Permeable Pavements for Local Streets

Nick Hutchinson – City of Ann Arbor
Agenda

- Benefits
- Sylvan Avenue
- Willard Street
- Maintenance
- Suggestions
- Future
Benefits of Permeable Pavement

- Improved storm water management
- Reduced downstream impacts
- Improved storm water quality
- Winter Conditions
- Noise
Agenda

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Sylvan Ave - Background

Goals...

- *Improve storm water management*
  - Infiltration or detention
  - Cleaning of stormwater

- *Test case for permeable asphalt streets*
Sylvan Ave - Background

Sylvan Ave Issues...
- Flat road
- Narrow road
- Narrow ROW
- Ponding
Sylvan Ave - Design

- Initial soil borings
- Deeper soil borings
- To infiltrate or not to infiltrate?

<table>
<thead>
<tr>
<th>Sample No./Type</th>
<th>Recovery (in.)</th>
<th>Depth (ft.)</th>
<th>Description of Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS-1</td>
<td>18</td>
<td>0</td>
<td>Ground Surface Elevation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Note 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>Note 2</td>
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<td>3</td>
<td>SILTY FINE TO MEDIUM SAND FILL - trace clay and gravel - loose - moist - brown - (SM)</td>
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<td>4</td>
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<tr>
<td>SS-2</td>
<td>18</td>
<td>5</td>
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</tr>
<tr>
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<td>6</td>
<td>Note 1: 2.0&quot; Bituminous Concrete Pavement</td>
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<td></td>
<td>7</td>
<td>Note 2: 6.0&quot; SILTY FINE TO COARSE SAND AND GRAVEL FILL - moist - brown - (SM-GM Fill)</td>
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</tbody>
</table>
Sylvan Ave - Design

1. Filter Layer
   - Free draining sand
   - 6” Underdrain
   - Impermeable liner

2. Reservoir
   - 100 yr design storm
   - 18-24” thickness (35-40% voids)
   - Open graded stone - crushed
3. Pavement section & details

- Permeable HMA
  - 3” thick
  - 50 gyratory mix design
  - 75-85% density; 15-25% porosity
  - AC 5.0-6.5%
  - Polymer Binder

- Standard curb & gutter vs. spill-out
Sylvan Ave - Construction

- Subgrade prep
Sylvan Ave - Construction

- Membrane & underdrains
Sylvan Ave - Construction

- Aggregate
Sylvan Ave - Construction

- Curb & gutter and sidewalk
Sylvan Ave - Construction

- Paving
Sylvan Ave - Construction
Sylvan Ave - Construction
Permeability Test ("bucket test")
Agenda

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1. Different Challenges
   - Soils
   - Cross Slope
   - Traffic Volumes

2. Different Opportunities
   - Full Infiltration
   - Spill-Out Curbs
Willard St. - Design

1. Stone Reservoir
   - Used different aggregate
   - Minimum 30% voids
   - Grid, but no liner

2. HMA mix
   - 4” thickness
Willard St. - Construction

06/23/2012
Agenda

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Maintenance - General

**Vacuum Road** - twice per year (Fall and Spring)

**Clogged Areas** - Power wash ($< 200$ psi) with detergent, and vacuumed.

**Planter Areas** - Well maintained and confined.
Maintenance - General

Exposed Ground - Seed and mulch

Surface Sealing or Resurfacing - Not permitted

Patching (< 50 square feet) - Standard patch

Patching (> 50 square feet) – Permeable pavement

Stock Piling Materials - Not permitted
Maintenance - Winter

**Plowing** – Plow every 2”+ storm with a slightly raised blade

**Salt** – Minimal salt permitted

**Sand** – Not permitted
Maintenance - Residents

Leaves/Yard Waste – Bag or compost. Not in street

Contaminants – Prevent from leaving property

No Dumping - materials or liquids on road

Planter Areas - well maintained and confined

Exposed Ground – Seed and mulch at a minimum
Suggestions

- Design by a licensed engineer
- Deep soil borings
- Careful site selection
- Full-time inspection
- Material selection
- Clear maintenance program
Agenda

- Background
- Design
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Future

- Future of permeable pavement in Ann Arbor?
  - Test case results
  - Possible future projects
  - Another option for stormwater infiltration
Questions?

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