

### UNAnswered Q&A:

- Andy Erickson (not fair, right?): 10:24 AM: I'm curious about the mixing in the concrete truck. Was there any evidence of particle segregation due to size and/or density differences? Was consistency measured?
  - Robert Pitt: there was no obvious problem with the large-scale mixing. Consistency only checked visually.
- David Brasfield, Norway 11:39 AM: Could there be an equivalent of borrowing goats to mow the lawn for these kinds of installations? In other words, tweaking the ecosystem to be more self-maintaining.
  - Robert Pitt: Difficult in ultra urban settings. I have raised goats and it would be impossible to only have them work on selected plants and leave others. Also increased bacteria in the system with animals on the controls.
- Dwayne Stenlund (DOT) 11:46 AM: how do you mix collected sediments into the media if surface removal does not correct movement of water through media?
  - Robert Pitt: with depth removal of sediment and pollutants, the whole layer of media is removed and replaced. The removed media is tested for proper disposal. We designed the major SSFL media treatment systems for about a ten year plus media life. The smaller culvert modifications were “undersized” compared to optimal sizing and required more frequent media replacement. Scraping of surface collected material is also difficult without removing the plants also.
- Andy Szatko 11:34 AM: A lot is asked of the media, flow control, treatment, plant support, & more. It is noted that in-situ soils are helping out with the removal of pollutants, should bioretention systems be looked at as a way to enhance surrounding soils to improve overall effectiveness through promoting rooting of plants, use of plants with phytoremediation qualities, regulating flow through the system with orifices/valves rather than the composition of the media, or something else?
  - Robert Pitt: yes, if infiltration is desirable/permitted, the majority of the soluble pollutant capture may likely be in the underlying soils. The media can capture substantial amounts of material and can act as pretreatment before infiltration. Flow control with orifices are sometimes needed if the media treatment flow rate is too rapid and with underdrains.
- Dwayne Stenlund (DOT) 11:50 AM: Bob, have you installed lamella plates in a pretreatment vault?
  - Robert Pitt: Yes, the LTV (red tanks) at SSFL use lamella plates in the settling chambers. I have also used lamella plates in the Multi-chambered treatment train (MCTT) that I developed. Similar flow distribution materials have been used in the UpFlo Filter that I developed also.

- David Brasfield, Norway 12:06 PM: Winter salting wasn't mentioned. That would have been an interesting factor to discuss.
  - Robert Pitt: I am sorry that I wasn't able to discuss snowmelt issues also. Zeolite media are problematic with high incoming salts removing captured metals, for example; high salts also kill biofilter vegetation; salts are poorly captured by any media (or underlying soils). Rain gardens for roof runoff probably safe (if don't capture runoff from adjacent salted walks), but great care is needed (such as diverting snowmelt) for parking lot and roadside biofilters/infiltration devices. There have also been many instances where elevated salt in runoff caused high SAR (sodium adsorption ratio) conditions in the media and surrounding soil. With even small portions of clays and some organics, this results in dramatically decreased infiltration rates of the biofiltration devices, which is difficult to recover.

**Answered Q&A:**

- John Voorhees 10:22 AM: For the biofilters that had sedimentation, were the loading rates below the clogging rate? If not, how was maintenance performed on the devices?
  - *This question has been answered live*
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- Jeff Rice 10:43 AM: Could you say a bit about the types of rainfall data required for WinSLAMM and whether (or how) the model can examine changing precipitation patterns over time ("climate change")?
  - *This question has been answered live*
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- Kerem Gungor (MaineDOT Stormwater Engineer) 10:16 AM:
  - *This question has been answered live*
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- Will the monitoring data be submitted to the International Stormwater BMP Database or other publicly available databases?
  - *This question has been answered live*
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- gary oberts 10:33 AM: In such a dry climate, how did you gather enough "real" SW to conduct adequate lab tests? For the CA studies.
  - *This question has been answered live*
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- Mike Trojan 11:16 AM: I think we have long focused on the final BMP, like bioretention, tree trench, permeable pavement, etc. Have we overlooked

pretreatment and source control/P2 as a way of improving the function of the end BMP?

- *This question has been answered live*
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- John P Bilotta 10:38 AM: If time permits, I'd like to hear more from Bob about those two forthcoming groundwater quality and quantity e-books he mentioned. What is covered in them etc.
  - *This question has been answered live*
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- Jeff Rice 11:16 AM: Not only "natural variability" of hydrology, chemistry, etc. But also long-term changes in climate affecting biota, precipitation patterns, etc. How do these complicate the assessment and design process? Will designs age or fail more quickly? Will communities find that what worked "now" fail and require additional investments in the future?
  - *This question has been answered live*
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- Jeff Rice 11:33 AM: Thanks for the comments on climate change. Just to put a slight finer point to my questions: I am particularly interested in changes to local and regional environments in vegetation (e.g. increased "invasives"), soils, etc., not just the precipitation (rain; snow) patterns. How might these affect runoff treatment? As a now-retired consultant (still in touch with my former colleagues and clients), I remain concerned about how municipalities and others make decisions in the face of impending change and how we address it as practitioners.
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- Anonymous Attendee 11:20 AM: We see many stormwater bmps designed and installed according to guidelines or rules of thumb, but very little follow up effectiveness monitoring. How confident should we be of the performance of these practices?
  - *This question has been answered live*
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- Jeff Rice 11:34 AM: Sorry, gotta run. Thank you, Bob, the panelists and you folks at SAFL/UofM! Great presentation; great seminar series!
  - Andy Erickson: Thanks!!
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## **Chat**

- From Andy Erickson, 09:54 AM: Hello and Welcome to the MN Stormwater Seminar Series! We will start in a few minutes. Thanks for joining us today!

- From Andy Erickson, 09:56 AM: Here are the weblinks we featured in the opening...
  - Learn about upcoming events: <https://www.wrc.umn.edu/swseminars>
  - YouTube Channel: <http://z.umn.edu/swsrecord> or search for “Minnesota Stormwater Seminar Series” on YouTube
  - To get announcements for future seminars, signup for UPDATES Newsletter at <http://stormwater.saf1.umn.edu/>
- From gary oberts, 11:03 AM: Hi Bob - Looks like Roger will live on forever with that picture of his frontward bio system. Keep up the great work. Unbelievable what you can produce! Gary
- Ralph Reznick 12:06 PM: Great Seminar! Thanks to all who made it happen.
  - Andy Erickson: Thanks!
- From Andy Erickson, 12:07 PM: Thanks for attending today! If you are interested in PDH credits for this event, please send an email to Andy Erickson at [eric0706@umn.edu](mailto:eric0706@umn.edu) with your request.