Lacey's Regime Canal Design

Silt factor, regime velocity, area, wetted perimeter, hydraulic mean depth and bed slope of an alluvial canal by Lacey's regime equations.

Method: Lacey's regime equations (Garg, Irrigation Engineering and Hydraulic Structures (Khanna))

Input parameters

Unit system: SI

Parameter	Value	Unit
Discharge	108,000	m³/h
Mean silt diameter	0.32000	mm

Calculated results

Parameter	Value	Unit
Silt factor	0.99561	
Regime velocity	0.77243	m/s
Area	38.838	m²
Wetted perimeter	26.017	m
Hydraulic mean depth	1.4982	m
Bed slope	1.6861e-04	

Notes for this case

- A from Q/V and P × R differ slightly (38.84 m² against 38.98 m²): Lacey's equations agree only approximately; use A = Q/V.
- Lacey's regime theory (SI form) for channels in incoherent alluvium carrying silt. Choose the side slope (often 1:2 in regime) and solve bed width and depth from A and P.

Formula and method

$$f = 1.76\sqrt{d_{mm}},\quad V = \left(\frac{Qf^2}{140}\right)^{1/6},\quad P = 4.75\sqrt{Q},\quad R = \frac{5V^2}{2f},\quad S = \frac{f^{5/3}}{3340Q^{1/6}}$$

Variables

Q	Discharge	m³/s
d_{mm}	Mean silt diameter (used in mm in the formula)	m
f	Silt factor	-
V	Regime velocity	m/s
A	Area	m²
P	Wetted perimeter	m
R	Hydraulic mean depth	m
S	Bed slope	-

Method and standards

Lacey's equations.

Assumptions and limits

- Alluvial channels in regime.
- The silt diameter may be entered in any length unit; the silt factor uses it in mm.
- Lacey's equations are only approximately consistent: A = Q/V and P × R differ slightly; a note shows both.

References

- Lacey's regime equations (Garg, Irrigation Engineering and Hydraulic Structures (Khanna))

Report details

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Release checks	2 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/hydraulics/lacey-regime-canal

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.