

NOTITIE

Onderwerp Verkennd Geotechnisch Advies Bouwrijp Maken Markiezaat
Project Noordland 12-16 & Markiezaat Container Terminal
Opdrachtgever Mepavex Logistics B.V.
Projectcode 115018
Status Definitief
Datum 15 april 2022
Referentie 115018/22-005.580
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Aan Mepavex Logistics B.V.
Kopie -

1 INLEIDING

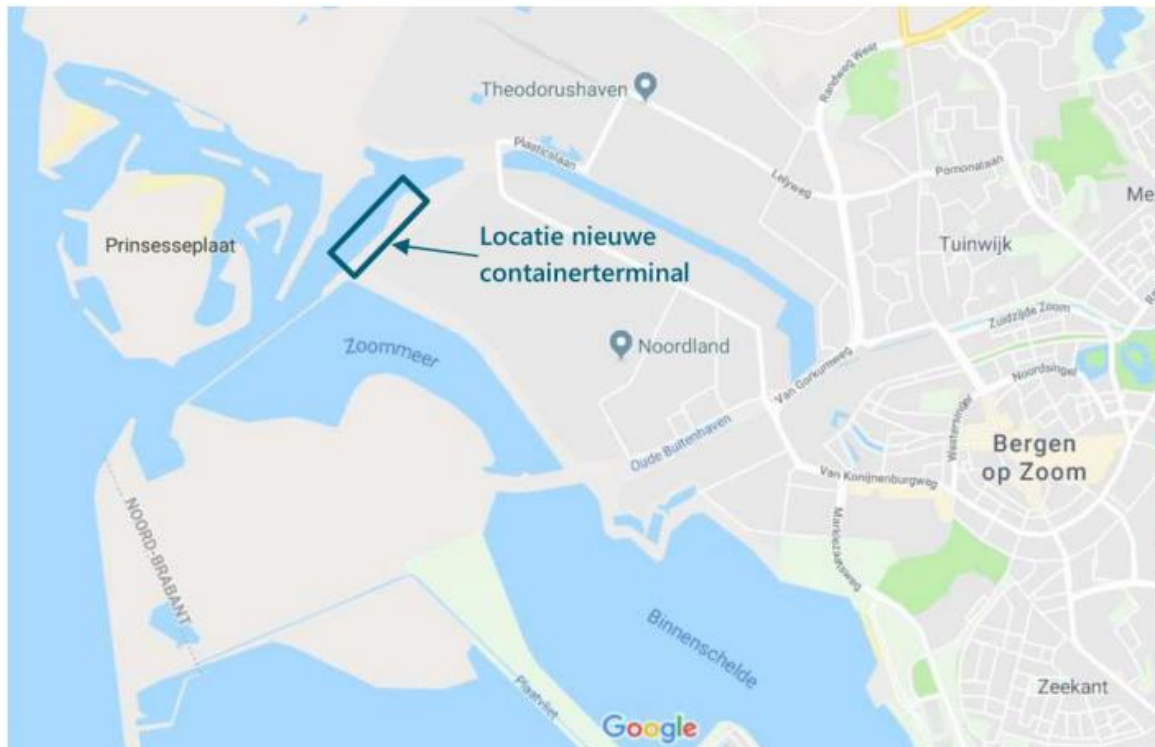
1.1 Opdrachtomschrijving

De bouw van de nieuwe Markiezaat Container Terminal, te Bergen op Zoom, is in voorbereiding door Mepavex Logistics B.V. Het betreft de aanleg van een buitenhaven gezien de buitendijkse ligging van de beoogde locatie, weergegeven in afbeelding 1.1. De nieuwe containerterminal dient de op- en overslag van containers te voorzien.

Witteveen+Bos onderzoekt welke maatregelen benodigd zijn om het terrein bouwrijp te maken. In deze notitie wordt een eerste inschatting gemaakt van de te verwachten (rest)zettingen welke zullen optreden als gevolg van voorbelasting. Dit is een verkennend onderzoek omdat nog niet alle gegevens van het

grondonderzoek beschikbaar zijn. Indien de berekende (rest)zettingen te groot zijn, worden de vervolgstappen besproken om tot een haalbaar ontwerp te komen.

Afbeelding 1.1 Overzichtskaart gebied en locatie nieuwe containerterminal



1.2 Leeswijzer

Hoofdstuk 2 van de notitie beschrijft de gehanteerde uitgangspunten voor de zettingsanalyse. Vervolgens worden in hoofdstuk 3 de resultaten gepresenteerd en hoofdstuk 4 gaat in op de conclusie en aanbevelingen.

1.3 Referenties

- 1 MOS Grondmechanica B.V., Geotechnisch onderzoek, d.d. 16 december 2019, concept.
- 2 NEN 9997-1, Geotechnisch ontwerp van constructies - Deel 1, d.d. juni 2016.
- 3 Witteveen+Bos, Markiezaat Container Terminal Technische Programma van Eisen (TPvE), 13 september 2019, concept.
- 4 SBRCURnet Publication, Quay Walls Second Edition, d.d. 2014.
- 5 Witteveen+Bos, Buitenhaven Bergen op Zoom Schetsontwerp - Dwarsdoorsnede A-A en B-B, 22 augustus 2019, concept.
- 6 Tekening Noordland 12, Bergen op Zoom, bedrijfsvloer op palen, d.d. 8-7-2015, abt.
- 7 Tekening Noordland 13, Bergen op Zoom, vloerpalenplan, d.d. 19-3-2019, Adviesbureau Markslag Beljaars bv.

2 UITGANGSPUNTEN

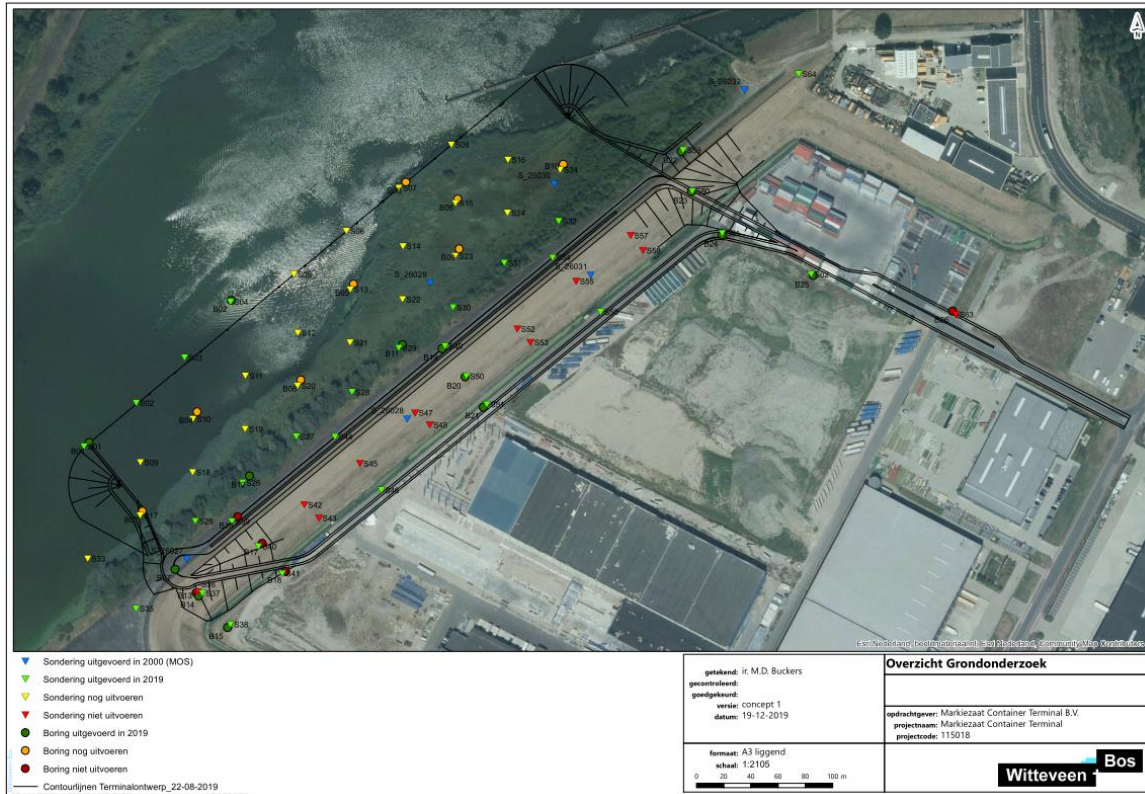
2.1 Bodemopbouw

Ten behoeve van de aanleg van de containerterminal is grondonderzoek uitgevraagd. Het uitgevraagde grondonderzoek betreft het uitvoeren van sonderingen (klasse 1 en 2), machinale en handboringen en laboratoriumonderzoek (i.e. korrelgrootteverdeling, volumieke massa, triaxiaalproeven en samendrukkingsproeven). Op het moment van schrijven is maar een beperkt deel van het onderzoek uitgevoerd, namelijk 30 van de 64 uitgevraagde sonderingen en 14 van de 27 boringen. Afbeelding 2.1 geeft een overzicht weer van het veldonderzoek. Verder is een deel van de boorstaten, volumegegewichten, triaxiaalproeven, korrelverdeling en samendrukkingsproeven uitgevoerd [ref. 1]. Overige proeven worden momenteel voorbereid en worden zo spoedig mogelijk uitgevoerd.

De containerterminal komt buitendijks te liggen, waarbij het terrein verdeeld is in een deel onder water en een deel op het land. Het onderwatergedeelte heeft een bodemniveau van circa NAP -3,0 m en het droge gedeelte loopt vanaf de waterlijn op NAP +0,14 m tot de kruin van de kering op NAP +6,5 m.

Wat opvalt in de beschikbare sonderingen is dat er een groot verschil in de bodemopbouw is te zien, zelfs op korte afstand van elkaar (circa 25 m). In sommige sonderingen is de ondergrond vooral zandig en worden weinig zettingen verwacht, terwijl in andere sonderingen dikke samendrukbare veenpakketten zijn te zien. Om de bandbreedte aan zettingen te bepalen is de bodemopbouw bepaald voor een aantal maatgevende sonderingen. De sonderingen zijn geselecteerd aan de hand van de dikte van de samendrukbare lagen en locatie van de sonderingen. Sondering S04 is geselecteerd als maatgevende ondergrens en sonderingen S03 en S26029 als de maatgevende bovengrens sonderingen. Hierbij zijn sonderingen S03 en S04 vanaf het water uitgevoerd en sondering S26029 op het voorland. Tot slot is sondering S50 genomen als ongunstige sondering op de dijk. Op deze wijze kan onderscheid gemaakt worden tussen werkzaamheden op het voorland/water en werkzaamheden die gaan optreden op de kruin. De interpretatie van de beschouwde sonderingen zijn in de onderstaande tabellen weergegeven [ref. 1].

Afbeelding 2.1 Overzicht grondonderzoek



Tabel 2.1 Ongunstige grondopbouw - op water uitgevoerde sondering - S03 [ref. 1]

Omschrijving grondsoort Sondering S03	Bovenkant laag (NAP + m)
klei matig organisch	-1,8
veen	-2,9
zand schoon los	-5,9
veen	-8,2
zand schoon los	-8,6
zand schoon matig	-11,7
zand zwak siltig	-14,6
zand schoon vast	-17,0
klei zwak zandig vast	-26,0
zand schoon vast	-27,8

Tabel 2.2 Gunstige grondopbouw - op water uitgevoerde sondering - S04 [ref. 1]

Omschrijving grondsoort Sondering S03	Bovenkant laag (NAP + m)
zand sterk siltig kleiig	-2,7
zand schoon matig	-5,2
veen	-8,3
zand schoon matig	-8,7
zand schoon vast	-16,9
klei sterk zandig	-26,4
zand zwak siltig kleiig	-27,0
zand schoon vast	-29,0

Tabel 2.3 Ongunstige grondopbouw - op verhoogde terrein uitgevoerde sondering - S26029 [ref. 1]

Omschrijving grondsoort	Bovenkant laag [NAP +m]
Sondering S03	
klei organisch slap	0,10
veen	-2,8
zand schoon los	-5,9
veen	-7,5
zand schoon los	-8,0
zand zwak siltig	-14,5

Tabel 2.4 Ongunstige grondopbouw - op dijk uitgevoerde sondering - S50 [ref. 1]

Omschrijving grondsoort	Bovenkant laag [NAP +m]
Sondering S50	
zand antropogeen	2,1
zand schoon matig	-1,7
klei sterk zandig	-0,2
zand sterk siltig	-0,6
klei zwak zandig	-1,2
veen	-3,8
zand schoon vast	-6,3

2.2 Geotechnische Parameters

Tot op heden is er één samendrukkingsproef uitgevoerd, welke onvoldoende is om een lokale parameterset op te stellen. Om die reden zijn de representatieve zettingsparameters vastgesteld op basis van tabel 2b van NEN-9997-1 en zijn weergegeven in tabel 2.4. Voor de bepaling van de samendrukkingsparameters is uitgegaan van een CR/C α en CR/RR verhouding van respectievelijk 20 en 6. De toplaag rekent met een Pre-Overburden Pressure (POP) van 10 kPa en de diepere lagen met een Over Consolidation Ratio (OCR) van 1,3. De voorgenoemde uitgangspunten zijn gangbare waardes voor samendrukkingsparameters.

Tabel 2.5 Samendrukkingsparameters op basis van NEN-9997-1 [ref. 2]

Grondsoort	$\gamma_{dry}/\gamma_{sat}$ (kN/m ³)	CR (-)	RR (-)	C α (-)	C _v (m ² /s)	OCR/POP (-)	POP (kPa)
klei organisch matig	15/15	0,230	0,0383	0,0115	5E-8	-	10
klei organisch slap	13/13	0,307	0,0511	0,0153	5E-8	-	10
klei schoon slap	14/14	0,329	0,0548	0,0131	5E-8	-	10
klei zwak zandig vast	20/20	0,0767	0,0128	0,00310	5E-8	1,3	-
veen	10/10	0,460	0,0767	0,023	1E-7	-	10
zand schoon los	17/19	0,0115	0,00192	0	drained	1,3	-
zand schoon matig	18/20	0,00380	0,000633	0	drained	1,3	-
zand zwak siltig	18/20	0,00510	0,000850	0	drained	1,3	-
zand schoon vast	19/21	0,00230	0,000383	0	drained	1,3	-

2.3 Waterstand

De gehanteerde waterstand is de gemiddelde stand op NAP +0,14 m conform technisch programma van eisen (TPvE) [ref. 3].

2.4 Bovenbelasting

Conform TPvE wordt van een stack van maximaal 4 volle containers [ref. 3] uitgegaan. In overeenstemming met Handboek kademuuren is de terreinbelasting van de stack 55 kN/m² tijdens ingebruikname van de containerterminal [ref. 4].

Ter plaatse van de dijk zijn de containers niet aanwezig in opslag, dit deel van het terrein is namelijk bestemd voor vrachtverkeer. De toekomstige verkeersbelasting wordt in de zettingsprognose niet meegenomen aangezien het vrachtverkeer niet permanent aanwezig gaat zijn op de dijk. De kruin van de dijk wordt ontgraven tot NAP +5,0 m, het niveau waar vervolgens het vrachtverkeer zal plaatsvinden.

2.5 Schetsontwerp

In de dwarsdoorsnede van het schetsontwerp wordt op hoofdlijnen de toekomstige containerterminal weergegeven [ref. 5]. Het geeft een opleverhoogte aan van NAP +3,5 m ter plaatse van de kade en NAP +5,0 m op de kruin. Op de kruin vindt dus een afgraving plaats tot NAP +5,0 m. De zettingsanalyse hanteert deze opleverhoogtes als netto ophoging.

2.6 Tijdelijke Overhoogte

Een veel gebruikte oplossing bij het bouwrijp maken van terreinen is het voorbelasten met een tijdelijke overhoogte in combinatie met verticale drainage om zodoende te voldoen aan (rest)zettingseisen. Deze oplossing zal ook hier worden beschouwd. De kering heeft een kruinhoogte van ongeveer NAP +6,5 m. Om de stabiliteit van de kering tijdens uitvoering te waarborgen wordt de tijdelijke overhoogte begrensd tot een maximale hoogte van NAP +6,0 m. Tot slot is er gerekend met verticale drainage, welke tot 1 m boven de eerste zandlaag is geplaatst.

2.7 Zettingseis

(Rest)zettingseisen zijn voor dit project niet opgesteld. Om de haalbaarheid van het voorbelastingsontwerp te kunnen toetsen wordt een restzettingseis van 0,30 m over een referentieperiode van 30 jaar gehanteerd. Voorgestelde restzettingseis is een gebruikelijke waarde bij wegverhardingen en wordt als toepasbaar geacht voor de containerterminal.

3 BEREKENINGSRESULTATEN

3.1 Resultaten zettingsberekeningen

De zettingsprognose bestaat uit een gunstige en ongunstige bodemopbouw om de bandbreedte aan zettingen van de containerterminal in kaart te brengen en vervolgens de benodigde maatregelen te bepalen.

Conform het schetsontwerp wordt de kademuur van de containerterminal opgeleverd op NAP +3,5 m. Deze opleverhoogte wordt aangehouden als netto ophoging in de analyse. Indien de restzettingseis van 0,30 m

over een referentieperiode van 30 jaar niet wordt gehaald, wordt tijdelijke overhoogte tot NAP +6,0 m toegepast.

Verder wordt met wegzakkende grondophoging rekening gehouden door zettingscompensatie toe te passen bij oplevering. Om inzichtelijk te krijgen wat het effect van de wachttijden is op de restzettingen is er gerekend met 1 en 2 jaar wachttijd. Wachttijden langer dan 2 jaar passen in principe niet in de planning en worden derhalve niet beschouwd. Tabel 3.1 geeft de resultaten weer op basis van bodemopbouw en voorgenoemde uitgangspunten.

Tabel 3.1 Resultaten zettingsprognose

Berekening	Huidig maaiveld niveau (m +NAP)	Dikte netto ophoging tot NAP +3,5 m (m)	Tijdelijke overhoogte (m)	Oplevering/ wachttijd (jaren)	Zetting bij oplevering (m)	Restzetting in 30 jaar na oplevering (m)
S03	-1,75	5,25	2,5	1,0	1,8	0,5
S03	-1,75	5,25	2,5	2,0	1,9	0,4
S04	-2,70	6,2	0,0	1,0	0,1	0,06
S50*	+2,05	n.v.t.	n.v.t.	1,0	0,2	0,2
S26029	0,14	3,36	2,5	1,0	2,0	0,7
S26029	0,14	3,36	2,5	2,0	2,1	0,6

* Geen verkeer- of containerbelasting van toepassing.

De berekeningen laten zien dat de bandbreedte aan (rest)zettingen aanzienlijk is. Enerzijds is in het meest gunstige geval voldoende om tot opleverhoogte van NAP +3,5 m op te hogen. De restzettingen zijn dan klein genoeg om de containerterminal snel te kunnen realiseren. Anderzijds treedt er, waar dikke samendrukbare lagen (circa 6 m) aanwezig zijn, duidelijk teveel restzetting op en is voorbelasten met tijdelijke overhoogte geen goede maatregel. Verder is een wachttijd van 2 jaar al vrij lang en langere wachttijden hebben weinig invloed op de zettingen bij oplevering. Bovendien past een langere voorbelastperiode niet in de planning.

3.2 Resultaten gevoeligheidsanalyse terreinbelasting

Resultaten laten zien dat een terreinbelasting van 55 kPa zeer ongunstig is voor de restzettingen, omdat de voorbelasting in dat geval weinig effectief is. De gehanteerde waarde uit het Handboek kademuren is gebaseerd op een hoge belasting voor een veilig ontwerp van kademuren op basis van sterkte. Bij zettingsberekeningen zal een meer gemiddelde belasting over een langere tijd realistischer zijn. Tijdens het gebruik zal de containerterminal niet voltijd bezet zijn en is een lagere terreinbelasting aannemelijker. Een gevoeligheidsanalyse is vervolgens gemaakt om de bandbreedte van de restzettingen te bepalen op basis van de terreinbelasting. Een terreinbelasting van 35 kPa en 45 kPa zijn aanvullend beschouwd, waarbij 35 kPa de gemiddelde gecombineerde belasting is van 20 en 40 ft containers en 45 kPa de gemiddelde belasting van enkel 20 ft containers. De belastingen zijn bepaald met behulp van de gegeven verdeling van gewichten in het Handboek kademuren en op basis van maximaal 4 stack containers, zie bijlage IV voor deze afleiding. Tabel 3.2 presenteert de gevoeligheidsanalyse. Hierbij wordt alsnog niet voldaan aan de restzettingseis, maar kan degelijk invloed hebben op de maatregelen. De te hanteren terreinbelasting dient nader bepaald te worden.

Tabel 3.2 Gevoeligheidsanalyse op basis van terreinbelasting

Berekening	Wachttijd (jaar)	Restzetting bij 35 kPa terreinbelasting (m)	Restzetting bij 45 kPa terreinbelasting (m)	Restzetting bij 55 kPa terreinbelasting (m)
S03	1	0,40	0,46	0,51
S03	2	0,32	0,37	0,43
S04	1	0,05	0,06	0,06
S50	1	n.v.t.	n.v.t.	n.v.t.
S26029	1	0,55	0,63	0,72
S26029	2	0,45	0,53	0,61

3.3 Quickscan zettingsgevoelige delen van het terrein

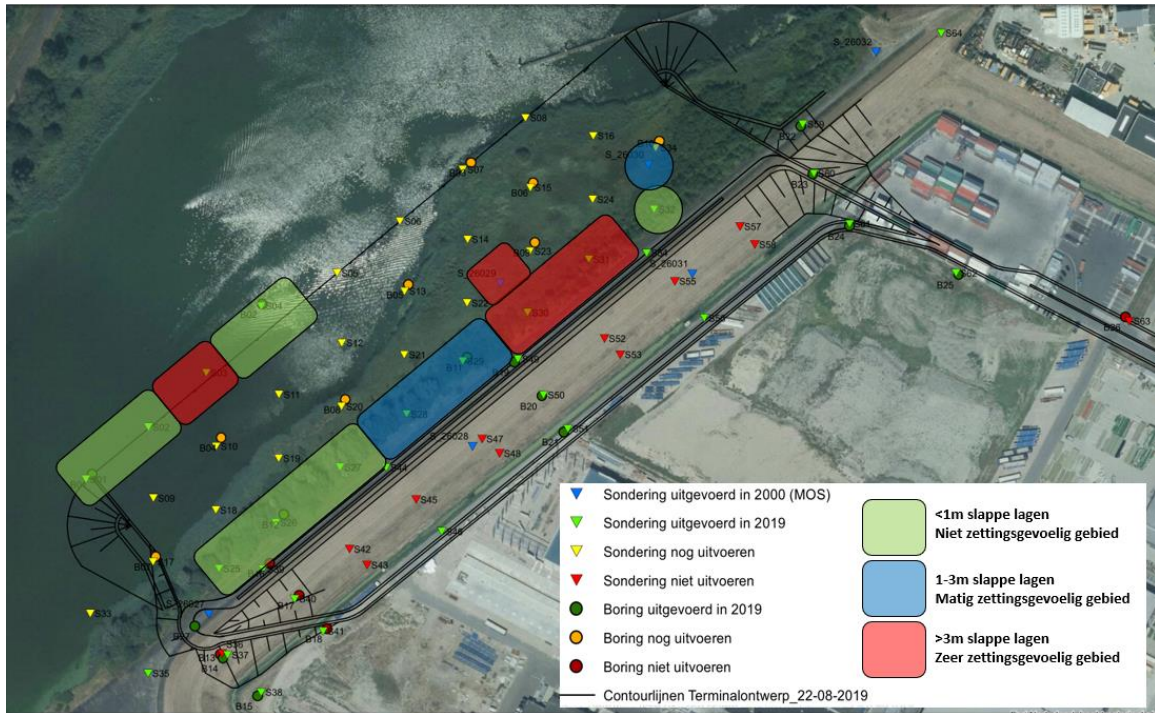
Tot slot is een quickscan uitgevoerd op de beschikbare sonderingen, kijkend naar de dikte van de slappe lagen. De quickscan verdeelt het terrein in 3 gebieden:

- niet zettingsgevoelig gebied, <1 m aan samendrukbare lagen;
- matig zettingsgevoelig gebied, 1-3 m aan samendrukbare lagen;
- zeer zettingsgevoelig gebied, >3 m aan samendrukbare lagen.

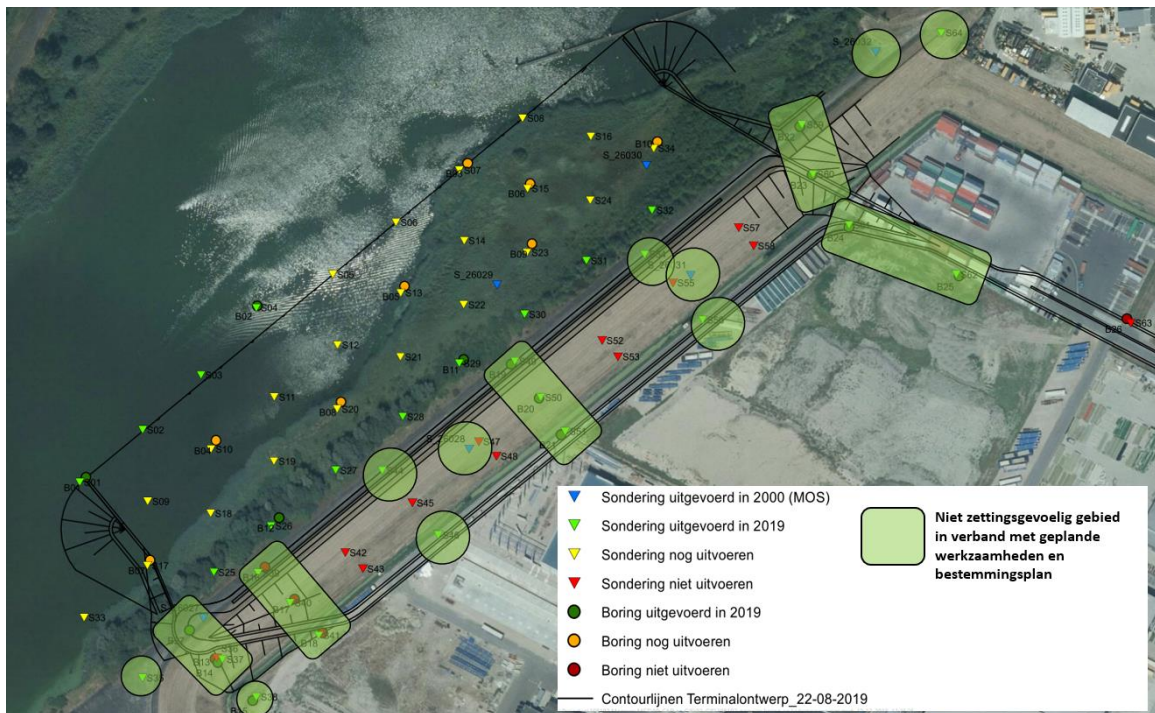
In afbeelding 3.1 en afbeelding 3.2 zijn de quickscans weergegeven ter plaatse van de kering en de toekomstige containerterminal. De quickscan geeft een overzicht weer van de uitgevoerde sonderingen. Deze zijn maar op een aantal locaties uitgevoerd, waarbij het overgrote deel van het gebied nog niet is onderzocht. Verder is in de quickscan een indicatief beeld te zien van de variabiliteit in de ondergrond, welke erg groot is, zelfs op korte afstand. Dit heeft als gevolg dat er grote verschillen in zettingen kunnen ontstaan. De kering in afbeelding 3.2 is als niet zettingsgevoelig ingedeeld vanwege de geplande werkzaamheden. Door ontgraving van de bestaande kruin en de afwezigheid van een hoge bovenbelasting wordt voldaan aan de restzettingseis, zoals aangetoond in tabel 3.1.

Vanwege de grote variabiliteit is het van belang de ondergrond beter in kaart te brengen. Hierbij is het alsnog uitvoeren van het geplande onderzoek van belang. Daarnaast kan worden gedacht aan aanvullende maatregelen. Tabel 3.3 geeft een prioriteringslijst weer van mogelijk te nemen maatregelen.

Afbeelding 3.1 Quickscan beschikbare sonderingen op basis van dikte samendrukbare lagen ter plaatse van de containerterminal



Afbeelding 3.2 Quickscan beschikbare sonderingen op basis van dikte samendrukbare lagen ter plaatse van de kering



Tabel 3.3 Prioritering maatregelen/oplossingen

Prioritering #	Maatregelen/Oplossingen	Oordeel
1	resterend onderzoek uitvoeren (Sonderingen en boringen conform tekening)	Bodemopbouw van het terrein voor het overgrote deel onbekend. Noodzakelijk om in beeld te krijgen om maatregelen te kunnen bepalen. Aanvullend laboratorium onderzoek lijkt op basis van informatie die nu beschikbaar is geen oplossing te bieden. Indien het nodig is voor het uitvoeren van het grondonderzoek om het groen te rooien en een zandaanvulling tot boven de waterlijn aan te brengen dan is dit een overweging voor de opdrachtgever omdat dit mogelijk beperkingen oplevert voor navolgende stappen.
2	ophogen i.c.m. verticale drainage	Indien blijkt dat er minder dan ca. 2,0 - 3,0 m samendrukbare lagen zijn, dan is ophogen i.c.m. verticale drainage het meest voor de hand liggende oplossing. Veel gebruikte en relatief goedkope oplossing.
3	grondverbetering (lokaal) (i.c.m. verticale drainage + ophogen)	Indien er blijkt dat er meer dan ca. 3,0 m samendrukbare lagen aanwezig zijn dan wordt grondverbetering aanbevolen. Met grondverbetering wordt bedoeld het verwijderen en vervangen van samendrukbare toplagen met bijvoorbeeld zand, wat zeer effectief is voor gebieden waar niet wordt voldaan aan de restzettingseis. Aandachtspunt hierbij is uitvoering. Als er al een eerste slag van zand is aangebracht (zie opmerking 1) dan is het niet efficiënt om alles af te graven maar kan wellicht gebruik worden gemaakt van grondverbetering met zandkolommen.
4	vacuümconsolidatie	Oplossing zeer effectief in dik pakket slappe lagen, echter in variabele grondopbouw met tussenzandlagen lijkt dit niet geschikt.
5	palenmatras	Oplossing zeer effectief, echter brengt hoge kosten met zich mee, minimale eisen verder verkend in paragraaf 3.4.
NB	licht ophoogmateriaal (BIMS, EPS)	Niet effectief vanwege hoge belasting van container terminal tijdens gebruik.

3.4 Schetsontwerp palenmatras

Er is een indicatieve berekening gemaakt van het bepalen van paalreacties om een inschatting te kunnen geven van de dimensies van de palen van het matras. Deze voorlopige berekening is gebaseerd op de ontwerptekeningen van de magazijnen van Noordland 12 & 13 [ref. 6, ref. 7]. De magazijnen daar zijn ook deels gefundeerd op een palenmatras en dienen dus als een goede referentie voor voorliggend vraagstuk. Verhoudingsgewijs is daarmee een inschatting gemaakt van de benodigde eigenschappen van het palenmatras.

Uit de tekening van Noordland 13 [ref. 7] wordt de volgende informatie gehaald over de eigenschappen van de palen:

- hart op hart afstand = 1,9 m x 2 m;
- paaldiameter = 0,219 m;
- grondverdringende paal met puntniveau variërend van NAP -13 m tot NAP -18 m;
- dek bovenkant NAP -2,0m.

Voor de beschouwing van een palenmatras voor de container terminal zijn de volgende uitgangspunten gehanteerd:

- dek bovenkant NAP -2,0 m;
- zand ophoging tot 3,5m NAP met volumiek gewicht = 20 kN/m³;
- een terreinbelasting van 45 kPa, gelijk aan de beschouwing van de zettingen in het geval van voorbelasten.

Dit resulteert in een totale belasting van 75 kPa. Met een hart op hart afstand van 2 x 2 m is de belasting per paal gelijk aan 300 kN. Dat is vergelijkbaar met de kracht zoals gevonden in het ontwerp van Noordland 13. Bij wijze van eerste benadering moeten de palen van het paalmatras de volgende afmetingen hebben:

- hart op hart afstand = 2 m x 2 m;
- diameter = 0,219 m;
- puntniveau = NAP -20 m.

4 CONCLUSIES EN AANBEVELINGEN

In deze notitie is een indicatieve zettingsanalyse opgesteld om inzichtelijk te krijgen hoeveel tijdelijke voorbelasting benodigd is om het terrein bouwrijp te maken. De indicatieve zettingsprognoses laten zien dat bij een maximale ophoging tot NAP +6,0 m, oftewel een ophoging van circa 6 - 8 m hoog, alsnog een restzetting van circa 0,5 - 0,7 m wordt verwacht op de zettingsgevoelige locaties. Dit wordt als onacceptabel groot geacht voor een containerterminal. Indien er weinig samendrukbare lagen aanwezig zijn volstaat het om tot de opleverhoogte van NAP +3,5 m op te hogen. De berekeningen gaan ervan uit dat er verticale drains aanwezig zijn met wachttijden van 1 tot 2 jaar. Waarbij een langere wachttijd van 2 jaar weinig invloed heeft op de restzetting en dus niet efficiënt is.

Bij deze indicatieve analyse dient er rekening mee gehouden te worden dat deze uitkomsten een eerste inschatting zijn. In het algemeen dient bij zettingsberekeningen in deze fase rekening te worden gehouden met een onzekerheidsmarge van 30 %. Op het moment van schrijven is niet al het grondonderzoek uitgevoerd (sonderingen en boringen) en zijn de gehanteerde uitgangspunten vrij conservatief ingeschat. Op basis van beschikbare sonderingen is de bodemopbouw zeer lokaal ongunstig, waardoor plaatselijke maatregelen mogelijk voldoende zijn om het terrein bouwrijp te maken. Dit dient echter eerst geverifieerd te worden. Om deze reden wordt aangeraden om de variabiliteit van de ondergrond beter in beeld te brengen. Ten eerste dienen alle uitgevraagde sonderingen en boringen uitgevoerd te worden. Resterend nog uit te voeren onderzoek bedraagt 34 sonderingen en 13 boringen. Hiervoor is een aardebaan tot boven de waterlijn benodigd om het groen te rooien en sonderingen in het water uit te voeren. Dit kan echter beperkingen veroorzaken voor navolgende stappen. Aanvullend laboratorium onderzoek lijkt op basis van informatie die nu beschikbaar is geen oplossing te bieden. Indien de bodemopbouw bekend is kan opgehoogd worden in combinatie met verticale drainage op locaties waar samendrukbare lagen kleiner zijn dan 2,0 à 3,0 m. Voor locaties met meer dan 3,0 m aan samendrukbare lagen wordt lokale grondverbetering in combinatie met ophogen en verticale drainage aanbevolen. Een aandachtspunt hierbij is uitvoering. Als er al een aardebaan van zand is aangebracht, dan is het niet efficiënt om de aardebaan af te graven. In dat geval kan gebruik worden gemaakt van grondverbetering met zandkolommen. Overige aandachtspunten zijn uitvoeringsstabiliteit bij grote ophogingen en de fasering van de ophooglagen. Dit dient in een latere fase meer in detail te worden beschouwd.

Andere oplossingen zijn vacuümconsolidatie en palenmatras. Deze technieken zijn zeer effectief maar niet altijd toepasbaar (i.e. vacuümconsolidatie bij variabele grondopbouw met tussenzandlagen) en zeer prijzig. Op basis van het gehanteerde palenmatras voor Noordland 13 is een eerste grove analyse gemaakt van de benodigde eigenschappen voor het hanteren van een palenmatras op de Markiezaat Container Terminal. In een eerste beschouwing zou een palenmatras met een hart op hart afstand van 2x2 m en een paaldiameter van 0,219 m met een paalpuntniveau van NAP -20 m een alternatief kunnen zijn voor het voorbelasten van het terminalterrein.



BIJLAGE: INTERPRETATIE SONDERING S03

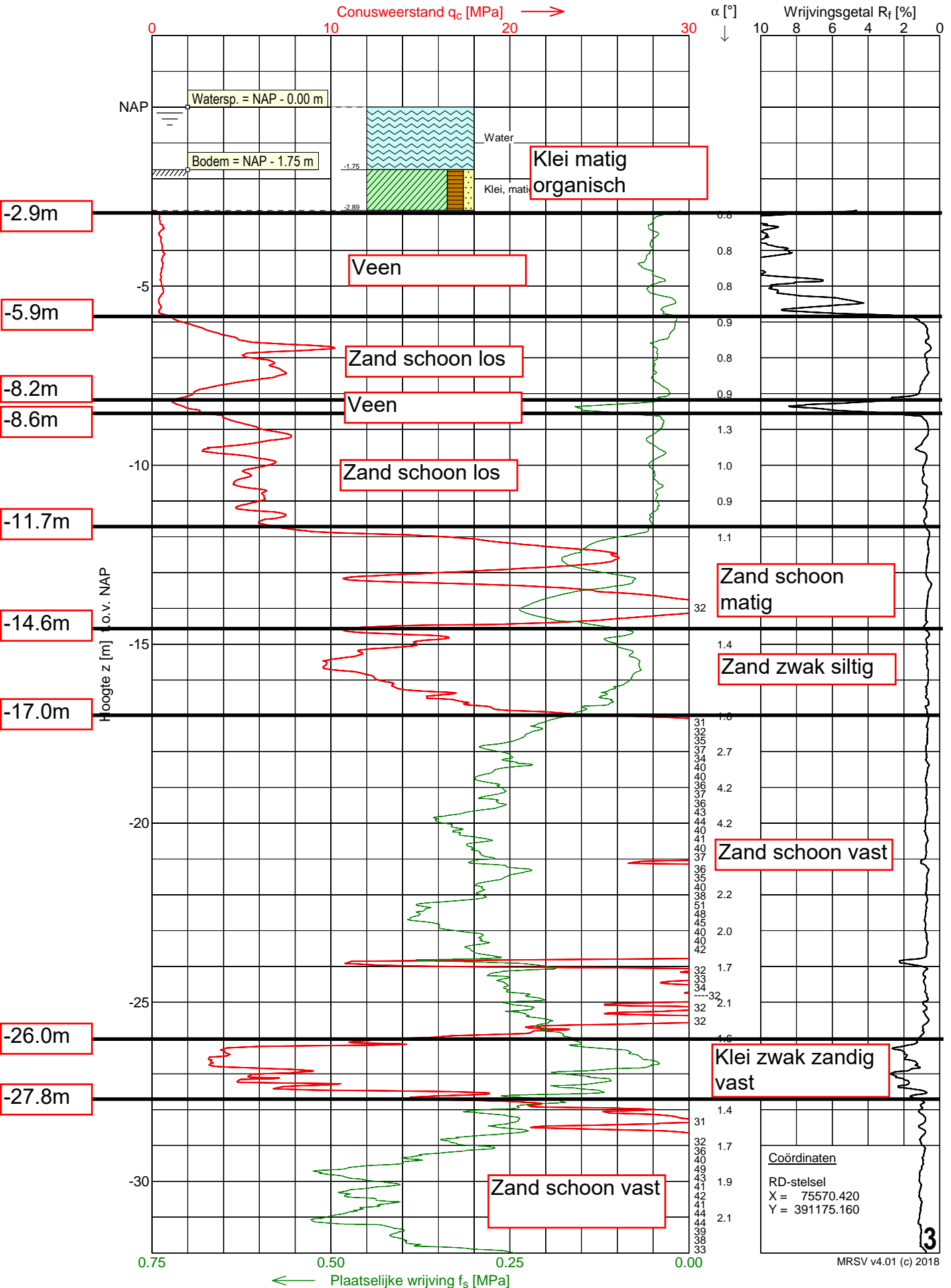
Sondering 3

Opdracht : 1901796
 Plaats : Bergen op Zoom
 Datum : 12-09-2019
 Project : Markiezaat Container Terminal

Conus nummer : I-CFYYP20-15/140801
 Soort conus : Elektrisch
 Opp. conuspunt : 1500 mm²

NEN-EN-ISO-22476-1
 Klasse 2, type TE1
 Sondeerunit : 65
 Blad : 1 van 2

MOS GRONDMECHANICA

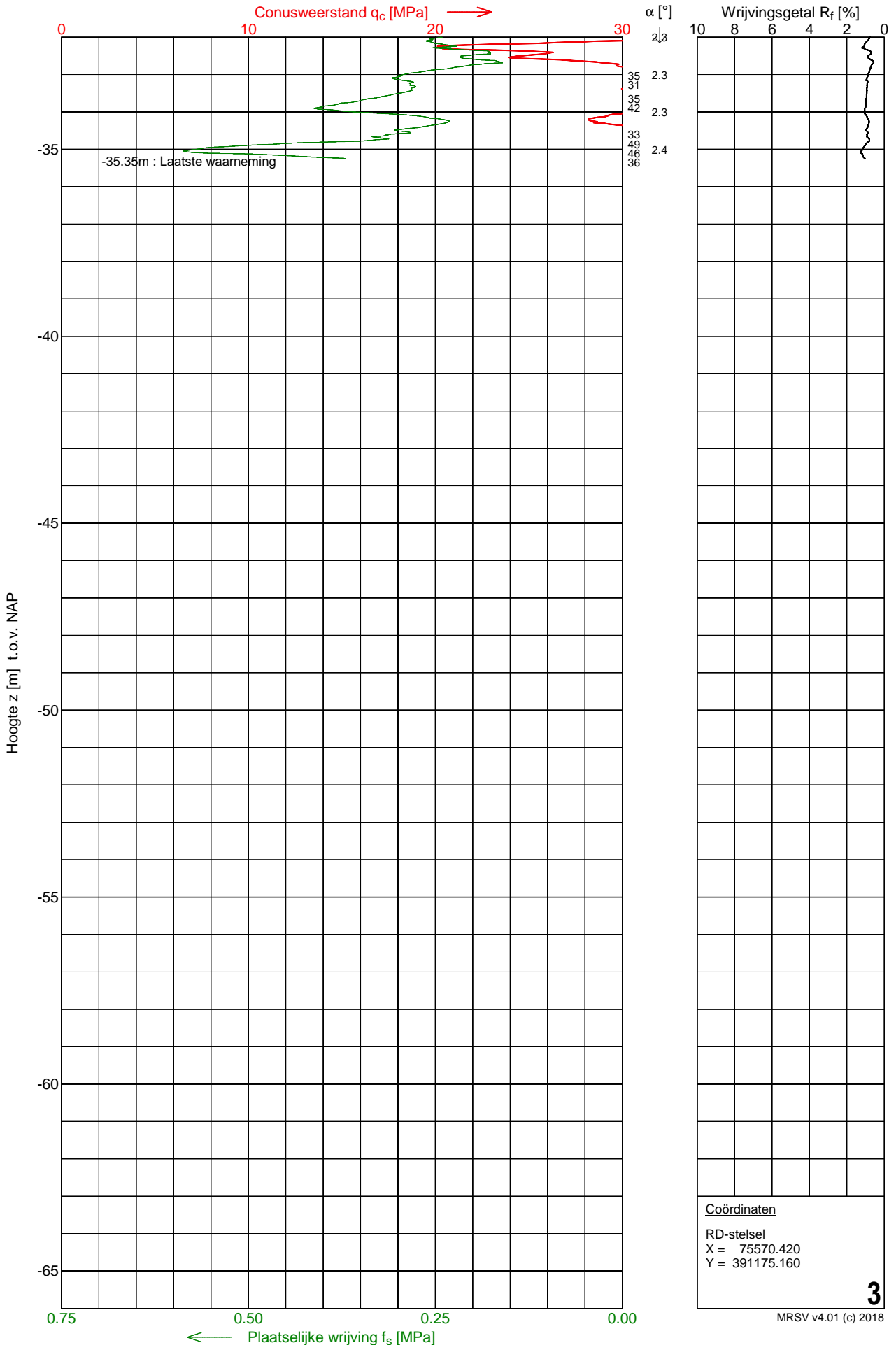


Sondering 3

Opdracht : 1901796
 Plaats : Bergen op Zoom
 Datum : 12-09-2019
 Project : Markiezaat Container Terminal

Conus nummer : I-CFXYP20-15/140801
 Soort conus : Elektrisch
 Opp. conuspunt : 1500 mm²

NEN-EN-ISO-22476-1
 Klasse 2, type TE1
 Sondeerunit : 65
 Blad : 2 van 2





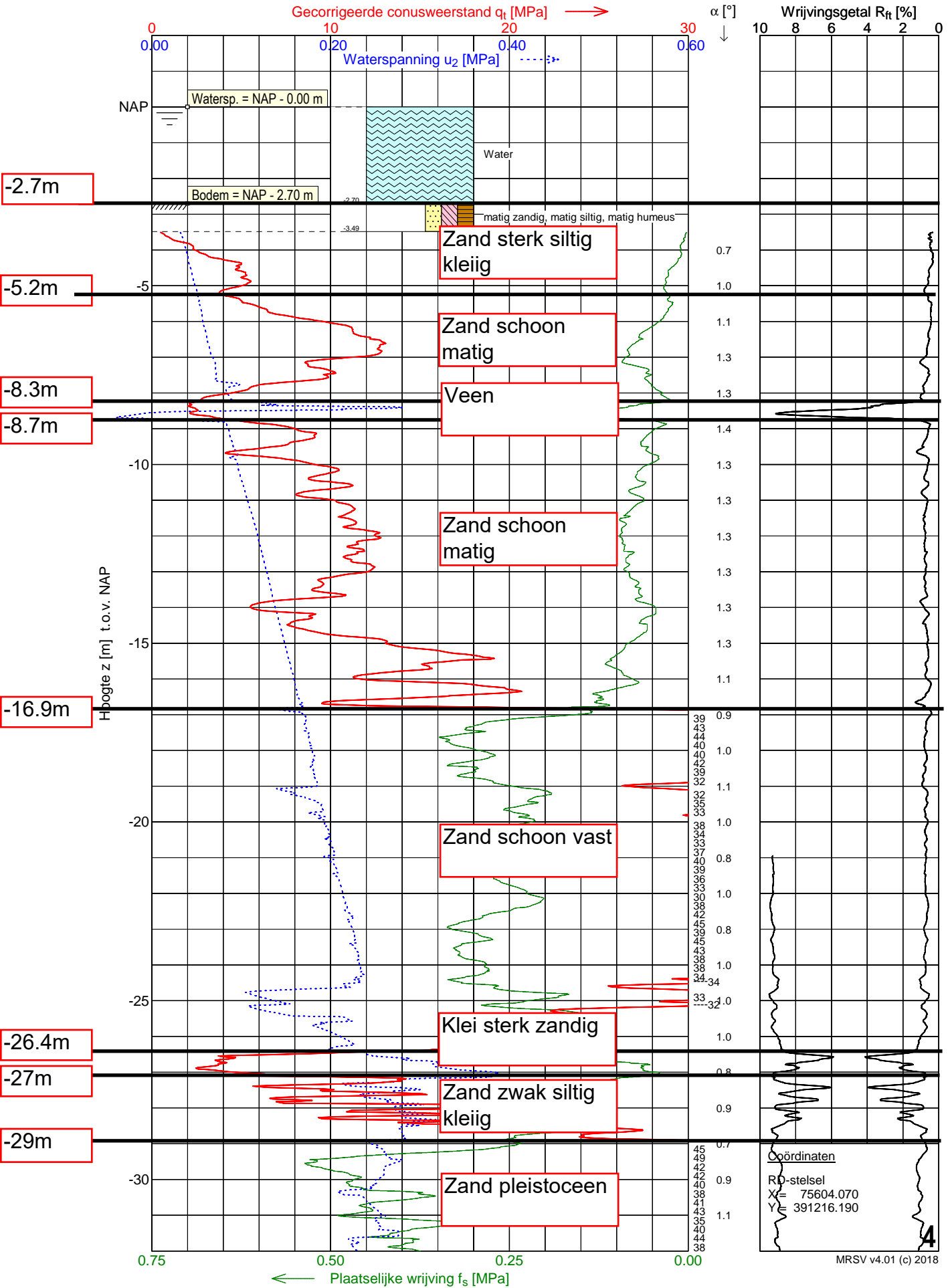
BIJLAGE: INTERPRETATIE SONDERING S04

Sondering 4

Opdracht : 1901796 Conus nummer : 140801C15
 Plaats : Bergen op Zoom Soort conus : Elektrisch
 Datum : 12-09-2019 Opp. conuspunt : 1500 mm²
 Project : Markiezaat Container Terminal

NEN-EN-ISO-22476-1
 Klasse 2, type TE2
 Sondeerunit : 65
 Blad : 1 van 2

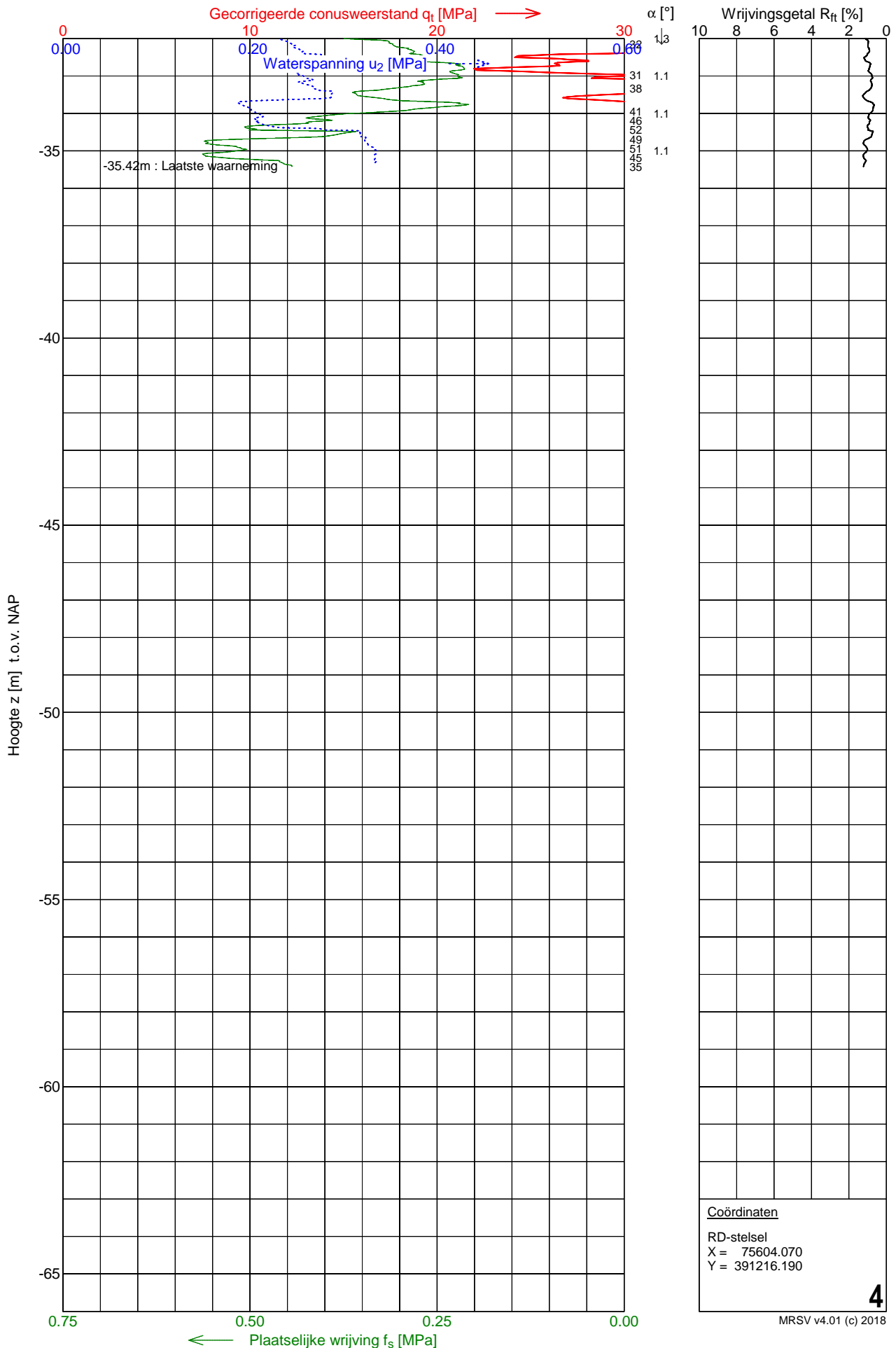
MOS GRONDMECHANICA



Sondering 4

Opdracht : 1901796 Conus nummer : 140801C15
 Plaats : Bergen op Zoom Soort conus : Elektrisch
 Datum : 12-09-2019 Opp. conuspunt : 1500 mm²
 Project : Markiezaat Container Terminal

NEN-EN-ISO-22476-1
 Klasse 2, type TE2
 Sondeerunit : 65
 Blad : 2 van 2



MOS GRONDMECHANICA



Sondering 4

Opdracht : 1901796
Plaats : Bergen op Zoom
Datum : 12-09-2019
Project : Markiezaat Container Terminal

Conus nummer : 140801C15
Soort conus : Elektrisch
Opp. conuspunt : 1500 mm²

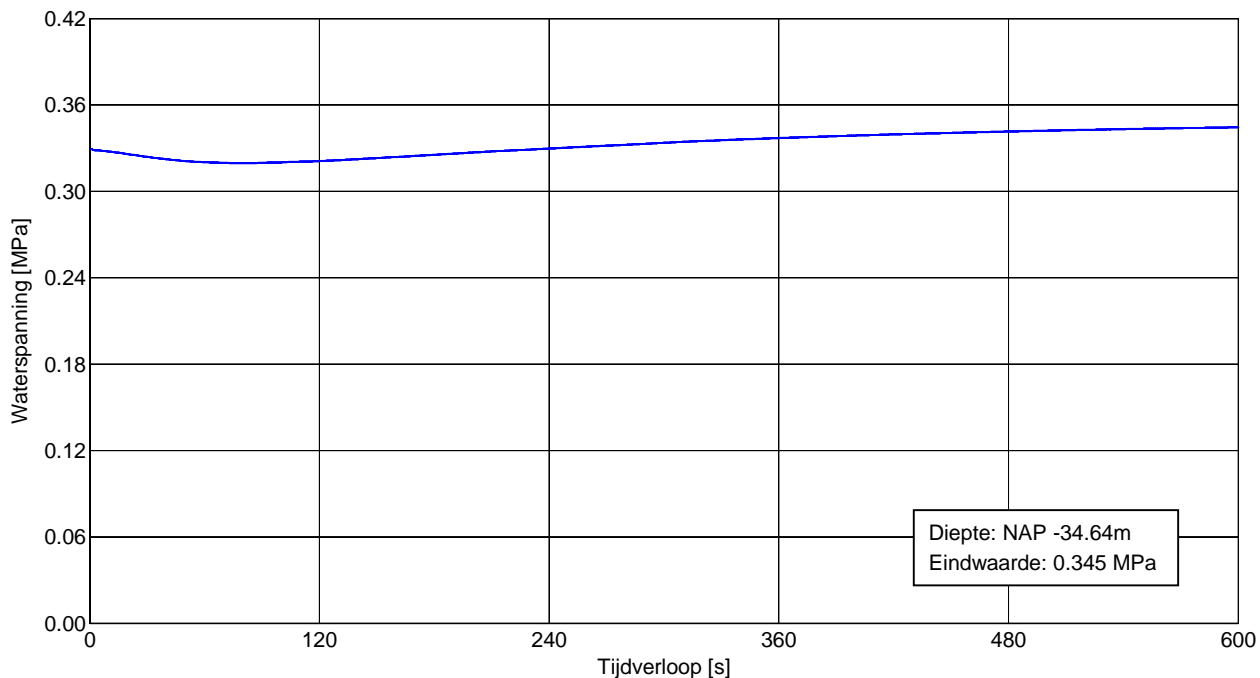
DISSIPATIETEST

NEN-EN-ISO-22476-1
Klasse 2, type TE2
Sondeerunit : 65

TestNo : 1

X : 75604.070
Y : 391216.190

Bodem :NAP -2.70m





BIJLAGE: INTERPRETATIE SONDERING S26029

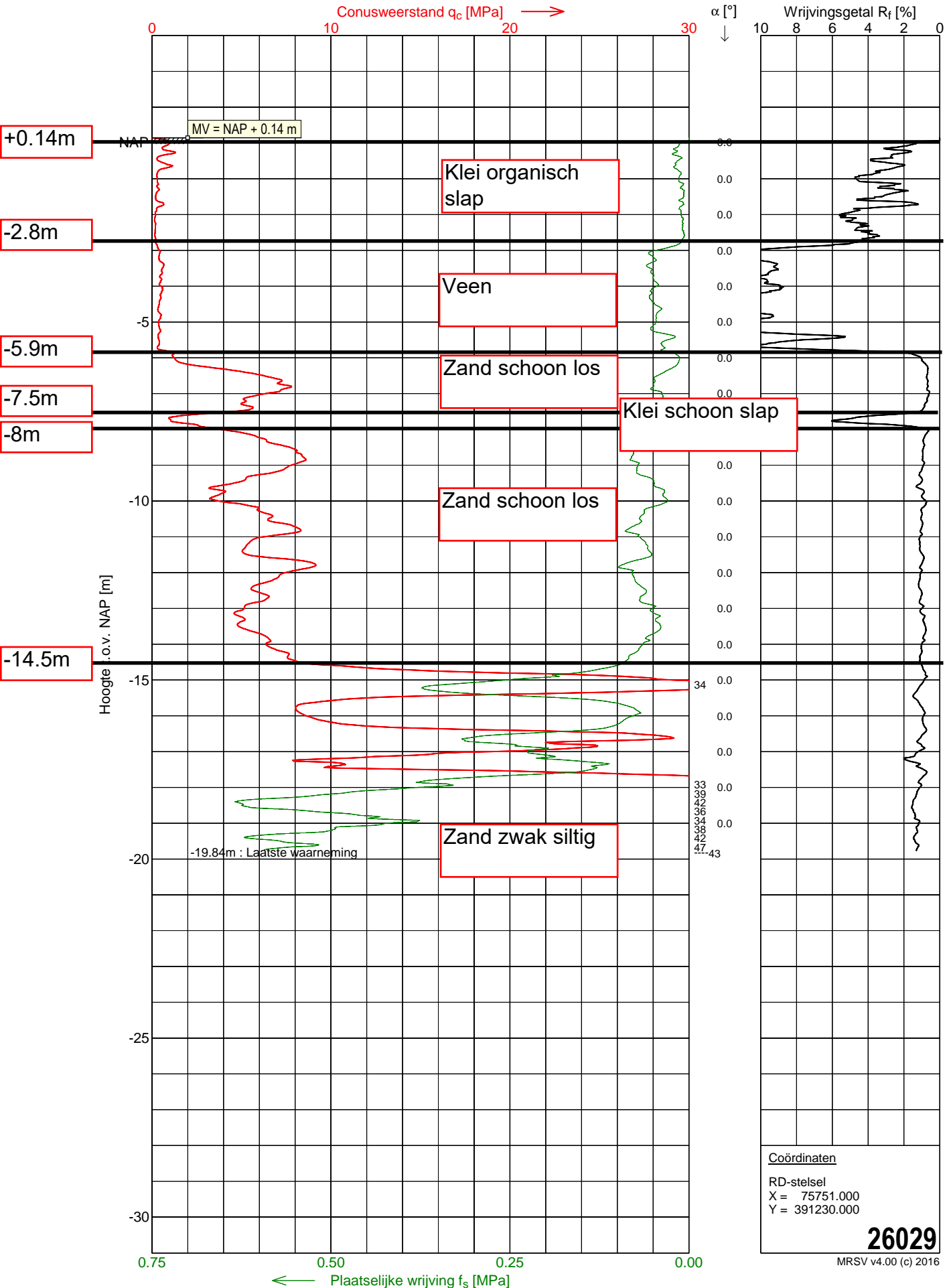
Sondering 26029

Opdracht : 1701728
 Plaats : Bergen op Zoom
 Datum : 29-09-2000
 Project : N2- en O2-pijpleidingen

Conus nummer : F7.5CKE/V
 Soort conus : Elektrisch

Norm : NEN5140
 Klasse : 2
 Sondeerunit : 200
 Blad : 1 van 1

MOS GRONDMECHANICA



IV

BIJLAGE: INTERPRETATIE SONDERING S50

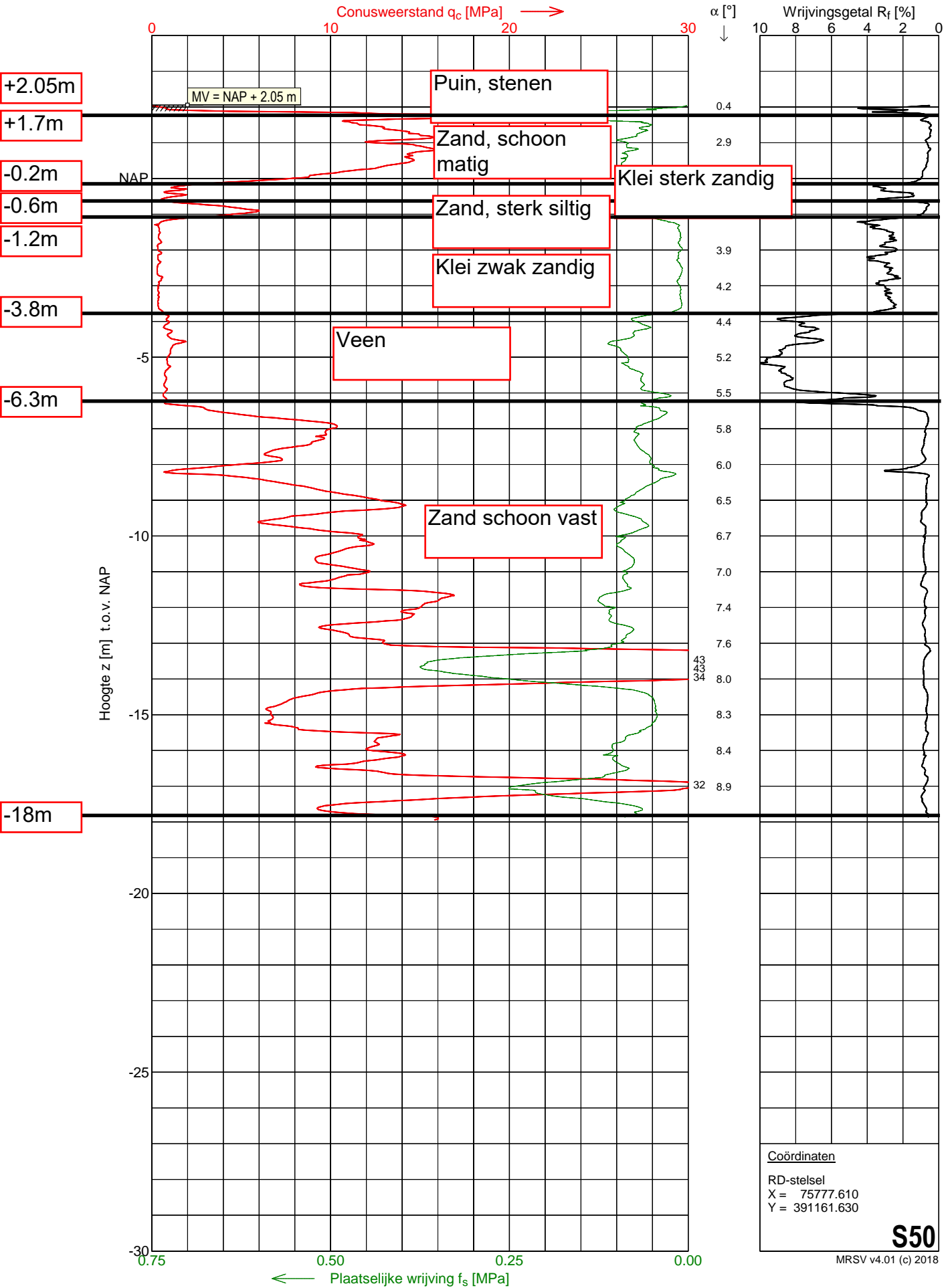
Sondering S50

Opdracht : 1901796
 Plaats : Bergen op Zoom
 Datum : 08-10-2019
 Project : Markiezaat Container Terminal

Conus nummer : S15-CFII.1652
 Soort conus : Elektrisch
 Opp. conuspunt : 1500 mm²

NEN-EN-ISO-22476-1
 Klasse 2, type TE1
 Sondeerunit : SR16
 Blad : 1 van 1

MOS GRONDMECHANICA





BIJLAGE: GEVOELIGHEIDSANALYSE TERREINBELASTING

Percentage	Belasting [kN]	Product [kN]
0.17	30	5.10
0.01	40	0.40
0.01	50	0.50
0.01	60	0.60
0.015	70	1.05
0.015	80	1.20
0.0175	90	1.58
0.0225	100	2.25
0.02	110	2.20
0.0225	120	2.70
0.02	130	2.60
0.02	140	2.80
0.0225	150	3.38
0.0225	160	3.60
0.02	170	3.40
0.025	180	4.50
0.025	190	4.75
0.05	200	10.00
0.05	210	10.50
0.065	220	14.30
0.075	230	17.25
0.1	240	24.00
0.0825	250	20.63
0.05	260	13.00
0.0225	270	6.08
0.0175	280	4.90
0.01	290	2.90
0.0025	300	0.75

Dimensies 20ft container	
lengte	6.1
breedte	2.44

Dimensies 40ft container	
lengte	12.20
breedte	2.44

Oppervlakte 20ft container	14.88
Oppervlakte 40ft container	29.77

Som percentages	0.99
Gewogen gemiddelde [kN]	166.90
Oppervlakte belasting 20ft container [kN/m2]	11.21
Oppervlakte belasting 40ft container [kN/m2]	5.61

Stacks containers	Oppervlakte belasting 20 ft container [kN/m²]	Oppervlakte belasting 40 ft container [kN/m²]	Gemiddelde oppervlakte belasting 20 & 40 ft container [kN/m²]
1	11	6	8
2	22	11	17
3	34	17	25
4	45	22	34
5	56	28	42

VI

BIJLAGE: RESULTATEN S03 - 1 JAAR WACHTTIJD

Report for D-Settlement 19.1

Settlement Calculations
Developed by Deltares

Date of report: 23-12-2019
Time of report: 14:54:29
Report with version: 19.1.1.23743

Date of calculation: 23-12-2019
Time of calculation: 12:31:59
Calculated with version: 19.1.1.23743

File name: D:\.\Berekeningen\Revisie 35 kPa\S03 35kPa 1 jaar

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2 Echo of the Input

2.1 Layer Boundaries

Boundary number	Co-ordinates [m]			
10 - X -	0.000	100.000		
10 - Y -	-1.750	-1.750		
9 - X -	0.000	100.000		
9 - Y -	-2.900	-2.900		
8 - X -	0.000	100.000		
8 - Y -	-5.900	-5.900		
7 - X -	0.000	100.000		
7 - Y -	-8.200	-8.200		
6 - X -	0.000	100.000		
6 - Y -	-8.600	-8.600		
5 - X -	0.000	100.000		
5 - Y -	-11.700	-11.700		
4 - X -	0.000	100.000		
4 - Y -	-14.600	-14.600		
3 - X -	0.000	100.000		
3 - Y -	-17.000	-17.000		
2 - X -	0.000	100.000		
2 - Y -	-26.000	-26.000		
1 - X -	0.000	100.000		
1 - Y -	-27.800	-27.800		
0 - X -	0.000	100.000		
0 - Y -	-35.000	-35.000		

2.2 PI-lines

PI-line number	Co-ordinates [m]			
1 - X -	0.000	100.000		
1 - Y -	0.140	0.140		

2.3 General Data

Soil model:	NEN Bjerrum
Consolidation model:	Darcy
Strain model:	Linear
Groundwater level:	Initial determined by PI-line number 1
Unit weight of water:	9.81 [kN/m ³]
Stress distribution	
- Soil:	Buisman
- Loads:	None
End of consolidation:	11335.00 [days]
No maintain profile	
Pc (initial):	Variable parallel to the initial effective stress
Pc (per step):	Automatic increased to the final effective stresses
Creep rate reference time:	1.000 [days]
No imaginary surface	
With submerging	
(only for non uniform loads)	
- Iteration stop criterium :	0.10 [m]
Load column width	
- Non-Uniform Loads :	1.00 [m]
- Trapeziform Loads :	1.00 [m]

2.4 Soil Profiles

Layer number	Material name	PI-line top	PI-line bottom
10	Klei matig organisch	1	1
9	Veen	1	1
8	Zand schoon los	1	1

Layer number	Material name	PI-line top	PI-line bottom
7	Veen	1	1
6	Zand schoon los	1	1
5	Zand schoon matig	1	1
4	Zand zwak siltig	1	1
3	Zand schoon vast	1	1
2	Klei zwak zandig vast	1	1
1	Zand schoon vast	1	1

2.5 Soil Properties

Layer number	Drained	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
10	No	15.00	15.00
9	No	10.00	10.00
8	Yes	17.00	19.00
7	No	10.00	10.00
6	Yes	17.00	19.00
5	Yes	18.00	20.00
4	Yes	18.00	20.00
3	Yes	19.00	21.00
2	No	20.00	20.00
1	Yes	19.00	21.00

Layer number	Storage type	Vert. consolid. coefficient Cv [m ² /s]	Ratio Ch/Cv [-]	Vertical permeability [m/s]	Ratio hor/vert permeability [-]	Permeability strain mod. [-]	Initial vertical permeability [m/s]
10	Vert. cons.	5.00E-08	1.000	-	-	-	-
9	Vert. cons.	1.00E-07	1.000	-	-	-	-
8	Vert. cons.	-	1.000	-	-	-	-
7	Vert. cons.	1.00E-07	1.000	-	-	-	-
6	Vert. cons.	-	1.000	-	-	-	-
5	Vert. cons.	-	1.000	-	-	-	-
4	Vert. cons.	-	1.000	-	-	-	-
3	Vert. cons.	-	1.000	-	-	-	-
2	Vert. cons.	5.00E-08	1.000	-	-	-	-
1	Vert. cons.	-	1.000	-	-	-	-

Layer number	POP [kN/m ²]	OCR [-]	Equiv. age [days]
10	10.00	-	-
9	10.00	-	-
8	-	1.30	-
7	10.00	-	-
6	-	1.30	-
5	-	1.30	-
4	-	1.30	-
3	-	1.30	-
2	-	1.30	-
1	-	1.30	-

Layer number	Secondary swelling type	Secondary swelling factor[-]	Unloading stress ratio[-]
10	Full	-	-
9	Full	-	-
8	Full	-	-
7	Full	-	-
6	Full	-	-
5	Full	-	-
4	Full	-	-
3	Full	-	-
2	Full	-	-
1	Full	-	-

Layer number	Reloading/ swelling ratio RR [-]	Compression ratio CR [-]	Coeff. of sec. compression Ca [-]	Reloading/ swelling index Cr [-]	Compression index Cc [-]	Initial void ratio (e0) [-]
10	0.0383333	0.2300000	0.0115000	-	-	-
9	0.0766667	0.4600000	0.0230000	-	-	-
8	0.0019167	0.0115000	0.0000000	-	-	-
7	0.0766667	0.4600000	0.0230000	-	-	-
6	0.0019167	0.0115000	0.0000000	-	-	-
5	0.0006333	0.0038000	0.0000000	-	-	-
4	0.0008500	0.0051000	0.0000000	-	-	-
3	0.0003833	0.0023000	0.0000000	-	-	-
2	0.0127833	0.0767000	0.0031000	-	-	-
1	0.0003833	0.0023000	0.0000000	-	-	-

2.6 Non-Uniform Loads

Load number	Time [days]	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
1	0	18.00	20.00
2	0	18.00	20.00
3	365	-18.00	-20.00
4	375	18.00	20.00
5	385	35.00	35.00

Load number	Co-ordinates [m]					
1 - X -	0.00	0.00	100.00	100.00		
1 - Y -	-1.75	3.50	3.50	-1.75		
2 - X -	0.00	0.00	100.00	100.00		
2 - Y -	3.50	6.00	6.00	3.50		
3 - X -	0.00	100.00				
3 - Y -	3.50	3.50				
4 - X -	0.00	0.00	100.00	100.00		
4 - Y -	3.50	5.30	5.30	3.50		
5 - X -	0.00	0.00	100.00	100.00		
5 - Y -	5.30	6.30	6.30	5.30		

2.7 Verticals

Vertical number	X co-ordinates [m]				
1	50.000				

Discretisation = 100

2.8 Vertical Drain

Drain type		Strip
Horizontal range "From"	[m]	0.000
Horizontal range "To"	[m]	100.000
Bottom position	[m]	-4.900
Center to center distance	[m]	1.500
Width	[m]	0.100
Thickness	[m]	0.003
Grid		Triangular
Drainage schedule		Off
Start of drainage	[days]	0.000

3 Results per Vertical

3.1 Results for Vertical 1 (X = 50.00 m; Z = 0.00 m)

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
-1.750	129.890	0.140	129.889	2.218
-1.850	129.210	0.262	129.889	2.181
-1.950	128.661	0.371	129.888	2.148
-2.050	128.227	0.468	129.888	2.115
-2.150	127.894	0.555	129.887	2.084
-2.250	127.648	0.633	129.887	2.053
-2.325	127.516	0.686	129.887	2.030
-2.350	127.480	0.703	129.887	2.023
-2.450	127.380	0.766	129.886	1.993
-2.550	127.339	0.823	129.885	1.964
-2.650	127.350	0.875	129.885	1.936
-2.750	127.405	0.922	129.884	1.908
-2.900	127.557	0.986	129.883	1.867
-2.900	127.557	0.986	129.883	1.867
-3.700	127.802	0.975	129.878	1.436
-4.400	129.688	0.796	129.871	1.060
-5.100	132.739	0.498	129.862	0.681
-5.900	136.388	0.140	129.850	0.246
-5.900	136.388	0.140	129.850	0.246
-6.450	141.432	0.140	129.839	0.240
-7.050	146.933	0.140	129.826	0.233
-7.600	151.973	0.140	129.812	0.228
-8.200	157.470	0.140	129.794	0.223
-8.200	157.470	0.140	129.794	0.223
-8.400	157.498	0.140	129.787	0.146
-8.600	157.532	0.140	129.781	0.068
-8.600	157.532	0.140	129.781	0.068
-9.350	164.396	0.140	129.752	0.062
-10.150	171.711	0.140	129.715	0.057
-10.900	178.564	0.140	129.675	0.053
-11.700	185.866	0.140	129.626	0.049
-11.700	185.866	0.140	129.626	0.049
-12.450	193.455	0.140	129.572	0.048
-13.150	200.532	0.140	129.516	0.047
-13.900	208.106	0.140	129.447	0.046
-14.600	215.168	0.140	129.376	0.045
-14.600	215.168	0.140	129.376	0.045
-15.200	221.215	0.140	129.309	0.044
-15.800	227.256	0.140	129.237	0.043
-16.400	233.291	0.140	129.158	0.042
-17.000	239.320	0.140	129.073	0.041
-17.000	239.320	0.140	129.073	0.041
-17.900	249.251	0.140	128.933	0.041
-18.900	260.268	0.140	128.760	0.040
-19.900	271.265	0.140	128.567	0.040
-20.900	282.242	0.140	128.354	0.040
-21.500	288.818	0.140	128.216	0.039
-23.000	305.225	0.140	127.838	0.039
-25.000	327.026	0.140	127.258	0.038
-26.000	337.893	0.140	126.936	0.038
-26.000	337.894	0.140	126.936	0.038
-26.900	346.564	0.160	126.627	0.019
-27.800	355.600	0.140	126.300	0.001
-27.800	355.600	0.140	126.300	0.001
-29.600	375.037	0.140	125.595	0.001
-31.400	394.405	0.140	124.822	0.001
-33.200	413.709	0.140	123.983	0.000

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
-35.000	432.951	0.140	123.083	0.000

4 Settlements

4.1 Settlements

Vertical number	X co-ordinate [m]	Z co-ordinate [m]	Surface level [m]	Settlement [m]
1	50.00	0.00	-1.75	2.218

4.2 Residual Times

Vertical number	Time [days]	Settlement [m]	Part of final settlement [%]	Residual settlements [m]
1	365	1.822	82.180	0.395
	385	1.819	82.041	0.398

End of Report

Report for D-Settlement 19.1

Settlement Calculations
Developed by Deltares

Date of report: 23-12-2019
Time of report: 14:55:18
Report with version: 19.1.1.23743

Date of calculation: 23-12-2019
Time of calculation: 12:26:28
Calculated with version: 19.1.1.23743

File name: D:\.\Berekeningen\Revisie 45 kPa\S03 45kPa 1 jaar

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2 Echo of the Input

2.1 Layer Boundaries

Boundary number	Co-ordinates [m]			
10 - X -	0.000	100.000		
10 - Y -	-1.750	-1.750		
9 - X -	0.000	100.000		
9 - Y -	-2.900	-2.900		
8 - X -	0.000	100.000		
8 - Y -	-5.900	-5.900		
7 - X -	0.000	100.000		
7 - Y -	-8.200	-8.200		
6 - X -	0.000	100.000		
6 - Y -	-8.600	-8.600		
5 - X -	0.000	100.000		
5 - Y -	-11.700	-11.700		
4 - X -	0.000	100.000		
4 - Y -	-14.600	-14.600		
3 - X -	0.000	100.000		
3 - Y -	-17.000	-17.000		
2 - X -	0.000	100.000		
2 - Y -	-26.000	-26.000		
1 - X -	0.000	100.000		
1 - Y -	-27.800	-27.800		
0 - X -	0.000	100.000		
0 - Y -	-35.000	-35.000		

2.2 PI-lines

PI-line number	Co-ordinates [m]			
1 - X -	0.000	100.000		
1 - Y -	0.140	0.140		

2.3 General Data

Soil model:	NEN Bjerrum
Consolidation model:	Darcy
Strain model:	Linear
Groundwater level:	Initial determined by PI-line number 1
Unit weight of water:	9.81 [kN/m ³]
Stress distribution	
- Soil:	Buisman
- Loads:	None
End of consolidation:	11335.00 [days]
No maintain profile	
Pc (initial):	Variable parallel to the initial effective stress
Pc (per step):	Automatic increased to the final effective stresses
Creep rate reference time:	1.000 [days]
No imaginary surface	
With submerging	
(only for non uniform loads)	
- Iteration stop criterium :	0.10 [m]
Load column width	
- Non-Uniform Loads :	1.00 [m]
- Trapeziform Loads :	1.00 [m]

2.4 Soil Profiles

Layer number	Material name	PI-line top	PI-line bottom
10	Klei matig organisch	1	1
9	Veen	1	1
8	Zand schoon los	1	1

Layer number	Material name	PI-line top	PI-line bottom
7	Veen	1	1
6	Zand schoon los	1	1
5	Zand schoon matig	1	1
4	Zand zwak siltig	1	1
3	Zand schoon vast	1	1
2	Klei zwak zandig vast	1	1
1	Zand schoon vast	1	1

2.5 Soil Properties

Layer number	Drained	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
10	No	15.00	15.00
9	No	10.00	10.00
8	Yes	17.00	19.00
7	No	10.00	10.00
6	Yes	17.00	19.00
5	Yes	18.00	20.00
4	Yes	18.00	20.00
3	Yes	19.00	21.00
2	No	20.00	20.00
1	Yes	19.00	21.00

Layer number	Storage type	Vert. consolid. coefficient Cv [m ² /s]	Ratio Ch/Cv [-]	Vertical permeability [m/s]	Ratio hor/vert permeability [-]	Permeability strain mod. [-]	Initial vertical permeability [m/s]
10	Vert. cons.	5.00E-08	1.000	-	-	-	-
9	Vert. cons.	1.00E-07	1.000	-	-	-	-
8	Vert. cons.	-	1.000	-	-	-	-
7	Vert. cons.	1.00E-07	1.000	-	-	-	-
6	Vert. cons.	-	1.000	-	-	-	-
5	Vert. cons.	-	1.000	-	-	-	-
4	Vert. cons.	-	1.000	-	-	-	-
3	Vert. cons.	-	1.000	-	-	-	-
2	Vert. cons.	5.00E-08	1.000	-	-	-	-
1	Vert. cons.	-	1.000	-	-	-	-

Layer number	POP [kN/m ²]	OCR [-]	Equiv. age [days]
10	10.00	-	-
9	10.00	-	-
8	-	1.30	-
7	10.00	-	-
6	-	1.30	-
5	-	1.30	-
4	-	1.30	-
3	-	1.30	-
2	-	1.30	-
1	-	1.30	-

Layer number	Secondary swelling type	Secondary swelling factor[-]	Unloading stress ratio[-]
10	Full	-	-
9	Full	-	-
8	Full	-	-
7	Full	-	-
6	Full	-	-
5	Full	-	-
4	Full	-	-
3	Full	-	-
2	Full	-	-
1	Full	-	-

Layer number	Reloading/ swelling ratio RR [-]	Compression ratio CR [-]	Coeff. of sec. compression Ca [-]	Reloading/ swelling index Cr [-]	Compression index Cc [-]	Initial void ratio (e0) [-]
10	0.0383333	0.2300000	0.0115000	-	-	-
9	0.0766667	0.4600000	0.0230000	-	-	-
8	0.0019167	0.0115000	0.0000000	-	-	-
7	0.0766667	0.4600000	0.0230000	-	-	-
6	0.0019167	0.0115000	0.0000000	-	-	-
5	0.0006333	0.0038000	0.0000000	-	-	-
4	0.0008500	0.0051000	0.0000000	-	-	-
3	0.0003833	0.0023000	0.0000000	-	-	-
2	0.0127833	0.0767000	0.0031000	-	-	-
1	0.0003833	0.0023000	0.0000000	-	-	-

2.6 Non-Uniform Loads

Load number	Time [days]	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
1	0	18.00	20.00
2	0	18.00	20.00
3	365	-18.00	-20.00
4	375	18.00	20.00
5	385	45.00	45.00

Load number	Co-ordinates [m]					
1 - X -	0.00	0.00	100.00	100.00		
1 - Y -	-1.75	3.50	3.50	-1.75		
2 - X -	0.00	0.00	100.00	100.00		
2 - Y -	3.50	6.00	6.00	3.50		
3 - X -	0.00	100.00				
3 - Y -	3.50	3.50				
4 - X -	0.00	0.00	100.00	100.00		
4 - Y -	3.50	5.30	5.30	3.50		
5 - X -	0.00	0.00	100.00	100.00		
5 - Y -	5.30	6.30	6.30	5.30		

2.7 Verticals

Vertical number	X co-ordinates [m]			
1	50.000			

Discretisation = 100

2.8 Vertical Drain

Drain type		Strip
Horizontal range "From"	[m]	0.000
Horizontal range "To"	[m]	100.000
Bottom position	[m]	-4.900
Center to center distance	[m]	1.500
Width	[m]	0.100
Thickness	[m]	0.003
Grid		Triangular
Drainage schedule		Off
Start of drainage	[days]	0.000

3 Results per Vertical

3.1 Results for Vertical 1 (X = 50.00 m; Z = 0.00 m)

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
-1.750	139.428	0.140	139.427	2.277
-1.850	138.747	0.262	139.426	2.240
-1.950	138.198	0.371	139.426	2.205
-2.050	137.763	0.468	139.425	2.172
-2.150	137.428	0.555	139.425	2.140
-2.250	137.182	0.633	139.424	2.108
-2.325	137.049	0.686	139.424	2.085
-2.350	137.014	0.703	139.424	2.078
-2.450	136.913	0.766	139.423	2.047
-2.550	136.872	0.823	139.422	2.018
-2.650	136.882	0.875	139.422	1.989
-2.750	136.936	0.922	139.421	1.960
-2.900	137.088	0.986	139.420	1.918
-2.900	137.088	0.986	139.420	1.918
-3.700	137.333	0.976	139.413	1.476
-4.400	139.220	0.796	139.405	1.089
-5.100	142.270	0.498	139.395	0.701
-5.900	145.919	0.140	139.380	0.255
-5.900	145.919	0.140	139.380	0.255
-6.450	150.961	0.140	139.368	0.248
-7.050	156.460	0.140	139.353	0.242
-7.600	161.498	0.140	139.336	0.236
-8.200	166.991	0.140	139.316	0.231
-8.200	166.991	0.140	139.316	0.231
-8.400	167.019	0.140	139.308	0.151
-8.600	167.052	0.140	139.300	0.071
-8.600	167.052	0.140	139.300	0.071
-9.350	173.911	0.140	139.267	0.065
-10.150	181.221	0.140	139.225	0.060
-10.900	188.068	0.140	139.180	0.056
-11.700	195.364	0.140	139.123	0.051
-11.700	195.364	0.140	139.123	0.051
-12.450	202.946	0.140	139.063	0.050
-13.150	210.015	0.140	138.999	0.049
-13.900	217.581	0.140	138.922	0.048
-14.600	224.634	0.140	138.843	0.047
-14.600	224.634	0.140	138.843	0.047
-15.200	230.673	0.140	138.768	0.046
-15.800	236.706	0.140	138.686	0.045
-16.400	242.732	0.140	138.598	0.044
-17.000	248.751	0.140	138.504	0.043
-17.000	248.751	0.140	138.504	0.043
-17.900	258.667	0.140	138.348	0.043
-18.900	269.665	0.140	138.156	0.042
-19.900	280.641	0.140	137.943	0.042
-20.900	291.596	0.140	137.707	0.041
-21.500	298.158	0.140	137.556	0.041
-23.000	314.527	0.140	137.140	0.041
-25.000	336.272	0.140	136.504	0.040
-26.000	347.109	0.140	136.151	0.040
-26.000	347.109	0.140	136.151	0.040
-26.900	355.744	0.160	135.814	0.020
-27.800	364.756	0.140	135.457	0.001
-27.800	364.757	0.140	135.457	0.001
-29.600	384.130	0.140	134.688	0.001
-31.400	403.430	0.140	133.847	0.001
-33.200	422.661	0.140	132.936	0.000

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
-35.000	441.827	0.140	131.960	0.000

4 Settlements

4.1 Settlements

Vertical number	X co-ordinate [m]	Z co-ordinate [m]	Surface level [m]	Settlement [m]
1	50.00	0.00	-1.75	2.277

4.2 Residual Times

Vertical number	Time [days]	Settlement [m]	Part of final settlement [%]	Residual settlements [m]
1	365	1.822	80.047	0.454
	385	1.819	79.912	0.457

End of Report

Report for D-Settlement 19.1

Settlement Calculations
Developed by Deltares

Date of report: 23-12-2019
Time of report: 14:56:19
Report with version: 19.1.1.23743

Date of calculation: 11-12-2019
Time of calculation: 12:52:35
Calculated with version: 19.1.1.23743

File name: D:\.\Berekeningen\Revisie 55 kPa\S03 55kPa 1 jaar

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2 Echo of the Input

2.1 Layer Boundaries

Boundary number	Co-ordinates [m]			
10 - X -	0.000	100.000		
10 - Y -	-1.750	-1.750		
9 - X -	0.000	100.000		
9 - Y -	-2.900	-2.900		
8 - X -	0.000	100.000		
8 - Y -	-5.900	-5.900		
7 - X -	0.000	100.000		
7 - Y -	-8.200	-8.200		
6 - X -	0.000	100.000		
6 - Y -	-8.600	-8.600		
5 - X -	0.000	100.000		
5 - Y -	-11.700	-11.700		
4 - X -	0.000	100.000		
4 - Y -	-14.600	-14.600		
3 - X -	0.000	100.000		
3 - Y -	-17.000	-17.000		
2 - X -	0.000	100.000		
2 - Y -	-26.000	-26.000		
1 - X -	0.000	100.000		
1 - Y -	-27.800	-27.800		
0 - X -	0.000	100.000		
0 - Y -	-35.000	-35.000		

2.2 PI-lines

PI-line number	Co-ordinates [m]			
1 - X -	0.000	100.000		
1 - Y -	0.140	0.140		

2.3 General Data

Soil model:	NEN Bjerrum
Consolidation model:	Darcy
Strain model:	Linear
Groundwater level:	Initial determined by PI-line number 1
Unit weight of water:	9.81 [kN/m ³]
Stress distribution	
- Soil:	Buisman
- Loads:	None
End of consolidation:	11335.00 [days]
No maintain profile	
Pc (initial):	Variable parallel to the initial effective stress
Pc (per step):	Automatic increased to the final effective stresses
Creep rate reference time:	1.000 [days]
No imaginary surface	
With submerging	
(only for non uniform loads)	
- Iteration stop criterium :	0.10 [m]
Load column width	
- Non-Uniform Loads :	1.00 [m]
- Trapeziform Loads :	1.00 [m]

2.4 Soil Profiles

Layer number	Material name	PI-line top	PI-line bottom
10	Klei matig organisch	1	1
9	Veen	1	1
8	Zand schoon los	1	1

Layer number	Material name	PI-line top	PI-line bottom
7	Veen	1	1
6	Zand schoon los	1	1
5	Zand schoon matig	1	1
4	Zand zwak siltig	1	1
3	Zand schoon vast	1	1
2	Klei zwak zandig vast	1	1
1	Zand schoon vast	1	1

2.5 Soil Properties

Layer number	Drained	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
10	No	15.00	15.00
9	No	10.00	10.00
8	Yes	17.00	19.00
7	No	10.00	10.00
6	Yes	17.00	19.00
5	Yes	18.00	20.00
4	Yes	18.00	20.00
3	Yes	19.00	21.00
2	No	20.00	20.00
1	Yes	19.00	21.00

Layer number	Storage type	Vert. consolid. coefficient Cv [m ² /s]	Ratio Ch/Cv [-]	Vertical permeability [m/s]	Ratio hor/vert permeability [-]	Permeability strain mod. [-]	Initial vertical permeability [m/s]
10	Vert. cons.	5.00E-08	1.000	-	-	-	-
9	Vert. cons.	1.00E-07	1.000	-	-	-	-
8	Vert. cons.	-	1.000	-	-	-	-
7	Vert. cons.	1.00E-07	1.000	-	-	-	-
6	Vert. cons.	-	1.000	-	-	-	-
5	Vert. cons.	-	1.000	-	-	-	-
4	Vert. cons.	-	1.000	-	-	-	-
3	Vert. cons.	-	1.000	-	-	-	-
2	Vert. cons.	5.00E-08	1.000	-	-	-	-
1	Vert. cons.	-	1.000	-	-	-	-

Layer number	POP [kN/m ²]	OCR [-]	Equiv. age [days]
10	10.00	-	-
9	10.00	-	-
8	-	1.30	-
7	10.00	-	-
6	-	1.30	-
5	-	1.30	-
4	-	1.30	-
3	-	1.30	-
2	-	1.30	-
1	-	1.30	-

Layer number	Secondary swelling type	Secondary swelling factor[-]	Unloading stress ratio[-]
10	Full	-	-
9	Full	-	-
8	Full	-	-
7	Full	-	-
6	Full	-	-
5	Full	-	-
4	Full	-	-
3	Full	-	-
2	Full	-	-
1	Full	-	-

Layer number	Reloading/ swelling ratio RR [-]	Compression ratio CR [-]	Coeff. of sec. compression Ca [-]	Reloading/ swelling index Cr [-]	Compression index Cc [-]	Initial void ratio (e0) [-]
10	0.0383333	0.2300000	0.0115000	-	-	-
9	0.0766667	0.4600000	0.0230000	-	-	-
8	0.0019167	0.0115000	0.0000000	-	-	-
7	0.0766667	0.4600000	0.0230000	-	-	-
6	0.0019167	0.0115000	0.0000000	-	-	-
5	0.0006333	0.0038000	0.0000000	-	-	-
4	0.0008500	0.0051000	0.0000000	-	-	-
3	0.0003833	0.0023000	0.0000000	-	-	-
2	0.0127833	0.0767000	0.0031000	-	-	-
1	0.0003833	0.0023000	0.0000000	-	-	-

2.6 Non-Uniform Loads

Load number	Time [days]	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
1	0	18.00	20.00
2	0	18.00	20.00
3	365	-18.00	-20.00
4	375	18.00	20.00
5	385	55.00	55.00

Load number	Co-ordinates [m]					
1 - X -	0.00	0.00	100.00	100.00		
1 - Y -	-1.75	3.50	3.50	-1.75		
2 - X -	0.00	0.00	100.00	100.00		
2 - Y -	3.50	6.00	6.00	3.50		
3 - X -	0.00	100.00				
3 - Y -	3.50	3.50				
4 - X -	0.00	0.00	100.00	100.00		
4 - Y -	3.50	5.30	5.30	3.50		
5 - X -	0.00	0.00	100.00	100.00		
5 - Y -	5.30	6.30	6.30	5.30		

2.7 Verticals

Vertical number	X co-ordinates [m]				
1	50.000				

Discretisation = 100

2.8 Vertical Drain

Drain type		Strip
Horizontal range "From"	[m]	0.000
Horizontal range "To"	[m]	100.000
Bottom position	[m]	-4.900
Center to center distance	[m]	1.500
Width	[m]	0.100
Thickness	[m]	0.003
Grid		Triangular
Drainage schedule		Off
Start of drainage	[days]	0.000

3 Results per Vertical

3.1 Results for Vertical 1 (X = 50.00 m; Z = 0.00 m)

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
-1.750	148.994	0.140	148.993	2.332
-1.850	148.312	0.262	148.992	2.295
-1.950	147.762	0.371	148.991	2.260
-2.050	147.326	0.468	148.991	2.226
-2.150	146.991	0.555	148.990	2.193
-2.250	146.744	0.633	148.990	2.161
-2.325	146.610	0.687	148.989	2.137
-2.350	146.575	0.704	148.989	2.129
-2.450	146.473	0.767	148.988	2.098
-2.550	146.431	0.824	148.987	2.068
-2.650	146.441	0.876	148.987	2.038
-2.750	146.495	0.923	148.986	2.009
-2.900	146.647	0.987	148.984	1.966
-2.900	146.647	0.987	148.984	1.966
-3.700	146.892	0.976	148.976	1.513
-4.400	148.778	0.797	148.967	1.117
-5.100	151.828	0.498	148.955	0.720
-5.900	155.477	0.140	148.939	0.264
-5.900	155.477	0.140	148.939	0.264
-6.450	160.518	0.140	148.925	0.256
-7.050	166.014	0.140	148.907	0.250
-7.600	171.050	0.140	148.888	0.244
-8.200	176.540	0.140	148.865	0.239
-8.200	176.540	0.140	148.865	0.239
-8.400	176.567	0.140	148.856	0.157
-8.600	176.599	0.140	148.847	0.074
-8.600	176.599	0.140	148.847	0.074
-9.350	183.454	0.140	148.810	0.068
-10.150	190.759	0.140	148.763	0.063
-10.900	197.600	0.140	148.712	0.058
-11.700	204.889	0.140	148.649	0.054
-11.700	204.889	0.140	148.649	0.054
-12.450	212.464	0.140	148.581	0.052
-13.150	219.526	0.140	148.510	0.051
-13.900	227.084	0.140	148.425	0.050
-14.600	234.128	0.140	148.337	0.049
-14.600	234.128	0.140	148.337	0.049
-15.200	240.159	0.140	148.254	0.048
-15.800	246.183	0.140	148.164	0.047
-16.400	252.200	0.140	148.067	0.046
-17.000	258.210	0.140	147.962	0.045
-17.000	258.210	0.140	147.962	0.045
-17.900	268.110	0.140	147.791	0.045
-18.900	279.089	0.140	147.580	0.044
-19.900	290.045	0.140	147.346	0.044
-20.900	300.977	0.140	147.089	0.043
-21.500	307.525	0.140	146.923	0.043
-23.000	323.857	0.140	146.469	0.042
-25.000	345.545	0.140	145.778	0.042
-26.000	356.351	0.140	145.394	0.041
-26.000	356.352	0.140	145.394	0.041
-26.900	364.952	0.161	145.027	0.021
-27.800	373.940	0.140	144.641	0.002
-27.800	373.940	0.140	144.641	0.002
-29.600	393.250	0.140	143.808	0.001
-31.400	412.482	0.140	142.899	0.001
-33.200	431.641	0.140	141.915	0.000

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
-35.000	450.730	0.140	140.863	0.000

4 Settlements

4.1 Settlements

Vertical number	X co-ordinate [m]	Z co-ordinate [m]	Surface level [m]	Settlement [m]
1	50.00	0.00	-1.75	2.332

4.2 Residual Times

Vertical number	Time [days]	Settlement [m]	Part of final settlement [%]	Residual settlements [m]
1	365	1.822	78.142	0.510
	385	1.819	78.010	0.513

End of Report

VII

BIJLAGE: RESULTATEN S03 - 2 JAAR WACHTTIJD

Report for D-Settlement 19.1

Settlement Calculations
Developed by Deltares

Date of report: 23-12-2019
Time of report: 14:58:34
Report with version: 19.1.1.23743

Date of calculation: 23-12-2019
Time of calculation: 12:32:44
Calculated with version: 19.1.1.23743

File name: D:\.\Berekeningen\Revisie 35 kPa\S03 35kPa 2 jaar

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2 Echo of the Input

2.1 Layer Boundaries

Boundary number	Co-ordinates [m]			
10 - X -	0.000	100.000		
10 - Y -	-1.750	-1.750		
9 - X -	0.000	100.000		
9 - Y -	-2.900	-2.900		
8 - X -	0.000	100.000		
8 - Y -	-5.900	-5.900		
7 - X -	0.000	100.000		
7 - Y -	-8.200	-8.200		
6 - X -	0.000	100.000		
6 - Y -	-8.600	-8.600		
5 - X -	0.000	100.000		
5 - Y -	-11.700	-11.700		
4 - X -	0.000	100.000		
4 - Y -	-14.600	-14.600		
3 - X -	0.000	100.000		
3 - Y -	-17.000	-17.000		
2 - X -	0.000	100.000		
2 - Y -	-26.000	-26.000		
1 - X -	0.000	100.000		
1 - Y -	-27.800	-27.800		
0 - X -	0.000	100.000		
0 - Y -	-35.000	-35.000		

2.2 PI-lines

PI-line number	Co-ordinates [m]			
1 - X -	0.000	100.000		
1 - Y -	0.140	0.140		

2.3 General Data

Soil model:	NEN Bjerrum
Consolidation model:	Darcy
Strain model:	Linear
Groundwater level:	Initial determined by PI-line number 1
Unit weight of water:	9.81 [kN/m ³]
Stress distribution	
- Soil:	Buisman
- Loads:	None
End of consolidation:	11700.00 [days]
No maintain profile	
Pc (initial):	Variable parallel to the initial effective stress
Pc (per step):	Automatic increased to the final effective stresses
Creep rate reference time:	1.000 [days]
No imaginary surface	
With submerging	
(only for non uniform loads)	
- Iteration stop criterium :	0.10 [m]
Load column width	
- Non-Uniform Loads :	1.00 [m]
- Trapeziform Loads :	1.00 [m]

2.4 Soil Profiles

Layer number	Material name	PI-line top	PI-line bottom
10	Klei matig organisch	1	1
9	Veen	1	1
8	Zand schoon los	1	1

Layer number	Material name	PI-line top	PI-line bottom
7	Veen	1	1
6	Zand schoon los	1	1
5	Zand schoon matig	1	1
4	Zand zwak siltig	1	1
3	Zand schoon vast	1	1
2	Klei zwak zandig vast	1	1
1	Zand schoon vast	1	1

2.5 Soil Properties

Layer number	Drained	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
10	No	15.00	15.00
9	No	10.00	10.00
8	Yes	17.00	19.00
7	No	10.00	10.00
6	Yes	17.00	19.00
5	Yes	18.00	20.00
4	Yes	18.00	20.00
3	Yes	19.00	21.00
2	No	20.00	20.00
1	Yes	19.00	21.00

Layer number	Storage type	Vert. consolid. coefficient Cv [m ² /s]	Ratio Ch/Cv [-]	Vertical permeability [m/s]	Ratio hor/vert permeability [-]	Permeability strain mod. [-]	Initial vertical permeability [m/s]
10	Vert. cons.	5.00E-08	1.000	-	-	-	-
9	Vert. cons.	1.00E-07	1.000	-	-	-	-
8	Vert. cons.	-	1.000	-	-	-	-
7	Vert. cons.	1.00E-07	1.000	-	-	-	-
6	Vert. cons.	-	1.000	-	-	-	-
5	Vert. cons.	-	1.000	-	-	-	-
4	Vert. cons.	-	1.000	-	-	-	-
3	Vert. cons.	-	1.000	-	-	-	-
2	Vert. cons.	5.00E-08	1.000	-	-	-	-
1	Vert. cons.	-	1.000	-	-	-	-

Layer number	POP [kN/m ²]	OCR [-]	Equiv. age [days]
10	10.00	-	-
9	10.00	-	-
8	-	1.30	-
7	10.00	-	-
6	-	1.30	-
5	-	1.30	-
4	-	1.30	-
3	-	1.30	-
2	-	1.30	-
1	-	1.30	-

Layer number	Secondary swelling type	Secondary swelling factor[-]	Unloading stress ratio[-]
10	Full	-	-
9	Full	-	-
8	Full	-	-
7	Full	-	-
6	Full	-	-
5	Full	-	-
4	Full	-	-
3	Full	-	-
2	Full	-	-
1	Full	-	-

Layer number	Reloading/ swelling ratio RR [-]	Compression ratio CR [-]	Coeff. of sec. compression Ca [-]	Reloading/ swelling index Cr [-]	Compression index Cc [-]	Initial void ratio (e0) [-]
10	0.0383333	0.2300000	0.0115000	-	-	-
9	0.0766667	0.4600000	0.0230000	-	-	-
8	0.0019167	0.0115000	0.0000000	-	-	-
7	0.0766667	0.4600000	0.0230000	-	-	-
6	0.0019167	0.0115000	0.0000000	-	-	-
5	0.0006333	0.0038000	0.0000000	-	-	-
4	0.0008500	0.0051000	0.0000000	-	-	-
3	0.0003833	0.0023000	0.0000000	-	-	-
2	0.0127833	0.0767000	0.0031000	-	-	-
1	0.0003833	0.0023000	0.0000000	-	-	-

2.6 Non-Uniform Loads

Load number	Time [days]	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
1	0	18.00	20.00
2	0	18.00	20.00
3	730	-18.00	-20.00
4	740	18.00	20.00
5	750	35.00	35.00

Load number	Co-ordinates [m]					
1 - X -	0.00	0.00	100.00	100.00		
1 - Y -	-1.75	3.50	3.50	-1.75		
2 - X -	0.00	0.00	100.00	100.00		
2 - Y -	3.50	6.00	6.00	3.50		
3 - X -	0.00	100.00				
3 - Y -	3.50	3.50				
4 - X -	0.00	0.00	100.00	100.00		
4 - Y -	3.50	5.40	5.40	3.50		
5 - X -	0.00	0.00	100.00	100.00		
5 - Y -	5.40	6.40	6.40	5.40		

2.7 Verticals

Vertical number	X co-ordinates [m]			
1	50.000			

Discretisation = 100

2.8 Vertical Drain

Drain type		Strip
Horizontal range "From"	[m]	0.000
Horizontal range "To"	[m]	100.000
Bottom position	[m]	-4.900
Center to center distance	[m]	1.500
Width	[m]	0.100
Thickness	[m]	0.003
Grid		Triangular
Drainage schedule		Off
Start of drainage	[days]	0.000

3 Results per Vertical

3.1 Results for Vertical 1 (X = 50.00 m; Z = 0.00 m)

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
-1.750	131.603	0.140	131.602	2.229
-1.850	130.923	0.262	131.602	2.192
-1.950	130.374	0.371	131.601	2.158
-2.050	129.940	0.468	131.601	2.126
-2.150	129.607	0.555	131.600	2.094
-2.250	129.361	0.633	131.600	2.063
-2.325	129.229	0.686	131.599	2.040
-2.350	129.193	0.703	131.599	2.033
-2.450	129.093	0.766	131.599	2.003
-2.550	129.052	0.823	131.598	1.974
-2.650	129.063	0.875	131.598	1.946
-2.750	129.118	0.922	131.597	1.918
-2.900	129.270	0.986	131.596	1.877
-2.900	129.270	0.986	131.596	1.877
-3.700	129.515	0.975	131.590	1.444
-4.400	131.401	0.796	131.583	1.065
-5.100	134.451	0.498	131.574	0.685
-5.900	138.100	0.140	131.561	0.248
-5.900	138.100	0.140	131.561	0.248
-6.450	143.143	0.140	131.550	0.241
-7.050	148.644	0.140	131.537	0.235
-7.600	153.684	0.140	131.522	0.230
-8.200	159.179	0.140	131.504	0.225
-8.200	159.179	0.140	131.504	0.225
-8.400	159.208	0.140	131.497	0.146
-8.600	159.241	0.140	131.490	0.068
-8.600	159.241	0.140	131.490	0.068
-9.350	166.104	0.140	131.460	0.063
-10.150	173.419	0.140	131.423	0.058
-10.900	180.270	0.140	131.382	0.053
-11.700	187.571	0.140	131.331	0.049
-11.700	187.571	0.140	131.331	0.049
-12.450	195.159	0.140	131.276	0.048
-13.150	202.234	0.140	131.218	0.047
-13.900	209.807	0.140	131.148	0.046
-14.600	216.867	0.140	131.076	0.045
-14.600	216.867	0.140	131.076	0.045
-15.200	222.913	0.140	131.007	0.044
-15.800	228.952	0.140	130.933	0.043
-16.400	234.986	0.140	130.852	0.043
-17.000	241.013	0.140	130.766	0.042
-17.000	241.013	0.140	130.766	0.042
-17.900	250.941	0.140	130.623	0.041
-18.900	261.955	0.140	130.446	0.041
-19.900	272.948	0.140	130.249	0.040
-20.900	283.921	0.140	130.032	0.040
-21.500	290.494	0.140	129.892	0.040
-23.000	306.895	0.140	129.507	0.039
-25.000	328.685	0.140	128.918	0.039
-26.000	339.547	0.140	128.590	0.038
-26.000	339.547	0.140	128.590	0.038
-26.900	348.213	0.159	128.275	0.019
-27.800	357.243	0.140	127.943	0.001
-27.800	357.243	0.140	127.943	0.001
-29.600	376.668	0.140	127.227	0.001
-31.400	396.025	0.140	126.441	0.001
-33.200	415.315	0.140	125.590	0.000

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
-35.000	434.543	0.140	124.676	0.000

4 Settlements

4.1 Settlements

Vertical number	X co-ordinate [m]	Z co-ordinate [m]	Surface level [m]	Settlement [m]
1	50.00	0.00	-1.75	2.229

4.2 Residual Times

Vertical number	Time [days]	Settlement [m]	Part of final settlement [%]	Residual settlements [m]
1	730	1.918	86.078	0.310
	750	1.913	85.827	0.316

End of Report

Report for D-Settlement 19.1

Settlement Calculations
Developed by Deltares

Date of report: 23-12-2019
Time of report: 15:17:26
Report with version: 19.1.1.23743

Date of calculation: 23-12-2019
Time of calculation: 12:27:15
Calculated with version: 19.1.1.23743

File name: D:\..\Berekeningen\Revisie 45 kPa\S03 45kPa 2 jaar

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2 Echo of the Input

2.1 Layer Boundaries

Boundary number	Co-ordinates [m]			
10 - X -	0.000	100.000		
10 - Y -	-1.750	-1.750		
9 - X -	0.000	100.000		
9 - Y -	-2.900	-2.900		
8 - X -	0.000	100.000		
8 - Y -	-5.900	-5.900		
7 - X -	0.000	100.000		
7 - Y -	-8.200	-8.200		
6 - X -	0.000	100.000		
6 - Y -	-8.600	-8.600		
5 - X -	0.000	100.000		
5 - Y -	-11.700	-11.700		
4 - X -	0.000	100.000		
4 - Y -	-14.600	-14.600		
3 - X -	0.000	100.000		
3 - Y -	-17.000	-17.000		
2 - X -	0.000	100.000		
2 - Y -	-26.000	-26.000		
1 - X -	0.000	100.000		
1 - Y -	-27.800	-27.800		
0 - X -	0.000	100.000		
0 - Y -	-35.000	-35.000		

2.2 PI-lines

PI-line number	Co-ordinates [m]			
1 - X -	0.000	100.000		
1 - Y -	0.140	0.140		

2.3 General Data

Soil model:	NEN Bjerrum
Consolidation model:	Darcy
Strain model:	Linear
Groundwater level:	Initial determined by PI-line number 1
Unit weight of water:	9.81 [kN/m ³]
Stress distribution	
- Soil:	Buisman
- Loads:	None
End of consolidation:	11700.00 [days]
No maintain profile	
Pc (initial):	Variable parallel to the initial effective stress
Pc (per step):	Automatic increased to the final effective stresses
Creep rate reference time:	1.000 [days]
No imaginary surface	
With submerging	
(only for non uniform loads)	
- Iteration stop criterium :	0.10 [m]
Load column width	
- Non-Uniform Loads :	1.00 [m]
- Trapeziform Loads :	1.00 [m]

2.4 Soil Profiles

Layer number	Material name	PI-line top	PI-line bottom
10	Klei matig organisch	1	1
9	Veen	1	1
8	Zand schoon los	1	1

Layer number	Material name	PI-line top	PI-line bottom
7	Veen	1	1
6	Zand schoon los	1	1
5	Zand schoon matig	1	1
4	Zand zwak siltig	1	1
3	Zand schoon vast	1	1
2	Klei zwak zandig vast	1	1
1	Zand schoon vast	1	1

2.5 Soil Properties

Layer number	Drained	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
10	No	15.00	15.00
9	No	10.00	10.00
8	Yes	17.00	19.00
7	No	10.00	10.00
6	Yes	17.00	19.00
5	Yes	18.00	20.00
4	Yes	18.00	20.00
3	Yes	19.00	21.00
2	No	20.00	20.00
1	Yes	19.00	21.00

Layer number	Storage type	Vert. consolid. coefficient Cv [m ² /s]	Ratio Ch/Cv [-]	Vertical permeability [m/s]	Ratio hor/vert permeability [-]	Permeability strain mod. [-]	Initial vertical permeability [m/s]
10	Vert. cons.	5.00E-08	1.000	-	-	-	-
9	Vert. cons.	1.00E-07	1.000	-	-	-	-
8	Vert. cons.	-	1.000	-	-	-	-
7	Vert. cons.	1.00E-07	1.000	-	-	-	-
6	Vert. cons.	-	1.000	-	-	-	-
5	Vert. cons.	-	1.000	-	-	-	-
4	Vert. cons.	-	1.000	-	-	-	-
3	Vert. cons.	-	1.000	-	-	-	-
2	Vert. cons.	5.00E-08	1.000	-	-	-	-
1	Vert. cons.	-	1.000	-	-	-	-

Layer number	POP [kN/m ²]	OCR [-]	Equiv. age [days]
10	10.00	-	-
9	10.00	-	-
8	-	1.30	-
7	10.00	-	-
6	-	1.30	-
5	-	1.30	-
4	-	1.30	-
3	-	1.30	-
2	-	1.30	-
1	-	1.30	-

Layer number	Secondary swelling type	Secondary swelling factor[-]	Unloading stress ratio[-]
10	Full	-	-
9	Full	-	-
8	Full	-	-
7	Full	-	-
6	Full	-	-
5	Full	-	-
4	Full	-	-
3	Full	-	-
2	Full	-	-
1	Full	-	-

Layer number	Reloading/ swelling ratio RR [-]	Compression ratio CR [-]	Coeff. of sec. compression Ca [-]	Reloading/ swelling index Cr [-]	Compression index Cc [-]	Initial void ratio (e0) [-]
10	0.0383333	0.2300000	0.0115000	-	-	-
9	0.0766667	0.4600000	0.0230000	-	-	-
8	0.0019167	0.0115000	0.0000000	-	-	-
7	0.0766667	0.4600000	0.0230000	-	-	-
6	0.0019167	0.0115000	0.0000000	-	-	-
5	0.0006333	0.0038000	0.0000000	-	-	-
4	0.0008500	0.0051000	0.0000000	-	-	-
3	0.0003833	0.0023000	0.0000000	-	-	-
2	0.0127833	0.0767000	0.0031000	-	-	-
1	0.0003833	0.0023000	0.0000000	-	-	-

2.6 Non-Uniform Loads

Load number	Time [days]	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
1	0	18.00	20.00
2	0	18.00	20.00
3	730	-18.00	-20.00
4	740	18.00	20.00
5	750	45.00	45.00

Load number	Co-ordinates [m]					
1 - X -	0.00	0.00	100.00	100.00		
1 - Y -	-1.75	3.50	3.50	-1.75		
2 - X -	0.00	0.00	100.00	100.00		
2 - Y -	3.50	6.00	6.00	3.50		
3 - X -	0.00	100.00				
3 - Y -	3.50	3.50				
4 - X -	0.00	0.00	100.00	100.00		
4 - Y -	3.50	5.40	5.40	3.50		
5 - X -	0.00	0.00	100.00	100.00		
5 - Y -	5.40	6.40	6.40	5.40		

2.7 Verticals

Vertical number	X co-ordinates [m]			
1	50.000			

Discretisation = 100

2.8 Vertical Drain

Drain type		Strip
Horizontal range "From"	[m]	0.000
Horizontal range "To"	[m]	100.000
Bottom position	[m]	-4.900
Center to center distance	[m]	1.500
Width	[m]	0.100
Thickness	[m]	0.003
Grid		Triangular
Drainage schedule		Off
Start of drainage	[days]	0.000

3 Results per Vertical

3.1 Results for Vertical 1 (X = 50.00 m; Z = 0.00 m)

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
-1.750	141.147	0.140	141.146	2.287
-1.850	140.466	0.262	141.145	2.250
-1.950	139.917	0.371	141.145	2.215
-2.050	139.482	0.468	141.144	2.182
-2.150	139.147	0.555	141.144	2.150
-2.250	138.901	0.633	141.143	2.118
-2.325	138.768	0.686	141.143	2.095
-2.350	138.732	0.703	141.142	2.087
-2.450	138.631	0.766	141.142	2.057
-2.550	138.590	0.823	141.141	2.027
-2.650	138.600	0.875	141.140	1.998
-2.750	138.655	0.922	141.140	1.969
-2.900	138.807	0.986	141.139	1.927
-2.900	138.807	0.986	141.139	1.927
-3.700	139.051	0.976	141.131	1.483
-4.400	140.938	0.796	141.123	1.094
-5.100	143.988	0.498	141.112	0.704
-5.900	147.636	0.140	141.097	0.257
-5.900	147.636	0.140	141.097	0.257
-6.450	152.678	0.140	141.085	0.249
-7.050	158.176	0.140	141.069	0.243
-7.600	163.213	0.140	141.052	0.238
-8.200	168.706	0.140	141.031	0.233
-8.200	168.706	0.140	141.031	0.233
-8.400	168.733	0.140	141.023	0.152
-8.600	168.766	0.140	141.015	0.072
-8.600	168.766	0.140	141.015	0.072
-9.350	175.625	0.140	140.981	0.066
-10.150	182.934	0.140	140.938	0.061
-10.900	189.780	0.140	140.891	0.056
-11.700	197.074	0.140	140.834	0.052
-11.700	197.074	0.140	140.834	0.052
-12.450	204.655	0.140	140.772	0.050
-13.150	211.722	0.140	140.706	0.049
-13.900	219.287	0.140	140.628	0.048
-14.600	226.338	0.140	140.547	0.047
-14.600	226.338	0.140	140.547	0.047
-15.200	232.376	0.140	140.470	0.046
-15.800	238.407	0.140	140.387	0.045
-16.400	244.431	0.140	140.297	0.045
-17.000	250.448	0.140	140.201	0.044
-17.000	250.448	0.140	140.201	0.044
-17.900	260.361	0.140	140.042	0.043
-18.900	271.355	0.140	139.847	0.043
-19.900	282.328	0.140	139.629	0.042
-20.900	293.278	0.140	139.390	0.042
-21.500	299.838	0.140	139.235	0.042
-23.000	316.200	0.140	138.812	0.041
-25.000	337.934	0.140	138.166	0.040
-26.000	348.765	0.140	137.808	0.040
-26.000	348.765	0.140	137.808	0.040
-26.900	357.396	0.160	137.465	0.020
-27.800	366.402	0.140	137.102	0.001
-27.800	366.402	0.140	137.102	0.001
-29.600	385.763	0.140	136.322	0.001
-31.400	405.051	0.140	135.468	0.001
-33.200	424.269	0.140	134.544	0.000

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
-35.000	443.421	0.140	133.553	0.000

4 Settlements

4.1 Settlements

Vertical number	X co-ordinate [m]	Z co-ordinate [m]	Surface level [m]	Settlement [m]
1	50.00	0.00	-1.75	2.287

4.2 Residual Times

Vertical number	Time [days]	Settlement [m]	Part of final settlement [%]	Residual settlements [m]
1	730	1.918	83.883	0.369
	750	1.913	83.638	0.374

End of Report

Report for D-Settlement 19.1

Settlement Calculations
Developed by Deltares

Date of report: 23-12-2019
Time of report: 15:17:56
Report with version: 19.1.1.23743

Date of calculation: 11-12-2019
Time of calculation: 12:51:03
Calculated with version: 19.1.1.23743

File name: D:\..\Berekeningen\Revisie 55 kPa\S03 55kPa 2 jaar

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2 Echo of the Input

2.1 Layer Boundaries

Boundary number	Co-ordinates [m]			
10 - X -	0.000	100.000		
10 - Y -	-1.750	-1.750		
9 - X -	0.000	100.000		
9 - Y -	-2.900	-2.900		
8 - X -	0.000	100.000		
8 - Y -	-5.900	-5.900		
7 - X -	0.000	100.000		
7 - Y -	-8.200	-8.200		
6 - X -	0.000	100.000		
6 - Y -	-8.600	-8.600		
5 - X -	0.000	100.000		
5 - Y -	-11.700	-11.700		
4 - X -	0.000	100.000		
4 - Y -	-14.600	-14.600		
3 - X -	0.000	100.000		
3 - Y -	-17.000	-17.000		
2 - X -	0.000	100.000		
2 - Y -	-26.000	-26.000		
1 - X -	0.000	100.000		
1 - Y -	-27.800	-27.800		
0 - X -	0.000	100.000		
0 - Y -	-35.000	-35.000		

2.2 PI-lines

PI-line number	Co-ordinates [m]			
1 - X -	0.000	100.000		
1 - Y -	0.140	0.140		

2.3 General Data

Soil model:	NEN Bjerrum
Consolidation model:	Darcy
Strain model:	Linear
Groundwater level:	Initial determined by PI-line number 1
Unit weight of water:	9.81 [kN/m ³]
Stress distribution	
- Soil:	Buisman
- Loads:	None
End of consolidation:	11700.00 [days]
No maintain profile	
Pc (initial):	Variable parallel to the initial effective stress
Pc (per step):	Automatic increased to the final effective stresses
Creep rate reference time:	1.000 [days]
No imaginary surface	
With submerging	
(only for non uniform loads)	
- Iteration stop criterium :	0.10 [m]
Load column width	
- Non-Uniform Loads :	1.00 [m]
- Trapeziform Loads :	1.00 [m]

2.4 Soil Profiles

Layer number	Material name	PI-line top	PI-line bottom
10	Klei matig organisch	1	1
9	Veen	1	1
8	Zand schoon los	1	1

Layer number	Material name	PI-line top	PI-line bottom
7	Veen	1	1
6	Zand schoon los	1	1
5	Zand schoon matig	1	1
4	Zand zwak siltig	1	1
3	Zand schoon vast	1	1
2	Klei zwak zandig vast	1	1
1	Zand schoon vast	1	1

2.5 Soil Properties

Layer number	Drained	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
10	No	15.00	15.00
9	No	10.00	10.00
8	Yes	17.00	19.00
7	No	10.00	10.00
6	Yes	17.00	19.00
5	Yes	18.00	20.00
4	Yes	18.00	20.00
3	Yes	19.00	21.00
2	No	20.00	20.00
1	Yes	19.00	21.00

Layer number	Storage type	Vert. consolid. coefficient Cv [m ² /s]	Ratio Ch/Cv [-]	Vertical permeability [m/s]	Ratio hor/vert permeability [-]	Permeability strain mod. [-]	Initial vertical permeability [m/s]
10	Vert. cons.	5.00E-08	1.000	-	-	-	-
9	Vert. cons.	1.00E-07	1.000	-	-	-	-
8	Vert. cons.	-	1.000	-	-	-	-
7	Vert. cons.	1.00E-07	1.000	-	-	-	-
6	Vert. cons.	-	1.000	-	-	-	-
5	Vert. cons.	-	1.000	-	-	-	-
4	Vert. cons.	-	1.000	-	-	-	-
3	Vert. cons.	-	1.000	-	-	-	-
2	Vert. cons.	5.00E-08	1.000	-	-	-	-
1	Vert. cons.	-	1.000	-	-	-	-

Layer number	POP [kN/m ²]	OCR [-]	Equiv. age [days]
10	10.00	-	-
9	10.00	-	-
8	-	1.30	-
7	10.00	-	-
6	-	1.30	-
5	-	1.30	-
4	-	1.30	-
3	-	1.30	-
2	-	1.30	-
1	-	1.30	-

Layer number	Secondary swelling type	Secondary swelling factor[-]	Unloading stress ratio[-]
10	Full	-	-
9	Full	-	-
8	Full	-	-
7	Full	-	-
6	Full	-	-
5	Full	-	-
4	Full	-	-
3	Full	-	-
2	Full	-	-
1	Full	-	-

Layer number	Reloading/ swelling ratio RR [-]	Compression ratio CR [-]	Coeff. of sec. compression Ca [-]	Reloading/ swelling index Cr [-]	Compression index Cc [-]	Initial void ratio (e0) [-]
10	0.0383333	0.2300000	0.0115000	-	-	-
9	0.0766667	0.4600000	0.0230000	-	-	-
8	0.0019167	0.0115000	0.0000000	-	-	-
7	0.0766667	0.4600000	0.0230000	-	-	-
6	0.0019167	0.0115000	0.0000000	-	-	-
5	0.0006333	0.0038000	0.0000000	-	-	-
4	0.0008500	0.0051000	0.0000000	-	-	-
3	0.0003833	0.0023000	0.0000000	-	-	-
2	0.0127833	0.0767000	0.0031000	-	-	-
1	0.0003833	0.0023000	0.0000000	-	-	-

2.6 Non-Uniform Loads

Load number	Time [days]	Unit weight	
		Unsaturated [kN/m³]	Saturated [kN/m³]
1	0	18.00	20.00
2	0	18.00	20.00
3	730	-18.00	-20.00
4	740	18.00	20.00
5	750	55.00	55.00

Load number	Co-ordinates [m]					
1 - X -	0.00	0.00	100.00	100.00		
1 - Y -	-1.75	3.50	3.50	-1.75		
2 - X -	0.00	0.00	100.00	100.00		
2 - Y -	3.50	6.00	6.00	3.50		
3 - X -	0.00	100.00				
3 - Y -	3.50	3.50				
4 - X -	0.00	0.00	100.00	100.00		
4 - Y -	3.50	5.40	5.40	3.50		
5 - X -	0.00	0.00	100.00	100.00		
5 - Y -	5.40	6.40	6.40	5.40		

2.7 Verticals

Vertical number	X co-ordinates [m]				
1	50.000				

Discretisation = 100

2.8 Vertical Drain

Drain type		Strip
Horizontal range "From"	[m]	0.000
Horizontal range "To"	[m]	100.000
Bottom position	[m]	-4.900
Center to center distance	[m]	1.500
Width	[m]	0.100
Thickness	[m]	0.003
Grid		Triangular
Drainage schedule		Off
Start of drainage	[days]	0.000

3 Results per Vertical

3.1 Results for Vertical 1 (X = 50.00 m; Z = 0.00 m)

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
-1.750	150.717	0.140	150.716	2.342
-1.850	150.036	0.262	150.716	2.304
-1.950	149.486	0.371	150.715	2.269
-2.050	149.050	0.468	150.715	2.235
-2.150	148.714	0.555	150.714	2.202
-2.250	148.467	0.633	150.713	2.170
-2.325	148.334	0.687	150.713	2.146
-2.350	148.298	0.704	150.712	2.138
-2.450	148.197	0.767	150.712	2.107
-2.550	148.154	0.824	150.711	2.077
-2.650	148.164	0.876	150.710	2.047
-2.750	148.218	0.923	150.709	2.017
-2.900	148.370	0.987	150.708	1.974
-2.900	148.370	0.987	150.708	1.974
-3.700	148.614	0.976	150.699	1.519
-4.400	150.501	0.797	150.690	1.122
-5.100	153.551	0.498	150.678	0.723
-5.900	157.199	0.140	150.661	0.265
-5.900	157.199	0.140	150.661	0.265
-6.450	162.239	0.140	150.646	0.258
-7.050	167.735	0.140	150.628	0.251
-7.600	172.770	0.140	150.609	0.246
-8.200	178.260	0.140	150.585	0.240
-8.200	178.260	0.140	150.585	0.240
-8.400	178.286	0.140	150.576	0.157
-8.600	178.318	0.140	150.567	0.075
-8.600	178.318	0.140	150.567	0.075
-9.350	185.172	0.140	150.528	0.069
-10.150	192.476	0.140	150.480	0.063
-10.900	199.316	0.140	150.428	0.059
-11.700	206.604	0.140	150.363	0.054
-11.700	206.604	0.140	150.363	0.054
-12.450	214.177	0.140	150.294	0.053
-13.150	221.238	0.140	150.222	0.052
-13.900	228.793	0.140	150.135	0.051
-14.600	235.836	0.140	150.045	0.050
-14.600	235.836	0.140	150.045	0.050
-15.200	241.865	0.140	149.960	0.049
-15.800	247.888	0.140	149.868	0.048
-16.400	253.903	0.140	149.769	0.047
-17.000	259.910	0.140	149.663	0.046
-17.000	259.910	0.140	149.663	0.046
-17.900	269.807	0.140	149.489	0.045
-18.900	280.782	0.140	149.274	0.045
-19.900	291.734	0.140	149.036	0.044
-20.900	302.663	0.140	148.774	0.044
-21.500	309.208	0.140	148.605	0.043
-23.000	325.532	0.140	148.144	0.043
-25.000	347.209	0.140	147.441	0.042
-26.000	358.010	0.140	147.052	0.042
-26.000	358.010	0.140	147.052	0.042
-26.900	366.605	0.161	146.680	0.021
-27.800	375.587	0.140	146.288	0.002
-27.800	375.587	0.140	146.288	0.002
-29.600	394.885	0.140	145.443	0.001
-31.400	414.104	0.140	144.521	0.001
-33.200	433.249	0.140	143.524	0.000

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
-35.000	452.324	0.140	142.457	0.000

4 Settlements

4.1 Settlements

Vertical number	X co-ordinate [m]	Z co-ordinate [m]	Surface level [m]	Settlement [m]
1	50.00	0.00	-1.75	2.342

4.2 Residual Times

Vertical number	Time [days]	Settlement [m]	Part of final settlement [%]	Residual settlements [m]
1	730	1.918	81.918	0.423
	750	1.913	81.679	0.429

End of Report

VIII

BIJLAGE: RESULTATEN S04 - 1 JAAR WACHTTIJD

Report for D-Settlement 19.1

Settlement Calculations
Developed by Deltares

Date of report: 23-12-2019
Time of report: 15:20:46
Report with version: 19.1.1.23743

Date of calculation: 23-12-2019
Time of calculation: 12:33:19
Calculated with version: 19.1.1.23743

File name: D:\.\Berekeningen\Revisie 35 kPa\S04 35kPa

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4.2 Residual Times	7

2 Echo of the Input

2.1 Layer Boundaries

Boundary number	Co-ordinates [m]				
8 - X -	0.000	100.000			
8 - Y -	-2.700	-2.700			
7 - X -	0.000	100.000			
7 - Y -	-5.200	-5.200			
6 - X -	0.000	100.000			
6 - Y -	-8.300	-8.300			
5 - X -	0.000	100.000			
5 - Y -	-8.700	-8.700			
4 - X -	0.000	100.000			
4 - Y -	-16.900	-16.900			
3 - X -	0.000	100.000			
3 - Y -	-26.400	-26.400			
2 - X -	0.000	100.000			
2 - Y -	-27.000	-27.000			
1 - X -	0.000	100.000			
1 - Y -	-29.000	-29.000			
0 - X -	0.000	100.000			
0 - Y -	-40.000	-40.000			

2.2 PI-lines

PI-line number	Co-ordinates [m]				
1 - X -	0.000	100.000			
1 - Y -	1.200	1.200			

2.3 General Data

Soil model:	NEN Bjerrum
Consolidation model:	Darcy
Strain model:	Linear
Groundwater level:	Initial determined by PI-line number 1
Unit weight of water:	9.81 [kN/m ³]
Stress distribution	
- Soil:	Buisman
- Loads:	None
End of consolidation:	11325.00 [days]
No maintain profile	
Pc (initial):	Variable parallel to the initial effective stress
Pc (per step):	Automatic increased to the final effective stresses
Creep rate reference time:	1.000 [days]
No imaginary surface	
With submerging	
(only for non uniform loads)	
- Iteration stop criterium :	0.10 [m]
Load column width	
- Non-Uniform Loads :	1.00 [m]
- Trapeziform Loads :	1.00 [m]

2.4 Soil Profiles

Layer number	Material name	PI-line top	PI-line bottom
8	Zand sterk siltig kleiig	1	1
7	Zand schoon matig	1	1
6	Veen	1	1
5	Zand schoon matig	1	1
4	Zand schoon vast	1	1
3	Klei sterk zandig	1	1
2	Zand zwak siltig	1	1

Layer number	Material name	PI-line top	PI-line bottom
1	Zand schoon vast	1	1

2.5 Soil Properties

Layer number	Drained	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
8	No	18.00	20.00
7	Yes	18.00	20.00
6	No	10.00	10.00
5	Yes	18.00	20.00
4	Yes	19.00	21.00
3	No	18.00	20.00
2	Yes	18.00	20.00
1	Yes	19.00	21.00

Layer number	Storage type	Vert. consolid. coefficient Cv [m ² /s]	Vertical permeability [m/s]	Permeability strain mod. [-]	Initial vertical permeability [m/s]
8	Vert. cons.	1.00E-02	-	-	-
7	Vert. cons.	-	-	-	-
6	Vert. cons.	1.00E-07	-	-	-
5	Vert. cons.	-	-	-	-
4	Vert. cons.	-	-	-	-
3	Vert. cons.	5.00E-08	-	-	-
2	Vert. cons.	-	-	-	-
1	Vert. cons.	-	-	-	-

Layer number	POP [kN/m ²]	OCR [-]	Equiv. age [days]
8	10.00	-	-
7	-	1.30	-
6	10.00	-	-
5	-	1.30	-
4	-	1.30	-
3	-	1.30	-
2	-	1.30	-
1	-	1.30	-

Layer number	Secondary swelling type	Secondary swelling factor[-]	Unloading stress ratio[-]
8	Full	-	-
7	Full	-	-
6	Full	-	-
5	Full	-	-
4	Full	-	-
3	Full	-	-
2	Full	-	-
1	Full	-	-

Layer number	Reloading/swelling ratio RR [-]	Compression ratio CR [-]	Coeff. of sec. compression Ca [-]	Reloading/swelling index Cr [-]	Compression index Cc [-]	Initial void ratio (e0) [-]
8	0.0019167	0.0115000	0.0000000	-	-	-
7	0.0006333	0.0038000	0.0000000	-	-	-
6	0.0766667	0.4600000	0.0230000	-	-	-
5	0.0006333	0.0038000	0.0000000	-	-	-
4	0.0003833	0.0023000	0.0000000	-	-	-
3	0.0153333	0.0920000	0.0030000	-	-	-
2	0.0008500	0.0051000	0.0000000	-	-	-
1	0.0003833	0.0023000	0.0000000	-	-	-

2.6 Non-Uniform Loads

Load number	Time [days]	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
1	0	18.00	20.00
2	365	18.00	20.00
3	375	35.00	35.00

Load number	Co-ordinates [m]					
1 - X -	0.00	0.00	100.00	100.00		
1 - Y -	-2.70	3.50	3.50	-2.70		
2 - X -	0.00	0.00	100.00	100.00		
2 - Y -	3.50	3.63	3.63	3.50		
3 - X -	0.00	0.00	100.00	100.00		
3 - Y -	3.63	4.63	4.63	3.63		

2.7 Verticals

Vertical number	X co-ordinates [m]				
1	49.694				

Discretisation = 100

3 Results per Vertical

3.1 Results for Vertical 1 (X = 49.69 m; Z = 0.00 m)

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
-2.700	117.170	1.200	117.169	0.169
-2.800	118.188	1.200	117.169	0.167
-2.900	119.207	1.200	117.169	0.166
-3.000	120.226	1.200	117.169	0.165
-3.100	121.244	1.200	117.168	0.163
-3.200	122.263	1.200	117.168	0.162
-3.300	123.282	1.200	117.168	0.161
-3.400	124.301	1.200	117.168	0.160
-3.500	125.319	1.200	117.167	0.159
-3.600	126.338	1.200	117.167	0.158
-3.700	127.357	1.200	117.167	0.157
-3.950	129.903	1.200	117.166	0.155
-4.600	136.524	1.200	117.163	0.149
-5.200	142.635	1.200	117.160	0.144
-5.200	142.635	1.200	117.160	0.144
-5.950	150.272	1.200	117.155	0.143
-6.750	158.417	1.200	117.147	0.141
-7.500	166.051	1.200	117.139	0.140
-8.300	174.191	1.200	117.127	0.139
-8.300	174.191	1.200	117.127	0.139
-8.500	174.222	1.200	117.123	0.081
-8.700	174.260	1.200	117.120	0.023
-8.700	174.260	1.200	117.120	0.023
-9.600	183.412	1.200	117.101	0.022
-10.600	193.575	1.200	117.074	0.020
-11.600	203.731	1.200	117.040	0.019
-12.600	213.879	1.200	116.998	0.018
-12.800	215.908	1.200	116.989	0.018
-13.700	225.031	1.200	116.941	0.017
-14.700	235.158	1.200	116.878	0.017
-15.700	245.273	1.200	116.803	0.016
-16.700	255.374	1.200	116.714	0.015
-16.900	257.393	1.200	116.695	0.015
-16.900	257.393	1.200	116.695	0.015
-17.450	263.492	1.200	116.639	0.015
-18.050	270.140	1.200	116.573	0.015
-19.050	281.207	1.200	116.451	0.014
-20.050	292.259	1.200	116.312	0.014
-21.050	303.293	1.200	116.156	0.014
-21.650	309.905	1.200	116.055	0.014
-23.200	326.956	1.200	115.761	0.013
-25.200	348.890	1.200	115.315	0.013
-26.400	362.013	1.200	115.010	0.013
-26.400	362.013	1.200	115.010	0.013
-26.700	364.972	1.202	114.929	0.007
-27.000	367.964	1.200	114.847	0.001
-27.000	367.964	1.200	114.847	0.001
-28.000	377.866	1.200	114.559	0.001
-29.000	387.748	1.200	114.251	0.001
-29.000	387.748	1.200	114.251	0.001
-30.900	408.371	1.200	113.613	0.001
-32.900	430.003	1.200	112.865	0.000
-34.500	447.256	1.200	112.214	0.000
-36.400	467.685	1.200	111.382	0.000
-38.400	489.124	1.200	110.441	0.000
-40.000	506.231	1.200	109.644	0.000

4 Settlements

4.1 Settlements

Vertical number	X co-ordinate [m]	Z co-ordinate [m]	Surface level [m]	Settlement [m]
1	49.69	0.00	-2.70	0.169

4.2 Residual Times

Vertical number	Time [days]	Settlement [m]	Part of final settlement [%]	Residual settlements [m]
1	365	0.121	71.539	0.048
	375	0.122	72.075	0.047

End of Report

Report for D-Settlement 19.1

Settlement Calculations
Developed by Deltares

Date of report: 23-12-2019
Time of report: 15:21:08
Report with version: 19.1.1.23743

Date of calculation: 23-12-2019
Time of calculation: 12:27:47
Calculated with version: 19.1.1.23743

File name: D:\..\Berekeningen\Revisie 45 kPa\S04 45kPa

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4.1 Settlements	7
4.2 Residual Times	7

2 Echo of the Input

2.1 Layer Boundaries

Boundary number	Co-ordinates [m]			
8 - X -	0.000	100.000		
8 - Y -	-2.700	-2.700		
7 - X -	0.000	100.000		
7 - Y -	-5.200	-5.200		
6 - X -	0.000	100.000		
6 - Y -	-8.300	-8.300		
5 - X -	0.000	100.000		
5 - Y -	-8.700	-8.700		
4 - X -	0.000	100.000		
4 - Y -	-16.900	-16.900		
3 - X -	0.000	100.000		
3 - Y -	-26.400	-26.400		
2 - X -	0.000	100.000		
2 - Y -	-27.000	-27.000		
1 - X -	0.000	100.000		
1 - Y -	-29.000	-29.000		
0 - X -	0.000	100.000		
0 - Y -	-40.000	-40.000		

2.2 PI-lines

PI-line number	Co-ordinates [m]			
1 - X -	0.000	100.000		
1 - Y -	1.200	1.200		

2.3 General Data

Soil model:	NEN Bjerrum
Consolidation model:	Darcy
Strain model:	Linear
Groundwater level:	Initial determined by PI-line number 1
Unit weight of water:	9.81 [kN/m ³]
Stress distribution	
- Soil:	Buisman
- Loads:	None
End of consolidation:	11325.00 [days]
No maintain profile	
Pc (initial):	Variable parallel to the initial effective stress
Pc (per step):	Automatic increased to the final effective stresses
Creep rate reference time:	1.000 [days]
No imaginary surface	
With submerging	
(only for non uniform loads)	
- Iteration stop criterium :	0.10 [m]
Load column width	
- Non-Uniform Loads :	1.00 [m]
- Trapeziform Loads :	1.00 [m]

2.4 Soil Profiles

Layer number	Material name	PI-line top	PI-line bottom
8	Zand sterk siltig kleiig	1	1
7	Zand schoon matig	1	1
6	Veen	1	1
5	Zand schoon matig	1	1
4	Zand schoon vast	1	1
3	Klei sterk zandig	1	1
2	Zand zwak siltig	1	1

Layer number	Material name	PI-line top	PI-line bottom
1	Zand schoon vast	1	1

2.5 Soil Properties

Layer number	Drained	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
8	No	18.00	20.00
7	Yes	18.00	20.00
6	No	10.00	10.00
5	Yes	18.00	20.00
4	Yes	19.00	21.00
3	No	18.00	20.00
2	Yes	18.00	20.00
1	Yes	19.00	21.00

Layer number	Storage type	Vert. consolid. coefficient Cv [m ² /s]	Vertical permeability [m/s]	Permeability strain mod. [-]	Initial vertical permeability [m/s]
8	Vert. cons.	1.00E-02	-	-	-
7	Vert. cons.	-	-	-	-
6	Vert. cons.	1.00E-07	-	-	-
5	Vert. cons.	-	-	-	-
4	Vert. cons.	-	-	-	-
3	Vert. cons.	5.00E-08	-	-	-
2	Vert. cons.	-	-	-	-
1	Vert. cons.	-	-	-	-

Layer number	POP [kN/m ²]	OCR [-]	Equiv. age [days]
8	10.00	-	-
7	-	1.30	-
6	10.00	-	-
5	-	1.30	-
4	-	1.30	-
3	-	1.30	-
2	-	1.30	-
1	-	1.30	-

Layer number	Secondary swelling type	Secondary swelling factor[-]	Unloading stress ratio[-]
8	Full	-	-
7	Full	-	-
6	Full	-	-
5	Full	-	-
4	Full	-	-
3	Full	-	-
2	Full	-	-
1	Full	-	-

Layer number	Reloading/swelling ratio RR [-]	Compression ratio CR [-]	Coeff. of sec. compression Ca [-]	Reloading/swelling index Cr [-]	Compression index Cc [-]	Initial void ratio (e0) [-]
8	0.0019167	0.0115000	0.0000000	-	-	-
7	0.0006333	0.0038000	0.0000000	-	-	-
6	0.0766667	0.4600000	0.0230000	-	-	-
5	0.0006333	0.0038000	0.0000000	-	-	-
4	0.0003833	0.0023000	0.0000000	-	-	-
3	0.0153333	0.0920000	0.0030000	-	-	-
2	0.0008500	0.0051000	0.0000000	-	-	-
1	0.0003833	0.0023000	0.0000000	-	-	-

2.6 Non-Uniform Loads

Load number	Time [days]	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
1	0	18.00	20.00
2	365	18.00	20.00
3	375	45.00	45.00

Load number	Co-ordinates [m]					
1 - X -	0.00	0.00	100.00	100.00		
1 - Y -	-2.70	3.50	3.50	-2.70		
2 - X -	0.00	0.00	100.00	100.00		
2 - Y -	3.50	3.63	3.63	3.50		
3 - X -	0.00	0.00	100.00	100.00		
3 - Y -	3.63	4.63	4.63	3.63		

2.7 Verticals

Vertical number	X co-ordinates [m]				
1	49.694				

Discretisation = 100

3 Results per Vertical

3.1 Results for Vertical 1 (X = 49.69 m; Z = 0.00 m)

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
-2.700	127.111	1.200	127.110	0.176
-2.800	128.128	1.200	127.109	0.175
-2.900	129.147	1.200	127.109	0.173
-3.000	130.166	1.200	127.109	0.172
-3.100	131.184	1.200	127.108	0.171
-3.200	132.203	1.200	127.108	0.170
-3.300	133.222	1.200	127.108	0.168
-3.400	134.240	1.200	127.107	0.167
-3.500	135.259	1.200	127.107	0.166
-3.600	136.278	1.200	127.107	0.165
-3.700	137.296	1.200	127.106	0.164
-3.950	139.842	1.200	127.105	0.162
-4.600	146.462	1.200	127.101	0.156
-5.200	152.572	1.200	127.097	0.151
-5.200	152.573	1.200	127.097	0.151
-5.950	160.208	1.200	127.091	0.149
-6.750	168.352	1.200	127.082	0.148
-7.500	175.983	1.200	127.071	0.146
-8.300	184.121	1.200	127.057	0.145
-8.300	184.121	1.200	127.057	0.145
-8.500	184.151	1.200	127.053	0.085
-8.700	184.189	1.200	127.049	0.025
-8.700	184.189	1.200	127.049	0.025
-9.600	193.337	1.200	127.026	0.023
-10.600	203.495	1.200	126.994	0.022
-11.600	213.645	1.200	126.954	0.021
-12.600	223.785	1.200	126.904	0.020
-12.800	225.812	1.200	126.893	0.020
-13.700	234.927	1.200	126.837	0.019
-14.700	245.044	1.200	126.764	0.018
-15.700	255.147	1.200	126.677	0.017
-16.700	265.236	1.200	126.576	0.016
-16.900	267.252	1.200	126.554	0.016
-16.900	267.253	1.200	126.554	0.016
-17.450	273.343	1.200	126.491	0.016
-18.050	279.982	1.200	126.415	0.016
-19.050	291.033	1.200	126.276	0.015
-20.050	302.066	1.200	126.119	0.015
-21.050	313.080	1.200	125.943	0.015
-21.650	319.679	1.200	125.829	0.015
-23.200	336.694	1.200	125.499	0.014
-25.200	358.576	1.200	125.001	0.014
-26.400	371.664	1.200	124.661	0.014
-26.400	371.664	1.200	124.661	0.014
-26.700	374.614	1.202	124.571	0.008
-27.000	377.596	1.200	124.479	0.002
-27.000	377.596	1.200	124.479	0.002
-28.000	387.467	1.200	124.160	0.001
-29.000	397.316	1.200	123.819	0.001
-29.000	397.316	1.200	123.819	0.001
-30.900	417.870	1.200	123.112	0.001
-32.900	439.426	1.200	122.288	0.001
-34.500	456.613	1.200	121.571	0.000
-36.400	476.959	1.200	120.656	0.000
-38.400	498.308	1.200	119.625	0.000
-40.000	515.339	1.200	118.752	0.000

4 Settlements

4.1 Settlements

Vertical number	X co-ordinate [m]	Z co-ordinate [m]	Surface level [m]	Settlement [m]
1	49.69	0.00	-2.70	0.176

4.2 Residual Times

Vertical number	Time [days]	Settlement [m]	Part of final settlement [%]	Residual settlements [m]
1	365	0.121	68.481	0.056
	375	0.122	68.994	0.055

End of Report

Report for D-Settlement 19.1

Settlement Calculations
Developed by Deltares

Date of report: 23-12-2019
Time of report: 15:21:32
Report with version: 19.1.1.23743

Date of calculation: 11-12-2019
Time of calculation: 11:00:10
Calculated with version: 19.1.1.23743

File name: D:\..\Berekeningen\Revisie 55 kPa\S04 55kPa

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2 Echo of the Input

2.1 Layer Boundaries

Boundary number	Co-ordinates [m]			
8 - X -	0.000	100.000		
8 - Y -	-2.700	-2.700		
7 - X -	0.000	100.000		
7 - Y -	-5.200	-5.200		
6 - X -	0.000	100.000		
6 - Y -	-8.300	-8.300		
5 - X -	0.000	100.000		
5 - Y -	-8.700	-8.700		
4 - X -	0.000	100.000		
4 - Y -	-16.900	-16.900		
3 - X -	0.000	100.000		
3 - Y -	-26.400	-26.400		
2 - X -	0.000	100.000		
2 - Y -	-27.000	-27.000		
1 - X -	0.000	100.000		
1 - Y -	-29.000	-29.000		
0 - X -	0.000	100.000		
0 - Y -	-40.000	-40.000		

2.2 PI-lines

PI-line number	Co-ordinates [m]			
1 - X -	0.000	100.000		
1 - Y -	1.200	1.200		

2.3 General Data

Soil model:	NEN Bjerrum
Consolidation model:	Darcy
Strain model:	Linear
Groundwater level:	Initial determined by PI-line number 1
Unit weight of water:	9.81 [kN/m ³]
Stress distribution	
- Soil:	Buisman
- Loads:	None
End of consolidation:	11325.00 [days]
No maintain profile	
Pc (initial):	Variable parallel to the initial effective stress
Pc (per step):	Automatic increased to the final effective stresses
Creep rate reference time:	1.000 [days]
No imaginary surface	
With submerging	
(only for non uniform loads)	
- Iteration stop criterium :	0.10 [m]
Load column width	
- Non-Uniform Loads :	1.00 [m]
- Trapeziform Loads :	1.00 [m]

2.4 Soil Profiles

Layer number	Material name	PI-line top	PI-line bottom
8	Zand sterk siltig kleiig	1	1
7	Zand schoon matig	1	1
6	Veen	1	1
5	Zand schoon matig	1	1
4	Zand schoon vast	1	1
3	Klei sterk zandig	1	1
2	Zand zwak siltig	1	1

Layer number	Material name	PI-line top	PI-line bottom
1	Zand schoon vast	1	1

2.5 Soil Properties

Layer number	Drained	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
8	No	18.00	20.00
7	Yes	18.00	20.00
6	No	10.00	10.00
5	Yes	18.00	20.00
4	Yes	19.00	21.00
3	No	18.00	20.00
2	Yes	18.00	20.00
1	Yes	19.00	21.00

Layer number	Storage type	Vert. consolid. coefficient Cv [m ² /s]	Vertical permeability [m/s]	Permeability strain mod. [-]	Initial vertical permeability [m/s]
8	Vert. cons.	1.00E-02	-	-	-
7	Vert. cons.	-	-	-	-
6	Vert. cons.	1.00E-07	-	-	-
5	Vert. cons.	-	-	-	-
4	Vert. cons.	-	-	-	-
3	Vert. cons.	5.00E-08	-	-	-
2	Vert. cons.	-	-	-	-
1	Vert. cons.	-	-	-	-

Layer number	POP [kN/m ²]	OCR [-]	Equiv. age [days]
8	10.00	-	-
7	-	1.30	-
6	10.00	-	-
5	-	1.30	-
4	-	1.30	-
3	-	1.30	-
2	-	1.30	-
1	-	1.30	-

Layer number	Secondary swelling type	Secondary swelling factor[-]	Unloading stress ratio[-]
8	Full	-	-
7	Full	-	-
6	Full	-	-
5	Full	-	-
4	Full	-	-
3	Full	-	-
2	Full	-	-
1	Full	-	-

Layer number	Reloading/swelling ratio RR [-]	Compression ratio CR [-]	Coeff. of sec. compression Ca [-]	Reloading/swelling index Cr [-]	Compression index Cc [-]	Initial void ratio (e0) [-]
8	0.0019167	0.0115000	0.0000000	-	-	-
7	0.0006333	0.0038000	0.0000000	-	-	-
6	0.0766667	0.4600000	0.0230000	-	-	-
5	0.0006333	0.0038000	0.0000000	-	-	-
4	0.0003833	0.0023000	0.0000000	-	-	-
3	0.0153333	0.0920000	0.0030000	-	-	-
2	0.0008500	0.0051000	0.0000000	-	-	-
1	0.0003833	0.0023000	0.0000000	-	-	-

2.6 Non-Uniform Loads

Load number	Time [days]	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
1	0	18.00	20.00
2	365	18.00	20.00
3	375	55.00	55.00

Load number	Co-ordinates [m]					
1 - X -	0.00	0.00	100.00	100.00		
1 - Y -	-2.70	3.50	3.50	-2.70		
2 - X -	0.00	0.00	100.00	100.00		
2 - Y -	3.50	3.63	3.63	3.50		
3 - X -	0.00	0.00	100.00	100.00		
3 - Y -	3.63	4.63	4.63	3.63		

2.7 Verticals

Vertical number	X co-ordinates [m]				
1	49.694				

Discretisation = 100

3 Results per Vertical

3.1 Results for Vertical 1 (X = 49.69 m; Z = 0.00 m)

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
-2.700	137.054	1.200	137.053	0.183
-2.800	138.071	1.200	137.052	0.182
-2.900	139.090	1.200	137.052	0.180
-3.000	140.109	1.200	137.052	0.179
-3.100	141.127	1.200	137.051	0.178
-3.200	142.146	1.200	137.051	0.176
-3.300	143.164	1.200	137.050	0.175
-3.400	144.183	1.200	137.050	0.174
-3.500	145.201	1.200	137.049	0.173
-3.600	146.220	1.200	137.049	0.172
-3.700	147.238	1.200	137.048	0.171
-3.950	149.785	1.200	137.047	0.168
-4.600	156.404	1.200	137.043	0.162
-5.200	162.513	1.200	137.038	0.157
-5.200	162.513	1.200	137.038	0.157
-5.950	170.148	1.200	137.030	0.155
-6.750	178.289	1.200	137.020	0.154
-7.500	185.919	1.200	137.007	0.152
-8.300	194.054	1.200	136.990	0.151
-8.300	194.054	1.200	136.990	0.151
-8.500	194.083	1.200	136.985	0.089
-8.700	194.120	1.200	136.980	0.027
-8.700	194.120	1.200	136.980	0.027
-9.600	203.264	1.200	136.953	0.025
-10.600	213.417	1.200	136.916	0.024
-11.600	223.561	1.200	136.870	0.023
-12.600	233.694	1.200	136.813	0.021
-12.800	235.719	1.200	136.800	0.021
-13.700	244.827	1.200	136.737	0.020
-14.700	254.933	1.200	136.653	0.019
-15.700	265.025	1.200	136.555	0.018
-16.700	275.101	1.200	136.441	0.018
-16.900	277.114	1.200	136.416	0.017
-16.900	277.114	1.200	136.416	0.017
-17.450	283.197	1.200	136.345	0.017
-18.050	289.826	1.200	136.260	0.017
-19.050	300.861	1.200	136.104	0.017
-20.050	311.875	1.200	135.929	0.016
-21.050	322.870	1.200	135.733	0.016
-21.650	329.456	1.200	135.606	0.016
-23.200	346.435	1.200	135.240	0.015
-25.200	368.264	1.200	134.689	0.015
-26.400	381.317	1.200	134.314	0.014
-26.400	381.318	1.200	134.314	0.014
-26.700	384.258	1.202	134.216	0.008
-27.000	387.232	1.200	134.115	0.002
-27.000	387.232	1.200	134.115	0.002
-28.000	397.070	1.200	133.763	0.002
-29.000	406.886	1.200	133.389	0.001
-29.000	406.886	1.200	133.389	0.001
-30.900	427.373	1.200	132.615	0.001
-32.900	448.851	1.200	131.713	0.001
-34.500	465.972	1.200	130.930	0.000
-36.400	486.237	1.200	129.934	0.000
-38.400	507.494	1.200	128.811	0.000
-40.000	524.449	1.200	127.862	0.000

4 Settlements

4.1 Settlements

Vertical number	X co-ordinate [m]	Z co-ordinate [m]	Surface level [m]	Settlement [m]
1	49.69	0.00	-2.70	0.183

4.2 Residual Times

Vertical number	Time [days]	Settlement [m]	Part of final settlement [%]	Residual settlements [m]
1	365	0.121	65.801	0.063
	375	0.122	66.294	0.062

End of Report

IX

BIJLAGE: RESULTATEN S26029 - 1 JAAR WACHTTIJD

Report for D-Settlement 19.1

Settlement Calculations
Developed by Deltares

Date of report: 23-12-2019
Time of report: 15:22:03
Report with version: 19.1.1.23743

Date of calculation: 23-12-2019
Time of calculation: 12:34:20
Calculated with version: 19.1.1.23743

File name: D:\..\Berekeningen\Revisie 35 kPa\S26029 35kPa 1 jaar

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2 Echo of the Input

2.1 Layer Boundaries

Boundary number	Co-ordinates [m]			
7 - X -	0.000	100.000		
7 - Y -	0.140	0.140		
6 - X -	0.000	100.000		
6 - Y -	-3.800	-3.800		
5 - X -	0.000	100.000		
5 - Y -	-5.900	-5.900		
4 - X -	0.000	100.000		
4 - Y -	-7.500	-7.500		
3 - X -	0.000	100.000		
3 - Y -	-8.000	-8.000		
2 - X -	0.000	100.000		
2 - Y -	-14.500	-14.500		
1 - X -	0.000	100.000		
1 - Y -	-35.000	-35.000		
0 - X -	0.000	100.000		
0 - Y -	-40.000	-40.000		

2.2 PI-lines

PI-line number	Co-ordinates [m]			
1 - X -	0.000	100.000		
1 - Y -	1.200	1.200		

2.3 General Data

Soil model:	NEN Bjerrum
Consolidation model:	Darcy
Strain model:	Linear
Groundwater level:	Initial determined by PI-line number 1
Unit weight of water:	9.81 [kN/m ³]
Stress distribution	
- Soil:	Buisman
- Loads:	None
End of consolidation:	11335.00 [days]
No maintain profile	
Pc (initial):	Variable parallel to the initial effective stress
Pc (per step):	Automatic increased to the final effective stresses
Creep rate reference time:	1.000 [days]
No imaginary surface	
With submerging	
(only for non uniform loads)	
- Iteration stop criterium :	0.10 [m]
Load column width	
- Non-Uniform Loads :	1.00 [m]
- Trapeziform Loads :	1.00 [m]

2.4 Soil Profiles

Layer number	Material name	PI-line top	PI-line bottom
7	Klei organisch slap	1	1
6	Veen	1	1
5	Zand schoon los	1	1
4	Veen	1	1
3	Zand schoon los	1	1
2	Zand zwak siltig	1	1
1	Zand schoon vast	1	1

2.5 Soil Properties

Layer number	Drained	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
7	No	13.00	13.00
6	No	10.00	10.00
5	Yes	17.00	19.00
4	No	10.00	10.00
3	Yes	17.00	19.00
2	Yes	18.00	20.00
1	Yes	19.00	21.00

Layer number	Storage type	Vert. consolid. coefficient Cv [m ² /s]	Ratio Ch/Cv [-]	Vertical permeability [m/s]	Ratio hor/vert permeability [-]	Permeability strain mod. [-]	Initial vertical permeability [m/s]
7	Vert. cons.	5.00E-08	1.000	-	-	-	-
6	Vert. cons.	1.00E-07	1.000	-	-	-	-
5	Vert. cons.	-	1.000	-	-	-	-
4	Vert. cons.	1.00E-07	1.000	-	-	-	-
3	Vert. cons.	-	1.000	-	-	-	-
2	Vert. cons.	-	1.000	-	-	-	-
1	Vert. cons.	-	1.000	-	-	-	-

Layer number	POP [kN/m ²]	OCR [-]	Equiv. age [days]
7	10.00	-	-
6	10.00	-	-
5	-	1.30	-
4	10.00	-	-
3	-	1.30	-
2	-	1.30	-
1	-	1.30	-

Layer number	Secondary swelling type	Secondary swelling factor[-]	Unloading stress ratio[-]
7	Full	-	-
6	Full	-	-
5	Full	-	-
4	Full	-	-
3	Full	-	-
2	Full	-	-
1	Full	-	-

Layer number	Reloading/swelling ratio RR [-]	Compression ratio CR [-]	Coeff. of sec. compression Ca [-]	Reloading/swelling index Cr [-]	Compression index Cc [-]	Initial void ratio (e0) [-]
7	0.0511167	0.3067000	0.0153000	-	-	-
6	0.0766667	0.4600000	0.0230000	-	-	-
5	0.0019200	0.0115000	0.0000000	-	-	-
4	0.0766667	0.4600000	0.0230000	-	-	-
3	0.0019200	0.0115000	0.0000000	-	-	-
2	0.0008500	0.0051000	0.0000000	-	-	-
1	0.0003833	0.0023000	0.0000000	-	-	-

2.6 Non-Uniform Loads

Load number	Time [days]	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
1	0	18.00	20.00
2	0	18.00	20.00
3	365	-18.00	-20.00
4	375	18.00	20.00
5	385	35.00	35.00

Load number	Co-ordinates [m]				
1 - X -	0.00	0.00	100.00	100.00	
1 - Y -	0.14	3.50	3.50	0.14	
2 - X -	0.00	0.00	100.00	100.00	
2 - Y -	3.50	6.00	6.00	3.50	
3 - X -	0.00	100.00			
3 - Y -	3.50	3.50			
4 - X -	0.00	0.00	100.00	100.00	
4 - Y -	3.50	5.40	5.40	3.50	
5 - X -	0.00	0.00	100.00	100.00	
5 - Y -	5.40	6.40	6.40	5.40	

2.7 Verticals

Vertical number	X co-ordinates [m]				
1	49.694				

Discretisation = 100

2.8 Vertical Drain

Drain type		Strip
Horizontal range "From"	[m]	0.000
Horizontal range "To"	[m]	100.000
Bottom position	[m]	-4.900
Center to center distance	[m]	1.500
Width	[m]	0.100
Thickness	[m]	0.003
Grid		Triangular
Drainage schedule		Off
Start of drainage	[days]	0.000

3 Results per Vertical

3.1 Results for Vertical 1 (X = 49.69 m; Z = 0.00 m)

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
0.140	101.990	1.200	101.989	2.497
0.040	102.294	1.201	101.989	2.451
-0.060	102.600	1.203	101.989	2.408
-0.160	102.907	1.204	101.989	2.366
-0.260	103.216	1.205	101.989	2.325
-0.360	103.525	1.206	101.988	2.285
-0.460	103.835	1.207	101.988	2.245
-0.560	104.146	1.208	101.988	2.206
-0.660	104.458	1.208	101.988	2.168
-0.760	104.771	1.209	101.988	2.131
-0.860	105.084	1.210	101.987	2.093
-1.830	108.144	1.213	101.984	1.754
-2.800	111.231	1.213	101.979	1.441
-3.800	114.449	1.209	101.971	1.141
-3.800	114.449	1.209	101.971	1.141
-4.350	114.558	1.208	101.965	0.901
-4.850	114.655	1.207	101.959	0.684
-5.400	114.776	1.205	101.951	0.445
-5.900	114.910	1.200	101.942	0.227
-5.900	114.910	1.200	101.942	0.227
-6.700	122.246	1.200	101.926	0.220
-7.500	129.577	1.200	101.906	0.214
-7.500	129.577	1.200	101.906	0.214
-7.750	129.614	1.200	101.898	0.127
-8.000	129.657	1.200	101.891	0.039
-8.000	129.657	1.200	101.891	0.039
-8.850	137.439	1.200	101.861	0.034
-9.850	146.586	1.200	101.818	0.029
-10.850	155.725	1.200	101.767	0.024
-11.250	159.377	1.200	101.743	0.022
-12.100	167.133	1.200	101.687	0.019
-13.100	176.246	1.200	101.611	0.016
-14.100	185.348	1.200	101.522	0.012
-14.500	188.984	1.200	101.483	0.011
-14.500	188.985	1.200	101.483	0.011
-16.250	206.619	1.200	101.285	0.009
-17.250	216.676	1.200	101.152	0.008
-18.250	226.717	1.200	101.003	0.007
-20.250	246.751	1.200	100.657	0.006
-22.250	266.717	1.200	100.243	0.005
-24.250	286.614	1.200	99.760	0.003
-24.750	291.577	1.200	99.628	0.003
-26.500	308.915	1.200	99.134	0.002
-28.500	328.666	1.200	98.504	0.002
-30.500	348.351	1.200	97.809	0.001
-32.500	367.973	1.200	97.052	0.001
-34.500	387.537	1.200	96.236	0.000
-35.000	392.420	1.200	96.023	0.000
-35.000	392.420	1.200	96.023	0.000
-36.300	406.399	1.200	95.455	0.000
-37.500	419.284	1.200	94.912	0.000
-40.000	446.076	1.200	93.729	0.000

4 Settlements

4.1 Settlements

Vertical number	X co-ordinate [m]	Z co-ordinate [m]	Surface level [m]	Settlement [m]
1	49.69	0.00	0.14	2.497

4.2 Residual Times

Vertical number	Time [days]	Settlement [m]	Part of final settlement [%]	Residual settlements [m]
1	365	1.958	78.410	0.539
	385	1.950	78.096	0.547

End of Report

Report for D-Settlement 19.1

Settlement Calculations
Developed by Deltares

Date of report: 23-12-2019
Time of report: 15:22:23
Report with version: 19.1.1.23743

Date of calculation: 23-12-2019
Time of calculation: 12:30:19
Calculated with version: 19.1.1.23743

File name: D:\..\Berekeningen\Revisie 45 kPa\S26029 45kPa 1 jaar

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2 Echo of the Input

2.1 Layer Boundaries

Boundary number	Co-ordinates [m]			
7 - X -	0.000	100.000		
7 - Y -	0.140	0.140		
6 - X -	0.000	100.000		
6 - Y -	-3.800	-3.800		
5 - X -	0.000	100.000		
5 - Y -	-5.900	-5.900		
4 - X -	0.000	100.000		
4 - Y -	-7.500	-7.500		
3 - X -	0.000	100.000		
3 - Y -	-8.000	-8.000		
2 - X -	0.000	100.000		
2 - Y -	-14.500	-14.500		
1 - X -	0.000	100.000		
1 - Y -	-35.000	-35.000		
0 - X -	0.000	100.000		
0 - Y -	-40.000	-40.000		

2.2 PI-lines

PI-line number	Co-ordinates [m]			
1 - X -	0.000	100.000		
1 - Y -	1.200	1.200		

2.3 General Data

Soil model:	NEN Bjerrum
Consolidation model:	Darcy
Strain model:	Linear
Groundwater level:	Initial determined by PI-line number 1
Unit weight of water:	9.81 [kN/m ³]
Stress distribution	
- Soil:	Buisman
- Loads:	None
End of consolidation:	11335.00 [days]
No maintain profile	
Pc (initial):	Variable parallel to the initial effective stress
Pc (per step):	Automatic increased to the final effective stresses
Creep rate reference time:	1.000 [days]
No imaginary surface	
With submerging	
(only for non uniform loads)	
- Iteration stop criterium :	0.10 [m]
Load column width	
- Non-Uniform Loads :	1.00 [m]
- Trapeziform Loads :	1.00 [m]

2.4 Soil Profiles

Layer number	Material name	PI-line top	PI-line bottom
7	Klei organisch slap	1	1
6	Veen	1	1
5	Zand schoon los	1	1
4	Veen	1	1
3	Zand schoon los	1	1
2	Zand zwak siltig	1	1
1	Zand schoon vast	1	1

2.5 Soil Properties

Layer number	Drained	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
7	No	13.00	13.00
6	No	10.00	10.00
5	Yes	17.00	19.00
4	No	10.00	10.00
3	Yes	17.00	19.00
2	Yes	18.00	20.00
1	Yes	19.00	21.00

Layer number	Storage type	Vert. consolid. coefficient Cv [m ² /s]	Ratio Ch/Cv [-]	Vertical permeability [m/s]	Ratio hor/vert permeability [-]	Permeability strain mod. [-]	Initial vertical permeability [m/s]
7	Vert. cons.	5.00E-08	1.000	-	-	-	-
6	Vert. cons.	1.00E-07	1.000	-	-	-	-
5	Vert. cons.	-	1.000	-	-	-	-
4	Vert. cons.	1.00E-07	1.000	-	-	-	-
3	Vert. cons.	-	1.000	-	-	-	-
2	Vert. cons.	-	1.000	-	-	-	-
1	Vert. cons.	-	1.000	-	-	-	-

Layer number	POP [kN/m ²]	OCR [-]	Equiv. age [days]
7	10.00	-	-
6	10.00	-	-
5	-	1.30	-
4	10.00	-	-
3	-	1.30	-
2	-	1.30	-
1	-	1.30	-

Layer number	Secondary swelling type	Secondary swelling factor[-]	Unloading stress ratio[-]
7	Full	-	-
6	Full	-	-
5	Full	-	-
4	Full	-	-
3	Full	-	-
2	Full	-	-
1	Full	-	-

Layer number	Reloading/swelling ratio RR [-]	Compression ratio CR [-]	Coeff. of sec. compression Ca [-]	Reloading/swelling index Cr [-]	Compression index Cc [-]	Initial void ratio (e0) [-]
7	0.0511167	0.3067000	0.0153000	-	-	-
6	0.0766667	0.4600000	0.0230000	-	-	-
5	0.0019200	0.0115000	0.0000000	-	-	-
4	0.0766667	0.4600000	0.0230000	-	-	-
3	0.0019200	0.0115000	0.0000000	-	-	-
2	0.0008500	0.0051000	0.0000000	-	-	-
1	0.0003833	0.0023000	0.0000000	-	-	-

2.6 Non-Uniform Loads

Load number	Time [days]	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
1	0	18.00	20.00
2	0	18.00	20.00
3	365	-18.00	-20.00
4	375	18.00	20.00
5	385	45.00	45.00

Load number	Co-ordinates [m]				
1 - X -	0.00	0.00	100.00	100.00	
1 - Y -	0.14	3.50	3.50	0.14	
2 - X -	0.00	0.00	100.00	100.00	
2 - Y -	3.50	6.00	6.00	3.50	
3 - X -	0.00	100.00			
3 - Y -	3.50	3.50			
4 - X -	0.00	0.00	100.00	100.00	
4 - Y -	3.50	5.40	5.40	3.50	
5 - X -	0.00	0.00	100.00	100.00	
5 - Y -	5.40	6.40	6.40	5.40	

2.7 Verticals

Vertical number	X co-ordinates [m]				
1	49.694				

Discretisation = 100

2.8 Vertical Drain

Drain type		Strip
Horizontal range "From"	[m]	0.000
Horizontal range "To"	[m]	100.000
Bottom position	[m]	-4.900
Center to center distance	[m]	1.500
Width	[m]	0.100
Thickness	[m]	0.003
Grid		Triangular
Drainage schedule		Off
Start of drainage	[days]	0.000

3 Results per Vertical

3.1 Results for Vertical 1 (X = 49.69 m; Z = 0.00 m)

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
0.140	111.313	1.200	111.312	2.584
0.040	111.615	1.202	111.312	2.537
-0.060	111.920	1.203	111.312	2.492
-0.160	112.226	1.204	111.311	2.449
-0.260	112.533	1.205	111.311	2.407
-0.360	112.842	1.207	111.311	2.366
-0.460	113.151	1.207	111.311	2.325
-0.560	113.461	1.208	111.310	2.285
-0.660	113.773	1.209	111.310	2.246
-0.760	114.084	1.210	111.310	2.207
-0.860	114.397	1.210	111.310	2.169
-1.830	117.453	1.214	111.306	1.818
-2.800	120.540	1.214	111.300	1.496
-3.800	123.760	1.210	111.290	1.185
-3.800	123.760	1.210	111.290	1.185
-4.350	123.869	1.209	111.284	0.937
-4.850	123.966	1.208	111.276	0.711
-5.400	124.087	1.205	111.267	0.463
-5.900	124.225	1.200	111.257	0.238
-5.900	124.225	1.200	111.257	0.238
-6.700	131.557	1.200	111.238	0.231
-7.500	138.886	1.200	111.214	0.225
-7.500	138.886	1.200	111.214	0.225
-7.750	138.922	1.200	111.206	0.134
-8.000	138.964	1.200	111.197	0.043
-8.000	138.964	1.200	111.197	0.043
-8.850	146.741	1.200	111.163	0.037
-9.850	155.883	1.200	111.115	0.032
-10.850	165.014	1.200	111.056	0.027
-11.250	168.663	1.200	111.029	0.025
-12.100	176.412	1.200	110.966	0.021
-13.100	185.515	1.200	110.880	0.018
-14.100	194.606	1.200	110.780	0.014
-14.500	198.238	1.200	110.736	0.013
-14.500	198.238	1.200	110.736	0.013
-16.250	215.848	1.200	110.514	0.011
-17.250	225.889	1.200	110.365	0.010
-18.250	235.913	1.200	110.199	0.009
-20.250	255.908	1.200	109.814	0.007
-22.250	275.828	1.200	109.354	0.005
-24.250	295.673	1.200	108.819	0.004
-24.750	300.622	1.200	108.673	0.004
-26.500	317.908	1.200	108.126	0.003
-28.500	337.593	1.200	107.432	0.002
-30.500	357.207	1.200	106.666	0.002
-32.500	376.754	1.200	105.832	0.001
-34.500	396.237	1.200	104.935	0.000
-35.000	401.098	1.200	104.701	0.000
-35.000	401.098	1.200	104.701	0.000
-36.300	415.021	1.200	104.078	0.000
-37.500	427.854	1.200	103.482	0.000
-40.000	454.531	1.200	102.185	0.000

4 Settlements

4.1 Settlements

Vertical number	X co-ordinate [m]	Z co-ordinate [m]	Surface level [m]	Settlement [m]
1	49.69	0.00	0.14	2.584

4.2 Residual Times

Vertical number	Time [days]	Settlement [m]	Part of final settlement [%]	Residual settlements [m]
1	365	1.958	75.776	0.626
	385	1.950	75.473	0.634

End of Report

Report for D-Settlement 19.1

Settlement Calculations
Developed by Deltares

Date of report: 23-12-2019
Time of report: 15:22:47
Report with version: 19.1.1.23743

Date of calculation: 11-12-2019
Time of calculation: 11:00:10
Calculated with version: 19.1.1.23743

File name: D:\.\Berekeningen\Revisie 55 kPa\S04 55kPa

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2 Echo of the Input

2.1 Layer Boundaries

Boundary number	Co-ordinates [m]			
8 - X -	0.000	100.000		
8 - Y -	-2.700	-2.700		
7 - X -	0.000	100.000		
7 - Y -	-5.200	-5.200		
6 - X -	0.000	100.000		
6 - Y -	-8.300	-8.300		
5 - X -	0.000	100.000		
5 - Y -	-8.700	-8.700		
4 - X -	0.000	100.000		
4 - Y -	-16.900	-16.900		
3 - X -	0.000	100.000		
3 - Y -	-26.400	-26.400		
2 - X -	0.000	100.000		
2 - Y -	-27.000	-27.000		
1 - X -	0.000	100.000		
1 - Y -	-29.000	-29.000		
0 - X -	0.000	100.000		
0 - Y -	-40.000	-40.000		

2.2 PI-lines

PI-line number	Co-ordinates [m]			
1 - X -	0.000	100.000		
1 - Y -	1.200	1.200		

2.3 General Data

Soil model:	NEN Bjerrum
Consolidation model:	Darcy
Strain model:	Linear
Groundwater level:	Initial determined by PI-line number 1
Unit weight of water:	9.81 [kN/m ³]
Stress distribution	
- Soil:	Buisman
- Loads:	None
End of consolidation:	11325.00 [days]
No maintain profile	
Pc (initial):	Variable parallel to the initial effective stress
Pc (per step):	Automatic increased to the final effective stresses
Creep rate reference time:	1.000 [days]
No imaginary surface	
With submerging	
(only for non uniform loads)	
- Iteration stop criterium :	0.10 [m]
Load column width	
- Non-Uniform Loads :	1.00 [m]
- Trapeziform Loads :	1.00 [m]

2.4 Soil Profiles

Layer number	Material name	PI-line top	PI-line bottom
8	Zand sterk siltig kleiig	1	1
7	Zand schoon matig	1	1
6	Veen	1	1
5	Zand schoon matig	1	1
4	Zand schoon vast	1	1
3	Klei sterk zandig	1	1
2	Zand zwak siltig	1	1

Layer number	Material name	PI-line top	PI-line bottom
1	Zand schoon vast	1	1

2.5 Soil Properties

Layer number	Drained	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
8	No	18.00	20.00
7	Yes	18.00	20.00
6	No	10.00	10.00
5	Yes	18.00	20.00
4	Yes	19.00	21.00
3	No	18.00	20.00
2	Yes	18.00	20.00
1	Yes	19.00	21.00

Layer number	Storage type	Vert. consolid. coefficient Cv [m ² /s]	Vertical permeability [m/s]	Permeability strain mod. [-]	Initial vertical permeability [m/s]
8	Vert. cons.	1.00E-02	-	-	-
7	Vert. cons.	-	-	-	-
6	Vert. cons.	1.00E-07	-	-	-
5	Vert. cons.	-	-	-	-
4	Vert. cons.	-	-	-	-
3	Vert. cons.	5.00E-08	-	-	-
2	Vert. cons.	-	-	-	-
1	Vert. cons.	-	-	-	-

Layer number	POP [kN/m ²]	OCR [-]	Equiv. age [days]
8	10.00	-	-
7	-	1.30	-
6	10.00	-	-
5	-	1.30	-
4	-	1.30	-
3	-	1.30	-
2	-	1.30	-
1	-	1.30	-

Layer number	Secondary swelling type	Secondary swelling factor[-]	Unloading stress ratio[-]
8	Full	-	-
7	Full	-	-
6	Full	-	-
5	Full	-	-
4	Full	-	-
3	Full	-	-
2	Full	-	-
1	Full	-	-

Layer number	Reloading/swelling ratio RR [-]	Compression ratio CR [-]	Coeff. of sec. compression Ca [-]	Reloading/swelling index Cr [-]	Compression index Cc [-]	Initial void ratio (e0) [-]
8	0.0019167	0.0115000	0.0000000	-	-	-
7	0.0006333	0.0038000	0.0000000	-	-	-
6	0.0766667	0.4600000	0.0230000	-	-	-
5	0.0006333	0.0038000	0.0000000	-	-	-
4	0.0003833	0.0023000	0.0000000	-	-	-
3	0.0153333	0.0920000	0.0030000	-	-	-
2	0.0008500	0.0051000	0.0000000	-	-	-
1	0.0003833	0.0023000	0.0000000	-	-	-

2.6 Non-Uniform Loads

Load number	Time [days]	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
1	0	18.00	20.00
2	365	18.00	20.00
3	375	55.00	55.00

Load number	Co-ordinates [m]					
1 - X -	0.00	0.00	100.00	100.00		
1 - Y -	-2.70	3.50	3.50	-2.70		
2 - X -	0.00	0.00	100.00	100.00		
2 - Y -	3.50	3.63	3.63	3.50		
3 - X -	0.00	0.00	100.00	100.00		
3 - Y -	3.63	4.63	4.63	3.63		

2.7 Verticals

Vertical number	X co-ordinates [m]				
1	49.694				

Discretisation = 100

3 Results per Vertical

3.1 Results for Vertical 1 (X = 49.69 m; Z = 0.00 m)

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
-2.700	137.054	1.200	137.053	0.183
-2.800	138.071	1.200	137.052	0.182
-2.900	139.090	1.200	137.052	0.180
-3.000	140.109	1.200	137.052	0.179
-3.100	141.127	1.200	137.051	0.178
-3.200	142.146	1.200	137.051	0.176
-3.300	143.164	1.200	137.050	0.175
-3.400	144.183	1.200	137.050	0.174
-3.500	145.201	1.200	137.049	0.173
-3.600	146.220	1.200	137.049	0.172
-3.700	147.238	1.200	137.048	0.171
-3.950	149.785	1.200	137.047	0.168
-4.600	156.404	1.200	137.043	0.162
-5.200	162.513	1.200	137.038	0.157
-5.200	162.513	1.200	137.038	0.157
-5.950	170.148	1.200	137.030	0.155
-6.750	178.289	1.200	137.020	0.154
-7.500	185.919	1.200	137.007	0.152
-8.300	194.054	1.200	136.990	0.151
-8.300	194.054	1.200	136.990	0.151
-8.500	194.083	1.200	136.985	0.089
-8.700	194.120	1.200	136.980	0.027
-8.700	194.120	1.200	136.980	0.027
-9.600	203.264	1.200	136.953	0.025
-10.600	213.417	1.200	136.916	0.024
-11.600	223.561	1.200	136.870	0.023
-12.600	233.694	1.200	136.813	0.021
-12.800	235.719	1.200	136.800	0.021
-13.700	244.827	1.200	136.737	0.020
-14.700	254.933	1.200	136.653	0.019
-15.700	265.025	1.200	136.555	0.018
-16.700	275.101	1.200	136.441	0.018
-16.900	277.114	1.200	136.416	0.017
-16.900	277.114	1.200	136.416	0.017
-17.450	283.197	1.200	136.345	0.017
-18.050	289.826	1.200	136.260	0.017
-19.050	300.861	1.200	136.104	0.017
-20.050	311.875	1.200	135.929	0.016
-21.050	322.870	1.200	135.733	0.016
-21.650	329.456	1.200	135.606	0.016
-23.200	346.435	1.200	135.240	0.015
-25.200	368.264	1.200	134.689	0.015
-26.400	381.317	1.200	134.314	0.014
-26.400	381.318	1.200	134.314	0.014
-26.700	384.258	1.202	134.216	0.008
-27.000	387.232	1.200	134.115	0.002
-27.000	387.232	1.200	134.115	0.002
-28.000	397.070	1.200	133.763	0.002
-29.000	406.886	1.200	133.389	0.001
-29.000	406.886	1.200	133.389	0.001
-30.900	427.373	1.200	132.615	0.001
-32.900	448.851	1.200	131.713	0.001
-34.500	465.972	1.200	130.930	0.000
-36.400	486.237	1.200	129.934	0.000
-38.400	507.494	1.200	128.811	0.000
-40.000	524.449	1.200	127.862	0.000

4 Settlements

4.1 Settlements

Vertical number	X co-ordinate [m]	Z co-ordinate [m]	Surface level [m]	Settlement [m]
1	49.69	0.00	-2.70	0.183

4.2 Residual Times

Vertical number	Time [days]	Settlement [m]	Part of final settlement [%]	Residual settlements [m]
1	365	0.121	65.801	0.063
	375	0.122	66.294	0.062

End of Report



BIJLAGE: RESULTATEN S26029 - 2 JAAR WACHTTIJD

Report for D-Settlement 19.1

Settlement Calculations
Developed by Deltares

Date of report: 23-12-2019
Time of report: 15:23:29
Report with version: 19.1.1.23743

Date of calculation: 23-12-2019
Time of calculation: 12:33:54
Calculated with version: 19.1.1.23743

File name: D:\.\Berekeningen\Revisie 35 kPa\S26029 35kPa 2jaar

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2 Echo of the Input

2.1 Layer Boundaries

Boundary number	Co-ordinates [m]			
7 - X -	0.000	100.000		
7 - Y -	0.140	0.140		
6 - X -	0.000	100.000		
6 - Y -	-3.800	-3.800		
5 - X -	0.000	100.000		
5 - Y -	-5.900	-5.900		
4 - X -	0.000	100.000		
4 - Y -	-7.500	-7.500		
3 - X -	0.000	100.000		
3 - Y -	-8.000	-8.000		
2 - X -	0.000	100.000		
2 - Y -	-14.500	-14.500		
1 - X -	0.000	100.000		
1 - Y -	-35.000	-35.000		
0 - X -	0.000	100.000		
0 - Y -	-40.000	-40.000		

2.2 PI-lines

PI-line number	Co-ordinates [m]			
1 - X -	0.000	100.000		
1 - Y -	1.200	1.200		

2.3 General Data

Soil model:	NEN Bjerrum
Consolidation model:	Darcy
Strain model:	Linear
Groundwater level:	Initial determined by PI-line number 1
Unit weight of water:	9.81 [kN/m ³]
Stress distribution	
- Soil:	Buisman
- Loads:	None
End of consolidation:	11700.00 [days]
No maintain profile	
Pc (initial):	Variable parallel to the initial effective stress
Pc (per step):	Automatic increased to the final effective stresses
Creep rate reference time:	1.000 [days]
No imaginary surface	
With submerging	
(only for non uniform loads)	
- Iteration stop criterium :	0.10 [m]
Load column width	
- Non-Uniform Loads :	1.00 [m]
- Trapeziform Loads :	1.00 [m]

2.4 Soil Profiles

Layer number	Material name	PI-line top	PI-line bottom
7	Klei organisch slap	1	1
6	Veen	1	1
5	Zand schoon los	1	1
4	Veen	1	1
3	Zand schoon los	1	1
2	Zand zwak siltig	1	1
1	Zand schoon vast	1	1

2.5 Soil Properties

Layer number	Drained	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
7	No	13.00	13.00
6	No	10.00	10.00
5	Yes	17.00	19.00
4	No	10.00	10.00
3	Yes	17.00	19.00
2	Yes	18.00	20.00
1	Yes	19.00	21.00

Layer number	Storage type	Vert. consolid. coefficient Cv [m ² /s]	Ratio Ch/Cv [-]	Vertical permeability [m/s]	Ratio hor/vert permeability [-]	Permeability strain mod. [-]	Initial vertical permeability [m/s]
7	Vert. cons.	5.00E-08	1.000	-	-	-	-
6	Vert. cons.	1.00E-07	1.000	-	-	-	-
5	Vert. cons.	-	1.000	-	-	-	-
4	Vert. cons.	1.00E-07	1.000	-	-	-	-
3	Vert. cons.	-	1.000	-	-	-	-
2	Vert. cons.	-	1.000	-	-	-	-
1	Vert. cons.	-	1.000	-	-	-	-

Layer number	POP [kN/m ²]	OCR [-]	Equiv. age [days]
7	10.00	-	-
6	10.00	-	-
5	-	1.30	-
4	10.00	-	-
3	-	1.30	-
2	-	1.30	-
1	-	1.30	-

Layer number	Secondary swelling type	Secondary swelling factor[-]	Unloading stress ratio[-]
7	Full	-	-
6	Full	-	-
5	Full	-	-
4	Full	-	-
3	Full	-	-
2	Full	-	-
1	Full	-	-

Layer number	Reloading/swelling ratio RR [-]	Compression ratio CR [-]	Coeff. of sec. compression Ca [-]	Reloading/swelling index Cr [-]	Compression index Cc [-]	Initial void ratio (e0) [-]
7	0.0511167	0.3067000	0.0153000	-	-	-
6	0.0766667	0.4600000	0.0230000	-	-	-
5	0.0019200	0.0115000	0.0000000	-	-	-
4	0.0766667	0.4600000	0.0230000	-	-	-
3	0.0019200	0.0115000	0.0000000	-	-	-
2	0.0008500	0.0051000	0.0000000	-	-	-
1	0.0003833	0.0023000	0.0000000	-	-	-

2.6 Non-Uniform Loads

Load number	Time [days]	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
1	0	18.00	20.00
2	0	18.00	20.00
3	730	-18.00	-20.00
4	740	18.00	20.00
5	750	35.00	35.00

Load number	Co-ordinates [m]				
1 - X -	0.00	0.00	100.00	100.00	
1 - Y -	0.14	3.50	3.50	0.14	
2 - X -	0.00	0.00	100.00	100.00	
2 - Y -	3.50	6.00	6.00	3.50	
3 - X -	0.00	100.00			
3 - Y -	3.50	3.50			
4 - X -	0.00	0.00	100.00	100.00	
4 - Y -	3.50	5.50	5.50	3.50	
5 - X -	0.00	0.00	100.00	100.00	
5 - Y -	5.50	6.50	6.50	5.50	

2.7 Verticals

Vertical number	X co-ordinates [m]				
1	49.694				

Discretisation = 100

2.8 Vertical Drain

Drain type		Strip
Horizontal range "From"	[m]	0.000
Horizontal range "To"	[m]	100.000
Bottom position	[m]	-4.900
Center to center distance	[m]	1.500
Width	[m]	0.100
Thickness	[m]	0.003
Grid		Triangular
Drainage schedule		Off
Start of drainage	[days]	0.000

3 Results per Vertical

3.1 Results for Vertical 1 (X = 49.69 m; Z = 0.00 m)

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
0.140	103.665	1.200	103.664	2.513
0.040	103.968	1.201	103.663	2.467
-0.060	104.274	1.203	103.663	2.423
-0.160	104.581	1.204	103.663	2.381
-0.260	104.889	1.205	103.663	2.340
-0.360	105.199	1.206	103.663	2.299
-0.460	105.509	1.207	103.662	2.260
-0.560	105.820	1.208	103.662	2.221
-0.660	106.132	1.208	103.662	2.182
-0.760	106.444	1.209	103.662	2.145
-0.860	106.757	1.210	103.661	2.107
-1.830	109.817	1.213	103.658	1.765
-2.800	112.904	1.213	103.653	1.451
-3.800	116.122	1.209	103.645	1.149
-3.800	116.122	1.209	103.645	1.149
-4.350	116.231	1.208	103.639	0.908
-4.850	116.327	1.207	103.632	0.688
-5.400	116.448	1.205	103.624	0.448
-5.900	116.583	1.200	103.615	0.229
-5.900	116.583	1.200	103.615	0.229
-6.700	123.918	1.200	103.598	0.222
-7.500	131.249	1.200	103.577	0.216
-7.500	131.249	1.200	103.577	0.216
-7.750	131.285	1.200	103.570	0.128
-8.000	131.328	1.200	103.562	0.040
-8.000	131.328	1.200	103.562	0.040
-8.850	139.109	1.200	103.531	0.034
-9.850	148.256	1.200	103.488	0.029
-10.850	157.392	1.200	103.434	0.024
-11.250	161.044	1.200	103.410	0.023
-12.100	168.799	1.200	103.353	0.019
-13.100	177.911	1.200	103.275	0.016
-14.100	187.010	1.200	103.184	0.013
-14.500	190.646	1.200	103.144	0.011
-14.500	190.646	1.200	103.144	0.011
-16.250	208.276	1.200	102.942	0.009
-17.250	218.330	1.200	102.806	0.008
-18.250	228.368	1.200	102.654	0.008
-20.250	248.395	1.200	102.301	0.006
-22.250	268.353	1.200	101.878	0.005
-24.250	288.240	1.200	101.386	0.004
-24.750	293.201	1.200	101.252	0.003
-26.500	310.529	1.200	100.748	0.003
-28.500	330.268	1.200	100.107	0.002
-30.500	349.941	1.200	99.399	0.001
-32.500	369.549	1.200	98.628	0.001
-34.500	389.099	1.200	97.797	0.000
-35.000	393.977	1.200	97.581	0.000
-35.000	393.978	1.200	97.581	0.000
-36.300	407.947	1.200	97.003	0.000
-37.500	420.822	1.200	96.451	0.000
-40.000	447.594	1.200	95.247	0.000

4 Settlements

4.1 Settlements

Vertical number	X co-ordinate [m]	Z co-ordinate [m]	Surface level [m]	Settlement [m]
1	49.69	0.00	0.14	2.513

4.2 Residual Times

Vertical number	Time [days]	Settlement [m]	Part of final settlement [%]	Residual settlements [m]
1	730	2.075	82.567	0.438
	750	2.065	82.162	0.448

End of Report

Report for D-Settlement 19.1

Settlement Calculations
Developed by Deltares

Date of report: 23-12-2019
Time of report: 15:23:44
Report with version: 19.1.1.23743

Date of calculation: 23-12-2019
Time of calculation: 12:29:02
Calculated with version: 19.1.1.23743

File name: D:\.\Berekeningen\Revisie 45 kPa\S26029 45kPa 2jaar

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2 Echo of the Input

2.1 Layer Boundaries

Boundary number	Co-ordinates [m]			
7 - X -	0.000	100.000		
7 - Y -	0.140	0.140		
6 - X -	0.000	100.000		
6 - Y -	-3.800	-3.800		
5 - X -	0.000	100.000		
5 - Y -	-5.900	-5.900		
4 - X -	0.000	100.000		
4 - Y -	-7.500	-7.500		
3 - X -	0.000	100.000		
3 - Y -	-8.000	-8.000		
2 - X -	0.000	100.000		
2 - Y -	-14.500	-14.500		
1 - X -	0.000	100.000		
1 - Y -	-35.000	-35.000		
0 - X -	0.000	100.000		
0 - Y -	-40.000	-40.000		

2.2 PI-lines

PI-line number	Co-ordinates [m]			
1 - X -	0.000	100.000		
1 - Y -	1.200	1.200		

2.3 General Data

Soil model:	NEN Bjerrum
Consolidation model:	Darcy
Strain model:	Linear
Groundwater level:	Initial determined by PI-line number 1
Unit weight of water:	9.81 [kN/m ³]
Stress distribution	
- Soil:	Buisman
- Loads:	None
End of consolidation:	11700.00 [days]
No maintain profile	
Pc (initial):	Variable parallel to the initial effective stress
Pc (per step):	Automatic increased to the final effective stresses
Creep rate reference time:	1.000 [days]
No imaginary surface	
With submerging	
(only for non uniform loads)	
- Iteration stop criterium :	0.10 [m]
Load column width	
- Non-Uniform Loads :	1.00 [m]
- Trapeziform Loads :	1.00 [m]

2.4 Soil Profiles

Layer number	Material name	PI-line top	PI-line bottom
7	Klei organisch slap	1	1
6	Veen	1	1
5	Zand schoon los	1	1
4	Veen	1	1
3	Zand schoon los	1	1
2	Zand zwak siltig	1	1
1	Zand schoon vast	1	1

2.5 Soil Properties

Layer number	Drained	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
7	No	13.00	13.00
6	No	10.00	10.00
5	Yes	17.00	19.00
4	No	10.00	10.00
3	Yes	17.00	19.00
2	Yes	18.00	20.00
1	Yes	19.00	21.00

Layer number	Storage type	Vert. consolid. coefficient Cv [m ² /s]	Ratio Ch/Cv [-]	Vertical permeability [m/s]	Ratio hor/vert permeability [-]	Permeability strain mod. [-]	Initial vertical permeability [m/s]
7	Vert. cons.	5.00E-08	1.000	-	-	-	-
6	Vert. cons.	1.00E-07	1.000	-	-	-	-
5	Vert. cons.	-	1.000	-	-	-	-
4	Vert. cons.	1.00E-07	1.000	-	-	-	-
3	Vert. cons.	-	1.000	-	-	-	-
2	Vert. cons.	-	1.000	-	-	-	-
1	Vert. cons.	-	1.000	-	-	-	-

Layer number	POP [kN/m ²]	OCR [-]	Equiv. age [days]
7	10.00	-	-
6	10.00	-	-
5	-	1.30	-
4	10.00	-	-
3	-	1.30	-
2	-	1.30	-
1	-	1.30	-

Layer number	Secondary swelling type	Secondary swelling factor[-]	Unloading stress ratio[-]
7	Full	-	-
6	Full	-	-
5	Full	-	-
4	Full	-	-
3	Full	-	-
2	Full	-	-
1	Full	-	-

Layer number	Reloading/swelling ratio RR [-]	Compression ratio CR [-]	Coeff. of sec. compression Ca [-]	Reloading/swelling index Cr [-]	Compression index Cc [-]	Initial void ratio (e0) [-]
7	0.0511167	0.3067000	0.0153000	-	-	-
6	0.0766667	0.4600000	0.0230000	-	-	-
5	0.0019200	0.0115000	0.0000000	-	-	-
4	0.0766667	0.4600000	0.0230000	-	-	-
3	0.0019200	0.0115000	0.0000000	-	-	-
2	0.0008500	0.0051000	0.0000000	-	-	-
1	0.0003833	0.0023000	0.0000000	-	-	-

2.6 Non-Uniform Loads

Load number	Time [days]	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
1	0	18.00	20.00
2	0	18.00	20.00
3	730	-18.00	-20.00
4	740	18.00	20.00
5	750	45.00	45.00

Load number	Co-ordinates [m]				
1 - X -	0.00	0.00	100.00	100.00	
1 - Y -	0.14	3.50	3.50	0.14	
2 - X -	0.00	0.00	100.00	100.00	
2 - Y -	3.50	6.00	6.00	3.50	
3 - X -	0.00	100.00			
3 - Y -	3.50	3.50			
4 - X -	0.00	0.00	100.00	100.00	
4 - Y -	3.50	5.50	5.50	3.50	
5 - X -	0.00	0.00	100.00	100.00	
5 - Y -	5.50	6.50	6.50	5.50	

2.7 Verticals

Vertical number	X co-ordinates [m]				
1	49.694				

Discretisation = 100

2.8 Vertical Drain

Drain type		Strip
Horizontal range "From"	[m]	0.000
Horizontal range "To"	[m]	100.000
Bottom position	[m]	-4.900
Center to center distance	[m]	1.500
Width	[m]	0.100
Thickness	[m]	0.003
Grid		Triangular
Drainage schedule		Off
Start of drainage	[days]	0.000

3 Results per Vertical

3.1 Results for Vertical 1 (X = 49.69 m; Z = 0.00 m)

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
0.140	112.997	1.200	112.996	2.599
0.040	113.299	1.202	112.995	2.551
-0.060	113.603	1.203	112.995	2.506
-0.160	113.909	1.204	112.995	2.463
-0.260	114.216	1.206	112.995	2.421
-0.360	114.525	1.207	112.995	2.379
-0.460	114.834	1.208	112.994	2.339
-0.560	115.144	1.208	112.994	2.299
-0.660	115.455	1.209	112.994	2.259
-0.760	115.767	1.210	112.993	2.220
-0.860	116.079	1.211	112.993	2.182
-1.830	119.135	1.214	112.989	1.829
-2.800	122.222	1.214	112.983	1.505
-3.800	125.442	1.210	112.973	1.192
-3.800	125.442	1.210	112.973	1.192
-4.350	125.551	1.209	112.966	0.942
-4.850	125.647	1.208	112.959	0.715
-5.400	125.768	1.205	112.949	0.466
-5.900	125.906	1.200	112.939	0.240
-5.900	125.906	1.200	112.939	0.240
-6.700	133.238	1.200	112.919	0.233
-7.500	140.566	1.200	112.895	0.226
-7.500	140.566	1.200	112.895	0.226
-7.750	140.602	1.200	112.886	0.135
-8.000	140.644	1.200	112.877	0.043
-8.000	140.644	1.200	112.877	0.043
-8.850	148.420	1.200	112.842	0.038
-9.850	157.561	1.200	112.793	0.032
-10.850	166.690	1.200	112.732	0.027
-11.250	170.339	1.200	112.705	0.025
-12.100	178.086	1.200	112.640	0.022
-13.100	187.188	1.200	112.552	0.018
-14.100	196.276	1.200	112.450	0.014
-14.500	199.907	1.200	112.405	0.013
-14.500	199.907	1.200	112.405	0.013
-16.250	217.513	1.200	112.179	0.011
-17.250	227.551	1.200	112.027	0.010
-18.250	237.571	1.200	111.857	0.009
-20.250	257.558	1.200	111.464	0.007
-22.250	277.470	1.200	110.996	0.006
-24.250	297.305	1.200	110.451	0.004
-24.750	302.252	1.200	110.303	0.004
-26.500	319.528	1.200	109.746	0.003
-28.500	339.201	1.200	109.040	0.002
-30.500	358.802	1.200	108.260	0.002
-32.500	378.334	1.200	107.413	0.001
-34.500	397.802	1.200	106.501	0.000
-35.000	402.660	1.200	106.263	0.000
-35.000	402.660	1.200	106.263	0.000
-36.300	416.573	1.200	105.630	0.000
-37.500	429.396	1.200	105.024	0.000
-40.000	456.053	1.200	103.706	0.000

4 Settlements

4.1 Settlements

Vertical number	X co-ordinate [m]	Z co-ordinate [m]	Surface level [m]	Settlement [m]
1	49.69	0.00	0.14	2.599

4.2 Residual Times

Vertical number	Time [days]	Settlement [m]	Part of final settlement [%]	Residual settlements [m]
1	730	2.075	79.847	0.524
	750	2.065	79.455	0.534

End of Report

Report for D-Settlement 19.1

Settlement Calculations
Developed by Deltares

Date of report: 23-12-2019
Time of report: 15:24:13
Report with version: 19.1.1.23743

Date of calculation: 11-12-2019
Time of calculation: 10:58:31
Calculated with version: 19.1.1.23743

File name: D:\.\Berekeningen\Revisie 55 kPa\S26029 55kPa 2jaar

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2 Echo of the Input

2.1 Layer Boundaries

Boundary number	Co-ordinates [m]			
7 - X -	0.000	100.000		
7 - Y -	0.140	0.140		
6 - X -	0.000	100.000		
6 - Y -	-3.800	-3.800		
5 - X -	0.000	100.000		
5 - Y -	-5.900	-5.900		
4 - X -	0.000	100.000		
4 - Y -	-7.500	-7.500		
3 - X -	0.000	100.000		
3 - Y -	-8.000	-8.000		
2 - X -	0.000	100.000		
2 - Y -	-14.500	-14.500		
1 - X -	0.000	100.000		
1 - Y -	-35.000	-35.000		
0 - X -	0.000	100.000		
0 - Y -	-40.000	-40.000		

2.2 PI-lines

PI-line number	Co-ordinates [m]			
1 - X -	0.000	100.000		
1 - Y -	1.200	1.200		

2.3 General Data

Soil model:	NEN Bjerrum
Consolidation model:	Darcy
Strain model:	Linear
Groundwater level:	Initial determined by PI-line number 1
Unit weight of water:	9.81 [kN/m ³]
Stress distribution	
- Soil:	Buisman
- Loads:	None
End of consolidation:	11700.00 [days]
No maintain profile	
Pc (initial):	Variable parallel to the initial effective stress
Pc (per step):	Automatic increased to the final effective stresses
Creep rate reference time:	1.000 [days]
No imaginary surface	
With submerging	
(only for non uniform loads)	
- Iteration stop criterium :	0.10 [m]
Load column width	
- Non-Uniform Loads :	1.00 [m]
- Trapeziform Loads :	1.00 [m]

2.4 Soil Profiles

Layer number	Material name	PI-line top	PI-line bottom
7	Klei organisch slap	1	1
6	Veen	1	1
5	Zand schoon los	1	1
4	Veen	1	1
3	Zand schoon los	1	1
2	Zand zwak siltig	1	1
1	Zand schoon vast	1	1

2.5 Soil Properties

Layer number	Drained	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
7	No	13.00	13.00
6	No	10.00	10.00
5	Yes	17.00	19.00
4	No	10.00	10.00
3	Yes	17.00	19.00
2	Yes	18.00	20.00
1	Yes	19.00	21.00

Layer number	Storage type	Vert. consolid. coefficient Cv [m ² /s]	Ratio Ch/Cv [-]	Vertical permeability [m/s]	Ratio hor/vert permeability [-]	Permeability strain mod. [-]	Initial vertical permeability [m/s]
7	Vert. cons.	5.00E-08	1.000	-	-	-	-
6	Vert. cons.	1.00E-07	1.000	-	-	-	-
5	Vert. cons.	-	1.000	-	-	-	-
4	Vert. cons.	1.00E-07	1.000	-	-	-	-
3	Vert. cons.	-	1.000	-	-	-	-
2	Vert. cons.	-	1.000	-	-	-	-
1	Vert. cons.	-	1.000	-	-	-	-

Layer number	POP [kN/m ²]	OCR [-]	Equiv. age [days]
7	10.00	-	-
6	10.00	-	-
5	-	1.30	-
4	10.00	-	-
3	-	1.30	-
2	-	1.30	-
1	-	1.30	-

Layer number	Secondary swelling type	Secondary swelling factor[-]	Unloading stress ratio[-]
7	Full	-	-
6	Full	-	-
5	Full	-	-
4	Full	-	-
3	Full	-	-
2	Full	-	-
1	Full	-	-

Layer number	Reloading/ swelling ratio RR [-]	Compression ratio CR [-]	Coeff. of sec. compression Ca [-]	Reloading/ swelling index Cr [-]	Compression index Cc [-]	Initial void ratio (e0) [-]
7	0.0511167	0.3067000	0.0153000	-	-	-
6	0.0766667	0.4600000	0.0230000	-	-	-
5	0.0019200	0.0115000	0.0000000	-	-	-
4	0.0766667	0.4600000	0.0230000	-	-	-
3	0.0019200	0.0115000	0.0000000	-	-	-
2	0.0008500	0.0051000	0.0000000	-	-	-
1	0.0003833	0.0023000	0.0000000	-	-	-

2.6 Non-Uniform Loads

Load number	Time [days]	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
1	0	18.00	20.00
2	0	18.00	20.00
3	730	-18.00	-20.00
4	740	18.00	20.00
5	750	55.00	55.00

Load number	Co-ordinates [m]				
1 - X -	0.00	0.00	100.00	100.00	
1 - Y -	0.14	3.50	3.50	0.14	
2 - X -	0.00	0.00	100.00	100.00	
2 - Y -	3.50	6.00	6.00	3.50	
3 - X -	0.00	100.00			
3 - Y -	3.50	3.50			
4 - X -	0.00	0.00	100.00	100.00	
4 - Y -	3.50	5.50	5.50	3.50	
5 - X -	0.00	0.00	100.00	100.00	
5 - Y -	5.50	6.50	6.50	5.50	

2.7 Verticals

Vertical number	X co-ordinates [m]				
1	49.694				

Discretisation = 100

2.8 Vertical Drain

Drain type		Strip
Horizontal range "From"	[m]	0.000
Horizontal range "To"	[m]	100.000
Bottom position	[m]	-4.900
Center to center distance	[m]	1.500
Width	[m]	0.100
Thickness	[m]	0.003
Grid		Triangular
Drainage schedule		Off
Start of drainage	[days]	0.000

3 Results per Vertical

3.1 Results for Vertical 1 (X = 49.69 m; Z = 0.00 m)

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
0.140	122.373	1.200	122.372	2.679
0.040	122.674	1.202	122.372	2.630
-0.060	122.977	1.203	122.372	2.584
-0.160	123.282	1.205	122.372	2.540
-0.260	123.588	1.206	122.371	2.497
-0.360	123.895	1.207	122.371	2.454
-0.460	124.203	1.208	122.371	2.412
-0.560	124.513	1.209	122.370	2.371
-0.660	124.823	1.210	122.370	2.331
-0.760	125.134	1.211	122.370	2.291
-0.860	125.446	1.212	122.369	2.251
-1.830	128.498	1.215	122.364	1.889
-2.800	131.584	1.215	122.357	1.555
-3.800	134.806	1.211	122.346	1.233
-3.800	134.806	1.211	122.346	1.233
-4.350	134.915	1.210	122.338	0.975
-4.850	135.011	1.209	122.329	0.741
-5.400	135.134	1.206	122.318	0.484
-5.900	135.274	1.200	122.307	0.250
-5.900	135.274	1.200	122.307	0.250
-6.700	142.604	1.200	122.284	0.243
-7.500	149.929	1.200	122.257	0.236
-7.500	149.929	1.200	122.257	0.236
-7.750	149.962	1.200	122.247	0.141
-8.000	150.004	1.200	122.237	0.047
-8.000	150.004	1.200	122.237	0.047
-8.850	157.776	1.200	122.198	0.041
-9.850	166.910	1.200	122.142	0.035
-10.850	176.033	1.200	122.074	0.029
-11.250	179.678	1.200	122.044	0.028
-12.100	187.417	1.200	121.972	0.024
-13.100	196.509	1.200	121.874	0.020
-14.100	205.586	1.200	121.760	0.016
-14.500	209.212	1.200	121.710	0.015
-14.500	209.212	1.200	121.710	0.015
-16.250	226.794	1.200	121.460	0.012
-17.250	236.816	1.200	121.292	0.011
-18.250	246.819	1.200	121.105	0.010
-20.250	266.766	1.200	120.672	0.008
-22.250	286.631	1.200	120.157	0.006
-24.250	306.414	1.200	119.559	0.005
-24.750	311.346	1.200	119.397	0.005
-26.500	328.569	1.200	118.788	0.004
-28.500	348.177	1.200	118.015	0.003
-30.500	367.706	1.200	117.165	0.002
-32.500	387.161	1.200	116.240	0.001
-34.500	406.548	1.200	115.246	0.001
-35.000	411.384	1.200	114.988	0.000
-35.000	411.385	1.200	114.988	0.000
-36.300	425.241	1.200	114.298	0.000
-37.500	438.011	1.200	113.639	0.000
-40.000	464.553	1.200	112.206	0.000

4 Settlements

4.1 Settlements

Vertical number	X co-ordinate [m]	Z co-ordinate [m]	Surface level [m]	Settlement [m]
1	49.69	0.00	0.14	2.679

4.2 Residual Times

Vertical number	Time [days]	Settlement [m]	Part of final settlement [%]	Residual settlements [m]
1	730	2.075	77.466	0.604
	750	2.065	77.086	0.614

End of Report

XI

BIJLAGE: RESULTATEN S50 - 1 JAAR WACHTTIJD

Report for D-Settlement 19.1

Settlement Calculations
Developed by Deltares

Date of report: 24-3-2020
Time of report: 17:54:25
Report with version: 19.1.1.23743

Date of calculation: 24-3-2020
Time of calculation: 15:46:38
Calculated with version: 19.1.1.23743

File name: D:\.\Berekeningen\Revisie 35 kPa\S50 1 jaar tot kruin.v2

Project identification: Container Terminal Markiezaat
Sondering S50

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2 Echo of the Input

2.1 Layer Boundaries

Boundary number	Co-ordinates [m]				
7 - X -	0.000	34.000	47.500	52.500	66.000
7 - Y -	2.000	2.000	6.500	6.500	2.000
7 - X -	100.000				
7 - Y -	2.000				
6 - X -	0.000	100.000			
6 - Y -	1.700	1.700			
5 - X -	0.000	100.000			
5 - Y -	-0.200	-0.200			
4 - X -	0.000	100.000			
4 - Y -	-0.600	-0.600			
3 - X -	0.000	100.000			
3 - Y -	-1.200	-1.200			
2 - X -	0.000	100.000			
2 - Y -	-3.800	-3.800			
1 - X -	0.000	100.000			
1 - Y -	-6.300	-6.300			
0 - X -	0.000	100.000			
0 - Y -	-16.300	-16.300			

2.2 PI-lines

PI-line number	Co-ordinates [m]				
1 - X -	0.000	100.000			
1 - Y -	0.140	0.140			

2.3 General Data

Soil model:	NEN Bjerrum
Consolidation model:	Darcy
Strain model:	Linear
Groundwater level:	Initial determined by PI-line number 1
Unit weight of water:	9.81 [kN/m ³]
Stress distribution	
- Soil:	Buisman
- Loads:	None
End of consolidation:	11335.00 [days]
No maintain profile	
Pc (initial):	Variable parallel to the initial effective stress
Pc (per step):	Automatic increased to the final effective stresses
Creep rate reference time:	1.000 [days]
No imaginary surface	
With submerging	
(only for non uniform loads)	
- Iteration stop criterium :	0.10 [m]
Load column width	
- Non-Uniform Loads :	1.00 [m]
- Trapeziform Loads :	1.00 [m]

2.4 Soil Profiles

Layer number	Material name	PI-line top	PI-line bottom
7	Zand antropogeen	1	1
6	Zand schoon matig	1	1
5	Klei sterk zandig	1	1
4	Zand sterk siltig	1	1
3	Klei zwak zandig slap	1	1
2	Veen	1	1
1	Zand schoon vast	1	1

2.5 Soil Properties

Layer number	Drained	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
7	Yes	18.00	20.00
6	Yes	18.00	20.00
5	No	18.00	18.00
4	Yes	18.00	20.00
3	No	15.00	15.00
2	No	10.00	10.00
1	Yes	19.00	21.00

Layer number	Storage type	Vert. consolid. coefficient Cv [m ² /s]	Vertical permeability [m/s]	Permeability strain mod. [-]	Initial vertical permeability [m/s]
7	Vert. cons.	-	-	-	-
6	Vert. cons.	-	-	-	-
5	Vert. cons.	5.00E-08	-	-	-
4	Vert. cons.	-	-	-	-
3	Vert. cons.	5.00E-08	-	-	-
2	Vert. cons.	1.00E-07	-	-	-
1	Vert. cons.	-	-	-	-

Layer number	POP [kN/m ²]	OCR [-]	Equiv. age [days]
7	10.00	-	-
6	10.00	-	-
5	10.00	-	-
4	-	1.30	-
3	-	1.30	-
2	10.00	-	-
1	-	1.30	-

Layer number	Secondary swelling type	Secondary swelling factor[-]	Unloading stress ratio[-]
7	Full	-	-
6	Full	-	-
5	Full	-	-
4	Full	-	-
3	Full	-	-
2	Full	-	-
1	Full	-	-

Layer number	Reloading/swelling ratio RR [-]	Compression ratio CR [-]	Coeff. of sec. compression Ca [-]	Reloading/swelling index Cr [-]	Compression index Cc [-]	Initial void ratio (e0) [-]
7	0.0001920	0.0115000	0.0230000	-	-	-
6	0.0006333	0.0038000	0.0000000	-	-	-
5	0.0153000	0.0920000	0.0037000	-	-	-
4	0.0001920	0.0011500	0.0000000	-	-	-
3	0.0383000	0.2300000	0.0092000	-	-	-
2	0.0766667	0.4600000	0.0230000	-	-	-
1	0.0003833	0.0023000	0.0000000	-	-	-

2.6 Non-Uniform Loads

Load number	Time [days]	Unit weight	
		Unsaturated [kN/m ³]	Saturated [kN/m ³]
1	0	-18.00	-20.00

Load number	Co-ordinates [m]					
1 - X -	43.00	47.50	52.50	57.00		
1 - Y -	5.00	5.00	5.00	5.00		

2.7 Verticals

Vertical number	X co-ordinates [m]				
1 - 4	20.000	34.000	44.000	50.000	

Discretisation = 100

3 Results per Vertical

3.1 Results for Vertical 1 (X = 20.00 m; Z = 0.00 m)

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
2.000	0.000	2.000	-0.001	0.215
1.900	1.799	1.900	-0.001	0.207
1.850	2.699	1.850	-0.001	0.203
1.800	3.599	1.800	-0.001	0.199
1.700	5.399	1.700	-0.001	0.190
1.700	5.399	1.700	-0.001	0.190
1.600	7.199	1.600	-0.001	0.190
1.500	8.999	1.500	-0.001	0.190
1.400	10.799	1.400	-0.001	0.190
1.300	12.598	1.300	-0.002	0.190
1.200	14.398	1.200	-0.002	0.190
1.100	16.198	1.100	-0.002	0.190
1.000	17.998	1.000	-0.002	0.190
0.750	22.497	0.750	-0.003	0.190
0.140	32.055	0.140	-1.425	0.190
-0.200	35.519	0.140	-1.426	0.190
-0.200	35.519	0.140	-1.426	0.190
-0.400	37.155	0.140	-1.427	0.189
-0.600	38.793	0.140	-1.428	0.188
-0.600	38.793	0.140	-1.428	0.188
-0.900	41.848	0.140	-1.430	0.188
-1.200	44.903	0.140	-1.432	0.188
-1.200	44.903	0.140	-1.432	0.188
-1.900	48.444	0.149	-1.438	0.179
-2.500	51.496	0.154	-1.444	0.171
-3.100	54.568	0.158	-1.452	0.164
-3.800	58.182	0.159	-1.464	0.155
-3.800	58.182	0.159	-1.464	0.155
-4.450	58.307	0.157	-1.476	0.115
-5.050	58.442	0.154	-1.490	0.078
-5.700	58.608	0.148	-1.507	0.038
-6.300	58.780	0.140	-1.524	0.000
-6.300	58.780	0.140	-1.524	0.000
-7.300	69.936	0.140	-1.557	0.000
-8.300	81.088	0.140	-1.596	0.000
-9.300	92.235	0.140	-1.639	0.000
-10.300	103.376	0.140	-1.687	0.000
-11.300	114.514	0.140	-1.740	0.000
-12.300	125.648	0.140	-1.796	0.000
-13.300	136.779	0.140	-1.855	0.000
-14.300	147.907	0.140	-1.917	0.000
-15.300	159.033	0.140	-1.980	0.000
-16.300	170.158	0.140	-2.045	0.000

3.2 Results for Vertical 2 (X = 34.00 m; Z = 0.00 m)

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
2.000	-0.023	2.000	-0.024	0.206
1.900	1.773	1.900	-0.027	0.198
1.850	2.671	1.850	-0.029	0.193
1.800	3.570	1.800	-0.030	0.189
1.700	5.366	1.700	-0.034	0.180

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
1.700	5.366	1.700	-0.034	0.180
1.600	7.162	1.600	-0.038	0.180
1.500	8.958	1.500	-0.042	0.180
1.400	10.753	1.400	-0.047	0.180
1.300	12.549	1.300	-0.051	0.180
1.200	14.343	1.200	-0.057	0.180
1.100	16.138	1.100	-0.062	0.180
1.000	17.932	1.000	-0.068	0.180
0.750	22.416	0.750	-0.084	0.180
0.140	32.003	0.140	-1.477	0.180
-0.200	35.434	0.140	-1.511	0.180
-0.200	35.434	0.140	-1.511	0.180
-0.400	37.049	0.140	-1.533	0.179
-0.600	38.665	0.140	-1.556	0.178
-0.600	38.665	0.140	-1.556	0.178
-0.900	41.684	0.140	-1.594	0.178
-1.200	44.699	0.140	-1.636	0.178
-1.200	44.699	0.140	-1.636	0.178
-1.900	48.138	0.149	-1.745	0.169
-2.500	51.091	0.154	-1.852	0.162
-3.100	54.054	0.157	-1.970	0.155
-3.800	57.532	0.158	-2.118	0.147
-3.800	57.532	0.158	-2.118	0.147
-4.450	57.524	0.157	-2.263	0.109
-5.050	57.533	0.153	-2.402	0.074
-5.700	57.561	0.147	-2.555	0.035
-6.300	57.606	0.140	-2.698	0.000
-6.300	57.606	0.140	-2.698	0.000
-7.300	68.560	0.140	-2.933	0.000
-8.300	79.522	0.140	-3.162	0.000
-9.300	90.495	0.140	-3.379	0.000
-10.300	101.483	0.140	-3.581	0.000
-11.300	112.487	0.140	-3.767	0.000
-12.300	123.508	0.140	-3.936	0.000
-13.300	134.547	0.140	-4.086	0.000
-14.300	145.604	0.140	-4.220	0.000
-15.300	156.677	0.140	-4.337	0.000
-16.300	167.766	0.140	-4.438	0.000

3.3 Results for Vertical 3 (X = 44.00 m; Z = 0.00 m)

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
5.333	0.001	5.333	0.000	0.493
5.233	1.800	5.233	0.000	0.485
5.133	3.600	5.133	0.000	0.476
5.033	5.400	5.033	0.000	0.468
4.933	1.200	4.933	-6.000	0.459
4.833	3.000	4.833	-6.000	0.451
4.733	4.797	4.733	-6.003	0.442
4.633	6.590	4.633	-6.010	0.434
4.533	8.377	4.533	-6.023	0.425
4.433	10.156	4.433	-6.044	0.416
4.333	11.926	4.333	-6.074	0.407
3.517	26.124	3.517	-6.576	0.333
2.600	41.841	2.600	-7.359	0.250
1.700	57.304	1.700	-8.096	0.167
1.700	57.304	1.700	-8.096	0.167
0.750	73.766	0.750	-8.734	0.167
0.140	83.181	0.140	-10.299	0.167
-0.200	86.494	0.140	-10.450	0.167

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
-0.200	86.494	0.140	-10.450	0.167
-0.400	88.051	0.140	-10.530	0.166
-0.600	89.618	0.140	-10.603	0.164
-0.600	89.618	0.140	-10.603	0.164
-0.900	92.578	0.140	-10.700	0.164
-1.200	95.551	0.140	-10.783	0.164
-1.200	95.551	0.140	-10.783	0.164
-1.900	98.876	0.157	-10.929	0.160
-2.500	101.812	0.167	-11.005	0.157
-3.100	104.828	0.173	-11.041	0.154
-3.800	108.444	0.175	-11.041	0.150
-3.800	108.444	0.175	-11.041	0.150
-4.450	108.628	0.172	-11.006	0.111
-5.050	108.863	0.166	-10.949	0.076
-5.700	109.182	0.154	-10.866	0.037
-6.300	109.532	0.140	-10.772	0.000
-6.300	109.532	0.140	-10.772	0.000
-7.300	120.906	0.140	-10.588	0.000
-8.300	132.305	0.140	-10.378	0.000
-9.300	143.721	0.140	-10.153	0.000
-10.300	155.145	0.140	-9.919	0.000
-11.300	166.574	0.140	-9.680	0.000
-12.900	184.859	0.140	-9.299	0.000
-14.900	207.700	0.140	-8.837	0.000
-16.300	223.674	0.140	-8.529	0.000

3.4 Results for Vertical 4 (X = 50.00 m; Z = 0.00 m)

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
6.500	0.001	6.500	0.000	0.568
6.400	1.800	6.400	0.000	0.559
6.300	3.600	6.300	0.000	0.551
6.200	5.400	6.200	0.000	0.542
6.100	7.200	6.100	0.000	0.533
6.000	9.000	6.000	0.000	0.524
5.900	10.800	5.900	0.000	0.515
5.800	12.600	5.800	0.000	0.506
5.700	14.400	5.700	0.000	0.497
5.600	16.200	5.600	0.000	0.488
5.500	18.000	5.500	0.000	0.479
4.800	3.600	4.800	-27.000	0.418
4.100	16.229	4.100	-26.971	0.358
3.300	30.874	3.300	-26.726	0.287
2.300	49.682	2.300	-25.918	0.197
1.700	61.198	1.700	-25.202	0.143
1.700	61.198	1.700	-25.202	0.143
0.750	79.646	0.750	-23.854	0.143
0.140	90.505	0.140	-23.975	0.143
-0.200	94.498	0.140	-23.447	0.143
-0.200	94.498	0.140	-23.447	0.143
-0.400	96.445	0.140	-23.136	0.142
-0.600	98.395	0.140	-22.826	0.141
-0.600	98.395	0.140	-22.826	0.141
-0.900	101.914	0.140	-22.364	0.141
-1.200	105.428	0.140	-21.907	0.141
-1.200	105.428	0.140	-21.907	0.141
-1.900	109.947	0.155	-20.870	0.141
-2.500	113.808	0.166	-20.021	0.141
-3.100	117.657	0.173	-19.214	0.140
-3.800	122.139	0.177	-18.326	0.139

Depth [m]	Effective Stress [kPa]	Hydraulic head [m]	Loading [kPa]	Settlement [m]
-3.800	122.139	0.177	-18.326	0.139
-4.450	123.056	0.175	-17.555	0.104
-5.050	123.903	0.168	-16.888	0.071
-5.700	124.824	0.156	-16.210	0.035
-6.300	125.679	0.140	-15.625	0.000
-6.300	125.679	0.140	-15.625	0.000
-7.300	137.765	0.140	-14.728	0.000
-8.300	149.762	0.140	-13.922	0.000
-9.300	161.680	0.140	-13.194	0.000
-10.300	173.528	0.140	-12.536	0.000
-11.300	185.314	0.140	-11.940	0.000
-12.900	204.062	0.140	-11.096	0.000
-14.900	227.339	0.140	-10.198	0.000
-16.300	243.548	0.140	-9.655	0.000

4 Settlements

4.1 Settlements

Vertical number	X co-ordinate [m]	Z co-ordinate [m]	Surface level [m]	Settlement [m]
1	20.00	0.00	2.00	0.215
2	34.00	0.00	2.00	0.206
3	44.00	0.00	5.33	0.493
4	50.00	0.00	6.50	0.568

4.2 Residual Times

Vertical number	Time [days]	Settlement [m]	Part of final settlement [%]	Residual settlements [m]
1	365	0.070	32.320	0.146
2	365	0.064	31.113	0.142
3	365	0.244	49.519	0.249
4	365	0.292	51.492	0.275

5 Warnings and errors

List of non-fatal warnings and errors generated during calculation.

- 1 Non-uniform load [1]: Co-ordinate (2) lies below surface
- 2 Non-uniform load [1]: Co-ordinate (3) lies below surface

End of Report

