

Use Of Geosynthetics During Monsoon

By Mr. Tiru Kulkarni, President & Head – Geosynthetics Division, Garware Technical Fibres Ltd.

Monsoon is one of the most awaited seasons for most of us that rejuvenates the life after an arid summer. However, the onset of monsoons brings disruption into our normal life. It causes rutting and fatigue in pavements, failures in track bed for railways, rock fall/ landslides, failures of embankments, shear strength failures in soft soils, floods etc. All these problems can be addressed with an appropriate geosynthetic material. Geotextiles primarily act as a separation, filtration, reinforcement, drainage and erosion control. Some of these applications are enumerated below.

During monsoons, when precipitation hits the ground it infiltrates, until the soil becomes saturated and rest flows as surface runoff. However, in urban areas when precipitation hits the city streets, rooftops and spaces make for hard surfaces that convert rainwater directly to runoff. As a result, the infiltration rate is considerably lower leading to negligible water recharge. Various water harvesting methods incorporating Geosynthetics can be used to save water. Geo-textile can be easily incorporated into conventional drainage systems to improve the water table. Water harvesting using Geo-synthetics is a cost effective way for ground water recharge and it also helps in resolving water logging due to heavy rains.

The infiltrated water in hilly terrain approaches and escapes from the cut slope face which thereby generates pore pressure and act as a triggering factor for landslides and rockfall. Various geosynthetic products covering from weep holes for pore pressure dissipation to high strength boulder nets to mitigate rock fall are available. In a major breakthrough in highway protection, most state governments in order to avoid accidents on their highways have started the use of Geosynthetics to prevent rockfalls caused due to heavy rains. The rockfall protection system is one of the major uses of Geosynthetics during the monsoons especially on the Mumbai Pune Expressway, Konkan Railway and other highways and railways routes where rockfalls are anticipated. Weathering is another important concern which causes erosion in case of canals, embankments etc. The erosion related problem can be address through a variety of geo-synthetic products.



Rockfall protection works using Netting and Rockfall barrier



Erosion control using Geosynthetics- Erosion control mats

The other advantage of the use of Geosynthetics is in transportation engineering to prevent the intermixing of subgrade soils and sub-base materials, lateral restraint effect to act as reinforcement, to achieve greater density of provided materials, releasing pore pressure that results in consolidation of subgrade and thereby increases the life of pavement. Using geotextile fabrics as a stabilization technique allows unstable subgrade areas to strengthen their bearing capacity, limit any deformation, and decrease any structure settlements.

Geotextiles are typically used for Embankments, Dams and Flood Defences, Retention Bunds etc.. It can also be used on soft soil to enhance the bearing capacity. Subsurface drainage composites or geotextiles are widely used as road edge drains, filters behind gabions and retaining walls, sports field drainage filter, drainage of golf course greens and sand bunkers, architectural and landscape drainage, and agricultural drains.



Silt fences are a temporary barrier of geotextile fabric used to retain erosion of silt and other sediment from polluting nearby streams, rivers, drains, and sensitive environments. Sediment such as sand, silt, and clay are considered as pollutants in storm water runoff systems. Silt fences act as a vertical permeable interceptor for areas exposed to sediment-laden waters.

It is important to distinguish that silt fences are not known to be used as erosion control devices, but are used for sediment control. They are commonly installed with support of poles, stakes, mesh wire, or a combination thereof. Mesh wire metal backing support provides the geotextile fence with increased strength to resist the weight of soil and water that may be present within a large drainage area or field.

Ponds are artificially created for fluid storage systems that are designed commonly using geosynthetic materials. Ponds can be of various types depending upon applications such as; Leachate Ponds, Brine Ponds, Wastewater Ponds, Containment Ponds, Gravity Ponds, Raw Water Storage Pond, Pregnant Solution Ponds etc. During the construction of ponds, underground running water and water tables may be intercepted, which must be drained to eliminate the hydrostatic pressure and guarantee the stability of the structure.



Geosynthetics in Canal Lining



Geosynthetics in Hazardous waste Landfill

Railroad tracks are one of the few geosynthetic applications in which a geosynthetic is used for multiple functions, namely, reinforcement, separation, filtration and drainage which prevents water-clogging and helps the railways function in cities like Mumbai in case of excessive rains.

The above are some of the key applications in which geosynthetics play an important role during the monsoon period.