ITLGC Geocell Installation Guide | CHANNEL PROTECTION

Purpose

GeoCells provide a three-dimensional confinement system to line channels and prevent erosion from flowing water. The GeoCell system can be filled with angular rock, vegetated soil, or concrete depending on the hydraulic and environmental requirements.

Applications:

- Storm channels and swales
- Spillways
- Irrigation channels
- Geomembrane protection
- Culvert and bridge inlet/outlet protection
- Energy dissipation zones
- Rip rap replacement

Materials Equipment

- GeoCell Panels- Cell depth and aperture per engineer's hydraulic design (typically 3-6 inch deep and intermediate cell aperture).
- Separation/Underlayment Layer (if specified)
    - Nonwoven geotextile- filtration and separation between the infill and subgrade.
    - Geomembrane- when impermeability is required. If used, do not use stakes. Place nonwoven geotextile over the geomembrane for protection from infill damage.

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Materials Equipment, continued

- Anchoring Devices:
    - Wood or rebar stakes for temporary or permanent anchoring prior to infill (length ≈ 3x cell depth). Not to be used if geomembrane is present.
    - For steep side slopes or high velocity designs where hydraulic shear forces may exceed the interface friction of the system, use a polyester tendon anchoring system with crest/deadman anchorage per engineer's design.
    - If tendons are used, they are tied to a 4" or 6" solid PVC or HDPE pipe placed horizontally at the base of the anchor trench, fully embedded and backfilled and compacted.
- Connection Devices- Cable ties or pneumatic stapler and staples.
- Infill Material- Per engineer's hydraulic design:
    - Rock infill- Angular rock, no larger than 1/3 the cell depth. Typically recommended for velocities ≤10 fps (verify with shear stress calculations and engineer's design).
    - Vegetated topsoil- With erosion control blanket overtop if required. Typically recommended for velocities ≤ 20 fps. Provided full vegetation is established.
    - Concrete infill- Suitable for velocities > 20 fps.
    - Not recommended- Rounded rock (river rock, pea gravel).
- Hand Tools- Utility knife (hook blades preferred), measuring tape/wheel, 3-5 lb. mallet, shovels, rakes, chalk line.

Site Preparation

- Clear channel bed and slopes of vegetation, debris or loose rocks or soil.
- Grade to design profile and side slope angles.
- Compact channel bed and slopes to reduce settlement.
- Excavate anchor trenches at both sides of the channel per engineer's design. If only side slopes are being lined, a toe trench will be required.
- Install underlayment if specified:
    - Nonwoven geotextile directly over prepared subgrade.
    - Geomembrane liner (if required) with a nonwoven geotextile placed over it for protection from infill damage.

GeoCell Deployment

- Panel orientation: Place panels so that expansion runs from one crest anchor trench, down the slope, across the channel bed, up the opposite slope, and into the other crest anchor trench.
- Measure from anchor trench, down slope, across bed, up opposite slope, and into other crest anchor trench to determine required panel length.
- Based on the total length required stage collapsed panels along one side of the channel.
- Connect the necessary panels (including partial panels if needed) to cover the entire channel width in a single deployment.
- If tendons are required measure, cut, thread through the collapsed panels and tie to the deadman pipe in the anchor trench.
- Expand panels evenly across channel width, ensuring not twisting or misalignment.
- Place at least one full cell into each anchor trench and anchor every 3-5 cells.
- At channel bends, cut and fit panels to follow curvature, maintaining full cell confinement.

Panel Connection

- Connect adjacent panels, cell to cell, along all seams using cable ties or pneumatic stapler and staples.
- Ensure no gaps exist that would allow infill loss or undermining.

Infill Guidelines

- Rock Armor- Place from one crest down slope, across channel, and up opposite slope, or fill bed first and then slopes. Slightly overfill 1-2 inches. Use well graded angular rock no larger than 1/3 the depth of the cell.
- Vegetated Soil- Place from one crest down slope, across bed, and up opposite slope, or fill bed first and then slopes. Slightly overfill 1-2 inches to allow for settlement. Use clean, organic-rich soil free of debris. Seed or sod immediately to establish vegetation for hydraulic resistance.
- Concrete Lining- Fill flush to the top of the cell wall and screed level. For larger projects, pour every other row across the channel one day, then fill the alternate rows the following day after curing to prevent panel deformation.

Anchoring

- Anchor trenches: Backfill and compact prior to filling the panels.
- Toe anchor trench (if specified): Backfill and compact after the panels are filled to lock in place.
- For tendon anchored systems: verify tension of tendon and clip security before backfilling the anchor trench.

Quality Control

- Check that panels are fully expanded, square and anchored before infill.
- Confirm all seams are connected cell to cell.
- Ensure anchor trench and toe trenches are fully compacted.
- Verify infill material meets gradation, placement, and compaction specifications.

Maintenance

- Inspect after high flow events for infill loss, displacement, or undermining.
- Refill areas where the silhouette of the geocell is exposed.
- For vegetated systems, maintain vegetation to ensure full coverage and root reinforcement.