

**11- What about the types of fences
which can be installed at the top
of the keystone wall?**

Retaining Wall Drainage Options

Poor drainage is a leading cause of retaining wall failures. Hydrostatic pressure can accumulate behind a wall and add an increased load on the wall if drainage provisions are not installed or not adequate for the conditions. The Keystone system has superior drainage features. The techniques below should be considered where the specified drainage issues are present.

1. Basic drainage/Unit drainage fill

Keystone's mortarless, interlocking system, with a free draining gravel drainage zone and corefill (See "Installation: Step-by-Step" section), allow proper drainage under most circumstances. No weep holes are necessary.

2. Surface run-off

Divert surface drainage at the top of the retaining wall by placing a impermeable soil cap (i.e. clay) or formed swale (i.e. soil or concrete) along the back surface of the Keystone units. This will help direct run-off away from the retaining wall.

3. Embankment flow

When embankment ground water flow behind the wall is likely, place a drainage composite or chimney drain over the cut soil (see product suppliers for recommended coverage and installation instructions or drainage composite). The drainage composite or chimney drain should drain to an outflow pipe (i.e. drain tile) to remove water. Numerous cost-effective products are available to serve this purpose.

4. Ground water flow

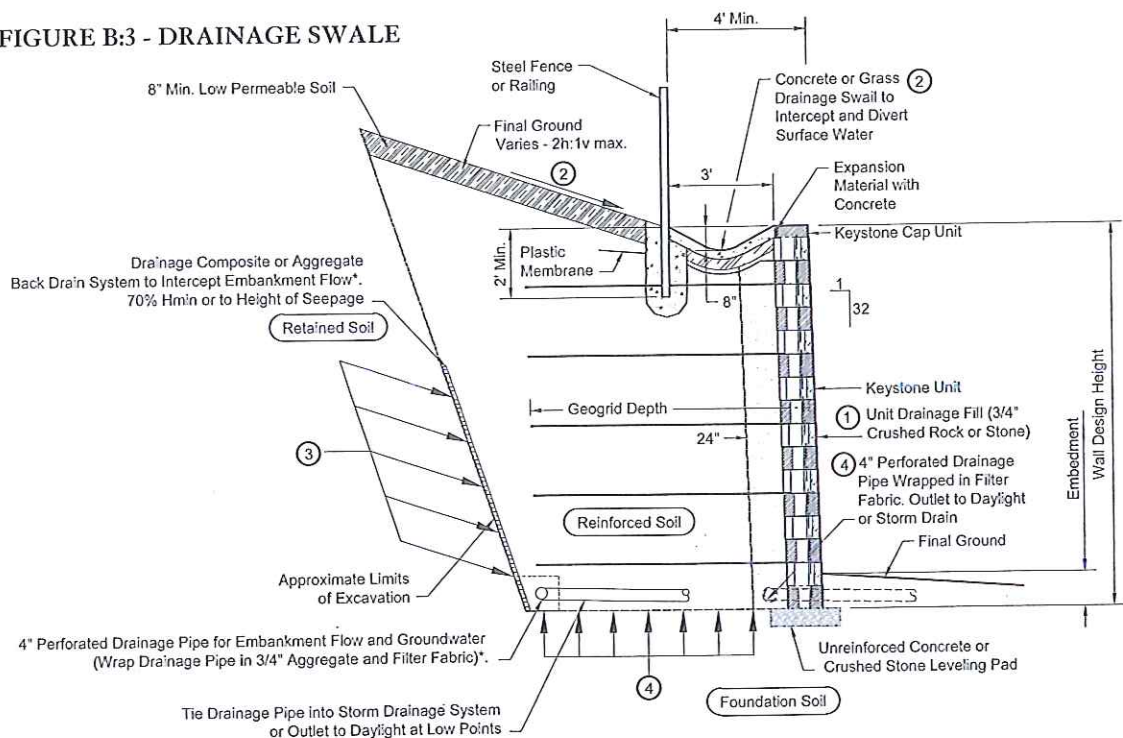
The effects of seasonally fluctuating ground water, at the base of the retaining wall, can be offset by placing an outflow pipe (i.e. drain tile) behind the lowest unit, along with a drain behind the reinforced fill.

GENERAL NOTES:

*Rear drainage pipe should be included when:

- » Groundwater or seepage is present in retained soils
- » Springs or seasonal seepage potential is noted in geotechnical report
- » Reinforced soil of lower permeability than retained soils
- » Generally, additional drainage material such as aggregate drains & fabrics and/or drainage composite nets are used in conjunction with rear drainage pipe as directed.
- » When above conditions are not present or groundwater conditions are not a factor, the rear drainage pipe may be omitted or alternately located behind units at the base of the drainage fill.

FIGURE B:3 - DRAINAGE SWALE



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SPECIALTY - TRAFFIC BARRIERS

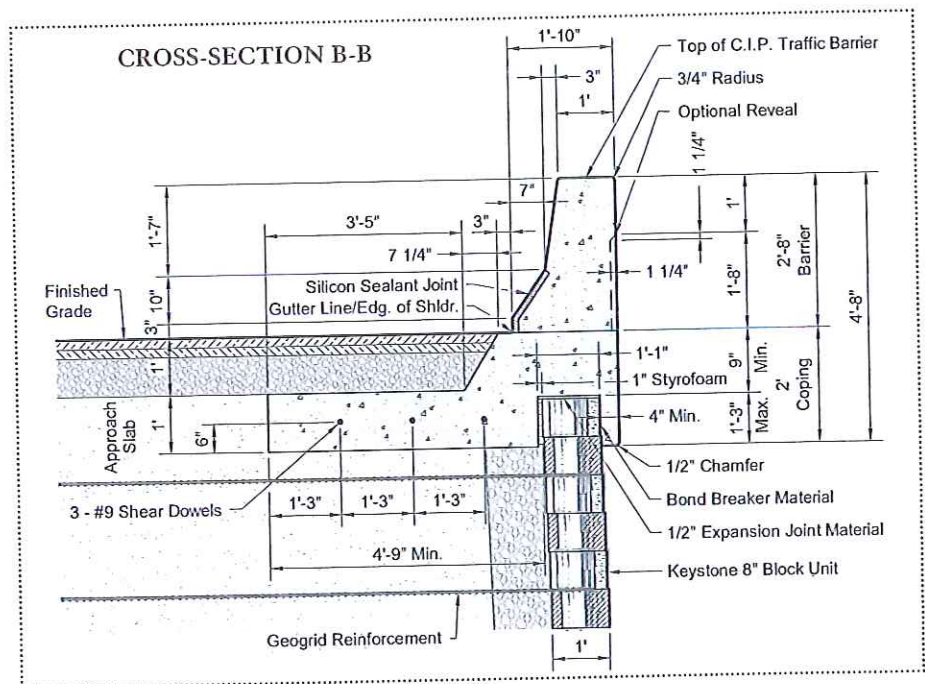
1. Install the Keystone wall per project installation instructions or as outlined in this manual.
2. Set and secure forming materials along the top course of the Keystone wall using standard forming procedures. Pour and finish traffic barrier as by the project engineered design. Insert control joints at a maximum 10 feet on center along the length of the barrier, or as specified by engineer.

Technical drawing of a concrete traffic barrier wall cross-section. The drawing shows a wall with a top of wall line, a top of concrete traffic barrier line, and a gutter line / top of coping line. The wall is divided into sections by control joints and an expansion joint. Dimensions include a typical 10' spacing between control joints, a 2.67' barrier height, a 2' coping height, and a 1'-3" maximum slope. The wall is constructed from 8" block units with a 1/2" expansion joint (typical).

Labels and dimensions:

- Optional Reveal
- Top of Concrete Traffic Barrier
- Top of Wall
- Barrier 2.67'
- Coping 2'
- 10' (Typ.)
- Const. Jnt.
- Const. Jnt.
- Gutter Line / Top of Coping
- 1'-3" Max.
- 1/2" Expansion Joint (Typ.)
- Control Joint
- Control Joint
- Keystone 8" Block Unit

1. If short CIP barrier sections are to be constructed adjacent to precast barrier sections, then this section's dimensions shall be adjusted to conform to the precast dimensions.
2. Elevations shown are at the labeled gutter point.



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Keystone Standard units are always recommended in situations where railings are considered for direct mounting on the wall system. It is difficult for a railing design to satisfy structural design requirements when considering the direct mounting on, or into, the Keystone modular wall system. The small unit size and mass provides minimal resistance to overturning by itself so a number of units must be engaged to provide the required resistance. The Keystone Standard unit is typically large enough to satisfy a 20 plf or 200lb post minimum IBC loading, provided that the post is grouted into the upper three courses as shown below. Shear resistance of Standard units ($>1000\text{plf}$) exceeds the driving forces (20plf) by a wide margin in a gravity wall application and is not critical evaluation. Railing shall not exceed maximum height of 42 inches above the units.

FIGURE N:3 - DIRECT MOUNT RAILING IN STANDARD UNIT WALL - NEAR VERTICAL

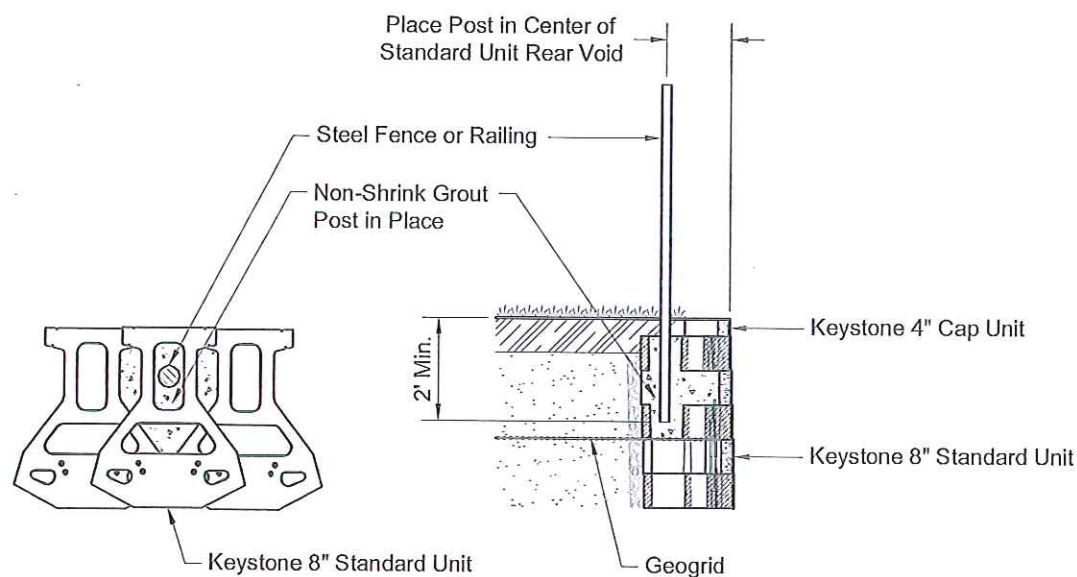
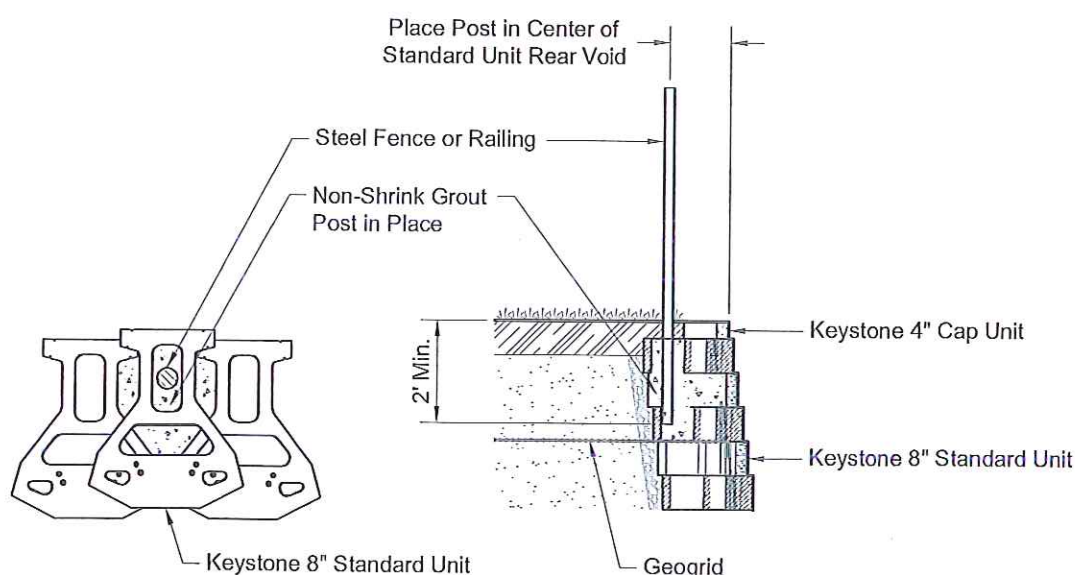


FIGURE O:3 - DIRECT MOUNT RAILING IN STANDARD UNIT WALL - 1" SETBACK



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Special Fence Installation : Standard Unit Only

FIGURE P:3 - ROUND POST
(post size shall not exceed 3" diameter)

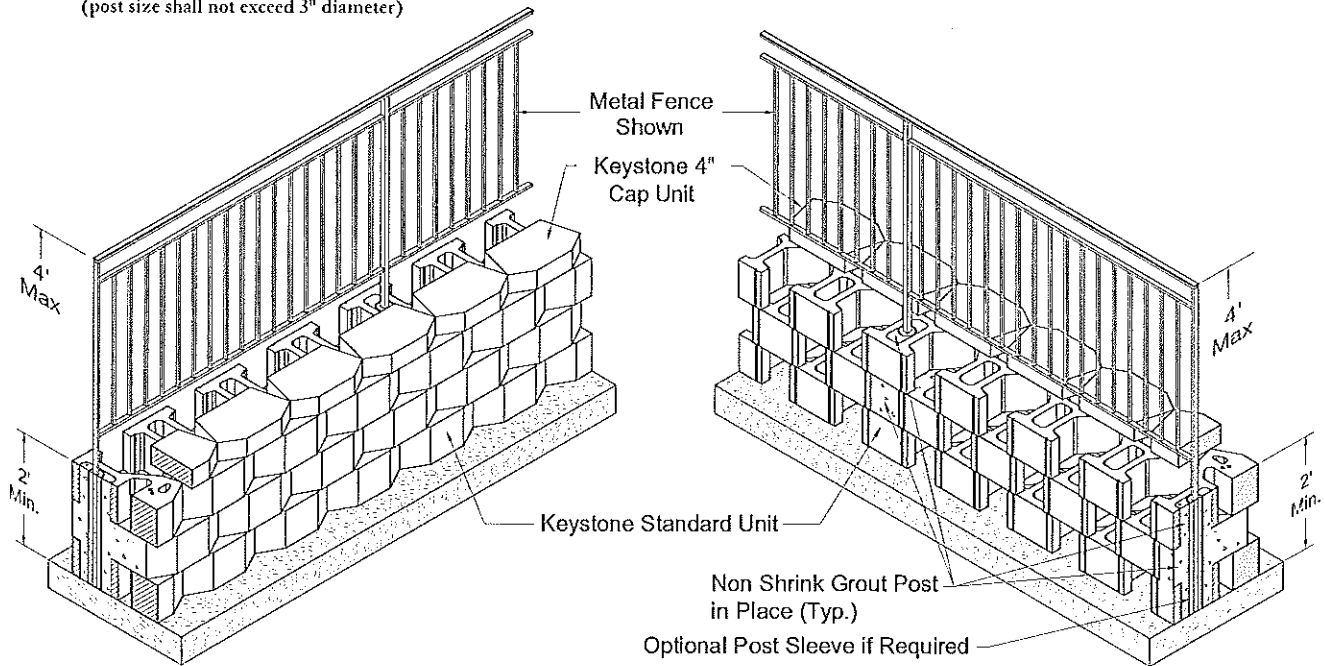
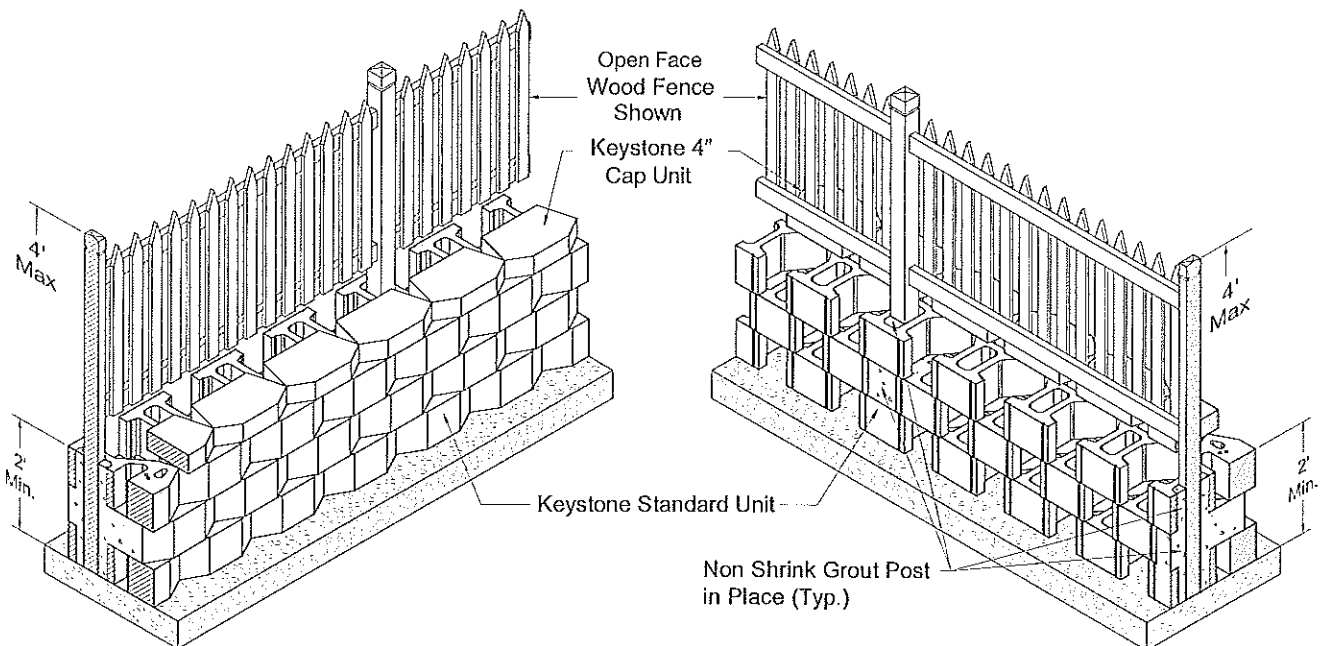


FIGURE Q:3 - SQUARE POST
(post size embedded in units shall not exceed 3" x 3")



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