

WORK PLAN

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Baker Park Course Leachate Study

Medina, Minnesota

I. Introduction

Historically, a wide variety of pesticides and fertilizers have been applied to golf courses in order to maintain high-quality turf on greens and fairways. Because of the perceived heavy use of these chemicals, golf courses have been implicated as a significant source of contaminants entering surface and groundwater. The location of many golf courses adjacent to waterbodies has exacerbated this problem by making lakes and streams the direct receiving body of golf course runoff. Any deterioration in water quality is at least partially blamed on the golf course. Unfortunately, accurate data regarding the type and quantity of contaminants in golf course runoff water is generally not available.

In order to assess the impact of golf courses on water resources, Hennepin Parks, the Minnesota Golf Course Superintendents Association and the Hurdzan Design Group are funding a study project with the following objectives.

1. Determine the quantity and quality of subsurface runoff from a golf course green.
2. Determine a suitable treatment system to remove contaminants from golf course green leachate water.
3. Inform golf course operators and the public of the project results.

II. Study Site

The Baker Golf Course is located within Baker Park Reserve, approximately 20 miles west of Minneapolis. Baker Park Reserve is one of seven reserves managed by the Suburban Hennepin Regional Park District. The golf course contains numerous wetlands and is adjacent to Spurzem Lake. During the renovation of the golf course in 1989, an underdrain tile system was installed in the green on the 7th hole. Leachate from the green is collected by the underdrain system and discharged into an adjacent manhole. The manhole was constructed to allow for the installation of flow monitoring and sampling equipment on the inflow and outflow pipes (Figure 1).

Leachate flow from the green will be monitored continuously during rainfall events and while irrigation of the green is occurring. Water quality samples will be collected from the underdrain system during four rainfall events and three irrigation events in 1990.



Samples will be collected during rainstorms occurring after the application of pesticides and/or fertilizer to the green. A normal schedule of pesticide and fertilizer application will be maintained during the study period. In the event that the current drought extends into 1990, the irrigation system will be used to simulate natural rainfall events for sample collection purposes.

The water samples will be analyzed for all pesticides and fertilizers which are currently being used on the golf course greens. A partial list of these products is shown in Table 1 below:

Table 1

Trade Name	Generic Pesticide Name/ Active Ingredient
BAYLETON 25	Triazole
3336-F	Thioallophante Ethyl
FUNGO 50	Thiophanate-Methyl
TERSAN SP	Chloroneb
BANOL	Propamocarb hydrochloride
TERSAN 1991	Benomyl
OFTANOL 2	Isofenphos
SUBDUE 2E	Metalaxyl
DACTHAL W-75	Chlorothal
DACONIL 2787	Chlorothalonil

(Continued on Page 7)

BAKER PARK—

(Continued from Page 6)

CHIPCO 26019	Iprodione
TERRACLOR	Pentachloronitrobenzene
RUBIGAN	Fenarimol
SPOTTRETE	Thiram
DYRENE	Anilazine
Inert ingredient	Xylene
CALO-CLOR	Mercury
CADMIUM CHLORIDE	Cadmium
PAR Ex	Phosphorus
PAR Ex	Nitrogen

The product list may be expanded to include new chemicals which will replace those currently being used.

The monitoring of one season of runoff will provide data on the types and quantities of chemicals leaching from the green. A suitable treatment system can then be designed to remove the contaminants detected in the runoff water. However, the project funding and proposed work schedule will involve only the collection of runoff data during 1990.

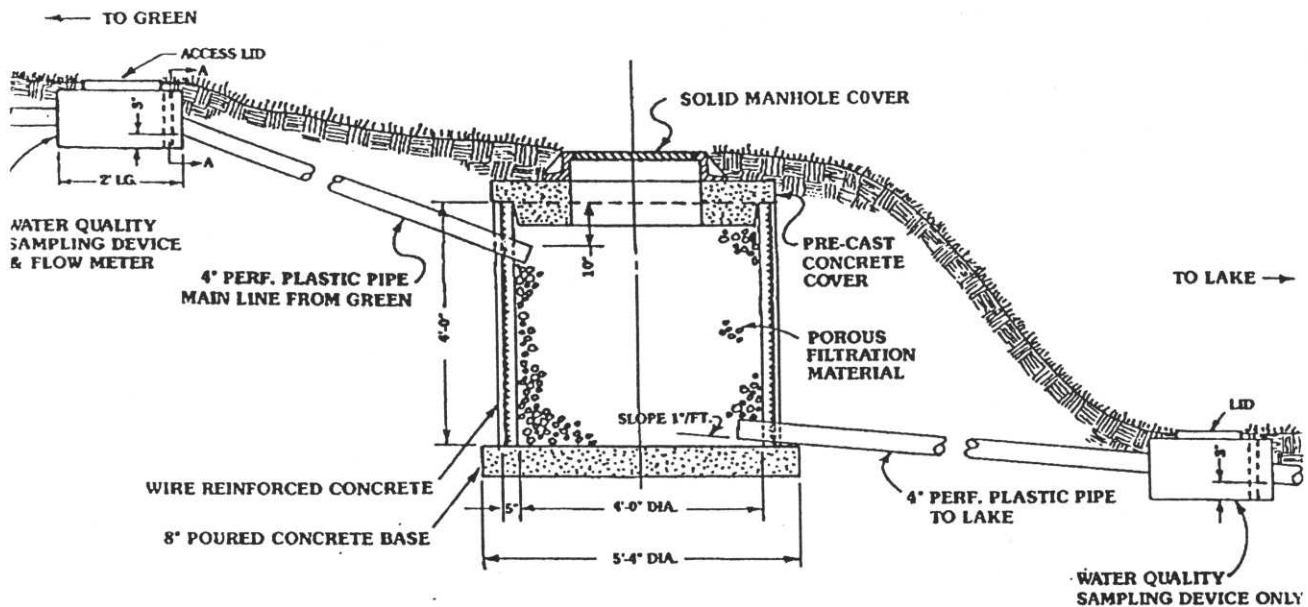
III Work Schedule

Task	Completion Date
1. Purchase sampling equipment	
- Select equipment type	November 1989
- Prepare bids	December 1989
- Select supplier	January 1990

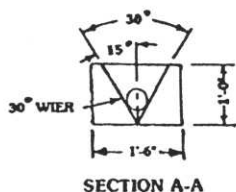
2. Select analytical laboratory	
- Prepare RFP	January 1990
- Prepare contract documents	March 1990
3. Install sampling equipment	
- Construct weirs in flow lines	April 1990
- Construct sampler housing units	April 1990
- Calibrate flow meter	April 1990
4. Collect flow data	
- Recalibrate meter as necessary	May-August 1990
- Monitor meter operation	May-August 1990
5. Collect water quality data	
- Activate sampler for rainfall and irrigation events	May-August 1990
- Transport samples to laboratory	May-August 1990
6. Analyze data	
- Calculate total runoff from green	September 1990
- Calculate quantity of contaminants lost from green	September 1990
7. Prepare report	
- Send draft report out for review and comment	October 1990
- Final report to Association of Golf Course Supervisors	November 1990

All project tasks, except laboratory analysis, will be completed by Henepin Parks staff. Design of the underdrain system and the manhole was done by Hurdzan Design Group.

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(SECTIONAL VIEW)



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(Continued from Page 7)

Project Costs

The approximate costs for the proposed monitoring program are as follows:

Flow meter	\$1,200
Automatic sampler	3,000
Sample analysis (Laboratory)	4,025
*Sample collection (75 hrs)	1,500
Data analysis (25 hrs)	500
Report preparation (25 hrs)	500
	<hr/>
	\$10,725

*Sample collection includes installation and maintenance of sample equipment and transport of samples to a laboratory.

The sample collection, data analysis and report preparation costs will consist of in-kind services provided by Hennepin Parks. A report detailing the study results will be prepared and presented to the Minnesota Golf Course Superintendents Association at the conclusion of the sampling season. Hennepin Parks in cooperation with the Hurdzan Design Group will design a treatment system to remove contaminants defected in the runoff water. This phase of the project will occur during the winter of 1990-1991.

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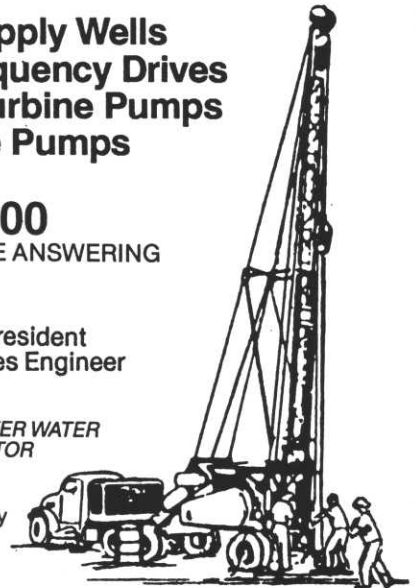
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