

COMPANY NAME		Calculation No.		
CALCULATION SHEET		CALCULATION NUMBER		
onlinestructuraldesign.com		Project No.		
		PROJECT NUMBER		
Project Title:	Project Name	Calc. By	Date	Rev.
		Author	today	0
Subject	Earth Pressure Coefficients K_0 (at rest), K_a (active), K_p (passive)	Checked By	Date	
	(no wall friction or soil cohesion)	Checker	today	

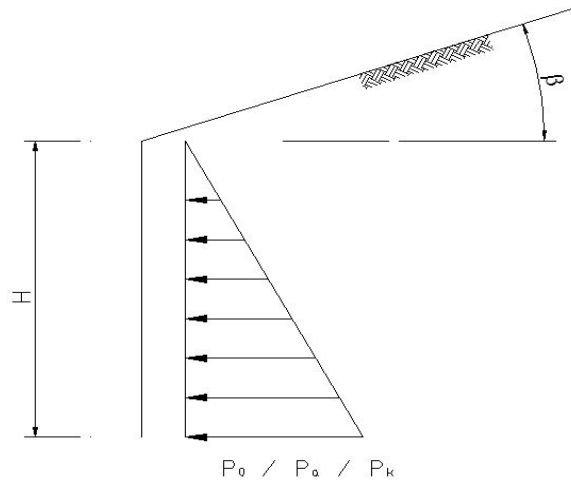
Calculation of Earth Pressure Coefficients and soil pressure
 K_0 (at rest), K_a (active), K_p (passive)
(no wall friction or soil cohesion)

per Bowles "Foundation Analysis and design"
Chapters 2 and 11

Soil characteristics

$\gamma =$ 115 lb/ft³ soil unit weight
 $\phi =$ 35 deg angle of internal friction
 $\beta =$ 0 deg soil angle

$\gamma * g =$ 0.115 kip/ft³



At rest pressure coefficient

$K_0 = 1 - \sin(\phi) = 0.43$

per Bowles - Jacky's equation
Chapter 2-8 / Formula (2-18a)

Active pressure coefficient

$K_a = \frac{\cos(\beta) * \{\cos(\beta) - \sqrt{[\cos(\beta)^2 - \cos(\phi)^2]}\}}{\{\cos(\beta) + \sqrt{[\cos(\beta)^2 - \cos(\phi)^2]}\}}$
 $K_a = 0.271$

per Bowles - Rankine Earth Pressures
Chapter 11-5 / Formula (11-7)

Passive pressure coefficient

$K_p = \frac{\cos(\beta) * \{\cos(\beta) + \sqrt{[\cos(\beta)^2 - \cos(\phi)^2]}\}}{\{\cos(\beta) - \sqrt{[\cos(\beta)^2 - \cos(\phi)^2]}\}}$
 $K_a = 3.690$

per Bowles - Rankine Earth Pressures
Chapter 11-5 / Formula (11-8)

Soil pressure at depth H

$H =$ 3.6 ft

$p_0 = \gamma * g * H * K_0 = 0.177 \text{ kip/ft}^2 = 1.226 \text{ psi}$ soil pressure at rest at depth H
 $p_a = \gamma * g * H * K_a = 0.112 \text{ kip/ft}^2 = 0.779 \text{ psi}$ soil active pressure at depth H
 $p_p = \gamma * g * H * K_p = 1.528 \text{ kip/ft}^2 = 10.609 \text{ psi}$ soil passive pressure at depth H

References:

FOUNDATION ANALYSIS AND DESIGN (Fifth Edition) - Joseph E. Bowles (McGraw-Hill / 1996)