

Stormwater & Highway Construction

Presented to:
2016 Waukesha County Stormwater Workshop

Case Studies

Silver Spring Drive (CTH VV) – Menomonee Falls

Median Bioretention

Lessons Learned

W. Lake Drive – Town of Oconomowoc

Wet Detention Basin

Lake Outfalls



Craig Donze, PE

One Source Consulting - Principal in Charge

- 18 Years Highway Design & Construction Experience (15+ years experience on WisDOT Projects)
- Sr. Highway Project Manger
- Hydrology & Hydraulic Modeling
- Water Quality Modeling
- Storm Sewer Plan & Profiles
- Construction Details
- Special Provisions & Bidding Documents
- Construction Cost Estimating

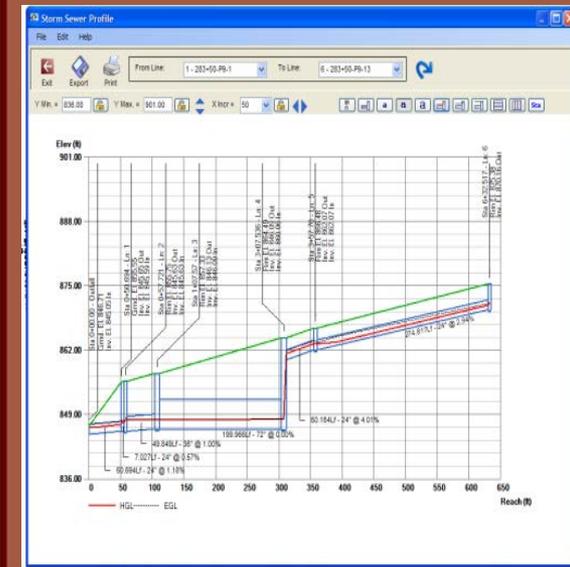
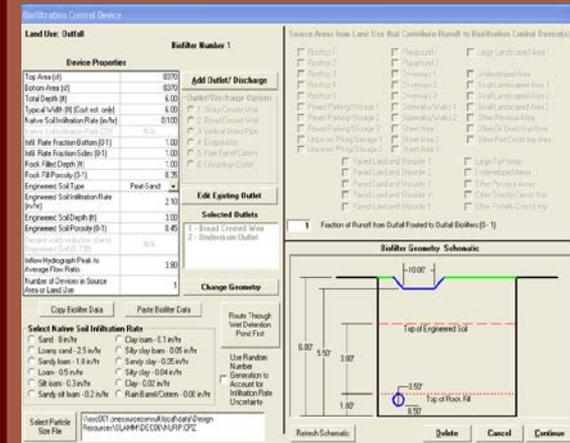
In the last 5 years:

- Designed \$15M of Waukesha County highway improvements
- Project leader for \$7M in highway improvements



Storm Water Experience

- Highway BMP Toolbox
 - Infiltration, Detention & Velocity Control in Swales
 - Wet & Dry Pond Design
 - Inline Storage
 - Median Bio-retention
 - Underground Detention
 - Porous Concrete Pavers
- Areas of Expertise
 - Storm Sewer Hydraulic Modeling
 - Water Quality Modeling
 - Hydrology Modeling for Peak Flow Reduction
 - Automated Design & Plan Production



Silver Spring Drive (CTH VV)

WisDOT Local Roads Project

Waukesha County DPW

5.5 miles of 2-lane to 4-lane Capacity Expansion

Construct in 2 Segments by WisDOT in 2011 & 2013

Storm Water Management Goals:

- Volume Reduction: Post-developed < Pre-developed
- Water Quality: 40% TSS Reduction

– Segment 1: Marcy Road to Pilgrim Road

- Tributary to Fox River & Butler Ditch
- Added 8.22 Acres of Impervious Surface

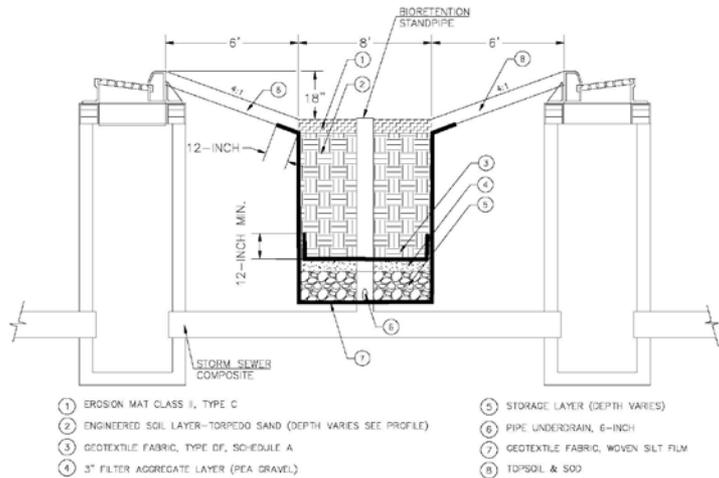
– Segment 2: Lannon Road to Marcy Road

- Tributary to Fox River
- Added 6.63 Acres of Impervious Surface



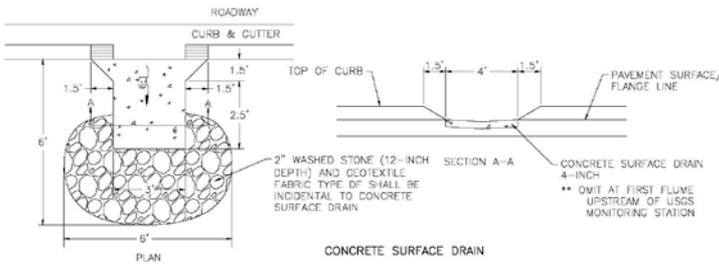
Median Bio-retention Details

2



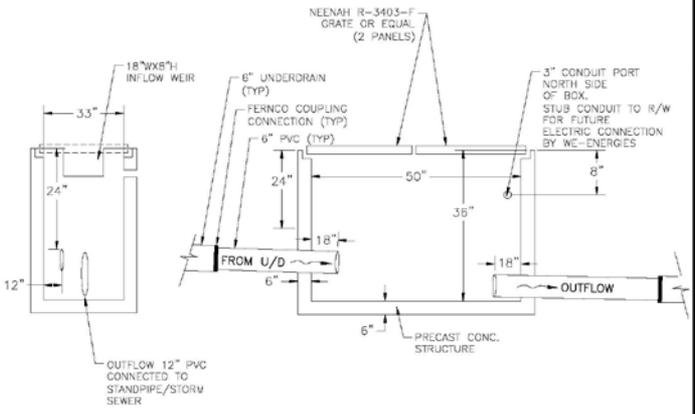
- ① EROSION MAT CLASS II, TYPE C
- ② ENGINEERED SOIL LAYER-TORPEDO SAND (DEPTH VARIES SEE PROFILE)
- ③ GEOTEXTILE FABRIC, TYPE DF, SCHEDULE A
- ④ 3" FILTER AGGREGATE LAYER (PEA GRAVEL)
- ⑤ STORAGE LAYER (DEPTH VARIES)
- ⑥ PIPE UNDERDRAIN, 6-INCH
- ⑦ GEOTEXTILE FABRIC, WOVEN SILT FILM
- ⑧ TOPSOIL & SOD
- ⑨ STORM SEWER COMPOSITE

MEDIAN BIO-FILTRATION BASIN

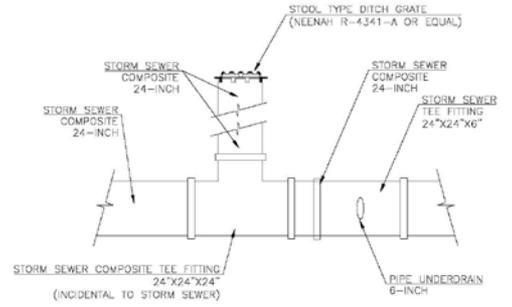


CONCRETE SURFACE DRAIN

2



USGS BIORETENTION MONITORING STRUCTURE



BIORETENTION STANDPIPE

PROJECT NUMBER: 2753-06-71	HWY: C.T.H. "V"	COUNTY: WAUKESHA	CONSTRUCTION DETAILS	SHEET NO: E
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Bio-retention Standard Parts



Construction Minded | Value Sensitive | Civil Engineers



Construction Sequence



CTH VV Since 2011



Treatment Areas:

Crown to Crown is tributary to bioswales.
(50% TSS Removal)

Outside lanes treated with Catch basins and
rural side slopes. (60% TSS Removal)

Construction Minded | Value Sensitive | Civil Engineers



CTH VV Bio-retention

Lessons Learned

- Construction Oversight
- Filter Media Type
- Establishment Period & Care Cycles
- Weeding & Rootstock Maintenance

Cost Effectiveness

- Reduced R/W Costs
- Reduces Storm Sewer Trunk Costs
- Increases Highway Maintenance Costs



W. Lake Drive

Town of Oconomowoc

1.0 miles of Pavement Replacement

Constructed in 2015

Storm Water Management Goals:

- Volume Reduction: Post-developed < Pre-developed
- Water Quality: 40% TSS Reduction
- Eliminate untreated discharges to Okauchee Lake

Brown Street (CTH P) to Okauchee Bridge

- Added 0.45 Acres of Impervious Surface



Wet Detention



Rough Excavation
& Clay Liner

Wet Detention



Spillway TRM
& Inlet Riprap



Wet Detention



Berm Restoration
& Safety Shelf



One Source
Consulting

Construction Minded | Value Sensitive | Civil Engineers

Summary & Questions

Highway Storm Water BMP Toolbox

BMP	Water Quality	Volume Control	Velocity Control	Costs
Wet Ponds	✓	✓	✓	\$\$\$\$
Bio-retention	✓	✓	✓	\$\$\$
Dry Ponds		✓	✓	\$\$
Inline Storage		✓	✓	\$
Catch Basins	✓			\$
Rural Section	✓		✓	\$
Vegetated Buffer	✓		✓	\$

Use in series as stormwater treatment trains to minimize lateral footprint and r/w impacts.

