CornerStone®
WALL SOLUTIONS

Fortus 12D®
RETAINING WALLS

Engineered for Strength, Designed for Beauty

Installation Guide

Make your landscape vision a reality with Fortus 12D's versatile, easy-to-install segmental retaining wall system. Discover its advantages, design capabilities and more!

» cornerstonewallsolutions.com

Design, Installation & Economic Advantages

With its multi-purpose hollow core design, Fortus 12D® retaining wall blocks deliver easy-to-install lightweight units with outstanding drainage capabilities. These durable blocks are equipped with built-in patented SureGrip handholds that prioritize easy lifting and versatile, cost-efficient installations. The Fortus 12D® system's versatility achieves modern, resilient retaining wall features including gravity or geogrid walls, elegant curves, corners, steps and pillar designs.

Design Advantage

For simple gravity retaining walls or geogrid-reinforced designs, Fortus 12D® offers time-saving, cost-efficient solutions for residential and commercial projects.

Covering 1 sq. ft. (0.092 sq. m.), this hollow core dry-cast block's enhanced drainage capabilities deliver strong, long-lasting retaining walls.

Installation Advantage

Fortus 12D's built-in patented SureGrip handholds make installations simpler for contractors and homeowners.

The blocks' lightweight design is easier to build with, expediting projects with a simple installation process for curves, corners and custom design features.

Economic Advantage

With faster installation times and shipping more blocks per pallet to reduce truckloads, end users save costly labor and freight charges.

Fortus 12D's resilient weather-resistant block strength and natural appearance provide long-term retaining wall solutions and an ageless look that blends into any landscape.

Universal Cap Unit

4″ Height x 18″ Width x 12″ Depth
(102 H x 457 W x 305 mm D)
Weight: 65 lbs (29 kgs)

90°Corner Block

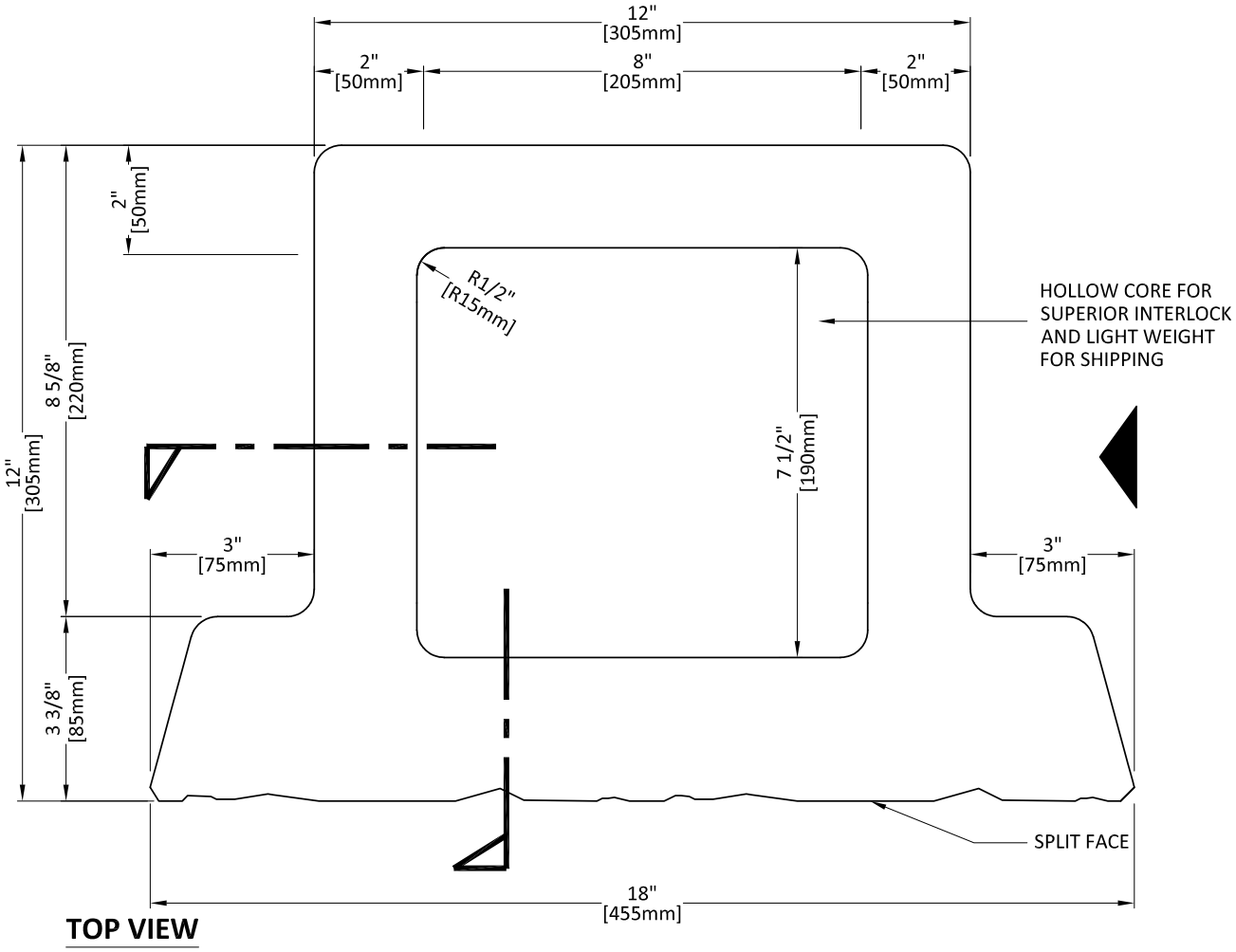
8″ Height x 18″ Width x 9″ Depth
(203 H x 457 W x 229 mm D)
Weight: 65 lbs (29 kgs)

Fortus 12D® Standard Block

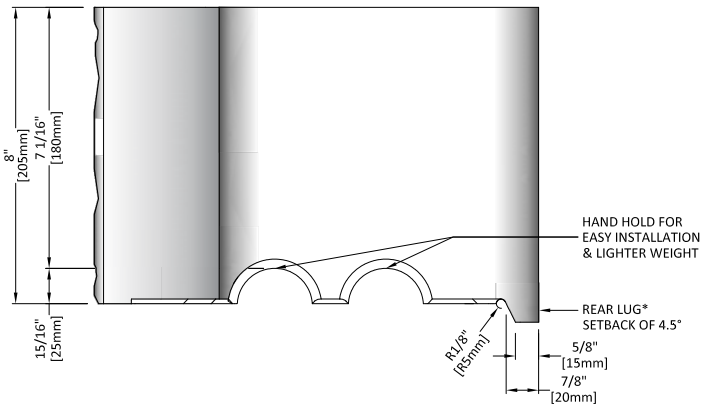
8″ Height x 18″ Width x 12″ Depth
(203 H x 457 W x 305 mm D)
Weight: 63 lbs (28.5 kgs)

⚠ For blocks used as base course, rear lip needs to be removed.

Technical Specifications

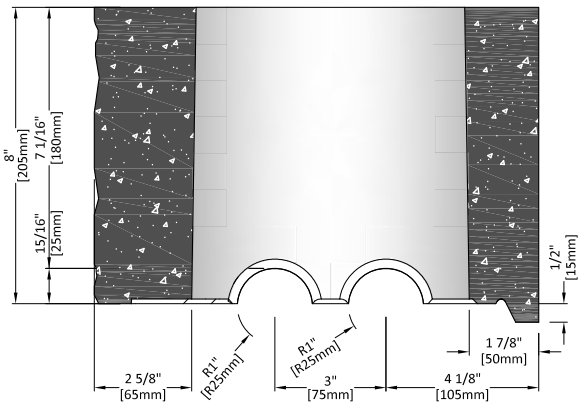


TOP VIEW

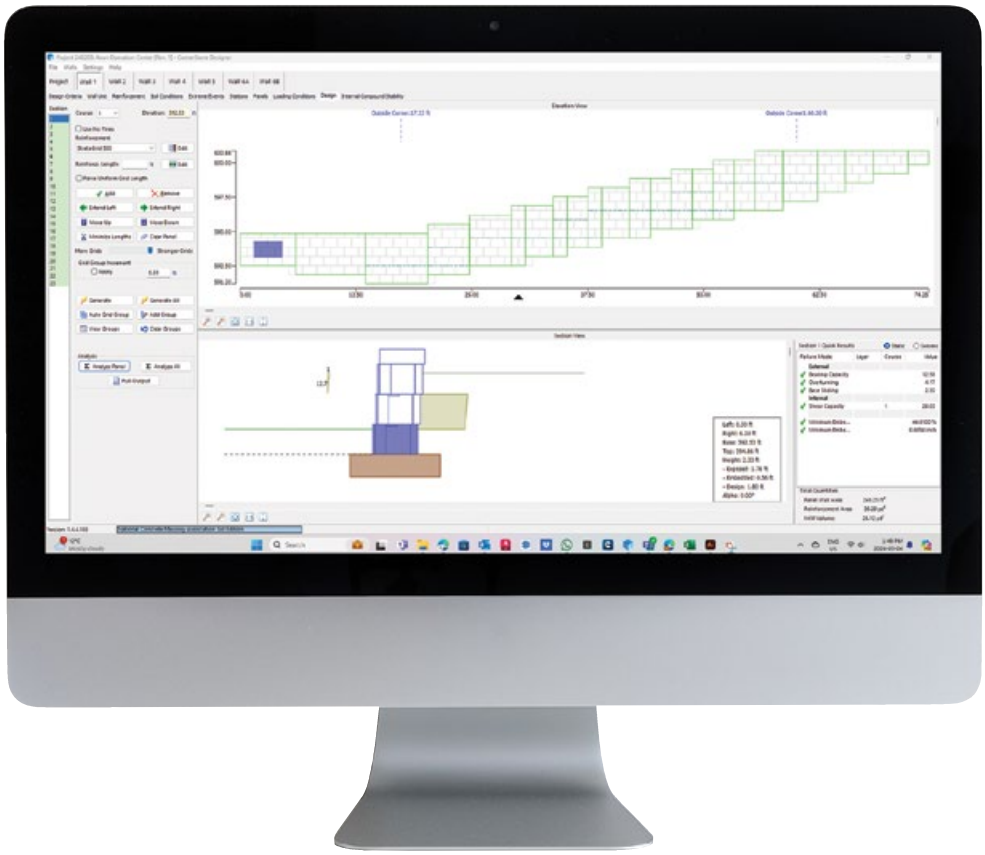


SIDE VIEW

*NOTE:
FOR BLOCKS USED AS BASE COURSE,
REAR LUG NEEDS TO BE REMOVED



SECTION - A



Start Designing Retaining Walls in Minutes

The CornerStone® Retaining Wall Design & Analysis Software program is designed with the Engineer in mind. It includes multiple methodologies, CornerStone® retaining wall products and geogrid reinforcement options for the designer to choose from. This comprehensive software allows the user to select and edit soils information, input loads and slopes above and below the retaining wall.

Global stability is available within the program, allowing engineers the ability to perform deep dives into the analysis of the walls being designed. You can customize almost any component of your project, with the ability to export your design to AutoCAD. The program is powerful and easy to use, making it a time and money saver for engineers.

Our Retaining Wall Software is Feature Packed

Perform deep-dive analyses on your CornerStone® retaining wall designs to account for unique site details including soil compositions, active loads and global stability to ensure your cross sections are structurally sound.

CornerStone® Retaining Wall Design & Analysis Software users share a common goal of building secure, lasting retaining walls that keep homes, businesses and communities safe. Let's get started.

Input Options

- Wall Geometry
- Soil Compositions
- Factor of Safety
- Block Specifications
- Geogrid Properties
- Global Stability
- Compound Stability
- Live & Dead Loads
- Project Information
- Imperial or Metric

Features & Benefits

- Utilizes NCMA, AASHTO, and AASHTO LRFD method options
- Great for designing solutions within the transportation industry
- Easy Export function to AutoCAD

Wall Structure Options

- Gravity Walls
- Geogrid Friction Reinforced
- Geogrid Positive Reinforced

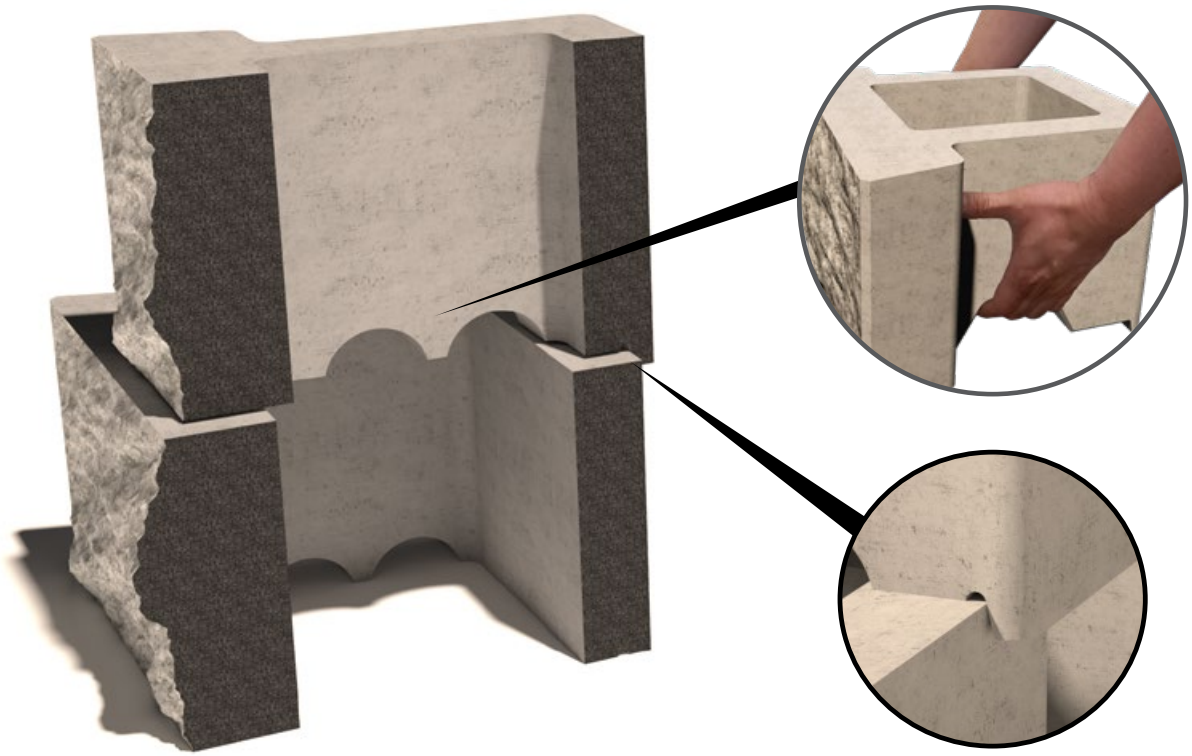
Software Download and Tutorial Videos Available Online

Fortus 12D® Gravity Retaining Walls

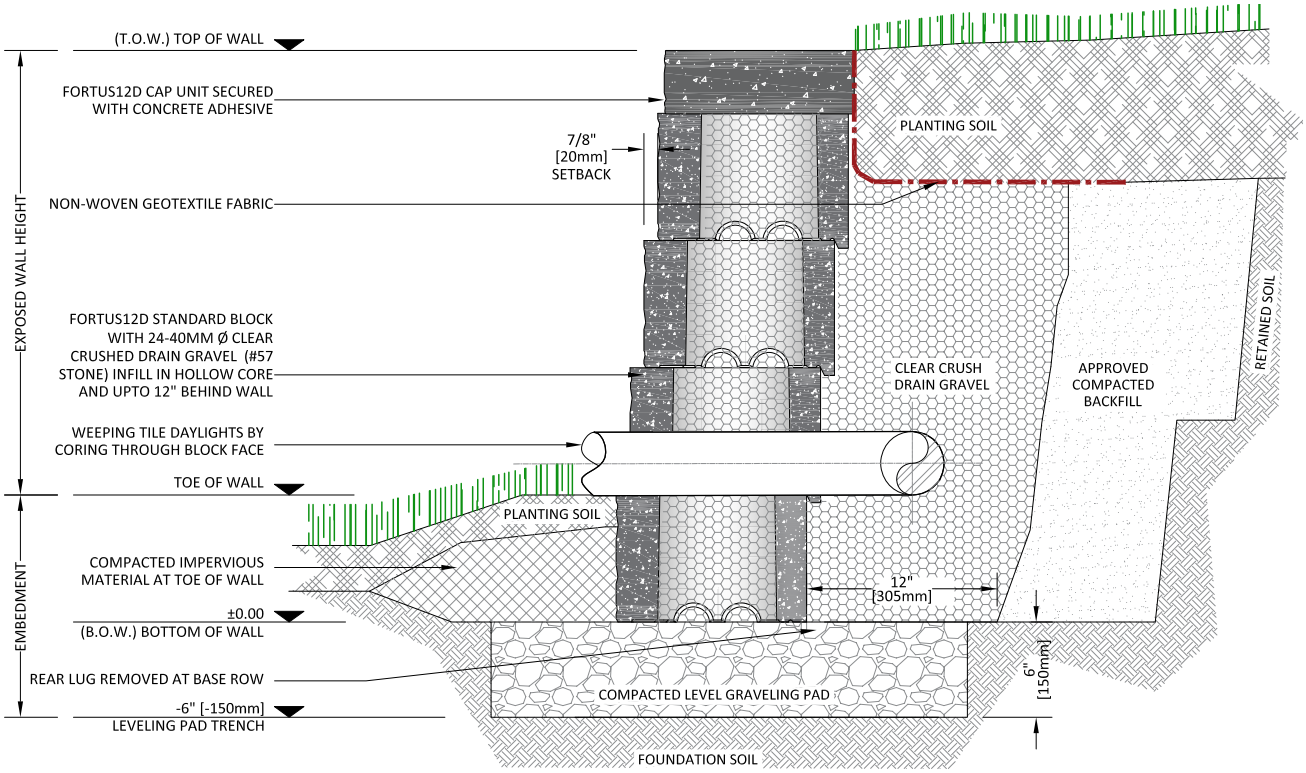
Gravity segmental retaining wall systems (SRWs) are structures lower in height that use the Fortus 12D® unit weight combined with gravel core infill to resist earth pressures behind and on top of the wall.

The ½”/unit (4.5 degree or 1”/vertical foot) batter or setback of the Fortus 12D® wall, along with proper soil conditions below and behind the wall, help provide structural stability. For walls 3.5ft (1.07m) and taller, a qualified engineer should be consulted.

View our online glossary for helpful terminology explanations: **cornerstonewallsolutions.com/resources/glossary/**



Connection Detail



Typical Cross Section

1

PLANNING

- Mark the bottom and top of the wall excavation location with spray paint or stakes
- Establish proper elevation bottom and top of wall before excavating
- Organic Materials should not be used in Structural Backfill Zone
- Store and protect Structural Backfill Materials from inclement weather during construction

2

EXCAVATION

- Excavate and prepare Sub Base Leveling Pad Trench 6" below first course
- Leveling Pad rench is approximately
- 2.5' to 3' wide
- Normal wall Burial Depth or Embedment Depth is 6" to 12" or one block
- Excavate cut line to a 2 to 1 slope or greater
- Back of wall excavation depth into the bank should be 12" beyond the back of the Sub Base Leveling Trench

3

SUB BASE COMPACTION

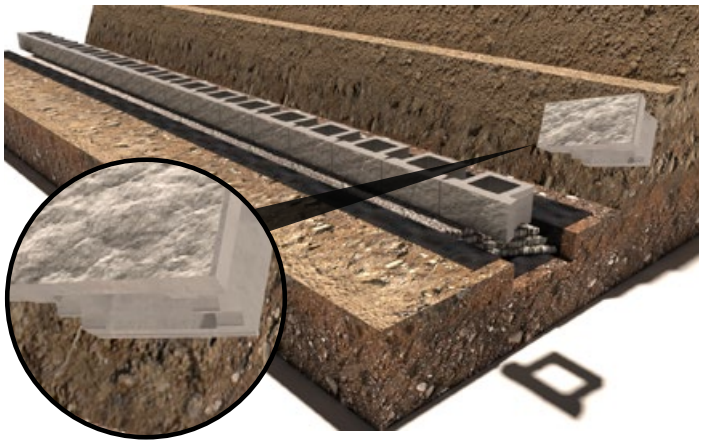
- Compact Sub Base to 95% Standard Proctor Density or greater
- Remove any Organic or poor soils in the Sub Base and replace with proper Structural Fill Materialsbefore compacting

4 BASE STABILIZATION

- Place 5' to 6' wide Base Stabilization Fabricon top of leveling pad trench (Optional)
- Place Well Graded Gravel (also known as Road Base Aggregates) on top of fabric in the leveling pad trench approximately 6" deep
- Compact the Gravel Leveling Pad to 95% Standard Proctor Density or greater
- Screed the gravel leveling pad with a Screed Board or Straight Edge across the trench on top of two screed pipes

5 LAY FIRST COURSE

- *For **Fortus 12D**® base units, remove rear lip with a rubber mallet before placing on leveling pad to create level base course*
- *Place each unit on top of the leveling pad in such a way as not to disturb the level gravel*
- *Place a steel stake or **Fortus 12D**® unit at either end of the leveling pad to establish the back of the first course of units*
- *Secure a tight string line to the stakes or **Fortus 12D**® units at either end which will provide the guide to line up the back of each base unit*
- *The distance of the string line between the steel stakes or **Fortus 12D**® units may vary due to heavy winds*
- *Units are laid snug together and parallel to the straight or curved line*
- *Ensure all Fortus 12D® base blocks are level unit to unit, from front-to-back and side-to-side along the full length of wall*



6 IMPERMEABLE FILL

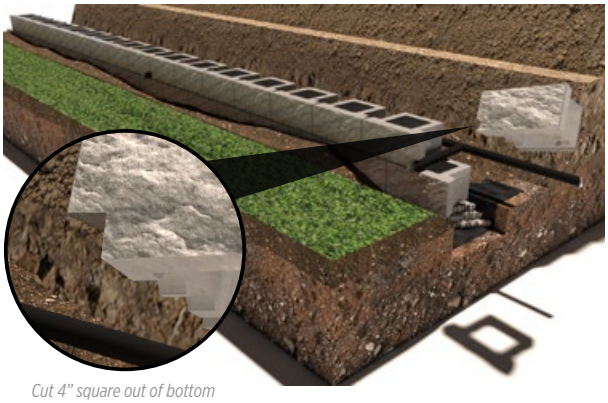
- Backfill behind, in front (toe of wall) and in the hollow cores of the units with Impermeable Materials up to the desired level of the Perforated Drain Pipe or to the top of the first course
- Compact the impermeable materials behind, in front and in the hollow cores of the units

⚠ **Important:** Sweep the top of the units clean of all debris. Sweeping should create a ½" void in the core to accommodate the SecureLug's interlock.

7 DRAIN PIPE OUTLET

- Perforated Drain Pipe should have adequate slope to drain water in the right direction towards each Drain Pipe Outlet
- Drain Pipe Outlet can be every 30 or 50 ft. (9 or 15 m.)
- Perforated Drain Pipe can be a Sock Wrapped system to help prevent fines from migrating into the pipe

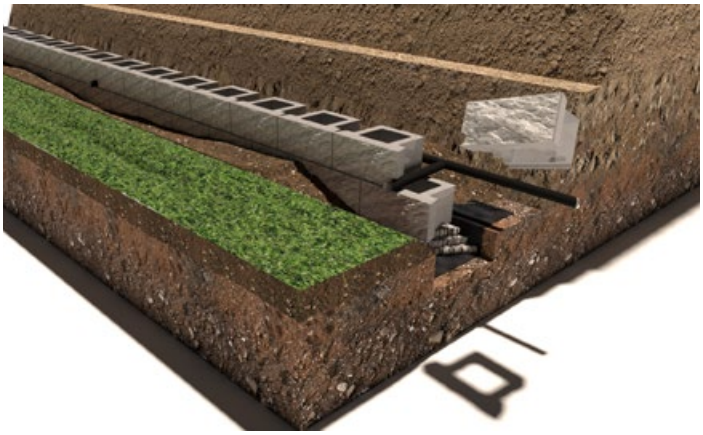
⚠ **Important:** Sweep the top of the units clean of all rock and dirt before placing the next course of units. Sweeping should create a ½" void in the core to accommodate the SecureLug's interlock.



Cut 4" square out of bottom for drainage pipe outlet

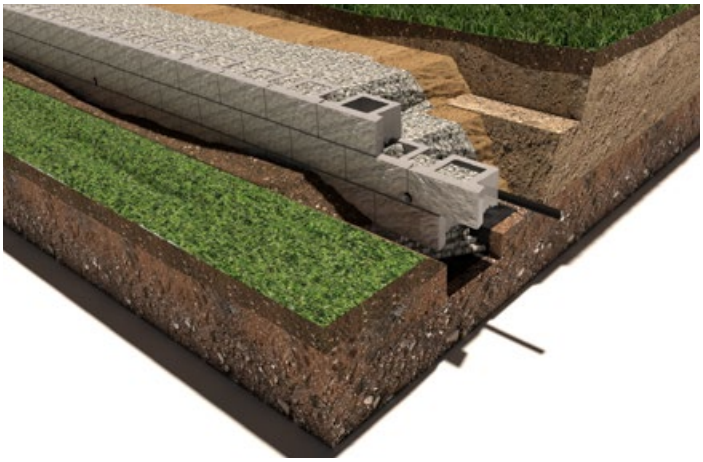
8 BACKFILL

- Place and compact Backfill Materials in maximum Lifts of 8"
- Backfill materials will be placed 6" to 12" behind the units allowing for Clear Crush Drain Gravel (Angular Aggregates free of fines) between the Fortus 12D® units and compacted backfill materials



9 CONTINUE BLOCK INSTALLATION

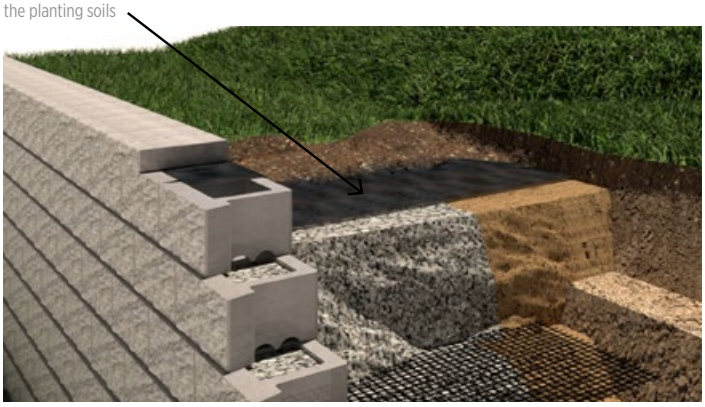
- Continue to install each course of units following the same steps as above, placing blocks in half bond pattern
- Backfill and Compact the Reinforced Zone by placing materials from the back of the wall towards the end of the retained soil
- Install drainage gravel in the cores and 6" to 12" behind the units after placing and compacting backfill materials
- Install and compact Backfill Materials in 8" lifts until wall is complete



10 CAPPING

- *Complete the top of the wall with **Fortus 12D**® cap units*
- *Properly secure the cap units using a Concrete Adhesive*
- *Make sure all units are free of dirt and stonesbefore installing the caps*
- *Place a solid bead of Concrete Adhesive around the top of each **Fortus 12D**® unit*
- *Place a bead of adhesive between each joint of the cap units*

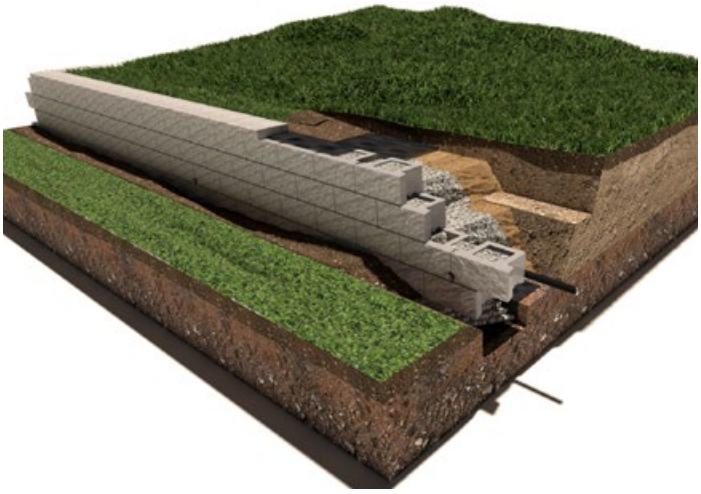
Place a 6 ft wide Soil Separating Filter Fabric on top of the backfill and drainage gravel and against the back of the last units before placing the planting soils



11 FINAL GRADING

- Ensure that final grading is done on top and bottom of the wall
- Make sure to protect newly placed planting soil from erosion during heavy rains or surface runoff

⚠ **Important:** Final determination of the suitability of the contemplated use, and its manner of use are the sole responsibility of the user.

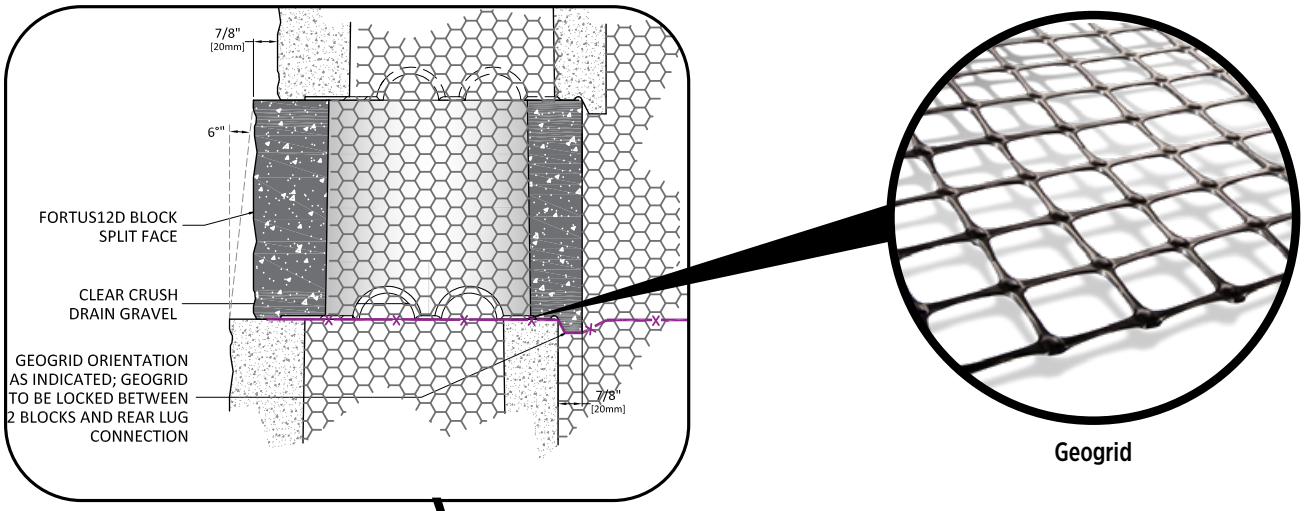


Fortus 12D® Geogrid Wall

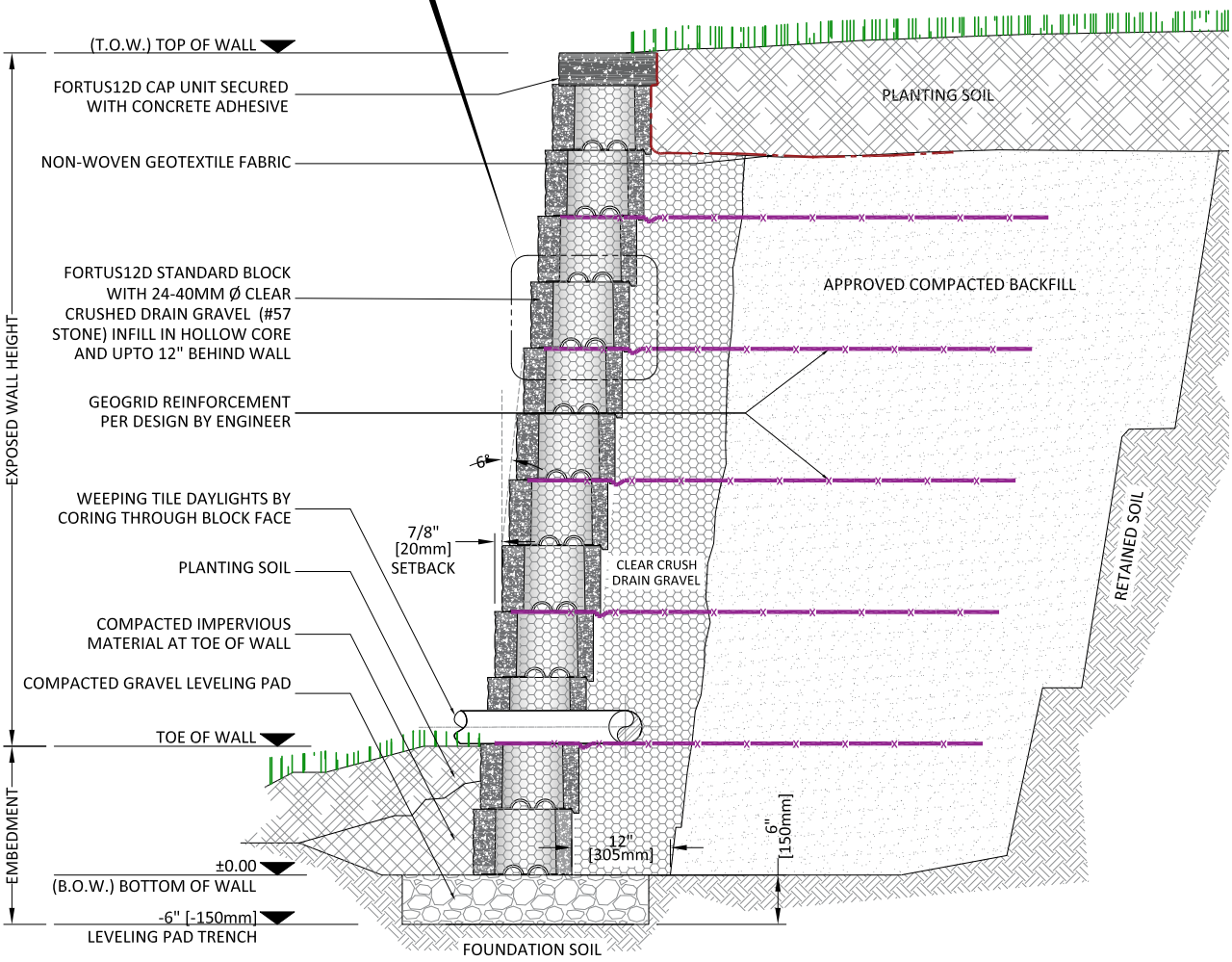
The construction of a Fortus 12D® reinforced wall system involves using geogrids for reinforcement. Walls of 3.5ft (1.07 meters) or taller require reinforcement to withstand active pressures. Even shorter walls may need reinforcement depending on specific factors. For example, parking lots, roadways, or slopes above the walls increase pressure, necessitating reinforcement.

Properly applied geogrids and backfill materials help resist these forces. For walls 3.5ft (1.07 meters) and taller, consulting a qualified engineer is recommended.

View our online glossary for helpful terminology explanations: **cornerstonewallsolutions.com/resources/glossary/**



Connection Detail



Typical Cross Section

1 PLANNING

- Mark the bottom and top of the wall excavation location with spray paint or stakes
- Establish proper elevation bottom and top of wall before excavating
- Organic Materials should not be used in Structural Backfill Zone
- Store and protect Structural Backfill Materials from inclement weather during construction

2 EXCAVATION

- Excavate and prepare Sub Base Leveling Pad Trench 6" below first course
- Leveling Pad rench is approximately
- 2.5' to 3' wide
- Normal wall Burial Depth or Embedment Depth is 6" to 12" or one block
- Excavate cut line to a 2 to 1 slope or greater
- Back of wall excavation depth into the bank should be 12" beyond the back of the Sub Base Leveling Trench

3 SUB BASE COMPACTION

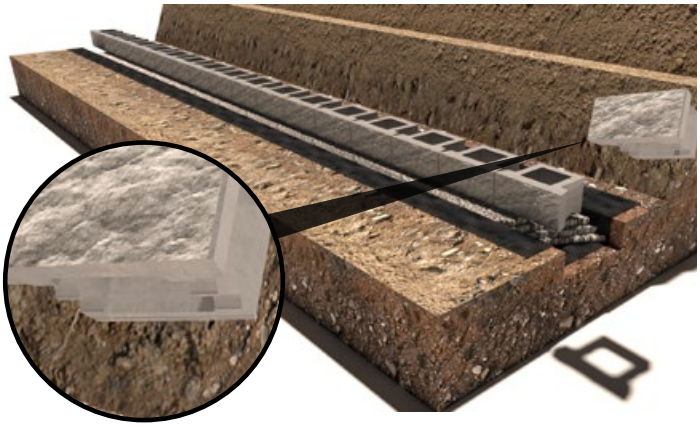
- Compact Sub Base to 95% Standard Proctor Density or greater
- Remove any Organic or poor soils in the Sub Base and replace with proper Structural Fill Materials before compacting

4 BASE STABILIZATION

- Place 5' to 6' wide Base Stabilization Fabric on top of leveling pad trench (Optional)
- Place Well Graded Gravel (also known as Road Base Aggregates) on top of fabric in the leveling pad trench approximately 6" deep
- Compact the Gravel Leveling Pad to 95% Standard Proctor Density or greater
- Screed the gravel leveling pad with a Screed Board or Straight Edge across the trench on top of two screed pipes

5 LAY FIRST COURSE

- *For **Fortus 12D**® base units, remove rear lip with a rubber mallet before placing on leveling pad to create level base course*
- *Place each unit on top of the leveling pad in such a way as not to disturb the level gravel*
- *Place a steel stake or **Fortus 12D**® unit at either end of the leveling pad to establish the back of the first course of units*
- *Secure a tight string line to the stakes or **Fortus 12D**® units at either end which will provide the guide to line up the back of each base unit*
- *The distance of the string line between the steel stakes or **Fortus 12D**® units may vary due to heavy winds*
- *Units are laid snug together and parallel to the straight or curved line*
- *Ensure all Fortus 12D® base blocks are level unit to unit, from front-to-back and side-to-side along the full length of wall*



6 IMPERMEABLE FILL

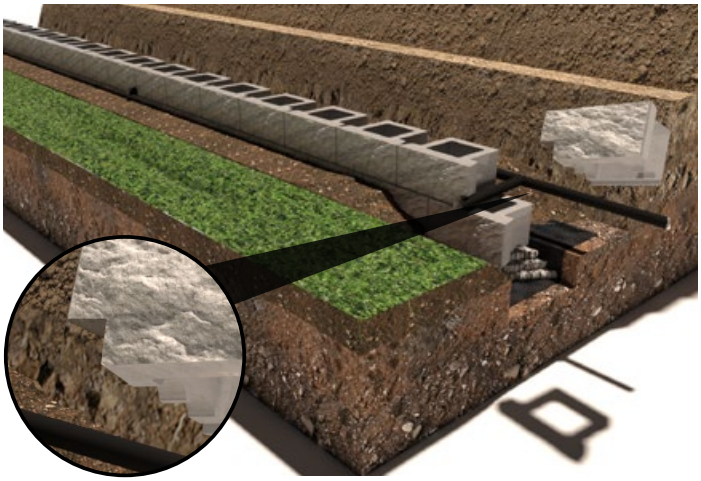
- Backfill behind, in front (toe of wall) and in the hollow cores of the units with Impermeable Materials up to the desired level of the Perforated Drain Pipe or to the top of the first course
- Compact the impermeable materials behind, in front and in the hollow cores of the units

⚠ **Important:** Sweep the top of the units clean of all debris. Sweeping should create a ½" void in the core to accommodate the SecureLug's interlock.

7 DRAIN PIPE OUTLET

- Perforated Drain Pipe should have adequate slope to drain water in the right direction towards each Drain Pipe Outlet
- Drain Pipe Outlet can be every 30 or 50 ft. (9 or 15 m.)
- Perforated Drain Pipe can be a Sock Wrapped system to help prevent fines from migrating into the pipe

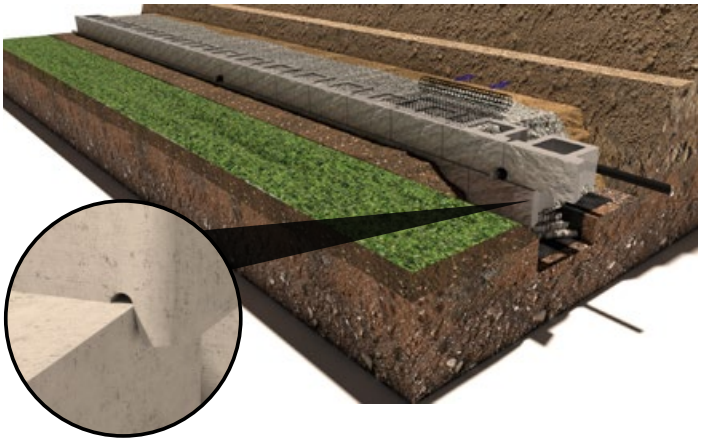
⚠ **Important:** Sweep the top of the units clean of all rock and dirt before placing the next course of units; Sweeping should create a ½" void in the core to accommodate the SecureLug's interlock.



Cut 4" square out of bottom for drainage pipe outlet

8 BACKFILL AND GEOGRID

- *Place and compact Backfill Materials in maximum Lifts of 8"*
- *Backfill materials will be placed 6" to 12" behind the units allowing for Clear Crush Drain Gravel (Angular Aggregates free of fines) between the **Fortus 12D®** units and compacted backfill materials*
- *Cut Geogrid Reinforcement to length specified in design*
- *Place the geogrid as far forward on the **Fortus 12D®** units as possible without revealing it on the face*
- *Place the next course of **Fortus 12D®** units on top of the lower units and geogrid at a half bond pattern*



Rear lip presses against the back of the blocks below

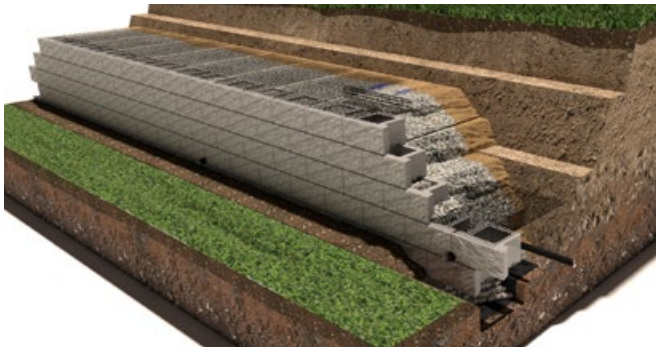
9 LAY SECOND COURSE

- *Pull the unit forward to engage and align the rear lip; Complete the installation of units on the Geogrid Reinforced courses*
- *Tension the geogrid in such a way as NOT to disturb the alignment of the upper units*
- *Each geogrid length should be laid parallel and adjacent to each other but never overlapping.*

⚠ **Important:** Correct geogrid orientation, strength and length is crucial to the success of the wall project;

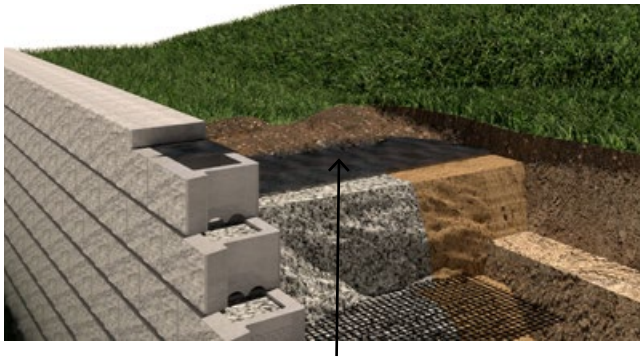
10 CONTINUE INSTALLATION

- Continue to install each course of units following the same steps as above
- Backfill and Compact the Reinforced Zone by placing materials from the back of the wall towards the end of the geogrid
- Install drainage gravel in the cores and 6" to 12" behind the units after placing and compacting backfill materials
- Install and compact Backfill Materials in 8" lifts until wall is complete



11 CAPPING

- *Complete the top of the wall with **Fortus 12D**® cap units*
- *Properly secure the cap units using a Concrete Adhesive*
- *Make sure all units are free of dirt and stones before installing the caps*
- *Place a solid bead of Concrete Adhesive around the top of each **Fortus 12D**® unit*
- *Place a bead of adhesive between each joint of the cap units*



Place a 72" wide Soil Separating Filter Fabric on top of the backfill and drainage gravel and against the back of the last units before placing the planting soils

12 FINAL GRADING

- Ensure that final grading is done on top and bottom of the wall
- Make sure to protect newly placed planting soil from erosion during heavy rains or surface runoff

⚠ **Important:** Final determination of the suitability of the contemplated use, and its manner of use are the sole responsibility of the user.

Fortus 12D® Wall Details

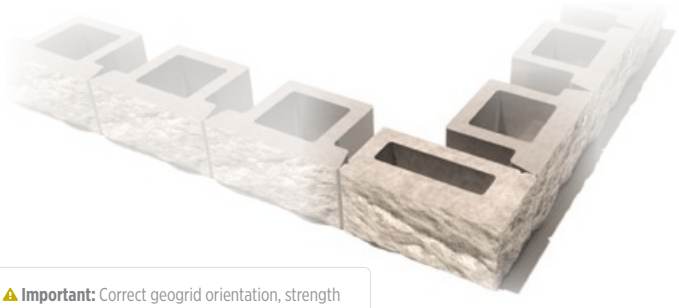
This section provides detailed, illustrated step-by-step instructions for using Fortus 12D™ to construct wall details including curves, corners, pillars and freestanding walls.

Curves and corners are the portions of a wall project that adapt to the specifics of the site and the needs of its users. Correct construction and professional completion of these wall details greatly enhances the safety, durability and visual appeal of the finished project. This also avoids the costly outcomes of improper installations.

View our online glossary for helpful terminology explanations: **cornerstonewallsolutions.com/resources/glossary/**

OUTSIDE CORNER - FIRST COURSE

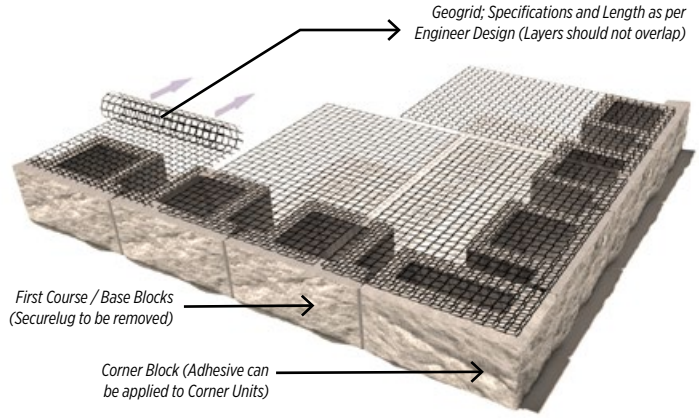
- *Use a 90° corner unit to build an outside corner*
- *Place the first 90° corner unit on the base leveling pad to start the outside corner*
- *Place a unit on either side against the 90° corner unit*
- *Continue to lay the **Fortus 12D**® base course on either side of the corner until first course is completed*



⚠ **Important:** Correct geogrid orientation, strength and length is crucial to the success of the wall project.

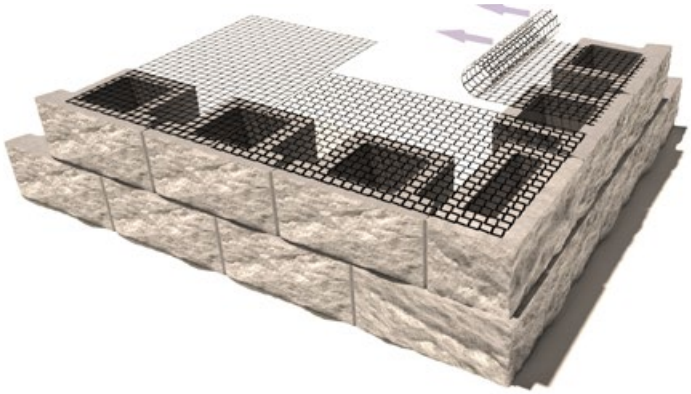
OUTSIDE CORNER - SECOND COURSE

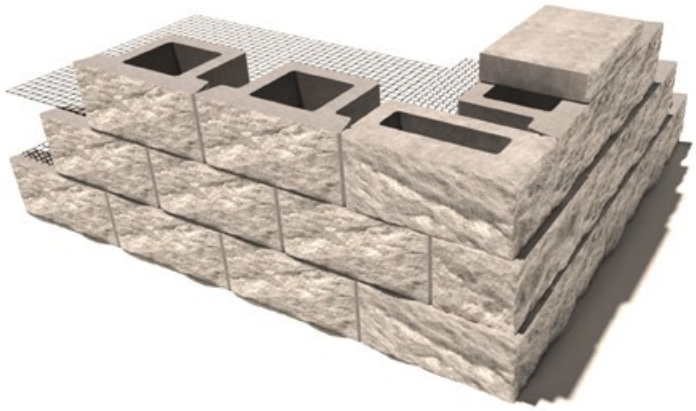
- *Flip and turn the second course 90° Corner overlapping the short side and half of the base unit. This unit should be pushed back ⅝" to achieve proper setback*
- *Continue to lay the second **Fortus 12D**® course on either side of the corner until second course is completed*
- *The 90° corners can be glued or concrete core filled to ensure a proper course to course outside corner interlock*



OUTSIDE CORNER WITH GEOGRID

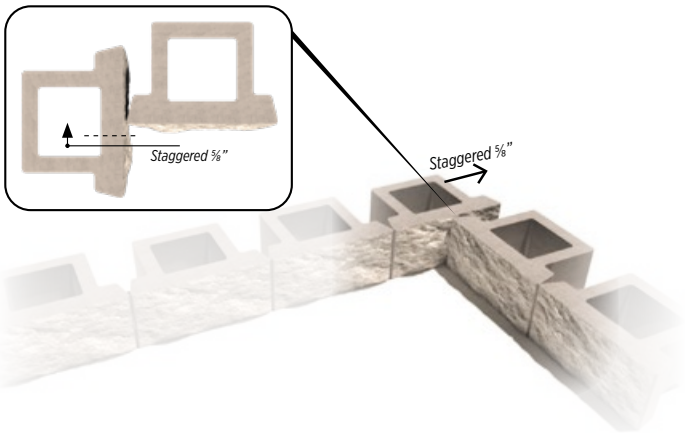
- Each geogrid length should be laid perpendicularly to the wall face
- Geogrid should not overlap on the units
- Lay the 1st geogrid corner section perpendicularly to one side of the corner
- Lay the 2nd geogrid section perpendicularly to the other side of the corner but not overlapping the 1st geogrid section
- Lay the secondary geogrid layer one course above and perpendicular to the lower main geogrid layer directional strength
- To complete the wall, place cap units in half bond pattern along the wall's top course





INSIDE CORNER - FIRST COURSE

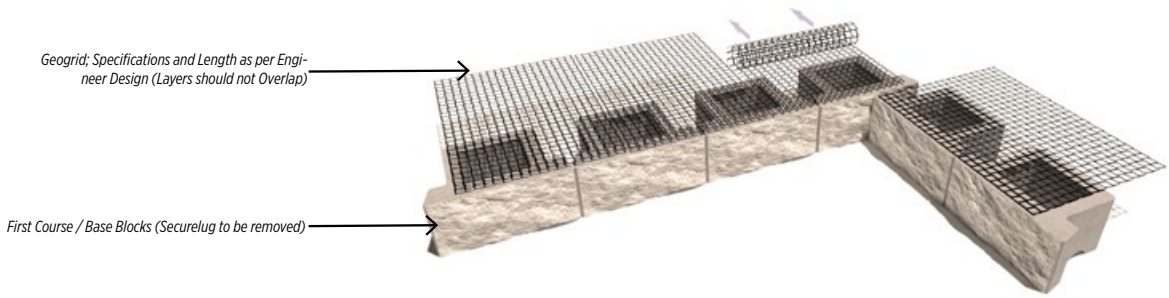
- Make sure second course units are placed at a ⅝" setback to the lower inside corner
- Continue to install the units left and right of the inside corner to complete the second course of the wall
- Repeat the above step by step installation until the wall height is completed or until reaching the first geogrid layer



INSIDE CORNER - SECOND COURSE

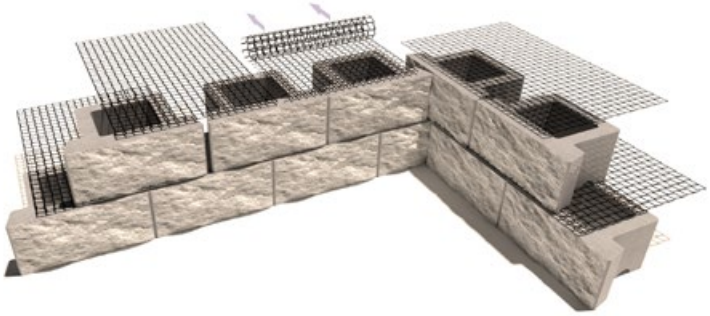
- Make sure second course units are placed at a ⅝" setback to the lower inside corner
- Continue to install the units left and right of the inside corner to complete the second course of the wall
- Repeat the above step by step installation until the wall height is completed or until reaching the first geogrid layer

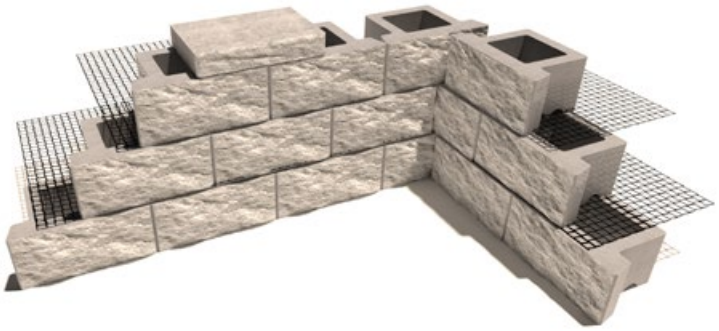
Important: Correct geogrid orientation, strength and length is crucial to the success of the wall project.



INSIDE CORNER WITH GEOGRID

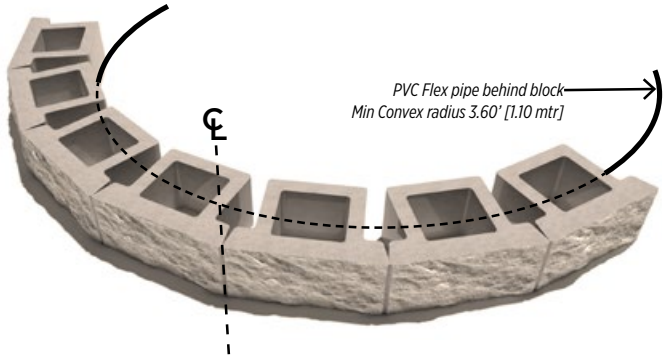
- Each geogrid length should be laid perpendicularly to the wall face
- Geogrid should not overlap on the Fortus 12D® units
- Lay the 1st geogrid corner section perpendicularly to one side of the corner and overlap h/4 through the backfill (Height of Wall ÷ 4)
- Lay the 2nd geogrid section perpendicularly to the 1st geogrid
- Lay the second geogrid layer perpendicularly and overlap h/4 through the backfill opposite to the first geogrid layer
- The h/4 overlap will alternate layer to layer to properly secure the inside corner
- To complete the wall, place cap units in half bond pattern along the wall's top course





CONVEX CURVE - FIRST COURSE

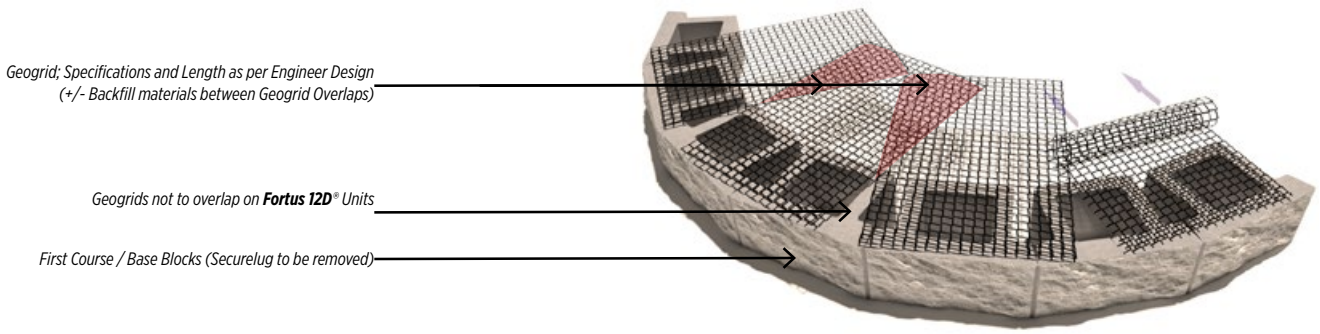
- *If possible, start building a curve from the center and work left and right through the curve*
- *Use PVC Flex Pipes to create smooth and accurate Convex curves;*
- *Use the back of the unit for alignment*
- *Build each course of units by starting at the same place and the same bond as the last course*
- *Convex curves have a slight increase in batter or setback to the standard ⅝" for **Fortus 12D®***



CONVEX CURVE - SECOND COURSE

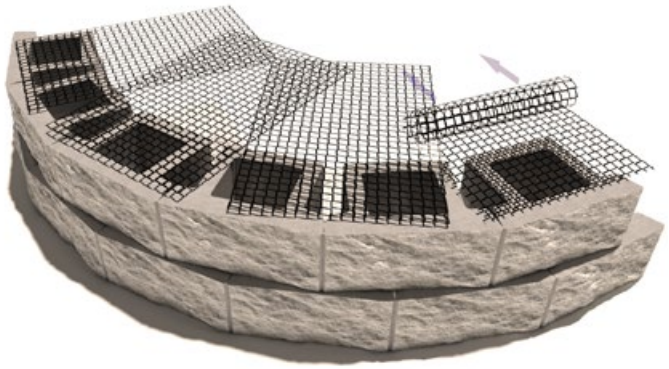
- *The taller the wall the larger the Convex first course needs to be. The radius of each additional course will be slightly smaller than the lower course*
- ***Fortus 12D®** minimum Concave curve is approximately **3.6 foot radius***

⚠ **Important:** Correct geogrid orientation, strength and length is crucial to the success of the wall project.



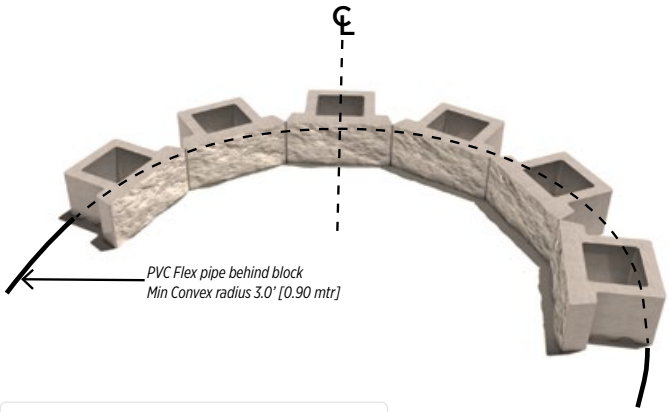
CONVEX CURVE WITH GEOGRID

- *Each geogrid length should be laid perpendicularly to the wall face*
- *Geogrid should not overlap on the **Fortus 12D®** units*



CONCAVE CURVE - FIRST COURSE

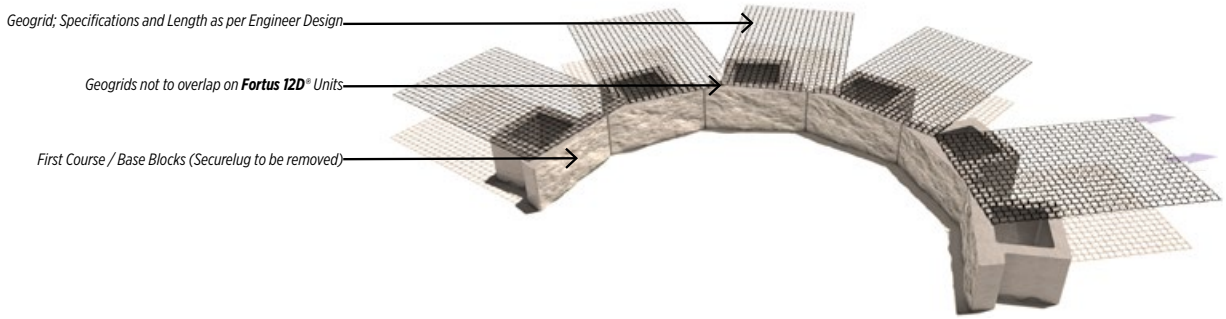
- If possible, start building a curve from the centerand work left and right through the curve
- Use PVC Flex Pipes to create smooth and accurate Concave curves
- Use the back of the unit for alignment
- Build each course of units by starting at the same place and the same bond as the last course
- Concave curves have a slight increase in batter or setback to the standard ⅝"



CONCAVE CURVE - SECOND COURSE

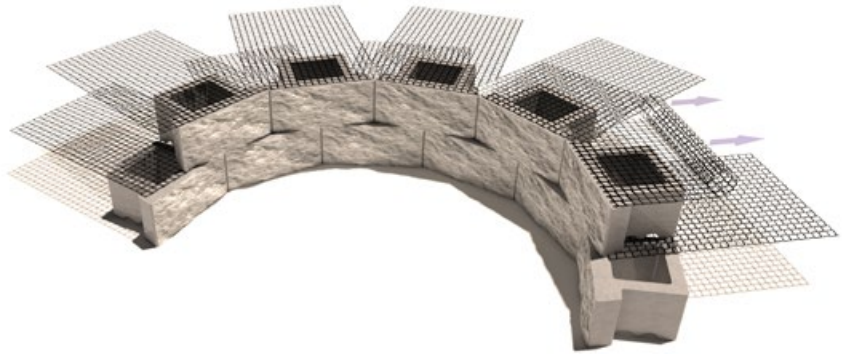
- The taller the wall the smaller the Concave first course needs to be. The radius of each additional course will be slightly larger than the lower course
- Fortus 12D® minimum Concave curve is approximately 3.0 foot radius

⚠ **Important:** Correct geogrid orientation, strength and length is crucial to the success of the wall project.



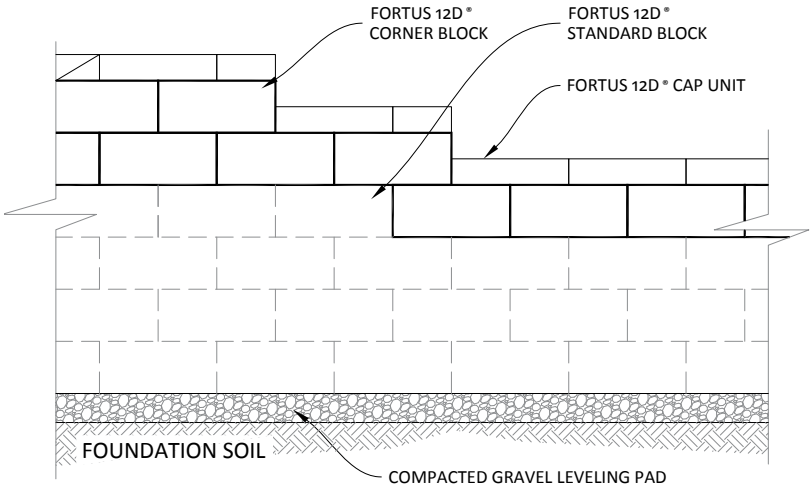
CONCAVE CURVE WITH GEOGRID

- Each geogrid length should be laid perpendicularly to the wall face
- Geogrid should not overlap on the Fortus 12D® units
- To ensure 100% coverage, place a second layer of geogrid centered to the unreinforced triangle zone one course above the main geogrid layer

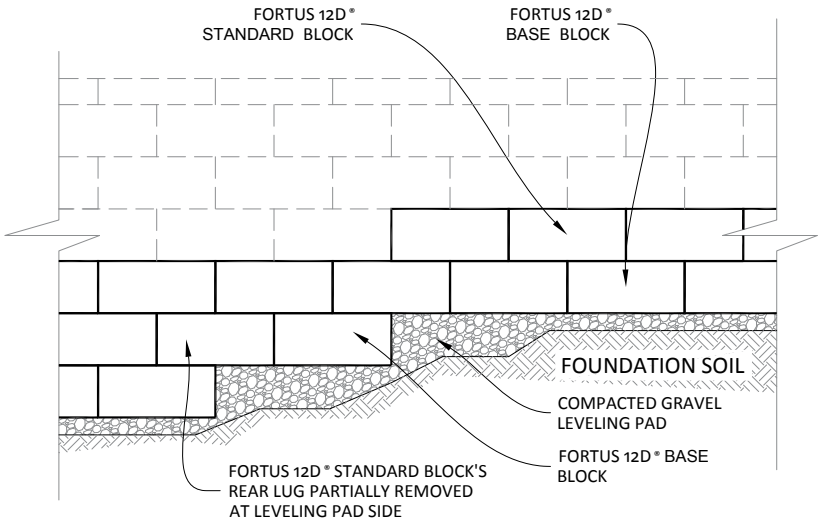


Full Circled Wall (Conceptual)

Base Elevation Changes



TOP OF WALL STEP UP/ DOWN



BASE OF WALL STEP UP/ DOWN

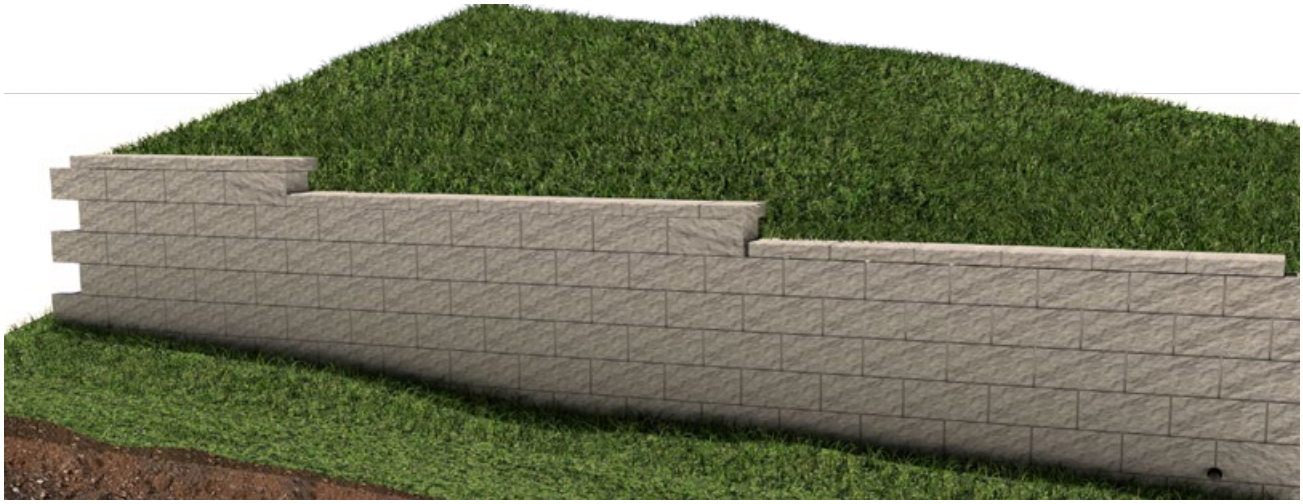
BASE ELEVATIONS - FIRST COURSE

- The top of the installed base unit will be used to establish the step up gravel leveling pad elevation
- Make sure to backfill and compact the gravel in and around the last unit of the first course
- Finished grade of the leveling pad should be an ⅛" to ¼" above top of first course units to allow for a small amount of settlement
- Repeat the above screeding steps on the second elevation gravel leveling pad

BASE ELEVATIONS - SECOND COURSE

- Place the first unit on the second course at a half bond on top of last & second last of the first course units, pressing upper block's rear lip tight to back of lower blocks beneath
- To align the wall, place a string line at the back of the units for a straight wall or place a PVC pipe for a curved wall
- Pull upper unit forward to engage and align units
- Place the second unit half on the last unit and half on the second gravel leveling pad. Remove the rear lip on the half of the unit that lays on the leveling pad

⚠ **Important:** Any blocks directly sitting on the leveling pad should be base units. Any blocks that are sitting atop two Fortus 12D® units should be standard blocks. Any units that are half on Fortus 12D® blocks and transition to the leveling pad for a step-up should be noted to have half the rear lugs removed (that removed half of the rear lug will sit on the leveling pad).



Fortus 12D®
RETAINING WALLS

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