

This Technical Bulletin is the second in a series of information papers in which we will be providing application ideas and “how-to” tips for VERSA-LOK Retaining Wall Systems.

CONSTRUCTION DETAILS ON VERSA-LOK STEPS

Steps are easily built into VERSA-LOK retaining walls by using standard VERSA-LOK wall units as risers and by using standard cap units as treads. Two procedures are optional for the construction of the steps described in this bulletin.

They are:

FIGURE 1 BASE PEDESTAL METHOD
Step Riser Section

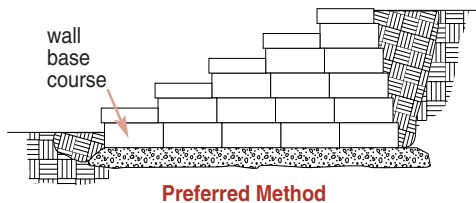
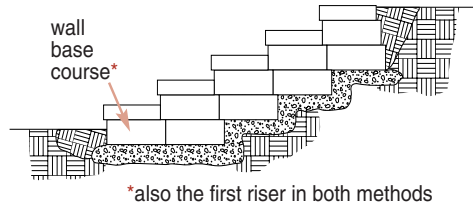


FIGURE 2 “CUT-IN” METHOD
Step Riser Section



The drawings shown for each method help to visualize the “step by step” installation instructions. The examples shown in this bulletin are five risers high and three VERSA-LOK units wide for illustration purposes only. Steps can be built substantially higher and wider.

STEP INSTALLATION - BASE PEDESTAL METHOD

Of the two construction procedures, VERSA-LOK recommends the Base Pedestal Method because of its labor-saving advantages and ease and accuracy of installation.

To minimize cutting and fitting of customized pieces, steps built into a retaining wall are usually located in a straight portion of the wall. The actual location is best determined once the wall base course is completed.

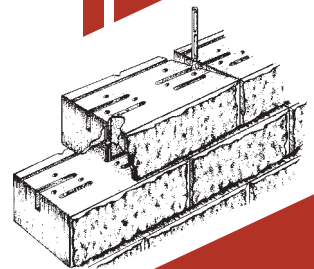
STEP 1 - Preparation of Pedestal Base

Start by excavating the pedestal foundation area deep enough to receive six inches of leveling pad material. This material should be coarse sand, gravel, or crushed stone. For a five-riser pedestal, provide space for four rows of base units and side walls. If required, provide other provisions such as drainage fill and drain pipe.

Place and compact base leveling pad material. Add 1/2 inch of sand on top to aid in final leveling. Use a trowel and 4-foot (or longer) level to ensure that the base is level from front to back and from side to side. Careful preparation of the pedestal foundation is critical to the stability and levelness of all riser and side wall units.



VERSA-LOK[®]
Retaining Wall Systems



STEP 2 - Building Step Riser Assembly

Based upon the width and number of risers in the step assembly, place and level pedestal base course units and side wall base units. (Figure 3) Place the second course of pedestal units so that they overlap the back 3/4-inch of the units below. Step assemblies do not pin.

Do not set any additional side wall units until all step riser units are in place and treads are installed. Continue building the step riser assembly until pedestal is completed. Position each unit to overlap 3/4 inch on the unit below.

If plans call for steps with more than six risers, we recommend starting a new pedestal every fifth riser. (Figure 4) Note that an extra base course unit must be added under the first riser of the second pedestal to add support at this point. Otherwise, the preparation of the granular leveling pad, the building of the pedestal and side walls, and the installation of the treads are identical to the procedures used for the first, or lower step assembly.

STEP 3 - Installing Treads

The treads (cap units) are now ready for installation. As mentioned earlier, install treads before stacking side walls. This avoids difficulties fitting caps between two existing walls. Typically, the width of the step riser assembly (measurement of the opening between side walls) will be in 16-inch increments - either two, three, or four VERSA-LOK units wide. However, it is possible to build wider steps following the same procedures for installing treads as described below.

FIGURE 3 Base Course Detail

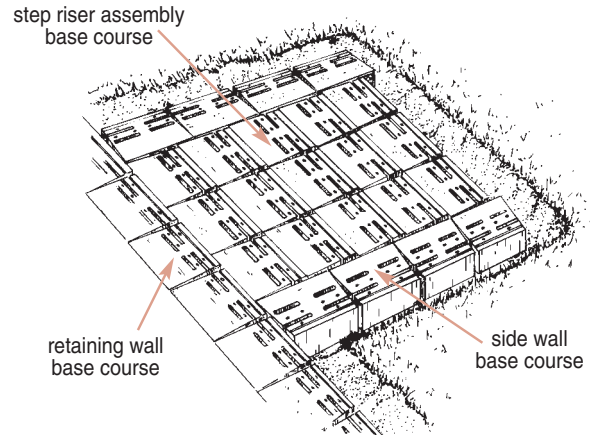
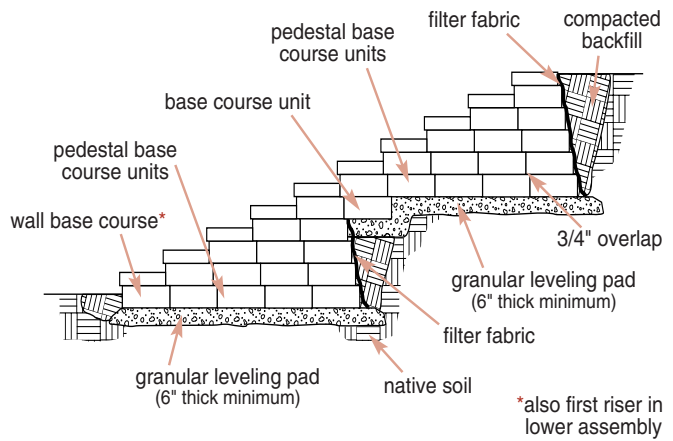
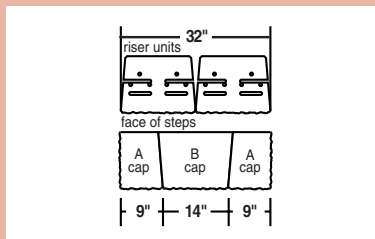


FIGURE 4 Step Riser Detail Double Base Pedestal Built in 5-Riser Increments



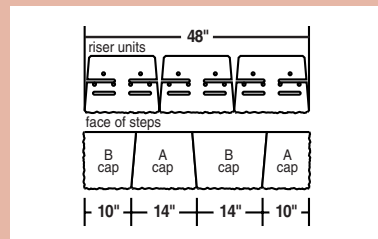
Step Riser Width:

32-inches (2 units)



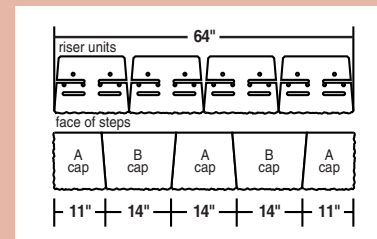
Center Type B cap in the opening as shown. There will be 18-inches of tread (measured at the face) left to fill the gap. Cut or split two Type A caps, 9-inches each, and install. Use VERSA-LOK Adhesive to bond all treads.

48-inches (3 units)



Measure halfway across at the face opening and mark. Set a Type A and a Type B cap as shown. Cut or split caps (measured at the face) to fill the gaps on either side. Use VERSA-LOK Adhesive to bond all treads.

64-inches (4 units)



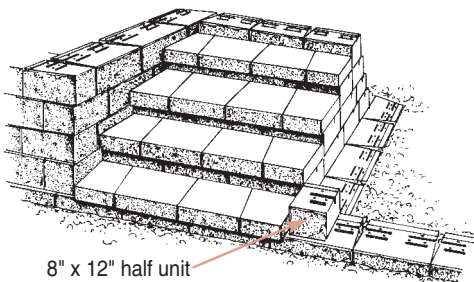
Center a Type A cap as shown; a Type B could also be used. Alternate caps on both sides and cut outside caps to fill the remaining gap. Always measure at the face. Use VERSA-LOK Adhesive to bond all treads.

Surfaces that are bonded must be clean and dry. After cutting and fitting the caps to be used as treads, remove them one at a time, apply adhesive to the riser and replace tread, pressing firmly in place. Always start at the top step and work downwards. Allow 48 hours for maximum adhesion before use. By assembling all step risers and treads in the above described sequence, step construction can easily be finished by the addition of the side walls.

STEP 4 - Building Side Walls

After placing tread caps, install vertical side walls. Start by placing a half unit at the outside corner of the step assembly. (Figure 5) This is set in either the 8-inch or 12-inch direction to establish a suitable bond for the remainder of the wall. Adhere half units using VERSA-LOK Adhesive. All corner and side wall units for step assemblies cannot be pinned. Remember, side walls for steps must be laid vertical - no setback - to eliminate the gap between steps and side walls. The front (retaining) wall maintains the 3/4-inch setback per

FIGURE 5 Side Wall Assembly - Base Pedestal Method



course. Continue building the side walls to the back of the step pedestal at same time as installing the portion of the front wall needed to support the corner units. Most side wall units are restrained from any movement by both the step assembly and backfill. The top and front side wall units that are not restrained should be bonded to the unit(s) below with VERSA-LOK Adhesive or by drilling and pinning.

STEP 5 - Finish Step/Wall Installation

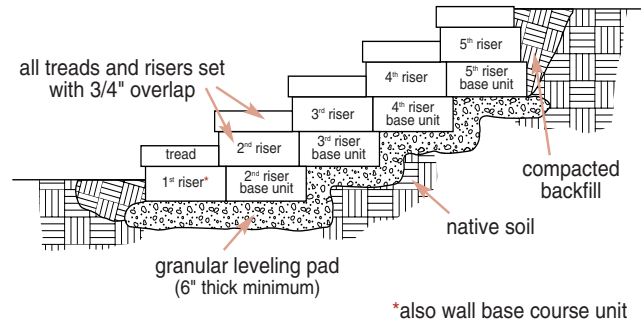
Place and compact backfill in all overexcavated areas. To prevent fines penetration through step and wall joints, filter fabric can be wrapped around the portion of the pedestal and side walls that are below grade.

When the side walls and front retaining wall are completed, cap all walls as recommended in VERSA-LOK's Technical Bulletin #4.

STEP INSTALLATION - "CUT-IN" METHOD

A second procedure for building VERSA-LOK steps is the "Cut-In" Method. (Figure 6) This is accomplished by cutting into the slope for each set of risers.

FIGURE 6 Step Riser Detail - "Cut-In" Method

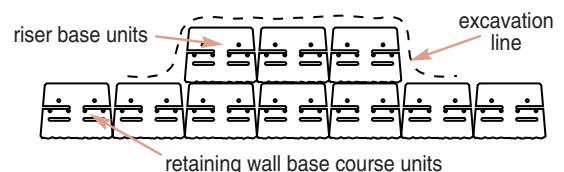


Although this method requires fewer riser units, considerably more time and attention to accuracy is required to build and compact a level soil platform for each set of risers. A thin leveling pad is needed for each riser. For non-granular soils like clay, a minimum of six inches of compacted granular, coarse-grained leveling pad material is required. The "cut-in" method also requires that both side walls be built as construction progresses from riser to riser. As with pedestal steps, the side walls are independent from the steps and are built vertical with no setback.

INSTALLATION INSTRUCTIONS

1. To start, excavate a work area behind the wall base course for the placement of three base units (for this example) as shown in Figure 7.

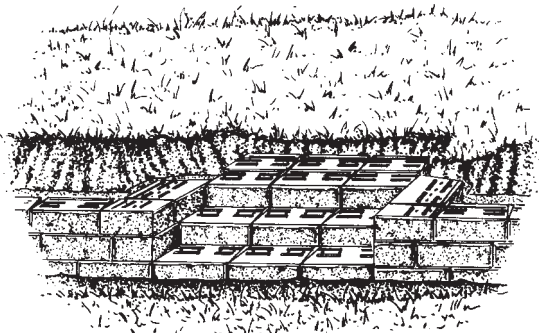
FIGURE 7 Base Course Detail - "Cut-In" Method



2. Thoroughly compact work area and place the second riser base units level with the wall units.
3. Excavate and compact back another 14-16 inches for third riser base units. Place these three units with a 3/4-inch overlap on the back edge of the second riser base units. Note that wall units and treads in this assembly will also overlap the 3/4 inch.

4. Place second riser units. (Figure 6)
 5. Start the side walls by placing half units at the outside corners of the stairway opening. Use VERSA-LOK Adhesive to bond this corner unit and all subsequent corner units. Remember, side walls are vertical and flush with the risers. The front wall maintains the 3/4-inch setback. Extend the front wall to the right and left of the corners at least six to eight units.
 6. Excavate and compact the area for the fourth riser base units and for the continuation of the sidewalls. Place the base units and third riser units the same as mentioned in No. 3 and No. 4 above.
 7. Continue the side walls by placing and adhering corner half units. Extend the side walls back one unit, setting them flush with the risers. Also, extend the front wall outward to receive the next course of units. The "cut-in" installation at this point should look the same as Figure 8.
9. Add backfill material and compact behind each course as it is completed. Excavate and compact for each additional set of risers. Complete as per previous instructions until the step assembly and adjacent side walls are done.
 10. Finish the entire step assembly and walls by installing treads and caps. See STEP 3 - Installing Treads in this bulletin and refer to Technical Bulletin #4 - VERSA-LOK Caps.

FIGURE 8 Step/Side Wall Detail - "Cut-In" Method



8. Repeat instructions covered in No. 3 and No. 4 for riser units. Continue side wall construction with a half unit at the corner and with wall units

Recommended Installation Equipment

- square and round nose shovels
- large finishing trowel
- hand tamper and/or power compactor
- level - 4 foot or longer
- string line
- line level
- hammer and 5# sledge hammer
- ruler and tape measure
- 3" or 4" masonry chisel
- brick tongs (to carry & set units)
- concrete saw
- caulking gun

VERSA-LOK offers a variety of technical support including in-house engineering assistance and reference literature. Please call (800) 770-4525 with questions or to request any of the following:

- Tech. Bulletin #1 Shoreline & Retention Ponds
- Tech. Bulletin #3 Curves & Corners
- Tech. Bulletin #4 Capping
- Tech. Bulletin #5 Base Installation
- Tech. Bulletin #6 Vertical & Freestanding Walls

Ask for VERSA-LOK'S DESIGN & INSTALLATION GUIDELINES for additional information.



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U.S. Patent D346,667 and other U.S. Patents pending;
Canadian Industrial Design Registration
No. 63929, No. 71472, No. 73910, No. 73911 and No. 73912.