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

Photo: Barr Engineering Company

Process So Far

- Distributed 1st Draft of Guidance Document – Nov.
  - Received comments from Tech Team and MPCA
- Distributed 2nd 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-3rd 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)

Document Overview

- 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

Document Overview

- 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)

Document Overview

- 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

Document Overview

- 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

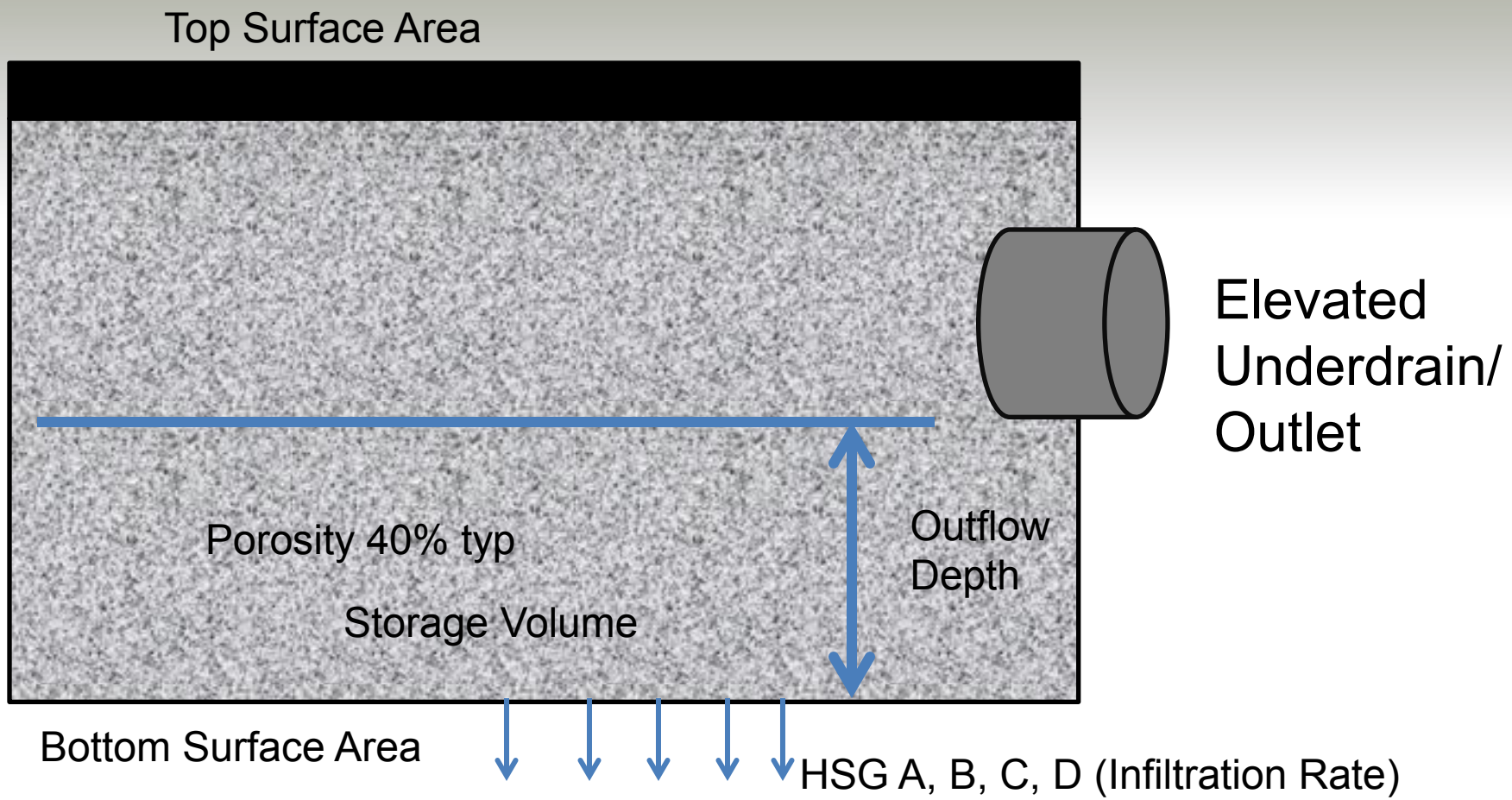
Document Overview

- Design Variables are Described
- Material Specifications Included
- Typical Cross Sections Provided
- Limitations Noted
- Sizing Equations Included

Calculator

- Input Variables
  - Top Surface Area
  - *Bottom Surface Area*
  - Outflow Depth (depth below UD or overflow)
  - Media Porosity (rock reservoir, typically 40%)

Permeable Pavement

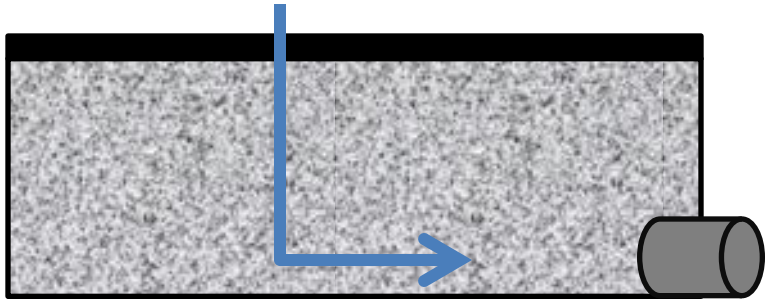


Calculator

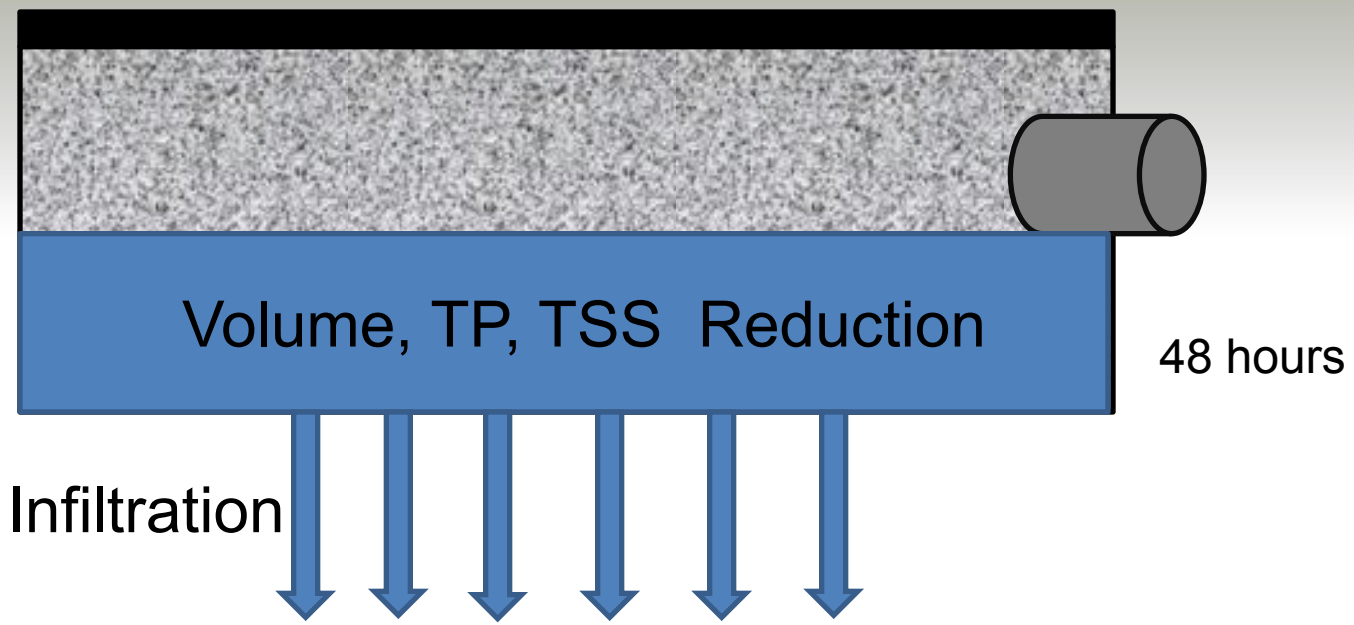
- Input Variables
  - Underlying Soil – Hydrologic Soil Group (A, B, C, D)
    - Infiltration rate
    - User defined rate is also an option
  - *Infiltration Adjustment for Compacted Subgrade (reduced)*
  - Required Drawdown Time
    - 48 hours typical
    - 24 hours for trout streams

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

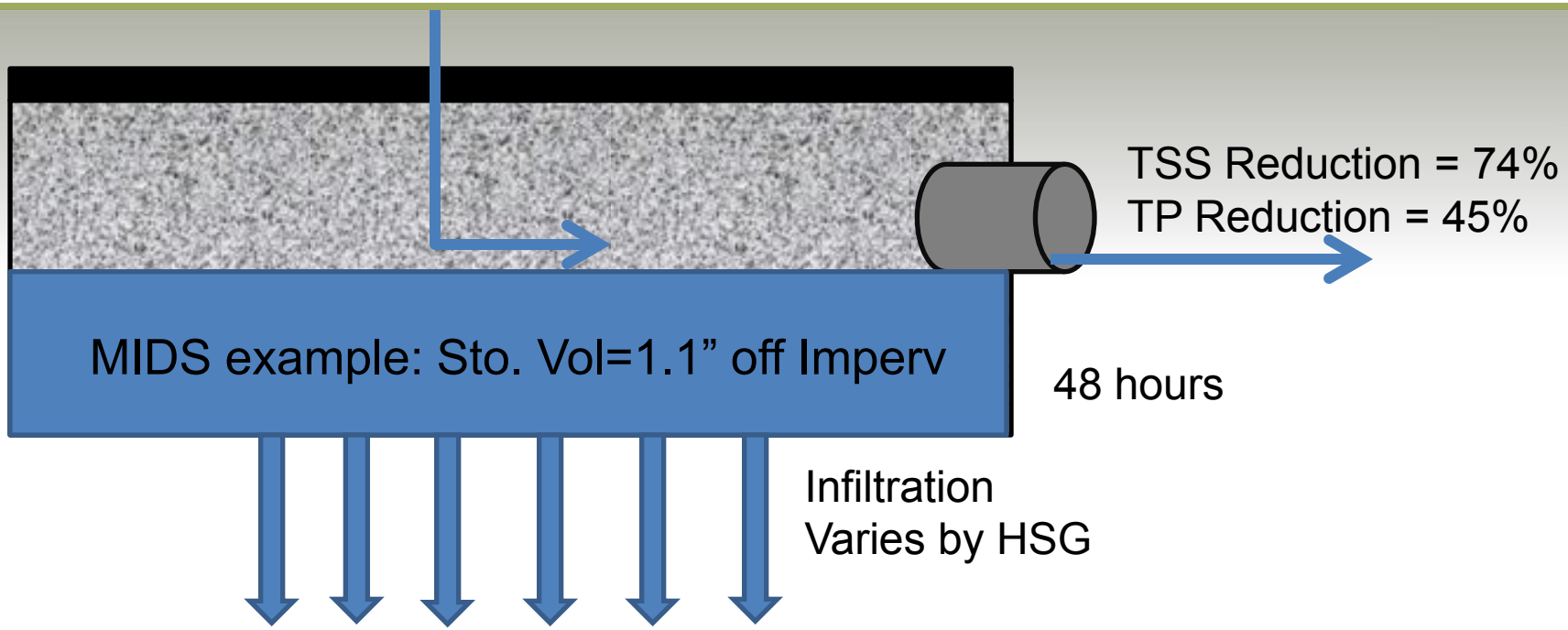


Credits in the Calculator



- 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



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

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

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