BASHKIA TIRANE
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MIRATOI
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VKT Nr. Date __ / __ / ____

RELACION TEKNIK KONSTRUKTIV

STRUKTURA: **NDERHYRJE EMERGJENTE NE RRUGEN "REXHEKRI", FSHATI SURREL NJ.ADM. DAJT**

Ing. Dhimiter PAPA Nr.Liç. K.1510/2

1. PERSHKRIMI I PERGJITHSHEM

REHABILITIMI I MURIT MBAJTES PER EMERGJENCE CIVILE

Objekti: NDERHYRJE EMERGJENCE NE RRUGEN "REXHEKRI", FSHATI SURREL NJ.ADM. DAJT

Konstruktor: **Ing. Dhimiter PAPA**

KODET DHE REFERENCAT

``Kusht Teknik Projektimi per Ndertimet Antisizmike KTP-N.2-89``
(AKADEMIA E SHKENCAVE, Qendra Sizmologjike)

``Kushte teknike te projektimit``, Libri II, (KTP-6,7,8,9-1978)
``Raport Mbi Kushtet Gjeologo-Inxhinierike te Sheshit te Ndertimit
``Studim Inxhiniero –Sizmiologjik
``Eurocode 2 : Design of Concrete Structures FINAL DRAFT prEN 1992-1-2``, December 2003)

``Eurocode 8 : Design of Structures for Earthquake Resistance FINAL DRAFT prEN 1998-1``, December 2003).
``Principles of Foundation Engineering``, Pws-Kent Publishing Company, Boston 1984 (Braja M Das)
``Foundation Analysis and Design``, McGraw-Hill1991 (Josepf E. Bowles)
``Foundation Vibration Analysis Using Simple Physical Models`` PTR Prentice Hall 1994 (John P. Wolf)
``Soil-Structure Interaction Foundation Vibrations ``, 2002 (Gunther Schmidt, Jean-Georges Sieffert)
``Geotechnical Earthquake Engineering`` Prentice Hall 1996 (Steven L. Kramer)
``Reinforced Concrete Structures``, John Wiley & Sons. 1975 (R. Park and T.Paulay)
``Seismic Design of Reinforced Concrete and Masonry Buildings `` John Wiley & Sons 1992 (T. Paulay & M.J.N. Priestley)
``Earthquake-Resistant Concrete Structures``, E&FN SPON (George G. Penelis, Andreas J. Kappos).
``Reinforced Concrete Mechanics and Design``, Third Edition, Prentice Hall, (James G. MacGregor).

2. MATERIALET

► Klasa e betonit te parashikuar ne projekt per murin mbajtes eshte C25/30.
► Celiku i perdorur eshte importi S500 me kufi rrjedhshmerie σ_{rrj} = 500 MPa. Kjo klase hekuri eshte parashikuar per te gjitha llojet e armaturave te perdorura ne objekt.
►Rezistencat llogaritese (te projektimit) per betonin dhe celikun jane marre nga reduktimi i rezistencave karakteristike sipas klases se betonit (apo celikut) te perdorur me faktorin e sigurise perkates si me poshte:

Per betonin: $f_{cd}=f_{ck}/\gamma_c$
$f_{cwd}=f_{cwk}/\gamma_c$

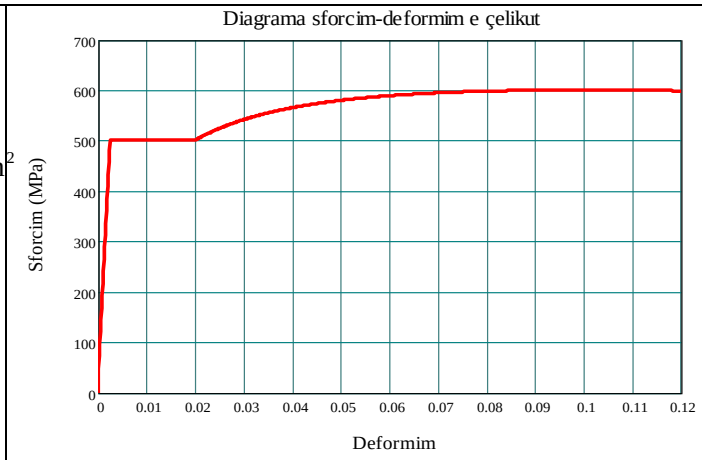
Per celikun: $f_{yd}=f_{yk}/\gamma_s$
$f_{ywd}=f_{ywk}/\gamma_s$

Karakteristikat e materialeve

Materialet që do të përdoren për projektimin e strukturës (betoni, çeliku i armimit dhe çeliku strukturor) duhet të plotësojnë të gjitha kriteret e parashikuara në KTP si dhe ato të Parashikuara në Eurokode.

Çeliku shufer që do të përdoret per pjesen e realizuar me beton arme, duhet të gëzojë veti të mira si në rezistencë ashtu edhe në deformueshmëri (duktilitet). Në elementët parësorë sizmike, për armaturën e hekurit duhet të përdoret çelik i klasës B ose C, sipas tabelës C1 në Aneksin Normativ C të Eurokodit 2, EN 1992. Më poshtë jepen karakteristikat dhe diagrama e çelikut të përdorur në strukturën e mesiperme. Referuar Eurokodeve shufrat e çelikut duhet të jenë patjetër të vjaskuara (çelik periodik).

$$Çelik - S500,\ f_{ys} = 50\,000\,kN/m^2,\ f_{us} = 60\,000\,kN/m^2, E = 20\,000\,000\,kN/m^2$$
$$\gamma_s = 1.15,\ \varepsilon_{sy} = 0.25\%,\ \varepsilon_{su} \geq 10.0\%$$

Çelik – S500 $f_{ys} = 50\,000\,\text{kN/m}^2$ $f_{us} = 60\,000\,\text{kN/m}^2$ $E = 20\,000\,000\,\text{kN/m}^2$ $\gamma_s = 1.15$ $\varepsilon_{sy} = 0.25\%$ $\varepsilon_{su} \geq 10.0\%$	 Figura 1: Diagrama sforcim-deformim e çelikut S500

Armatura e Zakonshme (EN 10080 Steel for the Reinforcement of Concrete)

Klasa e Celikut te Zakonshem	B500C (Bst500)
Rezistenca Karakteristike e Rrjedhshmerise	fyk ≥500 MPa
Rezistenca Karakteristike e Shkaterrimit	ftk ≥600 MPa
Moduli i Elasticitetit	Es = 210 000 MPa =210GPa
Koeficienti i Sigurise Parciale te Celikut	γs = 1,15
Rezistenca Llogaritese e Celikut	fyd = fyk / γs = 435 MPa
Rezistenca Llogaritese e Celikut ne Prerje	Fywd ≥500 MPa
Koeficienti i Puassonit	ν= 0.30

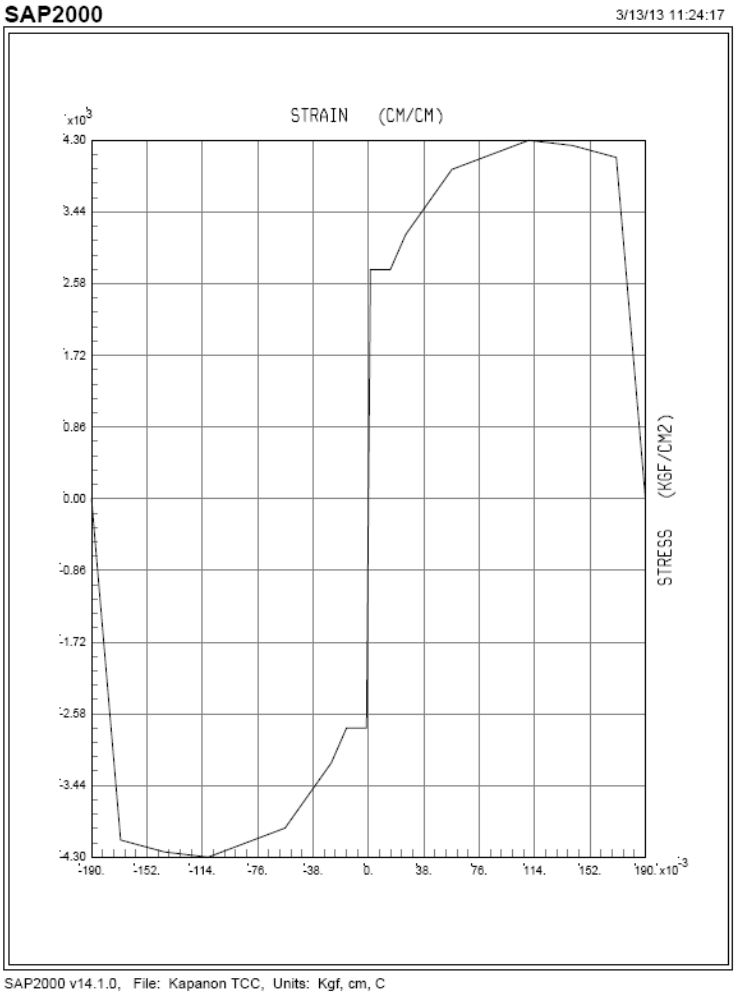
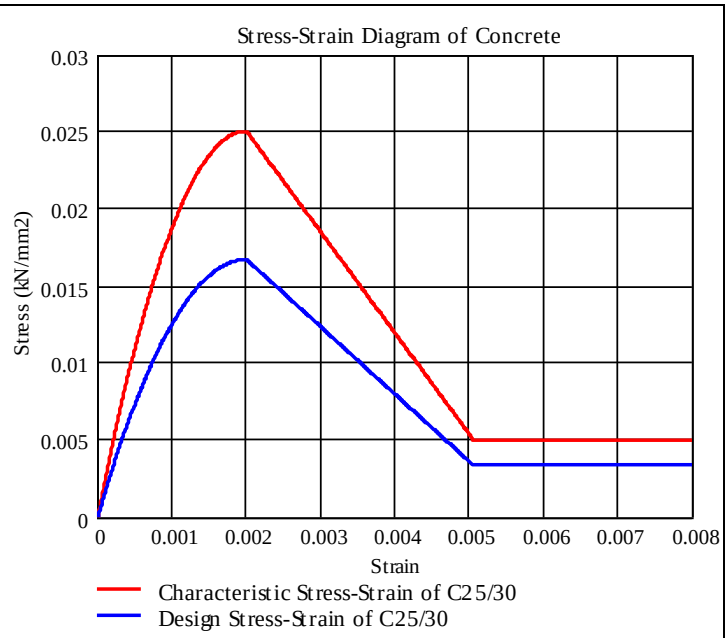
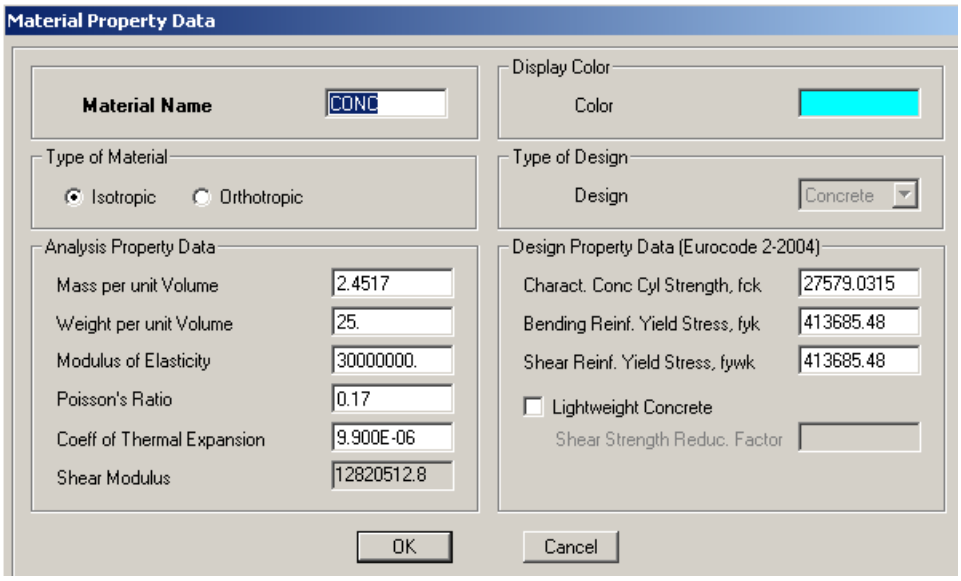


Diagrama Sigma Epsilon, Celiku Strukturor

Betoni Bazuar te EC8, në strukturat me duktilitet mesatar DCM, nuk mund të përdoret, per elementet paresore sizmike beton me klase me te vogel se C16/20. Betoni i klasës B-30 (C25/30) do të përdoret per realizmin e themeleve, kolonave, trareve dhe soletave te mbistruktures.

Beton – C25/30 (Marka 300) $f_{ck} = 2.5\,kN/cm^2$ $\gamma_c = 1.5$ $f_{cd} = 1.667\,kN/cm^2$ $\varepsilon_{cy} = 0.20\%$ $\varepsilon_{cu} = 0.35\%$	
	Figura 2: Diagrama Sforcim Deformim e Betonit C25/30

Parametrat e betonit të pa-shtrënguar (C25/30)



Parametrat e betonit të modeluar gjate llogaritjeve kompjuterike

BETON PER MBISTRUKTUREN

*Strength class of Concrete C **25/30***
Maximum dimension of aggregate Dmax = 25 mm, Concrete cover 50 mm
Cubic strength at 28 days fck,cube ≥ 25 Mpa, Cylindrical strength at 28 days fck,cyl ≥ 30MPa
Strength at ULS fcd = 14.16 Mpa, Tensile strength at ULS fctd = 1.59 MPa
Elastic Modulus Ec= 27 000 Mpa

Parametrat e betonit të pa-shtrënguar (C25/30) jepen ne tabelen e meposhtme:

Klasa e Rezistences se Betonit	C25/30 MPa
Rezistenca Karakteristike Cilindrike	fck = 25 MPa
Rezistenca Karakteristike Kubike	Rck = 25 MPa (fck,cube)
Rezistenca Mesatare ne Shtypje (28 ditore)	fcm = fck+8=25+8 = 32 MPa
Rezistenca Mesatare ne Terheqje (≤C50/60)	fctm = 0,3·fck^2/3 = 3.2 MPa
Rezistenca Karakteristike ne Terheqje	f ctk(5%) = 0,7·fctm = 2.24 MPa
Rezistenca Karakteristike ne Terheqje	f ctk(95%) = 1,3·fctm = 4.16 MPa
Moduli Sekant i Elasticitetit te Betonit	Ecm=22[(fcm)/10] ^0,3= 31GPa
Moduli i Elasticitetit (Vlera Llogaritese)	Ecd= Ecm / γcE =31/1.2=25.8GPa
Koeficientet e Sigurise Parciale te Betonit	γc = 1,5 α = 0,85
Rezistenca Llogaritese ne Shtypje (SLU)	fcd = α·fck / γc = 14.16 MPa
Rezistenca Llogaritese ne Terheqje (SLU)	fctd = fctk(5%) / γc = 1.59 MPa
Koeficienti i Puassonit	v = 0.20

3. NGARKESAT LLOGARITESE NE PROJEKT

DEAD LOADS					
Concrete specific gravity:	25.00	kN/m3	Slab coating:	1.50	kN/m²
Steel specific weight:	78.00	kN/m3	Slab tiling:	1.50	kN/m²
Brick Header wall weight:	3.60	kN/m²	Staircase tiling:	1.30	kN/m²
Brick Stretcher wall weight:	2.10	kN/m²	Soil specific gravity:	18.00	kN/m3

4. ANALIZA DHE LLOGARITJA KOMPJUTERIKE

Analiza statike dhe dinamike per te percaktuar reagimin e struktures ndaj tipeve te ndryshme te ngarkimit te struktures eshte kryer me programin ***GEOSTRUCTIRAL ANALYSIS GEO5.*** Modelimi i struktures ne teresi dhe i cdo elementi behet mbi bazen e metodikes se elementeve te fundem (Finite Element Metode - FEM) e cila eshte nje metode e perafert dhe praktike duke gjetur perdorim te gjere sot ne kushtet e epersise qe krijon perdorimi i programeve kompjuterike.

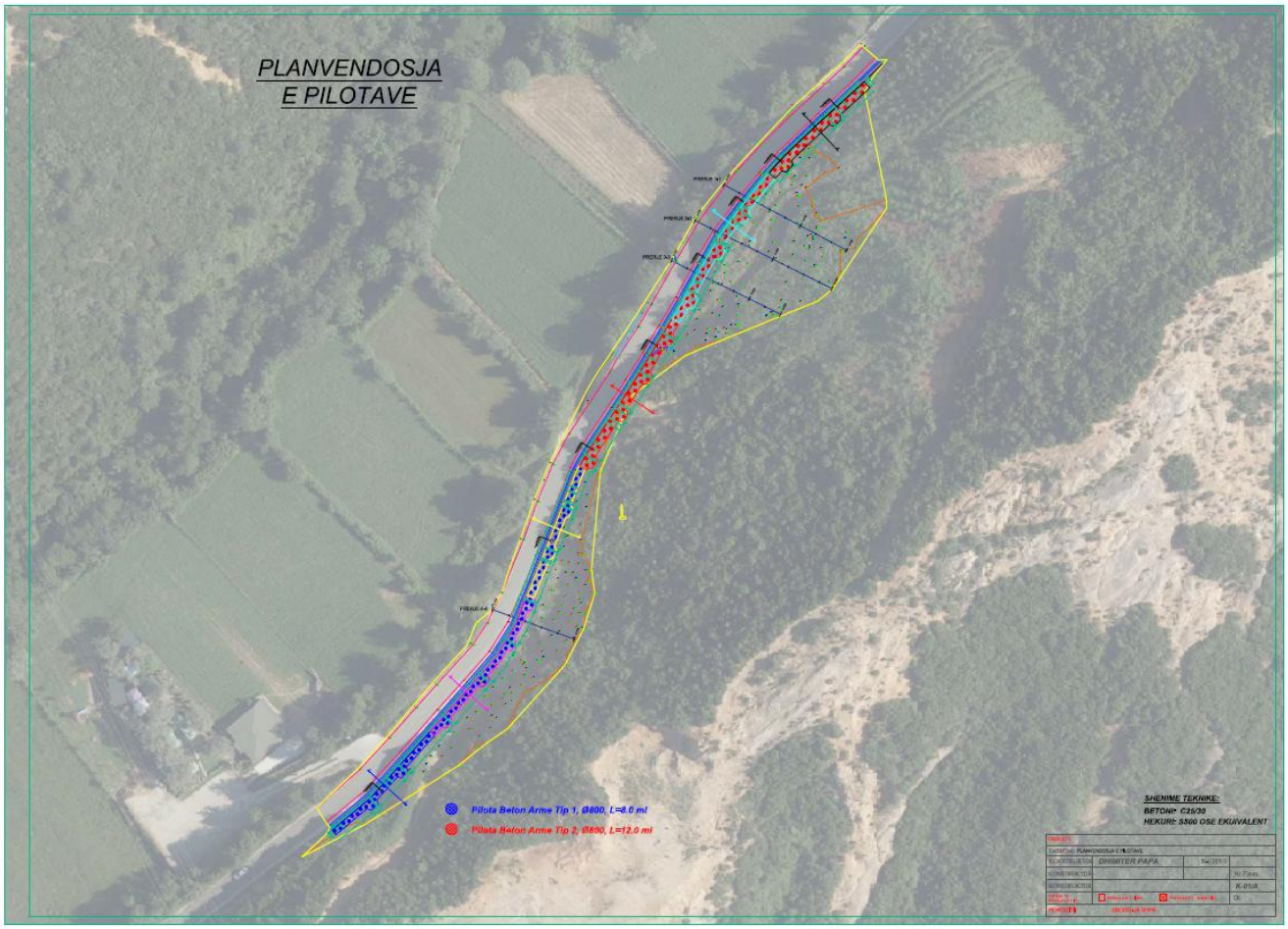
Analiza dinamike ka ne bazen e saj analizen modale me ***metoden e spektrit te reagimit***. Ngarkesat dinamike, (sizmike) te llogaritura pranohen si ngarkesa ekuivalente statike dhe ushtrohen ne vendin e masave te perqendruara. Si baze per metoden e llogaritjeve dinamike me metoden e spektrit te reagimit sherben ***analiza e vlerave te veta dhe e vektoreve te vete***. Me ane te kesaj metode percaktohen format e lekundjeve vetjake dhe frekuencat e lekundjeve te lira. ***Vlerat dhe vektoret e vete*** japin pa dyshim nje pasqyre te qarte dhe te plote per percaktimin e sjelljes se struktures nen veprimin e ngarkesave dinamike. Programi ***GEOSTRUCTIRAL ANALYSIS GEO5*** automatikisht kerkon modet me frekuenca rrethore me te uleta (perioda me te larta) *–shiko piken 8-* si me kontribuese ne thithjen e ngarkesave sizmike nga struktura. Numri maksimal i modeve te kerkuara nga programi eshte kushtezuar nga vete konstruktori ne *n=9 mode*, nderkohe qe masat e kateve te ketij objekti jane konsideruar me tre shkalle lirie, na te cilat *2 rrotulluese dhe nje translative sipas planit te vete soletes*. Frekuenca ciklike f (cikle/sec), frekuenca rrethore ω (rad/sec) dhe perioda T (sec) jane lidhur midis tyre nepermjet relacioneve: ***T=1/f*** dhe ***f=ω/2π.*** Si rezultat i analizes merren zhvendosjet, forcat e brendshme (M, Q, N,) dhe sforcimet σ ne cdo emelente te struktures.

Llogaritjet statike dhe dinamike te struktures jane kryer edhe me programet e avancuara komjuterike. Struktura eshte konceptuar mur beton arme mbajtes. Modeli dinamik i zgjedhur eshte ai me masa te perqendruara ne nivelet te percaktuara. Ngarkesat dhe kombinimi i tyre jane percaktuar sipas Eurocode EC jane paraqitur ne menyre te permbledhur me siper.

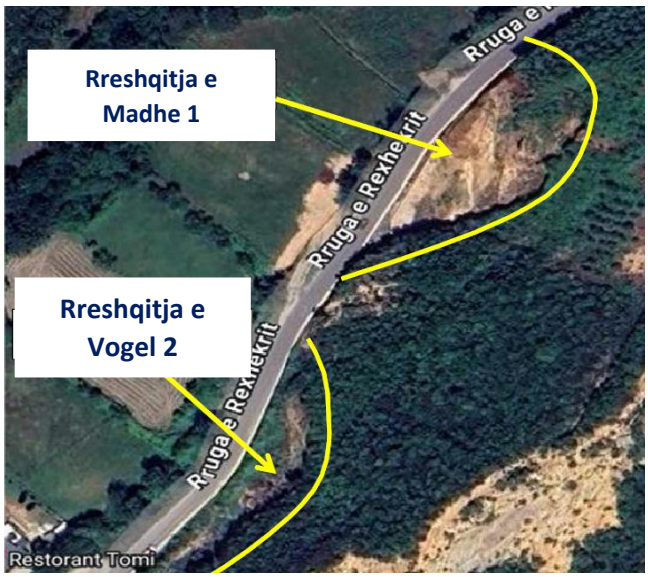
4. PERSHKRIMI DHE LLOGARITJA E STRUKTURES

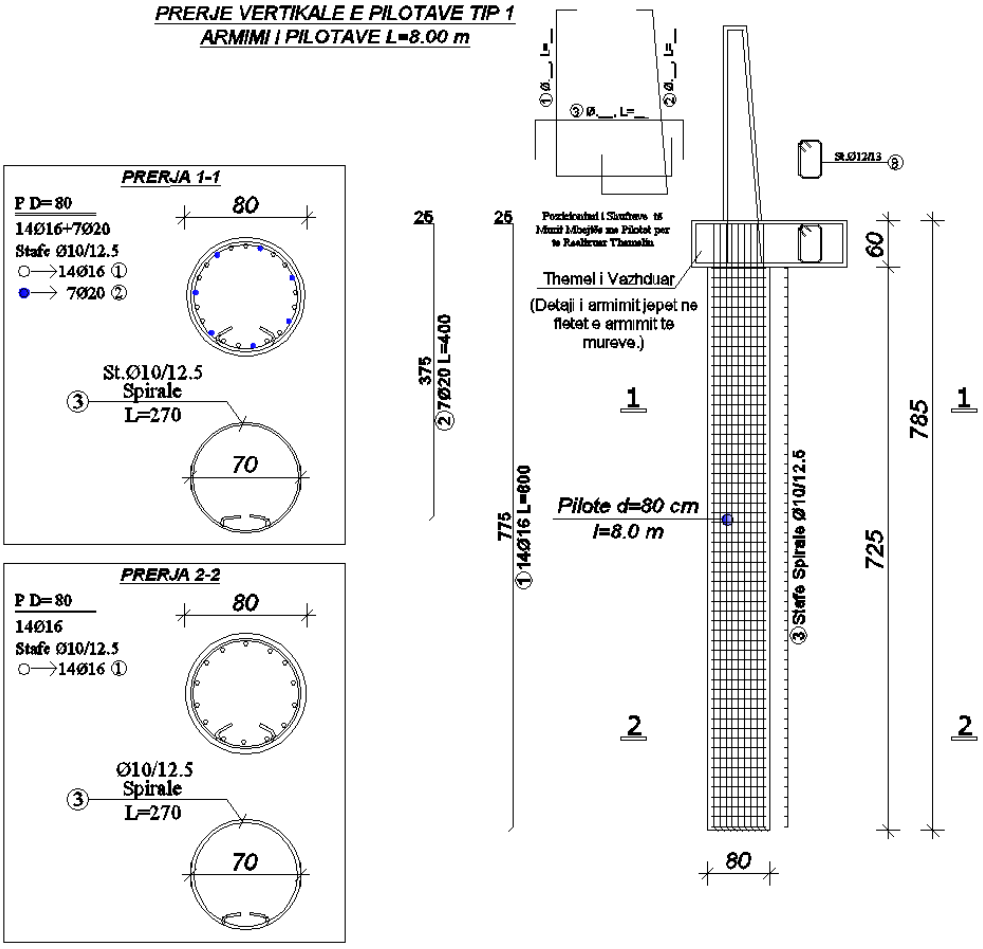
Struktura e llogaritur eshte muri mbajtes ne rrugen “Rexhekri”, Fshati Surrel Nj.Adm. Dajt. ***Analiza statike*** dhe dinamike per te percaktuar reagimin e struktures ndaj tipeve te ndryshme te ngarkimit te struktures eshte kryer me programin ***GEOSTRUCTURAL ANALYSIS GEO5.*** Struktura eshte konceptuar si mur mbajtes me pilota i ndare ne 6 zona me lartesi te ndryshme.

No.	Gjatesi [m]	Lartesi mbi Nivelin e Rruges [m]	Koordinatat e Fillimit te Aksit te Themelit
1	40.00	2.00	X: 407822.056, Y: 4575543.36
2	48.00	2.50	X: 407850.451, Y: 4575571.901
3	40.00	3.00	X: 407878.573, Y: 4575611.096
4	50.00	6.00	X: 407893.609, Y: 4575648.298
5	50.00	5.10	X: 407920.393, Y: 4575690.558
6	40.00	6.00	X: 407947.928, Y: 4575732.408

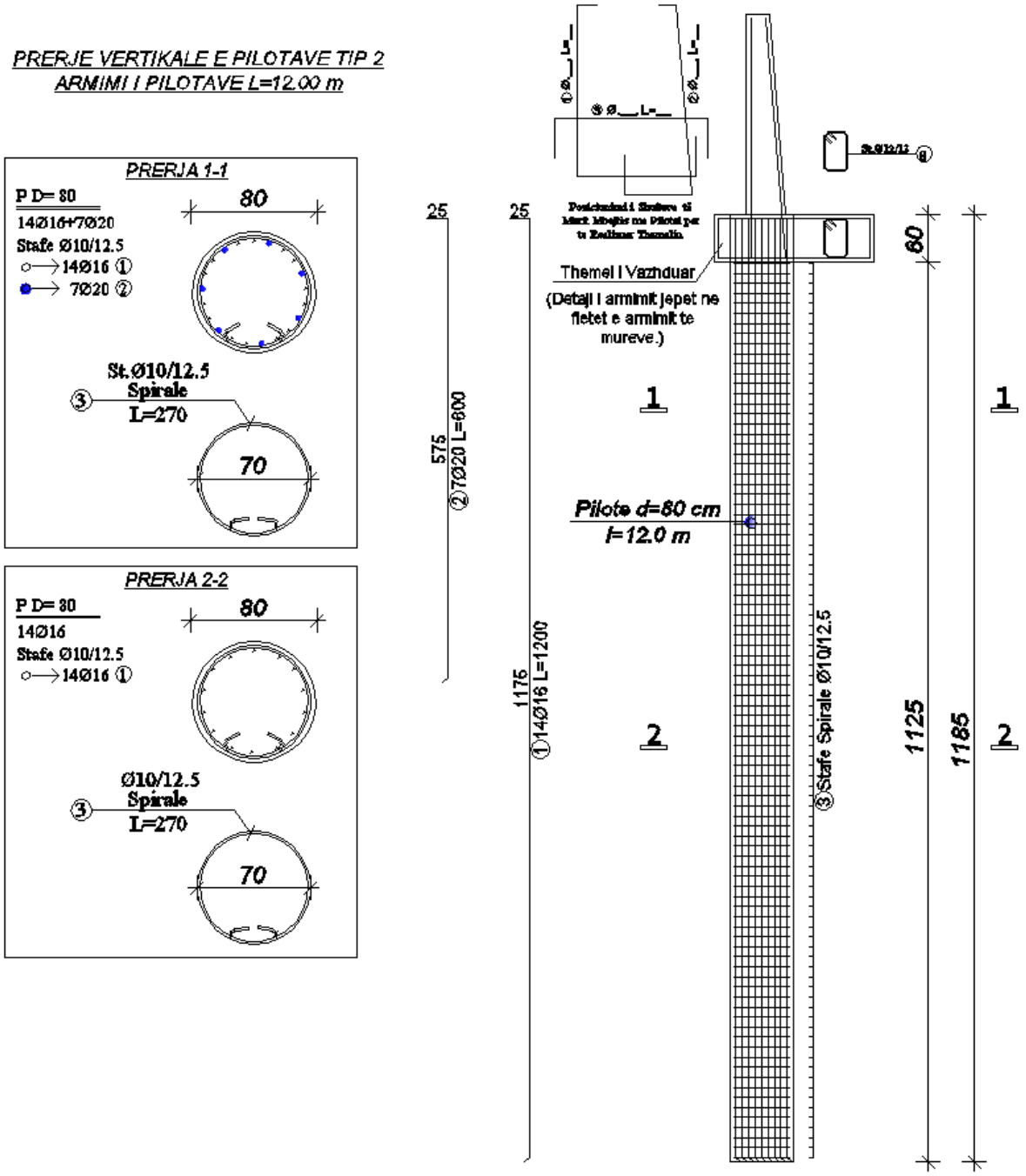


Zonat 1, 2 dhe 3 jane projektuar me pilota Ø800, L=8.0 ml qe i perkasin zones se rreshqitjeve te vogla, ndersa zonat 4, 5 dhe 6 te rreshqitjeve te medha jane projektuar me pilota Ø800, L=12.0 ml.





- Pilota Tipi 1, Ø800, L=8.0 ml



- Pilota Tipi 2, Ø800, L=8.0 ml

- ***PIKETIMI DHE VENDOSJA E AKSIT TE PILOTAVE***

· Te kushtohet rendesi e vecante saktesise se piketimit te tij, si persa i perket vertikalitetit ashtu dhe pozicionimit ne plan, pasi kjo perben orientimin baze per realizimin e pilotave.
· Para fillimit te punimeve te verifikohet vendosja dhe kuotimi i projektit te dhene me arkitekturen.
· Te azhornohen dhe menjanohen te gjitha linjat ekzistuese elektrik - ujesjelles - kanalizime - telekom.
· Kontraktori i punimeve duhet t'i raportojë menjëherë Projektuesve çdo rrethanë e cila sugjeron se sipas opinionit të tij, kushtet e tokës ndryshojnë nga ato që janë raportuar në Raportin Gjeologo Inxhinierik.
· Piketimi i Pilotave realizohet nga Kontraktori i punimeve. Perpara realizimit te cdo pilote Kontraktori i punimeve duhet te kontrolloje pozicionin e vendosjes ne plan te saj.
· Llogaritja, dimensionimi dhe projektimi i pilotave, eshte bere duke u bazuar mbi Studimin e Raportit Gjeologo Inxhinierik.

- ***BETONIMI I PILOTAVE DHE SPECIFIKIME TEKNIKE***

· Betonimi i pilotave duhet te behet i panderprere.
· Kontraktori duhet të marrë të gjitha masat paraprake në projektimin e recetës dhe hedhjen e betonit për të shmangur lidhjen e betonit me kemishat provizore te diafragmave si edhe per te garantuar qe betoni i hedhur nuk do te ndotet nga dheu, ose materiale te tjere te huaj .
· Konsistenca e betonit duhet të jetë në përputhje me specifikimet qe shenohen ne projekt dhe metoda e derdhjes se betonit duhet të jetë e tillë që të arrihet prerja tërthore e specifikuar prej betoni monolit ne te gjithe gjatesine e diafragmes.
· Betoni do të jetë vetë-kompaktesues pasi nuk do te perdoren vibratore per ngjeshjen e tij.
· Kontraktori duhet te marri te gjitha masat per te garantuar qe aftesia mbajtese e betonit te murit (marka e betonit) nuk demtohet nga humbja e lengut te cimentos apo ndarja e elementeve te ngurte te betonit.
· Metoda e derdhjes së betonit duhet të jetë e tillë që të sigurojë që betoni në pozicionin e tij përfundimtar të jetë i dendur dhe homogjen. Betoni duhet të hidhet në panelin e murit nëpërmjet një hinke me një tub derdhës me një ngurtësi dhe gjatësi të përshatshme për të siguruar që betoni të bjerë vertikalisht dhe në qendër te gropes se panelit te diafragmes. Hedhja e betonit te behet ne menyre te tille qe ai mos te godase faqet e hekurit ose te dheut.
· Tubi duhet të ketë një gjatësi të mjaftueshme për t'u siguruar që betoni bie lirshëm, fillimi i betonimit bëhet duke mbajtur gryken e derdhjes 50 cm lart fundit të gërmimit.
· Tubat e betonimit duhet te jene te paster, betoni duhet te rrjedhe lirshem, diametri i tubit te betonimit duhet te jete jo me i vogel 8 here diametri maksimal i fraksioneve perberes te betonit.
· Gjatë hedhjes duhen bere kontrolle të vazhdueshme te nivelit të betonimit. Tubi shkurtohet gjatë procesit cdo 3m duke u kujdesur që ai të jetë i zhytur në beton dhe mos hyjë bentonit në të.
· Gjatë gjithe kohës së betonimit të një grope duhet të kemi beton të punueshëm dhe të vazhduar, pa ndërprerje.

- ***FORMIMI I LIDHJEVE***

· Për formimin e lidhjeve përdoren kemisha të cilat para se të vendosen duhet të jenë të pastruara dhe pa deformime.
· Ato duhet te jenë rigjide në mënyrë që mos deformohen gjatë betonimit.
· Nxjerrja e kemishave bëhet e tille që mos të dëmtojë faqet e betonimit ne kontakt.
· Formimi i lidhjes dhe kemisha duhet të jenë të tilla që të lejojnë paisjen e gërmimit te heqë materialin në faqe të tij.

- ***BETONI***

· Betoni i pilotave b/a duhet të ketë klasë fortësie C 25/30 fck ,cube =25 N/mm2.
· Përbërja e betonit në lidhje me materialet dhe raportet e lejuara të recetës do të jenë në përputhje me kërkesat e ENV 1332-1.
· Përmbajtja e çimentos në betonin strukturor nuk do të jetë më pak se 300 kg/m3
· Raporti maksimal i ujit të palidhur/çimento nuk duhet ta kalojë vlerën 0.55 për betonin strukturor.
· Përmasa maksimale e fraksionit agregat nuk duhet të kalojë 20 mm.
· Betoni do të ketë një konsistencë të mjaftueshme për të lejuar hedhjen dhe ngjeshjen nëpërmjet metodave të përdorura në formimin e diafragmes, por pa largim të tepërt të lëngut të çimentos. Një klasë konsistence 4 ose 5 (konus 18-22cm) është e rekomanduar.
· Të gjithë përbërësit, qe permbahen ne recetën e betonit shtohen/hidhennë nyjen e betonit. Nuk lejohet te shtohet uje ose material tjeter shtese ne kantjer.

- ARMATURA E CELIKUT

· Çeliku i armimit duhet të jetë S500 me nivel të nderjes së normuar në rrjedhshmëri prej 500N/mm2 dhe zgjatim relativ karakteristik Brenda kushteve te lejuara per keto lloj strukturash.
· Çeliku i armimit duhet të depozitohet në kushte të pastra. Ai duhet të jetë I pastër dhe pa skorje korodimi në momentin e fiksimit në pozicion dhe betonimit të mëtejshëm.
· Hekuri i armimit do të jetë në përputhje me EN 1538
· Hekuri duhet të ruajë pozicionin e tij të saktë ne vertikalitet gjatë betonimit të diafragmës, për të lejuar një tolerancë vertikale prej +150/-50mm (dmth. një maksimum prej 300mm) mbi nivelin e armimit i cili del mbi ndërprerjen përfundimtare të panelit te murit.

- ***KONTROLLI- MONITORIMI***

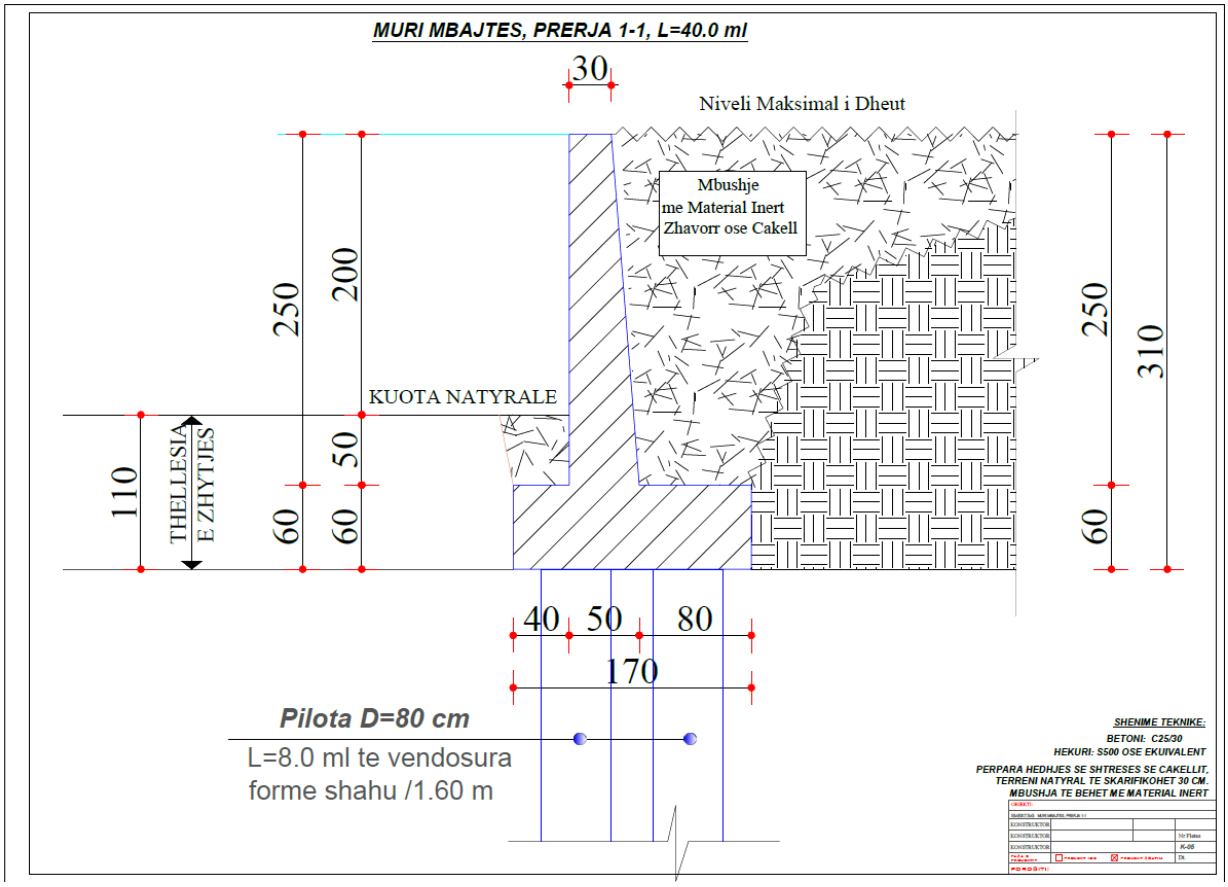
· Gjate gjithe proceseve te punimeve te zbatohen rregullat nacionale ne fuqi dhe ato te rekomanduara ne eurocode EN 1538: 2003.

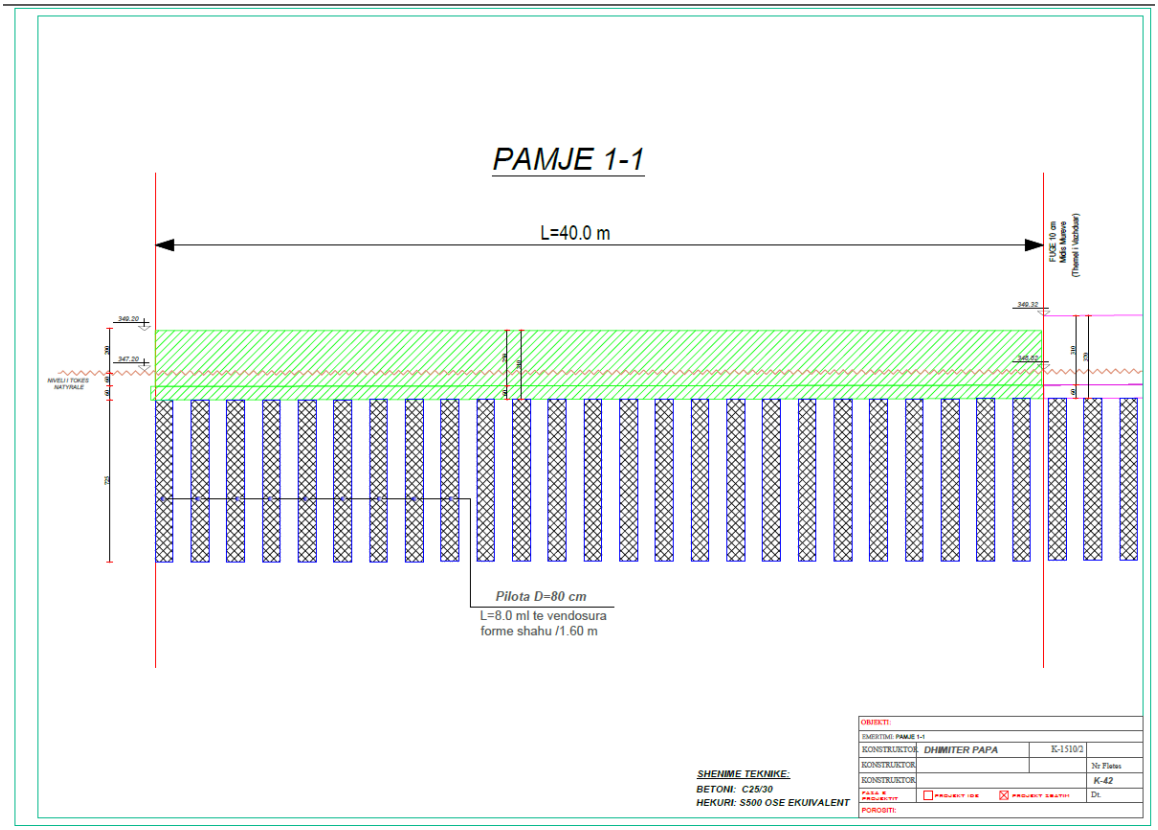
Cantilever wall analysis

Input data

Project

Task : Muret Mbajtese - SURREL
Part : Projekti i Perforcimit te Skarpates
Description : Muri Mbajtes - Prerja 1 - 1
Author : Dhimitri PAPA


MURI MBAJTES, PRERJA 1-1, L=40.0 ml
30
Niveli Maksimal i Dheut
Mbushje
me Material Inert
Zhavorr ose Cakell
250
200
KUOTA NATYRALE
110
THELLESIA
E ZHYTJES
50
60
60
250
310
60
40
50
80
170
Pilota D=80 cm
L=8.0 ml te vendosura
forme shahu /1.60 m
SHENIME TEKNIKE:
BETONI: C25/30
HEKURI: S500 OSE EKUIVALENT
PERPARA HEDHJES SE SHTRESES SE CAKELLIT,
TERRENI NATYRAL TE SKARIFIKOHET 30 CM.
MBUSHJA TE BEHET ME MATERIAL INERT


PAMJE 1-1
L=40.0 m
Pilota D=80 cm
L=8.0 ml te vendosura
forme shahu /1.60 m
SHENIME TEKNIKE:
BETONI: C25/30
HEKURI: S500 OSE EKUIVALENT
DHIMITER PAPA
K-1510/2
K-42

Settings

Standard - EN 1997 - DA3 (2)

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard

Wall analysis

Active earth pressure calculation : Coulomb
Passive earth pressure calculation : Caquot-Kerisel
Earthquake analysis : Mononobe-Okabe
Shape of earth wedge : Calculate as skew
Base key : The base key is considered as inclined footing bottom
Allowable eccentricity : 0.333
Verification methodology : according to EN 1997
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)									
Permanent design situation									
		State STR				State GEO			
		Unfavourable		Favourable		Unfavourable		Favourable	
Permanent actions :	γ_G =	1.35	[–]	1.00	[–]	1.00	[–]	1.00	[–]
Variable actions :	γ_Q =	1.50	[–]	0.00	[–]	1.30	[–]	0.00	[–]
Water load :	γ_w =					1.00	[–]		

Partial factors for soil parameters (M)			
Permanent design situation			
Partial factor on internal friction :	γ_ϕ =	1.25	[–]
Partial factor on effective cohesion :	γ_c =	1.25	[–]
Partial factor on undrained shear strength :	γ_{cu} =	1.40	[–]
Partial factor on Poisson's ratio :	γ_v =	1.00	[–]

Partial factors for variable actions			
Permanent design situation			
Factor for combination value :	ψ_0 =	0.70	[–]
Factor for frequent value :	ψ_1 =	0.50	[–]
Factor for quasi-permanent value :	ψ_2 =	0.30	[–]

Material of structure

Unit weight γ = 23.56 kN/m^3
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete : C 25/30
Cylinder compressive strength f_{ck} = 25.00 MPa
Tensile strength f_{ctm} = 2.60 MPa

Longitudinal steel : B500
Yield strength f_{yk} = 500.00 MPa

Geometry of structure

No.	Coordinate X [m]	Depth Z [m]
1	0.00	0.00
2	0.20	2.50

3	1.00	2.50
4	1.00	3.10
5	-0.70	3.10
6	-0.70	2.50
7	-0.30	2.50
8	-0.30	0.00

The origin [0,0] is located at the most upper right point of the wall.
Wall section area = 2.02 m².

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
1	Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm		14.00	25.00	19.00	10.00	12.00
2	Shtresa Nr.2 - Sandy clay (CS), consistency firm		21.00	50.00	21.00	12.00	12.00
3	Shtrsa Nr.3 - Sandy clay (CS), consistency firm		26.00	80.00	21.00	12.00	12.00

Soil parameters to compute pressure at rest

No.	Name	Pattern	Type calculation	φ_{ef} [°]	ν [–]	OCR [–]	K_r [–]
1	Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm		cohesive	-	0.40	-	-
2	Shtresa Nr.2 - Sandy clay (CS), consistency firm		cohesive	-	0.35	-	-
3	Shtrsa Nr.3 - Sandy clay (CS), consistency firm		cohesive	-	0.35	-	-

Soil parameters

Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm

Unit weight : $\gamma = 19.00$ kN/m³
Stress-state : effective
Angle of internal friction : $\varphi_{ef} = 14.00$ °
Cohesion of soil : $c_{ef} = 25.00$ kPa
Angle of friction struc.-soil : $\delta = 12.00$ °
Soil : cohesive
Poisson's ratio : $\nu = 0.40$
Saturated unit weight : $\gamma_{sat} = 20.00$ kN/m³

Shtresa Nr.2 - Sandy clay (CS), consistency firm

Unit weight : $\gamma = 21.00$ kN/m³
Stress-state : effective
Angle of internal friction : $\varphi_{ef} = 21.00$ °
Cohesion of soil : $c_{ef} = 50.00$ kPa
Angle of friction struc.-soil : $\delta = 12.00$ °
Soil : cohesive
Poisson's ratio : $\nu = 0.35$
Saturated unit weight : $\gamma_{sat} = 22.00$ kN/m³

Shtrsa Nr.3 - Sandy clay (CS), consistency firm

Unit weight : γ = 21.00 kN/m^3
Stress-state : effective
Angle of internal friction : φ_{ef} = 26.00 °
Cohesion of soil : c_{ef} = 80.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γ_{sat} = 22.00 kN/m^3

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	3.00	Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm	
2	2.00	Shtresa Nr.2 - Sandy clay (CS), consistency firm	
3	5.00	Shtrsa Nr.3 - Sandy clay (CS), consistency firm	
4	-	Shtrsa Nr.3 - Sandy clay (CS), consistency firm	

Foundation

Type of foundation : soil from geological profile

Terrain profile

Terrain behind construction has the slope 1: 5.00 (slope angle is 11.31 °).

Water influence

GWT behind the structure lies at a depth of 1.50 m
Uplift in foot. bottom due to different pressures is not considered.

Input surface surcharges

No.	Surcharge		Action	Mag.1 [kN/m^2]	Mag.2 [kN/m^2]	Ord.x x [m]	Length l [m]	Depth z [m]
	new	change						
1	YES		permanent	10.00				on terrain

No.	Name
1	G

Resistance on front face of the structure

Resistance on front face of the structure: passive
Soil on front face of the structure - Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
Angle of friction struc.-soil δ = 0.00 °
Soil thickness in front of structure h = 1.00 m

Terrain in front of structure is flat.

Earthquake

Factor of horizontal acceleration K_h = 0.0260
Factor of vertical acceleration K_v = 0.0170

Water below the GWT is restricted.

Settings of the stage of construction

Design situation : permanent
The wall is free to move. Active earth pressure is therefore assumed.

Verification No. 1

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. overtur.	Coeff. sliding	Coeff. stress
Weight - wall	0.00	-1.02	47.60	0.73	1.000	1.000	1.350
Earthq.- constr.	1.24	-1.02	-0.81	0.73	1.000	1.000	1.000
FF resistance	-63.11	-0.46	0.08	0.20	1.000	1.000	1.000
Earthq.- face	0.31	-0.67	0.00	0.40	1.000	1.000	1.000
Weight - earth wedge	0.00	-1.83	18.97	1.07	1.000	1.000	1.000
Earthquake - soil wedge	0.66	-1.64	-0.43	1.10	1.000	1.000	1.000
Active pressure	17.68	-0.92	7.95	1.57	1.000	1.000	1.000
Water pressure	12.80	-0.53	0.40	1.60	1.000	1.000	1.000
Uplift pressure	0.00	-3.10	0.00	0.70	1.000	1.000	1.000
Earthq.- act.pressure	13.46	-2.12	6.95	1.24	1.000	1.000	1.000
G	22.11	-1.18	15.39	1.34	1.000	1.000	1.000
G	0.00	-3.12	2.42	0.82	1.000	1.000	1.000

Verification of complete wall

Check for overturning stability
Resisting moment M_{res} = 98.22 kNm/m
Overturning moment M_{ovr} = 51.10 kNm/m

Wall for overturning is SATISFACTORY

Check for slip
Resisting horizontal force H_{res} = 68.52 kN/m
Active horizontal force H_{act} = 5.14 kN/m

Wall for slip is SATISFACTORY

Overall check - WALL is SATISFACTORY

Maximum stress in footing bottom : 111.92 kPa
Warning - allowable range of input data exceeded during earthquake analysis!
The analysis is carried out with the modified value of terrain inclination β.

Bearing capacity of foundation soil

Design load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]	Eccentricity [–]	Stress [kPa]
1	38.64	115.17	5.14	0.197	111.92
2	36.61	98.51	5.14	0.219	102.96

Service load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	-11.61	86.54	-47.86

Dimensioning No. 1

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Weight - wall	0.00	-1.02	47.60	0.73	1.350
Earthq.- constr.	1.24	-1.02	-0.81	0.73	1.000
FF resistance	-63.11	-0.46	0.08	0.20	1.000
Earthq.- face	0.31	-0.67	0.00	0.40	1.000
Weight - earth wedge	0.00	-1.83	18.97	1.07	1.000
Earthquake - soil wedge	0.66	-1.64	-0.43	1.10	1.000
Active pressure	17.68	-0.92	7.95	1.57	1.000
Water pressure	12.80	-0.53	0.40	1.60	1.000
Uplift pressure	0.00	-3.10	0.00	0.70	1.000
Earthq.- act.pressure	13.46	-2.12	6.95	1.24	1.000
G	22.11	-1.18	15.39	1.34	1.000
G	0.00	-3.12	2.42	0.82	1.000

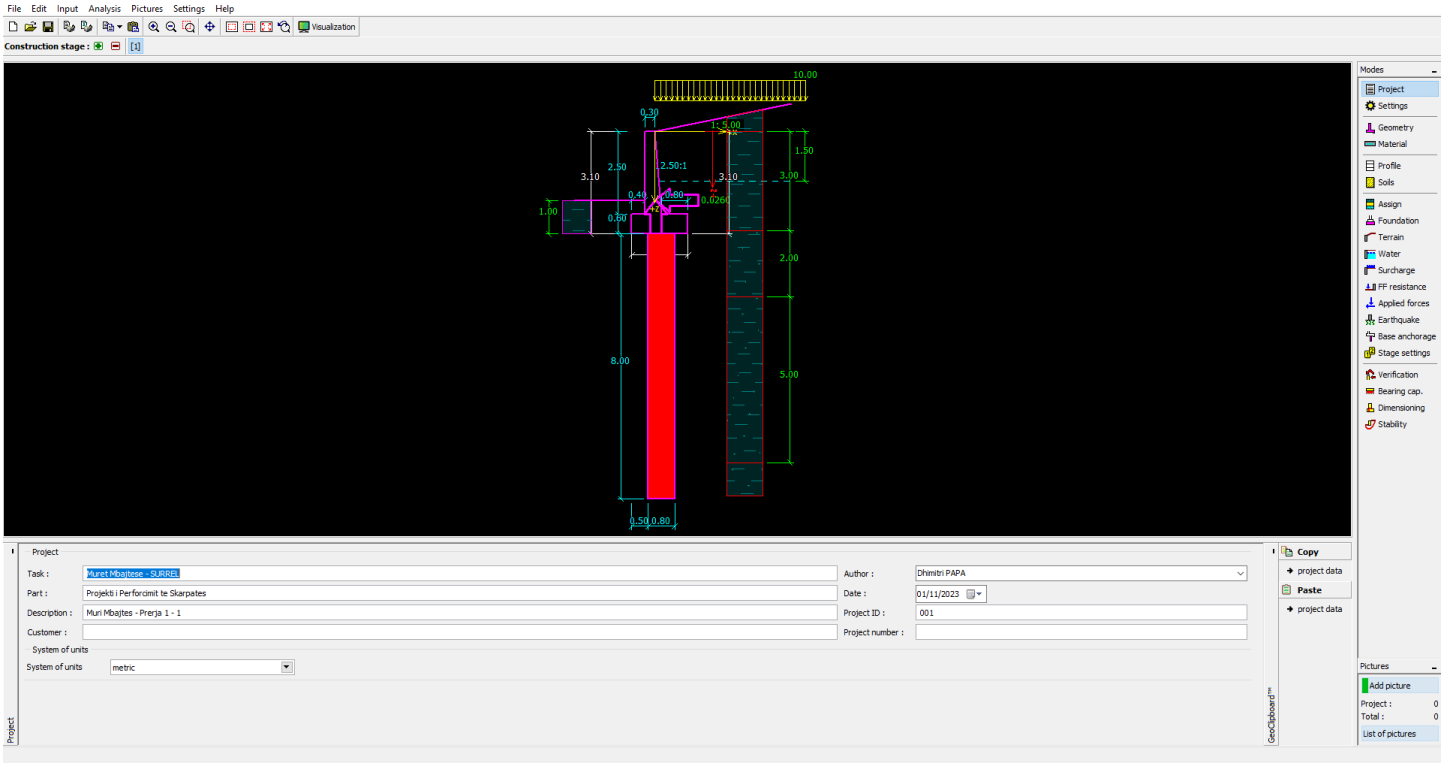
Front wall jump check

Reinforcement and dimensions of the cross-section

Bar diameter = 12.0 mm
Number of bars = 8
Reinforcement cover = 50.0 mm
Cross-section width = 1.00 m
Cross-section depth = 0.60 m

Reinforcement ratio	ρ	=	0.17	%	>	0.14	%	=	ρ_{min}
Position of neutral axis	x	=	0.03	m	<	0.34	m	=	x_{max}
Ultimate shear force	V_{Rd}	=	194.13	kN	>	51.96	kN	=	V_{Ed}
Ultimate moment	M_{Rd}	=	209.36	kNm	>	10.91	kNm	=	M_{Ed}

Cross-section is SATISFACTORY.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Visualization
Construction stage :
10.00
0.30
1.50
2.50
3.10
2.50:1
3.10
1.50
3.00
0.40
0.80
0.026
1.00
0.60
2.00
8.00
5.00
0.50 0.80
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Project
Task :
Muret Mbajtese - SURREL
Author :
Dhimitri PAPA
Part :
Projekti i Perforcimit te Skarpates
Date :
01/11/2023
Description :
Muri Mbajtes - Prerja 1 - 1
Project ID :
001
Customer :
Project number :
System of units
System of units
metric
Copy
project data
Paste
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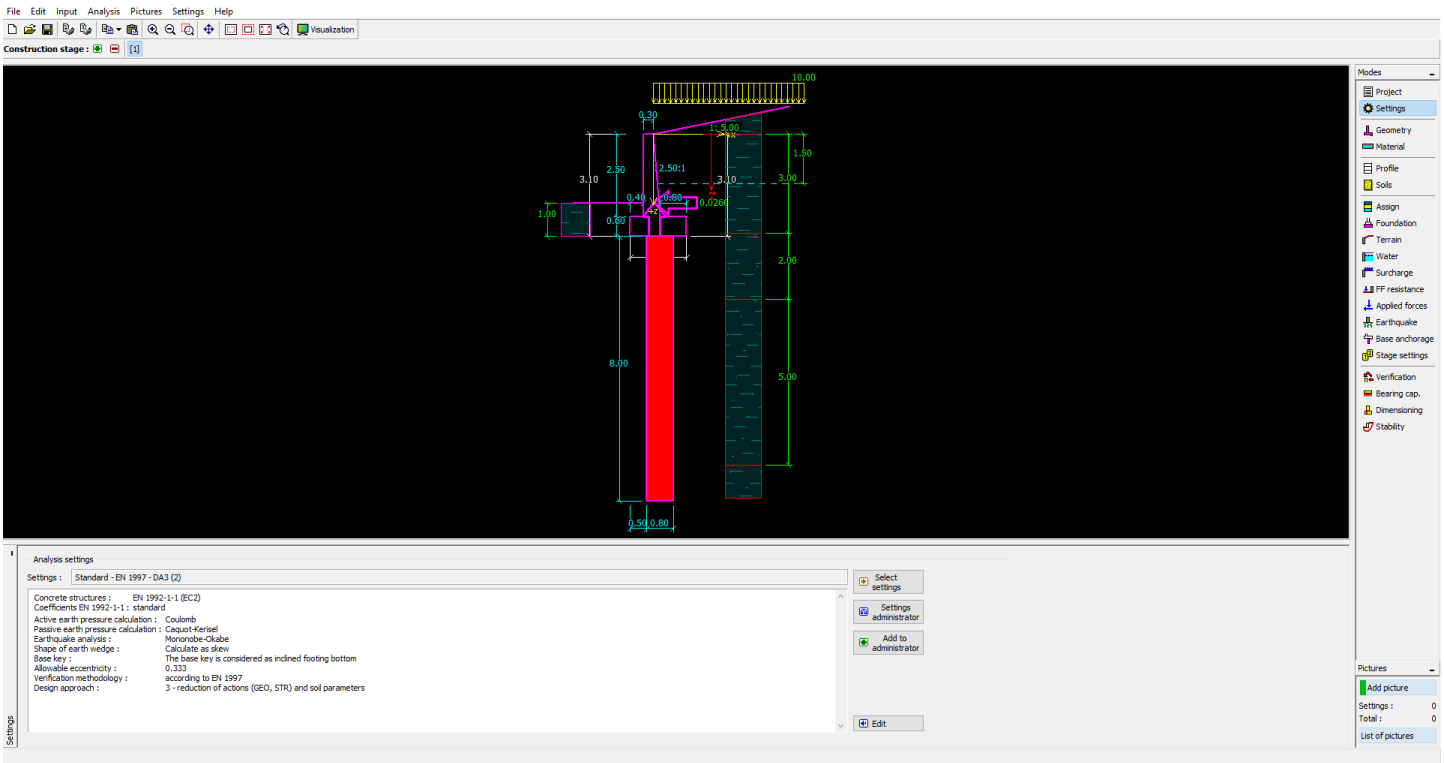
Pictures
Add picture
Project : 0
Total : 0
List of pictures
GeoClipboard™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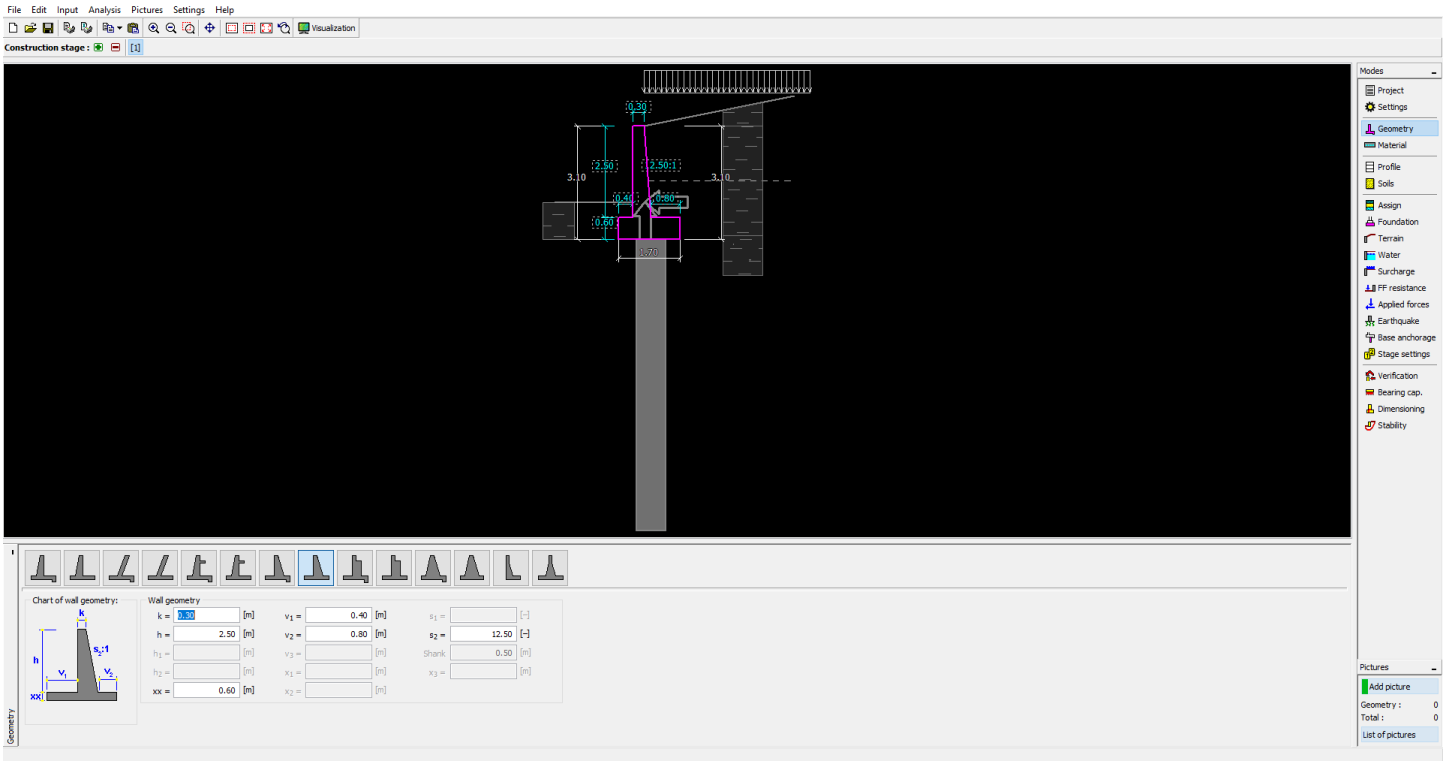
Visualization
Construction stage :
10.00
0.30
1.50
2.50
3.10
2.50:1
3.10
1.50
3.00
0.40
0.80
0.026
1.00
0.60
2.00
8.00
5.00
0.50 0.80
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Analysis settings
Settings :
Standard - EN 1997 - DA3 (2)
Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard
Active earth pressure calculation : Coulomb
Passive earth pressure calculation : Caquot-Kerisel
Earthquake analysis : Mononobe-Okabe
Shape of earth wedge : Calculate as skew
Base key : The base key is considered as inclined footing bottom
Allowable eccentricity : 0.333
Verification methodology : according to EN 1997
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters
Select settings
Settings administrator
Add to administrator
Edit
Pictures
Add picture
Settings : 0
Total : 0
List of pictures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Visualization
Construction stage :
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of wall geometry:
Wall geometry
Pictures
Add picture
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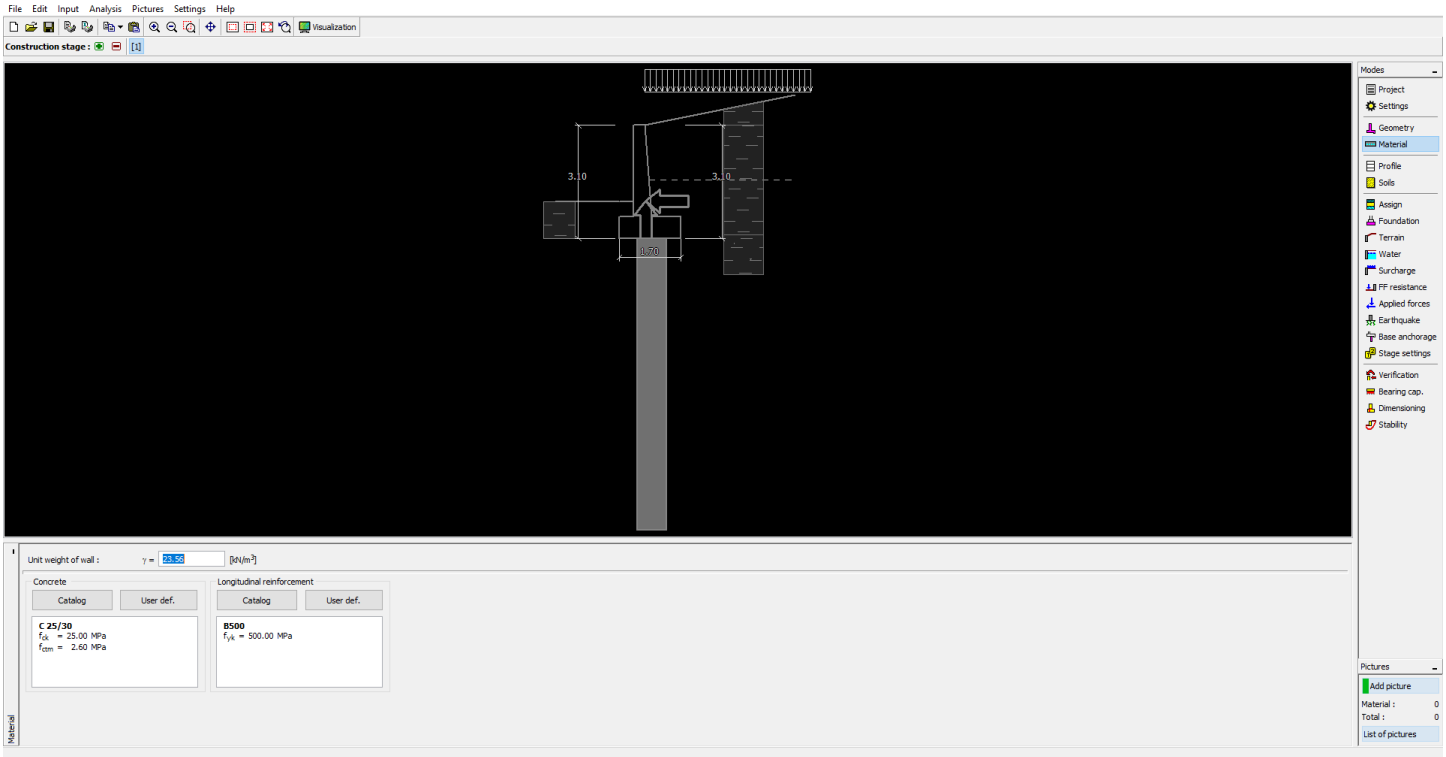
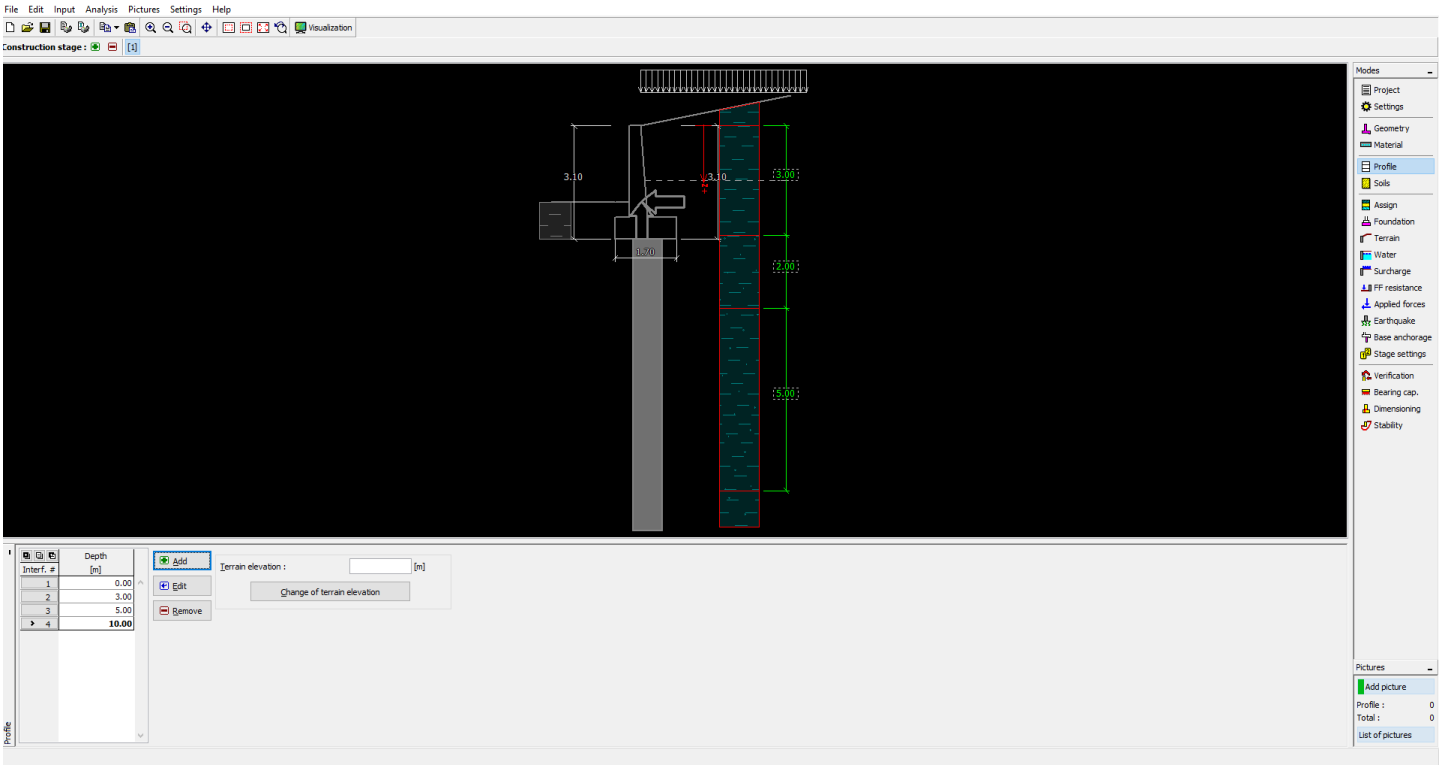
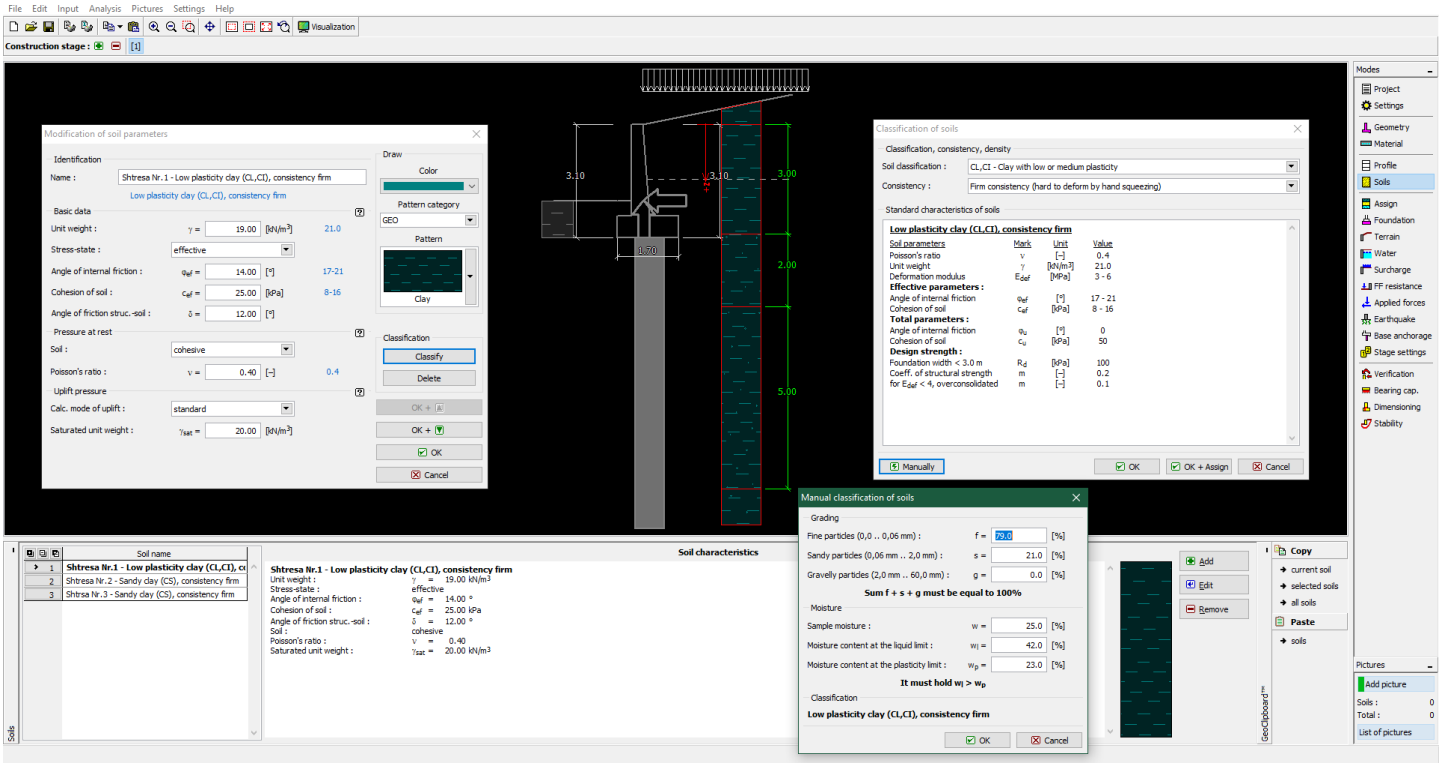
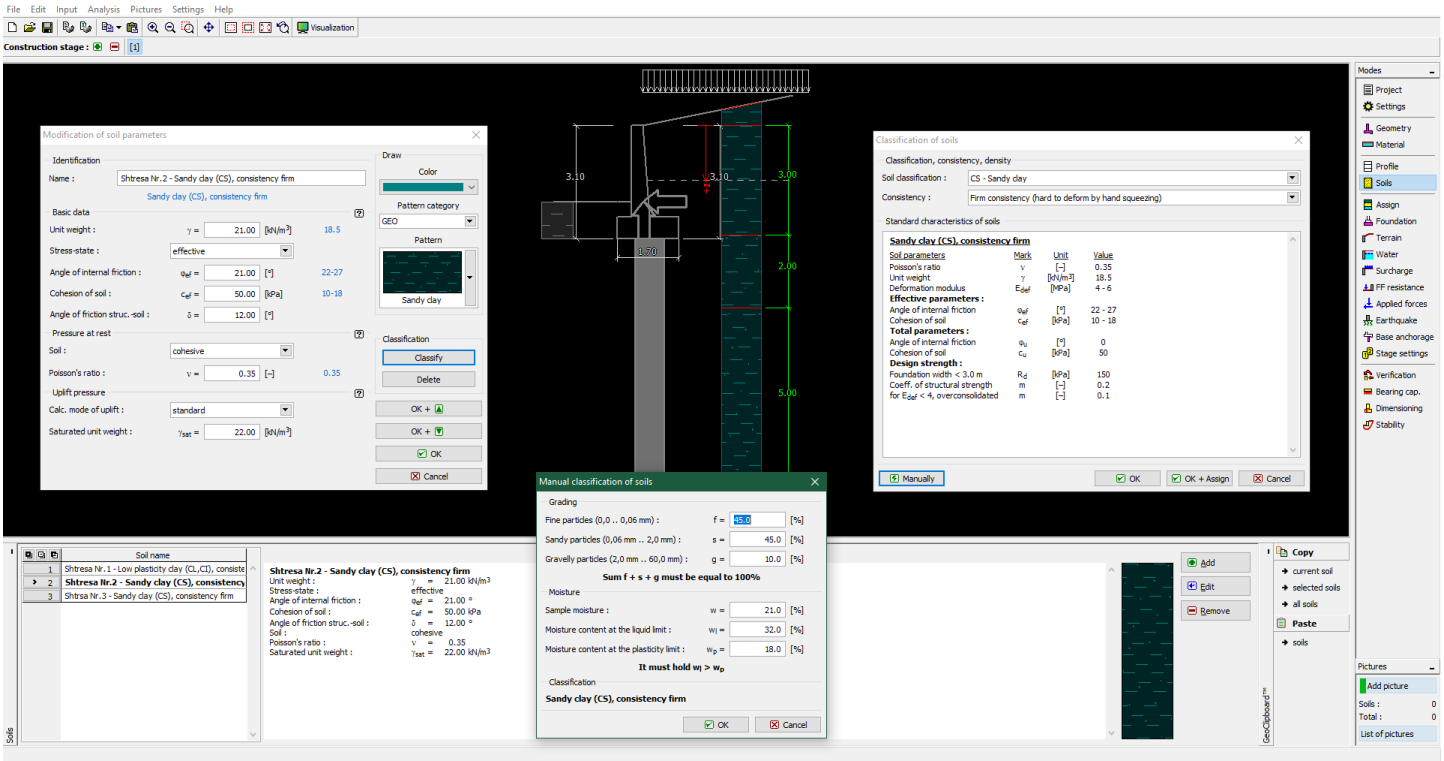
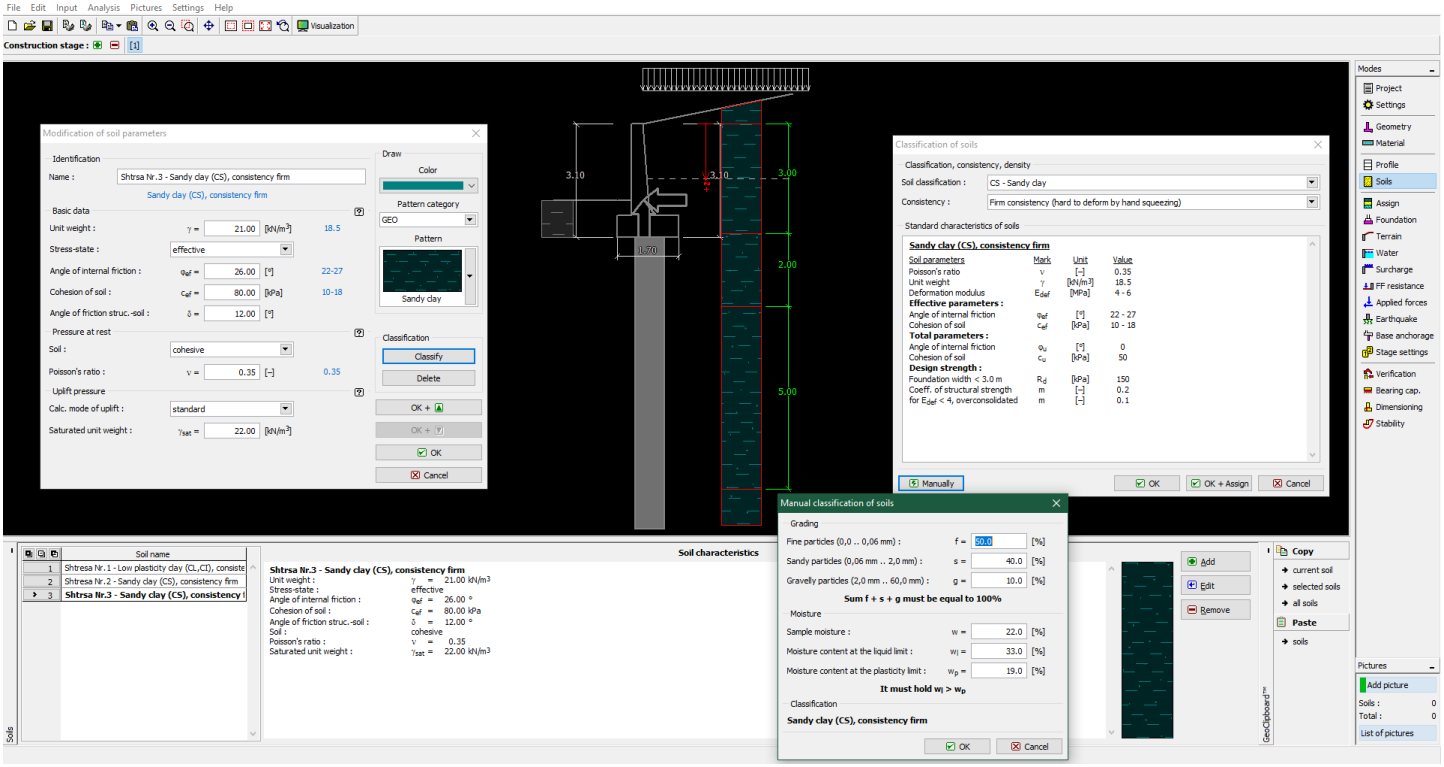
Total : 0
List of pictures

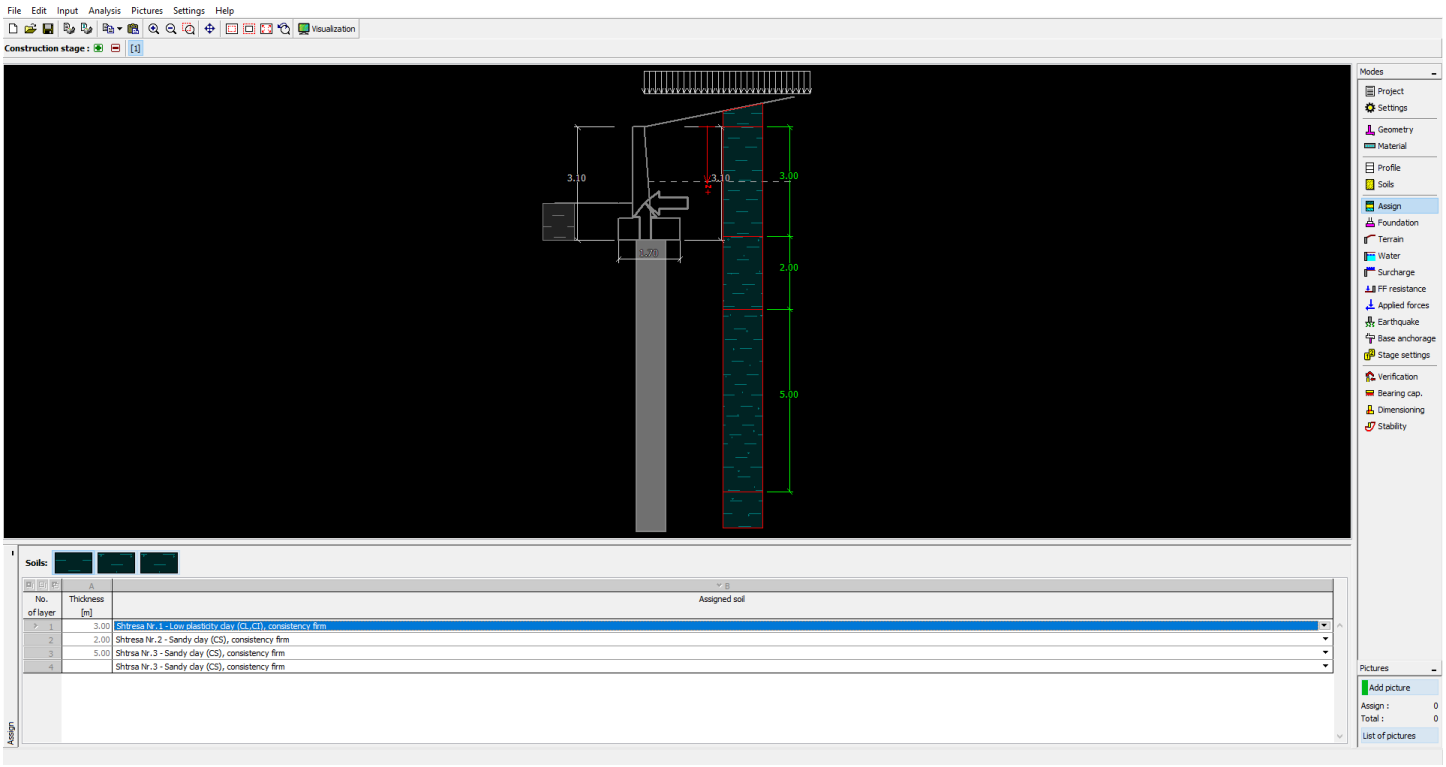

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Unit weight of wall :
Concrete
Catalog
User def.
C 25/30
Longitudinal reinforcement
B500
Pictures
Add picture
Material : 0
Total : 0
List of pictures


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
3.10
3.10
3.00
1.70
2.00
5.00
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Profile : 0
Total : 0
List of pictures
Depth
Interf. # [m]
1 0.00
2 3.00
3 5.00
4 10.00
Add
Edit
Remove
Terrain elevation : [m]
Change of terrain elevation
Profile

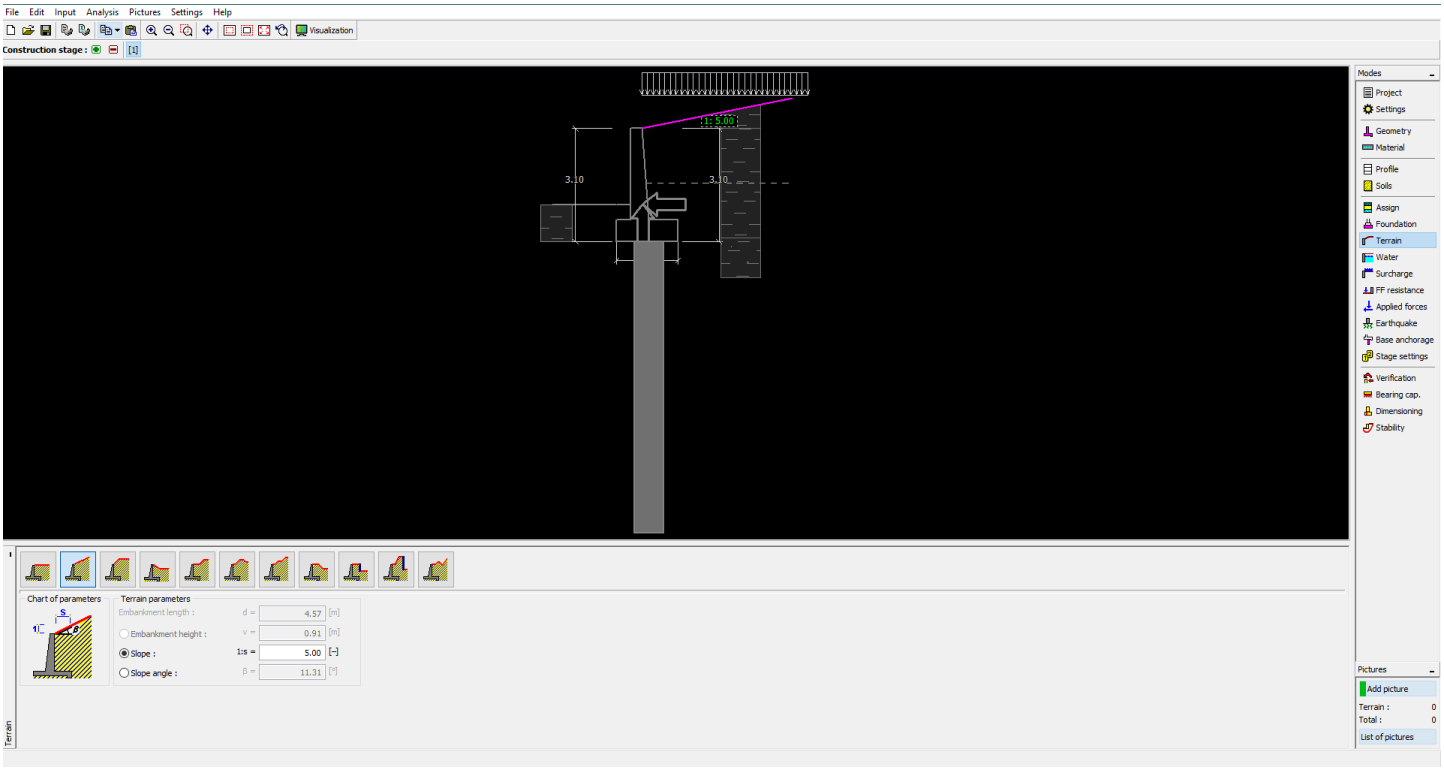

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
Modification of soil parameters
Identification
Name : Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
Low plasticity clay (CL,CI), consistency firm
Basic data
Unit weight : γ = 19.00 [kN/m³] 21.0
Stress-state : effective
Angle of internal friction : φef = 14.00 [°] 17-21
Cohesion of soil : cef = 25.00 [kPa] 8-16
Angle of friction struc.-soil : δ = 12.00 [°]
Pressure at rest
Soil : cohesive
Poisson's ratio : ν = 0.40 [-] 0.4
Uplift pressure
Calc. mode of uplift : standard
Saturated unit weight : γsat = 20.00 [kN/m³]
Draw
Color
Pattern category
GEO
Pattern
Clay
Classification
Classify
Delete
OK + Ai
OK + Vi
OK
Cancel
3.10
3.10
3.00
1.70
2.00
5.00
Classification of soils
Classification, consistency, density
Soil classification : CL,CI - Clay with low or medium plasticity
Consistency : Firm consistency (hard to deform by hand squeezing)
Standard characteristics of soils
Low plasticity clay (CL,CI), consistency firm
Soil parameters Mark Unit Value
Poisson's ratio ν [-] 0.4
Unit weight γ [kN/m³] 21.0
Deformation modulus Edef [MPa] 3 - 6
Effective parameters :
Angle of internal friction φef [°] 17 - 21
Cohesion of soil cef [kPa] 8 - 16
Total parameters :
Angle of internal friction φu [°] 0
Cohesion of soil cu [kPa] 50
Design strength :
Foundation width < 3.0 m Rd [kPa] 100
Coeff. of structural strength m [-] 0.2
for Edef < 4, overconsolidated m [-] 0.1
Manually
OK
OK + Assign
Cancel
Manual classification of soils
Grading
Fine particles (0,0 .. 0,06 mm) : f = 79.0 [%]
Sandy particles (0,06 mm .. 2,0 mm) : s = 21.0 [%]
Gravelly particles (2,0 mm .. 60,0 mm) : g = 0.0 [%]
Sum f + s + g must be equal to 100%
Moisture
Sample moisture : w = 25.0 [%]
Moisture content at the liquid limit : wl = 42.0 [%]
Moisture content at the plasticity limit : wp = 23.0 [%]
It must hold wl > wp
Classification
Low plasticity clay (CL,CI), consistency firm
OK
Cancel
Soil name
1 Shtresa Nr.1 - Low plasticity clay (CL,CI), cl
2 Shtresa Nr.2 - Sandy clay (CS), consistency firm
3 Shtresa Nr.3 - Sandy clay (CS), consistency firm
Soil characteristics
Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
Unit weight : γ = 19.00 kN/m³
Stress-state : effective
Angle of internal friction : φef = 14.00 °
Cohesion of soil : cef = 25.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.40
Saturated unit weight : γsat = 20.00 kN/m³
Add
Edit
Remove
Copy
current soil
selected soils
all soils
Paste
soils
GeoClipboard™
Soils
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Soils : 0
Total : 0
List of pictures

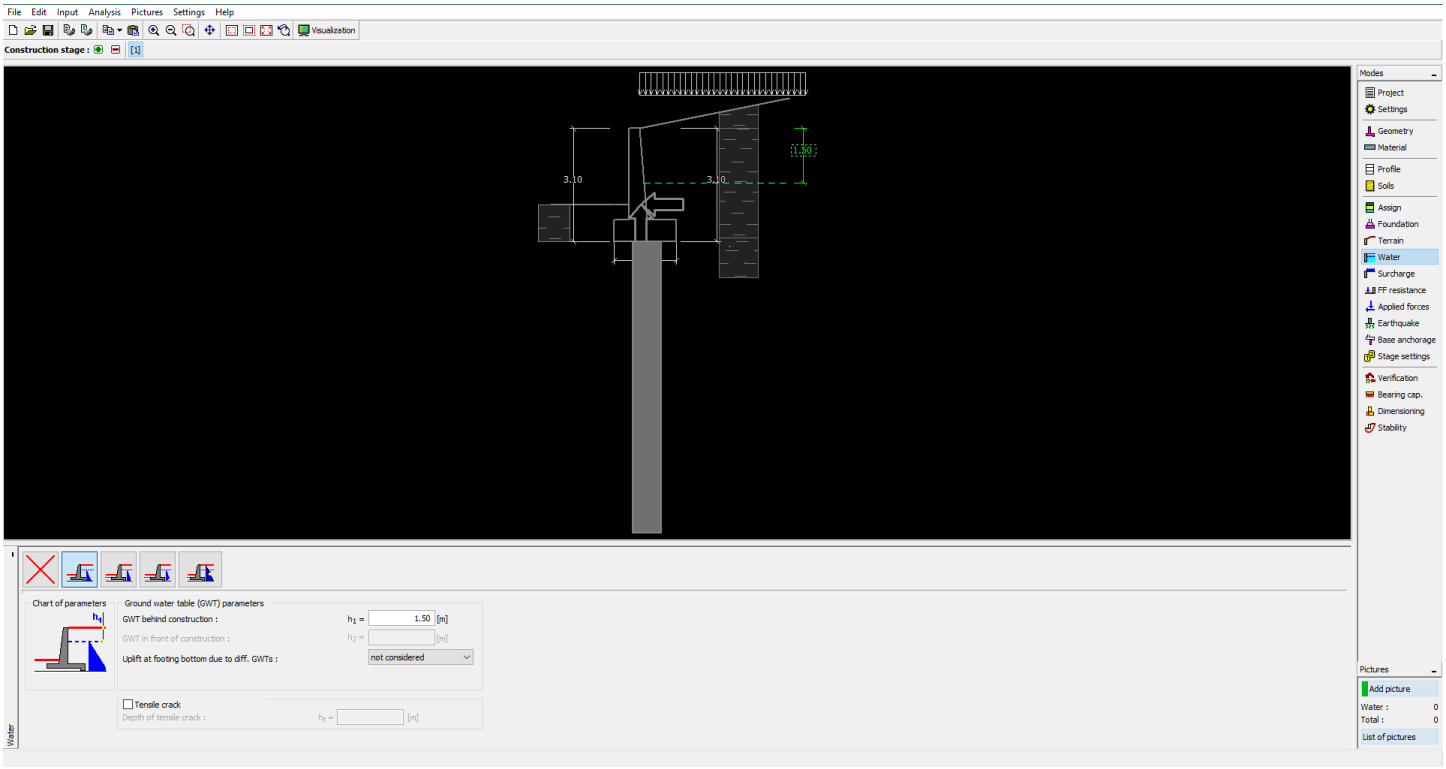

Modification of soil parameters
Identification
Name : Shtresa Nr.2 - Sandy clay (CS), consistency firm
Sandy clay (CS), consistency firm
Basic data
Unit weight : γ = 21.00 [kN/m³] 18.5
Stress-state : effective
Angle of internal friction : φef = 21.00 [°] 22-27
Cohesion of soil : cef = 50.00 [kPa] 10-18
Angle of friction struc.-soil : δ = 12.00 [°]
Pressure at rest
Soil : cohesive
Poisson's ratio : ν = 0.35 [–] 0.35
Uplift pressure
Calc. mode of uplift : standard
Saturated unit weight : γsat = 22.00 [kN/m³]
Draw
Color
Pattern category
GEO
Pattern
Sandy clay
Classification
Classify
Delete
OK + A
OK + V
OK
Cancel
Classification of soils
Classification, consistency, density
Soil classification : CS - Sandy clay
Consistency : Firm consistency (hard to deform by hand squeezing)
Standard characteristics of soils
Sandy clay (CS), consistency firm
Soil parameters Mark Unit Value
Poisson's ratio ν [–] 0.35
Unit weight γ [kN/m³] 18.5
Deformation modulus Edef [MPa] 4 - 6
Effective parameters :
Angle of internal friction φef [°] 22 - 27
Cohesion of soil cef [kPa] 10 - 18
Total parameters :
Angle of internal friction φu [°] 0
Cohesion of soil cu [kPa] 50
Design strength :
Foundation width < 3.0 m Rd [kPa] 150
Coeff. of structural strength m [–] 0.2
for Edef < 4, overconsolidated m [–] 0.1
Manually
OK
OK + Assign
Cancel
Manual classification of soils
Grading
Fine particles (0,0 .. 0,06 mm) : f = 45.0 [%]
Sandy particles (0,06 mm .. 2,0 mm) : s = 45.0 [%]
Gravelly particles (2,0 mm .. 60,0 mm) : g = 10.0 [%]
Sum f + s + g must be equal to 100%
Moisture
Sample moisture : w = 21.0 [%]
Moisture content at the liquid limit : wl = 32.0 [%]
Moisture content at the plasticity limit : wp = 18.0 [%]
It must hold wl > wp
Classification
Sandy clay (CS), consistency firm
OK
Cancel
3.10
3.10
3.00
1.70
2.00
5.00
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Solis : 0
Total : 0
List of pictures
Soil name
1 Shtresa Nr.1 - Low plasticity clay (CL,CI), consiste
2 Shtresa Nr.2 - Sandy clay (CS), consistency
3 Shtresa Nr.3 - Sandy clay (CS), consistency firm
Shtresa Nr.2 - Sandy clay (CS), consistency firm
Unit weight : γ = 21.00 kN/m³
Stress-state : effective
Angle of internal friction : φef = 21.00 °
Cohesion of soil : cef = 50.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γsat = 22.00 kN/m³
Add
Edit
Remove
Copy
current soil
selected soils
all soils
Paste
soils
GeoClipboard™
Solis

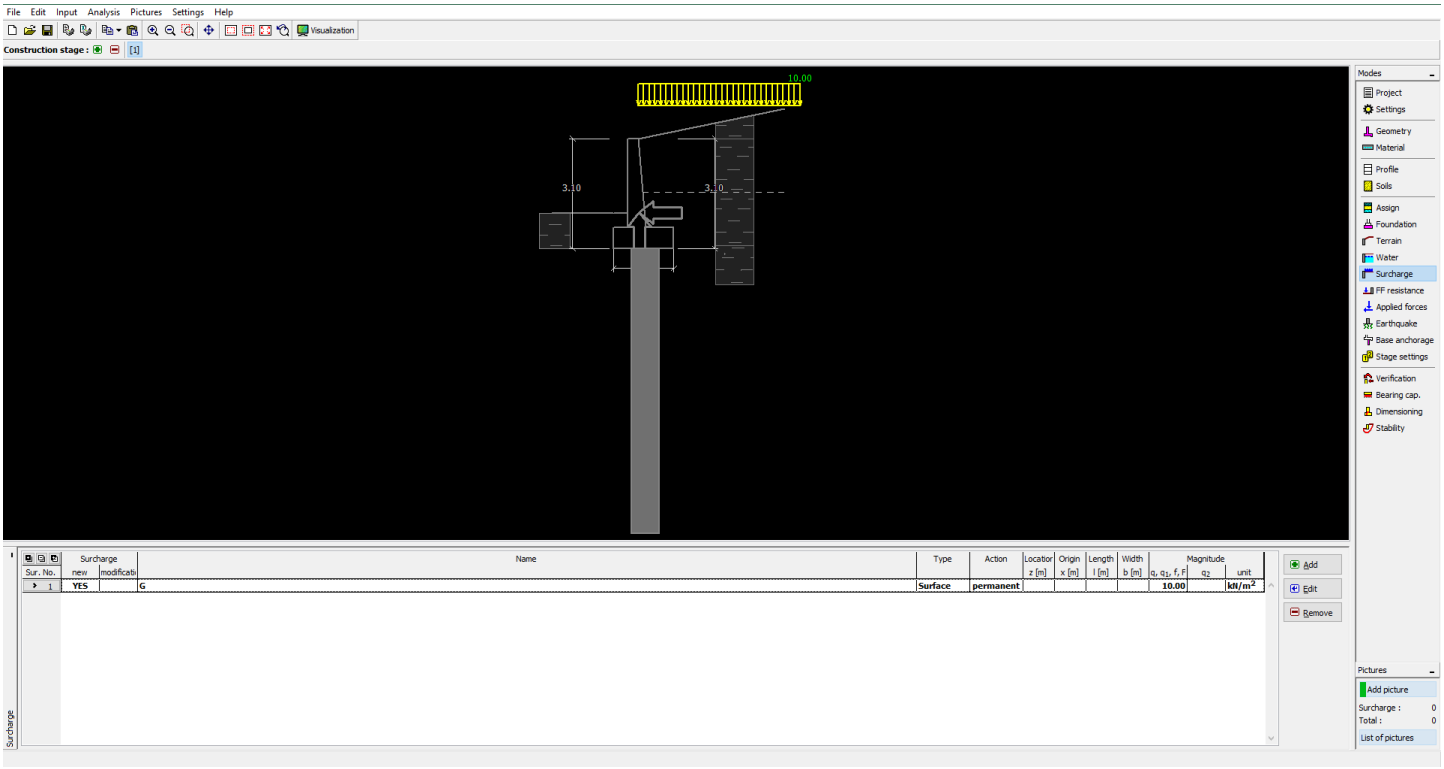

Modification of soil parameters
Identification
Name : Shtrsa Nr.3 - Sandy clay (CS), consistency firm
Sandy clay (CS), consistency firm
Basic data
Unit weight : γ = 21.00 [kN/m³] 18.5
Stress-state : effective
Angle of internal friction : φef = 26.00 [°] 22-27
Cohesion of soil : cef = 80.00 [kPa] 10-18
Angle of friction struc.-soil : δ = 12.00 [°]
Pressure at rest
Soil : cohesive
Poisson's ratio : ν = 0.35 [–] 0.35
Uplift pressure
Calc. mode of uplift : standard
Saturated unit weight : γsat = 22.00 [kN/m³]
Draw
Color
Pattern category
GEO
Pattern
Sandy clay
Classification
Classify
Delete
OK + A
OK + V
OK
Cancel
Classification of soils
Classification, consistency, density
Soil classification : CS - Sandy clay
Consistency : Firm consistency (hard to deform by hand squeezing)
Standard characteristics of soils
Sandy clay (CS), consistency firm
Soil parameters Mark Unit Value
Poisson's ratio ν [–] 0.35
Unit weight γ [kN/m³] 18.5
Deformation modulus Edef [MPa] 4 - 6
Effective parameters :
Angle of internal friction φef [°] 22 - 27
Cohesion of soil cef [kPa] 10 - 18
Total parameters :
Angle of internal friction φu [°] 0
Cohesion of soil cu [kPa] 50
Design strength :
Foundation width < 3.0 m Rd [kPa] 150
Coeff. of structural strength m [–] 0.2
for Edef < 4, overconsolidated m [–] 0.1
Manually
OK
OK + Assign
Cancel
Manual classification of soils
Grading
Fine particles (0,0 .. 0,06 mm) : f = 50.0 [%]
Sandy particles (0,06 mm .. 2,0 mm) : s = 40.0 [%]
Gravelly particles (2,0 mm .. 60,0 mm) : g = 10.0 [%]
Sum f + s + g must be equal to 100%
Moisture
Sample moisture : w = 22.0 [%]
Moisture content at the liquid limit : wl = 33.0 [%]
Moisture content at the plasticity limit : wp = 19.0 [%]
It must hold wl > wp
Classification
Sandy clay (CS), consistency firm
OK
Cancel
3.10
3.10
3.00
1.70
2.00
5.00
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Solis : 0
Total : 0
List of pictures
Soil name
1 Shtresa Nr.1 - Low plasticity clay (CL,CI), consiste
2 Shtresa Nr.2 - Sandy clay (CS), consistency firm
3 Shtrsa Nr.3 - Sandy clay (CS), consistency
Soil characteristics
Shtrsa Nr.3 - Sandy clay (CS), consistency firm
Unit weight : γ = 21.00 kN/m³
Stress-state : effective
Angle of internal friction : φef = 26.00 °
Cohesion of soil : cef = 80.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γsat = 22.00 kN/m³
Add
Edit
Remove
Copy
current soil
selected soils
all soils
Paste
soils
GeoClipboard™
Solis

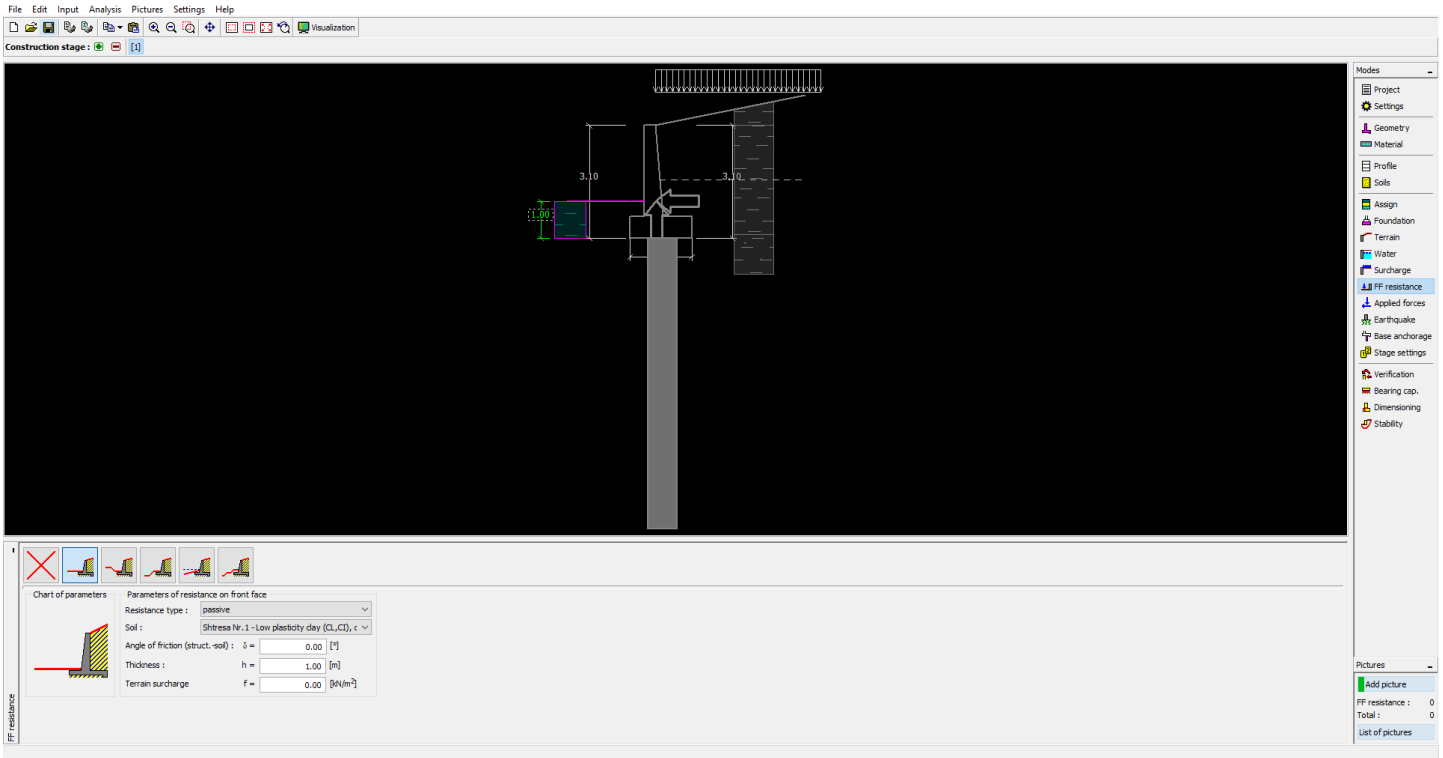

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
3.10
3.10
3.00
2.00
5.00
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Soils:
No. of layer
Thickness [m]
Assigned soil
1 3.00 Shtresa Nr. 1 - Low plasticity clay (CL,CI), consistency firm
2 2.00 Shtresa Nr.2 - Sandy clay (CS), consistency firm
3 5.00 Shtrsa Nr.3 - Sandy clay (CS), consistency firm
4 Shtrsa Nr.3 - Sandy clay (CS), consistency firm
Assign
Pictures
Add picture
Assign : 0
Total : 0
List of pictures


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
3.10
3.10
8.00
0.50
0.80
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Type of foundation : pile foundation
Parameters
Pile foundation : single pile
Unit weight : γ = 25.13 [kN/m³]
Length : l = 8.00 [m]
Diameter : d = 0.80 [m]
Offset : x = 0.50 [m]
Spacing : b = 0.80 [m]
Foundation
Pictures
Add picture
Foundation : 0
Total : 0
List of pictures

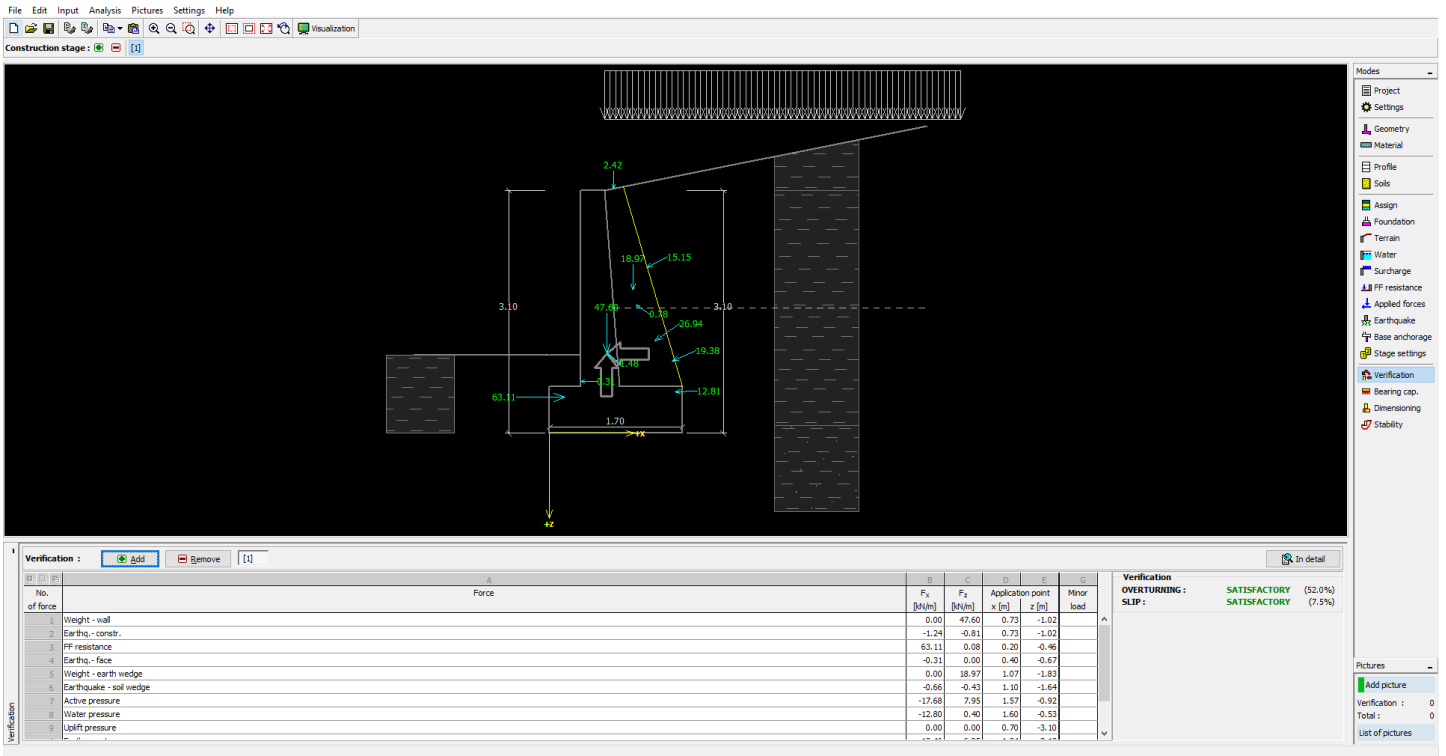

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
1: 5.00
3.10
3.10
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of parameters
Terrain parameters
Embankment length :
Embankment height :
Slope :
Slope angle :
4.57
0.91
5.00
11.31
Pictures
Add picture
Terrain : 0
Total : 0
List of pictures
Terrain

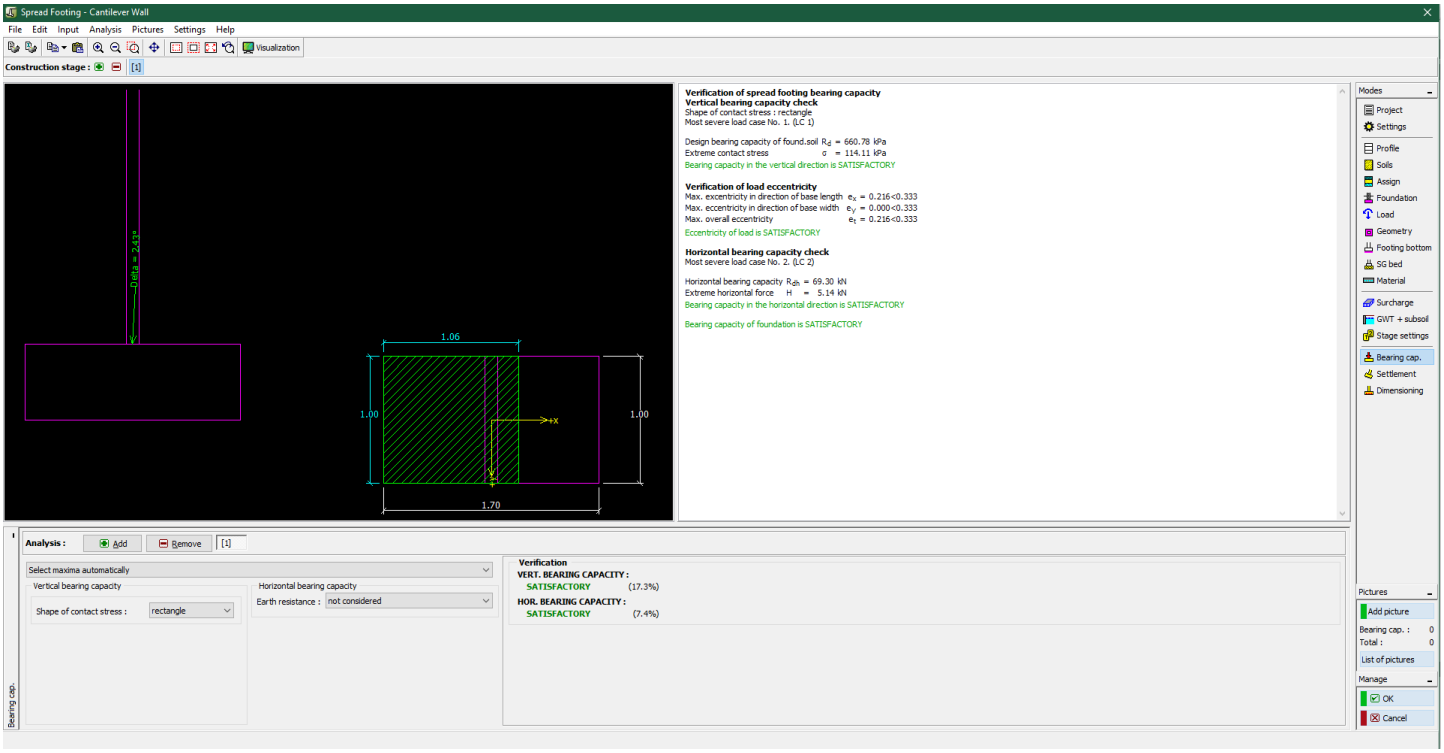

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
3.10
3.10
1.50
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of parameters
Ground water table (GWT) parameters
GWT behind construction :
GWT in front of construction :
Uplift at footing bottom due to diff. GWTs :
1.50
not considered
Tensile crack
Depth of tensile crack :
Pictures
Add picture
Water : 0
Total : 0
List of pictures
Water

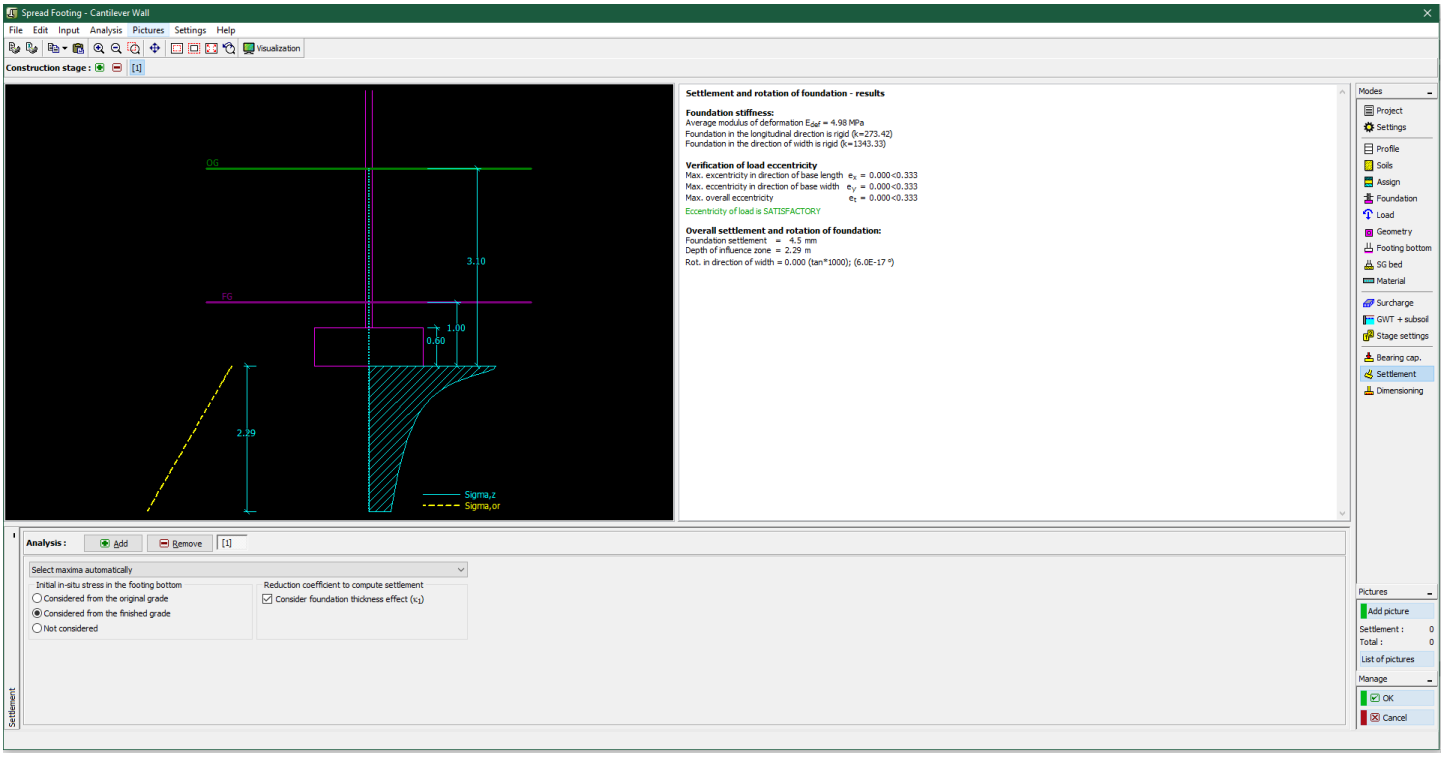

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
10.00
3.10
3.10
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Surcharge
Sur. No.
new
modificati
Name
Type
Action
Locatior z [m]
Origin x [m]
Length l [m]
Width b [m]
Magnitude q, q1, f, F
q2
unit
1
YES
G
Surface
permanent
10.00
kN/m2
Add
Edit
Remove
Pictures
Add picture
Surcharge : 0
Total : 0
List of pictures

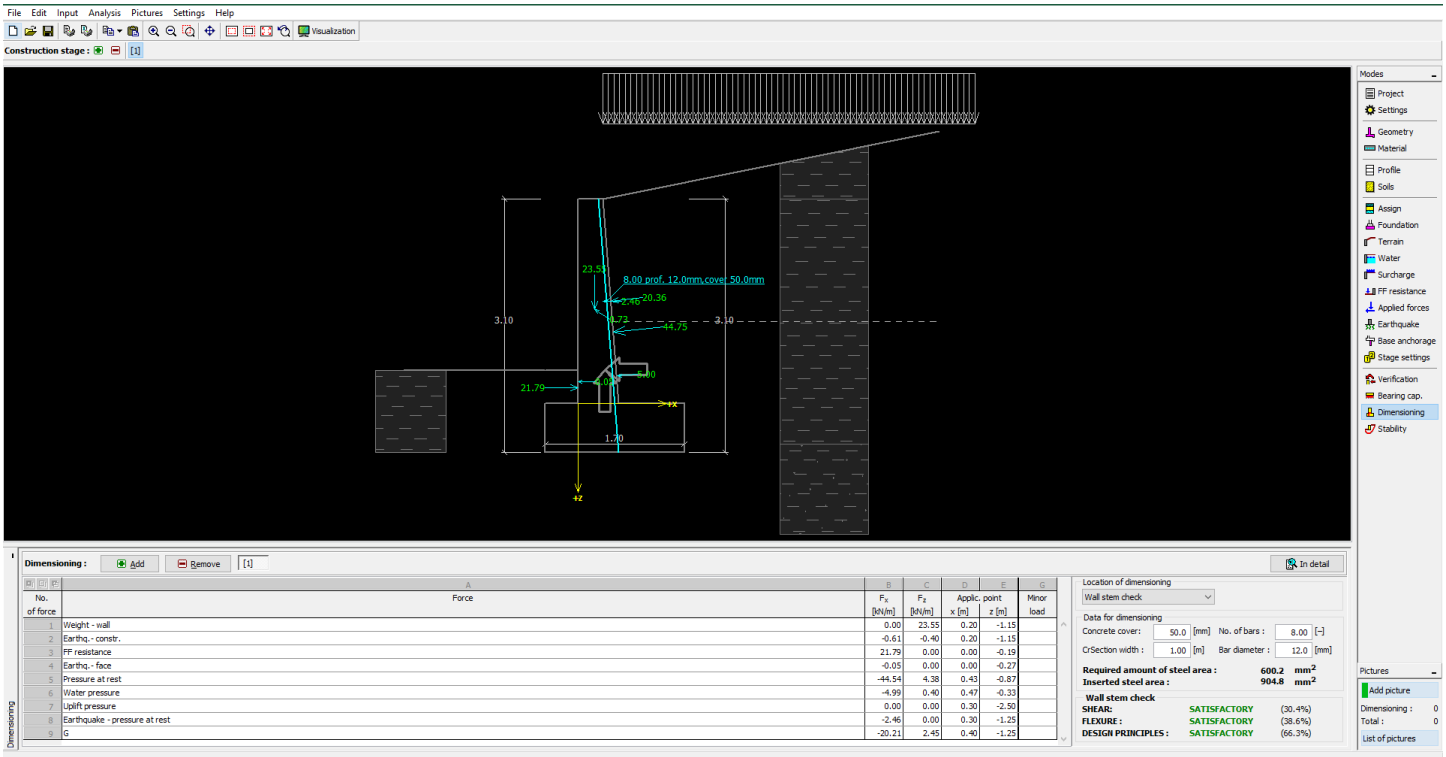

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
3.10
3.10
1.00
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of parameters
Parameters of resistance on front face
Resistance type : passive
Soil : Shtresa Nr.1 - Low plasticity clay (CL,CI), c
Angle of friction (struct.-soil) : δ = 0.00 [°]
Thickness : h = 1.00 [m]
Terrain surcharge f = 0.00 [kN/m2]
FF resistance
Pictures
Add picture
FF resistance : 0
Total : 0
List of pictures

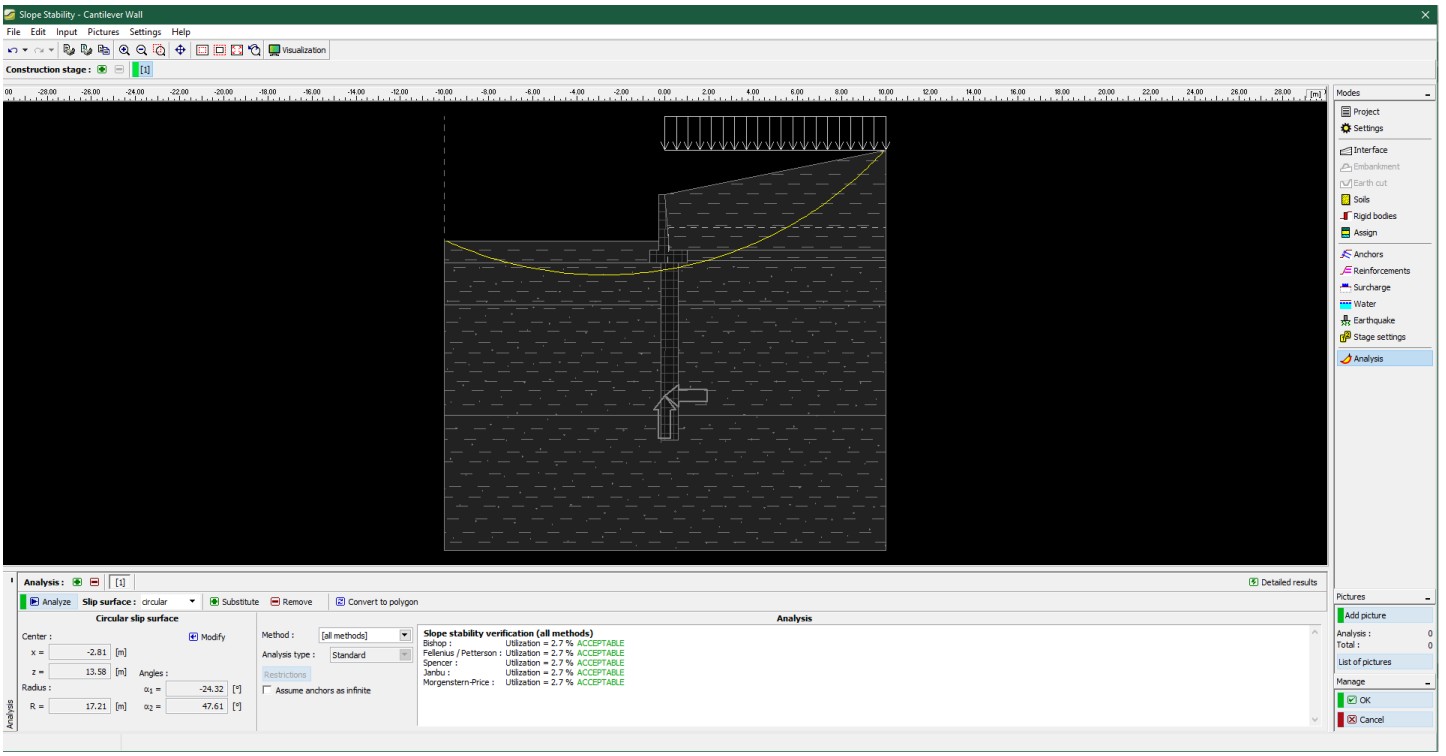

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
3.10
3.10
0.0260
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Analyze earthquake
Factor of horizontal acceleration : Kh = 0.0260 [-]
Factor of vertical acceleration : Kv = 0.0170 [-]
Input point of application of pressure
Coeff. to compute point of application : k,H = [-]
Water influence
Confined water
Unconfined water
Specific gravity of soil particles : Gs = [-]
H
k,H
Earthquake
Pictures
Add picture
Earthquake : 0
Total : 0
List of pictures


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
2.42
18.97
15.15
3.10
47.60
0.08
3.10
26.94
19.38
0.48
0.31
63.11
12.81
1.70
+x
+z
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Verification :
Add
Remove
[1]
In detail
No. of force
Force
Fx [kN/m]
Fz [kN/m]
Application point x [m]
Application point z [m]
Minor load
1 Weight - wall 0.00 47.60 0.73 -1.02
2 Earthq.- constr. -1.24 -0.81 0.73 -1.02
3 FF resistance 63.11 0.08 0.20 -0.46
4 Earthq.- face -0.31 0.00 0.40 -0.67
5 Weight - earth wedge 0.00 18.97 1.07 -1.83
6 Earthquake - soil wedge -0.66 -0.43 1.10 -1.64
7 Active pressure -17.68 7.95 1.57 -0.92
8 Water pressure -12.80 0.40 1.60 -0.53
9 Uplift pressure 0.00 0.00 0.70 -3.10
Verification
OVERTURNING : SATISFACTORY (52.0%)
SLIP : SATISFACTORY (7.5%)
Verification
Pictures
Add picture
Verification : 0
Total : 0
List of pictures

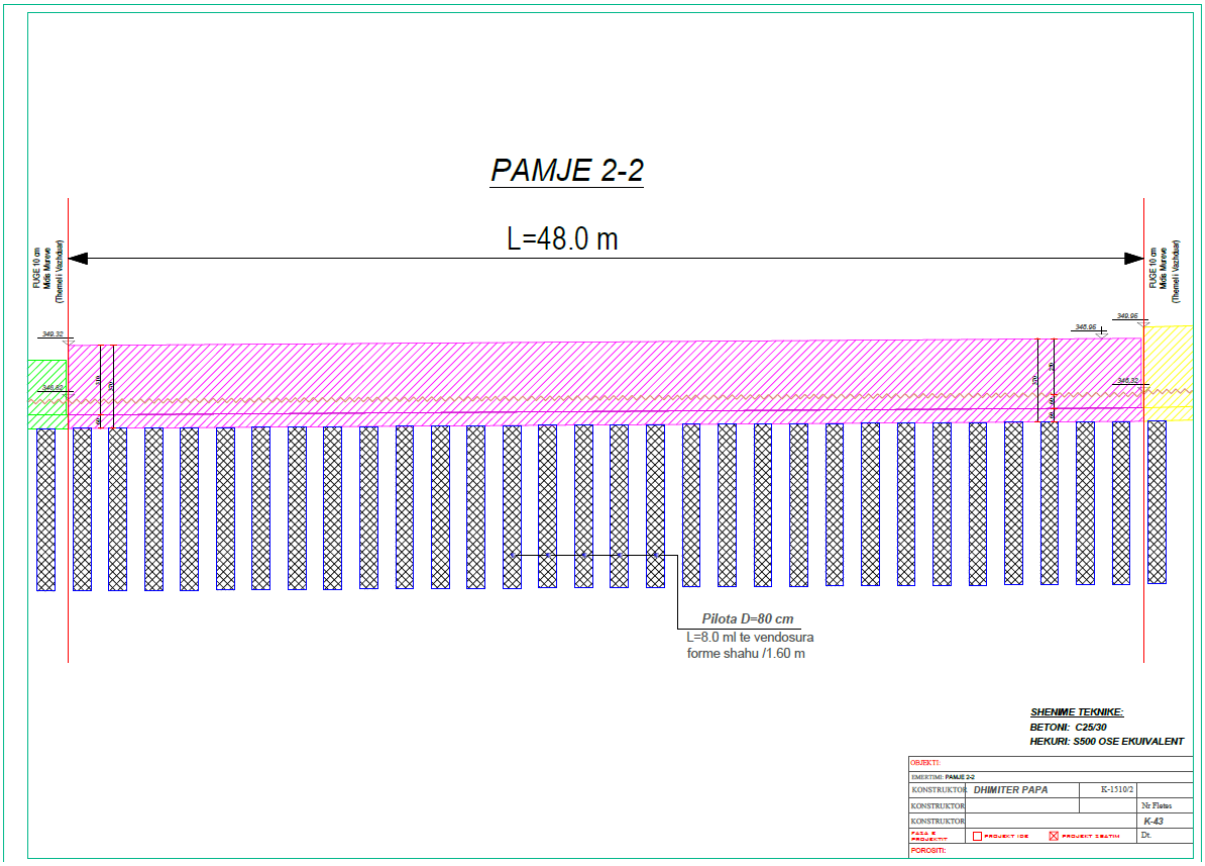

Spread Footing - Cantilever Wall
File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
[1]
Dg = 2.43
1.06
1.00
1.00
+x
1.70
Verification of spread footing bearing capacity
Vertical bearing capacity check
Shape of contact stress : rectangle
Most severe load case No. 1. (LC 1)
Design bearing capacity of found.soil Rd = 660.78 kPa
Extreme contact stress σ = 114.11 kPa
Bearing capacity in the vertical direction is SATISFACTORY
Verification of load eccentricity
Max. excentricity in direction of base length ex = 0.216<0.333
Max. eccentricity in direction of base width ey = 0.000<0.333
Max. overall eccentricity et = 0.216<0.333
Eccentricity of load is SATISFACTORY
Horizontal bearing capacity check
Most severe load case No. 2. (LC 2)
Horizontal bearing capacity Rdh = 69.30 kN
Extreme horizontal force H = 5.14 kN
Bearing capacity in the horizontal direction is SATISFACTORY
Bearing capacity of foundation is SATISFACTORY
Modes
Project
Settings
Profile
Soils
Assign
Foundation
Load
Geometry
Footing bottom
SG bed
Material
Surcharge
GWT + subsoil
Stage settings
Bearing cap.
Settlement
Dimensioning
Analysis :
Add
Remove
[1]
Select maxima automatically
Vertical bearing capacity
Shape of contact stress : rectangle
Horizontal bearing capacity
Earth resistance : not considered
Verification
VERT. BEARING CAPACITY :
SATISFACTORY (17.3%)
HOR. BEARING CAPACITY :
SATISFACTORY (7.4%)
Bearing cap.
Pictures
Add picture
Bearing cap. : 0
Total : 0
List of pictures
Manage
OK
Cancel

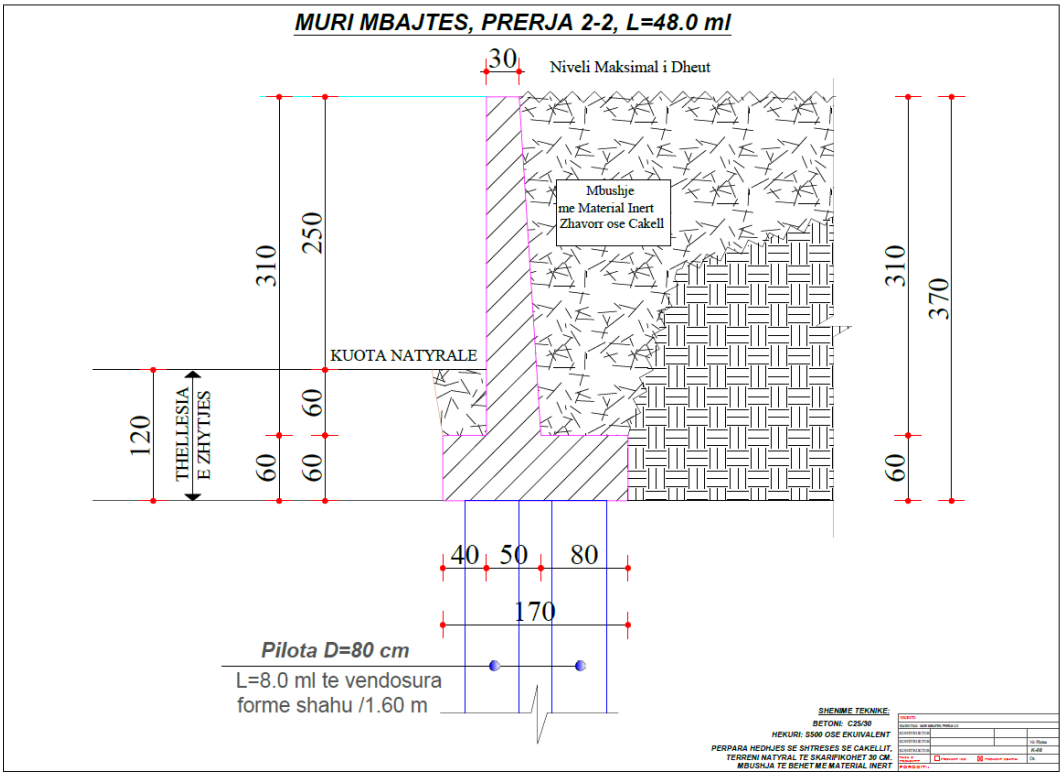

Spread Footing - Cantilever Wall
File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
[1]
OG
3.10
FG
1.00
0.60
2.29
Sigma,z
Sigma,or
Settlement and rotation of foundation - results
Foundation stiffness:
Average modulus of deformation Edef = 4.98 MPa
Foundation in the longitudinal direction is rigid (k=273.42)
Foundation in the direction of width is rigid (k=1343.33)
Verification of load eccentricity
Max. excentricity in direction of base length ex = 0.000<0.333
Max. eccentricity in direction of base width ey = 0.000<0.333
Max. overall eccentricity et = 0.000<0.333
Eccentricity of load is SATISFACTORY
Overall settlement and rotation of foundation:
Foundation settlement = 4.5 mm
Depth of influence zone = 2.29 m
Rot. in direction of width = 0.000 (tan*1000); (6.0E-17 °)
Modes
Project
Settings
Profile
Soils
Assign
Foundation
Load
Geometry
Footing bottom
SG bed
Material
Surcharge
GWT + subsoil
Stage settings
Bearing cap.
Settlement
Dimensioning
Analysis :
Add
Remove
[1]
Select maxima automatically
Initial in-situ stress in the footing bottom
Considered from the original grade
Considered from the finished grade
Not considered
Reduction coefficient to compute settlement
Consider foundation thickness effect (ks)
Settlement
Pictures
Add picture
Settlement : 0
Total : 0
List of pictures
Manage
OK
Cancel


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage : [1]
23.55
8.00 prof. 12.0mm,cover 50.0mm
2.46
20.36
3.10
4.73
44.75
3.10
21.79
4.99
0.00
+x
1.20
+z
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Dimensioning : Add Remove [1] In detail
No. of force | Force | Fx [kN/m] | Fz [kN/m] | Applic. point x [m] | Applic. point z [m] | Minor load
1 Weight - wall 0.00 23.55 0.20 -1.15
2 Earthq.- constr. -0.61 -0.40 0.20 -1.15
3 FF resistance 21.79 0.00 0.00 -0.19
4 Earthq.- face -0.05 0.00 0.00 -0.27
5 Pressure at rest -44.54 4.38 0.43 -0.87
6 Water pressure -4.99 0.40 0.47 -0.33
7 Uplift pressure 0.00 0.00 0.30 -2.50
8 Earthquake - pressure at rest -2.46 0.00 0.30 -1.25
9 G -20.21 2.45 0.40 -1.25
Location of dimensioning
Wall stem check
Data for dimensioning
Concrete cover: 50.0 [mm] No. of bars : 8.00 [-]
CrSection width : 1.00 [m] Bar diameter : 12.0 [mm]
Required amount of steel area : 600.2 mm2
Inserted steel area : 904.8 mm2
Wall stem check
SHEAR: SATISFACTORY (30.4%)
FLEXURE : SATISFACTORY (38.6%)
DESIGN PRINCIPLES : SATISFACTORY (66.3%)
Pictures
Add picture
Dimensioning : 0
Total : 0
List of pictures


Slope Stability - Cantilever Wall
File Edit Input Pictures Settings Help
Visualization
Construction stage : [1]
Modes
Project
Settings
Interface
Embankment
Earth cut
Soils
Rigid bodies
Assign
Anchors
Reinforcements
Surcharge
Water
Earthquake
Stage settings
Analysis
Analysis : [1] Detailed results
Analyze Slip surface : circular Substitute Remove Convert to polygon
Circular slip surface
Center :
x = -2.81 [m]
z = 13.58 [m]
Radius :
R = 17.21 [m]
Modify
Angles :
α1 = -24.32 [°]
α2 = 47.61 [°]
Method : [all methods]
Analysis type : Standard
Restrictions
Assume anchors as infinite
Analysis
Slope stability verification (all methods)
Bishop : Utilization = 2.7 % ACCEPTABLE
Fellenius / Petterson : Utilization = 2.7 % ACCEPTABLE
Spencer : Utilization = 2.7 % ACCEPTABLE
Janbu : Utilization = 2.7 % ACCEPTABLE
Morgenstern-Price : Utilization = 2.7 % ACCEPTABLE
Pictures
Add picture
Analysis : 0
Total : 0
List of pictures
Manage
OK
Cancel

Cantilever wall analysis





Input data

Project

Task : Muret Mbajtese - SURREL
Part : Projekti i Perforcimit te Skarpates
Description : Muri Mbajtes - Prerja 2-2
Author : Dhimitri PAPA

Settings

Standard - EN 1997 - DA3 (2)

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)

Wall analysis

Active earth pressure calculation : Coulomb
Passive earth pressure calculation : Caquot-Kerisel
Earthquake analysis : Mononobe-Okabe
Shape of earth wedge : Calculate as skew
Base key : The base key is considered as inclined footing bottom
Allowable eccentricity : 0.333
Verification methodology : according to EN 1997
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)									
Permanent design situation									
		State STR				State GEO			
		Unfavourable		Favourable		Unfavourable		Favourable	
Permanent actions :	γ_G =	1.35	[–]	1.00	[–]	1.00	[–]	1.00	[–]
Variable actions :	γ_Q =	1.50	[–]	0.00	[–]	1.30	[–]	0.00	[–]
Water load :	γ_w =					1.00	[–]		

Partial factors for soil parameters (M)			
Permanent design situation			
Partial factor on internal friction :	γ_ϕ =	1.25	[–]
Partial factor on effective cohesion :	γ_c =	1.25	[–]
Partial factor on undrained shear strength :	γ_{cu} =	1.40	[–]
Partial factor on Poisson's ratio :	γ_v =	1.00	[–]

Partial factors for variable actions			
Permanent design situation			
Factor for combination value :	ψ_0 =	0.70	[–]
Factor for frequent value :	ψ_1 =	0.50	[–]
Factor for quasi-permanent value :	ψ_2 =	0.30	[–]

Material of structure

Unit weight γ = 23.56 kN/m^3
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).
Concrete : C 25/30
Cylinder compressive strength f_{ck} = 25.00 MPa
Tensile strength f_{ctm} = 2.60 MPa
Longitudinal steel : B500
Yield strength f_{yk} = 500.00 MPa

Geometry of structure

No.	Coordinate X [m]	Depth Z [m]
1	0.00	0.00
2	0.20	3.10
3	1.00	3.10
4	1.00	3.70
5	-0.70	3.70
6	-0.70	3.10
7	-0.30	3.10
8	-0.30	0.00

The origin [0,0] is located at the most upper right point of the wall.
Wall section area = 2.26 m^2.

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m^3]	γ_{su} [kN/m^3]	δ [°]
1	Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm		14.00	25.00	19.00	10.00	12.00
2	Shtresa Nr.2 - Sandy clay (CS), consistency firm		21.00	50.00	21.00	12.00	12.00
3	Shtrsa Nr.3 - Sandy clay (CS), consistency firm		26.00	80.00	21.00	12.00	12.00

Soil parameters to compute pressure at rest

No.	Name	Pattern	Type calculation	φ_{ef} [°]	ν [–]	OCR [–]	K_r [–]
1	Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm		cohesive	-	0.40	-	-
2	Shtresa Nr.2 - Sandy clay (CS), consistency firm		cohesive	-	0.35	-	-
3	Shtrsa Nr.3 - Sandy clay (CS), consistency firm		cohesive	-	0.35	-	-

Soil parameters

Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm

Unit weight : γ = 19.00 kN/m^3
Stress-state : effective
Angle of internal friction : φ_{ef} = 14.00 °
Cohesion of soil : c_{ef} = 25.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.40
Saturated unit weight : γ_{sat} = 20.00 kN/m^3

Shtresa Nr.2 - Sandy clay (CS), consistency firm

Unit weight : γ = 21.00 kN/m^3
Stress-state : effective
Angle of internal friction : φ_{ef} = 21.00 °
Cohesion of soil : c_{ef} = 50.00 kPa

Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γ_{sat} = 22.00 kN/m^3

Shtrsa Nr.3 - Sandy clay (CS), consistency firm
Unit weight : γ = 21.00 kN/m^3
Stress-state : effective
Angle of internal friction : φ_{ef} = 26.00 °
Cohesion of soil : c_{ef} = 80.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γ_{sat} = 22.00 kN/m^3

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	3.00	Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm	
2	2.00	Shtresa Nr.2 - Sandy clay (CS), consistency firm	
3	5.00	Shtrsa Nr.3 - Sandy clay (CS), consistency firm	
4	-	Shtrsa Nr.3 - Sandy clay (CS), consistency firm	

Foundation

Type of foundation : pile foundation
Unit weight γ = 25.13 kN/m^3
Geometry
Length l = 7.00 m
Offset d = 0.80 m
Diameter x = 0.50 m

Terrain profile

Terrain behind construction has the slope 1: 5.00 (slope angle is 11.31 °).

Water influence

GWT behind the structure lies at a depth of 1.50 m
Uplift in foot. bottom due to different pressures is not considered.

Input surface surcharges

No.	Surcharge		Action	Mag.1 [kN/m^2]	Mag.2 [kN/m^2]	Ord.x x [m]	Length l [m]	Depth z [m]
	new	change						
1	YES		permanent	10.00				on terrain

No.	Name
1	G

Resistance on front face of the structure

Resistance on front face of the structure: passive
Soil on front face of the structure - Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
Angle of friction struc.-soil δ = 0.00 °

Soil thickness in front of structure h = 1.10 m

Terrain in front of structure is flat.

Earthquake

Factor of horizontal acceleration K_h = 0.0260
Factor of vertical acceleration K_v = 0.0170

Water below the GWT is restricted.

Settings of the stage of construction

Design situation : permanent
The wall is free to move. Active earth pressure is therefore assumed.

Verification No. 1

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. overtur.	Coeff. sliding	Coeff. stress
Weight - wall	0.00	-1.24	53.25	0.72	1.000	1.000	1.350
Earthq.- constr.	1.38	-1.24	-0.91	0.72	1.000	1.000	1.000
FF resistance	-70.99	-0.51	0.08	0.20	1.000	1.000	1.000
Earthq.- face	0.37	-0.73	0.00	0.40	1.000	1.000	1.000
Weight - earth wedge	0.00	-1.91	16.81	1.06	1.000	1.000	1.000
Earthquake - soil wedge	0.67	-1.70	-0.44	1.10	1.000	1.000	1.000
Active pressure	23.01	-1.36	12.28	1.47	1.000	1.000	1.000
Water pressure	24.20	-0.73	0.83	1.54	1.000	1.000	1.000
Uplift pressure	0.00	-3.70	0.00	0.70	1.000	1.000	1.000
Earthq.- act.pressure	18.78	-2.48	9.97	1.13	1.000	1.000	1.000
G	22.41	-1.75	18.37	1.24	1.000	1.000	1.000
G	0.00	-3.71	0.60	0.73	1.000	1.000	1.000

Verification of complete wall

Check for overturning stability
Resisting moment M_{res} = 108.64 kNm/m
Overturning moment M_{ovr} = 101.96 kNm/m

Wall for overturning is SATISFACTORY

Overall check - WALL is SATISFACTORY

Maximum stress in footing bottom : 919.85 kPa
Warning - allowable range of input data exceeded during earthquake analysis!
The analysis is carried out with the modified value of terrain inclination β.

Bearing capacity of foundation soil

Design load acting at the pile head

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]	Eccentricity [–]	Stress [kPa]
1	96.53	129.48	19.83	0.409	418.98
2	93.08	110.84	19.83	0.465	919.85

Service load acting at the pile head

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	19.39	95.53	-35.36

Input parameters for bearing capacity analysis
Pile spacing s = 1.00 m

Dimensioning No. 1

Forces acting on construction

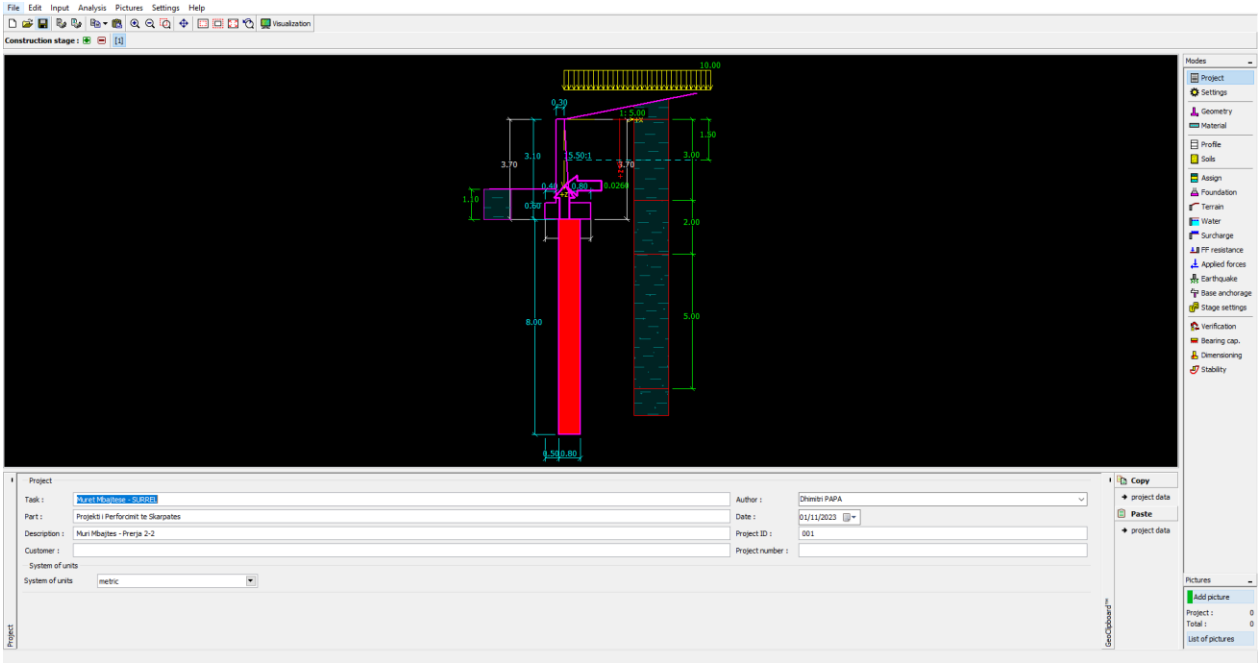
Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0.00	-1.42	29.20	0.20	1.350	1.350	1.000
Earthq.- constr.	0.76	-1.42	-0.50	0.20	1.000	1.000	1.000
FF resistance	-27.96	-0.24	0.00	0.00	1.000	1.000	1.000
Earthq.- face	0.08	-0.33	0.00	0.00	1.000	1.000	1.000
Pressure at rest	63.88	-1.12	5.15	0.43	1.000	1.000	1.000
Water pressure	12.78	-0.53	0.82	0.47	1.000	1.000	1.000
Uplift pressure	0.00	-3.10	0.00	0.30	1.000	1.000	1.000
Earthquake - pressure at rest	3.54	-1.55	0.00	0.30	1.000	1.000	1.000
G	24.89	-1.56	2.48	0.40	1.000	1.000	1.000

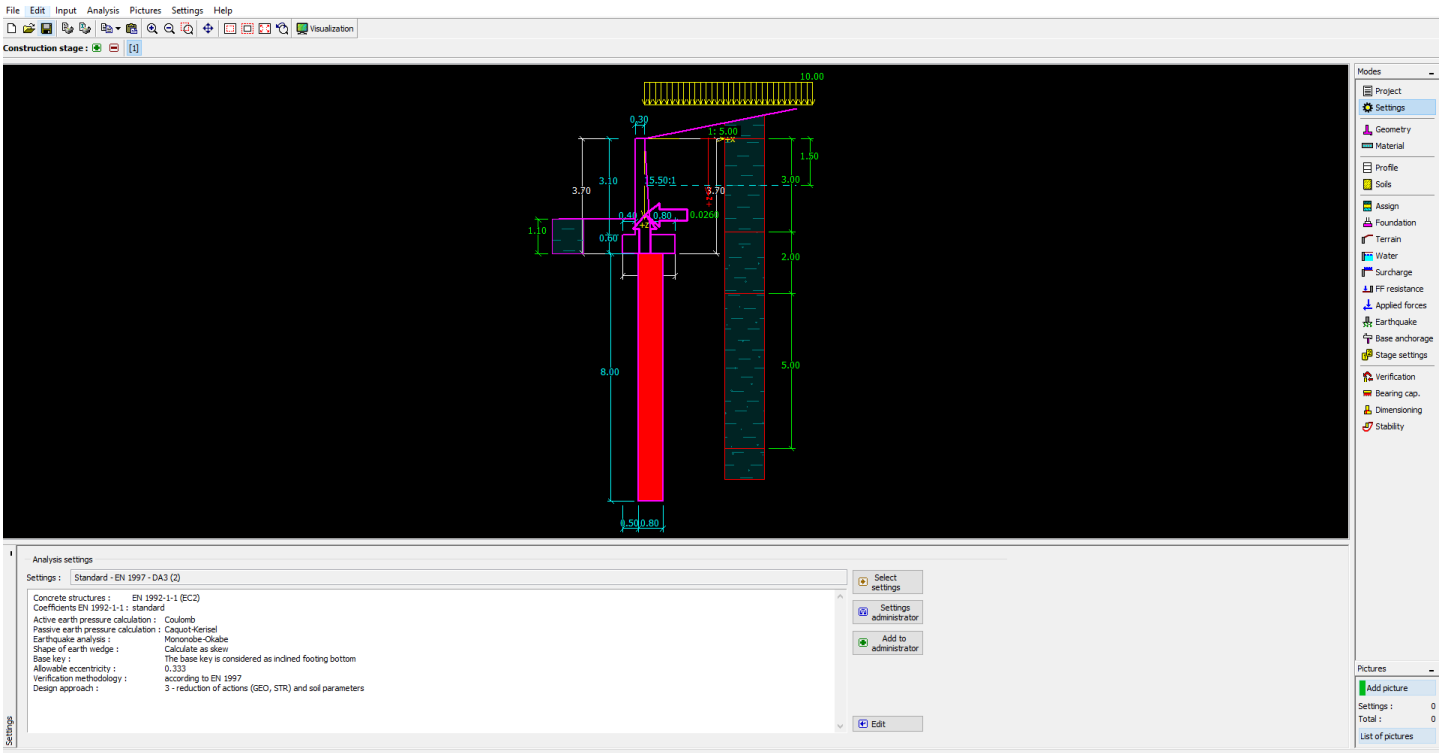
Wall stem check

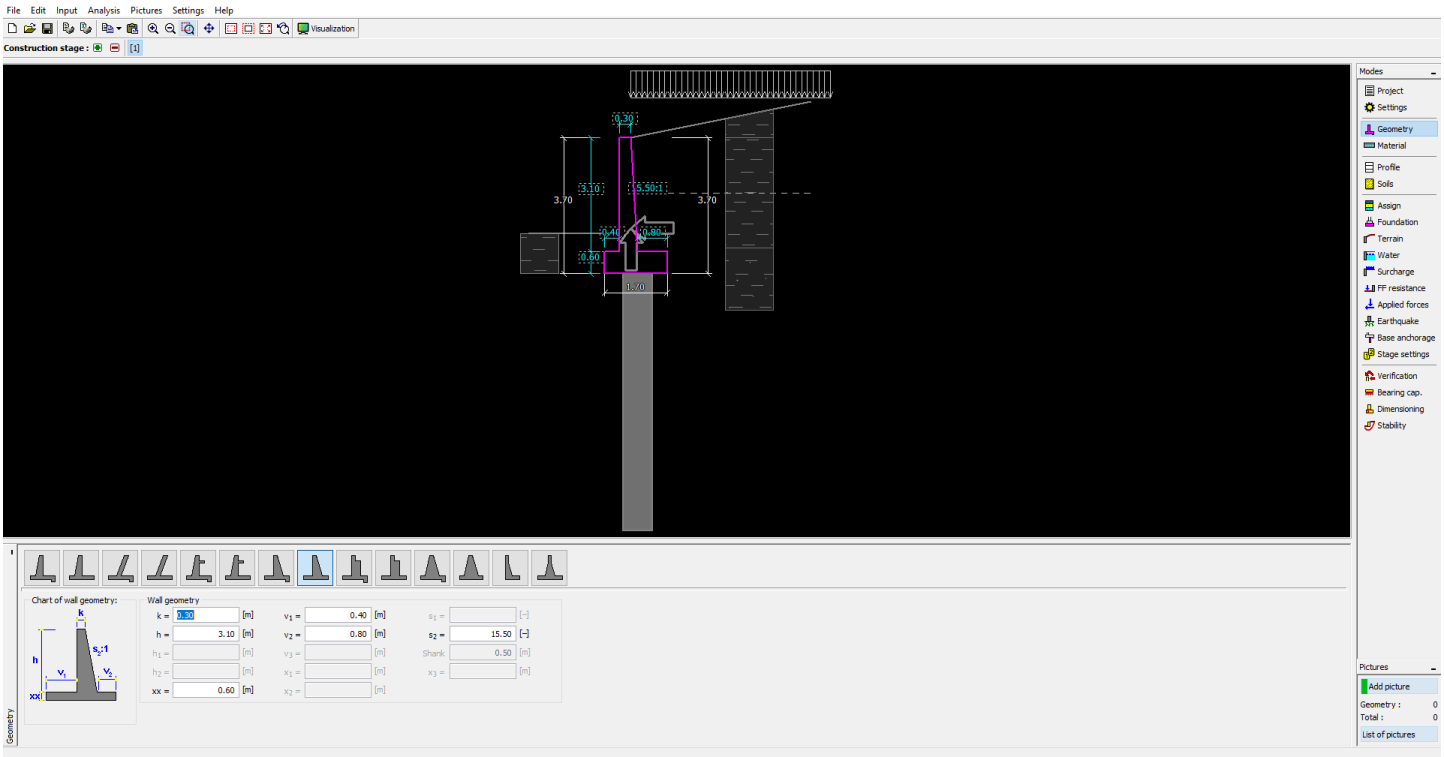
Reinforcement and dimensions of the cross-section
Bar diameter = 14.0 mm
Number of bars = 8
Reinforcement cover = 50.0 mm
Cross-section width = 1.00 m
Cross-section depth = 0.50 m

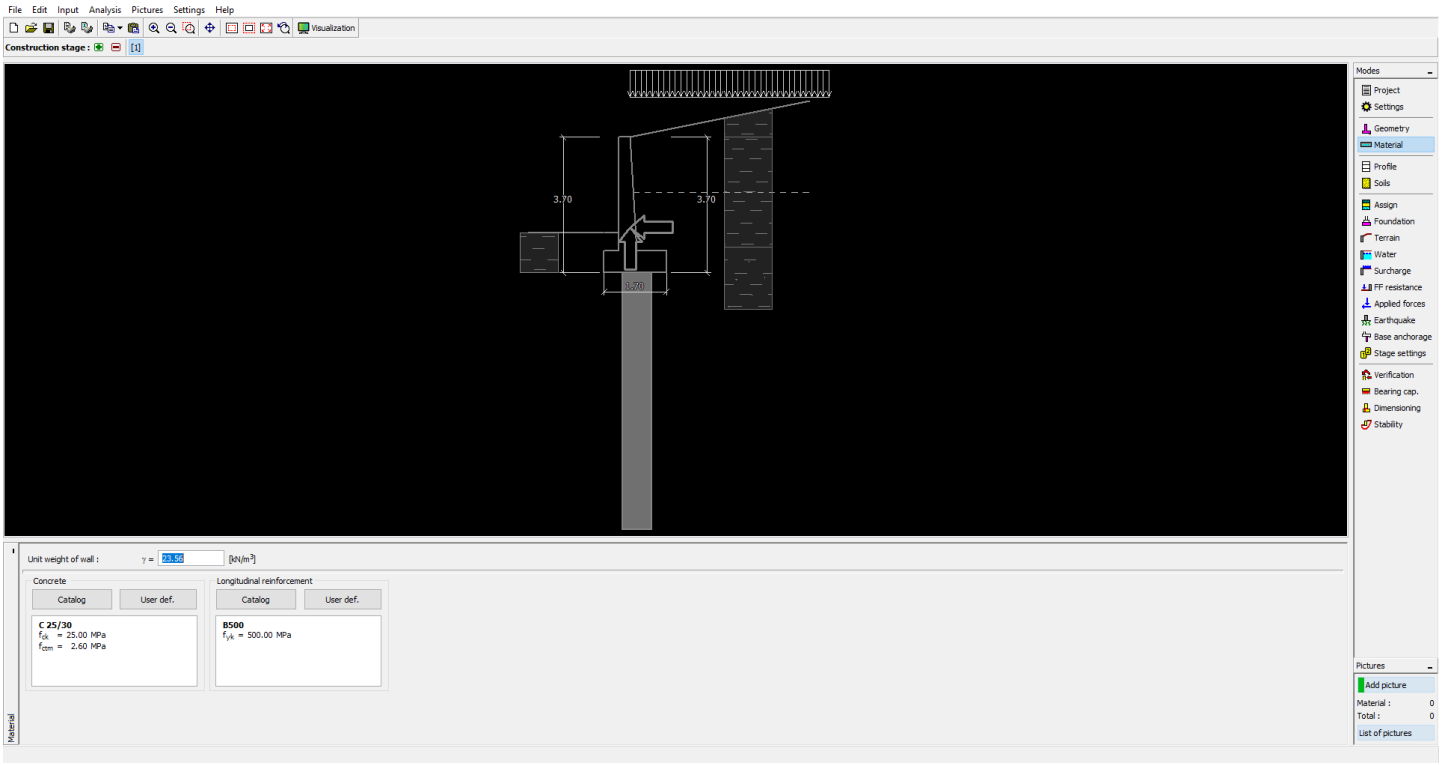
Reinforcement ratio	ρ	=	0.28 %	>	0.14 %	=	ρ_{min}
Position of neutral axis	x	=	0.04 m	<	0.27 m	=	x_{max}
Ultimate shear force	V_{Rd}	=	169.60 kN	>	77.97 kN	=	V_{Ed}
Ultimate moment	M_{Rd}	=	228.56 kNm	>	117.52 kNm	=	M_{Ed}

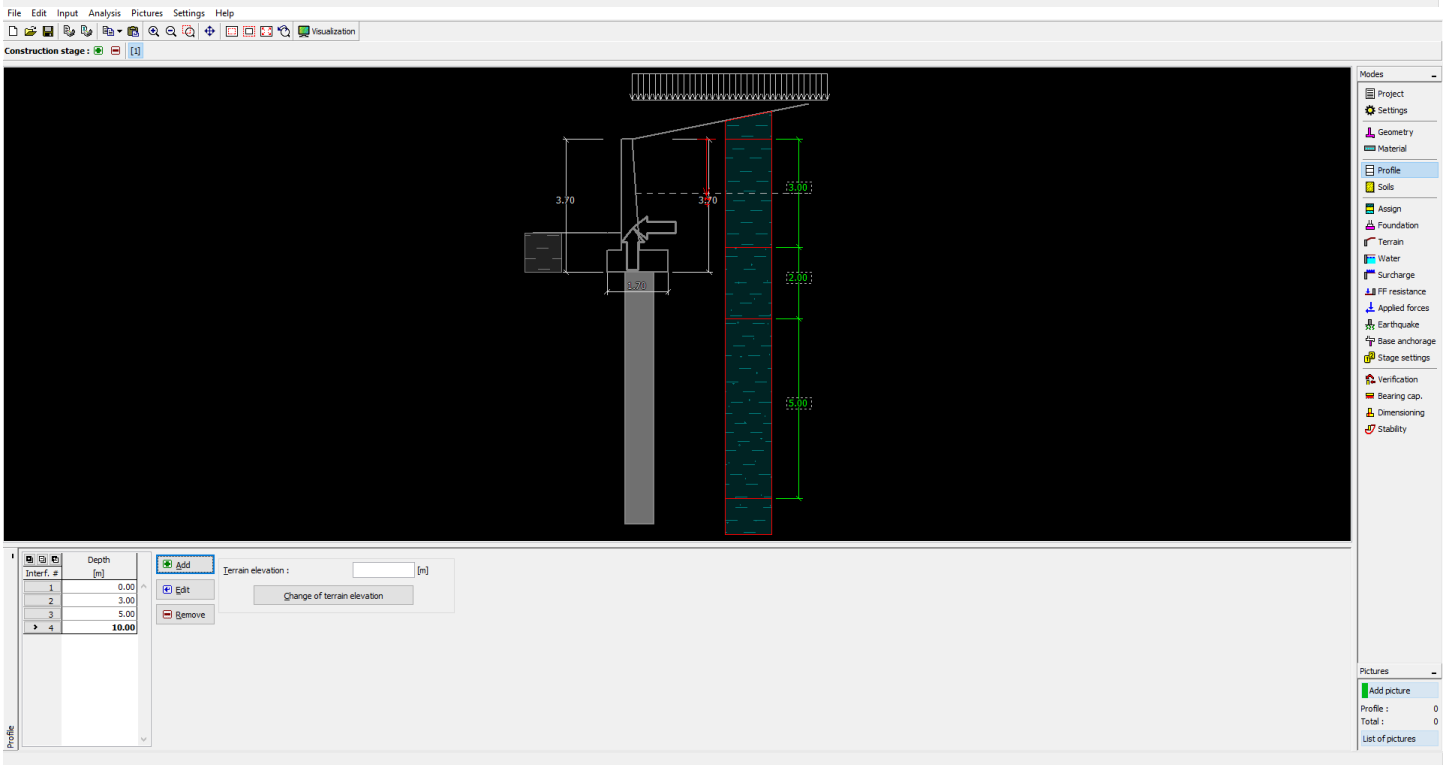
Cross-section is SATISFACTORY.

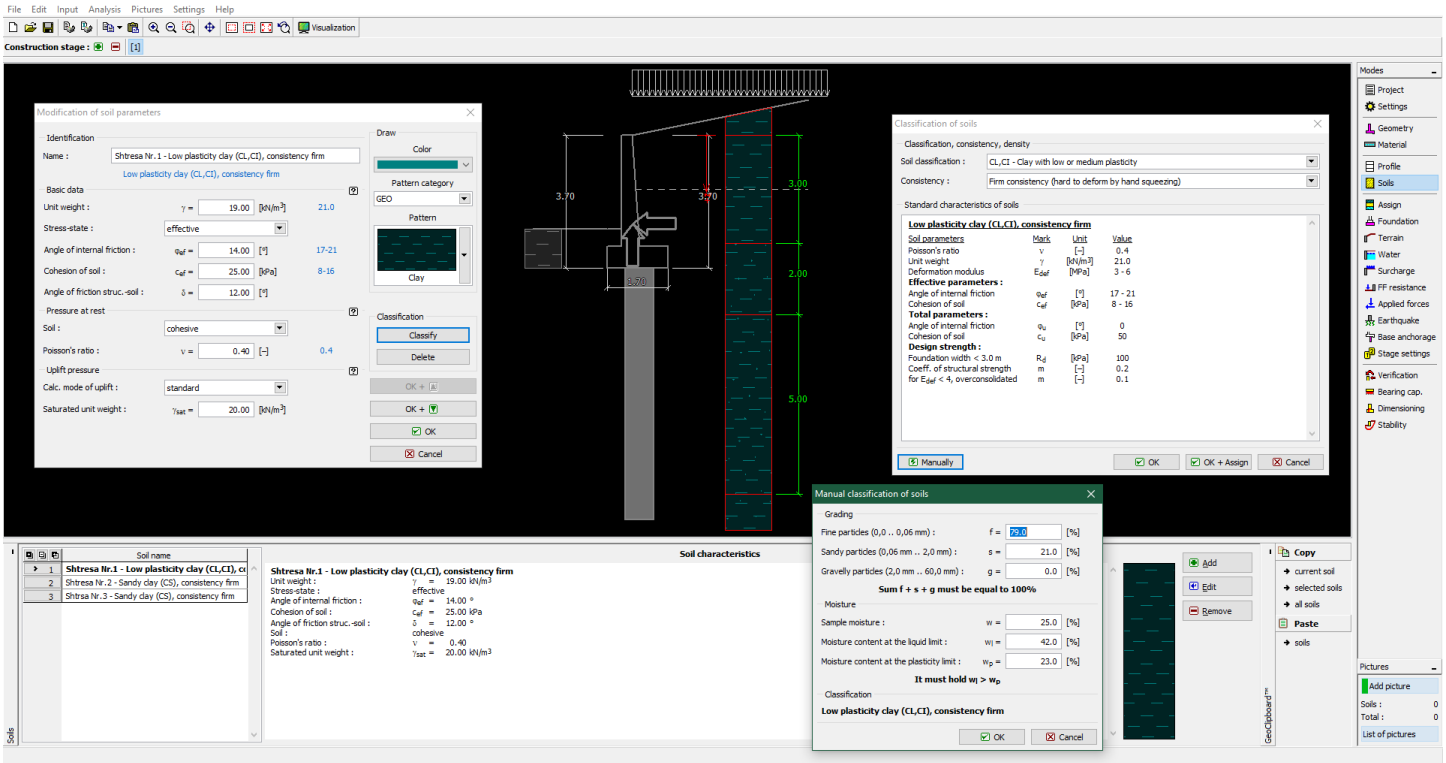


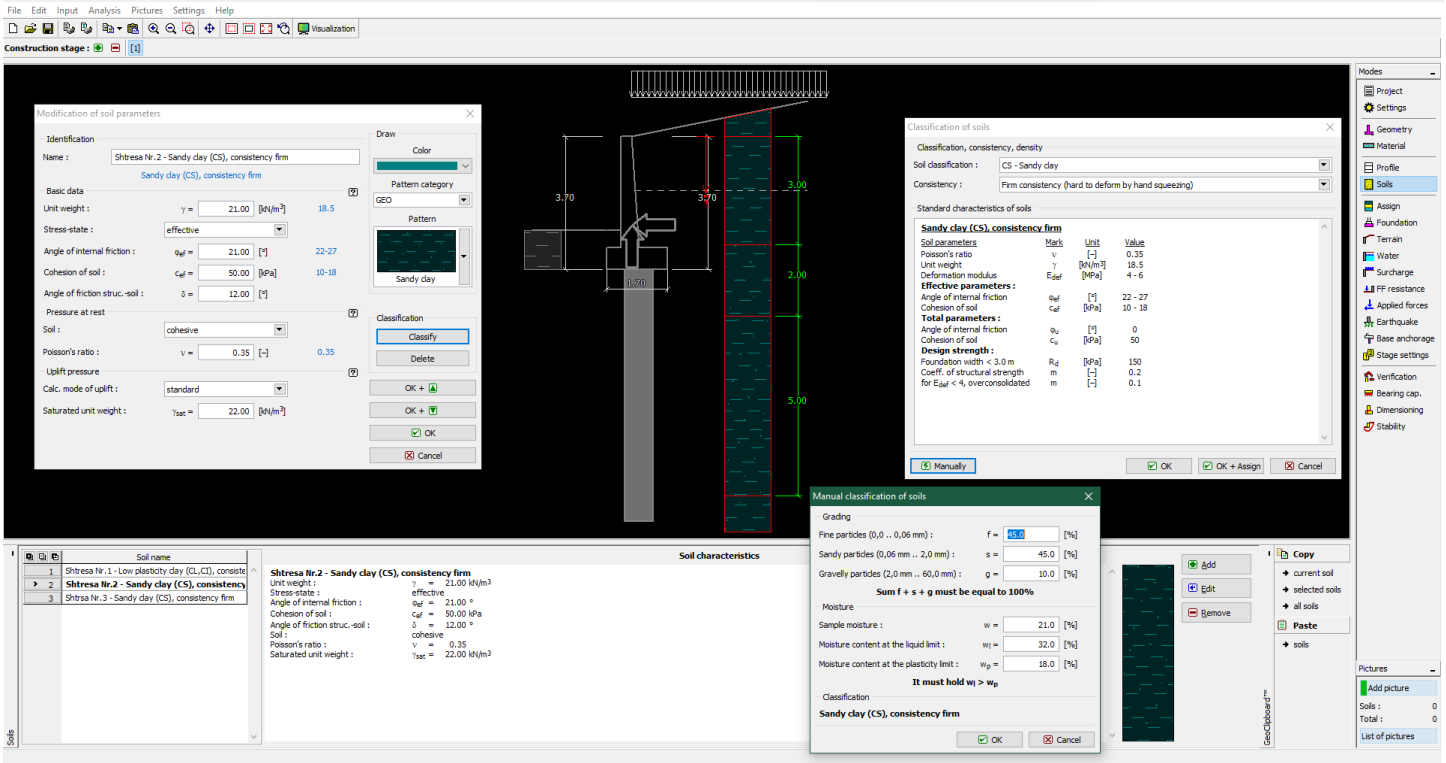

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
10.00
0.30
1: 5.00
1.50
3.70
3.10
15.50:1
3.70
3.00
0.40
0.80
0.0268
1.10
0.50
2.00
8.00
5.00
0.50
0.80
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Analysis settings
Settings :
Standard - EN 1997 - DA3 (2)
Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard
Active earth pressure calculation : Coulomb
Passive earth pressure calculation : Caquot-Kerisel
Earthquake analysis : Mononobe-Okabe
Shape of earth wedge : Calculate as skew
Base key : The base key is considered as inclined footing bottom
Allowable eccentricity : 0.333
Verification methodology : according to EN 1997
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters
Select settings
Settings administrator
Add to administrator
Edit
Settings
Pictures
Add picture
Settings : 0
Total : 0
List of pictures

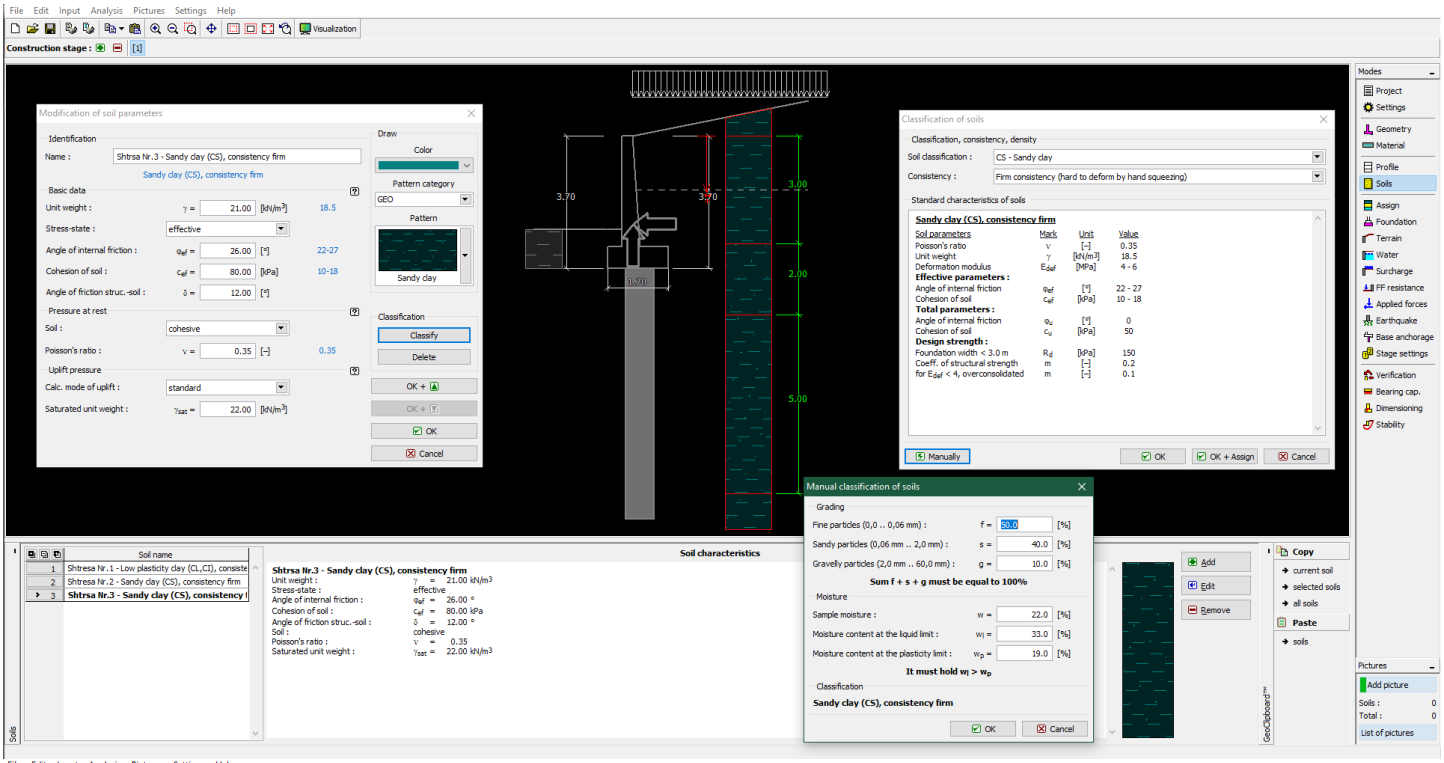

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
0.30
3.10
5.50:1
3.70
3.70
0.40
0.80
0.50
1.70
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of wall geometry:
Wall geometry
k = 0.50 [m]
h = 3.10 [m]
h1 = [m]
h2 = [m]
xx = 0.60 [m]
v1 = 0.40 [m]
v2 = 0.80 [m]
v3 = [m]
x1 = [m]
x2 = [m]
s1 = [-]
s2 = 15.50 [-]
Shank 0.50 [m]
x3 = [m]
Geometry
Pictures
Add picture
Geometry : 0
Total : 0
List of pictures

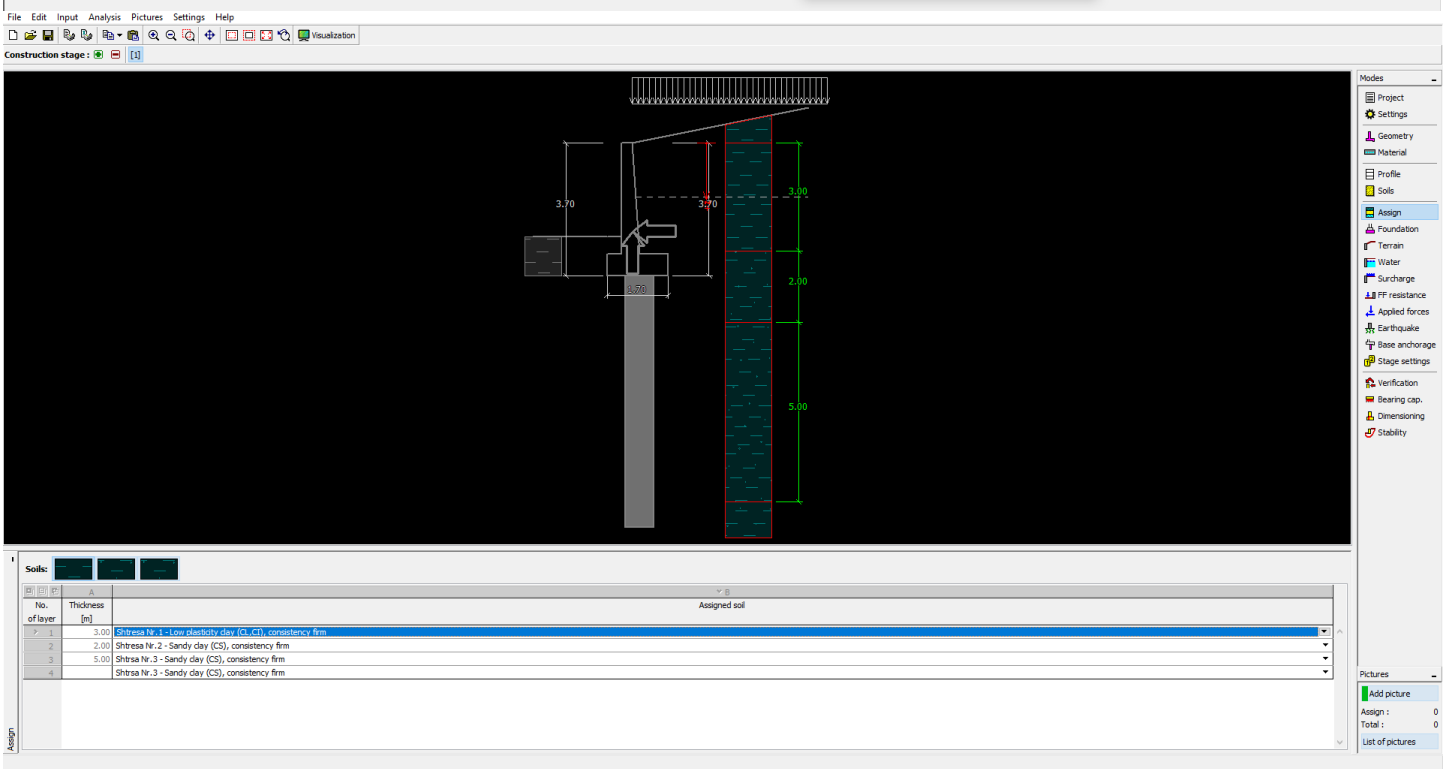

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
3.70
3.70
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Unit weight of wall :
γ =
23.50
[kN/m³]
Concrete
Catalog
User def.
C 25/30
f_ck = 25.00 MPa
f_ctm = 2.60 MPa
Longitudinal reinforcement
Catalog
User def.
B500
f_yk = 500.00 MPa
Material
Pictures
Add picture
Material : 0
Total : 0
List of pictures


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
3.70
3.70
3.00
2.00
5.00
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Interf. #
Depth [m]
1 0.00
2 3.00
3 5.00
4 10.00
Add
Edit
Remove
Terrain elevation :
[m]
Change of terrain elevation
Profile
Pictures
Add picture
Profile : 0
Total : 0
List of pictures


Modification of soil parameters
Identification
Name : Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
Low plasticity clay (CL,CI), consistency firm
Basic data
Unit weight : γ = 19.00 [kN/m³] 21.0
Stress-state : effective
Angle of internal friction : φef = 14.00 [°] 17-21
Cohesion of soil : cef = 25.00 [kPa] 8-16
Angle of friction struc.-soil : δ = 12.00 [°]
Pressure at rest
Soil : cohesive
Poisson's ratio : ν = 0.40 [–] 0.4
Uplift pressure
Calc. mode of uplift : standard
Saturated unit weight : γsat = 20.00 [kN/m³]
Draw
Color
Pattern category
GEO
Pattern
Clay
Classification
Classify
Delete
OK + A
OK +
OK
Cancel
Classification of soils
Classification, consistency, density
Soil classification : CL,CI - Clay with low or medium plasticity
Consistency : Firm consistency (hard to deform by hand squeezing)
Standard characteristics of soils
Low plasticity clay (CL,CI), consistency firm
Soil parameters Mark Unit Value
Poisson's ratio ν [–] 0.4
Unit weight γ [kN/m³] 21.0
Deformation modulus Edef [MPa] 3 - 6
Effective parameters :
Angle of internal friction φef [°] 17 - 21
Cohesion of soil cef [kPa] 8 - 16
Total parameters :
Angle of internal friction φu [°] 0
Cohesion of soil cu [kPa] 50
Design strength :
Foundation width < 3.0 m Rd [kPa] 100
Coeff. of structural strength m [–] 0.2
for Edef < 4, overconsolidated m [–] 0.1
Manually
OK
OK + Assign
Cancel
Manual classification of soils
Grading
Fine particles (0,0 .. 0,06 mm) : f = 29.0 [%]
Sandy particles (0,06 mm .. 2,0 mm) : s = 21.0 [%]
Gravelly particles (2,0 mm .. 60,0 mm) : g = 0.0 [%]
Sum f + s + g must be equal to 100%
Moisture
Sample moisture : w = 25.0 [%]
Moisture content at the liquid limit : wl = 42.0 [%]
Moisture content at the plasticity limit : wp = 23.0 [%]
It must hold wl > wp
Classification
Low plasticity clay (CL,CI), consistency firm
OK
Cancel
3.70
3.70
3.70
3.00
2.00
5.00
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Soil name
1 Shtresa Nr.1 - Low plasticity clay (CL,CI), cl
2 Shtresa Nr.2 - Sandy clay (CS), consistency firm
3 Shtresa Nr.3 - Sandy clay (CS), consistency firm
Soil characteristics
Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
Unit weight : γ = 19.00 kN/m³
Stress-state : effective
Angle of internal friction : φef = 14.00 °
Cohesion of soil : cef = 25.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.40
Saturated unit weight : γsat = 20.00 kN/m³
Add
Edit
Remove
Copy
current soil
selected soils
all soils
Paste
soils
Pictures
Add picture
Solis : 0
Total : 0
List of pictures
GeoClipboard™


Modification of soil parameters
Identification
Name : Shtresa Nr.2 - Sandy clay (CS), consistency firm
Sandy clay (CS), consistency firm
Basic data
Unit weight : γ = 21.00 [kN/m³] 18.5
Stress-state : effective
Angle of internal friction : φef = 21.00 [°] 22-27
Cohesion of soil : cef = 50.00 [kPa] 10-18
Angle of friction struc.-soil : δ = 12.00 [°]
Pressure at rest
Soil : cohesive
Poisson's ratio : ν = 0.35 [–] 0.35
Uplift pressure
Calc. mode of uplift : standard
Saturated unit weight : γsat = 22.00 [kN/m³]
Draw
Color
Pattern category
GEO
Pattern
Sandy clay
Classification
Classify
Delete
OK + A
OK +
OK
Cancel
Classification of soils
Classification, consistency, density
Soil classification : CS - Sandy clay
Consistency : Firm consistency (hard to deform by hand squeezing)
Standard characteristics of soils
Sandy clay (CS), consistency firm
Soil parameters Mark Unit Value
Poisson's ratio ν [–] 0.35
Unit weight γ [kN/m³] 18.5
Deformation modulus Edef [MPa] 4 - 6
Effective parameters :
Angle of internal friction φef [°] 22 - 27
Cohesion of soil cef [kPa] 10 - 18
Total parameters :
Angle of internal friction φu [°] 0
Cohesion of soil cu [kPa] 50
Design strength :
Foundation width < 3.0 m Rd [kPa] 150
Coeff. of structural strength m [–] 0.2
for Edef < 4, overconsolidated m [–] 0.1
Manually
OK
OK + Assign
Cancel
Manual classification of soils
Grading
Fine particles (0,0 .. 0,06 mm) : f = 45.0 [%]
Sandy particles (0,06 mm .. 2,0 mm) : s = 45.0 [%]
Gravelly particles (2,0 mm .. 60,0 mm) : g = 10.0 [%]
Sum f + s + g must be equal to 100%
Moisture
Sample moisture : w = 21.0 [%]
Moisture content at the liquid limit : wl = 32.0 [%]
Moisture content at the plasticity limit : wp = 18.0 [%]
It must hold wl > wp
Classification
Sandy clay (CS), consistency firm
OK
Cancel
3.70
3.70
3.70
3.00
2.00
5.00
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Soil name
1 Shtresa Nr.1 - Low plasticity clay (CL,CI), consiste
2 Shtresa Nr.2 - Sandy clay (CS), consistency
3 Shtresa Nr.3 - Sandy clay (CS), consistency firm
Soil characteristics
Shtresa Nr.2 - Sandy clay (CS), consistency firm
Unit weight : γ = 21.00 kN/m³
Stress-state : effective
Angle of internal friction : φef = 21.00 °
Cohesion of soil : cef = 50.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γsat = 22.00 kN/m³
Add
Edit
Remove
Copy
current soil
selected soils
all soils
Paste
soils
Pictures
Add picture
Solis : 0
Total : 0
List of pictures
GeoClipboard™


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
Modification of soil parameters
Identification
Name : Shtrsa Nr.3 - Sandy clay (CS), consistency firm
Sandy clay (CS), consistency firm
Basic data
Unit weight : γ = 21.00 [kN/m³] 18.5
Stress-state : effective
Angle of internal friction : φef = 26.00 [°] 22-27
Cohesion of soil : cef = 80.00 [kPa] 10-18
Angle of friction struc.-soil : δ = 12.00 [°]
Pressure at rest
Soil : cohesive
Poisson's ratio : ν = 0.35 [–] 0.35
Uplift pressure
Calc. mode of uplift : standard
Saturated unit weight : γsat = 22.00 [kN/m³]
Draw
Color
Pattern category
GEO
Pattern
Sandy clay
Classification
Classify
Delete
OK +
OK
Cancel
Classification of soils
Classification, consistency, density
Soil classification : CS - Sandy clay
Consistency : Firm consistency (hard to deform by hand squeezing)
Standard characteristics of soils
Sandy clay (CS), consistency firm
Soil parameters Mark Unit Value
Poisson's ratio ν [–] 0.35
Unit weight γ [kN/m³] 18.5
Deformation modulus Edef [MPa] 4 - 6
Effective parameters :
Angle of internal friction φef [°] 22 - 27
Cohesion of soil cef [kPa] 10 - 18
Total parameters :
Angle of internal friction φu [°] 0
Cohesion of soil cu [kPa] 50
Design strength :
Foundation width < 3.0 m Rd [kPa] 150
Coeff. of structural strength m [–] 0.2
for Edef < 4, overconsolidated m [–] 0.1
Manually
OK
OK + Assign
Cancel
Manual classification of soils
Grading
Fine particles (0,0 .. 0,06 mm) : f = 50.0 [%]
Sandy particles (0,06 mm .. 2,0 mm) : s = 40.0 [%]
Gravelly particles (2,0 mm .. 60,0 mm) : g = 10.0 [%]
Sum f + s + g must be equal to 100%
Moisture
Sample moisture : w = 22.0 [%]
Moisture content at the liquid limit : wl = 33.0 [%]
Moisture content at the plasticity limit : wp = 19.0 [%]
It must hold wl > wp
Classification
Sandy clay (CS), consistency firm
OK
Cancel
Soil name
1 Shtresa Nr.1 - Low plasticity clay (CL,CI), consiste
2 Shtresa Nr.2 - Sandy clay (CS), consistency firm
3 Shtrsa Nr.3 - Sandy clay (CS), consistency
Soil characteristics
Shtrsa Nr.3 - Sandy clay (CS), consistency firm
Unit weight : γ = 21.00 kN/m3
Stress-state : effective
Angle of internal friction : φef = 26.00 °
Cohesion of soil : cef = 80.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γsat = 22.00 kN/m3
Add
Edit
Remove
Copy
current soil
selected soils
all soils
Paste
soils
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Solis : 0
Total : 0
List of pictures
3.70
3.70
1.70
3.00
2.00
5.00


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
Soils:
No. of layer
Thickness [m]
Assigned soil
1 3.00 Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
2 2.00 Shtresa Nr.2 - Sandy clay (CS), consistency firm
3 5.00 Shtrsa Nr.3 - Sandy clay (CS), consistency firm
4 Shtrsa Nr.3 - Sandy clay (CS), consistency firm
Assign
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Assign : 0
Total : 0
List of pictures
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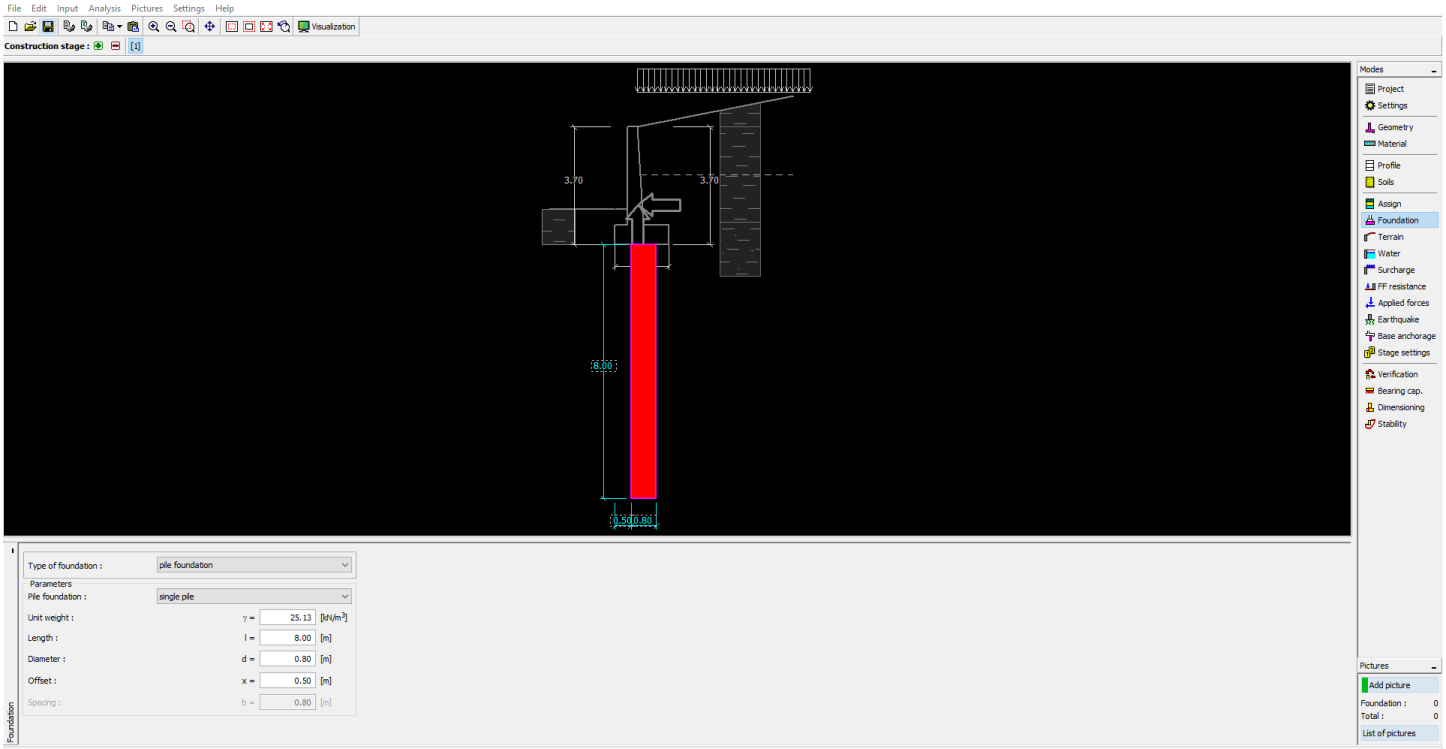
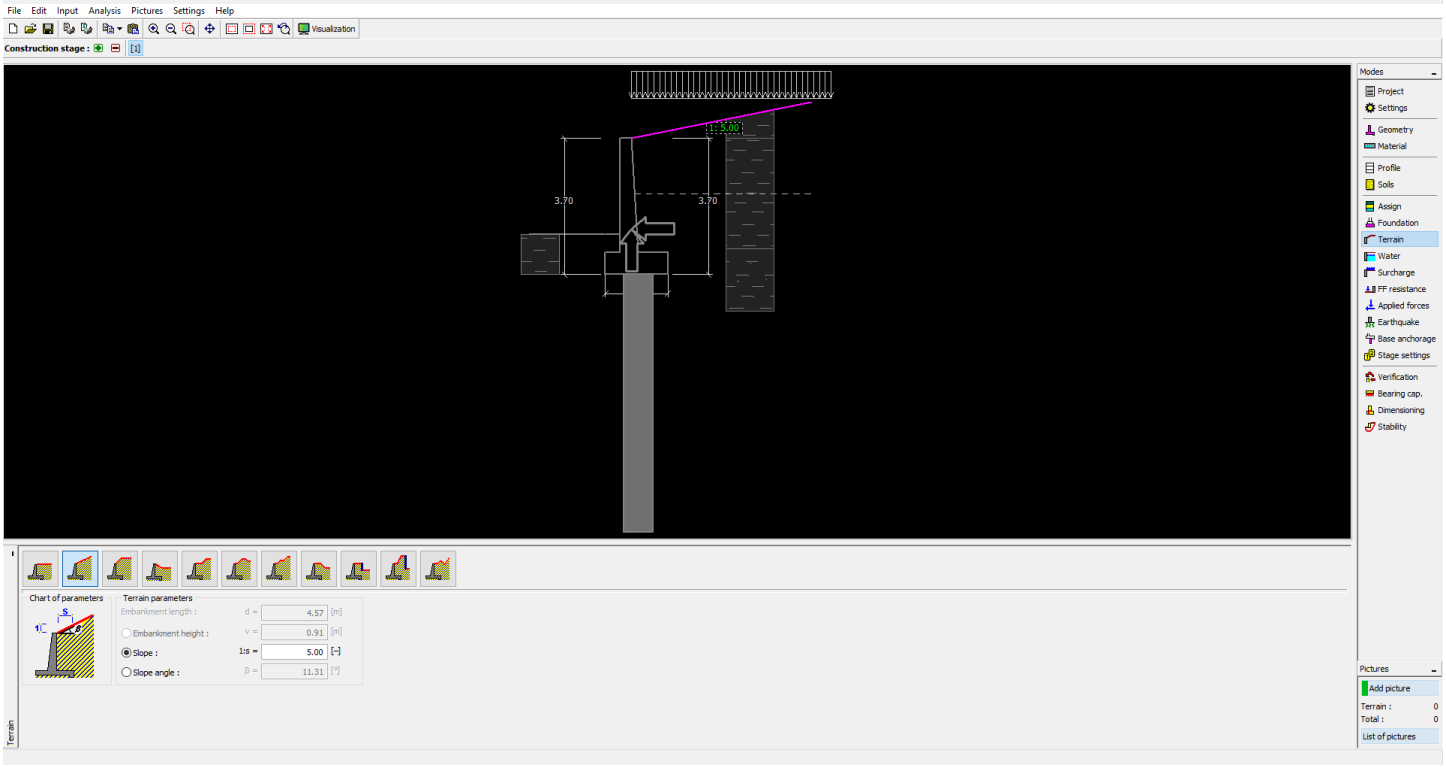
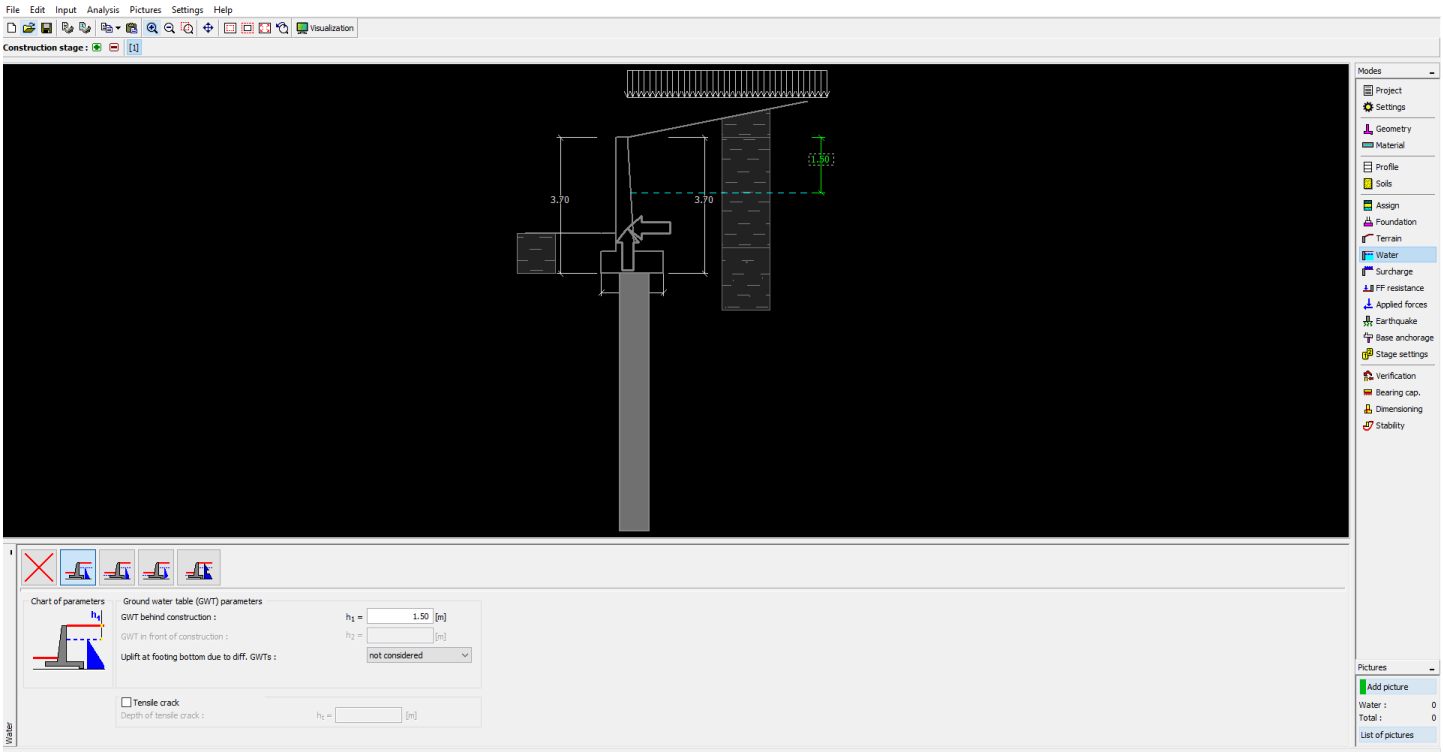
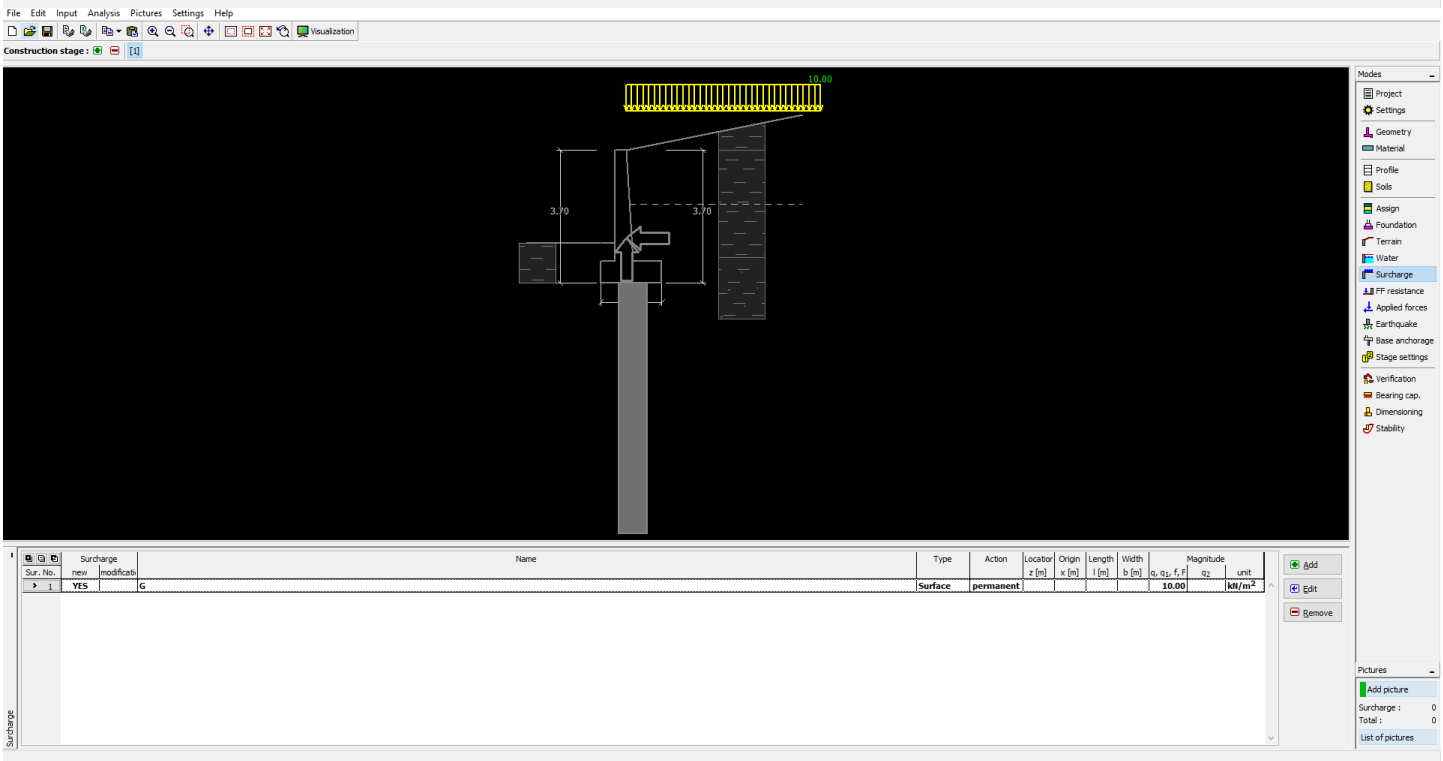
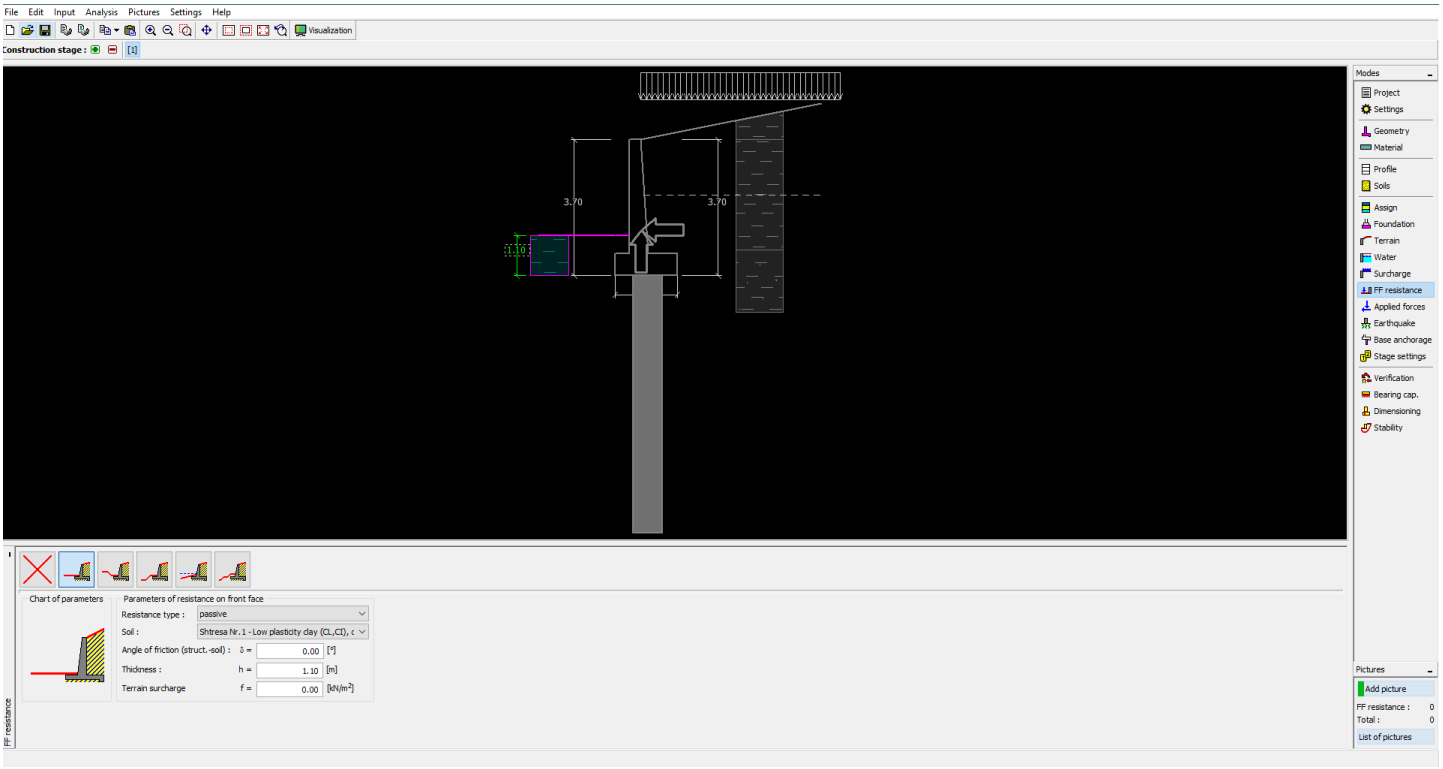
3.70
1.78
3.00
2.00
5.00

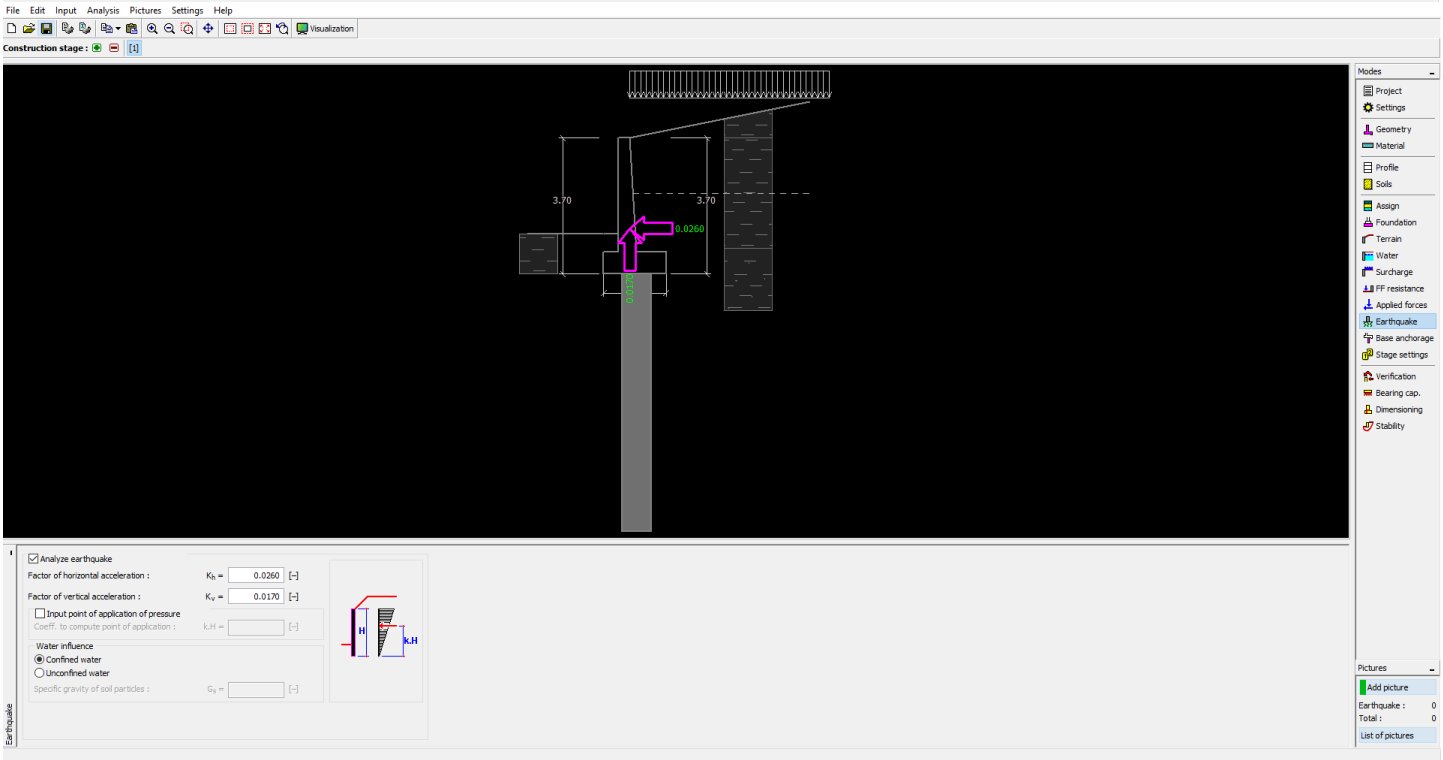

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
3.70
3.70
8.00
0.50 0.80
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Type of foundation : pile foundation
Parameters
Pile foundation : single pile
Unit weight : γ = 25.13 [kN/m³]
Length : l = 8.00 [m]
Diameter : d = 0.80 [m]
Offset : x = 0.50 [m]
Spacing : b = 0.80 [m]
Foundation
Pictures
Add picture
Foundation : 0
Total : 0
List of pictures

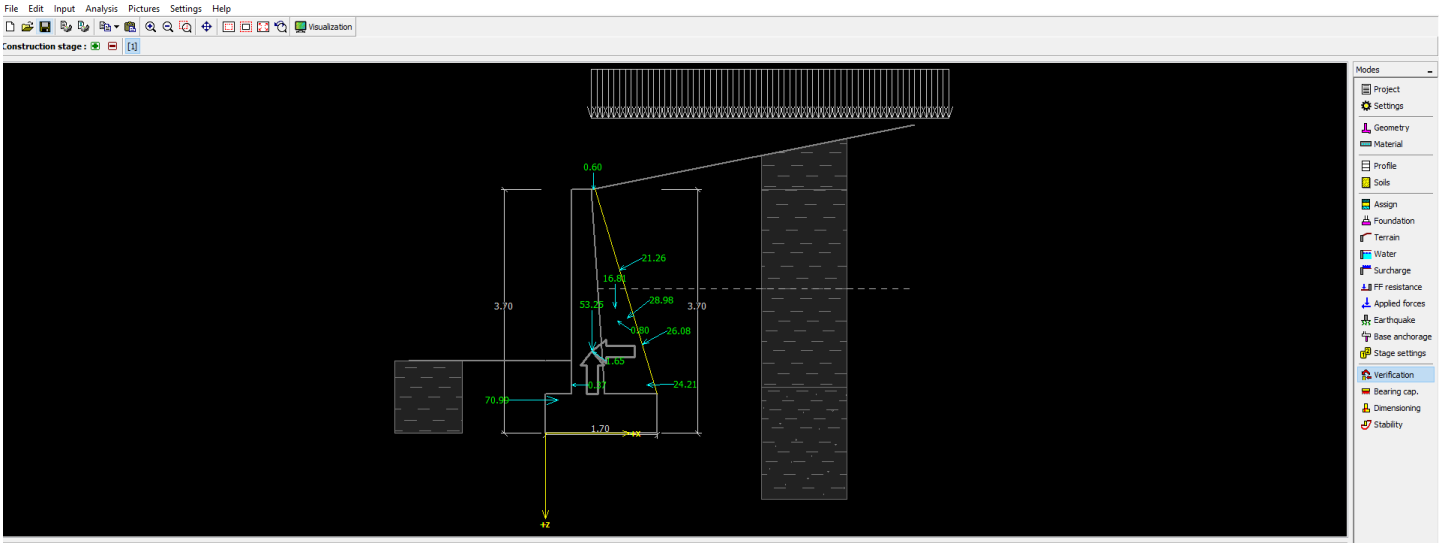

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
5.00
3.70
3.70
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of parameters
Terrain parameters
Embankment length : d = 4.57 [m]
Embankment height : v = 0.91 [m]
Slope : 1:s = 5.00 [-]
Slope angle : β = 11.31 [°]
Terrain
Pictures
Add picture
Terrain : 0
Total : 0
List of pictures

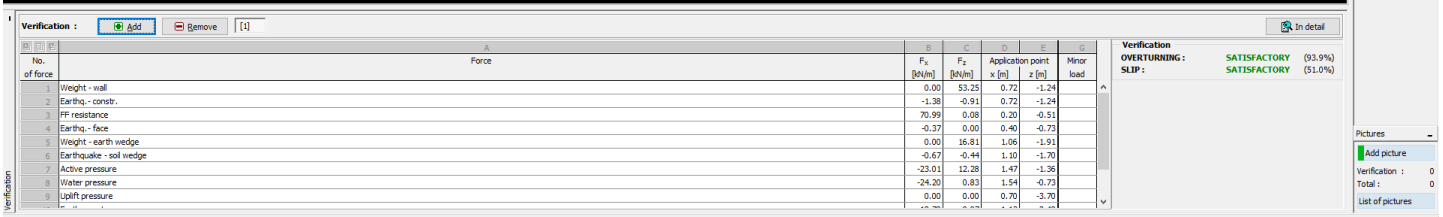

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
3.70
3.70
1.50
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of parameters
Ground water table (GWT) parameters
GWT behind construction :
1.50 [m]
GWT in front of construction :
Uplift at footing bottom due to diff. GWTs :
not considered
Tensile crack
Depth of tensile crack :
Pictures
Add picture
Water : 0
Total : 0
List of pictures
Water


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
10.00
3.70
3.70
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Surcharge
Sur. No.
new
modificati
Name
Type
Action
Locatior z [m]
Origin x [m]
Length l [m]
Width b [m]
Magnitude q, q1, f, F
q2
unit
1
YES
G
Surface
permanent
10.00
kN/m2
Add
Edit
Remove
Pictures
Add picture
Surcharge : 0
Total : 0
List of pictures
Surcharge

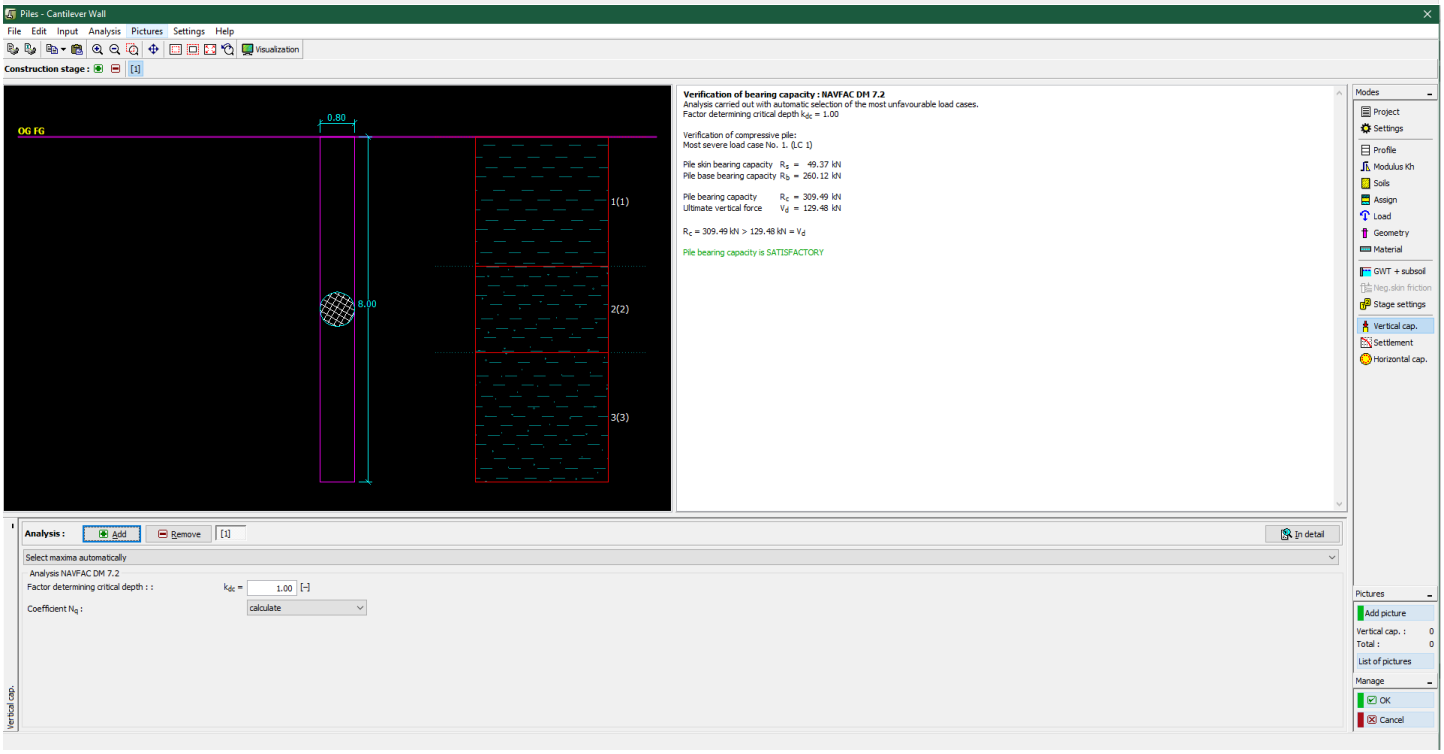

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
3.70
3.70
1.10
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of parameters
Parameters of resistance on front face
Resistance type : passive
Soil : Shtresa Nr. 1 - Low plasticity clay (CL,CI), c
Angle of friction (struct.-soil) : δ = 0.00 [°]
Thickness : h = 1.10 [m]
Terrain surcharge f = 0.00 [kN/m²]
FF resistance
Pictures
Add picture
FF resistance : 0
Total : 0
List of pictures

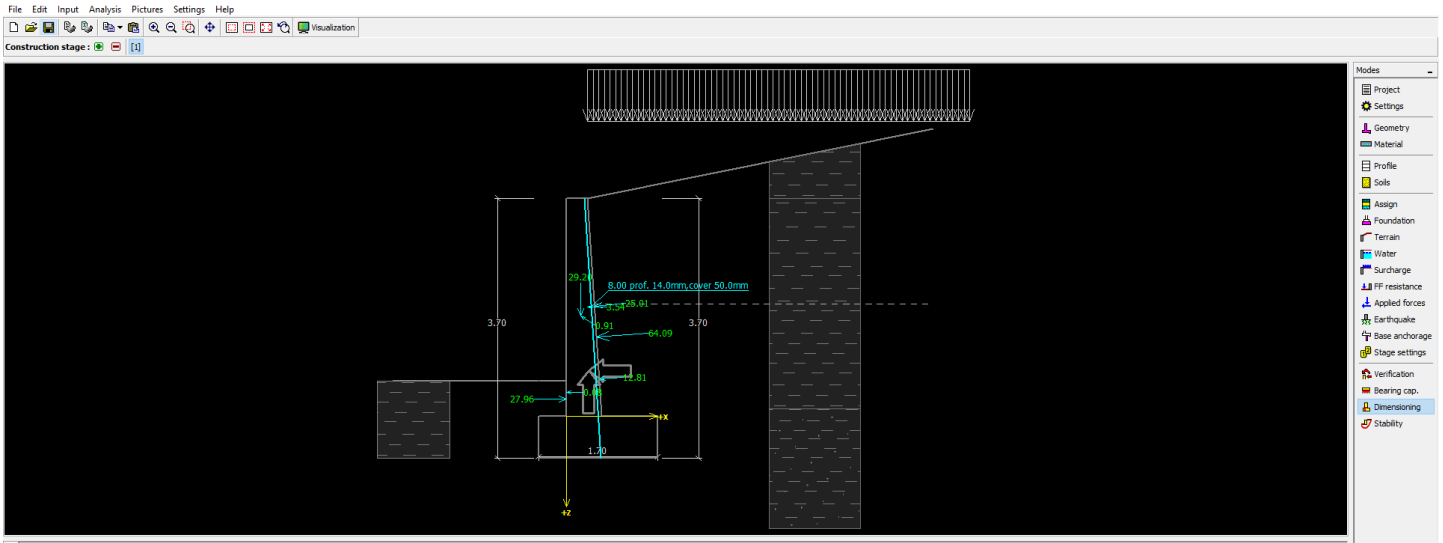

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
3.70
3.70
0.0260
0.0170
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Analyze earthquake
Factor of horizontal acceleration : Kh = 0.0260 [–]
Factor of vertical acceleration : Kv = 0.0170 [–]
Input point of application of pressure
Coeff. to compute point of application : k.H = [–]
Water influence
Confined water
Unconfined water
Specific gravity of soil particles : Gs = [–]
H
k.H
Earthquake
Pictures
Add picture
Earthquake : 0
Total : 0
List of pictures





No. of force	Force	F_x [kN/m]	F_z [kN/m]	Application point x [m]	Application point z [m]	Minor load
1	Weight - wall	0.00	53.25	0.72	-1.24	
2	Earthq. - constr.	-1.38	-0.91	0.72	-1.24	
3	FF resistance	70.99	0.08	0.20	-0.51	
4	Earthq. - face	-0.37	0.00	0.40	-0.73	
5	Weight - earth wedge	0.00	16.81	1.06	-1.91	
6	Earthquake - soil wedge	-0.67	-0.44	1.10	-1.70	
7	Active pressure	-23.01	12.28	1.47	-1.36	
8	Water pressure	-24.20	0.83	1.54	-0.73	
9	Uplift pressure	0.00	0.00	0.70	-3.70	





Dimensioning : Add Remove [1] In detail

No. of force	Force	F_x [kN/m]	F_z [kN/m]	Applic. point x [m]	Applic. point z [m]	Minor load
1	Weight - wall	0.00	29.20	0.20	-1.42	
2	Earthq.- constr.	-0.76	-0.50	0.20	-1.42	
3	FF resistance	27.96	0.00	0.00	-0.24	
4	Earthq.- face	-0.08	0.00	0.00	-0.33	
5	Pressure at rest	-63.88	5.15	0.43	-1.12	
6	Water pressure	-12.78	0.82	0.47	-0.53	
7	Uplift pressure	0.00	0.00	0.30	-3.10	
8	Earthquake - pressure at rest	-3.54	0.00	0.30	-1.55	
9	G	-24.89	2.48	0.40	-1.56	

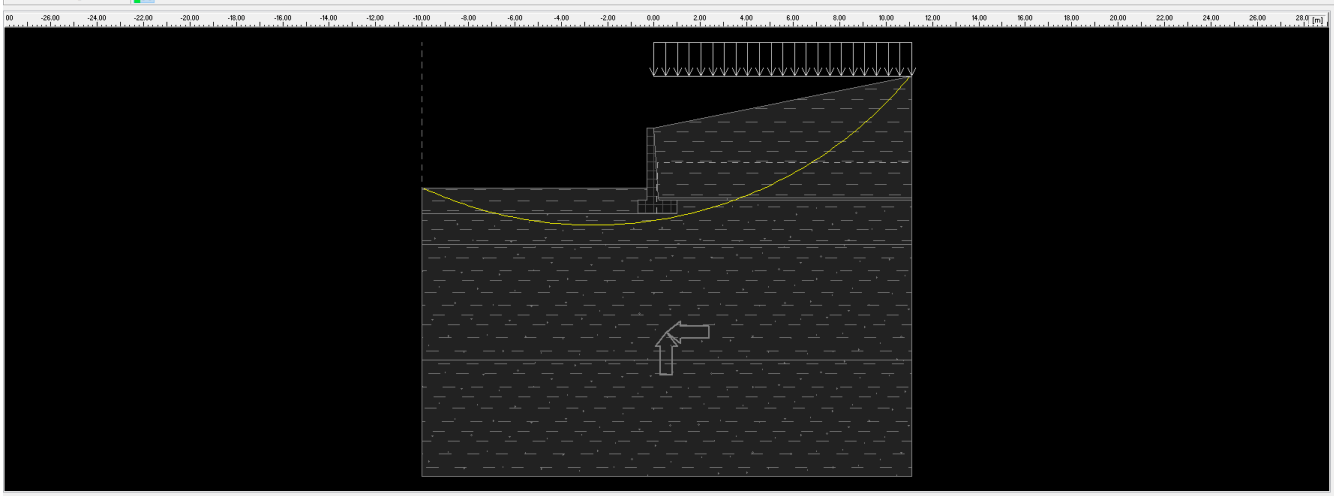
Location of dimensioning: Wall stem check

Data for dimensioning: Concrete cover: 50.0 [mm] No. of bars : 8.00 [-] CrSection width : 1.00 [m] Bar diameter : 14.0 [mm]

Required amount of steel area : 598.8 mm²
Inserted steel area : 1231.5 mm²

Wall stem check
SHEAR: SATISFACTORY (46.0%)
FLEXURE : SATISFACTORY (51.4%)
DESIGN PRINCIPLES : SATISFACTORY (48.6%)

Slope Stability - Cantilever Wall



Analysis : [1] Detailed results

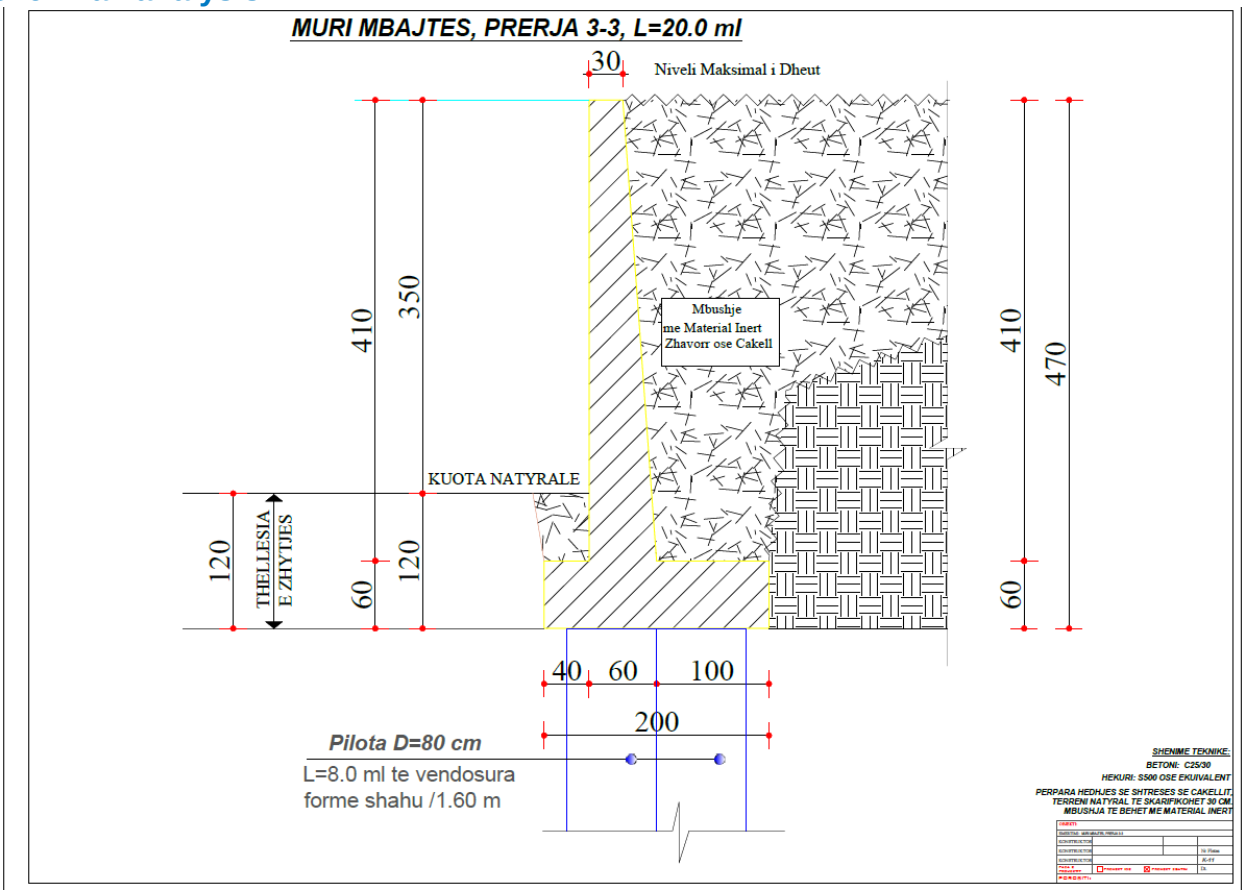
Analyze Slip surface : circular Substitute Remove Convert to polygon

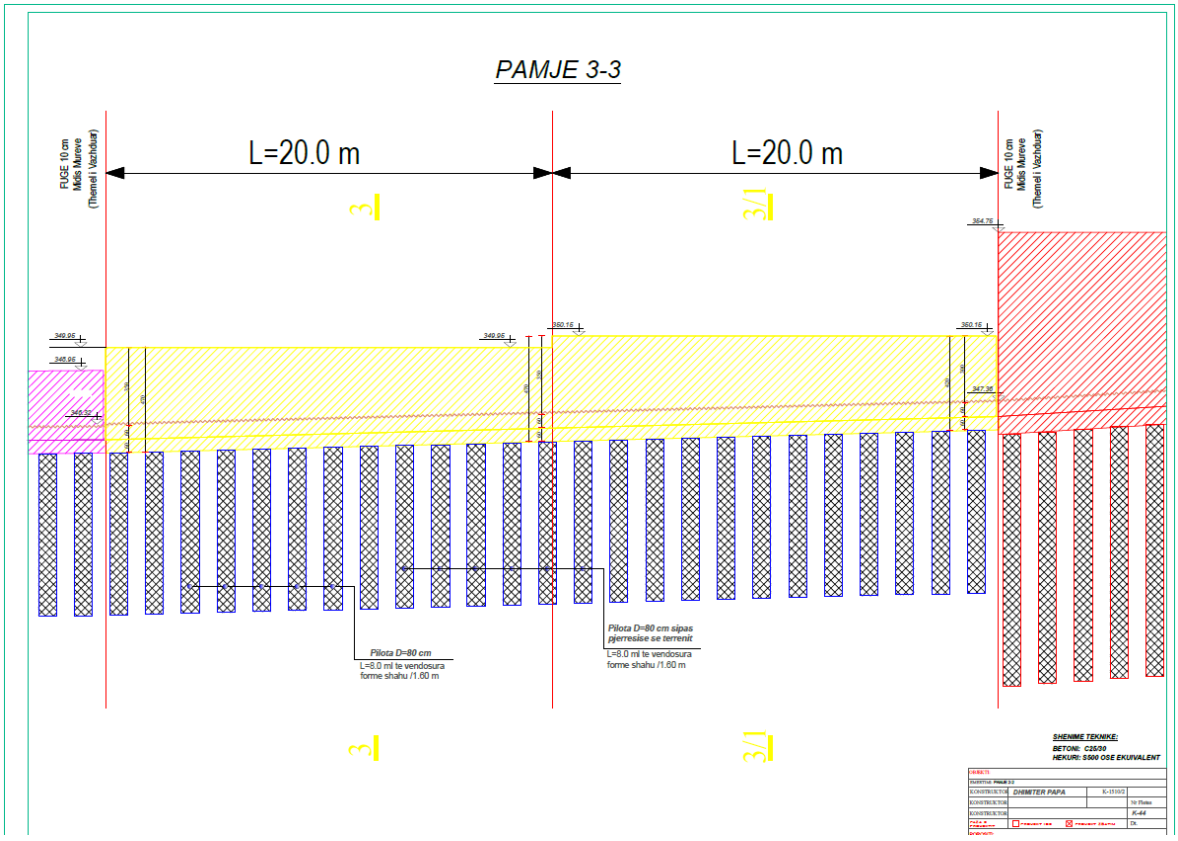
Circular slip surface
Center : Modify
x = -2.61 [m]
z = 13.54 [m]
Radius : R = 17.72 [m]
Angles : α_1 = -24.31 [°] α_2 = 50.18 [°]

Method : [all methods]
Analysis type : Standard
Restrictions
Assume anchors as infinite

Analysis
Slope stability verification (all methods)
Bishop : Utilization = 34.8 % ACCEPTABLE
Fellenius / Petterson : Utilization = 35.7 % ACCEPTABLE
Spencer : Utilization = 34.8 % ACCEPTABLE
Janbu : Utilization = 34.7 % ACCEPTABLE
Morgenstern-Price : Utilization = 34.7 % ACCEPTABLE

Cantilever wall analysis





Input data

Project

Task : Muret Mbajtese - SURREL
Part : Projekti i Perforcimit te Skarpates
Description : Muri Mbajtes - Prerja 3-3
Author : Dhimitri PAPA

Settings

Standard - EN 1997 - DA3 (2)

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard

Wall analysis

Active earth pressure calculation : Coulomb
Passive earth pressure calculation : Caquot-Kerisel
Earthquake analysis : Mononobe-Okabe
Shape of earth wedge : Calculate as skew
Base key : The base key is considered as inclined footing bottom
Allowable eccentricity : 0.333
Verification methodology : according to EN 1997
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)								
Permanent design situation								
		State STR				State GEO		
		Unfavourable		Favourable		Unfavourable	Favourable	
Permanent actions :	γ_G =	1.35	[–]	1.00	[–]	1.00 [–]	1.00	[–]
Variable actions :	γ_Q =	1.50	[–]	0.00	[–]	1.30 [–]	0.00	[–]
Water load :	γ_w =					1.00 [–]		

Partial factors for soil parameters (M)			
Permanent design situation			
Partial factor on internal friction :	γ_ϕ =	1.25	[–]
Partial factor on effective cohesion :	γ_c =	1.25	[–]
Partial factor on undrained shear strength :	γ_{cu} =	1.40	[–]
Partial factor on Poisson's ratio :	γ_v =	1.00	[–]

Partial factors for variable actions			
Permanent design situation			
Factor for combination value :	ψ_0 =	0.70	[–]
Factor for frequent value :	ψ_1 =	0.50	[–]
Factor for quasi-permanent value :	ψ_2 =	0.30	[–]

Material of structure

Unit weight γ = 23.56 kN/m^3
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete : C 25/30
Cylinder compressive strength f_{ck} = 25.00 MPa
Tensile strength f_{ctm} = 2.60 MPa

Longitudinal steel : B500

Yield strength f_{yk} = 500.00 MPa

Geometry of structure

No.	Coordinate X [m]	Depth Z [m]
1	0.00	0.00
2	0.30	3.60
3	1.30	3.60
4	1.30	4.20
5	-0.70	4.20
6	-0.70	3.60
7	-0.30	3.60
8	-0.30	0.00

The origin [0,0] is located at the most upper right point of the wall.
Wall section area = 2.82 m^2.

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m^3]	γ_{su} [kN/m^3]	δ [°]
1	Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm		14.00	25.00	19.00	10.00	12.00
2	Shtresa Nr.2 - Sandy clay (CS), consistency firm		21.00	50.00	21.00	12.00	12.00
3	Shtrsa Nr.3 - Sandy clay (CS), consistency firm		26.00	80.00	21.00	12.00	12.00

Soil parameters to compute pressure at rest

No.	Name	Pattern	Type calculation	φ_{ef} [°]	ν [–]	OCR [–]	K_r [–]
1	Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm		cohesive	-	0.40	-	-
2	Shtresa Nr.2 - Sandy clay (CS), consistency firm		cohesive	-	0.35	-	-
3	Shtrsa Nr.3 - Sandy clay (CS), consistency firm		cohesive	-	0.35	-	-

Soil parameters

Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm

Unit weight : γ = 19.00 kN/m^3
Stress-state : effective
Angle of internal friction : φ_{ef} = 14.00 °
Cohesion of soil : c_{ef} = 25.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.40
Saturated unit weight : γ_{sat} = 20.00 kN/m^3

Shtresa Nr.2 - Sandy clay (CS), consistency firm

Unit weight : γ = 21.00 kN/m^3
Stress-state : effective
Angle of internal friction : φ_{ef} = 21.00 °

Cohesion of soil : c_{ef} = 50.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γ_{sat} = 22.00 kN/m^3

Shtrsa Nr.3 - Sandy clay (CS), consistency firm
Unit weight : γ = 21.00 kN/m^3
Stress-state : effective
Angle of internal friction : φ_{ef} = 26.00 °
Cohesion of soil : c_{ef} = 80.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γ_{sat} = 22.00 kN/m^3

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	3.00	Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm	
2	2.00	Shtresa Nr.2 - Sandy clay (CS), consistency firm	
3	5.00	Shtrsa Nr.3 - Sandy clay (CS), consistency firm	
4	-	Shtrsa Nr.3 - Sandy clay (CS), consistency firm	

Foundation

Type of foundation : pile foundation
Unit weight γ = 25.13 kN/m^3
Geometry
Length l = 7.00 m
Offset d = 0.80 m
Diameter x = 0.50 m

Terrain profile

Terrain behind construction has the slope 1: 5.00 (slope angle is 11.31 °).

Water influence

GWT behind the structure lies at a depth of 3.00 m
Uplift in foot. bottom due to different pressures is not considered.
The evolution of tensile cracks is considered in the analyses. Depth of cracks is 0.80 m.

Input surface surcharges

No.	Surcharge new	Surcharge change	Action	Mag.1 [kN/m^2]	Mag.2 [kN/m^2]	Ord.x x [m]	Length l [m]	Depth z [m]
1	YES		permanent	10.00				on terrain

No.	Name
1	G

Resistance on front face of the structure

Resistance on front face of the structure: passive

Soil on front face of the structure - Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
Angle of friction struc.-soil $\delta = 0.00$ °
Soil thickness in front of structure $h = 1.20$ m

Terrain in front of structure is flat.

Earthquake

Factor of horizontal acceleration $K_h = 0.0220$
Factor of vertical acceleration $K_v = 0.0170$

Water below the GWT is restricted.

Settings of the stage of construction

Design situation : permanent
The wall is free to move. Active earth pressure is therefore assumed.

Verification No. 1

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. overtur.	Coeff. sliding	Coeff. stress
Weight - wall	0.00	-1.39	66.45	0.79	1.000	1.000	1.350
Earthq.- constr.	1.46	-1.39	-1.13	0.79	1.000	1.000	1.000
FF resistance	-79.15	-0.55	0.08	0.20	1.000	1.000	1.000
Earthq.- face	0.38	-0.80	0.00	0.40	1.000	1.000	1.000
Weight - earth wedge	0.00	-2.07	35.31	1.20	1.000	1.000	1.000
Earthquake - soil wedge	0.89	-1.93	-0.69	1.23	1.000	1.000	1.000
Active pressure	36.73	-1.79	20.55	1.62	1.000	1.000	1.000
Water pressure	7.20	-0.40	0.15	1.94	1.000	1.000	1.000
Tensile crack	3.31	-3.68	0.00	0.84	1.000	1.000	1.000
Uplift pressure	0.00	-4.20	0.00	0.70	1.000	1.000	1.000
Earthq.- act.pressure	25.94	-2.99	14.43	1.23	1.000	1.000	1.000
G	26.97	-2.07	21.64	1.42	1.000	1.000	1.000
G	0.00	-4.21	1.37	0.77	1.000	1.000	1.000

Verification of complete wall

Check for overturning stability
Resisting moment $M_{res} = 176.28$ kNm/m
Overturning moment $M_{ovr} = 174.78$ kNm/m

Wall for overturning is SATISFACTORY

Overall check - WALL is SATISFACTORY

Maximum stress in footing bottom : 8369.56 kPa
Warning - allowable range of input data exceeded during earthquake analysis!
The analysis is carried out with the modified value of terrain inclination β.

Bearing capacity of foundation soil

Design load acting at the pile head

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]	Eccentricity [–]	Stress [kPa]
1	143.42	181.42	23.72	0.445	828.94
2	140.85	158.16	23.72	0.495	8369.56

Service load acting at the pile head

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	16.37	133.94	-51.73

Input parameters for bearing capacity analysis
Pile spacing s = 1.00 m

Dimensioning No. 1

Forces acting on construction

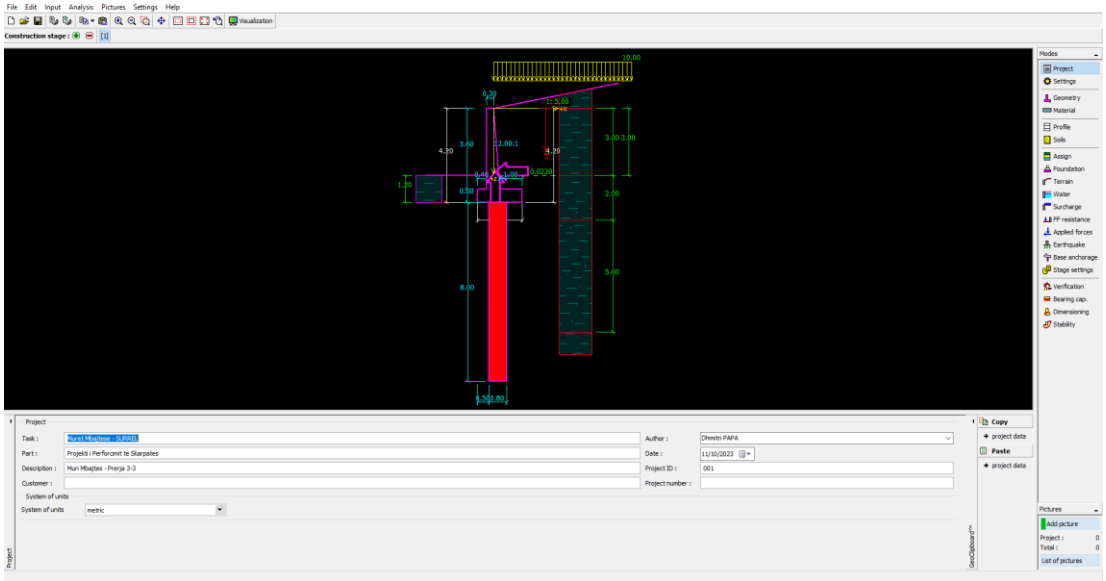
Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Weight - wall	0.00	-0.30	14.14	1.50	1.350
Weight - earth wedge	0.00	-2.07	35.31	1.20	1.000
Active pressure	36.73	-1.79	20.55	1.62	1.000
Tensile crack	3.31	-3.68	0.00	0.84	1.000
G	26.97	-2.07	21.64	1.42	1.000
Contact stress	0.00	0.00	0.00	1.00	1.000
Gravity surch. 1	0.00	-4.21	1.37	1.07	1.350

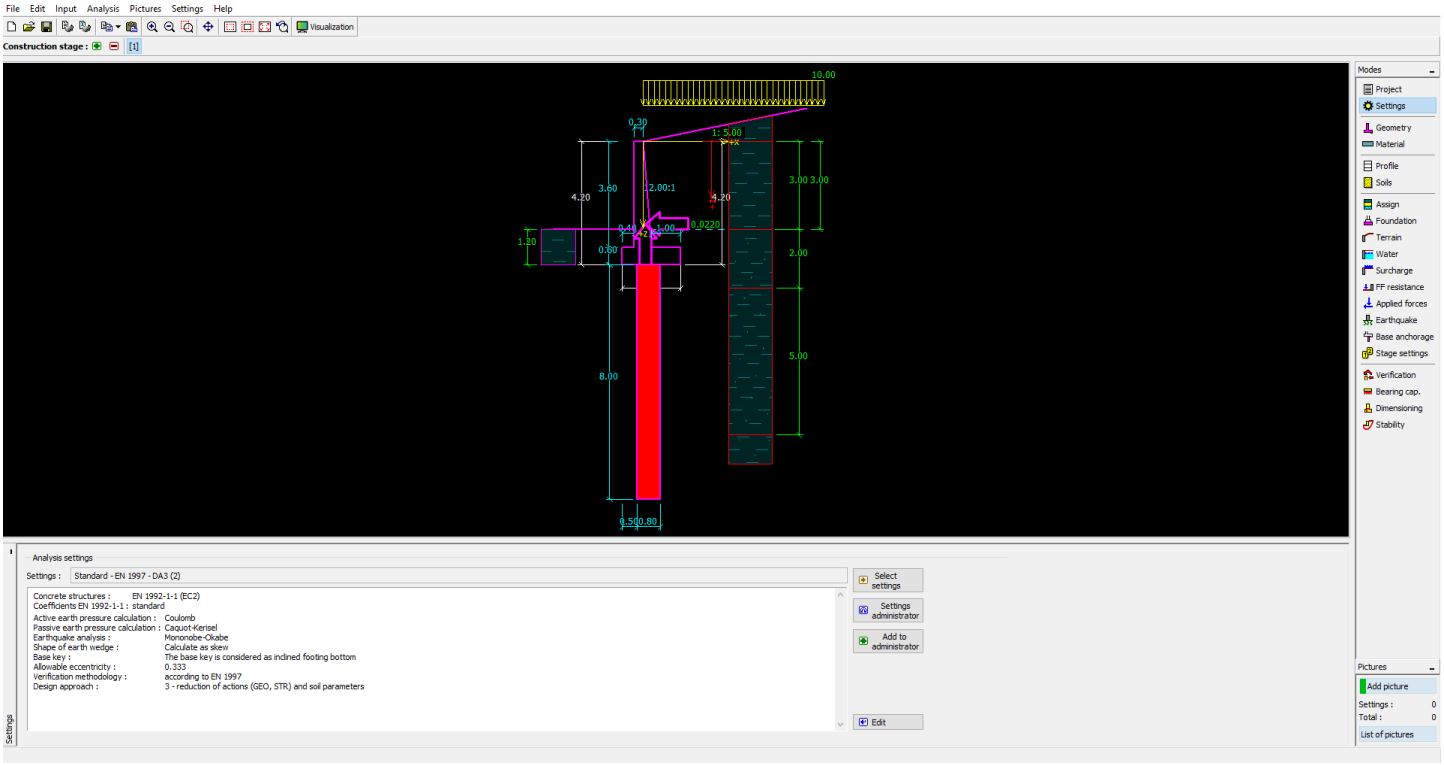
Back wall jump check

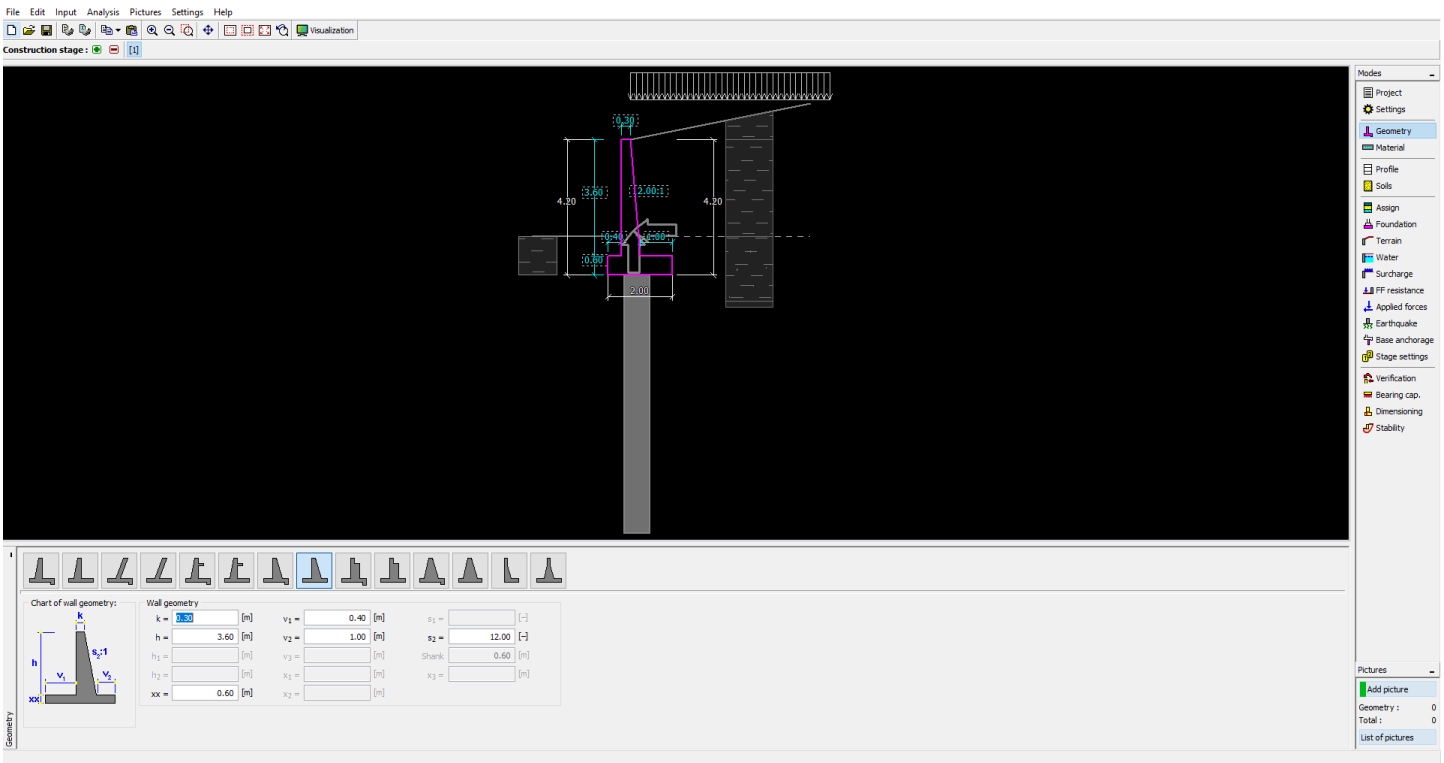
Reinforcement and dimensions of the cross-section
Bar diameter = 14.0 mm
Number of bars = 8
Reinforcement cover = 50.0 mm
Cross-section width = 1.00 m
Cross-section depth = 0.60 m

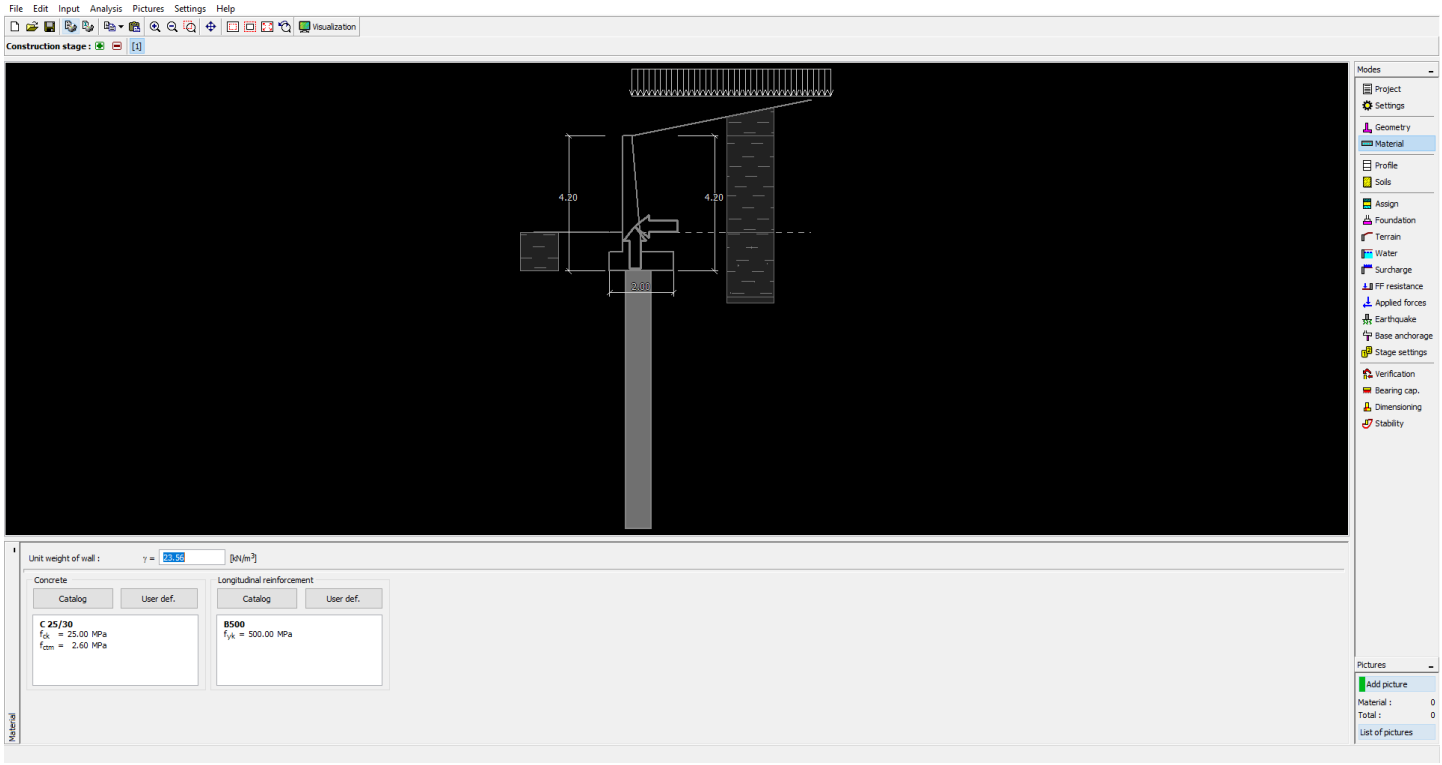
Reinforcement ratio	ρ	=	0.23	%	>	0.14	%	=	ρ_{min}
Position of neutral axis	x	=	0.04	m	<	0.33	m	=	x_{max}
Ultimate shear force	V_{Rd}	=	194.13	kN	>	98.43	kN	=	V_{Ed}
Ultimate moment	M_{Rd}	=	282.14	kNm	>	38.56	kNm	=	M_{Ed}

Cross-section is SATISFACTORY.




File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
10.00
0.30
1: 3.00
3.00 3.00
4.20
3.60
2.00:1
4.20
0.40
1.00
0.0220
1.20
0.80
2.00
5.00
8.00
0.50 0.80
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Analysis settings
Settings : Standard - EN 1997 - DA3 (2)
Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard
Active earth pressure calculation : Coulomb
Passive earth pressure calculation : Caquot-Kerisel
Earthquake analysis : Mononobe-Okabe
Shape of earth wedge : Calculate as skew
Base key : The base key is considered as inclined footing bottom
Allowable eccentricity : 0.333
Verification methodology : according to EN 1997
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters
Select settings
Settings administrator
Add to administrator
Edit
Settings
Pictures
Add picture
Settings : 0
Total : 0
List of pictures


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
0.30
3.60
2.00:1
4.20
4.20
0.40
1.00
0.80
2.00
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of wall geometry:
Wall geometry
k = 0.30 [m]
h = 3.60 [m]
h1 = [m]
h2 = [m]
xx = 0.60 [m]
v1 = 0.40 [m]
v2 = 1.00 [m]
v3 = [m]
x1 = [m]
x2 = [m]
s1 = [-]
s2 = 12.00 [-]
Shank 0.60 [m]
x3 = [m]
Geometry
Pictures
Add picture
Geometry : 0
Total : 0
List of pictures


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
4.20
4.20
2.00
Modes
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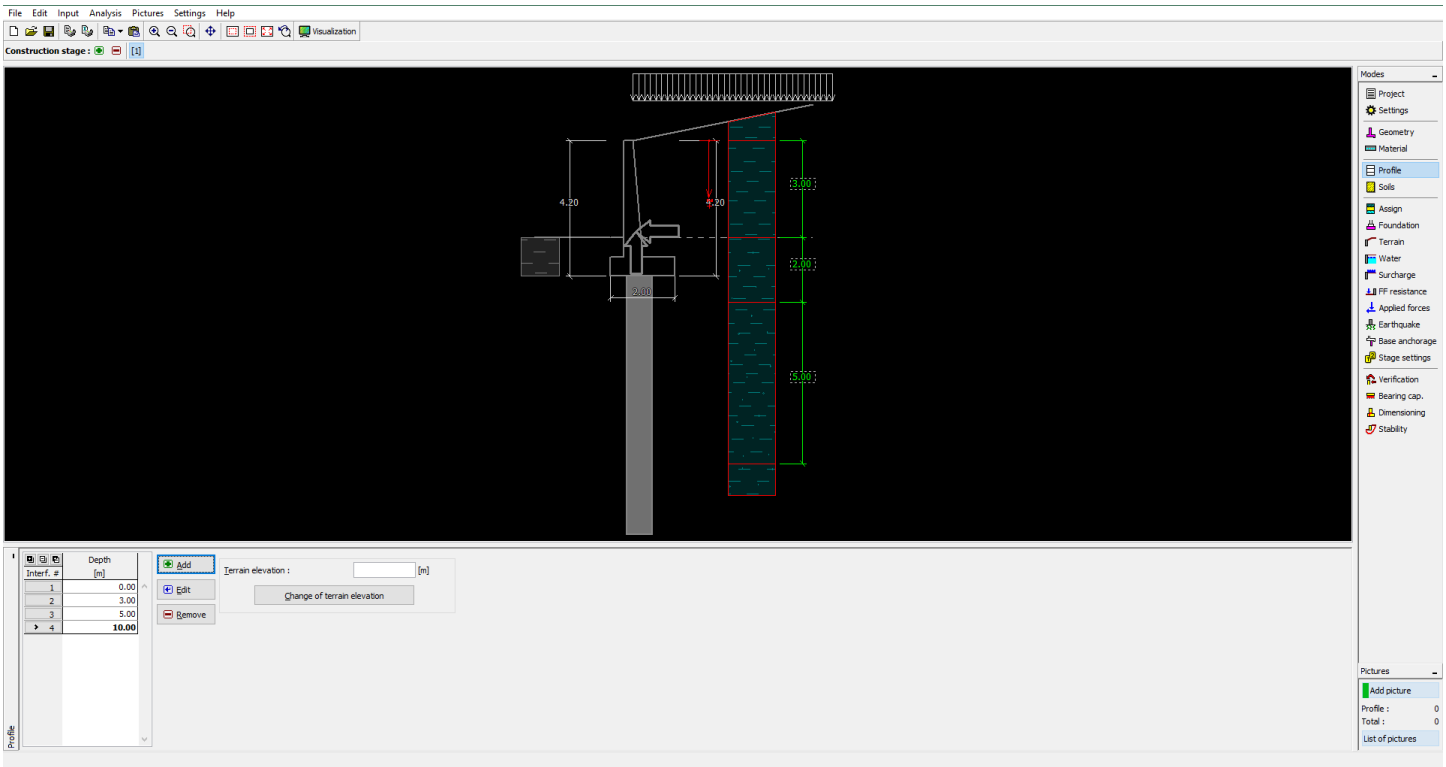
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Unit weight of wall :
γ =
25.50
[kN/m³]
Concrete
Catalog
User def.
C 25/30
fck = 25.00 MPa
fcm = 2.60 MPa
Longitudinal reinforcement
Catalog
User def.
B500
fyk = 500.00 MPa
Material
Pictures
Add picture
Material : 0
Total : 0
List of pictures


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
4.20
4.20
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3.00
2.00
5.00
Modes
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Assign
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Terrain
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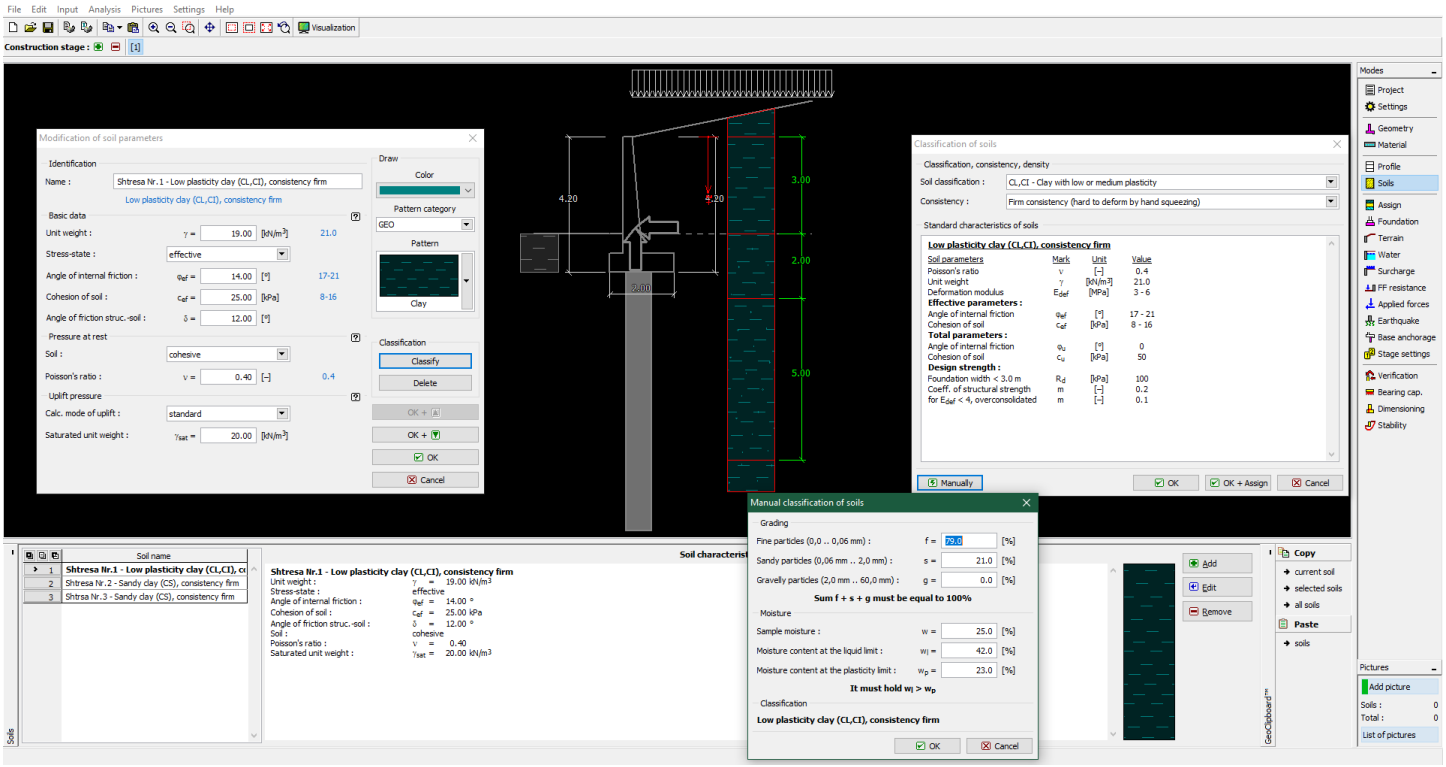
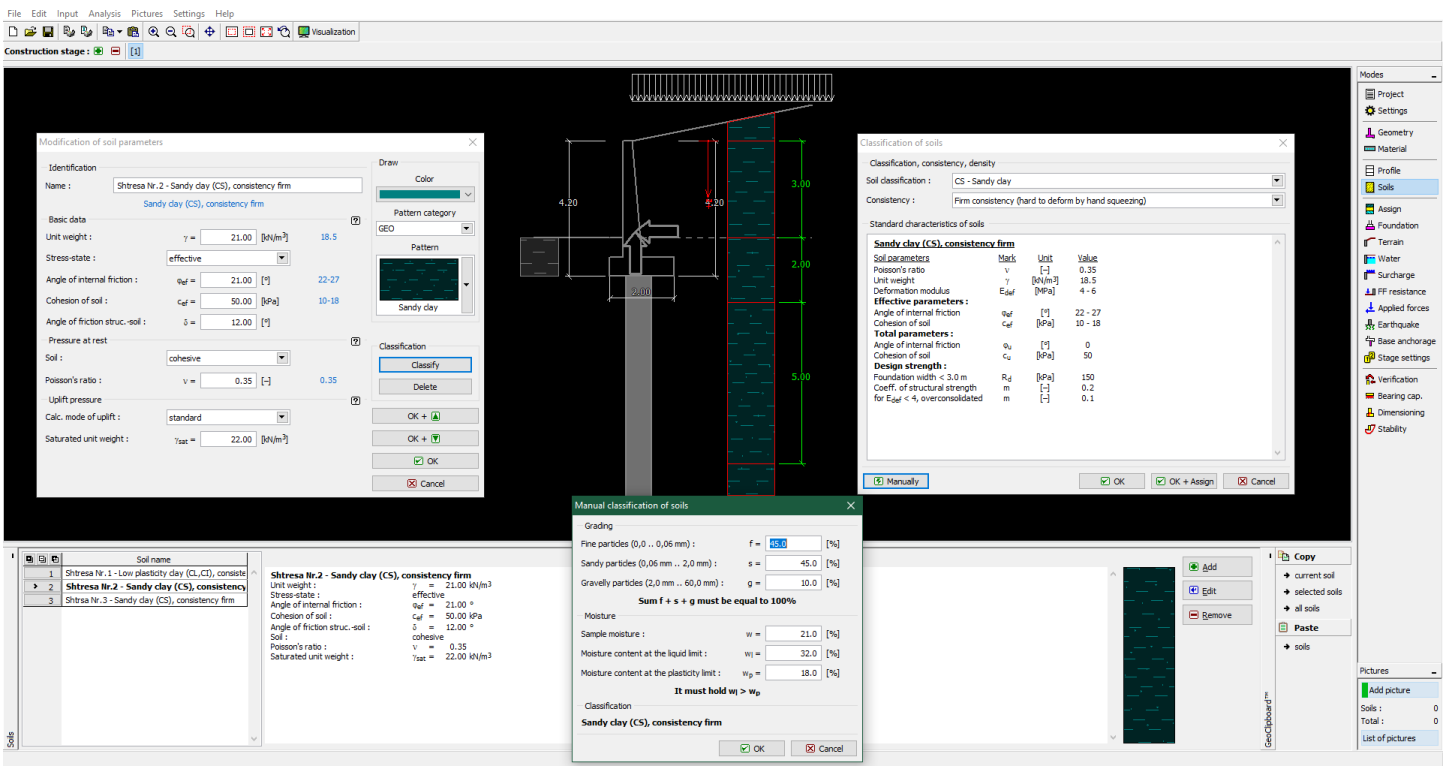
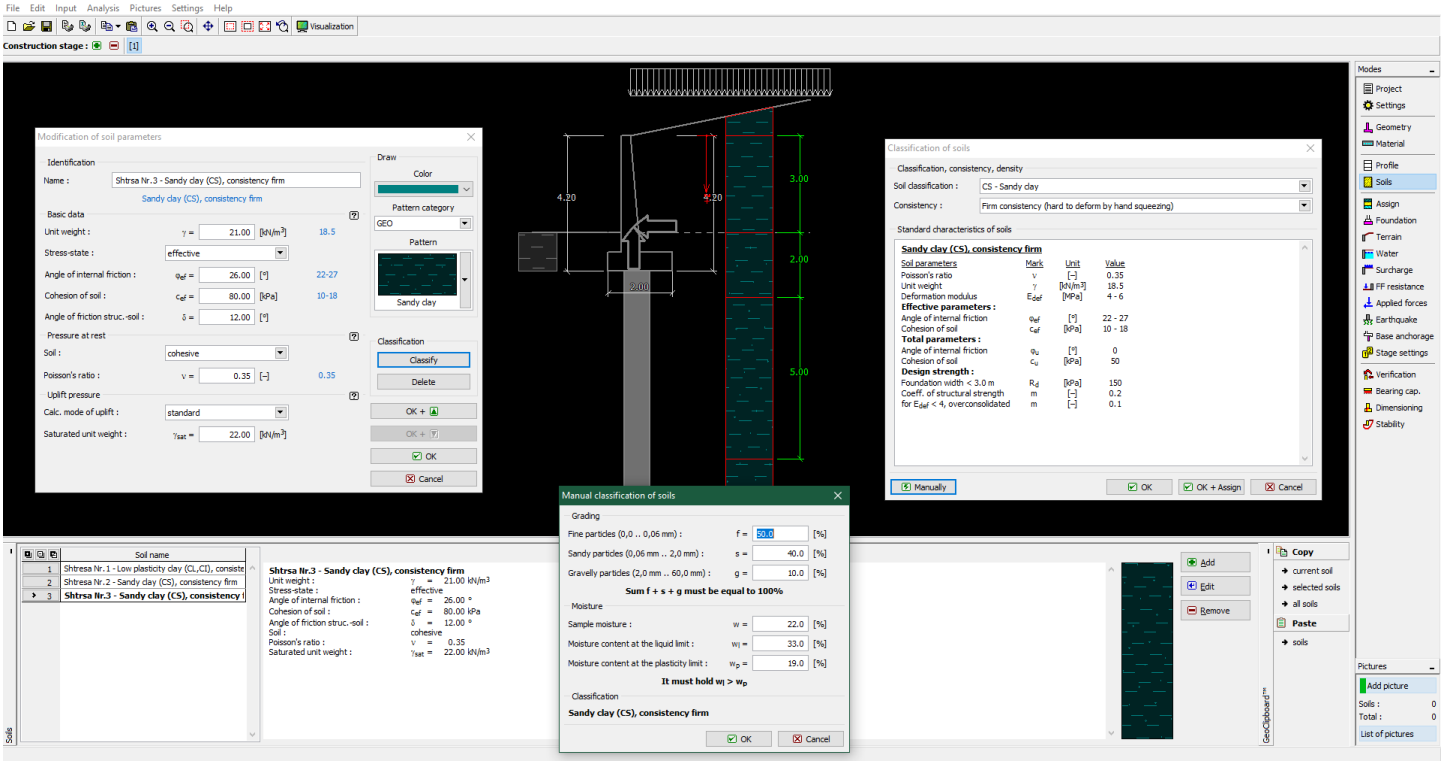
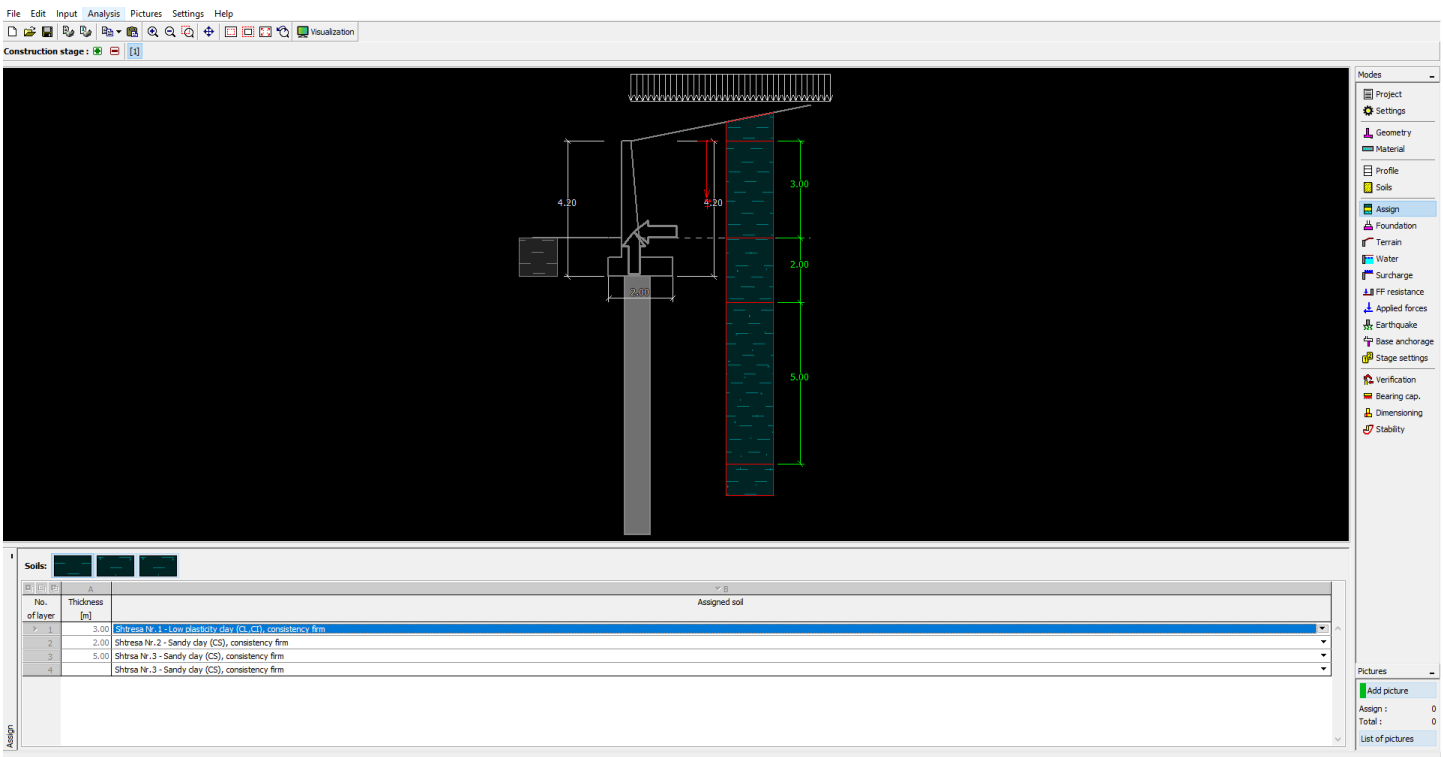
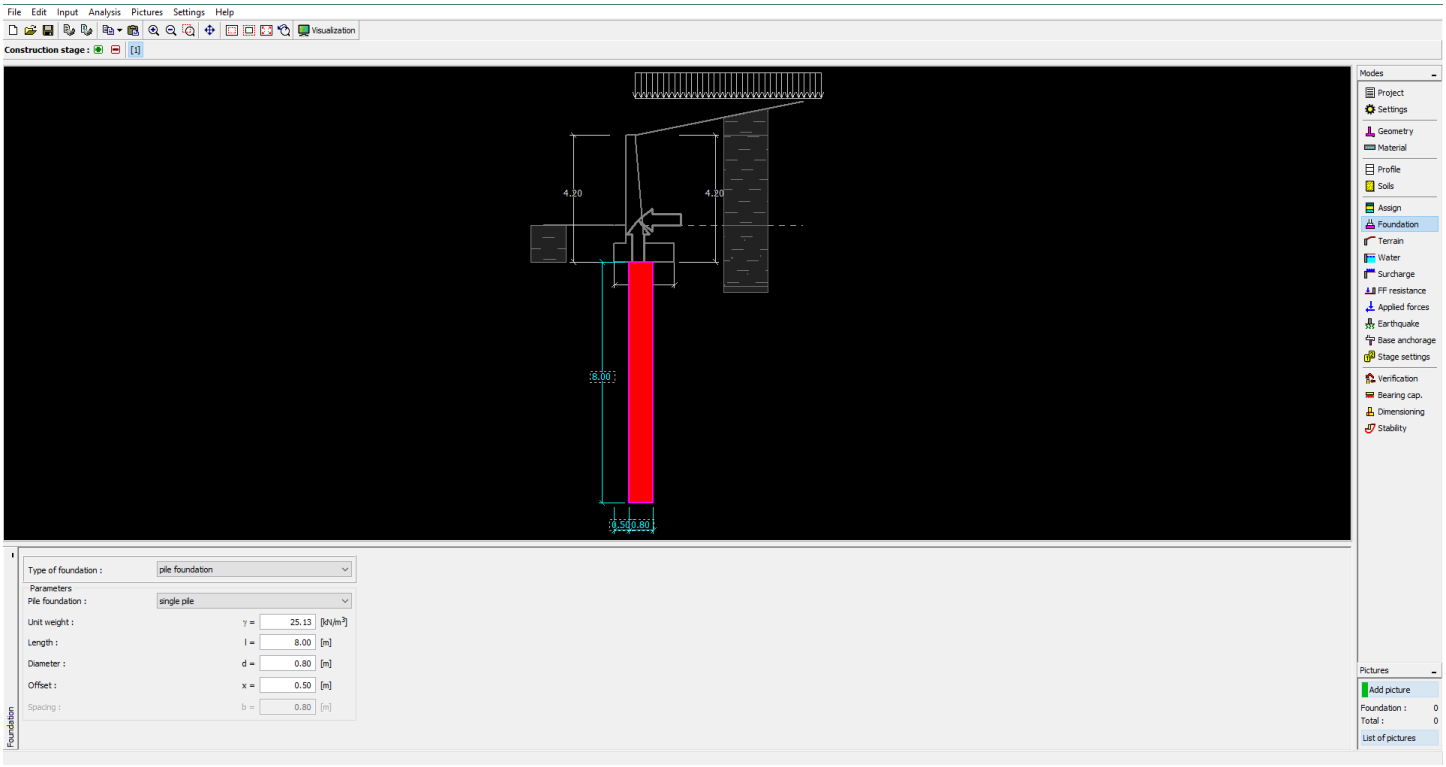
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Interf. #
Depth [m]
1 0.00
2 3.00
3 5.00
4 10.00
Add
Edit
Remove
Terrain elevation :
[m]
Change of terrain elevation
Profile
Pictures
Add picture
Profile : 0
Total : 0
List of pictures

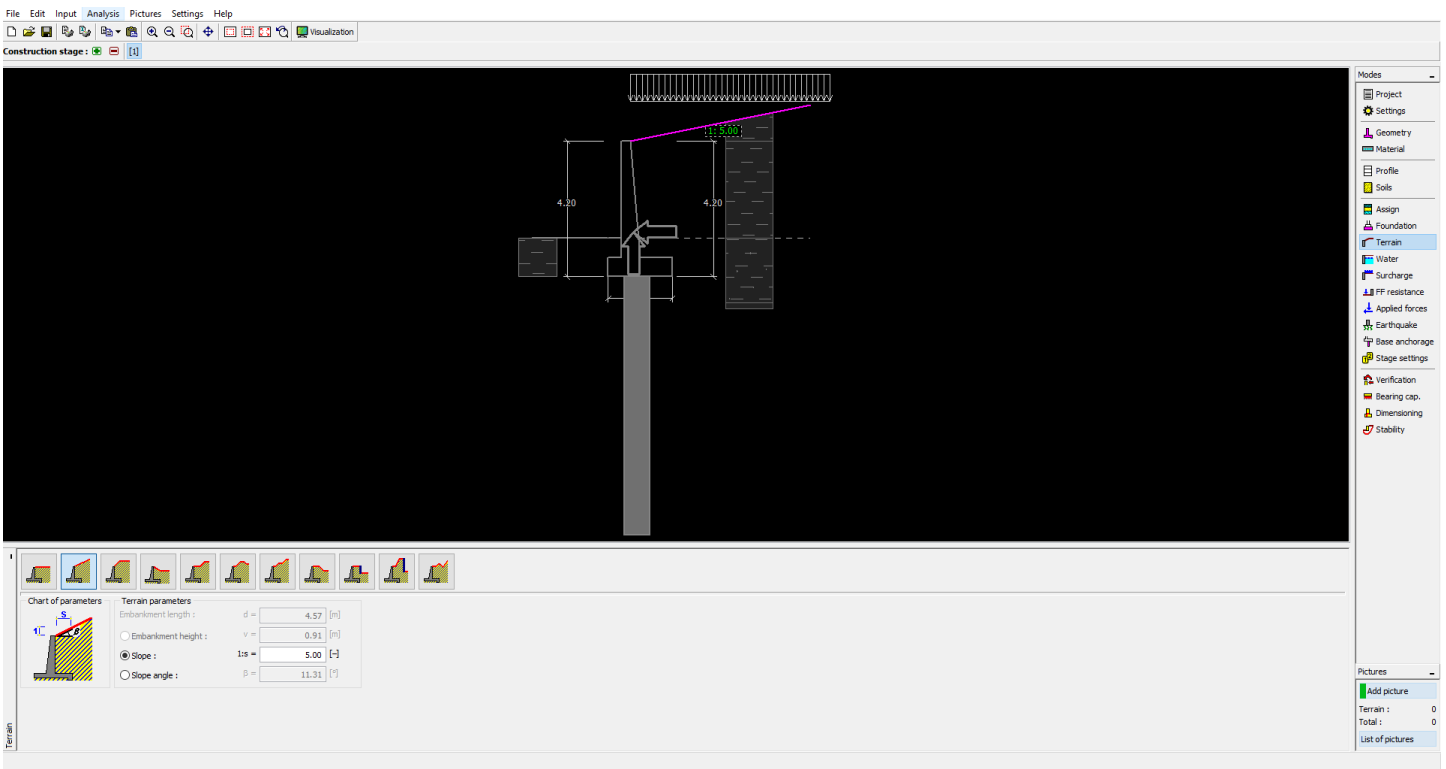

Modification of soil parameters
Identification
Name : Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
Low plasticity clay (CL,CI), consistency firm
Basic data
Unit weight : 19.00 [kN/m³] 21.0
Stress-state : effective
Angle of internal friction : 14.00 [°] 17-21
Cohesion of soil : 25.00 [kPa] 8-16
Angle of friction struc.-soil : 12.00 [°]
Pressure at rest
Soil : cohesive
Poisson's ratio : 0.40 [–] 0.4
Uplift pressure
Calc. mode of uplift : standard
Saturated unit weight : 20.00 [kN/m³]
Draw
Color
Pattern category
GEO
Pattern
Clay
Classification
Classify
Delete
OK + A
OK + ▼
OK
Cancel
4.20
3.00
2.00
5.00
Classification of soils
Classification, consistency, density
Soil classification : CL,CI - Clay with low or medium plasticity
Consistency : Firm consistency (hard to deform by hand squeezing)
Standard characteristics of soils
Low plasticity clay (CL,CI), consistency firm
Soil parameters Mark Unit Value
Poisson's ratio ν [–] 0.4
Unit weight γ [kN/m³] 21.0
Deformation modulus E_def [MPa] 3 - 6
Effective parameters :
Angle of internal friction φ_ef [°] 17 - 21
Cohesion of soil c_ef [kPa] 8 - 16
Total parameters :
Angle of internal friction φ_u [°] 0
Cohesion of soil c_u [kPa] 50
Design strength :
Foundation width < 3.0 m R_d [kPa] 100
Coeff. of structural strength m [–] 0.2
for E_def < 4, overconsolidated m [–] 0.1
Manually
OK
OK + Assign
Cancel
Manual classification of soils
Grading
Fine particles (0,0 .. 0,06 mm) : f = 79.0 [%]
Sandy particles (0,06 mm .. 2,0 mm) : s = 21.0 [%]
Gravelly particles (2,0 mm .. 60,0 mm) : g = 0.0 [%]
Sum f + s + g must be equal to 100%
Moisture
Sample moisture : w = 25.0 [%]
Moisture content at the liquid limit : w_l = 42.0 [%]
Moisture content at the plasticity limit : w_p = 23.0 [%]
It must hold w_l > w_p
Classification
Low plasticity clay (CL,CI), consistency firm
OK
Cancel
Soil name
1 Shtresa Nr.1 - Low plasticity clay (CL,CI), cl
2 Shtresa Nr.2 - Sandy clay (CS), consistency firm
3 Shtresa Nr.3 - Sandy clay (CS), consistency firm
Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
Unit weight : γ = 19.00 kN/m³
Stress-state : effective
Angle of internal friction : φ_ef = 14.00 °
Cohesion of soil : c_ef = 25.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.40
Saturated unit weight : γ_sat = 20.00 kN/m³
Soil characteris
Add
Edit
Remove
Copy
current soil
selected soils
all soils
Paste
soils
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Solis : 0
Total : 0
List of pictures
Soils
GeoClipboard™

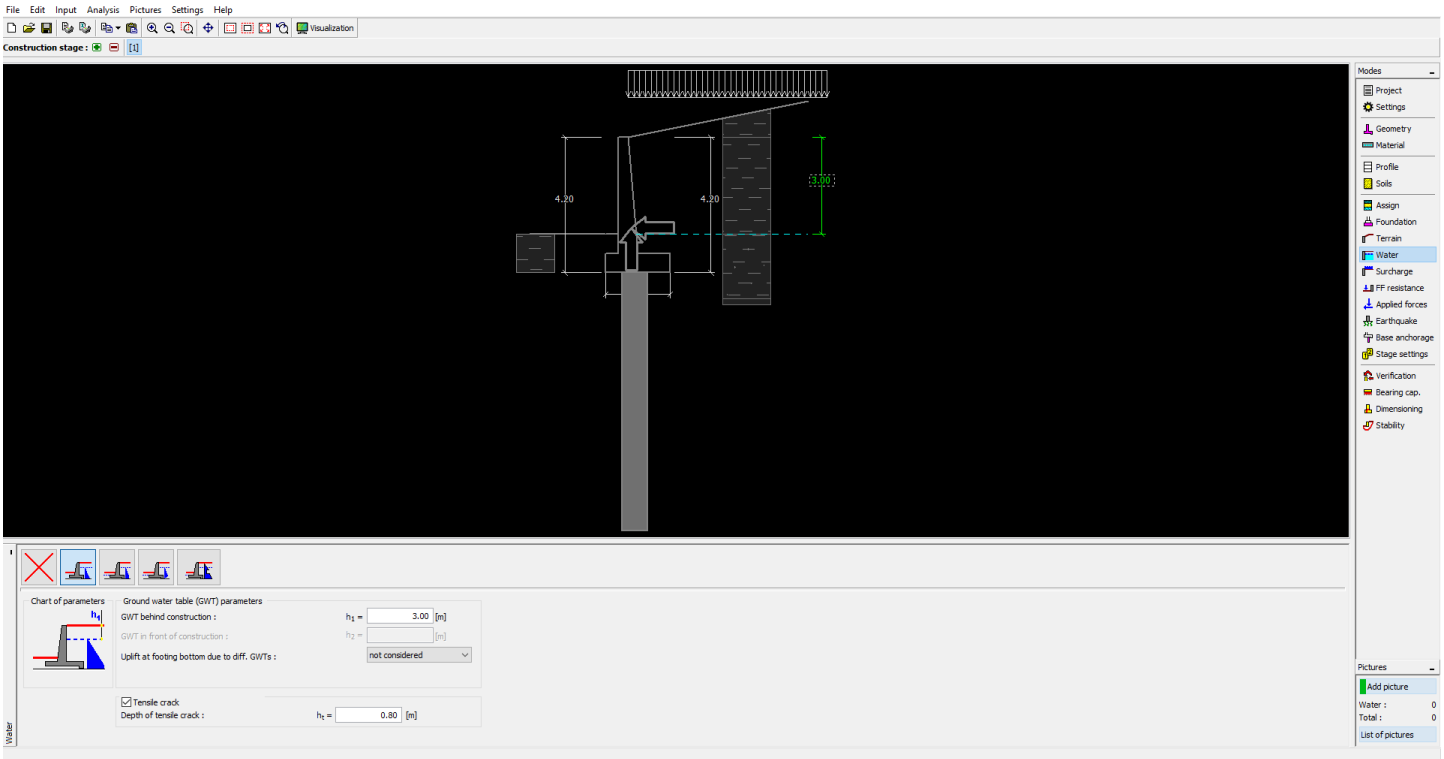

Modification of soil parameters
Identification
Name : Shtresa Nr.2 - Sandy clay (CS), consistency firm
Sandy clay (CS), consistency firm
Basic data
Unit weight : 21.00 [kN/m³] 18.5
Stress-state : effective
Angle of internal friction : 21.00 [°] 22-27
Cohesion of soil : 50.00 [kPa] 10-18
Angle of friction struc.-soil : 12.00 [°]
Pressure at rest
Soil : cohesive
Poisson's ratio : 0.35 [–] 0.35
Uplift pressure
Calc. mode of uplift : standard
Saturated unit weight : 22.00 [kN/m³]
Draw
Color
Pattern category
GEO
Pattern
Sandy clay
Classification
Classify
Delete
OK + A
OK + ▼
OK
Cancel
4.20
3.00
2.00
5.00
Classification of soils
Classification, consistency, density
Soil classification : CS - Sandy clay
Consistency : Firm consistency (hard to deform by hand squeezing)
Standard characteristics of soils
Sandy clay (CS), consistency firm
Soil parameters Mark Unit Value
Poisson's ratio ν [–] 0.35
Unit weight γ [kN/m³] 18.5
Deformation modulus E_def [MPa] 4 - 6
Effective parameters :
Angle of internal friction φ_ef [°] 22 - 27
Cohesion of soil c_ef [kPa] 10 - 18
Total parameters :
Angle of internal friction φ_u [°] 0
Cohesion of soil c_u [kPa] 50
Design strength :
Foundation width < 3.0 m R_d [kPa] 150
Coeff. of structural strength m [–] 0.2
for E_def < 4, overconsolidated m [–] 0.1
Manually
OK
OK + Assign
Cancel
Manual classification of soils
Grading
Fine particles (0,0 .. 0,06 mm) : f = 45.0 [%]
Sandy particles (0,06 mm .. 2,0 mm) : s = 45.0 [%]
Gravelly particles (2,0 mm .. 60,0 mm) : g = 10.0 [%]
Sum f + s + g must be equal to 100%
Moisture
Sample moisture : w = 21.0 [%]
Moisture content at the liquid limit : w_l = 32.0 [%]
Moisture content at the plasticity limit : w_p = 18.0 [%]
It must hold w_l > w_p
Classification
Sandy clay (CS), consistency firm
OK
Cancel
Soil name
1 Shtresa Nr.1 - Low plasticity clay (CL,CI), consiste
2 Shtresa Nr.2 - Sandy clay (CS), consistency
3 Shtresa Nr.3 - Sandy clay (CS), consistency firm
Shtresa Nr.2 - Sandy clay (CS), consistency firm
Unit weight : γ = 21.00 kN/m³
Stress-state : effective
Angle of internal friction : φ_ef = 21.00 °
Cohesion of soil : c_ef = 50.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γ_sat = 22.00 kN/m³
Add
Edit
Remove
Copy
current soil
selected soils
all soils
Paste
soils
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Solis : 0
Total : 0
List of pictures
Soils
GeoClipboard™

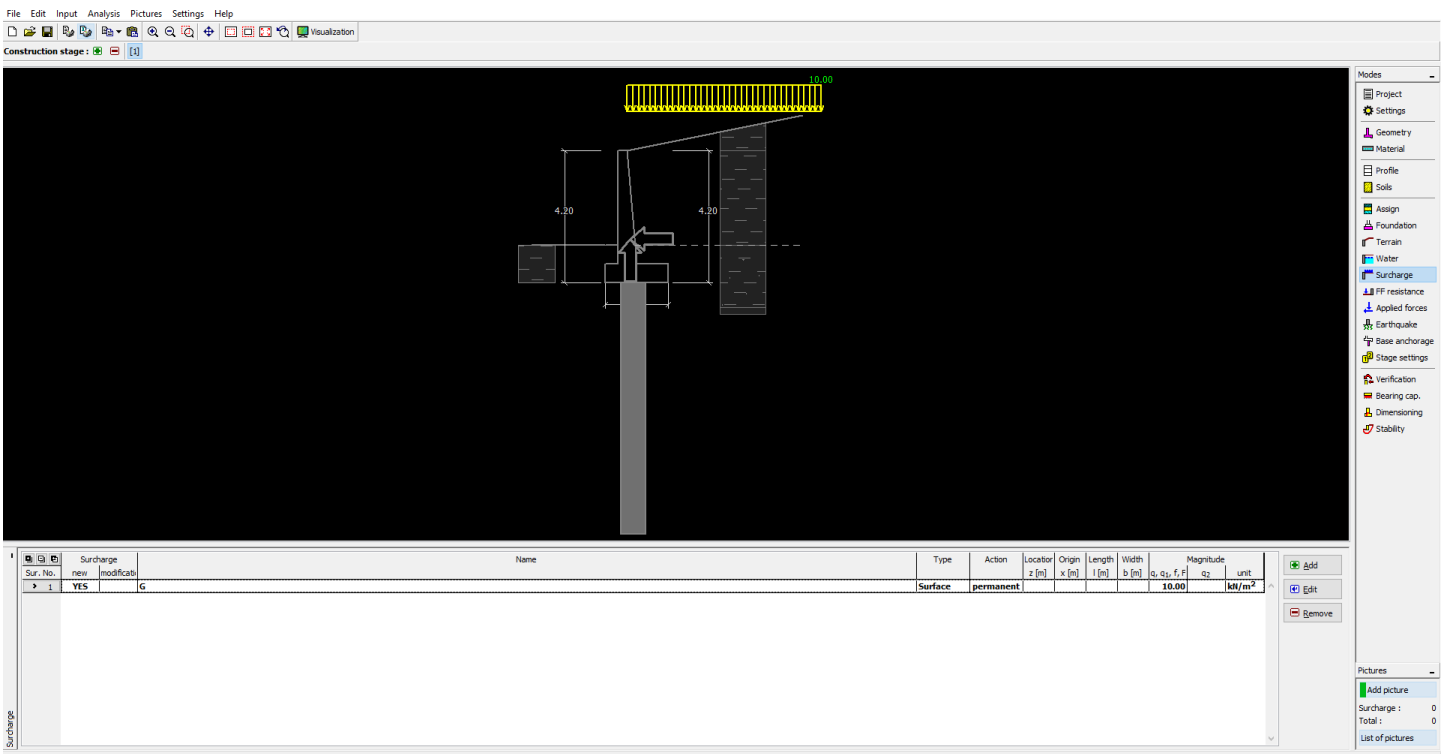

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
Modification of soil parameters
Identification
Name :
Shtrsa Nr.3 - Sandy clay (CS), consistency firm
Sandy clay (CS), consistency firm
Basic data
Unit weight :
Stress-state :
effective
Angle of internal friction :
Cohesion of soil :
Angle of friction struc.-soil :
Pressure at rest
Soil :
cohesive
Poisson's ratio :
Uplift pressure
Calc. mode of uplift :
standard
Saturated unit weight :
Draw
Color
Pattern category
GEO
Pattern
Sandy day
Classification
Classify
Delete
OK +
OK
Cancel
4.20
4.20
2.00
3.00
2.00
5.00
Classification of soils
Classification, consistency, density
Soil classification :
CS - Sandy clay
Consistency :
Firm consistency (hard to deform by hand squeezing)
Standard characteristics of soils
Sandy clay (CS), consistency firm
Soil parameters
Mark
Unit
Value
Poisson's ratio
Unit weight
Deformation modulus
Effective parameters :
Angle of internal friction
Cohesion of soil
Total parameters :
Angle of internal friction
Cohesion of soil
Design strength :
Foundation width < 3.0 m
Coeff. of structural strength
for E_def < 4, overconsolidated
Manually
OK
OK + Assign
Cancel
Manual classification of soils
Grading
Fine particles (0,0 .. 0,06 mm) :
Sandy particles (0,06 mm .. 2,0 mm) :
Gravelly particles (2,0 mm .. 60,0 mm) :
Sum f + s + g must be equal to 100%
Moisture
Sample moisture :
Moisture content at the liquid limit :
Moisture content at the plasticity limit :
It must hold w_l > w_p
Classification
Sandy clay (CS), consistency firm
OK
Cancel
Soil name
1 Shtresa Nr.1 - Low plasticity clay (CL,CI), consiste
2 Shtresa Nr.2 - Sandy clay (CS), consistency firm
3 Shtrsa Nr.3 - Sandy clay (CS), consistency f
Shtrsa Nr.3 - Sandy clay (CS), consistency firm
Unit weight : 21.00 kN/m3
Stress-state : effective
Angle of internal friction : 26.00 °
Cohesion of soil : 80.00 kPa
Angle of friction struc.-soil : 12.00 °
Soil : cohesive
Poisson's ratio : 0.35
Saturated unit weight : 22.00 kN/m3
Add
Edit
Remove
Copy
current soil
selected soils
all soils
Paste
soils
Soils
GeoClipboard™
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Solis : 0
Total : 0
List of pictures

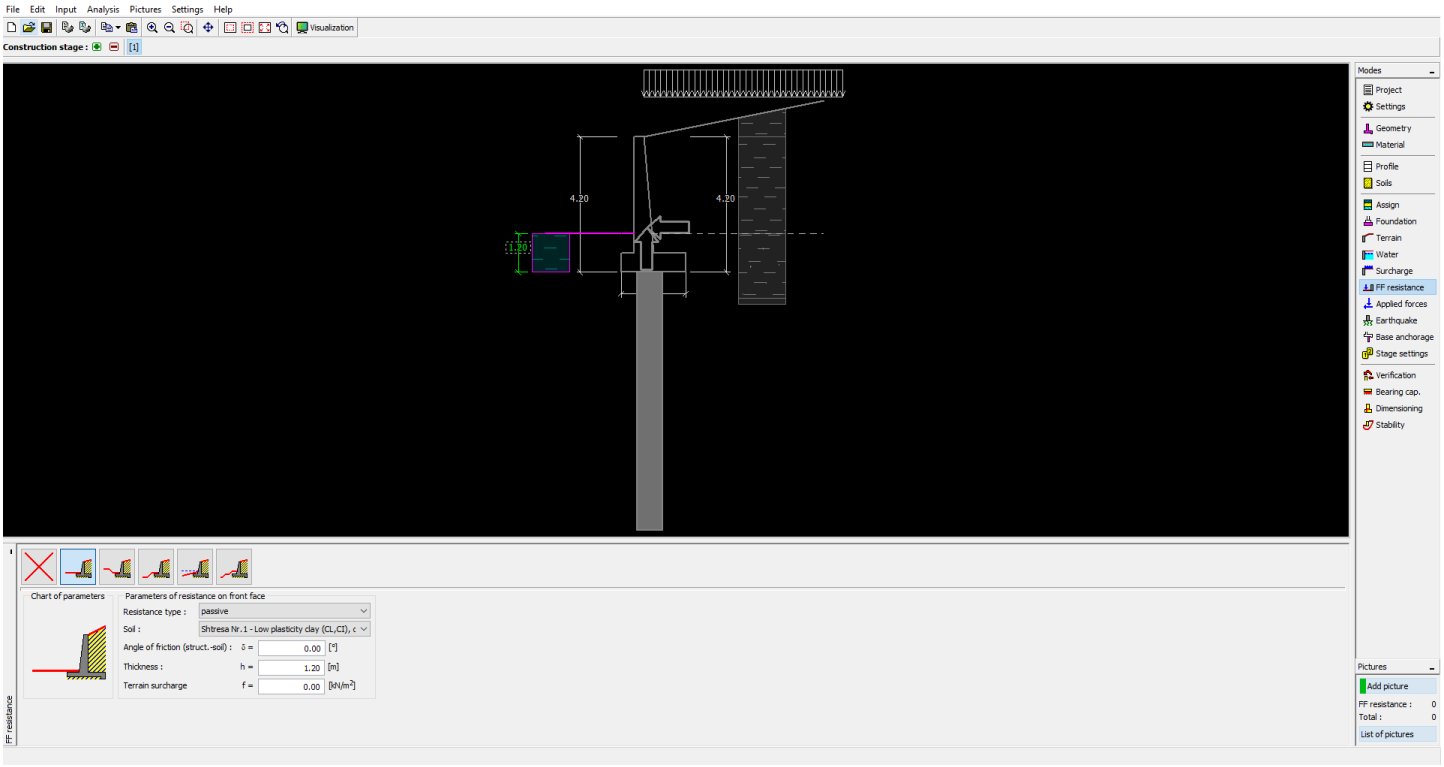

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
4.20
4.20
2.00
3.00
2.00
5.00
Soils:
No. of layer
Thickness [m]
Assigned soil
1 3.00 Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
2 2.00 Shtresa Nr.2 - Sandy clay (CS), consistency firm
3 5.00 Shtrsa Nr.3 - Sandy clay (CS), consistency firm
4 Shtrsa Nr.3 - Sandy clay (CS), consistency firm
Assign
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Assign : 0
Total : 0
List of pictures

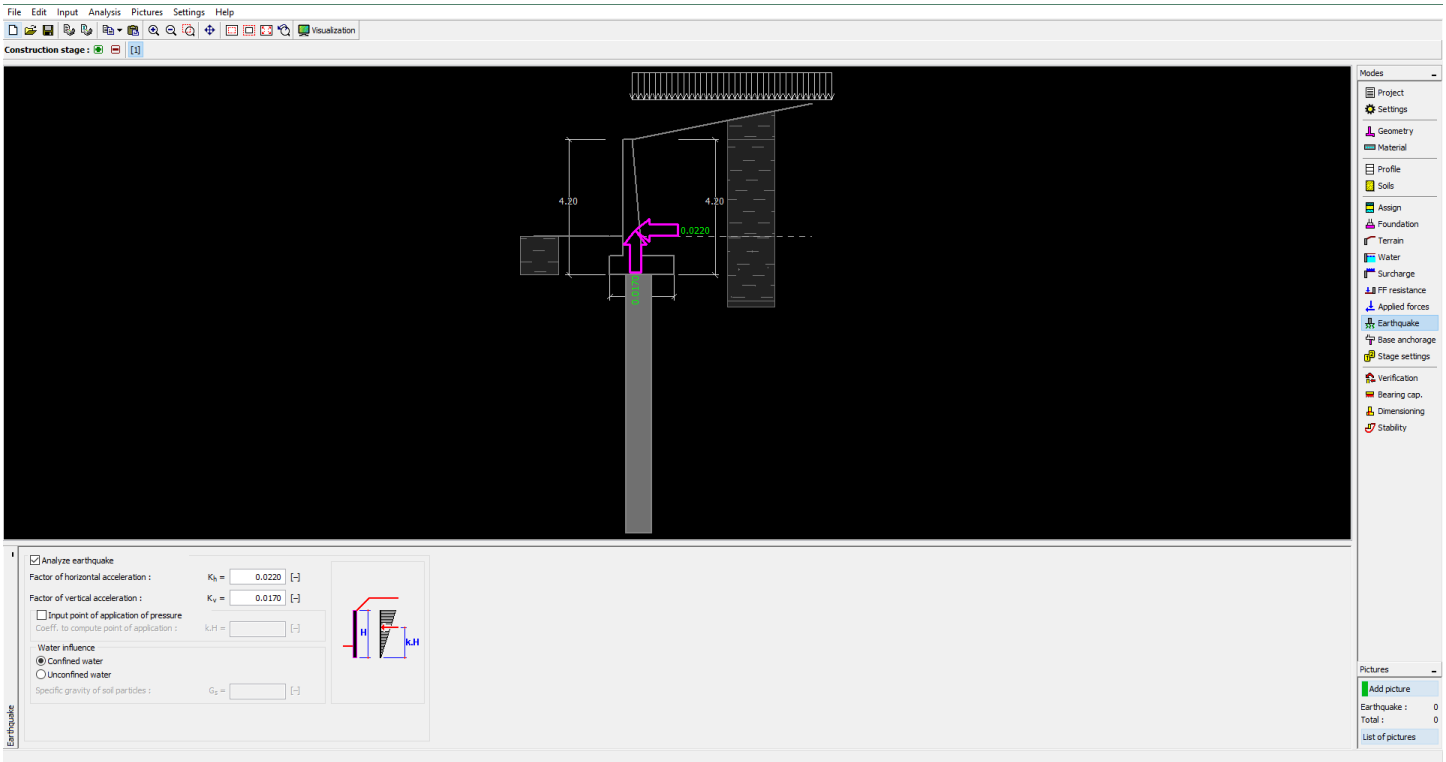

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
4.20
4.20
8.00
0.50 0.80
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Type of foundation : pile foundation
Parameters
Pile foundation : single pile
Unit weight : γ = 25.13 [kN/m³]
Length : l = 8.00 [m]
Diameter : d = 0.80 [m]
Offset : x = 0.50 [m]
Spacing : b = 0.80 [m]
Foundation
Pictures
Add picture
Foundation : 0
Total : 0
List of pictures

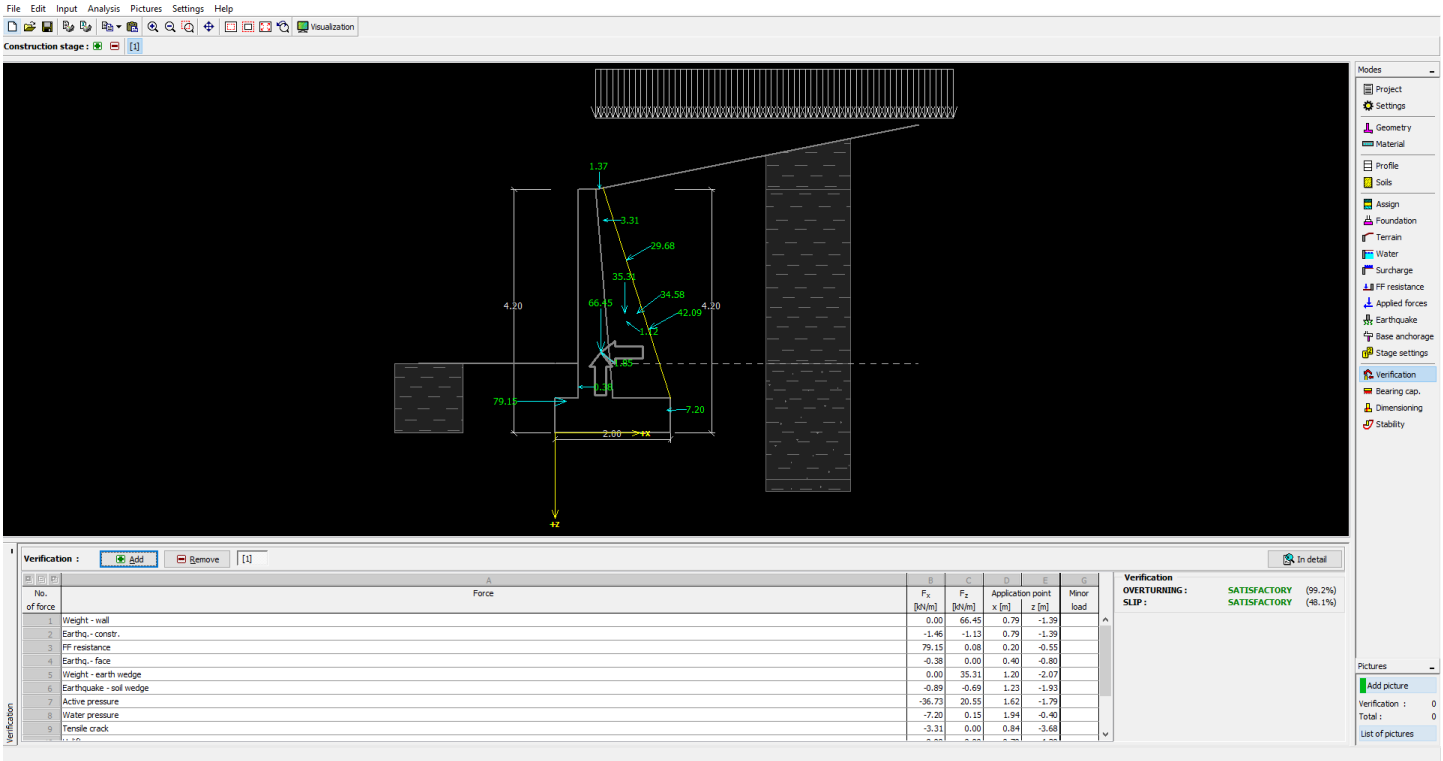

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
5.00
4.20
4.20
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of parameters
Terrain parameters
Embankment length : d = 4.57 [m]
Embankment height : v = 0.91 [m]
Slope : 1:s = 5.00 [-]
Slope angle : β = 11.31 [°]
Terrain
Pictures
Add picture
Terrain : 0
Total : 0
List of pictures

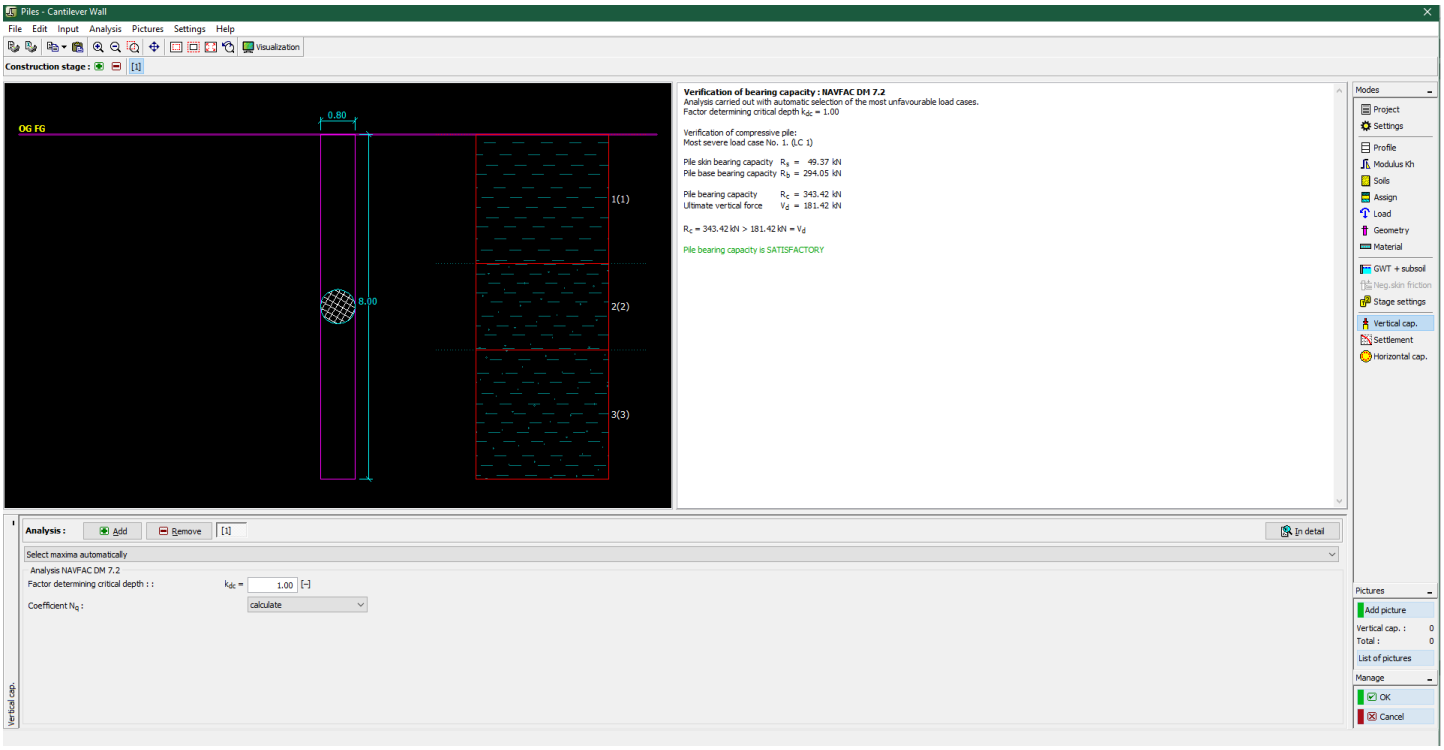

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
4.20
4.20
3.00
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of parameters
Ground water table (GWT) parameters
GWT behind construction :
3.00 [m]
GWT in front of construction :
Uplift at footing bottom due to diff. GWTs :
not considered
Tensile crack
Depth of tensile crack :
0.80 [m]
Pictures
Add picture
Water : 0
Total : 0
List of pictures
Water

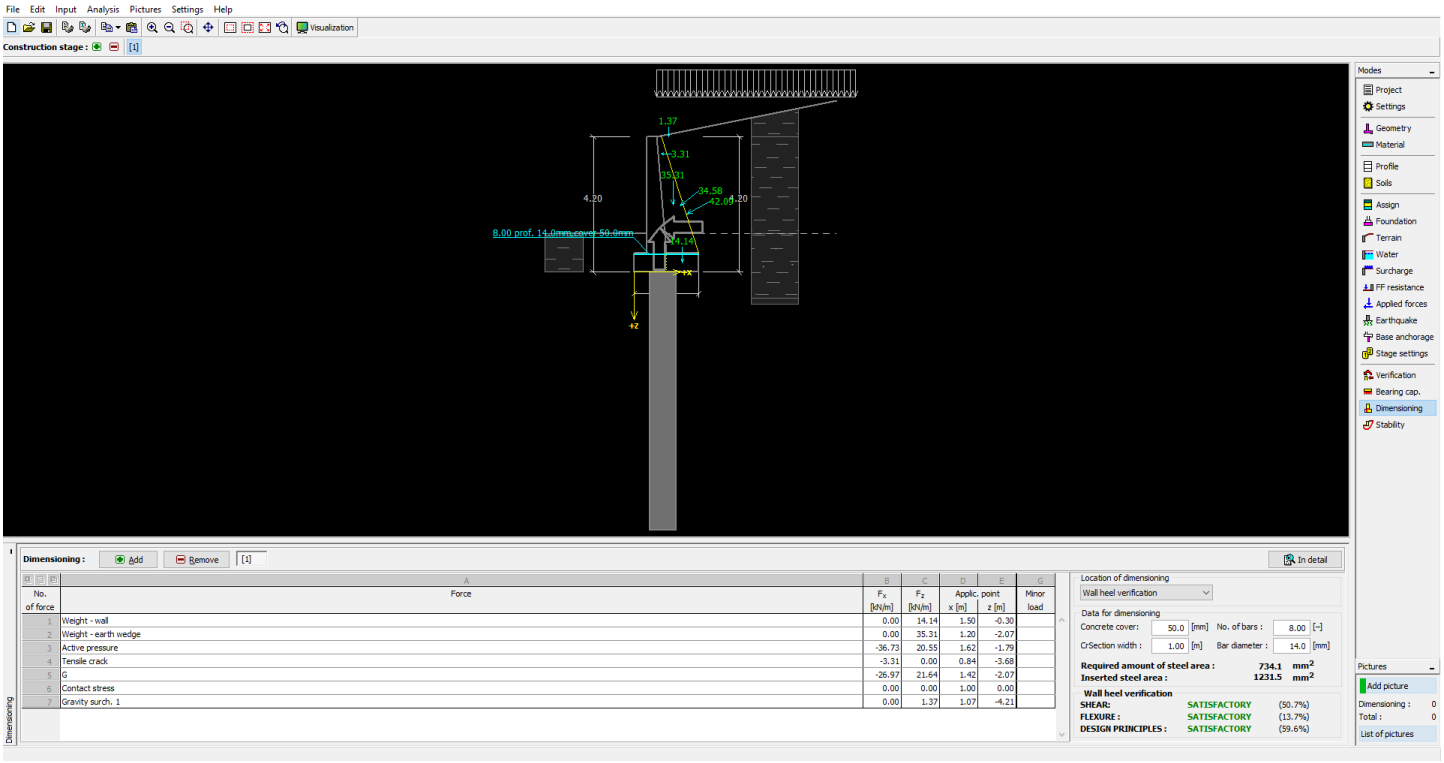

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
10.00
4.20
4.20
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Surcharge
Sur. No.
new
modificati
Name
Type
Action
Location z [m]
Origin x [m]
Length l [m]
Width b [m]
Magnitude
q, q1, f, F
q2
unit
1
YES
G
Surface
permanent
10.00
kN/m2
Add
Edit
Remove
Pictures
Add picture
Surcharge : 0
Total : 0
List of pictures
Surcharge

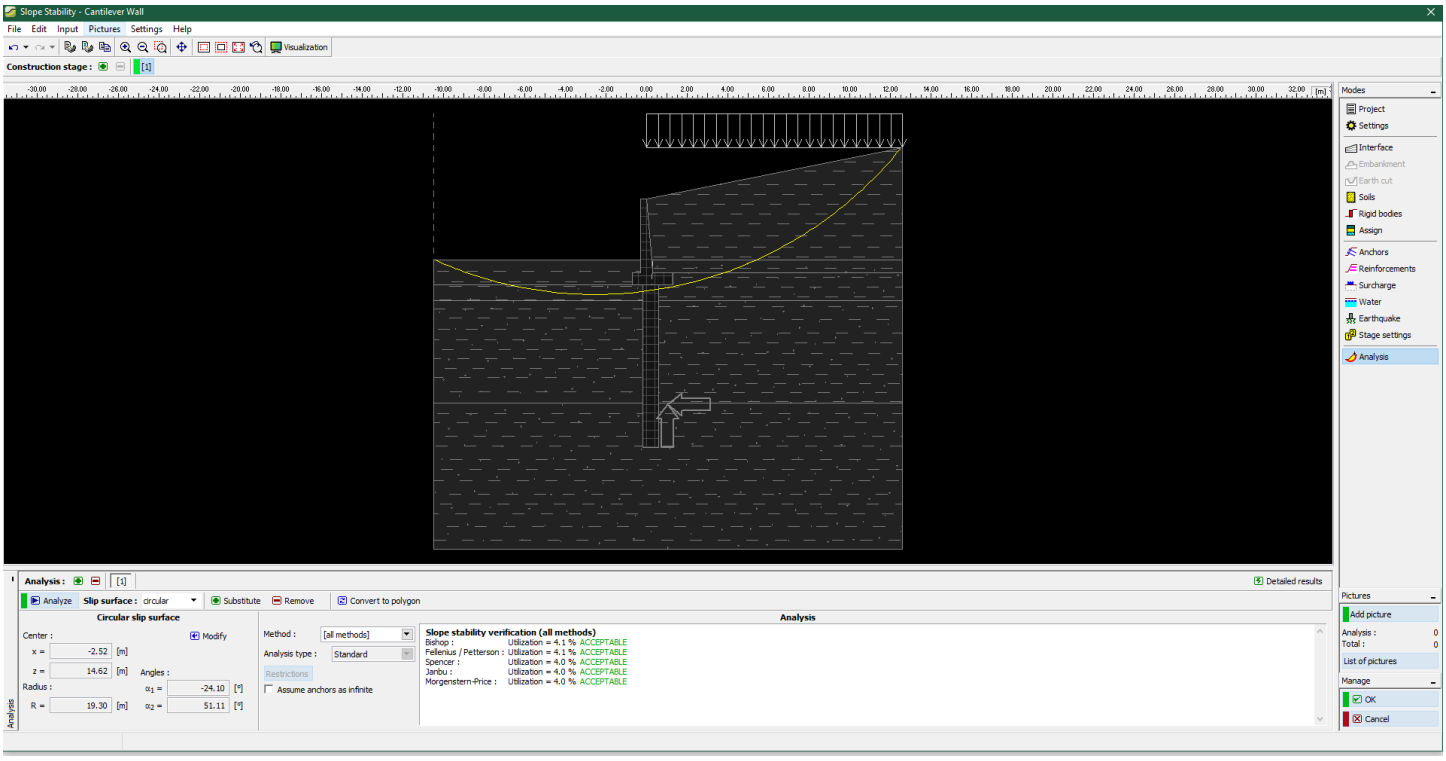

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
4.20
4.20
1.20
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of parameters
Parameters of resistance on front face
Resistance type : passive
Soil : Shtresa Nr.1 - Low plasticity clay (CL,CI), c
Angle of friction (struct.-soil) : δ = 0.00 [°]
Thickness : h = 1.20 [m]
Terrain surcharge f = 0.00 [kN/m²]
FF resistance
Pictures
Add picture
FF resistance : 0
Total : 0
List of pictures


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
4.20
4.20
0.0220
1.20
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Analyze earthquake
Factor of horizontal acceleration : Kh = 0.0220 [–]
Factor of vertical acceleration : Kv = 0.0170 [–]
Input point of application of pressure
Coeff. to compute point of application : k.H = [–]
Water influence
Confined water
Unconfined water
Specific gravity of soil particles : Gs = [–]
H
k.H
Earthquake
Pictures
Add picture
Earthquake : 0
Total : 0
List of pictures


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
1.37
3.31
29.68
35.31
34.58
42.09
4.20
4.20
66.45
1.12
1.85
1.94
79.15
7.20
2.00
+z
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Verification :
Add
Remove
[1]
In detail
No. of force
Force
Fx [kN/m]
Fz [kN/m]
Application point x [m]
z [m]
Minor load
1 Weight - wall 0.00 66.45 0.79 -1.39
2 Earthq. - constr. -1.46 -1.13 0.79 -1.39
3 FF resistance 79.15 0.08 0.20 -0.55
4 Earthq. - face -0.38 0.00 0.40 -0.80
5 Weight - earth wedge 0.00 35.31 1.20 -2.07
6 Earthquake - soil wedge -0.89 -0.69 1.23 -1.93
7 Active pressure -36.73 20.55 1.62 -1.79
8 Water pressure -7.20 0.15 1.94 -0.40
9 Tensile crack -3.31 0.00 0.84 -3.68
Verification
OVERTURNING : SATISFACTORY (99.2%)
SLIP : SATISFACTORY (48.1%)
Verification
Pictures
Add picture
Verification : 0
Total : 0
List of pictures

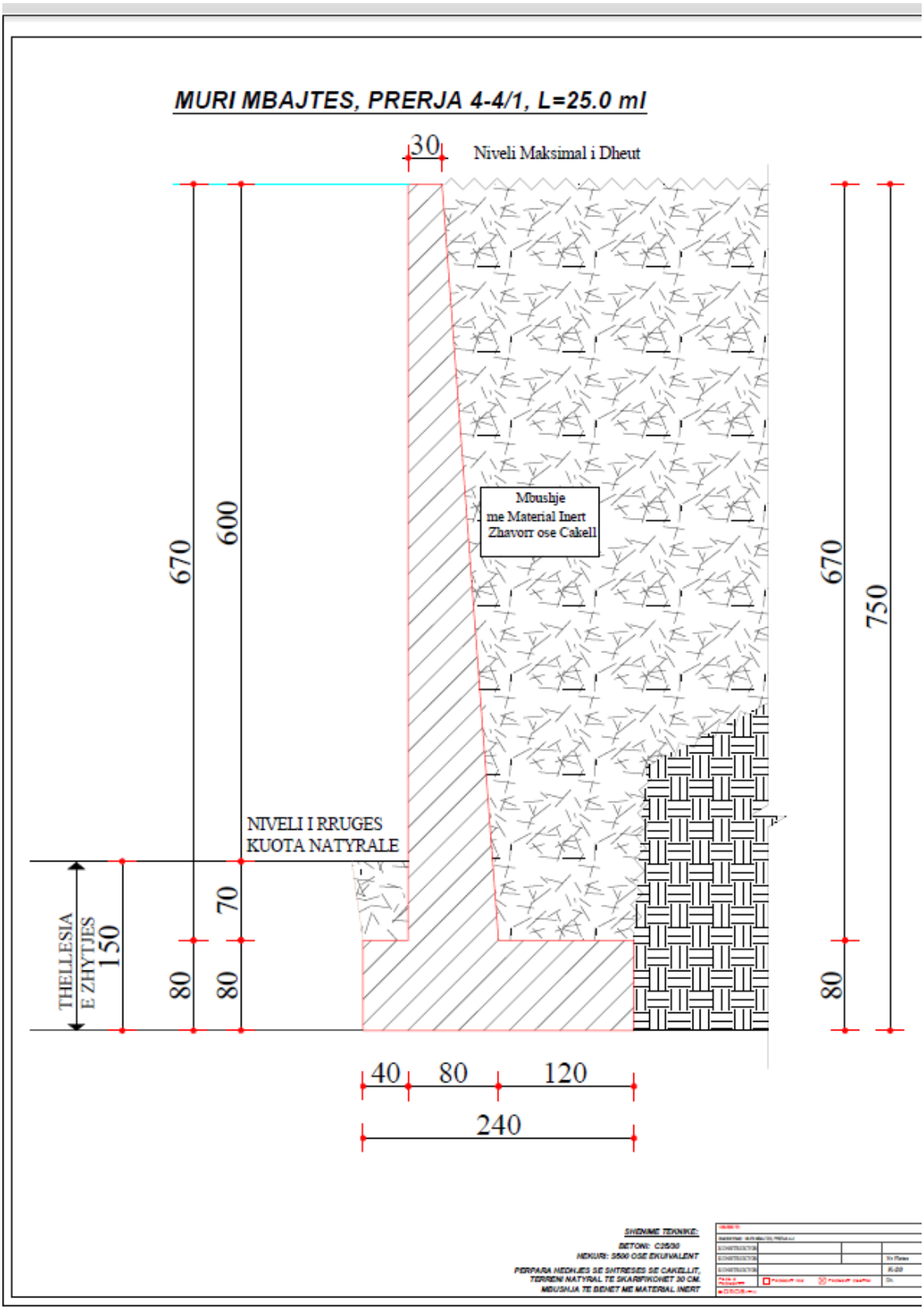

Piles - Cantilever Wall
File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
OG FG
0.80
8.00
1(1)
2(2)
3(3)
Verification of bearing capacity : NAVFAC DM 7.2
Analysis carried out with automatic selection of the most unfavourable load cases.
Factor determining critical depth kdc = 1.00
Verification of compressive pile:
Most severe load case No. 1. (LC 1)
Pile skin bearing capacity Rs = 49.37 kN
Pile base bearing capacity Rb = 294.05 kN
Pile bearing capacity Rc = 343.42 kN
Ultimate vertical force Vd = 181.42 kN
Rc = 343.42 kN > 181.42 kN = Vd
Pile bearing capacity is SATISFACTORY
Modes
Project
Settings
Profile
Modulus Kh
Soils
Assign
Load
Geometry
Material
GWT + subsoil
Neg.skin friction
Stage settings
Vertical cap.
Settlement
Horizontal cap.
Analysis :
Add
Remove
[1]
In detail
Select maxima automatically
Analysis NAVFAC DM 7.2
Factor determining critical depth : :
kdc = 1.00 [-]
Coefficient Nq :
calculate
Pictures
Add picture
Vertical cap. : 0
Total : 0
List of pictures
Manage
OK
Cancel
Vertical cap.


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
1.37
-3.31
35.01
34.56
42.09
4.20
4.20
8.00 prof. 14.0mm cover 50.0mm
14.14
+X
+Z
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Dimensioning :
Add
Remove
[1]
In detail
No. of force
Force
Fx [kN/m]
Fz [kN/m]
Applic. point x [m]
Applic. point z [m]
Minor load
1 Weight - wall 0.00 14.14 1.50 -0.30
2 Weight - earth wedge 0.00 35.31 1.20 -2.07
3 Active pressure -36.73 20.55 1.62 -1.79
4 Tensile crack -3.31 0.00 0.84 -3.68
5 G -26.97 21.64 1.42 -2.07
6 Contact stress 0.00 0.00 1.00 0.00
7 Gravity surch. 1 0.00 1.37 1.07 -4.21
Location of dimensioning
Wall heel verification
Data for dimensioning
Concrete cover: 50.0 [mm]
No. of bars : 8.00 [-]
CrSection width : 1.00 [m]
Bar diameter : 14.0 [mm]
Required amount of steel area : 734.1 mm2
Inserted steel area : 1231.5 mm2
Wall heel verification
SHEAR: SATISFACTORY (50.7%)
FLEXURE : SATISFACTORY (13.7%)
DESIGN PRINCIPLES : SATISFACTORY (59.6%)
Pictures
Add picture
Dimensioning : 0
Total : 0
List of pictures


Slope Stability - Cantilever Wall
File Edit Input Pictures Settings Help
Visualization
Construction stage :
Modes
Project
Settings
Interface
Embankment
Earth cut
Soils
Rigid bodies
Assign
Anchors
Reinforcements
Surcharge
Water
Earthquake
Stage settings
Analysis
Analysis :
[1]
Detailed results
Analyze
Slip surface : circular
Substitute
Remove
Convert to polygon
Circular slip surface
Center :
Modify
x = -2.52 [m]
z = 14.62 [m]
Angles :
Radius :
R = 19.30 [m]
α1 = -24.10 [°]
α2 = 51.11 [°]
Method : [all methods]
Analysis type : Standard
Restrictions
Assume anchors as infinite
Analysis
Slope stability verification (all methods)
Bishop : Utilization = 4.1 % ACCEPTABLE
Fellenius / Petterson : Utilization = 4.1 % ACCEPTABLE
Spencer : Utilization = 4.0 % ACCEPTABLE
Janbu : Utilization = 4.0 % ACCEPTABLE
Morgenstern-Price : Utilization = 4.0 % ACCEPTABLE
Pictures
Add picture
Analysis : 0
Total : 0
List of pictures
Manage
OK
Cancel

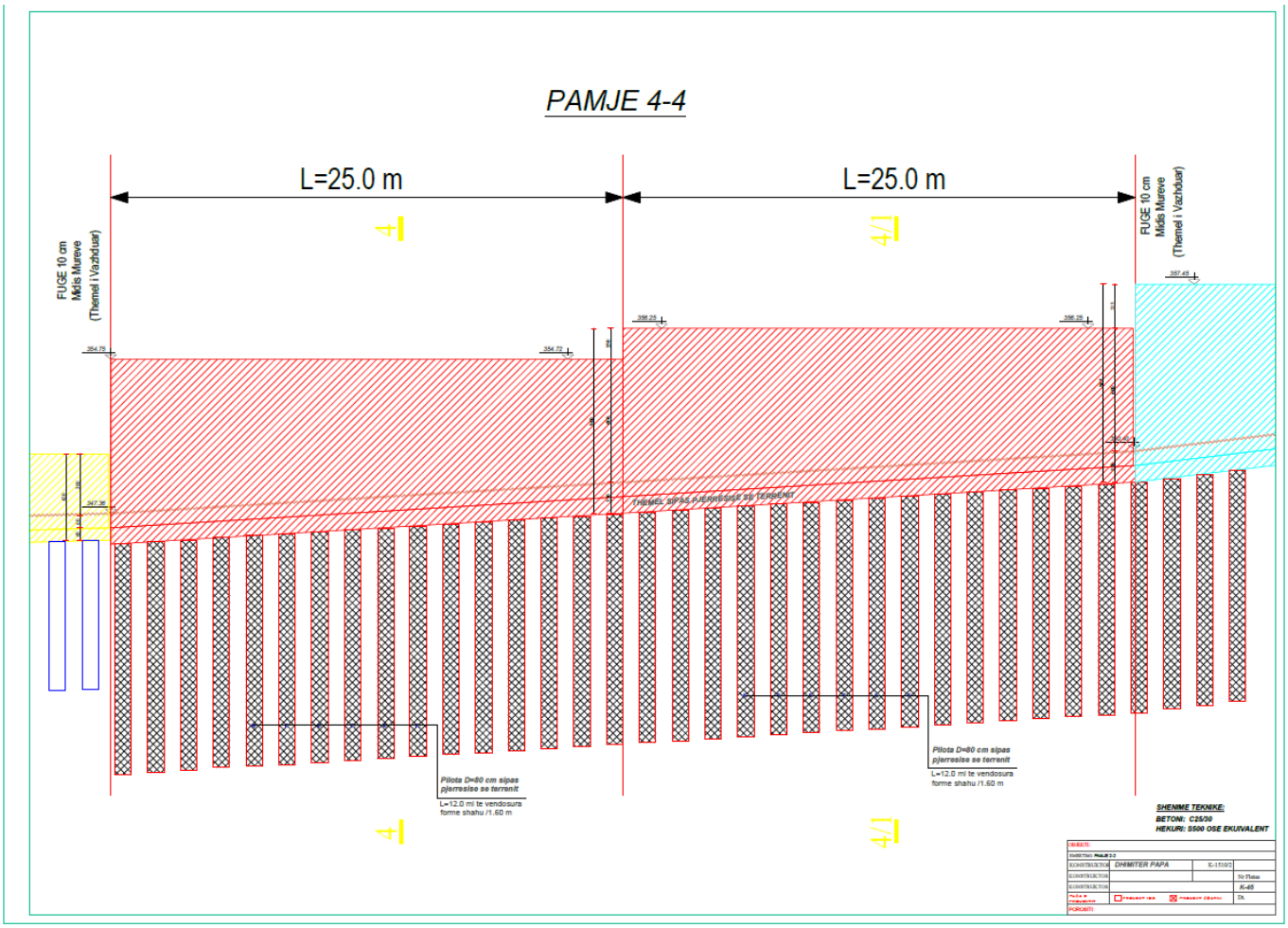
Cantilever wall analysis

Input data



Project

Task : Muret Mbajtese - SURREL
Part : Projekti i Perforcimit te Skarpates
Description : Muri Mbajtes - Prerja 4-4
Author : Dhimitri PAPA



Settings

Standard - EN 1997 - DA3 (2)

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard

Wall analysis

Active earth pressure calculation : Coulomb
Passive earth pressure calculation : Caquot-Kerisel
Earthquake analysis : Mononobe-Okabe
Shape of earth wedge : Calculate as skew
Base key : The base key is considered as inclined footing bottom
Allowable eccentricity : 0.333
Verification methodology : according to EN 1997
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)			
Permanent design situation			
		State STR	State GEO

Partial factors on actions (A)								
Permanent design situation								
		Unfavourable		Favourable		Unfavourable		Favourable	
Permanent actions :	γ_G =	1.35	[–]	1.00	[–]	1.00	[–]	1.00	[–]
Variable actions :	γ_Q =	1.50	[–]	0.00	[–]	1.30	[–]	0.00	[–]
Water load :	γ_w =					1.00	[–]		

Partial factors for soil parameters (M)			
Permanent design situation			
Partial factor on internal friction :	γ_ϕ =	1.25	[–]
Partial factor on effective cohesion :	γ_c =	1.25	[–]
Partial factor on undrained shear strength :	γ_{cu} =	1.40	[–]
Partial factor on Poisson's ratio :	γ_v =	1.00	[–]

Partial factors for variable actions			
Permanent design situation			
Factor for combination value :	ψ_0 =	0.70	[–]
Factor for frequent value :	ψ_1 =	0.50	[–]
Factor for quasi-permanent value :	ψ_2 =	0.30	[–]

Material of structure

Unit weight γ = 23.56 kN/m^3
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).
Concrete : C 25/30
Cylinder compressive strength f_{ck} = 25.00 MPa
Tensile strength f_{ctm} = 2.60 MPa
Longitudinal steel : B500
Yield strength f_{yk} = 500.00 MPa

Geometry of structure

No.	Coordinate X [m]	Depth Z [m]
1	0.00	0.00
2	0.90	6.70
3	1.70	6.70
4	1.70	7.50
5	-0.70	7.50
6	-0.70	6.70
7	-0.30	6.70
8	-0.30	0.00

The origin [0,0] is located at the most upper right point of the wall.
Wall section area = 6.94 m^2.

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m^3]	γ_{su} [kN/m^3]	δ [°]
1	Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm		14.00	25.00	19.00	10.00	12.00
2	Shtresa Nr.2 - Sandy clay (CS), consistency firm		21.00	50.00	21.00	12.00	12.00

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
3	Shtrsa Nr.3 - Sandy clay (CS), consistency firm		26.00	80.00	21.00	12.00	12.00

Soil parameters to compute pressure at rest

No.	Name	Pattern	Type calculation	φ_{ef} [°]	ν [–]	OCR [–]	K_r [–]
1	Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm		cohesive	-	0.40	-	-
2	Shtresa Nr.2 - Sandy clay (CS), consistency firm		cohesive	-	0.35	-	-
3	Shtrsa Nr.3 - Sandy clay (CS), consistency firm		cohesive	-	0.35	-	-

Soil parameters

Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm

Unit weight : γ = 19.00 kN/m³
Stress-state : effective
Angle of internal friction : φ_{ef} = 14.00 °
Cohesion of soil : c_{ef} = 25.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.40
Saturated unit weight : γ_{sat} = 20.00 kN/m³

Shtresa Nr.2 - Sandy clay (CS), consistency firm

Unit weight : γ = 21.00 kN/m³
Stress-state : effective
Angle of internal friction : φ_{ef} = 21.00 °
Cohesion of soil : c_{ef} = 50.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γ_{sat} = 22.00 kN/m³

Shtrsa Nr.3 - Sandy clay (CS), consistency firm

Unit weight : γ = 21.00 kN/m³
Stress-state : effective
Angle of internal friction : φ_{ef} = 26.00 °
Cohesion of soil : c_{ef} = 80.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γ_{sat} = 22.00 kN/m³

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	3.00	Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm	

No.	Layer [m]	Assigned soil	Pattern
2	2.00	Shtresa Nr.2 - Sandy clay (CS), consistency firm	
3	5.00	Shtrsa Nr.3 - Sandy clay (CS), consistency firm	
4	-	Shtrsa Nr.3 - Sandy clay (CS), consistency firm	

Foundation

Type of foundation : pile foundation
Unit weight γ = 25.13 kN/m^3
Geometry
Length l = 7.00 m
Offset d = 0.80 m
Diameter x = 0.50 m

Terrain profile

Terrain behind the structure is flat.

Water influence

GWT behind the structure lies at a depth of 3.00 m
Uplift in foot. bottom due to different pressures is not considered.

Input surface surcharges

No.	Surcharge new	Surcharge change	Action	Mag.1 [kN/m^2]	Mag.2 [kN/m^2]	Ord.x x [m]	Length l [m]	Depth z [m]
1	YES		permanent	10.00				on terrain

No.	Name
1	G

Resistance on front face of the structure

Resistance on front face of the structure: passive
Soil on front face of the structure - Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
Angle of friction struc.-soil δ = 0.00 °
Soil thickness in front of structure h = 1.20 m

Terrain in front of structure is flat.

Earthquake

Factor of horizontal acceleration K_h = 0.0200
Factor of vertical acceleration K_v = 0.0130

Water below the GWT is restricted.

Settings of the stage of construction

Design situation : permanent
The wall is free to move. Active earth pressure is therefore assumed.

Verification No. 1

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. overtur.	Coeff. sliding	Coeff. stress
Weight - wall	0.00	-2.63	163.58	0.92	1.000	1.000	1.350

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. overtur.	Coeff. sliding	Coeff. stress
Earthq.- constr.	3.27	-2.63	-2.13	0.92	1.000	1.000	1.000
FF resistance	-79.16	-0.55	0.08	0.20	1.000	1.000	1.000
Earthq.- face	0.34	-0.80	0.00	0.40	1.000	1.000	1.000
Weight - earth wedge	0.00	-1.34	7.83	1.79	1.000	1.000	1.000
Earthquake - soil wedge	0.27	-1.34	-0.18	1.79	1.000	1.000	1.000
Active pressure	15.04	-2.44	15.51	1.92	1.000	1.000	1.000
Water pressure	101.25	-1.50	9.19	1.73	1.000	1.000	1.000
Uplift pressure	0.00	-7.50	0.00	0.70	1.000	1.000	1.000
Earthq.- act.pressure	8.15	-4.83	3.41	1.28	1.000	1.000	1.000
G	14.83	-3.29	20.04	1.51	1.000	1.000	1.000

Verification of complete wall

Check for overturning stability

Resisting moment M_{res} = 243.36 kNm/m

Overturning moment M_{ovr} = 242.52 kNm/m

Wall for overturning is SATISFACTORY

Overall check - WALL is SATISFACTORY

Maximum stress in footing bottom : 28286.28 kPa

Bearing capacity of foundation soil

Design load acting at the pile head

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]	Eccentricity [–]	Stress [kPa]
1	193.34	274.58	63.99	0.418	700.91
2	194.76	217.33	63.99	0.498	28286.28

Service load acting at the pile head

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	128.68	202.60	19.35

Input parameters for bearing capacity analysis

Pile spacing s = 1.00 m

Dimensioning No. 1

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Weight - wall	0.00	-0.40	15.08	2.00	1.350
Weight - earth wedge	0.00	-1.34	7.83	1.79	1.000
Active pressure	15.04	-2.44	15.51	1.92	1.000
G	14.83	-3.29	20.04	1.51	1.000
Contact stress	0.00	0.00	0.00	1.60	1.000
Gravity surch. 1	0.00	-7.50	6.80	1.94	1.350

Back wall jump check

Reinforcement and dimensions of the cross-section

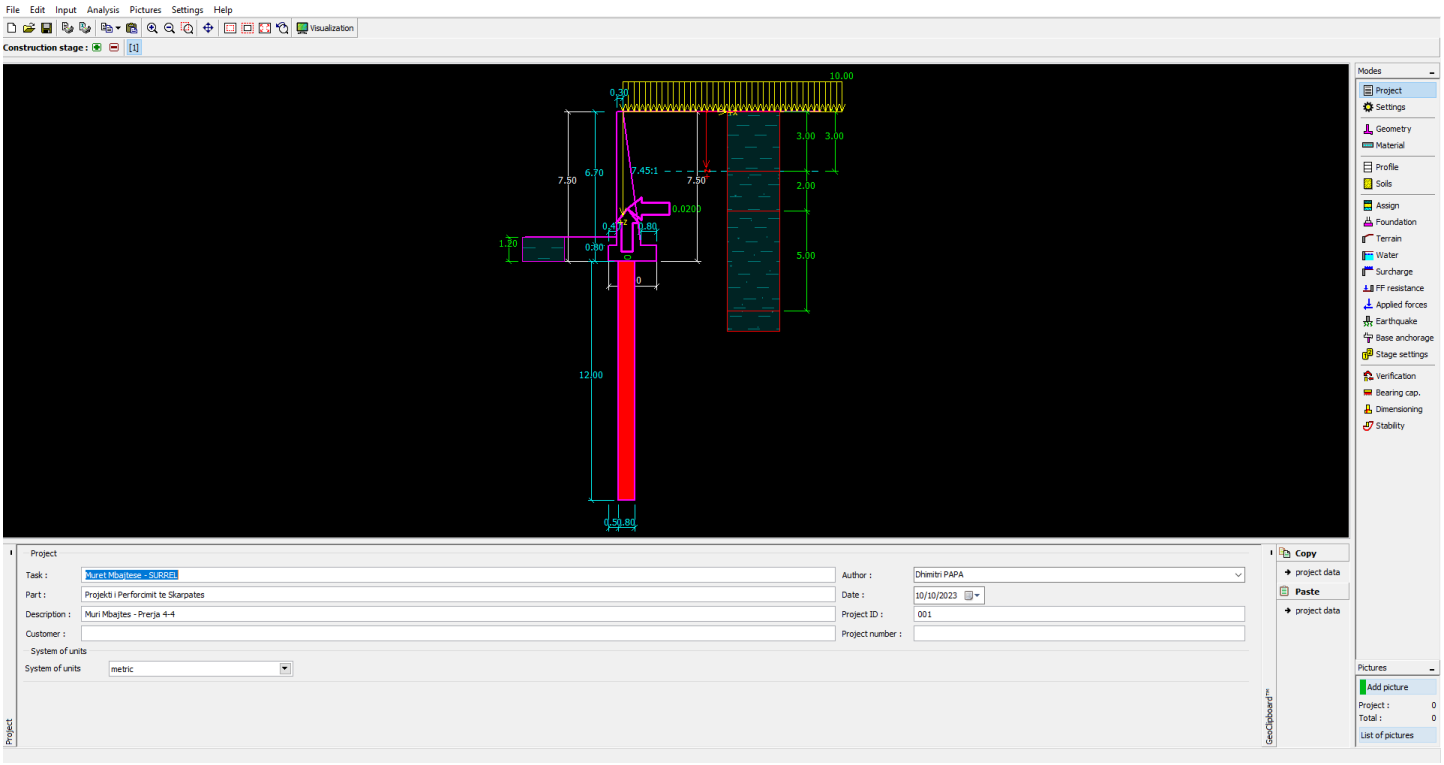
Bar diameter = 20.0 mm

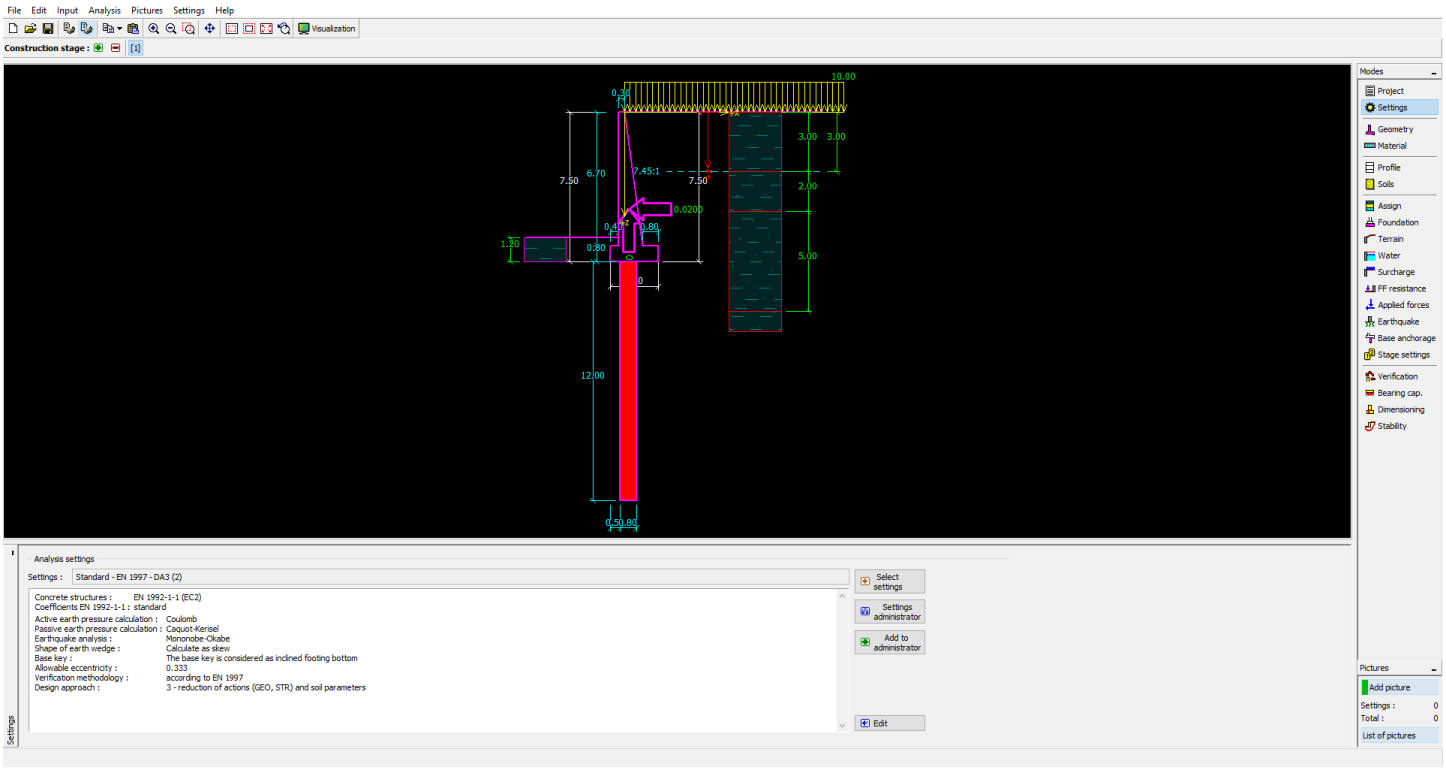
Number of bars = 8

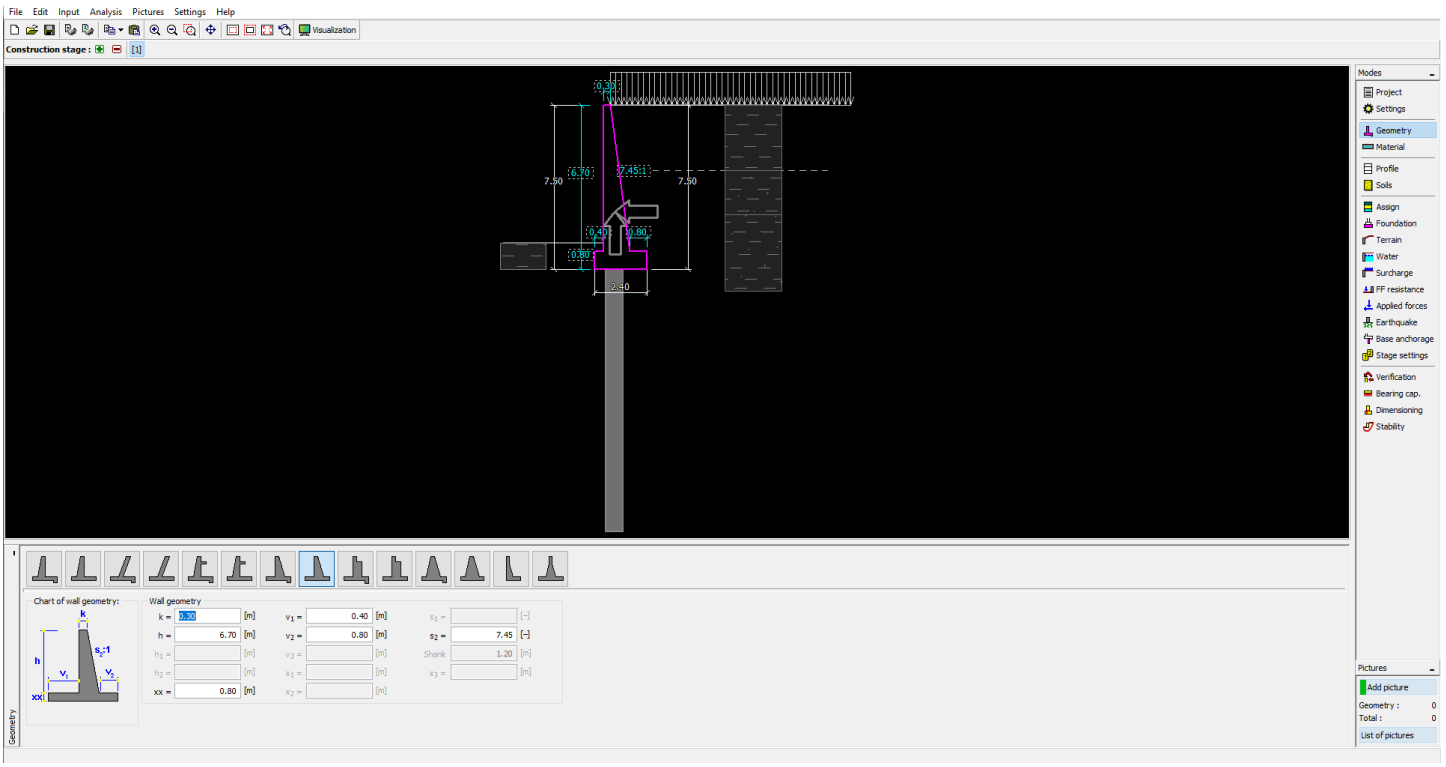
Reinforcement cover = 50.0 mm
Cross-section width = 1.00 m
Cross-section depth = 0.80 m

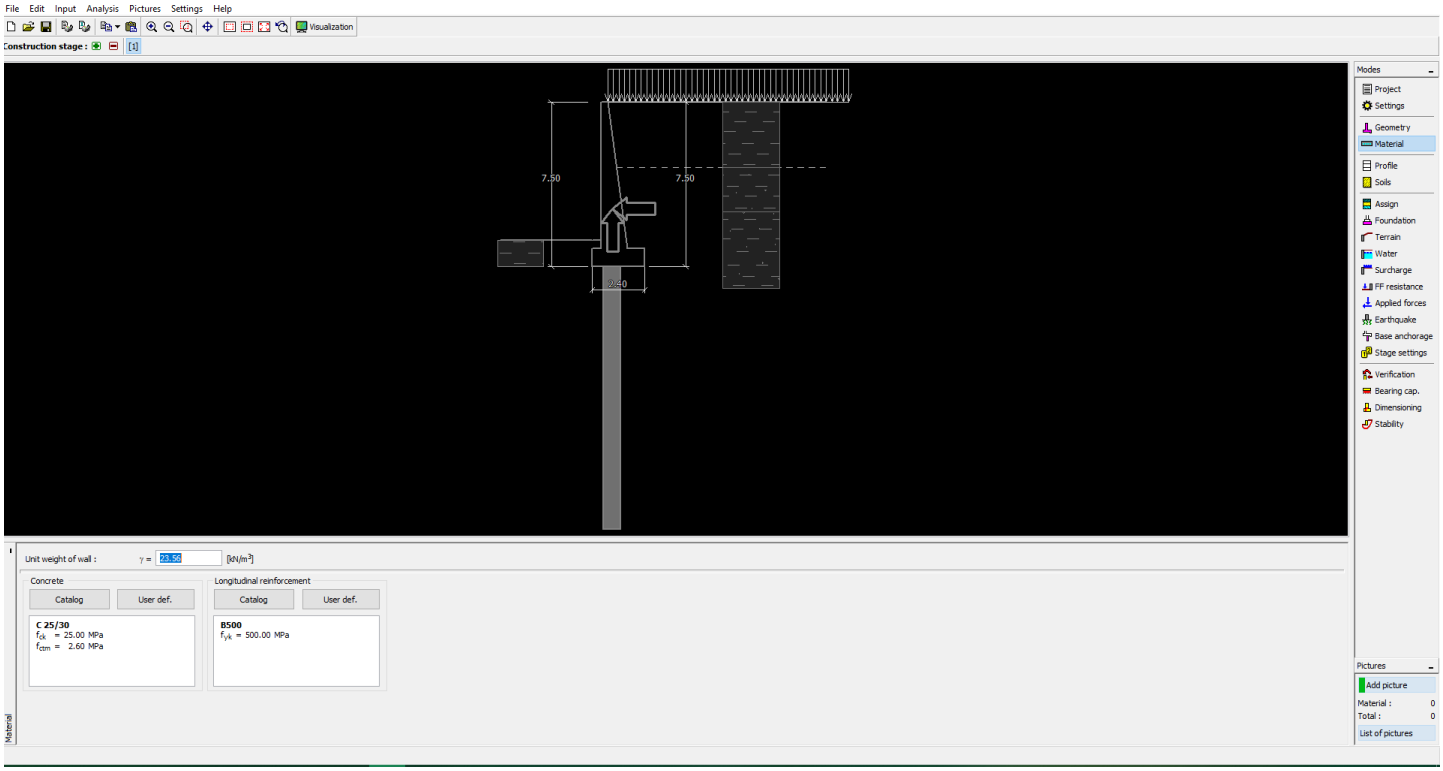
Reinforcement ratio	ρ	=	0.34	%	>	0.14	%	=	ρ_{min}
Position of neutral axis	x	=	0.08	m	<	0.46	m	=	x_{max}
Ultimate shear force	V_{Rd}	=	275.34	kN	>	72.92	kN	=	V_{Ed}
Ultimate moment	M_{Rd}	=	772.80	kNm	>	17.82	kNm	=	M_{Ed}

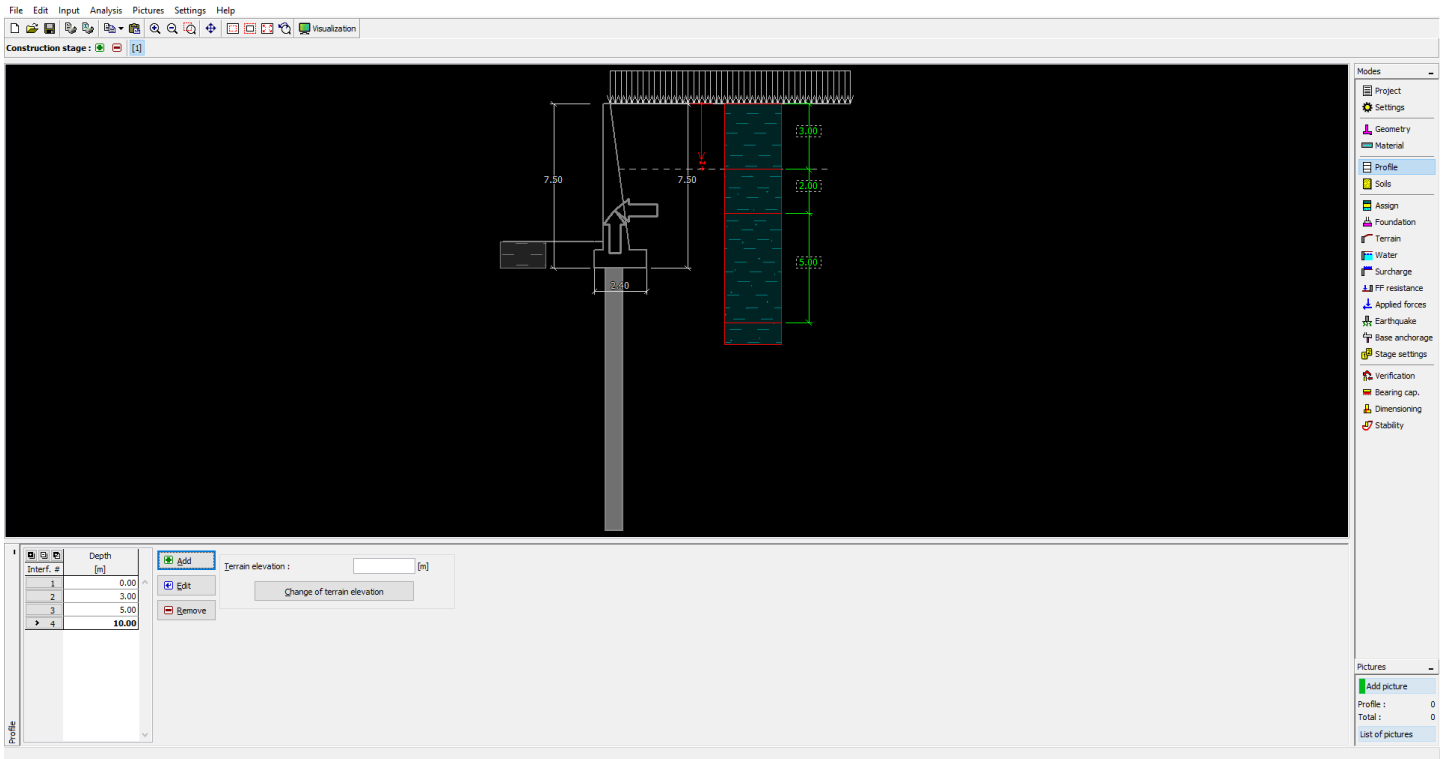
Cross-section is SATISFACTORY.

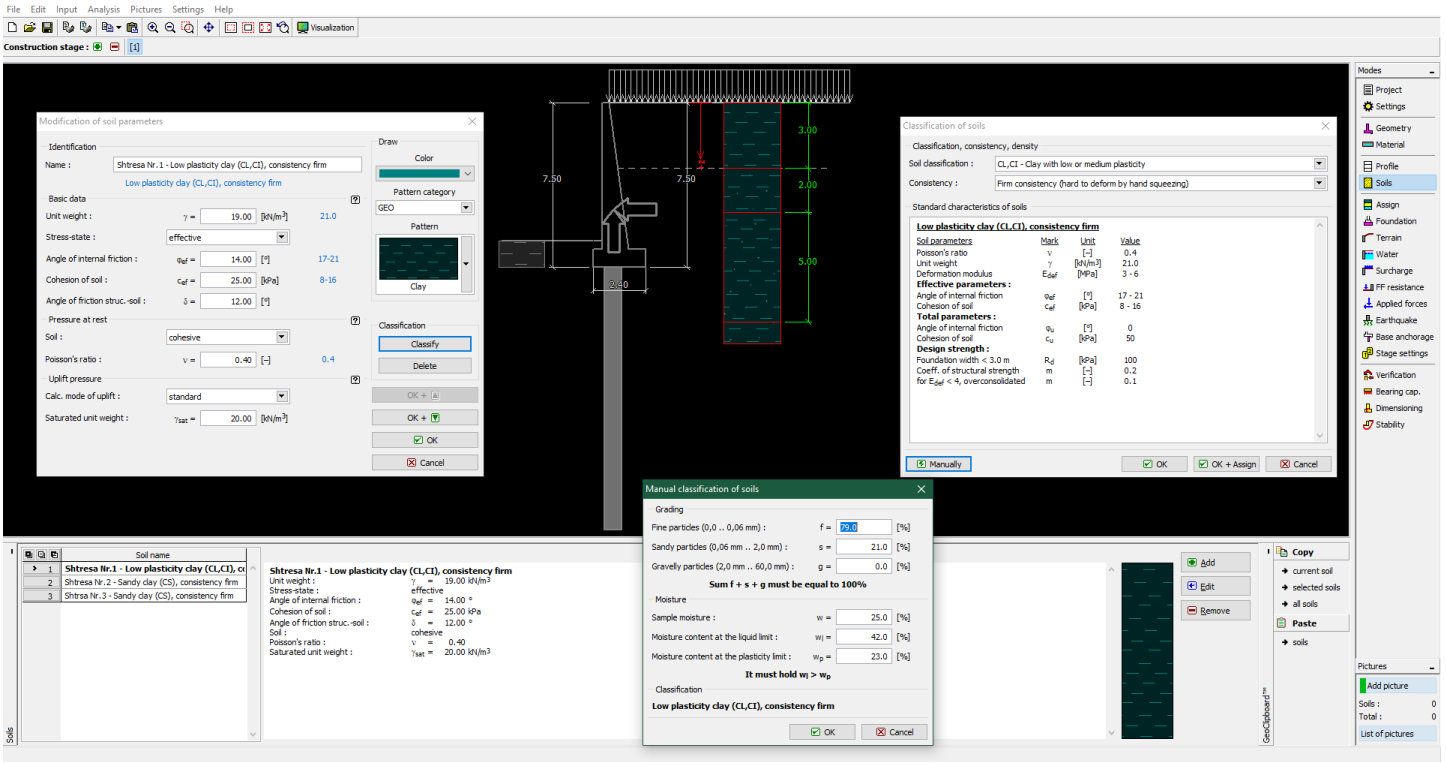


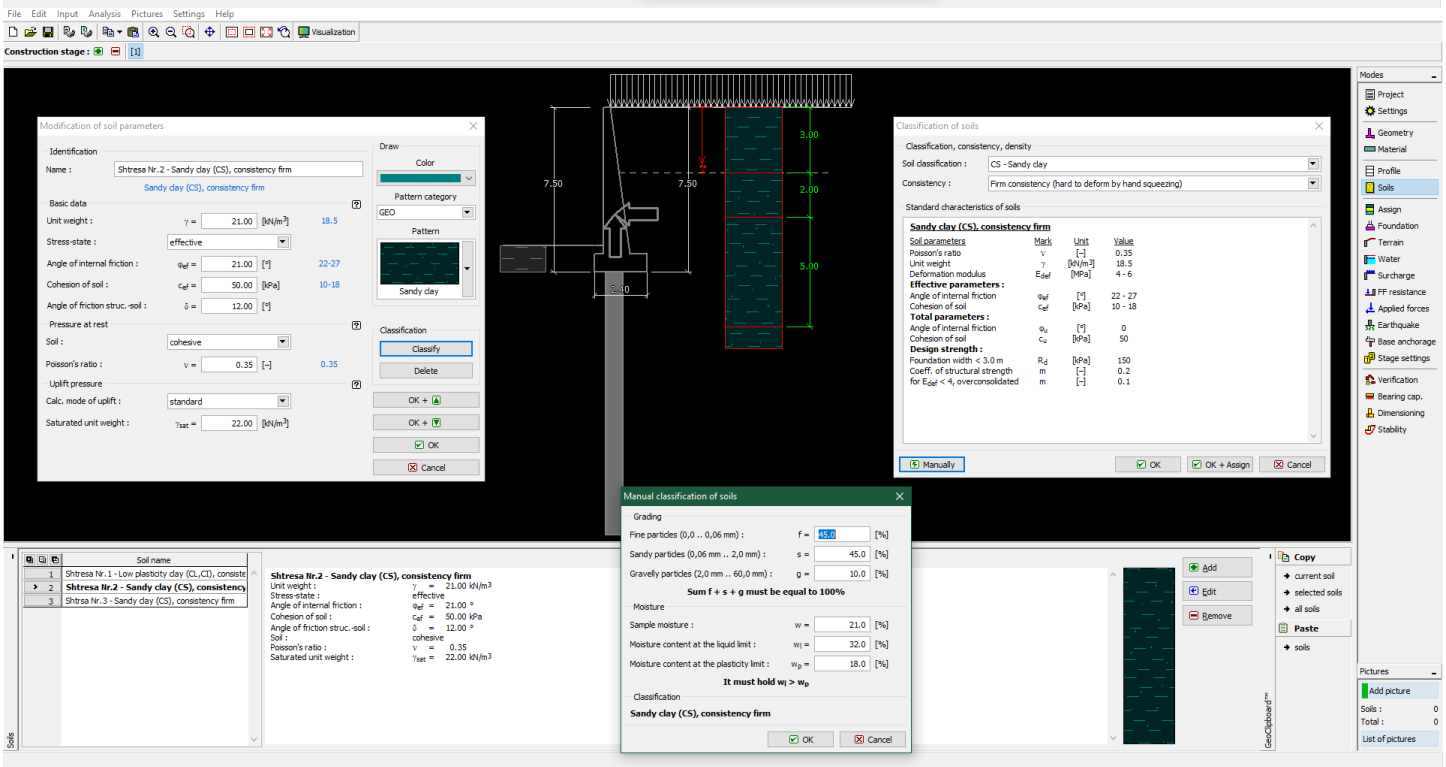

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
10.00
0.20
3.00 3.00
7.50
6.70
7.45:1
7.50
2.00
0.0200
0.40
0.80
1.20
0.80
5.00
12.00
0.50 0.80
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Analysis settings
Settings : Standard - EN 1997 - DA3 (2)
Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard
Active earth pressure calculation : Coulomb
Passive earth pressure calculation : Caquot-Kerisel
Earthquake analysis : Mononobe-Okabe
Shape of earth wedge : Calculate as skew
Base key : The base key is considered as inclined footing bottom
Allowable eccentricity : 0.333
Verification methodology : according to EN 1997
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters
Select settings
Settings administrator
Add to administrator
Edit
Settings
Pictures
Add picture
Settings : 0
Total : 0
List of pictures

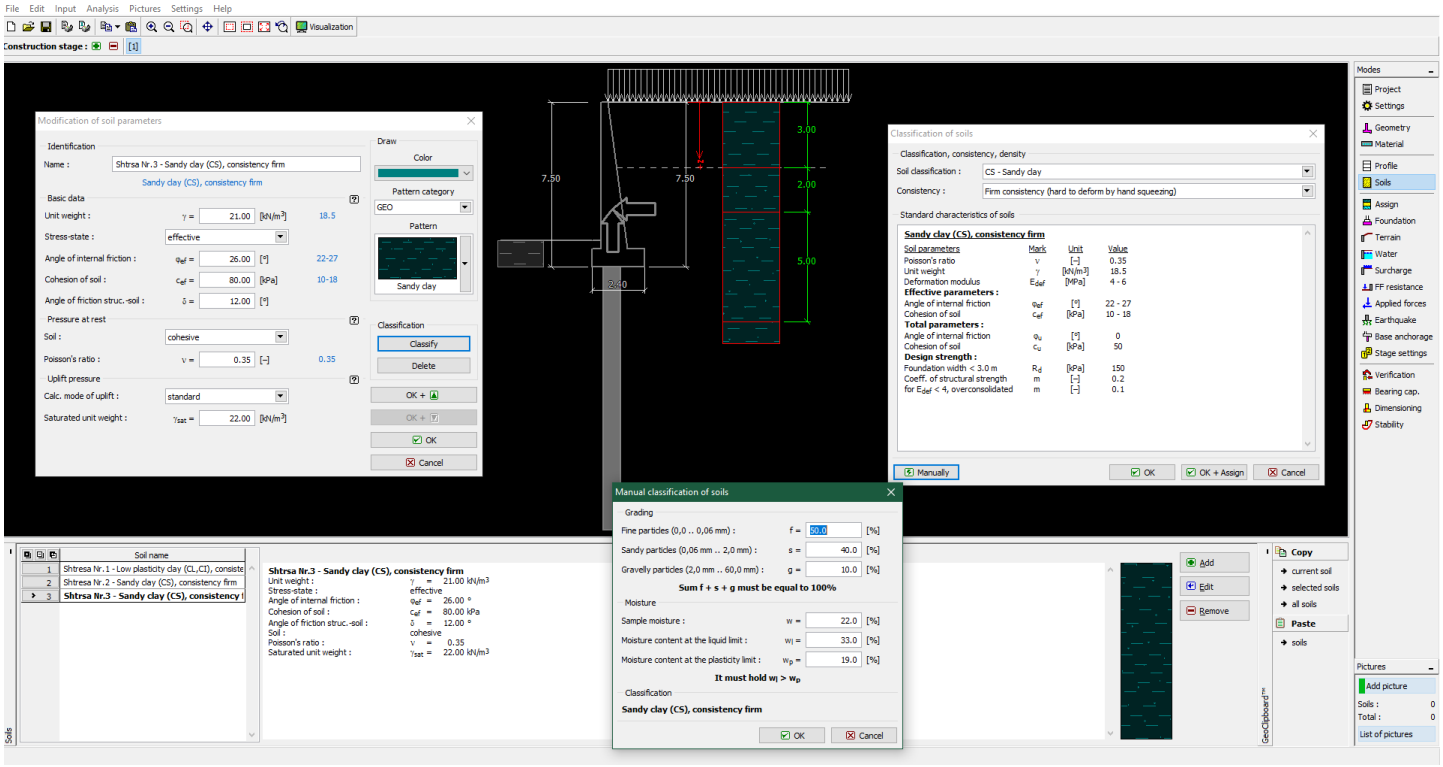

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
0.20
7.50
6.70
7.45:1
7.50
0.40
0.80
0.80
2.40
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of wall geometry:
Wall geometry
k = 0.20 [m]
h = 6.70 [m]
h1 = [m]
h2 = [m]
xx = 0.80 [m]
v1 = 0.40 [m]
v2 = 0.80 [m]
v3 = [m]
x1 = [m]
x2 = [m]
s1 = [-]
s2 = 7.45 [-]
Shank 1.20 [m]
x3 = [m]
Geometry
Pictures
Add picture
Geometry : 0
Total : 0
List of pictures

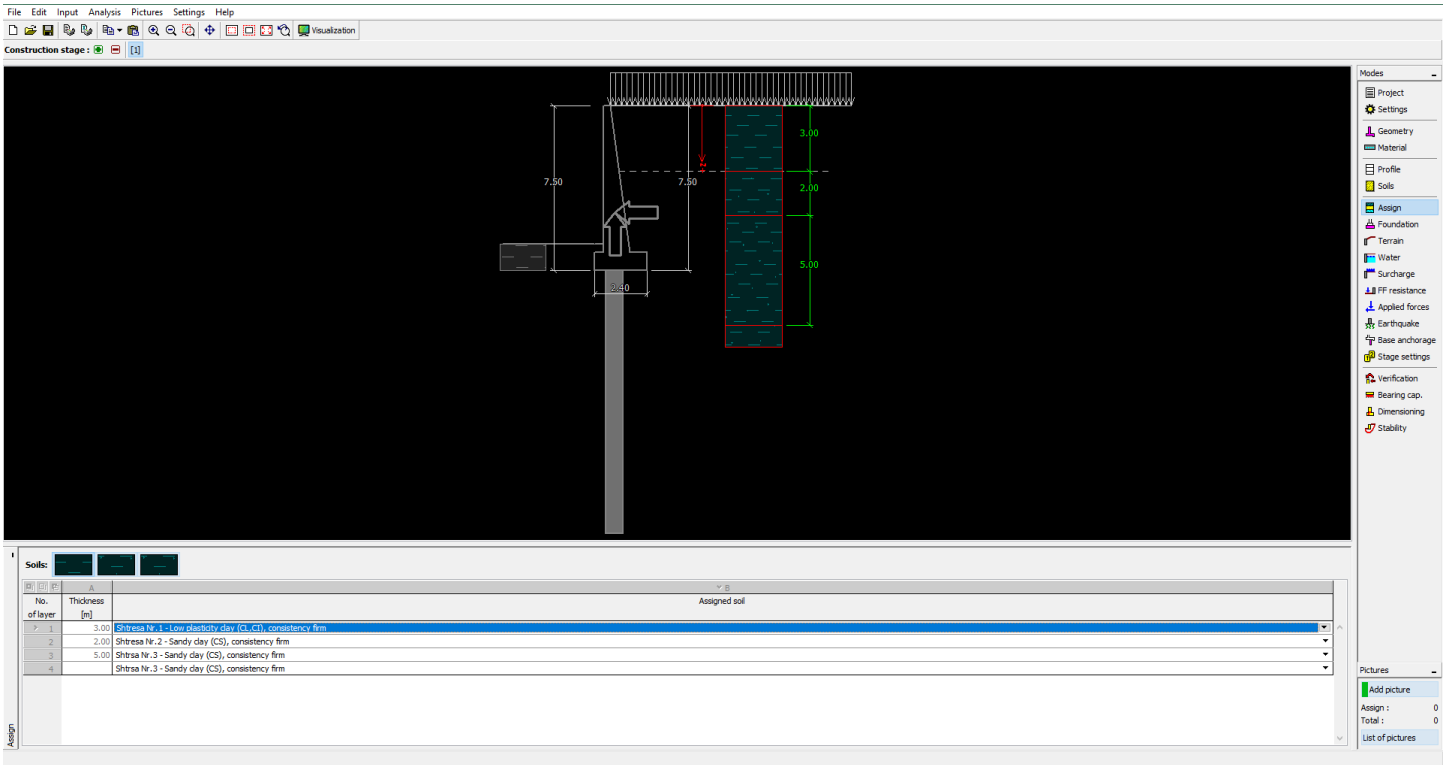

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
7.50
7.50
2.40
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Unit weight of wall :
γ =
23.50
[kN/m³]
Concrete
Catalog
User def.
C 25/30
f_ck = 25.00 MPa
f_ctm = 2.60 MPa
Longitudinal reinforcement
Catalog
User def.
B500
f_yk = 500.00 MPa
Material
Pictures
Add picture
Material : 0
Total : 0
List of pictures

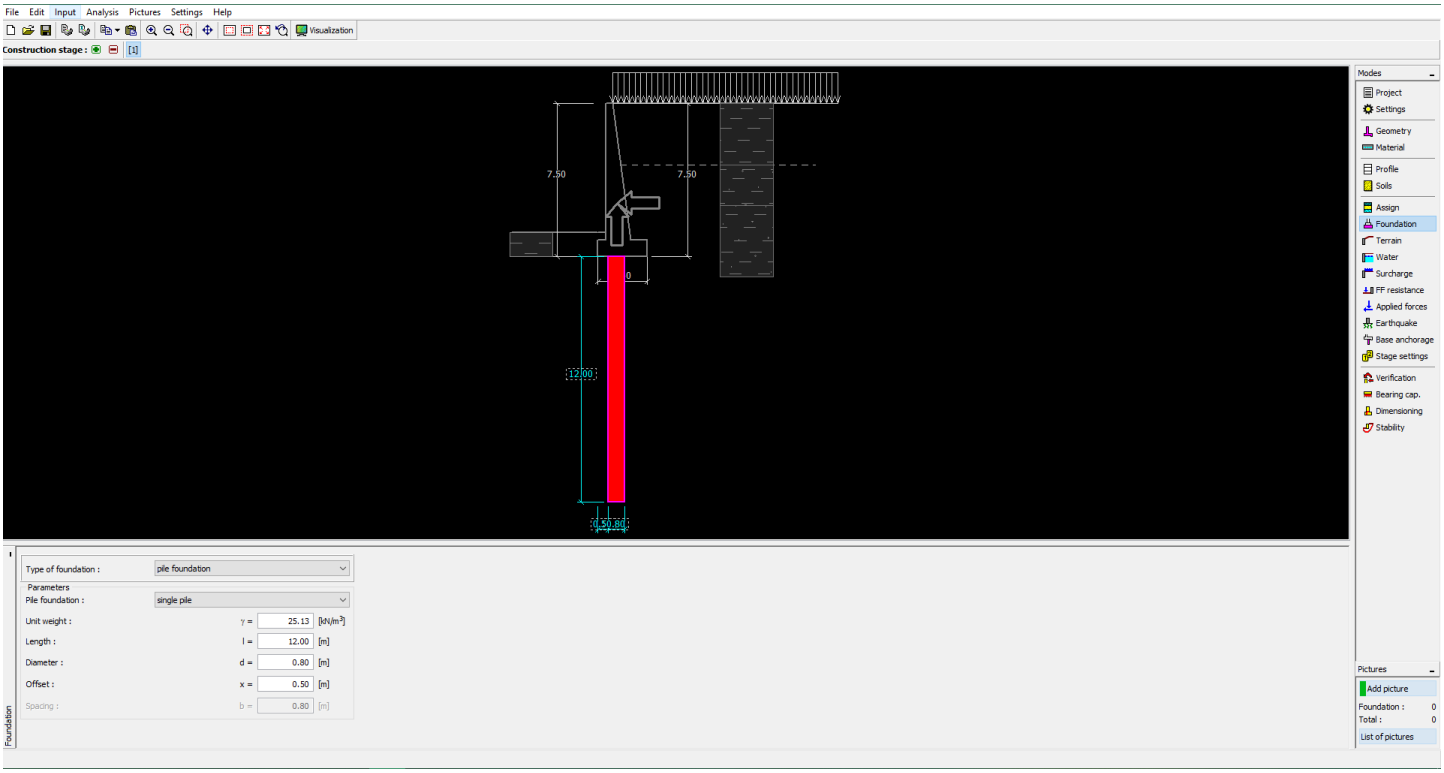

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
7.50
7.50
3.00
2.00
5.00
2.40
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Interf. #
Depth [m]
1 0.00
2 3.00
3 5.00
4 10.00
Add
Edit
Remove
Terrain elevation :
[m]
Change of terrain elevation
Profile
Pictures
Add picture
Profile : 0
Total : 0
List of pictures

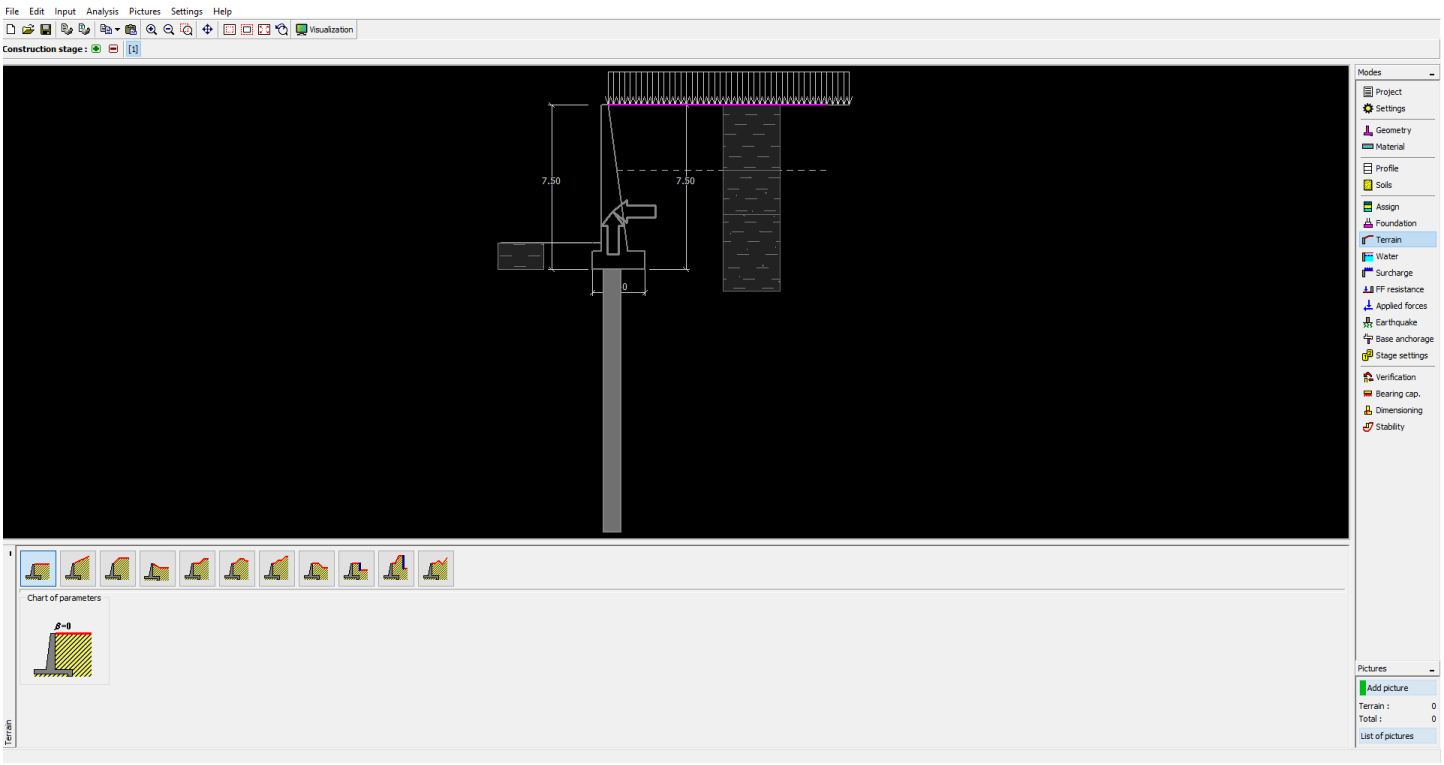

Modification of soil parameters
Identification
Name : Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
Low plasticity clay (CL,CI), consistency firm
Basic data
Unit weight : γ = 19.00 [kN/m³] 21.0
Stress-state : effective
Angle of internal friction : φef = 14.00 [°] 17-21
Cohesion of soil : cef = 25.00 [kPa] 8-16
Angle of friction struc.-soil : δ = 12.00 [°]
Pressure at rest
Soil : cohesive
Poisson's ratio : ν = 0.40 [-] 0.4
Uplift pressure
Calc. mode of uplift : standard
Saturated unit weight : γsat = 20.00 [kN/m³]
Draw
Color
Pattern category
GEO
Pattern
Clay
Classification
Classify
Delete
OK + A
OK + I
OK
Cancel
7.50
7.50
2.40
3.00
2.00
5.00
Classification of soils
Classification, consistency, density
Soil classification : CL,CI - Clay with low or medium plasticity
Consistency : Firm consistency (hard to deform by hand squeezing)
Standard characteristics of soils
Low plasticity clay (CL,CI), consistency firm
Soil parameters Mark Unit Value
Poisson's ratio ν [-] 0.4
Unit weight γ [kN/m³] 21.0
Deformation modulus Edef [MPa] 3 - 6
Effective parameters :
Angle of internal friction φef [°] 17 - 21
Cohesion of soil cef [kPa] 8 - 16
Total parameters :
Angle of internal friction φu [°] 0
Cohesion of soil cu [kPa] 50
Design strength :
Foundation width < 3.0 m Rd [kPa] 100
Coeff. of structural strength m [-] 0.2
for Edef < 4, overconsolidated m [-] 0.1
Manually
OK
OK + Assign
Cancel
Manual classification of soils
Grading
Fine particles (0,0 .. 0,06 mm) : f = 70.0 [%]
Sandy particles (0,06 mm .. 2,0 mm) : s = 21.0 [%]
Gravelly particles (2,0 mm .. 60,0 mm) : g = 0.0 [%]
Sum f + s + g must be equal to 100%
Moisture
Sample moisture : w = 25.0 [%]
Moisture content at the liquid limit : wl = 42.0 [%]
Moisture content at the plasticity limit : wp = 23.0 [%]
It must hold wl > wp
Classification
Low plasticity clay (CL,CI), consistency firm
OK
Cancel
Soils
Soil name
1 Shtresa Nr.1 - Low plasticity clay (CL,CI), cl
2 Shtresa Nr.2 - Sandy clay (CS), consistency firm
3 Shtresa Nr.3 - Sandy clay (CS), consistency firm
Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
Unit weight : γ = 19.00 kN/m³
Stress-state : effective
Angle of internal friction : φef = 14.00 °
Cohesion of soil : cef = 25.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.40
Saturated unit weight : γsat = 20.00 kN/m³
Add
Edit
Remove
Copy
current soil
selected soils
all soils
Paste
soils
GeoClipboard
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Solis : 0
Total : 0
List of pictures

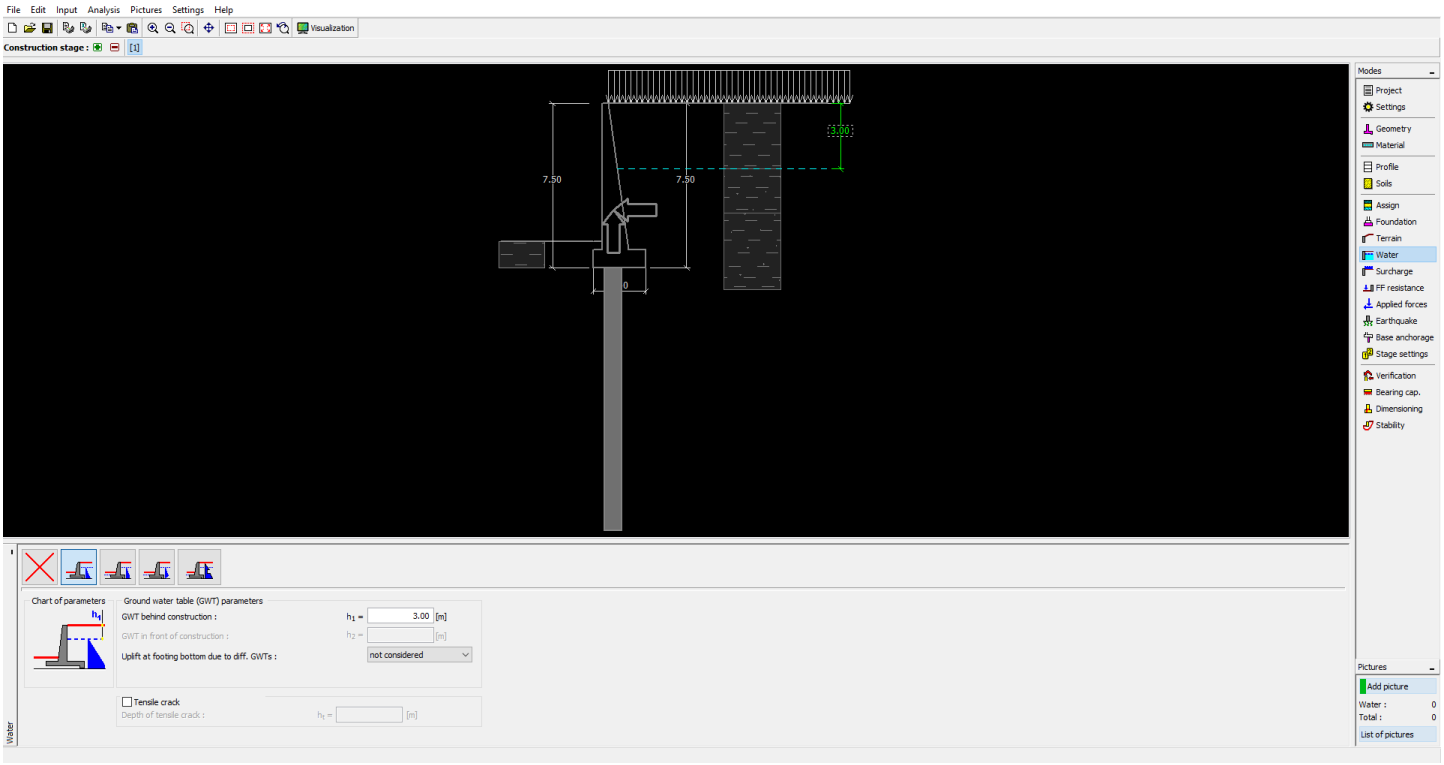

Modification of soil parameters
Identification
Name : Shtresa Nr.2 - Sandy clay (CS), consistency firm
Sandy clay (CS), consistency firm
Basic data
Unit weight : γ = 21.00 [kN/m³] 18.5
Stress-state : effective
Angle of internal friction : φef = 21.00 [°] 22-27
Cohesion of soil : cef = 50.00 [kPa] 10-18
Angle of friction struc.-soil : δ = 12.00 [°]
Pressure at rest
Soil : cohesive
Poisson's ratio : ν = 0.35 [-] 0.35
Uplift pressure
Calc. mode of uplift : standard
Saturated unit weight : γsat = 22.00 [kN/m³]
Draw
Color
Pattern category
GEO
Pattern
Sandy clay
Classification
Classify
Delete
OK + A
OK + I
OK
Cancel
7.50
7.50
2.40
3.00
2.00
5.00
Classification of soils
Classification, consistency, density
Soil classification : CS - Sandy clay
Consistency : Firm consistency (hard to deform by hand squeezing)
Standard characteristics of soils
Sandy clay (CS), consistency firm
Soil parameters Mark Unit Value
Poisson's ratio ν [-] 0.35
Unit weight γ [kN/m³] 18.5
Deformation modulus Edef [MPa] 4 - 6
Effective parameters :
Angle of internal friction φef [°] 22 - 27
Cohesion of soil cef [kPa] 10 - 18
Total parameters :
Angle of internal friction φu [°] 0
Cohesion of soil cu [kPa] 50
Design strength :
Foundation width < 3.0 m Rd [kPa] 150
Coeff. of structural strength m [-] 0.2
for Edef < 4, overconsolidated m [-] 0.1
Manually
OK
OK + Assign
Cancel
Manual classification of soils
Grading
Fine particles (0,0 .. 0,06 mm) : f = 45.0 [%]
Sandy particles (0,06 mm .. 2,0 mm) : s = 45.0 [%]
Gravelly particles (2,0 mm .. 60,0 mm) : g = 10.0 [%]
Sum f + s + g must be equal to 100%
Moisture
Sample moisture : w = 21.0 [%]
Moisture content at the liquid limit : wl = 32.0 [%]
Moisture content at the plasticity limit : wp = 18.0 [%]
It must hold wl > wp
Classification
Sandy clay (CS), consistency firm
OK
Cancel
Soils
Soil name
1 Shtresa Nr.1 - Low plasticity clay (CL,CI), consiste
2 Shtresa Nr.2 - Sandy clay (CS), consistency
3 Shtresa Nr.3 - Sandy clay (CS), consistency firm
Shtresa Nr.2 - Sandy clay (CS), consistency firm
Unit weight : γ = 21.00 kN/m³
Stress-state : effective
Angle of internal friction : φef = 21.00 °
Cohesion of soil : cef = 50.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γsat = 22.00 kN/m³
Add
Edit
Remove
Copy
current soil
selected soils
all soils
Paste
soils
GeoClipboard
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Solis : 0
Total : 0
List of pictures

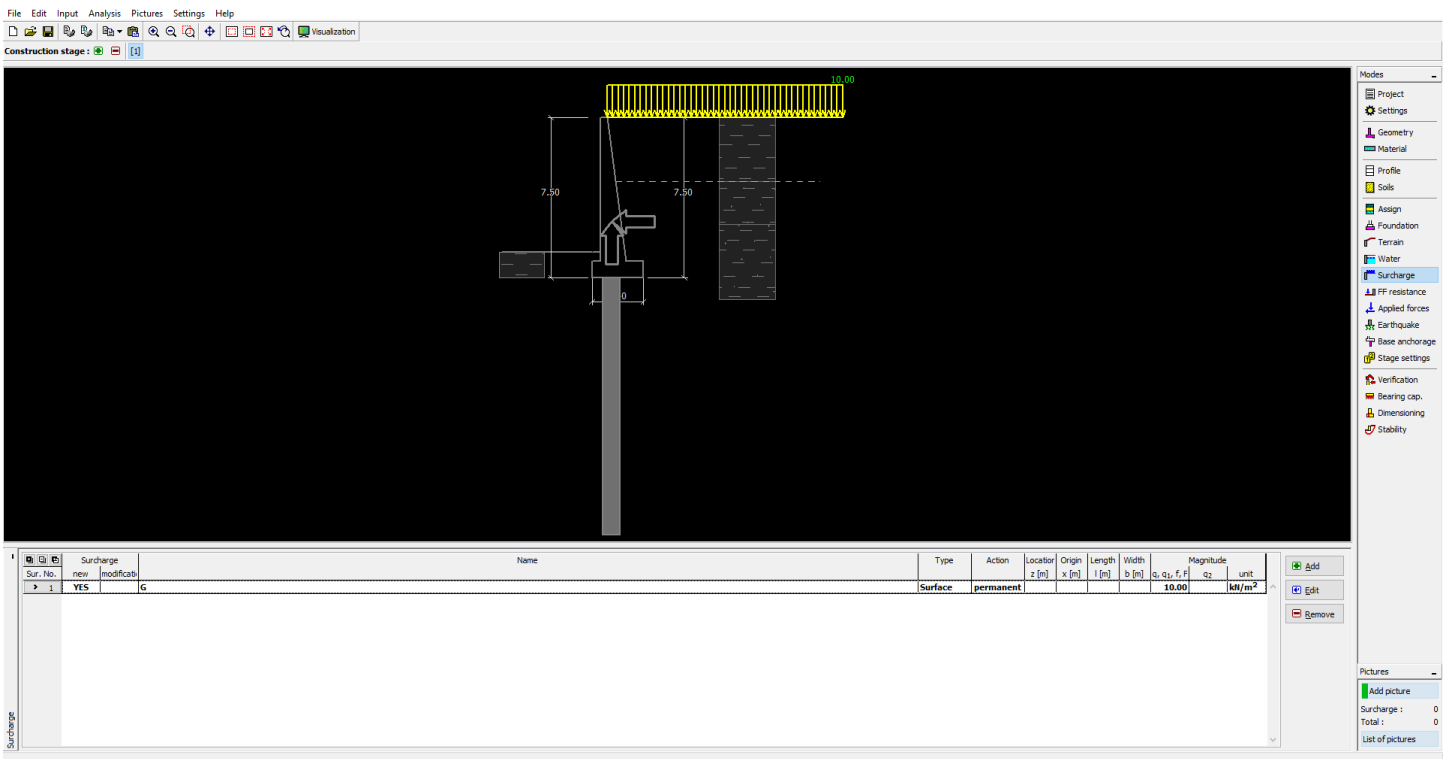

Modification of soil parameters
Identification
Name : Shtrsa Nr.3 - Sandy clay (CS), consistency firm
Sandy clay (CS), consistency firm
Basic data
Unit weight : γ = 21.00 [kN/m³] 18.5
Stress-state : effective
Angle of internal friction : φef = 26.00 [°] 22-27
Cohesion of soil : cef = 80.00 [kPa] 10-18
Angle of friction struc.-soil : δ = 12.00 [°]
Pressure at rest
Soil : cohesive
Poisson's ratio : ν = 0.35 [–] 0.35
Uplift pressure
Calc. mode of uplift : standard
Saturated unit weight : γsat = 22.00 [kN/m³]
Draw
Color
Pattern category
GEO
Pattern
Sandy clay
Classification
Classify
Delete
OK +
OK
Cancel
7.50
7.50
2.00
3.00
2.00
5.00
Classification of soils
Classification, consistency, density
Soil classification : CS - Sandy clay
Consistency : Firm consistency (hard to deform by hand squeezing)
Standard characteristics of soils
Sandy clay (CS), consistency firm
Soil parameters
Mark
Unit
Value
Poisson's ratio ν [–] 0.35
Unit weight γ [kN/m3] 18.5
Deformation modulus Edef [MPa] 4 - 6
Effective parameters :
Angle of internal friction φef [°] 22 - 27
Cohesion of soil cef [kPa] 10 - 18
Total parameters :
Angle of internal friction φu [°] 0
Cohesion of soil cu [kPa] 50
Design strength :
Foundation width < 3.0 m Rd [kPa] 150
Coeff. of structural strength m [–] 0.2
for Edef < 4, overconsolidated m [–] 0.1
Manually
OK
OK + Assign
Cancel
Manual classification of soils
Grading
Fine particles (0,0 .. 0,06 mm) : f = 20.0 [%]
Sandy particles (0,06 mm .. 2,0 mm) : s = 40.0 [%]
Gravelly particles (2,0 mm .. 60,0 mm) : g = 10.0 [%]
Sum f + s + g must be equal to 100%
Moisture
Sample moisture : w = 22.0 [%]
Moisture content at the liquid limit : wl = 33.0 [%]
Moisture content at the plasticity limit : wp = 19.0 [%]
It must hold wl > wp
Classification
Sandy clay (CS), consistency firm
OK
Cancel
Soils
Soil name
1 Shtresa Nr.1 - Low plasticity clay (CL,CI), consiste
2 Shtresa Nr.2 - Sandy clay (CS), consistency firm
3 Shtrsa Nr.3 - Sandy clay (CS), consistency f
Shtrsa Nr.3 - Sandy clay (CS), consistency firm
Unit weight : γ = 21.00 kN/m³
Stress-state : effective
Angle of internal friction : φef = 26.00 °
Cohesion of soil : cef = 80.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γsat = 22.00 kN/m³
Add
Edit
Remove
Copy
current soil
selected soils
all soils
Paste
soils
GeoClipboard™
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Solis : 0
Total : 0
List of pictures

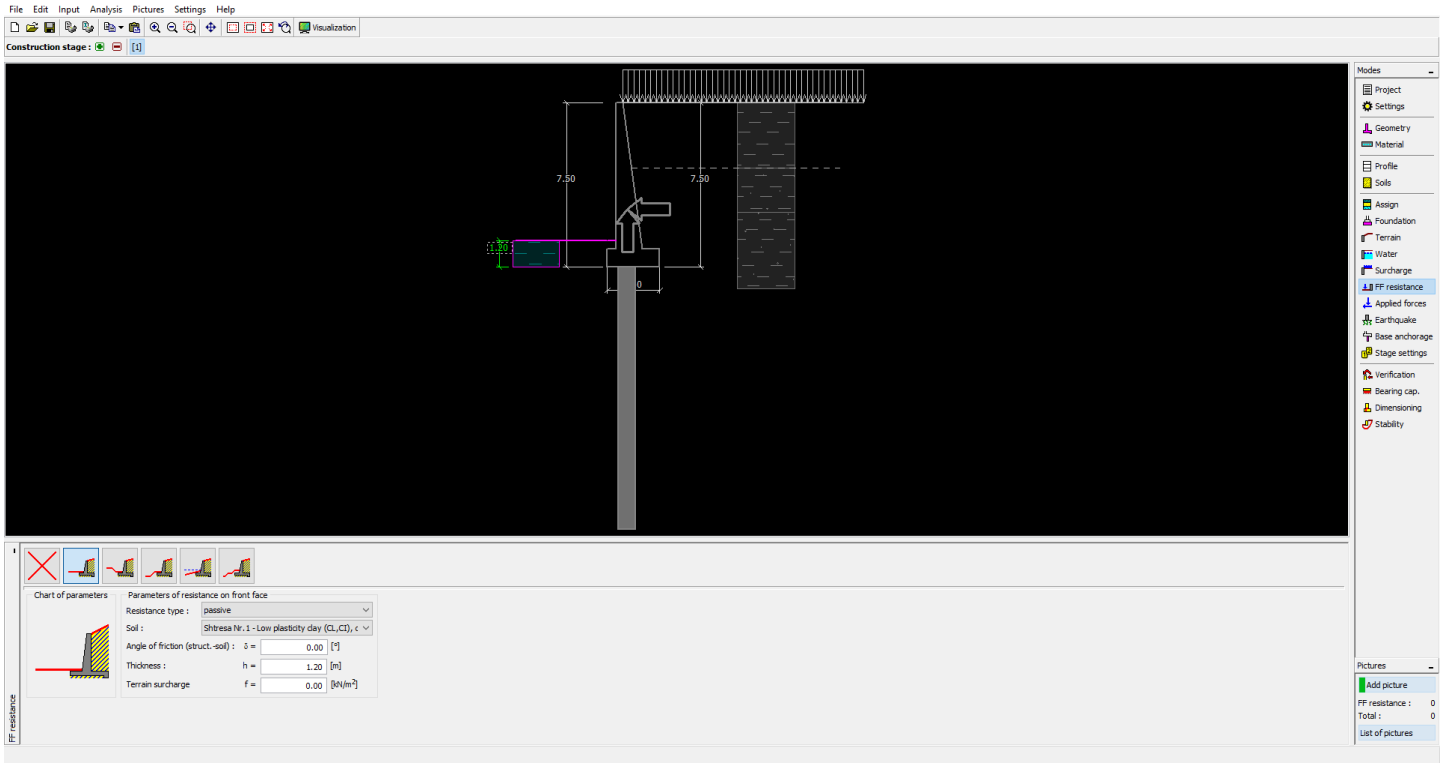

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
[1]
7.50
7.50
2.00
3.00
2.00
5.00
Soils:
No. of layer
Thickness [m]
Assigned soil
1 3.00 Shtresa Nr. 1 - Low plasticity clay (CL,CI), consistency firm
2 2.00 Shtresa Nr.2 - Sandy clay (CS), consistency firm
3 5.00 Shtrsa Nr.3 - Sandy clay (CS), consistency firm
4 Shtrsa Nr.3 - Sandy clay (CS), consistency firm
Assign
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Assign : 0
Total : 0
List of pictures

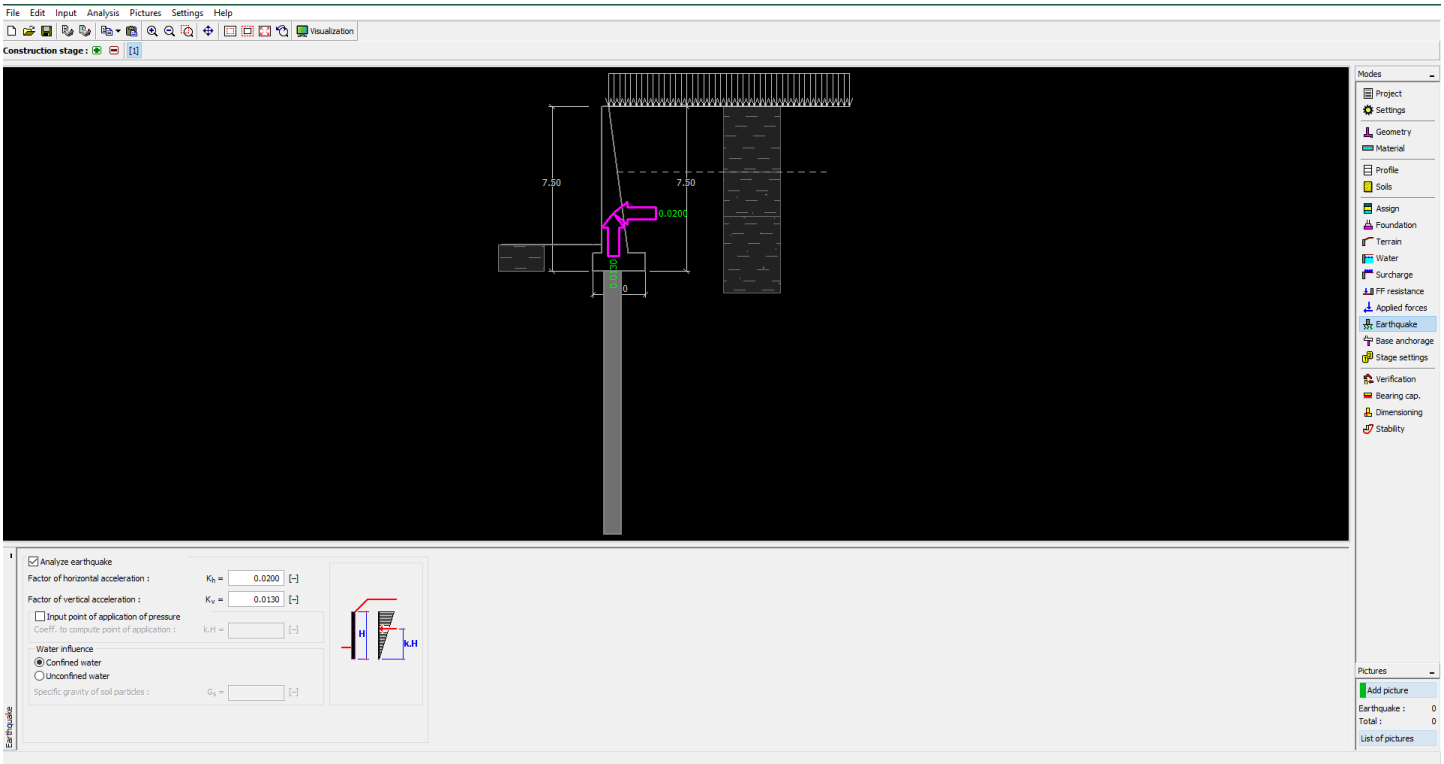

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
7.50
7.50
12.00
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Type of foundation : pile foundation
Parameters
Pile foundation : single pile
Unit weight : γ = 25.13 [kN/m³]
Length : l = 12.00 [m]
Diameter : d = 0.80 [m]
Offset : x = 0.50 [m]
Spacing : b = 0.80 [m]
Foundation
Pictures
Add picture
Foundation : 0
Total : 0
List of pictures

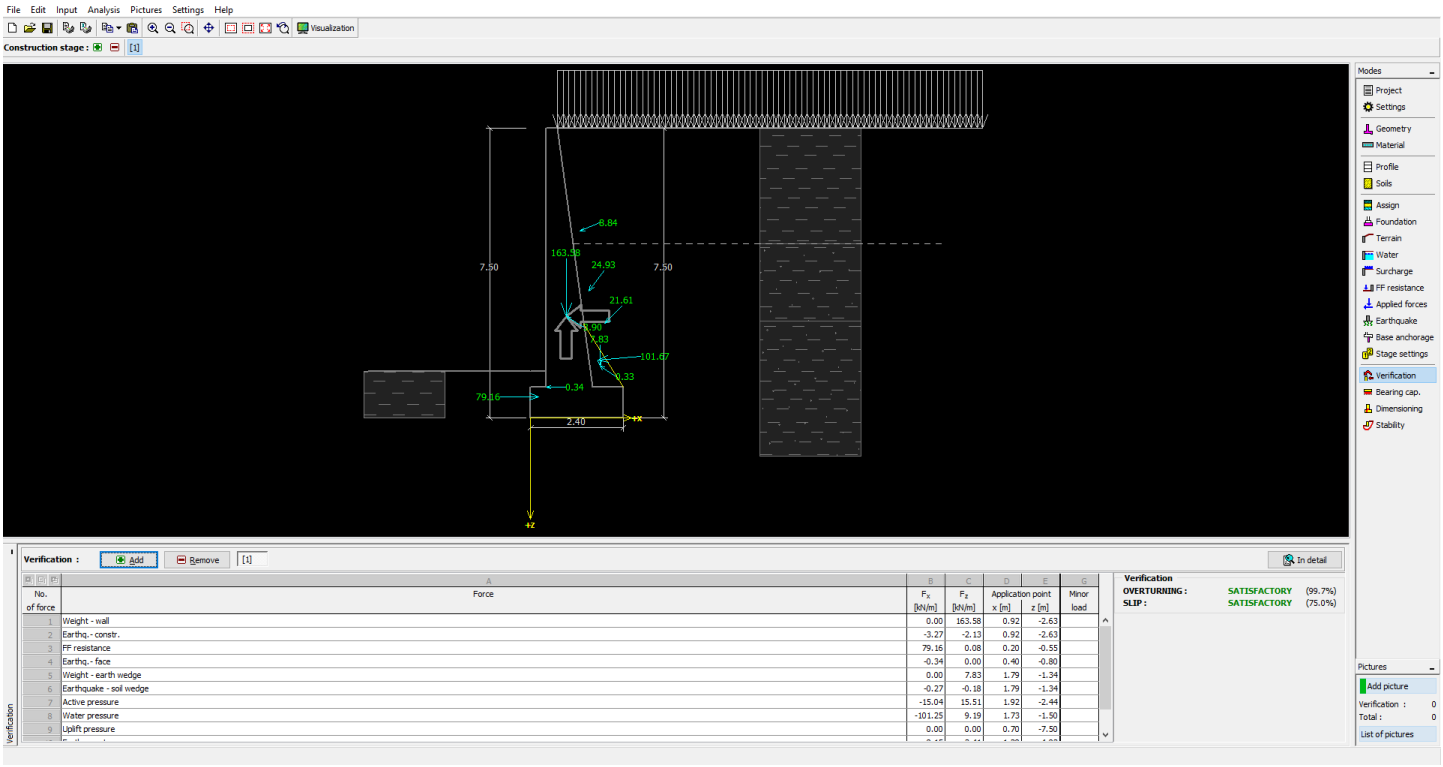

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
7.50
7.50
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of parameters
β=0
Terrain
Pictures
Add picture
Terrain : 0
Total : 0
List of pictures

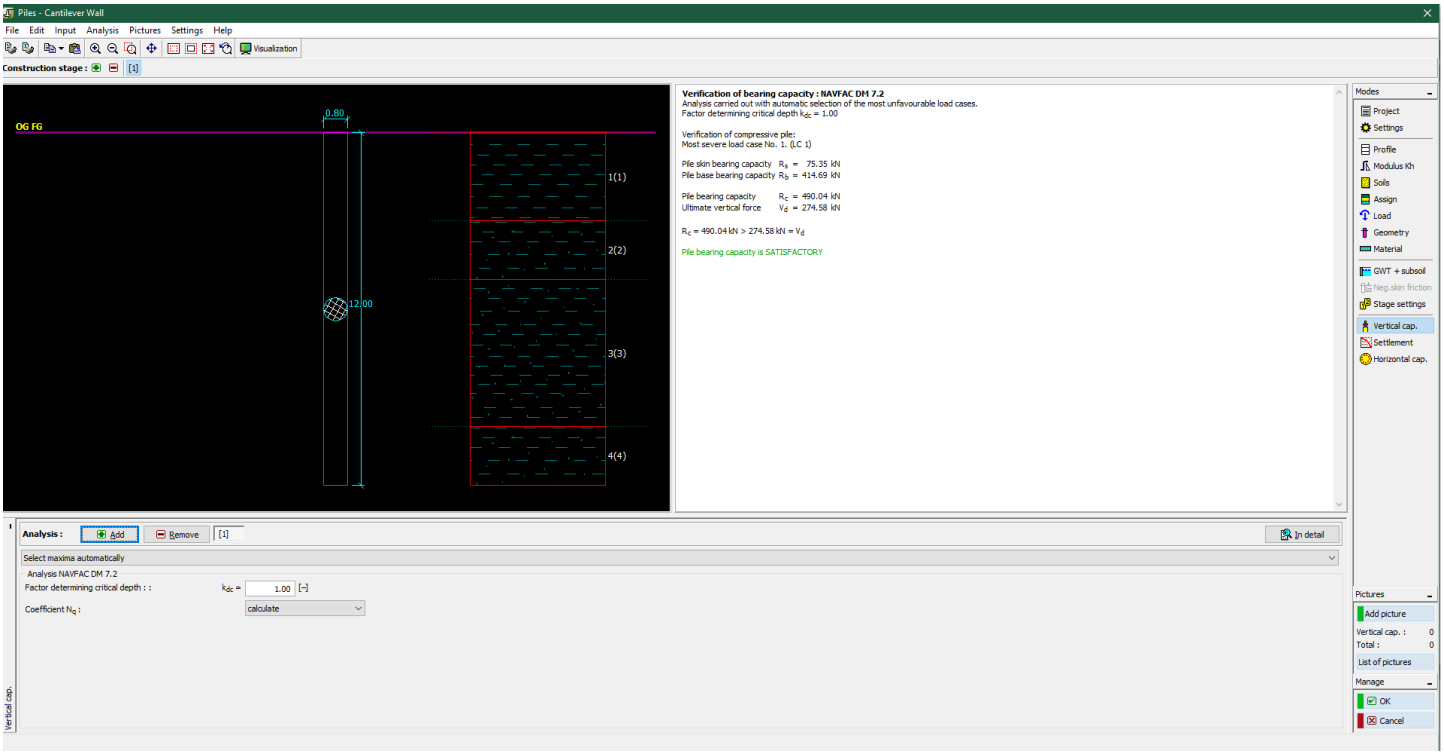

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
3.00
7.50
7.50
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of parameters
Ground water table (GWT) parameters
GWT behind construction :
3.00 [m]
GWT in front of construction :
Uplift at footing bottom due to diff. GWTs :
not considered
Tensile crack
Depth of tensile crack :
Pictures
Add picture
Water : 0
Total : 0
List of pictures
Water

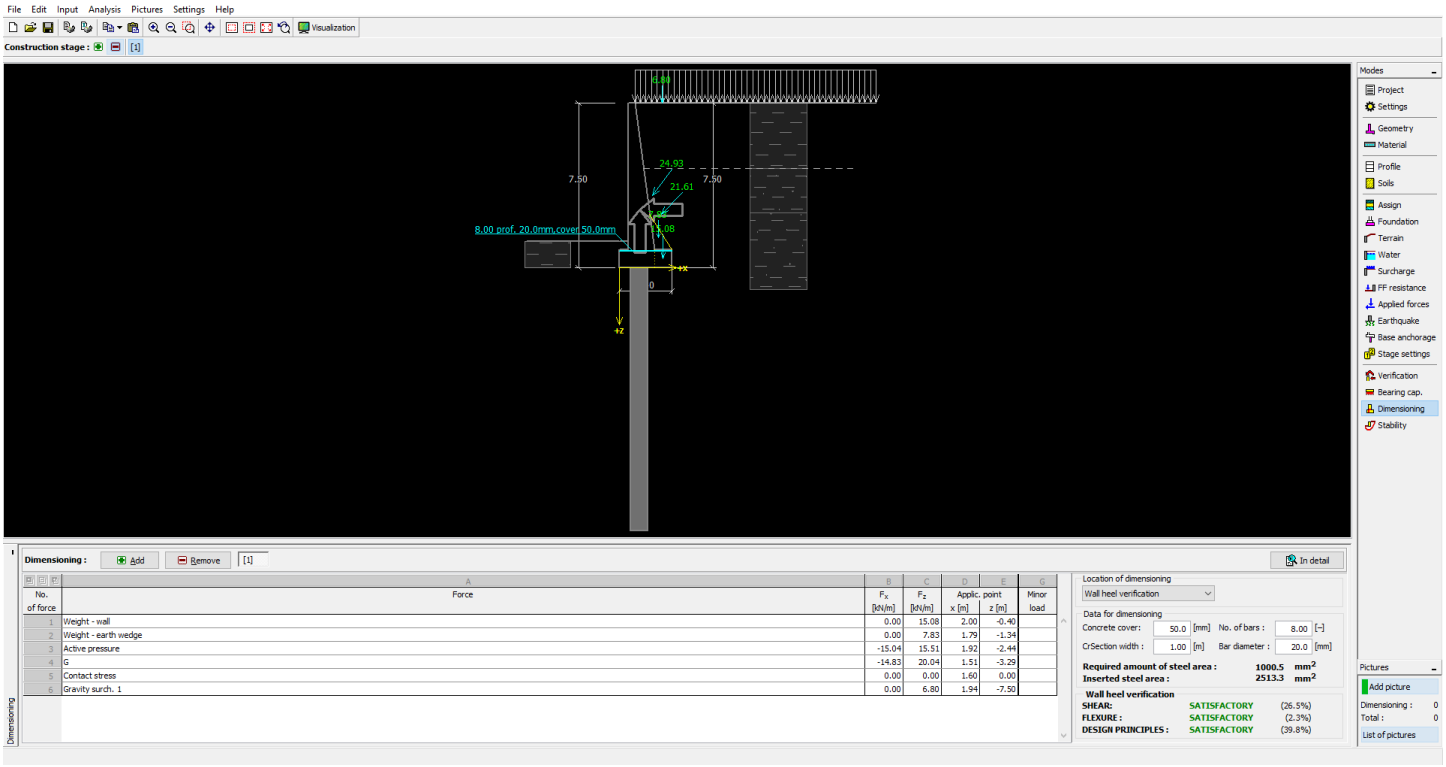

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
10.00
7.50
7.50
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Surcharge
Sur. No.
new
modificat
Name
Type
Action
Location z [m]
Origin x [m]
Length l [m]
Width b [m]
Magnitude
unit
1
YES
G
Surface
permanent
10.00
kN/m²
Add
Edit
Remove
Pictures
Add picture
Surcharge : 0
Total : 0
List of pictures
Surcharge

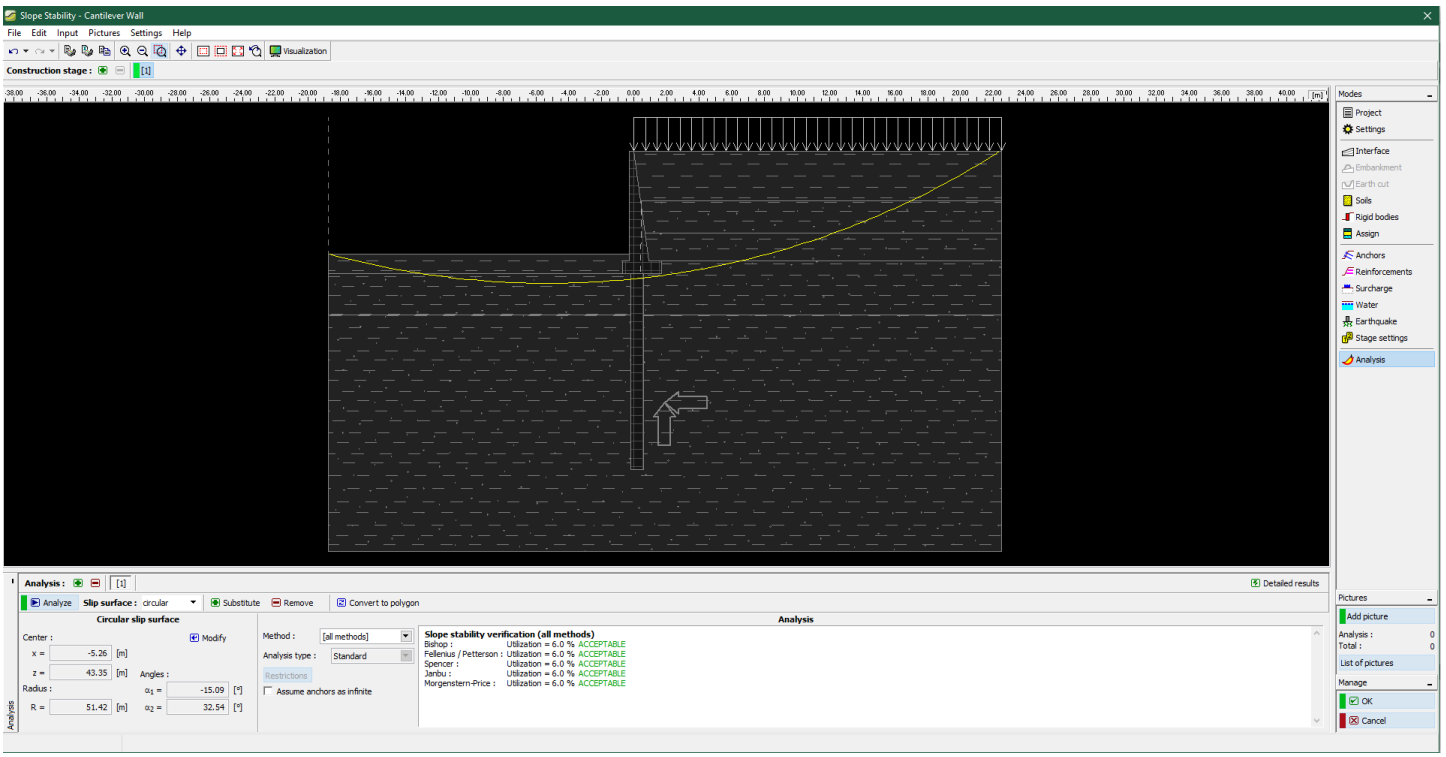

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
7.50
7.50
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of parameters
Parameters of resistance on front face
Resistance type : passive
Soil : Shtresa Nr.1 - Low plasticity clay (CL,CI), c
Angle of friction (struct.-soil) : δ = 0.00 [°]
Thickness : h = 1.20 [m]
Terrain surcharge f = 0.00 [kN/m²]
FF resistance
Pictures
Add picture
FF resistance : 0
Total : 0
List of pictures


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
7.50
7.50
0.0200
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Analyze earthquake
Factor of horizontal acceleration : Kh = 0.0200 [–]
Factor of vertical acceleration : Kv = 0.0130 [–]
Input point of application of pressure
Coeff. to compute point of application : k.H = [–]
Water influence
Confined water
Unconfined water
Specific gravity of soil particles : Gs = [–]
H
k.H
Earthquake
Pictures
Add picture
Earthquake : 0
Total : 0
List of pictures

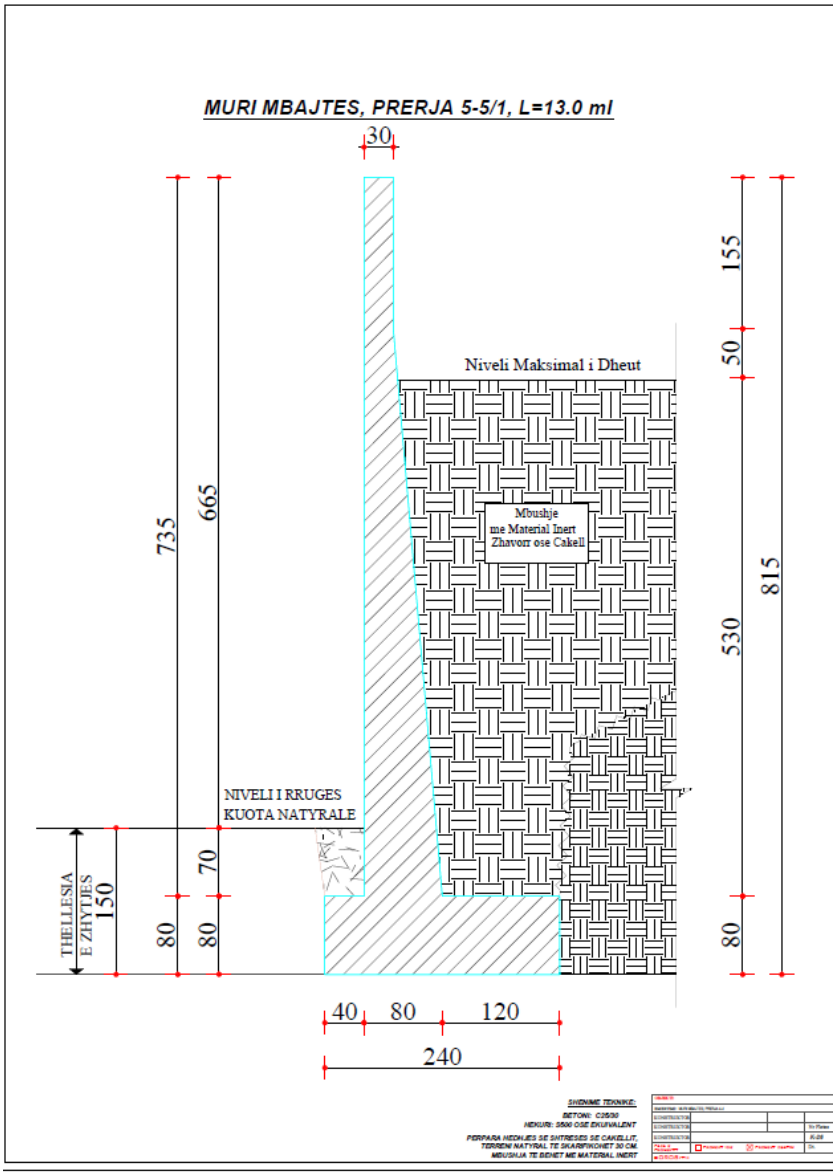

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
8.84
163.58
24.93
21.61
7.50
7.50
5.90
7.83
101.67
9.33
0.34
79.16
2.40
+x
+z
Verification :
Add
Remove
[1]
In detail
No. of force
Force
Fx [kN/m]
Fz [kN/m]
Application point x [m]
z [m]
Minor load
1 Weight - wall 0.00 163.58 0.92 -2.63
2 Earthq. - constr. -3.27 -2.13 0.92 -2.63
3 FF resistance 79.16 0.08 0.20 -0.55
4 Earthq. - face -0.34 0.00 0.40 -0.80
5 Weight - earth wedge 0.00 7.83 1.79 -1.34
6 Earthquake - soil wedge -0.27 -0.18 1.79 -1.34
7 Active pressure -15.04 15.51 1.92 -2.44
8 Water pressure -101.25 9.19 1.73 -1.50
9 Uplift pressure 0.00 0.00 0.70 -7.50
Verification
OVERTURNING : SATISFACTORY (99.7%)
SLIP : SATISFACTORY (75.0%)
Pictures
Add picture
Verification : 0
Total : 0
List of pictures
Verification


Piles - Cantilever Wall
File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
OG FG
0.80
12.00
1(1)
2(2)
3(3)
4(4)
Verification of bearing capacity : NAVFAC DM 7.2
Analysis carried out with automatic selection of the most unfavourable load cases.
Factor determining critical depth k_{dc} = 1.00
Verification of compressive pile:
Most severe load case No. 1. (LC 1)
Pile skin bearing capacity R_s = 75.35 kN
Pile base bearing capacity R_b = 414.69 kN
Pile bearing capacity R_c = 490.04 kN
Ultimate vertical force V_d = 274.58 kN
R_c = 490.04 kN > 274.58 kN = V_d
Pile bearing capacity is SATISFACTORY
Modes
Project
Settings
Profile
Modulus Kh
Soils
Assign
Load
Geometry
Material
GWT + subsoil
Neg.skin friction
Stage settings
Vertical cap.
Settlement
Horizontal cap.
Analysis :
Add
Remove
[1]
In detail
Select maxima automatically
Analysis NAVFAC DM 7.2
Factor determining critical depth : :
k_{dc} = 1.00 [-]
Coefficient N_q :
calculate
Pictures
Add picture
Vertical cap. : 0
Total : 0
List of pictures
Manage
OK
Cancel
Vertical cap.


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
4.00
7.50
24.93
21.61
7.50
1.08
8.00 prof. 20.0mm,cover 50.0mm
+x
+z
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Dimensioning :
Add
Remove
In detail
No. of force
Force
Fx [kN/m]
Fz [kN/m]
Applic. point x [m]
Applic. point z [m]
Minor load
1 Weight - wall 0.00 15.08 2.00 -0.40
2 Weight - earth wedge 0.00 7.83 1.79 -1.34
3 Active pressure -15.04 15.51 1.92 -2.44
4 G -14.83 20.04 1.51 -3.29
5 Contact stress 0.00 0.00 1.60 0.00
6 Gravity surch. 1 0.00 6.80 1.94 -7.50
Location of dimensioning
Wall heel verification
Data for dimensioning
Concrete cover: 50.0 [mm]
No. of bars : 8.00 [-]
CrSection width : 1.00 [m]
Bar diameter : 20.0 [mm]
Required amount of steel area : 1000.5 mm²
Inserted steel area : 2513.3 mm²
Wall heel verification
SHEAR: SATISFACTORY (26.5%)
FLEXURE : SATISFACTORY (2.3%)
DESIGN PRINCIPLES : SATISFACTORY (39.8%)
Pictures
Add picture
Dimensioning : 0
Total : 0
List of pictures


Slope Stability - Cantilever Wall
File Edit Input Pictures Settings Help
Visualization
Construction stage :
Modes
Project
Settings
Interface
Embankment
Earth cut
Soils
Rigid bodies
Assign
Anchors
Reinforcements
Surcharge
Water
Earthquake
Stage settings
Analysis
Analysis :
Detailed results
Analyze
Slip surface : circular
Substitute
Remove
Convert to polygon
Circular slip surface
Center :
Modify
x = -5.26 [m]
z = 43.35 [m]
Angles :
Radius :
α1 = -15.09 [°]
R = 51.42 [m]
α2 = 32.54 [°]
Method : [all methods]
Analysis type : Standard
Restrictions
Assume anchors as infinite
Analysis
Slope stability verification (all methods)
Bishop : Utilization = 6.0 % ACCEPTABLE
Fellenius / Petterson : Utilization = 6.0 % ACCEPTABLE
Spencer : Utilization = 6.0 % ACCEPTABLE
Janbu : Utilization = 6.0 % ACCEPTABLE
Morgenstern-Price : Utilization = 6.0 % ACCEPTABLE
Pictures
Add picture
Analysis : 0
Total : 0
List of pictures
Manage
OK
Cancel

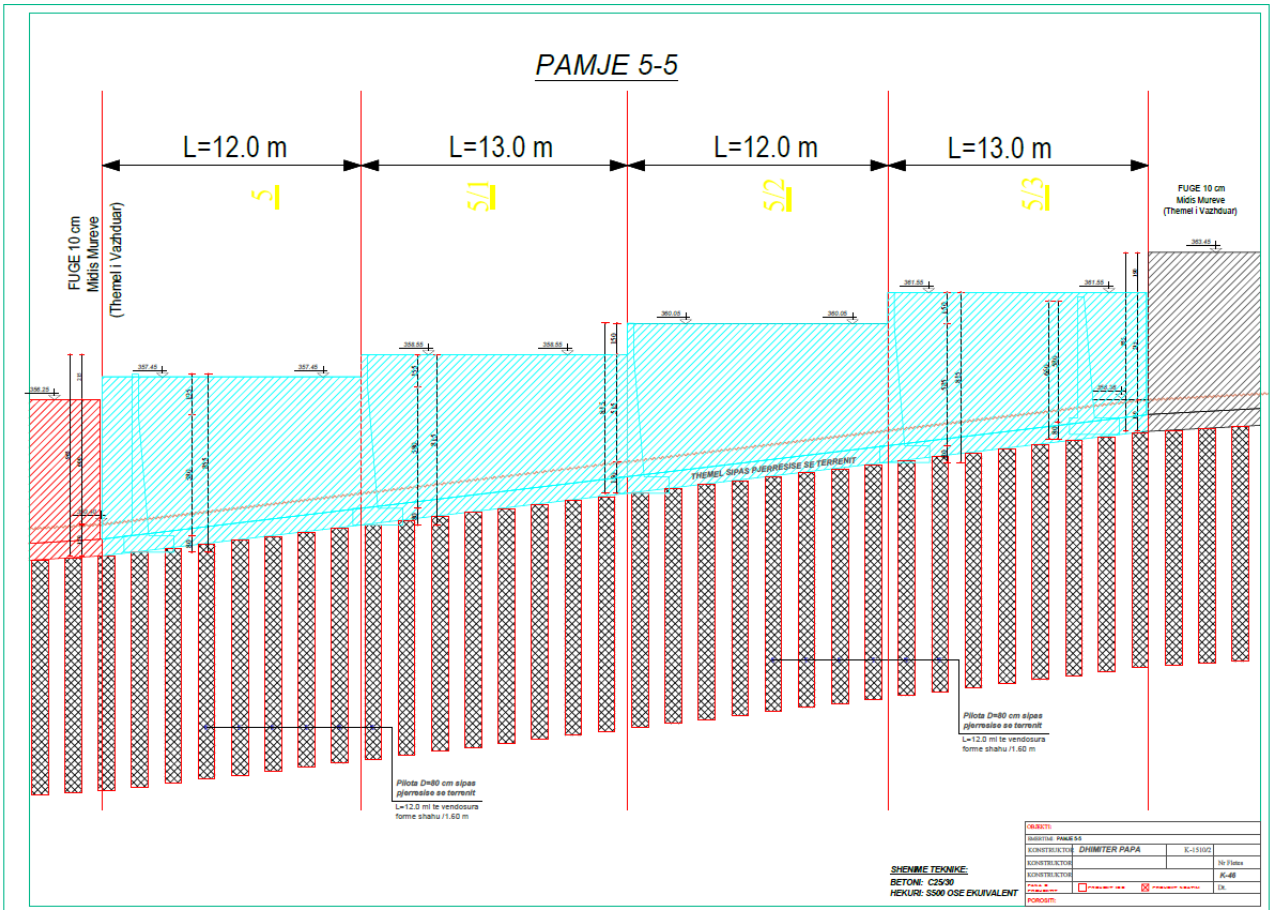
Cantilever wall analysis



Input data

Project

Task : Muret Mbajtese - SURREL
Part : Projekti i Perforcimit te Skarpates
Description : Muri Mbajtes - Prerja 5-5
Author : Dhimitri PAPA



Settings

Standard - EN 1997 - DA3 (2)

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard

Wall analysis

Active earth pressure calculation : Coulomb
Passive earth pressure calculation : Caquot-Kerisel
Earthquake analysis : Mononobe-Okabe
Shape of earth wedge : Calculate as skew
Base key : The base key is considered as inclined footing bottom
Allowable eccentricity : 0.333
Verification methodology : according to EN 1997
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)								
Permanent design situation								
		State STR				State GEO		
		Unfavourable		Favourable		Unfavourable		Favourable	
Permanent actions :	γ_G =	1.35	[–]	1.00	[–]	1.00	[–]	1.00	[–]
Variable actions :	γ_Q =	1.50	[–]	0.00	[–]	1.30	[–]	0.00	[–]
Water load :	γ_w =					1.00	[–]		

Partial factors for soil parameters (M)			
Permanent design situation			
Partial factor on internal friction :	γ_ϕ =	1.25	[–]
Partial factor on effective cohesion :	γ_c =	1.25	[–]
Partial factor on undrained shear strength :	γ_{cu} =	1.40	[–]
Partial factor on Poisson's ratio :	γ_v =	1.00	[–]

Partial factors for variable actions			
Permanent design situation			
Factor for combination value :	ψ_0 =	0.70	[–]
Factor for frequent value :	ψ_1 =	0.50	[–]
Factor for quasi-permanent value :	ψ_2 =	0.30	[–]

Material of structure

Unit weight γ = 23.56 kN/m^3
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete : C 25/30
Cylinder compressive strength f_{ck} = 25.00 MPa
Tensile strength f_{ctm} = 2.60 MPa

Longitudinal steel : B500
Yield strength f_{yk} = 500.00 MPa

Geometry of structure

No.	Coordinate X [m]	Depth Z [m]
1	0.00	0.00
2	0.90	5.80
3	1.70	5.80
4	1.70	6.60
5	-0.70	6.60
6	-0.70	5.80
7	-0.30	5.80
8	-0.30	0.00

The origin [0,0] is located at the most upper right point of the wall.
Wall section area = 6.27 m^2.

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m^3]	γ_{su} [kN/m^3]	δ [°]
1	Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm		14.00	25.00	19.00	10.00	12.00
2	Shtresa Nr.2 - Sandy clay (CS), consistency firm		21.00	50.00	21.00	12.00	12.00
3	Shtrsa Nr.3 - Sandy clay (CS), consistency firm		26.00	80.00	21.00	12.00	12.00

Soil parameters to compute pressure at rest

No.	Name	Pattern	Type calculation	φ_{ef} [°]	ν [–]	OCR [–]	K_r [–]
1	Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm		cohesive	-	0.40	-	-
2	Shtresa Nr.2 - Sandy clay (CS), consistency firm		cohesive	-	0.35	-	-
3	Shtrsa Nr.3 - Sandy clay (CS), consistency firm		cohesive	-	0.35	-	-

Soil parameters

Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm

Unit weight : $\gamma = 19.00$ kN/m³
Stress-state : effective
Angle of internal friction : $\varphi_{ef} = 14.00$ °
Cohesion of soil : $c_{ef} = 25.00$ kPa
Angle of friction struc.-soil : $\delta = 12.00$ °
Soil : cohesive
Poisson's ratio : $\nu = 0.40$
Saturated unit weight : $\gamma_{sat} = 20.00$ kN/m³

Shtresa Nr.2 - Sandy clay (CS), consistency firm

Unit weight : $\gamma = 21.00$ kN/m³
Stress-state : effective
Angle of internal friction : $\varphi_{ef} = 21.00$ °
Cohesion of soil : $c_{ef} = 50.00$ kPa
Angle of friction struc.-soil : $\delta = 12.00$ °
Soil : cohesive
Poisson's ratio : $\nu = 0.35$
Saturated unit weight : $\gamma_{sat} = 22.00$ kN/m³

Shtrsa Nr.3 - Sandy clay (CS), consistency firm

Unit weight : $\gamma = 21.00$ kN/m³
Stress-state : effective
Angle of internal friction : $\varphi_{ef} = 26.00$ °
Cohesion of soil : $c_{ef} = 80.00$ kPa
Angle of friction struc.-soil : $\delta = 12.00$ °
Soil : cohesive
Poisson's ratio : $\nu = 0.35$
Saturated unit weight : $\gamma_{sat} = 22.00$ kN/m³

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	3.00	Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm	
2	2.00	Shtresa Nr.2 - Sandy clay (CS), consistency firm	
3	5.00	Shtrsa Nr.3 - Sandy clay (CS), consistency firm	

No.	Layer [m]	Assigned soil	Pattern
4	-	Shtrsa Nr.3 - Sandy clay (CS), consistency firm	

Foundation

Type of foundation : pile foundation
Unit weight γ = 25.13 kN/m3
Geometry
Length l = 12.00 m
Offset d = 0.80 m
Diameter x = 0.50 m

Terrain profile

Terrain behind the structure is flat.

Water influence

GWT behind the structure lies at a depth of 2.50 m
Uplift in foot. bottom due to different pressures is not considered.

Input surface surcharges

No.	Surcharge new	Surcharge change	Action	Mag.1 [kN/m2]	Mag.2 [kN/m2]	Ord.x x [m]	Length l [m]	Depth z [m]
1	YES		permanent	10.00				on terrain

No.	Name
1	G

Resistance on front face of the structure

Resistance on front face of the structure: passive
Soil on front face of the structure - Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
Angle of friction struc.-soil δ = 0.00 °
Soil thickness in front of structure h = 1.20 m

Terrain in front of structure is flat.

Earthquake

Factor of horizontal acceleration K_h = 0.0220
Factor of vertical acceleration K_v = 0.0170

Water below the GWT is restricted.

Settings of the stage of construction

Design situation : permanent
The wall is free to move. Active earth pressure is therefore assumed.

Verification No. 1

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. overtur.	Coeff. sliding	Coeff. stress
Weight - wall	0.00	-2.29	147.67	0.94	1.000	1.000	1.350
Earthq.- constr.	3.25	-2.29	-2.51	0.94	1.000	1.000	1.000
FF resistance	-79.16	-0.55	0.08	0.20	1.000	1.000	1.000
Earthq.- face	0.38	-0.80	0.00	0.40	1.000	1.000	1.000
Weight - earth wedge	0.00	-1.32	7.46	1.79	1.000	1.000	1.000

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. overtur.	Coeff. sliding	Coeff. stress
Earthquake - soil wedge	0.29	-1.32	-0.22	1.79	1.000	1.000	1.000
Active pressure	17.83	-2.32	18.52	1.70	1.000	1.000	1.000
Water pressure	84.05	-1.37	8.44	1.75	1.000	1.000	1.000
Uplift pressure	0.00	-6.60	0.00	0.70	1.000	1.000	1.000
Earthq.- act.pressure	7.21	-4.20	3.30	1.31	1.000	1.000	1.000
G	15.34	-2.88	19.54	1.52	1.000	1.000	1.000

Verification of complete wall

Check for overturning stability

Resisting moment M_{res} = 229.08 kNm/m

Overturning moment M_{ovr} = 195.31 kNm/m

Wall for overturning is SATISFACTORY

Overall check - WALL is SATISFACTORY

Maximum stress in footing bottom : 605.88 kPa

Bearing capacity of foundation soil

Design load acting at the pile head

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]	Eccentricity [–]	Stress [kPa]
1	146.42	253.97	49.18	0.365	392.58
2	148.29	202.28	49.18	0.430	605.88

Service load acting at the pile head

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	87.77	191.24	7.09

Input parameters for bearing capacity analysis

Pile spacing s = 1.00 m

Dimensioning No. 1

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Weight - wall	0.00	-0.40	15.08	2.00	1.350
Weight - earth wedge	0.00	-1.32	7.46	1.79	1.000
Active pressure	17.83	-2.32	18.52	1.70	1.000
G	15.34	-2.88	19.54	1.52	1.000
Contact stress	0.00	0.00	0.00	1.60	1.000
Gravity surch. 1	0.00	-6.60	6.58	1.93	1.350

Back wall jump check

Reinforcement and dimensions of the cross-section

Bar diameter = 16.0 mm

Number of bars = 8

Reinforcement cover = 50.0 mm

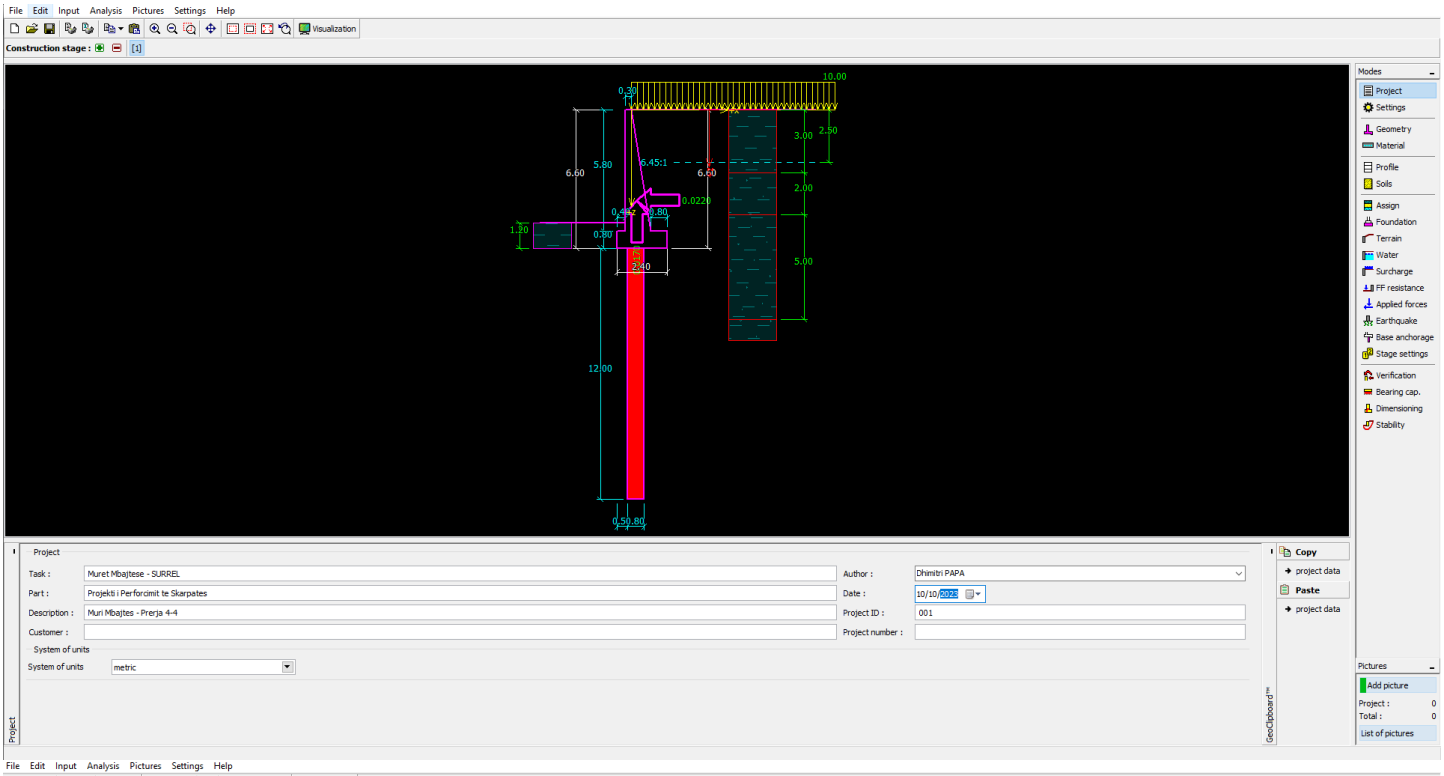
Cross-section width = 1.00 m

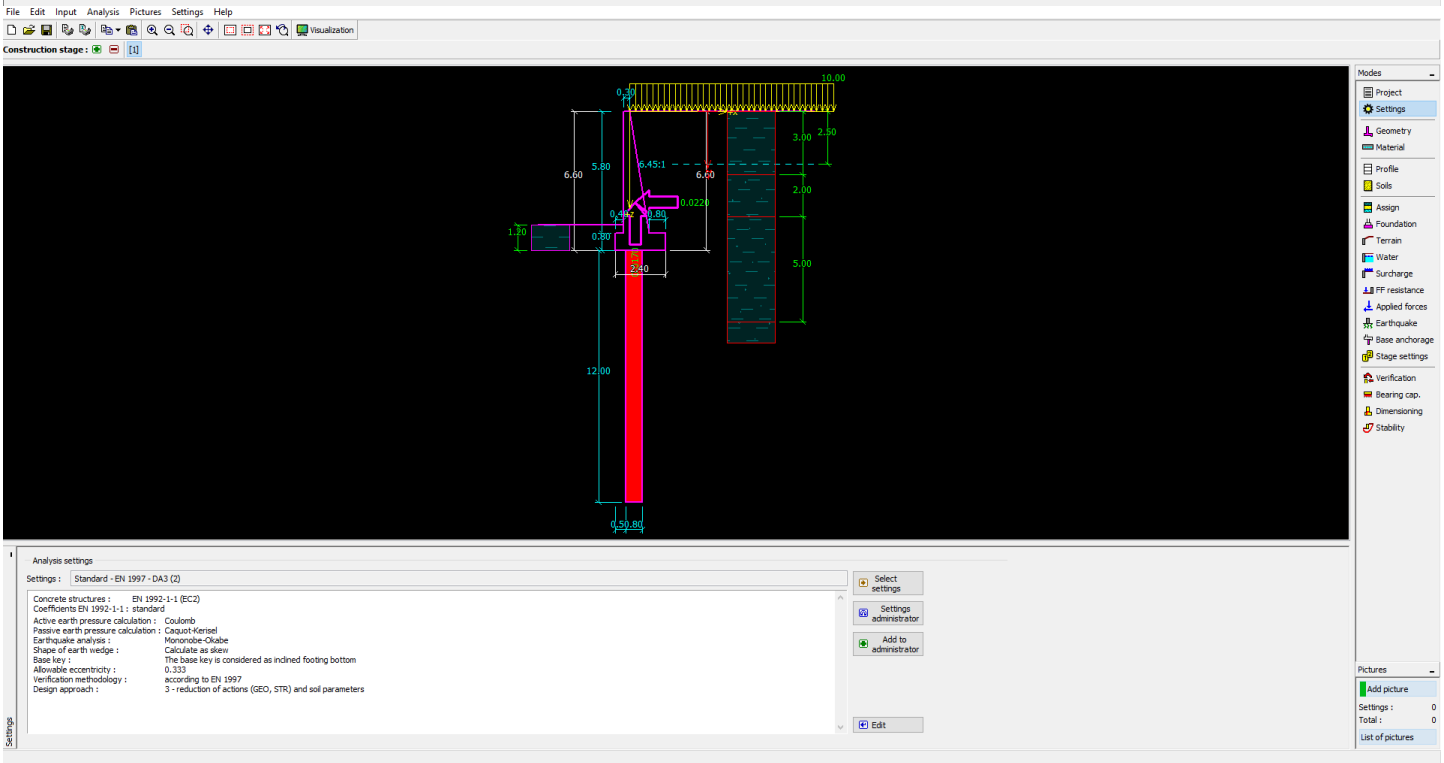
Cross-section depth = 0.80 m

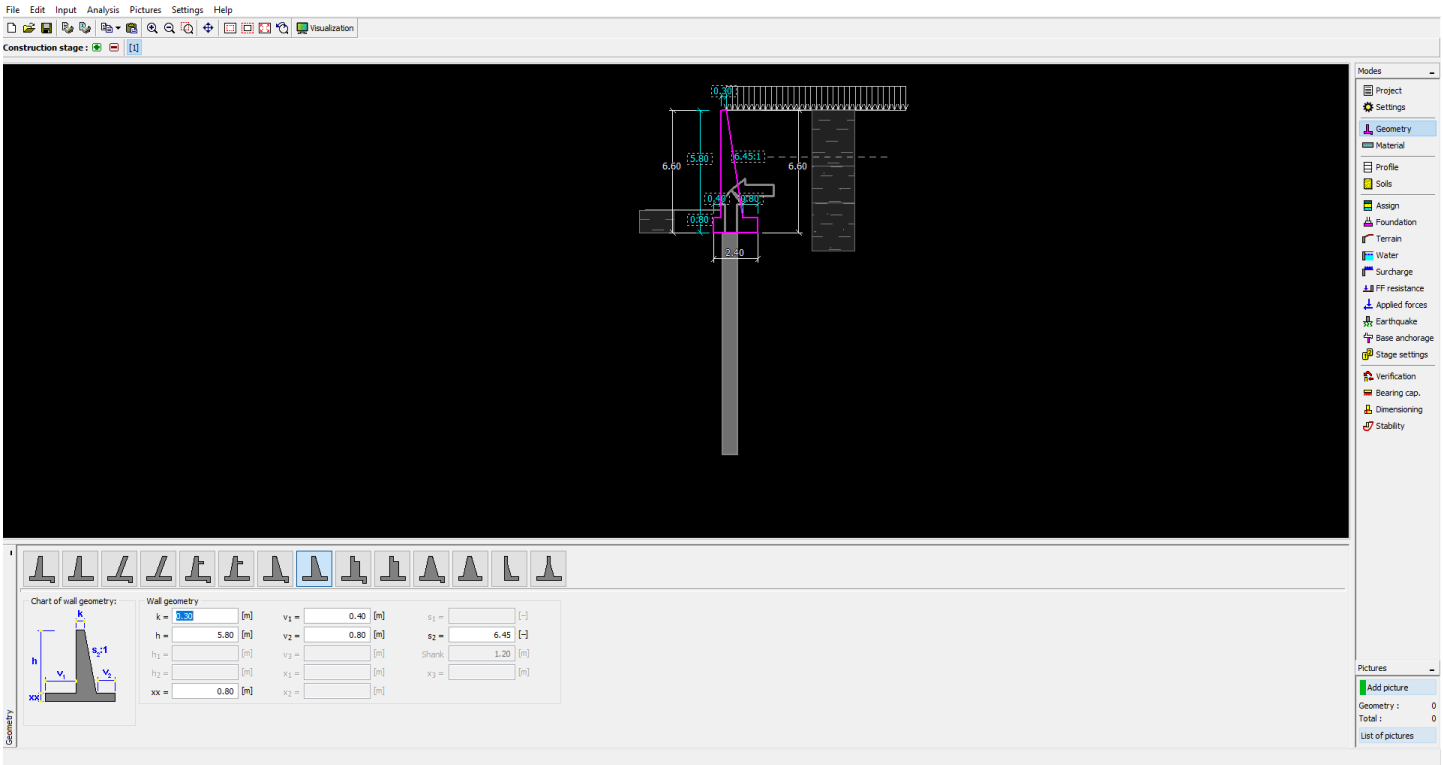
Reinforcement ratio ρ = 0.22 % > 0.14 % = ρ_{min}

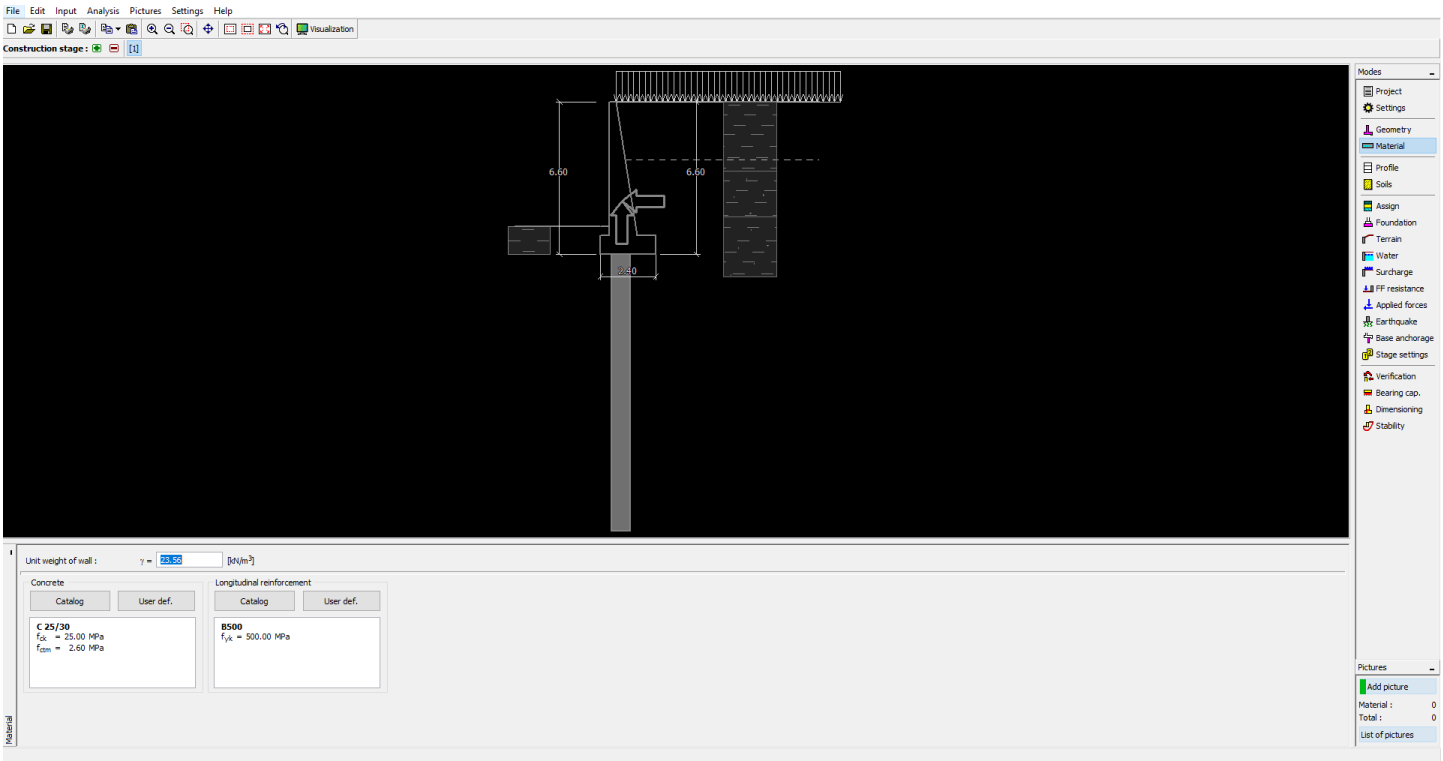
Position of neutral axis	x	=	0.05	m	<	0.46	m	= x_{max}
Ultimate shear force	V_{Rd}	=	258.84	kN	>	74.77	kN	= V_{Ed}
Ultimate moment	M_{Rd}	=	504.24	kNm	>	14.37	kNm	= M_{Ed}

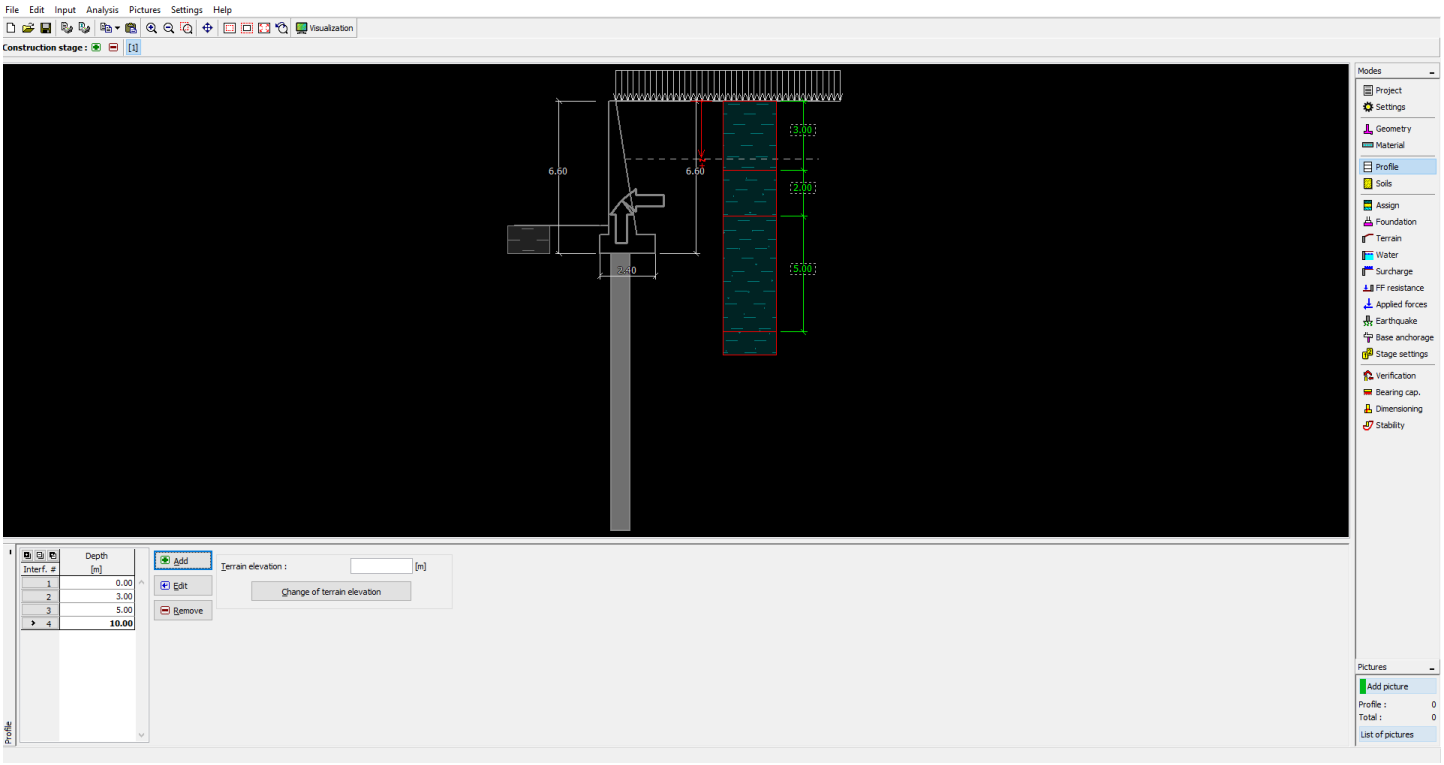
Cross-section is SATISFACTORY.

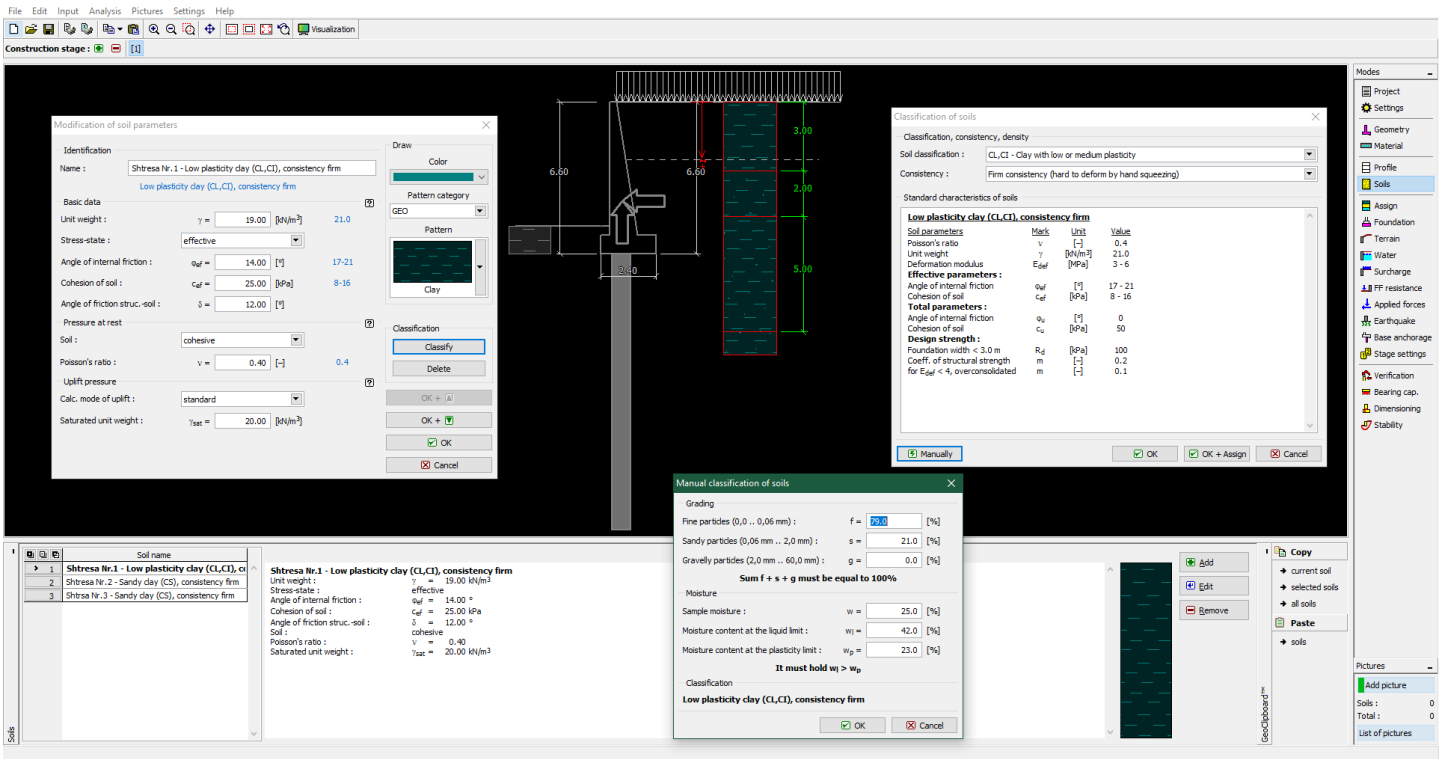


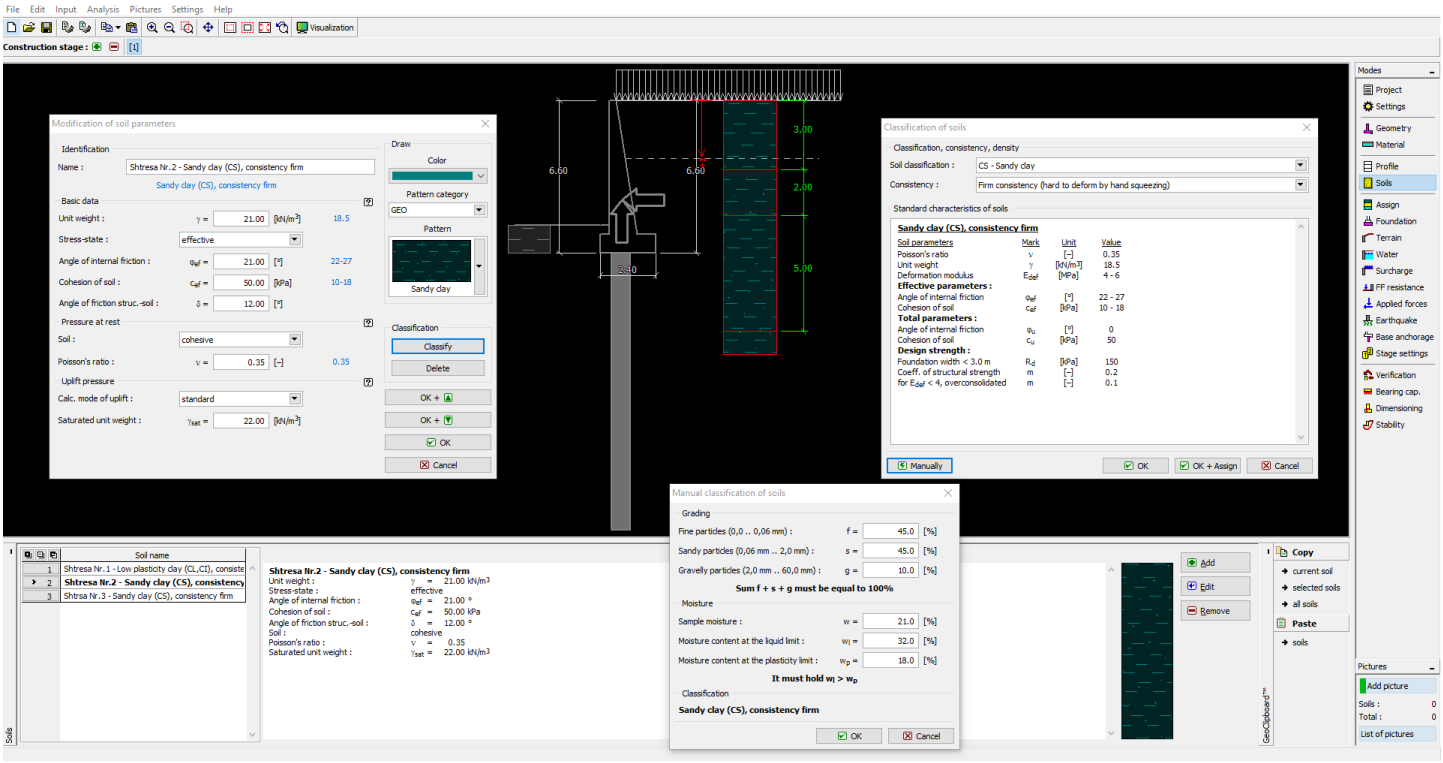


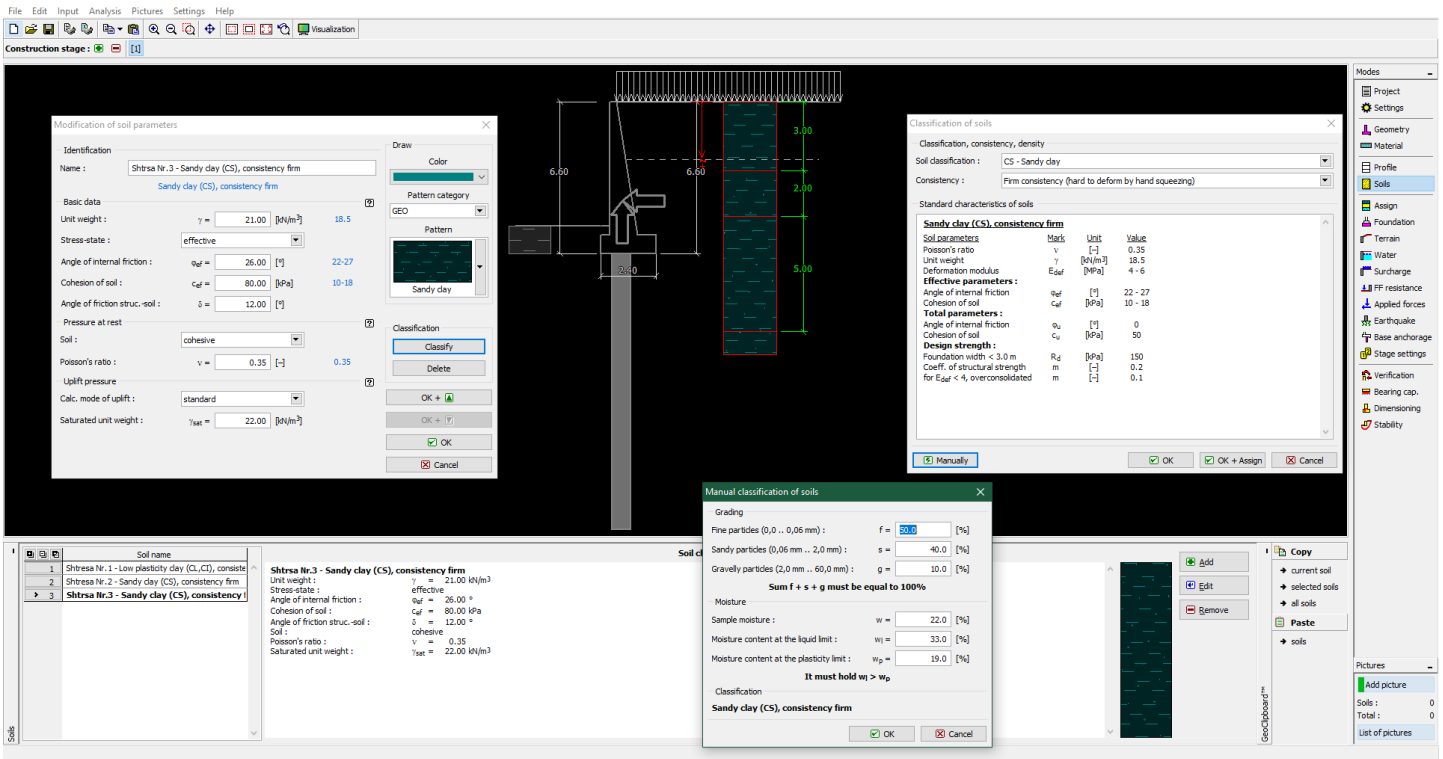

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
6.60
5.80
6.45:1
6.60
2.40
Chart of wall geometry:
Wall geometry
Pictures
Add picture
Geometry : 0
Total : 0
List of pictures
Geometry

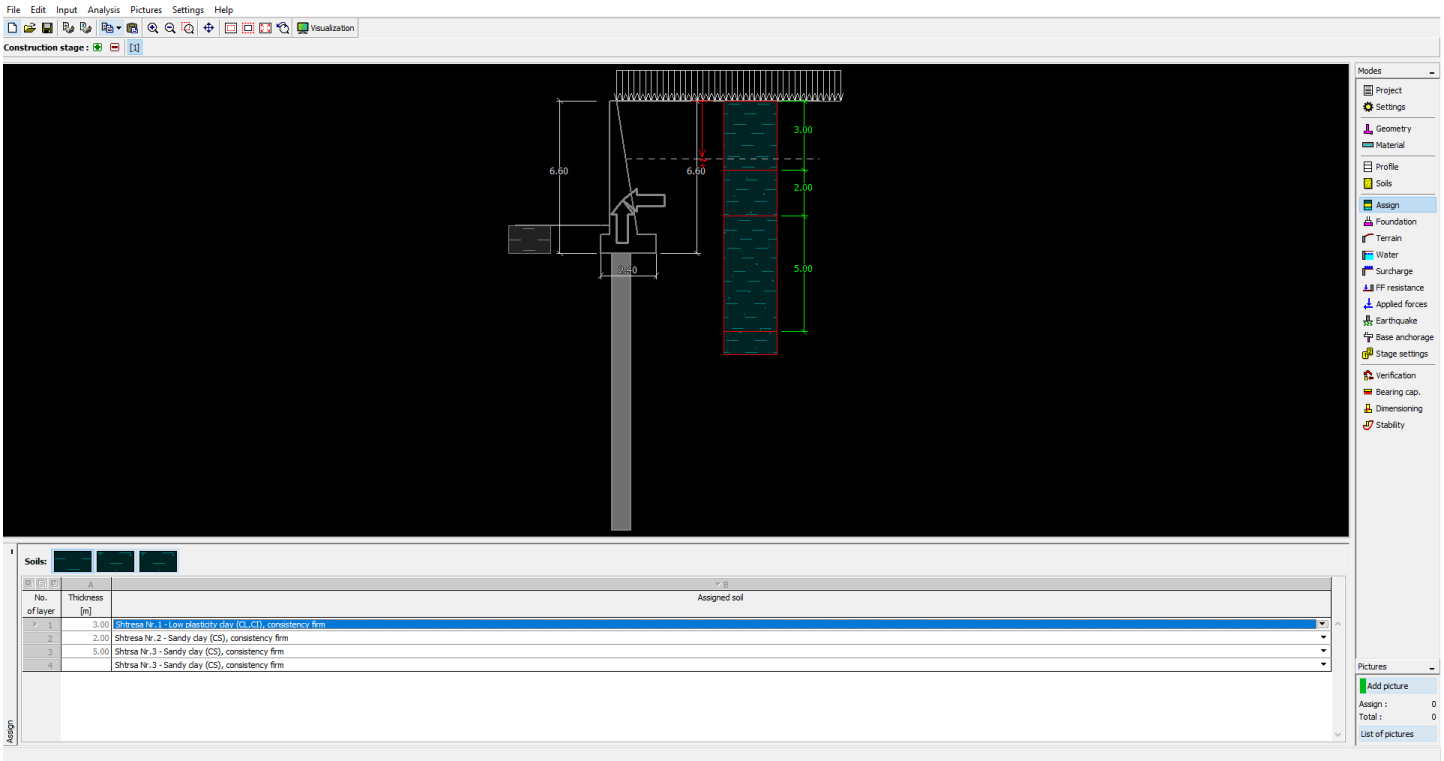

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
6.60
6.60
2.40
Unit weight of wall :
Concrete
Catalog
User def.
C 25/30
Longitudinal reinforcement
B500
Pictures
Add picture
Material : 0
Total : 0
List of pictures
Material

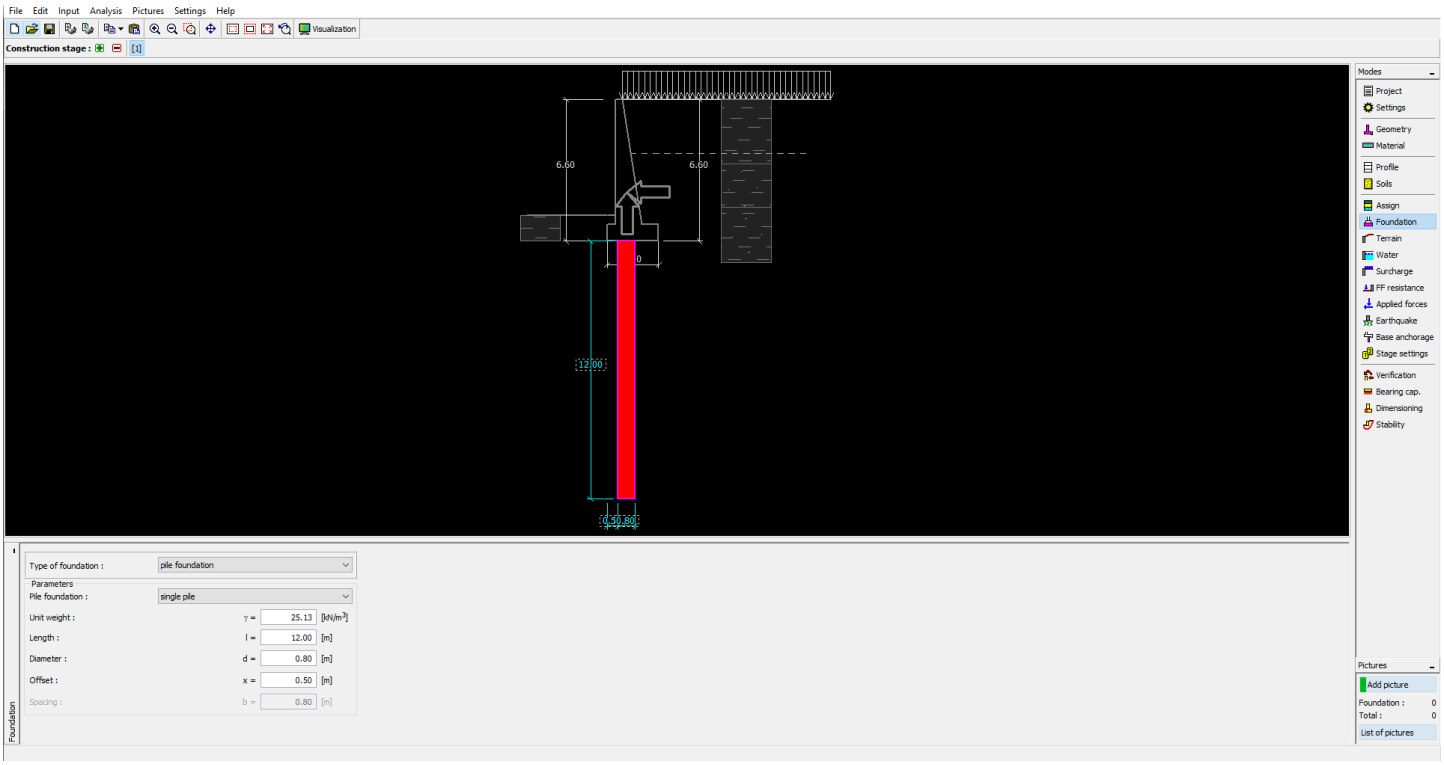

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
6.60
6.60
3.00
2.00
5.00
2.40
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Profile : 0
Total : 0
List of pictures
Profile
Interf. #
Depth [m]
1 0.00
2 3.00
3 5.00
4 10.00
Add
Edit
Remove
Terrain elevation :
[m]
Change of terrain elevation

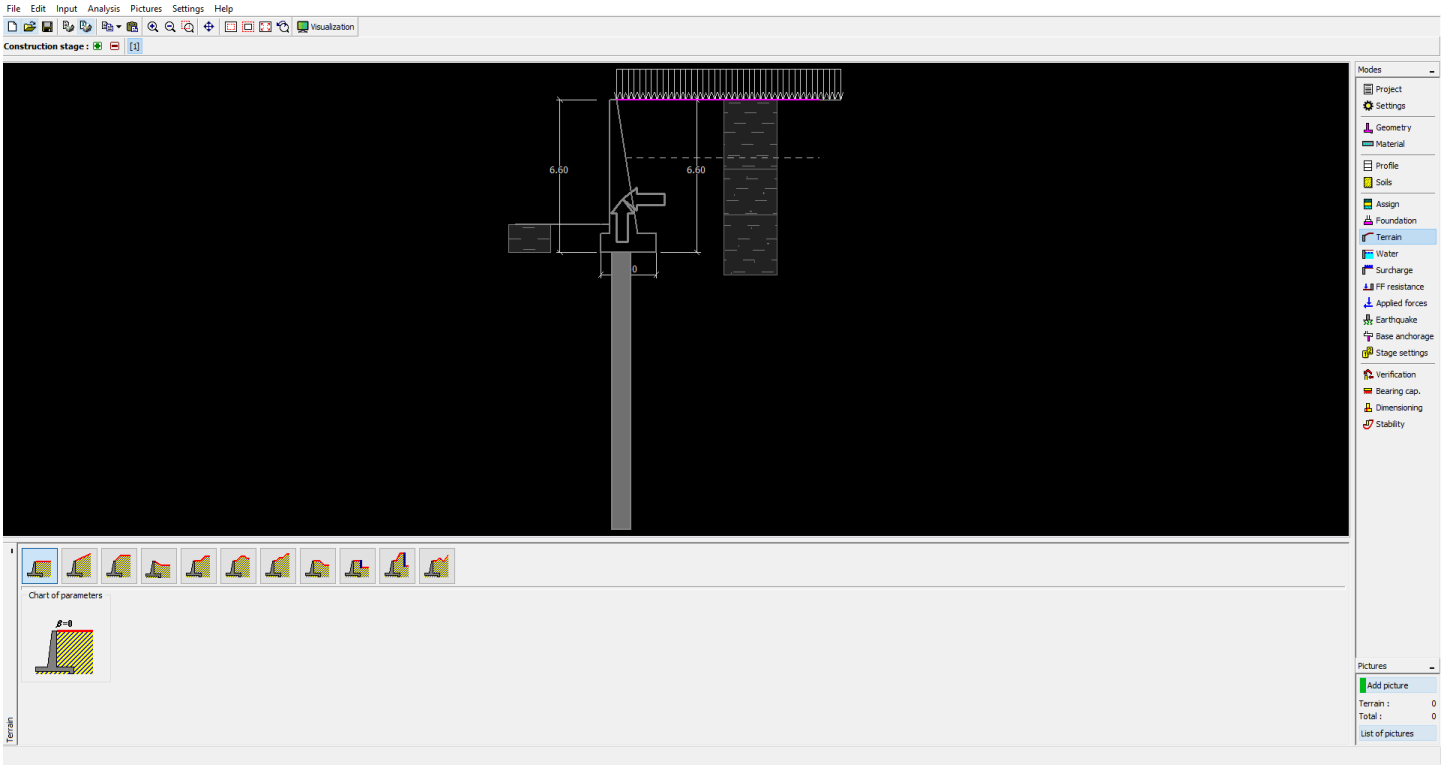

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
Modification of soil parameters
Identification
Name :
Shtresa Nr.1 - Low plasticity clay (Cl,CI), consistency firm
Low plasticity clay (Cl,CI), consistency firm
Basic data
Unit weight : γ = 19.00 [kN/m³] 21.0
Stress-state : effective
Angle of internal friction : φef = 14.00 [°] 17-21
Cohesion of soil : cef = 25.00 [kPa] 8-16
Angle of friction struc.-soil : δ = 12.00 [°]
Pressure at rest
Soil : cohesive
Poisson's ratio : ν = 0.40 [–] 0.4
Uplift pressure
Calc. mode of uplift : standard
Saturated unit weight : γsat = 20.00 [kN/m³]
Draw
Color
Pattern category
GEO
Pattern
Clay
Classification
Classify
Delete
OK + A
OK + V
OK
Cancel
Classification of soils
Classification, consistency, density
Soil classification : CL,CI - Clay with low or medium plasticity
Consistency : Firm consistency (hard to deform by hand squeezing)
Standard characteristics of soils
Low plasticity clay (CL,CI), consistency firm
Soil parameters Mark Unit Value
Poisson's ratio ν [–] 0.4
Unit weight γ [kN/m³] 21.0
Deformation modulus Edef [MPa] 3 - 6
Effective parameters :
Angle of internal friction φef [°] 17 - 21
Cohesion of soil cef [kPa] 8 - 16
Total parameters :
Angle of internal friction φu [°] 0
Cohesion of soil cu [kPa] 50
Design strength :
Foundation width < 3.0 m Rd [kPa] 100
Coeff. of structural strength m [–] 0.2
for Edef < 4, overconsolidated m [–] 0.1
Manually
OK
OK + Assign
Cancel
Manual classification of soils
Grading
Fine particles (0,0 .. 0,06 mm) : f = 79.0 [%]
Sandy particles (0,06 mm .. 2,0 mm) : s = 21.0 [%]
Gravelly particles (2,0 mm .. 60,0 mm) : g = 0.0 [%]
Sum f + s + g must be equal to 100%
Moisture
Sample moisture : w = 25.0 [%]
Moisture content at the liquid limit : wl = 42.0 [%]
Moisture content at the plasticity limit : wp = 23.0 [%]
It must hold wl > wp
Classification
Low plasticity clay (CL,CI), consistency firm
OK
Cancel
Soils
Soil name
1 Shtresa Nr.1 - Low plasticity clay (Cl,CI), cl
2 Shtresa Nr.2 - Sandy clay (CS), consistency firm
3 Shtresa Nr.3 - Sandy clay (CS), consistency firm
Shtresa Nr.1 - Low plasticity clay (Cl,CI), consistency firm
Unit weight : γ = 19.00 kN/m³
Stress-state : effective
Angle of internal friction : φef = 14.00 °
Cohesion of soil : cef = 25.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.40
Saturated unit weight : γsat = 20.00 kN/m³
Add
Edit
Remove
Copy
current soil
selected soils
all soils
Paste
soils
GeoClipboard™
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Soils : 0
Total : 0
List of pictures

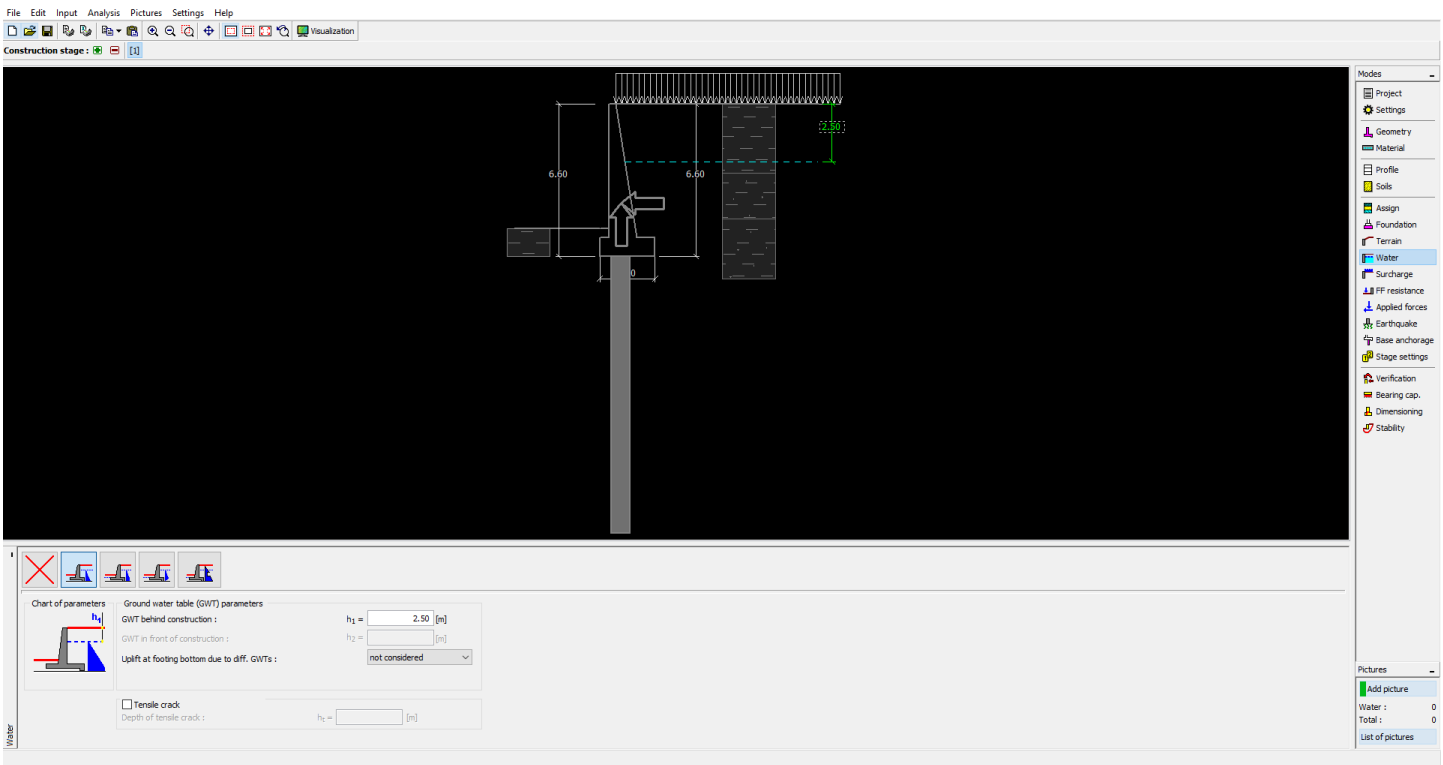

Modification of soil parameters
Identification
Name : Shtresa Nr.2 - Sandy clay (CS), consistency firm
Sandy clay (CS), consistency firm
Basic data
Unit weight : γ = 21.00 [kN/m³] 18.5
Stress-state : effective
Angle of internal friction : φef = 21.00 [°] 22-27
Cohesion of soil : cef = 50.00 [kPa] 10-18
Angle of friction struc.-soil : δ = 12.00 [°]
Pressure at rest
Soil : cohesive
Poisson's ratio : ν = 0.35 [–] 0.35
Uplift pressure
Calc. mode of uplift : standard
Saturated unit weight : γsat = 22.00 [kN/m³]
Draw
Color
Pattern category
GEO
Pattern
Sandy clay
Classification
Classify
Delete
OK +
OK +
OK
Cancel
6.60
6.60
3.00
2.00
5.00
2.40
Classification of soils
Classification, consistency, density
Soil classification : CS - Sandy clay
Consistency : Firm consistency (hard to deform by hand squeezing)
Standard characteristics of soils
Sandy clay (CS), consistency firm
Soil parameters Mark Unit Value
Poisson's ratio ν [–] 0.35
Unit weight γ [kN/m³] 18.5
Deformation modulus Edef [MPa] 4 - 6
Effective parameters :
Angle of internal friction φef [°] 22 - 27
Cohesion of soil cef [kPa] 10 - 18
Total parameters :
Angle of internal friction φu [°] 0
Cohesion of soil cu [kPa] 50
Design strength :
Foundation width < 3.0 m Rd [kPa] 150
Coeff. of structural strength m [–] 0.2
for Edef < 4, overconsolidated m [–] 0.1
Manually
OK
OK + Assign
Cancel
Manual classification of soils
Grading
Fine particles (0,0 .. 0,06 mm) : f = 45.0 [%]
Sandy particles (0,06 mm .. 2,0 mm) : s = 45.0 [%]
Gravelly particles (2,0 mm .. 60,0 mm) : g = 10.0 [%]
Sum f + s + g must be equal to 100%
Moisture
Sample moisture : w = 21.0 [%]
Moisture content at the liquid limit : wl = 32.0 [%]
Moisture content at the plasticity limit : wp = 18.0 [%]
It must hold wl > wp
Classification
Sandy clay (CS), consistency firm
OK
Cancel
Soil name
1 Shtresa Nr.1 - Low plasticity clay (CL,CI), consiste
2 Shtresa Nr.2 - Sandy clay (CS), consistency
3 Shtresa Nr.3 - Sandy clay (CS), consistency firm
Shtresa Nr.2 - Sandy clay (CS), consistency firm
Unit weight : γ = 21.00 kN/m³
Stress-state : effective
Angle of internal friction : φef = 21.00 °
Cohesion of soil : cef = 50.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γsat = 22.00 kN/m³
Add
Edit
Remove
Copy
current soil
selected soils
all soils
Paste
soils
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Solis : 0
Total : 0
List of pictures

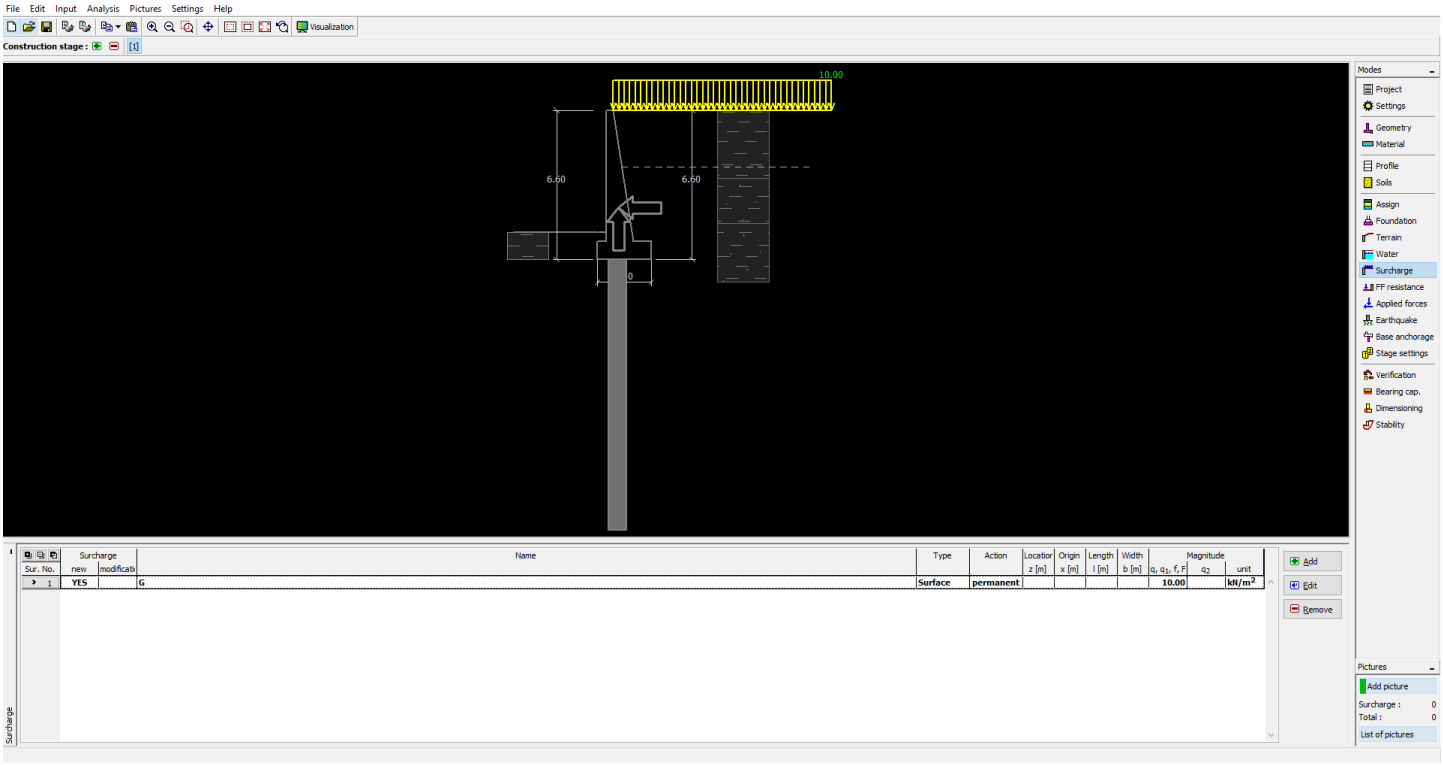

Modification of soil parameters
Identification
Name : Shtresa Nr.3 - Sandy clay (CS), consistency firm
Sandy clay (CS), consistency firm
Basic data
Unit weight : γ = 21.00 [kN/m³] 18.5
Stress-state : effective
Angle of internal friction : φef = 26.00 [°] 22-27
Cohesion of soil : cef = 80.00 [kPa] 10-18
Angle of friction struc.-soil : δ = 12.00 [°]
Pressure at rest
Soil : cohesive
Poisson's ratio : ν = 0.35 [–] 0.35
Uplift pressure
Calc. mode of uplift : standard
Saturated unit weight : γsat = 22.00 [kN/m³]
Draw
Color
Pattern category
GEO
Pattern
Sandy clay
Classification
Classify
Delete
OK +
OK +
OK
Cancel
6.60
6.60
3.00
2.00
5.00
2.40
Classification of soils
Classification, consistency, density
Soil classification : CS - Sandy clay
Consistency : Firm consistency (hard to deform by hand squeezing)
Standard characteristics of soils
Sandy clay (CS), consistency firm
Soil parameters Mark Unit Value
Poisson's ratio ν [–] 0.35
Unit weight γ [kN/m³] 18.5
Deformation modulus Edef [MPa] 4 - 6
Effective parameters :
Angle of internal friction φef [°] 22 - 27
Cohesion of soil cef [kPa] 10 - 18
Total parameters :
Angle of internal friction φu [°] 0
Cohesion of soil cu [kPa] 50
Design strength :
Foundation width < 3.0 m Rd [kPa] 150
Coeff. of structural strength m [–] 0.2
for Edef < 4, overconsolidated m [–] 0.1
Manually
OK
OK + Assign
Cancel
Manual classification of soils
Grading
Fine particles (0,0 .. 0,06 mm) : f = 50.0 [%]
Sandy particles (0,06 mm .. 2,0 mm) : s = 40.0 [%]
Gravelly particles (2,0 mm .. 60,0 mm) : g = 10.0 [%]
Sum f + s + g must be equal to 100%
Moisture
Sample moisture : w = 22.0 [%]
Moisture content at the liquid limit : wl = 33.0 [%]
Moisture content at the plasticity limit : wp = 19.0 [%]
It must hold wl > wp
Classification
Sandy clay (CS), consistency firm
OK
Cancel
Soil name
1 Shtresa Nr.1 - Low plasticity clay (CL,CI), consiste
2 Shtresa Nr.2 - Sandy clay (CS), consistency firm
3 Shtresa Nr.3 - Sandy clay (CS), consistency !
Shtresa Nr.3 - Sandy clay (CS), consistency firm
Unit weight : γ = 21.00 kN/m³
Stress-state : effective
Angle of internal friction : φef = 26.00 °
Cohesion of soil : cef = 80.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γsat = 22.00 kN/m³
Add
Edit
Remove
Copy
current soil
selected soils
all soils
Paste
soils
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Solis : 0
Total : 0
List of pictures

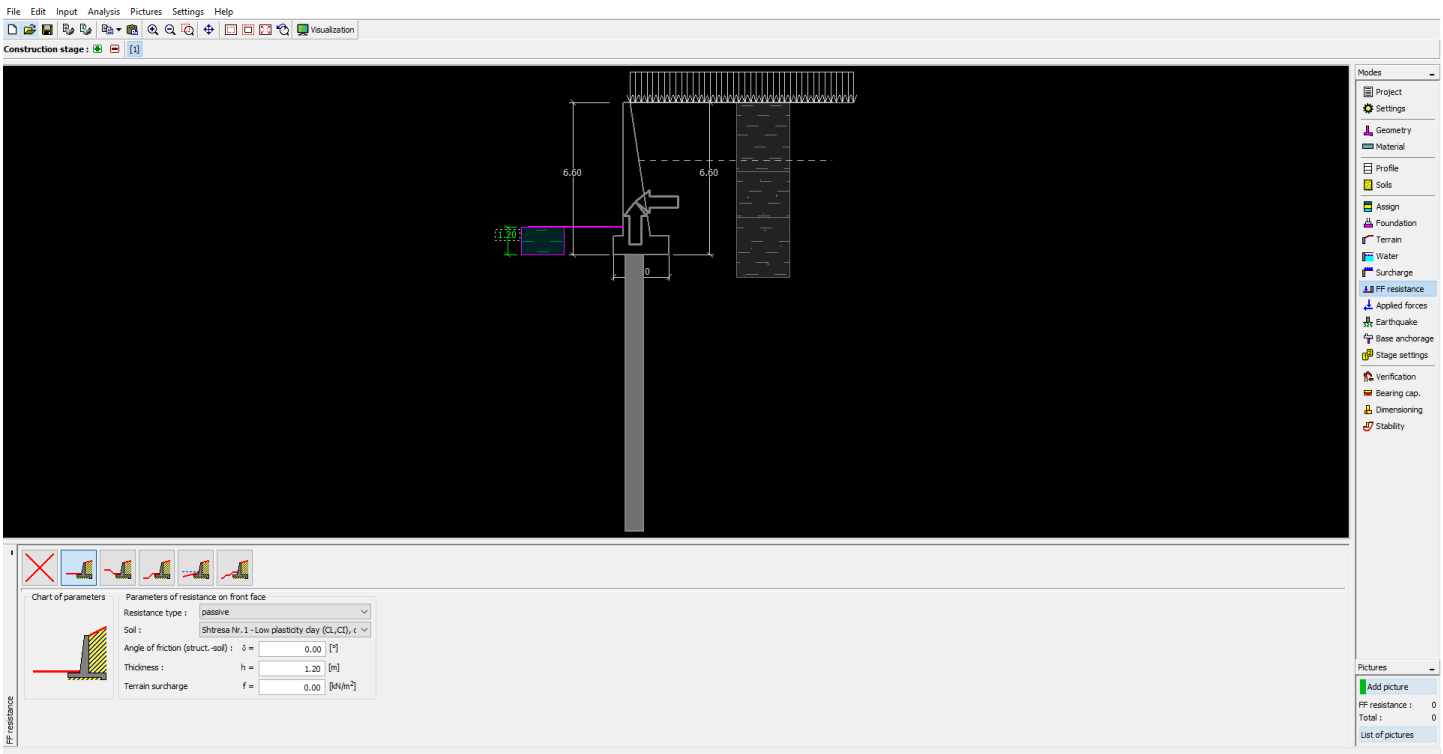

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
6.60
6.60
3.00
2.00
5.00
2.60
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Soils:
No. of layer
Thickness [m]
Assigned soil
1 3.00 Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
2 2.00 Shtresa Nr.2 - Sandy clay (CS), consistency firm
3 5.00 Shtresa Nr.3 - Sandy clay (CS), consistency firm
4 Shtresa Nr.3 - Sandy clay (CS), consistency firm
Assign
Pictures
Add picture
Assign : 0
Total : 0
List of pictures

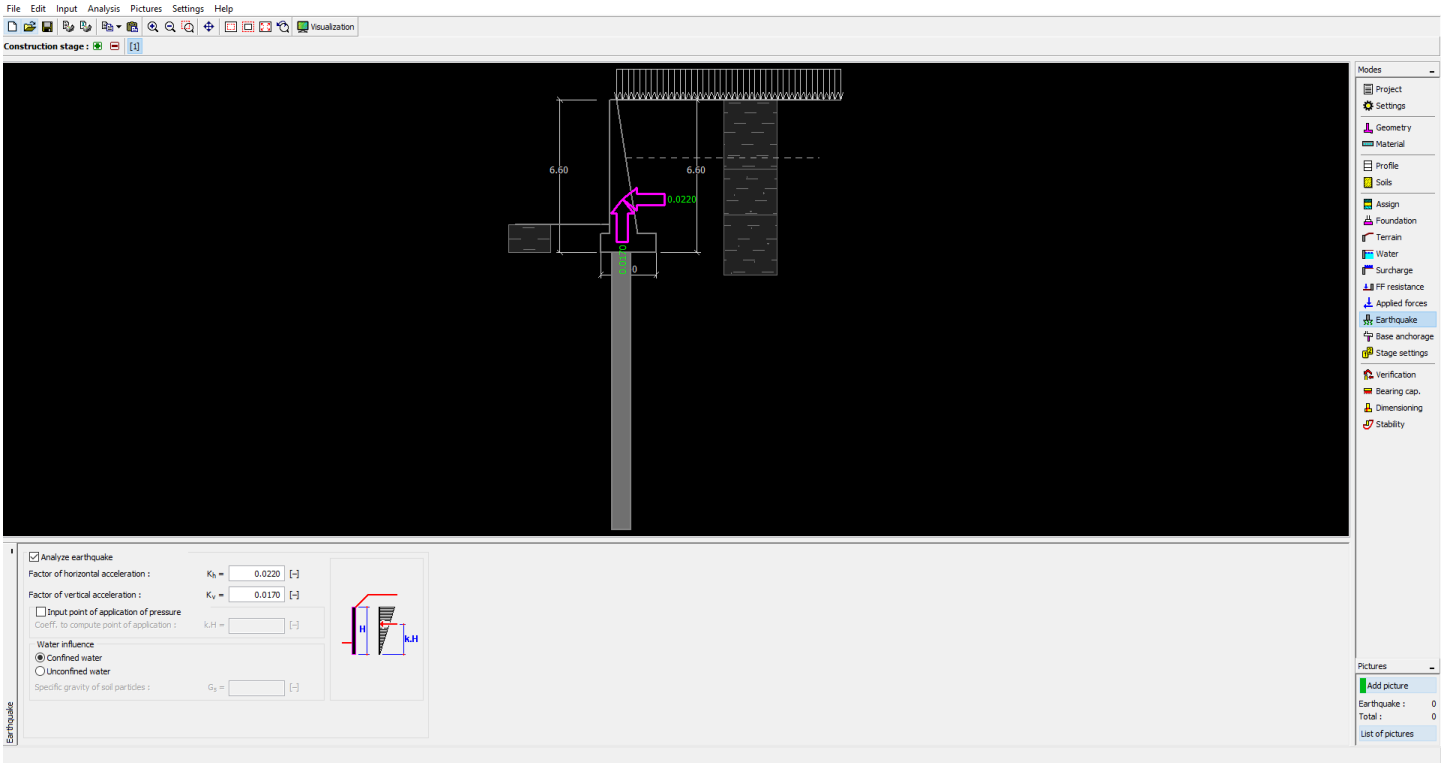

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
6.60
6.60
12.00
0.50
0.80
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Type of foundation : pile foundation
Parameters
Pile foundation : single pile
Unit weight : γ = 25.13 [kN/m³]
Length : l = 12.00 [m]
Diameter : d = 0.80 [m]
Offset : x = 0.50 [m]
Spacing : b = 0.80 [m]
Foundation
Pictures
Add picture
Foundation : 0
Total : 0
List of pictures

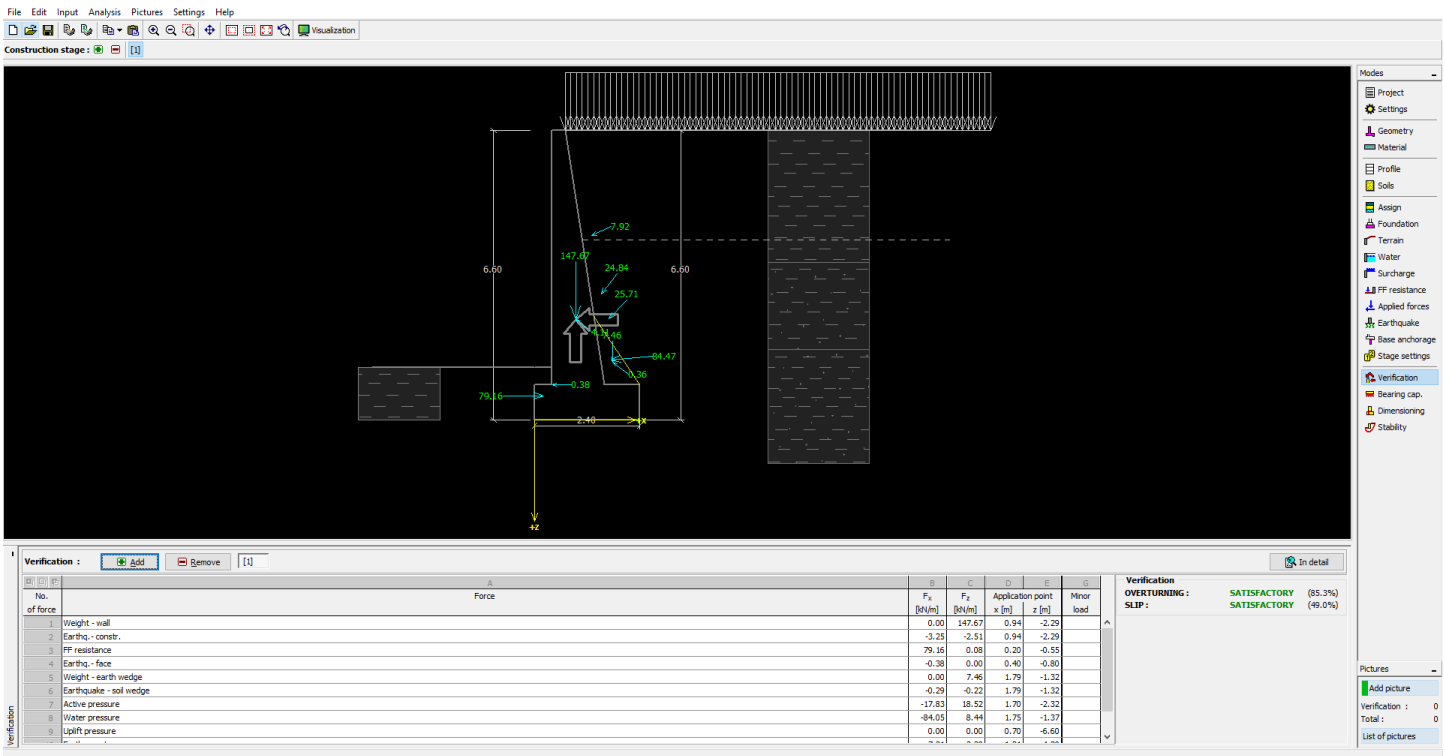

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
6.60
6.60
0
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of parameters
Pictures
Add picture
Terrain : 0
Total : 0
List of pictures
Terrain

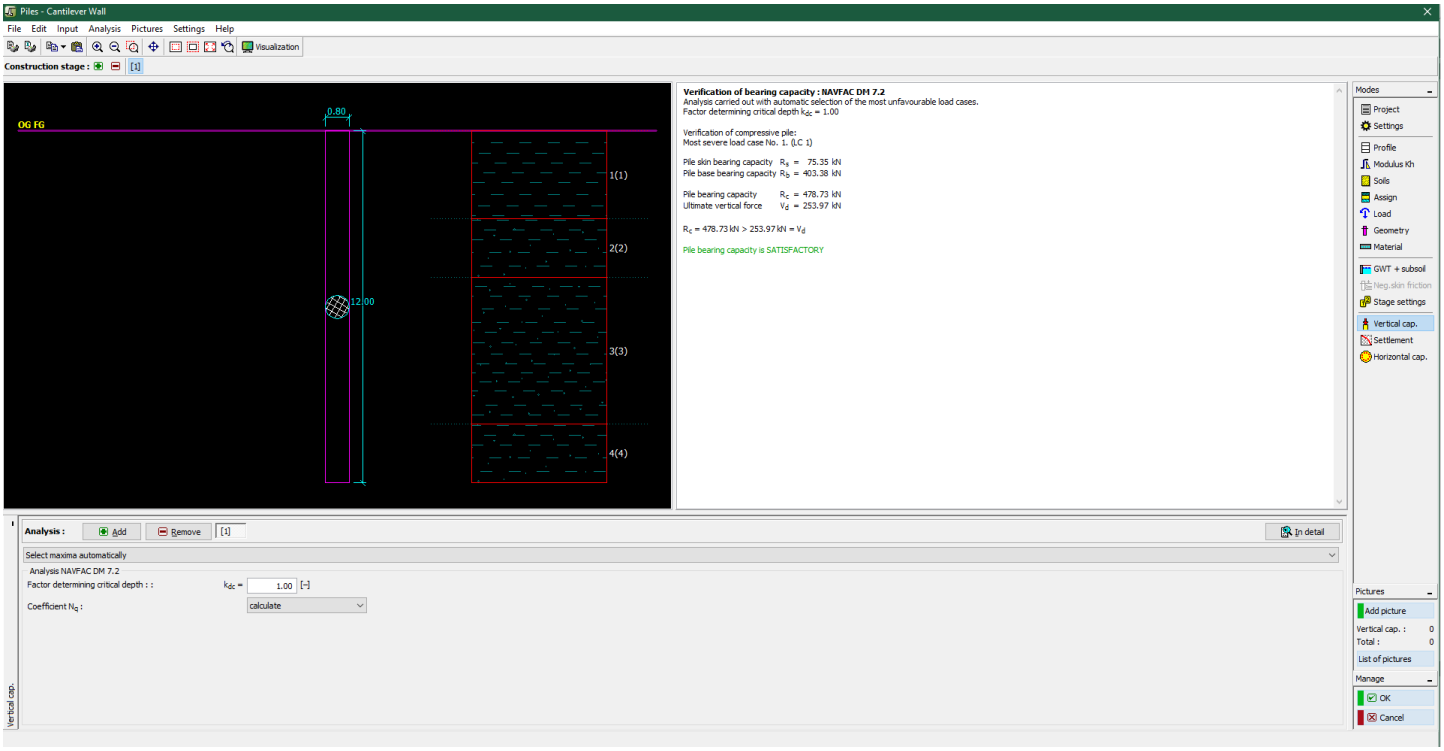

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
2.50
6.60
6.60
0
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of parameters
Ground water table (GWT) parameters
GWT behind construction : 2.50 [m]
GWT in front of construction : [m]
Uplift at footing bottom due to diff. GWTs : not considered
Tensile crack
Depth of tensile crack : [m]
Pictures
Add picture
Water : 0
Total : 0
List of pictures
Water

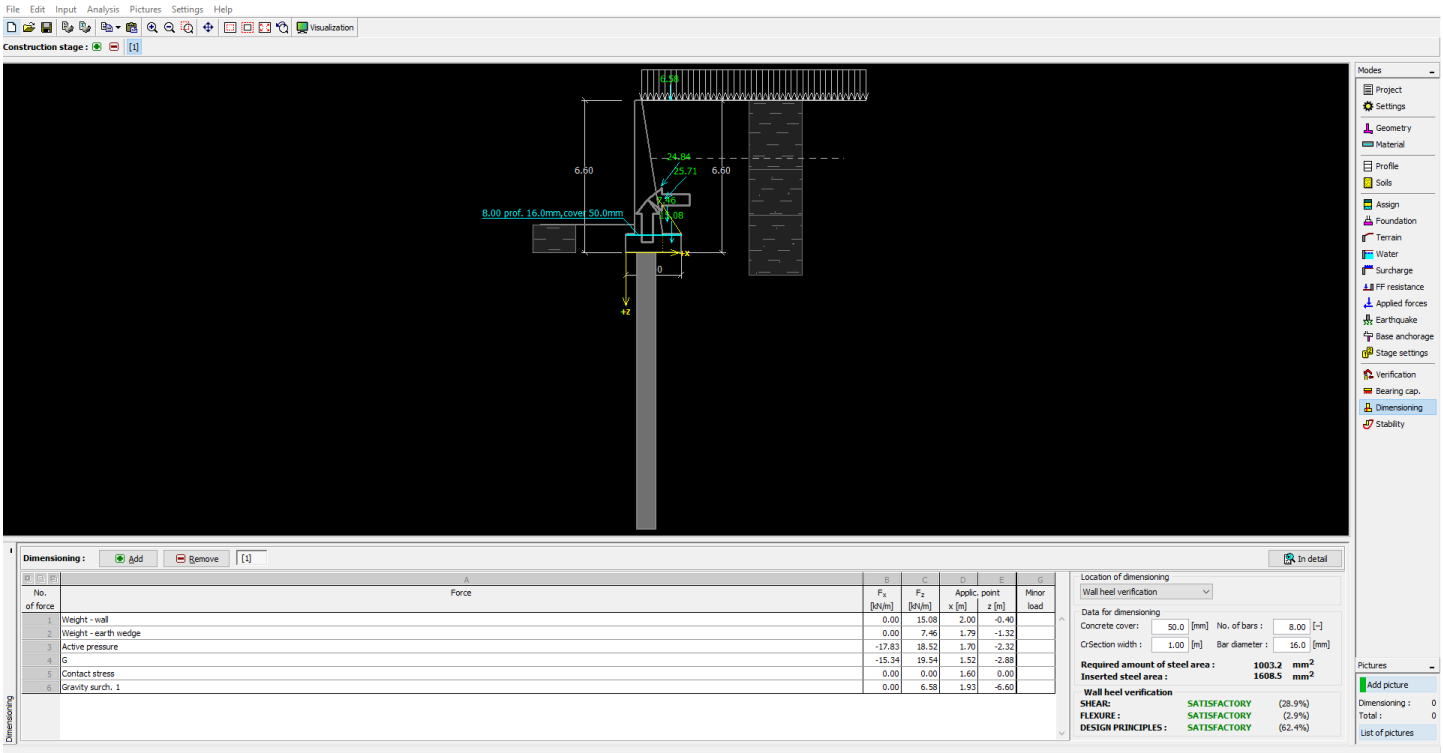

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
10.00
6.60
6.60
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Surcharge
Sur. No.
new
modificati
Name
Type
Action
Location z [m]
Origin x [m]
Length l [m]
Width b [m]
Magnitude q, q1, f, F
q2
unit
1
YES
G
Surface
permanent
10.00
kN/m2
Add
Edit
Remove
Pictures
Add picture
Surcharge : 0
Total : 0
List of pictures

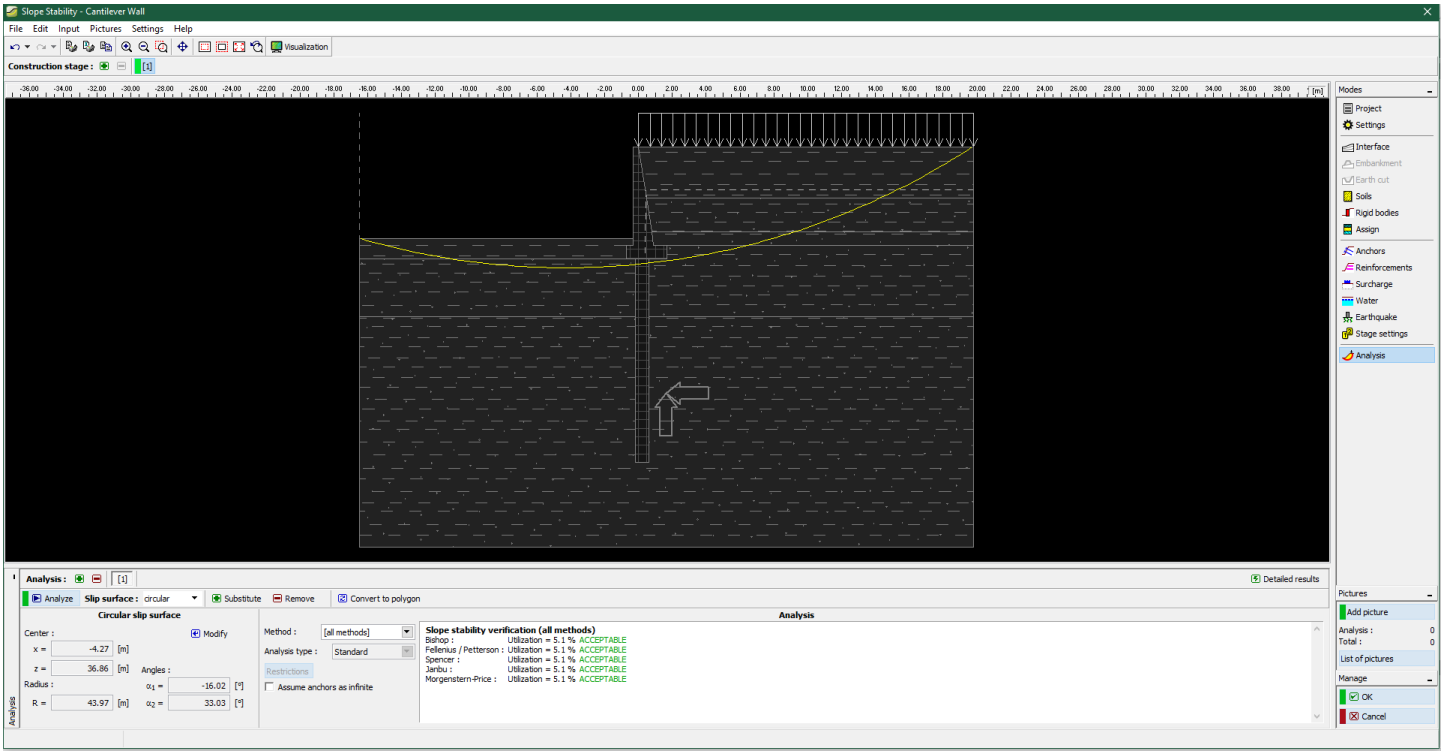

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
6.60
6.60
1.20
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of parameters
Parameters of resistance on front face
Resistance type : passive
Soil : Shtresa Nr.1 - Low plasticity clay (CL,CI), c
Angle of friction (struct.-soil) : δ = 0.00 [°]
Thickness : h = 1.20 [m]
Terrain surcharge f = 0.00 [kN/m2]
FF resistance
Pictures
Add picture
FF resistance : 0
Total : 0
List of pictures

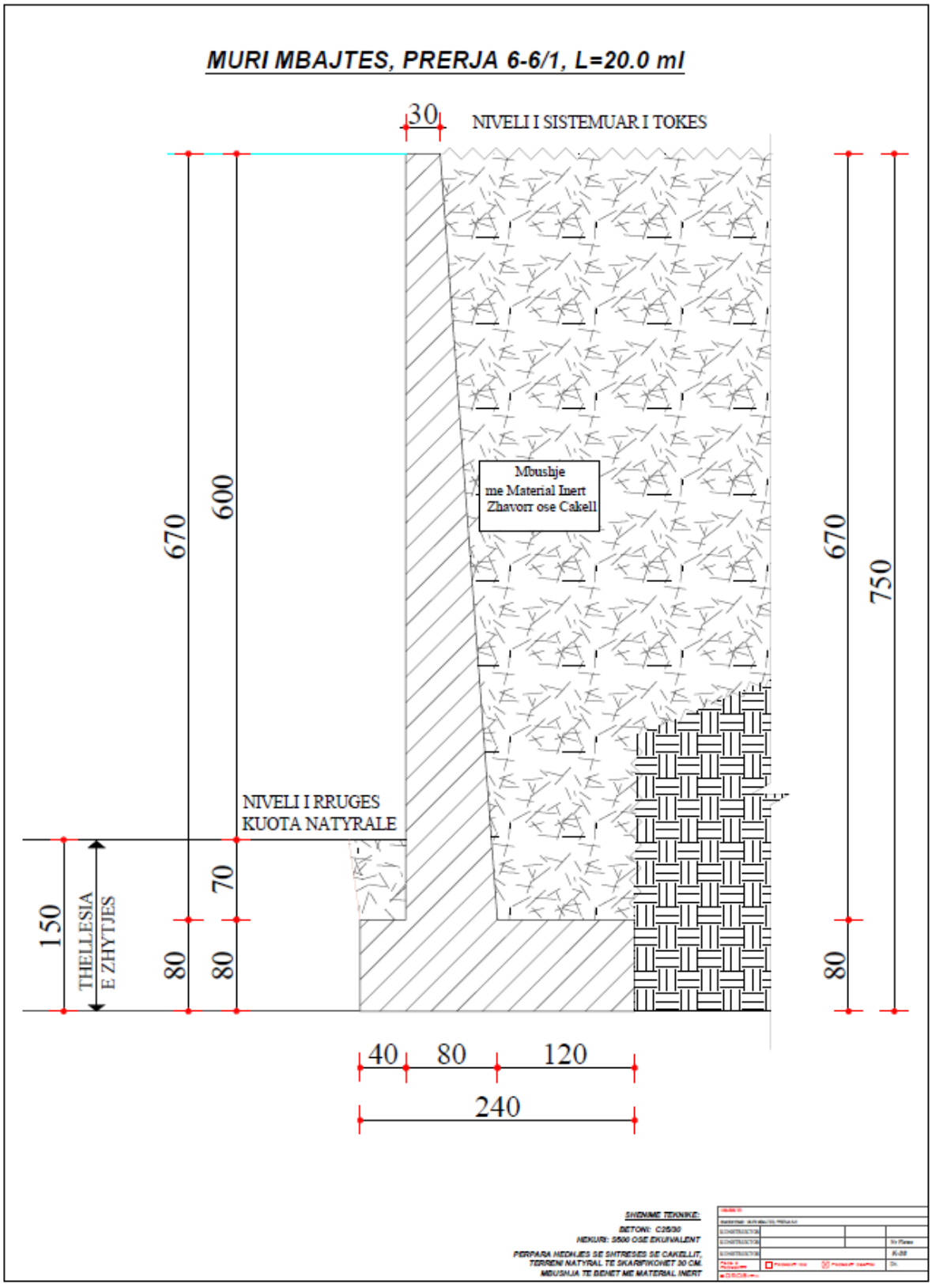

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
6.60
6.60
0.0220
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Analyze earthquake
Factor of horizontal acceleration : Kh = 0.0220 [–]
Factor of vertical acceleration : Kv = 0.0170 [–]
Input point of application of pressure
Coeff. to compute point of application : k.H = [–]
Water influence
Confined water
Unconfined water
Specific gravity of soil particles : Gs = [–]
H
k.H
Earthquake
Pictures
Add picture
Earthquake : 0
Total : 0
List of pictures

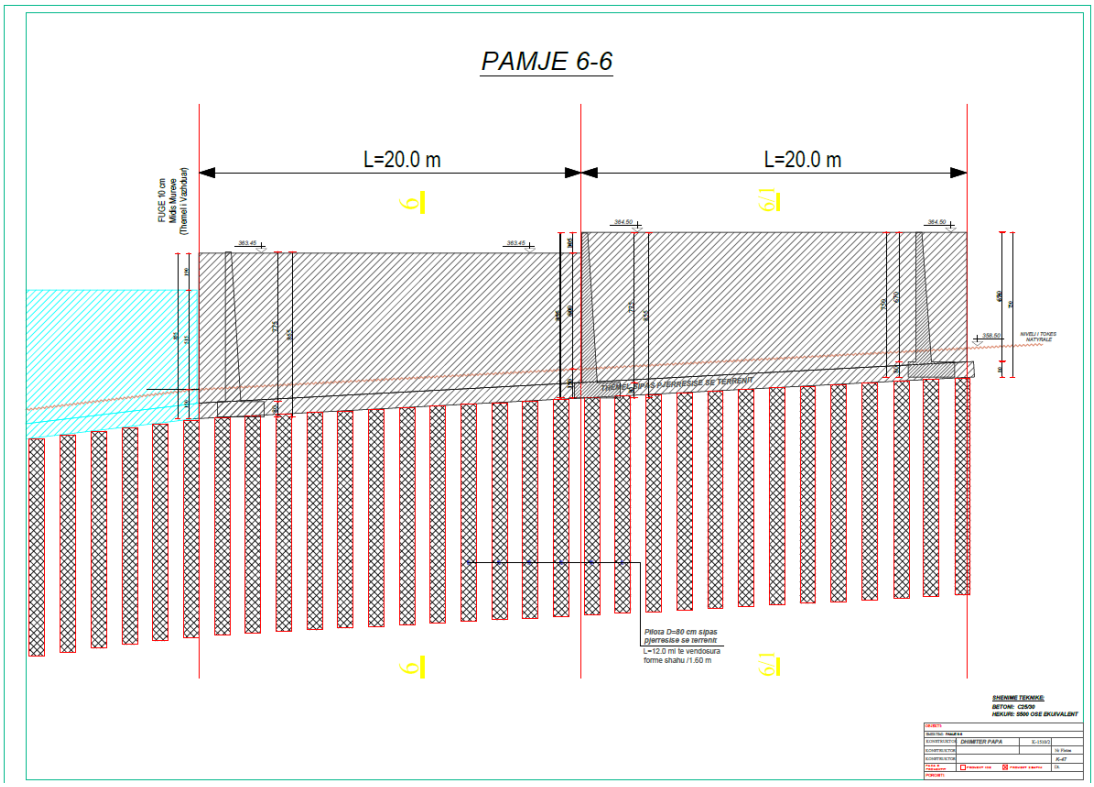

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
6.60
6.60
7.92
147.67
24.84
25.71
7.46
84.47
0.36
0.38
79.16
2.40
+z
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Verification :
Add
Remove
[1]
In detail
No. of force
Force
Fx [kN/m]
Fz [kN/m]
Application point x [m]
Application point z [m]
Minor load
1 Weight - wall 0.00 147.67 0.94 -2.29
2 Earthq. - constr. -3.25 -2.51 0.94 -2.29
3 FF resistance 79.16 0.08 0.20 -0.55
4 Earthq. - face -0.38 0.00 0.40 -0.80
5 Weight - earth wedge 0.00 7.46 1.79 -1.32
6 Earthquake - soil wedge -0.29 -0.22 1.79 -1.32
7 Active pressure -17.83 18.52 1.70 -2.32
8 Water pressure -84.05 8.44 1.75 -1.37
9 Uplift pressure 0.00 0.00 0.70 -6.60
Verification
OVERTURNING : SATISFACTORY (85.3%)
SLIP : SATISFACTORY (49.0%)
Verification
Pictures
Add picture
Verification : 0
Total : 0
List of pictures


Piles - Cantilever Wall
File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage : [1]
OG FG
0.80
12.00
1(1)
2(2)
3(3)
4(4)
Verification of bearing capacity : NAVFAC DM 7.2
Analysis carried out with automatic selection of the most unfavourable load cases.
Factor determining critical depth kdc = 1.00
Verification of compressive pile:
Most severe load case No. 1. (LC 1)
Pile skin bearing capacity Rs = 75.35 kN
Pile base bearing capacity Rb = 403.38 kN
Pile bearing capacity Rc = 478.73 kN
Ultimate vertical force Vd = 253.97 kN
Rc = 478.73 kN > 253.97 kN = Vd
Pile bearing capacity is SATISFACTORY
Modes
Project
Settings
Profile
Modulus Kh
Soils
Assign
Load
Geometry
Material
GWT + subsoil
Neg.skin friction
Stage settings
Vertical cap.
Settlement
Horizontal cap.
Analysis : Add Remove [1] In detail
Select maxima automatically
Analysis NAVFAC DM 7.2
Factor determining critical depth : : kdc = 1.00 [-]
Coefficient Nq : calculate
Pictures
Add picture
Vertical cap. : 0
Total : 0
List of pictures
Manage
OK
Cancel
Vertical cap.


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage : [1]
6.60
24.84
25.71
6.60
8.00 prof. 16.0mm,cover 50.0mm
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Dimensioning : Add Remove [1] In detail
No. of force
Force
Fx [kN/m]
Fz [kN/m]
Applic. point x [m]
Applic. point z [m]
Minor load
1 Weight - wall 0.00 15.08 2.00 -0.40
2 Weight - earth wedge 0.00 7.46 1.79 -1.32
3 Active pressure -17.83 18.52 1.70 -2.32
4 G -15.34 19.54 1.52 -2.88
5 Contact stress 0.00 0.00 1.60 0.00
6 Gravity surch. 1 0.00 6.58 1.93 -6.60
Location of dimensioning
Wall heel verification
Data for dimensioning
Concrete cover: 50.0 [mm] No. of bars : 8.00 [-]
CrSection width : 1.00 [m] Bar diameter : 16.0 [mm]
Required amount of steel area : 1003.2 mm2
Inserted steel area : 1608.5 mm2
Wall heel verification
SHEAR: SATISFACTORY (28.9%)
FLEXURE : SATISFACTORY (2.9%)
DESIGN PRINCIPLES : SATISFACTORY (62.4%)
Pictures
Add picture
Dimensioning : 0
Total : 0
List of pictures
Dimensioning


Slope Stability - Cantilever Wall
File Edit Input Pictures Settings Help
Visualization
Construction stage :
Modes
Project
Settings
Interface
Embankment
Earth cut
Soils
Rigid bodies
Assign
Anchors
Reinforcements
Surcharge
Water
Earthquake
Stage settings
Analysis
Analysis :
Detailed results
Analyze
Slip surface : circular
Substitute
Remove
Convert to polygon
Circular slip surface
Center :
Modify
x = -4.27 [m]
z = 36.86 [m]
Angles :
Radius :
R = 43.97 [m]
Method : [all methods]
Analysis type : Standard
Restrictions
Assume anchors as infinite
Analysis
Slope stability verification (all methods)
Bishop : Utilization = 5.1 % ACCEPTABLE
Fellenius / Petterson : Utilization = 5.1 % ACCEPTABLE
Spencer : Utilization = 5.1 % ACCEPTABLE
Janbu : Utilization = 5.1 % ACCEPTABLE
Morgenstern-Price : Utilization = 5.1 % ACCEPTABLE
Pictures
Add picture
Analysis : 0
Total : 0
List of pictures
Manage
OK
Cancel


MURI MBAJTES, PRERJA 6-6/1, L=20.0 ml
30
NIVELI I SISTEMUAR I TOKES
670
600
Mbushje
me Material Inert
Zhavorr ose Cakell
670
750
NIVELI I RRUGES
KUOTA NATYRALE
150
THELLESIA
E ZHYTJES
70
80
80
80
40
80
120
240
SHENIME TEKNIKE:
BETONI: C25/30
HEKURI: 3500 OSE EKUIVALENT
PERPARA NEDHJES SE SHTRESES SE CAKELLIT,
TERRENI NATYRAL TE SKARIFIKOHET 30 CM.
MBUSHJA TE BEHET ME MATERIAL INERT



Input data

Project

Task : Muret Mbajtese - SURREL
Part : Projekti i Perforcimit te Skarpates
Description : Muri Mbajtes - Prerja 6-6
Author : Dhimitri PAPA

Settings

Standard - EN 1997 - DA3 (2)

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard

Wall analysis

Active earth pressure calculation : Coulomb
Passive earth pressure calculation : Caquot-Kerisel
Earthquake analysis : Mononobe-Okabe
Shape of earth wedge : Calculate as skew
Base key : The base key is considered as inclined footing bottom
Allowable eccentricity : 0.333
Verification methodology : according to EN 1997
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)									
Permanent design situation									
		State STR				State GEO			
		Unfavourable		Favourable		Unfavourable		Favourable	
Permanent actions :	γ_G =	1.35	[–]	1.00	[–]	1.00	[–]	1.00	[–]
Variable actions :	γ_Q =	1.50	[–]	0.00	[–]	1.30	[–]	0.00	[–]

Partial factors on actions (A)									
Permanent design situation									
Water load :	γ_w =					1.00	[–]		

Partial factors for soil parameters (M)			
Permanent design situation			
Partial factor on internal friction :	γ_ϕ =	1.25	[–]
Partial factor on effective cohesion :	γ_c =	1.25	[–]
Partial factor on undrained shear strength :	γ_{cu} =	1.40	[–]
Partial factor on Poisson's ratio :	γ_v =	1.00	[–]

Partial factors for variable actions			
Permanent design situation			
Factor for combination value :	ψ_0 =	0.70	[–]
Factor for frequent value :	ψ_1 =	0.50	[–]
Factor for quasi-permanent value :	ψ_2 =	0.30	[–]

Material of structure

Unit weight γ = 23.56 kN/m^3
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete : C 25/30
Cylinder compressive strength f_{ck} = 25.00 MPa
Tensile strength f_{ctm} = 2.60 MPa

Longitudinal steel : B500
Yield strength f_{yk} = 500.00 MPa

Geometry of structure

No.	Coordinate X [m]	Depth Z [m]
1	0.00	0.00
2	0.90	6.70
3	1.70	6.70
4	1.70	7.50
5	-0.70	7.50
6	-0.70	6.70
7	-0.30	6.70
8	-0.30	0.00

The origin [0,0] is located at the most upper right point of the wall.
Wall section area = 6.94 m^2.

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m^3]	γ_{su} [kN/m^3]	δ [°]
1	Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm		14.00	25.00	19.00	10.00	12.00
2	Shtresa Nr.2 - Sandy clay (CS), consistency firm		21.00	50.00	21.00	12.00	12.00

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
3	Shtrsa Nr.3 - Sandy clay (CS), consistency firm		26.00	80.00	21.00	12.00	12.00

Soil parameters to compute pressure at rest

No.	Name	Pattern	Type calculation	φ_{ef} [°]	ν [–]	OCR [–]	K_r [–]
1	Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm		cohesive	-	0.40	-	-
2	Shtresa Nr.2 - Sandy clay (CS), consistency firm		cohesive	-	0.35	-	-
3	Shtrsa Nr.3 - Sandy clay (CS), consistency firm		cohesive	-	0.35	-	-

Soil parameters

Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm

Unit weight : γ = 19.00 kN/m³
Stress-state : effective
Angle of internal friction : φ_{ef} = 14.00 °
Cohesion of soil : c_{ef} = 25.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.40
Saturated unit weight : γ_{sat} = 20.00 kN/m³

Shtresa Nr.2 - Sandy clay (CS), consistency firm

Unit weight : γ = 21.00 kN/m³
Stress-state : effective
Angle of internal friction : φ_{ef} = 21.00 °
Cohesion of soil : c_{ef} = 50.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γ_{sat} = 22.00 kN/m³

Shtrsa Nr.3 - Sandy clay (CS), consistency firm

Unit weight : γ = 21.00 kN/m³
Stress-state : effective
Angle of internal friction : φ_{ef} = 26.00 °
Cohesion of soil : c_{ef} = 80.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γ_{sat} = 22.00 kN/m³

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	3.00	Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm	

No.	Layer [m]	Assigned soil	Pattern
2	2.00	Shtresa Nr.2 - Sandy clay (CS), consistency firm	
3	5.00	Shtrsa Nr.3 - Sandy clay (CS), consistency firm	
4	-	Shtrsa Nr.3 - Sandy clay (CS), consistency firm	

Foundation

Type of foundation : pile foundation
Unit weight γ = 25.13 kN/m^3
Geometry
Length l = 7.00 m
Offset d = 0.80 m
Diameter x = 0.50 m

Terrain profile

Terrain behind the structure is flat.

Water influence

GWT behind the structure lies at a depth of 3.00 m
Uplift in foot. bottom due to different pressures is not considered.

Input surface surcharges

No.	Surcharge new	Surcharge change	Action	Mag.1 [kN/m^2]	Mag.2 [kN/m^2]	Ord.x x [m]	Length l [m]	Depth z [m]
1	YES		permanent	10.00				on terrain

No.	Name
1	G

Resistance on front face of the structure

Resistance on front face of the structure: passive
Soil on front face of the structure - Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
Angle of friction struc.-soil δ = 0.00 °
Soil thickness in front of structure h = 1.20 m

Terrain in front of structure is flat.

Earthquake

Factor of horizontal acceleration K_h = 0.0200
Factor of vertical acceleration K_v = 0.0130

Water below the GWT is restricted.

Settings of the stage of construction

Design situation : permanent
The wall is free to move. Active earth pressure is therefore assumed.

Verification No. 1

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. overtur.	Coeff. sliding	Coeff. stress
Weight - wall	0.00	-2.63	163.58	0.92	1.000	1.000	1.350

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. overtur.	Coeff. sliding	Coeff. stress
Earthq.- constr.	3.27	-2.63	-2.13	0.92	1.000	1.000	1.000
FF resistance	-79.16	-0.55	0.08	0.20	1.000	1.000	1.000
Earthq.- face	0.34	-0.80	0.00	0.40	1.000	1.000	1.000
Weight - earth wedge	0.00	-1.34	7.83	1.79	1.000	1.000	1.000
Earthquake - soil wedge	0.27	-1.34	-0.18	1.79	1.000	1.000	1.000
Active pressure	15.04	-2.44	15.51	1.92	1.000	1.000	1.000
Water pressure	101.25	-1.50	9.19	1.73	1.000	1.000	1.000
Uplift pressure	0.00	-7.50	0.00	0.70	1.000	1.000	1.000
Earthq.- act.pressure	8.15	-4.83	3.41	1.28	1.000	1.000	1.000
G	14.83	-3.29	20.04	1.51	1.000	1.000	1.000

Verification of complete wall

Check for overturning stability

Resisting moment M_{res} = 243.36 kNm/m

Overturning moment M_{ovr} = 242.52 kNm/m

Wall for overturning is SATISFACTORY

Overall check - WALL is SATISFACTORY

Maximum stress in footing bottom : 28286.28 kPa

Bearing capacity of foundation soil

Design load acting at the pile head

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]	Eccentricity [–]	Stress [kPa]
1	193.34	274.58	63.99	0.418	700.91
2	194.76	217.33	63.99	0.498	28286.28

Service load acting at the pile head

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	128.68	202.60	19.35

Input parameters for bearing capacity analysis

Pile spacing s = 1.00 m

Dimensioning No. 1

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Weight - wall	0.00	-0.40	15.08	2.00	1.350
Weight - earth wedge	0.00	-1.34	7.83	1.79	1.000
Active pressure	15.04	-2.44	15.51	1.92	1.000
G	14.83	-3.29	20.04	1.51	1.000
Contact stress	0.00	0.00	0.00	1.60	1.000
Gravity surch. 1	0.00	-7.50	6.80	1.94	1.350

Back wall jump check

Reinforcement and dimensions of the cross-section

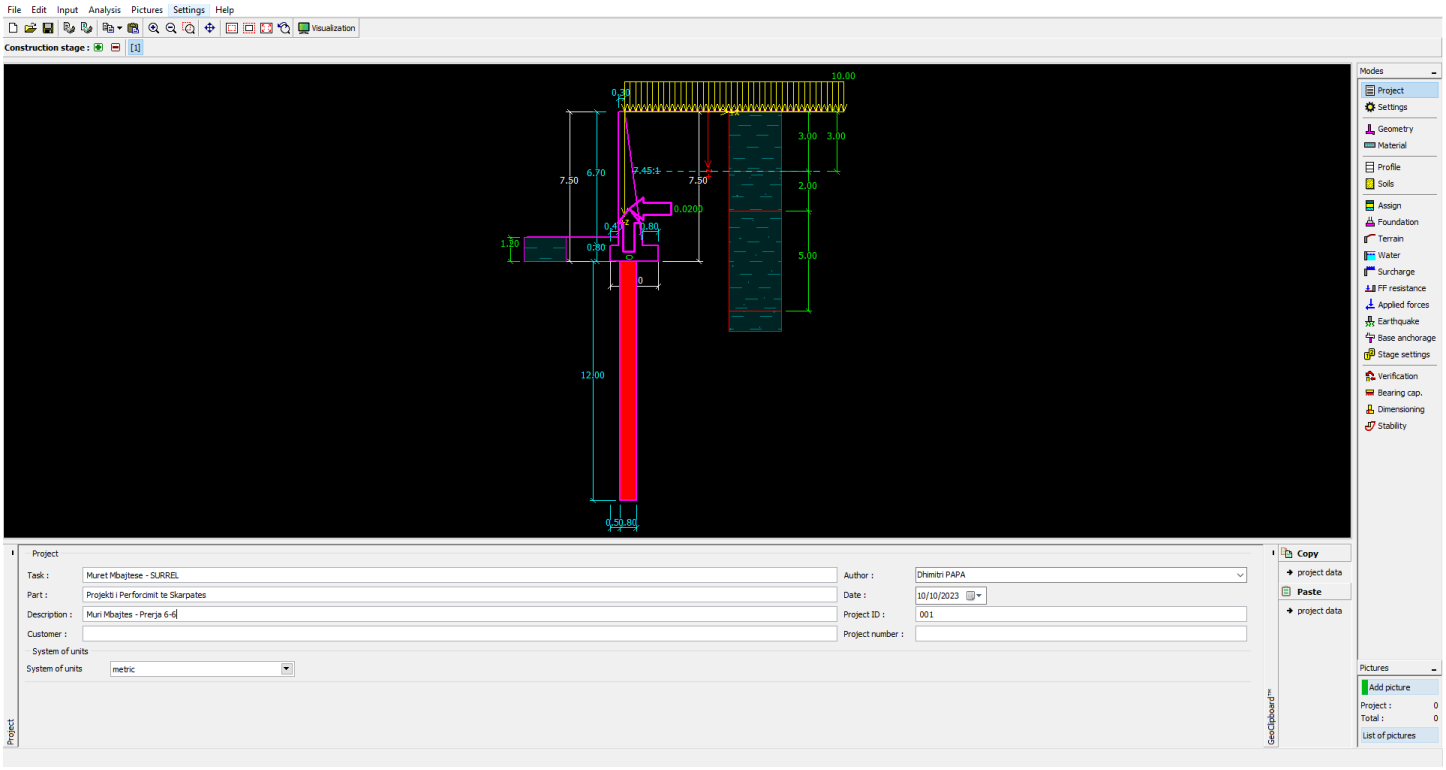
Bar diameter = 20.0 mm

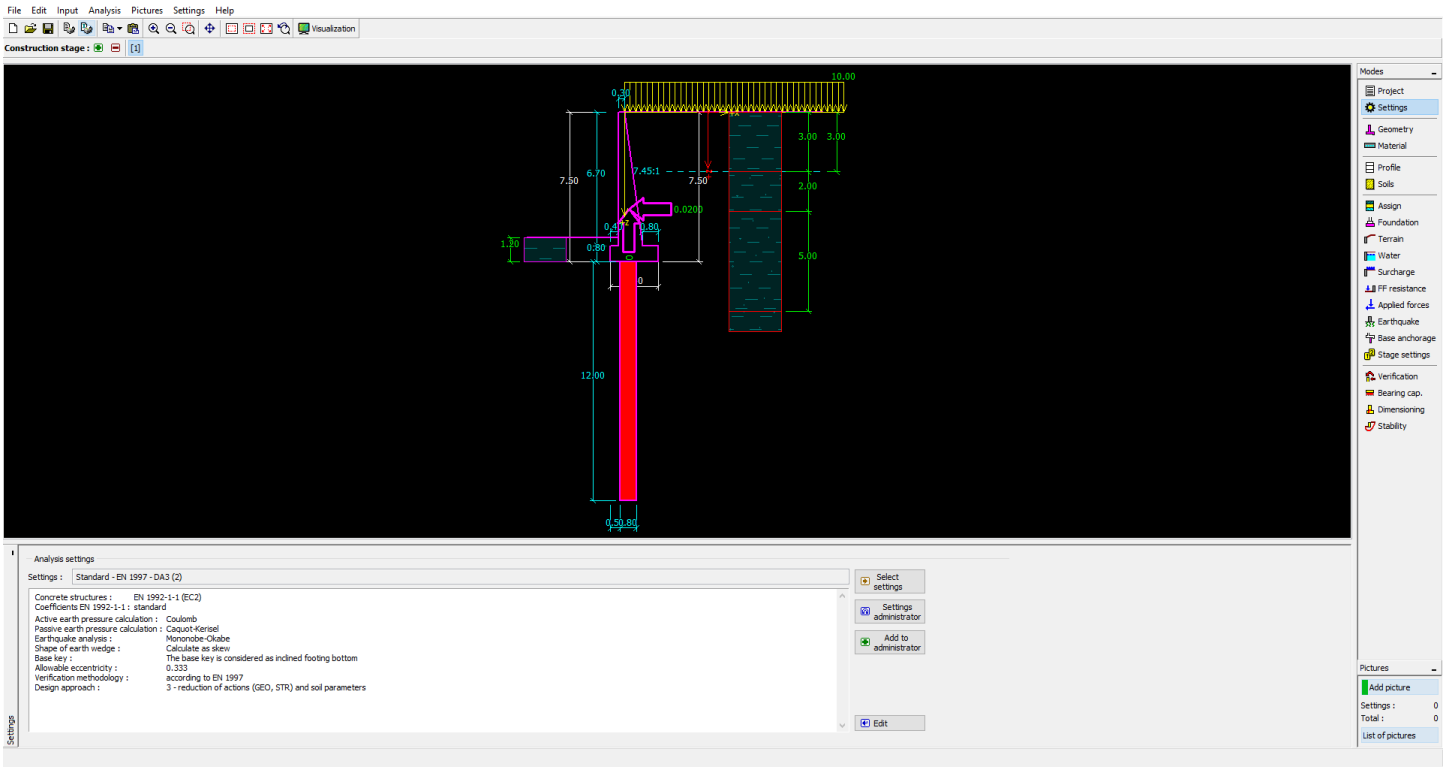
Number of bars = 8

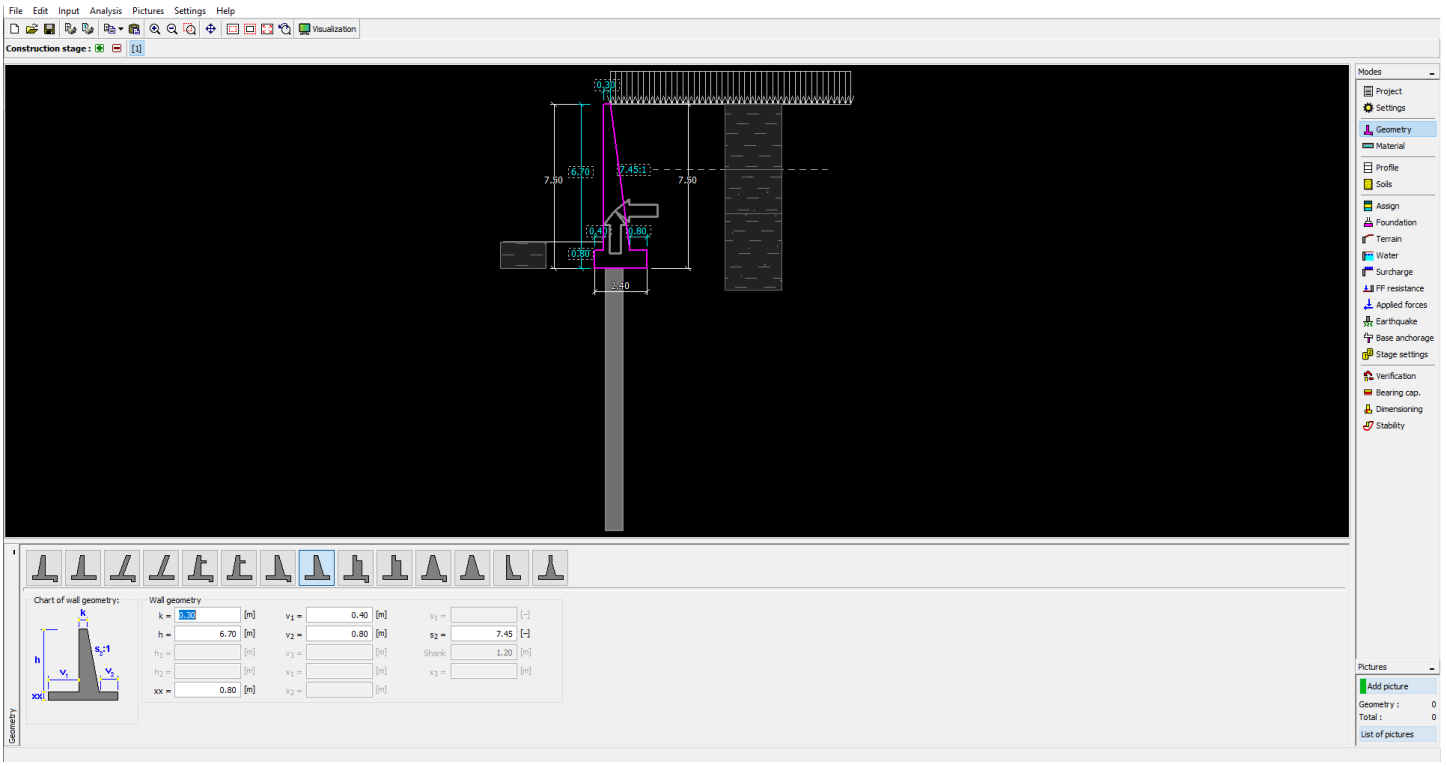
Reinforcement cover = 50.0 mm
Cross-section width = 1.00 m
Cross-section depth = 0.80 m

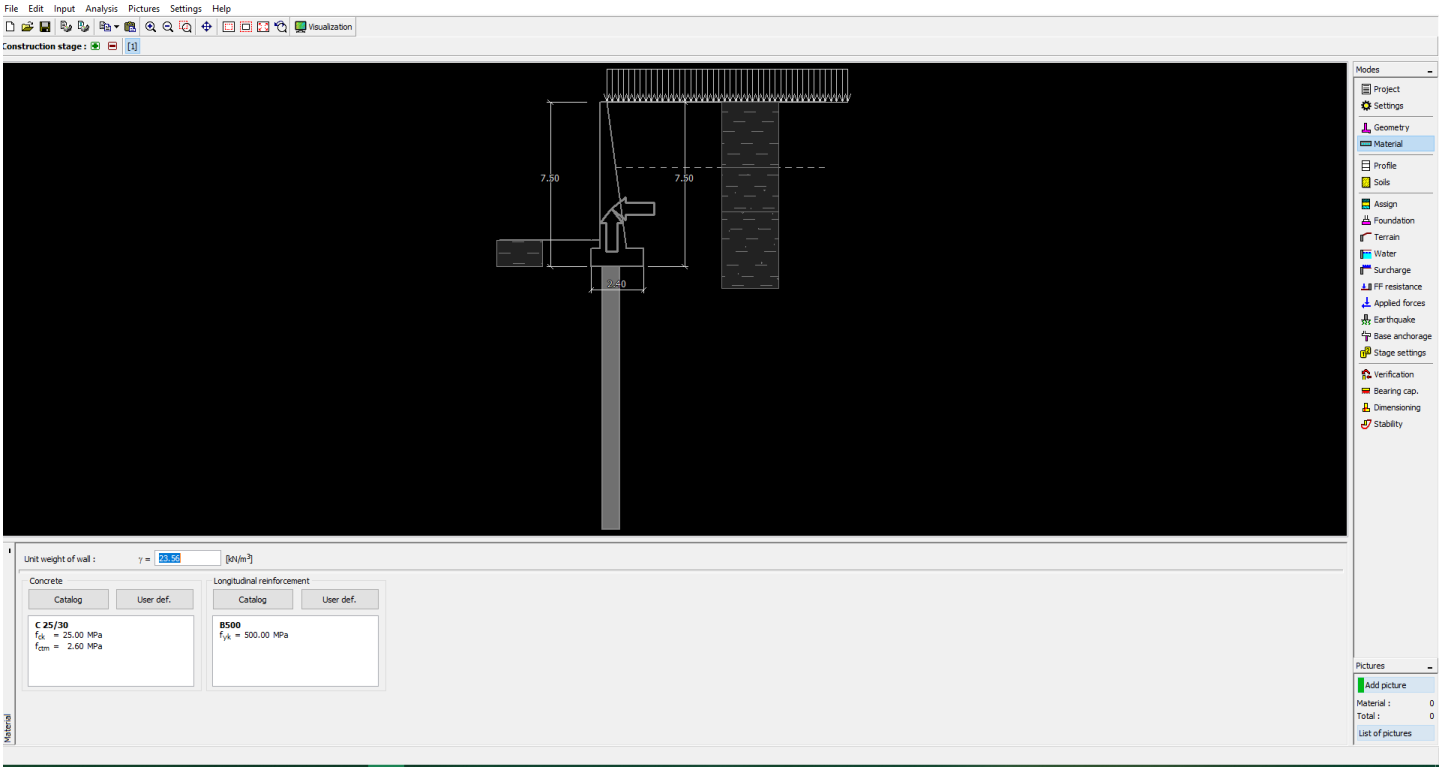
Reinforcement ratio	ρ	=	0.34	%	>	0.14	%	=	ρ_{min}
Position of neutral axis	x	=	0.08	m	<	0.46	m	=	x_{max}
Ultimate shear force	V_{Rd}	=	275.34	kN	>	72.92	kN	=	V_{Ed}
Ultimate moment	M_{Rd}	=	772.80	kNm	>	17.82	kNm	=	M_{Ed}

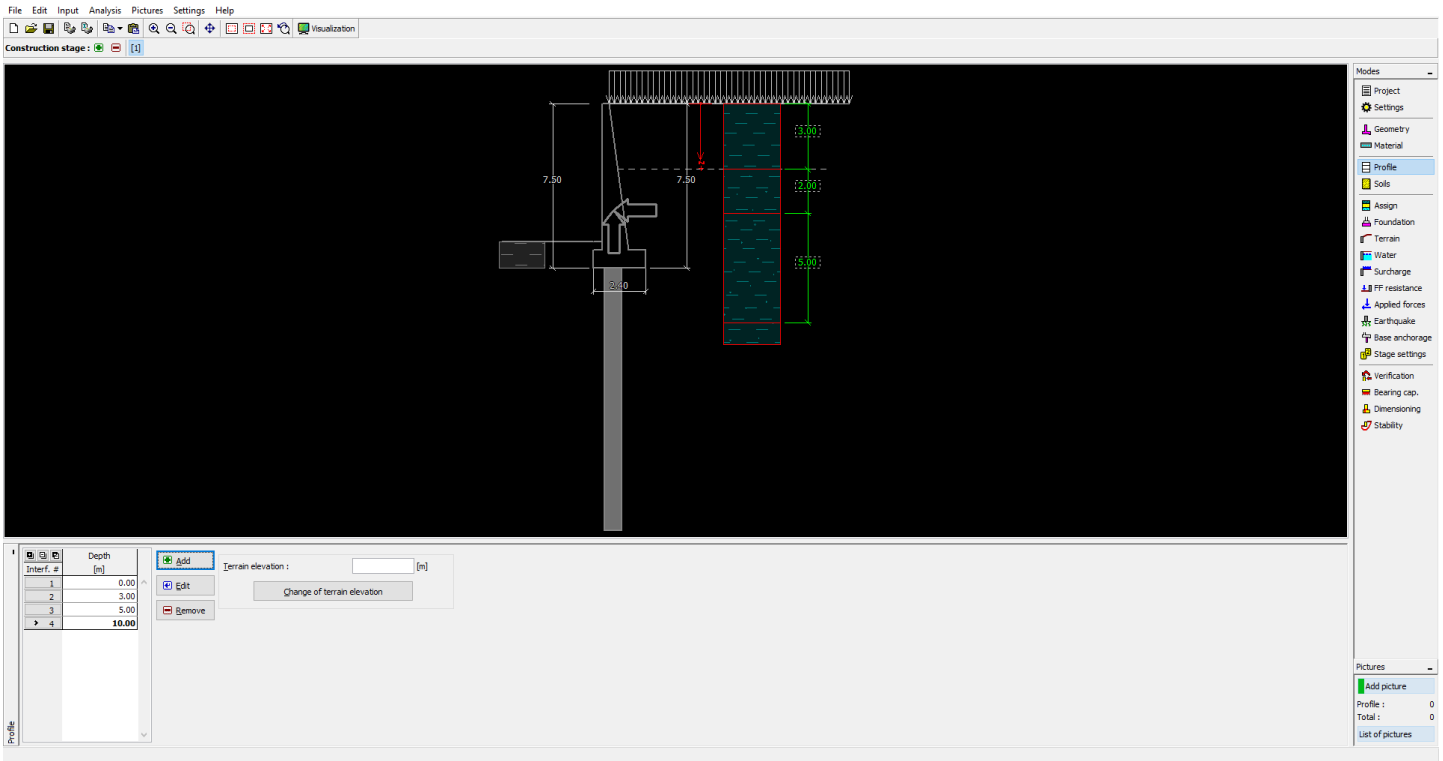
Cross-section is SATISFACTORY.

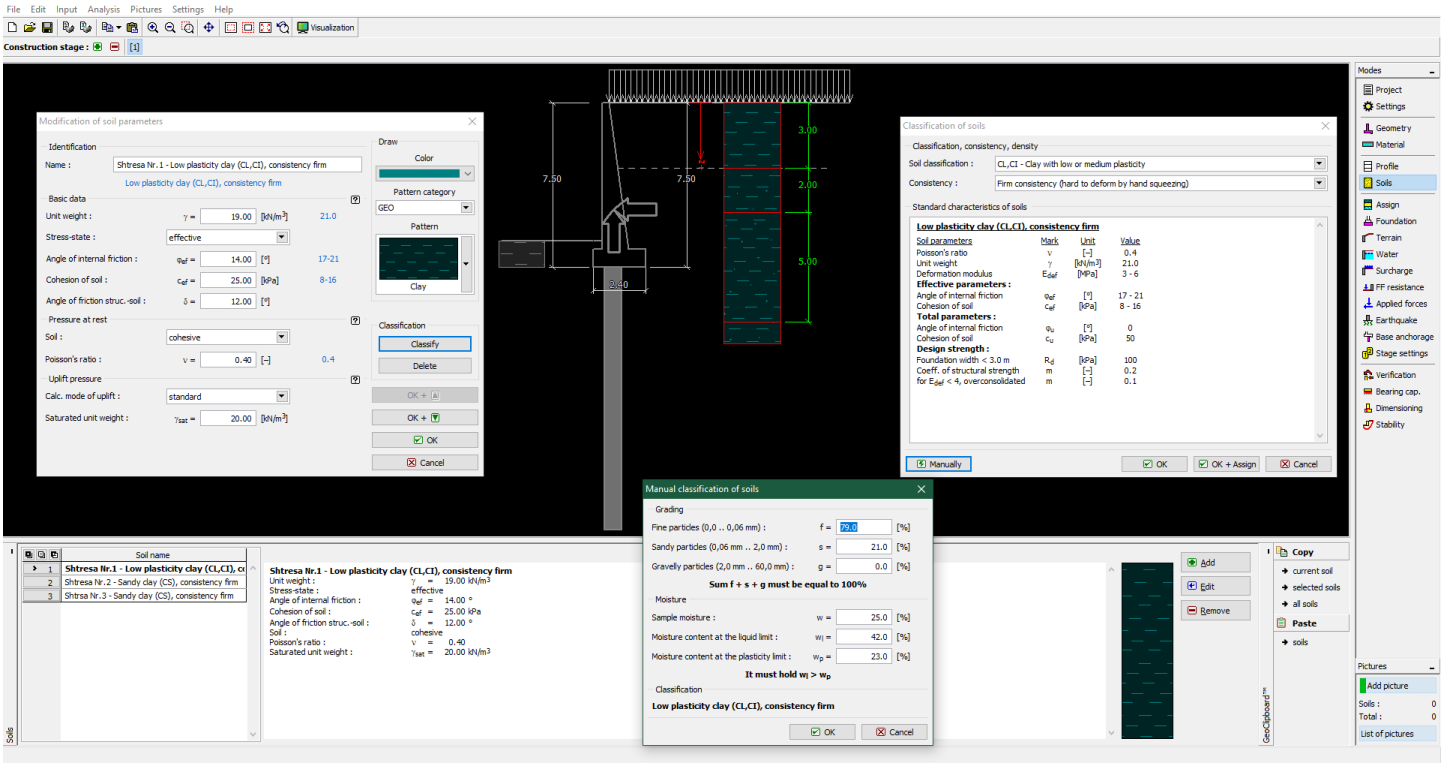


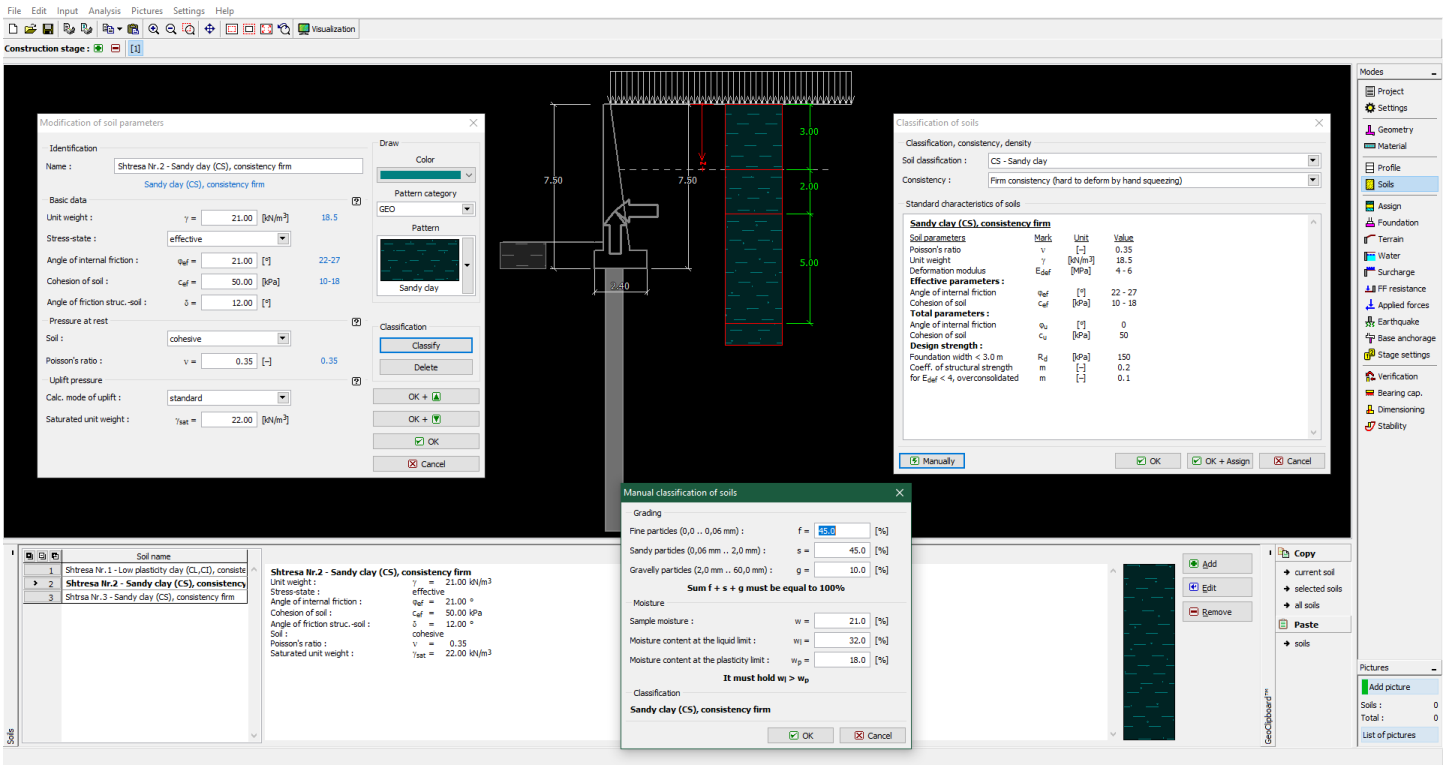

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
10.00
0.20
3.00 3.00
7.50
6.70
7.45:1
7.50
2.00
0.0200
0.40
0.80
1.20
0.80
5.00
0
12.00
0.50 0.80
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Settings : 0
Total : 0
List of pictures
Analysis settings
Settings : Standard - EN 1997 - DA3 (2)
Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard
Active earth pressure calculation : Coulomb
Passive earth pressure calculation : Caquot-Kerisel
Earthquake analysis : Mononobe-Okabe
Shape of earth wedge : Calculate as skew
Base key : The base key is considered as inclined footing bottom
Allowable eccentricity : 0.333
Verification methodology : according to EN 1997
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters
Select settings
Settings administrator
Add to administrator
Edit
Settings

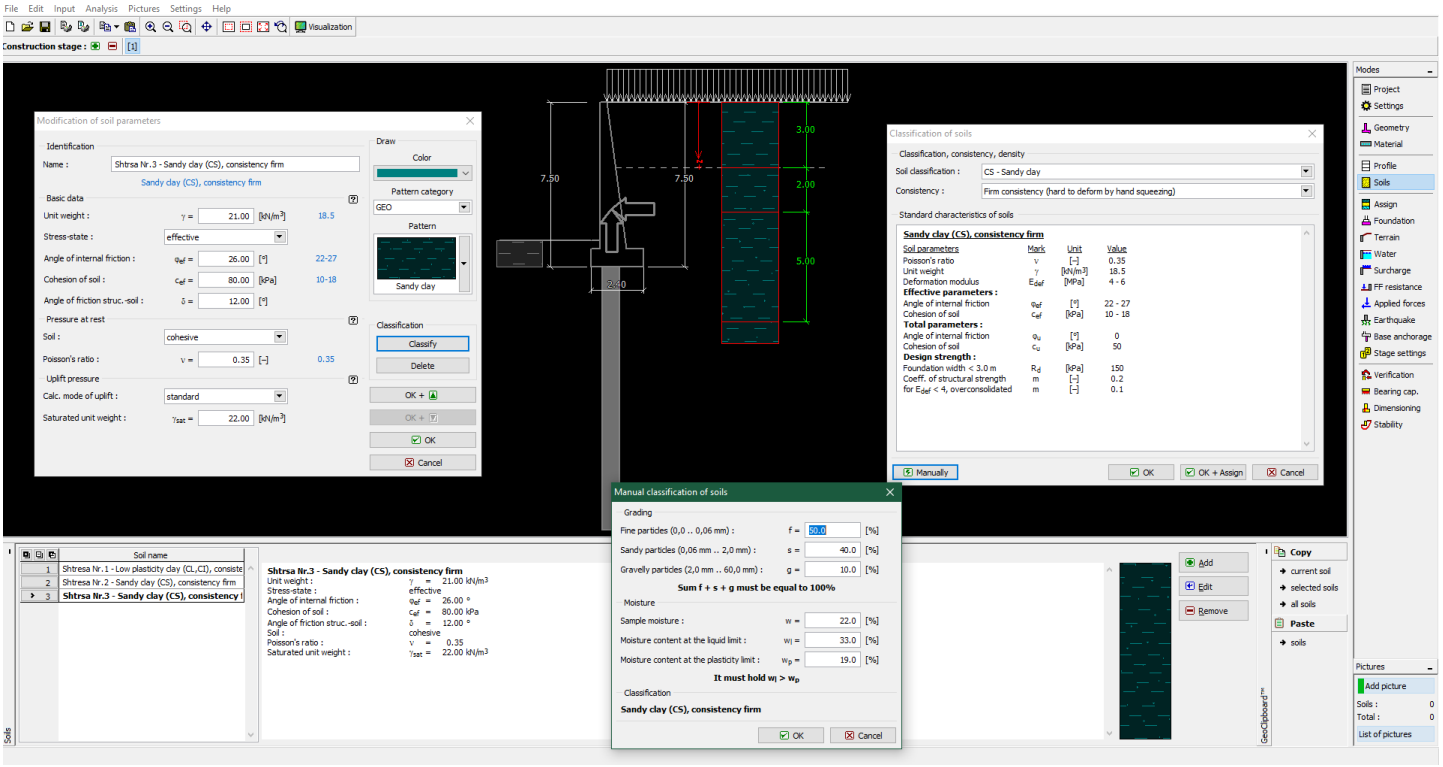

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
0.20
7.50
6.70
7.45:1
7.50
0.40
0.80
0.80
2.40
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Geometry : 0
Total : 0
List of pictures
Chart of wall geometry:
Wall geometry
k = 0.20 [m]
h = 6.70 [m]
h1 = [m]
h2 = [m]
xx = 0.80 [m]
v1 = 0.40 [m]
v2 = 0.80 [m]
v3 = [m]
x1 = [m]
x2 = [m]
s1 = [-]
s2 = 7.45 [-]
Shank 1.20 [m]
x3 = [m]
Geometry

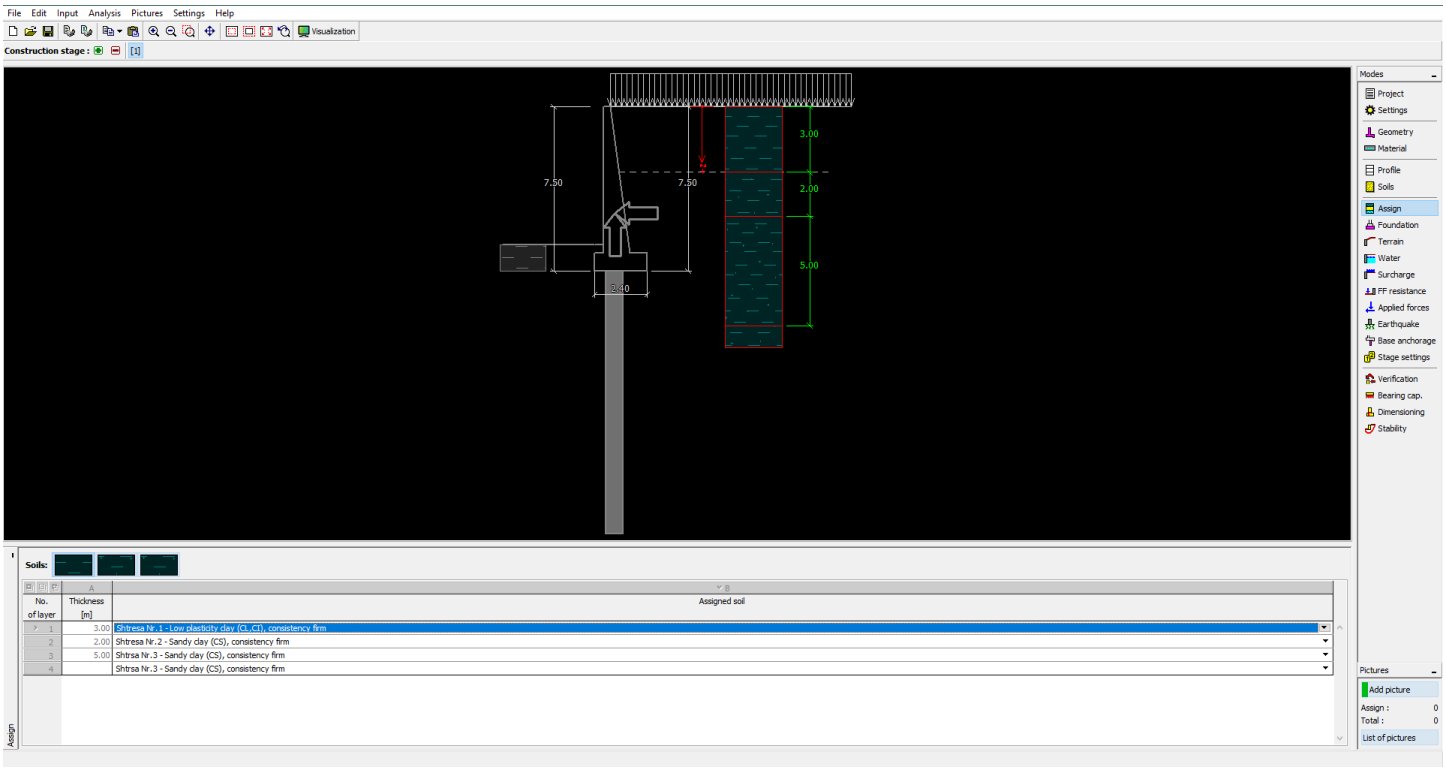

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
7.50
7.50
2.40
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Unit weight of wall :
γ =
[kN/m³]
Concrete
Catalog
User def.
C 25/30
f_ck = 25.00 MPa
f_ctm = 2.60 MPa
Longitudinal reinforcement
Catalog
User def.
B500
f_yk = 500.00 MPa
Material
Pictures
Add picture
Material : 0
Total : 0
List of pictures

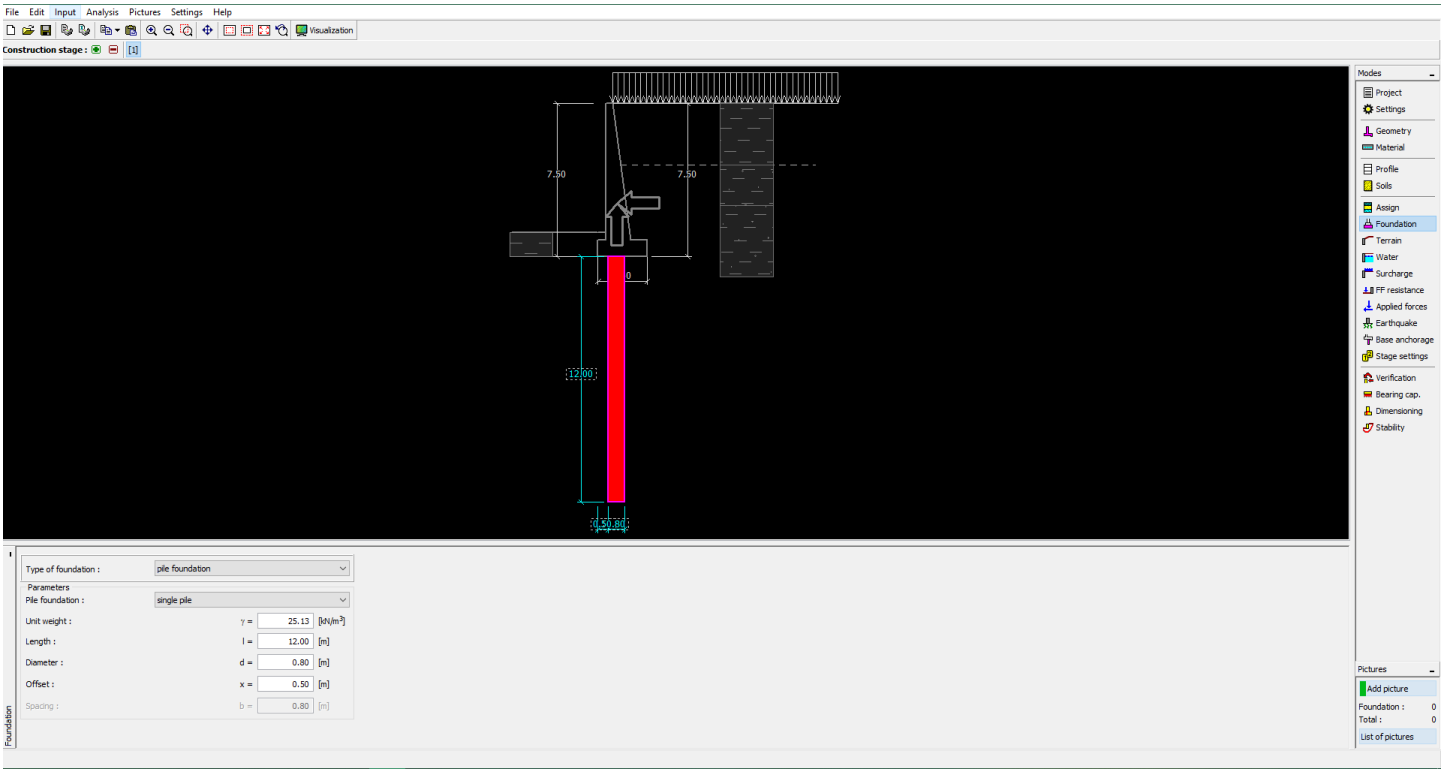

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
7.50
7.50
3.00
2.00
5.00
2.40
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Interf. #
Depth [m]
1 0.00
2 3.00
3 5.00
4 10.00
Add
Edit
Remove
Terrain elevation :
[m]
Change of terrain elevation
Profile
Pictures
Add picture
Profile : 0
Total : 0
List of pictures

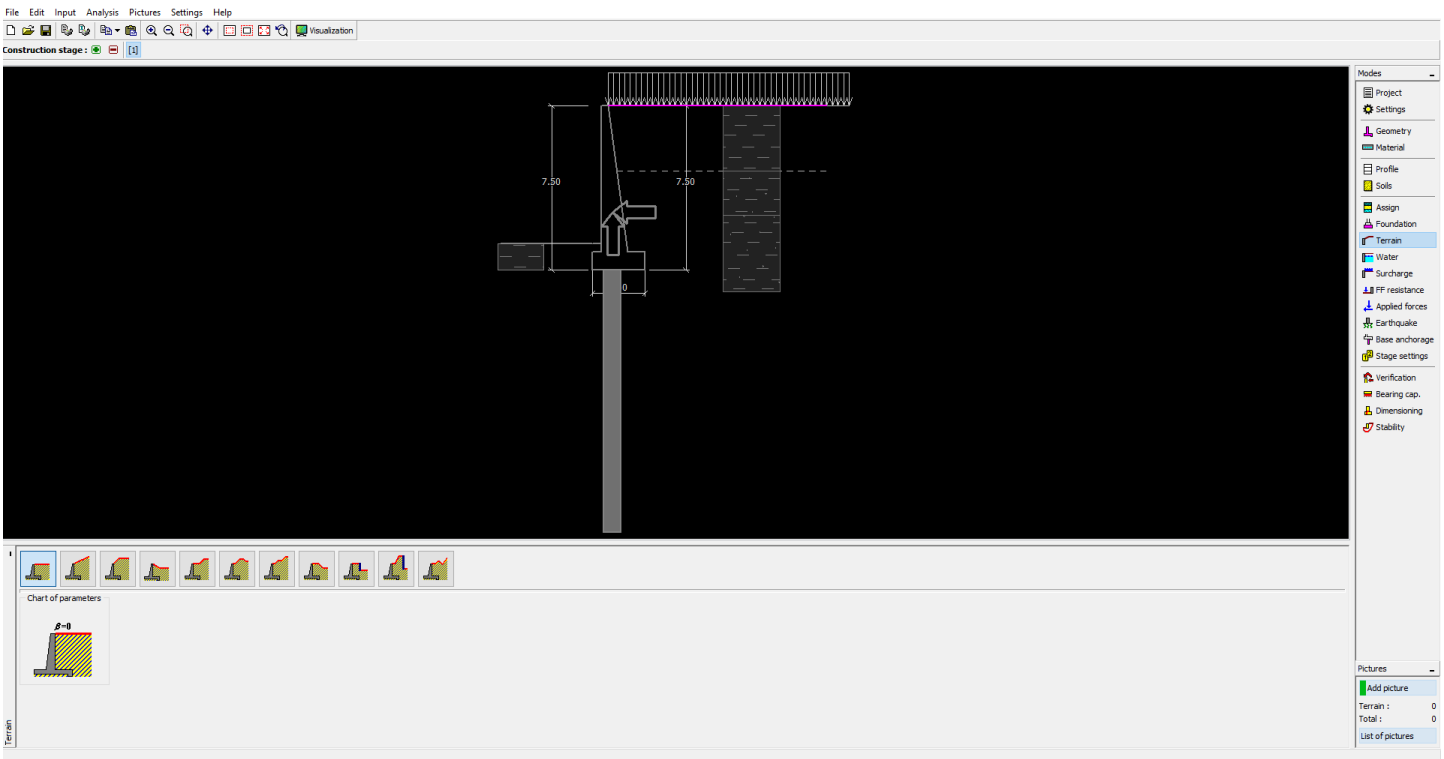

Modification of soil parameters
Identification
Name : Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
Low plasticity clay (CL,CI), consistency firm
Basic data
Unit weight : 19.00 [kN/m³] 21.0
Stress-state : effective
Angle of internal friction : 14.00 [°] 17-21
Cohesion of soil : 25.00 [kPa] 8-16
Angle of friction struc.-soil : 12.00 [°]
Pressure at rest
Soil : cohesive
Poisson's ratio : 0.40 [–] 0.4
Uplift pressure
Calc. mode of uplift : standard
Saturated unit weight : 20.00 [kN/m³]
Draw
Color
Pattern category
GEO
Pattern
Clay
Classification
Classify
Delete
OK + A
OK + I
OK
Cancel
7.50
7.50
3.00
2.00
5.00
2.50
Classification of soils
Classification, consistency, density
Soil classification : CL,CI - Clay with low or medium plasticity
Consistency : Firm consistency (hard to deform by hand squeezing)
Standard characteristics of soils
Low plasticity clay (CL,CI), consistency firm
Soil parameters Mark Unit Value
Poisson's ratio ν [–] 0.4
Unit weight γ [kN/m³] 21.0
Deformation modulus E_def [MPa] 3 - 6
Effective parameters :
Angle of internal friction φ_ef [°] 17 - 21
Cohesion of soil c_ef [kPa] 8 - 16
Total parameters :
Angle of internal friction φ_u [°] 0
Cohesion of soil c_u [kPa] 50
Design strength :
Foundation width < 3.0 m R_d [kPa] 100
Coeff. of structural strength m [–] 0.2
for E_def < 4, overconsolidated m [–] 0.1
Manually
OK
OK + Assign
Cancel
Manual classification of soils
Grading
Fine particles (0,0 .. 0,06 mm) : f = 70.0 [%]
Sandy particles (0,06 mm .. 2,0 mm) : s = 21.0 [%]
Gravelly particles (2,0 mm .. 60,0 mm) : g = 0.0 [%]
Sum f + s + g must be equal to 100%
Moisture
Sample moisture : w = 25.0 [%]
Moisture content at the liquid limit : w_l = 42.0 [%]
Moisture content at the plasticity limit : w_p = 23.0 [%]
It must hold w_l > w_p
Classification
Low plasticity clay (CL,CI), consistency firm
OK
Cancel
Soil name
1 Shtresa Nr.1 - Low plasticity clay (CL,CI), cl
2 Shtresa Nr.2 - Sandy clay (CS), consistency firm
3 Shtrsa Nr.3 - Sandy clay (CS), consistency firm
Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
Unit weight : γ = 19.00 kN/m³
Stress-state : effective
Angle of internal friction : φ_ef = 14.00 °
Cohesion of soil : c_ef = 25.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.40
Saturated unit weight : γ_sat = 20.00 kN/m³
Add
Edit
Remove
Copy
current soil
selected soils
all soils
Paste
soils
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Solis : 0
Total : 0
List of pictures

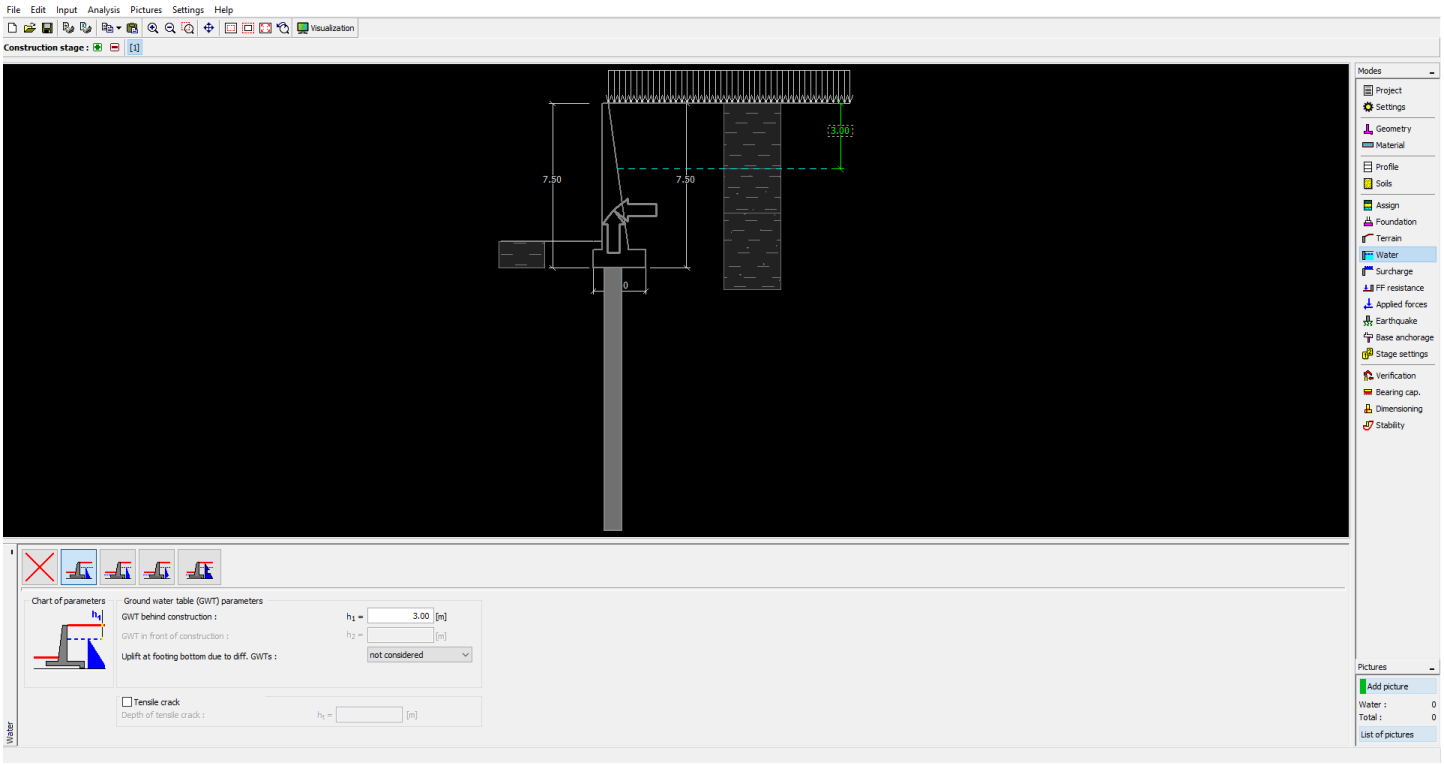

Modification of soil parameters
Identification
Name : Shtresa Nr.2 - Sandy clay (CS), consistency firm
Sandy clay (CS), consistency firm
Basic data
Unit weight : 21.00 [kN/m³] 18.5
Stress-state : effective
Angle of internal friction : 21.00 [°] 22-27
Cohesion of soil : 50.00 [kPa] 10-18
Angle of friction struc.-soil : 12.00 [°]
Pressure at rest
Soil : cohesive
Poisson's ratio : 0.35 [–] 0.35
Uplift pressure
Calc. mode of uplift : standard
Saturated unit weight : 22.00 [kN/m³]
Draw
Color
Pattern category
GEO
Pattern
Sandy clay
Classification
Classify
Delete
OK + A
OK + I
OK
Cancel
7.50
7.50
3.00
2.00
5.00
2.50
Classification of soils
Classification, consistency, density
Soil classification : CS - Sandy clay
Consistency : Firm consistency (hard to deform by hand squeezing)
Standard characteristics of soils
Sandy clay (CS), consistency firm
Soil parameters Mark Unit Value
Poisson's ratio ν [–] 0.35
Unit weight γ [kN/m³] 18.5
Deformation modulus E_def [MPa] 4 - 6
Effective parameters :
Angle of internal friction φ_ef [°] 22 - 27
Cohesion of soil c_ef [kPa] 10 - 18
Total parameters :
Angle of internal friction φ_u [°] 0
Cohesion of soil c_u [kPa] 50
Design strength :
Foundation width < 3.0 m R_d [kPa] 150
Coeff. of structural strength m [–] 0.2
for E_def < 4, overconsolidated m [–] 0.1
Manually
OK
OK + Assign
Cancel
Manual classification of soils
Grading
Fine particles (0,0 .. 0,06 mm) : f = 45.0 [%]
Sandy particles (0,06 mm .. 2,0 mm) : s = 45.0 [%]
Gravelly particles (2,0 mm .. 60,0 mm) : g = 10.0 [%]
Sum f + s + g must be equal to 100%
Moisture
Sample moisture : w = 21.0 [%]
Moisture content at the liquid limit : w_l = 32.0 [%]
Moisture content at the plasticity limit : w_p = 18.0 [%]
It must hold w_l > w_p
Classification
Sandy clay (CS), consistency firm
OK
Cancel
Soil name
1 Shtresa Nr.1 - Low plasticity clay (CL,CI), consiste
2 Shtresa Nr.2 - Sandy clay (CS), consistency
3 Shtresa Nr.3 - Sandy clay (CS), consistency firm
Shtresa Nr.2 - Sandy clay (CS), consistency firm
Unit weight : γ = 21.00 kN/m³
Stress-state : effective
Angle of internal friction : φ_ef = 21.00 °
Cohesion of soil : c_ef = 50.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γ_sat = 22.00 kN/m³
Add
Edit
Remove
Copy
current soil
selected soils
all soils
Paste
soils
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Solis : 0
Total : 0
List of pictures

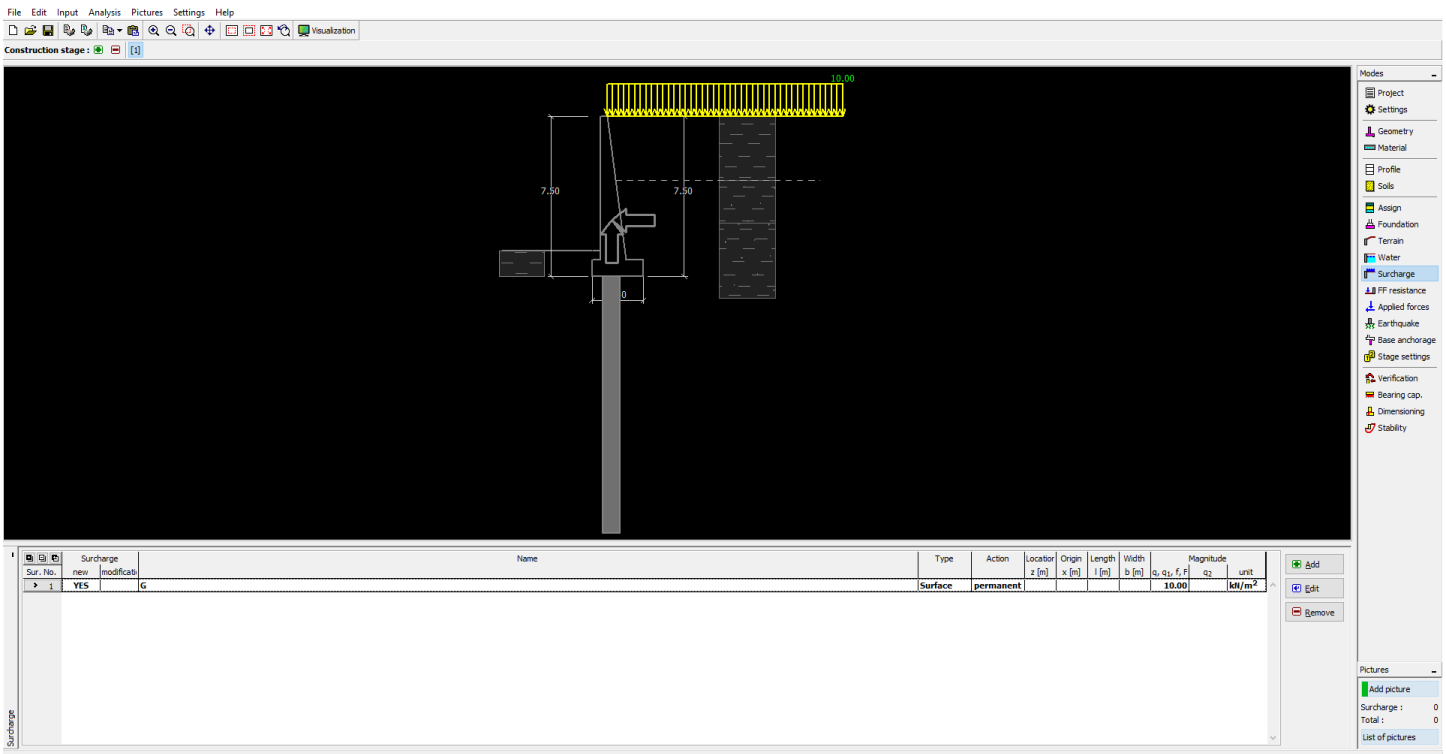

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
Modification of soil parameters
Identification
Name :
Shtrsa Nr.3 - Sandy clay (CS), consistency firm
Sandy clay (CS), consistency firm
Basic data
Unit weight :
21.00
[kN/m³]
18.5
Stress-state :
effective
Angle of internal friction :
26.00
[°]
22-27
Cohesion of soil :
80.00
[kPa]
10-18
Angle of friction struc.-soil :
12.00
[°]
Pressure at rest
Soil :
cohesive
Poisson's ratio :
0.35
[–]
0.35
Uplift pressure
Calc. mode of uplift :
standard
Saturated unit weight :
22.00
[kN/m³]
Draw
Color
Pattern category
GEO
Pattern
Sandy clay
Classification
Classify
Delete
OK +
OK
Cancel
7.50
7.50
3.00
2.00
5.00
2.40
Classification of soils
Classification, consistency, density
Soil classification :
CS - Sandy clay
Consistency :
Firm consistency (hard to deform by hand squeezing)
Standard characteristics of soils
Sandy clay (CS), consistency firm
Soil parameters
Mark
Unit
Value
Poisson's ratio
ν
[–]
0.35
Unit weight
γ
[kN/m3]
18.5
Deformation modulus
E_def
[MPa]
4 - 6
Effective parameters :
Angle of internal friction
φ_ef
[°]
22 - 27
Cohesion of soil
c_ef
[kPa]
10 - 18
Total parameters :
Angle of internal friction
φ_u
[°]
0
Cohesion of soil
c_u
[kPa]
50
Design strength :
Foundation width < 3.0 m
R_d
[kPa]
150
Coeff. of structural strength
m
[–]
0.2
for E_def < 4, overconsolidated
m
[–]
0.1
Manually
OK
OK + Assign
Cancel
Manual classification of soils
Grading
Fine particles (0,0 .. 0,06 mm) :
f =
30.0
[%]
Sandy particles (0,06 mm .. 2,0 mm) :
s =
40.0
[%]
Gravelly particles (2,0 mm .. 60,0 mm) :
g =
10.0
[%]
Sum f + s + g must be equal to 100%
Moisture
Sample moisture :
w =
22.0
[%]
Moisture content at the liquid limit :
wl =
33.0
[%]
Moisture content at the plasticity limit :
wp =
19.0
[%]
It must hold wl > wp
Classification
Sandy clay (CS), consistency firm
OK
Cancel
Soil name
1 Shtresa Nr.1 - Low plasticity clay (CL,CI), consiste
2 Shtresa Nr.2 - Sandy clay (CS), consistency firm
3 Shtrsa Nr.3 - Sandy clay (CS), consistency f
Shtrsa Nr.3 - Sandy clay (CS), consistency firm
Unit weight : γ = 21.00 kN/m³
Stress-state : effective
Angle of internal friction : φef = 26.00 °
Cohesion of soil : cef = 80.00 kPa
Angle of friction struc.-soil : δ = 12.00 °
Soil : cohesive
Poisson's ratio : ν = 0.35
Saturated unit weight : γsat = 22.00 kN/m³
Add
Edit
Remove
Copy
current soil
selected soils
all soils
Paste
soils
Soils
GeoClipboard™
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Soils : 0
Total : 0
List of pictures

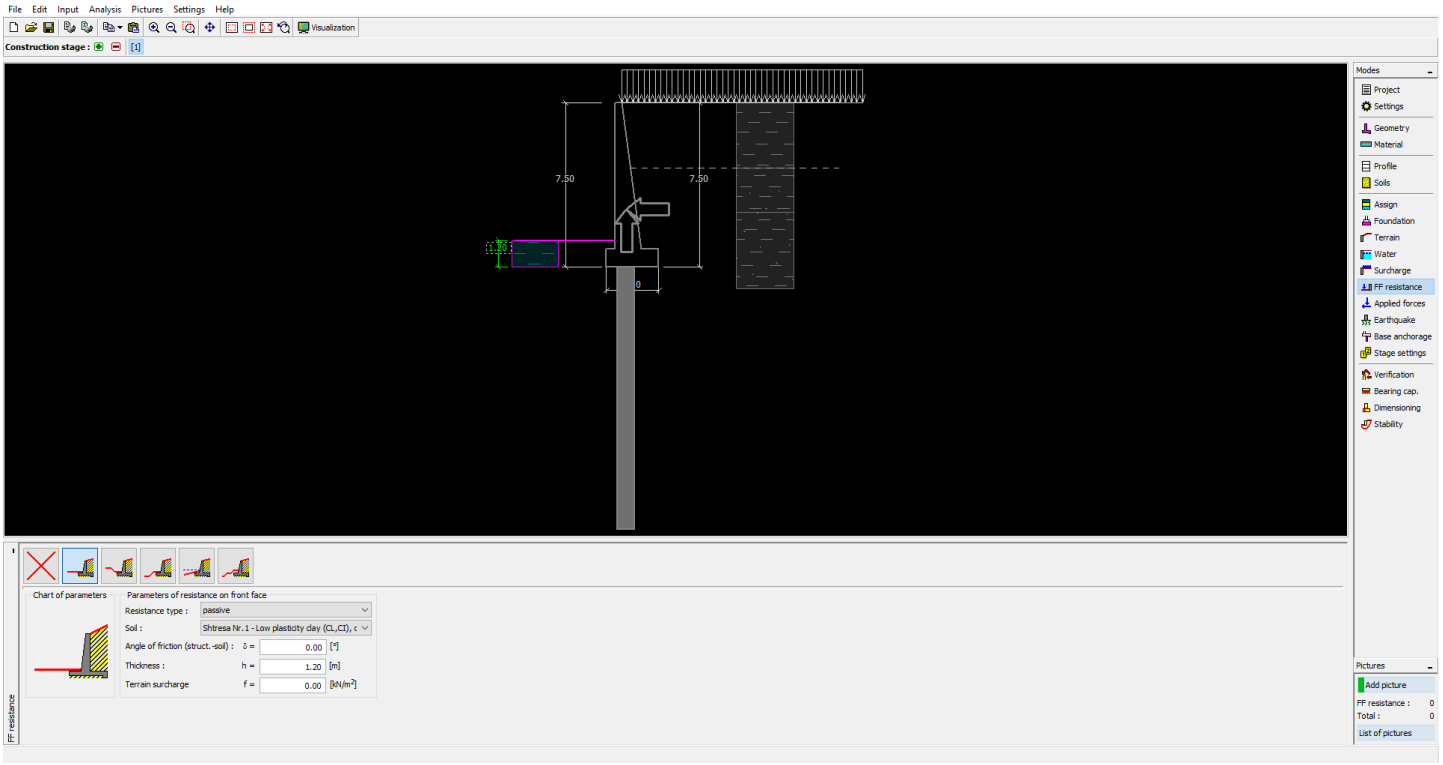

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
7.50
7.50
3.00
2.00
5.00
2.40
Soils:
No. of layer
Thickness [m]
Assigned soil
1 3.00 Shtresa Nr.1 - Low plasticity clay (CL,CI), consistency firm
2 2.00 Shtresa Nr.2 - Sandy clay (CS), consistency firm
3 5.00 Shtrsa Nr.3 - Sandy clay (CS), consistency firm
4 Shtrsa Nr.3 - Sandy clay (CS), consistency firm
Assign
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Pictures
Add picture
Assign : 0
Total : 0
List of pictures

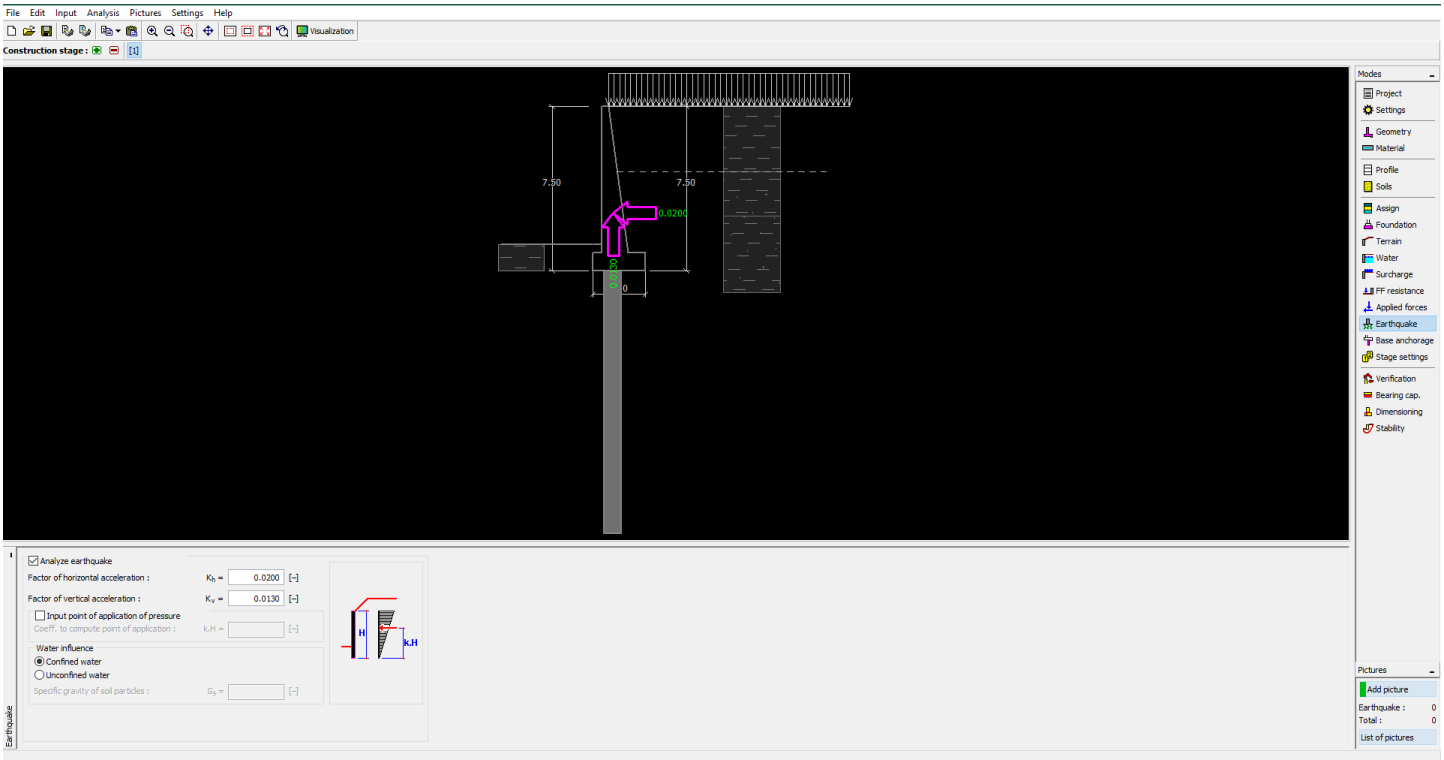

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
7.50
7.50
12.00
0.80
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Type of foundation : pile foundation
Parameters
Pile foundation : single pile
Unit weight : γ = 25.13 [kN/m³]
Length : l = 12.00 [m]
Diameter : d = 0.80 [m]
Offset : x = 0.50 [m]
Spacing : b = 0.80 [m]
Foundation
Pictures
Add picture
Foundation : 0
Total : 0
List of pictures

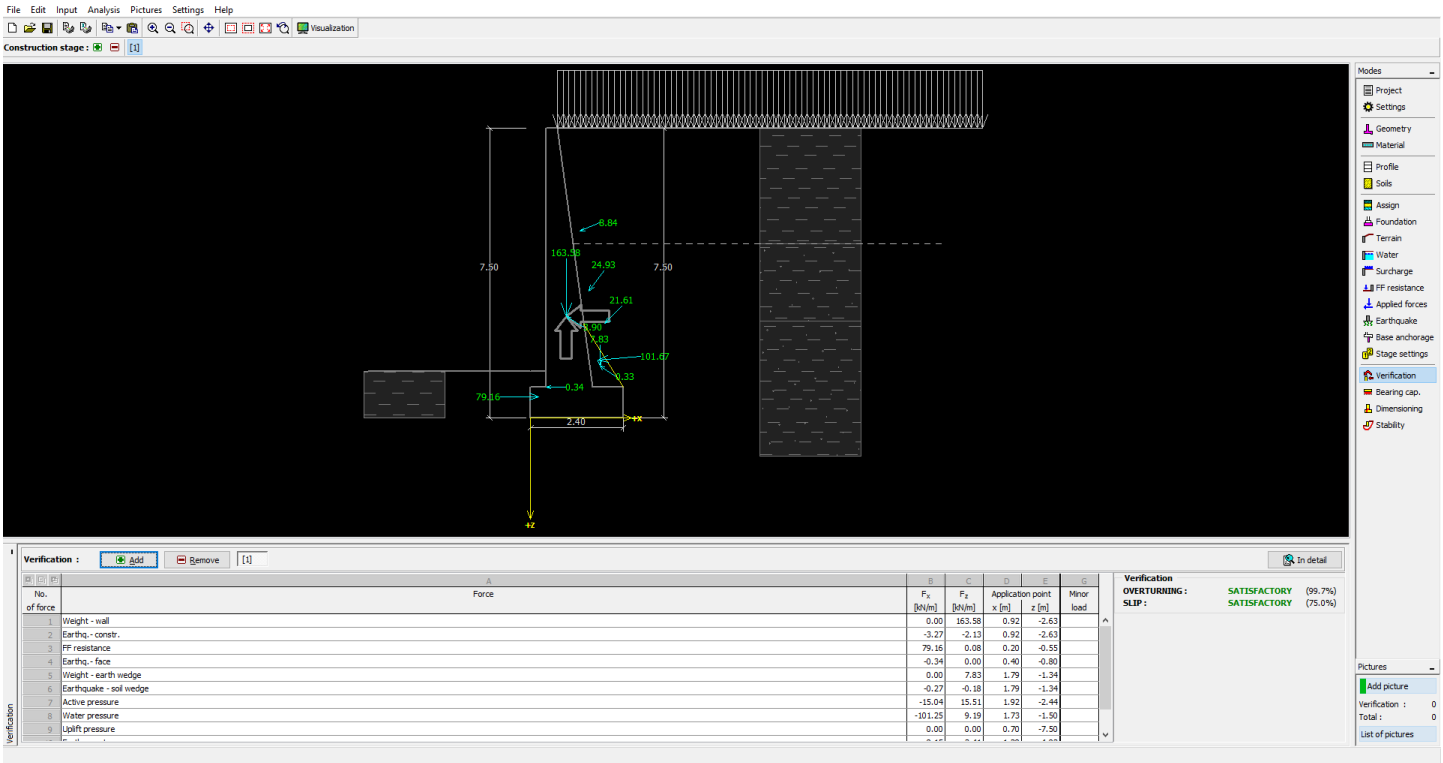

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
7.50
7.50
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of parameters
Terrain
Pictures
Add picture
Terrain : 0
Total : 0
List of pictures

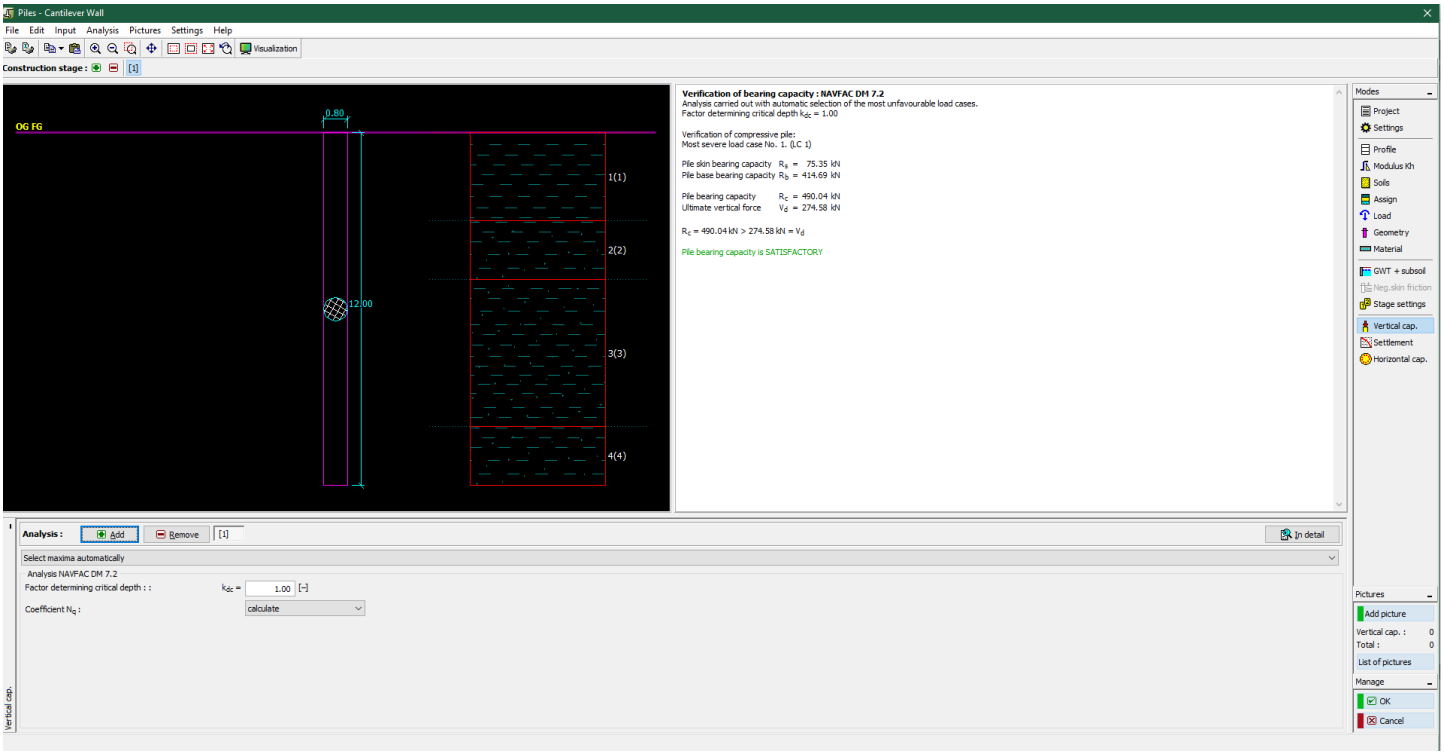

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
7.50
7.50
3.00
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of parameters
Ground water table (GWT) parameters
GWT behind construction :
3.00 [m]
GWT in front of construction :
Uplift at footing bottom due to diff. GWTs :
not considered
Tensile crack
Depth of tensile crack :
Pictures
Add picture
Water : 0
Total : 0
List of pictures
Water

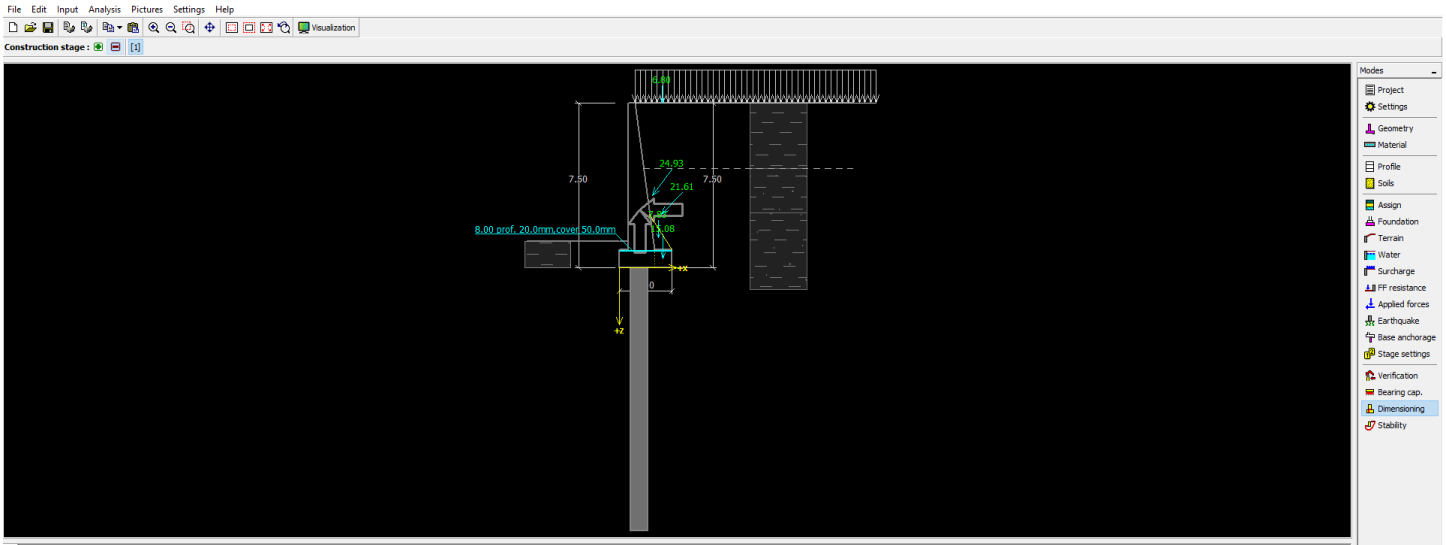

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
10.00
7.50
7.50
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Surcharge
Sur. No.
new
modificati
Name
Type
Action
Location z [m]
Origin x [m]
Length l [m]
Width b [m]
Magnitude q, q1, f, F
q2
unit
1
YES
G
Surface
permanent
10.00
kN/m2
Add
Edit
Remove
Pictures
Add picture
Surcharge : 0
Total : 0
List of pictures
Surcharge

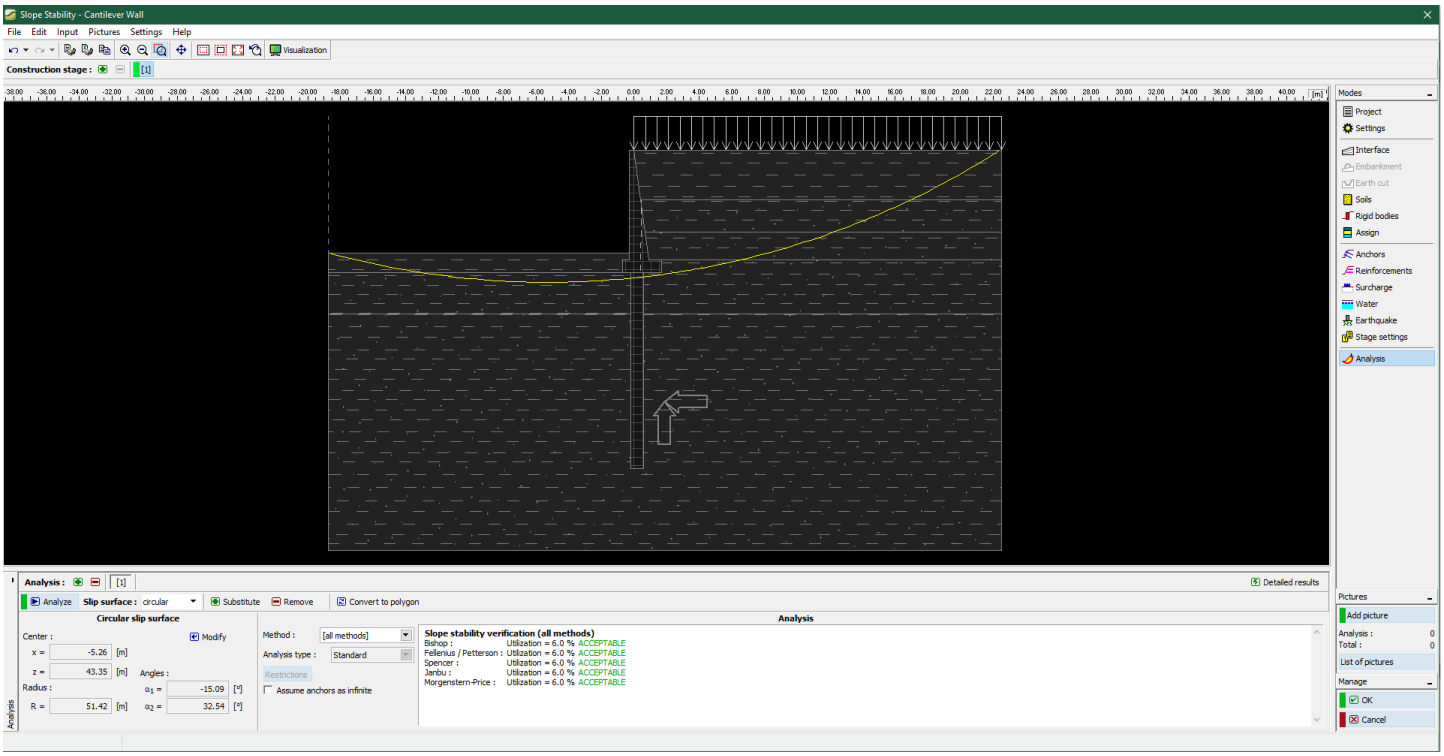

File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
7.50
7.50
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Chart of parameters
Parameters of resistance on front face
Resistance type : passive
Soil : Shtresa Nr.1 - Low plasticity clay (CL,CI), c
Angle of friction (struct.-soil) : δ = 0.00 [°]
Thickness : h = 1.20 [m]
Terrain surcharge f = 0.00 [kN/m²]
FF resistance
Pictures
Add picture
FF resistance : 0
Total : 0
List of pictures


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
7.50
7.50
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Analyze earthquake
Factor of horizontal acceleration : Kh = 0.0200 [-]
Factor of vertical acceleration : Kv = 0.0130 [-]
Input point of application of pressure
Coeff. to compute point of application : k.H = [-]
Water influence
Confined water
Unconfined water
Specific gravity of soil particles : Gs = [-]
H
k.H
Earthquake
Pictures
Add picture
Earthquake : 0
Total : 0
List of pictures


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
8.84
163.58
24.93
7.50
7.50
21.61
5.90
4.83
101.67
9.33
0.34
79.16
2.40
+x
+z
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Verification :
Add
Remove
[1]
In detail
No. of force
Force
Fx [kN/m]
Fz [kN/m]
Application point x [m]
z [m]
Minor load
1 Weight - wall 0.00 163.58 0.92 -2.63
2 Earthq. - constr. -3.27 -2.13 0.92 -2.63
3 FF resistance 79.16 0.08 0.20 -0.55
4 Earthq. - face -0.34 0.00 0.40 -0.80
5 Weight - earth wedge 0.00 7.83 1.79 -1.34
6 Earthquake - soil wedge -0.27 -0.18 1.79 -1.34
7 Active pressure -15.04 15.51 1.92 -2.44
8 Water pressure -101.25 9.19 1.73 -1.50
9 Uplift pressure 0.00 0.00 0.70 -7.50
Verification
OVERTURNING : SATISFACTORY (99.7%)
SLIP : SATISFACTORY (75.0%)
Pictures
Add picture
Verification : 0
Total : 0
List of pictures
Verification


Piles - Cantilever Wall
File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
OG FG
0.80
12.00
1(1)
2(2)
3(3)
4(4)
Verification of bearing capacity : NAVFAC DM 7.2
Analysis carried out with automatic selection of the most unfavourable load cases.
Factor determining critical depth kdc = 1.00
Verification of compressive pile:
Most severe load case No. 1. (LC 1)
Pile skin bearing capacity Rs = 75.35 kN
Pile base bearing capacity Rb = 414.69 kN
Pile bearing capacity Rc = 490.04 kN
Ultimate vertical force Vd = 274.58 kN
Rc = 490.04 kN > 274.58 kN = Vd
Pile bearing capacity is SATISFACTORY
Modes
Project
Settings
Profile
Modulus Kh
Soils
Assign
Load
Geometry
Material
GWT + subsoil
Neg.skin friction
Stage settings
Vertical cap.
Settlement
Horizontal cap.
Analysis :
Add
Remove
[1]
In detail
Select maxima automatically
Analysis NAVFAC DM 7.2
Factor determining critical depth : :
kdc = 1.00 [-]
Coefficient Nq :
calculate
Pictures
Add picture
Vertical cap. : 0
Total : 0
List of pictures
Manage
OK
Cancel
Vertical cap.


File Edit Input Analysis Pictures Settings Help
Visualization
Construction stage :
7.50
24.93
21.61
7.50
8.00 prof. 20.0mm,cover 50.0mm
Modes
Project
Settings
Geometry
Material
Profile
Soils
Assign
Foundation
Terrain
Water
Surcharge
FF resistance
Applied forces
Earthquake
Base anchorage
Stage settings
Verification
Bearing cap.
Dimensioning
Stability
Dimensioning :
Add
Remove
In detail
No. of force
Force
Fx [kN/m]
Fz [kN/m]
Applic. point x [m]
Applic. point z [m]
Minor load
1 Weight - wall 0.00 15.08 2.00 -0.40
2 Weight - earth wedge 0.00 7.83 1.79 -1.34
3 Active pressure -15.04 15.51 1.92 -2.44
4 G -14.83 20.04 1.51 -3.29
5 Contact stress 0.00 0.00 1.60 0.00
6 Gravity surch. 1 0.00 6.80 1.94 -7.50
Location of dimensioning
Wall heel verification
Data for dimensioning
Concrete cover: 50.0 [mm] No. of bars : 8.00 [-]
CrSection width : 1.00 [m] Bar diameter : 20.0 [mm]
Required amount of steel area : 1000.5 mm2
Inserted steel area : 2513.3 mm2
Wall heel verification
SHEAR: SATISFACTORY (26.5%)
FLEXURE : SATISFACTORY (2.3%)
DESIGN PRINCIPLES : SATISFACTORY (39.8%)
Pictures
Add picture
Dimensioning : 0
Total : 0
List of pictures


Slope Stability - Cantilever Wall
File Edit Input Pictures Settings Help
Visualization
Construction stage :
Modes
Project
Settings
Interface
Embankment
Earth cut
Soils
Rigid bodies
Assign
Anchors
Reinforcements
Surcharge
Water
Earthquake
Stage settings
Analysis
Analysis :
Detailed results
Analyze
Slip surface : circular
Substitute
Remove
Convert to polygon
Circular slip surface
Center :
Modify
x = -5.26 [m]
z = 43.35 [m]
Angles :
Radius :
R = 51.42 [m]
α1 = -15.09 [°]
α2 = 32.54 [°]
Method : [all methods]
Analysis type : Standard
Restrictions
Assume anchors as infinite
Analysis
Slope stability verification (all methods)
Bishop : Utilization = 6.0 % ACCEPTABLE
Fellenius / Petterson : Utilization = 6.0 % ACCEPTABLE
Spencer : Utilization = 6.0 % ACCEPTABLE
Janbu : Utilization = 6.0 % ACCEPTABLE
Morgenstern-Price : Utilization = 6.0 % ACCEPTABLE
Pictures
Add picture
Analysis : 0
Total : 0
List of pictures
Manage
OK
Cancel