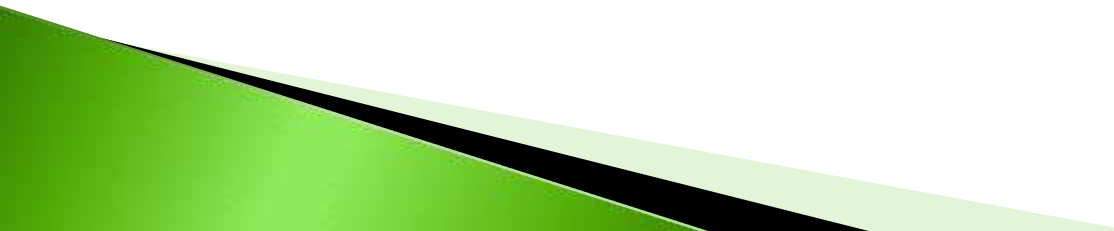


VILLAGE OF GREENDALE W. Grange Avenue Bioswale Project



August 26, 2011

Project Background

- ▶ Transportation improvement project along W. Grange Avenue from W. Loomis Road to S. 76th Street, in the Village of Greendale.
 - ▶ Pavement was severely deteriorated, storm water conveyance structures were dated, and the street lighting was at the end of its service life.
- 

Project Limits

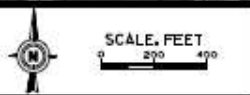
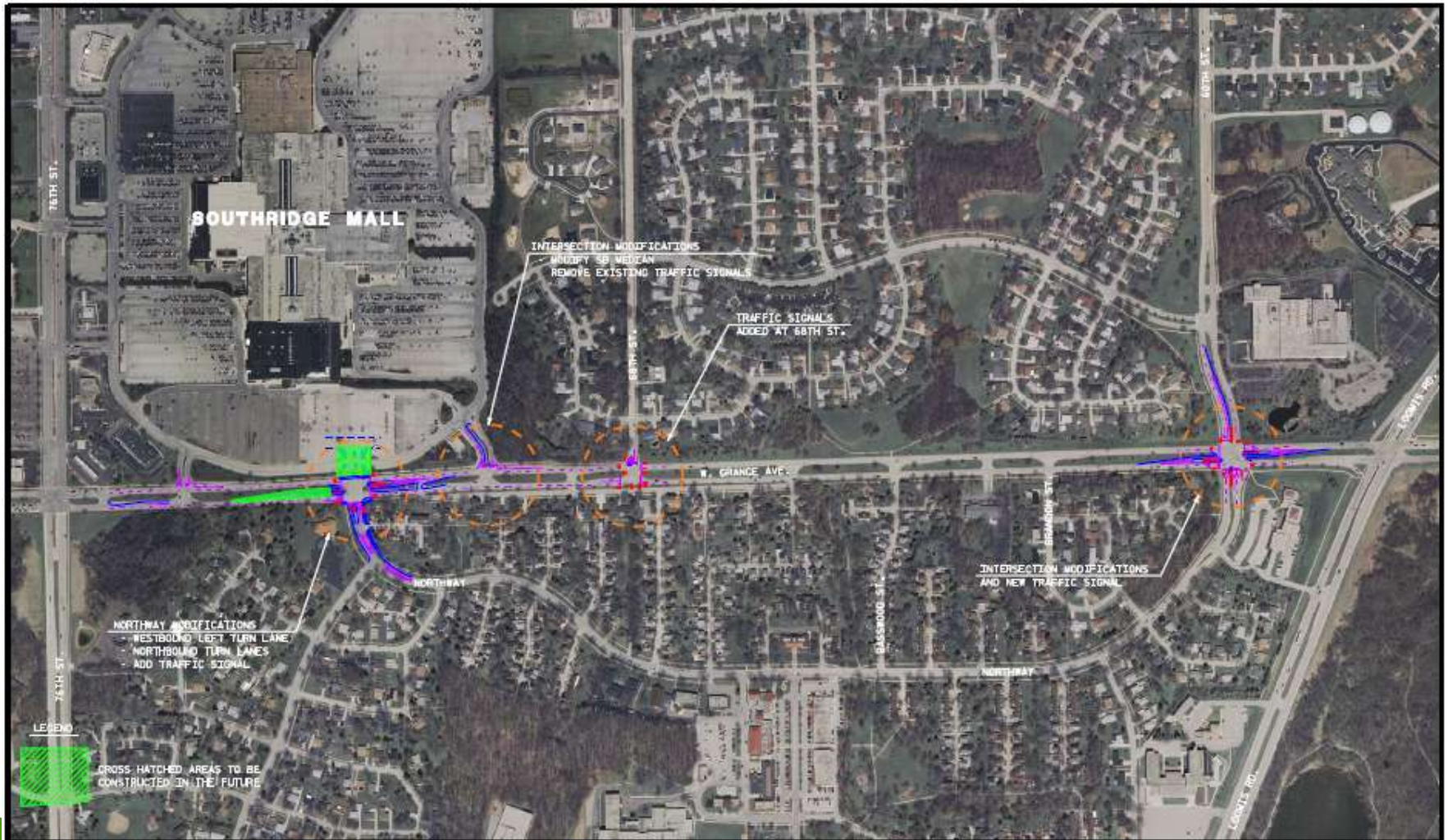
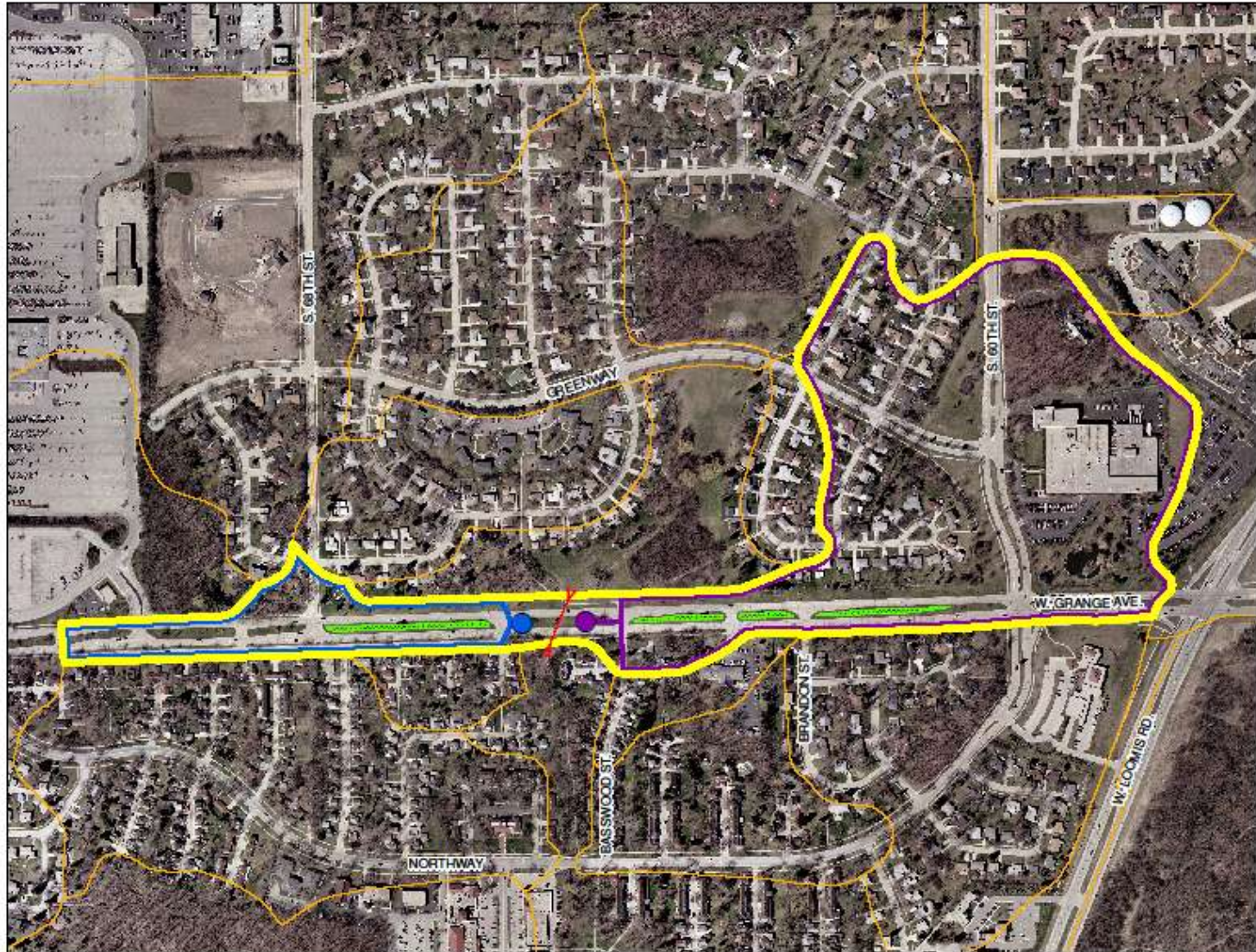


EXHIBIT 5A
INTERIM INTERSECTION IMPROVEMENTS CONSTRUCTION YEAR 2009
NORTHWAY, 68th STREET AND 60th STREET

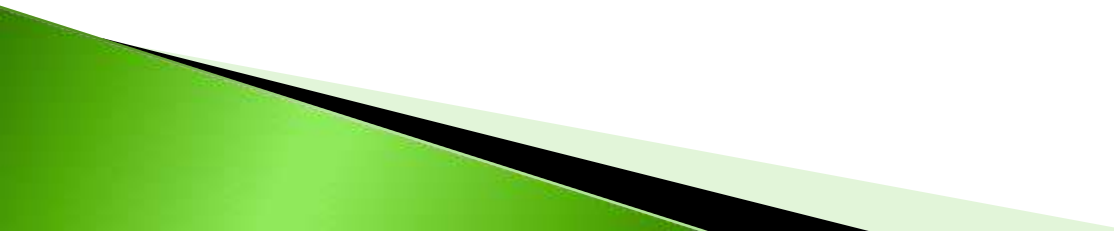
Project Background

- ▶ Project included:
 - Pavement rehabilitation/curb & gutter repair
 - Intersection improvements
 - Traffic signal & street lighting improvements
 - Storm water management enhancements (bioswales in medians & 2 Stormceptor units)
- ▶ The project is within the Dale Creek subbasin of the Root River Watershed
- ▶ Design completed by Ayres & Associates

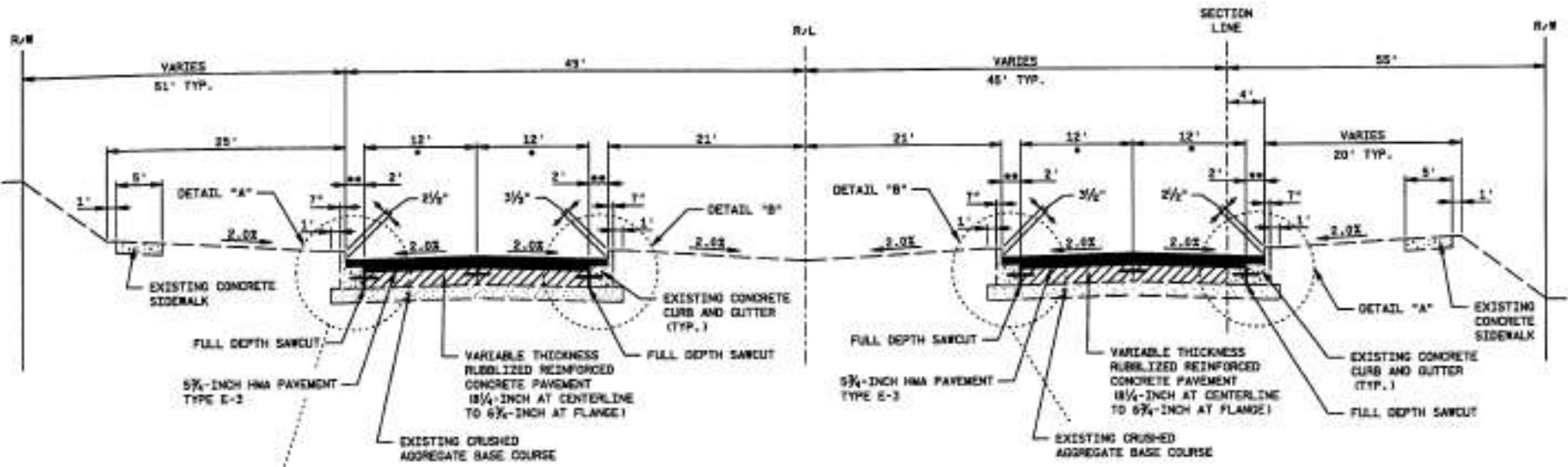
Drainage Basins



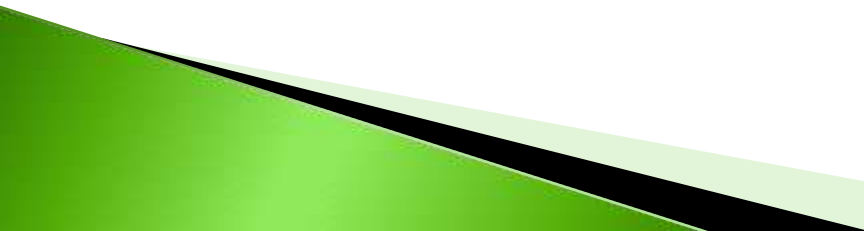
Unique Conditions

- ▶ Median width of 40 ft along Grange Avenue
 - ▶ Fairly deep storm sewer system that discharges directly to Dale Creek
 - ▶ Storm sewer runs down the center of the medians
 - ▶ The Village wanted to gain Total Suspended Solids (TSS) removal credits to meet the WPDES Permit goals
- 

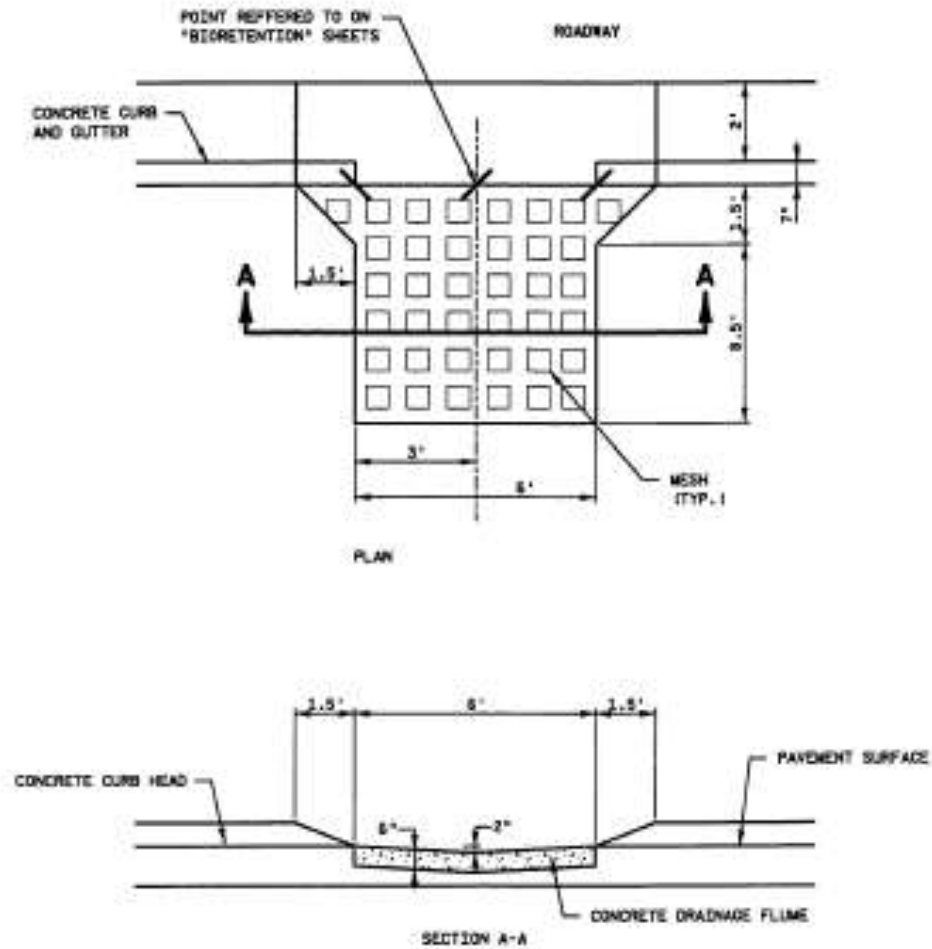
Typical Roadway Cross Section



Bioswale Design Details

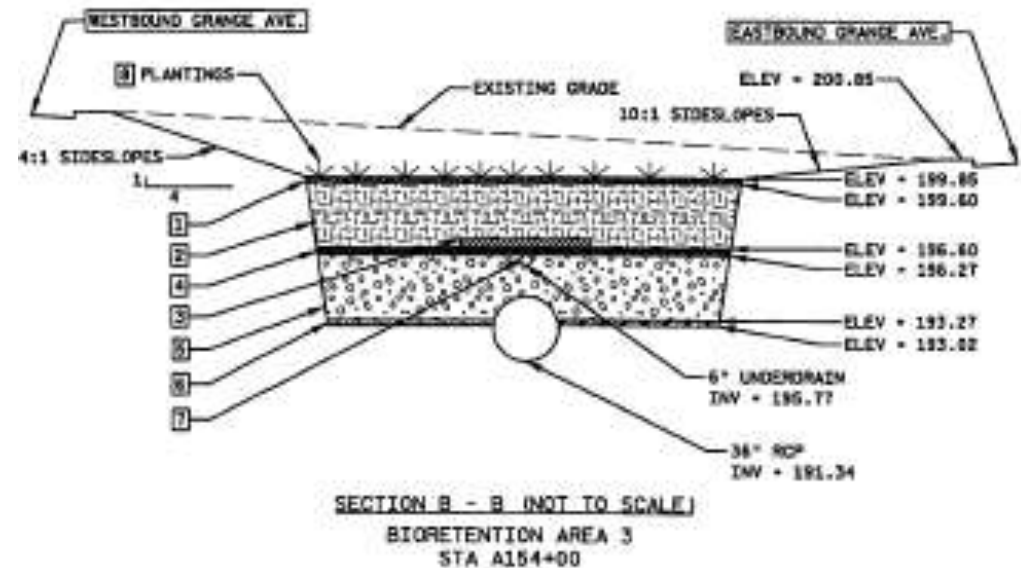
- ▶ Bioswales were only feasible within medians that had a storm sewer depth of approximately 6 feet
 - ▶ Total bioswale surface area within the medians is 0.64 Acres (1400 lineal feet)
 - ▶ 10 foot wide grass buffer strip along curb lines to protect from snow plowing and road salt
 - ▶ 41 curb openings equally distribute the runoff via concrete flumes
- 

Concrete Flumes

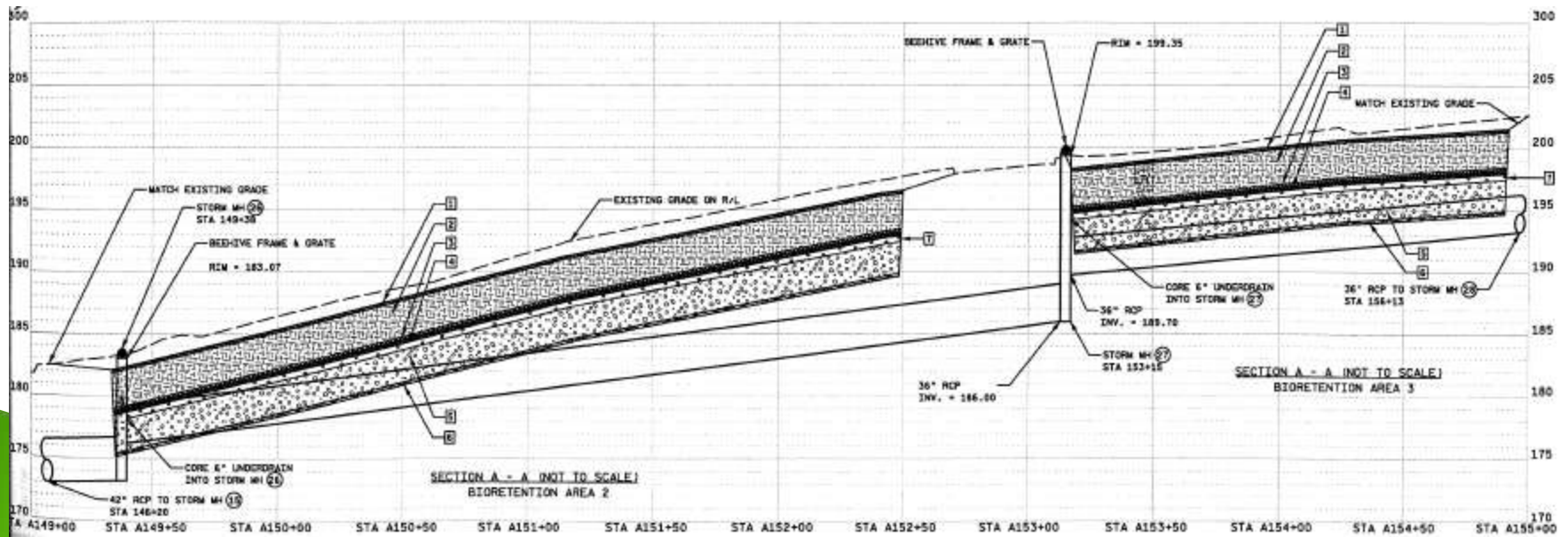
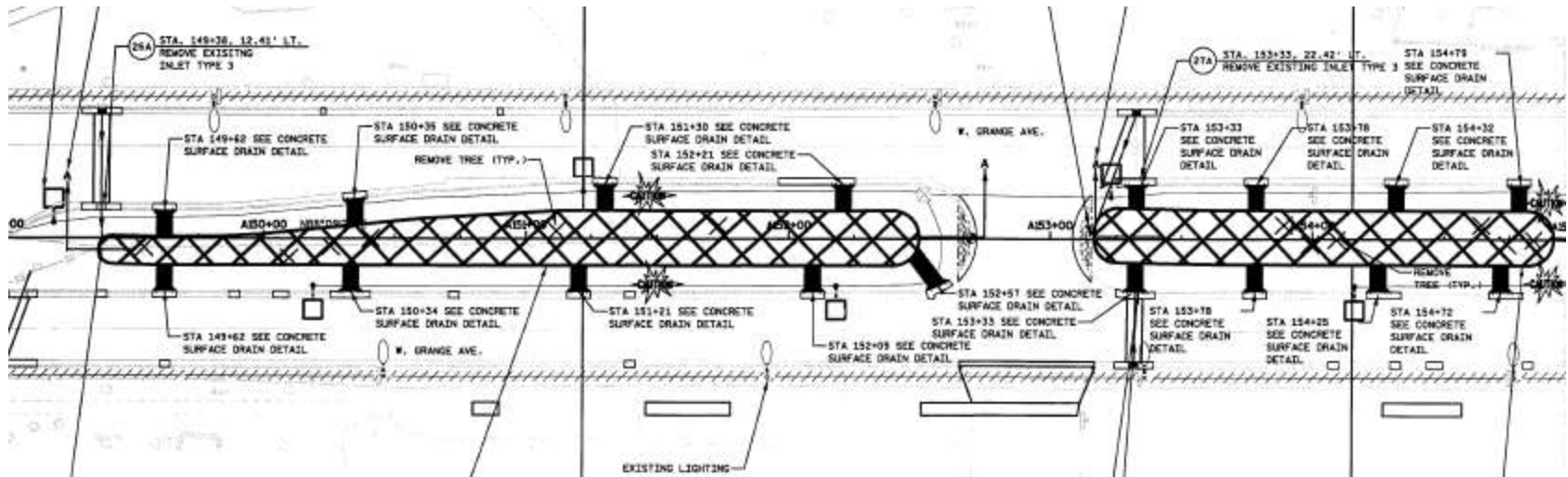


Bioswale Design Details

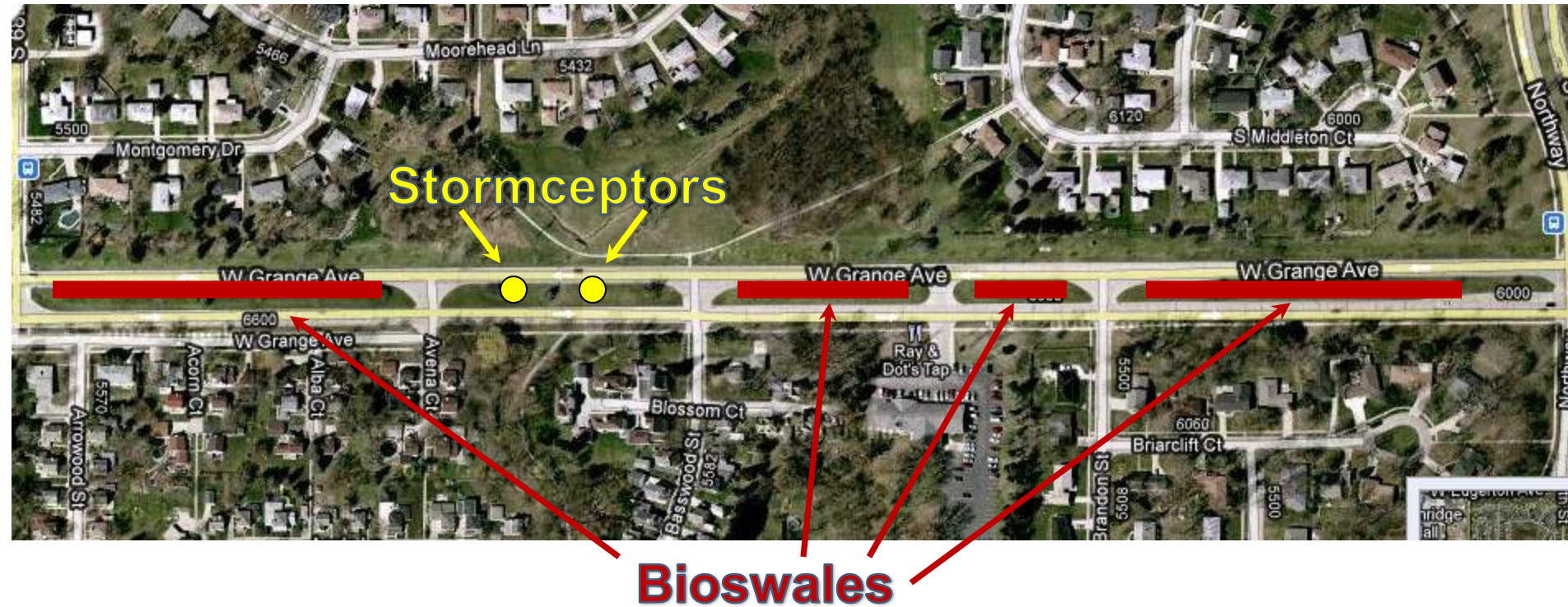
- ▶ Maximum ponding depth of 12"
- ▶ 3" mulch layer
- ▶ 36" engineered soil mix layer
- ▶ 6" underdrain piping connected to the storm sewer system
- ▶ 36" aggregate storage layer
- ▶ 3" sand interface
- ▶ Removes 770 lbs of TSS annually



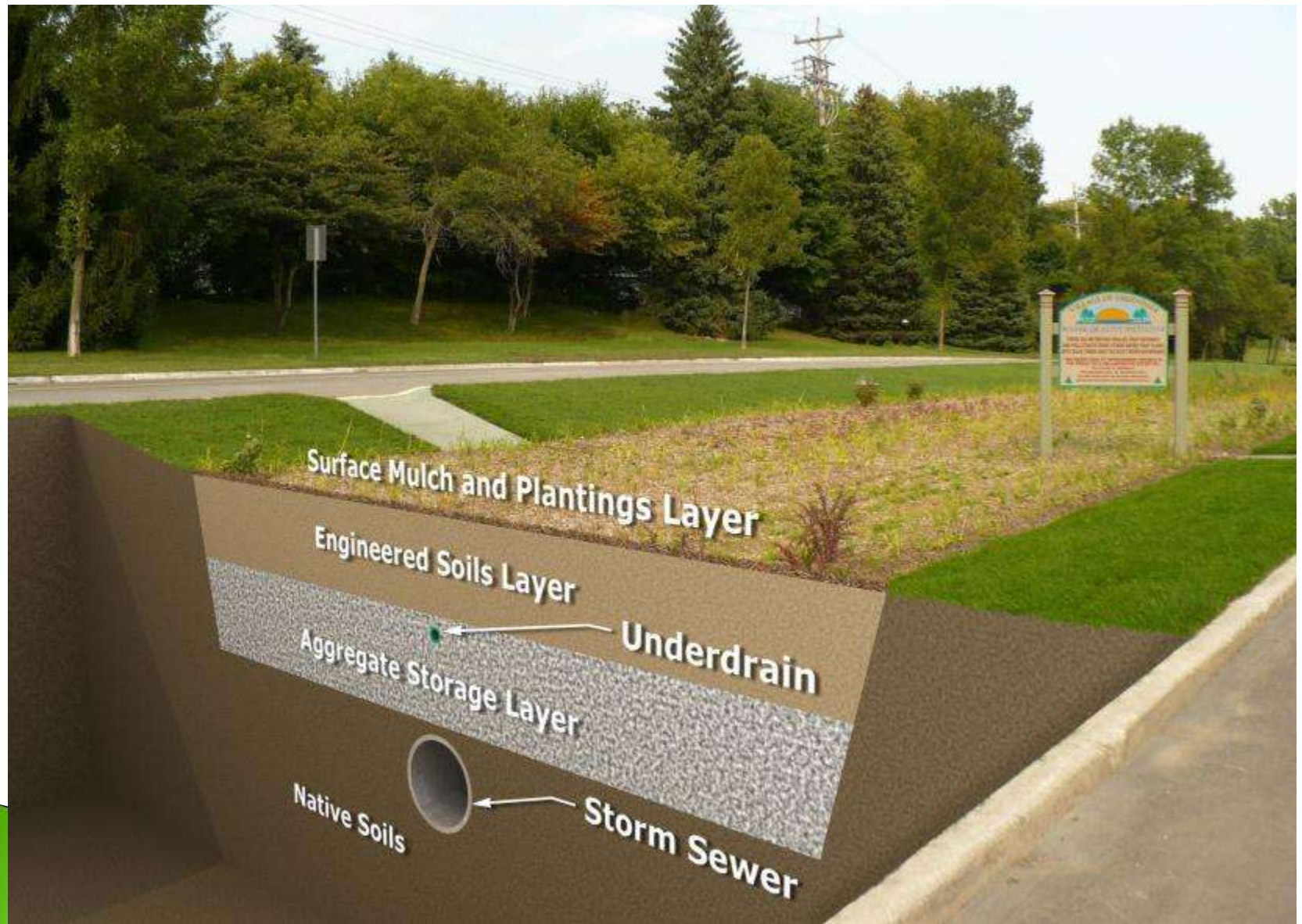
Bioswale Plan and Profile



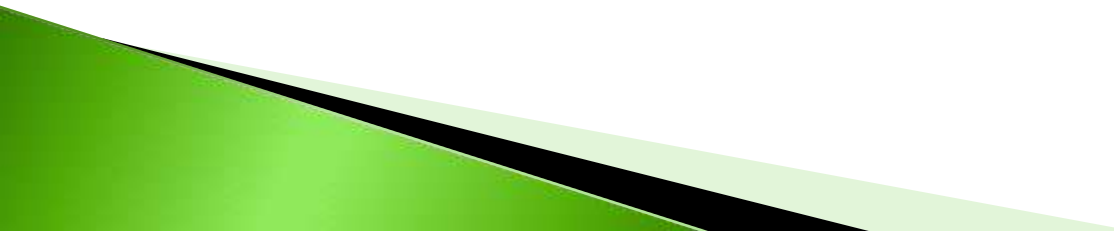
Bioswale Locations



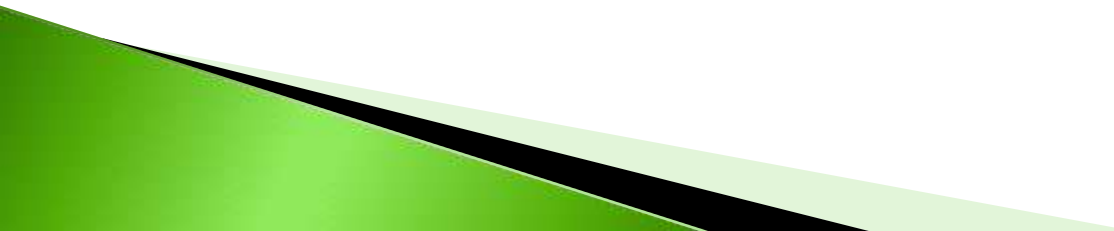
Bioswale Cross-Section



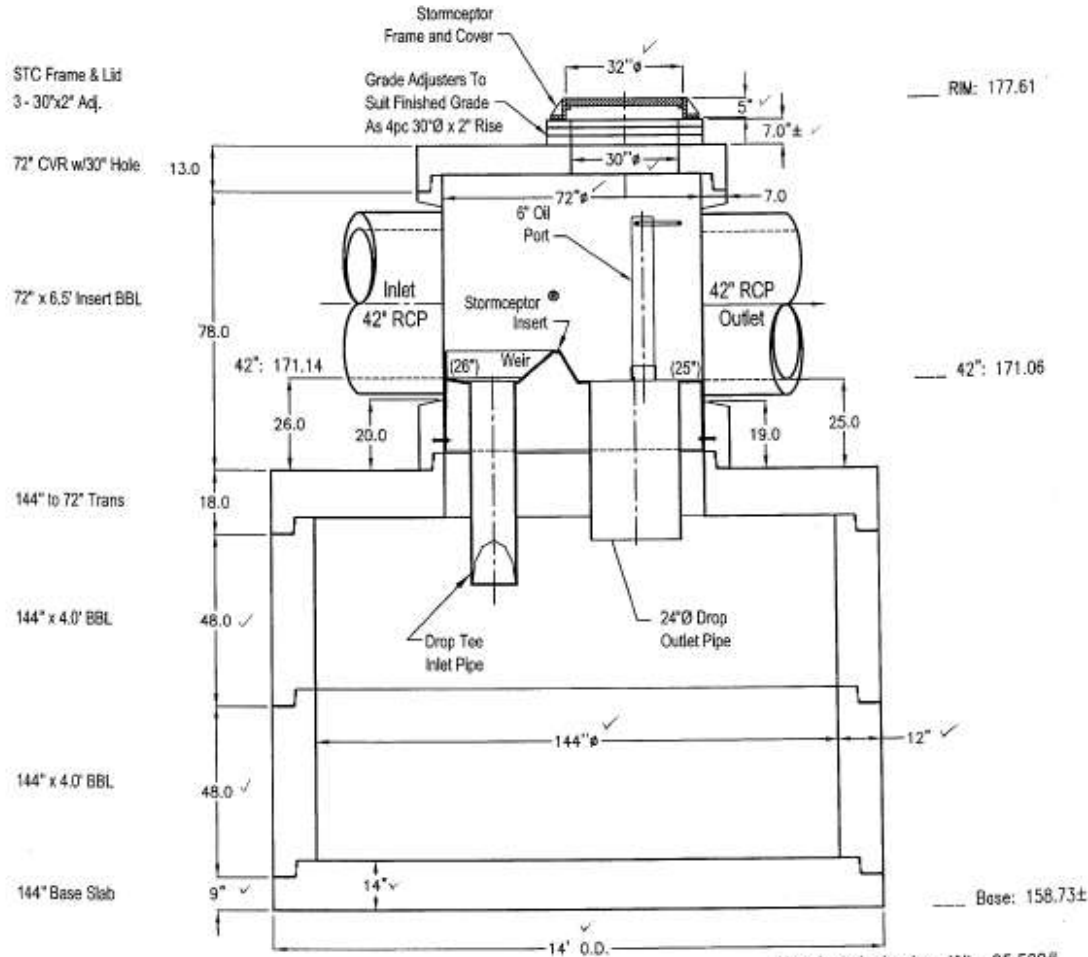
Stormceptor West of Dale Creek

- ▶ Model STC 2400
 - ▶ Total Drainage Area = 7.63 Acres
 - ▶ Device Depth = 15.5 feet
 - ▶ 8-foot chamber diameter
 - ▶ Removes approximately 215 lbs of TSS annually
- 

Stormceptor East of Dale Creek

- ▶ Model STC 7200
 - ▶ Total Drainage Area = 40.82 Acres
 - ▶ Device Depth = 19 feet
 - ▶ 12-foot chamber diameter
 - ▶ Removes approximately 1,270 lbs of TSS annually
- 

Stormceptor East of Dale Creek

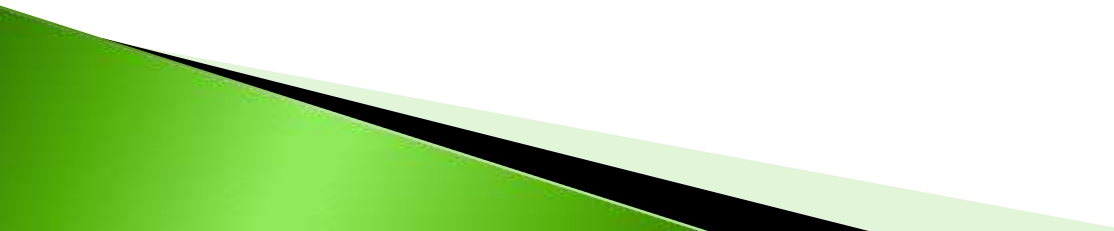


Heaviest single piece Wt = 25,500#

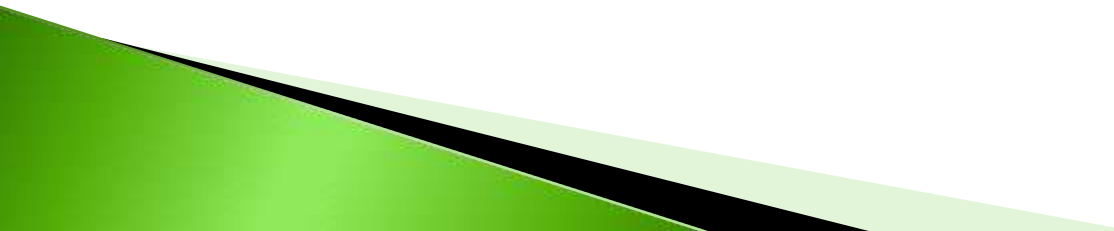
SECTION THRU CHAMBER

Note: structure depth below outlet invert adds 12.33'± to total height.

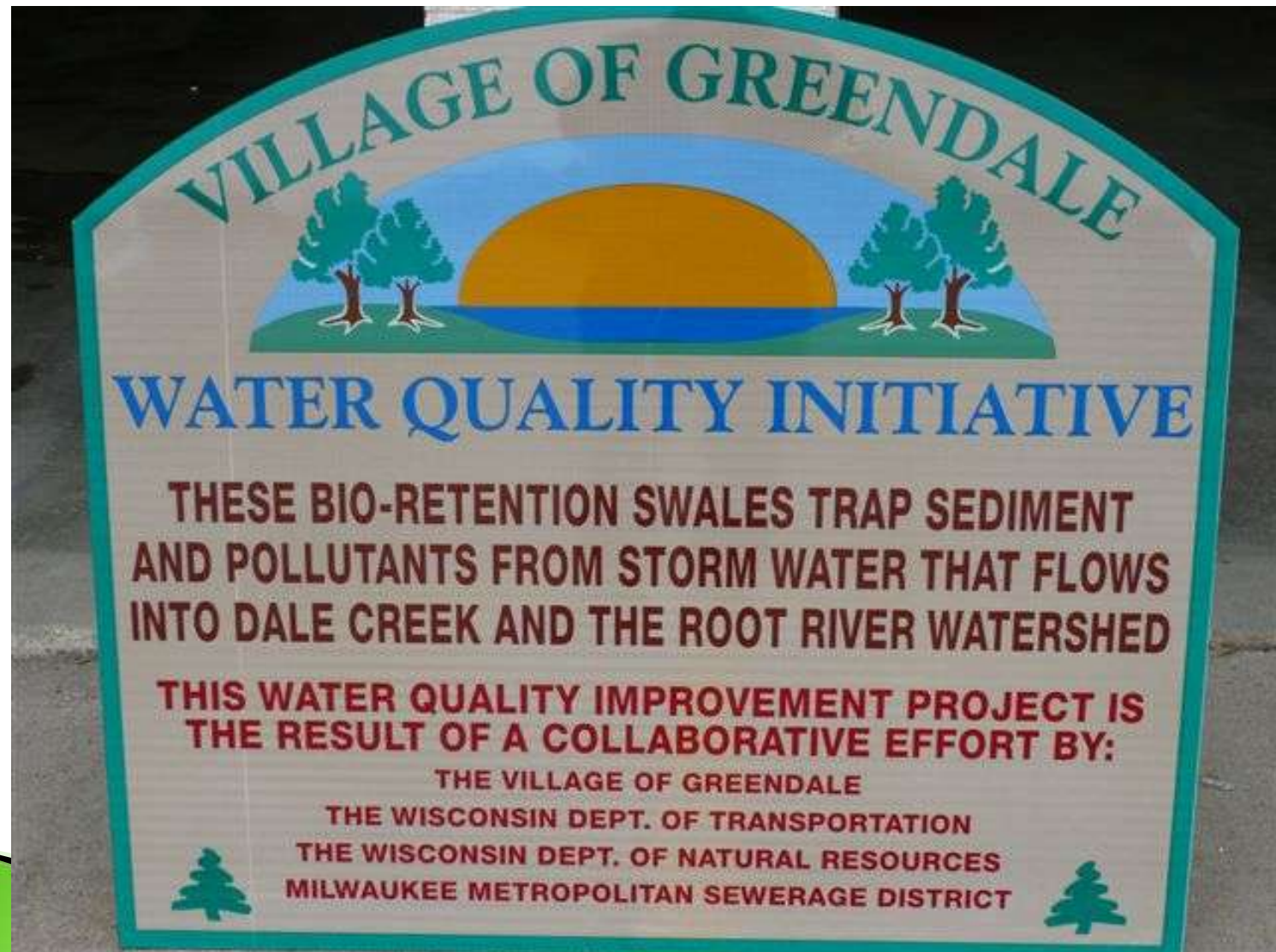
Total Project Results

- ▶ Total Project Area = 50.94 Acres
 - ▶ Total TSS Removal = 2,255 lbs annually
 - ▶ Total Bioswale Cost = \$212,000 (~\$151 /ft)
 - ▶ Total Stormceptor Cost = \$96,000
- 

Long-term Maintenance

- ▶ Life expectancy of the bioswale is approximately 10 – 20 years with annual maintenance for the vegetation
 - ▶ The bioswales are mowed with low ground pressure equipment each year to help control weeds
 - ▶ The plantings have performed at or above expectations with minimal replacement
- 

Public Education



Project Team

- ▶ The Village is proud to have been part of this beneficial Water Quality Initiative Project
- ▶ Collaborative Effort:
 - Village of Greendale
 - Wisconsin Dept. of Transportation
 - Milwaukee Metropolitan Sewerage District
 - Wisconsin Dept. of Natural Resources

Contact Information

Len Roecker, P.E., RLS

Greendale Village Engineer

R.A. Smith National, Inc.

262-317-3383

len.roecker@rasmithnational.com

Robbie McFaul

Greendale Department of Public Works

414-423-2133

rmcfaul@greendale.org

MMSD

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