



Featured Technical Topic Summary **FGI Monthly Members Meeting** **Friday, May 1, 2025**



TOPIC: Subgrade Drainage, Venting, and Possible Ballasting

Each month Tim Stark introduces a new technical topic for discussion and possible action. This month's topic is: **"Subgrade Drainage, Venting, and Possible Ballasting"**. This topic generated significant discussion with the main "take-aways" listed below:

Featured Technical Topic

Each month, Tim Stark introduces a new technical topic for discussion and possible action. This month's topic is "Subgrade Drainage, Venting, and Possible Ballasting." The main points discussed are presented below:

Groundwater Control/Drainage

- Pat Elliott started the discussion by describing many groundwater subgrade issues in a variety of applications including golf course ponds,
 - Pat is frequently asked to install a drainage system because it was not considered in design or not part of the design process before installing a geomembrane
 - Pat showed a photo with a groundwater collection trench along the bottom of water containment facility with a pump to recycle the water back into the reservoir (see photo below). This photo shows groundwater build up with 4 to 6" in the bottom of the pond (see photos below)
 - Pat emphasized that seasonal changes in groundwater, i.e., if installing in a dry season, should be considered because water can develop in the wet season – so need to understand year round groundwater level
 - Pat showed an underdrain system with branches and one-way check valves installed through a geomembrane to dissipate groundwater pressures if they build-up below the geomembrane
 - Lastly, Pat showed a photo of a reinforced geomembrane uplifted by underlying groundwater pressure – to repair this bubble/whale the geomembrane had to be cut and drainage installed to remove groundwater uplift pressures
-
- Annette Dehavilland showed a photo of groundwater seepage from sandy glacial till, which is usually solved with an under drain
 - Another photo showed groundwater bubbling up into subgrade and the selected repair was just placing fine-grained soil over the spring, which did not work
 - Another photo showed piping of subgrade materials due to a leak in an adjacent geomembrane
 - Another photo showed seepage underneath an unreinforced geomembrane-backed GCL, which resulted in hydration of the bentonite in the GCL and slope movement – excess pore-water pressures developed under the geomembrane due to rapid placement of heavy relocated waste – water squeezed out of the compressible subgrade and hydrated the GCL leading to slope movement – no drainage was installed prior to installation of the geomembrane-backed GCL.

Subgrade Venting

- Brain Fraser started the venting discussion with a project involving gas under a geomembrane at a food processing plant in Central California – The project involved a 60 mil HDPE geomembrane that was used to line a pond. The HDPE geomembrane could not withstand the elongation caused by the ballooning, which caused yielding of the geomembrane. The repair involved installing a geosynthetic drainage composite and vent strips under a new LLDPE geomembrane.
- Tim showed a video of an agricultural wastewater pond lined with an HDPE geomembrane. The video shows a number of bubbles/whales in the pond probably due to use of aerators/agitators. The teleconference attendees agreed the repair would probably consist of dewatering the pond, installing local vents, which

usually are not effective. The recommended repair would include dewatering the pond, removing the geomembrane, excavating all of the contaminated soil, giving the pond bottom a slope, installing a gravel vent layer over the entire pond bottom, installing a new double-sided drainage composite, and a new overlying flexible geomembrane.

- It is recommended that a vent be installed at the top of the slope to vent the drainage composite via drainage composite strips up the pond side slope – the vent consists of a screen with part of a PVC pipe over top of the screen to prevent rodents and debris from clogging the vent. These vents should be installed every 50 ft. The drainage composite strips or wrapped flat pipe are placed every 30 ft – vents should be kept clean of soil and vegetation.

Possible Ballasting

- Usually ballast tubes fall off bubbles/whales so this is not a fix; instead need to excavate organic material–good future Technical Topic – use 6” sand tube along entire slope for ballasting





