

STEPS PRIOR TO THE CONSTRUCTION OF A BASIC RETAINING WALL

initial planning for a retaining wall

The sequence of events has been determined, in part, by the order of required information in the "Stamped Engineering Request Form."

1. Determine the slope of wall block to be used and area of construction.
2. If there is to be a slope at the top of wall or bottom of wall, use the "Slope Angle Determination Guidelines" (see pages A•4-5).
3. Sketch the project using the graph paper and "Sketching Instructions" (see pages A•6-7). Professional plans/prints should be used if available.
4. Choose the appropriate designs (soil type, case & wall height) that fit the site configuration from the tables included. If the soil friction angle is not known, it is best to be conservative and use the 26 degree soil tables.
5. Perform a materials estimate using the "Material Estimating Guidelines" (see page A•11-18) for hand calculation of materials needed or use the Microsoft Excel® based "Material Estimating Spreadsheet" (Instructions are included on the HTS website).
6. Contact the local building department, with copies of the above information in hand, to determine if permitting and/or stamped engineering is required.
7. If stamped engineering is NOT required, construct the retaining wall in accordance with the included "Installation Guide" (Section 3) and appropriate design tables.

If stamped engineering IS required, continue on to page A•3 and use the enclosed "Stamped Engineering Request Form" (found at the back of this book or download from our website - www.hardscapetech.com).

design ideas • BASIC WALLS



STEPS PRIOR TO THE CONSTRUCTION OF AN ADVANCED RETAINING WALL

When building a retaining wall that requires stamped engineering, follow steps 1-7 on page A•2 before continuing onto the steps below.

if stamped engineering is required

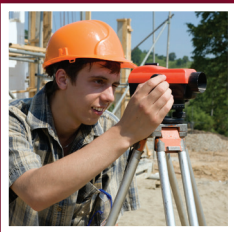
1. Fill out the "Stamped Engineering Request Form" found in the back of this book. Be sure to include your phone number and email address.
2. Photograph the retaining wall site using the "Photo Instructions" (page A•8-9).
3. If a professional soils report is not available, collect soil samples, in accordance with the "Soil Sampling Instructions" (pg A•10).
4. Send the following to Hardscape Technical Services
 - » Stamped Engineering Request Form
 - » Plan view and wall face profile sketches (pg A•6) or professional plans/prints
 - » Photographs (pg A•8). Forward as hard copies, on a CD, or email (if emailed, please note on subject line the name of the project to hts@hardscapetech.com.)
 - » Soil samples or professional soils report.
5. If faxed or emailed documentation is acceptable for your local building authorities, the turnaround time is estimated to be no longer than five working days from the day Hardscape Technical Services receives all the required information, including payment.

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**time-saving
TIP**

Rent a laser level from your local rental store for more accurate time-saving measurements.

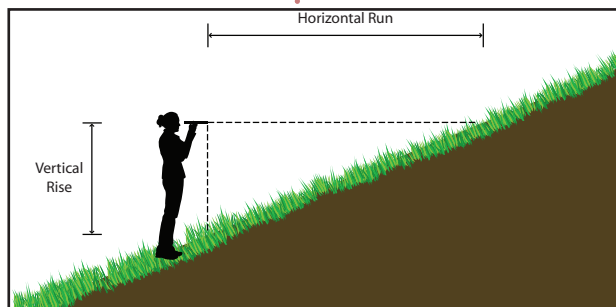


METHODS OF SLOPE DETERMINATION HAND LEVEL & TWO LEVEL METHOD

Determine the slope angle by finding the horizontal run and the vertical rise of the slope. To determine the run to rise ratio, divide the rise into the run. Two examples of this are; (1) if a slope has a horizontal run of 4' and a vertical rise of 2' it is a 2 to 1 slope or (2) if a slope has a horizontal run of 12' and a vertical rise of 4' it is a 3 to 1 slope.

Locate a spot on the slope that is representative of the slope. There are projects where the steepness of the slope varies and you will have to determine the slope angle in more than one spot. If you want to determine the slope angle in just one spot, choose the steepest spot. The following two pages give suggestions of methods for determining the run to rise of a slope.

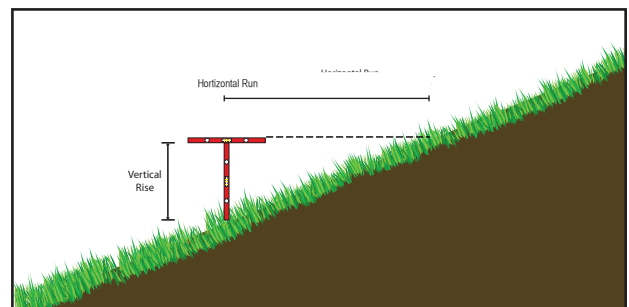
hand level



HAND LEVEL METHOD: Using a basic hand level to determine the Vertical Rise and Horizontal Run.

1. Stand on the slope, sight with the hand level, and mark the slope.
2. Measure from the ground to the middle of the hand level lens while it is at eye elevation to determine the rise.
3. Measure from the location of the hand level when sighting to the mark on the slope to determine the run.

two level

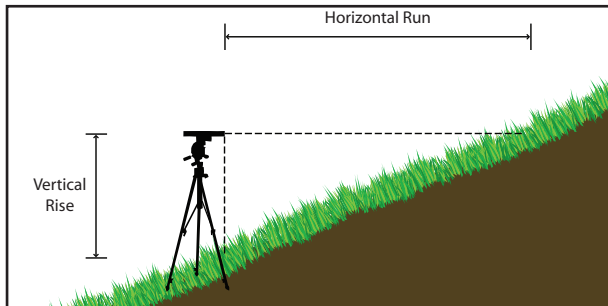


TWO LEVEL METHOD: Uses two basic levels to determine the Vertical Rise and Horizontal Run.

1. Hold one level (the longer level the better) plumb in the vertical position.
2. The length of the vertical level determines what the rise is.
3. Place the 2nd level horizontally on top of the vertical level forming a T with the top level in a level position perpendicular to the slope.
4. Sight along the top of the horizontal level and mark the spot on the slope.
5. Measure horizontally from the top of the vertical level to the spot marked on the slope to determine the run.

METHODS OF SLOPE DETERMINATION CONSTRUCTION LEVEL & PAPER METHOD

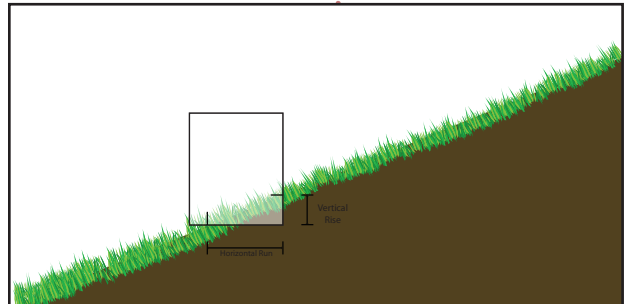
construction level



CONSTRUCTION OR TRANSIT LEVEL METHOD: Used to determine the Vertical Rise and Horizontal Run.

1. Set up construction level or transit on the slope.
2. Measure from the ground to the middle of the construction level or transit lens to determine rise.
3. Sight through the level or transit and mark the slope.
4. Measure from the level or transit to the mark on the slope to determine run.

paper

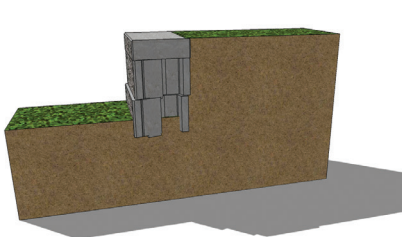


PAPER METHOD: Using a piece of paper to determine the vertical rise and horizontal run.

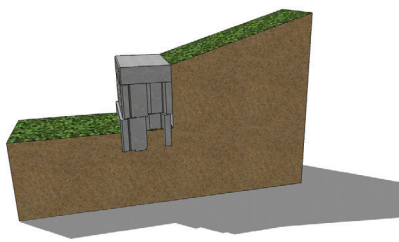
» **Graph paper works best, but a plain sheet of paper will do.**

1. Stand off to the side of the slope.
2. Hold the paper lightly between the forefinger and thumb so that it hangs plumb (directly vertical).
3. Hold the paper so that when you sight along the slope, the lower part of the slope will daylight at the bottom of the paper and the upper part of the slope will daylight at the side of the paper.
4. Mark on the paper where the slope daylights out of the bottom of the paper and where it daylights out of the side of the paper.
5. Measure along the bottom of the paper to determine the run of the slope and measure up the side of the paper to determine the rise of the slope. (Example: 8" run and a 2" rise = 4 to 1 slope)

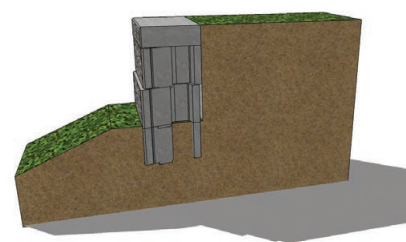
SLOPE TYPES



level top & bottom



slope top, flat bottom



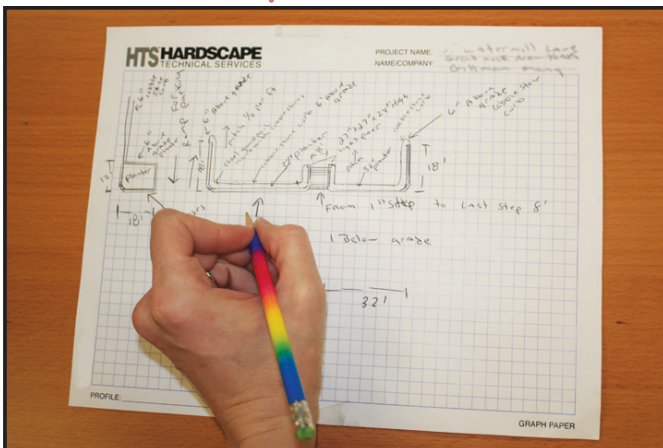
flat top, slope bottom

HOW TO PUT YOUR RETAINING WALL ON PAPER SKETCHING INSTRUCTIONS

Sketching is NOT necessary if, there are professional plans/drawings that include all of the items required for the sketching process.

If professional plans/drawings are not available, please continue with the sketching process. Included with these sketching instructions are two sample sketches of a hypothetical retaining wall project. One of the sample sketches is a plan view (from the top looking down) and the other is a wall face profile (face view of the retaining wall as if standing in front of the retaining wall).

This hypothetical project contains most of the top of wall and bottom of wall site configurations normally encountered including; slope at top of wall, surcharge at top of wall, flat at top of wall, slope at bottom of wall, and flat at bottom of wall.



helpful hints

USE GRAPH PAPER

» Sketches are most easily and most accurately drawn on graph paper. In the sample sketches the scale is 4' per square on 4x4 per square inch graph paper. Different scales can be chosen that will best fit with your retaining wall project.

USE SECTIONS

» When sketching retaining walls, they should be broken into sections. The grade or grade change of each section should be constant. The end of one section and the beginning of the next section would be at the starting point where the angle of grade change is different. A retaining wall can have from one to any number of sections.

(The clearest example of that is on the sample wall face profile sketches.)

The sample plan view and wall face profile sketches (on the following page) include all of the checklist items and should be a good "how to" reference when sketching your retaining walls. This information, accurately portrayed, is critical in determining which of the retaining wall designs to use on your project.

checklist

NECESSARY COMPONENTS OF THE SKETCHES

- ⊙ Indicate the direction North on the plan view.
- ⊙ Indicate exposed height at the beginning and end of each wall section.
- ⊙ Indicate the length of each wall section.
- ⊙ Indicate the proposed top of wall configuration for each wall section, for example; flat or positive slope. (positive slope angles up from top face of wall)
- ⊙ Indicate any surcharge (load) situations (such as; parking, driveway, building) at top of wall and distance (set back) that the surcharge is back from the face of the wall for each wall section.
- ⊙ Indicate the proposed bottom of wall configuration for each wall section, for example; flat or negative slope. (negative slope angles down from the bottom face of wall)
- ⊙ Slopes should be described by indicating the vertical rise to the horizontal run of the slope. (see page A•4)
- ⊙ When indicating the slope (example; 4 horizontal/1 vertical) on the plan view, include an arrow pointing in the down slope direction. (see the sample wall sketches on page A•7)
- ⊙ On the plan view, indicate which is the top of wall and which is the bottom of the wall.
- ⊙ If there is more than one wall, label or name each wall (For example: wall #1 etc. or West wall etc.)

HOW TO PHOTOGRAPH PROPOSED RETAINING WALL SITE PHOTO INSTRUCTIONS

IMPORTANT:

Photos of the site are a necessary component of the information gathering process. The preferred methods of transmittal would be via email in JPEG or JPG format; on CD; or hard copies. Faxed photos are the least desirable method of transmitting photos. Email to hts@hardscapetech.com (reference your name and the project name in the email), or send photos (printed or on a CD) with the "Stamped Engineering Request Form".

necessary elements

TO INCLUDE IN PHOTOS OF THE PROPOSED SITE

1. From the top of proposed wall site showing top of the wall conditions.
2. From the bottom of proposed wall site showing bottom of the wall conditions.
3. From the end of the proposed retaining wall site (take more than one for longer walls).
4. From the other end of the proposed retaining wall site (take more than one for longer walls).
5. Photo of any water conditions such as; seepage from the bank or pond, stream, standing water, etc., at bottom of wall.
6. Photo of any utility that might impact the retaining wall such as; utility pole or storm drain.
7. Photo of any surcharge (weight or load) that may be at the top of wall (example, pool, RV).
8. Photo of anything else that may impact the retaining wall.

potential retaining wall site



» for more example photos, refer to the following page.

section one: PLANNING

1. potential site • top

LOCATION OF THE TOP OF POTENTIAL WALL



2. potential site • bottom

LOCATION OF THE BOTTOM OF POTENTIAL WALL



3. side view • end

LOCATION OF THE END OF POTENTIAL WALL



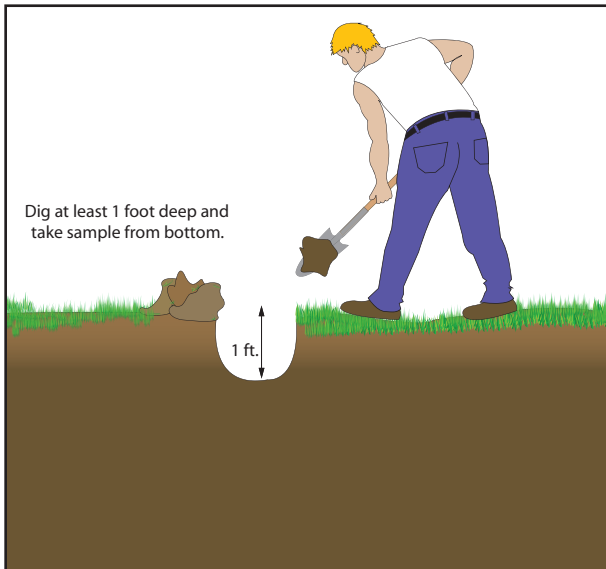
4. side view • end

LOCATION OF THE OTHER END OF POTENTIAL WALL



HOW TO OBTAIN A SOIL SAMPLE

SOIL SAMPLING INSTRUCTIONS



IF a soils report is available, please forward that with the "Stamped Engineering Request Form".

IF NOT, use this procedure to obtain the soil sample to be forwarded with the "Stamped Engineering Request Form".

Determine the location of the retaining wall.

1. Dig a hole at least one foot deep and take the sample from the bottom of the hole.
2. If one foot deep doesn't get below the topsoil, dig until through the topsoil.
3. Make sure that the soil sample represents the site soils.
4. Place soil sample in a quart zip lock bag (or the bag provided) and send with the "Stamped Engineering Request Form".

call before you dig!

Before beginning wall construction it is important to ensure that there are no underground hazards that could cause delays, disruptions or injury. Electric power lines, natural gas pipelines, communications lines, and other utility services could be within a few feet of the surface. Digging into an underground electric line can cause power outages and injury from shock or electrocution. A damaged gas pipeline or service to a house or business can create an explosion hazard that potentially endangers both persons and property.

In 1996 the United States Department of Transportation's Office of Pipeline Safety developed a national damage prevention and safety campaign now known as "Dig Safely". Since that time, the Dig Safely campaign has been used throughout the country to address damage prevention and worker safety. It is not difficult to find the right agency to contact in your area.

» **Go to www.digsafely.com and click on "One Call Contacts" for a list of who to call first in your area before you dig.**

ALTERNATELY YOU CAN USE THE 8-1-1 PROGRAM

how 8-1-1 works

One phone call to 811 starts the process to get your underground utility lines marked for free.

- When you call 811 from anywhere in the country, your call will be routed to your local One Call Center.
- Local One Call Center operators will ask you for the location of your digging job and route your call to affected utility companies.
- Your utility companies will then send a professional locator to your location to mark your lines within a few days. Once your underground lines have been marked, you will know the approximate location of your utility lines and can dig safely.

Go to www.call811.com for further information.