Braced Excavation Strut Loads (Peck Apparent Pressure)

Apparent earth pressure on the bracing of a braced cut in sand, soft clay or stiff clay by Peck's envelopes, and the load on one strut.

Method: Peck's apparent earth pressure envelopes for braced cuts

Input parameters

Unit system: SI

Parameter	Value	Unit
Soil	Sand	
Unit weight of the soil	18.000	kN/m³
Depth of the cut	8.0000	m
Friction angle (sand)	33.000	°
Undrained shear strength (clay)	40.000	kPa
Factor for stiff clay (0.2 to 0.4)	0.30000	
Horizontal strut spacing	3.0000	m
Vertical height of wall carried by the strut	2.5000	m

Calculated results

Parameter	Value	Unit
Active pressure coefficient (sand)	0.29480	
Stability number γH/c_u (clay)	3.6000	
Apparent pressure (uniform part of the envelope)	27.593	kPa
Load on the strut	206.95	kN

Notes for this case

• Peck's apparent pressure diagrams envelope the strut loads measured in real braced cuts; they are not true earth pressure distributions. Sand: uniform 0.65 K_a γH. Soft to medium clay: γH(1 − 4c_u/γH), at least 0.3γH, over the lower three quarters of the cut. Stiff fissured clay: 0.2–0.4 γH over the middle half. The strut load is the pressure times its tributary area s × h_t. Add surcharge, water pressure and preload as appropriate.

Formula and method

$$\text{sand}: \; p_a = 0.65 K_a \gamma H, \quad \text{soft clay}: \; p_a = \gamma H \left(1 - \frac{4c_u}{\gamma H}\right) \geq 0.3\gamma H, \quad F = p_a s h_t$$

Variables

soil	Soil	-
γ	Unit weight of the soil	N/m³
H	Depth of the cut	m
\phi'	Friction angle (sand)	rad
c_u	Undrained shear strength (clay)	Pa
k	Factor for stiff clay (0.2 to 0.4)	-
s	Horizontal strut spacing	m
h_t	Vertical height of wall carried by the strut	m
K_a	Active pressure coefficient (sand)	-
N	Stability number γH/c_u (clay)	-
p_a	Apparent pressure (uniform part of the envelope)	Pa

F	Load on the strut	N

Method and standards

Peck envelopes.

Assumptions and limits

- Cuts deeper than about 6 m; water table below the base or drained.

References

Peck's apparent earth pressure envelopes for braced cuts

Report details

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Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/civil/geotechnical/braced-excavation-strut-loads

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.