MEMORANDUM

DATE: March 10, 2010

TO: Amy Supple and Matt Morris, Landmark X, LLC

FROM: Betsy Powers and Mark Huber

SUBJECT: Stormwater Management for Proposed Edgewater Hotel Redevelopment

BT Squared, Inc., has developed a preliminary plan for managing stormwater runoff from the proposed Edgewater Hotel redevelopment. The plan is based on the requirements of Ch. 37, City of Madison Ordinances and our meeting with Gregg Fries, City of Madison Engineering, on January 29, 2010. The key areas addressed by the plan are:

- Sediment (total suspended solids [TSS]) control
- Oil and grease control

These key issues will be addressed with the installation of a stormwater treatment system located near the proposed loading dock. Details of the plan are presented in the following sections.

Stormwater Conveyance and Rate Control

The conceptual Stormwater Management Plan addresses new impervious vehicle accessible areas:

- Auto court
- Private drive (Langdon Avenue extension) and loading dock

The plan also addresses stormwater runoff from the plaza and roof top areas. The conceptual-level stormwater management infrastructure is shown on **Drawing C1.03** and further described below.

Vehicle-accessible areas will be graded so that stormwater runoff drains to storm sewer inlets. The storm sewer system for the private drive has been designed to accommodate stormwater runoff from a 10-year, 24-hour storm event. The storm sewer system for the auto court and loading dock areas has been designed to accommodate a 100-year, 24-hour storm event, which includes high intensity rainfall over a short period of time. The storm sewers for these areas outlet at a single location into Lake Mendota.

Plaza and rooftop drainage for the new building will be collected in yard and roof drains and discharged to the same Lake Mendota outlet structure. A piping layout for the rooftop and plaza yard drains will be provided by the mechanical contractor as the project progresses. The National Guardian Life underground parking structure will include a grassed roof that will allow runoff to sheet flow to the surrounding grassed areas.

The existing storm sewer that runs across the Edgewater property and serves portions of Wisconsin Avenue and Langdon Street will be re-routed across the private drive and will discharge to the Lake Mendota outlet. A properly sized outlet control structure will be designed to limit erosion at the discharge point. Other than this minor storm sewer re-routing, management of stormwater runoff from adjacent City of Madison streets will remain unchanged from current conditions.

Under City of Madison ordinance, runoff rate control is not required, because the proposed redevelopment will result in less than 20,000 square feet of new impervious area. Due to the site's immediate proximity to Lake Mendota, stormwater runoff rate control will serve limited benefit to the City

or the environment, because there are no downstream features that will be impacted from the quantity of runoff from the site.

Stormwater Treatment

Stormwater runoff from the vehicle-accessible areas (auto court, private drive, and loading dock) of the redevelopment will be collected in stormwater inlets and diverted to a treatment device located near the proposed loading dock on the southeast corner of the site.

The stormwater treatment device promotes the settling of particulates and captures oil and grease from the runoff. Treated stormwater discharged from the treatment device will flow into the storm sewer that outlets into Lake Mendota. The proposed treatment system will remove 72% of the TSS generated on the redeveloped site. This TSS removal rate is nearly double the 40% TSS removal rate required by code. Operation and maintenance of the treatment system and associated stormwater conveyance system will be performed under a future stormwater management maintenance agreement with the City of Madison. Treatment system removal efficiency calculations are presented in **Attachment A**.

Runoff from the remaining development (e.g., the plaza area and roof areas) will be directed to roof drains, ultimately discharging to the lake. Runoff from these areas is considered clean; therefore, water quality treatment is not required. The green spaces in the plaza and their associated underdrain systems will provide some water filtration and reduction of stormwater runoff volumes and velocities.

Silt fence and temporary diversion berms will be used to control sediment transport during construction. The locations of erosion control devices are shown on **Drawing C1.03**. A detailed Erosion Control Plan will be developed during the next phase of this project.

An Erosion Control Plan and Stormwater Management Plan will be prepared in accordance with the requirements of ss. 37.08 and 37.09, respectively. These plans will be prepared and submitted once the design concepts have been finalized.

Stormwater Infiltration

Stormwater infiltration is not required for redevelopment sites under City of Madison ordinance. Based on the proposed site layout and proximity to Lake Mendota, stormwater infiltration is likely unfeasible due to shallow groundwater conditions in open areas of the site. The Dane County regional groundwater model indicates that Lake Mendota serves as a net groundwater recharge area. Therefore, infiltration immediately adjacent to the lake will serve limited environmental benefit.

BP/lmh/MH
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LEGEND

- EXISTING GRADE (2' CONTOUR)
- EXISTING GRADE (10' CONTOUR)
- EXISTING TREELINE/VEGETATION
- EXISTING SHORELINE
- PROPERTY LINE (SUBJECT PROPERTY)
- PROPERTY LINE/RIGHT-OF-WAY
- EXISTING FENCE
- EXISTING ELECTRIC UTILITY
- EXISTING GAS MAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING WATER MAIN
- EXISTING HYDRANT
- EXISTING MANHOLE
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- PROPOSED STORM SEWER
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- PROPOSED SEDIMENT TRAP
- PROPOSED SILT FENCE/DIVERSION BERM
- PROPOSED SPOT ELEVATION (68.60)
- PROPOSED SLOPE (2.5%)

20 0 20

SCALE REDUCED
NOT TO SCALE

PROJECT NORTH

NOTES:

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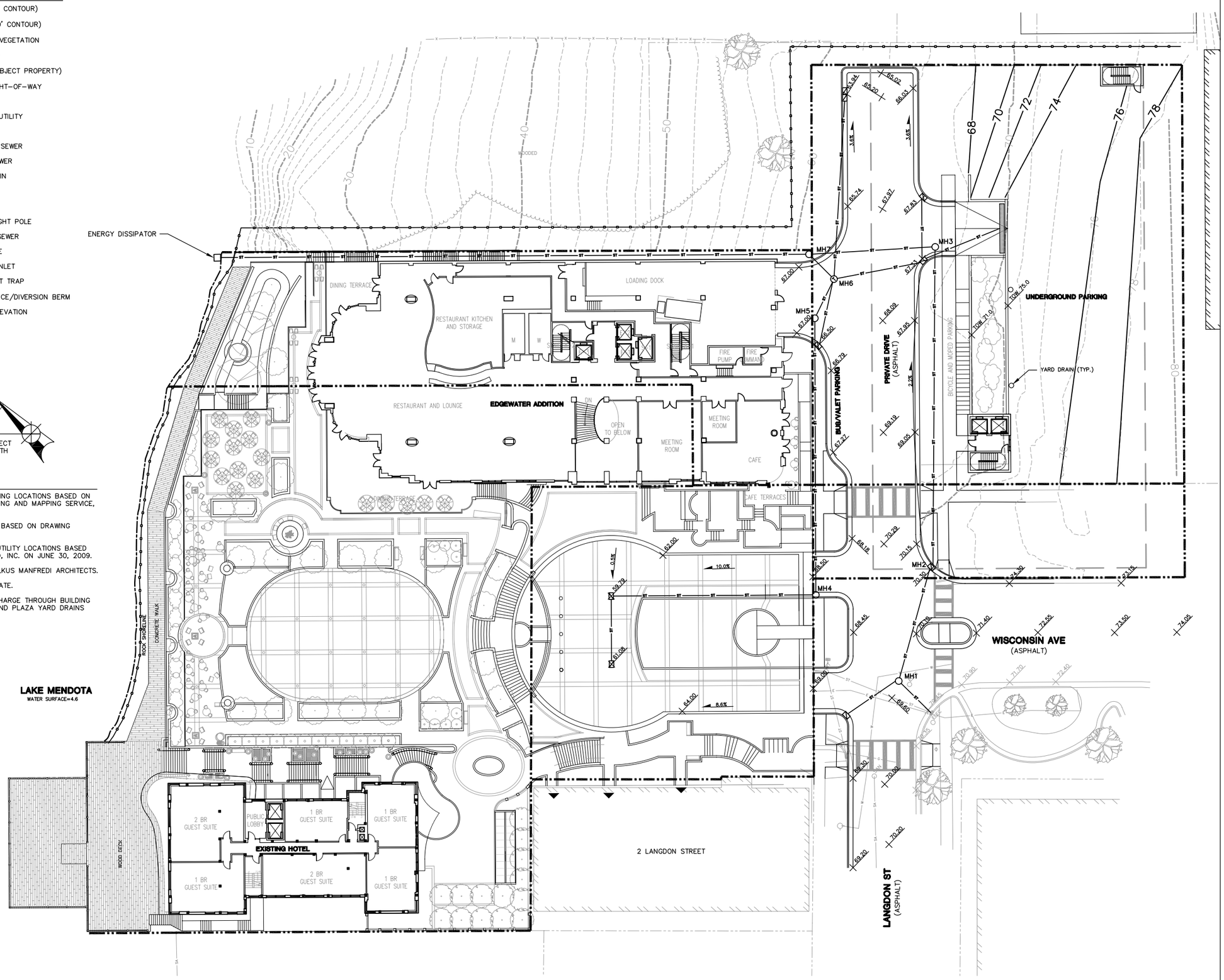

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The Edgewater

666 WIsconsIn Avenue
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Owner:
Landmark X, LLC
22 East Mifflin Street, Suite 800
Madison, WI 53703

Developer:
Hammes Company
22 East Mifflin Street, Suite 800
Madison, WI 53703

Civil Engineer:
BT Squared, Inc.
2830 Dairy Drive
Madison, WI 53718

Landscape Architect:
Ken Saiki Design, Inc.
303 S. Patterson, Suite One
Madison, WI 53703

PROJECT NUMBER: 3826

DATE: MARCH 10, 2010

REVISIONS:

1		08/18/09
2		10/28/09
3		01/13/10
4		01/27/10
5		02/17/10
6		03/10/10

SCALE: 1" = 20'

DRAWING NAME:

GRADING AND EROSION CONTROL PLAN

DRAWING NUMBER:

C1.03

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ATTACHMENT A

TOTAL SUSPENDED SOLIDS REMOVAL CALCULATION
PROPOSED EDGEWATER HOTEL REDEVELOPMENT

PURPOSE:

The purpose of this calculation is to determine the total suspended solids (TSS) removal efficiency for the proposed Edgewater Hotel Redevelopment project. This calculation is intended to demonstrate compliance with s. 37.09(3)(a)2., of the City of Madison Code of Ordinances, which requires 40% TSS removal for a redevelopment.

METHODOLOGIES:

The stormwater management design includes an Up-Flo device to remove sediment, oil, and grease from the runoff from the auto court, private drive and loading dock. Inlets and storm sewers will direct runoff from these areas to the treatment device. Plaza and roof runoff is assumed to be clean and do not require treatment.

The Source Loading and Management Model (SLAMM) was used to evaluate stormwater quality with and without controls.

ASSUMPTIONS:

Summarized below are some of the major assumptions and data used in the computations:

- TSS treatment is required for the vehicle accessible areas only.
- Sizing information for the Vivarium Parking Lot Reconstruction project in the City of Milwaukee was provided by Hydro International to use as a basis for sizing the proposed Edgewater Hotel Redevelopment device. These sites are similar in impervious treatment area size.
- Two treatment modules will be included in the Up-Flo manhole to provide an additional level of TSS treatment, resulting in an approximate 72% TSS removal efficiency.
- The Up-Flo device was modeled as "Other Control", and a 72% removal efficiency was entered in the SLAMM model.
- Other SLAMM model input assumptions are included in the attached SLAMM Input Summary.

RESULTS:

The Up-Flo device will provide approximately 72% TSS removal efficiency, which is well above the required 40% (see attached SLAMM Output).

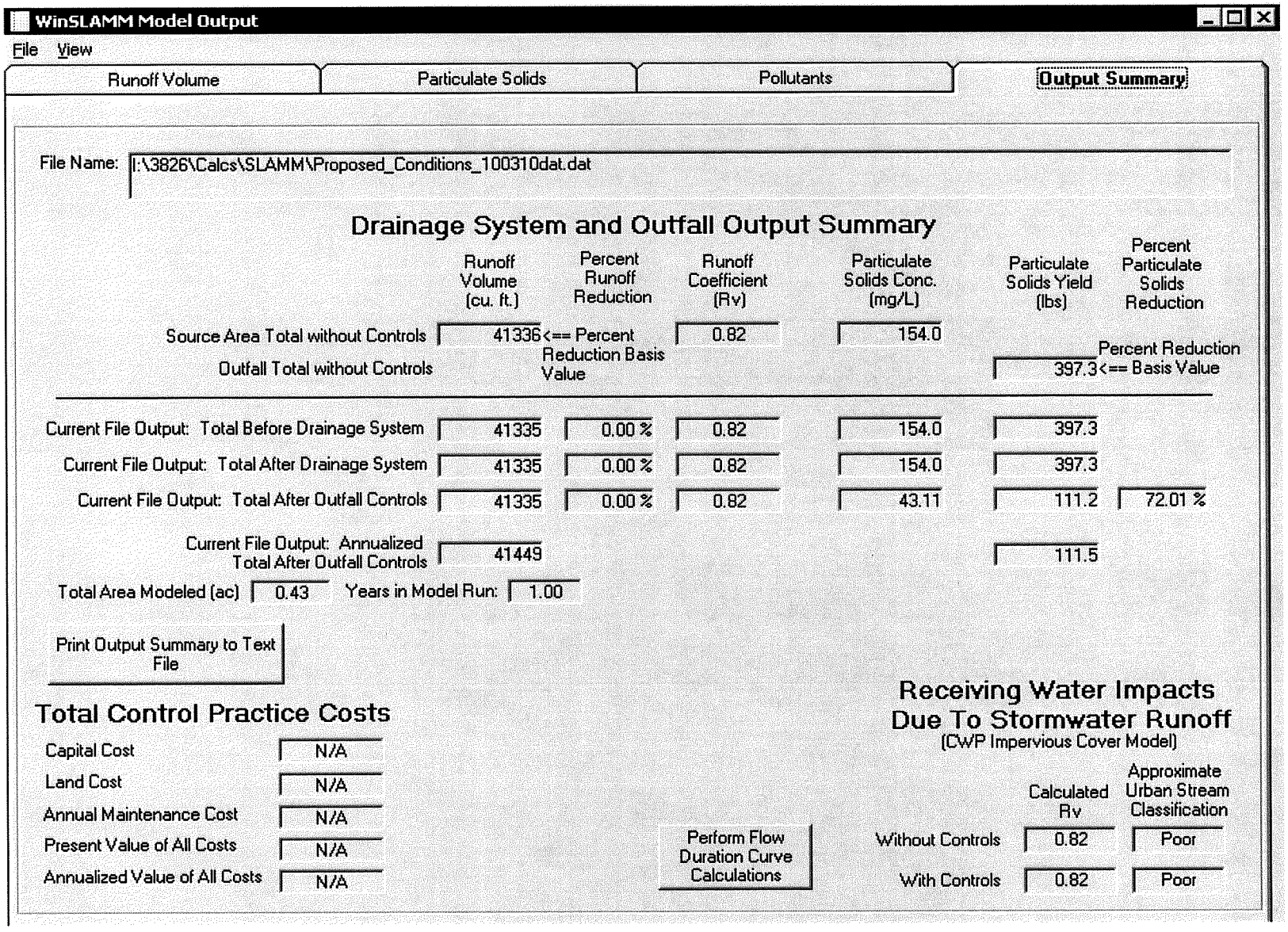
REFERENCES:

City of Madison Code of Ordinances – Chapter 37 – Erosion and Stormwater Runoff Control.

Revised By: BLP Date: 03/10/10
Checked: MRH Date: 03/10/10

SLAMM OUTPUT

SLAMM Model Output
Proposed Edgewater Hotel Redevelopment



SLAMM INPUT SUMMARY

SLAMM Model Input Summary
Proposed Edgewater Hotel Redevelopment

WinSLAMM Data File: [I:\3826\Calcs\SLAMM\Proposed_Conditions_100310dat.dat]

File Land Use Pollutants Tools Run Utilities Help

SLAMM Data File:
Proposed_Conditions_100310dat.DA

Current Land Use: Commercial

Source Area: Driveways 1

Current File Data...

Current File Status

Current File Data Entered

Land Use Areas

Residential Area:	0.00 Acres
Institutional Area:	0.00 Acres
Commercial Area:	0.43 Acres
Industrial Area:	0.00 Acres
Other Urban Area:	0.00 Acres
Freeway Area:	0.00 Acres
Total Area:	0.43 Acres

Source Area No.	Source Area	Area (acres)	H	W	P	O	S	B	Source Area Parameters
61	Roofs 1								
62	Roofs 2								
63	Roofs 3								
64	Roofs 4								
65	Roofs 5								
66	Paved Parking/Storage 1								
67	Paved Parking/Storage 2								
68	Paved Parking/Storage 3								
69	Unpaved Prkng/Storage 1								
70	Unpaved Prkng/Storage 2								
71	Playground 1								
72	Playground 2								
73	Driveways 1	0.430							Entered
74	Driveways 2								
75	Driveways 3								
76	Sidewalks/Walks 1								
77	Sidewalks/Walks 2								
78	Street Area 1								
79	Street Area 2								
80	Street Area 3								
81	Large Landscaped Area 1								
82	Large Landscaped Area 2								
83	Undeveloped Area								
84	Small Landscaped Area 1								

Current File Data

SLAMM Data File Name:
I:\3826\Calcs\SLAMM\Proposed_Conditions_100310dat.dat

Site Descript.: Edgewater Hotel Expansion
Sediment Loading from Auto Court, Private Drive, and NGL Parking Lot

Edit Seed: -42

Edit Rain File: C:\Program Files\WinSLAMM\Rain Files\WI Madison 81.RAN

Edit Start Date: 01/01/81
Edit End Date: 12/31/81
Winter Season Range
Start of Winter (mm/dd)
End of Winter (mm/dd)

Edit Pollutant Probability Distribution File: C:\Program Files\WinSLAMM\WI_GE001.ppd

Edit Runoff Coefficient File: C:\Program Files\WinSLAMM\WI_SL06 Dec06.rsv

Edit Particulate Solids Concentration File: C:\Program Files\WinSLAMM\WI_AVG01.psc

Edit Particulate Residue Delivery File: C:\Program Files\WinSLAMM\WI_DLV01.prr

Edit Street Delivery File (Select LU): C:\Program Files\WinSLAMM\WI_Res and Other Urban Dec06.std

(•) Residential LU ( ) Industrial LU
( ) Institutional LU ( ) Other Urban LU
( ) Commercial LU ( ) Freeways

Change all Street Delivery Files to Match the Current File

[ ] Use Cost Estimation Option — Select Cost Data File

Up-Flo™ Filter Sizing - Vivarium Parking Lot Reconstruction
Hydro Ref. # 2008-492

The performance of the Up-Flo™ Filter is highly dependent on the amount of the annual runoff that is treated by the unit. Over a long term, treating all of the runoff from a site is not reasonable, as the largest peak flows are substantially greater than flows that occur most of the time. To evaluate the performance of the Up-Flo Filter for the most frequent rainfall events, probability distributions have been generated using WinSLAMM, the Source Loading and Management Model, to determine the distribution of flows that could be expected.

Figures 1 and 2 are sizing plots for one acre paved parking or storage areas for Milwaukee, WI. The first plot shows the annual runoff distributions calculated using WinSLAMM for January through September, 1998. WinSLAMM is typically used for continuous simulations using several decades of rain data. These plots were made using calculated flows every 6 minutes, corresponding to the expected time of concentration limitations. The second plot shows the calculated percentage of the annual flows that would be treated at different treatment flow rates.

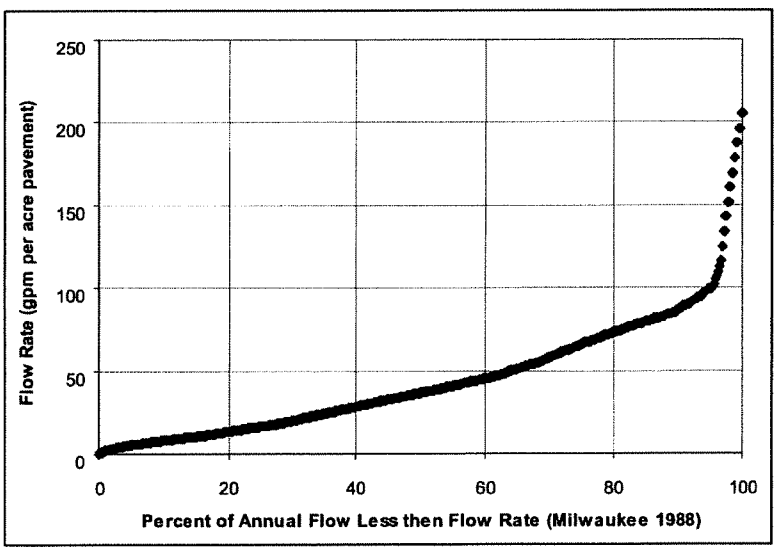


Figure 1. Treatment flow rates needed for Milwaukee, WI.

Hydro International • 94 Hutchins Drive • Portland, ME 04102
Tel: (207) 756-6200 • Fax: (207) 756-6212 • E-mail: hiltech@hil-tech.com
www.Hydro-International.biz

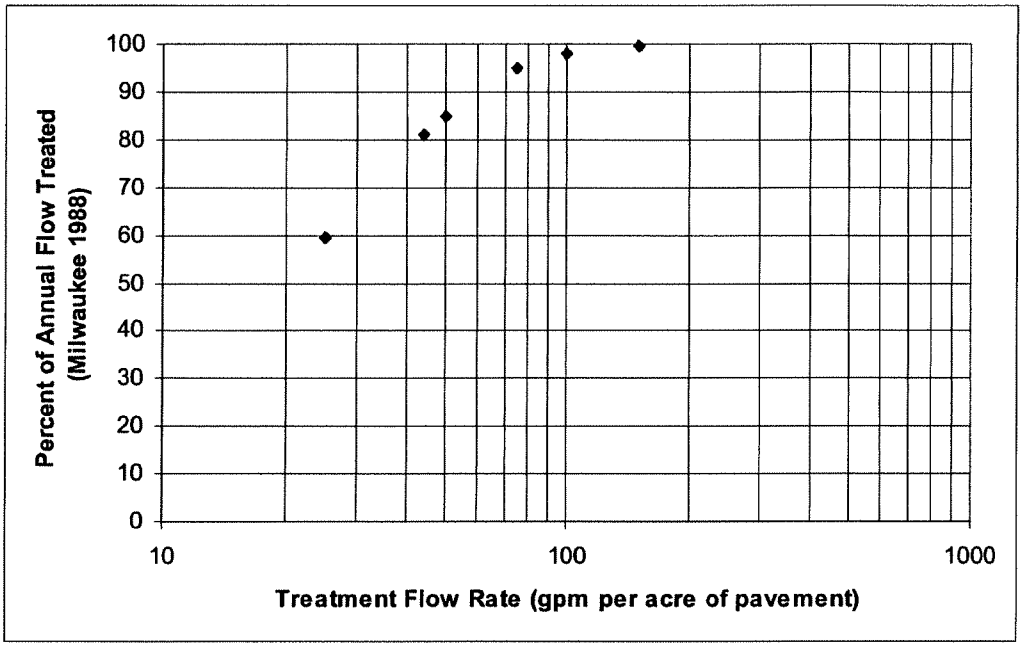


Figure 2. Treatment flow rates needed for Milwaukee, WI.

Table 1 summarizes these plots showing several treatment objectives. As highlighted, filtering approximately 65 gpm per acre imperviousness will capture 90% of the annual runoff volume in the Milwaukee area. If each filter module can filter 20-25 gpm and attain 80% removal of TSS, an annual reduction of 72% (0.9× 80%) can be expected.

Table 1: Example Flow Rates and Treatment Rates Needed for Different Treatment Objectives

	Annual Flow Rate Distributaries (gpm/acre pavement)			Flow Rate Needed for Different Levels of Annual Flow Treatment (gpm/acre pavement)		
Location	**50th Percentile**	**70th Percentile**	**90th Percentile**	**50%**	**70%**	**90%**
Seattle, WA	16	28	44	10	18	30
Portland, ME	31	52	80	18	30	53
Milwaukee, WI	35	60	83	20	35	65
Phoenix, AZ	38	60	150	20	35	90
Atlanta, GA	45	65	160	25	40	100

For the Vivarium project, a treatment goal of 40% removal of TSS is required. With a TSS reduction of 80% per module and targeting 50% of the annual flow, 20 gpm per acre of imperviousness is required to be filtered. The site has 0.46 impervious acres so the site's total filtration rate to treat 50% of the annual runoff is 9.2 gpm. We have proposed a single module Up-Flo that will filter 20-25 gpm, which exceeds the filtration rate needed to attain 40% TSS reductions on an annual basis.

Project: Wisconsin **Up-Flo Filter**

Date:

Variables:		
	Enter Value	
Total Drainage Area:	**1**	acres
% Impervious Area to Filter :	100	%
Filtration Rate	20	gpm/module
Filter Module TSS Reduction	80	%

WinSLAMM Parameters:			
Annual Runoff Treated	50%	70%	90%
Treatment Flow Rate (gpm)	20	35	65

Filtered Drainage Area: **1 acres**

Edgewater has 0.45 ac use 72% TSS removal efficiency in SLAMM

Annual TSS Reduction	**40%**	**56%**	**72%**	**4' Up-Flo Filter***
Number of Filter Modules	**Maximum Treatable Area**			**Cost**
1	1.0	0.57	0.31	$11,000.00
2	2.0	1.1	0.62	$13,800.00
3	3.0	1.7	0.9	$16,600.00
4	4.0	2.3	1.2	$19,400.00
5	5.0	2.9	1.5	$22,200.00
6	6.0	3.4	1.8	$25,000.00
7	7.0	4.0	2.2	
8	8.0	4.6	2.5	
9	9.0	5.1	2.8	
10	10.0	5.7	3.1	Use multiple 4 ft manholes connected by a manifold or single box structure containing mulitple rings.
11	11.0	6.3	3.4	
12	12.0	6.9	3.7	
13	13.0	7.4	4.0	
14	14.0	8.0	4.3	
15	15.0	8.6	4.6	
16	16.0	9.1	4.9	
17	17.0	9.7	5.2	
18	18.0	10.3	5.5	

*Includes the manhole, castings, and media.

LEGEND

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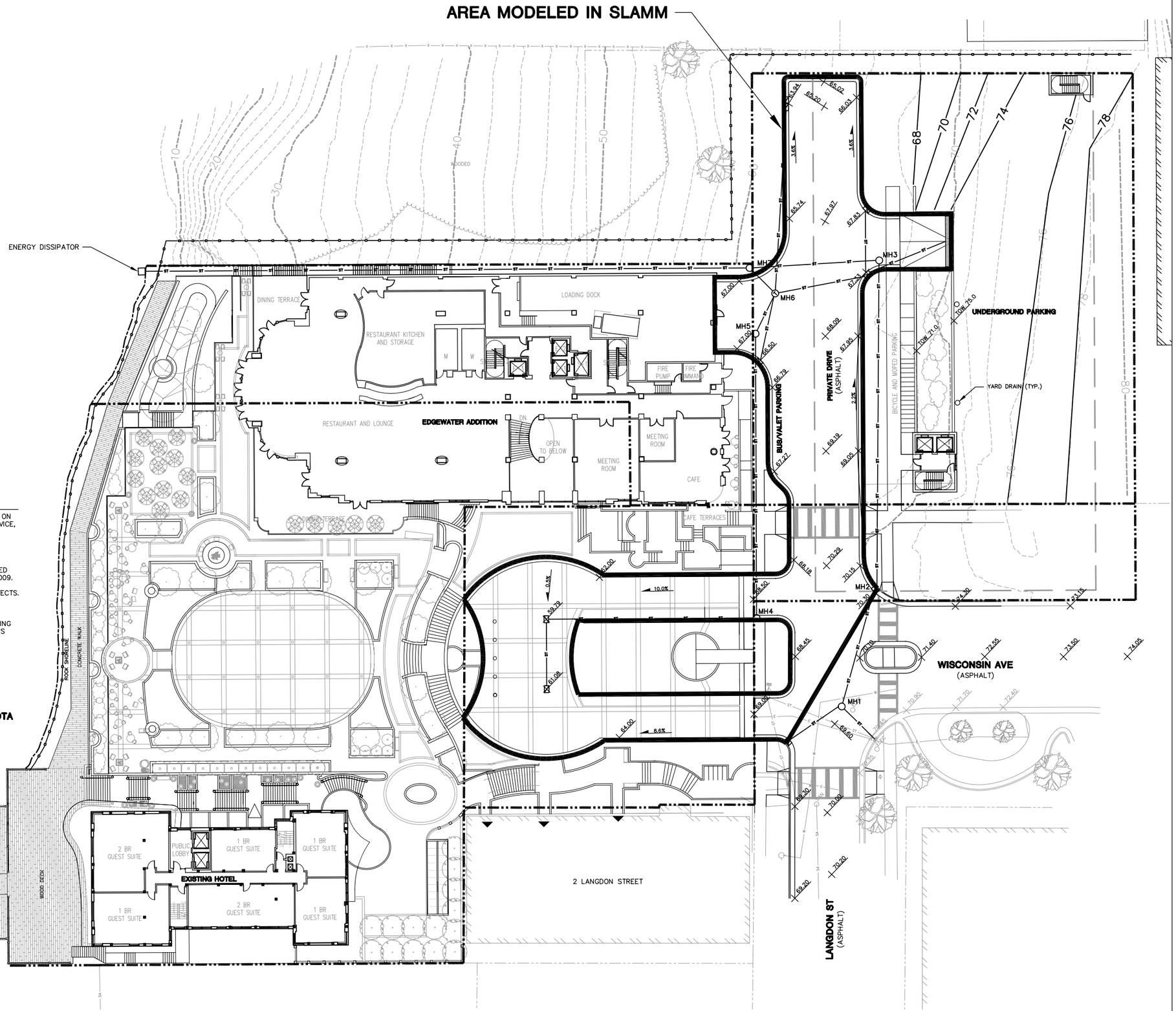

BT² inc.

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Developer:
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Madison, WI 53703

Civil Engineer:
BT Squared, Inc.
2830 Dalry Drive
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6		03/10/10

SCALE: 1" = 20'

DRAWING NAME:

GRADING AND EROSION CONTROL PLAN

DRAWING NUMBER:

C1.03

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