



May 23, 2013

District Department of the Environment (DDOE)

Watershed Protection Division

District of Columbia

Attn: Rebecca Stack, Project Manager, DDOE - Technical Services

1200 First Street NE, 5th Floor

Washington, DC 20002

RE: Proposed Stormwater Management Guidebook

Dear Ms. Stack:

The following comments are in response to several conversations with DDOE and the Center for Watershed Protection concerning the District of Columbia's proposed Stormwater Management Guidebook. In particular, we have addressed issues pertaining to Green Roof Design Criteria and Green Roof Storage Volume outlined in **Section 3.1.4**, **Table 3.1**, and **Equation 3.1**. Please see below for details about our comments.

- I. DDOE is committed to and has a vested interest in encouraging property owners to employ the most effective stormwater management techniques. After reviewing **Section 3.1.4** of the proposed regulations and understanding the process in which a property owner designs improvements and gains site plan approval for their real property, we foresee a disconnect between the proposed regulations and the goal of encouraging the most effective stormwater management techniques. Different green roof systems have different characteristics and water retention capabilities. Using the variable " n_1, n_2, n_3, \dots " in **Equation 3.1** is an appropriate way to determine the stormwater storage volume of a green roof system, provided " n " accurately reflects the characteristics of the green roof system components. Our concern relates to DDOE's policy to provide only project-specific approval of " n " values for products whose " n " exceeds the "typical" 0.25 " n_1 " value noted in the guidebook, versus providing product approval prior to submission of a project-specific stormwater management plan. Engineers and site planners need a reliable and predictable way to determine stormwater storage volume value (S_v determined using **Equation 3.1**) during the preliminary site design and site plan approval process; they need clarity on what DDOE will approve prior to submitting. Likewise, we respect that DDOE wants and needs a defined, fair criteria for approving any proposed " n ". We propose that the variable " n " (component porosity; although we believe the measurement of "maximum water retention" as defined by *ASTM E-2397* is more appropriate) be determined in a standardized fashion – in which the regulations clearly outline, and therefore provide a predictable and reliable process for engineers, site planners, and property owners when considering improvements to real property in the District.
- II. Further expanding on Item I, we propose that validated, third party certified ASTM (ASTM International, formerly American Society for Testing and Materials) tests be used to determine the variable " n " (maximum water retention). **Table 3.1** should specifically describe ASTM tests which would be suitable for determining maximum water retention. We recommend that the regulations read that DDOE will



approve of “n” values that differ from the “typical” 0.25 baseline, provided that the “n” values are certified by an ASTM-certified lab, and that those test results are submitted as part of the stormwater management permit application.

- III. We have identified a few ASTM tests that could appropriately determine the variable “n” in **Equation 3.1**. We have reviewed *ASTM E-2396*, *ASTM E-2397*, *ASTM E-2398*, and *ASTM E-2399*. Each test pertains to a different type of material; a certified ASTM lab should confirm that the test performed is appropriate to the material being evaluated.

- IV. Innovative green roof systems that deliver greater capacity to retain stormwater need not be considered *Proprietary Practices* as outlined in **Section 3.12** and **Appendix T** simply because of atypical “n” values, provided such values are validated by ASTM tests. As long as the system functions as a green roof as defined by **Section 3.1** and the process for determining Storage Volume (S_v as outlined in **Equation 3.1**) is standardized, clear, and predictable, the designation and criteria – with the aforementioned amendments, under **Section 3.1** is appropriate for innovative green roofs with higher retention values than traditional FLL green roof systems.

We would be happy to discuss in more detail and are open to dialogue on these issues. We support DDOE’s mission in utilizing regulation to encourage property owners to employ the most effective and innovative stormwater management techniques.

Respectfully,

A handwritten signature in black ink that reads "Michael Furbish".

Michael Furbish
President

cc: Greg Hoffman, P.E., Center for Watershed Protection

Rebecca,

We have reviewed your draft guidelines and offer the following comment:

- The major comment is definition of "n" in your retention calculations. Currently, "n" refers to porosity which may be applicable in at-grade applications, but is not an accurate indicator of field retention capacity for extensive green roofs that are essentially rapidly draining shallow systems atop impervious surface. We suggest "n" be more direct measurement of water retention capacity with data that can be verified by third party. ASTM tests E-2396, 2398, 2399 are tests for retention of drain media, composite drain sheet, and growth media respectively. To the extent any component within the profile is not accurately tested by these tests, then performance data verified by acceptable third party should be required (our retention layer may require such 3rd party testing).

- Paragraph 3.1: In the last sentence, change “does not need supplemental irrigation or fertilization” to “does not need supplemental irrigation and requires only minimal fertilization”.

- 3.1.1 under “Contributing Drainage Area”: The drainage area that contributes to the green roof (drainage area flowing to the green roof) is limited to 125% of the size of the green roof. What is the rationale for capping the area at 125%? Would you consider allowing the drainage area to be 150% or more? This would allow super-absorptive or high-capacity green roofs to gain more retention credit.

- In 3.1.4 (page 32), under “Green Roof Sizing” change “(i.e. prefabricated water cups...” to “(e.g. prefabricated water cups...” so as not to limit the drainage layer to cups or plastic modules.

- On page 34, Plant vendors are listed. Roofscapes / Roofmeadow is on the list, though they are not a plant vendor. Sempergreen is not on the list, and they are a the largest supplier in the region. Sempergreen / Moerings USA, LLC:

P.O. Box 60

Lignum, VA 22726

Phone: 540.399.5055

www.sempergreen.com

- Under 3.1.6, under “Construction Sequence” mention in bullet 3 EFVM as an alternative to flood testing. EFVM is mentioned elsewhere in the guidelines, just not here.

- In Appendix ‘M’, the checklist for green roof compliance is missing two critical pieces of information: depth of media (which is nearly a 1:1 correlation to retention) and vegetative cover (which also effects retention and other environmental benefits). These two data points should be taken. We can describe industry standard ways of estimating vegetative coverage. We also see “moss” on the form. Please note that moss might or might not be a negative criteria.

Michael Furbish

President

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Rebecca,

Sorry for the delay getting back to you. We have dialogued internally a few times on this and offer our latest thinking here.

- Essentially "n" is the % of component volume consumed by water. That is "water retention capacity". Porosity could be high, but not necessarily capable of holding water in all of the pore space. The various ASTM tests strive to calculate water retention. We agree with that intent. So our recommendation is to define "n" as % of volume that holds water in suspension as opposed to porosity. If a manufacturer represents a particular value for "n", it should be verifiable. You may choose if/when you request verification.
- We don't have a straight forward answer for more robust way of evaluating "n". That evaluation needs to be appropriate for the material. For example, methods for evaluating "n" for growth media don't apply for our drainage/retention layer or other drain boards. Whatever method appropriate for the material, it should be verifiable.
- Our system has a low value for "n" in the media, but a much higher value for "n" in the drainage layer. We consider our retention layer at the bottom of our profile to be the "drainage" layer and we would want to know you concur with that. We are happy to provide verifiable data for any value "n" we present.
- We are fine with Appendix T, but don't consider our EcoCline system a proprietary BMP. Rather, it is just a high performing extensive green roof. We are working on some alternative green roof systems that would perform more like bogs that might be more appropriate for Appendix T. Would you agree that 4" to 8" systems growing predominantly sedum varieties in granular media, albeit with very effective water retention at base of profile (our EcoCline system) is simply a green roof BMP as currently defined?

As we reviewed all of this, your approach make sense to us and we see no reason to make substantial changes. Wishing you well moving to final approval and implementation.

Michael Furbish

President

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