Installing Bioretention Facilities

Waukesha County Dept. of Parks & Land Use
Storm Water Infiltration Workshop
March 14, 2007

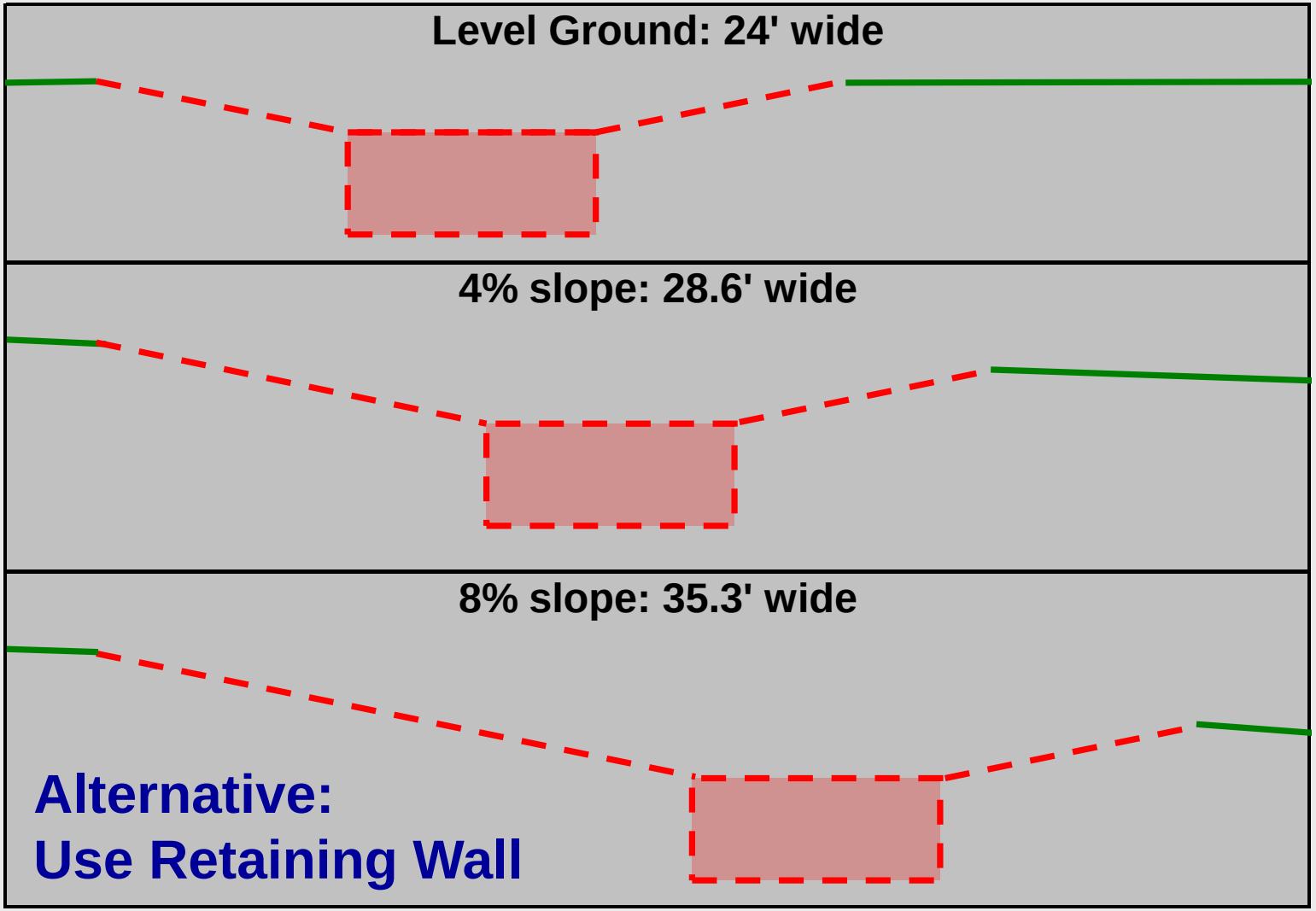
Presented by
Willie Gonwa, P.E., Ph.D.
West Allis, Wisconsin

SYMBIONT

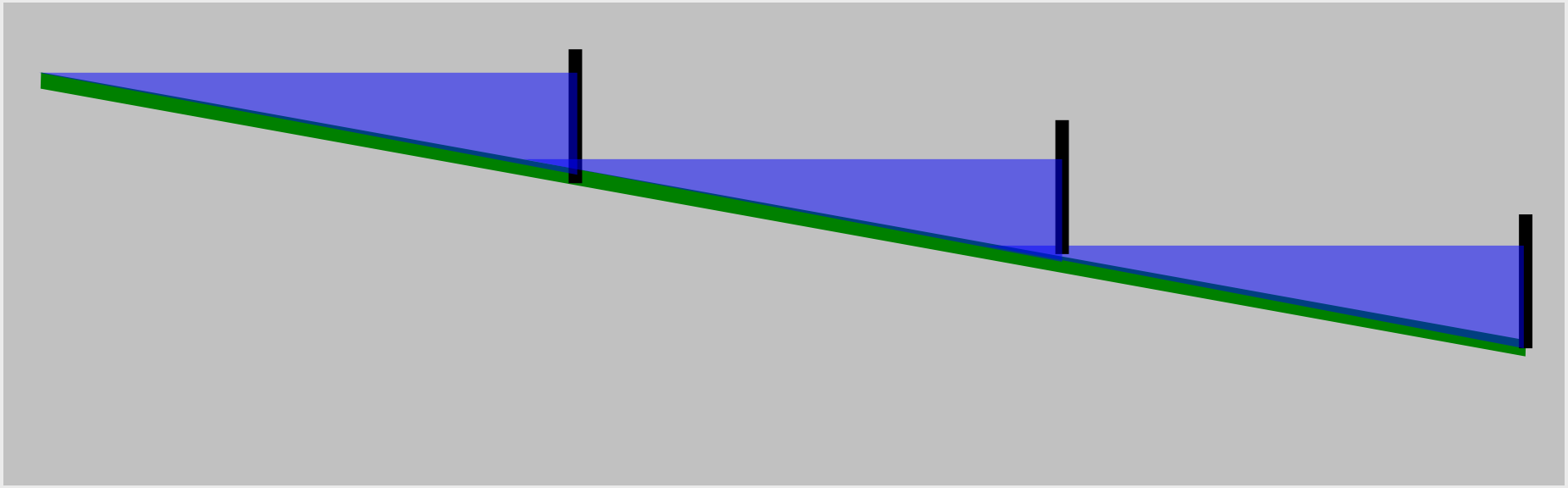
Topics

- Design considerations
- Construction issues
- Integrating practice into project plans
- Examples of successes and failures

Side Slope Increases Practice Size



Longitudinal Slope Increases Practice Size

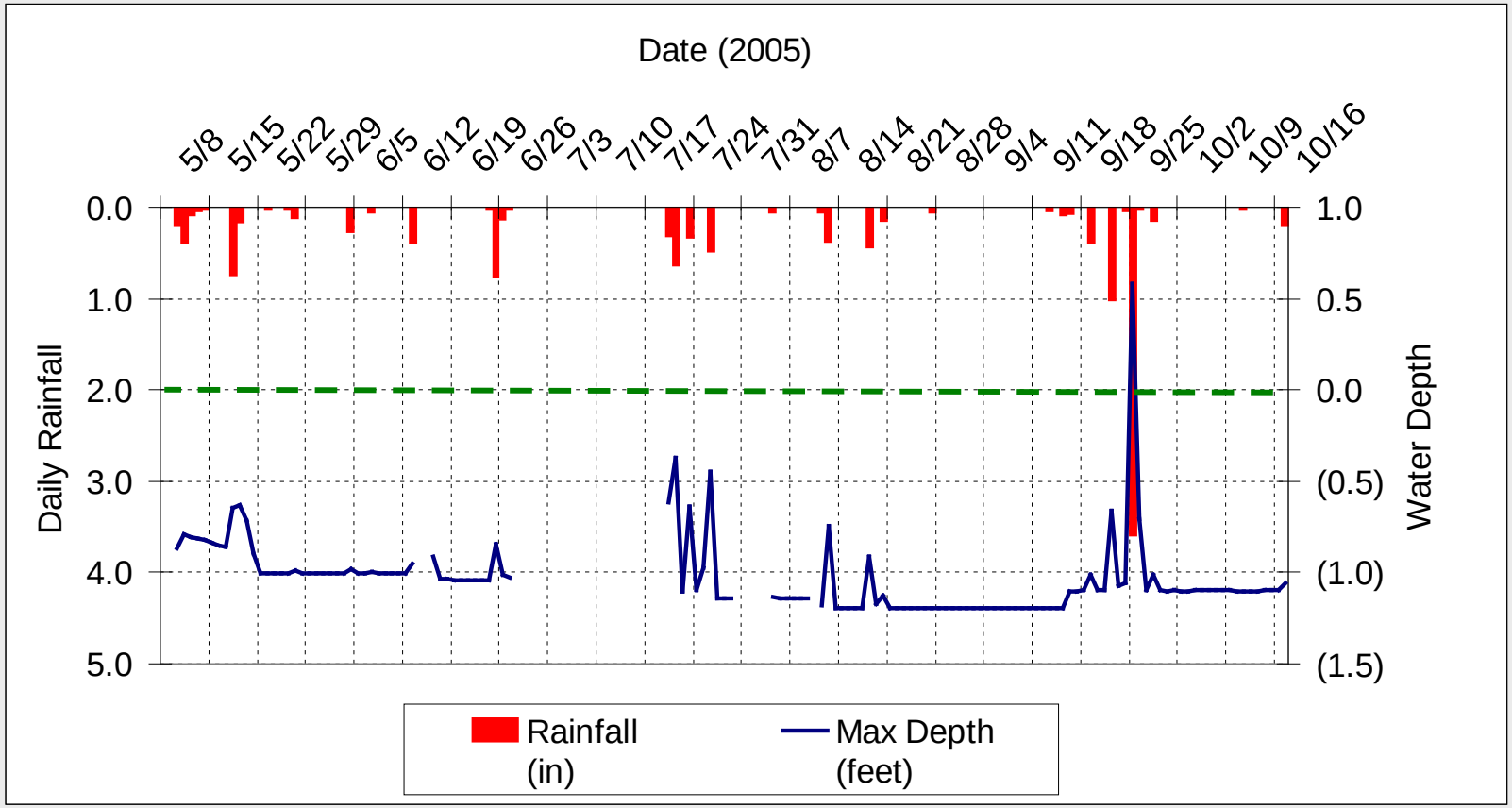


Alternative:
Use Check Dams

Fiberglass sheet piling prevents down slope water migration

Stone hides and reinforces wall

Infiltration is Possible Even in Heavy Soils



Recommendation:
Place Drain Tile above Bottom

Design Considerations

Many Sites Do Not Permit Pre-Treatment

Recommendation:
Use Prairie Plants to Maintain Permeability or plan on more frequent rehabilitation

Design Considerations

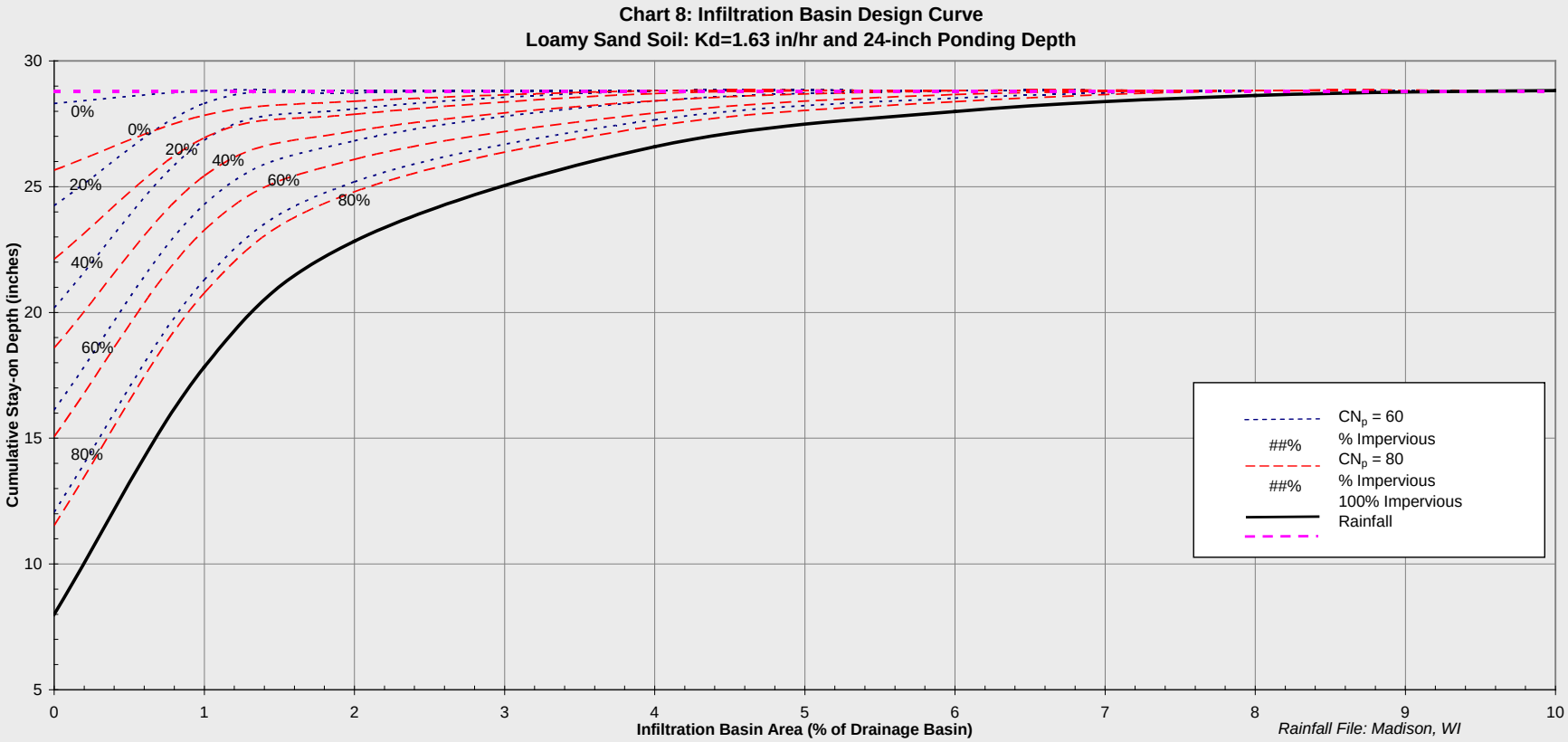
Protect location where water will enter the bioretention swale

Design Considerations

A landscape architect can really enhance the appearance of the project

Use RECARGA for sizing

http://dnr.wi.gov/org/water/wm/nps/stormwater/technote.htm



Design Considerations

Topics

- Design considerations
- Construction issues
- Integrating practice into project plans
- Examples of successes and failures

Erosion during construction is the No. 1 cause of failure

Recommendation

- Install practice after final site stabilization
  - Include construction sequence in bid documents (plans and specifications)
  - Discuss during pre-construction meeting
  - Inspect and enforce provisions

Erosion during construction is the No. 1 cause of failure

Alternatives

- Divert runoff around practice until final site stabilization
- Protect it as you would any area of special protection

Silica sand is not quarried in SE Wisconsin

Desire: I would like to see the manufactured soil recommendation revisited.

There are few compost suppliers that meet S100 specifications

Desire: Need more suppliers.

Construction compacts soil and reduces infiltration

Contractor:

- **Use wide track / low ground pressure machinery**
- **Restore compacted soils with deep tilling or ripping**

Topics

- Design considerations
- Construction issues
- Integrating practice into project plans
- Examples of successes and failures

Use bioretention where appropriate

- Roadside swales
- Smaller sites
- Isolated sites
- Condominiums
- Commercial sites
- Inadequate storm sewer

Follow standards for quick regulatory approval

- DNR Conservation Practice Standard 1002, Site Evaluation for Stormwater Infiltration
- DNR Conservation Practice Standard 1003, Infiltration Basin
- DNR Conservation Practice Standard 1004, Bioretention for Infiltration
- Wisconsin Department of Natural Resources Specification S100, Compost

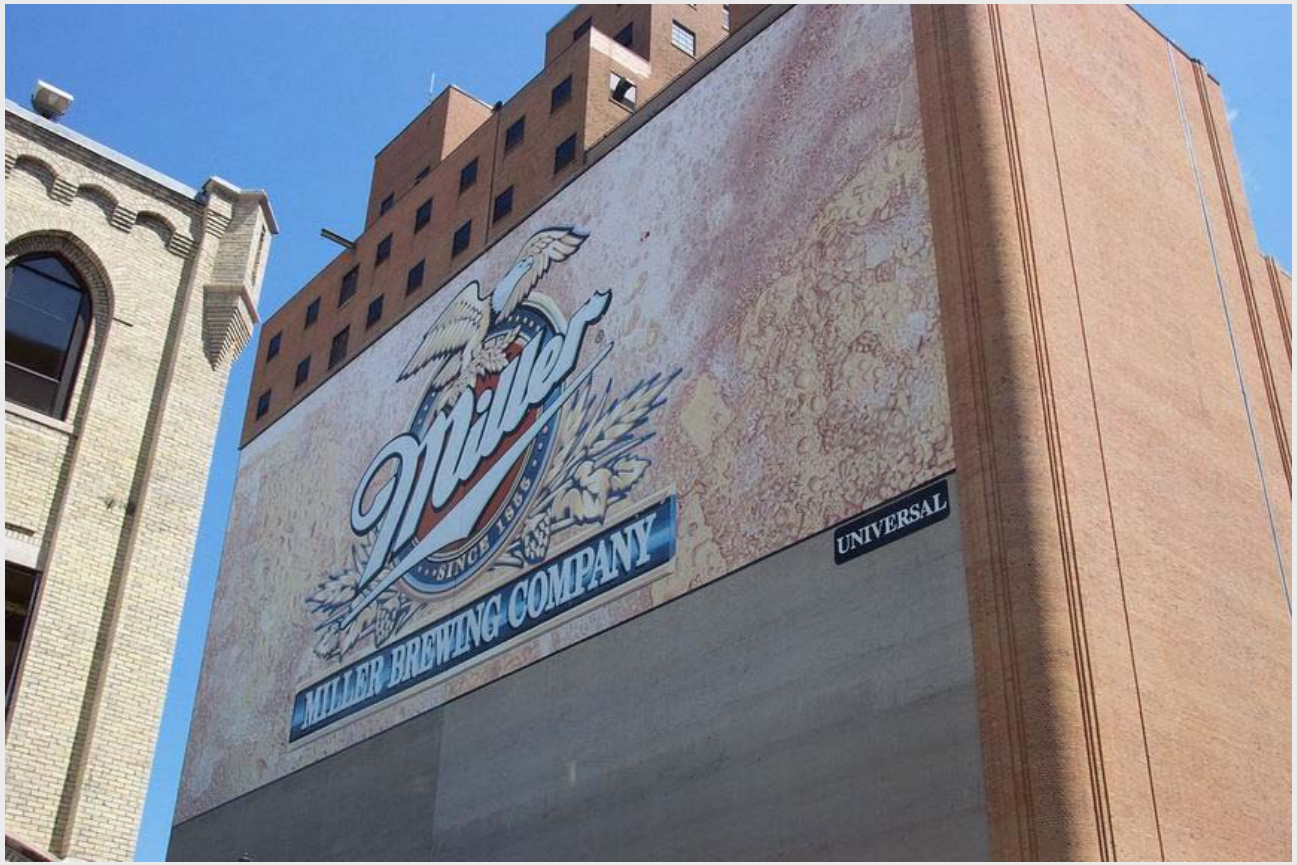
Specify construction sequence

Topics

- Design considerations
- Construction issues
- Integrating practice into project plans
- Examples of successes and failures

MILLER BREWING RAIN GARDEN AND BIORETENTION SWALE

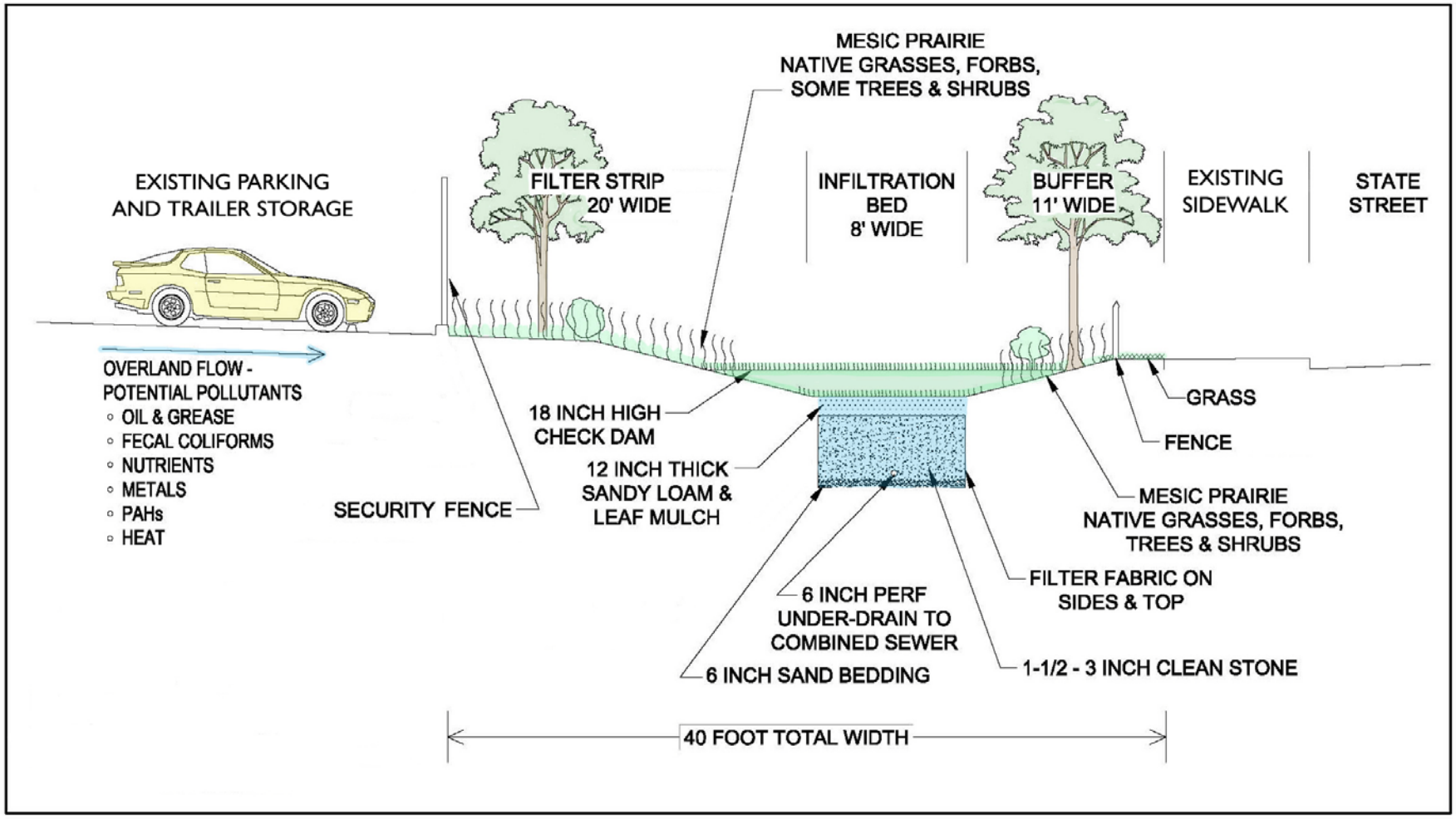
The project is located in Milwaukee, Wisconsin at the Miller Brewing Company Brewery



Prior to installing the rain garden, contaminated runoff discharged directly to the combined sewers

The green area indicates the approximate limits of the bioretention swale

Elevation of Bioretention Swale

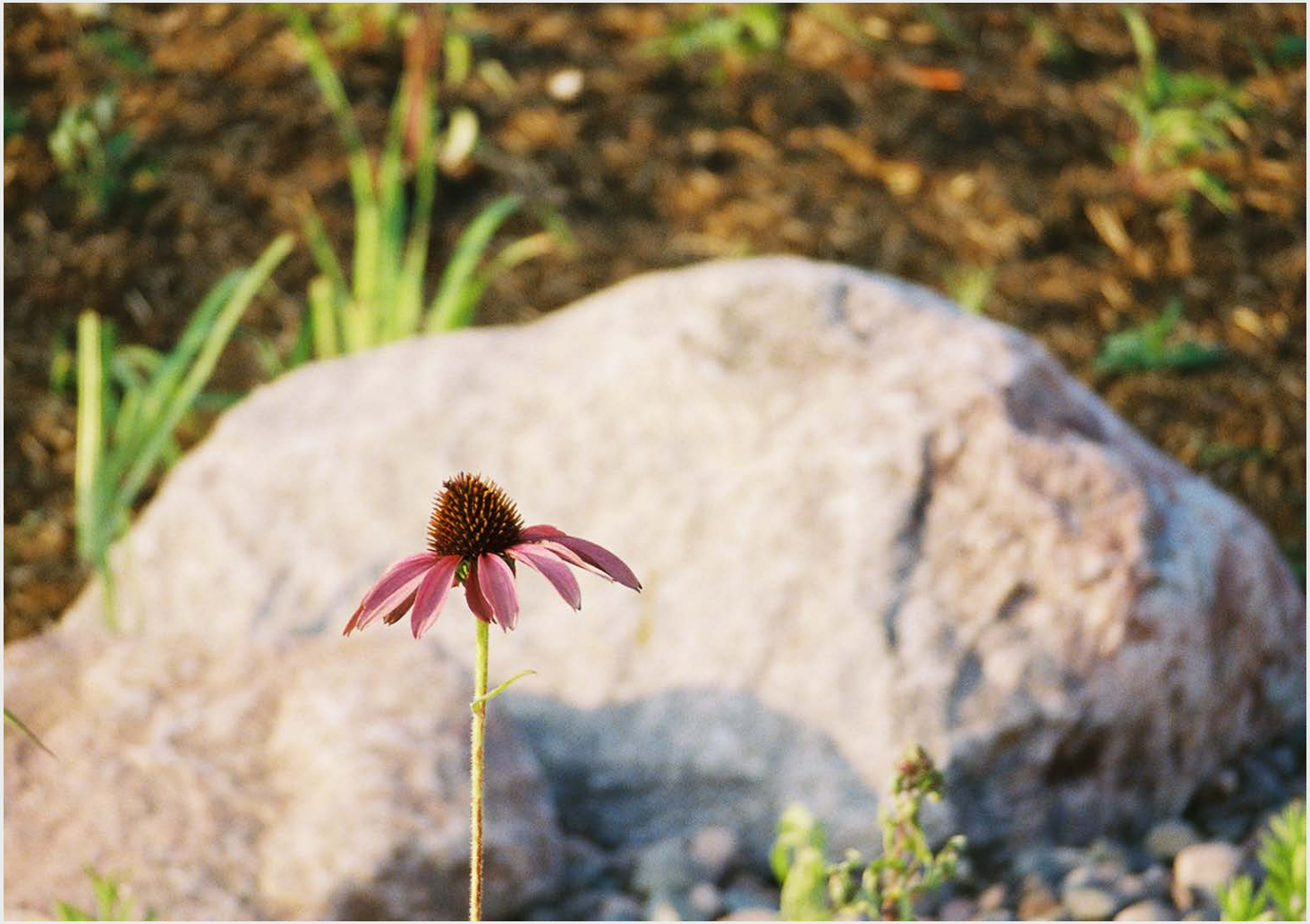


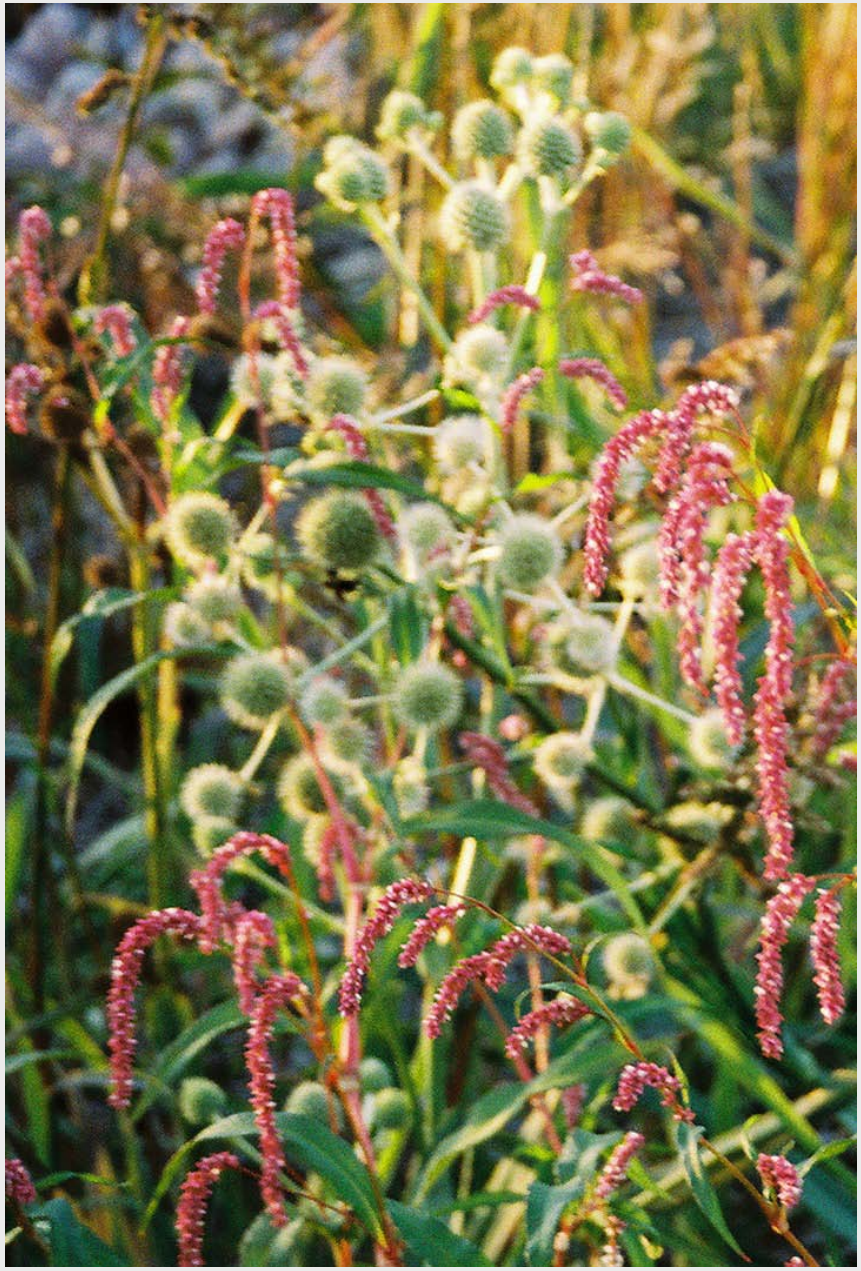
A loamy-sand, mulch mixture on the bottom filters and absorbs rainwater

A drain tile empties the bioretention swale

A serpentine stone path along the bottom breaks the project’s linearity

Plantings form swashes of color to emulate the prairie





Flowers

New England Astor
Prairie Blazing Star
Ohio Goldenrod

Trees

Kentucky Coffee
Professor Spranger
Crabapple

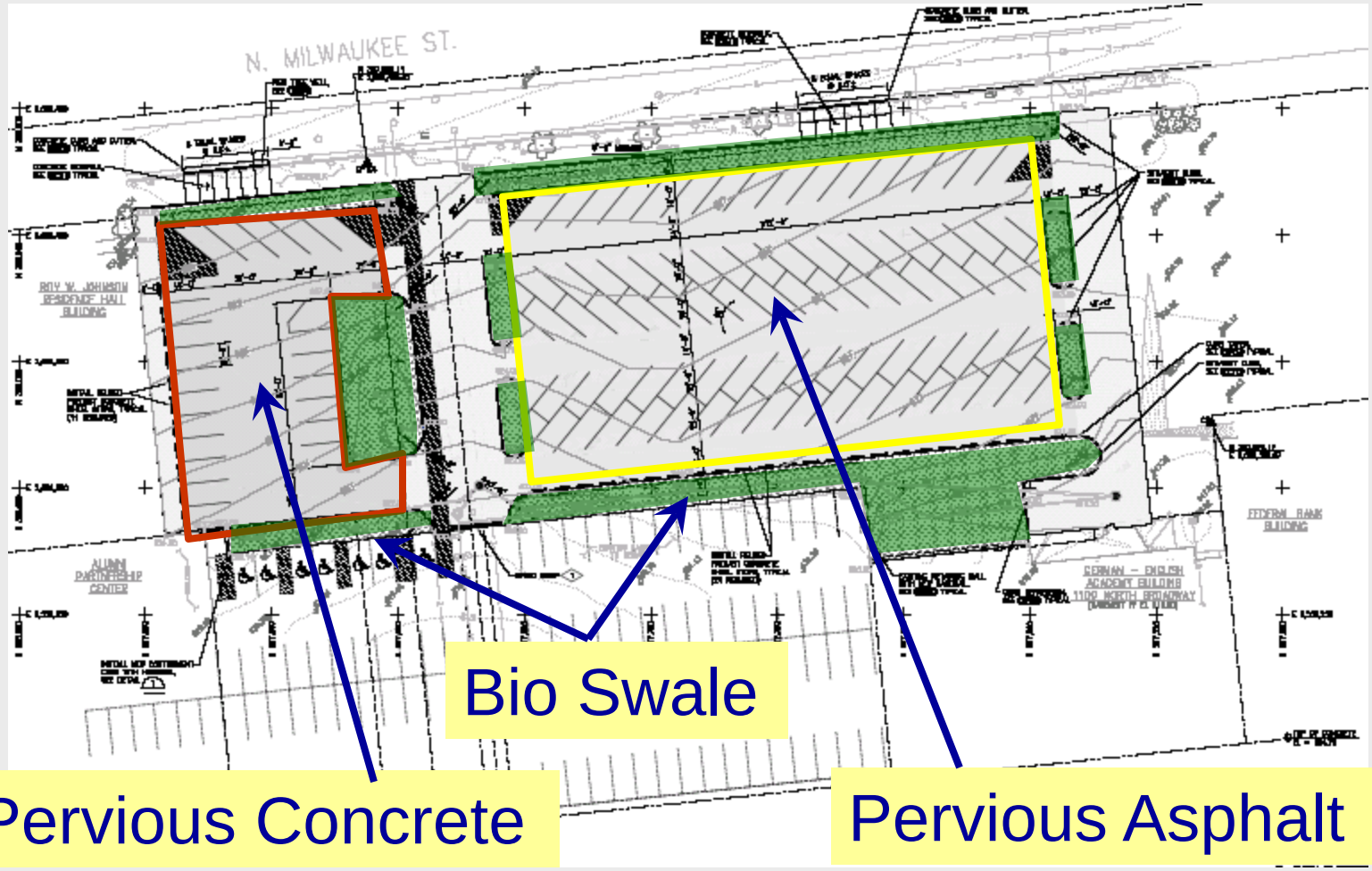
Grasses

Switchgrass
Little Bluestem
India grass
Hops

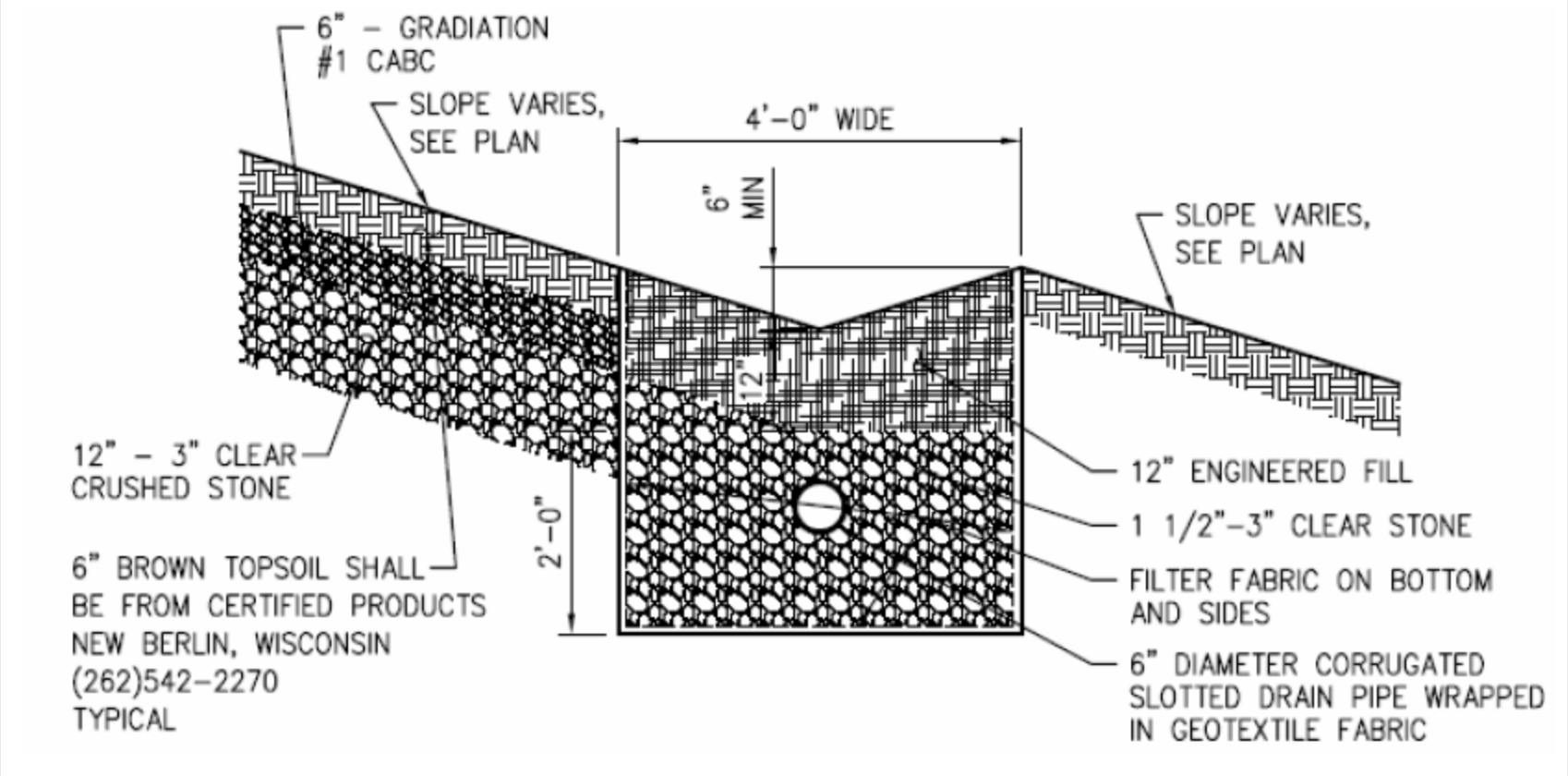
After two year’s growth, vegetation is flourishing

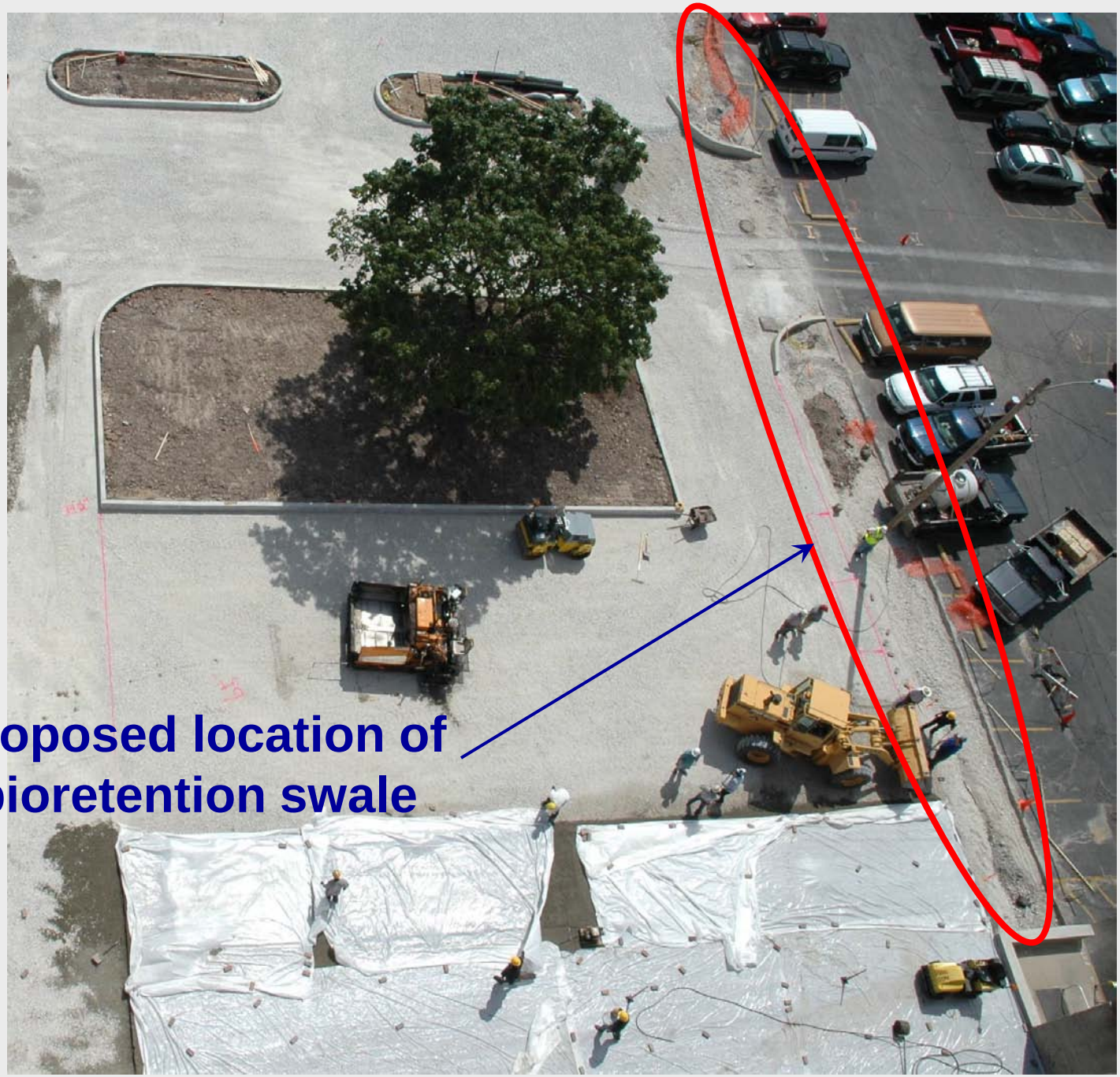
MILWAUKEE SCHOOL OF ENGINEERING PERVIOUS PARKING LOT

Site Plan


N. MILWAUKEE ST.
Bio Swale
Pervious Concrete
Pervious Asphalt

Bioretention Swale Detail




Proposed location of
bioretention swale

Installation Challenges

- Cross slope
- Existing utilities
- New storm sewer
- Restoration
- Time constraints
- Laydown space

In the end, we abandoned the bioretention swale and just placed grass. It just wasn't important enough for the project to install, given all the difficulties.

Lesson learned: Must have adequate time and space for a successful installation