

Friend's Equation

Parameters

Flow Length - The length of the Sheet flow path.

Land Slope - The slope of the hydraulic grade line.

Catchment Roughness - Horton's Roughness value.

Calculation

$$t_c = \frac{BnL^{0.333}}{S^{0.2}}$$

where:

B = Const (107 metric)

S = Average catchment slope (m/m)

L = Length of overland flow (m)

n = Horton's roughness (similar but not identical to Manning's n)

Paved 0.015

Bare Soil .0275

Poorly Grassed .035

Average Grass .045

Dense grass 0.06

t_c = time of concentration (mins)