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Friday, February 15, 2013

Filtterra® Bioretention Systems
11352 Virginia Precast Road
Ashland, VA 23005

Mr. Chris French,

Please find attached the results of the surface infiltration test conducted on the permeable interlocking concrete paver (PICP) portion of the Filtterra BioPave™ in Fayetteville, North Carolina on Wednesday, February 13, 2013. The mean infiltration rate of three locations, with three replicates per location, is $3,440 \text{ mm h}^{-1}$ (135 in h^{-1}) as determined by ASTM C 1701/C ("Standard Test Method for Infiltration Rate of In Place Pervious Concrete").

Please feel free to contact me to review and discuss these results. My office phone number is (919) 515-8595. You can contact me via e-mail at arander5@ncsu.edu.

Sincerely,



Andrew R. Anderson, E.I.T.
Extension Associate,
Biological & Agricultural Engineering
North Carolina State University

cc: Mindy Hills, Jodi Mills

METHOD

To determine the infiltration rate of the permeable pavement at the Amtrak Station in Fayetteville, North Carolina (472 Hay Street), ASTM Method C-17071 (Standard Test Method for Infiltration Rate of Pervious Concrete) was performed.

The objective of the test was to quantify the infiltration rate at the start of monitoring (February 2013) of a recently built permeable interlocking concrete paver lot. The parking lot was constructed in September 2013 and subsequent infiltration tests will be performed in August 2013, February 2014 and at the completion of monitoring.

Three locations were tested to represent the entire parking lot: a parking area, an edge of the permeable pavement and the center of the traffic lane. The temperature of the water was recorded for mass conversion. The infiltration ring was secured to the pavement with non-staining plumber's putty and care was taken to fill in between the interlocking pavers. All three locations were pre-wetted with a weight of 8.0 lb (3.60 kg) of water to determine whether the test should use 8 lb (3.60 kg) or 40.0 lb (18.00 kg) of water. Since all test locations drained the pre-wetting volume in more than 30 seconds, the test was performed with the smaller of the two volumes. The time to drain the 8.0 lb (3.60 kg) of water while maintaining a head between 10-15 mm of the bottom of the infiltration ring was recorded. The test was repeated at each location three times. Equation 1 was used to determine the infiltration rate.

$$I = \frac{KM}{D^2 * t} \quad (1)$$

where I = infiltration rate, mm/h (in/hr)
 K = 4 583 666 000 (SI) or 126 780 (English)
 M = mass of infiltrated water, kg (lb)
 D = inside diameter of infiltration ring, mm (in)
 t = time required for measured amount of water to infiltrate concrete.



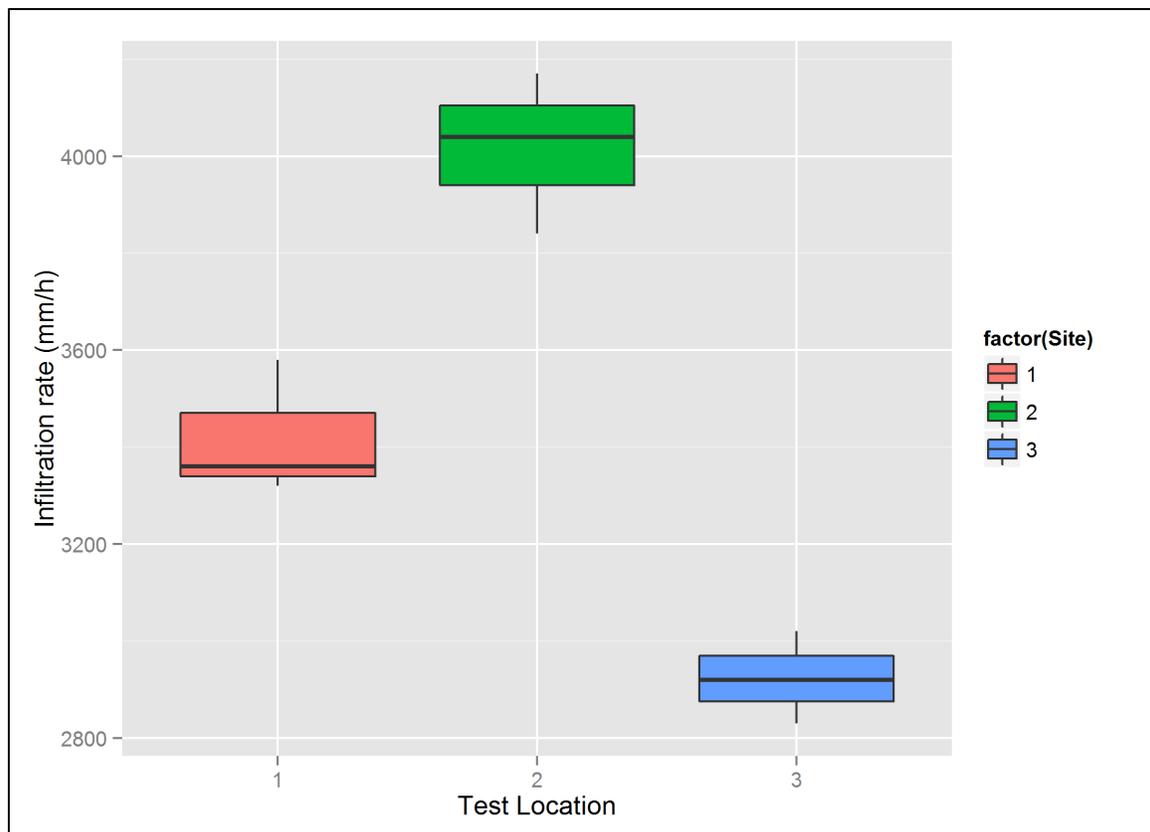
Figure 1. Infiltration ring fixed to permeable pavement with plumber's putty (left). Testing location 3 in center of driving lane (right).

RESULTS

Table 1 summarizes the average infiltration rate at each location. The overall average was computed to be 136 in/h. (3450 mm/h). The attached sheet includes all other intermittent recorded data and description of locations.

Table 1. Summary of Infiltration Rates.

Location	Average Infiltration Rate
-	in/h (mm/h)
1	135 (3420)
2	158 (4017)
3	115 (2923)
Overall	135 (3440)



C1701/C1707M: Standard Test Method for Infiltration Rate of Pervious Concrete Data Sheet

Test performed by: **Andrew Anderson and Alessandra Smolek**

Date: **2/13/13**

Age of PICP tested: **5 months**

Amount of rain during last event: **0.3" (7.62 mm)**

Temperature of water: **60.0° F (15.6° C)**

Inside diameter of infiltration ring: **11.82" (300 mm)**

ID #	Location Description	Time elapsed during prewetting	Weight of infiltrated water	Time elapsed during infiltration test	Infiltration rate
-	-	t_{wet} s	M lb (kg)	t s	I in/h
1a	NW corner of handicap parking spot, under tree, 1.8 ft from edge of curb, 12.0 ft from east edge of permeable pavement	41.5	7.92 (3.60)	55.2	130 (3320)
1b			7.92 (3.60)	54.6	131 (3360)
1c			7.92 (3.60)	51.2	140 (3580)
2a	1.3 ft north of south edge and 2.2 ft east of west edge of permeable pavement	37.3	7.92 (3.60)	45.4	158 (4040)
2b			7.92 (3.60)	47.8	150 (3840)
2c			7.92 (3.60)	44.0	163 (4170)
3a	5.1 ft east of west edge of permeable pavement and 12.4 ft west of center of east diagonal edge of permeable pavement	44.4	7.92 (3.60)	62.8	115 (2920)
3b			7.92 (3.60)	64.7	111 (2830)
3c			7.92 (3.60)	60.7	119 (3020)