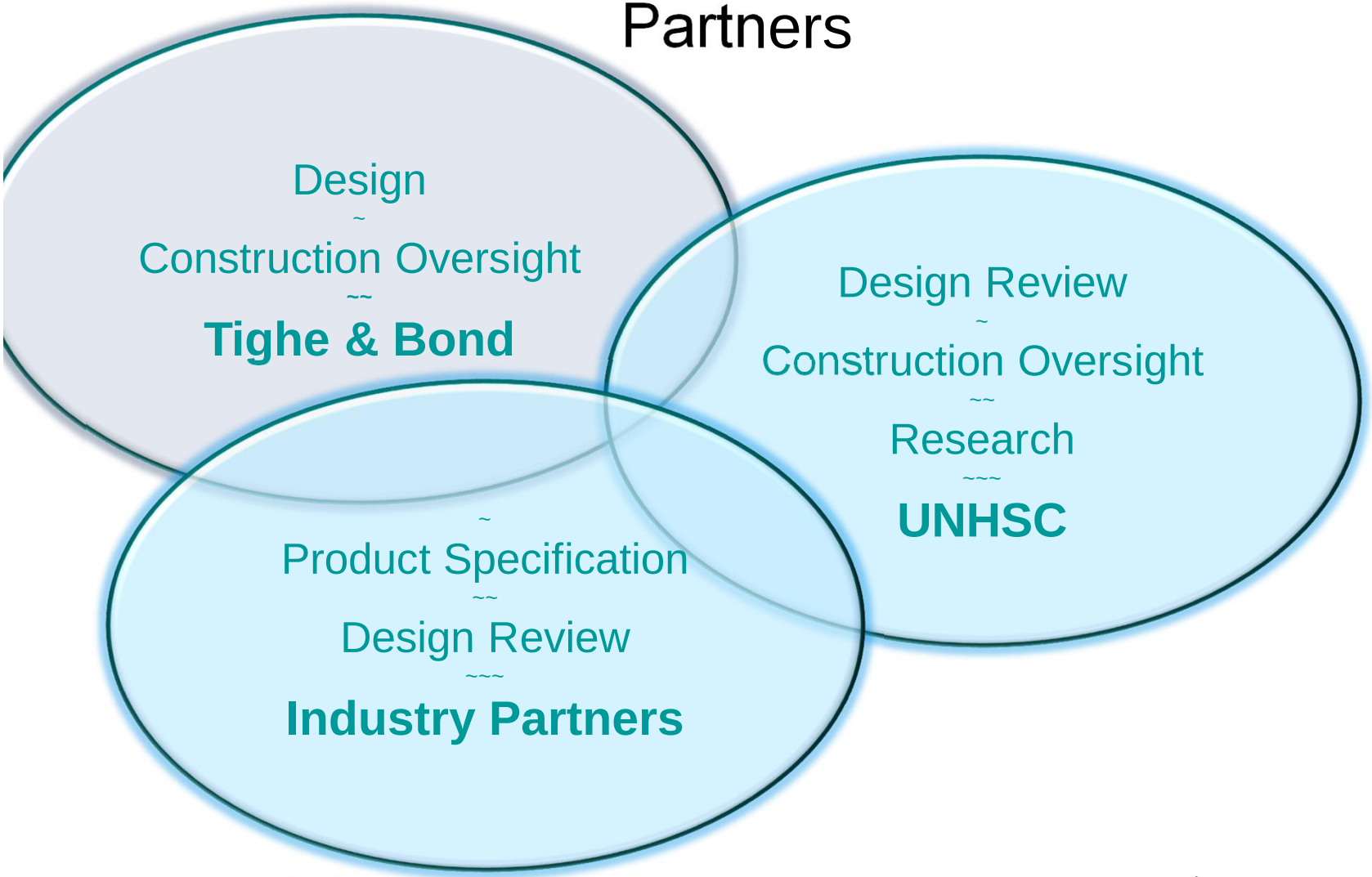

ICPI
INTERLOCKING CONCRETE PAVEMENT INSTITUTE ®
Tighe&Bond
Consulting Engineers
Environmental Specialists
SC
UNIVERSITY OF NEW HAMPSHIRE
STORMWATER CENTER
Permeable Interlocking Concrete Pavement
New England Water Environment Association
(NEWEA) 2015 Annual Conference

Collaboration between Tighe & Bond and the University of New Hampshire and Industry Partners



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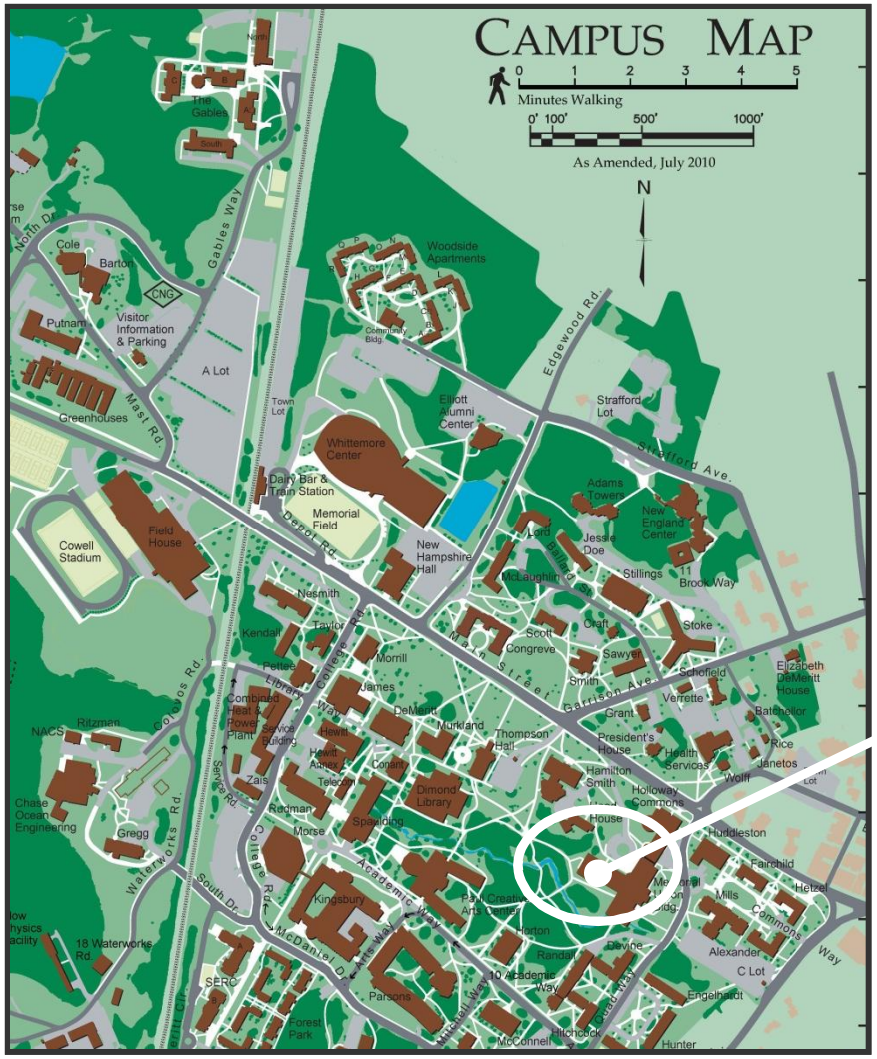
Acknowledgements

Many thanks to the generous donors whom made this research possible:

- Genest Concrete Works, Inc.
- Hanson Hardscape Products
- New England Concrete Masonry Association
- Nicolock Pavers
- Northeast Cement Shippers Association
- Oldcastle Architectural Products
- Pavers by Ideal
- Pavestone Company
- SF Concrete Products
- Techo Bloc, Inc.
- Unilock
- UNH Facilities

Hood House Location on UNH Campus



Hood House Parking Lot
Existing Conditions

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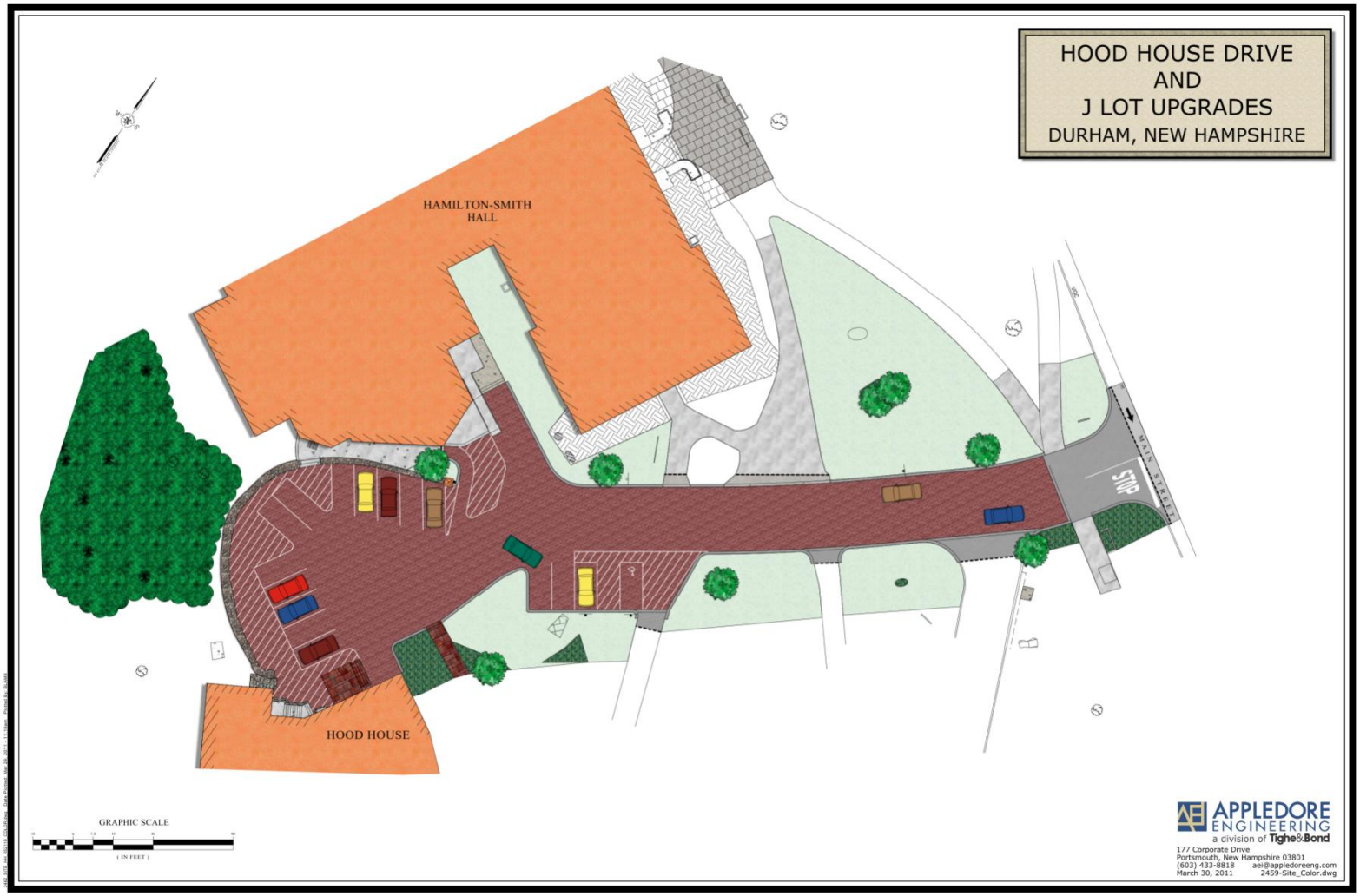
Hood House Parking Lot
Proposed Site Plan



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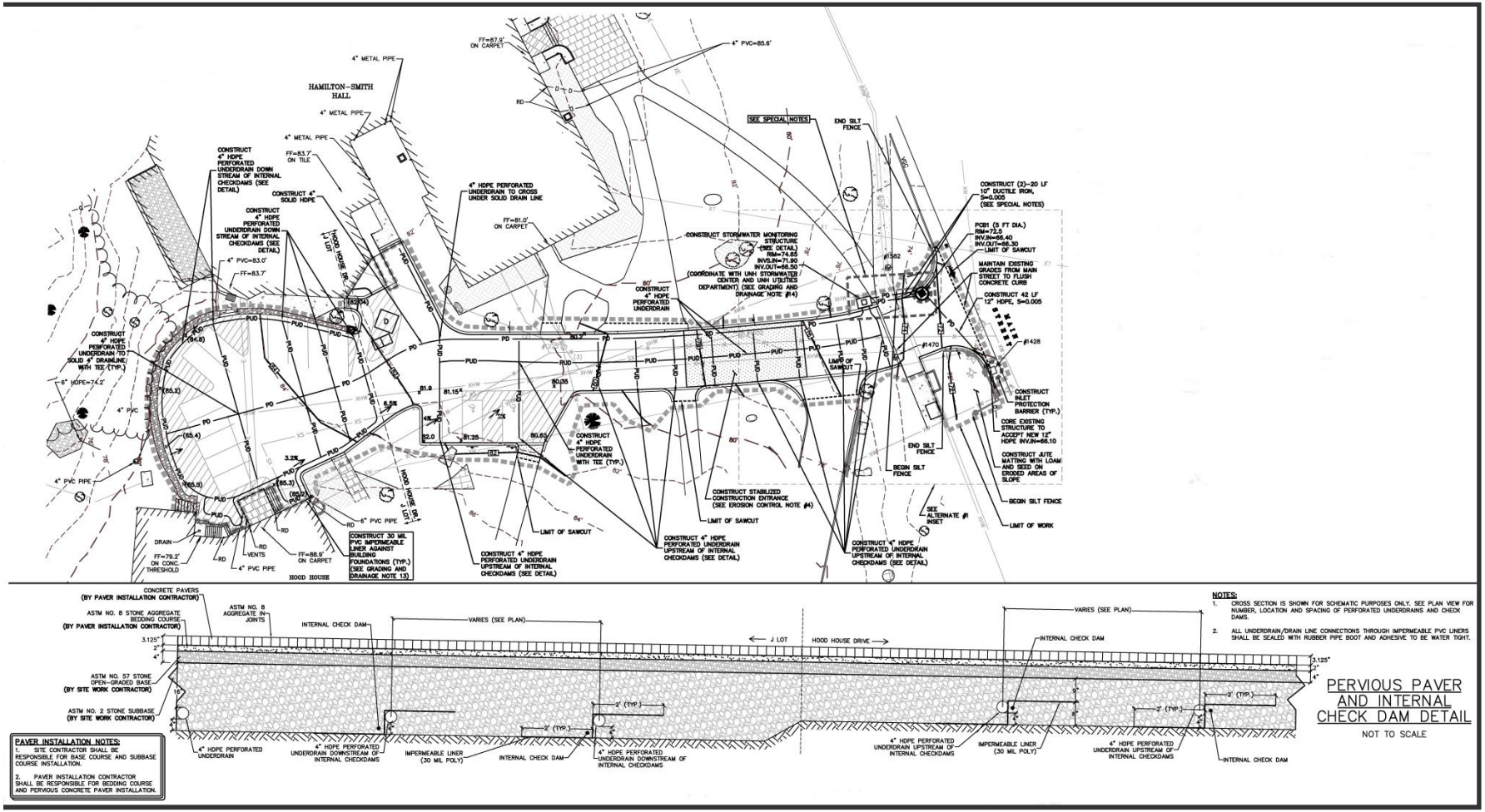
Hood House Parking Lot Grading Plan



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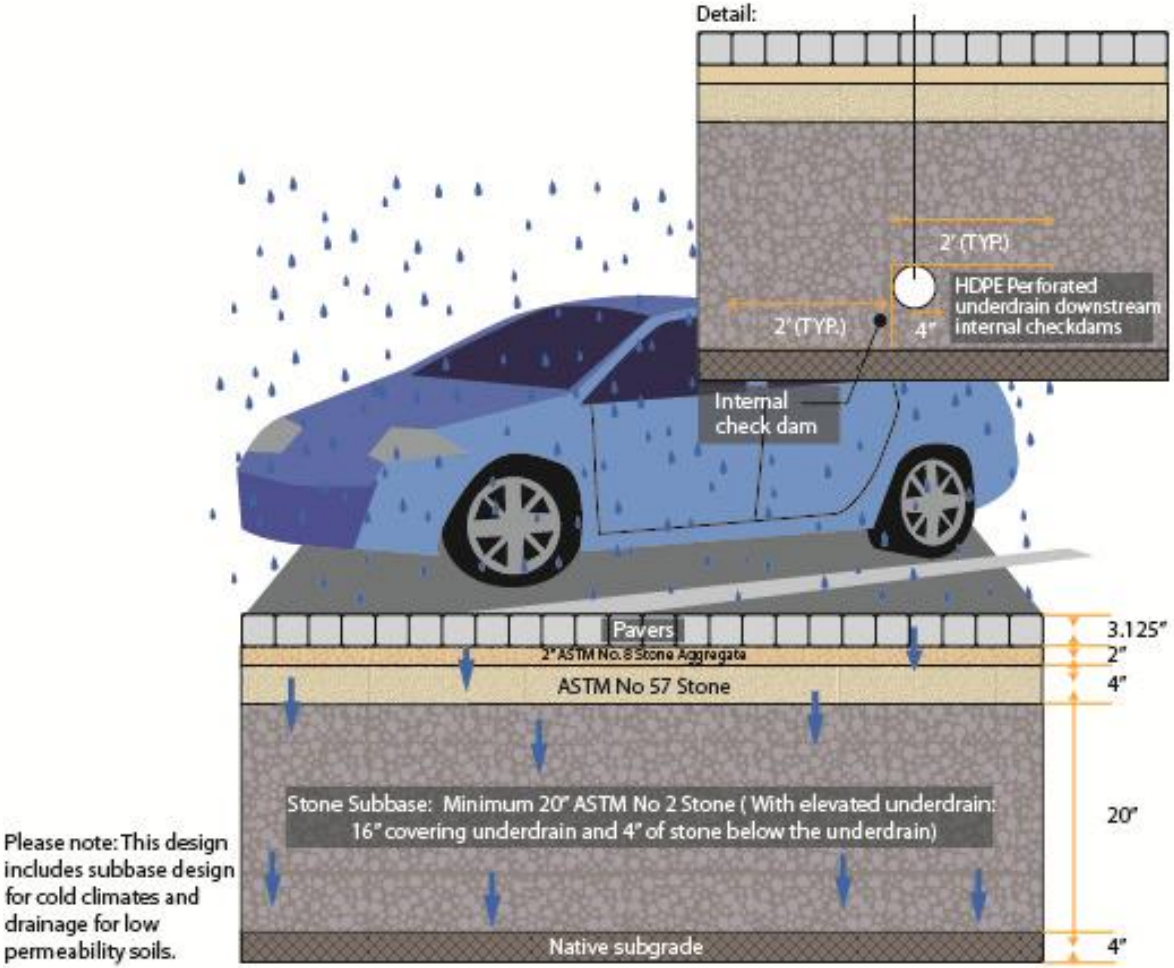
Hood House Parking Lot
Pervious Paver Section Detail



Please note: This design includes subbase design for cold climates and drainage for low permeability soils.

There is an internal check dam which consists of non-woven geo textile covering the upstream side of the 4" diameter perforated underdrain as shown in the detail in the top right.

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Hood House Parking Lot
Open Graded Base Course (No 57)

Hood House Parking Lot
Stone Bedding Course (No. 8)

Hood House Parking Lot Installation

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Hood House Parking Lot Project Completed

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Hood House Parking Lot Project Completed

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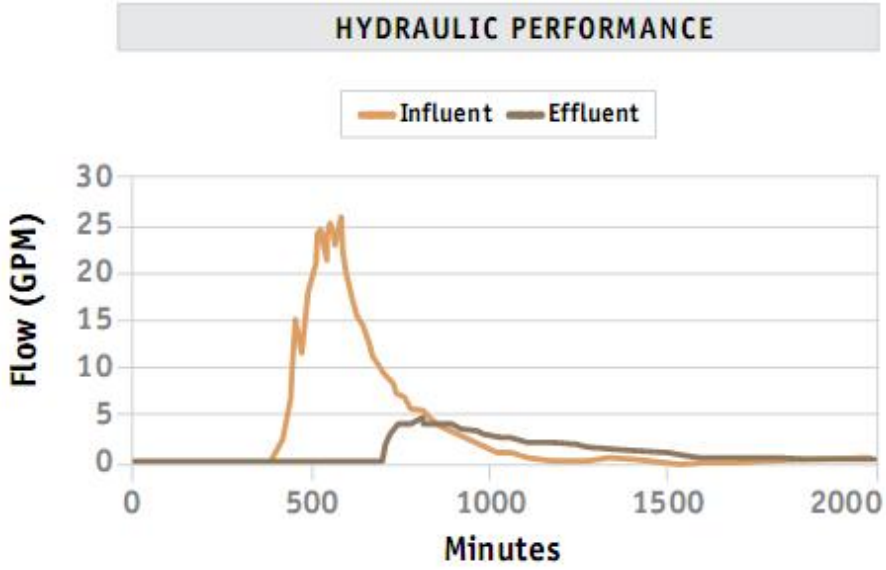
Hydrologic Performance Results

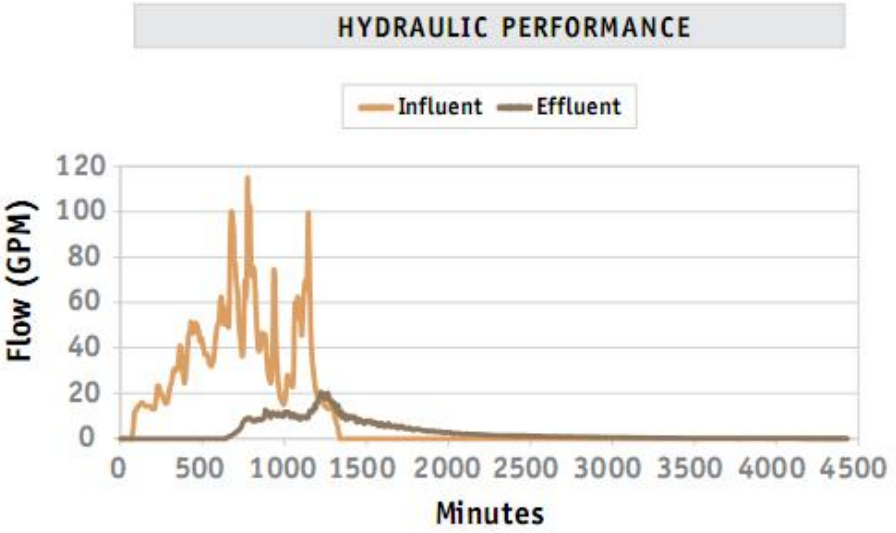
Hydraulic Performance of Porous Pavements

Porous Asphalt (HSG-C)



	Winter	Summer	Annual Average
Average Peak Flow Reduction	76%	86%	82%
Average Lag Time (minutes)	1,163	1,375	1,275

Pervious Concrete (HSG-B)



	Winter	Summer	Annual Average
Average Peak Flow Reduction	88%	97%	93%
Average Lag Time (minutes)	848	1,365	1,144
Average Volume Reduction	91%	98%	95%

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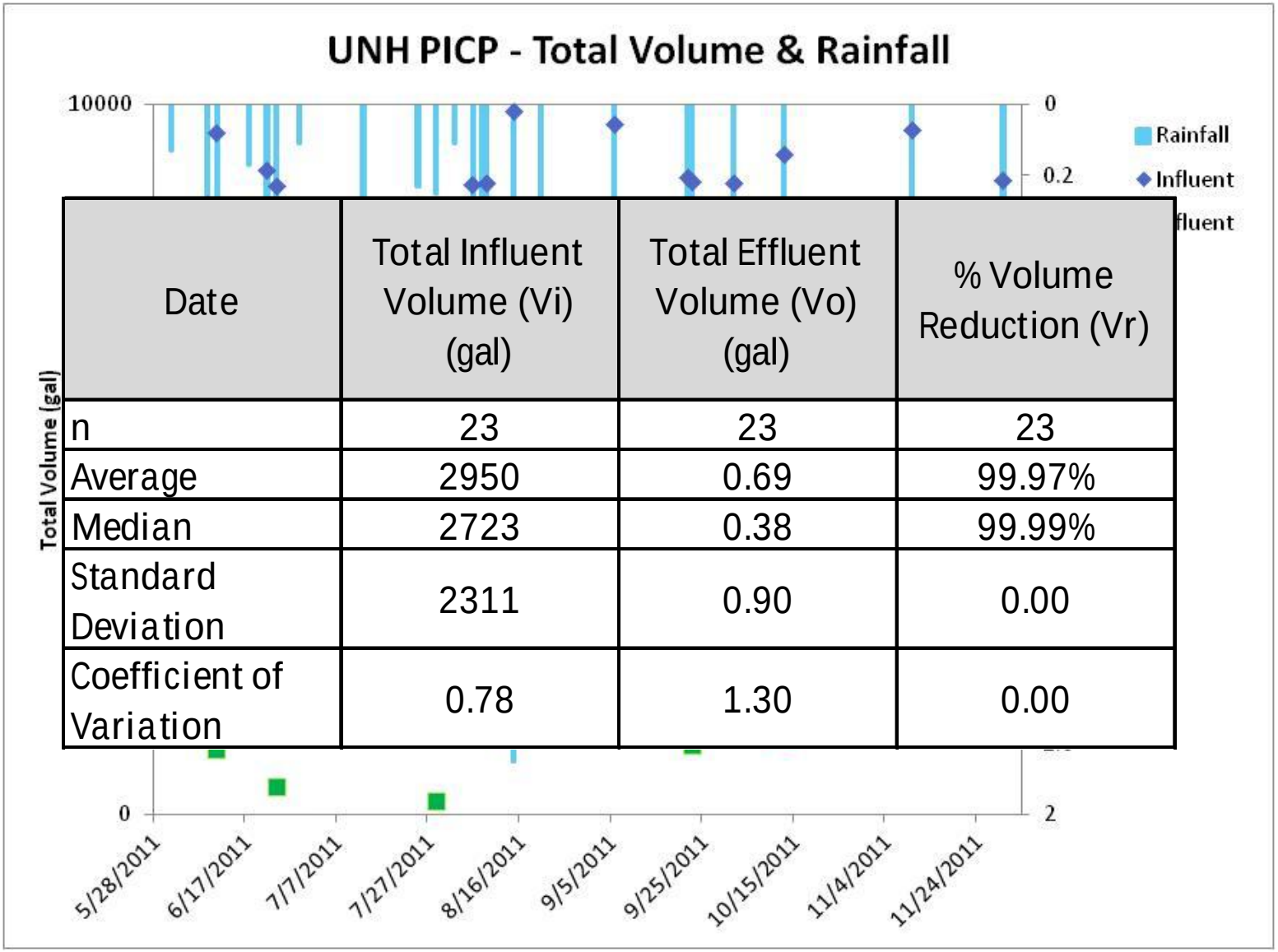
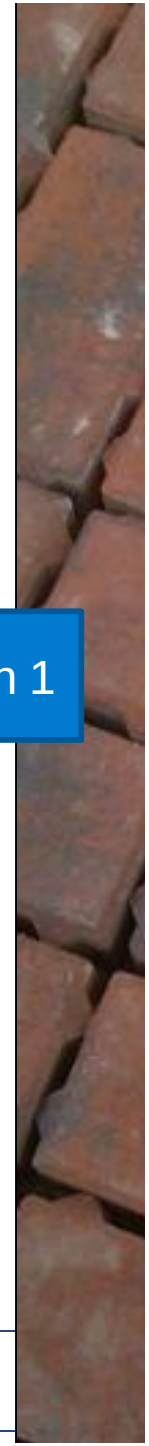


Date	Total Influent Volume (Vi) (gal)	Total Effluent Volume (Vo) (gal)	% Volume Reduction (Vr)
n	23	23	23
Average	2950	0.69	99.97%
Median	2723	0.38	99.99%
Standard Deviation	2311	0.90	0.00
Coefficient of Variation	0.78	1.30	0.00



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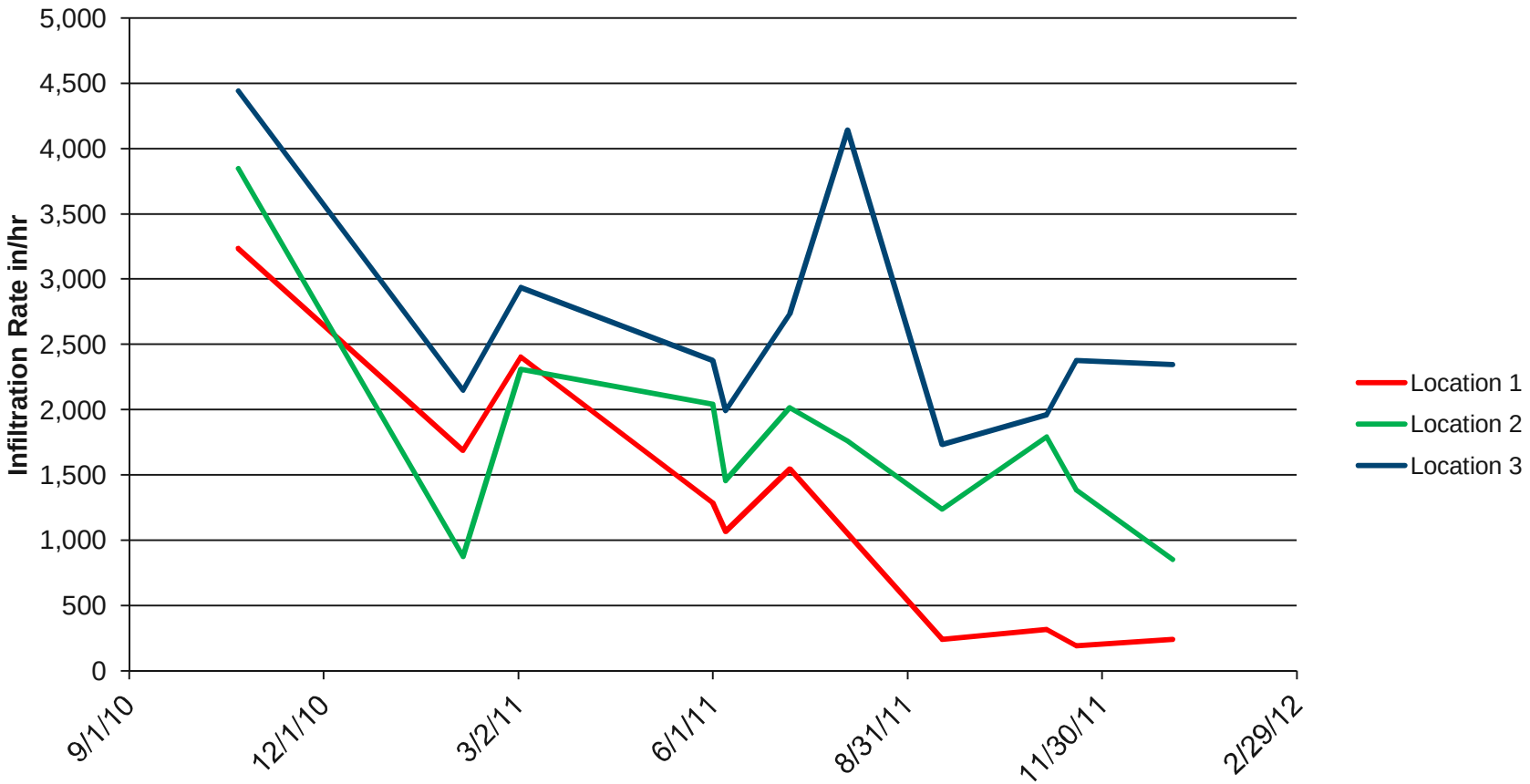
Infiltration Testing at Hood House



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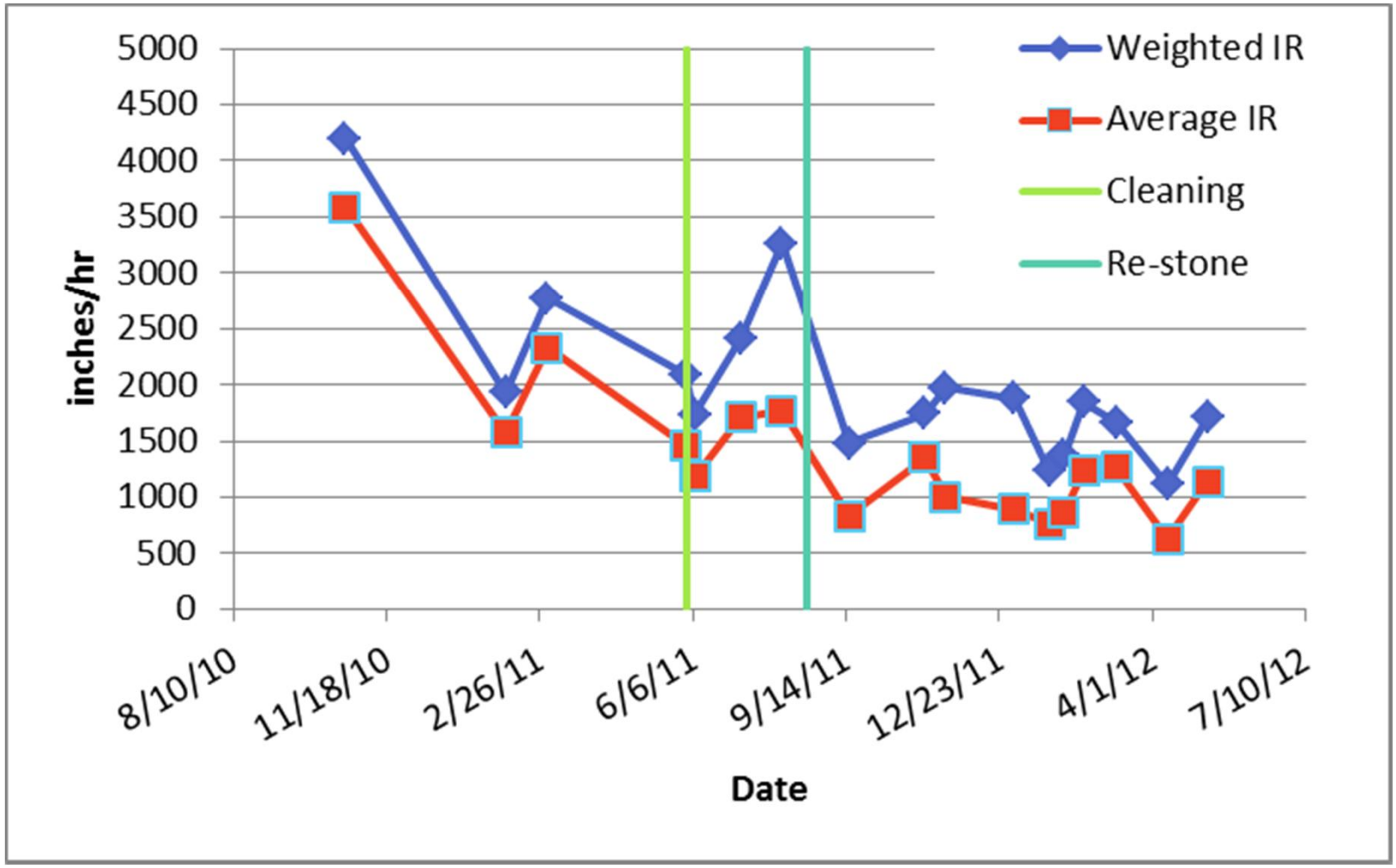

- Some areas have reduced IR (along curb-lines and areas where there runon)
- Low maintenance sensitivity due to excess infiltration capacity
- Clogged areas can drain to adjacent unclogged areas

ASTM C 1781-13

Test # 1-A

M (lb)	t (sec)	D (in)	K (in-lb)	I (in/hr)
8.0	192	11.875	126870	37.5

Test # 1-B

M (lb)	t (sec)	D (in)	K (in-lb)	I (in/hr)
8.0	244	11.875	126870	29.5

Test Site #1 Average I: 33.5 in/hr

Test # 2-A

M (lb)	t (sec)	D (in)	K (in-lb)	I (in/hr)
8.0	135	11.875	126870	53.3

Test # 2-B

M (lb)	t (sec)	D (in)	K (in-lb)	I (in/hr)
8.0	160	11.875	126870	45.0

Test Site #2 Average I: 49.1 in/hr

Test # 3-A

M (lb)	t (sec)	D (in)	K (in-lb)	I (in/hr)
8.0	968	11.875	126870	7.4

Test # 3-B

M (lb)	t (sec)	D (in)	K (in-lb)	I (in/hr)
8.0	1080.0	11.875	126870	6.7

Test Site #3 Average I: 7.0 in/hr

$I=(K*M)/(D^2*t)$

Site Average Surface I (in/hr): 30

INPUT ALL YELLOW FIELDS

NICOLOCK paving stones & retaining walls

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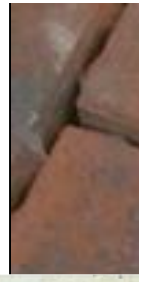

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Quality and Load Performance

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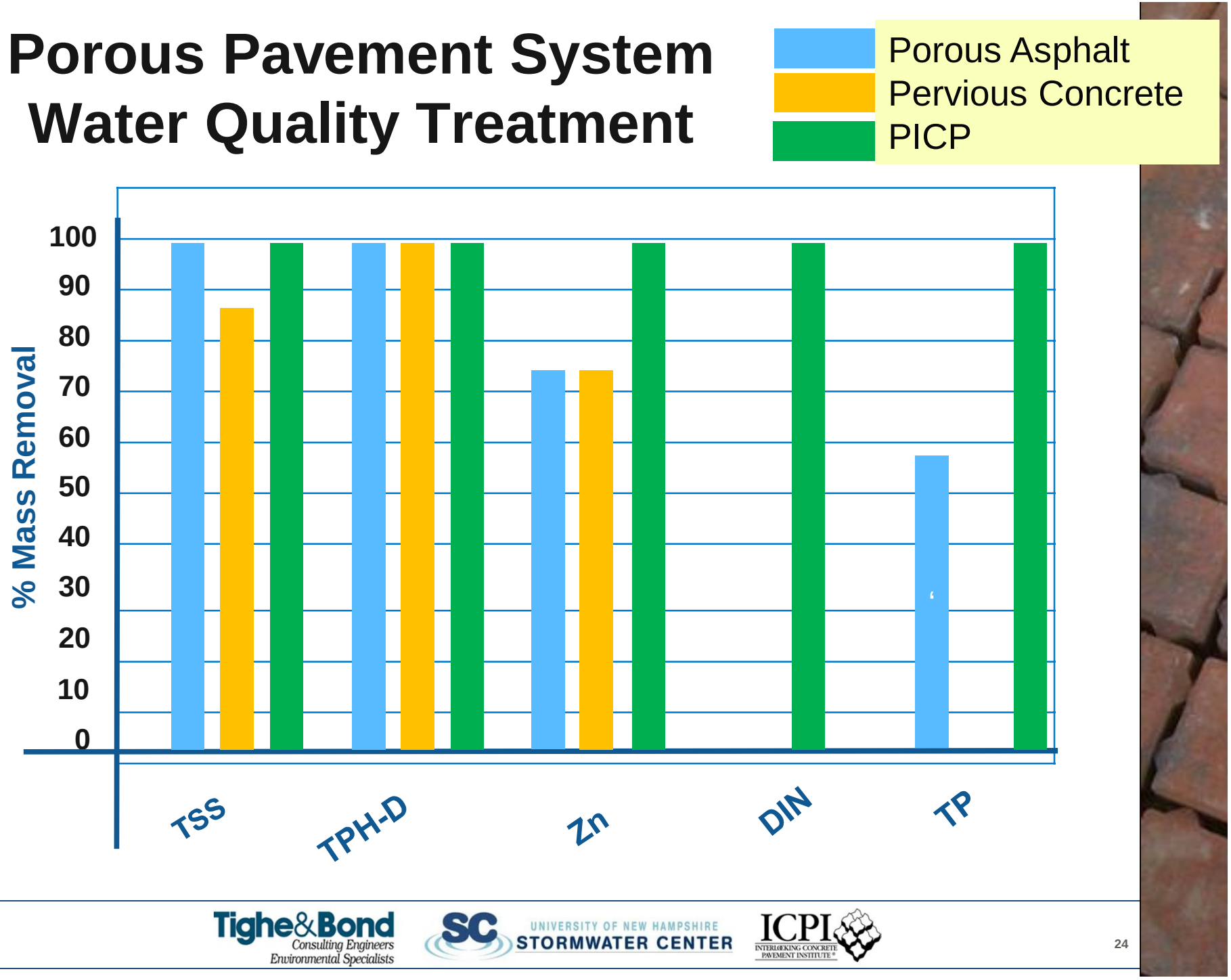
Porous Pavement System Water Quality Treatment



RE and V_r Examples

0% RE

92% Volume Reduction = 92% Load Reduction

95% RE

0% Volume Reduction = 95% Load Reduction

44% RE

70% Volume Reduction = 83% Load Reduction

10% RE

0% Volume Reduction = 10% Load Reduction

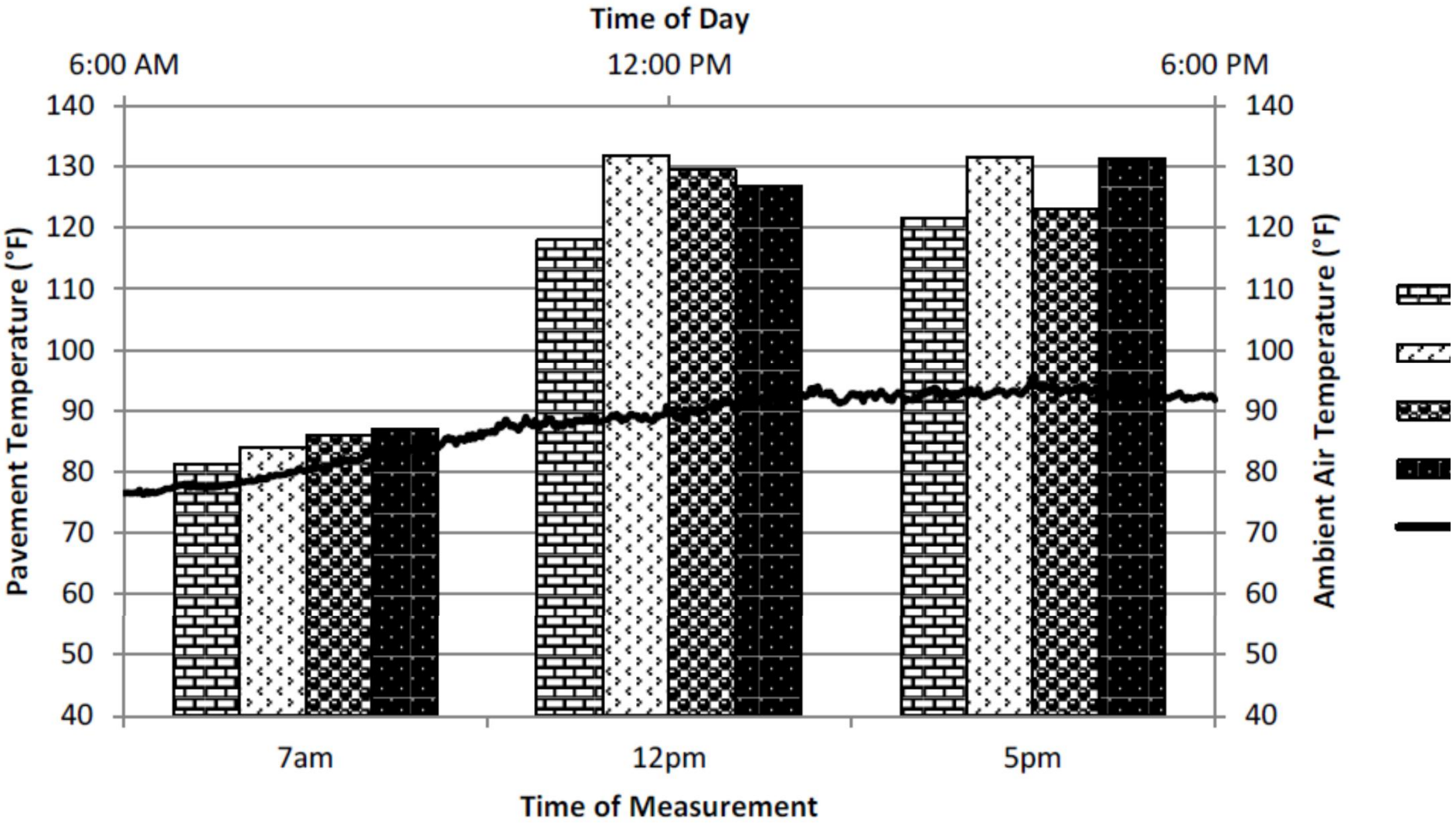
35% RE

0% Volume Reduction = 35% Load Reduction

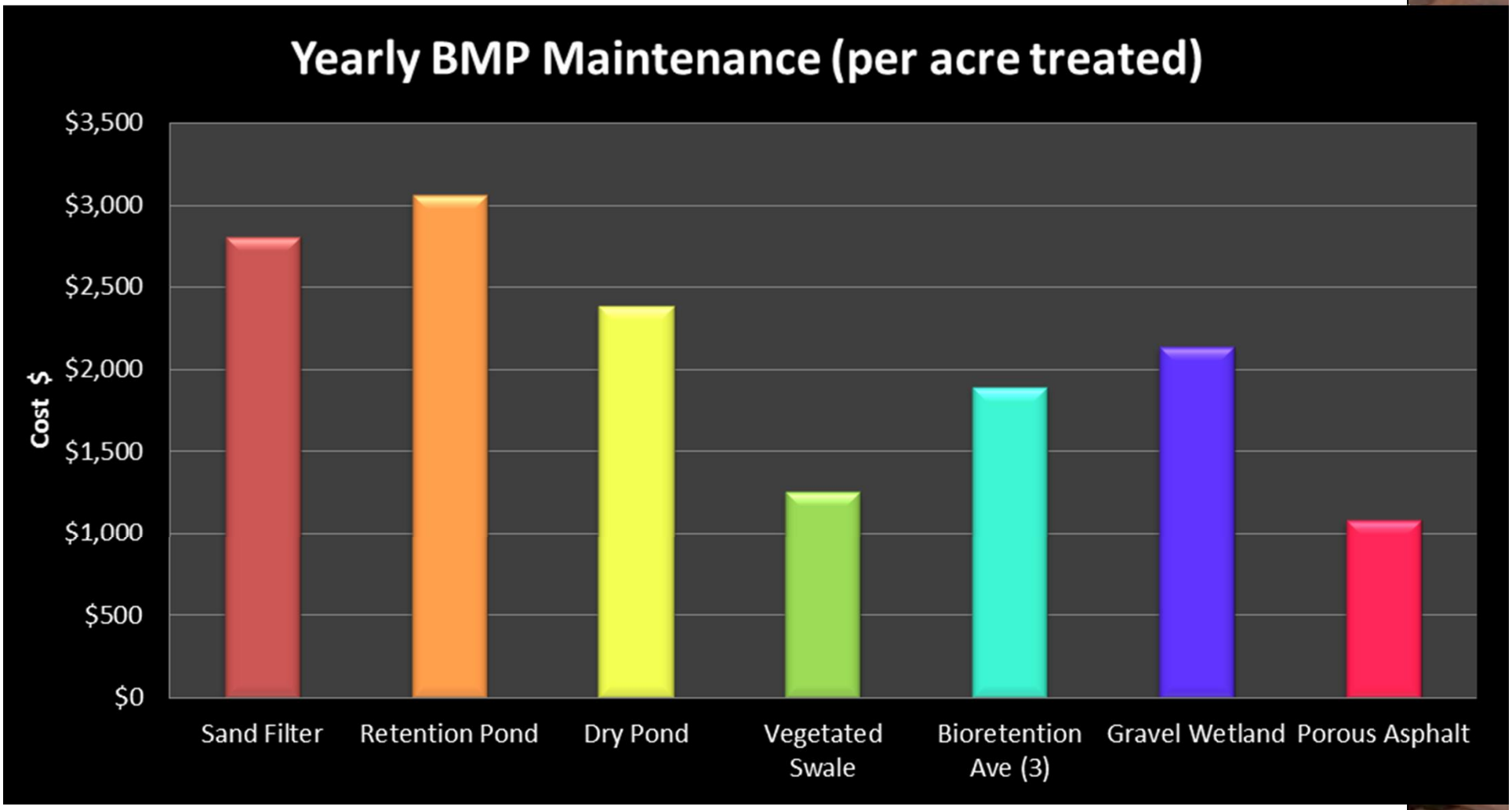
Water Quantity

Date	Total Influent Volume (Vi) (gal)	Total Effluent Volume (Vo) (gal)	% Volume Reduction (Vr)
n	23	23	23
Average	2950	0.69	99.97%
Median	2723	0.38	99.99%
Standard Deviation	2311	0.90	0.00
Coefficient of Variation	0.78	1.30	0.00

Radiometric Performance



Maintenance



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Questions?

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