



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 Ford du Lac
0047967022 Menomonee Falls, WI 53057

Dry Pond	
Wet Pond	<input checked="" type="checkbox"/>
Other	

Description: Pond #1
SWP 125 002

Location Of Pond Rear lot
Behind Building #3

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	778.00	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				

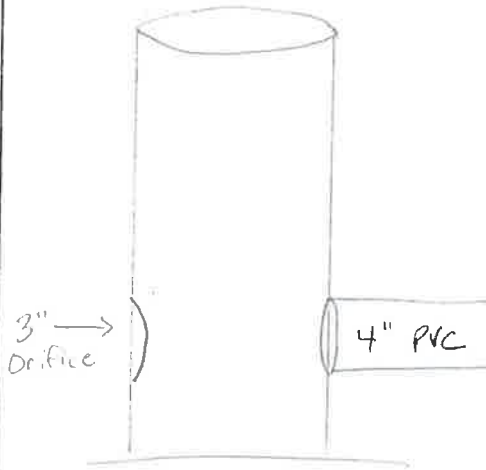
Compliance Verification	Design	Actual	Compliant Yes No		Comments	
Lower Discharge Control	(If Applicable)					
Opening Diameter						
Elevation						
Other (Description)						
Opening Type	3" orifice	3" orifice	✓			
Elevation	778.00	778.04	✓			
Emergency Spillway						
Elevation	783.00	782.5	✓			
Length 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		Points Surveyed	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 $V = H/3(A1 + A2 + (A1 \times A2)^{1/2})$

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

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

Sketch Outlet



Inspection Firm: Land Tech Surveying
and Engineering LLC
Phone Number: 242-367-7599
Address: P.O. Box 15
Hartland, WI 53029

Inspector Name : John Downing
Inspection Date: 8/17/11

Certifying
Professional Name: Frederick Bonney
Phone Number: 262-255-5845



Date: 8-23-2011

Signature: Frederick Bonney

Affix Seal Here



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.

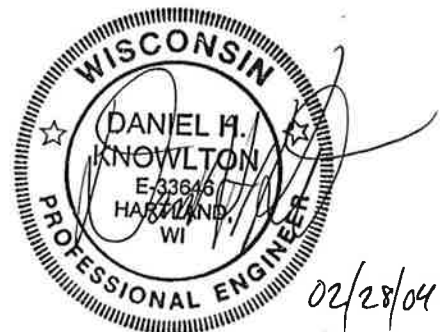
SITE MAPS AND INFORMATION

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

Post-developed discharges from pond (cfs):

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.

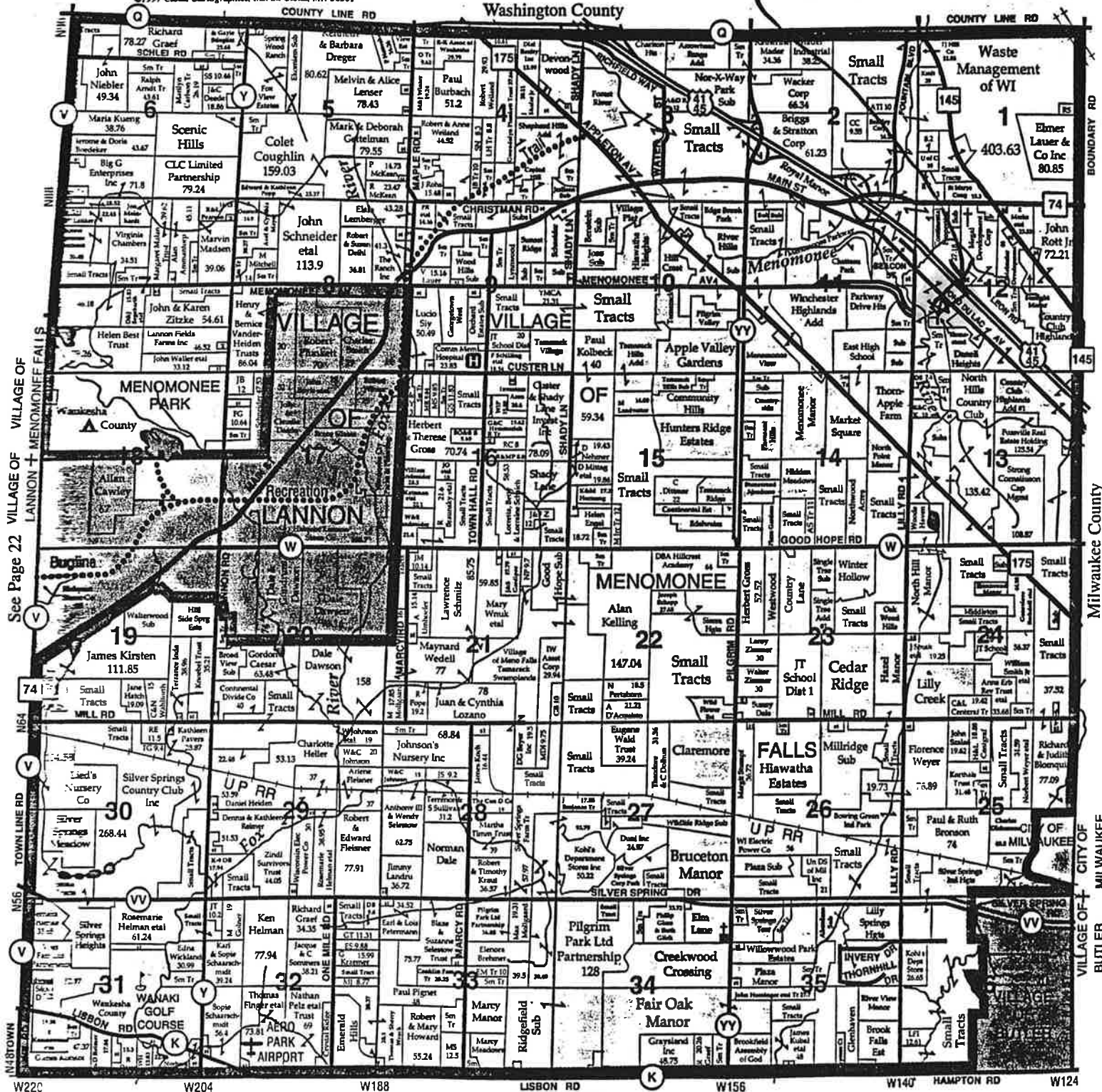
The maximum water elevation of the pond during the 100-year storm is as follows:
Pond 1: 782.75 feet

T.8N. - R.20E.



Project Location

Washington County

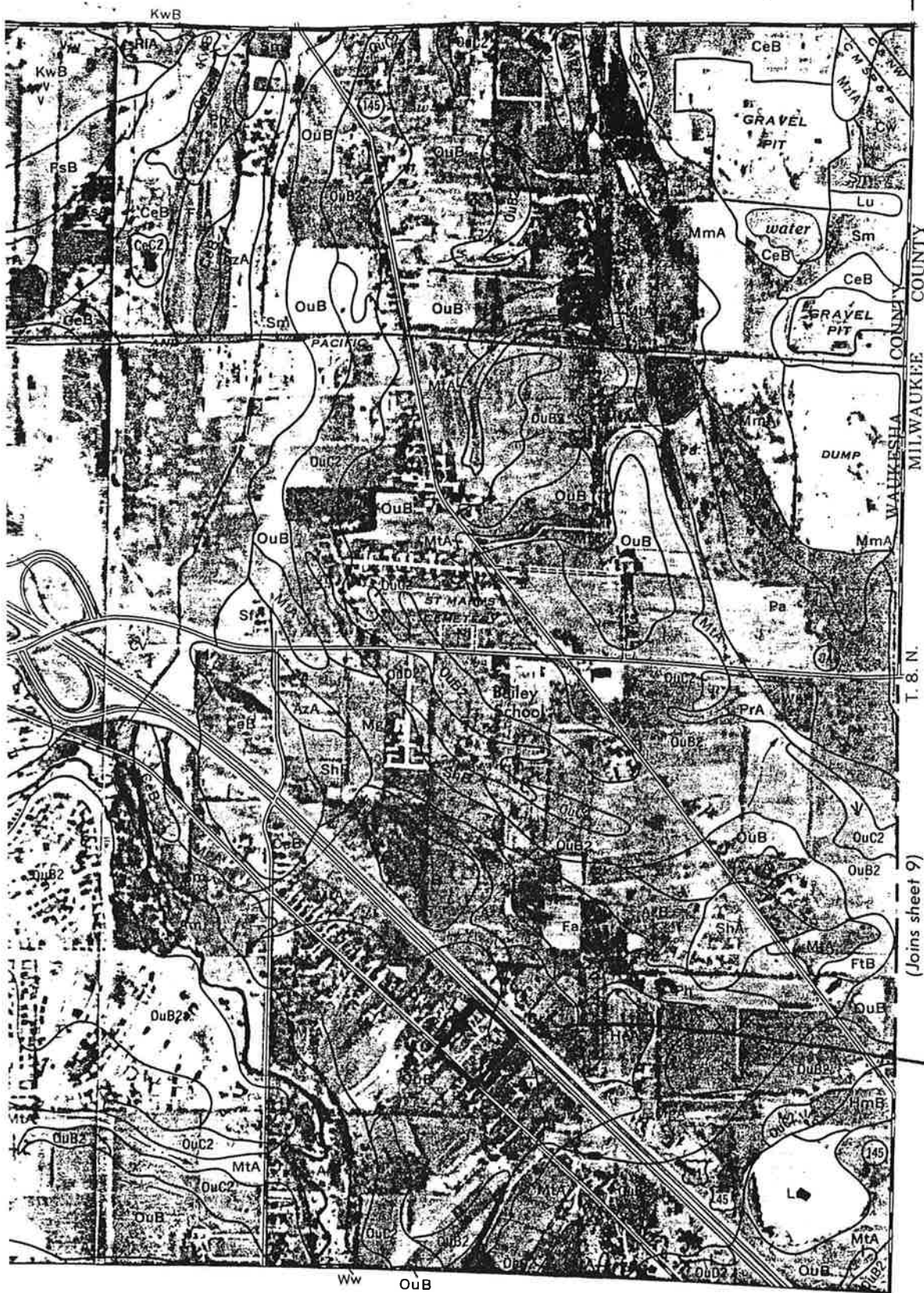


N56 TOWN LINE

Milwaukee County

VILLAGE OF + CITY OF
BLITZER MII WAIKKEE

See Page 19



MILWAUKEE COUNTY

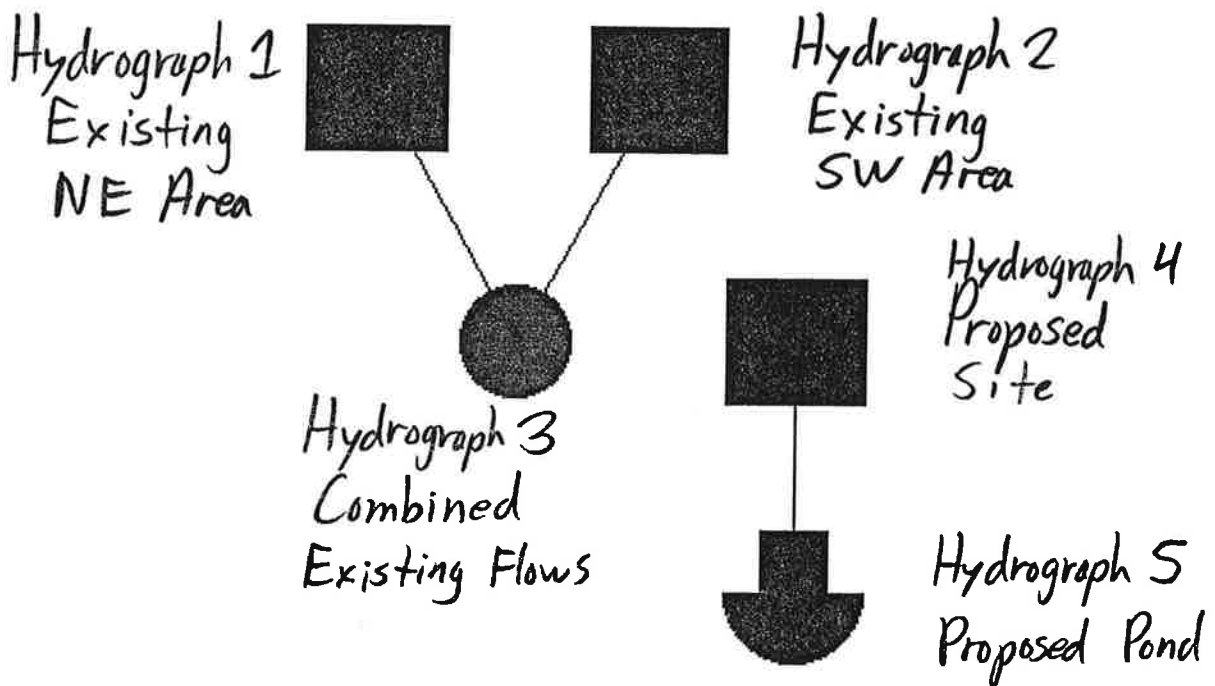
T. 8. N.

(Joins sheet 9)

Project Site



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

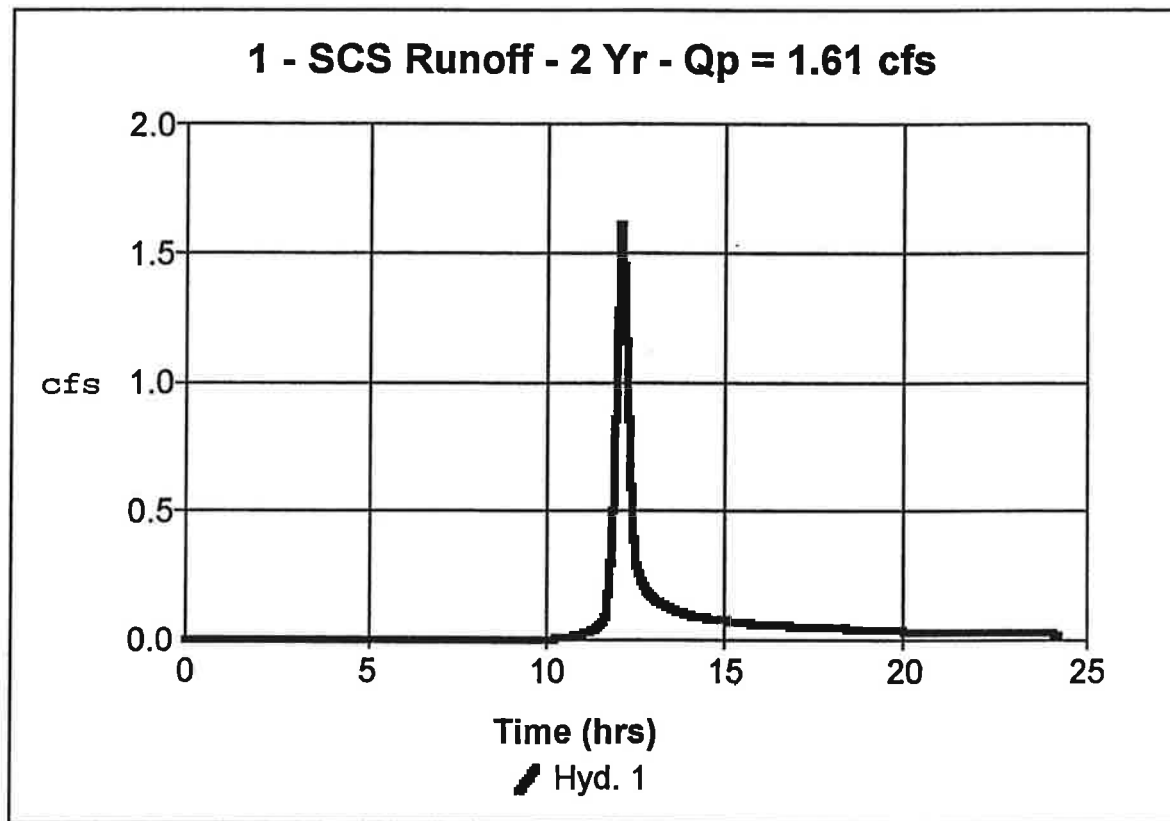
Hyd. No. 1

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

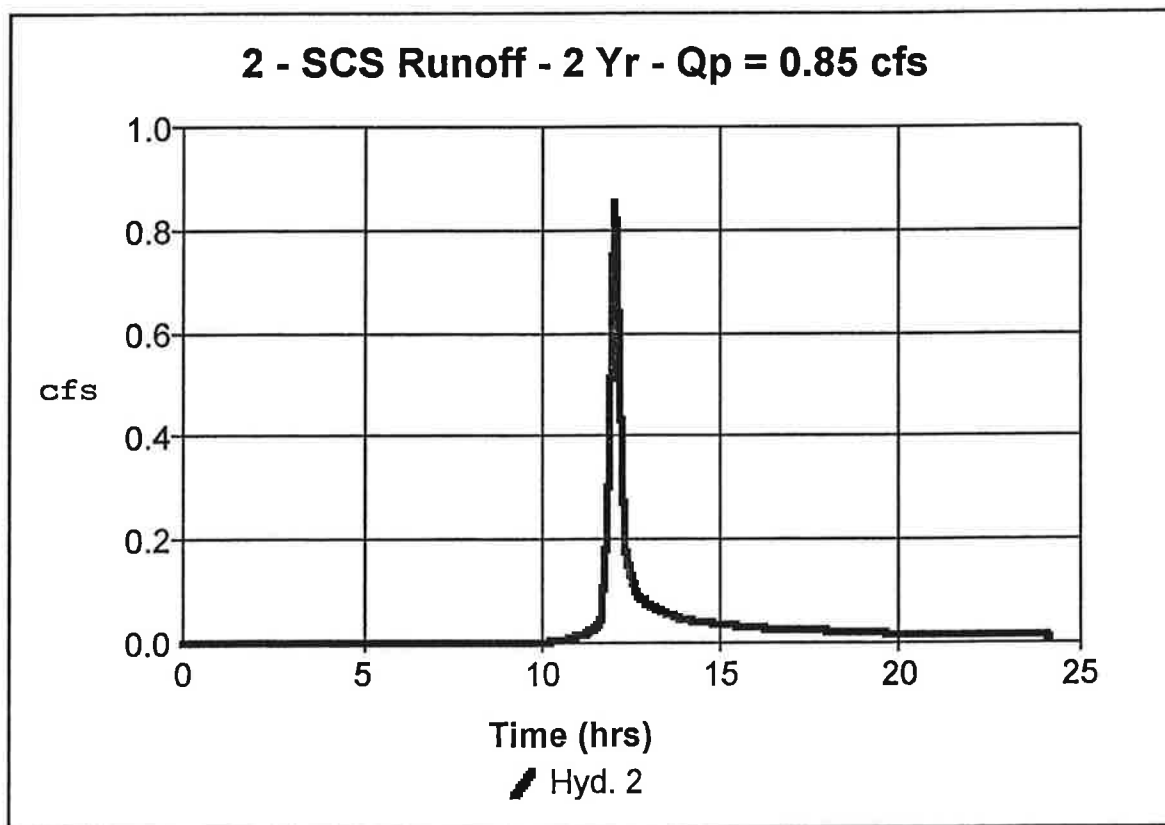
Hyd. No. 2

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

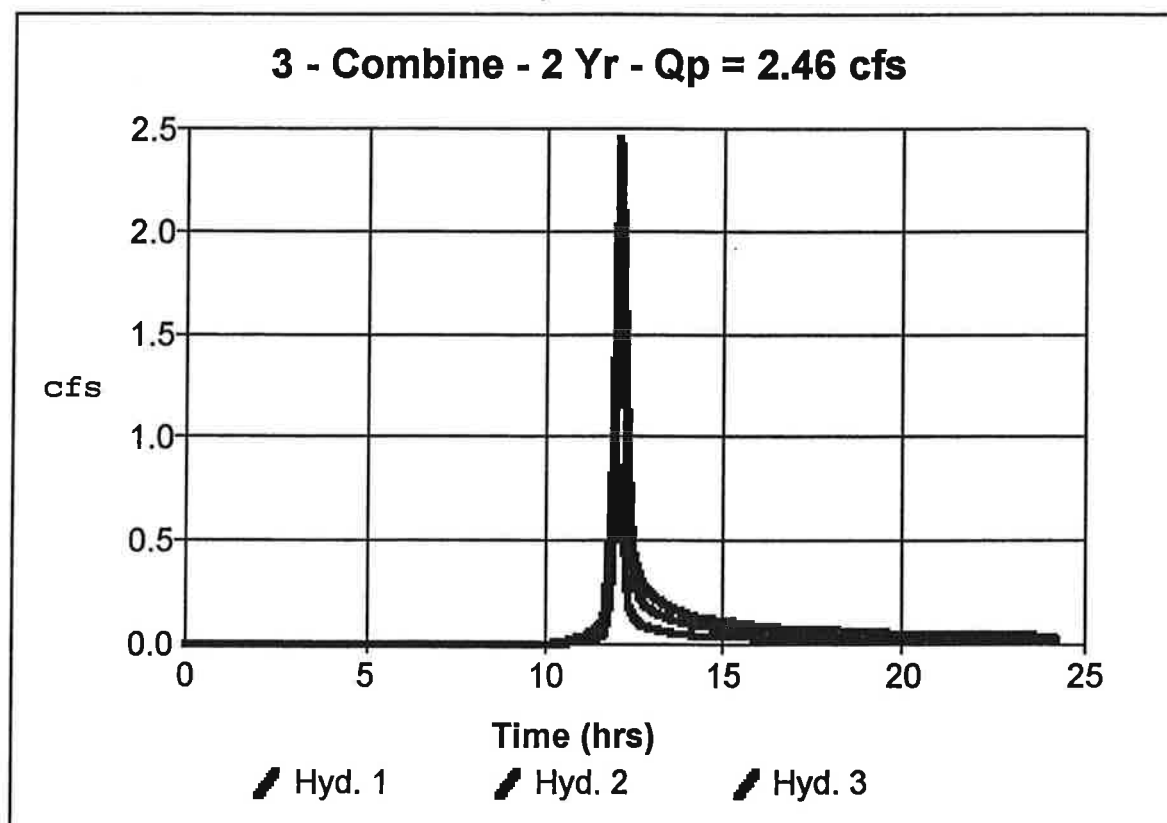
1st inflow hyd. No. = 1

Peak discharge = 2.46 cfs

Time interval = 2 min

2nd inflow hyd. No.= 2

Total Volume = 7,565 cuft



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

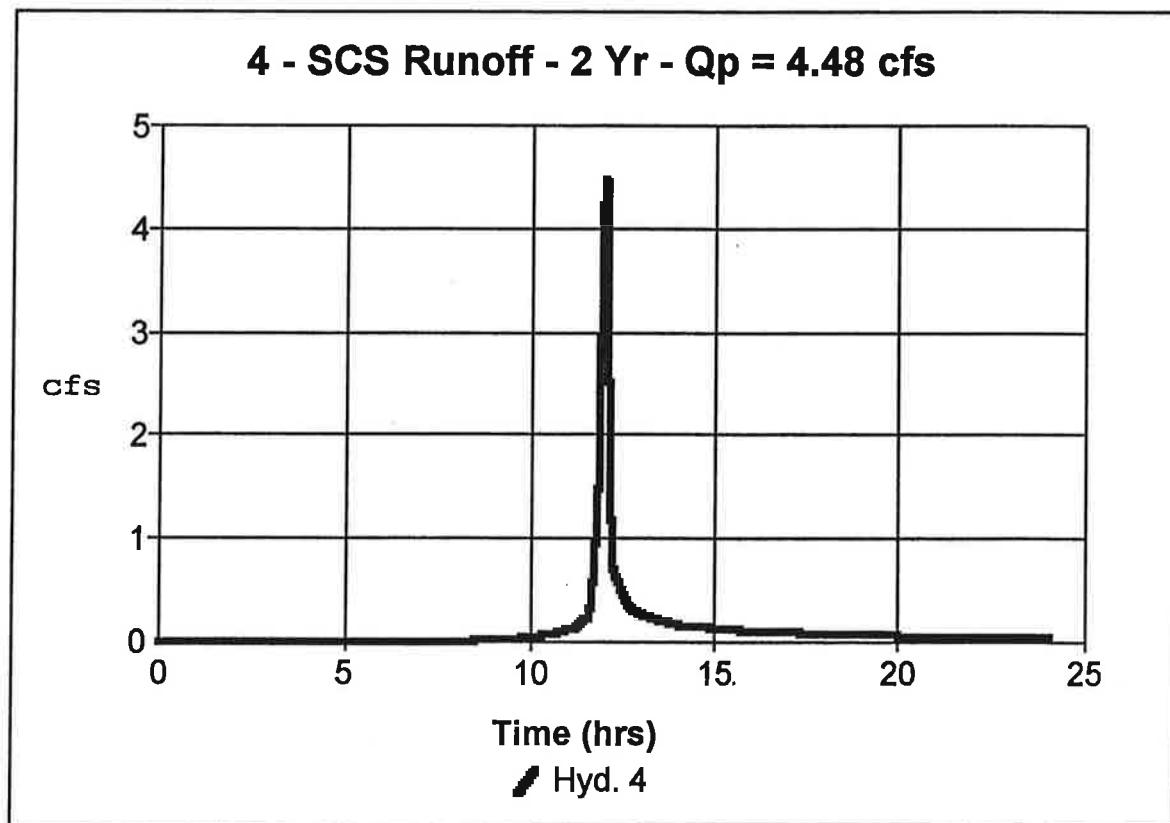
Hyd. No. 4

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

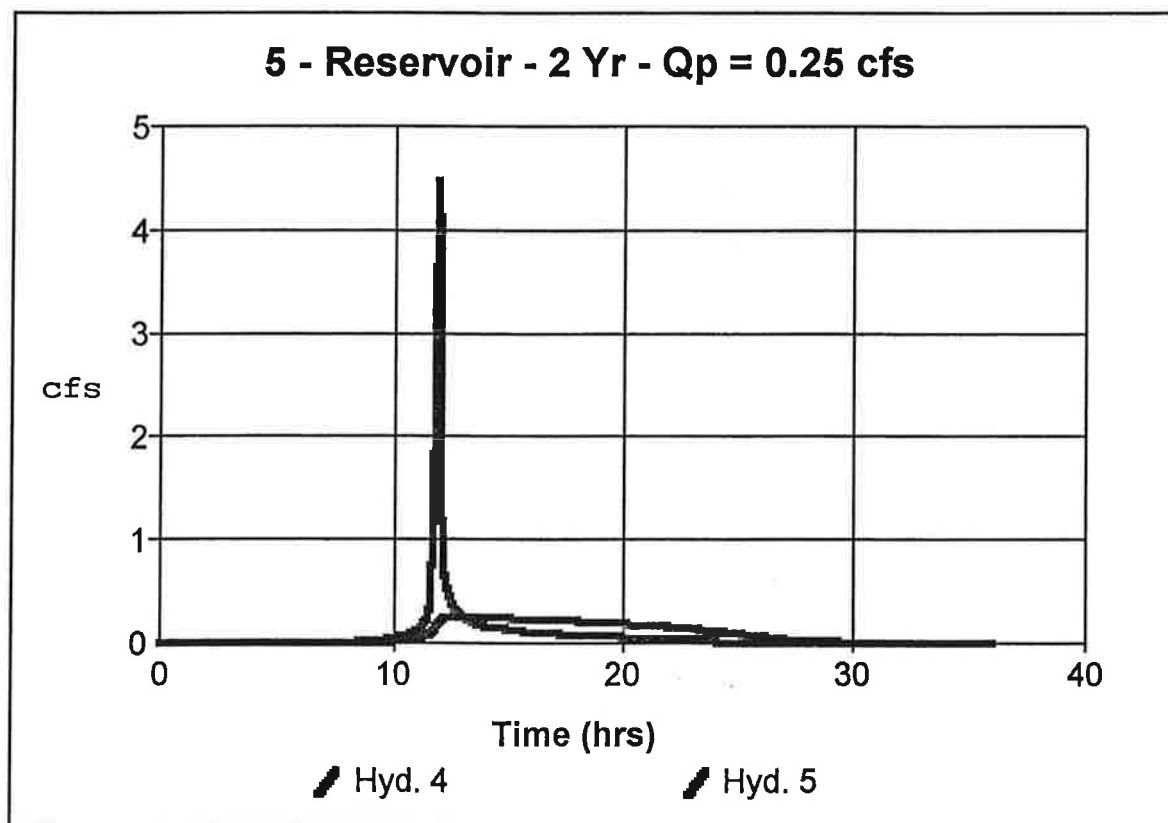
Hyd. No. 5

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

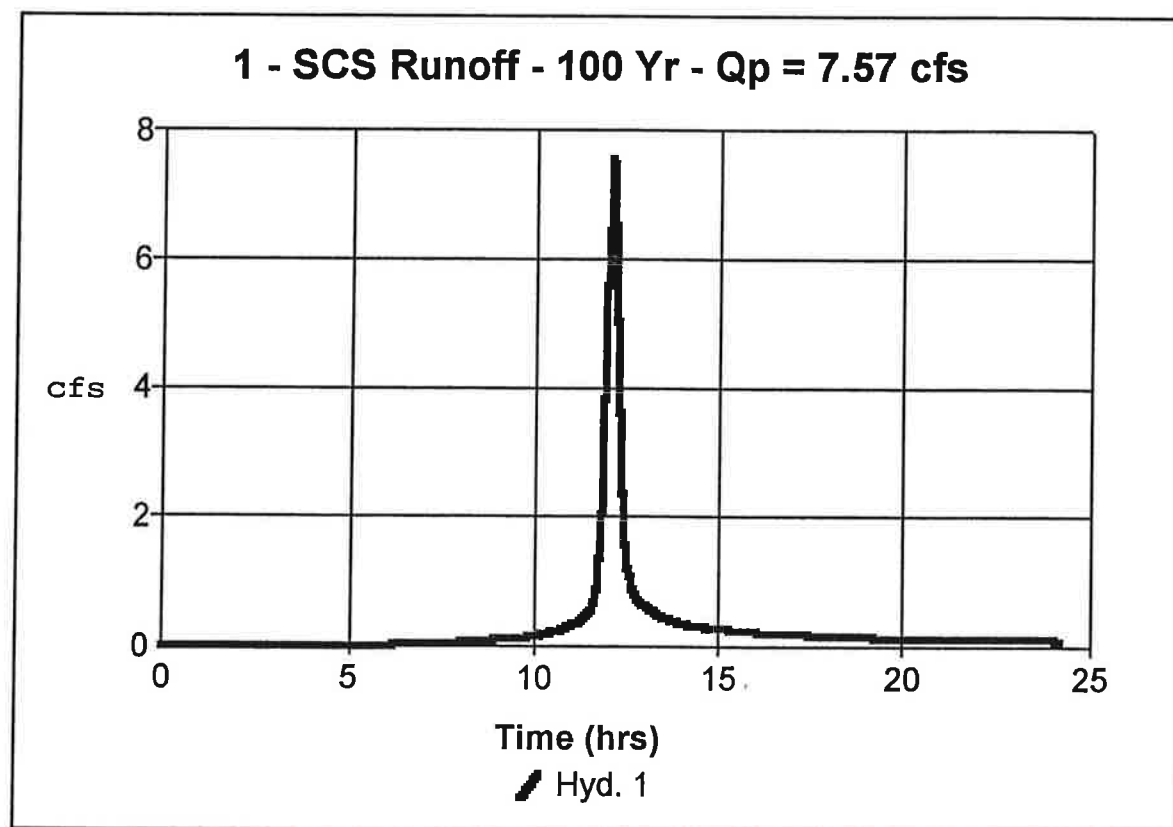
Hyd. No. 1

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

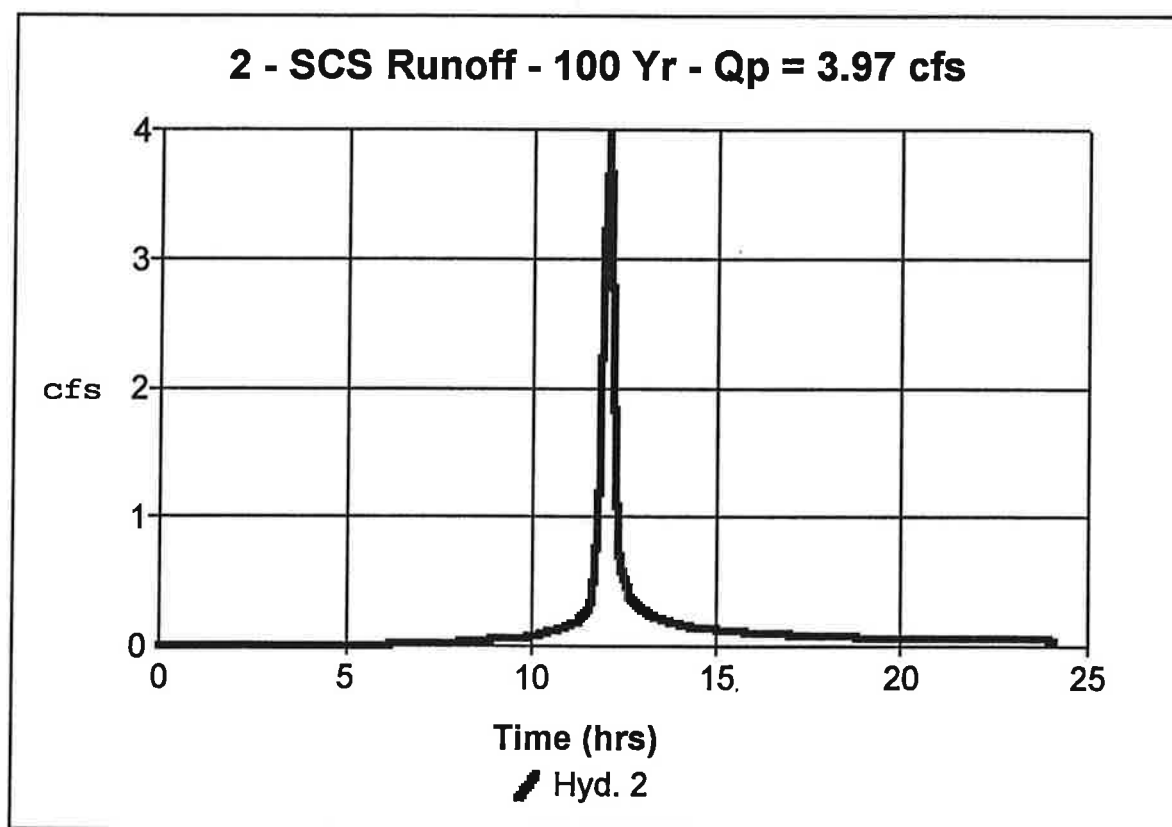
Hyd. No. 2

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

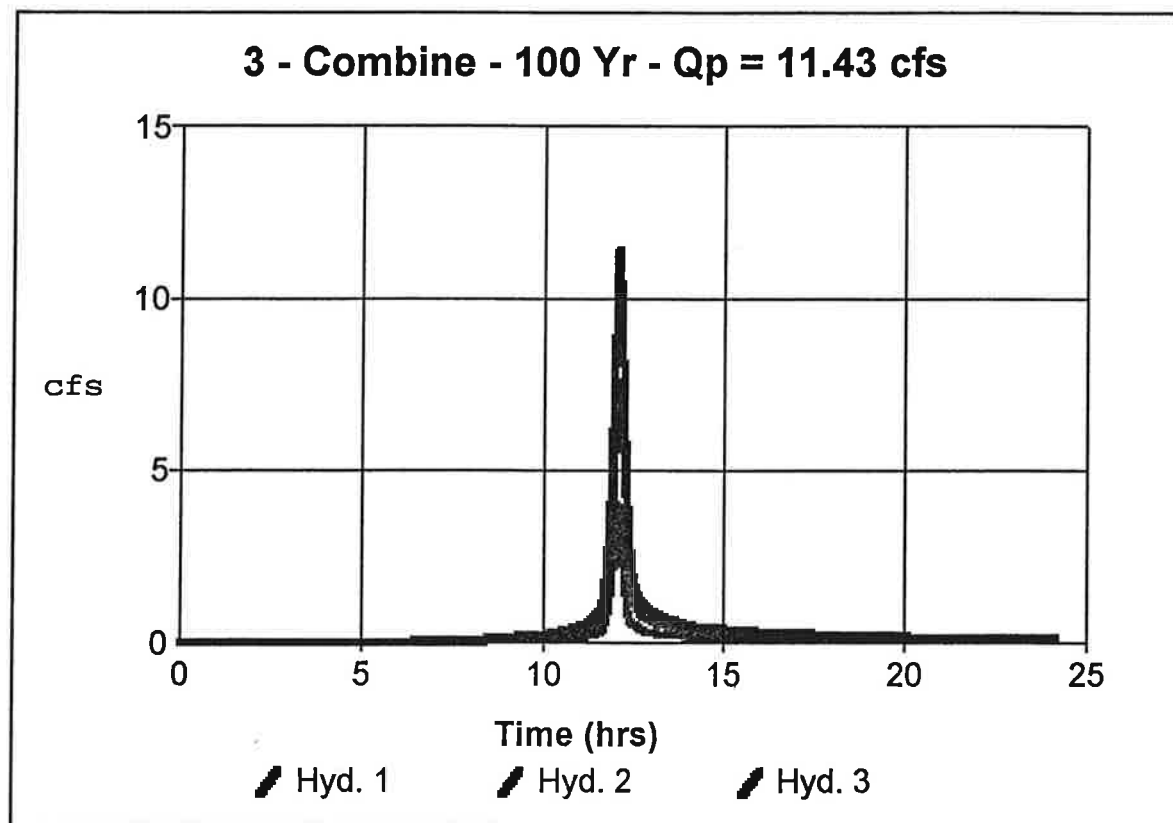
1st inflow hyd. No. = 1

Peak discharge = 11.43 cfs

Time interval = 2 min

2nd inflow hyd. No.= 2

Total Volume = 35,354 cuft



Hydrograph Plot

English

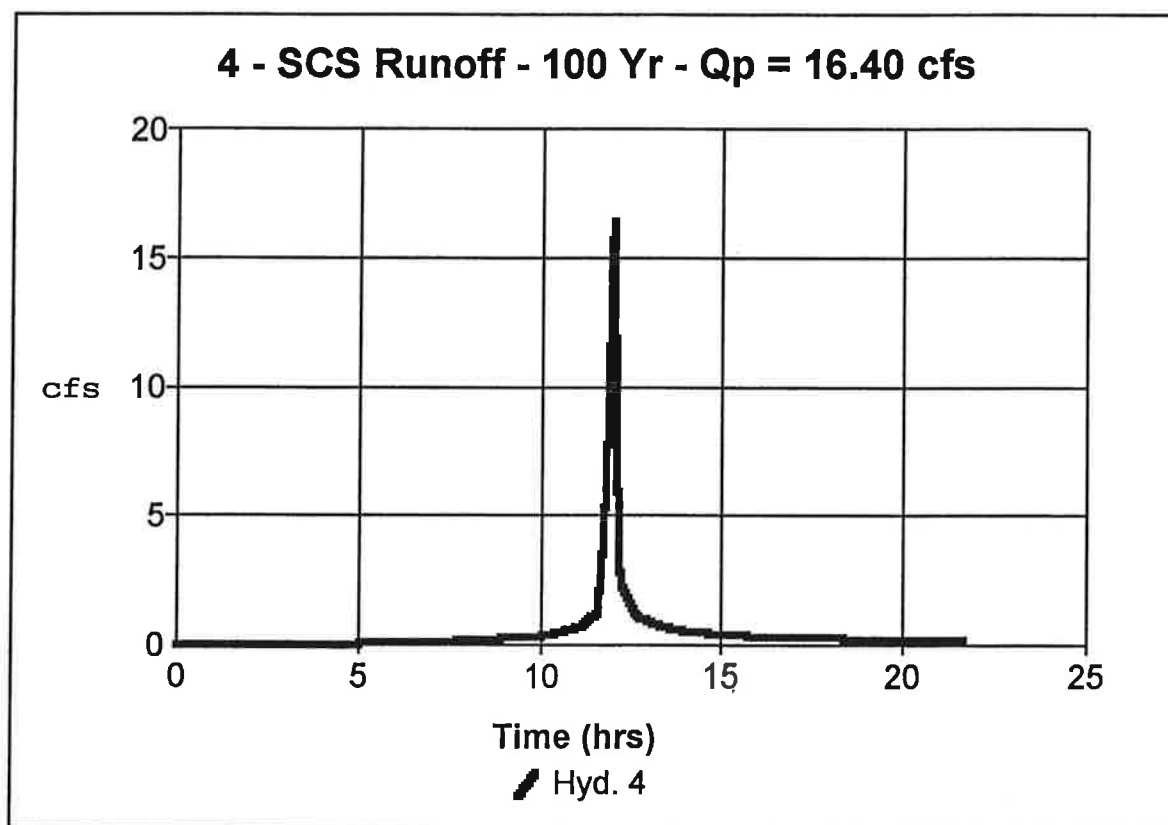
Hyd. No. 4

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

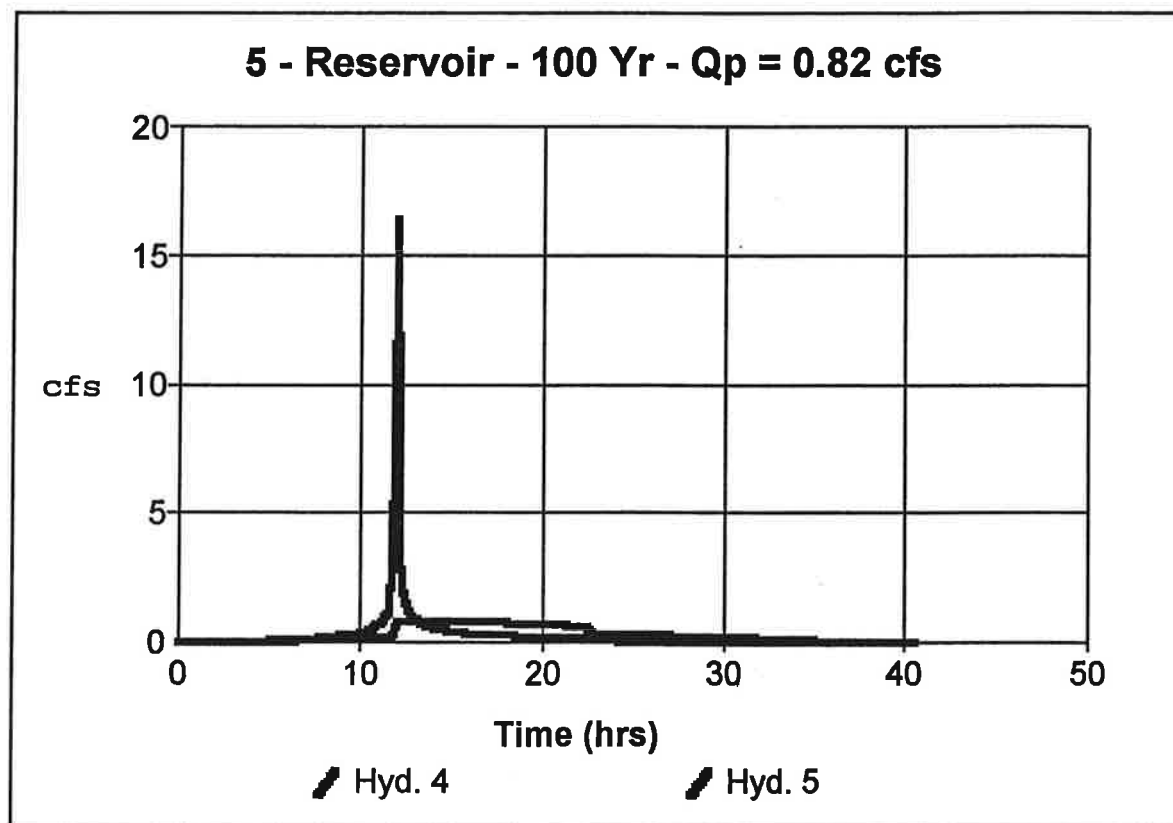
Hyd. No. 5

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

	[A]	[B]	[C]	[D]
Rise in	= 4.0	3.0	0.0	0.0
Span in	= 4.0	3.0	0.0	0.0
No. Barrels	= 1	1	0	0
Invert El. ft	= 778.00	778.00	0.00	0.00
Length ft	= 20.0	0.0	0.0	0.0
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

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 10.00	3.14	0.00	0.00
Crest El. ft	= 783.00	780.50	0.00	0.00
Weir Coeff.	= 3.00	3.00	0.00	0.00
Eqn. Exp.	= 1.50	1.50	0.00	0.00
Multi-Stage	= No	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

WOODMOOR

Downspout
& Storm Sewer
Comps

EAST BUILDING

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

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

2. WEST 1/2
 $A_2 = 4,116$ 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
 $A_3 = 4,116$ S.F. 6" PIPE 1/8" PITCH

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

4. WEST 1/2
 $A_4 = 4,116$ 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
 $A_5 = 2,940$ S.F. 4" PIPE 1/4" PITCH

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

6. $A_6 = 41,150$ 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 Seeboth 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