GEOTEHNIČKO INŽENJERSTVO

(I . Vježbe)

- UVOD (Izvedbeni plan predmeta Temeljenje, obaveze studenata, sustav ocjenjivanja pohađanja nastave i programa)
- PONAVLJANJE (Mehanika tla i stijena, Geotehničko inženjerstvo)

PLAN NASTAVE I OBAVEZE STUDENATA

15 – predavanja

15 – vježbi (auditorne + konstruktivne)

6 – programa

1 – ispit

SUSTAV BODOVANJA I OCJENJIVANJA

Studenti se ocjenjuju na temelju bodova prikupljenih iz:

- 6 programa (6 x 5 bodove = 30 bodova)
- ispita (zadaci: 50 bodova + teorijska pitanja: 20 bodova = 70 bodova)

Uvjet za potpis: na kraju semestra prikupljeno minimalno 10 bodova iz programa

Ukupan broj prikupljenih bodova:	55	65	75	85
Ocjena:	**2**	**3**	**4**	**5**

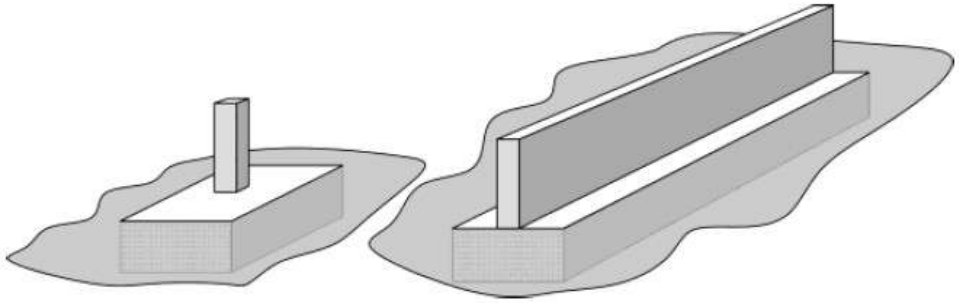
IZVEDBENI PLAN NASTAVE

Redni broj	Datum	tip vježbi A – audit. K – konst.	VJEŽBE	Program na vj. / rok predavanja	
1.	29.2.	A	**UVOD** - ponavljanje, izvedbeni plan nastave, pravila igre		
2.	7.3.	A	**EC7** – ponavljanje (proračunske situacije, projektne vrijednosti, parc. koef.), primjeri za razne konstr.		
3.	14.3.	A – K	**TEM. SAMAC (nosivost + slijeganje)** – primjer proračuna nosivosti za koso ekscentrično opterećenje i slijeganje Kanny, Steinbrenner, M&P 1 . PROGRAM – zadatak	1	
4.	21.3.	K	**1. PROGRAM** – rješavanje zadatka	1	
5.	28.3.	A – K	**KOSINA** – proračun stabilnosti u programu GEO-SLOPE 2 . PROGRAM – zadatak	2	1
6.	4.4.	K	**2. PROGRAM** – rješavanje zadatka	2	
7.	11.4.	A – K	**POTPORNI ZID** – primjer proračuna za gravitacijski i L zid (pritisci prema Rankine) 3. PROGRAM – zadatak	3	2
8.	18.4.	K	**3. PROGRAM** – rješavanje zadatka	3	

IZVEDBENI PLAN NASTAVE

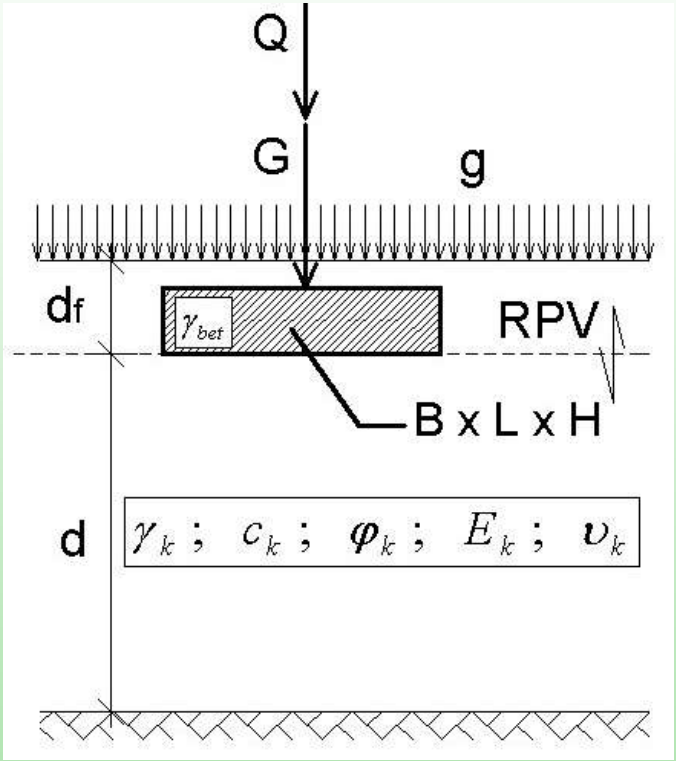
Redni broj	Datum	tip vježbi A – audit. K – konst.	VJEŽBE	Program na vj. / rok predavanja	
9.	25.4.	A – K	**ZAGATNA KONSTRUKCIJA** – primjer proračuna za sidrenje u jednom redu 4. PROGRAM – zadatak	4	3
10.	2.5.	K	**4. PROGRAM** – rješavanje zadatka	4	
11.	9.5.	A – K	**DUBOKO TEMELJENJE NA PILOTIMA** – primjer proračuna nosivosti (API i DIN) i slijeganja pilota (DIN) 5. PROGRAM – zadatak	5	4
12.	16.5.	K	**5. PROGRAM** – rješavanje zadatka	5	
13.	23.5.	A – K	**SEIZMIČKI PRORAČUN** – jednostavniji primjeri seizmičkih proračuna na geotehničkim konstrukcijama iz prethodnih programa 6. PROGRAM – zadatak	6	5
14.	30.5.	K	**6. PROGRAM** – rješavanje zadatka	6	
15.	6.6.	K	**PREGLED PROGRAMA**		6

PLITKO TEMELJENJE

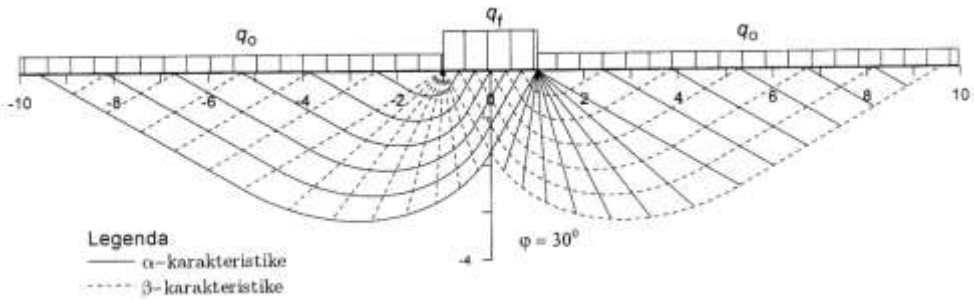


Slika 4-2 Temelj samac (lijevo) i temeljna traka (desno)

PLITKO TEMELJENJE

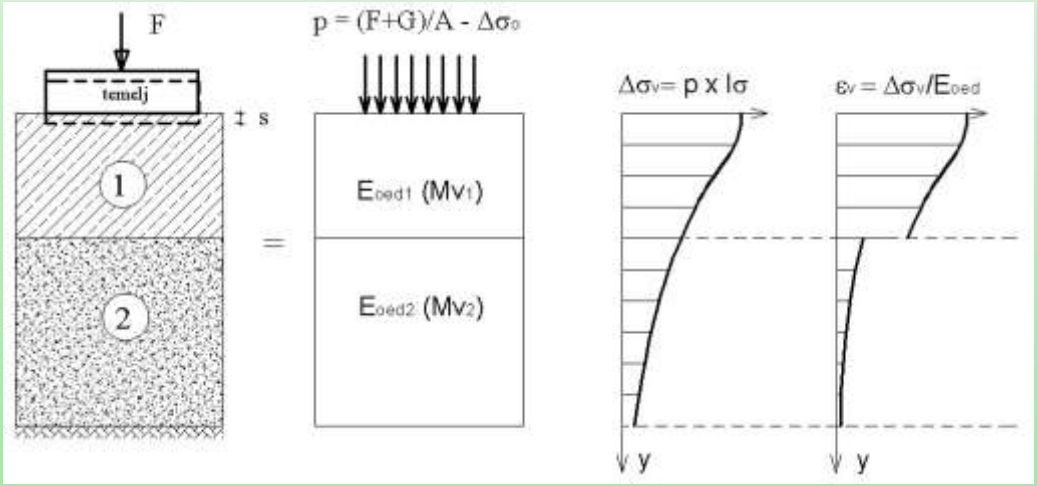


NOSIVOST



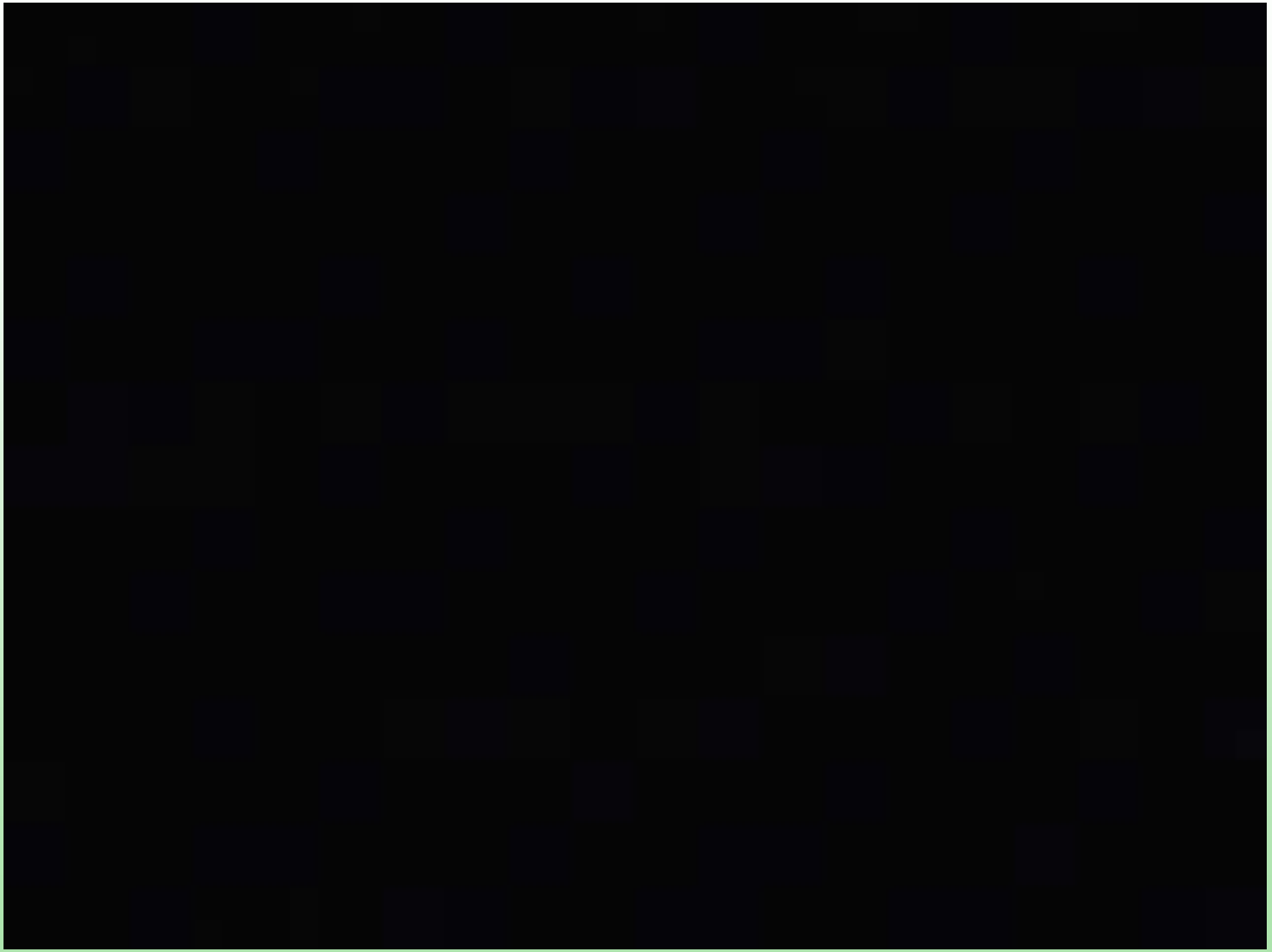
$$\frac{R}{A'} = q'_f = c' N_c b_c s_c i_c + q' N_q b_q s_q i_q + \frac{1}{2}\gamma' b' N_\gamma b_\gamma s_\gamma i_\gamma$$

SLIJEGANJE



STABILNOST KOSINE - KLIZIŠTA

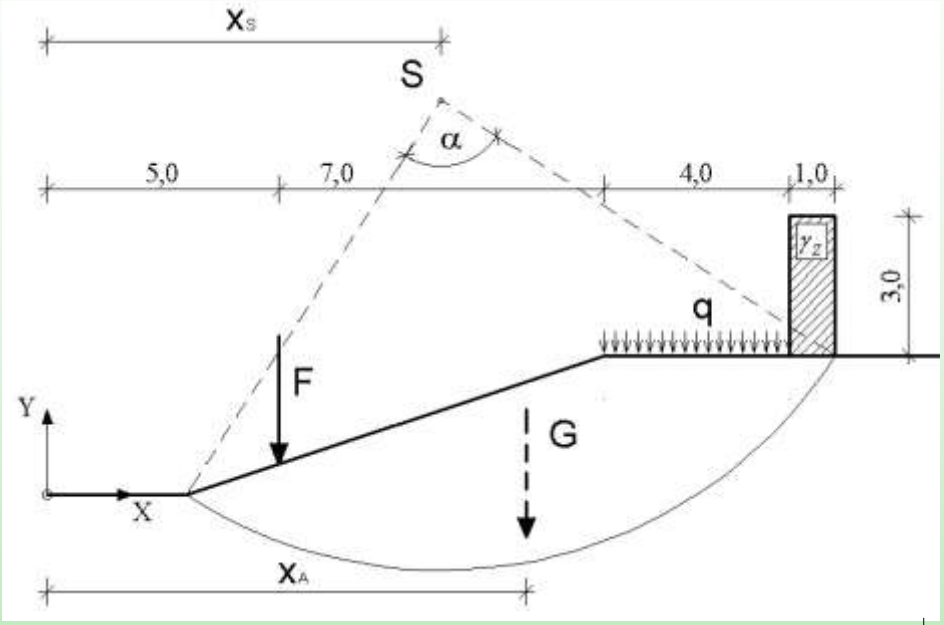
STABILNOST KOSINE - KLIZIŠTA



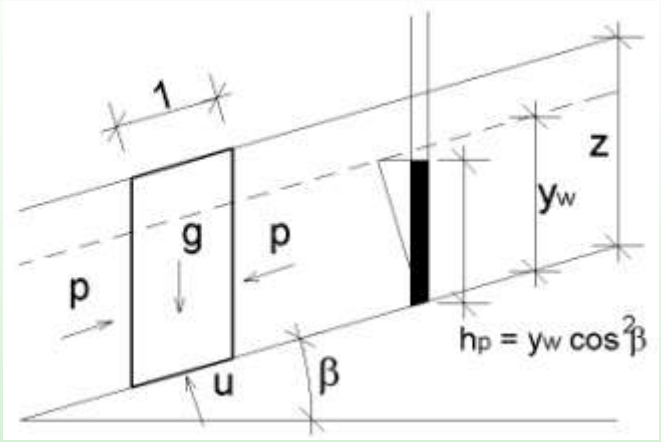
STABILNOST KOSINE - KLIZIŠTA

STABILNOS KOSINE

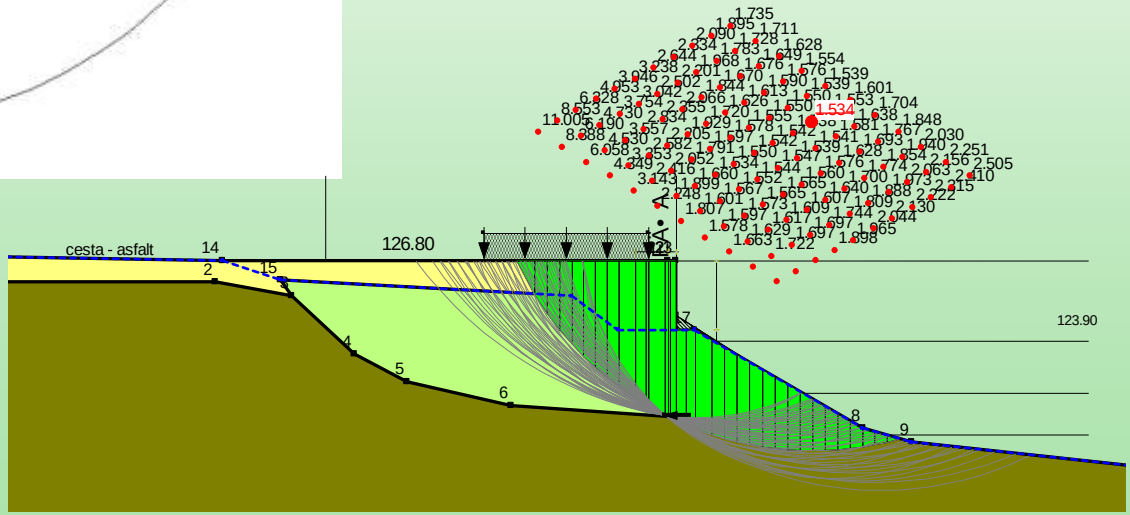
KRUŽNA KLIZNA PLOHA
– nedrenirani uvjeti u homogenom tlu



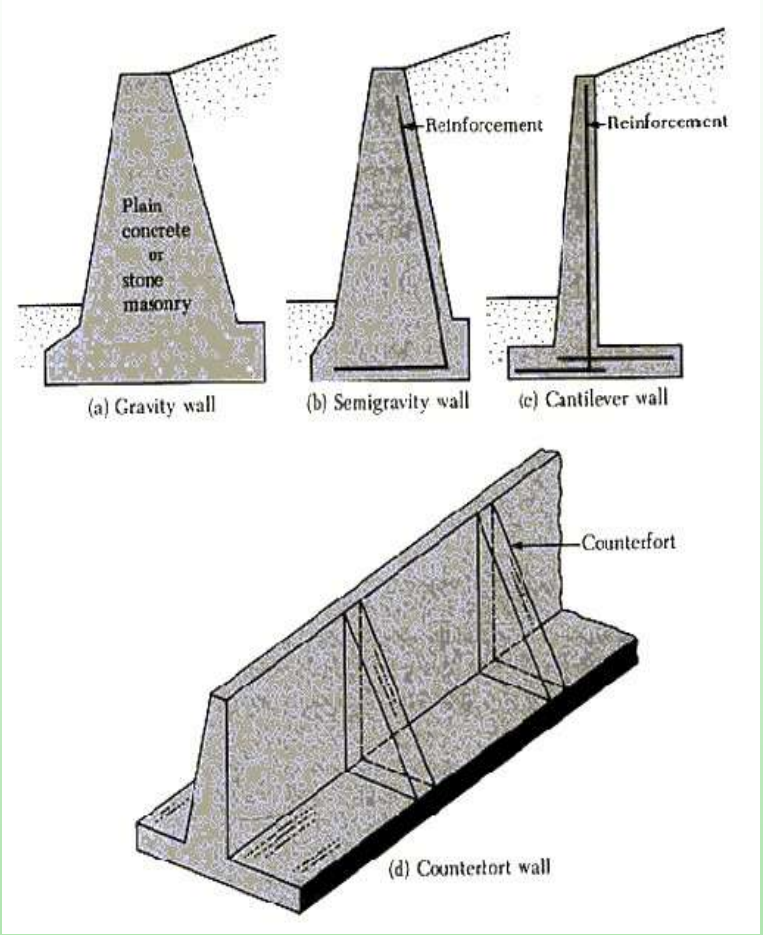
BESKONAČNA KOSINA
– drenirano / nedrenirano



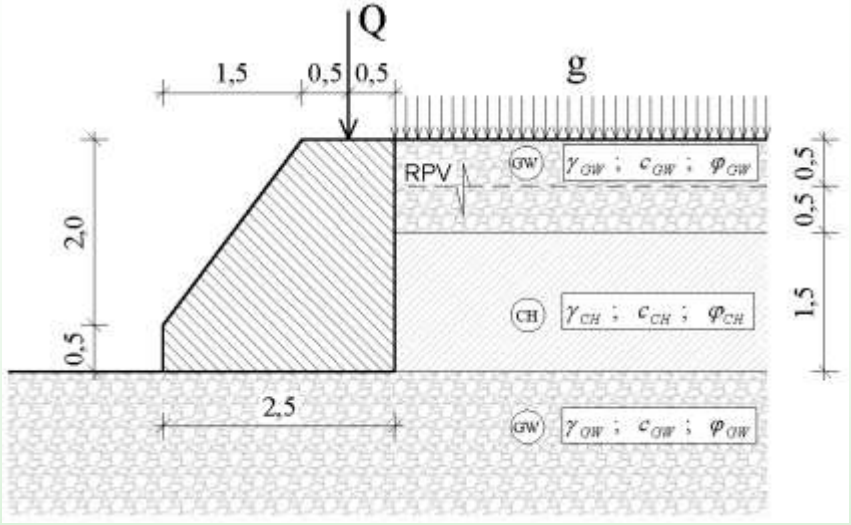
KRUŽNA KLIZNA PLOHA
– opće stanje
– program SLOPE

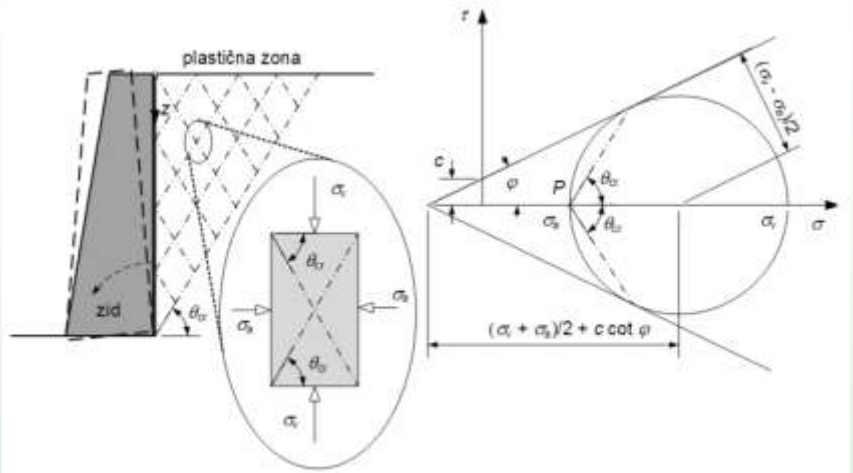


POTPORNI ZIDOVI



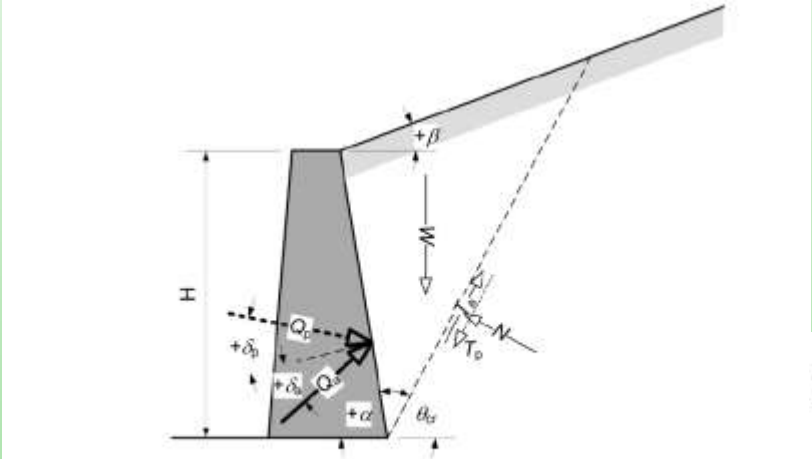
POTPORNI ZIDOVI





Slika 5-8 Uz Rankineovo stanje aktivnog tlaka iza zida

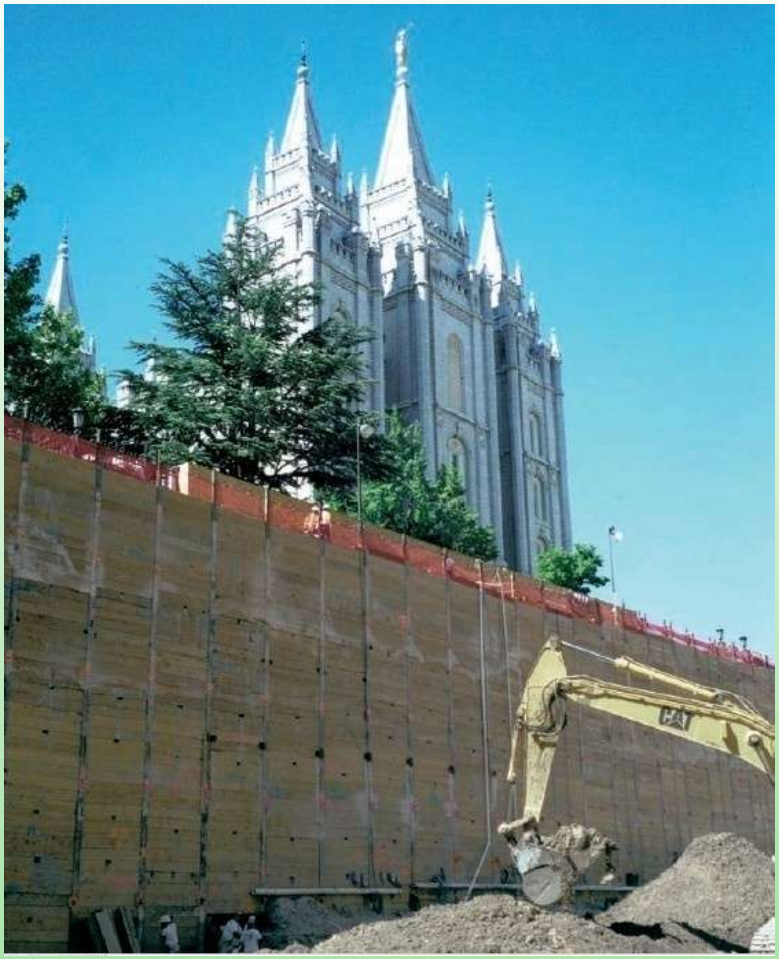
$$K_a = \frac{1 - \sin\varphi}{1 + \sin\varphi} = \tan^2\left(45^0 - \frac{\varphi}{2}\right)$$



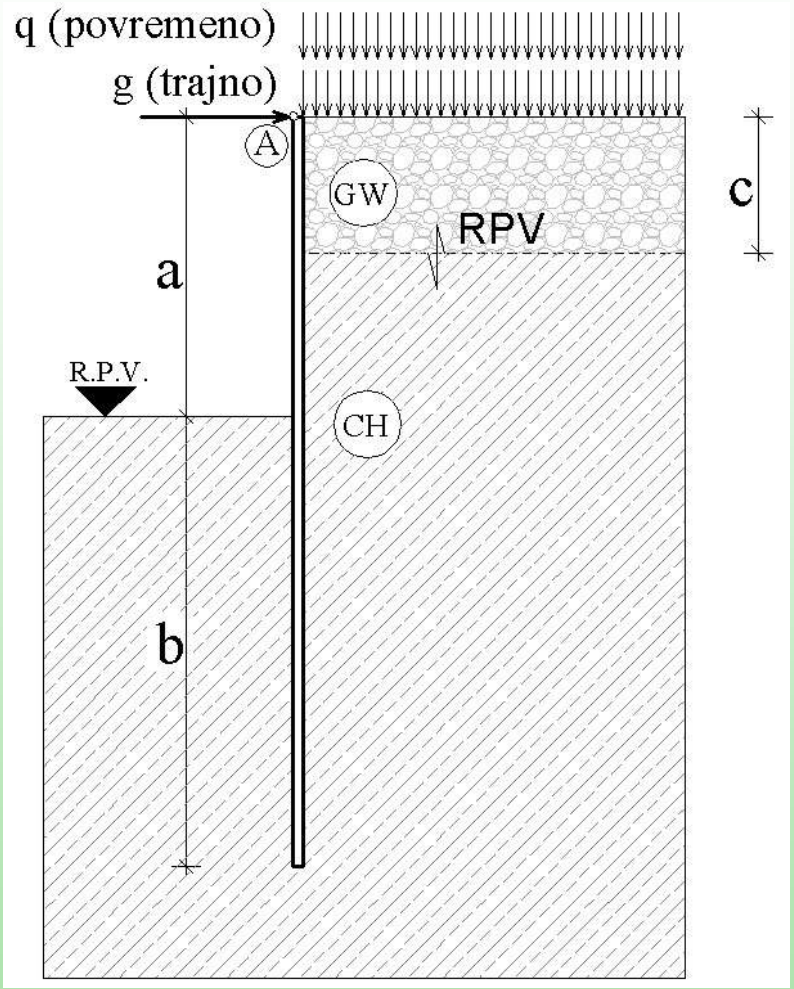
Slika 5-10Pritisak na zid prema Müller-Breslau: sile na klin tla s ravnom kliznom plohom

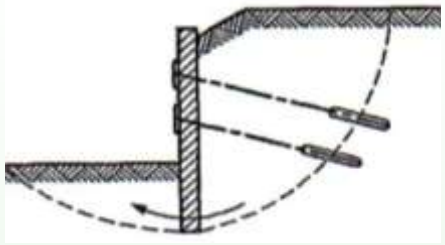
$$K_a = \frac{\sin^2(\alpha + \varphi)\cos\delta_a}{\sin\alpha \sin(\alpha - \delta_a)\left[1 + \sqrt{\frac{\sin(\varphi + \delta_a)\sin(\varphi - \beta)}{\sin(\alpha - \delta_a)\sin(\alpha + \beta)}}\right]^2}$$

ZAGATNE KONSTRUKCIJE

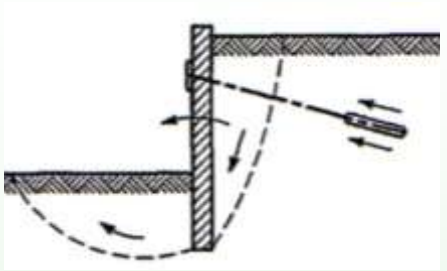


ZAGATNE KONSTRUKCIJE

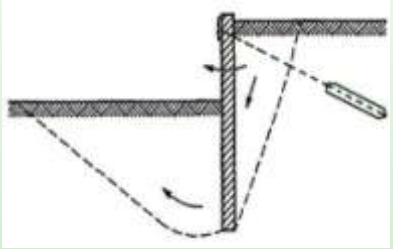




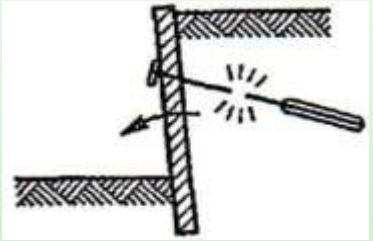
globalna stabilnost (GEO)



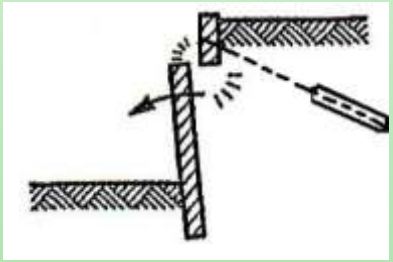
nosivost sidra (GEO)



prevrtanje (GEO)



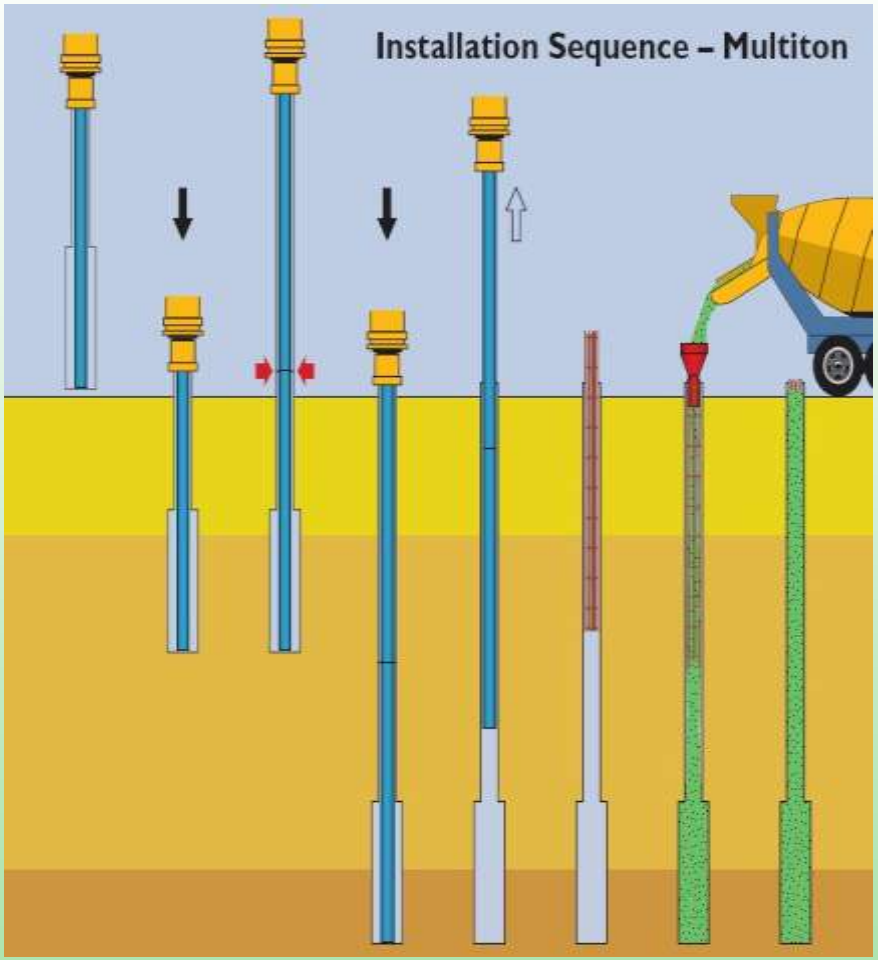
nosivost sidra (STR)



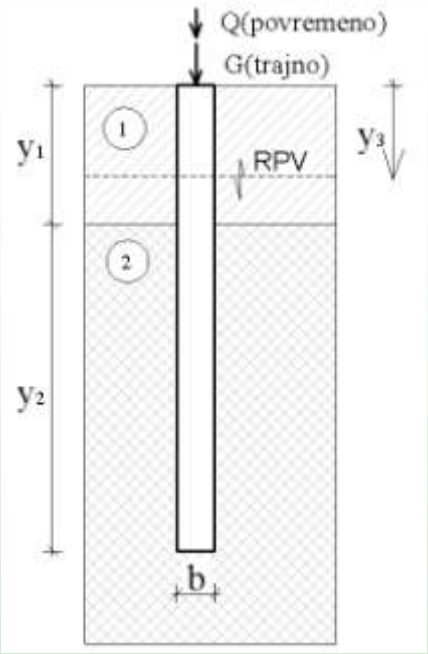
nosivost zida (STR)

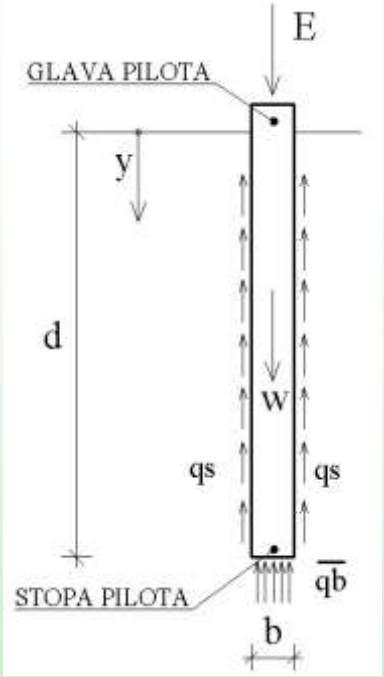
nosivost stope zida (GEO)

DUBOKO TEMELJENJE – piloti

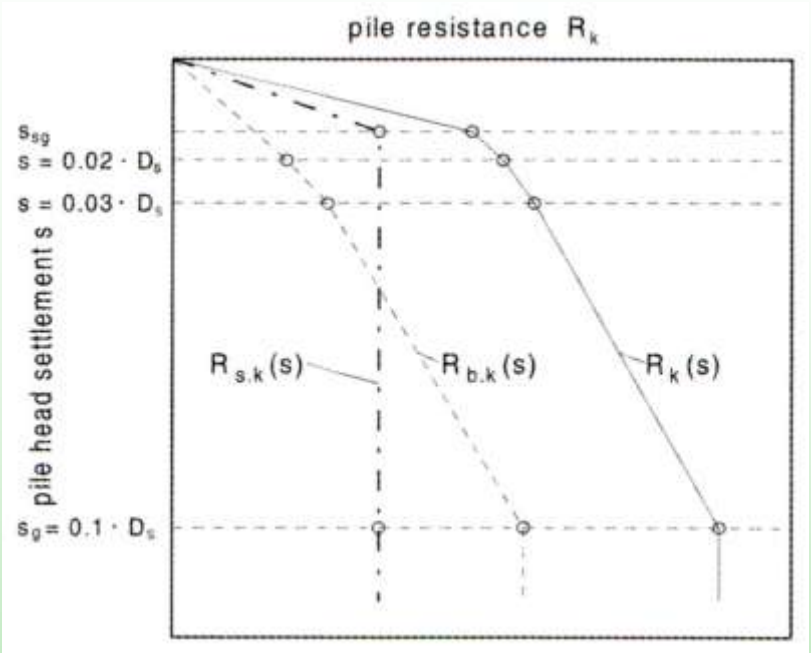


DUBOKO TEMELJENJE – piloti

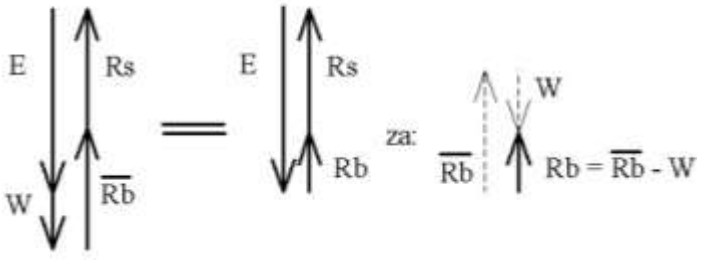




SLIJEGANJE



NOSIVOST



E - opterećenje pilota (djelovanje)

W - težina pilota

$\overline{Rb}$ - otpor stope pilota

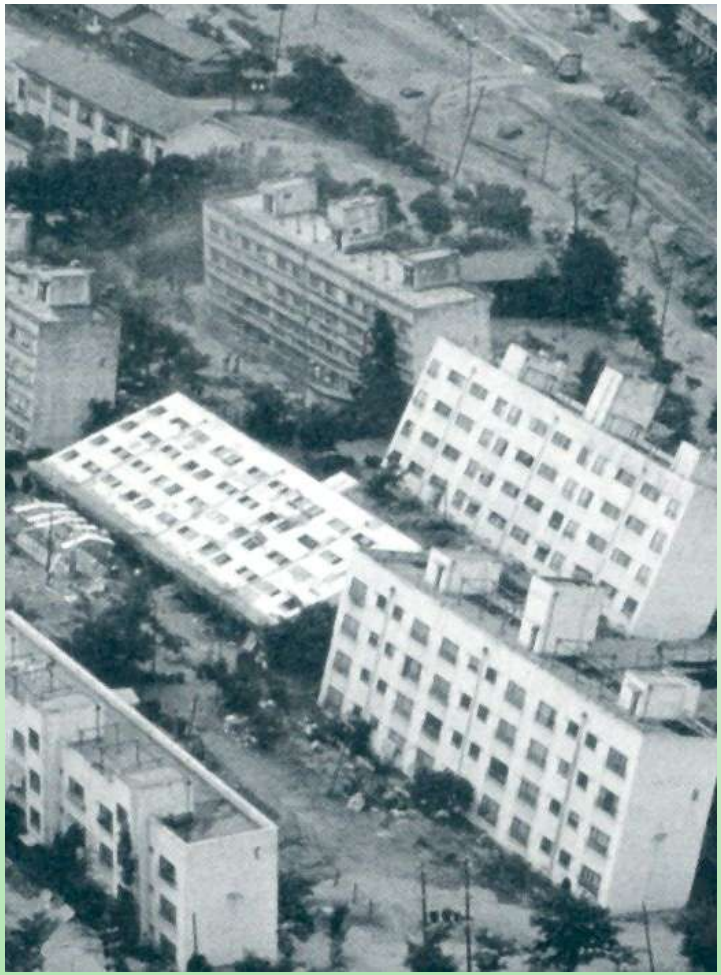
Rs - otpor plašta

$$Rs = \int_0^d q_s \cdot c \cdot dy$$

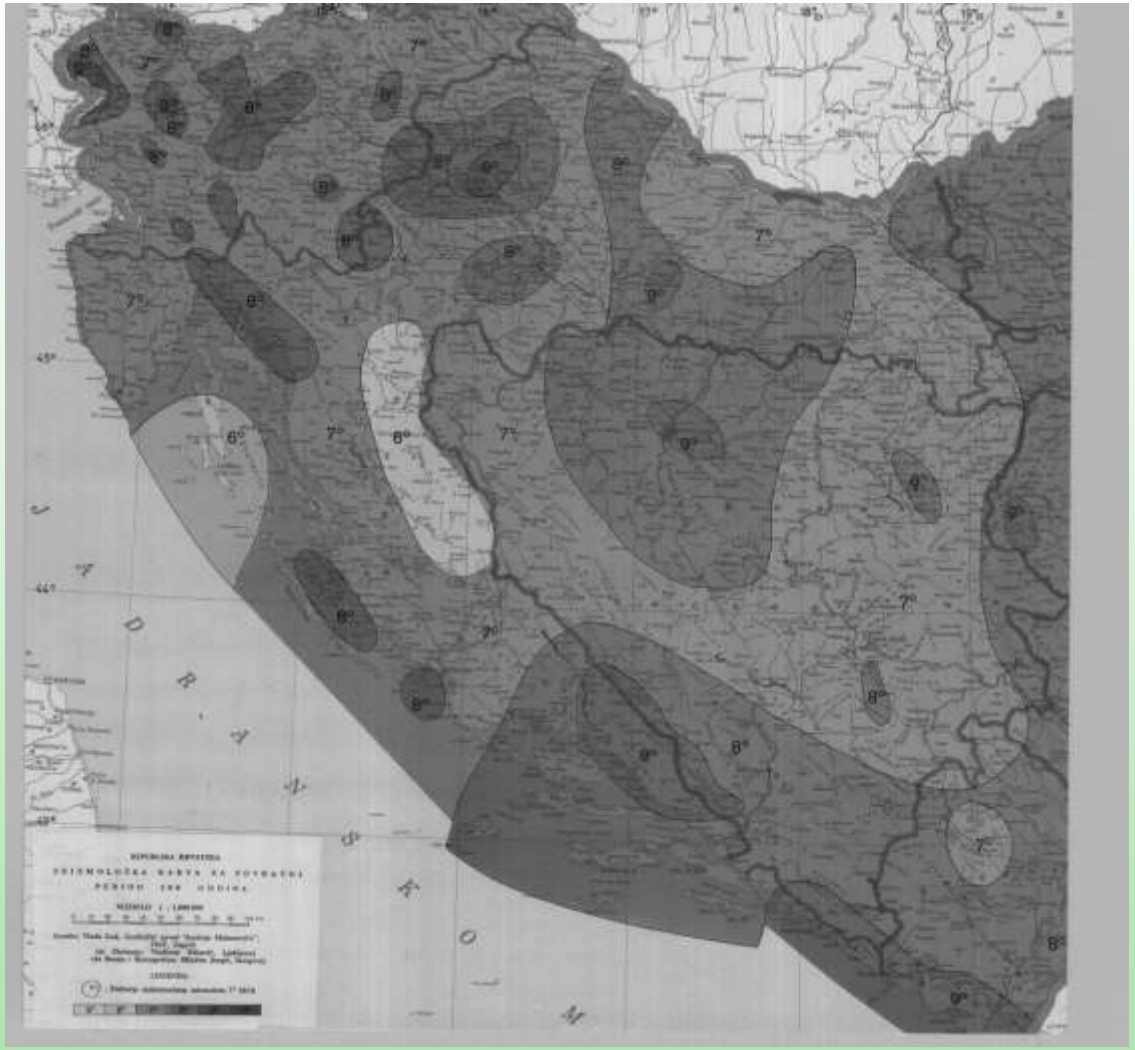
Rb - otpor stope pilota izražen na glavi pilota

$$Rb = A_b \cdot q_b$$

SEIZMIČKI GEOTEHNIČKI PRORAČUNI

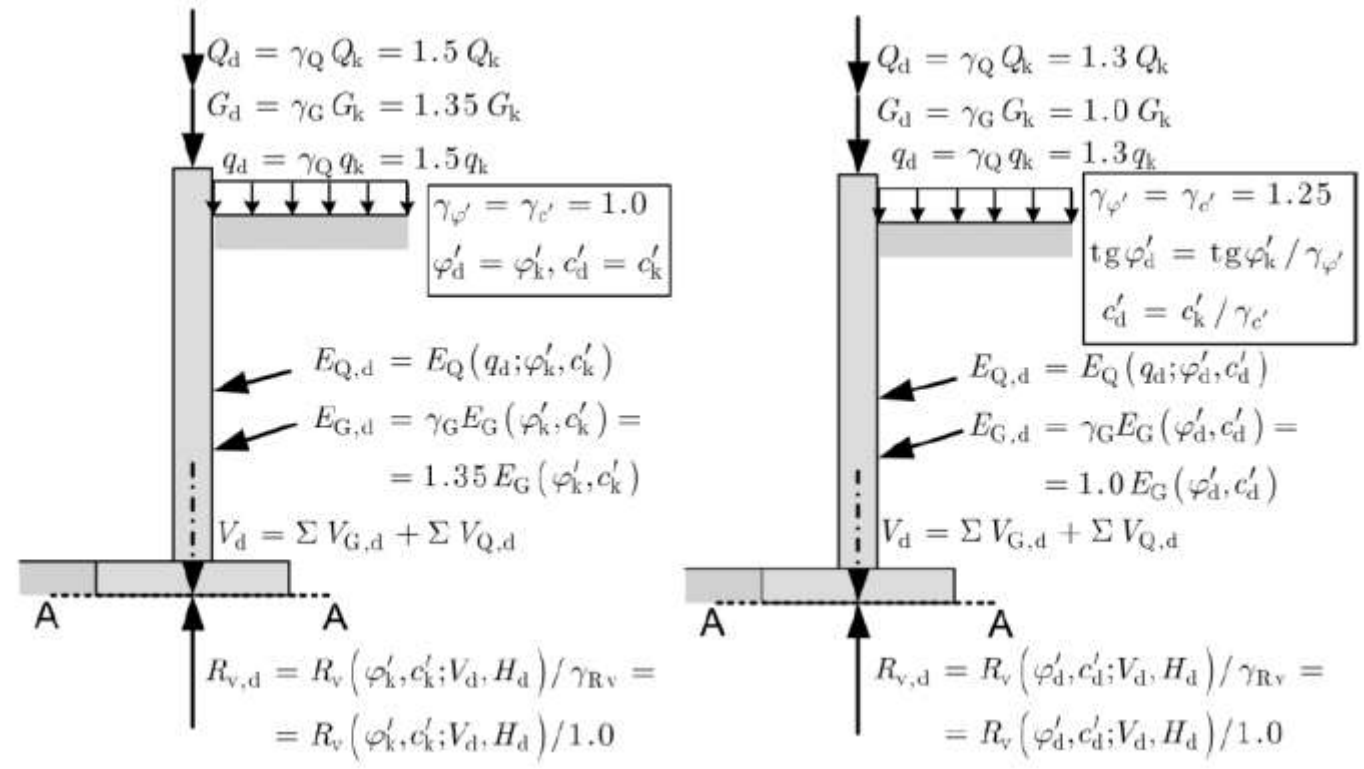


DJELOVANJE POTRESA NA OBJEKTE



SEIZMOLOŠKA KARTA HRVATSKE

EUROKOD 7



(1) Parcijalni koeficijenti za djelovanja (γ_F) i učinke djelovanja (γ_E)

Djelovanja		simbol	A1	A2
trajna	nepovoljna	γ_G	1.35	1
	povoljna	γ_G	1	1
prolazna (povremena)	nepovoljna	γ_Q	1.5	1.3
	povoljna	γ_Q	0	0

(2) Parcijalni koeficijenti za geotehničke parametre (γ_M)

Svojstvo	simbol	M1	M2
tangens efektivnog kuta trenja	$\gamma_{\varphi'}$	1	1.25
efektivna kohezija	$\gamma_{c'}$	1	1.25
nedrenirana i jednoosna čvrstoća	γ_{cu} i γ_{qu}	1	1.4
gustoća	γ_ρ	1	1