

# Guardrail Block Specifications & Installation Instructions



## Article 1: Background

- 1.1 Nature of Project
  - 1.1.1 The work to be performed includes sourcing, providing, and installing concrete guardrail blocks to the lines and grades as specified on the project construction drawings and as may be further specified herein.
  - 1.1.2 The guardrail wall has been designed to serve as a vehicle barrier for "parking lots" and for "lower speed non-thorough fare streets". All guardrail walls are to be built pursuant to a site specific design and analysis prepared by a registered professional engineer who is familiar with the product (the "wall engineer"). The registered professional engineer should review the engineering reports prepared by:
    - 1.1.2.1 Ericksen Roed & Associates dated 12/2/05, Section 2.0, Vehicle Barrier Wall and Exhibit C regarding Overturning.
    - 1.1.2.2 MRJ Engineering dated 10/3/05 regarding Shear Capacity
    - 1.1.2.3 MRJ Engineering dated 11/5/05 regarding Sliding.

## Article 2: Guardrail Blocks

- 2.1 The Guardrail Block
  - 2.1.1 The guardrail wall block shall be produced by authorized ReCon manufacturers. (Check at [www.reconwalls.com](http://www.reconwalls.com) for a complete list of authorized manufacturers.)
  - 2.1.2 The block shall have average 28-day compressive strength of no less than 4000 PSI.
  - 2.1.3 Concrete shall have air entrainment by volume (as measured in the plastic state in accordance with ASTM C172) of:
    - 2.1.3.1 5.5 - 8.5 percent, or
    - 2.1.3.2 In conformity with ASTM C94 (Table 1 and Section 7), latest revision.
  - 2.1.4 Exterior dimension at the face shall be 48" by 16" for the full fence block; 24" by 16" for the half fence block; and 48" by 6 1/2" for the capstone. Depth of the full and half fence block shall be 24". Depth of the capstone shall be 26". (Refer to Drawing #400 for the fence block and Drawing #200 for the capstone.)
  - 2.1.5 Texture on the face of the fence block should be as specified. Check with the authorized manufacturer in your area for availability of LeSueur County Limestone, North Shore Granite, Rustic, or Weathered Edge.

## Article 3: Grout Core Fill

- 3.1 Materials
  - 3.1.1 Fine Aggregate shall conform to ASTM C33
  - 3.1.2 Cement shall conform to ASTM C150 type I/II
  - 3.1.3 Flyash shall conform to ASTM C618 Class C or Class F
  - 3.1.4 Ground Granulated Blast Furnace Slag shall conform to ASTM C689 Grade 100 or Grade 120
  - 3.1.5 Water shall be potable and free of injurious quantities of oil, chlorides, grease, organic materials and carbohydrates.
  - 3.1.6 Air entraining shall conform to ASTM C260
  - 3.1.7 Other Admixtures, where used, shall conform to ASTM C494 Type A, F,G, or S
- 3.2 Concrete Mixture for Core Fill
  - 3.2.1 Compressive Strength: 5,000 psi at 28 days when measured in accordance with ASTM C109 or ASTM C39/ASTM C31

- 3.2.2 Air Content: Grout shall be purposefully air entrained with an air content of 7 +/-1.5 percent at the time of installation.
- 3.2.3 Water:cementitious ratio: The water:cementitious ratio shall not exceed 0.45.
- 3.2.4 Flow Characteristics: Grout shall be mixed to have a slump not greater than 6 inches at the time of placement. (The 6" maximum slump is designed to allow flow through the cores and reasonable consolidation of the core fill, while at the same time preventing the grout from flowing out between the Blocks. If it is desired to use a higher slump grout that still meets all of the other criteria of this Section 3.2, this is acceptable. However, some form of seal between the core holes from Block to Block will be required to prevent the grout from running out of the joints between the Blocks. This could be a 1" diameter backer rod formed into a 6" diameter ring and placed over the hole and between the blocks or a butyl sealer tape.)
- 3.2.5 Chloride ion content: The chloride ion content of the proportioned grout shall not exceed 0.15 percent by weight of the cementitious material when measured in accordance with ASTM C1218.

#### **Article 4: Guardrail Wall Construction**

- 4.1 Retaining Wall as Base of Guardrail
  - 4.1.1 In general, the Guardrail Block will be placed on top of a retaining wall built with the ReCon Retaining Wall Block. The Retaining Wall must be constructed pursuant to the ReCon Retaining Wall Block Specifications and Installation Instructions, as modified to incorporate the Guardrail Block.
- 4.2 Special Modifications to Retaining Wall
  - 4.2.1 As specified in the site specific design and analysis prepared by the wall engineer, a minimum of the top two courses of the retaining wall will modified to have two 6" diameter ribbed holes running through the block at 24" on center. These holes must align with the holes in the Guardrail Block.
- 4.3 Placement of Guardrail Block
  - 4.3.1 Guardrail Block (maximum of two courses) is to be placed on the top course of the retaining wall portion of the wall. Take care to make sure that the holes align through both courses of the Guardrail Block and the top two courses on the retaining wall.
- 4.4 Placement of Reinforcing Steel
  - 4.4.1 Reinforcement of Guardrail and Retaining Wall Block shall be as per the site specific wall design. In general, rebar (type as specified) shall be placed at 24" on center intervals through the two courses of Guardrail Block and the top two courses of Retaining Wall Block. Ensure that the steel rod is maintained in the center of the annular space. Where bars are not continuous ensure the overlap of the bars is at least 15 bar diameters.
  - 4.4.2 Bars shall be supported to avoid vibration until the grout has attained strength adequate to resist cracking.
- 4.5 Placement of Grout Core Fill
  - 4.5.1 Fill cores with grout meeting the requirements of Article 3 above. Fill the void after placement of the reinforcing steel rod. Do not fill more than 3 courses per lift. Place the grout so as to prevent the inclusion of entrapped air voids. Use vibration as required.
    - 4.5.1.1 Grout will be site mixed or delivered in ready mix trucks. Alternatively, a pre-packaged grout meeting or exceeding the above requirements may be used.
    - 4.5.1.2 Grout shall not be placed if the block temperature is below 40 or above 120 degrees Fahrenheit. Protect grout against freezing. Grout temperature shall not exceed 90 degrees Fahrenheit.
- 4.6 Capstone Placement

- 4.6.1 The top of the Guardrail Wall should be finished using the Capstone. The Capstone must be glued to the Guardrail Block using a concrete adhesive.
- 4.7 Turning Radius
  - 4.7.1 Given the design of the Guardrail Block with an “end to end tongue and groove”, it is possible to do curved walls using the standard Guardrail Block. When building curved guardrail walls, be aware that on the outside / concave curve side of the wall there will be a “gap” between the textured portion of the guardrail blocks. However, the tongue which protrudes from the end of the Guardrail Block will fill that “gap” so that the wall remains a solid wall with no visible spaces or gaps into the wall itself.
  - 4.7.2 Minimum Turning Radius, Inside / Convex Curve
    - 4.7.2.1 It is important that the 6” diameter holes in the Guardrail and the Retaining Wall Block remain aligned as the wall curves so that these holes can be filled with rebar and concrete.
    - 4.7.2.2 The very minimum radius for an inside curve is 35 feet with a .8 inch spacing left between the Guardrail Blocks when placed end to end. It is recommended that the radius be no less than 50 feet to avoid frustration in the field.
  - 4.7.3 Minimum Turning Radius, Outside / Concave Curve
    - 4.7.3.1 It is important that the 6” diameter holes in the Guardrail and the Retaining Wall Block remain aligned as the wall curves so that these holes can be filled with rebar and concrete.
    - 4.7.3.2 The very minimum radius for an outside curve is 40 feet with a 2” cut / removal of the inside wing of the Guardrail Block in the field. Once again, it is recommended that the radius be no less than 50 feet to avoid frustration in the field.
  - 4.7.4 A curved wall can reduce the “engineered strength” of the Guardrail Wall. This is particularly the case with an Inside / Convex Curve. It is important that the registered professional engineer that designed the wall be aware of the curves in the wall and consider the impact of the curves in the design of the wall.
  - 4.7.5 Capstone Placement
    - 4.7.5.1 With a curved wall, the Capstone Block will need to be cut in the field before it is installed and glued.

## **Article 5: Staining and Sealing**

### **5.1 Staining**

- 5.1.1 Before staining, the wall should be power washed and allowed to dry. This removes any dirt and / or form oil from the face of the block. This is very important.
- 5.1.2 Recommended stains include Sherwin Williams H & C Shield Plus Concrete Stain or TK Products Stain #5272. Both are latex / water based and can be applied with either an electric airless sprayer or a compressed air sprayer. Sherwin Williams is available at retail outlets across the country. For a distributor of the TK Products near you, contact TK Products at 11400 West 47<sup>th</sup> Street, Minnetonka, MN 55343, 1-800-441-2129. It is suggested that you have your customer provide to you a sample of the color they want to replicate. That color can then be taken to the stain distributor and used to mix the base coat and the highlights. Some staining contractors may have samples that they can provide to you to choose from. The concrete should be at least 28 day cured before staining.
- 5.1.3 The wall can be stained a one coat one color stain, or it can be stained with a base color and then highlighted with several different shades to more closely approximate a weathered natural stone look. Generally, the “highlights” are applied to several blocks in a random fashion, and then before the highlights dry, they are wiped out

with a wet sponge. This helps to blend the highlights into the block, making them look more natural.

- 5.1.4 The stain should not be applied if it is going to be below 45 degrees prior to the stain having a chance to dry. Consult the manufacturer's instructions for proper application of the stains.

## 5.2 Sealing

- 5.2.1 Some customers ask that their wall be sealed. This may be particularly relevant if the wall is in a road splash zone where winter road salts might get on the face of the wall.
- 5.2.2 If you are using the TK Products stain, then TK Products also sells a number of sealers that are compatible with their stains, including TK-290-12. This is a solvent-based 12% Siloxane sealer. The manufacturer indicates that it must be 32 degrees or above before this should be applied. In addition, the blocks must be completely and thoroughly dry before sealing. This is more than just dry to the surface touch. The water and the mineral based sealer do not mix. Thus, after the power wash, you will need dry warm weather and the passage of time before the sealer can be applied. Yes, the sealer is applied **before** the stain is applied.

## Article 6: Warranty

- 6.1 Each Block will have a 28 day compressive strength of at least 4000 PSI for 15 years after proper installation. If a Block does not meet this warranty standard, please notify the manufacturer in writing. If after it has been determined that the Block has not met the specifications, the manufacturer will have shipped to you, replacement Blocks which shall be the manufacturer's sole remedy for breach of this warranty. However, neither the manufacturer nor ReCon Wall Systems, Inc. shall have any obligation to install such replacement Blocks.
- 6.2 This warranty shall not apply to any Block which is damaged, defective or fails to meet the warranty standard due to improper installation of the Block, chemical contact, structural design of the wall, or excessive and unforeseen site conditions beyond the manufacturer's or ReCon Wall Systems, Inc.'s control.
- 6.3 The above warranty is the exclusive limited product warranty. ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE DISCLAIMED

This Specification and Installation Instruction should be read in conjunction with the Fence and Guardrail Block Reference Manual.

### Index of Important Engineering Reports:

- Ericksen Roed & Associates Structural Engineers Report dated 12/2/05, Section 2.0, Vehicle Barrier Wall and Exhibits B and C.
- MRJ Engineering dated 10/3/05 regarding Sliding.
- MRJ Engineering dated 11/5/05 regarding Sliding.