

Installation Guidelines- Retaining Wall Systems

Site Analysis

Your retaining wall design must begin with a proper site analysis. The conditions at the site will determine your wall height and location, as well as reinforcement requirements. Check the soil type and conditions at the base of your wall for adequate bearing pressure. The soil below a wall needs to be strong enough to support the weight of the wall resting on it. If the soil is in a moist or wet condition, extra precautions may be required to provide a stable base. An accurate site plan must also include the location of all lot lines, utilities, buildings, driveways and parking areas. Note any permanent trees or vegetation. Prior to design, proper permits, owner approvals, utility clearances* and temporary easements must be obtained.

If your jobsite has any of the following conditions, get a complete engineering analysis from a qualified designer before proceeding:

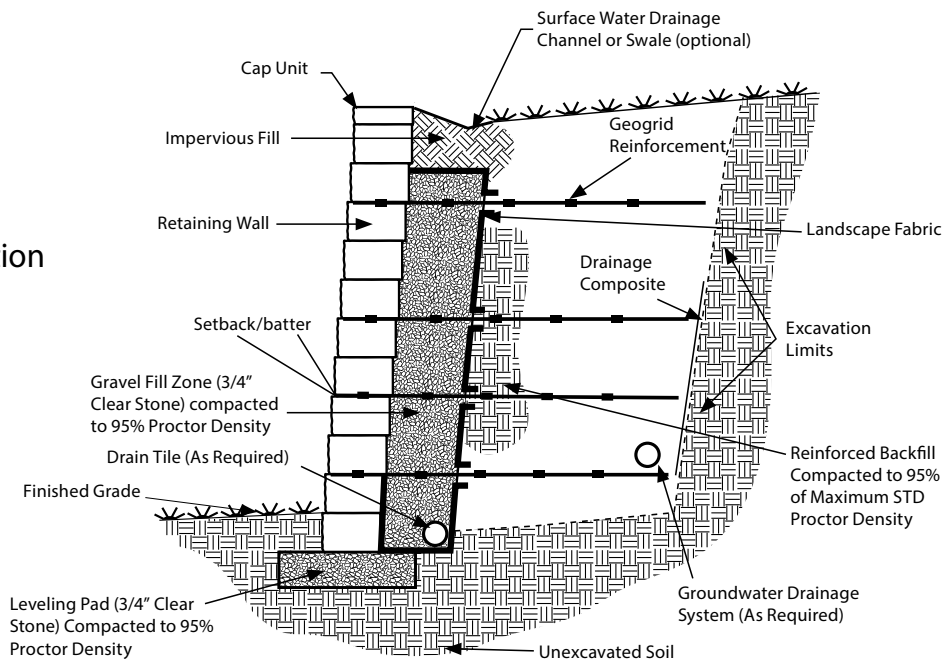
- Soft or unstable soils
- Excessive water runoff
- Surcharges greater than a residential driveway
- Waterfront and shoreline sites
- Terraces
- Slopes greater than 3 to 1 above or below the wall
- Wall heights exceeding 4'

Finalize Design

Develop a wall layout that will maximize drainage and direct the flow of water around the wall and away from buildings. Consider material and equipment access at the site, and try to minimize the excavation and hauling of soil and fill.

Reference the NCMA for more information.

Typical Reinforced Wall Application



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Getting Started

Build on stable, well-compacted ground. Spend extra care and preparation on the base and bottom row of your wall. Any unevenness in the base course will be amplified and difficult to correct after several courses have been installed. Always begin your wall construction at the lowest possible point of your base and step up. You should also begin from the corner blocks of steps and work outward to the end of the wall.

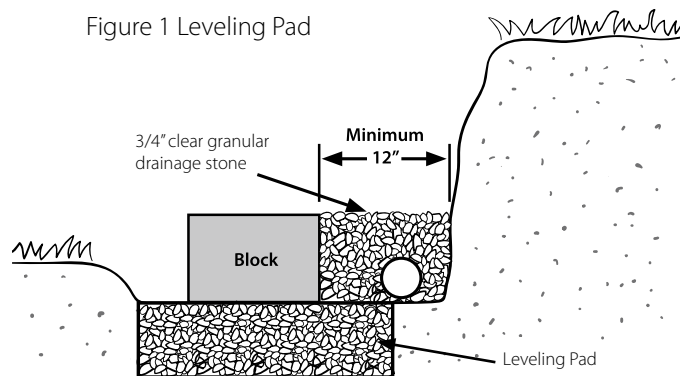
Leveling Pad

Excavate a shallow trench at the base of your planned wall. It should be a minimum of 24" wide and 8" deep to accommodate the leveling pad material and required unit embedment below grade. Place a minimum of 6" of base material in the leveling pad layer. Base material should consist of either granular, well-drained coarse sand, angular gravel or crushed stone. Use a hand-operated plate compactor to compact the base material every 2" to achieve a solid and level foundation. The leveling pad may be stepped in 8" increments to match any grade changes along the front of the wall.

Unit Installation

Place retaining wall units side-by-side in the center of the leveling pad (Figure 1). Align and level each unit with adjacent ones side-to-side and front-to-rear. Carefully tap high points with a rubber mallet. A thin layer of sand (1" or less) may be used on top of the compacted base material to help level the first course. Always align from the back of units, not from irregular front faces. A string line and level will keep each new row of blocks on track.

After placing and leveling the first course, install drain tile behind the block as necessary. If applicable, fill voids in and between block and a minimum of 12" behind block with clean granular drainage rock. Replace enough fill in front of the base course to secure it. Fill behind block with drainage rock until it is level with the top of the first course. Compact the fill with a hand-operated plate compactor on both sides of the first course to required specifications, or to 95% of maximum Standard Proctor Density (a method used to determine compaction). Compact on top of the block, and clean the top of the first course units to begin installation of second course.



Unit Embedment

Generally, if the grade in front of the wall is level, one half of the first course should be embedded below grade. Embedment should be increased for special conditions such as slope, soft foundation soils or shoreline applications. As a general rule, the first course of block should be embedded at a 6" minimum. For walls that are 4' or higher, add 1" embedment per one-foot rise.

Note: This guide offers typical installation recommendations for retaining walls under 4' high. For retaining wall installations over 4' high, and for walls that will be installed in wet or unstable soils, in areas with heavy surcharges, or applications that require drainage or other special conditions, a final design must be performed by a qualified engineer; site conditions and specific design parameters may vary. If you have questions, take time and ask a qualified contractor or your retaining wall distributor for more information.

Standard Proctor Density is referred to several times in this guide. Proper placement and compaction of soils is essential to the successful performance of any retaining wall system. Reinforced soil structures routinely specify that all soils be compacted to 95 % maximum density as determined by ASTM D698-Standard Proctor Density. Post construction settlement is an obvious concern of poorly compacted materials, excessive lateral wall movement and/or insufficient shear strength. Soils must be compacted in lifts to achieve maximum soil shear strength and validate the design.

*Call Diggers Hotline in advance (800-242-8511) before digging to locate any underground lines.

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Additional Courses

Install additional courses with seams of each successive course offset by several inches from the units below for structural stability.

County Block and Tribute retaining walls with pins:

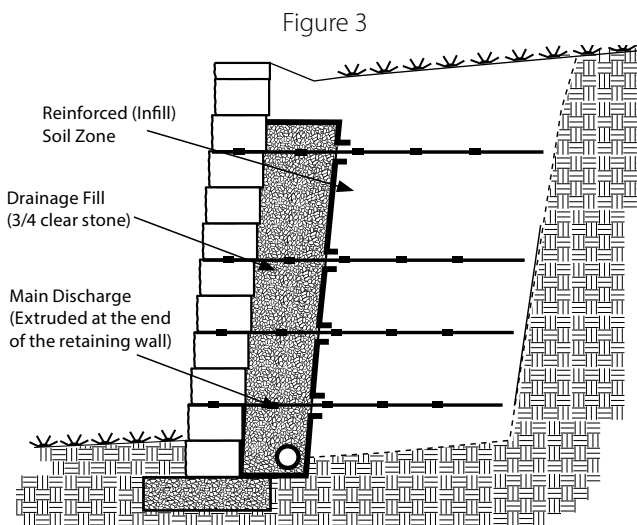
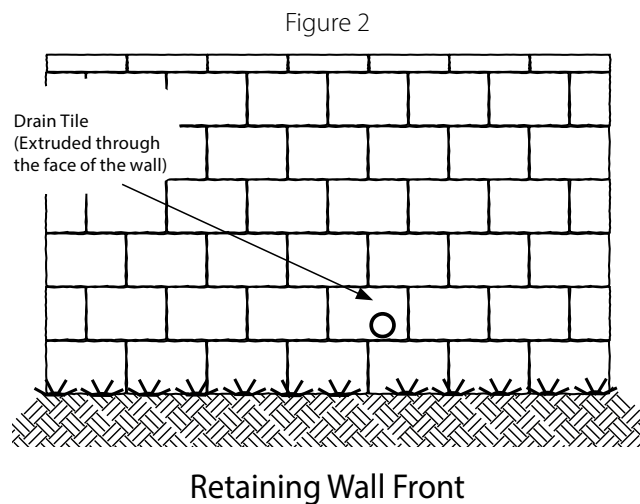
For the second and additional courses, set each unit 1" back from its finished position. Insert two pins in the front holes, and pull blocks forward so pins are fully seated into slots in two separate units below, locking them together. County Block Jumbo units only require 2 pins per block; these may be placed in any 2 of the 3 available holes. It may be necessary to tap pins lightly with a hammer for proper alignment. Check each course for tightness of each unit with adjacent units and check wall alignment.

Winston and Integrity retaining walls without pins:

If your wall system does not require the use of pins or cube system, be sure that the lower units are clean and additional courses are properly locked in place with the built in concrete locking mechanism.

Drain Tile

Drain tile should be placed behind the wall and extruded wherever possible. This means the drain tile may have to be extruded through the face of the wall (Figure 2) or at the end of the wall (Figure 3).

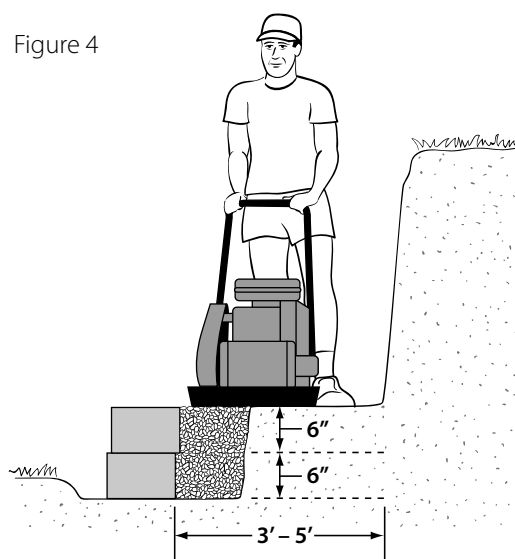


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Backfilling and Compaction

After each course is aligned, if applicable, fill in block cores and voids between units with drainage rock. Then, backfill and compact each course as you continue constructing the wall. Make sure to backfill in front of the wall until the desired grade is achieved (Figure 4). Next, use a hand-operated plate compactor directly over the top of the block to consolidate aggregates and pulverize any residual concrete fragments (slag). When compacting, it is important to backfill in small lifts. Know your compactor and how much it can handle. Most small compactors can handle a 6" lift at a time. This is a good general rule to follow when using a compactor. Work from the back of the wall to the furthest edge of excavated area, with a three to five foot minimum compacted zone, until all materials are compacted.

Figure 4



Retaining walls require only a certain amount of compaction with hand-operated equipment to consolidate the soil and minimize settling. Excessive compaction can cause forward rotation of the wall facing. Large equipment operating too close to the wall may cause over-compaction and result in localized bulging. It can also damage geogrid reinforcement materials.

Geogrid Reinforcement

If geogrid reinforcement is required, excavate behind wall location for a distance equal to the designed embedment length of the grid. Construct the wall up to the designated height of first grid layer. Place and compact granular fill within and behind the wall. Backfill and compact soil behind the granular fill in the reinforced zone.

Lay geogrid, cut to appropriate sizes and with the strength direction perpendicular to the wall, on top of units. The cut ends should nearly touch the front edge of the units but not extend past the front face. Extend the grid pieces to the back of the slope. Place the next course of units on top of the geogrid and be sure the units are locked in place by pins (if applicable) or the concrete locking mechanism. Pull units forward, making sure they are secure. Place granular drainage rock in cores (if applicable) between block and 1' behind units. Pull geogrid taut – staking is recommended – before placing backfill material. Compact backfill in 6" lifts behind wall.

*Estimation Geogrid Charts can be found on County Materials' website at www.countymaterials.com. Simply go to Downloads / Product Installation & Maintenance Guides / Landscaping. There you will find HTS Manuals specific to County Block®, County Block® Jumbo, Integrity™, Rib Rock™ and Tribute®.

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Ending and Capping a Retaining Wall

End a retaining wall by either stepping the courses or rolling the wall into the existing embankment. As a general rule, 2' of block buried into the hillside will prevent potential erosion. Complete your wall with available cap units placed flush with the face, set back slightly or set out as much as 1". Cap units should be installed by starting on one end of the wall, not in the middle. Use retaining wall adhesive on all cap units to hold them in place. Cap units may need to be split or cut for a proper fit (Figure 5).

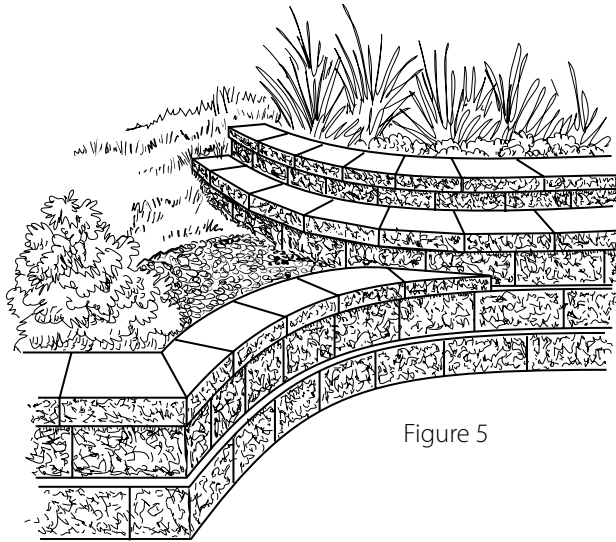


Figure 5

Inside Corners

Lay a unit perpendicular to the end of the wall so its side face is flush with the back of the first course. Complete the first course. On each successive row, alternate the position of units over the right angle to obtain an interlocking corner (Figure 6). For retaining wall systems with concrete locking mechanisms, make sure to cut or chisel off the locking mechanism to achieve the proper overlap.

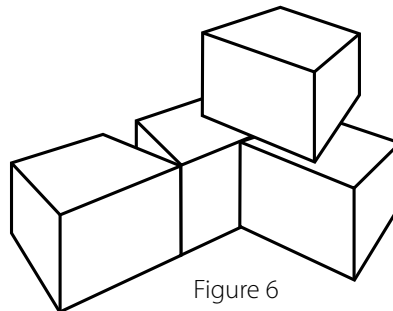
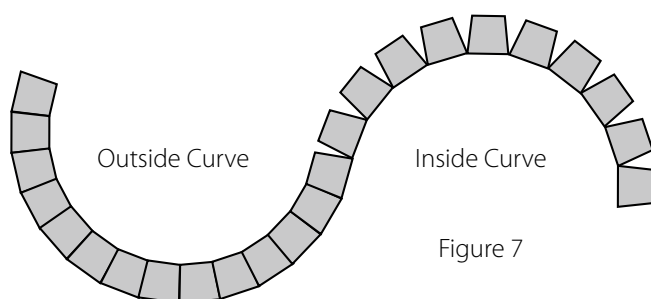


Figure 6

Installation Guidelines- Retaining Wall Systems

Curves

Simply fan or bring the tails of units together to make convex (outside), concave (inside) and serpentine curves (Figure 7).



Tribute retaining walls with curves:

The Tribute retaining wall system can create 4' radius curves with no cutting of units.

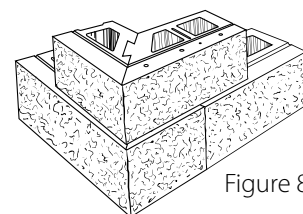
County Block retaining walls with curves using Jumbo units:

When using the County Block retaining wall system with jumbo units, be careful not to expose the center pinhole with too tight of a convex (outside) curve.

Outside Corners

County Block retaining walls with outside corners:

To construct outside corners with the County Block system, the industry recommends using a gas-powered masonry cut-off saw with a diamond blade. This creates a very clean and uniform surface edge to align standard units with. Building outside corners requires cutting one side of the 2 piece corner unit on each course and alternating the position of the cut block to maintain running bond pattern (Figure 8).



First Course: Cut the male side (Figure 9) of a corner unit along the cut line and insert the male key into the notch on the uncut female side. Construction adhesive applied to the female notch and male key is suggested to help lock the channel together. Position the block on the base material to form a 90° corner. Place a standard County Block unit along the cut side of the corner unit. Continue installing first course units. Fill and compact.

Second Course: Cut the female side (Figure 10) of a corner unit along the cut line. Slide the notch over the key of an uncut male side. Position the corner unit on top of the first course. Place standard County Block unit alongside. Fill and compact. Repeat previous steps for additional courses, alternating the position of corner units on each course.

Tribute, Integrity and Winston retaining walls with outside corners:

The units must be split in half to create an outside corner. Each unit split will create 2-corner block (one left, and one right corner). On each successive row, alternate the position of the cut corner units over the right angle to obtain an interlocking corner. Install additional courses with seams of each successive course offset by several inches from the units below for structural stability. Use retaining wall adhesive to help secure each corner unit.

