Installing GEOfabrics' geotextiles in coastal and river applications
Introduction

This document covers the general installation of GEOfabrics non-woven geotextiles in coastal applications. Further attention may be required to address site-specific requirements and conditions.

These guidelines are intended as an aid for the installer and to promote the most efficient and effective installation, whilst maintaining quality, maximising the geotextiles’ performance, and without compromising health and safety.

No warranty is made or implied as to the suitability of these guidelines in any particular application and the contractor must ensure that he uses appropriate methods at all times.

1. Unloading, handling & Storage

Roll weights can be between 300kg (660lbs) and 1320kg (2904lbs) and hence appropriate equipment is required for unloading and handling e.g. front-end loader, back hoe, forklift (pole truck) or crane.

Rolls should be lifted by using one of the following:

- Lifting straps capable of lifting twice the anticipated load. Straps should be located 1/3 of the way in from the roll ends.
- A spreader beam attached, by lifting chains, to a core bar inserted through the centre of the roll.
- A forklift truck and a stinger bar.

Note: GEOfabrics does not supply lifting equipment; please see suppliers’ list later in this document

It should be noted that, in general, deliveries within Europe are made by flatbed trailer allowing them to be unloaded by any of the above methods. Deliveries outside Europe are made by freight container, which should be unloaded by forklift truck fitted with a stinger attachment. A strap should be wrapped around the top, centre roll in the container (the first roll to be removed) before unloading the by forklift. The strap should then be used to gently slide the roll from the container (the plastic packaging should allow the roll to slide) as the rolls may have settled during transit. The remaining rolls can then be removed using the forklift.

2. Installation Equipment

In addition to conventional personal protective equipment (PPE) when working on site (hard hat, work boots and high visibility coat), the following equipment should be considered for use during installation:

- Gloves
- Safety glasses
- Carpet cutting knife (or Stanley knife)
- Hot air welding gun and hand roller
- Mobile electrical generator
- Sand bags or tyres
3. Laying HPS geotextiles – Above Water

- Rolls can be transferred to the working area using site plant and the sleeving removed without causing damage to the geotextile.
- Decide upon the best layout for the geotextile: for revetments the material should be unrolled down the slope and for groynes, the material can be placed along the length of the structure or transverse to the centreline as suits the method of rock placement.
- Either use a spreader beam to support the product and unroll directly into position or manually unroll suitable lengths on level ground, away from the end position, and cut each piece to the required length.
- Place lengths with suitable allowance for longitudinal and transverse overlaps. Clamshell grabs can be used to manoeuvre the heavier grades of geotextile (HPS14 and heavier).
- Once laid, the geotextile should be covered with an initial layer of rock before the first tide.

4. Overlaps for HPS Geotextiles – Above Water

Overlap widths are site specific and generally at the discretion of the on-site engineer. Overlaps are required to ensure that all of the underlying soils are fully covered by the geotextile after any movement has taken place during rock placement. The actual overlap will therefore depend upon the firmness of the subgrade and the weight of the rock armour. However, the following may be used as a guideline for coastal projects:

- 300mm minimum recommended overlap for work above high-water level on firm subsoil with stone pitching or concrete mats

- 1000mm overlaps for use in the inter-tidal zone with rock armour
  - Transverse overlaps (between subsequent rolls/lengths) should be located at least 1m from the toe and crest of slopes. Consider ordering rolls in non-standard lengths to match the site requirements in order to avoid transverse overlaps. GEOfabrics can manufacture roll lengths to order in increments of 5m.
  - Longitudinal overlaps (between adjacent roll lengths) should be formed down, not along, slopes.
5. Method of laying – below water

All needle-punched geotextiles will float in seawater and therefore require some form of ballast if they are to be successfully placed below the low-water line. There are a number of ways of achieving this, and many contractors will have developed their own procedures.

In shallow water, where it is possible for a machine to reach the full extent of the works, the geotextile can be rolled onto a steel pole with a buoy attached at one end. The leading edge is anchored beneath the tracks of an excavator & the roll can then be lowered into place. The pole can be retrieved once the fabric has been weighted with a quantity of stone.

For speed of installation on larger projects, it is possible to join two widths of geotextile using a prayer seam formed with a portable, sack-closing, sewing machine. Widths up to 12m can be prefabricated prior to installation. Joints with 60% of the geotextile’s strength can be fabricated using grades up-to 6mm thick.

Scrap rebar can be used as sacrificial ballast and lengths can be attached to the geotextile at intervals along its length using cable ties, tying wire or tape. Unroll a suitable length of geotextile on level ground away from the installation area. Attach one end of a geotextile length to a suitable steel core. Attach two lengths of rope to the core & lay the lengths along the fabric. Roll the fabric, rebar & ropes onto the core and transport to the installation area.
Use suitable methods to locate the exact position of the previous geotextile length to be place. Divers may be required or it may be possible, in shallow water, to attach floats to the edges of the geotextile. White lines spray painted onto the fabric to identify the correct overlap position may be suitable in some waters.

The geotextile and core can now be lowered into position by unwinding the ropes. The steel core can be recovered for future use. On long slopes, it may be more effective to place the roll on the slope shoulder and have the ropes hauled from on board a barge.

An initial layer of rock should be placed on the fabric immediately to ballast it.

For large projects, where sacrificial ballast would be expensive, it is possible to use a steel-wire net laid out on top of the geotextile in place of the rebar, rope and core. This is wound up inside the fabric and can be fully recovered once an initial layer of ballast (smaller than the steel-wire net apertures) has been placed to ballast the fabric.

6. Overlaps – below water

Overlap widths are site specific and generally at the discretion of the on-site engineer. Overlaps are required to ensure that all of the underlying soils are fully covered by the geotextile after any movement has taken place during rock placement. Consider spray painting a line on the fabric to mark the overlap if water is clear enough. A minimum overlap of 1m is recommended for works below water level.

7. Jointing

Prayer seam detail
8. Anchoring & detailing

Anchorage requirements should be in accordance with the project drawings, or be carried out under the guidance of the site engineer. The anchor trench should be backfilled with soil and compacted on completion of the geotextile installation.

9. Backfilling

- GEOfabrics' HPS (black) products contain 1% carbon black to provide UV resistance. However, it is recommended that these products should be covered within 1 month of installation to avoid any risk of degradation.

- It is recommended that the front profile of an anchor trench is rounded and smooth to reduce stress on the geotextile.

- Site or other equipment should never be driven directly on any geosynthetic product.
10. Equipment Suppliers

- **Lifting Equipment (spreader bars)**
  Invicta, Leeds (Peter Sharpe) 0113 277 1222
  RSU Lifting Services, Milton Keynes (Candy Scott) 01908 649202

- **Lifting Equipment (straps/slings)**
  Euroweb Lashing Systems, Eastbourne (Terry Butchers) – 01323 646 925

- **Cutting knives**
  Europa Machines Ltd, Cheshire – 01625 536314

- **Sewing Machine**
  Eastman Staples Ltd, Huddersfield – 01484 888888

11. Geotextile characteristics and properties

- All GEOfabrics' non-woven geotextiles are manufactured from polypropylene staple fibre and quality assured by a UKAS accredited laboratory to comply with the published data, within a prescribed tolerance range.
- The products are typically delivered to site as 6m wide rolls within the UK and 5.9m wide rolls outside the UK. Narrower roll widths can be manufactured.
- The core of each roll comprises a cardboard tube with an internal diameter of 120mm and an external diameter of 136mm.
- All geotextiles are delivered to site in protective plastic sleeving. Shipping labels are placed both on the inside and outside of the packaging. Shipping labels include product details such as product name, length, width, roll number, roll weight and date of manufacture. This information should be retained for the Resident Engineer and cross-referenced with quality control certificates supplied separately.

Further information can be found at www.geofabrics.com
or enquiries can be e-mailed to info@geofabrics.com.

These notes are written in good faith and comprise several years' experience of a number of different installers. While it is intended to provide the best practice for installation, these guidelines offer no guarantee for the quality and performance of the installation.