

GEOAMERICAS 2020

CIPATEX GROUP - BRAZIL

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## CASE HISTORICS

### INSTALLATION OF GEOMEMBRANES PANELS IN LOW HEIGHTS SLOPES.



## ABSTRACTS

We understand that one of Engineering's main services, in addition to following good construction techniques, is also allowing customers to low down costs, such as installation speed (shorter the time required to complete the work usually means lower costs). As a manufacturer of waterproofing geomembranes, we rarely participate in defining what kind of geomembrane is used for each job, but we are required to produce the geomembrane to the meet the necessary specifications. Sometimes, when we are asked to produce panels, we follow modulation requirements.

However, although we did not project, due to our experience as supplier participating in many projects and different works, this experience enable us to observe certain aspects of many projects we got in contact. One of these aspects, which we want to draw attention here, was the installation of geomembranes in small lagoons with 2.00 m height, where the placement of panels reached a high speed coupled with also high security in the installation.

## INTRODUCTION

One of the good practices for the installation of geomembranes is the recommendation that when installing them on a slope, the welds are always perpendicular to the edge of the slope, to reduce the tension on the welds, and following the same line, welds of slope with those of the bottom should be made at a distance of at least 1,00 m, from the encounter of the slope with the bottom and this welding should be done in the region of the bottom: the reason to avoid welding at that point (encounter of slope and bottom) is that it is a region where great tension occurs.

### 1. PRACTICAL EXPERIENCE

We find that in practice, in many projects where the slopes are at a height of 2,00 m or less, the rules described above are not all times used, perhaps because the tensions encountered are very small and do not affect the welds. This occurs mainly in ponds that use pre-fabricated panels with PVC geomembranes: Panels are placed in the same direction, starting at one slope and finishing at the other, and as it is possible to make panels with more than 300.00 m length, this avoids the need for cross-welding in most cases, avoiding triple points of welding, and greatly increase the speed of installation. For ponds, usually smaller than 1,500.00 m<sup>2</sup> (our internal data), in many cases they are already carried out at the factory, in the correct size of the pond, thus completely eliminating the need for welding in the field.

### 2. THEORETICAL BACKGROUND

We always recommend that good design practices should be followed, and it is up to designers to analyse all construction conditions. Our part here is to draw attention to what was conceived in some projects, provided that mainly the slope stability analysis and water column pressure have been verified and the values found allow us to use the solution we commented here. It should be noted that the overwhelming majority of the works we saw using this technique were no more than 2.00 m high from top to bottom.

### 3. PRINCIPLE OF APPLICATION

The principle of this application is the placement of the geomembrane in parallel form, going from slope to slope. The velocity achieved in the placement is high especially when using previously welded geomembranes in panels.

It is very important to highlight that the success of the work depends very much on the finishing of the ground, which must be continuous, smooth and free of elements that could damage the geomembrane.



The main rule is the correct alignment of the panels at the top of the slopes. The distance between the panels should be calculated in such way that when open, the edges should be as close as possible to each other (side edges of the panels). However, we can always realign the panels by shaking them and allowing the formation of an air mattress underneath them, which makes alignment much easier as well. Note: During the opening of the panels it is important that the anchor trenches are ready and the provisional ballast sandbags are already in place (remember that their amount is proportional to the occurrence of wind in the region).



We have seen on the field that the execution of this procedure (parallel geomembrane installations) is done even in large areas (600 m x 1000 m) for example, but keeping the height around 2.0 m.



Figure 1 - Parallel panel alignment detail



Figure 2 - Installation detail

## 4. CONCLUSION

Obviously, as far as the usage of geomembranes is concerned, it is very important to follow the rules already established, but it is also very important to observe innovations made in the area that frequently introduce new techniques, which in the present case, reduce dramatically the installation time of the panels. However, we always recommend checking the possibility of using this system on a case-by-case basis.