

# ReCon Series 50 Installation Guidelines

## Article 1: Background

- 1.1 Nature of Project
  - a. The work to be performed includes sourcing, providing, and installing concrete retaining wall blocks to the lines and grades as specified on the project construction drawings and as may be further specified herein.
- 1.2 Professional Engineer Standards
  - a. All 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”).

## Article 2: Wall Construction

- 2.1 Examination
  - a. Verify locations of utilities and existing structures prior to excavation.
  - b. Examine the Project site and evaluate conditions where the ReCon retaining wall will be constructed. Notify the proper supervising authority in writing of any conditions that may interfere with the proper construction of the ReCon wall or delay completion.
  - c. Promptly notify the wall design engineer of site conditions which may affect wall performance, soil conditions observed other than those assumed, or other conditions that may require a reevaluation of the wall design.
- 2.2 Excavation
  - a. The contractor shall excavate to the lines and grades shown on the construction drawings. The contractor shall be careful not to disturb base beyond the lines indicated.
  - b. Foundation soil shall be excavated as required for footing or base dimensions shown on the construction drawings, or as directed by the wall engineer.
  - c. Over-excavated areas shall be filled with suitable base or backfill material and compacted to 95% standard proctor.
- 2.3 Foundation Soils Preparation
  - a. Foundation soil shall be evaluated by a Geotechnical Engineer or Owner’s Representative to ensure that the bearing soils meet or exceed the design conditions or assumptions.
  - b. Compact foundation soil zone to 95% standard proctor prior to installing base / leveling pad.
- 2.4 Base / Leveling Pad
  - a. Bases shall be located as indicated on the construction drawings with a minimum thickness of 6 inches. Base materials are to be as specified by the wall engineer (generally crushed stone, ¾ inch minus, or similar).
  - b. Width of the base pad must extend a minimum of 6 inches in front and 6 inches in back of the ReCon Base Block footprint.
  - c. Bases material shall be compacted so as to provide a smooth, hard surface on which to place the first course of units.
  - d. Compact base material to 95% of standard proctor.
  - e. Base shall be prepared to ensure full contact of retaining wall unit with base material. Spacing or gaps between units shall not exceed ½”.
  - f. Contractor may elect to substitute a portion of the specified granular base materials with a lean, unreinforced concrete topping,
  - g. When a reinforced footing is required by the construction drawings, it shall be located below the frost line.
- 2.5 Unit Installation
  - a. First course of units shall be **Base Block** units and shall be placed in full contact with the base material.. *(Contractor Tip: The first course is the most important to ensure*

*accurate and acceptable results. Contractor may want to consider setting the Base Block so that the back edge of the Base Block is just slightly (about ¼" to ½") lower than the front edge of the Base Block (the "tip back"). By doing so, the wall can accommodate a minimal rotation forward, should this occur during backfill and compaction. However, on sections of the wall where there are sharp curves or a 90 degree corner, the blocks should be placed level from front to back with no "tip back".)*

- b. Check units for level from side-to-side, front to back, and check to maintain unit batter front-to-back.
- c. Place unit faces in contact side to side and avoid any gaps greater than ½".
- d. Fill and compact fill to grade in front of embedded units prior to compaction behind the wall units.
- e. Fill voids between ReCon Units with ¾" clean crushed rock to a distance of one foot behind the unit depth unless otherwise instructed in the Construction Drawings.
- f. Sweep and clean the top of each course before setting additional courses.
- g. Lay each successive course making sure that the bottom recess is in full contact with the unit locators of the course below. Pull unit forward as far as possible. Backfill and compact soil behind the units.
- h. Check and maintain level and wall batter by use of shims when necessary.
- i. The anchors recessed into the top of the block for placement of the block in the field are engineered to withstand tension at a factor of safety of at least 4 to 1 times the weight of the block. Nonetheless, proper handling of the block is essential for safety.
  - i. When handling blocks with a chain, one block at a time is the limit.
  - ii. When placing a ReCon Block in the field that uses TWO anchors for placement (66", 72", 78" and 84" deep blocks), the chains or cables used when linked together with a single "ring" must have a length on each leg of the chain such that the angle of the chain from the horizontal surface of the block is 60 degrees or more. This would make the chain at least 48" in length.
  - iii. When placing a ReCon Block in the field that uses TWO anchors for placement (66", 72", 78" and 84" deep blocks), the chains or cables used must be rated to safely lift the weight of the block PLUS an additional 40% of the weight of the block (given the shear forces at work between the two pick points) with a factor of safety of 5:1.
  - iv. When a block is to be transported over a significant distance in the field, it is recommended that a CABLE be used, NOT A CHAIN. The cable has some "stretch" that will absorb and reduce the dynamic loads. Keep the swinging and bouncing of the block to an absolute minimum. Move slowly during such transport.
  - v. If using a rigid "picking device" fixed to the front of a skid steer, care should be taken to make sure that the hook on the end of the picking device is resting freely in the lifting anchor / loop and that the skid steer operator does NOT tip the block back so that the picking device is "prying up" on the anchor, applying more force to the anchor than the force that would exist if the block was hanging freely.

## 2.6 Geogrid Installation (when required)

- a. Install geosynthetic reinforcement in accordance with manufacturer's recommendations and the Construction Drawings.
- b. Locate geosynthetic reinforcement at elevations and to the lengths shown on the Construction Drawings.
- c. Prior to installation of geosynthetic reinforcement, level and compact backfill material to the level of the reinforcement layer.
- d. Reinforcement design strength direction must be oriented perpendicular to wall face.

- e. Position reinforcement on ReCon units over tongue and groove and to within 2" of the front exposed face. The next course of units shall be placed such that the geogrid is deformed over the tongue and groove. This next course of units must be slid forward such that the back edge of the groove on this unit is up against the back edge of the tongue on the lower unit with the geogrid pinched between the tongue and groove. Hold in place by installing the next course of units.
- f. Remove all wrinkles or folds in reinforcement by pulling taut prior to backfill placement. Secure using soil staples, stakes or hand tension until reinforcement is covered with sufficient fill to maintain tensioned position.
- g. Reinforcements shall be continuous throughout the embedment length. Splicing along reinforcement strength direction is not allowed.
- h. Position reinforcement sections side-by-side to provide 100% coverage along wall face.
- i. Where curved wall sections cause overlap areas in reinforcement, maintain at least 3" of soil between layers where overlap occurs.

#### 2.7 Reinforced Backfill Placement

- a. Wall fill material shall be placed in lifts no greater than 8" in depth and shall be less if necessary to achieve necessary compaction.
- b. Compact backfill material to 95% of standard proctor.
- c. Only hand-operated compaction equipment shall be used within 3 feet of the back of the ReCon Units.
- d. Wherever possible, backfill should be placed beginning at the face of the wall. Backfill shall be placed, spread, and compacted in a manner that minimizes the development of wrinkles, folds or movement of the geogrid.
- e. Tracked construction equipment shall not be operated directly on the geogrid. A minimum backfill thickness of 6 inches is required prior to operation of tracked vehicles over the geogrid. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid.
- f. Rubber tired equipment may pass over the geogrid reinforcement at slow speeds, (less than 10 MPH). Avoid sudden braking and sharp turning.
- g. At the conclusion of each days work, slope backfill at both the crest and bottom of wall away from wall face to prevent surface drainage from scouring or ponding.
- h. During wall construction, the General Contractor shall be responsible for coordination of other project site operations so as to avoid adjacent construction site drainage from affecting wall construction area.
- i. Upon completion of wall construction work, the General Contractor shall:
  - 1. Ensure finished grading directs normal drainage away from the finished wall.
  - 2. Ensure other trades do not operate heavy equipment or excavate near the wall and reinforced soil zone.

#### 2.8 Curved Walls

- a. Full Blocks concave / inside curves: The minimum turning radius is actually 13' 1 1/4". However, each row of blocks that is added to the wall requires a setback, and thus as the wall height increases, the radius of the concave curve gets larger. **For ease of installation** (thus requiring less precision in the placement of each block), **it is highly recommended** that the radius of the base row of a multiple row wall be no less than 15'. As each row of block is added, the radius will increase by 2 inches. Refer to Drawing # 105 for a table of Top Row minimum radius, given varying wall heights.
- b. Full Blocks convex / outside curves: The minimum turning radius is 13' 1 1/4" for a one row wall. However, since each row of blocks that is added to a convex curve requires a tighter radius (due to the setback for each row), it is very important that the radius of the bottom row of blocks not be too tight, thus causing a problem on a

subsequent row of blocks as the radius for each row becomes tighter. **For ease of installation, it is highly recommended** that 6" of radius be added for each row of block added. Thus, the radius for the first row of a convex wall must be no tighter than: (a) 14' for a 2 row wall; (b) 14.5' for a three row wall; (c) 15' for a four row wall; (e) 15.5' for a five row wall; (f) 16' for a six row wall; (g) 16.5' for a seven row wall; and (h) 17' for an eight row wall. Refer to Drawing # 106 for a table of suggested Base Row minimum radius suggestions, given varying wall heights.

- c. The "loss of running bond" on curved walls: Because the radius of the curve on a wall changes with each row of block (it gets tighter on a convex / outside curve and it gets longer on a concave / inside curve), as the blocks progress along the curve, they will gradually work further away from the exact mid-point of the running bond. This can be minimized if the wall can be built such that each new row of block is begun in the middle of the row (if there are multiple curves in the wall) or in the middle of the curve (if there is just one curve in the wall) so that the shifting of the running bond is spread out in both directions of the wall. If as a result of the shift off of running bond the blocks do begin to bind at the tongue and groove, the binding can be eliminated or minimized if an inch or two of the block is cut from the face, thus restoring the row to the mid point of running bond. Also note that a wall that has both a concave and a convex curve will have a tendency to "self correct" some of the "loss of running bond" because on the convex portion of the curve the radius is getting tighter with each row added while on the concave portion of the curve the radius is getting larger with each row added. In summary, proper planning of the placement of each row can reduce the impact of "loss of running bond" in curved walls.
- d. If a tighter turning radius is required, one can consider the use of the 90 degree corner block to "step a wall back" in square corners as opposed to curves. Also, using a combination of half, three quarter, and/or full block (alternating on each row between a half and a full block OR using the three quarter block at the beginning and end of the curve on every other course of block and half blocks throughout the curve) will reduce the minimum radius.
- e. Half Blocks have a minimum one row convex turning radius of 6' 6 11/16" and a minimum one row concave turning radius of 6' 4 5/8".

#### 2.9 Base Row Step Up

- a. As the base row of the wall steps up, proper placement and then compaction of the base material at the point of the step up is important. Refer to Drawing # 107 for a visual example of a base row step up.
- b. With each row of base wall step up, the base leveling pad should be shifted back 1 inch to accommodate the 1 inch setback in each row of block.
- c. If a measurement from the face of wall at the top of the wall is a critical measurement (for example, there is a sidewalk or curb at the top of the wall and that sidewalk or curb needs to be exactly 3 feet from face of wall), then care must be taken when staking the base leveling pad and when placing the base block. This can be somewhat tricky when the wall is long and when there are multiple step-ups in the base of the wall. Remember, plan and measure twice, build once!

#### 2.10 Top of Wall Step Up and Step Down

- a. As the top of a retaining wall steps up or steps down, the "top corner block" is used to make this transition.
- b. If it is desired to have the long (4') face of the top corner block running along the face of the wall and the short (2') side of the top corner block running back from the face of the wall and into the slope (**Standard Placement**), then the top corner block will actually be resting on ½ of a full block (with the tongue protruding upward into the groove) and on ½ of a regular top block. A 7.5" thick concrete shim (or 4.5" thick concrete shim depending on the style of the top corner block delivered to the site) will need to be placed between the top block and the Left or Right corner top block at each point in the wall where the top of the wall steps up. Use a standard concrete

masonry unit (CMU) for the shim. These are generally available at a lumberyard, ready mix plant or masonry block plant. To achieve the required thickness of the shim (7.5 or 4.5 inches), it may require that the CMU be trimmed from 8" of thickness to 7.5" of thickness. **The shim should be glued in place with a concrete adhesive (recommended PL Premium Adhesive).** Refer to Drawing # 108 for more details.

- c. If it is desired to have the short (2') side of the top corner block running along the face of the wall and the long (4') side of the top corner block running back from the face of the wall and into the slope (**Alternative Placement**), then the top corner block will actually be resting on just ½ of a full block. About 7 inches of the end of the tongue of the full block will need to be removed with a concrete saw to accept the groove on the bottom of the top corner block. In this application, no shim is required. Refer to Drawing # 109 for more details.
- 2.11 Outside 90 Degree Corner
- a. When building a wall with an outside 90-degree corner, it is recommended that construction start at the corner and work away from this point in both directions. This will allow for placement of the corner blocks so that 1" of batter can be maintained in the wall in both directions. Assuming that both ends of the wall running away from the 90 degree corner run out into grade, no block will need to be cut in order to maintain the 1" of batter per row of block.
  - b. One standard corner block will be used at the corner on each row of the wall. The corner blocks will overlap each other at the corner, coming together in a "zipper fashion". **The corner blocks should be glued at the corner where they overlap with a concrete adhesive.** Refer to Drawing # 110 for block placement details.
  - c. If, however, one end of the wall must end vertically because it abuts to an existing vertical structure, or if the wall has two outside 90-degree corners, then blocks will need to be cut to maintain the 1" batter. Refer to Drawing # 112 for details on the Single Outside 90 Degree Corner Abutting to an Existing Vertical Structure and for details on a Double Outside 90 Degree Corner.
  - d. In lieu of maintaining the 1" of batter after turning a 90-degree corner, you can build one side of the corner (say Side B) vertically without the 1" batter per row of block. This will require you to cut 1" off the back of the tongue of the first regular block adjacent to the corner block in each row on Side B of the wall. You can re-establish the 1" batter on Side B gradually as you move out from the corner. However, the wall engineer must take the elimination of the batter into account in the design of the wall.
- 2.12 Inside 90 Degree Corner
- a. When building a wall with an Inside 90 Degree Corner, it is recommended that once the contractor gets to the base row of the inside corner, the contractor should then start each subsequent row at the corner and lay block out from the corner. Remember, the block has a 1" setback built into it for each row of block. This will have two different effects on the finished wall. First, at the point of the 90 degree corner, the wall will not be vertical, but rather the actual line at the corner will be laying back at the same 3.6 degrees of batter as the face of each of the sides of the wall that come together at the corner. Second, as each new row of block is place at the corner, the block will be set back not only 1" along the vertical axis but also will be placed 1" inside toward the corner along the horizontal axis. If you were to follow the second row of block out from the corner, you would see that the end of this row of block in the wall is 1" shorter in the horizontal /lineal direction than the base row. The third row of block will be 2" shorter in the horizontal / lineal direction than the base row, and so on. For taller walls, you may notice that the "running bond joint" is sliding off center by 2" for every other row. This is an aesthetic matter, not a structural issue.

- b. One standard corner block will be used at the corner on each row of the wall. The corner blocks will overlap each other at the corner, coming together in a “zipper fashion”. **The corner blocks should be glued at the corner where they overlap with a concrete adhesive.** Refer to Drawing # 111 for block placement details.
- 2.13 Railings / Guard Rails
- a. It is possible to install a railing at the top of the retaining wall by core drilling into the top block. Follow the instructions of the railing manufacturer and wall engineer. It is, however, recommended that if a railing is to be installed at the top of the wall, then the top row of blocks should be glued to the row of blocks beneath it with a concrete adhesive.
  - b. In addition, guardrails can be installed behind the block. Refer to Drawing # 113 for typical details.

## Article 3: Staining, Sealing, Anti-Graffiti

- 3.1 Staining
- a. 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.
  - b. Recommended stains include Sherwin Williams H & C Shield Plus Concrete Stain or TK Products Tri-Sheen Pigmented Stain TK #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.
  - c. 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.
  - d. 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.
- 3.2 Sealing and Anti-Graffiti
- a. 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.
  - b. 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 Tri Siloxane OTC. 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. This sealer is applied **before** the stain is applied.
  - c. If you also want to apply an Anti-Graffiti coating, then an acceptable product is 1496 TK Permaclean OTC. Consult manufacturers’ application instructions. Generally the anti-graffiti coatings can add a sheen to the wall and/or darken the wall. Test a small area of the wall before completely applying the coating.

## Article 4: Warranty

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.

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.

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

Note: Also available for review prior to the construction of a wall is a Power Point presentation that covers a number of topics discussed above. This presentation contains a number of useful on-site construction photos.

Index of Important Construction Detail Drawings (available at [www.reconwalls.com](http://www.reconwalls.com)):

- #100 Block Types
- #101 Typical Base Block Placement
- #102 Typical Maximum Gravity Wall Heights
- #103 Typical Geo-Grid Wall Cross Section
- #104 Typical Geo-Grid Orientation & Curved Walls
- #105 Typical Inside Radius – Full Block
- #106 Typical Outside Radius – Full Block
- #107 Typical Base Row Step Up
- #108 Typical Top of Wall Step Up
- #109 Typical Top of Wall Step Up – Alternative Placement
- #110 Typical Outside Corner Detail
- #111 Typical Inside Corner Detail
- #112 Outside Corner Details – Double & Single 90 Degree Corners Abutting to Vertical Structures
- #113 Typical Guard Rail Detail
- #114 Typical Railing Detail
- #115 Typical Water Wall Detail
- #116 Typical Drain Tile Detail
- #117 Typical Box Culvert Headwall Grid
- #118 Typical Box Culvert Headwall Gravity
- #119 Typical Box Culvert Wing Wall Grid
- #120 Typical Box Culvert Wing Wall Gravity
- #121 Typical Oblique Inside Corner Standard
- #122 Typical Oblique Inside Corner Special
- #123 Typical Oblique Outside Corner Standard
- #124 Typical Oblique Outside Corner Special
- #125 Typical Double Stacked Half Block
- #200 Capstone Unit Details
- #201 Step Block
- #301 Full High Cap Block