 0,00 |
| 3 | -19,00 | 405,89 | 409,13 | 26,64 | 0,00 |
| 3 | -19,50 | 425,31 | 425,31 | 27,45 | 0,00 |
| 3 | -20,00 | 441,49 | 441,49 | 28,26 | 0,00 |
| 3 | -20,50 | 457,67 | 457,67 | 29,07 | 0,00 |
| 3 | -21,00 | 473,84 | 473,84 | 29,89 | 0,00 |
| 3 | -21,50 | 490,02 | 490,02 | 30,70 | 0,00 |
| 5 | -18,00 | 357,14 | 386,38 | 25,01 | 0,00 |
| 5 | -18,50 | 385,47 | 402,56 | 25,83 | 0,00 |
| 5 | -19,00 | 411,16 | 418,73 | 26,64 | 0,00 |
| 5 | -19,50 | 434,70 | 434,91 | 27,45 | 0,00 |
| 5 | -20,00 | 451,09 | 451,09 | 28,26 | 0,00 |
| 5 | -20,50 | 467,27 | 467,27 | 29,07 | 0,00 |
| 5 | -21,00 | 483,45 | 483,45 | 29,89 | 0,00 |
| 5 | -21,50 | 499,63 | 499,63 | 30,70 | 0,00 |
| 6 | -18,00 | 340,15 | 365,37 | 25,01 | 0,00 |
| 6 | -18,50 | 368,35 | 381,55 | 25,83 | 0,00 |
| 6 | -19,00 | 393,81 | 397,73 | 26,64 | 0,00 |
| 6 | -19,50 | 413,91 | 413,91 | 27,45 | 0,00 |
| 6 | -20,00 | 430,09 | 430,09 | 28,26 | 0,00 |
| 6 | -20,50 | 446,27 | 446,27 | 29,07 | 0,00 |
| 6 | -21,00 | 462,45 | 462,45 | 29,89 | 0,00 |
| 6 | -21,50 | 478,63 | 478,63 | 30,70 | 0,00 |
| 8 | -18,00 | 379,70 | 401,40 | 25,01 | 0,00 |
| 8 | -18,50 | 403,79 | 417,58 | 25,83 | 0,00 |
| 8 | -19,00 | 428,46 | 433,76 | 26,64 | 0,00 |
| 8 | -19,50 | 449,94 | 449,94 | 27,45 | 0,00 |
| 8 | -20,00 | 466,12 | 466,12 | 28,26 | 0,00 |
| 8 | -20,50 | 482,30 | 482,30 | 29,07 | 0,00 |
| 8 | -21,00 | 498,48 | 498,48 | 29,89 | 0,00 |
| 8 | -21,50 | 514,65 | 514,65 | 30,70 | 0,00 |
| 9 | -18,00 | 379,51 | 379,51 | 25,01 | 0,00 |
| 9 | -18,50 | 395,69 | 395,69 | 25,83 | 0,00 |
| 9 | -19,00 | 411,87 | 411,87 | 26,64 | 0,00 |
| 9 | -19,50 | 428,04 | 428,04 | 27,45 | 0,00 |
| 9 | -20,00 | 444,22 | 444,22 | 28,26 | 0,00 |
| 9 | -20,50 | 460,40 | 460,40 | 29,07 | 0,00 |
| 9 | -21,00 | 476,58 | 476,58 | 29,89 | 0,00 |
| 9 | -21,50 | 492,76 | 492,76 | 30,70 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.1.2 Pile group 2

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
2
9

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 390,42 | 982,99 | 25,01 | 0,00 |
| 3 | -18,50 | 417,68 | 1064,94 | 25,83 | 0,00 |

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -19,00 | 449,93 | 1151,66 | 26,64 | 0,00 |
| 3 | -19,50 | 480,65 | 1243,34 | 27,45 | 0,00 |
| 3 | -20,00 | 510,12 | 1340,16 | 28,26 | 0,00 |
| 3 | -20,50 | 538,61 | 1442,31 | 29,07 | 0,00 |
| 3 | -21,00 | 566,35 | 1549,96 | 29,89 | 0,00 |
| 3 | -21,50 | 593,51 | 1663,29 | 30,70 | 0,00 |
| 5 | -18,00 | 386,19 | 1037,98 | 25,01 | 0,00 |
| 5 | -18,50 | 421,14 | 1122,95 | 25,83 | 0,00 |
| 5 | -19,00 | 454,01 | 1212,81 | 26,64 | 0,00 |
| 5 | -19,50 | 485,22 | 1307,73 | 27,45 | 0,00 |
| 5 | -20,00 | 515,11 | 1407,90 | 28,26 | 0,00 |
| 5 | -20,50 | 543,98 | 1513,49 | 29,07 | 0,00 |
| 5 | -21,00 | 572,04 | 1624,71 | 29,89 | 0,00 |
| 5 | -21,50 | 599,48 | 1741,72 | 30,70 | 0,00 |
| 6 | -18,00 | 368,52 | 942,27 | 25,01 | 0,00 |
| 6 | -18,50 | 403,44 | 1021,84 | 25,83 | 0,00 |
| 6 | -19,00 | 436,17 | 1106,05 | 26,64 | 0,00 |
| 6 | -19,50 | 467,17 | 1195,09 | 27,45 | 0,00 |
| 6 | -20,00 | 496,83 | 1289,14 | 28,26 | 0,00 |
| 6 | -20,50 | 525,45 | 1388,39 | 29,07 | 0,00 |
| 6 | -21,00 | 553,29 | 1493,01 | 29,89 | 0,00 |
| 6 | -21,50 | 580,51 | 1603,19 | 30,70 | 0,00 |
| 8 | -18,00 | 417,74 | 1148,18 | 25,01 | 0,00 |
| 8 | -18,50 | 448,16 | 1238,90 | 25,83 | 0,00 |
| 8 | -19,00 | 480,31 | 1334,68 | 26,64 | 0,00 |
| 8 | -19,50 | 510,93 | 1435,69 | 27,45 | 0,00 |
| 8 | -20,00 | 540,34 | 1542,12 | 28,26 | 0,00 |
| 8 | -20,50 | 568,82 | 1654,15 | 29,07 | 0,00 |
| 8 | -21,00 | 596,56 | 1771,96 | 29,89 | 0,00 |
| 8 | -21,50 | 623,73 | 1895,73 | 30,70 | 0,00 |
| 9 | -18,00 | 431,22 | 1021,23 | 25,01 | 0,00 |
| 9 | -18,50 | 461,31 | 1104,94 | 25,83 | 0,00 |
| 9 | -19,00 | 490,14 | 1193,45 | 26,64 | 0,00 |
| 9 | -19,50 | 518,03 | 1286,94 | 27,45 | 0,00 |
| 9 | -20,00 | 545,22 | 1385,61 | 28,26 | 0,00 |
| 9 | -20,50 | 571,88 | 1489,64 | 29,07 | 0,00 |
| 9 | -21,00 | 598,14 | 1599,19 | 29,89 | 0,00 |
| 9 | -21,50 | 624,09 | 1714,47 | 30,70 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.1.3 Pile group 3

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
3
7

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 390,42 | 982,99 | 25,01 | 0,00 |
| 3 | -18,50 | 417,68 | 1064,94 | 25,83 | 0,00 |
| 3 | -19,00 | 449,93 | 1151,66 | 26,64 | 0,00 |





| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -19,50 | 480,65 | 1243,34 | 27,45 | 0,00 |
| 3 | -20,00 | 510,12 | 1340,16 | 28,26 | 0,00 |
| 3 | -20,50 | 538,61 | 1442,31 | 29,07 | 0,00 |
| 3 | -21,00 | 566,35 | 1549,96 | 29,89 | 0,00 |
| 3 | -21,50 | 593,51 | 1663,29 | 30,70 | 0,00 |
| 5 | -18,00 | 386,19 | 1037,98 | 25,01 | 0,00 |
| 5 | -18,50 | 421,14 | 1122,95 | 25,83 | 0,00 |
| 5 | -19,00 | 454,01 | 1212,81 | 26,64 | 0,00 |
| 5 | -19,50 | 485,22 | 1307,73 | 27,45 | 0,00 |
| 5 | -20,00 | 515,11 | 1407,90 | 28,26 | 0,00 |
| 5 | -20,50 | 543,98 | 1513,49 | 29,07 | 0,00 |
| 5 | -21,00 | 572,04 | 1624,71 | 29,89 | 0,00 |
| 5 | -21,50 | 599,48 | 1741,72 | 30,70 | 0,00 |
| 6 | -18,00 | 368,52 | 942,27 | 25,01 | 0,00 |
| 6 | -18,50 | 403,44 | 1021,84 | 25,83 | 0,00 |
| 6 | -19,00 | 436,17 | 1106,05 | 26,64 | 0,00 |
| 6 | -19,50 | 467,17 | 1195,09 | 27,45 | 0,00 |
| 6 | -20,00 | 496,83 | 1289,14 | 28,26 | 0,00 |
| 6 | -20,50 | 525,45 | 1388,39 | 29,07 | 0,00 |
| 6 | -21,00 | 553,29 | 1493,01 | 29,89 | 0,00 |
| 6 | -21,50 | 580,51 | 1603,19 | 30,70 | 0,00 |
| 8 | -18,00 | 417,74 | 1148,18 | 25,01 | 0,00 |
| 8 | -18,50 | 448,16 | 1238,90 | 25,83 | 0,00 |
| 8 | -19,00 | 480,31 | 1334,68 | 26,64 | 0,00 |
| 8 | -19,50 | 510,93 | 1435,69 | 27,45 | 0,00 |
| 8 | -20,00 | 540,34 | 1542,12 | 28,26 | 0,00 |
| 8 | -20,50 | 568,82 | 1654,15 | 29,07 | 0,00 |
| 8 | -21,00 | 596,56 | 1771,96 | 29,89 | 0,00 |
| 8 | -21,50 | 623,73 | 1895,73 | 30,70 | 0,00 |
| 9 | -18,00 | 431,22 | 1021,23 | 25,01 | 0,00 |
| 9 | -18,50 | 461,31 | 1104,94 | 25,83 | 0,00 |
| 9 | -19,00 | 490,14 | 1193,45 | 26,64 | 0,00 |
| 9 | -19,50 | 518,03 | 1286,94 | 27,45 | 0,00 |
| 9 | -20,00 | 545,22 | 1385,61 | 28,26 | 0,00 |
| 9 | -20,50 | 571,88 | 1489,64 | 29,07 | 0,00 |
| 9 | -21,00 | 598,14 | 1599,19 | 29,89 | 0,00 |
| 9 | -21,50 | 624,09 | 1714,47 | 30,70 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.1.4 Pile group 4

Number of piles belonging to this pile group : 4
Names of piles belonging to this pile group
4
5
6
8

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 443,08 | 2452,30 | 25,01 | 0,00 |
| 3 | -18,50 | 479,21 | 2715,32 | 25,83 | 0,00 |

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -19,00 | 522,98 | 2997,44 | 26,64 | 0,00 |
| 3 | -19,50 | 565,73 | 3299,38 | 27,45 | 0,00 |
| 3 | -20,00 | 607,59 | 3621,88 | 28,26 | 0,00 |
| 3 | -20,50 | 648,75 | 3965,67 | 29,07 | 0,00 |
| 3 | -21,00 | 689,37 | 4331,48 | 29,89 | 0,00 |
| 3 | -21,50 | 729,56 | 4720,04 | 30,70 | 0,00 |
| 5 | -18,00 | 435,42 | 2633,80 | 25,01 | 0,00 |
| 5 | -18,50 | 481,13 | 2908,91 | 25,83 | 0,00 |
| 5 | -19,00 | 525,39 | 3203,55 | 26,64 | 0,00 |
| 5 | -19,50 | 568,48 | 3518,45 | 27,45 | 0,00 |
| 5 | -20,00 | 610,65 | 3854,34 | 28,26 | 0,00 |
| 5 | -20,50 | 652,08 | 4211,95 | 29,07 | 0,00 |
| 5 | -21,00 | 692,94 | 4592,02 | 29,89 | 0,00 |
| 5 | -21,50 | 733,33 | 4995,27 | 30,70 | 0,00 |
| 6 | -18,00 | 416,56 | 2335,10 | 25,01 | 0,00 |
| 6 | -18,50 | 462,24 | 2588,58 | 25,83 | 0,00 |
| 6 | -19,00 | 506,39 | 2860,64 | 26,64 | 0,00 |
| 6 | -19,50 | 549,34 | 3152,02 | 27,45 | 0,00 |
| 6 | -20,00 | 591,33 | 3463,44 | 28,26 | 0,00 |
| 6 | -20,50 | 632,59 | 3795,63 | 29,07 | 0,00 |
| 6 | -21,00 | 673,27 | 4149,33 | 29,89 | 0,00 |
| 6 | -21,50 | 713,50 | 4525,26 | 30,70 | 0,00 |
| 8 | -18,00 | 481,01 | 3014,45 | 25,01 | 0,00 |
| 8 | -18,50 | 521,31 | 3312,56 | 25,83 | 0,00 |
| 8 | -19,00 | 565,03 | 3630,88 | 26,64 | 0,00 |
| 8 | -19,50 | 607,68 | 3970,14 | 27,45 | 0,00 |
| 8 | -20,00 | 649,48 | 4331,07 | 28,26 | 0,00 |
| 8 | -20,50 | 690,61 | 4714,40 | 29,07 | 0,00 |
| 8 | -21,00 | 731,21 | 5120,86 | 29,89 | 0,00 |
| 8 | -21,50 | 771,40 | 5551,18 | 30,70 | 0,00 |
| 9 | -18,00 | 512,21 | 2594,32 | 25,01 | 0,00 |
| 9 | -18,50 | 554,48 | 2864,36 | 25,83 | 0,00 |
| 9 | -19,00 | 595,84 | 3153,62 | 26,64 | 0,00 |
| 9 | -19,50 | 636,54 | 3462,83 | 27,45 | 0,00 |
| 9 | -20,00 | 676,72 | 3792,72 | 28,26 | 0,00 |
| 9 | -20,50 | 716,51 | 4144,02 | 29,07 | 0,00 |
| 9 | -21,00 | 756,00 | 4517,47 | 29,89 | 0,00 |
| 9 | -21,50 | 795,24 | 4913,79 | 30,70 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

**3.5.2 Results for pile type : funde 460/560**

3.5.2.1 Pile group 1

Number of piles belonging to this pile group : 1
Names of piles belonging to this pile group
1

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 371,24 | 371,24 | 37,78 | 0,00 |





| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,50 | 387,13 | 387,13 | 39,00 | 0,00 |
| 3 | -19,00 | 403,02 | 403,02 | 40,23 | 0,00 |
| 3 | -19,50 | 418,91 | 418,91 | 41,46 | 0,00 |
| 3 | -20,00 | 434,80 | 434,80 | 42,68 | 0,00 |
| 3 | -20,50 | 450,69 | 450,69 | 43,91 | 0,00 |
| 3 | -21,00 | 466,58 | 466,58 | 45,14 | 0,00 |
| 3 | -21,50 | 482,47 | 482,47 | 46,36 | 0,00 |
| 5 | -18,00 | 380,67 | 380,67 | 37,78 | 0,00 |
| 5 | -18,50 | 396,56 | 396,56 | 39,00 | 0,00 |
| 5 | -19,00 | 412,45 | 412,45 | 40,23 | 0,00 |
| 5 | -19,50 | 428,34 | 428,34 | 41,46 | 0,00 |
| 5 | -20,00 | 444,23 | 444,23 | 42,68 | 0,00 |
| 5 | -20,50 | 460,13 | 460,13 | 43,91 | 0,00 |
| 5 | -21,00 | 476,01 | 476,01 | 45,14 | 0,00 |
| 5 | -21,50 | 491,90 | 491,90 | 46,36 | 0,00 |
| 6 | -18,00 | 360,04 | 360,04 | 37,78 | 0,00 |
| 6 | -18,50 | 375,93 | 375,93 | 39,00 | 0,00 |
| 6 | -19,00 | 391,82 | 391,82 | 40,23 | 0,00 |
| 6 | -19,50 | 407,71 | 407,71 | 41,46 | 0,00 |
| 6 | -20,00 | 423,60 | 423,60 | 42,68 | 0,00 |
| 6 | -20,50 | 439,49 | 439,49 | 43,91 | 0,00 |
| 6 | -21,00 | 455,38 | 455,38 | 45,14 | 0,00 |
| 6 | -21,50 | 471,27 | 471,27 | 46,36 | 0,00 |
| 8 | -18,00 | 395,43 | 395,43 | 37,78 | 0,00 |
| 8 | -18,50 | 411,32 | 411,32 | 39,00 | 0,00 |
| 8 | -19,00 | 427,21 | 427,21 | 40,23 | 0,00 |
| 8 | -19,50 | 443,10 | 443,10 | 41,46 | 0,00 |
| 8 | -20,00 | 458,99 | 458,99 | 42,68 | 0,00 |
| 8 | -20,50 | 474,88 | 474,88 | 43,91 | 0,00 |
| 8 | -21,00 | 490,77 | 490,77 | 45,14 | 0,00 |
| 8 | -21,50 | 506,66 | 506,66 | 46,36 | 0,00 |
| 9 | -18,00 | 373,93 | 373,93 | 37,78 | 0,00 |
| 9 | -18,50 | 389,82 | 389,82 | 39,00 | 0,00 |
| 9 | -19,00 | 405,71 | 405,71 | 40,23 | 0,00 |
| 9 | -19,50 | 421,60 | 421,60 | 41,46 | 0,00 |
| 9 | -20,00 | 437,49 | 437,49 | 42,68 | 0,00 |
| 9 | -20,50 | 453,38 | 453,38 | 43,91 | 0,00 |
| 9 | -21,00 | 469,27 | 469,27 | 45,14 | 0,00 |
| 9 | -21,50 | 485,16 | 485,16 | 46,36 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.2.2 Pile group 2

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
2
9

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 442,54 | 987,67 | 37,78 | 0,00 |
| 3 | -18,50 | 470,77 | 1070,10 | 39,00 | 0,00 |

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -19,00 | 504,08 | 1157,34 | 40,23 | 0,00 |
| 3 | -19,50 | 535,79 | 1249,57 | 41,46 | 0,00 |
| 3 | -20,00 | 566,36 | 1346,96 | 42,68 | 0,00 |
| 3 | -20,50 | 596,14 | 1449,71 | 43,91 | 0,00 |
| 3 | -21,00 | 625,38 | 1557,99 | 45,14 | 0,00 |
| 3 | -21,50 | 654,21 | 1671,99 | 46,36 | 0,00 |
| 5 | -18,00 | 440,63 | 1042,98 | 37,78 | 0,00 |
| 5 | -18,50 | 476,44 | 1128,45 | 39,00 | 0,00 |
| 5 | -19,00 | 509,98 | 1218,84 | 40,23 | 0,00 |
| 5 | -19,50 | 541,92 | 1314,32 | 41,46 | 0,00 |
| 5 | -20,00 | 572,72 | 1415,09 | 42,68 | 0,00 |
| 5 | -20,50 | 602,72 | 1521,31 | 43,91 | 0,00 |
| 5 | -21,00 | 632,14 | 1633,17 | 45,14 | 0,00 |
| 5 | -21,50 | 661,13 | 1750,86 | 46,36 | 0,00 |
| 6 | -18,00 | 419,95 | 946,78 | 37,78 | 0,00 |
| 6 | -18,50 | 456,10 | 1026,81 | 39,00 | 0,00 |
| 6 | -19,00 | 489,73 | 1111,51 | 40,23 | 0,00 |
| 6 | -19,50 | 521,60 | 1201,07 | 41,46 | 0,00 |
| 6 | -20,00 | 552,28 | 1295,68 | 42,68 | 0,00 |
| 6 | -20,50 | 582,14 | 1395,51 | 43,91 | 0,00 |
| 6 | -21,00 | 611,43 | 1500,74 | 45,14 | 0,00 |
| 6 | -21,50 | 640,29 | 1611,56 | 46,36 | 0,00 |
| 8 | -18,00 | 471,20 | 1153,85 | 37,78 | 0,00 |
| 8 | -18,50 | 503,17 | 1245,10 | 39,00 | 0,00 |
| 8 | -19,00 | 536,63 | 1341,44 | 40,23 | 0,00 |
| 8 | -19,50 | 568,41 | 1443,04 | 41,46 | 0,00 |
| 8 | -20,00 | 599,04 | 1550,09 | 42,68 | 0,00 |
| 8 | -20,50 | 628,87 | 1662,76 | 43,91 | 0,00 |
| 8 | -21,00 | 658,13 | 1781,26 | 45,14 | 0,00 |
| 8 | -21,50 | 686,98 | 1905,74 | 46,36 | 0,00 |
| 9 | -18,00 | 480,64 | 1026,15 | 37,78 | 0,00 |
| 9 | -18,50 | 512,32 | 1110,35 | 39,00 | 0,00 |
| 9 | -19,00 | 542,66 | 1199,38 | 40,23 | 0,00 |
| 9 | -19,50 | 572,14 | 1293,42 | 41,46 | 0,00 |
| 9 | -20,00 | 601,06 | 1392,67 | 42,68 | 0,00 |
| 9 | -20,50 | 629,58 | 1497,30 | 43,91 | 0,00 |
| 9 | -21,00 | 657,80 | 1607,50 | 45,14 | 0,00 |
| 9 | -21,50 | 685,81 | 1723,44 | 46,36 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.2.3 Pile group 3

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
3
7

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 442,54 | 987,67 | 37,78 | 0,00 |
| 3 | -18,50 | 470,77 | 1070,10 | 39,00 | 0,00 |
| 3 | -19,00 | 504,08 | 1157,34 | 40,23 | 0,00 |





| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -19,50 | 535,79 | 1249,57 | 41,46 | 0,00 |
| 3 | -20,00 | 566,36 | 1346,96 | 42,68 | 0,00 |
| 3 | -20,50 | 596,14 | 1449,71 | 43,91 | 0,00 |
| 3 | -21,00 | 625,38 | 1557,99 | 45,14 | 0,00 |
| 3 | -21,50 | 654,21 | 1671,99 | 46,36 | 0,00 |
| 5 | -18,00 | 440,63 | 1042,98 | 37,78 | 0,00 |
| 5 | -18,50 | 476,44 | 1128,45 | 39,00 | 0,00 |
| 5 | -19,00 | 509,98 | 1218,84 | 40,23 | 0,00 |
| 5 | -19,50 | 541,92 | 1314,32 | 41,46 | 0,00 |
| 5 | -20,00 | 572,72 | 1415,09 | 42,68 | 0,00 |
| 5 | -20,50 | 602,72 | 1521,31 | 43,91 | 0,00 |
| 5 | -21,00 | 632,14 | 1633,17 | 45,14 | 0,00 |
| 5 | -21,50 | 661,13 | 1750,86 | 46,36 | 0,00 |
| 6 | -18,00 | 419,95 | 946,78 | 37,78 | 0,00 |
| 6 | -18,50 | 456,10 | 1026,81 | 39,00 | 0,00 |
| 6 | -19,00 | 489,73 | 1111,51 | 40,23 | 0,00 |
| 6 | -19,50 | 521,60 | 1201,07 | 41,46 | 0,00 |
| 6 | -20,00 | 552,28 | 1295,68 | 42,68 | 0,00 |
| 6 | -20,50 | 582,14 | 1395,51 | 43,91 | 0,00 |
| 6 | -21,00 | 611,43 | 1500,74 | 45,14 | 0,00 |
| 6 | -21,50 | 640,29 | 1611,56 | 46,36 | 0,00 |
| 8 | -18,00 | 471,20 | 1153,85 | 37,78 | 0,00 |
| 8 | -18,50 | 503,17 | 1245,10 | 39,00 | 0,00 |
| 8 | -19,00 | 536,63 | 1341,44 | 40,23 | 0,00 |
| 8 | -19,50 | 568,41 | 1443,04 | 41,46 | 0,00 |
| 8 | -20,00 | 599,04 | 1550,09 | 42,68 | 0,00 |
| 8 | -20,50 | 628,87 | 1662,76 | 43,91 | 0,00 |
| 8 | -21,00 | 658,13 | 1781,26 | 45,14 | 0,00 |
| 8 | -21,50 | 686,98 | 1905,74 | 46,36 | 0,00 |
| 9 | -18,00 | 480,64 | 1026,15 | 37,78 | 0,00 |
| 9 | -18,50 | 512,32 | 1110,35 | 39,00 | 0,00 |
| 9 | -19,00 | 542,66 | 1199,38 | 40,23 | 0,00 |
| 9 | -19,50 | 572,14 | 1293,42 | 41,46 | 0,00 |
| 9 | -20,00 | 601,06 | 1392,67 | 42,68 | 0,00 |
| 9 | -20,50 | 629,58 | 1497,30 | 43,91 | 0,00 |
| 9 | -21,00 | 657,80 | 1607,50 | 45,14 | 0,00 |
| 9 | -21,50 | 685,81 | 1723,44 | 46,36 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.2.4 Pile group 4

Number of piles belonging to this pile group : 4
Names of piles belonging to this pile group
4
5
6
8

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 520,99 | 2486,08 | 37,78 | 0,00 |
| 3 | -18,50 | 561,78 | 2751,91 | 39,00 | 0,00 |

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -19,00 | 611,19 | 3036,95 | 40,23 | 0,00 |
| 3 | -19,50 | 659,51 | 3341,93 | 41,46 | 0,00 |
| 3 | -20,00 | 707,00 | 3667,60 | 42,68 | 0,00 |
| 3 | -20,50 | 753,89 | 4014,67 | 43,91 | 0,00 |
| 3 | -21,00 | 800,36 | 4383,89 | 45,14 | 0,00 |
| 3 | -21,50 | 846,50 | 4775,97 | 46,36 | 0,00 |
| 5 | -18,00 | 513,83 | 2669,37 | 37,78 | 0,00 |
| 5 | -18,50 | 565,10 | 2947,36 | 39,00 | 0,00 |
| 5 | -19,00 | 614,76 | 3244,99 | 40,23 | 0,00 |
| 5 | -19,50 | 663,27 | 3563,00 | 41,46 | 0,00 |
| 5 | -20,00 | 710,95 | 3902,13 | 42,68 | 0,00 |
| 5 | -20,50 | 758,02 | 4263,10 | 43,91 | 0,00 |
| 5 | -21,00 | 804,64 | 4646,64 | 45,14 | 0,00 |
| 5 | -21,50 | 850,92 | 5053,48 | 46,36 | 0,00 |
| 6 | -18,00 | 491,37 | 2367,55 | 37,78 | 0,00 |
| 6 | -18,50 | 542,86 | 2623,75 | 39,00 | 0,00 |
| 6 | -19,00 | 592,56 | 2898,65 | 40,23 | 0,00 |
| 6 | -19,50 | 641,00 | 3192,99 | 41,46 | 0,00 |
| 6 | -20,00 | 688,58 | 3507,49 | 42,68 | 0,00 |
| 6 | -20,50 | 735,53 | 3842,88 | 43,91 | 0,00 |
| 6 | -21,00 | 782,03 | 4199,89 | 45,14 | 0,00 |
| 6 | -21,50 | 828,20 | 4579,26 | 46,36 | 0,00 |
| 8 | -18,00 | 564,10 | 3053,49 | 37,78 | 0,00 |
| 8 | -18,50 | 609,88 | 3354,58 | 39,00 | 0,00 |
| 8 | -19,00 | 659,41 | 3676,01 | 40,23 | 0,00 |
| 8 | -19,50 | 707,74 | 4018,50 | 41,46 | 0,00 |
| 8 | -20,00 | 755,24 | 4382,77 | 42,68 | 0,00 |
| 8 | -20,50 | 802,13 | 4769,57 | 43,91 | 0,00 |
| 8 | -21,00 | 848,59 | 5179,62 | 45,14 | 0,00 |
| 8 | -21,50 | 894,72 | 5613,65 | 46,36 | 0,00 |
| 9 | -18,00 | 597,30 | 2629,20 | 37,78 | 0,00 |
| 9 | -18,50 | 645,51 | 2902,07 | 39,00 | 0,00 |
| 9 | -19,00 | 692,75 | 3194,27 | 40,23 | 0,00 |
| 9 | -19,50 | 739,35 | 3506,54 | 41,46 | 0,00 |
| 9 | -20,00 | 785,51 | 3839,62 | 42,68 | 0,00 |
| 9 | -20,50 | 831,34 | 4194,22 | 43,91 | 0,00 |
| 9 | -21,00 | 876,93 | 4571,09 | 45,14 | 0,00 |
| 9 | -21,50 | 922,33 | 4970,95 | 46,36 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

**3.5.3 Results for pile t pe : DP 410**

3.5.3.1 Pile group 1

Number of piles belonging to this pile group : 1
Names of piles belonging to this pile group
1

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 357,10 | 377,02 | 24,41 | 0,00 |





| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,50 | 378,82 | 393,21 | 25,21 | 0,00 |
| 3 | -19,00 | 403,78 | 409,40 | 26,00 | 0,00 |
| 3 | -19,50 | 425,60 | 425,60 | 26,79 | 0,00 |
| 3 | -20,00 | 441,79 | 441,79 | 27,59 | 0,00 |
| 3 | -20,50 | 457,98 | 457,98 | 28,38 | 0,00 |
| 3 | -21,00 | 474,18 | 474,18 | 29,17 | 0,00 |
| 3 | -21,50 | 490,37 | 490,37 | 29,96 | 0,00 |
| 5 | -18,00 | 354,68 | 386,63 | 24,41 | 0,00 |
| 5 | -18,50 | 383,08 | 402,83 | 25,21 | 0,00 |
| 5 | -19,00 | 408,90 | 419,02 | 26,00 | 0,00 |
| 5 | -19,50 | 432,57 | 435,21 | 26,79 | 0,00 |
| 5 | -20,00 | 451,40 | 451,40 | 27,59 | 0,00 |
| 5 | -20,50 | 467,60 | 467,60 | 28,38 | 0,00 |
| 5 | -21,00 | 483,79 | 483,79 | 29,17 | 0,00 |
| 5 | -21,50 | 499,98 | 499,98 | 29,96 | 0,00 |
| 6 | -18,00 | 337,86 | 365,61 | 24,41 | 0,00 |
| 6 | -18,50 | 366,12 | 381,80 | 25,21 | 0,00 |
| 6 | -19,00 | 391,69 | 398,00 | 26,00 | 0,00 |
| 6 | -19,50 | 414,19 | 414,19 | 26,79 | 0,00 |
| 6 | -20,00 | 430,38 | 430,38 | 27,59 | 0,00 |
| 6 | -20,50 | 446,57 | 446,57 | 28,38 | 0,00 |
| 6 | -21,00 | 462,77 | 462,77 | 29,17 | 0,00 |
| 6 | -21,50 | 478,96 | 478,96 | 29,96 | 0,00 |
| 8 | -18,00 | 377,49 | 401,67 | 24,41 | 0,00 |
| 8 | -18,50 | 401,63 | 417,87 | 25,21 | 0,00 |
| 8 | -19,00 | 426,39 | 434,06 | 26,00 | 0,00 |
| 8 | -19,50 | 449,24 | 450,25 | 26,79 | 0,00 |
| 8 | -20,00 | 466,44 | 466,44 | 27,59 | 0,00 |
| 8 | -20,50 | 482,63 | 482,63 | 28,38 | 0,00 |
| 8 | -21,00 | 498,83 | 498,83 | 29,17 | 0,00 |
| 8 | -21,50 | 515,02 | 515,02 | 29,96 | 0,00 |
| 9 | -18,00 | 379,53 | 379,76 | 24,41 | 0,00 |
| 9 | -18,50 | 395,95 | 395,95 | 25,21 | 0,00 |
| 9 | -19,00 | 412,14 | 412,14 | 26,00 | 0,00 |
| 9 | -19,50 | 428,34 | 428,34 | 26,79 | 0,00 |
| 9 | -20,00 | 444,53 | 444,53 | 27,59 | 0,00 |
| 9 | -20,50 | 460,72 | 460,72 | 28,38 | 0,00 |
| 9 | -21,00 | 476,92 | 476,92 | 29,17 | 0,00 |
| 9 | -21,50 | 493,11 | 493,11 | 29,96 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for sand and gravel are adjusted for the coarsness of the actual soil (sand when D50 > 0.6mm; gravel when D50 > 2 mm).
Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.3.2 Pile group 2

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
2
9

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 387,35 | 982,70 | 24,41 | 0,00 |
| 3 | -18,50 | 414,54 | 1064,63 | 25,21 | 0,00 |
| 3 | -19,00 | 446,73 | 1151,32 | 26,00 | 0,00 |
| 3 | -19,50 | 477,39 | 1242,97 | 26,79 | 0,00 |
| 3 | -20,00 | 506,79 | 1339,76 | 27,59 | 0,00 |
| 3 | -20,50 | 535,22 | 1441,87 | 28,38 | 0,00 |
| 3 | -21,00 | 562,89 | 1549,49 | 29,17 | 0,00 |
| 3 | -21,50 | 589,98 | 1662,79 | 29,96 | 0,00 |
| 5 | -18,00 | 383,02 | 1037,67 | 24,41 | 0,00 |
| 5 | -18,50 | 417,89 | 1122,62 | 25,21 | 0,00 |
| 5 | -19,00 | 450,70 | 1212,45 | 26,00 | 0,00 |
| 5 | -19,50 | 481,85 | 1307,34 | 26,79 | 0,00 |
| 5 | -20,00 | 511,69 | 1407,47 | 27,59 | 0,00 |
| 5 | -20,50 | 540,51 | 1513,04 | 28,38 | 0,00 |
| 5 | -21,00 | 568,51 | 1624,21 | 29,17 | 0,00 |
| 5 | -21,50 | 595,87 | 1741,18 | 29,96 | 0,00 |
| 6 | -18,00 | 365,53 | 942,00 | 24,41 | 0,00 |
| 6 | -18,50 | 400,36 | 1021,54 | 25,21 | 0,00 |
| 6 | -19,00 | 433,01 | 1105,72 | 26,00 | 0,00 |
| 6 | -19,50 | 463,95 | 1194,74 | 26,79 | 0,00 |
| 6 | -20,00 | 493,56 | 1288,76 | 27,59 | 0,00 |
| 6 | -20,50 | 522,12 | 1387,97 | 28,38 | 0,00 |
| 6 | -21,00 | 549,89 | 1492,56 | 29,17 | 0,00 |
| 6 | -21,50 | 577,03 | 1602,70 | 29,96 | 0,00 |
| 8 | -18,00 | 414,60 | 1147,84 | 24,41 | 0,00 |
| 8 | -18,50 | 444,92 | 1238,54 | 25,21 | 0,00 |
| 8 | -19,00 | 476,99 | 1334,28 | 26,00 | 0,00 |
| 8 | -19,50 | 507,54 | 1435,26 | 26,79 | 0,00 |
| 8 | -20,00 | 536,88 | 1541,65 | 27,59 | 0,00 |
| 8 | -20,50 | 565,29 | 1653,64 | 28,38 | 0,00 |
| 8 | -21,00 | 592,96 | 1771,42 | 29,17 | 0,00 |
| 8 | -21,50 | 620,05 | 1895,16 | 29,96 | 0,00 |
| 9 | -18,00 | 428,32 | 1020,93 | 24,41 | 0,00 |
| 9 | -18,50 | 458,33 | 1104,61 | 25,21 | 0,00 |
| 9 | -19,00 | 487,08 | 1193,09 | 26,00 | 0,00 |
| 9 | -19,50 | 514,89 | 1286,56 | 26,79 | 0,00 |
| 9 | -20,00 | 541,99 | 1385,20 | 27,59 | 0,00 |
| 9 | -20,50 | 568,56 | 1489,19 | 28,38 | 0,00 |
| 9 | -21,00 | 594,72 | 1598,71 | 29,17 | 0,00 |
| 9 | -21,50 | 620,57 | 1713,95 | 29,96 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for sand and gravel are adjusted for the coarsness of the actual soil (sand when D50 > 0.6mm; gravel when D50 > 2 mm).
Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.3.3 Pile group 3

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
3
7





| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 387,35 | 982,70 | 24,41 | 0,00 |
| 3 | -18,50 | 414,54 | 1064,63 | 25,21 | 0,00 |
| 3 | -19,00 | 446,73 | 1151,32 | 26,00 | 0,00 |
| 3 | -19,50 | 477,39 | 1242,97 | 26,79 | 0,00 |
| 3 | -20,00 | 506,79 | 1339,76 | 27,59 | 0,00 |
| 3 | -20,50 | 535,22 | 1441,87 | 28,38 | 0,00 |
| 3 | -21,00 | 562,89 | 1549,49 | 29,17 | 0,00 |
| 3 | -21,50 | 589,98 | 1662,79 | 29,96 | 0,00 |
| 5 | -18,00 | 383,02 | 1037,67 | 24,41 | 0,00 |
| 5 | -18,50 | 417,89 | 1122,62 | 25,21 | 0,00 |
| 5 | -19,00 | 450,70 | 1212,45 | 26,00 | 0,00 |
| 5 | -19,50 | 481,85 | 1307,34 | 26,79 | 0,00 |
| 5 | -20,00 | 511,69 | 1407,47 | 27,59 | 0,00 |
| 5 | -20,50 | 540,51 | 1513,04 | 28,38 | 0,00 |
| 5 | -21,00 | 568,51 | 1624,21 | 29,17 | 0,00 |
| 5 | -21,50 | 595,87 | 1741,18 | 29,96 | 0,00 |
| 6 | -18,00 | 365,53 | 942,00 | 24,41 | 0,00 |
| 6 | -18,50 | 400,36 | 1021,54 | 25,21 | 0,00 |
| 6 | -19,00 | 433,01 | 1105,72 | 26,00 | 0,00 |
| 6 | -19,50 | 463,95 | 1194,74 | 26,79 | 0,00 |
| 6 | -20,00 | 493,56 | 1288,76 | 27,59 | 0,00 |
| 6 | -20,50 | 522,12 | 1387,97 | 28,38 | 0,00 |
| 6 | -21,00 | 549,89 | 1492,56 | 29,17 | 0,00 |
| 6 | -21,50 | 577,03 | 1602,70 | 29,96 | 0,00 |
| 8 | -18,00 | 414,60 | 1147,84 | 24,41 | 0,00 |
| 8 | -18,50 | 444,92 | 1238,54 | 25,21 | 0,00 |
| 8 | -19,00 | 476,99 | 1334,28 | 26,00 | 0,00 |
| 8 | -19,50 | 507,54 | 1435,26 | 26,79 | 0,00 |
| 8 | -20,00 | 536,88 | 1541,65 | 27,59 | 0,00 |
| 8 | -20,50 | 565,29 | 1653,64 | 28,38 | 0,00 |
| 8 | -21,00 | 592,96 | 1771,42 | 29,17 | 0,00 |
| 8 | -21,50 | 620,05 | 1895,16 | 29,96 | 0,00 |
| 9 | -18,00 | 428,32 | 1020,93 | 24,41 | 0,00 |
| 9 | -18,50 | 458,33 | 1104,61 | 25,21 | 0,00 |
| 9 | -19,00 | 487,08 | 1193,09 | 26,00 | 0,00 |
| 9 | -19,50 | 514,89 | 1286,56 | 26,79 | 0,00 |
| 9 | -20,00 | 541,99 | 1385,20 | 27,59 | 0,00 |
| 9 | -20,50 | 568,56 | 1489,19 | 28,38 | 0,00 |
| 9 | -21,00 | 594,72 | 1598,71 | 29,17 | 0,00 |
| 9 | -21,50 | 620,57 | 1713,95 | 29,96 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for sand and gravel are adjusted for the coarsness of the actual soil (sand when D50 > 0.6mm; gravel when D50 > 2 mm).
Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.3.4 Pile group 4

Number of piles belonging to this pile group : 4
Names of piles belonging to this pile group
4
5
6
8

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 438,78 | 2450,49 | 24,41 | 0,00 |
| 3 | -18,50 | 474,65 | 2713,37 | 25,21 | 0,00 |
| 3 | -19,00 | 518,12 | 2995,33 | 26,00 | 0,00 |
| 3 | -19,50 | 560,56 | 3297,11 | 26,79 | 0,00 |
| 3 | -20,00 | 602,12 | 3619,44 | 27,59 | 0,00 |
| 3 | -20,50 | 642,98 | 3963,06 | 28,38 | 0,00 |
| 3 | -21,00 | 683,30 | 4328,69 | 29,17 | 0,00 |
| 3 | -21,50 | 723,18 | 4717,06 | 29,96 | 0,00 |
| 5 | -18,00 | 431,10 | 2631,90 | 24,41 | 0,00 |
| 5 | -18,50 | 476,50 | 2906,86 | 25,21 | 0,00 |
| 5 | -19,00 | 520,45 | 3201,34 | 26,00 | 0,00 |
| 5 | -19,50 | 563,25 | 3516,07 | 26,79 | 0,00 |
| 5 | -20,00 | 605,12 | 3851,79 | 27,59 | 0,00 |
| 5 | -20,50 | 646,26 | 4209,23 | 28,38 | 0,00 |
| 5 | -21,00 | 686,82 | 4589,11 | 29,17 | 0,00 |
| 5 | -21,50 | 726,91 | 4992,17 | 29,96 | 0,00 |
| 6 | -18,00 | 412,45 | 2333,36 | 24,41 | 0,00 |
| 6 | -18,50 | 457,80 | 2586,70 | 25,21 | 0,00 |
| 6 | -19,00 | 501,64 | 2858,61 | 26,00 | 0,00 |
| 6 | -19,50 | 544,29 | 3149,83 | 26,79 | 0,00 |
| 6 | -20,00 | 585,98 | 3461,09 | 27,59 | 0,00 |
| 6 | -20,50 | 626,94 | 3793,11 | 28,38 | 0,00 |
| 6 | -21,00 | 667,32 | 4146,63 | 29,17 | 0,00 |
| 6 | -21,50 | 707,25 | 4522,38 | 29,96 | 0,00 |
| 8 | -18,00 | 476,43 | 3012,36 | 24,41 | 0,00 |
| 8 | -18,50 | 516,43 | 3310,32 | 25,21 | 0,00 |
| 8 | -19,00 | 559,84 | 3628,47 | 26,00 | 0,00 |
| 8 | -19,50 | 602,18 | 3967,56 | 26,79 | 0,00 |
| 8 | -20,00 | 643,67 | 4328,31 | 27,59 | 0,00 |
| 8 | -20,50 | 684,50 | 4711,46 | 28,38 | 0,00 |
| 8 | -21,00 | 724,80 | 5117,73 | 29,17 | 0,00 |
| 8 | -21,50 | 764,67 | 5547,85 | 29,96 | 0,00 |
| 9 | -18,00 | 507,55 | 2592,46 | 24,41 | 0,00 |
| 9 | -18,50 | 549,49 | 2862,35 | 25,21 | 0,00 |
| 9 | -19,00 | 590,54 | 3151,45 | 26,00 | 0,00 |
| 9 | -19,50 | 630,93 | 3460,50 | 26,79 | 0,00 |
| 9 | -20,00 | 670,80 | 3790,22 | 27,59 | 0,00 |
| 9 | -20,50 | 710,27 | 4141,35 | 28,38 | 0,00 |
| 9 | -21,00 | 749,44 | 4514,61 | 29,17 | 0,00 |
| 9 | -21,50 | 788,36 | 4910,74 | 29,96 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for sand and gravel are adjusted for the coarsness of the actual soil (sand when D50 > 0.6mm; gravel when D50 > 2 mm).
Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

**3.5.4 Results for pile t□ pe : DP□ 460**

3.5.4.1 Pile group 1

Number of piles belonging to this pile group : 1
Names of piles belonging to this pile group
1





| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 374,33 | 374,33 | 30,73 | 0,00 |
| 3 | -18,50 | 390,38 | 390,38 | 31,73 | 0,00 |
| 3 | -19,00 | 406,43 | 406,43 | 32,73 | 0,00 |
| 3 | -19,50 | 422,48 | 422,48 | 33,73 | 0,00 |
| 3 | -20,00 | 438,53 | 438,53 | 34,72 | 0,00 |
| 3 | -20,50 | 454,58 | 454,58 | 35,72 | 0,00 |
| 3 | -21,00 | 470,63 | 470,63 | 36,72 | 0,00 |
| 3 | -21,50 | 486,68 | 486,68 | 37,72 | 0,00 |
| 5 | -18,00 | 377,44 | 383,86 | 30,73 | 0,00 |
| 5 | -18,50 | 399,91 | 399,91 | 31,73 | 0,00 |
| 5 | -19,00 | 415,96 | 415,96 | 32,73 | 0,00 |
| 5 | -19,50 | 432,01 | 432,01 | 33,73 | 0,00 |
| 5 | -20,00 | 448,06 | 448,06 | 34,72 | 0,00 |
| 5 | -20,50 | 464,11 | 464,11 | 35,72 | 0,00 |
| 5 | -21,00 | 480,16 | 480,16 | 36,72 | 0,00 |
| 5 | -21,50 | 496,21 | 496,21 | 37,72 | 0,00 |
| 6 | -18,00 | 359,03 | 363,03 | 30,73 | 0,00 |
| 6 | -18,50 | 379,08 | 379,08 | 31,73 | 0,00 |
| 6 | -19,00 | 395,13 | 395,13 | 32,73 | 0,00 |
| 6 | -19,50 | 411,18 | 411,18 | 33,73 | 0,00 |
| 6 | -20,00 | 427,23 | 427,23 | 34,72 | 0,00 |
| 6 | -20,50 | 443,27 | 443,27 | 35,72 | 0,00 |
| 6 | -21,00 | 459,32 | 459,32 | 36,72 | 0,00 |
| 6 | -21,50 | 475,37 | 475,37 | 37,72 | 0,00 |
| 8 | -18,00 | 397,45 | 398,77 | 30,73 | 0,00 |
| 8 | -18,50 | 414,82 | 414,82 | 31,73 | 0,00 |
| 8 | -19,00 | 430,87 | 430,87 | 32,73 | 0,00 |
| 8 | -19,50 | 446,92 | 446,92 | 33,73 | 0,00 |
| 8 | -20,00 | 462,97 | 462,97 | 34,72 | 0,00 |
| 8 | -20,50 | 479,02 | 479,02 | 35,72 | 0,00 |
| 8 | -21,00 | 495,07 | 495,07 | 36,72 | 0,00 |
| 8 | -21,50 | 511,12 | 511,12 | 37,72 | 0,00 |
| 9 | -18,00 | 377,05 | 377,05 | 30,73 | 0,00 |
| 9 | -18,50 | 393,10 | 393,10 | 31,73 | 0,00 |
| 9 | -19,00 | 409,15 | 409,15 | 32,73 | 0,00 |
| 9 | -19,50 | 425,20 | 425,20 | 33,73 | 0,00 |
| 9 | -20,00 | 441,25 | 441,25 | 34,72 | 0,00 |
| 9 | -20,50 | 457,30 | 457,30 | 35,72 | 0,00 |
| 9 | -21,00 | 473,35 | 473,35 | 36,72 | 0,00 |
| 9 | -21,50 | 489,40 | 489,40 | 37,72 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for sand and gravel are adjusted for the coarsness of the actual soil (sand when D50 > 0.6mm; gravel when D50 > 2 mm).
Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.4.2 Pile group 2

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
2
9

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 416,49 | 985,37 | 30,73 | 0,00 |
| 3 | -18,50 | 444,26 | 1067,56 | 31,73 | 0,00 |
| 3 | -19,00 | 477,05 | 1154,53 | 32,73 | 0,00 |
| 3 | -19,50 | 508,24 | 1246,48 | 33,73 | 0,00 |
| 3 | -20,00 | 538,21 | 1343,58 | 34,72 | 0,00 |
| 3 | -20,50 | 567,27 | 1446,02 | 35,72 | 0,00 |
| 3 | -21,00 | 595,66 | 1553,97 | 36,72 | 0,00 |
| 3 | -21,50 | 623,56 | 1667,63 | 37,72 | 0,00 |
| 5 | -18,00 | 413,28 | 1040,52 | 30,73 | 0,00 |
| 5 | -18,50 | 448,79 | 1125,74 | 31,73 | 0,00 |
| 5 | -19,00 | 482,06 | 1215,85 | 32,73 | 0,00 |
| 5 | -19,50 | 513,64 | 1311,05 | 33,73 | 0,00 |
| 5 | -20,00 | 543,95 | 1411,50 | 34,72 | 0,00 |
| 5 | -20,50 | 573,32 | 1517,40 | 35,72 | 0,00 |
| 5 | -21,00 | 601,97 | 1628,93 | 36,72 | 0,00 |
| 5 | -21,50 | 630,08 | 1746,27 | 37,72 | 0,00 |
| 6 | -18,00 | 394,11 | 944,57 | 30,73 | 0,00 |
| 6 | -18,50 | 429,73 | 1024,36 | 31,73 | 0,00 |
| 6 | -19,00 | 462,95 | 1108,82 | 32,73 | 0,00 |
| 6 | -19,50 | 494,39 | 1198,11 | 33,73 | 0,00 |
| 6 | -20,00 | 524,52 | 1292,43 | 34,72 | 0,00 |
| 6 | -20,50 | 553,69 | 1391,96 | 35,72 | 0,00 |
| 6 | -21,00 | 582,16 | 1496,87 | 36,72 | 0,00 |
| 6 | -21,50 | 610,10 | 1607,36 | 37,72 | 0,00 |
| 8 | -18,00 | 444,42 | 1151,04 | 30,73 | 0,00 |
| 8 | -18,50 | 475,63 | 1242,02 | 31,73 | 0,00 |
| 8 | -19,00 | 508,45 | 1338,07 | 32,73 | 0,00 |
| 8 | -19,50 | 539,64 | 1439,37 | 33,73 | 0,00 |
| 8 | -20,00 | 569,62 | 1546,10 | 34,72 | 0,00 |
| 8 | -20,50 | 598,71 | 1658,44 | 35,72 | 0,00 |
| 8 | -21,00 | 627,13 | 1776,58 | 36,72 | 0,00 |
| 8 | -21,50 | 655,05 | 1900,70 | 37,72 | 0,00 |
| 9 | -18,00 | 455,83 | 1023,73 | 30,73 | 0,00 |
| 9 | -18,50 | 486,68 | 1107,68 | 31,73 | 0,00 |
| 9 | -19,00 | 516,21 | 1196,44 | 32,73 | 0,00 |
| 9 | -19,50 | 544,82 | 1290,20 | 33,73 | 0,00 |
| 9 | -20,00 | 572,80 | 1389,15 | 34,72 | 0,00 |
| 9 | -20,50 | 600,30 | 1493,47 | 35,72 | 0,00 |
| 9 | -21,00 | 627,47 | 1603,34 | 36,72 | 0,00 |
| 9 | -21,50 | 654,38 | 1718,94 | 37,72 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for sand and gravel are adjusted for the coarsness of the actual soil (sand when D50 > 0.6mm; gravel when D50 > 2 mm).
Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.4.3 Pile group 3

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
3
7





| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 416,49 | 985,37 | 30,73 | 0,00 |
| 3 | -18,50 | 444,26 | 1067,56 | 31,73 | 0,00 |
| 3 | -19,00 | 477,05 | 1154,53 | 32,73 | 0,00 |
| 3 | -19,50 | 508,24 | 1246,48 | 33,73 | 0,00 |
| 3 | -20,00 | 538,21 | 1343,58 | 34,72 | 0,00 |
| 3 | -20,50 | 567,27 | 1446,02 | 35,72 | 0,00 |
| 3 | -21,00 | 595,66 | 1553,97 | 36,72 | 0,00 |
| 3 | -21,50 | 623,56 | 1667,63 | 37,72 | 0,00 |
| 5 | -18,00 | 413,28 | 1040,52 | 30,73 | 0,00 |
| 5 | -18,50 | 448,79 | 1125,74 | 31,73 | 0,00 |
| 5 | -19,00 | 482,06 | 1215,85 | 32,73 | 0,00 |
| 5 | -19,50 | 513,64 | 1311,05 | 33,73 | 0,00 |
| 5 | -20,00 | 543,95 | 1411,50 | 34,72 | 0,00 |
| 5 | -20,50 | 573,32 | 1517,40 | 35,72 | 0,00 |
| 5 | -21,00 | 601,97 | 1628,93 | 36,72 | 0,00 |
| 5 | -21,50 | 630,08 | 1746,27 | 37,72 | 0,00 |
| 6 | -18,00 | 394,11 | 944,57 | 30,73 | 0,00 |
| 6 | -18,50 | 429,73 | 1024,36 | 31,73 | 0,00 |
| 6 | -19,00 | 462,95 | 1108,82 | 32,73 | 0,00 |
| 6 | -19,50 | 494,39 | 1198,11 | 33,73 | 0,00 |
| 6 | -20,00 | 524,52 | 1292,43 | 34,72 | 0,00 |
| 6 | -20,50 | 553,69 | 1391,96 | 35,72 | 0,00 |
| 6 | -21,00 | 582,16 | 1496,87 | 36,72 | 0,00 |
| 6 | -21,50 | 610,10 | 1607,36 | 37,72 | 0,00 |
| 8 | -18,00 | 444,42 | 1151,04 | 30,73 | 0,00 |
| 8 | -18,50 | 475,63 | 1242,02 | 31,73 | 0,00 |
| 8 | -19,00 | 508,45 | 1338,07 | 32,73 | 0,00 |
| 8 | -19,50 | 539,64 | 1439,37 | 33,73 | 0,00 |
| 8 | -20,00 | 569,62 | 1546,10 | 34,72 | 0,00 |
| 8 | -20,50 | 598,71 | 1658,44 | 35,72 | 0,00 |
| 8 | -21,00 | 627,13 | 1776,58 | 36,72 | 0,00 |
| 8 | -21,50 | 655,05 | 1900,70 | 37,72 | 0,00 |
| 9 | -18,00 | 455,83 | 1023,73 | 30,73 | 0,00 |
| 9 | -18,50 | 486,68 | 1107,68 | 31,73 | 0,00 |
| 9 | -19,00 | 516,21 | 1196,44 | 32,73 | 0,00 |
| 9 | -19,50 | 544,82 | 1290,20 | 33,73 | 0,00 |
| 9 | -20,00 | 572,80 | 1389,15 | 34,72 | 0,00 |
| 9 | -20,50 | 600,30 | 1493,47 | 35,72 | 0,00 |
| 9 | -21,00 | 627,47 | 1603,34 | 36,72 | 0,00 |
| 9 | -21,50 | 654,38 | 1718,94 | 37,72 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for sand and gravel are adjusted for the coarsness of the actual soil (sand when D50 > 0.6mm; gravel when D50 > 2 mm).
Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.4.4 Pile group 4

Number of piles belonging to this pile group : 4
Names of piles belonging to this pile group
4
5
6
8

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 480,85 | 2468,43 | 30,73 | 0,00 |
| 3 | -18,50 | 519,22 | 2732,78 | 31,73 | 0,00 |
| 3 | -19,00 | 565,70 | 3016,28 | 32,73 | 0,00 |
| 3 | -19,50 | 611,10 | 3319,68 | 33,73 | 0,00 |
| 3 | -20,00 | 655,61 | 3643,68 | 34,72 | 0,00 |
| 3 | -20,50 | 699,47 | 3989,03 | 35,72 | 0,00 |
| 3 | -21,00 | 742,83 | 4356,45 | 36,72 | 0,00 |
| 3 | -21,50 | 785,81 | 4746,69 | 37,72 | 0,00 |
| 5 | -18,00 | 473,37 | 2650,78 | 30,73 | 0,00 |
| 5 | -18,50 | 521,82 | 2927,25 | 31,73 | 0,00 |
| 5 | -19,00 | 568,70 | 3223,31 | 32,73 | 0,00 |
| 5 | -19,50 | 614,38 | 3539,70 | 33,73 | 0,00 |
| 5 | -20,00 | 659,16 | 3877,12 | 34,72 | 0,00 |
| 5 | -20,50 | 703,25 | 4236,33 | 35,72 | 0,00 |
| 5 | -21,00 | 746,81 | 4618,05 | 36,72 | 0,00 |
| 5 | -21,50 | 789,96 | 5023,01 | 37,72 | 0,00 |
| 6 | -18,00 | 452,75 | 2350,59 | 30,73 | 0,00 |
| 6 | -18,50 | 501,27 | 2605,36 | 31,73 | 0,00 |
| 6 | -19,00 | 548,10 | 2878,78 | 32,73 | 0,00 |
| 6 | -19,50 | 593,67 | 3171,56 | 33,73 | 0,00 |
| 6 | -20,00 | 638,31 | 3484,44 | 34,72 | 0,00 |
| 6 | -20,50 | 682,25 | 3818,16 | 35,72 | 0,00 |
| 6 | -21,00 | 725,66 | 4173,43 | 36,72 | 0,00 |
| 6 | -21,50 | 768,67 | 4550,99 | 37,72 | 0,00 |
| 8 | -18,00 | 521,22 | 3033,07 | 30,73 | 0,00 |
| 8 | -18,50 | 564,16 | 3332,60 | 31,73 | 0,00 |
| 8 | -19,00 | 610,67 | 3652,40 | 32,73 | 0,00 |
| 8 | -19,50 | 656,04 | 3993,19 | 33,73 | 0,00 |
| 8 | -20,00 | 700,54 | 4355,71 | 34,72 | 0,00 |
| 8 | -20,50 | 744,39 | 4740,69 | 35,72 | 0,00 |
| 8 | -21,00 | 787,75 | 5148,85 | 36,72 | 0,00 |
| 8 | -21,50 | 830,73 | 5580,93 | 37,72 | 0,00 |
| 9 | -18,00 | 553,29 | 2610,97 | 30,73 | 0,00 |
| 9 | -18,50 | 598,37 | 2882,35 | 31,73 | 0,00 |
| 9 | -19,00 | 642,52 | 3173,01 | 32,73 | 0,00 |
| 9 | -19,50 | 686,00 | 3483,67 | 33,73 | 0,00 |
| 9 | -20,00 | 729,00 | 3815,08 | 34,72 | 0,00 |
| 9 | -20,50 | 771,65 | 4167,95 | 35,72 | 0,00 |
| 9 | -21,00 | 814,02 | 4543,02 | 36,72 | 0,00 |
| 9 | -21,50 | 856,18 | 4941,02 | 37,72 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for sand and gravel are adjusted for the coarsness of the actual soil (sand when D50 > 0.6mm; gravel when D50 > 2 mm).
Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

**3.5.5 Results for pile t: pe : Round 510**

3.5.5.1 Pile group 1

Number of piles belonging to this pile group : 1
Names of piles belonging to this pile group
1





| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18.00 | 371,24 | 371,24 | 37,78 | 0,00 |
| 3 | -18,50 | 387,13 | 387,13 | 39,00 | 0,00 |
| 3 | -19.00 | 403,02 | 403,02 | 40,23 | 0,00 |
| 3 | -19.50 | 418,91 | 418,91 | 41,46 | 0,00 |
| 3 | -20.00 | 434,80 | 434,80 | 42,68 | 0,00 |
| 3 | -20.50 | 450,69 | 450,69 | 43,91 | 0,00 |
| 3 | -21.00 | 466,58 | 466,58 | 45,14 | 0,00 |
| 3 | -21.50 | 482,47 | 482,47 | 46,36 | 0,00 |
| 5 | -18,00 | 380,67 | 380,67 | 37,78 | 0,00 |
| 5 | -18.50 | 396,56 | 396,56 | 39,00 | 0,00 |
| 5 | -19,00 | 412,45 | 412,45 | 40,23 | 0,00 |
| 5 | -19.50 | 428,34 | 428,34 | 41,46 | 0,00 |
| 5 | -20,00 | 444,23 | 444,23 | 42,68 | 0,00 |
| 5 | -20,50 | 460,13 | 460,13 | 43,91 | 0,00 |
| 5 | -21,00 | 476,01 | 476,01 | 45,14 | 0,00 |
| 5 | -21,50 | 491,90 | 491,90 | 46,36 | 0,00 |
| 6 | -18,00 | 360,04 | 360,04 | 37,78 | 0,00 |
| 6 | -18,50 | 375,93 | 375,93 | 39,00 | 0,00 |
| 6 | -19,00 | 391,82 | 391,82 | 40,23 | 0,00 |
| 6 | -19,50 | 407,71 | 407,71 | 41,46 | 0,00 |
| 6 | -20,00 | 423,60 | 423,60 | 42,68 | 0,00 |
| 6 | -20,50 | 439,49 | 439,49 | 43,91 | 0,00 |
| 6 | -21,00 | 455,38 | 455,38 | 45,14 | 0,00 |
| 6 | -21,50 | 471,27 | 471,27 | 46,36 | 0,00 |
| 8 | -18,00 | 395,43 | 395,43 | 37,78 | 0,00 |
| 8 | -18,50 | 411,32 | 411,32 | 39,00 | 0,00 |
| 8 | -19,00 | 427,21 | 427,21 | 40,23 | 0,00 |
| 8 | -19,50 | 443,10 | 443,10 | 41,46 | 0,00 |
| 8 | -20,00 | 458,99 | 458,99 | 42,68 | 0,00 |
| 8 | -20,50 | 474,88 | 474,88 | 43,91 | 0,00 |
| 8 | -21,00 | 490,77 | 490,77 | 45,14 | 0,00 |
| 8 | -21,50 | 506,66 | 506,66 | 46,36 | 0,00 |
| 9 | -18,00 | 373,93 | 373,93 | 37,78 | 0,00 |
| 9 | -18,50 | 389,82 | 389,82 | 39,00 | 0,00 |
| 9 | -19,00 | 405,71 | 405,71 | 40,23 | 0,00 |
| 9 | -19,50 | 421,60 | 421,60 | 41,46 | 0,00 |
| 9 | -20,00 | 437,49 | 437,49 | 42,68 | 0,00 |
| 9 | -20,50 | 453,38 | 453,38 | 43,91 | 0,00 |
| 9 | -21,00 | 469,27 | 469,27 | 45,14 | 0,00 |
| 9 | -21,50 | 485,16 | 485,16 | 46,36 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.5.2 Pile group 2

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
2
9

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 442,54 | 987,67 | 37,78 | 0,00 |
| 3 | -18,50 | 470,77 | 1070,10 | 39,00 | 0,00 |
| 3 | -19,00 | 504,08 | 1157,34 | 40,23 | 0,00 |
| 3 | -19,50 | 535,79 | 1249,57 | 41,46 | 0,00 |
| 3 | -20,00 | 566,36 | 1346,96 | 42,68 | 0,00 |
| 3 | -20,50 | 596,14 | 1449,71 | 43,91 | 0,00 |
| 3 | -21,00 | 625,38 | 1557,99 | 45,14 | 0,00 |
| 3 | -21,50 | 654,21 | 1671,99 | 46,36 | 0,00 |
| 5 | -18,00 | 440,63 | 1042,98 | 37,78 | 0,00 |
| 5 | -18,50 | 476,44 | 1128,45 | 39,00 | 0,00 |
| 5 | -19,00 | 509,98 | 1218,84 | 40,23 | 0,00 |
| 5 | -19,50 | 541,92 | 1314,32 | 41,46 | 0,00 |
| 5 | -20,00 | 572,72 | 1415,09 | 42,68 | 0,00 |
| 5 | -20,50 | 602,72 | 1521,31 | 43,91 | 0,00 |
| 5 | -21,00 | 632,14 | 1633,17 | 45,14 | 0,00 |
| 5 | -21,50 | 661,13 | 1750,86 | 46,36 | 0,00 |
| 6 | -18,00 | 419,95 | 946,78 | 37,78 | 0,00 |
| 6 | -18,50 | 456,10 | 1026,81 | 39,00 | 0,00 |
| 6 | -19,00 | 489,73 | 1111,51 | 40,23 | 0,00 |
| 6 | -19,50 | 521,60 | 1201,07 | 41,46 | 0,00 |
| 6 | -20,00 | 552,28 | 1295,68 | 42,68 | 0,00 |
| 6 | -20,50 | 582,14 | 1395,51 | 43,91 | 0,00 |
| 6 | -21,00 | 611,43 | 1500,74 | 45,14 | 0,00 |
| 6 | -21,50 | 640,29 | 1611,56 | 46,36 | 0,00 |
| 8 | -18,00 | 471,20 | 1153,85 | 37,78 | 0,00 |
| 8 | -18,50 | 503,17 | 1245,10 | 39,00 | 0,00 |
| 8 | -19,00 | 536,63 | 1341,44 | 40,23 | 0,00 |
| 8 | -19,50 | 568,41 | 1443,04 | 41,46 | 0,00 |
| 8 | -20,00 | 599,04 | 1550,09 | 42,68 | 0,00 |
| 8 | -20,50 | 628,87 | 1662,76 | 43,91 | 0,00 |
| 8 | -21,00 | 658,13 | 1781,26 | 45,14 | 0,00 |
| 8 | -21,50 | 686,98 | 1905,74 | 46,36 | 0,00 |
| 9 | -18,00 | 480,64 | 1026,15 | 37,78 | 0,00 |
| 9 | -18,50 | 512,32 | 1110,35 | 39,00 | 0,00 |
| 9 | -19,00 | 542,66 | 1199,38 | 40,23 | 0,00 |
| 9 | -19,50 | 572,14 | 1293,42 | 41,46 | 0,00 |
| 9 | -20,00 | 601,06 | 1392,67 | 42,68 | 0,00 |
| 9 | -20,50 | 629,58 | 1497,30 | 43,91 | 0,00 |
| 9 | -21,00 | 657,80 | 1607,50 | 45,14 | 0,00 |
| 9 | -21,50 | 685,81 | 1723,44 | 46,36 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.5.3 Pile group 3

Number of piles belonging to this pile group : 2
Names of piles belonging to this pile group
3
7





| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 442,54 | 987,67 | 37,78 | 0,00 |
| 3 | -18,50 | 470,77 | 1070,10 | 39,00 | 0,00 |
| 3 | -19,00 | 504,08 | 1157,34 | 40,23 | 0,00 |
| 3 | -19,50 | 535,79 | 1249,57 | 41,46 | 0,00 |
| 3 | -20,00 | 566,36 | 1346,96 | 42,68 | 0,00 |
| 3 | -20,50 | 596,14 | 1449,71 | 43,91 | 0,00 |
| 3 | -21,00 | 625,38 | 1557,99 | 45,14 | 0,00 |
| 3 | -21,50 | 654,21 | 1671,99 | 46,36 | 0,00 |
| 5 | -18,00 | 440,63 | 1042,98 | 37,78 | 0,00 |
| 5 | -18,50 | 476,44 | 1128,45 | 39,00 | 0,00 |
| 5 | -19,00 | 509,98 | 1218,84 | 40,23 | 0,00 |
| 5 | -19,50 | 541,92 | 1314,32 | 41,46 | 0,00 |
| 5 | -20,00 | 572,72 | 1415,09 | 42,68 | 0,00 |
| 5 | -20,50 | 602,72 | 1521,31 | 43,91 | 0,00 |
| 5 | -21,00 | 632,14 | 1633,17 | 45,14 | 0,00 |
| 5 | -21,50 | 661,13 | 1750,86 | 46,36 | 0,00 |
| 6 | -18,00 | 419,95 | 946,78 | 37,78 | 0,00 |
| 6 | -18,50 | 456,10 | 1026,81 | 39,00 | 0,00 |
| 6 | -19,00 | 489,73 | 1111,51 | 40,23 | 0,00 |
| 6 | -19,50 | 521,60 | 1201,07 | 41,46 | 0,00 |
| 6 | -20,00 | 552,28 | 1295,68 | 42,68 | 0,00 |
| 6 | -20,50 | 582,14 | 1395,51 | 43,91 | 0,00 |
| 6 | -21,00 | 611,43 | 1500,74 | 45,14 | 0,00 |
| 6 | -21,50 | 640,29 | 1611,56 | 46,36 | 0,00 |
| 8 | -18,00 | 471,20 | 1153,85 | 37,78 | 0,00 |
| 8 | -18,50 | 503,17 | 1245,10 | 39,00 | 0,00 |
| 8 | -19,00 | 536,63 | 1341,44 | 40,23 | 0,00 |
| 8 | -19,50 | 568,41 | 1443,04 | 41,46 | 0,00 |
| 8 | -20,00 | 599,04 | 1550,09 | 42,68 | 0,00 |
| 8 | -20,50 | 628,87 | 1662,76 | 43,91 | 0,00 |
| 8 | -21,00 | 658,13 | 1781,26 | 45,14 | 0,00 |
| 8 | -21,50 | 686,98 | 1905,74 | 46,36 | 0,00 |
| 9 | -18,00 | 480,64 | 1026,15 | 37,78 | 0,00 |
| 9 | -18,50 | 512,32 | 1110,35 | 39,00 | 0,00 |
| 9 | -19,00 | 542,66 | 1199,38 | 40,23 | 0,00 |
| 9 | -19,50 | 572,14 | 1293,42 | 41,46 | 0,00 |
| 9 | -20,00 | 601,06 | 1392,67 | 42,68 | 0,00 |
| 9 | -20,50 | 629,58 | 1497,30 | 43,91 | 0,00 |
| 9 | -21,00 | 657,80 | 1607,50 | 45,14 | 0,00 |
| 9 | -21,50 | 685,81 | 1723,44 | 46,36 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

3.5.5.4 Pile group 4

Number of piles belonging to this pile group : 4
Names of piles belonging to this pile group
4
5
6
8

| CPT name | Level [m R.L.] | Rt;d Indicative [kN] | Max. mobilized soil weight [kN] | Pile weight [kN] | Tension derived from clay [%] |
|---|---|---|---|---|---|
| 3 | -18,00 | 520,99 | 2486,08 | 37,78 | 0,00 |
| 3 | -18,50 | 561,78 | 2751,91 | 39,00 | 0,00 |
| 3 | -19,00 | 611,19 | 3036,95 | 40,23 | 0,00 |
| 3 | -19,50 | 659,51 | 3341,93 | 41,46 | 0,00 |
| 3 | -20,00 | 707,00 | 3667,60 | 42,68 | 0,00 |
| 3 | -20,50 | 753,89 | 4014,67 | 43,91 | 0,00 |
| 3 | -21,00 | 800,36 | 4383,89 | 45,14 | 0,00 |
| 3 | -21,50 | 846,50 | 4775,97 | 46,36 | 0,00 |
| 5 | -18,00 | 513,83 | 2669,37 | 37,78 | 0,00 |
| 5 | -18,50 | 565,10 | 2947,36 | 39,00 | 0,00 |
| 5 | -19,00 | 614,76 | 3244,99 | 40,23 | 0,00 |
| 5 | -19,50 | 663,27 | 3563,00 | 41,46 | 0,00 |
| 5 | -20,00 | 710,95 | 3902,13 | 42,68 | 0,00 |
| 5 | -20,50 | 758,02 | 4263,10 | 43,91 | 0,00 |
| 5 | -21,00 | 804,64 | 4646,64 | 45,14 | 0,00 |
| 5 | -21,50 | 850,92 | 5053,48 | 46,36 | 0,00 |
| 6 | -18,00 | 491,37 | 2367,55 | 37,78 | 0,00 |
| 6 | -18,50 | 542,86 | 2623,75 | 39,00 | 0,00 |
| 6 | -19,00 | 592,56 | 2898,65 | 40,23 | 0,00 |
| 6 | -19,50 | 641,00 | 3192,99 | 41,46 | 0,00 |
| 6 | -20,00 | 688,58 | 3507,49 | 42,68 | 0,00 |
| 6 | -20,50 | 735,53 | 3842,88 | 43,91 | 0,00 |
| 6 | -21,00 | 782,03 | 4199,89 | 45,14 | 0,00 |
| 6 | -21,50 | 828,20 | 4579,26 | 46,36 | 0,00 |
| 8 | -18,00 | 564,10 | 3053,49 | 37,78 | 0,00 |
| 8 | -18,50 | 609,88 | 3354,58 | 39,00 | 0,00 |
| 8 | -19,00 | 659,41 | 3676,01 | 40,23 | 0,00 |
| 8 | -19,50 | 707,74 | 4018,50 | 41,46 | 0,00 |
| 8 | -20,00 | 755,24 | 4382,77 | 42,68 | 0,00 |
| 8 | -20,50 | 802,13 | 4769,57 | 43,91 | 0,00 |
| 8 | -21,00 | 848,59 | 5179,62 | 45,14 | 0,00 |
| 8 | -21,50 | 894,72 | 5613,65 | 46,36 | 0,00 |
| 9 | -18,00 | 597,30 | 2629,20 | 37,78 | 0,00 |
| 9 | -18,50 | 645,51 | 2902,07 | 39,00 | 0,00 |
| 9 | -19,00 | 692,75 | 3194,27 | 40,23 | 0,00 |
| 9 | -19,50 | 739,35 | 3506,54 | 41,46 | 0,00 |
| 9 | -20,00 | 785,51 | 3839,62 | 42,68 | 0,00 |
| 9 | -20,50 | 831,34 | 4194,22 | 43,91 | 0,00 |
| 9 | -21,00 | 876,93 | 4571,09 | 45,14 | 0,00 |
| 9 | -21,50 | 922,33 | 4970,95 | 46,36 | 0,00 |

| CPT name | Alpha t aver. overall | Alpha t aver. sand/gravel | Alpha t aver. clay/peat/loam |
|---|---|---|---|
| 3 | 0,0088 | 0,0090 | 0,0000 |
| 5 | 0,0089 | 0,0090 | 0,0000 |
| 6 | 0,0089 | 0,0090 | 0,0000 |
| 8 | 0,0089 | 0,0090 | 0,0000 |
| 9 | 0,0090 | 0,0090 | 0,0000 |

Please note that User defined values for Alpha t for clay are adjusted when the profile does not entiarly consists of peat/clay. Also note that Alpha t for peat is 0.

## End of Report