



ROCVALE | **UNILOCK**

BELMURO WALL SYSTEM INSTALLATION GUIDE

TABLE OF CONTENTS

TABLE OF CONTENTS.....	1
SYSTEM DESCRIPTION	2
DRY STACK SYSTEM: INSTALLATION GUIDE	5
GEOGRID WALL SYSTEM: INSTALLATION GUIDE	9
MASONRY WALL SYSTEM: INSTALLATION GUIDE	13
STEPS: INSTALLATION GUIDE	17

SYSTEM DESCRIPTION

The BelMuro is a wall system designed to bridge embankments. Moreover, BelMuro can be used as a freestanding wall system. The BelMuro blocks are factory-produced cuboid concrete elements featuring two chambers arranged in a row. Any wall over 1 m in height may be subject to permit requirements and engineering analysis. Always consult with your local authorities before beginning your project.

This system should only be installed by trained, professional contractors to ensure a safe, consistent, reliable system that will be long-lasting.

TOOLS YOU WILL NEED

WHEELBARROW



CHALK
LINE



RUBBER
MALLET



MEASURING
TAPE



PEGS



CONCRETE
SAW



LEVEL



VIBRATING
PLATE



LINE AND PINS



CEMENT MIXER



SHOVEL



SEALANT GUN



MATERIALS AND SPECIFICATIONS

1 - BelMuro Walling System units: Conforming to DIN EN 13198



Square brick
505 mm x 165
mm x 252 mm

1/2-Square
brick
255 mm x 165
mm x 252 mm

End stone
505 mm x 165
mm x 252 mm

1/2-End stone
255 mm x 165
mm x 252 mm

2- Coping Options:



Natural Edge Coping - Natural
Collection
300 mm x 1200 mm x 50 mm
300 mm x 1800 mm x 50 mm



Fullnose Coping - Natural
Collection
300 mm x 1200 mm x 50 mm
300 mm x 1800 mm x 50 mm



Coping Unit - LedgeStone
Collection
305 mm x 610 mm x 70 mm



Closed End Coping -
LedgeStone Collection
305 mm x 610 mm x 70 mm

- 3- **Concrete:** CSA A23.1, minimum 20 MPa (3000 psi) compressive strength at 28 days.
- 4- **Mortar:** CAN/CSA A179, Type S based on proportion specifications.
- 5- **Grout:** CAN/CSA A179, pre-mixed type, minimum 12.5 MPa compressive strength at 28 days such as Coarse Masonry Grout by Maxi-Mix.
- 6- **Reinforcing bars:** CSA-G30.18, #M10, billet steel, grade 350, deformed bars.
- 7 - **Seal Profiles:** As supplied with the BelMuro blocks.
- 8 - **Silicone Adhesive and Sealant:** ASTM C920, Type S, Grade NS, Class 50, Use T, NT, M, G, A, and O silicone material such as Unilock Concrete Adhesive.
- 9 - **Geogrid*:** extruded polypropylene, bi-axial, single layer with opening configuration either square or rectangular in shape, labelled in accordance with ASTM D4873. Tensile strength as specified by the engineer.

* Reinforced Retaining Wall System with Geogrid Only

DRY STACK SYSTEM: INSTALLATION GUIDE

FOR WALLS UP TO 508 MM IN HEIGHT.

PREPARATION AND PLANNING

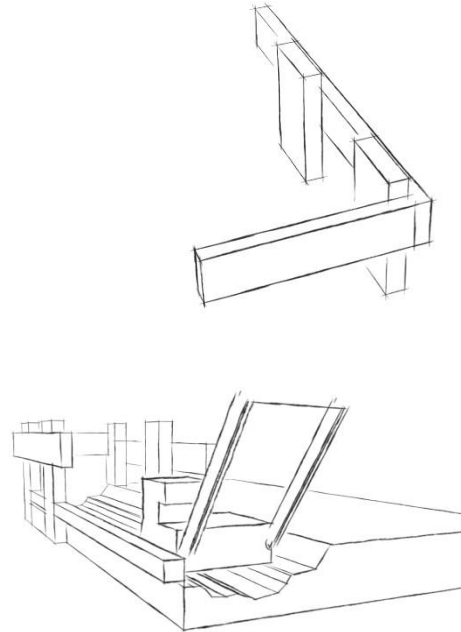
1. Draw a detailed sketch of the retaining wall or steps showing layout and dimensions. Determine whether you will need a shallow or deep excavation based on the height of your wall. Alternatively, refer to the professional details produced for the retaining wall.
2. Prior to digging, always check with local utility companies to perform a "utilities locate" for any potential underground utilities.
3. If applicable, check with the local municipality to inquire about minimum setback requirements and building permit requirements.



4. Determine the type of soil present on the site and the depth of the water table. Local building officials are often in a position to provide useful advice regarding local conditions. Do not build on expansive soil, liquefiable soils or other questionable soils, unless the soil has been specially prepared in accordance with recommendations of a civil or geotechnical engineer

TRENCH EXCAVATION

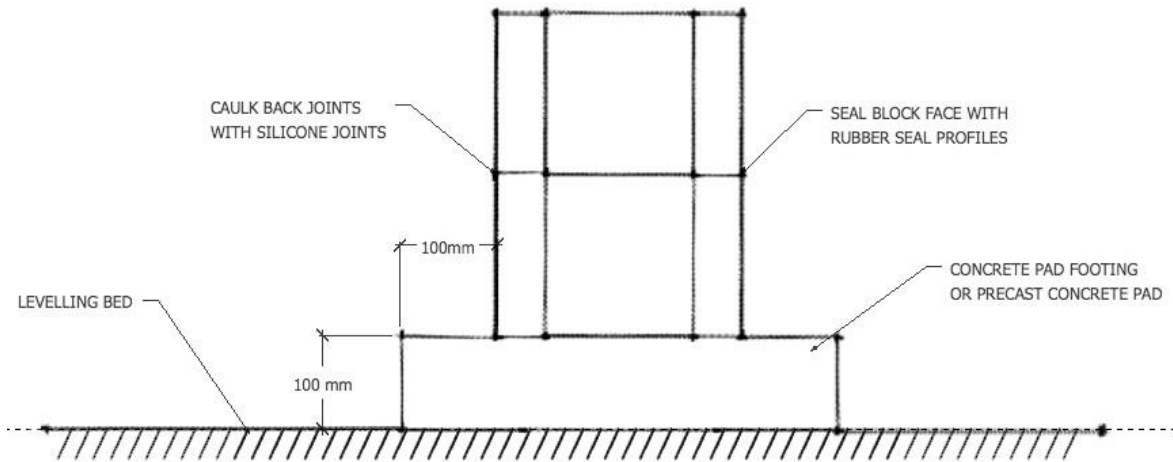
1. Begin by laying out the edges of the concrete pad with batter boards.
2. Use the mason's line, pegs and chalk to lay out the width of the concrete pad. Dig the trench at the lines marked.
3. Make sure you remove any surface vegetation and organic materials.
4. Line excavation with minimum 25 mm granular fill and compact using vibrating plate to minimum 95% Proctor Density to provide a levelling bed.



FOUNDATION (CHOICE OF: CAST-IN-PLACE OR PRECAST CONCRETE PAD)

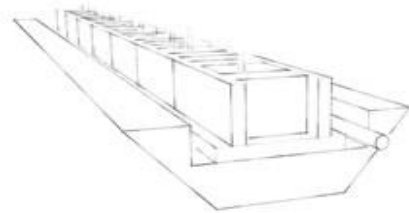
1. Cast-in-place Concrete pad: Pads should project beyond each side of the wall by at least 100 mm. Minimum 252 mm wide x Minimum 100 mm deep.
2. Drive stakes into the ground and mark the depth of the pad at the top. Stakes should be no more than 2400 mm apart.
3. Use 2x8 and attach them to the stakes to create the forms for the concrete pour. Reinforce the form with 1x2 spreaders installed 600 to 900 mm apart. Make sure everything is level.
4. Mix and place the concrete in accordance with the concrete supplier/manufacturer's instructions.
5. Screed the forms to produce a smooth and level surface.
6. Cover the concrete with burlap after placing to allow for curing; the concrete should be kept damp.

ALTERNATIVE: Use "12" - Pisa2 Coping Precast Unit - 300x600x75mm" furnished by Unilock as a base for the wall. Install this unit on level and properly compacted ground to ensure a durable installation.



INSTALLING THE FIRST COURSE

1. Install a drainage pipe (weeper tile) along the rear face of the trench to allow proper drainage for all walls over 1.2 m and all walls installed in silty or clay soils.
2. Apply a 25 mm thick layer of mortar to the exposed section of concrete pad and furrow it lightly. Set the first course of block in the mortar.
3. Use a level to ensure the first course is level side-to-side and front-to-back.



INSTALLING THE REMAINING COURSES

1. Start the second row with a 1/2 block offset and place each piece tightly together. Secure the blocks together using beads of construction adhesive.
2. Install plastic T spacers at regular intervals at the back of every course to ensure proper spacing. Seal the back joints with silicone adhesive.
3. Seal the face joints using the rubber seal profiles (supplied with the blocks) by laying the seal profiles flush with the inside surface immediately after setting each block. Angle the seal profiles into place in order to fit them to the notch in the vertical joints.
4. Repeat this process until the desired height of the wall is reached (do not exceed 4 courses).

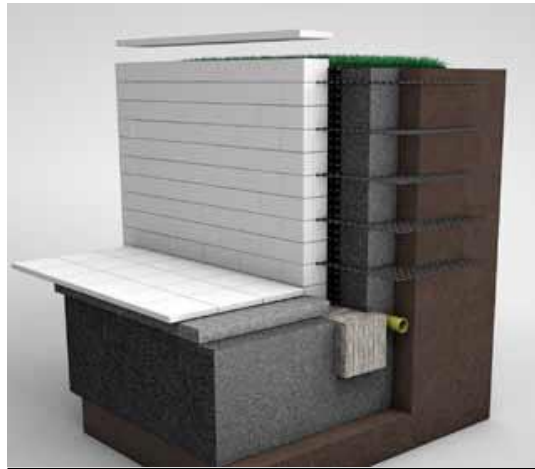
REMEMBER: Expansion joints must be installed at intervals of 5 to 8 m, in order to prevent crack formation. You can produce these expansion joints by leaving a chamber created between two adjacent blocks unreinforced and filling it with coarse aggregate instead (grain size 8-16 mm).

COPING THE WALL

1. Install coping blocks by setting them in mortar.
2. Fill the chambers up to the top edge of the seal profile to create the mortar bed.
3. Seal all joints of the coping blocks with silicone sealants in order to prevent rainwater from penetrating into the wall.

GEOGRID WALL SYSTEM: INSTALLATION GUIDE

FOR WALLS UP TO 508 MM IN HEIGHT.



PREPARATION AND PLANNING

Conform to requirements noted on Page 5.

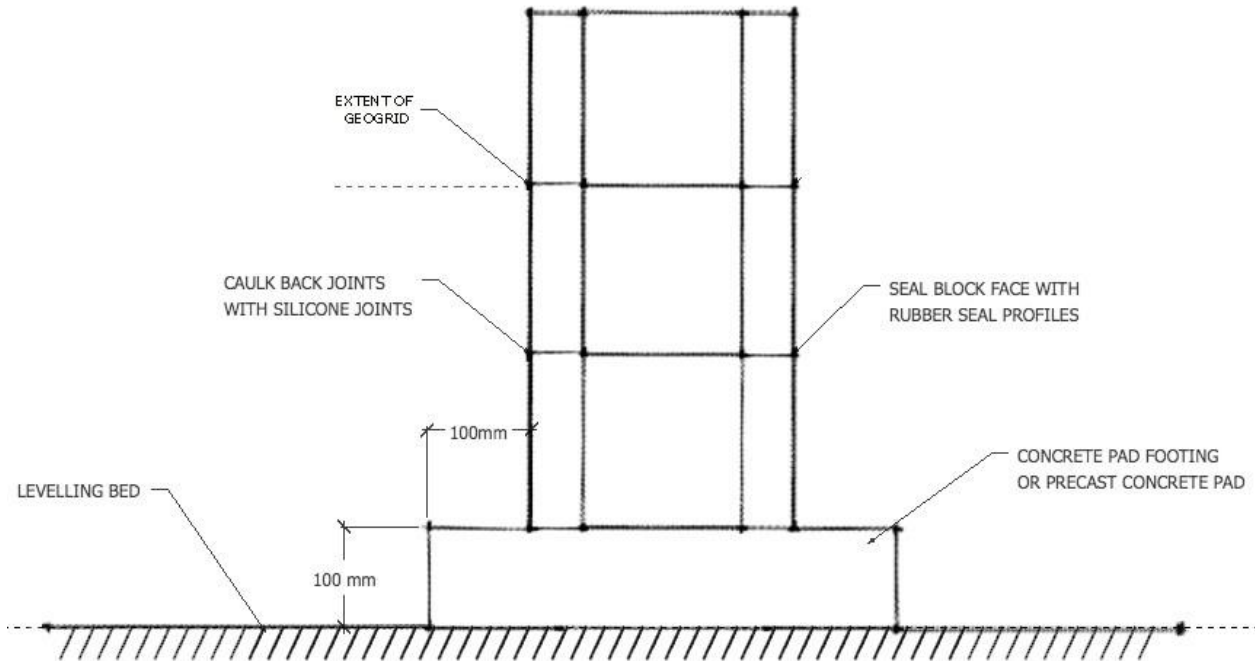
TRENCH EXCAVATION

Conform to requirements noted on Page 6.

In addition: Be sure to remove existing soils in the reinforced soil area to the maximum embedment length of the geogrid. Provide a level soil conditions behind wall units for the placement of each geogrid layer.

FOUNDATION (CHOICE OF: CAST-IN-PLACE OR PRECAST CONCRETE PAD)

Conform to requirements noted on Page 6.



INSTALLING THE FIRST COURSE

Conform to requirements noted on page 7.

In addition: Fill the hollow chambers of the base course and a minimum of 300 mm behind the wall with backfill material.

INSTALLING THE REMAINING COURSES

1. Use the vibrating plate compactor to compact the backfill material immediately behind the blocks. Compact parallel to the wall. Work from the back of the blocks to the back of the backfill material.
2. Ensure the base course is level and adjust as necessary.
3. Compact all backfill soils to minimum 95% Standard Proctor density.
4. Use equipment appropriate for the soil being compacted.
5. Start the second row with a 1/2 block offset and place each piece tightly together. Secure the blocks together using construction adhesive.
6. Every course after the first course requires compaction.
7. Geogrid Installation:
 - a. Place the geogrid as you install the blocks and as you place and compact backfill material for each course. (Refer to backfilling section)
 - b. Cut sections from geogrid roll to a depth of 1.75 m.
 - c. Install the geogrid without folds every third course and stretched out smooth. Make sure geogrid is placed within 25 mm of wall face.
 - d. Secure the back edge of the geogrid before and during backfill and compaction.
 - e. Ensure geogrids cover the respective reinforcement layer completely. In order to achieve this, overlap multiple layers of geogrid by approximately 100 mm. No overlapping is permitted in the main tensile strength direction (roll direction).
 - f. Provide a minimum of 150 mm backfill coverage prior to driving equipment over the geogrid. Avoid driving or turning vehicles directly on geogrid. The fill soil must be firmly compacted using suitable compaction equipment.
8. Install plastic T spacers at regular intervals at the back of every course to ensure proper spacing. Seal the back joints with beads of silicone adhesive.
9. Seal the joints using the seal profiles (supplied with the blocks) by laying the seal profiles flush with the inside surface immediately after setting each block. Angle the seal profiles into place in order to fit them to the notch in the vertical joints.

10. Install Granular A or Granular B material in block chambers and 300 mm behind the wall. Use approved to backfill soils behind the Granular A or Granular B material in the reinforced zone.
11. All Granular A or Granular B material and backfill soils within 0.9 m of the wall must be properly compacted using a mechanical plate compactor. Compact in maximum 200 mm, starting on the block and working in a path that runs parallel to the block towards the back of the reinforced zone.
12. Compact all materials to a minimum 95% Standard Proctor density.
13. Check and adjust for level, alignment and the wall batter as the wall is erected.
14. Remove all excess Granular A or Granular B material and ridges or slag material from the top surface of all units.
15. Repeat above steps until you reach your desired wall height.

REMEMBER: Expansion joints must be installed at intervals of 5 to 8 m, in order to prevent crack formation. You can produce these expansion joints by leaving a chamber created between two adjacent blocks unreinforced and filling it with coarse aggregate instead (grain size 8-16 mm).

INFILLING AND BACKFILLING

1. Use granular materials such as OPSS 'Granular A' or 'Granular B' as infill material in the block cores.
2. All other native backfill material should be prepared as necessary to be non-expansive, free of debris, organic material and clods or rocks larger than 100 mm.
3. Backfill each course. Fill open spaces between units and block chambers, and 300 mm zone behind the wall with 'Granular A' or 'Granular B' material.
4. Ensure the backfill is dewatered.
5. Backfill each course in increments of 150 mm and compact with appropriate compaction equipment. Backfill and compact behind each course before installing additional courses.
6. Do not use heavy ride-on compaction equipment within 1m from back of wall. Do not use jumping or ramming type compaction.

COPING THE WALL

1. Conform to requirements noted on page 8.

MASONRY WALL SYSTEM: INSTALLATION GUIDE

All walls described in this section should be subject to an engineering analysis by a local civil or geotechnical engineer and built to the approved plans and specifications provided by the engineer.



PREPARATION AND PLANNING

Conform to requirements noted on Page 5.

In addition: determine the exact locations of the “Sonotube” piers before beginning the excavation.

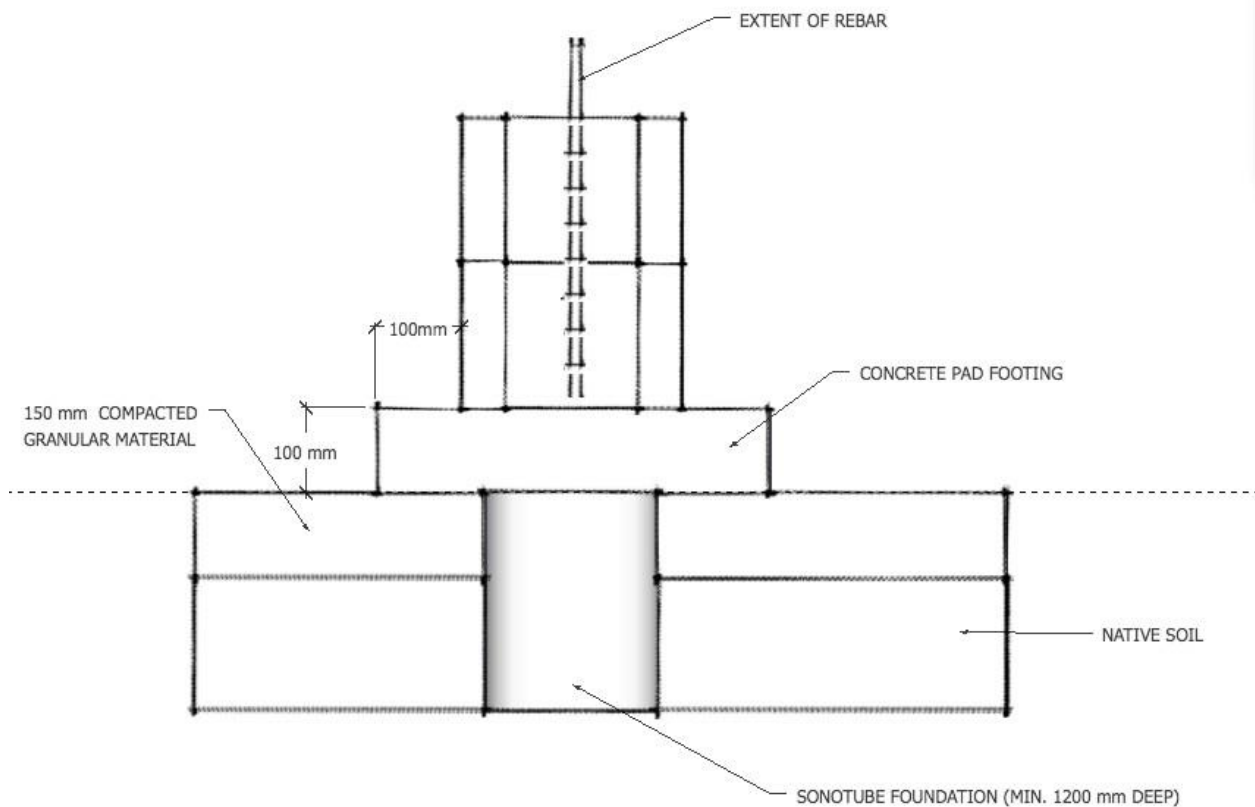
TRENCH EXCAVATION

Conform to requirements noted on Page 6.

Except: excavate minimum 150 mm below the frost line (1.2 m in most places in Ontario) at all “Sonotube” pier locations. Provide minimum 150 mm compacted granular material to serve as a leveling bed.

FOUNDATION (CAST-IN-PLACE CONCRETE PAD WITH SONOTUBE PIERS)

Conform to requirements noted on Page 6. In addition: strictly conform to “Sonotube” manufacturer’s installation instructions for the installation of all “Sonotube” piers.



INSTALLING THE FIRST COURSE

Conform to requirements noted on page 7.

INSTALLING THE REMAINING COURSES

1. Start the second row with a 1/2 block offset and place each piece tightly together. Secure the blocks together using construction adhesive.
2. Seal the joints using the seal profiles (supplied with the blocks) by laying the seal profiles flush with the inside surface immediately after setting each block. Angle the seal profiles into place in order to fit them to the notch in the vertical joints.
3. Repeat this process until you reach 1 m of height. You are now ready to fill the chambers with grout.
4. Pour grout in the chambers in accordance with the grout manufacturer's recommendations up to approximately 100 mm below the upper edge of the wall.
5. Overlap the reinforcement bars by approximately 900 mm and, depending on the total height of the wall, extend them up to an additional 1 m below the full height of the wall.
6. Lay the additional block courses (including seal profile).
7. Fill the chambers with grout up to approximately 20 mm below the upper edge.

REMEMBER: Expansion joints must be installed at intervals of 5 to 8 m, in order to prevent crack formation. You can produce these expansion joints by leaving a chamber created between two adjacent blocks unreinforced and filling it with coarse aggregate instead (grain size 8-16 mm).

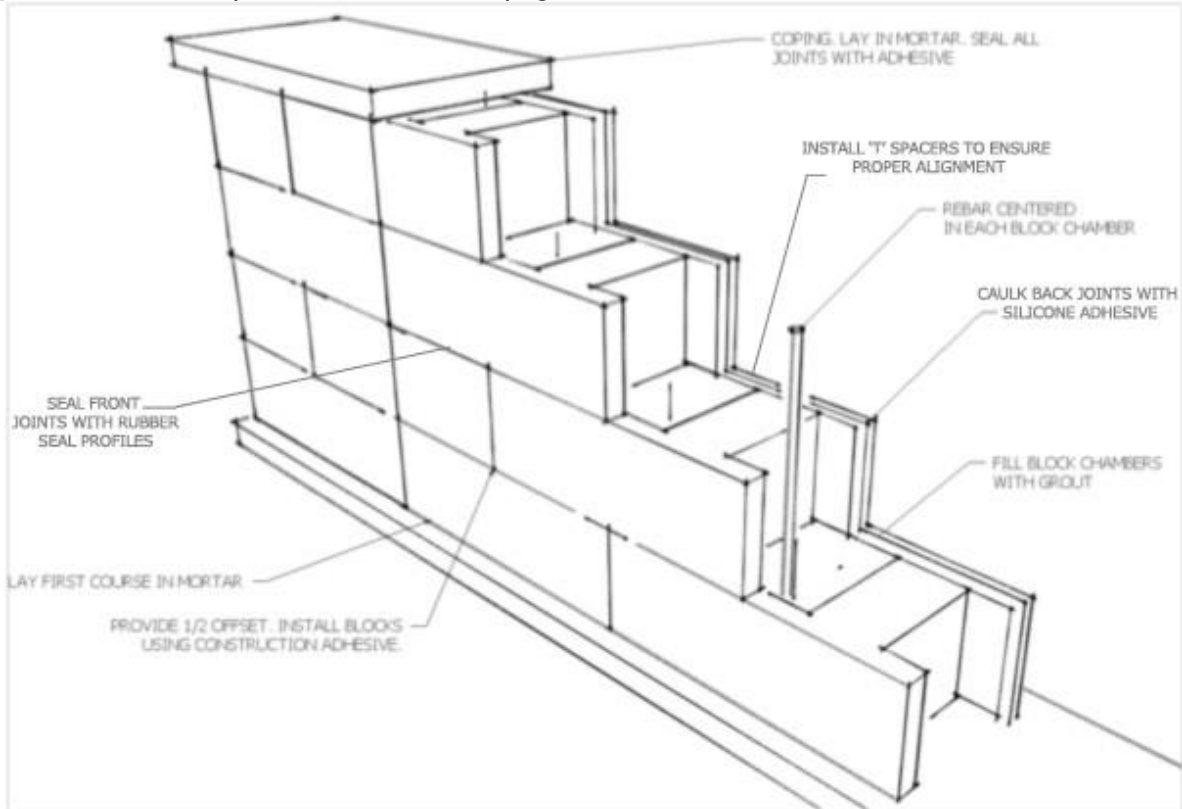
BACKFILLING

1. All native backfill material should be prepared as necessary to be non-expansive, free of debris, organic material and clods or rocks larger than 100 mm.
2. Backfill each course. Fill open spaces between units and the 300 mm zone behind the wall with 'Granular A' or 'Granular B' material.
3. Ensure the backfill is dewatered.
4. Backfill each course in increments of 150 mm and compact with appropriate compaction equipment. Backfill and compact behind each course before installing additional courses.

5. Do not use heavy ride-on compaction equipment within 1m from back of wall. Do not use jumping or ramming type compaction.

COPING THE WALL

1. Conform to requirements noted on page 8.



STEPS: INSTALLATION GUIDE



PREPARATION AND PLANNING

1. Conform to requirements noted on Page 5.

FOUNDATION (CHOICE OF: CAST-IN-PLACE OR PRECAST CONCRETE PAD)

Conform to requirements noted on Page 6.

STEP INSTALLATION

1. Mark a line on the ground to determine the edge of the first riser.
2. Build the first riser with the standard Belmuro units along the pre-determined and marked line. Fill the blocks' chambers with native infill material
3. Position the coping units on top of the riser and secure with adhesive.

4. Seal all joints of the coping blocks with silicone sealants to prevent rainwater from penetrating into the wall.
5. Trim the coping as necessary. The maximum overhang for each step should not exceed 38 mm.
6. Backfill the first course with the granular 'A' base material and compact to 95% Standard Proctor Density. Refer to instructions on page 15 for additional information.
7. Ensure the top elevation of the base is flush with the top elevation of lower units.
8. Ensure the face of riser units is in contact with the back of the coping units on the lower course.
9. Position the coping units on top and secure with adhesive.
10. Repeat steps 4 to 7 to continue the risers until you finish the steps.

