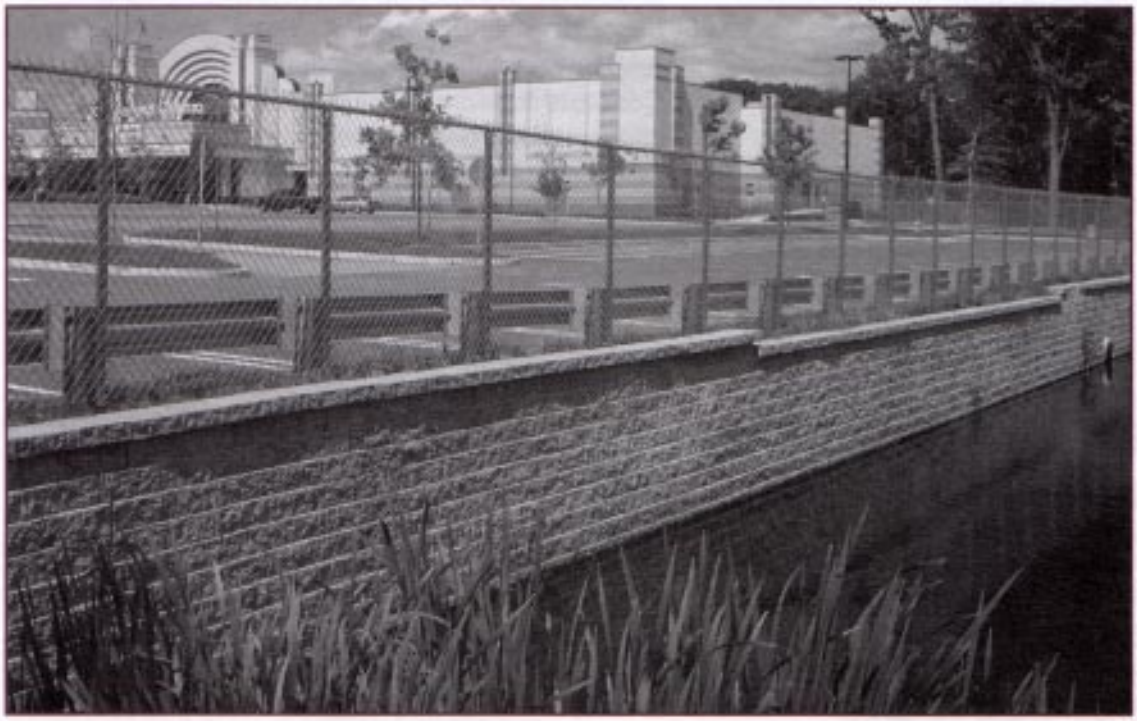
This Technical Bulletin is the eighth in a series of informational papers that provide application ideas and "how-to" tips for VERSA-LOK Retaining Wall Systems.

FENCES, RAILINGS, & TRAFFIC BARRIERS



There are many specialized construction techniques that can be applied in the installation of VERSA-LOK walls, such as tiers and terraces, freestanding walls, water applications, etc. Technical support, including in-house preliminary engineering, construction details on CD-ROM, and a technical bulletin series, is available from VERSA-LOK covering the design and installation of each of these construction techniques.

This technical bulletin discusses other specialized applications to VERSA-LOK walls — different types of top-of-the-wall barriers, including fences, guide rails, concrete traffic barriers, and stair rails. While this bulletin provides general suggestions for fence and railing installation behind VERSA-LOK walls, conditions will vary with each project. Information presented here should not be interpreted as final construction details; further, project-specific engineering is necessary.

FENCES

Whenever possible, fences should be installed several feet behind VERSA-LOK walls to provide a stable foundation for the posts. A minimum depth for fence post embedment is 30"; depending on site loading, more embedment may be needed. Fences can be installed after the entire wall is completed or during construction. If the wall is completed, you can dig or drill the post holes, set the posts, and pour the concrete in sequence the entire length of the wall.

Providing post holes during construction is also an easy matter. Cylindrical concrete tube forms can be placed at planned post hole locations and backfill placed around the tubes. When the wall is completed, concrete and fence posts can be placed in the tubes. (See Figure 1)

VERSA-LOK®
Retaining Wall Systems

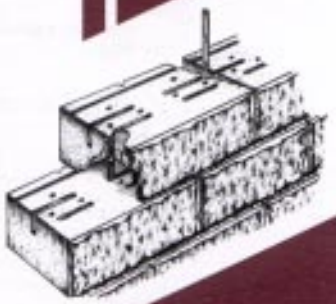
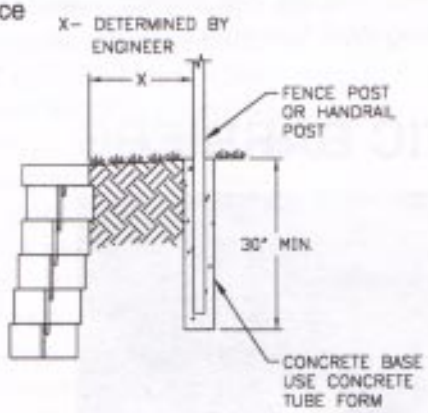


Figure 1

Post Detail Typical Section —

Handrail or Fence Post (Setback from Wall)



If there is little or no space to put the fence back from the wall, it can be positioned as part of the VERSA-LOK wall. (See Figures 2 and 3) It will be necessary to break off parts of the backs of three retaining wall units to create a "post hole" in which to place rebar and to embed the post in concrete. The concrete should extend a minimum of 12" behind the post to help stabilize the fence against overturning. Depending on loading, more embedment may be needed. The cap unit should be cored or cut to receive the post. The fence should have joints to accommodate differential movement between the wall and the fence.

Figure 2

Post Detail — Section A-A

Typical Handrail or Fence Post (No Setback)

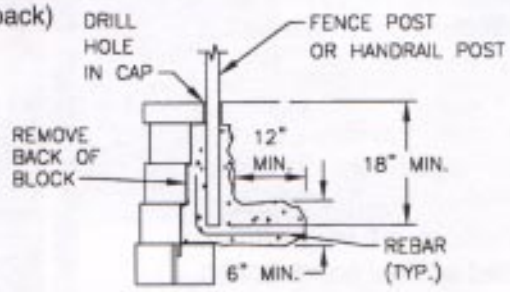
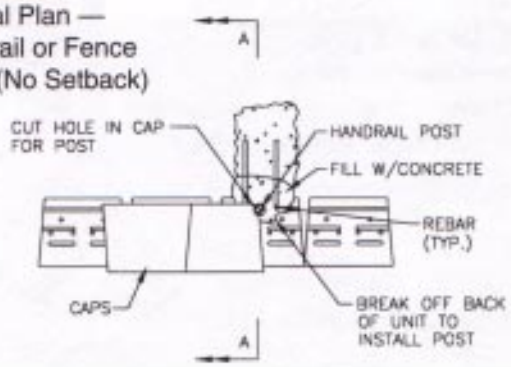


Figure 3

Post Detail

Typical Plan — Handrail or Fence Post (No Setback)



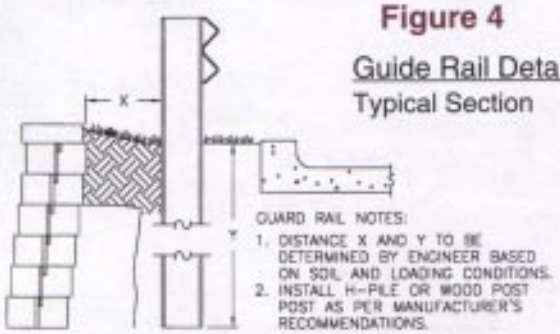
GUIDE RAILS

Guide rails used for vehicular traffic control can easily be installed behind VERSA-LOK segmental retaining walls. (See Figure 4) Posts, either wood or steel, should be placed a minimum of 36" behind the wall face to provide anchoring of the post into reinforced soil area. Embedment depth should be determined by the project engineer, depending on site loading. For highway loads, AASHTO recommends a depth of five feet. Concrete tube forms placed during wall construction can be used for installation of the railing's foundations.

Figure 4

Guide Rail Detail

Typical Section



WHEN POSTS PENETRATE GEOGRID

For geogrid-reinforced walls, fence and railing posts will often extend below the top layer(s) of geogrid. The geogrid can be cut to fit around the planned post locations, per the geogrid manufacturer's recommendations. Usually the top layers of geogrid can accommodate small intrusions without significantly compromising the reinforcement capacity. However, the area cut out of the geogrid should be no more than the minimum needed to fit the post. Augering or driving through backfilled geogrid is generally not suggested because it can excessively disturb or pull the geogrid from the soil. The wall design engineer must review any planned post intrusions to ensure that they do not reduce the geogrid strength below needed levels.

When space allows, fences and railings should be placed several feet behind VERSA-LOK units.

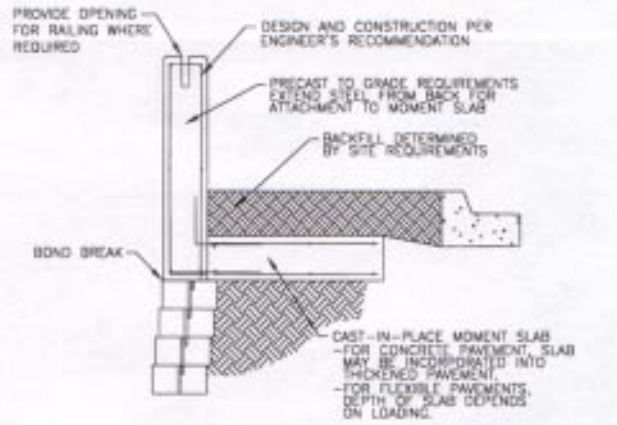
CONCRETE TRAFFIC BARRIERS

When space is too limited to adequately set back traffic guide rails behind the wall, concrete traffic barriers can be installed directly on top of the wall. These barriers can be formed and cast in place, or precast Jersey-type barriers. To resist lateral and overturning loads from traffic, cantilevered supports extending behind the walls stabilize the barriers. (See Figure 5)

Design of these barriers is project specific; steel design and coping geometry will vary with specific site conditions and loadings. Barriers of this type must be designed to accommodate differential movement between the retaining wall and the barrier. Control joints should be inserted along the length of the coping at a maximum spacing as specified by the engineer. Note suggestions regarding use of expansion joint and bond break materials in Figure 5. During placement of concrete for these barriers, precautions should be taken to reduce lateral pressure on the existing wall by using temporary bracing.

Figure 5

Coping Detail Traffic Barrier Section



VERSA-LOK units are adaptable to various wall, stair, and deck anchoring options.

STAIR RAILS

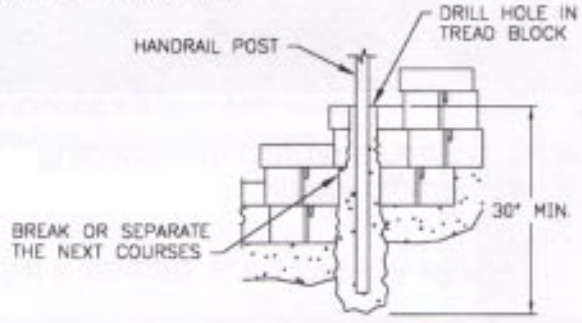
Hand rails and rail posts can be anchored into VERSA-LOK stair assemblies in different ways: by anchoring posts in the ground just outside of the stair assembly, or by anchoring them directly into the riser and tread units themselves. Because VERSA-LOK units are solid, and because many fasteners and techniques are available for attaching posts and railings to masonry and concrete, this is an easy task.

For step assemblies with a large number of risers, where spanning from landing to landing is impractical, attaching railings to side walls is preferred. If side walls are not available, rail posts can be anchored directly into VERSA-LOK stair assemblies. A hole is drilled into the cap unit (stair tread) to receive the post — the affected riser units beneath can be cut or broken off at the back to form a post hole a minimum of 30" deep. This will then be filled with grout or concrete to anchor the post. (See Figure 6)

Special techniques and devices, developed expressly for fastening railings and posts to masonry and concrete, have made the attachment easy. Some fasteners are simply embedded in plastic grout or mortar; others actually cut threads into the masonry. The appropriate fastener for each specific project may vary with site and loading conditions; refer to your fastener manufacturer's recommendations.

Figure 6

Post Detail Typical Section — Handrail Post at Stairs

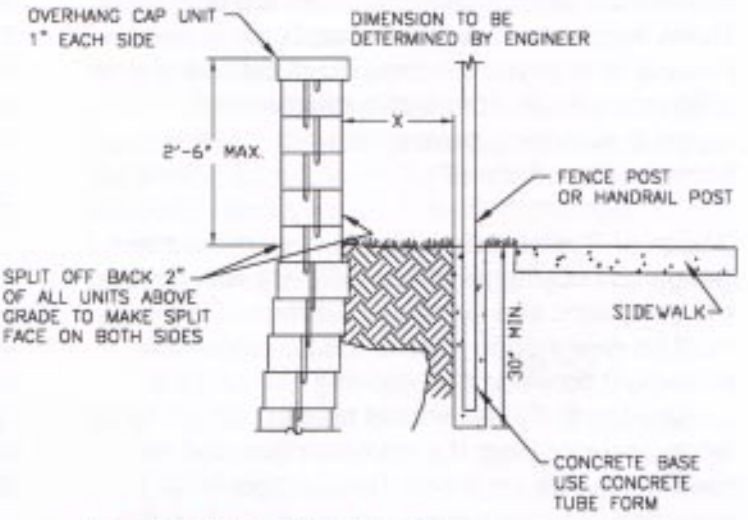


FREESTANDING WALLS

VERSA-LOK units can be modified to create straight, freestanding walls that extend above grade with split textured faces exposed on both sides. (See VERSA-LOK Technical Bulletin #6 for more information.) These freestanding walls are for aesthetics only. They should not be relied upon to resist any lateral loads and should not exceed 2.5' to 3.0' in height. To protect freestanding walls from pedestrian or traffic loads, fences and railings should be installed behind the wall using conventional anchoring procedures. Suitable distances to place posts from the wall will vary with loadings and should be determined by the project engineer. All posts should be anchored in concrete a minimum depth of 30". (See Figure 7)

Figure 7

Freestanding Wall Detail (Straight Walls Only)
Typical Handrail or Fence Post



DOUBLE WALLS

Double VERSA-LOK walls, spaced far enough apart, can provide a wider, lower alternative to a tall fence, depending on local code requirements. Ideally, these walls can be used as planter enclosures, as shown in the photo below, to add pleasing aesthetics to the landscape. Check your local codes for application and required width.

Rails should protect freestanding walls from traffic loads.

With proper engineering, double walls are an alternative to fences where codes allow.

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

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