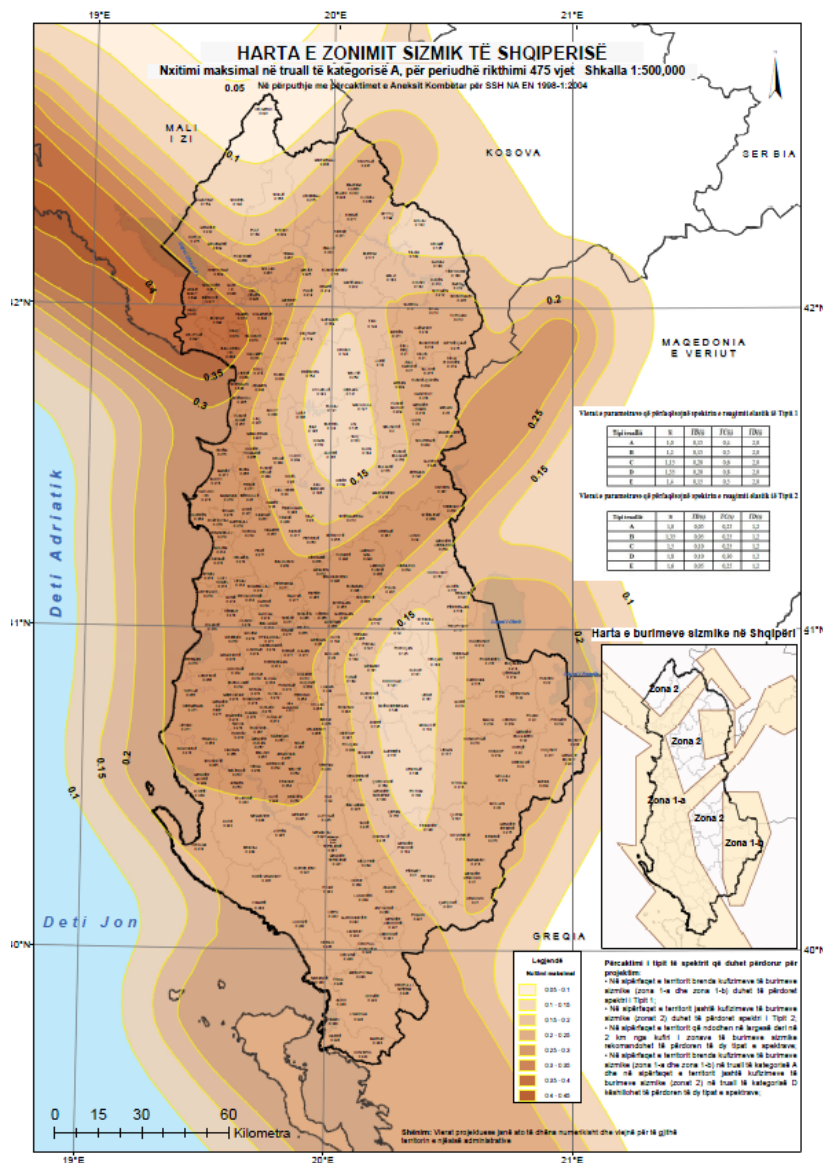


Shenim 3: Vlerat që u caktohen PNCR ose TNCR për t’u përdorur në një vend, mund të gjenden në Aneksin përkatës Kombëtar të këtij dokumenti. Vlerat e rekomanduara PDLR ose TDLR janë: PDLR = 10% dhe TDLR = 95 vjet.

Per definimin e parametrave sizmike me poshte jepet nje harte e cila tregon nxitimin maksimal te truallit (m/s^2) me 10% me propabilitet tejkalimi ne 50 vjet, nga botimi “Sizmiciteti, tektonika dhe vleresimi i rrezikut sizmik ne Shqiperi”.



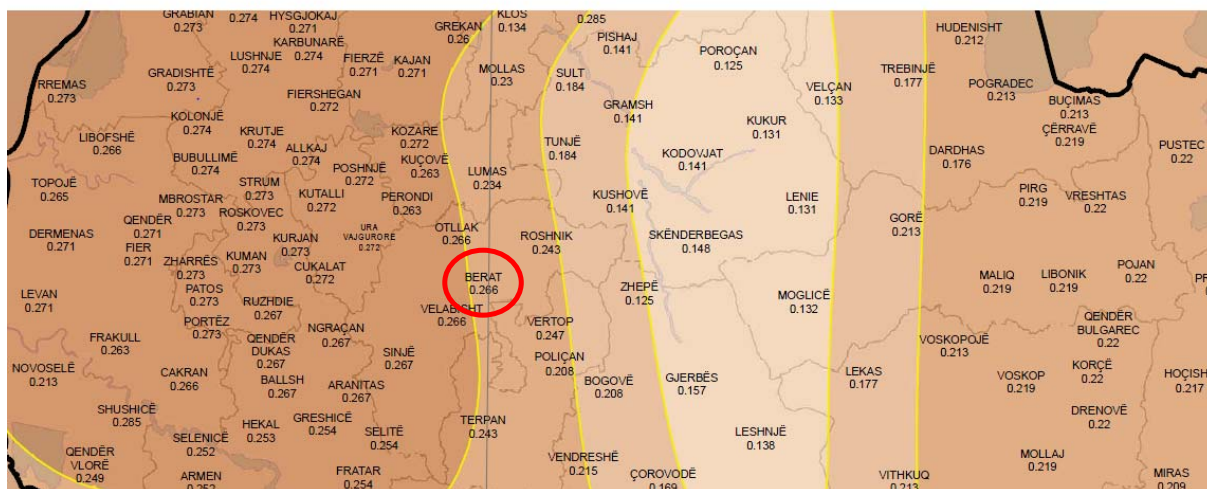


Figura 1– Harta e Nxitimit Maksimal të Trullit (m/s^2) me periode kthimi prej 475 vjetesh, për Tipin A të trullit, botimi “Sizmiteti, tektonika dhe vleresimi i rrezikut sizmik në Shqipëri”.

Nga relacioni gjeoteknik, kryesisht për përshkrimin e karakteristikave gjeologjike të njësive litologjike konkludohet se kategoria e tokës është C.

Ground type	Description of stratigraphic profile	Parameters		
		$v_{s,30}$ (m/s)	N_{SPPT} (blows/30cm)	c_u (kPa)
A	Rock or other rock-like geological formation, including at most 5 m of weaker material at the surface.	> 800	–	–
B	Deposits of very dense sand, gravel, or very stiff clay, at least several tens of metres in thickness, characterised by a gradual increase of mechanical properties with depth.	360 – 800	> 50	> 250
C	Deep deposits of dense or medium-dense sand, gravel or stiff clay with thickness from several tens to many hundreds of metres.	180 – 360	15 - 50	70 - 250
D	Deposits of loose-to-medium cohesionless soil (with or without some soft cohesive layers), or of predominantly soft-to-firm cohesive soil.	< 180	< 15	< 70
E	A soil profile consisting of a surface alluvium layer with v_s values of type C or D and thickness varying between about 5 m and 20 m, underlain by stiffer material with $v_s > 800$ m/s.			
S_1	Deposits consisting, or containing a layer at least 10 m thick, of soft clays/silts with a high plasticity index ($PI > 40$) and high water content	< 100 (indicative)	–	10 - 20
S_2	Deposits of liquefiable soils, of sensitive clays, or any other soil profile not included in types A – E or S_1			

Table 1- Tipet e trullit sipas EN-1998-1

Me qellim që të kenan kerkesat themelore të dhena në 2.1 (EN 1998: Pjesa 1), duhet të kontrollohen gjendjet kufitare vijuese (shih 2.2.2 dhe 2.2.3):

- gjendjet e fundit kufitare;
- gjendjet e kufizimit të demtimeve;

Per definimin e veprimit sizmik, është e nevojshme të specifikohet periudha reference e rikthimit, në varesi të gjendjes kufitare të marre në konsideratë:

- Koha nominale e struktures ose *Jetegjatesia projektuese e struktures*.

Per projektimin e strukturave është marre në konsideratë një *Jetegjatesi projektuese e struktures prej 50 vjetesh*. Bazuar tek EN 1990 : EUROCODE: BAZAT E PROJEKTIMIT TE STRUKTURAVE, Jetegjatesia projektuese e struktures është e definuar në tabelën e mëposhtme:

Table 2.1 - Indicative design working life

Design working life category	Indicative design working life (years)	Examples
1	10	Temporary structures ⁽¹⁾
2	10 to 25	Replaceable structural parts, e.g. gantry girders, bearings
3	15 to 30	Agricultural and similar structures
4	50	Building structures and other common structures
5	100	Monumental building structures, bridges, and other civil engineering structures
(1) Structures or parts of structures that can be dismantled with a view to being re-used should not be considered as temporary.		

- Periudha reference e rikthimit, T_{NCR} .

Te dhënat e përdorura për vlerësimin e kërkesës sizmike në strukturën e këtij relacioni, është veprimi reference sizmik i cili reflekton eventin sizmik me një periudhë kthimi reference (RP), T_{NCR} , prej 475 vitesh. Një ngjarje e tillë ka një probabilitet tejkalimi (PR) prej 10% për një periudhë të projektimit prej 50 vjetesh. Prandaj, në rastin e ures tone e cila ka një *periudhë projektimi pune (DWL)* me të madhe se periudha e veprimit reference sizmik, duke filluar me keto të dhëna input $ag = 0.266g$ është llogaritur nxitimi i cili do të përdoret për llogaritjen dhe projektimin e ures tone (Nga libri “Sizmiciteti, Sizmotektonika dhe Vlerësimi i rrezikut sizmik në Shqipëri” (Shyqyri Aliaj, Siasi Kociu, Betim Muco, Eduard Sulstarova), Aneksi I – Tabelat e rrezikut sizmik për Shqipërinë – Tabela 1”).

Per spektrin e rekomanduar të reagimit elastik horizontal, parametrat sizmike për Tipin 1 (shih hartën në **Figure 9** se cila magnitudo maksimale i përket Tiranes $M > 5.5$), janë të dhëna në tabelën e mëposhtme:

Table 3.2: Values of the parameters describing the recommended Type 1 elastic response spectra

Ground type	S	T_B (s)	T_C (s)	T_D (s)
A	1,0	0,15	0,4	2,0
B	1,2	0,15	0,5	2,0
C	1,15	0,20	0,6	2,0
D	1,35	0,20	0,8	2,0
E	1,4	0,15	0,5	2,0

Per spektrin e rekomanduar te reagimit elastik vertikal, parametrat sizmike per Tipin 1, jane te dhena ne tabelen e meposhtme:

Case	S		T_B (s)		T_C (s)		T_D (s)		a_{vg}/a_g	
Spectrum type	1	2	1	2	1	2	1	2	1	2
Soil class A	1.0	1.00	0.15	0.05	0.4	0.25	2.0	1.2		
Soil class B	1.20	1.35	0.15	0.05	0.5	0.25	2.0	1.2		
Soil class C	1.15	1.50	0.20	0.10	0.6	0.25	2.0	1.2		
Soil class D	1.35	1.80	0.20	0.10	0.8	0.30	2.0	1.2		
Soil class E	1.40	1.60	0.15	0.05	0.5	0.25	2.0	1.2		
Vertical Spectrum	1.00	1.00	0.05	0.05	0.15	0.15	1.0	1.0	0.90	0.45

Table 3.4: Recommended values of parameters describing the vertical elastic response spectra

Spectrum	a_{vg}/a_g	T_B (s)	T_C (s)	T_D (s)
Type 1	0.90	0.05	0.15	1.0
Type 2	0.45	0.05	0.15	1.0

Veprimi sizmik vertikal duhet te konsiderohet si nje veprim me drejtim per lart ose per poshte, per te krijuar keshtu efektin me te pafavorshem.

Intensiteti i nje force te tille ekuivalente sizmike, per nje zone te dhene sizmike varet, nga vlere e zhvendosjes te perhershme, e cila eshte njeheresh e pranuar dhe e lejuar nga zgjidhja e pranuar strukture.

Ne mungese te studimeve te vecanta, koeficientet sizmike horizontale (k_h) dhe vertikale (k_v), qe ndikojne te gjitha masat duhet te merren si:

$$k_h = \alpha \frac{S}{r}$$

$$k_v = \pm 0.5 k_h \quad \text{if } a_{vg}/a_g \text{ is larger than } 0.6$$

$$k_v = \pm 0.33 k_h \quad \text{otherwise}$$

$$\alpha = \frac{a_{gR} \cdot \gamma_1}{g}$$

Ku faktori r merr vlerat e renditura ne Tabelen 7.1 qe varen nga tipi i struktures mbajttese. Per mure jo me te larte se 10 m, koeficienti sizmik duhet te merret konstant pergjate gjithe lartesis. Ne rastin e tombinos tip drejtkendor, pjese i ketij relacioni, kjo strukture konsiderohet me faktor $r=1$.

6. MURET

Nevoja e projektimit të ketyre strukturave lindi si pasojë e pranisë së objekteve të banimit apo shërbimeve të tjera përgjatë gjurmës së rrugës.

Duke qenë se rruga shtrihet përgjithësisht përgjatë bregut të lumit Osum, do të ndërtohet një argjinaturë anës lumit në zonën e banuar, e cila do të shërbejë dhe si trup rruge për korsinë e biçikletave që do të kalojë përgjatë saj.

Projektimi i gjurmës së re të rrugës, shoqërohet me nevojën për projektimin e strukturave mbajtëse përgjatë rrugës, si janë muret.

Muret do të realizohen me teknologji të cilat janë miqësore me mjedisin dhe materiale të zgjedhur nga ana estetike si dheu i përforcuar.

Gjatë germimeve të punimeve të ndërtimit do të verifikohet raporti gjeologjik në mënyrë që të evitohet pozicionimi i mureve mbi terren mbushës.

Në vijim jepet tabela përmbledhëse e mureve të parashikuara në projekt.

Lista e Mureve - Rruga Kryesore						
Nr.	Tipi i murit	Ana (Majtas/Djathtas)	Gjatesia (m)	Progresiva e Fillimit	Progresiva e Fundit	Lartesia (m)
1	Mur Rrethues Guri	Djathtas	27.7	0+023.66	0+051.35	2.0
2	Mur Rrethues Guri	Djathtas	4.8	0+055.20	0+060.00	2.0
3	Mur gravitar	Djathtas	10.0	0+060.00	0+070.00	1.8
4	Mur Rrethues Guri	Djathtas	32.5	0+070.00	0+102.50	2.0
5	Mur Rrethues Guri	Majtas	42.0	0+086.40	0+128.40	2.0
6	Mur mbajtes b/a	Djathtas	25.1	0+135.00	0+160.00	1.7
7	Mur Rrethues Guri	Djathtas	30.0	0+133.90	0+163.90	2.0
8	Mur Rrethues Guri	Djathtas	40.0	0+165.30	0+205.30	2.0
9	Mur Rrethues Guri	Majtas	44.0	0+173.00	0+217.00	2.0
10	Mur Rrethues Guri	Majtas	12.0	0+221.00	0+233.00	2.0
11	Mur Rrethues Guri	Djathtas	33.3	0+231.40	0+264.70	2.0
12	Mur Rrethues Guri	Majtas	20.5	0+240.80	0+261.30	2.0
13	Mur Rrethues Guri	Djathtas	24.0	0+272.20	0+296.20	2.0
14	Mur Rrethues Guri	Majtas	40.0	0+268.00	0+308.00	2.0
15	Mur Rrethues Guri	Djathtas	9.7	0+298.20	0+307.90	2.0
16	Mur Rrethues Guri	Djathtas	24.5	0+313.50	0+338.00	2.0
17	Mur Rrethues Guri	Majtas	25.5	0+313.50	0+330.80	2.0
18	Mur Rrethues Guri	Majtas	25.0	0+448.50	0+473.50	2.0
19	Mur Rrethues Guri	Majtas	21.0	0+477.50	0+498.50	2.0
20	Mur gravitar	Djathtas	58.0	0+591.50	0+647.90	1.8
21	Mur mbajtes b/a	Majtas	50.6	0+637.50	0+689.50	1.7
22	Mur mbajtes b/a	Majtas	10.3	0+694.70	0+705.00	1.7
23	Mur mbajtes b/a	Majtas	38.5	0+935.00	0+975.00	2.8
24	Mur me dhe te armuar	Djathtas	67.0	1+160.00	1+230.00	2.4-4.2
25	Mur Rrethues me blloqe	Majtas	29.0	1+162.50	1+190.00	2.1
26	Mur mbajtes b/a	Djathtas	70.5	1+233.00	1+304.70	1.7
27	Mur Rrethues me blloqe	Majtas	10.0	1+287.00	1+297.00	2.1
28	Mur mbajtes b/a	Majtas	7.7	1+414.15	1+420.35	1.7
29	Mur Rrethues me blloqe	Majtas	102.0	1+896.00	2+001.50	2.1
30	Mur Rrethues me blloqe	Majtas	28.7	2+484.90	2+513.60	2.1

Lista e Mureve - Rruga Sekondare						
Nr.	Tipi i murit	Ana (Majtas/Djathtas)	Gjatesia (m)	Progresiva e Fillimit	Progresiva e Fundit	Lartesia (m)
1	Mur Rrethues me blloqe	Majtas	121.00	0+246.40	0+371.70	2.1
2	Mur Rrethues me blloqe	Djathtas	17.30	0+308.00	0+325.30	2.1
3	Mur Gravitar + Mur rrethues	Djathtas	30.00	0+370.00	0+400.00	1.2+2.1
4	Mur Rrethues me blloqe	Majtas	91.00	0+375.20	0+473.90	2.1
5	Mur Rrethues me blloqe	Majtas	79.00	0+480.70	0+574.50	2.1
6	Mur Gravitar + Mur rrethues	Djathtas	6.00	0+567.20	0+573.20	1.2+2.1
7	Mur mbajtes b/a	Djathtas	40.00	0.573.20	2+409.50	2.8-3.5

6.1. Tipet e Mureve

Tipet e mureve mbajtes te cilet ne po perdorim jane:

- Mur mbajtes me Dhe te Perforcuar
- Mur mbajtes Betonarme
- Mur mbajtes Gravitare

Muret me Dhe te Perforcuar jane dhe natyral ose i seleksionuar i lidhur me perforcime artificiale. Materialet e perdorura per perforcime variojne po kryesisht jane celik dhe materiale gjeosintetike. Fasada e kesaj tipologjie muresh eshte e realizuar me sistemin Green Terramesh i cili toleron spostime te vogla. Dheu i perforcuar perdor shtresa horizontale gjeogridi me material rezistent prej polipropileni. Lartesia e mureve te ketij lloji te perdorur ne projekt eshte 2.4-4.2m.

Muret mbajtes beton-arme jane te realizuar me nje berthame celiku, te veshur me beton te derdhur ne vend. Kjo tipologji muresh transferon ngarkesat (si nje tra) tek nje bazament strukturor te gjere duke konvertuar ngarkesat horizontale nga mbas murit ne ngarkesa vertikale tek terreni. Muret betonarme te parashikuar ne projekt jane me lartesi 1.70m dhe 2.80m.

Muri mbajtes gravitar ka lartesi 1.80m mbajtes gravitar.

Perzgjedhja e tipit te murit eshte bere nisur nga kushtet specifike ne ate zone si: lartesia e nevojshme e struktures, gjeologjia, hapësira dhe mundësia e ndertimit etj.

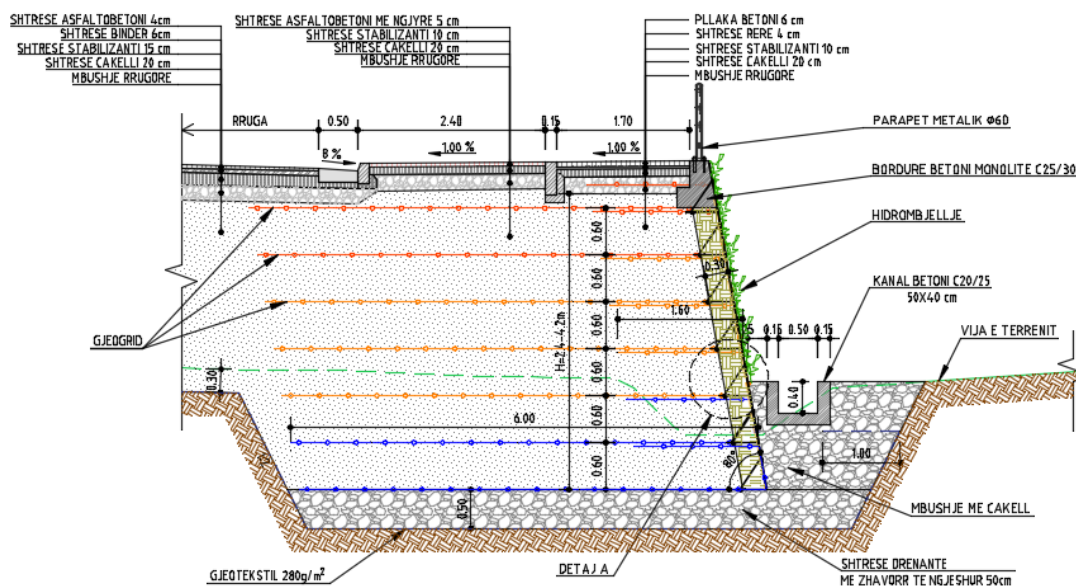


Figura 2 - Prerje Terthore Tip e Mureve Me Dhe te Perforcuar

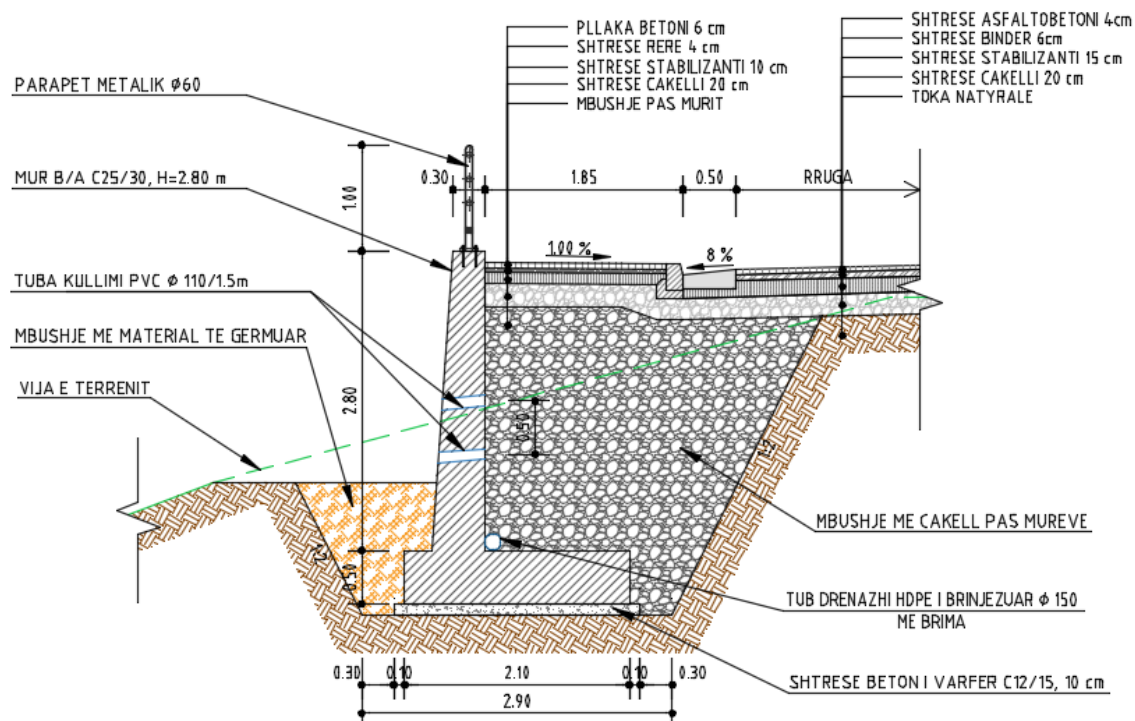


Figura 3 - Prerje Terthore Tip e Mureve Betonarme me $H=2.80\text{m}$

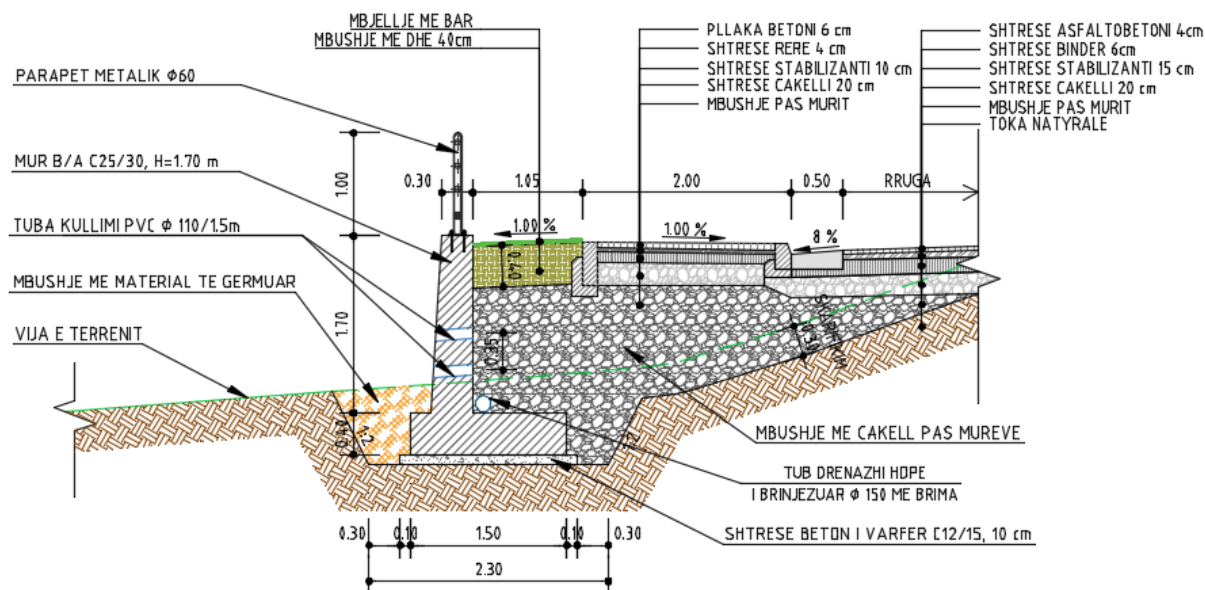


Figura 4 - Prerje Terthore Tip e Mureve Betonarme me H=1.70m

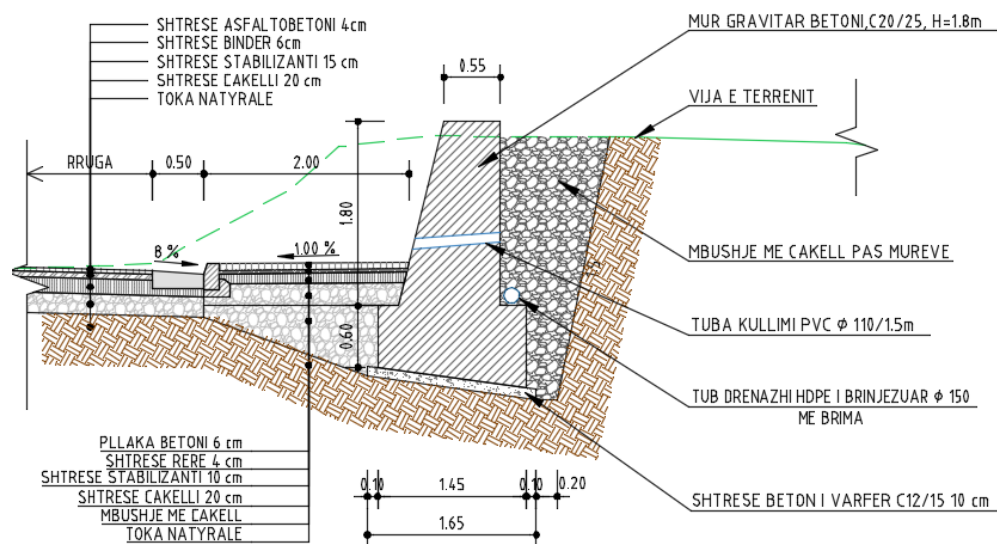


Figura 5 - Prerje Terthore Tip e Murit Gravitar Prites H=1.80

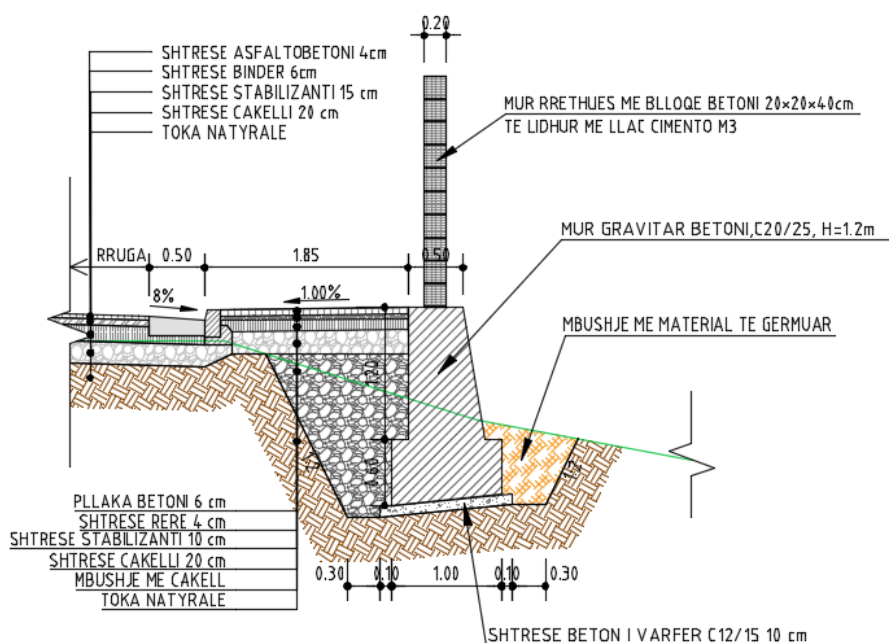


Figura 6 - Prerje Terthore Tip e Murit Gravitar H=1.20

Rezultatet e projektimit dhe analizës së stabilitetit të mureve realizohen me software-in "GeoStructural Retaining Wall Analysis"

Ky program kryen analizat e mëposhtme lidhur me:

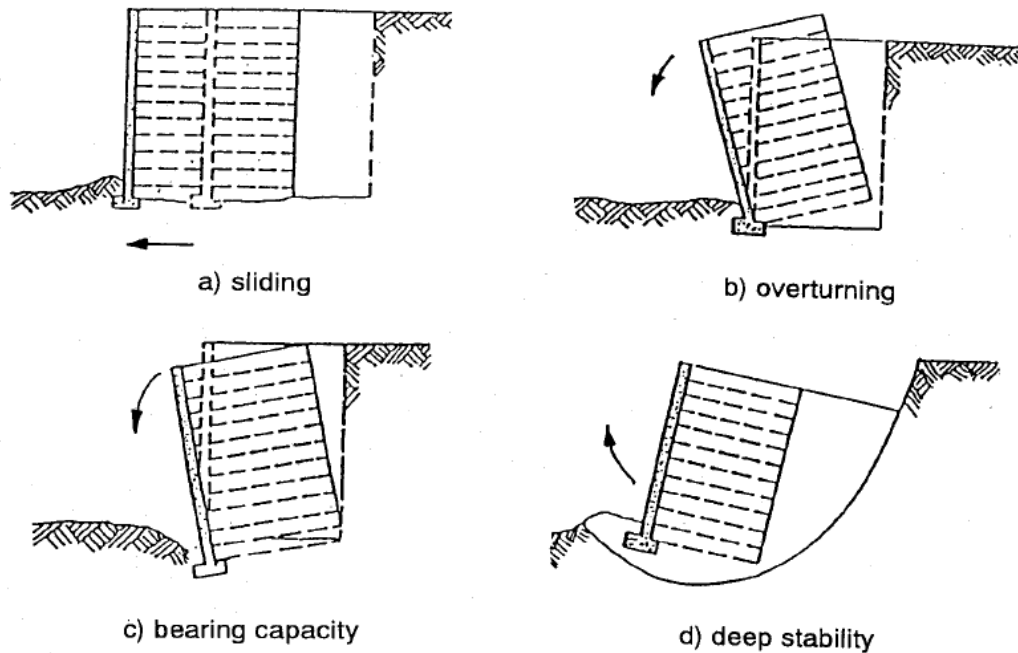
Stabilitetin e përgjithshëm të murit:

- Stabilitet në rrëshqitje
- Stabilitet në përmbysje
- Stabilitet global
- Kapacitet mbajtës

Kontrolli nga rrëshqitja bëhet duke krahasuar rezultanten e forcave të jashtme horizontale që veprojnë në strukturën tonë të shumëzuar me koeficientët përkatës referuar Eurocode, me shumatoren e të gjitha forcave vertikale që ndihmojnë në stabilitetin e strukturës nga rrëshqitja shumëzuar me koeficientin e fërkimit i cili përcaktohet në funksion të këndit të fërkimit të dheut ku mbështetet struktura jonë.

Stabiliteti në përmbysje kontrollohet duke verifikuar që momenti përmbysës i shkaktuar nga forcat që veprojnë në strukturën tonë kundrejt qendrës së mundshme kundrejt të cilës ndodh përmbysja e murit si në figurë, nuk e kalon vlerën e momentit mbajtës.

Të dyja këto kushte janë të lidhura drejtpërdrejt me kontrollin dhe verifikimin e dimensioneve, gjeometrisë së murit.



Stabiliteti global kontrollohet sipas sipërfaqeve rrethore të rrëshqitjes, referuar metodës Bishop për përcaktimin dhe optimizimin e saj.

Kapaciteti mbajtës I dheut ku mbështetet muri është përcaktuar me metodën e Terzaghi-t, referuar karakteristikave të shtresës në bazë sipas raportit gjeologjik.

Rezultatet e ketyre analizave të gjeneruara nga programi paraqiten si Aneks i raportit të strukturave.

7. TOMBINOT

Përgjatë gjurmës së projektit është parashikuar ndërtimi i 31 tombinove, rrethore ose drejtkëndore betoni. Te gjitha tombinot rrethore janë tuba betoni të parapergatitur si dhe tombinot drejtkëndore janë monolite betonarme.

Me poshtë janë dhënë progresivat dhe permasat e të gjithave tombinove të vendosura në rrugën kryesore dhe ato sekondare.

Lista e Tombinove									
Nr.	km.	ID	TIPI	DIAMETRI (mm)	KUOTA HYRESE (m)	KUOTA DALESE (m)	TRASHESIA (mm)	PJERRESIA %	GJATESIA (m)
Unaza e Beratit									
1	0+270.50	T01	Ekzistuese	-	-	-	-	-	-
2	1+334.10	T02	Tuba Betoni	Ø800	59.68	59.36	100	1.18	27.2
3	1+460.10	T03	Tuba Betoni	Ø600	60.87	60.63	50	0.94	25.5
4	2+029.40	T04	Tuba Betoni	Ø1000	61.7	61.69	100	0.04	25.7
5	2+456.20	T05	Tuba Betoni	Ø600	67.42	67.2	50	0.76	28.8
6	2+512.00	T06	Tuba Betoni	Ø600	67.96	67.93	50	0.11	26.6
7	2+752.90	T07	Tuba Betoni	Ø600	71.41	70.75	50	3.14	21.0
8	3+022.90	T07/1	Tuba Betoni	Ø800	71.14	70.2	100	3.84	24.5
9	3+184.70	T08	Box b/a	2000x1500	72.23	71.27	300	4.92	19.5
10	3+318.30	T08/1	Tuba Betoni	Ø600	71.75	70.9	50	3.48	24.4
11	3+651.20	T09	Box b/a	2 x 2000x2000	72.53	71.67	300	3.60	23.9
12	3+805.50	T10	Tuba Betoni	Ø800	77.55	77.47	100	0.39	20.6
13	3+813.45	T11	Tuba Betoni	Ø600	78.31	78.27	50	0.21	19.0
Rrethrotullimi									
14	Rrethrotullimi	T12	Tuba Betoni	Ø600	89.89	89.43	50	0.57	81.0
15	Rrethrotullimi	T13	Tuba Betoni	Ø600	88.95	88.59	50	0.55	65.7
Rruga Sekondare									
16	//	T01/SEK	Box b/a	2200 x 700	67.3	65.09	300	0.64	343.5
17	0+352.00	T02/SEK	Tuba Betoni	Ø600	65.89	65.75	100	0.79	17.7
18	//	T03/SEK	Tuba Betoni	Ø400	-	-	50	-	6.0
19	//	T04/SEK	Tuba Betoni	Ø400	-	-	50	-	6.0
20	//	T05/SEK	Tuba Betoni	Ø400	-	-	50	-	6.0
21	//	T06/SEK	Tuba Betoni	Ø400	-	-	50	-	7.5
22	//	T07/SEK	Tuba Betoni	Ø400	-	-	50	-	6.0
23	//	T08/SEK	Tuba Betoni	Ø400	-	-	50	-	9.0
Vazhdimi i Rrugës Sekondare									
24	0+057.90	T09/SEK	Tuba Betoni	Ø800	-	-	50	-	13.3
Rruga Bujqësore 1									
25	0+141.83	T01/B1	Tuba Betoni	Ø600	-	-	50	-	5.4
26	0+171.76	T02/B1	Tuba Betoni	Ø600	-	-	50	-	5.4
Rruga Bujqësore 2									
27	0+137.20	T01/B2	Box b/a	2 x 2000x2000	-	-	300	-	7.1
28	0+465.00	T02/B2	Tuba Betoni	Ø600	-	-	50	-	5.0
29	0+616.70	T03/B2	Box b/a	2000x1500	-	-	300	-	7.1
30	0+790.00	T04/B2	Tuba Betoni	Ø800	-	-	100	-	5.0
Argjinatura									
31	0+118.65	T01/A	Box b/a	2000x2000	57.05	56.07	300	3.77	26.0

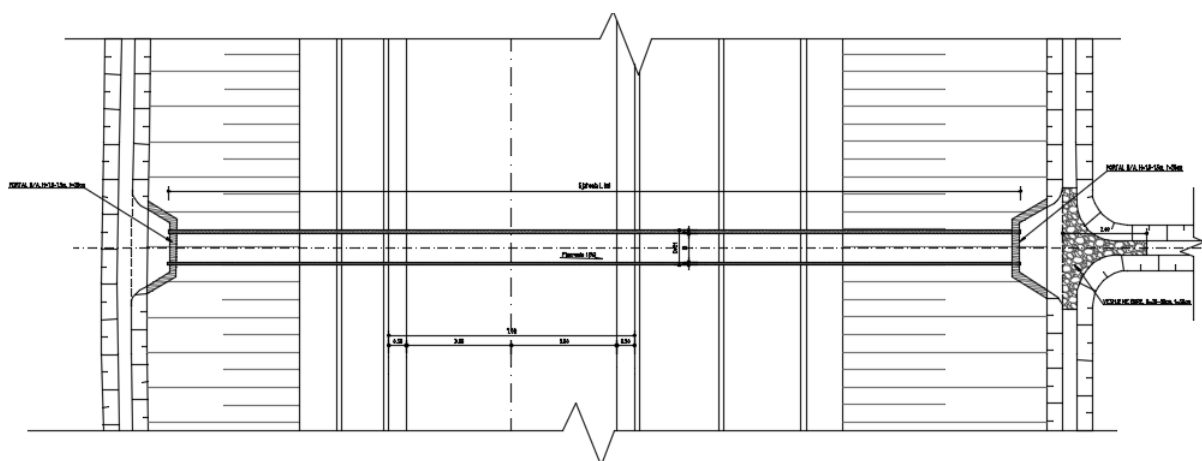


Figura 7 – Planimetri tip e tombinos

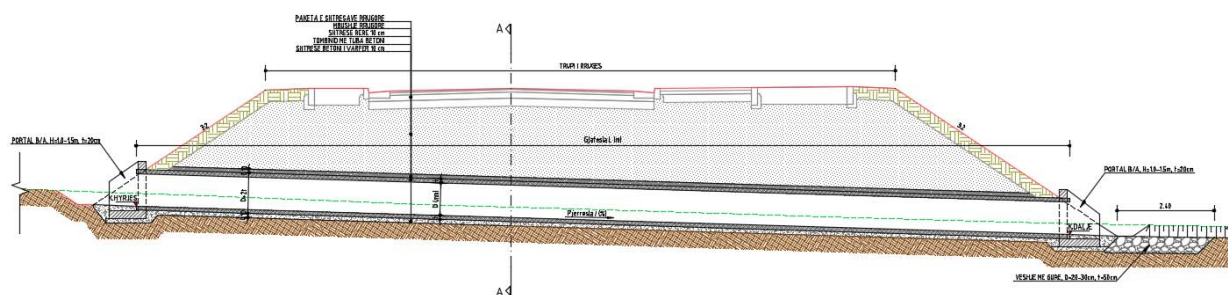


Figura 8 – Profil tip i tombinos

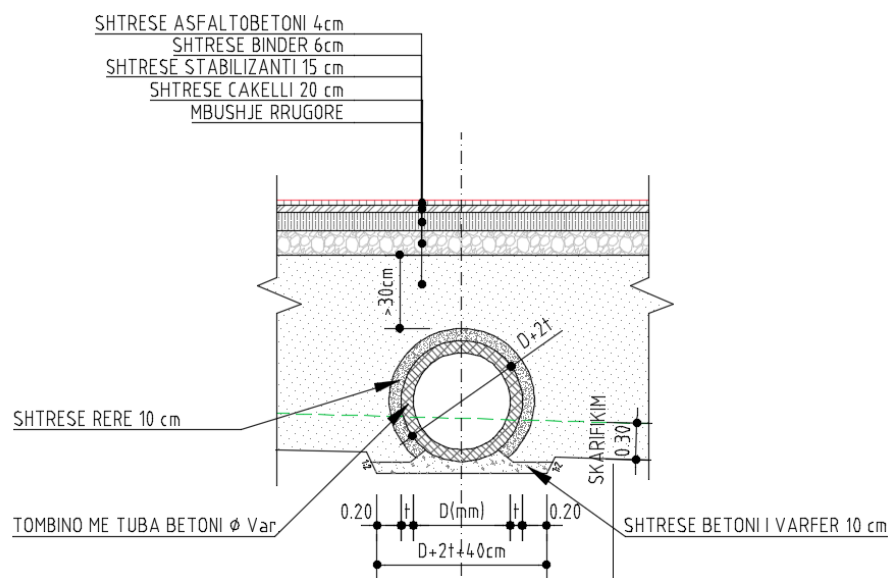


Figura 9 – Seksion terthor tip – Tombino me tuba betoni

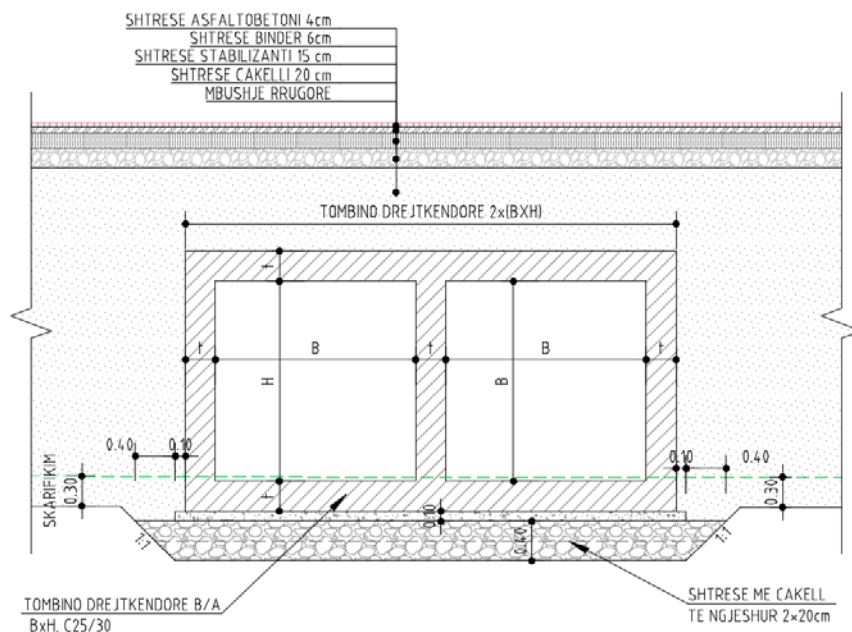


Figura 10 – Seksion terthor tip – Tombino drejtkendore

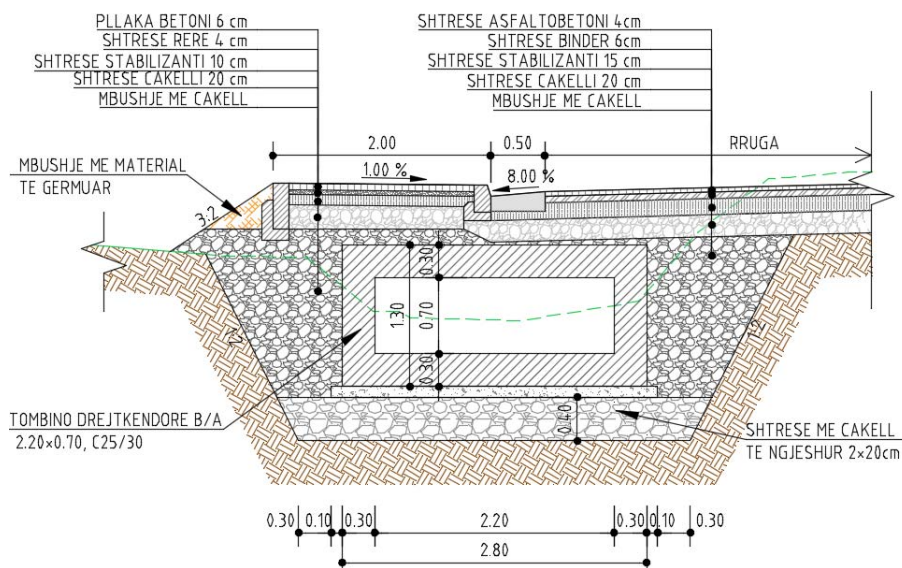


Figura 11 – Seksion terthor tip – Tombino drejtkendore 2.20 m x 0.7m

ANEKS

MUR B/A H=1.70 m

Cantilever wall analysis

Input data

Project

Task : Mur mbajtes b/a, H=1.7m
 Author : SEED Consulting
 Date : 8/3/2020
 Unit weight of water is considered : 9,81 kN/m³

Settings

(input for current task)

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 : Coulomb
 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	
Permanent actions :	$\gamma_G =$	1.35	[-]	1.00	[-]	1.00	[-]
Variable actions :	$\gamma_Q =$	1.50	[-]	0.00	[-]	1.30	[-]
Water load :	$\gamma_W =$					1.00	[-]

Partial factors for soil parameters (M)			
Permanent design situation			
Partial factor on internal friction :	$\gamma_\phi =$	1.25	[-]
Partial factor on effective cohesion :	$\gamma_c =$	1.25	[-]
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.40	[-]
Partial factor on Poisson's ratio :	$\gamma_v =$	1.00	[-]

Partial factors for variable actions			
Permanent design situation			
Factor for combination value :	$\psi_0 =$	0.70	[-]
Factor for frequent value :	$\psi_1 =$	0.50	[-]
Factor for quasi-permanent value :	$\psi_2 =$	0.30	[-]

Partial factors on actions (A)						
Seismic design situation						
		State STR			State GEO	
		Unfavourable		Favourable	Unfavourable	Favourable
Permanent actions :	$\gamma_G =$	1.00	[-]	1.00 [-]	1.00 [-]	1.00 [-]

Partial factors on actions (A)							
Seismic design situation							
Variable actions :	$\gamma_Q =$	1.00	[-]	0.00	[-]	1.00	[-]
Water load :	$\gamma_w =$					1.00	[-]

Partial factors for soil parameters (M)			
Seismic design situation			
Partial factor on internal friction :	$\gamma_\phi =$	1.00	[-]
Partial factor on effective cohesion :	$\gamma_c =$	1.00	[-]
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.00	[-]
Partial factor on Poisson's ratio :	$\gamma_v =$	1.00	[-]

Material of structure

Unit weight $\gamma = 24.00 \text{ kN/m}^3$

Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete : C 25/30

Cylinder compressive strength $f_{ck} = 25.00 \text{ MPa}$

Tensile strength $f_{ctm} = 2.60 \text{ MPa}$

Longitudinal steel : B500

Yield strength $f_{yk} = 500.00 \text{ MPa}$

Geometry of structure

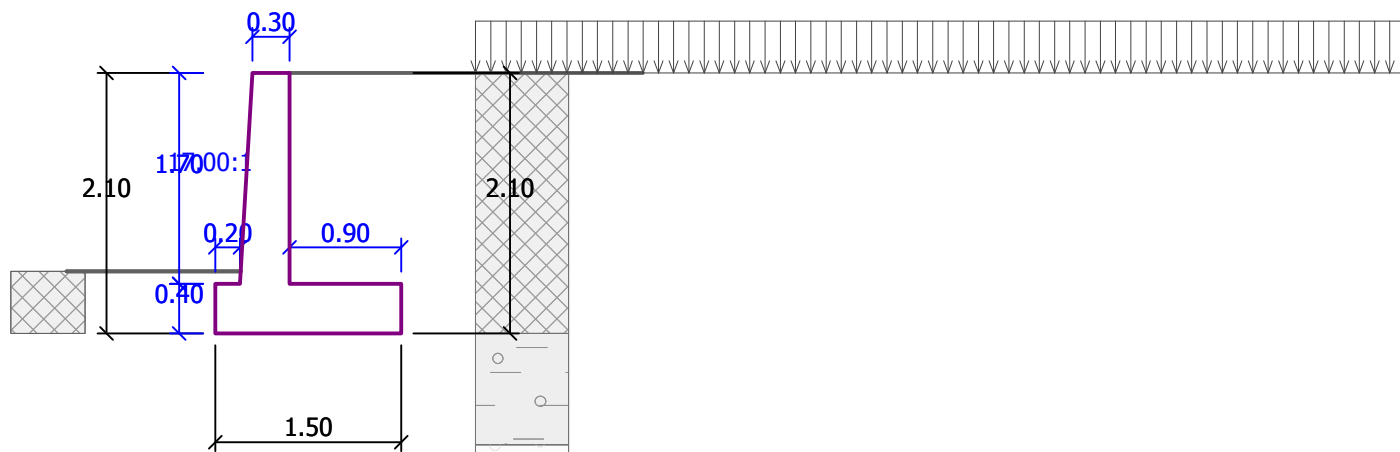
No.	Coordinate X [m]	Depth Z [m]
1	0.00	0.00
2	0.00	1.70
3	0.90	1.70
4	0.90	2.10
5	-0.60	2.10
6	-0.60	1.70
7	-0.40	1.70
8	-0.30	0.00

The origin [0,0] is located at the most upper right point of the wall.

Wall section area = 1.20 m².

Name : Geometry

Stage - analysis : 1 - 0



Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]	γ_{su} [kN/m ³]	δ [°]
1	Mbushje		35.00	0.00	19.00	10.19	23.00
2	Shtrese 1 (suargjila)		16.00	40.00	18.00	12.19	10.70
3	Shtrese 2 (zhavorre)		24.00	10.00	20.10	11.19	16.00

Soil parameters to compute pressure at rest

No.	Name	Pattern	Type calculation	φ_{ef} [°]	ν [-]	OCR [-]	K_r [-]
1	Mbushje		cohesionless	35.00	-	-	-
2	Shtrese 1 (suargjila)		cohesive	-	0.30	-	-
3	Shtrese 2 (zhavorre)		cohesionless	24.00	-	-	-

Soil parameters

Mbushje

Unit weight : $\gamma = 19.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 35.00^\circ$
 Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$
 Angle of friction struc.-soil : $\delta = 23.00^\circ$
 Soil : cohesionless
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

Shtrese 1 (suargjila)

Unit weight : $\gamma = 18.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{\text{ef}} = 16.00^\circ$
 Cohesion of soil : $c_{\text{ef}} = 40.00 \text{ kPa}$
 Angle of friction struc.-soil : $\delta = 10.70^\circ$
 Soil : cohesive
 Poisson's ratio : $\nu = 0.30$
 Saturated unit weight : $\gamma_{\text{sat}} = 22.00 \text{ kN/m}^3$

Shtrese 2 (zhavorre)

Unit weight : $\gamma = 20.10 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{\text{ef}} = 24.00^\circ$
 Cohesion of soil : $c_{\text{ef}} = 10.00 \text{ kPa}$
 Angle of friction struc.-soil : $\delta = 16.00^\circ$
 Soil : cohesionless
 Saturated unit weight : $\gamma_{\text{sat}} = 21.00 \text{ kN/m}^3$

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	2.10	Mbushje	
2	0.90	Shtrese 1 (suargjila)	
3	2.00	Shtrese 2 (zhavorre)	
4	-	Shtrese 2 (zhavorre)	

Foundation

Type of foundation : soil from geological profile

Terrain profile

Terrain behind the structure is flat.

Water influence

Ground water table is located below the structure.

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		variable	20.00		1.50	7.50	on terrain
No.	Name							
1	Ngarkesa e Trafikut							

Resistance on front face of the structure

Resistance on front face of the structure: at rest
 Soil on front face of the structure - Mbushje

Soil thickness in front of structure $h = 0.50 \text{ m}$

Terrain in front of structure is flat.

Settings of the stage of construction

Design situation : permanent

The wall is free to move. Active earth pressure is therefore assumed.

Verification No. 1 (Stage of construction 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	-0.70	28.68	0.59	1.000	1.000	1.350
FF resistance	-1.21	-0.17	0.01	0.17	1.000	1.000	1.000
Weight - earth wedge	0.00	-0.98	14.78	0.90	1.000	1.000	1.000
Active pressure	13.58	-0.73	15.80	1.23	1.000	1.000	1.000
Ngarkesa e Trafikut	5.39	-0.56	5.40	1.30	1.300	1.300	1.300

Verification of complete wall

Check for overturning stability

Resisting moment $M_{res} = 58.75 \text{ kNm/m}$

Overturning moment $M_{ovr} = 13.65 \text{ kNm/m}$

Wall for overturning is SATISFACTORY

Check for slip

Resisting horizontal force $H_{res} = 37.13 \text{ kN/m}$

Active horizontal force $H_{act} = 19.37 \text{ kN/m}$

Wall for slip is SATISFACTORY

Overall check - WALL is SATISFACTORY

Maximum stress in footing bottom : 57.12 kPa

Bearing capacity of foundation soil (Stage of construction 1)

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	6.25	76.33	19.37	0.055	57.12
2	4.62	66.29	19.37	0.046	48.72

Service load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	1.76	62.84	13.03

Verification of foundation soil

Eccentricity verification

Max. eccentricity of normal force $e = 0.055$

Maximum allowable eccentricity $e_{alw} = 0.333$

Eccentricity of the normal force is SATISFACTORY

Verification of bearing capacityMax. stress at footing bottom $\sigma = 57.12 \text{ kPa}$ Bearing capacity of foundation soil $R_d = 150.00 \text{ kPa}$ **Bearing capacity of foundation soil is SATISFACTORY****Overall verification - bearing capacity of found. soil is SATISFACTORY****Dimensioning No. 1 (Stage of construction 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	-0.20	8.64	1.05	1.350
Weight - earth wedge	0.00	-0.98	14.78	0.90	1.000
Active pressure	13.58	-0.73	15.80	1.23	1.000
Ngarkesa e Trafikut	5.39	-0.56	5.40	1.30	1.300
Contact stress	0.00	0.00	-39.80	1.02	1.000

Back wall jump check

Reinforcement and dimensions of the cross-section

Bar diameter = 14.0 mm

Number of bars = 5

Reinforcement cover = 40.0 mm

Cross-section width = 1.00 m

Cross-section depth = 0.40 m

Reinforcement ratio $\rho = 0.22 \% > 0.14 \% = \rho_{\text{min}}$ Position of neutral axis $x = 0.03 \text{ m} < 0.22 \text{ m} = x_{\text{max}}$ Ultimate shear force $V_{\text{Rd}} = 143.34 \text{ kN} > 9.47 \text{ kN} = V_{\text{Ed}}$ Ultimate moment $M_{\text{Rd}} = 114.77 \text{ kNm} > 8.02 \text{ kNm} = M_{\text{Ed}}$ **Cross-section is SATISFACTORY.****Slope stability analysis****Input data****Project****Settings**

(input for current task)

Stability analysis

Earthquake analysis : Standard

Verification methodology : according to EN 1997

Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

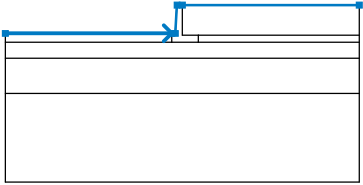
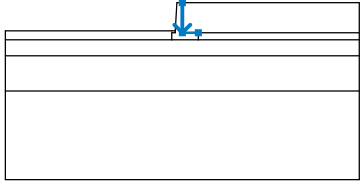
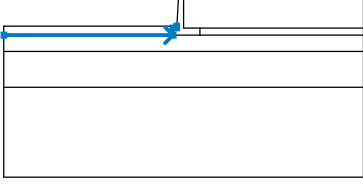
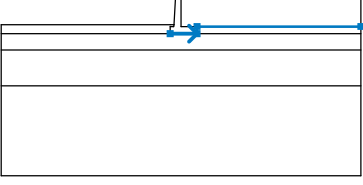
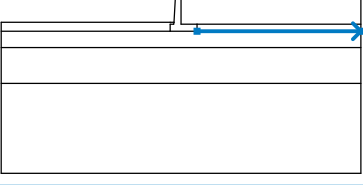
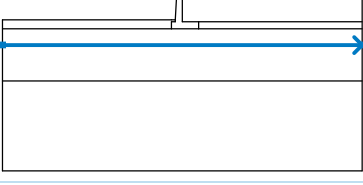
Partial factors on actions (A)					
Permanent design situation					
		State STR		State GEO	
		Unfavourable	Favourable	Unfavourable	Favourable
Permanent actions :	$\gamma_G =$	1.35 [-]	1.00 [-]	1.00 [-]	1.00 [-]
Variable actions :	$\gamma_Q =$	1.50 [-]	0.00 [-]	1.30 [-]	0.00 [-]
Water load :	$\gamma_w =$			1.00 [-]	

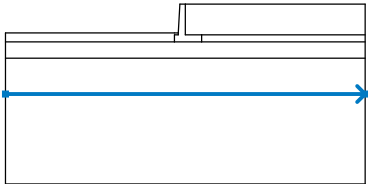
Partial factors for soil parameters (M)

Permanent design situation

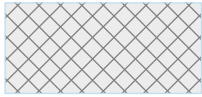
Partial factor on internal friction :	$\gamma_{\phi} =$	1.25	[-]
Partial factor on effective cohesion :	$\gamma_c =$	1.25	[-]
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.40	[-]

Interface

No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
1		-10.00	-1.60	-0.60	-1.60	-0.39	-1.60
		-0.30	0.00	0.00	0.00	10.00	0.00
2		0.00	0.00	0.00	-1.70	0.90	-1.70
3		-10.00	-2.10	-0.60	-2.10	-0.60	-1.70
		-0.40	-1.70	-0.39	-1.60		
4		-0.60	-2.10	0.90	-2.10	0.90	-1.70
		10.00	-1.70				
5		0.90	-2.10	10.00	-2.10		
6		-10.00	-3.00	10.00	-3.00		

No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
7		-10.00	-5.00	10.00	-5.00		

Soil parameters - effective stress state

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]
1	Mbushje		35.00	0.00	19.00
2	Shtrese 1 (suargjila)		16.00	40.00	18.00
3	Shtrese 2 (zhavorre)		24.00	10.00	20.10

Soil parameters - uplift

No.	Name	Pattern	γ_{sat} [kN/m ³]	γ_s [kN/m ³]	n [-]
1	Mbushje		20.00		
2	Shtrese 1 (suargjila)		22.00		
3	Shtrese 2 (zhavorre)		21.00		

Soil parameters

Mbushje

Unit weight : $\gamma = 19.00 \text{ kN/m}^3$
Stress-state : effective
Angle of internal friction : $\varphi_{ef} = 35.00^\circ$
Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$
Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

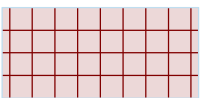
Shtrese 1 (suargjila)

Unit weight : $\gamma = 18.00 \text{ kN/m}^3$
Stress-state : effective
Angle of internal friction : $\varphi_{ef} = 16.00^\circ$
Cohesion of soil : $c_{ef} = 40.00 \text{ kPa}$
Saturated unit weight : $\gamma_{sat} = 22.00 \text{ kN/m}^3$

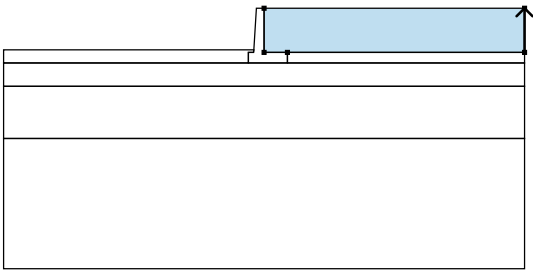
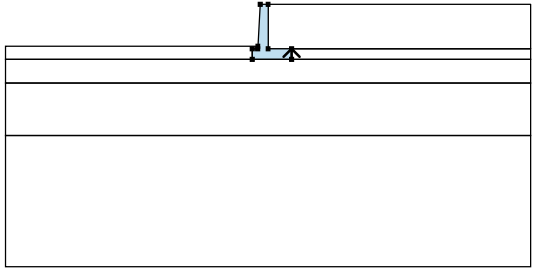
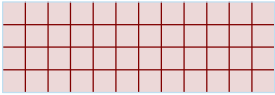
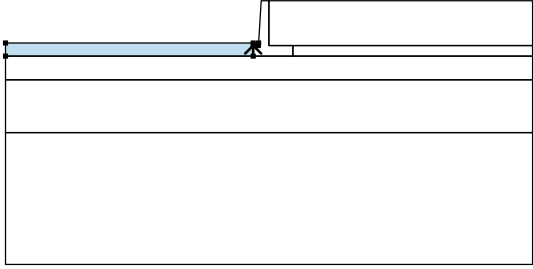
Shtrese 2 (zhavorre)

Unit weight : $\gamma = 20.10 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 24.00^\circ$
 Cohesion of soil : $c_{ef} = 10.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 21.00 \text{ kN/m}^3$

Rigid bodies

No.	Name	Sample	γ [kN/m ³]
1	Wall material		24.00

Assigning and surfaces

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
1		10.00	-1.70	10.00	0.00	Mbushje 
		0.00	0.00	0.00	-1.70	
		0.90	-1.70			
2		0.90	-2.10	0.90	-1.70	Wall material 
		0.00	-1.70	0.00	0.00	
		-0.30	0.00	-0.39	-1.60	
		-0.40	-1.70	-0.60	-1.70	
		-0.60	-2.10			
3		-0.60	-2.10	-0.60	-1.70	Mbushje 
		-0.40	-1.70	-0.39	-1.60	
		-0.60	-1.60	-10.00	-1.60	
		-10.00	-2.10			

Surcharge

Surcharges

Water

Tensile crack

10

Earthquake

Earthquake not included.

Settings of the stage of construction

Design situation : permanent

Results (Stage of construction 1)**Analysis 1****Circular slip surface**

Slip surface parameters					
Center :	x =	0.15 [m]	Angles :	α_1 =	-26.84 [°]
	z =	3.04 [m]		α_2 =	54.22 [°]
Radius :	R =	5.20 [m]			
The slip surface after optimization.					

Slope stability verification (Bishop)Sum of active forces : $F_a = 80.38$ kN/mSum of passive forces : $F_p = 167.52$ kN/mSliding moment : $M_a = 417.96$ kNm/mResisting moment : $M_p = 871.10$ kNm/m

Utilization : 48.0 %

Slope stability ACCEPTABLE**Optimization of circular slip surface (Bishop)**

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
1	0.15	3.04	5.20	48.0 %	ACCEPTABLE
2	0.15	3.04	5.20	48.0 %	ACCEPTABLE
3	0.15	3.04	5.20	48.0 %	ACCEPTABLE
4	-1.26	20.36	22.49	0.3 %	ACCEPTABLE
5	-0.07	9.59	12.72	15.9 %	ACCEPTABLE
6	5.01	1.56	3.63	0.0 %	ACCEPTABLE
7	0.81	1.66	7.66	28.3 %	ACCEPTABLE
8	-3.77	3.04	5.20	0.1 %	ACCEPTABLE
9	-1.13	19.16	21.35	2.4 %	ACCEPTABLE
10	-8.07	11.10	14.00	0.1 %	ACCEPTABLE
11	-18.41	139.80	142.33	0.5 %	ACCEPTABLE
12	0.15	3.04	5.20	48.0 %	ACCEPTABLE
13	-0.90	13.84	15.93	0.2 %	ACCEPTABLE
14	-0.04	7.47	10.25	15.4 %	ACCEPTABLE
15	3.70	1.56	3.63	0.0 %	ACCEPTABLE
16	0.73	1.81	6.51	33.1 %	ACCEPTABLE
17	-2.46	3.04	5.20	0.4 %	ACCEPTABLE
18	-0.71	12.45	14.63	2.2 %	ACCEPTABLE
19	-9.40	21.88	24.56	0.2 %	ACCEPTABLE
20	-16.52	107.68	110.21	0.5 %	ACCEPTABLE
21	0.15	3.04	5.20	48.0 %	ACCEPTABLE
22	-0.61	9.84	11.92	0.2 %	ACCEPTABLE
23	0.00	6.04	8.59	17.4 %	ACCEPTABLE
24	1.89	3.04	5.20	0.1 %	ACCEPTABLE
25	0.64	1.98	5.82	36.2 %	ACCEPTABLE
26	-1.59	3.04	5.20	0.5 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
27	-1.14	1.19	3.95	30.0 %	ACCEPTABLE
28	-0.43	8.72	10.90	3.5 %	ACCEPTABLE
29	1.86	3.17	5.30	0.1 %	ACCEPTABLE
30	-10.48	31.44	34.06	0.3 %	ACCEPTABLE
31	-15.27	88.64	91.18	0.4 %	ACCEPTABLE
32	0.15	3.04	5.20	48.0 %	ACCEPTABLE
33	1.49	2.30	4.65	0.4 %	ACCEPTABLE
34	-15.06	88.88	91.23	0.4 %	ACCEPTABLE
35	-9.98	49.38	51.76	0.5 %	ACCEPTABLE
36	-0.38	7.37	9.45	0.2 %	ACCEPTABLE
37	2.01	0.16	3.52	23.7 %	ACCEPTABLE
38	0.03	5.07	7.48	19.4 %	ACCEPTABLE
39	1.31	3.04	5.20	0.2 %	ACCEPTABLE
40	0.55	2.17	5.43	36.5 %	ACCEPTABLE
41	0.60	0.49	2.66	0.8 %	ACCEPTABLE
42	-3.16	11.88	13.48	0.4 %	ACCEPTABLE
43	-7.42	21.76	24.22	0.5 %	ACCEPTABLE
44	-1.01	3.04	5.20	0.5 %	ACCEPTABLE
45	-0.37	0.39	3.60	34.8 %	ACCEPTABLE
46	-0.74	1.91	4.38	36.8 %	ACCEPTABLE
47	0.57	0.58	2.70	0.6 %	ACCEPTABLE
48	-0.24	6.56	8.74	6.3 %	ACCEPTABLE
49	1.21	3.46	5.53	0.2 %	ACCEPTABLE
50	-11.24	38.86	41.46	0.3 %	ACCEPTABLE
51	-14.44	77.00	79.55	0.4 %	ACCEPTABLE
52	-10.08	38.86	41.46	0.5 %	ACCEPTABLE
53	0.15	3.04	5.20	48.0 %	ACCEPTABLE
54	0.86	3.32	5.42	0.2 %	ACCEPTABLE
55	-2.23	16.03	17.64	0.5 %	ACCEPTABLE
56	-0.86	10.35	11.96	0.6 %	ACCEPTABLE
57	-0.22	5.83	7.92	0.2 %	ACCEPTABLE
58	1.43	0.98	3.84	29.1 %	ACCEPTABLE
59	0.06	4.41	6.73	21.2 %	ACCEPTABLE
60	0.92	3.04	5.20	0.4 %	ACCEPTABLE
61	0.47	2.35	5.23	33.3 %	ACCEPTABLE
62	0.36	1.49	3.57	0.4 %	ACCEPTABLE
63	-1.56	6.86	8.58	0.6 %	ACCEPTABLE
64	-1.04	5.87	7.48	0.6 %	ACCEPTABLE
65	-0.62	3.04	5.20	0.9 %	ACCEPTABLE
66	0.40	0.28	3.21	31.4 %	ACCEPTABLE
67	-0.23	1.44	4.09	35.5 %	ACCEPTABLE
68	0.59	0.75	3.09	14.8 %	ACCEPTABLE
69	-0.05	0.68	3.71	33.7 %	ACCEPTABLE
70	-0.45	2.34	4.68	40.3 %	ACCEPTABLE
71	0.42	1.28	3.42	1.1 %	ACCEPTABLE
72	-0.11	5.27	7.44	6.7 %	ACCEPTABLE
73	0.83	3.43	5.51	0.2 %	ACCEPTABLE
74	-11.76	44.28	46.87	0.4 %	ACCEPTABLE
75	-13.89	69.70	72.26	0.4 %	ACCEPTABLE
76	-10.98	44.28	46.87	0.4 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
77	0.15	3.04	5.20	48.0 %	ACCEPTABLE
78	0.56	3.46	5.54	0.2 %	ACCEPTABLE
79	-0.93	8.75	10.51	0.4 %	ACCEPTABLE
80	-0.14	6.34	8.09	0.2 %	ACCEPTABLE
81	-0.10	4.85	6.96	0.3 %	ACCEPTABLE
82	1.02	1.58	4.18	34.1 %	ACCEPTABLE
83	0.08	3.96	6.23	39.6 %	ACCEPTABLE
84	0.67	3.04	5.20	0.6 %	ACCEPTABLE
85	0.39	2.51	5.15	35.2 %	ACCEPTABLE
86	0.26	2.04	4.13	0.5 %	ACCEPTABLE
87	-0.89	5.18	7.02	0.6 %	ACCEPTABLE
88	-0.38	4.29	6.03	0.7 %	ACCEPTABLE
89	-0.37	3.04	5.20	1.4 %	ACCEPTABLE
90	0.36	0.95	3.62	35.3 %	ACCEPTABLE
91	0.68	0.62	3.24	34.3 %	ACCEPTABLE
92	-0.13	2.06	4.48	38.8 %	ACCEPTABLE
93	0.44	1.45	3.71	42.9 %	ACCEPTABLE
94	0.06	1.27	4.00	34.9 %	ACCEPTABLE
95	-0.26	2.60	4.86	43.2 %	ACCEPTABLE
96	0.33	1.82	3.96	1.4 %	ACCEPTABLE
97	-0.02	4.47	6.64	26.4 %	ACCEPTABLE
98	0.59	3.34	5.44	0.2 %	ACCEPTABLE
99	-12.11	48.10	50.68	0.4 %	ACCEPTABLE
100	-13.53	65.05	67.61	0.4 %	ACCEPTABLE
101	-11.59	48.10	50.68	0.4 %	ACCEPTABLE
102	0.15	3.04	5.20	48.0 %	ACCEPTABLE
103	0.40	3.41	5.49	0.5 %	ACCEPTABLE
104	-0.45	6.14	8.02	0.2 %	ACCEPTABLE
105	0.05	4.87	6.74	0.2 %	ACCEPTABLE
106	-0.02	4.23	6.35	1.2 %	ACCEPTABLE
107	0.74	2.03	4.46	37.2 %	ACCEPTABLE
108	0.10	3.66	5.89	41.8 %	ACCEPTABLE
109	0.49	3.04	5.20	2.1 %	ACCEPTABLE
110	0.32	2.65	5.13	37.0 %	ACCEPTABLE
111	0.22	2.39	4.49	0.5 %	ACCEPTABLE
112	-0.51	4.34	6.28	0.5 %	ACCEPTABLE
113	-0.14	3.72	5.59	0.4 %	ACCEPTABLE
114	-0.19	3.04	5.20	2.0 %	ACCEPTABLE
115	0.32	1.50	4.00	37.7 %	ACCEPTABLE
116	0.53	1.26	3.72	37.7 %	ACCEPTABLE
117	-0.05	2.43	4.74	41.1 %	ACCEPTABLE
118	0.34	1.95	4.17	44.8 %	ACCEPTABLE
119	0.12	1.75	4.28	37.3 %	ACCEPTABLE
120	-0.13	2.76	4.98	44.7 %	ACCEPTABLE
121	0.27	2.20	4.35	2.4 %	ACCEPTABLE
122	0.03	3.97	6.14	45.2 %	ACCEPTABLE
123	0.44	3.26	5.37	0.7 %	ACCEPTABLE
124	-12.34	50.74	53.32	0.4 %	ACCEPTABLE
125	-13.29	62.04	64.60	0.4 %	ACCEPTABLE
126	-12.00	50.74	53.32	0.4 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
127	0.15	3.04	5.20	48.0 %	ACCEPTABLE
128	0.31	3.32	5.42	0.5 %	ACCEPTABLE
129	-0.21	4.88	6.85	0.2 %	ACCEPTABLE
130	0.11	4.14	6.10	0.5 %	ACCEPTABLE
131	0.03	3.82	5.95	1.7 %	ACCEPTABLE
132	0.55	2.34	4.68	39.4 %	ACCEPTABLE
133	0.12	3.46	5.66	43.7 %	ACCEPTABLE
134	0.38	3.04	5.20	3.1 %	ACCEPTABLE
135	0.27	2.76	5.13	38.9 %	ACCEPTABLE
136	0.19	2.61	4.73	0.9 %	ACCEPTABLE
137	-0.28	3.86	5.87	0.5 %	ACCEPTABLE
138	-0.03	3.44	5.40	0.5 %	ACCEPTABLE
139	-0.08	3.04	5.20	2.8 %	ACCEPTABLE
140	0.28	1.94	4.32	39.6 %	ACCEPTABLE
141	0.42	1.76	4.12	39.8 %	ACCEPTABLE
142	0.01	2.65	4.91	42.6 %	ACCEPTABLE
143	0.27	2.30	4.50	45.8 %	ACCEPTABLE
144	0.15	2.12	4.52	39.0 %	ACCEPTABLE
145	-0.04	2.86	5.06	45.6 %	ACCEPTABLE
146	0.23	2.47	4.63	5.4 %	ACCEPTABLE
147	0.07	3.65	5.82	45.9 %	ACCEPTABLE
148	0.34	3.19	5.32	1.5 %	ACCEPTABLE
149	-12.50	52.54	55.12	0.4 %	ACCEPTABLE
150	-13.13	60.08	62.64	0.4 %	ACCEPTABLE
151	-12.27	52.54	55.12	0.4 %	ACCEPTABLE
152	0.15	3.04	5.20	48.0 %	ACCEPTABLE
153	0.25	3.24	5.36	1.1 %	ACCEPTABLE
154	-0.07	4.18	6.22	0.5 %	ACCEPTABLE
155	0.14	3.73	5.76	0.5 %	ACCEPTABLE
156	0.07	3.56	5.70	2.5 %	ACCEPTABLE
157	0.42	2.56	4.84	40.9 %	ACCEPTABLE
158	0.13	3.32	5.51	44.9 %	ACCEPTABLE
159	0.30	3.04	5.20	4.3 %	ACCEPTABLE
160	0.24	2.84	5.14	40.4 %	ACCEPTABLE
161	0.18	2.76	4.89	1.3 %	ACCEPTABLE
162	-0.13	3.57	5.63	0.5 %	ACCEPTABLE
163	0.04	3.29	5.32	0.5 %	ACCEPTABLE
164	0.00	3.04	5.20	4.3 %	ACCEPTABLE
165	0.24	2.27	4.57	41.3 %	ACCEPTABLE
166	0.33	2.14	4.43	41.6 %	ACCEPTABLE
167	0.06	2.79	5.01	44.3 %	ACCEPTABLE
168	0.23	2.54	4.73	46.1 %	ACCEPTABLE
169	0.15	2.39	4.71	40.6 %	ACCEPTABLE
170	0.03	2.92	5.11	46.1 %	ACCEPTABLE
171	0.20	2.66	4.81	3.3 %	ACCEPTABLE
172	0.10	3.44	5.61	46.1 %	ACCEPTABLE
173	0.28	3.15	5.28	1.3 %	ACCEPTABLE
174	-12.60	53.76	56.33	0.4 %	ACCEPTABLE
175	-13.03	58.78	61.35	0.4 %	ACCEPTABLE
176	-12.45	53.76	56.33	0.4 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
177	0.15	3.04	5.20	48.0 %	ACCEPTABLE
178	0.22	3.18	5.31	1.4 %	ACCEPTABLE
179	0.01	3.77	5.84	0.5 %	ACCEPTABLE
180	0.14	3.48	5.55	0.5 %	ACCEPTABLE
181	0.10	3.38	5.53	5.2 %	ACCEPTABLE
182	0.33	2.72	4.95	42.8 %	ACCEPTABLE
183	0.13	3.23	5.41	45.8 %	ACCEPTABLE
184	0.25	3.04	5.20	5.3 %	ACCEPTABLE
185	0.21	2.90	5.16	41.6 %	ACCEPTABLE
186	0.17	2.85	4.99	2.3 %	ACCEPTABLE
187	-0.04	3.39	5.48	0.5 %	ACCEPTABLE
188	0.08	3.20	5.27	0.5 %	ACCEPTABLE
189	0.05	3.04	5.20	5.3 %	ACCEPTABLE
190	0.22	2.51	4.76	42.8 %	ACCEPTABLE
191	0.28	2.42	4.67	42.7 %	ACCEPTABLE
192	0.09	2.88	5.08	45.4 %	ACCEPTABLE
193	0.20	2.71	4.88	47.3 %	ACCEPTABLE
194	0.16	2.59	4.86	42.0 %	ACCEPTABLE
195	0.07	2.96	5.14	46.6 %	ACCEPTABLE
196	0.19	2.78	4.94	9.5 %	ACCEPTABLE
197	0.12	3.31	5.47	47.4 %	ACCEPTABLE
198	0.23	3.11	5.26	4.7 %	ACCEPTABLE
199	-12.67	54.58	57.15	0.4 %	ACCEPTABLE
200	-12.96	57.93	60.50	0.4 %	ACCEPTABLE
201	-12.57	54.58	57.15	0.4 %	ACCEPTABLE
202	0.15	3.04	5.20	48.0 %	ACCEPTABLE
203	0.19	3.13	5.27	2.3 %	ACCEPTABLE
204	0.06	3.51	5.62	0.7 %	ACCEPTABLE
205	0.15	3.33	5.43	0.5 %	ACCEPTABLE
206	0.11	3.27	5.42	5.3 %	ACCEPTABLE
207	0.27	2.82	5.03	43.9 %	ACCEPTABLE
208	0.14	3.16	5.34	45.9 %	ACCEPTABLE
209	0.22	3.04	5.20	6.7 %	ACCEPTABLE
210	0.19	2.95	5.17	43.5 %	ACCEPTABLE
211	0.16	2.91	5.06	4.4 %	ACCEPTABLE
212	0.03	3.27	5.38	0.7 %	ACCEPTABLE
213	0.10	3.14	5.24	0.5 %	ACCEPTABLE
214	0.08	3.04	5.20	7.4 %	ACCEPTABLE
215	0.20	2.67	4.90	43.4 %	ACCEPTABLE
216	0.24	2.61	4.83	44.0 %	ACCEPTABLE
217	0.11	2.94	5.12	46.7 %	ACCEPTABLE
218	0.19	2.82	4.99	47.3 %	ACCEPTABLE
219	0.16	2.73	4.96	43.5 %	ACCEPTABLE
220	0.09	2.99	5.16	47.4 %	ACCEPTABLE
221	0.17	2.87	5.03	15.7 %	ACCEPTABLE
222	0.13	3.22	5.38	47.6 %	ACCEPTABLE
223	0.21	3.09	5.24	5.3 %	ACCEPTABLE
224	-12.72	55.13	57.70	0.4 %	ACCEPTABLE
225	-12.91	57.37	59.93	0.4 %	ACCEPTABLE
226	-12.65	55.13	57.70	0.4 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
227	0.15	3.04	5.20	48.0 %	ACCEPTABLE
228	0.18	3.10	5.25	5.3 %	ACCEPTABLE
229	0.09	3.35	5.47	1.1 %	ACCEPTABLE
230	0.15	3.23	5.35	1.1 %	ACCEPTABLE
231	0.13	3.19	5.34	6.8 %	ACCEPTABLE
232	0.23	2.89	5.09	44.7 %	ACCEPTABLE
233	0.14	3.12	5.29	46.7 %	ACCEPTABLE
234	0.20	3.04	5.20	10.1 %	ACCEPTABLE
235	0.18	2.98	5.18	44.6 %	ACCEPTABLE
236	0.16	2.96	5.11	4.0 %	ACCEPTABLE
237	0.07	3.19	5.32	1.4 %	ACCEPTABLE
238	0.12	3.11	5.23	1.0 %	ACCEPTABLE
239	0.10	3.04	5.20	9.6 %	ACCEPTABLE
240	0.18	2.79	5.00	44.4 %	ACCEPTABLE
241	0.21	2.75	4.95	45.2 %	ACCEPTABLE
242	0.12	2.97	5.15	46.6 %	ACCEPTABLE
243	0.17	2.89	5.06	47.2 %	ACCEPTABLE
244	0.16	2.83	5.04	44.6 %	ACCEPTABLE
245	0.11	3.01	5.17	10.3 %	ACCEPTABLE
246	0.17	2.92	5.08	15.6 %	ACCEPTABLE
247	0.13	3.16	5.32	15.8 %	ACCEPTABLE
248	0.19	3.07	5.23	10.1 %	ACCEPTABLE
249	-12.75	55.50	58.07	0.4 %	ACCEPTABLE
250	-12.88	56.99	59.56	0.4 %	ACCEPTABLE
251	-12.71	55.50	58.07	0.4 %	ACCEPTABLE
252	0.15	3.04	5.20	48.0 %	ACCEPTABLE
253	0.17	3.08	5.23	4.7 %	ACCEPTABLE
254	0.11	3.24	5.38	2.4 %	ACCEPTABLE
255	0.15	3.16	5.30	2.3 %	ACCEPTABLE
256	0.13	3.14	5.30	16.8 %	ACCEPTABLE
257	0.20	2.94	5.12	46.3 %	ACCEPTABLE
258	0.15	3.10	5.26	16.8 %	ACCEPTABLE
259	0.18	3.04	5.20	15.6 %	ACCEPTABLE
260	0.17	3.00	5.18	46.2 %	ACCEPTABLE
261	0.16	2.98	5.14	15.6 %	ACCEPTABLE
262	0.10	3.14	5.28	2.3 %	ACCEPTABLE
263	0.13	3.08	5.22	2.2 %	ACCEPTABLE
264	0.12	3.04	5.20	10.3 %	ACCEPTABLE
265	0.17	2.87	5.06	45.7 %	ACCEPTABLE
266	0.19	2.85	5.03	46.3 %	ACCEPTABLE
267	0.13	2.99	5.16	47.1 %	ACCEPTABLE
268	0.17	2.94	5.10	15.6 %	ACCEPTABLE
269	0.15	2.90	5.09	45.7 %	ACCEPTABLE
270	0.13	3.02	5.18	10.3 %	ACCEPTABLE
271	0.16	2.96	5.12	15.6 %	ACCEPTABLE
272	0.14	3.12	5.28	15.8 %	ACCEPTABLE
273	0.17	3.06	5.22	15.5 %	ACCEPTABLE
274	-12.77	55.75	58.32	0.4 %	ACCEPTABLE
275	-12.86	56.74	59.31	0.4 %	ACCEPTABLE
276	-12.74	55.75	58.32	0.4 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
277	0.15	3.04	5.20	48.0 %	ACCEPTABLE
278	0.16	3.07	5.22	5.3 %	ACCEPTABLE
279	0.12	3.17	5.32	5.3 %	ACCEPTABLE
280	0.15	3.12	5.26	2.3 %	ACCEPTABLE
281	0.14	3.11	5.26	4.7 %	ACCEPTABLE
282	0.19	2.97	5.15	46.0 %	ACCEPTABLE
283	0.15	3.08	5.24	47.9 %	ACCEPTABLE
284	0.17	3.04	5.20	16.6 %	ACCEPTABLE
285	0.16	3.01	5.19	46.3 %	ACCEPTABLE
286	0.15	3.00	5.16	9.5 %	ACCEPTABLE
287	0.11	3.11	5.25	2.3 %	ACCEPTABLE
288	0.14	3.07	5.21	2.2 %	ACCEPTABLE
289	0.13	3.04	5.20	10.3 %	ACCEPTABLE
290	0.16	2.93	5.11	46.2 %	ACCEPTABLE
291	0.18	2.91	5.09	46.2 %	ACCEPTABLE
292	0.14	3.01	5.18	47.0 %	ACCEPTABLE
293	0.16	2.97	5.14	47.0 %	ACCEPTABLE
294	0.15	2.95	5.13	46.2 %	ACCEPTABLE
295	0.13	3.03	5.19	15.9 %	ACCEPTABLE
296	0.16	2.99	5.15	15.6 %	ACCEPTABLE
297	0.14	3.09	5.25	15.8 %	ACCEPTABLE
298	0.17	3.05	5.21	16.5 %	ACCEPTABLE
299	-12.79	55.91	58.48	0.4 %	ACCEPTABLE
300	-12.84	56.58	59.14	0.4 %	ACCEPTABLE
301	-12.77	55.91	58.48	0.4 %	ACCEPTABLE
302	0.15	3.04	5.20	48.0 %	ACCEPTABLE
303	0.16	3.06	5.22	15.5 %	ACCEPTABLE
304	0.13	3.13	5.28	5.3 %	ACCEPTABLE
305	0.15	3.09	5.24	4.7 %	ACCEPTABLE
306	0.14	3.08	5.24	15.8 %	ACCEPTABLE
307	0.17	3.00	5.17	46.9 %	ACCEPTABLE
308	0.15	3.06	5.23	46.9 %	ACCEPTABLE
309	0.16	3.04	5.20	10.2 %	ACCEPTABLE
310	0.16	3.02	5.19	46.9 %	ACCEPTABLE
311	0.15	3.02	5.17	5.3 %	ACCEPTABLE
312	0.13	3.08	5.23	5.8 %	ACCEPTABLE
313	0.14	3.06	5.21	4.3 %	ACCEPTABLE
314	0.14	3.04	5.20	15.9 %	ACCEPTABLE
315	0.16	2.96	5.14	46.2 %	ACCEPTABLE
316	0.17	2.95	5.12	47.0 %	ACCEPTABLE
317	0.14	3.02	5.18	15.9 %	ACCEPTABLE
318	0.16	3.00	5.16	15.6 %	ACCEPTABLE
319	0.15	2.98	5.15	47.1 %	ACCEPTABLE
320	0.14	3.03	5.19	15.9 %	ACCEPTABLE
321	0.15	3.01	5.17	10.2 %	ACCEPTABLE
322	0.15	3.07	5.23	10.2 %	ACCEPTABLE
323	0.16	3.05	5.21	16.5 %	ACCEPTABLE
324	-12.80	56.02	58.59	0.4 %	ACCEPTABLE
325	-12.83	56.47	59.03	0.4 %	ACCEPTABLE
326	-12.78	56.02	58.59	0.4 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
327	0.15	3.04	5.20	48.0 %	ACCEPTABLE

Input data (Stage of construction 2)

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	2.10	Mbushje	
2	0.90	Shtrese 1 (suargjila)	
3	2.00	Shtrese 2 (zhavorre)	
4	-	Shtrese 2 (zhavorre)	

Foundation

Type of foundation : soil from geological profile

Terrain profile

Terrain behind the structure is flat.

Water influence

Ground water table is located below the structure.

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	NO	YES	variable	4.00		1.50	7.50	on terrain

No.	Name
1	Ngarkesa e Trafikut

Resistance on front face of the structure

Resistance on front face of the structure: at rest

Soil on front face of the structure - Mbushje

Soil thickness in front of structure $h = 0.50$ m

Terrain in front of structure is flat.

Earthquake

Factor of horizontal acceleration $K_h = 0.2040$

Factor of vertical acceleration $K_v = 0.1020$

Water below the GWT is restricted.

Settings of the stage of construction

Design situation : seismic

The wall is free to move. Active earth pressure is therefore assumed.

Verification No. 1 (Stage of construction 2)**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	-0.70	28.68	0.59	1.000	1.000	1.000
Earthq.- constr.	5.85	-0.70	-2.93	0.59	1.000	1.000	1.000
FF resistance	-1.01	-0.17	0.01	0.17	1.000	1.000	1.000
Weight - earth wedge	0.00	-0.98	14.78	0.90	1.000	1.000	1.000
Earthquake - soil wedge	3.01	-0.98	-1.51	0.90	1.000	1.000	1.000
Active pressure	10.69	-0.73	15.67	1.23	1.000	1.000	1.000
Earthq.- act.pressure	7.13	-1.41	13.39	0.96	1.000	1.000	1.000
Ngarkesa e Trafikut	0.67	-0.44	0.74	1.36	0.000	0.700	0.700

Verification of complete wall**Check for overturning stability**Resisting moment $M_{res} = 59.23$ kNm/mOverturning moment $M_{ovr} = 24.75$ kNm/m**Wall for overturning is SATISFACTORY****Check for slip**Resisting horizontal force $H_{res} = 48.04$ kN/mActive horizontal force $H_{act} = 26.14$ kN/m**Wall for slip is SATISFACTORY****Overall check - WALL is SATISFACTORY**

Maximum stress in footing bottom : 67.28 kPa

Bearing capacity of foundation soil (Stage of construction 2)**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	16.47	68.61	26.14	0.160	67.28

Service load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	16.47	68.61	26.14

Verification of foundation soil**Eccentricity verification**Max. eccentricity of normal force $e = 0.160$ Maximum allowable eccentricity $e_{alw} = 0.333$ **Eccentricity of the normal force is SATISFACTORY****Verification of bearing capacity**Max. stress at footing bottom $\sigma = 67.28$ kPaBearing capacity of foundation soil $R_d = 150.00$ kPa**Bearing capacity of foundation soil is SATISFACTORY**

Overall verification - bearing capacity of found. soil is SATISFACTORY

Dimensioning No. 1 (Stage of construction 2)

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	-0.20	8.64	1.05	1.000
Weight - earth wedge	0.00	-0.98	14.78	0.90	1.000
Active pressure	10.69	-0.73	15.67	1.23	1.000
Ngarkesa e Trafikut	0.67	-0.44	0.74	1.36	0.700
Contact stress	0.00	0.00	-25.35	0.91	1.000

Back wall jump check

Reinforcement and dimensions of the cross-section

Bar diameter = 14.0 mm

Number of bars = 5

Reinforcement cover = 40.0 mm

Cross-section width = 1.00 m

Cross-section depth = 0.40 m

Reinforcement ratio $\rho = 0.22 \% > 0.14 \% = \rho_{min}$

Position of neutral axis $x = 0.03 \text{ m} < 0.22 \text{ m} = x_{max}$

Ultimate shear force $V_{Rd} = 143.34 \text{ kN} > 14.25 \text{ kN} = V_{Ed}$

Ultimate moment $M_{Rd} = 114.77 \text{ kNm} > 10.76 \text{ kNm} = M_{Ed}$

Cross-section is SATISFACTORY.

Slope stability analysis

Input data

Project

Settings

(input for current task)

Stability analysis

Earthquake analysis : Standard

Verification methodology : according to EN 1997

Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)					
Seismic design situation					
		State STR		State GEO	
		Unfavourable	Favourable	Unfavourable	Favourable
Permanent actions :	$\gamma_G =$	1.00 [-]	1.00 [-]	1.00 [-]	1.00 [-]
Variable actions :	$\gamma_Q =$	1.00 [-]	0.00 [-]	1.00 [-]	0.00 [-]
Water load :	$\gamma_w =$			1.00 [-]	

Partial factors for soil parameters (M)			
Seismic design situation			
Partial factor on internal friction :	$\gamma_\phi =$	1.00	[-]
Partial factor on effective cohesion :	$\gamma_c =$	1.00	[-]

Partial factors for soil parameters (M)

Seismic design situation

Partial factor on undrained shear strength :

 $\gamma_{cu} =$

1.00 [-]

Interface

No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
1		-10.00	-1.60	-0.60	-1.60	-0.39	-1.60
		-0.30	0.00	0.00	0.00	10.00	0.00
2		0.00	0.00	0.00	-1.70	0.90	-1.70
3		-10.00	-2.10	-0.60	-2.10	-0.60	-1.70
		-0.40	-1.70	-0.39	-1.60		
4		-0.60	-2.10	0.90	-2.10	0.90	-1.70
		10.00	-1.70				
5		0.90	-2.10	10.00	-2.10		
6		-10.00	-3.00	10.00	-3.00		
7		-10.00	-5.00	10.00	-5.00		

Soil parameters - effective stress state

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]
1	Mbushje		35.00	0.00	19.00
2	Shtrese 1 (suargjila)		16.00	40.00	18.00
3	Shtrese 2 (zhavorre)		24.00	10.00	20.10

Soil parameters - uplift

No.	Name	Pattern	γ_{sat} [kN/m ³]	γ_s [kN/m ³]	n [-]
1	Mbushje		20.00		
2	Shtrese 1 (suargjila)		22.00		
3	Shtrese 2 (zhavorre)		21.00		

Soil parameters

Mbushje

Unit weight : $\gamma = 19.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 35.00^\circ$
 Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

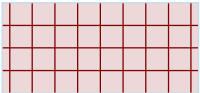
Shtrese 1 (suargjila)

Unit weight : $\gamma = 18.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 16.00^\circ$
 Cohesion of soil : $c_{ef} = 40.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 22.00 \text{ kN/m}^3$

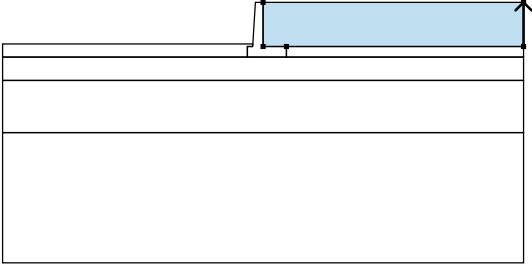
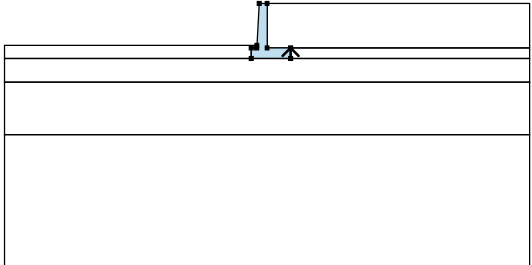
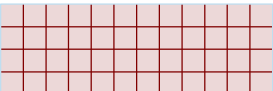
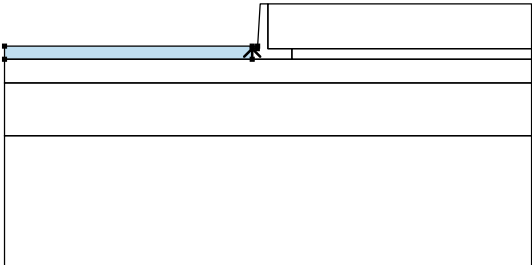
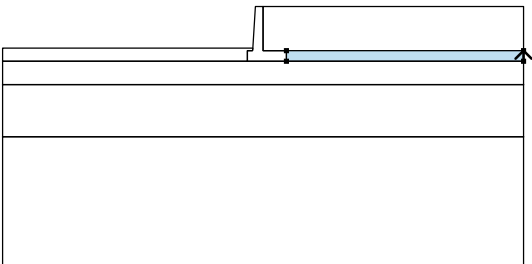
Shtrese 2 (zhavorre)

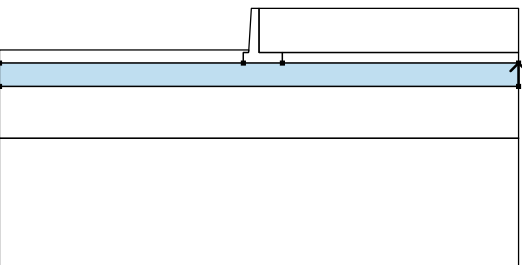
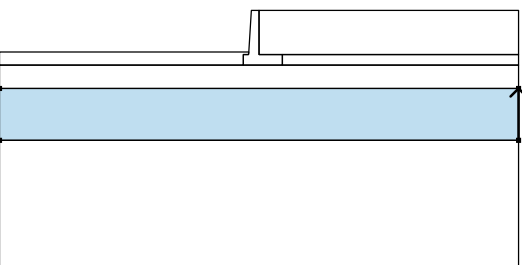
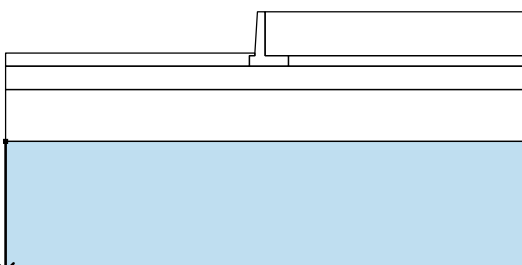
Unit weight : $\gamma = 20.10 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 24.00^\circ$
 Cohesion of soil : $c_{ef} = 10.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 21.00 \text{ kN/m}^3$

Rigid bodies

No.	Name	Sample	γ [kN/m ³]
1	Wall material		24.00

Assigning and surfaces

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
1		10.00	-1.70	10.00	0.00	Mbushje 
		0.00	0.00	0.00	-1.70	
		0.90	-1.70			
2		0.90	-2.10	0.90	-1.70	Wall material 
		0.00	-1.70	0.00	0.00	
		-0.30	0.00	-0.39	-1.60	
		-0.40	-1.70	-0.60	-1.70	
		-0.60	-2.10			
3		-0.60	-2.10	-0.60	-1.70	Mbushje 
		-0.40	-1.70	-0.39	-1.60	
		-0.60	-1.60	-10.00	-1.60	
		-10.00	-2.10			
4		10.00	-2.10	10.00	-1.70	Mbushje 
		0.90	-1.70	0.90	-2.10	

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
5		10.00	-3.00	10.00	-2.10	Shtrese 1 (suargjila) 
		0.90	-2.10	-0.60	-2.10	
		-10.00	-2.10	-10.00	-3.00	
6		10.00	-5.00	10.00	-3.00	Shtrese 2 (zhavorre) 
		-10.00	-3.00	-10.00	-5.00	
7		-10.00	-5.00	-10.00	-10.00	Shtrese 2 (zhavorre) 
		10.00	-10.00	10.00	-5.00	

Surcharge

No.	Type	Type of action	Location z [m]	Origin x [m]	Length l [m]	Width b [m]	Slope α [°]	Magnitude		
								q, q ₁ , f, F	q ₂	unit
1	strip	variable	on terrain	x = 1.50	l = 7.50		0.00	4.00		kN/m ²

Surcharges

No.	Name
1	Ngarkesa e Trafikut

Water

Water type : No water

Tensile crack

Tensile crack not inputted.

EarthquakeHorizontal seismic coefficient : $K_h = 0.20$ Vertical seismic coefficient : $K_v = 0.10$ **Settings of the stage of construction**

Design situation : seismic

Results (Stage of construction 1)

Analysis 1

Circular slip surface

Slip surface parameters						
Center :	x =	0.15 [m]	Angles :	α_1 =	-26.84 [°]	
	z =	3.04 [m]		α_2 =	54.22 [°]	
Radius :	R =	5.20 [m]				
The slip surface after optimization.						

Slope stability verification (Bishop)

Sum of active forces : $F_a = 55.49$ kN/m

Sum of passive forces : $F_p = 137.63$ kN/m

Sliding moment : $M_a = 288.54$ kNm/m

Resisting moment : $M_p = 715.68$ kNm/m

Utilization : 40.3 %

Slope stability ACCEPTABLE

Optimization of circular slip surface (Bishop)

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
1	0.15	3.04	5.20	40.3 %	ACCEPTABLE
2	0.15	3.04	5.20	40.3 %	ACCEPTABLE
3	0.15	3.04	5.20	40.3 %	ACCEPTABLE
4	-1.26	20.36	22.49	0.8 %	ACCEPTABLE
5	-0.07	9.59	12.72	28.9 %	ACCEPTABLE
6	5.01	1.56	3.63	18.4 %	ACCEPTABLE
7	0.81	1.66	7.66	30.9 %	ACCEPTABLE
8	-3.77	3.04	5.20	0.1 %	ACCEPTABLE
9	-1.13	19.16	21.35	5.1 %	ACCEPTABLE
10	-8.07	11.10	14.00	0.1 %	ACCEPTABLE
11	-18.41	139.80	142.33	1.0 %	ACCEPTABLE
12	0.15	3.04	5.20	40.3 %	ACCEPTABLE
13	-0.90	13.84	15.93	0.5 %	ACCEPTABLE
14	-0.04	7.47	10.25	25.3 %	ACCEPTABLE
15	3.70	1.56	3.63	18.4 %	ACCEPTABLE
16	0.73	1.81	6.51	32.6 %	ACCEPTABLE
17	-2.46	3.04	5.20	0.5 %	ACCEPTABLE
18	-0.71	12.45	14.63	4.3 %	ACCEPTABLE
19	-9.40	21.88	24.56	0.3 %	ACCEPTABLE
20	-16.52	107.68	110.21	0.9 %	ACCEPTABLE
21	0.15	3.04	5.20	40.3 %	ACCEPTABLE
22	-0.61	9.84	11.92	0.4 %	ACCEPTABLE
23	0.00	6.04	8.59	26.9 %	ACCEPTABLE
24	1.89	3.04	5.20	0.3 %	ACCEPTABLE
25	0.64	1.98	5.82	32.9 %	ACCEPTABLE
26	-1.59	3.04	5.20	0.4 %	ACCEPTABLE
27	-1.14	1.19	3.95	25.2 %	ACCEPTABLE
28	-0.43	8.72	10.90	6.5 %	ACCEPTABLE
29	1.86	3.17	5.30	0.4 %	ACCEPTABLE
30	-10.48	31.44	34.06	0.4 %	ACCEPTABLE
31	-15.27	88.64	91.18	0.9 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
32	0.15	3.04	5.20	40.3 %	ACCEPTABLE
33	1.49	2.30	4.65	0.8 %	ACCEPTABLE
34	-15.06	88.88	91.23	0.7 %	ACCEPTABLE
35	-9.98	49.38	51.76	0.9 %	ACCEPTABLE
36	-0.38	7.37	9.45	0.4 %	ACCEPTABLE
37	2.01	0.16	3.52	16.5 %	ACCEPTABLE
38	0.03	5.07	7.48	28.8 %	ACCEPTABLE
39	1.31	3.04	5.20	0.4 %	ACCEPTABLE
40	0.55	2.17	5.43	30.8 %	ACCEPTABLE
41	0.60	0.49	2.66	0.6 %	ACCEPTABLE
42	-3.16	11.88	13.48	0.6 %	ACCEPTABLE
43	-7.42	21.76	24.22	0.7 %	ACCEPTABLE
44	-1.01	3.04	5.20	0.4 %	ACCEPTABLE
45	-0.37	0.39	3.60	28.0 %	ACCEPTABLE
46	-0.74	1.91	4.38	29.5 %	ACCEPTABLE
47	0.57	0.58	2.70	0.4 %	ACCEPTABLE
48	-0.24	6.56	8.74	10.7 %	ACCEPTABLE
49	1.21	3.46	5.53	0.3 %	ACCEPTABLE
50	-11.24	38.86	41.46	0.5 %	ACCEPTABLE
51	-14.44	77.00	79.55	0.8 %	ACCEPTABLE
52	-10.08	38.86	41.46	0.8 %	ACCEPTABLE
53	0.15	3.04	5.20	40.3 %	ACCEPTABLE
54	0.86	3.32	5.42	0.3 %	ACCEPTABLE
55	-2.23	16.03	17.64	1.0 %	ACCEPTABLE
56	-0.86	10.35	11.96	1.0 %	ACCEPTABLE
57	-0.22	5.83	7.92	0.4 %	ACCEPTABLE
58	1.43	0.98	3.84	21.6 %	ACCEPTABLE
59	0.06	4.41	6.73	30.8 %	ACCEPTABLE
60	0.92	3.04	5.20	0.7 %	ACCEPTABLE
61	0.47	2.35	5.23	26.4 %	ACCEPTABLE
62	0.36	1.49	3.57	0.3 %	ACCEPTABLE
63	-1.56	6.86	8.58	0.9 %	ACCEPTABLE
64	-1.04	5.87	7.48	0.9 %	ACCEPTABLE
65	-0.62	3.04	5.20	0.7 %	ACCEPTABLE
66	0.40	0.28	3.21	22.7 %	ACCEPTABLE
67	-0.23	1.44	4.09	27.6 %	ACCEPTABLE
68	0.59	0.75	3.09	10.9 %	ACCEPTABLE
69	-0.05	0.68	3.71	25.7 %	ACCEPTABLE
70	-0.45	2.34	4.68	32.4 %	ACCEPTABLE
71	0.42	1.28	3.42	0.8 %	ACCEPTABLE
72	-0.11	5.27	7.44	11.1 %	ACCEPTABLE
73	0.83	3.43	5.51	0.3 %	ACCEPTABLE
74	-11.76	44.28	46.87	0.6 %	ACCEPTABLE
75	-13.89	69.70	72.26	0.8 %	ACCEPTABLE
76	-10.98	44.28	46.87	0.7 %	ACCEPTABLE
77	0.15	3.04	5.20	40.3 %	ACCEPTABLE
78	0.56	3.46	5.54	0.3 %	ACCEPTABLE
79	-0.93	8.75	10.51	0.6 %	ACCEPTABLE
80	-0.14	6.34	8.09	0.3 %	ACCEPTABLE
81	-0.10	4.85	6.96	0.5 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
82	1.02	1.58	4.18	24.1 %	ACCEPTABLE
83	0.08	3.96	6.23	32.6 %	ACCEPTABLE
84	0.67	3.04	5.20	1.0 %	ACCEPTABLE
85	0.39	2.51	5.15	26.1 %	ACCEPTABLE
86	0.26	2.04	4.13	0.3 %	ACCEPTABLE
87	-0.89	5.18	7.02	0.4 %	ACCEPTABLE
88	-0.38	4.29	6.03	0.5 %	ACCEPTABLE
89	-0.37	3.04	5.20	1.1 %	ACCEPTABLE
90	0.36	0.95	3.62	26.1 %	ACCEPTABLE
91	0.68	0.62	3.24	24.6 %	ACCEPTABLE
92	-0.13	2.06	4.48	30.8 %	ACCEPTABLE
93	0.44	1.45	3.71	33.9 %	ACCEPTABLE
94	0.06	1.27	4.00	26.5 %	ACCEPTABLE
95	-0.26	2.60	4.86	35.4 %	ACCEPTABLE
96	0.33	1.82	3.96	1.0 %	ACCEPTABLE
97	-0.02	4.47	6.64	38.6 %	ACCEPTABLE
98	0.59	3.34	5.44	0.4 %	ACCEPTABLE
99	-12.11	48.10	50.68	0.6 %	ACCEPTABLE
100	-13.53	65.05	67.61	0.7 %	ACCEPTABLE
101	-11.59	48.10	50.68	0.7 %	ACCEPTABLE
102	0.15	3.04	5.20	40.3 %	ACCEPTABLE
103	0.40	3.41	5.49	0.4 %	ACCEPTABLE
104	-0.45	6.14	8.02	0.3 %	ACCEPTABLE
105	0.05	4.87	6.74	0.3 %	ACCEPTABLE
106	-0.02	4.23	6.35	0.8 %	ACCEPTABLE
107	0.74	2.03	4.46	27.2 %	ACCEPTABLE
108	0.10	3.66	5.89	34.5 %	ACCEPTABLE
109	0.49	3.04	5.20	1.4 %	ACCEPTABLE
110	0.32	2.65	5.13	27.8 %	ACCEPTABLE
111	0.22	2.39	4.49	0.3 %	ACCEPTABLE
112	-0.51	4.34	6.28	0.3 %	ACCEPTABLE
113	-0.14	3.72	5.59	0.3 %	ACCEPTABLE
114	-0.19	3.04	5.20	1.6 %	ACCEPTABLE
115	0.32	1.50	4.00	28.8 %	ACCEPTABLE
116	0.53	1.26	3.72	28.4 %	ACCEPTABLE
117	-0.05	2.43	4.74	33.4 %	ACCEPTABLE
118	0.34	1.95	4.17	34.7 %	ACCEPTABLE
119	0.12	1.75	4.28	28.9 %	ACCEPTABLE
120	-0.13	2.76	4.98	37.3 %	ACCEPTABLE
121	0.27	2.20	4.35	1.6 %	ACCEPTABLE
122	0.03	3.97	6.14	38.9 %	ACCEPTABLE
123	0.44	3.26	5.37	0.5 %	ACCEPTABLE
124	-12.34	50.74	53.32	0.6 %	ACCEPTABLE
125	-13.29	62.04	64.60	0.7 %	ACCEPTABLE
126	-12.00	50.74	53.32	0.7 %	ACCEPTABLE
127	0.15	3.04	5.20	40.3 %	ACCEPTABLE
128	0.31	3.32	5.42	0.4 %	ACCEPTABLE
129	-0.21	4.88	6.85	0.3 %	ACCEPTABLE
130	0.11	4.14	6.10	0.3 %	ACCEPTABLE
131	0.03	3.82	5.95	1.2 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
132	0.55	2.34	4.68	29.8 %	ACCEPTABLE
133	0.12	3.46	5.66	36.3 %	ACCEPTABLE
134	0.38	3.04	5.20	2.1 %	ACCEPTABLE
135	0.27	2.76	5.13	29.8 %	ACCEPTABLE
136	0.19	2.61	4.73	0.6 %	ACCEPTABLE
137	-0.28	3.86	5.87	0.3 %	ACCEPTABLE
138	-0.03	3.44	5.40	0.3 %	ACCEPTABLE
139	-0.08	3.04	5.20	2.0 %	ACCEPTABLE
140	0.28	1.94	4.32	29.2 %	ACCEPTABLE
141	0.42	1.76	4.12	29.1 %	ACCEPTABLE
142	0.01	2.65	4.91	35.2 %	ACCEPTABLE
143	0.27	2.30	4.50	36.4 %	ACCEPTABLE
144	0.15	2.12	4.52	29.0 %	ACCEPTABLE
145	-0.04	2.86	5.06	38.7 %	ACCEPTABLE
146	0.23	2.47	4.63	3.8 %	ACCEPTABLE
147	0.07	3.65	5.82	39.1 %	ACCEPTABLE
148	0.34	3.19	5.32	1.0 %	ACCEPTABLE
149	-12.50	52.54	55.12	0.6 %	ACCEPTABLE
150	-13.13	60.08	62.64	0.7 %	ACCEPTABLE
151	-12.27	52.54	55.12	0.7 %	ACCEPTABLE
152	0.15	3.04	5.20	40.3 %	ACCEPTABLE
153	0.25	3.24	5.36	0.7 %	ACCEPTABLE
154	-0.07	4.18	6.22	0.4 %	ACCEPTABLE
155	0.14	3.73	5.76	0.3 %	ACCEPTABLE
156	0.07	3.56	5.70	1.7 %	ACCEPTABLE
157	0.42	2.56	4.84	31.9 %	ACCEPTABLE
158	0.13	3.32	5.51	37.3 %	ACCEPTABLE
159	0.30	3.04	5.20	3.0 %	ACCEPTABLE
160	0.24	2.84	5.14	31.6 %	ACCEPTABLE
161	0.18	2.76	4.89	0.9 %	ACCEPTABLE
162	-0.13	3.57	5.63	0.3 %	ACCEPTABLE
163	0.04	3.29	5.32	0.3 %	ACCEPTABLE
164	0.00	3.04	5.20	3.1 %	ACCEPTABLE
165	0.24	2.27	4.57	31.5 %	ACCEPTABLE
166	0.33	2.14	4.43	31.7 %	ACCEPTABLE
167	0.06	2.79	5.01	35.4 %	ACCEPTABLE
168	0.23	2.54	4.73	37.2 %	ACCEPTABLE
169	0.15	2.39	4.71	31.0 %	ACCEPTABLE
170	0.03	2.92	5.11	37.4 %	ACCEPTABLE
171	0.20	2.66	4.81	2.3 %	ACCEPTABLE
172	0.10	3.44	5.61	39.0 %	ACCEPTABLE
173	0.28	3.15	5.28	0.9 %	ACCEPTABLE
174	-12.60	53.76	56.33	0.6 %	ACCEPTABLE
175	-13.03	58.78	61.35	0.7 %	ACCEPTABLE
176	-12.45	53.76	56.33	0.7 %	ACCEPTABLE
177	0.15	3.04	5.20	40.3 %	ACCEPTABLE
178	0.22	3.18	5.31	1.0 %	ACCEPTABLE
179	0.01	3.77	5.84	0.4 %	ACCEPTABLE
180	0.14	3.48	5.55	0.4 %	ACCEPTABLE
181	0.10	3.38	5.53	3.7 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
182	0.33	2.72	4.95	34.2 %	ACCEPTABLE
183	0.13	3.23	5.41	38.2 %	ACCEPTABLE
184	0.25	3.04	5.20	3.7 %	ACCEPTABLE
185	0.21	2.90	5.16	33.0 %	ACCEPTABLE
186	0.17	2.85	4.99	1.6 %	ACCEPTABLE
187	-0.04	3.39	5.48	0.4 %	ACCEPTABLE
188	0.08	3.20	5.27	0.3 %	ACCEPTABLE
189	0.05	3.04	5.20	3.8 %	ACCEPTABLE
190	0.22	2.51	4.76	33.5 %	ACCEPTABLE
191	0.28	2.42	4.67	33.4 %	ACCEPTABLE
192	0.09	2.88	5.08	36.7 %	ACCEPTABLE
193	0.20	2.71	4.88	38.8 %	ACCEPTABLE
194	0.16	2.59	4.86	32.8 %	ACCEPTABLE
195	0.07	2.96	5.14	38.1 %	ACCEPTABLE
196	0.19	2.78	4.94	6.8 %	ACCEPTABLE
197	0.12	3.31	5.47	40.3 %	ACCEPTABLE
198	0.23	3.11	5.26	3.3 %	ACCEPTABLE
199	-12.67	54.58	57.15	0.6 %	ACCEPTABLE
200	-12.96	57.93	60.50	0.7 %	ACCEPTABLE
201	-12.57	54.58	57.15	0.7 %	ACCEPTABLE
202	0.15	3.04	5.20	40.3 %	ACCEPTABLE
203	0.19	3.13	5.27	1.6 %	ACCEPTABLE
204	0.06	3.51	5.62	0.5 %	ACCEPTABLE
205	0.15	3.33	5.43	0.4 %	ACCEPTABLE
206	0.11	3.27	5.42	3.8 %	ACCEPTABLE
207	0.27	2.82	5.03	35.5 %	ACCEPTABLE
208	0.14	3.16	5.34	38.2 %	ACCEPTABLE
209	0.22	3.04	5.20	4.8 %	ACCEPTABLE
210	0.19	2.95	5.17	35.1 %	ACCEPTABLE
211	0.16	2.91	5.06	3.1 %	ACCEPTABLE
212	0.03	3.27	5.38	0.5 %	ACCEPTABLE
213	0.10	3.14	5.24	0.3 %	ACCEPTABLE
214	0.08	3.04	5.20	5.3 %	ACCEPTABLE
215	0.20	2.67	4.90	34.5 %	ACCEPTABLE
216	0.24	2.61	4.83	35.0 %	ACCEPTABLE
217	0.11	2.94	5.12	38.4 %	ACCEPTABLE
218	0.19	2.82	4.99	39.0 %	ACCEPTABLE
219	0.16	2.73	4.96	34.6 %	ACCEPTABLE
220	0.09	2.99	5.16	39.2 %	ACCEPTABLE
221	0.17	2.87	5.03	11.6 %	ACCEPTABLE
222	0.13	3.22	5.38	40.3 %	ACCEPTABLE
223	0.21	3.09	5.24	3.7 %	ACCEPTABLE
224	-12.72	55.13	57.70	0.6 %	ACCEPTABLE
225	-12.91	57.37	59.93	0.7 %	ACCEPTABLE
226	-12.65	55.13	57.70	0.7 %	ACCEPTABLE
227	0.15	3.04	5.20	40.3 %	ACCEPTABLE
228	0.18	3.10	5.25	3.7 %	ACCEPTABLE
229	0.09	3.35	5.47	0.8 %	ACCEPTABLE
230	0.15	3.23	5.35	0.7 %	ACCEPTABLE
231	0.13	3.19	5.34	4.8 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
232	0.23	2.89	5.09	36.4 %	ACCEPTABLE
233	0.14	3.12	5.29	39.0 %	ACCEPTABLE
234	0.20	3.04	5.20	7.3 %	ACCEPTABLE
235	0.18	2.98	5.18	36.3 %	ACCEPTABLE
236	0.16	2.96	5.11	2.8 %	ACCEPTABLE
237	0.07	3.19	5.32	0.9 %	ACCEPTABLE
238	0.12	3.11	5.23	0.7 %	ACCEPTABLE
239	0.10	3.04	5.20	6.9 %	ACCEPTABLE
240	0.18	2.79	5.00	35.7 %	ACCEPTABLE
241	0.21	2.75	4.95	36.6 %	ACCEPTABLE
242	0.12	2.97	5.15	38.4 %	ACCEPTABLE
243	0.17	2.89	5.06	39.1 %	ACCEPTABLE
244	0.16	2.83	5.04	35.9 %	ACCEPTABLE
245	0.11	3.01	5.17	7.5 %	ACCEPTABLE
246	0.17	2.92	5.08	11.6 %	ACCEPTABLE
247	0.13	3.16	5.32	11.7 %	ACCEPTABLE
248	0.19	3.07	5.23	7.3 %	ACCEPTABLE
249	-12.75	55.50	58.07	0.7 %	ACCEPTABLE
250	-12.88	56.99	59.56	0.7 %	ACCEPTABLE
251	-12.71	55.50	58.07	0.7 %	ACCEPTABLE
252	0.15	3.04	5.20	40.3 %	ACCEPTABLE
253	0.17	3.08	5.23	3.3 %	ACCEPTABLE
254	0.11	3.24	5.38	1.7 %	ACCEPTABLE
255	0.15	3.16	5.30	1.6 %	ACCEPTABLE
256	0.13	3.14	5.30	12.5 %	ACCEPTABLE
257	0.20	2.94	5.12	38.2 %	ACCEPTABLE
258	0.15	3.10	5.26	12.6 %	ACCEPTABLE
259	0.18	3.04	5.20	11.5 %	ACCEPTABLE
260	0.17	3.00	5.18	38.2 %	ACCEPTABLE
261	0.16	2.98	5.14	11.5 %	ACCEPTABLE
262	0.10	3.14	5.28	1.6 %	ACCEPTABLE
263	0.13	3.08	5.22	1.6 %	ACCEPTABLE
264	0.12	3.04	5.20	7.5 %	ACCEPTABLE
265	0.17	2.87	5.06	37.2 %	ACCEPTABLE
266	0.19	2.85	5.03	37.9 %	ACCEPTABLE
267	0.13	2.99	5.16	39.1 %	ACCEPTABLE
268	0.17	2.94	5.10	11.6 %	ACCEPTABLE
269	0.15	2.90	5.09	37.3 %	ACCEPTABLE
270	0.13	3.02	5.18	7.5 %	ACCEPTABLE
271	0.16	2.96	5.12	11.5 %	ACCEPTABLE
272	0.14	3.12	5.28	11.7 %	ACCEPTABLE
273	0.17	3.06	5.22	11.5 %	ACCEPTABLE
274	-12.77	55.75	58.32	0.7 %	ACCEPTABLE
275	-12.86	56.74	59.31	0.7 %	ACCEPTABLE
276	-12.74	55.75	58.32	0.7 %	ACCEPTABLE
277	0.15	3.04	5.20	40.3 %	ACCEPTABLE
278	0.16	3.07	5.22	3.7 %	ACCEPTABLE
279	0.12	3.17	5.32	3.8 %	ACCEPTABLE
280	0.15	3.12	5.26	1.6 %	ACCEPTABLE
281	0.14	3.11	5.26	3.3 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
282	0.19	2.97	5.15	37.9 %	ACCEPTABLE
283	0.15	3.08	5.24	40.3 %	ACCEPTABLE
284	0.17	3.04	5.20	12.3 %	ACCEPTABLE
285	0.16	3.01	5.19	38.3 %	ACCEPTABLE
286	0.15	3.00	5.16	6.8 %	ACCEPTABLE
287	0.11	3.11	5.25	1.6 %	ACCEPTABLE
288	0.14	3.07	5.21	1.6 %	ACCEPTABLE
289	0.13	3.04	5.20	7.5 %	ACCEPTABLE
290	0.16	2.93	5.11	38.0 %	ACCEPTABLE
291	0.18	2.91	5.09	37.9 %	ACCEPTABLE
292	0.14	3.01	5.18	39.1 %	ACCEPTABLE
293	0.16	2.97	5.14	39.1 %	ACCEPTABLE
294	0.15	2.95	5.13	38.0 %	ACCEPTABLE
295	0.13	3.03	5.19	11.8 %	ACCEPTABLE
296	0.16	2.99	5.15	11.5 %	ACCEPTABLE
297	0.14	3.09	5.25	11.7 %	ACCEPTABLE
298	0.17	3.05	5.21	12.3 %	ACCEPTABLE
299	-12.79	55.91	58.48	0.7 %	ACCEPTABLE
300	-12.84	56.58	59.14	0.7 %	ACCEPTABLE
301	-12.77	55.91	58.48	0.7 %	ACCEPTABLE
302	0.15	3.04	5.20	40.3 %	ACCEPTABLE
303	0.16	3.06	5.22	11.5 %	ACCEPTABLE
304	0.13	3.13	5.28	3.8 %	ACCEPTABLE
305	0.15	3.09	5.24	3.3 %	ACCEPTABLE
306	0.14	3.08	5.24	11.7 %	ACCEPTABLE
307	0.17	3.00	5.17	39.0 %	ACCEPTABLE
308	0.15	3.06	5.23	39.1 %	ACCEPTABLE
309	0.16	3.04	5.20	7.4 %	ACCEPTABLE
310	0.16	3.02	5.19	39.0 %	ACCEPTABLE
311	0.15	3.02	5.17	3.8 %	ACCEPTABLE
312	0.13	3.08	5.23	4.1 %	ACCEPTABLE
313	0.14	3.06	5.21	3.1 %	ACCEPTABLE
314	0.14	3.04	5.20	11.8 %	ACCEPTABLE
315	0.16	2.96	5.14	38.0 %	ACCEPTABLE
316	0.17	2.95	5.12	39.0 %	ACCEPTABLE
317	0.14	3.02	5.18	11.8 %	ACCEPTABLE
318	0.16	3.00	5.16	11.5 %	ACCEPTABLE
319	0.15	2.98	5.15	39.1 %	ACCEPTABLE
320	0.14	3.03	5.19	11.8 %	ACCEPTABLE
321	0.15	3.01	5.17	7.4 %	ACCEPTABLE
322	0.15	3.07	5.23	7.4 %	ACCEPTABLE
323	0.16	3.05	5.21	12.3 %	ACCEPTABLE
324	-12.80	56.02	58.59	0.7 %	ACCEPTABLE
325	-12.83	56.47	59.03	0.7 %	ACCEPTABLE
326	-12.78	56.02	58.59	0.7 %	ACCEPTABLE
327	0.15	3.04	5.20	40.3 %	ACCEPTABLE

MUR B/A H=2.80 m

Cantilever wall analysis

Input data

Project

Task : Mur mbajtes b/a, H=2.8m
 Author : SEED Consulting
 Date : 8/3/2020
 Unit weight of water is considered : 9,81 kN/m³

Settings

(input for current task)

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 : Coulomb
 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	
Permanent actions :	$\gamma_G =$	1.35	[-]	1.00	[-]	1.00	[-]
Variable actions :	$\gamma_Q =$	1.50	[-]	0.00	[-]	1.30	[-]
Water load :	$\gamma_W =$					1.00	[-]

Partial factors for soil parameters (M)			
Permanent design situation			
Partial factor on internal friction :	$\gamma_\phi =$	1.25	[-]
Partial factor on effective cohesion :	$\gamma_c =$	1.25	[-]
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.40	[-]
Partial factor on Poisson's ratio :	$\gamma_v =$	1.00	[-]

Partial factors for variable actions			
Permanent design situation			
Factor for combination value :	$\psi_0 =$	0.70	[-]
Factor for frequent value :	$\psi_1 =$	0.50	[-]
Factor for quasi-permanent value :	$\psi_2 =$	0.30	[-]

Partial factors on actions (A)							
Seismic design situation							
		State STR			State GEO		
		Unfavourable		Favourable	Unfavourable	Favourable	
Permanent actions :	$\gamma_G =$	1.00	[-]	1.00	[-]	1.00	[-]

Partial factors on actions (A)							
Seismic design situation							
Variable actions :	$\gamma_Q =$	1.00	[-]	0.00	[-]	1.00	[-]
Water load :	$\gamma_w =$					1.00	[-]

Partial factors for soil parameters (M)							
Seismic design situation							
Partial factor on internal friction :	$\gamma_\phi =$					1.00	[-]
Partial factor on effective cohesion :	$\gamma_c =$					1.00	[-]
Partial factor on undrained shear strength :	$\gamma_{cu} =$					1.00	[-]
Partial factor on Poisson's ratio :	$\gamma_v =$					1.00	[-]

Material of structure

Unit weight $\gamma = 24.00 \text{ kN/m}^3$

Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete : C 25/30

Cylinder compressive strength

$$f_{ck} = 25.00 \text{ MPa}$$

Tensile strength

$$f_{ctm} = 2.60 \text{ MPa}$$

Longitudinal steel : B500

Yield strength

$$f_{yk} = 500.00 \text{ MPa}$$

Geometry of structure

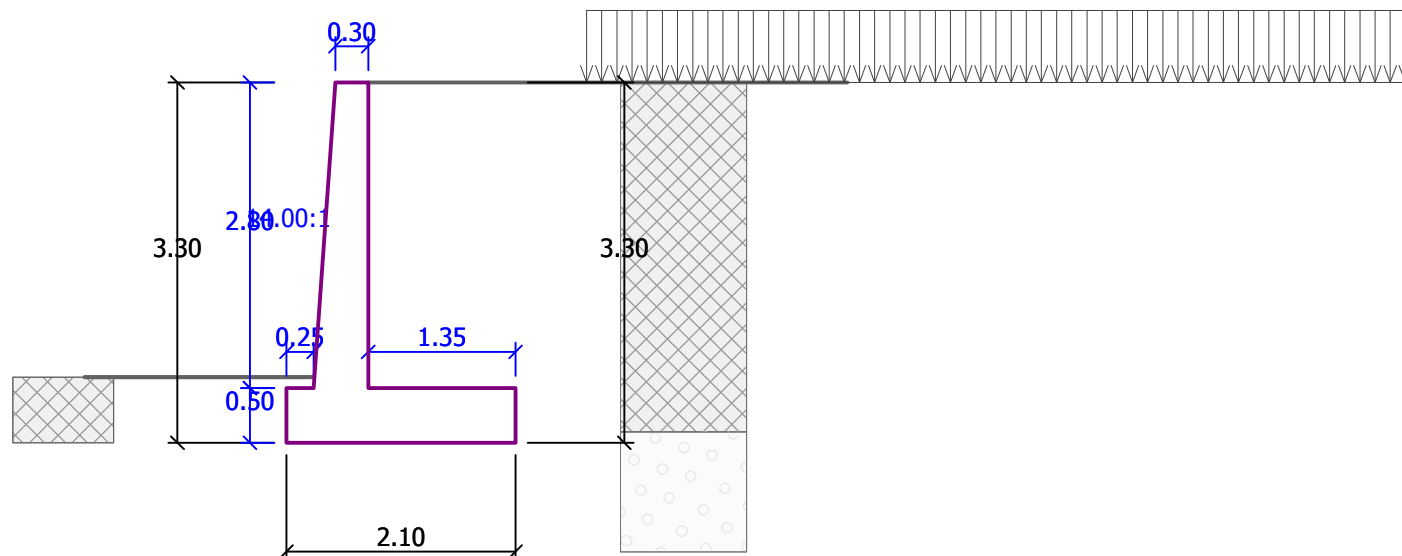
No.	Coordinate X [m]	Depth Z [m]
1	0.00	0.00
2	0.00	2.80
3	1.35	2.80
4	1.35	3.30
5	-0.75	3.30
6	-0.75	2.80
7	-0.50	2.80
8	-0.30	0.00

The origin [0,0] is located at the most upper right point of the wall.

Wall section area = 2.17 m².

Name : Geometry

Stage - analysis : 1 - 0



Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]	γ_{su} [kN/m ³]	δ [°]
1	Mbushje		35.00	0.00	19.00	10.19	23.00
2	Shtrese 1 (suargjila)		16.00	40.00	18.00	12.19	10.70
3	Shtrese 2 (zhavorre)		24.00	10.00	20.10	11.19	16.00

Soil parameters to compute pressure at rest

No.	Name	Pattern	Type calculation	φ_{ef} [°]	ν [-]	OCR [-]	K_r [-]
1	Mbushje		cohesionless	35.00	-	-	-
2	Shtrese 1 (suargjila)		cohesive	-	0.30	-	-
3	Shtrese 2 (zhavorre)		cohesionless	24.00	-	-	-

Soil parameters

Mbushje

Unit weight :

$\gamma = 19.00 \text{ kN/m}^3$

Stress-state :

effective

Angle of internal friction :

$\varphi_{ef} = 35.00^\circ$

Cohesion of soil :

$c_{ef} = 0.00 \text{ kPa}$

Angle of friction struc.-soil :

$\delta = 23.00^\circ$

Soil :

cohesionless

Saturated unit weight : $\gamma_{\text{sat}} = 20.00 \text{ kN/m}^3$

Shtrese 1 (suargjila)

Unit weight : $\gamma = 18.00 \text{ kN/m}^3$

Stress-state : effective

Angle of internal friction : $\varphi_{\text{ef}} = 16.00^\circ$

Cohesion of soil : $c_{\text{ef}} = 40.00 \text{ kPa}$

Angle of friction struc.-soil : $\delta = 10.70^\circ$

Soil : cohesive

Poisson's ratio : $\nu = 0.30$

Saturated unit weight : $\gamma_{\text{sat}} = 22.00 \text{ kN/m}^3$

Shtrese 2 (zhavorre)

Unit weight : $\gamma = 20.10 \text{ kN/m}^3$

Stress-state : effective

Angle of internal friction : $\varphi_{\text{ef}} = 24.00^\circ$

Cohesion of soil : $c_{\text{ef}} = 10.00 \text{ kPa}$

Angle of friction struc.-soil : $\delta = 16.00^\circ$

Soil : cohesionless

Saturated unit weight : $\gamma_{\text{sat}} = 21.00 \text{ kN/m}^3$

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	3.20	Mbushje	
2	2.00	Shtrese 2 (zhavorre)	
3	-	Shtrese 2 (zhavorre)	

Foundation

Type of foundation : soil from geological profile

Terrain profile

Terrain behind the structure is flat.

Water influence

Ground water table is located below the structure.

Input surface surcharges

No.	Surcharge new	change	Action	Mag.1 [kN/m ²]	Mag.2 [kN/m ²]	Ord.x x [m]	Length l [m]	Depth z [m]
1	YES		variable	20.00		2.00	7.50	on terrain
No.	Name							
1	Ngarkesa e Trafikut							

Resistance on front face of the structure

Resistance on front face of the structure: at rest

Soil on front face of the structure - Mbushje

Soil thickness in front of structure $h = 0.60 \text{ m}$

Terrain in front of structure is flat.

Settings of the stage of construction

Design situation : permanent

The wall is free to move. Active earth pressure is therefore assumed.

Verification No. 1 (Stage of construction 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	-1.04	52.08	0.79	1.000	1.000	1.350
FF resistance	-1.75	-0.20	0.01	0.22	1.000	1.000	1.000
Weight - earth wedge	0.00	-1.36	33.26	1.20	1.000	1.000	1.000
Active pressure	33.79	-1.14	41.43	1.65	1.000	1.000	1.000
Ngarkesa e Trafikut	8.82	-0.96	9.62	1.69	1.300	0.000	1.300

Verification of complete wall

Check for overturning stability

Resisting moment $M_{res} = 170.56 \text{ kNm/m}$

Overturning moment $M_{ovr} = 49.21 \text{ kNm/m}$

Wall for overturning is SATISFACTORY

Check for slip

Resisting horizontal force $H_{res} = 59.19 \text{ kN/m}$

Active horizontal force $H_{act} = 32.05 \text{ kN/m}$

Wall for slip is SATISFACTORY

Overall check - WALL is SATISFACTORY

Maximum stress in footing bottom : 91.39 kPa

Bearing capacity of foundation soil (Stage of construction 1)

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	29.64	157.51	43.52	0.090	91.39
2	21.90	126.78	32.05	0.085	79.94

Service load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	13.36	133.58	30.72
2	14.16	126.46	24.99

Verification of foundation soil

Eccentricity verification

Max. eccentricity of normal force $e = 0.090$

Maximum allowable eccentricity $e_{alw} = 0.333$

Eccentricity of the normal force is SATISFACTORY

Verification of bearing capacityMax. stress at footing bottom $\sigma = 91.39 \text{ kPa}$ Bearing capacity of foundation soil $R_d = 200.00 \text{ kPa}$ **Bearing capacity of foundation soil is SATISFACTORY****Overall verification - bearing capacity of found. soil is SATISFACTORY****Dimensioning No. 1 (Stage of construction 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	-0.25	16.20	1.43	1.350
Weight - earth wedge	0.00	-1.36	33.26	1.20	1.000
Active pressure	33.79	-1.14	41.43	1.65	1.000
Ngarkesa e Trafikut	8.82	-0.96	9.62	1.69	1.300
Contact stress	0.00	0.00	-81.81	1.33	1.000

Back wall jump check

Reinforcement and dimensions of the cross-section

Bar diameter = 16.0 mm

Number of bars = 5

Reinforcement cover = 40.0 mm

Cross-section width = 1.00 m

Cross-section depth = 0.50 m

Reinforcement ratio $\rho = 0.22 \% > 0.14 \% = \rho_{min}$ Position of neutral axis $x = 0.03 \text{ m} < 0.28 \text{ m} = x_{max}$ Ultimate shear force $V_{Rd} = 169.97 \text{ kN} > 27.25 \text{ kN} = V_{Ed}$ Ultimate moment $M_{Rd} = 191.83 \text{ kNm} > 31.44 \text{ kNm} = M_{Ed}$ **Cross-section is SATISFACTORY.****Slope stability analysis****Input data****Project****Settings**

(input for current task)

Stability analysis

Earthquake analysis : Standard

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 :	$\gamma_G =$	1.35 [-]	1.00 [-]	1.00 [-]	1.00 [-]
Variable actions :	$\gamma_Q =$	1.50 [-]	0.00 [-]	1.30 [-]	0.00 [-]

Partial factors on actions (A)

Permanent design situation

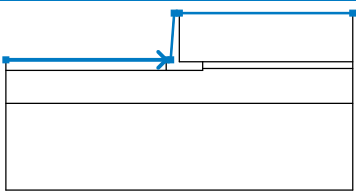
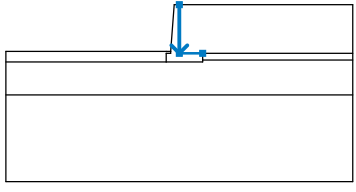
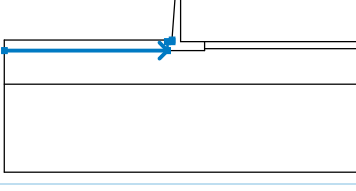
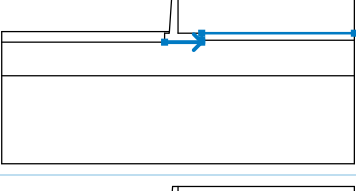
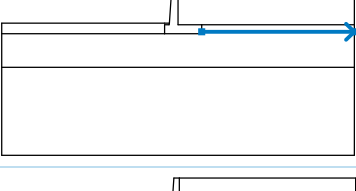
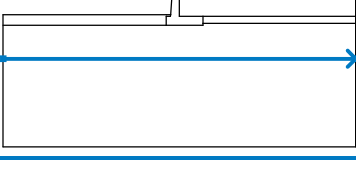
Water load :	$\gamma_w =$					1.00	[-]		
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Partial factors for soil parameters (M)

Permanent design situation

Partial factor on internal friction :	$\gamma_\phi =$		1.25	[-]
Partial factor on effective cohesion :	$\gamma_c =$		1.25	[-]
Partial factor on undrained shear strength :	$\gamma_{cu} =$		1.40	[-]

Interface

No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
1		-10.00	-2.70	-0.75	-2.70	-0.49	-2.70
		-0.30	0.00	0.00	0.00	10.00	0.00
2		0.00	0.00	0.00	-2.80	1.35	-2.80
3		-10.00	-3.30	-0.75	-3.30	-0.75	-2.80
		-0.50	-2.80	-0.49	-2.70		
4		-0.75	-3.30	1.35	-3.30	1.35	-3.20
		1.35	-2.80	10.00	-2.80		
5		1.35	-3.20	10.00	-3.20		
6		-10.00	-5.20	10.00	-5.20		

Soil parameters - effective stress state

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]
1	Mbushje		35.00	0.00	19.00
2	Shtrese 1 (suargjila)		16.00	40.00	18.00
3	Shtrese 2 (zhavorre)		24.00	10.00	20.10

Soil parameters - uplift

No.	Name	Pattern	γ_{sat} [kN/m ³]	γ_s [kN/m ³]	n [-]
1	Mbushje		20.00		
2	Shtrese 1 (suargjila)		22.00		
3	Shtrese 2 (zhavorre)		21.00		

Soil parameters

Mbushje

Unit weight : $\gamma = 19.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 35.00^\circ$
 Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

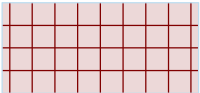
Shtrese 1 (suargjila)

Unit weight : $\gamma = 18.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 16.00^\circ$
 Cohesion of soil : $c_{ef} = 40.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 22.00 \text{ kN/m}^3$

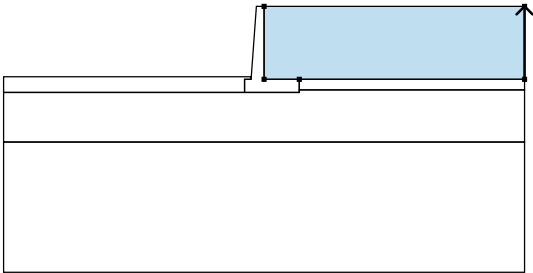
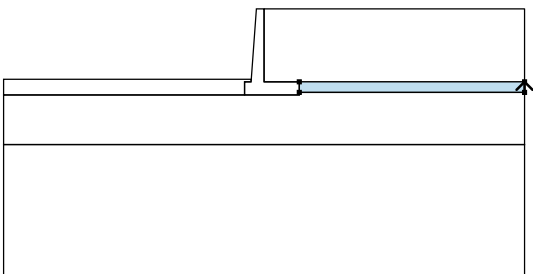
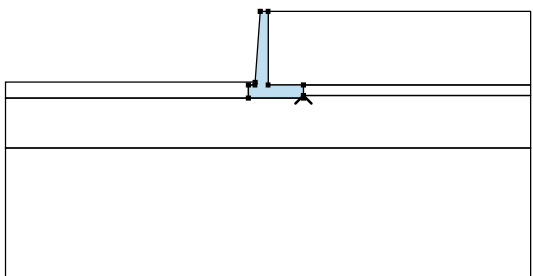
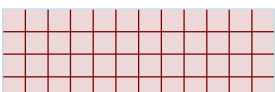
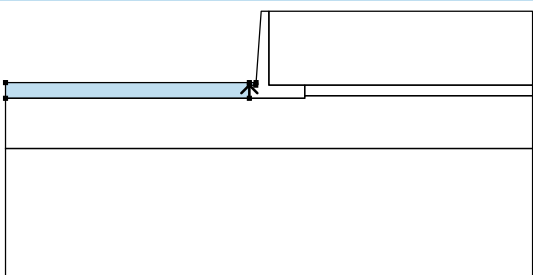
Shtrese 2 (zhavorre)

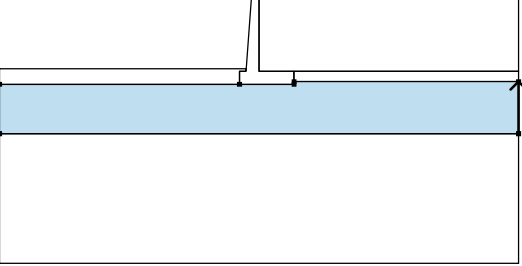
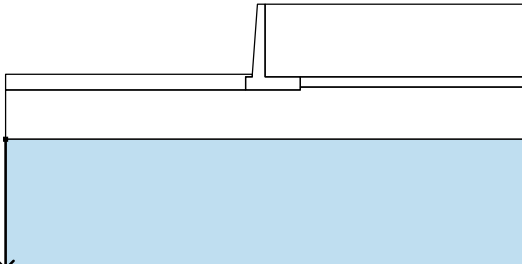
Unit weight : $\gamma = 20.10 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 24.00^\circ$
 Cohesion of soil : $c_{ef} = 10.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 21.00 \text{ kN/m}^3$

Rigid bodies

No.	Name	Sample	γ [kN/m ³]
1	Wall material		24.00

Assigning and surfaces

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
1		10.00	-2.80	10.00	0.00	Mbushje 
		0.00	0.00	0.00	-2.80	
		1.35	-2.80			
2		10.00	-3.20	10.00	-2.80	Mbushje 
		1.35	-2.80	1.35	-3.20	
3		1.35	-3.30	1.35	-3.20	Wall material 
		1.35	-2.80	0.00	-2.80	
		0.00	0.00	-0.30	0.00	
		-0.49	-2.70	-0.50	-2.80	
		-0.75	-2.80	-0.75	-3.30	
4		-0.75	-3.30	-0.75	-2.80	Mbushje 
		-0.50	-2.80	-0.49	-2.70	
		-0.75	-2.70	-10.00	-2.70	
		-10.00	-3.30			

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
5		10.00	-5.20	10.00	-3.20	Shtrese 2 (zhavorre) 
		1.35	-3.20	1.35	-3.30	
		-0.75	-3.30	-10.00	-3.30	
		-10.00	-5.20			
6		-10.00	-5.20	-10.00	-10.20	Shtrese 2 (zhavorre) 
		10.00	-10.20	10.00	-5.20	

Surcharge

No.	Type	Type of action	Location z [m]	Origin x [m]	Length l [m]	Width b [m]	Slope α [°]	Magnitude		
								q, q ₁ , f, F	q ₂	unit
1	strip	variable	on terrain	x = 2.00	l = 7.50		0.00	20.00		kN/m ²

Surcharges

No.	Name
1	Ngarkesa e Trafikut

Water

Water type : No water

Tensile crack

Tensile crack not inputted.

Earthquake

Earthquake not included.

Settings of the stage of construction

Design situation : permanent

Results (Stage of construction 1)

Analysis 1

Circular slip surface

Slip surface parameters					
Center :	x =	-0.41 [m]	Angles :	α_1 =	-35.46 [°]
	z =	1.34 [m]		α_2 =	74.33 [°]
Radius :	R =	4.96 [m]			
The slip surface after optimization.					

Slope stability verification (Bishop)

Sum of active forces : $F_a = 138.44$ kN/m

Sum of passive forces : $F_p = 201.18 \text{ kN/m}$

Sliding moment : $M_a = 686.69 \text{ kNm/m}$

Resisting moment : $M_p = 997.85 \text{ kNm/m}$

Utilization : 68.8 %

Slope stability ACCEPTABLE

Optimization of circular slip surface (Bishop)

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
1	-0.41	1.34	4.96	68.8 %	ACCEPTABLE
2	-0.41	1.34	4.96	68.8 %	ACCEPTABLE
3	-0.41	1.34	4.96	68.8 %	ACCEPTABLE
4	-1.89	12.60	16.20	3.9 %	ACCEPTABLE
5	-0.73	5.94	10.80	50.6 %	ACCEPTABLE
6	4.46	0.31	3.84	0.0 %	ACCEPTABLE
7	0.19	0.67	8.13	35.6 %	ACCEPTABLE
8	-4.33	1.34	4.96	0.2 %	ACCEPTABLE
9	-1.74	11.75	15.45	38.1 %	ACCEPTABLE
10	-20.57	25.13	32.76	0.1 %	ACCEPTABLE
11	-38.67	175.13	181.32	0.9 %	ACCEPTABLE
12	-0.41	1.34	4.96	68.8 %	ACCEPTABLE
13	-1.50	8.38	11.92	3.5 %	ACCEPTABLE
14	-0.68	4.47	8.87	55.9 %	ACCEPTABLE
15	2.20	1.34	4.96	0.4 %	ACCEPTABLE
16	0.09	0.77	6.93	42.7 %	ACCEPTABLE
17	-5.77	4.32	8.68	0.7 %	ACCEPTABLE
18	-3.02	1.34	4.96	0.6 %	ACCEPTABLE
19	-1.32	7.50	11.18	56.8 %	ACCEPTABLE
20	2.47	0.60	4.55	1.2 %	ACCEPTABLE
21	-22.63	39.46	46.39	0.3 %	ACCEPTABLE
22	-35.19	139.46	145.70	0.8 %	ACCEPTABLE
23	-0.41	1.34	4.96	68.8 %	ACCEPTABLE
24	-8.53	36.07	38.93	0.8 %	ACCEPTABLE
25	-4.30	17.31	20.20	1.2 %	ACCEPTABLE
26	-1.19	5.78	9.31	3.0 %	ACCEPTABLE
27	-0.63	3.47	7.58	60.0 %	ACCEPTABLE
28	1.33	1.34	4.96	3.3 %	ACCEPTABLE
29	0.00	0.88	6.17	49.3 %	ACCEPTABLE
30	-3.43	4.95	7.82	1.1 %	ACCEPTABLE
31	-3.90	5.50	8.53	1.1 %	ACCEPTABLE
32	-2.15	1.34	4.96	0.8 %	ACCEPTABLE
33	-1.75	0.20	4.38	1.5 %	ACCEPTABLE
34	-1.02	5.10	8.77	61.7 %	ACCEPTABLE
35	1.30	1.43	5.01	2.6 %	ACCEPTABLE
36	-24.42	51.39	58.07	0.4 %	ACCEPTABLE
37	-32.90	118.05	124.33	0.8 %	ACCEPTABLE
38	-22.68	51.39	58.07	0.9 %	ACCEPTABLE
39	-0.41	1.34	4.96	68.8 %	ACCEPTABLE
40	0.88	0.98	4.75	55.8 %	ACCEPTABLE
41	-2.88	11.27	14.06	1.2 %	ACCEPTABLE
42	-0.98	6.24	9.01	2.3 %	ACCEPTABLE
43	-0.96	4.18	7.71	3.1 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
44	-0.58	2.78	6.71	63.0 %	ACCEPTABLE
45	0.75	1.34	4.96	58.5 %	ACCEPTABLE
46	-0.09	0.98	5.70	54.6 %	ACCEPTABLE
47	-2.36	3.59	6.62	1.2 %	ACCEPTABLE
48	-1.43	2.53	5.28	1.6 %	ACCEPTABLE
49	-1.57	1.34	4.96	1.0 %	ACCEPTABLE
50	-1.33	0.65	4.58	2.6 %	ACCEPTABLE
51	-0.83	3.69	7.35	64.9 %	ACCEPTABLE
52	0.67	1.58	5.11	59.9 %	ACCEPTABLE
53	-25.72	60.39	66.96	0.5 %	ACCEPTABLE
54	-31.41	104.83	111.15	0.7 %	ACCEPTABLE
55	-24.56	60.39	66.96	0.8 %	ACCEPTABLE
56	-0.41	1.34	4.96	68.8 %	ACCEPTABLE
57	0.31	1.51	5.06	63.5 %	ACCEPTABLE
58	-1.66	6.14	9.16	1.2 %	ACCEPTABLE
59	-0.51	3.81	6.81	0.7 %	ACCEPTABLE
60	-0.79	3.17	6.72	3.8 %	ACCEPTABLE
61	-0.54	2.32	6.13	65.1 %	ACCEPTABLE
62	0.36	1.34	4.96	62.6 %	ACCEPTABLE
63	-0.17	1.07	5.42	58.6 %	ACCEPTABLE
64	-0.16	0.23	3.76	4.3 %	ACCEPTABLE
65	-1.70	2.79	5.98	0.9 %	ACCEPTABLE
66	-0.90	1.91	4.89	0.9 %	ACCEPTABLE
67	-1.18	1.34	4.96	1.4 %	ACCEPTABLE
68	-0.84	0.36	4.44	61.7 %	ACCEPTABLE
69	-1.04	0.92	4.72	3.8 %	ACCEPTABLE
70	-0.11	0.12	3.70	9.5 %	ACCEPTABLE
71	-0.69	2.84	6.48	66.9 %	ACCEPTABLE
72	0.28	1.57	5.10	64.0 %	ACCEPTABLE
73	-26.62	66.86	73.37	0.5 %	ACCEPTABLE
74	-30.42	96.49	102.83	0.7 %	ACCEPTABLE
75	-25.85	66.86	73.37	0.7 %	ACCEPTABLE
76	-0.41	1.34	4.96	68.8 %	ACCEPTABLE
77	0.02	1.59	5.11	66.8 %	ACCEPTABLE
78	-1.14	4.04	7.25	0.6 %	ACCEPTABLE
79	-0.40	2.77	5.96	0.6 %	ACCEPTABLE
80	-0.67	2.53	6.10	4.8 %	ACCEPTABLE
81	0.43	0.43	4.47	57.4 %	ACCEPTABLE
82	-0.50	2.00	5.74	66.4 %	ACCEPTABLE
83	0.11	1.34	4.96	64.9 %	ACCEPTABLE
84	-0.24	1.14	5.24	61.6 %	ACCEPTABLE
85	-0.27	0.62	4.16	4.0 %	ACCEPTABLE
86	-1.26	2.29	5.60	0.6 %	ACCEPTABLE
87	-0.69	1.66	4.83	0.6 %	ACCEPTABLE
88	-0.93	1.34	4.96	2.2 %	ACCEPTABLE
89	-0.72	0.75	4.63	65.7 %	ACCEPTABLE
90	-0.12	0.28	3.98	64.8 %	ACCEPTABLE
91	-0.53	0.20	4.38	59.7 %	ACCEPTABLE
92	-0.83	1.08	4.80	4.6 %	ACCEPTABLE
93	-0.21	0.49	4.09	13.4 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
94	-0.60	2.31	5.95	67.8 %	ACCEPTABLE
95	0.04	1.52	5.07	66.2 %	ACCEPTABLE
96	-27.23	71.38	77.86	0.6 %	ACCEPTABLE
97	-29.77	91.13	97.50	0.7 %	ACCEPTABLE
98	-26.72	71.38	77.86	0.7 %	ACCEPTABLE
99	-0.41	1.34	4.96	68.8 %	ACCEPTABLE
100	-0.14	1.56	5.09	68.1 %	ACCEPTABLE
101	-0.86	2.97	6.31	0.9 %	ACCEPTABLE
102	-0.38	2.22	5.55	1.1 %	ACCEPTABLE
103	-0.58	2.12	5.70	6.6 %	ACCEPTABLE
104	0.15	0.73	4.62	61.5 %	ACCEPTABLE
105	-0.48	1.78	5.48	67.2 %	ACCEPTABLE
106	-0.07	1.34	4.96	66.3 %	ACCEPTABLE
107	-0.29	1.20	5.14	63.7 %	ACCEPTABLE
108	-0.32	0.87	4.43	4.9 %	ACCEPTABLE
109	-0.98	1.97	5.37	0.9 %	ACCEPTABLE
110	-0.58	1.54	4.85	0.6 %	ACCEPTABLE
111	-0.75	1.34	4.96	3.4 %	ACCEPTABLE
112	-0.26	0.35	4.30	62.4 %	ACCEPTABLE
113	-0.04	0.15	4.07	60.9 %	ACCEPTABLE
114	-0.62	0.97	4.75	67.2 %	ACCEPTABLE
115	-0.22	0.62	4.29	66.7 %	ACCEPTABLE
116	-0.47	0.54	4.52	63.1 %	ACCEPTABLE
117	-0.69	1.17	4.86	7.9 %	ACCEPTABLE
118	-0.28	0.76	4.37	22.2 %	ACCEPTABLE
119	-0.54	1.97	5.60	22.1 %	ACCEPTABLE
120	-0.11	1.47	5.04	67.2 %	ACCEPTABLE
121	-27.65	74.49	80.94	0.6 %	ACCEPTABLE
122	-29.34	87.66	94.04	0.7 %	ACCEPTABLE
123	-27.30	74.49	80.94	0.7 %	ACCEPTABLE
124	-0.41	1.34	4.96	68.8 %	ACCEPTABLE
125	-0.24	1.50	5.06	23.9 %	ACCEPTABLE
126	-0.70	2.36	5.80	1.6 %	ACCEPTABLE
127	-0.38	1.90	5.32	2.1 %	ACCEPTABLE
128	-0.53	1.86	5.45	7.5 %	ACCEPTABLE
129	-0.04	0.93	4.72	64.1 %	ACCEPTABLE
130	-0.46	1.64	5.31	67.8 %	ACCEPTABLE
131	-0.18	1.34	4.96	67.2 %	ACCEPTABLE
132	-0.32	1.24	5.07	65.1 %	ACCEPTABLE
133	-0.35	1.03	4.61	6.7 %	ACCEPTABLE
134	-0.79	1.76	5.23	1.4 %	ACCEPTABLE
135	-0.52	1.46	4.88	1.4 %	ACCEPTABLE
136	-0.64	1.34	4.96	5.1 %	ACCEPTABLE
137	-0.30	0.65	4.49	64.6 %	ACCEPTABLE
138	-0.16	0.51	4.33	63.8 %	ACCEPTABLE
139	-0.56	1.11	4.82	68.3 %	ACCEPTABLE
140	-0.29	0.85	4.50	67.7 %	ACCEPTABLE
141	-0.44	0.78	4.65	65.0 %	ACCEPTABLE
142	-0.60	1.23	4.90	9.4 %	ACCEPTABLE
143	-0.32	0.95	4.56	23.6 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
144	-0.49	1.76	5.38	22.2 %	ACCEPTABLE
145	-0.21	1.43	5.02	67.8 %	ACCEPTABLE
146	-27.93	76.60	83.04	0.6 %	ACCEPTABLE
147	-29.05	85.38	91.77	0.7 %	ACCEPTABLE
148	-27.70	76.60	83.04	0.7 %	ACCEPTABLE
149	-0.41	1.34	4.96	68.8 %	ACCEPTABLE
150	-0.30	1.46	5.03	22.5 %	ACCEPTABLE
151	-0.60	2.00	5.49	2.5 %	ACCEPTABLE
152	-0.38	1.70	5.19	3.3 %	ACCEPTABLE
153	-0.49	1.68	5.28	9.5 %	ACCEPTABLE
154	-0.16	1.07	4.80	65.6 %	ACCEPTABLE
155	-0.44	1.54	5.19	68.2 %	ACCEPTABLE
156	-0.26	1.34	4.96	67.8 %	ACCEPTABLE
157	-0.35	1.27	5.03	66.2 %	ACCEPTABLE
158	-0.37	1.14	4.73	10.4 %	ACCEPTABLE
159	-0.66	1.62	5.13	2.1 %	ACCEPTABLE
160	-0.48	1.42	4.90	2.2 %	ACCEPTABLE
161	-0.56	1.34	4.96	7.4 %	ACCEPTABLE
162	-0.33	0.86	4.63	65.9 %	ACCEPTABLE
163	-0.24	0.77	4.52	65.6 %	ACCEPTABLE
164	-0.51	1.19	4.87	68.5 %	ACCEPTABLE
165	-0.33	1.01	4.65	68.2 %	ACCEPTABLE
166	-0.43	0.96	4.74	66.4 %	ACCEPTABLE
167	-0.54	1.27	4.92	13.2 %	ACCEPTABLE
168	-0.35	1.08	4.69	22.2 %	ACCEPTABLE
169	-0.47	1.61	5.24	22.1 %	ACCEPTABLE
170	-0.28	1.40	5.00	68.2 %	ACCEPTABLE
171	-28.11	78.03	84.46	0.6 %	ACCEPTABLE
172	-28.86	83.88	90.28	0.7 %	ACCEPTABLE
173	-27.96	78.03	84.46	0.6 %	ACCEPTABLE
174	-0.41	1.34	4.96	68.8 %	ACCEPTABLE
175	-0.34	1.42	5.01	23.9 %	ACCEPTABLE
176	-0.53	1.77	5.30	3.6 %	ACCEPTABLE
177	-0.39	1.58	5.11	4.6 %	ACCEPTABLE
178	-0.46	1.57	5.17	9.6 %	ACCEPTABLE
179	-0.24	1.16	4.85	66.7 %	ACCEPTABLE
180	-0.43	1.47	5.12	68.3 %	ACCEPTABLE
181	-0.31	1.34	4.96	68.2 %	ACCEPTABLE
182	-0.37	1.29	5.01	67.0 %	ACCEPTABLE
183	-0.39	1.20	4.80	14.4 %	ACCEPTABLE
184	-0.58	1.52	5.07	3.1 %	ACCEPTABLE
185	-0.45	1.39	4.92	3.6 %	ACCEPTABLE
186	-0.51	1.34	4.96	9.5 %	ACCEPTABLE
187	-0.36	1.02	4.73	67.2 %	ACCEPTABLE
188	-0.30	0.95	4.66	66.7 %	ACCEPTABLE
189	-0.48	1.24	4.90	68.6 %	ACCEPTABLE
190	-0.36	1.12	4.75	68.4 %	ACCEPTABLE
191	-0.42	1.08	4.81	67.1 %	ACCEPTABLE
192	-0.50	1.29	4.93	13.3 %	ACCEPTABLE
193	-0.37	1.16	4.78	22.2 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
194	-0.45	1.52	5.15	68.6 %	ACCEPTABLE
195	-0.32	1.38	4.99	68.4 %	ACCEPTABLE
196	-28.24	78.99	85.41	0.6 %	ACCEPTABLE
197	-28.74	82.89	89.29	0.7 %	ACCEPTABLE
198	-28.14	78.99	85.41	0.6 %	ACCEPTABLE
199	-0.41	1.34	4.96	68.8 %	ACCEPTABLE
200	-0.36	1.40	4.99	22.4 %	ACCEPTABLE
201	-0.49	1.62	5.18	4.5 %	ACCEPTABLE
202	-0.40	1.50	5.06	5.8 %	ACCEPTABLE
203	-0.45	1.49	5.10	13.3 %	ACCEPTABLE
204	-0.30	1.22	4.89	67.4 %	ACCEPTABLE
205	-0.42	1.43	5.06	68.5 %	ACCEPTABLE
206	-0.34	1.34	4.96	68.4 %	ACCEPTABLE
207	-0.38	1.31	4.99	67.6 %	ACCEPTABLE
208	-0.39	1.25	4.86	14.4 %	ACCEPTABLE
209	-0.52	1.46	5.04	5.1 %	ACCEPTABLE
210	-0.44	1.37	4.93	4.5 %	ACCEPTABLE
211	-0.48	1.34	4.96	13.3 %	ACCEPTABLE
212	-0.37	1.12	4.80	67.7 %	ACCEPTABLE
213	-0.33	1.08	4.75	67.6 %	ACCEPTABLE
214	-0.46	1.28	4.92	22.1 %	ACCEPTABLE
215	-0.37	1.19	4.82	68.4 %	ACCEPTABLE
216	-0.42	1.16	4.85	67.8 %	ACCEPTABLE
217	-0.47	1.31	4.94	13.3 %	ACCEPTABLE
218	-0.38	1.22	4.84	23.6 %	ACCEPTABLE
219	-0.44	1.46	5.08	22.1 %	ACCEPTABLE
220	-0.35	1.37	4.98	68.6 %	ACCEPTABLE
221	-28.32	79.63	86.05	0.6 %	ACCEPTABLE
222	-28.65	82.23	88.64	0.7 %	ACCEPTABLE
223	-28.25	79.63	86.05	0.6 %	ACCEPTABLE
224	-0.41	1.34	4.96	68.8 %	ACCEPTABLE
225	-0.38	1.38	4.98	22.4 %	ACCEPTABLE
226	-0.46	1.52	5.11	7.6 %	ACCEPTABLE
227	-0.40	1.44	5.02	9.7 %	ACCEPTABLE
228	-0.43	1.44	5.05	13.3 %	ACCEPTABLE
229	-0.34	1.26	4.91	67.9 %	ACCEPTABLE
230	-0.42	1.40	5.03	68.6 %	ACCEPTABLE
231	-0.36	1.34	4.96	68.5 %	ACCEPTABLE
232	-0.39	1.32	4.98	68.0 %	ACCEPTABLE
233	-0.40	1.28	4.89	13.4 %	ACCEPTABLE
234	-0.48	1.42	5.01	7.4 %	ACCEPTABLE
235	-0.43	1.36	4.94	6.1 %	ACCEPTABLE
236	-0.46	1.34	4.96	13.3 %	ACCEPTABLE
237	-0.39	1.19	4.85	68.0 %	ACCEPTABLE
238	-0.36	1.16	4.82	67.9 %	ACCEPTABLE
239	-0.44	1.30	4.94	68.7 %	ACCEPTABLE
240	-0.39	1.24	4.87	68.5 %	ACCEPTABLE
241	-0.41	1.22	4.89	68.1 %	ACCEPTABLE
242	-0.45	1.32	4.95	13.3 %	ACCEPTABLE
243	-0.39	1.26	4.88	23.6 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
244	-0.43	1.42	5.04	23.6 %	ACCEPTABLE
245	-0.37	1.36	4.97	68.7 %	ACCEPTABLE
246	-28.38	80.06	86.48	0.6 %	ACCEPTABLE
247	-28.60	81.79	88.20	0.7 %	ACCEPTABLE
248	-28.33	80.06	86.48	0.6 %	ACCEPTABLE
249	-0.41	1.34	4.96	68.8 %	ACCEPTABLE
250	-0.39	1.37	4.98	23.6 %	ACCEPTABLE
251	-0.45	1.46	5.06	9.6 %	ACCEPTABLE
252	-0.40	1.41	5.00	13.5 %	ACCEPTABLE
253	-0.43	1.41	5.02	22.2 %	ACCEPTABLE
254	-0.36	1.29	4.93	68.1 %	ACCEPTABLE
255	-0.42	1.38	5.01	68.6 %	ACCEPTABLE
256	-0.38	1.34	4.96	68.6 %	ACCEPTABLE
257	-0.40	1.33	4.97	68.4 %	ACCEPTABLE
258	-0.40	1.30	4.91	22.2 %	ACCEPTABLE
259	-0.46	1.39	4.99	9.5 %	ACCEPTABLE
260	-0.42	1.35	4.95	13.4 %	ACCEPTABLE
261	-0.44	1.34	4.96	22.1 %	ACCEPTABLE
262	-0.39	1.24	4.89	68.3 %	ACCEPTABLE
263	-0.38	1.22	4.87	68.2 %	ACCEPTABLE
264	-0.43	1.31	4.94	22.1 %	ACCEPTABLE
265	-0.39	1.27	4.90	68.5 %	ACCEPTABLE
266	-0.41	1.26	4.91	68.3 %	ACCEPTABLE
267	-0.44	1.33	4.95	23.6 %	ACCEPTABLE
268	-0.40	1.29	4.91	22.2 %	ACCEPTABLE
269	-0.42	1.39	5.01	23.6 %	ACCEPTABLE
270	-0.38	1.35	4.97	68.6 %	ACCEPTABLE
271	-28.41	80.35	86.76	0.6 %	ACCEPTABLE
272	-28.56	81.50	87.91	0.7 %	ACCEPTABLE
273	-28.38	80.35	86.76	0.7 %	ACCEPTABLE
274	-0.41	1.34	4.96	68.8 %	ACCEPTABLE
275	-0.40	1.36	4.97	22.2 %	ACCEPTABLE
276	-0.43	1.42	5.02	13.8 %	ACCEPTABLE
277	-0.41	1.39	4.99	13.4 %	ACCEPTABLE
278	-0.42	1.38	5.00	23.6 %	ACCEPTABLE
279	-0.38	1.30	4.94	68.2 %	ACCEPTABLE
280	-0.41	1.37	4.99	22.2 %	ACCEPTABLE
281	-0.39	1.34	4.96	68.7 %	ACCEPTABLE
282	-0.40	1.33	4.97	68.4 %	ACCEPTABLE
283	-0.41	1.31	4.93	22.2 %	ACCEPTABLE
284	-0.44	1.38	4.98	9.5 %	ACCEPTABLE
285	-0.42	1.35	4.95	13.4 %	ACCEPTABLE
286	-0.43	1.34	4.96	22.1 %	ACCEPTABLE
287	-0.40	1.27	4.91	68.4 %	ACCEPTABLE
288	-0.39	1.26	4.90	68.4 %	ACCEPTABLE
289	-0.42	1.32	4.95	22.1 %	ACCEPTABLE
290	-0.40	1.30	4.92	68.8 %	ACCEPTABLE
291	-0.41	1.29	4.93	68.4 %	ACCEPTABLE
292	-0.43	1.33	4.95	23.6 %	ACCEPTABLE
293	-0.40	1.30	4.92	68.8 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
294	-0.42	1.38	5.00	23.6 %	ACCEPTABLE
295	-0.39	1.35	4.97	68.7 %	ACCEPTABLE
296	-28.44	80.54	86.96	0.6 %	ACCEPTABLE
297	-28.54	81.31	87.72	0.6 %	ACCEPTABLE
298	-28.42	80.54	86.96	0.6 %	ACCEPTABLE
299	-0.41	1.34	4.96	68.8 %	ACCEPTABLE
300	-0.40	1.35	4.97	68.7 %	ACCEPTABLE
301	-0.43	1.39	5.00	22.2 %	ACCEPTABLE
302	-0.41	1.37	4.98	23.6 %	ACCEPTABLE
303	-0.42	1.37	4.99	22.1 %	ACCEPTABLE
304	-0.39	1.32	4.95	68.5 %	ACCEPTABLE
305	-0.41	1.36	4.98	68.8 %	ACCEPTABLE
306	-0.40	1.34	4.96	68.8 %	ACCEPTABLE
307	-0.40	1.33	4.97	68.4 %	ACCEPTABLE
308	-0.41	1.32	4.94	23.6 %	ACCEPTABLE
309	-0.43	1.36	4.97	13.3 %	ACCEPTABLE
310	-0.42	1.35	4.95	13.4 %	ACCEPTABLE
311	-0.42	1.34	4.96	22.2 %	ACCEPTABLE
312	-0.40	1.30	4.93	68.5 %	ACCEPTABLE
313	-0.39	1.29	4.92	68.5 %	ACCEPTABLE
314	-0.42	1.33	4.95	23.6 %	ACCEPTABLE
315	-0.40	1.31	4.93	68.8 %	ACCEPTABLE
316	-0.41	1.30	4.94	68.5 %	ACCEPTABLE
317	-0.42	1.33	4.96	22.1 %	ACCEPTABLE
318	-0.41	1.32	4.94	23.6 %	ACCEPTABLE
319	-0.41	1.36	4.98	68.8 %	ACCEPTABLE
320	-0.40	1.35	4.96	22.2 %	ACCEPTABLE
321	-28.45	80.67	87.08	0.6 %	ACCEPTABLE
322	-28.52	81.18	87.59	0.6 %	ACCEPTABLE
323	-28.44	80.67	87.08	0.6 %	ACCEPTABLE
324	-0.41	1.34	4.96	68.8 %	ACCEPTABLE

Input data (Stage of construction 2)

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	3.20	Mbushje	
2	2.00	Shtrese 2 (zhavorre)	
3	-	Shtrese 2 (zhavorre)	

Foundation

Type of foundation : soil from geological profile

Terrain profile

Terrain behind the structure is flat.

Water influence

Ground water table is located below the structure.

Input surface surcharges

No.	Surcharge new	change	Action	Mag.1 [kN/m ²]	Mag.2 [kN/m ²]	Ord.x x [m]	Length l [m]	Depth z [m]
1	NO	YES	variable	4.00		2.00	7.50	on terrain
No.	Name							
1	Ngarkesa e Trafikut							

Resistance on front face of the structure

Resistance on front face of the structure: at rest

Soil on front face of the structure - Mbushje

Soil thickness in front of structure $h = 0.60 \text{ m}$

Terrain in front of structure is flat.

Earthquake

Factor of horizontal acceleration $K_h = 0.2040$

Factor of vertical acceleration $K_v = 0.1020$

Water below the GWT is restricted.

Settings of the stage of construction

Design situation : seismic

The wall is free to move. Active earth pressure is therefore assumed.

Verification No. 1 (Stage of construction 2)**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	-1.04	52.08	0.79	1.000	1.000	1.000
Earthq.- constr.	10.62	-1.04	-5.31	0.79	1.000	1.000	1.000
FF resistance	-1.46	-0.20	0.01	0.22	1.000	1.000	1.000
Weight - earth wedge	0.00	-1.36	33.26	1.20	1.000	1.000	1.000
Earthquake - soil wedge	6.78	-1.36	-3.39	1.20	1.000	1.000	1.000
Active pressure	26.45	-1.15	41.11	1.65	1.000	1.000	1.000
Earthq.- act.pressure	17.27	-2.18	30.12	1.25	1.000	1.000	1.000
Ngarkesa e Trafikut	1.14	-0.77	1.42	1.78	0.000	0.000	0.700

Verification of complete wall**Check for overturning stability**

Resisting moment $M_{res} = 178.30 \text{ kNm/m}$

Overturning moment $M_{ovr} = 88.14 \text{ kNm/m}$

Wall for overturning is SATISFACTORY

Check for slip

Resisting horizontal force $H_{res} = 78.03 \text{ kN/m}$

Active horizontal force $H_{act} = 59.68 \text{ kN/m}$

Wall for slip is SATISFACTORY

Overall check - WALL is SATISFACTORY

Maximum stress in footing bottom : 121.34 kPa

Bearing capacity of foundation soil (Stage of construction 2)**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	64.99	148.87	60.48	0.208	121.34
2	65.11	147.87	59.68	0.210	121.26

Service load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	64.99	148.87	60.48
2	65.11	147.87	59.68

Verification of foundation soil**Eccentricity verification**

Max. eccentricity of normal force $e = 0.208$

Maximum allowable eccentricity $e_{alw} = 0.333$

Eccentricity of the normal force is SATISFACTORY**Verification of bearing capacity**

Max. stress at footing bottom $\sigma = 121.34$ kPa

Bearing capacity of foundation soil $R_d = 200.00$ kPa

Bearing capacity of foundation soil is SATISFACTORY**Overall verification - bearing capacity of found. soil is SATISFACTORY****Dimensioning No. 1 (Stage of construction 2)****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	-0.25	16.20	1.43	1.000
Weight - earth wedge	0.00	-1.36	33.26	1.20	1.000
Active pressure	26.45	-1.15	41.11	1.65	1.000
Ngarkesa e Trafikut	1.14	-0.77	1.42	1.78	0.700
Contact stress	0.00	0.00	-52.25	1.11	1.000

Back wall jump check

Reinforcement and dimensions of the cross-section

Bar diameter = 14.0 mm

Number of bars = 5

Reinforcement cover = 40.0 mm

Cross-section width = 1.00 m

Cross-section depth = 0.50 m

Reinforcement ratio $\rho = 0.17 \% > 0.14 \% = \rho_{min}$

Position of neutral axis $x = 0.03 \text{ m} < 0.28 \text{ m} = x_{max}$

Ultimate shear force $V_{Rd} = 170.23 \text{ kN} > 39.31 \text{ kN} = V_{Ed}$

Ultimate moment $M_{Rd} = 148.24 \text{ kNm} > 44.84 \text{ kNm} = M_{Ed}$

Cross-section is SATISFACTORY.

Slope stability analysis

Input data

Project

Settings

(input for current task)

Stability analysis

Earthquake analysis : Standard

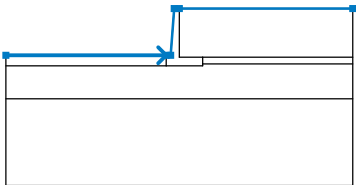
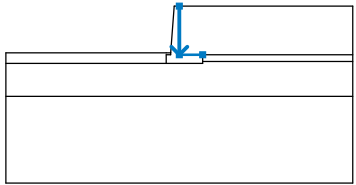
Verification methodology : according to EN 1997

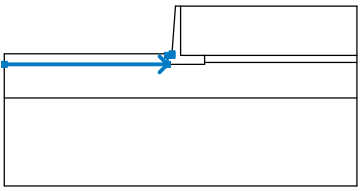
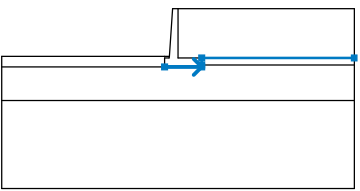
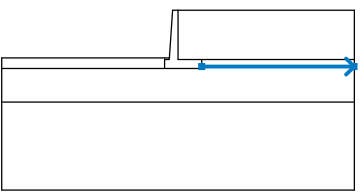
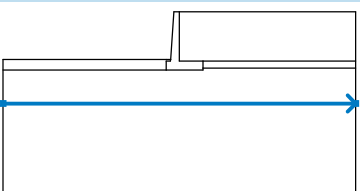
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)					
Seismic design situation					
		State STR		State GEO	
		Unfavourable	Favourable	Unfavourable	Favourable
Permanent actions :	$\gamma_G =$	1.00 [-]	1.00 [-]	1.00 [-]	1.00 [-]
Variable actions :	$\gamma_Q =$	1.00 [-]	0.00 [-]	1.00 [-]	0.00 [-]
Water load :	$\gamma_W =$			1.00 [-]	

Partial factors for soil parameters (M)			
Seismic design situation			
Partial factor on internal friction :	$\gamma_\phi =$	1.00	[-]
Partial factor on effective cohesion :	$\gamma_c =$	1.00	[-]
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.00	[-]

Interface

No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
1		-10.00	-2.70	-0.75	-2.70	-0.49	-2.70
		-0.30	0.00	0.00	0.00	10.00	0.00
2		0.00	0.00	0.00	-2.80	1.35	-2.80

No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
3		-10.00	-3.30	-0.75	-3.30	-0.75	-2.80
		-0.50	-2.80	-0.49	-2.70		
4		-0.75	-3.30	1.35	-3.30	1.35	-3.20
		1.35	-2.80	10.00	-2.80		
5		1.35	-3.20	10.00	-3.20		
6		-10.00	-5.20	10.00	-5.20		

Soil parameters - effective stress state

No.	Name	Pattern	Φ_{ef} [°]	C_{ef} [kPa]	γ [kN/m ³]
1	Mbushje		35.00	0.00	19.00
2	Shtrese 1 (suargjila)		16.00	40.00	18.00
3	Shtrese 2 (zhavorre)		24.00	10.00	20.10

Soil parameters - uplift

No.	Name	Pattern	γ_{sat} [kN/m ³]	γ_s [kN/m ³]	n [-]
1	Mbushje		20.00		
2	Shtrese 1 (suargjila)		22.00		

No.	Name	Pattern	γ_{sat} [kN/m ³]	γ_s [kN/m ³]	n [-]
3	Shtrese 2 (zhavorre)		21.00		

Soil parameters

Mbushje

Unit weight : $\gamma = 19.00$ kN/m³
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 35.00^\circ$
 Cohesion of soil : $c_{ef} = 0.00$ kPa
 Saturated unit weight : $\gamma_{sat} = 20.00$ kN/m³

Shtrese 1 (suargjila)

Unit weight : $\gamma = 18.00$ kN/m³
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 16.00^\circ$
 Cohesion of soil : $c_{ef} = 40.00$ kPa
 Saturated unit weight : $\gamma_{sat} = 22.00$ kN/m³

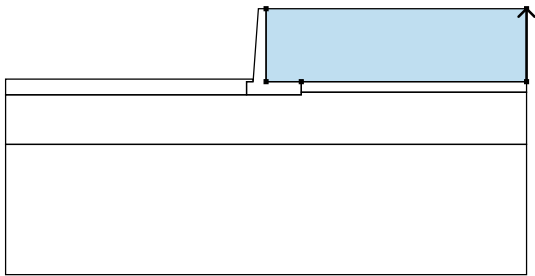
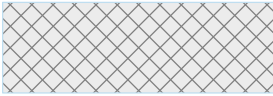
Shtrese 2 (zhavorre)

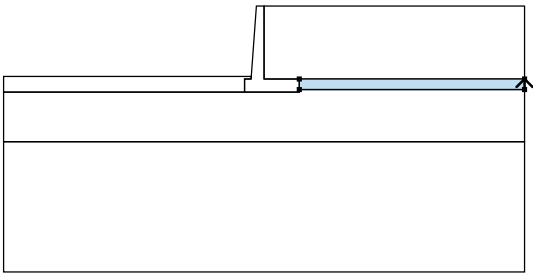
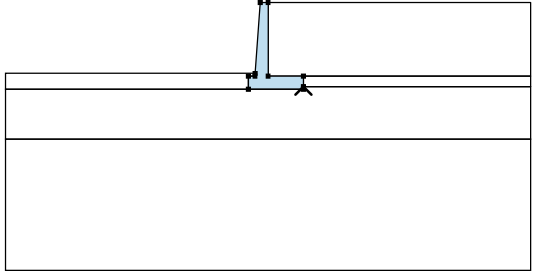
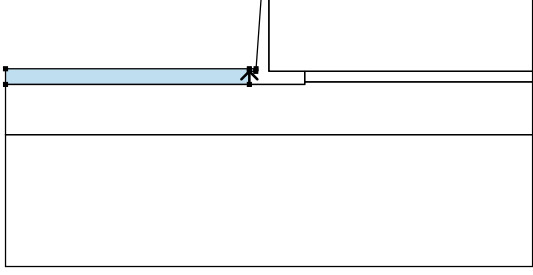
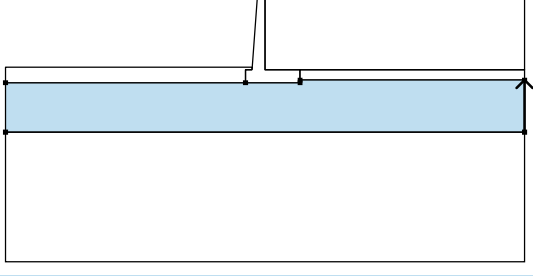
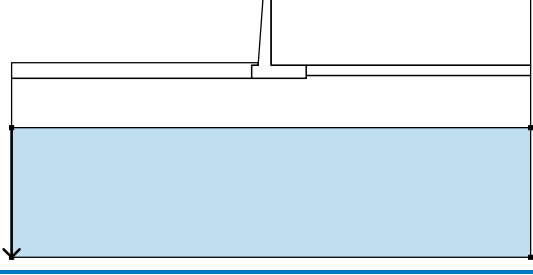
Unit weight : $\gamma = 20.10$ kN/m³
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 24.00^\circ$
 Cohesion of soil : $c_{ef} = 10.00$ kPa
 Saturated unit weight : $\gamma_{sat} = 21.00$ kN/m³

Rigid bodies

No.	Name	Sample	γ [kN/m ³]
1	Wall material		24.00

Assigning and surfaces

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
1		10.00	-2.80	10.00	0.00	Mbushje 
		0.00	0.00	0.00	-2.80	
		1.35	-2.80			

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
2		10.00	-3.20	10.00	-2.80	Mbushje
		1.35	-2.80	1.35	-3.20	
3		1.35	-3.30	1.35	-3.20	Wall material
		1.35	-2.80	0.00	-2.80	
		0.00	0.00	-0.30	0.00	
		-0.49	-2.70	-0.50	-2.80	
		-0.75	-2.80	-0.75	-3.30	
4		-0.75	-3.30	-0.75	-2.80	Mbushje
		-0.50	-2.80	-0.49	-2.70	
		-0.75	-2.70	-10.00	-2.70	
		-10.00	-3.30			
5		10.00	-5.20	10.00	-3.20	Shtrese 2 (zhavorre)
		1.35	-3.20	1.35	-3.30	
		-0.75	-3.30	-10.00	-3.30	
		-10.00	-5.20			
6		-10.00	-5.20	-10.00	-10.20	Shtrese 2 (zhavorre)
		10.00	-10.20	10.00	-5.20	

Surcharge

No.	Type	Type of action	Location z [m]	Origin x [m]	Length l [m]	Width b [m]	Slope α [°]	Magnitude		unit
1	strip	variable	on terrain	x = 2.00	l = 7.50		0.00	q, q ₁ , f, F	q ₂	kN/m ²

Surcharges

No.	Name
1	Ngarkesa e Trafikut

Water

Water type : No water

Tensile crack

Tensile crack not inputted.

Earthquake

Horizontal seismic coefficient : $K_h = 0.20$

Vertical seismic coefficient : $K_v = 0.10$

Settings of the stage of construction

Design situation : seismic

Results (Stage of construction 1)**Analysis 1****Circular slip surface**

Slip surface parameters					
Center :	x =	-0.47 [m]	Angles :	α_1 =	-30.02 [°]
	z =	2.85 [m]		α_2 =	63.60 [°]
Radius :	R =	6.41 [m]			
The slip surface after optimization.					

Slope stability verification (Bishop)

Sum of active forces : $F_a = 136.23$ kN/m

Sum of passive forces : $F_p = 205.27$ kN/m

Sliding moment : $M_a = 873.27$ kNm/m

Resisting moment : $M_p = 1315.81$ kNm/m

Utilization : 66.4 %

Slope stability ACCEPTABLE**Optimization of circular slip surface (Bishop)**

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
1	-0.47	2.85	6.41	66.4 %	ACCEPTABLE
2	-0.47	2.85	6.41	66.4 %	ACCEPTABLE
3	-0.47	2.85	6.41	66.4 %	ACCEPTABLE
4	-2.11	16.74	20.20	1.7 %	ACCEPTABLE
5	-0.76	8.34	12.98	55.4 %	ACCEPTABLE
6	4.72	1.20	4.63	15.7 %	ACCEPTABLE
7	0.31	1.67	9.04	41.3 %	ACCEPTABLE
8	-4.39	2.85	6.41	0.6 %	ACCEPTABLE
9	-1.83	14.96	18.58	56.7 %	ACCEPTABLE
10	-23.00	39.32	46.25	0.3 %	ACCEPTABLE
11	-0.47	2.85	6.41	66.4 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
12	-1.66	11.54	14.98	1.4 %	ACCEPTABLE
13	-0.71	6.57	10.82	57.7 %	ACCEPTABLE
14	2.14	2.85	6.41	1.0 %	ACCEPTABLE
15	0.19	1.84	7.91	46.4 %	ACCEPTABLE
16	-3.08	2.85	6.41	1.1 %	ACCEPTABLE
17	-2.38	0.51	5.06	2.2 %	ACCEPTABLE
18	-1.38	10.10	13.71	59.9 %	ACCEPTABLE
19	2.17	2.77	6.35	1.0 %	ACCEPTABLE
20	-25.75	57.88	64.48	0.5 %	ACCEPTABLE
21	-39.03	174.81	181.00	1.5 %	ACCEPTABLE
22	-0.47	2.85	6.41	66.4 %	ACCEPTABLE
23	1.76	1.25	5.40	44.2 %	ACCEPTABLE
24	-12.04	57.77	60.83	1.3 %	ACCEPTABLE
25	-7.06	30.48	33.58	1.8 %	ACCEPTABLE
26	-1.31	8.35	11.79	1.5 %	ACCEPTABLE
27	-0.66	5.37	9.37	59.8 %	ACCEPTABLE
28	1.27	2.85	6.41	4.1 %	ACCEPTABLE
29	0.06	2.03	7.24	51.2 %	ACCEPTABLE
30	-4.20	9.43	12.19	1.1 %	ACCEPTABLE
31	-5.84	12.09	15.29	1.1 %	ACCEPTABLE
32	-2.21	2.85	6.41	0.8 %	ACCEPTABLE
33	-1.78	1.42	5.50	3.4 %	ACCEPTABLE
34	-1.09	7.32	10.92	62.1 %	ACCEPTABLE
35	1.14	3.29	6.74	2.3 %	ACCEPTABLE
36	-27.79	72.63	79.09	0.7 %	ACCEPTABLE
37	-36.70	150.58	156.80	1.3 %	ACCEPTABLE
38	-26.05	72.63	79.09	1.3 %	ACCEPTABLE
39	-0.47	2.85	6.41	66.4 %	ACCEPTABLE
40	0.64	3.03	6.54	60.4 %	ACCEPTABLE
41	-3.46	16.40	19.15	1.7 %	ACCEPTABLE
42	-1.48	10.03	12.78	1.9 %	ACCEPTABLE
43	-1.05	6.38	9.83	1.8 %	ACCEPTABLE
44	1.44	0.37	5.01	41.8 %	ACCEPTABLE
45	-0.62	4.56	8.39	62.6 %	ACCEPTABLE
46	0.69	2.85	6.41	59.4 %	ACCEPTABLE
47	-0.05	2.20	6.85	54.9 %	ACCEPTABLE
48	-0.10	0.86	4.30	2.6 %	ACCEPTABLE
49	-2.69	6.37	9.32	1.6 %	ACCEPTABLE
50	-1.84	5.13	7.86	1.6 %	ACCEPTABLE
51	-1.63	2.85	6.41	1.0 %	ACCEPTABLE
52	-1.02	0.82	5.20	56.9 %	ACCEPTABLE
53	0.23	0.04	3.88	53.5 %	ACCEPTABLE
54	-0.78	0.04	4.89	49.8 %	ACCEPTABLE
55	-1.37	1.97	5.82	4.2 %	ACCEPTABLE
56	-0.03	0.68	4.20	12.0 %	ACCEPTABLE
57	-0.88	5.67	9.26	64.5 %	ACCEPTABLE
58	0.55	3.31	6.75	60.6 %	ACCEPTABLE
59	-29.21	83.51	89.91	0.8 %	ACCEPTABLE
60	-35.16	135.48	141.72	1.2 %	ACCEPTABLE
61	-28.05	83.51	89.91	1.2 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
62	-0.47	2.85	6.41	66.4 %	ACCEPTABLE
63	0.16	3.32	6.76	63.2 %	ACCEPTABLE
64	-1.92	9.21	12.18	1.3 %	ACCEPTABLE
65	-0.75	6.34	9.29	0.7 %	ACCEPTABLE
66	-0.87	5.13	8.61	2.9 %	ACCEPTABLE
67	0.82	1.14	5.35	51.3 %	ACCEPTABLE
68	-0.58	4.00	7.74	63.7 %	ACCEPTABLE
69	0.30	2.85	6.41	62.1 %	ACCEPTABLE
70	-0.16	2.36	6.64	57.9 %	ACCEPTABLE
71	-0.27	1.59	5.03	2.2 %	ACCEPTABLE
72	-1.89	4.98	8.10	0.9 %	ACCEPTABLE
73	-1.13	3.92	6.85	1.0 %	ACCEPTABLE
74	-1.24	2.85	6.41	1.5 %	ACCEPTABLE
75	-0.15	0.36	4.67	53.7 %	ACCEPTABLE
76	-0.87	1.61	5.60	62.1 %	ACCEPTABLE
77	-0.02	0.88	4.60	60.5 %	ACCEPTABLE
78	-0.62	0.76	5.17	55.7 %	ACCEPTABLE
79	-1.08	2.30	6.03	5.2 %	ACCEPTABLE
80	-0.18	1.33	4.86	12.1 %	ACCEPTABLE
81	-0.75	4.66	8.24	65.3 %	ACCEPTABLE
82	0.19	3.22	6.68	64.0 %	ACCEPTABLE
83	-30.17	91.24	97.60	0.9 %	ACCEPTABLE
84	-34.15	125.88	132.14	1.1 %	ACCEPTABLE
85	-29.40	91.24	97.60	1.2 %	ACCEPTABLE
86	-0.47	2.85	6.41	66.4 %	ACCEPTABLE
87	-0.09	3.29	6.73	8.7 %	ACCEPTABLE
88	-1.30	6.39	9.54	0.6 %	ACCEPTABLE
89	-0.55	4.83	7.97	0.5 %	ACCEPTABLE
90	-0.74	4.34	7.84	3.8 %	ACCEPTABLE
91	0.40	1.68	5.65	56.9 %	ACCEPTABLE
92	-0.55	3.63	7.30	64.6 %	ACCEPTABLE
93	0.05	2.85	6.41	63.7 %	ACCEPTABLE
94	-0.24	2.49	6.52	60.3 %	ACCEPTABLE
95	-0.35	2.03	5.50	2.9 %	ACCEPTABLE
96	-1.39	4.20	7.44	0.6 %	ACCEPTABLE
97	-0.84	3.45	6.57	0.6 %	ACCEPTABLE
98	-0.99	2.85	6.41	2.2 %	ACCEPTABLE
99	-0.22	1.03	5.08	58.4 %	ACCEPTABLE
100	0.09	0.71	4.72	56.3 %	ACCEPTABLE
101	-0.75	2.08	5.89	64.2 %	ACCEPTABLE
102	-0.18	1.50	5.15	63.6 %	ACCEPTABLE
103	-0.53	1.34	5.45	59.5 %	ACCEPTABLE
104	-0.88	2.50	6.16	6.4 %	ACCEPTABLE
105	-0.28	1.81	5.35	12.1 %	ACCEPTABLE
106	-0.66	4.02	7.60	65.8 %	ACCEPTABLE
107	-0.04	3.12	6.61	65.1 %	ACCEPTABLE
108	-30.82	96.60	102.94	1.0 %	ACCEPTABLE
109	-33.47	119.69	125.97	1.1 %	ACCEPTABLE
110	-30.31	96.60	102.94	1.1 %	ACCEPTABLE
111	-0.47	2.85	6.41	66.4 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
112	-0.23	3.19	6.66	8.5 %	ACCEPTABLE
113	-0.98	4.98	8.26	0.6 %	ACCEPTABLE
114	-0.49	4.06	7.33	0.6 %	ACCEPTABLE
115	-0.65	3.83	7.35	4.5 %	ACCEPTABLE
116	0.11	2.06	5.87	60.4 %	ACCEPTABLE
117	-0.53	3.37	7.01	65.1 %	ACCEPTABLE
118	-0.13	2.85	6.41	64.7 %	ACCEPTABLE
119	-0.31	2.59	6.47	62.0 %	ACCEPTABLE
120	-0.40	2.31	5.80	3.9 %	ACCEPTABLE
121	-1.08	3.72	7.06	0.7 %	ACCEPTABLE
122	-0.69	3.21	6.47	0.5 %	ACCEPTABLE
123	-0.81	2.85	6.41	3.4 %	ACCEPTABLE
124	-0.29	1.55	5.44	61.2 %	ACCEPTABLE
125	-0.08	1.32	5.18	60.2 %	ACCEPTABLE
126	-0.67	2.37	6.08	65.2 %	ACCEPTABLE
127	-0.28	1.93	5.55	64.7 %	ACCEPTABLE
128	-0.49	1.78	5.70	61.9 %	ACCEPTABLE
129	-0.75	2.62	6.25	9.1 %	ACCEPTABLE
130	-0.34	2.14	5.69	20.2 %	ACCEPTABLE
131	-0.59	3.62	7.19	66.0 %	ACCEPTABLE
132	-0.18	3.04	6.55	65.6 %	ACCEPTABLE
133	-31.26	100.26	106.59	1.0 %	ACCEPTABLE
134	-33.03	115.66	121.94	1.1 %	ACCEPTABLE
135	-30.91	100.26	106.59	1.1 %	ACCEPTABLE
136	-0.47	2.85	6.41	66.4 %	ACCEPTABLE
137	-0.31	3.09	6.59	12.9 %	ACCEPTABLE
138	-0.79	4.18	7.55	1.1 %	ACCEPTABLE
139	-0.47	3.61	6.98	1.4 %	ACCEPTABLE
140	-0.59	3.50	7.03	6.4 %	ACCEPTABLE
141	-0.08	2.31	6.04	62.5 %	ACCEPTABLE
142	-0.51	3.20	6.81	65.6 %	ACCEPTABLE
143	-0.24	2.85	6.41	65.3 %	ACCEPTABLE
144	-0.36	2.67	6.44	63.3 %	ACCEPTABLE
145	-0.42	2.49	6.01	7.0 %	ACCEPTABLE
146	-0.87	3.42	6.83	1.2 %	ACCEPTABLE
147	-0.61	3.07	6.43	1.0 %	ACCEPTABLE
148	-0.70	2.85	6.41	4.5 %	ACCEPTABLE
149	-0.34	1.94	5.72	63.0 %	ACCEPTABLE
150	-0.20	1.78	5.54	62.5 %	ACCEPTABLE
151	-0.61	2.54	6.19	65.8 %	ACCEPTABLE
152	-0.34	2.23	5.83	65.4 %	ACCEPTABLE
153	-0.47	2.10	5.90	63.4 %	ACCEPTABLE
154	-0.65	2.70	6.31	12.8 %	ACCEPTABLE
155	-0.39	2.37	5.92	12.9 %	ACCEPTABLE
156	-0.55	3.36	6.92	19.9 %	ACCEPTABLE
157	-0.28	2.98	6.50	66.1 %	ACCEPTABLE
158	-31.55	102.74	109.07	1.0 %	ACCEPTABLE
159	-32.73	113.01	119.30	1.1 %	ACCEPTABLE
160	-31.32	102.74	109.07	1.1 %	ACCEPTABLE
161	-0.47	2.85	6.41	66.4 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
162	-0.37	3.02	6.53	8.5 %	ACCEPTABLE
163	-0.68	3.70	7.14	2.0 %	ACCEPTABLE
164	-0.47	3.34	6.77	2.3 %	ACCEPTABLE
165	-0.55	3.28	6.82	8.8 %	ACCEPTABLE
166	-0.21	2.49	6.16	63.9 %	ACCEPTABLE
167	-0.50	3.08	6.68	65.7 %	ACCEPTABLE
168	-0.32	2.85	6.41	65.7 %	ACCEPTABLE
169	-0.39	2.73	6.42	64.3 %	ACCEPTABLE
170	-0.44	2.61	6.14	6.7 %	ACCEPTABLE
171	-0.74	3.23	6.69	1.9 %	ACCEPTABLE
172	-0.56	2.99	6.42	1.9 %	ACCEPTABLE
173	-0.62	2.85	6.41	6.5 %	ACCEPTABLE
174	-0.38	2.22	5.93	64.1 %	ACCEPTABLE
175	-0.29	2.11	5.80	63.9 %	ACCEPTABLE
176	-0.56	2.65	6.27	65.9 %	ACCEPTABLE
177	-0.39	2.43	6.02	65.8 %	ACCEPTABLE
178	-0.47	2.33	6.05	64.3 %	ACCEPTABLE
179	-0.59	2.75	6.34	11.8 %	ACCEPTABLE
180	-0.41	2.53	6.08	11.9 %	ACCEPTABLE
181	-0.53	3.18	6.75	66.1 %	ACCEPTABLE
182	-0.34	2.94	6.47	66.2 %	ACCEPTABLE
183	-31.75	104.42	110.74	1.0 %	ACCEPTABLE
184	-32.53	111.26	117.56	1.1 %	ACCEPTABLE
185	-31.59	104.42	110.74	1.1 %	ACCEPTABLE
186	-0.47	2.85	6.41	66.4 %	ACCEPTABLE
187	-0.40	2.97	6.49	9.2 %	ACCEPTABLE
188	-0.61	3.40	6.88	3.0 %	ACCEPTABLE
189	-0.46	3.17	6.64	3.4 %	ACCEPTABLE
190	-0.53	3.13	6.68	9.1 %	ACCEPTABLE
191	-0.29	2.61	6.24	64.7 %	ACCEPTABLE
192	-0.49	3.01	6.59	66.0 %	ACCEPTABLE
193	-0.37	2.85	6.41	65.9 %	ACCEPTABLE
194	-0.42	2.77	6.42	64.9 %	ACCEPTABLE
195	-0.45	2.69	6.23	8.5 %	ACCEPTABLE
196	-0.65	3.10	6.59	2.6 %	ACCEPTABLE
197	-0.53	2.94	6.41	2.6 %	ACCEPTABLE
198	-0.57	2.85	6.41	8.4 %	ACCEPTABLE
199	-0.41	2.42	6.08	64.8 %	ACCEPTABLE
200	-0.34	2.35	5.99	64.9 %	ACCEPTABLE
201	-0.53	2.72	6.32	66.1 %	ACCEPTABLE
202	-0.41	2.57	6.15	66.0 %	ACCEPTABLE
203	-0.47	2.50	6.16	65.1 %	ACCEPTABLE
204	-0.55	2.79	6.36	8.4 %	ACCEPTABLE
205	-0.43	2.63	6.19	20.1 %	ACCEPTABLE
206	-0.51	3.07	6.63	21.3 %	ACCEPTABLE
207	-0.39	2.91	6.45	66.3 %	ACCEPTABLE
208	-31.88	105.54	111.86	1.0 %	ACCEPTABLE
209	-32.40	110.11	116.41	1.0 %	ACCEPTABLE
210	-31.78	105.54	111.86	1.0 %	ACCEPTABLE
211	-0.47	2.85	6.41	66.4 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
212	-0.43	2.93	6.47	21.4 %	ACCEPTABLE
213	-0.56	3.21	6.72	4.0 %	ACCEPTABLE
214	-0.47	3.06	6.56	4.6 %	ACCEPTABLE
215	-0.51	3.04	6.59	11.8 %	ACCEPTABLE
216	-0.35	2.69	6.30	65.2 %	ACCEPTABLE
217	-0.48	2.95	6.53	66.0 %	ACCEPTABLE
218	-0.40	2.85	6.41	66.1 %	ACCEPTABLE
219	-0.43	2.79	6.41	65.3 %	ACCEPTABLE
220	-0.46	2.74	6.29	11.9 %	ACCEPTABLE
221	-0.59	3.02	6.53	3.6 %	ACCEPTABLE
222	-0.51	2.91	6.41	4.0 %	ACCEPTABLE
223	-0.54	2.85	6.41	11.8 %	ACCEPTABLE
224	-0.43	2.56	6.18	65.4 %	ACCEPTABLE
225	-0.39	2.51	6.13	65.2 %	ACCEPTABLE
226	-0.51	2.76	6.35	66.1 %	ACCEPTABLE
227	-0.43	2.66	6.23	66.2 %	ACCEPTABLE
228	-0.47	2.61	6.24	65.5 %	ACCEPTABLE
229	-0.53	2.81	6.38	21.4 %	ACCEPTABLE
230	-0.45	2.71	6.26	11.9 %	ACCEPTABLE
231	-0.49	3.00	6.56	21.3 %	ACCEPTABLE
232	-0.41	2.89	6.44	66.3 %	ACCEPTABLE
233	-31.96	106.30	112.61	1.1 %	ACCEPTABLE
234	-32.31	109.34	115.64	1.0 %	ACCEPTABLE
235	-31.90	106.30	112.61	1.0 %	ACCEPTABLE
236	-0.47	2.85	6.41	66.4 %	ACCEPTABLE
237	-0.44	2.90	6.45	66.3 %	ACCEPTABLE
238	-0.53	3.09	6.61	5.6 %	ACCEPTABLE
239	-0.47	2.99	6.51	5.6 %	ACCEPTABLE
240	-0.49	2.98	6.53	20.0 %	ACCEPTABLE
241	-0.39	2.74	6.33	65.6 %	ACCEPTABLE
242	-0.48	2.92	6.49	66.1 %	ACCEPTABLE
243	-0.42	2.85	6.41	66.2 %	ACCEPTABLE
244	-0.45	2.81	6.41	65.7 %	ACCEPTABLE
245	-0.46	2.78	6.33	12.8 %	ACCEPTABLE
246	-0.55	2.96	6.49	5.4 %	ACCEPTABLE
247	-0.50	2.89	6.41	5.3 %	ACCEPTABLE
248	-0.52	2.85	6.41	11.8 %	ACCEPTABLE
249	-0.44	2.66	6.26	65.7 %	ACCEPTABLE
250	-0.41	2.62	6.22	65.6 %	ACCEPTABLE
251	-0.50	2.79	6.37	20.0 %	ACCEPTABLE
252	-0.45	2.73	6.29	20.1 %	ACCEPTABLE
253	-0.47	2.69	6.30	65.7 %	ACCEPTABLE
254	-0.51	2.82	6.39	11.9 %	ACCEPTABLE
255	-0.45	2.75	6.31	21.4 %	ACCEPTABLE
256	-0.49	2.95	6.51	20.0 %	ACCEPTABLE
257	-0.43	2.88	6.43	66.3 %	ACCEPTABLE
258	-32.02	106.80	113.11	1.0 %	ACCEPTABLE
259	-32.26	108.83	115.13	1.0 %	ACCEPTABLE
260	-31.98	106.80	113.11	1.0 %	ACCEPTABLE
261	-0.47	2.85	6.41	66.4 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
262	-0.45	2.89	6.44	21.4 %	ACCEPTABLE
263	-0.51	3.01	6.54	6.8 %	ACCEPTABLE
264	-0.47	2.94	6.48	11.9 %	ACCEPTABLE
265	-0.49	2.93	6.49	21.4 %	ACCEPTABLE
266	-0.42	2.78	6.36	65.9 %	ACCEPTABLE
267	-0.48	2.90	6.46	20.0 %	ACCEPTABLE
268	-0.44	2.85	6.41	66.3 %	ACCEPTABLE
269	-0.45	2.82	6.41	65.8 %	ACCEPTABLE
270	-0.46	2.80	6.36	20.1 %	ACCEPTABLE
271	-0.52	2.92	6.46	8.4 %	ACCEPTABLE
272	-0.49	2.88	6.41	6.9 %	ACCEPTABLE
273	-0.50	2.85	6.41	20.0 %	ACCEPTABLE
274	-0.45	2.72	6.31	65.8 %	ACCEPTABLE
275	-0.43	2.70	6.28	65.9 %	ACCEPTABLE
276	-0.49	2.81	6.38	66.3 %	ACCEPTABLE
277	-0.45	2.77	6.33	66.3 %	ACCEPTABLE
278	-0.47	2.74	6.33	65.9 %	ACCEPTABLE
279	-0.49	2.83	6.40	66.3 %	ACCEPTABLE
280	-0.46	2.79	6.34	20.1 %	ACCEPTABLE
281	-0.48	2.92	6.48	20.0 %	ACCEPTABLE
282	-0.45	2.87	6.42	21.4 %	ACCEPTABLE
283	-32.06	107.14	113.44	1.1 %	ACCEPTABLE
284	-32.22	108.49	114.79	1.0 %	ACCEPTABLE
285	-32.03	107.14	113.44	1.0 %	ACCEPTABLE
286	-0.47	2.85	6.41	66.4 %	ACCEPTABLE
287	-0.46	2.87	6.43	66.3 %	ACCEPTABLE
288	-0.50	2.96	6.50	9.1 %	ACCEPTABLE
289	-0.47	2.91	6.45	11.9 %	ACCEPTABLE
290	-0.48	2.91	6.46	20.0 %	ACCEPTABLE
291	-0.44	2.80	6.38	65.9 %	ACCEPTABLE
292	-0.47	2.88	6.45	21.4 %	ACCEPTABLE
293	-0.45	2.85	6.41	66.3 %	ACCEPTABLE
294	-0.46	2.83	6.41	66.0 %	ACCEPTABLE
295	-0.47	2.82	6.37	11.9 %	ACCEPTABLE
296	-0.50	2.90	6.44	8.4 %	ACCEPTABLE
297	-0.48	2.87	6.41	11.9 %	ACCEPTABLE
298	-0.49	2.85	6.41	20.0 %	ACCEPTABLE
299	-0.46	2.76	6.34	66.0 %	ACCEPTABLE
300	-0.44	2.75	6.32	66.1 %	ACCEPTABLE
301	-0.48	2.83	6.39	20.0 %	ACCEPTABLE
302	-0.46	2.79	6.36	20.1 %	ACCEPTABLE
303	-0.47	2.78	6.36	66.1 %	ACCEPTABLE
304	-0.49	2.84	6.40	20.0 %	ACCEPTABLE
305	-0.46	2.81	6.37	66.4 %	ACCEPTABLE
306	-0.48	2.89	6.45	21.4 %	ACCEPTABLE
307	-0.45	2.86	6.42	20.0 %	ACCEPTABLE
308	-32.09	107.36	113.67	1.0 %	ACCEPTABLE
309	-32.19	108.26	114.57	1.0 %	ACCEPTABLE
310	-32.07	107.36	113.67	1.0 %	ACCEPTABLE
311	-0.47	2.85	6.41	66.4 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
312	-0.46	2.87	6.42	21.4 %	ACCEPTABLE
313	-0.49	2.92	6.47	12.8 %	ACCEPTABLE
314	-0.47	2.89	6.44	21.4 %	ACCEPTABLE
315	-0.48	2.89	6.45	21.4 %	ACCEPTABLE
316	-0.45	2.82	6.39	66.1 %	ACCEPTABLE
317	-0.47	2.87	6.43	21.4 %	ACCEPTABLE
318	-0.46	2.85	6.41	66.3 %	ACCEPTABLE
319	-0.46	2.84	6.41	66.2 %	ACCEPTABLE
320	-0.47	2.83	6.39	20.0 %	ACCEPTABLE
321	-0.49	2.88	6.43	11.9 %	ACCEPTABLE
322	-0.48	2.86	6.41	12.8 %	ACCEPTABLE
323	-0.48	2.85	6.41	20.0 %	ACCEPTABLE
324	-0.46	2.79	6.36	20.1 %	ACCEPTABLE
325	-0.45	2.78	6.35	66.1 %	ACCEPTABLE
326	-0.48	2.83	6.40	66.3 %	ACCEPTABLE
327	-0.46	2.81	6.37	66.4 %	ACCEPTABLE
328	-0.47	2.80	6.38	66.1 %	ACCEPTABLE
329	-0.48	2.84	6.40	20.0 %	ACCEPTABLE
330	-0.47	2.82	6.38	20.0 %	ACCEPTABLE
331	-0.47	2.88	6.44	20.0 %	ACCEPTABLE
332	-0.46	2.86	6.42	20.0 %	ACCEPTABLE
333	-32.10	107.51	113.82	1.0 %	ACCEPTABLE
334	-32.17	108.11	114.42	1.0 %	ACCEPTABLE
335	-32.09	107.51	113.82	1.0 %	ACCEPTABLE
336	-0.47	2.85	6.41	66.4 %	ACCEPTABLE

MUR GRAVITAR H=1.80 m

Gravity wall analysis

Input data

Project

Task : Mur Gravitator H=1.8m
 Author : SEED Consulting
 Date : 8/1/2020
 Unit weight of water is considered : 9,81 kN/m³

Settings

(input for current task)

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)
 Coefficients EN 1992-1-1 : standard
 Masonry (stone) wall : EN 1996-1-1 (EC6)

Wall analysis

Active earth pressure calculation : Coulomb
 Passive earth pressure calculation : Coulomb
 Earthquake analysis : Mononobe-Okabe
 Shape of earth wedge : Calculate as skew
 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 :	$\gamma_G =$	1.35 [-]	1.00 [-]	1.00 [-]	1.00 [-]		
Variable actions :	$\gamma_Q =$	1.50 [-]	0.00 [-]	1.30 [-]	0.00 [-]		
Water load :	$\gamma_w =$			1.00 [-]			

Partial factors for soil parameters (M)			
Permanent design situation			
Partial factor on internal friction :	$\gamma_\phi =$	1.25 [-]	
Partial factor on effective cohesion :	$\gamma_c =$	1.25 [-]	
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.40 [-]	
Partial factor on Poisson's ratio :	$\gamma_v =$	1.00 [-]	

Partial factors for variable actions			
Permanent design situation			
Factor for combination value :	$\psi_0 =$	0.70 [-]	
Factor for frequent value :	$\psi_1 =$	0.50 [-]	
Factor for quasi-permanent value :	$\psi_2 =$	0.30 [-]	

Partial factors on actions (A)					
Seismic design situation					
		State STR		State GEO	
		Unfavourable	Favourable	Unfavourable	Favourable
Permanent actions :	$\gamma_G =$	1.00 [-]	1.00 [-]	1.00 [-]	1.00 [-]

Partial factors on actions (A)							
Seismic design situation							
Variable actions :	$\gamma_Q =$	1.00	[-]	0.00	[-]	1.00	[-]
Water load :	$\gamma_w =$					1.00	[-]

Partial factors for soil parameters (M)			
Seismic design situation			
Partial factor on internal friction :	$\gamma_\phi =$	1.00	[-]
Partial factor on effective cohesion :	$\gamma_c =$	1.00	[-]
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.00	[-]
Partial factor on Poisson's ratio :	$\gamma_v =$	1.00	[-]

Material of structure

Unit weight $\gamma = 24.00 \text{ kN/m}^3$

Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete : C 20/25

Cylinder compressive strength

$f_{ck} = 20.00 \text{ MPa}$

Tensile strength

$f_{ctm} = 2.20 \text{ MPa}$

Longitudinal steel : B500

Yield strength

$f_{yk} = 500.00 \text{ MPa}$

Geometry of structure

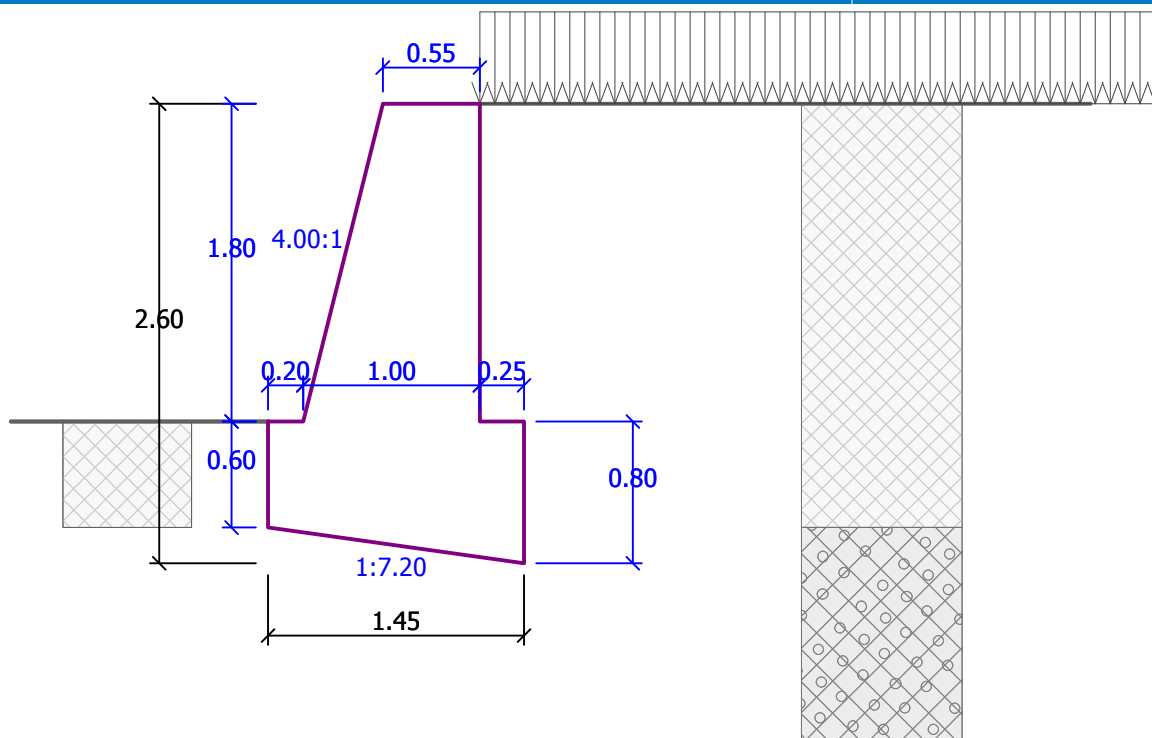
No.	Coordinate X [m]	Depth Z [m]
1	0.00	0.00
2	0.00	1.80
3	0.25	1.80
4	0.25	2.60
5	-1.20	2.40
6	-1.20	1.80
7	-1.00	1.80
8	-0.55	0.00

The origin [0,0] is located at the most upper right point of the wall.

Wall section area = 2.41 m².

Name : Geometry

Stage - analysis : 1 - 0



Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]	γ_{su} [kN/m ³]	δ [°]
1	Mbushje		35.00	0.00	19.00	10.19	23.00
2	Shtresa Inertesh		30.00	0.00	19.00	10.19	20.00
3	Shtrese zhavorre lumi		24.00	10.00	20.10	12.19	16.00

Soil parameters to compute pressure at rest

No.	Name	Pattern	Type calculation	φ_{ef} [°]	ν [-]	OCR [-]	K_r [-]
1	Mbushje		cohesionless	35.00	-	-	-
2	Shtresa Inertesh		cohesive	-	0.30	-	-
3	Shtrese zhavorre lumi		cohesionless	24.00	-	-	-

Soil parameters

Mbushje

Unit weight :

$$\gamma = 19.00 \text{ kN/m}^3$$

Stress-state :

effective

Angle of internal friction : $\varphi_{ef} = 35.00^\circ$
 Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$
 Angle of friction struc.-soil : $\delta = 23.00^\circ$
 Soil : cohesionless
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

Shtresa Inertesh

Unit weight : $\gamma = 19.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 30.00^\circ$
 Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$
 Angle of friction struc.-soil : $\delta = 20.00^\circ$
 Soil : cohesive
 Poisson's ratio : $\nu = 0.30$
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

Shtrese zhavorre lumi

Unit weight : $\gamma = 20.10 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 24.00^\circ$
 Cohesion of soil : $c_{ef} = 10.00 \text{ kPa}$
 Angle of friction struc.-soil : $\delta = 16.00^\circ$
 Soil : cohesionless
 Saturated unit weight : $\gamma_{sat} = 22.00 \text{ kN/m}^3$

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	2.40	Mbushje	
2	1.40	Shtresa Inertesh	
3	2.00	Shtrese zhavorre lumi	
4	-	Shtrese zhavorre lumi	

Foundation

Type of foundation : soil from geological profile

Terrain profile

Terrain behind the structure is flat.

Water influence

GWT behind the structure lies at a depth of 3.80 m
 GWT in front of the structure lies at a depth of 3.80 m
 Subgrade at the heel is not permeable.
 Uplift in foot. bottom due to different pressures is not considered.

Input surface surcharges

No.	Surcharge new	change	Action	Mag.1 [kN/m ²]	Mag.2 [kN/m ²]	Ord.x x [m]	Length l [m]	Depth z [m]
1	YES		variable	5.00				on terrain

No.	Name
1	Ngarkesa te perkohshme

Resistance on front face of the structure

Resistance on front face of the structure: at rest

Soil on front face of the structure - Mbushje

Soil thickness in front of structure $h = 0.60$ m

Terrain in front of structure is flat.

Settings of the stage of construction

Design situation : permanent

Verification No. 1 (Stage of construction 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	-0.92	57.86	0.78	1.000	1.000	1.350
FF resistance	-1.75	-0.20	0.00	0.00	1.000	1.000	1.000
Weight - earth wedge	0.00	-0.76	1.14	1.28	1.000	1.000	1.000
Active pressure	19.92	-0.65	12.51	1.35	1.000	1.000	1.000
Water pressure	0.00	-2.40	0.00	1.20	1.000	1.000	1.000
Ngarkesa te perkohshme	3.95	-1.07	2.33	1.31	1.300	1.300	1.300

Verification of complete wall**Check for overturning stability**Resisting moment $M_{res} = 67.63$ kNm/mOverturning moment $M_{ovr} = 18.10$ kNm/m**Wall for overturning is SATISFACTORY****Check for slip**Resisting horizontal force $H_{res} = 35.58$ kN/mActive horizontal force $H_{act} = 12.82$ kN/m**Wall for slip is SATISFACTORY****Overall check - WALL is SATISFACTORY**

Maximum stress in footing bottom : 72.07 kPa

Bearing capacity of foundation soil (Stage of construction 1)**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	3.32	97.09	9.72	0.040	72.07
2	4.51	77.03	12.48	0.061	59.91

Service load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	0.14	75.20	6.76

Verification of foundation soil**Eccentricity verification**Max. eccentricity of normal force $e = 0.040$ Maximum allowable eccentricity $e_{alw} = 0.333$ **Eccentricity of the normal force is SATISFACTORY****Verification of bearing capacity**Max. stress at footing bottom $\sigma = 72.07 \text{ kPa}$ Bearing capacity of foundation soil $R_d = 150.00 \text{ kPa}$ **Bearing capacity of foundation soil is SATISFACTORY****Overall verification - bearing capacity of found. soil is SATISFACTORY****Dimensioning No. 1 (Stage of construction 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	-0.92	57.86	0.78	1.000
FF resistance	-1.75	-0.20	0.00	0.00	1.000
Weight - earth wedge	0.00	-0.76	1.14	1.28	1.000
Active pressure	19.92	-0.65	12.51	1.35	1.000
Water pressure	0.00	-2.40	0.00	1.20	1.000
Ngarkesa te perkohshme	3.95	-1.07	2.33	1.31	1.000

Front wall jump checkOffset of the front wall jump is smaller than $0.50 \cdot$ thickness of foundation. Reinforcement is not required.**Slope stability analysis****Input data****Project****Settings**

(input for current task)

Stability analysis

Earthquake analysis : Standard

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 :	$\gamma_G =$	1.35 [-]	1.00 [-]	1.00 [-]	1.00 [-]
Variable actions :	$\gamma_Q =$	1.50 [-]	0.00 [-]	1.30 [-]	0.00 [-]

Partial factors on actions (A)

Permanent design situation

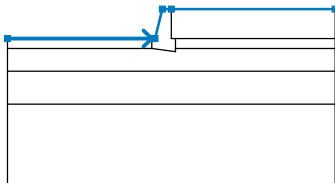
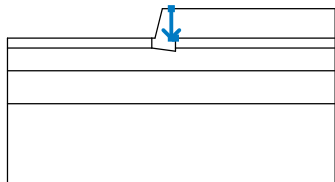
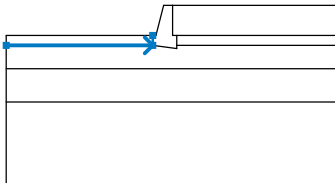
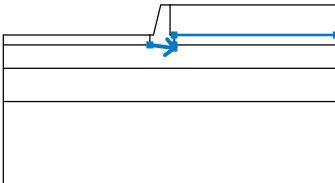
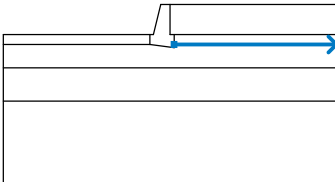
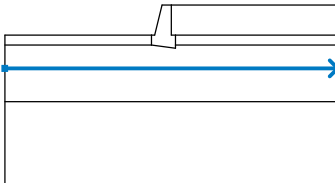
Water load :	$\gamma_w =$					1.00	[-]		
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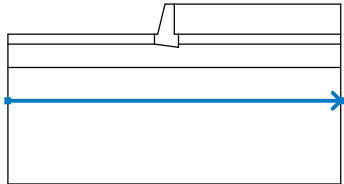
Partial factors for soil parameters (M)

Permanent design situation

Partial factor on internal friction :	$\gamma_\phi =$	1.25	[-]
Partial factor on effective cohesion :	$\gamma_c =$	1.25	[-]
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.40	[-]

Interface

No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
1		-10.00	-1.80	-1.20	-1.80	-1.00	-1.80
		-0.55	0.00	0.00	0.00	10.00	0.00
2		0.00	0.00	0.00	-1.80	0.25	-1.80
3		-10.00	-2.40	-1.20	-2.40	-1.20	-1.80
4		-1.20	-2.40	0.25	-2.60	0.25	-2.40
		0.25	-1.80	10.00	-1.80		
5		0.25	-2.40	10.00	-2.40		
6		-10.00	-3.80	10.00	-3.80		

No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
7		-10.00	-5.80	10.00	-5.80		

Soil parameters - effective stress state

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]
1	Mbushje		35.00	0.00	19.00
2	Shtresa Inertesh		30.00	0.00	19.00
3	Shtrese zhavorre lumi		24.00	10.00	20.10

Soil parameters - uplift

No.	Name	Pattern	γ_{sat} [kN/m ³]	γ_s [kN/m ³]	n [-]
1	Mbushje		20.00		
2	Shtresa Inertesh		20.00		
3	Shtrese zhavorre lumi		22.00		

Soil parameters

Mbushje

Unit weight : $\gamma = 19.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 35.00^\circ$
 Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

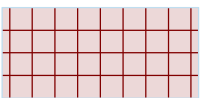
Shtresa Inertesh

Unit weight : $\gamma = 19.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 30.00^\circ$
 Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

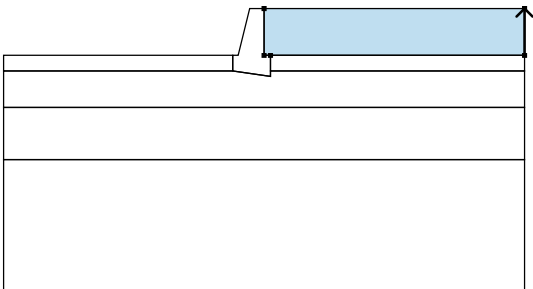
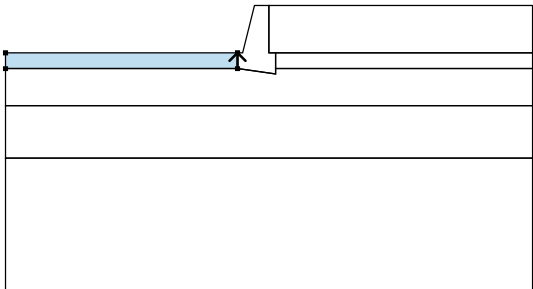
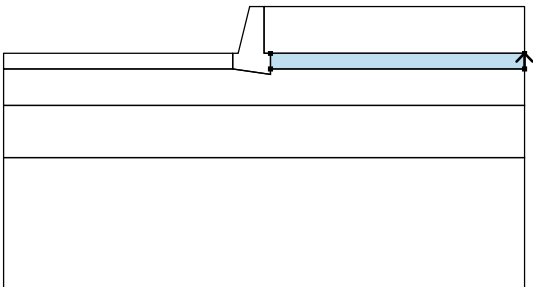
Shtrese zhavorre lumi

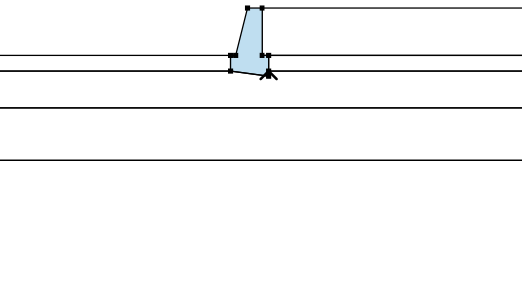
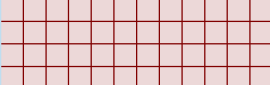
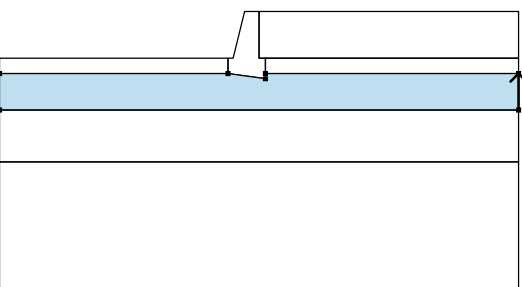
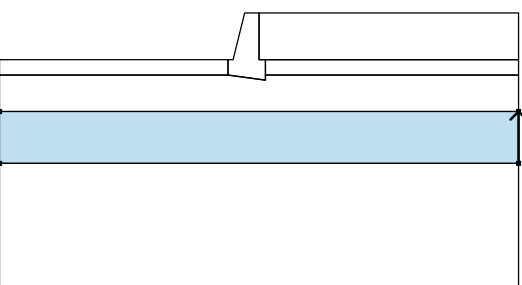
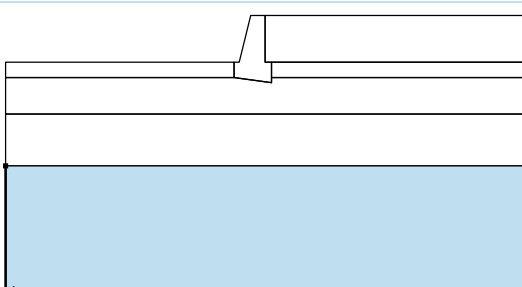
Unit weight : $\gamma = 20.10 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{\text{ef}} = 24.00^\circ$
 Cohesion of soil : $c_{\text{ef}} = 10.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{\text{sat}} = 22.00 \text{ kN/m}^3$

Rigid bodies

No.	Name	Sample	γ [kN/m ³]
1	Wall material		24.00

Assigning and surfaces

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
1		10.00	-1.80	10.00	0.00	Mbushje 
		0.00	0.00	0.00	-1.80	
		0.25	-1.80			
2		-1.20	-2.40	-1.20	-1.80	Mbushje 
		-10.00	-1.80	-10.00	-2.40	
3		10.00	-2.40	10.00	-1.80	Mbushje 
		0.25	-1.80	0.25	-2.40	

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
4		0.25	-2.60	0.25	-2.40	Wall material 
		0.25	-1.80	0.00	-1.80	
		0.00	0.00	-0.55	0.00	
		-1.00	-1.80	-1.20	-1.80	
		-1.20	-2.40			
5		10.00	-3.80	10.00	-2.40	Shtresa Inertesh 
		0.25	-2.40	0.25	-2.60	
		-1.20	-2.40	-10.00	-2.40	
		-10.00	-3.80			
6		10.00	-5.80	10.00	-3.80	Shtrese zhavorre lumi 
		-10.00	-3.80	-10.00	-5.80	
7		-10.00	-5.80	-10.00	-10.80	Shtrese zhavorre lumi 
		10.00	-10.80	10.00	-5.80	

Surcharge

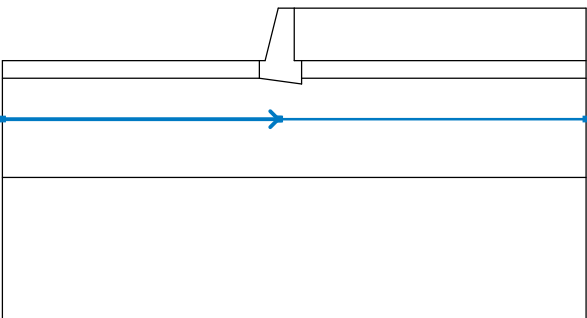
No.	Type	Type of action	Location z [m]	Origin x [m]	Length l [m]	Width b [m]	Slope α [°]	Magnitude	
1	strip	variable	on terrain	x = 0.00	l = 10.00		0.00	q, q ₁ , f, F	q ₂ unit
								5.00	kN/m ²

Surcharges

No.	Name
1	Ngarkesa te perkohshme

Water

Water type : GWT

No.	GWT location	Coordinates of GWT points [m]					
		x	z	x	z	x	z
1		-10.00	-3.80	-0.55	-3.80	-0.50	-3.80
		10.00	-3.80				

Tensile crack

Tensile crack not inputted.

Earthquake

Earthquake not included.

Settings of the stage of construction

Design situation : permanent

Results (Stage of construction 1)**Analysis 1****Circular slip surface**

Slip surface parameters					
Center :	x =	-1.30 [m]	Angles :	α_1 =	-45.55 [°]
	z =	0.84 [m]		α_2 =	77.13 [°]
Radius :	R =	3.77 [m]			
The slip surface after optimization.					

Slope stability verification (Bishop)Sum of active forces : $F_a = 62.37$ kN/mSum of passive forces : $F_p = 107.19$ kN/mSliding moment : $M_a = 235.14$ kNm/mResisting moment : $M_p = 404.12$ kNm/m

Utilization : 58.2 %

Slope stability ACCEPTABLE**Optimization of circular slip surface (Bishop)**

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
1	-1.30	0.68	3.63	58.1 %	ACCEPTABLE
2	-1.30	0.68	3.63	58.1 %	ACCEPTABLE
3	-1.30	0.68	3.63	58.1 %	ACCEPTABLE
4	-2.14	9.22	12.42	33.9 %	ACCEPTABLE
5	-1.62	5.19	9.38	34.0 %	ACCEPTABLE
6	-1.00	0.35	7.20	23.3 %	ACCEPTABLE
7	-4.76	1.95	4.87	0.0 %	ACCEPTABLE
8	-2.30	10.51	13.51	34.3 %	ACCEPTABLE
9	-22.40	131.54	134.61	0.2 %	ACCEPTABLE
10	-1.30	0.68	3.63	58.1 %	ACCEPTABLE
11	-1.95	6.13	9.17	39.7 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
12	-1.57	3.75	7.47	40.9 %	ACCEPTABLE
13	1.31	0.68	3.63	0.2 %	ACCEPTABLE
14	-1.05	0.40	5.94	27.9 %	ACCEPTABLE
15	-4.14	0.94	3.92	0.0 %	ACCEPTABLE
16	-3.91	0.68	3.63	0.0 %	ACCEPTABLE
17	-1.99	6.39	9.38	39.9 %	ACCEPTABLE
18	-12.25	19.33	22.70	0.0 %	ACCEPTABLE
19	-20.22	100.56	103.64	0.2 %	ACCEPTABLE
20	-9.64	19.33	22.70	0.2 %	ACCEPTABLE
21	-1.30	0.68	3.63	58.1 %	ACCEPTABLE
22	-8.91	42.60	44.52	0.1 %	ACCEPTABLE
23	-4.50	17.74	19.67	0.2 %	ACCEPTABLE
24	-1.78	4.17	7.14	50.2 %	ACCEPTABLE
25	-1.52	2.77	6.19	46.2 %	ACCEPTABLE
26	0.44	0.68	3.63	35.3 %	ACCEPTABLE
27	-1.09	0.45	5.12	32.6 %	ACCEPTABLE
28	-3.94	3.80	5.86	0.1 %	ACCEPTABLE
29	-3.91	3.76	5.81	0.1 %	ACCEPTABLE
30	-3.04	0.68	3.63	0.2 %	ACCEPTABLE
31	-1.77	4.11	7.09	50.2 %	ACCEPTABLE
32	0.58	0.20	3.43	25.4 %	ACCEPTABLE
33	-13.39	28.12	31.38	0.0 %	ACCEPTABLE
34	-18.78	82.28	85.37	0.2 %	ACCEPTABLE
35	-11.65	28.12	31.38	0.2 %	ACCEPTABLE
36	-1.30	0.68	3.63	58.1 %	ACCEPTABLE
37	-3.09	9.75	11.72	0.3 %	ACCEPTABLE
38	-1.32	4.76	6.72	0.2 %	ACCEPTABLE
39	-1.65	2.93	5.86	53.9 %	ACCEPTABLE
40	-1.48	2.10	5.33	50.3 %	ACCEPTABLE
41	-0.14	0.68	3.63	44.7 %	ACCEPTABLE
42	-1.14	0.50	4.59	37.5 %	ACCEPTABLE
43	-3.02	2.61	4.88	0.2 %	ACCEPTABLE
44	-1.88	1.35	3.27	0.2 %	ACCEPTABLE
45	-2.46	0.68	3.63	0.4 %	ACCEPTABLE
46	-2.31	0.17	3.42	0.8 %	ACCEPTABLE
47	-1.62	2.80	5.77	53.4 %	ACCEPTABLE
48	-0.11	0.60	3.59	43.8 %	ACCEPTABLE
49	-14.22	35.04	38.25	0.1 %	ACCEPTABLE
50	-17.84	71.14	74.25	0.1 %	ACCEPTABLE
51	-13.06	35.04	38.25	0.1 %	ACCEPTABLE
52	-1.30	0.68	3.63	58.1 %	ACCEPTABLE
53	-0.44	0.37	3.49	46.5 %	ACCEPTABLE
54	-2.17	4.85	7.12	0.3 %	ACCEPTABLE
55	-1.10	2.68	4.93	0.3 %	ACCEPTABLE
56	-1.55	2.14	5.06	12.8 %	ACCEPTABLE
57	-1.43	1.64	4.77	53.0 %	ACCEPTABLE
58	-0.53	0.68	3.63	50.1 %	ACCEPTABLE
59	-1.18	0.54	4.25	43.3 %	ACCEPTABLE
60	-2.44	1.93	4.37	0.3 %	ACCEPTABLE
61	-1.57	0.99	3.22	0.3 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
62	-2.07	0.68	3.63	0.7 %	ACCEPTABLE
63	-1.99	0.39	3.50	1.3 %	ACCEPTABLE
64	-1.52	2.02	4.99	55.4 %	ACCEPTABLE
65	-0.53	0.71	3.64	50.4 %	ACCEPTABLE
66	-14.80	40.12	43.30	0.1 %	ACCEPTABLE
67	-17.21	64.19	67.31	0.1 %	ACCEPTABLE
68	-14.02	40.12	43.30	0.1 %	ACCEPTABLE
69	-1.30	0.68	3.63	58.1 %	ACCEPTABLE
70	-0.77	0.64	3.61	52.8 %	ACCEPTABLE
71	-1.81	2.98	5.47	0.4 %	ACCEPTABLE
72	-1.12	1.83	4.30	0.5 %	ACCEPTABLE
73	-1.47	1.63	4.56	13.2 %	ACCEPTABLE
74	-1.40	1.33	4.39	54.8 %	ACCEPTABLE
75	-0.78	0.68	3.63	53.2 %	ACCEPTABLE
76	-1.21	0.58	4.03	47.5 %	ACCEPTABLE
77	-2.05	1.50	4.09	0.4 %	ACCEPTABLE
78	-1.45	0.85	3.31	0.4 %	ACCEPTABLE
79	-1.82	0.68	3.63	1.2 %	ACCEPTABLE
80	-1.69	0.25	3.45	12.2 %	ACCEPTABLE
81	-1.77	0.51	3.55	1.7 %	ACCEPTABLE
82	-1.45	1.54	4.50	56.6 %	ACCEPTABLE
83	-0.80	0.73	3.66	53.7 %	ACCEPTABLE
84	-15.19	43.72	46.88	0.1 %	ACCEPTABLE
85	-16.80	59.76	62.89	0.1 %	ACCEPTABLE
86	-14.67	43.72	46.88	0.1 %	ACCEPTABLE
87	-1.30	0.68	3.63	58.1 %	ACCEPTABLE
88	-0.97	0.72	3.65	55.6 %	ACCEPTABLE
89	-1.61	2.06	4.70	0.8 %	ACCEPTABLE
90	-1.16	1.38	4.02	1.1 %	ACCEPTABLE
91	-1.42	1.31	4.23	7.4 %	ACCEPTABLE
92	-0.80	0.15	3.42	47.7 %	ACCEPTABLE
93	-1.37	1.12	4.13	56.3 %	ACCEPTABLE
94	-0.96	0.68	3.63	55.1 %	ACCEPTABLE
95	-1.24	0.61	3.89	50.8 %	ACCEPTABLE
96	-1.20	0.21	3.13	5.6 %	ACCEPTABLE
97	-1.80	1.22	3.92	0.6 %	ACCEPTABLE
98	-1.39	0.78	3.40	0.7 %	ACCEPTABLE
99	-1.64	0.68	3.63	1.8 %	ACCEPTABLE
100	-1.57	0.43	3.52	13.0 %	ACCEPTABLE
101	-1.17	0.10	3.09	56.4 %	ACCEPTABLE
102	-1.47	0.07	3.39	50.5 %	ACCEPTABLE
103	-1.61	0.58	3.58	2.7 %	ACCEPTABLE
104	-1.19	0.18	3.12	8.0 %	ACCEPTABLE
105	-1.40	1.24	4.20	57.2 %	ACCEPTABLE
106	-0.97	0.73	3.65	55.7 %	ACCEPTABLE
107	-15.45	46.21	49.36	0.1 %	ACCEPTABLE
108	-16.53	56.90	60.03	0.1 %	ACCEPTABLE
109	-15.11	46.21	49.36	0.1 %	ACCEPTABLE
110	-1.30	0.68	3.63	58.1 %	ACCEPTABLE
111	-1.09	0.74	3.66	56.9 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
112	-1.50	1.54	4.28	1.2 %	ACCEPTABLE
113	-1.20	1.13	3.86	1.6 %	ACCEPTABLE
114	-1.38	1.09	4.03	13.3 %	ACCEPTABLE
115	-0.97	0.33	3.48	51.5 %	ACCEPTABLE
116	-1.35	0.98	3.97	56.9 %	ACCEPTABLE
117	-1.07	0.68	3.63	56.2 %	ACCEPTABLE
118	-1.26	0.63	3.80	53.1 %	ACCEPTABLE
119	-1.24	0.37	3.30	7.9 %	ACCEPTABLE
120	-1.63	1.04	3.81	1.0 %	ACCEPTABLE
121	-1.36	0.74	3.47	1.0 %	ACCEPTABLE
122	-1.53	0.68	3.63	2.3 %	ACCEPTABLE
123	-1.27	0.13	3.30	53.0 %	ACCEPTABLE
124	-1.49	0.53	3.56	8.0 %	ACCEPTABLE
125	-1.21	0.29	3.26	57.3 %	ACCEPTABLE
126	-1.41	0.26	3.45	53.4 %	ACCEPTABLE
127	-1.51	0.62	3.60	3.2 %	ACCEPTABLE
128	-1.23	0.34	3.28	13.8 %	ACCEPTABLE
129	-1.37	1.05	4.00	57.7 %	ACCEPTABLE
130	-1.08	0.72	3.65	56.6 %	ACCEPTABLE
131	-15.63	47.91	51.06	0.1 %	ACCEPTABLE
132	-16.35	55.04	58.17	0.1 %	ACCEPTABLE
133	-15.40	47.91	51.06	0.1 %	ACCEPTABLE
134	-1.30	0.68	3.63	58.1 %	ACCEPTABLE
135	-1.16	0.73	3.65	57.5 %	ACCEPTABLE
136	-1.43	1.23	4.04	1.7 %	ACCEPTABLE
137	-1.23	0.97	3.78	2.9 %	ACCEPTABLE
138	-1.35	0.95	3.89	13.4 %	ACCEPTABLE
139	-1.08	0.44	3.53	53.5 %	ACCEPTABLE
140	-1.33	0.88	3.85	57.4 %	ACCEPTABLE
141	-1.15	0.68	3.63	56.9 %	ACCEPTABLE
142	-1.27	0.65	3.74	54.8 %	ACCEPTABLE
143	-1.26	0.48	3.41	7.8 %	ACCEPTABLE
144	-1.52	0.92	3.75	1.4 %	ACCEPTABLE
145	-1.34	0.72	3.52	1.6 %	ACCEPTABLE
146	-1.45	0.68	3.63	4.1 %	ACCEPTABLE
147	-1.28	0.30	3.40	54.8 %	ACCEPTABLE
148	-1.18	0.21	3.30	54.3 %	ACCEPTABLE
149	-1.43	0.59	3.59	13.5 %	ACCEPTABLE
150	-1.24	0.41	3.38	57.5 %	ACCEPTABLE
151	-1.37	0.39	3.50	55.1 %	ACCEPTABLE
152	-1.44	0.64	3.61	5.4 %	ACCEPTABLE
153	-1.25	0.45	3.40	13.8 %	ACCEPTABLE
154	-1.35	0.92	3.87	57.9 %	ACCEPTABLE
155	-1.16	0.71	3.64	57.3 %	ACCEPTABLE
156	-15.75	49.06	52.21	0.1 %	ACCEPTABLE
157	-16.23	53.81	56.95	0.1 %	ACCEPTABLE
158	-15.60	49.06	52.21	0.1 %	ACCEPTABLE
159	-1.30	0.68	3.63	58.1 %	ACCEPTABLE
160	-1.21	0.72	3.65	57.7 %	ACCEPTABLE
161	-1.39	1.04	3.89	2.8 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
162	-1.25	0.87	3.72	4.2 %	ACCEPTABLE
163	-1.34	0.86	3.80	13.5 %	ACCEPTABLE
164	-1.15	0.52	3.56	55.1 %	ACCEPTABLE
165	-1.32	0.81	3.78	57.4 %	ACCEPTABLE
166	-1.20	0.68	3.63	57.3 %	ACCEPTABLE
167	-1.28	0.66	3.71	55.6 %	ACCEPTABLE
168	-1.28	0.55	3.48	7.8 %	ACCEPTABLE
169	-1.45	0.84	3.71	2.1 %	ACCEPTABLE
170	-1.32	0.71	3.56	2.4 %	ACCEPTABLE
171	-1.40	0.68	3.63	5.4 %	ACCEPTABLE
172	-1.28	0.42	3.47	55.9 %	ACCEPTABLE
173	-1.22	0.36	3.40	55.7 %	ACCEPTABLE
174	-1.39	0.63	3.60	7.7 %	ACCEPTABLE
175	-1.26	0.50	3.46	57.7 %	ACCEPTABLE
176	-1.34	0.48	3.54	56.0 %	ACCEPTABLE
177	-1.39	0.65	3.62	13.6 %	ACCEPTABLE
178	-1.27	0.53	3.47	7.8 %	ACCEPTABLE
179	-1.33	0.84	3.79	58.0 %	ACCEPTABLE
180	-1.20	0.70	3.64	57.5 %	ACCEPTABLE
181	-15.83	49.83	52.98	0.1 %	ACCEPTABLE
182	-16.15	53.00	56.14	0.1 %	ACCEPTABLE
183	-15.73	49.83	52.98	0.1 %	ACCEPTABLE
184	-1.30	0.68	3.63	58.1 %	ACCEPTABLE
185	-1.24	0.71	3.64	58.0 %	ACCEPTABLE
186	-1.36	0.91	3.80	4.5 %	ACCEPTABLE
187	-1.27	0.80	3.69	7.7 %	ACCEPTABLE
188	-1.32	0.80	3.74	58.1 %	ACCEPTABLE
189	-1.26	0.83	3.75	58.1 %	ACCEPTABLE
190	-1.38	1.04	3.92	3.3 %	ACCEPTABLE
191	-1.29	0.93	3.81	5.4 %	ACCEPTABLE
192	-1.34	0.92	3.86	13.5 %	ACCEPTABLE
193	-1.22	0.69	3.69	56.3 %	ACCEPTABLE
194	-1.34	0.89	3.84	57.9 %	ACCEPTABLE
195	-1.25	0.80	3.74	57.6 %	ACCEPTABLE
196	-1.30	0.78	3.79	56.5 %	ACCEPTABLE
197	-1.30	0.71	3.64	13.6 %	ACCEPTABLE
198	-1.42	0.91	3.80	3.0 %	ACCEPTABLE
199	-1.34	0.82	3.69	3.3 %	ACCEPTABLE
200	-1.39	0.80	3.74	5.3 %	ACCEPTABLE
201	-1.31	0.62	3.63	56.8 %	ACCEPTABLE
202	-1.27	0.57	3.58	56.6 %	ACCEPTABLE
203	-1.38	0.76	3.72	7.7 %	ACCEPTABLE
204	-1.29	0.68	3.62	13.6 %	ACCEPTABLE
205	-1.35	0.66	3.67	57.1 %	ACCEPTABLE
206	-1.38	0.78	3.73	7.7 %	ACCEPTABLE
207	-1.30	0.69	3.63	13.6 %	ACCEPTABLE
208	-1.34	0.91	3.85	14.5 %	ACCEPTABLE
209	-1.26	0.82	3.75	57.9 %	ACCEPTABLE
210	-15.88	50.36	53.50	0.1 %	ACCEPTABLE
211	-16.09	52.47	55.61	0.1 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
212	-15.81	50.36	53.50	0.1 %	ACCEPTABLE
213	-1.32	0.80	3.74	58.1 %	ACCEPTABLE
214	-1.28	0.82	3.75	58.1 %	ACCEPTABLE
215	-1.36	0.96	3.86	5.3 %	ACCEPTABLE
216	-1.30	0.89	3.78	5.3 %	ACCEPTABLE
217	-1.34	0.88	3.82	13.5 %	ACCEPTABLE
218	-1.25	0.73	3.70	57.1 %	ACCEPTABLE
219	-1.33	0.86	3.81	57.8 %	ACCEPTABLE
220	-1.27	0.80	3.74	57.8 %	ACCEPTABLE
221	-1.31	0.79	3.77	57.2 %	ACCEPTABLE
222	-1.31	0.74	3.67	7.7 %	ACCEPTABLE
223	-1.39	0.87	3.78	4.1 %	ACCEPTABLE
224	-1.33	0.81	3.71	4.1 %	ACCEPTABLE
225	-1.37	0.80	3.74	7.7 %	ACCEPTABLE
226	-1.31	0.68	3.66	57.4 %	ACCEPTABLE
227	-1.28	0.65	3.63	57.2 %	ACCEPTABLE
228	-1.36	0.78	3.73	7.7 %	ACCEPTABLE
229	-1.30	0.72	3.66	13.6 %	ACCEPTABLE
230	-1.34	0.71	3.70	57.3 %	ACCEPTABLE
231	-1.36	0.79	3.73	7.7 %	ACCEPTABLE
232	-1.31	0.73	3.67	13.6 %	ACCEPTABLE
233	-1.33	0.87	3.81	13.5 %	ACCEPTABLE
234	-1.28	0.81	3.75	57.8 %	ACCEPTABLE
235	-16.17	52.66	55.80	0.1 %	ACCEPTABLE
236	-16.31	54.10	57.23	0.1 %	ACCEPTABLE
237	-16.13	52.66	55.80	0.1 %	ACCEPTABLE
238	-1.32	0.80	3.74	58.1 %	ACCEPTABLE
239	-1.29	0.81	3.75	57.9 %	ACCEPTABLE
240	-1.34	0.91	3.82	5.3 %	ACCEPTABLE
241	-1.31	0.86	3.77	7.7 %	ACCEPTABLE
242	-1.33	0.86	3.79	13.5 %	ACCEPTABLE
243	-1.28	0.75	3.72	57.3 %	ACCEPTABLE
244	-1.33	0.84	3.78	13.5 %	ACCEPTABLE
245	-1.29	0.80	3.74	58.0 %	ACCEPTABLE
246	-1.31	0.79	3.76	57.5 %	ACCEPTABLE
247	-1.31	0.76	3.70	13.6 %	ACCEPTABLE
248	-1.36	0.85	3.76	5.3 %	ACCEPTABLE
249	-1.33	0.81	3.72	5.4 %	ACCEPTABLE
250	-1.35	0.80	3.74	13.5 %	ACCEPTABLE
251	-1.31	0.72	3.69	57.6 %	ACCEPTABLE
252	-1.30	0.70	3.67	57.5 %	ACCEPTABLE
253	-1.35	0.78	3.73	7.7 %	ACCEPTABLE
254	-1.31	0.75	3.69	13.6 %	ACCEPTABLE
255	-1.33	0.74	3.71	57.7 %	ACCEPTABLE
256	-1.35	0.79	3.74	13.5 %	ACCEPTABLE
257	-1.31	0.75	3.69	13.6 %	ACCEPTABLE
258	-1.33	0.85	3.79	13.5 %	ACCEPTABLE
259	-1.29	0.81	3.74	58.2 %	ACCEPTABLE
260	-1.26	0.82	3.75	57.9 %	ACCEPTABLE
261	-1.32	0.92	3.82	5.8 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
262	-1.28	0.87	3.77	7.7 %	ACCEPTABLE
263	-1.30	0.87	3.79	13.5 %	ACCEPTABLE
264	-1.25	0.76	3.72	57.4 %	ACCEPTABLE
265	-1.30	0.85	3.78	58.1 %	ACCEPTABLE
266	-1.26	0.81	3.74	58.0 %	ACCEPTABLE
267	-1.28	0.80	3.76	57.4 %	ACCEPTABLE
268	-1.28	0.77	3.70	13.6 %	ACCEPTABLE
269	-1.33	0.86	3.76	5.3 %	ACCEPTABLE
270	-1.30	0.82	3.72	5.4 %	ACCEPTABLE
271	-1.32	0.81	3.74	13.6 %	ACCEPTABLE
272	-1.28	0.73	3.69	57.6 %	ACCEPTABLE
273	-1.27	0.71	3.67	57.6 %	ACCEPTABLE
274	-1.32	0.79	3.73	13.6 %	ACCEPTABLE
275	-1.28	0.75	3.69	58.0 %	ACCEPTABLE
276	-1.30	0.75	3.71	57.7 %	ACCEPTABLE
277	-1.32	0.80	3.74	58.1 %	ACCEPTABLE
278	-1.28	0.76	3.69	13.6 %	ACCEPTABLE
279	-1.30	0.86	3.79	13.5 %	ACCEPTABLE
280	-1.26	0.82	3.74	58.1 %	ACCEPTABLE
281	-16.19	52.90	56.04	0.1 %	ACCEPTABLE
282	-16.29	53.85	56.99	0.1 %	ACCEPTABLE
283	-16.16	52.90	56.04	0.1 %	ACCEPTABLE
284	-1.29	0.81	3.74	58.2 %	ACCEPTABLE
285	-1.27	0.82	3.74	13.6 %	ACCEPTABLE
286	-1.31	0.88	3.79	7.7 %	ACCEPTABLE
287	-1.28	0.85	3.76	7.7 %	ACCEPTABLE
288	-1.30	0.85	3.77	13.5 %	ACCEPTABLE
289	-1.26	0.78	3.72	57.7 %	ACCEPTABLE
290	-1.29	0.84	3.77	58.1 %	ACCEPTABLE
291	-1.27	0.81	3.74	58.0 %	ACCEPTABLE
292	-1.29	0.80	3.75	57.7 %	ACCEPTABLE
293	-1.29	0.78	3.71	13.6 %	ACCEPTABLE
294	-1.32	0.84	3.76	7.7 %	ACCEPTABLE
295	-1.29	0.82	3.73	13.6 %	ACCEPTABLE
296	-1.31	0.81	3.74	13.6 %	ACCEPTABLE
297	-1.29	0.75	3.70	57.8 %	ACCEPTABLE
298	-1.27	0.74	3.69	57.7 %	ACCEPTABLE
299	-1.31	0.80	3.73	13.6 %	ACCEPTABLE
300	-1.28	0.77	3.71	58.0 %	ACCEPTABLE
301	-1.30	0.77	3.72	57.8 %	ACCEPTABLE
302	-1.31	0.81	3.74	13.6 %	ACCEPTABLE
303	-1.28	0.78	3.71	13.6 %	ACCEPTABLE
304	-1.30	0.84	3.77	58.2 %	ACCEPTABLE
305	-1.28	0.85	3.77	13.6 %	ACCEPTABLE
306	-1.32	0.91	3.82	7.6 %	ACCEPTABLE
307	-1.29	0.88	3.79	7.7 %	ACCEPTABLE
308	-1.31	0.88	3.81	13.5 %	ACCEPTABLE
309	-1.27	0.81	3.75	57.8 %	ACCEPTABLE
310	-1.30	0.87	3.80	58.1 %	ACCEPTABLE
311	-1.28	0.84	3.77	13.5 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
312	-1.30	0.83	3.78	57.8 %	ACCEPTABLE
313	-1.30	0.81	3.74	13.6 %	ACCEPTABLE
314	-1.33	0.87	3.79	7.7 %	ACCEPTABLE
315	-1.30	0.85	3.76	13.6 %	ACCEPTABLE
316	-1.32	0.84	3.77	13.5 %	ACCEPTABLE
317	-1.30	0.78	3.73	57.9 %	ACCEPTABLE
318	-1.28	0.77	3.72	57.7 %	ACCEPTABLE
319	-1.32	0.83	3.76	13.5 %	ACCEPTABLE
320	-1.29	0.80	3.74	58.0 %	ACCEPTABLE
321	-1.31	0.80	3.75	57.9 %	ACCEPTABLE
322	-1.32	0.83	3.77	13.5 %	ACCEPTABLE
323	-1.29	0.81	3.74	58.2 %	ACCEPTABLE
324	-1.31	0.87	3.80	13.5 %	ACCEPTABLE
325	-1.28	0.84	3.77	13.5 %	ACCEPTABLE
326	-16.15	52.87	56.01	0.1 %	ACCEPTABLE
327	-16.22	53.50	56.64	0.1 %	ACCEPTABLE
328	-16.13	52.87	56.01	0.1 %	ACCEPTABLE
329	-1.30	0.84	3.77	58.2 %	ACCEPTABLE
330	-1.29	0.85	3.77	13.5 %	ACCEPTABLE
331	-1.31	0.89	3.80	7.7 %	ACCEPTABLE
332	-1.29	0.87	3.78	7.7 %	ACCEPTABLE
333	-1.30	0.86	3.79	13.5 %	ACCEPTABLE
334	-1.28	0.82	3.76	57.8 %	ACCEPTABLE
335	-1.30	0.86	3.79	13.5 %	ACCEPTABLE
336	-1.29	0.84	3.77	58.1 %	ACCEPTABLE
337	-1.30	0.84	3.78	57.9 %	ACCEPTABLE
338	-1.30	0.82	3.75	13.6 %	ACCEPTABLE
339	-1.32	0.86	3.78	7.7 %	ACCEPTABLE
340	-1.30	0.84	3.76	13.5 %	ACCEPTABLE
341	-1.31	0.84	3.77	14.5 %	ACCEPTABLE
342	-1.30	0.80	3.75	57.8 %	ACCEPTABLE
343	-1.29	0.79	3.74	57.8 %	ACCEPTABLE
344	-1.31	0.83	3.77	58.0 %	ACCEPTABLE
345	-1.30	0.82	3.75	13.6 %	ACCEPTABLE
346	-1.31	0.81	3.76	57.9 %	ACCEPTABLE
347	-1.31	0.84	3.77	14.5 %	ACCEPTABLE
348	-1.30	0.82	3.75	13.6 %	ACCEPTABLE
349	-1.30	0.86	3.79	13.5 %	ACCEPTABLE
350	-1.29	0.84	3.77	58.1 %	ACCEPTABLE
351	-16.24	53.55	56.69	0.1 %	ACCEPTABLE
352	-16.28	53.98	57.12	0.1 %	ACCEPTABLE
353	-16.23	53.55	56.69	0.1 %	ACCEPTABLE
354	-1.30	0.84	3.77	58.2 %	ACCEPTABLE

Input data (Stage of construction 2)

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	2.40	Mbushje	
2	1.40	Shtresa Inertesh	
3	2.00	Shtrese zhavorre lumi	
4	-	Shtrese zhavorre lumi	

Foundation

Type of foundation : soil from geological profile

Terrain profile

Terrain behind the structure is flat.

Water influence

GWT behind the structure lies at a depth of 3.80 m

GWT in front of the structure lies at a depth of 3.80 m

Subgrade at the heel is not permeable.

Uplift in foot. bottom due to different pressures is not considered.

Input surface surcharges

No.	Surcharge new	change	Action	Mag.1 [kN/m ²]	Mag.2 [kN/m ²]	Ord.x x [m]	Length l [m]	Depth z [m]
1	NO	YES	variable	1.00				on terrain

No.	Name
1	Ngarkesa te perkohshme

Resistance on front face of the structure

Resistance on front face of the structure: at rest

Soil on front face of the structure - Mbushje

Soil thickness in front of structure $h = 0.60$ m

Terrain in front of structure is flat.

Earthquake

Factor of horizontal acceleration $K_h = 0.2040$

Factor of vertical acceleration $K_v = 0.1020$

Water below the GWT is restricted.

Settings of the stage of construction

Design situation : seismic

Verification No. 1 (Stage of construction 2)**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	-0.92	57.86	0.78	1.000	1.000	1.000
Earthq.- constr.	11.80	-0.92	-5.90	0.78	1.000	1.000	1.000
FF resistance	-1.46	-0.20	0.00	0.00	1.000	1.000	1.000
Weight - earth wedge	0.00	-0.76	1.14	1.28	1.000	1.000	1.000
Earthquake - soil wedge	0.23	-0.76	-0.12	1.28	1.000	1.000	1.000
Active pressure	15.64	-0.65	12.25	1.35	1.000	1.000	1.000
Water pressure	0.00	-2.40	0.00	1.20	1.000	1.000	1.000
Earthq.- act.pressure	9.07	-1.51	6.29	1.27	1.000	1.000	1.000
Ngarkesa te perkohshme	0.62	-1.07	0.45	1.31	0.700	0.700	0.700

Verification of complete wall**Check for overturning stability**Resisting moment $M_{res} = 66.95$ kNm/mOverturning moment $M_{ovr} = 35.01$ kNm/m**Wall for overturning is SATISFACTORY****Check for slip**Resisting horizontal force $H_{res} = 43.92$ kN/mActive horizontal force $H_{act} = 25.50$ kN/m**Wall for slip is SATISFACTORY****Overall check - WALL is SATISFACTORY**

Maximum stress in footing bottom : 90.61 kPa

Bearing capacity of foundation soil (Stage of construction 2)**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	20.15	76.07	24.92	0.215	90.61

Service load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	20.15	76.07	24.92

Verification of foundation soil**Eccentricity verification**Max. eccentricity of normal force $e = 0.215$ Maximum allowable eccentricity $e_{alw} = 0.333$ **Eccentricity of the normal force is SATISFACTORY****Verification of bearing capacity**Max. stress at footing bottom $\sigma = 90.61$ kPaBearing capacity of foundation soil $R_d = 150.00$ kPa**Bearing capacity of foundation soil is SATISFACTORY**

Overall verification - bearing capacity of found. soil is SATISFACTORY

Dimensioning No. 1 (Stage of construction 2)

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	-0.92	57.86	0.78	1.000
Earthq.- constr.	11.80	-0.92	-5.90	0.78	1.000
FF resistance	-1.46	-0.20	0.00	0.00	1.000
Weight - earth wedge	0.00	-0.76	1.14	1.28	1.000
Earthquake - soil wedge	0.23	-0.76	-0.12	1.28	1.000
Active pressure	15.64	-0.65	12.25	1.35	1.000
Water pressure	0.00	-2.40	0.00	1.20	1.000
Earthq.- act.pressure	9.07	-1.51	6.29	1.27	1.000
Ngarkesa te perkohshme	0.62	-1.07	0.45	1.31	1.000

Front wall jump check

Offset of the front wall jump is smaller than $0.50 \cdot$ thickness of foundation. Reinforcement is not required.

Slope stability analysis

Input data

Project

Settings

(input for current task)

Stability analysis

Earthquake analysis : Standard

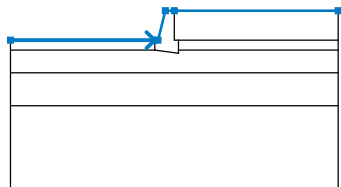
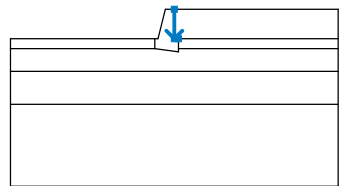
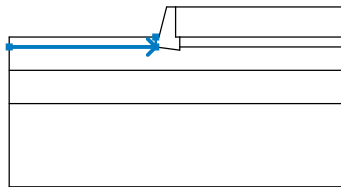
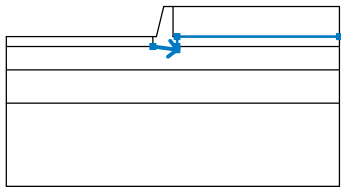
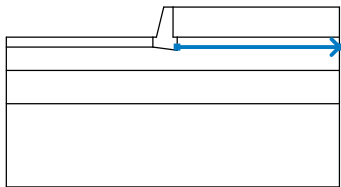
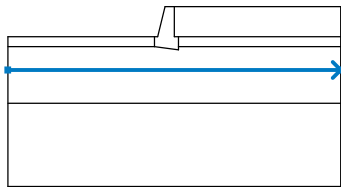
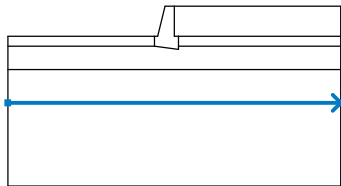
Verification methodology : according to EN 1997

Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)					
Seismic design situation					
		State STR		State GEO	
		Unfavourable	Favourable	Unfavourable	Favourable
Permanent actions :	$\gamma_G =$	1.00 [-]	1.00 [-]	1.00 [-]	1.00 [-]
Variable actions :	$\gamma_Q =$	1.00 [-]	0.00 [-]	1.00 [-]	0.00 [-]
Water load :	$\gamma_w =$			1.00 [-]	

Partial factors for soil parameters (M)			
Seismic design situation			
Partial factor on internal friction :	$\gamma_\phi =$	1.00	[-]
Partial factor on effective cohesion :	$\gamma_c =$	1.00	[-]
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.00	[-]

Interface

No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
1		-10.00	-1.80	-1.20	-1.80	-1.00	-1.80
		-0.55	0.00	0.00	0.00	10.00	0.00
2		0.00	0.00	0.00	-1.80	0.25	-1.80
3		-10.00	-2.40	-1.20	-2.40	-1.20	-1.80
4		-1.20	-2.40	0.25	-2.60	0.25	-2.40
		0.25	-1.80	10.00	-1.80		
5		0.25	-2.40	10.00	-2.40		
6		-10.00	-3.80	10.00	-3.80		
7		-10.00	-5.80	10.00	-5.80		

Soil parameters - effective stress state

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]
1	Mbushje		35.00	0.00	19.00
2	Shtresa Inertesh		30.00	0.00	19.00
3	Shtrese zhavorre lumi		24.00	10.00	20.10

Soil parameters - uplift

No.	Name	Pattern	γ_{sat} [kN/m ³]	γ_s [kN/m ³]	n [-]
1	Mbushje		20.00		
2	Shtresa Inertesh		20.00		
3	Shtrese zhavorre lumi		22.00		

Soil parameters

Mbushje

Unit weight : $\gamma = 19.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 35.00^\circ$
 Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

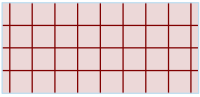
Shtresa Inertesh

Unit weight : $\gamma = 19.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 30.00^\circ$
 Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

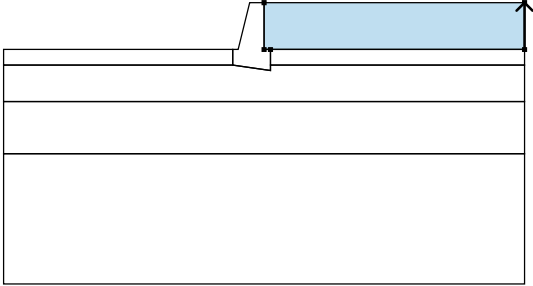
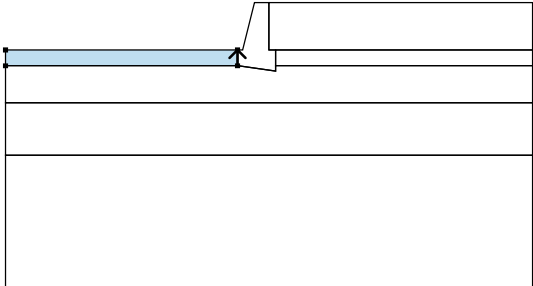
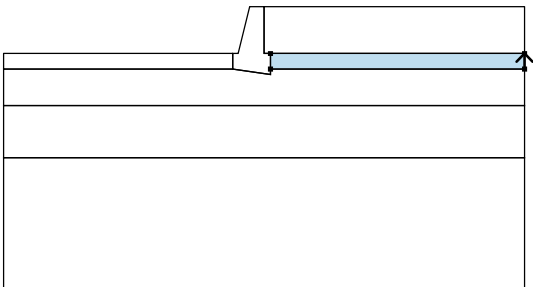
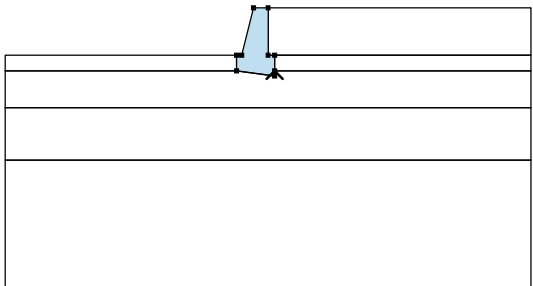
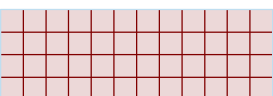
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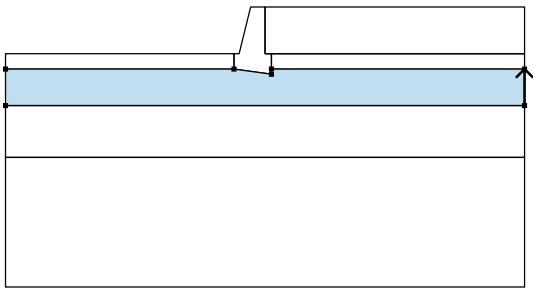
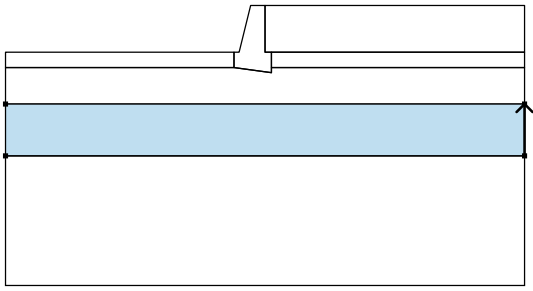
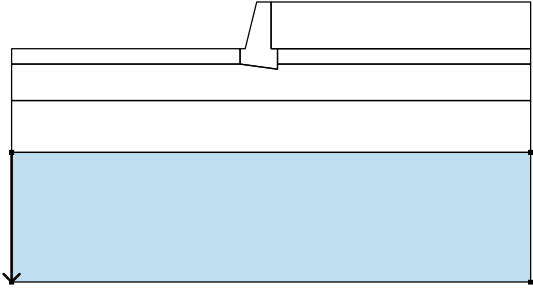
Unit weight : $\gamma = 20.10 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 24.00^\circ$
 Cohesion of soil : $c_{ef} = 10.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 22.00 \text{ kN/m}^3$

Rigid bodies

No.	Name	Sample	γ [kN/m ³]
1	Wall material		24.00

Assigning and surfaces

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
1		10.00	-1.80	10.00	0.00	Mbushje 
		0.00	0.00	0.00	-1.80	
		0.25	-1.80			
2		-1.20	-2.40	-1.20	-1.80	Mbushje 
		-10.00	-1.80	-10.00	-2.40	
3		10.00	-2.40	10.00	-1.80	Mbushje 
		0.25	-1.80	0.25	-2.40	
4		0.25	-2.60	0.25	-2.40	Wall material 
		0.25	-1.80	0.00	-1.80	
		0.00	0.00	-0.55	0.00	
		-1.00	-1.80	-1.20	-1.80	
		-1.20	-2.40			

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
5		10.00	-3.80	10.00	-2.40	Shtresa Inertesh 
		0.25	-2.40	0.25	-2.60	
		-1.20	-2.40	-10.00	-2.40	
		-10.00	-3.80			
6		10.00	-5.80	10.00	-3.80	Shtrese zhavorre lumi 
		-10.00	-3.80	-10.00	-5.80	
7		-10.00	-5.80	-10.00	-10.80	Shtrese zhavorre lumi 
		10.00	-10.80	10.00	-5.80	

Surcharge

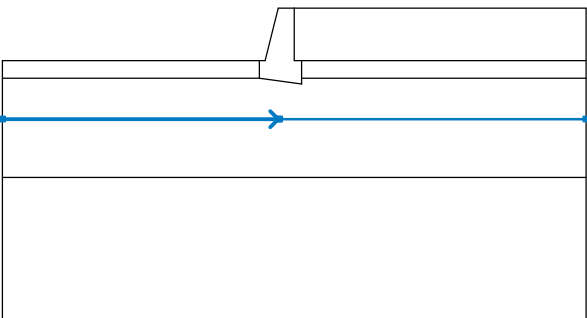
No.	Type	Type of action	Location z [m]	Origin x [m]	Length l [m]	Width b [m]	Slope α [°]	Magnitude		
								q, q ₁ , f, F	q ₂	unit
1	strip	variable	on terrain	x = 0.00	l = 10.00		0.00	1.00		kN/m ²

Surcharges

No.	Name
1	Ngarkesa te perkohshme

Water

Water type : GWT

No.	GWT location	Coordinates of GWT points [m]					
		x	z	x	z	x	z
1		-10.00	-3.80	-0.55	-3.80	-0.50	-3.80
		10.00	-3.80				

Tensile crack

Tensile crack not inputted.

EarthquakeHorizontal seismic coefficient : $K_h = 0.20$ Vertical seismic coefficient : $K_v = 0.10$ **Settings of the stage of construction**

Design situation : seismic

Results (Stage of construction 1)**Analysis 1****Circular slip surface**

Slip surface parameters						
Center :	x =	-1.64 [m]	Angles :	α_1 =	-36.60	[°]
	z =	2.76 [m]		α_2 =	60.93	[°]
Radius :	R =	5.68 [m]				
The slip surface after optimization.						

Slope stability verification (Bishop)Sum of active forces : $F_a = 86.32 \text{ kN/m}$ Sum of passive forces : $F_p = 127.17 \text{ kN/m}$ Sliding moment : $M_a = 490.29 \text{ kNm/m}$ Resisting moment : $M_p = 722.30 \text{ kNm/m}$

Utilization : 67.9 %

Slope stability ACCEPTABLE**Optimization of circular slip surface (Bishop)**

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
1	-1.64	2.76	5.68	67.9 %	ACCEPTABLE
2	-1.64	2.76	5.68	67.9 %	ACCEPTABLE
3	-1.64	2.76	5.68	67.9 %	ACCEPTABLE
4	-2.56	14.51	17.51	59.0 %	ACCEPTABLE
5	-1.94	8.91	12.80	53.0 %	ACCEPTABLE
6	2.28	2.76	5.68	0.4 %	ACCEPTABLE
7	-1.15	1.79	8.58	41.2 %	ACCEPTABLE
8	-3.88	0.92	3.89	0.1 %	ACCEPTABLE
9	-5.52	2.90	5.81	0.0 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
10	-2.62	15.00	17.95	59.0 %	ACCEPTABLE
11	-27.09	191.32	194.38	0.4 %	ACCEPTABLE
12	-1.64	2.76	5.68	67.9 %	ACCEPTABLE
13	-2.33	10.29	13.20	62.0 %	ACCEPTABLE
14	-1.89	6.93	10.46	58.4 %	ACCEPTABLE
15	0.97	2.76	5.68	47.6 %	ACCEPTABLE
16	-1.23	1.93	7.42	43.6 %	ACCEPTABLE
17	-4.25	2.76	5.68	0.3 %	ACCEPTABLE
18	-3.79	0.59	4.54	0.9 %	ACCEPTABLE
19	-2.30	10.05	13.00	61.9 %	ACCEPTABLE
20	1.18	1.79	5.08	41.8 %	ACCEPTABLE
21	-16.32	44.25	47.41	0.0 %	ACCEPTABLE
22	-24.87	153.37	156.43	0.3 %	ACCEPTABLE
23	-13.71	44.25	47.41	0.3 %	ACCEPTABLE
24	-1.64	2.76	5.68	67.9 %	ACCEPTABLE
25	0.69	0.02	4.37	33.4 %	ACCEPTABLE
26	-13.07	79.42	81.47	0.3 %	ACCEPTABLE
27	-7.91	39.95	42.00	0.4 %	ACCEPTABLE
28	-2.15	7.61	10.48	13.6 %	ACCEPTABLE
29	-1.84	5.59	8.88	61.2 %	ACCEPTABLE
30	0.10	2.76	5.68	55.8 %	ACCEPTABLE
31	-1.30	2.08	6.70	46.3 %	ACCEPTABLE
32	-5.32	11.77	13.65	0.2 %	ACCEPTABLE
33	-6.40	14.10	16.20	0.2 %	ACCEPTABLE
34	-3.38	2.76	5.68	0.5 %	ACCEPTABLE
35	-3.12	1.52	4.94	1.1 %	ACCEPTABLE
36	-2.09	7.23	10.17	64.0 %	ACCEPTABLE
37	0.12	2.67	5.62	55.3 %	ACCEPTABLE
38	-17.68	57.69	60.82	0.1 %	ACCEPTABLE
39	-23.40	130.44	133.51	0.3 %	ACCEPTABLE
40	-15.94	57.69	60.82	0.3 %	ACCEPTABLE
41	-1.64	2.76	5.68	67.9 %	ACCEPTABLE
42	-0.35	2.17	5.30	57.1 %	ACCEPTABLE
43	-3.86	16.93	18.87	0.4 %	ACCEPTABLE
44	-2.05	10.05	11.99	0.4 %	ACCEPTABLE
45	-2.00	5.91	8.77	7.8 %	ACCEPTABLE
46	0.04	0.34	4.46	39.8 %	ACCEPTABLE
47	-1.79	4.67	7.82	63.3 %	ACCEPTABLE
48	-0.48	2.76	5.68	60.6 %	ACCEPTABLE
49	-1.38	2.22	6.27	50.0 %	ACCEPTABLE
50	-1.28	0.55	3.49	8.7 %	ACCEPTABLE
51	-3.67	6.81	8.97	0.3 %	ACCEPTABLE
52	-2.57	4.86	6.78	0.3 %	ACCEPTABLE
53	-2.80	2.76	5.68	0.7 %	ACCEPTABLE
54	-2.41	0.92	4.66	53.4 %	ACCEPTABLE
55	-1.15	0.11	3.32	56.6 %	ACCEPTABLE
56	-2.65	2.04	5.23	1.8 %	ACCEPTABLE
57	-1.31	0.64	3.53	3.8 %	ACCEPTABLE
58	-1.94	5.57	8.51	65.3 %	ACCEPTABLE
59	-0.51	2.90	5.78	61.2 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
60	-18.61	67.71	70.82	0.1 %	ACCEPTABLE
61	-22.43	116.21	119.28	0.3 %	ACCEPTABLE
62	-17.45	67.71	70.82	0.2 %	ACCEPTABLE
63	-1.64	2.76	5.68	67.9 %	ACCEPTABLE
64	-0.87	2.77	5.69	63.3 %	ACCEPTABLE
65	-2.68	9.13	11.37	0.4 %	ACCEPTABLE
66	-1.60	6.17	8.40	0.4 %	ACCEPTABLE
67	-1.89	4.81	7.68	7.9 %	ACCEPTABLE
68	-0.50	1.07	4.72	50.6 %	ACCEPTABLE
69	-1.75	4.05	7.12	64.6 %	ACCEPTABLE
70	-0.87	2.76	5.68	63.3 %	ACCEPTABLE
71	-1.44	2.35	6.02	56.4 %	ACCEPTABLE
72	-1.45	1.35	4.22	3.4 %	ACCEPTABLE
73	-2.91	5.08	7.46	0.4 %	ACCEPTABLE
74	-2.07	3.70	5.92	0.4 %	ACCEPTABLE
75	-2.41	2.76	5.68	1.2 %	ACCEPTABLE
76	-1.55	0.43	4.13	51.9 %	ACCEPTABLE
77	-2.19	1.71	5.04	61.8 %	ACCEPTABLE
78	-1.33	0.92	3.99	63.3 %	ACCEPTABLE
79	-2.00	0.84	4.63	52.8 %	ACCEPTABLE
80	-2.32	2.33	5.40	2.5 %	ACCEPTABLE
81	-1.42	1.27	4.17	6.0 %	ACCEPTABLE
82	-1.84	4.56	7.49	66.2 %	ACCEPTABLE
83	-0.90	2.93	5.80	64.0 %	ACCEPTABLE
84	-19.24	74.86	77.96	0.2 %	ACCEPTABLE
85	-21.78	107.19	110.27	0.2 %	ACCEPTABLE
86	-18.46	74.86	77.96	0.2 %	ACCEPTABLE
87	-1.64	2.76	5.68	67.9 %	ACCEPTABLE
88	-1.16	2.92	5.79	65.6 %	ACCEPTABLE
89	-2.22	6.25	8.71	0.5 %	ACCEPTABLE
90	-1.54	4.67	7.12	0.6 %	ACCEPTABLE
91	-1.81	4.11	6.99	8.8 %	ACCEPTABLE
92	-0.87	1.59	4.98	56.9 %	ACCEPTABLE
93	-1.72	3.63	6.64	65.6 %	ACCEPTABLE
94	-1.12	2.76	5.68	64.9 %	ACCEPTABLE
95	-1.50	2.46	5.88	59.8 %	ACCEPTABLE
96	-1.53	1.84	4.71	4.6 %	ACCEPTABLE
97	-2.46	4.19	6.73	0.4 %	ACCEPTABLE
98	-1.88	3.28	5.72	0.4 %	ACCEPTABLE
99	-2.16	2.76	5.68	1.8 %	ACCEPTABLE
100	-1.56	1.05	4.49	58.0 %	ACCEPTABLE
101	-1.25	0.72	4.12	56.5 %	ACCEPTABLE
102	-2.02	2.14	5.29	65.1 %	ACCEPTABLE
103	-1.44	1.51	4.51	65.9 %	ACCEPTABLE
104	-1.86	1.38	4.87	58.4 %	ACCEPTABLE
105	-2.10	2.50	5.51	3.3 %	ACCEPTABLE
106	-1.50	1.73	4.64	8.7 %	ACCEPTABLE
107	-1.78	3.92	6.85	66.6 %	ACCEPTABLE
108	-1.16	2.91	5.78	65.6 %	ACCEPTABLE
109	-19.66	79.83	82.93	0.2 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
110	-21.36	101.38	104.47	0.2 %	ACCEPTABLE
111	-19.14	79.83	82.93	0.2 %	ACCEPTABLE
112	-1.64	2.76	5.68	67.9 %	ACCEPTABLE
113	-1.33	2.93	5.80	66.6 %	ACCEPTABLE
114	-1.99	4.84	7.45	0.9 %	ACCEPTABLE
115	-1.55	3.92	6.52	1.0 %	ACCEPTABLE
116	-1.76	3.65	6.54	8.9 %	ACCEPTABLE
117	-1.12	1.96	5.18	61.0 %	ACCEPTABLE
118	-1.70	3.34	6.32	66.2 %	ACCEPTABLE
119	-1.30	2.76	5.68	65.9 %	ACCEPTABLE
120	-1.54	2.54	5.79	62.0 %	ACCEPTABLE
121	-1.57	2.15	5.03	5.0 %	ACCEPTABLE
122	-2.18	3.67	6.33	0.8 %	ACCEPTABLE
123	-1.78	3.07	5.67	0.7 %	ACCEPTABLE
124	-1.98	2.76	5.68	2.5 %	ACCEPTABLE
125	-1.57	1.54	4.81	61.6 %	ACCEPTABLE
126	-1.37	1.30	4.54	61.1 %	ACCEPTABLE
127	-1.90	2.39	5.44	15.0 %	ACCEPTABLE
128	-1.51	1.91	4.88	66.8 %	ACCEPTABLE
129	-1.77	1.78	5.08	61.9 %	ACCEPTABLE
130	-1.95	2.60	5.57	4.4 %	ACCEPTABLE
131	-1.55	2.06	4.97	8.7 %	ACCEPTABLE
132	-1.73	3.52	6.45	66.9 %	ACCEPTABLE
133	-1.32	2.87	5.76	66.3 %	ACCEPTABLE
134	-19.94	83.24	86.33	0.2 %	ACCEPTABLE
135	-21.07	97.61	100.69	0.2 %	ACCEPTABLE
136	-19.59	83.24	86.33	0.2 %	ACCEPTABLE
137	-1.64	2.76	5.68	67.9 %	ACCEPTABLE
138	-1.44	2.90	5.77	67.1 %	ACCEPTABLE
139	-1.86	4.06	6.77	1.3 %	ACCEPTABLE
140	-1.57	3.49	6.20	1.8 %	ACCEPTABLE
141	-1.72	3.35	6.25	9.0 %	ACCEPTABLE
142	-1.29	2.22	5.33	63.1 %	ACCEPTABLE
143	-1.68	3.15	6.11	66.6 %	ACCEPTABLE
144	-1.41	2.76	5.68	66.5 %	ACCEPTABLE
145	-1.57	2.61	5.75	63.7 %	ACCEPTABLE
146	-1.59	2.36	5.25	6.0 %	ACCEPTABLE
147	-2.00	3.35	6.10	1.2 %	ACCEPTABLE
148	-1.73	2.95	5.66	1.3 %	ACCEPTABLE
149	-1.87	2.76	5.68	3.6 %	ACCEPTABLE
150	-1.59	1.91	5.06	64.0 %	ACCEPTABLE
151	-1.45	1.74	4.87	63.7 %	ACCEPTABLE
152	-1.82	2.53	5.53	15.0 %	ACCEPTABLE
153	-1.56	2.19	5.14	67.4 %	ACCEPTABLE
154	-1.72	2.08	5.25	64.2 %	ACCEPTABLE
155	-1.85	2.66	5.61	5.8 %	ACCEPTABLE
156	-1.58	2.29	5.20	8.6 %	ACCEPTABLE
157	-1.70	3.26	6.18	67.2 %	ACCEPTABLE
158	-1.43	2.84	5.73	66.9 %	ACCEPTABLE
159	-20.13	85.55	88.64	0.2 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
160	-20.88	95.13	98.22	0.2 %	ACCEPTABLE
161	-19.90	85.55	88.64	0.2 %	ACCEPTABLE
162	-1.64	2.76	5.68	67.9 %	ACCEPTABLE
163	-1.51	2.86	5.75	67.3 %	ACCEPTABLE
164	-1.78	3.59	6.37	2.2 %	ACCEPTABLE
165	-1.59	3.23	6.01	2.8 %	ACCEPTABLE
166	-1.69	3.15	6.05	14.8 %	ACCEPTABLE
167	-1.41	2.39	5.44	64.5 %	ACCEPTABLE
168	-1.67	3.02	5.97	66.9 %	ACCEPTABLE
169	-1.49	2.76	5.68	66.8 %	ACCEPTABLE
170	-1.59	2.66	5.72	65.0 %	ACCEPTABLE
171	-1.61	2.49	5.39	6.0 %	ACCEPTABLE
172	-1.88	3.15	5.95	1.8 %	ACCEPTABLE
173	-1.70	2.88	5.66	1.8 %	ACCEPTABLE
174	-1.79	2.76	5.68	5.9 %	ACCEPTABLE
175	-1.60	2.17	5.25	65.3 %	ACCEPTABLE
176	-1.51	2.05	5.11	65.3 %	ACCEPTABLE
177	-1.76	2.62	5.59	67.5 %	ACCEPTABLE
178	-1.58	2.38	5.32	67.4 %	ACCEPTABLE
179	-1.69	2.29	5.38	65.4 %	ACCEPTABLE
180	-1.78	2.69	5.64	8.5 %	ACCEPTABLE
181	-1.60	2.44	5.36	8.6 %	ACCEPTABLE
182	-1.68	3.09	6.01	14.8 %	ACCEPTABLE
183	-1.50	2.82	5.72	67.0 %	ACCEPTABLE
184	-20.25	87.11	90.20	0.2 %	ACCEPTABLE
185	-20.76	93.49	96.58	0.2 %	ACCEPTABLE
186	-20.10	87.11	90.20	0.2 %	ACCEPTABLE
187	-1.64	2.76	5.68	67.9 %	ACCEPTABLE
188	-1.55	2.83	5.73	67.3 %	ACCEPTABLE
189	-1.73	3.30	6.12	3.0 %	ACCEPTABLE
190	-1.60	3.07	5.89	3.9 %	ACCEPTABLE
191	-1.68	3.02	5.93	15.1 %	ACCEPTABLE
192	-1.48	2.51	5.52	65.4 %	ACCEPTABLE
193	-1.66	2.93	5.87	67.4 %	ACCEPTABLE
194	-1.54	2.76	5.68	67.1 %	ACCEPTABLE
195	-1.61	2.69	5.71	66.1 %	ACCEPTABLE
196	-1.62	2.58	5.49	15.2 %	ACCEPTABLE
197	-1.80	3.02	5.86	2.6 %	ACCEPTABLE
198	-1.68	2.84	5.66	3.0 %	ACCEPTABLE
199	-1.74	2.76	5.68	5.9 %	ACCEPTABLE
200	-1.61	2.36	5.38	66.2 %	ACCEPTABLE
201	-1.55	2.28	5.29	66.2 %	ACCEPTABLE
202	-1.72	2.67	5.62	15.2 %	ACCEPTABLE
203	-1.60	2.50	5.44	67.5 %	ACCEPTABLE
204	-1.67	2.44	5.47	66.3 %	ACCEPTABLE
205	-1.73	2.72	5.65	8.5 %	ACCEPTABLE
206	-1.61	2.55	5.46	9.3 %	ACCEPTABLE
207	-1.67	2.98	5.90	15.1 %	ACCEPTABLE
208	-1.55	2.80	5.71	67.2 %	ACCEPTABLE
209	-20.34	88.16	91.25	0.2 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
210	-20.67	92.41	95.50	0.2 %	ACCEPTABLE
211	-20.23	88.16	91.25	0.2 %	ACCEPTABLE
212	-1.64	2.76	5.68	67.9 %	ACCEPTABLE
213	-1.58	2.81	5.71	14.9 %	ACCEPTABLE
214	-1.70	3.11	5.97	4.0 %	ACCEPTABLE
215	-1.62	2.96	5.82	5.8 %	ACCEPTABLE
216	-1.66	2.93	5.85	15.1 %	ACCEPTABLE
217	-1.54	2.59	5.57	66.1 %	ACCEPTABLE
218	-1.65	2.88	5.81	67.6 %	ACCEPTABLE
219	-1.57	2.76	5.68	67.2 %	ACCEPTABLE
220	-1.62	2.71	5.70	66.6 %	ACCEPTABLE
221	-1.63	2.64	5.55	15.2 %	ACCEPTABLE
222	-1.74	2.93	5.80	3.6 %	ACCEPTABLE
223	-1.66	2.81	5.67	4.5 %	ACCEPTABLE
224	-1.71	2.76	5.68	8.5 %	ACCEPTABLE
225	-1.62	2.49	5.48	66.8 %	ACCEPTABLE
226	-1.58	2.43	5.41	66.8 %	ACCEPTABLE
227	-1.70	2.70	5.64	16.3 %	ACCEPTABLE
228	-1.62	2.59	5.52	67.7 %	ACCEPTABLE
229	-1.66	2.54	5.54	66.7 %	ACCEPTABLE
230	-1.70	2.73	5.66	9.3 %	ACCEPTABLE
231	-1.62	2.62	5.54	15.2 %	ACCEPTABLE
232	-1.66	2.91	5.83	16.3 %	ACCEPTABLE
233	-1.58	2.79	5.70	67.3 %	ACCEPTABLE
234	-20.39	88.86	91.95	0.2 %	ACCEPTABLE
235	-20.61	91.70	94.79	0.2 %	ACCEPTABLE
236	-20.32	88.86	91.95	0.2 %	ACCEPTABLE
237	-1.64	2.76	5.68	67.9 %	ACCEPTABLE
238	-1.60	2.79	5.70	67.3 %	ACCEPTABLE
239	-1.68	2.99	5.87	5.9 %	ACCEPTABLE
240	-1.62	2.89	5.77	8.3 %	ACCEPTABLE
241	-1.66	2.87	5.79	67.7 %	ACCEPTABLE
242	-1.57	2.65	5.61	66.6 %	ACCEPTABLE
243	-1.65	2.84	5.76	67.7 %	ACCEPTABLE
244	-1.59	2.76	5.68	67.2 %	ACCEPTABLE
245	-1.62	2.73	5.69	67.2 %	ACCEPTABLE
246	-1.63	2.68	5.60	15.2 %	ACCEPTABLE
247	-1.71	2.87	5.76	4.5 %	ACCEPTABLE
248	-1.66	2.79	5.67	5.9 %	ACCEPTABLE
249	-1.69	2.76	5.68	8.5 %	ACCEPTABLE
250	-1.63	2.58	5.54	67.3 %	ACCEPTABLE
251	-1.60	2.54	5.50	67.2 %	ACCEPTABLE
252	-1.68	2.72	5.65	15.2 %	ACCEPTABLE
253	-1.62	2.65	5.57	15.2 %	ACCEPTABLE
254	-1.65	2.62	5.58	67.3 %	ACCEPTABLE
255	-1.68	2.74	5.67	15.2 %	ACCEPTABLE
256	-1.63	2.66	5.58	15.2 %	ACCEPTABLE
257	-1.65	2.86	5.78	15.2 %	ACCEPTABLE
258	-1.60	2.78	5.69	67.4 %	ACCEPTABLE
259	-20.43	89.33	92.42	0.2 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
260	-20.58	91.22	94.31	0.2 %	ACCEPTABLE
261	-20.38	89.33	92.42	0.2 %	ACCEPTABLE
262	-1.64	2.76	5.68	67.9 %	ACCEPTABLE
263	-1.61	2.78	5.70	14.9 %	ACCEPTABLE
264	-1.67	2.91	5.81	8.5 %	ACCEPTABLE
265	-1.63	2.85	5.74	8.3 %	ACCEPTABLE
266	-1.65	2.84	5.75	15.1 %	ACCEPTABLE
267	-1.59	2.69	5.63	66.9 %	ACCEPTABLE
268	-1.65	2.81	5.74	67.6 %	ACCEPTABLE
269	-1.61	2.76	5.68	67.3 %	ACCEPTABLE
270	-1.63	2.74	5.69	67.3 %	ACCEPTABLE
271	-1.63	2.71	5.62	8.6 %	ACCEPTABLE
272	-1.69	2.83	5.73	8.5 %	ACCEPTABLE
273	-1.65	2.78	5.67	5.9 %	ACCEPTABLE
274	-1.67	2.76	5.68	15.2 %	ACCEPTABLE
275	-1.63	2.64	5.59	67.4 %	ACCEPTABLE
276	-1.61	2.61	5.56	67.3 %	ACCEPTABLE
277	-1.66	2.73	5.66	16.4 %	ACCEPTABLE
278	-1.63	2.68	5.61	15.2 %	ACCEPTABLE
279	-1.65	2.66	5.61	67.4 %	ACCEPTABLE
280	-1.67	2.75	5.67	15.2 %	ACCEPTABLE
281	-1.63	2.70	5.62	16.4 %	ACCEPTABLE
282	-1.65	2.82	5.74	67.8 %	ACCEPTABLE
283	-1.61	2.77	5.69	14.9 %	ACCEPTABLE
284	-20.45	89.64	92.73	0.2 %	ACCEPTABLE
285	-20.55	90.90	94.00	0.2 %	ACCEPTABLE
286	-20.42	89.64	92.73	0.2 %	ACCEPTABLE
287	-1.64	2.76	5.68	67.9 %	ACCEPTABLE
288	-1.62	2.78	5.69	15.2 %	ACCEPTABLE
289	-1.66	2.86	5.76	15.1 %	ACCEPTABLE
290	-1.63	2.82	5.72	8.5 %	ACCEPTABLE
291	-1.65	2.81	5.73	67.8 %	ACCEPTABLE
292	-1.61	2.71	5.65	67.5 %	ACCEPTABLE
293	-1.64	2.79	5.72	67.6 %	ACCEPTABLE
294	-1.62	2.76	5.68	67.8 %	ACCEPTABLE
295	-1.63	2.75	5.68	67.6 %	ACCEPTABLE
296	-1.64	2.73	5.64	8.6 %	ACCEPTABLE
297	-1.67	2.81	5.71	8.5 %	ACCEPTABLE
298	-1.65	2.78	5.68	8.5 %	ACCEPTABLE
299	-1.66	2.76	5.68	15.2 %	ACCEPTABLE
300	-1.63	2.68	5.62	67.6 %	ACCEPTABLE
301	-1.62	2.66	5.60	67.6 %	ACCEPTABLE
302	-1.66	2.74	5.67	16.4 %	ACCEPTABLE
303	-1.63	2.71	5.63	15.2 %	ACCEPTABLE
304	-1.65	2.69	5.64	67.4 %	ACCEPTABLE
305	-1.66	2.75	5.67	9.3 %	ACCEPTABLE
306	-1.63	2.72	5.64	67.8 %	ACCEPTABLE
307	-1.65	2.80	5.72	67.8 %	ACCEPTABLE
308	-1.62	2.77	5.69	67.7 %	ACCEPTABLE
309	-20.47	89.85	92.94	0.2 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
310	-20.54	90.69	93.78	0.2 %	ACCEPTABLE
311	-20.45	89.85	92.94	0.2 %	ACCEPTABLE
312	-1.64	2.76	5.68	67.9 %	ACCEPTABLE
313	-1.63	2.77	5.69	67.7 %	ACCEPTABLE
314	-1.65	2.83	5.74	15.1 %	ACCEPTABLE
315	-1.63	2.80	5.71	15.2 %	ACCEPTABLE
316	-1.64	2.79	5.71	67.7 %	ACCEPTABLE
317	-1.62	2.73	5.66	67.6 %	ACCEPTABLE
318	-1.64	2.78	5.71	67.6 %	ACCEPTABLE
319	-1.63	2.76	5.68	67.8 %	ACCEPTABLE
320	-1.64	2.75	5.68	15.2 %	ACCEPTABLE
321	-1.64	2.74	5.65	8.6 %	ACCEPTABLE
322	-1.66	2.79	5.70	8.5 %	ACCEPTABLE
323	-1.64	2.77	5.68	15.2 %	ACCEPTABLE
324	-1.65	2.76	5.68	15.2 %	ACCEPTABLE
325	-1.64	2.70	5.64	67.6 %	ACCEPTABLE
326	-1.63	2.69	5.63	67.5 %	ACCEPTABLE
327	-1.65	2.75	5.67	16.3 %	ACCEPTABLE
328	-1.64	2.73	5.65	15.2 %	ACCEPTABLE
329	-1.64	2.72	5.65	15.2 %	ACCEPTABLE
330	-1.65	2.75	5.68	15.2 %	ACCEPTABLE
331	-1.64	2.73	5.65	15.2 %	ACCEPTABLE
332	-1.64	2.79	5.71	67.7 %	ACCEPTABLE
333	-1.63	2.77	5.68	15.2 %	ACCEPTABLE
334	-20.48	89.99	93.08	0.2 %	ACCEPTABLE
335	-20.52	90.55	93.64	0.2 %	ACCEPTABLE
336	-20.47	89.99	93.08	0.2 %	ACCEPTABLE
337	-1.64	2.76	5.68	67.9 %	ACCEPTABLE

MUR ME DHE TE PERFORCUAR
H=2.40 m

Analysis of reinforced slopes

Input data

Project

Task : Mur me dhe te armuar, H=2.4 m
 Author : SEED Consulting
 Date : 8/3/2020
 Unit weight of water is considered : 9,81 kN/m³

Settings

(input for current task)

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 : Coulomb
 Earthquake analysis : Mononobe-Okabe
 Shape of earth wedge : Calculate as skew
 Allowable eccentricity : 0.333
 Internal stability : Standard - straight slip surface
 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	
Permanent actions :	$\gamma_G =$	1.35	[-]	1.00	[-]	1.00	[-]
Variable actions :	$\gamma_Q =$	1.50	[-]	0.00	[-]	1.30	[-]
Water load :	$\gamma_W =$					1.00	[-]

Partial factors for soil parameters (M)			
Permanent design situation			
Partial factor on internal friction :	$\gamma_\phi =$	1.25	[-]
Partial factor on effective cohesion :	$\gamma_c =$	1.25	[-]
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.40	[-]
Partial factor on Poisson's ratio :	$\gamma_v =$	1.00	[-]

Partial factors for variable actions			
Permanent design situation			
Factor for combination value :	$\psi_0 =$	0.70	[-]
Factor for frequent value :	$\psi_1 =$	0.50	[-]
Factor for quasi-permanent value :	$\psi_2 =$	0.30	[-]

Partial factors on actions (A)					
Seismic design situation					
		State STR		State GEO	
		Unfavourable		Unfavourable	
Permanent actions :	$\gamma_G =$	1.00	[-]	1.00	[-]

Partial factors on actions (A)						
Seismic design situation						
Variable actions :	$\gamma_Q =$	1.00 [-]	0.00 [-]	1.00 [-]	0.00 [-]	
Water load :	$\gamma_W =$			1.00 [-]		

Partial factors for soil parameters (M)						
Seismic design situation						
Partial factor on internal friction :	$\gamma_\phi =$	1.00 [-]				
Partial factor on effective cohesion :	$\gamma_c =$	1.00 [-]				
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.00 [-]				
Partial factor on Poisson's ratio :	$\gamma_v =$	1.00 [-]				

Stability analysis

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 :	$\gamma_G =$	1.35 [-]	1.00 [-]	1.00 [-]	1.00 [-]	
Variable actions :	$\gamma_Q =$	1.50 [-]	0.00 [-]	1.30 [-]	0.00 [-]	
Water load :	$\gamma_W =$			1.00 [-]		

Partial factors for soil parameters (M)						
Permanent design situation						
Partial factor on internal friction :	$\gamma_\phi =$	1.25 [-]				
Partial factor on effective cohesion :	$\gamma_c =$	1.25 [-]				
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.40 [-]				

Partial factors on actions (A)						
Seismic design situation						
		State STR		State GEO		
		Unfavourable	Favourable	Unfavourable	Favourable	
Permanent actions :	$\gamma_G =$	1.00 [-]	1.00 [-]	1.00 [-]	1.00 [-]	
Variable actions :	$\gamma_Q =$	1.00 [-]	0.00 [-]	1.00 [-]	0.00 [-]	
Water load :	$\gamma_W =$			1.00 [-]		

Partial factors for soil parameters (M)						
Seismic design situation						
Partial factor on internal friction :	$\gamma_\phi =$	1.00 [-]				
Partial factor on effective cohesion :	$\gamma_c =$	1.00 [-]				
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.00 [-]				

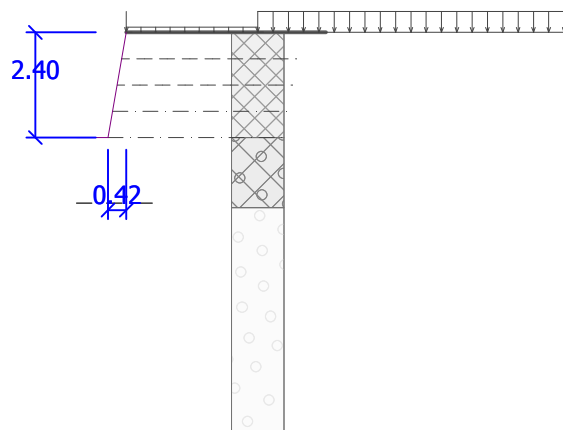
Geometry of structure

Embankment height $h_n = 2.40$ m

Embankment length $l_n = 0.42$ m

Name : Geometry

Stage - analysis : 1 - 0



Material

Types of reinforcements

No.	Name	Type of reinforcement	Line type	Reinforcement strength		Coefficient	
				$T_{ult}[\text{kN/m}]$	$R_t[\text{kN/m}]$	$C_{ds}[-]$	$C_i[-]$
1	Tult 55 (user)	user-defined	-----	55.00	20.05	0.67	0.67
2	Tult 80 (user)	user-defined	-----	80.00	29.17	0.67	0.67
3	Tult 110 (user)	user-defined	~~~~~	110.00	40.11	0.67	0.67

Reinforcement details

1. Tult 55 (user)

Short-term char. strength $T_{ult} = 55.00 \text{ kN/m}$ Long-term design strength $R_t = 20.05 \text{ kN/m}$ Overall coeff. of model uncertainty $FS_{UNC} = 1.25$

Inputted reduction factors

Creep red. factor $RF_{CR} = 1.59$ Durability red. factor $RF_D = 1.15$ Installation damage red. factor $RF_{ID} = 1.20$

2. Tult 80 (user)

Short-term char. strength $T_{ult} = 80.00 \text{ kN/m}$ Long-term design strength $R_t = 29.17 \text{ kN/m}$ Overall coeff. of model uncertainty $FS_{UNC} = 1.25$

Inputted reduction factors

Creep red. factor $RF_{CR} = 1.59$ Durability red. factor $RF_D = 1.15$ Installation damage red. factor $RF_{ID} = 1.20$

3. Tult 110 (user)

Short-term char. strength $T_{ult} = 110.00 \text{ kN/m}$ Long-term design strength $R_t = 40.11 \text{ kN/m}$ Overall coeff. of model uncertainty $FS_{UNC} = 1.25$

Inputted reduction factors

Creep red. factor $RF_{CR} = 1.59$ Durability red. factor $RF_D = 1.15$ Installation damage red. factor $RF_{ID} = 1.20$

Reinforcement

No.	Number of reinforcement	Type of reinforcement	Spacing of reinforcement $h_r[m]$	Height of first reinforcement $h[m]$	Reinforcements geometry
1	2	Tult 80 (user)	0.60	0.00	identical length of reinforcements
2	2	Tult 55 (user)	0.60	1.20	identical length of reinforcements

Reinforcement details

Reinforcement No. 1

Reinforcement type : Tult 80 (user)

Number of reinforcements 2

Reinforcement geometry : identical length of reinforcements

Reinforcement length : 4.00 m

Reinforcement No.	Origin $l_1[m]$	End $l_2[m]$	Height from bottom $h[m]$	Length $l[m]$
1	-0.42	3.58	0.00	4.00
2	-0.31	3.68	0.60	4.00

Reinforcement No. 2

Reinforcement type : Tult 55 (user)

Number of reinforcements 2

Reinforcement geometry : identical length of reinforcements

Reinforcement length : 4.00 m

Reinforcement No.	Origin $l_1[m]$	End $l_2[m]$	Height from bottom $h[m]$	Length $l[m]$
1	-0.21	3.79	1.20	4.00
2	-0.10	3.90	1.80	4.00

Soil parameters

Mbushje

Unit weight : $\gamma = 19.00 \text{ kN/m}^3$ Angle of internal friction : $\varphi_{ef} = 35.00^\circ$ Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$ Angle of friction struc.-soil : $\delta = 23.00^\circ$ Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

Shtrese 1 (suargjile)

Unit weight : $\gamma = 18.00 \text{ kN/m}^3$ Angle of internal friction : $\varphi_{ef} = 16.00^\circ$ Cohesion of soil : $c_{ef} = 40.00 \text{ kPa}$ Angle of friction struc.-soil : $\delta = 10.70^\circ$ Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

Shtrese 2 (zhavorre)

Unit weight : $\gamma = 20.10 \text{ kN/m}^3$ Angle of internal friction : $\varphi_{ef} = 24.00^\circ$

SEED Consulting	Mur me dhe te armuar, H=2.4 m
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Cohesion of soil : $c_{ef} = 10.00$ kPa
 Angle of friction struc.-soil : $\delta = 16.00^\circ$
 Saturated unit weight : $\gamma_{sat} = 21.00$ kN/m³

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	2.40	Mbushje	
2	1.60	Shtrese 1 (suargjile)	
3	6.00	Shtrese 2 (zhavorre)	
4	-	Shtrese 2 (zhavorre)	

Terrain profile

Terrain behind the structure is flat.

Water influence

Ground water table at height -1.50 m from structure heel.

Input surface surcharges

No.	Surcharge new	change	Action	Mag.1 [kN/m ²]	Mag.2 [kN/m ²]	Ord.x x [m]	Length l [m]	Depth z [m]
1	YES		variable	20.00		3.00	7.00	on terrain
2	YES		variable	5.00		0.00	3.00	on terrain

No.	Name
1	Trafiku
2	Turma

Resistance on front face of the structure

Resistance on front face of the structure is not considered.

Applied forces acting on the structure

No.	Force new	modification	Name	Action	F _x [kN/m]	F _z [kN/m]	M [kNm/m]	x [m]	z [m]
1	YES		Bordure Betoni+Guardrail	permanent	0.00	8.00	0.00	0.00	0.00

Settings of the stage of construction

Design situation : permanent

Verification No. 1 (Stage of construction 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
Gravity force	0.00	-1.20	181.80	2.20	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
Active pressure	12.31	-0.81	4.51	4.15	1.000	1.000	1.000
Water pressure	0.00	-2.40	0.00	4.32	1.000	1.000	1.000
Trafiku	13.97	-1.17	5.56	4.21	1.300	1.300	1.300
Trafiku	0.00	-2.40	17.90	3.87	0.000	0.000	1.300
Turma	0.00	-2.40	15.00	1.92	0.000	0.000	1.300
Bordure Betoni+Guardrail	0.00	-2.40	8.00	0.42	1.000	1.000	1.350

Verification of complete wall

Check for overturning stability

Resisting moment $M_{res} = 452.97$ kNm/m

Overturning moment $M_{ovr} = 31.24$ kNm/m

Wall for overturning is SATISFACTORY

Check for slip

Resisting horizontal force $H_{res} = 112.89$ kN/m

Active horizontal force $H_{act} = 30.47$ kN/m

Wall for slip is SATISFACTORY

Overall check - WALL is SATISFACTORY

Maximum stress in footing bottom : 77.68 kPa

Bearing capacity of foundation soil (Stage of construction 1)

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	-69.04	310.74	30.47	0.000	77.68
2	-18.66	201.54	30.47	0.000	50.38

Service load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	-58.33	232.50	19.45
2	-26.10	199.60	19.45

Verification of foundation soil

Eccentricity verification

Max. eccentricity of normal force $e = 0.000$

Maximum allowable eccentricity $e_{alw} = 0.333$

Eccentricity of the normal force is SATISFACTORY

Verification of bearing capacity

Max. stress at footing bottom $\sigma = 77.68$ kPa

Bearing capacity of foundation soil $R_d = 280.00$ kPa

Bearing capacity of foundation soil is SATISFACTORY

Overall verification - bearing capacity of found. soil is SATISFACTORY

Verification of slip on georeinforcement No. 1 (Stage of construction 1)**Forces acting on construction (verification of most utilized reinforcement)**

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	12.14	-0.80	4.24	4.14	1.000
Trafiku	10.99	-1.19	3.84	4.21	1.300
Bordure Betoni+Guardrail	0.00	-2.40	8.00	0.42	1.000
Gravity force	0.00	-1.20	182.47	2.21	1.000
Trafiku	0.00	-2.40	20.06	3.92	0.000
Turma	0.00	-2.40	15.00	1.92	0.000

Check for slip along geo-reinforcement with the maximal utilization (Reinforc. No.: 1)

Inclination of slip surface	= 80.00 °
Overall normal force acting on reinforcement	= 199.70 kN/m
Coefficient of reduction of slip along geo-textile	= 0.67
Wall resistance	= 0.00 kN/m
Overall bearing capacity of reinforcements	= 0.00 kN/m
Resistance along geo-reinforcement	= 93.69 kN/m

Check for slip:Resisting horizontal force $H_{res} = 93.69$ kN/mActive horiz. force $H_{act} = 26.43$ kN/m**Slip along geotextile is SATISFACTORY****Verification of slip on georeinforcement No. 2 (Stage of construction 1)****Forces acting on construction (verification of reinforcement No.: 2)**

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	6.83	-0.60	2.38	4.11	1.000
Trafiku	8.22	-0.89	2.87	4.16	1.300
Bordure Betoni+Guardrail	0.00	-1.80	8.00	0.31	1.000
Gravity force	0.00	-0.90	136.84	2.16	1.000
Trafiku	0.00	-1.80	20.05	3.82	0.000
Turma	0.00	-1.80	15.00	1.81	0.000

Verification against slip along geotextile No.: 2

Inclination of slip surface	= 80.00 °
Overall normal force acting on reinforcement	= 150.96 kN/m
Coefficient of reduction of slip along geo-textile	= 0.67
Wall resistance	= 0.00 kN/m
Overall bearing capacity of reinforcements	= 0.00 kN/m
Resistance along geo-reinforcement	= 70.82 kN/m

Check for slip:Resisting horizontal force $H_{res} = 70.82$ kN/mActive horiz. force $H_{act} = 17.51$ kN/m**Slip along geotextile is SATISFACTORY**

Verification of slip on georeinforcement No. 3 (Stage of construction 1)**Forces acting on construction (verification of reinforcement No.: 2)**

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	6.83	-0.60	2.38	4.11	1.000
Trafiku	8.22	-0.89	2.87	4.16	1.300
Bordure Betoni+Guardrail	0.00	-1.80	8.00	0.31	1.000
Gravity force	0.00	-0.90	136.84	2.16	1.000
Trafiku	0.00	-1.80	20.05	3.82	0.000
Turma	0.00	-1.80	15.00	1.81	0.000

Verification against slip along geotextile No.: 2

Inclination of slip surface	= 80.00 °
Overall normal force acting on reinforcement	= 150.96 kN/m
Coefficient of reduction of slip along geo-textile	= 0.67
Wall resistance	= 0.00 kN/m
Overall bearing capacity of reinforcements	= 0.00 kN/m
Resistance along geo-reinforcement	= 70.82 kN/m

Check for slip:Resisting horizontal force $H_{res} = 70.82$ kN/mActive horiz. force $H_{act} = 17.51$ kN/m**Slip along geotextile is SATISFACTORY****Verification of slip on georeinforcement No. 4 (Stage of construction 1)****Forces acting on construction (verification of reinforcement No.: 2)**

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	6.83	-0.60	2.38	4.11	1.000
Trafiku	8.22	-0.89	2.87	4.16	1.300
Bordure Betoni+Guardrail	0.00	-1.80	8.00	0.31	1.000
Gravity force	0.00	-0.90	136.84	2.16	1.000
Trafiku	0.00	-1.80	20.05	3.82	0.000
Turma	0.00	-1.80	15.00	1.81	0.000

Verification against slip along geotextile No.: 2

Inclination of slip surface	= 80.00 °
Overall normal force acting on reinforcement	= 150.96 kN/m
Coefficient of reduction of slip along geo-textile	= 0.67
Wall resistance	= 0.00 kN/m
Overall bearing capacity of reinforcements	= 0.00 kN/m
Resistance along geo-reinforcement	= 70.82 kN/m

Check for slip:Resisting horizontal force $H_{res} = 70.82$ kN/mActive horiz. force $H_{act} = 17.51$ kN/m**Slip along geotextile is SATISFACTORY**

Verification of slip on georeinforcement No. 5 (Stage of construction 1)**Forces acting on construction (verification of reinforcement No.: 2)**

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	6.83	-0.60	2.38	4.11	1.000
Trafiku	8.22	-0.89	2.87	4.16	1.300
Bordure Betoni+Guardrail	0.00	-1.80	8.00	0.31	1.000
Gravity force	0.00	-0.90	136.84	2.16	1.000
Trafiku	0.00	-1.80	20.05	3.82	0.000
Turma	0.00	-1.80	15.00	1.81	0.000

Verification against slip along geotextile No.: 2

Inclination of slip surface	= 80.00 °
Overall normal force acting on reinforcement	= 150.96 kN/m
Coefficient of reduction of slip along geo-textile	= 0.67
Wall resistance	= 0.00 kN/m
Overall bearing capacity of reinforcements	= 0.00 kN/m
Resistance along geo-reinforcement	= 70.82 kN/m

Check for slip:Resisting horizontal force $H_{res} = 70.82$ kN/mActive horiz. force $H_{act} = 17.51$ kN/m**Slip along geotextile is SATISFACTORY****Verification of slip on georeinforcement No. 6 (Stage of construction 1)****Forces acting on construction (verification of reinforcement No.: 2)**

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	6.83	-0.60	2.38	4.11	1.000
Trafiku	8.22	-0.89	2.87	4.16	1.300
Bordure Betoni+Guardrail	0.00	-1.80	8.00	0.31	1.000
Gravity force	0.00	-0.90	136.84	2.16	1.000
Trafiku	0.00	-1.80	20.05	3.82	0.000
Turma	0.00	-1.80	15.00	1.81	0.000

Verification against slip along geotextile No.: 2

Inclination of slip surface	= 80.00 °
Overall normal force acting on reinforcement	= 150.96 kN/m
Coefficient of reduction of slip along geo-textile	= 0.67
Wall resistance	= 0.00 kN/m
Overall bearing capacity of reinforcements	= 0.00 kN/m
Resistance along geo-reinforcement	= 70.82 kN/m

Check for slip:Resisting horizontal force $H_{res} = 70.82$ kN/mActive horiz. force $H_{act} = 17.51$ kN/m**Slip along geotextile is SATISFACTORY**

Verification of slip on georeinforcement No. 7 (Stage of construction 1)

Forces acting on construction (verification of reinforcement No.: 2)

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	6.83	-0.60	2.38	4.11	1.000
Trafiku	8.22	-0.89	2.87	4.16	1.300
Bordure Betoni+Guardrail	0.00	-1.80	8.00	0.31	1.000
Gravity force	0.00	-0.90	136.84	2.16	1.000
Trafiku	0.00	-1.80	20.05	3.82	0.000
Turma	0.00	-1.80	15.00	1.81	0.000

Verification against slip along geotextile No.: 2

Inclination of slip surface	= 80.00 °
Overall normal force acting on reinforcement	= 150.96 kN/m
Coefficient of reduction of slip along geo-textile	= 0.67
Wall resistance	= 0.00 kN/m
Overall bearing capacity of reinforcements	= 0.00 kN/m
Resistance along geo-reinforcement	= 70.82 kN/m

Check for slip:Resisting horizontal force $H_{res} = 70.82$ kN/mActive horiz. force $H_{act} = 17.51$ kN/m**Slip along geotextile is SATISFACTORY****Calculation of internal stability No. 1 (Stage of construction 1)**

Calculated forces and strength of geo-reinforcements

No.	Name	F _x [kN/m]	Depth z[m]	R _t [kN/m]	Utilization [%]	T _p [kN/m]	Utilization [%]
1	user-defined	-6.05	2.40	29.17	20.76	171.07	3.54
2	user-defined	-10.30	1.80	29.17	35.31	120.29	8.56
3	user-defined	-4.50	1.21	20.05	22.42	75.20	5.98
4	user-defined	-3.76	0.61	20.05	18.75	35.16	10.69

Check for tensile strength (georeinforcement No.2)Tensile strength $R_t = 29.17$ kN/mGeo-reinforcement force $F_x = 10.30$ kN/m**Geo-reinforcement for tensile strength is SATISFACTORY****Check for pull out resistance (georeinforcement No.4)**Pull out resistance $T_p = 35.16$ kN/mGeo-reinforcement force $F_x = 3.76$ kN/m**Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY****Calculation of internal stability No. 2 (Stage of construction 1)**

Check for bearing capacity of geo-reinforcement No.: 2

Check for tensile strengthTensile strength $R_t = 29.17$ kN/m

Geo-reinforcement force $F_x = 10.30 \text{ kN/m}$

Geo-reinforcement for tensile strength is SATISFACTORY

Check for pull out resistance

Pull out resistance $T_p = 120.29 \text{ kN/m}$

Geo-reinforcement force $F_x = 10.30 \text{ kN/m}$

Geo-reinforcement for pull out resistance is SATISFACTORY

Overall verification - geo-reinforcement is SATISFACTORY

Calculation of internal stability No. 3 (Stage of construction 1)

Check for bearing capacity of geo-reinforcement No.: 3

Check for tensile strength

Tensile strength $R_t = 20.05 \text{ kN/m}$

Geo-reinforcement force $F_x = 4.50 \text{ kN/m}$

Geo-reinforcement for tensile strength is SATISFACTORY

Check for pull out resistance

Pull out resistance $T_p = 75.20 \text{ kN/m}$

Geo-reinforcement force $F_x = 4.50 \text{ kN/m}$

Geo-reinforcement for pull out resistance is SATISFACTORY

Overall verification - geo-reinforcement is SATISFACTORY

Calculation of internal stability No. 4 (Stage of construction 1)

Check for bearing capacity of geo-reinforcement No.: 4

Check for tensile strength

Tensile strength $R_t = 20.05 \text{ kN/m}$

Geo-reinforcement force $F_x = 3.76 \text{ kN/m}$

Geo-reinforcement for tensile strength is SATISFACTORY

Check for pull out resistance

Pull out resistance $T_p = 35.16 \text{ kN/m}$

Geo-reinforcement force $F_x = 3.76 \text{ kN/m}$

Geo-reinforcement for pull out resistance is SATISFACTORY

Overall verification - geo-reinforcement is SATISFACTORY

Calculation of internal stability No. 5 (Stage of construction 1)

Check for bearing capacity of geo-reinforcement No.: 4

Check for tensile strength

Tensile strength $R_t = 20.05 \text{ kN/m}$

Geo-reinforcement force $F_x = 3.76 \text{ kN/m}$

Geo-reinforcement for tensile strength is SATISFACTORY

Check for pull out resistance

Pull out resistance $T_p = 35.16 \text{ kN/m}$

Geo-reinforcement force $F_x = 3.76 \text{ kN/m}$

Geo-reinforcement for pull out resistance is SATISFACTORY

Overall verification - geo-reinforcement is SATISFACTORY

Calculation of internal stability No. 6 (Stage of construction 1)

Check for bearing capacity of geo-reinforcement No.: 4

Check for tensile strength

Tensile strength $R_t = 20.05 \text{ kN/m}$

Geo-reinforcement force $F_x = 3.76 \text{ kN/m}$

Geo-reinforcement for tensile strength is SATISFACTORY

Check for pull out resistance

Pull out resistance $T_p = 35.16 \text{ kN/m}$

Geo-reinforcement force $F_x = 3.76 \text{ kN/m}$

Geo-reinforcement for pull out resistance is SATISFACTORY

Overall verification - geo-reinforcement is SATISFACTORY

Calculation of internal stability No. 7 (Stage of construction 1)

Check for bearing capacity of geo-reinforcement No.: 4

Check for tensile strength

Tensile strength $R_t = 20.05 \text{ kN/m}$

Geo-reinforcement force $F_x = 3.76 \text{ kN/m}$

Geo-reinforcement for tensile strength is SATISFACTORY

Check for pull out resistance

Pull out resistance $T_p = 35.16 \text{ kN/m}$

Geo-reinforcement force $F_x = 3.76 \text{ kN/m}$

Geo-reinforcement for pull out resistance is SATISFACTORY

Overall verification - geo-reinforcement is SATISFACTORY

Global stability analysis No. 1 (Stage of construction 1)

Slip surface parameters

(slip surface after optimization)

Center $S = (-1.21; -0.05) \text{ m}$

Radius $r = 2.56 \text{ m}$

Angle $\alpha_1 = 18.04^\circ$

$\alpha_2 = 88.88^\circ$

Slope stability check (Bishop)

Utilization = 52.42 %

Slope stability is SATISFACTORY

Slope stability analysis

Input data

Project

Settings

(input for current task)

Stability analysis

Earthquake analysis : Standard

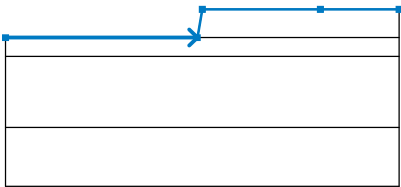
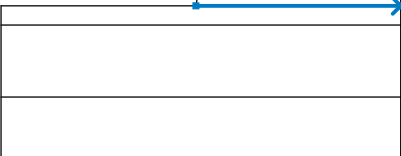
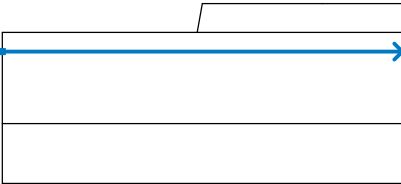
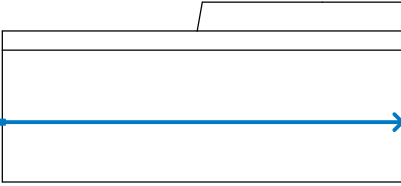
Verification methodology : according to EN 1997

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 :	$\gamma_G =$	1.35 [-]	1.00 [-]	1.00 [-]	1.00 [-]
Variable actions :	$\gamma_Q =$	1.50 [-]	0.00 [-]	1.30 [-]	0.00 [-]
Water load :	$\gamma_w =$			1.00 [-]	

Partial factors for soil parameters (M)			
Permanent design situation			
Partial factor on internal friction :	$\gamma_\phi =$	1.25 [-]	
Partial factor on effective cohesion :	$\gamma_c =$	1.25 [-]	
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.40 [-]	

Interface

No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
1		-16.67	-2.40	-0.42	-2.40	0.00	0.00
		10.00	0.00	16.67	0.00		
2		-0.42	-2.40	16.67	-2.40		
3		-16.67	-4.00	16.67	-4.00		
4		-16.67	-10.00	16.67	-10.00		

Soil parameters - effective stress state

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]
1	Mbushje		35.00	0.00	19.00
2	Shtrese 1 (suargjile)		16.00	40.00	18.00
3	Shtrese 2 (zhavorre)		24.00	10.00	20.10

Soil parameters - uplift

No.	Name	Pattern	γ_{sat} [kN/m ³]	γ_s [kN/m ³]	n [-]
1	Mbushje		20.00		
2	Shtrese 1 (suargjile)		20.00		
3	Shtrese 2 (zhavorre)		21.00		

Soil parameters

Mbushje

Unit weight : $\gamma = 19.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 35.00^\circ$
 Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

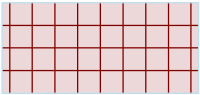
Shtrese 1 (suargjile)

Unit weight : $\gamma = 18.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 16.00^\circ$
 Cohesion of soil : $c_{ef} = 40.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

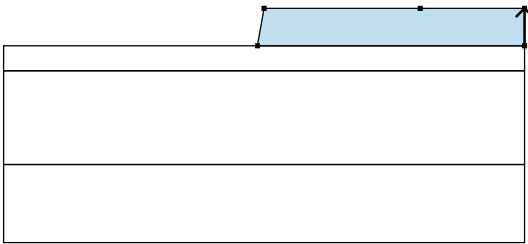
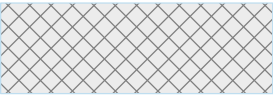
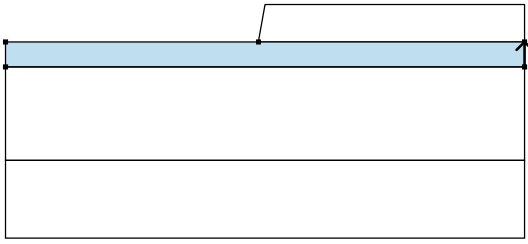
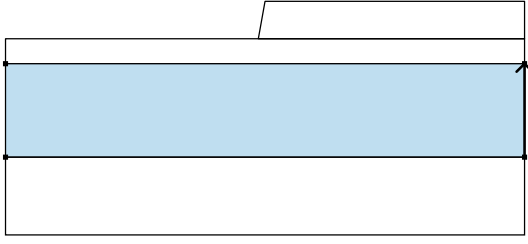
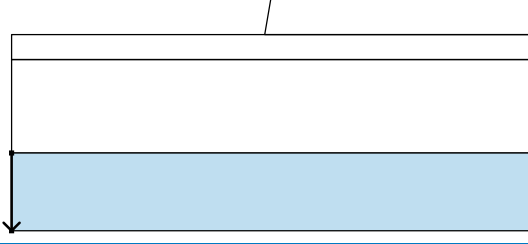
Shtrese 2 (zhavorre)

Unit weight : $\gamma = 20.10 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 24.00^\circ$
 Cohesion of soil : $c_{ef} = 10.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 21.00 \text{ kN/m}^3$

Rigid bodies

No.	Name	Sample	γ [kN/m ³]
1	Material of cover		23.56

Assigning and surfaces

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
1		16.67	-2.40	16.67	0.00	Mbushje 
		10.00	0.00	0.00	0.00	
		-0.42	-2.40			
2		16.67	-4.00	16.67	-2.40	Shtrese 1 (suargjile) 
		-0.42	-2.40	-16.67	-2.40	
		-16.67	-4.00			
3		16.67	-10.00	16.67	-4.00	Shtrese 2 (zhavorre) 
		-16.67	-4.00	-16.67	-10.00	
4		-16.67	-10.00	-16.67	-15.00	Shtrese 2 (zhavorre) 
		16.67	-15.00	16.67	-10.00	

Reinforcements

No.	Point to the left		Point to the right		Length L [m]	Strength R_t [kN/m]	Pull out resist.	End of reinf.
	x [m]	z [m]	x [m]	z [m]				
1	-0.10	-0.60	3.90	-0.60	4.00	20.05	$T_p = 15.96$ kN/m ²	Fixed
2	-0.21	-1.20	3.79	-1.20	4.00	20.05	$T_p = 31.93$ kN/m ²	Fixed
3	-0.31	-1.80	3.69	-1.80	4.00	29.17	$T_p = 47.89$ kN/m ²	Fixed
4	-0.42	-2.40	3.58	-2.40	4.00	29.17	$T_p = 63.86$ kN/m ²	Fixed

Surcharge

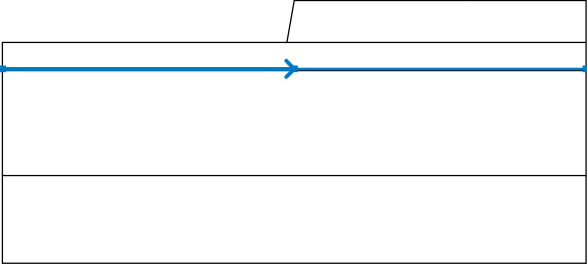
No.	Type	Type of action	Location z [m]	Origin x [m]	Length l [m]	Width b [m]	Slope α [°]	Magnitude	
1	strip	variable	on terrain	x = 3.00	l = 7.00		0.00	q, q ₁ , f, F	q ₂
2	strip	variable	on terrain	x = 0.00	l = 3.00		0.00	20.00	5.00
									unit
									kN/m ²
									kN/m ²

Surcharges

No.	Name
1	Trafiku
2	Turma

Water

Water type : GWT

No.	GWT location	Coordinates of GWT points [m]					
		x	z	x	z	x	z
1		-16.67	-3.90	0.00	-3.90	16.67	-3.90

Tensile crack

Tensile crack not inputted.

Earthquake

Earthquake not included.

Settings of the stage of construction

Design situation : permanent

Results (Stage of construction 1)**Analysis 1****Circular slip surface**

Slip surface parameters						
Center :	x =	-0.12 [m]	Angles :	α_1 =	-49.01	[°]
	z =	2.69 [m]		α_2 =	69.72	[°]
Radius :	R =	7.76 [m]				
The slip surface after optimization.						

Reinforcement forces

Reinforcement Force [kN/m]

1	0.00
2	0.00
3	0.00
4	0.00

Slope stability verification (Bishop)Sum of active forces : F_a = 213.71 kN/mSum of passive forces : F_p = 526.53 kN/m

Sliding moment : $M_a = 1658.41 \text{ kNm/m}$ Resisting moment : $M_p = 4085.90 \text{ kNm/m}$

Utilization : 40.6 %

Slope stability ACCEPTABLE**Optimization of circular slip surface (Bishop)**

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
1	-1.04	0.09	3.34	24.5 %	ACCEPTABLE
2	-1.04	0.09	3.34	24.5 %	ACCEPTABLE
3	-1.04	0.09	3.34	24.5 %	ACCEPTABLE
4	-2.79	16.84	20.49	16.1 %	ACCEPTABLE
5	-1.42	6.15	12.00	38.4 %	ACCEPTABLE
6	5.17	6.15	12.00	15.1 %	ACCEPTABLE
7	-0.92	4.62	17.03	22.2 %	ACCEPTABLE
8	-8.01	6.15	12.00	10.9 %	ACCEPTABLE
9	-7.35	1.04	9.70	11.7 %	ACCEPTABLE
10	-2.39	24.22	30.10	19.2 %	ACCEPTABLE
11	5.69	2.04	9.99	12.6 %	ACCEPTABLE
12	-35.10	190.96	195.96	23.6 %	ACCEPTABLE
13	-1.42	6.15	12.00	38.4 %	ACCEPTABLE
14	-38.10	430.02	433.08	14.8 %	ACCEPTABLE
15	-21.91	200.28	203.35	19.5 %	ACCEPTABLE
16	-2.03	16.54	22.53	28.4 %	ACCEPTABLE
17	-1.79	13.82	20.44	29.3 %	ACCEPTABLE
18	2.97	6.15	12.00	21.0 %	ACCEPTABLE
19	-1.01	4.88	15.10	26.9 %	ACCEPTABLE
20	-10.57	43.29	45.84	22.4 %	ACCEPTABLE
21	-14.73	57.85	60.96	22.3 %	ACCEPTABLE
22	-5.81	6.15	12.00	24.5 %	ACCEPTABLE
23	-5.47	3.49	10.56	25.5 %	ACCEPTABLE
24	-2.08	17.15	23.02	28.1 %	ACCEPTABLE
25	3.15	4.79	11.21	20.7 %	ACCEPTABLE
26	-46.87	262.72	267.69	16.6 %	ACCEPTABLE
27	-68.37	673.90	678.83	16.3 %	ACCEPTABLE
28	-42.48	262.72	267.69	24.4 %	ACCEPTABLE
29	-1.42	6.15	12.00	38.4 %	ACCEPTABLE
30	1.89	3.14	10.40	31.2 %	ACCEPTABLE
31	-4.81	43.21	46.30	10.1 %	ACCEPTABLE
32	-0.83	24.39	27.48	14.4 %	ACCEPTABLE
33	-1.86	12.97	18.85	31.7 %	ACCEPTABLE
34	2.24	0.45	9.58	25.8 %	ACCEPTABLE
35	-1.70	11.32	17.63	32.4 %	ACCEPTABLE
36	1.51	6.15	12.00	33.1 %	ACCEPTABLE
37	-1.10	5.14	13.89	31.1 %	ACCEPTABLE
38	-0.78	0.40	6.74	36.4 %	ACCEPTABLE
39	-5.82	17.65	21.22	16.0 %	ACCEPTABLE
40	-2.69	10.67	13.73	23.6 %	ACCEPTABLE
41	-4.35	6.15	12.00	32.8 %	ACCEPTABLE
42	-3.81	1.92	9.95	30.1 %	ACCEPTABLE
43	-0.71	0.06	6.67	35.1 %	ACCEPTABLE
44	-3.60	0.29	9.56	26.1 %	ACCEPTABLE
45	-4.17	4.74	11.18	33.1 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
46	-0.91	1.14	6.96	38.6 %	ACCEPTABLE
47	-3.77	24.48	27.55	12.6 %	ACCEPTABLE
48	0.23	10.70	13.76	19.1 %	ACCEPTABLE
49	-1.37	5.80	11.78	38.4 %	ACCEPTABLE
50	-1.24	4.74	11.18	38.4 %	ACCEPTABLE
51	2.02	1.14	6.96	35.4 %	ACCEPTABLE
52	-0.75	0.94	9.68	32.1 %	ACCEPTABLE
53	-4.72	5.85	9.71	13.3 %	ACCEPTABLE
54	-1.58	2.04	5.04	23.3 %	ACCEPTABLE
55	-3.84	1.14	6.96	22.4 %	ACCEPTABLE
56	-3.64	0.06	6.66	21.4 %	ACCEPTABLE
57	-1.42	6.16	12.00	38.4 %	ACCEPTABLE
58	2.16	0.40	6.74	33.0 %	ACCEPTABLE
59	-50.42	317.85	322.81	18.2 %	ACCEPTABLE
60	-64.76	591.98	596.91	17.0 %	ACCEPTABLE
61	-47.49	317.85	322.81	22.0 %	ACCEPTABLE
62	-0.91	1.14	6.96	38.6 %	ACCEPTABLE
63	-2.22	10.98	14.93	27.6 %	ACCEPTABLE
64	0.22	5.53	9.47	33.0 %	ACCEPTABLE
65	-1.25	4.19	10.07	39.2 %	ACCEPTABLE
66	0.86	3.06	9.50	38.1 %	ACCEPTABLE
67	-2.65	17.52	21.53	15.5 %	ACCEPTABLE
68	-0.24	10.75	14.74	29.1 %	ACCEPTABLE
69	-1.57	8.17	14.04	37.4 %	ACCEPTABLE
70	1.20	0.73	8.69	33.1 %	ACCEPTABLE
71	-1.46	7.30	13.47	37.5 %	ACCEPTABLE
72	0.70	4.19	10.07	39.1 %	ACCEPTABLE
73	-1.05	3.70	11.52	35.8 %	ACCEPTABLE
74	-0.86	0.83	6.86	37.8 %	ACCEPTABLE
75	-3.89	8.99	13.33	28.4 %	ACCEPTABLE
76	-1.71	5.39	9.37	30.6 %	ACCEPTABLE
77	-3.20	4.19	10.07	35.8 %	ACCEPTABLE
78	-2.91	2.15	9.12	34.0 %	ACCEPTABLE
79	-0.80	0.53	6.78	36.7 %	ACCEPTABLE
80	-2.68	0.57	8.66	30.3 %	ACCEPTABLE
81	-3.10	3.50	9.71	35.4 %	ACCEPTABLE
82	-0.90	1.08	6.94	38.5 %	ACCEPTABLE
83	-1.56	8.12	14.01	37.4 %	ACCEPTABLE
84	0.72	4.10	10.02	38.9 %	ACCEPTABLE
85	-35.74	154.64	159.67	22.1 %	ACCEPTABLE
86	-45.09	280.14	285.11	22.7 %	ACCEPTABLE
87	-33.79	154.64	159.67	26.5 %	ACCEPTABLE
88	-1.25	4.19	10.07	39.2 %	ACCEPTABLE
89	0.10	3.87	9.90	39.4 %	ACCEPTABLE
90	1.45	3.53	9.73	36.3 %	ACCEPTABLE
91	-0.64	10.66	15.43	34.2 %	ACCEPTABLE
92	0.91	7.30	12.06	35.5 %	ACCEPTABLE
93	-0.12	6.40	12.41	37.2 %	ACCEPTABLE
94	1.73	1.57	8.92	33.4 %	ACCEPTABLE
95	-0.05	5.90	12.11	37.3 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
96	1.40	3.87	9.90	36.6 %	ACCEPTABLE
97	0.24	3.55	10.87	35.8 %	ACCEPTABLE
98	0.33	1.73	7.78	38.8 %	ACCEPTABLE
99	-1.60	6.64	11.60	37.9 %	ACCEPTABLE
100	-0.13	4.42	9.17	39.7 %	ACCEPTABLE
101	1.22	4.12	8.99	38.5 %	ACCEPTABLE
102	-1.35	14.01	17.54	17.2 %	ACCEPTABLE
103	0.32	9.43	12.96	19.0 %	ACCEPTABLE
104	-0.43	7.52	12.22	37.4 %	ACCEPTABLE
105	1.63	1.73	7.77	36.9 %	ACCEPTABLE
106	-0.30	6.64	11.59	38.5 %	ACCEPTABLE
107	1.17	4.42	9.17	38.2 %	ACCEPTABLE
108	0.10	3.87	9.90	39.4 %	ACCEPTABLE
109	0.15	2.04	6.77	40.1 %	ACCEPTABLE
110	1.57	1.49	6.51	37.5 %	ACCEPTABLE
111	-0.98	9.46	12.98	29.9 %	ACCEPTABLE
112	0.70	5.65	9.15	33.7 %	ACCEPTABLE
113	-0.15	4.56	9.26	39.6 %	ACCEPTABLE
114	-0.04	3.87	8.84	40.3 %	ACCEPTABLE
115	1.32	3.52	8.64	38.7 %	ACCEPTABLE
116	-1.13	12.39	16.13	17.7 %	ACCEPTABLE
117	0.52	8.24	11.97	31.2 %	ACCEPTABLE
118	-0.32	6.74	11.67	38.5 %	ACCEPTABLE
119	1.68	1.37	7.65	36.2 %	ACCEPTABLE
120	-0.21	5.99	11.16	39.1 %	ACCEPTABLE
121	1.26	3.87	8.84	38.7 %	ACCEPTABLE
122	0.16	3.43	9.68	39.1 %	ACCEPTABLE
123	0.24	1.60	6.57	40.0 %	ACCEPTABLE
124	-1.89	7.13	11.10	29.9 %	ACCEPTABLE
125	-0.42	4.79	8.50	34.1 %	ACCEPTABLE
126	-1.34	3.87	8.84	39.0 %	ACCEPTABLE
127	-0.14	0.47	6.77	36.6 %	ACCEPTABLE
128	-1.11	2.52	8.12	39.2 %	ACCEPTABLE
129	0.32	1.22	6.41	39.6 %	ACCEPTABLE
130	-0.88	1.15	7.58	36.9 %	ACCEPTABLE
131	-1.26	3.37	8.56	39.4 %	ACCEPTABLE
132	0.23	1.62	6.58	40.0 %	ACCEPTABLE
133	-0.29	6.57	11.55	38.6 %	ACCEPTABLE
134	1.25	3.95	8.89	38.6 %	ACCEPTABLE
135	-48.65	305.09	310.06	23.5 %	ACCEPTABLE
136	-54.99	414.22	419.16	19.2 %	ACCEPTABLE
137	-47.35	305.09	310.06	21.7 %	ACCEPTABLE
138	-0.04	3.87	8.84	40.3 %	ACCEPTABLE
139	0.83	3.87	8.84	39.5 %	ACCEPTABLE
140	-0.67	8.69	12.84	33.5 %	ACCEPTABLE
141	0.40	6.41	10.55	35.2 %	ACCEPTABLE
142	-0.23	5.76	10.69	39.2 %	ACCEPTABLE
143	1.12	2.15	7.95	38.6 %	ACCEPTABLE
144	-0.16	5.29	10.39	39.6 %	ACCEPTABLE
145	0.83	3.87	8.84	39.5 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
146	0.10	3.55	9.37	39.8 %	ACCEPTABLE
147	0.13	2.38	7.31	40.4 %	ACCEPTABLE
148	1.02	2.29	7.26	39.4 %	ACCEPTABLE
149	-0.49	6.52	10.63	34.7 %	ACCEPTABLE
150	0.59	4.48	8.58	36.0 %	ACCEPTABLE
151	-0.07	4.05	8.95	40.0 %	ACCEPTABLE
152	1.28	0.91	6.69	37.1 %	ACCEPTABLE
153	0.00	3.65	8.71	40.3 %	ACCEPTABLE
154	1.00	2.38	7.31	39.4 %	ACCEPTABLE
155	0.25	2.18	7.96	39.6 %	ACCEPTABLE
156	0.32	1.04	5.95	39.3 %	ACCEPTABLE
157	-1.06	4.04	8.28	37.6 %	ACCEPTABLE
158	-0.05	2.70	6.79	37.3 %	ACCEPTABLE
159	-0.74	2.38	7.31	39.7 %	ACCEPTABLE
160	0.08	0.29	6.10	36.9 %	ACCEPTABLE
161	-0.61	1.71	6.99	39.5 %	ACCEPTABLE
162	0.37	0.81	5.86	38.9 %	ACCEPTABLE
163	-0.43	0.76	6.64	37.6 %	ACCEPTABLE
164	-0.69	2.13	7.19	39.8 %	ACCEPTABLE
165	0.32	1.02	5.94	39.3 %	ACCEPTABLE
166	-0.05	3.94	8.88	40.2 %	ACCEPTABLE
167	0.99	2.44	7.34	39.5 %	ACCEPTABLE
168	-40.84	227.46	232.44	24.4 %	ACCEPTABLE
169	-45.03	288.97	293.93	23.1 %	ACCEPTABLE
170	-39.97	227.46	232.44	25.5 %	ACCEPTABLE
171	0.13	2.38	7.31	40.4 %	ACCEPTABLE
172	0.70	2.42	7.33	40.0 %	ACCEPTABLE
173	-0.25	4.88	9.26	38.2 %	ACCEPTABLE
174	0.46	3.68	8.05	38.7 %	ACCEPTABLE
175	-0.01	3.48	8.38	40.3 %	ACCEPTABLE
176	0.90	1.38	6.86	38.7 %	ACCEPTABLE
177	0.04	3.23	8.24	40.4 %	ACCEPTABLE
178	0.61	3.30	8.28	40.0 %	ACCEPTABLE
179	-0.34	5.95	10.41	37.9 %	ACCEPTABLE
180	0.37	4.66	9.12	38.6 %	ACCEPTABLE
181	-0.09	4.41	9.39	40.0 %	ACCEPTABLE
182	0.81	2.14	7.69	39.3 %	ACCEPTABLE
183	-0.05	4.14	9.23	40.2 %	ACCEPTABLE
184	0.62	3.23	8.24	40.0 %	ACCEPTABLE
185	0.13	3.04	8.62	40.0 %	ACCEPTABLE
186	0.15	2.29	7.26	40.4 %	ACCEPTABLE
187	-0.75	4.43	8.96	38.8 %	ACCEPTABLE
188	-0.08	3.48	7.93	39.3 %	ACCEPTABLE
189	-0.54	3.23	8.24	40.3 %	ACCEPTABLE
190	0.01	1.61	7.21	39.6 %	ACCEPTABLE
191	0.35	1.24	6.80	39.1 %	ACCEPTABLE
192	-0.47	2.83	8.03	40.2 %	ACCEPTABLE
193	0.19	2.09	7.17	40.3 %	ACCEPTABLE
194	-0.32	1.99	7.63	39.7 %	ACCEPTABLE
195	-0.51	3.07	8.15	40.3 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
196	0.16	2.23	7.24	40.4 %	ACCEPTABLE
197	0.73	2.26	7.25	39.9 %	ACCEPTABLE
198	-0.21	4.66	9.12	38.8 %	ACCEPTABLE
199	0.50	3.48	7.93	39.1 %	ACCEPTABLE
200	0.03	3.30	8.29	40.5 %	ACCEPTABLE
201	0.60	3.37	8.33	39.9 %	ACCEPTABLE
202	-0.35	6.05	10.49	37.7 %	ACCEPTABLE
203	0.35	4.75	9.18	38.5 %	ACCEPTABLE
204	-0.10	4.49	9.45	39.9 %	ACCEPTABLE
205	0.80	2.20	7.73	39.4 %	ACCEPTABLE
206	-0.06	4.21	9.28	40.0 %	ACCEPTABLE
207	0.61	3.30	8.29	40.0 %	ACCEPTABLE
208	0.12	3.11	8.67	40.1 %	ACCEPTABLE
209	0.14	2.36	7.31	40.4 %	ACCEPTABLE
210	-0.76	4.51	9.03	38.7 %	ACCEPTABLE
211	-0.09	3.56	7.99	39.3 %	ACCEPTABLE
212	-0.55	3.30	8.29	40.3 %	ACCEPTABLE
213	0.01	1.67	7.25	39.7 %	ACCEPTABLE
214	0.34	1.29	6.84	39.2 %	ACCEPTABLE
215	-0.48	2.90	8.07	40.4 %	ACCEPTABLE
216	0.18	2.15	7.21	40.4 %	ACCEPTABLE
217	-0.33	2.04	7.66	39.8 %	ACCEPTABLE
218	-0.52	3.14	8.20	40.3 %	ACCEPTABLE
219	0.15	2.29	7.28	40.4 %	ACCEPTABLE
220	-0.09	4.39	9.39	40.0 %	ACCEPTABLE
221	0.59	3.38	8.33	39.9 %	ACCEPTABLE
222	-36.51	181.89	186.90	26.6 %	ACCEPTABLE
223	-39.27	217.87	222.86	25.9 %	ACCEPTABLE
224	-35.93	181.89	186.90	27.9 %	ACCEPTABLE
225	0.03	3.30	8.29	40.5 %	ACCEPTABLE
226	0.40	3.39	8.34	40.2 %	ACCEPTABLE
227	-0.22	5.03	9.65	39.1 %	ACCEPTABLE
228	0.25	4.22	8.84	39.4 %	ACCEPTABLE
229	-0.06	4.09	9.06	40.1 %	ACCEPTABLE
230	0.55	2.56	7.90	40.0 %	ACCEPTABLE
231	-0.03	3.91	8.95	40.3 %	ACCEPTABLE
232	0.42	3.30	8.29	40.2 %	ACCEPTABLE
233	0.09	3.17	8.53	40.2 %	ACCEPTABLE
234	0.10	2.67	7.63	40.5 %	ACCEPTABLE
235	0.47	2.74	7.67	40.2 %	ACCEPTABLE
236	-0.14	4.29	8.88	39.5 %	ACCEPTABLE
237	0.33	3.52	8.11	39.8 %	ACCEPTABLE
238	0.01	3.42	8.36	40.4 %	ACCEPTABLE
239	0.61	1.98	7.29	39.8 %	ACCEPTABLE
240	0.04	3.25	8.26	40.3 %	ACCEPTABLE
241	0.49	2.67	7.63	40.3 %	ACCEPTABLE
242	0.16	2.56	7.90	40.3 %	ACCEPTABLE
243	0.17	2.07	7.00	40.3 %	ACCEPTABLE
244	-0.42	3.40	8.04	39.9 %	ACCEPTABLE
245	0.03	2.81	7.39	40.0 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
246	-0.29	2.67	7.63	40.5 %	ACCEPTABLE
247	0.09	1.61	6.96	39.8 %	ACCEPTABLE
248	0.32	1.36	6.69	39.5 %	ACCEPTABLE
249	-0.24	2.45	7.52	40.4 %	ACCEPTABLE
250	0.20	1.94	6.94	40.3 %	ACCEPTABLE
251	-0.14	1.87	7.24	40.1 %	ACCEPTABLE
252	-0.27	2.58	7.58	40.4 %	ACCEPTABLE
253	0.18	2.03	6.98	40.4 %	ACCEPTABLE
254	0.02	3.35	8.32	40.4 %	ACCEPTABLE
255	0.48	2.73	7.66	40.3 %	ACCEPTABLE
256	-40.38	225.03	230.02	25.0 %	ACCEPTABLE
257	-42.24	251.30	256.27	24.2 %	ACCEPTABLE
258	-40.00	225.03	230.02	25.4 %	ACCEPTABLE
259	0.10	2.67	7.63	40.5 %	ACCEPTABLE
260	0.34	2.74	7.66	40.4 %	ACCEPTABLE
261	-0.06	3.71	8.42	40.0 %	ACCEPTABLE
262	0.25	3.22	7.94	40.2 %	ACCEPTABLE
263	0.04	3.17	8.11	40.4 %	ACCEPTABLE
264	0.44	2.20	7.40	40.1 %	ACCEPTABLE
265	0.06	3.06	8.05	40.4 %	ACCEPTABLE
266	0.36	2.67	7.63	40.4 %	ACCEPTABLE
267	0.14	2.59	7.81	40.3 %	ACCEPTABLE
268	0.15	2.27	7.21	40.3 %	ACCEPTABLE
269	-0.25	3.15	7.90	40.2 %	ACCEPTABLE
270	0.05	2.76	7.47	40.3 %	ACCEPTABLE
271	-0.16	2.67	7.63	40.6 %	ACCEPTABLE
272	0.08	2.74	7.66	40.5 %	ACCEPTABLE
273	-0.32	3.71	8.42	40.0 %	ACCEPTABLE
274	-0.01	3.22	7.94	40.2 %	ACCEPTABLE
275	-0.22	3.17	8.11	40.5 %	ACCEPTABLE
276	0.18	2.20	7.40	40.3 %	ACCEPTABLE
277	-0.20	3.06	8.05	40.5 %	ACCEPTABLE
278	0.10	2.67	7.63	40.5 %	ACCEPTABLE
279	-0.12	2.59	7.81	40.4 %	ACCEPTABLE
280	-0.11	2.27	7.21	40.3 %	ACCEPTABLE
281	-0.51	3.15	7.90	40.0 %	ACCEPTABLE
282	-0.21	2.76	7.47	40.3 %	ACCEPTABLE
283	-0.42	2.67	7.63	40.4 %	ACCEPTABLE
284	-0.17	1.94	7.16	40.2 %	ACCEPTABLE
285	-0.01	1.77	6.97	40.1 %	ACCEPTABLE
286	-0.39	2.54	7.56	40.4 %	ACCEPTABLE
287	-0.10	2.18	7.17	40.4 %	ACCEPTABLE
288	-0.31	2.12	7.36	40.2 %	ACCEPTABLE
289	-0.41	2.61	7.60	40.4 %	ACCEPTABLE
290	-0.11	2.24	7.19	40.3 %	ACCEPTABLE
291	-0.21	3.12	8.09	40.5 %	ACCEPTABLE
292	0.09	2.71	7.65	40.4 %	ACCEPTABLE
293	-38.45	204.16	209.16	26.0 %	ACCEPTABLE
294	-39.68	220.68	225.67	25.5 %	ACCEPTABLE
295	-38.19	204.16	209.16	26.4 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
296	-0.16	2.67	7.63	40.6 %	ACCEPTABLE
297	0.00	2.72	7.66	40.4 %	ACCEPTABLE
298	-0.26	3.35	8.14	40.3 %	ACCEPTABLE
299	-0.06	3.03	7.83	40.3 %	ACCEPTABLE
300	-0.20	3.00	7.95	40.4 %	ACCEPTABLE
301	0.07	2.36	7.47	40.4 %	ACCEPTABLE
302	-0.19	2.93	7.91	40.5 %	ACCEPTABLE
303	0.01	2.67	7.63	40.5 %	ACCEPTABLE
304	-0.13	2.62	7.75	40.4 %	ACCEPTABLE
305	-0.13	2.41	7.35	40.4 %	ACCEPTABLE
306	-0.39	2.99	7.80	40.2 %	ACCEPTABLE
307	-0.19	2.73	7.52	40.3 %	ACCEPTABLE
308	-0.33	2.67	7.63	40.5 %	ACCEPTABLE
309	-0.16	2.18	7.31	40.2 %	ACCEPTABLE
310	-0.06	2.05	7.18	40.3 %	ACCEPTABLE
311	-0.32	2.59	7.59	40.3 %	ACCEPTABLE
312	-0.12	2.34	7.32	40.4 %	ACCEPTABLE
313	-0.26	2.30	7.44	40.3 %	ACCEPTABLE
314	-0.32	2.63	7.61	40.5 %	ACCEPTABLE
315	-0.12	2.38	7.34	40.5 %	ACCEPTABLE
316	-0.20	2.97	7.93	40.5 %	ACCEPTABLE
317	0.01	2.70	7.65	40.4 %	ACCEPTABLE
318	-38.91	206.87	211.86	25.5 %	ACCEPTABLE
319	-39.73	217.88	222.87	25.3 %	ACCEPTABLE
320	-38.74	206.87	211.86	25.7 %	ACCEPTABLE
321	-0.16	2.67	7.63	40.6 %	ACCEPTABLE
322	-0.05	2.71	7.65	40.4 %	ACCEPTABLE
323	-0.23	3.11	7.96	40.4 %	ACCEPTABLE
324	-0.09	2.91	7.76	40.4 %	ACCEPTABLE
325	-0.19	2.89	7.84	40.4 %	ACCEPTABLE
326	-0.01	2.46	7.52	40.4 %	ACCEPTABLE
327	-0.18	2.84	7.82	40.5 %	ACCEPTABLE
328	-0.05	2.67	7.63	40.5 %	ACCEPTABLE
329	-0.14	2.64	7.71	40.6 %	ACCEPTABLE
330	-0.03	2.68	7.73	40.4 %	ACCEPTABLE
331	-0.21	3.08	8.04	40.4 %	ACCEPTABLE
332	-0.07	2.87	7.83	40.5 %	ACCEPTABLE
333	-0.17	2.86	7.92	40.4 %	ACCEPTABLE
334	0.01	2.43	7.61	40.4 %	ACCEPTABLE
335	-0.16	2.81	7.90	40.5 %	ACCEPTABLE
336	-0.03	2.64	7.71	40.6 %	ACCEPTABLE
337	-0.12	2.61	7.79	40.4 %	ACCEPTABLE
338	-0.12	2.47	7.53	40.5 %	ACCEPTABLE
339	-0.29	2.85	7.82	40.5 %	ACCEPTABLE
340	-0.16	2.67	7.63	40.6 %	ACCEPTABLE
341	-0.25	2.64	7.71	40.6 %	ACCEPTABLE
342	-0.14	2.31	7.50	40.3 %	ACCEPTABLE
343	-0.08	2.23	7.41	40.3 %	ACCEPTABLE
344	-0.25	2.59	7.69	40.4 %	ACCEPTABLE
345	-0.11	2.43	7.50	40.5 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
346	-0.21	2.40	7.59	40.3 %	ACCEPTABLE
347	-0.25	2.62	7.70	40.5 %	ACCEPTABLE
348	-0.12	2.45	7.52	40.5 %	ACCEPTABLE
349	-0.16	2.84	7.91	40.4 %	ACCEPTABLE
350	-0.03	2.66	7.72	40.4 %	ACCEPTABLE
351	-39.05	208.68	213.68	25.5 %	ACCEPTABLE
352	-39.60	216.02	221.01	25.3 %	ACCEPTABLE
353	-38.93	208.68	213.68	25.7 %	ACCEPTABLE
354	-0.14	2.64	7.71	40.6 %	ACCEPTABLE
355	-0.07	2.67	7.72	40.4 %	ACCEPTABLE
356	-0.18	2.93	7.92	40.5 %	ACCEPTABLE
357	-0.09	2.79	7.79	40.4 %	ACCEPTABLE
358	-0.16	2.78	7.85	40.6 %	ACCEPTABLE
359	-0.04	2.50	7.64	40.4 %	ACCEPTABLE
360	-0.15	2.76	7.83	40.4 %	ACCEPTABLE
361	-0.06	2.64	7.71	40.6 %	ACCEPTABLE
362	-0.13	2.62	7.76	40.5 %	ACCEPTABLE
363	-0.13	2.52	7.59	40.6 %	ACCEPTABLE
364	-0.24	2.78	7.78	40.5 %	ACCEPTABLE
365	-0.15	2.66	7.66	40.5 %	ACCEPTABLE
366	-0.22	2.64	7.71	40.6 %	ACCEPTABLE
367	-0.14	2.42	7.57	40.5 %	ACCEPTABLE
368	-0.10	2.36	7.51	40.4 %	ACCEPTABLE
369	-0.21	2.61	7.69	40.5 %	ACCEPTABLE
370	-0.12	2.50	7.57	40.6 %	ACCEPTABLE
371	-0.19	2.48	7.63	40.5 %	ACCEPTABLE
372	-0.21	2.63	7.70	40.6 %	ACCEPTABLE
373	-0.12	2.51	7.58	40.6 %	ACCEPTABLE
374	-0.16	2.77	7.84	40.5 %	ACCEPTABLE
375	-0.07	2.65	7.72	40.6 %	ACCEPTABLE
376	-39.80	217.28	222.27	25.1 %	ACCEPTABLE
377	-40.17	222.26	227.24	24.9 %	ACCEPTABLE
378	-39.72	217.28	222.27	25.2 %	ACCEPTABLE
379	-0.14	2.64	7.71	40.6 %	ACCEPTABLE
380	-0.09	2.66	7.72	40.4 %	ACCEPTABLE
381	-0.17	2.83	7.85	40.6 %	ACCEPTABLE
382	-0.11	2.74	7.76	40.5 %	ACCEPTABLE
383	-0.15	2.74	7.80	40.4 %	ACCEPTABLE
384	-0.07	2.55	7.66	40.4 %	ACCEPTABLE
385	-0.15	2.72	7.79	40.5 %	ACCEPTABLE
386	-0.09	2.64	7.71	40.6 %	ACCEPTABLE
387	-0.04	2.66	7.72	40.4 %	ACCEPTABLE
388	-0.12	2.83	7.85	40.6 %	ACCEPTABLE
389	-0.06	2.74	7.76	40.5 %	ACCEPTABLE
390	-0.10	2.74	7.80	40.4 %	ACCEPTABLE
391	-0.02	2.55	7.66	40.4 %	ACCEPTABLE
392	-0.10	2.72	7.79	40.6 %	ACCEPTABLE
393	-0.04	2.64	7.71	40.6 %	ACCEPTABLE
394	-0.08	2.63	7.75	40.4 %	ACCEPTABLE
395	-0.08	2.56	7.63	40.6 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
396	-0.16	2.73	7.76	40.5 %	ACCEPTABLE
397	-0.10	2.66	7.68	40.5 %	ACCEPTABLE
398	-0.14	2.64	7.71	40.6 %	ACCEPTABLE
399	-0.09	2.49	7.61	40.4 %	ACCEPTABLE
400	-0.06	2.45	7.57	40.4 %	ACCEPTABLE
401	-0.14	2.62	7.70	40.5 %	ACCEPTABLE
402	-0.08	2.54	7.62	40.5 %	ACCEPTABLE
403	-0.12	2.53	7.65	40.4 %	ACCEPTABLE
404	-0.14	2.63	7.71	40.5 %	ACCEPTABLE
405	-0.08	2.55	7.62	40.6 %	ACCEPTABLE
406	-0.10	2.73	7.80	40.6 %	ACCEPTABLE
407	-0.05	2.75	7.81	40.4 %	ACCEPTABLE
408	-0.13	2.92	7.94	40.6 %	ACCEPTABLE
409	-0.07	2.83	7.85	40.6 %	ACCEPTABLE
410	-0.11	2.83	7.89	40.4 %	ACCEPTABLE
411	-0.03	2.64	7.75	40.5 %	ACCEPTABLE
412	-0.11	2.81	7.88	40.6 %	ACCEPTABLE
413	-0.05	2.73	7.80	40.6 %	ACCEPTABLE
414	-0.09	2.71	7.83	40.5 %	ACCEPTABLE
415	-0.09	2.65	7.72	40.6 %	ACCEPTABLE
416	-0.17	2.82	7.85	40.5 %	ACCEPTABLE
417	-0.11	2.75	7.77	40.6 %	ACCEPTABLE
418	-0.15	2.73	7.80	40.4 %	ACCEPTABLE
419	-0.10	2.58	7.70	40.4 %	ACCEPTABLE
420	-0.07	2.54	7.66	40.4 %	ACCEPTABLE
421	-0.15	2.71	7.79	40.6 %	ACCEPTABLE
422	-0.09	2.63	7.71	40.5 %	ACCEPTABLE
423	-0.13	2.62	7.74	40.4 %	ACCEPTABLE
424	-0.15	2.72	7.79	40.5 %	ACCEPTABLE
425	-0.09	2.64	7.71	40.6 %	ACCEPTABLE
426	-0.11	2.82	7.89	40.6 %	ACCEPTABLE
427	-0.05	2.74	7.80	40.4 %	ACCEPTABLE
428	-39.86	218.10	223.09	25.1 %	ACCEPTABLE
429	-40.10	221.42	226.41	25.1 %	ACCEPTABLE
430	-39.81	218.10	223.09	25.2 %	ACCEPTABLE
431	-0.10	2.73	7.80	40.6 %	ACCEPTABLE
432	-0.07	2.74	7.81	40.4 %	ACCEPTABLE
433	-0.12	2.86	7.90	40.5 %	ACCEPTABLE
434	-0.08	2.80	7.84	40.6 %	ACCEPTABLE
435	-0.11	2.79	7.86	40.4 %	ACCEPTABLE
436	-0.05	2.67	7.77	40.5 %	ACCEPTABLE
437	-0.11	2.78	7.86	40.6 %	ACCEPTABLE
438	-0.07	2.73	7.80	40.4 %	ACCEPTABLE
439	-0.09	2.72	7.82	40.5 %	ACCEPTABLE
440	-0.09	2.68	7.74	40.4 %	ACCEPTABLE
441	-0.15	2.79	7.83	40.5 %	ACCEPTABLE
442	-0.11	2.74	7.78	40.5 %	ACCEPTABLE
443	-0.13	2.73	7.80	40.6 %	ACCEPTABLE
444	-0.10	2.74	7.81	40.6 %	ACCEPTABLE
445	-0.15	2.86	7.90	40.4 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
446	-0.11	2.80	7.84	40.6 %	ACCEPTABLE
447	-0.14	2.79	7.86	40.6 %	ACCEPTABLE
448	-0.08	2.67	7.77	40.5 %	ACCEPTABLE
449	-0.14	2.78	7.86	40.6 %	ACCEPTABLE
450	-0.10	2.73	7.80	40.6 %	ACCEPTABLE
451	-0.12	2.72	7.82	40.5 %	ACCEPTABLE
452	-0.12	2.68	7.74	40.4 %	ACCEPTABLE
453	-0.18	2.79	7.83	40.5 %	ACCEPTABLE
454	-0.14	2.74	7.78	40.5 %	ACCEPTABLE
455	-0.16	2.73	7.80	40.4 %	ACCEPTABLE
456	-0.13	2.63	7.73	40.6 %	ACCEPTABLE
457	-0.11	2.60	7.71	40.4 %	ACCEPTABLE
458	-0.16	2.72	7.79	40.5 %	ACCEPTABLE
459	-0.12	2.67	7.74	40.6 %	ACCEPTABLE
460	-0.15	2.66	7.76	40.5 %	ACCEPTABLE
461	-0.16	2.72	7.80	40.5 %	ACCEPTABLE
462	-0.12	2.67	7.74	40.6 %	ACCEPTABLE
463	-0.14	2.79	7.86	40.6 %	ACCEPTABLE
464	-0.10	2.74	7.80	40.4 %	ACCEPTABLE
465	-40.15	222.05	227.04	25.0 %	ACCEPTABLE
466	-40.31	224.28	229.27	25.0 %	ACCEPTABLE
467	-40.12	222.05	227.04	25.1 %	ACCEPTABLE
468	-0.13	2.73	7.80	40.6 %	ACCEPTABLE
469	-0.11	2.74	7.80	40.4 %	ACCEPTABLE
470	-0.14	2.81	7.86	40.5 %	ACCEPTABLE
471	-0.12	2.78	7.82	40.5 %	ACCEPTABLE
472	-0.14	2.77	7.84	40.5 %	ACCEPTABLE
473	-0.10	2.69	7.78	40.5 %	ACCEPTABLE
474	-0.13	2.76	7.84	40.6 %	ACCEPTABLE
475	-0.11	2.73	7.80	40.6 %	ACCEPTABLE
476	-0.09	2.74	7.80	40.4 %	ACCEPTABLE
477	-0.12	2.81	7.86	40.5 %	ACCEPTABLE
478	-0.10	2.78	7.82	40.5 %	ACCEPTABLE
479	-0.12	2.77	7.84	40.5 %	ACCEPTABLE
480	-0.08	2.69	7.78	40.5 %	ACCEPTABLE
481	-0.11	2.76	7.84	40.6 %	ACCEPTABLE
482	-0.09	2.73	7.80	40.4 %	ACCEPTABLE
483	-0.11	2.72	7.82	40.5 %	ACCEPTABLE
484	-0.11	2.70	7.76	40.5 %	ACCEPTABLE
485	-0.14	2.77	7.82	40.5 %	ACCEPTABLE
486	-0.11	2.74	7.78	40.5 %	ACCEPTABLE
487	-0.13	2.73	7.80	40.6 %	ACCEPTABLE
488	-0.11	2.66	7.76	40.5 %	ACCEPTABLE
489	-0.10	2.65	7.74	40.5 %	ACCEPTABLE
490	-0.13	2.72	7.80	40.5 %	ACCEPTABLE
491	-0.10	2.69	7.76	40.6 %	ACCEPTABLE
492	-0.08	2.70	7.76	40.5 %	ACCEPTABLE
493	-0.11	2.77	7.82	40.5 %	ACCEPTABLE
494	-0.09	2.74	7.78	40.5 %	ACCEPTABLE
495	-0.11	2.73	7.80	40.6 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
496	-0.07	2.65	7.74	40.5 %	ACCEPTABLE
497	-0.10	2.72	7.80	40.5 %	ACCEPTABLE
498	-0.08	2.69	7.76	40.6 %	ACCEPTABLE
499	-0.10	2.68	7.78	40.5 %	ACCEPTABLE
500	-0.10	2.66	7.72	40.4 %	ACCEPTABLE
501	-0.13	2.73	7.78	40.5 %	ACCEPTABLE
502	-0.10	2.70	7.74	40.5 %	ACCEPTABLE
503	-0.12	2.69	7.76	40.6 %	ACCEPTABLE
504	-0.10	2.70	7.76	40.5 %	ACCEPTABLE
505	-0.13	2.77	7.82	40.5 %	ACCEPTABLE
506	-0.11	2.74	7.78	40.5 %	ACCEPTABLE
507	-0.13	2.73	7.80	40.6 %	ACCEPTABLE
508	-0.09	2.65	7.74	40.5 %	ACCEPTABLE
509	-0.12	2.72	7.80	40.6 %	ACCEPTABLE
510	-0.10	2.69	7.76	40.6 %	ACCEPTABLE
511	-0.12	2.68	7.78	40.5 %	ACCEPTABLE
512	-0.12	2.66	7.72	40.4 %	ACCEPTABLE
513	-0.15	2.73	7.78	40.5 %	ACCEPTABLE
514	-0.12	2.70	7.74	40.5 %	ACCEPTABLE
515	-0.14	2.69	7.76	40.6 %	ACCEPTABLE
516	-0.12	2.62	7.72	40.5 %	ACCEPTABLE
517	-0.11	2.61	7.70	40.5 %	ACCEPTABLE
518	-0.14	2.68	7.76	40.5 %	ACCEPTABLE
519	-0.11	2.65	7.72	40.6 %	ACCEPTABLE
520	-0.13	2.64	7.73	40.5 %	ACCEPTABLE
521	-0.14	2.69	7.76	40.6 %	ACCEPTABLE
522	-0.12	2.65	7.72	40.6 %	ACCEPTABLE
523	-0.12	2.73	7.80	40.6 %	ACCEPTABLE
524	-0.10	2.69	7.76	40.6 %	ACCEPTABLE
525	-40.21	222.42	227.41	25.0 %	ACCEPTABLE
526	-40.32	223.91	228.90	25.0 %	ACCEPTABLE
527	-40.19	222.42	227.41	25.0 %	ACCEPTABLE
528	-0.12	2.69	7.76	40.6 %	ACCEPTABLE

Input data (Stage of construction 2)

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	2.40	Mbushje	
2	1.60	Shtrese 1 (suargjile)	
3	6.00	Shtrese 2 (zhavorre)	
4	-	Shtrese 2 (zhavorre)	

Terrain profile

Terrain behind the structure is flat.

Water influence

Ground water table at height -1.50 m from structure heel.

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		variable	4.00		3.00	7.00	on terrain
2	YES		variable	1.00		0.00	3.00	on terrain

No.	Name
1	Trafiku
2	Turma

Resistance on front face of the structure

Resistance on front face of the structure is not considered.

Applied forces acting on the structure

No.	Force		Name	Action	F _x [kN/m]	F _z [kN/m]	M [kNm/m]	x [m]	z [m]
	new	modification							
1	NO	NO	Bordure Betoni+Guardrail	permanent	0.00	8.00	0.00	0.00	0.00

Earthquake

Factor of horizontal acceleration $K_h = 0.2040$

Factor of vertical acceleration $K_v = 0.1020$

Water below the GWT is restricted.

Settings of the stage of construction

Design situation : seismic

Verification No. 1 (Stage of construction 2)**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
Gravity force	0.00	-1.20	181.80	2.20	1.000	1.000	1.000
Earthquake - soil wedge	37.09	-1.20	-18.54	2.20	1.000	1.000	1.000
Active pressure	9.09	-0.82	4.42	4.15	1.000	1.000	1.000
Water pressure	0.00	-2.40	0.00	4.32	1.000	1.000	1.000
Earthq.- act.pressure	7.37	-1.61	4.22	4.27	1.000	1.000	1.000
Trafiku	2.07	-1.17	1.08	4.21	0.700	0.700	0.700
Trafiku	0.00	-2.40	3.58	3.87	0.000	0.000	0.700
Turma	0.00	-2.40	3.00	1.92	0.000	0.000	0.700
Bordure Betoni+Guardrail	0.00	-2.40	8.00	0.42	1.000	1.000	1.000

Verification of complete wall**Check for overturning stability**

Resisting moment $M_{res} = 402.51$ kNm/m

Overturning moment $M_{ovr} = 65.40$ kNm/m

Wall for overturning is SATISFACTORY**Check for slip**Resisting horizontal force $H_{res} = 126.49 \text{ kN/m}$ Active horizontal force $H_{act} = 55.00 \text{ kN/m}$ **Wall for slip is SATISFACTORY****Overall check - WALL is SATISFACTORY**

Maximum stress in footing bottom : 48.91 kPa

Bearing capacity of foundation soil (Stage of construction 2)**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	19.68	185.25	55.00	0.027	48.91
2	24.19	180.65	55.00	0.033	48.40

Service load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	19.68	185.25	55.00
2	24.19	180.65	55.00

Verification of foundation soil**Eccentricity verification**Max. eccentricity of normal force $e = 0.027$ Maximum allowable eccentricity $e_{alw} = 0.333$ **Eccentricity of the normal force is SATISFACTORY****Verification of bearing capacity**Max. stress at footing bottom $\sigma = 48.91 \text{ kPa}$ Bearing capacity of foundation soil $R_d = 280.00 \text{ kPa}$ **Bearing capacity of foundation soil is SATISFACTORY****Overall verification - bearing capacity of found. soil is SATISFACTORY****Verification of slip on georeinforcement No. 1 (Stage of construction 2)****Forces acting on construction (verification of reinforcement No.: 2)**

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	6.30	-0.60	4.41	4.00	1.000
Earthq.- act.pressure	4.28	-1.20	3.00	4.00	1.000
Trafiku	2.07	-0.88	1.45	4.00	0.700
Bordure Betoni+Guardrail	0.00	-1.80	8.00	0.31	1.000
Gravity force	0.00	-0.89	131.41	2.08	1.000
Earthquake - soil wedge	26.81	-0.89	-13.40	2.08	1.000
Trafiku	0.00	-1.80	2.74	3.66	0.000
Turma	0.00	-1.80	3.00	1.81	0.000
Reinforcement	-2.25	-0.60	0.00	4.00	1.000

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Reinforcement	-2.25	-1.20	0.00	4.00	1.000

Verification against slip along geotextile No.: 2

Inclination of slip surface	=	90.00 °
Overall normal force acting on reinforcement	=	134.43 kN/m
Coefficient of reduction of slip along geo-textile	=	0.67
Wall resistance	=	0.00 kN/m
Overall bearing capacity of reinforcements	=	4.49 kN/m
Resistance along geo-reinforcement	=	63.07 kN/m

Check for slip:Resisting horizontal force $H_{res} = 67.56$ kN/mActive horiz. force $H_{act} = 12.02$ kN/m**Slip along geotextile is SATISFACTORY****Verification of slip on georeinforcement No. 2 (Stage of construction 2)****Forces acting on construction (verification of reinforcement No.: 2)**

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	6.30	-0.60	4.41	4.00	1.000
Earthq.- act.pressure	4.28	-1.20	3.00	4.00	1.000
Trafiku	2.07	-0.88	1.45	4.00	0.700
Bordure Betoni+Guardrail	0.00	-1.80	8.00	0.31	1.000
Gravity force	0.00	-0.89	131.41	2.08	1.000
Earthquake - soil wedge	26.81	-0.89	-13.40	2.08	1.000
Trafiku	0.00	-1.80	2.74	3.66	0.000
Turma	0.00	-1.80	3.00	1.81	0.000
Reinforcement	-2.25	-0.60	0.00	4.00	1.000
Reinforcement	-2.25	-1.20	0.00	4.00	1.000

Verification against slip along geotextile No.: 2

Inclination of slip surface	=	90.00 °
Overall normal force acting on reinforcement	=	134.43 kN/m
Coefficient of reduction of slip along geo-textile	=	0.67
Wall resistance	=	0.00 kN/m
Overall bearing capacity of reinforcements	=	4.49 kN/m
Resistance along geo-reinforcement	=	63.07 kN/m

Check for slip:Resisting horizontal force $H_{res} = 67.56$ kN/mActive horiz. force $H_{act} = 12.02$ kN/m**Slip along geotextile is SATISFACTORY**

Verification of slip on georeinforcement No. 3 (Stage of construction 2)**Forces acting on construction (verification of reinforcement No.: 2)**

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	6.30	-0.60	4.41	4.00	1.000
Earthq.- act.pressure	4.28	-1.20	3.00	4.00	1.000
Trafiku	2.07	-0.88	1.45	4.00	0.700
Bordure Betoni+Guardrail	0.00	-1.80	8.00	0.31	1.000
Gravity force	0.00	-0.89	131.41	2.08	1.000
Earthquake - soil wedge	26.81	-0.89	-13.40	2.08	1.000
Trafiku	0.00	-1.80	2.74	3.66	0.000
Turma	0.00	-1.80	3.00	1.81	0.000
Reinforcement	-2.25	-0.60	0.00	4.00	1.000
Reinforcement	-2.25	-1.20	0.00	4.00	1.000

Verification against slip along geotextile No.: 2

Inclination of slip surface	= 90.00 °
Overall normal force acting on reinforcement	= 134.43 kN/m
Coefficient of reduction of slip along geo-textile	= 0.67
Wall resistance	= 0.00 kN/m
Overall bearing capacity of reinforcements	= 4.49 kN/m
Resistance along geo-reinforcement	= 63.07 kN/m

Check for slip:Resisting horizontal force H_{res} = 67.56 kN/mActive horiz. force H_{act} = 12.02 kN/m**Slip along geotextile is SATISFACTORY****Verification of slip on georeinforcement No. 4 (Stage of construction 2)****Forces acting on construction (verification of reinforcement No.: 2)**

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	6.30	-0.60	4.41	4.00	1.000
Earthq.- act.pressure	4.28	-1.20	3.00	4.00	1.000
Trafiku	2.07	-0.88	1.45	4.00	0.700
Bordure Betoni+Guardrail	0.00	-1.80	8.00	0.31	1.000
Gravity force	0.00	-0.89	131.41	2.08	1.000
Earthquake - soil wedge	26.81	-0.89	-13.40	2.08	1.000
Trafiku	0.00	-1.80	2.74	3.66	0.000
Turma	0.00	-1.80	3.00	1.81	0.000
Reinforcement	-2.25	-0.60	0.00	4.00	1.000
Reinforcement	-2.25	-1.20	0.00	4.00	1.000

Verification against slip along geotextile No.: 2

Inclination of slip surface	= 90.00 °
Overall normal force acting on reinforcement	= 134.43 kN/m
Coefficient of reduction of slip along geo-textile	= 0.67
Wall resistance	= 0.00 kN/m
Overall bearing capacity of reinforcements	= 4.49 kN/m

Resistance along geo-reinforcement = 63.07 kN/m

Check for slip:

Resisting horizontal force H_{res} = 67.56 kN/m

Active horiz. force H_{act} = 12.02 kN/m

Slip along geotextile is SATISFACTORY

Verification of slip on georeinforcement No. 5 (Stage of construction 2)

Forces acting on construction (verification of reinforcement No.: 2)

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	6.30	-0.60	4.41	4.00	1.000
Earthq.- act.pressure	4.28	-1.20	3.00	4.00	1.000
Trafiku	2.07	-0.88	1.45	4.00	0.700
Bordure Betoni+Guardrail	0.00	-1.80	8.00	0.31	1.000
Gravity force	0.00	-0.89	131.41	2.08	1.000
Earthquake - soil wedge	26.81	-0.89	-13.40	2.08	1.000
Trafiku	0.00	-1.80	2.74	3.66	0.000
Turma	0.00	-1.80	3.00	1.81	0.000
Reinforcement	-2.25	-0.60	0.00	4.00	1.000
Reinforcement	-2.25	-1.20	0.00	4.00	1.000

Verification against slip along geotextile No.: 2

Inclination of slip surface = 90.00 °
 Overall normal force acting on reinforcement = 134.43 kN/m
 Coefficient of reduction of slip along geo-textile = 0.67
 Wall resistance = 0.00 kN/m
 Overall bearing capacity of reinforcements = 4.49 kN/m
 Resistance along geo-reinforcement = 63.07 kN/m

Check for slip:

Resisting horizontal force H_{res} = 67.56 kN/m

Active horiz. force H_{act} = 12.02 kN/m

Slip along geotextile is SATISFACTORY

Verification of slip on georeinforcement No. 6 (Stage of construction 2)

Forces acting on construction (verification of reinforcement No.: 2)

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	6.30	-0.60	4.41	4.00	1.000
Earthq.- act.pressure	4.28	-1.20	3.00	4.00	1.000
Trafiku	2.07	-0.88	1.45	4.00	0.700
Bordure Betoni+Guardrail	0.00	-1.80	8.00	0.31	1.000
Gravity force	0.00	-0.89	131.41	2.08	1.000
Earthquake - soil wedge	26.81	-0.89	-13.40	2.08	1.000
Trafiku	0.00	-1.80	2.74	3.66	0.000
Turma	0.00	-1.80	3.00	1.81	0.000
Reinforcement	-2.25	-0.60	0.00	4.00	1.000

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Reinforcement	-2.25	-1.20	0.00	4.00	1.000

Verification against slip along geotextile No.: 2

Inclination of slip surface	=	90.00 °
Overall normal force acting on reinforcement	=	134.43 kN/m
Coefficient of reduction of slip along geo-textile	=	0.67
Wall resistance	=	0.00 kN/m
Overall bearing capacity of reinforcements	=	4.49 kN/m
Resistance along geo-reinforcement	=	63.07 kN/m

Check for slip:Resisting horizontal force $H_{res} = 67.56$ kN/mActive horiz. force $H_{act} = 12.02$ kN/m**Slip along geotextile is SATISFACTORY****Verification of slip on georeinforcement No. 7 (Stage of construction 2)****Forces acting on construction (verification of reinforcement No.: 2)**

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	6.30	-0.60	4.41	4.00	1.000
Earthq.- act.pressure	4.28	-1.20	3.00	4.00	1.000
Trafiku	2.07	-0.88	1.45	4.00	0.700
Bordure Betoni+Guardrail	0.00	-1.80	8.00	0.31	1.000
Gravity force	0.00	-0.89	131.41	2.08	1.000
Earthquake - soil wedge	26.81	-0.89	-13.40	2.08	1.000
Trafiku	0.00	-1.80	2.74	3.66	0.000
Turma	0.00	-1.80	3.00	1.81	0.000
Reinforcement	-2.25	-0.60	0.00	4.00	1.000
Reinforcement	-2.25	-1.20	0.00	4.00	1.000

Verification against slip along geotextile No.: 2

Inclination of slip surface	=	90.00 °
Overall normal force acting on reinforcement	=	134.43 kN/m
Coefficient of reduction of slip along geo-textile	=	0.67
Wall resistance	=	0.00 kN/m
Overall bearing capacity of reinforcements	=	4.49 kN/m
Resistance along geo-reinforcement	=	63.07 kN/m

Check for slip:Resisting horizontal force $H_{res} = 67.56$ kN/mActive horiz. force $H_{act} = 12.02$ kN/m**Slip along geotextile is SATISFACTORY****Calculation of internal stability No. 1 (Stage of construction 2)****Calculated forces and strength of geo-reinforcements**

No.	Name	F_x [kN/m]	Depth z[m]	R_t [kN/m]	Utilization [%]	T_p [kN/m]	Utilization [%]
1	user-defined	-2.61	2.40	29.17	8.94	171.07	1.52
2	user-defined	-4.53	1.80	29.17	15.53	120.29	3.77
3	user-defined	-4.25	1.21	20.05	21.19	75.20	5.65
4	user-defined	-5.94	0.61	20.05	29.62	35.16	16.90

Check for tensile strength (georeinforcement No.4)Tensile strength $R_t = 20.05$ kN/mGeo-reinforcement force $F_x = 5.94$ kN/m**Geo-reinforcement for tensile strength is SATISFACTORY****Check for pull out resistance (georeinforcement No.4)**Pull out resistance $T_p = 35.16$ kN/mGeo-reinforcement force $F_x = 5.94$ kN/m**Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY****Calculation of internal stability No. 2 (Stage of construction 2)****Check for bearing capacity of geo-reinforcement No.: 2****Check for tensile strength**Tensile strength $R_t = 29.17$ kN/mGeo-reinforcement force $F_x = 4.53$ kN/m**Geo-reinforcement for tensile strength is SATISFACTORY****Check for pull out resistance**Pull out resistance $T_p = 120.29$ kN/mGeo-reinforcement force $F_x = 4.53$ kN/m**Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY****Calculation of internal stability No. 3 (Stage of construction 2)****Check for bearing capacity of geo-reinforcement No.: 3****Check for tensile strength**Tensile strength $R_t = 20.05$ kN/mGeo-reinforcement force $F_x = 4.25$ kN/m**Geo-reinforcement for tensile strength is SATISFACTORY****Check for pull out resistance**Pull out resistance $T_p = 75.20$ kN/mGeo-reinforcement force $F_x = 4.25$ kN/m**Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY**

Calculation of internal stability No. 4 (Stage of construction 2)**Check for bearing capacity of geo-reinforcement No.: 4****Check for tensile strength**Tensile strength $R_t = 20.05 \text{ kN/m}$ Geo-reinforcement force $F_x = 5.94 \text{ kN/m}$ **Geo-reinforcement for tensile strength is SATISFACTORY****Check for pull out resistance**Pull out resistance $T_p = 35.16 \text{ kN/m}$ Geo-reinforcement force $F_x = 5.94 \text{ kN/m}$ **Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY****Calculation of internal stability No. 5 (Stage of construction 2)****Check for bearing capacity of geo-reinforcement No.: 4****Check for tensile strength**Tensile strength $R_t = 20.05 \text{ kN/m}$ Geo-reinforcement force $F_x = 5.94 \text{ kN/m}$ **Geo-reinforcement for tensile strength is SATISFACTORY****Check for pull out resistance**Pull out resistance $T_p = 35.16 \text{ kN/m}$ Geo-reinforcement force $F_x = 5.94 \text{ kN/m}$ **Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY****Calculation of internal stability No. 6 (Stage of construction 2)****Check for bearing capacity of geo-reinforcement No.: 4****Check for tensile strength**Tensile strength $R_t = 20.05 \text{ kN/m}$ Geo-reinforcement force $F_x = 5.94 \text{ kN/m}$ **Geo-reinforcement for tensile strength is SATISFACTORY****Check for pull out resistance**Pull out resistance $T_p = 35.16 \text{ kN/m}$ Geo-reinforcement force $F_x = 5.94 \text{ kN/m}$ **Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY****Calculation of internal stability No. 7 (Stage of construction 2)****Check for bearing capacity of geo-reinforcement No.: 4****Check for tensile strength**Tensile strength $R_t = 20.05 \text{ kN/m}$ Geo-reinforcement force $F_x = 5.94 \text{ kN/m}$ **Geo-reinforcement for tensile strength is SATISFACTORY**

Check for pull out resistancePull out resistance $T_p = 35.16 \text{ kN/m}$ Geo-reinforcement force $F_x = 5.94 \text{ kN/m}$ **Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY****Global stability analysis No. 1 (Stage of construction 2)****Slip surface parameters**

(slip surface after optimization)

Center S = (-1.64;-66.69) m

Radius r = 84.22 m

Angle $\alpha_1 = -34.88^\circ$ $\alpha_2 = 37.64^\circ$ **Slope stability check (Bishop)**

Utilization = 68.54 %

Slope stability is SATISFACTORY**Slope stability analysis****Input data****Project****Settings**

(input for current task)

Stability analysis

Earthquake analysis : Standard

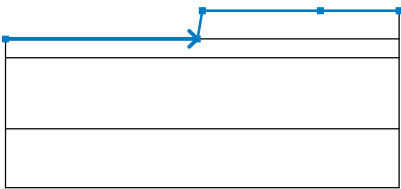
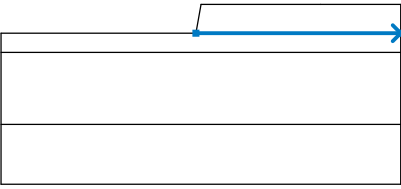
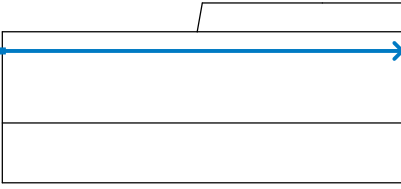
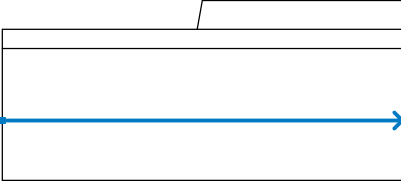
Verification methodology : according to EN 1997

Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

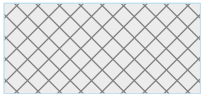
Partial factors on actions (A)					
Seismic design situation					
		State STR		State GEO	
		Unfavourable	Favourable	Unfavourable	Favourable
Permanent actions :	$\gamma_G =$	1.00 [-]	1.00 [-]	1.00 [-]	1.00 [-]
Variable actions :	$\gamma_Q =$	1.00 [-]	0.00 [-]	1.00 [-]	0.00 [-]
Water load :	$\gamma_W =$			1.00 [-]	

Partial factors for soil parameters (M)			
Seismic design situation			
Partial factor on internal friction :	$\gamma_\phi =$	1.00	[-]
Partial factor on effective cohesion :	$\gamma_c =$	1.00	[-]
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.00	[-]

Interface

No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
1		-16.67	-2.40	-0.42	-2.40	0.00	0.00
		10.00	0.00	16.67	0.00		
2		-0.42	-2.40	16.67	-2.40		
3		-16.67	-4.00	16.67	-4.00		
4		-16.67	-10.00	16.67	-10.00		

Soil parameters - effective stress state

No.	Name	Pattern	Φ_{ef} [°]	C_{ef} [kPa]	γ [kN/m ³]
1	Mbushje		35.00	0.00	19.00
2	Shtrese 1 (suargjile)		16.00	40.00	18.00
3	Shtrese 2 (zhavorre)		24.00	10.00	20.10

Soil parameters - uplift

No.	Name	Pattern	γ_{sat} [kN/m ³]	γ_s [kN/m ³]	n [-]
1	Mbushje		20.00		

No.	Name	Pattern	γ_{sat} [kN/m ³]	γ_s [kN/m ³]	n [-]
2	Shtrese 1 (suargjile)		20.00		
3	Shtrese 2 (zhavorre)		21.00		

Soil parameters

Mbushje

Unit weight : $\gamma = 19.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 35.00^\circ$
 Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

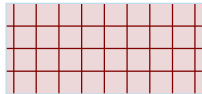
Shtrese 1 (suargjile)

Unit weight : $\gamma = 18.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 16.00^\circ$
 Cohesion of soil : $c_{ef} = 40.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

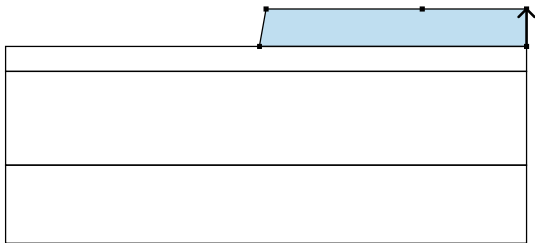
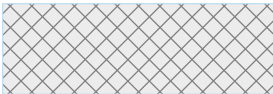
Shtrese 2 (zhavorre)

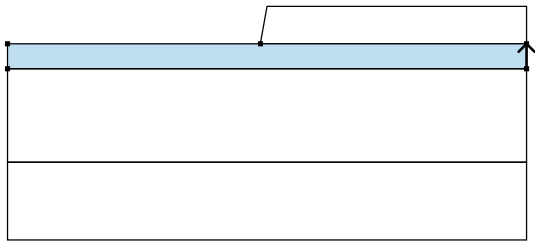
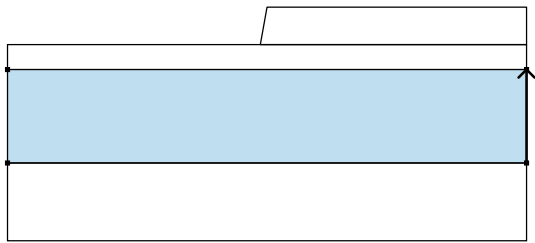
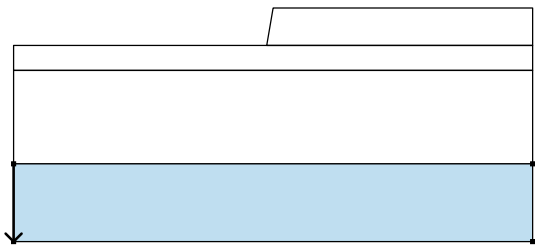
Unit weight : $\gamma = 20.10 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 24.00^\circ$
 Cohesion of soil : $c_{ef} = 10.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 21.00 \text{ kN/m}^3$

Rigid bodies

No.	Name	Sample	γ [kN/m ³]
1	Material of cover		23.56

Assigning and surfaces

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
1		16.67	-2.40	16.67	0.00	Mbushje
		10.00	0.00	0.00	0.00	
		-0.42	-2.40			

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
2		16.67	-4.00	16.67	-2.40	Shtrese 1 (suargjile) 
		-0.42	-2.40	-16.67	-2.40	
		-16.67	-4.00			
3		16.67	-10.00	16.67	-4.00	Shtrese 2 (zhavorre) 
		-16.67	-4.00	-16.67	-10.00	
4		-16.67	-10.00	-16.67	-15.00	Shtrese 2 (zhavorre) 
		16.67	-15.00	16.67	-10.00	

Reinforcements

No.	Point to the left		Point to the right		Length L [m]	Strength R_t [kN/m]	Pull out resist.	End of reinf.
	x [m]	z [m]	x [m]	z [m]				
1	-0.10	-0.60	3.90	-0.60	4.00	20.05	$T_p = 15.96 \text{ kN/m}^2$	Fixed
2	-0.21	-1.20	3.79	-1.20	4.00	20.05	$T_p = 31.93 \text{ kN/m}^2$	Fixed
3	-0.31	-1.80	3.69	-1.80	4.00	29.17	$T_p = 47.89 \text{ kN/m}^2$	Fixed
4	-0.42	-2.40	3.58	-2.40	4.00	29.17	$T_p = 63.86 \text{ kN/m}^2$	Fixed

Surcharge

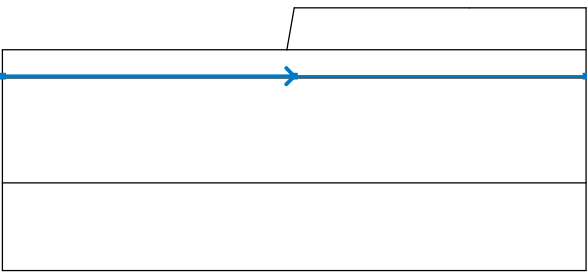
No.	Type	Type of action	Location z [m]	Origin x [m]	Length l [m]	Width b [m]	Slope α [°]	Magnitude		
								q, q ₁ , f, F	q ₂	unit
1	strip	variable	on terrain	x = 3.00	l = 7.00		0.00	4.00		kN/m ²
2	strip	variable	on terrain	x = 0.00	l = 3.00		0.00	1.00		kN/m ²

Surcharges

No.	Name
1	Trafiku
2	Turma

Water

Water type : GWT

No.	GWT location	Coordinates of GWT points [m]					
		x	z	x	z	x	z
1		-16.67	-3.90	0.00	-3.90	16.67	-3.90

Tensile crack

Tensile crack not inputted.

EarthquakeHorizontal seismic coefficient : $K_h = 0.20$ Vertical seismic coefficient : $K_v = 0.10$ **Settings of the stage of construction**

Design situation : seismic

Results (Stage of construction 1)**Analysis 1****Circular slip surface**

Slip surface parameters						
Center :	x =	0.00 [m]	Angles :	$\alpha_1 =$	-61.31 [°]	
	z =	0.00 [m]		$\alpha_2 =$	90.00 [°]	
Radius :	R =	5.00 [m]				
Analysis of the slip surface without optimization.						

Reinforcement forces

Reinforcement Force [kN/m]

1	0.00
2	0.00
3	0.00
4	0.00

Slope stability verification (Bishop)Sum of active forces : $F_a = 151.39$ kN/mSum of passive forces : $F_p = 449.79$ kN/mSliding moment : $M_a = 756.96$ kNm/mResisting moment : $M_p = 2248.96$ kNm/m

Utilization : 33.7 %

Slope stability ACCEPTABLE

MUR ME DHE TE PERFORCUAR
H=4.20 m

Analysis of reinforced slopes

Input data

Project

Task : Mur me dhe te armuar, H=4.2m
 Author : SEED Consulting
 Date : 8/3/2020
 Unit weight of water is considered : 9,81 kN/m³

Settings

(input for current task)

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 : Coulomb
 Earthquake analysis : Mononobe-Okabe
 Shape of earth wedge : Calculate as skew
 Allowable eccentricity : 0.333
 Internal stability : Standard - straight slip surface
 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	
Permanent actions :	$\gamma_G =$	1.35	[-]	1.00	[-]	1.00	[-]
Variable actions :	$\gamma_Q =$	1.50	[-]	0.00	[-]	1.30	[-]
Water load :	$\gamma_W =$					1.00	[-]

Partial factors for soil parameters (M)			
Permanent design situation			
Partial factor on internal friction :	$\gamma_\phi =$	1.25	[-]
Partial factor on effective cohesion :	$\gamma_c =$	1.25	[-]
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.40	[-]
Partial factor on Poisson's ratio :	$\gamma_v =$	1.00	[-]

Partial factors for variable actions			
Permanent design situation			
Factor for combination value :	$\psi_0 =$	0.70	[-]
Factor for frequent value :	$\psi_1 =$	0.50	[-]
Factor for quasi-permanent value :	$\psi_2 =$	0.30	[-]

Partial factors on actions (A)					
Seismic design situation					
		State STR		State GEO	
		Unfavourable	Favourable	Unfavourable	Favourable
Permanent actions :	$\gamma_G =$	1.00 [-]	1.00 [-]	1.00 [-]	1.00 [-]

Partial factors on actions (A)						
Seismic design situation						
Variable actions :	$\gamma_Q =$	1.00 [-]	0.00 [-]	1.00 [-]	0.00 [-]	
Water load :	$\gamma_W =$			1.00 [-]		

Partial factors for soil parameters (M)						
Seismic design situation						
Partial factor on internal friction :	$\gamma_\phi =$	1.00 [-]				
Partial factor on effective cohesion :	$\gamma_c =$	1.00 [-]				
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.00 [-]				
Partial factor on Poisson's ratio :	$\gamma_v =$	1.00 [-]				

Stability analysis

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 :	$\gamma_G =$	1.35 [-]	1.00 [-]	1.00 [-]	1.00 [-]	
Variable actions :	$\gamma_Q =$	1.50 [-]	0.00 [-]	1.30 [-]	0.00 [-]	
Water load :	$\gamma_W =$			1.00 [-]		

Partial factors for soil parameters (M)						
Permanent design situation						
Partial factor on internal friction :	$\gamma_\phi =$	1.25 [-]				
Partial factor on effective cohesion :	$\gamma_c =$	1.25 [-]				
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.40 [-]				

Partial factors on actions (A)						
Seismic design situation						
		State STR		State GEO		
		Unfavourable	Favourable	Unfavourable	Favourable	
Permanent actions :	$\gamma_G =$	1.00 [-]	1.00 [-]	1.00 [-]	1.00 [-]	
Variable actions :	$\gamma_Q =$	1.00 [-]	0.00 [-]	1.00 [-]	0.00 [-]	
Water load :	$\gamma_W =$			1.00 [-]		

Partial factors for soil parameters (M)						
Seismic design situation						
Partial factor on internal friction :	$\gamma_\phi =$	1.00 [-]				
Partial factor on effective cohesion :	$\gamma_c =$	1.00 [-]				
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.00 [-]				

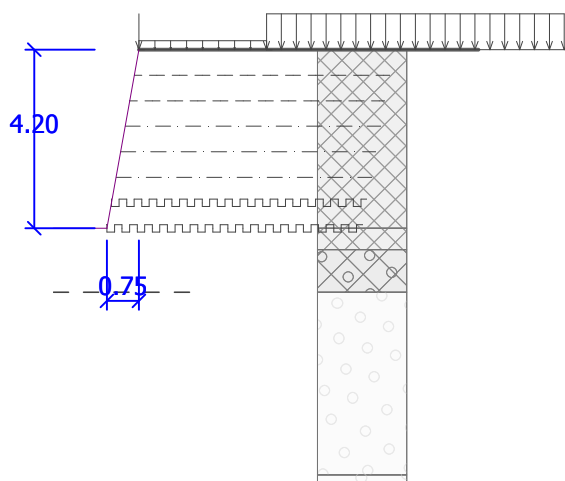
Geometry of structure

Embankment height $h_n = 4.20$ m

Embankment length $l_n = 0.75$ m

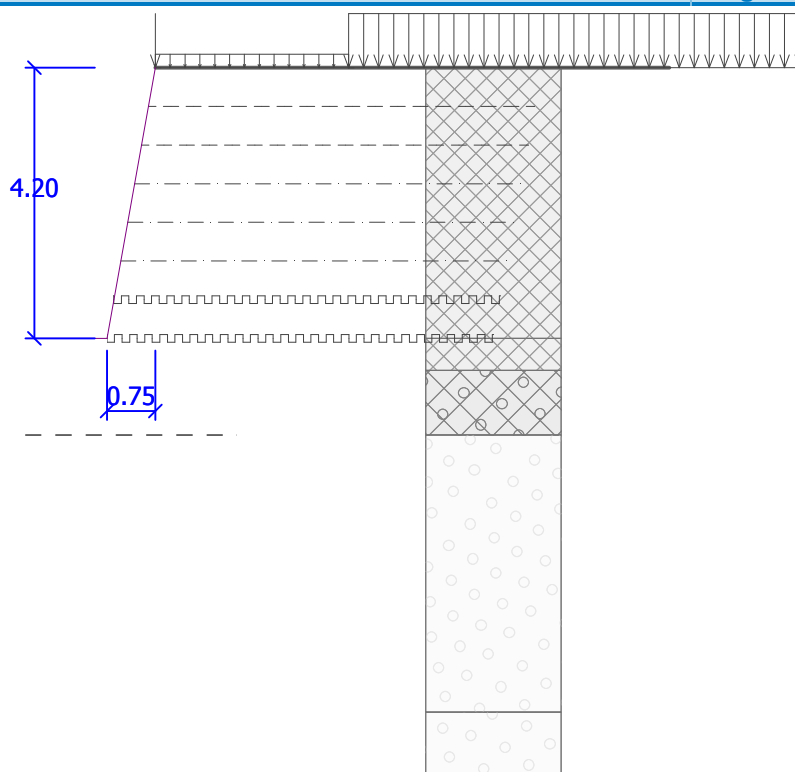
Name : Geometry

Stage - analysis : 1 - 0



Name : Geometry

Stage - analysis : 1 - 0

**Material****Types of reinforcements**

No.	Name	Type of reinforcement	Line type	Reinforcement strength		Coefficient	
				$T_{ult}[\text{kN/m}]$	$R_t[\text{kN/m}]$	$C_{ds}[-]$	$C_i[-]$
1	Tult 55 (user)	user-defined	-----	55.00	20.05	0.67	0.67

No.	Name	Type of reinforcement	Line type	Reinforcement strength		Coefficient	
				T_{ult} [kN/m]	R_t [kN/m]	C_{ds} [-]	C_i [-]
2	Tult 80 (user)	user-defined	-----	80.00	29.17	0.67	0.67
3	Tult 110 (user)	user-defined	~~~~~	110.00	40.11	0.67	0.67

Reinforcement details

1. Tult 55 (user)

Short-term char. strength $T_{ult} = 55.00$ kN/m

Long-term design strength $R_t = 20.05$ kN/m

Overall coeff. of model uncertainty $FS_{UNC} = 1.25$

Inputted reduction factors

Creep red. factor $RF_{CR} = 1.59$

Durability red. factor $RF_D = 1.15$

Installation damage red. factor $RF_{ID} = 1.20$

2. Tult 80 (user)

Short-term char. strength $T_{ult} = 80.00$ kN/m

Long-term design strength $R_t = 29.17$ kN/m

Overall coeff. of model uncertainty $FS_{UNC} = 1.25$

Inputted reduction factors

Creep red. factor $RF_{CR} = 1.59$

Durability red. factor $RF_D = 1.15$

Installation damage red. factor $RF_{ID} = 1.20$

3. Tult 110 (user)

Short-term char. strength $T_{ult} = 110.00$ kN/m

Long-term design strength $R_t = 40.11$ kN/m

Overall coeff. of model uncertainty $FS_{UNC} = 1.25$

Inputted reduction factors

Creep red. factor $RF_{CR} = 1.59$

Durability red. factor $RF_D = 1.15$

Installation damage red. factor $RF_{ID} = 1.20$

Reinforcement

No.	Number of reinforcement	Type of reinforcement	Spacing of reinforcement h_r [m]	Height of first reinforcement h [m]	Reinforcements geometry
1	2	Tult 110 (user)	0.60	0.00	identical length of reinforcements
2	3	Tult 80 (user)	0.60	1.20	identical length of reinforcements
3	2	Tult 55 (user)	0.60	3.00	identical length of reinforcements

Reinforcement details

Reinforcement No. 1

Reinforcement type : Tult 110 (user)

Number of reinforcements 2

Reinforcement geometry : identical length of reinforcements

Reinforcement length : 6.00 m

Reinforcement No.	Origin l_1 [m]	End l_2 [m]	Height from bottom h [m]	Length l [m]
1	-0.75	5.25	0.00	6.00
2	-0.64	5.36	0.60	6.00

Reinforcement No. 2

Reinforcement type : Tult 80 (user)

Number of reinforcements 3

Reinforcement geometry : identical length of reinforcements

Reinforcement length : 6.00 m

Reinforcement No.	Origin l_1 [m]	End l_2 [m]	Height from bottom h [m]	Length l [m]
1	-0.54	5.46	1.20	6.00
2	-0.43	5.57	1.80	6.00
3	-0.32	5.68	2.40	6.00

Reinforcement No. 3

Reinforcement type : Tult 55 (user)

Number of reinforcements 2

Reinforcement geometry : identical length of reinforcements

Reinforcement length : 6.00 m

Reinforcement No.	Origin l_1 [m]	End l_2 [m]	Height from bottom h [m]	Length l [m]
1	-0.21	5.79	3.00	6.00
2	-0.11	5.89	3.60	6.00

Soil parameters

Mbushje

Unit weight : $\gamma = 19.00 \text{ kN/m}^3$

Angle of internal friction : $\varphi_{ef} = 35.00^\circ$

Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$

Angle of friction struc.-soil : $\delta = 23.00^\circ$

Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

Shtrese 1 (suargjile)

Unit weight : $\gamma = 18.00 \text{ kN/m}^3$

Angle of internal friction : $\varphi_{ef} = 16.00^\circ$

Cohesion of soil : $c_{ef} = 40.00 \text{ kPa}$

Angle of friction struc.-soil : $\delta = 10.70^\circ$

Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

Shtrese 2 (zhavorre)

Unit weight : $\gamma = 20.10 \text{ kN/m}^3$

Angle of internal friction : $\varphi_{ef} = 24.00^\circ$

Cohesion of soil : $c_{ef} = 10.00 \text{ kPa}$

Angle of friction struc.-soil : $\delta = 16.00^\circ$

Saturated unit weight : $\gamma_{sat} = 21.00 \text{ kN/m}^3$

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	4.20	Mbushje	
2	0.50	Mbushje	
3	1.00	Shtrese 1 (suargjile)	
4	4.30	Shtrese 2 (zhavorre)	
5	-	Shtrese 2 (zhavorre)	

Terrain profile

Terrain behind the structure is flat.

Water influence

Ground water table at height -1.50 m from structure heel.

Input surface surcharges

No.	Surcharge new	change	Action	Mag.1 [kN/m ²]	Mag.2 [kN/m ²]	Ord.x x [m]	Length l [m]	Depth z [m]
1	YES		variable	20.00		3.00	7.00	on terrain
2	YES		variable	5.00		0.00	3.00	on terrain

No.	Name
1	Trafiku
2	Turma

Resistance on front face of the structure

Resistance on front face of the structure is not considered.

Applied forces acting on the structure

No.	Force new	modification	Name	Action	F _x [kN/m]	F _z [kN/m]	M [kNm/m]	x [m]	z [m]
1	YES		Bordure Betoni+Guardrail	permanent	0.00	8.00	0.00	0.00	0.00

Settings of the stage of construction

Design situation : permanent

Verification No. 1 (Stage of construction 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
Gravity force	0.00	-2.10	478.19	3.37	1.000	1.000	1.350
Active pressure	37.22	-1.41	13.11	6.26	1.000	1.000	1.000
Water pressure	0.00	-4.20	0.00	6.64	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
Trafiku	24.70	-2.07	9.24	6.38	1.300	1.300	1.300
Trafiku	0.00	-4.20	57.86	5.20	0.000	0.000	1.300
Turma	0.00	-4.20	15.00	2.25	0.000	0.000	1.300
Bordure Betoni+Guardrail	0.00	-4.20	8.00	0.75	1.000	1.000	1.350

Verification of complete wall**Check for overturning stability**Resisting moment $M_{res} = 1776.56$ kNm/mOverturning moment $M_{ovr} = 118.96$ kNm/m**Wall for overturning is SATISFACTORY****Check for slip**Resisting horizontal force $H_{res} = 286.42$ kN/mActive horizontal force $H_{act} = 69.34$ kN/m**Wall for slip is SATISFACTORY****Overall check - WALL is SATISFACTORY**

Maximum stress in footing bottom : 129.37 kPa

Bearing capacity of foundation soil (Stage of construction 1)**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	-330.01	776.19	69.34	0.000	129.37
2	-123.67	511.31	69.34	0.000	85.22

Service load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	-271.02	580.97	45.74
2	-155.19	508.11	45.74

Verification of foundation soil**Eccentricity verification**Max. eccentricity of normal force $e = 0.000$ Maximum allowable eccentricity $e_{alw} = 0.333$ **Eccentricity of the normal force is SATISFACTORY****Verification of bearing capacity**Max. stress at footing bottom $\sigma = 129.37$ kPaBearing capacity of foundation soil $R_d = 280.00$ kPa**Bearing capacity of foundation soil is SATISFACTORY****Overall verification - bearing capacity of found. soil is SATISFACTORY**

Verification of slip on georeinforcement No. 1 (Stage of construction 1)**Forces acting on construction (verification of reinforcement No.: 1)**

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	37.17	-1.40	12.98	6.25	1.000
Trafiku	19.22	-2.09	6.72	6.37	1.300
Bordure Betoni+Guardrail	0.00	-4.20	8.00	0.75	1.000
Gravity force	0.00	-2.10	478.42	3.37	1.000
Trafiku	0.00	-4.20	59.81	5.25	0.000
Turma	0.00	-4.20	15.00	2.25	0.000
Reinforcement	-0.09	-0.60	0.00	6.11	1.000
Reinforcement	-0.14	-1.20	0.00	6.21	1.000
Reinforcement	-0.17	-1.80	0.00	6.32	1.000
Reinforcement	-0.17	-2.40	0.00	6.42	1.000
Reinforcement	-0.14	-3.00	0.00	6.53	1.000
Reinforcement	-0.09	-3.60	0.00	6.63	1.000

Verification against slip along geotextile No.: 1

Inclination of slip surface	= 80.00 °
Overall normal force acting on reinforcement	= 508.14 kN/m
Coefficient of reduction of slip along geo-textile	= 0.67
Wall resistance	= 0.00 kN/m
Overall bearing capacity of reinforcements	= 0.81 kN/m
Resistance along geo-reinforcement	= 238.39 kN/m

Check for slip:Resisting horizontal force $H_{res} = 239.19$ kN/mActive horiz. force $H_{act} = 62.16$ kN/m**Slip along geotextile is SATISFACTORY****Verification of slip on georeinforcement No. 2 (Stage of construction 1)****Forces acting on construction (verification of reinforcement No.: 2)**

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	27.31	-1.20	9.54	6.21	1.000
Trafiku	16.48	-1.79	5.76	6.32	1.300
Bordure Betoni+Guardrail	0.00	-3.60	8.00	0.64	1.000
Gravity force	0.00	-1.80	410.12	3.32	1.000
Trafiku	0.00	-3.60	59.84	5.14	0.000
Turma	0.00	-3.60	15.00	2.14	0.000
Reinforcement	-0.07	-0.60	0.00	6.11	1.000
Reinforcement	-0.12	-1.20	0.00	6.21	1.000
Reinforcement	-0.13	-1.80	0.00	6.32	1.000
Reinforcement	-0.12	-2.40	0.00	6.42	1.000
Reinforcement	-0.07	-3.00	0.00	6.53	1.000

Verification against slip along geotextile No.: 2

Inclination of slip surface	= 80.00 °
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Overall normal force acting on reinforcement = 435.15 kN/m
 Coefficient of reduction of slip along geo-textile = 0.67
 Wall resistance = 0.00 kN/m
 Overall bearing capacity of reinforcements = 0.50 kN/m
 Resistance along geo-reinforcement = 204.15 kN/m

Check for slip:

Resisting horizontal force H_{res} = 204.65 kN/m

Active horiz. force H_{act} = 48.73 kN/m

Slip along geotextile is SATISFACTORY

Verification of slip on georeinforcement No. 3 (Stage of construction 1)**Forces acting on construction (verification of reinforcement No.: 3)**

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	18.96	-1.00	6.62	6.18	1.000
Trafiku	13.73	-1.49	4.80	6.26	1.300
Bordure Betoni+Guardrail	0.00	-3.00	8.00	0.54	1.000
Gravity force	0.00	-1.50	341.81	3.27	1.000
Trafiku	0.00	-3.00	59.87	5.03	0.000
Turma	0.00	-3.00	15.00	2.04	0.000
Reinforcement	-0.06	-0.60	0.00	6.11	1.000
Reinforcement	-0.09	-1.20	0.00	6.21	1.000
Reinforcement	-0.09	-1.80	0.00	6.32	1.000
Reinforcement	-0.06	-2.40	0.00	6.42	1.000

Verification against slip along geotextile No.: 3

Inclination of slip surface = 80.00 °
 Overall normal force acting on reinforcement = 362.67 kN/m
 Coefficient of reduction of slip along geo-textile = 0.67
 Wall resistance = 0.00 kN/m
 Overall bearing capacity of reinforcements = 0.29 kN/m
 Resistance along geo-reinforcement = 170.14 kN/m

Check for slip:

Resisting horizontal force H_{res} = 170.43 kN/m

Active horiz. force H_{act} = 36.82 kN/m

Slip along geotextile is SATISFACTORY

Verification of slip on georeinforcement No. 4 (Stage of construction 1)**Forces acting on construction (verification of reinforcement No.: 4)**

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	12.14	-0.80	4.24	6.14	1.000
Trafiku	10.98	-1.19	3.83	6.21	1.300
Bordure Betoni+Guardrail	0.00	-2.40	8.00	0.43	1.000
Gravity force	0.00	-1.20	273.48	3.21	1.000
Trafiku	0.00	-2.40	59.89	4.93	0.000

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Turma	0.00	-2.40	15.00	1.93	0.000
Reinforcement	-0.04	-0.60	0.00	6.11	1.000
Reinforcement	-0.06	-1.20	0.00	6.21	1.000
Reinforcement	-0.04	-1.80	0.00	6.32	1.000

Verification against slip along geotextile No.: 4

Inclination of slip surface	= 80.00 °
Overall normal force acting on reinforcement	= 290.70 kN/m
Coefficient of reduction of slip along geo-textile	= 0.67
Wall resistance	= 0.00 kN/m
Overall bearing capacity of reinforcements	= 0.14 kN/m
Resistance along geo-reinforcement	= 136.38 kN/m

Check for slip:Resisting horizontal force H_{res} = 136.52 kN/mActive horiz. force H_{act} = 26.41 kN/m**Slip along geotextile is SATISFACTORY****Verification of slip on georeinforcement No. 5 (Stage of construction 1)****Forces acting on construction (verification of reinforcement No.: 5)**

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	6.97	-0.60	2.57	6.10	1.000
Trafiku	8.16	-0.89	3.01	6.14	1.300
Bordure Betoni+Guardrail	0.00	-1.80	8.00	0.32	1.000
Gravity force	0.00	-0.90	204.58	3.15	1.000
Trafiku	0.00	-1.80	59.27	4.80	0.000
Turma	0.00	-1.80	15.00	1.82	0.000
Reinforcement	-0.26	-0.60	0.00	6.10	1.000
Reinforcement	-0.26	-1.20	0.00	6.19	1.000

Verification against slip along geotextile No.: 5

Inclination of slip surface	= 81.00 °
Overall normal force acting on reinforcement	= 219.06 kN/m
Coefficient of reduction of slip along geo-textile	= 0.67
Wall resistance	= 0.00 kN/m
Overall bearing capacity of reinforcements	= 0.52 kN/m
Resistance along geo-reinforcement	= 102.77 kN/m

Check for slip:Resisting horizontal force H_{res} = 103.29 kN/mActive horiz. force H_{act} = 17.57 kN/m**Slip along geotextile is SATISFACTORY**

Verification of slip on georeinforcement No. 6 (Stage of construction 1)

Forces acting on construction (verification of reinforcement No.: 6)

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	3.10	-0.40	1.14	6.06	1.000
Trafiku	5.40	-0.59	1.99	6.09	1.300
Bordure Betoni+Guardrail	0.00	-1.20	8.00	0.21	1.000
Gravity force	0.00	-0.60	136.52	3.10	1.000
Trafiku	0.00	-1.20	59.52	4.70	0.000
Turma	0.00	-1.20	15.00	1.71	0.000
Reinforcement	-0.13	-0.60	0.00	6.10	1.000

Verification against slip along geotextile No.: 6

Inclination of slip surface	= 81.00 °
Overall normal force acting on reinforcement	= 148.26 kN/m
Coefficient of reduction of slip along geo-textile	= 0.67
Wall resistance	= 0.00 kN/m
Overall bearing capacity of reinforcements	= 0.13 kN/m
Resistance along geo-reinforcement	= 69.55 kN/m

Check for slip:Resisting horizontal force $H_{res} = 69.68$ kN/mActive horiz. force $H_{act} = 10.12$ kN/m**Slip along geotextile is SATISFACTORY****Verification of slip on georeinforcement No. 7 (Stage of construction 1)**

Forces acting on construction (verification of reinforcement No.: 7)

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	0.69	-0.20	0.19	6.05	1.000
Trafiku	2.72	-0.29	0.74	6.07	1.300
Bordure Betoni+Guardrail	0.00	-0.60	8.00	0.11	1.000
Gravity force	0.00	-0.30	68.64	3.06	1.000
Trafiku	0.00	-0.60	60.85	4.63	0.000
Turma	0.00	-0.60	15.00	1.61	0.000

Verification against slip along geotextile No.: 7

Inclination of slip surface	= 76.00 °
Overall normal force acting on reinforcement	= 77.80 kN/m
Coefficient of reduction of slip along geo-textile	= 0.67
Wall resistance	= 0.00 kN/m
Overall bearing capacity of reinforcements	= 0.00 kN/m
Resistance along geo-reinforcement	= 36.50 kN/m

Check for slip:Resisting horizontal force $H_{res} = 36.50$ kN/mActive horiz. force $H_{act} = 4.23$ kN/m**Slip along geotextile is SATISFACTORY**

Calculation of internal stability No. 1 (Stage of construction 1)**Check for bearing capacity of geo-reinforcement No.: 1****Check for tensile strength**Tensile strength $R_t = 40.11 \text{ kN/m}$ Geo-reinforcement force $F_x = 8.28 \text{ kN/m}$ **Geo-reinforcement for tensile strength is SATISFACTORY****Check for pull out resistance**Pull out resistance $T_p = 449.11 \text{ kN/m}$ Geo-reinforcement force $F_x = 8.28 \text{ kN/m}$ **Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY****Calculation of internal stability No. 2 (Stage of construction 1)****Check for bearing capacity of geo-reinforcement No.: 2****Check for tensile strength**Tensile strength $R_t = 40.11 \text{ kN/m}$ Geo-reinforcement force $F_x = 15.52 \text{ kN/m}$ **Geo-reinforcement for tensile strength is SATISFACTORY****Check for pull out resistance**Pull out resistance $T_p = 368.67 \text{ kN/m}$ Geo-reinforcement force $F_x = 15.52 \text{ kN/m}$ **Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY****Calculation of internal stability No. 3 (Stage of construction 1)****Check for bearing capacity of geo-reinforcement No.: 3****Check for tensile strength**Tensile strength $R_t = 29.17 \text{ kN/m}$ Geo-reinforcement force $F_x = 14.04 \text{ kN/m}$ **Geo-reinforcement for tensile strength is SATISFACTORY****Check for pull out resistance**Pull out resistance $T_p = 292.59 \text{ kN/m}$ Geo-reinforcement force $F_x = 14.04 \text{ kN/m}$ **Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY****Calculation of internal stability No. 4 (Stage of construction 1)****Check for bearing capacity of geo-reinforcement No.: 4****Check for tensile strength**Tensile strength $R_t = 29.17 \text{ kN/m}$ Geo-reinforcement force $F_x = 12.56 \text{ kN/m}$ **Geo-reinforcement for tensile strength is SATISFACTORY**

Check for pull out resistancePull out resistance $T_p = 223.60 \text{ kN/m}$ Geo-reinforcement force $F_x = 12.56 \text{ kN/m}$ **Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY****Calculation of internal stability No. 5 (Stage of construction 1)****Check for bearing capacity of geo-reinforcement No.: 5****Check for tensile strength**Tensile strength $R_t = 29.17 \text{ kN/m}$ Geo-reinforcement force $F_x = 10.58 \text{ kN/m}$ **Geo-reinforcement for tensile strength is SATISFACTORY****Check for pull out resistance**Pull out resistance $T_p = 159.21 \text{ kN/m}$ Geo-reinforcement force $F_x = 10.58 \text{ kN/m}$ **Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY****Calculation of internal stability No. 6 (Stage of construction 1)****Check for bearing capacity of geo-reinforcement No.: 6****Check for tensile strength**Tensile strength $R_t = 20.05 \text{ kN/m}$ Geo-reinforcement force $F_x = 4.54 \text{ kN/m}$ **Geo-reinforcement for tensile strength is SATISFACTORY****Check for pull out resistance**Pull out resistance $T_p = 99.76 \text{ kN/m}$ Geo-reinforcement force $F_x = 4.54 \text{ kN/m}$ **Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY****Calculation of internal stability No. 7 (Stage of construction 1)****Check for bearing capacity of geo-reinforcement No.: 7****Check for tensile strength**Tensile strength $R_t = 20.05 \text{ kN/m}$ Geo-reinforcement force $F_x = 3.69 \text{ kN/m}$ **Geo-reinforcement for tensile strength is SATISFACTORY****Check for pull out resistance**Pull out resistance $T_p = 47.29 \text{ kN/m}$ Geo-reinforcement force $F_x = 3.69 \text{ kN/m}$ **Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY**

Global stability analysis No. 1 (Stage of construction 1)

Slip surface parameters

(slip surface after optimization)

Center S = (-0.68;-2.48) m

Radius r = 8.95 m

Angle α_1 = -41.72 °

α_2 = 73.91 °

Slope stability check (Bishop)

Utilization = 58.22 %

Slope stability is SATISFACTORY

Slope stability analysis

Input data

Project

Settings

(input for current task)

Stability analysis

Earthquake analysis : Standard

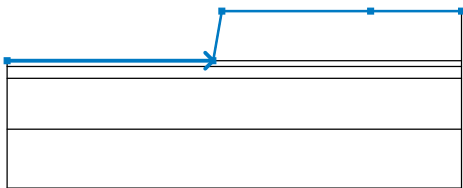
Verification methodology : according to EN 1997

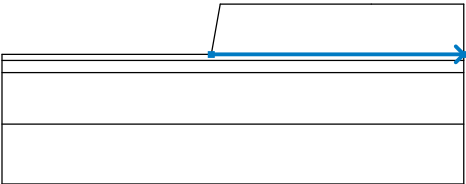
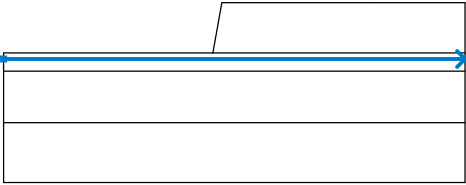
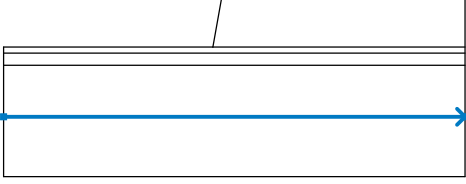
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)					
Permanent design situation					
		State STR		State GEO	
		Unfavourable	Favourable	Unfavourable	Favourable
Permanent actions :	$\gamma_G =$	1.35 [-]	1.00 [-]	1.00 [-]	1.00 [-]
Variable actions :	$\gamma_Q =$	1.50 [-]	0.00 [-]	1.30 [-]	0.00 [-]
Water load :	$\gamma_w =$			1.00 [-]	

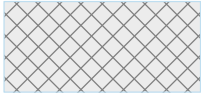
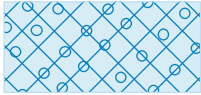
Partial factors for soil parameters (M)			
Permanent design situation			
Partial factor on internal friction :	$\gamma_\phi =$	1.25 [-]	
Partial factor on effective cohesion :	$\gamma_c =$	1.25 [-]	
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.40 [-]	

Interface

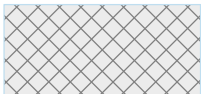
No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
1		-18.20	-4.20	-0.75	-4.20	0.00	0.00
		12.60	0.00	20.30	0.00		

No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
2		-0.75	-4.20	20.30	-4.20		
3		-18.20	-4.70	20.30	-4.70		
4		-18.20	-5.70	20.30	-5.70		
5		-18.20	-10.00	20.30	-10.00		

Soil parameters - effective stress state

No.	Name	Pattern	Φ_{ef} [°]	C_{ef} [kPa]	γ [kN/m ³]
1	Mbushje		35.00	0.00	19.00
2	Shtrese 1 (suargjile)		16.00	40.00	18.00
3	Shtrese 2 (zhavorre)		24.00	10.00	20.10

Soil parameters - uplift

No.	Name	Pattern	γ_{sat} [kN/m ³]	γ_s [kN/m ³]	n [-]
1	Mbushje		20.00		
2	Shtrese 1 (suargjile)		20.00		

No.	Name	Pattern	γ_{sat} [kN/m ³]	γ_s [kN/m ³]	n [-]
3	Shtrese 2 (zhavorre)		21.00		

Soil parameters**Mbushje**

Unit weight : $\gamma = 19.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 35.00^\circ$
 Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

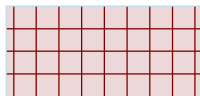
Shtrese 1 (suargjile)

Unit weight : $\gamma = 18.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 16.00^\circ$
 Cohesion of soil : $c_{ef} = 40.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

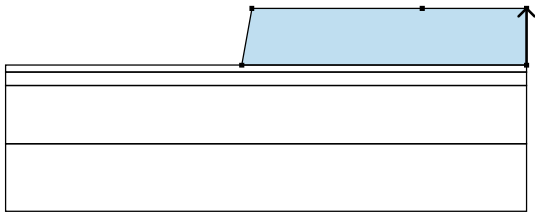
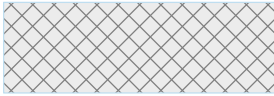
Shtrese 2 (zhavorre)

Unit weight : $\gamma = 20.10 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 24.00^\circ$
 Cohesion of soil : $c_{ef} = 10.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 21.00 \text{ kN/m}^3$

Rigid bodies

No.	Name	Sample	γ [kN/m ³]
1	Material of cover		23.56

Assigning and surfaces

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
1		20.30	-4.20	20.30	0.00	Mbushje
		12.60	0.00	0.00	0.00	
		-0.75	-4.20			

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
2		20.30	-4.70	20.30	-4.20	Mbushje
		-0.75	-4.20	-18.20	-4.20	
		-18.20	-4.70			
3		20.30	-5.70	20.30	-4.70	Shtrese 1 (suargjile)
		-18.20	-4.70	-18.20	-5.70	
4		20.30	-10.00	20.30	-5.70	Shtrese 2 (zhavorre)
		-18.20	-5.70	-18.20	-10.00	
5		-18.20	-10.00	-18.20	-15.00	Shtrese 2 (zhavorre)
		20.30	-15.00	20.30	-10.00	

Reinforcements

No.	Point to the left		Point to the right		Length L [m]	Strength R _t [kN/m]	Pull out resist.	End of reinf.
	x [m]	z [m]	x [m]	z [m]				
1	-0.11	-0.60	5.89	-0.60	6.00	20.05	T _p = 15.96 kN/m ²	Fixed
2	-0.21	-1.20	5.79	-1.20	6.00	20.05	T _p = 31.93 kN/m ²	Fixed
3	-0.32	-1.80	5.68	-1.80	6.00	29.17	T _p = 47.89 kN/m ²	Fixed
4	-0.43	-2.40	5.57	-2.40	6.00	29.17	T _p = 63.86 kN/m ²	Fixed
5	-0.54	-3.00	5.46	-3.00	6.00	29.17	T _p = 79.82 kN/m ²	Fixed
6	-0.64	-3.60	5.36	-3.60	6.00	40.11	T _p = 95.79 kN/m ²	Fixed
7	-0.75	-4.20	5.25	-4.20	6.00	40.11	T _p = 111.75 kN/m ²	Fixed

Surcharge

No.	Type	Type of action	Location z [m]	Origin x [m]	Length l [m]	Width b [m]	Slope α [°]	Magnitude		
								q, q ₁ , f, F	q ₂	unit
1	strip	variable	on terrain	x = 3.00	l = 7.00		0.00	20.00		kN/m ²
2	strip	variable	on terrain	x = 0.00	l = 3.00		0.00	5.00		kN/m ²

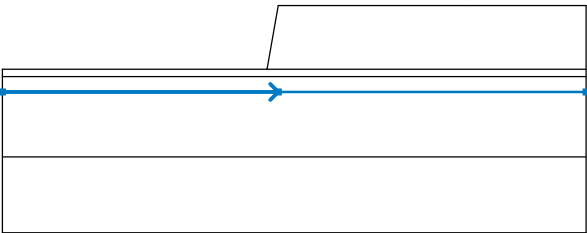
Surcharges

No.	Name
1	Trafiku

No.	Name
2	Turma

Water

Water type : GWT

No.	GWT location	Coordinates of GWT points [m]					
		x	z	x	z	x	z
1		-18.20	-5.70	0.00	-5.70	20.30	-5.70

Tensile crack

Tensile crack not inputted.

Earthquake

Earthquake not included.

Settings of the stage of construction

Design situation : permanent

Results (Stage of construction 1)**Analysis 1****Circular slip surface**

Slip surface parameters						
Center :	x =	-0.68 [m]	Angles :	α_1 =	-41.72 [°]	
	z =	2.48 [m]		α_2 =	73.91 [°]	
Radius :	R =	8.95 [m]				
The slip surface after optimization.						

Reinforcement forces

Reinforcement Force [kN/m]

1	0.00
2	0.00
3	0.00
4	0.00
5	0.00
6	0.00
7	0.00

Slope stability verification (Bishop)Sum of active forces : $F_a = 355.87$ kN/mSum of passive forces : $F_p = 611.22$ kN/mSliding moment : $M_a = 3185.04$ kNm/mResisting moment : $M_p = 5470.41$ kNm/m

Utilization : 58.2 %

Slope stability ACCEPTABLE

Analysis 2**Circular slip surface**

Slip surface parameters					
Center :	x =	-0.68 [m]	Angles :	α_1 =	-41.72 [°]
	z =	2.48 [m]		α_2 =	73.91 [°]
Radius :	R =	8.95 [m]			
Specified slip surface.					

Slope stability verification (Bishop)**Analysis has not been performed.****Optimization of circular slip surface (Bishop)****Analysis has not been performed.****Input data (Stage of construction 2)****Geological profile and assigned soils**

No.	Layer [m]	Assigned soil	Pattern
1	4.20	Mbushje	
2	0.50	Mbushje	
3	1.00	Shtrese 1 (suargjile)	
4	4.30	Shtrese 2 (zhavorre)	
5	-	Shtrese 2 (zhavorre)	

Terrain profile

Terrain behind the structure is flat.

Water influence

Ground water table at height -1.50 m from structure heel.

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		variable	4.00		3.00	7.00	on terrain
2	YES		variable	1.00		0.00	3.00	on terrain
No.	Name							
1	Trafiku							
2	Turma							

Resistance on front face of the structure

Resistance on front face of the structure is not considered.

Applied forces acting on the structure

No.	new	Force modification	Name	Action	F_x [kN/m]	F_z [kN/m]	M [kNm/m]	x [m]	z [m]
1	NO	NO	Bordure Betoni+Guardrail	permanent	0.00	8.00	0.00	0.00	0.00

EarthquakeFactor of horizontal acceleration $K_h = 0.2040$ Factor of vertical acceleration $K_v = 0.1020$

Water below the GWT is restricted.

Settings of the stage of construction

Design situation : seismic

Verification No. 1 (Stage of construction 2)**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
Gravity force	0.00	-2.10	478.19	3.37	1.000	1.000	1.000
Earthquake - soil wedge	97.55	-2.10	-48.78	3.37	1.000	1.000	1.000
Active pressure	27.41	-1.41	12.87	6.26	1.000	1.000	1.000
Water pressure	0.00	-4.20	0.00	6.64	1.000	1.000	1.000
Earthq.- act.pressure	22.32	-2.82	11.81	6.51	1.000	1.000	1.000
Trafiku	3.67	-2.07	1.81	6.38	0.700	0.700	0.700
Trafiku	0.00	-4.20	11.57	5.20	0.000	0.000	0.700
Turma	0.00	-4.20	3.00	2.25	0.000	0.000	0.700
Bordure Betoni+Guardrail	0.00	-4.20	8.00	0.75	1.000	1.000	1.000

Verification of complete wall**Check for overturning stability**Resisting moment $M_{res} = 1618.94$ kNm/mOverturning moment $M_{ovr} = 311.53$ kNm/m**Wall for overturning is SATISFACTORY****Check for slip**Resisting horizontal force $H_{res} = 324.45$ kN/mActive horizontal force $H_{act} = 149.85$ kN/m**Wall for slip is SATISFACTORY****Overall check - WALL is SATISFACTORY**

Maximum stress in footing bottom : 82.80 kPa

Bearing capacity of foundation soil (Stage of construction 2)**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	66.47	473.57	149.85	0.023	82.80

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]	Eccentricity [-]	Stress [kPa]
2	82.68	463.37	149.85	0.030	82.11

Service load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	66.47	473.57	149.85
2	82.68	463.37	149.85

Verification of foundation soil**Eccentricity verification**Max. eccentricity of normal force $e = 0.023$ Maximum allowable eccentricity $e_{alw} = 0.333$ **Eccentricity of the normal force is SATISFACTORY****Verification of bearing capacity**Max. stress at footing bottom $\sigma = 82.80$ kPaBearing capacity of foundation soil $R_d = 280.00$ kPa**Bearing capacity of foundation soil is SATISFACTORY****Overall verification - bearing capacity of found. soil is SATISFACTORY****Verification of slip on georeinforcement No. 1 (Stage of construction 2)****Forces acting on construction (verification of reinforcement No.: 1)**

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	27.36	-1.40	12.76	6.25	1.000
Earthq.- act.pressure	21.98	-2.80	10.25	6.49	1.000
Trafiku	5.30	-2.09	2.47	6.37	0.700
Bordure Betoni+Guardrail	0.00	-4.20	8.00	0.75	1.000
Gravity force	0.00	-2.10	478.42	3.37	1.000
Earthquake - soil wedge	97.60	-2.10	-48.80	3.37	1.000
Trafiku	0.00	-4.20	11.96	5.25	0.000
Turma	0.00	-4.20	3.00	2.25	0.000
Reinforcement	-0.09	-0.60	0.00	6.11	1.000
Reinforcement	-0.14	-1.20	0.00	6.21	1.000
Reinforcement	-0.17	-1.80	0.00	6.32	1.000
Reinforcement	-0.17	-2.40	0.00	6.42	1.000
Reinforcement	-0.14	-3.00	0.00	6.53	1.000
Reinforcement	-0.09	-3.60	0.00	6.63	1.000

Verification against slip along geotextile No.: 1

Inclination of slip surface = 80.00 °
 Overall normal force acting on reinforcement = 462.36 kN/m
 Coefficient of reduction of slip along geo-textile = 0.67
 Wall resistance = 0.00 kN/m
 Overall bearing capacity of reinforcements = 0.81 kN/m
 Resistance along geo-reinforcement = 216.91 kN/m

Check for slip:Resisting horizontal force $H_{res} = 217.72 \text{ kN/m}$ Active horiz. force $H_{act} = 53.05 \text{ kN/m}$ **Slip along geotextile is SATISFACTORY****Verification of slip on georeinforcement No. 2 (Stage of construction 2)****Forces acting on construction (verification of reinforcement No.: 2)**

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	20.10	-1.20	9.37	6.21	1.000
Earthq.- act.pressure	16.15	-2.40	7.53	6.42	1.000
Trafiku	4.54	-1.79	2.12	6.32	0.700
Bordure Betoni+Guardrail	0.00	-3.60	8.00	0.64	1.000
Gravity force	0.00	-1.80	410.12	3.32	1.000
Earthquake - soil wedge	83.67	-1.80	-41.83	3.32	1.000
Trafiku	0.00	-3.60	11.97	5.14	0.000
Turma	0.00	-3.60	3.00	2.14	0.000
Reinforcement	-0.07	-0.60	0.00	6.11	1.000
Reinforcement	-0.12	-1.20	0.00	6.21	1.000
Reinforcement	-0.13	-1.80	0.00	6.32	1.000
Reinforcement	-0.12	-2.40	0.00	6.42	1.000
Reinforcement	-0.07	-3.00	0.00	6.53	1.000

Verification against slip along geotextile No.: 2

Inclination of slip surface = 80.00°
 Overall normal force acting on reinforcement = 394.68 kN/m
 Coefficient of reduction of slip along geo-textile = 0.67
 Wall resistance = 0.00 kN/m
 Overall bearing capacity of reinforcements = 0.50 kN/m
 Resistance along geo-reinforcement = 185.16 kN/m

Check for slip:Resisting horizontal force $H_{res} = 185.66 \text{ kN/m}$ Active horiz. force $H_{act} = 39.43 \text{ kN/m}$ **Slip along geotextile is SATISFACTORY****Verification of slip on georeinforcement No. 3 (Stage of construction 2)****Forces acting on construction (verification of reinforcement No.: 3)**

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	16.82	-1.00	10.92	6.03	1.000
Earthq.- act.pressure	11.76	-2.00	7.63	6.07	1.000
Trafiku	3.55	-1.48	2.30	6.05	0.700
Bordure Betoni+Guardrail	0.00	-3.00	8.00	0.54	1.000
Gravity force	0.00	-1.48	329.72	3.16	1.000
Earthquake - soil wedge	67.26	-1.48	-33.63	3.16	1.000
Trafiku	0.00	-3.00	10.28	4.82	0.000

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Turma	0.00	-3.00	3.00	2.04	0.000
Reinforcement	-3.69	-0.60	0.00	6.02	1.000
Reinforcement	-5.53	-1.20	0.00	6.04	1.000
Reinforcement	-5.53	-1.80	0.00	6.06	1.000
Reinforcement	-3.69	-2.40	0.00	6.08	1.000

Verification against slip along geotextile No.: 3

Inclination of slip surface = 88.00 °
 Overall normal force acting on reinforcement = 324.25 kN/m
 Coefficient of reduction of slip along geo-textile = 0.67
 Wall resistance = 0.00 kN/m
 Overall bearing capacity of reinforcements = 18.44 kN/m
 Resistance along geo-reinforcement = 152.12 kN/m

Check for slip:

Resisting horizontal force H_{res} = 170.56 kN/m

Active horiz. force H_{act} = 31.06 kN/m

Slip along geotextile is SATISFACTORY

Verification of slip on georeinforcement No. 4 (Stage of construction 2)**Forces acting on construction (verification of reinforcement No.: 4)**

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	11.19	-0.80	7.84	6.00	1.000
Earthq.- act.pressure	7.61	-1.60	5.33	6.00	1.000
Trafiku	2.77	-1.18	1.94	6.00	0.700
Bordure Betoni+Guardrail	0.00	-2.40	8.00	0.43	1.000
Gravity force	0.00	-1.19	263.83	3.11	1.000
Earthquake - soil wedge	53.82	-1.19	-26.91	3.11	1.000
Trafiku	0.00	-2.40	10.29	4.71	0.000
Turma	0.00	-2.40	3.00	1.93	0.000
Reinforcement	-3.44	-0.60	0.00	6.00	1.000
Reinforcement	-4.58	-1.20	0.00	6.00	1.000
Reinforcement	-3.44	-1.80	0.00	6.00	1.000

Verification against slip along geotextile No.: 4

Inclination of slip surface = 90.00 °
 Overall normal force acting on reinforcement = 259.44 kN/m
 Coefficient of reduction of slip along geo-textile = 0.67
 Wall resistance = 0.00 kN/m
 Overall bearing capacity of reinforcements = 11.46 kN/m
 Resistance along geo-reinforcement = 121.71 kN/m

Check for slip:

Resisting horizontal force H_{res} = 133.17 kN/m

Active horiz. force H_{act} = 20.74 kN/m

Slip along geotextile is SATISFACTORY

Verification of slip on georeinforcement No. 5 (Stage of construction 2)

Forces acting on construction (verification of reinforcement No.: 5)

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	6.30	-0.60	4.41	6.00	1.000
Earthq.- act.pressure	4.28	-1.20	3.00	6.00	1.000
Trafiku	2.07	-0.88	1.45	6.00	0.700
Bordure Betoni+Guardrail	0.00	-1.80	8.00	0.32	1.000
Gravity force	0.00	-0.89	199.70	3.08	1.000
Earthquake - soil wedge	40.74	-0.89	-20.37	3.08	1.000
Trafiku	0.00	-1.80	10.71	4.66	0.000
Turma	0.00	-1.80	3.00	1.82	0.000
Reinforcement	-2.29	-0.60	0.00	6.00	1.000
Reinforcement	-2.29	-1.20	0.00	6.00	1.000

Verification against slip along geotextile No.: 5

Inclination of slip surface	=	90.00 °
Overall normal force acting on reinforcement	=	195.75 kN/m
Coefficient of reduction of slip along geo-textile	=	0.67
Wall resistance	=	0.00 kN/m
Overall bearing capacity of reinforcements	=	4.58 kN/m
Resistance along geo-reinforcement	=	91.84 kN/m

Check for slip:

Resisting horizontal force H_{res} = 96.42 kN/m

Active horiz. force H_{act} = 12.02 kN/m

Slip along geotextile is SATISFACTORY

Verification of slip on georeinforcement No. 6 (Stage of construction 2)

Forces acting on construction (verification of reinforcement No.: 6)

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	2.80	-0.40	1.96	6.00	1.000
Earthq.- act.pressure	1.90	-0.80	1.33	6.00	1.000
Trafiku	1.37	-0.58	0.96	6.00	0.700
Bordure Betoni+Guardrail	0.00	-1.20	8.00	0.21	1.000
Gravity force	0.00	-0.60	134.36	3.05	1.000
Earthquake - soil wedge	27.41	-0.60	-13.70	3.05	1.000
Trafiku	0.00	-1.20	11.14	4.61	0.000
Turma	0.00	-1.20	3.00	1.71	0.000
Reinforcement	-1.15	-0.60	0.00	6.00	1.000

Verification against slip along geotextile No.: 6

Inclination of slip surface	=	90.00 °
Overall normal force acting on reinforcement	=	132.61 kN/m
Coefficient of reduction of slip along geo-textile	=	0.67
Wall resistance	=	0.00 kN/m
Overall bearing capacity of reinforcements	=	1.15 kN/m

Resistance along geo-reinforcement = 62.21 kN/m

Check for slip:

Resisting horizontal force $H_{res} = 63.36$ kN/m

Active horiz. force $H_{act} = 5.66$ kN/m

Slip along geotextile is SATISFACTORY

Verification of slip on georeinforcement No. 7 (Stage of construction 2)

Forces acting on construction (verification of reinforcement No.: 7)

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	0.70	-0.20	0.49	6.00	1.000
Earthq.- act.pressure	0.48	-0.40	0.33	6.00	1.000
Trafiku	0.66	-0.28	0.46	6.00	0.700
Bordure Betoni+Guardrail	0.00	-0.60	8.00	0.11	1.000
Gravity force	0.00	-0.30	67.79	3.03	1.000
Earthquake - soil wedge	13.83	-0.30	-6.91	3.03	1.000
Trafiku	0.00	-0.60	11.57	4.55	0.000
Turma	0.00	-0.60	3.00	1.61	0.000

Verification against slip along geotextile No.: 7

Inclination of slip surface = 90.00 °

Overall normal force acting on reinforcement = 70.02 kN/m

Coefficient of reduction of slip along geo-textile = 0.67

Wall resistance = 0.00 kN/m

Overall bearing capacity of reinforcements = 0.00 kN/m

Resistance along geo-reinforcement = 32.85 kN/m

Check for slip:

Resisting horizontal force $H_{res} = 32.85$ kN/m

Active horiz. force $H_{act} = 1.64$ kN/m

Slip along geotextile is SATISFACTORY

Calculation of internal stability No. 1 (Stage of construction 2)

Check for bearing capacity of geo-reinforcement No.: 1

Check for tensile strength

Tensile strength $R_t = 40.11$ kN/m

Geo-reinforcement force $F_x = 4.37$ kN/m

Geo-reinforcement for tensile strength is SATISFACTORY

Check for pull out resistance

Pull out resistance $T_p = 449.11$ kN/m

Geo-reinforcement force $F_x = 4.37$ kN/m

Geo-reinforcement for pull out resistance is SATISFACTORY

Overall verification - geo-reinforcement is SATISFACTORY

Calculation of internal stability No. 2 (Stage of construction 2)**Check for bearing capacity of geo-reinforcement No.: 2****Check for tensile strength**Tensile strength $R_t = 40.11 \text{ kN/m}$ Geo-reinforcement force $F_x = 8.50 \text{ kN/m}$ **Geo-reinforcement for tensile strength is SATISFACTORY****Check for pull out resistance**Pull out resistance $T_p = 368.67 \text{ kN/m}$ Geo-reinforcement force $F_x = 8.50 \text{ kN/m}$ **Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY****Calculation of internal stability No. 3 (Stage of construction 2)****Check for bearing capacity of geo-reinforcement No.: 3****Check for tensile strength**Tensile strength $R_t = 29.17 \text{ kN/m}$ Geo-reinforcement force $F_x = 8.20 \text{ kN/m}$ **Geo-reinforcement for tensile strength is SATISFACTORY****Check for pull out resistance**Pull out resistance $T_p = 292.59 \text{ kN/m}$ Geo-reinforcement force $F_x = 8.20 \text{ kN/m}$ **Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY****Calculation of internal stability No. 4 (Stage of construction 2)****Check for bearing capacity of geo-reinforcement No.: 4****Check for tensile strength**Tensile strength $R_t = 29.17 \text{ kN/m}$ Geo-reinforcement force $F_x = 7.90 \text{ kN/m}$ **Geo-reinforcement for tensile strength is SATISFACTORY****Check for pull out resistance**Pull out resistance $T_p = 223.60 \text{ kN/m}$ Geo-reinforcement force $F_x = 7.90 \text{ kN/m}$ **Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY****Calculation of internal stability No. 5 (Stage of construction 2)****Check for bearing capacity of geo-reinforcement No.: 5****Check for tensile strength**Tensile strength $R_t = 29.17 \text{ kN/m}$ Geo-reinforcement force $F_x = 7.31 \text{ kN/m}$ **Geo-reinforcement for tensile strength is SATISFACTORY**

Check for pull out resistancePull out resistance $T_p = 159.21 \text{ kN/m}$ Geo-reinforcement force $F_x = 7.31 \text{ kN/m}$ **Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY****Calculation of internal stability No. 6 (Stage of construction 2)****Check for bearing capacity of geo-reinforcement No.: 6****Check for tensile strength**Tensile strength $R_t = 20.05 \text{ kN/m}$ Geo-reinforcement force $F_x = 6.97 \text{ kN/m}$ **Geo-reinforcement for tensile strength is SATISFACTORY****Check for pull out resistance**Pull out resistance $T_p = 99.76 \text{ kN/m}$ Geo-reinforcement force $F_x = 6.97 \text{ kN/m}$ **Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY****Calculation of internal stability No. 7 (Stage of construction 2)****Check for bearing capacity of geo-reinforcement No.: 7****Check for tensile strength**Tensile strength $R_t = 20.05 \text{ kN/m}$ Geo-reinforcement force $F_x = 9.87 \text{ kN/m}$ **Geo-reinforcement for tensile strength is SATISFACTORY****Check for pull out resistance**Pull out resistance $T_p = 47.29 \text{ kN/m}$ Geo-reinforcement force $F_x = 9.87 \text{ kN/m}$ **Geo-reinforcement for pull out resistance is SATISFACTORY****Overall verification - geo-reinforcement is SATISFACTORY****Global stability analysis No. 1 (Stage of construction 2)****Slip surface parameters**

(slip surface after optimization)

Center $S = (-1.74; -74.42) \text{ m}$ Radius $r = 95.81 \text{ m}$ Angle $\alpha_1 = -34.86^\circ$ $\alpha_2 = 39.04^\circ$ **Slope stability check (Bishop)**

Utilization = 73.94 %

Slope stability is SATISFACTORY

Slope stability analysis

Input data

Project

Settings

(input for current task)

Stability analysis

Earthquake analysis : Standard

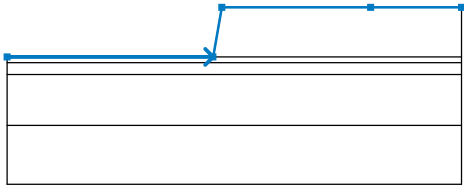
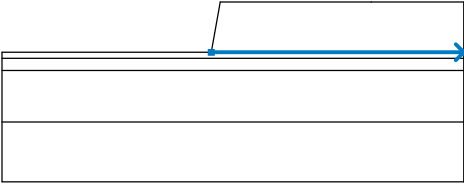
Verification methodology : according to EN 1997

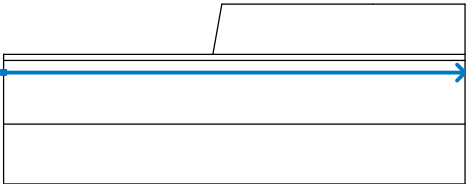
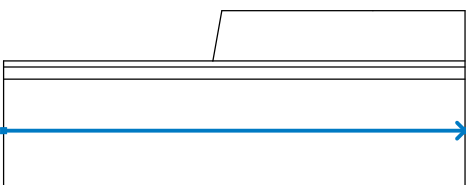
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)							
Seismic design situation							
		State STR				State GEO	
		Unfavourable		Favourable		Unfavourable	
Permanent actions :	$\gamma_G =$	1.00	[-]	1.00	[-]	1.00	[-]
Variable actions :	$\gamma_Q =$	1.00	[-]	0.00	[-]	1.00	[-]
Water load :	$\gamma_w =$					1.00	[-]

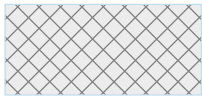
Partial factors for soil parameters (M)			
Seismic design situation			
Partial factor on internal friction :	$\gamma_\phi =$	1.00	[-]
Partial factor on effective cohesion :	$\gamma_c =$	1.00	[-]
Partial factor on undrained shear strength :	$\gamma_{cu} =$	1.00	[-]

Interface

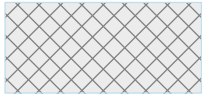
No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
1		-18.20	-4.20	-0.75	-4.20	0.00	0.00
		12.60	0.00	20.30	0.00		
2		-0.75	-4.20	20.30	-4.20		
3		-18.20	-4.70	20.30	-4.70		

No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
4		-18.20	-5.70	20.30	-5.70		
5		-18.20	-10.00	20.30	-10.00		

Soil parameters - effective stress state

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]
1	Mbushje		35.00	0.00	19.00
2	Shtrese 1 (suargjile)		16.00	40.00	18.00
3	Shtrese 2 (zhavorre)		24.00	10.00	20.10

Soil parameters - uplift

No.	Name	Pattern	γ_{sat} [kN/m ³]	γ_s [kN/m ³]	n [-]
1	Mbushje		20.00		
2	Shtrese 1 (suargjile)		20.00		
3	Shtrese 2 (zhavorre)		21.00		

Soil parameters

MbushjeUnit weight : $\gamma = 19.00 \text{ kN/m}^3$

Stress-state : effective

Angle of internal friction : $\varphi_{ef} = 35.00^\circ$ Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$ Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

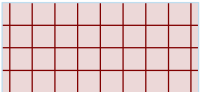
Shtrese 1 (suargjile)

Unit weight : $\gamma = 18.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 16.00^\circ$
 Cohesion of soil : $c_{ef} = 40.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

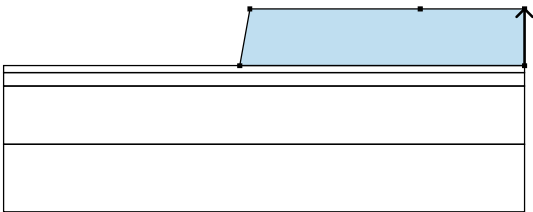
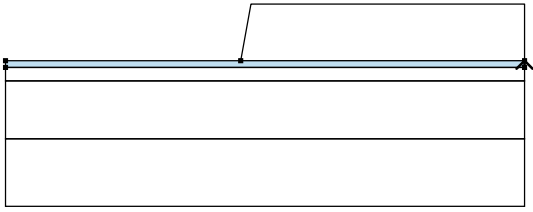
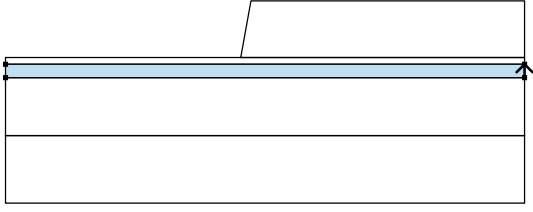
Shtrese 2 (zhavorre)

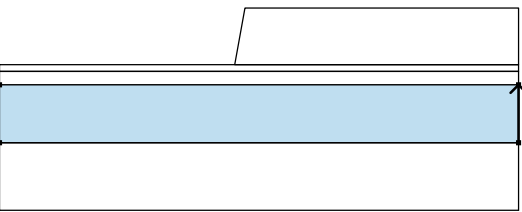
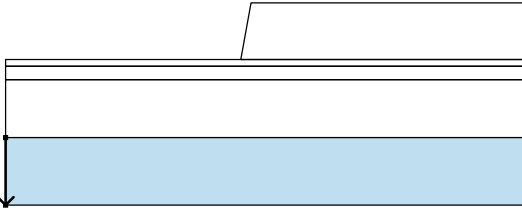
Unit weight : $\gamma = 20.10 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 24.00^\circ$
 Cohesion of soil : $c_{ef} = 10.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 21.00 \text{ kN/m}^3$

Rigid bodies

No.	Name	Sample	γ [kN/m ³]
1	Material of cover		23.56

Assigning and surfaces

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
1		20.30	-4.20	20.30	0.00	Mbushje 
		12.60	0.00	0.00	0.00	
		-0.75	-4.20			
2		20.30	-4.70	20.30	-4.20	Mbushje 
		-0.75	-4.20	-18.20	-4.20	
		-18.20	-4.70			
3		20.30	-5.70	20.30	-4.70	Shtrese 1 (suargjile) 
		-18.20	-4.70	-18.20	-5.70	

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
4		20.30	-10.00	20.30	-5.70	Shtrese 2 (zhavorre)
		-18.20	-5.70	-18.20	-10.00	
5		-18.20	-10.00	-18.20	-15.00	Shtrese 2 (zhavorre)
		20.30	-15.00	20.30	-10.00	

Reinforcements

No.	Point to the left		Point to the right		Length L [m]	Strength R _t [kN/m]	Pull out resist.	End of reinf.
	x [m]	z [m]	x [m]	z [m]				
1	-0.11	-0.60	5.89	-0.60	6.00	20.05	T _p = 15.96 kN/m ²	Fixed
2	-0.21	-1.20	5.79	-1.20	6.00	20.05	T _p = 31.93 kN/m ²	Fixed
3	-0.32	-1.80	5.68	-1.80	6.00	29.17	T _p = 47.89 kN/m ²	Fixed
4	-0.43	-2.40	5.57	-2.40	6.00	29.17	T _p = 63.86 kN/m ²	Fixed
5	-0.54	-3.00	5.46	-3.00	6.00	29.17	T _p = 79.82 kN/m ²	Fixed
6	-0.64	-3.60	5.36	-3.60	6.00	40.11	T _p = 95.79 kN/m ²	Fixed
7	-0.75	-4.20	5.25	-4.20	6.00	40.11	T _p = 111.75 kN/m ²	Fixed

Surcharge

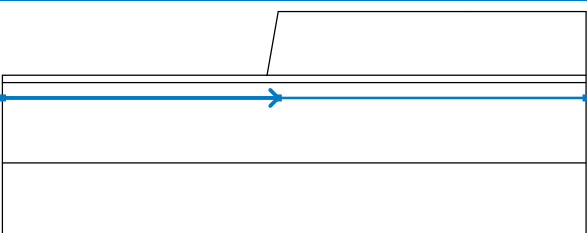
No.	Type	Type of action	Location z [m]	Origin x [m]	Length l [m]	Width b [m]	Slope α [°]	Magnitude		
								q, q ₁ , f, F	q ₂	unit
1	strip	variable	on terrain	x = 3.00	l = 7.00		0.00	4.00		kN/m ²
2	strip	variable	on terrain	x = 0.00	l = 3.00		0.00	1.00		kN/m ²

Surcharges

No.	Name
1	Trafiku
2	Turma

Water

Water type : GWT

No.	GWT location	Coordinates of GWT points [m]					
		x	z	x	z	x	z
1		-18.20	-5.70	0.00	-5.70	20.30	-5.70

Tensile crack

Tensile crack not inputted.

EarthquakeHorizontal seismic coefficient : $K_h = 0.20$ Vertical seismic coefficient : $K_v = 0.10$ **Settings of the stage of construction**

Design situation : seismic

Results (Stage of construction 1)**Analysis 1****Circular slip surface**

Slip surface parameters					
Center :	x =	-0.80 [m]	Angles :	α_1 =	-42.44 [°]
	z =	14.61 [m]		α_2 =	55.03 [°]
Radius :	R =	25.49 [m]			
The slip surface after optimization.					

Reinforcement forces

Reinforcement Force [kN/m]

1	0.00
2	0.00
3	0.00
4	0.00
5	0.00
6	0.00
7	0.00

Slope stability verification (Bishop)Sum of active forces : $F_a = 1249.90$ kN/mSum of passive forces : $F_p = 1935.90$ kN/mSliding moment : $M_a = 31859.92$ kNm/mResisting moment : $M_p = 49346.12$ kNm/m

Utilization : 64.6 %

Slope stability ACCEPTABLE**Analysis 2****Circular slip surface**

Slip surface parameters						
Center :	x =	-0.80	[m]	Angles :	α_1 =	-42.44 [°]
	z =	14.61	[m]		α_2 =	55.03 [°]
Radius :	R =	25.49	[m]			
Specified slip surface.						