Report for D-Foundations 19.1

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



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2 Input Data

2.1 General Input Data

Model	Bearing Piles (EC7-NL)

2.2 General Report Data

Geotechnical consultant :	[redacted]
Design engineer superstructure :	
Principal :	
Title 1 :	Kader boombehoud
Title 2 :	IB Amsterdam
Title 3 :	D-Foundations indicatief jetgroutpaal berekening v2
Number of project :	
Location of project :	

2.3 Application Area Model Bearing Piles

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

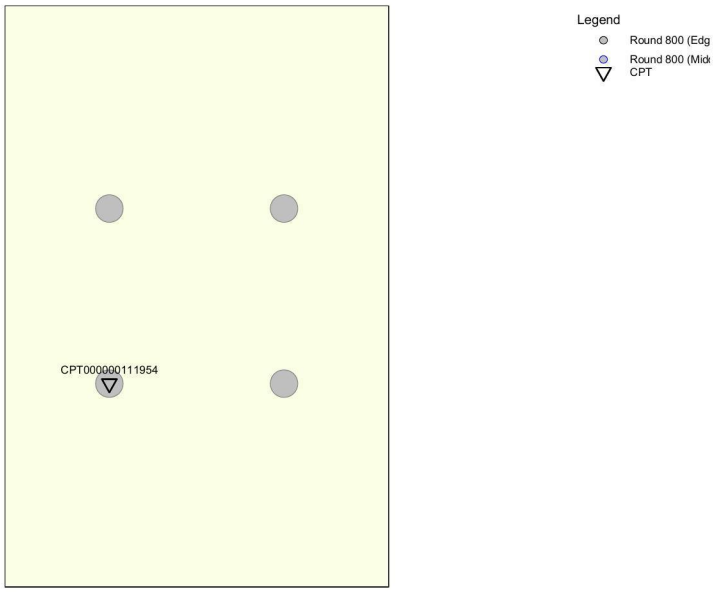
2.4 Superstructure

Rigidity of the superstructure :	Non-Rigid

2.5 General CPT Data

Number of CPT's :	1
Timing of CPT's :	CPT - Excavation - Install

2.5.1 View of CPT's in Foundation Plan



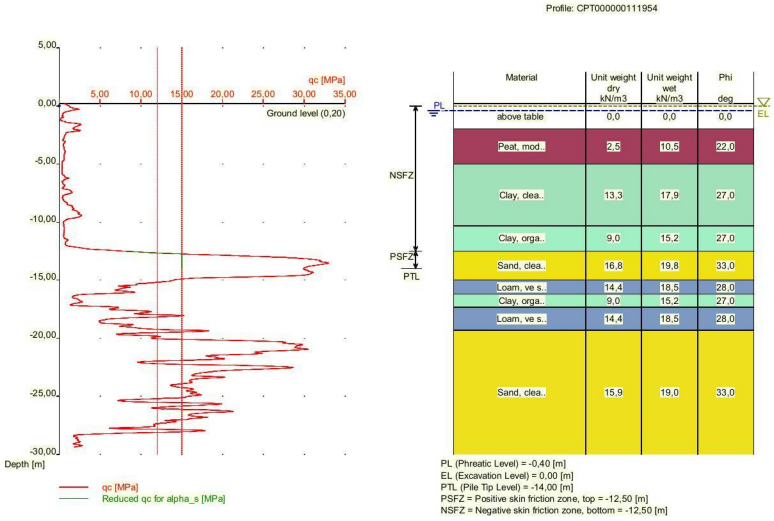
Name CPT	Pile tip level [m R.L.]	Top of pos. friction zone [m R.L.]	Bottom of neg. friction zone [m R.L.]	X-coor-dinate [m]	Y-coor-dinate [m]
CPT0000001..	-14,00	-12,50	-12,50	121013,00	487228,00

2.6 Soil Data

Number of soil profiles (= number of CPT's) : 1

2.6.1 Soil Profile CPT000000111954

Belonging to CPT	CPT000000111954
Surface level in [m. reference level] :	0,20
Phreatic level in [m. reference level] :	-0,40
Pile tip level in [m. reference level] :	-14,00
Top of positive skin friction zone in [m. reference level] :	-12,50
Bottom of negative skin friction zone in [m. reference level] :	-12,50
OCR-value foundation layer :	1,00
Expected groundlevel settlement in [m] :	0,11
Number of layers in profile :	9



Number layer	Top layer [m R.L.]	Gamma [kN/m3]	Gamma;sat [kN/m3]	Phi [deg]	Soil Type	Median (Sand/Gravel) [mm]
1	0,200	0,01	0,01	0,00	Sand	0,200
2	-2,000	2,50	10,50	22,00	Peat	--
3	-5,000	13,30	17,90	27,00	Clay	--
4	-10,320	9,00	15,20	27,00	Clay	--
5	-12,500	16,80	19,80	33,00	Sand	0,200
6	-15,000	14,40	18,50	28,00	Loam	--
7	-16,200	9,00	15,20	27,00	Clay	--
8	-17,320	14,40	18,50	28,00	Loam	--
9	-19,320	15,90	19,00	33,00	Sand	0,200

2.7 Pile Types

2.7.1 Pile type : Round 800

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

Pile type for determination of execution factor alpha_s in sand/gravel:
Micro pile, vibrated

Pile type for determination of exectution factor alpha_s in clay/loam/peat:
alpha_s clay/loam/peat according to table 7.f, art. 7.6.2.3 (i)
NEN 9997-1:2016
Note : alpha_s depends on the soiltype and relative depth.

Pile type for determination of pile class factor alpha_p :
User defined
alpha_p : 0,5000
Evidence to support chosen alpha_p should be provided.

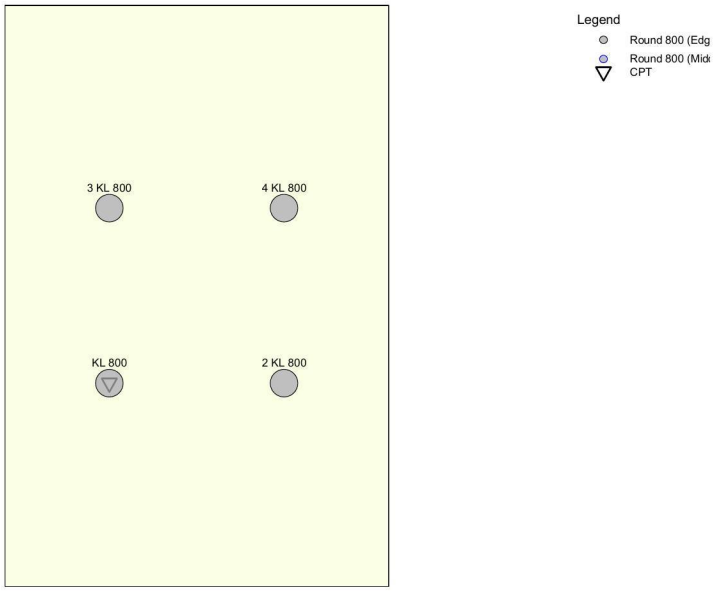
Pile type for use in load/settlement curve : 1
Materialtype for pile : Concrete
Slip layer : None
Pile shape : Round pile
beta (Shape factor) according to figure 7.i, NEN 9997-1:2016.
s (factor for the influence of the shape of the crosssection of the pile base) according to NEN 9997-1:2016.

Pile dimensions :
Diameter [m] : 0,800
Warning : for this pile type, the (equivalent) diameter should not exceed 0.200 m!

2.8 Foundation Plan

Number of piles : 4
Number of collaborating piles* : 1
* : 0 = not defined, 1 = non rigid superstructure, >1 = rigid superstructure

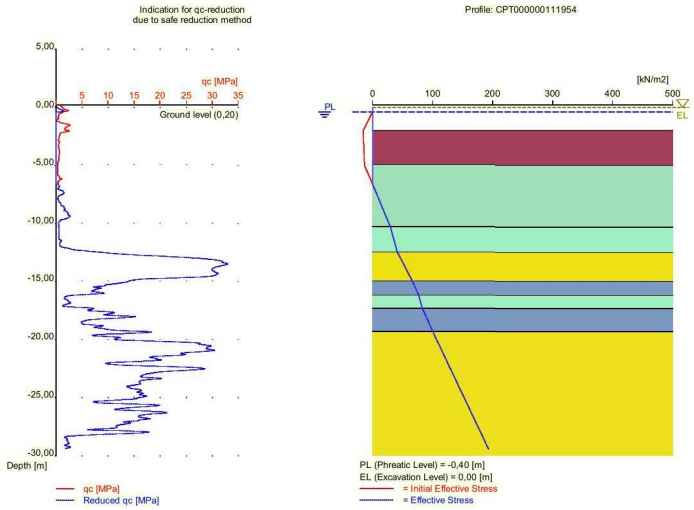
2.8.1 View of Foundation Plan



Pile nr/name	X-coor-dinate [m]	Y-coor-dinate [m]	Fc;d (EQU/STR/GEO) [kN]	Fc;d (SLS) [kN]	P0 [kN/m2]	Pile head level [m R.L.]
1: KL 800	121013,00	487228,00	0,00	0,00	0,00	-1,00
2: 2 KL 800	121018,00	487228,00	0,00	0,00	0,00	-1,00
3: 3 KL 800	121013,00	487233,00	0,00	0,00	0,00	-1,00
4: 4 KL 800	121018,00	487233,00	0,00	0,00	0,00	-1,00

2.9 Excavation Data

Excavation level in [m. reference level] : 0,00
Reduction model : Safe (NEN)



2.10 Overruled Parameters

All parameters according to standard.

2.11 Model Options

Suppress pile group (for negative skin friction)
Create intermediate results file
Use reduction for continuous flight auger piles (standard)
Use the influence of excavations (standard).

2.12 Model Options

Selected pile types :
-Round 800

Selected profiles :
-CPT000000111954

3 Bearing Piles (EC7-NL): Results Preliminary Design, Bearing capacity at fixed pile tip lev

3.1 Errors and Warnings

Pile Type Round 800:
Warning : for this pile type, the (equivalent) diameter should not exceed 0.200 m!
This means that all results for this pile type are in fact invalid (see footnote d, table 7.c).

Soil profile CPT000000111954
Warning : The lowest pile head level lies below the surface level. The maximum value for the top of the friction zones is therefor reset to -1,00 m relative to reference level.

3.2 Remarks

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

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

3.3 Calculation Parameters

3.3.1 Pile Factors

gamma;b (NEN 9997-1:2016, table A.6 A.7 A.8, Limit State EQU/STR/GEO) :	1,20
gamma;b (NEN 9997-1:2016, table A.6 A.7 A.8, the Serviceability Limit State) :	1,00
gamma;s (NEN 9997-1:2016, table A.6 A.7 A.8, Limit State EQU/STR/GEO) :	1,20
gamma;s (NEN 9997-1:2016, table A.6 A.7 A.8, the Serviceability Limit State) :	1,00
xi3 (NEN 9997-1:2016, table A.10a, for N = 1) :	1,39
xi4 (NEN 9997-1:2016, table A.10a, for N = 1) :	1,39

3.3.2 Pile type : Round 800

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

Pile type for determination of execution factor alpha_s in sand/gravel:
Micro pile, vibrated

Pile type for determination of exectution factor alpha_s in clay/loam/peat:
alpha_s clay/loam/peat according to table 7.f, art. 7.6.2.3 (i)
NEN 9997-1:2016
Note : alpha_s depends on the soiltype and relative depth.

Pile type for determination of pile class factor alpha_p :
User defined
alpha_p : 0,5000
Evidence to support chosen alpha_p should be provided.

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

Pile shape : Round pile
beta (Shape factor: figure 7.i, NEN 9997-1:2016
art. 7.6.2.3(g) : Pile tip) : 1,00
s (NEN 9997-1:2016 art. 7.6.2.3(h) : factor for
the influence of the shape of the crosssection of the pile base) : 1,00

Pile dimensions :
Diameter [m] : 0,800
Warning : for this pile type, the (equivalent) diameter should not exceed 0.200 m!
This means that all results for this pile type are in fact invalid (see footnote d, table 7.c).

Number/Name CPT	Alpha_s Sand/ Gravel	Alpha_s Clay/Loam Peat	Alpha_p
0:CPT00000..	0,0060	--	0,5000

3.4 Results for pile type : Round 800

Number/Name CPT	Level [m R.L.]	Groundlevel [m R.L.]	Rb;cal;max [kN]	Rs;cal;max [kN]	Rc;cal;max [kN]	Rc;d [kN]	F;nsf;k [kN]	Fnsf;d [kN]
0:CPT00...	-14.00	0,20	953	325	1278	766	39	39

3.5 Summary Net Bearing Capacity in kN

Number/Name CPT	Groundlevel [m R.L.]	Level [m R.L.]	Round 800 Rc;net;d [kN]
0:CPT00000..	0,20	-14,00	727,00

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

End of Report