



Featured Technical Topic Summary

FGI Monthly Members Meeting

Friday, June 7, 2024



TOPIC: Hydropower Applications

Each month Tim Stark introduces a new technical topic for discussion and possible action. This month's topic is: **“Hydropower Applications”**. This topic generated significant discussion with the main “take-aways” listed below:

Hydropower Reservoir Applications

- Industry want a Geomembrane (GM) that will last 50 years, a 75 to 100 year life-cycle, and/or a 75 year warranty -
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- Mt. Elbert Reservoir – GM is covered with 18 to 24” of soil and rockfill on the upstream slope - Only GM lined hydropower reservoir in public use in the U.S.A.
- Tesla Reservoir – Original Design - exposed GM - 1995 & 2017
- Concern with a soil or rock cover is the soil or rock could get into turbines so industry is interested in exposed GM applications
- A bituminous geomembrane (BGM) might be suitable
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- Taum Sauk Pumped Storage Hydropower (PSH) Facility leaking upper reservoir was repaired with exposed GM – subsequently embankment was overtopped because no spillway was present; should have initially lined the upper reservoir with a geomembrane
- Luddington PSH – leaking upper reservoir was repaired with exposed GM
- Asphalt concrete (AC) liners appear to be currently preferred to a GM – advantages are waterproof barrier & durable wear surface – a hydraulic grade of asphalt is used but over time cracks develop & have to be sealed – in addition, subjected to seismic cracking
- FGI should research cost of AC liner system per square foot – probably cost is \$15 to \$20/ft²
- Could install four or five GMs for the cost of an AC liner
- A better liner system in seismic areas could be a dual system of GM overlain by AC liner due to cracking
- Concrete facing is too expensive for a reservoir so not considered
- In non-seismic areas could use GM as a secondary liner under the AC liner to provide containment after AC starts cracking due to exposure
- GM under an asphalt liner system – hot asphalt (170°F) placed on top of fPP-R has been effective and can be installed with no wrinkles to facilitate AC liner placement
- Flexible geomembranes make more sense because few wrinkles and good elongation and ductility
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- If there is a short-term application, e.g., line a spillway or a storage tank, a flexible geomembrane makes more sense
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- AC Pavement design – asphalt pavements have exposure issues with time, e.g., reflective and shrinkage cracking; flexible geomembranes would be a good secondary barrier or use GM exposed and forego AC liner

Conveyance Structures

- Emergency spillways can be protected with a geotextile and then covered with rockfill

