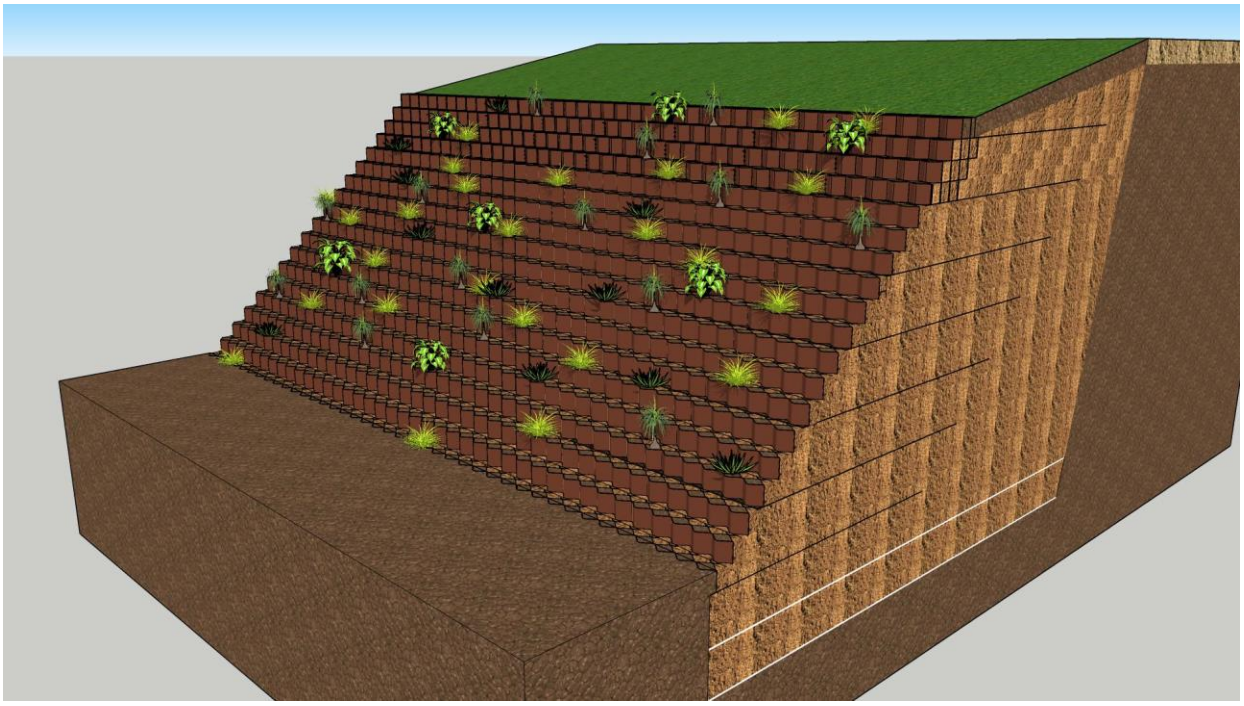
CONSTRUCTION OF STEEP RETAINING WALLS USING GEOCELLS



Before preparation
The site should be marked and surrounded by a fence, in order to avoid entrance of unauthorized people.
All goods for installation, infill material and equipment for installation, should be located in a safe place near the site.
The subgrade soil that support the structure, should be shaped and proofed prior to construction, even by removing or replacing part of the local soil with suitable compacted materials.

1. Site preparation.

The existing slope (behind the reinforced structure), has to be stabilized and secured against erosion and or sudden sliding.
The area must be prepared to the required levels, gradients and dimensions to take the fully expanded geocell units. All debris and vegetative cover should be removed.

The base of the wall should be excavated down along its full width and set into the ground at a depth of minimum 40-50 cm. All this sub-base area, should be compacted according the planners instructions, in order to achieve appropriate bearing capacity..

A geotextile should be laid over the base of this excavation. It is recommended that a woven type is used. It is also recommended that the textile should not weigh less than 200 gr/sq.m.

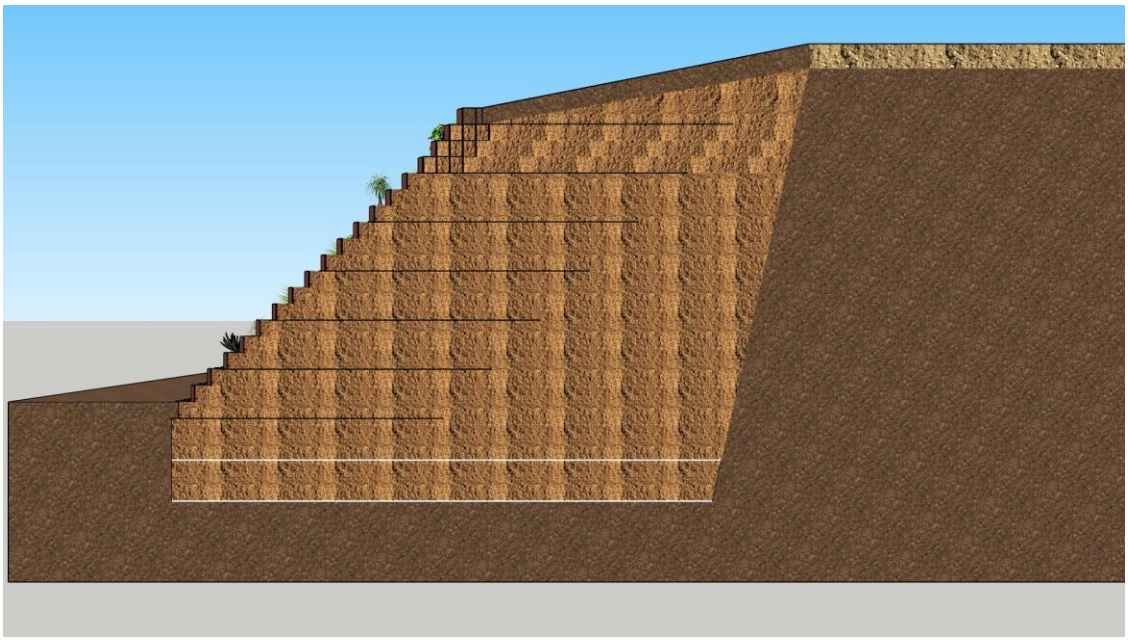
An overlap, according the planner's instructions, is recommended between two adjacent expanded rolls.

Above the geotextile, a layer of gravel should be spread fill with tractor. This layer should be leveled and compacted.

Driving trucks or any other vehicles, directly on the geotextile is not allowed. A minimum cover of 30-40 cm is requested. Only on this layer vehicles can move.

It is recommended to place a granular base material and to compact it by a compactor to the density according the planner's instructions. This layer should be free of fine particles, in order to enable drainage of the base.

Above this granular material, it is recommended to have another layer of the same geotextile , and by that to achieve a base of drainage layer.



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2. Placing of the GeoGlobe Confinement System.

Anchor pins recommended be inserted along the proposed front edge of the wall (the toe) at intervals of about 50 cm. (Generally every second cell). The pins must be made of iron with a 10 mm diameter and be 80-100 cm long.

The first layer of GeoGlobe geocells, must be placed over the anchoring pins and then stretched/expanded across the wall- width until it is at full stretch, making diamond shaped cells.

The GeoGlobe geocells should be anchored on the other (inner) edge of the wall with similar pins at similar intervals.

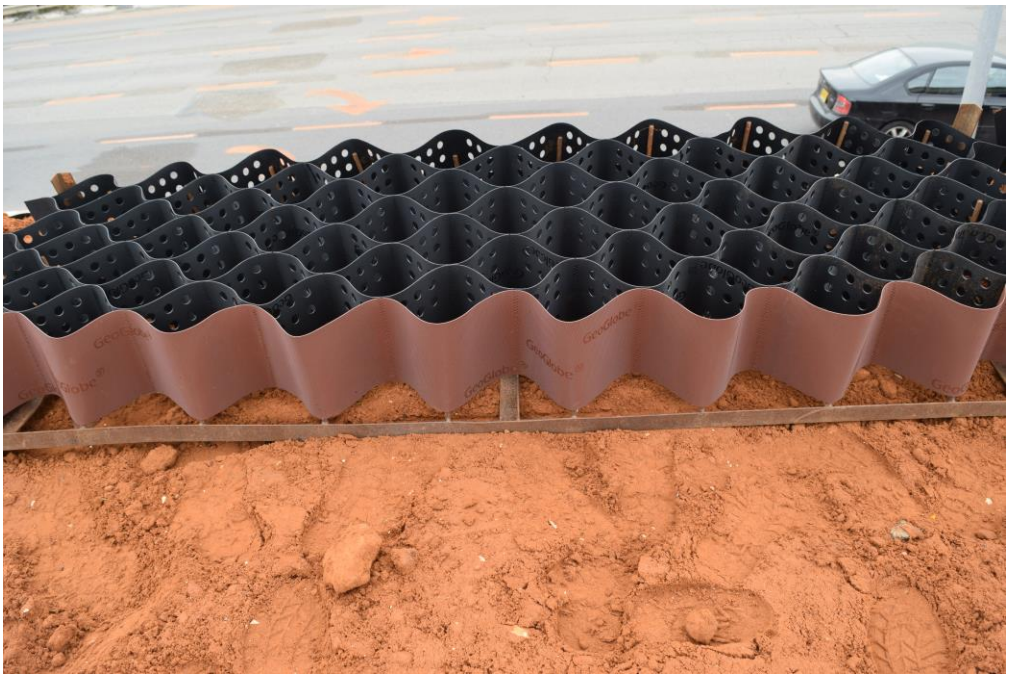
The pins are driven down to hold the walls of the GeoGlobe geocells in place.

Adjacent GeoGlobe geocells units are joined together by GG s+n, (screws and nuts), developed by GeoGlobe Europe, (in order to replace metal staples, which can suffer from rust). The number of screws and nuts needed for each joint depends upon the height of the cell. In 20 cm high geocells, there are four screws and nuts, (which their total head-diameter is equal to 50% of the cell height).

Behind the base should be installed an outlet drainage pipe, ensuring at least gradient of 1% is maintained throughout and the outlet of the pipe should be in a place that won't cause localize of water under the wall.

3. Infilling the GeoGlobe geocell units.

Each stacked layer of geocell units must be completely filled with a suitable granular material according to the engineer's requirements.
Each layer can be expanded by similar metal pins, or by metal frame, or by series of individual –H- stretcher bars, which hold the geocell units expanded, till the cells are filled with the granular material.



When the cells of the GeoGlobe geocells are filled with infill material, the stretching tools (frame, pins…etc'), can be moved and repeat the process.

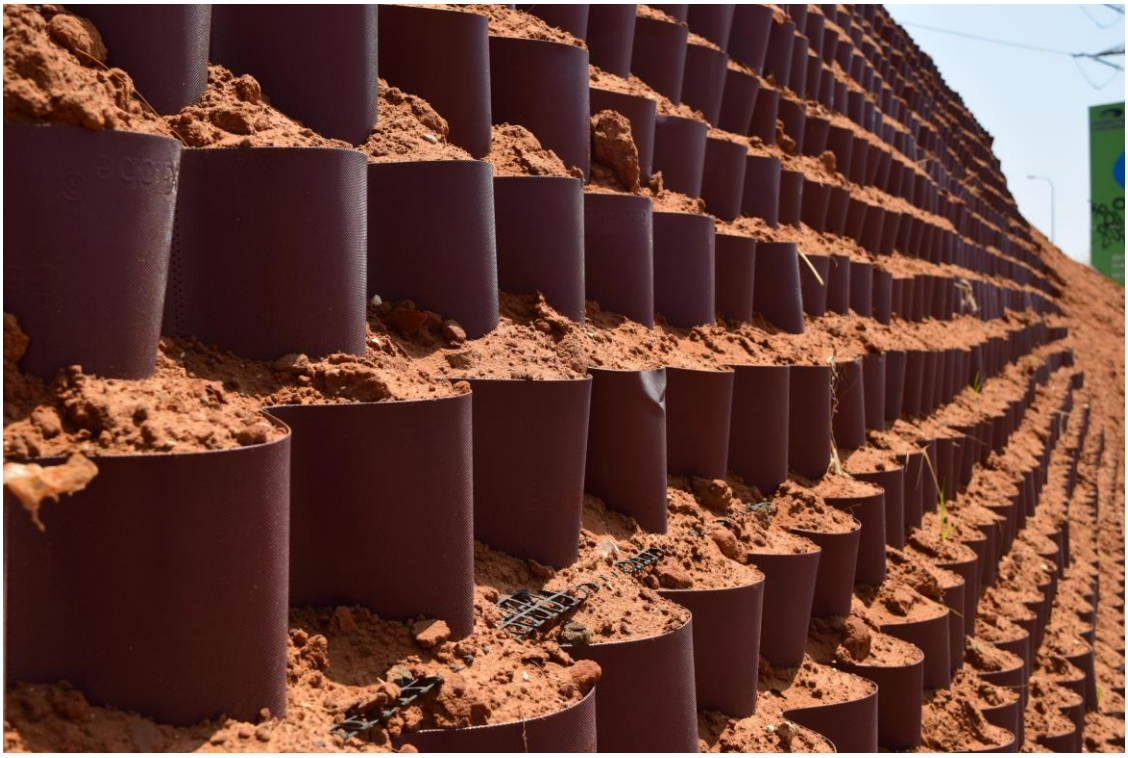
Each 200-mm. layer must be compacted by compactor and re-filled until it achieves a smooth compacted thickness of 200 mm. Care must be taken not to damage the geocell walls during the compaction procedure. Therefore, it is recommended to cover each layer of geocells, with extra 5 cm infill above, than to compact it. After achieving the requested level of compaction, usually more than 95%, the extra remaining material, should be removed, till the upper level/surface of the geocells,

Also it is recommended that near (about 50 cm) and above the geocells area, a walk-behind and not very heavy compactor, will be used for compaction of the infill.

It is recommended that layers will be anchored to the layers beneath it, by anchoring pins as though it was the bottom layer. Then each subsequent layer must be filled and compacted in a similar fashion until the required wall height is achieved.
During installation of the layers, care should be taken to align the section, according the angle of the planned wall.

Since the wall is planned as composite steep soil-reinforced walls, where the geocells are the facia of the wall, it is recommended to place the reinforcing geogrid between the GeoGlobe geocell layers.
The geogrids are placed horizontally, with the high strength axis perpendicular to the cell face. It should be free from folds and wrinkles after placement, and slight tension should be applied.
Adjacent geogrids shall have minimum 20 cm overlap, or according the planner's instructions. Never should be mix-up of longitudinal and transverse directions.

The geogrids should be placed so that the leading edge is within 15-20 cm of the front face of the wall and extend horizontally into the compacted backfill zone behind the wall.



The construction of the wall should be layer by layer, of compacted 20 cm high, after compaction each layer to the density, according the planner's instructions.
The layers of the infill in the geocells should be leveled with the area of the back-fill behind.
Every some layers, according the planner's instructions, there will be a geogrid for reinforcement and accordingly above other some layers of geocells, another geogrid.

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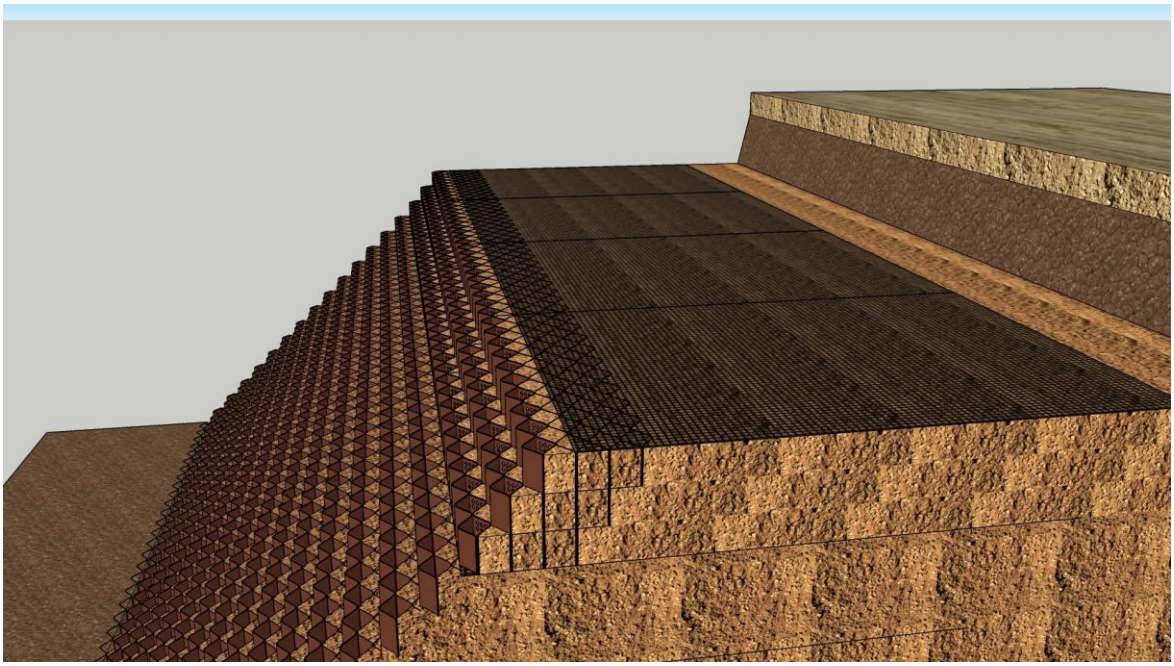

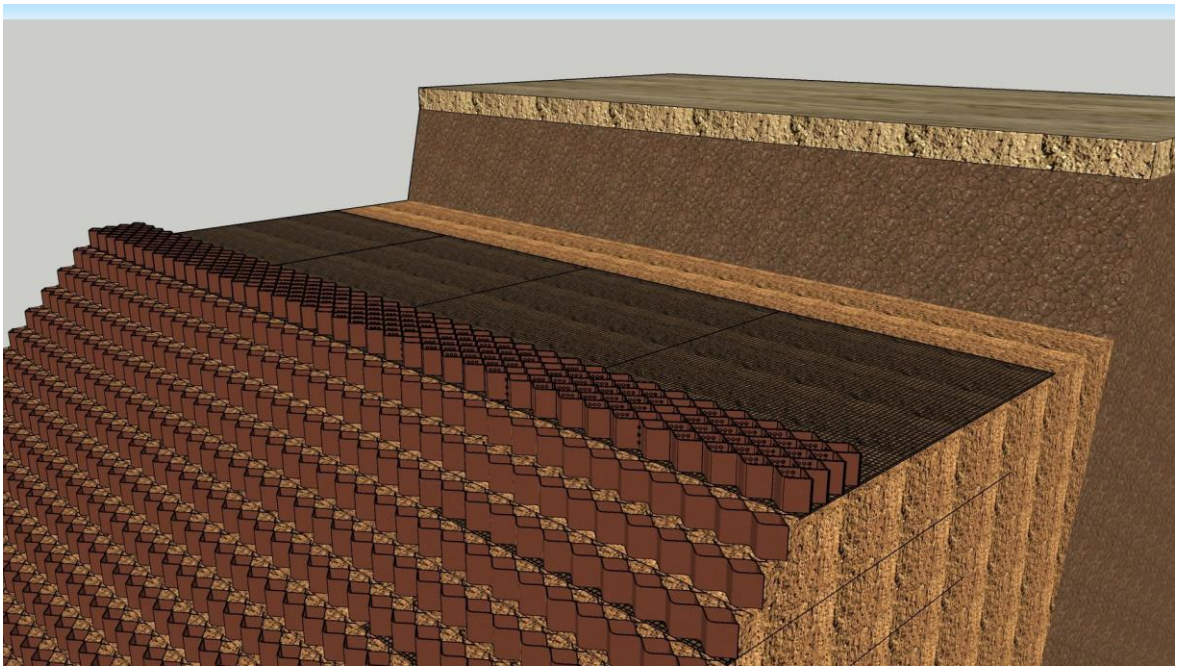

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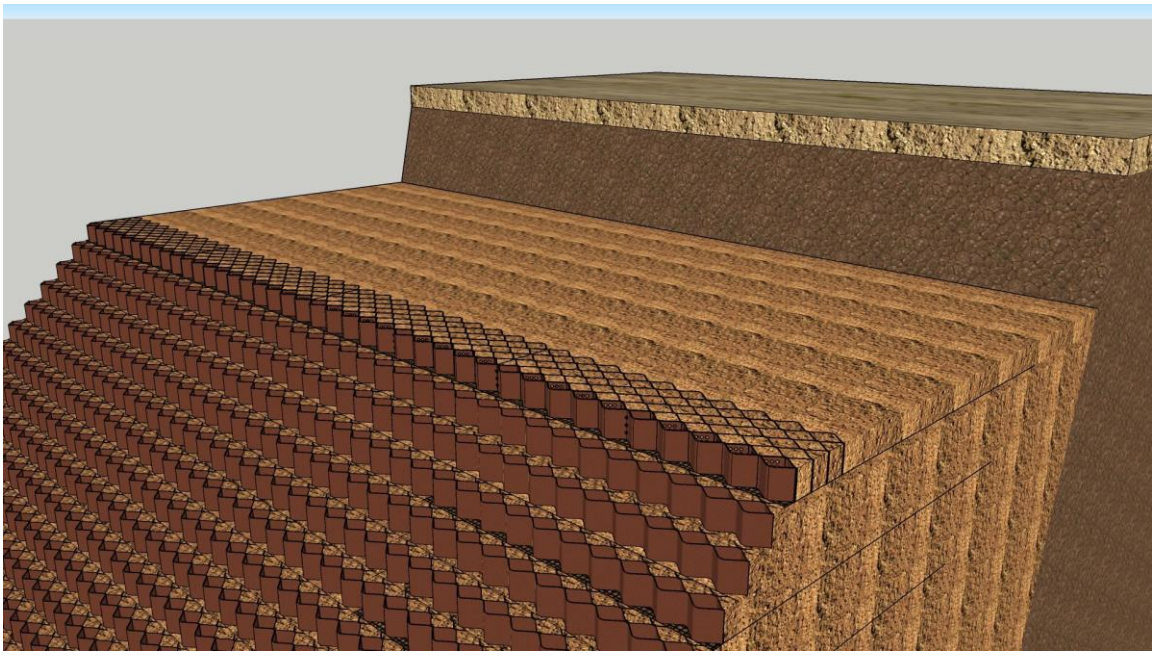
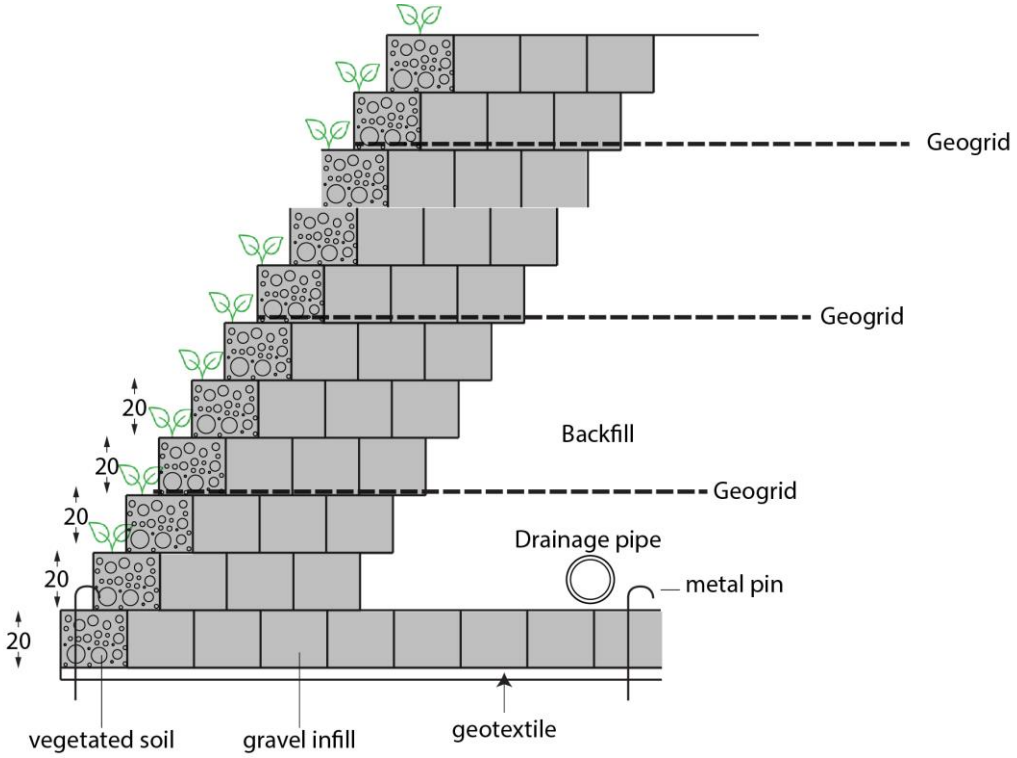


The first raw of cells, can be filled with vegetated soil, for establishment of vegetation. In such case, a wooden plate is covering this row, while filling the rest rear cells, and later, taking out this plate, infilling the empty cells with soil, and compaction of the whole structure.

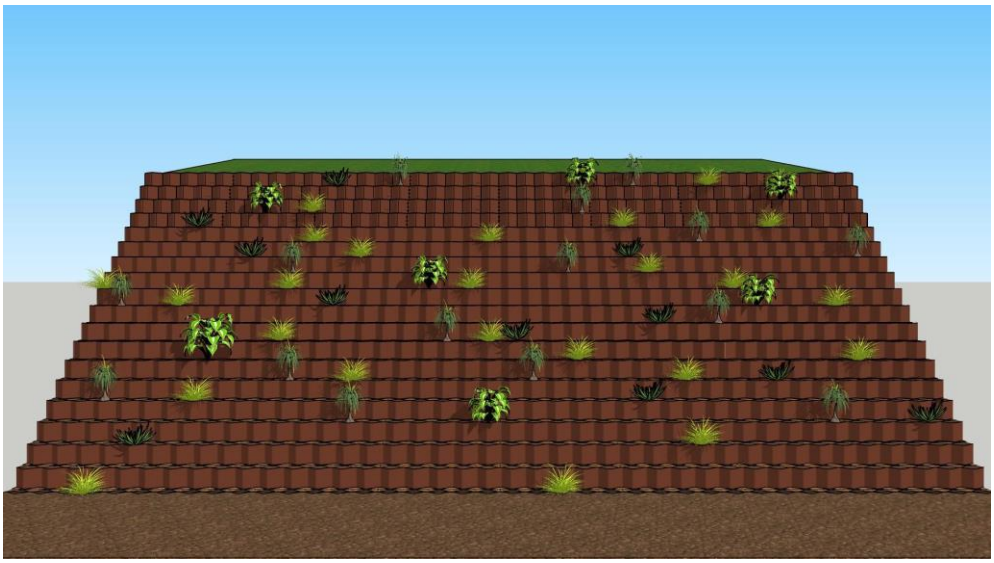
At the rear of the GeoGlobe wall, the reinforcement is taken into the larger mass of fill material behind the wall according to the engineer's design.
At the rear of the wall, it is also recommended that arrangements be made to drain excess groundwater away from the wall. A granular drainage layer wrapped in geotextile, or a perforated corrugated pipe wrapped in geotextile would be suitable.

If very large water flows are expected over the top of the wall from the ground being retained, it is recommended to prepare suitable water interception ditches and overflow sluices. GeoGlobe geocells can be used for this purpose.



4. Safety installation instructions
The contractor should know that driving of vehicles on empty cells is forbidden.
Movement of light compactor on filled cells is allowed.

5. Summary: The installation of the reinforced wall is simple and fast and it looks after construction as the drawing below.



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