

ENVIRONMENTAL SUSTAINABLE SOLUTIONS LTD

Project: Royal Bank of Scotland
Location: Edinburgh, Scotland
Type of System: Hydrostatic and Soil Pressure Relief System
Size: 12,000 m²
Date of Installation: 2003
Discharged to: Natural Infiltration incorporating constructed wet lands as part of the development

Problem:

The new World Head Quarters of the Royal Bank of Scotland constructed in West Edinburgh had the potential problem of a fluctuating ground water table at the construction site. Furthermore there was potential for expansion of surrounding clay of up to 25 mm. This combined with upward ground water pressure exerted from ground expansion during wet weather; causing pressure on the concrete basement slab of the building required a novel solution.



Original Solution:

The original design was to collect the ground water ingress using gravel placed against the wall and foundation with water proofing membranes covering the outside of the wall. The ground water is collected using perimeter drains. The total insulation is protected with compacted backfill to provide support.

Engineers Requirements:

The engineering requirements for the project were assessed as follows.

- * Hydrostatic pressure relief system
- * Soil pressure relief system
- * High tank storage requirement in a highly restricted limited space



52 mm Drainage Cell

ESS Solution:

ESS provided a solution using 52 mm ESS Drainage Cells (load bearing capacity of 150 t/m² – (1471.05 KN/m²) and a void ratio of 96%) as a horizontal blanket drain, 80/100 ESS Geo Void and 6 mm ESS Geocomposite Drainage Cell was used as a vertical blanket drain between the existing ground and the sides of the concrete base slab (Foundation for the building).

Installation:

Single layer of 52mm ESS Drainage Cell surrounded by ESS Geotex 225 FF (permeability of 314.85 L/m²/sec) was installed on the formation overlaid above by ESS Protection Board and the concrete base slab. 6 mm ESS Geocomposite Drainage Cell was placed vertically up the sides of the foundation concrete as a protection to eliminate the ingress of ground water.

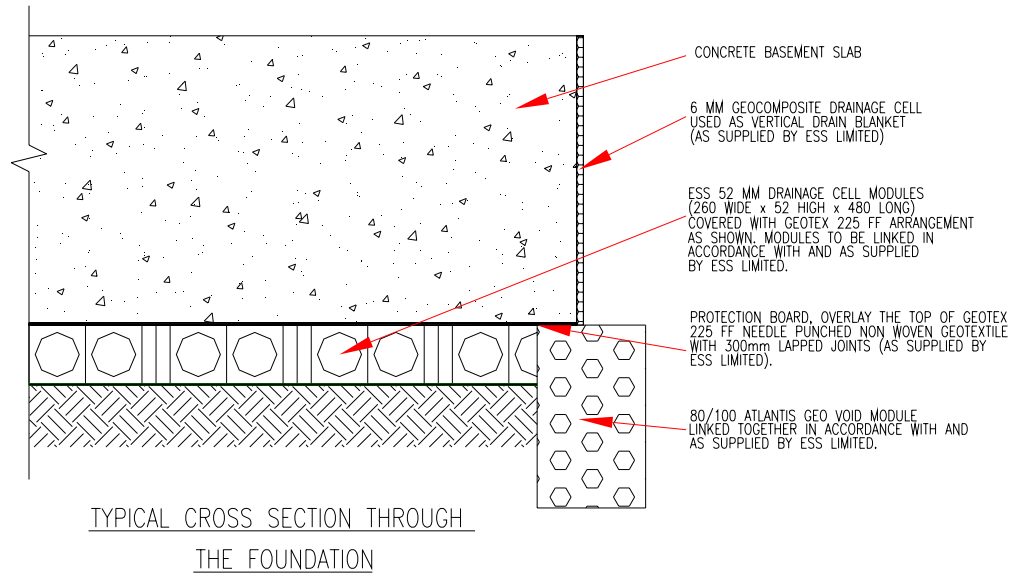


80/100 Geo Void Cell

The 52 mm ESS Drainage Cell and 6 mm ESS Geocomposite Drainage Cell was connected to layers of 80/100 ESS Geo Void to collect the infiltrated ground water running throughout the base and sides of the concrete foundation for the whole building. (Installation drawing given below)

Any rise in water table will infiltrate water into the horizontal and vertical blanket drains allowing them to collect in the ESS storage tank constructed using 80/100 ESS Geo Void. The installation has been functioning successfully from the time of installation (2003). Water is collected by a series of sumps and is channelled into the main surface system which involves surface flood abutment features.





Benefits:

- * Innovative, Flexible and Economical Hydrostatic and soil Pressure Relief System
- * Installation time reduced compared to traditional methods
- * High load bearing capacity
- * Better infiltration using Geotex 225 FF (filter fabric)
- * Highly cost effective flexible solution
- * Additional ability for the drainage medium to be able to absorb potentially reactive clay which could expand 25 mm into the drainage cell.