March 13, 2018

EXCEL
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Wisconsin Department of Natural Resources
Attention: Brooke Robinson
2300 North Dr. Martin Luther King Jr. Drive
Milwaukee, WI 53212

Re: Kohler Golf Course NOI

Dear Brooke,

On behalf of Kohler Company, Excel Engineering is submitting the following responses and/or additional information you requested in your February 6, 2018 email. Our responses are provided in the order presented in your email as follows.

General Storm Water Permit Requirements

- Documentation showing how the NHI requirements are satisfied – This work will be submitted under separate cover by Kohler Co.
- Documentation showing how the Archeological/Historic hits were resolved – This work will be submitted under separate cover by Kohler Co.
- Submit a complete set of digital plans – A set of digital plans are included with this transmittal.

Erosion Control Plan Requirements

- Describe the intended sequence of each stage of construction – The proposed construction sequence is provided in Section III (e) of the revised storm water management plan report.
- Rerun the USLE calculations using Version 2.0 – This was completed and updated calculations are included in the revised storm water management plan report in Appendixes D & E
- Revise the USLE calculations to utilize an increased duration of bare ground conditions and/or shift to a time of year with higher erosion rates – The updated USLE calculations mentioned in the previous bullet point were based upon shifting the time of year to summer (June 16 – August 16). The 2 month duration proposed is consistent with Kohler's plans to phase in "grow in" as quickly as possible.

Storm Water Plan Requirements

- Please clarify what filter strips will receive runoff based upon the proposed access road grades – Please see Appendix G where the drainage area tributary to the proposed Up-Flo Filter is delineated as well as the drainage areas around the access drive. A worst case drainage area that is tributary to the proposed filter strips is also shown and discussed further below.
- Revise the WinSLAMM calculations to use a "dynamic" infiltration rate of 6.5 inches/hour – The WinSLAMM calculations have been updated in the revised storm water management plan report.
- Show that NR151 peak discharge rate requirements will be met – In consultation with Pete Wood, Excel ran a WinSLAMM analysis for the entire developed area including the effects of the depression areas (depicted in Appendix L) using the Milwaukee 6392.rain rail file. This rain event exceeds the 2-year, 24-hour storm volume analysis required by the DNR. The SLAMM analysis shows no runoff will occur during the analyzed rain event. This is detailed in Section IV (f) of the revised storm water management plan report.
- Show that infiltration requirements will be met – The WinSLAMM results for the entire development discussed in previous bullet point show that the infiltration requirements will be met.
- How where representative areas selected for analysis and is it possible some filter strips will be bypassed – To address this question, in addition to the representative areas, WinSLAMM calculations have been added to the revised storm water management plan report that include areas of possible runoff concentration (worst case scenarios) along the proposed roadway, cart paths, maintenance building access driveway and the parking lot. The worst case areas are depicted on Appendixes G, H & I. The WinSLAMM results for these areas all exceed the 80% TSS removal rate requirement. In addition, WinSLAMM calculations to represent the round-about area have also been added to the report.
- NR151 requires pre-treatment of the parking lot and drive areas prior to infiltration – After consultation with Pete Wood, Excel is proposing pre-treatment strips be installed along the proposed roadways, cart paths and parking lot. The pre-treatment strips are depicted throughout the plans and are shown in Appendices M & N. The pre-treatment strips area not included within the adjacent WinSLAMM filter strip calculations. There is no numerical requirement for pre-treatment performance and separate WinSLAMM calculations for the pre-treatment strips are not provided.
- Provide an explanation for why infiltration test #8 was redone - The first test was completed in a depression adjacent to a flowing artesian well that was installed as part

of the irrigation well testing. The surrounding area was artificially saturated which provided an erroneous result. Therefore, a second location was tested outside the area impacted by the well to obtain a more accurate and representative test result.

- Post-construction maintenance requirements including the specific inspection schedule for the filter strips and pre-treatment areas – The post-construction maintenance requirements have been updated to provide the specific inspection schedules requested and the manufactures requirements for maintaining the Hydro Up-Flo filter are also included. This is shown in Appendix A of the storm water management plan. Furthermore, this information has been incorporated into the proposed storm water maintenance agreement with the City of Sheboygan.
- The proposed storm water maintenance agreement with the City of Sheboygan is included with this transmittal. A final recorded version of this agreement will be provided when it is available.
- Are all of the proposed infiltration practices adequately separated from groundwater - Separation distances that meet the DNR requirements are provided and specifically discussed in Section III (d) of the storm water management plan.

Thank you for your assistance with this project. If you have any questions regarding this information, please don't hesitate to call.

Sincerely,

Jeff Quast, P.E.
President

Cc: Jess Barley - Kohler Company, Pete Wood - WDNR

Attachments

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STORMWATER MANAGEMENT & EROSION CONTROL PLAN

FOR:

KOHLER COMPANY
PROPOSED GOLF COURSE
CITY OF SHEBOYGAN, WI

January 17, 2018
REVISED February 26, 2018

Prepared By:
Jeff Quast, P.E.
Excel Engineering Inc.
100 Camelot Drive
Fond du Lac, WI 54935
920-926-9800

Table of Contents

I. Project Overview

II. Existing Soil Information

III. Applicable Stormwater Runoff Regulations & Requirements
   a) Peak discharge (Quantity)
   b) Stormwater Quality
   c) Stormwater Infiltration
   d) Protective Areas
   e) Erosion Control

IV. Stormwater & Erosion Control Analysis
   a) Maintenance Building Area
   b) Guest Parking & Club House Area
   c) Access Road and Cart Paths
   d) Caddie/Cart Barn Area
   e) Roundabout Area
   f) Overall development

Appendix A - Post Construction Operation and Management Plan
Appendix B – USGS Soil Information
Appendix C – Infiltration Test Area Maps & Reports
Appendix D: South Stormwater & Erosion Control Exhibit
Appendix E: North Stormwater & Erosion Control Exhibit
Appendix F: Stormwater Overall Management Exhibit
Appendix G: Area 1 – Maintenance Building Area Map
Appendix H: Area 2 – Guest Parking & Club House Area Map
Appendix I: Area 3 – Access Road & Cart Paths Map
Appendix J: Area 4 – Caddie/Cart Barn Area Map
Appendix K: Area 5 - Roundabout Area Map
Appendix L: Area 6 - Total Development and Depression Area map
Appendix M: Access Road & Cart Path Section Details
Appendix N: Guest Parking Lot & Fairway Section Details
Appendix O: SLAMM Input Information
Appendix P: Groundwater Exhibit

I – Project Overview

Excel Engineering, Inc. has been retained by the Kohler Company to prepare this stormwater management and erosion control plan for a proposed 18-hole golf course in the City of Sheboygan in Sheboygan County. The proposed project is located in the City of Sheboygan bordered by the Timberlake subdivision to the north, Lake Michigan to the East, Black River to the west and the Kohler-Andrae State Park to the South. In addition to the golf course, the proposed development includes a driving range, club house, parking lot, cart storage building and maintenance facility. An entrance road and system of golf cart/maintenance paths will also be constructed as part of the project.

Due to the nature of this project, the storm water management and erosion control plan has been broken into five representative areas and an overall developed site area. The areas include the maintenance building area, club house & guest parking area, the entrance drive/cart path areas, caddie/cart barn area, and roundabout area. Detailed engineering plans including the proposed storm water management and erosion control devise locations are provided for all areas except the fairways. In the fairway areas, generally proposed grades are provided along with a defined corridor for each hole. Final grades will be determined in the field with land disturbance limited to the corridors identified. The fairways will be constructed of native sand and seeded, with no topsoil required for any growing medium.

The stormwater management plan is designed take advantage of the site's highly permeable sandy soils and low proposed impervious surface area (3%). The plan will result in zero stormwater runoff in the post-construction condition. In this manner, impacts to nearby wetland hydrology are minimized to the maximum extent possible and no runoff will leave the site. A Post Construction Operation and Maintenance Plan is provided as Appendix A

II – Existing Soil Information

According to the USGS Soils Map (see Appendix B), the existing on-site soil types are as follows:

Dn Dune Land, Type A
Bd, Beaches sand, Type A
Gb Granby loamy fine sand, Type A/D
OaB Oakville loamy fine sand, 0 to 6% slopes, Type A
OaC Oakville loamy fine sand, 6 to 12% slopes, Type A

Type A soils typically have high infiltration rates. To quantify the actual infiltration rates, ten double ring infiltration tests were taken throughout the property by PSI, Inc. in December of 2016. The soils were identified as uniform fine grained sand throughout the property. Infiltration test results ranged from 15.4 in/hr to 53in/hr. In addition to the tests completed in 2016, four double ring infiltrometer tests were also completed 2011 by Midwest Engineering. The soils were identified as fine grained sand in each test location and the infiltration test results ranged from 26in/hr to 52in/hr. Please see Appendix C for infiltration test locations and results.

Based upon the elevated infiltration test results throughout the property, an average infiltration rate was established for design purposes. The average total site infiltration rate based on 14 borings is 32.7 in/hr. Utilizing a correction safety factor of 2.5 as required by the Wisconsin Department of Natural Resources Technical Standard 1002 Table 3, a design rate of 13.1 in/hr. was assumed. Test #8 was not used as a part of the infiltration results. Test #8 was retested as Test #8A at a later date. Test #8 was completed in a depression adjacent to a flowing artesian well that was installed as part of the irrigation well testing. The surrounding area was artificially saturated which provided an erroneous result. Therefore, a second location was tested outside the area impacted by the well to obtain a more accurate and representative test result.

<u>III – Applicable Stormwater Regulations and Requirements</u> – Stormwater runoff and erosion control for the proposed project are regulated by the City of Sheboygan Storm Water Ordinance and the Wisconsin Natural Resources Code 151 and 216. The overall requirements are as follows.

a) <u>Peak Discharge (Quantity)</u> - Post development storm water flow rates are required to be controlled by the City of Sheboygan and the State of Wisconsin. The City of Sheboygan requires the post-development 10-year, 24-hour runoff rate not exceed the 2-year, 24-hour pre-development runoff rate. The State of Wisconsin requires the post-development 24-hour runoff rate not exceed the pre-development 24-hour runoff rate for both the 1-year and 2-year storms. The maximum rainfall intensity during the 10 year event is 1.80 in/hr. (see below). With a design infiltration rate of 13.1 in/hr., the pre-development runoff rate during the 10-year storm will be zero. Post-development runoff rates will also be zero due to the extremely low percentage of proposed impervious surface, along with the high infiltration rates and the numerous on-site depressions. This significantly exceeds any of the requirements for peak discharge and will be discussed in more detail in the analysis section.

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.324 (0.256–0.408)	0.386 (0.306–0.487)	0.489 (0.383–0.613)	0.566 (0.444–0.715)	0.672 (0.511–0.857)	0.750 (0.562–0.964)	0.829 (0.603–1.07)	0.900 (0.637–1.19)	0.993 (0.663–1.33)	1.06 (0.717–1.43)
10-min	0.474 (0.375–0.597)	0.566 (0.448–0.713)	0.711 (0.561–0.896)	0.828 (0.651–1.05)	0.983 (0.743–1.25)	1.10 (0.823–1.41)	1.21 (0.894–1.57)	1.32 (0.933–1.74)	1.46 (1.00–1.94)	1.55 (1.05–2.10)
15-min	0.578 (0.458–0.729)	0.690 (0.546–0.870)	0.868 (0.685–1.10)	1.01 (0.794–1.28)	1.20 (0.913–1.53)	1.34 (1.00–1.72)	1.47 (1.08–1.92)	1.61 (1.14–2.12)	1.77 (1.22–2.37)	1.89 (1.26–2.56)
30-min	0.803 (0.636–1.01)	0.960 (0.760–1.21)	1.21 (0.954–1.53)	1.41 (1.11–1.78)	1.67 (1.27–2.13)	1.86 (1.39–2.39)	2.04 (1.49–2.65)	2.22 (1.57–2.92)	2.44 (1.68–3.25)	2.59 (1.75–3.51)
60-min	1.04 (0.825–1.31)	1.23 (0.975–1.55)	1.55 (1.22–1.95)	1.80 (1.42–2.26)	2.15 (1.64–2.75)	2.42 (1.81–3.11)	2.68 (1.96–3.46)	2.94 (2.08–3.87)	3.27 (2.25–4.38)	3.52 (2.38–4.76)
2-hr	1.27 (1.02–1.58)	1.50 (1.21–1.87)	1.88 (1.51–2.35)	2.20 (1.75–2.75)	2.64 (2.04–3.34)	2.97 (2.28–3.80)	3.31 (2.45–4.29)	3.65 (2.62–4.79)	4.11 (2.85–5.47)	4.45 (3.03–6.06)
3-hr	1.42 (1.15–1.75)	1.67 (1.35–2.06)	2.08 (1.68–2.57)	2.44 (1.96–3.02)	2.95 (2.31–3.73)	3.35 (2.57–4.27)	3.77 (2.81–4.86)	4.20 (3.03–5.62)	4.79 (3.35–6.37)	5.25 (3.59–7.03)

b) <u>Stormwater Quality</u> – The City of Sheboygan and State of Wisconsin require post-development storm water runoff be treated to remove 80% of the total suspended soils (TSS) load. As was previously stated, there will be no post-development runoff from the site. However, stormwater pretreatment and final treatment will be provided for runoff from impervious surface areas (roadways, cart paths, parking areas, building and maintenance areas) prior to discharging to grade in the form of pretreatment strips and filter strips. The proposed filter strips will provide stormwater TSS treatment from these areas for the protection of groundwater and sensitive areas. In addition, mechanical pretreatment

including oil and grease separators will be provided where appropriate for further protection. This approach significantly exceeds the requirements for stormwater quality and will be discuss in more detail in the analysis section.

c) Stormwater Infiltration – The State of Wisconsin requires a post-development site to infiltrate 90% of the pre-development infiltration volume based on an average annual rainfall. In this case, 100% of the pre-development and post-development rainfall will be infiltrated which significantly exceeds the requirement. Specific details will be discussed in the analysis section.

d) Protected Areas - The site development design will ensure that all drainage prior to flowing to any wetlands will be treated to WDNR standards using native sand filter strips (NR 151.125(4)e). Where the asphalt roads need to abut or cross through wetland areas, filter strips using native sand, will treat runoff prior to entering the surface water (NR 151.125(4)e). All best management practice areas will have adequate separation from the seasonal high groundwater per NR 151.124(4)(b) Table 3. The treatment strips for the impervious areas of the entrance road, driveways, parking areas and maintenance facility will have a minimum of 5 feet of separation from groundwater and the treatment strips for the cart paths will have a minimum of 3 feet of groundwater separation.

e) Erosion Control - The erosion control specifications, site stabilization notes, seeding notes, and dewatering notes are all listed within the construction plan set. Silt fence and tracking pads will be added to protect the associated ASNRI waterways and wetlands areas.

Construction of the golf course will be completed in phases. Some phases may occur simultaneously depending upon site conditions. Prior to beginning each phase, silt fences will be installed along the planned limits of disturbance and clearing and grubbing will be completed. Site stabilization will occur as the phases are completed to minimize the potential for erosion and increase the time available for "grow in" which is important for golf course construction. Proposed post-construction BMPs will be in place as the phases are completed. Tracking pads will be provided between phases that are under construction and areas that are undeveloped or already completed. Temporary access roads will be constructed on the golf course to facilitate the phased construction. Construction of the access road from the State Park entrance, the maintenance facility, and the irrigation pond will begin first to support the construction and grow-in of the proposed golf course, followed by the start of golf hole construction, utility installations, clubhouse, caddy/cart building, rest stations and guest parking lot. It is anticipated that approximately nine holes will be completed annually, with the overall project being complete in approximately two years with variability due to weather conditions.

Appendixes D & E of this report show the locations of the silt fence and tracking pads. The USLE (Version 2.0) sheets are also shown on these appendixes. The USLE sheets shown are the worst case flow paths to wetland areas. According to the USLE calculations silt fence with seeding and mulch are needed to achieve sediment discharges under 5.0 tons per acre

IV – Stormwater & Erosion Control Analysis – Due to the nature of the proposed project, the stormwater management and erosion control analysis has been broken into five representative areas (See Appendix F – Overall Stormwater Management for areas) and an overall developed site area. The analysis is as follows.

a) Maintenance Building Area - The runoff from the maintenance building yard area will drain to catchbasins and storm sewer to a mechanical unit (Up-Flow filter system) for treatment of TSS and oil and grease prior to being discharged to a sand depression. Separation will be greater than 5' from the treated storm sewer system outfall to the groundwater elevation (Outfall =589.8, Groundwater =584.00). The mechanical system will remove over 80% of the TSS and oil and grease with 18 filter modules. The access drives were modeled with 11' long filter strips which will remove over 80% of TSS prior to being discharged to grade. The first 4' of the strip adjacent to the pavement area is the pretreatment area and the remaining 7' of the filter strip will remove over 80% TSS. Roof areas are not required to be pretreated. The water quality components of the maintenance building area within the fueling and maintenance pavement area will be satisfied by achieving a greater than 80% TSS removal rate (82.2% see output summary below). The access drives will remove greater than 80% TSS with the 11' long filter strips. The filter strip was modeled at a worst case area. See attached map (Appendix G) for details of this area.

SLAMM Outfall Summary for the Up-Flow Filter with 18 modules:

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	84435		0.65	121.9	642.4	
Outfall Total with Controls	84533	-0.12 %	0.65	21.63	114.2	82.22 %
Current File Output Annualized Total After Outfall Controls	85707	Years in Model Run:	0.99		115.8	

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

Total Area Modeled (ac): 1.080

Total Control Practice Costs

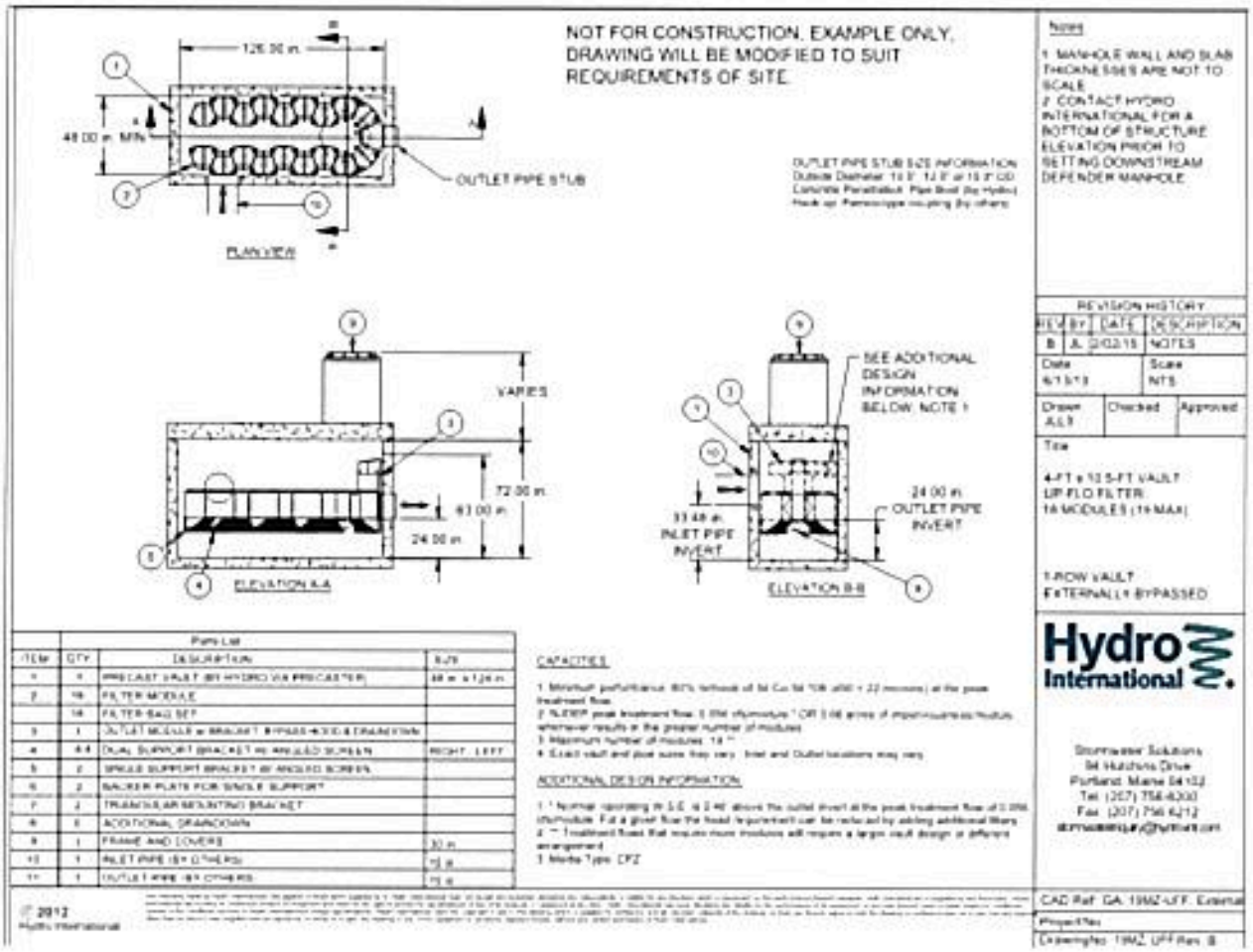
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

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	0.65	Poor
With Controls	0.65	Poor

Detail of Up-Flow Filter Vault with 18 modules:



Item	QTY	DESCRIPTION	SIZE
1	1	PRECAST VAULT (BY HYDRO INTERNATIONAL PRECASTER)	48 in. x 126 in.
2	18	FILTER MODULE	
	18	FILTER BAG SET	
3	1	OUTLET MODULE w/ BRACKET, BYPASS WEIR & DRAINDOWN	
4	4-4	DUAL SUPPORT BRACKET W/ ANGLED SCREEN	RIGHT, LEFT
5	2	SINGLE SUPPORT BRACKET W/ ANGLED SCREEN	
6	2	BACKER PLATE FOR SINGLE SUPPORT	
7	2	TRIANGULAR MOUNTING BRACKET	
8	8	ADDITIONAL DRAINDOWN	
9	1	FRAME AND COVERS	30 in.
10	1	INLET PIPE (BY OTHERS)	15 in.
11	1	OUTLET PIPE (BY OTHERS)	15 in.

SLAMM Outfall Summary for the Driveway Filter Strips:
This output summary is based on the worst case area which contained 2,458 sf of impervious area. The output summary is based on the 36' of available filter strip width at this location.

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	64.22		0.01	154.0	0.6174	
Outfall Total with Controls	0	100.00 %	0.00	0	0	100.00 %
Current File Output: Annualized Total After Outfall Controls	0	Years in Model Run:	0.99		0	

Print Output Summary to Text File

Print Output Summary to .csv File

Total Area Modeled (ac): 0.060

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	0.01	Good
With Controls	0.00	Good

b) Guest Parking & Club House Area - The parking area and access drives will be treated with filter strips which will remove over 80% of TSS prior to being discharged to grade. The roof areas are not required to be treated. All runoff from the roof areas will discharge to grade and infiltrate into the native sand around the perimeter of the buildings. Groundwater separation will be greater than 5' from the filter strips at the lowest elevation within this area (Filter strip =587.34, Groundwater =582.20). The parking lot, which has the largest impervious area within this area and was used for the calculations, has been designed to sheet drain to the west, south and east off the parking lot. A per unit area approach will be used for the filter strip calculations. A 10' section of the asphalt parking area (60' long) results in an analyzed drainage area from the parking area of 600 sf (per unit analysis). The filter strip for this area is 12' long. The first 4' of the strip adjacent to the pavement is the pretreatment area, the remaining 8' of the strip was modeled for the percentage of TSS removal. The majority of this area was modeled with a width of 10', flow length of 8', and a dynamic infiltration rate of 6.5 in/hr. SLAMM calculations show that typically 88.15% TSS reduction is achieved with an 8' long filter strip. See Appendix H for a map of this area.

SLAMM output for the typical parking lot area with 8' long, 10' wide filter strips:

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	998.7		0.64	130.0	8.105	
Outfall Total with Controls	132.4	66.74 %	0.08	114.9	0.9495	88.29 %
Current File Output: Annualized Total After Outfall Controls	134.2	Years in Model Run:	0.93		0.9629	

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

Total Area Modeled (ac): 0.013

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	0.64	Poor
With Controls	0.08	Good

A worst case area that was not typical of most of the parking areas was also modeled. See Appendix H for a map of this area.

SLAMM output for the worst case parking lot area with 8' long filter strips:
This output summary is based on the worst case area which contained 3,389 sf of drainage area with an impervious area of 2,222 sf. The output summary is based on the available filter strip width of 31 feet for this area.

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	3873		0.40	130.8	31.63	
Outfall Total with Controls	800.9	79.32 %	0.08	123.8	6.188	80.44 %
Current File Output: Annualized Total After Outfall Controls	812.0	Years in Model Run:	0.99		6.274	

Print Output Summary to Text File

Print Output Summary to .csv File

Total Area Modeled (ac): 0.080

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	0.08	Good

c) Access Road & Cart Paths - The access road and cart paths will be treated with filter strips which will remove over 80% of TSS prior to being discharged to grade. The filter strip for the access roads is 11' long and for the cart paths it is 9' long. The first 4' of the access road and the first 2' of the cart path strip adjacent to the pavement is the pretreatment area, the remaining 7' of the strip was modeled for the percentage of TSS removal. The access road has been designed as a crowned road that will sheet drain to the filter strip on each side of the driveway. The typical one half of the driveway section from the centerline is 12'of asphalt pavement. The cart paths are designed as a 10' to 12' wide asphalt path. The cart paths are designed to sheet drain from one edge of the path to the other to the filter strip. Because of the extents of the length of the road and cart paths on site, a per unit area approach will be used for the analysis, a width of 20' was used. A 20' section of the asphalt access road or cart path areas results in an analyzed drainage area from the asphalt of 240 sf (per unit analysis). The filter strip has been modeled with a width of 20', flow length of 7', and a dynamic infiltration rate of 6.5 in/hr. SLAMM calculations show that a 99.54% reduction is achieved in this length. Note that the percent of runoff from the road area is nearly zero. A worst case area that was not typical of most of the access road areas and cart paths were also modeled. See Appendix I for detailed map of this area.

SLAMM Outfall Output Summary for the typical access road and cart path area modeled with 7' long, 20' wide filter strips:

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	384.1		0.64	130.0	3.117	
Outfall Total with Controls	2.211	99.42 %	0.00	104.9	0.01448	99.54 %
Current File Output: Annualized Total After Outfall Controls	2.242	Years in Model Run	0.99		0.01460	

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

Total Area Modeled (ac): 0.005

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	0.64	Poor
With Controls	0.00	Good

SLAMM output for the worst case access road modeled with 7' long filter strips:
This output summary is based on the worst case area which contained 320 sf of impervious area. The output summary is based on a filter strip width of 10 feet, the available filter strip width for this area is 12 feet.

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	588.4		0.72	154.0	5.657	
Outfall Total with Controls	38.31	93.49 %	0.05	129.0	0.3084	94.55 %
Current File Output: Annualized Total After Outfall Controls	38.41	Years in Model Run:	1.00		0.3093	

Print Output Summary to Text File

Print Output Summary to .csv File

Total Area Modeled (ac) 0.007

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	0.72	Poor
With Controls	0.05	Good

SLAMM output for the worst case cart path modeled with 7' long filter strips:
This output summary is based on the worst case area which contained 425 sf of impervious area and 2,187 sf of grass area. The output summary is based on a filter strip width of 28 feet, the available filter strip width for this area is 36 feet.

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	744.9		0.11	159.2	7.406	
Outfall Total with Controls	135.7	81.78 %	0.02	153.3	1.299	82.46 %
Current File Output: Annualized Total After Outfall Controls	137.6	Years in Model Run:	0.99		1.317	

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

Total Area Modeled (ac): 0.059

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	0.11	Fair
With Controls	0.02	Good

d) Caddie/Cart Barn-
The Cart Barn roof area is designed to sheet drain to the north and south. The roof areas are not required to be pretreated. A filter strip is designed at the north and east edges of the asphalt area and will be used to collect the sheet flow from the roof and pavement area. The filter strip for this area is 12' long with the first 4' along the pavement edge reserved as a pretreatment area. This strip has been modeled with a width of 213', a flow length of 8', and a dynamic infiltration rate of 6.5 in/hr. See attached map, Appendix J, for a close up of this area. SLAMM calculations show that due to the high infiltration rate of the soil that a 94.30% reduction is achieved from this sand filter strip.

SLAMM Outfall Output Summary for the cart barn:

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	17938		0.71	82.85	92.78	
Outfall Total with Controls	1209	93.26 %	0.05	70.03	5.284	94.30 %
Current File Output: Annualized Total After Outfall Controls	1225	Years in Model Run:	0.99		5.357	

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

Total Area Modeled (ac): 0.210

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	0.71	Poor
With Controls	0.05	Good

e) Roundabout area- The roundabout area is a redevelopment of the existing park entrance. The majority of this area would follow stormwater redevelopment standards. To keep the design conservative for this area the roundabout area will be treated with filter strips which will remove over 80% of TSS prior to being discharged to grade. The majority of the filter strips for the roundabout area are 11' long (Areas 1,2 &4), with the southern area along the car staging area at the park entrance at 14' long (Area 3). The first 4' of the filter strip, adjacent to the pavement, is the pretreatment area with the remaining 7' or 10' of the strip modeled for the percentage of TSS removal. Four drainage areas were modeled with a dynamic infiltration rate of 6.5 in/hr. The calculated percentage of TSS reduction for each area is shown below. See attached map (Appendix K) for details of this area.

Roundabout SLAMM Outfall Output for **Area 1** with a calculated 7'long filter strip:

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	22277		0.72	154.0	214.2	
Outfall Total with Controls	2811	87.38 %	0.09	134.3	23.56	89.00 %
Current File Output: Annualized Total After Outfall Controls	2819	Years in Model Run:	1.00		23.62	

Print Output Summary to Text File

Print Output Summary to .csv File

Total Area Modeled (ac): 0.265

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	0.72	Poor
With Controls	0.09	Good

Roundabout SLAMM Outfall Output for **Area 2** with a calculated 7'long filter strip:

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	10529		0.72	154.0	105.1	
Outfall Total with Controls	1913	82.49 %	0.13	137.5	16.42	84.38 %
Current File Output: Annualized Total After Outfall Controls	1919	Years in Model Run:	1.00		16.46	

Print Output Summary to Text File

Print Output Summary to .csv File

Total Area Modeled (ac): 0.130

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	0.72	Poor
With Controls	0.13	Good

Roundabout SLAMM Outfall Output for **Area 3** with a calculated 10'long filter strip:

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	37270		0.73	150.9	351.1	
Outfall Total with Controls	6945	81.37 %	0.14	139.0	60.26	82.84 %
Current File Output: Annualized Total After Outfall Controls	6965	Years in Model Run:	1.00		60.42	

Print Output Summary to Text File

Print Output Summary to .csv File

Total Area Modeled (ac): 0.441

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	0.73	Poor
With Controls	0.14	Fair

Roundabout SLAMM Outfall Output for **Area 4** with a calculated 7'long filter strip:

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	5632		0.72	154.0	54.15	
Outfall Total with Controls	327.8	94.18 %	0.04	128.7	2.634	95.14 %
Current File Output: Annualized Total After Outfall Controls	328.7	Years in Model Run:	1.00		2.641	

Print Output Summary to Text File

Print Output Summary to .csv File

Total Area Modeled (ac): 0.067

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	0.72	Poor
With Controls	0.04	Good

f) Overall Development - An overall SLAMM analysis for the entire project area of the project was analyzed for both quality and quantity components.

Quality Control:
The overall development of the project is an area encompassing approximately 170 acres. This region includes all disturbed areas, impervious areas, irrigation pond, and the entire golf course area (fairways, driving range, existing trees, native areas between golf holes, etc.). The analysis includes all the best management practices throughout the development and also modeled all sand depressions within this area. The model only included the depressions within the developed area of the project and did not include any wetland areas or any of the numerous depressions outside of the development area zone. The SLAMM model included all the BMP's (filter strips, Up-Flo filters and the sand depressions) and a dynamic infiltration rate of 6.5 in/hr. The calculations show a 100% TSS reduction. Appendix L shows the limits of the entire developed area and the total area of sand depressions within the developed area.

SLAMM Outfall Output Summary for the total development:

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	269584		0.01	169.8	3194	
Outfall Total with Controls	0	100.00 %	0.00	0	0	100.00 %
Current File Output: Annualized Total After Outfall Controls	0	Years in Model Run:	0.99		0	

Print Output Summary to Text File

Print Output Summary to .csv File

Total Area Modeled (ac): 170.083

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	0.01	Good
With Controls	0.00	Good

Quantity Control 2 year 24 hour storm:

The following calculation was completed to show that there is no runoff from the entire site during the 2 year 24 hour storm. The following SLAMM Outfall Output Summary for the total development used the Milwaukee 6392.ran rain file which has rainfall events exceeding the 2 year 24 storm (2.70 in):

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	7.235E+06		0.01	189.3	85496	
Outfall Total with Controls	0	100.00 %	0.00	0	0	100.00 %
Current File Output, Annualized Total After Outfall Controls	0	Years in Model Run:	29.99		0	

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

Total Area Modeled (ac): 170.083

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	0.01	Good
With Controls	0.00	Good

Quantity Control 10 year 24 hour storm:

The calculated TR-55 post developed peak flow for the 170 acres of the developed portion of the project during the 10 year 24 hour storm is 1.915 cfs, with a generated volume of 62,820 cu.ft. (see calculations below). As noted previously, there are numerous depressions within the developed portion of the site containing a total 264,908 sf of area (See Appendix L). The 62,820 cu.ft. of volume runoff would be contained within 3 inches of depth of the 264,908 sf of the depressions. The depressions along with the extremely high infiltration rates will contain all runoff within the developed portion of the project. The depressions noted and mapped within the developed site does not include all the on-site wetlands and all the depressions located adjacent and outside of the developed area (but still on the property) as well. The post-development runoff rates will be zero due to the extremely low percentage of proposed impervious surface, along with the high infiltration rates and the numerous on-site depressions.

Model | Hydrographs | Ponds

○ 1-Yr ○ 2-Yr ○ 5-Yr ● 10-Yr ○ 100-Yr

Hyd. No.	Hydrograph type	Peak flow	Time interval	Time of conc. Tc	Time to peak	Volume	Inflow hyd(s)	Maximum Elevation	Maximum Storage	Hydrograph description
	(origin)	(cfs)	(min)	(min)	(min)	(cuft)		(ft)	(cuft)	
1	SCS Runoff	0.000	3	6.00	0.00	0.000				pre-developed
2	SCS Runoff	2.000	3	6.00	717.00	6,162				AREA 1
3	SCS Runoff	0.298	3	6.00	717.00	740				AREA 2
4	SCS Runoff	0.809	3	6.00	717.00	2,097				AREA 3
5	SCS Runoff	1.809	3	6.00	717.00	4,688				AREA 4
6	SCS Runoff	0.236	3	6.00	717.00	617				AREA 5
7	SCS Runoff	0.616	3	6.00	720.00	1,491				AREA 6
8	Combine	5.710	3		717.00	14,916	2, 3, 4, 5, 6, 7			total to depression area
9										
10										
11	SCS Runoff	0.000	3	77.20	0.00	0.000				pre-development disturbed area
12	SCS Runoff	1.916	3	77.20	864.00	82,820				post development disurbed
13										

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v11

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	0.000	0.000	------	0.000	0.000	------	------	0.015	pre-developed
2	SCS Runoff	------	1.111	1.387	------	1.720	2.000	------	------	3.251	AREA 1
3	SCS Runoff	------	0.159	0.198	------	0.246	0.286	------	------	0.464	AREA 2
4	SCS Runoff	------	0.450	0.561	------	0.696	0.809	------	------	1.316	AREA 3
5	SCS Runoff	------	1.005	1.255	------	1.556	1.809	------	------	2.941	AREA 4
6	SCS Runoff	------	0.132	0.165	------	0.205	0.238	------	------	0.387	AREA 5
7	SCS Runoff	------	0.040	0.171	------	0.397	0.616	------	------	1.809	AREA 6
8	Combine	2, 3, 4, 5, 6, 7	2.868	3.691	------	4.769	5.710	------	------	10.16	total to depression area
11	SCS Runoff	------	0.000	0.000	------	0.000	0.000	------	------	1.728	pre-development-disturbed area
12	SCS Runoff	------	0.000	0.021	------	0.617	1.915	------	------	35.56	post-development disturbed

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v11

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.000	3	n/a	0	------	------	------	pre-developed
2	SCS Runoff	2.000	3	717	5,182	------	------	------	AREA 1
3	SCS Runoff	0.286	3	717	740	------	------	------	AREA 2
4	SCS Runoff	0.809	3	717	2,097	------	------	------	AREA 3
5	SCS Runoff	1.809	3	717	4,688	------	------	------	AREA 4
6	SCS Runoff	0.238	3	717	617	------	------	------	AREA 5
7	SCS Runoff	0.616	3	720	1,491	------	------	------	AREA 6
8	Combine	5.710	3	717	14,816	2, 3, 4, 5, 6, 7	------	------	total to depression area
11	SCS Runoff	0.000	3	n/a	0	------	------	------	pre-development-disturbed area
12	SCS Runoff	1.915	3	864	62,820	------	------	------	post-development disturbed

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v11 Thursday, 03 / 1 / 2018

Hyd. No. 12

post-development disturbed

Hydrograph type	= SCS Runoff	Peak discharge	= 1.915 cfs
Storm frequency	= 10 yrs	Time to peak	= 864 min
Time interval	= 3 min	Hyd. volume	= 62,820 cuft
Drainage area	= 170.000 ac	Curve number	= 43*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 77.20 min
Total precip.	= 3.86 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(50.110 x 30) + (13.190 x 98) + (101.000 x 39) + (5.700 x 98)] / 170.000

TR55 Tc Worksheet

Hyd. No. 12

post-development disturbed

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.400		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 2.50		2.50		0.00		
Land slope (%)	= 1.00		1.00		0.00		
Travel Time (min)	**= 77.20**	**+**	**0.00**	**+**	**0.00**	**=**	**77.20**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.10		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=0.51		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... **77.20 min**

Appendix A

POST CONSTRUCTION OPERATION AND MAINTENANCE PLAN

The owner of the property affected shall inspect and maintain the following stormwater management systems frequently, especially after heavy rainfalls, but at least on an annual basis unless otherwise specified.	
STORMWATER FACILITY	**TYPE OF ACTION**
1. Lawn and Landscaped Areas	All lawn areas shall be kept clear of any materials that block the flow of stormwater. Rills and small gullies shall immediately be filled and reestablished with native vegetation.
2. Swales	All swales showing signs of erosion, scour, or channelization shall be repaired, reinforced, and revegetated immediately. All swales shall be repaired to the original plan requirements.
3. Filter Strips	The surface areas over the pretreatment area and filter strip area shall be inspected for any type of settling or clogging that may take place on an annual basis. Any failed areas showing signs of degradation shall be restored to the original plan requirements.
4. Hydro International Up-Flo Filter Quality Structures	Inspection of the structure shall be completed annually at a minimum by qualified maintenance personnel. Sediment in the bottom of the structure shall be inspected to verify sediment is less than 16" deep. If sediment is greater than 16" deep, the sediment shall be removed per Hydro International requirements. Qualified maintenance personnel shall enter structure to remove a Media Bag to be weighed. Media Bags weighing more than 40 lbs are an indication that the bag is full and need to be replaced. Replace per manufacturer specifications. Qualified maintenance personnel shall inspect the oil layer on the water surface to oil being entrained in the Media Bags. If the oil accumulation is greater than 1.5", the structure shall be pumped per manufacturer's specifications. After storm events of greater than 1" of rainfall, the structure shall be inspected 48 hours after the rainfall even to verify the water level inside the structure has dropped to below the base of the filter modules. If the water level has not dropped, the filters are considered to be clogged and shall be replaced per manufacturer's specifications. For further information, obtain Hydro International's Up-Flo Filter Operation and Maintenance Manual for details.
5. Record of Maintenance	The operation and maintenance plan shall remain onsite and be available for inspection when requested by WDNR. When requested, the owner shall make available for inspection all maintenance records to the department or agent for the life of the system.

Appendix B
USDA Soil Information:

Hydrologic Soil Group—Sheboygan County, Wisconsin

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sheboygan County, Wisconsin
Survey Area Data: Version 12, Sep 27, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 29, 2011—Jun 3, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Sheboygan County, Wisconsin (WI117)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Ag	Adrian muck	A/D	25.2	7.2%
Bd	Beaches, sandy		24.2	6.9%
Dn	Dune land	A	122.9	35.0%
Gb	Granby loamy fine sand	A/D	23.0	6.5%
Hu	Houghton muck, 0 to 2 percent slopes	A/D	37.6	10.7%
OaB	Oakville loamy fine sand, 0 to 6 percent slopes	A	72.3	20.6%
OaC	Oakville loamy fine sand, 6 to 12 percent slopes	A	32.7	9.3%
W	Water		0.2	0.1%
Totals for Area of Interest			**351.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

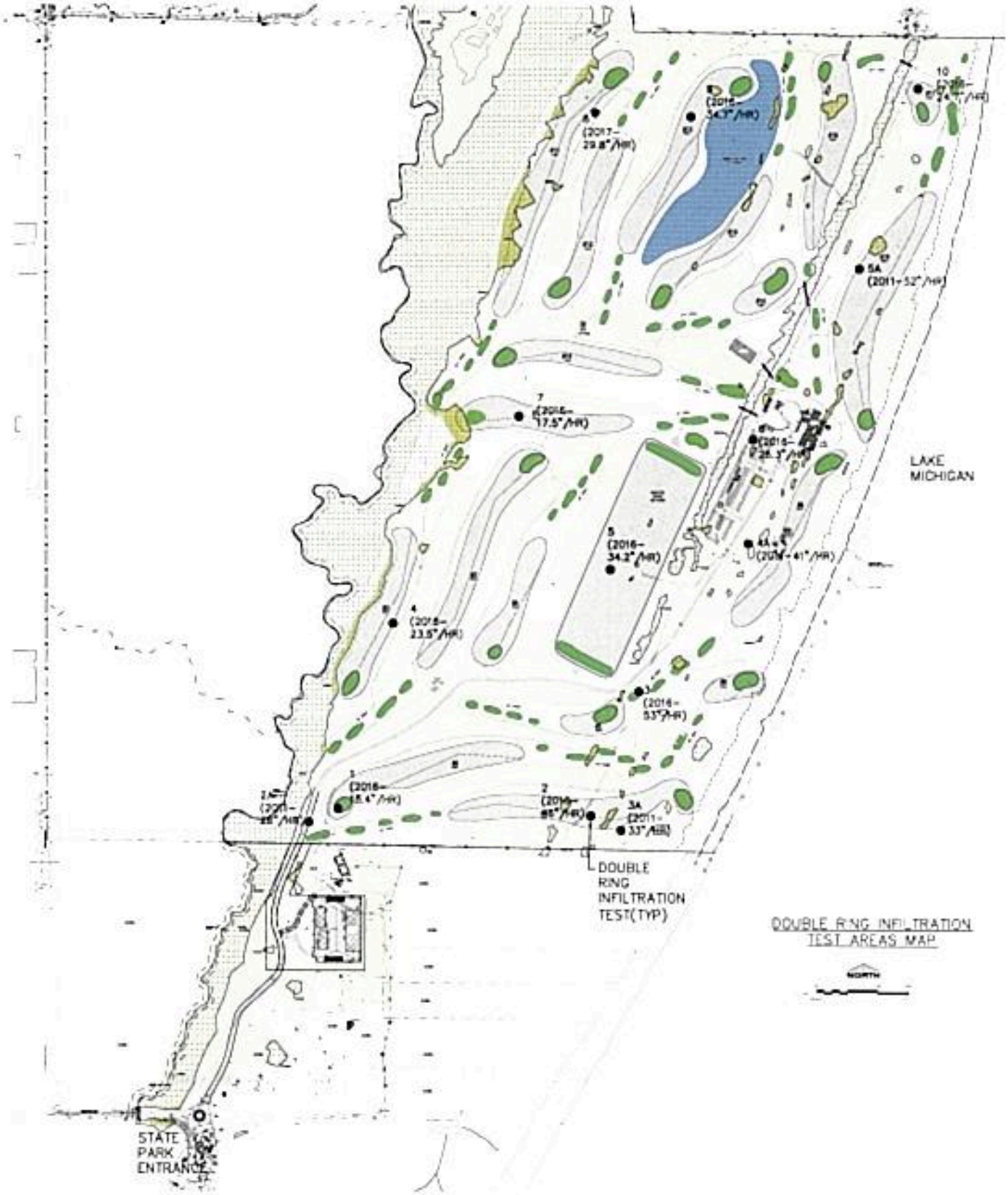
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix C
Infiltration Test Area Maps and Report:



DOUBLE RING INFILTRATION TEST AREAS MAP

midwest engineering services, inc.

geotechnical environmental materials engineers

821 Corporate Court
Suite 102
Waukesha, WI 53189-5010
262-521-2125
FAX 262-521-2471
www.midwestsing.com

December 22, 2011

Mr. Eric Drazkowski, P. E.
Excel Engineering
100 Camelot Drive
Fond du Lac, WI 54935

Subject: Double-Ring Infiltrometer Testing and Infiltration Evaluation
Tented Forest Parcel
Town of Wilson, Sheboygan County, Wisconsin
MES Project No. 7-113182

Dear Mr. Drazkowski,

INTRODUCTION

In accordance with your request, Midwest Engineering Services, Inc. (MES) has performed modified double-ring infiltrometer testing to provide a preliminary evaluation of the soil infiltration rates for four (4) specific locations on the Tented Forest Parcel, located in the Town of Wilson, Sheboygan County, Wisconsin, which is situated along Lake Michigan. A fifth test was eliminated due to access issues in that area of the site. The results of these tests are summarized in this report. Hard copies of this report can be provided upon request.

These recent services were performed in accordance with an agreement (MES Proposal No. 7-11341, dated December 14, 2011) between MES and Excel Engineering and signed by Mr. Jeffrey Quast, President of Excel Engineering, on December 22, 2011. The general conditions for the performance of the work were referenced in the proposal. This infiltration evaluation report has been prepared on behalf of, and exclusively for the use of the Excel Engineering. The information contained in this letter report may not be relied upon by any other parties without the written consent of MES, and acceptance by such parties of MES General Conditions.

PURPOSE

The purpose of the infiltometer tests was to aid in assessing the average rate of infiltration of water into the vegetated surface soils at predetermined locations on the Tented Forest Parcel.

SCOPE

The scope of services included a site reconnaissance, field observations of the existing surface conditions, performance of infiltrometer tests, and an evaluation and analysis of the

data obtained. The double ring tests were performed in the general locations specified by Excel Engineering. Initially, a total of five (5) tests were to be completed. However, due to the inaccessible nature of one (1) of the test locations (Test Location 1), it was eliminated from the scope. In addition, three other tests (Test Locations 3, 4 and 5), which were initially located near Lake Michigan on existing sand dunes, were relocated to western locations due to encountered surface condition access issues at the predetermined locations. Further, no soil sampling services were performed.

The field work for the performance of the infiltration tests were in general accordance with the guidelines expressed in the WDNR modified procedures for performing a double ring infiltrometer test per ASTM D3385. The design of the proposed swales and other devices was beyond the scope of services for this project.

SITE AND PROJECT DESCRIPTION

The project area is located within the Town of Wilson, Sheboygan County, Wisconsin. It consists of a large, heavily wooded area along Lake Michigan and south of the Timber Lake Subdivision, north of the Kohler-Andrae State Park and east of the Black River. The topography of the site is considered to be rolling with dunes along Lake Michigan. It is understood that the site development will consist of twelve (12) tented structures (Mongolian Yurts), a restaurant, a recreation tent structure, and a picnic area on the sand dunes along Lake Michigan; a maintenance building with a parking area in the southwest corner; and a reception structure with a guest parking area in the northwest corner. It is also understood that the site development will also attempt to maintain the site infiltration as natural as possible and any constructed impervious areas and any roof runoff will be designed to drain into the existing vegetated areas with no stormwater runoff leaving the site. Five (5) separate locations were initially proposed to be evaluated for this project and were anticipated to be accessible with a support truck. However, the area of Test Location 1, which was proposed to be located in the northwest portion of the site, was inaccessible with a support truck and was eliminated by Excel. Further, the initial locations of Test Locations 3, 4 and 5 were also inaccessible and were subsequently relocated to accessible locations of the site. The test locations are shown on the attached location diagram.

It is understood that the scope of the project is to evaluate the existing vegetated areas regarding infiltration rates to assist in the design of any proposed stormwater management devices.

FIELD CONDITIONS AND INFILTROMETER TESTING PROCEDURES

As proposed, MES performed field double ring infiltrometer tests in general accordance with WDNR modified procedures based upon ASTM D3385 standards. These tests were performed at four (4) specific locations on the parcel. The double ring method consists of placing two open-ended cylinders into the ground at the test location, with one cylinder inside the other. The rings were set approximately 4 to 6 inches into the vegetated surface. Per the

WDNR standard, the grass was not removed during the test procedures. Both of the rings are then filled with clean water. Once an equal depth of water is obtained within each ring, the water level within the inner ring is allowed drop to a predetermined depth, typically one inch. The time it takes the water to drop the predetermined depth is recorded. Per WDNR requirements, these test procedures were performed until an apparent uniform infiltration rate was achieved or for a minimum of two (2) hours. The volume of water added to the inner ring is that which infiltrates into the soils. The maximum steady-state infiltration velocity is equal to the infiltration rate.

In general, the vegetated surfaces of the test locations consisted of a thin layer of about 1 to 3 inches of root mat with fine sand. Some unvegetated areas were observed on the site, but generally in the areas of the eastern sand dunes.

SOIL SURVEY MAP REVIEW

The USDA Soil Conservation Survey for Sheboygan County, Wisconsin, dated January 1978, indicated the near surface soils in the vicinity of Test Location 1 (which was eliminated due to area access issues) and Test Location 2, consist of the Oakfield Loamy Fine Sand (OaB), while the near surface soils in the vicinity of Test Location 3, 4, and 5 consist of Dune Land (Dn). The Oakville soils generally consist of shallow loamy fine sand with underlying sand. Estimated permeability (infiltration rate) was indicated to be 6 to 20 inches per hour for the loamy fine sand and greater than 20 inches per hour for the sand. Though no estimated infiltration rates were indicated for the Dune Land soils due to its variable consistency, its description in the Soil Survey document indicated that these soils are excessively drained medium and fine sand with a very rapid permeability.

CONCLUSIONS OF INFILTROMETER TESTING

The following table summarizes the test location, surface condition, and the measured average infiltration rate. Results of the individual field infiltrometer test are also attached to this letter report.

Test Location	Date Tested	Test Depth	Surface Description	Average Infiltration Rate (in./hour)
#2	12-16-11	At grade	Sparsely Vegetated Loamy Fine Sand	26
#3	12-16-11	At grade	Sparsely Vegetated Fine Sand	33
#4	12-19-11	At grade	Sparsely Vegetated Fine Sand	41
#5	12-19-11	At grade	Sparsely Vegetated Fine Sand	52

In general, the infiltration rate is based on the average incremental infiltration velocity measured from the inner ring. The outer ring is to promote one-dimensional flow beneath the inner ring; therefore outer ring measurements were not collected. However, water was periodically added to the outer ring to maintain a general equal water level with the inner ring. It should be recognized that the infiltration rate could be affected by such factors as the condition of the soil surface, soil structure/layering, percentage of gravel or larger material, degree of saturation, and depth to the water table or bedrock. In summary, it should be recognized that the infiltration rates at these specific locations are expected to be somewhat variable depending upon the uniformity, and the in-place density of the subsoils below the individual infiltration areas.

At test locations, the average measured infiltration rates ranged from 26 to 52 inches per hour. However, it is indicated within the ASTM description of the Double Ring Standard (ASTM D3385), that the "test method is difficult to use or the resultant data may be unreliable, or both, in very pervious or impervious soils (soils with a hydraulic conductivity greater than about 14 inches per hour or less that about 0.0014 inches per hour)." The measured rates are greater than 14 inches per hour and must therefore be used with extreme caution when performing stormwater management area design. It may therefore be advisable to utilize either a limiting value of 14 inches per hour, or the infiltration rates provided for these soil textures in the NRCS Survey for Sheboygan County, when conducting the stormwater management area design. These rates expressed in the NRCS Survey document ranged from 6 to 20 inches per hour for the shallow soils around Test Locations 1 and 2, and to potentially greater than 20 inches per hour for the surface soils around Test Locations 3, 4, and 5.

GENERAL COMMENTS

The limited evaluation has been prepared on the basis of the conditions encountered at the test locations discussed above. Preliminary recommendations presented herein are based on available information and test data collected. This study has been conducted in the manner consistent with that level of care ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. The findings and opinions contained herein have been promulgated in accordance with general accepted practices in the fields of soil mechanics and engineering geology. No other representations, expressed or applied, and no warranty or guarantee is included or intended in this report.

After you have had the opportunity of reading this report, please call at any time with any questions or comments you may have. MES appreciates the opportunity to be of service on this project.

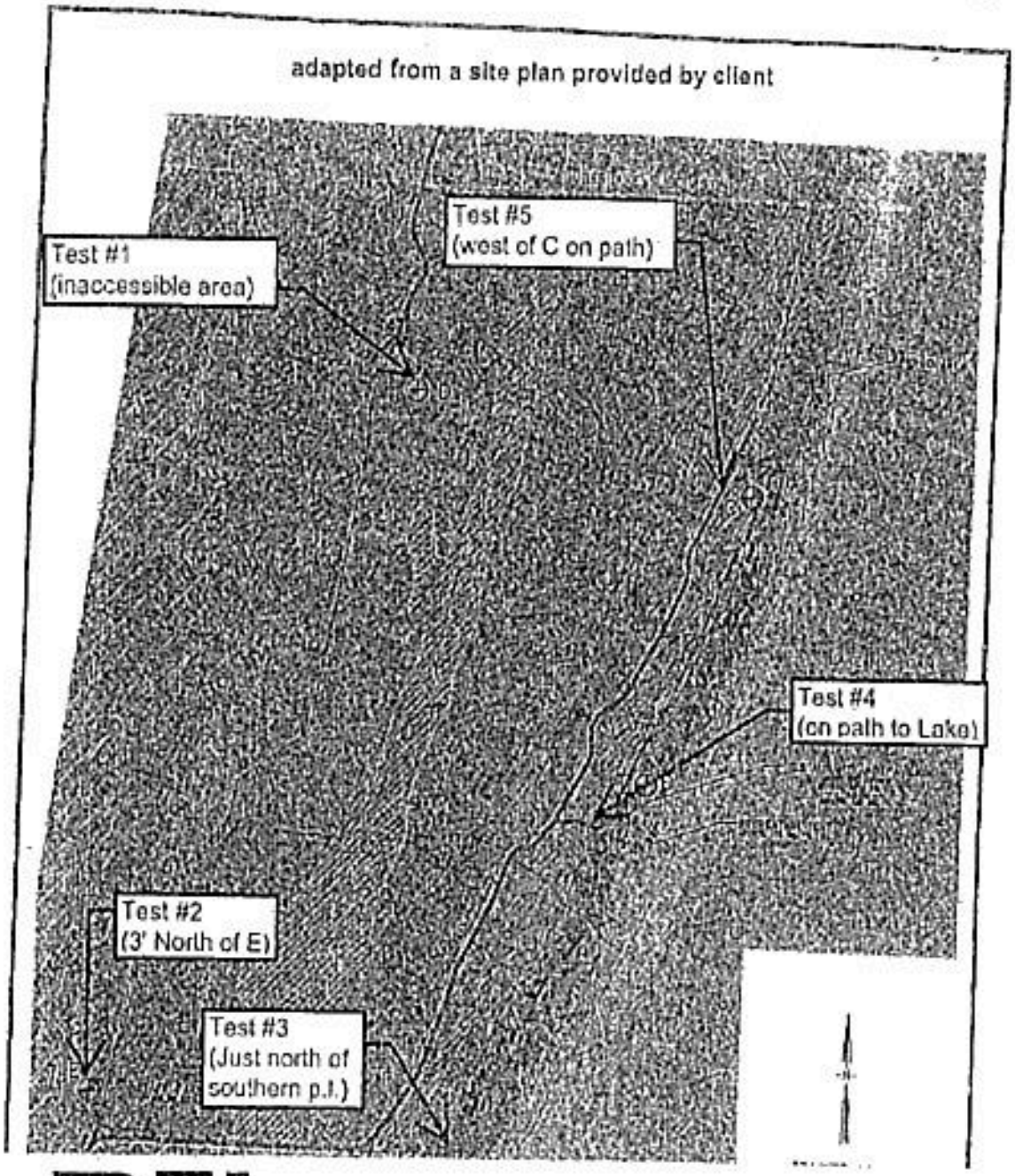
Sincerely yours,

MIDWEST ENGINEERING SERVICES, INC.

Patrick J. Patterson, P.E., P.G.
Project Engineer
Geotechnical Services

Bradley Broback, P.E.
Project Engineer
Geotechnical Services

Enclosures: Approximate Double Ring Test Location Diagram (1);
Field Notes of Double Ring Infiltrometer Tests (2);
General Notes (1)



MES

midwest engineering services, inc.

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Approximate Double Ring Test Location Diagram
Tented Forest Parcel
Town of Wilson
Sheboygan County, Wisconsin

Field Notes

Project Name: Tented Forest
Project Location: Town of Wilson, Wisconsin
MES Project No: 7-113182

Test Location : **Test #2** Date: **12/16/11**

Time	Elapsed Time	Δ Water Level	Total Time
11:30 am	2 min 19 sec	1"	
11:34 am	2 min 19 sec	1"	4 minutes
11:39 am	2 min 18 sec	1"	9 minutes
11:43 am	2 min 19 sec	1"	13 minutes
11:49 am	2 min 20 sec	1"	19 minutes
11:54 am	2 min 16 sec	1"	24 minutes
11:59 am	2 min 17 sec	1"	29 minutes
12:07 pm	2 min 15 sec	1"	37 minutes
12:11 pm	2 min 23 sec	1"	41 minutes
12:16 pm	2 min 17 sec	1"	46 minutes
12:21 pm	2 min 19 sec	1"	51 minutes
12:25 pm	2 min 20 sec	1"	55 minutes

Average Elapsed Time: **2 min 18.5 sec (0.0385 hours)**

Average Infiltration Rate: **26 in/hr**

Test Location : **Test #3** Date: **12/16/11**

Time	Elapsed Time	Δ Water Level	Total Time
2:35 pm	1 min 46 sec	1"	
2:38 pm	1 min 50 sec	1"	3 minutes
2:41 pm	1 min 49 sec	1"	6 minutes
2:44 pm	1 min 49 sec	1"	9 minutes
2:48 pm	1 min 50 sec	1"	13 minutes
2:51 pm	1 min 49 sec	1"	16 minutes
2:55 pm	1 min 48 sec	1"	20 minutes
2:59 pm	1 min 49 sec	1"	24 minutes
3:02 pm	1 min 50 sec	1"	27 minutes
3:05 pm	1 min 47 sec	1"	30 minutes
3:09 pm	1 min 46 sec	1"	34 minutes
3:13 pm	1 min 50 sec	1"	38 minutes
3:17 pm	1 min 48 sec	1"	42 minutes

Average Elapsed Time: **1 min 48.5 sec (0.0301 hours)**

Average Infiltration Rate: **33 in/hr**

Field Notes

Project Name: Tented Forest
Project Location: Town of Wilson, Wisconsin
MES Project No: 7-113182

Test Location : **Test #4** Date: **12/19/11**

Time	Elapsed Time	Δ Water Level	Total Time
11:45 am	1 min 32 sec	1"	
11:48 am	1 min 32 sec	1"	3 minutes
11:51 am	1 min 30 sec	1"	6 minutes
11:54 am	1 min 30 sec	1"	9 minutes
11:57 am	1 min 29 sec	1"	12 minutes
12:00 pm	1 min 31 sec	1"	15 minutes
12:04 pm	1 min 29 sec	1"	19 minutes
12:07 pm	1 min 28 sec	1"	22 minutes
12:11 pm	1 min 28 sec	1"	26 minutes
12:14 pm	1 min 27 sec	1"	29 minutes
12:17 pm	1 min 26 sec	1"	32 minutes
12:20 pm	1 min 25 sec	1"	35 minutes
12:24 pm	1 min 26 sec	1"	39 minutes
12:30 pm	1 min 26 sec	1"	45 minutes

Average Elapsed Time: **1 min 28.4 sec (0.0246 hours)**

Average Infiltration Rate: **41 in/hr**

Test Location : **Test #5** Date: **12/19/11**

Time	Elapsed Time	Δ Water Level	Total Time
1:47 pm	1 min 7 sec	1"	
1:50 pm	1 min 10 sec	1"	3 minutes
1:53 pm	1 min 8 sec	1"	6 minutes
1:56 pm	1 min 10 sec	1"	9 minutes
1:59 pm	1 min 9 sec	1"	12 minutes
2:03 pm	1 min 10 sec	1"	15 minutes
2:06 pm	1 min 10 sec	1"	18 minutes
2:10 pm	1 min 9 sec	1"	22 minutes
2:14 pm	1 min 10 sec	1"	26 minutes
2:17 pm	1 min 10 sec	1"	29 minutes
2:20 pm	1 min 8 sec	1"	32 minutes
2:24 pm	1 min 7 sec	1"	36 minutes
2:28 pm	1 min 10 sec	1"	40 minutes
2:35 pm	1 min 9 sec	1"	45 minutes

Average Elapsed Time: **1 min 9.1 sec (0.0192 hours)**

Average Infiltration Rate: **52 in/hr**

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December 19, 2016

Kohler Company
444 Highland Drive
Kohler, WI 53044

Attn: Mr. Jess Barley
Senior Staff Project Manager

Subject: Double-Ring Infiltrometer Testing and Infiltration Evaluation
Kohler Parcel
Town of Wilson, Sheboygan County, Wisconsin
PSI Project No. 00541315

Dear Mr. Barley,

INTRODUCTION

In accordance with your request, Professional Service Industries (PSI), has performed modified double-ring infiltrometer testing to provide a preliminary evaluation of the soil infiltration rates for ten (10) specific locations on the Kohler Parcel, located in the Town of Wilson, Sheboygan County, Wisconsin, which is situated along Lake Michigan. The results of these tests are summarized in this report. Hard copies of this report will be provided upon request.

These recent services were performed under a signed contact between PSI and Kohler Company, dated November 11, 2016. The general conditions for the performance of the work were referenced in PSI's Proposal (Proposal No. 0054194179, dated November 8, 2016), which was included in the contract as Exhibit A. This infiltration evaluation report has been prepared on behalf of, and exclusively for the use of the Kohler Company. The information contained in this letter report may not be relied upon by any other parties without the written consent of PSI.

PURPOSE

The purpose of the infiltometer tests was to aid in assessing the average rate of infiltration of water into the vegetated surface soils at predetermined locations on the Kohler Parcel.

SCOPE

The scope of services included a site reconnaissance, field observations of the existing

surface conditions, performance of infiltrometer tests, and an evaluation and analysis of the data obtained. The double ring tests were performed in the general locations specified by the Client. A total of ten (10) tests were completed. No soil sampling services were performed. The field work for the performance of the infiltration tests were in general accordance with the guidelines expressed in the WDNR modified procedures for performing a double ring infiltrometer test per ASTM D3385. The design of the proposed swales and other devices was beyond the scope of services for this project.

SITE AND PROJECT DESCRIPTION

The project area is located within the Town of Wilson, Sheboygan County, Wisconsin. It consists of a large, heavily wooded area along Lake Michigan and south of the Timber Lake Subdivision, north of the Kohler-Andrae State Park and east of the Black River. The topography of the site is considered to be rolling with dunes along Lake Michigan. It is understood that the site development will consist of a golf course. Ten (10) separate locations were evaluated for this project, and the test locations are shown on the attached location diagram.

It is understood that the scope of the project is to evaluate the existing vegetated areas regarding infiltration rates to assist in the design of any proposed stormwater management devices.

FIELD CONDITIONS AND INFILTROMETER TESTING PROCEDURES

As proposed, PSI performed field double ring infiltrometer tests in general accordance with WDNR modified procedures based upon ASTM D3385 standards. These tests were performed at ten (10) specific locations on the parcel. The double ring method consists of placing two open-ended cylinders into the ground at the test location, with one cylinder inside the other. The rings were set approximately 4 to 6 inches into the vegetated surface. Per the WDNR standard, the grass/vegetation was not removed during the test procedures. Both of the rings were then filled with clean water. Once an equal depth of water was obtained within each ring, the water level within the inner ring was allowed to drop to a predetermined depth, typically one inch. The time it takes the water to drop the predetermined depth was recorded. Per WDNR requirements, these test procedures were performed until an apparent uniform infiltration rate was achieved or for a minimum of two (2) hours. The volume of water added to the inner ring is that which infiltrates into the soils. The maximum steady-state infiltration velocity is equal to the infiltration rate.

In general, the vegetated surfaces of the test locations consisted of a thin layer of about 1 inch of root mat with fine sand to loamy fine sand.

SOIL SURVEY MAP REVIEW

The USDA Soil Conservation Survey for Sheboygan County, Wisconsin, dated January 1978, indicated the near surface soils in the vicinity of Test Locations 1, 2, 4, 7, 8, and 9 consist of the Oakville Loamy Fine Sand (OaB and OaC), while the near surface soils in the vicinity of Test Location 2, 3, 5, 6, and 10 consist of Dune Land (Dn). The Oakville soils generally consist of shallow loamy fine sand with underlying sand. Estimated permeability (infiltration rate) was indicated to range from about 6 to 20 inches per hour for the loamy fine sand and greater than 20 inches per hour for the sand. Though no estimated infiltration rates were indicated for the Dune Land soils due to its variable consistency, its description in the Soil Survey document indicated that these soils are excessively drained medium and fine sand with a very rapid permeability.

CONCLUSIONS OF INFILTROMETER TESTING

The following table summarizes the test location, surface condition, and the measured average infiltration rate. Results of the individual field infiltrometer tests are also attached to this letter report.

Test Location	Date Tested	Test Depth	Surface Description	Average Infiltration Rate (in./hour)
#1	12-7-16	At grade	Sparsely Vegetated Loamy Fine Sand	15.4
#2	12-6-16	At grade	Sparsely Vegetated Fine Sand	46
#3	12-6-16	At grade	Sparsely Vegetated Fine Sand	53
#4	12-7-16	At grade	Sparsely Vegetated Loamy Fine Sand	23.5
#5	12-7-16	At grade	Sparsely Vegetated Fine Sand	34.2
#6	12-5-16	At grade	Sparsely Vegetated Fine Sand	26.3
#7	12-5-16	At grade	Sparsely Vegetated Loamy Fine Sand	17.5
#8	12-5-16	At grade	Sparsely Vegetated Loamy Fine Sand	~~7.69~~ 29.8
#9	12-7-16	At grade	Sparsely Vegetated Loamy Fine Sand	34.7
#10	12-6-16	At grade	Sparsely Vegetated Fine Sand	24.7

In general, the infiltration rate is based on the average incremental infiltration velocity measured from the inner ring. The outer ring is to promote one-dimensional flow beneath the inner ring; therefore outer ring measurements were not collected. However, water was periodically added to the outer ring to maintain a general equal water level with the inner ring. It should be recognized that the infiltration rate could be affected by such factors as the condition of the soil surface, soil structure/layering, percentage of gravel or larger material, degree of saturation, and depth to the water table or bedrock. In summary, it should be recognized that the infiltration rates at these specific locations are expected to be somewhat variable depending upon the uniformity, and the in-place density of the subsoils below the individual infiltration areas.

At test locations, the average measured infiltration rates ranged from 4.59 to 53 inches per hour. However, it is indicated within the ASTM description of the Double Ring Standard (ASTM D3385), that the "test method is difficult to use or the resultant data may be unreliable, or both, in very pervious or impervious soils (soils with a hydraulic conductivity greater than about 14 inches per hour or less that about 0.0014 inches per hour)." The measured rates are greater than 14 inches per hour and must therefore be used with extreme caution when performing stormwater management area design. It may therefore be advisable to utilize either a limiting value of 14 inches per hour, or the infiltration rates provided for these soil textures in the NRCS Survey for Sheboygan County, when conducting the stormwater management area design. These rates expressed in the NRCS Survey document ranged from 6 to 20 inches per hour for the shallow soils around Test Locations 1, 4, 7, 8, and 9 and to potentially greater than 20 inches per hour for the surface soils around Test Locations 2, 3, 5, 6, and 10.

GENERAL COMMENTS

The limited evaluation has been prepared on the basis of the conditions encountered at the test locations discussed above. Preliminary recommendations presented herein are based on available information and test data collected. This study has been conducted in the manner consistent with that level of care ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. The findings and opinions contained herein have been promulgated in accordance with general accepted practices in the fields of soil mechanics and engineering geology. No other representations, expressed or applied, and no warranty or guarantee is included or intended in this report.

After you have had the opportunity of reading this report, please call at any time with any questions or comments you may have. PSI appreciates the opportunity to be of service on this project.

Sincerely yours,

PROFESSIONAL SERVICE INDUSTRIES, INC.

Patrick J. Patterson, P.E., P.G., C.S.T.
Senior Engineer
Environmental Services

Larry Raether, P.E.
Department Manager
Environmental Services

Enclosures: Approximate Double Ring Test Location Diagram (1);
Field Notes of Double Ring Infiltrometer Tests (9);
General Notes (1)

Double Ring Test
Location Diagram
Test #10
Test #8
Test #9
Test #7
Test #6
LAKE MICHIGAN
Test #5
Test #4
STAY ON EXISTING TRAILS
Test #3
Test #1
Test #2
STAY WEST OF THIS LINE (RARE SPECIES LOCATED TO THE EAST)
Legend:
:Double Ring Test Location
Adapted from diagram furnished by client
Kohler Parcel
CTH V
Town of Wilson, Wisconsin
PSI Project No. 00541315

Information To Build On

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Field Notes

Project Name: Kohler Parcel
Project Location: Town of Wilson, Wisconsin
PSI Project No: 00541315

Test Location : **Test #1** Date: **12/7/16**

Time	Elapsed Time	Δ Water Level	Total Time
2:20 pm	3 min 54 sec	1"	
2:25 pm	3 min 54 sec	1"	5 minutes
2:30 pm	3 min 52 sec	1"	10 minutes
2:36 pm	3 min 56 sec	1"	16 minutes
2:41 pm	3 min 54 sec	1"	21 minutes
2:47 pm	3 min 54 sec	1"	27 minutes
2:53 pm	3 min 54 sec	1"	33 minutes
2:58 pm	3 min 53 sec	1"	38 minutes
3:04 pm	3 min 54 sec	1"	44 minutes
3:08 pm	3 min 54 sec	1"	48 minutes
3:14 pm	3 min 53 sec	1"	54 minutes
3:20 pm	3 min 54 sec	1"	60 minutes

Average Elapsed Time: **3 min 54 sec (0.065 hours)**

Average Infiltration Rate: **15.4 in/hr**

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Field Notes

Project Name: Kohler Parcel

Project Location: Town of Wilson, Wisconsin

PSI Project No: 00541315

Test Location : **Test #2** Date: **12/6/16**

Time	Elapsed Time	Δ Water Level	Total Time
1:36 pm	1 min 18 sec	1"	
1:39 pm	1 min 18 sec	1"	3 minutes
1:41 pm	1 min 18 sec	1"	5 minutes
1:43 pm	1 min 18 sec	1"	7 minutes
1:45 pm	1 min 18 sec	1"	9 minutes
1:48 pm	1 min 18 sec	1"	12 minutes
1:50 pm	1 min 18 sec	1"	14 minutes
1:53 pm	1 min 17 sec	1"	17 minutes
1:56 pm	1 min 17 sec	1"	20 minutes
1:58 pm	1 min 18 sec	1"	22 minutes
2:01 pm	1 min 18 sec	1"	25 minutes
2:04 pm	1 min 17 sec	1"	28 minutes
2:06 pm	1 min 18 sec	1"	30 minutes
2:09 pm	1 min 17 sec	1"	33 minutes
2:11 pm	1 min 18 sec	1"	35 minutes
2:14 pm	1 min 18 sec	1"	38 minutes
2:16 pm	1 min 18 sec	1"	40 minutes
2:19 pm	1 min 18 sec	1"	43 minutes
2:21 pm	1 min 18 sec	1"	45 minutes
2:24 pm	1 min 17 sec	1"	48 minutes

Average Elapsed Time: **1 min 18 sec (0.0217 hours)**

Average Infiltration Rate: **46 in/hr**

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Field Notes

Project Name: Kohler Parcel
Project Location: Town of Wilson, Wisconsin
PSI Project No: 00541315

Test Location : **Test #3** Date: **12/6/16**

Time	Elapsed Time	Δ Water Level	Total Time
12:10 pm	1 min 07 sec	1"	
12:13 pm	1 min 07 sec	1"	3 minutes
12:16 pm	1 min 06 sec	1"	6 minutes
12:18 pm	1 min 07 sec	1"	8 minutes
12:21 pm	1 min 07 sec	1"	11 minutes
12:23 pm	1 min 08 sec	1"	13 minutes
12:26 pm	1 min 08 sec	1"	16 minutes
12:28 pm	1 min 07 sec	1"	18 minutes
12:31 pm	1 min 07 sec	1"	21 minutes
12:33 pm	1 min 08 sec	1"	23 minutes
12:35 pm	1 min 07 sec	1"	25 minutes
12:38 pm	1 min 07 sec	1"	28 minutes
12:40 pm	1 min 08 sec	1"	30 minutes
12:42 pm	1 min 07 sec	1"	32 minutes
12:44 pm	1 min 08 sec	1"	34 minutes
12:46 pm	1 min 07 sec	1"	36 minutes
12:48 pm	1 min 08 sec	1"	38 minutes
12:50 pm	1 min 08 sec	1"	40 minutes
12:52 pm	1 min 07 sec	1"	42 minutes
12:55 pm	1 min 08 sec	1"	45 minutes
12:57 pm	1 min 08 sec	1"	47 minutes
12:59 pm	1 min 08 sec	1"	49 minutes

Average Elapsed Time: **1 min 7.5 sec (0.0187 hours)**

Average Infiltration Rate: **53 in/hr**

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Field Notes

Project Name: Kohler Parcel
Project Location: Town of Wilson, Wisconsin
MES Project No: 00541315

Test Location : **Test #4** Date: **12/7/16**

Time	Elapsed Time	Δ Water Level	Total Time
1:49 pm	2 min 24 sec	1"	
1:53 pm	2 min 30 sec	1"	4 minutes
1:57 pm	2 min 37 sec	1"	8 minutes
2:01 pm	2 min 34 sec	1"	12 minutes
2:05 pm	2 min 33 sec	1"	16 minutes
2:09 pm	2 min 30 sec	1"	20 minutes
2:13 pm	2 min 31 sec	1"	24 minutes
2:16 pm	2 min 31 sec	1"	27 minutes
2:20 pm	2 min 33 sec	1"	31 minutes
2:24 pm	2 min 30 sec	1"	35 minutes
2:30 pm	2 min 30 sec	1"	41 minutes
2:34 pm	2 min 29 sec	1"	45 minutes
2:38 pm	2 min 29 sec	1"	49 minutes
2:42 pm	2 min 30 sec	1"	53 minutes
2:46 pm	2 min 30 sec	1"	57 minutes

Average Elapsed Time: **2 min 33 sec (0.0425 hours)**

Average Infiltration Rate: **23.5 in/hr**

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Field Notes

Project Name: Kohler Parcel
Project Location: Town of Wilson, Wisconsin
PSI Project No: 00541315

Test Location : **Test #5** Date: **12/7/16**

Time	Elapsed Time	Δ Water Level	Total Time
12:12 pm	1 min 45 sec	1"	
12:14 pm	1 min 46 sec	1"	2 minutes
12:17 pm	1 min 46 sec	1"	5 minutes
12:19 pm	1 min 47 sec	1"	7 minutes
12:22 pm	1 min 46 sec	1"	10 minutes
12:25 pm	1 min 46 sec	1"	13 minutes
12:27 pm	1 min 45 sec	1"	15 minutes
12:30 pm	1 min 46 sec	1"	18 minutes
12:33 pm	1 min 45 sec	1"	21 minutes
12:36 pm	1 min 45 sec	1"	24 minutes
12:39 pm	1 min 45 sec	1"	27 minutes
12:41 pm	1 min 45 sec	1"	29 minutes
12:43 pm	1 min 46 sec	1"	31 minutes
12:46 pm	1 min 44 sec	1"	34 minutes
12:48 pm	1 min 45 sec	1"	36 minutes
12:51 pm	1 min 45 sec	1"	39 minutes
12:53 pm	1 min 45 sec	1"	41 minutes
12:56 pm	1 min 44 sec	1"	44 minutes
12:58 pm	1 min 44 sec	1"	46 minutes
1:01 pm	1 min 45 sec	1"	49 minutes

Average Elapsed Time: **1 min 45.25 sec (0.0292 hours)**

Average Infiltration Rate: **34.2 in/hr**

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Field Notes

Project Name: Kohler Parcel
Project Location: Town of Wilson, Wisconsin
MES Project No: 00541315

Test Location : **Test #6** Date: **12/5/16**

Time	Elapsed Time	Δ Water Level	Total Time
11:29 am	2 min 16 sec	1"	
11:33 am	2 min 10 sec	1"	4 minutes
11:36 am	2 min 13 sec	1"	8 minutes
11:40 am	2 min 18 sec	1"	12 minutes
11:44 am	2 min 17 sec	1"	16 minutes
11:48 am	2 min 19 sec	1"	20 minutes
11:51 am	2 min 15 sec	1"	23 minutes
11:55 am	2 min 18 sec	1"	27 minutes
11:58 am	2 min 18 sec	1"	30 minutes
12:03 pm	2 min 17 sec	1"	35 minutes
12:07 pm	2 min 19 sec	1"	39 minutes
12:11 pm	2 min 17 sec	1"	43 minutes
12:14 pm	2 min 18 sec	1"	46 minutes
12:17 pm	2 min 17 sec	1"	49 minutes
12:21 pm	2 min 19 sec	1"	53 minutes
12:25 pm	2 min 18 sec	1"	57 minutes
12:29 pm	2 min 18 sec	1"	61 minutes

Average Elapsed Time: **2 min 16.9 sec (0.0380 hours)**

Average Infiltration Rate: **26.3 in/hr**

Information To Build On

Engineering • Consulting • Testing

Field Notes

Project Name: Kohler Parcel
Project Location: Town of Wilson, Wisconsin
PSI Project No: 00541315

Test Location : **Test #7** Date: **12/5/16**

Time	Elapsed Time	Δ Water Level	Total Time
3:02 pm	3 min 25 sec	1"	
3:06 pm	3 min 30 sec	1"	5 minutes
3:10 pm	3 min 25 sec	1"	10 minutes
3:15 pm	3 min 25 secc	1"	16 minutes
3:19 pm	3 min 26 sec	1"	21 minutes
3:24 pm	3 min 26 sec	1"	27 minutes
3:28 pm	3 min 24 sec	1"	33 minutes
3:33 pm	3 min 27 sec	1"	38 minutes
3:38 pm	3 min 26 sec	1"	44 minutes
3:42 pm	3 min 26 sec	1"	48 minutes

Average Elapsed Time: **3 min 26 sec (0.0572 hours)**

Average Infiltration Rate: **17.5 in/hr**

Test Location : **Test #8** Date: **12/5/16**

Time	Elapsed Time	Δ Water Level	Total Time
1:34 pm	13 min 05 sec	1"	
1:49 pm	13 min 03 sec	1"	15 minutes
2:06 pm	13 min 04 sec	1"	32 minutes
2:21 pm	13 min 04 sec	1"	47 minutes
2:37 pm	13 min 03 sec	1"	63 minutes

Average Elapsed Time: **13 min 3.8 sec (0.2177 hours)**

Average Infiltration Rate: **4.59 in/hr**

psi Information To Build On
Engineering • Consulting • Testing

Field Notes

Project Name: Kohler Parcel
Project Location: Town of Wilson, Wisconsin
PSI Project No: 00541315

Test Location : **Test 8A** Date: **1/4/17**

Time	Elapsed Time	Δ Water Level	Total Time
11:14 am	1 min 59 sec	1"	
11:18 am	1 min 59 sec	1"	4 minutes
11:21 am	2 min 01 sec	1"	7 minutes
11:26 am	2 min 01 sec	1"	12 minutes
11:30 am	2 min 01 sec	1"	16 minutes
11:34 am	2 min 01 sec	1"	20 minutes
11:37 am	2 min 01 sec	1"	23 minutes
11:41 am	2 min 02 sec	1"	27 minutes
11:45 am	2 min 02 sec	1"	31 minutes
11:50 am	2 min 01 sec	1"	36 minutes
11:53 am	2 min 02 sec	1"	39 minutes
11:58 am	2 min 01 sec	1"	44 minutes
12:02 pm	2 min 01 sec	1"	48 minutes
12:07 pm	2 min 02 sec	1"	53 minutes
12:11 pm	2 min 01 sec	1"	57 minutes
12:16 pm	2 min 01 sec	1"	62 minutes
12:20 pm	2 min 01 sec	1"	66 minutes
12:24 pm	2 min 01 sec	1"	70 minutes
12:29 pm	2 min 01 sec	1"	75 minutes

Average Elapsed Time: **2 min 01 sec (0.0336 hours)**

Average Infiltration Rate: **29.8 in/hr**

Information To Build On

Engineering • Consulting • Testing

Field Notes

Project Name: Kohler Parcel
Project Location: Town of Wilson, Wisconsin
PSI Project No: 00541315

Test Location : **Test #9** Date: **12/7/16**

Time	Elapsed Time	Δ Water Level	Total Time
10:08 am	1 min 43 sec	1"	
10:11 am	1 min 43 sec	1"	3 minutes
10:13 am	1 min 44 sec	1"	5 minutes
10:16 am	1 min 44 sec	1"	8 minutes
10:19 am	1 min 43 sec	1"	11 minutes
10:21 am	1 min 44 sec	1"	13 minutes
10:25 am	1 min 45 sec	1"	14 minutes
10:27 am	1 min 42 sec	1"	17 minutes
10:30 am	1 min 45 sec	1"	20 minutes
10:34 am	1 min 44 sec	1"	22 minutes
10:36 am	1 min 45 sec	1"	25 minutes
10:39 am	1 min 43 sec	1"	28 minutes
10:41 am	1 min 44 sec	1"	30 minutes
10:44 am	1 min 44 sec	1"	33 minutes
10:47 am	1 min 43 sec	1"	35 minutes
10:50 am	1 min 44 sec	1"	38 minutes
10:53 am	1 min 43 sec	1"	40 minutes
10:56 am	1 min 45 sec	1"	43 minutes
10:59 am	1 min 44 sec	1"	45 minutes

Average Elapsed Time: **1 min 43.8 sec (0.0288 hours)**

Average Infiltration Rate: **34.7 in/hr**

Information To Build On

Engineering • Consulting • Testing

Field Notes

Project Name: Kohler Parcel
Project Location: Town of Wilson, Wisconsin
PSI Project No: 00541315

Test Location : **Test #10** Date: **12/6/16**

Time	Elapsed Time	Δ Water Level	Total Time
10:25 am	2 min 26 sec	1"	
10:31 am	2 min 26 sec	1"	6 minutes
10:35 am	2 min 27 sec	1"	10 minutes
10:39 am	2 min 26 sec	1"	14 minutes
10:43 am	2 min 24 sec	1"	18 minutes
10:47 am	2 min 23 sec	1"	22 minutes
10:51 am	2 min 26 sec	1"	26 minutes
10:54 am	2 min 25 sec	1"	29 minutes
10:58 am	2 min 25 sec	1"	33 minutes
11:03 am	2 min 25 sec	1"	38 minutes
11:07 am	2 min 26 sec	1"	42 minutes
11:11 am	2 min 26 sec	1"	46 minutes
11:15 am	2 min 26 sec	1"	50 minutes

Average Elapsed Time: **2 min 25.5 sec (0.0404 hours)**

Average Infiltration Rate: **24.7 in/hr**

GENERAL NOTES

SAMPLE IDENTIFICATION

The Unified Soil Classification System (USCS), AASHTO 1988 and ASTM designations D2487 and D-2488 are used to identify the encountered materials unless otherwise noted. Coarse-grained soils are defined as having more than 50% of their dry weight retained on a #200 sieve (0.075mm); they are described as: boulders, cobbles, gravel or sand. Fine-grained soils have less than 50% of their dry weight retained on a #200 sieve; they are defined as silts or clay depending on their Atterberg Limit attributes. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size.

DRILLING AND SAMPLING SYMBOLS

SFA: Solid Flight Auger - typically 4" diameter flights, except where noted.
HSA: Hollow Stem Auger - typically 3¼" or 4¼ I.D. openings, except where noted.
M.R.: Mud Rotary - Uses a rotary head with Bentonite or Polymer Slurry
R.C.: Diamond Bit Core Sampler
H.A.: Hand Auger
P.A.: Power Auger - Handheld motorized auger

SS: Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
RC: Rock Core
TC: Texas Cone
BS: Bulk Sample
PM: Pressuremeter
CPT-U: Cone Penetrometer Testing with Pore-Pressure Readings

SOIL PROPERTY SYMBOLS

N: Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2-inch O.D. Split-Spoon.
N_{60}: A "N" penetration value corrected to an equivalent 60% hammer energy transfer efficiency (ETR)
Q_u: Unconfined compressive strength, TSF
Q_p: Pocket penetrometer value, unconfined compressive strength, TSF
w%: Moisture/water content, %
LL: Liquid Limit, %
PL: Plastic Limit, %
PI: Plasticity Index = (LL-PL),%
DD: Dry unit weight, pcf
▼,▽,▼ Apparent groundwater level at time noted

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Relative Density	N - Blows/foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	50 - 80
Extremely Dense	80+

ANGULARITY OF COARSE-GRAINED PARTICLES

Description	Criteria
Angular:	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular:	Particles are similar to angular description, but have rounded edges
Subrounded:	Particles have nearly plane sides, but have well-rounded corners and edges
Rounded:	Particles have smoothly curved sides and no edges

GRAIN-SIZE TERMINOLOGY

Component	Size Range
Boulders:	Over 300 mm (>12 in.)
Cobbles:	75 mm to 300 mm (3 in. to 12 in.)
Coarse-Grained Gravel:	19 mm to 75 mm (¾ in. to 3 in.)
Fine-Grained Gravel:	4.75 mm to 19 mm (No 4 to ¾ in.)
Coarse-Grained Sand:	2 mm to 4.75 mm (No.10 to No.4)
Medium-Grained Sand:	0.42 mm to 2 mm (No 40 to No.10)
Fine-Grained Sand:	0.075 mm to 0.42 mm (No. 200 to No.40)
Silt:	0.005 mm to 0.075 mm
Clay:	<0.005 mm

PARTICLE SHAPE

Description	Criteria
Flat:	Particles with width/thickness ratio > 3
Elongated:	Particles with length/width ratio > 3
Flat & Elongated:	Particles meet criteria for both flat and elongated

RELATIVE PROPORTIONS OF FINES

Descriptive Term	% Dry Weight
Trace:	< 5%
With:	5% to 12%
Modifier:	>12%

GENERAL NOTES

(Continued)

CONSISTENCY OF FINE-GRAINED SOILS

Q_u - TSF	N - Blows/foot	Consistency
0 - 0.25	0 - 2	Very Soft
0.25 - 0.50	2 - 4	Soft
0.50 - 1.00	4 - 8	Firm (Medium Stiff)
1.00 - 2.00	8 - 15	Stiff
2.00 - 4.00	15 - 30	Very Stiff
4.00 - 8.00	30 - 50	Hard
8.00+	50+	Very Hard

MOISTURE CONDITION DESCRIPTION

Description	Criteria
Dry:	Absence of moisture, dusty, dry to the touch
Moist:	Damp but no visible water
Wet:	Visible free water, usually soil is below water table

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term	% Dry Weight
Trace:	< 15%
With:	15% to 30%
Modifier:	>30%

STRUCTURE DESCRIPTION

Description	Criteria
Stratified:	Alternating layers of varying material or color with layers at least ¼-inch (6 mm) thick
Laminated:	Alternating layers of varying material or color with layers less than ¼-inch (6 mm) thick
Fissured:	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided:	Fracture planes appear polished or glossy, sometimes striated
Blocky:	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed:	Inclusion of small pockets of different soils
Layer:	Inclusion greater than 3 inches thick (75 mm)
Seam:	Inclusion 1/8-inch to 3 inches (3 to 75 mm) thick extending through the sample
Parting:	Inclusion less than 1/8-inch (3 mm) thick

SCALE OF RELATIVE ROCK HARDNESS

Q_u - TSF	Consistency
2.5 - 10	Extremely Soft
10 - 50	Very Soft
50 - 250	Soft
250 - 525	Medium Hard
525 - 1,050	Moderately Hard
1,050 - 2,600	Hard
>2,600	Very Hard

ROCK BEDDING THICKNESSES

Description	Criteria
Very Thick Bedded	Greater than 3-foot (>1.0 m)
Thick Bedded	1-foot to 3-foot (0.3 m to 1.0 m)
Medium Bedded	4-inch to 1-foot (0.1 m to 0.3 m)
Thin Bedded	1¼-inch to 4-inch (30 mm to 100 mm)
Very Thin Bedded	½-inch to 1¼-inch (10 mm to 30 mm)
Thickly Laminated	1/8-inch to ½-inch (3 mm to 10 mm)
Thinly Laminated	1/8-inch or less "paper thin" (<3 mm)

ROCK VOIDS

Voids	Void Diameter
Pit	<6 mm (<0.25 in)
Vug	6 mm to 50 mm (0.25 in to 2 in)
Cavity	50 mm to 600 mm (2 in to 24 in)
Cave	>600 mm (>24 in)

GRAIN-SIZED TERMINOLOGY

(Typically Sedimentary Rock)

Component	Size Range
Very Coarse Grained	>4.76 mm
Coarse Grained	2.0 mm - 4.76 mm
Medium Grained	0.42 mm - 2.0 mm
Fine Grained	0.075 mm - 0.42 mm
Very Fine Grained	<0.075 mm

ROCK QUALITY DESCRIPTION

Rock Mass Description	RQD Value
Excellent	90 - 100
Good	75 - 90
Fair	50 - 75
Poor	25 - 50
Very Poor	Less than 25

DEGREE OF WEATHERING

Slightly Weathered:	Rock generally fresh, joints stained and discoloration extends into rock up to 25 mm (1 in), open joints may contain clay, core rings under hammer impact.
Weathered:	Rock mass is decomposed 50% or less, significant portions of the rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.
Highly Weathered:	Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

SOIL CLASSIFICATION CHART

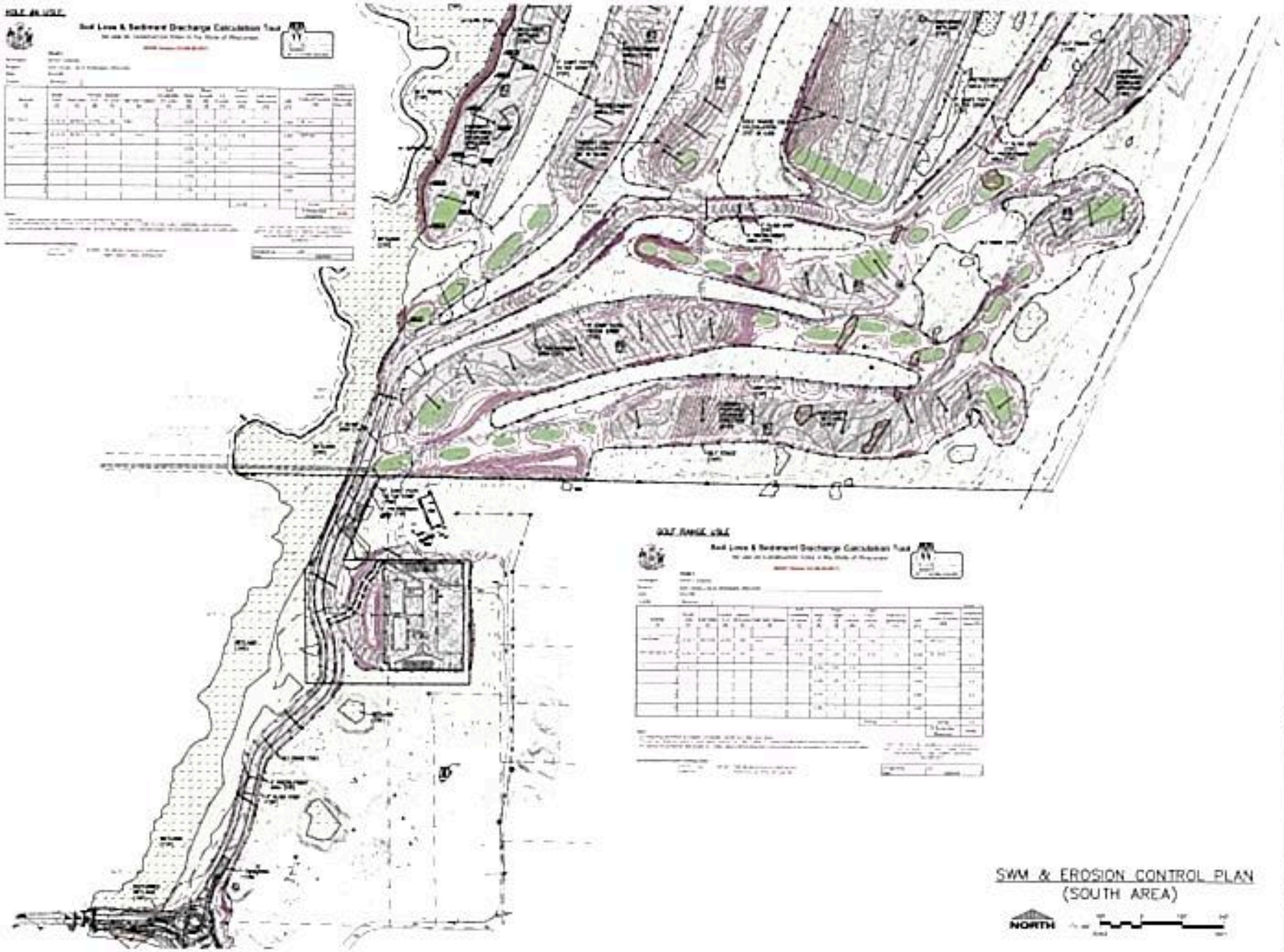
NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

psi

Appendix D

South Stormwater & Erosion Control Exhibit:



SWM & EROSION CONTROL PLAN
(SOUTH AREA)

EXCEL

NEW GOLF COURSE
KOHLER COMPANY
CITY OF SHEBOYGAN • SHEBOYGAN COUNTY, WI

NOT FOR CONSTRUCTION

SWM & EROSION CONTROL

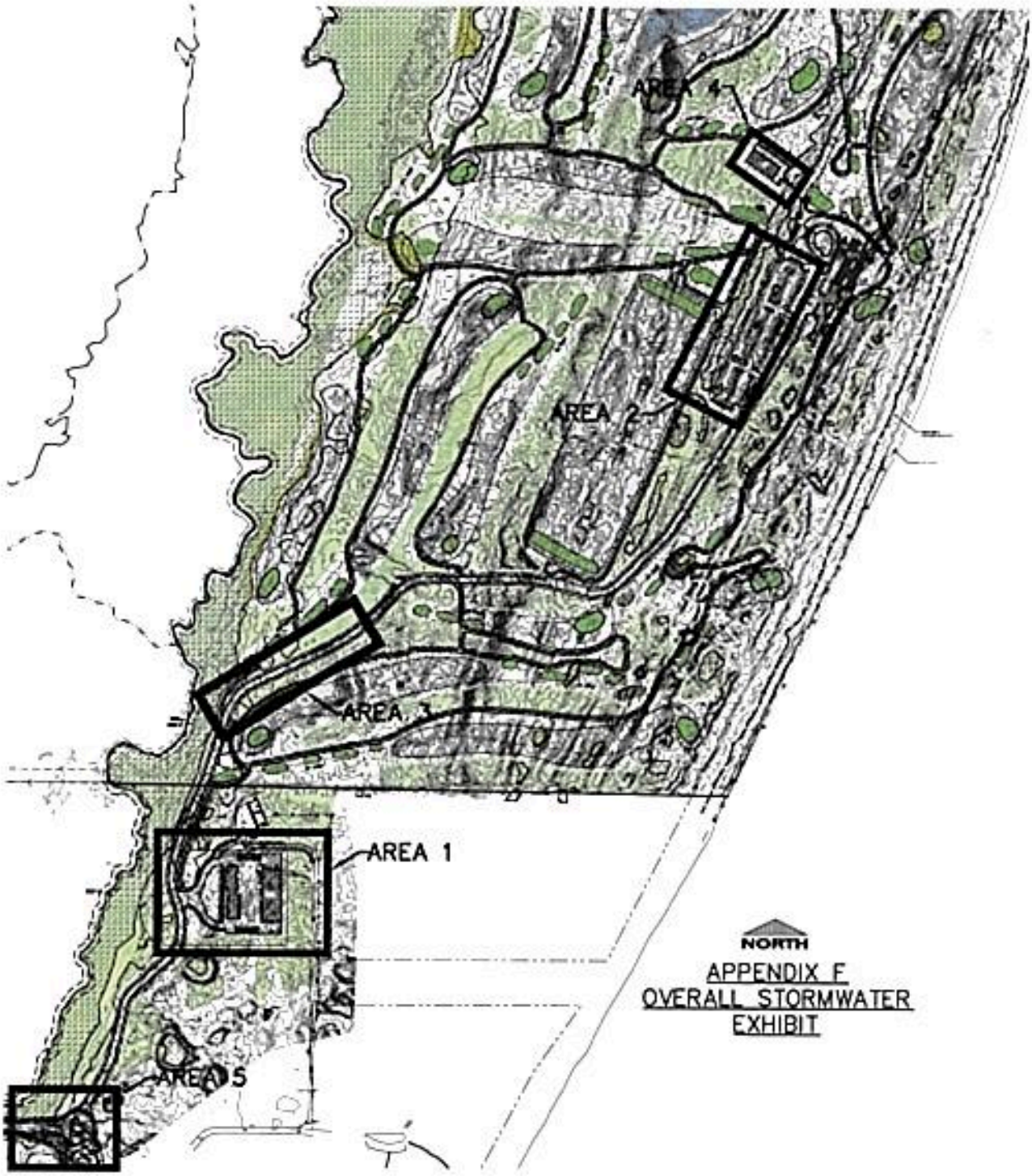
D

Appendix E

North Stormwater & Erosion Control Exhibit:

Soil Loss & Sediment Discharge Calculation Tool
Soil Loss & Sediment Discharge Calculation Tool
PRACTICE GREEN
SWM & EROSION CONTROL PLAN
(NORTH AREA)
NORTH
EXCEL
NEW GOLF COURSE
KOHLER COMPANY
CITY OF SHEBOYGAN • SHEBOYGAN COUNTY, WI
NOT FOR CONSTRUCTION
E

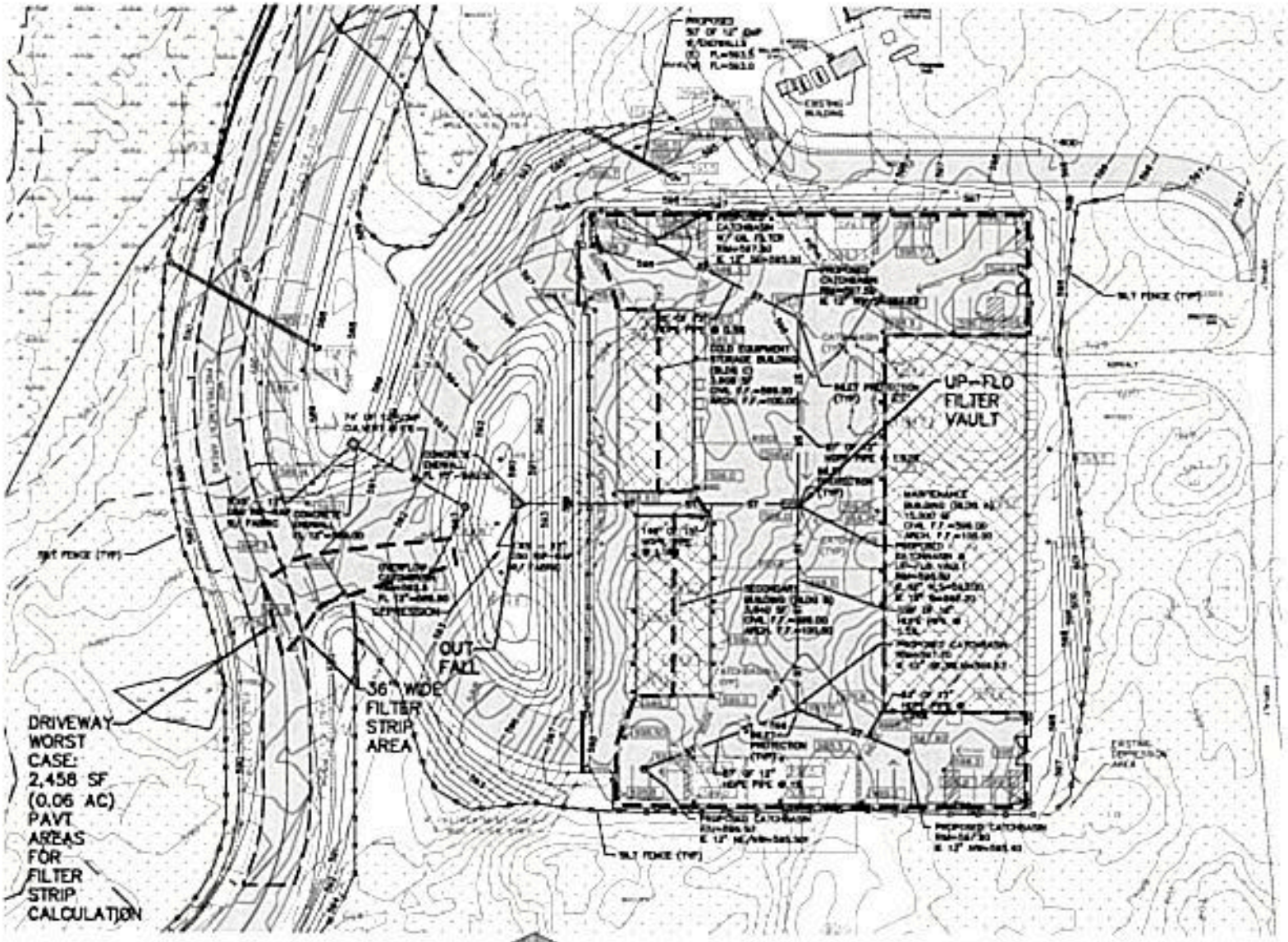
Appendix F
Stormwater Overall Management Exhibit:



APPENDIX F
OVERALL STORMWATER
EXHIBIT

Appendix G

Area 1 – Maintenance Building Map and Calculations:



NORTH

1" = 50'

50' 0 50' 100'

SCALE FEET

AREA 1
MAINTENANCE BUILDING

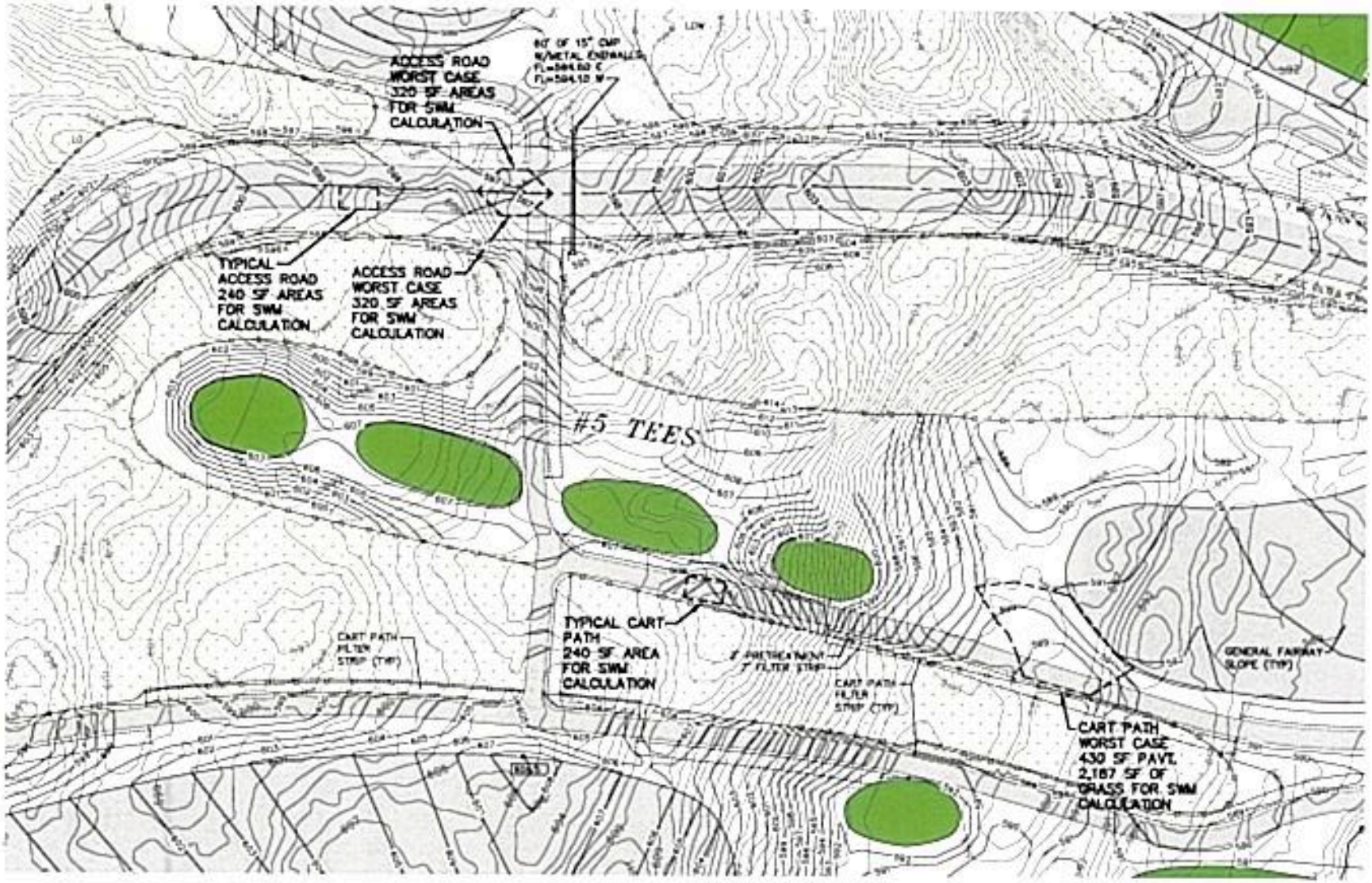
Appendix H

Area 2 – Guest Parking & Lodge Area Map and Calculations:

AREA 2
PARKING AREA

Appendix I

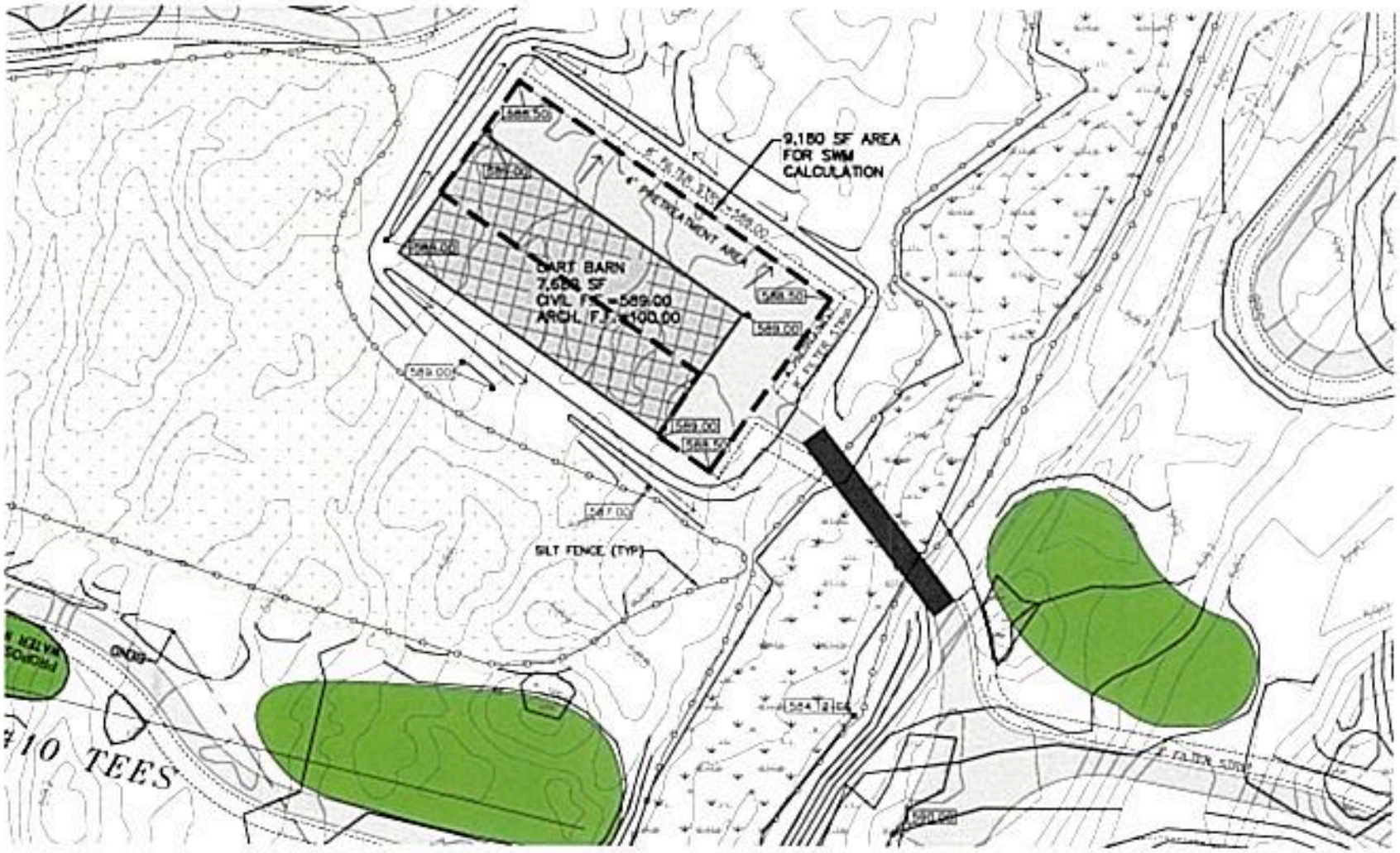
Area 3 – Access Road & Cart Paths Map and Calculations:



AREA 3
ACCESS DRIVE & CART PATHS

Appendix J

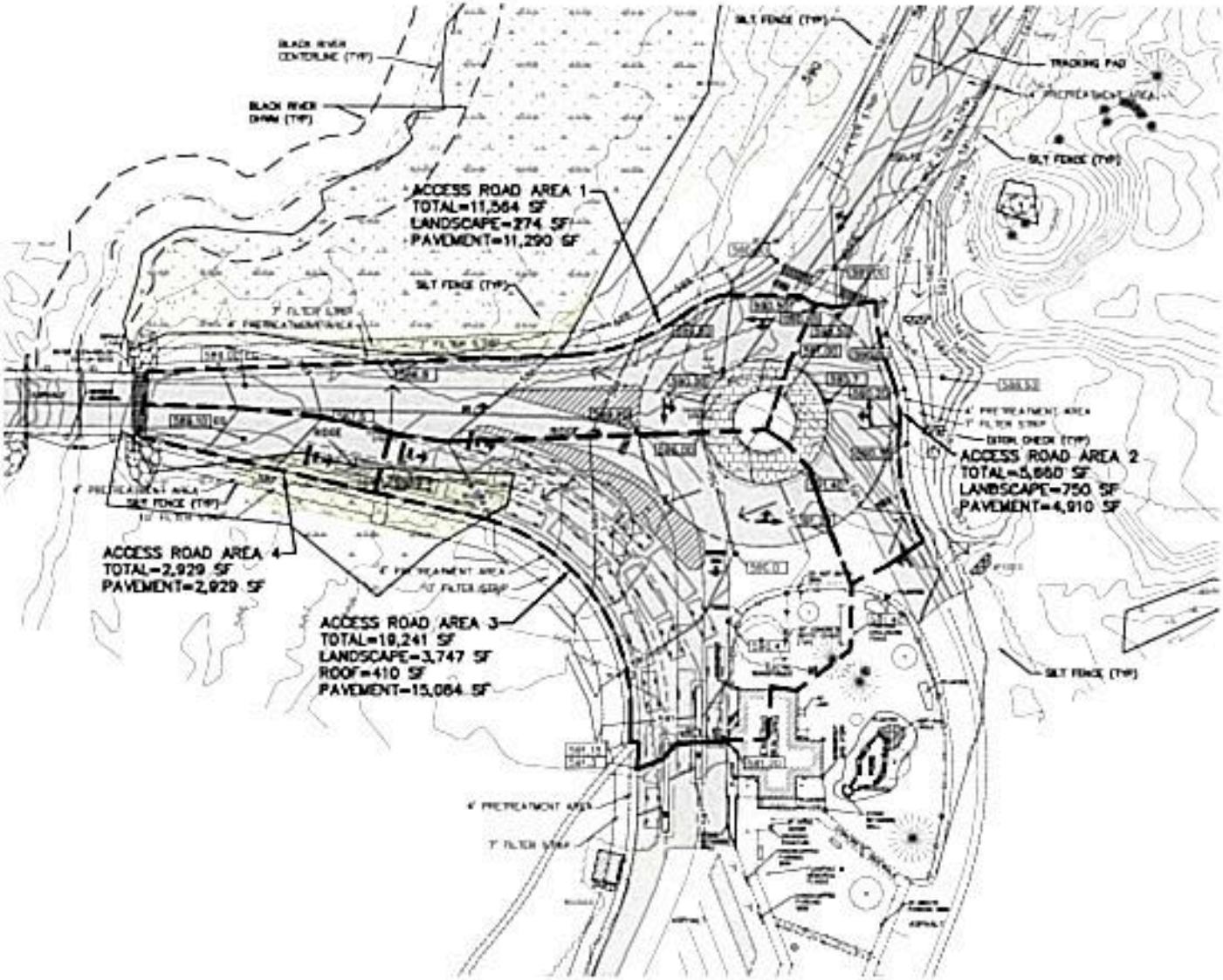
Area 4 – Caddie/Cart Barn Map and Calculations:



AREA 4
CART BARN

Appendix K

Area 5 – Roundabout Area Map:



AREA 5
ROUNDABOUT AREA

Appendix L

Area 6 – Total Development and Depression Area Map and Calculations:

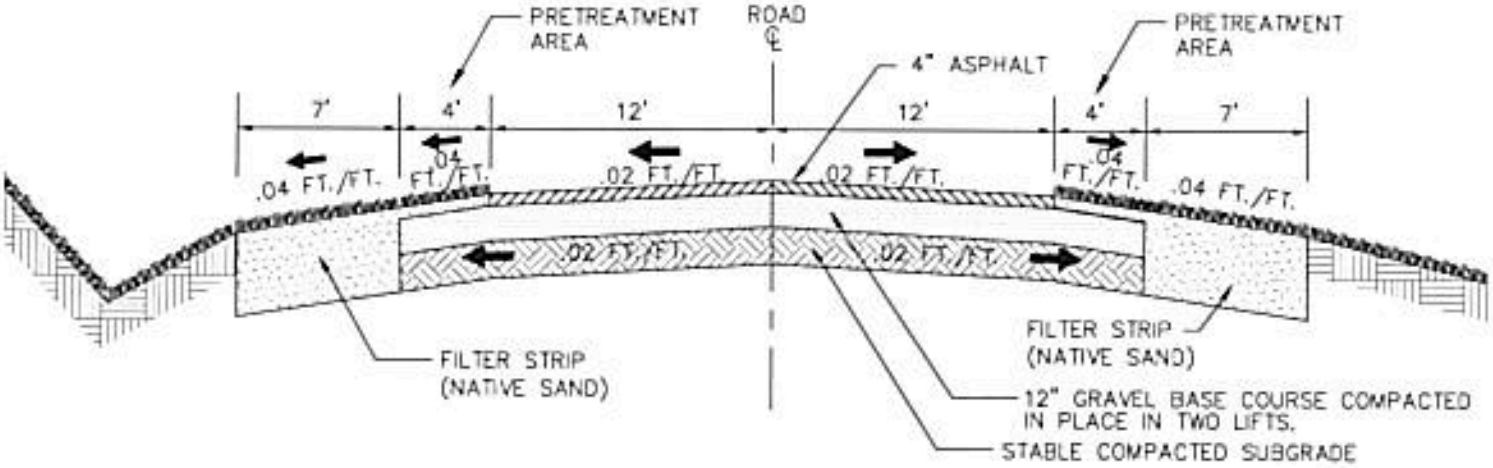
TOTAL DEVELOPMENT &
DEPRESSION AREA MAP

APPENDIX L

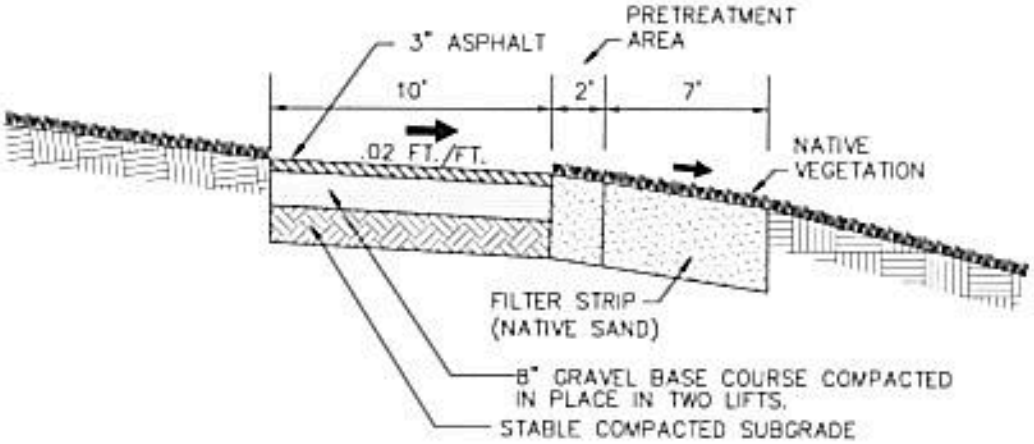
AREA 6

Appendix M

Access Road & Cart Path Section Details:



TYPICAL ACCESS DRIVE SECTION
NO SCALE



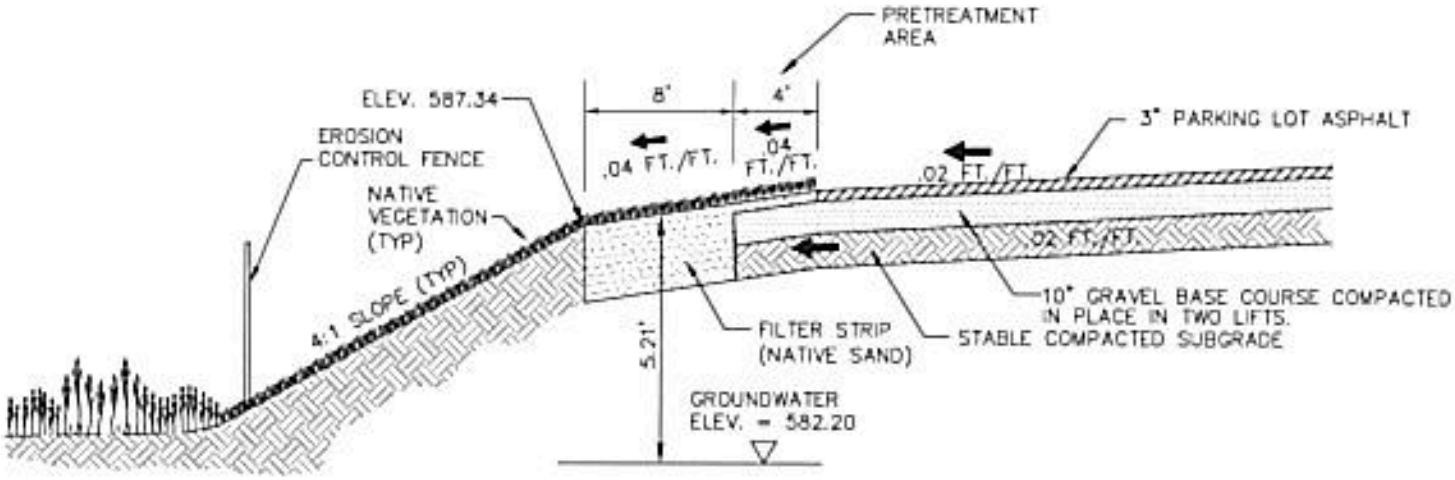
TYPICAL CART PATH SECTION
NO SCALE

ACCESS ROAD & CART PATH DETAILS

APPENDIX M

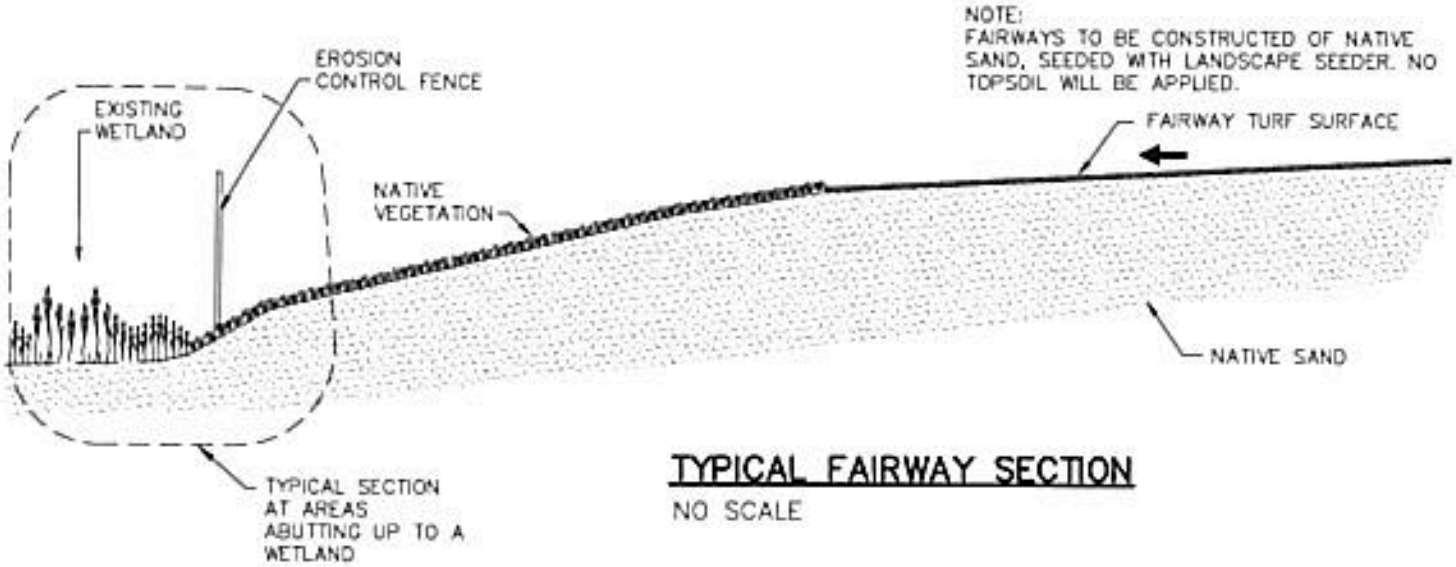
Appendix N

Parking Lot & Fairway Section Details:



PARKING LOT SECTION LOOKING NORTH ALONG WEST SIDE OF PARKING LOT

NO SCALE



TYPICAL FAIRWAY SECTION

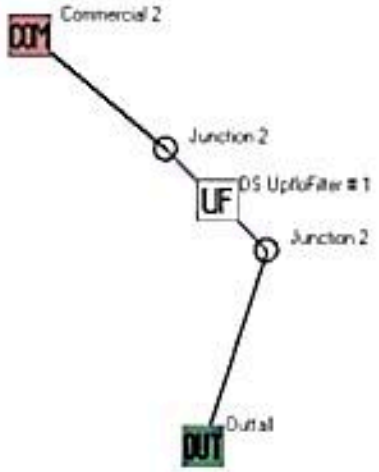
NO SCALE

PARKING LOT & FAIRWAY SECTION DETAILS

APPENDIX N

Appendix O
SLAMM Input Information:

Maintenance Building

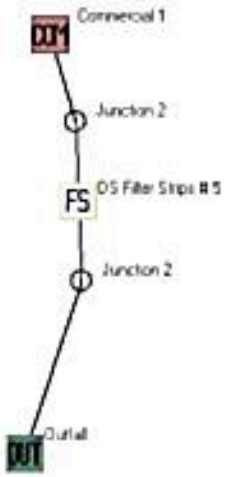


Data file name: F:\Job Files\1639740 Kohler -Golf Course 2016\1639744 Civil\storm water report and calculations\maintenance-filter.mdb
WinSLAMM Version 10.3.2
Rain file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WiReg - Milwaukee WI 1969 RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.psex
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Institutional Street Delivery file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Freeway Street Delivery file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/06 End of Winter Season: 03/28
Date: 02-23-2018 Time: 11:51:27
Site information:

LU# 1 - Commercial: Commercial 2 Total area (ac): 1.080
1 - Roofs 1: 0.073 ac. Pitched Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
13 - Paved Parking 1: 1.007 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Upflo Filter CP# 1 (DS) - DS UpfloFilter # 1
Media Type: CPZ
Fraction of Area Served by Upflo Filters (0-1): 1.0
Height from Outlet Invert to Structure Top (ft): 5.0
Sump Depth (ft): 2.00
The program will determine the Sump Cleaning/Filter Replacement Frequency
Solve for Given Conditions

Number of filters: 18
Upflo Filter particle size distribution file name: Not needed - calculated by program



Maintenance Driveway – Worst Case:

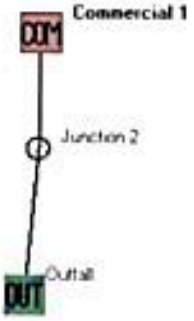
Data file name: F:\Job Files\1639740 Kohler – City of Sheboygan Golf Course 2016\1639744 Civil\storm water report and calculations\maintenance-driveway-worst.mdb
WinSLAMM Version 10.3.2
Rain file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WisReg - Milwaukee WI 1969.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1\WI_AVG01.psex
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Institutional Street Delivery file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Freeway Street Delivery file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/06 End of Winter Season: 03/28
Date: 02-27-2018 Time: 09:18:32
Site information:

LU# 1 - Commercial: Commercial 1 Total area (ac): 0.060
25 - Driveways 1: 0.060 ac Disconnected Normal Sandy Source Area PSD File: C:\WinSLAMM Files\NURP.cpe

Control Practice 1: Filter Strip CP# 1 (DS) - DS Filter Strips # 5
Total drainage area (acres)= 0.060
Fraction of drainage area served by filter strips (ac) = 1.00
Total filter strip width (ft) = 36.0
Effective flow length (ft) = 7
Infiltration rate (in/hr)= 6.500
Typical longitudinal slope (ft H/ft V) = 0.040
Typical grass height (in) = 2.0
Swale retardance factor = C
Use stochastic analysis to determine infiltration rate: False

Infiltration rate coefficient of variation (COV) = 0.00
Particle size distribution file name: Not needed - calculated by program
Surface Clogging Load (lbs/sf) = 3.50

Parking Area



Data file name: F:\Job Files\1639740 Kohler - Golf Course 2016\1639744 Civil\storm water report and calculations\parking-area-typ.mdb
WinSLAMM Version 10.3.2
Rain file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WinReg - Milwaukee WI 1969 RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Institutional Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Freeway Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/06 End of Winter Season: 03/28
Date: 02-23-2018 Time: 11:57:33
Site information:

LU# 1 - Commercial: Commercial 1 Total area (ac): 0.013
13 - Paved Parking 1: 0.013 ac Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz FS-CP#1

Control Practice 1: Filter Strip CP# 1 (SA) - SA Device, LU# 1 ,SA# 13
Total drainage area (acres)= 0.013
Fraction of drainage area served by filter strips (ac) = 1.00
Total filter strip width (ft) = 10.0
Effective flow length (ft) = 8
Infiltration rate (in/hr)= 6.500
Typical longitudinal slope (ft H/ft V) = 0.040
Typical grass height (in) = 2.0
Swale retardance factor = C

Use stochastic analysis to determine infiltration rate: False
Infiltration rate coeficient of variation (COV) = 0.00
Particle size distribution file name: Not needed - calculated by program
Surface Clogging Load (lbs/sf) = 3.50

Parking Area – Worst Case

Data file name: F:\Job Files\1639740 Kobler - City of Sheboygan Golf Course 2016\1639744 Civil\storm water report and calculations\parking-area-worst.mdb
WinSLAMM Version 10.3.2
Rain file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WisReg - Milwaukee WI 1969 RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.psca
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SLD6 Dec06.rsvx
Residential Street Delivery file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Institutional Street Delivery file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Freeway Street Delivery file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/06 End of Winter Season: 03/28
Date: 02-23-2018 Time: 12:00:06
Site information

LU# 1 - Commercial: Commercial 1 Total area (ac): 0.080
13 - Paved Parking 1: 0.050 ac Connected Source Area PSD File: C:\WinSLAMM Files\\NURP.cpz FS-CP#1
45 - Large Landscaped Areas 1: 0.030 ac Normal Sandy Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Filter Strip CP# 1 (SA) - SA Device, LU# 1, SA# 13
Total drainage area (acres)= 0.050
Fraction of drainage area served by filter strips (ac) = 1.00
Total filter strip width (ft) = 31.0
Effective flow length (ft) = 8
Infiltration rate (in/hr)= 6.500
Typical longitudinal slope (ft H/ft V) = 0.040
Typical grass height (in) = 2.0
Swale retardance factor = C
Use stochastic analysis to determine infiltration rate: False
Infiltration rate coeficient of variation (COV) = 0.00
Particle size distribution file name: Not needed - calculated by program
Surface Clogging Load (lbs/sf) = 3.50

Access Road & Cart Paths

Road & Cart Path Typical:

Data file name: F:\Job Files\1639740 Kohler - City of Sheboygan Golf Course 2016\1639744 Civil\storm water report and calculations\Cart-path-typ.mdb
WinSLAMM Version 10.3.2
Rain file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WisReg - Milwaukee WI 1969.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.psce
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Institutional Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Freeway Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/06 End of Winter Season: 03/28
Date: 02-23-2018 Time: 12:22:15
Site information:

LU# 1 - Commercial: Commercial 1 Total area (ac): 0.005
13 - Paved Parking 1: 0.005 ac Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz FS-CP#1

Control Practice 1: Filter Strip CP# 1 (SA) - SA Device, LU# 1, SA# 13
Total drainage area (acres)= 0.005
Fraction of drainage area served by filter strips (ac) = 1.00
Total filter strip width (ft) = 20.0
Effective flow length (ft) = 7
Infiltration rate (in/hr)= 6.500
Typical longitudinal slope (ft H/ft V) = 0.040
Typical grass height (in) = 2.0
Swale retardance factor = C
Use stochastic analysis to determine infiltration rate: False
Infiltration rate coeficient of variation (COV) = 0.00
Particle size distribution file name: Not needed - calculated by program
Surface Clogging Load (lbs/sf) = 3.50

Road Worst Case:

Data file name: F:\Job Files\1639740 Kohler - City of Sheboygan Golf Course 2016\1639744 Civil\storm water report and calculations\road-area-worst.mdb
WinSLAMM Version 10.3.2
Rain file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WisReg - Madison WI 1981.RAN
Particulate Solids Concentration file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\v10.1 WI_AVG01.psce

Runoff Coefficient file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: F:\Programs\civil\WinSLAMM\v10.3.2\Parameter Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/01/81 Study period ending date: 12/31/81
Date: 02-23-2018 Time: 12:03:09
Site information:

LU# 1 - Commercial: Commercial 1 Total area (ac): 0.007
25 - Driveways 1: 0.007 ac Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Filter Strip CP# 1 (DS) - DS Filter Strips # 4
Total drainage area (acres)= 0.007
Fraction of drainage area served by filter strips (ac) = 1.00
Total filter strip width (ft) = 10.0
Effective flow length (ft) = 7
Infiltration rate (in/hr)= 6.500
Typical longitudinal slope (ft H/ft V) = 0.040
Typical grass height (in) = 2.0
Swale retardance factor = C
Use stochastic analysis to determine infiltration rate: False
Infiltration rate coeficient of variation (COV) = 0.00
Particle size distribution file name: Not needed - calculated by program
Surface Clogging Load (lbs/sf) = 3.50

Cart Path Worst Case:

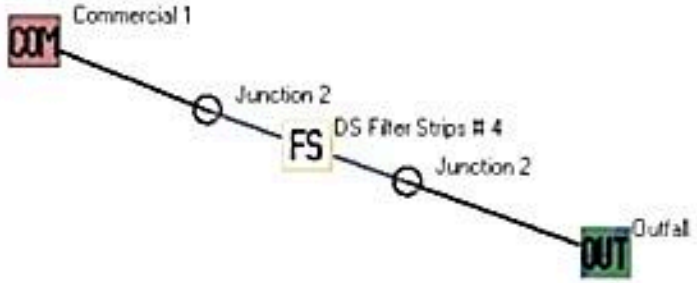
Data file name: F:\Job Files\1639740 Kohler - City of Sheboygan Golf Course 2016\1639744 Civil\storm water report and calculations\Cart-path-worst.mdb
WinSLAMM Version 10.3.2
Rain file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WisReg - Milwaukee WI 1969 RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.psca
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Institutional Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Freeway Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/06 End of Winter Season: 03/28
Date: 02-23-2018 Time: 12:04:57
Site information:

LU# 1 - Commercial: Commercial 1 Total area (ac): 0.059
25 - Driveways 1: 0.009 ac Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.050 ac Normal Sandy Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Filter Strip CP# 1 (DS) - DS Filter Strips # 5
Total drainage area (acres)= 0.059
Fraction of drainage area served by filter strips (ac) = 1.00

Total filter strip width (ft) = 28.0
Effective flow length (ft) = 7
Infiltration rate (in/hr) = 6.500
Typical longitudinal slope (ft H/ft V) = 0.040
Typical grass height (in) = 2.0
Swale retardance factor = C
Use stochastic analysis to determine infiltration rate: False
Infiltration rate coefficient of variation (COV) = 0.00
Particle size distribution file name: Not needed - calculated by program
Surface Clogging Load (lbs/sf) = 3.50

Cart Barn



Data file name: F:\Job Files\1639740 Kohler - City of Sheboygan Golf Course 2016\1639744 Civil storm water report and calculations\Cart Barn.mdb
WinSLAMM Version 10.3.2
Rain file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WinReg - Milwaukee WI 1969 RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1\WI_AVG01.psc\
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Institutional Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Freeway Street Delivery file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/06 End of Winter Season: 03/28
Date: 02-23-2018 Time: 12:06:05
Site information:

LU# 1 - Commercial: Commercial 1 Total area (ac): 0.210
1 - Roofs 1: 0.090 ac Pitched Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

13 - Paved Parking 1 0.120 ac Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Filter Strip CP# 1 (DS) - DS Filter Strips # 4
Total drainage area (acres)= 0.210
Fraction of drainage area served by filter strips (ac) = 1.00
Total filter strip width (ft) = 213.0
Effective flow length (ft) = 8
Infiltration rate (in/hr)= 6.500
Typical longitudinal slope (ft H/ft V) = 0.040
Typical grass height (in) = 2.0
Swale retardance factor = C
Use stochastic analysis to determine infiltration rate: False
Infiltration rate coeficient of variation (COV) = 0.00
Particle size distribution file name: Not needed - calculated by program
Surface Clogging Load (lbs/sf) = 3.50

Roundabout Area

AREA 1
Data file name: F:\Job Files\1639740 Kohler - City of Sheboygan Golf Course 2016\1639744 Civil\storm water report and calculations\roundabout-1.mdb
WinSLAMM Version 10.3.2
Rain file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WinReg - Madison WI 1981.RAN
Particulate Solids Concentration file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\v10.1 WI_AVG01.psc.v
Runoff Coefficient file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: F:\Programs\civil\WinSLAMM\v10.3.2\Parameter Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/01/81 Study period ending date: 12/31/81
Date: 02-28-2018 Time: 09:52:33
Site information:

LU# 1 - Commercial: Commercial 1 Total area (ac): 0.265
25 - Driveways 1: 0.259 ac Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
63 - Paved Playground 1: 0.006 ac Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Filter Strip CP# 1 (DS) - DS Filter Strips # 4
Total drainage area (acres)= 0.265
Fraction of drainage area served by filter strips (ac) = 1.00
Total filter strip width (ft) = 275.0
Effective flow length (ft) = 7
Infiltration rate (in/hr)= 6.500
Typical longitudinal slope (ft H/ft V) = 0.040
Typical grass height (in) = 2.0
Swale retardance factor = C
Use stochastic analysis to determine infiltration rate: False
Infiltration rate coeficient of variation (COV) = 0.00
Particle size distribution file name: Not needed - calculated by program
Surface Clogging Load (lbs/sf) = 3.50

AREA 2
Data file name: F:\Job Files\1639740 Kohler - City of Sheboygan Golf Course 2016\1639744 Civil\storm water report and calculations\roundabout-2.mdb
WinSLAMM Version 10.3.2
Rain file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WinReg - Madison WI 1981.RAN

Particulate Solids Concentration file name F:\Programs\Civil\WinSLAMM v10 3 2\Parameter Files\v10 1 WI_AVG01 pscx
Runoff Coefficient file name F:\Programs\Civil\WinSLAMM v10 3 2\Parameter Files\WI_SL06 Dec06 rsvx
Residential Street Delivery file name F:\Programs\Civil\WinSLAMM v10 3 2\Parameter Files\WI_Res and Other Urban Dec06 std
Institutional Street Delivery file name F:\Programs\Civil\WinSLAMM v10 3 2\Parameter Files\WI_Com Inst Indust Dec06 std
Commercial Street Delivery file name F:\Programs\Civil\WinSLAMM v10 3 2\Parameter Files\WI_Com Inst Indust Dec06 std
Industrial Street Delivery file name F:\Programs\Civil\WinSLAMM v10 3 2\Parameter Files\WI_Com Inst Indust Dec06 std
Other Urban Street Delivery file name F:\Programs\Civil\WinSLAMM v10 3 2\Parameter Files\WI_Res and Other Urban Dec06 std
Freeway Street Delivery file name F:\Programs\Civil\WinSLAMM v10 3 2\Parameter Files\Freeway Dec06 std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance False
Pollutant Relative Concentration file name F:\Programs\civil\WinSLAMM v10 3 2\Parameter Files\WI_GEO03 ppdx
Source Area PSD and Peak to Average Flow Ratio File C:\WinSLAMM Files\NURP Source Area PSD Files csv
Cost Data file name
Seed for random number generator -42
Study period starting date 01/01/81 Study period ending date 12/31/81
Date 02-28-2018 Time 10 53 28
Site information

LU# 1 - Commercial Commercial 1 Total area (ac) 0 130
25 - Driveways 1 0 113 ac Connected Source Area PSD File C:\WinSLAMM Files\NURP cpz
63 - Paved Playground 1 0 017 ac Connected Source Area PSD File C:\WinSLAMM Files\NURP cpz

Control Practice 1 Filter Strip CP# 1 (DS) - DS Filter Strips # 4
Total drainage area (acres)= 0 130
Fraction of drainage area served by filter strips (ac) = 1 00
Total filter strip width (ft) = 118 0
Effective flow length (ft) = 7
Infiltration rate (in/hr)= 6 500
Typical longitudinal slope (ft H/ft V) = 0 040
Typical grass height (in) = 2 0
Swale retardance factor = C
Use stochastic analysis to determine infiltration rate False
Infiltration rate coeficient of variation (COV) = 0 00
Particle size distribution file name Not needed - calculated by program
Surface Clogging Load (lbs/sf) = 3 50

AREA 3.
Data file name F:\Job Files\1639740 Kohler – City of Sheboygan Golf Course 2016\1639744 Civil\storm water report and calculations\roundabout-3 mdb
WinSLAMM Version 10 3 2
Rain file name F:\Programs\Civil\WinSLAMM v10 3 2\Parameter Files\WisReg - Madison WI 1981 RAN
Particulate Solids Concentration file name F:\Programs\Civil\WinSLAMM v10 3 2\Parameter Files\v10 1 WI_AVG01 pscx
Runoff Coefficient file name F:\Programs\Civil\WinSLAMM v10 3 2\Parameter Files\WI_SL06 Dec06 rsvx
Residential Street Delivery file name F:\Programs\Civil\WinSLAMM v10 3 2\Parameter Files\WI_Res and Other Urban Dec06 std
Institutional Street Delivery file name F:\Programs\Civil\WinSLAMM v10 3 2\Parameter Files\WI_Com Inst Indust Dec06 std
Commercial Street Delivery file name F:\Programs\Civil\WinSLAMM v10 3 2\Parameter Files\WI_Com Inst Indust Dec06 std
Industrial Street Delivery file name F:\Programs\Civil\WinSLAMM v10 3 2\Parameter Files\WI_Com Inst Indust Dec06 std
Other Urban Street Delivery file name F:\Programs\Civil\WinSLAMM v10 3 2\Parameter Files\WI_Res and Other Urban Dec06 std
Freeway Street Delivery file name F:\Programs\Civil\WinSLAMM v10 3 2\Parameter Files\Freeway Dec06 std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance False
Pollutant Relative Concentration file name F:\Programs\civil\WinSLAMM v10 3 2\Parameter Files\WI_GEO03 ppdx
Source Area PSD and Peak to Average Flow Ratio File C:\WinSLAMM Files\NURP Source Area PSD Files csv
Cost Data file name
Seed for random number generator -42
Study period starting date 01/01/81 Study period ending date 12/31/81
Date 02-28-2018 Time 10 52 54
Site information

LU# 1 - Commercial Commercial 1 Total area (ac) 0 441
1 - Roofs 1 0 009 ac Pitched Connected Source Area PSD File C:\WinSLAMM Files\NURP cpz
25 - Driveways 1 0 346 ac Connected Source Area PSD File C:\WinSLAMM Files\NURP cpz
63 - Paved Playground 1 0 086 ac Connected Source Area PSD File C:\WinSLAMM Files\NURP cpz

Control Practice 1 Filter Strip CP# 1 (DS) - DS Filter Strips # 4
Total drainage area (acres)= 0 441
Fraction of drainage area served by filter strips (ac) = 1 00

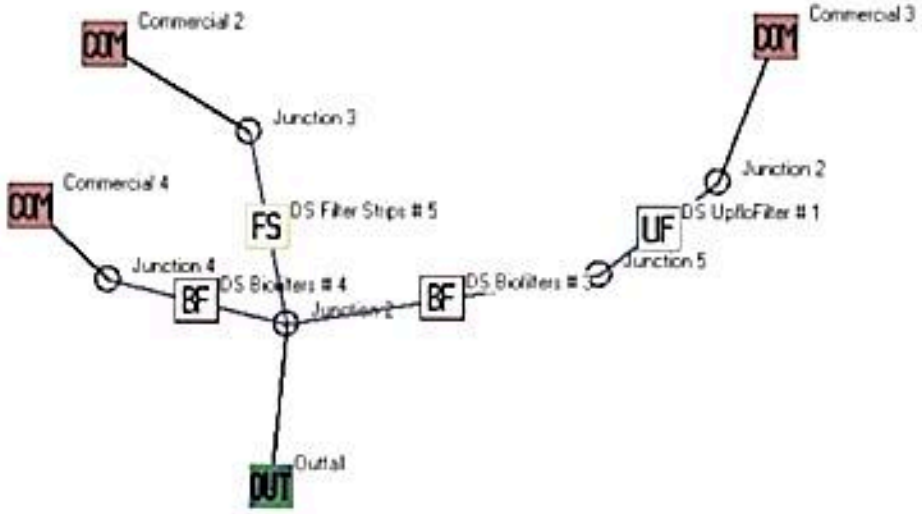
Total filter strip width (ft) = 204.0
Effective flow length (ft) = 10
Infiltration rate (in/hr)= 6.500
Typical longitudinal slope (ft H/ft V) = 0.040
Typical grass height (in) = 2.0
Swale retardance factor = C
Use stochastic analysis to determine infiltration rate: False
Infiltration rate coefficient of variation (COV) = 0.00
Particle size distribution file name: Not needed - calculated by program
Surface Clogging Load (lbs/sf) = 3.50

AREA 4
Data file name: F:\Job Files\1639740 Kohler – City of Sheboygan: Golf Course 2016\1639744 Civil\storm water report and calculations\roundabout-4.mdb
WinSLAMM Version 10.3.2
Rain file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WisReg - Madison WI 1981 RAN
Particulate Solids Concentration file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\v10.1 WI_AVG01.psca
Runoff Coefficient file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: F:\Programs\Civil\WinSLAMM\v10.3.2\Parameter Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: F:\Programs\civil\WinSLAMM\v10.3.2\Parameter Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/01/81 Study period ending date: 12/31/81
Date: 02-28-2018 Time: 12:55:22
Site information:

LU# 1 - Commercial: Commercial 1 Total area (ac): 0.067
25 - Driveways 1: 0.067 ac Connected: Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Filter Strip CP# 1 (DS) - DS Filter Strips # 4
Total drainage area (acres)= 0.067
Fraction of drainage area served by filter strips (ac) = 1.00
Total filter strip width (ft) = 104.0
Effective flow length (ft) = 7
Infiltration rate (in/hr)= 6.500
Typical longitudinal slope (ft H/ft V) = 0.040
Typical grass height (in) = 2.0
Swale retardance factor = C
Use stochastic analysis to determine infiltration rate: False
Infiltration rate coefficient of variation (COV) = 0.00
Particle size distribution file name: Not needed - calculated by program
Surface Clogging Load (lbs/sf) = 3.50

Total Overall Development



Data file name F:\Job Files\1639740 Kohler - City of Sheboygan Golf Course 2016\1639744 Civil\storm water report and calculations\total-infiltration.mdb
WinSLAMM Version 10.3.2
Rain file name F:\Programs\civil\WinSLAMM v10.3.1\Parameter Files\WisReg - Milwaukee WI 1969 RAN
Particulate Solids Concentration file name C:\WinSLAMM Files\v10.1 WI_AVG01.psca
Runoff Coefficient file name C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Institutional Street Delivery file name F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Freeway Street Delivery file name F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance False
Pollutant Relative Concentration file name C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name
Seed for random number generator -42
Study period starting date 01/05/69 Study period ending date 12/31/69
Start of Winter Season 12/02 End of Winter Season 03/12
Date 02-23-2018 Time 12:08:01
Site information

Pre-Development Area Description	Pre-Development Area (ac)	Pre-Development CN
woods	170.080	30
Total Area (ac) Composite CN	170.080	30

LU# 1 - Commercial Commercial 2 Total area (ac) 12.173
1 - Roofs 1 0.513 ac Flat Disconnected Normal Sandy Source Area PSD File C:\WinSLAMM Files\NURP.cpz
2 - Roofs 2 0.440 ac Pitched Disconnected Normal Sandy Source Area PSD File C:\WinSLAMM Files\NURP.cpz
13 - Paved Parking 1 1.580 ac Disconnected Normal Sandy Source Area PSD File C:\WinSLAMM Files\NURP.cpz
25 - Driveways 1 9.640 ac Disconnected Normal Sandy Source Area PSD File C:\WinSLAMM Files\NURP.cpz

LU# 2 - Commercial Commercial 3 Total area (ac) 1.080
1 - Roofs 1 0.073 ac Flat Connected Source Area PSD File C:\WinSLAMM Files\NURP.cpz

13 - Paved Parking 1: 1.007 ac Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 3 - Commercial: Commercial 4 Total area (ac): 156.830
45 - Large Landscaped Areas 1: 156.830 ac Normal Sandy Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Filter Strip CP# 1 (DS) - DS Filter Strips # 5
Total drainage area (acres)= 12.173
Fraction of drainage area served by filter strips (ac) = 1.00
Total filter strip width (ft) = 40644.0
Effective flow length (ft) = 12
Infiltration rate (in/hr)= 6.500
Typical longitudinal slope (ft H/ft V) = 0.040
Typical grass height (in) = 2.0
Swale retardance factor = C
Use stochastic analysis to determine infiltration rate: False
Infiltration rate coeficient of variation (COV) = 0.00
Particle size distribution file name: Not needed - calculated by program
Surface Clogging Load (lbs/sf) = 3.50

Control Practice 2: Upflo Filter CP# 1 (DS) - DS UpfloFilter # 1
Media Type: CPZ
Fraction of Area Served by Upflo Filters (0-1): 1.0
Height from Outlet Invert to Structure Top (ft): 5.0
Sump Depth (ft): 2.00
Sump Cleaning/Filter Replacement is not considered during the model run
Solve for Given Conditions
Number of filters: 18
Upflo Filter particle size distribution file name: Not needed - calculated by program

Control Practice 3: Biofilter CP# 1 (DS) - DS Biofilters # 3
1. Top area (square feet) = 6112
2. Bottom aea (square feet) = 965
3. Depth (ft): 3.2
4. Biofilter width (ft) - for Cost Purposes Only: 10
5. Infiltration rate (in/hr) = 6.5
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side): 1
8. Infiltration rate fraction (bottom): 1
9. Depth of biofilter that is rock filled (ft) 0
10. Porosity of rock filled volume = 0
11. Engineered soil infiltration rate: 0
12. Engineered soil depth (ft) = 0
13. Engineered soil porosity = 0
14. Percent solids reduction due to flow through engineered soil = 0
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1
17. Particle size distribution file: Not needed - calculated by program
18. Initial water surface elevation (ft): 0
Soil Data Soil Type Fraction in Eng. Soil
Biofilter Outlet/Discharge Characteristics
Outlet type: Broad Crested Weir
1. Weir crest length (ft): 10
2. Weir crest width (ft): 5
3. Height of datum to bottom of weir opening: 2.7

Control Practice 4: Biofilter CP# 2 (DS) - DS Biofilters # 4
1. Top area (square feet) = 264908
2. Bottom aea (square feet) = 75000
3. Depth (ft): 2
4. Biofilter width (ft) - for Cost Purposes Only: 10
5. Infiltration rate (in/hr) = 6.5
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side): 1
8. Infiltration rate fraction (bottom): 1

9. Depth of biofilter that is rock filled (ft) 0
10. Porosity of rock filled volume = 0
11. Engineered soil infiltration rate 0
12. Engineered soil depth (ft) = 0
13. Engineered soil porosity = 0
14. Percent solids reduction due to flow through engineered soil = 0
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1
17. Particle size distribution file Not needed - calculated by program
18. Initial water surface elevation (ft) 0

Soil Data Soil Type Fraction in Eng. Soil

Biofilter Outlet Discharge Characteristics

Outlet type Broad Crested Weir

1. Weir crest length (ft) 20
2. Weir crest width (ft) 20
3. Height of datum to bottom of weir opening 1.5

Total Overall Development 2 year:

Data file name F:\Job Files\1639740 Kohler - City of Sheboygan Golf Course 2016\1639744 Civil\storm water report and calculations\total-infiltration-2yr.mdb
WinSLAMM Version 10.3.2
Rain file name F:\Programs\civil\WinSLAMM\v10.2.0\Parameter Files\WisReg - Milwaukee 6392.ran
Particulate Solids Concentration file name C:\WinSLAMM Files\v10.1 WI_AVG01.psex
Runoff Coefficient file name C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Institutional Street Delivery file name F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Freeway Street Delivery file name F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WI_Com Inst Indust Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance False
Pollutant Relative Concentration file name C:\WinSLAMM Files\WI_GF003.ppdx
Source Area PSD and Peak to Average Flow Ratio File C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name
Seed for random number generator -42
Study period starting date 01/09/63 Study period ending date 12/30/92
Start of Winter Season 12/02 End of Winter Season 03/12
Date 02-23-2018 Time 12:09:55
Site information

Pre-Development Area Description	Pre-Development Area (ac)	Pre-Developement CN
woods	170.080	30
Total Area (ac)/Composite CN	170.080	30

LU# 1 - Commercial Commercial 2 Total area (ac) 12.173
1 - Roofs 1: 0.513 ac Flat Disconnected Normal Sandy Source Area PSD File C:\WinSLAMM Files\NURP.cpz
2 - Roofs 2: 0.440 ac Pitched Disconnected Normal Sandy Source Area PSD File C:\WinSLAMM Files\NURP.cpz
13 - Paved Parking 1: 1.580 ac Disconnected Normal Sandy Source Area PSD File C:\WinSLAMM Files\NURP.cpz
25 - Driveways 1: 9.640 ac Disconnected Normal Sandy Source Area PSD File C:\WinSLAMM Files\NURP.cpz

LU# 2 - Commercial Commercial 3 Total area (ac) 1.080
1 - Roofs 1: 0.073 ac Flat Connected Source Area PSD File C:\WinSLAMM Files\NURP.cpz
13 - Paved Parking 1: 1.007 ac Connected Source Area PSD File C:\WinSLAMM Files\NURP.cpz

LU# 3 - Commercial Commercial 4 Total area (ac) 156.830
45 - Large Landscaped Areas 1: 156.830 ac Normal Sandy Source Area PSD File C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Filter Strip CP# 1 (DS) - DS Filter Strips # 5
Total drainage area (acres)= 12.173
Fraction of drainage area served by filter strips (ac) = 1.00
Total filter strip width (ft) = 40644.0
Effective flow length (ft) = 12
Infiltration rate (in/hr)= 6.500
Typical longitudinal slope (ft H/ft V) = 0.040
Typical grass height (in) = 2.0

Swale retardance factor = C
Use stochastic analysis to determine infiltration rate False
Infiltration rate coefficient of variation (COV) = 0.00
Particle size distribution file name Not needed - calculated by program
Surface Clogging Load (lbs/sf) = 3.50

Control Practice 2 Upflo Filter CP# 1 (DS) - DS UpfloFilter # 1
Media Type CPZ
Fraction of Area Served by Upflo Filters (0-1) 1.0
Height from Outlet Invert to Structure Top (ft) 5.0
Sump Depth (ft) 2.00
Sump Cleaning/Filter Replacement is not considered during the model run
Solve for Given Conditions
Number of filters 18
Upflo Filter particle size distribution file name Not needed - calculated by program

Control Practice 3 Biofilter CP# 1 (DS) - DS Biofilters # 3
1. Top area (square feet) = 6112
2. Bottom area (square feet) = 965
3. Depth (ft) 3.2
4. Biofilter width (ft) - for Cost Purposes Only 10
5. Infiltration rate (in/hr) = 6.5
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side) 1
8. Infiltration rate fraction (bottom) 1
9. Depth of biofilter that is rock filled (ft) 0
10. Porosity of rock filled volume = 0
11. Engineered soil infiltration rate 0
12. Engineered soil depth (ft) = 0
13. Engineered soil porosity = 0
14. Percent solids reduction due to flow through engineered soil = 0
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1
17. Particle size distribution file Not needed - calculated by program
18. Initial water surface elevation (ft) 0
Soil Data Soil Type Fraction in Eng. Soil
Biofilter Outlet/Discharge Characteristics
Outlet type Broad Crested Weir
1. Weir crest length (ft) 10
2. Weir crest width (ft) 5
3. Height of datum to bottom of weir opening 2.7

Control Practice 4 Biofilter CP# 2 (DS) - DS Biofilters # 4
1. Top area (square feet) = 264908
2. Bottom area (square feet) = 75000
3. Depth (ft) 2
4. Biofilter width (ft) - for Cost Purposes Only 10
5. Infiltration rate (in/hr) = 6.5
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side) 1
8. Infiltration rate fraction (bottom) 1
9. Depth of biofilter that is rock filled (ft) 0
10. Porosity of rock filled volume = 0
11. Engineered soil infiltration rate 0
12. Engineered soil depth (ft) = 0
13. Engineered soil porosity = 0
14. Percent solids reduction due to flow through engineered soil = 0
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1
17. Particle size distribution file Not needed - calculated by program
18. Initial water surface elevation (ft) 0
Soil Data Soil Type Fraction in Eng. Soil
Biofilter Outlet/Discharge Characteristics
Outlet type Broad Crested Weir
1. Weir crest length (ft) 20
2. Weir crest width (ft) 20
3. Height of datum to bottom of weir opening 1.5

Appendix P
Groundwater Exhibit:

EXHIBIT 1

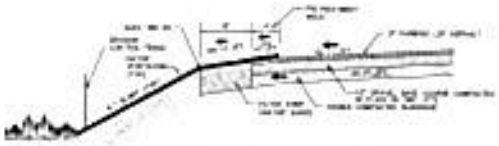
APPENDIX P

PROPOSED 18-HOLE GOLF COURSE FOR:
KOHLER COMPANY
CITY OF SHEBOYGAN, WISCONSIN

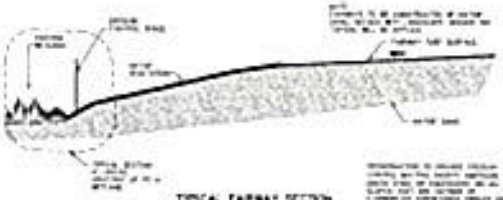
LEGEND

TYPICAL CART PATH SECTION

TYPICAL ACCESS ROAD SECTION



PARKING LOT SECTION
LOOKING NORTH ALONG WEST
SIDE OF PARKING LOT



TYPICAL FAIRWAY SECTION

CONSTRUCTION SEQUENCE	
Phase	TYPE OF ACTION
1. PRE-CONSTRUCTION ACTION	
2. CONSTRUCTION ACTION	
3. POST CONSTRUCTION ACTION	

CONSTRUCTION STAKING SERVICES

GENERAL PROJECT NOTES

PROJECT LOCATION MAP

CALL DIGGERS HOTLINE
1-800-242-8511

CIVIL SHEET INDEX

SHEET	SHEET TITLE
C1.0	CIVIL COVER SHEET
C1.1	CIVIL SPECIFICATIONS
C2	EXISTING CONDITIONS & EROSION CONTROL - NORTH
C3	EXISTING CONDITIONS & EROSION CONTROL - SOUTH
C4	GRADING AND EROSION CONTROL PLAN-SHEET INDEX C5
C5	GRADING AND EROSION CONTROL PLAN-SHEET C5
C6	GRADING AND EROSION CONTROL PLAN-SHEET C6
C7	GRADING AND EROSION CONTROL PLAN-SHEET C7
C8	GRADING AND EROSION CONTROL PLAN-SHEET C8
C9	GRADING AND EROSION CONTROL PLAN-SHEET C9
C10	GRADING AND EROSION CONTROL PLAN-SHEET C10
C11	GRADING AND EROSION CONTROL PLAN-SHEET C11
C12	GRADING AND EROSION CONTROL PLAN-SHEET C12
C13	GRADING AND EROSION CONTROL PLAN-SHEET C13
C14	GRADING AND EROSION CONTROL PLAN-SHEET C14
C15	GRADING AND EROSION CONTROL PLAN-SHEET C15
C16	EROSION CONTROL DETAILS

EXCEL

NEW GOLF COURSE
KOHLER COMPANY
CITY OF SHEBOYGAN • SHEBOYGAN COUNTY, WI

NOT FOR CONSTRUCTION

CIVIL COVER SHEET

C1.0

PLAN SPECIFICATIONS

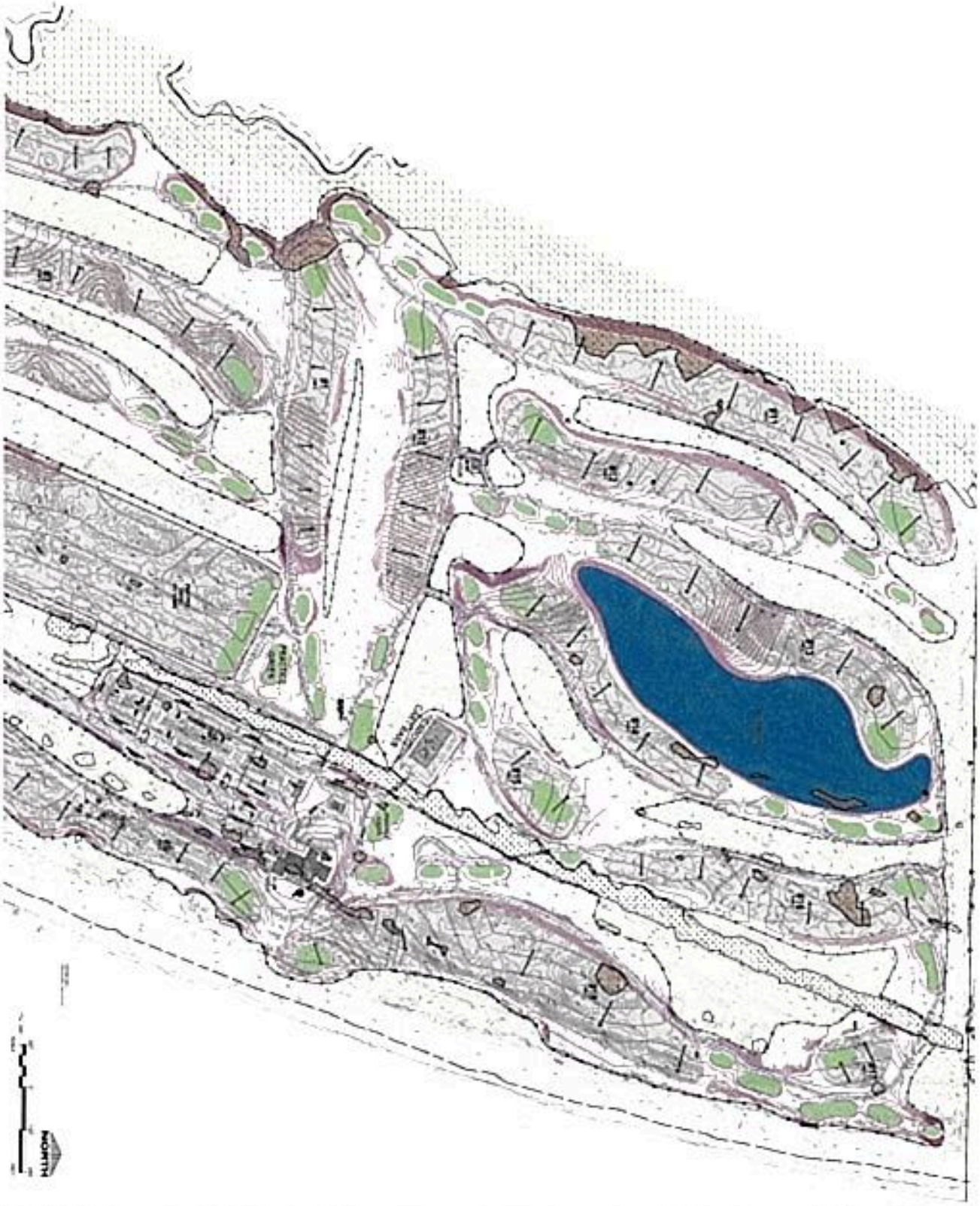
EXCEL

NEW GOLF COURSE
KOHLER COMPANY
CITY OF SHEBOYGAN • SHEBOYGAN COUNTY, WI

NOT FOR CONSTRUCTION

CIVIL SPECIFICATIONS

C1.0A



NOT FOR CONSTRUCTION

NEW GOLF COURSE

KOHLER COMPANY

CITY OF SHEBOYGAN • SHEBOYGAN COUNTY, WI

EXCEL

G1

EXCEL

NEW GOLF COURSE

KOHLER COMPANY

CITY OF SHEBOYGAN • SHEBOYGAN COUNTY, WI

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G2

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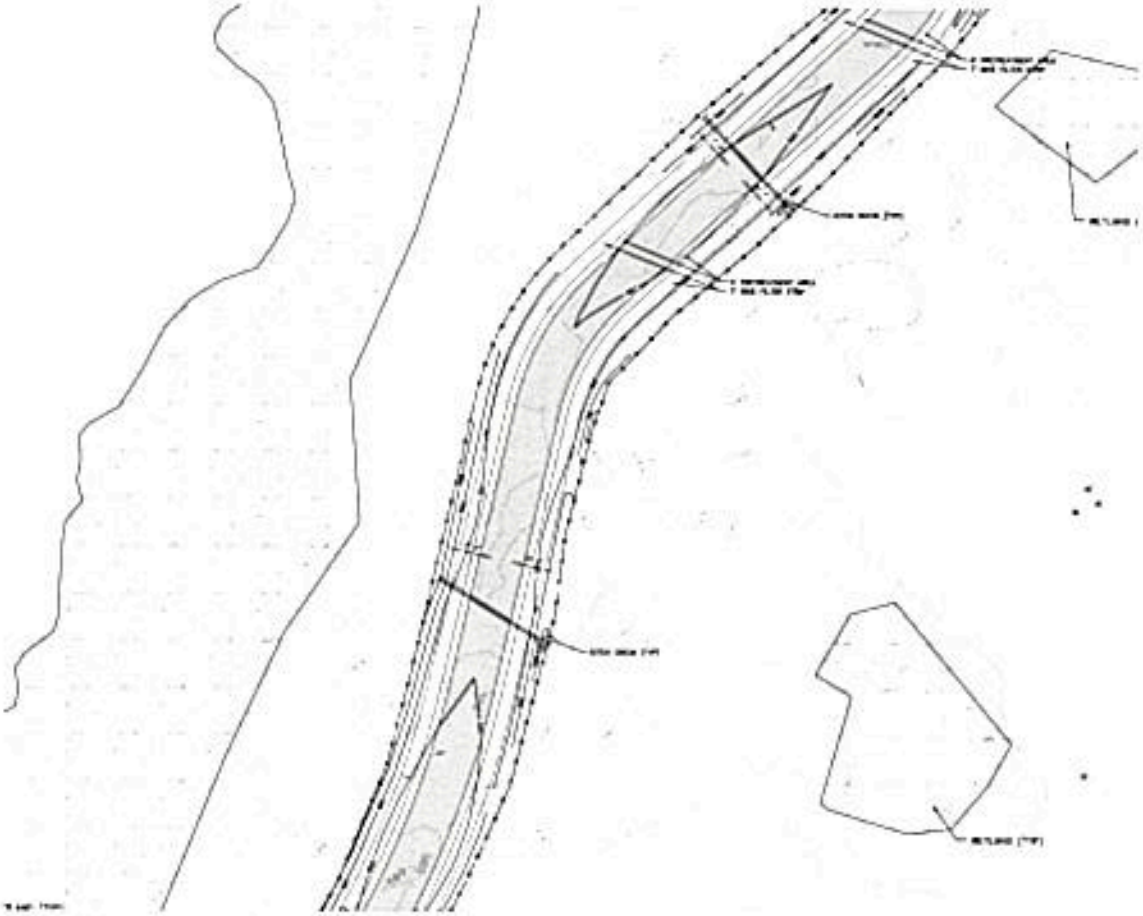
NORTH

G3



OVERALL MAP LOCATION

EXCEL

NEW GOLF COURSE

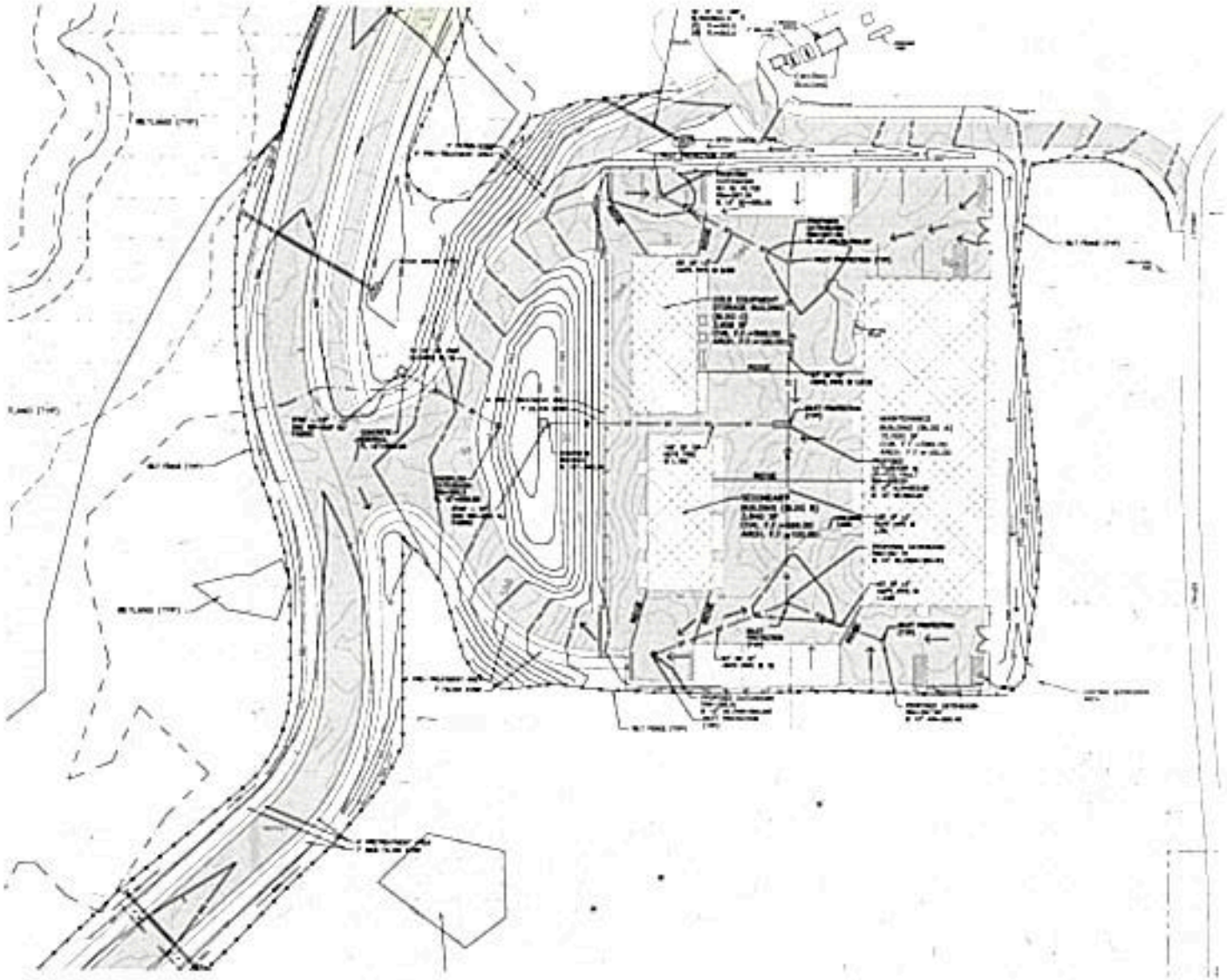
KOHLER COMPANY

CITY OF SHEBOYGAN • SHEBOYGAN COUNTY, WI

NOT FOR CONSTRUCTION

NORTH

G4



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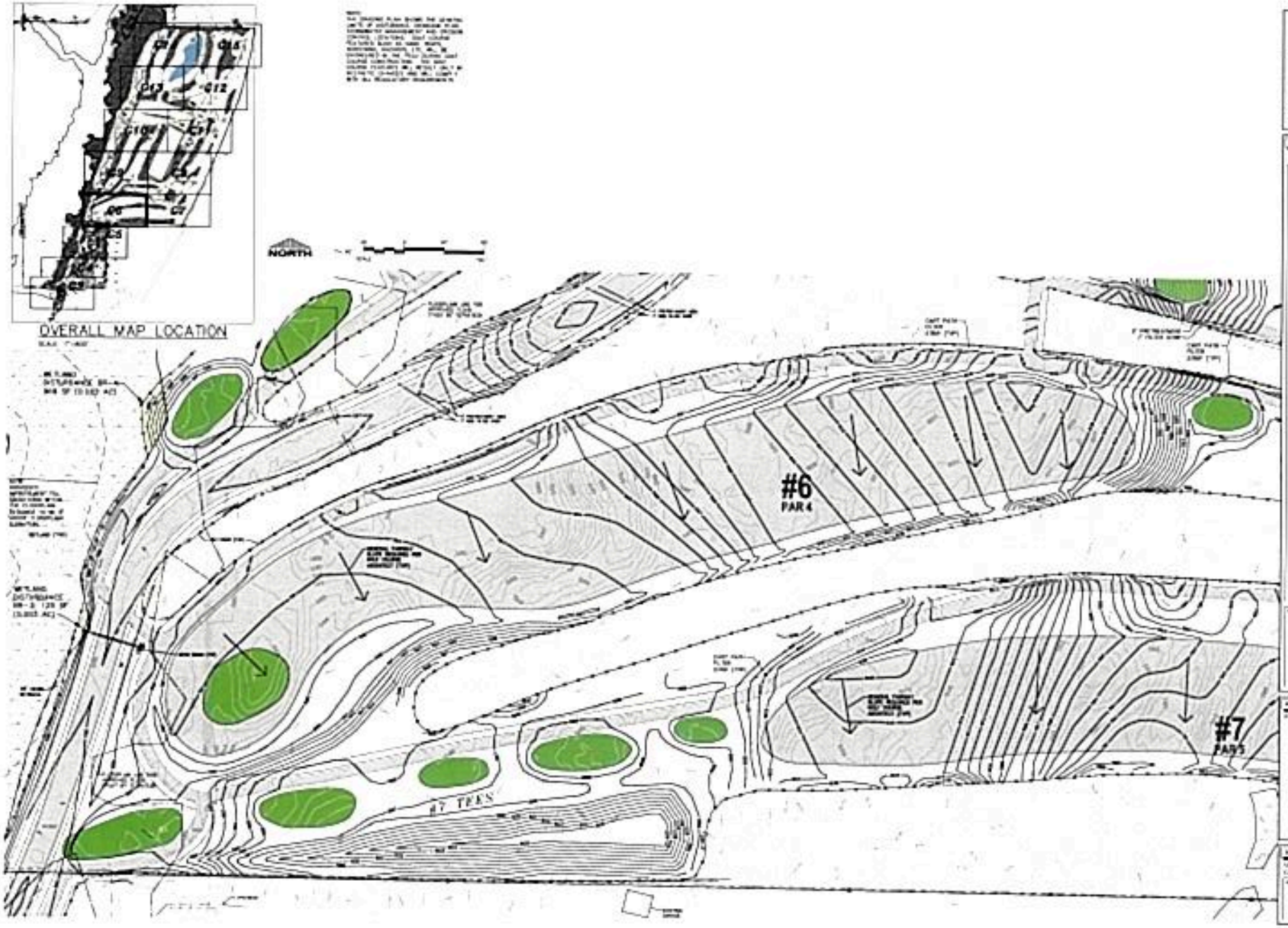
CITY OF SHEBOYGAN • SHEBOYGAN COUNTY, WI

NOT FOR CONSTRUCTION

NORTH

G5



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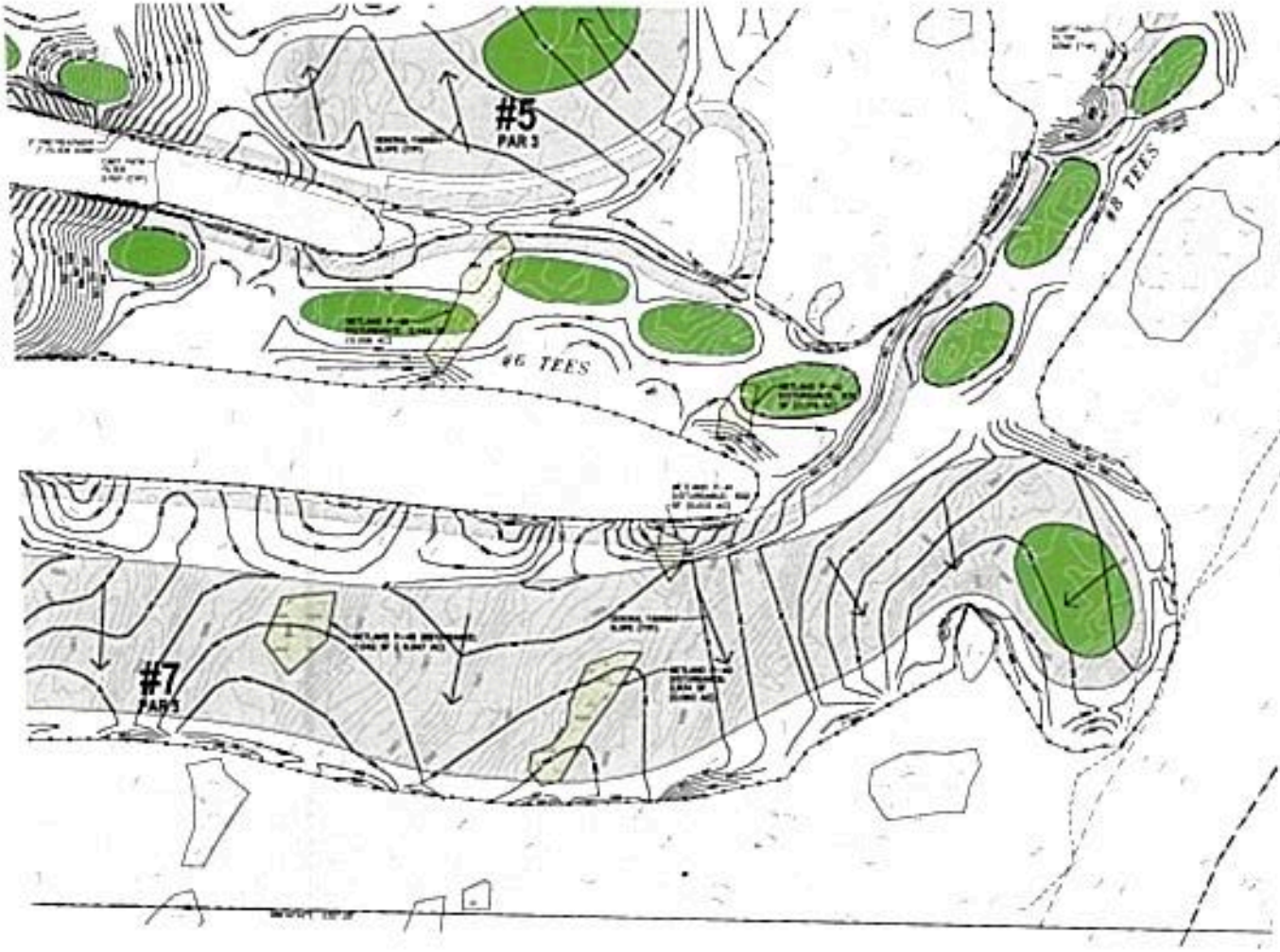
KOHLER COMPANY
CITY OF SHEBOYGAN • SHEBOYGAN COUNTY, WI

NOT FOR CONSTRUCTION

G6



OVERALL MAP LOCATION

NORTH

EXCEL

NEW GOLF COURSE

KOHLER COMPANY

CITY OF SHEBOYGAN • SHEBOYGAN COUNTY, WI

NOT FOR CONSTRUCTION

G7

EXCEL

NEW GOLF COURSE

KOHLER COMPANY

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NOT FOR CONSTRUCTION

G8

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NOT FOR CONSTRUCTION

G9

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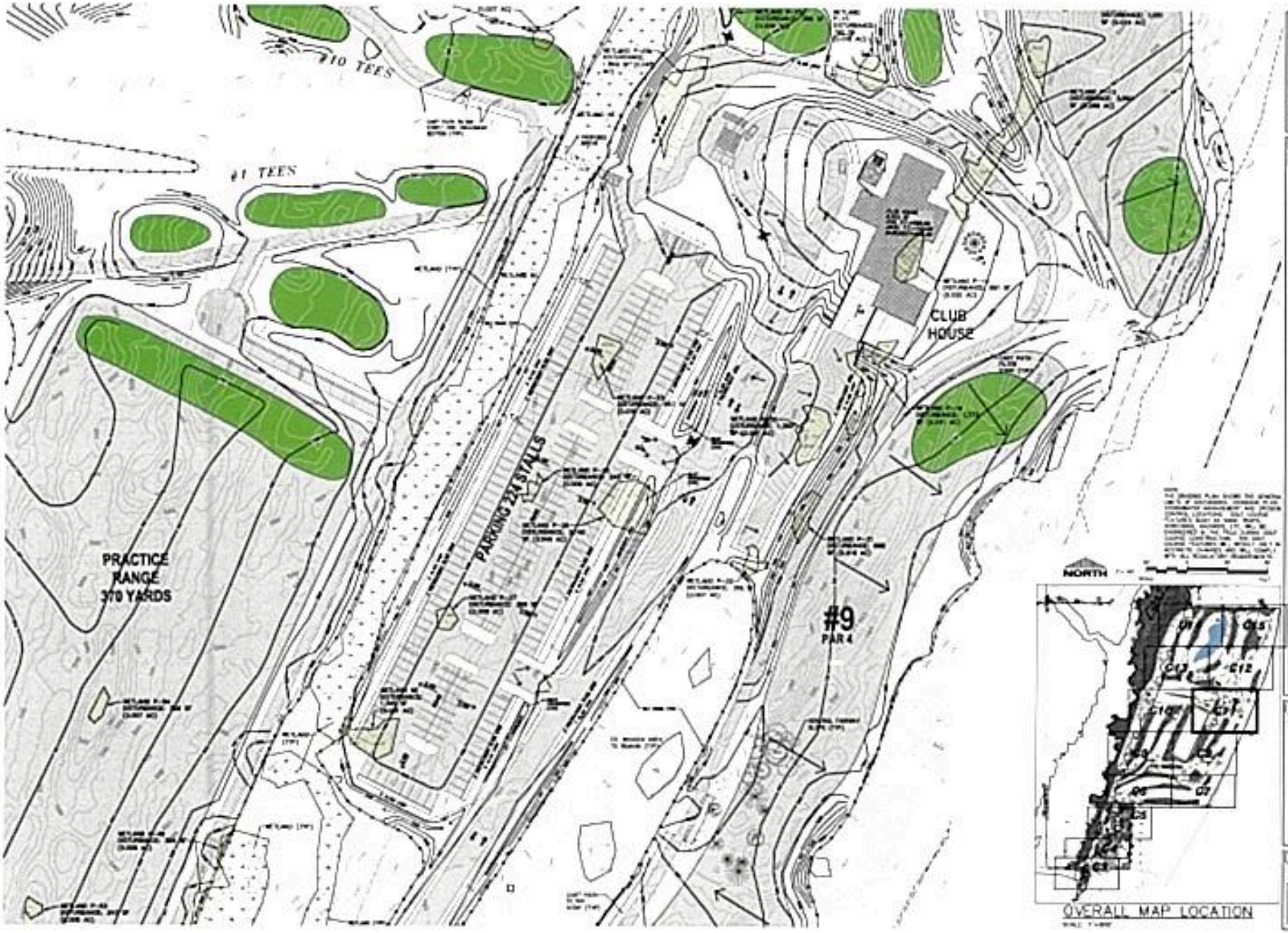
CITY OF SHEBOYGAN • SHEBOYGAN COUNTY, WI

NOT FOR CONSTRUCTION

G10

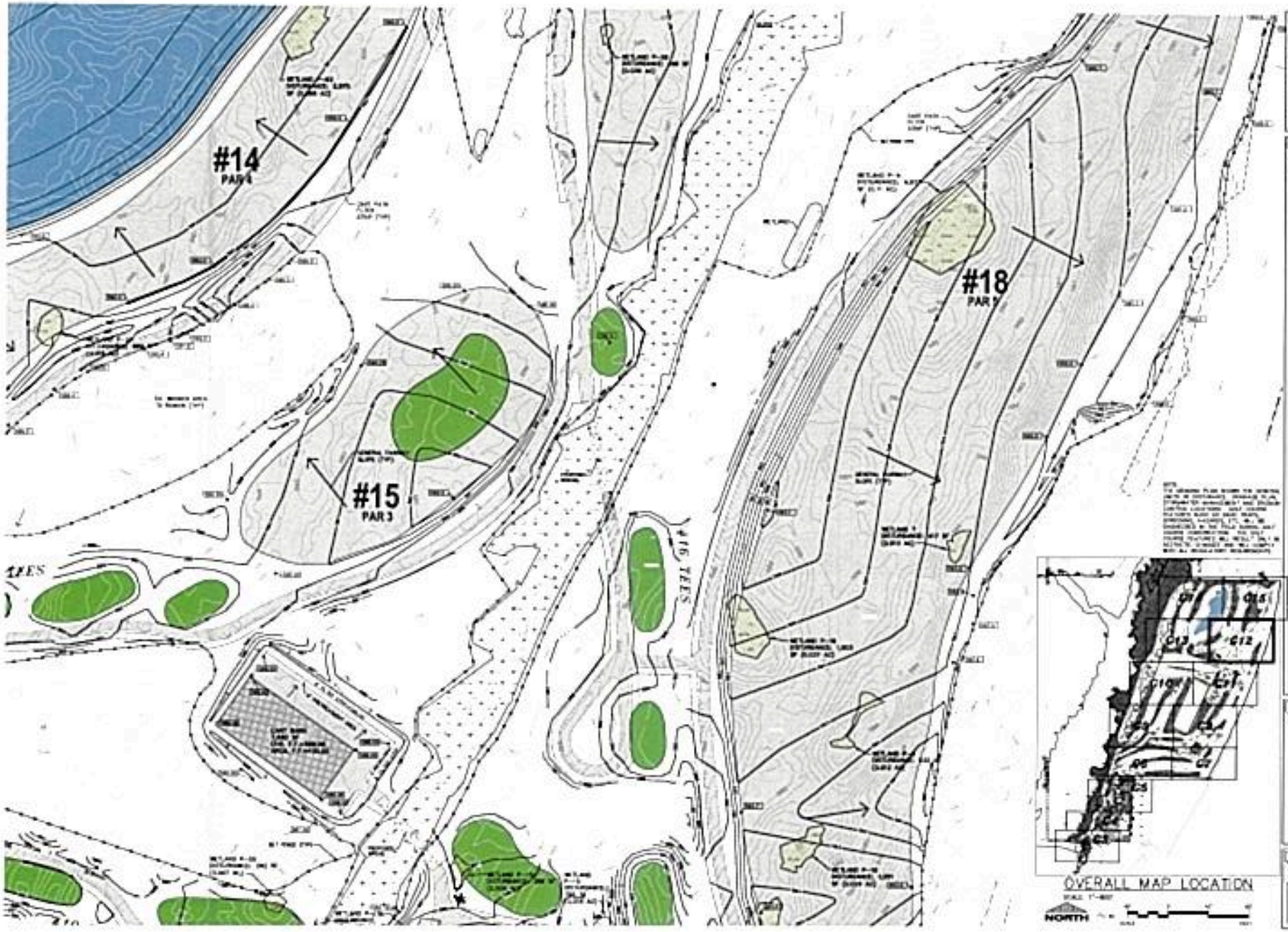


EXCEL

NEW GOLF COURSE
KOHLER COMPANY
CITY OF SHEBOYGAN • SHEBOYGAN COUNTY, WI

NOT FOR CONSTRUCTION

G11



EXCEL

NEW GOLF COURSE

KOHLER COMPANY

CITY OF SHEBOYGAN • SHEBOYGAN COUNTY, WI

NOT FOR CONSTRUCTION

G12

OVERALL MAP LOCATION
NORTH
#12
PAR 4
#10
PAR 4
REST STATION
#11 TEES
#13 TEES
EXCEL
NEW GOLF COURSE
KOHLER COMPANY
CITY OF SHEBOYGAN • SHEBOYGAN COUNTY, WI
NOT FOR CONSTRUCTION
G13

EXCEL

NEW GOLF COURSE
KOHLER COMPANY
CITY OF SHEBOYGAN • SHEBOYGAN COUNTY, WI

NOT FOR CONSTRUCTION

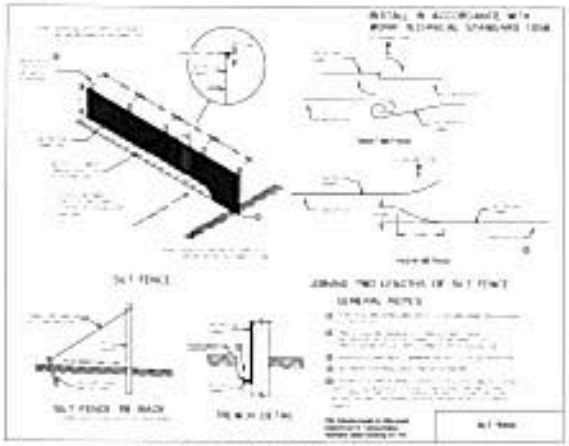
G14

EXCEL

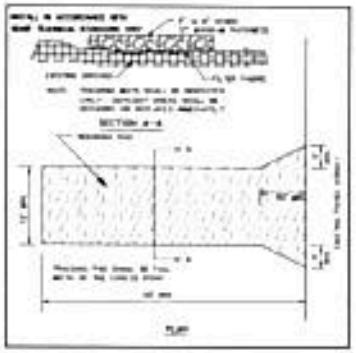
NEW GOLF COURSE
KOHLER COMPANY
CITY OF SHEBOYGAN • SHEBOYGAN COUNTY, WI

NOT FOR CONSTRUCTION

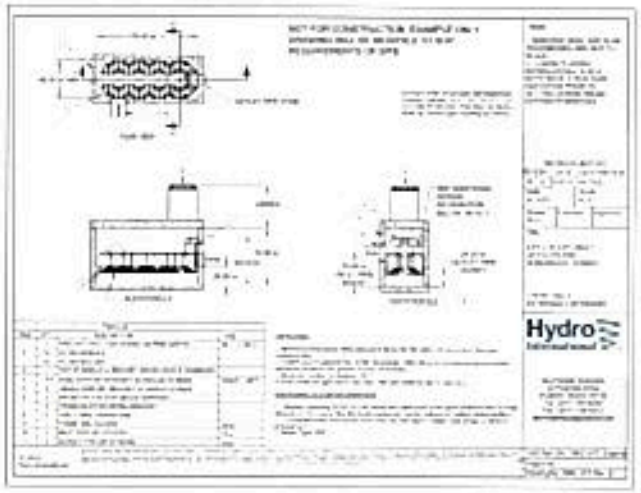
G15



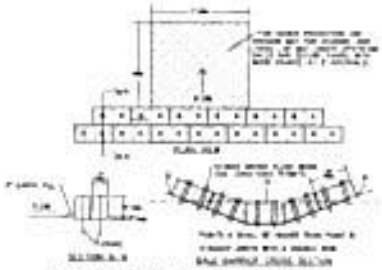
SILT FENCE – INSTALLATION DETAIL



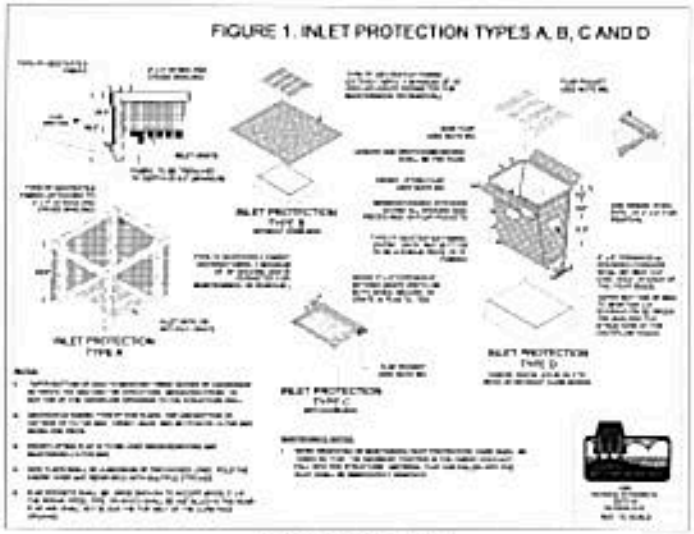
TRACKPAD DETAILS



UP-FLO FILTER STRUCTURE TYPICAL DETAIL



HAY OR STRAW BALE DITCH CHECK



INLET PROTECTION DETAIL

EXCEL

NEW GOLF COURSE
KOHLER COMPANY
CITY OF SHEBOYGAN • SHEBOYGAN COUNTY, WI

NOT FOR CONSTRUCTION

EROSION CONTROL DETAILS

G16

STORMWATER FACILITIES MAINTENANCE AGREEMENT

This Stormwater Facilities Maintenance Agreement is made by and between the City of Sheboygan, Wisconsin ("City"), and the Kohler Company, 444 Highland Drive, Kohler, WI 53044 ("Owner").

RECITALS

The upkeep and maintenance of stormwater facilities is essential to the protection of water resources in the City of Sheboygan. All property owners are expected to conduct business in a manner that promotes environmental protection. This Agreement contains specific provisions with respect to maintenance of stormwater facilities. The authority to require maintenance and pollution source control is provided in the City of Sheboygan "Post-Construction Stormwater Management Zoning Ordinance," being Appendix E to the Sheboygan Municipal Code.

A part of the NW ¼ and a part of Government Lots 1 & 2 and a part of the SW ¼ of the SW ¼ and a part of Government Lots 3 & 4 of Section 14 and a part of the SE ¼ of the SW ¼ and a part of Government Lot 4 of Section 11, T14N-R23E, City of Sheboygan, Sheboygan County, Wisconsin

[Legal Description]

59281328012
59281328011
59281328015
59281328016
59281328017
59281328018
Parcel Identification No's

Owner has designed and installed or caused to be designed and installed certain structural and/or non-structural stormwater management measures in accordance with the approved stormwater management plan and permit on the property described above. In order to further the goals of the City to ensure the protection and enhancement of Sheboygan's water resources, and in consideration of the recitals and mutual agreements herein set forth, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the City and Owner hereby enter into this maintenance agreement. The responsibilities of each party to this Agreement are identified below.

OWNER SHALL:

(1) Implement or cause to be implemented the stormwater facility maintenance program included herein as Attachment "A".

(2) Maintain a record (in the form of a log book) of steps taken to implement the program referenced in (1) above. The log book shall be available for inspection by City staff at Owner's business during normal business hours, or at an alternate location approved by City staff. The log book shall catalog the action taken, who took it, when it was done, how it was done, and any problems encountered or follow-on actions recommended. Maintenance items listed in Attachment "A" shall be inspected on a monthly or more frequent basis as necessary. Owner is encouraged to photocopy the individual checklists in Attachment "A" and use them to complete its monthly inspections. These completed checklists would then, in combination, comprise the log book.

(3) Maintain the approved stormwater management practices in accordance with the schedule referenced in (1) and (2).

(4) Provide the City with the name, address and telephone number of the business, the person or the firm responsible for plan implementation, if other than the Owner.

(5) Permit authorized representatives of the City access to the property described above to conduct inspections of stormwater management practices as necessary to ascertain that the practices are being maintained and operated in accordance with this Agreement.

(6) Permit authorized representatives of the City to perform corrective actions if the Owner does not make or cause to make required corrections within a specified time period and enter the amount due on the tax rolls and collect the money as a special charge against the property pursuant to state statutes, if payment is not made within thirty (30) days of submittal of invoice to Owner for City performed corrective actions.

(7) Prevent any unauthorized modifications to the approved stormwater management practices and prevent them from being dismantled, revised, altered or removed except as necessary for maintenance, repair or replacement. Any such actions shall be approved of by the City. Modifications to the approved stormwater management practices must be approved in advance by the City.

THE CITY OF SHEBOYGAN SHALL:

(1) Provide technical assistance to Owner in support of its operation and maintenance activities conducted pursuant to its maintenance and source control programs. Said assistance shall be provided upon request, and as City time and resources permit, at no charge to Owner.

(2) Maintain public records of the results of site inspections, inform the Owner or other designated responsible party of the inspection results, and specifically indicate any corrective actions required to bring the stormwater management practice into proper working condition.

(3) Review this agreement with Owner and modify it as necessary at least once every three (3) years.

REMEDIES:

(1) If the City determines that maintenance or repair work is required to be done to the stormwater facility existing on the Owner property, the Director of the Department of Public Works, or his/her designee, shall give the Owner, and/or the person or agent in control of said property, notice of the specific maintenance and/or repair required. The Director or designee shall set a reasonable time in which such work is to be completed. If the above required maintenance and/or repair is not completed within the time set by the Director, or his/her designee, written notice will be sent to the persons who were given notice stating the City's intention to perform such maintenance and bill the Owner for all incurred expenses.

(2) If at any time the City determines that the existing system creates any imminent threat to public health or welfare, the Director, or his/her designee, may take immediate measures to remedy said threat. No notice to the persons listed in Remedies (1), above, shall be required under such circumstances.

(3) The Owner grants unrestricted authority to the City for access to any and all stormwater system features for the purpose of performing maintenance or repair as may become necessary under Remedies (1) and/or (2).

(4) The persons listed in Remedies (1), above, shall assume all responsibility for the cost of any maintenance and for repairs to the stormwater facility. Such responsibility shall include reimbursement to the City within 30 days of the receipt of the invoice for any such work performed. Overdue payments will require payment of interest at the current legal rate for liquidated judgments. If legal action ensures, any costs or fees incurred by the City will be borne by the parties responsible for said reimbursements.

(5) The Owner hereby grants to the City a lien against the above-described property in an amount equal to the cost incurred by the City to perform the maintenance or repair work described herein.

This Agreement is intended to protect the value and desirability of the real property described above and to benefit all the citizens of the City. It shall run with the land and be binding on all parties having or acquiring from Owner or their successors any right, title or interest in the property or any part thereof, as well as their title, or interest in the property or any part thereof, as well as their heirs, successors and assigns. They shall inure to the benefit of each present or future successor in interest of said property or any part thereof, or interest therein, and to the benefit of all citizens of the City.

Dated at Sheboygan, Wisconsin, this ___ day of _____, 2018.

_____
Owner

_____
Owner

STATE OF WISCONSIN)
) ss
COUNTY OF SHEBOYGAN)

On this ___ day of _____, 2018, before me personally appeared _____ and _____, to me known to be the persons described, and who executed the foregoing Agreement and acknowledged before me that they executed the same as their free and voluntary act and deed for the uses and purposes therein mentioned.

_____
Notary Public, Sheboygan County, WI
My commission (expires)(is) _____

Dated at Sheboygan, Wisconsin, this ___ day of _____, 2018.

CITY OF SHEBOYGAN

_____
Authorized Agent for the City of Sheboygan

This document consists of four (4) typewritten pages, including the following attestation page.

STATE OF WISCONSIN)
) ss
COUNTY OF SHEBOYGAN)

On this ___ day of _____, 2018, before me personally appeared _____, Authorized Agent of the above-named municipal corporation, to me known to be the person who executed the foregoing instrument, and to me known to be such Authorized Agent of said corporation, and acknowledged that he/she executed the foregoing instrument as such officer of said corporation, by its authority.

_____
Notary Public, Sheboygan County, WI
My commission (expires)(is) _____

APPROVED AS TO FORM:

_____
City Attorney
City of Sheboygan, WI

Appendix A

POST CONSTRUCTION OPERATION AND MAINTENANCE PLAN

The owner of the property affected shall inspect and maintain the following stormwater management systems frequently, especially after heavy rainfalls, but at least on an annual basis unless otherwise specified.	
STORMWATER FACILITY	**TYPE OF ACTION**
1. Lawn and Landscaped Areas	All lawn areas shall be kept clear of any materials that block the flow of stormwater. Rills and small gullies shall immediately be filled and reestablished with native vegetation.
2. Swales	All swales showing signs of erosion, scour, or channelization shall be repaired, reinforced, and revegetated immediately. All swales shall be repaired to the original plan requirements.
3. Filter Strips (as located along parking lots, driveways and cart path pavement edges)	The surface areas over the pretreatment area and filter strip area shall be inspected for any type of settling or clogging that may take place on an annual basis. Any failed areas showing signs of degradation shall be restored to the original plan requirements.
4. Hydro International Up-Flo Filter Quality Structures (located within maintenance facility pavement area)	Inspection of the structure shall be completed annually at a minimum by qualified maintenance personnel. Sediment in the bottom of the structure shall be inspected to verify sediment is less than 16" deep. If sediment is greater than 16" deep, the sediment shall be removed per Hydro International requirements. Qualified maintenance personnel shall enter structure to remove a Media Bag to be weighed. Media Bags weighing more than 40 lbs are an indication that the bag is full and need to be replaced. Replace per manufacturer specifications. Qualified maintenance personnel shall inspect the oil layer on the water surface to oil being entrained in the Media Bags. If the oil accumulation is greater than 1.5", the structure shall be pumped per manufacturer's specifications. After storm events of greater than 1" of rainfall, the structure shall be inspected 48 hours after the rainfall even to verify the water level inside the structure has dropped to below the base of the filter modules. If the water level has not dropped, the filters are considered to be clogged and shall be replaced per manufacturer's specifications. For further information, obtain Hydro International's Up-Flo Filter Operation and Maintenance Manual for details.
5. Record of Maintenance	The operation and maintenance plan shall remain onsite and be available for inspection when requested by WDNR. When requested, the owner shall make available for inspection all maintenance records to the department or agent for the life of the system.