LateralK

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About

LateralK

LateralK is a computer program for calculating lateral earth pressure coefficients in static and earthquake conditions.

Although all efforts have been undertaken to ensure that this software is of the highest possible quality and that the results obtained are correct, the authors do not warrant the functions contained in the program will meet your requirements or that the operation of the program will be uninterrupted or error-free. The authors are not responsible and assume no liability for any results or any use made thereof, nor for any damages or litigation that may result from the use of the software for any purpose. All results to be verified independently by user.

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Vancouver, Canada

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References

1- Foundation analysis and design (5th edition)
Joseph E. Bowles

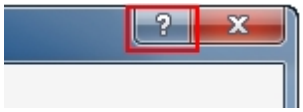
2- Principles of Geotechnical Engineering
Braja M. Das

Units System

This version of LateralK supports the following units system:

- Metric (kN, m)
- US Customary (lb, ft)

Getting Help



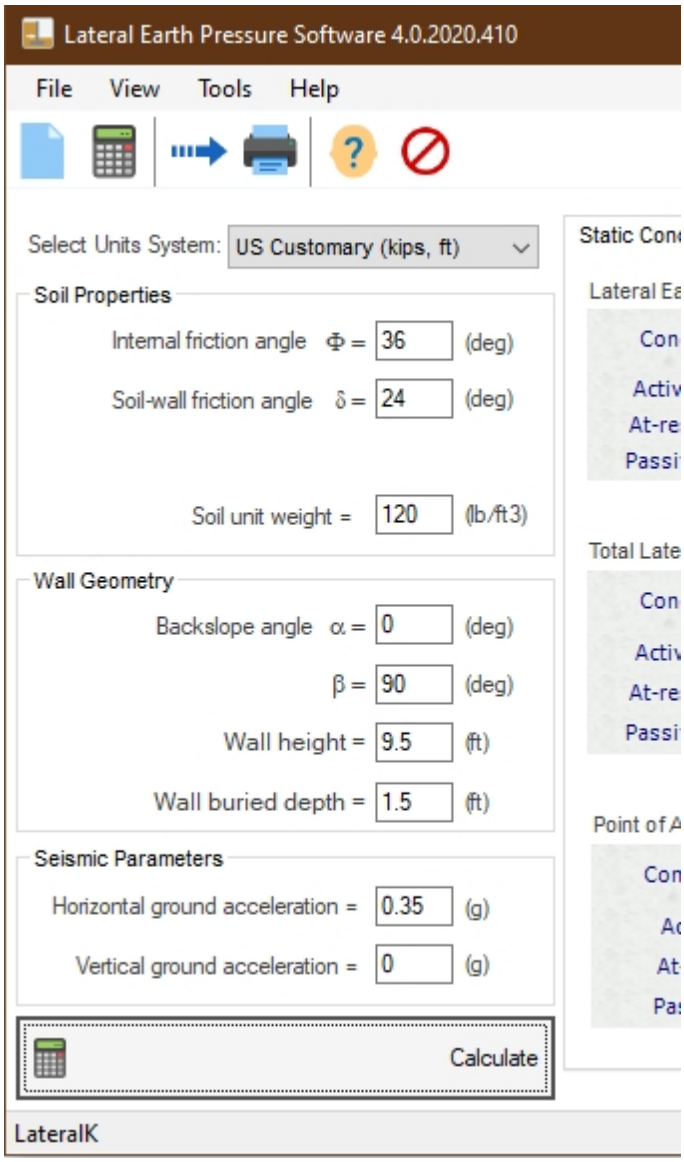
Help button is placed at the top-right corner of program dialog pages.
In order to open the help content associated with a page, please click on **?** button. Otherwise you can open the Help file from Help menu.

» If you prefer the PDF or e-Book format, please refer to Users Manuals folder, located in the program installation folder.

Contents

Input data

As it can be seen in the following screenshot, there are three sets of input parameters in **LateralK** program:



Soil Properties

Φ : Internal friction angle of soil in degrees (between 0 and 55)

δ : Angle of friction between soil and concrete as ratio of F

γ : Unit weight of backfill material

Geometry

α : Back-slope angle in degrees

β : Batter angle of rear face of the retaining wall

Total Height of the wall, and buried portion of the wall

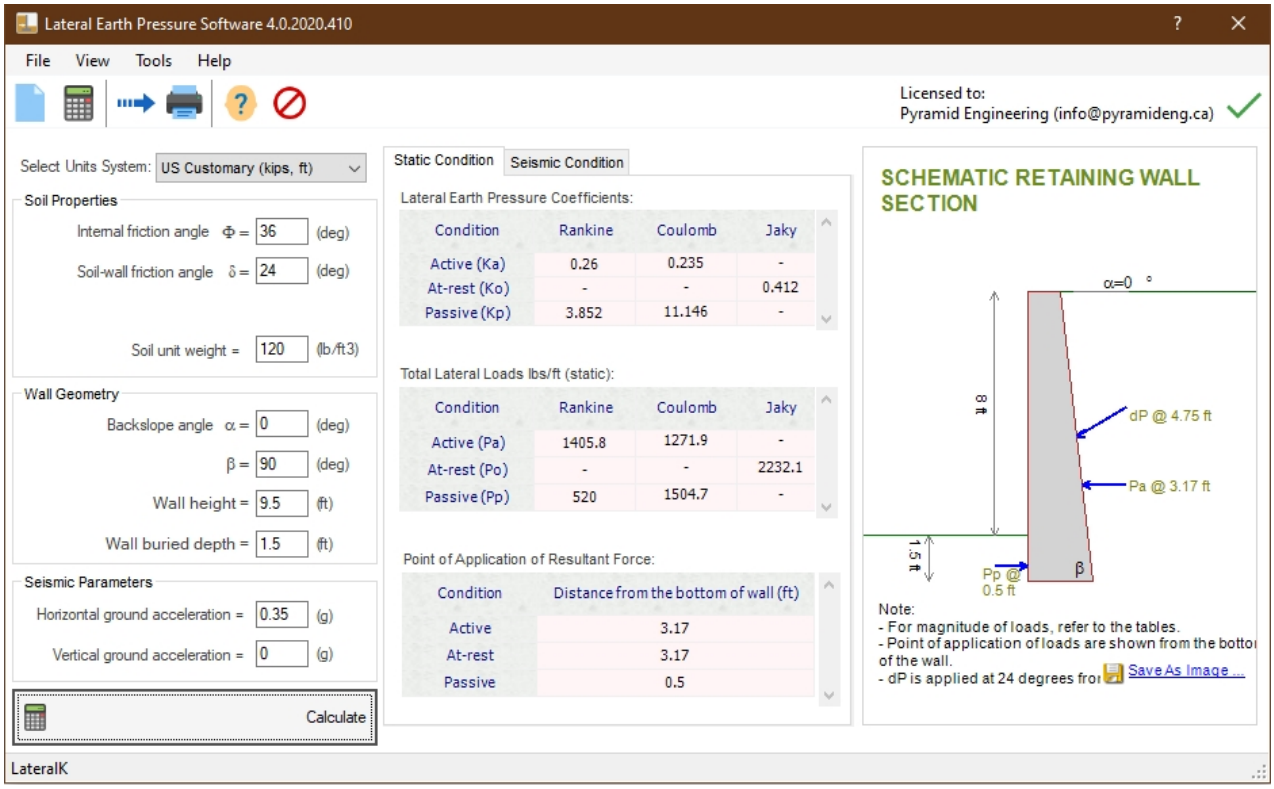
Seismic Parameters

Horizontal and vertical peak ground accelerations

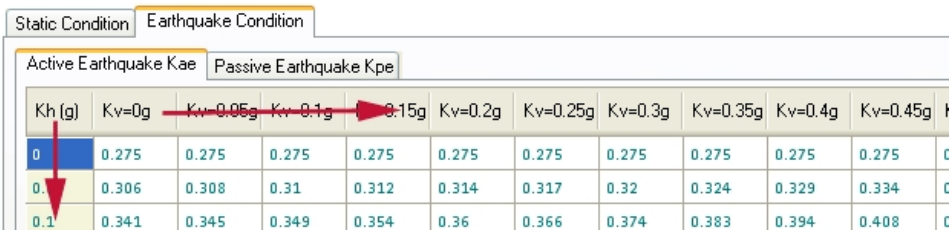
When all parameters are entered, press the Calculate button to view the results.

Analysis Results

Lateral earth pressure coefficients and lateral loads are provided in both static and seismic loading conditions



Click on View > Details menu, in order to view the details of Kae and Kpe coefficients (seismic) for different horizontal and vertical ground accelerations (a_h,a_v):



$K_h = a_h/g$

$K_v = a_v/g$

where g is acceleration due to gravity (9.81 m/s^2).

Note: The Ke values marked with * represent a mathematical limitations in Mononobe & Okabe equation.

Reporting

After performing the calculations if a report is needed, we recommend Exporting the results to Microsoft Excel or image files and then incorporate them into your reports (use File→Export menu). Alternatively you can directly print the tables using the printer button on toolbar or by using File menu.

Equations

Following is the list of all equations used in **LateralK** for calculating the lateral earth pressure coefficients.

Static Conditions - Active Ka

» Rankin Method

$$K_a = tg^2\left(45^0 - \frac{\varphi}{2}\right)$$

» Coulomb Method

$$K_a = \frac{\cos^2(\varphi - \alpha)}{\cos^2\alpha \cdot \cos(\alpha + \delta)\left[1 + \sqrt{\frac{\sin(\varphi + \delta)\cdot\sin(\varphi - \beta)}{\cos(\alpha + \delta)\cdot\cos(\alpha - \beta)}}\right]^2}$$

Static Conditions - Passive Kp

» Rankin Method

$$K_p = \frac{1+\sin\varphi}{1-\sin\varphi} = \tan^2\left(45 + \frac{\varphi}{2}\right)$$

» Coulomb Method

$$K_p = \frac{\cos^2(\varphi - \alpha)}{\cos^2\alpha \cdot \cos(\delta - \alpha)\left[1 + \sqrt{\frac{\sin(\varphi - \delta)\cdot\sin(\varphi + \beta)}{\cos(\alpha - \delta)\cdot\cos(\alpha + \beta)}}\right]^2}$$

Static Conditions - At rest Ko

- Jaky Method

$$K_o = 1 - \sin\varphi$$

Earthquake Conditions - Active and Passive Kae, Kpe

- Mononobe , Okabe Method

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