

Bentofix – Geosynthetic Clay Liner

project name: City of Barrie Landfill

location: Barrie, Ontario

installation date: 2008 and 2010

terrafix®

project case history

Challenge

City of Barrie landfill capacity was reaching its limit. To secure capacity the City took an extensive program to recycle material from decade old cells and place non-recycle material back into a multi-layered Geosynthetic Barrier System.

Solution

Terrafix installed a multi-layered Geosynthetic Barrier System which contained a 60 mil textured HDPE geomembrane and a Geosynthetic Clay Liner – Bentofix.

Since the late 1980s, Geosynthetic Clay Liners (GCLs) have been specified and used by design engineers, agencies, and owners as an alternative to soil barriers in various applications. Research after research the advantages they offer over soil barriers.

Why Thermal Lock GCLs?

Thermal Lock GCLs are GCLs that have been heat burnished on the bottom side of the GCL fabric to increase the shear strength of the GCL. However, research also shows that a Thermally Locked GCL provides a lower Bulk Void Ratio. The engineering characteristics such as the hydraulic conductivity (Petrov et al., 1997) and diffusion coefficient (Lake and Rowe, 2000) can be both directly related to the bulk void ratio of the GCL. Petrov et al. (1997) showed that needle-punching has a significant effect on the bulk void ratio by comparing results for a needle-punched GCL and an otherwise similar GCL without needle punching. Lake and Rowe (2000) also demonstrated that heat burnishing (thermal treatment – Thermal Lock) of needle-punched fibres can also significantly influence the bulk GCL void ratio. The effect of heat burnishing is greatest at low confining stress when the combination of needle-punching and thermal treatment reduce the amount of swelling and hence the bulk void ratio. A lower bulk void ratio provides a lower permeability. Of the GCLs tested, needle-punched heat burnished GCLs provided the best performance.

North America's Leader in Geosynthetic Contracting



Visit terrafix® online at www.terrafixgeo.com/contracting

Effect of GCL Structure on Bulk Void Ratio (Confined Swell Test). Values listed are Final Bulk Void Ratio, e_b

Needle - punching	No ¹	Yes	Yes
Thermally-treated	No ¹	No ¹	Yes ²
Confining Stress (kPa)			
6	7.6	5.1	4.0
25	4.0	3.2	3.0
100	2.6	2.3	2.2
200	2.0	1.7	1.7

1 - Petrov et al. (1997) 2 - Lake and Rowe (2000)

Table presents results for tests where the stress is applied prior to hydration. It shows that the effect of thermal treatment is even more significant for cases where the sample is allowed to hydrate at a low confining stress (e.g. 6 kPa) and then, after hydration, the stress is applied. This is a likely situation in many environmental applications where a GCL below a GM (HDPE) hydrates by taking up moisture from the underlying soil with only the leachate collection system in place and the waste is not placed until after hydration has occurred. In this case the effect of heat burnishing is manifest throughout the stress history because the fibres thermally locked to the carrier geotextile are far more resistant to pull out of the carrier geotextile during hydration at low stress than when they are simply held by needle-punching.

