

Biotec Vegetation Strips®

Introduction

Biotec Vegetation Strips® is a worldwide patented system of hillside stabilisation work for slope cuts which are caused by various buildings and need to be secured. The development to today's product was done by Mr Franc Subic, academically trained engineer, by conducting trials in practice. Thus, he developed today's successful system. Biotec Vegetation Strips® is not "just a special net to control erosion" since every object has to be planned by taking into account the specifically important points of the area that is to be secured.

Therefore, the definite carrying out of the netting supplied by us can vary.

Several factors influence the effectiveness of undertaking the netting:

- The geological conditions
- The slope stability
- The soil structure
- Possible ground water emergence
- The degree of weathering of the soil
- The slope angle of the slope cut
- The exposure of the object, sun - shade
- Windward side, amount of precipitation
- Environmental planning obligations
- Shallow layer of vegetation

The Carrying Out Step by Step

The project at issue will be analyzed with you. Based on our decision-making process we will discuss whether Biotec Vegetation Strips® is the right solution. The stability of the cut slope has to be clarified or you can order this from us, against payment.

In case of a positive assessment we will write the definite invitation of tenders for a submission. In case of a negative assessment we will be able to make different proposals concerning your object.

An accurate survey of the area of the slope will be made out in order to accurately produce the networks, including the areas which overlap.

As soon as the offer is definitely awarded to a company and the beginning of construction and the building plan are fixed the production of the network will be started. The delivery date is guaranteed within three weeks. As soon as the slope stabilisation work begins the Biotec Vegetation Strips® material is delivered and a special team on the construction site will install the network in a short period of time.

After an analysis of the soil is conducted corresponding aggregates are added to ensure optimal growth of the plants. The network which can be installed quickly thanks to the survey points set in the geological survey, will be filled carefully with a special subsoil mixture right afterwards or stage by stage

The following planting will be carried out without interrupting the work, directly after the filling in.

This way, an optimal starting phase of the planting work is ensured and the inspection with the SIA (SIA = Swiss Construction Standards of Architects and Engineers)

protocol finishes the first construction phase. The second phase, care and maintenance during five years, will be supervised and accompanied by us. This way a completely vegetated Biotec Vegetation Strips® can be handed over to the client.

Projecting Work

Our services include the following work:

- Exact survey of the effective slope area in order to produce the network accurately, including the overlapping areas.
- Giving details concerning the filling material. Most of it is available subsoil material which will be supplemented with corresponding aggregates after the soil analysis. Thus, the mixture will become optimal for the plant habitat.
- The determination of the seed mixture will be done on the spot by making an arrangement with the supplier of the seeds.
- Determining the right choice of plants for the project by taking into account possible environmental planning obligations.
- Delivery of the network to the construction site, carriage paid.
- Installment of the network by an educated special team (alpinist training).
- Company and carrying out of the remaining work in consultation with the contractor.
- Final control and inspection of the construction site.
- Company and supervision of maintenance and care.

These projecting jobs are included in the prices of the offer.

Work concerning construction:

- Security measures against weathering for the excavation of the slope (SIA Standard Nr. 229, excavation works)
- Supply of sufficient amounts of humus and raw soil.

Method of Construction and Effects

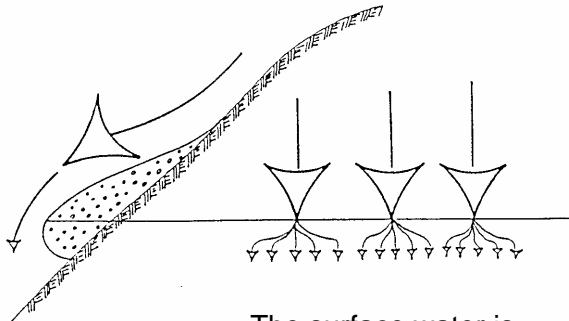
Biotec Vegetation Strips® are a variable network, consisting of a grid strength 1,4 mm. The set up vegetation pockets consist of jute mesh and mineral tissue, combined with wire mesh.

The anchoring of the network depends on the geological conditions and is determined by soil bioengineering and geological standards. In pricipal, however, it is independent of the product. The anchoring is usually carried out at the slope crest in grown terrain. Additional fixing anchors are only needed in slope hollows to ensure contact with the surface. The surface may, of course, be uneven.

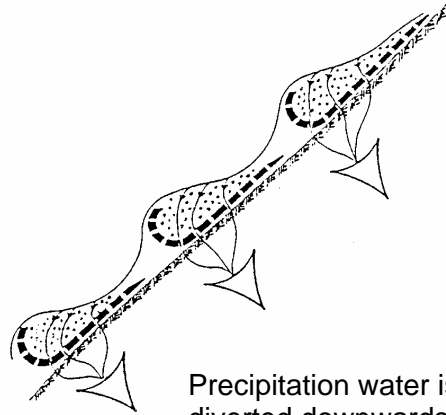
The slope stabilisation is carried out in 2 phases:

Phase 1:

The network protects instantly from rockfall and erosion due to the grid and the weight of the filled vegetation pockets. At the same time the vegetation strip functions as a brake of the surface water. Precipitation is spread in the underground and acts as a water reservoir for the second phase.



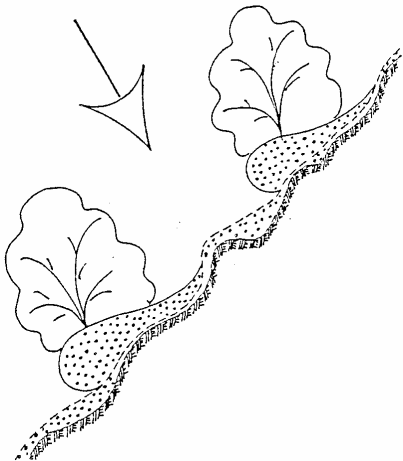
The surface water is slowed down and spread. Thus, erosion is prevented.



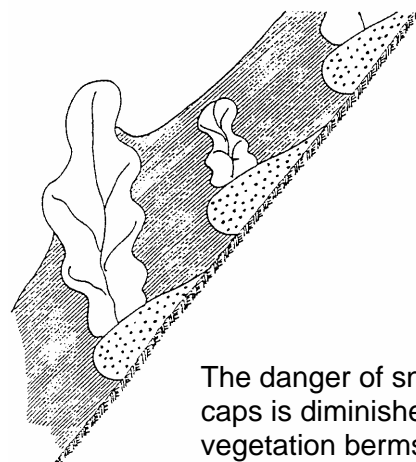
Precipitation water is diverted downwards on vegetation berms.

Phase 2:

The vegetation strips are connected with the underground due to the growth of the plants and to the used plant species. The stored water is absorbed by the plants, furthermore an optimal micro-climate for fauna and flora, continuous erosion control and stabilisation are established. After the Biotec Vegetation Strips® have established themselves, the danger of snow caps is strongly diminished.



Improvement of the micro-climate for fauna and flora.



The danger of snow caps is diminished by vegetation berms.

Maintenance and Control

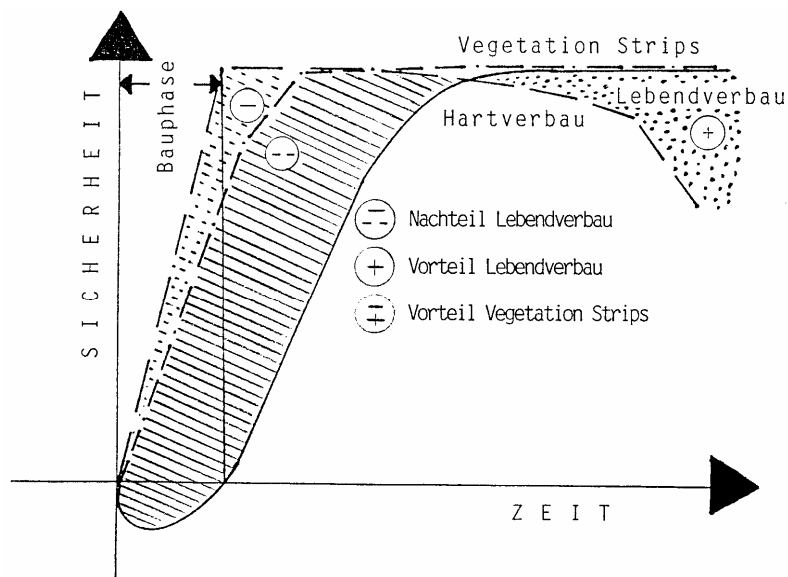
Maintenance and control are important parts of this biotechnological system. They allow the first and second phase to unfold and the technical system to go over to the soil bioengineering phase. By combining soil bioengineering with technology the advantages of construction technology and bioengineering are optimized, especially thanks to the very short time of carrying out such a construction.

The maintenance work is simple and easy to carry out since the Biotec Vegetation Strips® can be inspected by foot.

Costs

Slope stabilisation using Biotec Vegetation Strips® is a reasonably priced solution. Depending on the object and its requirements the price ranges between 90 CHF.- and 130.CHF- per m².

Schematic representation of the advantages and disadvantages of both methods of construction:



Sicherheit = security,

Bauphase = Time of construction

Lebendbau = Soil Bioengineering methods

Hartverbau = static construction methods

Nachteil Lebendverbau = disadvantage Soil Bioengineering method

Vorteil Lebendverbau = Advantage Soil Bioengineering methods

Vorteil Biotec Vegetation Strips® = Advantage Biotec Vegetation Strips®