

Design and Construction Demeanor of a Very High Embankment Using Geosynthetics

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Abstract : Kannur International Airport Ltd. (KIAL) is a new Greenfield airport project with airside development on an undulating terrain with an average height of 90m above Mean Sea Level (MSL) and a maximum height of 142m. To accommodate the desired Runway length and Runway End Safety Area (RESA) at both the ends along the proposed alignment, it resulted in 45.5 million cubic meters in cutting and filling. The insufficient availability of land for the construction of free slope embankment at RESA 07 end resulted in the design and construction of Reinforced Soil Slope (RSS) with a maximum slope of 65 degrees. An embankment fill of average 70m height with steep slopes located in high rainfall area is a unique feature of this project. The design and construction was challenging being asymmetrical with curves and bends. The fill was reinforced with high strength Uniaxial geogrids laid perpendicular to the slope. Weld mesh wrapped with coir mat acted as the facia units to protect it against surface failure. Face anchorage were also provided by wrapping the geogrids along the facia units where the slope angle was steeper than 45 degrees. Considering high rainfall received on this table top airport site, extensive drainage system was designed for the high embankment fill. Gabion wall up to 10m height were also designed and constructed along the boundary to accommodate the toe of the RSS fill beside the jeepable track at the base level. The design of RSS fill was done using ReSSA software and verified in PLAXIS 2D modeling. Both slip surface failure and wedge failure cases were considered in static and seismic analysis for local and global failure cases. The site won excavated laterite soil was used as the fill material for the construction. Extensive field and laboratory tests were conducted during the construction of RSS system for quality assurance. This paper represents a case study detailing the design and construction of a very high embankment using geosynthetics for the provision of Runway length and RESA area.

Keywords : airport, embankment, gabion, high strength uniaxial geogrid, kial, laterite soil, plaxis 2d

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