StoneWall® II

Installation Guide

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Introduction – How to Use Guide

StoneWall® II is a multipurpose block system for use in retaining wall and construction hardscape structures - freestanding and bench walls, columns, sitting areas, fire pits, BBQ's, planters, fountains, and more. StoneWall II can be constructed as a gravity wall up to 3 feet tall. For taller and/or more rigorous applications StoneWall II should be combined with geogrid soil reinforcement, and the walls must be designed by a qualified professional engineer.

This manual is an overview of the design and construction methods. The site conditions may vary from the assumptions made in this document. Actual design should always be performed or reviewed by a qualified professional engineer. The design should conform to the local building codes.

This manual includes StoneWall® II product information, installation procedures and design examples. For information not included in this document, visit the WestBlock Systems website at www.westblocksystems.com, or contact your local distributor.

Before Starting – Tools

Advance planning, preparation and layout are important to the success of the StoneWall® II project. The list below will help in establishing project goals.

1. Review all plans and diagrams to confirm the location of property lines, wall locations, wall length and wall height.
2. Understand the soils; refer to the soils and engineering reports to verify that the soils used for construction are the same soils required by the engineer designing the wall. *Soils with organics, roots, or trash are not suitable backfill materials. Sandy soils or gravelly soils provide good drainage and should be used for wall backfill soils.*
3. Confirm the location of all underground utilities. You may call Underground Service Alert North at 811 o 1-800-227-2600.
4. Verify that all necessary and proper building permits are obtained.
5. Check all materials delivered to the job site, verifying proper block type and color. Confirm that the geosynthetic (geogrid) is from the correct manufacturer and is the correct strength.
6. Be sure to use the correct tools for the job.
   - A. Rubber Mallet Hammer
   - B. 4 foot Level
   - C. Torpedo Level
   - D. Shovel
   - E. Vibratory Plate Compactor
   - F. Hand Tamper
   - G. String-Line
   - H. Broom
   - I. Tape Measure
   - J. Caulking Gun
   - K. Layout/Survey Stakes
   - L. Safety Protective Equipment- Ear Plugs, Dust Mask, Protective Boots, Gloves, Glasses/Goggles

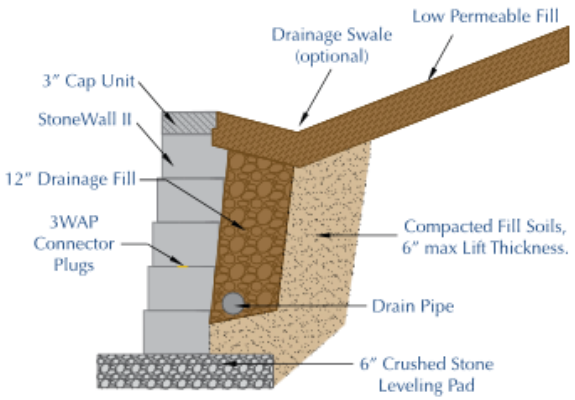
Optional Tools: Circular saw, masonry blade, respirator. Always wear proper protective equipment and operate the tools as prescribed by the manufacturer.

Retaining Wall Basics

Segmental Retaining Walls are classified in three ways: Conventional or Gravity, Soil Reinforced, and Specialty.

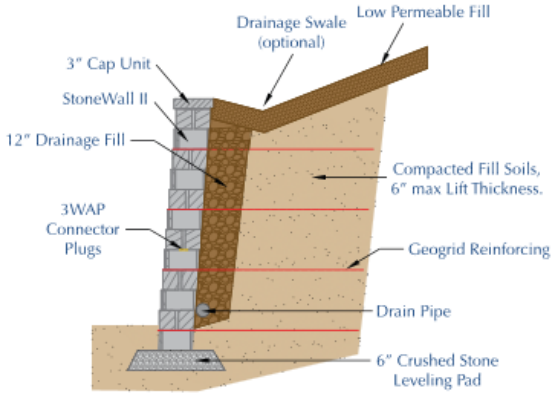
Conventional or Gravity Walls

A *conventional* or *gravity wall* does not require soil reinforcement; rather it relies on the mass weight of the block, batter, setback and proper soils to resist the earth pressure applied. The primary advantage of a gravity wall is that the wall structure is narrow, allowing minimal excavation. The maximum height of a gravity wall is generally 2 to 3 times the block depth (length from front to back). Taller walls, typically associated with "cut "sites, will require larger blocks or expandable block systems, such walls should be designed by a qualified professional engineer.



Soil Reinforced Walls

A *soil reinforced*, or *mechanically stabilized embankment (MSE)* wall is a durable and cost-effective method of constructing taller walls. *Soil reinforced walls* are typically utilized on "fill" sites, require increased work area behind the wall, have soils capable of performing properly with reinforcement, and are designed by a qualified professional engineer. A *soil reinforced wall* stabilizes the block face with the soil mass behind the block by integrating layers of geosynthetic reinforcement. The layers of reinforcement connect to the block faces and extend horizontally into the soil; the large stabilized soil mass created is referred to as the reinforced zone. The greater the reinforced soil mass, the larger or taller the soil embankment that can be retained or held back. The minimum length of soil reinforcement if 60% of the wall height, and may be larger with sloping backfills, toe slopes below the wall, or poor soil conditions.



Product Selection-Features & Benefits

The StoneWall® II Retaining Wall is a system of concrete units used to create elegant, naturally beautiful, and durable walls reminiscent of handcrafted stone walls. Stonewall II consists of three series; Olympic, Cascade, and Rainier each of which provide a large variety of design and build options, allowing one to create a backyard retreat that will be the envy of the neighborhood.

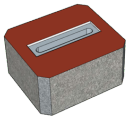
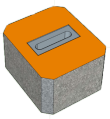
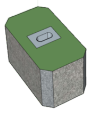
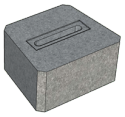
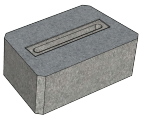
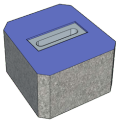
The designs shown within were created to efficiently utilize the units in creating conventional, terraced, and reinforced retaining walls, parapets, freestanding, bench, and seat walls; columns, fire pits, BBQ's, planters, fountains, and more.

Rectangle/Square units are textured on all 4 sides. They should be stacked adjacent each other and are used separately for corners and columns.

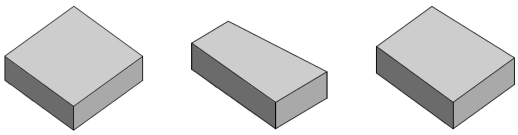
Trapezoid units are textured on the faces only. They should be stacked adjacent to each other and are used as the primary wall units

Transition units are textured on the face only. Stack them between the Trapezoid and Rectangle units.

Olympic Series

Rectangle/Square units			Trapezoid units			Transition units.
						
12"w x 10.5"d x 6"h	9"w x 10.5"d x 6"h	6"w x 10.5"d x 6"h	6/4"w x 10.5"d x 6"h	12/10"w x 10.5"d x 6"h	16/14"w x 10.5"d x 6"h	9"/10"w x 10.5"d x 6"h

Caps: Stack caps in sequence, reverse faces and abut sidewalls



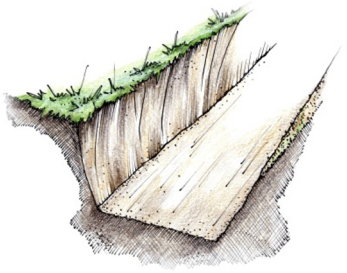
Cap dimensions vary by manufacturer, verify with your local distributor

Instructions

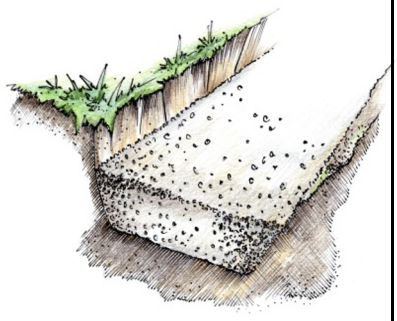
Successful installation begins with proper site evaluation and planning. Site soil, groundwater, horizontal/vertical layout, structural design, wall loadings, observation, testing, and construction assurance are all vital to a successful wall project. If your wall is *taller than three feet*, has a steep slope on top or in front, will support heavy foot traffic or vehicle loads then consult a professional engineer BEFORE installation as a part of project planning.

1. Lay out the wall
   - Verify placement of the wall with the homeowner or project superintendent and when necessary utilize a qualified surveyor.

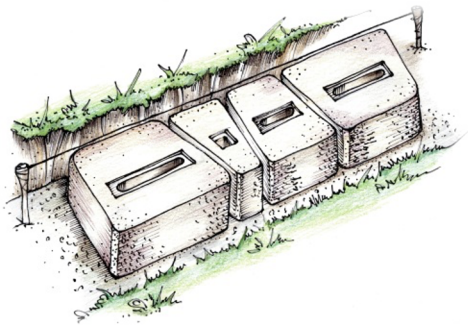
2. Excavation
   - Excavate a trench for the leveling pad to the lines and grades shown on the approved plans.
   - Assure trench is at least 12 inches wider than the depth of the block and 6 inches deeper than the height of the block.
   - If the grade along the wall changes elevation, then step the trench up in equal block height increments to match the change of grade. Always start at the lowest point and work upwards.



3. Leveling Pad
   - Place a ¾ inch minus crushed aggregate into the excavated trench; assure the aggregate is at least 6" deep, and extends a minimum of 6" beyond both the front and back of the block.
   - After placing the aggregate into the excavated trench, level the material and compact with at least 3 passes of vibratory compaction equipment.



4. Base Course
   - The base or first course is buried and is the most important course in the wall.
   - Place a level string line along the length of the wall at the front and back top edge of the desired location of the blocks. Assure that the string is level and at the desired height of the first course of blocks.
   - Begin stacking the units at the lowest point in the wall. Work upwards by placing the StoneWall® II blocks side by side and in full contact with the leveling pad.

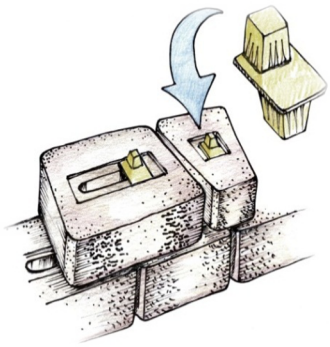


   - As the blocks are stacked, use a torpedo level to ensure that the blocks are level front to back and side to side. Utilize a 4 foot level to assure that a group of blocks are level side to side.
   - If the wall is located on an incline, step the footing and the blocks in increments equal to the height of the block, assuring the blocks remain level.

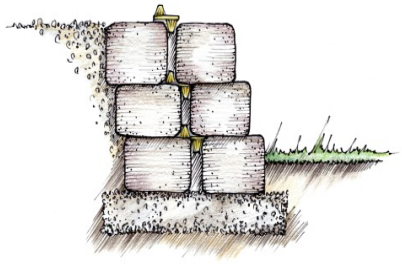
5. Placing the *3 Way Alignment Plug (3WAP)*

   - After stacking each course of StoneWall® II place a 3WAP into the center core of every block. Be sure the "Top" label on the plug points up and that the flange of the plug rests within the recess that surrounds the center core of the blocks. Wall batter is established by the orientation of the *3WAP* within the center core.

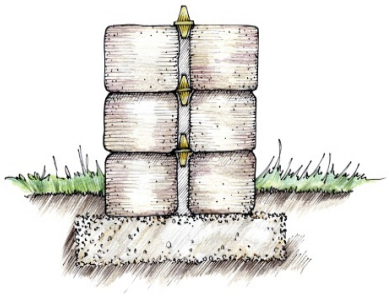
     NOTE: The small trapezoid unit only receives a 3WAP on top, if the unit is in a critical part of the wall, then use construction adhesive to secure the unit to the course above and below.



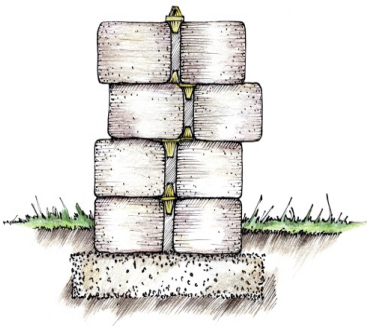
3WAP placement



Set back (1"/12" of wall height): Place the upper Plug body toward the back of the block.



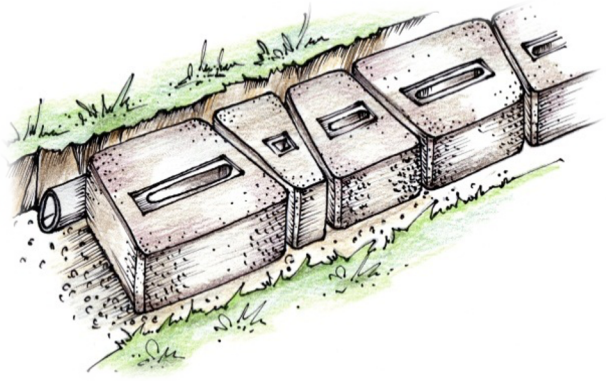
Vertical: Center the upper Plug body over the core



Reveal (1/2"): Place the upper Plug body toward the front face of the block. USE *Reveal* only OCCASIONALLY to highlight an individual unit

6. Wall Drainage
   - After stacking the base course, place a 4 inch diameter (or larger) perforated drain pipe directly behind the wall. Place the pipe so it drains to an area outside of the wall face at the lowest side or face of the wall. Confirm that the pipe water empties into a storm drain or a collection area below the base of the wall.
   - Long walls require that the drain pipe extends through the face of the wall every 50 feet and at both ends of the wall.

7. Stacking the Wall and Compacting Soil
   - Once the base course, the 3WAP's and the drainage pipe have been installed, place a clean and angular unit fill (¾" minus aggregate) between the blocks and 12 inches behind them.
   - Place native soil as backfill behind the unit fill and compact the soil in 6 inch lifts.
   - When constructing and compacting the wall, assure that heavy equipment remains at least 3 feet away from the back of the wall.
   - After the soil backfill is compacted sweep all debris from the top of the blocks and place the 3WAP's into the center cores of the block.



- Place the next course of block onto the course below and over the *3WAP*'s.
- Maintain a running bond pattern; avoid placing blocks in a "stack bond" pattern which will create a structurally weak wall.
- Pull each block forward to engage the 3WAP's and to ensure proper setback, and confirm the blocks are level side to side and front to back.
- Repeat these construction steps up to the top of the wall.

8. Geogrid Reinforcement:

See page 14 for additional instructions.
IF UTILIZING GEOGRID REINFORCEMENT WITH THE STONEWALL® II BLOCKS FOLLOW THE SPECIFICATIONS AND INSTALLATION STEPS AS OUTLINED BY THE PROFESSIONAL ENGINEER.

9. Capping the Wall
    - Always cap a wall by starting from the lowest point.
    - Sweep all debris from the top course of the StoneWall® II units.
    - Lay out all the caps onto the wall prior to adhering them to the blocks.
    - Place the caps either vertically aligned with the wall face, or with a slight 1"-2" overhang, creating a shadow effect.
    - Confirm the blocks are completely dry and free of loose dirt. Place a bead of silicone concrete construction adhesive onto the top course of block at the front and back of the block and along the entire length of the wall.
    - Place the caps onto the adhesive and into the desired position.

10. Final Grade
    - It is important to minimize the infiltration of water into the backfill soil located behind the wall, especially when geogrid reinforcement is utilized.
    - The reinforced zone and backfill should be capped with a low permeable material. Properly constructed, this process will minimize the infiltration of water into the wall zone.
    - Slope the soil away from the wall face and reinforced zone, directing it above the Unit fill zone and sloping to the sides of the wall.

11. Finishing the Project.
    - Sweep the top of the caps and clean up the construction area of debris.
    - Notify the project superintendent or homeowner that the project is ready for final inspection.

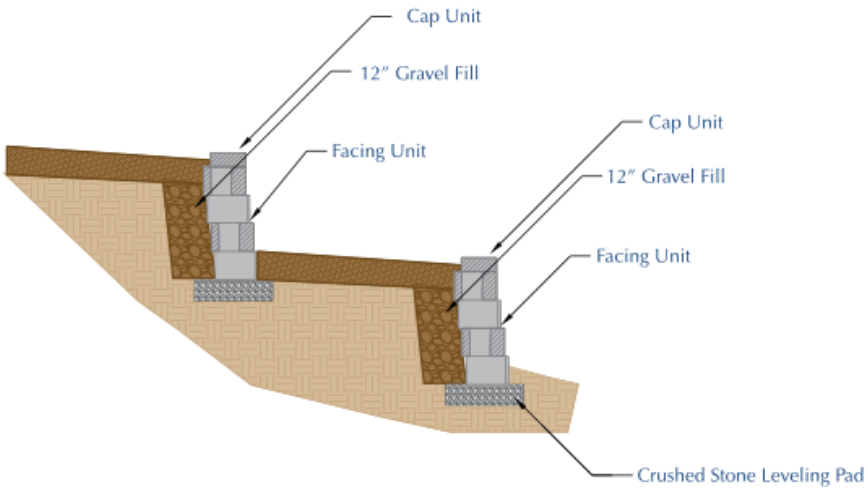
Special Applications

Parapets

- A Parapet is a wall section rising above grade and stacked upon the retaining wall.
- A Parapet is constructed by continuing the block courses above grade rather than terminating at the top of the retaining wall with a cap block.
- Parapet heights are typically 27", (4 courses plus a cap.)
- Parapets serve as a barrier or bench.
- Once the desired height of the Parapet is reached, place a cap onto the top course.

Terraced Wall Installation

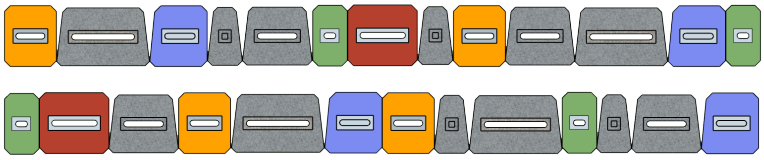
1 Independent Terraced Walls- When an upper wall does not place a surcharge load onto a lower wall, the walls are considered to be *independent terraced walls*. For walls to be independent of each other they must be built with a setback to height ratio of 2H:1V or greater. This means the upper wall must be located behind the lower wall by a minimum distance of twice the height of the lower wall. For proper drainage, it is important that the upper walls' drain pipe does not outlet onto the lower wall.



2 Dependent Terraced Walls- When the upper wall does place a surcharge on the lower wall, the front and back walls are "*dependent terraced walls*." For walls to be dependent upon each other they must be built with a setback to height ratio less than 2H:1V. This means that the upper wall is located behind the lower wall by a distance less than twice the height of the lower wall. In this case it is important to seek out the help of a qualified professional engineer so that a detailed engineering analysis, including a global stability analysis, is performed.

Details and Diagrams

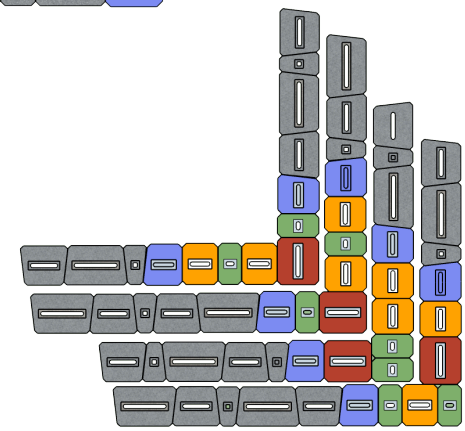
Retaining Wall Panels



90 Degree Corners:

Outside and Inside Corners:

- Place the square sided unit at the tip of the corner.
- Build the wall panel section in either direction from that corner point.
- Alternate the square sided units on each course to assure that no vertical joints are created.



Radius and Serpentine Curves:

Planning the curve

- Build the wall out from the corner.
- Determine the desired radius and then select the corner block combination that matches this radius.
- CONVEX curves show the WIDE FACE, CONCAVE corners show the SMALL FACE.

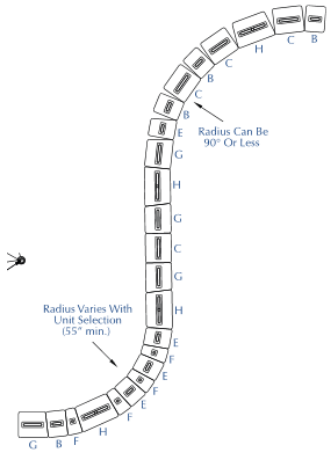
A 53” radius maintains equal use of the three trapezoid shapes.

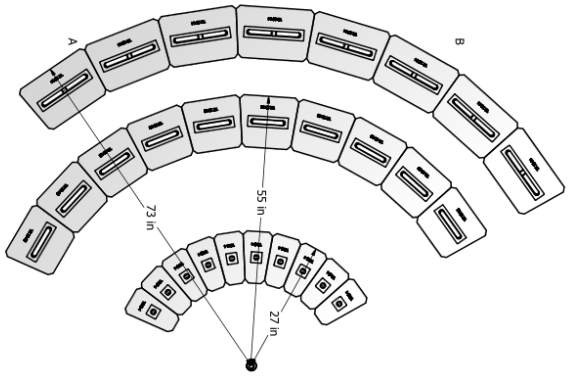
Building the radius curve

As the wall panel approaches the radius curve place the desired radius pattern at the end of the straight wall section.

- After completing the radius curve, return to the beginning of the desired wall panel pattern.

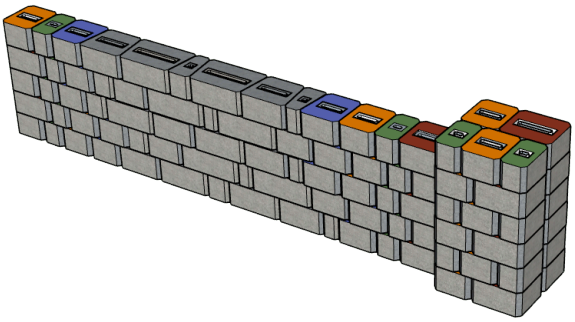
NOTE: If building a wall with the 3WAP in the setback position, the radius of the corner will decrease 1” per vertical foot of wall, creating a lateral shift of the blocks on each course.





Freestanding Walls

Planning your project:



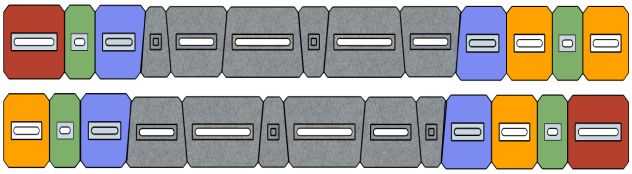
- Successful installation begins with proper site evaluation: site soil, groundwater, horizontal/vertical layout, and structural design are vital to quality design and construction. Consider the use of columns as a layout option.
- Freestanding walls are typically three feet tall or less.
- Columns are typically four feet tall or less.
- Curves must be carefully considered.

Planning column and wall panels:

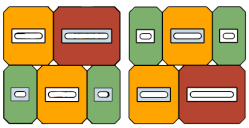
- In planning a freestanding wall, first determine the desired wall panel length
- Wall panels are optimized when the different shapes: Trapezoid, Transition, and Square Sided blocks are used equally.

Wall panels and columns by Product series:

- *The Olympic series wall panels are optimized at multiples of 124" in length*. 6 Trapezoids units = 62", 2 Transition units = 19', and 5 square sided units = 42". By combining these units and allowing for 1" of wiggle room the blocks form a 124" panel section.

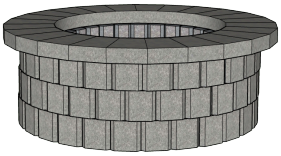


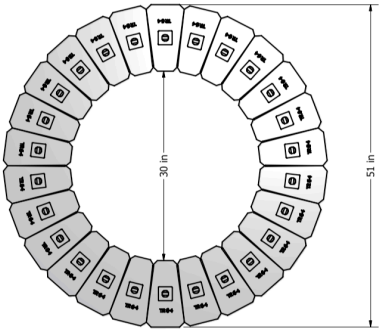
Column Layout



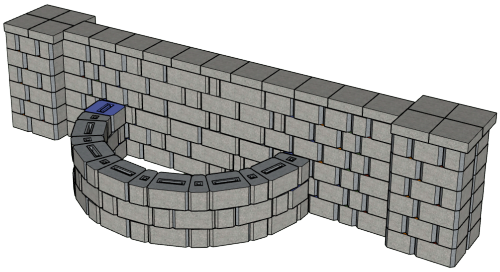
Combined Wall Features

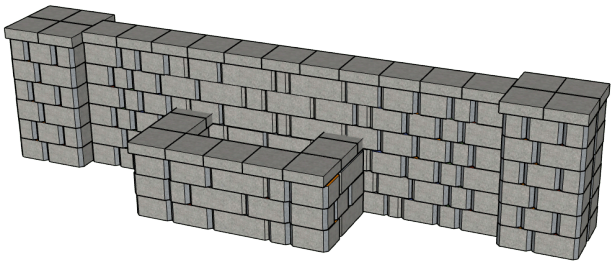
Fire Pits

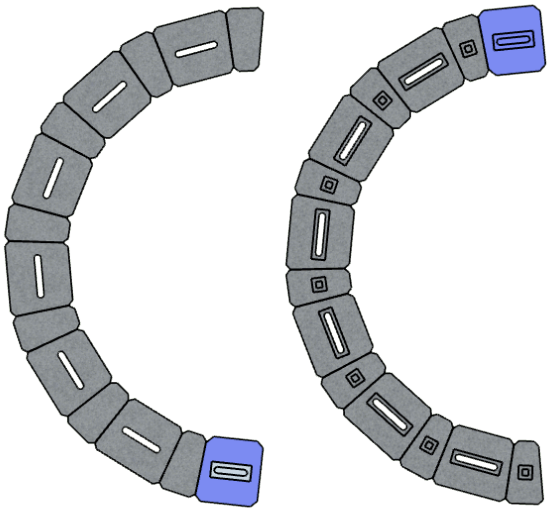


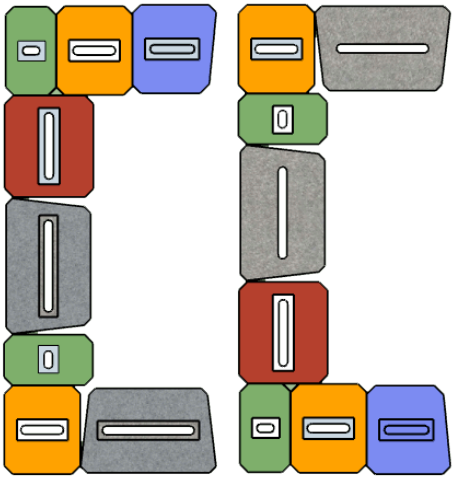


Planters/Fountains

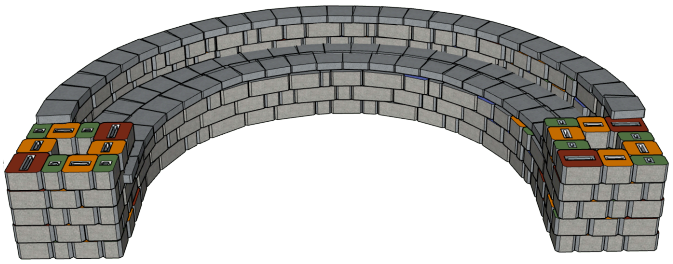


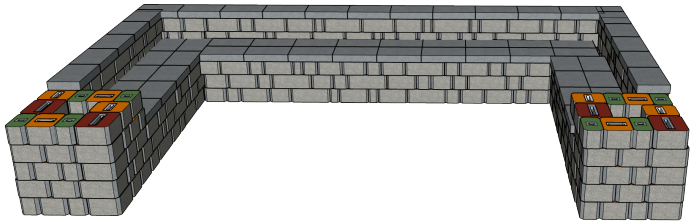




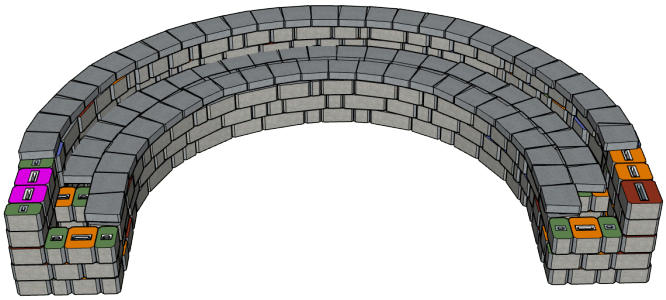


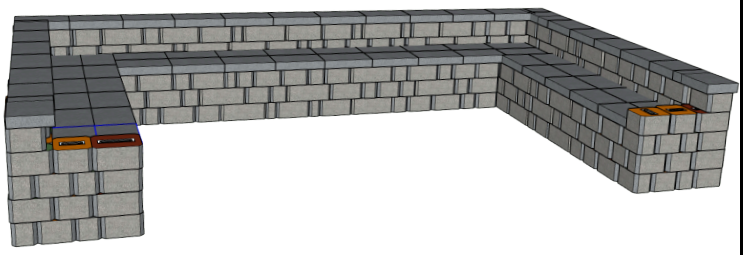
Sitting Areas



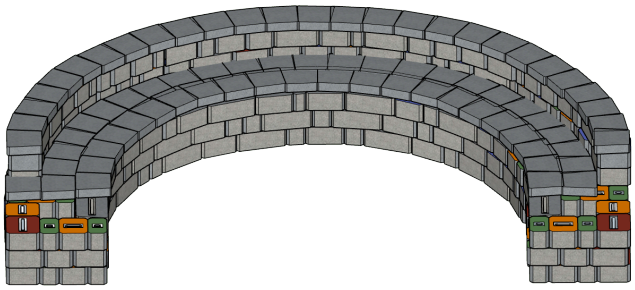


Column Option





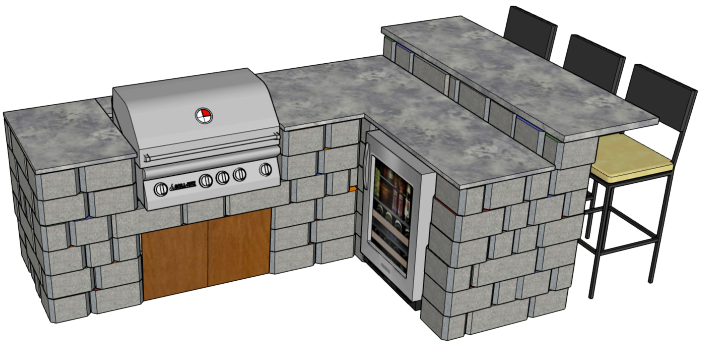
Closed Bench Option



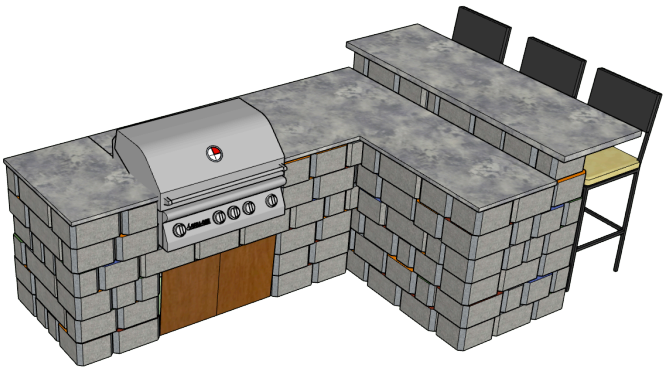
Open Bench Option

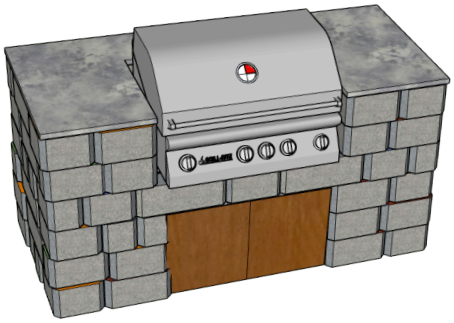
Barbeques

Configuration with fridge



Configurations without fridge





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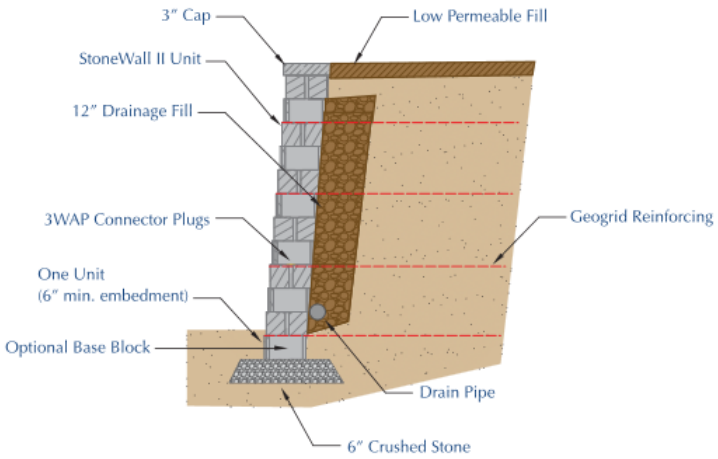
STONEWALL II

Geogrid Reinforcement Installation

Geogrid reinforcement is required when wall heights are greater than what a self-supporting wall can attain. Consult a qualified professional engineer for an approved design when geogrid reinforcement is required. The final approved design must be followed exactly by the installation contractor; any changes in the installation must be reviewed and authorized by the engineer prior to construction.

- Before starting the project, acquire a set of approved construction plans. Ensure that the plans are complete and the design conforms to the local building codes. Contact the design engineer for any clarification BEFORE construction.
- Review the plans, evaluate the placement of geogrid layers, and be sure the lengths and strengths of the geogrid match the specified design.
- Cut the geogrid to length as noted on the plans.



- Ensure that the specified strength direction of the geogrid is oriented correctly and is perpendicular to the wall.
- Sweep the top of the blocks of any debris, set the geogrid 1" from the face of the block, placing it over the *3WAP* alignment plugs. Do NOT overlap the geogrid courses.
- Install the next course of blocks, pulling blocks forward to engage the *3WAP* and securing the geogrid reinforcement between the two courses of block.
- Pull the geogrid towards the back of the reinforced soil zone until it is taut; secure it with stakes, staples, or U-nails.
- Place the unit fill between the blocks and 12 inches behind them.
- Place the native soil backfill in 6" vertical lifts, confirming that the material is placed to the end of the reinforced zone.
- Compact the backfill material to 95% standard proctor.
- Keep heavy equipment 3 feet away from the face of the block; do not drive on the geogrid until a minimum of 6 inches of material has been placed over it.
- Avoid turning vehicles wheels directly upon the geogrid as sudden braking and sharp turns will move and or damage the geogrid. Consult geogrid reinforcement manufacturer recommendations for any additional information.