Wisconsin Department of Natural Resources
Bureau of Watershed Management (WT/3)
101 S. Webster St.
Madison, WI 53703
PO Box 7921
Madison, WI 53707-7921

Final Report Form 3400-189 (rev. 7/30/09)

- **Targeted Runoff Management Grant Program (ch. NR 153)**
- **Notice of Discharge Program (ch. NR 153)**
- **Urban Nonpoint Source & Storm Water Management Grant Program (ch. NR 155)**

NOTICE: This Final Report is authorized under ss. 281.65 and 281.66., Wis. Stats., and chs. NR 153 and NR 155, Wis. Admin. Code. Personally identified information collected will be used for program administration and may be made available to requesters as required under Wisconsin Open Records Law [ss. 19.31-19.39, Wis. Stats.].

INSTRUCTIONS: Your grant agreement requires you to submit a Final Report with your final reimbursement request. This Final Report form must be used in conjunction with the "FINAL REPORT INSTRUCTIONS." The instructions detail how to complete and submit the report to DNR as described in the instructions.

1. GRANT TYPE. Check the one that applies.

- ☐ Targeted Runoff Management Grant – Agricultural
- ☐ Urban Nonpoint Source & Storm Water Management Grant – Construction
- ☐ Notice of Discharge Grant
- ☐ Targeted Runoff Management Grant – Urban
- ☒ Urban Nonpoint Source & Storm Water Management Grant – Planning

2. PROJECT NAME & LOCATION.

2.1. Project Name: **Master Storm Water Management Plan**	2.2. Grant Number: **USP-LR-13258-14**	
2.3. Governmental Unit Name: **Monona, City of**	2.4. Primary Watershed Name: **Yahara River/Lake Monona**	2.5. Watershed Code: **LR08**

NOTE FOR SECTION 2.6 (which follows):

Section 2.6. includes five (5) columns (A. through E.) for recording data about five (5) discrete site locations. If your grant has more than five (5) discrete project locations, attach additional columns for Section 2.6 as described in the instructions. If your project occurs in more than one 12-digit Hydrologic Unit Code (HUC), use the space in adjacent columns to record other HUC numbers.

2.6 Site Location(s) →	A.	B.	C.	D.	E.
Name of Cost-Share Recipient or Governmental Unit	**Monona, City of**	**Monona, City of**			
Cost-Share Agreement Number (Agricultural only)	**31,710**	**31,710**			
12-Digit Hydrologic Unit Code(s) (HUC) Where Work Was Completed	**070900020702**	**070900020702**			
Nearest Surface Receiving Water Affected					
Name:	**Lake Monona**	**Yahara River**			
Waterbody Identification Code(s) (WBIC):	**804600**	**798300**			
Nearest Impaired Water Affected					
Name:	**Lake Monona**	**Yahara River**			
Waterbody Identification Code(s) (WBIC):	**804600**	**798300**			
Pollutants Reduced	**TSS & Phosphorus**	**TSS & Phosphorus**			
Impairments/Impacts Addressed	**Sediment Discharge (TSS) and TMDL (Phosphorus)**	**Sediment Discharge (TSS) and TMDL (Phosphorus)**			

Project Location(s) (cont.) →	**A.**	**B.**	**C.**	**D.**	**E.**
Project Coordinates:					
Town	**7**	**7**			
Range	**10**	**10**			
Section	**8,9,16,17,18,19,20,21,28,29,30**	**8,9,16,17,18,19,20,21,28,29,30**			
Quarter					
Quarter-Quarter					
Latitude (degrees, minutes, seconds North of Equator; use the DNR's Surface Water Data Viewer (SWDV))	**43.05629**	**43.05629**			
Longitude (degrees, minutes, seconds W of Prime Meridian, use the SWDV)	**89.3323**	**89.3323**			

3. SUMMARY OF RESULTS.

Table A. Agricultural Projects. – Ch. NR 151 Performance Standards and Prohibitions and Other Water Resources Management Priorities

A.1. Management Measures	Units of Measure	Quantity	Measurement Method Used
Sheet, rill and wind erosion	Acres meeting "T"	**acres**	
Manure Storage Facilities: New Construction/Alterations	Number of facilities	**facilities**	
	Number of animal units	**animal units**	
Manure Storage Facilities: Closure	Number of facilities	**facilities**	
Manure Storage Facilities: Failing/Leaking Facilities	Number of facilities	**facilities**	
	Number of animal units	**animal units**	
Clean Water Diversions in WQMA	Pollutant load reduction	**lbs.**	
	Number of farms with diversions	**farms**	
	Number animal units	**animal units**	
Nutrient Management on Agricultural Land	Acres planned	**acres**	
Prohibition: Manure Storage Overflow	Number of farms	**farms**	
	Number of animal units	**animal units**	
Prohibition: Unconfined Manure Pile in WQMA	Number of farms	**farms**	
Prohibition: Direct Runoff From Feedlot/Stored Manure	Pollutant load reduction	**lbs.**	
	Number of facilities	**facilities**	
	Number of animal units	**animal units**	
Prohibition: Unlimited Livestock Access	Feet of bank protected	**feet**	
	Number of farms	**farms**	

Table A. Agricultural Projects. (continued) A.2. Other Management Measures	Units of Measure	Quantity	Measurement Method Used
Streambank & Shoreline Protection	Units (use feet, acres or number as applicable)		
	Pollutant load reduction (if method available)		
Other:	Units (use feet, acres or number as applicable)		
	Pollutant load reduction (if method available)		
Other:	Units (use feet, acres or number as applicable)		
	Pollutant load reduction (if method available)		
Other:	Units (use feet, acres or number as applicable)		
	Pollutant load reduction (if method available)		

Table B. Urban Construction Projects Serving Developed Areas.			
B.1. Required Management Measures	Units of Measure	Quantity	Measurement Method Used
20-40% Total Suspended Solids (TSS) Reduction for NR 216 communities	TSS reduced	**lbs.**	
	TSS reduction	**%**	
B.2. Other Management Measures			
20-40% Reduction in TSS for non-NR 216 communities	TSS reduced	**lbs.**	
	TSS reduction	**%**	
Infiltration	Pre-development stay-on volume	**%**	
	Stay-on volume	**ft^3/year**	
Peak flow discharge for 2 year/24 hour design storm	Change in cubic feet per second for design year	**ft^3/sec**	
Protective areas	Bank protected	**feet**	
Fueling & maintenance areas	Oily sheen presence reduced	☐**Yes** ☐ **No**	
Streambank & Shoreline Protection	Bank erosion reduced	**tons**	
	Bank protected	**feet**	
Other:	Pollutant load reduction (if method available)		
	Units (use feet, acres or number as applicable)		

Table C. Urban Planning Projects.			
C.1. Governmental unit(s) involved (list by name): **City of Monona**			
C.2. Estimate total acres covered by the	Existing Developed Urban Areas	New Development	Total Acres

planning product:	**2,115 acres**	**acres**	**2,115 acres**

C.3. Products developed (check all below that apply)	Identify Documents by Name (if applicable)
☒ Storm Water Plan	**Master Storm Water Management Plan**
☐ Construction or Erosion Ordinances	
☐ Post-construction Storm Water Ordinances	
☐ Other Types of Storm Water Quality Ordinances	
☐ Financing Methods: identified and evaluated	
☐ Financing Methods: developed or implemented	
☐ I & E Plan	
☐ I & E Implementation Activities	
☐ Other:	

C.4. Identify the Storm Water goals addressed (check all that apply)	
☒ Reduce TSS	**Comments:**
☐ Maintain infiltration	
☐ Control Peak Flow	**The Master Storm Water Management Plan:**
☐ Protective Areas	**• Provides a summary of current City of Monona storm water management features, ordinances, and policies**
☐ Control of Fueling & Maintenance Areas	**• Provides a detailed description of current and pending storm water management regulations** **• Evaluates the effectiveness of existing storm water management facilities and practices in reducing TSS and TP**
☐ Remove Illicit Discharges	**• Identifies additional storm water management facilities and practices options for further improving the quality of the city's storm water runoff**
☒ Other: **Reduce Phosphorus**	**• Provides guidance on prioritizing storm water management improvement projects and policies and provides a schedule for implementing best management practices moving forward** **• Identifies funding mechanisms for future storm water management improvement projects**

4. Satisfaction of Notice Requirements.

If cost sharing for this project was offered under a formal notice pursuant to chs. NR 151 or 243, provide information for each notice in the table below.

Notice Information				Notice Satisfaction Information		
Chs. NR 151 or 243 Notice Type	Issue Date	From (Name)	To (Name)	Satisfied? Yes	Satisfied? No	Date Letter Sent
				☐	☐	
				☐	☐	
				☐	☐	
				☐	☐	

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5. Additional Information. (Space will expand to fit your text.)

This loan process was delayed due to multiple changes at the Public Works Project Manager position at the City of Monona. One project manager began planning phase of project, one came on at the completion of project, currently the project manager is wrapping up final reporting and reimbursement of DNR funded grants for said project.

Project implementation has begun according to that which is planned in the Master Storm Water Management Plan. DNR can count on a Phase 1 report early 2016 on the current and planned implementation process going forward to carry out said plan.

6. Summary of Project Challenges. (Space will expand to fit your text.)

Coordination between municipality and consultants. Data compilation for SLAMM Modelling.

7. Grantee Certification.

Checking here ☒ certifies that, to the best of your knowledge, the information contained in this report is correct.

Name of Authorized Representative (type or print) ↓	Title of Authorized Representative (type or print) ↓
Daniel Stephany	Director of Public Works

Signature of Authorized Representative	Date
Daniel J. Stephany	11/05/2015

8. For Departmental Use Only

Regional NPS Coordinator – Please complete the following:

8.A. Check here ☐ if you have received the following from the project sponsor:

- one (1) printed, signed, original Final Report + attachments
- one (1) electronic version of Final Report

Send the printed, signed original Final Report with attachments + electronic version to the Community Financial Assistance Grants Manager. Community Financial Assistance will forward to Runoff Management Section Grants Coordinator.

8.B. Comments about this project:

8.C. Type or print Name of Regional NPS Coordinator →

8.D. Signature of Regional NPS Coordinator

8.E. Date

Find Instructions at http://dnr.wi.gov/runoff/financial.htm

SCS ENGINEERS







Master Storm Water Management Plan

City of Monona
Monona, Wisconsin

Prepared for:

City of Monona

MONONA

5211 Schluter Road
Monona, Wisconsin 53716

Prepared by:

SCS ENGINEERS
2830 Dairy Drive
Madison, Wisconsin 53718-6751
(608) 224-2830

December 2014
File No. 25214062

Master Storm Water Management Plan
City of Monona
Monona, Wisconsin

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1.0 INTRODUCTION

The city of Monona is a Wisconsin community located on the east shore of Lake Monona in the Rock River basin. Monona citizens, employees, and elected officials recognize the benefits and value of protecting the city's many water resources. The City of Monona 2014-2016 Strategic Plan includes the goal of improving storm water management and executing the City's clean water initiatives to create a sustainable community. A summary of the key elements of the strategic plan is presented in **Appendix A**.

The city is subject to Wisconsin Department of Natural Resource (WDNR) requirements for the reduction of total suspended solids (TSS) under a municipal separate storm sewer system (MS4) Wisconsin Pollutant Discharge Elimination System (WPDES) permit. The City is currently meeting the requirements of the MS4 permit. However, the WDNR has placed the Rock River Basin on the state's impaired waters list, because the basin is not meeting State water quality standards. The WDNR may include higher TSS and add total phosphorus (TP) removal requirements into the City's MS4 permit when it is renewed in late 2014/early 2015. On October 28, 2014, WDNR issued a guidance document to help municipalities meet higher TSS and TP removal requirements as a result of Total Maximum Daily Load (TMDL) allocations. The guidance document can be viewed at http://dnr.wi.gov/topic/stormwater/documents/MS4TMDLImpGuidance.pdf.

The pending permit requirement changes and associated guidance document are likely to have a significant impact on the City's approach to storm water management in the coming years. Therefore, this Master Storm Water Management Plan (Master SWMP) has been developed to serve as a guide to help the City select the most cost-effective storm water management options when the MS4 permit is renewed. The City will review this plan during its annual budgeting process to identify storm water projects that best help it achieve its strategic goals and meet current and pending regulatory requirements.

Preparation of this Master SWMP was partially funded by a WDNR Urban Nonpoint Source & Storm Water Management Grant Program. The plan is intended to serve as a 10-year planning guidance document. This Master SWMP:

- Provides a summary of current City of Monona storm water management features, ordinances, and policies
- Provides a detailed description of current and pending storm water management regulations
- Evaluates the effectiveness of existing storm water management facilities and practices in reducing TSS and TP
- Identifies additional storm water management facilities and practices options for further improving the quality of the city's storm water runoff

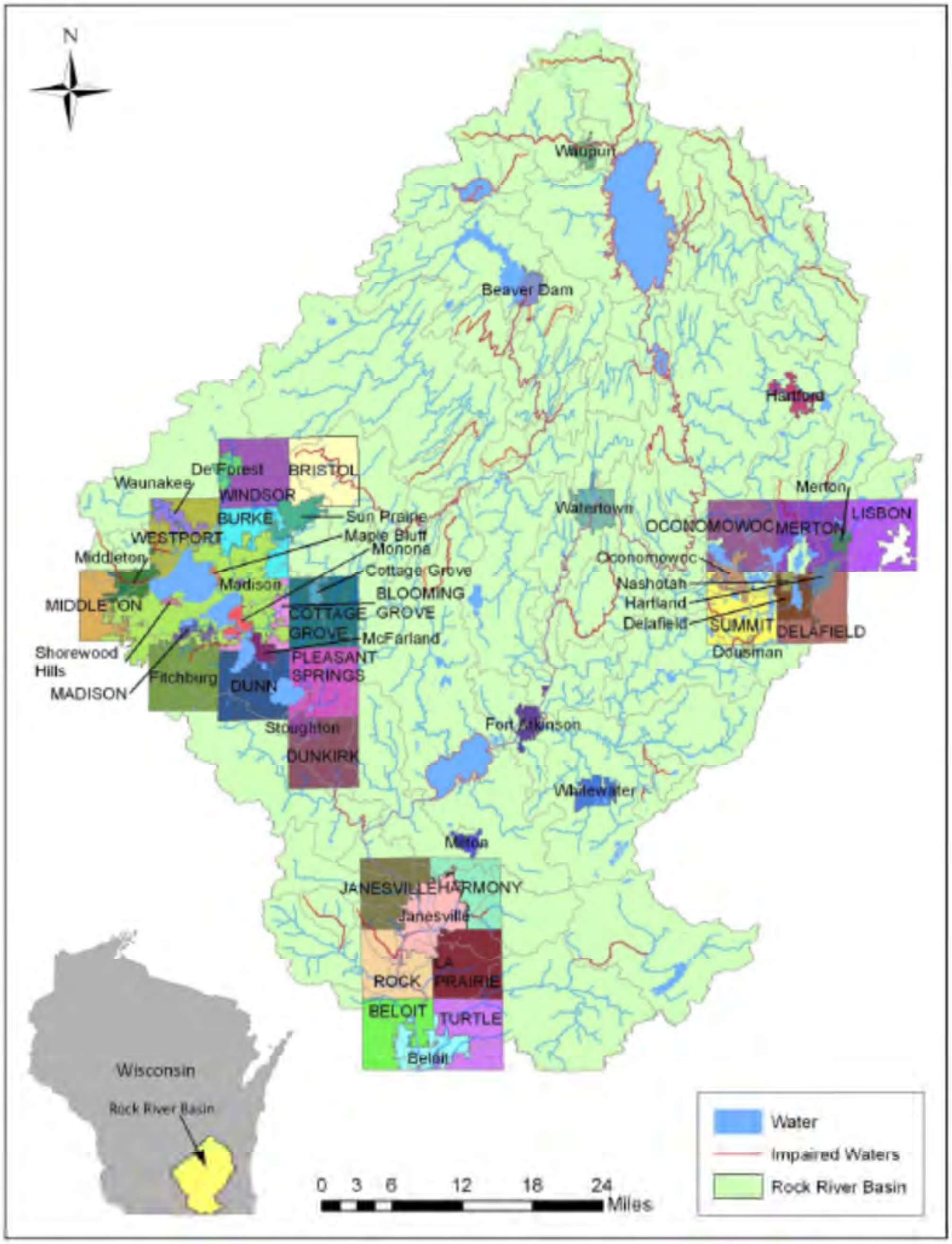
- Provides guidance on prioritizing storm water management improvement projects and policies

- Identifies funding mechanisms for future storm water management improvement projects

2.0 EXISTING CONDITIONS

2.1 WATERSHEDS

The city of Monona is located in the Rock River basin.



Source: Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Rock River Basin, July 2011

Twenty three subwatersheds have been delineated within the city limits, as shown on **Figure 1**.

2.2 SOILS

City of Monona soils are predominantly silt/loam with moderate infiltration rates (hydrologic soil group B). A soils map is included in **Appendix B**.

2.3 STORM WATER INFRASTRUCTURE

2.3.1 Storm Water Conveyance and Outfalls

The city's storm water conveyance system consists of networks of storm sewers, open channels, and culverts discharging to 98 storm water outfalls. Of these outfalls, 17 have been classified as major outfalls. A major outfall is defined as a municipal separate storm sewer that meets one of the following criteria:

- A single pipe with an inside diameter of 36 inches or more, or from an equivalent conveyance which is associated with a drainage area of more than 50 acres.
- A single pipe with an inside diameter of 12 inches or more, or from an equivalent conveyance which receives storm water runoff from lands zoned industrial activity with 2 or more acres of industrial activity.

Figure 1 shows the outfalls. The City performed outfall inspections in 2012.

2.3.2 Storm Water Treatment Devices

The City owns and maintains five public/regional storm water treatment devices:

- Lottes Park storm water basin
- Interlake storm water basin
- Lake Edge storm water basin
- Winnequah Park lagoon
- Cove Channel proprietary sediment removal structure
- Fireman's Park storm water basin

The location of each of the structures is shown on **Figure 1**. Available as-built drawings for the above features are included in **Appendix C**.

Six additional City-owned and maintained proprietary treatment devices are planned for installation in 2015:

- Proprietary sediment removal structure at Graham Park outfall
- Proprietary sediment removal structure at Pirate Island outfall
- Two proprietary sediment removal structures at Winnequah Road outfalls into lagoon at Winnequah Park
- Two proprietary sediment removal structures at two outfalls into cove at Schluter Park

The City is also planning a bank stabilization project at the lagoon north of Winnequah Road.

In addition, as redevelopment projects occur within the city, storm water treatment devices are often installed to meet storm water runoff performance criteria established by the City and State of Wisconsin. A summary of storm water treatment devices installed with redevelopment projects since 2007 is presented within the letter report included in **Appendix D**. The treatment provided by these storm water controls was credited towards the City's TSS and TP reduction efforts as part of the City's storm water modeling update (see **Section 2.4**).

2.4 POLLUTANT REMOVAL EFFICIENCY

On behalf of the City, Vierbicher Associates, Inc. (Vierbicher) updated the storm water quality model for each of the city's subwatersheds. The Source Loading and Management Model (SLAMM) was used to estimate the TSS and TP in storm water runoff discharged from the city's watersheds to surface waters of the state both before and after storm water controls. This model update gives the City an idea of how effective the current Best Management Practices (BMPs) and operational practices are at removing TSS and TP.

Based on this updated analysis, the current BMPs and City operations provide an overall 40 percent reduction in TSS and 25.8 percent reduction in TP. The individual storm water runoff treatment efficiency within each subwatershed varies. Refer to **Appendix D** for the full model update report and results.

As additional BMPs and/or operational changes are made, the model can be updated to reflect the impact the changes have on removing TSS and TP.

3.0 REGULATORY STANDARDS FOR TSS AND TP REMOVAL

In addition to the City's strong commitment to reducing its contribution of pollutants to storm water runoff, regulatory standards also serve as drivers to implementing storm water improvement projects, as further described below.

3.1 MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PERMIT

The city of Monona's municipal separate storm sewer system (MS4) is regulated by WPDES Permit No. WI-S058416-3. The goal of the permit is to reduce pollutants from urban and rural nonpoint sources in order to improve and protect the water quality of streams, lakes, wetlands, and groundwater.

The City of Monona is part of a group of 21 central Dane County municipalities, Dane County, and UW-Madison, who submitted a joint storm water discharge permit to the WDNR under the requirements of Subchapter I of Chapter NR 216, Wisconsin Administrative Code. Rather than applying for the permit individually, these municipal entities joined forces to save time, money, and resources. Collectively, this group is known as the Madison Area Municipal Stormwater Partnership (MAMSWaP).

The permit covers a wide array of activities that occur within a municipality, including the following.

MS4 Permit Requirement	Description
Public Education and Outreach	The MS4 permit specifies that public education and outreach programs be developed to encourage the public and businesses to modify their behaviors and procedures to reduce storm water pollution.
Public Involvement and Participation	Municipalities are required to encourage participation from individuals to prevent storm water pollution.
Illicit Discharge Detection and Elimination	Storm sewers that carry rain water runoff are not intended for other fluids and waste material. These pollutants are illicit discharges and may have the potential to harm people, animals, and aquatic life in the downstream rivers, lakes, and wetlands. Municipalities are required to develop programs to identify, prevent, and eliminate illicit discharges to their storm sewer systems. The WDNR has developed additional illicit discharge detection and elimination guidance to assist municipalities with this requirement.
Construction Site Pollutant Control	Municipalities are required to develop a soil erosion control ordinance and enforce it on construction sites.
Post-Construction Storm Water Management	Municipalities are required to develop a post-construction ordinance and enforce it to ensure that areas of new and redevelopment will include structural measures to control pollutants, control peak flow, maintain infiltration, and establish vegetated protective areas adjacent to waterways and wetlands.
Pollution Prevention Practices for the Municipality	MS4 storm water programs are to include practices to prevent pollutants from municipally-owned transportation infrastructure, maintenance areas, storage yards, sand and salt storage areas, and waste transfer stations entering the storm sewer system.
Storm Sewer System Maps	Municipalities covered by an MS4 permit area are required to maintain a map of the storm sewer system. These maps identify storm sewer conveyances such as pipes and ditches, and also identify roads, streams, and lakes.
Impaired Waters	If the storm sewer system discharges a pollutant of concern to an impaired water, a municipality covered by an MS4 permit is required to develop a plan to reduce those pollutants.

The City has made significant progress in meeting the above permit requirements. The City's progress in meeting the requirements is documented in reports prepared biennially.

3.2 ROCK RIVER BASIN TOTAL MAXIMUM DAILY LOAD

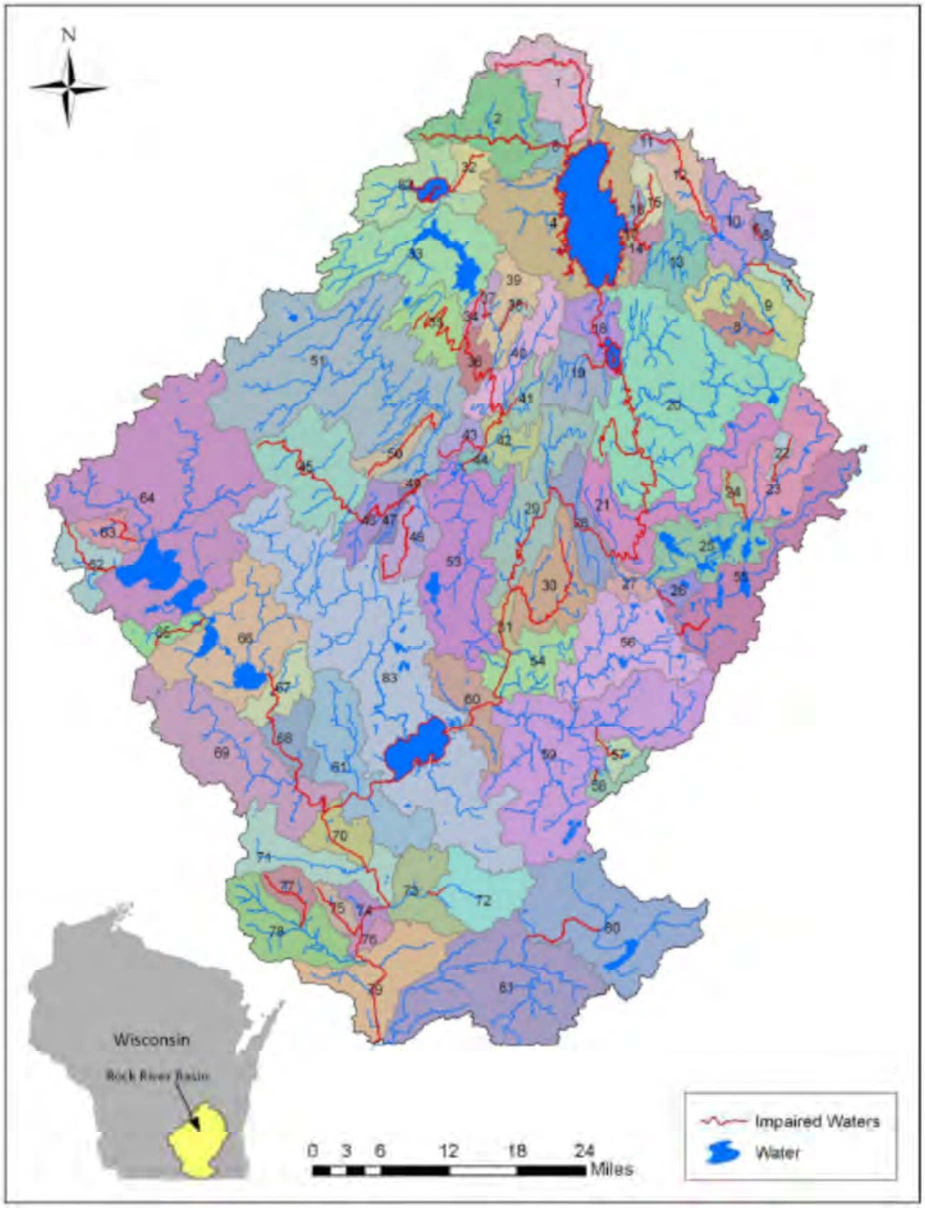
The city of Monona is located in the Rock River Basin. WDNR has placed the Rock River Basin on the State's impaired waters list, also known as the 303(d) list, which means that it is not meeting State water quality standards. The primary pollutants causing impairment are excessive sediment and phosphorus. These pollutants cause harm to fish and aquatic life, and obstruct recreation and navigation. The WDNR developed a TMDL for the Upper and Lower Rock River basins, which was approved by the Environmental Protection Agency in 2011. The TMDL provides a quantitative analysis of the amount of sediment and/or phosphorus that the waterbodies can receive from both point (i.e., end of pipe discharges) and nonpoint (i.e., surface runoff) sources and still meet water quality standards. To achieve the desired reduction in pollutants, WDNR then allocates an allowable amount of pollution to individual wastewater treatment plants, industries, and to municipalities that have an MS4 storm water permit. In addition, for each subwatershed, a reduction goal is established for agriculture and other non-point or runoff sources. The complete Rock River TMDL report can be found at http://dnr.wi.gov/topic/TMDLs/RockRiver/FinalRockRiverTMDLReportWithTables.pdf.

The city discharges runoff to three main water reaches in the Rock River Basin. A reach is a section of a river whose endpoints are usually defined by confluences with other rivers or other significant features. WDNR has established TSS and phosphorus reductions for these reaches as summarized in the following table:

Reach	Calculated TP Reduction From No Controls	Calculated TSS Reduction From No Controls
64	61%	73%
65	63%	68%
66	54%	62%

Source: Rock River TMDL MS4 Annual Average Percent Reductions, Eric Rortvedt, WDNR, 9/16/14

The location of each reach is shown on the following figure:



Source: Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Rock River Basin, July 2011

Runoff of phosphorus and sediment are closely tied, as phosphorus easily attaches to soil and moves with it when soil is carried off the land and into the water. Therefore, reducing sediment delivery to waters will also reduce the phosphorus delivered. Although phosphorus is important for growing plants, a surplus amount can cause algae blooms and excess rooted plant growth in surface waters. When the plants die, the process of decomposition uses much of the available oxygen, resulting in a depleted supply of oxygen in the water and endangering fish and other aquatic life. Phosphorus in runoff is also the main cause of blue-green algae growth. This algae produces toxins which can cause rashes, illness, and sometimes death. Excessive amounts of sediment can destroy habitat, block sunlight, and warm water.

4.0 WATER QUALITY IMPROVEMENT OPTIONS

4.1 GENERAL

This section describes several water quality improvement options that can help the City achieve its water quality goals and meet existing and future storm water management regulations. Water quality improvements can be realized through:

- Policy
- Education
- Operational procedures
- Incentive programs
- Maintenance
- Structural BMPs
- Adaptive management

While the pollutant removal provided by some options cannot be accounted for in the city-wide water quality model (see **Section 2.4**), implementation of any of the options will help the City meet its Strategic Plan goal of improving storm water runoff and meet some of the requirements of the MS4 permit (see **Section 3.1**).

4.2 POLICY OPPORTUNITIES

The City of Monona has an existing Erosion and Stormwater Runoff Control ordinance (Title 15, Chapter 2 (15-2), City of Monona Ordinances). The City modified the ordinance in December 2014 to be as restrictive as Dane County's ordinance requirements.

Under the ordinance, new development projects are required to meet more stringent performance criteria than redevelopment projects. Redevelopment sites resulting in exposed parking lots and associated traffic areas are required to include design practices to retain soil particles greater than 20 microns on the entire site (40 percent reduction) resulting from a 1-year, 24-hour storm event.

Because the City is landlocked and development projects occurring within the city largely qualify as redevelopment projects, opportunities to receive the increased TSS reductions provided by new development projects are limited. The City can require more aggressive TSS removal requirements for redevelopment projects in order to help meet the TMDL standards. The City of Madison, for example, has implemented a change in policy for this purpose. Normal redevelopment standards within the City of Madison require 40 percent TSS removal from exposed pavements compared to no controls. For redevelopment properties within TMDL watersheds, the City of Madison TSS performance standard requires 80 percent TSS reduction compared to existing conditions before redevelopment. The City of Monona can implement a similar update in policy.

The impacts of this type of policy change can be accounted for in the city-wide storm water quality model (see **Section 2.4**) in instances where the City is taking credit for private development storm water BMPs.

4.3 EDUCATIONAL OPPORTUNITIES

The City has several public education and outreach efforts in place:

- The City's Water, Sewer, and Storm Utilities webpage (http://mymonona.com/256/Water-Sewer-Storm-Utilities) provides education and tips for improving the quality of runoff entering the City's storm sewer system.
- The City has "No Dumping – Drains to Lake" decals on storm sewer inlets.
- 2012 was proclaimed the "Year of Water" with several activities during the year to provide education on water quality.

The City is an active member of both MAMSWap (see **Section 3.1**) and YaharaWINS (Watershed Improvement Network) (see **Section 4.8**). These organizations can provide additional storm water management educational opportunities. For example, the MAMSWaP website, myfairlakes.com, provides information on how citizens' daily activities can have a positive impact on Dane County's water resources. The City can utilize the resources on this website to provide informational items to residents and businesses. Outreach can be in the form of newsletters; links to the myfairlakes.com website on the City's website; and fliers located at City Hall, the public library, and at City events (e.g., farmer's market, fall festival, 4th of July festival). These informational items can also be shared with local schools to incorporate into applicable curriculum.

In addition, the CLA is a not-for-profit organization devoted to improving the water quality of the lakes, streams, and wetlands of the Yahara River watershed. In November 2012, the CLA issued a report titled, "The Yahara CLEAN Strategic Action Plan for Reducing Phosphorus," which enumerates specific actions with clear achievable phosphorus reduction goals to clean the lakes in the Yahara River watershed. The goal of the plan is to produce improvements in lake water quality by achieving a 50 percent reduction in the average annual phosphorus load from direct drainage sources in the Yahara chain of lakes. Of this 50 percent reduction, the plan calls for urban areas to provide a 29 percent reduction and rural areas to provide a 71 percent reduction in phosphorus inputs into the Yahara lakes. This plan supports the initiatives specified in the Yahara CLEAN Strategic Action Plan for Reducing Phosphorus. The Yahara CLEAN Strategic Action Plan for Reducing Phosphorus can be viewed at http://www.cleanlakesalliance.com/wp-content/uploads/2012/11/Strategic-Action-Plan-11092012.pdf.

Storm water runoff quality improvements accredited to providing public education cannot be accounted for in the city-wide storm water quality model (see **Section 2.4**).

4.4 INCENTIVE PROGRAM OPPORTUNITIES

4.4.1 Storm Water Utility Fee Discounts

The City provides storm water utility fee credits for landowners who discharge all or portions of the storm water into privately-owned and maintained retention and detention ponds. Landowners may receive up to a 65 percent credit towards the impervious area charge applied to their property. The percentage applied is determined based on both storm water quantity (up to 35 percent) and storm water quality (up to 30 percent) criteria, as defined in the storm water utility ordinance (Chapter 4, City of Monona ordinances).

While this incentive program has been in place for several years, increasing public awareness of this opportunity may result in increased participation. Storm water runoff quality improvements accredited to providing storm water utility fee credits cannot be accounted for in the city-wide storm water quality model (see **Section 2.4**).

4.4.2 Rain Garden Program

Rain garden programs could include both a cost-share program and a City-sponsored program. The City constructed rain gardens on two properties on Panther Trail in 2014. Both of these rain gardens were paid for with grants from Yahara WINS and Dane County. A City-sponsored program could continue these efforts of installing rain gardens.

With a cost-share program, residents could apply for a grant through the city for a specified portion (e.g., 50 percent, up to $1,000) of the project costs for installing a rain garden. Refer to **Appendix E** for the water quality/quantity benefits of rain gardens.

If landowners record a storm water maintenance agreement with the City, storm water runoff quality improvements accredited to rain gardens can be accounted for in the city-wide storm water quality model (see **Section 2.4**).

4.4.3 Rain Barrel Program

With this type of program, the City could provide rain barrels at a reduced cost to residents. Rain barrels reduce the amount of storm water runoff from a property from entering the city storm sewer system and promote reuse. Storm water runoff quality improvements accredited to providing reduced cost rain barrels cannot be accounted for in the city-wide storm water quality model (see **Section 2.4**).

4.4.4 Sustainable Backyard Program

This type of program would provide residents rebates on purchases of trees, native plants, compost bins, and rain barrels. Workshops can be performed to provide basic information on the installation and maintenance of rain barrels, compost bins, native plants, and trees. Exploring teaming opportunities with other programs (e.g., The Natural Step) can help provide the necessary expertise for this type of a program. Storm water runoff quality improvements accredited to this opportunity cannot be accounted for in the city-wide storm water quality model (see **Section 2.4**).

4.5 OPERATIONAL OPPORTUNITIES

4.5.1 Street Sweeping

The City currently conducts vacuum-assisted street sweeping every four weeks. Street sweeping is effective at collecting large (sand sized) sediment particles, trash, debris, and leaves. Street sweeping provides limited removal of fine-grained particles such as silt, clay, and small organic matter, although vacuum sweepers provide improved removal of finer particles than broom sweepers.

Sediment tends to accumulate near the curb line, where cars are often parked during street sweeping activities. Therefore, parking along streets greatly reduces the effectiveness of street sweeping. While enforcing a parking restriction would likely increase the effectiveness of this program, minimizing inconveniences to residents and visitors is also important. Changes to the street sweeping program are therefore not recommended.

Storm water runoff quality improvements resulting from this opportunity are currently accounted for in the city-wide storm water quality runoff model (see **Section 2.4**).

4.5.2 Catch Basin Cleaning

The City currently performs catch basin cleaning on a semi-annual basis. Catch basin cleaning is effective at collecting large sediment particles (sand sized), trash, debris, and leaves. Similar to street sweeping, it has limited effectiveness at removing fine-grained particles such as silt, clay, and small organic matter. The pollutant reduction benefits of catch basin cleaning are similar to street sweeping. Because the City performs street sweeping on a regular basis (see **Section 4.5.1**), increased catch basin cleaning is not recommended as a means to provide improved treatment.

Storm water runoff quality improvements resulting from this opportunity are currently accounted for in the city-wide storm water quality runoff model (see **Section 2.4**).

4.5.3 Improved Leaf Management

As storm water runoff flows through leaf piles, it carries nutrients such as phosphorus and nitrogen to the receiving water. While it is generally understood that it is therefore beneficial to keep leaves out of the street, quantifying the amount of pollutant removal gained by leaf collection services is difficult. The City of Madison, WDNR, and U.S. Geological Survey are conducting a research project to quantify the phosphorus reduction benefits of various municipal leaf collection techniques. The purpose of the study is to determine which leaf collection technique is most beneficial for phosphorus reduction and to provide more insight on quantifying the benefit received. The study will be completed in 2015, with the subsequent report anticipated in 2016. Further details regarding the study can be found at http://www.cityofmadison.com/engineering/stormwater/LeafStudy.cfm.

The results of the study will help determine if credit for the amount of phosphorus removed through the leaf collection process can be accounted for in the city-wide storm water runoff quality model (see **Section 2.4**), as well as if the current leaf collection program should be modified. After the study is completed, the City should evaluate their leaf collection techniques in relation to the results of the study.

4.6 MAINTENANCE OPPORTUNITIES

Once storm water treatment devices are installed, they need to be maintained to continue to provide the treatment capabilities they were designed to achieve. The need for maintenance is determined by regular inspections of the treatment devices. For the public storm water treatment devices, typical maintenance schedules are included in **Appendix F**.

For privately-owned devices, Section 15-2-13(a)(1)(g), City of Monona ordinances, requires applicants for a storm water control permit to include a maintenance plan and schedule for all permanent storm water management practices to be recorded on an affidavit. However, the City currently does not have a mechanism in place to ensure the maintenance plan and schedule are being followed, at least not without requiring City staff time and efforts to perform inspections or contact owners for information. To ensure the maintenance plan is being implemented as planned, the City can consider including a provision in the ordinances that requires property owners with a maintenance agreement to submit documentation that the maintenance plan is being followed and that requires owners to document any maintenance performed during the calendar year. Other communities have similar requirements in place.

The storm water quality improvements provided by this opportunity are indirectly accounted for in the city-wide storm water model (see **Section 2.4**) by ensuring that the performance of the BMPs accounted for in the model are performing as designed and the predicted pollutant removal is being achieved.

4.7 STRUCTURAL BEST MANAGEMENT PRACTICE OPPORTUNITIES

As the City initiates capital improvement projects, structural opportunities for storm water quality improvement should be identified. The City has demonstrated this commitment with the installation of several new storm water treatment devices at City outfalls. Below are examples of structural storm water treatment devices that can be considered for future infrastructure improvement projects:

- Grass swales
- Biofiltration
- Infiltration basin
- Wet detention basin
- Retrofit existing detention basins
- Proprietary sediment removal devices
- Permeable pavement

- Catch basins
- Bank stabilization
- Other BMPs

Detailed information regarding each of these BMPs is provided in **Appendix E**.

4.8 ADAPTIVE MANAGEMENT

Adaptive management projects are another approach to achieving TMDL pollutant reduction goals. Adaptive management is a new regulatory approach to address phosphorus. Traditional regulatory approaches to address phosphorus have focused on controlling phosphorus from point sources, which include wastewater treatment plants and municipal storm water control facilities. This has been found to be too narrow of a focus, because in most watersheds, the majority of phosphorus reaching lakes and streams comes from non-point sources, which include runoff from agricultural fields, construction sites, and urban areas. In adaptive management, all sources of phosphorus work collaboratively to implement cost effective phosphorus control practices throughout the watershed. Control practices will vary, and will likely involve a mix of agricultural and urban BMPs.

Madison Metropolitan Sewerage District and Dane County, with multiple partners including the City of Monona, as well as other villages, towns, cities, WDNR, environmental organizations, and farm producers, are implementing an adaptive management pilot project in the Yahara Watershed. This collaborative effort is called Yahara WINs (Watershed Improvement Network). It is the first project in the State of Wisconsin, and nationally, to test the adaptive management concept. Yahara WINs participants have agreed to conduct an adaptive management pilot project before moving to full implementation in the Yahara River Watershed. The pilot project is being conducted in the Sixmile Creek Subwatershed, which is located northwest of Lake Mendota. It is anticipated that the pilot project will lead to implementation of a full scale adaptive management project beginning in 2016. Further information on the Yahara WINs project can be found at http://www.madsewer.org/Programs-Initiatives/Yahara-WINs.

Once the results of this pilot project are complete, the City, along with its MAMSWaP partners, can further evaluate the pollutant reduction opportunities to perform full-scale adaptive management projects to help meet the Rock River TMDL pollutant removal goals. This type of strategy may prove more cost effective than implementing individual pollutant removal BMPs with smaller scale projects (e.g., at individual outfalls).

4.9 ENVIRONMENTAL CONSIDERATIONS

Before implementing any new structural BMP, environmental issues need to be considered, including environmental hazards (e.g., prohibiting infiltration for sites with soil contamination); cultural, historical, endangered, and threatened resources; wetlands; and other water resources protected by Chapter 30, Wisconsin Statutes.

Contaminated sites can be found on the WDNR Bureau for Remediation and Redevelopment Tracking System website at http://dnr.wi.gov/topic/Brownfields/botw.html.

Cultural, historical, endangered, and threatened resource information can be found on the WDNR website at http://dnr.wi.gov/topic/Lands/CulturalRes/.

To determine if the project location has mapped wetlands or hydric soils, which are one of the indicators for a wetland area, visit the WDNR's surface water data viewer interactive mapping website http://dnrmaps.wi.gov/SL/Viewer.html?Viewer=SWDV.

The need for a Chapter 30 permit will depend on the project location relative to waters, the amount of disturbance, and the type of project. Further information on water permits required under Chapter 30 can be found at http://dnr.wi.gov/permits/water/.

5.0 RECOMMENDATIONS

The City is currently meeting the requirements of the MS4 permit. However, the Rock River TMDL requirements for TSS and TP reduction are not being met (see **Table 1**). The TMDL requirements will be incorporated into the City's MS4 permit when it is renewed in early 2015. In addition, the WDNR recently issued a guidance document to help municipalities meet higher TSS and TP removal requirements resulting from TMDL load allocations. The pending permit requirement changes, associated guidance document, and results of ongoing studies described in this Master SWMP are likely to have a significant impact on the City's approach to storm water management in the coming years. Therefore, this Master SWMP has been developed to serve as a guide to help the City select the most cost-effective storm water management options when the MS4 permit is renewed.

The City will review this plan during its annual budgeting process to identify storm water projects that best help it achieve its strategic goals and meet current and pending regulatory requirements. Based on the above, specific recommendations are not provided in this plan. Two tables are included in this plan to help guide the City in determining storm water improvement projects to undertake. **Table 2** provides a storm water quality improvement summary of the various water quality improvement options presented in this report. Each option includes a ranking in terms of pollutant removal capability, cost, land requirement, and maintenance. The table also indicates which options could be included in the city-wide storm water quality model. Options that can be entered into the model will show reductions in TSS and TP and will therefore help the City meet the permit requirements for reducing TSS and TP. **Table 3** provides a ranking of storm water structural BMP improvement options on a subwatershed basis. The BMP options listed and associated rankings are based on pollutant removal capabilities and land availability.

6.0 FUNDING SOURCES

6.1 URBAN NONPOINT SOURCE & STORM WATER MANAGEMENT GRANT PROGRAM

The Urban Nonpoint Source & Storm Water (UNPS&SW) Management Grant Program offers competitive grants to local governments. Grants reimburse costs of planning or construction projects controlling urban nonpoint source and storm water runoff pollution.

Planning grant eligible projects include:

- Storm water management planning for urban areas
- Preparation of local ordinances affecting storm water discharge (construction site or post construction erosion control, pet waste, or illicit discharge management)
- Local financing options for evaluation of storm water utilities/programs
- Administrative costs for initial establishment of local storm water management funding programs
- Illicit discharge detection and elimination
- Public information and education activities

Construction grant eligible projects include:

- Construction of structural urban BMPs including detention, wet, infiltration, or wetland basins, or infiltration trenches
- Engineering design and construction services for BMPs installation
- Land acquisition and easement purchase, including appraisal cost
- Storm sewer rerouting and removal of structures
- Streambank and shoreline stabilization

UNPS&SW grants cannot be used for projects associated with new development and dredging, draining, or flooding projects unrelated to water quality.

This grant is administered by WDNR. Refer to the WDNR website (http://dnr.wi.gov/Aid/UrbanNonpoint.html) for more information.

6.2 RIVER PROTECTION PLANNING & RIVER PROTECTION MANAGEMENT GRANT

River management grants are available for purchasing land or conservation easements, local ordinance development, installation of nonpoint source pollution control practices, and river restoration activities. They may also be used for education, planning, and design activities necessary for completion of a management project.

This grant is administered by WDNR. Refer to the WDNR website (http://dnr.wi.gov/AID/Rivers.html) for more information.

6.3 DANE COUNTY URBAN WATER QUALITY GRANT PROGRAM

Since 2005, Dane County has made funds available to municipalities for this cost-sharing program to improve old storm drain outlets that discharge untreated storm water and litter into county lakes, rivers, and streams. The goals of the Urban Water Quality Grant Program are to improve the quality of urban storm water runoff entering Dane County lakes, rivers, and streams; increase public awareness of urban water quality issues; and provide public education about urban storm water quality improvement practices. In 2013, $1,500,000 was available in this program. For the first time, municipalities that contain one of the county's top ten storm water outfalls into the lakes were eligible for an enhanced cost-sharing rate of 75 percent of the total cost of BMPs (no cap). Other projects that treat urban runoff were eligible for cost-sharing up to 50 percent of the total cost of construction (not to exceed $100,000).

This grant is administered by Dane County Lakes and Watershed Commission. Refer to their website (http://www.danewaters.com/resource/urbanWater.aspx) for more information.

6.4 TAX INCREMENT FINANCING

Monona has six active tax increment districts (TIDs). Storm water projects are an eligible tax increment financing (TIF) expenditure if identified in the TID Project Plan. TIF can be used to fund storm water system improvements as listed in a TID Project Plan. Downstream storm water facilities outside a tax increment district boundary that serve development within a tax increment district are eligible TIF projects. Future TID Project Plans should be created and include storm water system improvements listed as an eligible cost. TID boundary and TID Project Plan amendments should include storm water system improvements that will serve the amended area.

6.5 MONONA STORM WATER UTILITY

The City of Monona developed a storm water utility to help fund storm water infrastructure construction and maintenance. Funds from this source can be used for capital projects related to storm water quality and quantity management. The City should review the current rate schedule and consider a rate increase to fund future storm water improvement projects.

TABLES

Table 1. Pollutant Reduction Summary by Reach
City of Monona, Wisconsin / SCS Engineers Project #25214062

Reach	Watershed Index #	Total Suspended Solids (TSS)				Total Phosphorus (TP)			
		Discharge no controls (pounds)	Discharge with controls (pounds)	Existing TSS Control (%)	Goal for TSS Control (%)	Discharge no controls (pounds)	Discharge with controls (pounds)	Existing TP Control (%)	Goal for TP Control (%)
64	1	3,832	3,270	14.6%	See below	12	11	10.4%	See below
	1A	1,767	1,359	23.1%		5	4	17.5%	
	2	2,671	1,850	30.7%		9	7	21.4%	
	3	29,714	24,627	17.1%		132	118	10.5%	
	4	36,305	28,914	20.4%		158	138	12.7%	
	5	9,439	7,916	16.1%		24	22	10.8%	
	6	43,696	13,547	69.0%		196	103	47.1%	
	7	2,112	1,689	20.0%		51	45	12.2%	
	8	52,735	41,488	21.3%		202	175	13.6%	
	9	6,013	5,090	15.4%		30	28	9.2%	
Reach 64 Subtotal		**188,284**	**129,750**	**31.1%**	**73%**	**819**	**651**	**20.5%**	**61%**
65	20	14,908	12,125	18.7%	See below	36	33	10.7%	See below
	21	60,161	19,784	67.1%		146	76	47.9%	
	22	18,402	18,402	0.0%		132	132	0.0%	
Reach 65 Subtotal		**93,471**	**50,311**	**46.2%**	**68%**	**314**	**241**	**23.2%**	**63%**
66	10	6,193	4,889	21.1%	See below	26	22	13.4%	See below
	11	20,716	11,437	44.8%		117	84	28.5%	
	12	17,061	12,779	25.1%		59	49	17.2%	
	13	13,879	7,748	44.2%		54	38	29.3%	
	14	21,744	6,023	72.3%		69	32	53.3%	
	15	4,248	3,050	28.2%		12	10	18.5%	
	16	13,639	9,984	26.8%		34	28	17.4%	
	17	47,797	9,737	79.6%		177	80	54.7%	
	18	33,151	28,527	13.9%		96	87	9.5%	
	19	31,223	20,572	34.1%		68	49	27.9%	
Reach 66 Subtotal		**209,651**	**114,746**	**45.3%**	**62%**	**712**	**479**	**32.7%**	**54%**

I:\25214062\Reports\[Table 1_Reach Performance Summary_rev.xlsx]Sheet1

Table 2. Storm Water Quality Improvement Option Summary
City of Monona, Wisconsin / SCS Project #25214062

Water Quality Improvement Option	Typical Pollutant Removal Ability Total Suspended Solids (TSS)	Typical Pollutant Removal Ability Total Phosphorus (TP)	Cost	Land Requirement	Maintenance Considerations	TSS/TP Reduction Credit Received in City-wide Storm Water Model? (see Note 1)
Policy Opportunities	**NQ**	**NQ**	**Low**	**None**	**None**	**Yes**
Educational Opportunities	**NQ**	**NQ**	**Low**	**None**	**None**	**No**
Incentive Program Opportunities	**NQ**	**NQ**	**Low**	**Minimal (see Note 5)**	**None**	**No**
- Storm Water Utility Fee Discounts	NQ	NQ	Low	None	None	No
- Rain Garden Program	NQ	NQ	Low	Moderate	None	No
- Rain Barrel Program	NQ	NQ	Low	None	None	No
- Sustainable Backyard Program	NQ	NQ	Low	None	None	No
Operational Opportunities	**Low**	**Low**	**Moderate**	**None**	**Moderate**	**Yes**
- Street Sweeping	Low-Moderate	Low-Moderate	High	None	Moderate	Yes
- Catch Basin Cleaning	Low-Moderate	Low-Moderate	Moderate	None	Moderate	Yes
- Improved Leaf Management	NQ	NQ	Moderate-High	None	Moderate	Yes
Maintenance Opportunities	**Maintains design removal**	**Maintains design removal**	**Moderate**	**None**	**High**	**No (see Note 4)**
Structural BMP Opportunities	**Low-High**	**Low-High**	**High**	**Moderate**	**Moderate**	**Yes**
- Grass Swale	Low	Low	Moderate	Moderate	Low	Yes
- Biofiltration (bioretention, rain gardens, bio-swales)	High	High	Moderate	Moderate	High	Yes
- Infiltration Basin	High	High	High	Large	High	Yes
- Wet Detention Basin	High	High	High	Large	Low	Yes
- Retrofit Existing Detention Basins	High	High	Moderate	None-Moderate	Low	Yes
- Proprietary Sediment Control Structures	Low-Moderate	Low	High	Moderate	High	Yes
- Permeable Pavement	Moderate-High	Moderate-High	High	Moderate (see Note 2)	Moderate	Yes
- Catch Basins	Low-Moderate	Low	Moderate	Minimal	High	Yes
- Bank Stabilization	NQ	NQ	Moderate-High	Moderate	Low	No (see Note 4)
Adaptive Management	**NQ**	**NQ**	**High**	**High (see Note 3)**	**Moderate**	**Yes**

NQ = Not Quantified

Notes:
1. The City-wide storm water model is the mechanism by which the City measures its ability to meet regulatory TSS and TP removal standards (see Section 2.4 of report).
2. Permeable pavement is utilized in place of standard impervious surfaces. Additional land us not required beyond what is proposed for planned impervious surfaces.
3. The land requirements associated with adaptive management opportunities is from agricultural land, not City-owned land.
4. The City-wide storm water runoff quality model assumes BMPs are maintained and banks are stabilized. Implementing these opportunities supports this assumption.
5. Incentive program opportunities would occur on private land and do not require City-owned property.

I:\25214062\Reports\[Table 2_BMP Pollutant Removal Efficiencies_rev1.xlsx]Sheet1

Table 3. Storm Water Quality Improvement Project Ranking
City of Monona, Wisconsin / SCS Project #25214062

Ranking	Watershed #	Best Structural BMP Water Quality Improvement Options
High	6	Retrofit existing Winnequah Park lagoon basin
		Construct new wet detention basin, bioretention basin, or proprietary sediment removal structure in Winnequah Park
		See Note 1
		Note: Two proprietary sediment removal structures at outfalls to Winnequah Park lagoon are planned for construction in 2015
	7	Construct new wet detention basin, bioretention basin, infiltration basin or grass swale in Maywood Park
		See Note 1
	12	Retrofit existing Interlake Sediment Basin
		See Note 1
Moderate	1	Install proprietary sediment removal structure at outfall to Lake Monona
		See Note 1
	3	Install proprietary sediment removal structure(s)
		See Note 1
	4	Install rain gardens/bioretention basins around IHM church/school footprint
		See Note 1
	5	Install rain gardens/bioretention basins around high school footprint
		See Note 1
	8	Install proprietary sediment removal structure(s)
		See Note 1
	9	Install proprietary sediment removal structure at outfall(s) to Squaw Bay
		See Note 1
	10	Install proprietary sediment removal structure(s)
		See Note 1
		Note: Proprietary sediment removal structure at Pirate Island outfall planned for construction in 2015
	16	Install proprietary sediment removal structure at outfall
		See Note 1
	18	Install proprietary sediment removal structure(s)
		See Note 1
Low	1A	See Note 1
	2	See Note 1
	11	Note: Proprietary sediment removal structure at Graham Park outfall planned for construction in 2015
		See Note 1
	14	See Note 1
	15	See Note 1
	17	See Note 1
	19	See Note 1
	20	See Note 1
	21	See Note 1
	22	See Note 1

Note:
1. For all watersheds, adaptive management, policy opportunities, educational opportunities, incentive programs, operational opportunities, and maintenance opportunities as described in the report are recommended for consideration. Adaptive management may provide an overall higher rate of removal than treating individual subwatersheds. However, this new approach is still in the pilot study stage.
2. Rankings are based on the following criteria:
   - High: Available open public land; Large drainage area; Current low TSS/TP removal
   - Moderate: Limited open public land; Moderate to large drainage area; Current low to moderate TSS/TP removal
   - Low: Small drainage area; Current high TSS/TP removal

I:\25214062\Reports\[Table 3_Watershed Rankings for SW Improvement Projects.xlsx]Sheet1

FIGURE

Municipal Storm Sewer System – Watersheds
and Best Management Practices

MUNICIPAL STORM SEWER SYSTEM

WATERSHEDS & BEST MANAGEMENT PRACTICES

APPENDIX A

2014–2016 Strategic Plan Excerpt

Dec., 2013

CITY OF MONONA 2014-16 STRATEGIC PLAN

Mission

To provide a safe, sustainable, well-planned, and fiscally responsible city where a sense of community builds a high quality of life.

Vision

A welcoming, vibrant community where people want to be

Guiding Principles – *We Will…*

1. **Responsive -** We will respond to residents' requests in a timely, informative and thorough manner
2. **Transparent -** We will be honest and transparent in providing information on our actions and decisions
3. **Fiscally Responsible -** We will act in a fiscally responsible manner on behalf of our residents
4. **Collaborative –** We will work together
5. **Sustainable -** We will strive to be sustainable in everything we do

Target / Lead Stakeholders

- **Potential Owners** – Business and Homeowners
- Developers
- Retirees / Seniors
- Frontline Employees
- City Leadership

INT. & EXT. Strategic Goals

IV. BECOME MORE SUSTAINABLE

Achieve 25 x 25 renewable energy goal.

Potential Measures:

Energy Consumption

- ❑ Fuel purchase history

Water Management

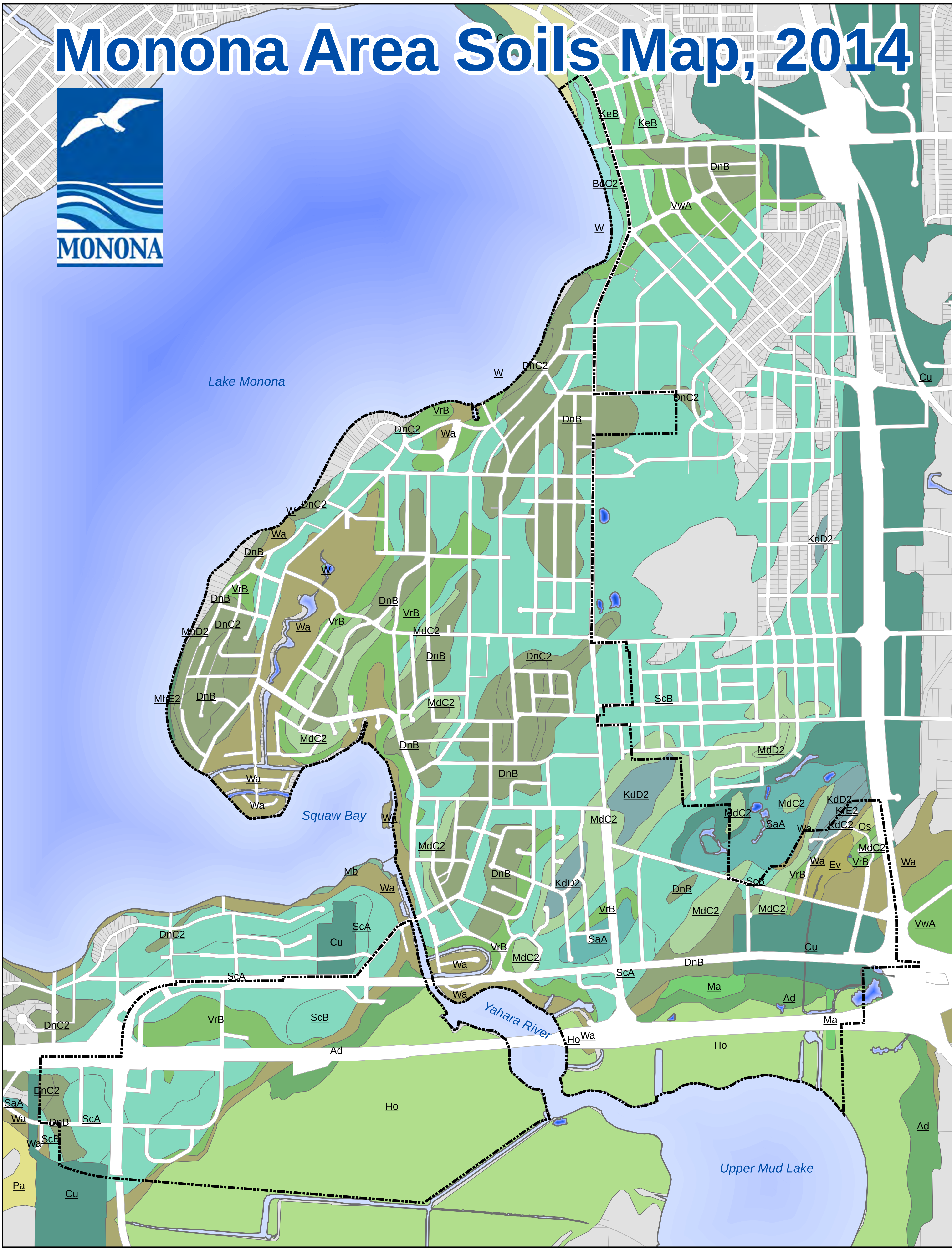
- ❑ Water incidences (KPI)
- ❑ Volume of storm water capacity
- ❑ Annual VMT
- ❑ $ of grants secured

Objectives - WHAT	Strategies / Tactics - HOW
IV.A Develop Policies and Strategies to Incorporate Sustainability in Everything We Do Staff Owner: Sustainability Committee	❑ Develop and finalize comprehensive sustainability plan *Q1-2014* ❑ Train staff and community on sustainability and efficiency *ongoing*
IV.B Utilize Technology to Minimize Paper Usage Staff Owner(s): All Staff	❑ Staff training on technology that will reduce paper and energy. *ongoing* ❑ Eliminate duplication of efforts (e.g. preparing both electronic and hard copy documents) *2015* ❑ Investigate electronic billing system for bills *3-5 year* ❑ Investigate printers that make more efficient use of toner (e.g. a good "draft" print function). *2014*
IV.C Reduce City Government Energy Consumption Staff Owner(s): Public Works	❑ Find ways to reduce energy and fuel usage *ongoing* ❑ Reduce drive time to and from job site due to lack of preparation; limit staff trips *2014* ❑ LED lighting for building interiors and exteriors *3-5 years*
IV.D Identify / Develop Partnerships and Funding Sources Staff Owner(s): Sustainability Committee	❑ Create plan to fund/incentivize energy and water efficiency *3-5 years* ❑ Investigate sustainability related grants *ongoing* ❑ Investigate state funding for sustainability initiatives *ongoing* ❑ Continuing financing Sustainability Committee educational efforts *ongoing*
IV.E Improve Our Storm Water Management and Execute Our Clear Water Initiatives Staff Owner(s): Public Works; Plan Commission; Sustainability Committee	❑ Storm water treatment (e.g. improving sediment and phosphorus capture before entering lakes via structure improvements) *ongoing* ❑ Educate residents regarding good storm water practices *ongoing* ❑ Improve water quality by promoting resident/business involvement with good practices to keep water on site whenever possible *ongoing* ❑ Review stormwater code impervious surface on residential properties *2014*

APPENDIX B

Soils Map

Monona Area Soils Map, 2014



0 0.25 0.5 1 Miles

N

March 20, 2014

Legend

Monona Area Soils

Soil Name & Abbr.

- ADRIAN (Ad)
- BOYER (BoC2)
- COLWOOD (Co)
- CUT (Cu)
- DODGE (DnB, DnC2)
- ELVERS (Ev)
- HOUGHTON (Ho)
- KEGONSA (KeB)
- KIDDER (KdC2, KdD2, KrE2))
- MADELAND (Ma)
- MARSH (Mb)
- MARSHAN (Mc)
- MCHENRY (MdC2)
- MILITARY (MhD2, MhE2)
- ORION (Os)
- PALMS (Pa)
- SABLE (SaA)
- ST.CHARLES (ScA, ScB)
- VIRGIL (VrB, VwA)
- WACOUSTA (Wa)
- WATER

Monona Boundary

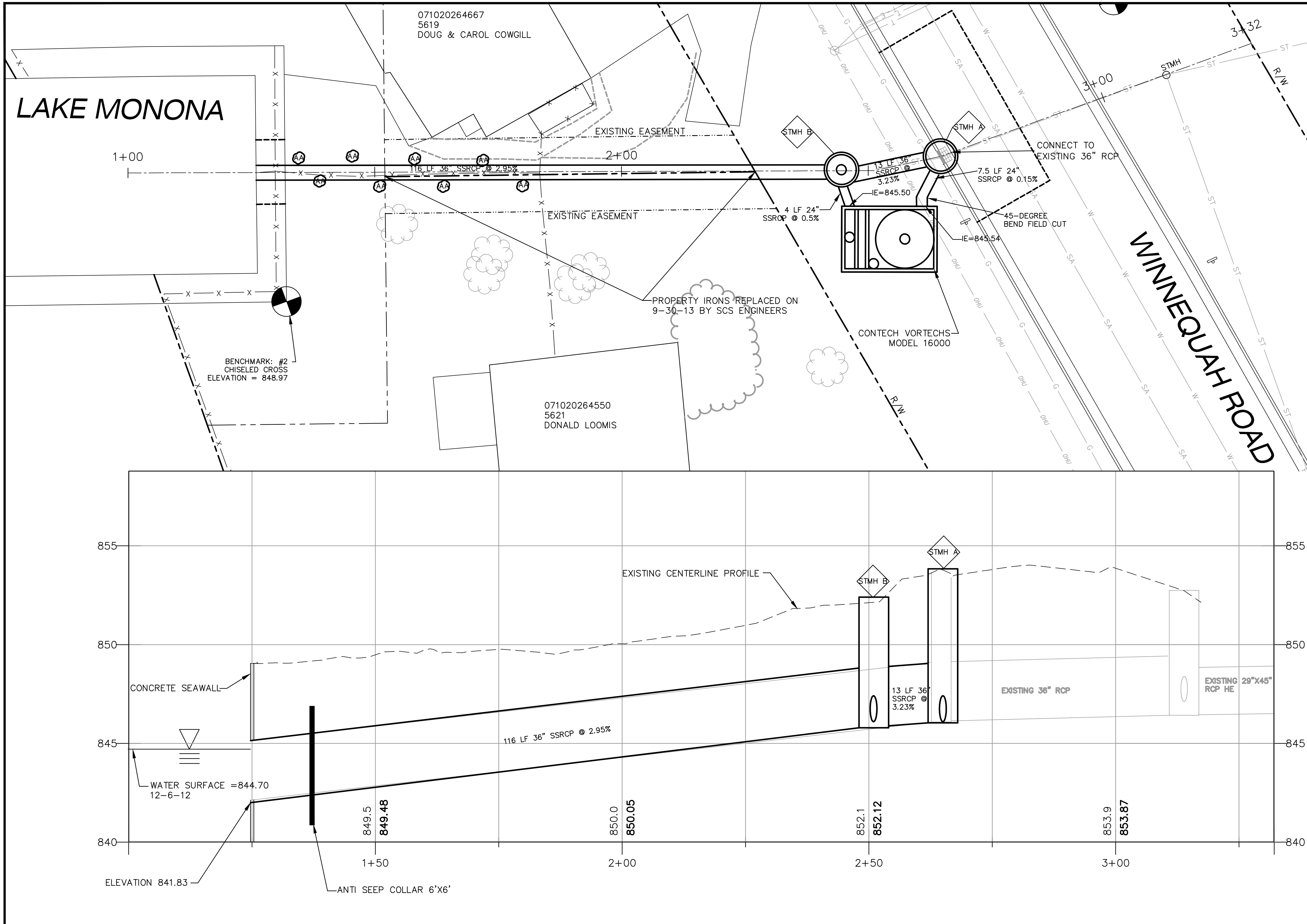
Monona ROW

Monona Area Hydrology

Parcels

APPENDIX C

Existing Public Storm Water Treatment Device As-built Drawings



STMH A – 2+65.00,
SALVAGE AND RE-USE INLET COVER
MANHOLES 6-FT DIAMETER
TOC = 853.84
NIE = 844.94 (CONNECT TO EX. 36" RCP)
SWIE = 845.67 (36" RCP)
EIE = 845.55 (24" RCP)
6' WEIR – 847.55 (SEE DETAILS)

STMH B – 2+51.00,
MANHOLE COVER TYPE J
MANHOLES 6-FT DIAMETER
RIM = 852.40
NEIE = 845.25 (36" RCP)
SWIE = 845.25 (36" RCP)
EIE = 845.27 (24" RCP)

PROJECT NO.	25212260.00	DRAWN BY:	BS2
DRAWN:	12/6/12	CHECKED BY:	GB
REVISED:	9/26/13	APPROVED BY:	GB

ENGINEER: SCS ENGINEERS
421 WISCONSIN DELLS PARKWAY, STE. 2, WISCONSIN DELLS, WI 53965
PHONE: (608) 253-9307

CLIENT: CITY OF MONONA
5211 SCHLUTER ROAD
MONONA, WI 53716-2598
608-222-2525

SITE: CITY OF MONONA
PLAN OF PROPOSED IMPROVEMENT
COVE STORM SEWER REPLACEMENT

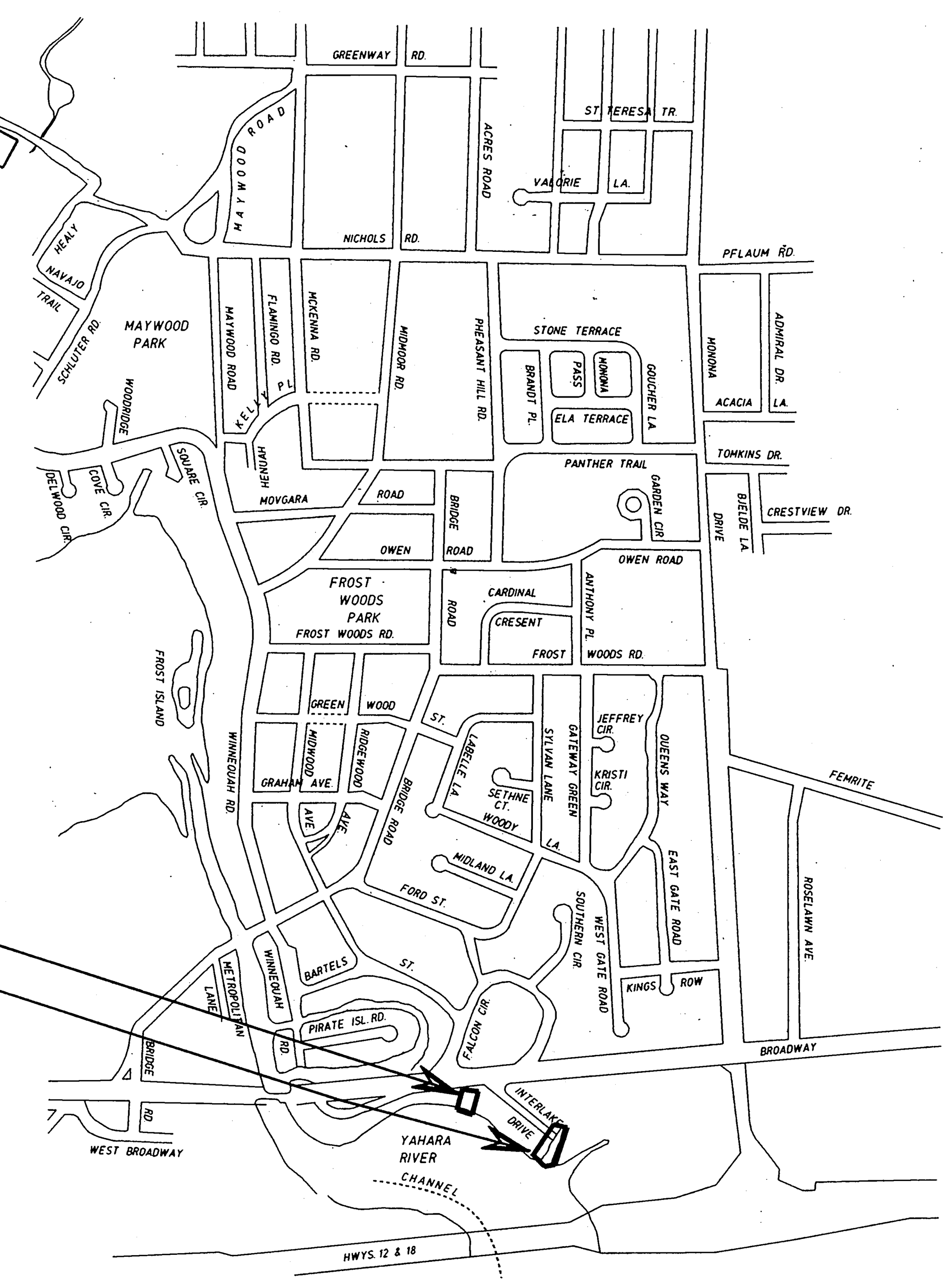
AS-BUILT

SHEET 4 OF 7

CITY OF MONONA

PUBLIC WORKS CONSTRUCTION

1993 PRIORITY WATERSHED PROJECTS



PROJECT LOCATIONS
WINNEQUAH PARKING LOT
INTERLAKE DR.
LOTTES PARK

N

CITY of MONONA

NO SCALE

INDEX OF DRAWINGS

MONONA – WATERSHED

WISCONSIN JOHN A. LICHTENBERG E- MIDDLETON, WIS. PROFESSIONAL ENGINEER

NO.	DATE	REVISION	INITIAL	NO.	DATE	REVISION	INITIAL
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

CITY of MONONA

TITLE SHEET

SCALE	NONE
DATE	MAY, 1993
DESIGNED	M.L.C.
DRAWN	W.A.C.
SURVEYED	---
CHECKED	M.L.C.,JAL
APPROVED	J.A.L.

MEAD & HUNT
Consulting Engineers
6501 Watts Road Suite 101
Madison, Wisconsin 53719-1361
(608) 273-6380 / FAX (608) 273-6391

A8138-T1

JOB NO. M257-92F,93C,93D

REV. -

1993-026

NO.	DATE	REVISION	INITIAL	NO.	DATE	REVISION	INITIAL
1	5/6/93	CHANGE GABION LOCATION	WAC	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

CITY OF MONONA, WISCONSIN

LOTTES PARK DETENSION BASIN

SITE PLAN

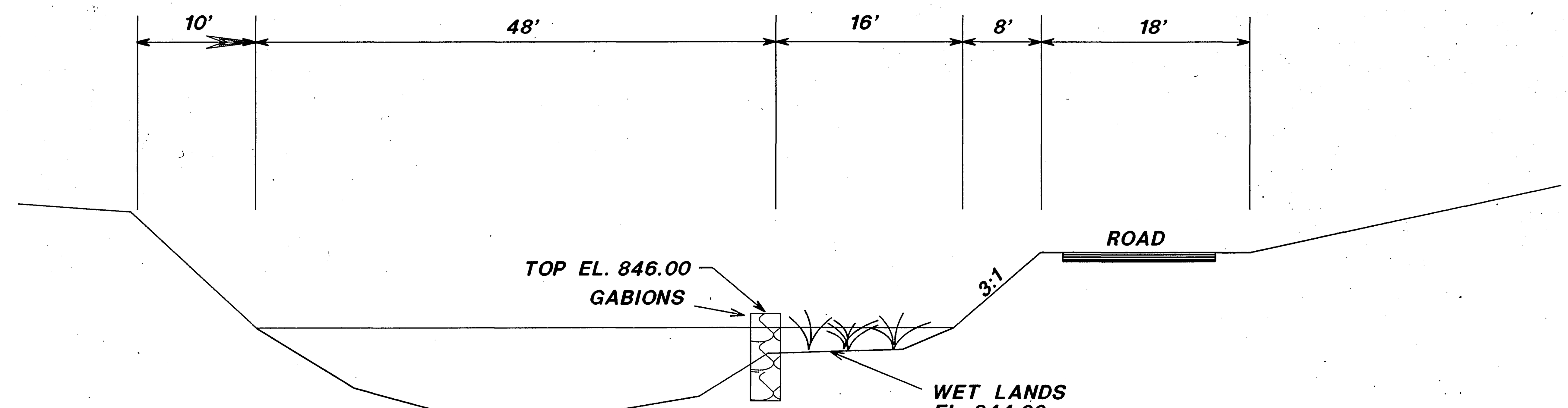
SCALE 1" = 20'
DATE 4/26/93

DESIGNED MLC-PMR
DRAWN WAC
SURVEYED ---
CHECKED ---
APPROVED ---

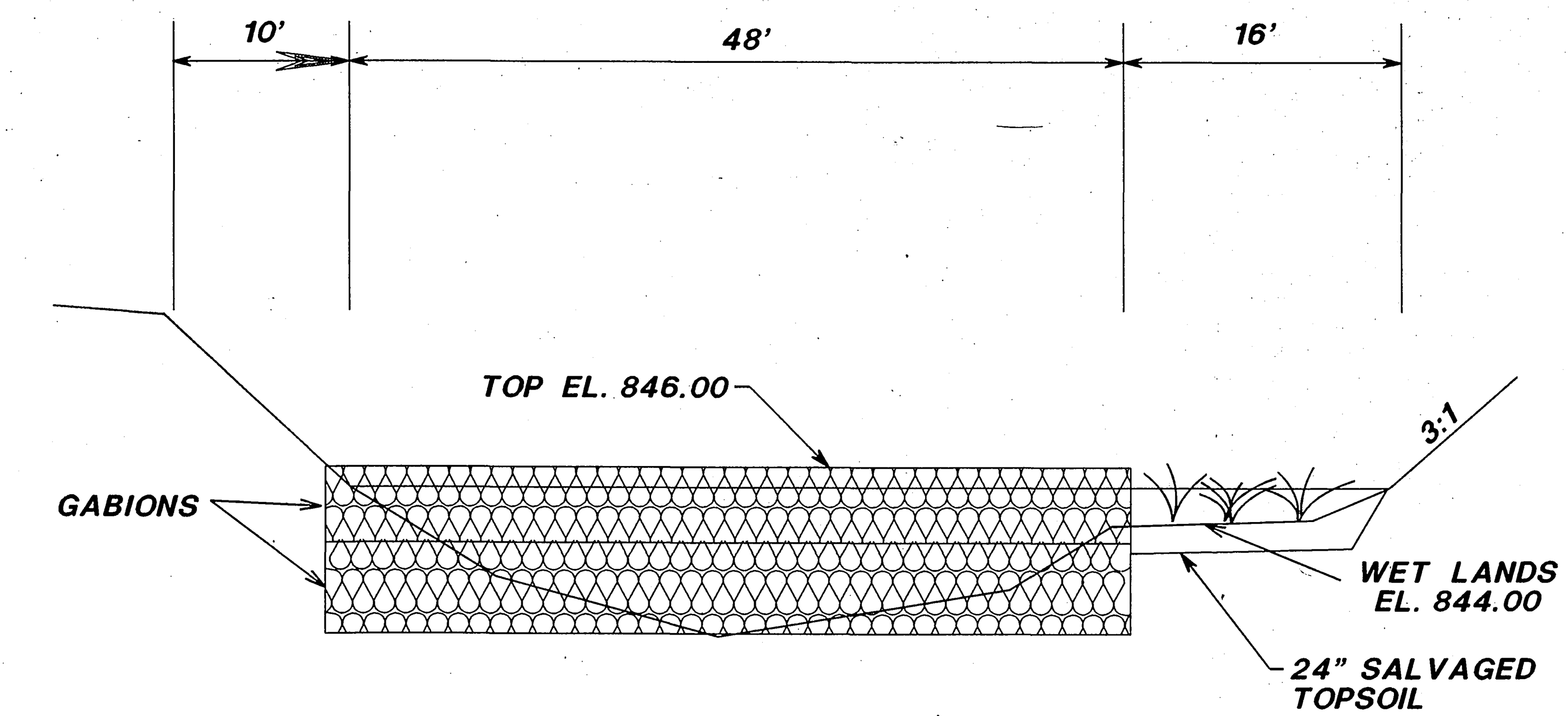
MEAD & HUNT
Consulting Engineers
6501 Watts Road Suite 101
Madison, Wisconsin 53719-1361
(608) 273-6380 / FAX (608) 273-6391

A8138-LS1
JOB NO. M257-93D
REV. 1

1993-027



SECTION B-B



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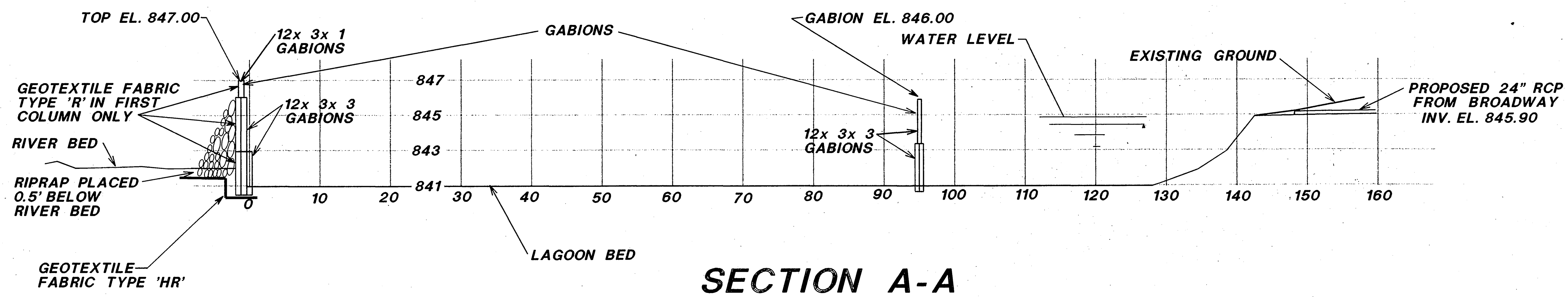
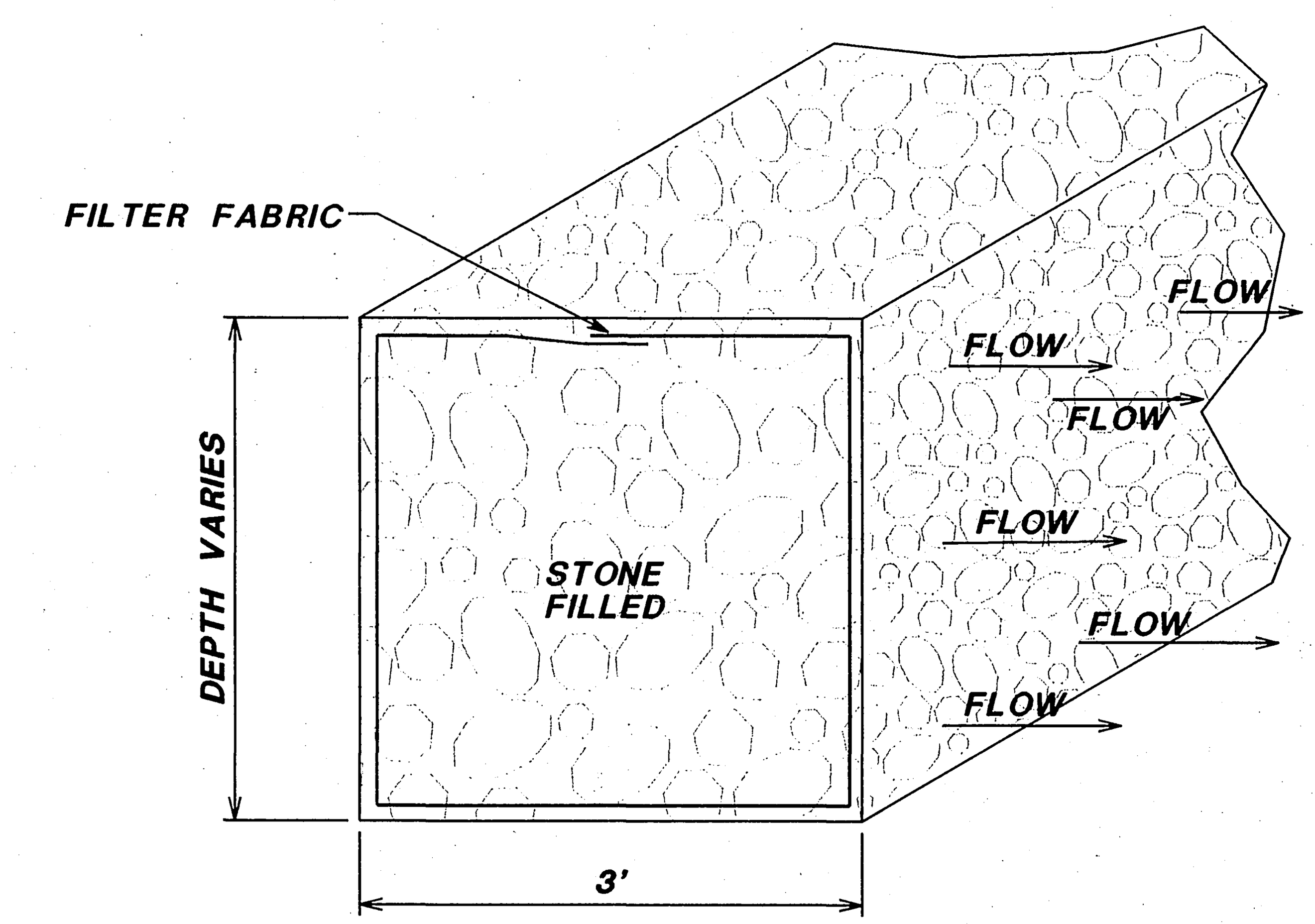
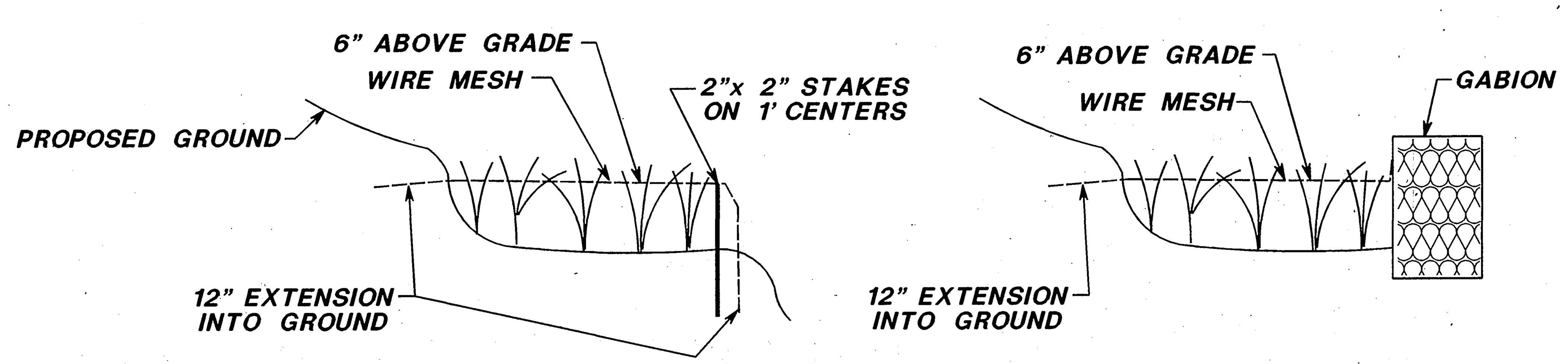


SECTION A-A



TYPICAL GABION LINING SECTION



WITHOUT GABION

WITH GABION

WET LANDS PLANT PROTECTION

NO.	DATE	REVISION	INITIAL	NO.	DATE	REVISION	INITIAL
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

CITY OF MONONA, WISCONSIN

LOTTES PARK DETENSION BASIN

PROFILE SECTIONS

SCALE 1" = 20'

DATE 4/7/93

DESIGNED ---
DRAWN WAC
SURVEYED ---
CHECKED ---
APPROVED ---

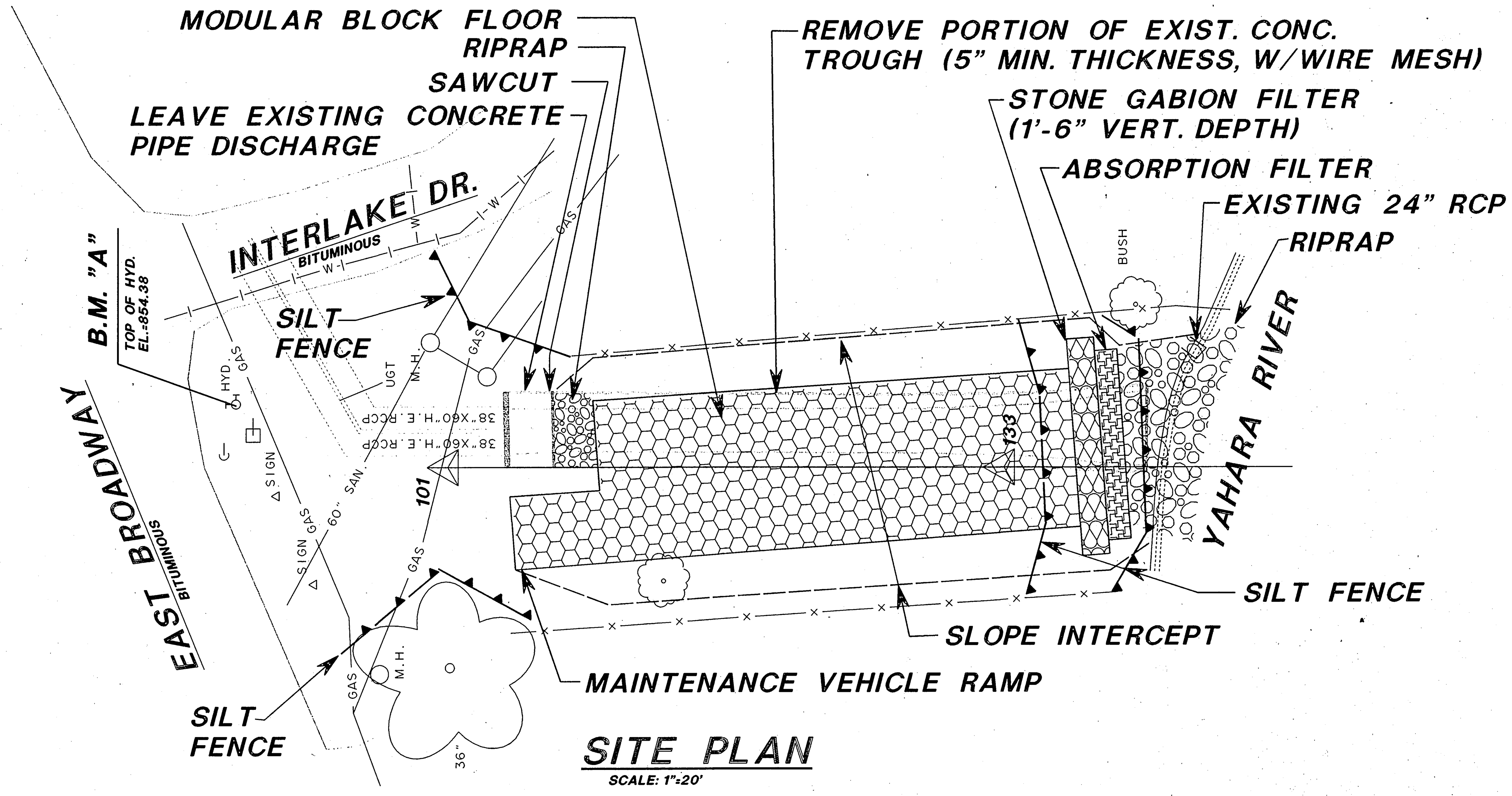
MEAD & HUNT
Consulting Engineers
6501 Watts Road Suite 101
Madison, Wisconsin 53719-1361
(608) 273-6380 / FAX (608) 273-6391

A8138-LS2

JOB NO. -

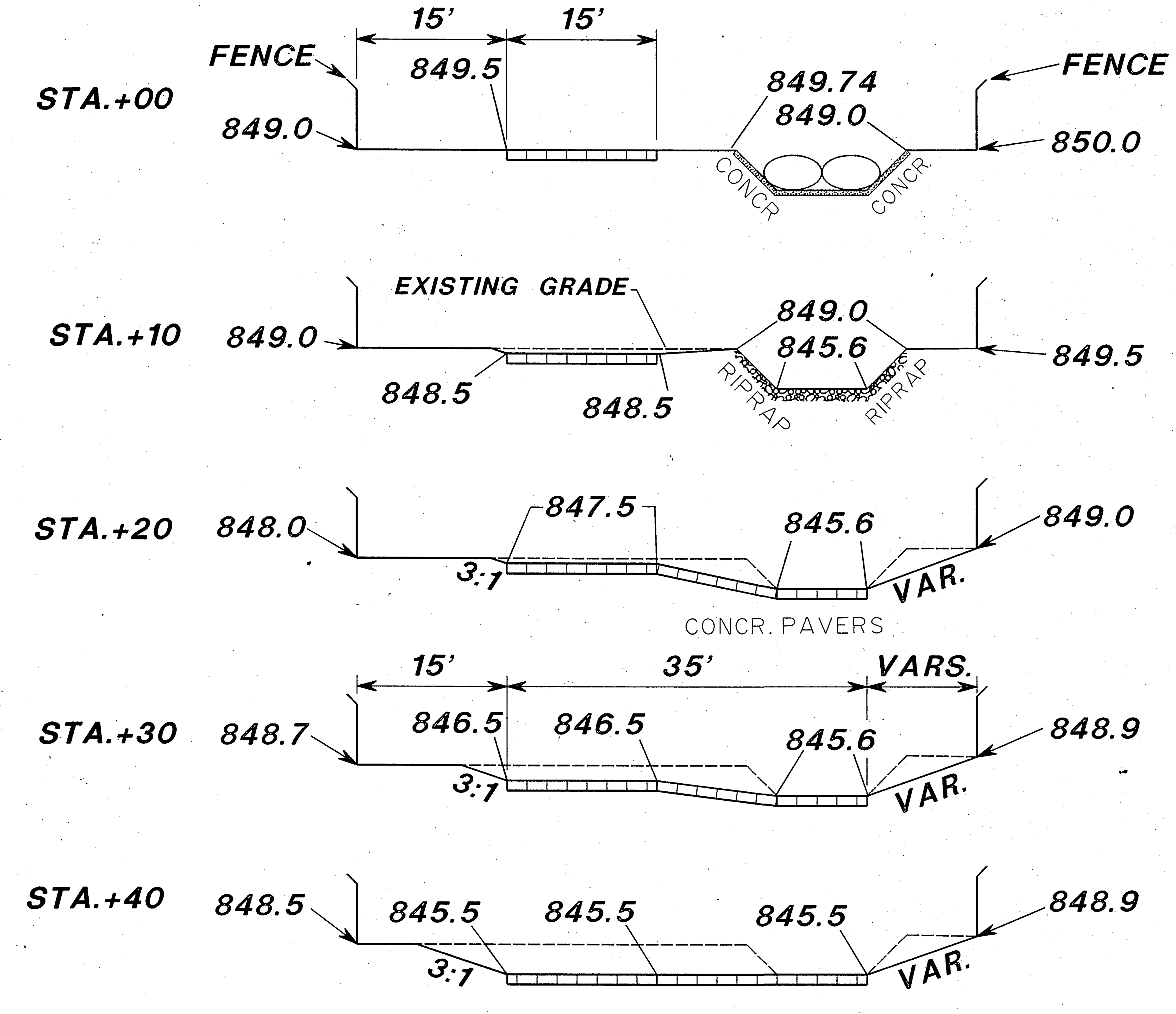
REV. -

1993-028

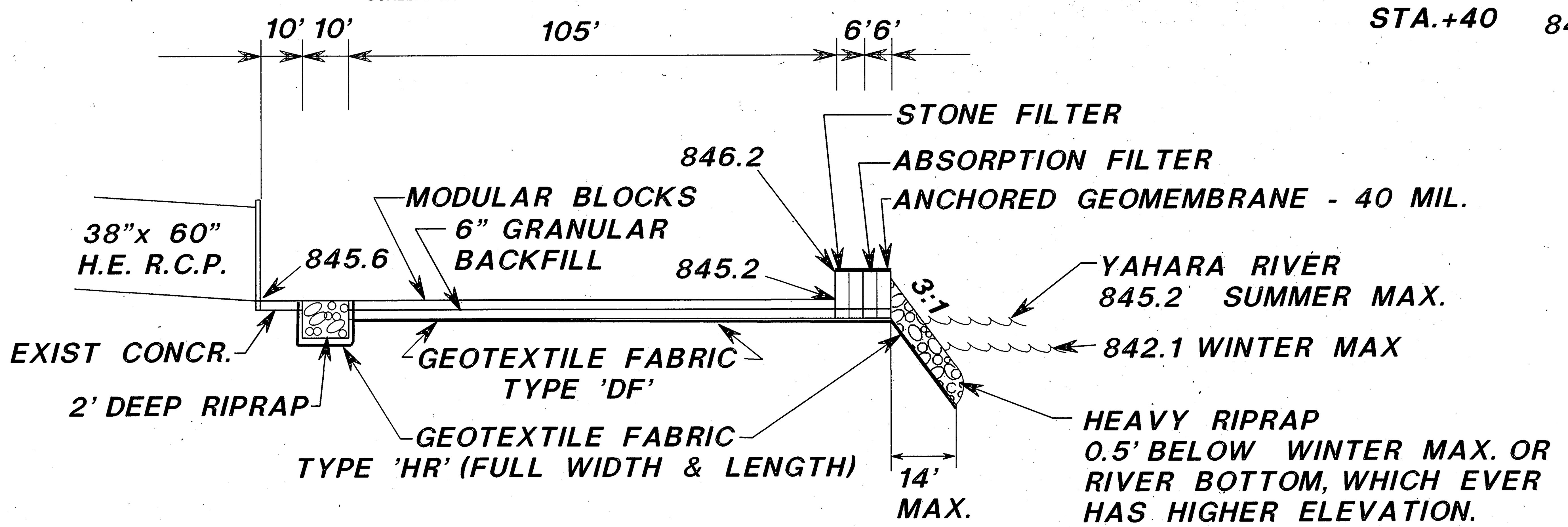


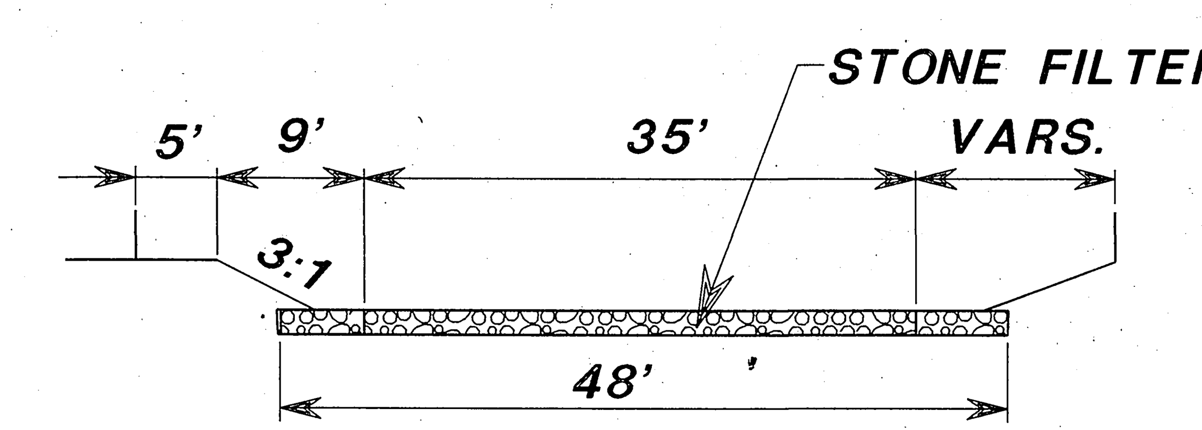
SITE PLAN

SCALE: 1"=20'

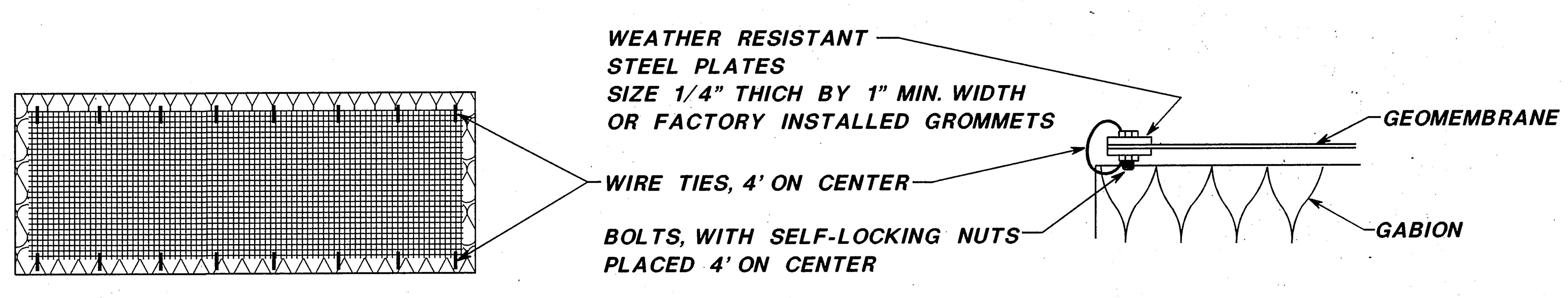


MODULAR BLOCK SECTIONS



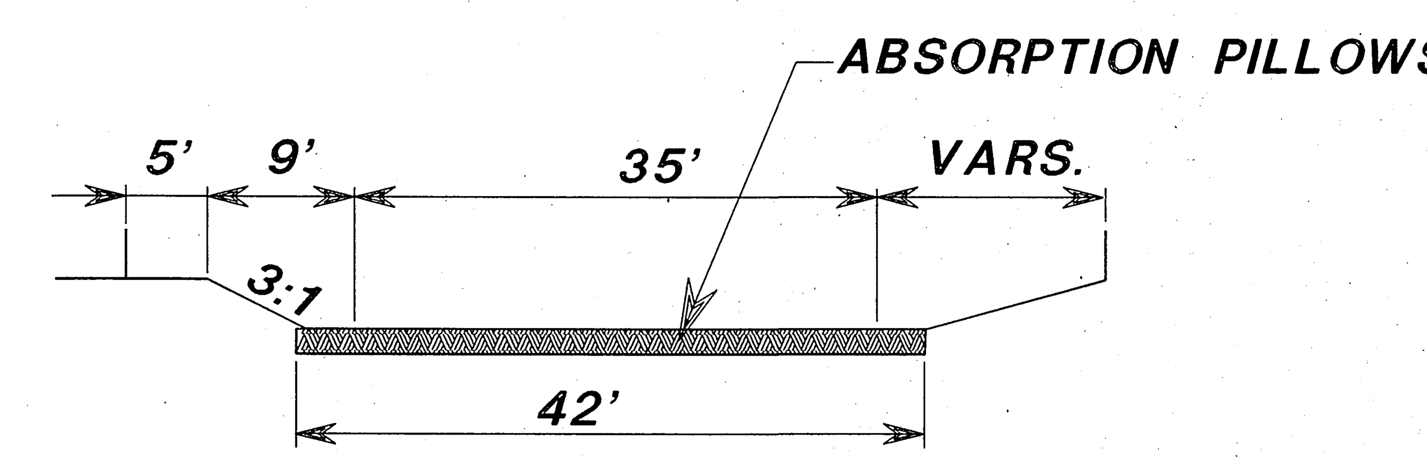


STONE FILTER SECTION



NOTE: TIE WIRE SHALL MEET SAME SPECIFICATIONS AS GABION TIE WIRE.

GABION GEOMEMBRANE COVER DETAILS



ABSORPTION FILTER SECTION

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-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

CITY OF MONONA, WI. INTERLAKE STORM SEWER DISCHARGE STUDY	PLAN AND SECTIONS	SCALE AS NOTED; DATE APRIL, 1993	DESIGNED M.L.K.; DRAWN T.J.H.; SURVEYED ---; CHECKED ---; APPROVED ---	MEAD & HUNT Consulting Engineers 6501 Watts Road Suite 101 Madison, Wisconsin 53719-1361 (608) 273-6380 / FAX (608) 273-6391	A8138-LS3; JOB NO. M257-92F; REV. -

1993-029

NO.	DATE	REVISION	INITIAL	NO.	DATE	REVISION	INITIAL
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

VILLAGE OF MONONA
WINNEQUAH PARKING LOT

TOPOGRAPHIC MAP

SCALE 1" = 10'
DATE MAY, 1993

DESIGNED -
DRAWN DMS
SURVEYED DLB, JRG
CHECKED -
APPROVED -

MEAD & HUNT
Consulting Engineers
6501 Watts Road Suite 101
Madison, Wisconsin 53719-1361
(608) 273-6380 / FAX (608) 273-6391

A8138-LS4
JOB NO. M257-93C
REV. -

1993-030

FIGURE 1B. SEDIMENT TRAP POND GRADING PLAN

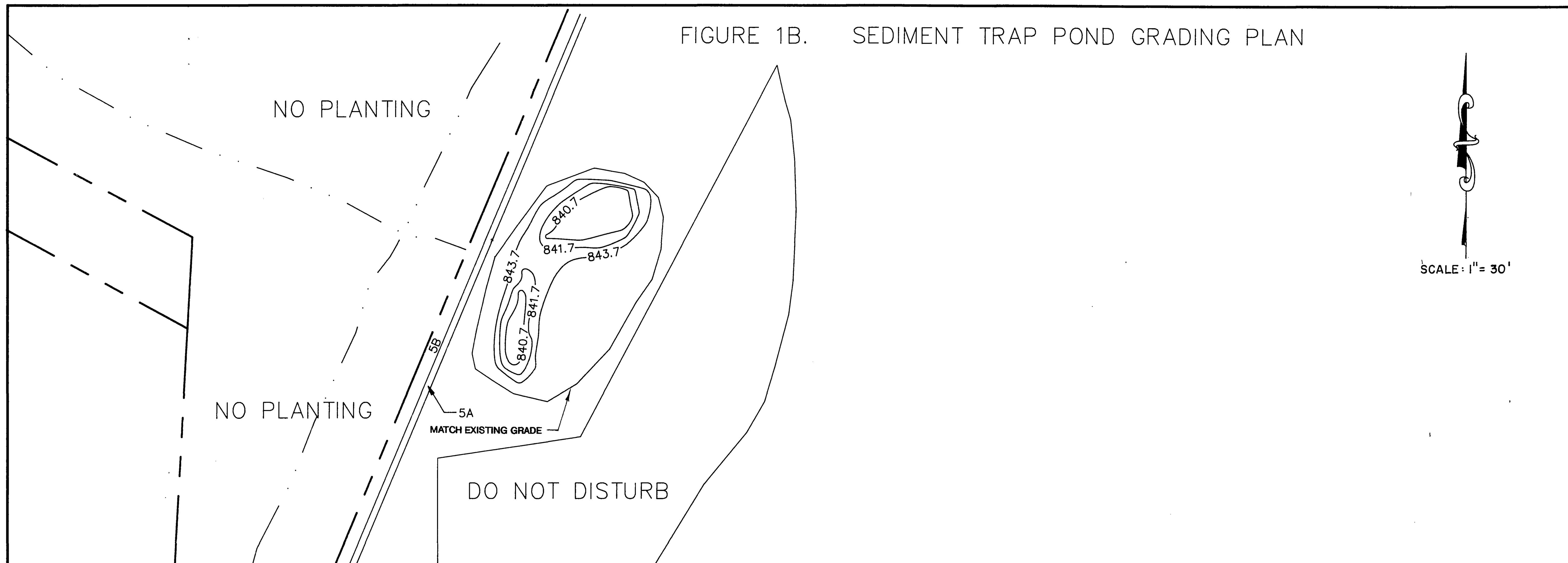


FIGURE 1C. WETLAND POND GRADING PLAN

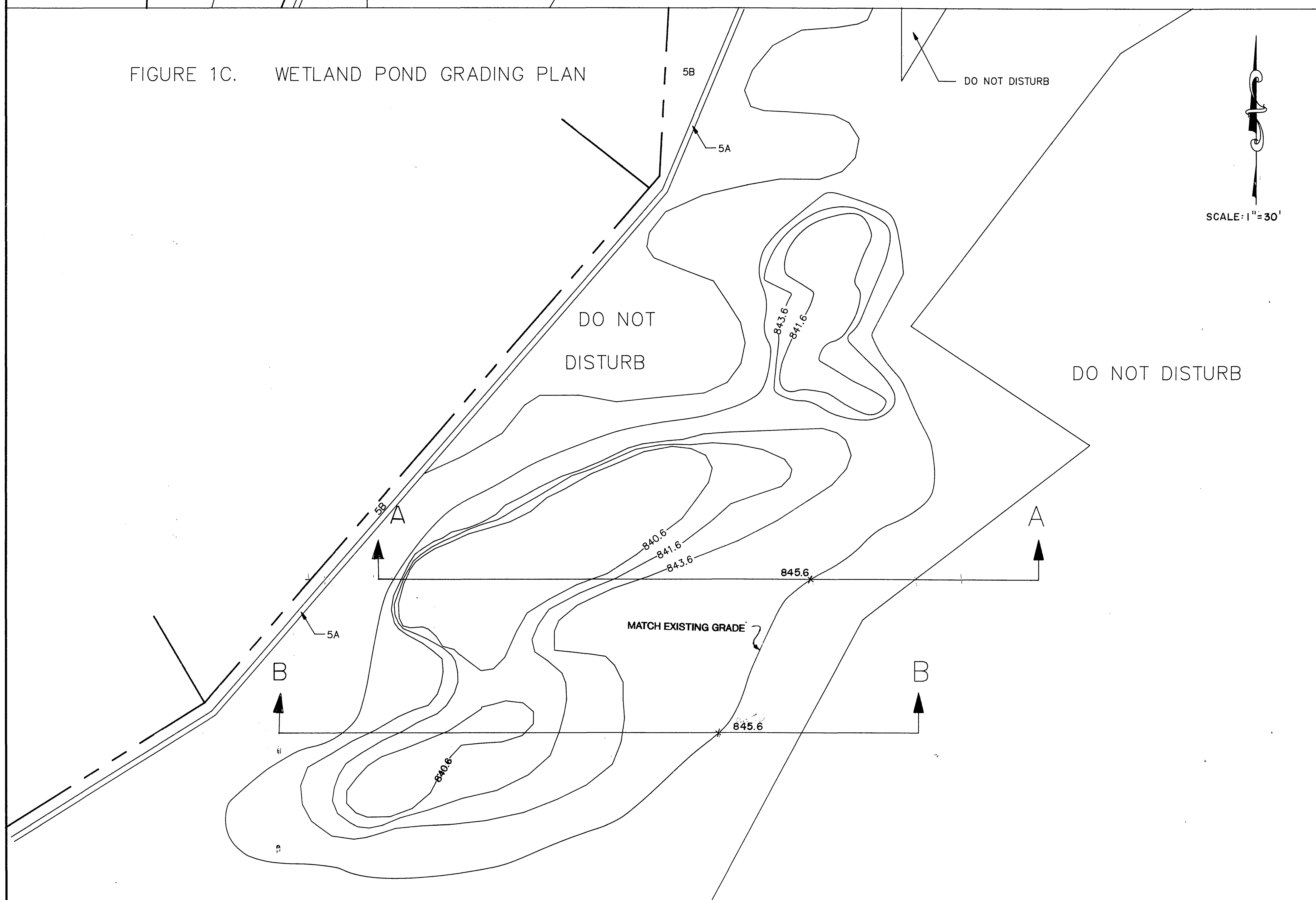
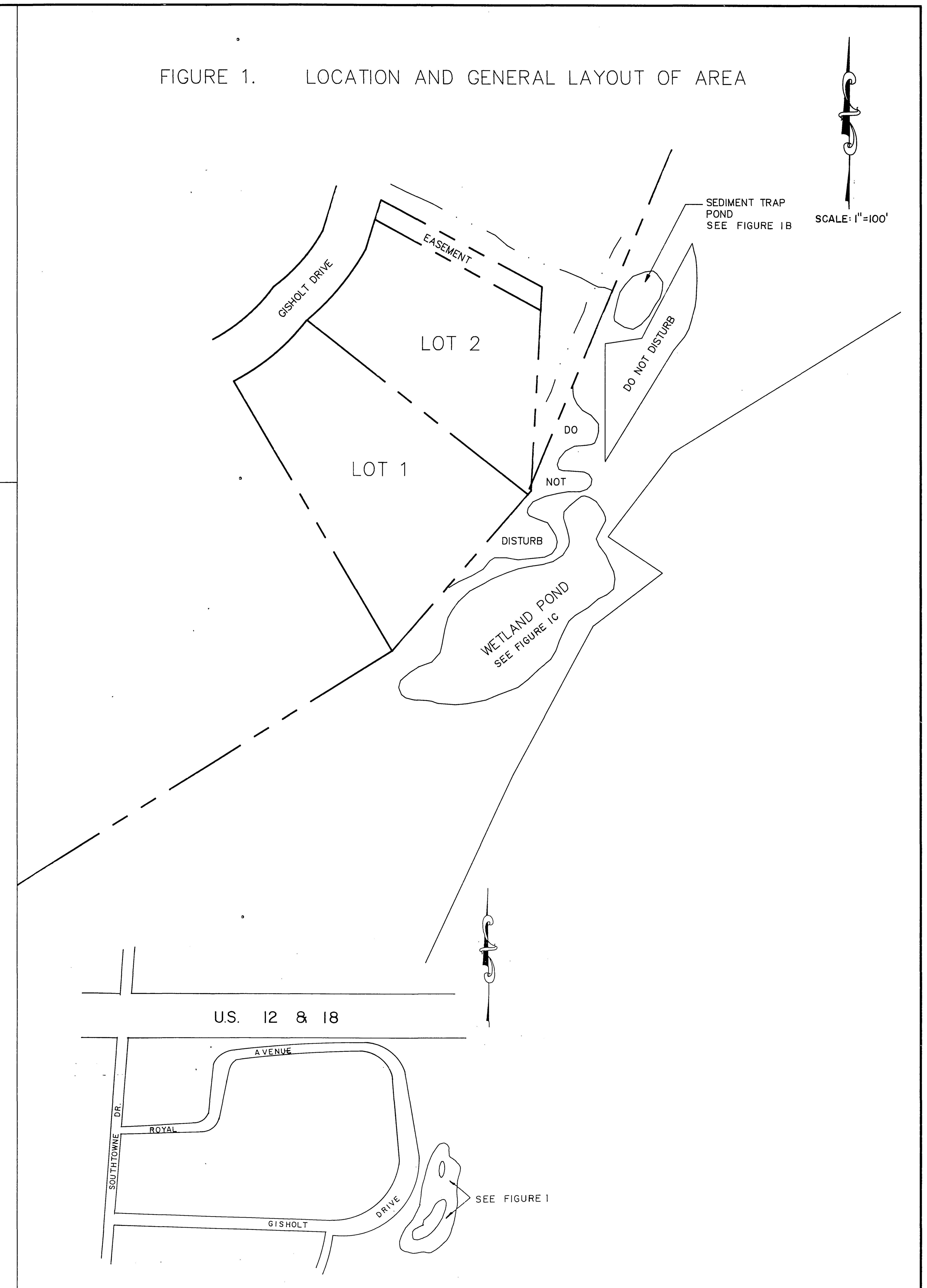


FIGURE 1. LOCATION AND GENERAL LAYOUT OF AREA



VICINITY MAP

CHRISTOPHER B. BURKE ENGINEERING LTD.
10275 West Higgins Road, Suite 460
Rosemont, Illinois 60018
(708) 296-0500

CLIENT : LAND AND WATER RESOURCES, INC.
JOHN RYAN
OFFICE 708/387-0827
3451 GRAND BOULEVARD BROOKFIELD, IL 60513

APPLIED ECOLOGICAL SERVICES, INC.
ROUTE 3, SMITH ROAD, P.O. BOX 256
BRODHEAD, WISCONSIN 53520
(608) 897-8547
STEVE APFELBAUM

NO.	DATE	NATURE OF REVISION	BY	CHKD.

DSGN.	JR
DWN.	PDR
CHKD.	
SCALE :	

TITLE :

PROJECT NO.	93-56
DATE :	
SHEET	OF
DRAWING NO.	

1993-031

FIGURE 1B. SEDIMENT TRAP POND GRADING PLAN

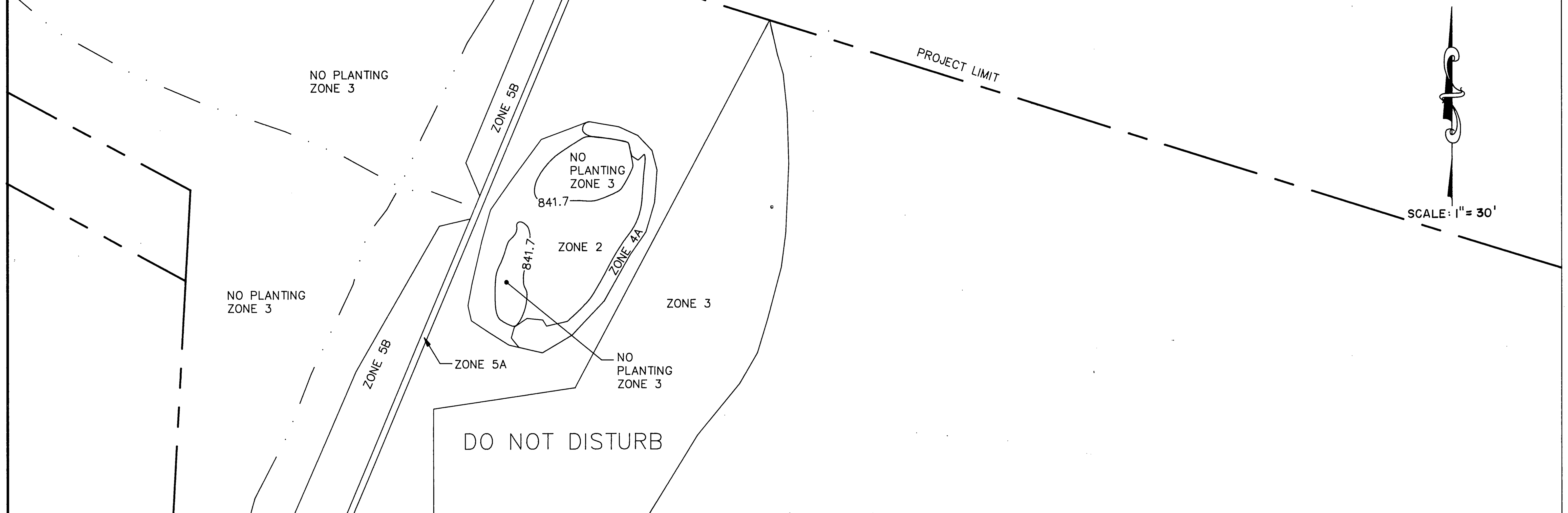


FIGURE 1C. WETLAND POND GRADING PLAN

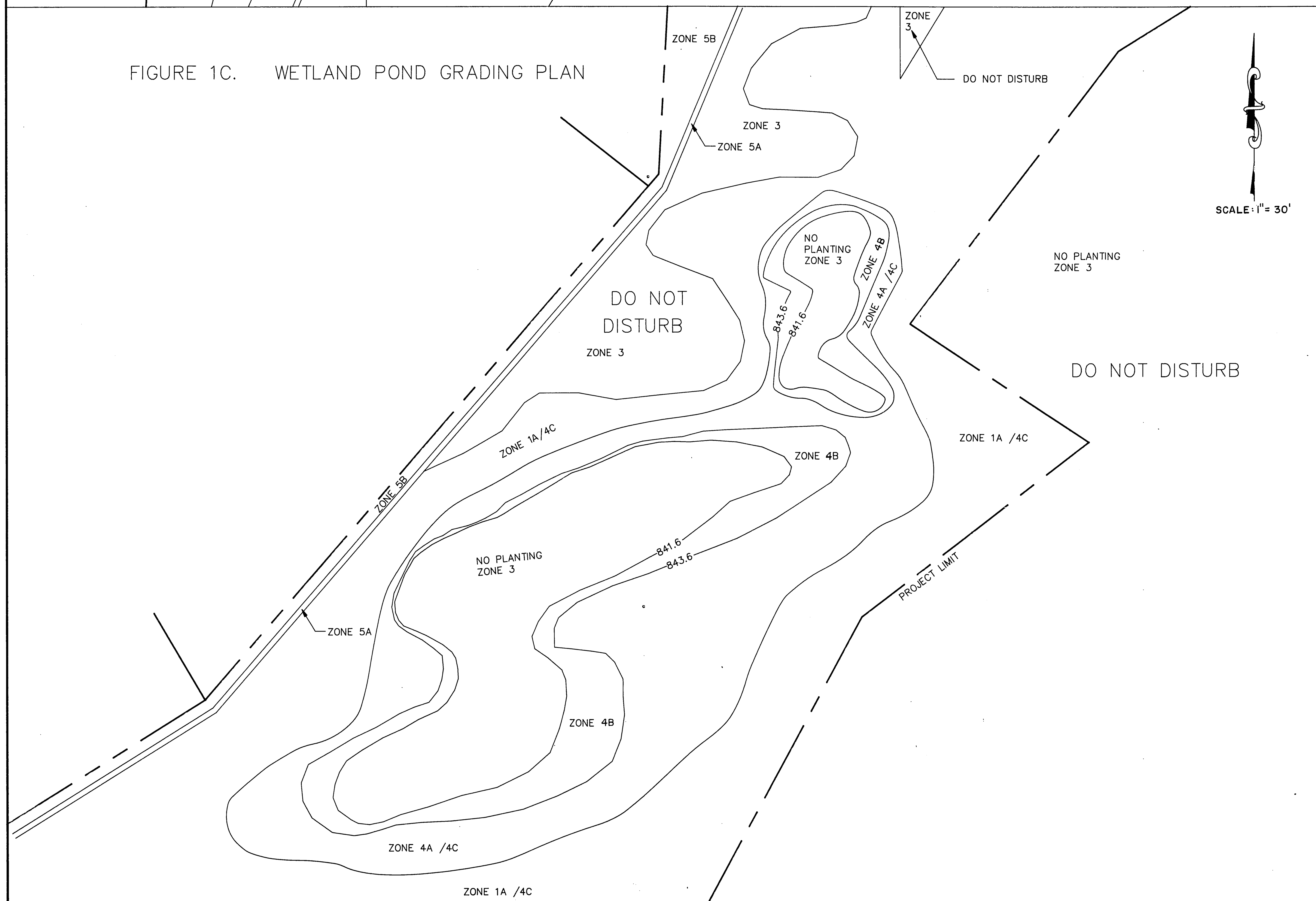
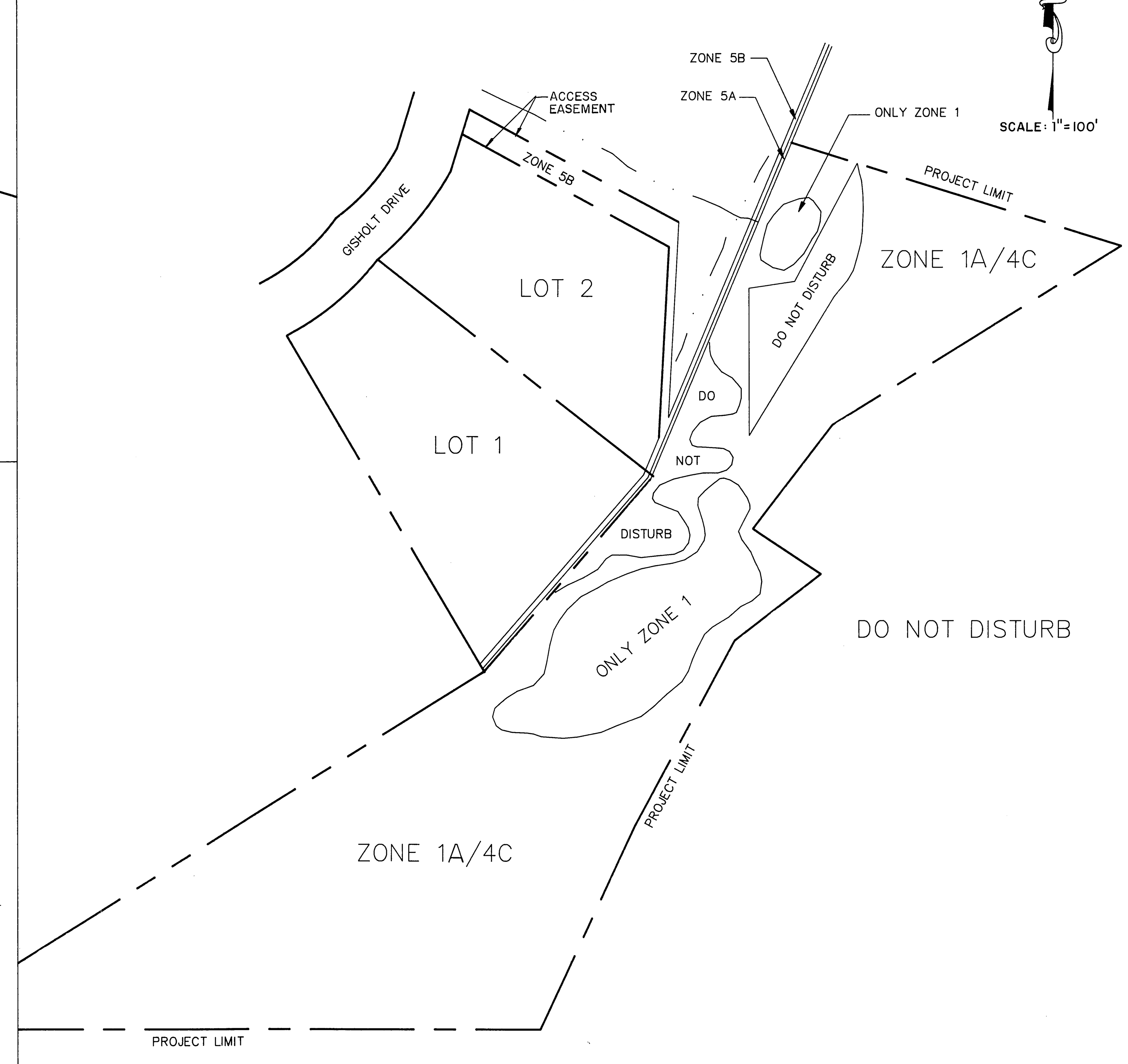


FIGURE 2. OVERALL SITE WORK AND GENERAL LAYOUT OF AREA



CHRISTOPHER B. BURKE ENGINEERING LTD.
10275 West Higgins Road, Suite 460
Rosemont, Illinois 60018
(708) 296-0500

CLIENT : LAND AND WATER RESOURCES, INC.
JOHN RYAN
OFFICE 708/387-0827
3451 GRAND BOULEVARD BROOKFIELD, IL 60513

APPLIED ECOLOGICAL SERVICES, INC.
ROUTE 3, SMITH ROAD, P.O. BOX 256
BRODHEAD, WISCONSIN 53520
(608) 897-8547
STEVE APFELBAUM

NO.	DATE	NATURE OF REVISION	BY	CHKD.

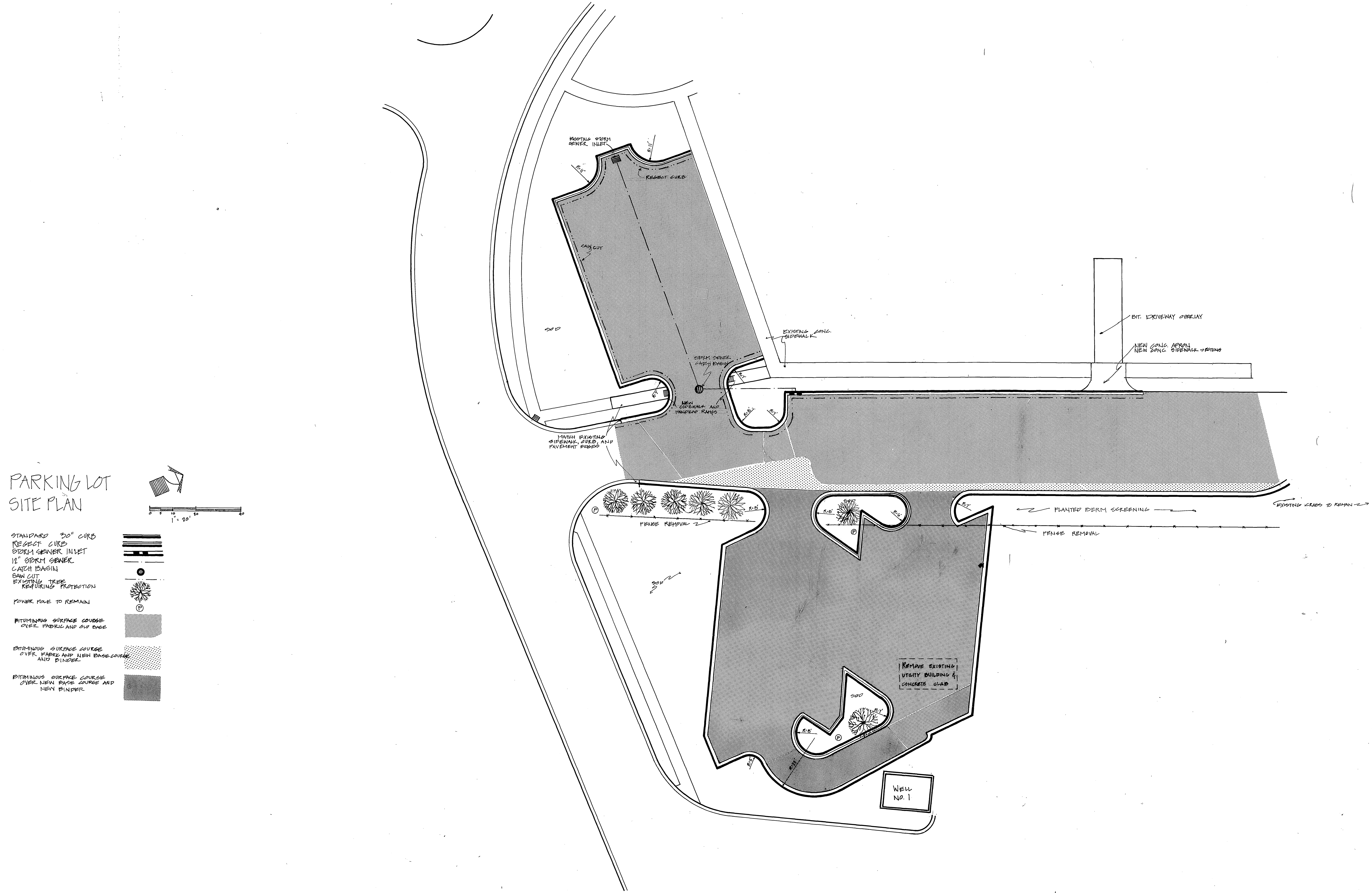
DSGN.	JR
DWN.	PDR
CHKD.	
SCALE :	

TITLE :

1993-032

PROJECT NO.	93-56
DATE :	
SHEET	OF
DRAWING NO.	

UTILITY DRAWER DRAWING 107-A



PARKING LOT SITE PLAN
0 5 10 20 40
1" = 20'
STANDARD 30" CURB
REGECT CURB
STORM SEWER INLET
12" STORM SEWER
CATCH BASIN
SAW CUT
EXISTING TREE REQUIRING PROTECTION
POWER POLE TO REMAIN
BITUMINOUS SURFACE COURSE OVER FABRIC AND OLD BASE
BITUMINOUS SURFACE COURSE OVER FABRIC AND NEW BASE COURSE AND BINDER
BITUMINOUS SURFACE COURSE OVER NEW BASE COURSE AND NEW BINDER
EXISTING STORM SEWER INLET
R=11'
R=11'
REGECT CURB
SAW CUT
SOD
EXISTING CONC. SIDEWALK
STORM SEWER CATCH BASIN
R=7'
R=7'
R=8'
R=7'
NEW SIDEWALK AND HANDICAP RAMPS
MATCH EXISTING SIDEWALK, CURB, AND PAVEMENT EDGES
BIT. DRIVEWAY OVERLAY
NEW CONC. APRON
NEW CONC. SIDEWALK SECTIONS
R=8'
FENCE REMOVAL
SOD
R=8'
R=6'
R=7'
PLANTED BERM SCREENING
FENCE REMOVAL
EXISTING GRADES TO REMAIN
SOD
REMOVE EXISTING UTILITY BUILDING & CONCRETE SLAB
SOD
R=7'
R=8'
R=5'
WELL NO. 1

1933-035

APPENDIX D

Existing City-wide WinSLAMM Modeling Results

vierbicher
planners | engineers | advisors

999 Fourier Drive, Suite 201
Madison, Wisconsin 53717
(608) 826-0532 phone
(608) 826-0530 FAX
www.vierbicher.com

August 29, 2014

Daniel Stephany – Director of Public Works
City of Monona
5211 Schluter Road **VIA EMAIL**
Monona, WI 53716

Re: Municipal Separate Storm Sewer System (MS4) Modeling Update
City of Monona, Wisconsin

Dear Dan:

As part of the City's current stormwater management planning efforts, we have updated the stormwater computer models for the city's watersheds. The stormwater models are used to estimate the total suspended solids (TSS) and phosphorus in stormwater runoff discharged from the City's watersheds to surface waters of the State. In addition, the models can be used to determine the percent reduction of TSS and phosphorus due to stormwater Best Management Practices (BMPs) that the City has constructed, or that have been constructed on privately owned property in the City. A brief review of the steps taken to update the stormwater models follows.

1. We began to update the models by converting the year 2007 SLAMM version 8.5 models to the most current version (10.1.1) of SLAMM. During this process, we presumed that the land use areas and BMPs in the existing models were up to date with the year 2007 conditions and WDNR modeling guidance at that time.

2. Next, the City owned BMPs constructed since 2007 were added to the models by reviewing the City's storm sewer system GIS map, and obtaining record drawings of the new BMPs from the City's Department of Public Works staff. The City's current street sweeping and catch basin cleaning practices (vacuum assisted street cleaning every four weeks, and semi-annual catch basin cleaning) were also included as BMPs in the "with controls" modeling condition.

3. The models were adjusted to current WDNR MS4 modeling standards by reviewing available WDNR MS4 modeling guidance documents, addressing the review comments in Eric Rortvedt's (WDNR stormwater review staff) 11/28/2008 email, and current discussions with Eric Rortvedt. As was done in the 2007 models, and consistent with WDNR guidance documents, State and County freeway areas within the City were excluded from the models.

4. Several sites within the City of Monona have been redeveloped since the 2007 models were completed. We reviewed our site plan review files from 2007 to 2013 and compiled a list of redeveloped sites. The attached "Redeveloped Sites" list includes the site name, location, site specific BMPs, and the site specific model estimated pollutant reduction percentage for each site. The site specific BMPs were added to the City's stormwater models.

5. We added watershed index numbers to the attached City of Monona "Municipal Storm Sewer System" map. The watershed index number corresponds to the first number in the names of the stormwater models. The letters and numbers after the dash (-) in the model names match the names of the 2007, version 8.5 models.

6. We ran the updated models and prepared results summaries. Model configuration diagrams and the "Outfall Output Summary" for each model can be found in the attached "MS4 Model Diagrams & Output Summaries". Results from running the updated models are summarized in the attached "Summary of MS4 Modeling Results" table. This table shows the estimated pollutant discharges from the "with controls (BMPs)" and the "without controls" conditions, and the percent pollutant control (reduction) achieved by the BMPs.

The City's "Totals" are listed at the bottom of the "Summary of MS4 Modeling Results" table. Of particular interest is the "TSS Control (%)" total. NR 151.13 (2) requires MS4 permit holders to work toward a 40% reduction of TSS in runoff that enters waters of the State as compared to the "no controls" condition. As you can see from the TSS Control % total, the updated modeling verifies that the City is meeting the current TSS reduction standard.

If you have any questions, please feel free to call me at 821-3956.

Sincerely,
VIERBICHER ASSOCIATES, INC.

Darrin R. Pope

Darrin R. Pope, PE

DRP/

Enclosures

MUNICIPAL STORM SEWER SYSTEM

WATERSHEDS & BEST MANAGEMENT PRACTICES

Redeveloped Sites
with Stormwater Best Management Practices

2007-2013

Stormwater Models Update - 2014

City of Monona, Wisconsin

Project No.: 140058.00
Date: 8/29/14

Site Name	Address	Watershed	Stormwater BMP	Site Specific SW BMP Modeled Performance	BMP/Site Notes
Fairway Glen	5005 Monona Drive; 5001, 5003, 5005, 5007 Gordon Ave	8	Wet Detention & CB Sumps	40%	
McDonalds	4905 Monona Drive	8	Wet Detention & CB Sumps	44%	Underground Detention.
Monona Heritage	111 Owen Road	10	Wet Detention	40%	Underground Detention.
Aldo Leopold Nature Center	330 Femrite Drive	13	Wet Detention	59%	Pond #3.
Homes on Femrite	215 Femrite Dr	14	Detention Basins	40%	
Badgerland Materials	925 E. Broadway Dr	16	Bio-retention Basin	40%	
Menards Site Plan Review	925 E. Broadway Dr	17	Bio-retention Basin	59%	
UW Yahara Clinic	1050 East Broadway	17	Wet Detention	81%	Regional Basin.
Meriter Clinic	6408 Copps Ave	17	Wet Detention & Rock Cribs	63%	
WPS Parking Lot Expansion	SW corner of WPS Drive & W Broadway	18	Bio-retention Basin & Rock Crib	91%	Removed area from model as it meets New Development standards of NR 115.12 per WDNR Developed Urban Area Guidance 11/24/10.
Walmart SW Credit App	2101 Royal Ave	21	Wet Detention	95%	
Speedway	2500 Royal Ave.	21	Wet Detention & CB Sumps	41%	Underground Detention.
Farrell Equipment & Supply	6809 Mangrove Lane	22	Wet Detentionn & Bio-Retention	43%	Underground Detention.

MS4 Model Diagrams & Output Summaries

Stormwater Models Update - 2014

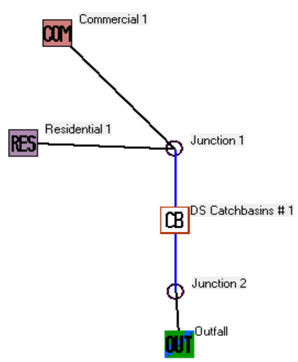
City of Monona, Wisconsin

Project No.: 140058.00

Date: 8/29/14

Watershed #

1



File Name:
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Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	3.173E+06		0.43	96.71	19158	
Outfall Total with Controls	3.173E+06	0.00 %	0.43	82.55	16352	14.65 %
Current File Output: Annualized Total After Outfall Controls	634649	Years in Model Run:	5.00		3270	

Pollutant	Concen-tration - No Controls	Concen-tration - With Controls	Concen-tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	96.71	82.55	mg/L	19158	16352	lbs	14.65 %
Total Phosphorus	0.3052	0.2735	mg/L	60.45	54.19	lbs	10.37 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 12.450

Total Control Practice Costs

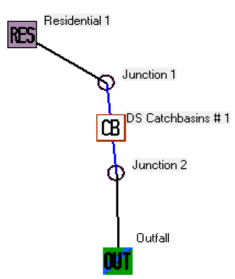
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.43	Poor
With Controls	0.43	Poor

1A



File Name:
M:\Monona, City of\140058_Storm Water Planning\SLAMM Update\2014 SLAMM Files\1A-ExEc.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	922397		0.39	153.5	8836	
Outfall Total with Controls	922396	0.00 %	0.39	118.0	6796	23.09 %
Current File Output: Annualized Total After Outfall Controls	184479	Years in Model Run:	5.00		1359	

Pollutant	Concen-tration - No Controls	Concen-tration - With Controls	Concen-tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	153.5	118.0	mg/L	8836	6796	lbs	23.09 %
Total Phosphorus	0.4455	0.3674	mg/L	25.65	21.16	lbs	17.54 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 3.980

Total Control Practice Costs

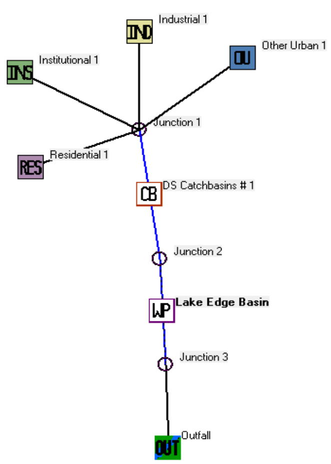
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.39	Poor
With Controls	0.39	Poor

2



File Name:
M:\Monona, City of\140058_Storm Water Planning\SLAMM Update\2014 SLAMM Files\2-ExEcMO09.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	1.155E+06		0.25	185.1	13353	
Outfall Total with Controls	1.098E+06	4.94 %	0.24	134.9	9248	30.74 %
Current File Output: Annualized Total After Outfall Controls	219610	Years in Model Run:	5.00		1850	

Pollutant	Concen-tration - No Controls	Concen-tration - With Controls	Concen-tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	185.1	134.9	mg/L	13353	9248	lbs	30.74 %
Total Phosphorus	0.6537	0.5406	mg/L	47.15	37.06	lbs	21.40 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 7.610

Total Control Practice Costs

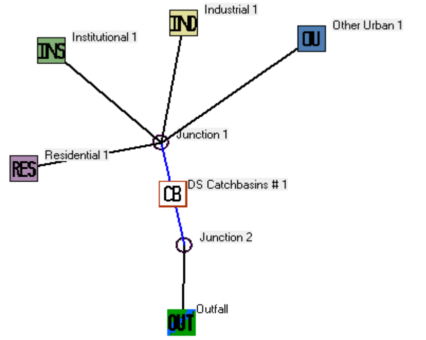
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.25	Poor
With Controls	0.24	Poor

3



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Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	1.958E+07		0.22	121.5	148570	
Outfall Total with Controls	1.958E+07	0.00 %	0.22	100.7	123134	17.12 %
Current File Output: Annualized Total After Outfall Controls	3.917E+06	Years in Model Run:	5.00		24627	

Pollutant	Concentration - No Controls	Concentration - With Controls	Concentration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	121.5	100.7	mg/L	148570	123134	lbs	17.12 %
Total Phosphorus	0.5390	0.4822	mg/L	659.0	589.5	lbs	10.54 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 146.700

Total Control Practice Costs

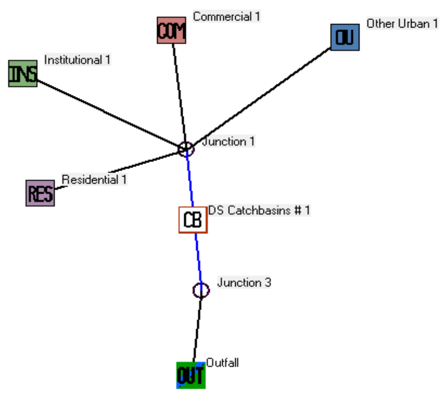
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.22	Poor
With Controls	0.22	Poor

4



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Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	2.213E+07		0.21	131.4	181527	
Outfall Total with Controls	2.213E+07	0.00 %	0.21	104.7	144570	20.36 %
Current File Output: Annualized Total After Outfall Controls	4.426E+06	Years in Model Run:	5.00		28914	

Pollutant	Concentration - No Controls	Concentration - With Controls	Concentration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	131.4	104.7	mg/L	181527	144570	lbs	20.36 %
Total Phosphorus	0.5714	0.4986	mg/L	789.4	688.8	lbs	12.74 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 174.970

Total Control Practice Costs

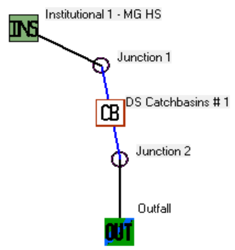
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.21	Poor
With Controls	0.21	Poor

5



File Name:
M:\Monona, City of\140058_Storm Water Planning\SLAMM Update\2014 SLAMM Files\5-ExEcMO08.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	4.136E+06		0.35	182.8	47197	
Outfall Total with Controls	4.136E+06	0.00 %	0.35	153.3	39582	16.13 %
Current File Output: Annualized Total After Outfall Controls	827240	Years in Model Run:	5.00		7916	

Pollutant	Concentration - No Controls	Concentration - With Controls	Concentration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	182.8	153.3	mg/L	47197	39582	lbs	16.13 %
Total Phosphorus	0.4719	0.4208	mg/L	121.8	108.7	lbs	10.83 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 20.020

Total Control Practice Costs

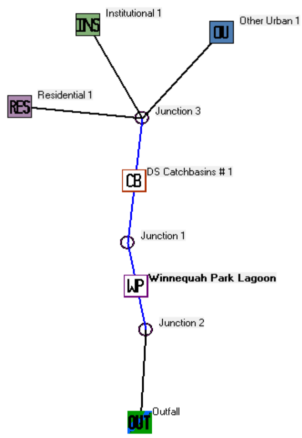
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.35	Poor
With Controls	0.35	Poor

6



File Name:
M:\Monona, City of\140058_Storm Water Planning\SLAMM Update\2014 SLAMM Files\6-ExEcMO05.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	2.653E+07		0.19	131.9	218508	
Outfall Total with Controls	2.633E+07	0.75 %	0.19	41.43	68091	68.84 %
Current File Output: Annualized Total After Outfall Controls	5.266E+06	Years in Model Run:	5.00		13618	

Pollutant	Concen-tration - No Controls	Concen-tration - With Controls	Concen-tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	131.9	41.43	mg/L	218508	68091	lbs	68.84 %
Total Phosphorus	0.5904	0.3154	mg/L	977.9	518.4	lbs	46.99 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 231.300

A pond has overflowed during a model run. Review outfall runoff volume event-by-event output to determine which pond it is.

Total Control Practice Costs

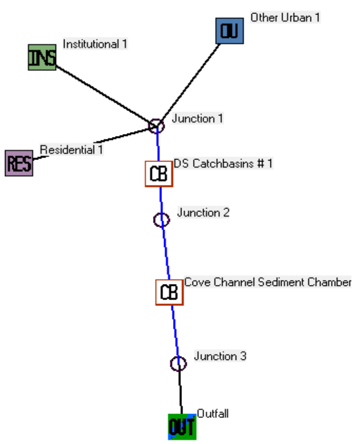
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.19	Poor
With Controls	0.19	Poor

7



File Name:
M:\Monona, City of\140058_Storm Water Planning\SLAMM Update\2014 SLAMM Files\7-ExEcMO04.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	1.278E+06		0.18	132.4	10559	
Outfall Total with Controls	1.278E+06	0.00 %	0.18	105.9	8447	20.00 %
Current File Output: Annualized Total After Outfall Controls	1.281E+06	Years in Model Run:	1.00		8470	

Pollutant	Concen-tration - No Controls	Concen-tration - With Controls	Concen-tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	132.4	105.9	mg/L	10559	8447	lbs	20.00 %
Total Phosphorus	0.6415	0.5631	mg/L	51.17	44.91	lbs	12.23 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 61.990

Total Control Practice Costs

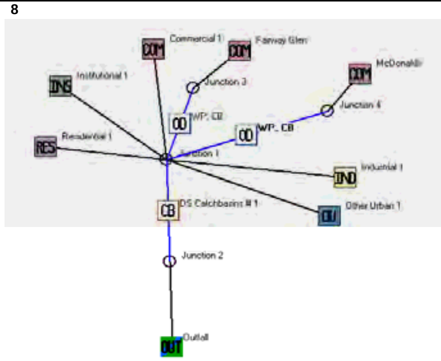
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.18	Poor
With Controls	0.18	Poor

8



File Name:
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Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	2.952E+07		0.24	143.1	263673	
Outfall Total with Controls	2.952E+07	0.00 %	0.24	112.6	207440	21.33 %
Current File Output: Annualized Total After Outfall Controls	5.903E+06	Years in Model Run:	5.00		41488	

Pollutant	Concen-tration - No Controls	Concen-tration - With Controls	Concen-tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	143.1	112.6	mg/L	263673	207440	lbs	21.33 %
Total Phosphorus	0.5494	0.4744	mg/L	1012	874.2	lbs	13.64 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 205.820

Total Control Practice Costs

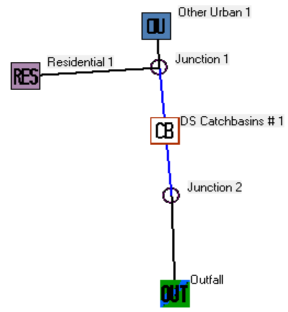
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.24	Poor
With Controls	0.24	Poor

9



File Name:
M:\Monona, City of\140058_Storm Water Planning\SLAMM Update\2014 SLAMM Files\9-ExEcMO02.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	4.015E+06		0.17	119.9	30064	
Outfall Total with Controls	4.015E+06	0.00 %	0.17	101.5	25449	15.35 %
Current File Output: Annualized Total After Outfall Controls	802955	Years in Model Run:	5.00		5090	

Pollutant	Concen-tration - No Controls	Concen-tration - With Controls	Concen-tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	119.9	101.5	mg/L	30064	25449	lbs	15.35 %
Total Phosphorus	0.6057	0.5502	mg/L	151.8	137.9	lbs	9.16 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 39.210

Total Control Practice Costs

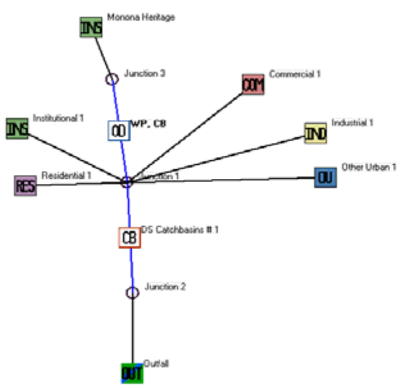
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.17	Fair
With Controls	0.17	Fair

10



File Name:
M:\Monona, City of\140058_Storm Water Planning\SLAMM Update\2014 SLAMM Files\10-ExEcYH06.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	4.041E+06		0.27	122.7	30966	
Outfall Total with Controls	4.041E+06	0.00 %	0.27	96.90	24445	21.06 %
Current File Output: Annualized Total After Outfall Controls	4.052E+06	Years in Model Run:	1.00		24512	

Pollutant	Concen-tration - No Controls	Concen-tration - With Controls	Concen-tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	122.7	96.90	mg/L	30966	24445	lbs	21.06 %
Total Phosphorus	0.5077	0.4395	mg/L	128.1	110.9	lbs	13.42 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 129.270

Total Control Practice Costs

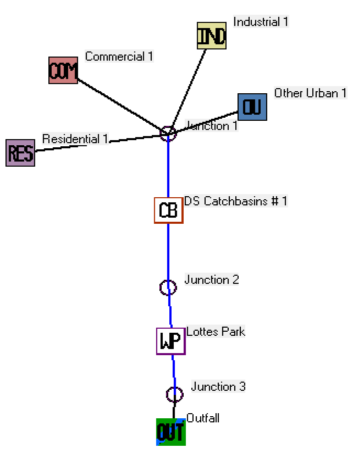
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.27	Poor
With Controls	0.27	Poor

11



File Name:
M:\Monona, City of\140058_Storm Water Planning\SLAMM Update\2014 SLAMM Files\11-ExEcYH04.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	1.341E+07		0.13	128.2	107322	
Outfall Total with Controls	1.331E+07	0.75 %	0.13	71.88	59740	44.34 %
Current File Output: Annualized Total After Outfall Controls	2.662E+06	Years in Model Run:	5.00		11948	

Pollutant	Concen-tration - No Controls	Concen-tration - With Controls	Concen-tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	128.2	71.88	mg/L	107322	59740	lbs	44.34 %
Total Phosphorus	0.7201	0.5201	mg/L	603.0	432.2	lbs	28.31 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 171.470

Total Control Practice Costs

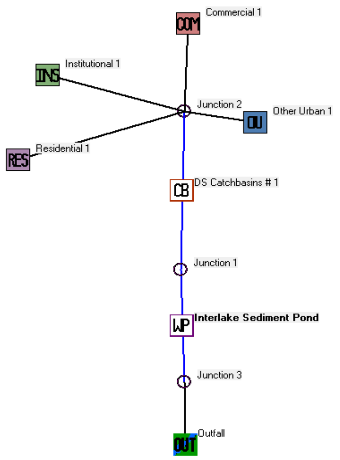
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.13	Fair
With Controls	0.13	Fair

12



File Name:
M:\Monona, City of\140058_Storm Water Planning\SLAMM Update\2014 SLAMM Files\12-ExEcYH05.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	8.706E+06		0.28	157.0	85303	
Outfall Total with Controls	8.627E+06	0.91 %	0.28	118.6	63894	25.10 %
Current File Output: Annualized Total After Outfall Controls	1.725E+06	Years in Model Run: 5.00			12779	

Pollutant	Concen-tration - No Controls	Concen-tration - With Controls	Concen-tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	157.0	118.6	mg/L	85303	63894	lbs	25.10 %
Total Phosphorus	0.5390	0.4502	mg/L	292.9	242.5	lbs	17.22 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 52.380

Total Control Practice Costs

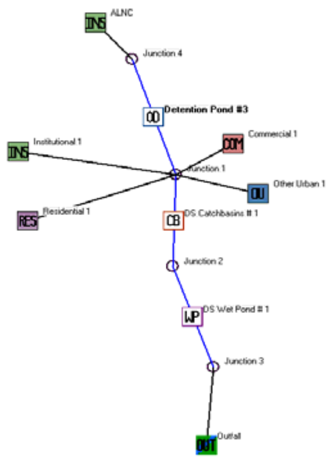
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.28	Poor
With Controls	0.28	Poor

13



File Name:
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Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	5.895E+06		0.16	188.6	69395	
Outfall Total with Controls	5.843E+06	0.88 %	0.16	106.2	38742	44.17 %
Current File Output: Annualized Total After Outfall Controls	1.169E+06	Years in Model Run: 5.00			7748	

Pollutant	Concen-tration - No Controls	Concen-tration - With Controls	Concen-tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	188.6	106.2	mg/L	69395	38742	lbs	44.17 %
Total Phosphorus	0.7318	0.5219	mg/L	269.3	190.4	lbs	29.31 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 62.610

Total Control Practice Costs

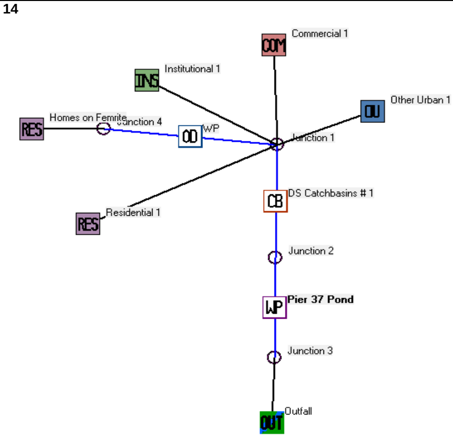
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.16	Fair
With Controls	0.16	Fair

14



File Name:
M:\Monona, City of\140058_Storm Water Planning\SLAMM Update\2014 SLAMM Files\14-ExEcML02.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	8.855E+06		0.22	196.7	108719	
Outfall Total with Controls	8.783E+06	0.81 %	0.22	54.92	30114	72.30 %
Current File Output: Annualized Total After Outfall Controls	1.757E+06	Years in Model Run: 5.00			6023	

Pollutant	Concen-tration - No Controls	Concen-tration - With Controls	Concen-tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	196.7	54.92	mg/L	108719	30114	lbs	72.30 %
Total Phosphorus	0.6209	0.2921	mg/L	343.2	160.2	lbs	53.34 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 67.500

Total Control Practice Costs

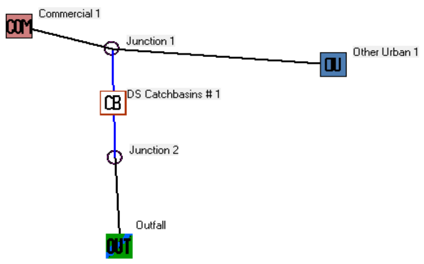
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.22	Poor
With Controls	0.22	Poor

15



File Name:
M:\Monona, City of\140058_Storm Water Planning\SLAMM Update\2014 SLAMM Files\15-ExEcML03.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	1.806E+06		0.21	188.4	21241	
Outfall Total with Controls	1.806E+06	0.00 %	0.21	135.3	15249	28.21 %

Current File Output: Annualized Total After Outfall Controls: 361200 | Years in Model Run: 5.00 | 3050

Pollutant	Concen- tration - No Controls	Concen- tration - With Controls	Concen- tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	188.4	135.3	mg/L	21241	15249	lbs	28.21 %
Total Phosphorus	0.5531	0.4506	mg/L	62.35	50.80	lbs	18.53 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 14.670

Total Control Practice Costs

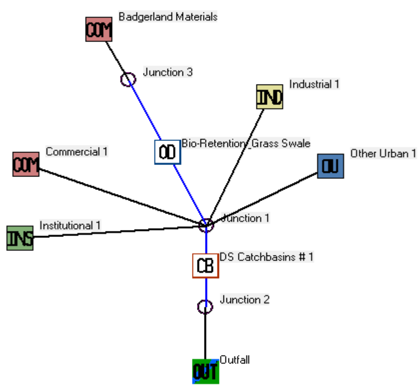
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.21	Poor
With Controls	0.21	Poor

16



File Name:
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Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	4.848E+06		0.32	225.3	68195	
Outfall Total with Controls	4.848E+06	0.00 %	0.32	164.9	49920	26.80 %

Current File Output: Annualized Total After Outfall Controls: 969693 | Years in Model Run: 5.00 | 9984

Pollutant	Concen- tration - No Controls	Concen- tration - With Controls	Concen- tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	225.3	164.9	mg/L	68195	49920	lbs	26.80 %
Total Phosphorus	0.5551	0.4582	mg/L	168.0	138.7	lbs	17.46 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 25.470

Total Control Practice Costs

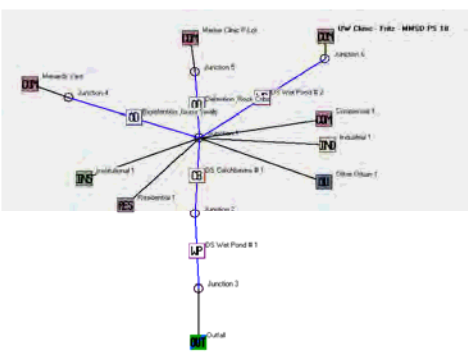
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.32	Poor
With Controls	0.32	Poor

17



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Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	2.153E+07		0.17	177.8	238987	
Outfall Total with Controls	2.135E+07	0.84 %	0.17	36.53	48686	79.63 %

Current File Output: Annualized Total After Outfall Controls: 4.269E+06 | Years in Model Run: 5.00 | 9737

Pollutant	Concen- tration - No Controls	Concen- tration - With Controls	Concen- tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	177.8	36.53	mg/L	238987	48686	lbs	79.63 %
Total Phosphorus	0.6577	0.3006	mg/L	884.0	400.6	lbs	54.68 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 208.970

Total Control Practice Costs

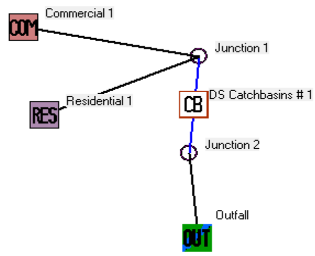
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.17	Fair
With Controls	0.17	Fair

18



File Name:
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Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	2.077E+07		0.31	127.9	165756	
Outfall Total with Controls	2.077E+07	0.00 %	0.31	110.0	142637	13.95 %
Current File Output: Annualized Total After Outfall Controls	4.153E+06	Years in Model Run:	5.00		28527	

Pollutant	Concen-tration - No Controls	Concen-tration - With Controls	Concen-tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	127.9	110.0	mg/L	165756	142637	lbs	13.95 %
Total Phosphorus	0.3698	0.3346	mg/L	479.4	433.7	lbs	9.52 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 114.160

Total Control Practice Costs

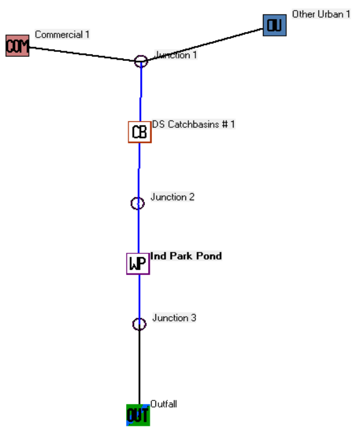
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.31	Poor
With Controls	0.31	Poor

19



File Name:
M:\Monona, City of\140058_Storm Water Planning\SLAMM Update\2014 SLAMM Files\19-ExEcYH02.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	1.042E+07		0.41	239.9	156116	
Outfall Total with Controls	1.033E+07	0.86 %	0.40	159.4	102860	34.11 %
Current File Output: Annualized Total After Outfall Controls	2.067E+06	Years in Model Run:	5.00		20572	

Pollutant	Concen-tration - No Controls	Concen-tration - With Controls	Concen-tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	239.9	159.4	mg/L	156116	102860	lbs	34.11 %
Total Phosphorus	0.5236	0.3808	mg/L	340.7	245.6	lbs	27.90 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 42.920

Total Control Practice Costs

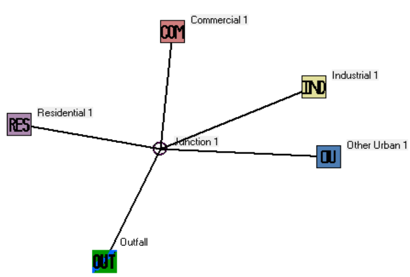
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.41	Poor
With Controls	0.40	Poor

20



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Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	5.664E+06		0.40	210.8	74540	
Outfall Total with Controls	5.664E+06	0.00 %	0.40	171.4	60624	18.67 %
Current File Output: Annualized Total After Outfall Controls	1.133E+06	Years in Model Run:	5.00		12125	

Pollutant	Concen-tration - No Controls	Concen-tration - With Controls	Concen-tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	210.8	171.4	mg/L	74540	60624	lbs	18.67 %
Total Phosphorus	0.5144	0.4595	mg/L	181.9	162.5	lbs	10.68 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 23.620

Total Control Practice Costs

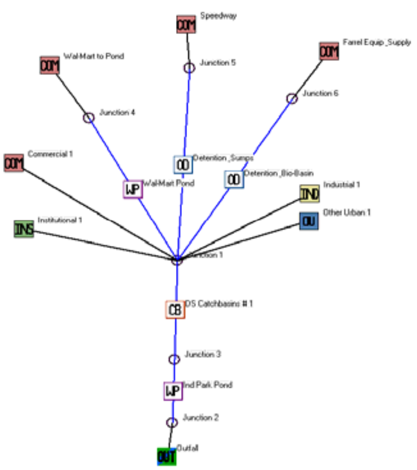
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.40	Poor
With Controls	0.40	Poor

21



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Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	2.339E+07		0.39	206.0	300807	
Outfall Total with Controls	2.316E+07	0.98 %	0.38	68.42	98920	67.12 %
Current File Output: Annualized Total After Outfall Controls	4.631E+06	Years in Model Run: 5.00			19784	

Pollutant	Concen-tration - No Controls	Concen-tration - With Controls	Concen-tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	206.0	68.42	mg/L	300807	98920	lbs	67.12 %
Total Phosphorus	0.4985	0.2623	mg/L	727.8	379.2	lbs	47.90 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 101.980

Total Control Practice Costs

Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

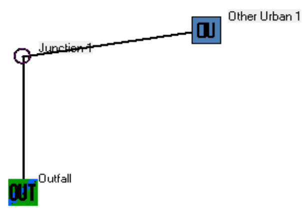
Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff

(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.39	Poor
With Controls	0.38	Poor

22



File Name:
M:\Monona, City of\140058_Storm Water Planning\SLAMM Update\2014 SLAMM Files\22-ExEcYH03.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	6.493E+06		0.05	227.0	92009	
Outfall Total with Controls	6.493E+06	0.00 %	0.05	227.0	92008	0.00 %
Current File Output: Annualized Total After Outfall Controls	1.299E+06	Years in Model Run: 5.00			18402	

Pollutant	Concen-tration - No Controls	Concen-tration - With Controls	Concen-tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	227.0	227.0	mg/L	92009	92008	lbs	0.00 %
Total Phosphorus	1.634	1.634	mg/L	662.3	662.3	lbs	0.00 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 220.120

Total Control Practice Costs

Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff

(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.05	Good
With Controls	0.05	Good

Summary of MS4 Modeling Results

Stormwater Models Update - 2014

City of Monona, Wisconsin

Project No.: 140058.00

Date: 12/2/14

Suggested format by Eric Rortvedt (WDNR)

Watershed Index # (label)	Model Name	Watershed Index	Area (acres)	Primary Land Use (R, C, etc.)	Total Suspended Solids: Discharge no controls (pounds)	Total Suspended Solids: Discharge with controls (pounds)	Total Suspended Solids: TSS Control (%)	Total Phosphorus: Discharge no controls (pounds)	Total Phosphorus: Discharge with controls (pounds)	Total Phosphorus: P Control (%)	Stormwater Practices Employed: Primary (WD, SW, etc.)	Stormwater Practices Employed: Other (WD, GS, etc.)	Public/Regional BMPs	Redeveloped Private Sites BMPs	Notes
					Summary of MS4 Modeling Results (annual averages)										
1	1-ExEcST01	ST16-U-0168-D-MAD-C	12	R	3,832	3,270	14.6%	12	11	10.4%	C, VS				
1A	1A-ExEc	MO13-A-0170-H-MAD-C	4	R	1,767	1,359	23.1%	5	4	17.5%	C, VS				
2	2-MO09	MO13-A-0009-H-MON-C	8	R	2,671	1,850	30.7%	9	7	21.4%	C, VS, WD		Lake Edge Park WD		
3	3-ExEcMO06	MO13-U-0006-A-MON-C	147	R	29,714	24,627	17.1%	132	118	10.5%	C, VS				
4	4-ExEcMO07	MO13-B-0007-A-MON-C	175	R	36,305	28,914	20.4%	158	138	12.7%	C, VS				
5	5-ExEcMO08	MO13-U-0008-A-MON-C	20	I	9,439	7,916	16.1%	24	22	10.8%	C, VS				MG High School
6	6-ExEcMO05	MO12-A-0005-A-MON-C	231	R	43,696	13,547	69.0%	196	103	47.1%	CB, VS, WD		Winnequah Park WD Firemen's Park WD & GS		
7	7-ExEcMO04	MO11-A-0004-A-MON-C	62	R	2,112	1,689	20.0%	51	45	12.2%	C, VS	O (Sediment Structure)	Cove Channel Sed. Struct.		
8	8-ExEcMO03	MO11-B-0003-A-MON-C	205	R	52,735	41,488	21.3%	202	175	13.6%	C, VS			Fariway Glen WD, C; McDonalds WD, C	
9	9-ExEcMO02	MO11-U-0002-A-MON-C	39	R	6,013	5,090	15.4%	30	28	9.2%	C, VS				
10	10-ExEcYH06	YH02-A-0006-D-MON-C	126	R	6,193	4,889	21.1%	26	22	13.4%	C, VS			Monona Heritage C, WD	
11	11-ExEcYH04	YH02-U-0004-A-MON-C	172	R	20,716	11,437	44.8%	117	84	28.5%	CB, VS, WD		Lottes Park WD	Treysta on the Water B, C	State and County Freeways not included = WDOT & County MS4s.
12	12-ExEcYH05	YH02-B-0005-D-MON-C	52	R	17,061	12,779	25.1%	59	49	17.2%	CB, VS, WD		Interlake Sediment Basin		
13	13-ExEcML05	PE01-U-0005-B-MON-C	63	R	13,879	7,748	44.2%	54	38	29.3%	C, VS, WD		City Park WD	Aldo Leopold Nat. Center WD	
14	14-ExEcML02	YH02-C-0002-B-MON-C	68	C	21,744	6,023	72.3%	69	32	53.3%	C, VS, WD		Pier 37 WD	Homes on Femrite WD	State and County Freeways not included = WDOT & County MS4s.
15	15-EcEcML03	PE01-A-0003-B-MON-C	15	C	4,248	3,050	28.2%	12	10	18.5%	C, VS				
16	16-ExEcML04	PE01-B-0004-B-MON-C	24	C	13,639	9,984	26.8%	34	28	17.4%	C, VS			Baderland Materials, B	
17	17-ExEcML01	PE01-U-0006-D-MON-C	196	C	47,797	9,737	79.6%	177	80	54.7%	C, VS, WD			Menards B; UW Clinic WD; Meriter Clinic WD	State and County Freeways not included = WDOT & County MS4s.
18	-	YH01-U0002-A-MON-C	113	C	33,151	28,527	13.9%	96	87	9.5%	C, VS			WPS P-lot removed = mets New Development Stnds.	State and County Freeways not included = WDOT & County MS4s.
19	19-ExEcYH02	YH01-U-0007-A-MON-C	43	C	31,223	20,572	34.1%	68	49	27.9%	C, VS, WD, I		Industrial Park WD, I		
20	22-ExEcMO01	MO09-U-0483-A-MAD-C	24	D	14,908	12,125	18.7%	36	33	10.7%					
21	21-ExEcYH01	YH01-A-0001-A-MON-C	98	C	60,161	19,784	67.1%	146	76	47.9%	CB, VS, WD		Industrial Park WD	Wal-Mart WD; Speedway C, WD; Farrel Equip Supply WD, B	State and County Freeways not included = WDOT & County MS4s.
22	20-ExEcYH03	YH01-U-0003-A-MON-C	220	O	18,402	18,402	0.0%	132	132	0.0%					Undeveloped Wetlands > 5 acres. State and County Freeways not included = WDOT & County MS4s.
Totals			**2,115**		**491,406**	**294,808**	**40.0%**	**1,845**	**1,370**	**25.8%**					

Land Use Areas: R: residential; I: institutional; C: commercial; D: industrial; O: open urban; F: freeways

Stormwater Practices: WD: wet detention; SW: street sweeping; VS: vacuum streets; B: biofiltration; I: infiltration; C: catch basin; DC: drainage control; GS: Grass Swale; O: other control

APPENDIX E

Structural BMP Opportunity Details

Grass Swales

Grass swales remove pollutants by filtration through the grass and infiltration into the soil. The water quality benefits of a grass swale retrofit are largely based on the infiltrating capacity of the underlying soils and the depth to groundwater. A grass swale located in sandy soil has much higher pollutant reduction as compared to a grass swale located in clayey soil or compacted soil. Grass swales are typically located along streets and are best suited for low- to medium-density residential land uses (i.e., single-family houses on 0.25 – 0.5 acre lots). Most streets located within the city have curb and gutter with storm sewers. Converting the existing street drainage infrastructure to grass swales is likely to be cost prohibitive on a city-wide scale. This option may be viable if it can be incorporated into a larger redevelopment project. Grass swales can typically provide a 15 percent reduction in total suspended solids (TSS) and a 10 percent reduction in total phosphorus (TP).

If implemented, Wisconsin Department of Natural Resources (WDNR) Conservation Practice Standard 1005 (Vegetated Infiltration Swale) should be consulted for design and construction criteria. This standard can be found at http://dnr.wi.gov/topic/stormwater/standards/postconst_standards.html. Storm water runoff quality improvements resulting from this opportunity can be accounted for in the city-wide storm water quality runoff model (see **Section 2.4**).

Biofiltration

Biofiltration devices remove pollutants by filtrating through an engineered soil. WDNR Technical Standard 1004 (Bioretention) requires a 2-foot-deep engineered soil layer that consists of a sand, compost, and topsoil mixture. Prairie flowers, grasses, shrubs, and/or trees are typically planted in a mulch layer located above the engineered soil. During a rainfall, storm water is temporarily stored above the mulch layer until it can be filtered through the engineered soil. A perforated underdrain pipe located beneath the engineered soil collects the filtered water and discharges it into an adjacent storm sewer or other conveyance system. Biofiltration devices are for small drainage areas (less than 2 acres). Biofiltration devices are identified as a "bioretention" device when the native soils located beneath the engineered soil layer are sufficiently permeable and storm water can easily infiltrate into the native soils. In sandy soils it may be feasible to eliminate the perforated underdrain pipe so that all of the filtered storm water is infiltrated into the underlying native soil. Bioretention devices are typically used to recharge groundwater and improve storm water quality, whereas biofiltration devices are only used to improve storm water quality. Based on WDNR regulations, storm water runoff at sites with soil contamination should not be infiltrated due to concern for groundwater contamination.

Bioretention devices can also include bio-swales. These devices have a longitudinal slope to facilitate water conveyance, rather than simply ponding water. Bio-swales typically have a linear configuration and are generally installed within parking lots or along streets. They can be used to recharge groundwater and provide water quality benefits. Bio-swales may include an underdrain pipe to remove excess water infiltrating through the swale.

Biofiltration, bio-swales, and other similar devices in clay soils with an underdrain pipe can typically provide a 60 percent reduction in TP and an 80 reduction in TSS. In sandy soils, these devices can reduce TP and TSS by 100 percent if all runoff from the average annual rainfall infiltrates.

City of Monona soils are predominantly silt/loam with moderate infiltration rates (hydrologic soil group B). Although soil types vary and should be confirmed prior to individual project implementation, in general, any of the biofiltration devices described above could be a feasible means of improving runoff quality in the city.

Biofiltration devices are a cost effective option with high TSS removal rates. However, they require significant open land and are not readily implemented in developed areas like the city of Monona. Biofiltration could be evaluated for construction at underutilized open spaces. If implemented, WDNR Conservation Practice Standard 1004 (Bioretention for Infiltration) should be consulted for design and construction criteria. This standard can be found at http://dnr.wi.gov/topic/stormwater/standards/postconst_standards.html, along with a technical note for performing site evaluations for utilizing infiltration-type devices. Storm water runoff quality improvements resulting from this opportunity can be accounted for in the city-wide storm water quality runoff model (see **Section 2.4**).

Infiltration Basin

An infiltration basin is a water impoundment constructed with a permeable subsoil. The infiltration basin temporarily stores storm water and allows it to infiltrate through the bottom and sides of the basin. Pollutants are removed by infiltrating water into the underlying soil. The primary functions of an infiltration basin are to provide groundwater recharge, reduce runoff volumes, and reduce peak discharge rates. By promoting infiltration rather than discharge, infiltration basins also provide water quality improvements.

Infiltration basins require pretreatment to prevent soil clogging and failure. WDNR Conservation Practice Standard 1003 (Infiltration Basin) requires a pretreatment system to reduce the TSS load entering an infiltration basin by 60 percent for a residential land use and 80 percent for a commercial, industrial, or institutional land use. A grass swale system, bioretention device, or wet detention pond are typical pretreatment devices. WDNR regulations prohibit infiltration from areas with soil contamination due to concerns of groundwater contamination.

In order for an infiltration basin to be feasible, the depth to groundwater typically needs to be 5 feet or more. Sandy or silty subsoils are ideal to promote infiltration. Soils in the city are predominately silt/loam (hydrologic soil group B). Soil and groundwater conditions at any particular site will need to be evaluated to determine the feasibility of using infiltration basins within the city.

Like biofiltration devices, infiltration basins require significant open land and are not readily implemented in developed areas like the city of Monona. Infiltration basins could be evaluated for construction at underutilized open spaces. If implemented, WDNR Conservation Practice Standard 1003 (Infiltration Basin) should be consulted for design and construction criteria. This standard can be found at http://dnr.wi.gov/topic/stormwater/standards/postconst_standards.html, along with a technical note for performing site evaluations for utilizing infiltration-type devices.

Storm water runoff quality improvements resulting from this opportunity can be accounted for in the city-wide storm water quality runoff model (see **Section 2.4**).

Wet Detention Basin

Wet detention basins are effective at removing sediment, phosphorus, heavy metals, hydrocarbons, and bacteria. Pollutant removal within a wet basin is primarily due to gravity settling of particulates. Filtration, adsorption, and microbial decomposition also remove pollutants. A permanent pool depth of 5 feet is typically provided to minimize re-suspension of previously removed sediment and phosphorus during a rainfall event. Wet detention basins are typically more cost effective in clay soils than biofiltration or infiltration. In order to protect groundwater and maintain a permanent pool, a liner is typically needed for basins located within sandy or silty soils. Wet detention basins also provide flood storage benefits by detaining runoff and releasing it at a controlled rate and with a lag in peak discharge timing.

To achieve an 80 percent TSS reduction and a 60 percent TP reduction, a wet detention basin needs to remove the 3 to 5 micron particle size. Wet detention basins are well suited for larger watersheds (> 15 to 20 acres in clay soil). A wet detention basin located in a small watershed may develop stagnation problems and become a public nuisance. Public acceptance of storm water Best Management Practices (BMPs) is important to the success of a municipal storm water program.

Wet detention basins require significant open land and are not readily implemented in developed areas like the city of Monona. Wet detention basins could be evaluated for construction at underutilized open spaces. If implemented, WDNR Conservation Practice Standard 1001 (Wet Detention Pond) shall be consulted for design and construction criteria. This standard can be found at http://dnr.wi.gov/topic/stormwater/standards/postconst_standards.html. Storm water runoff quality improvements resulting from this opportunity can be accounted for in the city-wide storm water quality runoff model (see **Section 2.4**).

Retrofit Existing Detention Basins

Existing detention basins may be retrofitted to provide improved TSS and TP reductions. Retrofits may include expanding the basins, deepening the basins, and altering outlet structures. Basins designed in accordance with the wet detention basin criteria described above can achieve TSS and TP reductions of 80 and 60 percent, respectively. Basins achieving less than this may be considered for retrofits. Factors that will need to be evaluated for determining the feasibility of retrofitting basins include available space to expand, groundwater levels, environmental considerations (see **Section 4.9**), and cost. In addition, detailed storm water modeling would be required prior to implementation of a retrofit project.

Proprietary Sediment Removal Devices

Proprietary sediment removal devices are manufactured structures that promote the removal of sediment through gravity settling. The devices are chambers or sets of chambers which may include internal baffles or other equipment and associated piping that is provided as a defined product by a commercial vendor and is warranted by that vendor to provide a specific storm water pollutant removal performance under specified conditions. These devices can consist of prefabricated equipment supplied by a manufacturer, structures constructed on site, or a combination thereof. These devices can typically provide a 10 to 40 percent reduction in TSS and a 5 to 20 percent reduction in TP.

At a minimum, any time a major outfall (see **Section 2.2.1**) is repaired/replaced, incorporation of a proprietary sediment removal device should be considered for its feasibility to be incorporated into the outfall design, considering available space and costs.

If implemented, WDNR Conservation Practice Standard 1006 (Method for Predicting Efficiency for Proprietary Storm Water Sedimentation Devices) should be consulted for design, testing, and construction criteria. This standard can be found at http://dnr.wi.gov/topic/stormwater/standards/postconst_standards.html. Storm water runoff quality improvements resulting from this opportunity can be accounted for in the city-wide storm water quality runoff model (see **Section 2.4**).

Permeable Pavement

Permeable pavement systems are designed to achieve water quality and quantity benefits by allowing storm water to infiltrate through the pavement surface and into a base/subbase reservoir. Permeable pavements promote infiltration and groundwater recharge, reduce the discharge of storm water pollutants, reduce storm water discharge volumes and rates, and reduce the temperature of storm water discharges. These systems are most effective in areas where subsoil and groundwater conditions are suitable for storm water infiltration and the risk for groundwater contamination is minimized. Appropriate conditions for infiltration are identified in ss. NR 151.124 and 151.241, Wisconsin Administrative Code. Permeable pavements can typically provide a 55 to 100 percent reduction in TSS and a 35 to 100 percent reduction in TP.

Permeable pavements may be suitable for parking lot reconstruction. Because turning movements can be damaging to permeable pavements, a new public parking area could be designed with conventional pavement driving aisles and permeable pavement parking stalls.

If implemented, WDNR Conservation Practice Standard 1008 (Permeable Pavement) should be consulted for design and construction criteria. This standard can be found at http://dnr.wi.gov/topic/stormwater/standards/postconst_standards.html, along with a technical note for performing infiltration rate, pollutant load, and runoff volume reduction modeling for these types of devices. Storm water runoff quality improvements resulting from this opportunity can be accounted for in the city-wide storm water quality runoff model (see **Section 2.4**).

Catch Basins

In accordance with City policy, inlets are replaced with catch basins during road reconstruction projects or other infrastructure improvements. Catch basin sumps are effective for parking lots and streets that serve small drainage areas, typically less than 1 acre. Catch basin sumps should have at least 3 feet of depth below the discharge pipe to minimize scouring of settled particles during a rainfall. Catch basins can typically provide a 10 to 30 percent reduction in TSS and a 10 to 20 percent reduction in TP.

As additional inlets are converted to catch basins, storm water quality improvements resulting from this opportunity can be accounted for in the city-wide storm water quality runoff model (see **Section 2.4**).

Bank Stabilization

The city-wide water quality model (see **Section 2.4**) assumes all banks are stabilized.
As unstable banks are noted in the city limits, they should be evaluated for stabilization in accordance with WDNR requirements based on the erosivity of the shoreline location. Bank stabilization measures may include hard armor (e.g., riprap) or biological armor (e.g., live stakes, biologs). Further information regarding bank stabilization can be found on the WDNR website at http://dnr.wi.gov/topic/Waterways/shoreline/lake_erosion.html.

Because the storm water quality model assumes banks are stable, no credits would be provided by the city-wide storm water quality runoff model (see **Section 2.4**). Rather, bank stabilization projects support this model assumption.

Other BMPs

Other emerging urban BMPs may be considered, including the addition of aluminum sulfate (alum) to storm water treatment devices. The City of Madison is performing a storm water alum demonstration project at the Marion-Dunn Pond (aka Glenway Pond). The study will be conducted for three years. Progress on this project can be monitored on the City of Madison webpage at http://www.cityofmadison.com/engineering/stormwater/AlumPilotProject.cfm.

Storm water runoff quality improvements resulting from this opportunity will be accounted for in the city-wide storm water quality runoff model (see **Section 2.4**).

APPENDIX F

BMP Maintenance Schedule

Typical BMP Maintenance/Inspection Schedule

BMP	Activity	Schedule
Grass Swale	Inspect swale for signs of erosion, obstructions and sediment buildup	Annually
	Mow swale (maintain minimum grass height of 6 – 8 inches) Remove undesirable vegetation and tree growth	Twice per year
	Remove sediment build-up	As needed
Biofiltration	Inspect biofiltration device, outfalls, and overflow structures (if applicable) for signs of erosion, damage, clogging, obstructions and sediment buildup	Annually
	Remove sediment, undercut 2 feet, replace undercut with engineered soil mix and restore in kind	When system shows standing water beyond 72 hours of rain event
Infiltration Basin	Inspect basin, outfalls and outlet structure for damage, erosion, sediment level and obstructions	Annually
	Mow basin (maintain minimum grass height of 6 – 8 inches) Remove undesirable vegetation and tree growth	Twice per year
	Remove sediment build-up and restore in kind	When system shows standing water beyond 72 hours of rain event
Detention Pond	Inspect basin, outfalls and outlet structure for damage, erosion, sediment level and obstructions	Annually
	Mow basin (maintain minimum grass height of 6 – 8 inches) Remove undesirable vegetation and tree growth	Twice per year
	Remove sediment build-up	As needed
Proprietary Sediment Removal Devices	Inspect device annually for settlement, deformation, cracking, sedimentation, signs of ponding, obstructions and erosion	Annually
	Remove sediment buildup and debris	As needed
	Perform other maintenance	In accordance with manufacturer's recommendations
Permeable Pavement	Inspect pavement and outfalls for signs of damage, erosion and clogging	Annually
	Clean surface	Minimum twice per year
	Inspect observation wells to verify draining correctly	72 hours after a rain event of 0.5 inch or greater
Catch Basins	Inspect for signs of damage Remove sediment buildup	Twice per year

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