PRE-CONSTRUCTION CHECKLIST

Before you start construction of a Redi-Rock wall, take the time to complete necessary planning and preparation. This process will help ensure a safe, efficient, and quality installation. It will also help avoid costly mistakes.

☐ SAFETY
Safety is of primary concern to Redi-Rock International. Redi-Rock walls must be installed in a safe manner. All local, state, and federal safety regulations must be followed. In addition, Redi-Rock International greatly encourages installers to set up company programs to help their people stay safe at work. These programs should address items such as: personal protective equipment, maintaining safe slopes and excavations, fall protection, rigging and lifting, and other safety precautions. Safety-training materials specific to your company can be found at www.osha.gov or by calling 1-800-321-OSHA (6742).

☐ ENGINEERING AND PERMITS
Obtain necessary engineering and permits for your project. Your local building department is an excellent resource to help determine the requirements for your project.

Note: This installation manual is intended to supplement a detailed, site-specific wall design prepared for your project by a Professional Engineer. The construction documents for your project supersedes any recommendations presented here.

☐ REVIEW THE PROJECT PLANS
Take the time to review and understand the project plans and specifications. Make sure that the plans take into account current site and soil conditions. Pay close attention to silty or clayey soils and ground water or surface water on the site. A pre-construction meeting with the wall designer, construction inspector, wall contractor, and owner or representative is recommended.

☐ CONSTRUCTION PLANNING
Develop a plan to coordinate construction activities on your site. Make sure your plan specifically addresses how to control surface water during construction.

☐ UTILITY LOCATION
Make sure to have underground utilities located and marked on the ground before starting any construction. Call 8-1-1 or go online to www.call811.com to schedule utility marking for your project site.

☐ MATERIAL STAGING
Store Redi-Rock blocks in a location close to the proposed wall. Blocks should be kept clean and mud free. Blocks should also be stored in a location which will minimize the amount of handling on the project site.

Store geogrid in a clean, dry location close to the proposed wall. Keep the geogrid covered or in the shade and avoid exposure to direct sunlight.

Be careful where you stockpile excavation and backfill material. Do not stockpile soils over buried utility lines which could be damaged by the extra weight.
EQUIPMENT
Make sure you have the proper equipment to handle Redi-Rock blocks and install the wall. Redi-Rock blocks can weigh up to 3,500 pounds each. Make sure excavators and other construction equipment are properly sized to handle Redi-Rock blocks. (Figure 1)

Hand operated equipment should include, as a minimum, shovels, 2’ level, 4’ level, broom, hammer, tape measure, string, spray paint, laser level, pry bar, walk behind vibratory plate compactor (capable of delivering a minimum of 2000 lb centrifugal force), and a concrete saw. (Figure 2)

Personal protective equipment should include, as a minimum, appropriate clothing, steel toe boots with metatarsal protection, eye protection, hard hat, gloves, hearing protection, fall protection rigging, and other items as necessary to insure a safe working environment.
SUBGRADE SOILS..........................................................................................

Proper base preparation is a critical element in the construction of your retaining wall. Not only is it important to provide a stable foundation for the wall, but a properly prepared base will greatly increase the speed and efficiency of your wall installation. Proper base preparation starts with the subgrade soils.

Existing soils must be removed to the bottom of the leveling pad elevation for the retaining wall. (Figure 3)

The base and back of excavation should expose fresh, undisturbed soil or rock. Remove all disturbed soils which “fall-in” along the base of the wall or the back of the excavation.

The subgrade soil (below the leveling pad) should be evaluated by the Professional Engineer responsible for the wall to make sure it meets the design requirements and to determine its adequacy to support the retaining wall. Any unsuitable material shall be excavated and replaced as directed. Subgrade soils must be compacted to a minimum of 95% maximum density as determined by a standard proctor test (ASTM D698).

Figure 3
LEVELING PAD

Base preparation continues with proper leveling pad construction. Redi-Rock retaining walls can be designed with an open-graded crushed stone, dense-graded crushed stone (GAB), or concrete leveling pad which supports the bottom row of blocks. The choice of which type of leveling pad to use is made by the wall designer and depends on several factors including the bearing capacity of the native soil, location of the drain outlet, conditions at the base of the wall, and any other special considerations for the wall.

OPEN-GRADED CRUSHED STONE LEVELING PAD

The most common type of leveling pad is made using an open-graded crushed stone with a drain located in the bottom of the stone. (Figure 4) This is the method that is shown in most Redi-Rock preliminary or conceptual drawings. An open-graded crushed stone leveling pad assumes that the wall drain can drain to daylight (by gravity) somewhere on the site below the elevation of the bottom of the leveling pad. If you cannot outlet the wall drain below the elevation of the bottom of the leveling pad, you should not use open-graded crushed stone. Water will become trapped below the drain outlet, weakening the base of your retaining wall and causing other problems.

Leveling pad material should be washed, crushed stone, 1 inch diameter and smaller. A crushed stone meeting the gradation requirements of ASTM No. 57 with no material passing the No. 200 sieve is preferred. The leveling pad thickness shall be as designed by the Professional Engineer. A minimum thickness of 6” or 12” is common. The leveling pad should extend at least 6” in front and 12” behind the bottom block. Make sure to check your plans.

A drain is placed in the bottom of the leveling pad to provide an outlet for any water collected behind the wall. A 4” perforated sock drain is commonly used. The drain runs the entire length of the wall and must have proper outlets to provide drainage for the wall. (Figure 5)
The leveling pad material should be placed and compacted to provide a uniform, level pad on which to construct the retaining wall. (Figure 6) Proper elevation can be established with a laser level or transit. You can also set two 20’ long grade pipes to the desired grade and screed the crushed stone material between the pipes.

Place the stone leveling pad in uniform loose lifts a maximum of 6” thick. Consolidate the stone with a minimum of three passes with a 24” wide, walk-behind, vibrating plate compactor capable of delivering at least 2000 pounds of centrifugal force. This should achieve 90% relative density of the stone determined in accordance with ASTM D-4253 and D-4254. In place density of the stone fill should be confirmed using ASTM D-6938. If you don’t achieve a minimum of 90% relative density, place the stone in smaller lifts or apply more compaction effort until you do achieve 90% relative density of the stone.

Do NOT place a thin layer of sand between the leveling pad and bottom block. This layer will reduce the sliding resistance between the leveling pad and bottom block.
DENSE-GRADED CRUSHED STONE LEVELING PAD

If you cannot outlet the wall drain below the elevation of the bottom of the leveling pad, you need to construct the leveling pad from material which has a low permeability and will not trap water below the elevation of the drain outlet. In this case, a dense-graded crushed stone or graded aggregate base (GAB) material is typically used up to the elevation where the wall drain can gravity outlet through the face of the wall. (Figure 7)

Leveling pad material should be dense-graded crushed stone with between 8 and 20% “fines” which will pass through a No. 200 sieve. The leveling pad thickness shall be as designed by the Professional Engineer. A minimum thickness of 6” or 12” is common. The leveling pad should extend at least 6” in front and 12” behind the bottom block. Make sure to check your plans.

Place the dense-graded crushed stone in uniform loose lifts a maximum of 6” thick. Consolidate the stone with a minimum of three passes with a 24” wide, walk-behind, vibrating plate compactor capable of delivering at least 2000 pounds of centrifugal force. This should achieve 90% relative density of the stone determined in accordance with ASTM D-4253 and D-4254. In place density of the stone fill should be confirmed using ASTM D-6938. If you don’t achieve a minimum of 90% relative density, place the stone in smaller lifts or apply more compaction effort until you do achieve 90% relative density of the stone.

Make sure the dense-graded crushed stone is placed and compacted to provide a uniform, level pad on which to construct the retaining wall.

Place the bottom row of blocks on the leveling pad.

Continue wall construction as described in the section “SETTING THE WALL BLOCKS”. However, use dense-graded crushed stone up to the elevation where the wall drain can gravity outlet through the face or at the ends of the retaining wall. At this elevation, place a wall drain to provide an outlet for any water collected behind the wall. A 4” perforated sock drain is commonly used. The drain runs the entire length of the wall and must have proper outlets to provide drainage for the wall.

There are two methods to outlet the drain through the face of the wall. The first method is to sawcut a small notch in the sides of two adjacent blocks. This makes a small hole for the drain outlet. Place the outlet pipe through the hole and seal the area between the pipe and Redi-Rock blocks with a non-shrink grout. The second method is to outlet the drain into small pipes cast through the Redi-Rock blocks. These blocks are custom, special order items. Please coordinate with your local Redi-Rock manufacturer.

Change from dense-graded to open-graded crushed stone from the elevation of the wall drain up through the rest of the wall. The stone should be placed as described in the section “SETTING THE WALL BLOCKS”.

---

Figure 7

<table>
<thead>
<tr>
<th>TYPICAL DENSE-GRADED CRUSHED STONE LEVELING PAD MATERIAL GRADATION REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRADE SIZE</td>
</tr>
<tr>
<td>1 INCH</td>
</tr>
<tr>
<td>3/8 INCH</td>
</tr>
<tr>
<td>NO. 8</td>
</tr>
<tr>
<td>NO. 200</td>
</tr>
</tbody>
</table>

DRAINSTONE (ASTM NO. 57) TO EXTEND AT LEAST 12" BEHIND WALL

NON-WOVEN GEOTEXTILE FABRIC (IF SPECIFIED)

PERFORATED SOCK DRAIN (AS SPECIFIED BY ENGINEER) GRAVITY FLOW TO OUTLET AROUND ENDS OF WALL AND EVERY 60" ON-CENTER OR AS SPECIFIED

CONVERT TO SOLID PIPE BEFORE OUTLETING THROUGH WALL

INTENDED FOR USE WHERE THE WALL DRAIN CAN ONLY OUTLET AT THE BOTTOM OF THE EXPOSED WALL FACE
CONCRETE LEVELING PAD

In some cases, the wall design requires the construction of a concrete leveling pad. (Figure 8a) Construct the leveling pad according to the detailed plans for your project.

Your design may also require a shear key in the bottom of the footing and/or a lip in front of the Redi-Rock blocks. These items would be shown in the project plans. (Figure 8b)

If steel rebar is to be placed in the footing, secure the bars together with wire ties in the pattern shown in the wall design. Use rebar supports to hold the rebar structure in the proper position in the footing.

Place wood formwork at the front and back of the concrete leveling pad or footing. The top of the formwork should be placed at the elevation of the top of the concrete footing so you can screed the top smooth in preparation for block placement.

Place concrete as specified in the wall design.

Once the concrete has been allowed to cure to the minimum specified strength, place the bottom blocks and continue construction of the retaining wall.

A drain is placed on the top of the concrete footing to provide an outlet for any water collected behind the wall. A 4" perforated sock drain is common. The drain runs the entire length of the wall and must have proper outlets to provide drainage for the wall. Refer to the description in the DENSE-GRADED CRUSHED STONE LEVELING PAD section above for descriptions of how to outlet the wall drain through the face of the wall.
SETTING THE BOTTOM ROW OF WALL BLOCKS.................................................

Redi-Rock blocks are typically delivered to the construction site using a flat bed trailer or boom truck. (Figure 9) Rubber tired backhoes, loaders, skid steers, or excavators are used to set the retaining wall blocks. (Figure 10) Redi-Rock blocks weigh up to 3,500 lbs. Make sure to use the proper sized equipment to handle the blocks. All lifting chains, rigging, or slings must be OSHA compliant and safety rated for proper working loads.

Properly mark the location of the retaining wall. A string line or offset stakes are typically used to establish horizontal and vertical alignment. If offset stakes are used, the stakes should be placed at least 5 feet but no more than 10 feet in front of the face of the retaining wall. A stake should be provided at every elevation change and at a maximum of 50 feet apart.

Place a complete row of blocks on the prepared leveling pad. Blocks shall be placed tight together. Block alignment should be established by lining up the “form line” where the face texture meets the steel form finished area at the top of the block, approximately 5 inches back from the front face. (Figure 11)

Check all blocks for level and alignment as they are placed. Small adjustments to the block location can be made with a large pry bar. If you take the time to set the bottom row properly, installation of the upper rows of blocks is much easier and more efficient.

TIP: Wall construction should start at a fixed point such as a building wall, 90° corner, or at the lowest elevation of the wall.
Place non-woven geotextile fabric in the vertical joint between the blocks to hold the backfill material between the blocks in place and prevent material from “washing out” through the joints between blocks. (Figure 12)

Place and compact backfill in front of the bottom row of blocks to help hold them in place.

Place washed drainstone or open-graded crushed stone backfill between blocks and at least 12 inches behind the wall. (Figure 13) A stone meeting the gradation requirements of ASTM No. 57 with no material passing the No. 200 sieve is preferred. Place the stone in uniform loose lifts a maximum of 6” thick. Consolidate the stone with a minimum of three passes with a 24” wide, walk-behind, vibrating plate compactor capable of delivering at least 2000 pounds of centrifugal force. This should achieve 90% relative density of the stone determined in accordance with ASTM D-4253 and D-4254. In place density of the stone fill should be confirmed using ASTM D-6938. If you don’t achieve a minimum of 90% relative density, place the stone in smaller lifts or apply more compaction effort until you do achieve 90% relative density of the stone.

Place non-woven geotextile fabric between the drainstone and the remaining backfill material if specified.

Backfill behind the washed drainstone with material as specified in the project design. Place the lifts as specified, but not to exceed 9” maximum. Granular backfill shall be compacted to a minimum of 95% maximum density as determined by a standard proctor test (ASTM D698). Use proper equipment to ensure complete compaction of the backfill material. It may be necessary to wet or dry the backfill material, place the material in smaller lifts, and/or apply more compaction effort to reach 95% maximum density. Do not use any organic, topsoil, frozen, soft, wet, or loose soils when backfilling the wall.

Re-check all units for level and alignment and sweep the top of each course of blocks clean before starting construction of the next course.
SETTING UPPER ROWS OF WALL BLOCKS

Place the next row of blocks on top of the bottom row.

If needed, a half block can be used at the end of every other row to establish a running bond in the wall where a Redi-Rock block straddles the two blocks below it. (Figure 14)

Push the Redi-Rock blocks forward until the groove on the bottom of the block comes in full contact with the knobs on the blocks below.

Place non-woven geotextile fabric in the vertical joint between the blocks, and place and compact the drainstone and backfill material the same way you did for the bottom row.

Do not install more than one course of blocks without placing and compacting stone and backfill. Having more than one course of blocks without backfill will prevent you from being able to properly place and consolidate the stone fill between blocks.

Repeat these steps with each course of blocks to the top of the wall.

IMPORTANT NOTES

If at any time ground water seepage is observed along the exposed excavation behind the retaining wall, contact the wall designer immediately to determine the corrective action needed.

Once you commence working, continue without interruption or delays. This will help expedite construction and minimize the time the excavation is open.

The construction site should be graded and maintained to direct surface water runoff away from the retaining wall throughout the entire construction process. If there is a rain event with surface water runoff producing erosion or scour near the retaining wall, contact the wall designer immediately to determine the corrective action needed.

Allowable construction tolerance at the wall face is 1° vertically and 1” in 10’ horizontally.
STEPS IN A WALL

STEPS IN THE TOP OF A WALL
Most walls have a grade change along the top of a wall which requires stepping down the top blocks. There are different options available to step down the top of a wall.

End blocks or garden corner blocks may be used to make a step-down. (Figure 15) If desired, the inside lip can be removed to allow the topsoil to fill to the edge of the block. To remove the lip, make one cut with a concrete saw and knock the lip off with a sledgehammer.

Top blocks may be placed in a radius to provide a scalloped look. (Figure 16) Two to four half blocks should be used. Remove the outside knob on the last middle block of the bottom course before beginning scallop. A concrete saw and sledgehammer can be used to remove the knob in the field.

Freestanding corner blocks can be used inline to step-down or finish the end of a wall. A Redi-Rock Step block or Cap Block can be used to provide a more finished look. (Figures 17 and 18)

STEPS IN THE BOTTOM OF A WALL
Grade changes along the bottom of a wall can be accommodated by stepping the bottom row of blocks.

Steps in the bottom of a wall are relatively simple to make with either a crushed stone or concrete footing. A half bottom block is used to finish the bottom row before making the step. This accounts for the running bond between rows of blocks and keeps a middle block from being used at the bottom of the wall. (Figure 19)
CORNERS AND CURVES

Corners and curves can be made with Redi-Rock walls. Corners are typically constructed at 90° angles. Smaller or larger angles in the wall are typically made with curves.

WALLS WITH 90° CORNERS
Corner freestanding blocks are used to make 90° corners. (Figure 20) If a standard corner block with a straight bottom groove and 6” diameter knobs is used, a small portion of the knob on the corner block and on the adjacent retaining wall block must be sawcut and removed for proper block alignment. If the special 90° corner block with a modified (wider) bottom groove and smaller knob is used, no sawcutting is required.

Start construction at the 90° corner and work away in both directions.

If a double 90° corner is to be constructed, special construction details must be followed to account for the effect of the wall batter.

There are several construction details available online at www.redi-rock.com which show examples of single and double 90° corners.

CURVED WALLS
Curves can easily be incorporated into a Redi-Rock wall. (Figure 21)

Convex curves may be installed at varying radii. Redi-Rock blocks are tapered on the sides. The smallest radius you can make with Redi-Rock blocks (without cutting the blocks) occurs when the blocks are placed together with their sides touching. The minimum radius for full size blocks is 14’-6” from the face of the blocks. A minimum radius of 8’-0” from the face of the blocks can be made if all half blocks are used. Note: you will not have a running bond joint between blocks if you use all half blocks.

When you are building a multiple course Redi-Rock wall, each layer of blocks sets back from the blocks below. Looking down on the top of the wall, you can see that the radius for each row of blocks gets smaller as you go higher in the wall. The shortest radius will be on the top course of the wall.
Plan ahead when laying out a curved retaining wall. Start with the minimum radius you want at the top of the wall and then add 2" per course for each standard setback block, 10" per course for each 9" setback block, and 17" per course for each planter block in the wall below the top row of blocks. This will make sure that you have enough room at the top of the wall to build the top row of blocks without interference. Refer to the following chart for minimum bottom radius in Redi-Rock walls. (Figure 23)

<table>
<thead>
<tr>
<th>NUMBER OF COURSES</th>
<th>HEIGHT OF BLOCKS</th>
<th>MIN. RADIUS (FROM FACE OF BLOCK) AND APPROX. DISTANCE BETWEEN BLOCKS (PER SKETCH)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>NO PLANTER BLOCKS</td>
</tr>
<tr>
<td>1</td>
<td>1'-6&quot;</td>
<td>14'-6&quot;</td>
</tr>
<tr>
<td>2</td>
<td>3'-0&quot;</td>
<td>14'-8&quot;</td>
</tr>
<tr>
<td>3</td>
<td>4'-6&quot;</td>
<td>14'-10&quot;</td>
</tr>
<tr>
<td>4</td>
<td>6'-0&quot;</td>
<td>15'-0&quot;</td>
</tr>
<tr>
<td>5</td>
<td>7'-6&quot;</td>
<td>15'-2&quot;</td>
</tr>
<tr>
<td>6</td>
<td>9'-0&quot;</td>
<td>15'-4&quot;</td>
</tr>
<tr>
<td>7</td>
<td>10'-6&quot;</td>
<td>15'-6&quot;</td>
</tr>
<tr>
<td>8</td>
<td>12'-0&quot;</td>
<td>15'-8&quot;</td>
</tr>
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<td>9</td>
<td>13'-6&quot;</td>
<td>15'-10&quot;</td>
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<td>10</td>
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</tr>
<tr>
<td>11</td>
<td>16'-6&quot;</td>
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</tr>
<tr>
<td>12</td>
<td>18'-0&quot;</td>
<td>16'-4&quot;</td>
</tr>
<tr>
<td>13</td>
<td>19'-6&quot;</td>
<td>16'-6&quot;</td>
</tr>
<tr>
<td>14</td>
<td>21'-0&quot;</td>
<td>16'-8&quot;</td>
</tr>
</tbody>
</table>

Remember to include the non-woven fabric in the vertical joint between adjacent blocks. If the block spacing becomes too tight for the non-woven fabric and stone between the blocks, place the non-woven fabric over the joint at the back of the blocks. (Figure 24)
INSTALLING PLANTER BLOCKS

Planter block features may be incorporated into the design of the wall. Planter blocks are used to provide for vegetation to break up the face of a wall. (Figure 25) Planter blocks can also be used without vegetation to increase the wall batter and help improve stability.

The trough in the planter blocks must be filled with soil, stone, or concrete, depending on how the planter blocks are used. In no case shall the trough in the planter blocks be left empty as backfill from behind the wall can wash out through joints between the blocks causing voids to form behind the wall.

The planter block has a 16 5/8” setback and is supported partially on the stone backfill material behind the wall. (Figure 26) It is important that the stone backfill be leveled and compacted prior to placing the planter blocks. Place the stone in uniform loose lifts a maximum of 6” thick. Consolidate the stone with a minimum of three passes with a 24” wide, walk-behind, vibrating plate compactor capable of delivering at least 2000 pounds of centrifugal force. This should achieve 90% relative density of the stone determined in accordance with ASTM D-4253 and D-4254. In place density of the stone fill should be confirmed using ASTM D-6938. If you don’t achieve a minimum of 90% relative density, place the stone in smaller lifts or apply more compaction effort until you do achieve 90% relative density of the stone.

In some cases, planter blocks may be transitioned in or out of a normal middle block course in a wall. This transition is done by removing one or two knobs at the transition, or by using the corner block. (Figure 27) Please note that transitioning planter blocks in or out of a middle block course may offset the joints slightly from falling in the middle of the block below.

In general, you want to keep all sources of water away from your retaining wall. However, if properly designed and constructed, planters may be irrigated on a case by case basis as directed by the Professional Engineer responsible for the wall design. Place a piece of geotextile fabric over the joint between planter blocks to eliminate soil from washing out. (Figure 28)
REINFORCED SOIL WALLS USING GEOCONNECTOR BLOCKS

Redi-Rock blocks are designed to allow you to build relatively tall non-reinforced or gravity walls which use the weight of the blocks to provide stability. In some instances, you may need to build a wall even taller than can be achieved using Redi-Rock non-reinforced walls. In these cases, reinforced soil walls using a combination of geogrid soil reinforcement and Redi-Rock retaining wall blocks can be used.

Reinforced walls with Redi-Rock 28" blocks use large sheets of geogrid to reinforce the soil.  (Figure 29) The sheets of geogrid are connected to the Redi-Rock blocks at the horizontal “geoconnector” groove in the blocks.

Stability of reinforced soil walls rely on the interaction between geogrid reinforcement, soil in the reinforced zone, and the Redi-Rock facing blocks. It is very important that reinforced soil walls be constructed per the detailed design prepared by a Professional Engineer. Make sure you are using the proper type and strength of geogrid listed in the design. The geogrid layers need to be placed at the proper elevations and to the proper distances into the reinforced soil zone detailed in the design. It is also critical to use the appropriate backfill material in the reinforced soil zone.

GEOGRID INSTALLATION

Construct the wall up to the elevation of the geogrid layer shown in the design. Before placing geogrid, grind smooth any rough edges on the back of the concrete blocks prior to placement to avoid damage to the geogrid sheets.

Place geogrid sheets from the wall blocks to the design length at the back of the reinforced soil zone. The distance the geogrid must extend into the reinforced soil zone is usually measured from the face of the wall to the back of geogrid. As always, check your plans to make sure.

Use the specified geogrid with the strong or roll direction PERPENDICULAR to the wall face. Geogrid must be placed in a continuous sheet throughout its length from the connection at the Redi-Rock blocks to the back of the reinforced zone. Do not splice or overlap the geogrid.

Make the appropriate connection to the Redi-Rock blocks. (See a description of the connection below.) After connecting, pull the geogrid sheets taut and pin them down prior to placing and compacting backfill.

Place lifts of specified fill material in the reinforced soil zone. The fill material is typically a sand or gravel with less than 5% “fines” (material passing the No. 200 sieve). This material is usually classified as a GW, GP, SW, or SP. It is very important that you only use the fill material specified in your project design drawings and specifications.

Perform compaction starting from the back of the wall blocks and working into the reinforced soil zone. This will help avoid “bunching” the geogrid reinforcement. Material should be placed in lifts of 9” maximum and compacted to 95% maximum density as determined by a standard proctor test (ASTM D698).
Do not operate tracked construction equipment directly on the geogrid reinforcement. A minimum fill thickness of 6" is required for the operation of tracked vehicles over the geogrid reinforcement. Turning of tracked vehicles should be kept to a minimum to prevent displacement of the fill and the geogrid reinforcement. Rubber-tired vehicles may pass over the geogrid reinforcement at a slow speed (less than 5 mph). Sudden breaking and sharp turning should be avoided.

Place retained soil immediately between the reinforced soil zone and the back of the excavation. Material should be placed in lifts of 9" maximum and compacted to 95% maximum density as determined by a standard proctor test (ASTM D698). Bring the reinforced and retained soil up to grade at the same time. At no time should the elevation of the reinforced soil be more than 1 block higher than the retained soil.

**GEOGRID CONNECTION TO BLOCKS**

Connection between geogrid sheets and the Redi-Rock 28" Series blocks is made with the Redi-Rock Type 1AT connection. The connection is made with one 7/16" diameter solid fiberglass rod available from your local Redi-Rock manufacturer. (Figure 30)

The Type 1AT Connection is made with the following steps:

- Install a complete row of retaining wall blocks. Sweep the top of the blocks clean.
- Lay the geogrid across the top of the block and let it hang down to the bottom of the front face.
- Place one 40" fiberglass rod over the geogrid into the geoconnector slot. (Figure 31)
- Pull the geogrid back over the rod and extend the tail beyond the back of the block to provide a minimum of 3 feet embedment. TIP: A steel angle can be used to hold the rod and geogrid in position as shown. (Figure 32)
- Install the next course of retaining wall blocks to lock the geogrid connection in place.
- Pull the geogrid flat and tight. Secure it in place with pins or staples as recommended by the manufacturer.
- Place 3 inches of drainstone between the anchored tail and the primary geogrid layer.
- Backfill and compact as specified.
GEOGRID PLACEMENT ON CONCAVE CURVES AND INSIDE CORNERS

Figure 33

TO COMPLETE PLACEMENT OF REINFORCEMENT FOR A SPECIFIED PLACEMENT ELEVATION, PLACE ADDITIONAL REINFORCEMENT ON NEXT COURSE OF SEGMENTAL UNITS IMMEDIATELY ABOVE THE SPECIFIED PLACEMENT ELEVATION, IN A MANNER THAT ELIMINATES GAPS LEFT BY PREVIOUS LAYER OF GEOSYNTHETIC AT SPECIFIED REINFORCEMENT ELEVATION. IF REINFORCEMENT PLACEMENT IS SPECIFIED FOR SUCCESSIVE LIFTS, ENSURE GAPS IN REINFORCEMENT ARE COVERED WITH REINFORCEMENT PRIOR TO BACKFILLING.

SQUARED CORNER

SERPENTINE CURVES AND 90° RADIUS CORNER
GEOGRID PLACEMENT ON CONVEX CURVES AND OUTSIDE CORNERS

3" OF SOIL REQUIRED BETWEEN OVERLAPPING REINFORCEMENT FOR PROPER ANCHORAGE IF BOTH LAYERS PLACED AT THE SAME SRW UNIT ELEVATION.

ALTERNATE TO OVERLAPPING IN A SINGLE COURSE. REINFORCEMENT COULD BE PLACED IN THE PERPENDICULAR PRINCIPLE DIRECTION IN THE CROSS-OVER AREA ON THE SUCCEEDING COURSE.

SQUARED CORNER

3" OF SOIL FILL REQUIRED BETWEEN OVERLAPPING REINFORCEMENT FOR PROPER ANCHORAGE.

CURVED CORNER

SERPENTINE CURVES AND 90° RADIUS CORNER
DRAINAGE FEATURES IN REINFORCED SOIL WALLS

Drainage features shall be installed per the detailed design prepared by a Professional Engineer. Measures may include a chimney drain behind the reinforced soil zone if required. (Figure 35) The site should also include drainage swales or other methods to direct water away from the top and bottom of the wall.
Reinforced walls with the Positive Connection Series blocks use discrete, 12” wide strips of geogrid to reinforce the soil. The strips of geogrid wrap through a slot cast in the center of Positive Connection blocks and extend full length behind the blocks on both the top and bottom of the block. (Figure 36)

Stability of reinforced soil walls rely on the interaction between geogrid reinforcement, soil in the reinforced zone, and the Redi-Rock PC blocks. It is very important that reinforced soil walls be constructed per the detailed design prepared by a Professional Engineer. Make sure you are using the proper type and strength of geogrid listed in the design. The geogrid strips need to be installed in the appropriate blocks and to the appropriate length. In most cases, every PC block in the wall has a geogrid strip. It is also critical to use the appropriate backfill material in the reinforced soil zone. Review your project design drawings and specifications.

Before constructing a reinforced soil wall using the Redi-Rock PC system, inspect the material delivered to the project site. The geogrid strips should be properly cut to a 12” width. The size and spacing of main, longitudinal strands vary with type and weight of geogrid. Check and make sure that you have the correct number of main, longitudinal strands for your geogrid type and that the outside strands are intact and were not damaged in the manufacturing or cutting process. Check the Redi-Rock PC blocks for any flashing or sharp edges in the slot and groove through the block. Remove any flashing and grind smooth any sharp edges which could damage the geogrid strips.

The distance a geogrid strip must extend into the reinforced soil zone, or design length, is measured from the back of the block to the back of geogrid. The actual cut length of geogrid strip is two times the design length plus an additional length for the geogrid required in the block. For the Redi-Rock 28” PC blocks, the cut length is 2 times the design length plus 3 feet (2xL + 3’).

GEOGRID STRIP INSTALLATION

Place the bottom row of Positive Connection blocks on a prepared leveling pad.

Place the geogrid strips through the Redi-Rock Positive Connection blocks. Pin the bottom leg of the geogrid strip with staples, stakes, or other appropriate methods. Pull the geogrid strip tight to remove any slack, wrinkles, or folds. (Figure 37)
Place drainstone backfill (ASTM No. 57) between blocks and at least 12” behind the wall. This stone will secure the front end of the geogrid strips in place. (Figure 38) Place the stone in uniform loose lifts a maximum of 6” thick. Consolidate the stone with a minimum of three passes with a 24” wide, walk-behind, vibrating plate compactor capable of delivering at least 2000 pounds of centrifugal force. This should achieve 90% relative density of the stone determined in accordance with ASTM D-4253 and D-4254. In place density of the stone fill should be confirmed using ASTM D-6938. If you don’t achieve a minimum of 90% relative density, place the stone in smaller lifts or apply more compaction effort until you do achieve 90% relative density of the stone. Place non-woven geotextile fabric between the drainstone and the reinforced soil zone if specified.

Place lifts of specified fill material in the reinforced soil zone. (Figure 39) The fill material is typically a sand or gravel with less than 5% “fines” (material passing the No. 200 sieve). This material is usually classified as a GW, GP, SW, or SP. It is very important that you only use the fill material specified in your project design drawings and specifications.

Perform compaction starting from the back of the wall blocks and working into the reinforced soil zone. This will help avoid “bunching” the geogrid reinforcement. Material should be placed in lifts of 9” maximum and compacted to 95% maximum density as determined by a standard proctor test (ASTM D698).

Tracked construction equipment shall not be operated directly on the geogrid strip reinforcement. A minimum fill thickness of 6 inches is required for the operation of tracked vehicles over the geogrid strips. Turning of tracked vehicles should be kept to a minimum to prevent displacement of the fill and the geogrid strips. Rubber-tired vehicles may pass over the geogrid strips at a slow speed (less than 5 mph). Sudden breaking and sharp turning should be avoided.

After placing backfill to the elevation of the geogrid strip at the top of the block, stretch the top leg of the geogrid strip to the back of the reinforced soil zone. Pull the geogrid strip tight to remove any slack, wrinkles, or folds. Pin the top leg of the geogrid strip with staples, stakes, or other appropriate methods to hold it in place and keep the geogrid strip taut.

Fill the center core in the PC blocks with drainstone.
Place retained soil immediately between the reinforced soil zone and the back of the excavation. Material should be placed in lifts of 9” maximum and compacted to 95% maximum density as determined by a standard proctor test (ASTM D698). Bring the reinforced and retained soil up to grade at the same time. At no time should the elevation of the reinforced soil be more than 1 block higher than the retained soil.

Sweep the top of the Redi-Rock blocks clean and then continue setting the next course of blocks following this same procedure. (Figure 40)
GEOGRID STRIP PLACEMENT ON CONCAVE CURVES AND INSIDE CORNERS

SQUARED CORNER

SERPENTINE CURVES AND 90° RADIUS CORNER

LEGEND
- GEOGRID STRIP REINFORCEMENT AROUND BLOCK ON CURRENT LAYER
- GEOGRID STRIP REINFORCEMENT AROUND BLOCK ONE LAYER DOWN

Figure 41
GEOGRID STRIP PLACEMENT ON CONVEX CURVES AND OUTSIDE CORNERS

**Figure 42**

- **Legend:**
  - GEOGRID STRIP REINFORCEMENT AROUND BLOCK ON CURRENT LAYER
  - GEOGRID STRIP REINFORCEMENT AROUND BLOCK ONE LAYER DOWN

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**SQUARED CORNER**

- Place 18" high piece of non-woven geotextile fabric in joint between blocks (typ.)
- Place stone in joint between blocks
- Place 3" of soil required between overlapping reinforcement

**ENLARGED JOINT DETAIL**

**SERPENTINE CURVES AND 90° RADIUS CORNER**

- Place 3" of soil required between overlapping reinforcement
- Place stone in joint between blocks
- Place 18" high piece of non-woven geotextile fabric in joint between blocks (typ.)
DRAINAGE FEATURES IN PC SYSTEM REINFORCED SOIL WALLS

Drainage features shall be installed per the detailed design prepared by a Professional Engineer. Measures may include a chimney drain behind the reinforced soil zone if required. (Figure 43) The site should also include drainage swales or other methods to direct water away from the top and bottom of the wall.

TYPICAL DRAIN SECTION

(Poor-draining retained soils and/or areas with potential groundwater impact)
FREESTANDING WALLS

Redi-Rock freestanding wall blocks have facing texture on two or three sides. They are used in applications where two or three sides of the wall are visible. Freestanding blocks can be installed as “stand alone” walls, such as perimeter walls or fences. (Figure 44) They can also be designed and installed as top courses on a standard Redi-Rock retaining wall. (Figure 45)

Freestanding wall installation is similar to Redi-Rock retaining wall blocks. The main exception is that there is typically no backfill material behind the freestanding walls. Even though there is no backfill acting on the walls, freestanding walls need to be properly engineered. They require adequate stability at the base of the wall and they need to resist any applied forces such as wind loads or forces from railings or fences.

FREESTANDING WALL INSTALLATION

If you are building a “stand alone” freestanding wall, prepare the subgrade soils and leveling pad as described previously. Place bottom blocks on the leveling pad. A 6” minimum bury on the bottom block is typical. Middle and top blocks are placed directly on top of the bottom blocks with no batter.

If you are building a freestanding wall on the top of a Redi-Rock retaining wall, end the last row of retaining wall blocks with a middle block. The size of the knob on top of the last row of retaining wall blocks will establish the setback for the first row of freestanding blocks. Retaining blocks with a 10” knob will produce a 2 7/8” setback between the retaining block and the first freestanding block. If the retaining blocks have a 7 1/2” knob, the setback between the retaining block and the first freestanding block will be 1 5/8”. (Figure 46) Remember, the 10” diameter knobs are standard on most Redi-Rock retaining wall blocks. Be sure to contact your local Redi-Rock manufacturer to determine availability of specialty blocks and specify which knob size you require for your project.
FREESTANDING WALL NOTES
Start and end freestanding walls with straight blocks. Three sided curved blocks are not available.

Freestanding walls are installed with no batter.

A wall constructed with all freestanding curved blocks will have a radius of 14’ 6”.
A wall constructed with alternating straight and curved freestanding blocks will have a radius of 29’ 0”.
Other radii can be constructed by cutting the ends of the freestanding blocks to fit.
Redi-Rock freestanding blocks with the 4” x 12” end insert are designed to be easier to cut in the field. (Figure 47)

Colored foam “Backer Rod” can be used to fill any small gaps which may occur between the blocks when installing walls. (Figure 48)
Backer rods diameter can be purchased from concrete supply centers. Call your local Redi-Rock manufacturer for help locating foam backer rods for your project.

CAP INSTALLATION
Cap blocks are commonly used on top of freestanding walls to provide a “finished” look to the project.

Mark the center of the freestanding blocks to monitor the correct running bond spacing.

Place a minimum of two beads of construction adhesive on top of the freestanding block before setting the cap block. (Figure 49)
Use an adhesive that meets the requirements of ASTM D3498 and C557 and HUD/FHA Use of Materials Bulletin #60. An example is Titebond Heavy Duty Construction Adhesive by Franklin International (1-800-347-4583) or PL Premium Construction Adhesive (www.stickwithpl.com). Mortar cement can also be used.

Three sided caps should be used on the end of walls. Two sided caps should be used in the middle of walls. Caps can be cut as needed for proper alignment.

If desired, grout the joints between cap blocks after installation with a non-shrink grout.

TIP: A Probst Quick Lift may be used for easier installation of cap blocks or freestanding top (flat) blocks. (Figure 50)
FORCE PROTECTION WALLS

Redi-Rock freestanding blocks can be manufactured with horizontal and vertical conduits cast into the blocks, producing the Redi-Rock Force Protection Series blocks. The conduits create holes in the blocks which provide the ability to connect the blocks together with post-tensioned cables and j-bolts. The resulting wall section provides more resistance to small impact loads than individual blocks alone. While not intended to be used as a traffic barrier subject to typical vehicle impact loads, properly constructed Force Protection Series walls are used in many applications where the wall designer wants the extra stability from the connected blocks.

Note: Full scale crash testing has not been performed on the Redi-Rock Force Protection Series, thus the system is not rated to any testing standard. There are computer simulations of vehicle impacts to Force Protection walls available at www.redi-rock.com.

Note: The following are individual line item steps to describe the installation of the post-tensioned cable and j-bolts. In practice, the cable is threaded through the blocks and j-bolts are installed simultaneously as the blocks are placed.

POST-TENSIONED CABLE INSTALLATION
Install a threaded termination end on the end of the cable. Electroline M Series terminations manufactured by Esmet, Inc. work well.

Thread cable with termination end through all the blocks. It is important that the cable is placed in each course of blocks prior to placing the next course.

Pull the cable through the block on the far end of the wall until approximately 2” of threads protrude beyond the end of the blocks. This 2” of exposed threads will provide room to place a 5/8” x 6” x 9” steel plate over the exposed threads and start the nut.

Mark and cut the cable at the starting end of the wall so that 4” of cable protrudes beyond the block. The 4” protrusion will provide room to install a 5/8” x 6” x 9” steel plate and ferrule termination fitting.

After the cable has been cut, slide the entire cable several feet towards the ferrule end so that you will have room to work. Install a steel plate and ferrule termination end on the cable.

Pull the cable snug so that the ferrule is against the steel plate. There will be 2” of thread exposed at the far end of the wall which has the termination end on the cable.

Place the steel plate over the threads and start the nut. The nut can be tightened to the desired tension. (Figure 51)

J-BOLT INSTALLATION
Before placing bottom row of blocks, augur hole and pour in place 10” x 3’ deep concrete anchor with ½” rebar hook.

Set the bottom block.

Install J-bolt in ground anchor and lean against block.

Set an adjacent block.

Place a clip between blocks in hooks provided on block ends.

Place a J-bolt through center of the clip, thread a nut on J-bolt, and tighten.

For next courses of block, repeat this procedure but connect J-bolt to lower block instead of ground anchor. (Figure 52)
POST-TENSION CABLE SYSTEM

Threaded Cable Termination

SECTION E-E

Ferrule Cable Termination

DETAIL A
SCALE 1/5

SECTION B-B
SCALE 1/5

DETAIL C
SCALE 1/5

SECTION D-D
SCALE 1/5
REDI-ROCK COLUMNS

Redi-Rock column blocks are available to complement Redi-Rock walls. Columns can be installed by themselves or with fences or gates. *(Figures 53 and 54)*

COLUMN AND FENCE INSTALLATION

Prepare base and leveling pad per design details.

Bury columns per design details. Minimum bury at the bottom of the column block should be at least 2 inches. Extra bury may be required in your design depending on site conditions and application.

Place the bottom column block, then install concrete fence rails or split wood fence rails. *(Figure 55)*

Install pocket plugs above or below fence rails as needed.

Install subsequent courses of column blocks. Use a concrete adhesive or mortar cement to fasten column blocks together.

Install a column cap on the top course using concrete adhesive or mortar cement. *(Figure 56)*

COLUMN AND GATE INSTALLATION

Measure the gate and mark the location on the ground. Leave enough room for the gate, hinges, and other mounting hardware.

Prepare the base and leveling pad per design details.

Place the column blocks.

Insert gate hinge or latch hardware into the columns at the appropriate elevations.

Mount gate on hinges and adjust to level gate.

Fill the core through the column blocks with concrete. A conduit can be left through the core if needed for lighting, etc.

Finish the column with a column cap. Adjust the cap position until all sides are equidistant and square to the column. Secure the column cap with mortar, construction adhesive or concrete fill as appropriate.
Redi-Rock pavers can finish your hardscape installation. Installation is completed in the following steps:

Grade and compact sub-base material as specified in the project design.

Place and compact a gravel base course. A typical thickness of the gravel base course is 4” to 6”, depending on your application.

Place and compact a sand leveling course beneath pavers. A typical thickness of the sand course is 1” to 1 ½”, compacted and screeded smooth. (Figure 57)

Install pavers per the project design. Pavers may be placed using slings. After placing pavers and removing slings, nudge pavers into their final position with an excavator. A vacuum lift is also an effective method to set pavers.

Place two coats of concrete sealer after paver installation.

Curved pavers come standard with textured sides. Three curved pavers in a row can turn a 90° corner, or a 7’ 6” inside radius.

Pavers may be placed using the mortarless joint sides.

If pavers are used in light traffic situations, sweep sand into the joints to lock them into place. (Figure 58) Failure to sweep sand into the joints may allow the pavers to move and result in the concrete chipping at the top edge of the pavers.

Paver joints may be sprayed with weed killer to eliminate grass or vegetation growth.

If textured sides are used on pavers, approximately 1 ½” joints may be filled with grout or filler sand, depending on the application. Do not use grout for light traffic loading situations as the grout may pop or crack under the traffic loading.

Pavers may be cut to fit special applications with a concrete chop saw.

Manhole covers, valve top boxes, or other embedded items may be special ordered cast-in-place. (Figure 59)

Redi-Rock pavers have an optional 1’ x 1’ joint pattern on a 2’ x 2’ x 2 ½” paver for a specialized edging treatment. These pavers can be easily cut to fit in customized applications. Check with your local Redi-Rock manufacturer for availability.