STORMWATER MANAGEMENT & EROSION CONTROL PLAN

FOR:

KOHLER COMPANY
PROPOSED GOLF COURSE
CITY OF SHEBOYGAN, WI

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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. Those areas include the maintenance building area, club house & guest parking area, caddie/cart barn area, entrance drive/cart path areas and the fairway/driving range areas. 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. Locations of filter strips for tees/fairway/greens will be field engineered, located, and documented to ensure compliance as the project is constructed.

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 also 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 the 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.

III – Applicable Stormwater Regulations and Requirements – 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) Peak Discharge (Quantity) - 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 and the high infiltration rates on-site. This significantly exceeds any of the requirements for peak discharge.

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	0.323 (0.258-0.407)	0.385 (0.305-0.486)	0.485 (0.383-0.612)	0.564 (0.444-0.714)	0.670 (0.510-0.896)	0.748 (0.561-0.963)	0.824 (0.602-1.07)	0.898 (0.635-1.18)	0.991 (0.680-1.33)	1.06 (0.715-1.43)
10-min	0.473 (0.375-0.596)	0.564 (0.447-0.712)	0.710 (0.562-0.898)	0.826 (0.650-1.05)	0.981 (0.747-1.25)	1.10 (0.821-1.41)	1.21 (0.881-1.57)	1.32 (0.930-1.73)	1.45 (0.996-1.94)	1.55 (1.05-2.12)
15-min	0.577 (0.457-0.727)	0.688 (0.545-0.868)	0.866 (0.683-1.09)	1.01 (0.792-1.27)	1.20 (0.911-1.53)	1.34 (1.00-1.72)	1.47 (1.08-1.92)	1.60 (1.13-2.12)	1.77 (1.22-2.37)	1.89 (1.28-2.56)
30-min	0.802 (0.635-1.01)	0.959 (0.759-1.21)	1.21 (0.953-1.52)	1.41 (1.12-1.77)	1.66 (1.27-2.12)	1.85 (1.39-2.38)	2.04 (1.49-2.65)	2.21 (1.56-2.92)	2.43 (1.67-3.25)	2.59 (1.79-3.50)
60-min	1.04 (0.821-1.31)	1.23 (0.974-1.55)	1.54 (1.22-1.96)	1.80 (1.42-2.26)	2.15 (1.64-2.76)	2.41 (1.81-3.11)	2.67 (1.95-3.46)	2.93 (2.07-3.87)	3.26 (2.24-4.37)	3.51 (2.37-4.79)
2-hr	1.27 (1.02-1.58)	1.50 (1.20-1.87)	1.88 (1.50-2.34)	2.20 (1.75-2.74)	2.63 (2.04-3.34)	2.97 (2.25-3.79)	3.30 (2.44-4.27)	3.64 (2.61-4.73)	4.09 (2.84-5.45)	4.43 (3.01-5.96)
3-hr	1.42 (1.15-1.75)	1.67 (1.35-2.06)	2.08 (1.66-2.57)	2.44 (1.95-3.02)	2.94 (2.30-3.73)	3.34 (2.56-4.29)	3.76 (2.80-4.85)	4.19 (3.02-5.48)	4.77 (3.33-6.30)	5.23 (3.57-7.01)
6-hr	1.68 (1.36-2.08)	1.96 (1.60-2.38)	2.44 (1.99-2.98)	2.87 (2.33-3.51)	3.52 (2.82-4.44)	4.06 (3.15-5.14)	4.62 (3.48-5.94)	5.23 (3.82-6.84)	6.09 (4.30-8.29)	6.78 (4.68-9.23)
12-hr	1.96 (1.63-2.35)	2.27 (1.86-2.72)	2.83 (2.34-3.43)	3.35 (2.76-4.04)	4.15 (3.36-5.21)	4.84 (3.82-6.09)	5.59 (4.27-7.14)	6.40 (4.72-8.32)	7.57 (5.39-10.0)	8.53 (5.90-11.3)
24-hr	2.25 (1.88-2.66)	2.59 (2.17-3.08)	3.22 (2.72-3.82)	3.83 (3.20-4.56)	4.73 (3.94-5.66)	5.63 (4.63-7.02)	6.54 (5.06-8.30)	7.56 (5.65-9.75)	9.02 (6.48-11.9)	10.2 (7.12-13.4)
2-day	2.57 (2.19-2.99)	2.92 (2.49-3.47)	3.61 (3.07-4.22)	4.28 (3.62-5.02)	5.35 (4.46-6.29)	6.29 (5.13-7.78)	7.34 (5.74-9.22)	8.50 (6.36-10.9)	10.2 (7.38-13.3)	11.6 (8.13-15.1)
3-day	2.81 (2.42-3.25)	3.17 (2.72-3.68)	3.85 (3.30-4.46)	4.53 (3.86-5.26)	5.62 (4.72-6.67)	6.59 (5.37-8.09)	7.67 (6.24-9.59)	8.87 (6.71-11.3)	10.6 (7.74-13.8)	12.1 (8.52-15.7)
4-day	3.02 (2.62-3.47)	3.38 (2.92-3.89)	4.08 (3.51-4.70)	4.77 (4.09-5.51)	5.88 (4.96-7.14)	6.86 (5.62-8.56)	7.96 (6.30-9.90)	9.18 (6.97-11.7)	11.0 (8.01-14.2)	12.5 (8.79-16.2)
7-day	3.54 (3.09-4.01)	3.97 (3.47-4.50)	4.78 (4.18-5.43)	5.54 (4.80-6.33)	6.74 (5.72-8.06)	7.78 (6.47-9.56)	8.91 (7.09-10.9)	10.2 (7.75-12.8)	12.0 (8.77-15.4)	13.5 (9.54-17.3)
10-day	4.00 (3.52-4.52)	4.50 (3.96-5.07)	5.41 (4.74-6.10)	6.24 (5.44-7.07)	7.50 (6.38-8.86)	8.57 (7.10-10.2)	9.73 (7.77-11.8)	11.0 (8.43-13.7)	12.8 (9.38-16.3)	14.2 (10.1-18.2)
20-day	5.42 (4.85-6.21)	6.07 (5.41-6.73)	7.16 (6.37-7.96)	8.12 (7.17-9.06)	9.49 (8.13-11.0)	10.6 (8.95-12.4)	11.8 (9.48-14.1)	13.0 (9.99-15.9)	14.7 (10.8-18.5)	16.0 (11.5-20.4)
30-day	6.67 (6.01-7.32)	7.41 (6.69-8.17)	8.69 (7.79-9.57)	9.74 (8.68-10.8)	11.2 (9.84-12.8)	12.4 (10.8-14.3)	13.5 (10.9-16.0)	14.7 (11.4-17.9)	16.3 (12.1-20.4)	17.5 (12.6-22.3)
45-day	8.30 (7.54-9.23)	9.23 (8.38-10.3)	10.7 (9.72-11.7)	11.9 (10.7-13.1)	13.6 (11.7-15.2)	14.8 (12.5-16.9)	16.0 (12.9-18.7)	17.1 (13.3-20.6)	18.6 (13.8-23.1)	19.7 (14.2-25.0)
60-day	9.71 (8.86-10.5)	10.8 (9.89-11.7)	12.6 (11.4-13.6)	13.9 (12.5-15.2)	15.7 (13.6-17.5)	17.0 (14.4-19.3)	18.2 (14.8-21.2)	19.4 (15.0-23.2)	20.8 (15.5-25.8)	21.8 (15.8-27.5)

b) Stormwater Quality – 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 pre-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 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 60% 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. Stormwater from impervious surfaces will be sheet drained to grade after pretreatment in an un-concentrated manner to avoid groundwater mounding. Engineered infiltration devices will not be necessary due to the area-wide high infiltration rates.

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 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 pretreat runoff prior to entering the surface water (NR 151.125(4)e).

e) Erosion Control - The erosion control specifications, construction sequence, site stabilization notes, seeding notes, dewatering notes, and post construction and maintenance plan 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. Appendixes D & E of this report show the locations of the silt fence and tracking pads. The USLE sheets are also shown on these appendixes. The USLE sheets shown are the worst case flow paths to wetland areas. The calculations show that silt fence is the only sediment control practice needed to achieve sediment discharges under 5.0 tons per acre

IV – Stormwater & Erosion Control Analysis – Due to 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). 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 pretreatment of TSS and oil and grease prior to being discharged to grade. The mechanical system will remove over 80% of the TSS and oil and grease with 18 filter modules. The roof areas and access drives will be pretreated with 7' long filter strips which will remove over 80% of TSS prior to being discharged to grade. Roof areas are not required to be pretreated but have been proposed as part of the plan to add additional groundwater

protection. The water quality components of the maintenance building area will be satisfied by achieving a greater than 80% TSS removal rate (82.2% see output summary below). See attached map (Appendix G) for details of this area.

Quality Control: 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	95707	Years in Model Run:	0.99		115.9	

Print Output Summary to Text File

Print Output Summary to .csv File

Total Area Modeled (ac): 1.080

Total Control Practice Costs

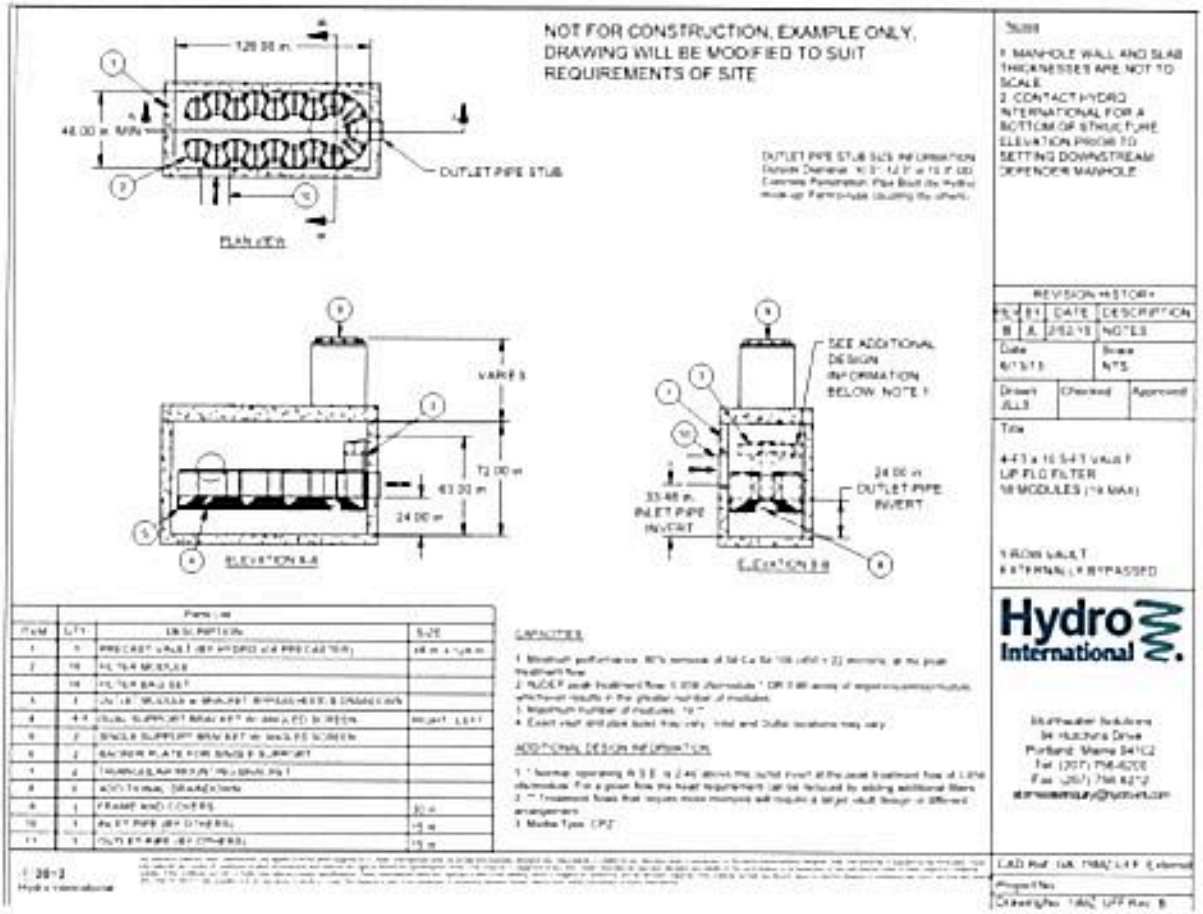
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

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

Quality Control: Detail of Up-Flow Filter Vault with 18 modules:



b) Guest Parking & Club House Area - The roof areas, parking area and access drives will be pretreated with filter strips which will remove over 80% of TSS prior to being discharged to grade. 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 plus 4' gravel for a total of 64') results in an analyzed drainage area from the parking area of 640 sf (per unit analysis). The majority of this area was modeled with a width of 10', flow length of 8', and a dynamic infiltration rate of 13.1 in/hr. See attached map for close up of this area. SLAMM calculations show that 88.15% TSS reduction is achieved with an 8' long filter strip.

SLAMM output for the 8' long filer 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	1229		0.64	130.0	9.976	
Outfall Total with Controls	157.7	87.17 %	0.09	120.0	1.162	88.15 %
Current File Output: Annualized Total After Outfall Controls	159.9	Years in Model Run:	0.99		1.199	

Print Output Summary to Text File

Print Output Summary to .csv File

Total Area Modeled (ac): 0.016

Total Control Practice Costs

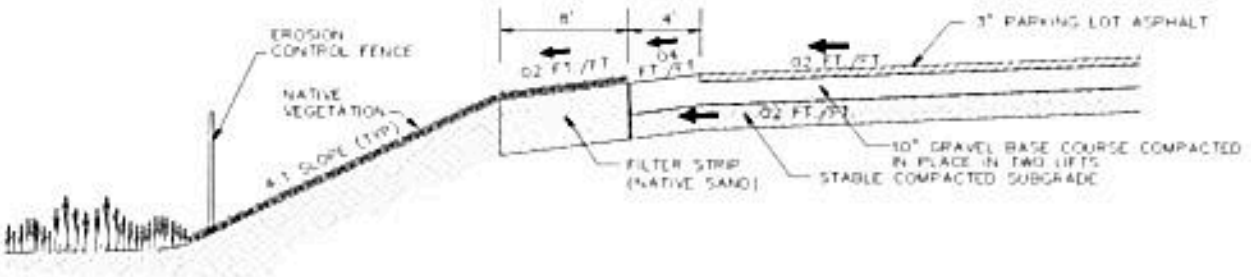
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

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	0.09	Good



PARKING LOT SECTION
LOOKING NORTH ALONG WEST SIDE OF PARKING LOT
NO SCALE

c) Access Road & Cart Paths - The access road and cart paths will be pretreated with filter strips which will remove over 80% of TSS prior to being discharged to grade. The access road has been designed as a crowned road that will sheet drain to a 7' wide filter strip on each side of the driveway. The typical one half of the driveway section from the centerline is 12'of asphalt pavement, a 4' wide gravel shoulder and a 7' wide filter strip. 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 a 7' wide filter strip. Because of the extents of the length of the road 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 areas results in an analyzed drainage area from the asphalt and gravel shoulder of 320 sf (per unit analysis). The road area will sheet drain to the filter strip. This strip has been modeled with a width of 20', flow length of 7', and a dynamic infiltration rate of 13.1 in/hr. See attached map for close up of this area. SLAMM calculations show that a 99.11% reduction is achieved in this length.

The cart paths are modeled in a similar way. A 20' section of the asphalt path results in a 200 sf (per unit analysis). The cart path area will sheet drain to the sand filter strip. This strip has been modeled with a width of 20', flow length of 7', and a dynamic infiltration rate of 13.1 in/hr. See attached map for close up of this area. SLAMM calculations show that a 100% reduction is achieved in this length.

SLAMM Outfall Output Summary for the access road:

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	768.3		0.64	130.0	6.235	
Outfall Total with Controls	8.162	98.94 %	0.01	109.5	0.05579	99.11 %
Current File Output: Annualized Total After Outfall Controls	8.275	Years in Model Run:	0.99		0.05656	

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

Total Area Modeled (ac): 0.010

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	0.01	Good

SLAMM Outfall Output Summary for the cart paths:

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	394.1		0.64	130.0	3.117	
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:	0.93		0	

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
(Dw/P Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.64	Poor
With Controls	0.00	Good

d) Caddie/Cart Barn-

Quality Control:

The Cart Barn was used for analysis because it contains both building and pavement areas and therefore these results can be extrapolated to other structures on site. The Cart Barns roof area is designed to sheet drain to the north and south. A natural filter strip is designed at the north edge of the asphalt area and will be used to collect the sheet flow from the roof and pavement area. This strip has been modeled with a width of 153', and a flow depth length of 12', and a dynamic infiltration rate of 13.1 in/hr. See attached map for close up of this area. SLAMM calculations show that due to the high infiltration rate of the soil that a 99.87% reduction is achieved from this sand filter strip.

Quality Control: 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	1486.5		0.73	73.11	67.84	
Outfall Total with Controls	24.42	99.04 %	0.00	60.01	0.09148	99.87 %
Current File Output: Annualized Total After Outfall Controls	24.76	Years in Model Run:	0.99		0.09275	

Print Output Summary to Text File | Print Output Summary to .csv File | Total Area Modeled (ac): 0.170

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	0.00	Good

e) Fairway & Driving Range Areas - The fairways will be constructed of native sand and seeded, with no topsoil required for any growing medium.

Quality Control:
A per unit area approach will be used for the drainage calculations. This area has been analyzed using a 2' x 150' proposed fairway area resulting in a drainage area of 300 sf (per unit analysis). All the fairways will sheet drain across the site from one edge to the other side of the fairway. Because the fairways will be constructed with native sand with no topsoil the fairway will in fact be a filter strip, but to ensure that there is no runoff from the fairways and to keep the design conservative, filter strips are proposed on the low side of the fairways. The filter strips have been modeled with a width of 2', flow length of 11', and a dynamic infiltration rate of 13.1 in/hr. See attached map for a close up of this area.

Because the fairways will have no topsoil and be constructed of native sand there is no calculated runoff from the fairway area. The downside runoff of the fairway will have a 11' long filter strip that will treat the runoff from the calculated fairway surface to over 81.34% TSS per the SLAMM model.

Quality Control: SLAMM Outfall Output Summary for the fairways:

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	366.2		0.44	227.0	5.169	
Outfall Total with Controls	70.79	80.67 %	0.08	219.2	0.9684	81.34 %
Current File Output: Annualized Total After Outfall Controls	71.76	Years in Model Run:	0.99		0.9819	

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)

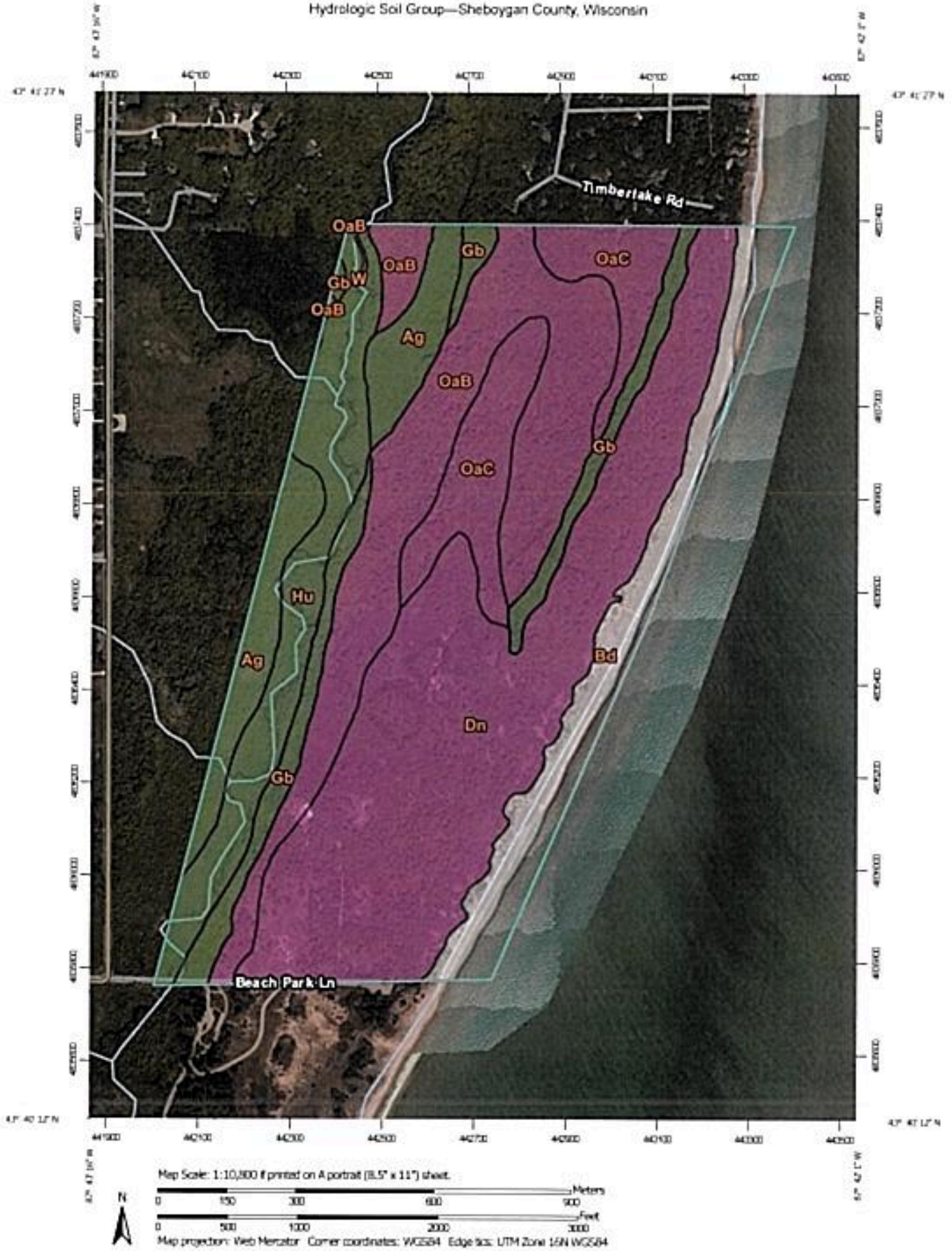
	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.44	Good
With Controls	0.08	Good

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 area over the filter strip and basin areas shall be inspected for any type of settling or clogging that may take place. 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. Qualified maintenance personnel shall remove sediment, replace media bags, and inspect oil layer 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:


Timberlake Rd
Beach Park Ln
OaB
OaB
GbW
OaB
Gb
OaC
Ag
OaB
Gb
OaC
Hu
Ag
Bd
Dn
Gb
Map Scale: 1:10,800 if printed on A portrait (8.5" x 11") sheet.
Meters
0 150 300 600 900
Feet
0 500 1000 2000 3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84
N

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.

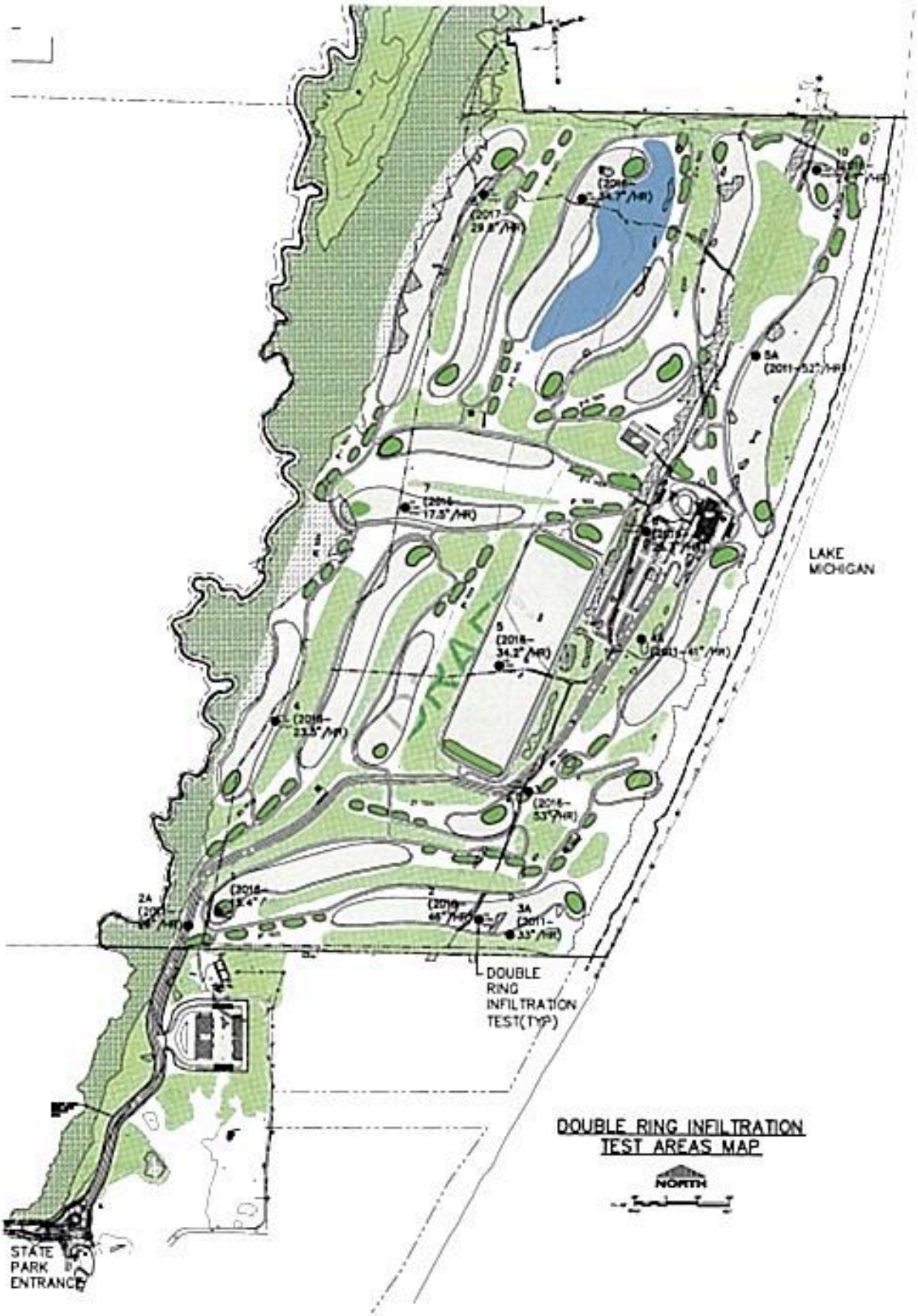
Rating Options

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.midwestesg.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 infiltrometer 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 tota' 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.

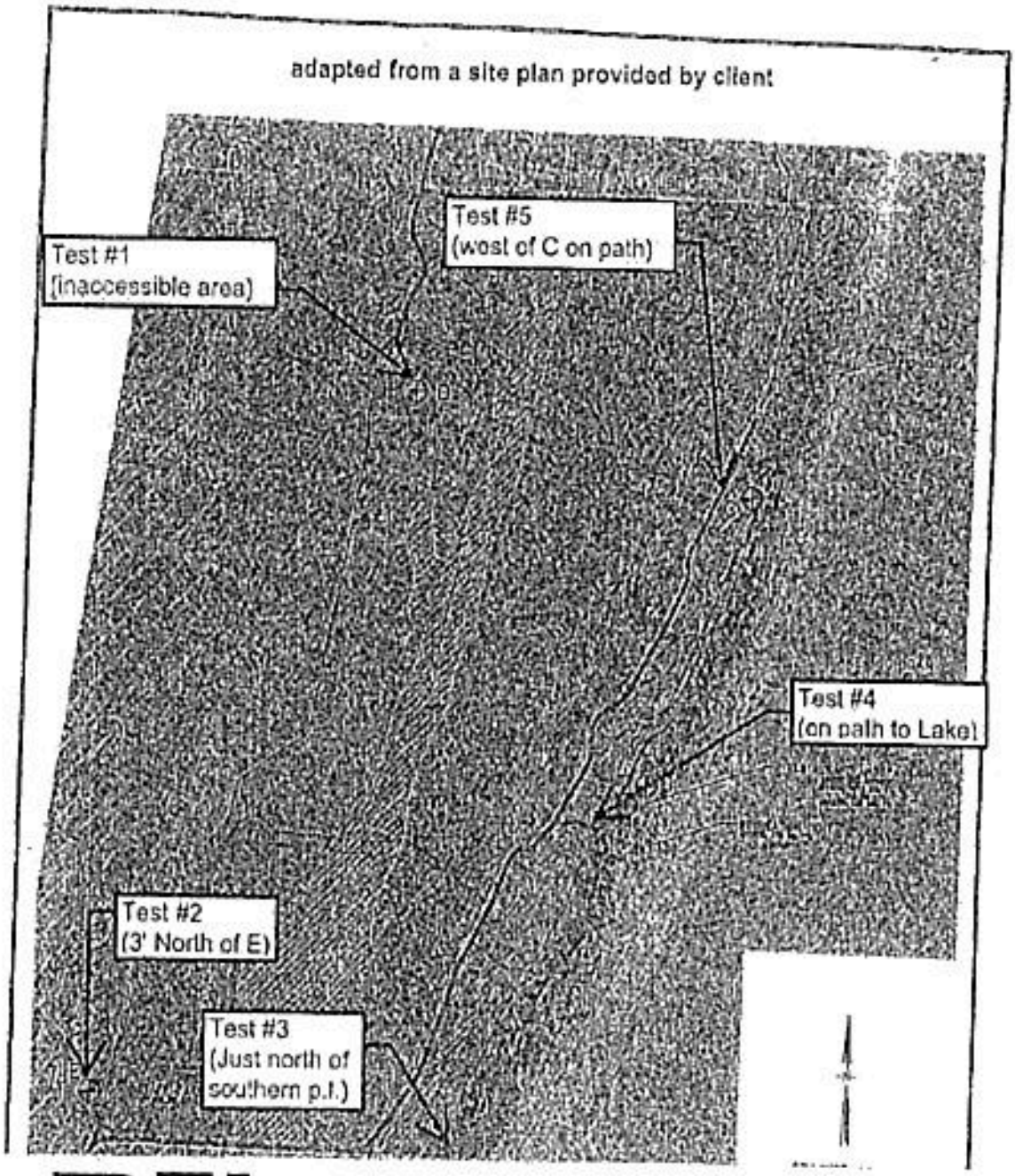
Sincerely yours,

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)



midwest engineering services, inc.

geotechnical • environmental • materials engineers

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

Field Notes

Project Name: Tanted 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 25 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"	16 minutes
2:10 pm	1 min 8 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**

Information To Build On
Engineering • Consulting • Testing

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	~~4.69~~ 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.

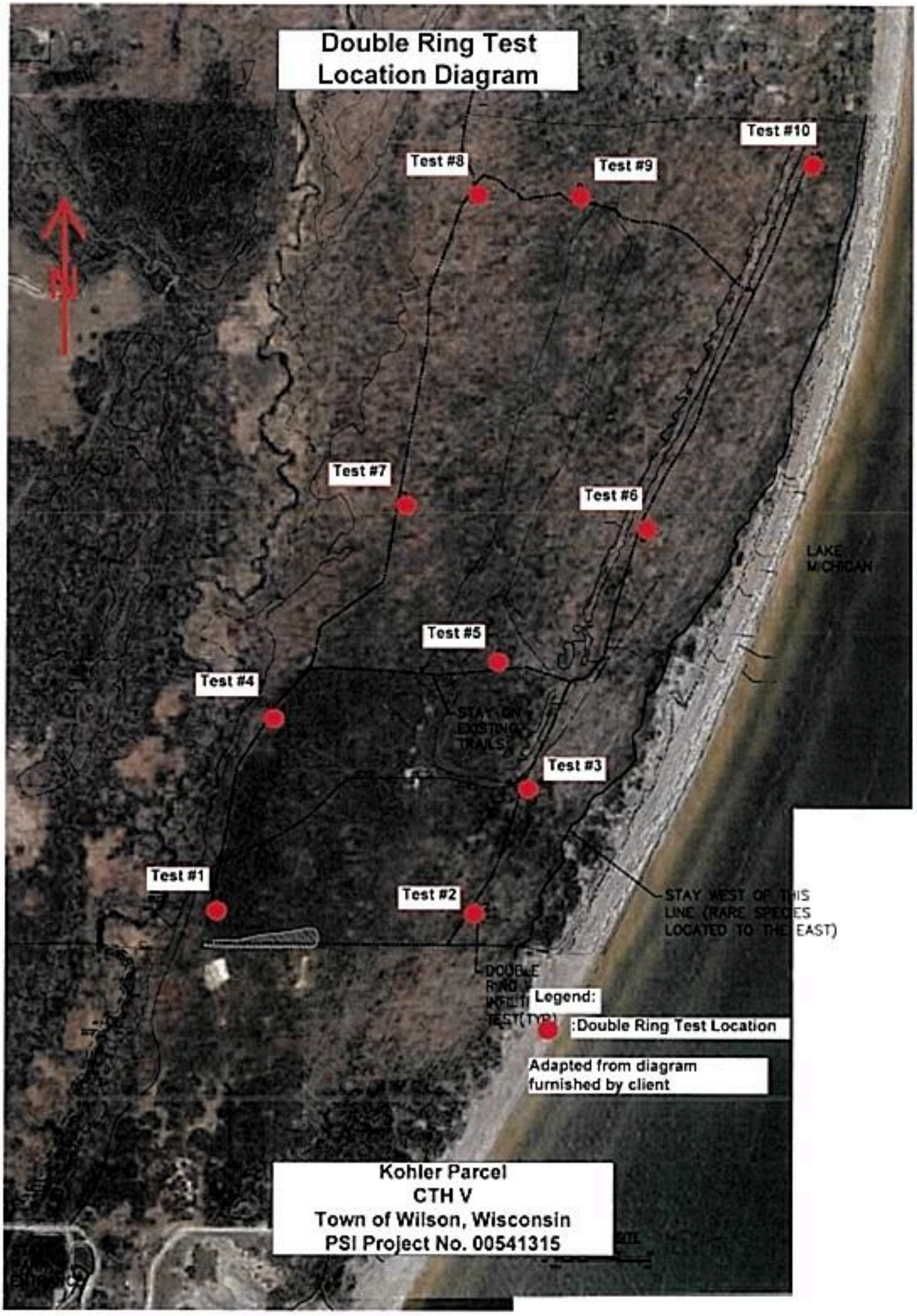
Sincerely yours,

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)
DOUBLE
RING
INFILTR
TEST(TYP)
Legend:
:Double Ring Test Location
Adapted from diagram
furnished by client
Kohler Parcel
CTH V
Town of Wilson, Wisconsin
PSI Project No. 00541315

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 #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**

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 #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**

psi Information To Build On
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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**

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 #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**

psi Information To Build On
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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**

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 #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**

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 #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**

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 #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	⅓-inch to 1¼-inch (10 mm to 30 mm)
Thickly Laminated	1/8-inch to ⅓-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

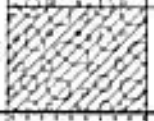
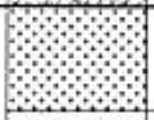
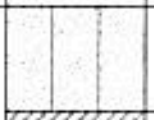
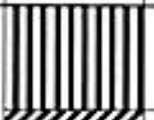
Rock Mass Description	RQD Value
Excellent	90 -100
Good	75 - 90
Fair	50 - 75
Poor	25 -50
Very Poor	Less than 25

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.

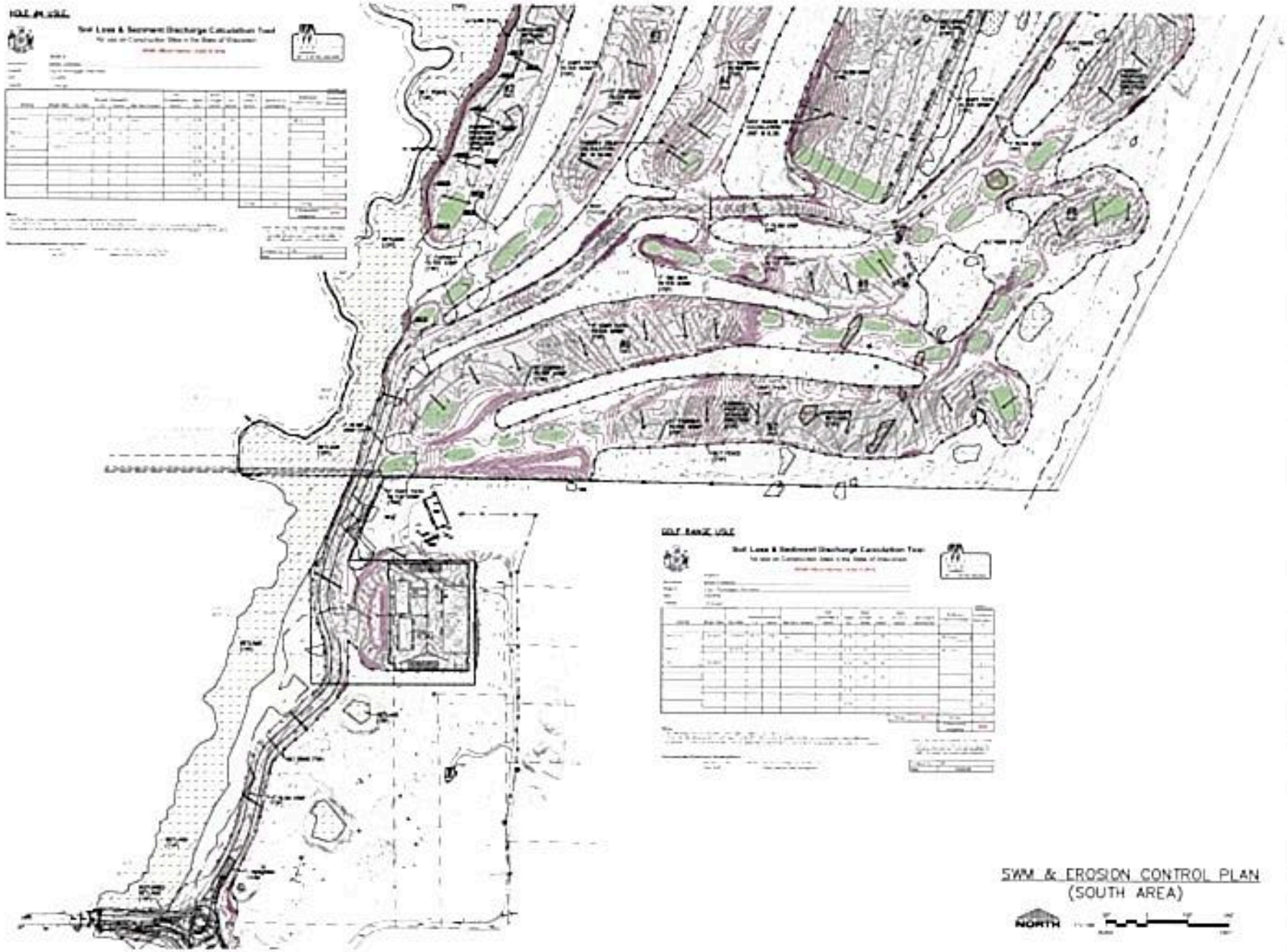
SOIL CLASSIFICATION CHART

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 (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS — MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				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)

NORTH

EXCEL

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

NOT FOR CONSTRUCTION

D

Appendix E
North Stormwater & Erosion Control Exhibit:

SWM & EROSION CONTROL PLAN (NORTH AREA)

NORTH

EXCEL

NEW GOLF COURSE

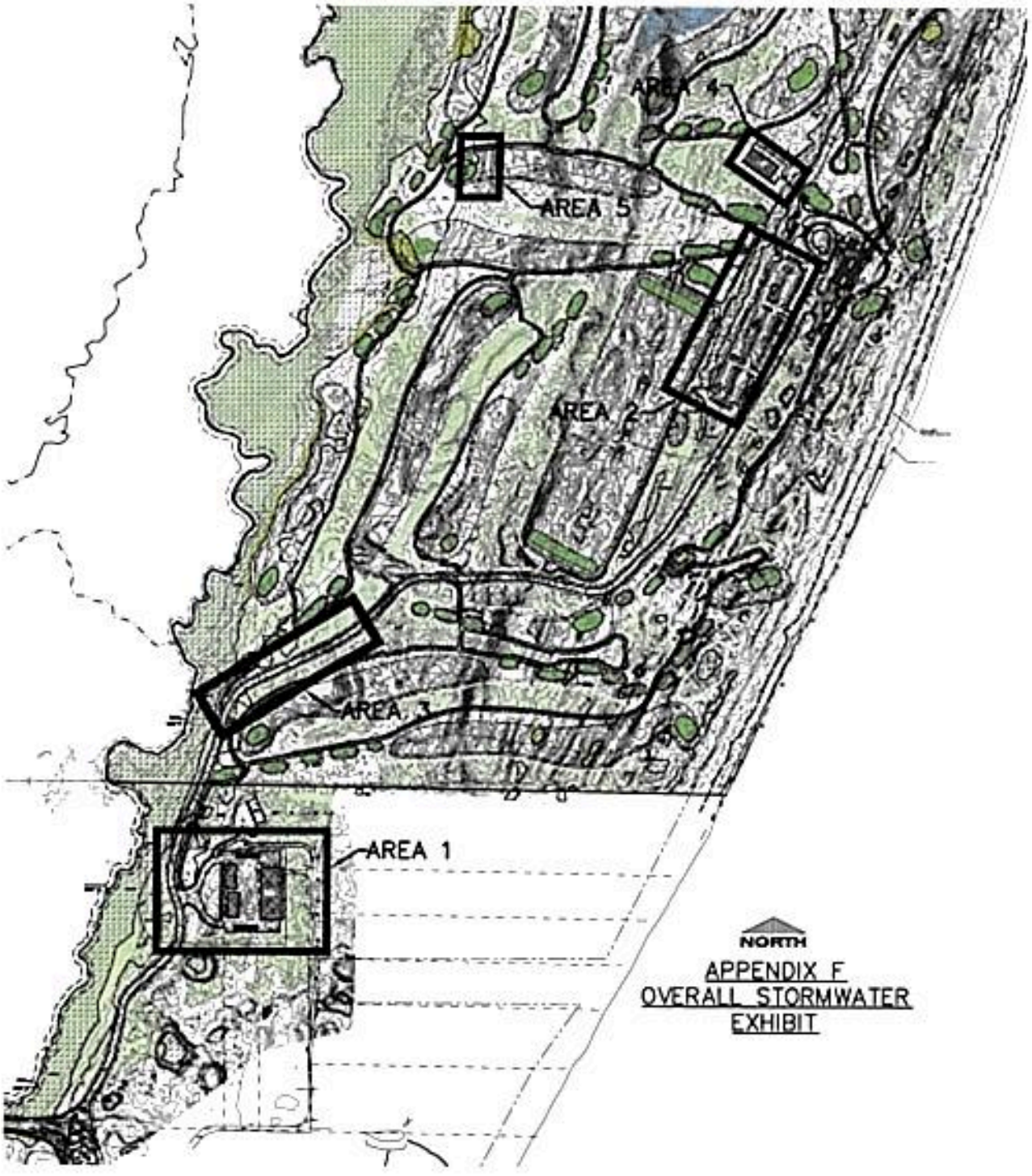
KOHLER COMPANY

CITY OF SHEBOYGAN • SHEBOYGAN COUNTY, WI

NOT FOR CONSTRUCTION

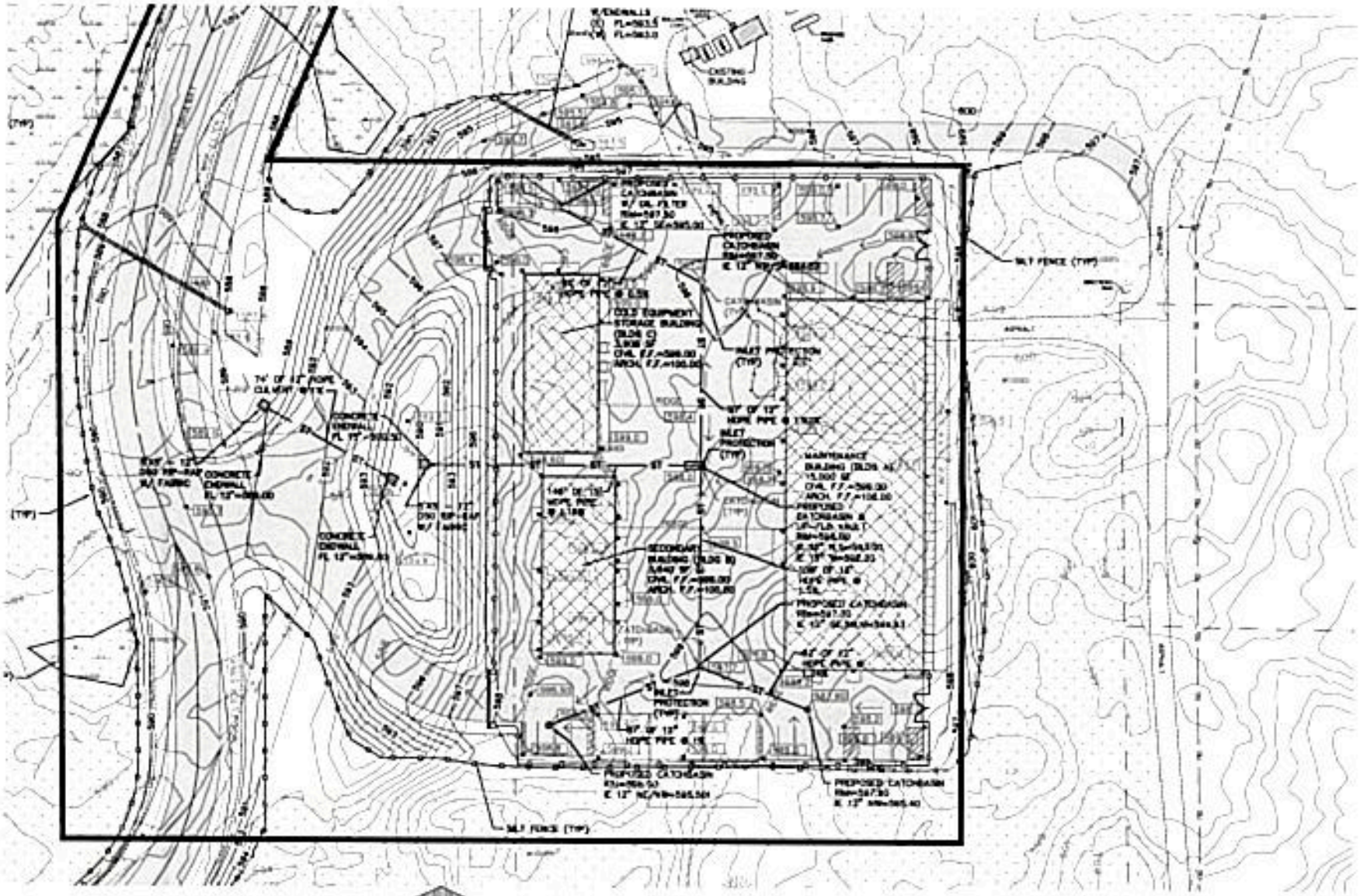
E

Appendix F
Stormwater Overall Management Exhibit:



APPENDIX F
OVERALL STORMWATER
EXHIBIT

Appendix G
Area 1 – Maintenance Building Map and Calculations:



AREA 1
MAINTENANCE BUILDING

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

AREA 2
PARKING AREA

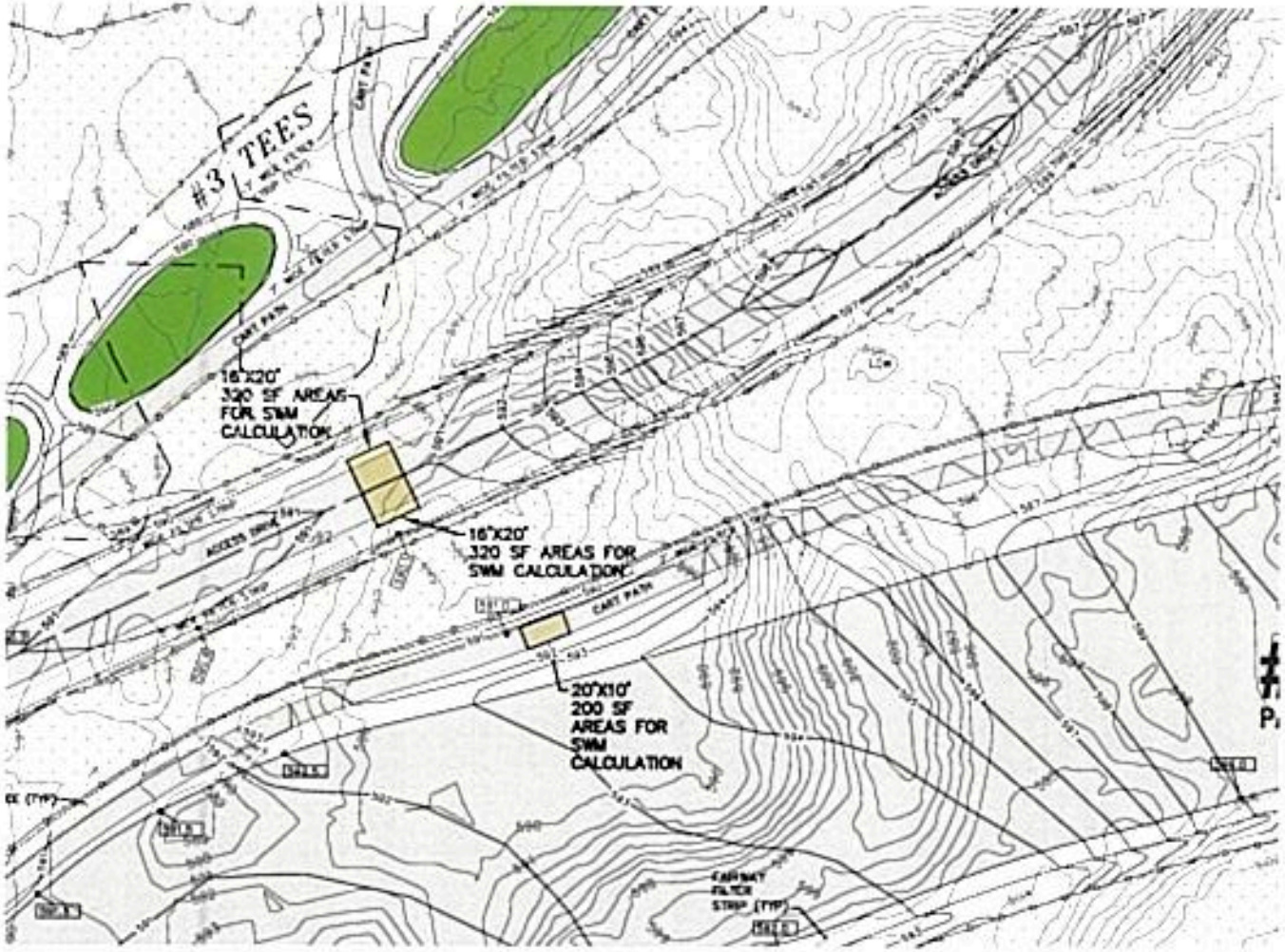
NORTH

60' 0 60' 120'

1" = 60'

SCALE FEET

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



NORTH

50' 0 50' 100'

SCALE FEET

AREA 3

ACCESS DRIVE & CART PATHS

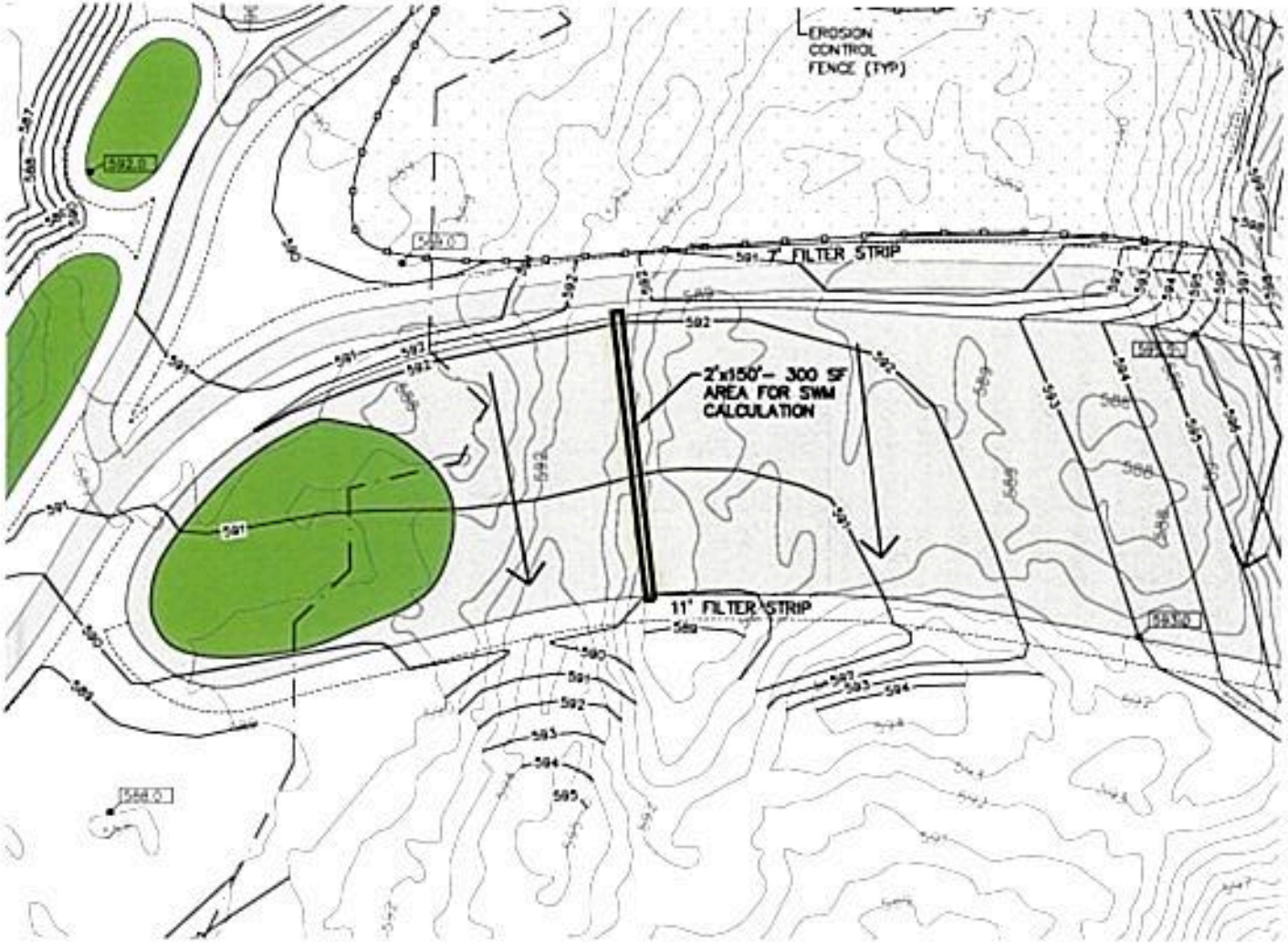
Appendix J
Area 4 – Caddie/Cart Barn Map and Calculations:

NORTH

1"= 40' SCALE 40' 0 40' 80' FEET

AREA 4
CART BARN

Appendix K
Area 5 – Fairway & Driving Range Map and Calculations:



NORTH

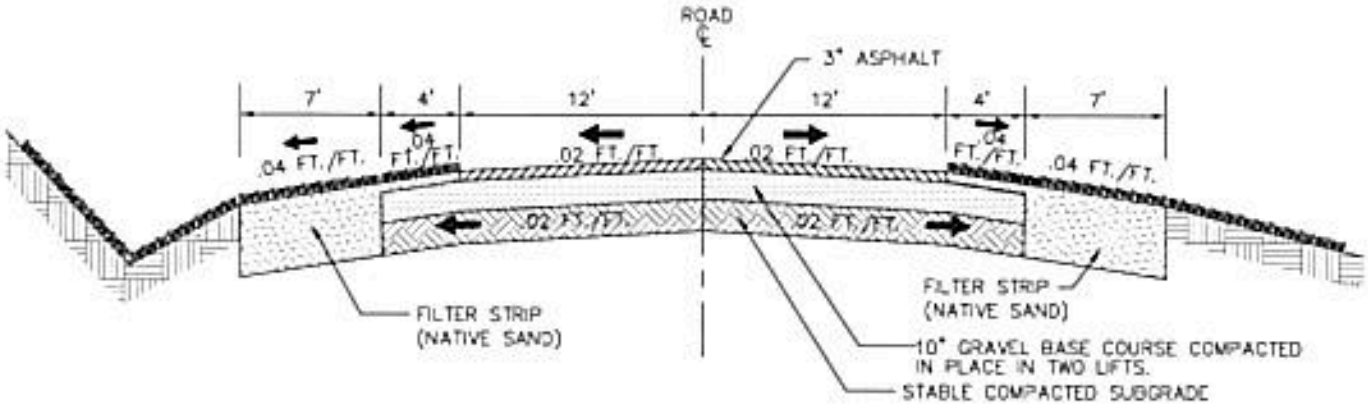
1"= 40'

SCALE

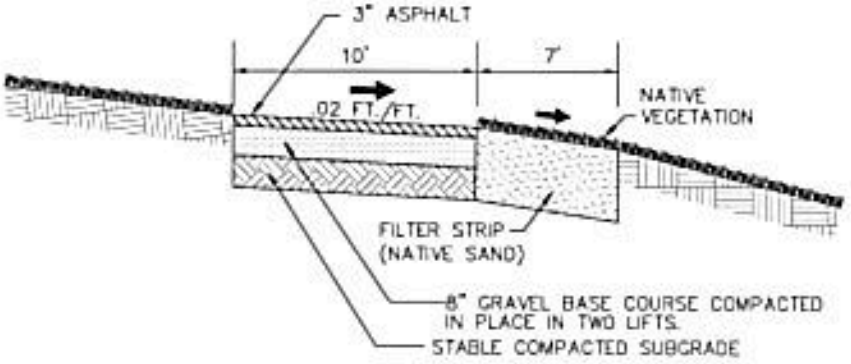
FEET

AREA 5
FAIRWAY

Appendix L
Access Road & Cart Path Section Details:



TYPICAL ACCESS DRIVE SECTION
NO SCALE

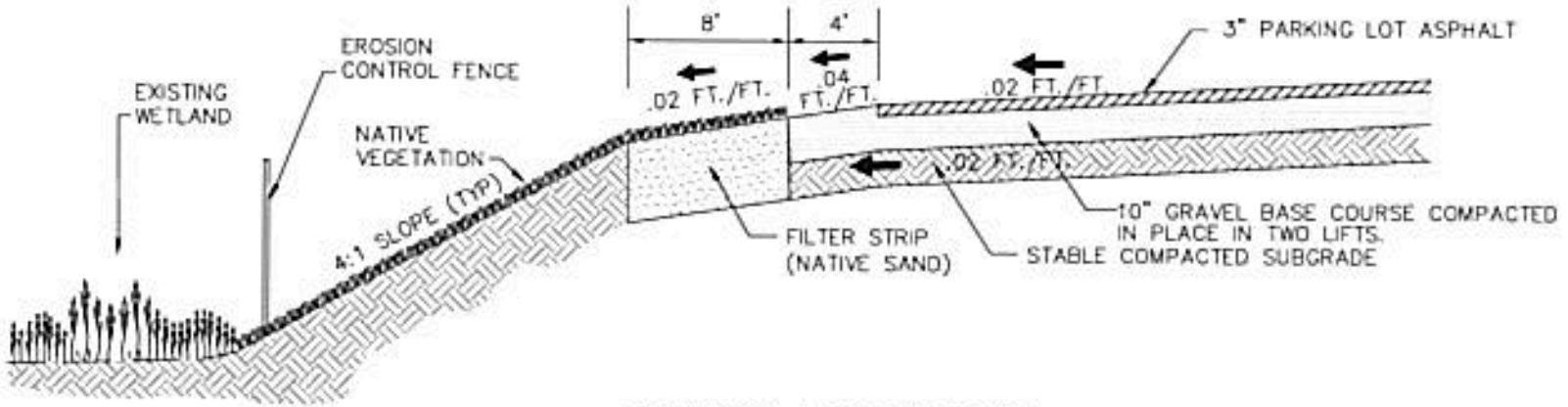


TYPICAL CART PATH SECTION
NO SCALE

ACCESS ROAD & CART PATH DETAILS

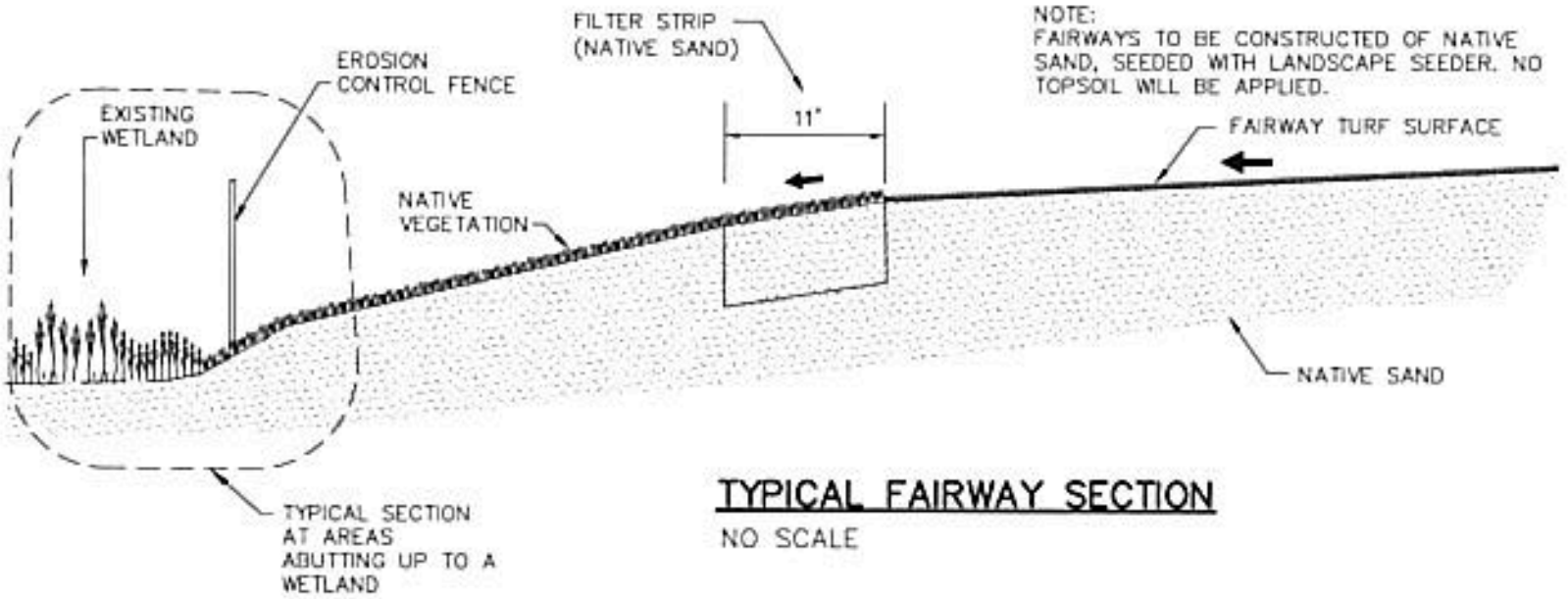
APPENDIX L

Appendix M
Parking Lot & Fairway Section Details:



PARKING LOT SECTION LOOKING NORTH ALONG WEST SIDE OF PARKING LOT

NO SCALE



TYPICAL FAIRWAY SECTION

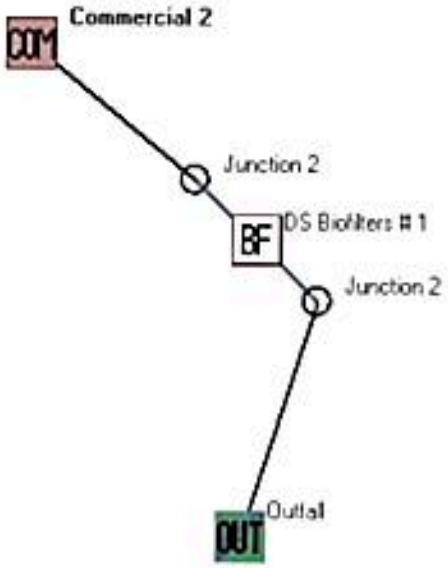
NO SCALE

PARKING LOT & FAIRWAY SECTION DETAILS

APPENDIX M

Appendix N
Infiltration SLAMM Input Information:

Maintenance Building



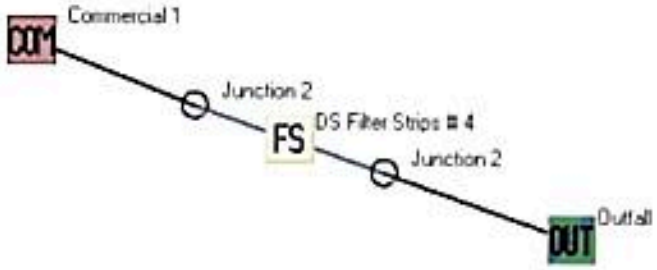
Data file name: F:\Job Files\1639740 Kohler - Golf Course 2016\1639744 Civil\storm water report and calculations\maintenance.mdb
WinSLAMM Version 10.3.2
Rain file name: F:\Programs\civil\WinSLAMM v10.0\Parameter Files\WisReg - Milwaukee WI 1969 RAN
Particulate Solids Concentration file name: C:\WinSLAMM 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_GE003.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: 01/01/69 Study period ending date: 12/31/69
Start of Winter Season: 12/06 End of Winter Season: 03/28
Date: 12-19-2017 Time: 15:30:11
Site information:

LU# 1 - Commercial: Commercial 2 Total area (ac): 1.600
1 - Roofs 1: 0.163 ac. Pitched Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
13 - Paved Parking 1: 1.127 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

45 - Large Landscaped Areas 1 0 310 ac Normal Sandy Source Area PSD File C:\WinSLAMM Files\NURP.cpz

Control Practice 1 Biofilter CP# 1 (DS) - DS Biofilters # 1
1 Top area (square feet) = 6300
2 Bottom aea (square feet) = 2658
3 Depth (ft) 2 75
4 Biofilter width (ft) - for Cost Purposes Only 25
5 Infiltration rate (in/hr) = 15 4
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 11 95
12 Engineered soil depth (ft) = 1
13 Engineered soil porosity = 0 1
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
Sands 0 900
Loamy Sands 0 100
Infiltration rate (in/hr) = 11 95
Biofilter Outlet Discharge Characteristics
Outlet type Broad Crested Weir
1. Weir crest length (ft) 10
2. Weir crest width (ft) 10
3. Height of datum to bottom of weir opening 2 5

Parking Area



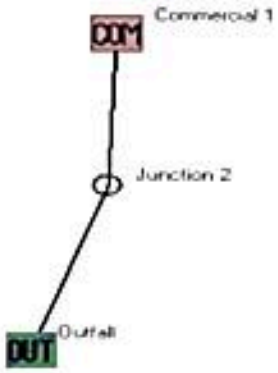
Data file name F:\Job Files\1639740 Kohler -Golf Course 2016\1639744 Civil\storm water report and calculations\parking-area.mdb
WinSLAMM Version 10 3 2
Rain file name F:\Programs\civil\WinSLAMM v10 0\Parameter Files\WesReg - Milwaukee WI 1969 RAN
Particulate Solids Concentration file name C:\WinSLAMM 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: 12-19-2017 Time: 15:32:51
Site information:

LU# 1 - Commercial: Commercial 1 Total area (ac): 0.016
13 - Paved Parking 1: 0.016 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)= 0.016
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)= 13.100
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 Drive



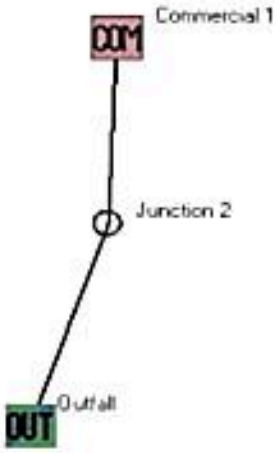
Data file name: F:\Job Files\1639740 Kohler - Golf Course 2016\1639744 Civil\storm water report and calculations\24FTroad-area.mdb
WinSLAMM Version 10.3.2
Rain file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WisReg - Milwaukee WI 1969 RAN
Particulate Solids Concentration file name: C:\WinSLAMM 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: 12-19-2017 Time: 15:35:05
Site information:

LU# 1 - Commercial: Commercial 1 Total area (ac): 0.010
13 - Paved Parking 1: 0.010 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)= 0.010
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)= 13.100
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 Paths



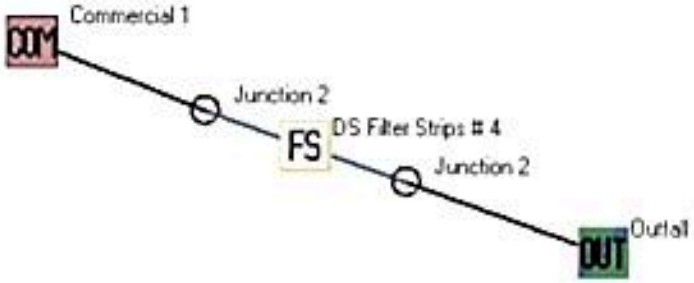
Data file name: F:\Job Files\1639740 Kohler - Golf Course 2016\1639744 Civil\storm water report and calculations\Cart-path.mdb
WinSLAMM Version 10.3.2
Rain file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WisReg - Milwaukee WI 1969.RAN
Particulate Solids Concentration file name: C:\WinSLAMM 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: 12-19-2017 Time: 15:36:48
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)= 13.100
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



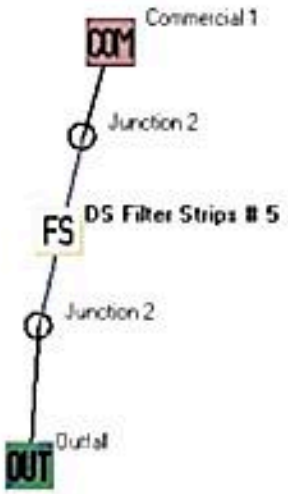
Data file name: F:\Job Files\1639740 Kohler - Golf Course 2016\1639744 Civil storm water report and calculations\Cart Barn.mdb
WinSLAMM Version 10.3.2
Rain file name: F:\Programs\civil\WinSLAMM\v10.0\Parameter Files\WisReg - Milwaukee WI 1969.RAN
Particulate Solids Concentration file name: C:\WinSLAMM 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: 12-19-2017 Time: 15:38:44
Site information:

LU# 1 - Commercial: Commercial 1 Total area (ac): 0.170
1 - Roofs 1: 0.090 ac. Pitched Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
13 - Paved Parking 1: 0.080 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)= 0.170
Fraction of drainage area served by filter strips (ac) = 1.00
Total filter strip width (ft) = 150.0
Effective flow length (ft) = 12
Infiltration rate (in/hr)= 13.100
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

Fairway



Data file name: F:\Job Files\1639744 Kohler - Town of Wilson Golf Course 2016\1639744 Civil\storm water report and calculations\FAIRWAY.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.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: 12-19-2017 Time: 15:40:09
Site information

LU# 1 - Commercial: Commercial 1 Total area (ac): 0.007
71 - Other Pervious Areas 1: 0.007 ac Moderately Compacted 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)= 0.007
Fraction of drainage area served by filter strips (ac.) = 1.00
Total filter strip width (ft) = 2.0
Effective flow length (ft) = 11
Infiltration rate (in/hr.)= 13.100
Typical longitudinal slope (ft H/ft V) = 0.020
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

Appendix O
Groundwater Exhibit:

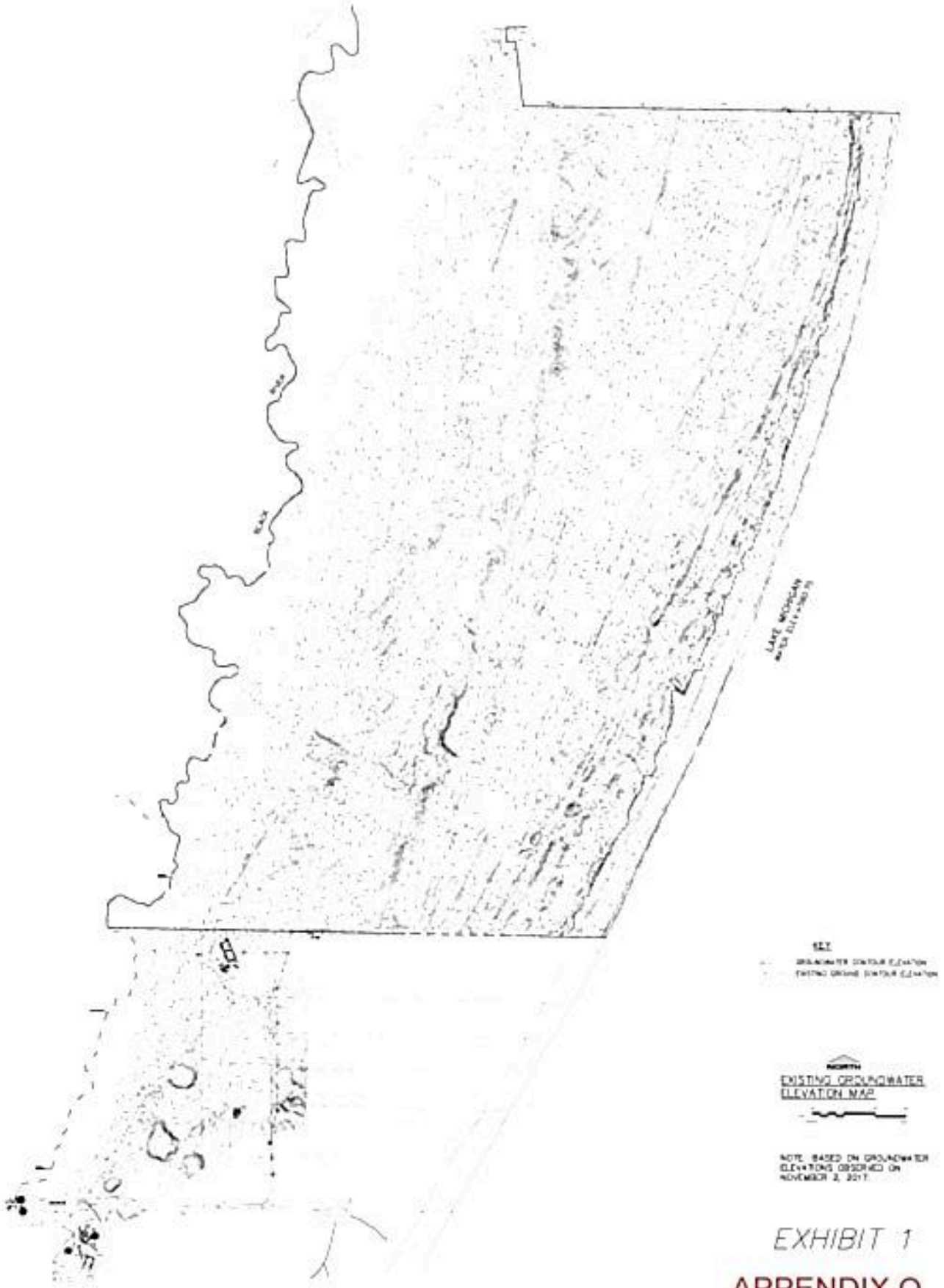


EXHIBIT 1

APPENDIX O