Permeable Pavement
Guidance Document and Credits

MIDS Work Group
February 15, 2013
Work Order Tasks

• Review and Edit Guidance Document from Tech Team
• Add Sections
  – Suitability-retrofit, cold climates, etc.
  – Installer Certification
  – Credits
• Update Calculator
Process So Far

• Distributed 1\textsuperscript{st} Draft of Guidance Document – Nov.
  – Received comments from Tech Team and MPCA
• Distributed 2\textsuperscript{nd} Draft – January 25, 2013
• Tech Team/MPCA Conference Call – February 7, 2013
  – Received comments from Tech Team and MPCA
• Updated PPT and Calculator after Conference Call
• Tech Team/Barr Updating Guidance Document-3\textsuperscript{rd} Draft
Work Remaining

• Summarize Guidance Document to Work Group (today)

• Receive Final Comments 2 weeks from today (Feb. 28)
  – MPCA
  – Tech Team
  – Work Group

• Prepare and Distribute Final Guidance Document
Document Overview

• Three Types of Permeable Pavement
  – Pervious Concrete
  – Porous Asphalt
  – Permeable Interlocking Concrete Pavers (PICP)
• Best Suited to Pedestrian Areas and Light Traffic
  – Can be designed for heavier loads
• Use to Reduce Impervious Surfaces
  – Paved areas act like green space
• Proper Construction is Critical for Performance
• Routine Maintenance is Required
 Contributing Area

- Limit runoff from surrounding areas
- 2:1 maximum ratio of Tributary Impervious (parking lots and roads) to Permeable Pavement unless:
  - Effective pretreatment for sediment control
  - Runoff is directly from a roof
  - Frequent maintenance is performed to prevent clogging (several times per year)
• Basic Function for All Three Types
  – Runoff flows through the pavement
    • Faster than rainfall intensity
    • Some filtering occurs
    • Prone to plugging
  – Runoff is stored in underlying reservoir
    • Crushed stone
    • Depth varies
  – Reservoir volume infiltrates or drains through underdrain (UD) or combination of both
• Basic Water Quality Benefits of Permeable Pavement
  – Infiltration = volume reduction = most benefit
    (Don’t add an UD for a “factor of safety” in HSG A and B)
  – Larger Reservoir = Greater WQ Benefit
  – Effective at Reducing
    • Volume
    • TSS
    • TP
    • Temperature
Document Overview

- Design Variables are Described
- Material Specifications Included
- Typical Cross Sections Provided
- Limitations Noted
- Sizing Equations Included
• **Input Variables**
  – Top Surface Area
  – *Bottom Surface Area*
  – Outflow Depth (depth below UD or overflow)
  – Media Porosity (rock reservoir, typically 40%)
Permeable Pavement

Top Surface Area

Porosity 40% typ

Storage Volume

Outflow Depth

Bottom Surface Area

Elevated Underdrain/Outlet

HSG A, B, C, D (Infiltration Rate)
Calculator

- **Input Variables**
  - Underlying Soil – Hydrologic Soil Group (A, B, C, D)
    - Infiltration rate
    - User defined rate is also an option
  - *Infiltration Adjustment for Compacted Subgrade (reduced)*
  - Required Drawdown Time
    - 48 hours typical
    - 24 hours for trout streams
Credits in the Calculator

• Filtration (underdrain on the bottom)
  – No Volume Reduction
  – TSS Reduction = 74%
  – TP Reduction = 45%

• Values based on median of published values
Credits in the Calculator

- Volume Reduction = Storage Volume Infiltrated within Drawdown Time
- TSS and TP Reductions are a Function of the Storage Volume (increased storage=increased reductions)
Credits in the Calculator

MIDS example: Sto. Vol=1.1” off Imperv

- **HSG A:** 97% Annual Volume Reduction, 3% out the UD
- **HSG C:** 91% Annual Volume Reduction, 9% out the UD

**Infiltration**
- Varies by HSG

**48 hours**

**TSS Reduction = 74%**
**TP Reduction = 45%**
Credits in the Calculator

• Additional
  – Limited Ratio of Tributary Impervious to Permeable Pavement is 2:1 unless:
    • Roof runoff
    • Effective pretreatment
  – Pervious Areas May Be Routed to Permeable Pavement
    • Be careful to avoid high sediment and organic loads from pervious areas