Iowa Water Conference 2016

Ames, Iowa
March 23–24, 2016

Permeable Paving
&
Riverfront Development

Charles City, Iowa
Charles City, Iowa: America’s Hometown

- Floyd County seat
- Population ~ 7,500
- Amenities
  - Trails
  - Parks
  - Golf Courses
  - Cedar River
  - Family Oriented Events
Permeable Paving Project

- What was the drive to do this?
- What are permeable pavers, what do they look like?
- How do the streets and Stormwater infrastructure (BMPs) work?
- Old concept, but yet it seems so exciting
- Maintenance
- Effectiveness through very variable seasons
- Funding

Riverfront Park

- Community asset: More than just a park
- Alternative Stormwater management infrastructure
Permeable Paving Project

- Flooding initiated the discussion on permeable pavement...
Permeable Paving Project

- Improving roads had been on the City Council’s radar for a long time
  - Iowa Pavement Management Program
    - Analysis rated many roads in “Poor” or “Very Poor” condition
  - Undersized or non-existent storm water system
  - Localized ponding/flooding
Rainwater falling within the project area is collected and treated by the four rainwater system BMPs. See below for a description of each system component.

1) Porous Unit Paving
2) Amended Soil Infiltration Areas
3) Cobble Infiltration Areas
4) Alley Trench Grate
Permeable Paving Project: Pavers
Permeable Paving Project: Construction
Permeable Paving Project: Rock!!
Permeable Paving Project: Construction
Permeable Paving Project: (Infiltration and Detention/Retention Capacity)
Permeable Paving Project: Amended Soil

b. Porous Unit Paving + Amended Soil

- Turf grass
- Amended soil
- Porous unit pavers
- Gravel setting bed
- Gravel base
- Geotextile filter fabric
- Undisturbed soil

Amended Soil Infiltration Area  Curb + Gutter  Porous Unit Paving
Permeable Paving Project: Amended Soil
Permeable Paving Project: Intake Structures
Permeable Paving Project: Intake Structures
Permeable Paving Project: Alley Trench Grates
Permeable Paving Project: Durable and Effective

- **Maintenance**
  - Localized fixes if needed
  - Addition of chip rock
  - Vacuuming

- **Snow Removal**
  - Carbide blade
  - Salt/Brine
  - No sand!

- **Freeze/Thaw Cycle**
  - Ice formation minimized compared to regular
  - Heaving of pavers not noticeable
Permeable Paving Project: Benefits

- Discharge reduced over 60% for 10-year event (4.38 inches of rainfall)
- **Peak** discharge reduced over 90% for 10-year event
- Runoff volumes and rates reduced over 30% for 100-year event (7.07 inches)
- System must fully infiltrate runoff from a 1.25 inch rainfall, also known as the 90% cumulative frequency event (to meet Iowa Stormwater Mgmt. requirements)
- Exceeds requirements as system can fully infiltrate runoff from a 3 inch rainfall
Permeable Paving Project: Benefits

**Porous Pavement System**
- Total Suspended Solids: 65–100% reduction
- Total Nitrogen: 65–100% reduction
- Total Phosphorus: 30–65% reduction

**Infiltration Trench**
- Total Suspended Solids: 50–80% reduction
- Total Nitrogen: 50–80% reduction
- Total Phosphorus: 15–45% reduction
Permeable Paving Project: Funding

- Total Cost – $5,678,759
- City $
  - Water and Sewer $1,139,748
  - Stormwater $138,782
  - SRF loans $3,277,462
- Outside $
  - ARRA $569,167 Outside funding
  - Forgivable Loan $453,600 ~20% of all costs
  - State Grant $100,000 ~25.5% of non utility costs
Permeable Paving Project

- Two phases have been completed to date totaling 26 blocks!
Permeable Paving Project

- An additional permeable paved street going into a new PUD (Parkside Villa)
  - This development offers:
    - Stormwater BMPs
    - Shared block geothermal system
    - Onsite solar energy generation
    - Energy efficient homes
Riverfront Park

- The Cedar River is one of the most valuable assets of Charles City
- Didn’t want a park only for mowing
- Desired to develop the park and capitalize on the presence of the Cedar River downtown

- Is it possible to create a park that does this and also helps with Stormwater management?
  - We think so!
Riverfront Park: Natural Play Area

- Reduces velocity and volume of water
- Provides area for children to play
- Something different than just regular open space
Riverfront Park: Stormwater Fountain

- Replaced existing storm sewer pipe that fed directly into river
- Reduces velocity and volume of water reaching river
Riverfront Park: Permeable Concrete Labyrinth

- Demonstration area for alternative Stormwater management technique
- Visually unique
Riverfront Park: Whitewater Course
Water Quality Project: Upper Cedar Urban/Rural Partnership

- February 2016 Awarded: USDA– Regional Conservation Partnership Program (RCPP) Grant –$1.6M
- Designed to support and expand implementation of conservation practices that address water quality, soil health and flood mitigation on the Upper Cedar River
- Charles City and 14 partners involved in the project
  - IDNR, IDALS, Iowa Soybean Assoc., The Nature Conservancy, Iowa Flood Center, Floyd & Mitchell County Farm Bureau, Floyd & Mitchell County Conservation Districts, Floyd County BOS, Trees Forever & Charles City Rotary Club, City of Osage & City of Waverly
Water Quality Project: Upper Cedar Urban/Rural Partnership
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Upper Cedar Urban/Rural Partnership

Plan: 5 year period
- 10,000 acres of nutrient management plans
- 15,000 acres of cover crops
- 10,000 acres of no-till or strip-till
- Five Bio reactors
- Two Saturated Buffers
- Utilize “RIOS” tool developed by The Nature Conservancy

Goals:
- Advance the goals established by the Upper Cedar Water Management Authority and build on the state projects already taking place
- Address requirements of the Iowa Nutrient Reduction Strategy
- Protect Charles City Riverfront Investment and low lying areas from flood damage
Thank You!!!

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