# Getting Started (Analysis Mode)

This tutorial is intended to provide a basic-level walkthrough of the Verti-Block Design Software in **Analysis mode**, where a single cross section of a wall is analyzed. Though not all advanced options are addressed, it will provide enough training to help you become familiar with designing and analyzing a simple Verti-Block retaining wall profile.
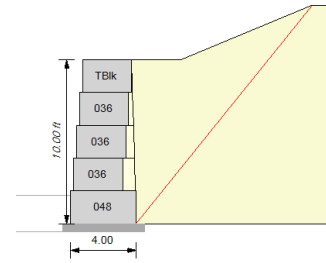
INPUT PARAMETERS

Project Information: *This will be displayed on the finished analysis printout.*

1. Enter all desired information in the ***Project Information*** fields.

Block – Reinforcement Info: *Allows you to specify the block types that will be used in your design.*

1. For the most basic set, select **VertiBlock.**
   NOTE: The **VertiBlock CIP** option includes some less common block sizes. Check with your local Verti-Block licensed producer to find out which blocks they have available.
2. If a reinforced wall will be designed, select **Stratagrid.**
3. Under **Available Blocks***, select all desired block types to be used in the design.

Block Properties: *Displays dimensions, density, shear properties, and other information about the blocks.*

Geogrid Properties: *Displays properties of various Stratagrid types.*

NOTE: Inputs on this page will only affect the wall design if a reinforced wall is being analyzed. Gravity wall designs will not be affected.

1. In the **Geogrid Selection** zone, select the desired geogrid type from the drop-down list for **Primary**, **Secondary**, and **Third**, with **Primary** being the strongest geogrid. If only one type of geogrid is desired, select that type for **Primary** and select **none** for the remaining boxes. It is recommended to start with SG200 (weakest geogrid) as the primary and change to stronger geogrids as needed.

Factors of Safety: *Displays default factors of safety and allows user to adjust them as needed.*

1. Verify that the factors of safety displayed are sufficient for your project. The default factors of safety are based on the design method selected under **Section Information** (see below). Different values may be entered in the boxes if desired.

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Section Information: *Design method and other miscellaneous parameters.*

1. By default, the **NCMA** design method should be selected. **AASHTO** and other design methods may be selected from the drop-down menu next to **Design Method**.
2. Verti-Block Design Software will typically generate a gravity design only for small wall heights. If a reinforced design is required, select **Force a Reinforced Design**, and it will now calculate both a gravity and reinforced design.

Geometry: *Input geometric and load parameters for the wall to be analyzed.*

1. Fill in all boxes that apply to the wall being analyzed. The most common fields are described below:
   - **Ht** – block height, refers to the entire wall height, including the embedded portion
   - **Batter** – Verti-Block has a default batter of 5.2° (2-3/16" setback for each block). A different angle may be entered if desired.
   - **Embed** – depth of the base block below the finished grade
   - **Leveling Pad Depth** – thickness of the leveling pad (gravel or concrete)
   - **Leveling Pad Width** –distance the leveling pad extends in front of (**Front +**) and behind (**Rear +**) the block
   - **Percent Coverage** – geogrid coverage in the reinforced zone (default 100% per NCMA)
   - **Slope Angle** – angle (degrees) of the top slope (above the wall), measured from the horizontal
   - **Slope Length** – horizontal length of the top slope
   - **Slope Toe Offset** – distance from the back of the top block to the slope toe
   - **Live Load** – live surcharge load with varying magnitude and presence (input in psf)
   - **LL Offset** – distance from the back of the top block to the edge of the applied live load
   - **LL Width** – width of the zone where the live load is applied (50 ft width is a conservative input that extends the load well past the failure plane of the retaining wall)
   - **Dead Load** – dead surcharge load with constant magnitude and presence (input in psf)
   - **DL Offset** – distance from the back of the top block to the edge of the applied dead load
   - **DL Width** – width of the zone where the dead load is applied
   - **Toe Slope Ang.** – angle (degrees) of the toe slope (below the wall), measured from the horizontal
   - **Toe Slope Length** – horizontal length of the toe slope
   - **Toe Slope Bench** – distance from the front of the base block to the top of the toe slope

   All other fields are set by default and generally do not need to be changed.

Water: *Allows for water analysis when required.*

1. If water analysis is required, select **Enable Water Analysis**.
2. If the water is above the base of the bottom block, select **Water is Above Footing** and fill all required fields. If the water is below the base of the bottom block, deselect **Water is Above Footing** and enter the depth of the water below the wall.

Soil: *Allows you to specify soil and leveling pad parameters.*

1. Under **Leveling Pad**, indicate whether the pad will be crushed stone or concrete fill.
2. Under **Soil Properties**, enter the friction angle (phi) for each soil type in the analysis.
   - **Reinforced** – soil behind the wall when geogrid reinforcement is used
   - **Retained (gravity wall)** – soil behind the wall when no geogrid is present
   - **Foundation** – soil beneath the wall
   - **Leveling Pad** – gravel (or concrete) fill directly beneath the base block

Seismic: *Allows for seismic analysis when required.*

1. If seismic analysis is required, check the box next to **Enable** and enter the necessary values in the above fields.

ANALYSIS RESULTS

Gravity Design: *Displays stability results if a gravity wall is used.*

1. Select **Gravity Design** on the left-hand side. Each time you click this, the software will regenerate the gravity wall design to match the newest inputted parameters.
2. If the leveling pad or any blocks are colored red, one of the factors of safety is not acceptable and a change should be made. The table at the top left and the box at the bottom right will help indicate which type of failure is occurring. If there are no red blocks, the design criteria have been met.

   NOTE: Depending on the available blocks that were selected in **Block – Reinforcement Info**, you can lengthen or shorten blocks in the analysis to produce different results. In the table at the top left, highlight the cell for the block you want to change and press SHIFT+RIGHT to lengthen or SHIFT+LEFT to shorten the block.

Reinforced Design: *Displays stability results if a reinforced wall is used.*

1. This tab is very similar to the **Gravity Design** tab above. Select **Reinforced Design** on the left-hand side and a reinforced wall design is generated.

NOTE: Geogrid lengths can be shortened or lengthened, just as block sizes can be changed. Follow the same procedure mentioned in the previous note, and geogrid lengths will change in 0.5 ft increments.

Global: *Determines the global stability of the soil surrounding the wall.*

1. Once the gravity or reinforced wall design meets all required factors of safety, it is important to ensure its global stability. On the left-hand side, select **Global**.
2. Click on the **Global Stability** option, which has a dark green flashing border. The software will calculate multiple global stability failure planes.

> NOTE: Each curved line represents a possible failure plane. The lines are color-coded according to the key at the top left. Match the line color with the key to determine the factor of safety against that failure. A factor of safety value is displayed above the wall (FS = _____) for the line with the lowest factor of safety.

OUTPUTS AND PRINTOUTS

Save Image: *Exports a wall profile image.*

1. Select **File > Save Image** to save the wall profile as either a JPG image or DXF CAD drawing.

Print Design: *Generates project printout with input parameters, wall profile, and calculations.*

1. If a simple analysis summary is needed, select **File > Print Design > Short**. A 2-page summary will display project information, input parameters, factors of safety, analysis results, and a wall profile image.
2. For a detailed analysis summary with calculations, select **File > Print Design > Long**. All details from the short summary will be included, as well as detailed calculations and formulas used to produce the resulting design.

> NOTE: To save the design as a PDF, select **Adobe PDF** or **Microsoft Print to PDF** as the printer and click **Print.**

3. A **Print preview** window will appear. Use the arrows at the top right to view all pages of the printout before printing or saving PDFs.

NOTE: **Print All Design Sections**, **Print Estimate**, **Print Estimate (DOC)**, and **Create Estimate Memo** do not apply to **Analysis mode**. For details on these options, see the **Getting Started – Layout** PDF tutorial.

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