

# COIR DRAINING BLANKET FOR CONSOLIDATION

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## **COIR DRAINING BLANKET FOR CONSOLIDATION**

M.Sudhakaran Pillai

### **ABSTRACT:**

Consolidation of soil, especially of soft clayey structure is being recognized as a problem that required effective and economical solution. Coir non-woven geo-textile is one of the materials, used as horizontal blanket over vertical drains in the application of soil consolidation for geo textile applications.

### **INTRODUCTION:**

Construction of high and heavy embankment directly over weak and soft, in slushy and marshy areas leads to long term settlement problems. They are likely to undergo shear failure. A primary solution in such areas is the removal of the soft soil, the thickness of such extraction depending upon the height of the embankment and other design considerations. The embankment materials have also to be compacted in thin layers using suitable mechanism at specified intervals, to the designed height. The stability of these embankment treacheries soils, like weak clays black cotton soils and very soft slushy soils can be ensured and enhanced with other shear strength improvement technique

### **CONSOLIDATION:**

The soft clayey deposit has a very large void space filled with water, which is termed as pore water. When loaded these deposits undergo large settlements and have very low load carrying capacity. The process of expulsion of pore water and reduction in void space is termed as consolidation. The reduction of void space increases the shear strength of the deposit. The pre-consolidation and strengthening of such deposits by pre-loading is one of the most widely used methods for ground improvement. However, the time required for consolidation goes into years depending upon the thickness of strata, as the permeability of clayey deposit is very low.

### **VERTICAL DRAINS:**

The installation of the vertical drains is one method, which would reduce the time for the consolidation of the soft clay layer considerably. The vertical drains, which are commonly used, are sand-rains, sandwiches, or geo-synthetic drains. Forming above into the ground and filling the bore with sand install sand drains. Ground improvement with vertical drains has been an accepted practice for improving soft, clay deposit and has been widely used. The time required for settlement to occur is considerably reduced as the length of drainage path thorough soil is reduced. Vertical drains are required to have high permeability and sufficiently high drainage capacity so, that pore water escapes in horizontal direction towards the nearest drain.

**FUNCTION OF VERTICAL DRAIN:**

The process paves way for the water in the soft clay subjected to excess pore pressure under surcharge to permeate into the vertical drains and to dissipate as fast as possible, and so to achieve the desired degree of consolidation of the foundation soils. The consolidation takes place rapidly due to such radial and vertical movement of the pore water, which finally escapes through the horizontal layer at the top. The water then flows freely vertically along the drain to the draining blanket placed on the soil surface. The pore water from the vertical drains is further drained into adjacent drains through Horizontal drainage blanket. Non-woven coir, which is highly permeable, can be used as horizontal draining blanket.

**HORIZONTAL COIR DRAINING BLANKET:**

The first draining layer consisting of a mixture crushed stone to aggregate 1.5mm to 3mm proportion spread to the thickness of 20cms. It is then well compacted till it attained a density of 1.83t/m<sup>3</sup>. Over this layer Non-woven Coir Needled Felt (1000gram/m<sup>2</sup>) to be laid. The felt is to have double the width of the base of the embankment. And is laid with equal projections on both sides, so that when it is folded towards the center results in a second layers. As explained below, that 6mm size coarse crushed stone aggregate to a thickness of 20cm was then spread on this felt and compacted again to a density of 1.85t/m<sup>3</sup>. The projecting ends of the Coir Felt are then folded towards the center to cover the primary layer, except for a 2.00m width at the center. The ends of the Coir Felt are kept unconnected with a gap in the middle, so as to allow for and to accommodate any deformation due to the possible settlement of the foundation layers, under the loads imposed by the embankments. Laying of the crushed stone aggregate layer compacted to a density of 1.85t/m<sup>3</sup>, as laid earlier, is then repeated over the above Coir Needled Felt blanket.

**BLANKET – THE FUNCTION:**

The unique qualities of the coir contribute liberally to the functions of the blanket in different capacities and measures, as under.

The Coir Needled felt laid as blanket over the vertical drains allows the pore water, which gets collected and accumulated through and into the drain, to move freely to the sides. The Needled felt here acts as separator, filter, and filter reinforcement and facilities drainage during the function.

While performing as a separator, the Coir Needled felt at the same item will act as a filter allowing water to pass freely through or into the plane. Again, it tends to confine the supporting aggregate beneath the pressure aggregates able to retain a degree of reinforcement within itself. The installed Coir Felt permits the water entering to be transmitted laterally, away from the areas of loading also. As a barrier, the blanket prevents the inter mixing of materials from either sides also.

**CONSTRUCTION OF EMBANKMENT:**

The construction of the embankment has to be undertaken in stages, after ensuring that the primary consolidation is over. Sufficient provisions for effective drainage of the surface water from the sub-grade soils also were insisted to keep it free from soaking, which could only ensure long-term satisfactory performance of the embankment and the pavement, thereon.

**CASE STUDY:**

A case study had conducted at the National Highway by pass in NH17 on Calicut stretch from ch.20870 to ch.28127 which runs through an embankment on soft soils and soft clay deposits The case study and the fieldwork reveled that significant reduction in time for primary consolidation of soft clay can be achieved by adoption of vertical drains, coupled with horizontal Coir blankets.

**CONCLUSION:**

Consolidation of weak and soft, in slushy and marshy areas can be achieved by adoption of vertical drains coupled with horizontal coir blankets. . A versatile product, available abundantly throughout the country, produced at cheaper costs, it is, as such a sure and economical answer to the problems related to primary consolidation.

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