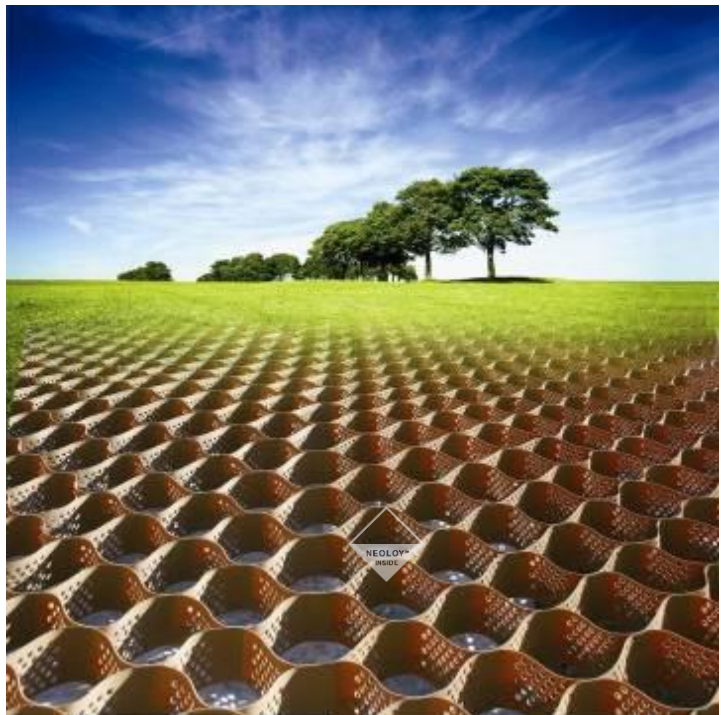


# NEOLOY® GEOCELLS INSTALLATION

## Earth Retention Wall Applications



PRS-EN-TD-ER-3000  
Version 2019 Revision 1

**INSTALLATION GUIDE**

**Purpose of this Document:**

This guide describes the procedures for installing Neoloy® Geocells in earth retention wall applications.



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# Key Points Before Starting – Do’s & Don’ts

<b>Site Preparation</b>	<b>DO:</b>	<input type="checkbox"/> Confirm that site is cleared, ready for installation <input type="checkbox"/> Verify the specified Neoloy Geocells are onsite <input type="checkbox"/> Make sure you have approved final design and construction plans
	<b>DON'T:</b>	<input type="checkbox"/> <b>DO NOT verify conditions onsite without visual confirmation</b>
<b>Required Tools</b>	<b>DO:</b>	<input type="checkbox"/> Fill out Required tools checklist – verify all equipment onsite and ready for use
	<b>DON'T:</b>	<input type="checkbox"/> <b>DO NOT begin installation until all equipment is onsite</b>
<b>Training</b>	<b>DO:</b>	<input type="checkbox"/> Make sure installation team receives training from certified supervisor
	<b>DON'T:</b>	<input type="checkbox"/> <b>DO NOT install geocells without training</b>
<b>Layout</b>	<b>DO:</b>	<input type="checkbox"/> Layout section in correct direction, alignment <input type="checkbox"/> Ensure that U-shaped rebars or stakes hold cells open for each pair of fascia-back cells (width)
	<b>DON'T:</b>	<input type="checkbox"/> <b>DO NOT skip any pairs of fascia - back cells</b>
<b>Fastening</b>	<b>DO:</b>	<input type="checkbox"/> Use the correct number of staples per panel (1 staple / 2.54 cm of cell height, e.g., 8 staples in 20 cm height cell)
	<b>DON'T:</b>	<input type="checkbox"/> <b>DO NOT use less than the required number of staples</b>
<b>Opening Sections</b>	<b>DO:</b>	<input type="checkbox"/> Verify that bottom of cells sits on flat foundation <input type="checkbox"/> Verify that geocells are fully opened
	<b>DON'T:</b>	<input type="checkbox"/> <b>DO NOT walk or drive vehicles on empty cells</b>
<b>Infill Placement</b>	<b>DO:</b>	<input type="checkbox"/> <b>Verify that soil is dry; In rainy weather, cover infill materials with tarps, covers (for graded, cohesive soils only)</b> <input type="checkbox"/> Confirm specified infill soil is as specified in design <input type="checkbox"/> Verify that all cells overfilled by 5 cm <b>before</b> grading/compaction <input type="checkbox"/> Remove large rocks or debris
	<b>DON'T:</b>	<input type="checkbox"/> <b>DO NOT infill with wet cohesive soil – may cause project failure</b>
<b>Compaction</b>	<b>DO:</b>	<input type="checkbox"/> Verify full compaction for each layer according to specifications – <b>full compaction is critical to project success</b> <input type="checkbox"/> Verify that all cells overfilled by at least 2 cm <b>after</b> compaction
	<b>DON'T:</b>	<input type="checkbox"/> <b>DO NOT compact cohesive wet soil – may cause project failure</b>
<b>Safety &amp; Environment</b>	<b>DO:</b>	<input type="checkbox"/> Adhere to all safety standards and procedures <input type="checkbox"/> Adhere to all environmental protection guidelines
	<b>DON'T:</b>	<input type="checkbox"/> <b>DO NOT deviate from safety and environmental procedures</b>

# Safety Standards

Adhere to all applicable standard construction work safety procedures associated with site construction, power tools and construction vehicles (e.g., EU Directive 92/57<sup>1</sup> and US OSHA standards<sup>2</sup>). Safety procedures are part of the planning process and should be incorporated before actual construction begins; however specifics are dependent upon project specifications and on-site supervision.

## Site Preparation Procedures

1. **Preplanning excavation work** – consider all possible jobsite conditions and consult with the appropriate authorities about traffic, nearby structures, soil, water supplies, underground utilities and weather.
2. **Underground utilities** – determine the approximate location of utility installations -- such as sewer, telephone, fuel, electric, water lines – that may be reasonably expected prior to excavation. Proceed with caution, and protect, support or remove underground utilities, in coordination with the appropriate owners wherever possible.
3. **Excavations and trenches** – make sure that steep temporary earthwork has stable slopes or protective structures to prevent cave-ins or failure, including protection from weather and water hazards during construction.

## Traffic control signs, signals, barricades or devices

1. **Safety Standards** – The use of appropriate traffic signs, signals and barricades where installation takes place near public roadways is mandatory to protect workers and equipment, as well as the vehicular traffic itself.

## Personal Protective Equipment (PPE)

1. **Personal protective equipment** – installers should wear protective gear for on-site safety including, but not limited to, helmets, work shoes, gloves, and protective safety glasses where applicable.
2. **Reflective vests or garments** – installers should wear visibility clothing, such as orange vests, and if worn for night work, must be of reflective material.

## Power Tools and Air Supply

1. **Equipment** – operate pneumatic tools, compressor and generator according to the manufacturer's instructions, and only if properly trained in its use and alerted to its potential hazards.
2. **Eye protection** – all members of installation team operating with or in proximity to power tools should wear safety glasses with side protection that conform to industry standards.

<sup>1</sup> EU Council Directive 92/57/EEC of 24 June 1992 on the implementation of minimum safety and health requirements at temporary or mobile construction sites, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0057:EN:HTML>

<sup>2</sup> US Occupational Safety & Health Administration (OSHA) Regulation 1926, Safety and Health Regulations for Construction, [http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=10593](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10593)



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3. **Air supply and connections** – shall be secured to the hose in a positive manner to prevent accidental disconnection. Never use oxygen or other bottled gases for air supply. Do not exceed the PSIG indicated on the tool label. Disconnect when making adjustments or when not in use.
1. **Operation of power tools (e.g., pneumatic stapler)** – Never point tool at yourself or others. Care must be taken during fastening, particularly to hands and fingers to avoid serious personal injury. Do not overlap staples or drive staples close to the edge of the material, as this may cause deflection of the fasteners. Open pneumatic stapler magazine cover fully to relieve stable feed load before removing magazine to load staples.

**NOTE: Make sure to disconnect the air supply to the compressor when adding staples to the pneumatic stapler – accidental discharge may cause serious personal injury.**

## Vehicles and Mechanized Equipment

Observe all standard safety procedures for mechanized construction equipment including, but not limited to the following:

1. Do not operate vehicles on steep slopes. Perform earthmoving operations from the top or from the bottom of the slope or wall.
2. Check vehicles before each shift to assure that all parts and accessories are in safe operating condition.
3. Do not drive a vehicle in reverse gear with an obstructed rear view, unless it has an audible reverse alarm, or another worker signals that it is safe.
4. Make sure that personnel are in the clear before dumping, shoveling or lifting.
5. Haulage vehicles that are loaded by cranes, power shovels, loaders etc., must have a cab shield or canopy that protects the driver from falling materials.
6. Lower or block blades, buckets, dump bodies, etc., when not in use, and leave all controls in neutral position, with parking brake set.

## Infill and Cover Layers

1. All site preparation, infill, cover and landscape work will be in full compliance with detailed work plans and applicable industry standards.
2. Employees will be properly trained in the use of concrete pumps if applicable and alerted to potential hazards of poured concrete.



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# Overview

This guide describes the procedures for installing PRS Neoloy® Geocells (formerly known as PRS-Neoweb) in steep earth stabilization and retention wall applications. The following are the basic installation stages:

- Tools, storage and handling
- Site preparation
- Base layer and footing
- Fasten sections
- Expand sections in base layer
- Construct wall layers
- Infill & Compaction
- Installation on curves



FIGURE 1 - INSTALLATION OF NEOLOY

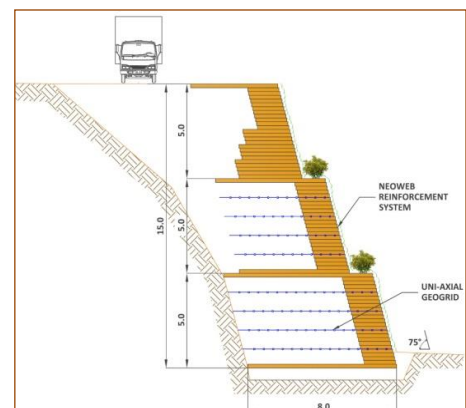
## Key Points before Starting

1. **Materials** – ensure that all specified materials and the correct Neoloy Geocell type/width are delivered to the site, undamaged, and ready for use.
2. **Tools** – verify that you have the appropriate materials and required tools – such as, anchors, pneumatic stapler (and staples), air compressor and electricity source; geogrids and geotextiles as specified.
3. **Plans** – make sure that you have approved project construction plans and specifications.
4. **Layout** – when laying out the Neoloy strips, make sure the sections and cell openings are in the direction, alignment and elevation as shown on the construction drawings.
5. **Empty cells** – do not walk on exposed cells. Although the cell walls are stiff, Neoloy is a composite system that works only when infilled with soil. Walking on empty cells may bend the cell walls, such that the performance of the system is damaged. Use boards and planks to walk over empty cells if necessary.
6. **Vehicles** – vehicles may not be operated directly on exposed Neoloy Geocells at any time; during the infill process make sure that the Neoloy Geocells are not damaged by mechanical equipment.
7. **Safety** – ensure that employees are familiar with and adhere to safety standards and procedures.
8. **Environment** – perform construction activities in accordance with all applicable guidelines to minimize the environmental impacts of storm water run-off and the release of sediment or pollutants in local waterways.
9. **Compaction** – maximum soil compaction according to the project specifications must be verified for each layer before progressing to the next layer; lack of proper compaction may cause structural failure.
10. **Reinforcement** – geogrids are typically uniaxial, and therefore it is critical to lay them out in the correct position and directionality; incorrect positioning may cause structural failure.

## Typical Applications

The following are typical earth retention applications:

- Multi-grade transportation arteries
- Seismically stable (flexible) retention structures
- Road and rail embankments
- Green walls
- Mine site and quarry restoration
- Failed and steep slopes
- Cliff stabilization and preservation
- Expanding fields and plots to edge of site
- Rapid grade changes





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# Required Tools and Equipment

		
<b>Neoloy Geocell Sections Palletized</b>	<b>Neoloy Geocell Sections Expanded on-site</b>	<b>U-shaped rebars, (or stretcher frames, stakes)</b>
		
<b>Geosynthetics (if specified)</b>	<b>Pneumatic Stapler and 1/2" (13 mm) Galvanized Staples</b>	<b>Air Compressor and Generator (60 psi /4 bar pressure) &amp; Pneumatic Hammer with Head for Driving Stakes (optional)</b>

## Optional Standard Construction Tools

In addition to the required and optional tools and equipment above, standard construction tools typically used during installation include the following:

- a) Hand Tools – shovels, rakes, sledge hammers, utility knives, lumber and nails
- b) Lumber – long planks and/or rectangular boards used for walking over empty cells
- c) Power Tools – drills, saws, hammers
- d) Concrete Finishing – floats, trowels, tampers
- e) Surveying Equipment – levels, tripod, laser beacons, receivers, survey stakes, string markers

## Mechanical Construction Equipment

- a) Front-end loaders with buckets and excavators are the most suitable equipment for the installation infill processes.
- b) Optionally conveyors, dumpers and chutes may be used for the infill process.
- c) Manual (walk-behind) vibratory plates are required to compact Neoloy infill.
- d) Heavy mechanical rollers or compactors are required to compact backfill for large retention structures.
- e) Water trucks to saturate soil during compaction.



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# Material Storage and Handling

## Dimensions and Weights

Neoloy Geocell sections are folded, shrink-wrapped and palletized for delivery to the site. The following table provides typical dimensions and weights of standard palletized sections. The amount, size and weight of the sections and cells vary according to Neoloy type and height.

TABLE 1. TYPICAL MINIMUM AND MAXIMUM WEIGHTS AND DIMENSIONS OF STANDARD PALLETIZED NEOLOY SECTIONS

Minimum Pallet Size Length x Width x Height	Maximum Pallet Size Length x Width x Height	Minimum Pallet Weight	Maximum Pallet Weight
100 x 100 x 100 cm	112 x 110 x 115 cm	420 kg	615 kg

## Transport and Storage

1. Take care that protective wrapping, labels and the Neoloy Geocell sections are undamaged during transport, handling and storage.
2. If the Neoloy Geocells are to be stored on or off site for an extended amount of time, make sure the palletized sections are protected from UV radiation (sunlight, chemicals, fire or welding sparks), high temperatures and damage from people or equipment.



FIGURE 2. PALLETIZED SECTIONS

## Off-loading Sections On-site

Off-load palletized sections on-site utilizing slings and fork attachments. After removing wrapping, individual sections can be lifted and carried by one individual.

1. Ensure that all specified materials are delivered to the site, undamaged, and ready for use.



FIGURE 3. OFF-LOADING SECTIONS ON-SITE





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# Site Preparation

## Prepare Backslope

Prepare the backslope as indicated on the construction drawings or as directed by the Engineer on site.

1. Excavate or fill backslope according to project plans.
2. Remove loose soil and rock on backslope to prevent falling debris.
3. Make sure that temporary steep earthwork has stable slopes or protective structures to prevent cave-ins or failure, including protection from weather during construction.



FIGURE 4. PREPARE SUBGRADE LAYER

## Excavate Foundation Soil (Subgrade)

Excavate and compact the foundation soil for the wall base as indicated on the construction drawings or as directed by the Engineer on site.

1. Prepare subgrade and foundation soil.
2. Complete earthwork.
  - a) Level surface to planned elevations and grades.
  - b) Compact subgrade according to project specifications.
3. Mark working boundaries.
  - a) Mark working boundaries for Neoloy Geocell installation with stakes and marking rope.



FIGURE 5. EXCAVATING FOUNDATION SOIL

## Layout Geotextile

Install geotextiles (typically non-woven) to separate the subgrade and base footing layers and the slope.

1. Install geotextiles according to the manufacturer's directions over the base and on the cut slope.
2. Ensure required overlap between rolls or pre-sewn seams according to project specification.



FIGURE 6. LAYOUT GEOGRID

# Base Layer & Footing

## Prepare Base Leveling Pad

The compacted base acts as structural support and as a leveling course for the Neoloy wall system.

1. Prepare leveling pad.
  - a) Infill with granular material according to project specifications (or optional concrete).
  - b) Compact infill using vibratory compaction equipment according to project specifications. Verify **full** compaction according to project requirements.
  - c) Level surface to **exact** planned elevations and grades and verify measurements.

**NOTE: Incomplete compaction may cause wall failure.**



FIGURE 7. PREPARATION OF BASE LEVELING PAD

## Install Drainage Systems (optional)

Install sub-drain piping in the base level and/or backslope according to the project specifications.

1. Insure pipe joints are connected properly and minimum gradients are maintained (1%).
2. Protect outlet discharge against localized erosion by wrapping with geotextile or other solution according to project specifications.

## Mark and Anchor Stakes

Stakes (or pins) are used to position and anchor the outer cells of the Neoloy Geocell sections prior to infill. Use pointed wood, iron or steel j-hooks or Neo-anchor stakes. Typical stake dimensions are 40-60 cm long (height) and 10-12 mm diameter.

1. **Marking** – use string to align staking locations and borders of the outside and inside of the wall
2. Anchor the stakes firmly in the ground.
  - a) **Intervals** – one stake per cell when fully opened.
  - b) Penetrate the geotextile fabric with the stakes.
  - c) Leave 15 cm of the top of the stakes exposed above ground for easy removal.



FIGURE 8. LAYOUT SECTIONS ALONG WALL LENGTH

**NOTE: The following paragraphs describe how to fasten and expand the Neoloy Geocell sections (including installation on curves) and are applicable to all layers of the wall construction.**



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# Fasten Neoloy Geocell Sections

Sections are delivered in predetermined lengths and widths. . The ends of adjoining sections are typically fastened the length of their long dimension when closed (end to end). Additional sections for the top and footer layers of the wall (face to face) may be fastened along the width as well.

**CAUTION:** It is recommended that 2 people perform the fastening. Observe all safety precautions when using the pneumatic stapler to prevent serious injury to hands and body.

## Use the Correct Number of Staples

1. Fasten using 1 staple per 25 mm geocell height (see Figure 9 ):
  - ≤ PRS 120 mm – 5 staples
  - ≤ PRS 150 mm – 6 staples
  - ≤ PRS 200 mm – 8 staples

**NOTES:** Correct positioning of the top and bottom staples is critical. Use ½ inch (13 mm) galvanized staples. Verify that staples penetrate all strips and/or seams.

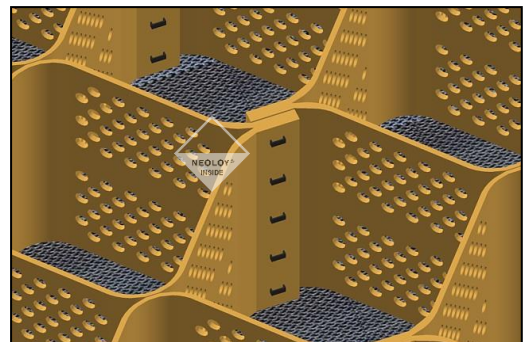


FIGURE 9. STAPLES FASTENING SECTIONS END TO END— PRS 150 MM

## Staple Sections End to End (Figure 10)

- 1) Fasten each end of the 2 sections:
  - a) The staples must penetrate the seams (2 strips) on each section (total of 4 strips).
- 2) Align and interleaf the ends of adjoining sections.
  - a) Overlap the end seams of the two adjoining sections and ensure that their surfaces are flush.
- 3) Fasten the edges of adjoining sections at the seams using the pneumatic stapler.
  - a) Use the same overlap (interleaf) sequence for each strip of the section.

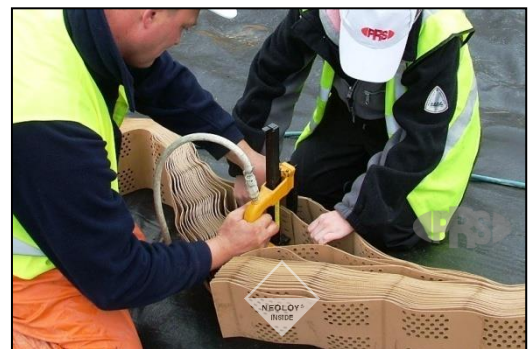


FIGURE 10. FASTENING SECTIONS END TO END

## Fasten Sections Face to Face (Figure 11)

1. Align 2 adjacent sections face to face (the “long” sides).
  - a) The ends and perforations (if exist) should be aligned.
2. Continue fastening the sections by stapling the middle of each cell (unperforated area) along the entire length of the strip until completed.

**NOTE:** Each cell (seam) must be fastened properly – do not skip any cells, as this may cause failure of the entire section.



FIGURE 11. FASTENING SECTIONS FACE TO FACE



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# Expand Neoloy Geocell Sections in Base

The sections for the base of the wall are typically the entire width and length of the wall, and the Neoloy Geocell sections for the base cover the entire area. After fastening the sections to the correct dimensions, the sections are opened and laid out over the base.

**NOTE: Make sure that the side of the section with the non-perforated 'fascia' cells is on the outside of the wall (visible side of wall face).**

## Expand Sections over Anchors

1. Place the outer cells of the joined sections over the anchors on the outside of the wall face.
2. Open and expand the sections to the opposite side and "hook" over the anchors (stakes).
3. Verify that the expanded sections are flush on the ground and opened to their nominal dimensions (see Figure 12 and Table 2).

**NOTE: Do not walk on empty cells - this may bend cell walls and damage the system. Spread planks or boards over empty cells to walk over the Neoloy Geocell sections if necessary.**



FIGURE 12. EXPANDING SECTIONS OVER ANCHORS

TABLE 2. DIMENSIONS OF STANDARD SIZED CELLS AT RECOMMENDED OPENINGS

CELL & SECTION NOMINAL DIMENSIONS		
PROPERTIES	PRS-445-150/200-7PS-1XS	PRS-660-150/200-7PS-1XS
Cell Distance between Weld Seams	445 mm ( $\pm 2.5\%$ )	660 mm ( $\pm 2.5\%$ )
Cell Wall Heights	120, 150, 200 mm	120, 150, 200 mm
Cell Dimension (Expanded)	340 x 290 mm ( $\pm 3\%$ )	500 x 420 mm ( $\pm 3\%$ )
No. of Cells/m <sup>2</sup>	22	10
Section Size (Expanded)	2.81 x 10.7 m ( $\pm 3\%$ )	2.5 x 16.0 m ( $\pm 3\%$ )
Section Area (Expanded)	30 m <sup>2</sup>	40 m <sup>2</sup>

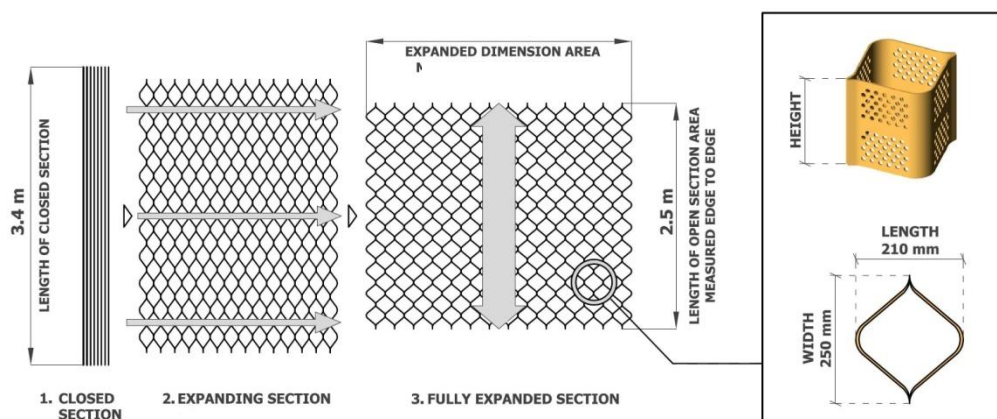


FIGURE 13 DIRECTION OF EXPANDING SECTION



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## Construct Wall Layers

Each wall layer – both gravity and reinforced – is laid out, infilled and compacted one at a time. Each layer after compaction is structurally stable.

Additional drainage systems and/or geogrid reinforcement may be included in each or alternating layers.

**NOTE: No vehicle is permitted over exposed geocells. Minimal overfill of 5 cm (before compaction) is required.**

**NOTE: Make sure that the non-perforated 'fascia' cells are on the outside of the wall (visible side of wall face).**



FIGURE 14. LAYOUT SECTIONS ALONG CREST OF WALL

### Using Geogrid Reinforcement (optional)

Geogrids between layers provide lateral sheet reinforcement and frictional resistance between the soil mass. Install the reinforcement according to the project specifications.

1. At the designated layers in the project plan, layout the geogrid.
  - a) Ensure overlap between geogrid sheets
2. Secure the geosynthetic with stakes, ties or infill.

**CAUTION: Geogrids are typically uniaxial and reinforce in one direction; therefore, it is critical to lay them out in the correct position and directionality; incorrect positioning may cause structural failure.**



FIGURE 15. POSITIONING GEOGRID REINFORCEMENT ALONG LENGTH OF WALL

### Layout Neoloy Geocell Sections Along Wall Face

1. Layout closed wall sections along the length of the wall – with the non-perforated side facing the outside (visible) side of the wall – and fasten adjacent sections, if not already done so.
2. Expand sections and anchor using U-shaped rebars that are shaped to the exact opening width.
3. Infill and compact – see the paragraph on Infill and Compaction.

**NOTE: Use string-lines to mark alignment of each layer.**

**NOTE: Ensure the proper vertical offset and alignment between each additional Neoloy layer to prevent soil from escaping underneath the cell**



FIGURE 16. ANCHOR WITH U-SHAPED REBARS



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# Infill

Typical infill placement and compaction procedures described below are applicable to all layers.

**NOTE: 1) Vehicles are not permitted over exposed geocells at any time; 2) Any vehicle over 1500 kg will not come within 2m of the face of the wall; 3) Minimal overfill of 5 cm (before compaction) is required for trafficking.**

## Place Topsoil Infill for Green Wall Fascia)

1. Manually infill the outer-most row of Neoloy Geocells (only) with topsoil, if plan specifies a vegetated green wall face.

## Infill Neoloy Geocells (Granular)

1. Mechanically (and/or manually) infill the Neoloy expanded sections using the designated granular fill.
  - a) Do not walk on empty cells. Use planks or boards to walk over empty cells.



FIGURE 17. INFILL PLACEMENT

**NOTE: Limit drop height of infill to 1m (100 cm) to prevent damage to the cell walls.**

2. Overfill the Neoloy Geocells to at least 5 cm above the cell walls to allow for settling before compaction or trafficking.
  - a) Manually complete infill of cells as necessary
  - b) Level infill with timber board

**NOTES:**

**Visually inspect infill and remove any large pieces of debris, soil or rock.**



FIGURE 18. INFILL PLACEMENT

## Concrete Infill (Optional)

Infill operations are typically performed with a concrete pump. No forms are necessary.

1. Use industry standard procedures for handling and pouring concrete, according to project specifications.
2. Manually rake the concrete to ensure uniform distribution in the cells before hardening.

## Place Backfill to Native Slope

1. Complete backfill using the specified retained soil behind the Neoloy wall sections up to the native slope (cut or fill).

**NOTE: After placing infill remove rebars before compacting.**



FIGURE 19. BACKFILL OF BACK SLOPE



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# Compaction

## Watering

The moisture content of the infill is vital to proper compaction.

1. Spray the soil with water to saturate granular material before compacting.

## Compaction

Compact using standard procedures and conventional mechanical compaction equipment according to the project specifications.

1. Compact the Neoloy infill layer with manual (walk-behind) vibratory plate compactor.
2. Compact backfill layer behind Neoloy wall with heavy mechanical roller compactor according to project specifications (and size of area to be compacted.)

**NOTE: Compaction in each layer of Neoloy Geocells in the wall should be tested and approved by certified authority.**

**NOTE: Lateral displacement of wall sections indicates over-compaction.**

## Stacking of Rows

1. After compaction, remove excess material that may be sticking out, such as geogrids, to enable accurate stacking of the next row of Neoloy Geocells.
2. Ensure that the proper vertical setback of each layer is maintained according to the project specifications.
3. Ensure that cells walls are aligned vertically with the previous row to prevent loss of cell infill material.



FIGURE 20. WATERING INFILL FOR COMPACTION



FIGURE 21. MANUAL COMPACTION WITH VIBRATORY PLATE



FIGURE 22. MANUAL COMPACTION OF NEOLOY ALONGSIDE MECHANICAL COMPACTION OF BACKFILL



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# Installation on Curves

## Curved Sections

Neoloy Geocells can be easily adapted to moderate curves by varying the degree of cell expansion.

1. Vary the cell dimensions by over-expanding the outer cells and under-expanding the inner cells.
2. Cell expansion is according to the long axis (direction).

**NOTE: Under or over expanded cell size on curves must not exceed 15% of nominal cell dimensions (see Table 2). If exceeding this value, use tapered trapezoidal sections as below.**

**NOTE: Radius changes from one layer to another may cause misalignment of cells. Correct this with a layer setback of 15 cm (6 in).**



**FIGURE 23. CURVED WALLS**






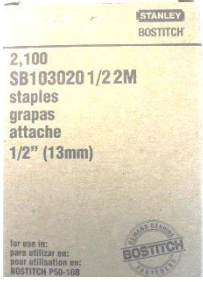



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# Appendix: Neoloy Geocells: Pre-Installation Site Preparation –Mandatory Items Checklist

No.	Description	Responsibility		Images	Required	Status
		Client	PRS			
<b>Preinstallation - General</b>						
1	Leveling, Drying and compaction of installation area	✓				
2	Preparing site for installation according to plan	✓				
3	Design approval		✓			
4	Filling material: quantity, quality (strength), and grading according to design requirements	✓				
5	Confirmation of laboratory results		✓			
6	Installation Supervision		✓			
7	Delivery and reading installation guide	✓	✓			
8	Installation Team	✓				
9	Supply of geotextile fabrics	✓				
10	Monitoring and supervision	✓	✓			
11	Ready-for-installation tools:	✓				



Installation Equipment						
12	Pneumatic staple guns	✓				
13	Staples for staple guns	✓				
14	Compressor (2 hp) + compatible generator + adequate fuel	✓				
15	Air-pressure hose suited for 2 hp / 4.5 Bar	✓				
16	Fastening device for geotextile fabrics	✓				









17	<b>Installation anchors (wood / iron)</b>	✓				
18	<b>Marking rope</b>	✓				
19	<b>Hammers - Minimum weight 2 kg</b>	✓				
20	<b>Safety equipment</b>	✓		Shall be provided in accordance with the requirements of the site supervision		



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## Heavy Engineering Equipment for Installation:

No.	Description	Responsibility		Images	Required	Status
		Client	PRS			
21	Dump trucks	✓				
22	Front-end and/or Backhoe Loader/s	✓				
23	Road Grader/s	✓				
24	Water Truck/s	✓				
25	Compactor/s	✓				
26	Excavator/s for infilling material in cells (slope and wall projects)	✓				



Stabilizing an unstable world!



### Installation Manpower

No.	Description	QTY	Responsibility		Status
			Client	PRS	
1	Site engineer		✓		
2	Soil sampling tester		✓		
3	Laboratory tester		✓		
4	Installation supervisor			✓	
5	Installation teams One team consists of 4 people		✓		
6	Project supervisor		✓		
7	Surveyor		✓		
8	QA/QC Tester		✓		