

## **Geosynthetic Cementitious Composite Mat (GCCM) installed as a shroud over wire baskets for protection and containment**

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Geosynthetic Cementitious Composite Mats (GCCM) have become a useful tool that are being incorporated into many civil engineering solutions worldwide. The flexibility of this new family of geosynthetic products provides a unique opportunity for engineers and designers to create a permanent hard armor protection in any number of challenging scenarios. The most common of these scenarios are ditch and channel lining or slope protection.

As a channel lining, GCCMs can be rapidly deployed in typical hard to access places and will conform to virtually any shape. It is a fast and cost-effective alternative to traditional hard lining materials like rip-rap, poured-in-place concrete, grout-filled mattresses, cabled concrete mats, articulated concrete blocks, shotcrete or HDPE half-pipes.

In slope and berm protection applications GCCMs require no specialized equipment or personnel to install and causes minimal site impact, as well as reduces traffic and time required on site. This is particularly advantageous on industrial sites where GCCMs also reduces total project costs, lowers long-term maintenance costs and offers an added level of fire protection.

GCCMs have become an increasingly common and a valuable tool to manage maintenance costs while extending the life of otherwise failing stormwater infrastructure particularly as a protective wearing surface in corrugated metal pipe (CMP) culverts and are used at headwalls, inlets and outlets of culverts to prevent erosion and undermining of existing structures.

Increasing acceptance of GCCMs has been propelled into the municipal public works and departments of transportation by the development of standards and specifications on a local, national and global scale. Agencies like ASTM International, British Standards Institute (BSI), European Committee for Standardization (CEN) and International Standards Organization (ISO) have been busy providing expertise to promote best practices and provide piece of mind to engineers and owners alike. GCCMs solutions can be found in more than 50 countries around the world and have been employed in projects in 49 states in the USA.

While GCCMs are becoming more recognized as a valuable resource in traditional civil works and infrastructure rehab, they are also being widely used at facilities in the oil and gas industry for common maintenance applications. And while for the most part in this industry sector, GCCMs have been employed much as described above in applications for ditches, channels, slopes and berms, a recent project at a petrochemical distribution terminal near New Orleans was unique.

The use of a GCCM to create a protective, hard armor layer, or shroud, in the armoring of existing wire baskets was a special GCCM application. The wire baskets lined with a nonwoven

geotextile filter and then filled with sand had been previously installed as a containment barrier system for above ground storage tanks at a petroleum distribution terminal.



Similarly, soil/sand filled wire baskets (aka gabions) have long been used as shoreline protection and flood control and widely utilized by military engineers as rapid deployment defenses not solely for flood control but as semi-permanent blast walls against explosions or small arms. In some of these military applications, the gabions, once placed and filled, have been further armored by various coverings, of which GCCMs have excelled.

The wire basket containment for this facility was used in lieu of the traditional bund or earthen berms which are commonly used for secondary containment. However, the permeability of the wire basket structure, lined with a permeable geotextile filter and filled with river sand, was not optimal and found to be noncompliant. The proposed “traditional” solution for rectifying this situation was to remove the entire containment system and replace with poured in place concrete T-walls.

The case study will present a brief introduction to GCCMs, their history of traditional uses and development of standards but focus on the specific challenges of deploying the GCCM as well as the means and methods of fixing the GCCM to the existing gabion wire baskets.