Journal of Young Scientist, Volume IV, 2016
ISSN 2344 - 1283; ISSN CD-ROM 2344 - 1291; ISSN Online 2344 - 1305; ISSN-L 2344 – 1283

SOLUTIONS TO AVOID LAND LOSSES IN ADJACENT AREAS OF TELEAJEN RIVER IN VĂLENII DE MUNTE

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Abstract

In the minor Teleajen riverbed, on adjacent area of dike corresponding to Valeni polder occure same deficiences consisting in erosion.
The solution proposed aims to reduce the longitudinal river slope and to protect the banks. The treshold's cross section adopted were chosen depending on stability factor obtained.

Key words: *water course planning, bank erosion*

INTRODUCTION

On the occasion of the field visit it was ascertained that in the minor Teleajen riverbed, on adjacent area of dike corresponding to Văleni polder occurred the following deficiences:

- Erosions in the embankment protection area related to the longitudinal dike of the polder
- Profound erosions on great lengths of the left bank (unprotected), with land losses
- Erosions in the Teleajen riverbed (Figure 1)

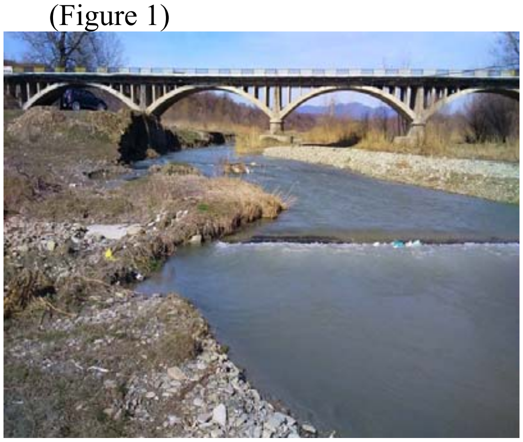

Figure 1. Teleajen riverbed

These deficiences were caused by a serie of natural characteristics of the Teleajen river (high speed flow, large longitudinal slope), as well as the riverbed narrowing due to hydraulic works in the area.

Taking into consideration the situation presented above, in order to regulate the Teleajen riverbed in the area of Văleni polder (Figure 2), it was adopted a solution consisting in measures for reducing the water flow speed, homogenizing the water distribution over the entire height of the riverbed and creating distribution channels with the main purpose of reducing the longitudinal slope of the river Teleajen.

The protection of the river banks that were subject of deep erosions was also taken into account. (Gabriela Dimu et al, 2006).

MATERIALS AND METHODS

The technical solution consists in:

- In the minor riverbed, immediately downstream the bridge, there were provided 2 concrete thersholds and one of gabions, in order to assure the bench mark of the dike's buttress. The two concrete thresholds consist of Creager-Ofiterov profiles, with 5m long sinks, provided with a row of Reboch teeth and doubled by 6m long mobile elements dissipator field (this type of threshold was succesfully used for the Izvoarele polder). Because of the land configuration, the thresholds have different widths: threshold 1 – 60 m and threshold 2 – 50 m.

- Threshold number 3 is realised for stabilizing the thalweg of the Teleajen riverbed and is a threshold made of underground gabions: an inferior row of underground gabions of 1.00 x 2.00 x3.00 m, over which are placed three rows of gabion mattresses.
- In order to stop profound erosions on great lenghts of the left riverbank (L= 415 m) and of the right one (erosions that uncovered the regularization buttress on a length of aproximately 560 m, present in two locations) there will be implemented works for stabilizing and protecting the river banks, by strictly obeying the limit gauge or the regulated riverbed: the 50 m width at the base and also taking into consideration the deepening phenomenon, in the meantime generalized, of the thalweg projected for regularizing Teleajen river.

Figure 2. Deep erosions on longitudinal dike of the polder

In these conditions, the bank defense must be realized using a technical solution as simple and efficient as possible – resistant, elastic and stable to the hydraulic influences of the river stream, as well as easy to build up. The technical solution is applied both in plan and in longitudinal path, the characteristic section consists of executing a section of recalibrated and protected riverbed on the left bank on a length of about 415 m with gabions, boxes 1.00 x 1.00 x 5.00 m and 1.00 x 1.50 x 5.00 m, above mattresses of gabions 3.00 x 3.00 x 5.00 m. This bank protection will be adapted in the connection section with the concrete thresholds. On the right bank adjacent to the uncovered buttress, will be assured the same elastic protection, but without the last row of gabion boxes. Gabion boxes will be made from concrete steel with diameter 16 mm and galvanized wire mesh, and will be filled with river rocks twice the dimensions of the enmeshing.

Figure 3. Concrete thresholds

RESULTS AND DISCUSSIONS

In the following tables are presented the results of the calculations needed for realizing the protections. For the hydraulic computation there were taken into consideration the next data:

- The medium roughness of the riverbed: n=0.035
- The medium width of the regulated riverbed base (b = 50.00 m), from which is eliminated the left bank's rocks defense of 3.40 m, so the net width will be b=46.60 m.
- The medium general slope of this river sector: i=5.97 ‰.

It is mentioned that the water depths calculated will be add up to the bench marks of the projected thalweg, for regularizing the river Teleajen, this way resulting absolute bench marks of water levels at given flows (by reffering to Black See Level)- Table 1.

The results of these calculations represent the base of drafting and finalizing the type sections of bank defense works, reproduced in Figure 4.

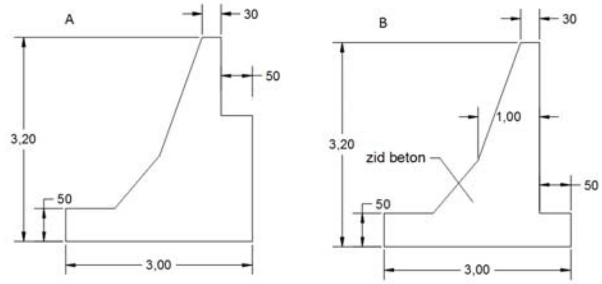

Figure 4. Croos section proposed for concrete threshold

For the given cross section it was verified the stability (Table 2) and the rezistance (Table 3). All obtained values for the verification made demonstrate that the analyzed structures are possible to be built.

Table 1. Calculation of hydraulic parameters

Parametrii	Q_{etiaj} =20 mc/s	$Q_{formare}$ =100 mc/s	$Q_{5\%}$ =275 mc/s	$Q_{1\%}$=450 mc/s
H (m)	0.38	0.98	1.79	2.40
A (mp)	17.96	47.35	89.02	121.92
P (m)	48.13	50.56	53.83	56.29
R (m)	0.373	0.937	1.654	2.166
V(m/s)	1.144	2.113	3.087	3.696
Q (mc/s)	20.55	100.06	274.83	450.55

Table 2. Verification of the stability of proposed structures

	Ca (kN/m^2)	Cr (kN/m^2)	p (kN/m^2)
A	3.09	8.75	62.12
B	2.81	7.90	56.54

Table 3. Verification of the rezistance of proposed structures

	Ϭzam (kN/m^2)	Ϭzav (kN/m^2)	Ϭam (kN/m^2)	Ϭav (kN/m^2)	Ϭxam (kN/m^2)	Ϭxav (kN/m^2)	Ϭ1am (kN/m^2)	Ϭ1av (kN/m^2)	Ϭ2am (kN/m^2)	Ϭ2av (kN/m^2)
A	211.24	-74.16	-169.84	-	184.74	-	368.09	57.5	27.39	0
B	142.60	-22.38	-101.20	-	116.10	-	231.41	57.5	27.29	0

CONCLUSIONS

The solution is meant to limit the development of river banks erosions, by avoiding this way any losses of land adjacent to the riverbed.

The positioning of the proposed works was made based on the hydraulic calculation of the speed flow and water depth.

It is recommended to be chosen the „B" cross section because it developes lower inner efforts and assures all the stability conditions; in addition, the geometry is simpler, so the construction time and costs will be reduced.

REFERENCES

STAS 4273 / 83 – Construcţii hidrotehnice. Încadrarea în clase de importanţă.

H.G. nr. 766/1997 pentru aprobarea unor regulamente privind calitatea în construcţii, cu modificările şi completărilor ulterioare.

Gabriela Dimu, Alexandru Scăunaşu, Ruxandra Pencescu, Adina Oprisan – Regularizare Teleajen în lungul polderului VĂLENI, București, 2006.