

# Permeable Pavements: Integrated Strategy for Multiple Benefits



Washington Stormwater Center  
Permeable Pavement Webinar  
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City of Spokane Integrated Capital Management

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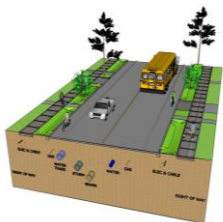
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## Integrated Strategy



- > Integrated Clean Water Plan: eliminate stormwater when rebuilding streets
- > Financial commitment to integration
  - Revenue Bonds (investors)
  - Street Levy Approved (voters)
  - \$5 Million/year for stormwater
- > 3-dimensional view of streets
- > Embedding this notion into the City's Comprehensive Plan



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## Objectives



- Environmental
  - Clean River faster
  - Pollutant removal beyond permit requirements
- Financially Responsible
  - Live within our means
  - Savings of multiple benefits



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## Permeable Pavements Benefits



Manages stormwater

**WITHOUT**

- Large surface area for swales
- Extra cost for piping system

**AND provides a means for**

- New pavement
- Bike lane options

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## Current Porous Pavement Installations



- West Broadway
- Hazel's Creek LID
- Liberty Park (Madelia St.)
- Upriver Dam
- Olmsted Brothers Green

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## Upriver Dam



- Grass pavers in parking lot installed in 1986
- Eliminated the need for a swale
- No mowing
- Plowed during winter
- Never repaired



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### Upriver Dam



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### West Broadway



- Pervious concrete sidewalk installed July, 2010
- Too much water in the initial mix and the addition of water to the surface by misting caused binding-not pervious.



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### Liberty Park Sidewalk



Pervious concrete sidewalk installed: Circa 2011

- Low infiltration rate
- Infiltration improves from north to south:

- did the pour start at the north end and continue to dry the mix as it moved south?

- did skill improve over length of sidewalk?



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### Hazel's Creek LID

Pervious concrete trail installed August 9, 2012

Excellent Infiltration

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### OLMSTED BROTHERS GREEN - PERVIOUS PAVING DEMONSTRATION

1. LOCATION PAVING
2. POLYMER-REINFORCED POLYMER SAND
3. PERVIOUS CONCRETE
4. 6" SAND
5. 4" SAND
6. 2" SAND
7. 2" SAND
8. 2" SAND
9. 2" SAND
10. 2" SAND
11. 2" SAND
12. 2" SAND
13. 2" SAND
14. 2" SAND
15. 2" SAND
16. 2" SAND
17. 2" SAND
18. 2" SAND
19. 2" SAND
20. 2" SAND

**WHAT IS PERVIOUS PAVING?**  
WHILE PERVIOUS PAVING LOOKS LIKE CONVENTIONAL PAVING, IT PROVIDES ENVIRONMENTAL BENEFITS BY DRAINING UP, FILTERING AND INTO CLEANING. PERVIOUS PAVING IS AS STRONG AS CONVENTIONAL PAVING, BUT IT CAN LAST OVER TWENTY YEARS. IT CAN BE USED FOR PARKS, SIDEWALKS, DRIVEWAYS, BIKE LANE SURFACES AND OTHER SURFACES.

**HOW DO RAIN GARDENS WORK?**  
RAIN GARDENS COLLECT STORMWATER RUNOFF FROM ROOFS, DRIVEWAYS AND ROADS. THE PLANTS IN THE RAIN GARDENS TRAP SEDIMENTS AND METALS WHILE THE ROOTS ABSORB THE WATER AND NUTRIENTS. WATER FILTERS THROUGH THE SOIL TO RECHARGE THE GROUNDWATER.

**PERVIOUS PAVING IS PERVIOUS, WHICH ALLOWS WATER TO PORE THROUGH AND SOAK INTO THE GROUND.**  
**WATER IS HELD IN A SANDY STORAGE AREA, WHICH CAN BE RECHARGED AGAIN INTO THE GROUND.**  
**THE CLEANER WATER RECHARGES THE GROUNDWATER SUPPLY.**

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### Olmsted Brothers Green

- Pervious concrete sidewalk and pavers demonstration project installed July 2014
- Excellent infiltration

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## Future Projects



- Havana Street Bike Lanes 2015 Construction
- RPWRF LID 2015 Construction
- Finch Arboretum LID Demo 2015 Construction
- Sharp Avenue 2016 Construction

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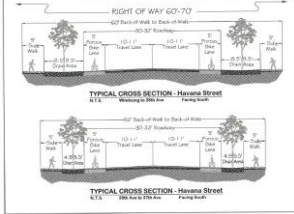
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## Havana Street



### Typical Section



### Main Features

- Porous Asphalt Bike Lanes
- Gravel Swale
- Trees
- No Curb

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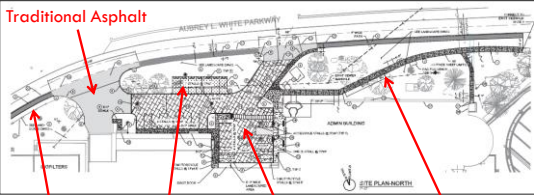
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## “LID” Demonstration at RPWRF



- Traditional Asphalt
- Gravel Strip
- Grass Pavers
- Interlocking Pavers
- Pervious Concrete

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### Finch Arboretum LID Project

**FEATURES**

- Parking lot 7000 sf
- Monitoring by the City
  - Drywell flow preconstruction
  - Grab samples
  - Durability
- Monitoring by WSU
  - Temperature
  - Comparison of sub-surface between pavement types

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### Sharp Avenue

**Legend**

- Drain
- Porous Concrete
- Full Width Porous Asphalt
- Porous Asphalt Side Lane & Parking
- Porous Concrete Interceptor

**SHARP AVE SECTION - IMPERVIOUS HMA PAVEMENT**

**SHARP AVE SECTION - POROUS ASPHALT PAVEMENT**

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### Sharp Avenue

**3 Different Sections**

- Full width porous asphalt
- Bike/parking lane porous asphalt
- Full width standard asphalt

**Main Features**

- Center Swale
- Trees
- Bump Outs

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## Sharp Avenue



**Collaboration with Gonzaga University:**

- Shared Maintenance
- Feasibility Study completed August 2014
- Senior Project for Monitoring Test Strip
  - Water Quality
  - Durability
  - Construction Methods
  - Maintenance



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## Sharp Avenue Future Monitoring & Research



- Monitoring System Design
  - Water Quality
  - Durability
  - Maintenance
- LID BMP Education



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