

## RESPONSES TO COMMENTS ON DRAFT FINAL REPORT

1. A major portion of the report discusses the differences between ASTM 1701 and ERIK test methods. However, there is no mention of ERIK or ASTM-based permeability in the design method on the UCF Pervious Pavement Design Spreadsheet.  
These tests are for maintenance indicator purposes and not design purposes. Site specific soils are the controlling factor in how these types of systems will ultimately perform and that is what water management districts will examine, similar to how a retention pond is designed. The scope of the UCF testing did not include this type of analysis.
2. The design of a permeable pavement (from the UCF Pervious Pavement Design Spreadsheet) is based solely on Porosity?  
Yes, to a large extent. The curve number is based on the porosity of the system, specifically the operating porosity, which is the porosity measured after the material has been previously clogged and rejuvenated. This is used under the assumption that the site soils are able to maintain a minimum 2 inch/hour infiltration rate under the compacted conditions of the final system. Additionally, it is assumed that the bottom of the system is at least 2 feet above the season high ground water table.
  - a. With all of the testing on PaveDrain permeability, is this not quantified in any way in design?  
Two reasons, first the water management districts do not currently require this for design purposes. As mentioned in response to question 1, it is the parent soils that control the recovery of these types of systems and will therefore drive the design. Second, this was not part of the original scope of work. Future work can be performed if there is an interest by PaveDrain in a follow up study which aims to incorporate this data into design.
3. When discussing the comparatively lower porosity of PaveDrain (19.5%) versus the porosity of FirmaPave (47%) and FilterPave (39%), Mike suggested that FirmaPave and FilterPave are not approved for use in Florida due to a low surface friction. Where is there a list of what is approved for use in Florida?  
The porosity values of FirmaPave and FilterPave in the design aid spreadsheet are incorrect. These systems will be removed from the next release of the design aid. There is no list of approved products for use in Florida.
4. Mike has mentioned that the PaveDrain system took a large quantity of sediment to load the system.
  - a. Is there any comparison of the volume of sediment required to load the different systems that were tested? This type of information was not collected for any of the systems examined and the target was to add enough materials to reduce the infiltration rates below acceptable value. Mike shared this information with Randy anecdotally, based on his personal observations.
  - b. Could a general statement be included about the greater quantity of sediment to clog the PaveDrain sections? Since the amount of soils added to other pavement was not directly measured, this request cannot be supported under the current study. What can be said is something along these lines “with the amount of void space provided in the typical PaveDrain system design, it can be inferred that these systems are able to satisfactorily infiltrate stormwater with longer maintenance intervals.” This has been included in the report.
  - c. Can this be extrapolated to a longer maintenance interval than other pervious pavements? Please see reply to 4b above.

5. Mike has spoken highly of the effectiveness of the VacHead system – Could this statement be “on the record” in the final report?

This is anecdotal information only and not supported by any comparative analysis as no side by side testing was conducted (not part of scope). We have added a statement to the effect of “based on the opinion of the authors, after seeing the performance of the PaveDrain VacHead system compared to the performance of typical vacuum sweeper trucks at removing sediment from these types of systems, it appears that the PaveDrain VacHead system is able to remove sediment better than the typical vacuum sweeper trucks.”

6. The scale of the graphs on pages 46 and 47 give the appearance that these sections have 0 in/hr permeability after the 2<sup>nd</sup> vacuum event – can the y-axis scale be changed or could these last several data points be labelled to show the actual values?

We looked at adding labels so the true values are apparent but it just made the graph really hard to read. This is addressed within the text as to what the range of values are for each testing condition. A note has been added below each graph indicating what the minimum values are for additional clarification.

7. All 4 ASTM 1701 graphs show a better permeability after the second cleaning than any of the 8 ERIK graphs. Does the 6” diameter ERIK pipe restrict the effectiveness of the vac-head cleaning (especially the long ERIK pipes, where there may be a vacuum formed by the 6” pipe being embedded into the subgrade)?

That is possible, however it is much more likely that there is lateral flow within the surface layer during the ASTM testing which will make it appear that infiltration rates are much higher than they actually are. We actually observed on several occasions this exact thing occurring. This is the advantage of the ERIK test method, wherein you are sure that the water is going into the system and flowing downward and not lateral. This is addressed in the report.

8. The physical properties of the R-Tank SD and R-Tank XD should be listed in the report. **Done**

9. R-Cell should be identified as “R-Tank XD”. **This will be corrected.**

10. Could we define permeability, infiltration rate and porosity? **Done**

11. Could we show a chart showing infiltration rate and permeability? OR an infiltration rate to permeability ratio.

No, only infiltration was measured as part of this effort. Due to the nature of these kinds of systems it is not possible to measure permeability insitu as there is no way to measure the rate of water that moves through the system. It should be noted that this is an issue in the industry as infiltration and permeability are used interchangeably. This has been further clarified in the report.

12. The entire permeable pavement industry focuses on infiltration rate. This report needs to reflect it.

We believe that the report also focuses on infiltration rates as the primary variable.