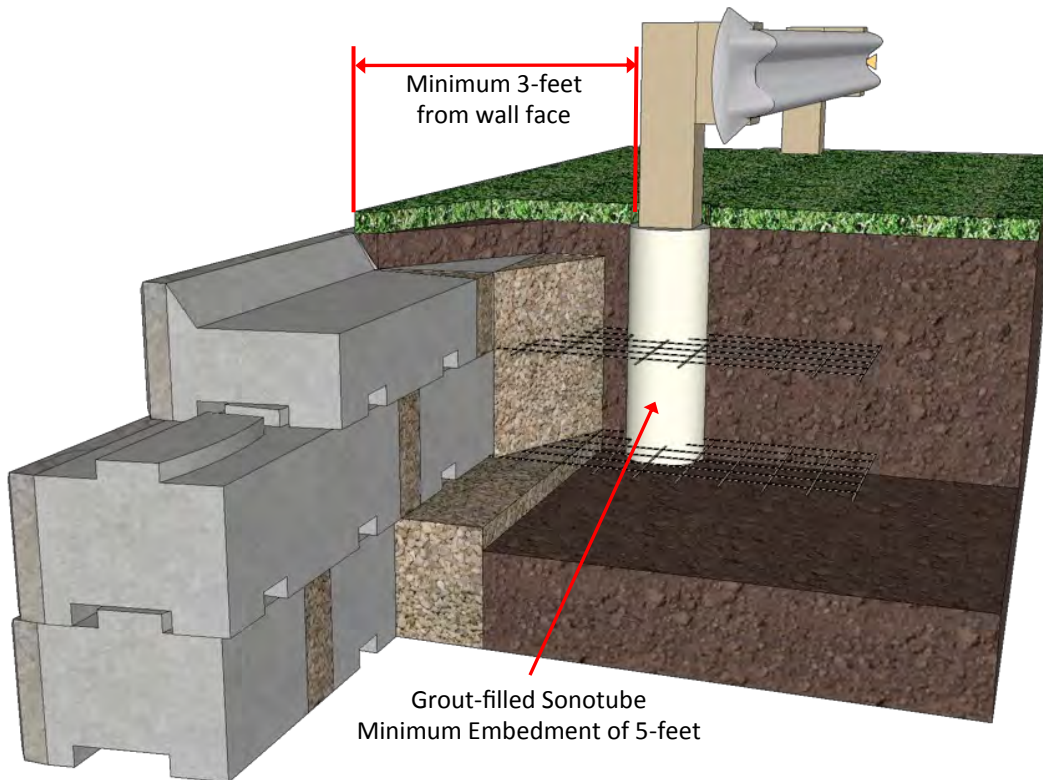


Independent Pedestrian Railings, Fences and Traffic Barriers

Often, it is desired or required that an independent pedestrian railing, fence or traffic barrier be constructed behind the top of a finished retaining wall. Although they are technically independent from a construction perspective, it is possible that any load applied to these structures could influence the wall. For that reason, it is important that the wall design engineer and the railing/fence/traffic barrier engineer coordinate efforts to ensure that both designs are adequate.

Additional information regarding typical loading for pedestrian handrails, fences and traffic barriers is discussed in subsequent sections of this manual.



Notes:

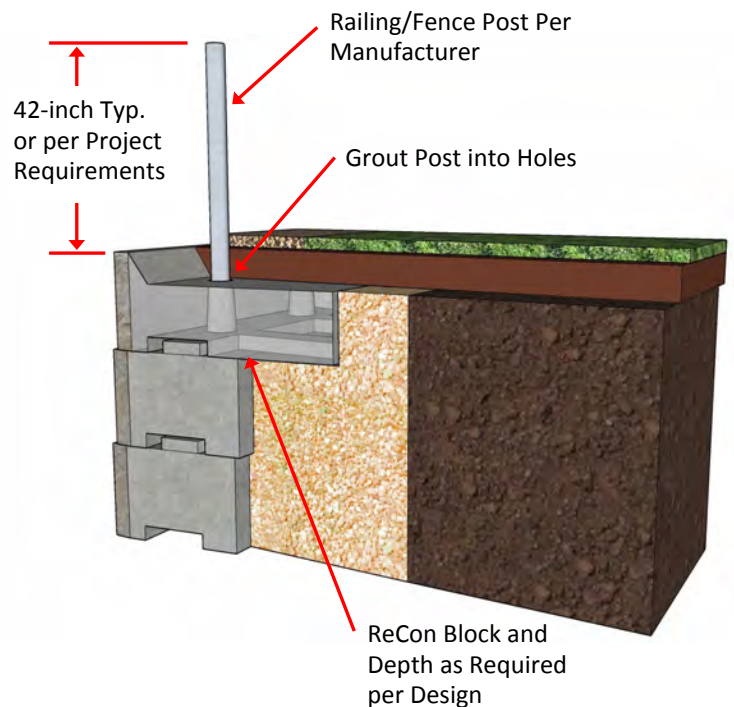
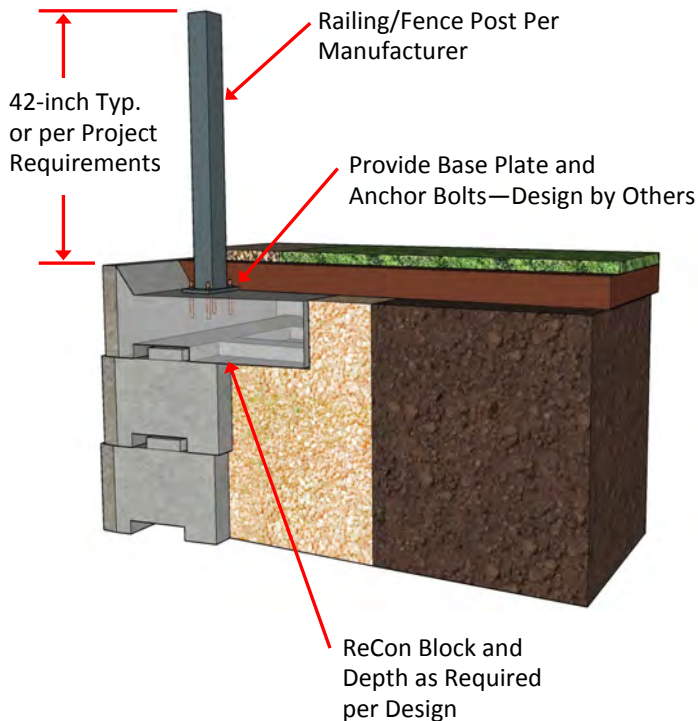
1. The figure above is intended to visually depict some of the minimum construction requirements for installing an independent post and beam traffic barrier. These minimums are based upon the requirements of the AASHTO LRFD Bridge Design Specification. Final design of the post and beam system, including the depth and diameter of the required Sonotube and the distance from face of wall is by others.
2. Once the final design of the post and beam system is determined, the wall design engineer should verify that the retaining wall design is capable of resisting any induced load from impact on the traffic barrier.
3. For ReCon walls requiring geogrid reinforcement, refer to the Construction portion of this manual for additional guidance on the installation of the Sonotube.

Integral Pedestrian Railings and Fences

One of the defining characteristics of ReCon blocks is their substantial mass. Among many other advantages, the mass of the blocks presents an ideal condition for safely mounting pedestrian railings and fence posts directly to the top of the blocks.

When analyzing ReCon blocks for the addition of handrailings or fences, there are several loads that need to be considered. These include pedestrian load, wind load, earth load or a combination of the three. The magnitude of these loads is typically determined in accordance with Code and project requirements. For more information regarding these loads, refer to the International Building Code (IBC), American Society of Civil Engineer (ASCE) 7, and the American Association of State Highway and Transportations Officials (AASHTO) Bridge Design Specification.

In some cases, the mass of a single block is adequate to resist the overturning forces from the applied loads. In other applications, the mass of more than one block is required. In these instances, a mechanical connection between blocks is required. ReCon has a spreadsheet calculator that is setup to help determine the block configuration that is required based upon specific conditions. Block configurations may consist of ReCon's Top Block, Full-High Cap, or Fence Block and Capstone. Additionally, the calculator provides some general guidance on the loading that the system must be designed for. Please contact ReCon to obtain a copy of this calculator. The figures below illustrate two options for attaching a fence or railing post to a ReCon Top Block. Refer to ReCon's Typical Construction details for additional information on mechanically fastening multiple courses of block.



Fence and Guardrail Block Walls

In addition to the full offering of retaining wall blocks, ReCon offers a variety of Fence and Guardrail blocks. Fence and Guardrail blocks are used in above grade applications and are textured on all exposed faces. So, whether your project needs a free-standing wall or an above grade option to complement our traditional retaining wall blocks, the Fence and Guardrail blocks offer an excellent solution.

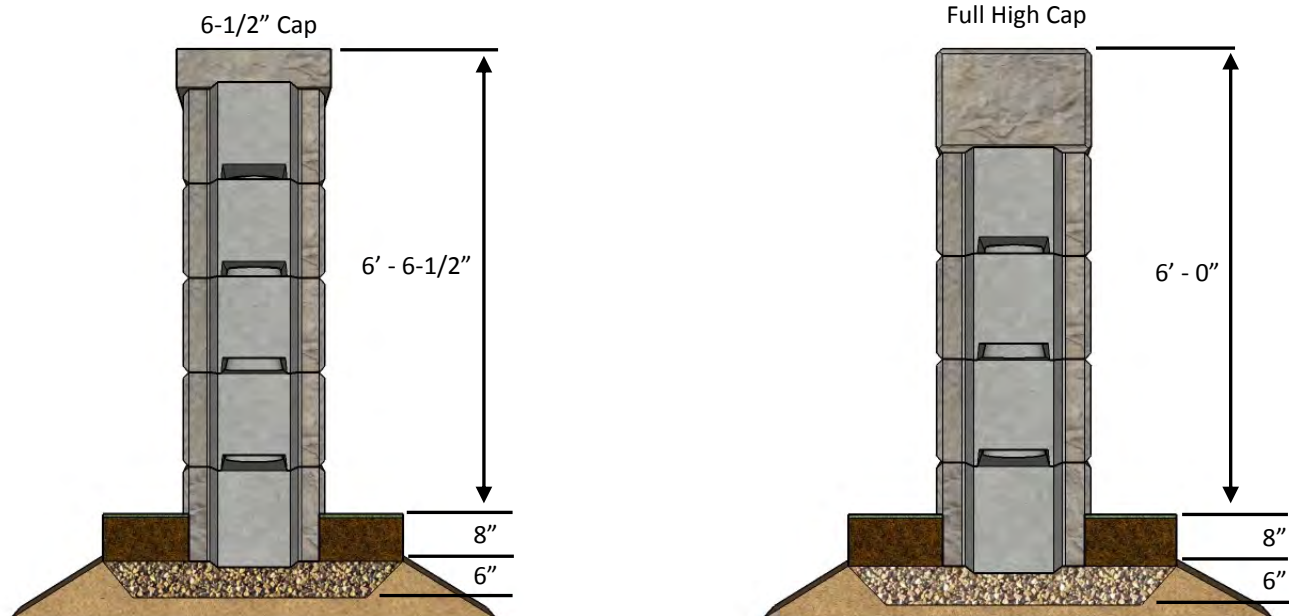
Independent and Integral Free-Standing Walls

Whether completely independent, or constructed at the top of a retaining wall, ReCon's free-standing Fence block provides a unique solution when a project requires a privacy barrier with the look of natural stone.

Although each of ReCon's Fence blocks have considerable mass, there are limitations to the height in which they can be stacked without the need for reinforcement securing the block together. In a report dated December 2, 2005, Ericksen Roed & Associates summarizes the results of an engineering analysis that was completed for ReCon's free-standing Fence block system. The purpose of the analysis was to determine the structural capacity of a free-standing wall with respect to lateral forces applied above grade. The wall was analyzed using the following loads:

1. A continuous pedestrian load of 50 pounds per linear foot, applied horizontally at a height of 42-inches above grade, per the International Building Code 2000 (IBC) 1607.7.1
2. A single pedestrian load of 200 pounds, applied at any point, per IBC 1607.7.1.1
3. A wind pressure of 15 pounds per square foot, per IBC 1609.1.2

The critical load combination was determined to be the continuous load (50 lb/ft) acting in conjunction with 80% of the prescribed wind pressure. The results of the analysis show that a free-standing wall can be stacked to a ***maximum height of 6-feet 8-inches above grade*** and still meet minimum factors of safety. Above this height, the need for reinforcement and a wider footing would be required. In cases where reinforcement is required, it is recommended that ReCon's Guardrail block be used, to help facilitate and ease installation. To obtain a copy of the full analysis and report, please contact ReCon Wall Systems.



When constructing an independent, free-standing wall using ReCon Fence block it is important that the foundation soils be properly prepared and compacted to provide adequate support for the wall. When free-standing walls are installed in combination with a retaining wall (as the top of wall finish), the wall and foundation soils should be analyzed for the addition of the free-standing wall's weight.

Integral Traffic Barrier

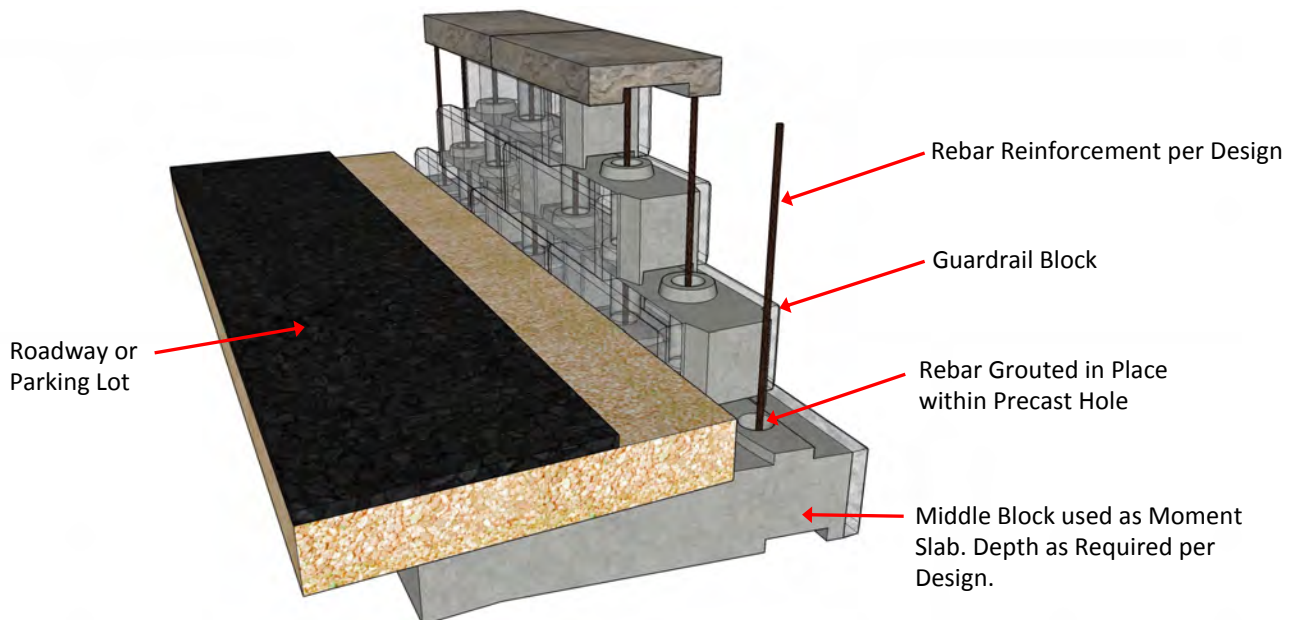
Often times, in the case of parking lots and along roadways, there is not enough space to install an independent traffic barrier system behind the top of wall. In these situations, a traffic barrier can be created at the top of a ReCon retaining wall using ReCon's Guardrail block.

There are many things that must be considered when designing a traffic barrier system. The most important piece of information though, is the magnitude of force that the barrier must be capable of resisting. This force is often referred to as an impact load, but in design it is common to use an equivalent static load. Both the International Building Code (IBC) and the American Association of State Highway and Transportation Officials (AASHTO) Bridge Design Specification provide guidance on determining applicable loads.

The IBC has a standard load, equal to 6,000 pounds, that is for vehicle barriers in parking structures or intended to protect building elements. This load is also generally accepted for parking lots, residential side streets or private drives where low vehicle speeds are anticipated.

By contrast, the AASHTO Standard has six load levels ranging from Test Level-1 (TL-1) through TL-6. Each of these load levels corresponds to a maximum vehicle mass, speed and angle of impact to the barrier. This information is then used to calculate an equivalent static load that can be used in design. For TL-1, that load is 13,500 pounds.

With proper reinforcing and block depths, ReCon's Guardrail block can be used to create a traffic barrier capable of resisting loads as high as AASHTO's TL-1. The figure below shows the general configuration of the block as well as the location of the rebar reinforcement. Please contact ReCon Wall Systems to obtain a copy of the supporting calculations for both the IBC and the AASHTO TL-1 traffic barriers.



Column Blocks

The final block type in ReCon’s lineup is the Column block. Like the Fence block, the Column block is an above grade option that is textured on all exposed faces but is used to create free-standing columns. All the Column block types can be found in the Block Catalog and various installation options are discussed later in this manual.

Since the dimensions of the Column block are similar to that of the Fence block, the analysis completed regarding maximum height is applicable for Column block as well, provided the loading is the same. Adding reinforcement to the Column block core and adding a larger below grade footing would allow for additional height. Final determination of the maximum height should be completed based upon site conditions and anticipated loads.

Finally, it is important that the foundation soils beneath the ReCon Column block be properly prepared during construction and that they are adequate to support the loading from the column.

