

## UTILISATION DES GEOSYNTHETIQUES POUR CHAUSSEES A STRUCTURE RESERVOIR

### GEOSYNTHETICS IN RESERVOIR-PAVEMENT STRUCTURES

B. FAURE  
SACER

J. ITTY  
SACER

#### ► Résumé

Les contraintes environnementales imposent, dans le cadre d'une opération d'aménagement du centre ville de LESIGNY (77), l'utilisation d'une technique alternative d'assainissement des eaux pluviales.

Mots clés : chaussées réservoir, géotextile, géomembrane, eaux pluviales, assainissement

#### ► Abstract

*Environmental constraints impose to specified, as part of a town centre development operation in Lésigny (77), a reservoir-pavement structure for the drainage of rainwater.*

*Keywords: reservoir-pavement structure, geotextile, geomembrane, rainwater, drainage*



Vue d'ensemble / General view

## 1 INTRODUCTION

As part of a town centre development operation, the municipality of Lésigny (77) has chosen a compensatory technique for rainwater drainage: the reservoir-pavement structure. The project, which covers an approximate area of 3.5 hectares, has been the subject of a declaration made in accordance with the so-called « water law » of 3/01/92.

## 2 CONTEXT

The geological exploration campaign indicated the following sequence:

- blackish topsoil over 0.2 to 0.4 m;
- clayey silt with calcareous fragments (tableland silt) as far as 1.60 m;
- siliceous limestone clay to a depth of 2.0 m;
- Brie marly calcareous then Sannoisian green clay.

The water table of the Brie horizon is relatively deep. The siliceous limestone clay and silt, because of the predominant clay, are not very permeable and could lead to water retention during damp periods.

## 3 PRINCIPLE

The rainwater is fed to the pavement body via manholes, and is then stored in a highly porous bed. The volume of the reservoir is 4000 m<sup>3</sup>; it includes a dozen or so «sub-basins». The discharge flow rate is limited to 30 l/s.

The structure consists of a bituminous geomembrane protected by a geotextile, on top of which are laid a drainage layer 90 cm thick and then a surface layer of road asphalt.

The material constituting the reservoir meets the following specifications :

- aggregate with  $d > 10-20$  mm and  $D < 100$  mm,
- crushing index  $I_c > 60\%$ ,
- surface cleanliness  $< 2\%$ ,
- $LA < 30$  and  $MDE < 25$ ,
- frost resistance  $F < 25\%$

It was decided to use crushed concrete.

## 4 ROLE OF GEOSYNTHETICS

- The consulting engineer decided to lay a geomembrane in order to protect the water table and avoid any risk of modification of the soil caused by swelling, a risk already encountered in Lésigny.

Table 1 Specifications of the geomembrane

Properties	Test method	Values
Area mass	NF P 84-514	4.5 kg/m <sup>2</sup>
Thickness	NF P 84-512	3.9 mm
Permeability	Darcy's law NF P 84-515	$7 \times 10^{-14}$ m/s < 0.1 l/m <sup>2</sup> /j
Tensile strength (transverse)	NF P 84-501	19 kN (17 kN)
Elongation		44% (53%)

5,600 m<sup>2</sup> Colétanche NTP2 has been laid on the site.

- The purpose of the geotextile is to protect the geomembrane.

Table 2 Specifications of the geotextile

Properties	Test method	Values
Area mass	NFG 38-013	400 g/m <sup>2</sup>
Thickness	NF G38-012	4 mm
Tensile strength (mean longitudinal and transverse)	NFG 38-014	18 kN/m
Elongation (ditto)		75%
Resistance to perforation	DIN 54307	2.75 kN
Permittivity	NFG 38-016	1.1 s <sup>-1</sup>
Filtration size	NFG 38-017	100 μ

It was laid only on the geomembrane.

## 5 PERFORMANCE OF THE WORK

The work, carried out by Sacer's Melun branch, comprises the following stages :

- earthworks; adjustment of the base and lime treatment;
- installation of hydraulic structures;
- manual laying of the geomembrane and geotextile;
- procurement and spreading of 20/50 crushed concrete to a thickness of 90 cm, adjustment using a grader and compacting using a non-vibrating cylinder, in two layers;
- surfacing with 4/20 impregnated material and 3/8 then impregnation;
- making 2 x 4 cm BBSG 0/10 (semi-coarse asphaltic concrete).

Each water entry point comprises a siphon-decanting system. The whole installation will be checked periodically and maintenance operations will be determined accordingly. This service, carried out by an approved and appointed company, will be recorded in the installation's log book.

## 6 CONCLUSION

The building of reservoir-pavement structures is a construction technique with a high added value because it involves the use of several manufactured products, enabling ingenious solutions to be found to difficult development problems at the lowest possible cost.

However, when geosynthetics are used in the presence of a large number of structures (inspection holes, gulleys, etc.), it is necessary not only to take precautions, but also to give particular attention to detail to ensure lasting water flow control.

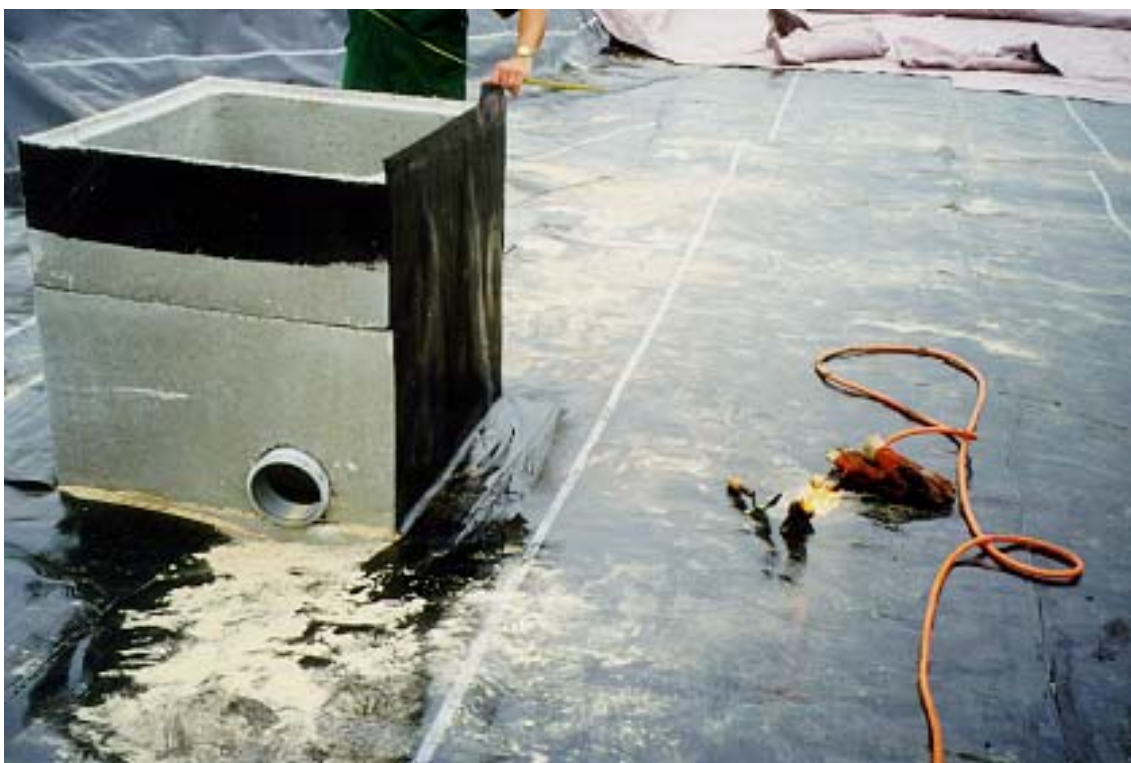


Figure 1 Raccordement aux regards / *Connection to the inspection holes*



Figure 2 Géotextile de protection / *Protective geotextile*



Figure 3 Vue d'ensemble d'un réservoir / *General view of a reservoir*



Figure 4 Cloison / *Partition*