QUIBEL, A., Centre d'Expérimentations Routières, France
PERRIER, H., Centre d'Etudes Techniques de l'Equipement Normandie-Centre, France

USE OF LIGHT FABRICS IN ENVIRONMENTAL STUDIES

DIE VERWENDUNG VON LEICHTEN GEOTEXTILIEN FÜR UMWELTSTUDIEN BEI DER STRASSENPROJEKTIERUNG

EMPLOI DE NAPPES TRICOTEES LEGERES POUR LES ETUDES D'IMPACT D'UN OUVRAGE SUR LE SITE

The development of significant road project in sensitive area create often integration problems. A bad evaluation of this integration problems is often in the beginning of the residents displeasures. Environment study with temporary construction can smoothed difficulties away. This temporary construction can be realised with light fabrics, ropes and poles. This paper reports on the use of a such system for environment studies.

INTRODUCTION

The law of october 12 th 1977 stipulates that we have to enter upon environment study for road projects which cost more than 6 MFRF. These studies call upon documents presenting the construction and its consequences on the environment. Usually, they use photomontages which only present part of the project from determined places and distances.

OBJECTIVES

The purpose of this study is to improve the perception of the construction through the realization of a temporary full-sized construction. This simulation shows to the observer (resident, representative...) the actual scale of the project and of its integration in the site. So, he can appreciate and analyse the impact of the future construction on the environment (visual obstacle, destructions, loss of comfort, physical obstacles, lack of space, shadows...). This permits the people concerned to visualize the construction from any viewpoint and to compare with the existing situation (photo 1).

MEANS

Due to its precariousness (from several days to several weeks), this technique must be easy to put into practice, cheap and readily available (industrial product).

Consequently, the use of light prefabricated blocks has been abandonned because of its cost.

By analysis with the camping phenomenon (secondary residence, light, removable and economical), the use of the fabrics has been considered.

photo 1 : Experimental dimensional board

As this plan seemed realistic, we have taken our inspiration from the assembly drawings of large circuses to determine the plans of the masts of the different projects :

- simulation of motorway embankments and constructions (diagrams 1 and 2)
- the choice of the components and of the means of assembly has made the realization of an experimental dimensional board necessary.

DIMENSIONAL BOARD

The respect of 3 facts must be taken into consideration : simplicity, low price, availability of the product, has lead to the following definition of the components :

- Standard masts being 7 m wooden telegraph poles, these elements permit the realization of a large majority of structures up to 6 m high.

  The study of higher constructions will require locally the use of higher poles made on demand (wooden masts used by yachts can reach 20 m).

- The shroud will be made with a polypropylen rope which at present is the cheapest type of ropes available on the market.

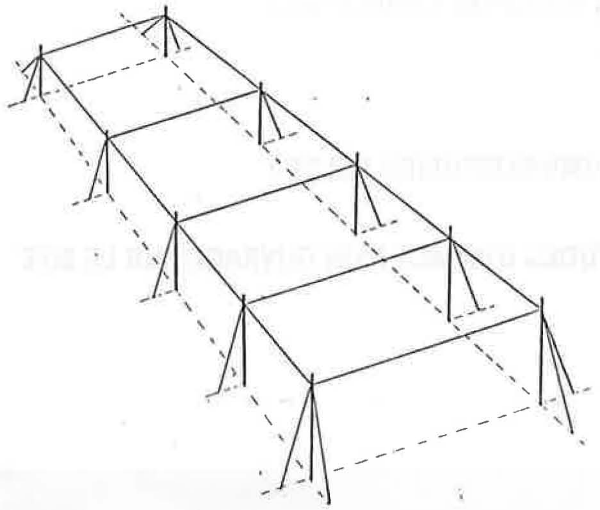

Diagram 1 : Motorway embankment project

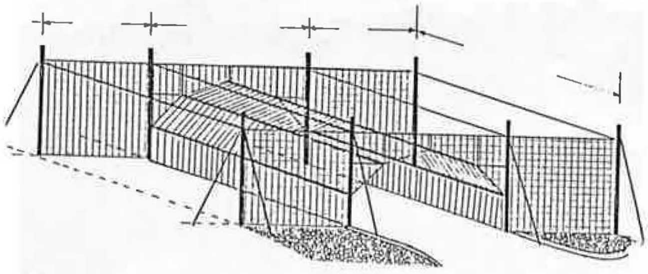

Diagram 2 : Bridge project

Some shroud could need steel rope in areas where low sags are necessary.

Angle changes of the ropes will be done by single blocks hooked on the masts.

The ropes tension will be carried out by reusable turnbuckles (diagram 3).

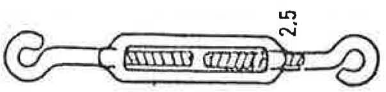

Diagram 3 : Turnbukle

- The choice of the fabrics determines the success of the project. It is indeed the setting up of this assembly of poles and ropes which represents the embankment, the bridge or the building to be simulated.

  This frabric must also respect the 3 following indispensable conditions for this type of work :

  - lightness, so as to not weigh down too heavily on the framework of the construction ;
  - opacity, the fabric must be opaque enough to allow the volumes to be marked but also transparent enough to allow the previous site to be seen (which is going to disappear after the construction has been built) ;
  - weak resistance to wind, the elected fabric must be permable to the wind to avoid the construction being destroyed or blown away by strong winds.

All these facts lead to the choice of a light meshed fabric TP 38 manufactured by Boussac Saint Frères (diagram 4).

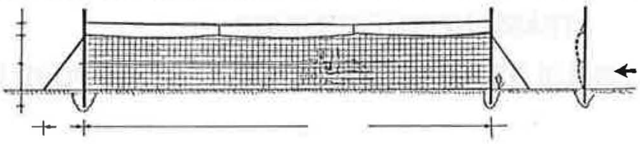

Diagram 4 : Experimental board

This product generally used for plum sacks weighs 38 g/m^2 and is sold in strips which are 8 m wide and allows a wide range of large constructions.

The setting up of the experimental board has given way to the maximum possible spacing of the poles to be determined in the process of making a fabric wall with a central sag admittable in the simulation.

We have also looked at the potential of the necessary materials for the setting up of this type of construction. It appears that only the installation of the masts needs a strong material. For a large number of masts, it is wise to use a specific material (Drill), if not the use of a multipurpose material (hydraulic shovel) is satisfactory (photo 2).

photo 2 : Installation of the mats use of hydraulic shovel

The maximum space of the masts is determined by the wind resistance of the fabric taking into consideration the strength of the head wind. However it seems that a spacing of 30 m is a maximum (photo 1) and at these distances the usage of a 2nd higher rope bearer linked to the bearer of the fabric every 10 m considerably improves the appearance and the representation of the simulation.

Photo 3 : Experimental board : wind resistance

For the wall exposed to dominant winds, an horizontal rope which avoids the expansion of the fabric is necessary every 2 m up (photo 3)

ESTIMATE OF THE COST OF AN EMBANKMENT TYPE PROJECT

A brief economic approach of an elemental part of an embankment with a trapezoïdale cross section, the lower side being 20 m, the upper one being 10 m and a 30 m cross, gives a cost per m^3 of a simulated embankment at 4 FRF/m^3 of which 3 FRF/m^3 are reusable.

It has to be noted that for more complexe constructions, the total cost increases but the cost of the non reusable elements remain the same.

CONCLUSION

Without going as far as constructions such as CRISTO'S proposals by covering LE PONT NEUF at PARIS in 1985, or with other constructions recently in the United States, we can say that the technique of textile simulation applied to the constructions on site in actual size with the purpose of environment studies is original.

The rational choice of the components can lead to a limited cost of the operation. Furthermore, giving a clear picture on the visual and physical plans can justify the building of such simulations in sensible areas.