

Repairing a Leaky Wet Detention Basin

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Waukesha County Dept. of Parks and
Land Use

Pictures and data – Brian Pehl, PE –
Yaggy Colby

Drainage Area 400 + Acres

CIRCLE
RIDGE
DR

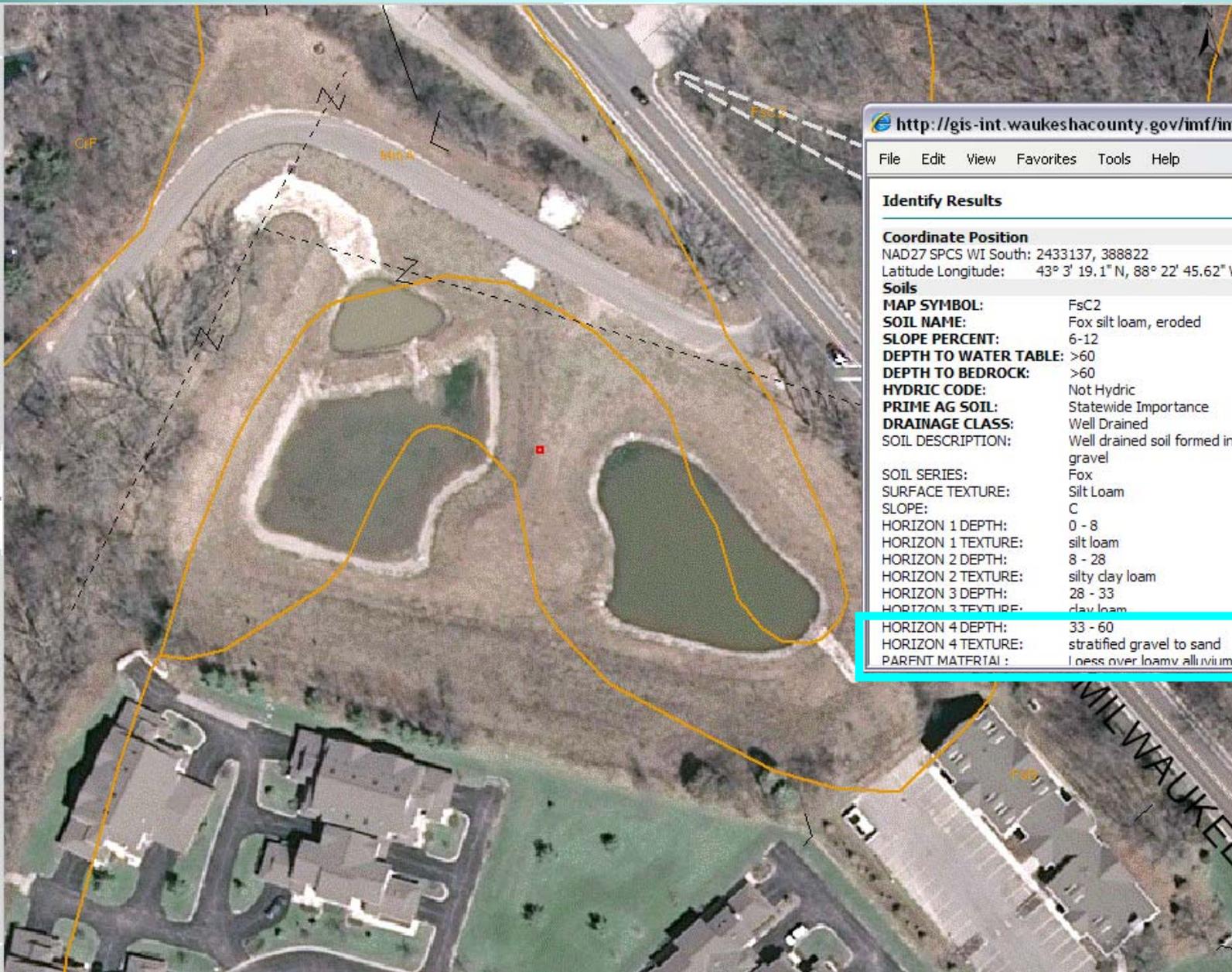
COLLEGE
RD

DR



History

- Regional wet detention basin
- Built in 2004
- Permanent pool about 1.3 acres
- Soils unsaturated sand and gravel
- Clay-lined
- Never held water at design elevation



- Map Layers**
- Basemaps
 - Basemap Annotation
 - Street Annotation (Sm...

http://gis-int.waukeshacounty.gov/imf/imfIdentifyDefault.jsp?l...
 File Edit View Favorites Tools Help

Identify Results

Coordinate Position

NAD27 SPCS WI South: 2433137, 388822
 Latitude Longitude: 43° 3' 19.1" N, 88° 22' 45.62" W

Soils

MAP SYMBOL: FsC2
SOIL NAME: Fox silt loam, eroded
SLOPE PERCENT: 6-12
DEPTH TO WATER TABLE: >60
DEPTH TO BEDROCK: >60
HYDRIC CODE: Not Hydric
PRIME AG SOIL: Statewide Importance
DRAINAGE CLASS: Well Drained
SOIL DESCRIPTION: Well drained soil formed in silty and loamy deposits over sand and gravel
SOIL SERIES: Fox
SURFACE TEXTURE: Silt Loam
SLOPE: C
HORIZON 1 DEPTH: 0 - 8
HORIZON 1 TEXTURE: silt loam
HORIZON 2 DEPTH: 8 - 28
HORIZON 2 TEXTURE: silty day loam
HORIZON 3 DEPTH: 28 - 33
HORIZON 3 TEXTURE: clay loam
HORIZON 4 DEPTH: 33 - 60
HORIZON 4 TEXTURE: stratified gravel to sand
PARENT MATERIAL: loess over loamy alluvium over calcareous sandy and gravelly

- Retired Plats
- Retired Tax Parcels
- Parcel Addresses
- Survey Control System
- Transportation
- Environment and Land Use
- Zoning Files
- Soils
 - Soil Thematic Maps
 - Soils
- Park and Open Space
- Topography
- Contour Lines 2005
- 10' Contour Annotation 20...









Repairs

- 40 mil LDPE liner
- Floatation considered in design process

















Bid Tabulation

Description	Est. Qty.	Units	Average Low Bid	
Install 40 mil LDPE Liner	72750	SF	\$	50,808.60
Install geotextile above and below Liner	55255	SF	\$	21,331.75
Anchor Trench Excavation	1350	LF	\$	6,555.36
Reshape and re-compact existing clay liner	6150	SY	\$	20,485.53
Remove existing berm	1	LS	\$	5,445.82
Re-construct berm with on-site clay	1	LS	\$	6,373.87
Strip, stockpile, and re-spread topsoil	1400	CY	\$	14,647.39
Remove, stockpile, and re-install ex. riprap w/ geotex	1300	SF	\$	5,588.75
Install riprap on berm with geotextile fabric	2500	SF	\$	10,199.55
Erosion matting (Curlex 1)	6720	SY	\$	8,773.77
Erosion matting (Landlok S1)	1725	SY	\$	2,402.79
Temporary stone tracking pad	1	EA	\$	1,679.11
Canopy trees	2	EA	\$	771.73
Ornamental trees	14	EA	\$	3,688.33
Deciduous shrubs	37	EA	\$	2,049.32
Prairie-type seeding	1.5	AC	\$	6,987.99
Prairie-type plugs	3879	EA	\$	13,011.17
Site weeds eradication	1	LS	\$	3,495.49
			\$	184,296.31

Cost Summary

- Total low bid \$184,000
- Included \$27,000 for trees, shrubs, prairie plants
- \$78,000 for liner materials and installation
- \$31,000 for re-shaping berms, re-compaction of existing liner materials
- \$44,000 for topsoil handling, riprap, e-mat, weed control
- About \$112,000 / acre for essential costs

BMP Maintenance Costs

Acknowledgements:

Rob Davy, PE - LCE

Daryl Matter - Super Western

Jay Settersten - EC3

Keir Peckham - Natural Landscapes
County DPW

Roger Bannerman - WDNR

Brian Pehl, PE - Yaggy Colby

Shawn Gleason - American Hydro Services

Mark Doudlah - Agrecol

Wet Detention Basin Maintenance Costs

Task	Units	Unit Cost	References
Mowing	Half day	\$800	Consultant
Annual O&M	Lump Sum	5% of capital cost	State of WI, Fiscal Estimate Worksheet for the Non-agricultural Performance Standards, October, 2001
Dewater	Per acre of pond	\$3,700	County project
Dredge	Per acre of pond CY	\$14,750 \$5	County project Contractor
Manage, stabilize spoils	Per acre of pond	\$7,000	County project
Liner replacement – clay	Per acre of pond CY	\$22,000 \$5	County project Contractor
Liner install. – synth.	Per acre of pond	\$56,000	City of Delafield project
EC, topsoil mgmt, restoration	Per acre of pond	\$34,000 \$5,000	City of Delafield project County project

Infiltration Basin Maintenance Costs

Task	Units	Unit Cost	References
Annual O&M	Lump Sum	5% of capital cost	State of WI, Fiscal Estimate Worksheet for the Non-agricultural Performance Standards, October, 2001
Mowing	Half Day	\$800	Contractor
	Whole Day	\$1,200	
Burning	Half Day	\$1,700	Contractor
	Whole Day	\$3,000	
Herbicide, Re-planting, follow-up	Per acre	\$2,500	Contractor
Sediment removal	CY	\$6+	Contractors
Deep tilling / ripping	Lump Sum	\$1,500 – exc. w/ tooth	Contractor

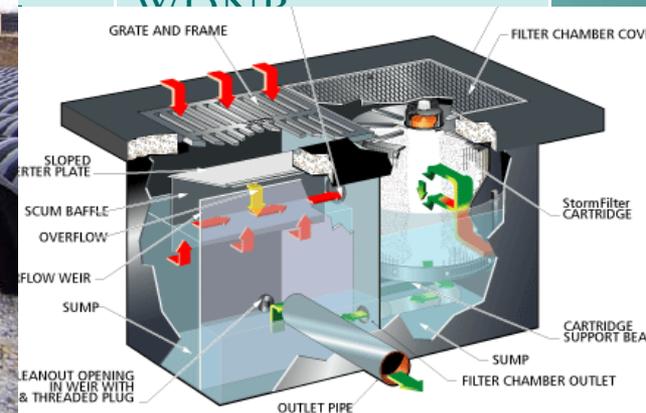
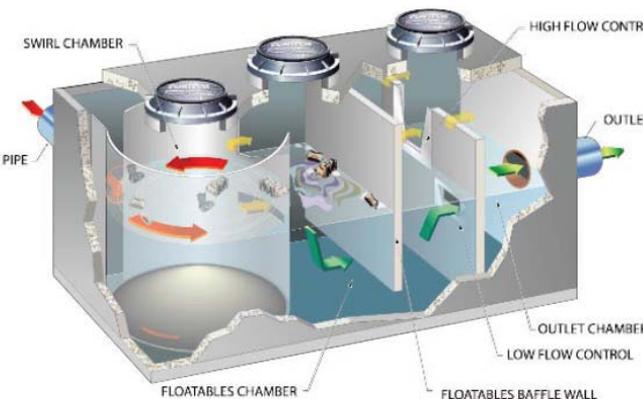


Bioretention Basin Maintenance Costs

Task	Units	Unit Cost	References
Annual O&M	Lump Sum	5% of capital cost	State of WI, Fiscal Estimate Worksheet for the Non-agricultural Performance Standards, October, 2001
Mowing	Half Day	\$800	Contractor
	Whole Day	\$1,200	
Burning	Half Day	\$1,700	Contractor
	Whole Day	\$3,000	
Herbicide, Re-planting, follow-up	Per acre	\$2,500	Contractor
Engineered fill replacement, not incl. removal of old fill	CY- sand local	\$55	Contractor
	CY - silica sand	\$255	

Maintenance Costs for Underlot BMPs

Task	Units	Unit Cost	References
Vacuum Underlot Sedimentation Device, Catch Basin	Hourly Per catch basin	\$150 mob., \$230 on-site \$150	Contractor
Jet / Vacuum Underlot Detention (incl. disposal)	Each 100' run Hourly	\$930 \$240	Contractor
Maintain Underlot Filtration Device	Cycle (> 1 year)	\$1,500 - \$2,000 /	Roger Bannerman - WDNB



Miscellaneous Repairs

(note: prices based on large quantities)

Task	Units	Unit Cost	References
Seeding Mix. No. 60	lb Acre	\$6.27 \$380-\$750	County projects
Seeding - Temp.	lb Acre	\$2 \$240	County projects
Sod	SY	\$2.50	County projects
Mulching	SY Acre	\$0.10 \$4,356	County projects
Riprap	CY	\$45	County projects
Geotextile	SY	\$2	County projects
Erosion Mat	SY	\$1	County projects
Turf Reinf. Mat	SY	\$75	Contractor

Costs for Post-Construction Documentation

Task	Units	Unit Cost	References
Construction verification	Lump Sum, incl. inspections	Up to \$15,000	Various consultants County project County project
	Hourly	\$110	
	Report only	\$1,900	
Planting verification, incl. transects	Each	\$400-\$1,000	Various consultants
As-built Survey	Per basin	\$1,200	Consultant County project County project
	Per basin	\$1,400	
	Hourly	\$150	
Maintenance agreement and addendum	Total	\$4,000	Consultant Consultant
	Addendum, per basin	\$700	

Questions?