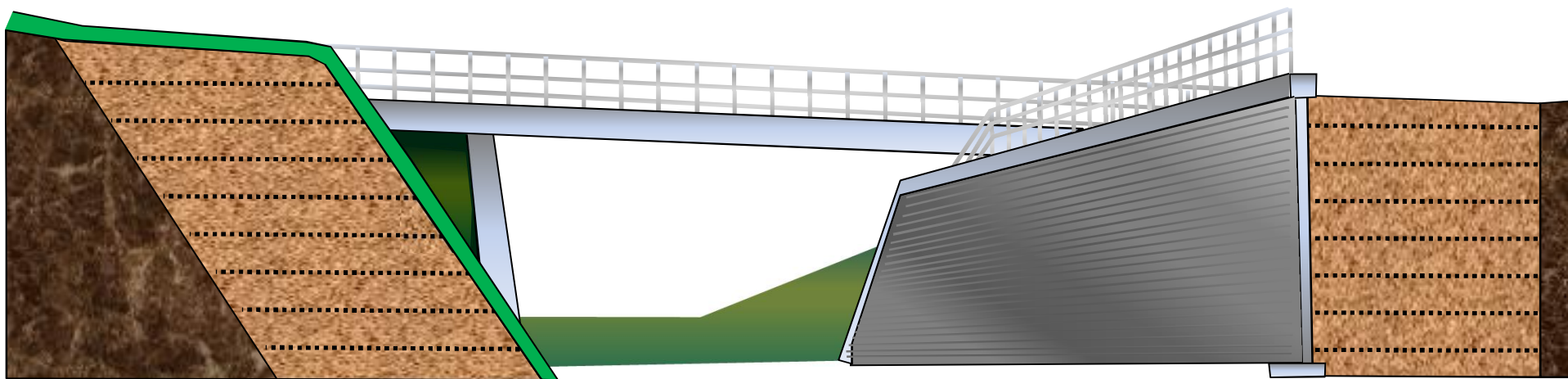


# Herziening Ontwerprichtlijn Kerende constructies van gewapende grond CUR 198

Suzanne van Eekelen, Deltares

Marco Peters, Sweco



# Kerngroep SBRCURnet commissie



Theo  
Huybregts  
*Geologics*



Marijn  
Brugman  
*Arthe Civil  
& Structure*



Voorzitter  
Suzanne  
van Eekelen  
*Deltares*



Rapporteur  
Marco Peters  
*Sweco*



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van Duijnen  
*Geotec  
Solutions*



Rens  
Servais  
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van den Berg  
*Low & Bonar*



Jörg  
Klompmaker  
*Naue/BBG*



Teunis  
Linthof  
*RHDHV*



Sander Suk  
*Terre Armee*



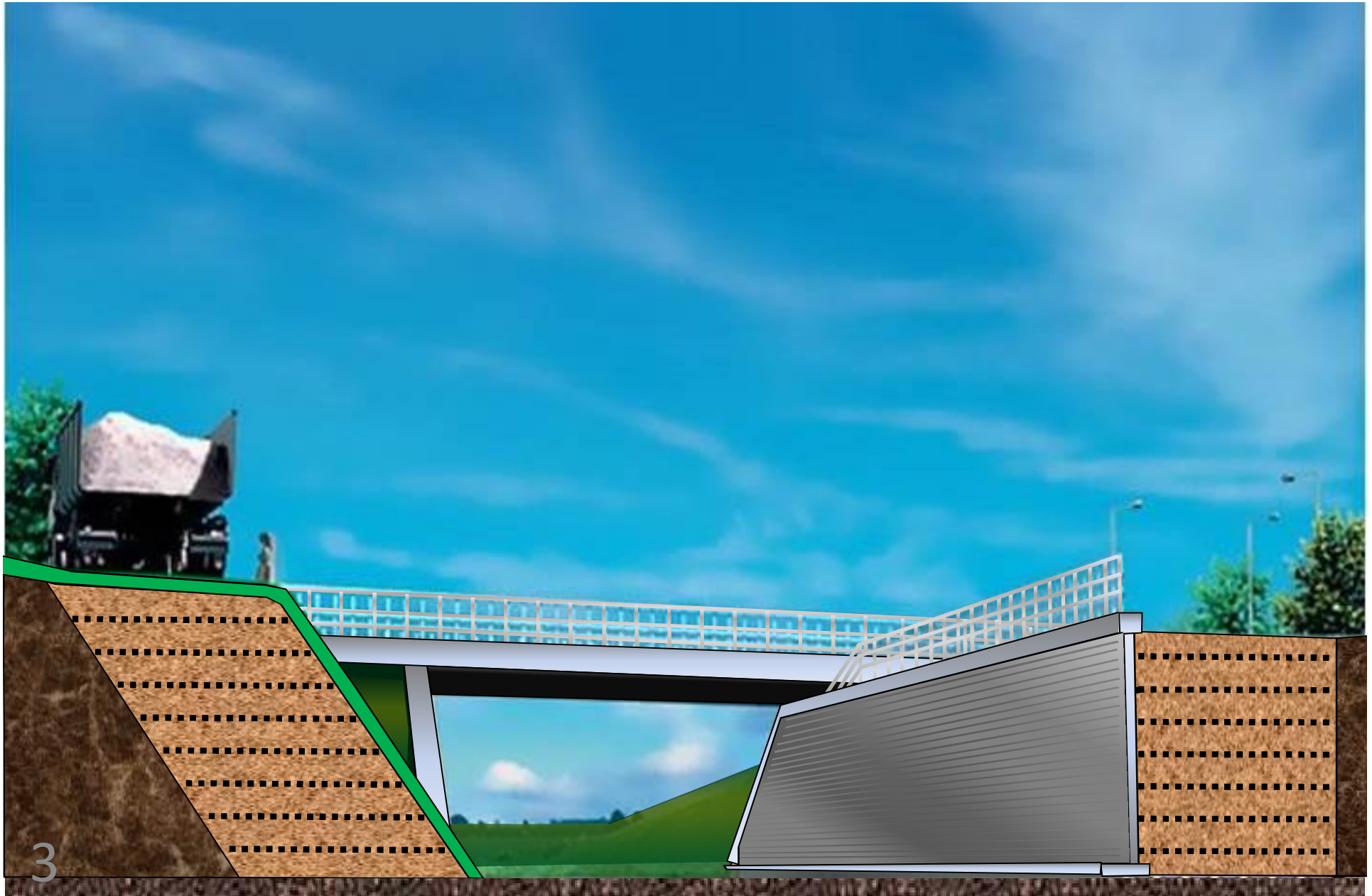
Dirk Goeman  
*CRUX  
Engineering*



Mark-Peter  
Rooduijn  
*Fugro*



Fred Jonker  
*SBRCURnet*







TenCate





Low  
& Bonar



Voets  
Huesker



Naue





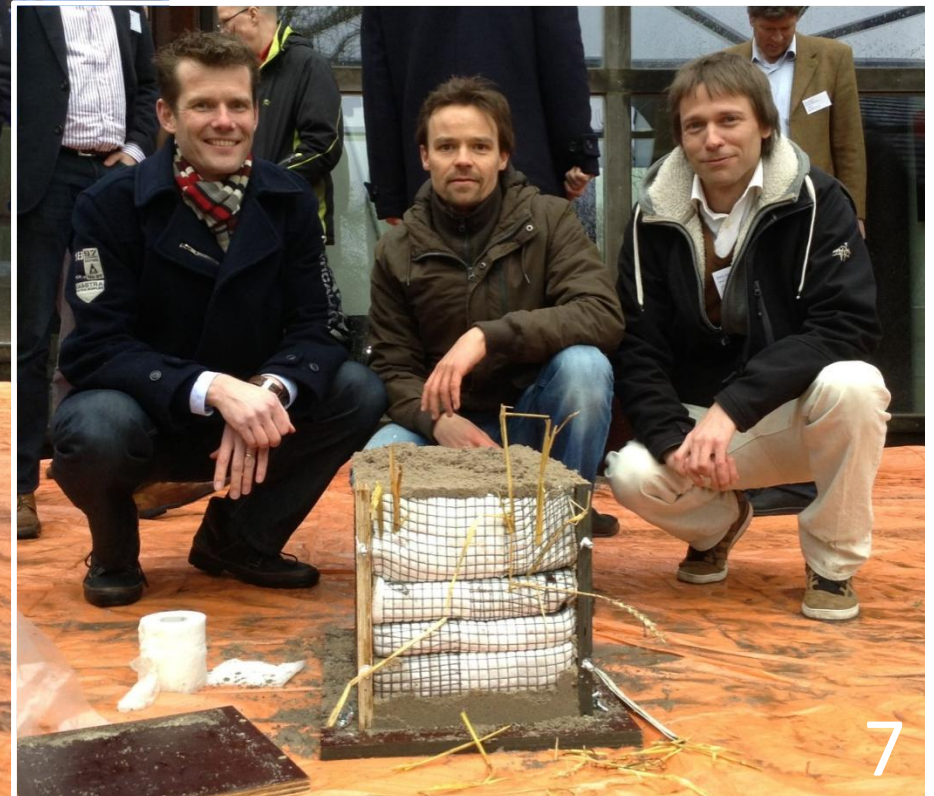
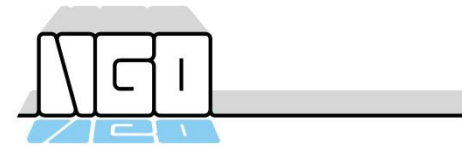


Tensar



Terre Armee









Low &  
Bonar



Voets / Huesker



Tensar



Terre Armee



# Kerende constructies van gewapende grond: waarom?

Weinig beschikbare ruimte

Kosten effectief

Constructieve voordelen

Sustainable

Aardbevingen





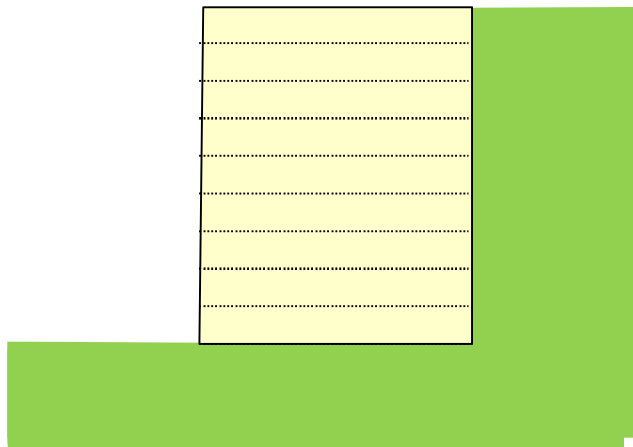
# De nieuwe CUR198 : wat is anders?



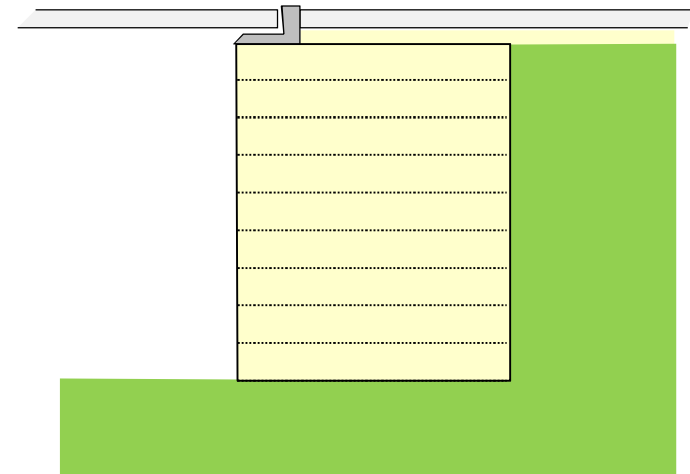
1. Constructietypen
2. Rekenproces
3. Veiligheid



# Constructietypen: oud

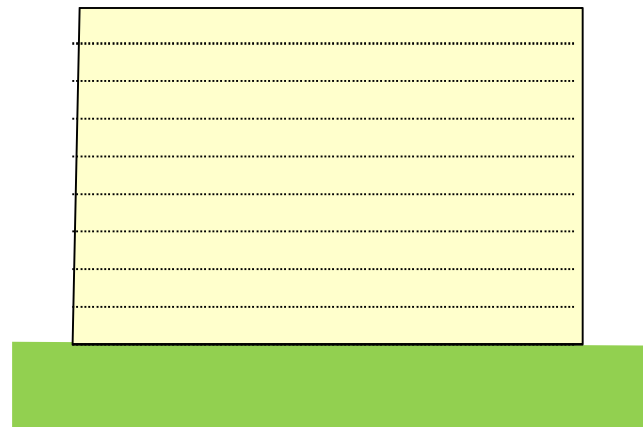


Standaard



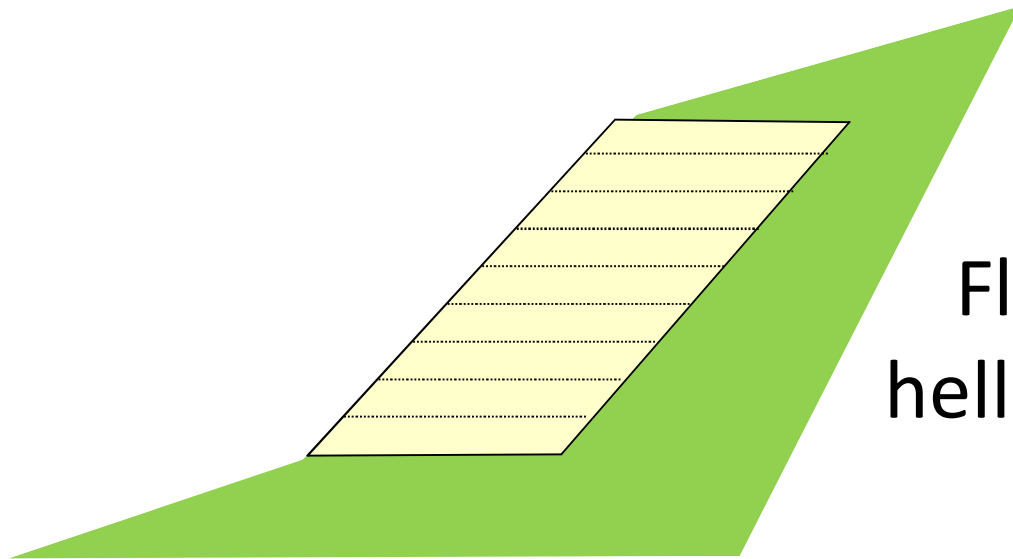
Landhoofd

Tweezijdig  
gewapend





# Constructietypen: nieuw



Flauwe  
hellingen

~~Soil nailing~~

Bijzondere  
typen





# Acht rekenstappen



1.

2.

3.

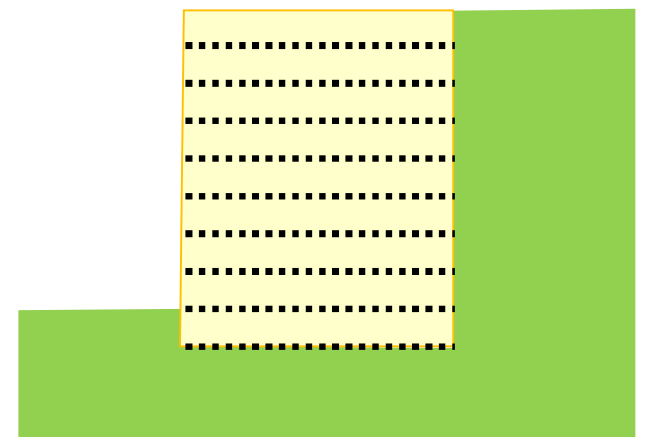
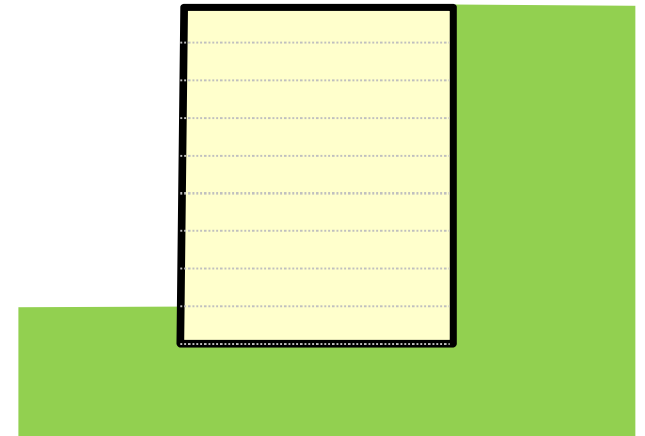
4. **Uitwendige stabiliteit**

5.

6. **Inwendige stabiliteit**

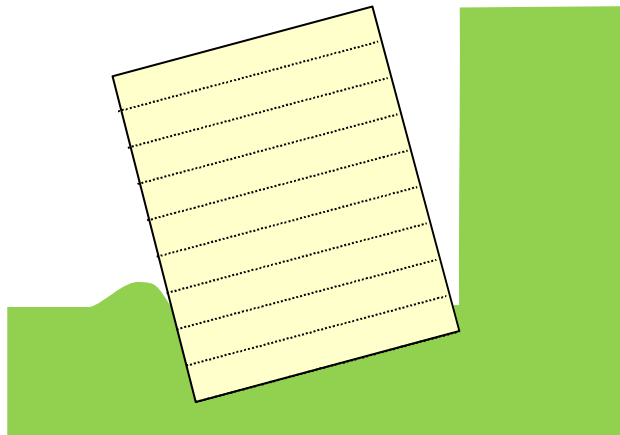
7.

8.

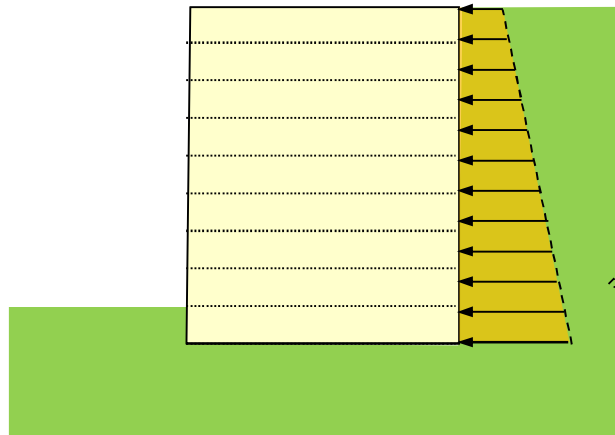




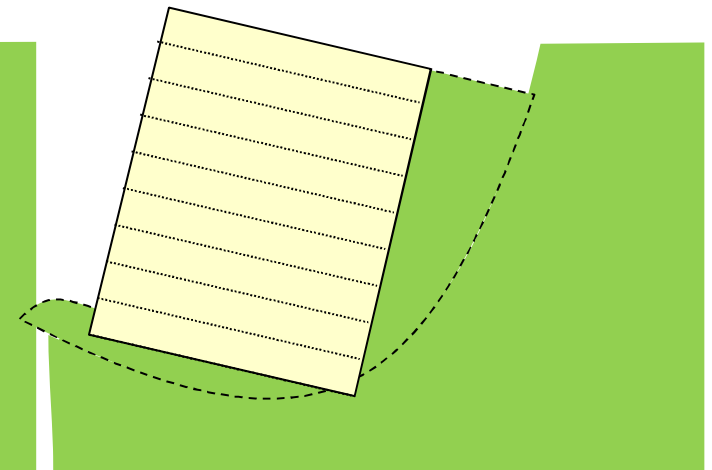
# 4. Toetsing uitwendige stabiliteit



overschrijden  
draagvermogen



horizontaal  
glijden



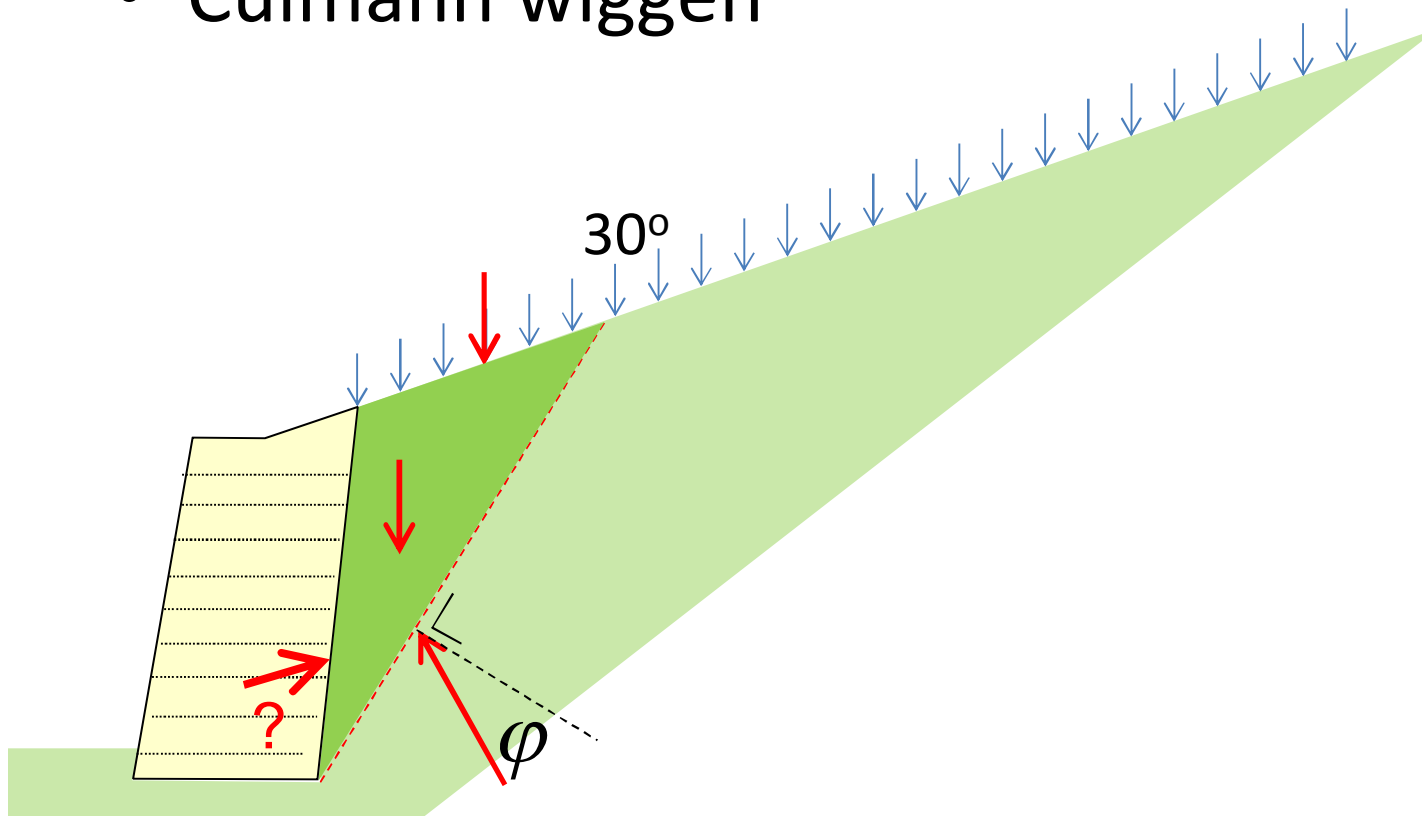
diep  
glijvlak



# Horizontale gronddruk



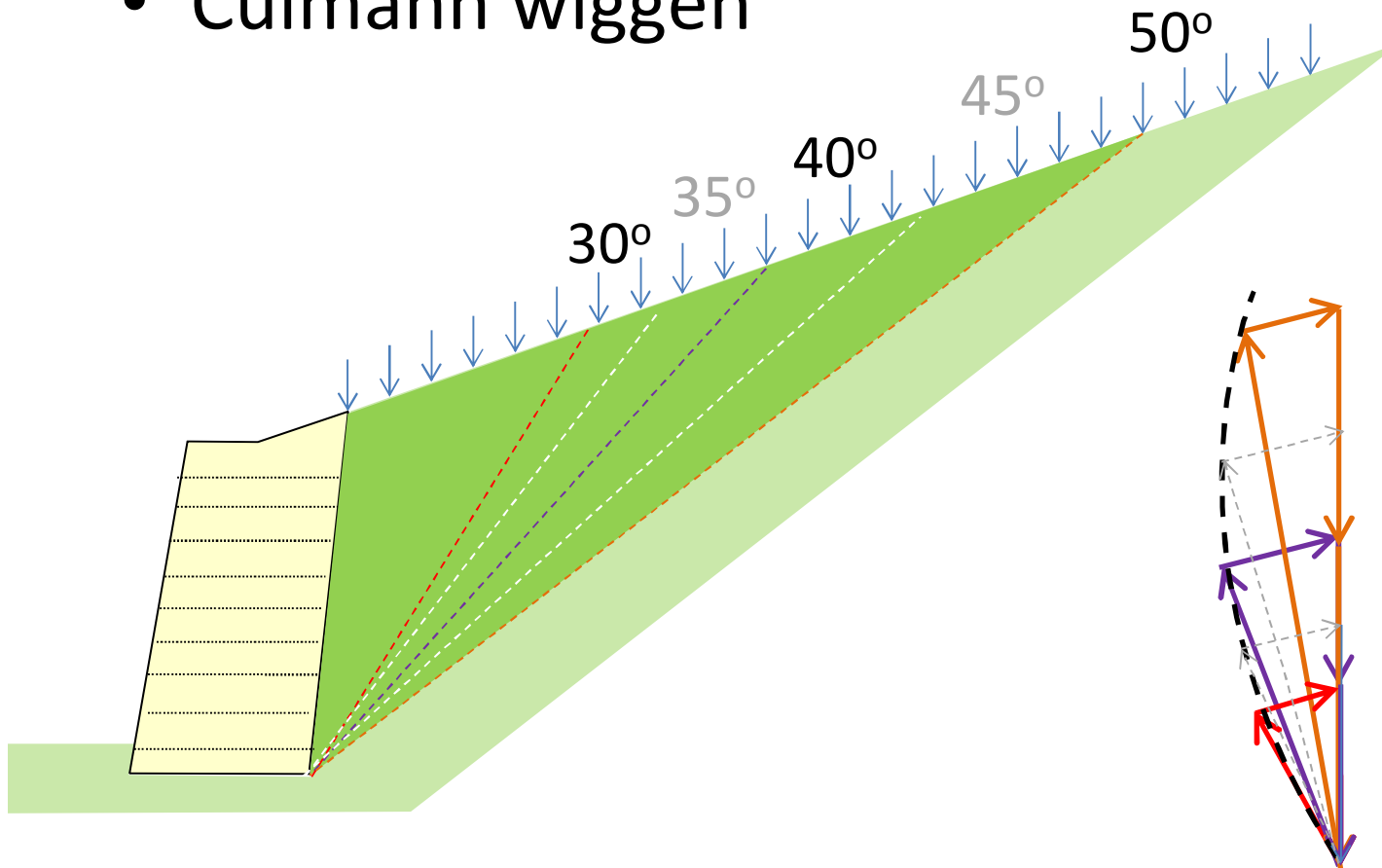
- Culmann wiggen



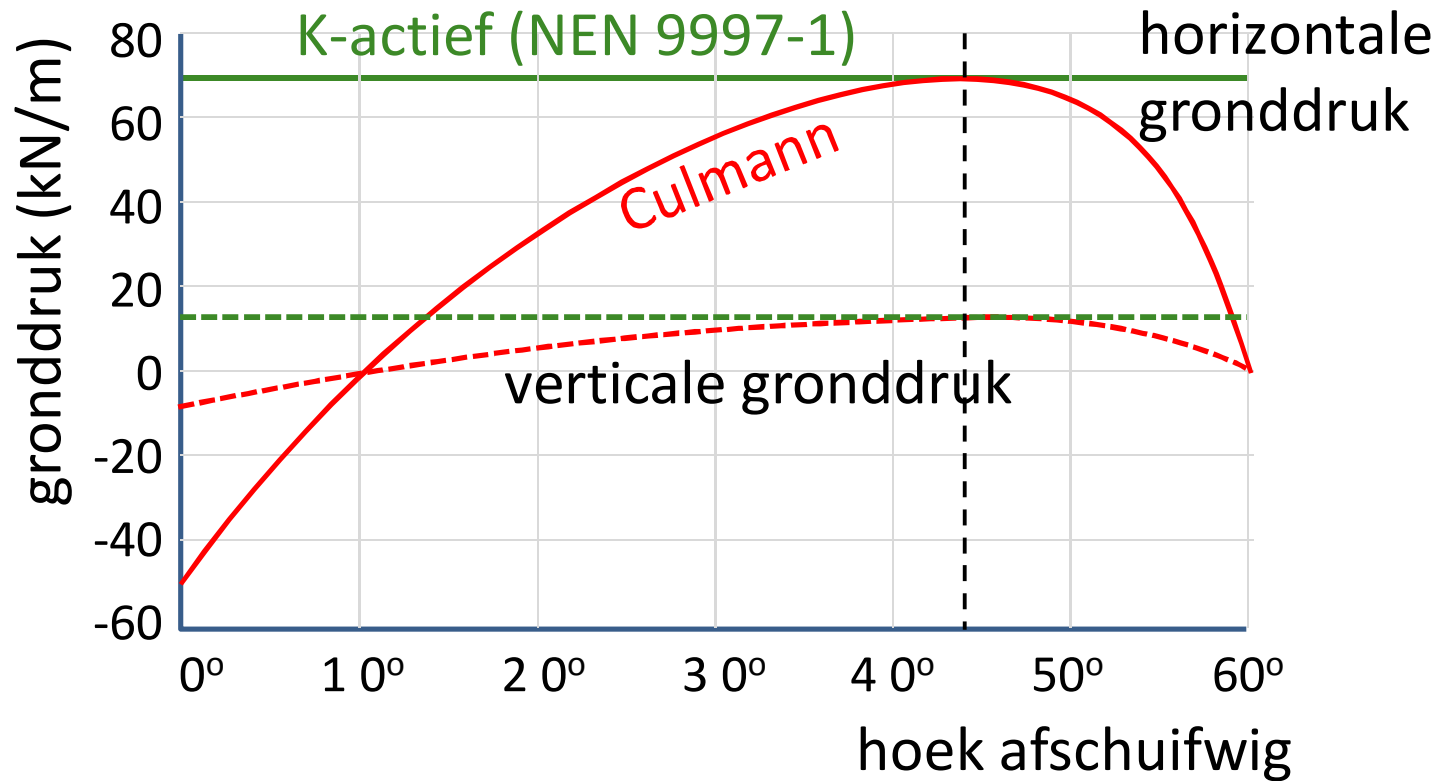
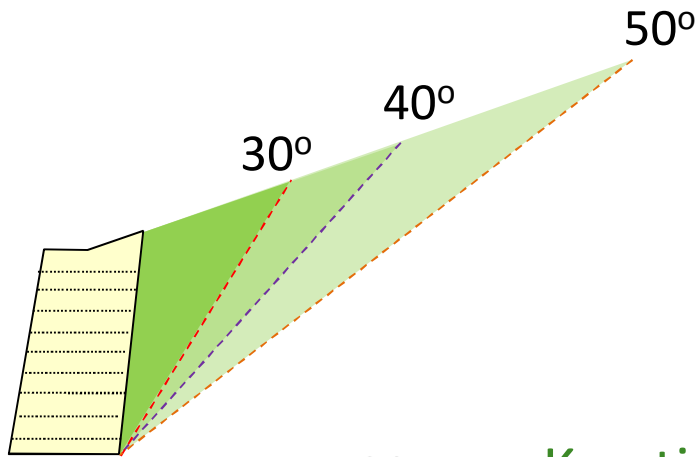
# Horizontale gronddruk



- Culmann wiggen



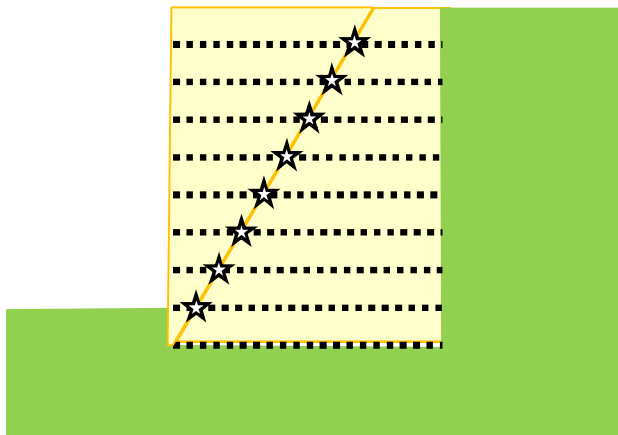




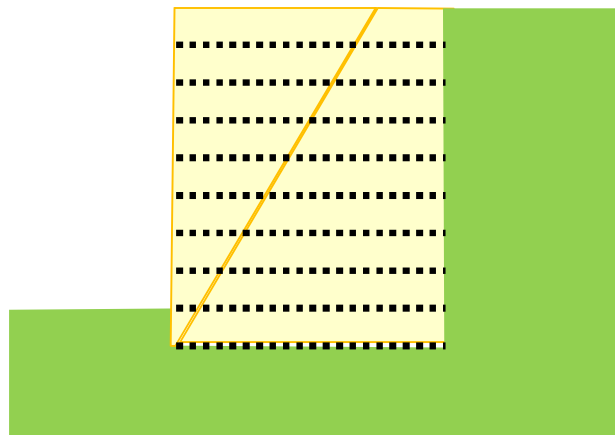
# 6. Toetsing inwendige stabiliteit



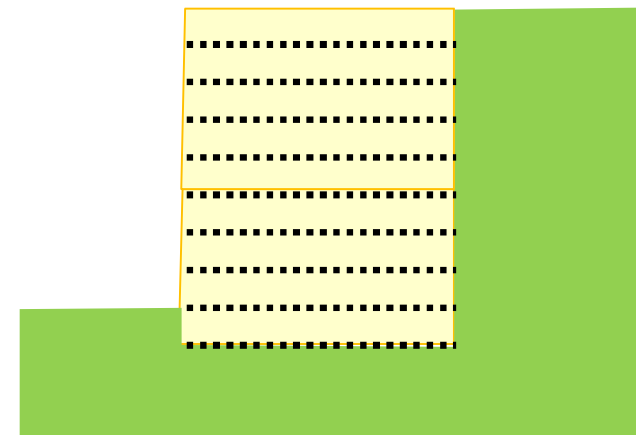
Trekkracht in de wapening berekenen en toetsen :



Treksterkte



Verankerings-  
lengte



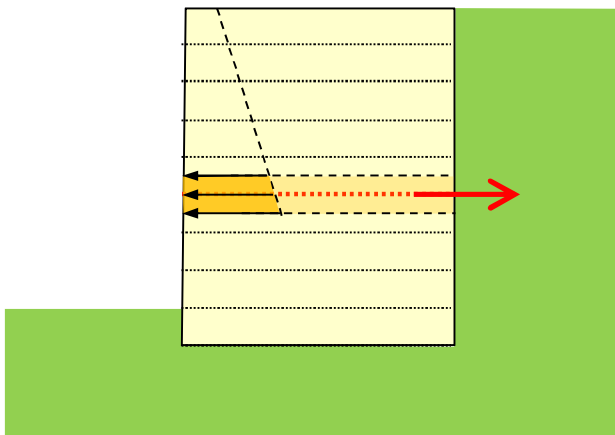
Horizontaal  
schuiven



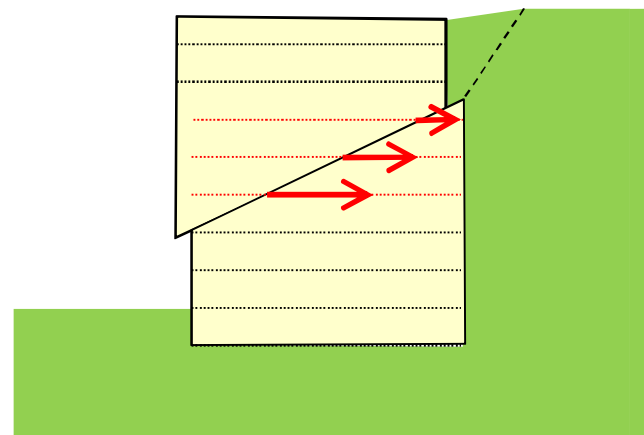
# Trekkracht bepalen



per wapeningslaag  
(lokaal)



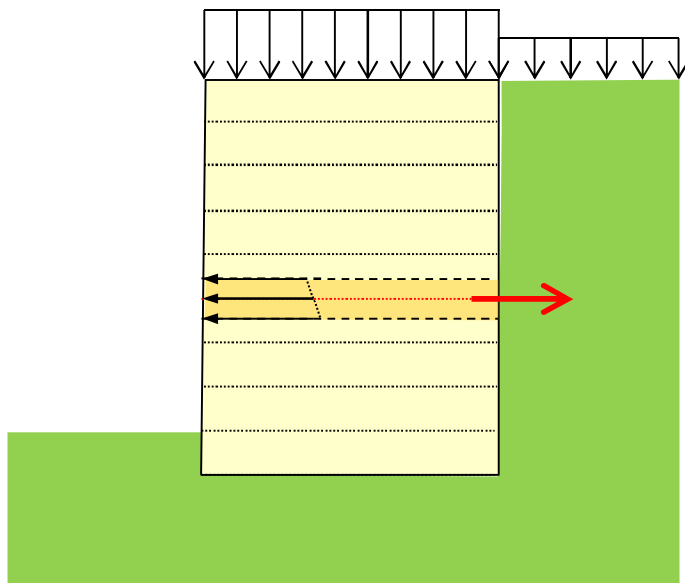
alle  
bovenliggende  
wapeningslagen  
(globaal)



# Lokaal: per wapeningslaag



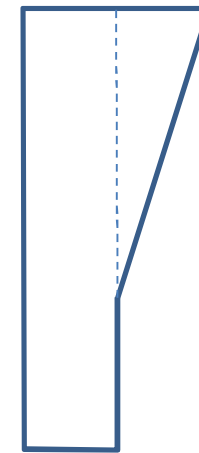
Coefficiënt van  
horizontale gronddruk:



$$K = K_a$$

Geokunststof

$$K = K_0$$



$$K = K_a$$

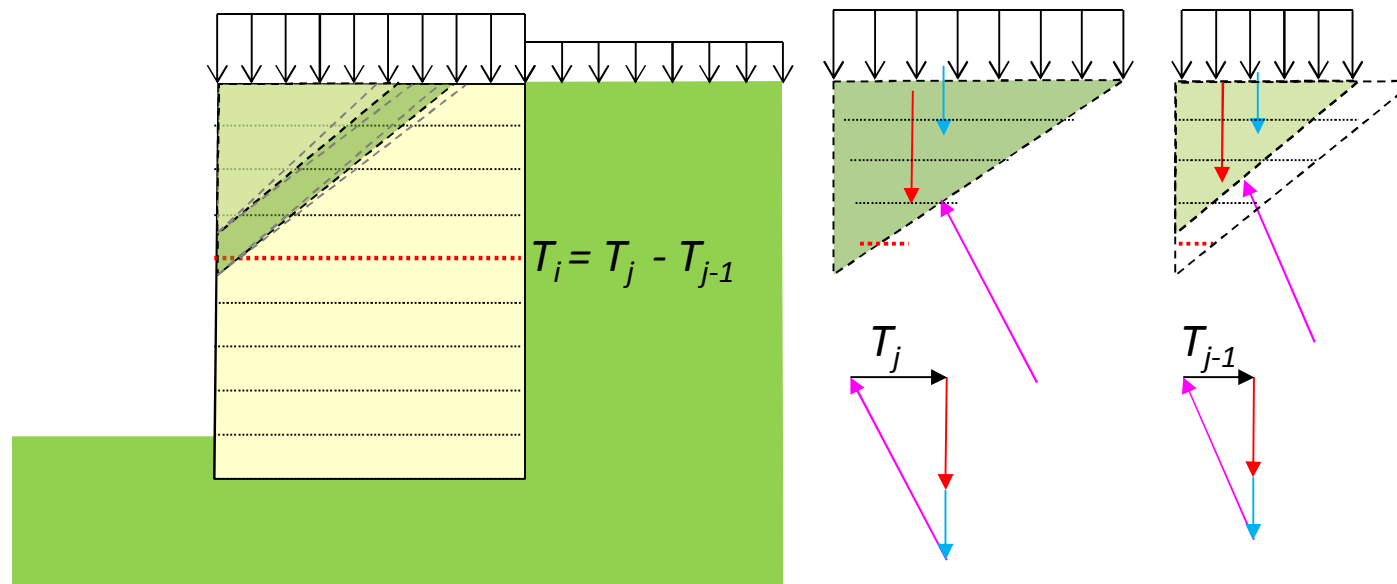
Staalwapening



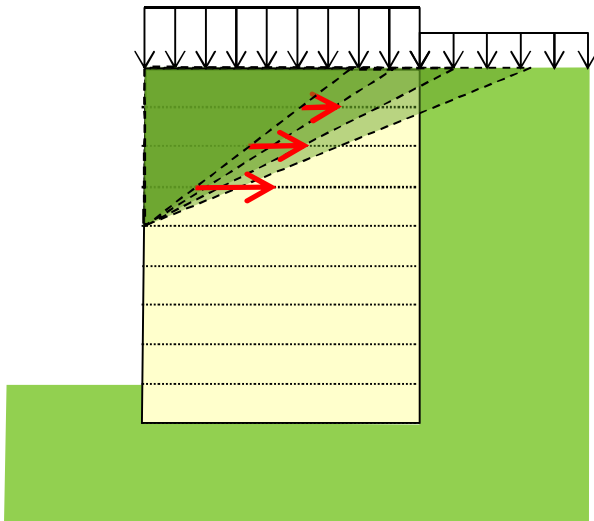
# Lokaal: per wapeningslaag



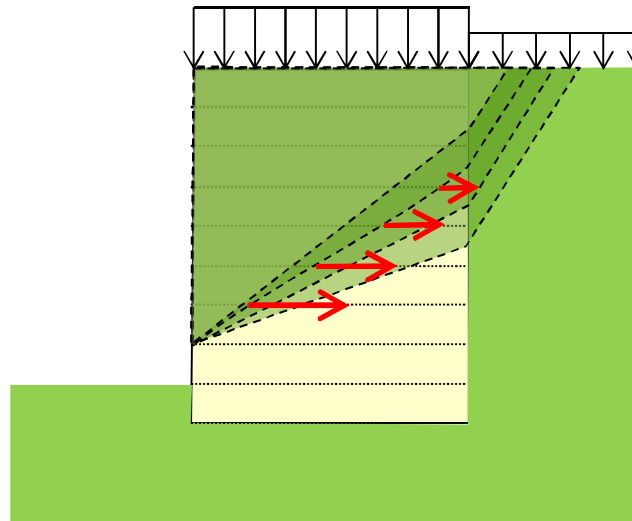
**OF:** Actieve Culman wiggen (geokunststof)



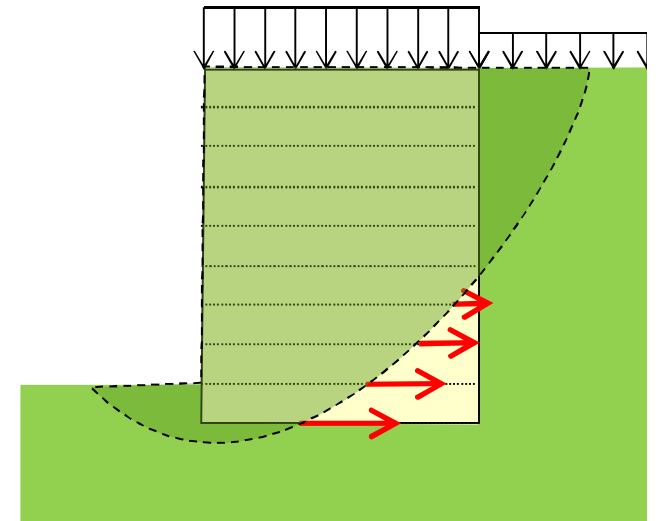
# Globaal: alle bovenliggende wapeningslagen



*Oude CUR198:*  
Rechte glijvlakken

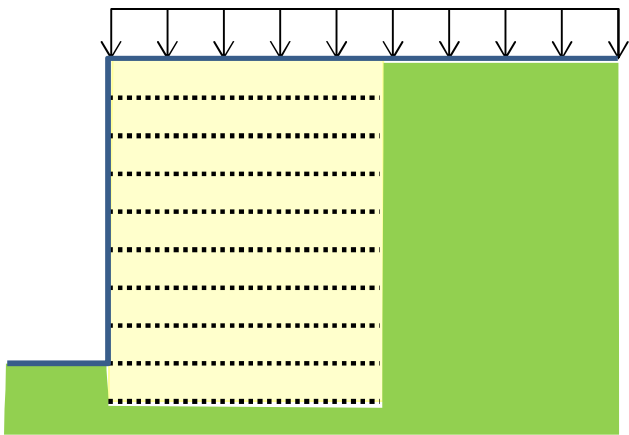


*Nieuw:*  
Bi-lineair glijvlak

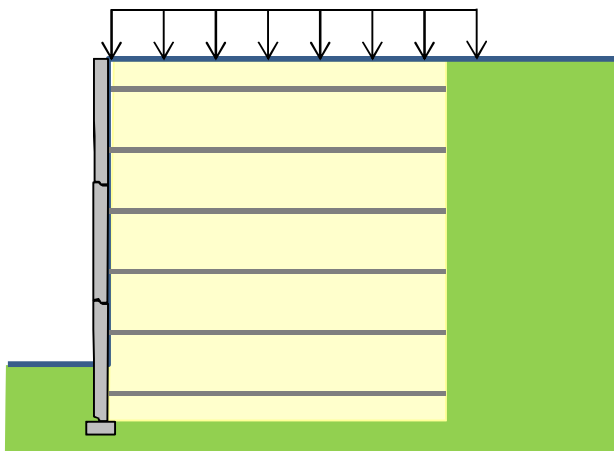
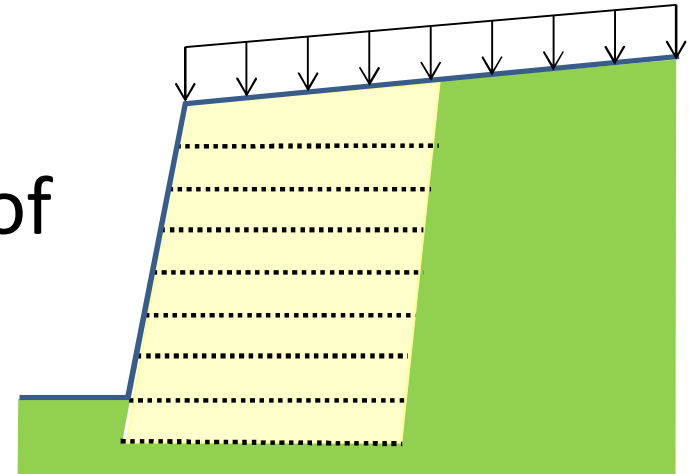


Glijvlakken  
vrije vorm

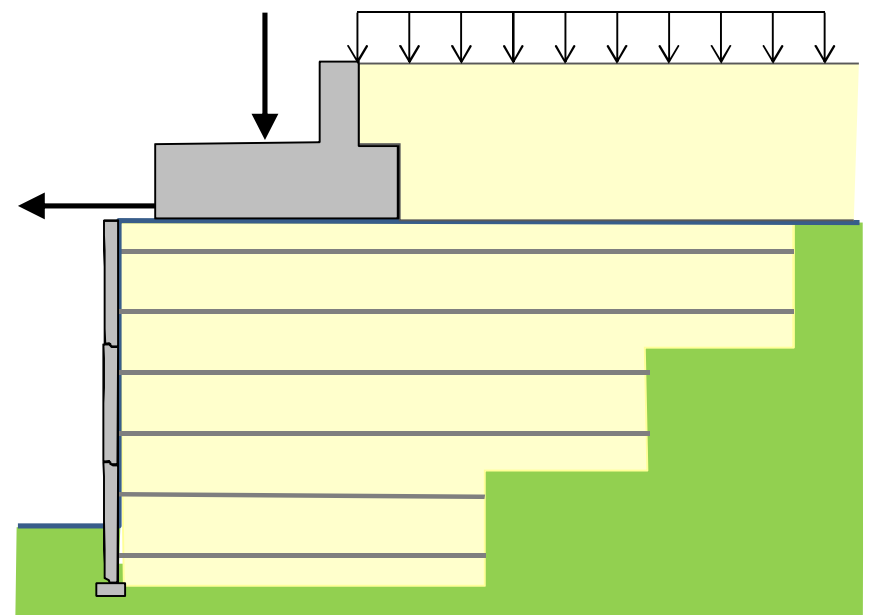
# Rekenvoorbeelden



geokunststof



staal





# De nieuwe CUR198 : wat is anders?



1. Constructietypen
2. Rekenproces
3. Veiligheid

<b>BELASTINGFACTOREN</b>	<b>CC1</b>	<b>CC2</b>	<b>CC3</b>
Permanente belasting, ongunstig	1,0	1,0	1,0
Permanente belasting, gunstig	1,0	1,0	1,0
Veranderlijke belasting, ongunstig	1,2	1,3	1,45
Veranderlijke belasting, gunstig	0	0	0

<b>MATERIAALFACTOREN</b>	<b>CC1</b>	<b>CC2</b>	<b>CC3</b>
Hoek van inwendige wrijving (tan)	1,20	1,25	1,30
Effectieve cohesie	1,30	1,45	1,60
Ongedraineerde schuifsterkte	1,50	1,75	2,00
Volume gewicht	1,00	1,00	1,00
<b>Treksterkte wapening</b>	<b>1,05</b>	<b>1,10</b>	<b>1,15</b>
<b>Aanhechting wapening</b>	<b>1,15</b>	<b>1,20</b>	<b>1,30</b>

# Hoe leer ik de ontwerprichtlijn kennen?



## PAO cursussen:

13-14 juni 2018: CUR198

28-29 Nov 2017:

Paalmatrassen CUR226

[www.pao-tudelft.nl](http://www.pao-tudelft.nl)

Eind 2017:

Ontwerprichtlijn verkrijgbaar