PERMEABLE PAVEMENT DESIGN

• Why & When to Avoid It
• Resources
• Calculations Overview (Quality, Quantity)
• Component Design (Asphalt, Aggregate Storage, Subgrade & Underdrains)
WHY USE PERMEABLE PAVEMENT?

- Reduce TSS
- Reduce TP
- Infiltrate
- Reduce Runoff Rates
- Can reduce/eliminate storm sewer
- Can deal with stormwater under the pavement
WHEN TO AVOID PERMEABLE PAVEMENT

• See Tech. Standard 1002
• High groundwater
• High bedrock
• Within 25’ of POWTS
• Within 10’ of building foundation
• Dirty sites
GENERAL DESIGN RESOURCES

• American Concrete Institute
• National & WI Redimix Association
• National & Wisconsin Asphalt Pavement Association
• Interlocking Concrete Pavement Institute
DNR INFILTRATION PRETREATMENT REQUIREMENTS

• Pavement 25% max voids or
• Drains through 5” of stone ASTM C-33, No. 8, 89, 9 or 57 aggregate in the paver joints or below the pavers
• 12” minimum aggregate storage layer.
WATER QUALITY CREDITS

Water through permeable pavement and aggregate storage (to underdrain).

• 55% TSS reduction
• 35% TSS reduction
• 100% Water infiltrated
WATER QUALITY CREDITS

Aggregate Storage Reservoir
Underdrain
Soil Subgrade
Permeable Pavement Surface
Run-on Source Area

TSS-55%
TP-35%

0%
100%
WATER QUANTITY DESIGN

- Same as Detention Pond
- Volume = Pore Space
- Inflow Hydrograph
- Storage Indication Pond Routing
- Metrics: 33% Porosity Under All Pavement & 24-hour rainfall
  - 12” aggregate can store 4” of runoff from pavement above (+/-25-year recurrence interval)
  - 18” of aggregate can store 6” of runoff from pavement above (+/- 100-year recurrence interval)
ROUTING GRAPHIC

Porous Asphalt

Normal Asphalt

Aggregate Storage Layer

Pipe Out
SUBGRADE DESIGN

- Standard Allows 2% Bottom
- Recommend Flat Bottom
- Soil Separation Fabric in Silt & Clay
- Liner?
AGGREGATE STORAGE LAYER DESIGN

- Clear stone
- 5% Max. passing #200 sieve (consider 2%)
- Minimum porosity 30%
- Typical 40%
- Recommend design of 33%
- Comply with WisDOT soundness, wear, etc. standards
- Consider covering top of storage layer until paving
AGGREGATE STORAGE LAYER DESIGN

3:1 Run-on to Effective Infiltration Area
PROTECT STORAGE LAYER DURING CONSTRUCTION

Wrap Clear Stone
Future Porous Asphalt Pavement

Drains Away from Porous Asphalt
PAVEMENT DESIGN-ASPHALT

• Asphalt Pavement = Rocks and Liquid Asphalt
• 6% Liquid Asphalt
• 3/8” Stone
• 18% Voids
• Minimize Fine Particles
• Drain Down Concern
PAVEMENT DESIGN-ASPHALT

• Little Asphalt Compaction
• Tender Initially
• Stiffens in about 7 Days
• Protect From Landscapers
UNDERDRAINS – IF NEEDED

• 4” Minimum Perforated Pipe

• Location
  • Bottom of aggregate storage – silt/clay soils
  • Higher in Other Soils
  • 4” Minimum Stone Around pipe

• Drain down in 72 hours

• One observation well per acre

• No socks!
WHAT ABOUT SLOPED INSTALLATIONS

Clear Stone Storage Cell

Asphalt

4” PVC pipe

Manhole

¾” Dense Graded Base Dense Aggregate Berm

Cleanouts
SUMMARY

• Follow Tech Std & Use Industry Guidance
• Model Quantity/Quality/Infiltration
• Get a Good Materials Engineer to Help
• Design Specifics for Asphalt, Aggregates & Subgrade
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