



Curso básico de muros anclados para edificaciones

Contenido :

- Introducción
- Maquinarias
- Introducción al diseño
- Diseño de un anillo
- Proceso constructivo
- Slide
- Diseño de 2 anillos
- Introducción a los micropilotes
- Diseño de micropilotes

Horarios:

Lunes, miércoles y viernes
Grupo 1: 10 am
Grupo 2: 3 pm
Grupo 3: 7 pm
Martes, jueves y sábado
Grupo 4 : 7pm y 10 am



BATALLA DE JUNÍN

INGENIERÍA Y CONSTRUCCIÓN DE OBRAS CIVILES

Síguenos :   

www.anclajesjunin.com



BATALLA DE JUNÍN

INGENIERÍA Y CONSTRUCCIÓN DE OBRAS CIVILES

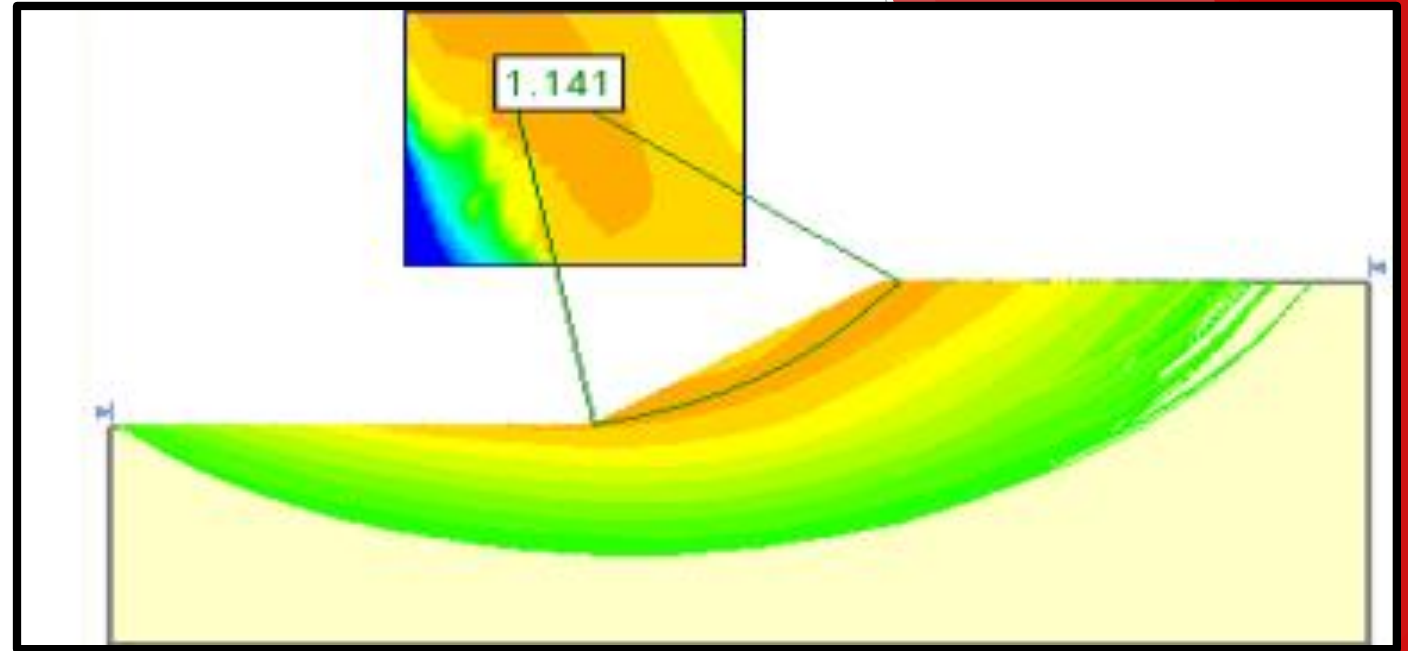
CLASE 6: SLIDE



INTIWASI



ESTABILIDAD DE TALUDES SLIDE V6.0



A 3D perspective view of a slope stability analysis. The slope is shown with a failure surface (slip surface) indicated by a curved line. The area above the failure surface is shaded with a color gradient from green to yellow, representing the safety factor distribution. A specific safety factor value of 1.141 is highlighted in a box within the diagram.

Slide

TOPOscience

CONTENIDO

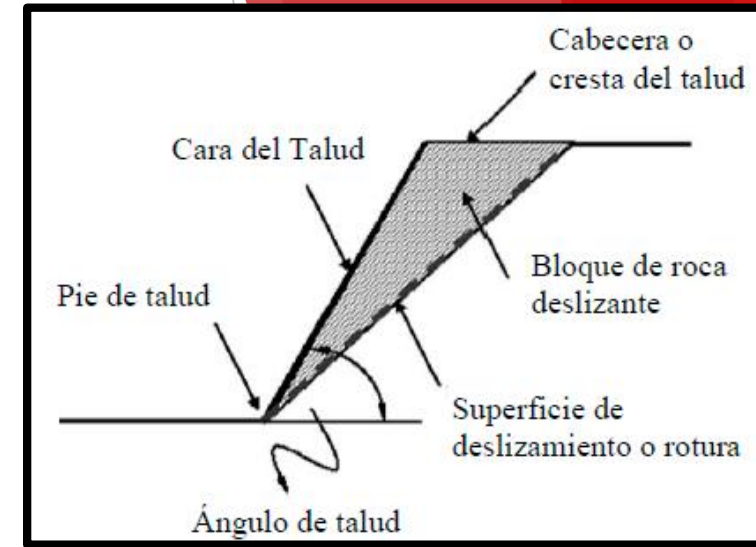
1. INTRODUCCION AL SLIDE (EVELYN)
2. PARAMETROS DE RESISTENCIA AL CORTE (MANUEL)
3. METODO DE DOVELAS (DIANA)
4. MODELAMIENTO 1 - CAD (EVELYN)
5. MODELAMIENTO 2 - COORDENADAS (DIANA)



1. INTRODUCCION AL SLIDE

1. Factores de inestabilidad

- Agua
- Hielo y Nieve
- Sismicidad
- Actividad Humana





Falla Planar



Falla Circular



Falla en Cuña



Pandeo y Pateo



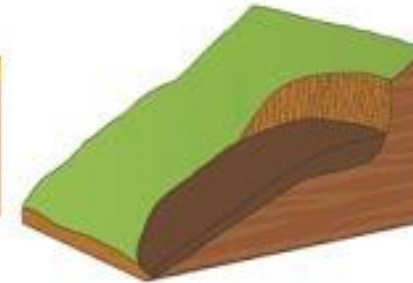
Volteo



Caída de Bloques



Deslizamiento



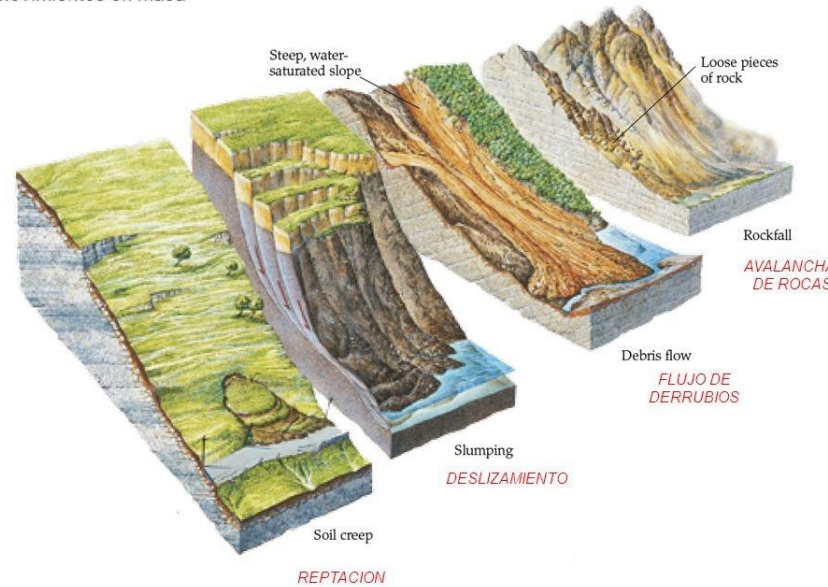
Flujo



Desprendimiento



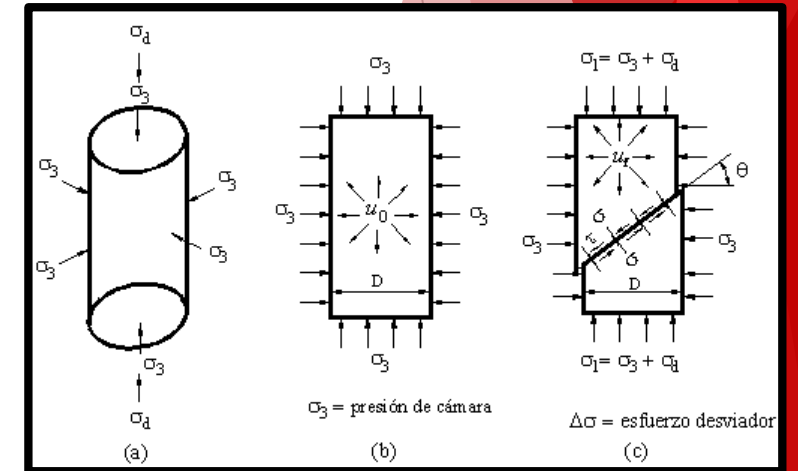
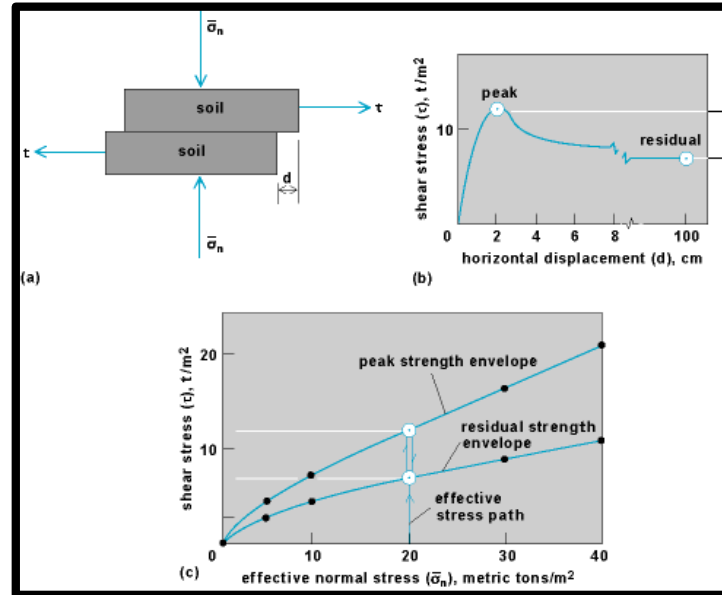
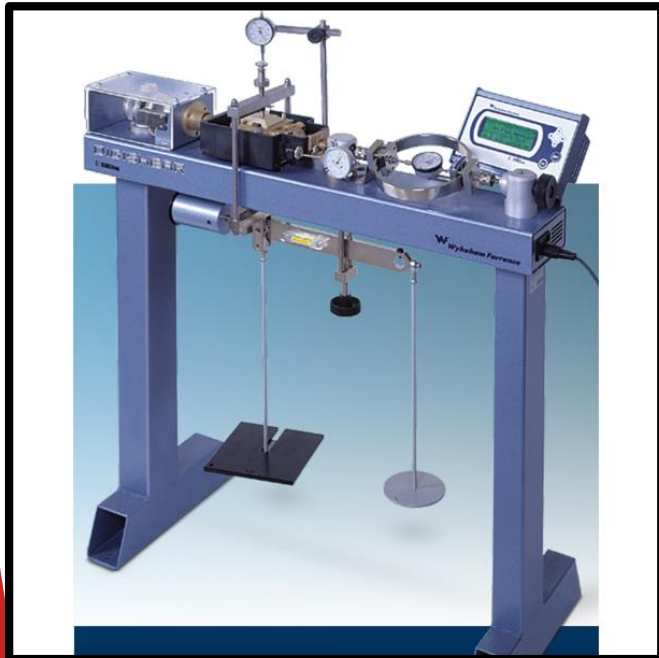
Movimientos en masa



2. Ensayos de Laboratorio

Ensayos para Suelos

- Triaxial CD, Triaxial CU, Triaxial UU
- Corte Directo
- Clasificación de Suelos SUCS, AASHTO
- Permeabilidad
- SPT

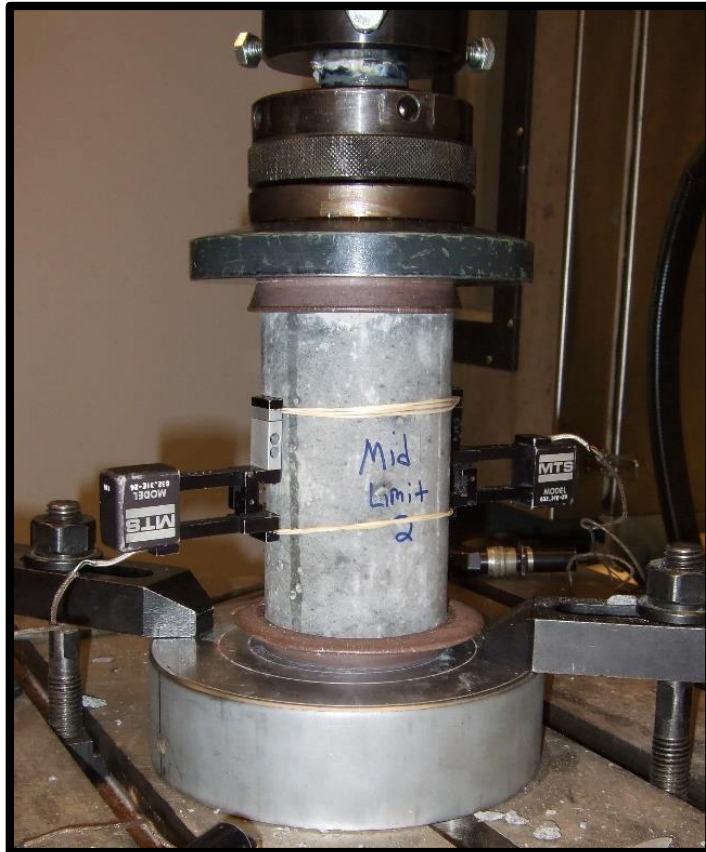


Ensayos para Rocas

- Clasificación RMR, GSI
- UCS Resistencia a la Compresión Uniaxial
- Ensayo Triaxial
- Corte Directo (Discontinuidades)

Categorías de la clasificación	R.M.R.	Descripción del macizo rocoso	Clase
	Suma de los puntajes obtenidos de las tablas anteriores		
	81 - 100	Muy bueno	I
	61 - 80	Bueno	II
	41 - 60	Medio	III
	21 - 40	Malo	IV
	0 - 20	Muy malo	V

Clase (R.M.R.)	c [Kpa]	ϕ°	t sin soporte
I (81 - 100)	> 400	> 45	20 años, luz de 15m
II (61 - 80)	300 - 400	35 - 45	1 año, luz de 10m
III (41 - 60)	200 - 300	25 - 35	1 semana, luz 5 m
IV (21 - 40)	100 - 200	15 - 25	10 hs., luz 2.50 m
V (0 - 20)	< 100	< 15	30 min, luz 1m



Pick GSI Value		SURFACE CONDITIONS				
Rock Type:	General	VERY GOOD	GOOD	FAIR	POOR	VERY POOR
GSI Selection:	100	DECREASING SURFACE QUALITY →				
STRUCTURE		DECREASING INTERLOCKING OF ROCK PIECES ↓				
	INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities	90	80	70	N/A	N/A
	BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets		70	60		
	VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets			50		
	BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity			40		
	DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces				30	
	LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes					20
						10
		N/A	N/A			

3. Modelamiento en el programa



1. Parámetros geométricos
2. Parámetros geotécnicos
3. Parámetros hidrogeológicos
4. Parámetros de carga
5. Parámetros sísmicos
6. Parámetros de soporte

Método de Análisis

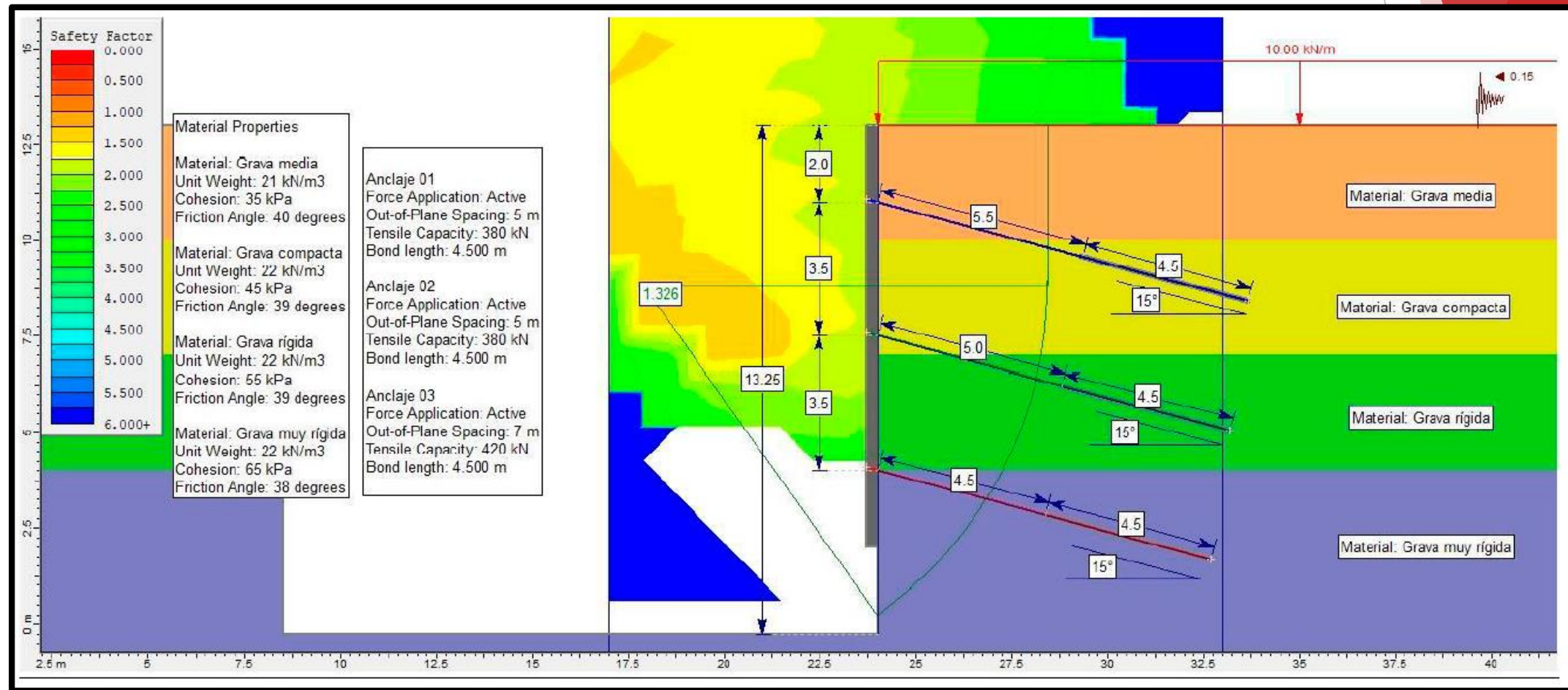
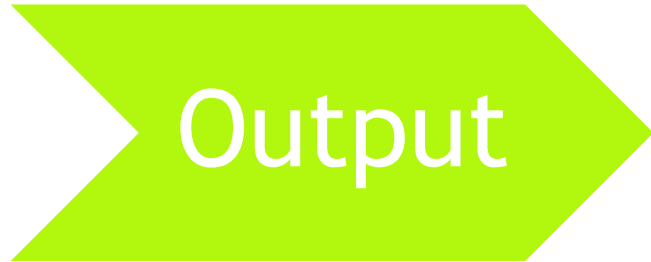
- Bishop
- Fellenius
- Jambu simplified, corrected
- Spencer

Factor de Seguridad

- Estático
- Pseudoestático
- Global
- Local



4. Diseño



2. PARAMETROS DE RESISTENCIA

The background features a close-up, low-angle shot of a concrete wall under construction. Numerous metal fasteners, likely U-bolts or similar anchors, are embedded in the concrete, protruding from the surface. The fasteners are arranged in a somewhat regular pattern, though some are more prominent than others. The concrete has a light, textured appearance. On the right side of the image, there is a large, semi-transparent red geometric overlay consisting of several overlapping triangular and quadrilateral shapes. The overall lighting is somewhat dim, suggesting an overcast day or a shaded area.

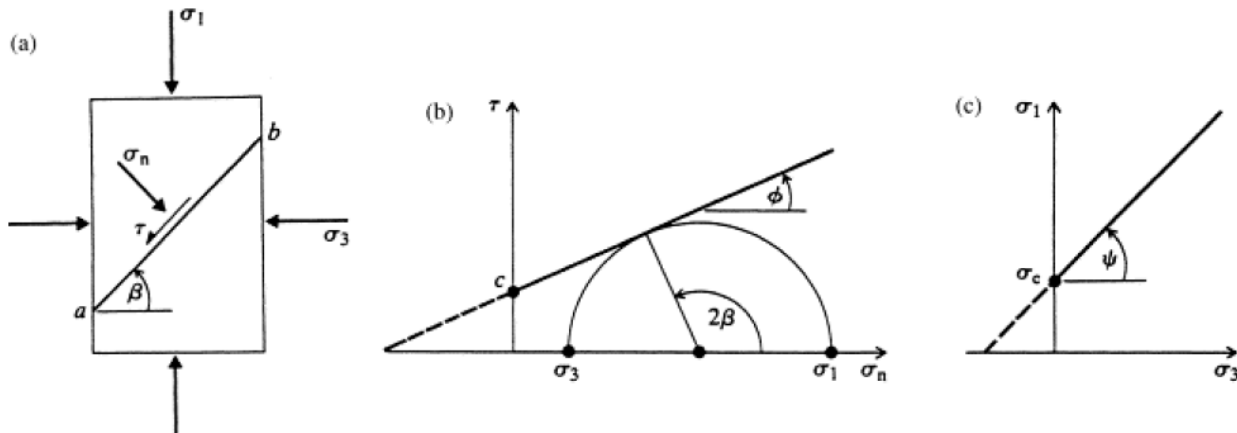
5. Criterios de resistencia

$$FS = \frac{\sum (c \cdot \Delta l + W \cos \alpha \tan \phi)}{\sum W \sin \alpha}$$

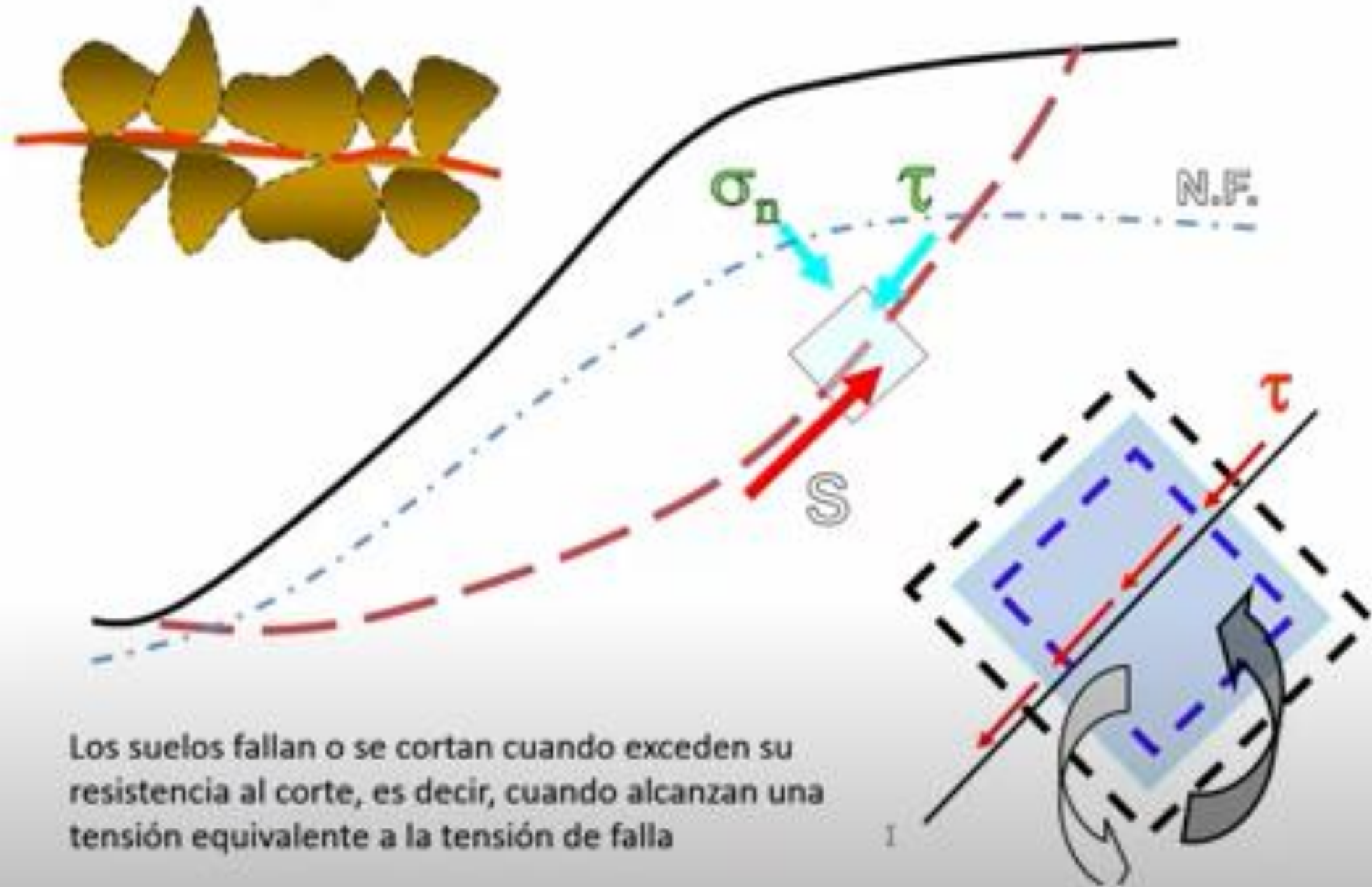
MOHR COULOMB

$$\tau = c + \sigma_n \tan \phi$$

ϕ : ángulo de fricción interno,
 τ : resistencia al corte,
 σ_n : esfuerzo normal
 c : cohesión



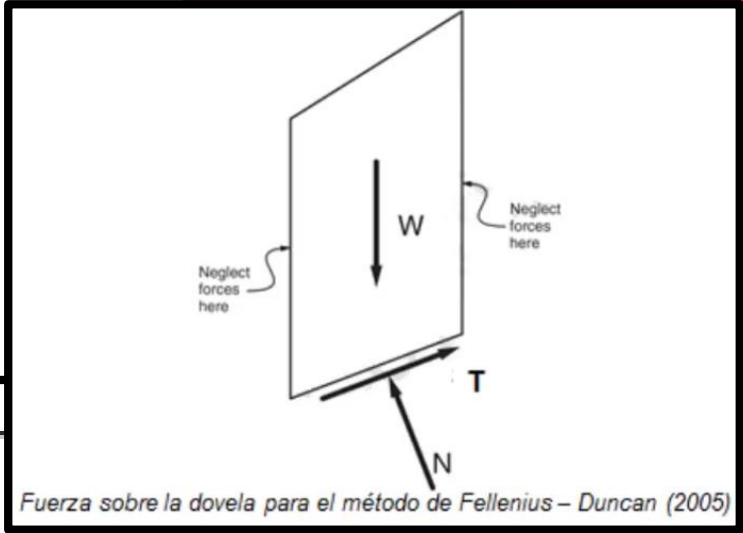
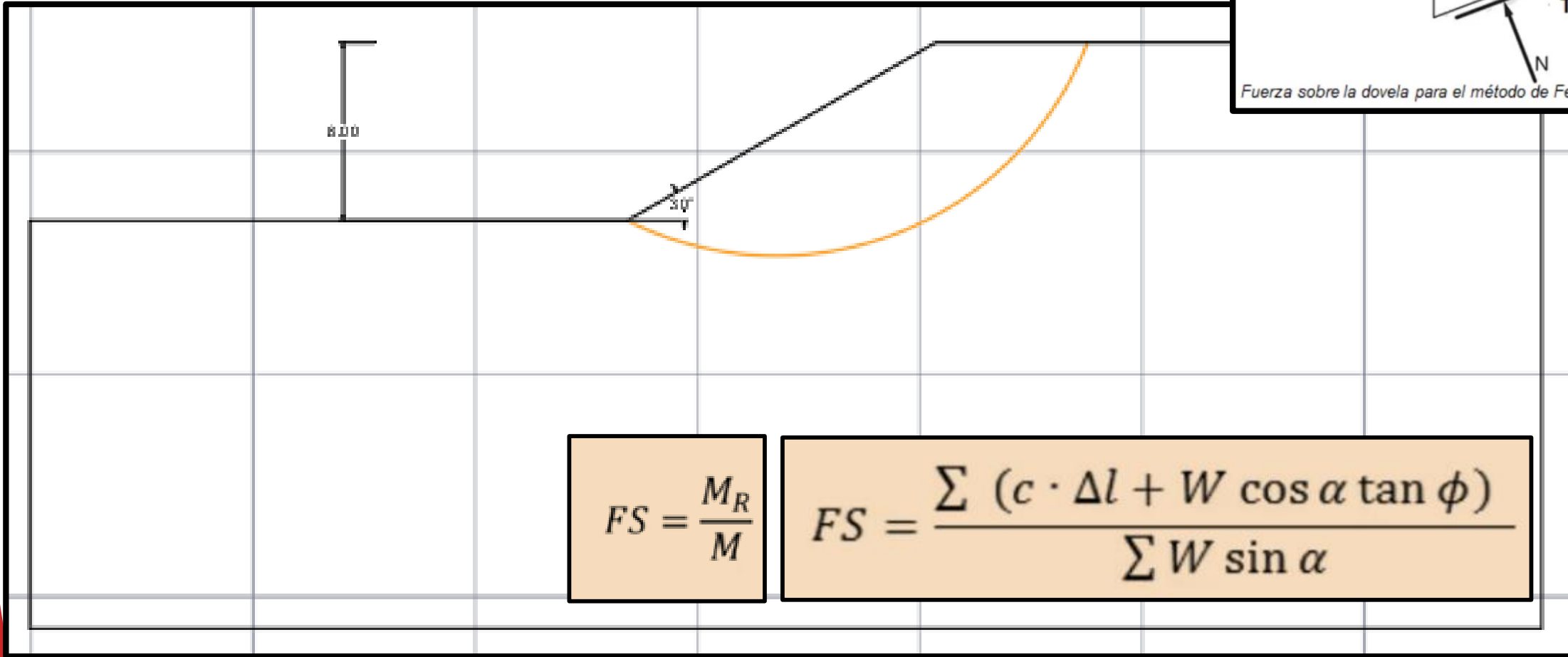
RESISTENCIA AL CORTE DE LOS SUELOS



Los suelos fallan o se cortan cuando exceden su resistencia al corte, es decir, cuando alcanzan una tensión equivalente a la tensión de falla

3. METODO DE DOVELAS



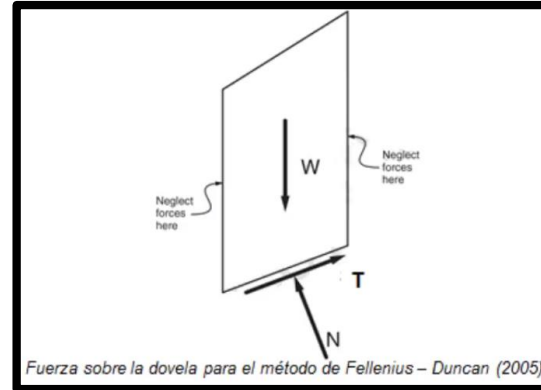


Fuerza sobre la dovela para el método de Fellenius - Duncan (2005)

Momento resistente

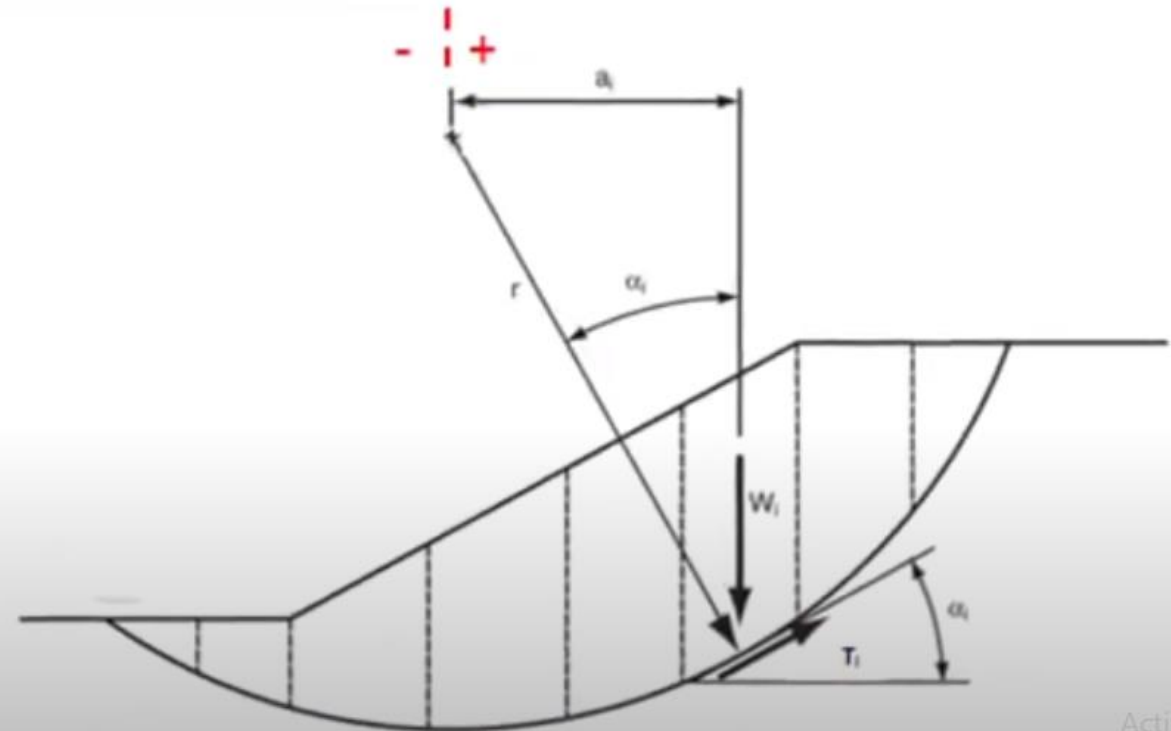
$$M_R = \sum rT_i = r \sum T_i$$

$$M_R = r \sum \tau_i \cdot \Delta l_i$$



$$FS = \frac{\sum (c_i + \sigma_i \tan \phi) \cdot \Delta l_i}{\sum W_i \sin \alpha_i}$$

$$FS = \frac{\sum (c \cdot \Delta l + W \cos \alpha \tan \phi)}{\sum W \sin \alpha}$$



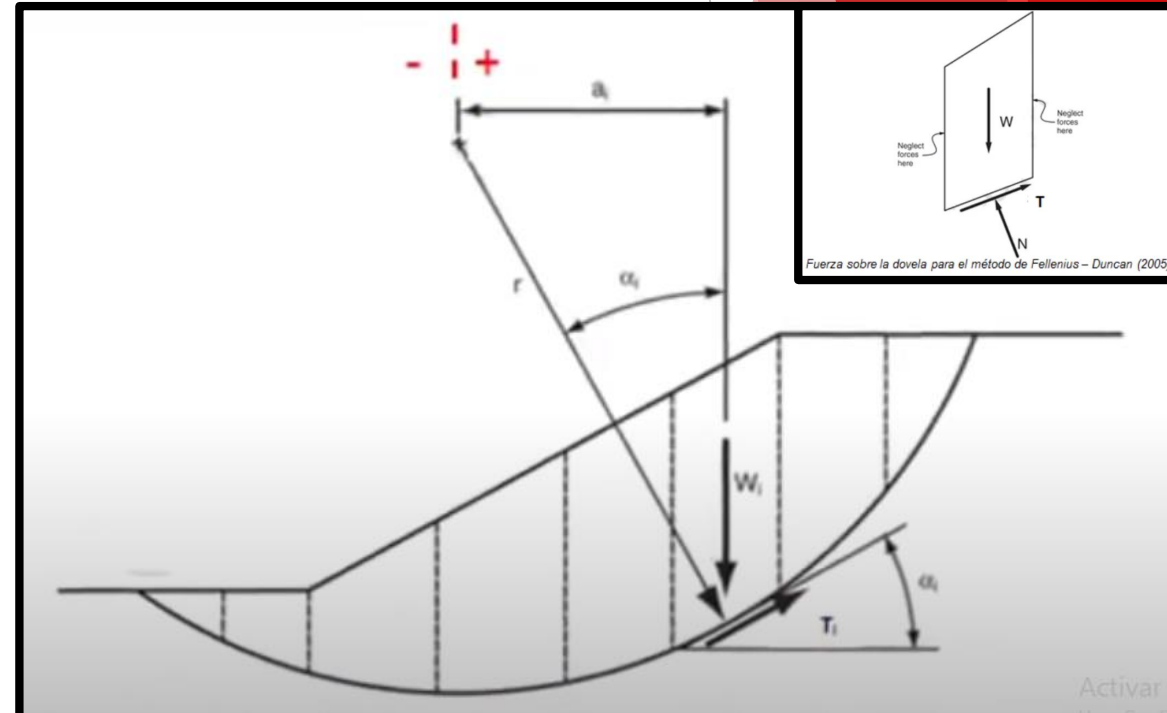
Momento actuante

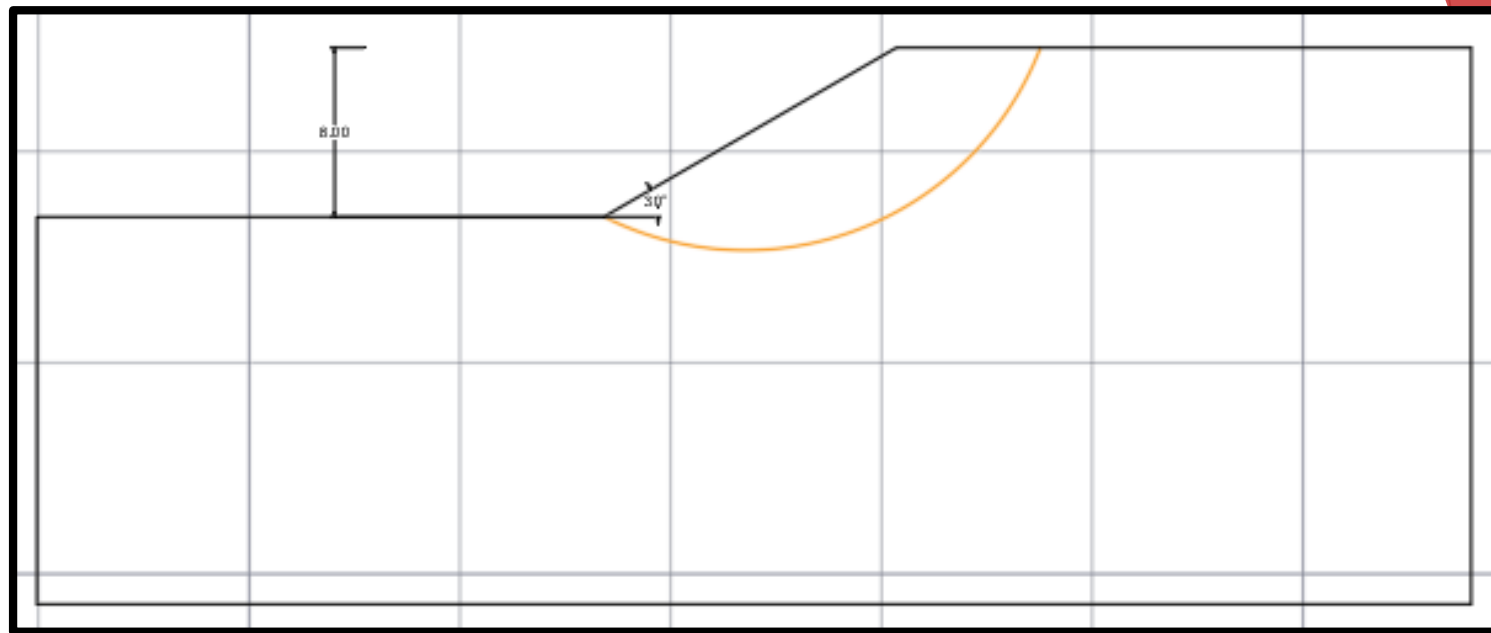
$$M = \sum W_i a_i$$

$$M = r \sum W_i \sin \alpha_i$$

$$FS = \frac{\sum (c_i + \sigma_i \tan \phi) \cdot \Delta l_i}{\sum W_i \sin \alpha_i}$$

$$FS = \frac{\sum (c \cdot \Delta l + W \cos \alpha \tan \phi)}{\sum W \sin \alpha}$$

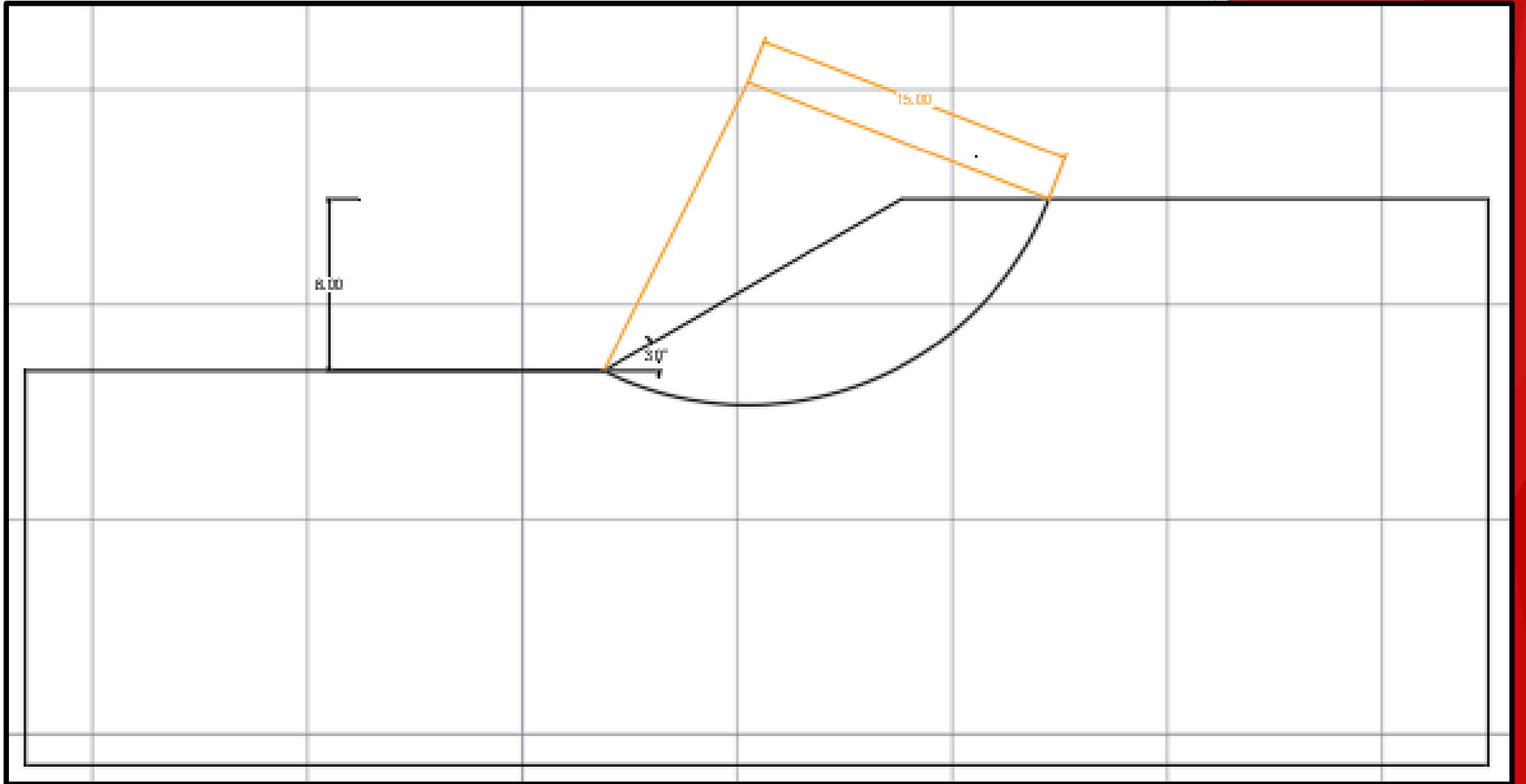


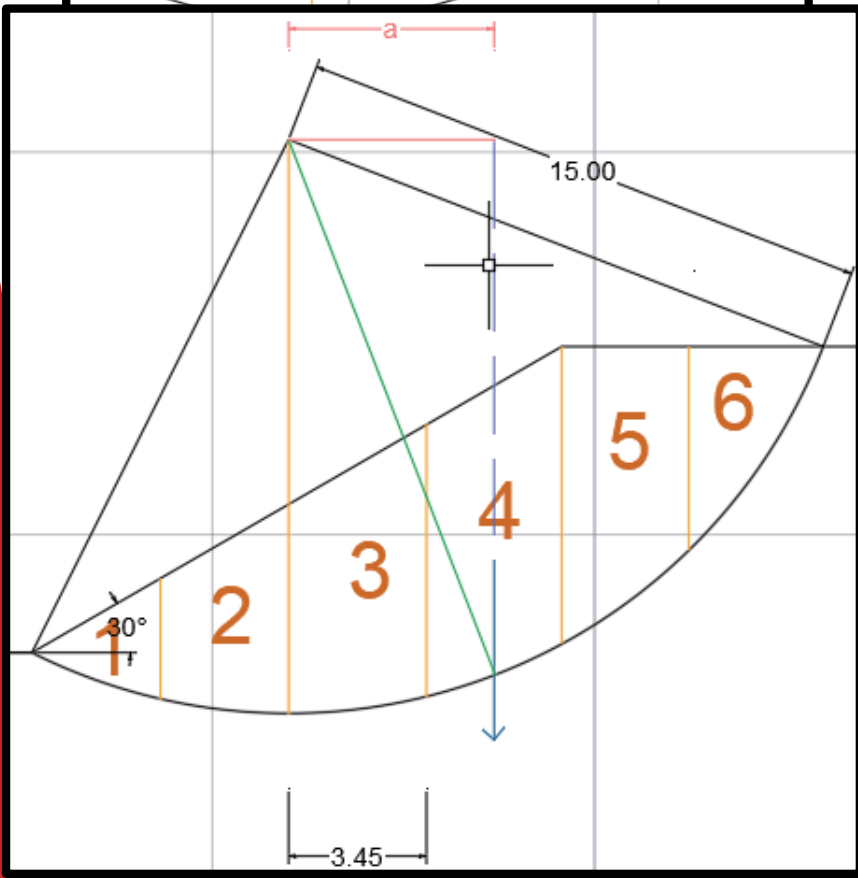
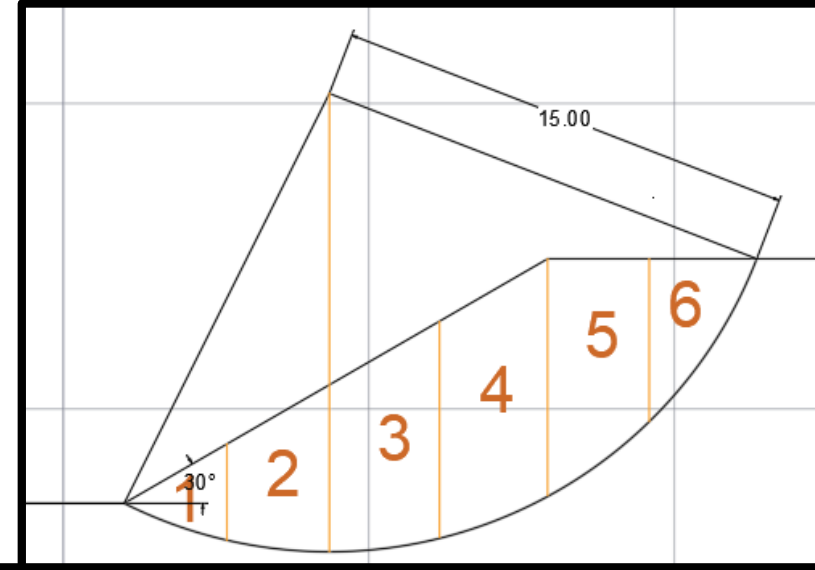
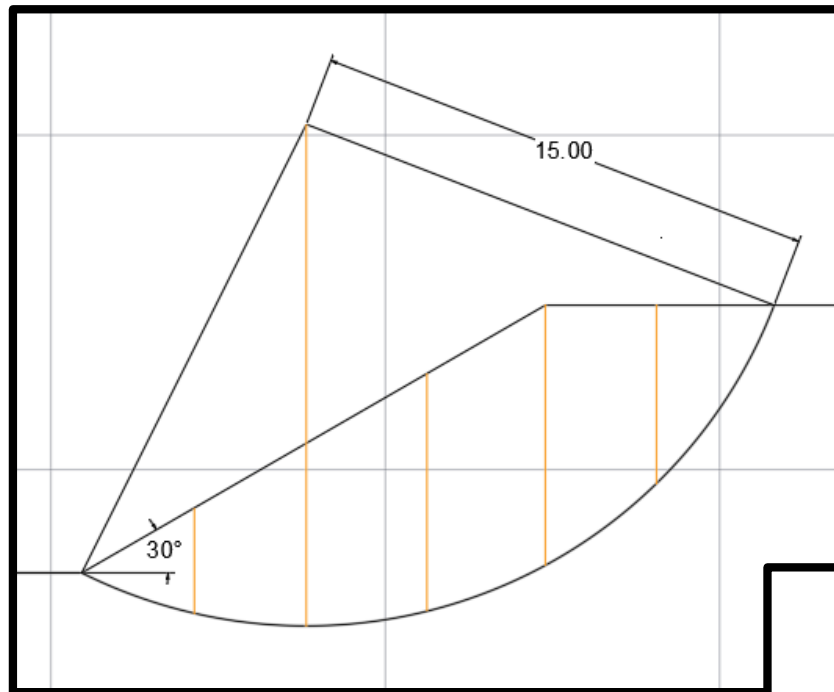
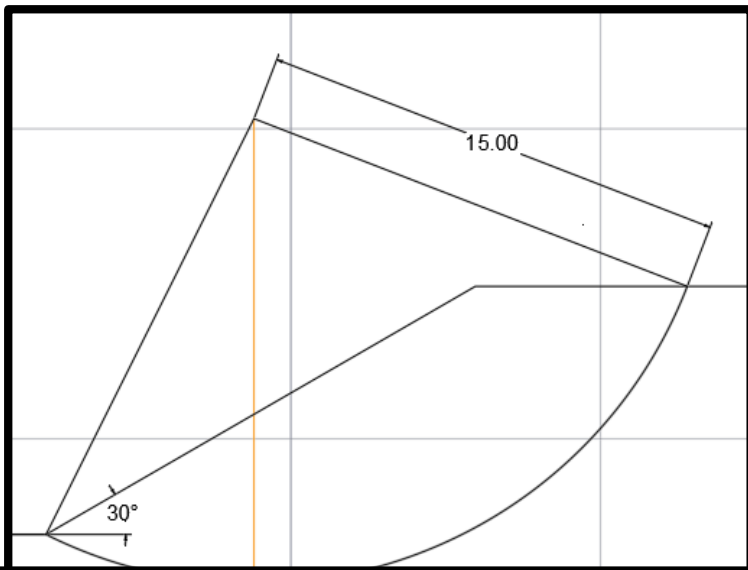


$$FS = \frac{M_R}{M}$$

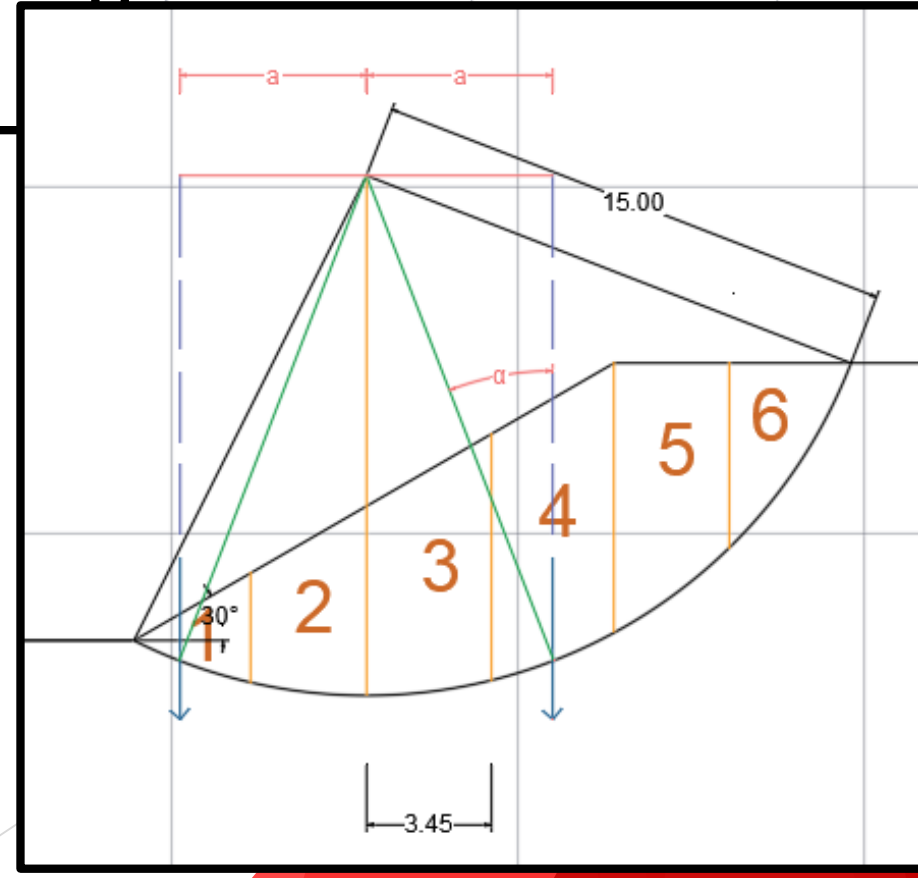
$$FS = \frac{\sum (c \cdot \Delta l + W \cos \alpha \tan \phi)}{\sum W \sin \alpha}$$

Dovela	b	α	Δl	Área	γ	c	ϕ	W	M_R	M
i	b_i	α_i	Δl_i	Área _i	γ_i	c_i	ϕ_i	W_i	$M_{R(i)}$	$M_{(i)}$
i+1	b_{i+1}	α_{i+1}	Δl_{i+1}	Área _{i+1}	γ_{i+1}	c_{i+1}	ϕ_{i+1}	W_{i+1}	$M_{R(i+1)}$	$M_{(i+1)}$
...
n	b_n	α_n	Δl_n	Área _n	γ_n	c_n	ϕ_n	W_n	$M_{R(n)}$	$M_{(n)}$
									ΣM_R	ΣM





$$\sin \alpha = \frac{a}{r} \rightarrow \alpha = \sin^{-1} \left(\frac{a}{r} \right)$$

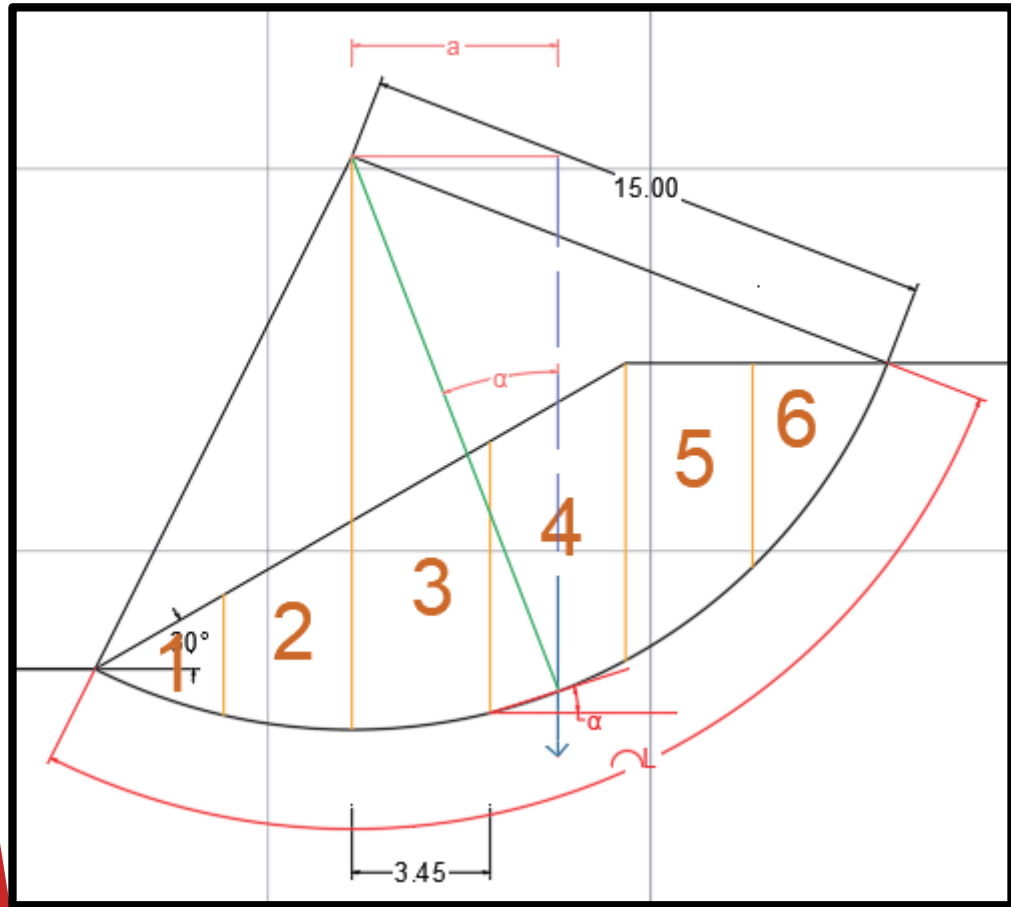


$$FS = \frac{M_R}{M}$$

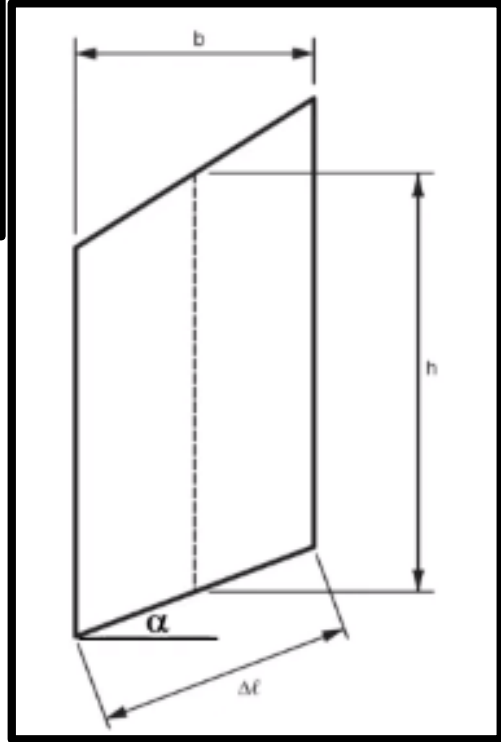
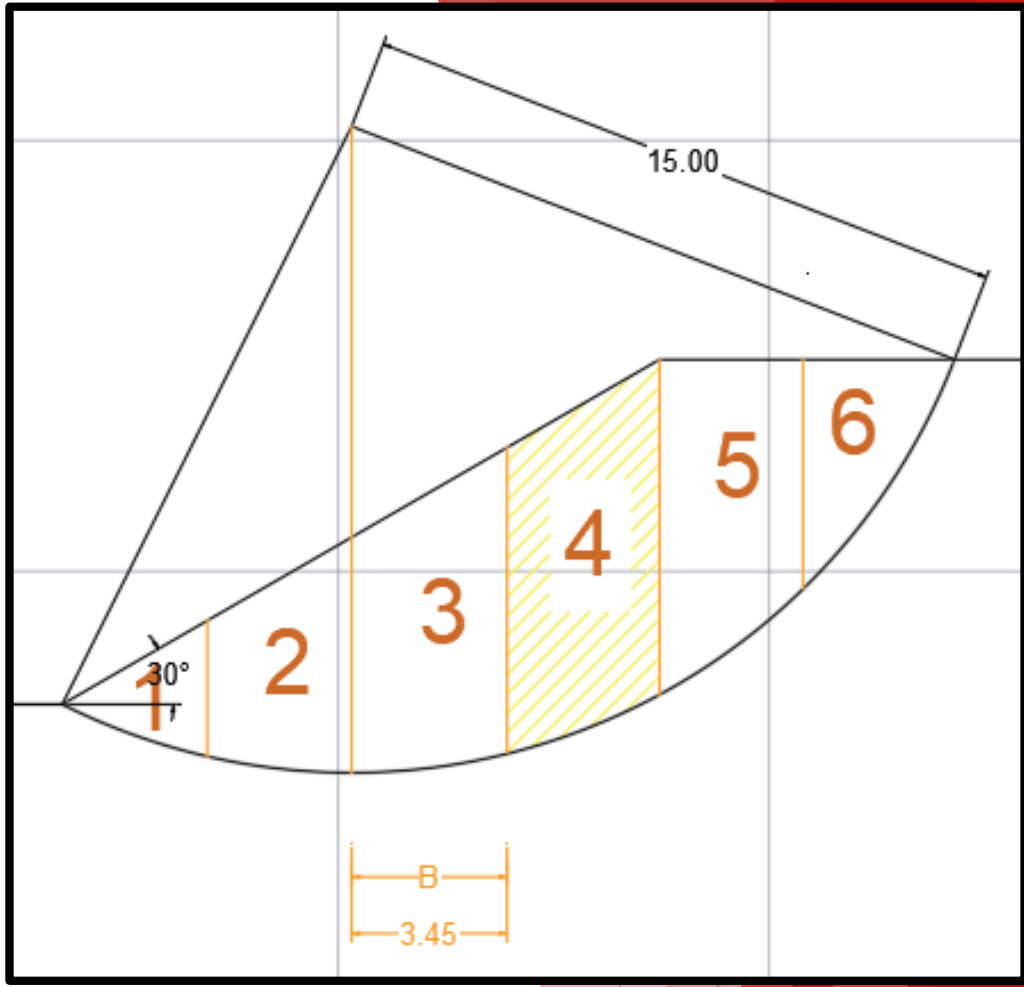
$$FS = \frac{\sum (c \cdot \Delta l + W \cos \alpha \tan \phi)}{\sum W \sin \alpha}$$

Dovela	b	α	Δl	Área	γ	c	ϕ	W	M_R	M
i	b_i	α_i	Δl_i	Área _i	γ_i	c_i	ϕ_i	W_i	$M_{R(i)}$	$M_{(i)}$
i+1	b_{i+1}	α_{i+1}	Δl_{i+1}	Área _{i+1}	γ_{i+1}	c_{i+1}	ϕ_{i+1}	W_{i+1}	$M_{R(i+1)}$	$M_{(i+1)}$
...
n	b_n	α_n	Δl_n	Área _n	γ_n	c_n	ϕ_n	W_n	$M_{R(n)}$	$M_{(n)}$
									ΣM_R	ΣM

DOVELA	B	a	α
1	3.45	-5.18	-20
2	3.45	-1.73	-6
3	3.45	1.73	6
4	3.45	5.18	20
5	3.45	8.63	36
6	3.45	12.08	55



$$W = Ah \cdot \bar{Y}_h$$



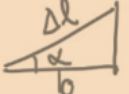
$$\frac{\Delta l}{b} = \cos \alpha \Rightarrow \cos \alpha = \frac{b}{\Delta l} \Rightarrow \Delta l = \frac{b}{\cos \alpha}$$

grava medianamente densa	
c	17.5
Φ	38
γ	19.00

$$FS = \frac{M_R}{M}$$

$$FS = \frac{\sum (c \cdot \Delta l + W \cos \alpha \tan \phi)}{\sum W \sin \alpha}$$

$$\sin \alpha = \frac{a}{r} \rightarrow \alpha = \sin^{-1} \left(\frac{a}{r} \right)$$



$$\cos \alpha = \frac{b}{\Delta l} \rightarrow \Delta l = \frac{b}{\cos \alpha}$$

$$W = Ah \cdot \gamma_h$$

DOVELA	B	a	α	ΔL	h	Ah	γ (kN/m3)	W	Mr	M	FS
1	3.45	-5.18	-20	3.67	1.73	6.35	19.00	120.67	88.54	-41.25	-2.15
2	3.45	-1.73	-6	3.47	4.5	15.61	19.00	296.60	230.30	-30.99	-7.43
3	3.45	1.73	6	3.47	6.44	22.34	19.00	424.46	329.58	44.35	7.43
4	3.45	5.18	20	3.67	7.57	27.79	19.00	528.03	387.42	180.51	2.15
5	3.45	8.63	36	4.26	6.73	28.69	19.00	545.17	344.43	320.30	1.08
6	3.45	12.08	55	6.01	3.23	19.41	19.00	368.88	165.30	302.06	0.55
									1545.57	774.98	1.99

4. MODELAMIENTO 1 - CAD

The image features a dark, semi-transparent aerial photograph of an industrial plant, likely a power station, with a dense grid of tall chimneys. A large, semi-transparent red graphic, composed of overlapping geometric shapes, is positioned on the right side of the frame. The text '4. MODELAMIENTO 1 - CAD' is centered in white, bold, sans-serif font.

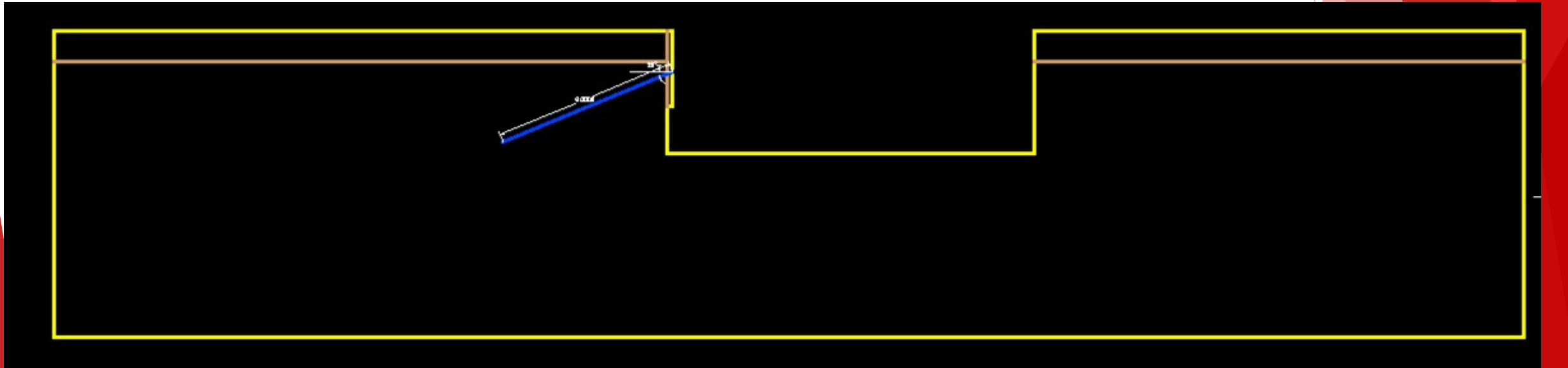
Parámetros para el análisis

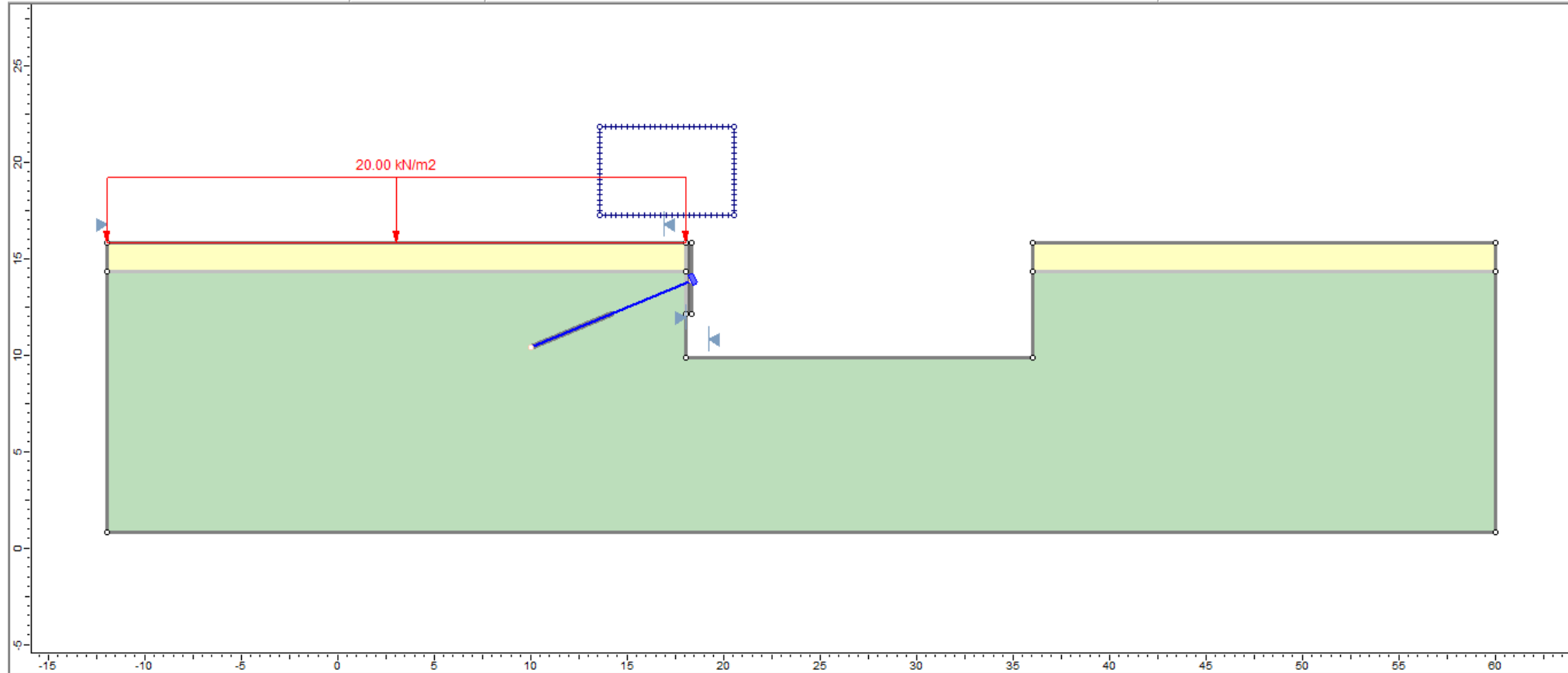
Anclaje	ancho (m)	alto (m)	N.A.	Ll (m)	Lb (m)	Lt (m)	Carga (Tn)
AN01	5.00	3.70	-2.00	4.50	4.50	9.00	40

Seccion 1: Eje A-A Frente (Av. Izaguirre)	
Ancho	20 m
Altura	6 m

ESTRATO	H (m)	γ (kN/m ³)	C (kPa)	Φ
Relleno	1.5	17	2.5	28
Grava med Densa	10	19	17.5	38
Concreto Armado		24	6	35

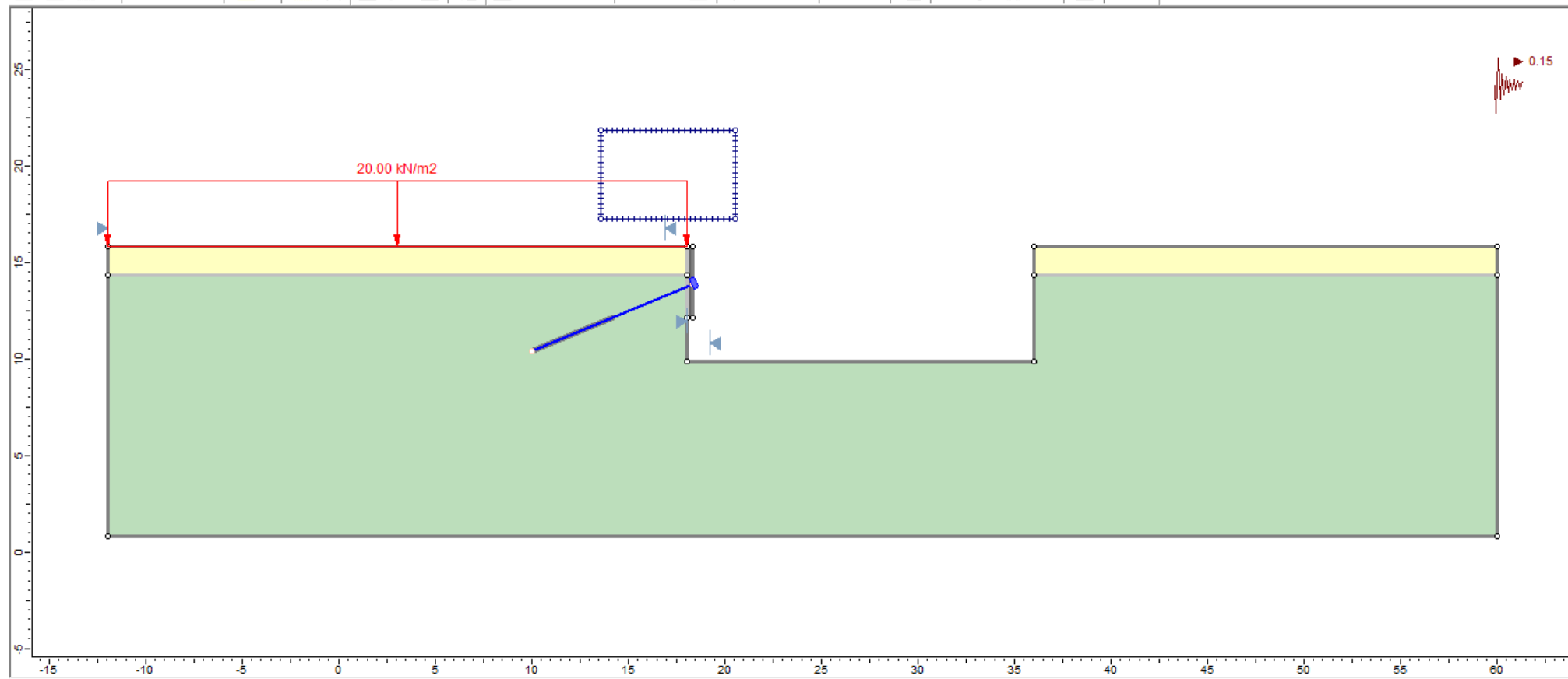
E...	Nombre	A...	Inut...	Bl...	Color	Tipo de ...	Grosor d...	Transp...	Estilo ...
✓	0	☰	☀	🔒	blanco	Continu...	— Por...	0	Color_7
☞	Defpoints	☰	☀	🔒	blanco	Continu...	— Por...	0	Color_7
☞	ANCHOR	☰	☀	🔒	160	Continu...	— 0.30...	0	Color_...
☞	EXTERNAL	☰	☀	🔒	amarillo	Continu...	— 0.35...	0	Color_2
☞	MATERIAL	☰	☀	🔒	33	Continu...	— 0.30...	0	Color_33





Slide - [Ejemplo slide - copia - CAD View]

File Edit View Analysis Boundaries Loading Support Surfaces Properties Tools Window Help




For Help, press F1

DATA TIPS MAX SNAP GRID ORTHO OSNAP



11:26
13/05/2020

5. MODELAMIENTO 2 - COORDENADAS

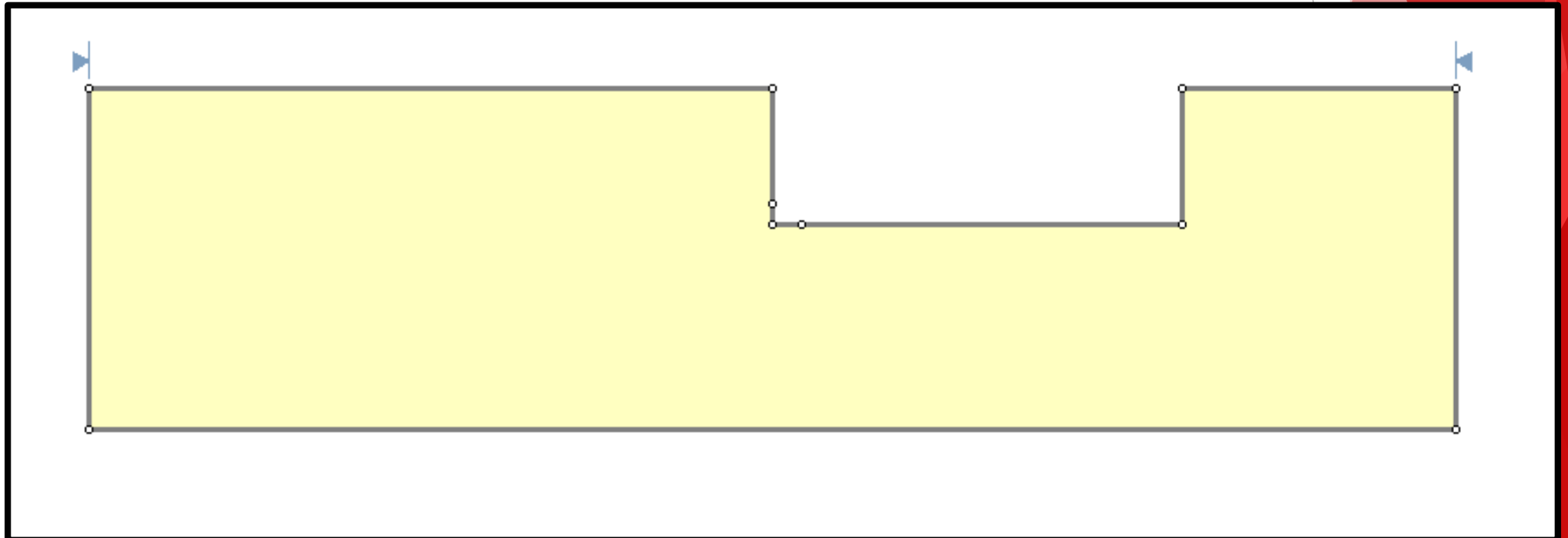
The background features a large, circular antenna array with numerous cylindrical elements. A semi-transparent red geometric shape, consisting of overlapping triangles, is positioned on the right side of the image. The text '5. MODELAMIENTO 2 - COORDENADAS' is centered in white, bold, sans-serif font.

Parámetros para el análisis

Anclaje	ancho (m)	alto (m)	N.A.	LI (m)	Lb (m)	Lt (m)	Carga (Tn)
AN01	5.00	3.70	-2.00	4.50	4.50	9.00	40

Seccion 1: Eje A-A Frente (Av. Izaguirre)	
Ancho	20 m
Altura	6 m

ESTRATO	H (m)	γ (kN/m3)	C (kPa)	Φ
Relleno	1.5	17	2.5	28
Grava med Densa	10	19	17.5	38
Concreto Armado		24	6	35



$(0,15)$

$(30,15)$

$(48,15)$

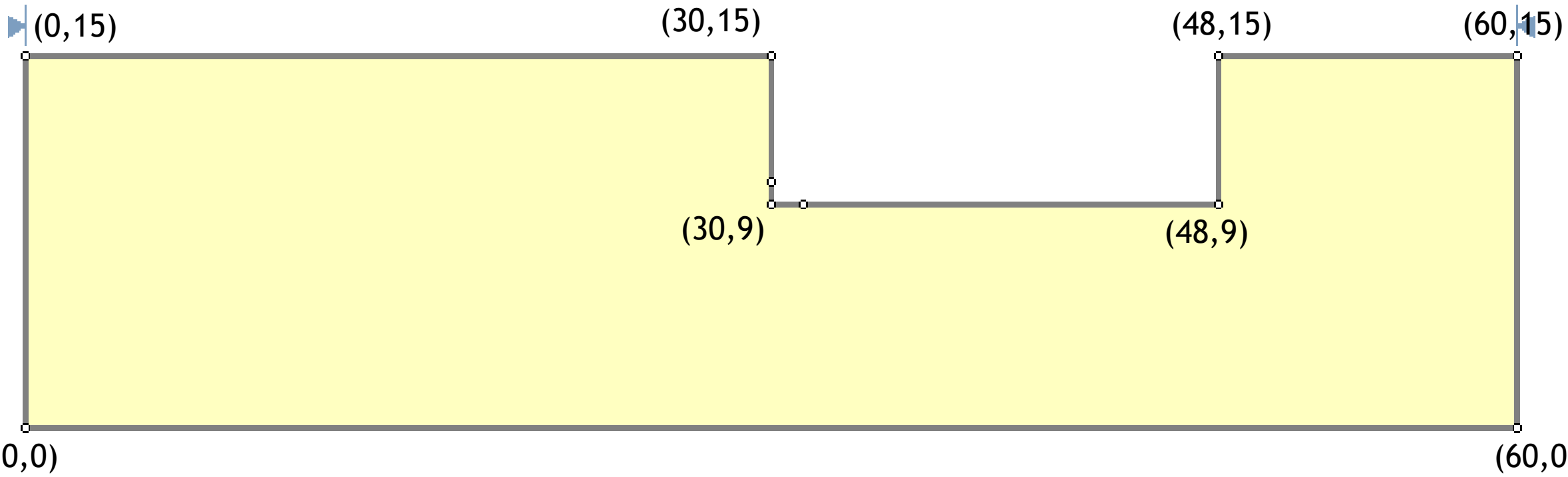
$(60,15)$

$(0,0)$

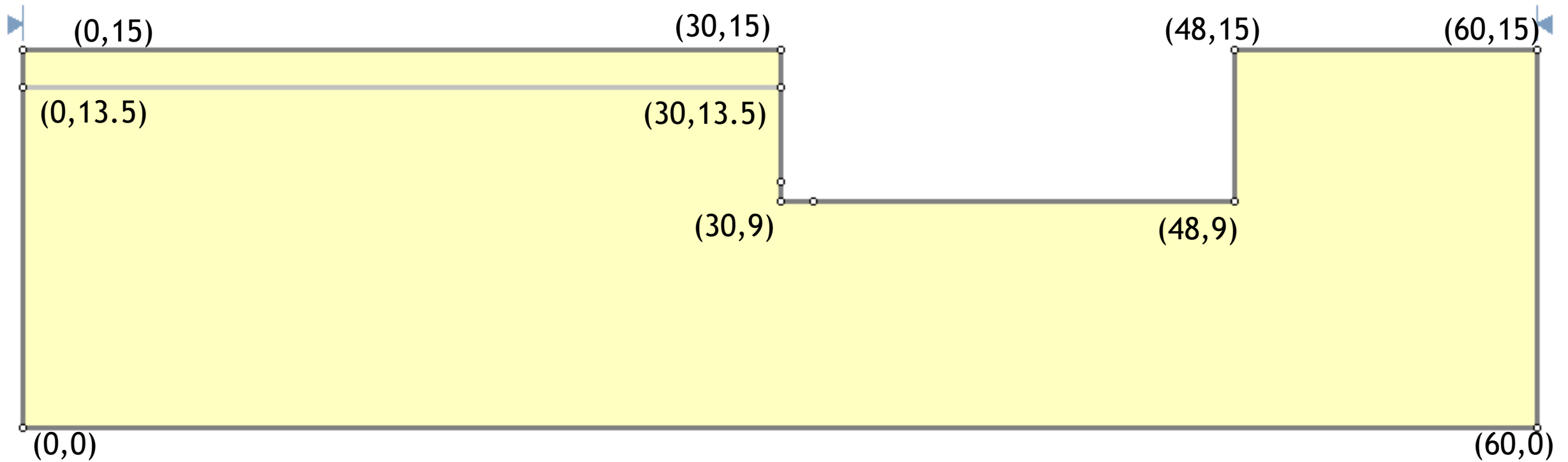
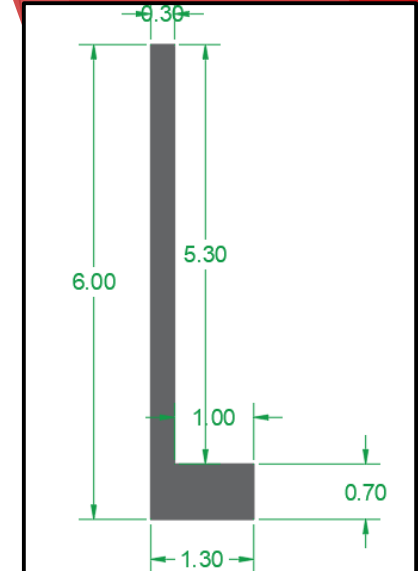
$(30,9)$

$(48,9)$

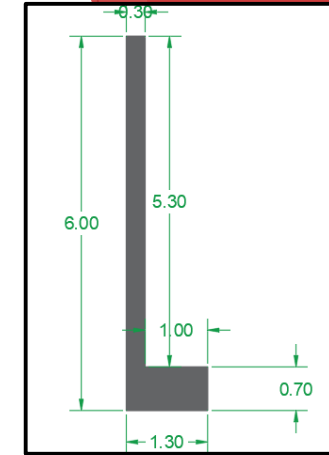
$(60,0)$



ESTRATO	H (m)	γ (kN/m ³)	C (kPa)	Φ
Relleno	1.5	17	2.5	28
Grava med Densa	10	19	17.5	38
Concreto Armado		24	6	35

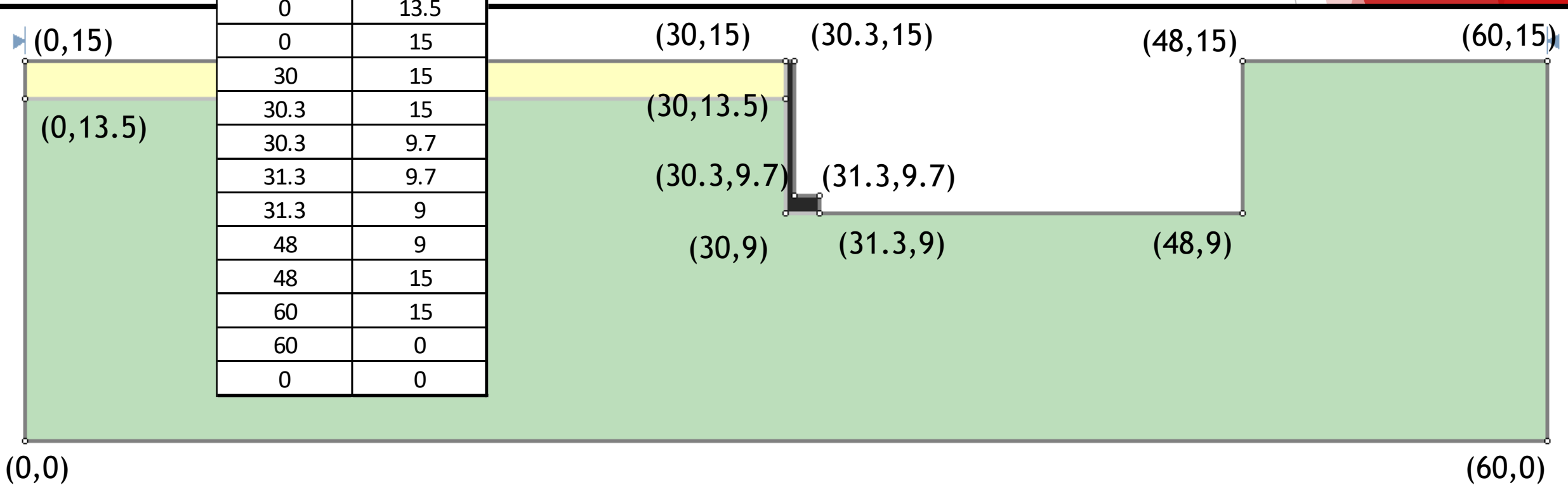


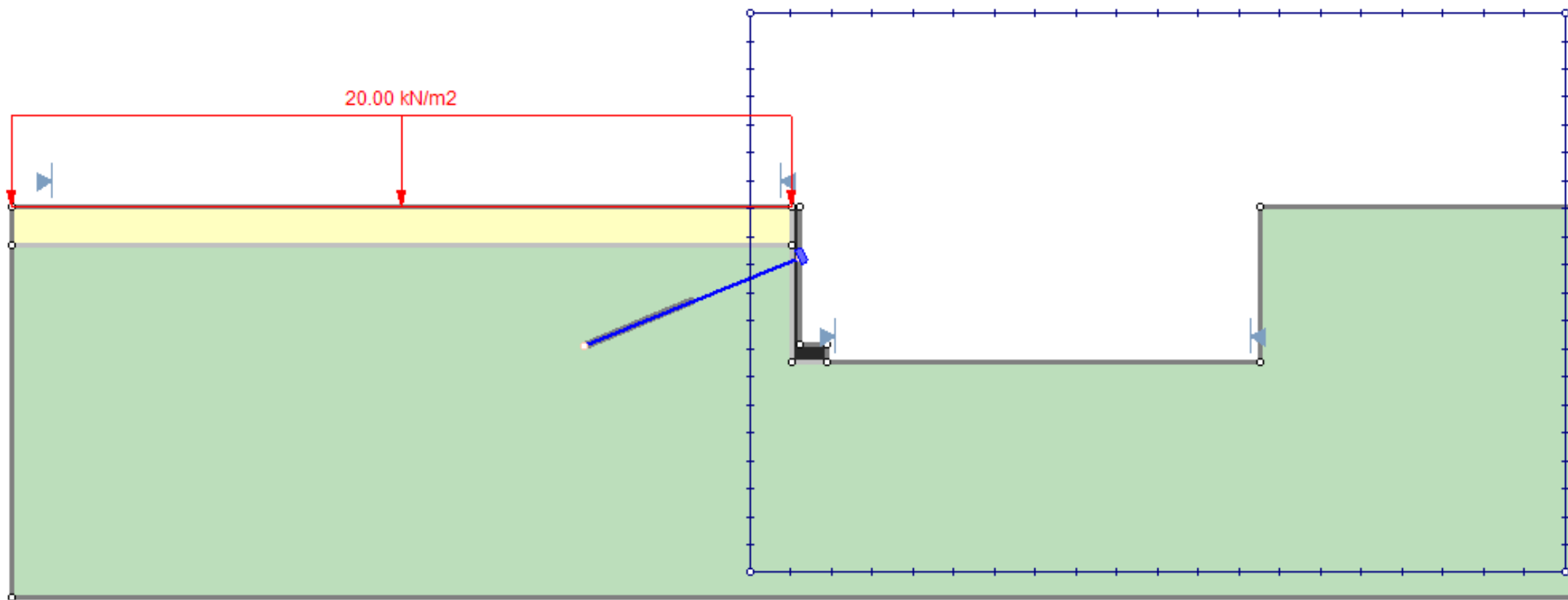
ESTRATO	H (m)	γ (kN/m ³)	C (kPa)	Φ
Relleno	1.5	17	2.5	28
Grava med Densa	10	19	17.5	38
Concreto Armado		24	6	35



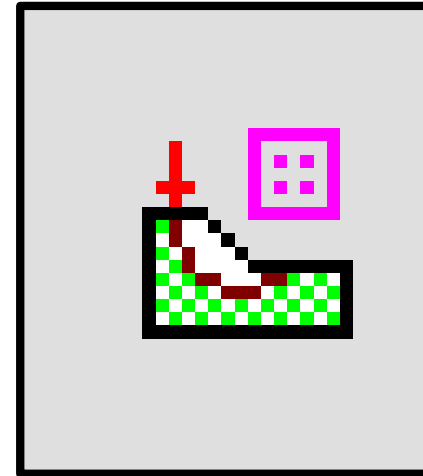
COORDENADAS	
X	Y
0	0
0	13.5
0	15
30	15
30.3	15
30.3	9.7
31.3	9.7
31.3	9
48	9
48	15
60	15
60	0
0	0

Anclaje	ancho (m)	alto (m)	N.A.	LI (m)	Lb (m)	Lt (m)	Carga (Tn)
AN01	5.00	3.70	-2.00	4.50	4.50	9.00	40





Entramos al programa





BATALLA DE JUNÍN

INGENIERÍA Y CONSTRUCCIÓN DE OBRAS CIVILES



Diana Camayo



Manuel Pachas



Evelyn Cerron



Diego Rafael

Gracias



Ángela Espinoza



Gabriela Lazo



Fabiana Santangelo



Alejandra Limo