EVERGREEN®

EVERGREEN WALLS, INC.

Main Office: 6069 Oakbrook Parkway, Norcross, Atlanta, Georgia 30093, USA, 770 840 7060
Geissbergstrasse 46, 5408 Ennetbaden, Switzerland, Phone +4156 222 0724 Cell +4179 356 0081
www.evergreen-walls.com

EVERGREEN ERECTION INSTRUCTIONS – Short Version

A. CONTRACTOR'S BASICS

1. Work made by the Contractor:

- Site preparation: excavation and compaction, as required.
- Forming and pouring the foundations.
- Erect wall units, backfill, and compact in layers.
- Install fences, guardrails, or other necessary items.

2. Crew Size:

A typical wall erection crew includes:

- One operator for excavator/crane for setting units and backfill placement.
- One working foreman to check alignment.
- Two men for setting units and placeing joint materials.
- One front-end loader and operator to deliver backfill and Evergreen Macro units.

3. Production Rates:

- Construction rates for Evergreen Macro depend entirely upon the rate select backfill can be delivered, placed, and compacted.
- This is especially the case with the relatively large Evergreen Macro units that are easy to ship and set using a crane or excavator.

4. Materials and Services Supplied by Evergreen Precast Manufacturer:

- Sublicense to build the structural Evergreen units.
- On-site technical assistance.
- Engineering and design of the structure.
- Delivery of the following wall materials to the site:
- Precast concrete Evergreen Macro units.
- Filter fabric to cover the horizontal and vertical joints.
- Connection hardware such as two steel dowels per unit as required by the design.

5. Basic Construction Procedures:

- Form and pour foundations.
- Compact fill between foundations.
- Set first course of units.
- Place and compact select backfill.
- Place joint material and shear dowels.
- Set next course of units and repeat cycle.

6. Equipment, Materials and Tools Supplied by the Contractor:

- Evergreen unit lifting equipment: backhoe, excavator, or crane.
- Equipment for hauling, dumping, and spreading backfill: dump trucks, front-end loaders, and dozers.
- Compaction equipment: trench compactor, small walk-behind vibratory roller, or Rammax type equipment. Do not use big construction equipment inside the wall or within 3 ft. of the back of the wall.

7. Tools:

- Lifting beam with proper hooks, matching to the inserts.
- Chalk line Shims Instrument level to check grade of foundation.
- Broom for sweeping foundation.
- Pinch bar.
- Four foot level.
- Crow bar.
- Short ladder.

B. SITE PREPARATION:

- Excavate the site to the elevation shown on the contract plans for the entire footprint of the Evergreen® Macro structure (including the area covered by the select backfill between the back beams).
- Under special conditions, the excavation may be done in increments to minimize the amount of open cut.
- All unsuitable materials below subgrade must be removed and replaced with select, compacted backfill at the direction of the owner's engineer.
- Compact the subgrade to 95% standard Proctor (95% relative density).
- Proof-roll the foundation for meeting project specifications.
- The foundation area is to be inspected and approved by the owner or owner's engineer for required bearing capacity as shown on the approved Evergreen® Macro drawings.
- Excavate for the foundation and place foundation concrete and or crushed rock aggregate as specified by the drawings.
- Excavate the width of the foundation to allow sufficient room to set the widest units, till leaving space behind the back beam for access.
- Any under drains, drainage piping, or drainage blankets should be installed now.

C. CONSTRUCTION PROCEDURES

1. Site Preparation:

- Pouring the foundations.
- Setting the unit on the foundations.
- Foundation construction.

2. Foundation Construction:

- The foundation is designed for exact dimensions and slant for the wall batter.
- Most Evergreen Macro units are set on individual or on continuous foundations.
- Form the foundation similar to forming a sidewalk.
- They must be checked with a level to assure proper elevation and tolerance.
- Finish surface tolerance is plus zero and minus 1/8 inch in any 10 foot length.
- Check for alignment. A precise foundation very much eases erection of the wall.
- The front edge of the foundation should be minimum 3" outside the wall front line.
- Start with the foundation at the lowest level.
- Leave an 8" gap before casting neighboring higher level foundations.
- This gap assures that the setting the higher units does not interfere with the units on the lower level.
- For vertical walls the typical vertical step (change in elevation) is 2.5 ft. or 0.75m.
- For a battered wall multiply this with the cosines of the wall batter, which ends up being an uneven number of course – see drawings.

3. Wall Alignment

- Establish the wall alignment by snapping a chalk line on the surface of the foundation to determine the exact position of the lowest unit foot point.
- This defines the front face of the wall.
- Grade the top of grade material with the foundation along the full foundation area.

4. Front face of units on stepped leveling foundation

- The foundation snap line helps for construction alignment.
- The concrete may be low strength, 3000 to 4000 psi with rebars in the foundation.
- Pour the foundation with the concrete surface finish smooth and flat.
- Check the foundation for line, grade, and tolerance with a triangle and a level.
- If the foundation is out of tolerance, make corrections NOW.
- The tolerance for foundation elevation is plus zero, minus 1/8 inch.
- Precise foundation elevations considerably ease erection of higher level units.

5. Steps in the Foundation: Precast Foundation

- Precast foundations have not proven helpful, because of the needed precise setting.
- Compaction and grading under precast foundations is extremely important because any settlement or tilting will result in an unacceptable joint pattern or spalling of the concrete units.
- Prior to the start of construction, the Contractor and the Precast Manufacturer should develop a schedule for material deliveries.
- This timetable will allow the producer to match unit production with the construction schedule.

6. Evergreen Wall Unit Delivery:

- Units are delivered on truck: Lower one unit into place and set that unit.
- Under normal circumstances, a two hour unloading time is allowed for each delivery.
- During this period of time, the units may be unloaded and stacked on the ground using the lifting device.

- If the coordination is perfect lower units directly onto the foundations for saving time; otherwise store units on the side.
- A typical truck load comes fully loaded to the truck capacity and is 4 – 8 units, depending on the size of units.
- Special care must be exercised during handling to protect the units from damage.
- ***Units stored on site must not be stacked more than <u>three</u> units high.***
- ***Use <u>THREE wooden blocks</u> under each unit to prevent torsion and wrapping of units which then would result in subsequent cracks in the wall.***
- Dunnage and plastic edge guards are the property of the Precast Manufacturer and must be collected and returned as soon as possible.

D. <u>CONSTRUCTING SEQUENCE, COURSES AND BACKFILL:</u>

1. Start Erection of Wall

- Start erection at the lowest foundation level or at a fixed point such as a corner, step, or tie-in to an existing structure.
- If there is no fixed point, simply start on the lowest foundation.
- Use a ½" vertical space between the units. A smooth ½" steel rod 18" long or a piece of wood ½ inch thick.
- Joint material is especially required between the foundation and the lowest and the second lowest precast units.
- Set the first units on the foundations, using the chalk line as a guide aligning the front face.
- Adjust the elevation of the back beam to plumb the front face of the unit.
- After aligning the front face, check the top of the front face for level and height with relation to the other units in this course.
- If the top of the unit is irregular, place the level on the line where the top of the front face is chamfered. Shim as necessary.
- Rechecking alignment, level and plumb for making sure changed another unit while adjusting this one.
- Finally, step back and sight down the tops of the units: This visual check will allows for to fine tuning the alignment.
- Every effort is needed to ensure that the first course of units is perfectly aligned and level (or at the wall batter): that eases subsequent erection nicely.
- Construct the wall in horizontal lifts.
- **Walls have a tendency to grow or shrink in length depending on the amount of care taken to properly layout and align the first course!**

2. Filter Fabric:

- Prior to initial backfilling, use 18” x 18” filter fabric pieces to cover the joint between adjacent ‘arms’ or trays.
- For closed face Evergreen® Macro walls cut strips of geofabric 12inch wide and place them behind the vertical joints.
- Center these strips across the ½" vertical joints between the units at the rear face. This filter fabric prevents the backfill material from migrating through the joint during heavy rains.

3. Shear Dowels

- Two shear dowels placed into the vertical holes and covered with mortar ensure the wall stability by providing shear resistance.
- In case of side by side unit additional shear dowels connect the wide units with the upper row.

4. SHIMS

- In case of rocking units or for adjusting wall batter additional shims are needed on the legs.
- Use wooden shims only to be removed after the mortar has hardened or left in place.
- Their purpose is to keep the unit in exact place until the mortar has set. The mortar then develops distributed contact pressures AND the subsequent transverse friction between units.
- That is why deteriorating shims are needed for mobilizing transverse horizontal friction to stabilize the retaining wall.
- NON-deteriorating shims, such as asphalt shims, plastic shims, or metallic shims are NOT allowed.

5. PLUMBING AND ALIGNING

- Report difficulties with plumbing and alignment to the Evergreen Company for selecting measures to adjust and especially improve foundation conditions in similar areas by over-excavation and backfilling coarse material.
- There is no objection to dump fill material directly onto the legs of the wall.
- That way the fill produces earth pressures on both sides of legs, which reduces the risk of lateral unit dislocations.

E. BACKFILL MATERIALS

- ***It is mandatory that the backfill material meets the gradation specification shown on the project drawings.***
- While filling add some topsoil immediately, min. 4 - 6 inches into the front pockets to support plant growth later on.
- Grade the individual slope immediately.
- Do not stack the units more than one unit high without backfilling.
- This prevents uneven settlement inside the wall and allows proper filling and compaction of Macro units in two lifts each.
- Evergreen® Macro Walls should be constructed horizontally, one course at a time.
- However, there are situations where stepped construction is needed.
- Such vertical steps along the wall structure should not be more than two units between adjacent columns.
- This restriction prevents unbalanced earth pressure and subsequent uneven deformations:
- Evergreen Macro units are NOT made for withstanding longitudinal earth pressures.
- **Contact the Evergreen Walls Company for instructions to resolve construction problems by adequate planning of a staged construction sequence.**