

A construction site showing the installation of Reti-Rock retaining walls. The walls are made of large, grey, rectangular concrete blocks with a textured, stone-like appearance. In the background, a yellow excavator is working on a pile of blocks. A yellow skid steer loader is positioned near a white dump truck that is partially filled with gravel. Another white dump truck is visible on the right side of the site. The ground is a mix of gravel and dirt. In the foreground, there are some dry, brown branches and a blue tarp covering a portion of the wall. The overall scene is a busy construction site in a wooded area.

REDI+ROCK

INSTALLATION GUIDE



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Table of Contents

4 Installation Guide

26 Block Library

28 Block Textures

30 Isometric Block Drawings

Retaining, Freestanding, Accessories

52 Typical Construction Details





INSTALLATION GUIDE

1. PURPOSE

This manual is intended to serve as a guide for the proper installation and construction of a Redi-Rock® retaining wall. The recommendations and guidelines presented here are intended to supplement detailed construction documents, plans, and specifications for the project.

2. RESPONSIBILITIES

Redi-Rock supports a Total Quality Management approach to Quality Assurance and Quality Control (QA/QC) in the planning, design, manufacture, installation, and final acceptance of a Redi-Rock wall. This approach requires the responsible party at each stage of the project ensure that proper procedures are followed for their portion of the work. The responsible parties during the construction phase of a Redi-Rock wall include the Contractor, Engineer or Owner's Representative, and Redi-Rock licensed manufacturer. Their specific responsibilities for compliance are as follows:

CONTRACTOR

The Contractor is responsible for providing construction according to the contract documents, plans, and specifications for the project. The Contractor shall ensure that employees engaged in construction of the Redi-Rock wall understand and follow the project plans and specifications, are familiar with construction methods required, and have adequate safety training.

ENGINEER OR OWNER'S REPRESENTATIVE

The Engineer or Owner's Representative is responsible for construction review to assure that the project is being constructed according to the contract documents (plans and specifications). The representative shall fully understand the project plans and specifications and shall perform adequate field verification checks to ensure construction is in conformance with the project requirements. The presence of the Engineer or Owner's representative does not relieve the Contractor of their responsibilities for compliance with the project plans and specifications.

REDI-ROCK LICENSED MANUFACTURER

Redi-Rock blocks are produced by independently-owned licensed manufacturers. The manufacturer is responsible for the production and delivery of Redi-Rock units to the job site in accordance with published material quality, size tolerances, construction documents, plans, and specifications. The licensed manufacturer is responsible for adherence to any project specific QA/QC requirements for the production of precast concrete retaining wall units. Often, additional services—such as installation training classes—are available through the Redi-Rock manufacturer.

3. 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, by calling 1-800-321-OSHA (6742), or from your local government safety office.

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.

This installation guide is intended to supplement a detailed, site-specific wall design prepared for your project by a Professional Engineer. The construction documents for your project supersede 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, soil, and water conditions. Pay close attention to silty or clayey soils and ground water or surface water on the site as these can significantly increase the forces on the wall. A pre-construction meeting with the wall design engineer, 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, go online to www.call811.com, or contact your local utility company 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 and avoid exposure to direct sunlight.

Be careful where you stockpile excavation and backfill material. Do not stockpile material over buried utility pipes, cables, or near basement walls which could be damaged by the extra weight.

□ MATERIAL VERIFICATION

Material planned for use as drainage aggregate between and behind Redi-Rock blocks and structural backfill material proposed for use in the reinforced soil zone of mechanically stabilized earth walls must be inspected and verified to comply with requirements of the construction documents, plans, and specifications.

□ EQUIPMENT

Make sure you have the proper equipment to handle Redi-Rock blocks and install the wall. Redi-Rock blocks are quite large and heavy. Make sure excavators and other construction equipment are properly sized to handle the blocks safely. **(Figure 1)**

Hand-operated equipment should include, at a minimum: shovels, 2-foot (0.6-meter) level, 4-foot (1.2-meter) level, broom, hammer, tape measure, string, spray paint, laser level, pry or Burke bar, walk-behind vibratory plate compactor (capable of delivering a minimum of 2000 lb (8.9 kN) centrifugal force), and a 16-inch (406-millimeter) concrete cut-off saw. **(Figure 2)**

Personal protective equipment should include, at 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 ensure a safe working environment.



Figure 1



Figure 2

4. 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.

The base and back of excavation should expose fresh, undisturbed soil or rock. Remove all organic, unsuitable, and disturbed soils that “fall-in” along the base of the wall or the back of the excavation. Always provide safe excavations in accordance with OSHA requirements.

The subgrade soil (below the leveling pad) should be evaluated by the Engineer or Owner’s Representative to verify that 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 by the on-site representative and per the requirements of the contract drawings, plans, and specifications.

Subgrade soils must be compacted to a density as specified in the contract documents, plans, and specifications but not less than 90% maximum density at $\pm 2\%$ optimum moisture content as determined by a modified proctor test (ASTM D1557). **(Figures 3 and 4)**

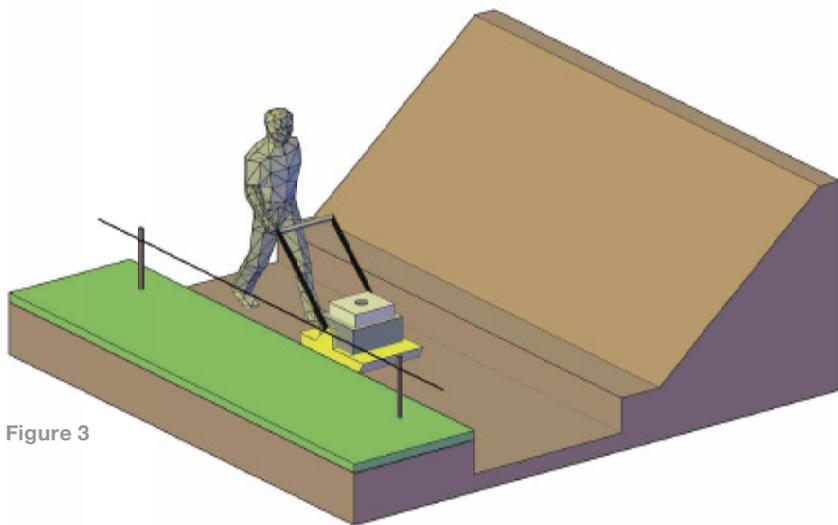


Figure 3

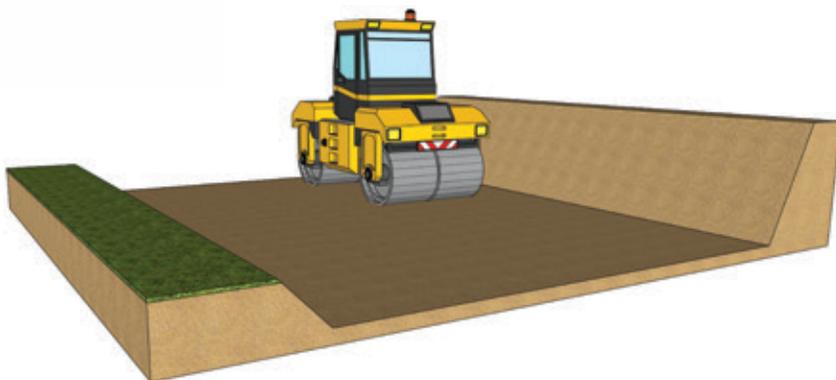


Figure 4

5. 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 design engineer and depends on several factors including the bearing capacity of the native soil, location of the drain outlet, and conditions at the base of the wall.

Open-graded crushed stone is typically used in cases where the wall drain can outlet to daylight (by gravity) somewhere below the elevation of the bottom of the leveling pad. **(Figure 6A)** The material should be 1-inch (25-millimeter) diameter and smaller stone. A crushed stone meeting the gradation requirements of ASTM No. 57 with no material passing the No. 200 (74 μm) sieve is preferred. The leveling pad thickness shall be as designed by the wall design engineer. A minimum thickness of 6 inches (152 millimeters) or 12 inches (305 millimeters) is common. The leveling pad should extend at least 6 inches (152 millimeter) in front and 12 inches (305 millimeters) behind the bottom block. Make sure to check your construction documents for details.

Dense-graded crushed stone or graded aggregate base (GAB) material is typically used in cases where the wall drain can only outlet to daylight somewhere above the bottom of the leveling pad. **(Figure 6B)** The material should be dense-graded crushed stone with between 8 and 20% “fines” which will pass through a No. 200 (74 μm) sieve. The leveling pad thickness shall be as designed by the wall design engineer. Minimum dimensions are the same as those for an open-graded crushed stone leveling pad.

The leveling pad material should be placed and compacted to provide a uniform, level pad on which to construct the retaining wall. **(Figure 5)** Proper elevation can be established with a laser level or transit. You can also set two 20' (6 m) long grade (screed) pipes to the desired grade and screed the crushed stone material between the pipes.



Figure 5

Place the stone leveling pad in uniform loose lifts a maximum of 6 inches (152 millimeter) thick. Consolidate the stone with a minimum of three passes with a 24-inch (610-millimeter) wide walk-behind vibrating plate compactor capable of delivering at least 2000 pounds (8.9 kN) of centrifugal force. This should achieve 85% 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 85% relative density, place the stone in smaller lifts or apply more compaction effort until you do achieve desired density of the stone.

Unless specifically included in the design calculations, 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.

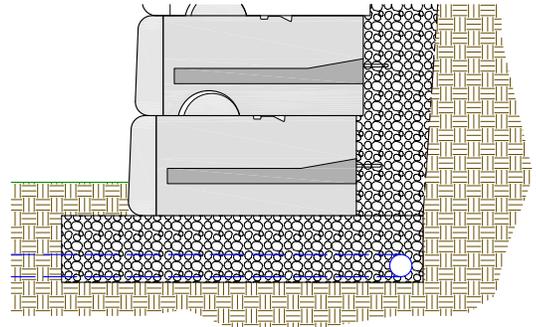
In some cases, the wall design requires the construction of a concrete leveling pad. **(Figures 6C and 6D)** Construct the leveling pad according to the detailed plans for your project.

Some designs 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.

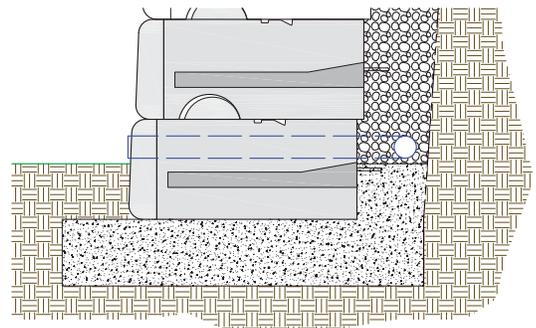
If steel rebar is to be placed in the footing, secure the bars together with wire ties in the pattern shown in the construction documents. Use rebar supports to hold the rebar structure in the proper position in the footing.

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. It is important that the top surface be smooth and level for full contact of the retaining wall blocks. 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.

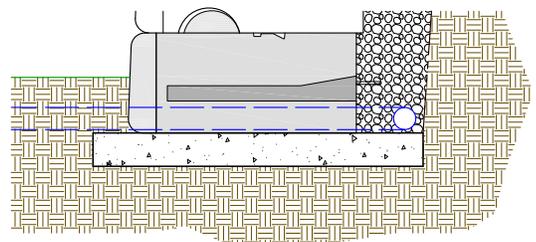
Figure 6



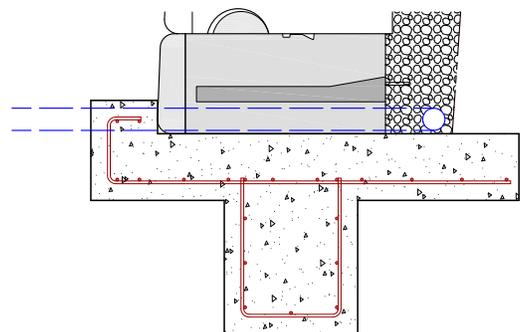
A. Open Graded Stone Leveling Pad



B. Dense Graded Stone Leveling Pad



C. Lean Concrete Leveling Pad



D. Reinforced Concrete Leveling Pad

6. SETTING THE BOTTOM ROW OF WALL BLOCKS

Redi-Rock blocks are typically delivered to the construction site using a flatbed trailer or boom truck. **(Figure 7)** Rubber tired backhoes, loaders, skid steers, or excavators are used to set the retaining wall blocks. **(Figure 8)** Make sure to use the proper sized equipment to handle the large 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 (1.5 meters) but no more than 10 feet (3 meters) 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 (15 meters) apart.

Wall construction should start at a fixed point such as a building wall, 90° corner, or at the lowest elevation of the wall.

Place the blocks on the prepared leveling pad. Blocks shall be placed in full contact with the leveling pad and other immediately adjacent block units. **(Figure 9)** 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 (127 millimeters) back from the front face. **(Figure 10)**

Check all blocks for level and alignment as they are placed. Small adjustments to the block location can be made with a large pry or Burke bar. Proper installation of the bottom block course is critical to maintaining the proper installation of all subsequent block courses within acceptable construction tolerance. It also makes installation of the upper rows of blocks much easier and more efficient.

Place and compact backfill in front of the bottom block course prior to placement of subsequent block courses or backfill. This will keep the blocks in place as drainage aggregate and backfill are placed and compacted.



Figure 7



Figure 8

Place an 18 inch x 12 inch (457 millimeter x 305 millimeter) piece of non-woven geotextile fabric in the vertical joint between the blocks to prevent the drainage aggregate and backfill material from migrating through the vertical joints between blocks. **(Figure 11)**

Place washed drainstone or open-graded crushed stone backfill between blocks and at least 12 inch (305 millimeter) behind the wall. A stone meeting the gradation requirements of ASTM No. 57 with no material passing the No. 200 (74 μ m) sieve is preferred. Place the stone in uniform loose lifts a maximum of 6 inches (157 millimeter) thick. Consolidate the stone with a minimum of three passes with a 24-inch (610 millimeter) wide, walk-behind, vibrating plate compactor capable of delivering at least 2000 lb (8.9 kN) of centrifugal force. **(Figure 12)** This should achieve 85% 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 85% relative density, place the stone in smaller lifts or apply more compaction effort until you do achieve desired density of the stone.

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

Backfill behind the drainage aggregate with material as specified in the project construction documents. Place the lifts as specified, but not to exceed 9 inches (229 millimeter) maximum. Granular backfill shall be compacted to a minimum of 90% maximum density at $\pm 2\%$ optimum moisture content as determined by a modified proctor test (ASTM D1557). Use proper equipment to insure 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 90% 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.

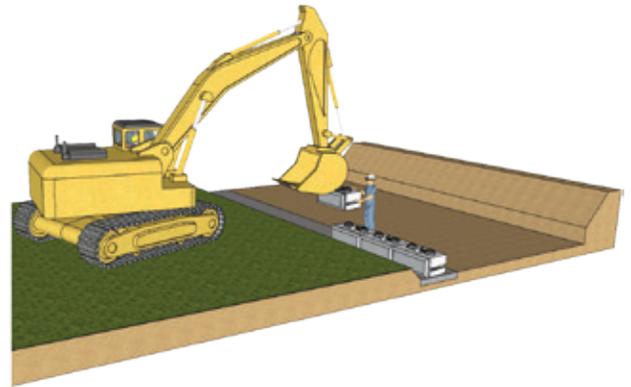


Figure 9

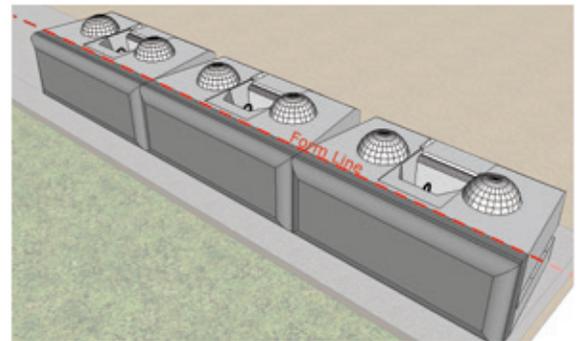


Figure 10



Figure 11



Figure 12

7. INSTALLING THE WALL DRAIN

A drain is placed behind the Redi-Rock wall blocks at the lowest elevation where the pipe can safely outlet to daylight. Drainage aggregate should be placed to the bottom of the drain as shown in the construction documents. A 4-inch (102 millimeter) perforated sock drain is commonly used for the drain pipe. Often the drain is encapsulated with drainage aggregate and wrapped with a non-woven geotextile fabric. The drain should run the entire length of the wall and needs to have proper outlets on the ends and at regularly spaced points along the wall. Solid pipe should be used for weep hole outlets through the face or under the retaining wall. **(Figure 13)**

Care needs to be taken during installation to avoid crushing or damaging the drain pipe or outlets.

8. SETTING UPPER ROWS OF WALL BLOCKS

Once the backfill is fully placed and compacted for the block course below, place the next row of blocks in a running bond configuration with the vertical joint of the lower block units centered under the mid-point of the block units above. If needed, a half block can be used at the end of every other row to maintain a running bond. **(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. Adjacent blocks shall be placed with their front edges tightly abutted together.

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

Never install more than one course of blocks without placing and compacting drainage aggregate and backfill to the full height of the block units. Placing multiple courses of blocks without backfill will prevent the proper placement and consolidation of the drainage aggregate between the blocks.

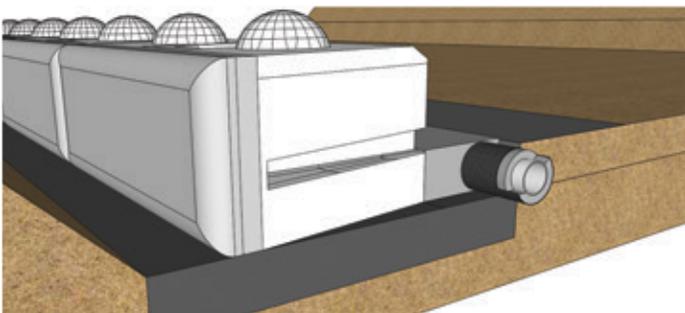


Figure 13

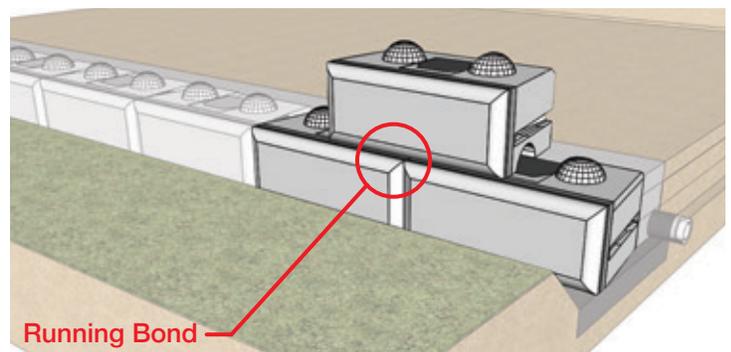


Figure 14

9. INSTALLING GEOGRID FOR MECHANICALLY STABILIZED EARTH WALLS

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. However, for some projects you may need to build even taller walls. In these cases, mechanically stabilized earth (MSE) retaining walls can be built with the Redi-Rock Positive Connection (PC) System.

The geogrid used in Redi-Rock PC System walls are 12-inch (305-millimeter) wide strips of PVC coated polyester geogrid that wrap through a vertical core slot cast into the block and extend full length into the reinforced soil zone on both the top and bottom of the block.

It is critical that you only use factory cut strips of Mirafi geogrid that are certified by TenCate Mirafi for width and strength. Field cutting strips of geogrid from larger rolls can significantly degrade the capacity of the wall system and is not allowed. Geogrid strips are only available through a Redi-Rock Manufacturer. (Figure 15)

Verify that you have the correct geogrid material and then cut the individual strips to the required length. The distance a geogrid strip must extend into the reinforced soil zone (design length) is measured from the back of the block to the end of the geogrid. Since the geogrid wraps through the block, the actual cut length of a given geogrid strip is two (2) times the design length plus enough additional geogrid to wrap through the block. For the Redi-Rock 28-inch (710-millimeter) PC blocks, the cut length is two (2) times the design length plus 3 feet (0.9 meters).



Figure 15

Inspect the Redi-Rock PC blocks for any concrete 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 reinforcement.

Place the geogrid strip in the vertical core slot from the bottom of the block and pull approximately half of the length of the strip up through the core slot. Measure from the back of the block unit to the required design length and 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. Secure the geogrid firmly in place by putting a pin through the geogrid and the steel lifting insert which is located in the recessed area on the top of the PC block (Figure 16) or placing drainage aggregate in the vertical core slot.

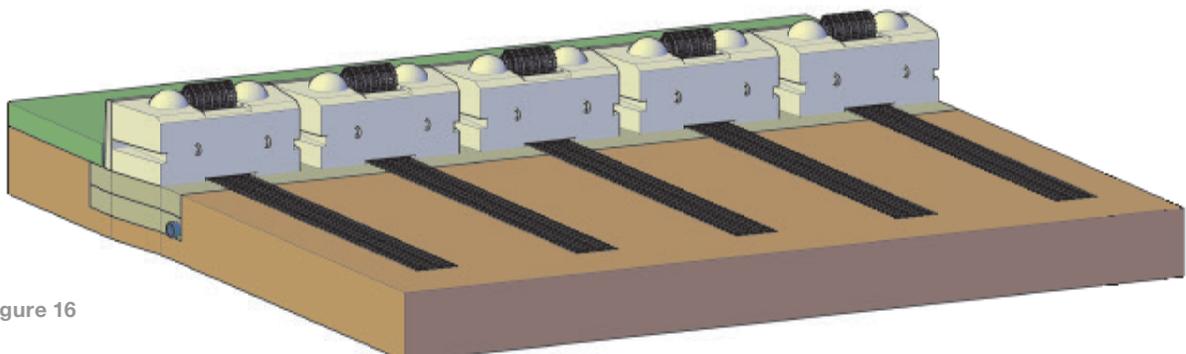


Figure 16

Place drainage aggregate between and behind the blocks. **(Figure 17)** Place the stone in uniform loose lifts as required in the project plans and specifications. Consolidate the stone between the blocks by hand tamping. Make sure to tamp stone into the ends of the groove on the bottom of the Redi-Rock PC blocks. Consolidate the stone behind the blocks with a minimum of three passes with a 24-inch (610-millimeter) wide walk-behind vibrating plate compactor capable of delivering at least 2000 lb (8.9 kN) of centrifugal force. Provide further compaction if needed to meet the density specified in the contract documents, but not less than 85% relative density of the stone determined in accordance with ASTM D-4253 and D-4254.

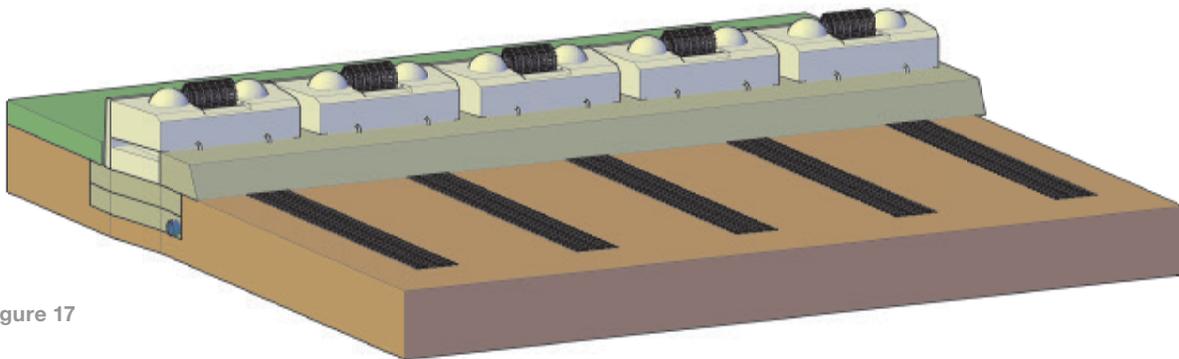


Figure 17

Place a strip of non-woven geotextile fabric between the drainage aggregate and the reinforced soil zone if specified.

Place the reinforced soil zone material in uniform loose lifts as required in the project plans and specifications. Reinforced soil zone material must be compacted to a density as specified in the contract documents, plans, and specifications but not less than 90% maximum density as determined by a modified proctor test (ASTM D1557).

Begin compaction at the back of the wall blocks and proceed to the embedded end of the geogrid strip using care to maintain the reinforcement strip in a level, taut condition oriented perpendicular to the back of the block unit to which it is attached.

Use hand operated compaction equipment within 3 feet (1 meter) of the back of the PC blocks. Heavier equipment can be used beyond 3 feet (1 meter) away from the PC blocks. Tracked construction equipment must not be operated directly on the geogrid strip reinforcement. A minimum fill thickness of 6 inches (150 millimeter) 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 of less than 5 mph (8 km/hr). Sudden braking and sharp turning should be avoided.

After placing and properly compacting backfill to the elevation of the geogrid strip at the top of the block, extend the top leg of the geogrid strip to the design length required. Pull the geogrid strip tight to remove any slack, wrinkles, or folds. **(Figure 18)** 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.

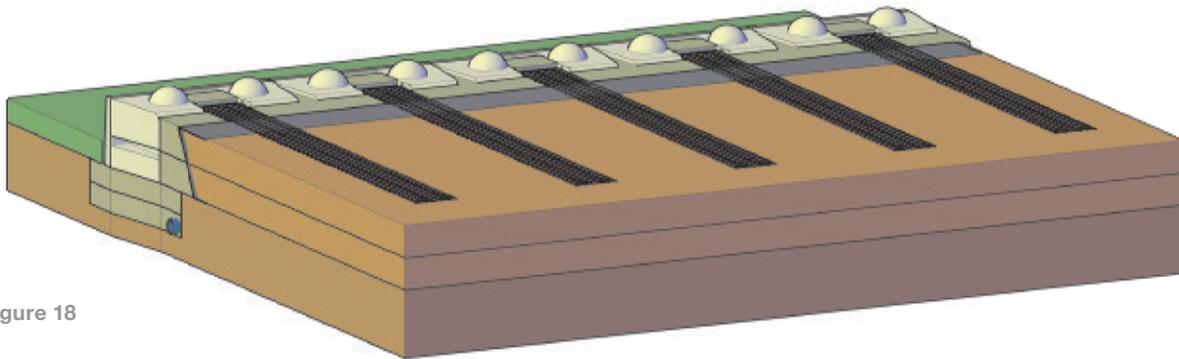


Figure 18

Fill the center slot in the PC blocks with drainage aggregate. Be careful to keep the grid flat against the back of the slot in the PC block and prevent any stone from lodging between the geogrid and the concrete block. Fill the vertical core slot completely with drainage aggregate. Consolidate the drainage aggregate by hand tamping. Use a broom to sweep clean the top of the blocks. Do not operate a walk behind vibratory plate compactor on top of the Redi-Rock PC blocks.

Place retained soil immediately between the end of the reinforced soil zone (identified as the embedded end of the geogrid reinforcement strips) and the back of the excavation. Compact retained soil to a density as specified in the contract documents, plans, and specifications but not less than 90% maximum density at $\pm 2\%$ optimum moisture content as determined by a modified proctor test (ASTM D1557). Maximum differential elevation between the reinforced fill and the retained soil fill should never exceed 18 inches (457 millimeters).

Continue construction in a similar fashion to the top of the wall. **(Figure 19)**

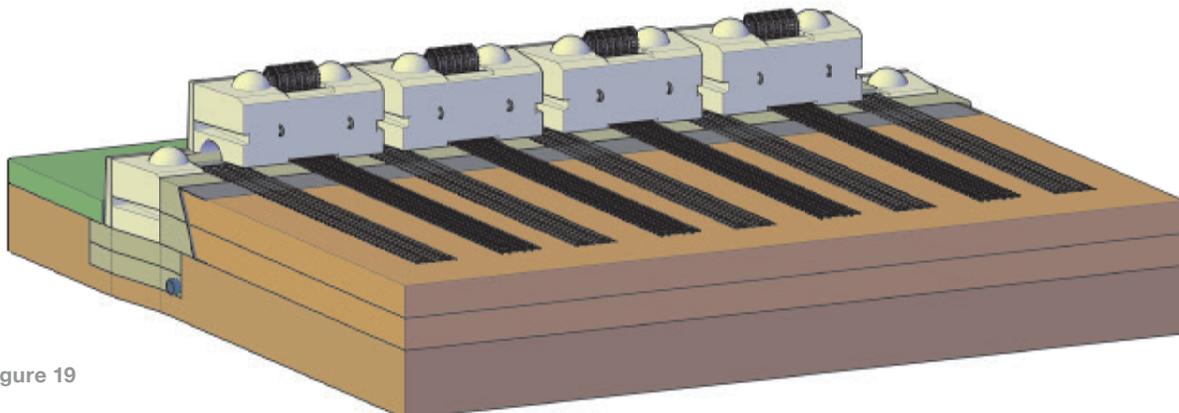


Figure 19

10. SPECIAL FEATURES

Some walls require special features such as curves, corners, top of wall details, drains in areas with elevated groundwater, and other details. **(Figures 21-23)** Refer to the construction documents, plans, and specifications to construct these features. Additional guides and common construction details are available at redi-rock.com.



Figure 21



Figure 22



Figure 23

11. IMPORTANT NOTES

Best practice dictates that wall construction should 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.

Do not exceed the allowable construction tolerances specified in the contract documents, plans, and specifications. At no time should tolerances at the wall face exceed 1° vertically and 1 inch in 10 feet (25.4 millimeters in 3048 millimeters) (1:120) horizontally.

Immediately report the following site conditions, if encountered, to the Engineer or Owner's representative to determine the corrective action needed:

- Any observed groundwater seepage.
- Surface water run-off directed toward the retaining wall during construction.
- Erosion or scour of material near the wall.
- Ponded water near the wall.
- Wet, soft, or easily compressible soils in the foundation zone.
- Existing rock that differs in location from that shown on the project plans or rock located above the elevation of the bottom of the leveling pad.
- Existing or proposed toe or crest slopes that differ from typical cross-sections shown in the project plans.
- Any other items not specifically mentioned which raise questions or cause concerns during wall construction.

Immediately implement any corrective action before resuming wall construction.

12. 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. They can also be designed and installed as the finishing top courses on a Redi-Rock retaining wall.

Freestanding wall installation is similar to that for Redi-Rock retaining walls. 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.

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 inch (152 millimeter) minimum bury on the bottom block is typical. Extra bury may be required for some projects. 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-inch (254-millimeter) diameter knob will produce a 2 7/8 inch (73 millimeter) setback between the retaining block and the first freestanding block. If the retaining blocks have a 7 ½ inch (190 millimeter) diameter knob, the setback between the retaining block and the first freestanding block will be 1 5/8 inches (41 millimeters). Be sure to contact your local Redi-Rock manufacturer to determine availability of blocks with different knob sizes.

Begin and end freestanding walls with full or half Corner blocks.

Freestanding walls are installed plumb with no batter.



Figure 24

Variable radius freestanding blocks with a 4 inch x 12 inch (102 millimeter x 305 millimeter) pocket in one or two ends of the block are used to make curved walls. Field cut the relatively thin face texture on the ends of the variable radius blocks as needed to make the desired radius for your wall. **(Figure 24)**

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

13. CAP INSTALLATION

Cap or step blocks are commonly used on top of freestanding walls to provide a finished look. **(Figure 25)**

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

Secure the cap with construction adhesive, polyurethane sealant, or mortar. If construction adhesive is used, it should meet the requirements of ASTM D3498 and C557 and HUD/FHA Use of Materials Bulletin #60. Two examples are Titebond Heavy Duty Construction Adhesive by Franklin International or PL Premium Construction Adhesive. If polyurethane sealant is used, it should be one-component, highly-flexible, non-priming, gun-grade, high-performance elastomeric polyurethane sealant with movement of $\pm 25\%$ per ASTM C719, tensile strength greater than 200 psi (1.4 MPa) per ASTM D412, and adhesion to peel on concrete greater than 20 PLI per ASTM C794.

Adhesive or sealants should be applied in 1.5 inch (38 millimeter) diameter round “Hershey Kiss” shaped dollops located in two rows at the top of the freestanding blocks at 8 inches (203 millimeter) on center.

Caps can be cut as needed for proper alignment. If desired, grout the joints between cap blocks after installation with a non-shrink grout.



Figure 25

14. FORCE PROTECTION WALLS

Install a threaded termination end on the end of the cable. Electroline M Series terminations manufactured by *Esmet, Inc.* work well.

Thread cable with a 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 inches (51 millimeters) of threads protrude beyond the end of the blocks. The exposed threads will provide room to place for a 5/8 inch x 6 inch x 9 inch (16 millimeter x 152 millimeter x 229 millimeter) steel plate over the exposed threads and start the nut.

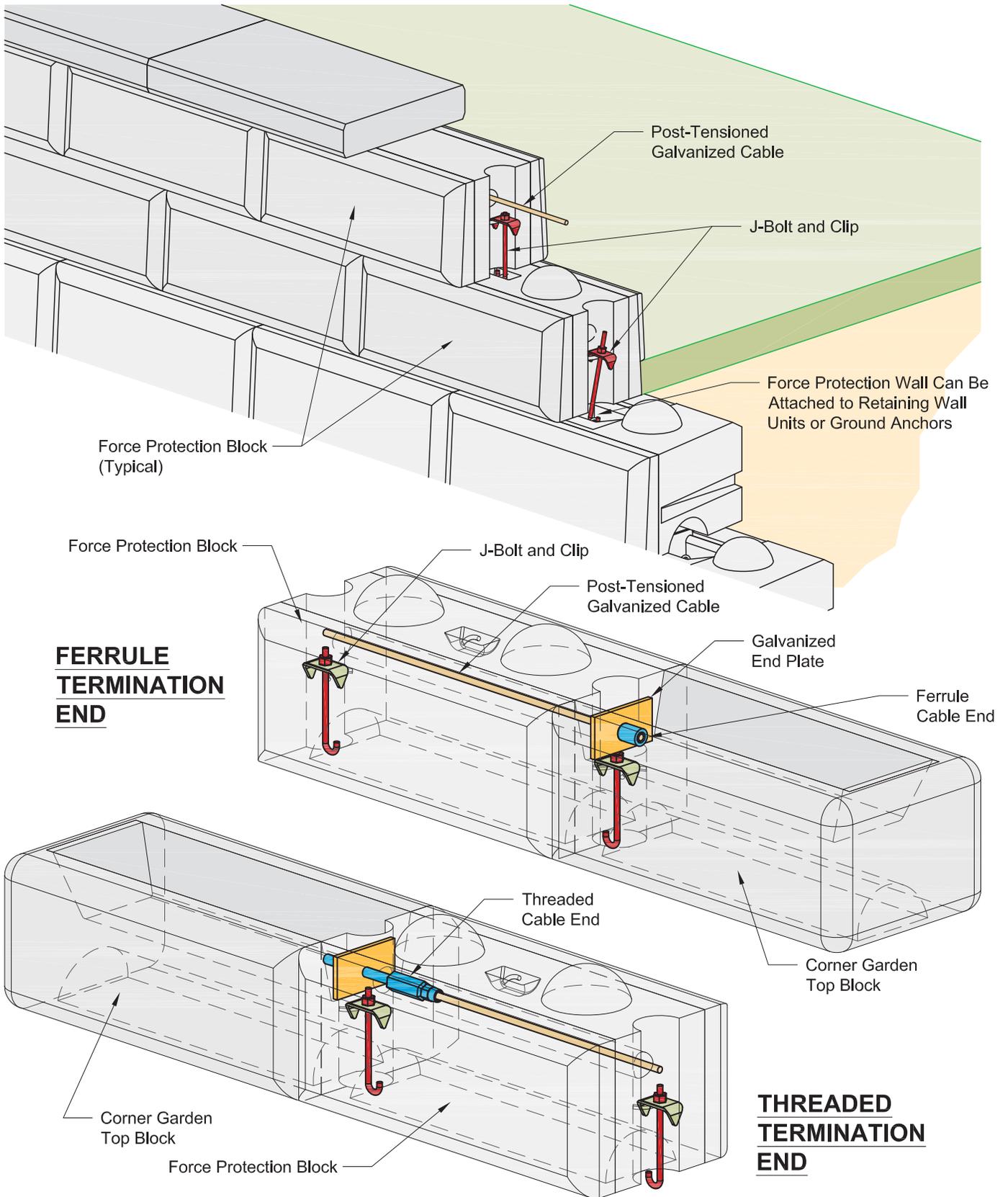
Mark and cut the cable at the starting end of the wall so that 4 inches (102 millimeter) of cable protrudes beyond the block, providing room a 5/8 inch x 6 inch x 9 inch (16 millimeter x 152 millimeter x 229 millimeter) steel plate and ferrule termination fitting.

After the cable has been cut, slide the entire cable several feet (meters) 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 inches (51 millimeters) 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.

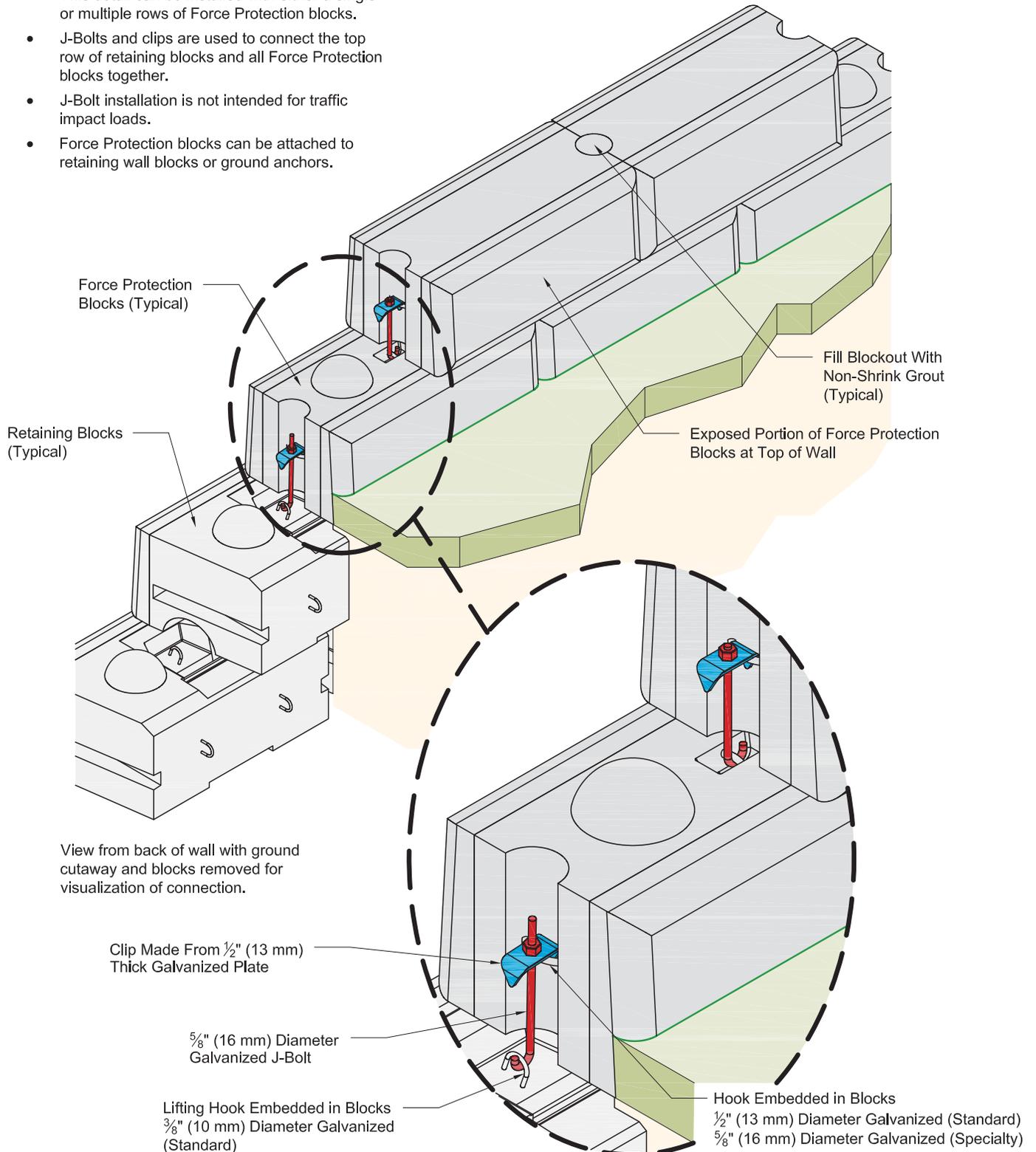
Force Protection Coping With J-Bolts and Post-Tensioned Cable



- This drawing is for reference only.
- **Final designs for construction must be prepared by a registered Professional Engineer** using the actual conditions of the proposed site.
- **Final wall design must address both internal and external drainage and shall be evaluated by the Professional Engineer who is responsible for the wall design.**

Force Protection Coping With J-Bolts

- This detail can be installed with either a single or multiple rows of Force Protection blocks.
- J-Bolts and clips are used to connect the top row of retaining blocks and all Force Protection blocks together.
- J-Bolt installation is not intended for traffic impact loads.
- Force Protection blocks can be attached to retaining wall blocks or ground anchors.



- *This drawing is for reference only.*
- **Final designs for construction must be prepared by a registered Professional Engineer** using the actual conditions of the proposed site.
- **Final wall design must address both internal and external drainage and shall be evaluated by the Professional Engineer who is responsible for the wall design.**

J-BOLT INSTALLATION

J-Bolts can be used to secure force protection walls to the top row of retaining wall blocks (when used on the top of a Redi-Rock wall) or to concrete anchors set in the ground (for a stand alone wall).

Set force protection blocks with the ends centered on ground anchors or the center of Redi-Rock middle retaining wall blocks immediately below.

Place a clip between blocks in hooks provided in the middle of the block on each end.

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

Repeat for all remaining courses of force protection blocks.

15. 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.

Column blocks can be placed on properly prepared aggregate or concrete leveling pads or directly on Redi-Rock retaining wall blocks, depending on the specific design for your project.

Column blocks can be manufactured with pockets for concrete or split wood fence rails.

Concrete adhesive or polyurethane sealant can be used between stacked column blocks.

Install a cap on the top of a column. Adjust the cap position until all sides are equidistant and square to the column. Secure the column cap with construction adhesive or polyurethane sealant.

Special inserts are available for mounting gates or similar features to Redi-Rock columns.

Column blocks are available with 4 inch (102 millimeter) or tapered 8 inch (203 millimeter) diameter cores which can be filled with stone or concrete and steel rebar reinforcement.

A conduit can be left through the core if needed for lighting or other features.







BLOCK LIBRARY

Three Custom Textures, One Complete System

Redi-Rock is a complete retaining wall solution that looks good. Engineers love it because it combines solid engineering and aesthetics, which can be a hard combination to find.

Redi-Rock offers three face textures: Ledgestone, Cobblestone, and Limestone. Any block in the Redi-Rock arsenal can be produced in any texture, which means that you can create a complete solution for your next project. Retaining wall blocks, freestanding blocks, and columns are available in each of the three textures, allowing you to design an integrated, coordinated project that looks awesome. Because Redi-Rock is made from first-use, architectural grade precast concrete, the detail in texture and the durability are phenomenal.

Each Redi-Rock block is cast in one continuous pour using molds taken from actual stone. These molds are bolt-on attachments to the Redi-Rock steel forms which can be interchanged from form to form. This means that a Redi-Rock manufacturer can use a single form to make a Ledgestone gravity block one day and a Limestone PC block the next day by simply switching out a few parts and pieces! This comprehensive forming system allows your local Redi-Rock manufacturer to create a variety of blocks, resulting in a faster, more affordable finished product.

Redi-Rock blocks are also available in a variety of color options to match the natural stone in your local area. Contact your local Redi-Rock manufacturer for color options!



Ledgestone



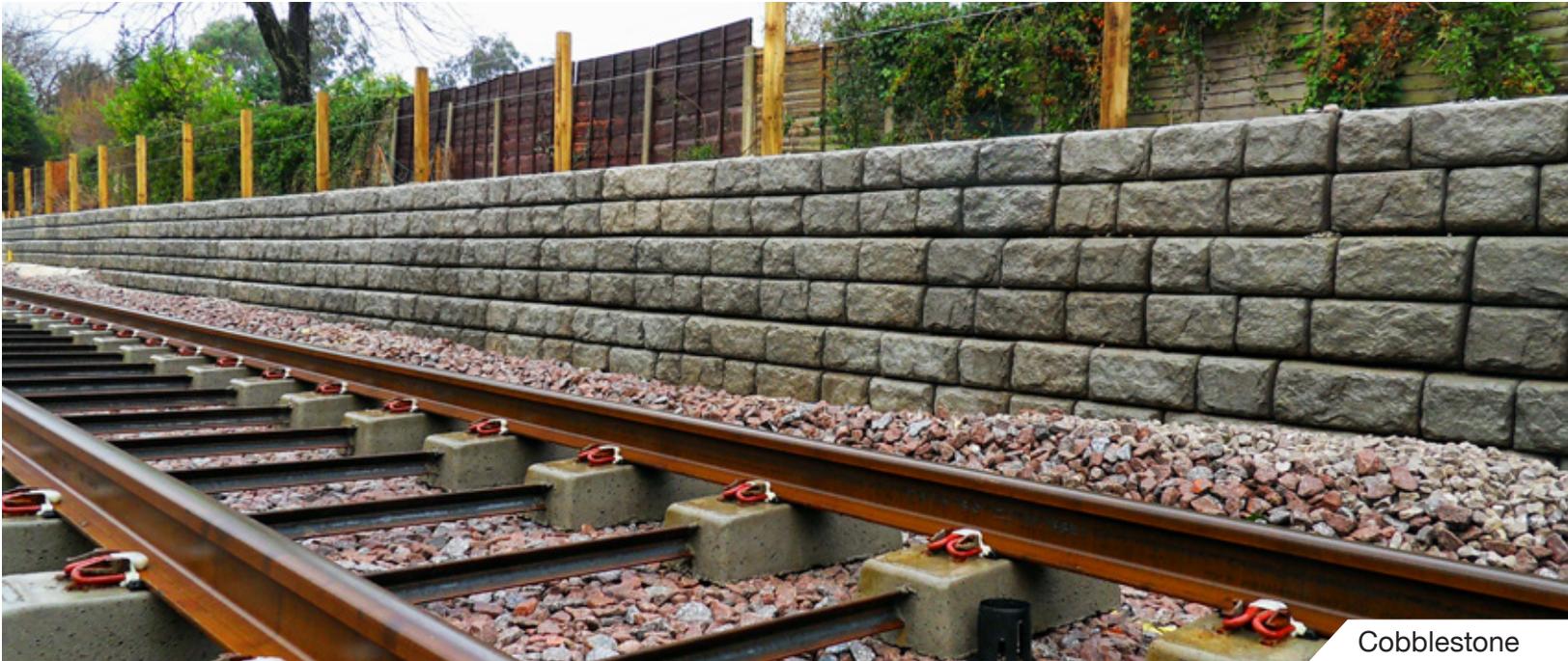
Cobblestone



Limestone



Ledgestone



Cobblestone



Limestone

RETAINING BLOCKS (FINISHED TEXTURE ON ONE FACE)

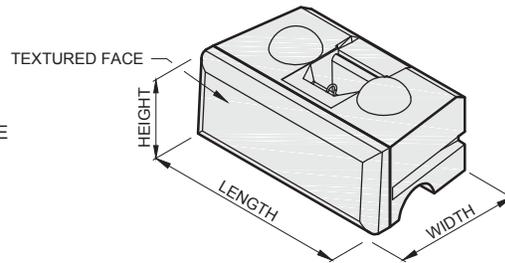
The Redi-Rock Retaining wall blocks come in multiple widths and configurations. The defining characteristic is that Retaining blocks have an aesthetic texture cast into only ONE face, and the textured face is the only side exposed to view in the finished wall. These blocks are machine-placed, wet-cast, precast modular block units manufactured from first purpose, non-reconstituted concrete and intended for constructing dry-stacked modular retaining wall systems. The block units are manufactured from structural-grade concrete mixes in accordance with ASTM C94 or ASTM C685 that produce a finished unit with excellent resistance to freeze-thaw, deicing chemical exposure, and submerged conditions in both fresh water and salt water applications. All Redi-Rock blocks are manufactured and distributed through an international network of individually-owned, licensed precast concrete manufacturers.

CONCRETE MIX PROPERTIES ⁽¹⁾

FREEZE THAW EXPOSURE CLASS ⁽²⁾	MINIMUM 28 DAY COMPRESSIVE STRENGTH ⁽³⁾	MAXIMUM WATER CEMENT RATIO	NOMINAL MAXIMUM AGGREGATE SIZE ⁽¹⁰⁾	AGGREGATE CLASS DESIGNATION ⁽⁴⁾	AIR CONTENT ⁽⁵⁾
MODERATE	4,000 psi (27.6 MPa)	0.45	1.0 (25)	3M	4.5% ± 1.5%
SEVERE	4,000 psi (27.6 MPa)	0.45	1.0 (25)	3S	6.0% ± 1.5%
VERY SEVERE	4,500 psi (30.0 MPa)	0.40	1.0 (25)	4S	6.0% ± 1.5%
MAXIMUM WATER-SOLUBLE CHLORIDE ION (Cl ⁻) CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT ⁽⁶⁾					0.015
MAXIMUM CHLORIDE AS Cl ⁻ CONCENTRATION IN MIXING WATER, PARTS PER MILLION					1000
MAXIMUM PERCENTAGE OF TOTAL CEMENTITIOUS MATERIALS BY WEIGHT ^(7, 9) (VERY SEVERE EXPOSURE CLASS ONLY)					
FLY ASH OR OTHER POZZOLANS PER ASTM C618		25	TOTAL ASH, POZZOLANS, SLAG, AND SILICA FUME ⁽⁸⁾		50
SLAG CONFORMING TO ASTM C989		50	TOTAL ASH, POZZOLANS, AND SILICA FUME ⁽⁸⁾		35
SILICA FUME CONFORMING TO ASTM C1240		10	ALKALI-AGGREGATE REACTIVITY MITIGATION PER ACI 201		

REFERENCE DIMENSIONS:

HEIGHT = VERTICAL DIMENSION OF TEXTURED FACE
 LENGTH = HORIZONTAL DIMENSION PARALLEL TO TEXTURED FACE
 WIDTH = HORIZONTAL DIMENSION PERPENDICULAR TO TEXTURED FACE



DIMENSIONAL TOLERANCES ^{(10) (11)}

HEIGHT	ALL BLOCKS	18 ± 3/16 (457 ± 5)
LENGTH	FULL BLOCKS	46 7/8 ± 1/2 (1172 ± 13)
	HALF BLOCKS	22 13/16 ± 1/2 (579 ± 13)
WIDTH	28" (710) BLOCKS	22 5/8 ± 1/2 (575 ± 13) FORM LINE TO BACK OF BLOCK, PLUS APPROX. 5 3/8 (136) FACE TEXTURE
	41" (1030) BLOCKS	35 5/8 ± 1/2 (892 ± 13) FORM LINE TO BACK OF BLOCK, PLUS APPROXIMATELY 5 3/8 (136) FACE TEXTURE
	60" (1520) BLOCKS	54 5/8 ± 1/2 (1387 ± 13) FORM LINE TO BACK OF BLOCK, PLUS APPROXIMATELY 5 3/8 (136) FACE TEXTURE

⁽¹⁾ Concrete mix properties are in general accordance with ACI 318 durability requirements. Research has shown that concrete manufactured to these standards demonstrates good durability and performance. When these requirements are followed, specific freeze-thaw testing of the concrete is typically NOT required.

⁽²⁾ Exposure class is as described in ACI 318.

⁽³⁾ Test method ASTM C39.

⁽⁴⁾ Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregate for Concrete*.

⁽⁵⁾ Test method ASTM C231.

⁽⁶⁾ Test method ASTM C1218 at age between 28 and 42 days.

⁽⁷⁾ The total cementitious material also includes ASTM C150, C595, C845, and C1157 cement. The maximum percentages shall include:

(a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.

(b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.

(c) Silica fume, ASTM C1240, present in a blended cement.

⁽⁸⁾ Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.

⁽⁹⁾ Prescriptive limits shown may be waived for concrete mixes that demonstrate excellent freeze-thaw durability in a detailed and current testing program.

⁽¹⁰⁾ All dimensions are shown in units of *inches (mm)*.

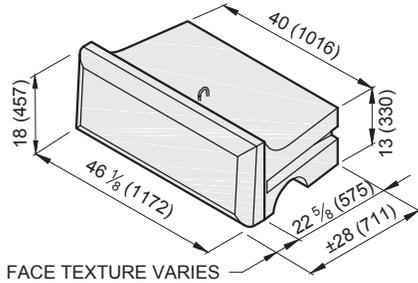
⁽¹¹⁾ Permissible defects: Chips smaller than 1.5" (38mm) in its largest dimension and cracks not wider than 0.012" (0.305mm) and not longer than 25% of the nominal height of the block; bug holes in the architectural face smaller than 0.75" (19mm); and bug holes, water marks, and color variation on non-architectural faces.

RETAINING BLOCKS

Block Library

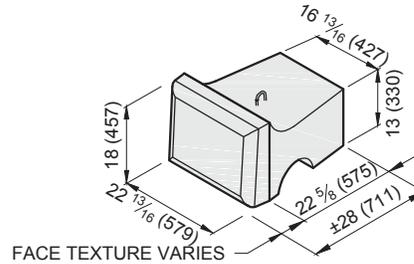
28" (710mm) TOP

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1229 lb (557 kg)	1158 lb (525 kg)
Block Volume:	8.57 ft ³ (0.243 m ³)	8.07 ft ³ (0.229 m ³)
Center of Gravity:	14.9" (378mm)	14.2" (362mm)



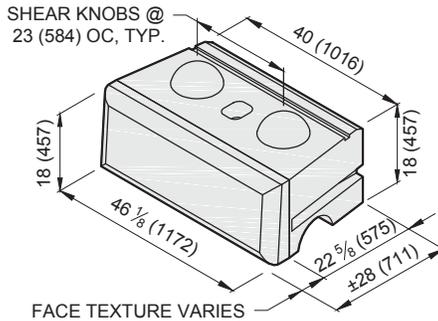
28" (710mm) HALF TOP

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	573 lb (260 kg)	538 lb (244 kg)
Block Volume:	4.01 ft ³ (0.113 m ³)	3.76 ft ³ (0.106 m ³)
Center of Gravity:	15.3" (389 mm)	14.7" (373 mm)



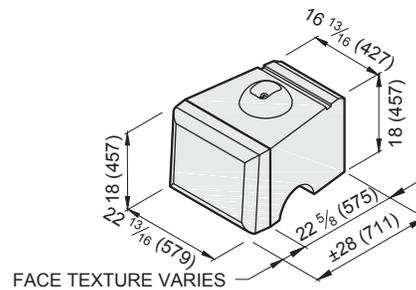
28" (710mm) MIDDLE

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1613 lb (732 kg)	1542 lb (699 kg)
Block Volume:	11.28 ft ³ (0.319 m ³)	10.78 ft ³ (0.305 m ³)
Center of Gravity:	13.9" (354 mm)	13.4" (340 mm)



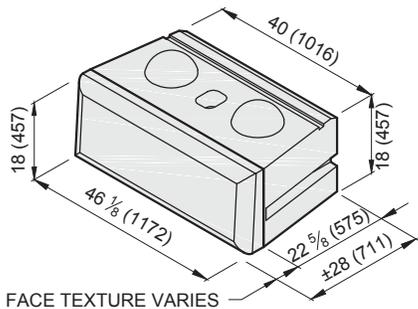
28" (710mm) HALF MIDDLE

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	748 lb (339 kg)	713 lb (323 kg)
Block Volume:	5.23 ft ³ (0.148 m ³)	4.98 ft ³ (0.141 m ³)
Center of Gravity:	14.3" (364 mm)	13.8" (350 mm)



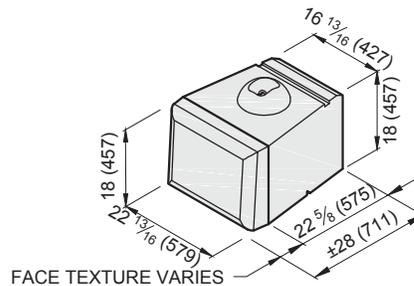
28" (710mm) BOTTOM

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1744 lb (791 kg)	1672 lb (758 kg)
Block Volume:	12.19 ft ³ (0.345 m ³)	11.70 ft ³ (0.331 m ³)
Center of Gravity:	14.0" (355 mm)	13.5" (343 mm)



28" (710mm) HALF BOTTOM

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	809 lb (367 kg)	774 lb (351 kg)
Block Volume:	5.66 ft ³ (0.160 m ³)	5.41 ft ³ (0.153 m ³)
Center of Gravity:	14.3" (364 mm)	13.8" (352 mm)



1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Confirm block production with licensed Redi-Rock manufacturer.
3. Center of Gravity is measured from the back of block.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft³ (2291kg/m³).

6. Half blocks contain a fork slot on only one side of the block.
7. Interface Shear knobs are typically 10" (254mm) diameter by 4" (102mm) tall. Smaller knob diameters are available.

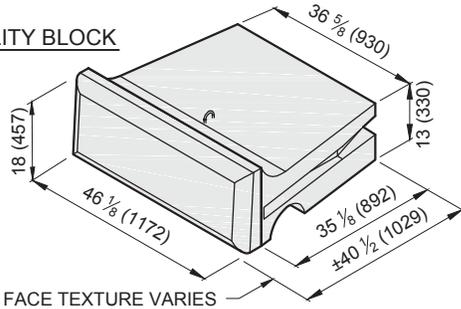
RETAINING BLOCKS

Block Library

41" (1030mm) TOP *

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1748 lb (793 kg)	1677 lb (760 kg)
Block Volume:	12.22 ft ³ (0.346 m ³)	11.73 ft ³ (0.332 m ³)
Center of Gravity:	21.3" (540 mm)	20.6" (522 mm)

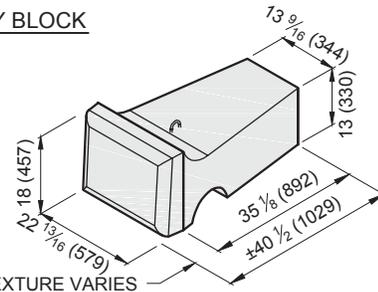
SPECIALITY BLOCK



41" (1030mm) HALF TOP *

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	770 lb (350 kg)	735 lb (333 kg)
Block Volume:	5.38 ft ³ (0.15 m ³)	5.14 ft ³ (0.15 m ³)
Center of Gravity:	22.4" (568 mm)	21.6" (550 mm)

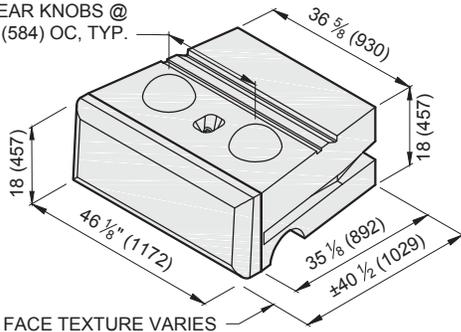
SPECIALITY BLOCK



41" (1030mm) MIDDLE

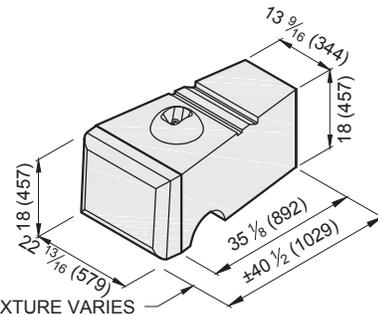
Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	2309 lb (1047 kg)	2237 lb (1015 kg)
Block Volume:	16.14 ft ³ (0.457 m ³)	15.65 ft ³ (0.443 m ³)
Center of Gravity:	20.4" (518 mm)	19.8" (504 mm)

SHEAR KNOBS @
23 (584) OC, TYP.



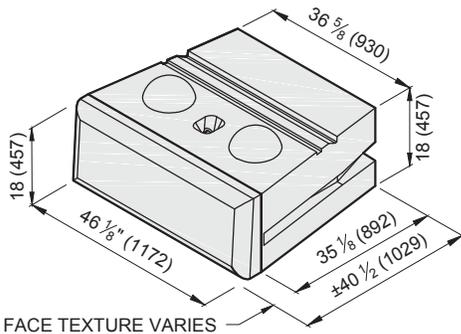
41" (1030mm) HALF MIDDLE

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1022 lb (463 kg)	987 lb (447 kg)
Block Volume:	7.14 ft ³ (0.20 m ³)	6.90 ft ³ (0.20 m ³)
Center of Gravity:	21.4" (543 mm)	20.8" (528 mm)



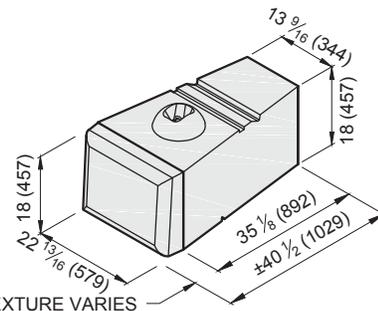
41" (1030mm) BOTTOM

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	2439 lb (1106 kg)	2368 lb (1074 kg)
Block Volume:	17.06 ft ³ (0.483 m ³)	16.56 ft ³ (0.469 m ³)
Center of Gravity:	20.7" (527 mm)	20.2" (514 mm)



41" (1030mm) HALF BOTTOM

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1083 lb (491 kg)	1048 lb (475 kg)
Block Volume:	7.58 ft ³ (0.21 m ³)	7.33 ft ³ (0.21 m ³)
Center of Gravity:	21.7" (551 mm)	21.2" (538 mm)



1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Confirm block production with licensed Redi-Rock manufacturer.
3. Center of Gravity is measured from the back of block.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft³ (2291kg/m³).

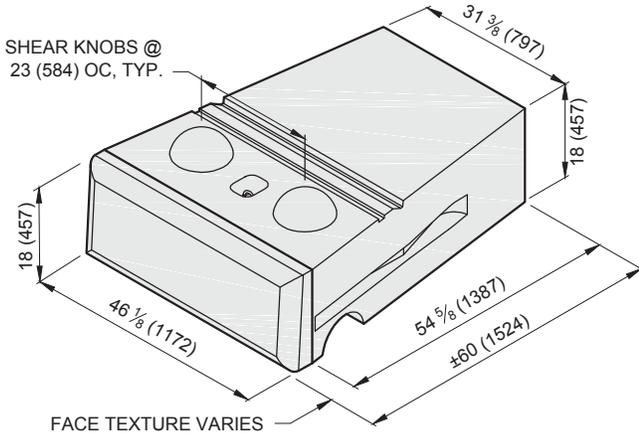
6. Half blocks contain a fork slot on only one side of the block.
7. Interface Shear knobs are typically 10" (254mm) diameter by 4" (102mm) tall. Smaller knob diameters are available.
8. * 41" (1030mm) Top blocks are not typical and used in limited applications.

RETAINING BLOCKS

Block Library

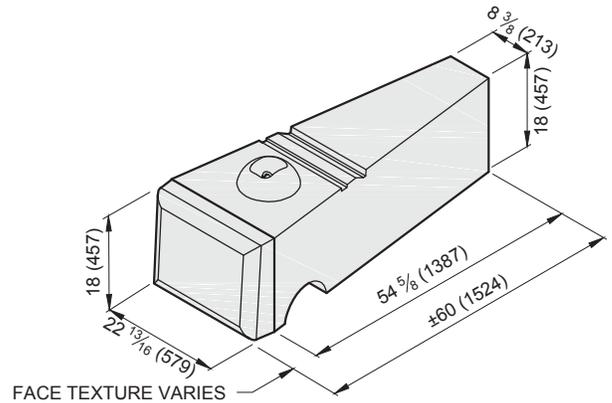
60" (1520mm) MIDDLE

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	3287 lb (1491 kg)	3216 lb (1458 kg)
Block Volume:	23.00 ft ³ (0.651 m ³)	22.49 ft ³ (0.637 m ³)
Center of Gravity:	31.0" (786 mm)	30.4" (772 mm)



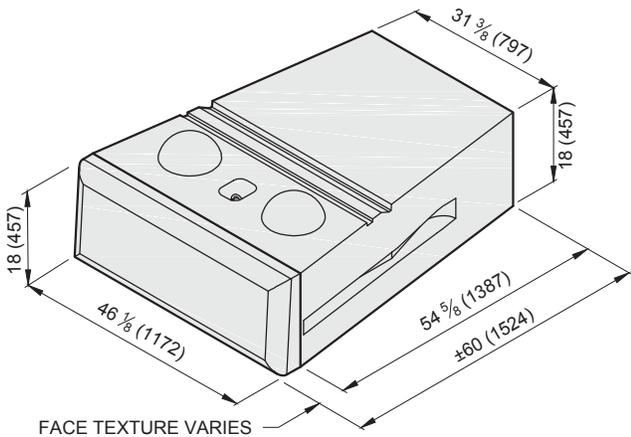
60" (1520mm) HALF MIDDLE

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1335 lb (606 kg)	1300 lb (590 kg)
Block Volume:	9.34 ft ³ (0.264 m ³)	9.09 ft ³ (0.258 m ³)
Center of Gravity:	33.7" (856 mm)	33.1" (840 mm)



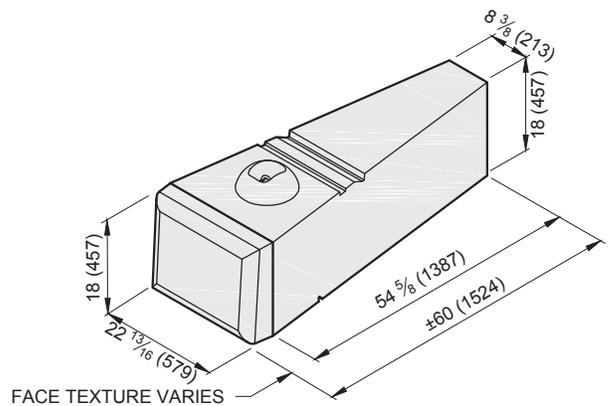
60" (1520mm) BOTTOM

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	3418 lb (1550 kg)	3346 lb (1518 kg)
Block Volume:	23.90 ft ³ (0.677 m ³)	23.40 ft ³ (0.663 m ³)
Center of Gravity:	31.6" (802 mm)	31.0" (788 mm)



60" (1520mm) HALF BOTTOM

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1397 lb (633 kg)	1364 lb (618 kg)
Block Volume:	9.77 ft ³ (0.277 m ³)	9.52 ft ³ (0.270 m ³)
Center of Gravity:	34.3" (871 mm)	33.7" (856 mm)



1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Confirm block production with licensed Redi-Rock manufacturer.
3. Center of Gravity is measured from the back of block.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft³ (2291kg/m³).

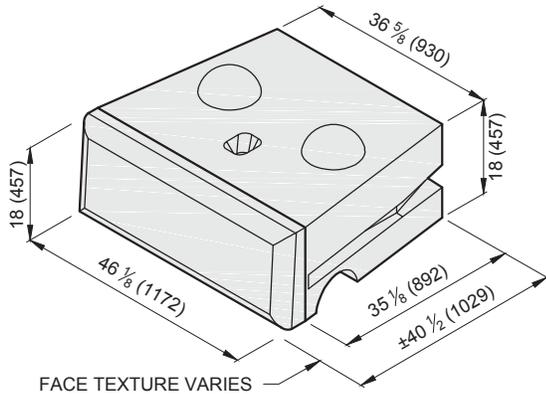
6. 60" (1520 mm) are typically used at the bottom of taller walls.
7. Half blocks contain a fork slot on only one side of the block.
8. Interface Shear knobs are typically 10" (254mm) diameter by 4" (102mm) tall. Smaller knob diameters are available.

RETAINING BLOCKS

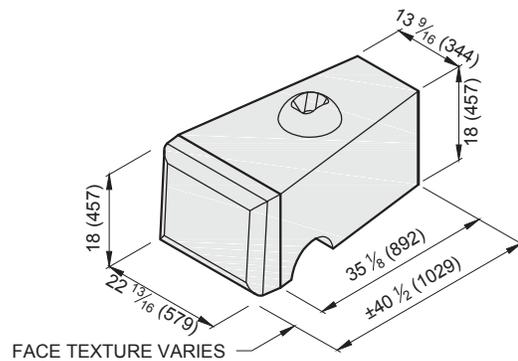
Block Library

41" (1030mm) MIDDLE 9" (230mm) SETBACK

Face Texture:	Cobble / Limestone	Ledgestone	Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	2319 lb (1052 kg)	2247 lb (1019 kg)	Block Weight:	1030 lb (467 kg)	995 lb (451 kg)
Block Volume:	16.21 ft ³ (0.46 m ³)	15.72 ft ³ (0.44 m ³)	Block Volume:	7.20 ft ³ (0.20 m ³)	6.96 ft ³ (0.20 m ³)
Center of Gravity:	20.2" (514 mm)	19.7" (500 mm)	Center of Gravity:	21.3" (540 mm)	20.7" (525 mm)



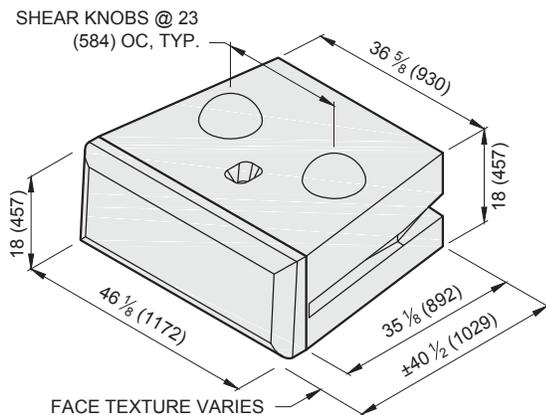
FULL MIDDLE



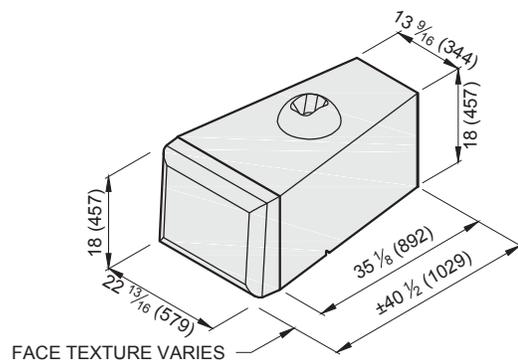
HALF MIDDLE

41" (1030mm) BOTTOM 9" (230mm) SETBACK

Face Texture:	Cobble / Limestone	Ledgestone	Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	2449 lb (1111 kg)	2378 lb (1078 kg)	Block Weight:	1092 lb (495 kg)	1057 lb (479 kg)
Block Volume:	17.13 ft ³ (0.48 m ³)	16.63 ft ³ (0.47 m ³)	Block Volume:	7.63 ft ³ (0.22 m ³)	7.39 ft ³ (0.21 m ³)
Center of Gravity:	20.6" (523 mm)	20.1" (510 mm)	Center of Gravity:	21.6" (548 mm)	21.0" (534 mm)



FULL BOTTOM



HALF BOTTOM

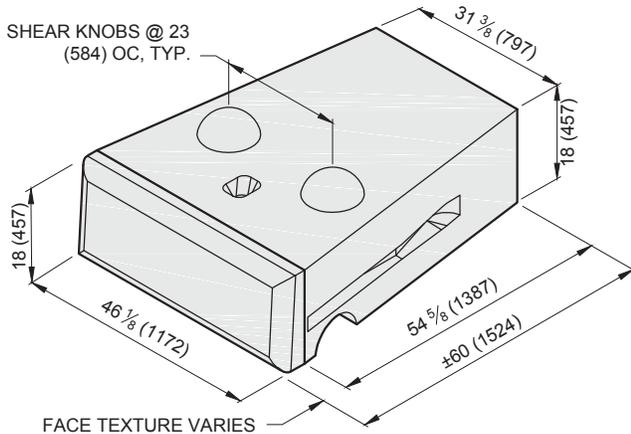
- Units for dimensions are inches (mm), typical unless noted otherwise.
- Confirm block production with licensed Redi-Rock manufacturer.
- Center of Gravity is measured from the back of block.
- Actual block volumes and weights may vary.
- Weights are based upon a concrete density of 143 lb/ft³ (2291kg/m³).
- Half blocks contain a fork slot on only one side of the block.
- Interface Shear knobs are typically 10" (254mm) diameter by 4" (102 mm) tall.

RETAINING BLOCKS

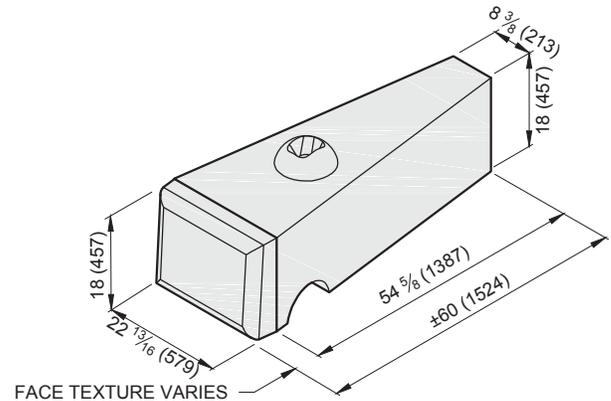
Block Library

60" (1520mm) MIDDLE 9" (230mm) SETBACK

Face Texture:	Cobble / Limestone	Ledgestone	Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	3297 lb (1495 kg)	3226 lb (1463 kg)	Block Weight:	1340 lb (608 kg)	1305 lb (592 kg)
Block Volume:	23.06 ft ³ (0.65 m ³)	22.56 ft ³ (0.64 m ³)	Block Volume:	9.37 ft ³ (0.26 m ³)	9.12 ft ³ (0.26 m ³)
Center of Gravity:	30.9" (785 mm)	30.3" (770 mm)	Center of Gravity:	33.6" (855 mm)	33.0" (839 mm)



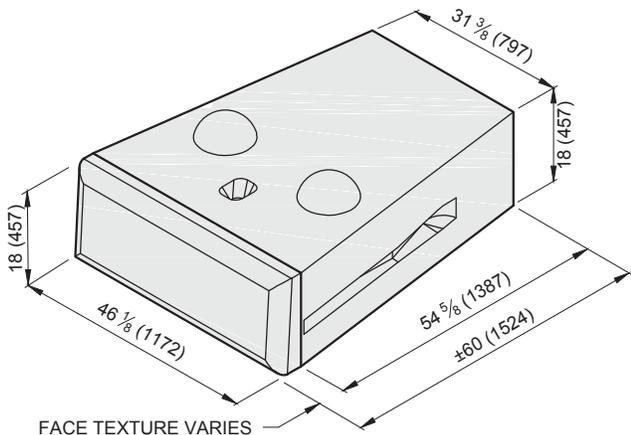
FULL MIDDLE



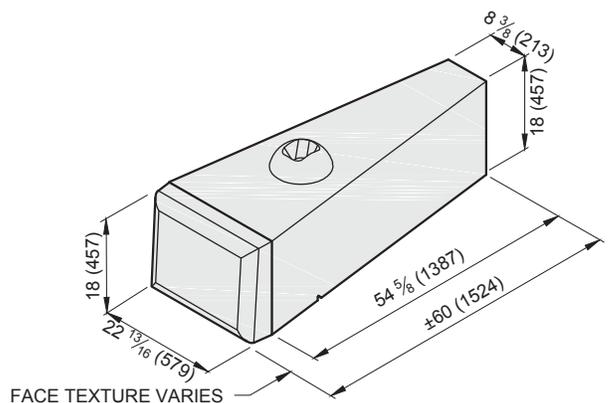
HALF MIDDLE

60" (1520mm) BOTTOM 9" (230mm) SETBACK

Face Texture:	Cobble / Limestone	Ledgestone	Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	3428 lb (1554 kg)	3356 lb (1522 kg)	Block Weight:	1401 lb (635 kg)	1366 lb (620 kg)
Block Volume:	23.97 ft ³ (0.68 m ³)	23.47 ft ³ (0.66 m ³)	Block Volume:	9.80 ft ³ (0.28 m ³)	9.55 ft ³ (0.27 m ³)
Center of Gravity:	31.5" (800 mm)	30.9" (786 mm)	Center of Gravity:	34.2" (869 mm)	33.6" (854 mm)



FULL BOTTOM



HALF BOTTOM

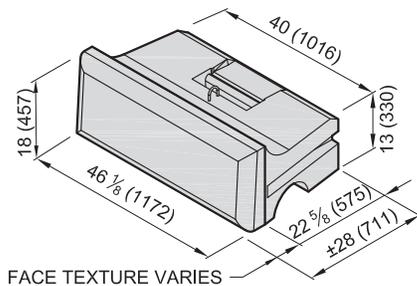
- Units for dimensions are inches (mm), typical unless noted otherwise.
- Confirm block production with licensed Redi-Rock manufacturer.
- Center of Gravity is measured from the back of block.
- Actual block volumes and weights may vary.
- Weights are based upon a concrete density of 143 lb/ft³ (2291kg/m³).
- Half blocks contain a fork slot on only one side of the block.
- Interface Shear knobs are typically 10" (254mm) diameter by 4" (102 mm) tall.
- 60" (1520 mm) Blocks are typically used at the bottom of taller walls.

RETAINING BLOCKS

Block Library

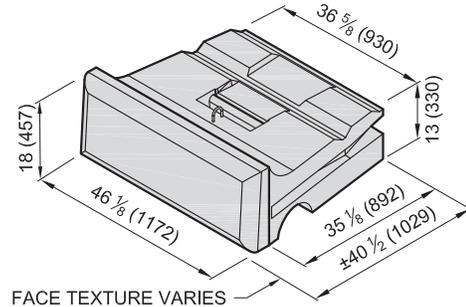
28" (710mm) PC TOP

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1167 lb (529 kg)	1096 lb (497 kg)
Block Volume:	8.16 ft ³ (0.231 m ³)	7.66 ft ³ (0.217 m ³)
Center of Gravity:	15.3" (388 mm)	14.6" (372 mm)



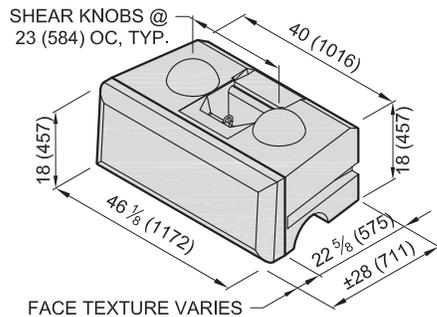
41" (1030mm) PC TOP

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1627 lb (738 kg)	1556 lb (706 kg)
Block Volume:	11.38 ft ³ (0.32 m ³)	10.88 ft ³ (0.31 m ³)
Center of Gravity:	21.8" (554 mm)	21.1" (536 mm)



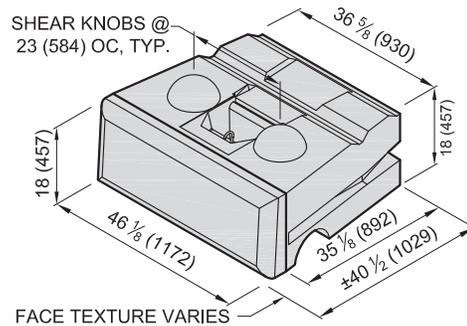
28" (710mm) PC MIDDLE

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1518 lb (689 kg)	1447 lb (656 kg)
Block Volume:	10.62 ft ³ (0.301 m ³)	10.12 ft ³ (0.287 m ³)
Center of Gravity:	14.2" (360 mm)	13.6" (346 mm)



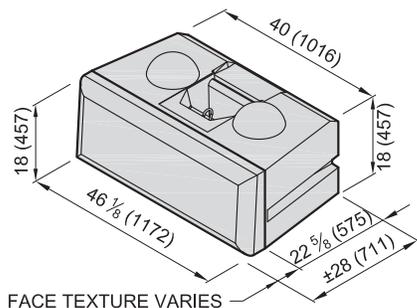
41" (1030mm) PC MIDDLE

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	2172 lb (985 kg)	2101 lb (953 kg)
Block Volume:	15.2 ft ³ (0.43 m ³)	14.69 ft ³ (0.42 m ³)
Center of Gravity:	20.6" (522 mm)	20.0" (508 mm)



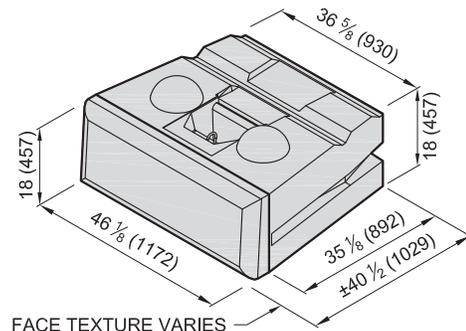
28" (710mm) PC BOTTOM

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1622 lb (736 kg)	1551 lb (703 kg)
Block Volume:	11.34 ft ³ (0.321 m ³)	10.85 ft ³ (0.307 m ³)
Center of Gravity:	14.2" (362 mm)	13.7" (349 mm)



41" (1030mm) PC BOTTOM

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	2276 lb (1032 kg)	2205 lb (1000 kg)
Block Volume:	15.92 ft ³ (0.45 m ³)	15.42 ft ³ (0.44 m ³)
Center of Gravity:	20.2" (514mm)	19.7" (501mm)



1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Confirm block production with licensed Redi-Rock manufacturer.
3. Center of Gravity is measured from the back of block.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft³ (2291kg/m³).

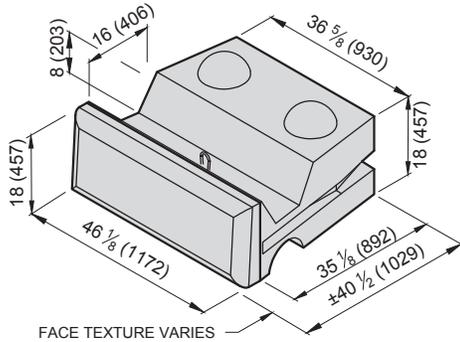
6. Blocks contain a vertical slot for a 12" (300 mm) strip of geogrid soil reinforcement.
7. Interface Shear knobs are typically 10" (254mm) diameter by 4" (102 mm) tall. Smaller knob diameters are available.

RETAINING BLOCKS

Block Library

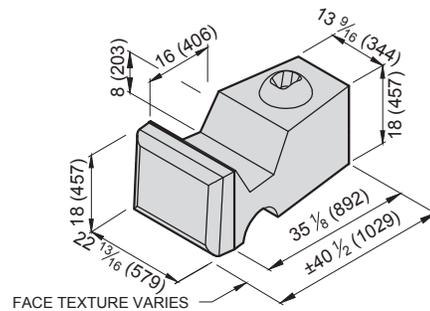
41" (1030mm) PLANTER

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	2005 lb (910 kg)	1934 lb (877 kg)
Block Volume:	14.02 ft ³ (0.40 m ³)	13.53 ft ³ (0.38 m ³)
Center of Gravity:	19.1" (485 mm)	18.4" (468 mm)



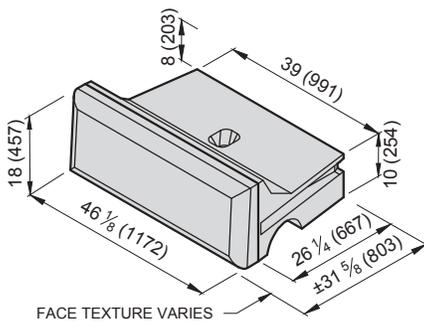
41" (1030mm) HALF PLANTER

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	878 lb (398 kg)	843 lb (382 kg)
Block Volume:	6.14 ft ³ (0.17 m ³)	5.89 ft ³ (0.17 m ³)
Center of Gravity:	20.2" (513 mm)	19.5" (495 mm)



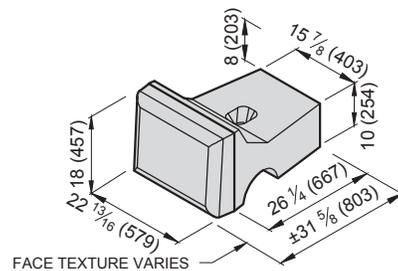
MODIFIED TOP

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1198 lb (543 kg)	1127 lb (511 kg)
Block Volume:	8.38 ft ³ (0.24 m ³)	7.88 ft ³ (0.22 m ³)
Center of Gravity:	17.9" (455 mm)	17.2" (438 mm)



MODIFIED HALF TOP

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	708 lb (321 kg)	637 lb (289 kg)
Block Volume:	4.95 ft ³ (0.14 m ³)	4.45 ft ³ (0.13 m ³)
Center of Gravity:	20.7" (527 mm)	19.8" (504 mm)



SPECIALITY BLOCK

SPECIALITY BLOCK

1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Confirm block production with licensed Redi-Rock manufacturer.
3. Center of Gravity is measured from the back of block.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft³ (2291kg/m³).

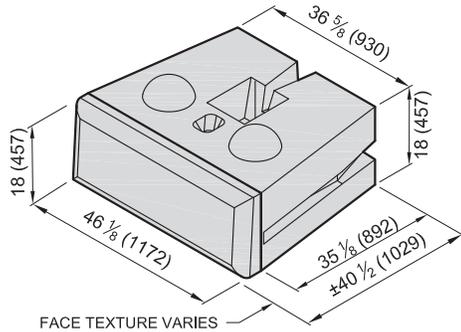
6. Half blocks contain a fork slot on only one side of the block.
7. Interface Shear knobs are typically 10" (254 mm) diameter by 4" (102 mm) tall.

RETAINING BLOCKS

Block Library

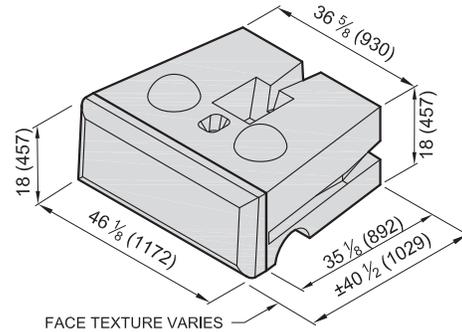
BOTTOM ANCHOR

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	2365 lb (1073 kg)	2294 lb (1040 kg)
Block Volume:	16.54 ft ³ (0.47 m ³)	16.04 ft ³ (0.45 m ³)
Center of Gravity:	21.0" (533 mm)	20.4" (519 mm)



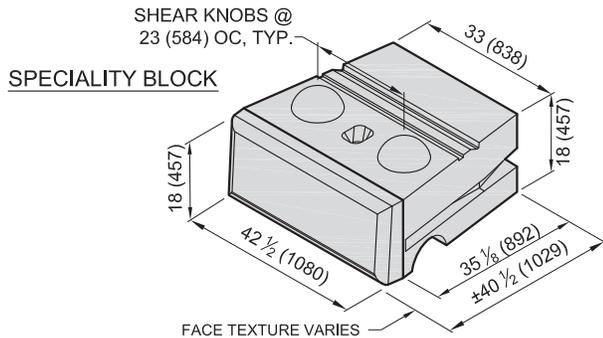
MIDDLE ANCHOR

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	2235 lb (1014 kg)	2164 lb (981 kg)
Block Volume:	15.63 ft ³ (0.44 m ³)	15.13 ft ³ (0.43 m ³)
Center of Gravity:	20.6" (523 mm)	20.0" (509 mm)



SHORT MIDDLE

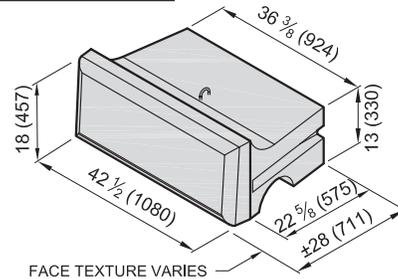
Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	2137 lb (969 kg)	2075 lb (941 kg)
Block Volume:	14.95 ft ³ (0.42 m ³)	14.51 ft ³ (0.41 m ³)
Center of Gravity:	19.7" (499mm)	19.2" (487mm)



SHORT TOP

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1111 lb (504 kg)	1048 lb (475 kg)
Block Volume:	7.77 ft ³ (0.22 m ³)	7.33 ft ³ (0.21 m ³)
Center of Gravity:	13.7" (349mm)	13.2" (336mm)

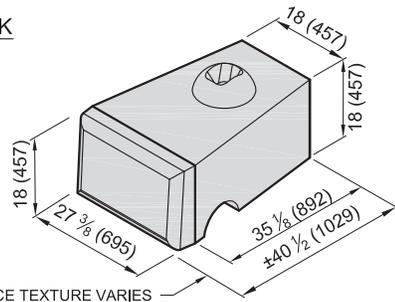
SPECIALITY BLOCK



9" (230mm) SETBACK SHORT MIDDLE

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1281 lb (581 kg)	1239 lb (562 kg)
Block Volume:	8.96 ft ³ (0.25 m ³)	8.66 ft ³ (0.24 m ³)
Center of Gravity:	20.0" (507mm)	19.5" (494mm)

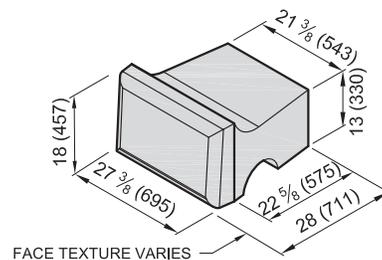
SPECIALITY BLOCK



9" (230mm) SETBACK SHORT TOP

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	706 lb (320 kg)	664 lb (301 kg)
Block Volume:	4.94 ft ³ (0.14 m ³)	4.64 ft ³ (0.13 m ³)
Center of Gravity:	13.9" (352mm)	13.3" (339mm)

SPECIALITY BLOCK



1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Confirm block production with licensed Redi-Rock manufacturer.
3. Center of Gravity is measured from the back of block.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft³ (2291kg/m³).

6. 27" (695) wide blocks contain a fork slot on only one side of the block. These are speciality blocks and may have limited availability and is only used in double 90 degree corner applications.
7. Interface Shear knobs are typically 10" (254mm) diameter by 4" (102 mm) tall. Smaller knob diameters are available.



FREESTANDING BLOCKS (FINISHED TEXTURE ON MORE THAN ONE FACE)

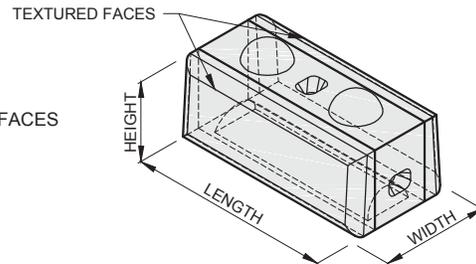
The Redi-Rock Freestanding blocks come in one width and stack in a vertical manner. The defining characteristic is that freestanding blocks have an aesthetic texture cast into multiple faces; the textured face is on at least the two longitudinal vertical faces, and also as required on one end or the top of the blocks. These blocks are machine-placed, wet-cast, precast modular block units manufactured from first purpose, non-reconstituted concrete and intended for constructing dry-stacked modular retaining wall systems. The block units are manufactured from structural-grade concrete mixes in accordance with ASTM C94 or ASTM C685 that produce a finished unit with excellent resistance to freeze-thaw, deicing chemical exposure, and submerged conditions in both fresh water and salt water applications. All Redi-Rock blocks are manufactured and distributed through an international network of individually-owned, licensed precast concrete manufacturers.

CONCRETE MIX PROPERTIES ⁽¹⁾

FREEZE THAW EXPOSURE CLASS ⁽²⁾	MINIMUM 28 DAY COMPRESSIVE STRENGTH ⁽³⁾	MAXIMUM WATER CEMENT RATIO	NOMINAL MAXIMUM AGGREGATE SIZE ⁽¹⁰⁾	AGGREGATE CLASS DESIGNATION ⁽⁴⁾	AIR CONTENT ⁽⁵⁾
MODERATE	4,000 psi (27.6 MPa)	0.45	1.0 (25)	3M	4.5% ± 1.5%
SEVERE	4,000 psi (27.6 MPa)	0.45	1.0 (25)	3S	6.0% ± 1.5%
VERY SEVERE	4,500 psi (30.0 MPa)	0.40	1.0 (25)	4S	6.0% ± 1.5%
MAXIMUM WATER-SOLUBLE CHLORIDE ION (Cl ⁻) CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT ⁽⁶⁾					0.015
MAXIMUM CHLORIDE AS Cl ⁻ CONCENTRATION IN MIXING WATER, PARTS PER MILLION					1000
MAXIMUM PERCENTAGE OF TOTAL CEMENTITIOUS MATERIALS BY WEIGHT ^(7, 9) (VERY SEVERE EXPOSURE CLASS ONLY)					
FLY ASH OR OTHER POZZOLANS PER ASTM C618		25	TOTAL ASH, POZZOLANS, SLAG, AND SILICA FUME ⁽⁸⁾		50
SLAG CONFORMING TO ASTM C989		50	TOTAL ASH, POZZOLANS, AND SILICA FUME ⁽⁸⁾		35
SILICA FUME CONFORMING TO ASTM C1240		10	ALKALI-AGGREGATE REACTIVITY MITIGATION PER ACI 201		

REFERENCE DIMENSIONS:

- HEIGHT = VERTICAL DIMENSION OF TEXTURED FACE
- LENGTH = LONGER HORIZONTAL DIMENSION PARALLEL TO TEXTURED FACES
- WIDTH = HORIZONTAL DIMENSION PERPENDICULAR TO LONGER TEXTURED FACES



DIMENSIONAL TOLERANCES ^{(10) (11)}

HEIGHT	ALL BLOCKS	18 ± 3/16 (457 ± 5)
LENGTH	FULL BLOCKS	46 1/8 ± 1/2 (1172 ± 13)
	HALF BLOCKS	22 13/16 ± 1/2 (579 ± 13)
WIDTH	23 -24 (584-610)	13 ± 1/2 (330 ± 13) FORM LINE TO FORM LINE, PLUS APPROX. 5 3/8 (136) FACE TEXTURE ON LONG SIDES

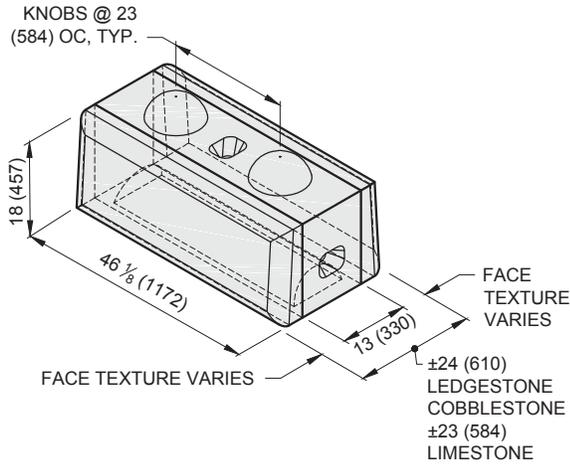
- ⁽¹⁾ Concrete mix properties are in general accordance with ACI 318 durability requirements. Research has shown that concrete manufactured to these standards demonstrates good durability and performance. When these requirements are followed, specific freeze-thaw testing of the concrete is typically NOT required.
- ⁽²⁾ Exposure class is as described in ACI 318.
- ⁽³⁾ Test method ASTM C39.
- ⁽⁴⁾ Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregate for Concrete*.
- ⁽⁵⁾ Test method ASTM C231.
- ⁽⁶⁾ Test method ASTM C1218 at age between 28 and 42 days.
- ⁽⁷⁾ The total cementitious material also includes ASTM C150, C595, C845, and C1157 cement. The maximum percentages shall include:
 - (a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.
 - (b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.
 - (c) Silica fume, ASTM C1240, present in a blended cement.
- ⁽⁸⁾ Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.
- ⁽⁹⁾ Prescriptive limits shown may be waived for concrete mixes that demonstrate excellent freeze-thaw durability in a detailed and current testing program.
- ⁽¹⁰⁾ All dimensions are shown in units of *inches (mm)*.
- ⁽¹¹⁾ Permissible defects: Chips smaller than 1.5 (38) in its largest dimension and cracks not wider than 0.012 (0.305) and not longer than 25% of the nominal height of the block; bug holes in the architectural face smaller than 0.75 (19); and bug holes, water marks, and color variation on non-architectural faces.

FREESTANDING BLOCKS

Block Library

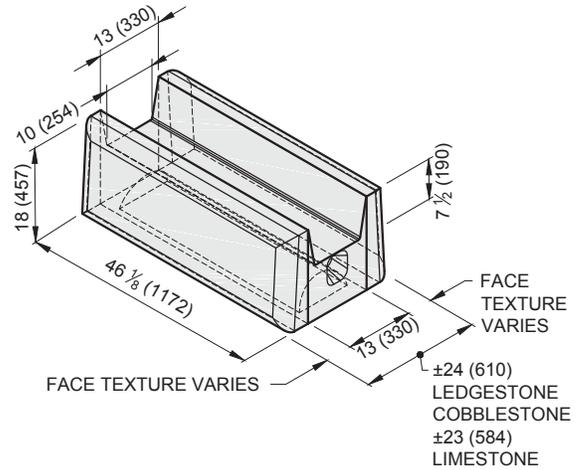
STRAIGHT MIDDLE

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1407 lb (638 kg)	1264 lb (573 kg)
Block Volume:	9.84 ft ³ (0.279 m ³)	8.84 ft ³ (0.250 m ³)



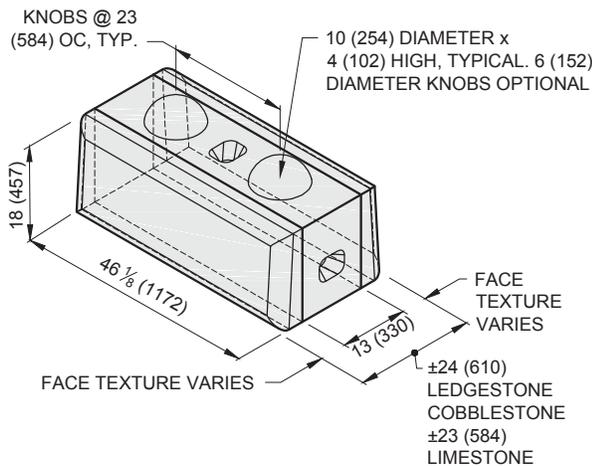
STRAIGHT GARDEN TOP

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1050 lb (476 kg)	908 lb (412 kg)
Block Volume:	7.35 ft ³ (0.208 m ³)	6.35 ft ³ (0.180 m ³)



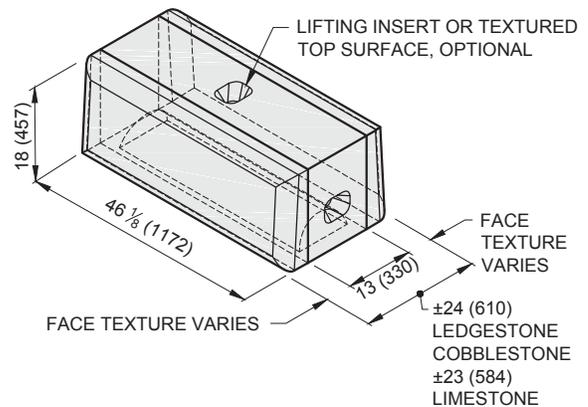
STRAIGHT BOTTOM

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1523 lb (691 kg)	1381 lb (626 kg)
Block Volume:	10.65 ft ³ (0.302 m ³)	9.66 ft ³ (0.273 m ³)



STRAIGHT TOP

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1375 lb (623 kg)	1232 lb (559 kg)
Block Volume:	9.61 ft ³ (0.272 m ³)	8.62 ft ³ (0.244 m ³)



1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Confirm block production with licensed Redi-Rock manufacturer.
3. Architectural faces on the blocks have varying texture.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft³ (2291 kg/m³).

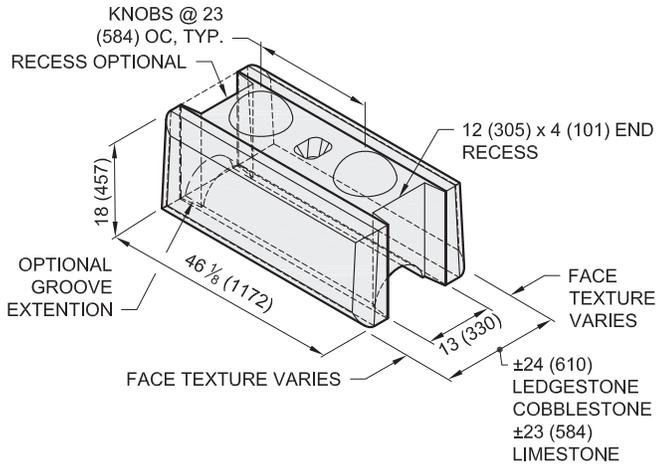
6. 6" (152 mm) diameter vertical semi-cylindrical voids at the ends of the block for mechanical tie-down are available, refer to Force Protection blocks for additional information.
7. Knobs are typically 10" (254mm) diameter by 4" (102 mm) tall. Smaller knobs are available.

FREESTANDING BLOCKS

Block Library

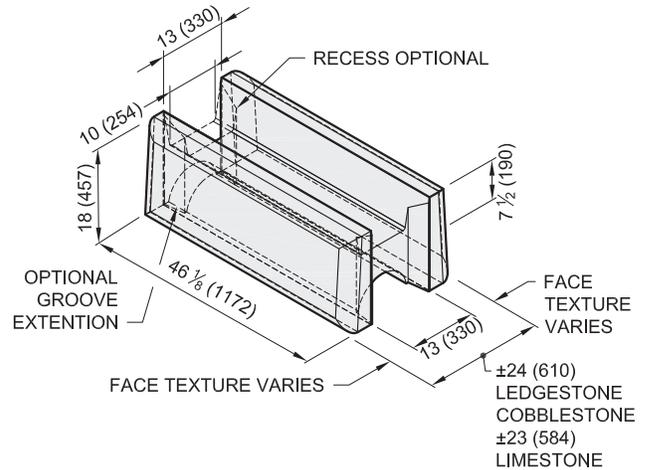
VARIABLE RADIUS MIDDLE

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1267 lb (574 kg)	1124 lb (510 kg)
Block Volume:	8.86 ft ³ (0.251 m ³)	7.86 ft ³ (0.223 m ³)



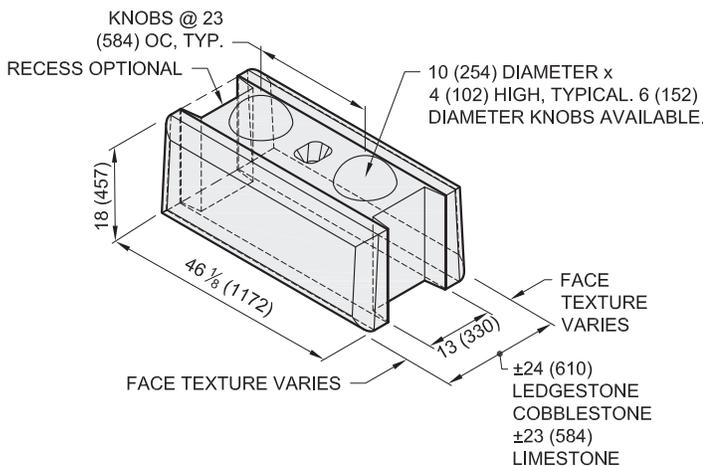
VARIABLE RADIUS GARDEN TOP

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	967 lb (438 kg)	824 lb (374 kg)
Block Volume:	6.76 ft ³ (0.191 m ³)	5.76 ft ³ (0.163 m ³)



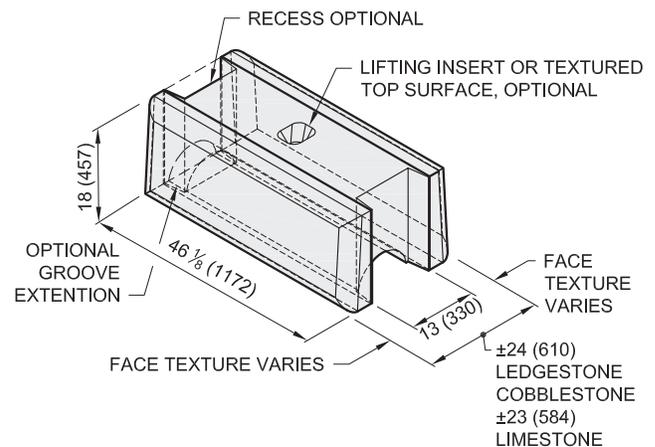
VARIABLE RADIUS BOTTOM

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1380 lb (626 kg)	1238 lb (561 kg)
Block Volume:	9.65 ft ³ (0.273 m ³)	8.66 ft ³ (0.245 m ³)



VARIABLE RADIUS TOP

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1235 lb (560 kg)	1092 lb (495 kg)
Block Volume:	8.63 ft ³ (0.244 m ³)	7.64 ft ³ (0.216 m ³)



1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Confirm block production with licensed Redi-Rock manufacturer.
3. Variable radius feature can be cast on only one end, coordinate.
4. Architectural faces on the blocks have varying texture.

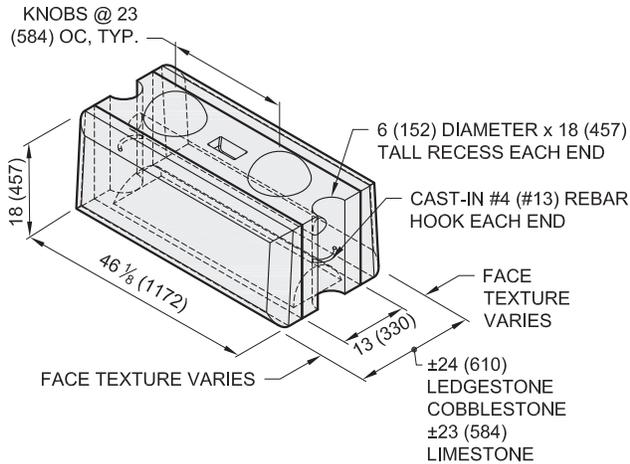
5. Actual block volumes and weights may vary.
6. Weights are based upon a concrete density of 143 lb/ft³ (2291 kg/m³).
7. Knobs are typically 10" (254 mm) diameter by 4" (102 mm) tall. Smaller knobs are available.

FREESTANDING BLOCKS

Block Library

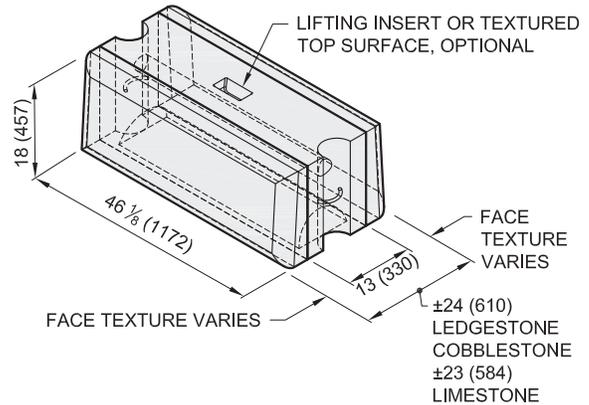
FORCE PROTECTION MIDDLE

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1345 lb (610 kg)	1203 lb (546 kg)
Block Volume:	9.41 ft ³ (0.267 m ³)	8.42 ft ³ (0.238 m ³)



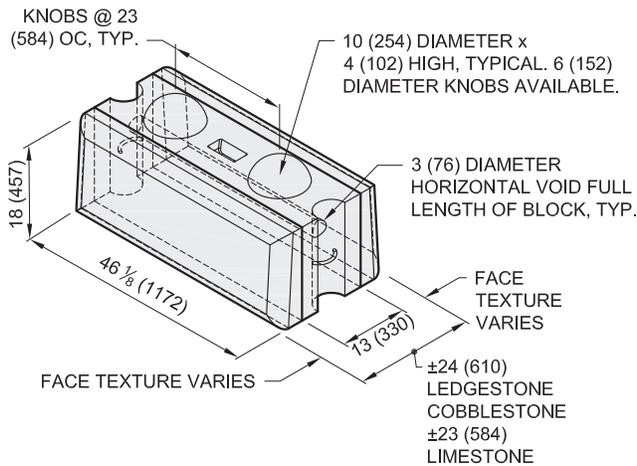
FORCE PROTECTION TOP

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1314 lb (596 kg)	1171 lb (531 kg)
Block Volume:	9.19 ft ³ (0.260 m ³)	8.19 ft ³ (0.232 m ³)



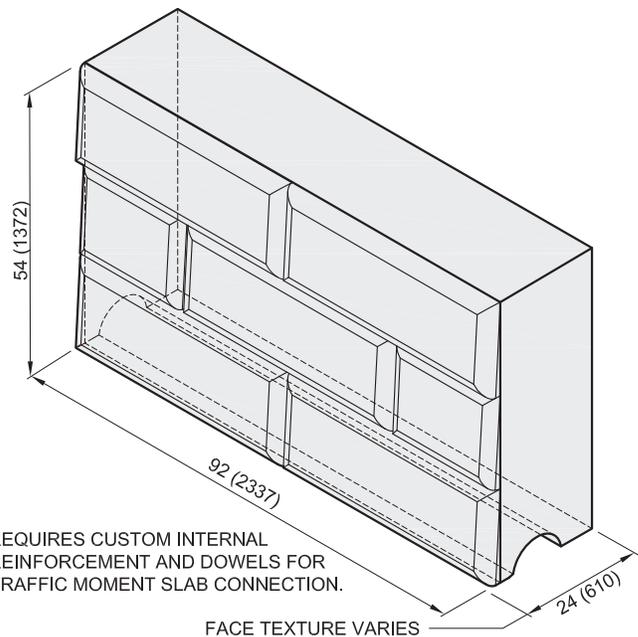
FORCE PROTECTION BOTTOM

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	1463 lb (663 kg)	1320 lb (599 kg)
Block Volume:	10.23 ft ³ (0.290 m ³)	9.23 ft ³ (0.261 m ³)



BARRIER BLOCK

Block Weight:	9,350 lb (4,240 kg)
Block Volume:	65.4 ft ³ (1.85 m ³)



1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Confirm block production with licensed Redi-Rock manufacturer.
3. Architectural faces on the blocks have varying texture.
4. Actual block volumes and weights may vary.

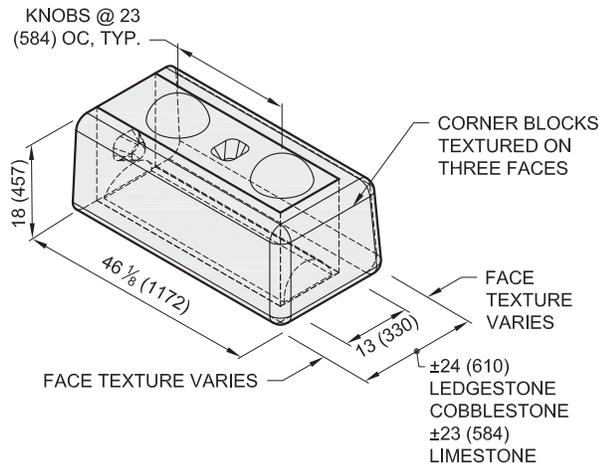
5. Weights are based upon a concrete density of 143 lb/ft³ (2291 kg/m³).
6. Knobs are typically 10" (254mm) diameter by 4" (102 mm) tall. Smaller knobs are available.

FREESTANDING BLOCKS

Block Library

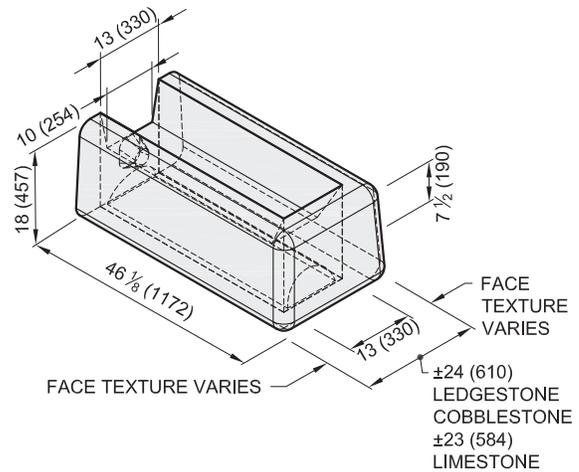
CORNER MIDDLE

Face Texture:	Limestone	Cobblestone	Ledgestone
Block Weight:	1370 lb (620kg)	1390 lb (630 kg)	1360 lb (617kg)
Block Volume:	9.6 ft ³ (0.27m ³)	9.7 ft ³ (0.28m ³)	9.5 ft ³ (0.27m ³)



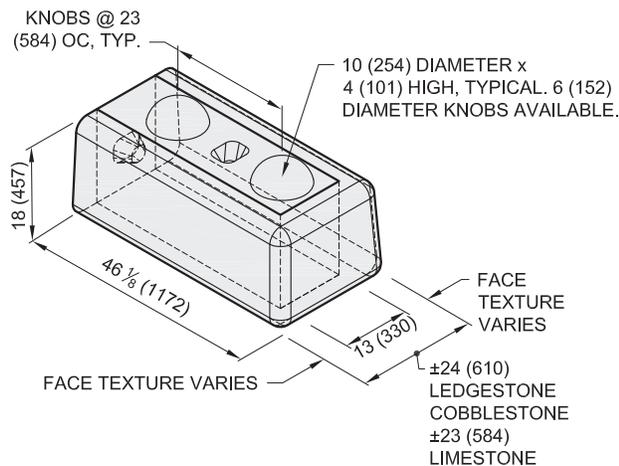
CORNER GARDEN TOP

Face Texture:	Limestone	Cobblestone	Ledgestone
Block Weight:	1070 lb (480kg)	1080 lb (490 kg)	1060 lb (480kg)
Block Volume:	7.5 ft ³ (0.21m ³)	7.6 ft ³ (0.22m ³)	7.4 ft ³ (0.21m ³)



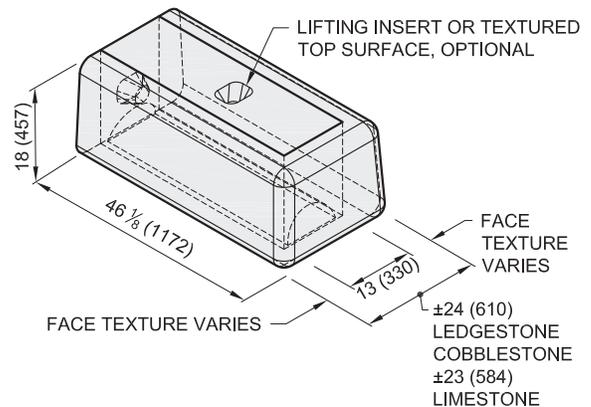
CORNER BOTTOM

Face Texture:	Limestone	Cobblestone	Ledgestone
Block Weight:	1490 lb (680kg)	1510 lb (680 kg)	1480 lb (670kg)
Block Volume:	10.4 ft ³ (0.30m ³)	10.5 ft ³ (0.30m ³)	10.3 ft ³ (0.29m ³)



CORNER TOP

Face Texture:	Limestone	Cobblestone	Ledgestone
Block Weight:	1340 lb (610kg)	1360 lb (620 kg)	1330 lb (600kg)
Block Volume:	9.4 ft ³ (0.26m ³)	9.5 ft ³ (0.27m ³)	9.3 ft ³ (0.26m ³)



1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Confirm block production with licensed Redi-Rock manufacturer.
3. Architectural faces on the blocks have varying texture.
4. Actual block volumes and weights may vary.

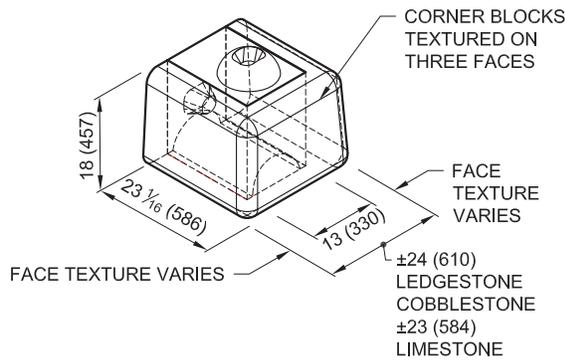
5. Weights are based upon a concrete density of 143 lb/ft³ (2291 kg/m³).
6. Knobs are typically 10" (254mm) diameter by 4" (102 mm) tall. Smaller knobs are available.

FREESTANDING BLOCKS

Block Library

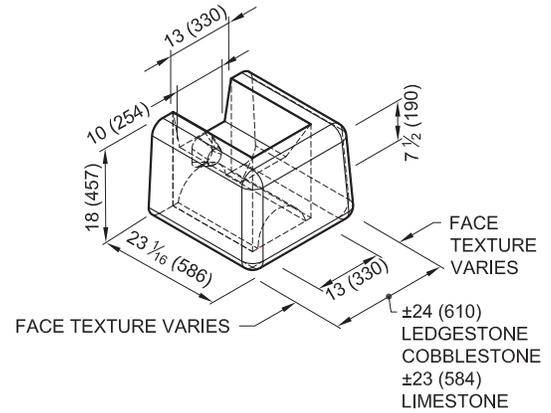
HALF CORNER MIDDLE

Face Texture:	Limestone	Cobblestone	Ledgestone
Block Weight:	660 lb (300kg)	690 lb (310 kg)	650 lb (300kg)
Block Volume:	4.6 ft ³ (0.13m ³)	4.8 ft ³ (0.14m ³)	4.6 ft ³ (0.13m ³)



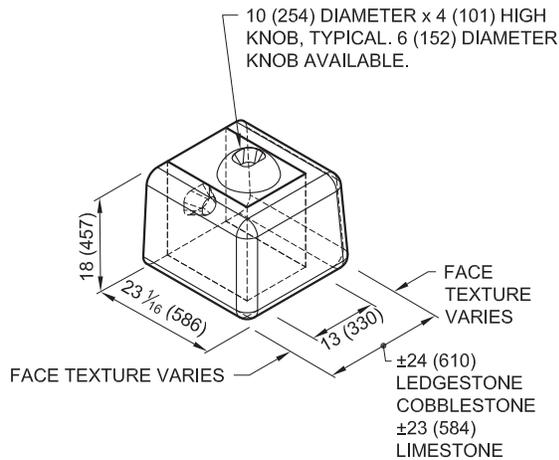
HALF CORNER GARDEN TOP

Face Texture:	Limestone	Cobblestone	Ledgestone
Block Weight:	530 lb (240kg)	570 lb (260 kg)	530 lb (240kg)
Block Volume:	3.7 ft ³ (0.11m ³)	4.0 ft ³ (0.11m ³)	3.7 ft ³ (0.10m ³)



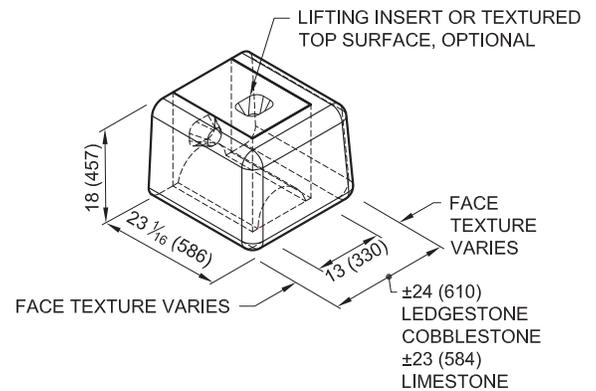
HALF CORNER BOTTOM

Face Texture:	Limestone	Cobblestone	Ledgestone
Block Weight:	710 lb (320kg)	740 lb (340 kg)	700 lb (320kg)
Block Volume:	5.0 ft ³ (0.14m ³)	5.2 ft ³ (0.15m ³)	4.9 ft ³ (0.14m ³)



HALF CORNER TOP

Face Texture:	Limestone	Cobblestone	Ledgestone
Block Weight:	640 lb (290kg)	670 lb (310 kg)	630 lb (290kg)
Block Volume:	4.5 ft ³ (0.13m ³)	4.7 ft ³ (0.13m ³)	4.4 ft ³ (0.13m ³)



- Units for dimensions are inches (mm), typical unless noted otherwise.
- Confirm block production with licensed Redi-Rock manufacturer.
- Architectural faces on the blocks have varying texture.
- Actual block volumes and weights may vary.

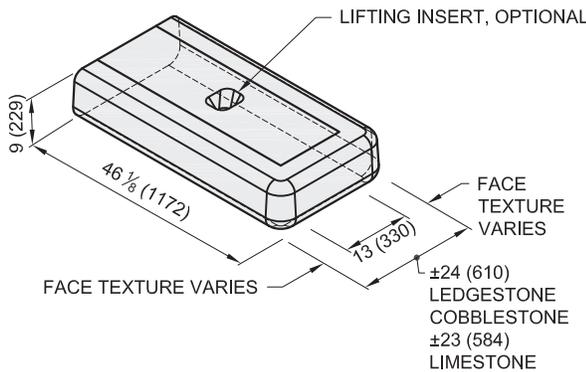
- Weights are based upon a concrete density of 143 lb/ft³ (2291 kg/m³).
- Knobs are typically 10" (254mm) diameter by 4" (102 mm) tall. Smaller knobs are available.

FREESTANDING BLOCKS

Block Library

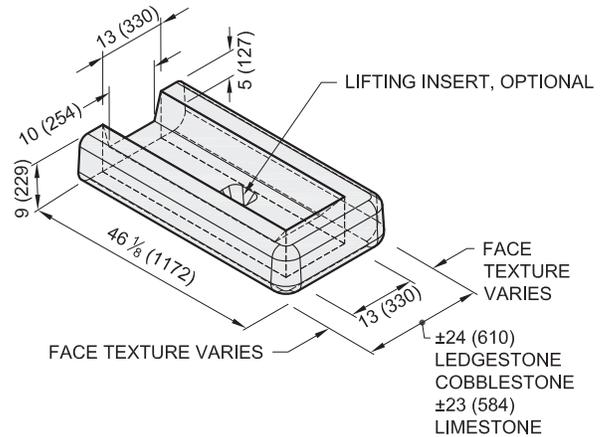
9" (230) STEPDOWN

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	740 lb (335 kg)	660 lb (300 kg)
Block Volume:	5.17 ft ³ (0.146 m ³)	4.60 ft ³ (0.130 m ³)



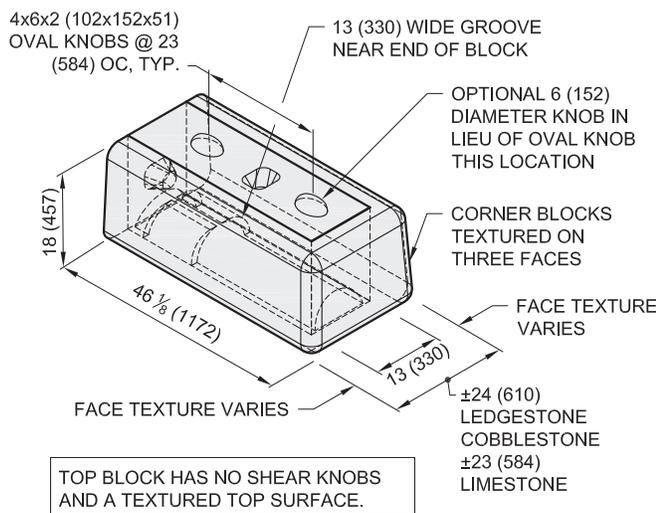
9" (230) STEPDOWN GARDEN

Face Texture:	Cobble / Limestone	Ledgestone
Block Weight:	553 lb (251 kg)	471 lb (214 kg)
Block Volume:	3.86 ft ³ (0.109 m ³)	3.30 ft ³ (0.093 m ³)



90 DEGREE CORNER

Face Texture:	Limestone	Cobblestone	Ledgestone
Block Weight:	1330 lb (600kg)	1350 lb (610 kg)	1320 lb (600kg)
Block Volume:	9.3 ft ³ (0.26m ³)	9.4 ft ³ (0.27m ³)	9.2 ft ³ (0.26m ³)



- Units for dimensions are inches (mm), typical unless noted otherwise.
- Confirm block production with licensed Redi-Rock manufacturer.
- Architectural faces on the blocks have varying texture.
- Actual block volumes and weights may vary.
- Weights are based upon a concrete density of 143 lb/ft³ (2291 kg/m³).



ACCESSORY BLOCKS (COLUMNS, STEPS, AND CAPS)

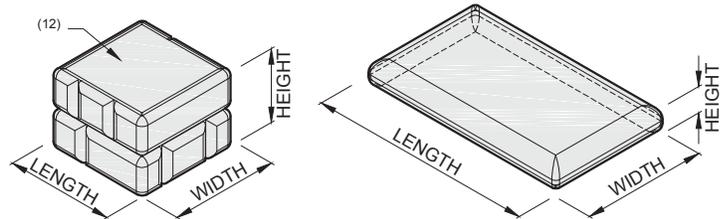
The Redi-Rock Column and Accessory blocks come in multiple widths and configurations. The defining characteristic is that these blocks have an aesthetic texture cast into two or more faces, and create columns, caps, and steps that complement both Retaining and Freestanding blocks. These blocks are machine-placed, wet-cast, precast modular block units manufactured from first purpose, non-reconstituted concrete and intended for constructing dry-stacked modular features that coordinate with retaining walls. The block units are manufactured from structural-grade concrete mixes in accordance with ASTM C94 or ASTM C685 that produce a finished unit with excellent resistance to freeze-thaw, deicing chemical exposure, and submerged conditions in both fresh water and salt water applications. All Redi-Rock blocks are manufactured and distributed through an international network of individually-owned, licensed precast concrete manufacturers.

CONCRETE MIX PROPERTIES ⁽¹⁾

FREEZE THAW EXPOSURE CLASS ⁽²⁾	MINIMUM 28 DAY COMPRESSIVE STRENGTH ⁽³⁾	MAXIMUM WATER CEMENT RATIO	NOMINAL MAXIMUM AGGREGATE SIZE ⁽¹⁰⁾	AGGREGATE CLASS DESIGNATION ⁽⁴⁾	AIR CONTENT ⁽⁵⁾
MODERATE	4,000 psi (27.6 MPa)	0.45	1.0 (25)	3M	4.5% ± 1.5%
SEVERE	4,000 psi (27.6 MPa)	0.45	1.0 (25)	3S	6.0% ± 1.5%
VERY SEVERE	4,500 psi (30.0 MPa)	0.40	1.0 (25)	4S	6.0% ± 1.5%
MAXIMUM WATER-SOLUBLE CHLORIDE ION (Cl ⁻) CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT ⁽⁶⁾					0.015
MAXIMUM CHLORIDE AS Cl ⁻ CONCENTRATION IN MIXING WATER, PARTS PER MILLION					1000
MAXIMUM PERCENTAGE OF TOTAL CEMENTITIOUS MATERIALS BY WEIGHT ^(7,9) (VERY SEVERE EXPOSURE CLASS ONLY)					
FLY ASH OR OTHER POZZOLANS PER ASTM C618		25	TOTAL ASH, POZZOLANS, SLAG, AND SILICA FUME ⁽⁸⁾		50
SLAG CONFORMING TO ASTM C989		50	TOTAL ASH, POZZOLANS, AND SILICA FUME ⁽⁸⁾		35
SILICA FUME CONFORMING TO ASTM C1240		10	ALKALI-AGGREGATE REACTIVITY MITIGATION PER ACI 201		

REFERENCE DIMENSIONS:

HEIGHT = VERTICAL DIMENSION OF TEXTURED FACE
 LENGTH = LONGER HORIZONTAL DIMENSION OF TEXTURED FACE
 WIDTH = SHORTER HORIZONTAL DIMENSION



COLUMN BLOCK

CAP/ STEP BLOCK

DIMENSIONAL TOLERANCES ⁽¹⁰⁾⁽¹¹⁾

	COLUMN BLOCKS	CAP/ STEP BLOCKS
HEIGHT	18 ± 3/16 (457 ± 5)	6 ± 3/16 (152 ± 5)
LENGTH	24 ± 1/2 (610 ± 13)	VARIABLE ± 1/2 (VARIES ± 13)
WIDTH	24 ± 1/2 (610 ± 13)	28 1/2 ± 1/2 (724 ± 13)

⁽¹⁾ Concrete mix properties are in general accordance with ACI 318 durability requirements. Research has shown that concrete manufactured to these standards demonstrates good durability and performance. When these requirements are followed, specific freeze-thaw testing of the concrete is typically NOT required.

⁽²⁾ Exposure class is as described in ACI 318.

⁽³⁾ Test method ASTM C39.

⁽⁴⁾ Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregate for Concrete*.

⁽⁵⁾ Test method ASTM C231.

⁽⁶⁾ Test method ASTM C1218 at age between 28 and 42 days.

⁽⁷⁾ The total cementitious material also includes ASTM C150, C595, C845, and C1157 cement. The maximum percentages shall include:

(a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.

(b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.

(c) Silica fume, ASTM C1240, present in a blended cement.

⁽⁸⁾ Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.

⁽⁹⁾ Prescriptive limits shown may be waived for concrete mixes that demonstrate excellent freeze-thaw durability in a detailed and current testing program.

⁽¹⁰⁾ All dimensions are shown in units of *inches (mm)*.

⁽¹¹⁾ Permissible defects: Chips smaller than 1.5" (38mm) in its largest dimension and cracks not wider than 0.012" (0.305mm) and not longer than 25% of the nominal height of the block; bug holes in the architectural face smaller than 0.75" (19mm); and bug holes, water marks, and color variation on non-architectural faces.

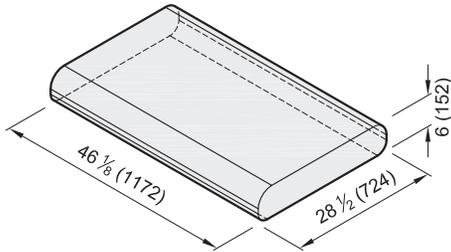
⁽¹²⁾ Column blocks have a smooth troweled finish on horizontal faces.

ACCESSORIES (CAP AND STEP BLOCKS)

Block Library

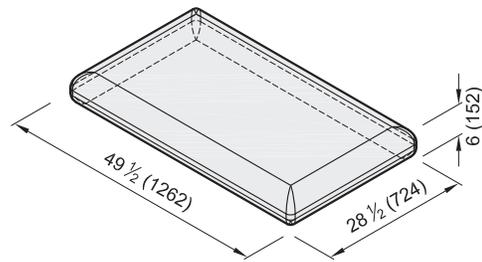
TWO-SIDED

Block Weight: 631 lb (286 kg)
Block Volume: 4.42 ft³ (0.125 m³)



FOUR-SIDED

Block Weight: 665 lb (302 kg)
Block Volume: 4.65 ft³ (0.132 m³)



1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Confirm block production with licensed Redi-Rock manufacturer.

3. Actual block volumes and weights may vary.
4. Weights are based upon a concrete density of 143 lb/ft³ (2291 kg/m³).

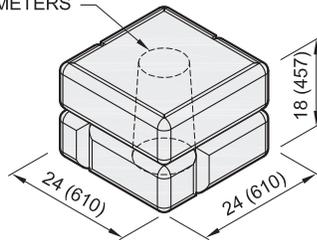
ACCESSORIES (COLUMN BLOCKS)

Block Library

COLUMN - 8" (203mm) CORE

Block Weight: 730 lb (330 kg)
 Block Volume: 5.1 ft³ (0.14 m³)

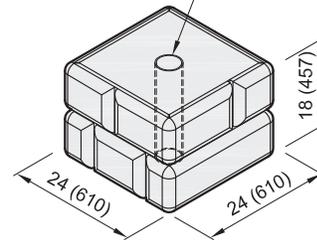
CENTERED THRU TAPERED HOLE
 8-10 (200-250) DIAMETERS



COLUMN - 4" (102mm) CORE

Block Weight: 810 lb (370 kg)
 Block Volume: 5.6 ft³ (0.16 m³)

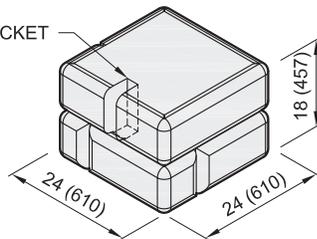
CENTERED 4 (102) DIAMETER
 PVC PIPE SLEEVE THRU BLOCK



COLUMN - SOLID CORE

Block Weight: 825 lb (375 kg)
 Block Volume: 5.8 ft³ (0.16 m³)

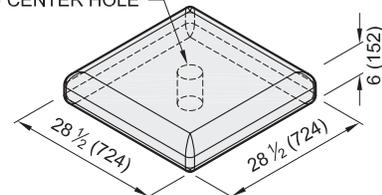
OPTIONAL FENCE POCKET



COLUMN CAP

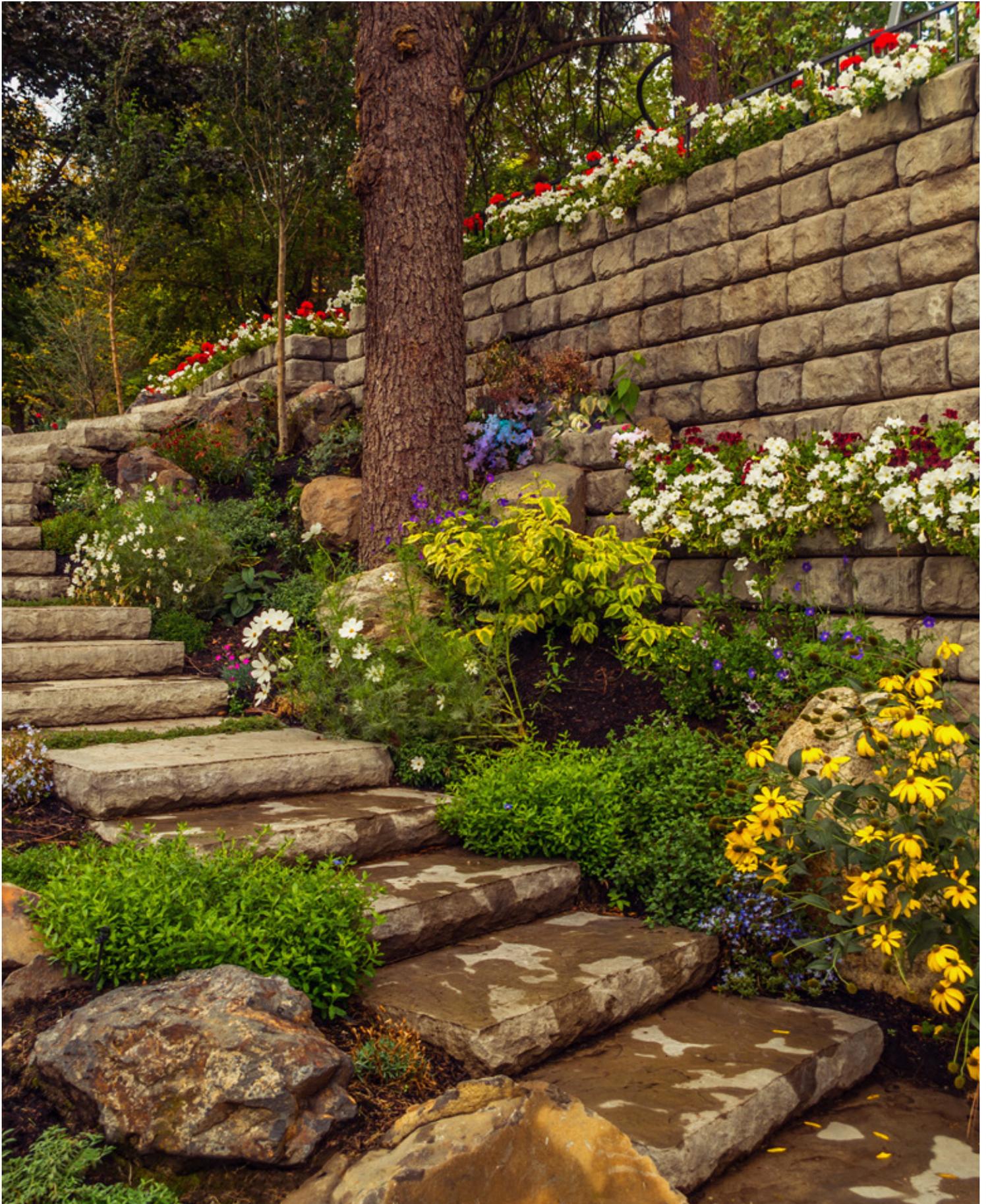
Block Weight: 390 lb (180 kg)
 Block Volume: 2.7 ft³ (0.08 m³)

OPTIONAL 4 (102) DIAMETER
 THRU CENTER HOLE



1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Confirm block production with licensed Redi-Rock manufacturer.
3. Actual block volumes and weights may vary.
4. Weights are based upon a concrete density of 143 lb/ft³ (2291 kg/m³).

5. Weight and volume ranges represents the blocks with the maximum hole size shown and with no hole.
6. Optional fence rail pockets available upon request. Typical pocket size is: 2 (50) wide x 5 (130) deep x 9 (230) tall.

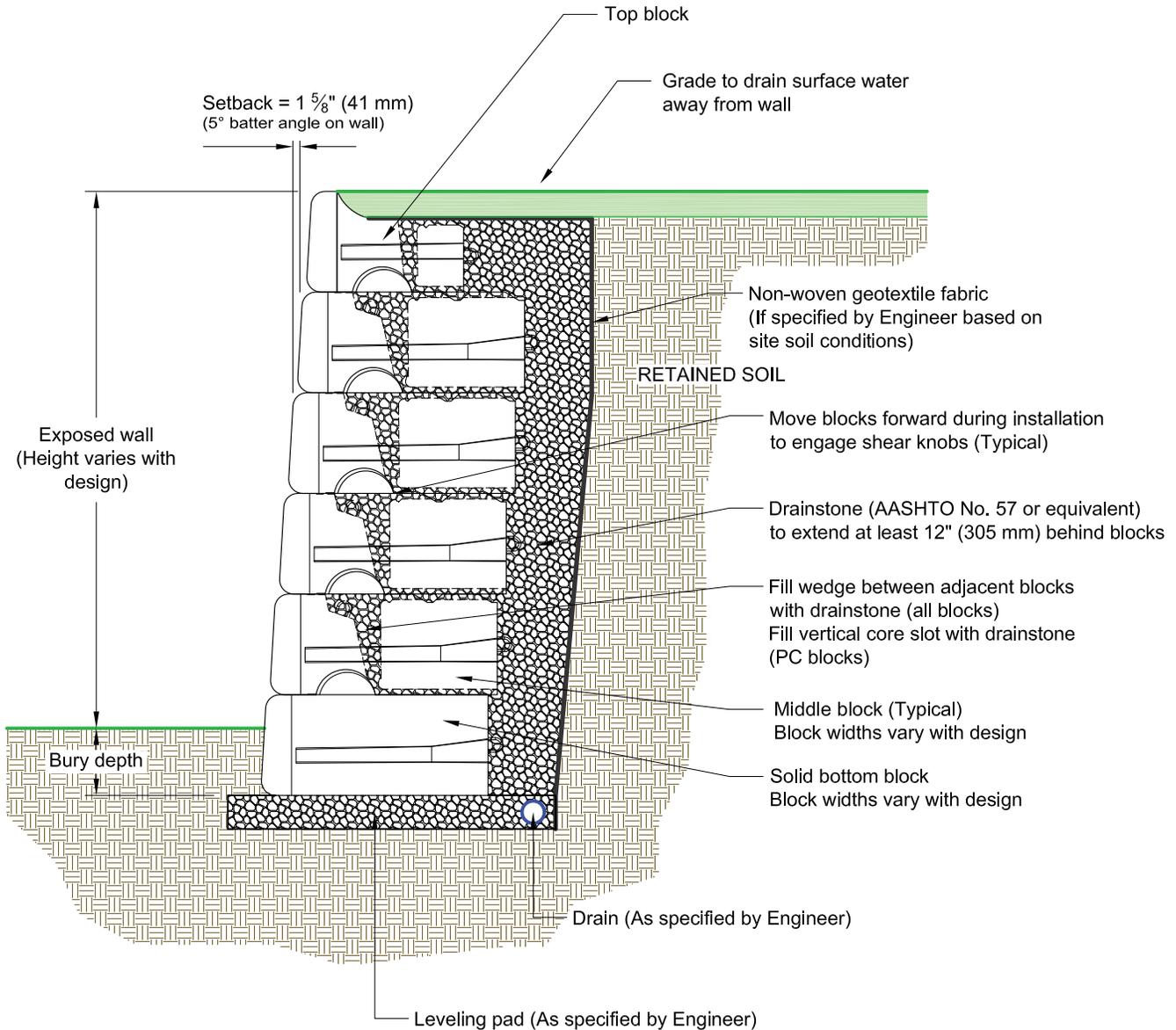






CONSTRUCTION DETAILS

Typical Gravity Wall Section

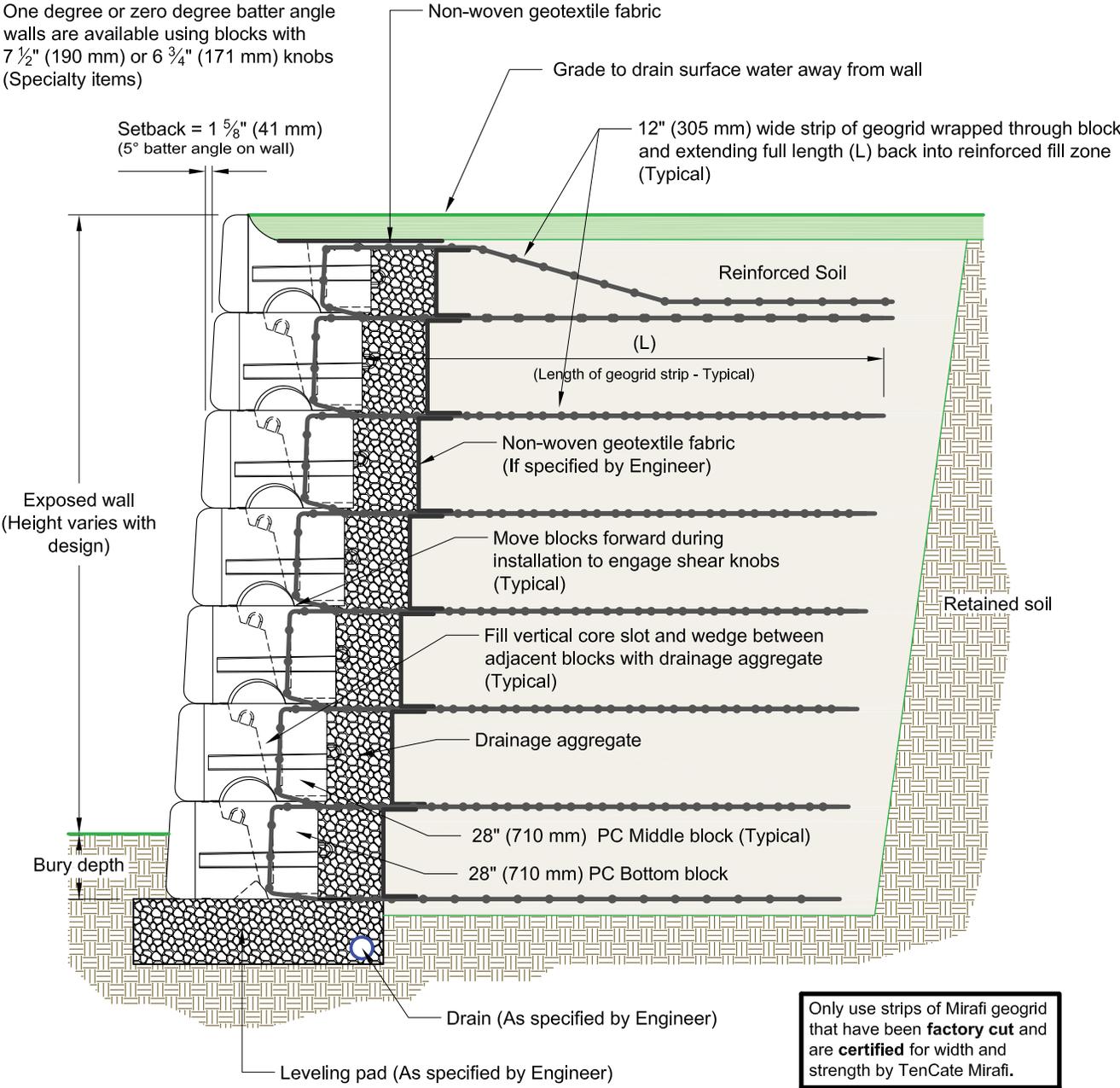


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Typical Reinforced Wall Section

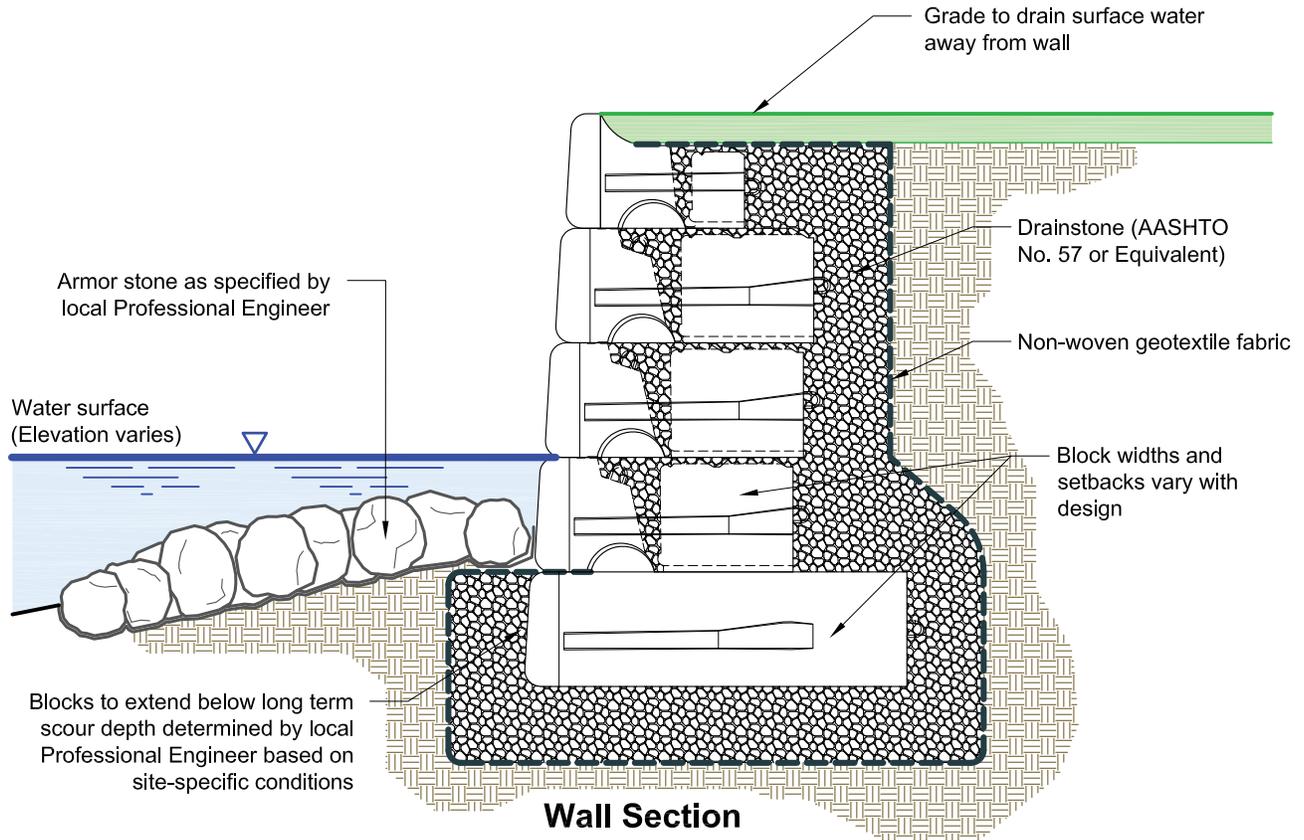
Note:

One degree or zero degree batter angle walls are available using blocks with 7 1/2" (190 mm) or 6 3/4" (171 mm) knobs (Specialty items)



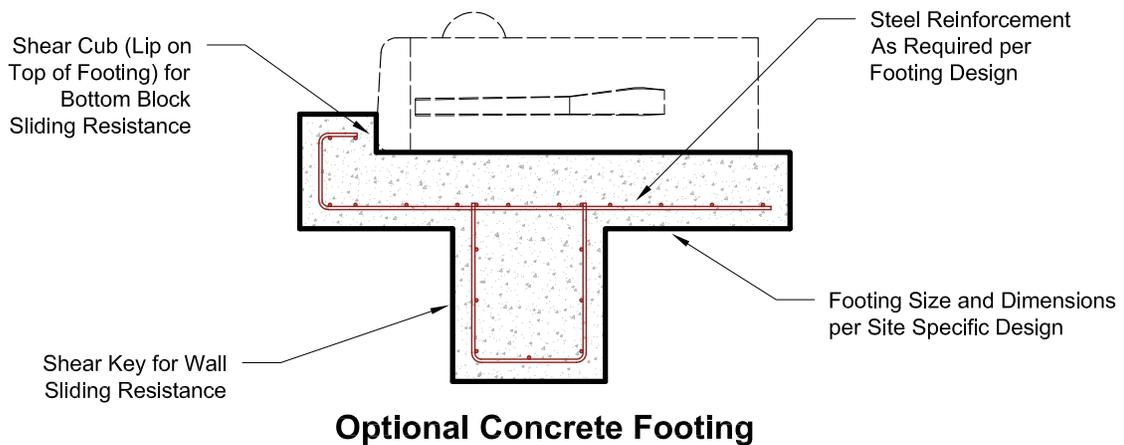
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Conceptual Seawall Detail



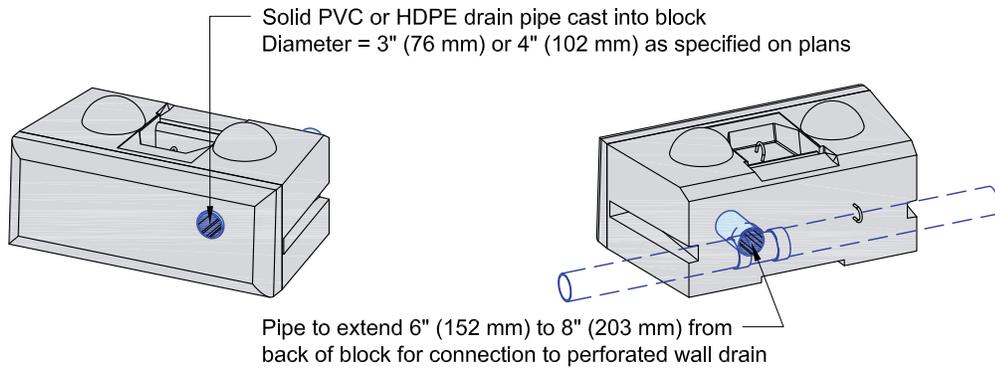
Notes:

- Use ASTM No. 57 stone (or as specified by local Professional Engineer) to infill between blocks.
- Preliminary wall height charts do not apply and should not be used for walls in water applications due to the variety of site-specific variables.
- Contact your local Professional Engineer for specific details and final design.
- Walls may require geogrid reinforcement.
- Refer to final engineering plans.

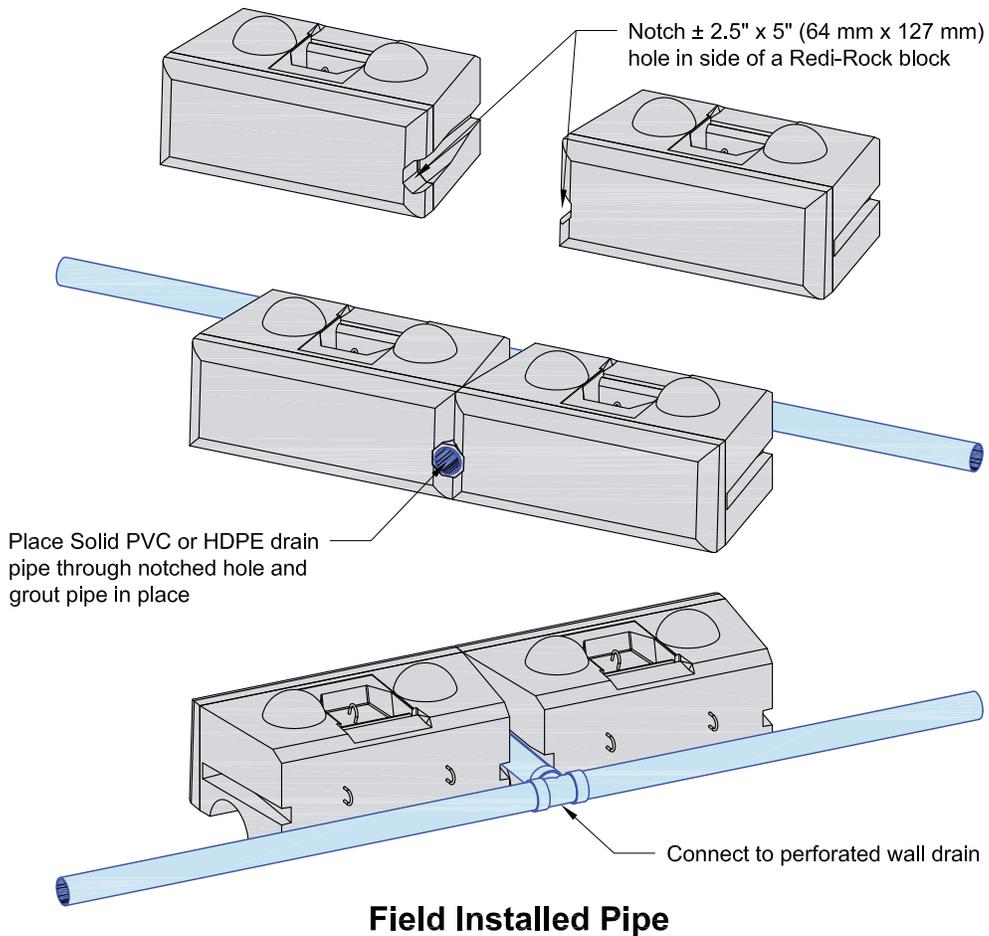


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Wall Drain Weep Hole Options

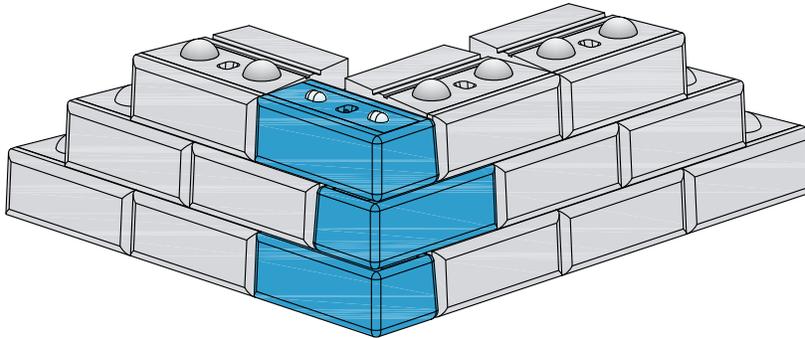


Custom Pipe Cast into Block



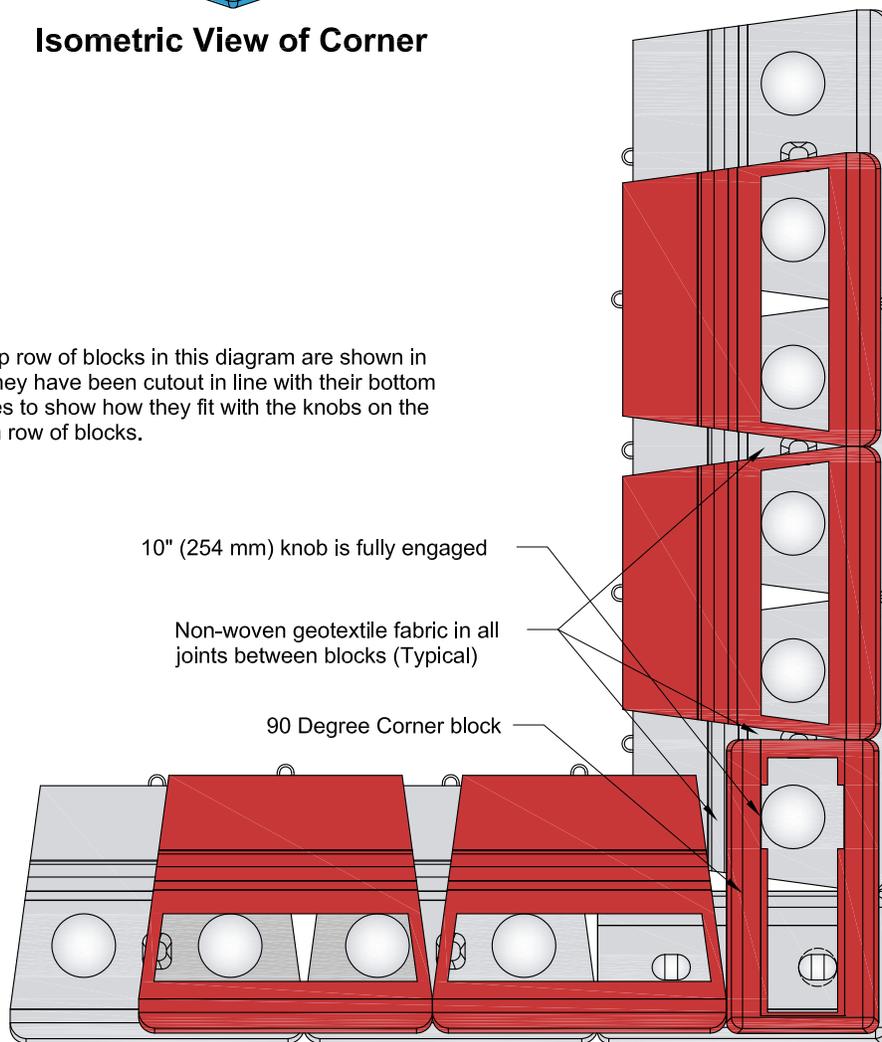
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90° Outside Corner



Isometric View of Corner

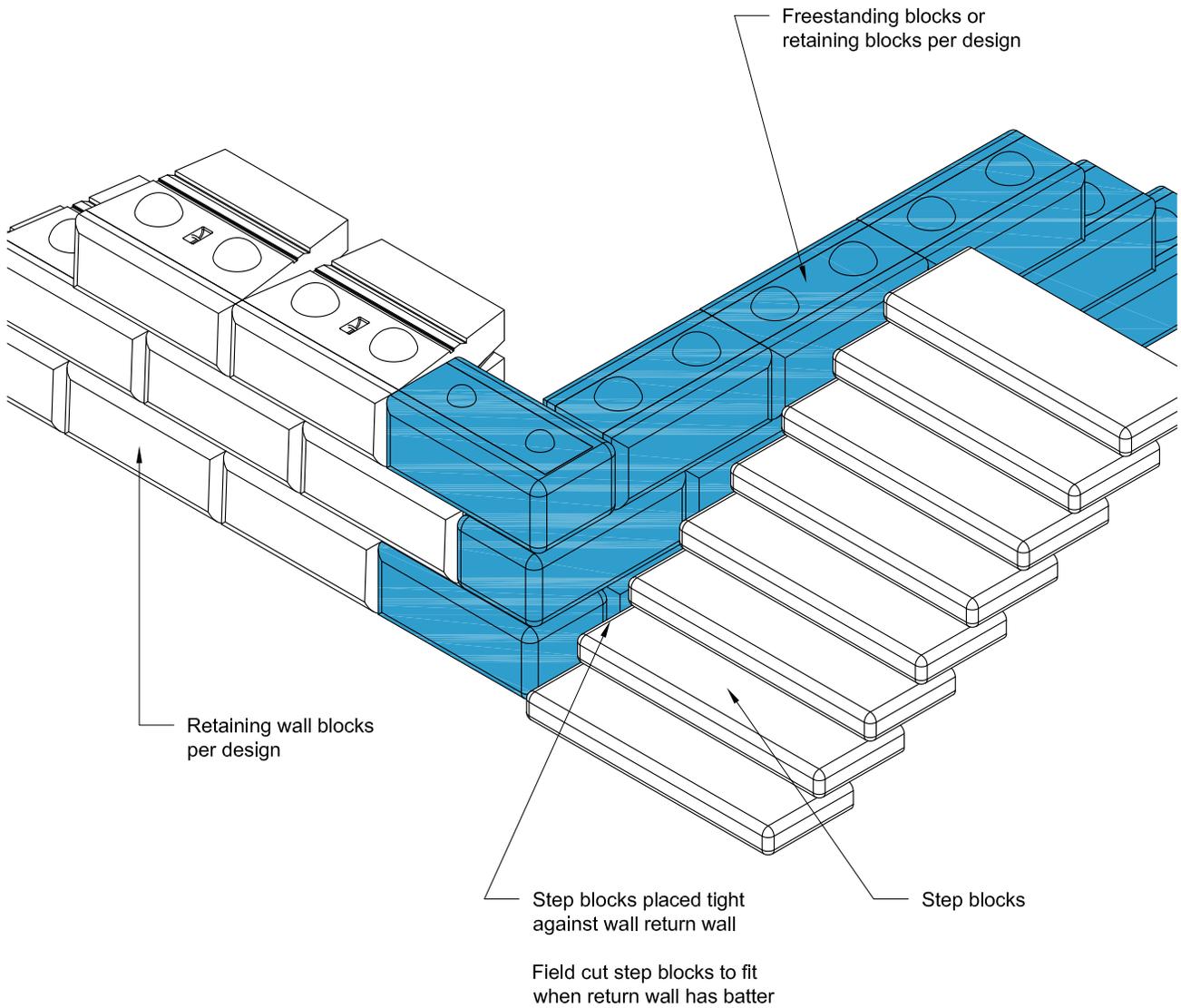
The top row of blocks in this diagram are shown in red. They have been cutout in line with their bottom grooves to show how they fit with the knobs on the bottom row of blocks.



Top View of Bottom Two Rows

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Steps Through Wall

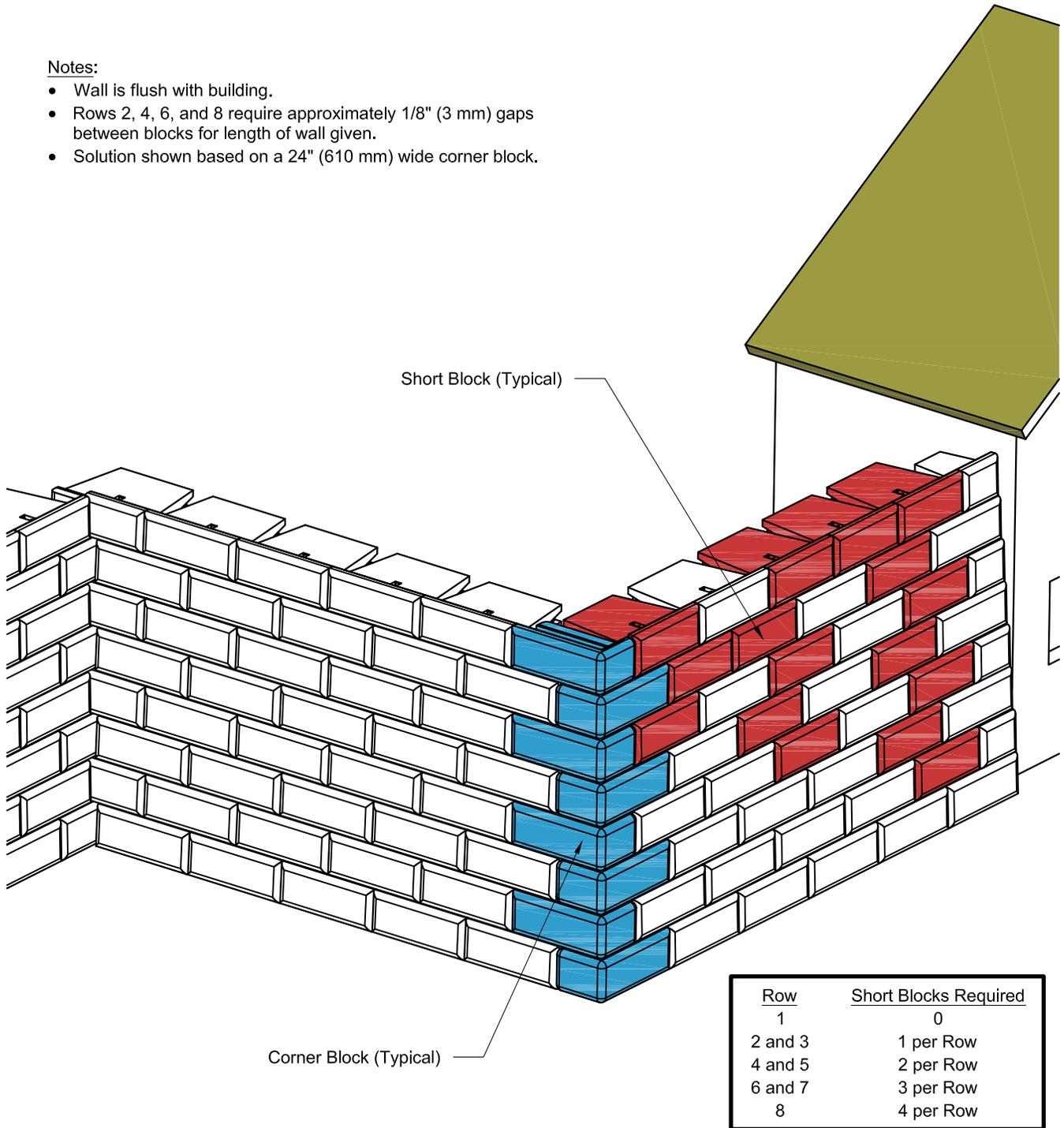


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Flush End to 90° Corner

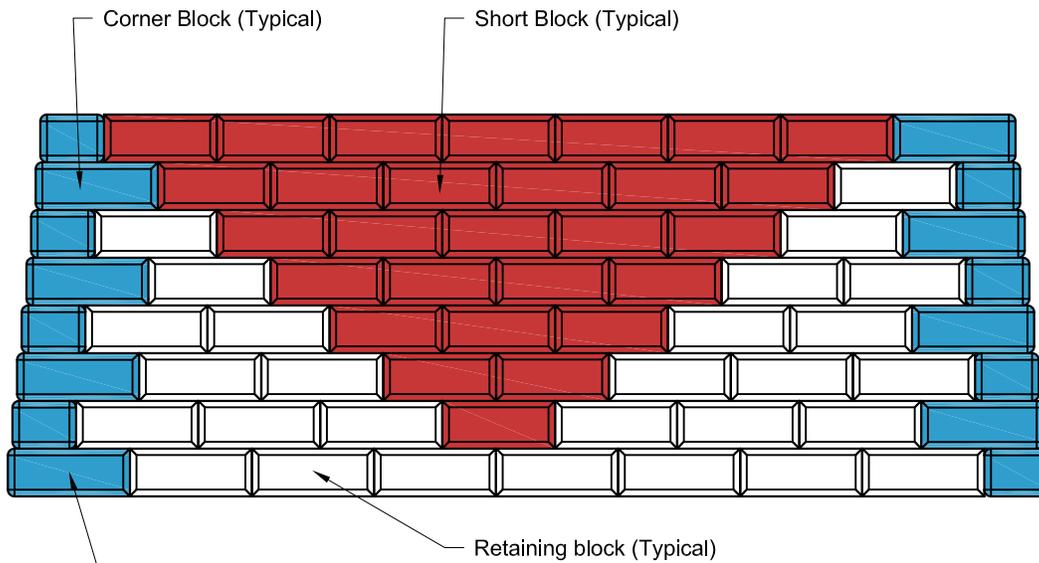
Notes:

- Wall is flush with building.
- Rows 2, 4, 6, and 8 require approximately 1/8" (3 mm) gaps between blocks for length of wall given.
- Solution shown based on a 24" (610 mm) wide corner block.

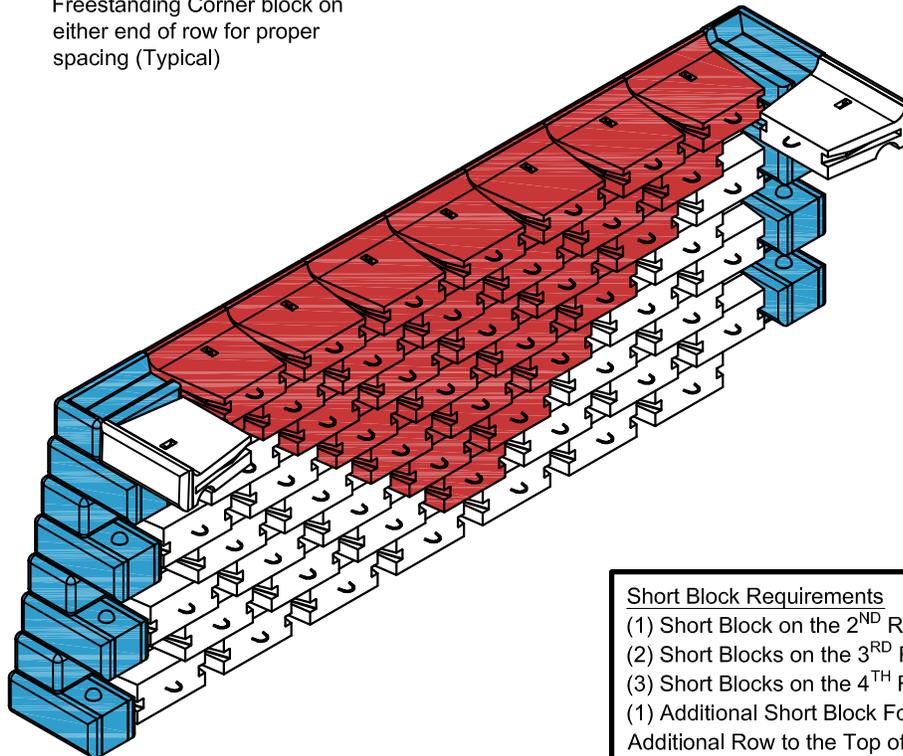


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Double 90° Outside Corner - Short Block Solution



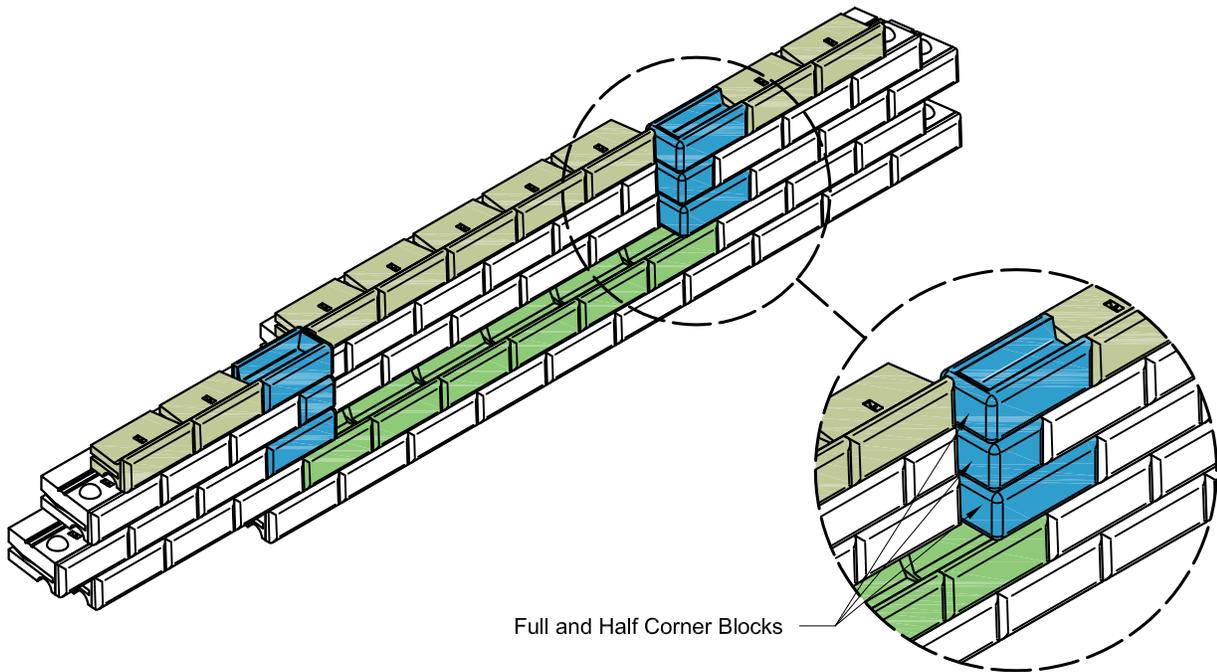
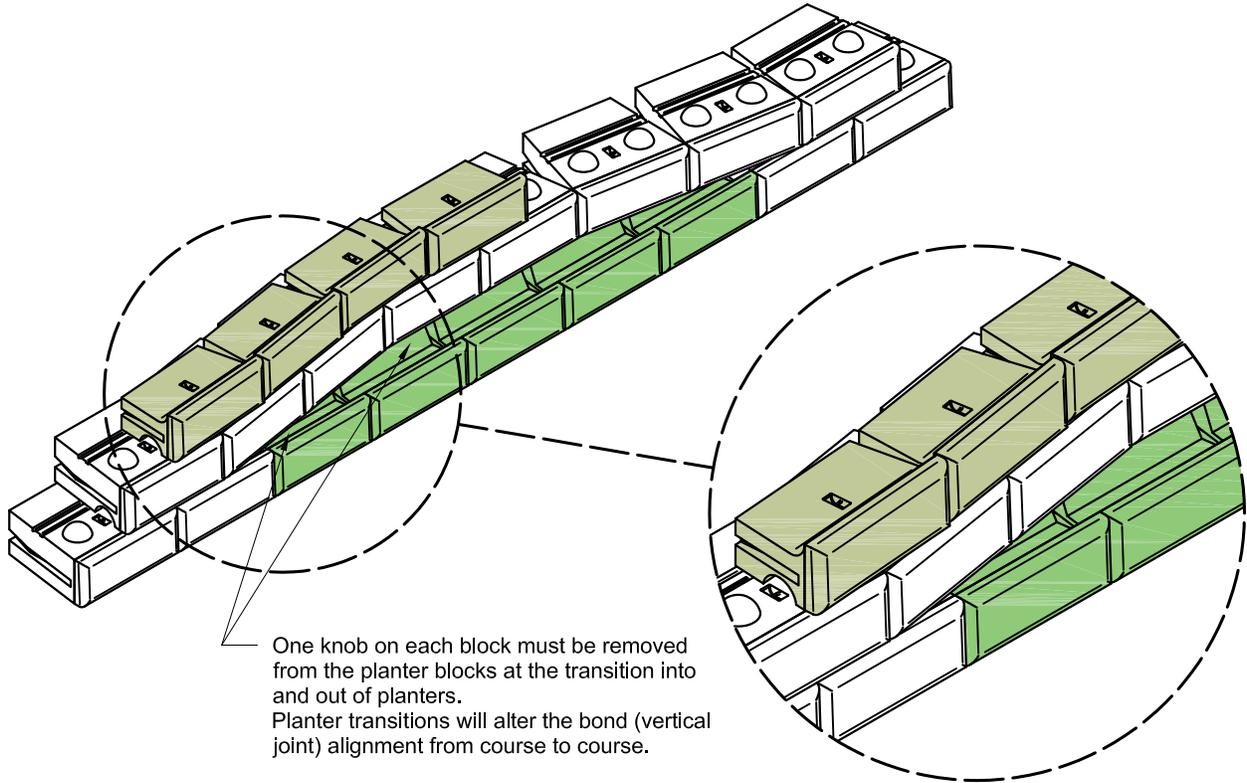
Alternate long and short face of Freestanding Corner block on either end of row for proper spacing (Typical)



- Short Block Requirements**
- (1) Short Block on the 2ND Row
 - (2) Short Blocks on the 3RD Row
 - (3) Short Blocks on the 4TH Row
 - (1) Additional Short Block For Every Additional Row to the Top of the Wall

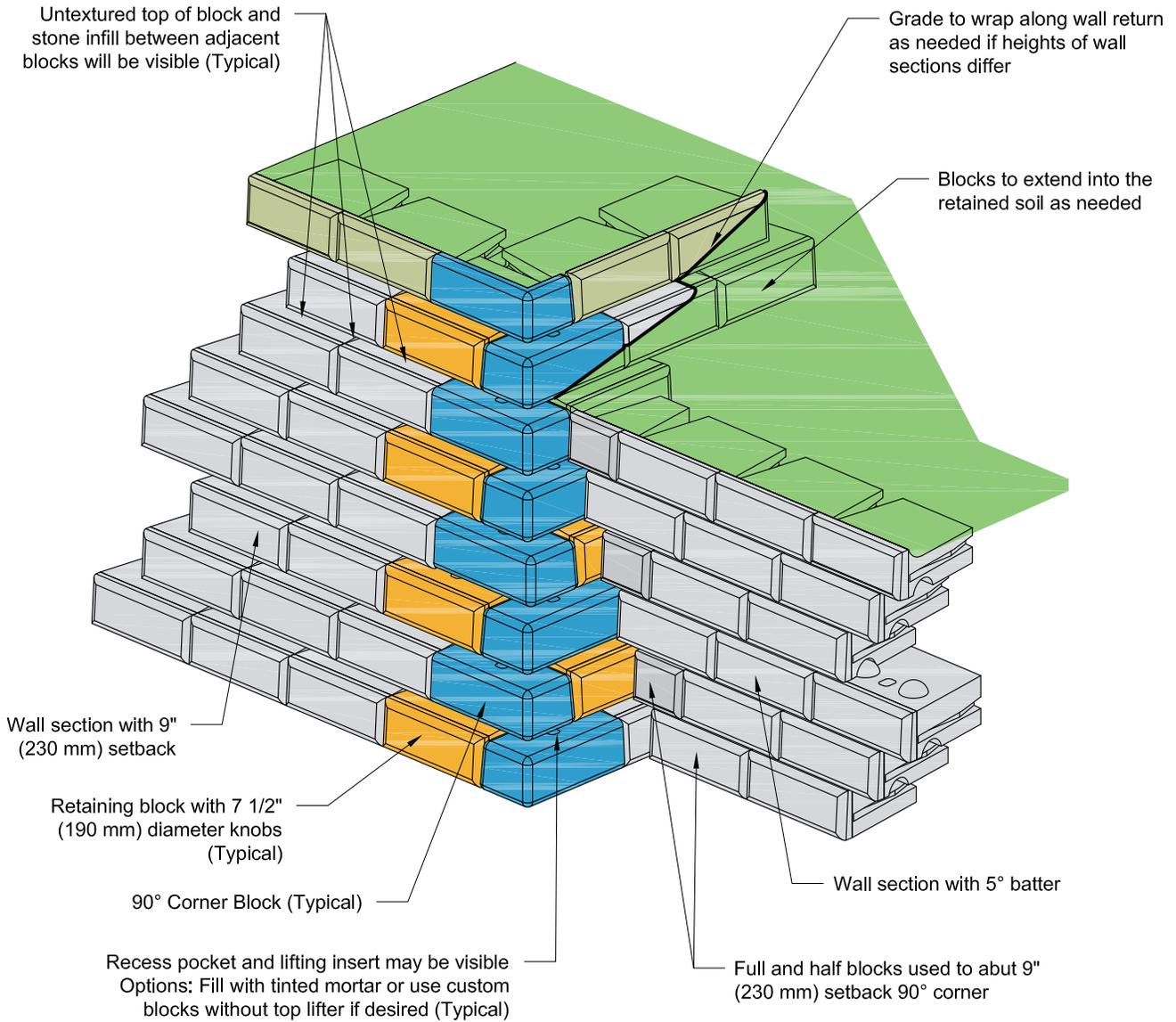
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Transitions Into Planters



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Transition From 5° Batter to 9" (230 mm) Setback



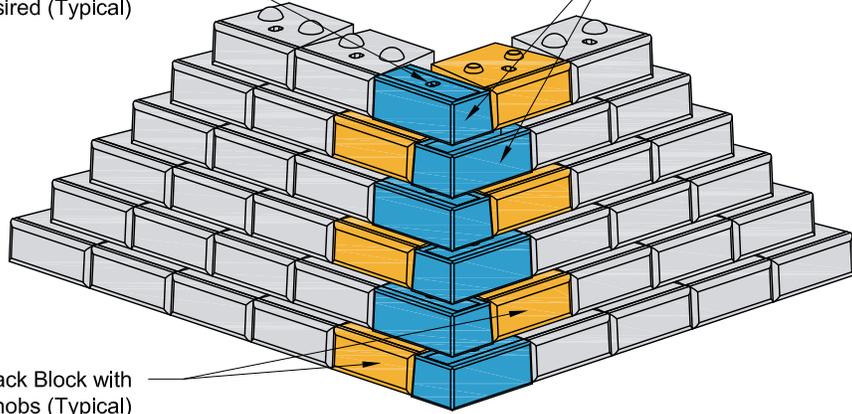
Preferred option is to start construction at transition and work away in both directions.
If construction cannot start at transition, blocks must be field cut as needed to fit.

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90° Outside Corner for 9" (230 mm) Setback Walls

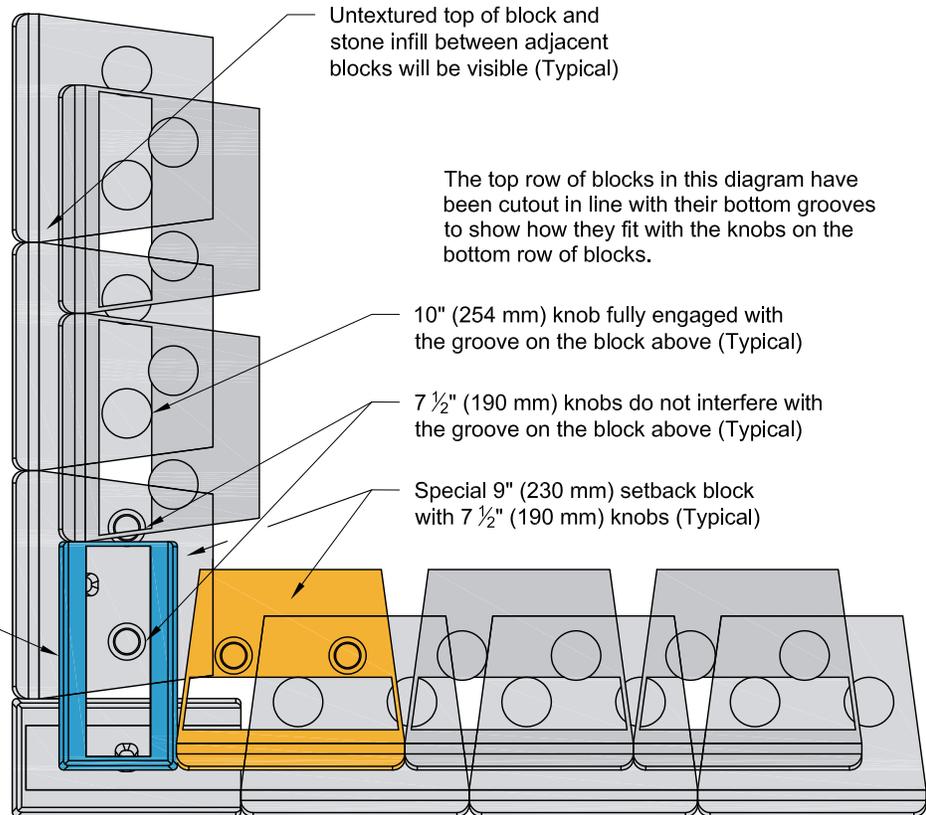
Recess pocket and lifting insert may be visible
Options: Fill with tinted mortar or use custom blocks without top lifter if desired (Typical)

Freestanding Corner Top Block (Typical)



Special 9" (230 mm) Setback Block with 7 1/2" (190 mm) diameter knobs (Typical)

Multiple Row Installation



Untextured top of block and stone infill between adjacent blocks will be visible (Typical)

The top row of blocks in this diagram have been cutout in line with their bottom grooves to show how they fit with the knobs on the bottom row of blocks.

10" (254 mm) knob fully engaged with the groove on the block above (Typical)

7 1/2" (190 mm) knobs do not interfere with the groove on the block above (Typical)

Special 9" (230 mm) setback block with 7 1/2" (190 mm) knobs (Typical)

Freestanding Corner Top block (Typical)

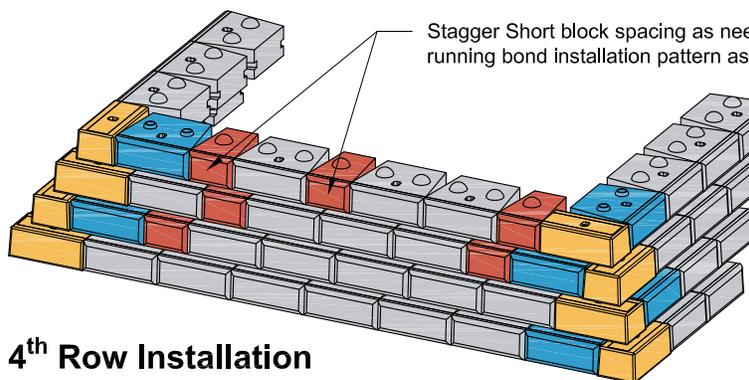
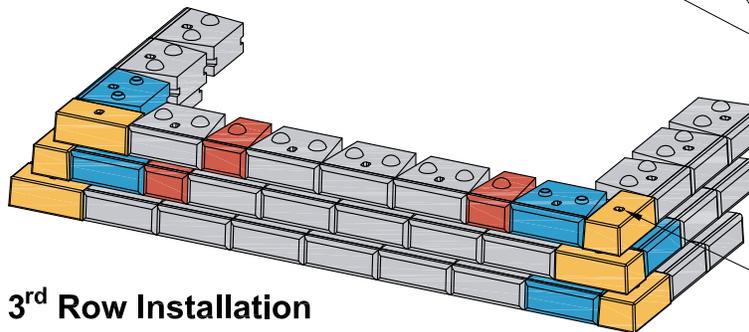
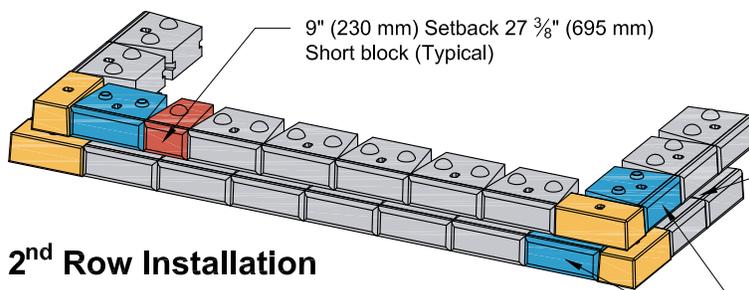
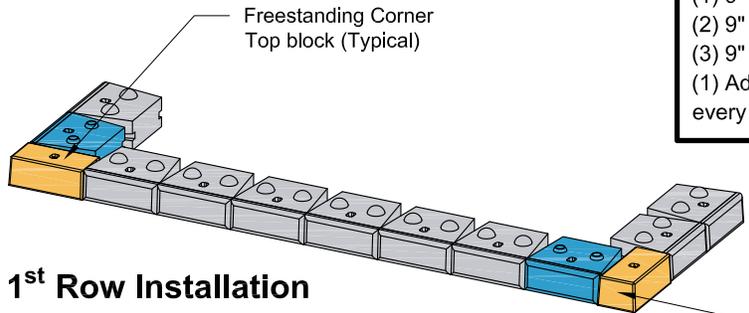
Top View of Bottom Two Rows

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Double 90° Outside Corner for 9" (230 mm) Setback Walls

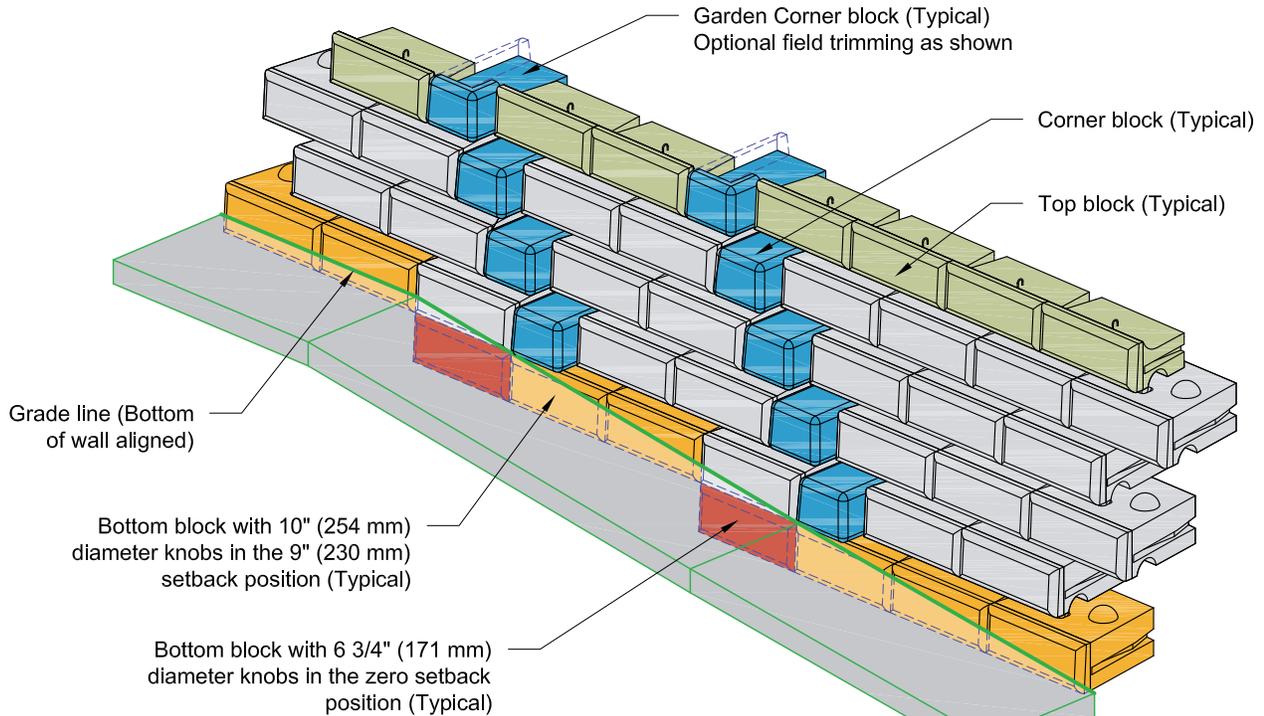
Short Block Requirements

- (1) 9" (230 mm) Setback Short block on the 2nd row
- (2) 9" (230 mm) Setback Short block on the 3rd row
- (3) 9" (230 mm) Setback Short block on the 4th row
- (1) Additional 9" (230 mm) Setback Short block for every additional row to the top of the wall

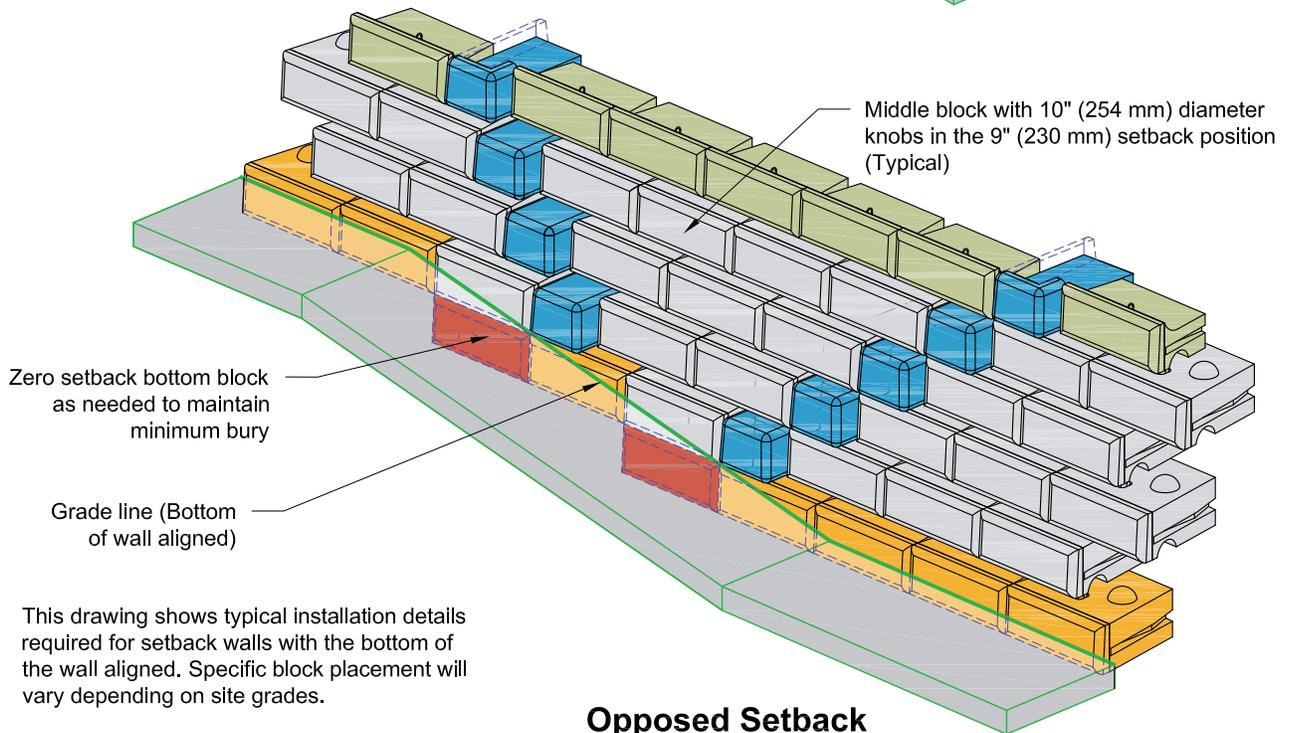


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Stepped 9" (230 mm) Setback Wall with Aligned Base



Parallel Setback

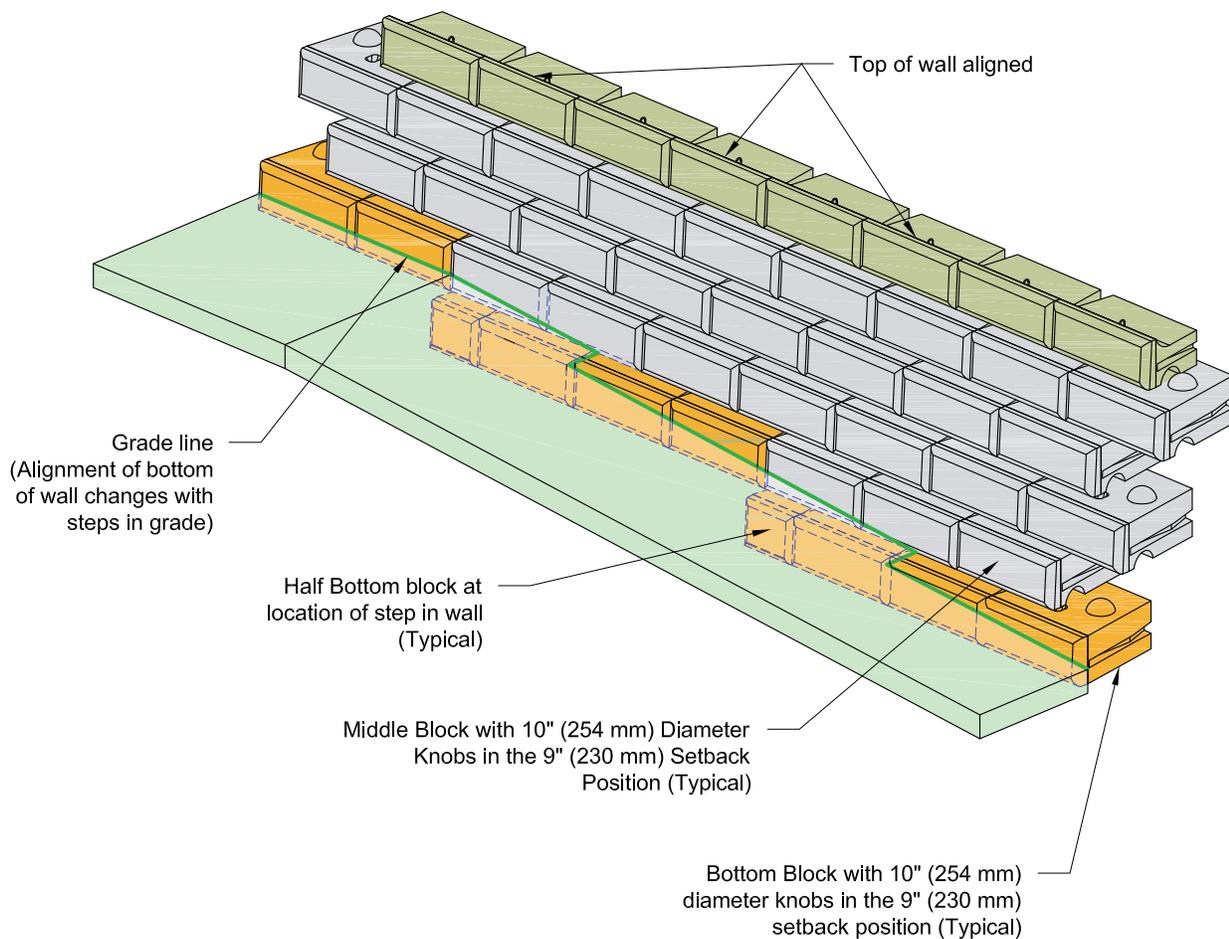


Opposed Setback

This drawing shows typical installation details required for setback walls with the bottom of the wall aligned. Specific block placement will vary depending on site grades.

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Stepped 9" (230 mm) Setback Wall with Aligned Top



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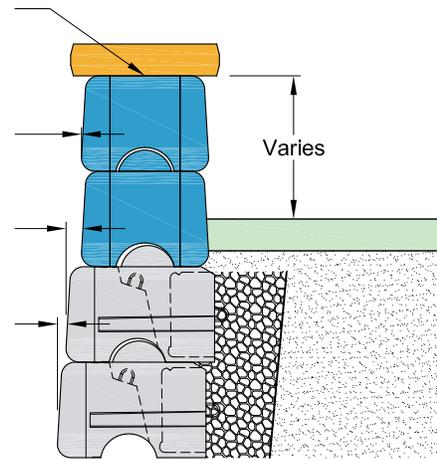
Freestanding and Cap Block Coping

Secure cap block to freestanding block with polyurethane sealant.
 Optional shear lugs cast into cap block or rebar ties that can be embedded in site-cast concrete (with garden block) are also available.

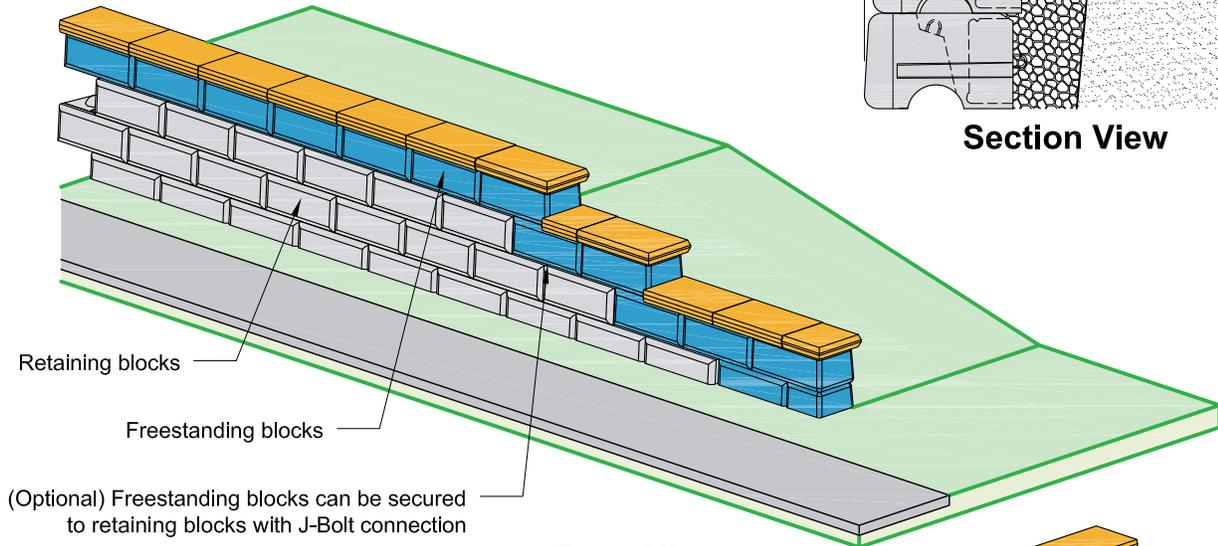
Setback = 0" (0 mm) on Freestanding blocks

Setback = $2 \frac{7}{8}$ " (73 mm) when 10" (254 mm) knob used
 Setback = $1 \frac{5}{8}$ " (41 mm) when $7 \frac{1}{2}$ " (190 mm) knob used

Setback = $1 \frac{5}{8}$ " (41 mm) when 10" (254 mm) knob used

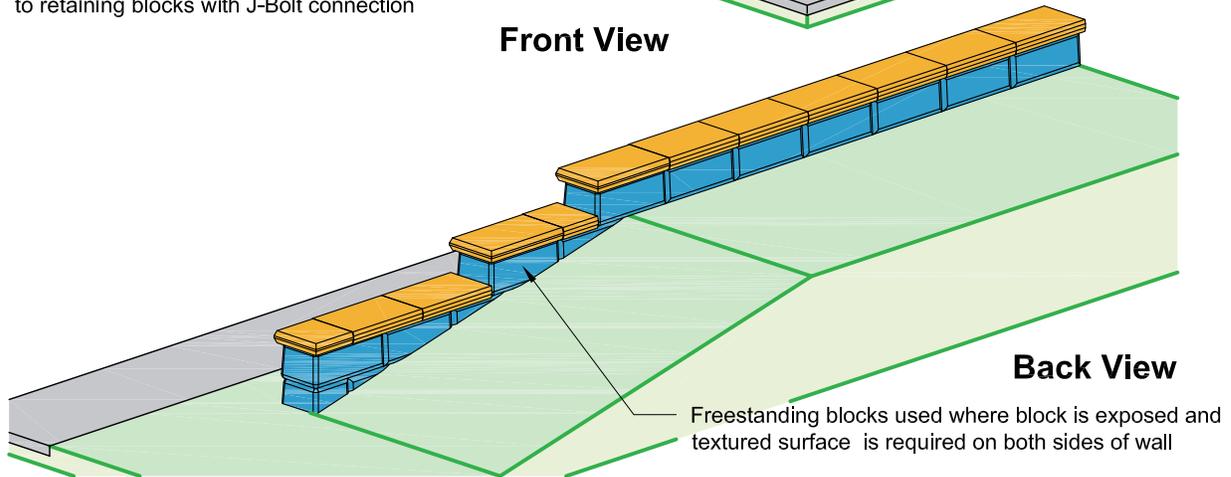


Section View



Front View

(Optional) Freestanding blocks can be secured to retaining blocks with J-Bolt connection



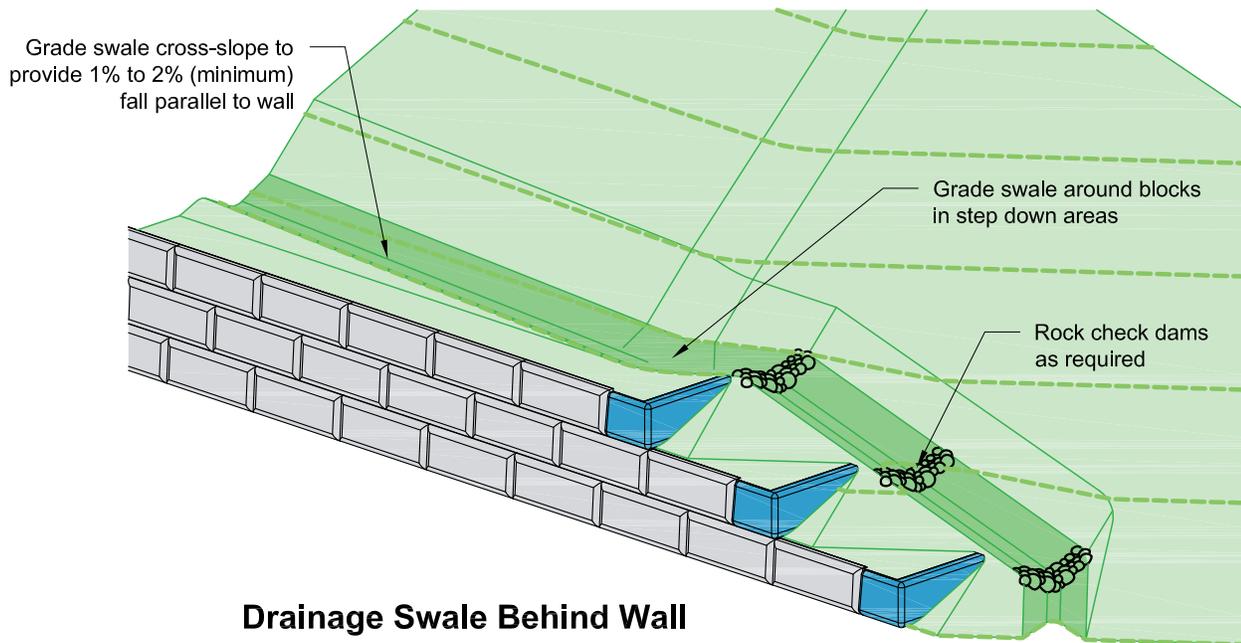
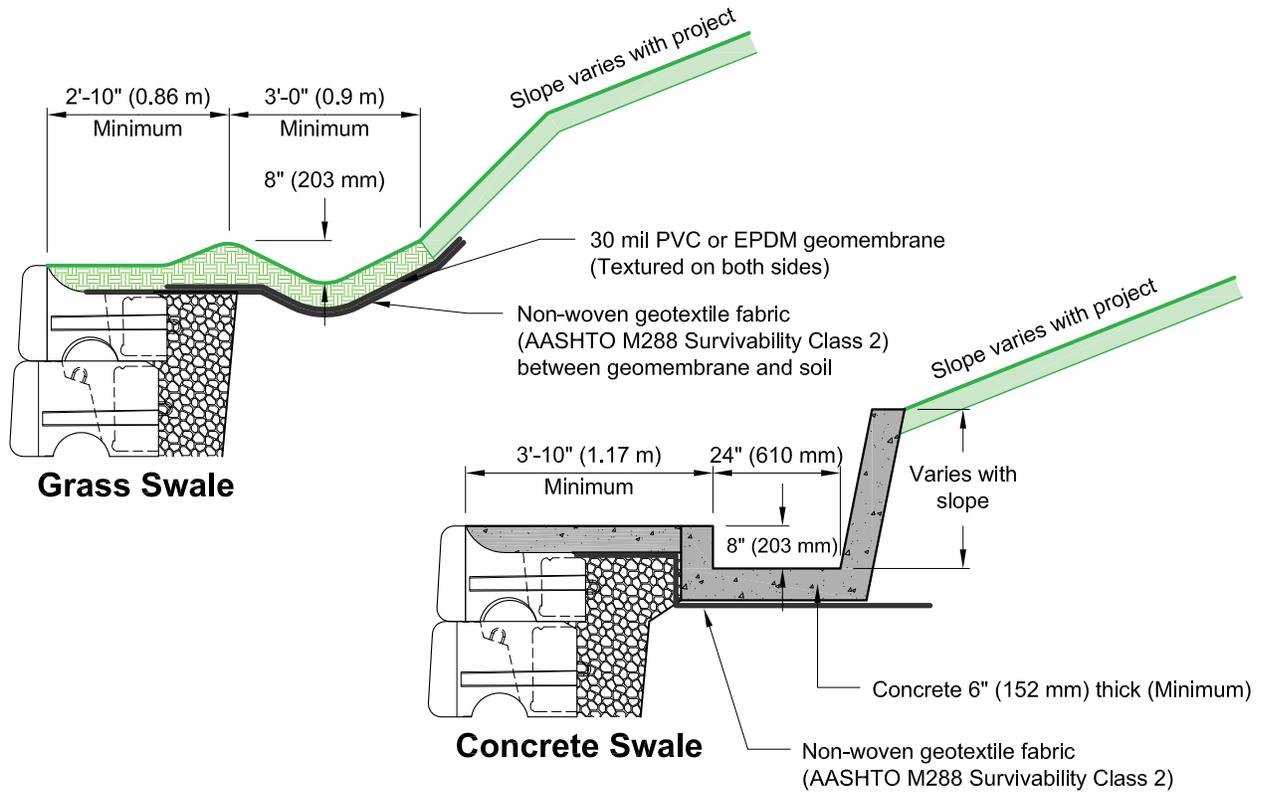
Back View

Freestanding blocks used where block is exposed and textured surface is required on both sides of wall

One-component, highly flexible, non-priming, gun grade, high performance elastomeric polyurethane sealant shall have movement of plus or minus 25% per ASTM C719, tensile strength greater than 200 psi (1.4 MPa) per ASTM D412, and adhesion to peel on concrete greater than 20 PLI per ASTM C794. Apply sealant in one and one half-inch (1.5") (38 mm) diameter round "hersey kiss" shaped dollops located in two rows at the top of the Freestanding blocks at 8" (203 mm) on center.

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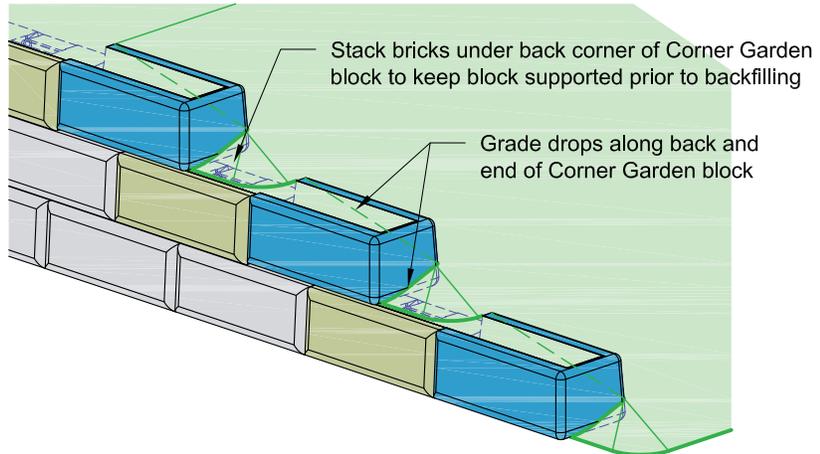
Drainage Swale Options



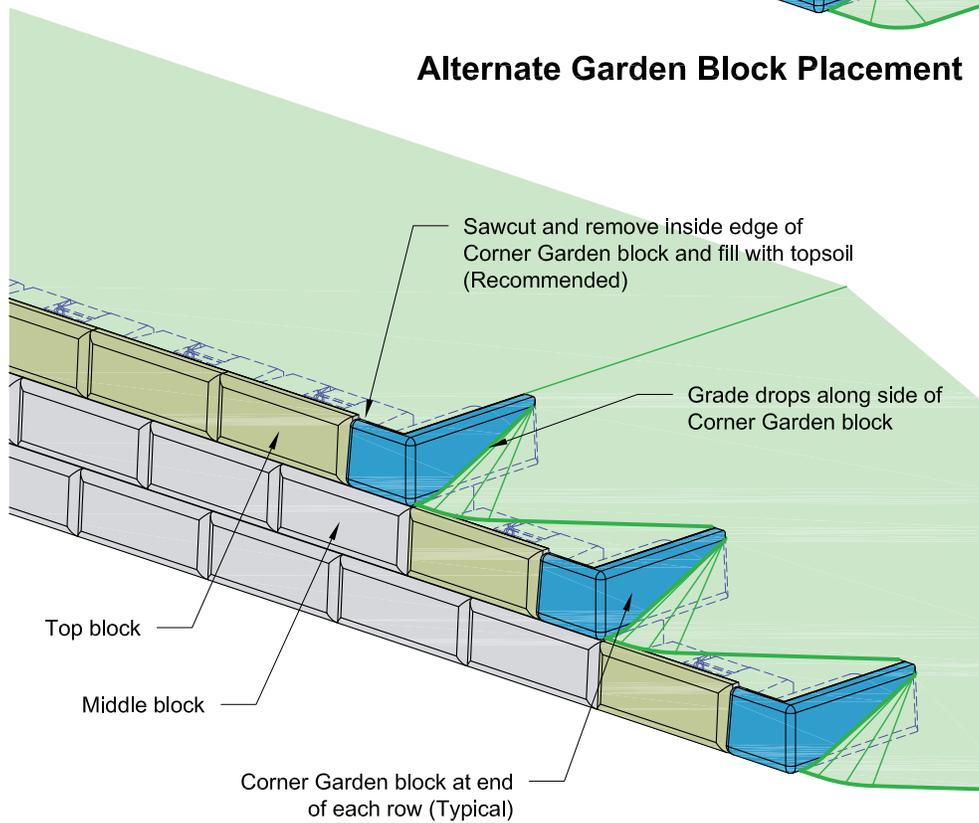
Drainage Swale Behind Wall

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Top Block Coping Option

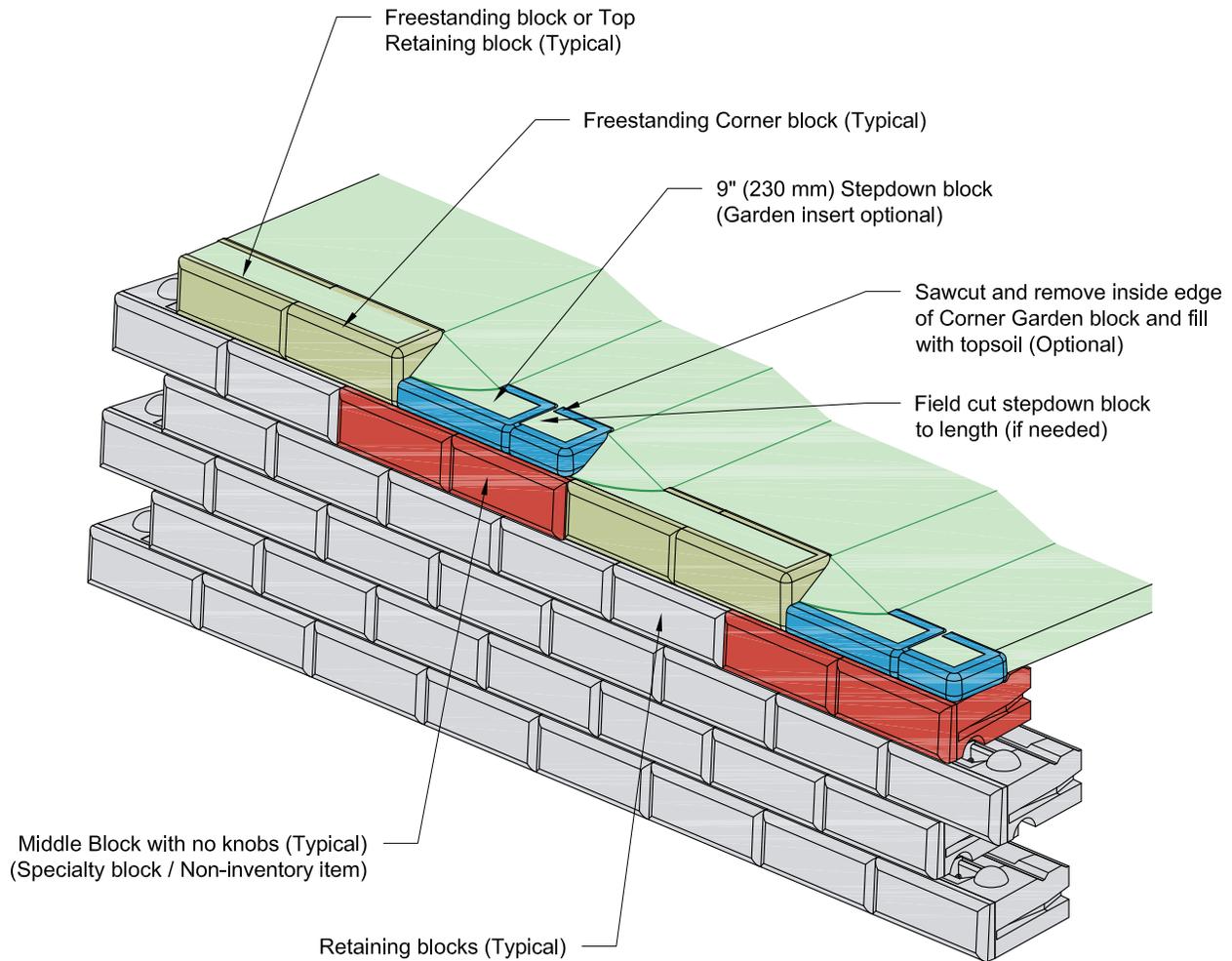


Alternate Garden Block Placement



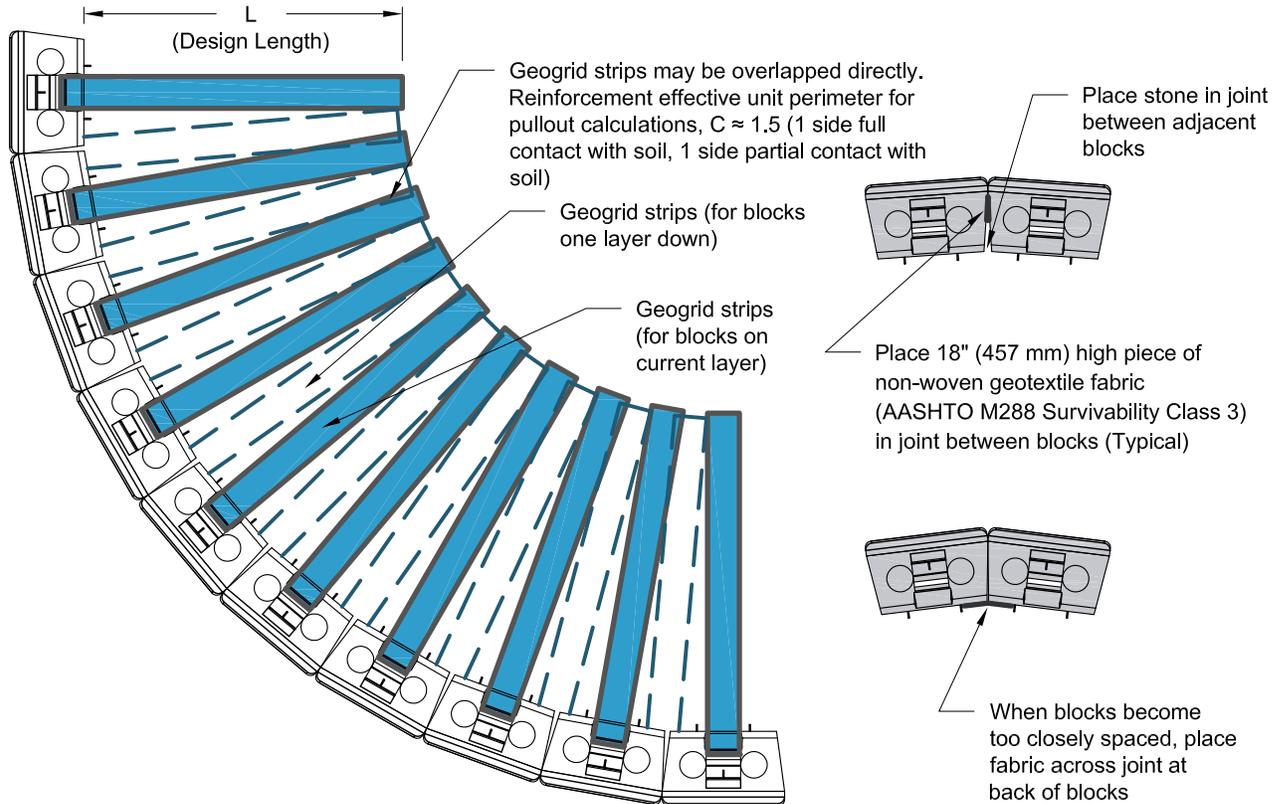
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Grade Change on Top of Wall Using 9" (230 mm) Stepdown Blocks



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Geogrid Layout for Convex Curves and Radial Corners

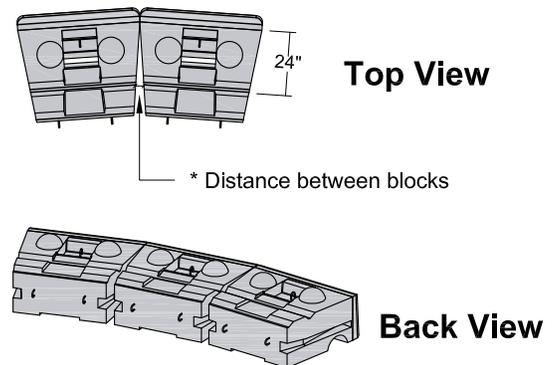


Minimum radius for bottom row

Number of courses	Height of wall	Radius from face of block	Distance between blocks*
1	1'-6" (0.46 m)	14'-6" (4.42 m)	0.13" (3 mm)
2	3'-0" (0.91 m)	14'-8" (4.47 m)	0.21" (5 mm)
3	4'-6" (1.37 m)	14'-10" (4.52 m)	0.28" (7 mm)
4	6'-0" (1.83 m)	15'-0" (4.57 m)	0.36" (9 mm)
5	7'-6" (2.29 m)	15'-2" (4.62 m)	0.43" (11 mm)
6	9'-0" (2.74 m)	15'-4" (4.67 m)	0.50" (13 mm)
7	10'-6" (3.20 m)	15'-6" (4.72 m)	0.57" (15 mm)
8	12'-0" (3.66 m)	15'-8" (4.78 m)	0.63" (16 mm)
9	13'-6" (4.11 m)	15'-10" (4.83 m)	0.70" (18 mm)
10	15'-0" (4.57 m)	16'-0" (4.88 m)	0.76" (19 mm)
11	16'-6" (5.03 m)	16'-2" (4.93 m)	0.83" (21 mm)
12	18'-0" (5.49 m)	16'-4" (4.98 m)	0.88" (22 mm)
13	19'-6" (5.94 m)	16'-6" (5.03 m)	0.95" (24 mm)
14	21'-0" (6.40 m)	16'-8" (5.08 m)	1.01" (26 mm)

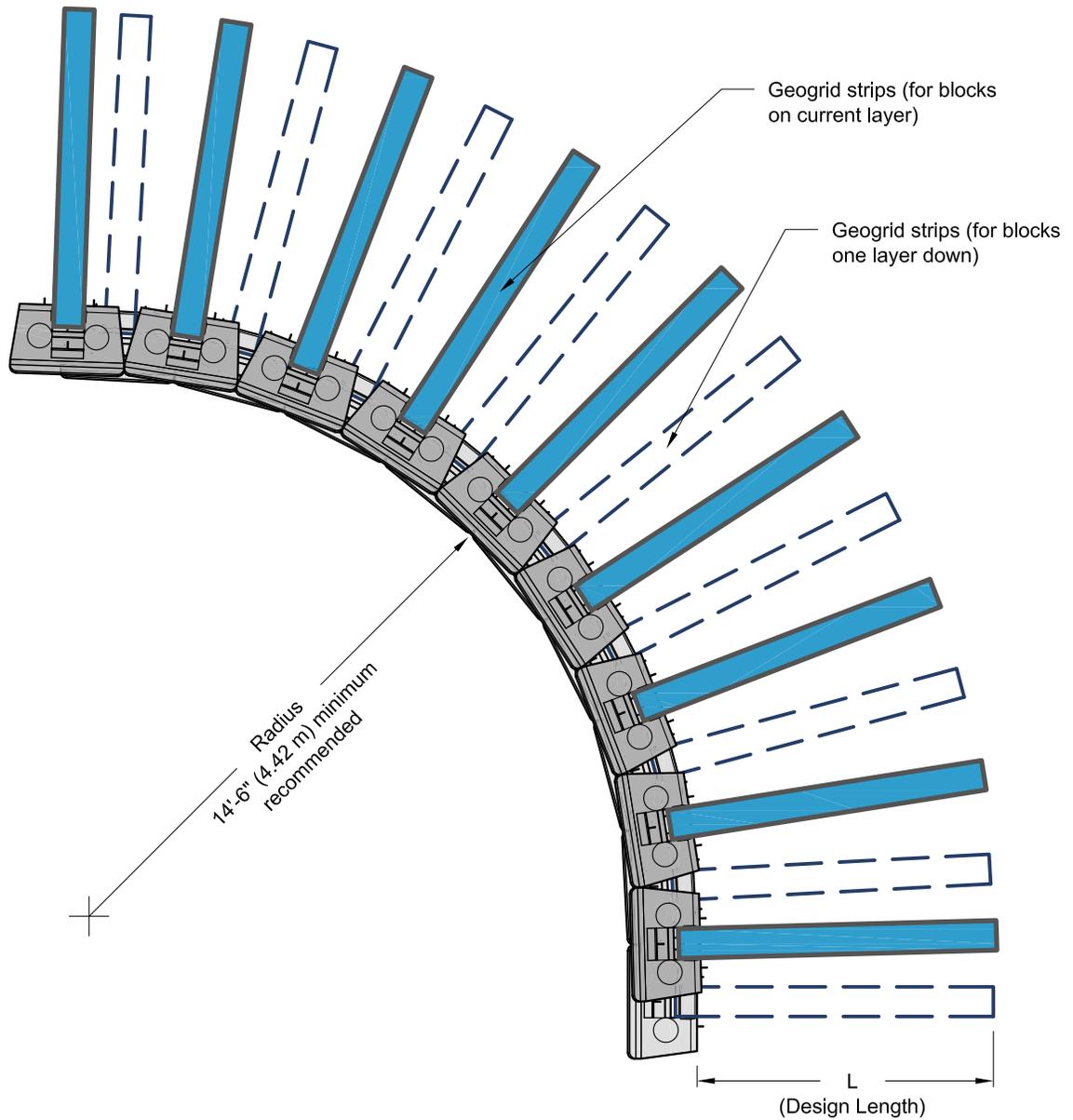
* Distance between blocks is measured at the back of 28" (710 mm) blocks and 24" (610 mm) behind the form parting line (back edge of face texture) for 41" (1030 mm) blocks. This distance is intended to be a guide only. Minimum radius is controlling.

14'-6" (4.42 m) is the minimum radius for Redi-Rock blocks. It occurs when all the blocks are placed tight together. A larger radius is required on the bottom row of a Redi-Rock wall to account for the batter between courses of blocks and still provide enough space to construct the top row of blocks.



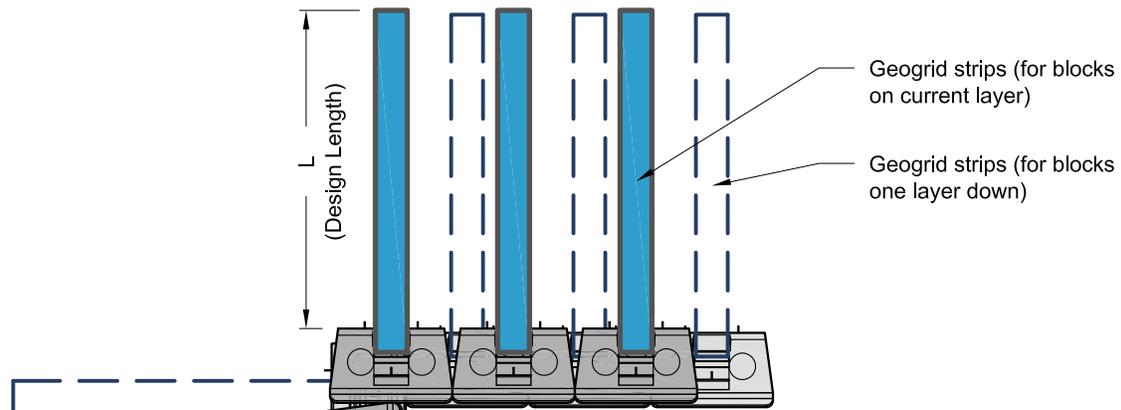
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Geogrid Layout for Concave Curves and Radial Corners

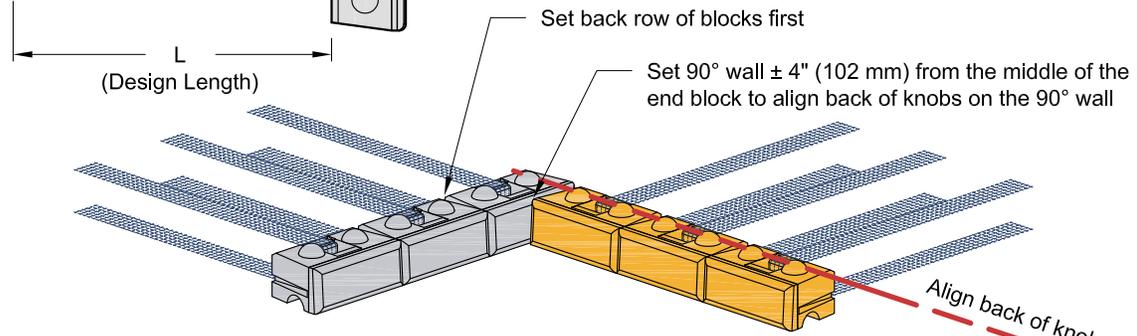


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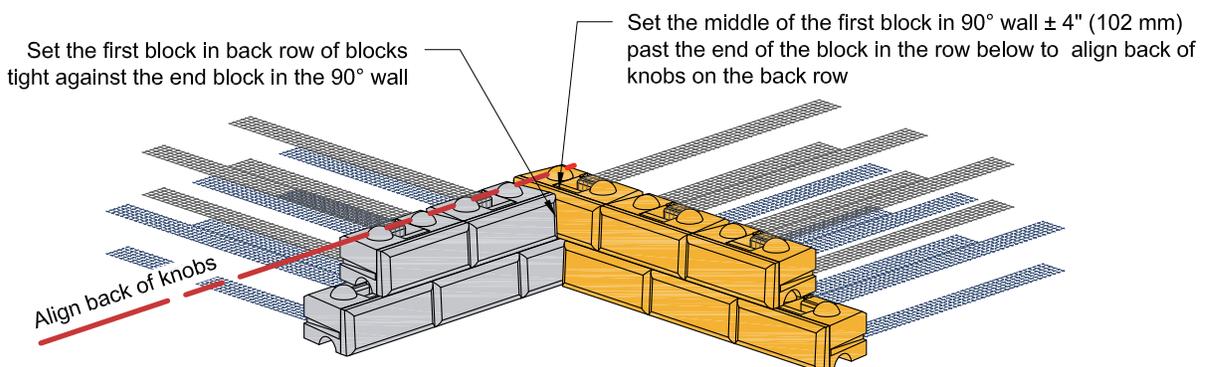
Geogrid Layout for 90° Inside Corner



Top View



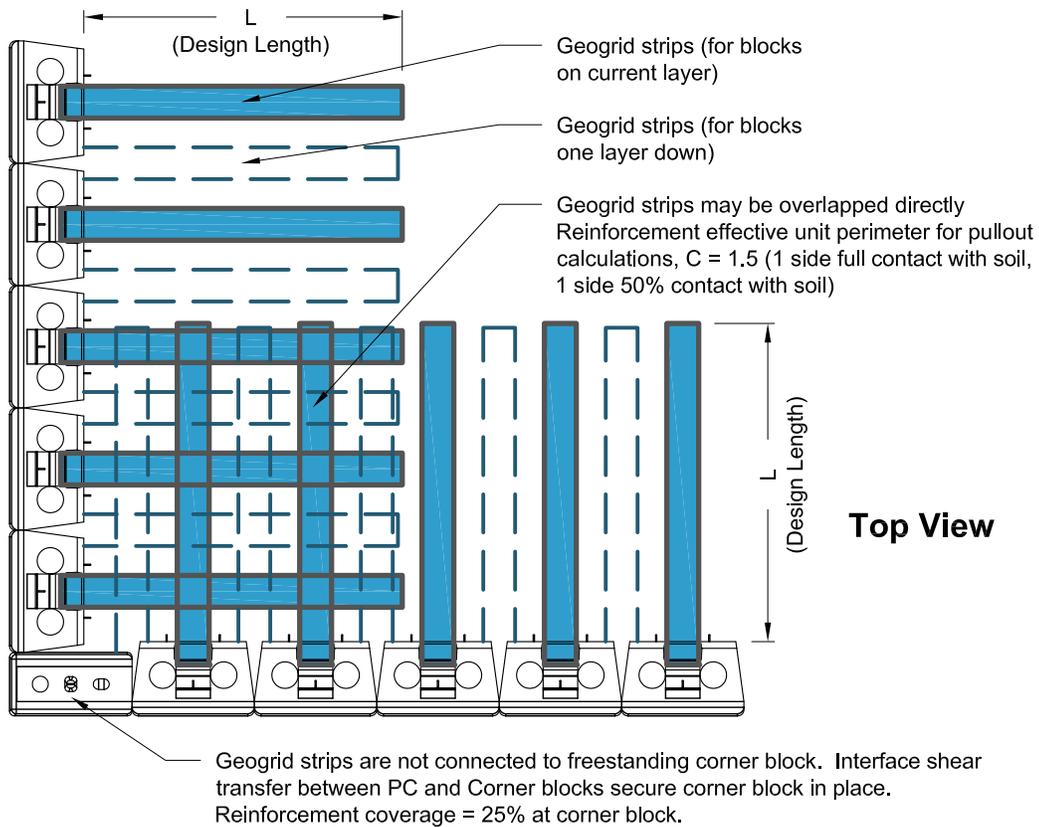
Block placement - First row



Block placement - Second row

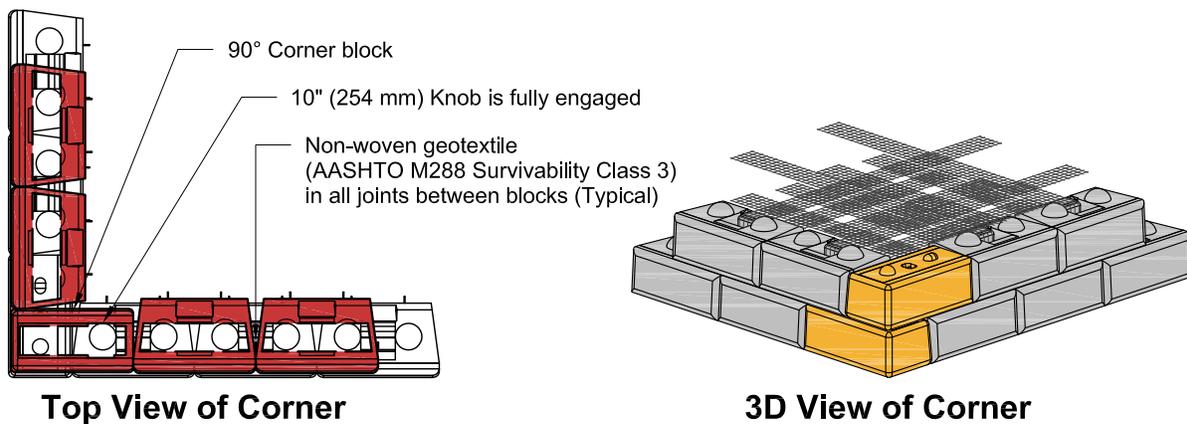
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Geogrid Layout for 90° Outside Corner



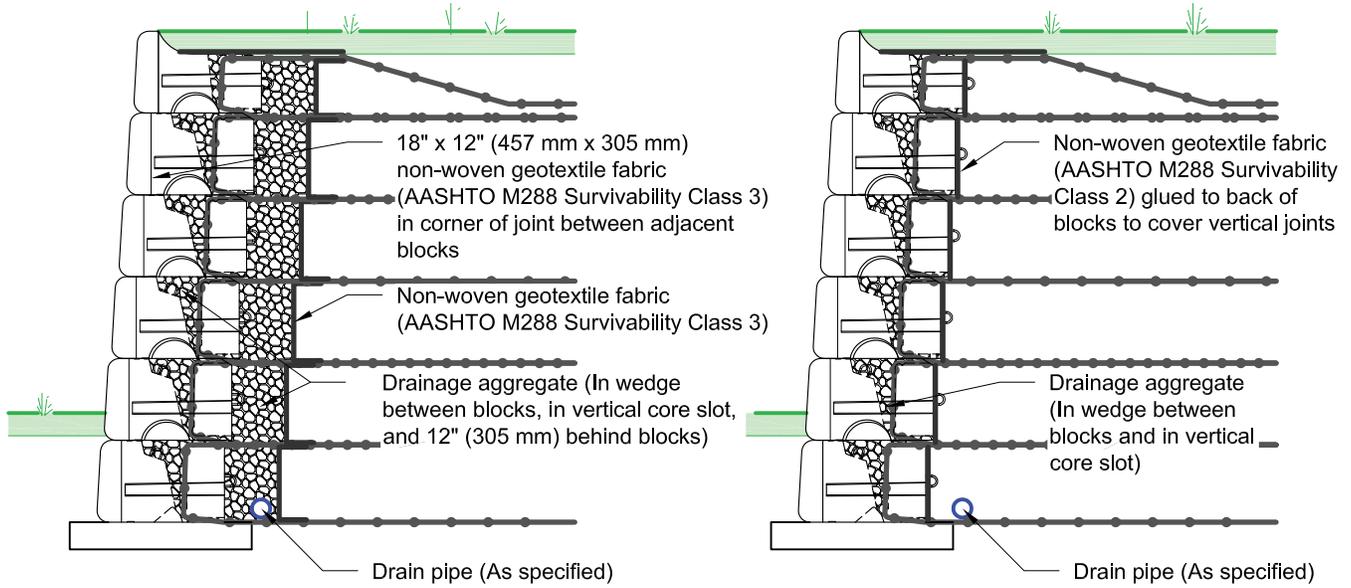
Block Layout for 90° Outside Corner

The top row of blocks are shown in red. They have been cutout in line with their bottom grooves to show how they fit with the knobs on the bottom row of block. The geogrid strips are not shown for clarity.



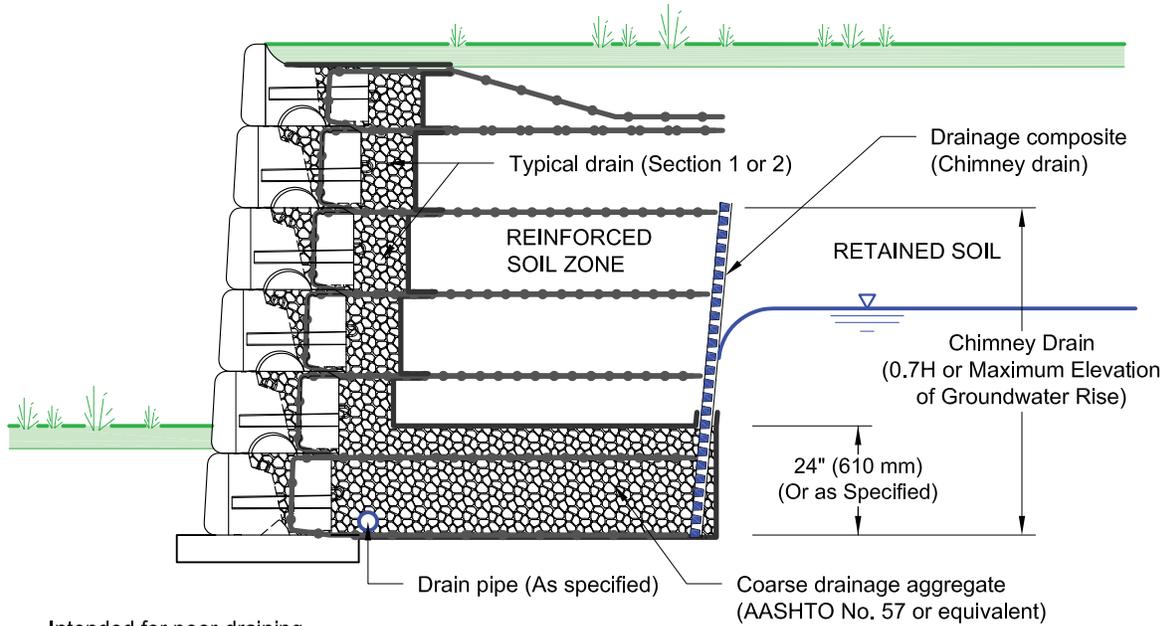
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Internal Drainage Options



Typical Section - Option 1

Typical Section - Option 2

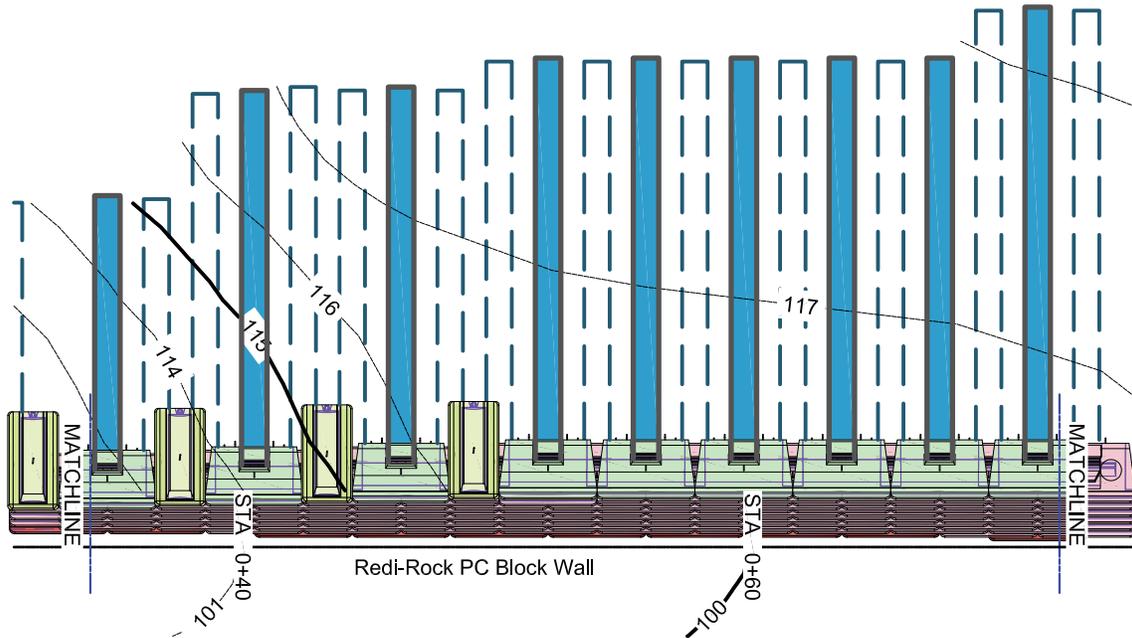


Intended for poor-draining retained soils and/or areas with potential groundwater impact

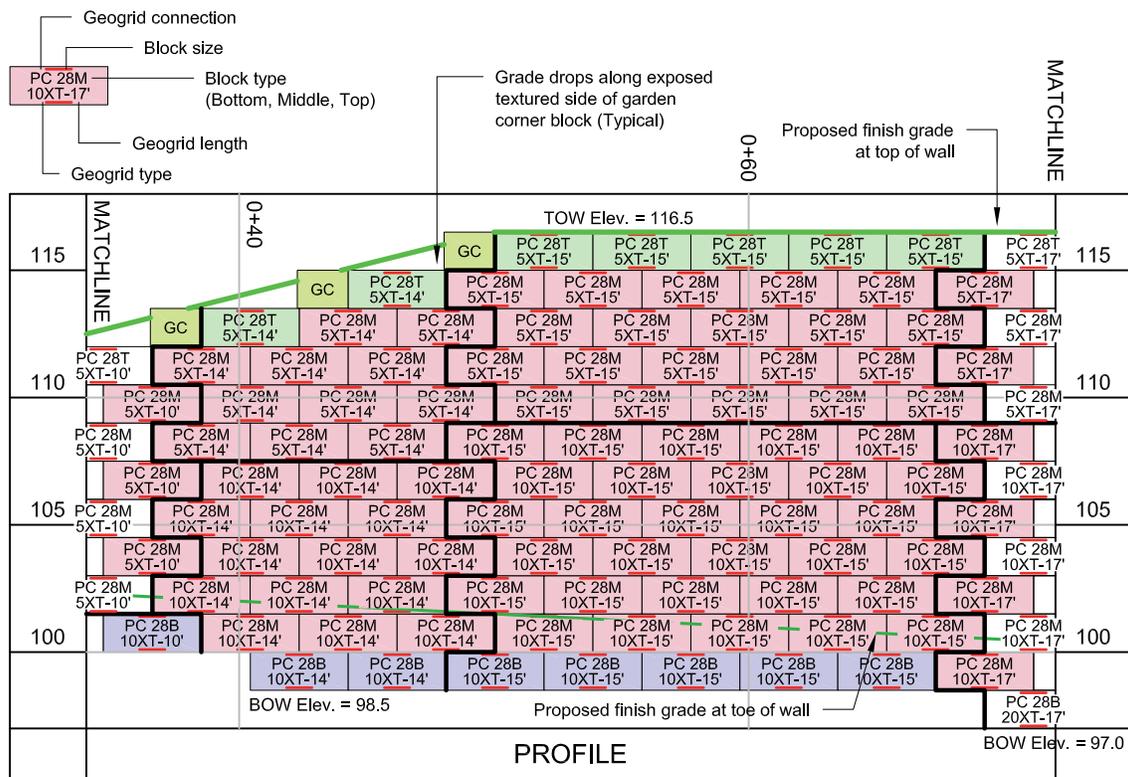
Blanket and Chimney Drain Section

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Sample Plan and Profile

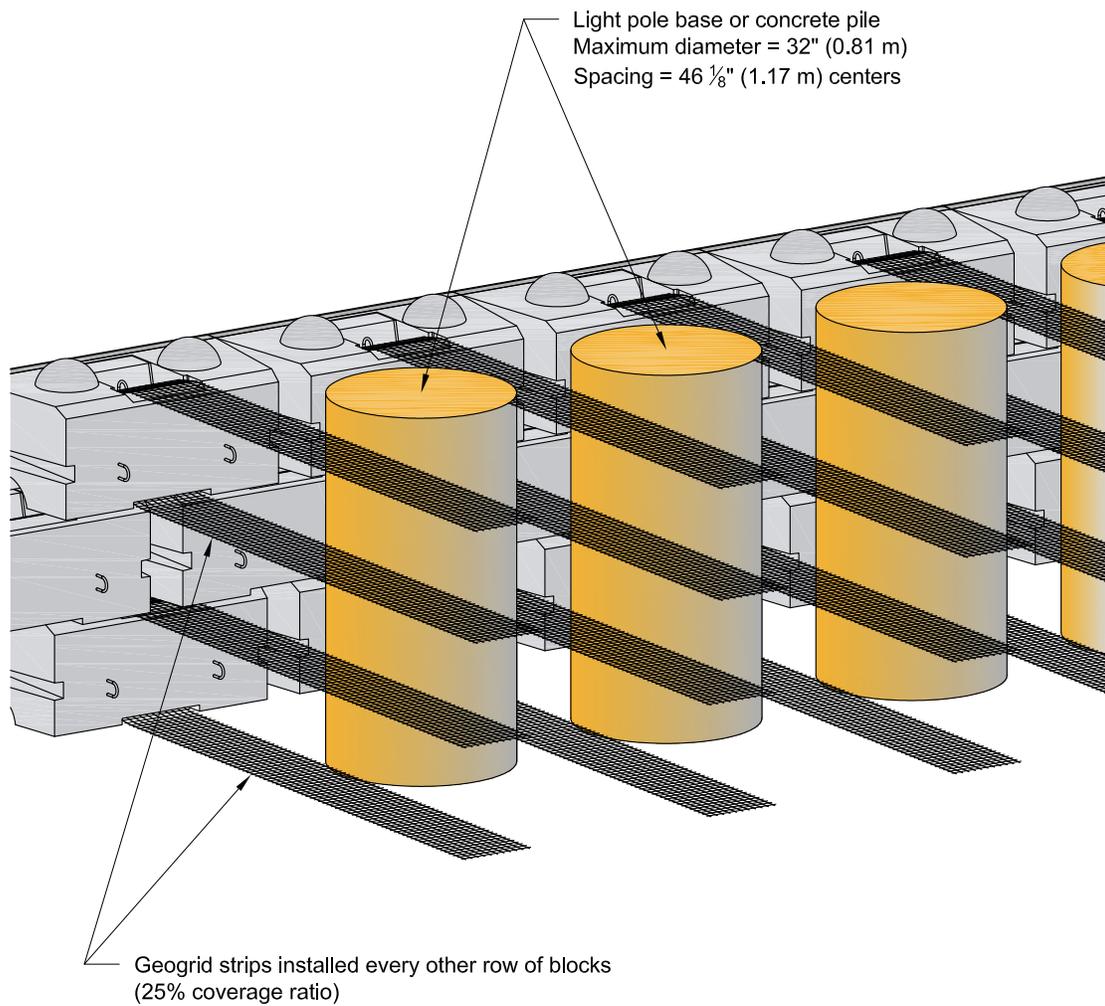


LEGEND:



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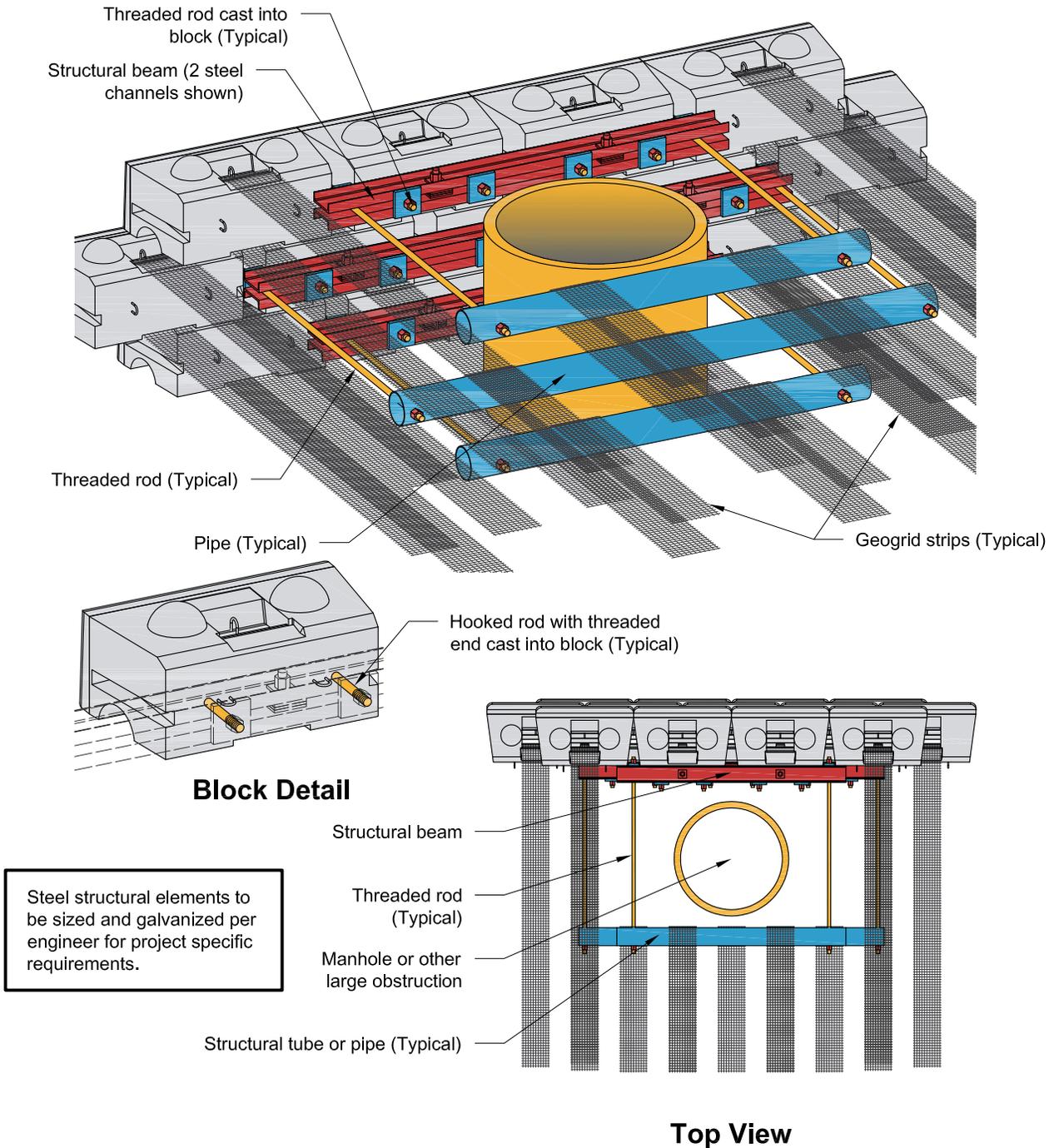
Light Pole Base or Concrete Pile in Reinforced Soil Zone



3D View from Back

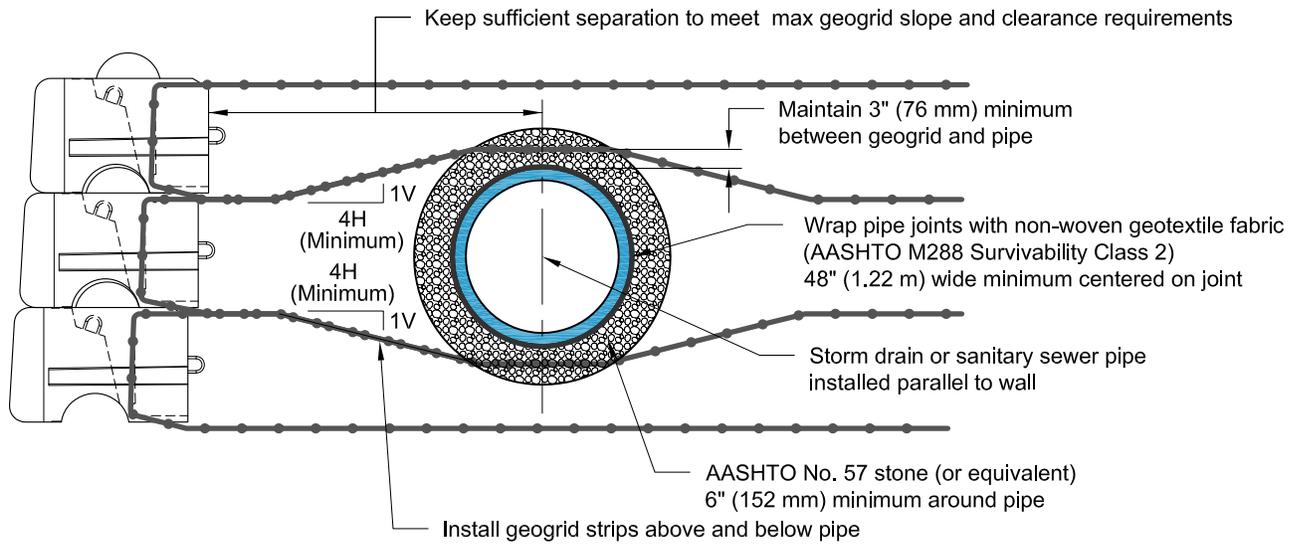
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Manhole or Large Obstruction in Reinforced Soil Zone

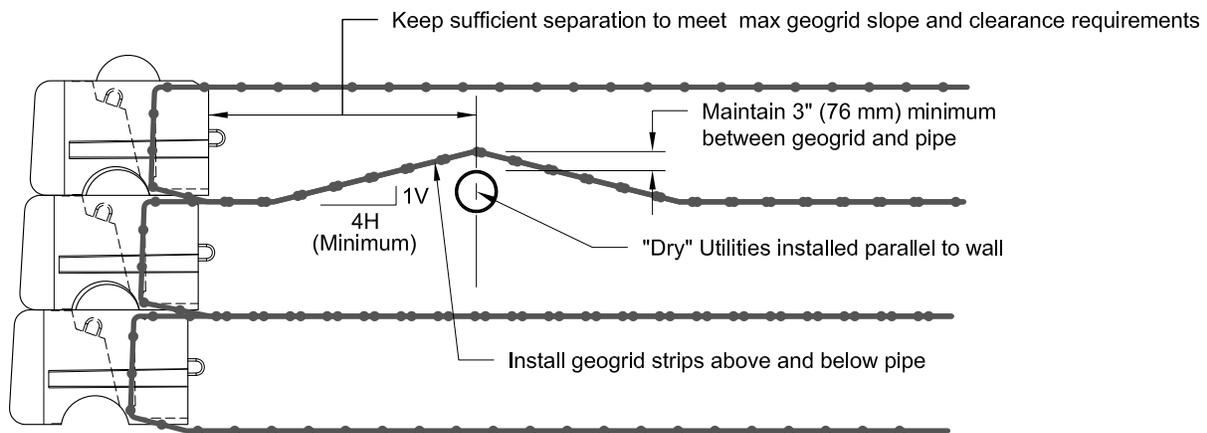


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Utilities in the Reinforced Soil Zone



Storm or Sanitary Sewer Pipe

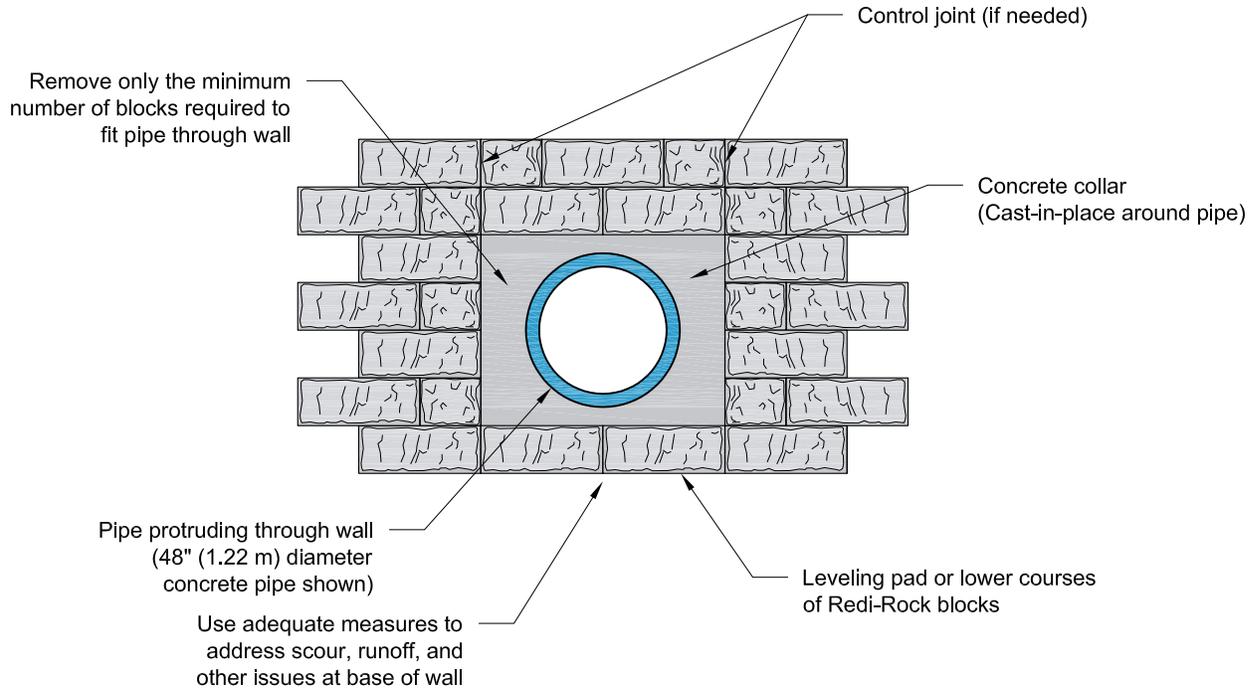


"Dry" Utilities (Electric, Gas, Telecommunications)

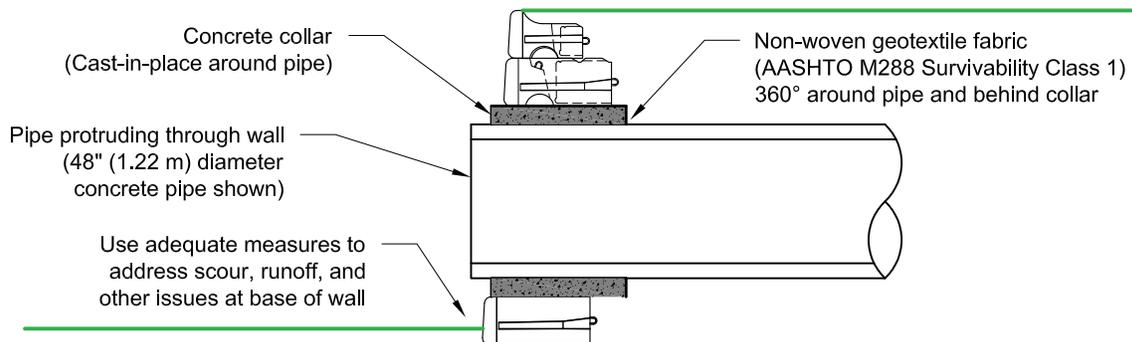
Redi-Rock International follows the recommendations of FHWA GEC 011 and discourages placing pipes or other horizontal obstructions behind the wall in the reinforced soil zone. Placing pipes in this zone could lead to maintenance problems and potential wall failure.

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Pipes Installed Through Wall - Perpendicular



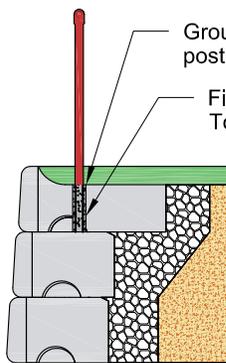
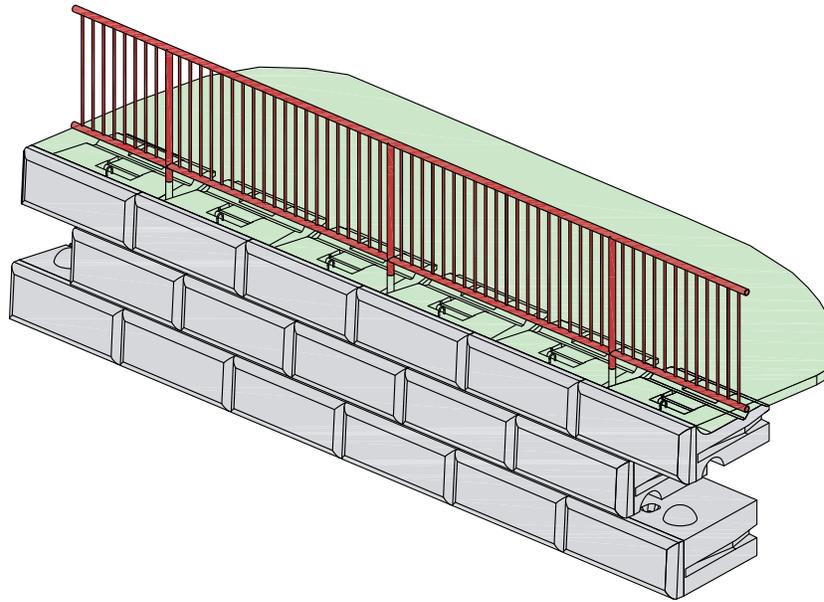
Plan View



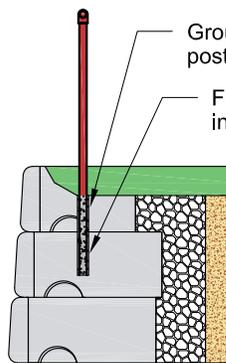
Section View

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Common Fence or Pedestrian Guard Connections

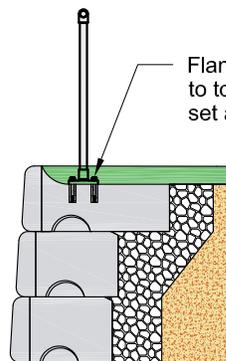


**Grouted Connection
(1 Block)**

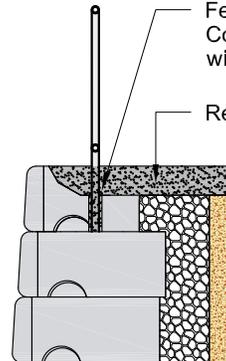


**Grouted Connection
(2 Blocks)**

These generic pedestrian guard and fence details show a few potential options for their installation on the top of a Redi-Rock retaining wall. It is the design engineer's responsibility to fully design and detail the connection of the guard posts to the retaining wall blocks and assure acceptable resistance to the applied forces. Redi-Rock blocks are plain concrete, without steel reinforcement.



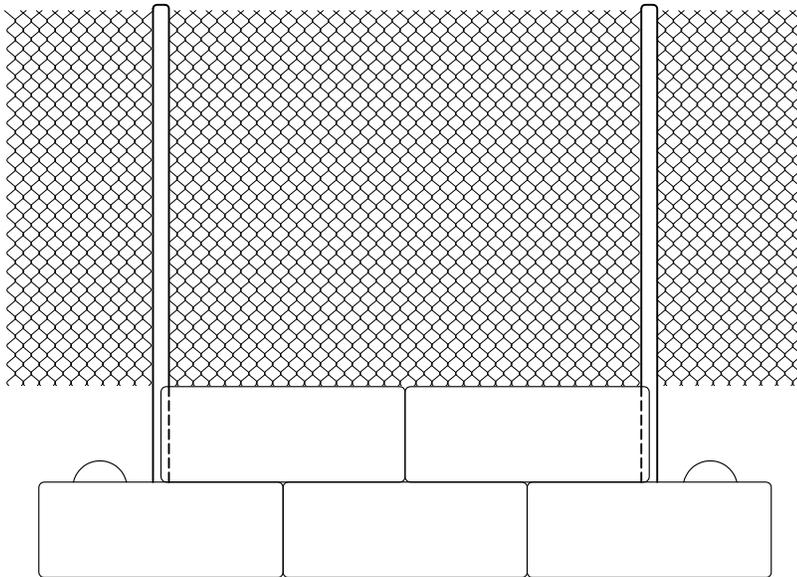
Flange Bolted Connection



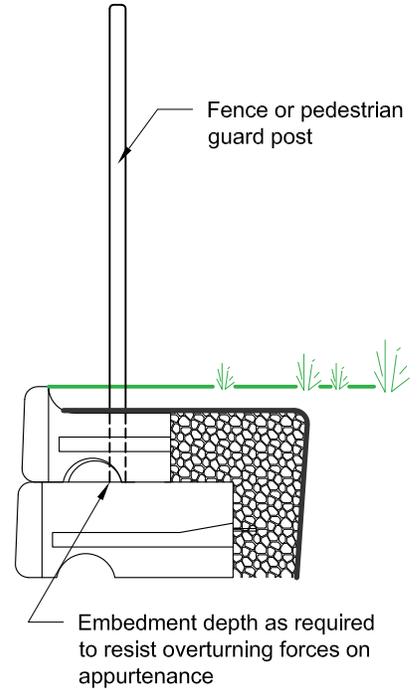
Moment Slab Connection

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Common Fence or Pedestrian Guard Connection Locations



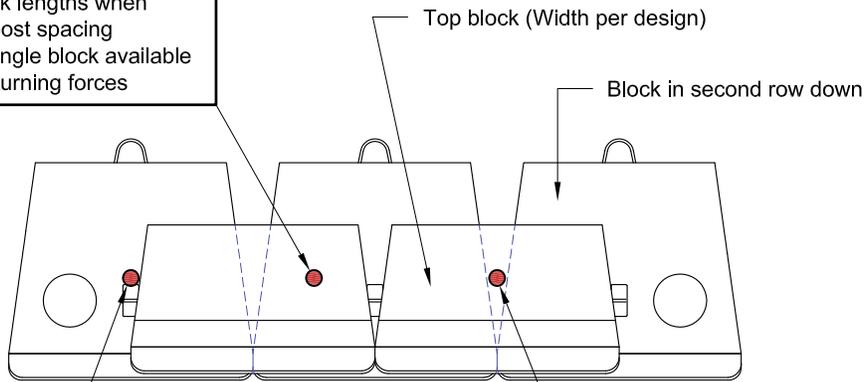
Front View



Side View

Connection Option #1
Anchor into the top block

- Consider block lengths when determining post spacing
- Weight of a single block available to resist overturning forces



Top View

Connection Option #2
Grout posts in v-shaped opening between top blocks

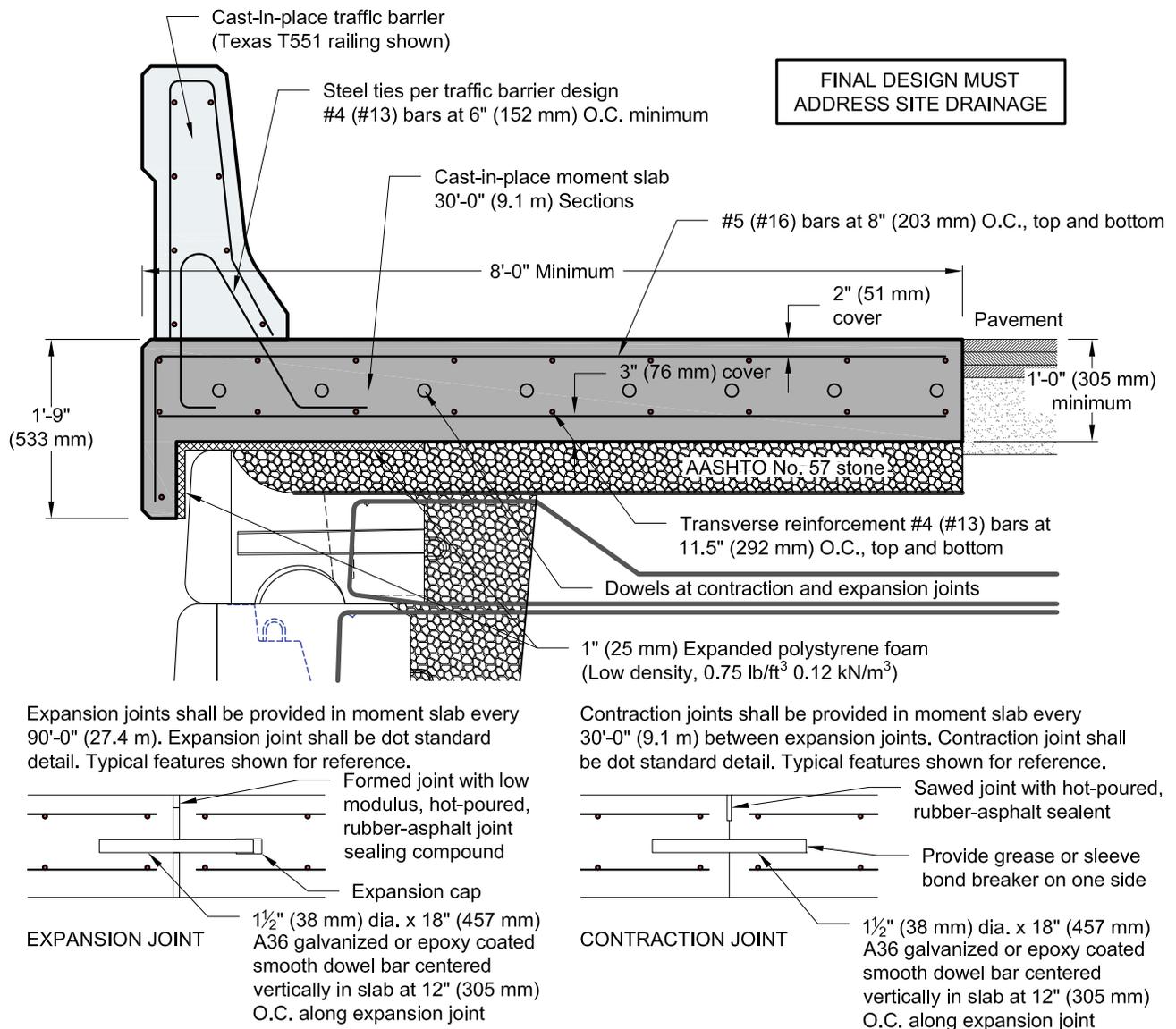
- Spacing in multiples of 46 1/8" (1172 mm)
- Weight of a 2 adjacent blocks available to resist overturning forces

Connection Option #3
Core through top block and grout posts in V-shaped opening between lower blocks

- Spacing in multiples of 46 1/8" (1172 mm)
- Weight of a 2 adjacent blocks on second level down and 3 top row blocks available to resist overturning forces

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Cast-in-Place Moment Slab Traffic Barrier - Flat Grade Installation



Materials

Concrete for cast-in-place barrier and moment slab shall be dot standard structure mix. Minimum 28 day compressive strength shall be 4,000 psi (27.6 mpa) or higher as specified. Reinforcing steel shall conform to ASTM A706 or AASHTO M31 Grade 60 (420 MPa).

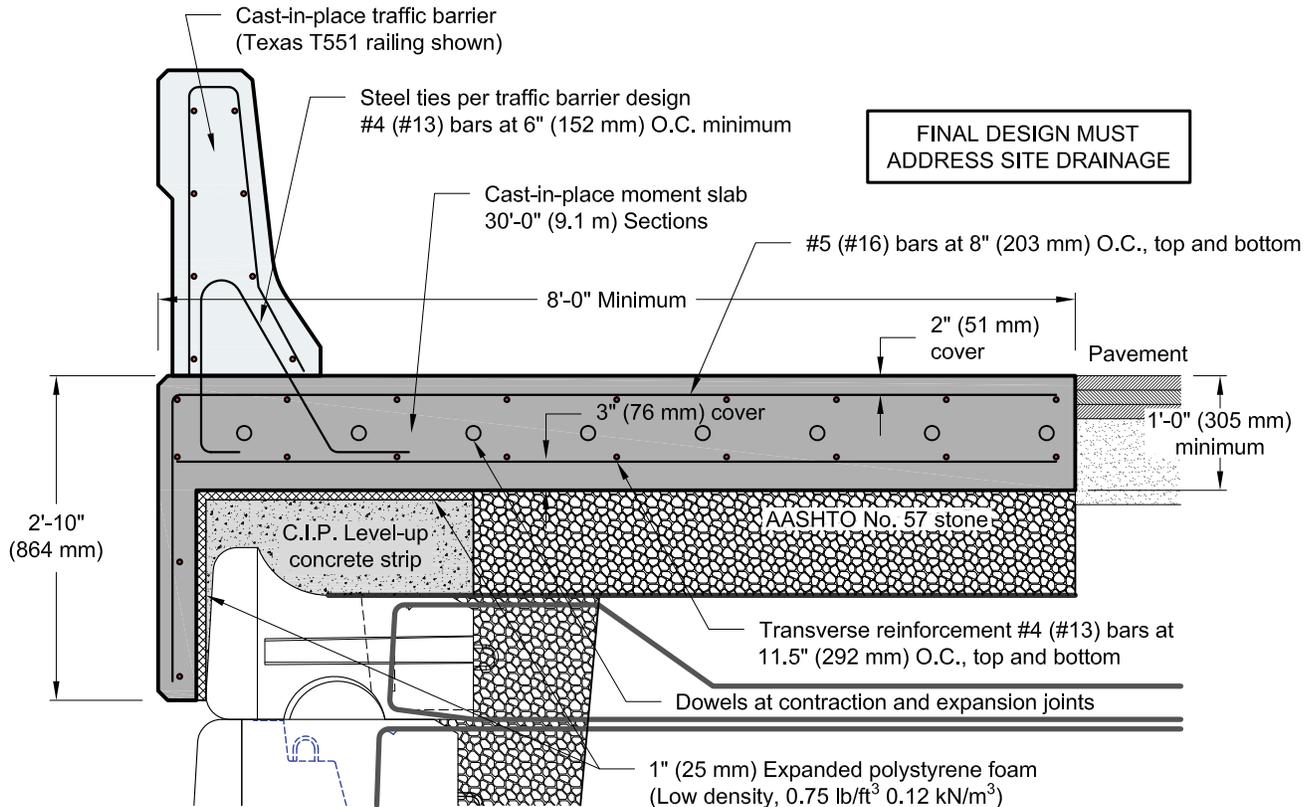
Design

Moment slab shown is dimensioned based on an equivalent static load of 10,000 lbs (44.5 kN) per NCHRP Report 663. Moment slab reinforcement shown is based on *AASHTO LRFD Bridge Design Specifications, 5th edition, 2010*, **TL-4** loading detailed in Table A13.2.1.

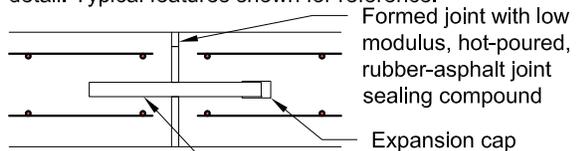
The selection and use of this detail, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the registered professional engineer in charge of the project.

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Cast-in-Place Moment Slab Traffic Barrier - Sloping Installation



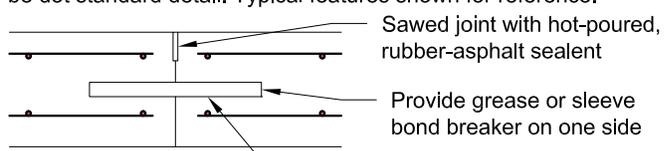
Expansion joints shall be provided in moment slab every 90'-0" (27.4 m). Expansion joint shall be dot standard detail. Typical features shown for reference.



EXPANSION JOINT

1½" (38 mm) dia. x 18" (457 mm) A36 galvanized or epoxy coated smooth dowel bar centered vertically in slab at 12" (305 mm) O.C. along expansion joint

Contraction joints shall be provided in moment slab every 30'-0" (9.1 m) between expansion joints. Contraction joint shall be dot standard detail. Typical features shown for reference.



CONTRACTION JOINT

1½" (38 mm) dia. x 18" (457 mm) A36 galvanized or epoxy coated smooth dowel bar centered vertically in slab at 12" (305 mm) O.C. along expansion joint

Materials

Concrete for cast-in-place barrier and moment slab shall be dot standard structure mix. Minimum 28 day compressive strength shall be 4,000 psi (27.6 mpa) or higher as specified. Cast-In-Place level up concrete shall be manufactured in accordance with ASTM C94. Minimum 28 day compressive strength shall be 3,500 psi (24.1 MPa) or higher as specified. Reinforcing steel shall conform to ASTM A706 or AASHTO M31 Grade 60 (420 MPa).

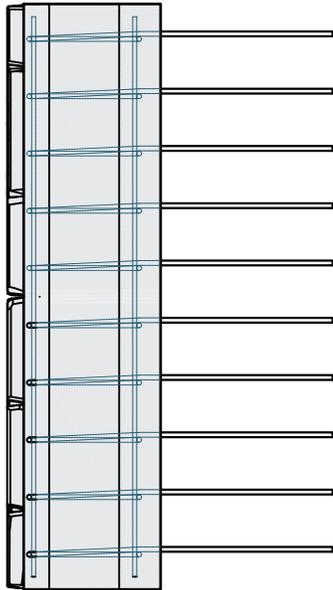
Design

Moment slab shown is dimensioned based on an equivalent static load of 10,000 lbs (44.5 kN) per NCHRP Report 663. Moment slab reinforcement shown is based on *AASHTO LRFD Bridge Design Specifications, 5th edition, 2010*, **TL-4** loading detailed in Table A13.2.1.

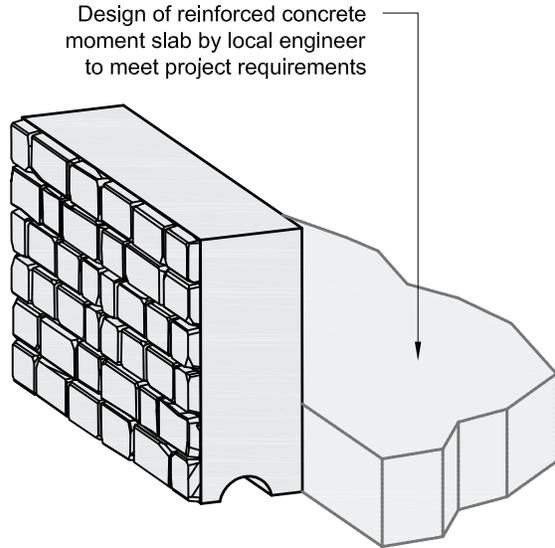
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Precast Barrier Block

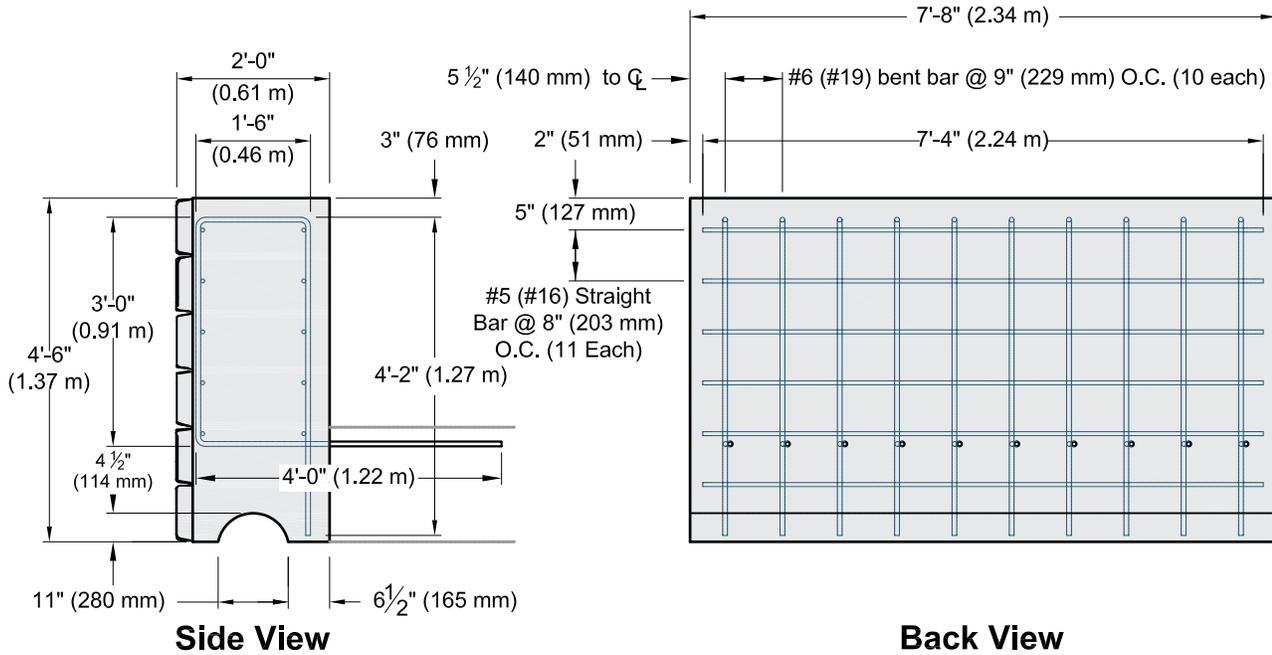


Top View



Isometric View

Rebar shown in barrier block meets AASHTO TL-3 loading requirements. Rebar design in barrier block is intended to be modified as necessary to meet other loading conditions. All reinforcing steel shall be grade 60 (414 MPa) deformed rebar. All concrete shall have a minimum 28 day compressive strength of 4000 psi (27.6 MPa).

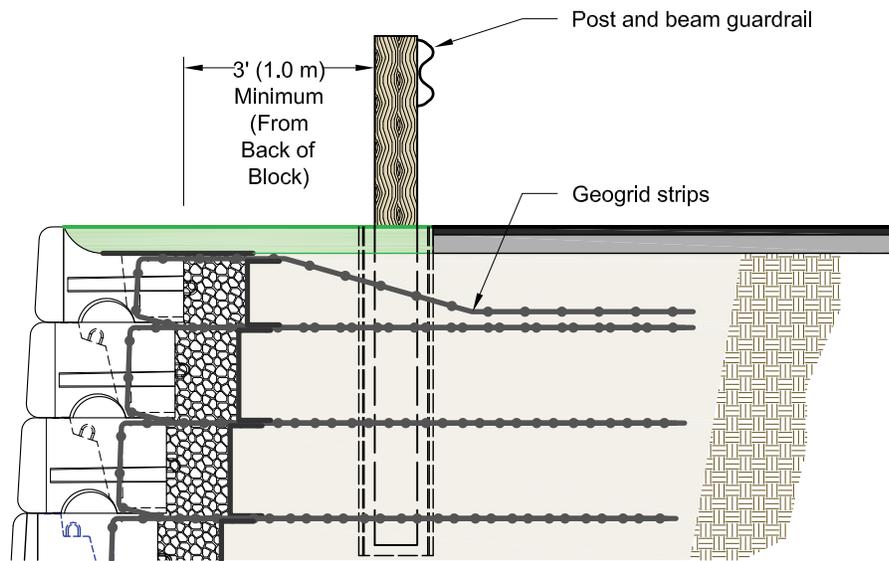


Side View

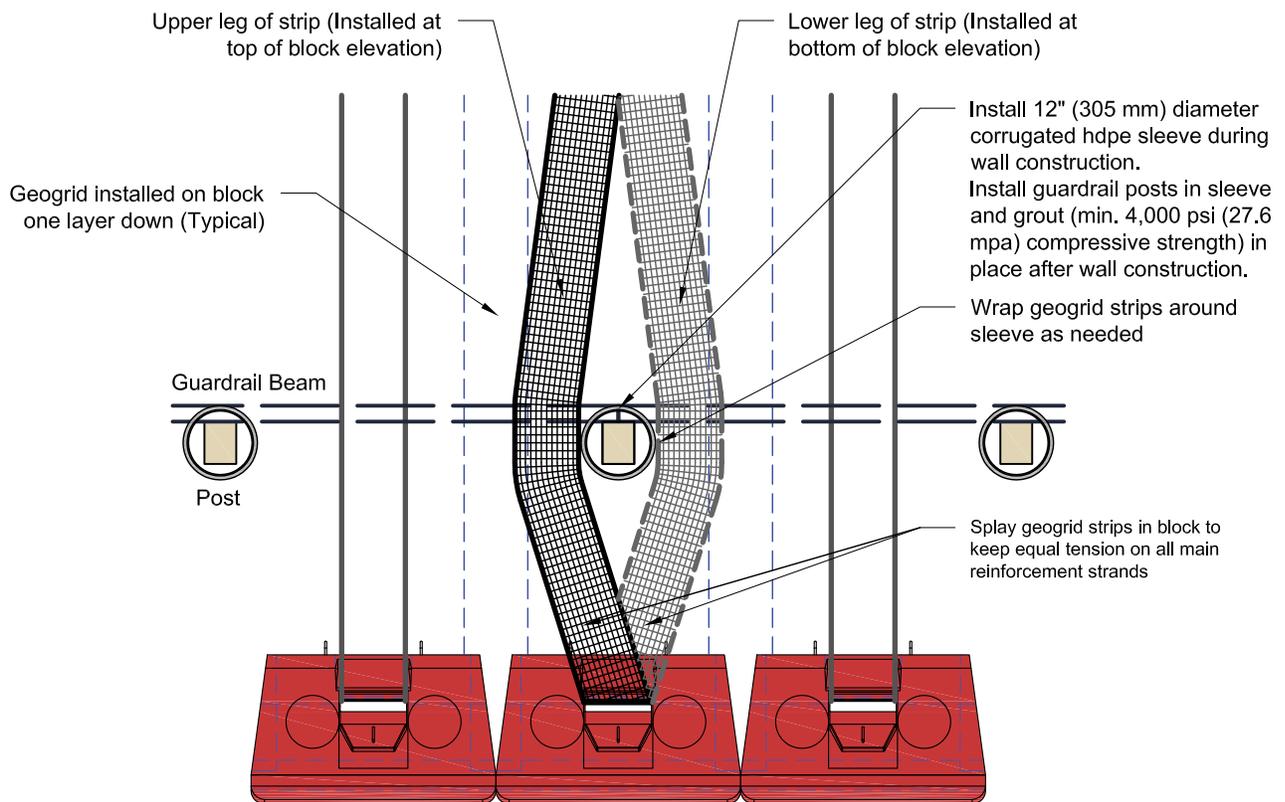
Back View

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Post and Beam Guardrail



Section View



Top View

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