

CASE STUDIES ON APPLICATION OF GEOSYNTHETICS IN FOR VARIOUS ENGINEERING INFRASTRUCTURE: A REVIEW

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Abstract:

This study involves the knowledge about the application of geosynthetics in various engineering infrastructures as they are the revolutionary products in the construction industry. They are having ravishing impacts as they enhance the properties of every material to be used in like from improving the bearing capacity of soil to filtration beneath the subgrades. They are used in various other engineering designs like in stabilization of soil, backfill retaining walls etc. It is widely used because of its speedy installation, being economical and easy handling. The most important factor regarding the geosynthetics is general environment safety and its durability. The lecture will briefly show some case studies of use of geo synthetics in civil infrastructure.

Introduction:

It is the planer product manufactured from the polymeric chain as it has become the integral part of civil infrastructure. It may the extract component of polyethylene, polymeric, polyester, or polypropylene. These can be used in various forms like geonets, grids or cells. Geosynthetics as geomat is a polymeric structure in the form of manufactured sheet consisting of yarns mechanically connected where its openings are larger than its constituents. It will be impossible to mention the all use of it however some case studies will be vizzed down. Geofoam a type of it can be used in transportation wing with its density of 23-47kg|cubic m. the geotube a type of it involves filling large tabular textile containers with local sand and sludge to hold unstable banks and other unstable lands. Experimental and analytical investigations were done to evaluate the comparative performance of various materials and it was found 10times better with use of geosynthetics.

Case studies:

1.Land Reclamation Dredge , Harbor Anping, Tainan, Taiwan, ROC

As its original design being inadequate, and being a urgent issue. The authority required dredging the silt and using it effectively, otherwise removal of the silt would entail additional cost.

ACE Solution

A geotextile tube is made of ACETex[®], a product of polypropylene geosynthetic material; properly filled, can be used to construct a dike. As it was 168m long and 10m wide at the bottom and 2.5m at the top. Considering in situ varying topographic contours, different sizes of ACETube[®] were designed. Its circumference was 8.6m to 12.8m and the length was 37m to 47m. The total length was 1,008m. pilled up for three layers, to 5m high. The silt could fill the tube backfilling the area behind ACETube[®] dike would provide the reclamation material.

In April, 2015, this dike was completed within one month.. We can understand that the geotextile tube solution can be a good substitute to some traditional dike methods.

2.Subgrade Stabilization for Northwest Crane in Hectorville:

In this the contractor was suggested by the geotechnical engineers to use fly ash, as the sub soil was silty and clayey in nature. But the consequences of using fly ash were catastrophic after using it on 2 acres. TenCate's Miraspec design software was utilized by TenCate engineers to develop a stabilization section for the existing soils. As the on-site soils were much worse, the contractor and owner, together, decided to build a test section to verify TenCate's design and see if they could thin up the aggregate requirement or utilize a lighterweight geotextile than calculated. After results owner

chose to go with Mirafi® RS580i, versus the lighter-weight Mirafi® RS380i, in order to provide additional reinforcement for the anticipated heavy loads and to provide an additional factor of safety.

By utilizing a geosynthetic-reinforced section, versus chemical stabilization, the contractor was able to achieve a consistent stabilization section and a reduced construction schedule by not having to wait on cure time. Three weeks after construction started, the owner wanted to truly see how well the section was going to hold up. So, they set up a crane in a few spots across the site and observed minimal, if any, deflection from the outriggers.

3. MEXICAN AIRPORT RUNWAY 3:

Production of more than 30 million linear meters of Prefabricated Vertical Drain (PVD) with record quantities delivered per week of 1 to 2 million linear meters.

- Implemented local PVD manufacturing facility where, in addition to the manufacturing in The Netherlands, the highly specified material was produced whilst meeting all the ISO standards demanded by the Client.
- Installed more than 30 million of PVD's with more than 10 rigs to depths ranging from 15 to 28 mt. The contract for the manufacturing and installation of more than 28 million linear meters of Prefabricated Vertical Drain to be installed under the future RUNWAY 3 for the NAICM. The wick drain solution was chosen with the purpose of accelerating the rate of consolidation of the very soft soils pre-sent at the site. At one point during the work execution, more than 10 Rigs were deployed at the site for 8 months, working 24/7. Work was commenced in February 2017 and successfully completed in September 2017.

4. Sunich Reinforced Green Slope Project (Iran):

It is a juice manufacturing company of Iran which was to be constructed. An integrated system consisting of PET Woven Geogrid (40 and 60 KN/m) was qualified for reinforcing. Needle-punched nonwoven geotextiles weighing 300 g/m² were specified as cushions as filter layer in facing. At the surface level (in front of geogrid reinforced slope), a 10 cm Perforated textured Geocell was specified to separate the existing reinforced slope the surface layers of a typical 30 cm thick agricultural soil for plantation. Some water proofing with HDPE Geomembrane is used for waterproofing the foundations. Finally, a green slope is constructed in a very harsh weather condition with using Geosynthetic materials.

Conclusion:

From the above studies we can conclude by saying being an integral part of civil infrastructure it is used all over world because of being economical, property enhancement and speedy installation. We have seen in various case studies how it improved the properties of existing materials. With the availability of variety of products with differing characteristics, the design engineer needs to be aware of not only the application possibilities but also more specifically the reason why he is using the geotextile and the governing geotextile functional properties to satisfy these functions. The material should be used also in effective separation of subgrade and sub-base courses in road construction and other engineering.

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