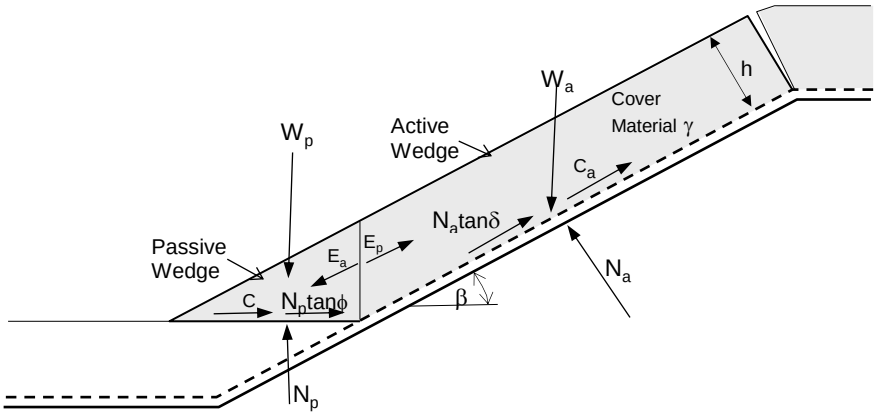
SLOPE STABILITY CALCULATION

UNIFORM COVER THICKNESS, FINITE SLOPE METHOD Jones & Dixon



INPUT DATA TO SHADED BOXES

β	Slope angle (°)	18.43 (1 in 3)
h	Thickness of the cover material (m)	1.00
γ	Unit weight of cover material (kN/m³)	18
h_w	Thickness of saturated cover material (m)	1
γ_s	Saturated unit weight of the cover material (kN/m³)	21
δ_u	Interface friction angle at the upper interface of material L_1 (°)	40
α_u	Apparent adhesion at upper interface of material L_1 (kPa)	1
δ_1	Interface friction angle at the lower interface of material L_1 (°)	27
α_1	Apparent adhesion at lower interface of material L_1 (kPa)	4
δ_2	Interface friction angle between L_2 and subgrade (°)	30
α_2	Apparent adhesion between L_2 and subgrade (kPa)	3
c	Cohesion of cover soil (kPa)	0
ϕ	Angle of internal friction of cover soil (°)	30
L	Slope length (m)	60

FACTOR OF SAFETY CALCULATION:

H	Slope height	18.97
Wa	Total weight of active wedge	1224.99
Wp	Total weight of passive wedge	35.01
Na	Effective force normal to the failure plane of the active wedge (kN/m)	610.33
Un	Resultant of the pore pressures acting perpendicular to the slope (kN/m)	553.41
Uh	Resultant of the pore pressures acting on the interwedge surfaces (kN/m)	5.00
Uv	Resultant of the vertical pore pressures acting on the passive wedge (kN/m)	15.00
a		367.91
b		-624.16
c		104.43
FS	Factor of safety (Cover soil/L_1 interface)	**1.51**
T_1	Tensile force in the geosynthetic material L_1 (kN)	**-144.28** no tension
a		367.91
b		-604.09
c		100.57
FS	Factor of safety (L_1/L_2 interface)	**1.45**

References: Robert M Koerner “Designing with Geosynthetic” 1990 Fourth Edition;Jones & Dixon"The stability of geosynthetic landfill lining systems".

Note: This calculation method requires interface friction angle and apparent athesion. FS-values without apparent athesion will be reduced to a great extent and will produce misleading results. The placement of the cover soil on the slope should always be from the toe upward to the crest. Horizontal part of the toe with collector drain should be constructed first. Gravitational forces of the cover soil and live load of the construction plant are compacting previously placed soil. This is creating passive wedge that is providing support for the active wedge.