Installed BMPs Can Make A Difference
Come and See How

Monica Smith, PE
President
Robinson Engineering Company
Owner – Robinson Engineering
Masters Degree in Water Resource Management for Colorado State University
The Dry Run Creek project got me interested in the design of infiltration based practices.
Iowa Certified Inspection and Maintenance of Stormwater Practices (ICIMPSP)
Rainscaper Certified: Bioretention Cells, Permeable Pavers, and Porous Asphalt
Dry Run Creek Watershed
Dry Run Creek Watershed

- 15,177 acres
  - 35% Urban (5,250 acres)
  - 65% Rural
- Creek Length = 24.5 miles
  - North Branch
  - Southwest Branch
  - University Branch
  - South Branch

HUC 070600050204
1992 – Initial Biological Assessment by IaDNR
   May have biological impairment
1996 – Fish Kill Reported
1999 – Further Investigation Completed

2002 – 2.8 Mile Stretch of Dry Run Creek Placed on the 303(d) List of Impaired Waters
   Impairment due to lack of aquatic life
2.8 Mile Stretch of Dry Run Creek

Black Hawk Creek
2003 – Later Studies Showed High E.Coli and High Nitrate Levels

2004 – Black Hawk Soil and Water Conservation
- Worked with Hawkeye Community College
- Sampling Completed at 6 Locations
- 45% of Samples had High E.Coli Readings

2004 – Iowa DNR Study Found Lack of Aquatic Life and Low Biotic Index
2005 – Additional Biological Assessments Conducted
  - UNI students completed “Stream Channel Analysis on Dry Run Creek, Black Hawk County, Iowa”
  - IaDNR, Hawkeye Community College and IOWATER
    - Conducted sampling at 20 sites
    - Sampling completed June to November, 2005

2008 – IaDNR Conducted Biological Assessment
  - Created Stressor Identification Study
  - Added Southwest, East and University Branch to 303(d) List
Dry Run Creek Impaired Stretch 2008

Dry Run Creek Bacteria Impairment on Southwest, East and University Branch
Dry Run Creek Impaired Stretch 2016
Stressor Identification Study

- Major Sources of Impairment
  - Increased Storm Water Inputs
  - Increased Suspended and Bedded Sediment
  - Decrease in Habitat Complexity and In-Stream Cover

- Secondary Cause
  - Acute Dissolved Oxygen Deficiencies
  - Abundance of Chlorine in Some Stretches
North Branch of Dry Run Creek
Projects Completed

- Towers Bioretention Cell (2006)
- Hudson Road Wetlands (2006-2007)
- Tennis Courts Streambank Stabilization (2007)
- Towers Streambank Stabilization (2008)
- Streambank Stabilization at Practice Fields (2008)
- Streambank Stabilization from Campus to Merner Street (2009)
Projects Completed

- 22\textsuperscript{nd} Street Bioretention Cells and Infiltration Trench (2009)
- Towers Permeable Paver Parking Lot (2011)
- North Dome Porous Asphalt Parking Lot (2011)
- West Dome Permeable Plaza (2013)
- Kamerick Bioretention Cell (2014)
Drainage Area = 15,100 sq ft

Bioretention Cell Design:
- 6” Wood Chips on top
- 36” Engineered Mix:
  - 60% Sand, 30% Compost, 10% topsoil
- 12” Gravel Bed

Completed with Community Foundation Grant of $5,000.00

Facilities Maintenance Personnel Completed Construction
Issues With Project

- Completed after utility work was completed in the area
- Installed with a Water Line located down the center of the Biocell
- Staff was afraid that students would walk through the Biocell on a regular basis
Towers Bioretention Cell (2006)
Towers Bioretention Cell
Towers Bioretention Cell
Towers Bioretention Cell
Hudson Road Wetland (2006-2007)

- Designed to include pedestrian trails, wildlife habitat and storm water capacity
- Design completed by AECOM in Waterloo, IA
- Native plants established in wetland
Hudson Road Wetland (2006-2007)
First Streambank Stabilization Project on Campus
Decided to do most eroded banks only
Installed Bank Hides for fish habitat
Installed A-Jacks at the toe of slope for reinforcement
Facilities staff worked with DNR Fisheries Personnel to install banks hides and complete project
Tennis Courts Streambank Stabilization (2007)
Facilities staff decided to continue stabilizing streambanks after the success of the previous project.

Completely grubbed area and stabilized streambanks.
Towers Streambank Stabilization (2008)
Towers Streambank Stabilization (2008)
Streambank Stabilization at Practice Fields (2008)

1,000 lin ft of Streambank Stabilization
Completed by Contractor
Created Stabilized 6:1 Slopes with 6” Topsoil
   - Excavated dirt was used as fill on campus
     No Waste Created
Erosion Control Mat and Straw Mulch Used
Streambank Stabilization at Practice Fields (2008)
Streambanks cut back to 4:1 slope with 6” topsoil added

Erosion Control Blanket Used for one width from toe of slope

Straw Mulch used on remaining streambank

Native Grasses used for seeding
Streambank Stabilization from Campus to Merner (2008)
Campus to Merner – As Grubbing Is Completed
Campus to Merner - Completed
Project was needed to handle storm water after multiple houses were moved one block to make room for a parking structure.

Houses were moved and a parking lot was paved behind the houses for student parking.

Storm water was not addresses as part of the original project.

Project Installed an Infiltration Trench and 2 Bioretention Cells.
22nd Street Drainage Structures
Infiltration Trench at 22nd Street

- Accepts all water from parking lot
- Trench is 4’ wide x 3.5’ deep
- 1.5” to 2.5” Dia. Clean Open Graded Stone with 6” clean sand layer on bottom
- Included Subdrain
- 5’ Grass strip captures debris from parking lot before reaching Infiltration Trench
Infiltration Trench at 22\textsuperscript{nd} Street
North Cell: Accepts some drainage from parking lot and overflow from infiltration trench
South Cell: Accepts drainage from around houses and associated ditches
Drainage Area = 0.5 acres for each cell
Approx. 40’ Dia. Cell
Rock Chamber Replaced by Open Bottom Plastic Pipe
  Facilities staff thought this would be easier to replace when needed
North Bioretention Cell
South Bioretention Cell
North Dome Parking Lot (2011)

- Porous Asphalt installed to accept drainage from parking lot
- Drainage Area = 7.67 acres
- 25,720 sq feet Asphalt Pavement Used
- Included Subdrains
- Installed small Bioretention Cells around area drain as part of project
North Dome Parking Lot (2011)
North Dome Parking Lot (2011)
North Dome Parking Lot (2011)
Permeable Pavers used to accept drainage from parking lot

Drainage Area = 1.8 acres

5,600 sq feet Permeable Pavers

Modified Towers Bioretention Cell as Part of this project

Removed Intake – Biocell Now Takes ALL Storm water
Towers Parking Lot (2011)
Towers Parking Lot (2011)
Towers Parking Lot (2011)
Towers Parking Lot (2011)
West Dome Plaza (2013)

- Installed Permeable Pavers and Tree Boxes in Plaza
- Drainage Area = 0.35 acres
- 15,322 Sq Feet Permeable Pavers
West Dome Plaza (2013)
West Dome Plaza (2013)
West Dome Plaza (2013)
Bioretention Cell design at bottom of performance area outside of Kamerick Building
Drainage Area = 0.73 acres
Connected to storm sewer which drains towards Dry Run Creek
Kamerick Plaza (2014)
Kamerick Plaza (2014)
Kamerick Plaza (2014)
Project Totals To Date

- 1 Constructed Wetland
- 5 Bioretention Cells
- 1 Infiltration Trench
- 2020 Lineal Ft. of Streambank Stabilization

Total Construction Cost: Approx. $800,000+
Iowa DNR has completed biological monitoring on Dry Run Creek since 2005.
This includes looking at Fish and Benthic Macroinvertebrates found in the Creek
Testing Conducted at two locations. A Third location was added in 2013
Testing Locations
### Fish Test Results

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**DRC14 Scores Well Above DRC4**

**DRC1 is Influenced by Cedar River**
# Benthic Test Results

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DRC14 is Higher than All Other Tests
Sampling Will Continue to be Completed By Iowa DNR Staff

More Data Points needed at DRC14 to Confirm Accomplishments

Similar Work Needs to be Completed on the Rest of the Creek Before Dry Run Creek can be Removed From 303(d) List
Memorial Tribute

All of this work was authorized by:

Paul Meyermann
Facilities Planning
Questions?
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