



# BELVEDERE INSTALLATION GUIDE

# WALL BLOCKS:

Wall blocks are provided in six basic shapes. The blocks are finished on the front and back faces. Both sides of the wall blocks are tapered on each side approximately 1" from the front to the back of the block.



# CORNER BLOCKS:

Corner blocks are provided in two sizes. The blocks are finished on three sides. The fourth side is tapered to fit with retaining wall blocks. The corner blocks can be used to construct columns, provide a finished end on a free standing wall and to make 90° corners.



# COPING BLOCKS (CAPS):

Coping blocks are provided in five basic sizes. There are three standard coping blocks which are finished on the front, back and two faces. The standard coping blocks are tapered and approximately 1" on each side from the front to the back. There are also two end units which are finished on the front, back, top and one of the sides. The other side is tapered approximately 1" from the front to the back. The end units are useful for constructing corners and ends



# **RETAINING WALL INSTALLATION:**

- 1. Review all plans and specification for the project. Make sure you understand the detailed design for the project before starting construction.
- 2. Footing excavation should be to the depth shown in the engineered plans for the wall, but at least 6" below the elevation of the bottom block of the wall.
- 3. Footing excavation width should be a minimum of 27", which will provide 6" in front of and 12" behind the bottom block.
- 4. Existing soil sub-grade should be compacted to a minimum of 95% of standard proctor before foundation material is introduced. Sub-grade soil should be firm native soil, dry and stable. Consult a soils engineer if in doubt.
- 5. Place leveling pad material as specified in the wall design Compact using a vibrator plate compactor.



- 6. Install a 4" diameter perforated drain pipe in the lowest portion of the free-draining stone, either on the bottom of the crushed stone leveling pad or immediately on top of the slow-draining road gravel leveling pad, depending on the detailed design. Daylight the drain pipe at the ends and/or through the face of the wall to allow for drainage.
- 7. Walls shall have the bottom courses buried to the depth shown on the engineered design. A minimum depth of 6" is required for all walls.
- 8. Place the bottom course of wall blocks. Take care to level the blocks both parallel and perpendicular to the wall.
- Backfill the first 12" behind the blocks and triangle shaped areas between the blocks with ASTM No. 57 drainstone. Place a layer of non-woven geotextile fabric immediately behind the drainstone and then place the retained or reinforced soil.
- 10. Drainstone and backfill shall be placed in maximum 6" lifts and compacted to a minimum of 95% of standard proctor. Hand compaction with a vibratory plate compactor shall be used within 3' of the retaining blocks.
- 11. Place successive units, drainstone, and compacted backfill to the desired grade/wall height.
- 12. The top of the wall must be graded to direct surface water away from the wall.
- 13. Coping layer should be adhered with a concrete adhesive.

# ADDITIONAL REQUIREMENTS FOR GEOGRID INSTALLATION (If Required):

- 14. Geogrid layers shall be installed to the lengths and elevations detailed in the wall design.
- 15. Geogrid shall be placed starting at the face of the retaining block and extending to the reinforced soil. Install the geogrid with the strong direction (roll direction) into the reinforced soil zone, not parallel to the wall.
- 16. Pull the geogrid taut to eliminate any folds and pretension the geogrid. Pin or secure the back edge of the geogrid before placing the reinforced fill.
- 17. Place and compact the reinforced fill starting at the back of the blocks and continuing back into the retained soil. Backfill shall be placed in maximum 6" thick layers and compacted to 95% of standard proctor. Hand compaction with a vibratory plate shall be used within 3 feet of the retaining wall blocks.
- 18. Tracked construction equipment shall not be used directly on the geogrid. A minimum of 6" of fill is required between tracked equipment and geogrid to prevent damage to the grid. Rubber-tired equipment may pass over the geogrid when traveling at low speeds of 5 mph or less.
- 19. Avoid any sudden stopping or turning of construction equipment in the reinforced fill zone to prevent moving or damaging the geogrid layers.
- 20. Follow geogrid manufacturer's requirements, including requirements for vertical separation and grid overlap.

# **RETAINING WALL PATTERNS:**

Here are some sample patterns to help you get started. These base patterns can be fit together in multiple ways to make walls of varying heights and lengths. Try these patterns or make your own random pattern. These patterns are NOT required and are presented for reference only. They are most useful for long, straight sections of retaining walls. Retaining walls are typically constructed with the front face of the block exposed. The v-shaped notches which appear on the back of wall between adjacent blocks must be filled with drainstone.





12" High x 13'-6" Wall Section Shown = 13.5 sft (1/2 Wall Pallet)

#### 18" High Wall



18" High x 18'-0" Wall Section Shown = 27.0 sft (1 Wall Pallet)

## 24" High Wall



24" High x 16'-0" Wall Section Shown = 32.0 sft (Approx. 1.2 Wall Pallets)

NOTE: The blocks shown below are labeled to be consistent with the convention used throughout this guide. For example, 4F would indicate the front (or longer) face of block 4, and 2B would indicate the back (or shorter) face of block 2.

# FREESTANDING WALL INSTALLATION:

This shows typical construction details for freestanding walls. These drawings are representative of major components required in wall construction. Belvedere freestanding walls are intended to be low walls (24" or lower) used in a garden or patio setting. Taller walls intended to act as railings or barriers, walls constructed in other settings, or walls subject to applied loads will require project specific engineering.

- 1. Footing excavation should be to the depth shown in the engineered plans for the wall, but at least 6" below the elevation of the bottom block in the wall.
- 2. Footing excavation width should be a minimum of 21", providing 6" in front of and behind the bottom block.
- 3. Existing soil sub-grade should be compacted to a minimum of 95% maximum dry density before foundation material is introduced. Sub-grade soil should be firm native soil, dry and stable. Consult a soils engineer if in doubt.



- 4. Place crushed stone or well-graded road gravel leveling pad material as specified in wall design. Compact using a vibrator plate compactor.
- 5. The first course should be buried to the depth shown in the engineered design. Typically, walls are buried 4" 6".
- 6. Place the bottom course of wall blocks. Take care to level the blocks both parallel and perpendicular to the wall. Adjacent blocks should be placed so the tapers on the sides are going opposite directions to provide a uniform wall face with no gaps on either side of the wall. Place successive units to the desired wall height.
- 7. Typically, concrete adhesive is used between all block courses to help provide additional stability.

# FREESTANDING RETAINING WALL PATTERNS:



NOTE: The blocks shown below are labeled to be consistent with the convention used throughout this guide. For example, 4F would indicate the front (or longer) face of block 4, and 2B would indicate the back (or shorter) face of block 2.

#### **PILLAR INSTRUCTIONS:**

Pillars make nice ends to freestanding walls, formal stair openings, stand-alone monuments and other areas to enhance your Belvedere project. The basic steps of pillar construction are shown here.



<u>Step 1</u> Place (4) 3" or 6" high corner blocks with the taper facing into the center of the pillar.



Step 2 Place the second row of (4) of the corner blocks with the taper facing into the center of the pillar. Typically if the first row is built with 6" corner blocks, the second row is built with 3" corner blocks.



Step 3

Continue with subsequent rows to the desired pillar height. One pallet of corner blocks will make a 24" x 24" x 36" high column.



<u>Step 4</u> Place a column cap to finish the pillar. The column cap can be cored as needed for

installation of a light.

# **INSIDE STEPS:**

This illustration shows typical construction details for making stair openings into a wall using Belvedere blocks and Rosetta dimensional steps. Stairs are a focal point in any project and need to be constructed properly. With some advance planning, installation can be easy and look great. These illustrations are shown without batter for clarity. Blocks in a retaining wall should be adjusted slightly in place and trimmed as needed to allow wall construction with a proper batter.



# 90° CORNER INSTRUCTIONS:

Take time to properly work corners into the larger wall patterns. Place blocks in an overlapping, interlocking pattern at corner for added wall stability. These illustrations are shown without batter for clarity. Blocks in a retaining wall should be adjusted slightly in place and trimmed as needed to allow wall construction with a proper batter.



# CURVED WALLS:

The taper on the sides of the blocks allow for construction of a wide range of curves in both retaining and freestanding walls.



**OUTSIDE CURVE** 



Minimum radius curves are shown which can be constructed without sawcutting a significant number of blocks. Larger radius curves can be created by leaving a larger gap between blocks on the back side of the wall. The gaps must be filled with drainstone. These illustrations are shown without batter for clarity. Blocks in a retaining wall should be adjusted slightly in place and trimmed as needed to allow wall construction with a proper batter.

When retaining walls are constructed with a batter, the radius on outside curves becomes smaller with each course and the radius on inside curves becomes larger with each course due to the block setback. For proper construction, the radius of the bottom course must be larger than the minimum radius so upper courses will have sufficient room for construction.

When retaining walls are constructed with a batter, the radius on inside curves becomes larger with each course due to the block setback.



NOTE: Curved freestanding walls can also be built. Typically, the blocks have to be field adjusted to make the desired curve. Front and back faces will alternate and blocks trimmed as needed to provide a tight fit between blocks with no gaps on either side of the freestanding wall.

This page shows preliminary guides for soil reinforcement required to construct a wall with Belvedere blocks in the conditions noted below. The geogrid layers shall be placed with 100% coverage along the length of the wall (no gaps between sections of grid). See wall installation details for typical construction notes. As always, follow the specific requirements shown in the engineered design for your wall.



These drawings are for reference only.

Final designs for construction must be prepared by a registered professional engineer using the actual conditions of the proposed site. Wall stability must be verified for site specific conditions.
Final wall design must address both internal and external drainage and shall be evaluated by the professional engineer who is responsible for the wall design.
Seismic conditions are not included in these guides and must be analyzed based on site specific conditions.
Vertical placement (VP) of geogrid is measured up from the botom of the blocks/top of stone leveling pad.
Length of geogrid is measured from the front of the Belvedere blocks.

- These guides assume a flat "toe" slope at the bottom of the wall. Toe slopes must be analyzed based on site conditions.

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Minimum Factors of Safety for the assumed conditions shown above are 1.5 for sliding, 2.0 for overturning, and 2.0 for bearing capacity.
Designs are in general accordance with NCMA's <u>Design Manual for Segmental Retaining Walls, and Ed.</u>
Reinforced and Backfill soils are to be compacted to 95% maximum dry density (Standard Proctor).
All Belvedere Specifications are to be followed. Block sizes and placement shown are for reference only. Individual blocks will vary with installation pattern.</sup> 

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