

BC Geo textile Method Statement

1. Introduction

Below method statement describes, precautions, handling and installation procedure for BC Geo textile in job sites

2. Delivery, Storage and Handling

Prior to unloading, the handling equipment is inspected to verify that it will not damage the material. Fabric straps or other approved apparatus are used for handling of material.

Rolls must be examined upon unloading to insure that there is no damage to the material and to assure that the correct material for the job has been received.

3. On-site Material Inspection

Identification labels on material rolls shall be inspected and roll numbers recorded for future documentation. The roll number is unique and shall be used to identify the roll in QC testing and to determine which panels are cut from an individual roll.

4. Panel Identification and Layout

As part of the initial job planning a panel layout drawing shall be prepared that shows how rolls of liner material may be assembled and joined to form the finished liner. Each panel of liner shall be assigned a number for future reference.

Proposed Panel Layout Drawings are intended as a guideline, during Project Planning, to indicate the basic layout concepts and allow for feedback between the Owner, Liner Installer, Engineer, etc. Actual finished Panel Layout (i.e. "As-Built") may differ from the proposed panel layout due to field evaluations of actual site conditions. Such conditions may include considerations for construction coordination between contractors, weather (i.e. wind direction), minimization of field seaming and miscellaneous other factors.

5. Equipment

Welding Equipment: The Geo textile fabric Contractor shall provide welding equipment showing extrudate temperature (extrusion welder), wedge temperature (wedge welder) or nozzle temperature (hot air). Sufficient equipment shall be available

to avoid delaying work, and shall be supplied by a power source capable of providing constant voltage under a combined-line load. Generators with rubber tires are allowed on the Geo textile fabric. Prior to placement on the Geo textile fabric, tires should be inspected to assure that there are no sharp objects adhered to them that could result in damage to the Geo textile fabric. Scrap membrane should be placed under the generator to ensure that any spilled fluids will not come into contact with the Geo textile fabric.

Punch Press: The Geo textile fabric Contractor shall provide a punch press for the on-site preparation of specimens for testing.

Field Tensiometer: The Geo textile fabric Contractor shall provide a tensiometer for on-site shear and peel testing of Geo textile fabric seams. The tensiometer shall be in good working order, built to ASTM specs, and calibrated within one year. The tensiometer shall be motor driven and capable of a 2 and 20 in/min jaw separation rate. It shall be capable of measuring the force exerted between the jaws and have a digital readout.

Vacuum Box: The Geo textile fabric Contractor shall provide a vacuum box for on-site testing of Geo textile fabric seams. The vacuum box shall have a transparent viewing window on top and a soft closed-cell neoprene gasket attached to the bottom. The housing shall be rigid and equipped with a bleed valve and vacuum gauge. A separate vacuum source shall be connected to the vacuum box. The equipment shall be capable of inducing and holding a vacuum of 5 psi.

Gauge and Air Pump: The Geo textile fabric Contractor shall provide an air pump capable of achieving a minimum of 35 psi. Gauges must be capable of registering at least 35 psi.

Miscellaneous Equipment: Small tools will include hook blade utility knives, scissors with rounded points and silicone or rubber rollers. Step up transformer per generator will be used to assure constant voltage to the welding equipment as necessary.

6. **Subgrade Preparation**

The subgrade is prepared by the owner or by the contractor according to the specifications. The surface must be smooth, with no rapid changes of grade such as steps or settlement next to concrete structures. All slopes and surfaces must be compacted to ensure the integrity of the membrane. While the Geo textile fabric is designed to withstand some differential settlement, an analysis of these areas must be made by the engineer to ensure that the stresses on the membrane are acceptable.

The surface of the subgrade must be free of sharp rocks, penetrating debris or other appurtenances that could damage the membrane. Typically, finished subgrade is achieved using a smooth steel drum roller or other method as approved by the Project Engineer. Under certain conditions a cushion geotextile can be evaluated and approved for use by the Project Engineer, to provide protection for the Geo textile fabric.

After acceptance by the Owner's Representative, Rowad shall perform a visual inspection of the subgrade surface to determine that it is suitable to be lined. Rowad's acceptance of the finished subgrade surface shall be recorded on the relevant form.

7. **Anchoring**

The membrane is to be anchored as shown on the plans and approved drawings. The anchor trench is excavated by the owner or by the contractor as shown on the approved contract drawings. Attention must be paid to the stability of the soil being excavated. Excavation of trenches should be coordinated with the Geo textile fabric

installation to avoid excessive exposure to weathering prior to installation. Trenches that collapse, deteriorate, or become saturated, may require rework by the contractor.

Upon placement of Geo textile fabric panels, the anchor trench must be partially backfilled by the contractor immediately to prevent panel slippage, wind uplift or blowout that could result in liner damage. If immediate backfilling of trenches is not possible, sandbag loading should be used to provide temporary ballast. Final backfilling and compaction, by the Owner or contractor, should commence only after the Geo textile fabric has had time to dissipate manufacturing orientation and settle into its final position. Final backfilling of the anchor trench shall be completed per the specification.

8. Deployment

Geo textile fabric panels shall be unrolled using methods that will not damage, stretch, or crimp the Geo textile fabric and shall protect the underlying subsurface from damage. The methods used shall minimize wrinkles. If necessary a smooth piece of Geo textile fabric may be used as a rub sheet to facilitate deployment of geosynthetic layers. The rub sheet does not need to run the entire length of the slope, only the top crest and first few feet of the slope need to be covered to facilitate deployment. Ballast that will not damage the Geo textile fabric shall be used to prevent uplift due to wind.

Panels shall be oriented perpendicular to the line of the slope crest (i.e., down and not across slope). If panels must be placed across slopes then they shall be shingled such that the upper panel is overlapped above the lower panel. For slopes steeper than 10:1, cross seams parallel to the crest or toe will be located at least 1 foot from the crest or the toe of slope or at such a distance where a fully integrated weld can be performed in restricted locations. Cross seams on slopes should be minimized, but are acceptable when staggered throughout the slope.

Each panel deployed shall be assigned a simple and logical identifying code consistent with the submitted panel layout drawings. No more panels shall be deployed in one day than can be welded during that same day. Tack welding may be acceptable as a temporary measure. However, when possible tack welded panels shall not be left overnight.

Personnel walking on the Geo textile fabric shall not wear types of shoes that could damage the Geo textile fabric. Smoking shall not be permitted on the Geo textile fabric.

Vehicular traffic on the Geo textile fabric shall be minimized. Equipment shall not damage the Geo textile fabric by handling, trafficking, leakage of hydrocarbons, or any other means. The Geo textile fabric surface shall not be used as a work area, for preparing patches, storing tools and supplies, or other uses. A protective cover may be spread out as a work surface.

Rowad uses low ground pressure devices such as ATV's and tractors to help facilitate deployment over other geosynthetic layers and to reduce the potential for strain related injuries among its field personnel. Low ground pressure devices are machines with less than 7 psi per wheel when carrying a driver weighing approximately 150 lbs. The typical specification for equipment working directly over the geosynthetics placing cover material is 7 psi. Using low ground pressure machines also results in a safer work environment. Utilizing low ground pressure machines also results in a safer work environment.

Sufficient material shall be provided to allow for Geo textile fabric shrinkage and contraction and to avoid bridging. The Superintendent shall determine the amount of additional Geo textile fabric required for compensation based on the weather conditions during installation.

9. Panel Placement

When possible the Geo textile fabric should be deployed according to the previously approved panel layout drawing, when such drawings are available. Site conditions such as wind and requirements of the owner or earthwork contractor may require changes to the panel layout sequence. The installation should be

started at the highest elevation so that any rainfall runs off to the lower part of the impoundment, thus preventing water from getting under the Geo textile fabric. When possible liner should also begin at the “upwind” side to minimize wind lift. When in position, panels shall be visually inspected to identify, and to allow for subsequent repair, any damage that may have occurred during handling or installation.

Geo textile fabric rolls are unrolled using a front-end loader or forklift, and specially designed lifting apparatus that is attached to the bucket or forks of the equipment. This enables the panels to be placed in position without heavy equipment running on the material. Panels are deployed to allow a minimum overlap of three inches. When possible, final overlap should be oriented to create a “shingle effect” in the down slope/grade direction.

10. Preparation for Seaming

The seam numbering system shall be compatible with the panel coding system. During welding operations, at least one Senior Technician shall be present and shall provide supervision over other welders.

The surface of the Geo textile fabric shall be wiped with a clean cloth to remove moisture, dust, dirt, debris, or other foreign material. Solvents or adhesives shall not be used. Panels shall overlap by a minimum of three inches for all welds.

Fish mouths or wrinkles at seam overlaps shall be cut to achieve a flat overlap. The cut fish mouths or wrinkles shall be welded where the overlap is more than three (3) inches. When there is less than three inches overlap, an oval or round patch extending a minimum of three inches beyond the cut in each direction shall be used.

Seams shall be welded only when ambient temperature is between 32°F and 110°F as measured six inches above the Geo textile fabric surface unless other limits are approved, in writing, by the Engineer (see Section G for site-specific requirements, if any). For temperatures below 32°F, the following procedures shall be utilized:

When the weather is clear and sunny with gentle winds (10 mph or less) wedge welding can normally be performed at an ambient temperature between 15°F and 32°F (liner temperature is usually warmer than ambient due to the sun) without additional provisions other than adjusting the welding machine. Welding temperatures and machine speeds are adjusted to compensate for cloudy weather and higher winds.

The following variables are measured and recorded:

- Liner Temperature (surface contact thermometer)
- Ambient Temperature (6" above liner)
- Wedge Temperature During Welding
- Wedge Speed
- Temperature Set Point of Wedge

The wedge temperature during welding must be monitored by the machine operator to insure temperature consistency. 10.4.5 No welding can take place when it is snowing, sleeting, or raining. Snow and ice must be removed from the liner prior to welding. Snow removal from the site area is the responsibility of the owner or contractor.

Trial Welds: Trial welds shall be performed on Geo textile fabric samples to verify welding equipment operations and performance of seaming methods and conditions. Minimum of two trial welds per day or shift per welding apparatus will be made, one made prior to the start of work and one completed mid shift.

Additional trial welds shall be made as necessary when air temperature changes by more than 10°F or winds change by more than 8 mph or in accordance with site-specific requirements, if any (see Section G). Welds shall be made under the same surface and environmental conditions as the production welds (i.e., in contact with Geo textile fabric subsurface and similar ambient temperature).