Slope Protection and Retaining Walls 3/3

LEVILLAIN, J.-P., Laboratoire Régional de l'Equipement, Les Ponts de Cé, France

GEOTEXTILES IN BANK PROTECTION: AN EXPERIENCE OF THREE YEARS IN LOIRE GEOTEXTILIEN IM UFERSCHUTZ: DREIJÄHRIGE ERFAHRUNGEN AN DER LOIRE LES GEOTEXTILES EN PROTECTION DE BERGE: TROIS ANS D'EXPERIENCE EN LOIRE

1 - THE EROSION OF THE BANK OF THE RIVER LA LOIRE

On the river la Loire, we observe a tide of 4 or 6 meters near NANTES at 45 km of the sea. The bank of the river are constitute of sand. Figure 1.



Figure 1 - Sand of the bank.

The actions on the embakement are : - the scour of the bed in the base of the embakement during the flood ; Figure 2 ;

During the flood



Subsiding water



Lowest water level



Figure 2 - Scour of the bed.

- the dredging point near the sandy bank ;
- the tide effect and the wake have a direct action on the structure of soil;
 a liquefaction of the sand is product by an augmenta-
- a liquefaction of the sand is product by an augmentation of the pressure in the pore water ;
- a galery is formed on the bank and the sand cliff is falling. Figure 3.

Lows tides



Highs tides



Lows tides



Figure 3 - Tide and wake effect on the bank.

A new cross section is obtain with a 5/1 slope (1 of high).

Near the bridges and along the urbanized area a protection of the slope are necessary.

2 - PROTECTION OF THE SLOPE BY A LOADED GEOTEXTILE BY GRAVEL FILLED

The embakement is made with a sand : $\Psi' = 35^{\circ}$, cohésion = 0. The stability is study with the variation of λ , slope of the flow in the embakement. Figure 4.



Figure 4 - Slope of the flow in the embakement.

Figure 5 give the security of the sand slope when we have variation of $\boldsymbol{\lambda}$ and $\boldsymbol{\beta}$.





For protected this embakement we have put a lining of a gravel filled geotextile. It is a structured nylon-based mat with as much as 90 % being filling space. A gravel filled 2-4 mm glued with asphalt is put on 20 mm thickness and a wearing filter made in polypropylere is fixed under the structure. Figure 6.



Figure 6 - Slope protection by lining.

In the high of the bank, the structured nylonbased mat contributes to the recovery of nature.

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3 - PROTECTION NEAR A GREAT BRIDGE

For a protection near the abutmont of a great bridge on the Loire, we have put a geotextile filter under the boulders.

The slope of the sandy bank is 3/2 (2 of high) and his heigh is 15 meters under the low tide.

All six meters. Figure 7. The non woven filter was sewned to a woven geotextile tube of 60 cm diameter.



Figure 7 - Filter under the boulders on the bank.

During the low tide, the mat was unrolling on the slope. In the woven geotextile tube, an over steel rigid tube is push and a gravel 15-25 mm is deposit. The rigid tube is pull out when the woven tube is full. Figure 8.



Figure 8 - Laying of filter geotextile on the bank.

The second mat recover the last woven tube. Figure 9. When all the bank is cover we put the boulders 15-300 kg.



Figure 9 - Geotextile mat on the bank.

Since three years this protection is effective and the stability of the bank is sure.