Primary Consolidation Settlement of a Clay Layer

Primary consolidation settlement of a clay layer from compression index, initial void ratio, thickness and the stress increase, normally or over-consolidated.

Method: One-dimensional consolidation settlement with C_c and C_r (Terzaghi; Das, Principles of Geotechnical Engineering)

Input parameters

Unit system: SI

Parameter	Value	Unit
Layer thickness	4.0000	m
Initial void ratio	0.90000	
Compression index	0.30000	
Recompression (swelling) index	0.050000	
Initial effective stress at mid-layer	60.000	kPa
Stress increase at mid-layer	50.000	kPa
Preconsolidation stress Equal to the initial stress for a normally consolidated clay.	60.000	kPa

Calculated results

Parameter	Value	Unit
Consolidation settlement	166.26	mm
Over-consolidation ratio	1.0000	

Formula and method

The formula is shown on the calculator page: https://calc.firecad.com/civil/geotechnical/consolidation-settlement

Variables

H	Layer thickness	m
e_0	Initial void ratio	-
C_c	Compression index	-
C_r	Recompression (swelling) index	-
\sigma'_0	Initial effective stress at mid-layer	Pa
$\Delta\sigma$	Stress increase at mid-layer	Pa
\sigma'_c	Preconsolidation stress	Pa
S_c	Consolidation settlement	m
OCR	Over-consolidation ratio	-

Method and standards

One-dimensional consolidation.

Assumptions and limits

- Primary consolidation only; stresses at mid-layer.

References

- One-dimensional consolidation settlement with C_c and C_r (Terzaghi; Das, Principles of Geotechnical Engineering)

Report details

Report reference	FCC-Y11Q-02FV (the same inputs always give the same reference)
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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

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/consolidation-settlement

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.