EVERGREEN®

EVERGREEN WALLS, INC.

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Evergreen Macro Erection Instructions

Purpose

These are the Evergreen Erection Instructions referred to in each 'Typical Section' as prepared for any project as part of the final design package and shop drawings that go on the site for the contractor to follow closely.

Preconditions

These erection instructions must be followed very closely by the contractor and anyone involved with the erection of an Evergreen wall to qualify for Evergreen product warranties.

Obviously, before the contractor starts working, he must have drawings clearly defining the foundations and retaining wall to be built validated and signed by the responsible professional engineer, who followed applicable codes and government restrictions as well as the Minimum Evergreen Requirements.

Such engineering drawings must include a 'Typical Section' of the wall with numerous notes describing the sequence and requirements of the work to be done.

A copy of these 'Erection Instructions' and a copy of the 'Evergreen Minimum Requirements' must be hand delivered on site by the responsible Evergreen representative together with the first delivery of Evergreen units and must be thoroughly explained to the crew installing the units to assure proper understanding and erection of Evergreen walls. This requirement is in accordance with standard product liability requirements and thus is also a legal obligation.

EVERGREEN WALLS, INC. Felix P. Jaecklin

Sequence and Instructions for Erection

1. Excavate soil as steeply as feasible for safe erection and backfilling.

2. Foundation excavation must reach well bearing soil or rock. Excavate deeper as needed and as approved by the engineer. (see light gray hard rock)

3. Any soft, wet or organic or otherwise unsuited material in the footing area shall be removed and replaced with a minimum of 0.3m of clean gravel placed and compacted in max. 0.3m lifts.

4. Minimum requirement material beneath foundation depends on individual project design as shown on drawings: friction angle phi = min. 32°, cohesion c = 0, gamma = min. 20 kN/m3.

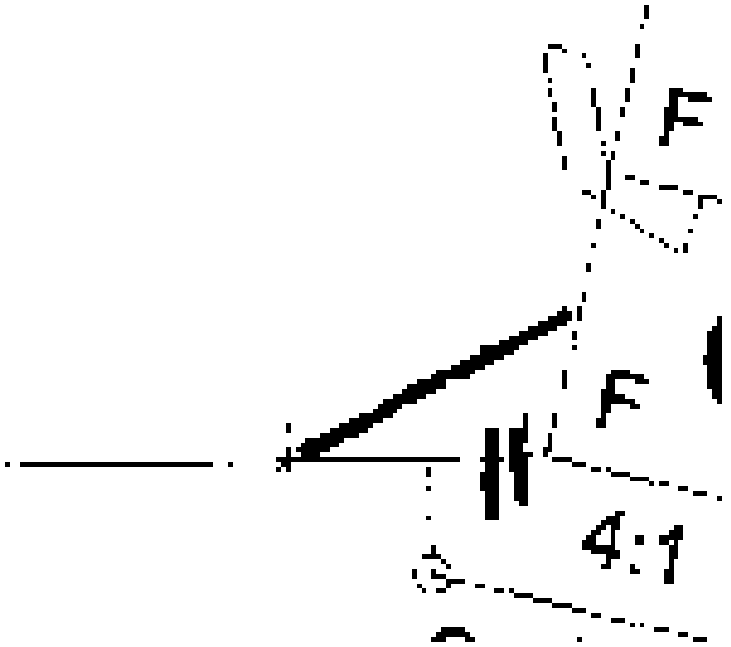
5. Should there be material of lower quality beneath foundation; wider Evergreen will be required according to the redesign.

Foundation reinforcement prepared separately.

Foundation reinforcement cages transported on site.

6. Provide concrete foundation min. BN 25 (=250 kg/cm2 compressive strength) and grade 500 MN/m2 reinforcing bars. Concrete cast against excavation with finished top to ensure proper grade and elevation at zero, (or better minus 10 to minus 25 or even minus 30mm) tolerance.

7. Add min. two dia 18 mm stirrups in front of each leg, covered with concrete to increase safety of lowest unit against sliding.



In the background left and center:

8. Use continuous foundation drain min. dia 100 mm pipe PVC, or approved equal with longitudinal grade min. 0.5% and add min. of 0.30m of free draining material covered with geotextile.

On the very Right: Cover anti-sliding dowels with mortar or concrete to keep dowels from rusting.

Right side:

9. First unit shall be adjusted with small wooden wedges using engineer's level and wooden triangles to set front level and legs within 3 mm tolerance. Push fast set mortar under legs of first unit. Use very thick (relatively dry) grout for joints over 20mm, normal plastic consistency grout for joints 5 to 20mm, and use very liquid grout for joints of less than 5mm and for units of second row and higher.

10. Preferably start erection at lowest foundation elevation. Two men and one foreman are required for installation. Never go under a suspended heavy load, it is very dangerous.

11. Thoroughly fill joints below first unit with mortar. Apply mortar in front of leg of first unit against sliding. Protect foundations with bituminous paint for in certain arid areas, with aggressive chemicals.

12. When lowering an adjacent unit, use a 15mm, ½ in. piece of wood between units, to prevent damages.

13. Adjust lowest units to proper elevation and wall batter within ± 3mm (1/8 in.).
Adjust adjacent units to be flush with arms of previous unit.

Fill first layer of elements with min. 0.30m (1 ft.) of free draining material in the back to prevent water backup.

11. Fill material within precast units: Normally use ordinary borrows, provided friction angle of compacted material is min. phi = 32 degrees.

12. Compact to moist density min. 19 kN/m3 at water content max. ± 2% off optimum water content. Fill each unit in two lifts and compact by vibratory roller and jumping compactor min. 6 passes according to recent field tests on site. - Do not over-compact to prevent damaging the units.

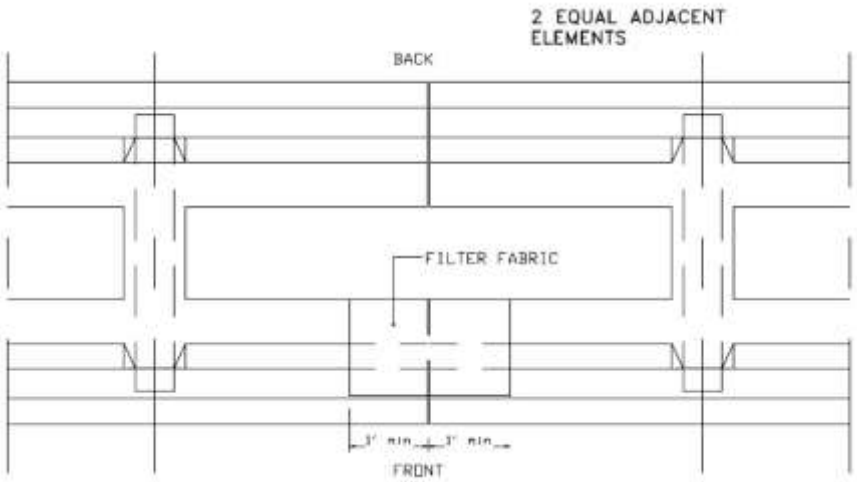
Testing fill material for moist density and relative density using Calibrated Sand Method.

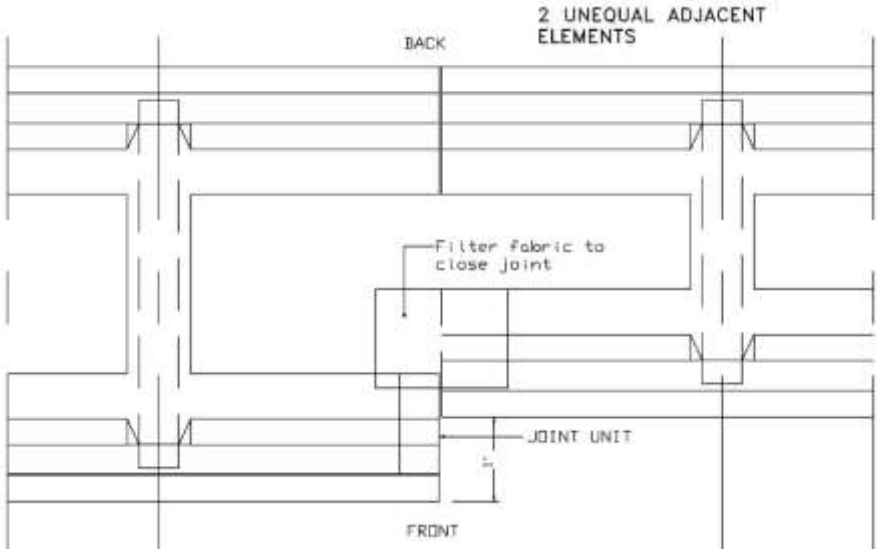
Fill material shall have max. 10 to 25% fines passing sieve #200, (0.074 mm); if fill contains 15 to 25% fines, then PL must be below 6 and fraction below 15 microns shall not exceed 15%.

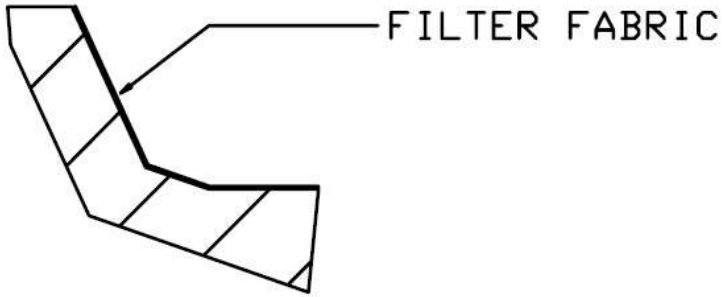
This means silt and clay material are not suited for fill inside of units.

Note that neither dry density nor relative density is adequate for describing the total weight function of fill inside of units for the gravity wall effect. The compaction requirement is based on **moist density** for assuring the weight of the wall for the gravity wall effect.

13. Fill front pockets of L-shaped trays with min. vertical depth of 0.25m plantable top soil, min. 25 mm of freeboard.







14. Use geotextile pieces about 0.6x0.6m to bridge the front joints and gaps between neighboring arms of units to prevent erosion rim of tray; fill and grade topsoil as wall goes up.

15. Backfill behind wall: Remove debris and topsoil before backfilling. Add drains at locations as directed by the local site supervising engineer.

16. General Backfill requirements within area closer than 1.0m behind wall: Fill in lifts of max. 0.30m, at max. $\pm$ 2% off optimum water content and compact to min. moist density of 19 kN/m3. Again use min. 6 passes of small vibratory roller and jumping compactor.

    Do not use heavy equipment in this area close to the back of the wall.

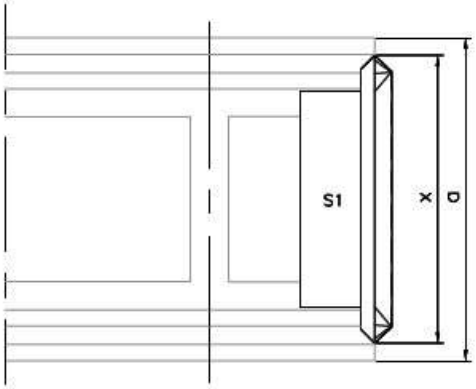
17. Further away compact backfill behind the wall according to general backfill requirements as specified by the engineer.

18. For the Evergreen wall, the inside fill and the backfill behind shall be built up simultaneously. The elevation of the fill behind the wall shall not be less than 0.75m at any time. Always fill and compact Evergreen units first up to the back beam, then backfill and compact to prevent elements from sliding.

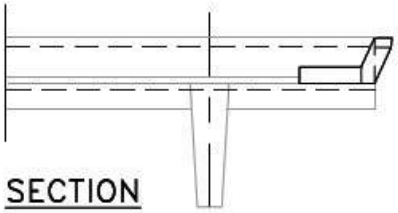
19. Units above first layer shall be placed on thin mortar beds on the full contact surface to prevent excessive contact pressures. The top five units do not need mortar beds, since pressures are much lower.

20. Place **End Shelves** on wall at wall steps with exposed ends of Evergreen units.

END SHELVES DETAIL

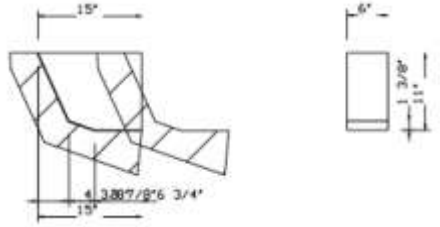


PLAN



SECTION

JOINT UNIT



21. Use "J"-type **Joint Units J** or boulders at exposed ends of individual arms to prevent erosion.
22. Provide final grade of fill on top of backfill of wall with min. 2% grade away from wall, or else provide drainage channel.

The contractor shall consult and follow the 'Erection Instructions for Evergreen Walls' and Specifications as provided by the manufacturer. End.