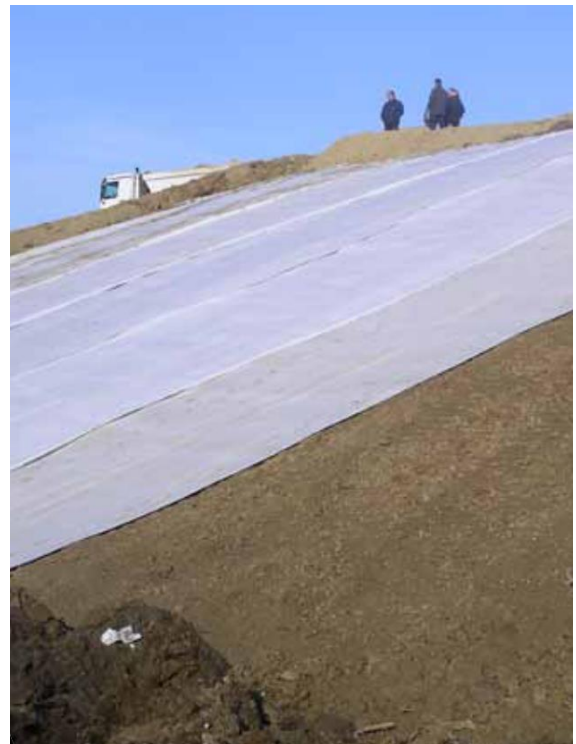


CAPPING OF ZAMÁRDI LANDFILL IN HUNGARY







ABSTRACT

Traditionally a landfill's capping construction involves large quantities of natural materials such as clay (waterproofing), gravel (drainage) and sand (filter and separation). These materials are scarce in the environment and are difficult, expensive and slow to place, especially on slopes. In the capping of Zamárdi's landfill (Hungary), discussed in this case study, the final design was based on the placement of a drainage geosynthetic for rainwater drainage and a bentonite layer for waterproofing.

ZAMÁRDI'S CAPPING	
JOB	
LANDFILL CAPPING OF SOUTH BALATON AND SIÓ-VALLEY	
PROVINCE	
SOMOGY	
COUNTRY	
HUNGARY	
CLIENT	
NEMZETI INFRASTRUKTURA FEJLESZTŐ ZRT. (Hungary's National Infrastructure Development Corporation)	
PRODUCTS	
INTERDRAIN GM 512	
MANUFACTURER	
INTERMAS NETS	
CONSTRUCTOR	
STRABAG	
INSTALLER	
STRABAG	



For over two decades geosynthetics manufactured by InterMas Nets have been used in landfills (new landfills and cappings) with great success around the world due to their many advantages over natural elements:

-  Geosynthetic's reduced thicknesses allow a greater volume of operation of the landfill.
-  They can be installed in steep slopes.
-  Due to their low weight they significantly reduce surcharge on waste.
-  Homogeneous properties as they are industrial products.
-  Comfortable, quick and easy to install and they require no heavy equipment.
-  They are a better solution for the environment, constituted by safe, non-polluting and recyclable materials.

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1. PROBLEM

A total surface of 36.000 m² of slopes had to be capped in Zamárdi's landfill, with a 2.5H:1V slope inclination. The projected capping had to guarantee several factors:

- Full capping waterproofing.
- Rainwater drainage.
- Topsoil cover to reduce superficial erosion and improve aesthetics.
- Long-term stability for the capping.



2. SOLUTION

The final capping design was based in the placement of a regularization soil cover over the waste material, a GCL for waterproofing and a drainage geocomposite for rainwater drainage.





MATERIALS, THICKNESSES AND FUNCTIONS OF THE DIFFERENT CAPPING LAYERS IN ZAMÁRDI'S LANDFILL			
MATERIAL	THICKNESS	PRODUCT	FUNCTION
Topsoil	20 cm	-	Reduce superficial erosion and improve aesthetics
Soil cover	80 cm	-	Sealing layer
Drainage Geocomposite	< 1 cm	INTERDRAIN GM 512	Filter + Drainage (rainwater) + Separation + Protection Eliminates hydrostatic pressure
Bentonite Geocomposite (GCL)	< 1 cm	-	Waterproofing Prevents entry of water into the landfill (leachate formation)
Soil	50 cm	-	Waste regularization and slope formation
Waste	-	-	-

3. USED PRODUCTS







Rainwater drainage

INTERDRAIN GM 512, a product manufactured by Intermas Nets, was placed as rainwater drainage layer. It is constituted by a high-density polyethylene (HDPE) geonet and 1 polypropylene (PP) geotextile heat-bonded to the net. The geonet is formed by two over-crossed strands at 60°, whose geometry creates channels with high flow capacities even under high pressures and at very low gradients. The geonet's main function is drainage while the geotextile acts as a filter element and fine particle anti-pollutant.

The main reasons why INTERDRAIN GM 512 was selected are:

-  High flow capacity.
-  High tensile and crush resistance which allow usual construction loads (vehicle traffic, compacting process, tensions due to land disposal, etc.) without any damage in the product.
-  Excellent creep and fatigue behavior that guarantees a long-term drainage solution.
-  Durability: PP and HDPE are chemically inert, imperishable, and not sensitive to saline water or microorganisms.

4. INSTALLATION PROCESS

-  Extension and compaction of a soil layer for waste regularization.
-  Opening of geosynthetic anchor trenches on the crest of the slopes.
-  Placement of GCL, allowing a minimum roll overlap of 15 cm and assuring joint sealing by adding granular bentonite.
-  Placement of INTERDRAIN GM 412 for rainwater drainage. In case of adverse climate conditions (wind) it is convenient to join the geotextiles with a hot-air gun to prevent lifting. Each roll includes the 10-cm geotextile overlap.
-  Extension and compaction of an 80 cm thick soil cover.
-  Extension and slight compaction of a 20 cm thick organic topsoil cover.

5. CONCLUSIONS

- The use of INTERDRAIN drainage geocomposite is suitable for landfill cappings.
- Long-term stability of the capping. Stability was not an issue in this job because the slope inclination was considerably low (2.5H:1V).
- INTERDRAIN's flow capacities are reliable, homogeneous (industrial products) and can substitute gravel layers (products with heterogeneous characteristics).
- Geosynthetics usage in landfill cappings is a better environmental option because PP and HDPE are non-polluting products and 100% recyclable. On the other hand, large quantities of natural materials are needed, which are scarce elements in nature and whose extraction creates a great environmental impact.
- Geosynthetic installation is fast, easy and economic.

