Case 1
The structure was analyzed with respect to the standard for “Vehicle Barriers” set forth in the International Building Code (IBC 1607.7.3), which is intended to apply to parking structures or vehicle barriers protecting building elements. The standard is also generally accepted for parking lots, residential side streets or private drives where low vehicle speeds would be typical.

The IBC standard specifies resistance to “a single load of 6000 pounds applied horizontally in any direction to the barrier system...at a height of 18 inches. It must be pointed out that the prescribed load is an arbitrary static load intended to provide nominal restraint to a slow moving vehicle, I.E., at the edge of parking decks. It is not intended to resist the impact from any specific combination of vehicle mass and velocity.

#4 bars in each core of the barrier wall (24-inches on-center) will resist the prescribed load and provide an approximate factor-of-safety of 1.8 with respect to allowable stresses. A Geogrid or other tie-back system providing a minimum lateral resistance of 100 lbs. per linear foot, is required to resist sliding and overturning with a minimum factor-of-safety of 1.5.

Case 2
The structure was also analyzed with respect to impact from moving vehicles.

#5 bars in each block core of the barrier wall will provide an approximate factor-of-safety of 1.5, with respect to allowable steel stresses, due to a 90-degree impact from a mid-sized sedan weighing 3500 lb. and traveling at 15-mph. Minor cracking and dislocation of blocks may occur, but the wall will stop the vehicle and remain essentially intact.

A Geogrid or other tie-back system providing a minimum lateral resistance of 1200 lbs. per linear foot is required to resist sliding and overturning with a minimum factor-of-safety of 1.5.

Higher velocity impacts can be resisted as the angle of incidence decreases. A 20-mph impact at 25-degrees or a 30-mph impact at 15-degrees are nominally equivalent to the 15-mph impact at 90-degrees.

Supporting Calculations can be found in the Ericksen Roed & Associates report dated Dec. 2, 2005 (available upon request from ReCon Wall Systems).

Note: For information regarding the construction of a ReCon Guardrail, including the concrete to be used in the hole through which the rebar is placed, please check the ReCon website for the Guardrail Block Specification and Installation Instructions.
Curved Wall-Guardrail Block

When constructing a ReCon Guardrail Wall that is curved, it is important that the 6" diameter holes that are cast into the Guardrail Blocks (two courses) and into the ReCon (45" deep) Retaining Wall Blocks (two courses) continue to “line up” so that the reinforcing rebar can be inserted through the four courses of block and a concrete grout then applied to fill these holes. As the radius of the curve becomes tighter, alignment becomes more of a challenge. If the wall being built has an “inside curve”, the radius should never be any tighter than 35’ if one is to avoid cutting of block to maintain alignment. If the wall being built has an “outside curve”, the radius can be as tight as 40’, but this will require cutting off 2” from the inside wing of the Guardrail Block (on both courses). Given the variability of block spacing that can occur in the field, it would be advisable to keep the radius to no less than 50’ to avoid some unexpected alignment issues.

Minimum Turning Radius, Inside Curve 35’

Minimum Turning Radius, Outside Curve 40’
40’ Radius with 2” cut/removed from inside wing of Guardrail in field
### Course Transitions

When a ReCon Fence Block is placed on top of a ReCon Retaining Wall Block, the initial set back in that first course between Retaining Wall Block to Fence Block is 1 1/2". Thereafter, any additional courses of Fence Block will go up vertically.

If the wall is “level on top” (i.e., no change in elevation at the top of the wall for the entire length of the wall), it is recommended that the Fence Block be placed on the Retaining Wall Block and the 1 1/2” setback be allowed to remain in the wall. It is not significantly noticeable, and from a design perspective ReCon wants to see a 1 1/2” setback in the wall before the wall is continued in height with no batter...fence block on fence block on fence block. No action is recommended in this situation.

However, often the top of a ReCon wall will change in elevation. In this case, when the wall is being “capped with fence block”, there will be areas in the wall where on the same course of block the wall will transition from Retaining Wall Block to Fence Block. When the first Fence Block is set on the top of a Retaining Wall Block, the setback will be 1 1/2”, not 1”. This can be noticeable in the wall, and thus the contractor may want to consider transitioning the setback from 1” to 1 1/2” over a distance in the wall that covers about 12’ or three ReCon blocks. This can be done by cutting a small portion off the back of the tongue on the Retaining Wall Block. The objective would be to remove 3/8” off the first tongue, when 1/4”, then 1/8”. The wall setback will gradually go from 1”, to 1 1/8”, to 1 1/4”, to 1 1/2”.

The tools needed to make this transition include a chop saw with diamond blade, a string line, a can of spray paint, a hammer and a chisel. The drawing illustrates the cuts that can be made to soften the transition. Use string line and spray paint to mark the cuts.