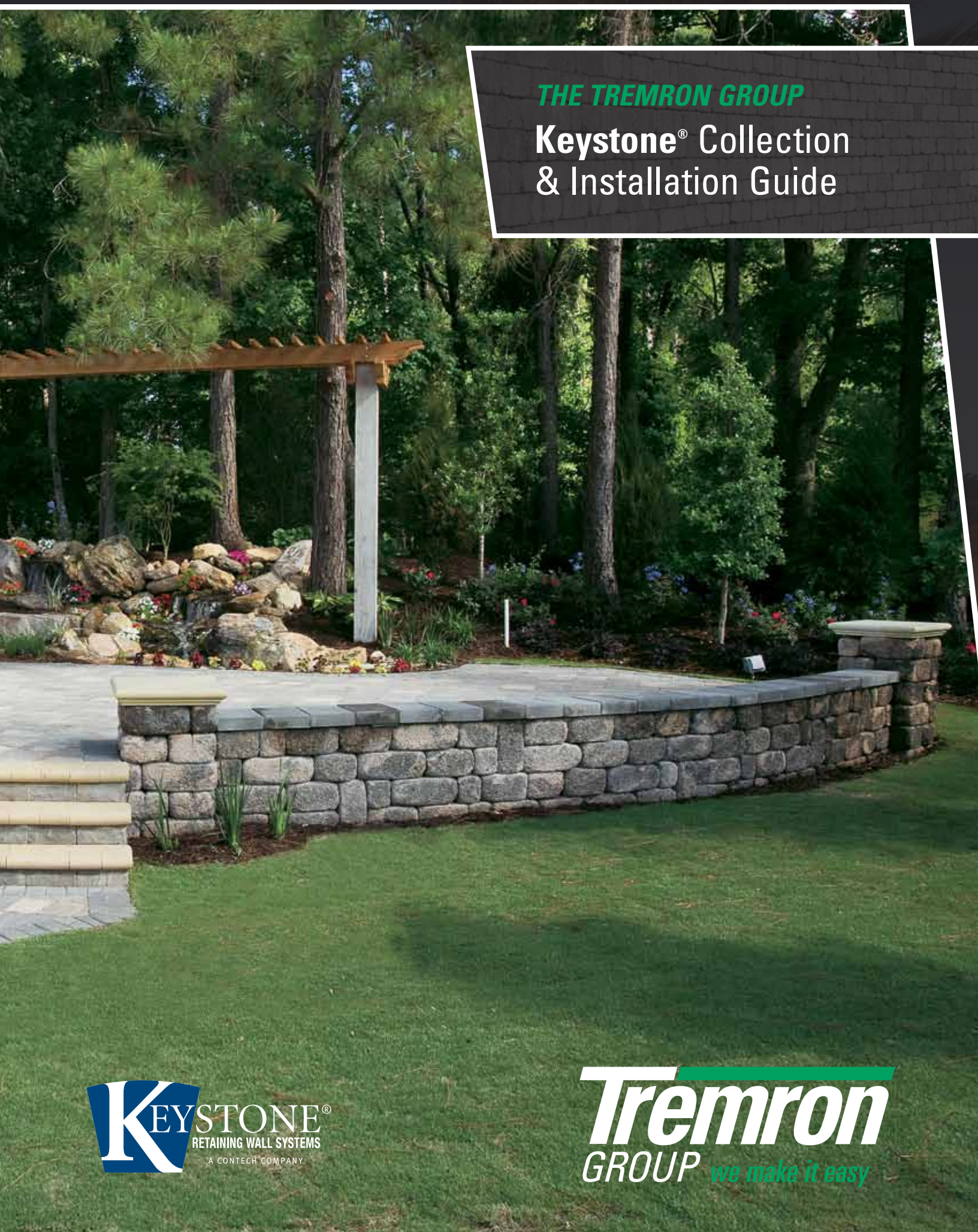


THE TREMRON GROUP

Keystone® Collection & Installation Guide

KEYSTONE® RETAINING WALL SYSTEMS
A CONTECH COMPANY

Tremron GROUP we make it easy

There's Only One Keystone®.

And in Florida, There's Only One Source. Tremron Group.

Tremron Group is Florida's exclusive licensed manufacturer of the popular Keystone Stonegate® Country Manor®, Compac, and Keystone Palazzo Stone®. Tremron's line of retaining wall products offer the natural appeal and flexibility that our architects, installers, contractors and homeowners are looking for. They're easy to install and are extremely low maintenance.

Easy selection. Easy ordering. Easy delivery. That's the promise of the Tremron team. With the most extensive manufactured product line in the Southeast, we are a ***complete solution for your hardscape needs*** – from pavers and natural stone to erosion control and now the one-of-a-kind Keystone retaining wall products.

The best products. The best selection. The best choice.

The Tremron Group.
We Make it Easy.


8451
CITIGATE
APARTMENTS. EVOLVED.

Available colors
shown in Tumbled

Tan

Granite

Oak Run

Sante Fe

Timberwood

Sierra

Autumn Blend

Keystone Palazzo Stone®

Keystone Palazzo Stone® features an attractive antique finish that provides a natural stone look. Keystone Palazzo Stone's random pattern appearance is achieved by alternating unit side dimensions. Each unit is angled and textured on both sides, providing two different face lengths for tight-fitting straight line walls and radii at curves. Keystone Palazzo Stone is available in both tumbled and untumbled finishing options, and is a great choice for beautifying your home or garden.

Keystone Palazzo Tumbled offers all the appeal and function of traditional untumbled Palazzo Stone, in a rustic tumbled variation to provide an antiqued look to your retaining wall project. Units are angled on both sides to create an old world random arrangement for classic, earthy charm.

KEYSTONE Palazzo Stone®

4"h x 12"/9"w x 8"d
25 lbs.

TUMBLED CAP UNIT
3"h x 12"w x 8"d
18 lbs.

Shade variation is inherent in all-natural materials. Colors may vary depending upon manufacturing location. Individual product measurements given are rounded. Contact your Tremron Sales Representative or visit our website for exact dimensions.

Palazzo Stone® Installation Steps

PREPARE THE BASE LEVELING PAD

Remove all surface vegetation and debris. Do not use this material as backfill. After selecting the location and length of the wall, excavate the base trench to the designed width and depth (min. 20" W x 12" D)[500mm x 300mm]. Start the leveling pad at the lowest elevation along wall alignment. Step up in 6" (150mm) increments with the base as required at elevation changes in the foundation. Level the prepared base with 6" (150mm) of well-compacted granular fill (gravel, road base, or 1/2" to 3/4" [10-20 mm] crushed stone). Compact to 95% Standard Proctor or greater. Do not use PEA GRAVEL or SAND for leveling pad.

INSTALL THE BASE COURSE

Place and level the first Keystone Palazzo Stone unit. Level each additional unit on the base course as you place it, making sure that the outside edges touch. If your wall contains both straight and curved areas, start with a straight area and build into the curves. Complete the base course before proceeding to the second course.

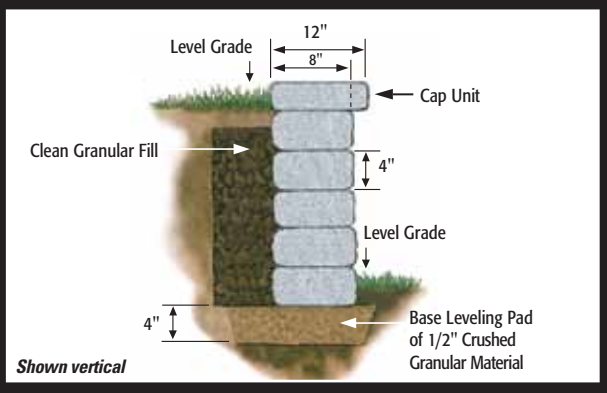
*Note: For straight line walls, unit faces can be alternated to create a more random look. Secure all units in place with appropriate concrete adhesive.

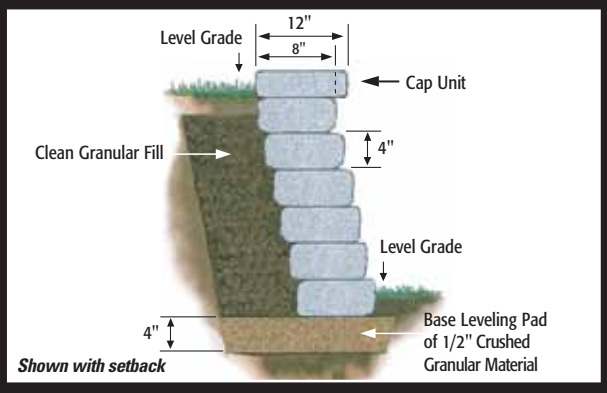
APPLY CONCRETE ADHESIVE

For all applications of this product, additional courses must be secured in place with concrete Adhesive, Keystone KapSeal™, or construction adhesive.

*Note: It is recommended to put all the units in place first, for easy adjustment and cutting, before securing with glue.

Setback Details





Antiqued Series

Keystone Country Manor®

Successful designers and contractors are using the old world charm of Keystone Country Manor® to provide a new look on wall projects. Keystone Country Manor offers the appearance of rustic, hand-laid stone walls with the strength and ease of installation provided by the latest in dry-stacked, modular, pin-connected technology.

Random and rugged, these high-strength concrete modules conjure images of old English estate walls, adding character to any project.

Keystone Country Manor® offers an infinite number of wall assembly combinations to ensure that every Country Manor wall will be one of a kind. With multiple color and texture options, and the ability to function as either a reinforced retaining wall or a freestanding gravity landscape wall, Keystone Country Manor has unlimited application options.

KEYSTONE® Country Manor®

KEYKUT™ TECHNOLOGY

6"h x 10"d x 16"/14"w
60 lbs.

6"h x 10"d x 12"/12"w
45 lbs.

6"h x 10"d x 12"/10"w
40 lbs.

6"h x 10"d x 10"/8"w
45 lbs.

6"h x 10"d x 6"/4"w
25 lbs.

CAP UNIT
3"h x 14"d x 12"w
9 lbs.

SHOULDERED PINS

Keystone shouldered pins are made from high strength pultruded fiberglass.

Available colors:

Autumn

Granite

Oak Run

Sanddune

Santa Fe

Sierra

Timberwood

Antiqued Series

Keystone Stonegate® Country Manor®

Featuring the look of smooth, weathered stone you might find in a quaint European town, Keystone Stonegate Country Manor has all the best features of the original Keystone Country Manor®, but with a twist!

Keystone Stonegate Country Manor's smooth face looks like cut stone and presents a more refined look. Utilizing Keystone's patented fiberglass pin connection method, Keystone Stonegate Country Manor offers the same freestanding wall options as Keystone Country Manor and is also suitable for larger, structural projects.

For any home, if you want the beauty of natural stone and sophisticated, easy-to-use technology, think Keystone Stonegate Country Manor.

KEYSTONE Stonegate® COUNTRY MANOR®

6"h x 10"d x 6"/4"w
25 lbs.

6"h x 10"d x 12"/10"w
40 lbs.

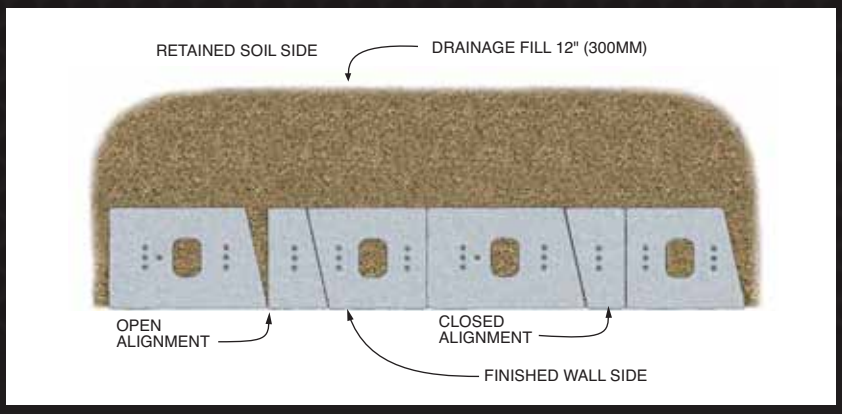
6"h x 10"d x 16"/14"w
60 lbs.

UNIVERSAL CAP
2¾"h x 12"d x 10"w
22 lbs.

SHOULDERED PINS

Keystone shouldered pins are made from high strength pultruded fiberglass.

Shade variation is inherent in all-natural materials. Colors may vary depending upon manufacturing location. Individual product measurements given are rounded. Contact your Tremron Sales Representative or visit our website for exact dimensions.



In addition to providing strength and beauty, Keystone Stonegate Country Manor can create signature hardscape designs that set your project apart from all others. The ability to create freestanding walls allows for the creation of barbeques, fireplaces, outdoor kitchens, bench seating, and the concealment of outdoor lighting and speaker systems. Use Keystone Stonegate Country Manor to provide detail and accent to a large lawn or green space, add grandeur to a drive or walkway, or create a truly unique pool/patio area.

Available colors:

Tan

Granite

Oak Run

Autumn

Santa Fe

Sierra

Timberwood

Antiqued Series

Keystone Stonegate Country Manor® | Keystone® Country Manor®

Features & Benefits

Closed end of receiving channel

The closed channel end at the unit bottom allows for finished end aesthetics on 90° corners, pilasters and wall end conditions. As required for pin interlock, remove the solid closed end of the receiving channel. Remove only if pin from unit below strikes this area.

The receiving channel on the bottom surface of each unit connects over the pins from the course below. Walls can be built with positive mechanical connection in 90° corners, curves and straight wall geometry without loss of connection or strength.

Three Face Dimensions

- Provides the greatest degree of random layout due to variations from unit side dimensions.
- Each unit has three side dimensions.

Colors

- Keystone's Country Manor Antiqued Series are produced in color blends that enhance the natural stone-like appearance.

Three Textured Sides on Each Unit

- Weathered or antiqued finish to provide a more natural stone look to the units.
- Allows each unit to be used in multiple positions within the wall.
- Each unit can be used as an exposed end unit or a 90° corner unit.
- Allows construction of small freestanding walls, parapet walls, pilasters and columns in addition to retaining walls.

Shape

- Each unit has a 90° angle and a tapered (angled) side, allowing the units to be used in 90° corners, tight fitting straight line walls, and radii at curves.

Units are Packaged in Sets

- Eliminates the need for the contractor to pull from multiple pallets to maintain random appearance.
- Provides for a simple method of construction and a random appearance to the wall system.
- Improved color consistency throughout finished wall.

High Strength Pins with Shouldered Cap

- Multiple pin positions allow for near vertical, 9.5° batter (setback), and the opportunity to randomly pull a unit forward to accent the wall.

Installation Steps

STEP 1

PREPARE THE BASE LEVELING PAD

Remove all surface vegetation and debris. Do not use this material as backfill. After selecting the location and length of the wall, excavate the base trench to the designed width and depth (min. 20" W x 12" D)[500mm x 300mm]. Start the leveling pad at the lowest elevation along wall alignment. Step up in 6" (150mm) increments with the base as required at elevation changes in the foundation. Level the prepared base with 6" (150mm) of well-compacted granular fill (gravel, road base, or 1/2" to 3/4" [10-20 mm] crushed stone). Compact to 95% Standard Proctor or greater. Do not use PEA GRAVEL or SAND for leveling pad.

STEP 2

INSTALL THE BASE COURSE

Place the first course of Keystone Stonegate Country Manor units end to end (with front corners touching) on the prepared base. The long groove (receiving channel) on the unit should be placed down and the three pin holes should face up, as shown. Make sure each unit is level - side to side and front to back. Leveling the first course is critical for accurate and acceptable results. For alignment of straight walls, use a string line aligned on the unit pin holes for accuracy. Minimum embedment of base course is 6" below grade.

STEP 3

INSERT THE FIBERGLASS PINS

Place the shouldered fiberglass pins into the holes of the Keystone Stonegate Country Manor Units (note: place one pin only per each grouping of three holes). Place pins in the middle hole for near vertical alignment or the holes nearest the embankment for a 9.5° ± setback per course. According to wall requirements and design, the front pin hole (towards the face of the wall) can be used randomly to allow a forward projection of a specific unit for accent and variation in the wall appearance.

STEP 4

INSTALL FILL & COMPACTION

Once the pins have been installed, provide 1/2"- 3/4" (10-20mm) crushed stone drainage fill behind the units to a minimum depth of 12" (300mm). Fill open spaces between units and open cavities/cores with the same drainage material. Proceed to place backfill in maximum 6" (150mm) layers (lifts) and compact to 95% Standard Proctor with the appropriate compaction equipment. Do not use heavy ride-on compaction equipment within 3' (1m) from back of wall. Do not use jumping or ramming type compaction.

STEP 5

INSTALL ADDITIONAL COURSES

Place the next course of Keystone Stonegate Country Manor units over the fiberglass pins, fitting the pins into the long receiving channel recess of the units above (Note: Some removal of debris in the pin holes and channel may be necessary prior to placement). Push the Keystone Stonegate Country Manor units toward the face of the wall until they make full contact with the pins. If pins do not connect with channel but align in open core of upper unit, place drainage fill in core to provide unit interlock with pin. For near vertical alignment, center the unit above over the center placed pins below.

STEP 6

CAPPING THE WALL

Continue all steps until ready to place the wall cap. Clean off the last course of Keystone Stonegate Country Manor in preparation for the cap or coping to finalize the wall. With units dry and clean, use construction adhesive (Keystone Kapseal™) for a mechanical bond. Install the Keystone Stonegate Country Manor 3" (75mm) capping unit, architectural precast concrete or cut stone as a coping element. Cap may be flush or overhanging as required by aesthetics and design. Note: For taller, more critical walls, refer to geogrid soil reinforcement instructions on the following page.

Pattern & Appearance

"Rule of Thumb" for bond pattern between courses: Construct the wall using the units as they come off each shipping pallet. Randomly utilize the various unit shapes trying to avoid a repetition of same unit size frequency along a horizontal line (some unit repetition is unavoidable).

Avoid stack bonding of unit joints (vertical joint line between adjoining units) for more than two courses vertically.

If some units seem to have a blemish or too much texturing in a specific area, orient them so the blemish faces the soil side of the wall to hide imperfections or use these units along the wall base.

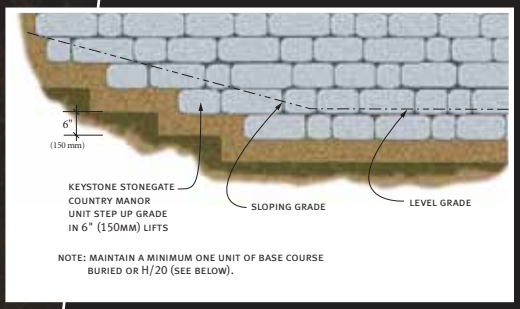
Embedment

Unit embedment below the grade line shall be a minimum of one unit buried, under all conditions, along with a general provision of H/20 (wall height divided by 20) for total wall embedment of taller walls. Note H=total height of wall from top of base leveling pad to top of wall.

Consult a qualified engineer for sloping grade conditions in front of wall or steep slopes and surcharge loads on top of wall.

Deeper embedment may be required in areas prone to surface scouring where base erosion is possible, or in areas where freestanding walls are desired and frost depths require deeper foundations.

Antiqued Series



Stepped Footing (Leveling Pad)

Leveling pad options:
- Crushed stone road base
- 3/8"-3/4" crushed stone
- Non-reinforced concrete (2000 psi)

Leveling pad thickness:
6" (150mm) ± granular materials
3" (75mm) ± concrete option

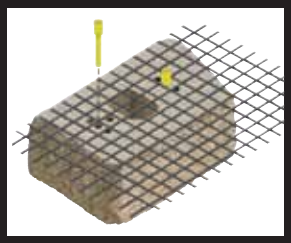
Always start wall at lowest elevation of site location where wall is to be constructed. Build step-ups in leveling pad to match 6" Keystone Stonegate Country Manor unit thickness. When using non-reinforced concrete for the leveling pad option, it is critical that the step-ups exactly match the Keystone Stonegate Country Manor unit thickness! With a concrete leveling pad, there are few options for correction if the step-up is built higher than the unit height.

General Notes

- Units may vary due to texturing processes and unit sizes by region. Verify unit type, size, weight availability by region. Units may vary up to 1" + (25mm) due to texture variations.
- Clean out pin holes and receiving channel as required to assemble wall. During manufacturing, some concrete crumbs may deposit in these areas and should be removed to permit pins to be placed in the appropriate holes and receiving channel.
- Cut or split units as required (with a mason saw, hydraulic break or chisel and hammer) for corners, caps or wherever units need to be altered to allow construction to be finalized. (Cuts produce smooth finish; splits produce textured finish.)
- When cutting concrete units, always wear safety goggles, gloves and filter mask per manufacturer's recommendations.
- Use Keystone Kapseal construction adhesive for all units in parapet walls, columns, etc. where wall is built freestanding (not retaining soil). Use vertical bead of adhesive between units in freestanding wall to avoid daylight view through wall units. Use adhesive as required at 90° corners or where pins do not interconnect units.

Geogrid Soil Reinforcement

Taller walls or walls supporting surcharge loads require the use of geogrid reinforcement material to reinforce a cohesive soil mass directly behind the retaining wall and provide connection to the concrete facing units. Geogrid properties and wall design require knowledge of wall heights, soil properties (Phi angle and moist unit weight), surcharge loads and manufacturer's requirements for specific geogrid types and strength capabilities. For general design of limited height walls, refer to the "Design Charts" in the back of this brochure. For conditions beyond these basic charts, consult a qualified engineer. To install geogrid into your wall, continue the installation process with the following steps.



Excavate Reinforced Soil Area: Remove existing soil in the reinforced soil zone to the maximum embedment length of the geogrid design. Level and compact soil behind the wall prior to placement of each geogrid layer.

Cut Geogrid: Cut sections from the geogrid roll to the specified length (embedment length) by design charts or engineers design analysis. Check manufacturer's criteria for biaxial or uniaxial geogrids. In most cases, the correct orientation is to roll the geogrid perpendicular to the wall face.

Install Geogrid: Place geogrid over the Keystone Stonegate Country Manor shouldered pins already in place. NOTE: Allow approximately 3" (75mm) of geogrid material to rest on the unit top surface ahead of the pin (from pin to face of wall). This will ensure that the next course above will be fully supported on geogrid. Place all sections of geogrid, abutting each other side-to-side as per manufacturers instructions.

Secure Geogrid: Pull the pinned geogrid taut to eliminate loose folds. Stake or secure the back edge of geogrid before backfill and compaction. As possible, compact from back of wall area towards embankment to avoid loosening geogrid or putting compaction pressure on wall. Remove stakes, as required, once backfill is placed.

Install the next course of Keystone Stonegate Country Manor Units: Follow steps 3-5 (on page 9) until next geogrid layer or completion of wall.

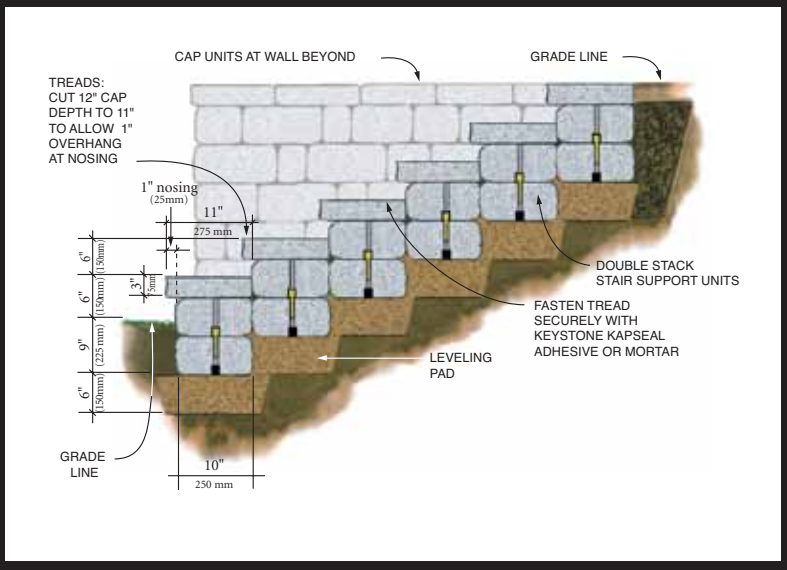
Step Designs

Handrails

Provide handrail/railing as per local building code. Core drill for handrail and secure with non-shrink grout as required. Core drill through cap unit into the base support units for handrail support.

Keystone Country Manor® and Stonegate® Country Manor® can be used on your step/stair projects with the following considerations:

- Provide the same material at the step foundation as used on the Keystone Stonegate Country Manor wall leveling pad.
- Compact leveling pad material to a minimum 95% Standard Proctor.
- Double stack the base support units to create a foundation for the stair “tread" units. Use pins and construction adhesive as required for a unified step assembly.



Antiqued Series

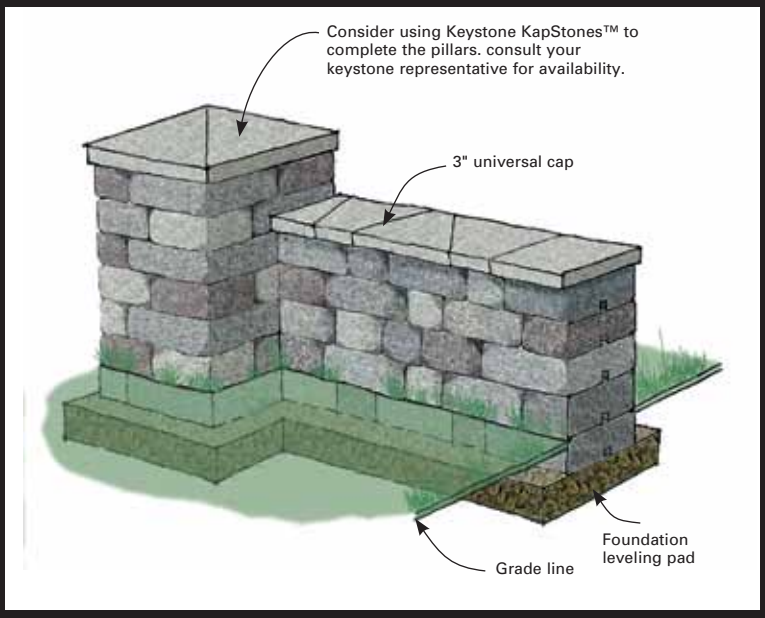
Freestanding Wall Applications

When considering freestanding wall conditions of any height, the designer must consider the requirements of geometry and internal reinforcing to resist overturning and seismic forces (where applicable). Reinforced footings/foundation depth must be considered to provide support and bearing as applied to soil and frost conditions. Due to the variable nature of each site situation, a qualified engineer should be consulted for appropriate design in accordance with local building codes.

The design details shown on the next few pages are for concept representation only and are not intended to represent final design. Consult a qualified engineer for specific design considerations.

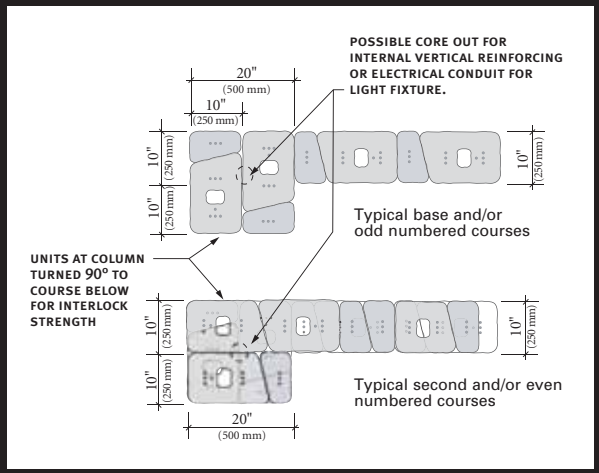
COLUMN TOP OPTIONS

- Landscape lighting/entry
- Planter with flowers or ornamentals
- Yard figurine/sculpture
- Mail box
- Street address monument



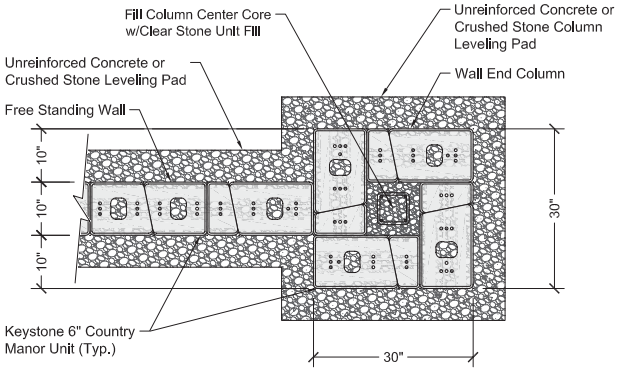
COLUMN CORNER

A typical column corner utilizes a 20"x 20" column geometry to develop an integrated pier at the end of a running wall. This detail offers visual aesthetic interest as well as provides strength at the end of the freestanding wall.

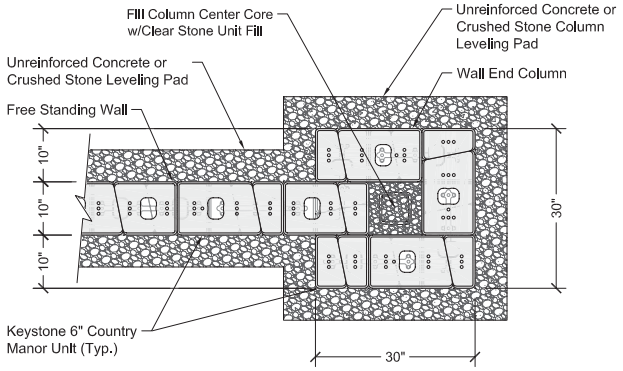


Wall End Column

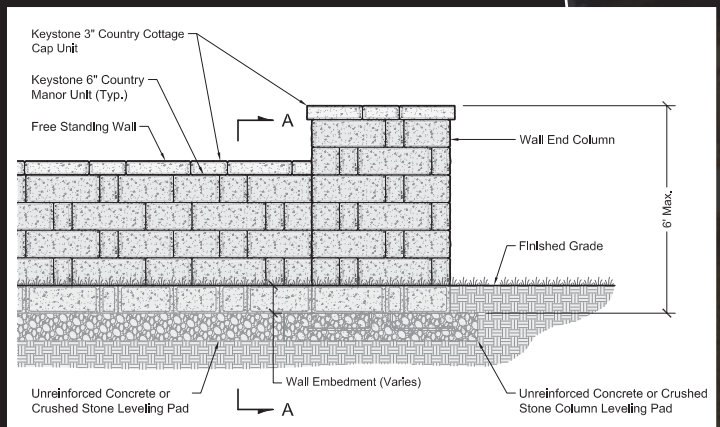
The wall end column is a larger version of the "Column Corner" detail. The benefit of this design option is the development of internal reinforcement to provide for greater strength and height, along with a larger footprint dimension for aesthetic purposes. Additionally, for markets where the 10"/8" unit is available, this can be combined with the 12"/10" unit to create a 20" long segment of the 30" x 30" column.



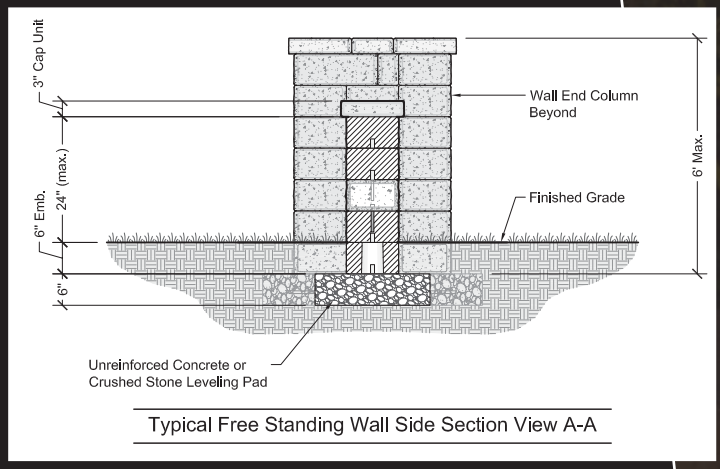
Typical base and/or odd numbered courses



Typical second and/or even numbered courses

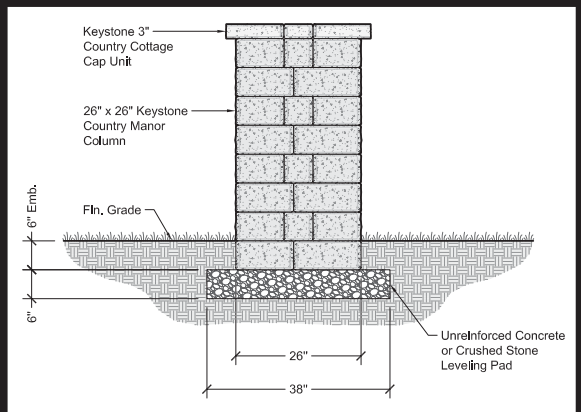


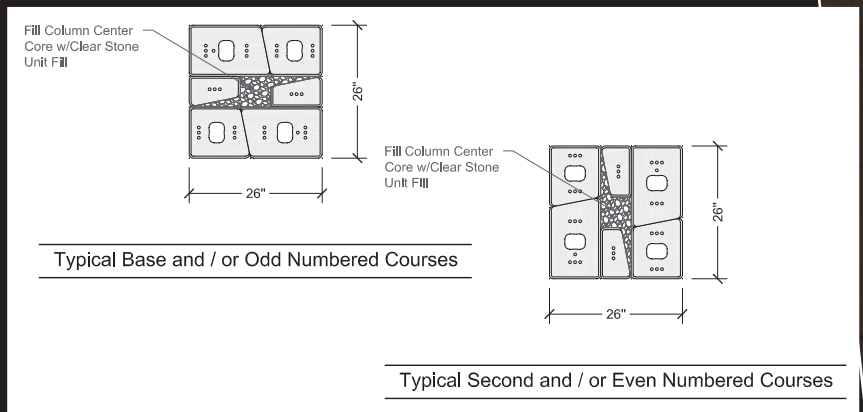
Typical Wall / Column Side Elevation



Typical Free Standing Wall Side Section View A-A

26" Column





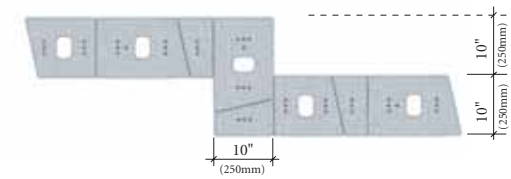
Typical Base and / or Odd Numbered Courses

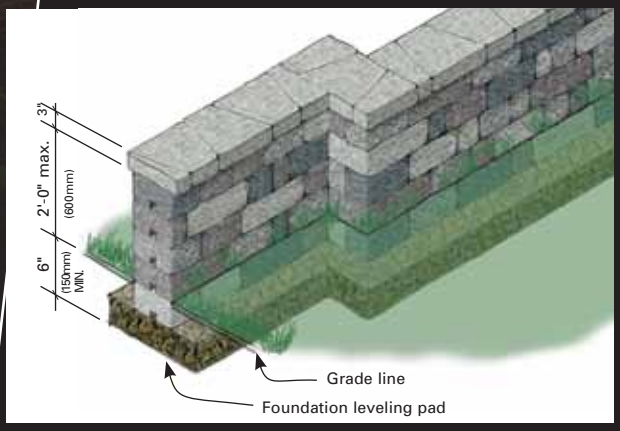
Typical Second and / or Even Numbered Courses

Antiqued Series

Wall Offset

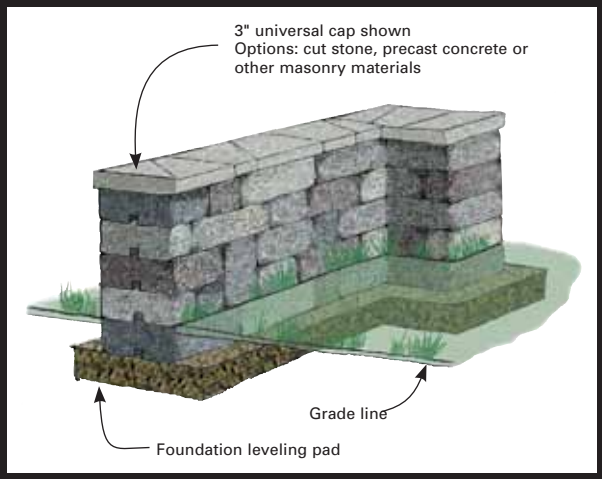
- Wider wall geometry (footprint) provides greater strength for parapet walls to resist overturning.
- Offsets allow for graceful changes in wall direction.
- Offsets are an opportunity for aesthetic geometry and landscape feature areas.





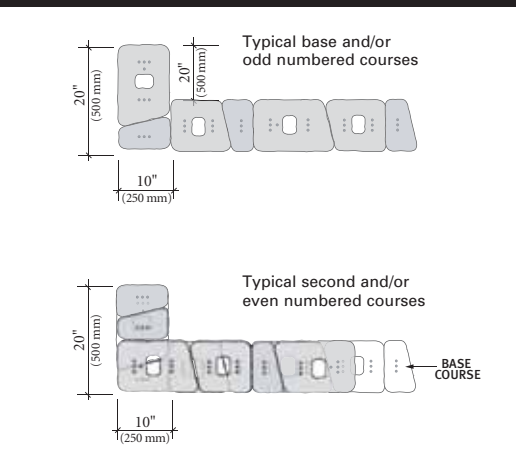
Notes

- The minimum offset for two parallel walls, as shown in the details on this page, is 10". Continuous offsets @ maximum 10'-0" O.C. will provide strength at parapet walls in coordination with construction adhesive (Keystone Kapseal) and/or vertical reinforcement as required by engineer.
- It is important to use overlapping unit combinations at the offset location where two units combined together equal 20" in length (see plan geometry on the right).
- Details showing freestanding wall applications show partial sections of walls. The unfinished ends, with channel openings visible, are not meant to portray a finished condition.



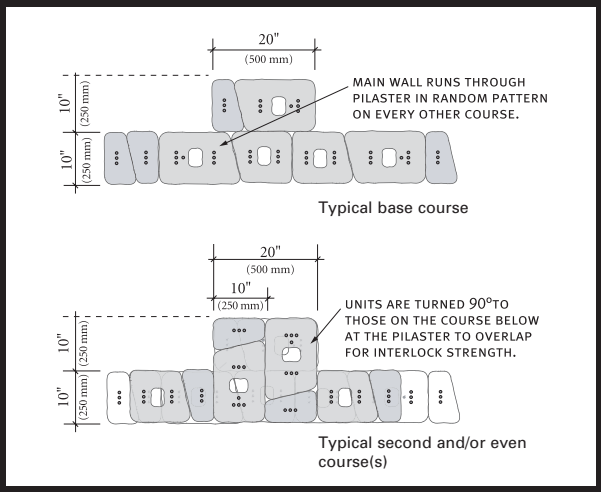
"L" Return End

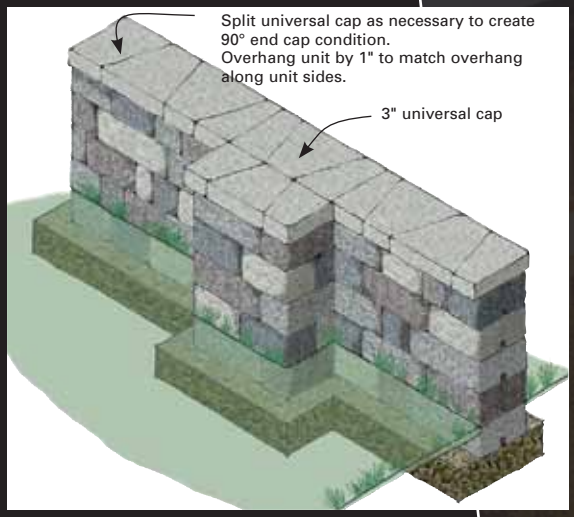
Similar to column corners, this detail offers stability and strength to resist overturning forces at the end of a freestanding wall.



Pilaster Detail

The pilaster detail creates a deeper wall section within the wall which can provide stability for a retaining structure, freestanding wall or parapet.

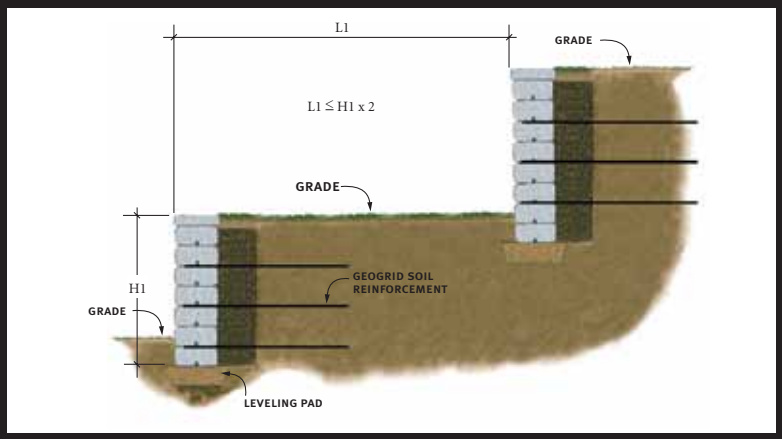




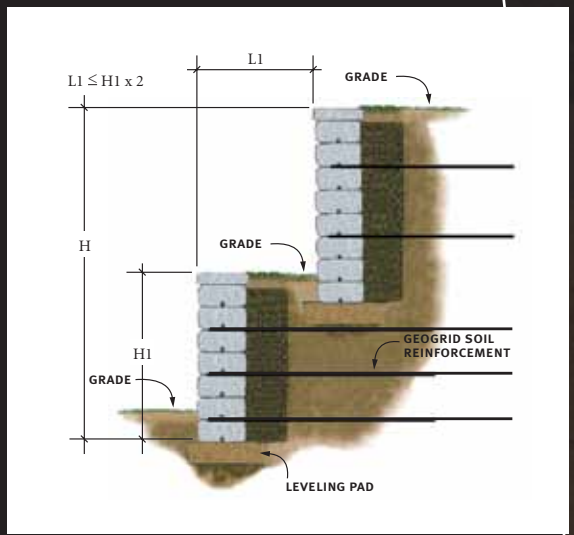
Terraces

Terraces are a pleasing way to build a taller retaining wall where aesthetics dictate the separation of walls to reduce the wall height and large mass appearance. Closely spaced terraces need to be reviewed by a qualified engineer to avoid global instability issues and to make sure soil reinforcement (geogrids) are properly designed to handle the loads for the entire wall structure.

Terraced walls should be analyzed as a complete wall system versus individual walls unless they are spread apart greater than twice the wall height of each terrace and the soils are free draining and granular in nature.



TERRACE WALL PROXIMITY EVALUATION

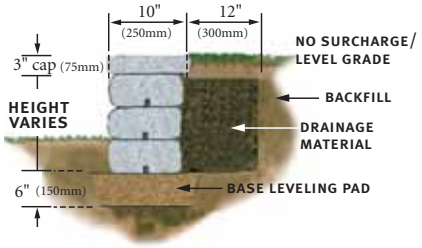


For walls where L1 is less than or equal to H1 x 2, then the walls are to be considered as a composite and the entire wall height (H) needs to be considered in the design.

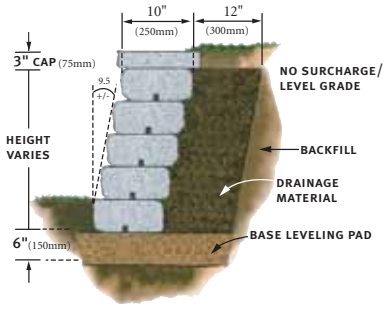
For walls where L1 is greater than or equal to H1 x 2, then the walls typically are analyzed separately. Walls built on slopes greater than or equal to 3:1 or on soft soils need to be analyzed for "global stability". Consult a qualified engineer.

Antiqued Series

GRAVITY WALL
Near Vertical Detail



GRAVITY WALL
Setback Detail 9.5° ± Batter



Design Considerations

Design Assumptions

- Friction angle (PHI) for earth pressure calculations of geogrid reinforced walls is evaluated at 26°, 30° and 34° only. For other soil type analysis, refer to KeyWall Software program or consult with a qualified engineer.
- Moist weight of three soil types indicated is 120 lb./ft.^{3} (19kN/m^2).
- Sliding calculations use 6" (150mm) crushed stone leveling pad as compacted foundation material.
- All backfill materials are compacted to 95% Standard Proctor density.
- The term "vertical" is a wall built to a near vertical alignment having a slight positive setback (1° ±).
- The information provided herein is for preliminary design use only. A qualified engineer should be consulted for design and analysis of structures. Keystone Retaining Wall Systems, Inc. assumes no liability for the improper use of this information.

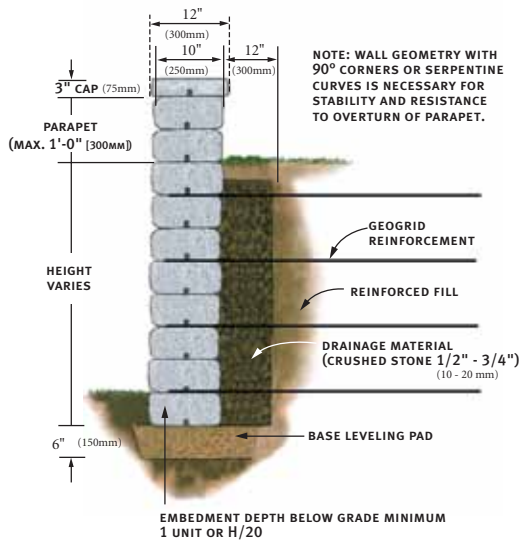
GRAVITY WALLS (maximum unreinforced wall height)

MAXIMUM HEIGHT	NEAR VERTICAL		9.5° ± BATTER	
	level	3h:1v	level	3h:1v
Sand / gravel phi= 34°	2'-0" (0.6m)	1'-6" (0.45m)	3'-0" (0.9m)	2'-6" (0.75m)
Silty sand phi = 30°	1'-6" (0.45m)	1'-6" (0.45m)	2'-6" (0.75m)	2'-0" (0.6m)
Silt / lean clay phi = 26°	1'-6" (0.45m)	1'-0" (0.3m)	2'-0" (0.6m)	1'-6" (0.45m)

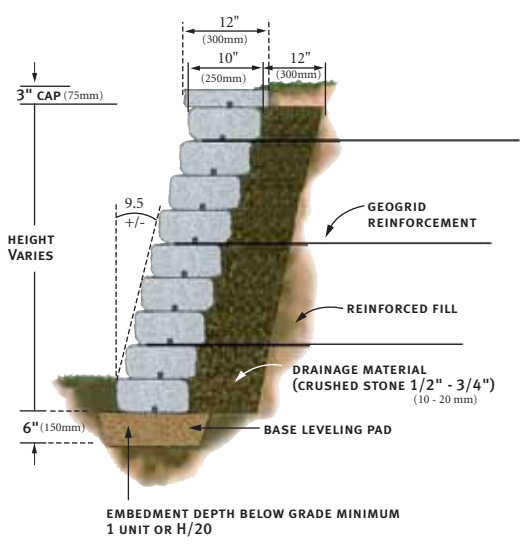
Design Notes

For low (non-structural) landscape retaining walls, Keystone Stonegate Country Manor can be constructed as a non-reinforced gravity wall as shown in the chart to the left. This chart is for retaining walls in the "near vertical" option. Note: use pins and construction adhesive at low border/parapet walls.

REINFORCED WALL
Near Vertical Detail



REINFORCED WALL
Setback Detail 9.5° ± Batter

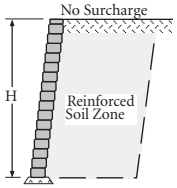


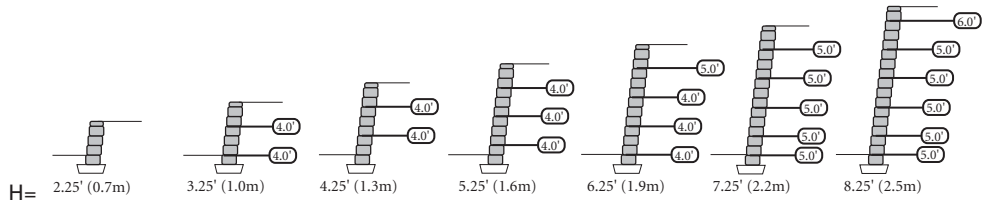
Design Charts

The following charts assume the use of a coated polyester geogrid with a minimum allowable design strength of: LTDS = 750 plf (10.9 kN/m) or Tal = 500 plf (7.3 kN/m)

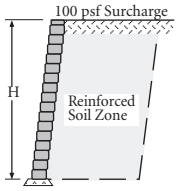
Silt/Lean Clay: f=26°, g=120 pcf (19kN/m³)

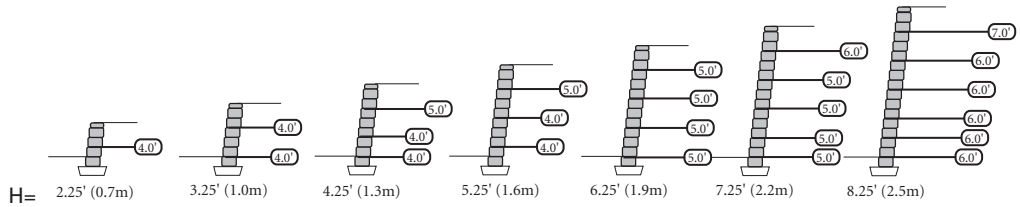
Case 1 — Reinforced walls - (9.5° ± setback)



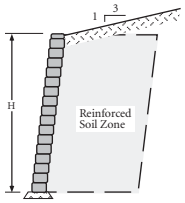


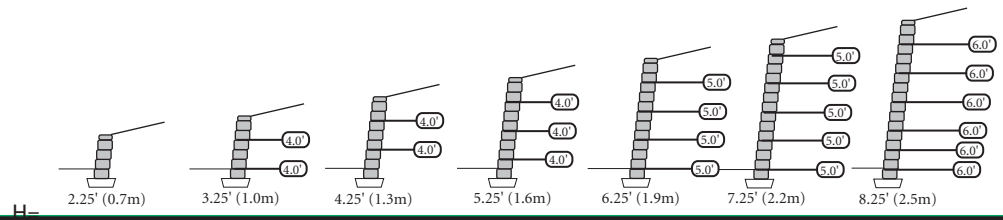
Case 2 — Reinforced walls - (9.5° ± setback)





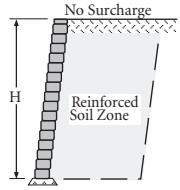
Case 3 — Reinforced walls - (9.5° ± setback)

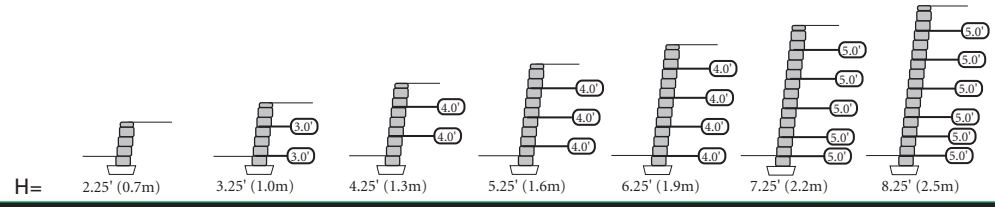




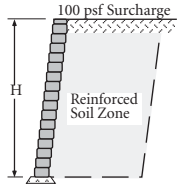
Silty Sand: f=30°, g=120 pcf (19kN/m³)

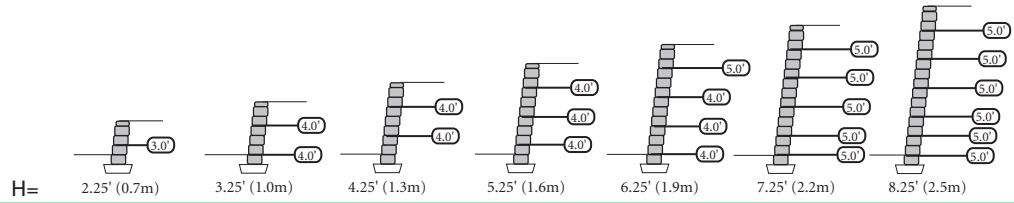
Case 1 — Reinforced walls - (9.5° ± setback)



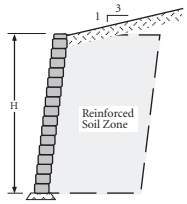


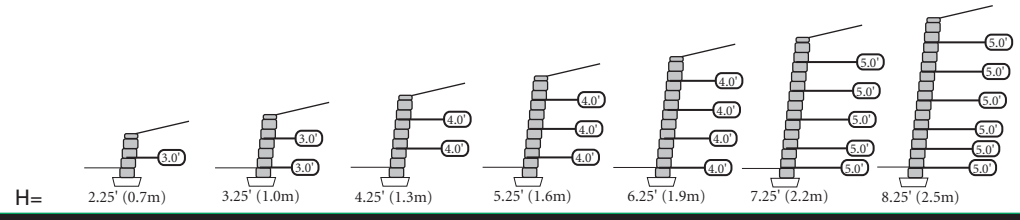
Case 2 — Reinforced walls - (9.5° ± setback)





Case 3 — Reinforced walls - (9.5° ± setback)





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Keystone Compac

The Keystone Compac is the perfect choice for large residential and small to large commercial projects.

The improved geometry of the Keystone Compac Unit allows for easier installation and increased connection strength with geogrid reinforcement.
This unit allows for various positive connections with reinforcement to build walls in excess of 60 feet tall.*
Units are interlocked with high-strength fiberglass units and available in a tri-plane KeyKut™ face option.

*Based on design by a professional engineer.

KEYSTONE® COMPAC

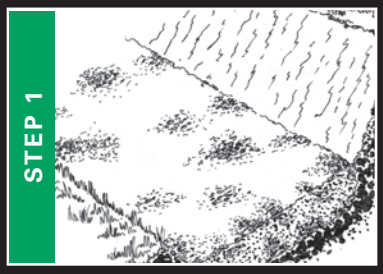
COMPAC III UNIT
8"h x 12"d x 18"w
75 lbs.

ABRAIDED CAP UNIT
3"h x 14"w x 12"d
39 lbs.

FIBERGLASS PINS

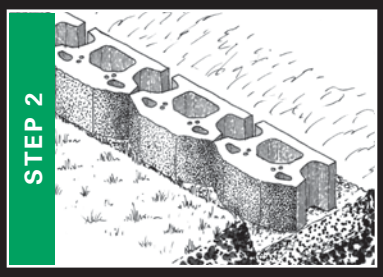
KEYKUT™ TECHNOLOGY

Installation Steps



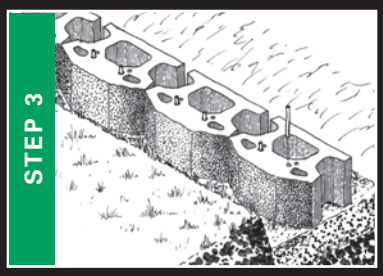
PREPARE THE BASE LEVELING PAD

After selecting the location and length of the wall, excavate the base trench to the designed width and depth. Start the leveling pad at the lowest elevation along the wall alignment. Step up in 8" (200mm) increments with the base as required at elevation change in the foundation. Level the prepared base with 6" (150mm) of well-compacted granular fill (gravel, road base, or 1/2" to 3/4" [10-20mm] crushed stone). Compact to 95% Standard Proctor or greater.
Do not use PEA GRAVEL or SAND for leveling pad.



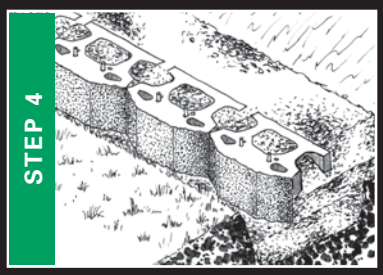
INSTALL THE BASE COURSE

Place the first course of Keystone units end to end (with face of wall corners touching) on the prepared base. The receiving pin holes should face upward, as shown. Make sure each unit is level. Leveling the first course is critical for accurate and acceptable results. Keystone recommends minimum embedment depth for below grade placement of Keystone units on a ratio of 1" (25mm) below grade for each 8" (200mm) of wall height above grade or one unit, whichever is greater.



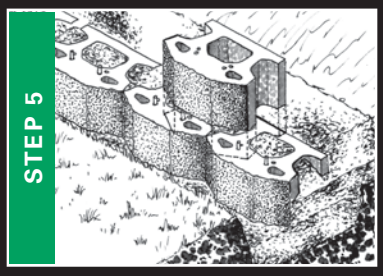
INSERT THE FIBERGLASS PINS

Place the appropriate fiberglass pins (straight or shouldered) into the holes of each Keystone unit as required. Once placed, the pins create an automatic setback for the additional courses. According to wall requirements and design, place pins in the front holes for near vertical (1/8" or [3mm]) setback and the rear holes for 1-1/4" (32mm) setback per course.



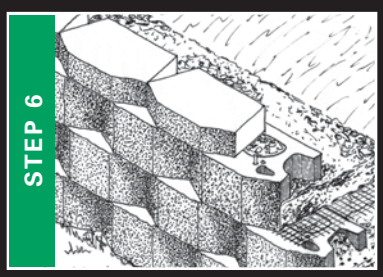
INSTALL FILL & COMPACTION

Once the pins have been installed, provide 1/2"-3/4" (10-20mm) crushed stone drainage fill behind the units to a minimum distance behind the tail of one foot (300mm). Fill all open spaces between units and open cavities/cores with the same drainage material. Proceed to place backfill in maximum 6-8" (150-200mm) layers and compact to 95% Standard Proctor with the appropriate compaction equipment.



INSTALL ADDITIONAL COURSES

Place the next course of Keystone units over the fiberglass pins, fitting the pins into the receiving pin hole of the units above. Push the units toward the face of the wall until they makes full contact with the pins. Continue backfilling and building to desired top elevation.



CAPPING THE WALL

Complete your wall with the appropriate Keystone capping units. With units dry and clean, use construction adhesive (Keystone KapSeal™) on the top surface of the last course before applying cap units. Backfill and compact to finish grade.

Available colors:

Tan

Coral

Natural

Sandstone

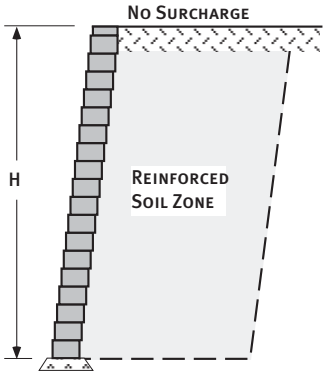
KEYSTONE® COMPAC

Design Charts

Silty Sand: ϕ=30°, γ=120 pcf (19kN/m³)

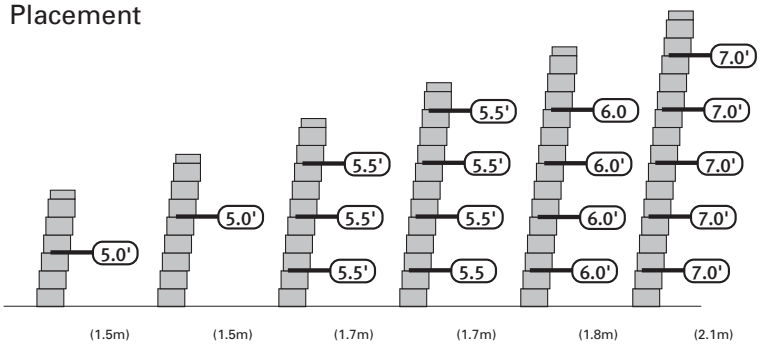
The following charts assume the use of a coated polyester geogrid with a minimum allowable design strength of: LTDS = 750 plf (10.9 kN/m) or Tal = 500 plf (7.3 kN/m)

Case 1



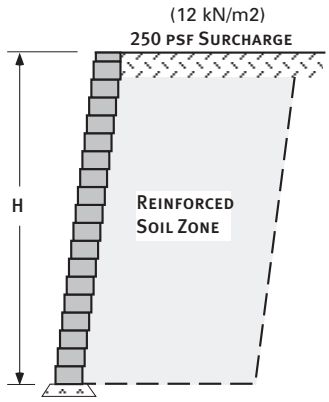
Reinforced walls - 1-1/4" (25mm) setback

Geogrid Placement



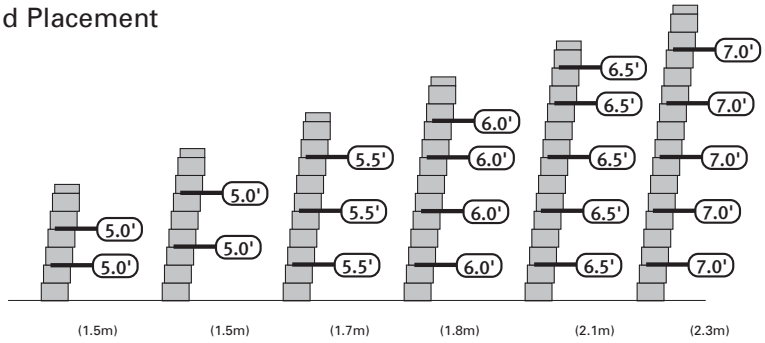
H=	4.3' (1.3m)	5.7' (1.7m)	7.0' (2.1m)	8.3' (2.5m)	9.7' (3.0m)	11.0' (3.4m)

Case 2



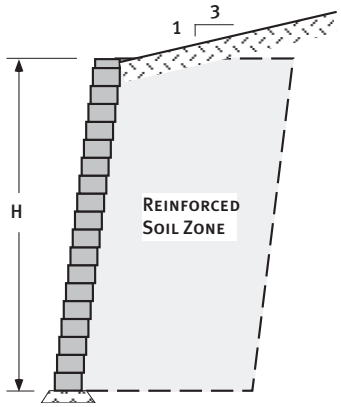
Reinforced walls - 1-1/4" (25mm) setback

Geogrid Placement



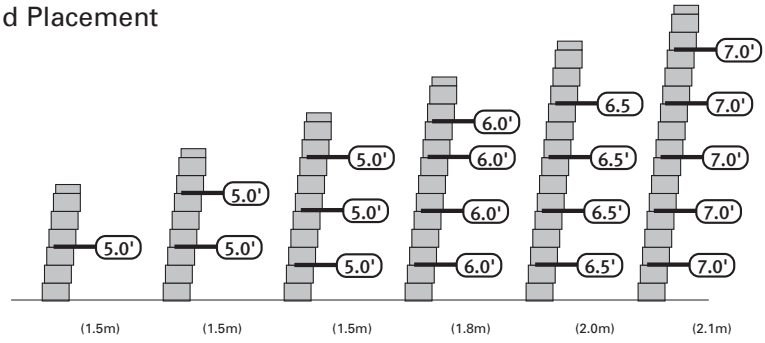
H=	4.3' (1.3m)	5.7' (1.7m)	7.0' (2.1m)	8.3' (2.5m)	9.7' (3.0m)	11.0' (3.4m)

Case 3



Reinforced walls - 1-1/4" (25mm) setback

Geogrid Placement



H=	4.3' (1.3m)	5.7' (1.7m)	7.0' (2.1m)	8.3' (2.5m)	9.7' (3.0m)	11.0' (3.4m)

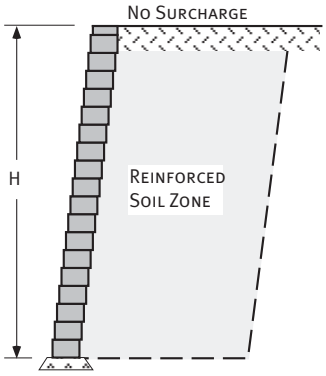
KEYSTONE® COMPAC

Design Charts

The following charts assume the use of a coated polyester geogrid with a minimum allowable design strength of: LTDS = 750 plf (10.9 kN/m) or Tal = 500 plf (7.3 kN/m)

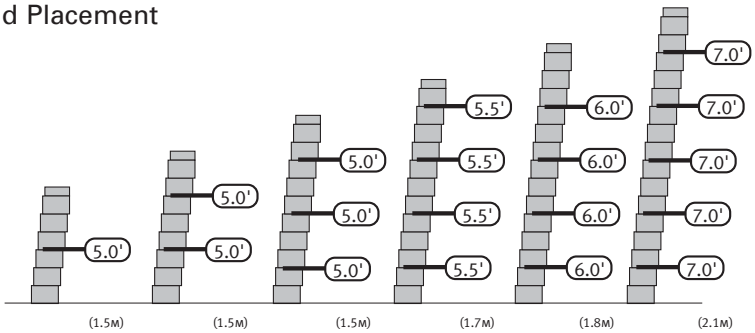
Sand/Gravel: ϕ=34°, γ=120 pcf (19kN/m³)

Case 1



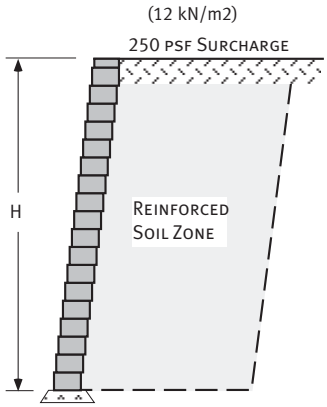
Reinforced walls - 1-1/4" (25mm) setback

Geogrid Placement



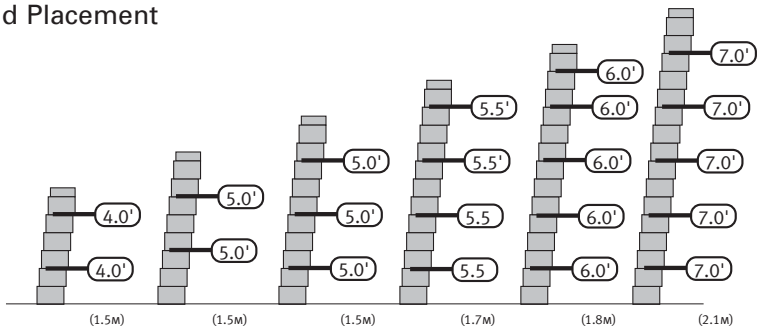
H=	4.3' (1.3m)	5.7' (1.7m)	7.0' (2.1m)	8.3' (2.5m)	9.7' (3.0m)	11.0' (3.4m)

Case 2



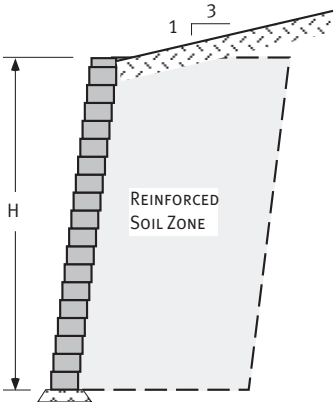
Reinforced walls - 1-1/4" (25mm) setback

Geogrid Placement



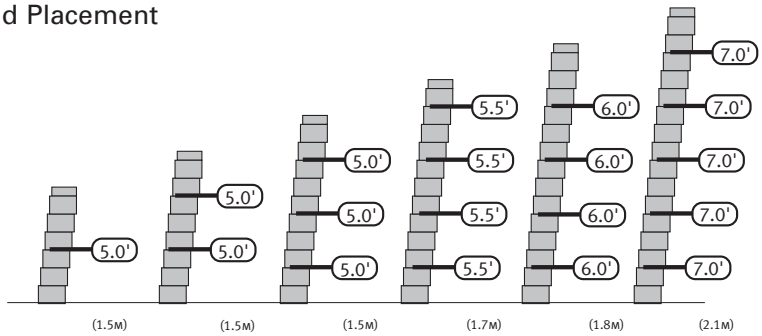
H=	4.3' (1.3m)	5.7' (1.7m)	7.0' (2.1m)	8.3' (2.5m)	9.7' (3.0m)	11.0' (3.4m)

Case 3



Reinforced walls - 1-1/4" (25mm) setback

Geogrid Placement



H=	4.3' (1.3m)	5.7' (1.7m)	7.0' (2.1m)	8.3' (2.5m)	9.7' (3.0m)	11.0' (3.4m)

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KEYSTONE®
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A CONTECH COMPANY

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