

Stairs

2

TECHNICAL BULLETIN

This Technical Bulletin is the second in a series of informational papers that provide application ideas and “how-to” tips for VERSA-LOK® Retaining Wall Systems.



VERSA-LOK® Standard units combined with VERSA-LOK Caps can create a variety of attractive and functional stairs that match the natural, classic look of VERSA-LOK Standard retaining walls. The size of VERSA-LOK Standard units—six inches high by 12 inches deep—easily adapts to construction of 2:1 (horizontal: vertical) step risers. Because VERSA-LOK Standard units are solid, they make stable step risers and can be easily modified for many types of stairs, including stairs inset into retaining walls or stairs that extend out from walls.

This technical bulletin provides a general overview of stair construction using VERSA-LOK Standard units and caps. However, none of the information presented here should be interpreted as final construction details. There are a variety of building codes that may apply to your project including step and railing requirements. The details shown here may not be in compliance with codes governing your project. Check with your local building code official and ensure any applicable stair details are met. Site conditions and design considerations will vary, so a qualified professional engineer should prepare a final, project-specific design based on actual site conditions.



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INSTALLING THE BASE PEDESTAL

For all types of VERSA-LOK® stairs, the “base pedestal” installation method is suggested for ease of construction. Using this method, the base courses beneath the step risers are all built at the same level. Then a pedestal of units is stacked to create subsequent step risers (Figure 1). While this method requires more units than simply cutting in a base for each riser, it can save substantial labor costs. This method also creates more accurate, level, and stable stairs.

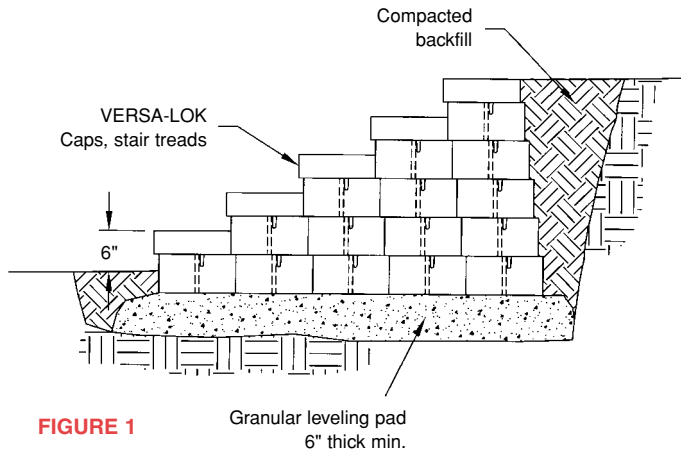


FIGURE 1

Careful preparation at the bottom of the pedestal is critical to the stability and levelness of the stairs. The leveling pad material should consist of crushed gravel, at least six inches thick. After placing and compacting the gravel, carefully check and adjust the level. A layer of fine sand may be used for final leveling. Place base course units on the leveling pad and check the level of the units front-to-back, side-to-side, and diagonally with a four-foot-long level. For more information regarding leveling pads and base installation, see Technical Bulletin No. 5—Base Installation.

The base course for stairs is usually buried 3-1/2 inches below the planned grade, leaving 2-1/2 inches of the unit exposed above grade. When a cap unit (about 3-1/2 inches high) is later placed on an embedded unit, it will create a six-inch-high step up from the grade (Figure 1).



Often, stairs are built into retaining walls, inset between sidewalls.

Create the remaining six-inch-high by 12-inch-deep risers by stacking courses of units in a pedestal. Shift each subsequent course of units forward about 3/4-inch, so they slightly overlap the row below (Figure 1). This will create an attractive overhang of the caps units when they are installed as treads.

If plans call for more than six risers, build the stairs in separate pedestals, each no more than five risers high (Figure 2). Building pedestals of more than five risers would bury more units than necessary.

Units placed in the stair pedestal are not pinned. The weight of the pedestal generally provides enough friction to keep stair units in place. If desired, use VERSA-LOK Concrete Adhesive to adhere each course to the one below. Be sure this completely cures before stairs are used, so the units do not shift (this can take several days).

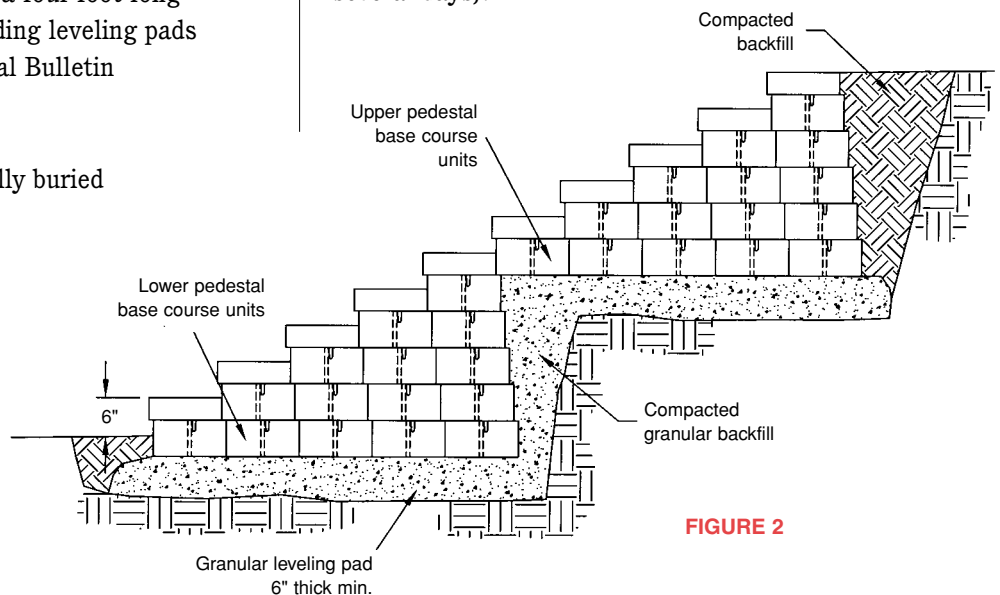


FIGURE 2

INSET STAIRS

Often, stairs are built into a retaining wall, inset between two sidewalls. These sidewalls usually turn back at 90-degree outside corners from the main retaining wall. The sidewalls are generally built vertical. This keeps the width of the risers the same throughout the height of the stairs.

To minimize cutting and special fitting, build the width of the stair risers equal to a whole number of units (each unit is 16 inches wide at the face). For example, risers could be 48 inches wide (three units), or 64 inches wide (four units) etc. Also, for each planned step, place a row of units in the base. For example, if the stairs are five risers high (2.5 feet), then place five rows of units in the base course (Figure 3).

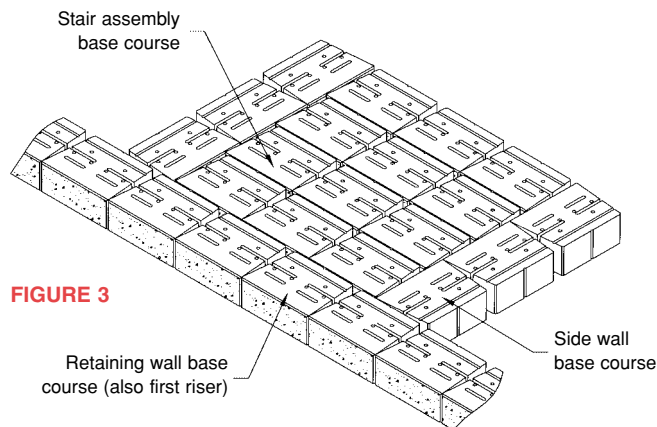


FIGURE 3

Level the base units for the retaining wall, the sidewalls and the stairs all at the same time.

The front of inset stairs is usually built in line with the main wall. The retaining wall base course then acts as the first riser for the stairs (Figure 3). Place subsequent risers according to the pedestal method and then place and adhere cap units as treads (see “Caps as Stair Treads” section).

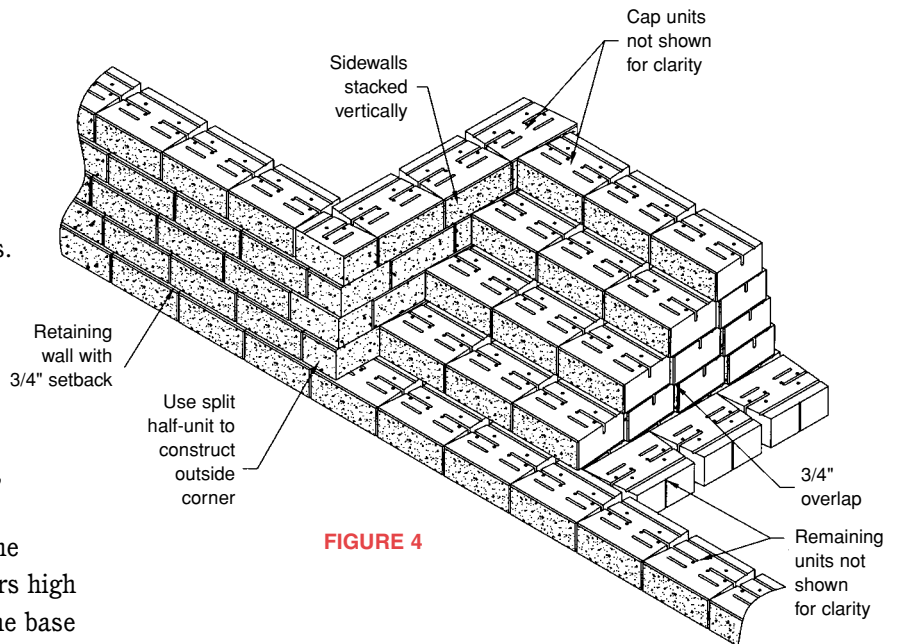


FIGURE 4

Only after the entire stair pedestal is installed and capped should the vertical sidewalls be built. Start these walls by placing a half-unit at the outside corners of the stair assembly (Figure 4). The half-unit is simply a whole VERSA-LOK® Standard unit split down the middle, creating a textured face on the side that matches the front split face.

Working out from the half-unit at the corner, place whole units for the sidewalls and the front retaining wall. For each subsequent course, alternate the direction of the half-unit at the corner and build out from the corner. Remember, the sidewall units are usually stacked vertical, while the front retaining wall units are setback the standard 3/4-inch per course.

The sidewall units and the half-units at the corners cannot be pinned. Most of these units will be buried or kept in place by the stair pedestal. For the few units that are not restrained, adhere them with VERSA-LOK Concrete Adhesive.

When the sidewalls and front retaining walls are completed, cap these walls using the standard methods for capping VERSA-LOK Standard walls as described in Technical Bulletin No. 4—Caps.



With VERSA-LOK® units, the exposed sides of stair pedestals can have textured split faces.

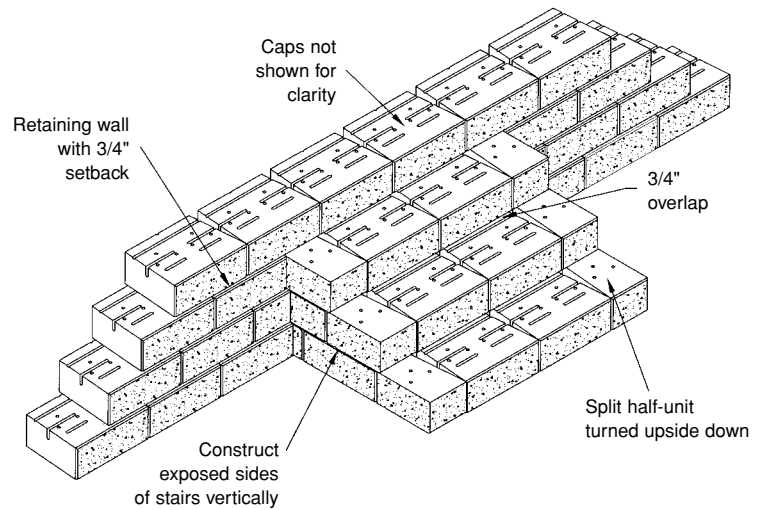


FIGURE 5

STAIRS EXPOSED ON BOTH SIDES

Rather than being inset, sometimes stairs extend out from a wall. In these cases, the sides of the stair pedestal will be visible. For aesthetics, these exposed sides can be built with textured split faces that match the front of VERSA-LOK Standard walls.

Place half-units at both edges of each riser. Similar to a 90-degree outside corner, the half-units provide a textured split face for the side of each riser. For the remaining portions of the sidewalls, place whole units with the front, textured face of the units facing out (Figure 5).

To minimize special fitting, build the exposed sidewalls vertical. This keeps the risers at the same width throughout the height of the stairs. If the exposed stairs extend out from a VERSA-LOK Standard wall, interlock each course of the sidewalls into the main retaining wall, similar to installing an inside 90-degree corner.

Level the base units of the stairs and the retaining wall at the same time. Figure 6 shows a suggested installation sequence for exposed stairs (four feet wide and two feet high) extending from a VERSA-LOK Standard retaining wall.

The units inside the pedestal are not visible and do not have to fit tightly. However, they should be arranged to provide proper support for the units above.

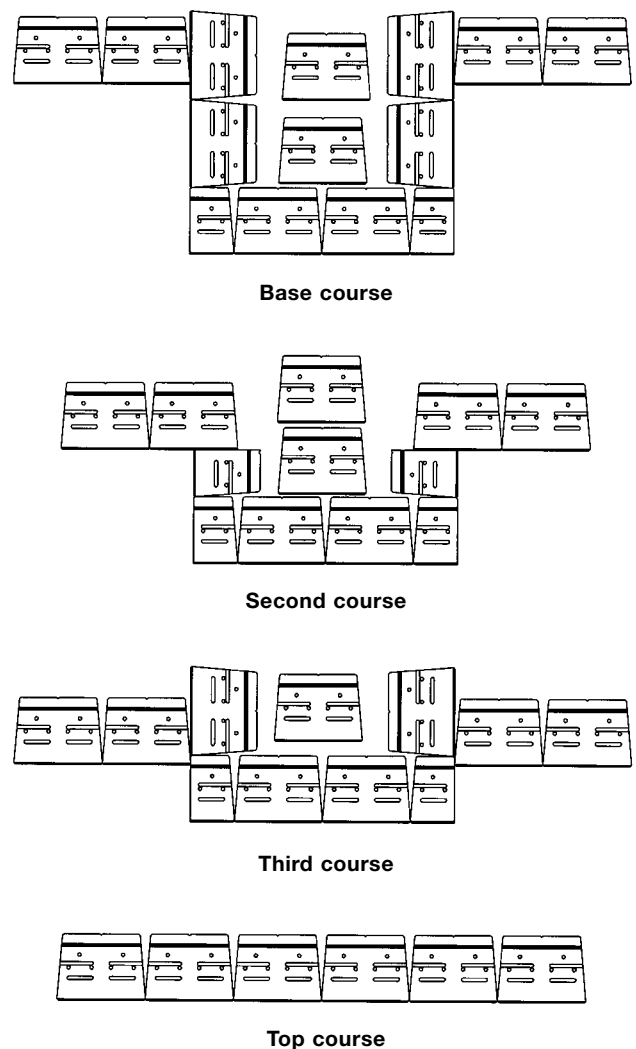


FIGURE 6

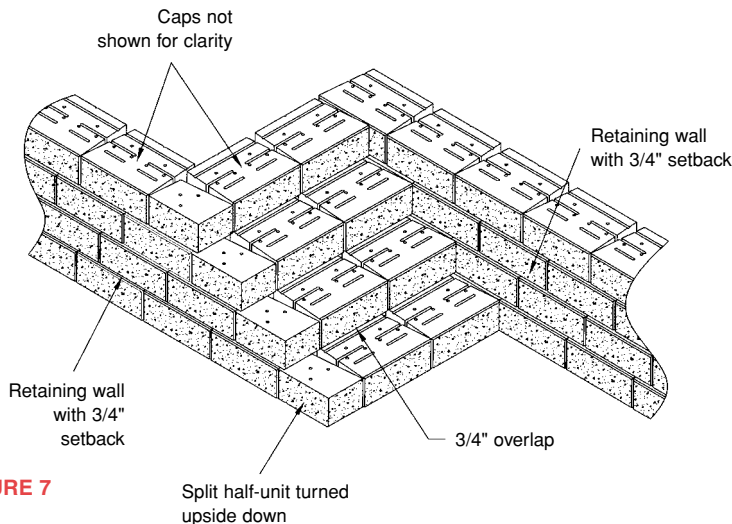


FIGURE 7

STAIRS EXPOSED ON ONE SIDE

Sometimes stairs are run along a retaining wall, with one side abutted into a wall and the other side exposed. For an attractive appearance, the exposed side of the stairs can be built with a split, textured face that matches the retaining wall (Figure 7).

Place a half-unit at the exposed side of each riser. This creates a 90-degree, textured corner. On the other side of the stairs, butt each riser into the retaining wall.

When the risers are abutted to a setback retaining wall, the exposed side of the risers will automatically also have a setback. If the exposed side of the stairs continues on to become a retaining wall, this setback in the risers will match the setback in the retaining wall it joins.

Level the base units for the stairs and the retaining wall at the same time. Figure 8 shows a suggested installation sequence for stairs with one side exposed (40 inches wide and two feet high).

The units inside the pedestal are not visible and do not have to fit tightly. However, they should be arranged to provide proper support for the units above.

GEOGRID REINFORCEMENT

If the sidewalls along inset stairs exceed four feet in height, geogrid soil reinforcement is required for sidewall stability. Generally, geogrid reinforcement is not needed within stair pedestals because the entire pedestal is made of a stable mass of units. However, for exposed stair pedestals with sidewalls exceeding four feet in height, geogrid may be required. See the *VERSA-LOK® Standard Design and Installation Guidelines* for information on geogrid installation. A qualified professional engineer should prepare a final, project-specific design based on actual site conditions.

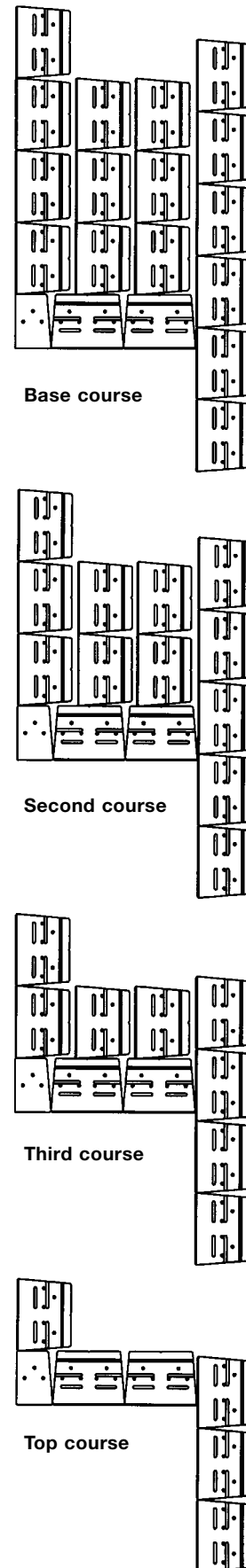


FIGURE 8

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U.S. Patent 6,488,448,
U.S. Patent D139,885,
U.S. Patent D321,060,
U.S. Patent D341,215,
U.S. Patent D346,667,
U.S. Patent D378,702,
U.S. Patent D391,376,
U.S. Patent D435,302,
U.S. Patent D452,332 and
other U.S. patents pending;

Canadian Industrial Design
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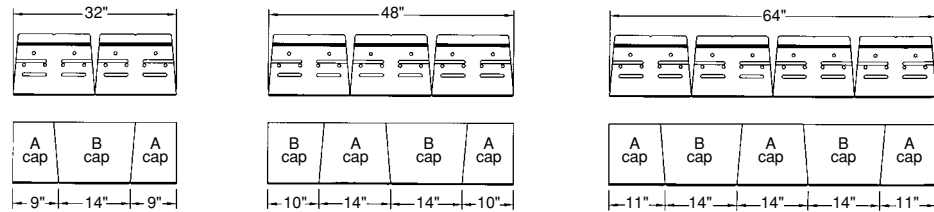


FIGURE 9

CAPS AS STAIR TREADS

VERSA-LOK® Cap units make excellent treads for stairs. Generally, start capping at the top step and work downwards. For straight steps, alternately place A and B caps along the length of the riser. The front of the caps should overhang the units below by about 3/4-inch.

When placing caps as treads for inset stairs, saw-cut or split the caps so they will fit in the space between the sidewalls. (Install caps on inset stairs before installing both sidewalls). Figure 9 shows example cap arrangements for straight, inset stairs in a variety of widths. For caps on steps that will be exposed on one or both sides, split the side of the caps at the exposed ends of the risers, similar to capping an outside 90-degree corner. For aesthetics, have the split side of the caps overhang the exposed side of the stairs by 3/4-inch.

Before adhering caps, complete any modifications and arrange them on the stairs to check alignment. Place two continuous, 1/4-inch beads of VERSA-LOK Concrete Adhesive on the step units. Set the caps into place and press them firmly into the adhesive. Adjust caps as needed before the adhesive sets. Allow at least 2-3 days (in warm weather) for adhesive to cure before using the stairs. For more information, see Technical Bulletin No. 4—Caps.

ICE REMOVAL

In northern climates, road salts are often used to de-ice stairs. Road salts and other de-icing chemicals can be detrimental to concrete products. Before using a particular de-icer on VERSA-LOK stairs, consult with your local VERSA-LOK supplier.

RAILINGS

Railings are needed for many stairs. Check with your local building codes regarding railing requirements. For more information on installing railings in VERSA-LOK walls and stairs, see Technical Bulletin No. 8—Fences, Railings, & Traffic Barriers.