



Arian Khak Iranian Group

Smart earth solutions:

■ LOAD SUPPORT ■ SLOPE PROTECTION ■ CHANNEL PROTECTION ■ RETAINING WALLS

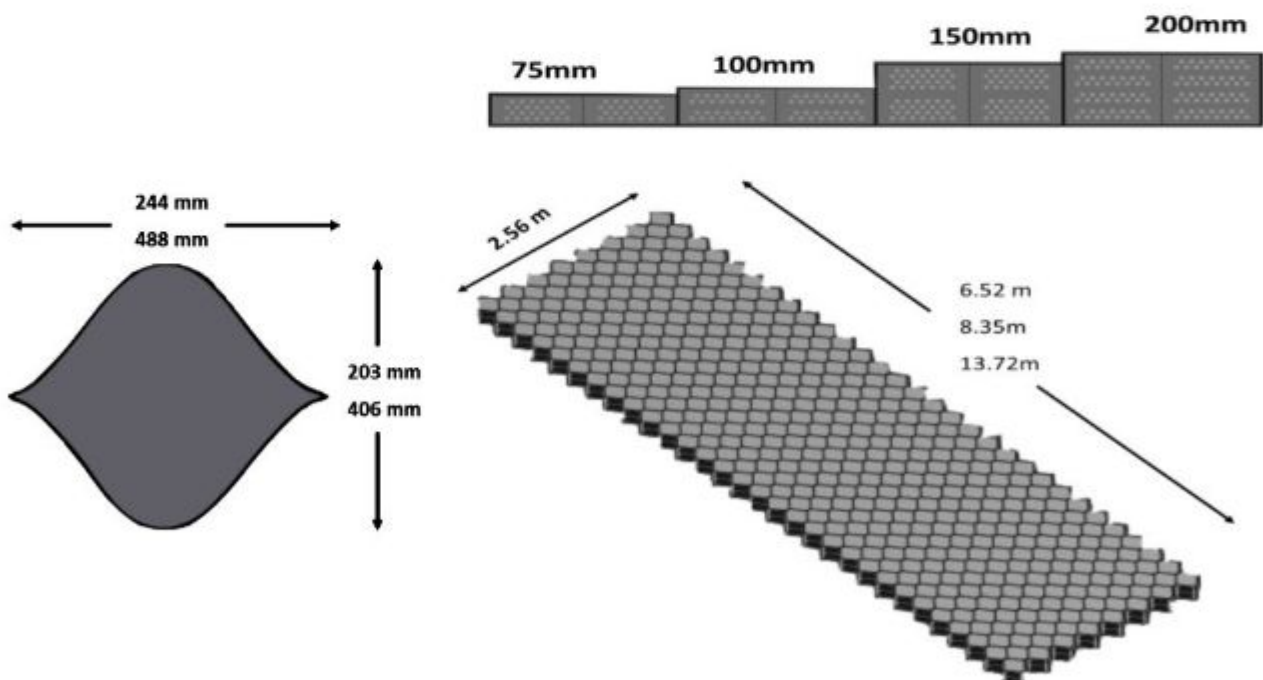


Introduction of Geocell



Geocell Is a 3D cellular system. It is expanded on-site to form a honeycomb-like structure which can be filled with sand, soil or other site material. This cost effective solution has multiple applications enabling reduced projects costs and lower environmental impact.

Geocell panels are manufactured from Iran, high-density polyethylene. Standard panels contain 20 strips of HDPE and Each strip is 100mm. Cell walls are textured and if perforations are required, between 9.5% and 14% of the cell wall is removed.



Geocell DataSheet



| Material Properties | | Test Method | Unit | Test Value | | |
|--|--|---|----------------|-------------------------|------------|------------|
| Polymer Density | | ASTM D 1505 | g/cm³ (lb/ft³) | 0.935-0.965 (58.4-60.2) | | |
| Environmental Stress Crack Resistance | | ASTM D 5397 | hours | > 400 | | |
| Environmental Stress Crack Resistance | | ASTM D 1693 | hours | 6000 | | |
| Carbon Black Content | | ASTM D 1603 | % by weight | 1.5% minimum | | |
| Nominal Sheet Thickness before texturing | | ASTM D 5199 | mm (mil) | 1.27 (50) -5%, +10% | | |
| Nominal Sheet Thickness after texturing | | ASTM D 5199 | mm (mil) | 1.52 (60) -5%, +10% | | |
| Physical Properties | | Unit | Test Value | | | |
| Cell Depth | | mm (in) | 75 (3) | 100 (4) | 150 (6) | 200 (8) |
| Seam Peel Strength | | N (lbf) | 1065 (240) | 1420 (320) | 2130 (480) | 2840 (640) |
| Seam Hang Strength | | A 102mm (4in) weld joint supporting a load of 72.5 kg (160 lbs) for 30 days minimum or a 102mm (4in) weld joint supporting a load of 72.5 kg (160 lbs) for 7 days minimum while undergoing temperature change from 23°C (74°F) to 54°C (130°F) on a 1 hour cycle. | | | | |

Surface cracking usually is happened because of Low soil resistance especially in weak and wet substrates. Geocell is known as a leading solution for soil stabilization in construction and landscaping by providing a light and flexible structure compared to concrete and steel stabilization networks.

- Infrastructure
- Mining Industry
- Oil & Gas Industry
- Railroad Industry
- Stormwater & Wastewater
- Transportation
- Wind Energy
- Green Buildin



Types of Geocell



Geocell is usually classified according to the type and structure of the strips (integrated or pierced), their attaching method and the structure of joining points.

Geocell Fabric: is made of geotextile stripes which are usually polyester. one of its privileged characteristics is preventing the passage of soil particles while water transfer.

Geocell plastic: Geocell plastic: is made of geomembrane strips which are usually HDPE. If drainage and flow of fluids are necessary it should be taken to create holes in the geomembrane strips before engaging in each other because geomembranes are impermeable to fluids.

Geocell Specifications:

- Lightweight with long lifespan
- Anti-decay
- Eco-friendly
- Low volume under expansion situation
- Lack of rust
- Tensile strength and high permeability
- High resistance to biological and chemical decomposition
- Appropriate drainage in perforated cells



Main function of Geocell:



SLOPE PROTECTION

Creates a stable environment for vegetation

LOAD SUPPORT

roadway, parking and yard surface problems.



CHANNEL PROTECTION



RETAINING WALLS



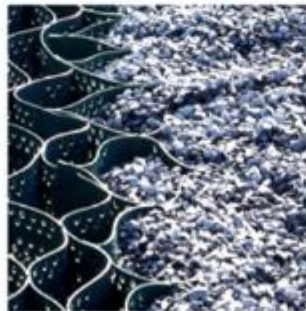


Proper materials for filling

- Concrete
- Soil
- Brick chips
- River stone and mineral wicker

Geocell benefits

- Fast and easy installations
- Cost-efficient constructions
- Secure load transfer connections
- Durable long life materials

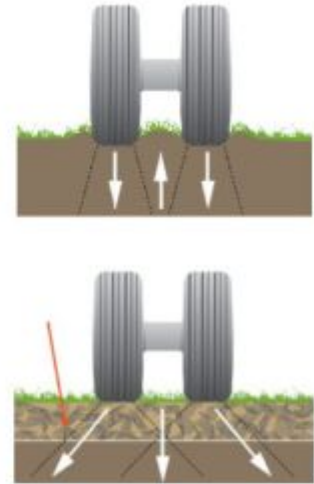


Geocell benefits



| soil stabilization | Erosion control | Retaining wall | Shoreline and channel |
|--|--|---|---|
| <p>Improve the mechanical qualities of local road construction soils</p> <p>Increase loading capacity (CBR)</p> <p>Improve structural integrity</p> <p>Reduce harmful moisture penetration</p> <p>Provide longer economic life of the roadbed (high long term performance)</p> <p>Reduce maintenance costs</p> <p>Lower road construction costs</p> <p>Project optimization & costs</p> <p>Customized geocell according to project requirements and design life</p> <p>Reduced optimized project costs up to 50%</p> | <p>Protect against run-off, rill and gully formation and erosive forces</p> <p>Reduces soil sliding & migration</p> <p>Facilitate plant and root interlock to further stabilize soil mass and slope</p> <p>Enhance soil structure and minimizes impact of raindrops</p> <p>Drainage, promote infiltration</p> <p>Enables flow of water, nutrients and soil organisms</p> <p>Enhance plant growth</p> | <p>Very long-term Stiffness and strength.</p> <p>Absorb energy making it highly resistant to Seismic activity</p> <p>Faster than poured Concrete.</p> <p>Each layer is Structurally ,without Scaffolding or cranes.</p> <p>Green wall with Vegetated fascia on the Outer rows for a soft.</p> <p>Resistant to extreme Temperatures and water.</p> <p>Permeability wall</p> <p>Perforations facilitates onsite drainage.</p> | <p>Confines selected infill material to resist down-slope movement of embankment materials and anticipated hydraulic flows.</p> <p>Minimizes the movement of embankment materials by functioning as anchored containers in the upper soil layer.</p> <p>Inhibits erosion particularly in areas of concentrated flow over erosive soils.</p> <p>Increases vegetation stability on slopes by interlocking with the vegetative root zone, or confining and interlocking aggregate or concrete.</p> |

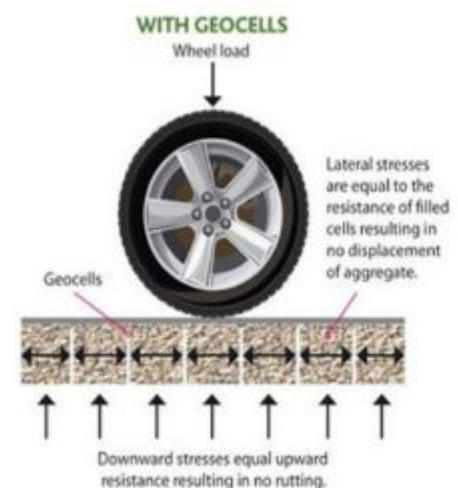
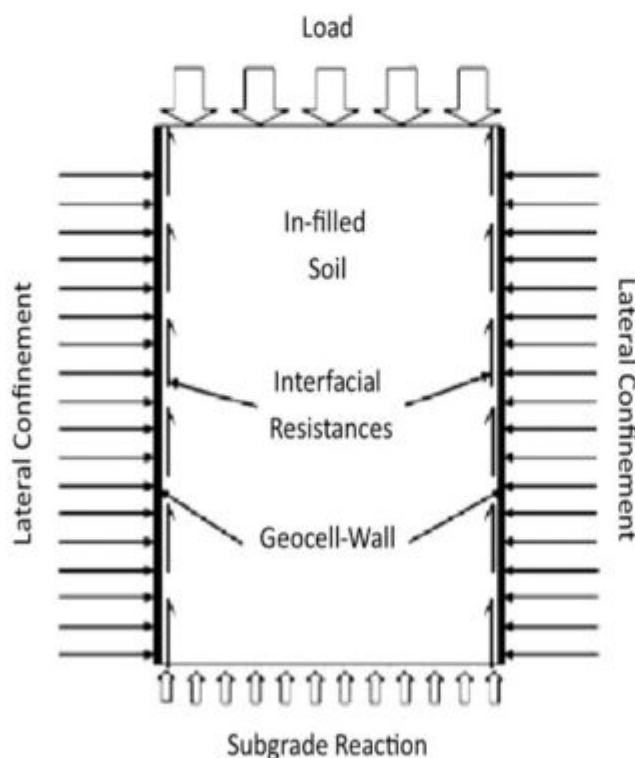


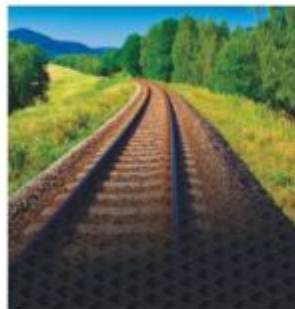


Load distribution

By distributing and bridging applied loads, Geocell system reduces vertical stresses that are typically applied to the underlying soil and root zone.

Geocell system is ideally suited for tree root protection applications where weak subsoil or no-dig restrictions exist





Application of Geocell

- Infrastructure
- Highways
- Railroad Industry
- Airports
- Ports and container yards
- Parking lots
- Shorelines and rivers capes
- Mining Industry
- Oil & Gas Industry
- Storm water & Wastewater
- Wind Energy
- Green Building
- Canals and irrigation
- Landfills
- Reservoirs
- Power



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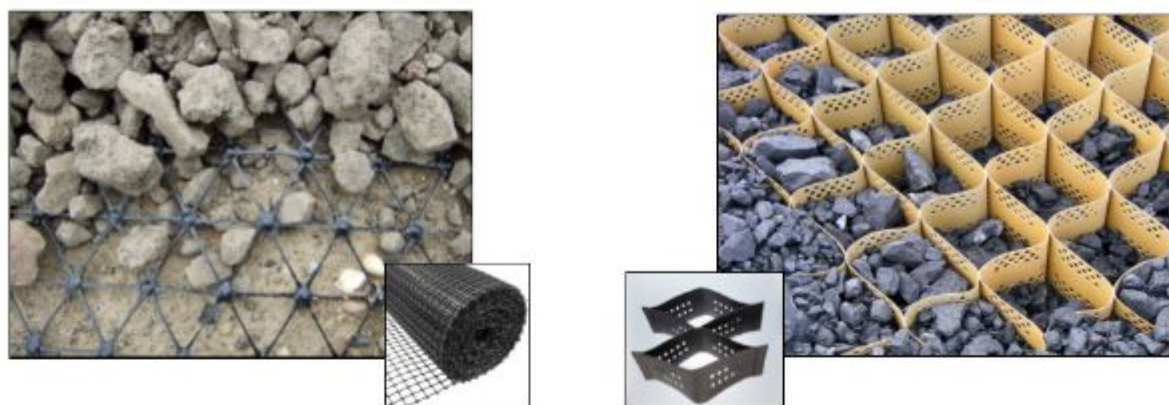
Application of Geocell



| soil stabilization | Erosion control | Retaining wall | Shoreline and channel |
|---|--|--|--|
| Permanent and temporary site access roads Permeable, load-supporting surfaces, ports Transportation / storage yards Roadway shoulders (vegetated or porous aggregate) Stabilized base for asphalt Stabilized drainage layer Railroad track ballast / subballast structures Trails and walkways Boat ramps and low watercrossings Foundation mattresses & pipeline protection Driveable vegetated surfaces | Vegetated & Permeable Embankments Geomembrane Protection Stormwater Basins & Wastewater Lagoons Shoreline Revetments Dikes & Levees Abutment Protection Landfill Linings & Covers Dam Faces & Spillways Cut or fill embankment slopes Shoreline revetments Waste water lagoons | Noise barriers Retaining walls Blast bunds Anti-ram bunds Earth retaining walls Green walls Culvert head walls Sound barriers | Shoreline Revetments & Embankment Protection Shoreline Restoration & Solutions Geomembrane Protection Stormwater or Wastewater Containment Basins Intermittent or Continuous/ Low- to High-Flow Channels Seawalls Swales & Drainage Ditches Process Water Channels or Containment Spillways/Downchutes/Drop Structures River scapes |



Comparison Table



There are numerous advantages to using Geocell, in comparison to geogrids. Geocell is more durable and resistant. At the same time, there are significant cost savings using Neoloy, which reduces pavement thickness and can deploy inferior soil.

| topic | Geocell | Geogrid |
|---------------------------------------|--|--|
| Reinforced/retained soils | Accepts a wide variety of soils, even inferior or poorly graded granular materials | Requires specific quality (and high-cost) aggregate fill type |
| Retained soil improvement | Improves the apparent cohesion of the soil, which significantly increases its resistance to imposed loading. | The improved area has a limited vertical range |
| Performance with abraded soils | Three-dimensional confinement reduces aggregate abrasion and attrition | Reduces attrition only if used with specific granular and graded soil |
| Drainage performance | Retains soil particles in a multi-axial range, thus allowing the natural passage of liquid flows in any direction while preventing those flows from leaching away the retained soil particles. | Retains soil particles in only thin layer consistent with its planer dimension. Liquid flows can easily leach soil particles away in all other directions. |



Comparison Table

| topic | Geocell | Geogrid |
|--|---|--|
| Resistance-deformation | Highly elastic behavior (resistance) before reaching high deformation | Small resistance at small deformation |
| Durability under cyclic dynamic loads | Vertical loads are translated to radial loads that are translated to hoop stress in geocell walls for very high dimensional stability and structural integrity | High level of deformation |
| Resistance zone | Resistance is achieved in a the three-dimensional "plane" | The resistance is limited to a thin plane, in one or two directions |
| Bending moment resistance | Depth of layer provides an increased bending moment resistance effective to at least the height of cell walls. Additionally the structural resistance and integrity of the Geocell solution provides a better performance under concentrated or "point" loads | Almost no resistance. Geogrids require a minimum of two layers to create a planer composite before gaining minor Bending Moment Resistance |
| Vertical soil interface friction | Large interface area of highly textured and perforated cell walls | Small height of active area |
| Lateral deformation | Lateral stresses on the cell walls are confined by stiff cell walls, while the passive earth resistance of adjacent cells provides additional resistance against the loaded cell. The result is a stiff beam with high bearing capacity. | The limitation of the lateral expansion is restricted to a very small section (unless the Geogrid can be used in a "wrap-around" fashion). |
| Stress and settlement | Geocell distributes the surface load though the three-dimensional beam or semi-rigid slab as a unit, reducing stresses transferred to the subgrade by up to 50%. | Geogrids only respond to loading within a small effective radius. The load is distributed over a smaller area, and thus, the stress increases as does the possibility of total or differential settlements |





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