ROSETTA®

GRAND LEDGE

INSTALLATION GUIDE

Large, snapped-limestone look and engineered efficiencies to make you love your work.

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Product Overview
Grand Ledge

Grand Ledge Retaining Blocks provide the texture of snapped limestone at a grand scale with engineered efficiencies to make installation easier. The blocks are 12 inches (305 mm) tall and come in lengths of 3, 4, 5, and 6 feet (915, 1220, 1525, or 1830 mm) long. The shear heels help create a consistent 2 ¼ inch (57 mm) setback, and the 7.5 degree taper from the mold line allows for subtle curves.

Grand Ledge 4-sided blocks can be used for corners, top blocks, or freestanding applications, providing the perfect finishing touches for every project.

Engineering & Design

The Grand Ledge wall system can be engineered to meet the unique needs of your site. For more information and preliminary wall sections visit the Design & Install page on our website. There you will find resources to assist you in preparing a detailed, site-specific design for your wall.

Rosetta walls are intended to be designed by a professional engineer and built with appropriate construction oversight, giving you the look of a natural stone wall and the confidence of a fully engineered wall system that will stand the test of time. Note that building officials in some jurisdictions require design by a licensed professional engineer for walls over a given height. Check with your local building official for requirements in your area.

The stability of a retaining wall depends upon, among other things, its height reltive to its width, soil strength, and loading conditions.

Various other site factors affect the performance of a retaining wall, as well, and need to be considered in the wall design. Special attention should be given to walls subject to the following conditions:

- Fine-grained or clayey soils
- Slopes above or below the wall
- Tiered walls
- Heavy surcharge loads behind the wall
- Ground water
- Waterfront walls
- Earthquake-prone areas

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Steps involved in the wall design process:

1. Retain an engineer familiar with the analysis and design of retaining walls and an understanding of local site and soil conditions and codes. Your local Rosetta manufacturer can help you find an engineer for your project.

2. Determine the desired geometry of the wall (alignment, profile, maximum height). This may require a topographic survey. Your engineer will determine what information is needed and help coordinate this work. It's also important to define what sort of loading the wall will need to support, such as traffic loads, future structures, or slopes.

3. Obtain site-specific soils information. Design of the wall system will require information pertinent to the foundation soils, reinforced soils, and retained soils. If the wall will retain imported fill material, the engineer will either need to specify a material or design the wall for the material that is proposed for fill. Information about on-site soils can be obtained via observation, test excavations, or soil borings. The project engineer can help determine the level of geotechnical investigation that may be necessary for the project.

4. The engineer will analyze wall layouts for stability and determine the details of the design. Those details will be communicated to the wall installer, usually through a set of engineering drawings. It is important that the engineer be involved during construction to ensure that the wall is constructed as intended and that any unforeseen conditions are considered.

Note:

This guide is intended to supplement a detailed, site-specific wall design prepared for your project by a Professional Engineer. The actual design for your project supersedes any recommendations presented here.

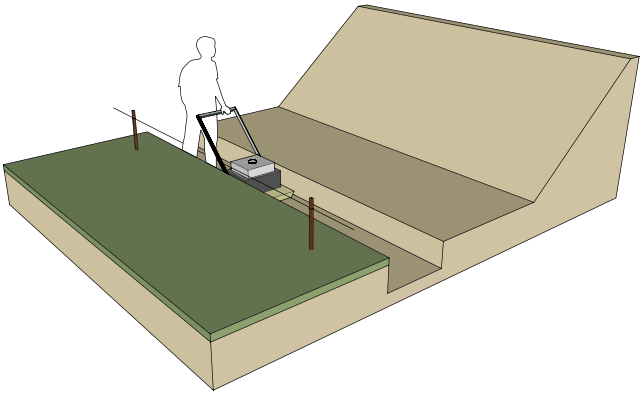
Step 1
Pre-Construction

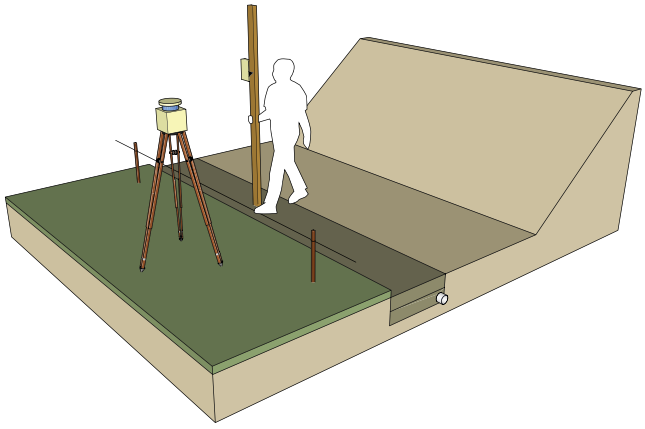
Before you start construction, take the time to complete the necessary planning and preparation. This process will keep your project running efficiently and will aid in completing a quality installation. Make sure to address the following:

- **Develop a project safety plan.** Be sure to follow all applicable regulatory (ie. OSHA) standards. Be sure to address items such as: personal protective equipment, maintaining safe slopes, fall protection, rigging and lifting, and any other safety precautions.
- **Attain the necessary permits and engineering.** Permitting and engineering requirements vary location to location. Check with your local code requirements before constructing your wall.
- **Review the project plans.** Make sure that the plans take into account current site and soil conditions. Clays or poor soils place significantly greater loads on walls than free draining aggregates. If poor soils are present, make sure the plans account for them.
- **Develop a plan to control surface water during construction.** The time of year and local weather conditions can greatly impact the construction phase. Planning ahead can help alleviate issues related to water as they arise.

Step 2
Base Preparation

Proper base preparation is one of the most critical elements of retaining wall construction. The retaining wall is only as stable as the foundation it is placed on. If subgrade soils are deemed unstable or excessively soft, contact a qualified geotechnical engineer for remediation. The solution may entail over-excavating and replacing the soft soil with compacted granular material.





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First, excavate for the leveling pad. The minimum leveling pad thickness is 6 inches (150 mm). Higher walls may require a thicker leveling pad based on the detailed wall design. The leveling pad should be a minimum of 36 inches (0.91 m) wide, or wider if called for in the engineered construction drawings. The subgrade material should be compacted to 95% of its standard proctor maximum dry density.

Place a 4-inch (100 mm) diameter perforated drain at the back of the excavated trench. Make sure the drain has a long-term gravity outlet (either to daylight or to an approved catch basin).

Place clean crushed stone into the excavated trench. Level and compact stone to the design thickness. Check level with a laser or transit.

Note:

Take time to make sure the base is accurately leveled. This will allow the wall to be installed much more efficiently.

Step 3
Place Bottom Course

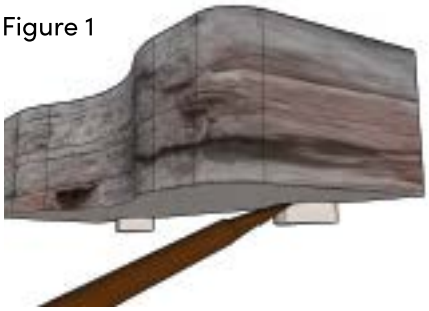
Proper placement of the bottom course of wall blocks is critical in determining the overall appearance and integrity of the finished project. Take extra time on this step and the rest of the project will go smoothly.

At this point you need to determine the best point of origin for the wall. If you have a fixed point, such as a building corner or a 90-degree corner, you will want to start the wall from that point and work your way out. This will minimize cutting of blocks. If there are no fixed points, start the wall at the lowest design elevation, as it is easier to step the base up than it is to step the base down.

Nearly all segmental block wall systems have a built in batter to provide greater wall stability. With Grand Ledge, the batter is 10.6 degrees, which equals 2¼ inches (57 mm) of setback for every 1-foot (305 mm) block height. The setback in blocks is achieved with shear heels which are cast into the blocks.

You may find it useful to **remove the shear heels from the blocks to be placed on the bottom course.** This can be done using a demolition bar. (see Figure 1.) Be sure to do this in a safe manner, keeping your body away from potential falling hazards.

Figure 1



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Using an appropriately rated skid steer or small excavator and the Rosetta Lifting Device, **place each block along the string line.** Be sure that the safety latch on the Lifting Device is engaged before lifting each block. (For more information about the Rosetta Lifting Device, refer to the Lifting Device Instructions.)

Use a bar to make small adjustments to bring the blocks into line. Because of the deeply textured faces of the blocks, it is best to align blocks by the mold line - the distinct transition between face texture and back of block.

After placing each block, **check for level both front to back and side to side.** If the block is out of level, either pick up the block and correct the base material, or tap it into place using the setting machine and a block of wood (to avoid marring the wall stone).

Continue following the above procedures until the entire course of wall blocks has been placed.

Step 4
Place Upper Courses

Placing the next course of blocks is similar to placing the first course. The primary difference is that you must engage the shear heels of the upper blocks with the backs of the lower blocks. Tips to accomplish this include:

- Position the clevis in the Rosetta Lifting Device in such a way that the front of the block is slightly higher than the back of the block.
- Hold each block behind and approximately 1/2” (13 mm) above the block below.
- Swing the block toward the face of the block below until both shear heels engage.
- Set the block down.
- Make final adjustments with a large pry bar.
- Ensure that adjacent blocks are aligned snuggly side by side.

Step 5
Backfill

Appropriate selection and placement of backfill is necessary for the structural integrity of the wall. **Place only backfill materials which are consistent with the wall design.** For safety reasons, do not stack wall blocks more than 3 feet (0.9 meters) high before backfilling. See Figure 2.

Before placing backfill materials, **place a 18-by-12-inch (457-by-305-mm) strip of non-woven geotextile fabric in the v-shaped gaps between blocks.** This will keep materials from eroding through the small voids between the blocks.

Place clean stone a minimum of 12 inches (300 mm) behind the wall. This creates a continuous drainage course for any water to rapidly reach the drain pipe. Hydrostatic pressure is the number one cause of retaining wall failure. This step is critical in keeping backfill materials dry and structurally sound.

Beginning at the back of the clean stone and working away from the wall, **place and spread backfill soils. Compact soils in lifts of appropriate depth for the compaction equipment being used**, typically 4-12 inches (100-300 mm). Backfill materials must be compacted to 95% Standard Proctor. Generally, you should operate compaction equipment parallel to the face of the wall. Start at the back of the blocks, and work your way away from the wall until you reach undisturbed soils. Continue placing and compacting backfill materials until you approximately reach the top of the upper course of blocks.

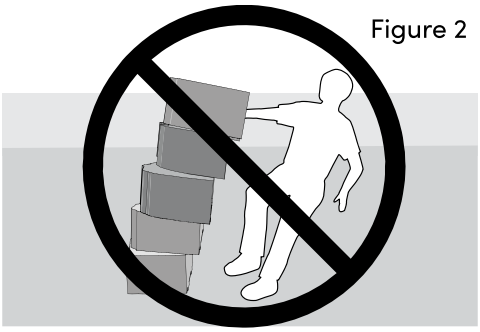


Figure 2

Step 6
Finishing the Wall

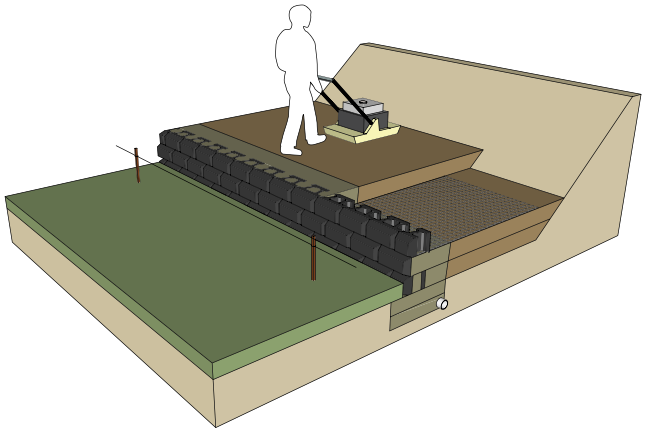
Repeat steps four and five until you have reached finish grade for the wall.

Then, completing a few simple tasks near the end of the project will ensure that the wall will function properly and look good for years to come.

Make sure that the drain pipe is tied into a catch basin or run to a long term daylight opening. If you are using flexible drainpipe behind the wall, convert it to Schedule 40 PVC or equivalent before outleting from behind the wall. This will ensure that the pipe is not easily crushed during future construction.

Place non-woven geotextile fabric over the clean stone. You may need to leave the clean stone down 4-6 inches (100-150 mm) from the top of the wall to allow for landscape or other materials.

Grade the top of the wall in such a way that water runs off away from the wall. Never leave the top of a wall graded where surface water will pond behind the wall. If future grading is to take place by others, you should have a responsible party sign off regarding this point.



Curves

Grand Ledge blocks are tapered to allow them to form a wide range of curves as may be desired for your project. The minimum radius that can be accomplished without cutting blocks depends on the taper angle and the block length. For the average mixture of block sizes within the Grand Ledge product line, **the minimum radius that can be achieved is 20 feet (6.1 m); however, we recommend limiting the radii of curves to no less than 30 feet (9.1 m)** for better constructability and aesthetics. These minimum values are suitable for both outside (convex) and inside (concave) curves.

Grand Ledge blocks have shear heels which provide a setback from lower blocks in the wall, causing the wall to batter back. This batter is important to the engineering design of the wall, and it must be accounted for during construction of a curved wall section.

> **Note:**
> an aesthetically-pleasing block alignment might require an occasional shear heel to be removed to allow for a smoother curve. This is acceptable in limited amounts without significantly affecting wall structural performance.

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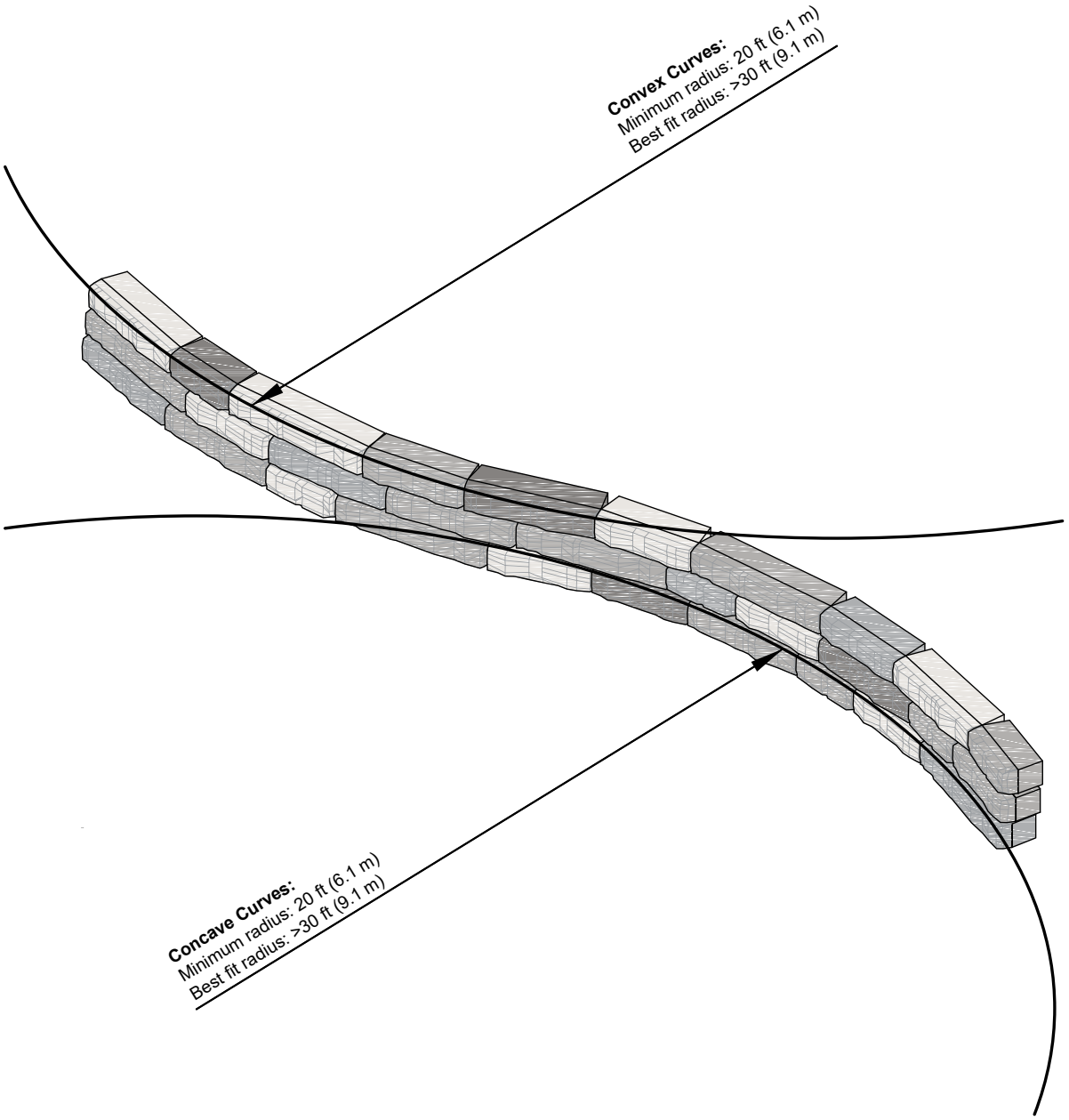
If you are constructing an outside (convex) curve:
The wall batter will cause the blocks higher in the wall to have a shorter radius around the curve than lower blocks. Therefore, the radius of the bottom row of blocks must be at least 2¼ inches (57 mm) greater than the minimum radius for each row of blocks above it.

If you are constructing an inside (concave) curve:
The wall batter will cause the blocks higher in the wall to have a longer radius around the curve than lower blocks.



Corners

Inside corners can be constructed using the Grand Ledge retaining blocks. Inside corners can be constructed by overlapping the perpendicular blocks from alternating rows. Alternatively, one leg of the wall can be constructed first and the perpendicular leg can then be abutted against it.

The Grand Ledge system has four, 4-sided blocks that are used to create 90-degree outside corners. Simply overlap the 4-sided blocks at the corner, alternating the orientation of the overlapping blocks by 90 degrees. Each 4-sided block should be offset by the block below by 2 1/4 inches (57 mm) to maintain the batter of each leg of the wall.

For walls where there is an outside corner and a vertical constraint (such as another retaining wall or a foundation wall), or a pair of outside corners, cutting blocks may be necessary to fit the constraints and maintain the batter on each leg of the wall. Cutting can be reduced for walls of 4 feet (1.2 m) or less by using the following pattern:

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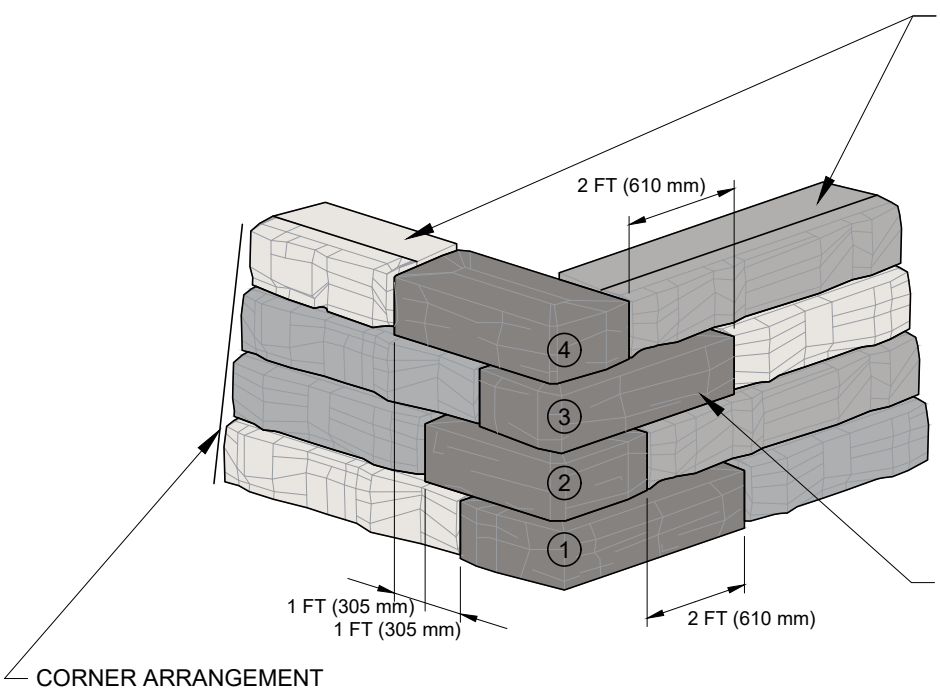

LEGEND

1. 50 $\frac{1}{2}$-IN (1280 mm) x 25 $\frac{1}{2}$-IN (650 mm) FOUR-SIDED BLOCK
2. 35 $\frac{1}{4}$-IN (895 mm) x 24 $\frac{1}{4}$-IN (615 mm) FOUR-SIDED BLOCK
3. 46-IN (1170 mm) x 21-IN (530 mm) FOUR-SIDED BLOCK
4. 42 $\frac{3}{4}$-IN (1090 mm) x 19 $\frac{3}{4}$-IN (500 mm) FOUR-SIDED BLOCK

OUTSIDE 90° CORNER CONFIGURATION FOR VERTICAL WALL END

Freestanding Walls

Use the 4-sided blocks to create freestanding walls, where both sides of the wall are exposed. Freestanding walls can be constructed on top of retaining walls to create a parapet or can be constructed independently.

The base for a freestanding wall should consist of compacted crushed stone, constructed similarly to that for a retaining application.

Blocks are placed similar to retaining blocks, though 4-sided blocks have no shear heels and are placed without setback or batter for freestanding applications.

Concrete Backfill

Where more height is required than what can be obtained from a standard gravity wall, but site constraints make a geogrid reinforced wall undesirable, cast-in-place concrete can be used to add additional width and mass to the lower blocks of the wall, improving stability and allowing additional height.

Tie the Grand Ledge blocks to the cast-in-place concrete using 18-inch (457 mm) long lengths of No. 4 (12 mm) reinforcing steel bent into a "U", looped through the lift hooks in the back of the blocks and extending into the mass of concrete behind. The dimensions (height and width) of the cast-in-place concrete depend on the site-specific conditions and are determined as part of the wall design.

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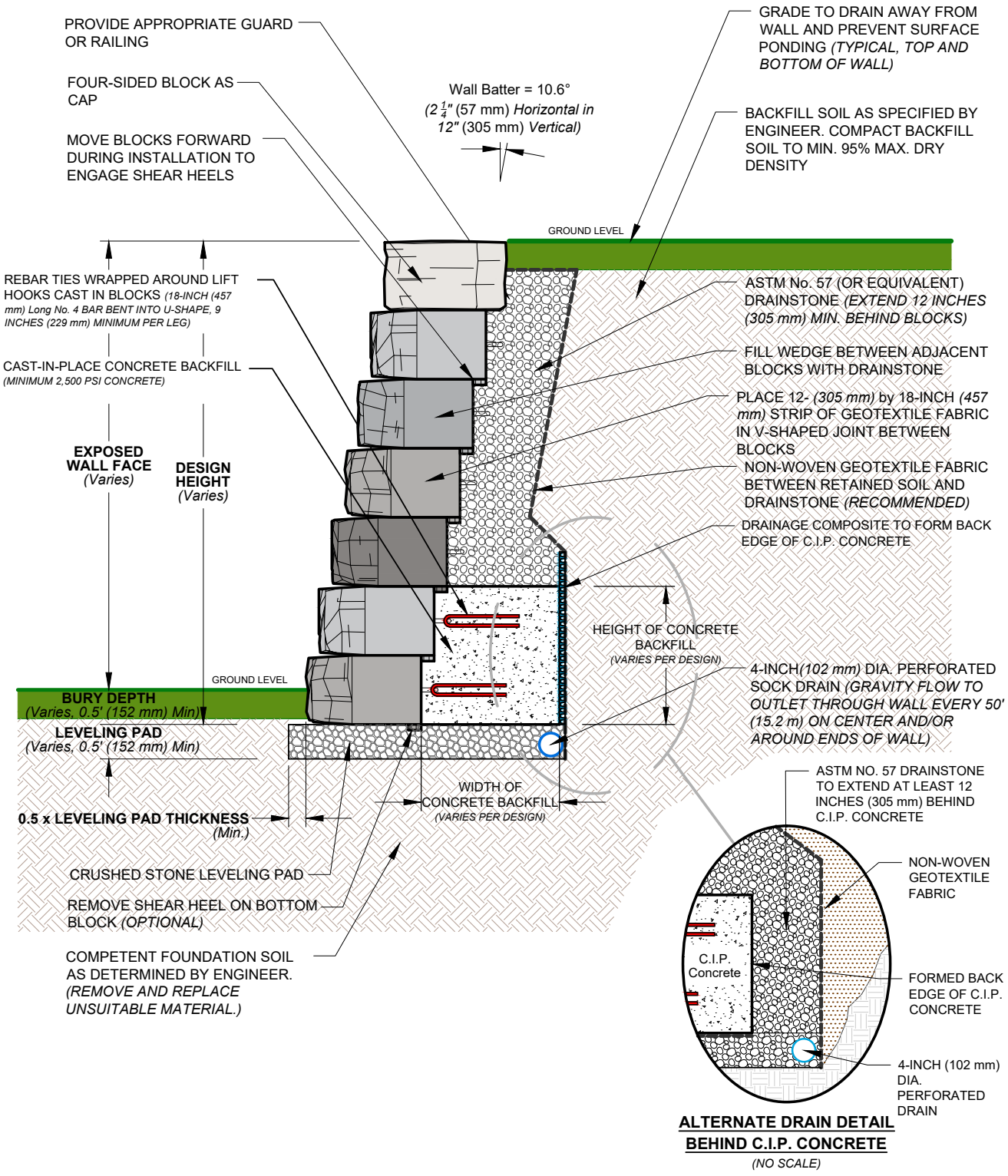

ALTERNATE DRAIN DETAIL BEHIND C.I.P. CONCRETE

(NO SCALE)

Reinforced Walls

For walls that need to be taller than what is stable using an unreinforced, gravity-type structure (ie. stacked blocks), they can easily be reinforced with geogrid.

The leveling pad and bottom row of blocks are installed as outlined in the step-by-step instructions in this guide.

Then, place the specified reinforced soil fill to the top of the block and compact.

Place geogrid (of the specified strength) on the block and compacted reinforced soil lift. The geogrid should extend from the back of the face texture (ie. mold line) to the specified length. Note that the strength of geogrid is usually different parallel to the roll direction versus perpendicular. Make sure it is placed in the correct direction. Do not overlap adjacent sheets.

The block-to-geogrid connection is simply a frictional ("sandwiched") connection, so **the next row of blocks is placed right on top of the geogrid.**

Remove wrinkles and hold the geogrid tight while the reinforced backfill material is placed. Begin by placing backfill near the block and work outwards, toward the end of the geogrid.

Compact in the same general pattern, from the back of the block outward. This helps to remove any slack. Avoid operating equipment directly on the geogrid; ensure there is at least 6 inches of soil over the geogrid prior to driving over it.

Continue with the wall placement, repeating as necessary, placing geogrid layers at the vertical locations specified in the design.

Railings & Guards

Building codes typically require railings, or guards, to be installed when retaining walls are over a certain height to prevent falls. Guards must be designed and constructed to resist the code-required loads.

Posts may be embedded in the backfill soil behind the wall, or can be fastened to the Grand Ledge blocks themselves. When attaching to the blocks, either grout the posts in cored holes or use a surface-mounted flange affixed to the blocks with anchor bolts. To avoid spalling, maintain at least 4 inches (100 mm) clear distance from the core holes or bolt holes to the edge of the blocks. Make sure enough block mass is engaged by the posts to withstand the required loads.