**bartlett@civil.utah.edu**

**From:** Nico Sutmoller <nsutmoller@aerixindustries.com>
**Sent:** Saturday, August 22, 2020 3:21 AM
**To:** bartlett@civil.utah.edu
**Subject:** RE: Storm water retention

Steve,

When looking at permeability testing, it appears that the degree of permeability of PLDCC can be evaluated under ASTM D 2434 (Modified), which is starting to be the standard in the industry.

Stan Peters (I believe you might know him) is probably the leader and has helped a number of firms come up to speed in making sure that there is some consistency when third parties are testing PLDCC.

Thank you and #StaySafe,

Nico Sutmoller
*Aerix Industries*


**From:** bartlett@eng.utah.edu <bartlett@eng.utah.edu> **On Behalf Of** bartlett@civil.utah.edu
**Sent:** Friday, August 21, 2020 12:35 PM
**To:** 'Andy Hong' <andy.hong@utah.edu>
**Cc:** "최종수 LH" <jongsoo@lh.or.kr>; Michael E. Barber <michael.barber@utah.edu>; 'Steven Burian' <steve.burian@utah.edu>; 'Daniel D B. Seely' <dan.seely@utah.edu>; Nico Sutmoller <nsutmoller@aerixindustries.com>
**Subject:** RE: Storm water retention

Hi Andy,

Good to hear from you. Sorry that we did not get to meet in person yesterday at the faculty retreat.

I have a weekly meeting with Dr. Choi regarding our permeable cellular concrete research every Tuesday afternoon (Wed. morning in Korea). Perhaps you can join us next week. I will set-up the zoom conference call. We usually have the meeting at 5 p.m. Mountain Daylight Time.

In short, we are exploring the use of lightweight cellular concrete (LCC) as a possible drainage and retention material for stormwater run-off. Permeable lightweight cellular concrete is a relatively new material that varies significantly from porous concrete in many key engineering property aspects. In short, LCC is much more permeable, has high porosity, but relatively weak in compressive strength when compared with porous concrete. Here is an LCC link that you might be interested in:

https://aerixindustries.com/aquaerix/

Initially, we are conceptually exploring the use of this material as stormwater retention/detention under roadways, roadway shoulders, sidewalks, hardscape (i.e., parking lots), and landscape. There is one construction site where LCC has been used as stormwater detention under a pile-supported building (Tulane Stormwater Detention-see attached).

Regarding infiltration, we are exploring cases where the water would be allowed to infiltrate into the groundwater and cases where it may not due to poorer water quality. We are interested in exploring the filtration capability of the LCC, but have not gone to far down exploring this topic. If infiltration to the groundwater is not allowed by Korean water quality regulations, then our initial thoughts of stopping groundwater intrusion by deploying an HDPE or PVC geomembrane underneath the LCC reservoir and managing the runoff as per Korean regulations.

For his sabbatical Dr. Choi is developing and planning a field infiltration test of LCC, later followed by a demonstration project in Korea. Dr. Choi is the Director of the Department of Urban & Environmental Research for the Korea Land and Housing Corporation (L.H., 한국토지주택공사). L.H. is a government-owned corporation that is responsible for the development of land in cities and the maintenance and management of land and housing in Korea (https://www.lh.or.kr/eng/index.do). I am assisting Dr. Choi in the testing of engineering properties (e.g., permeability, porosity, strength, etc.) I have current MPC funding regarding the use of LCC in highway construction and will be seeking additional funding for the stormwater retention research and development of this application. Aerix Industries is providing specimens for our testing.

I missed the planning meeting with the Taiwanese researcher(s), but maybe there is some research synergy that is possible.

Regards,
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**From:** Andy Hong <andy.hong@utah.edu>
**Sent:** Friday, August 21, 2020 8:59 AM
**To:** Steve Bartlett <bartlett@civil.utah.edu>
**Subject:** Storm water retention

Hi Steve,

Welcome back!

I heard from you yesterday that you are interested in collaborative work with the Korea campus on stormwater management.  I have been contemplating related ideas recently on increased infiltration under vegetative swale and permeable pavement.  My preliminary thought is as follows:

Vegetative swales and permeable concrete are common management techniques, even around campus we have quite a few new swales/trenches.  My idea was to concentrate on increasing infiltration, so as to greatly decrease the depth of the transmission zone in the infiltration process underneath but increase the saturated and the transition zones.  This is done by drilling well-spaced small bores (e.g. a couple inches in diameter) down the swales and backfill with coarse materials (not sure about the drilling cost).  This will allow water to rapidly move down and then infiltrate radially outward utilizing the drilled depth and the soil around it between

the bores as the shortened transmission zone, thereby increasing infiltration. Once the water is in the wetting zone, it undergoes natural purification before reaching the aquivers. I would like to explore enhanced infiltration with such an infrastructure strategy in the water cycle related to LID, particularly around physical, chemical, and biological processes that are likely involved. For an area of soil covered by a building or its paved parking lot, increasing the infiltration rate of a certain swale area will compensate significantly for the covered square footage.

Please let me know any thoughts come to mind. Thanks!

Best,
Andy

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