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Central Wanchai Bypass Reclamation

The use of geotextile container has become a common method to handle and dispose of contaminated material in associated with dredging polluted seabed. 58 units of 300m^3 capacity were designed and deployed to remove such material at the Hong Kong Convention and Exhibition Center.

Geotextile can be sewn and fabricated into specific size container. It acts as a sealed compartment holding contaminated material in split hull barge hopper. The entire container can be dropped to a permanent marine burial ground, limiting exposure of any contaminants to the environment.

The containers were custom made to size that fits the 300m^3 hopper compartment. High strength geotextile is stitched together with special seaming technique to form the pillow shape container which takes the shape of a pillow. A closing lid is incorporated with proprietary closure seaming. The container is designed to strength level anticipated during release from hopper gate, dropping in the water and upon impact at the seabed. Predictable geotextile strength can be determined (Palmerton, Leschinsky, Fowler).

An optimum filling volume ratio is also allowed in the design of the size of container. Oversizing is required to relieve excessive stress when the container hits the bottom.

While calculation determines the type of geotextile and size fabrication, the condition of the hopper could be damaging to the container. Irregularity of its surface and hopper gate edge roughness can induce abrasive tearing. Handling manual, standard operating procedure and special seaming instruction are available to ensure system integrity.

300m^3 container on barge

Filled up with contaminant

Closure of the container

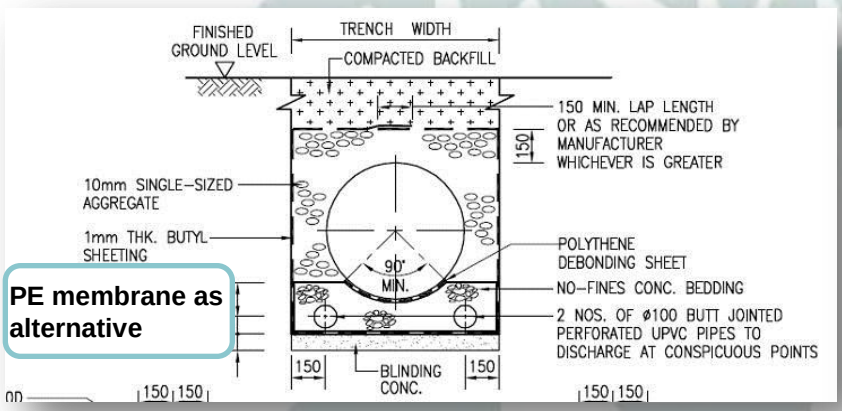
New Application

Practical and Versatile Applications of HDPE Geomembrane (1st of 2 series)

High density polyethylene (HDPE) geomembrane is well-known in the sanitary landfill industry (WENT, SENT and NENT Landfill). It is used as a lining to contain leachate to protect the environment. It is also used in large scale water containment, such as feature lake (Inspiration Lake at Disney), golf pond (Skycity Golf), and reservoir (Cemetery at Yau Tong Service Reservoir). While the usefulness extends to aquaculture, canal lining and tunnel waterproofing, there are some local unique applications as shown below:

Leakage Collection

When water pipe leaks, water escapes, adjacent soil can be soaked and slope stability becomes dangerous. Leakage collection system is developed to encapsulate pipe in the pipe trench, diverting burst water to designated sump or drain. HDPE geomembrane is fabricated for this application. WSD has adopted this material for over 18 years.



WSD Standard Drawing for Leakage Collection System

Improvement to Tong Yan San Tsuen Road & San Tsuen Village, Oct 1999.

Gas Barrier

Development within 250m radius of sanitary landfill poses hazards from landfill gas. HDPE geomembrane was first installed as gas barrier to block gas migration at TKO in 1997. Gas barrier can be installed along trenches at site perimeter, tanking entire basement structure or at the underside of potential hazard area. Together with vent pipe, gas can be diverted or released. A geocomposite can be introduced underneath the membrane to act as gas passage to prevent excessive trapping. HDPE is a cost effective gas treatment solution.

Construction of a Secondary School in Area 50, Tseung Kwan O, NT, Jan 2006.

Gas proof membrane at EcoPark, Tuen Mun, June 2010.

Central Park in Area 88, Tseung Kwan O, December 2007.

Opinion Column

Rockfall Barrier - Local Practice

Flexible barrier was developed in Europe as rockfall control in the 70'. But it was not until 2008 that European Organization for Technical Approval (EOTA) established European Technical Approval Guideline 027 (ETAG 027) as the technical assessment of product fit for use as rockfall barrier, the conformity of a falling rock protection kit. This document becomes the basis of the product specification and the fundamental of full scale testing. Based on such test, system is defined and anchor forces are determined. Proprietary systems have since been tested and certified by EOTA individually (www.eota.be, ETA - 09/0414 for Maccaferri RMC system). The same document has been recognized in Hong Kong as the basis of system acceptance and design.

Design of rockfall barrier starts with slope mapping, geology study and probability of rockfall trajectory simulation to give the required energy level, the dimension and location of the fence. Any proprietary system certified by EOTA with suitable energy level can be chosen for use. Anchor design follows the force from the full scale testing. Alignment will be set out through survey and actual site topography constrains. Final layout, anchor and installation details are presented in construction drawings.

ETAG 027 refers only to rockfall protection and does not address debris flow phenomena; indeed, international independent guideline is not available for full scale evaluation of debris flow barrier. The accepted engineering concept is that individual rock can be represented by instant impact energy, whereas debris is taken as accumulative passive forces. A number of mathematical models have been proposed for analysis. For the moment, systems that have been tested under ETAG 027 are taken to be applicable for debris flow

2,000 KJ barrier at Cheung Tung Road in Tung Chung, Apr 2011 (GE/2009/06).

2,000 KJ barrier at Yu Tung Road in Tung Chung, Lantau, Nov 2010 (GE/2008/25).

Technical Note

Stud or T-Keyed ? That's Beside the Point

Concrete protection liner are normally used in internal pipe and sewage structure, lately for waterproofing as well. The keys on the membrane can be cast into concrete forming an integral lining which isolates any aggressive medium (pollutants and chemicals). The type of polymer (HDPE, PVC), various thickness (1.0, 1.5 or 2.0 mm), shape and distribution of key element (continuous T-lock, studs), physical properties (strength, puncture etc), method to install on formwork (nail, clip) and how to join adjacent panels (chemical adhesion, heat bonding or welding) have become subjective specification preference. The essence is on the carefulness, attentiveness and craftsmanship of the installation, which determine the integrity and long term performance of the system.

There are a variety of methods to fix the liner onto formwork, which is an unconventional operation and often misunderstood and overlooked by contractors, who are versatile in reinforcement steel bar and concrete works. Once the formwork is removed, the liner is exposed and has to cleansed and repaired, overlapping joints can be reinstated and shutter can be covered. The entire lining becomes a homogenous surface that can be tested for flaw. Trained technicians are able to undertake this established procedure, formal record and report can be prepared as as-built document.

Upgrading of Siu Ho Wan Sewage Treatment Plant, Jan 2003 (DC/99/10).

Ting Kau and Sham Tseng Sewerage, Oct 2007 (DC/2006/14).

T-keyed Liner

StudLiner

For Your Information

Gabion Stock – Clearance Sale

We have the follow sizes of grey color, PVC coated gabions available immediately at fire sale price:

Product description:
Manufacturer: Maccaferri
Model: P/8/2.7
Lacing wire: 2.2mm (included)

L (m)	W (m)	H (m)	Quantity (nos)
3	1	0.375	1,250
3	1.3	0.375	40
3	1.65	0.375	40

If you are interested, please contact Shan Chiu at 25700103 or by e-mail: shan@g-and-e.com

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