Porous Asphalt Pavement Seminar and Demonstration
Hines Hill Conference Center and Brandywine Falls
Cuyahoga Valley National Park
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Lessons Learned

Paul D. Wilkerson, PE, CPESC
Construction Supervisor/Civil Engineer
Metro Parks, Serving Summit County
11,000 acres, 13 developed areas +
several conservation areas

Governed by independent, unpaid board

Cuyahoga Valley National Park
33,000 acres, one land mass
2010
WHAT ON EARTH HAVE WE LEARNED FROM THIS??

• If it’s a good site for development, it’s probably a good site for porous
• If you’re designing to meet other standards, you’re designing for porous
• Don’t go it alone
• Porous asphalt works, but be smart
• Be prepared for different maintenance
WHAT ON EARTH HAVE WE LEARNED FROM THIS??

- Site selection
- Design
- Construction
- Performance
- Maintenance
Site Selection

- Resource protection – space, receiving waters, wetlands
Site Selection

- Traffic volume, loads, turning movements
Site Selection

• Soil – strength and permeability testing

Springfield Bog: sand

Tallmadge, Liberty Park, Brandywine: silty clays
Site Selection

• Surface and subgrade slopes
Site Selection

• Sources of sediment, dirt – “run-on”, trees
Site Selection

- Commitment to maintenance
Design

• Why porous pavement where there is so much room?
Design

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Design

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Design

• Hydrologic design criteria per local regulations
• Regulations refer to “predevelopment” and “postdevelopment” discharge rates and volumes, and water quality practices.
• Need to measure (dye-test) rainfall vs. discharge from porous pavement & underdrain systems.
• Many variables, as with any other drainage design.

Our opinion: areas of porous pavement should be modeled similarly to dense meadow over the same soil when calculating time of concentration and runoff coefficients.
Design redundancies

- Soil infiltration rate – assume zero infiltration during storm duration
- Store design storm volume either in pavement base for infiltration or collect in underdrains and pipe to basin – OR BOTH
- Design as if it won’t be porous someday – institutional decision, lack of maintenance funds, ignorance
Design

- Redundancies in stormwater infrastructure
Design

• Redundancies in stormwater infrastructure
Design

- Base and pavement thickness - water storage volume vs. pavement structure
- Minimum thicknesses recommended for porous provide more than adequate pavement support
Porous Asphalt Section

- Redundant edge drain
- 3” porous asphalt
- 2” #57 limestone
- 9” #1/#2 crushed concrete or limestone
- Geogrid
- Stable but uncompacted subgrade
- Nonwoven fabric
- Perf pipe to daylight
Design

What do we do when we encounter weak or wet subgrade for “regular” asphalt?

What do we do when we need to reduce energy and stop erosion at pipe outlet?
Design

- Mix design/spec
- Don’t reinvent the wheel!
- We use single 3” lift, others use two lifts.
Design

• Surface and subgrade slopes and ADA

0% to 4% for porous pavement

5% max for ADA

2% max in loading areas
Construction

• Experience counts!
• Work with FPO and others in the industry
• Communication with contractor and inspector
• Construction sequence
• Observe mix, temperature, compaction timing, compaction effort
• Joint placement
• Costs
Construction Sequence

Prevent wash from adjacent areas

Project sequence to build porous parking last
Construction Sequence
Construction Sequence

Prevent wash from adjacent areas

Project sequence to build porous parking last
Placement & Compaction

Compact the mixture using a minimum of four (4) passes of a static tandem steel wheel roller having a minimum weight of 8 tons. Complete rolling before the mix temperature has dropped below 180 °F. (FPO spec)

Keep trucks off!
Joint Placement
Cost

Standard duty asphalt drive
4,316 sy  8 bids
$25.44/sy - $29.50/sy

Porous asphalt parking
3,346 sy  8 bids
$27.24/sy - $33.50/sy
Cost

Porous asphalt trail
1,500 sy  6 bids
$26.00/sy - $35.00/sy

2” porous asphalt
8” #57 (6” #4 + 2” #57)
geogrid

Porous asphalt parking
5,175 sy  6 bids
$28.70/sy - $36.48/sy

3” porous asphalt
2” #57
9” #1/#2
deogrid
Performance
Performance
Performance
Performance
Performance

Overflow pipe in heavy rain
Performance

Shear strength not quite like “regular” surface course
Maintenance

Sand Run –
blow pine needles

Nature Realm –
(concrete)
pollen is pasty

Springfield Bog –
Tallmadge –
Liberty Park –
SO FAR SO GOOD!

Strong vacuum sweeper may be in our future

KEEP IT CLEAN!
Maintenance

Careful plowing

Only salt for ice, and won’t need as much

NO SEAL COAT!
Clogging anyone???
Clogging anyone???

Portland, OR study

100-yr storm: 2.5 in/hr

New porous asphalt: 43 in/hr
Clogging anyone???
Clogging anyone???
LESSONS LEARNED

• Know the site and test soil – know infiltration rate & expectations for project
• If you’re designing for stormwater compliance, ADA compliance, pavement structure, and LEED points, you are practically designing for porous
• Don’t go it alone – look to industry experience
• In context of a bigger project, cost difference for porous is small
• Plan for overflow from base, even if it’s small
• Keep it clean
Sand Run – 2007

Broke all the rules and it still works!
Sand Run – 2007

Broke all the rules and it still works!
Thank you!
Questions?