



8-17-11
Village of Menomonee Falls
W156 N8480 Pilgrim Road
Menomonee Falls, WI 53051-3140
Telephone: (262) 532-4200

STORMWATER MANAGEMENT FACILITIES OPERATION AND INSPECTION REPORT

Quarter Section SW 1/4 Sec 12 Name of Business/Subdivision Woodmoor Condominiums
Property Tax ID Number 0047967001 - Address of Property N82W13370 Fond du Lac
Menomonee Falls, WI 53057
0047967022

Dry Pond		Description: <u>Pond #1</u> <u>SWP 125 002</u>	Location Of Pond	<u>Rear lot</u> <u>Behind Building #3</u>
Wet Pond	X			
Other				

Year Pond Constructed 2004

Year of Last Certification 2004

Compliance Verification	Design	Actual	Compliant Yes	No	Comments (Condition of Structure)
Primary Outlet Pipe					
Opening Diameter	4"	4"	✓		
Upstream Invert	77800	777.93	✓		
Downstream Invert	777.70	777.73	✓		
Length	20	22'	✓		
Slope	0.0150%	0.0091%	✓		
Secondary Outlet Pipe (If Applicable)					
Opening Diameter					
Upstream Invert					
Downstream Invert					
Length					
Slope					
Riser (If Applicable)					
Opening Diameter	12"	12"	✓		
Elevation	780.5	780.43	✓		
Upper Discharge Control (If Applicable)					
Opening Diameter					
Elevation					

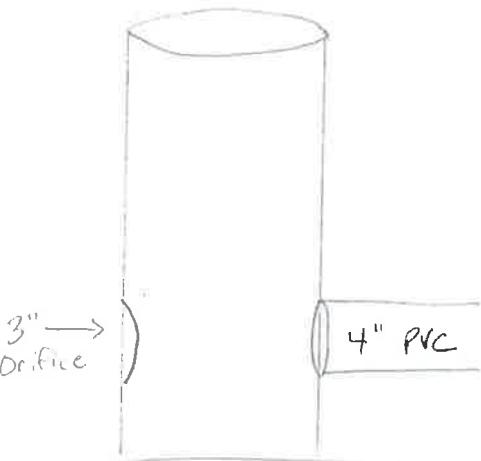
Compliance Verification	Design	Actual	Compliant Yes No	Comments
Lower Discharge Control	(If Applicable)			
Opening Diameter				
Elevation				
Other (Description)				
Opening Type	3" orifice	3" orifice	✓	
Elevation	778.00	778.04	✓	
Emergency Spillway				
Elevation	783.00	782.5	✓	
Length of spillway	10	10	✓	
Embankment			Present Yes No	
Unauthorized plantings, trees, or woody vegetation		X		Many small and large trees growing in bottom of pond.
Animal burrows or slope erosion		X		
Storage Properties	Design	Actual	Compliant Yes No	Equipment Used
Normal Water Elevation (Wet Ponds)	778.00	777.7	✓	Leica Total Station
Design High Water Elevation	785.00	785.0	✓	
Area at Normal Water Elevation (Ac) (Wet Ponds)	0.03Ac	0.03Ac	✓	
Area at Design High Water Elevation (Ac)	0.29Ac	0.29Ac	✓	
Active Storage Available (Ac-Ft)*	1.05	1.06	✓	
Lowest Elevation at Top of Embankment (If Applicable)				
Average Elevation at Top of Embankment (If Applicable)				
Maximum Bottom Elevation	776.0	776.0	✓	
Average Pond Bottom Elevation	776.0	776.0	✓	
Pond Bottom Area (Ac)	0.01Ac	0.01Ac	✓	
Maximum Pond Depth	2.0	1.7	✓	
Average Pond Depth	2.0	1.7	✓	

*To Determine Active Storage $V=H/3(A1+A2+(A1xA2)1/2)$

Wet Ponds Use $H = \text{Height of Section}$, $A1 = \text{area at normal water elevation}$, $A2 = \text{area at top section}$

Dry Ponds Use $H = \text{Height of Section}$, $A1 = \text{pond bottom area}$, $A2 = \text{area at top section}$

Sketch Outlet



Inspection Firm:
Phone Number:
Address:

Land Tech Surveying
and Engineering LLC
262-367-7599
P.O. Box 15
Hartland, WI 53024

Inspector Name :
Inspection Date:

John Downing
8/17/11

Certifying
Professional Name:
Phone Number:

Trevorick Bonney
262-255-5845

Date:
8-23-2011

Signature:

Trevorick Bonney





LAND TECH ENGINEERING

Engineering Consulting • Land Planning
557 COTTONWOOD AVE • Hartland, WI 53029 • (262) 367-7599 • FAX (262) 367-6726

Rec 8-17-11

Woodmoor

**METROPOLITAN MILWAUKEE SEWERAGE DISTRICT
STORMWATER MANAGEMENT SUBMITTAL
FOR WOODMOOR APARTMENTS
IN THE VILLAGE OF MENOMONEE FALLS**
February 28, 2004

GENERAL INFORMATION:

1. The attached stormwater management submittal is for the Woodmoor apartment complex located on W. Fond Du Lac Avenue in the Village of Menomonee Falls. The site is 1.81 acres in size and currently has two existing buildings and related pavement on site which will be removed. Some off-site drainage flows onto the site that makes the developed drainage area 1.93 acres.

Soils on the site consist of the following:

OuB – Ozaukee silt loam, Hydrologic Group “C”
GrA – Grays silt loam, hydrologic Group “B”

2. The Village of Menomonee Falls formerly required stormwater management which detained the 100-year, 7.1 inch post-developed rate at the 2-year, 2.6 inch pre-developed rate. The Village now requires compliance with the MMSD standard of 0.5 cfs/acre for the 100-year storm event and 0.15 cfs/acre for the 2-year storm event. For this site, the allowable release rates are 0.29 cfs for the 2-year storm event and 0.97 cfs for the 100-year storm event.
3. Documentation of the Village’s stormwater management approval is enclosed.
4. Erosion and sediment control will follow the guidelines of the Wisconsin Construction Site Best Management Practice Handbook and the requirements of the Village of Menomonee Falls erosion control ordinance.

5. Stormwater management will be addressed through the installation of one permanent stormwater pond in the northeast portion of the site. The pond will function to provide the detention requirements of the MMSD. Computations related to water quality are attached to the stormwater printouts.
6. Construction on the site is proposed to begin in March or April 2004 pending approvals from all regulating agencies. A detailed construction sequence is shown on the erosion control detail sheet.

SITE MAPS AND INFORMATION

The enclosed plan shows the existing topography, structures, roadways, utilities, natural features and drainageways and the proposed grades, parking areas, building sites, utilities and detention area. The soil type boundaries and the location of the site can be viewed on the attached soil and plat maps.

STORMWATER MANAGEMENT FACILITIES

The grading plan shows the location of the stormwater management facility and data related to the functioning of the outfall structure. Design computations and calculations for the pond is included along with a summarized report for the existing and proposed 2-year and 100-year storm events.

A maintenance plan for the stormwater management facilities has yet to be finalized, however, the Village may require a recorded document stating that the complex owner will be responsible for the facility maintenance.



STORMWATER MANAGEMENT SUMMARY

Rainfall Depths for 24-Hour Duration Storm Events

Recurrence Interval (yrs)	Rainfall Depths (in)
100	7.1
50	5.8
10	4.0
2	2.6

Pre-developed CN for existing site with "C" soils using Table 2-2a of TR-55: 82
Total area: 1.96 acres

Pre-developed Peak Discharge Rates (cfs)	
2-year	2.46
10-year	5.12
50-year	8.76
100-year	11.43

The entire site was analyzed as a single hydrograph since the area is quite homogeneous in the existing condition.

Post-developed CN for proposed apartment complex using Figure 2-3 of TR-55 assuming 53% of the site is impervious, the pervious area CN is 74 and 92% of the impervious area is connected: 88

Total Area: 1.93 acres

<u>Post-developed discharges from pond (cfs):</u>					
Pond	2-yr.	10-yr.	50-yr.	100-yr.	
1	0.25	0.64	0.75	0.82	

A small area of undetained runoff occurs in the south corner of the site. Runoff from undetained pervious areas can be excluded from the developed site peak flow requirements. The peak discharges and other relevant data can be viewed on the computer printouts.

The maximum water elevation of the pond during the 100-year storm is as follows:

Pond 1: 782.75 feet

**VILLAGE OF
MENOMONEE FALLS,
VILLAGE OF VILLAGE OF CITY OF
LANNON, BUTLER, MILWAUKEE**

T.8N. - R.20E.

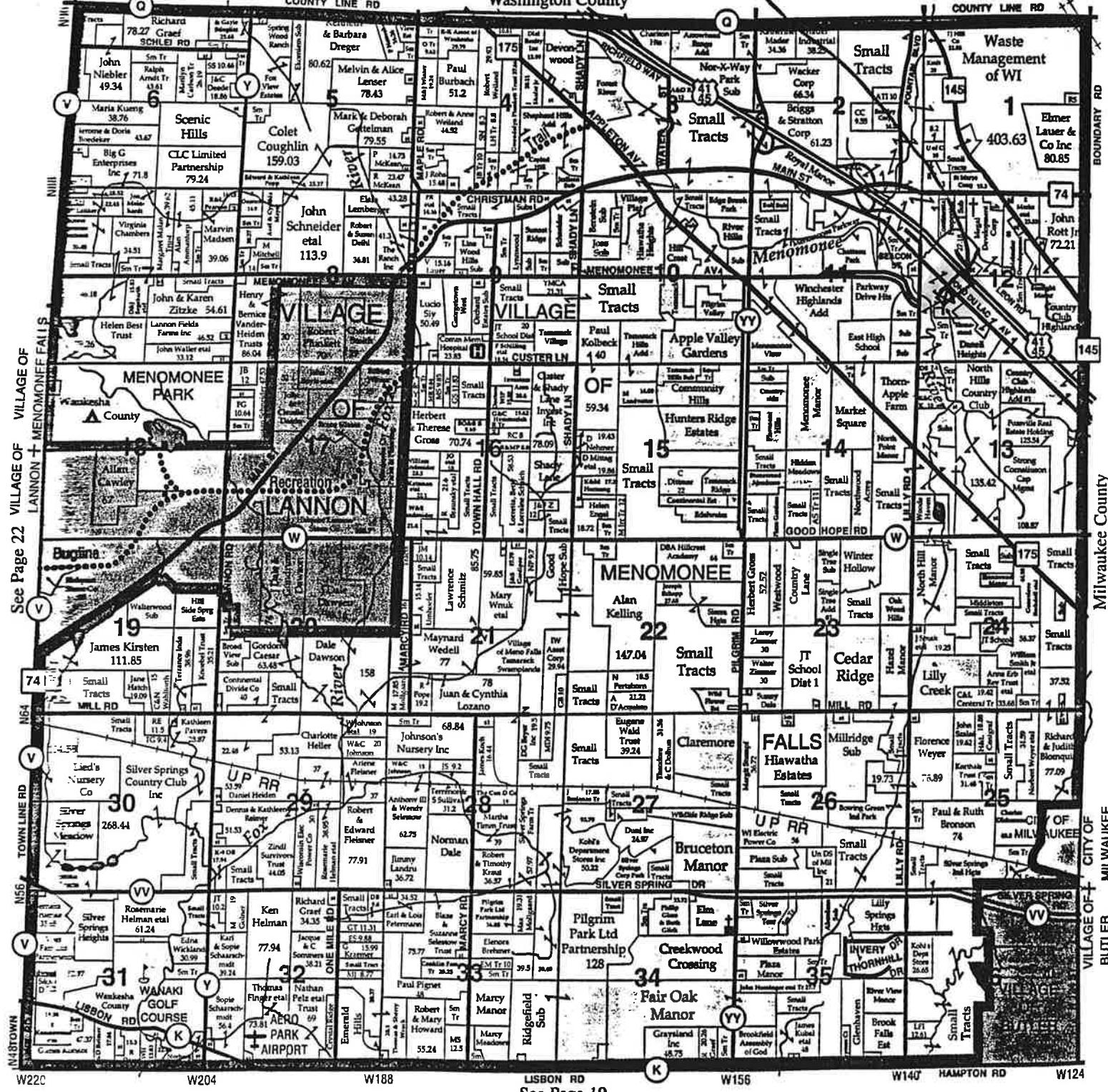


Project Location

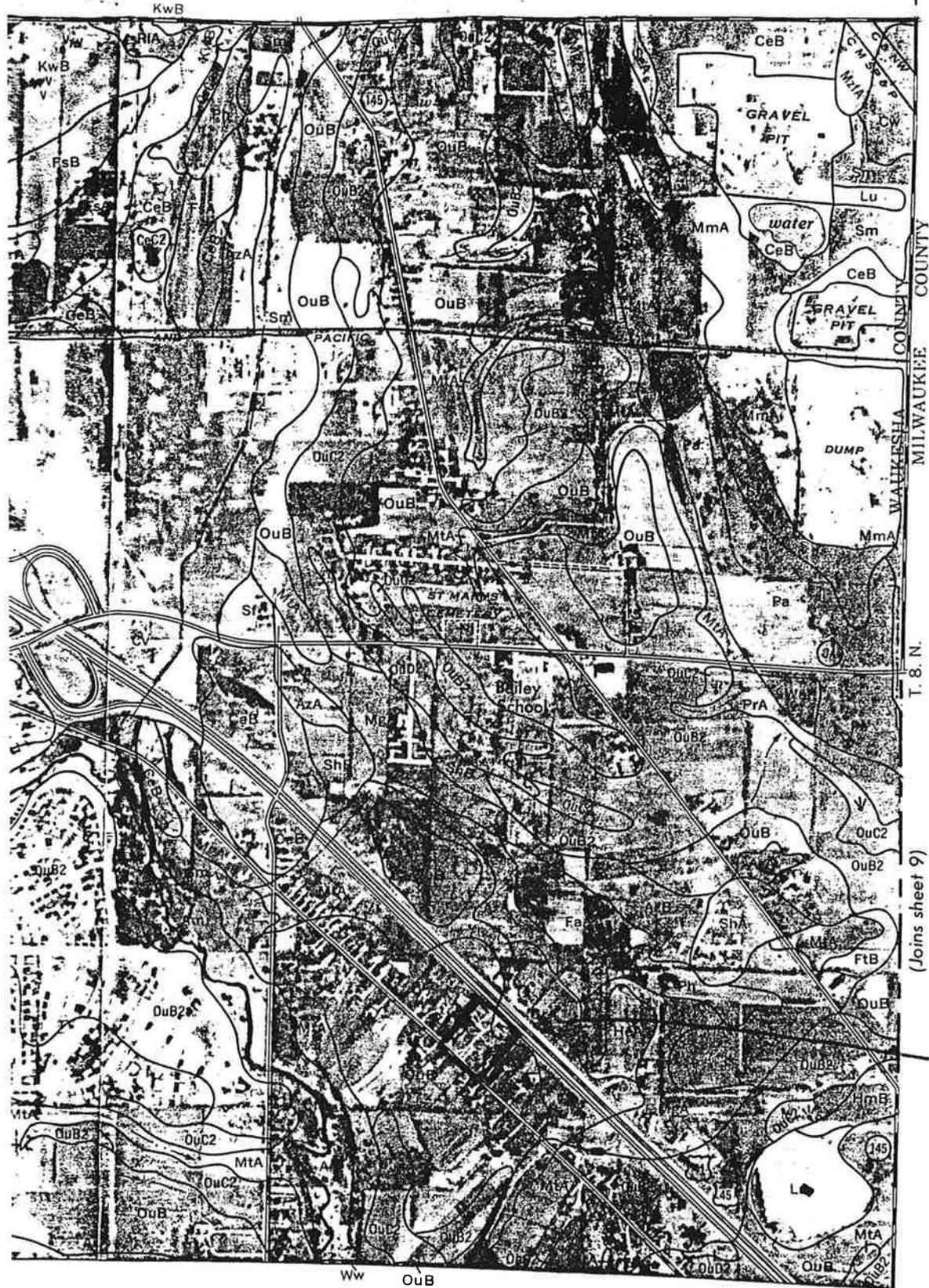
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COUNTY LINE RD

Washington County



LESSON 10



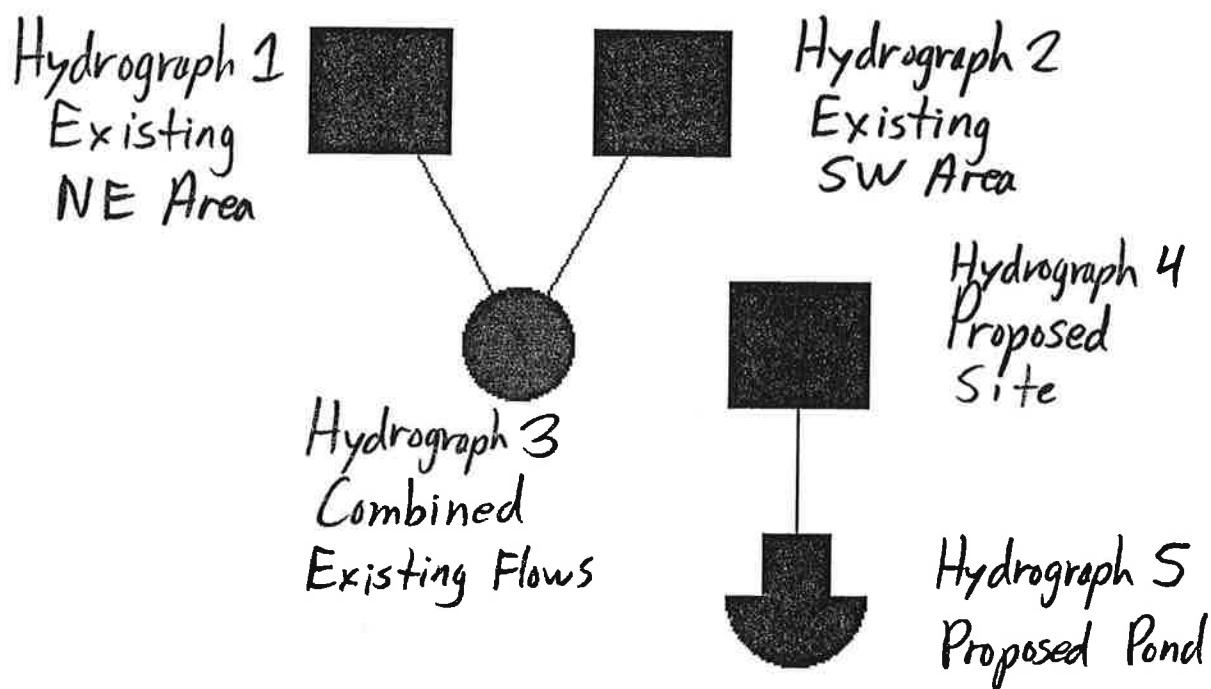
Project Site

1 Mile

5000 Feet

Woodmoor Apartments

Village of Menomonee Falls



TR55 Tc Worksheet

Page 1

Hyd. No. 1

Existing Northeast Area

Storm frequency = 2 yrs

Sheet Flow *A-B*

Manning's n-value = 0.240
Flow length = 180.0 ft
Two-year 24-hr precip. = 2.60 in
Land slope = 4.7 %

Travel Time = 18.0 min

Shallow Concentrated Flow *B-C*

Flow length = 165 ft
Watercourse slope = 1.5 %
Surface description = Unpaved
Average velocity = 1.99 ft/s

Travel Time = 1.4 min

Channel Flow

Cross section flow area = 0.0 sqft
Wetted perimeter = 0.0 ft
Channel slope = 0.0 %
Manning's n-value = 0.015
Velocity = 0.00 ft/s
Flow length = 0.0 ft

Travel Time = min

Total Travel Time, Tc = 19.4 min

Hydrograph Plot

English

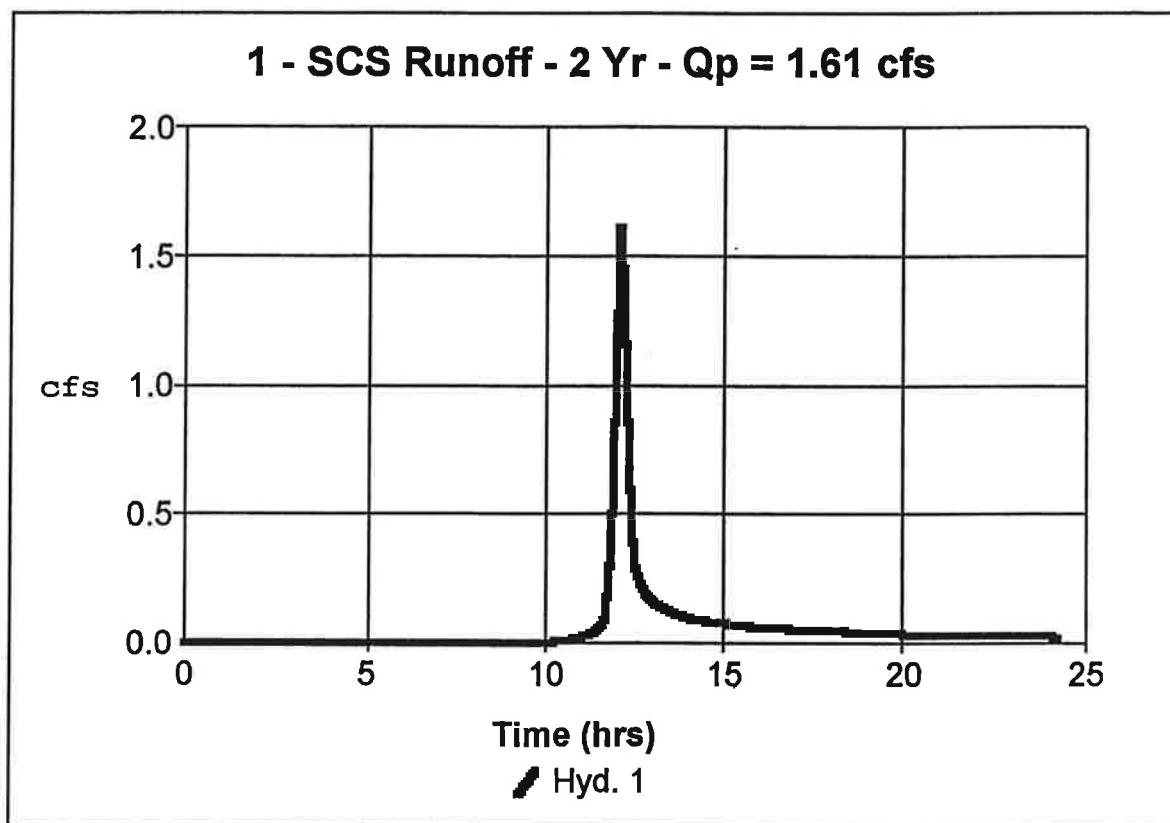
Hyd. No. 1

Existing Northeast Area

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Drainage area = 1.32 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 2.60 in
Storm duration = 24 hrs

Peak discharge = 1.61 cfs
Time interval = 2 min
Curve number = 82
Hydraulic length = 0 ft
Time of conc. (Tc) = 19.4 min
Distribution = Type II
Shape factor = 484

Total Volume = 5,137 cuft



TR55 Tc Worksheet

Page 1

Hyd. No. 2

Existing Southwest Area

Storm frequency = 2 yrs

Sheet Flow $A' - B'$

Manning's n-value = 0.240
Flow length = 133.0 ft
Two-year 24-hr precip. = 2.60 in
Land slope = 3.2 %

Travel Time = 16.6 min

Shallow Concentrated Flow

Flow length = 0 ft
Watercourse slope = 0.0 %
Surface description = Paved
Average velocity = 0.00 ft/s

Travel Time = 0.0 min

Channel Flow

Cross section flow area = 0.0 sqft
Wetted perimeter = 0.0 ft
Channel slope = 0.0 %
Manning's n-value = 0.015
Velocity = 0.00 ft/s
Flow length = 0.0 ft

Travel Time = min

Total Travel Time, Tc = 16.6 min

Hydrograph Plot

English

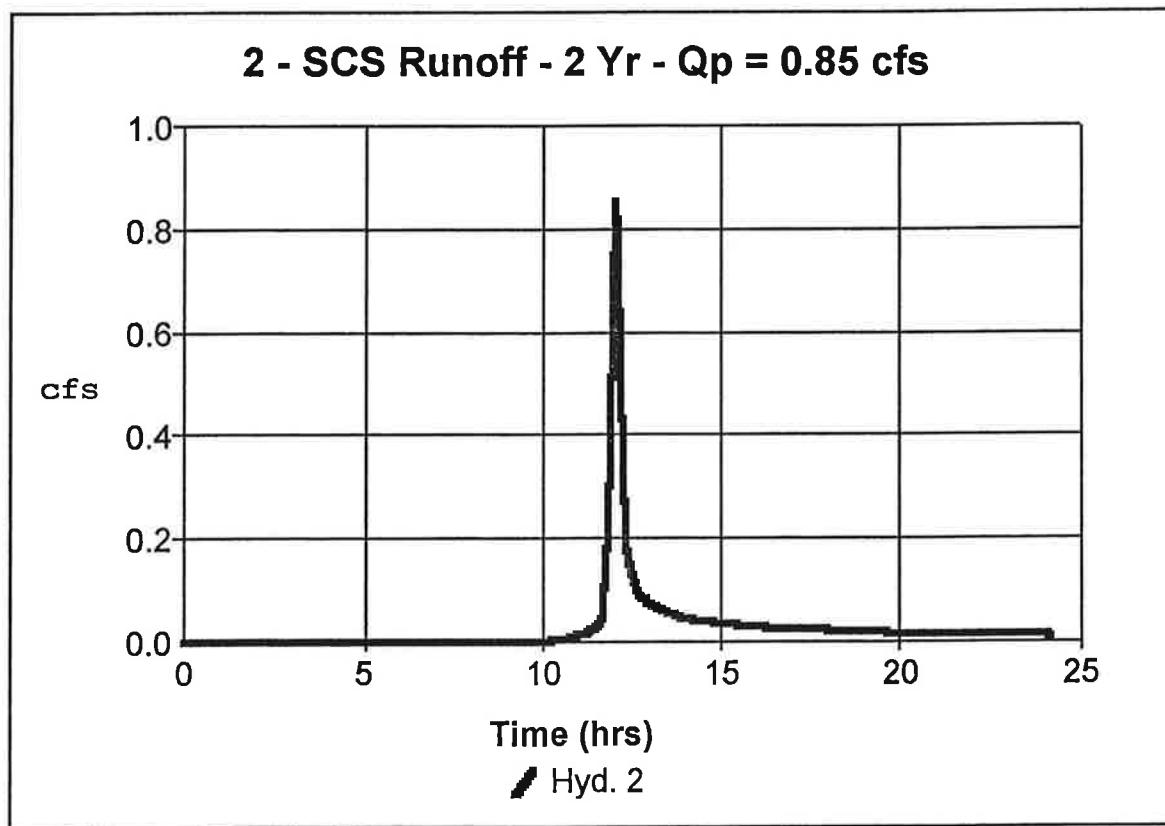
Hyd. No. 2

Existing Southwest Area

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Drainage area = 0.64 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 2.60 in
Storm duration = 24 hrs

Peak discharge = 0.85 cfs
Time interval = 2 min
Curve number = 82
Hydraulic length = 0 ft
Time of conc. (Tc) = 16.6 min
Distribution = Type II
Shape factor = 484

Total Volume = 2,428 cuft



Hydrograph Plot

English

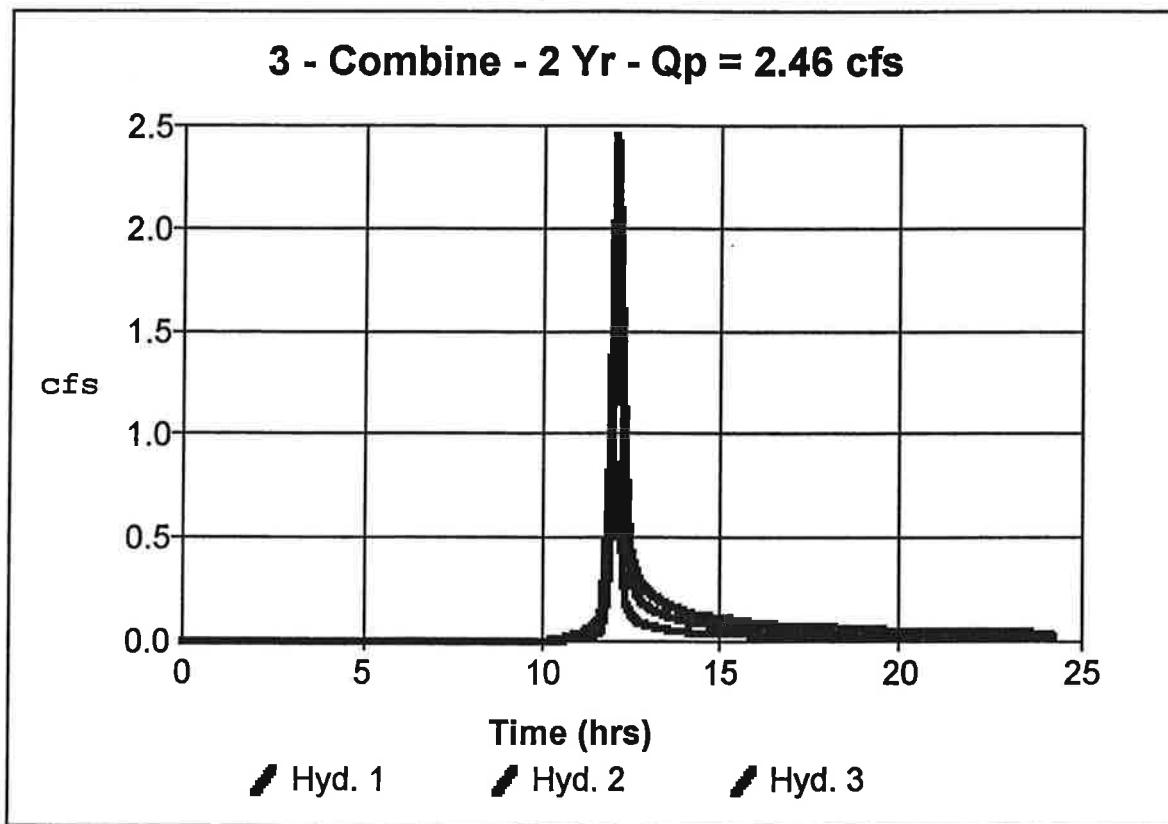
Hyd. No. 3

Combined Existing Flows

Hydrograph type = Combine
Storm frequency = 2 yrs
1st inflow hyd. No. = 1

Peak discharge = 2.46 cfs
Time interval = 2 min
2nd inflow hyd. No. = 2

Total Volume = 7,565 cu ft



TR55 Tc Worksheet

Page 1

Hyd. No. 4

Proposed Site

Storm frequency = 2 yrs

Sheet Flow *A-B*

Manning's n-value = 0.240
Flow length = 20.0 ft
Two-year 24-hr precip. = 2.60 in
Land slope = 1.0 %
Travel Time = 5.8 min

Shallow Concentrated Flow *B-C*

Flow length = 260 ft
Watercourse slope = 0.9 %
Surface description = Paved
Average velocity = 1.90 ft/s
Travel Time = 2.3 min

Channel Flow *C-D*

Cross section flow area = 1.2 sqft
Wetted perimeter = 3.9 ft
Channel slope = 0.8 %
Manning's n-value = 0.011
Velocity = 5.50 ft/s
Flow length = 200.0 ft
Travel Time = 0.6 min

Total Travel Time, Tc = 8.7 min

Hydrograph Plot

English

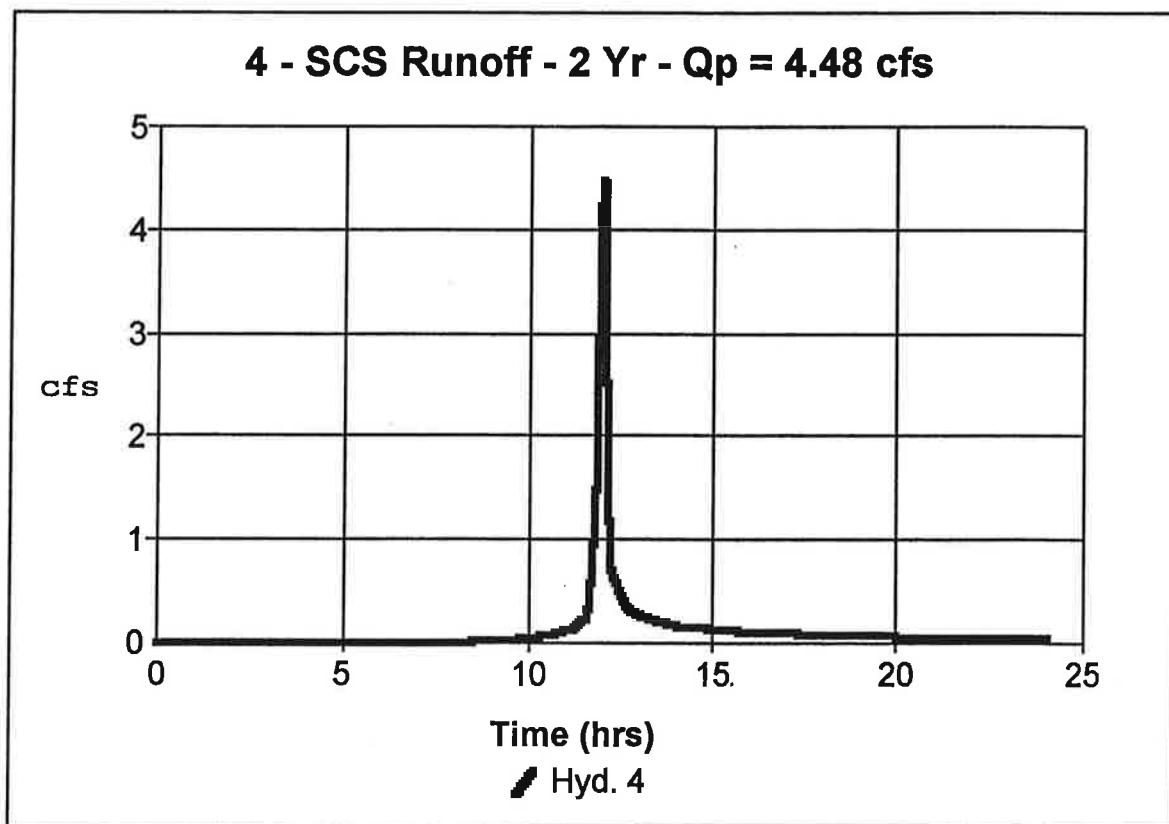
Hyd. No. 4

Proposed Site

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Drainage area = 1.93 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 2.60 in
Storm duration = 24 hrs

Peak discharge = 4.48 cfs
Time interval = 2 min
Curve number = 88
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.7 min
Distribution = Type II
Shape factor = 484

Total Volume = 10,281 cuft



Hydrograph Plot

English

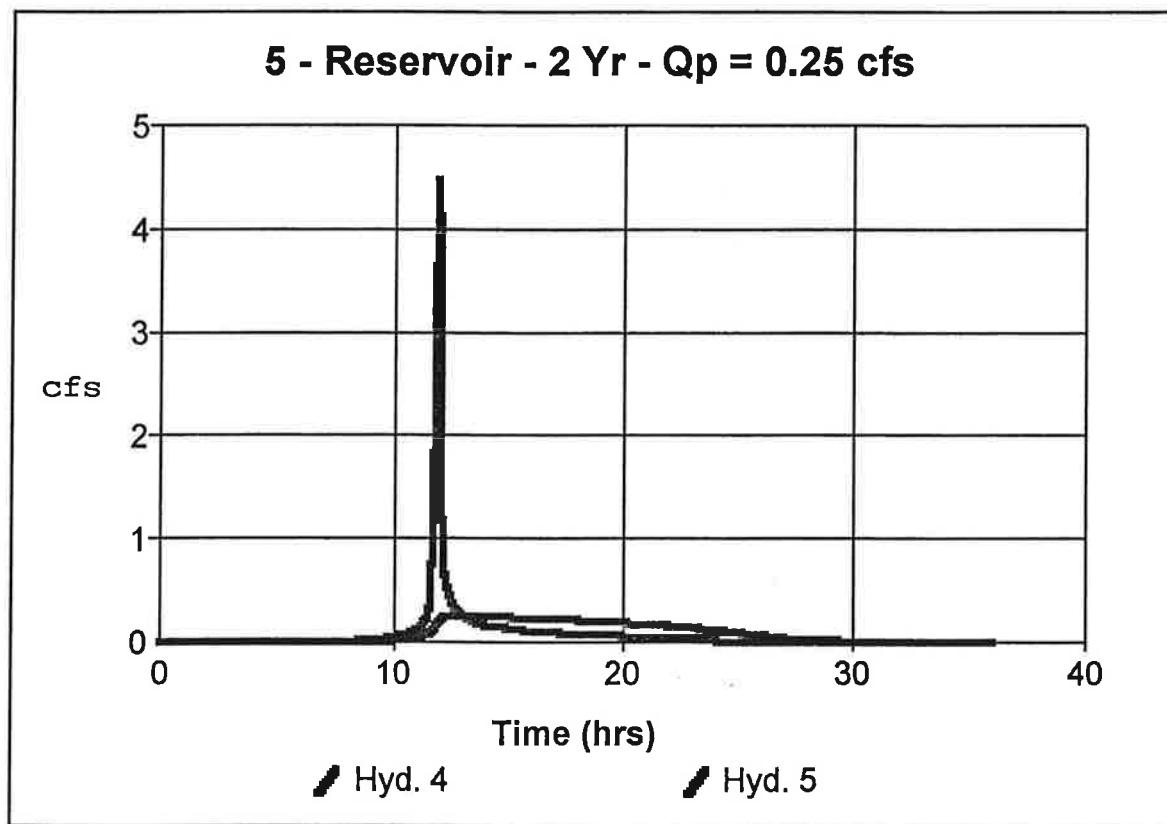
Hyd. No. 5

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Inflow hyd. No. = 4
Max. Elevation = 780.05 ft

Peak discharge = 0.25 cfs
Time interval = 2 min
Reservoir name = Revised Pond
Max. Storage = 5,411 cuft

Storage Indication method used.

Total Volume = 10,280 cuft



Hydrograph Plot

English

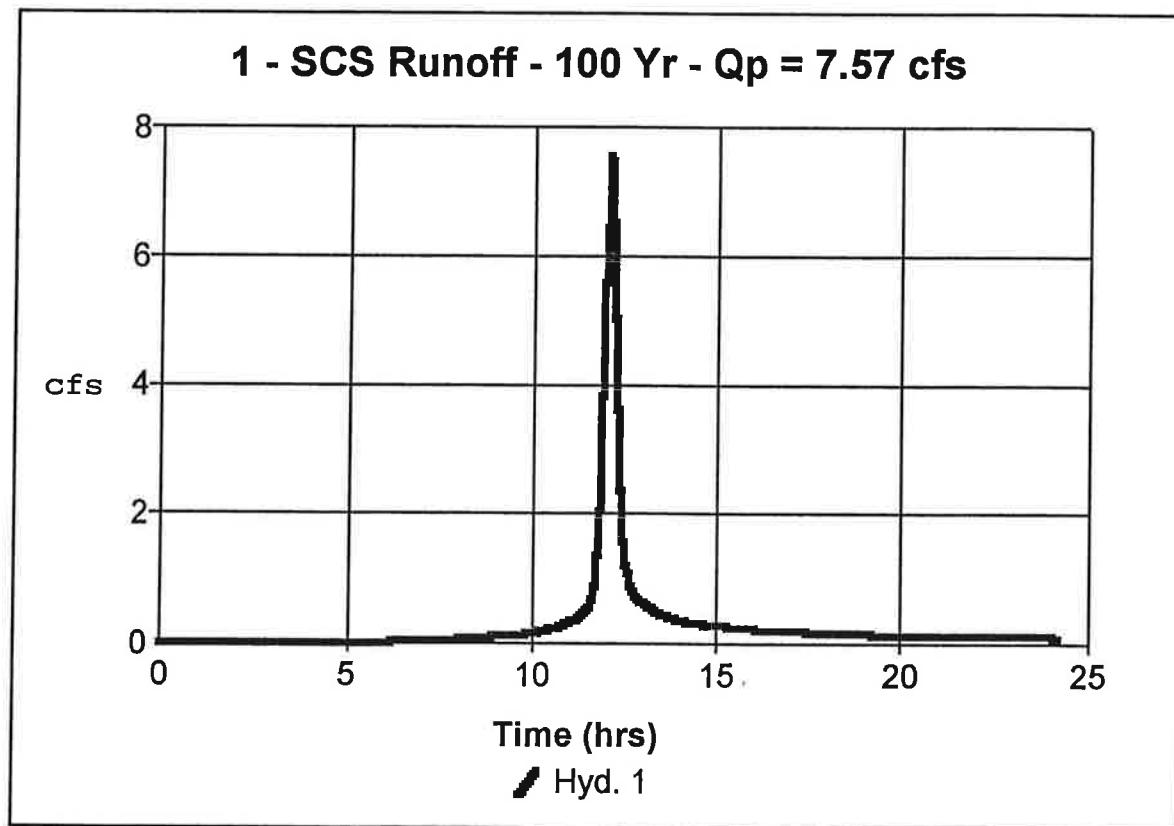
Hyd. No. 1

Existing Northeast Area

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 1.32 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 7.10 in
Storm duration = 24 hrs

Peak discharge = 7.57 cfs
Time interval = 2 min
Curve number = 82
Hydraulic length = 0 ft
Time of conc. (Tc) = 19.4 min
Distribution = Type II
Shape factor = 484

Total Volume = 24,006 cuft



Hydrograph Plot

English

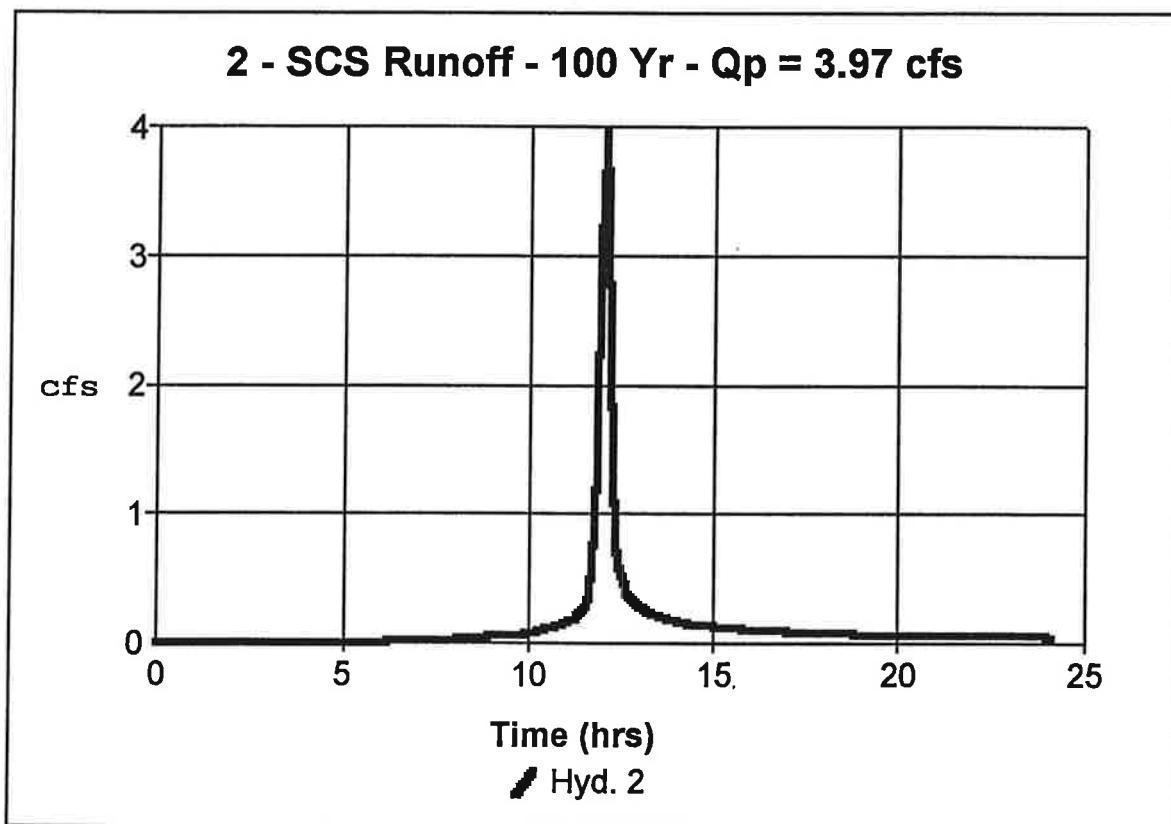
Hyd. No. 2

Existing Southwest Area

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 0.64 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 7.10 in
Storm duration = 24 hrs

Peak discharge = 3.97 cfs
Time interval = 2 min
Curve number = 82
Hydraulic length = 0 ft
Time of conc. (Tc) = 16.6 min
Distribution = Type II
Shape factor = 484

Total Volume = 11,348 cuft



Hydrograph Plot

English

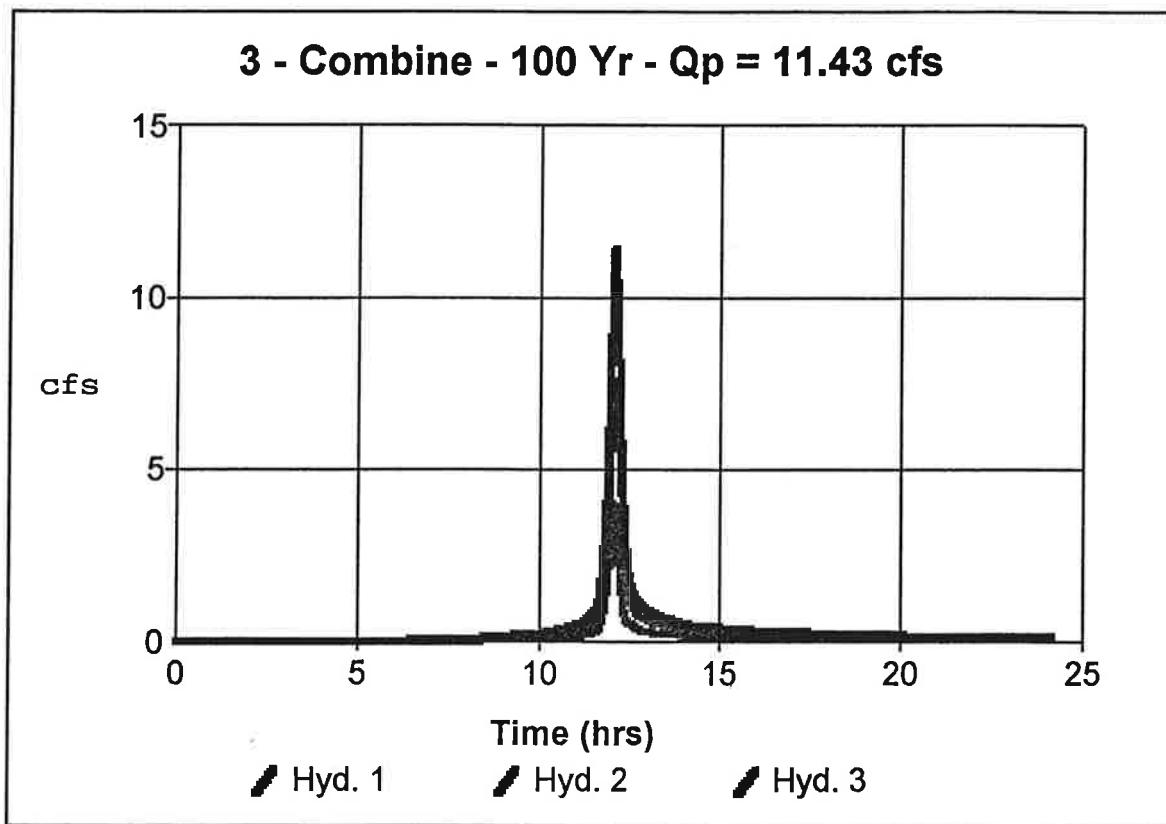
Hyd. No. 3

Combined Existing Flows

Hydrograph type = Combine
Storm frequency = 100 yrs
1st inflow hyd. No. = 1

Peak discharge = 11.43 cfs
Time interval = 2 min
2nd inflow hyd. No. = 2

Total Volume = 35,354 cu ft



Hydrograph Plot

English

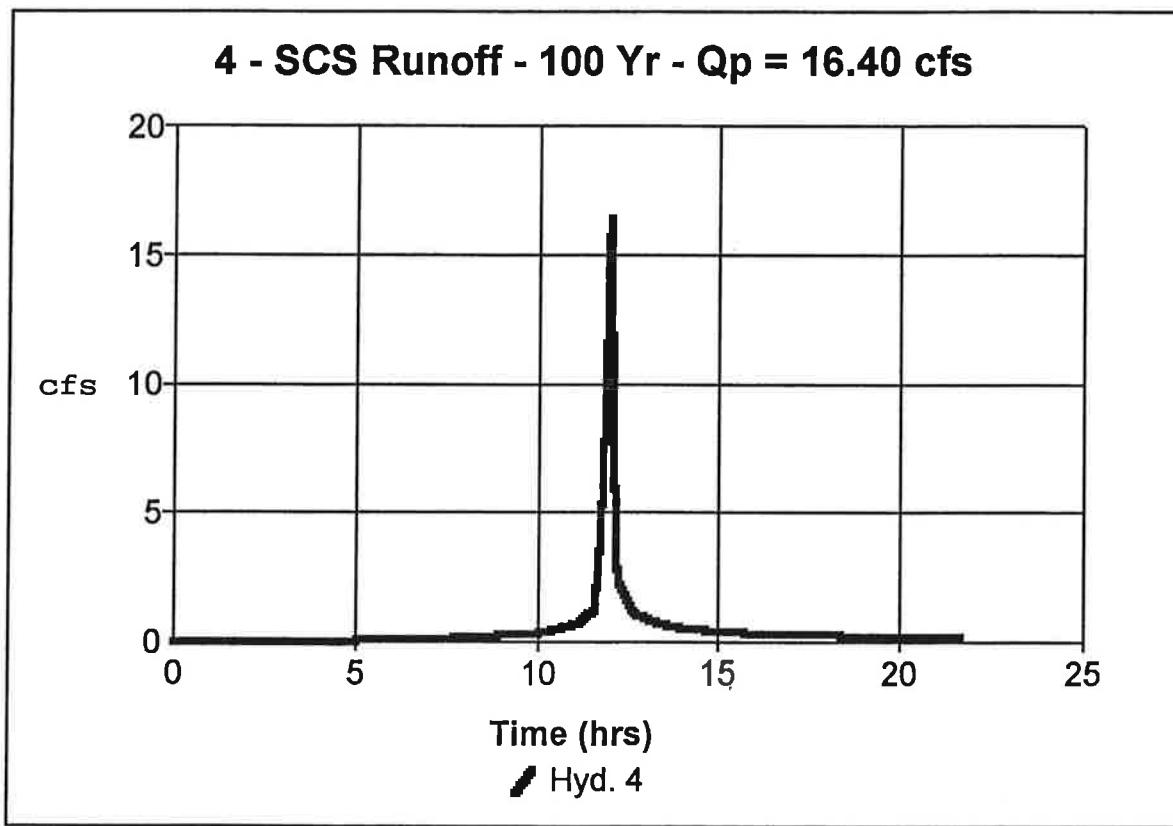
Hyd. No. 4

Proposed Site

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 1.93 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 7.10 in
Storm duration = 24 hrs

Peak discharge = 16.40 cfs
Time interval = 2 min
Curve number = 88
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.7 min
Distribution = Type II
Shape factor = 484

Total Volume = 39,868 cuft



Hydrograph Plot

English

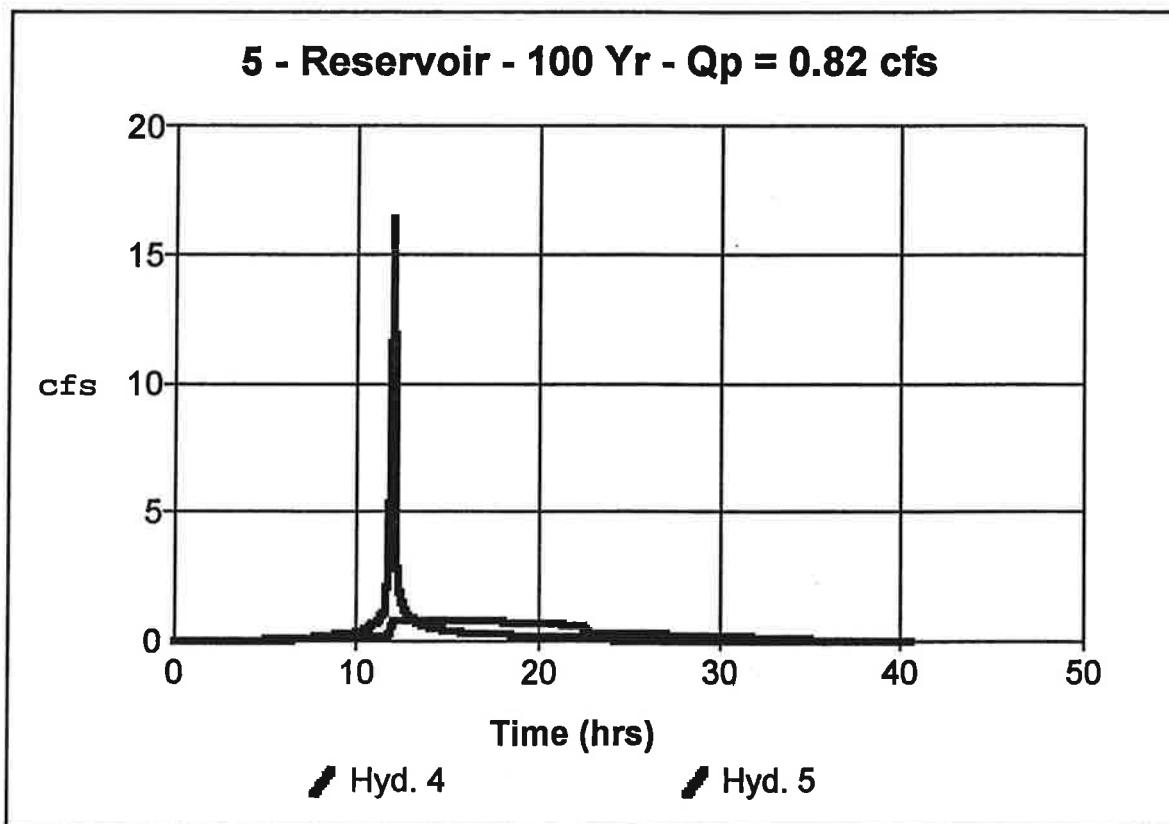
Hyd. No. 5

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Inflow hyd. No. = 4
Max. Elevation = 782.75 ft

Peak discharge = 0.82 cfs
Time interval = 2 min
Reservoir name = Revised Pond
Max. Storage = 22,687 cuft

Storage Indication method used.

Total Volume = 39,864 cuft



Reservoir Report

Page 1

English

Reservoir No. 1 - Revised Pond

Pond Data

Pond storage is based on known contour areas

Stage / Storage Table

Stage ft	Elevation ft	Contour area sqft	Incr. Storage cuft	Total storage cuft
0.00	778.00	1,216	0	0
1.00	779.00	2,420	1,818	1,818
2.00	780.00	4,284	3,352	5,170
3.00	781.00	5,809	5,047	10,217
4.00	782.00	7,216	6,513	16,729
5.00	783.00	8,619	7,918	24,647
6.00	784.00	10,380	9,500	34,146
7.00	785.00	12,780	11,580	45,726

Culvert / Orifice Structures

Weir Structures

	[A]	[B]	[C]	[D]		[A]	[B]	[C]	[D]
Rise in	= 4.0	3.0	0.0	0.0	Crest Len ft	= 10.00	3.14	0.00	0.00
Span in	= 4.0	3.0	0.0	0.0	Crest El. ft	= 783.00	780.50	0.00	0.00
No. Barrels	= 1	1	0	0	Weir Coeff.	= 3.00	3.00	0.00	0.00
Invert El. ft	= 778.00	778.00	0.00	0.00	Eqn. Exp.	= 1.50	1.50	0.00	0.00
Length ft	= 20.0	0.0	0.0	0.0	Multi-Stage	= No	Yes	No	No
Slope %	= 1.25	0.00	0.00	0.00					
N-Value	= .011	.013	.000	.000					
Orif. Coeff.	= 0.60	0.50	0.00	0.00					
Multi-Stage	= -----	Yes	No	No					
					Tailwater Elevation	= 0.00 ft			

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Discharge cfs
0.00	0	778.00	0.00	0.00	---	---	0.00	0.00	---	---	0.00
1.00	1,818	779.00	0.36	0.16	---	---	0.00	0.00	---	---	0.16
2.00	5,170	780.00	0.52	0.24	---	---	0.00	0.00	---	---	0.24
3.00	10,217	781.00	0.65	0.00	---	---	0.00	3.33	---	---	0.65
4.00	16,729	782.00	0.75	0.00	---	---	0.00	17.31	---	---	0.75
5.00	24,647	783.00	0.84	0.00	---	---	0.00	37.24	---	---	0.84
6.00	34,146	784.00	0.92	0.00	---	---	30.00	61.68	---	---	30.92
7.00	45,726	785.00	1.00	0.00	---	---	84.85	89.92	---	---	85.85

*Downspout
& Storm Sewer
Cumps*

WOODMOOR

EAST BUILDING

1. EAST 1/2
 $A_1 = 4,116 \text{ S.F.}$ 6" PIPE 1/8" PITCH

A_1 PROP. FLOW = 158 GPM A_1 DESIGN FLOW (MAX)=230GPM

2. WEST 1/2
 $A_2 = 4,116 \text{ S.F.}$ 6" PIPE 1/8" PITCH

A_2 PROP. FLOW = 158 GPM A_2 DESIGN FLOW (MAX) = 230 GPM

WEST BUILDING

3. EAST 1/2
 $A_3 = 4,116 \text{ S.F.}$ 6" PIPE 1/8" PITCH

A_3 PROP. FLOW = 158 GPM A_3 DESIGN FLOW = 230 GPM

4. WEST 1/2
 $A_4 = 4,116 \text{ S.F.}$ 6" PIPE 1/8" PITCH

A_4 PROP. FLOW = 158 GPM A_4 DESIGN FLOW = 230 GPM

NORTH BUILDING

5. SOUTH 1/2
 $A_5 = 2,940 \text{ S.F.}$ 4" PIPE 1/4" PITCH

A_5 PROP FLOW = 113 GPM A_5 DESIGN FLOW = 115 GPM

6. $A_6 = 41,150 \text{ S.F.}$ 15" PIPE (INLET#3-MH# 2) 1/8" PITCH

PROPOSED S.F.
ASPH = 21,750 S.F.
BLDG = 19,400 S.F.
 A_6 PROP TOTAL = 41,150 S.F.
 A_6 PROP FLOW = 1,415 GPM

DESIGN S.F.
ASPH = 48,098 S.F.
BLDG = 34,322 S.F.
 A_6 DESIGN TOTAL = 82,420 S.F.
 A_6 DESIGN FLOW = 2,800 GPM

7. $A_7 = 41,150$ S.F. 15" PIPE (MH#2-OUTFALL#1) 1/8" PITCH

PROPOSED S.F.

BLDG = 19,400 S.F.
ASPH = 21,750 S.F.
 A_7 PROP TOTAL = 41,150 S.F.
 A_7 PROP FLOW = 1,415 GPM

DESIGN S.F.

BLDG = 34,322 S.F.
ASPH = 48,098 S.F.
 A_7 DESIGN TOTAL = 82,420 S.F.
 A_7 DESIGN FLOW = 2,800 GPM



Village of Menomonee Falls
W156 N8480 Pilgrim Road
Menomonee Falls, WI 53051-3140
Telephone: (262) 532-4200 Fax: (262) 532-4219

May 4, 2004

Mr. Donald Nehmer
Capital Program Business Manager
Milwaukee Metropolitan Sewerage District
260 West Seetho St.
Milwaukee, WI 53204-1446

RE: Storm Water Management Plan for Woodmoor LLC

Dear Mr. Nehmer:

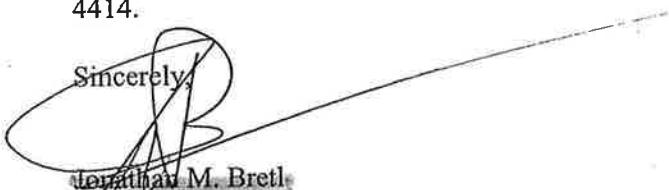
We are submitting, for your approval, plans under the seal of Daniel H. Knowlton; Land Tech Engineering, Inc.; 557 Cottonwood Ave.; Hartland, WI 53029 (262) 367-7599 for storm water management plans in accordance with MMSD requirements. The plans have been reviewed by the Village of Menomonee Falls Engineering Department and meet the release rates required by the MMSD Chapter 13 Guidelines. The type of method used in the computation of the stormwater plan is the Simple Unit Release Rate.

The site consists of approximately 1.9 acres of residential land located in the SW Quarter of Section 12, Town 8 North, Range 20 East, in the Village of Menomonee Falls.

Enclosed with this submittal are the following:

- 1 (one) COPY OF GRADING, STORM AND EROSION CONTROL PLAN
- 1 (one) COPY OF THE STORM WATER MANAGEMENT PLAN
- 1 (one) DRAFT OF THE STORM WATER MAINTENANCE AGREEMENT

If you have any questions in this matter, or require additional information, please contact us at 1-262-532-4414.

Sincerely,

Jonathan M. Bretl
Civil Engineer I

cc: Arlyn Johnson, Director of Engineering Services
Jeff Nettesheim, Senior Utility Engineer
Tom Hoffman, Senior Civil Engineer
Dan Knowlton, Land Tech Engineering