WELLINGTON PARK

Detention Basin Report: Northeast Basin

Prepared by Mark Kilgore, P.E.
Project Engineer

Developer:

The Jones Company

16640 Chesterfield Grove Boulevard

Chesterfield, Missouri 63305

(636) 537-7000

April 16, 2003

DETENTION BASIN REPORT

project: **Wellington Park**
juridiction: **City of O'fallon, MO**
det'n basin: **Northeast**
designer: Mark Kilgore, P.E.

DRAINAGE AREA
area: 3.07 ac

OUTLET STRUCTURE
Top of dam: 602.00
Stand pipe: 600.60
Slot width: 0.3 ft
Slot height: 0.6 ft
Slot FL: 595.50

BASIN GEOMETRY

elevation	area (SF)
595.5	0
596	1047
598	1989
600	3221
602	4740

ROUTED FLOW DATA
15-yr Q: 1.80 cfs @ 599.84

25-yr Q: 1.94 cfs @ 600.47

SEDIMENT (2-yr)
contour 1: 600 area: 3221 SF
contour 2: 602 area: 4740 SF
25-yr wsel: 600.47 area: 3578 SF
fig. 6 read: 190 cfs/ac/yr * 2yrs * 3.07 ac = 1167 CF
Ht of sed: 1167 CF / 3578 SF = 0.33 ft
Elev of sed: 600.47 + 0.33 = **600.80**
top dam: 602.00
freeboard: **1.20 ft**
over 25-yr + 2-yr sediment

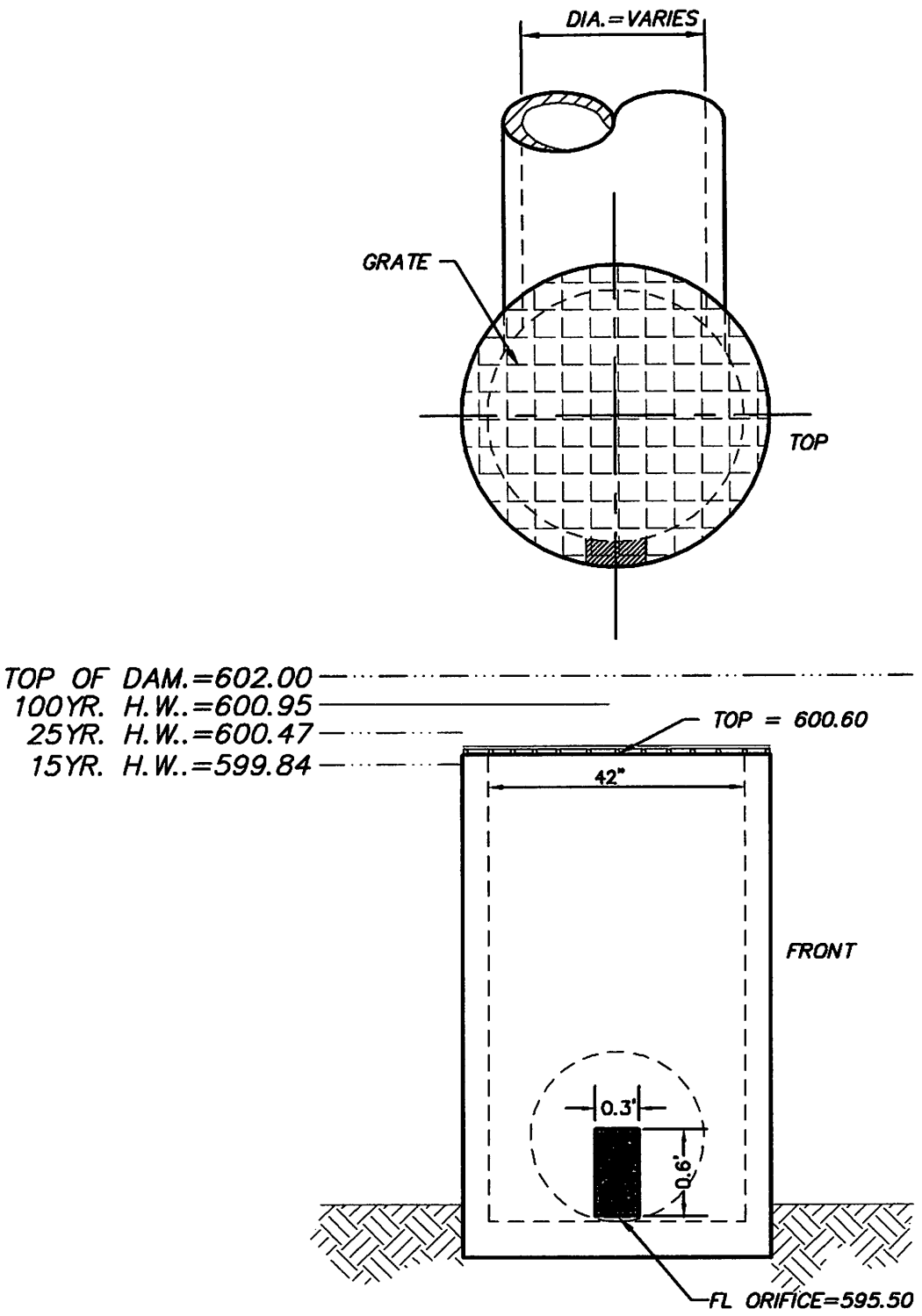
100-yr Q: 8.18 cfs @ 600.95 = 600.95
top dam: 602.00
freeboard: **1.05 ft**
over 100-yr

TIME OF CONCENTRATION
by Mark Kilgore, P.E.
Pickett, Ray & Silver, Inc.

Project:	Wellington Park
Jurisdict'n:	City of O'fallon
Basin:	Northeast
Condition:	Proposed

TIME OF CONC.			
SHEET FLOW:	30	ft	
START EL	616.5	el	
END EL=	616	el	
SLOPE=	0.0167	ft/ft	
SHAL CONC FLOW:	40	ft	
START EL	616	el	
END EL=	614.8	el	
SLOPE=	0.0300	ft/ft	
GRASS CH. FLOW:	76	ft	
CONC. CH. FLOW:	471	ft	
SHEET TIME:	0.0934	hr	
SHAL CONC:			
SH CONC V:	2.795	ft/sec	
SH CONC TIME:	0.0040	hr	
GRASS CHAN. V.:	5	ft/sec	(assume 5 for grass)
CONC. CHAN. V.:	12	ft/sec	(assume 12 for concrete)
GRASS CH. TIME:	0.0042	hr	
CONC. CH. TIME:	0.0109	hr	
TOTAL TIME OF C:	**0.1125**	**hr**	
	6.75	**min**	

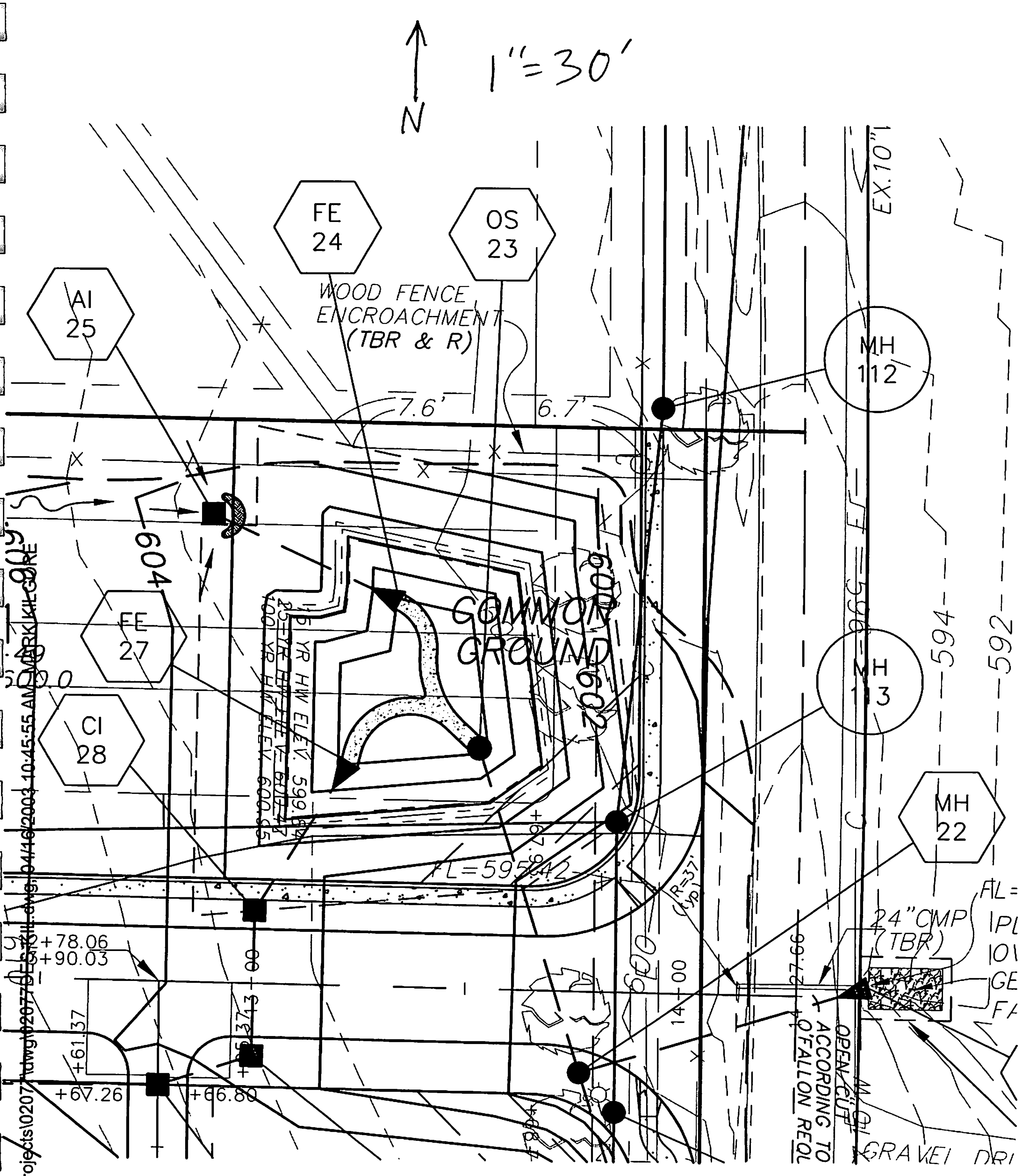
use **6** min to be conservative



NORTHEAST DETENTION BASIN OUTFALL STRUCTURE OS-23

42" DIA. CONCRETE STANDPIPE
STRUCTURE W/GRATE ON SILL

NOT TO SCALE



\\1server-prs\projects\0207...\dwg\0207...DEFSTkill.dwg, 04/16/2003 10:45:55 AM, MARK KILGORE

DIFFERENTIAL RUNOFF REPORT: 15-YEAR

project: **Wellington Park**
juridiction: **City of O'fallon, MO**
det'n basin: **Northeast**
designer: Mark Kilgore, P.E.
Pickett, Ray & Silver, Inc.

	area (ac)		15-yr PI		15-yr flow
Q15 existing:					
site:	3.30	*	1.87	=	6.17 cfs
off-site:	0.04	*	2.64	=	0.11 cfs
	(will drain through NE basin)				
	3.34 ac total				
			pre-developed runoff	=	**6.28 cfs**

Q15 developed (no detention):			15-yr PI		15-yr flow
	3.07	*	2.64	=	8.10 cfs
off-site:	0.04	*	2.64	=	0.11 cfs
	(will drain through NE basin)				
	3.11 ac total				
			developed runoff	=	**8.21 cfs**
			additional runoff created if no detention	=	**1.93 cfs**

Q15 developed (including detention):

basin name	area (ac)				15-yr flow
NE	3.07	through	detention	=	1.80 cfs
site not detained:					
			15-yr PI		
	0.81	*	2.64	=	2.14 cfs
	3.88 ac total				
Q15 dev:			**total Q15 outflow**	=	**3.94 cfs**

Q15 diff: **-2.34 cfs**

DIFFERENTIAL RUNOFF REPORT: 25-YEAR

project: **Wellington Park**
juridiction: **City of O'fallon, MO**
det'n basin: **Northeast**
designer: Mark Kilgore, P.E.
Pickett, Ray & Silver, Inc.

	area (ac)		25-yr PI		25-yr flow
Q25 existing:					
site:	3.30	*	2.31	=	7.62 cfs
off-site:	0.04	*	3.26	=	0.13 cfs
	(will drain through NE basin)				
	3.34 ac total				
			pre-developed runoff	=	**7.75 cfs**

Q25 developed (no detention):			25-yr PI		25-yr flow
	3.07	*	3.26	=	10.01 cfs
off-site:	0.04	*	3.26	=	0.13 cfs
	(will drain through NE basin)				
	3.11 ac total				
			developed runoff	=	**10.14 cfs**
			additional runoff created if no detention	=	**2.39 cfs**

Q25 developed (including detention):

basin name	area (ac)				25-yr flow
NE	3.07	through	detention	=	1.94 cfs
site not detained:					
			25-yr PI		
	0.81	*	3.26	=	2.64 cfs
	3.88 ac total				
Q25 dev:			**total Q25 outflow**	=	**4.58 cfs**

Q25 diff: **-3.17 cfs**

DIFFERENTIAL RUNOFF REPORT: 100-YEAR

project: **Wellington Park**
juridiction: **City of O'fallon, MO**
det'n basin: **Northeast**
designer: Mark Kilgore, P.E.
Pickett, Ray & Silver, Inc.

	area (ac)		100-yr PI		100-yr flow
Q100 existing:					
site:	3.30	*	2.95	=	9.74 cfs
off-site:	0.04	*	4.17	=	0.17 cfs
	(will drain through NE basin)				
	3.34 ac total				
			pre-developed runoff	=	**9.90 cfs**

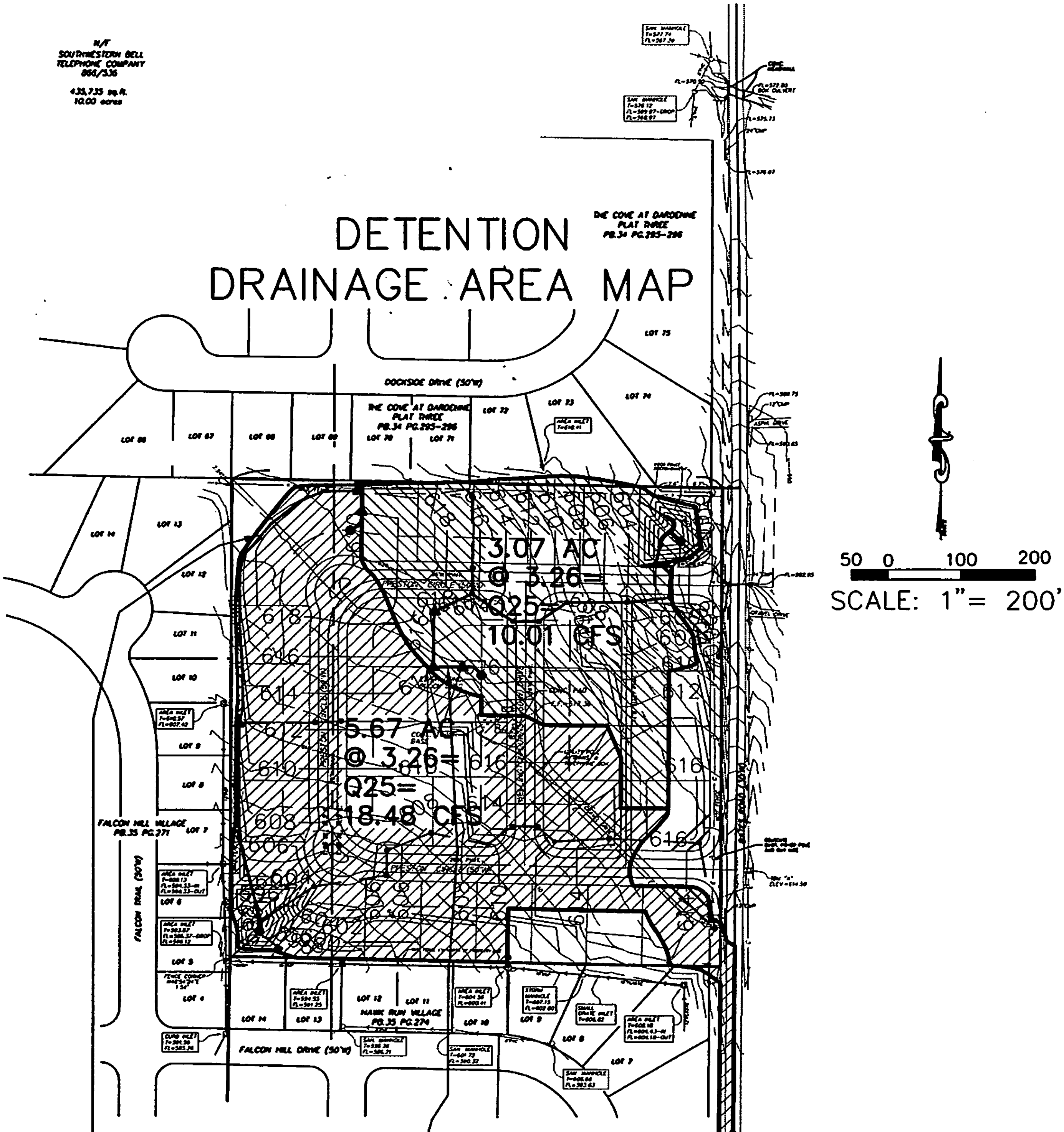
Q100 developed (no detention):			100-yr PI		100-yr flow
	3.07	*	4.17	=	12.80 cfs
off-site:	0.04	*	4.17	=	0.17 cfs
	(will drain through NE basin)				
	3.11 ac total				
			developed runoff	=	**12.97 cfs**
			additional runoff created if no detention	=	**3.07 cfs**

Q100 developed (including detention):

basin name	area (ac)				100-yr flow
NE	3.07	through	detention	=	8.18 cfs
site not detained:					
			100-yr PI		
	0.81	*	4.17	=	3.38 cfs
	3.88 ac total				
Q100 dev:			**total Q100 outflow**	=	**11.56 cfs**

Q100 diff: **1.66 cfs**

DETENTION DRAINAGE AREA MAP

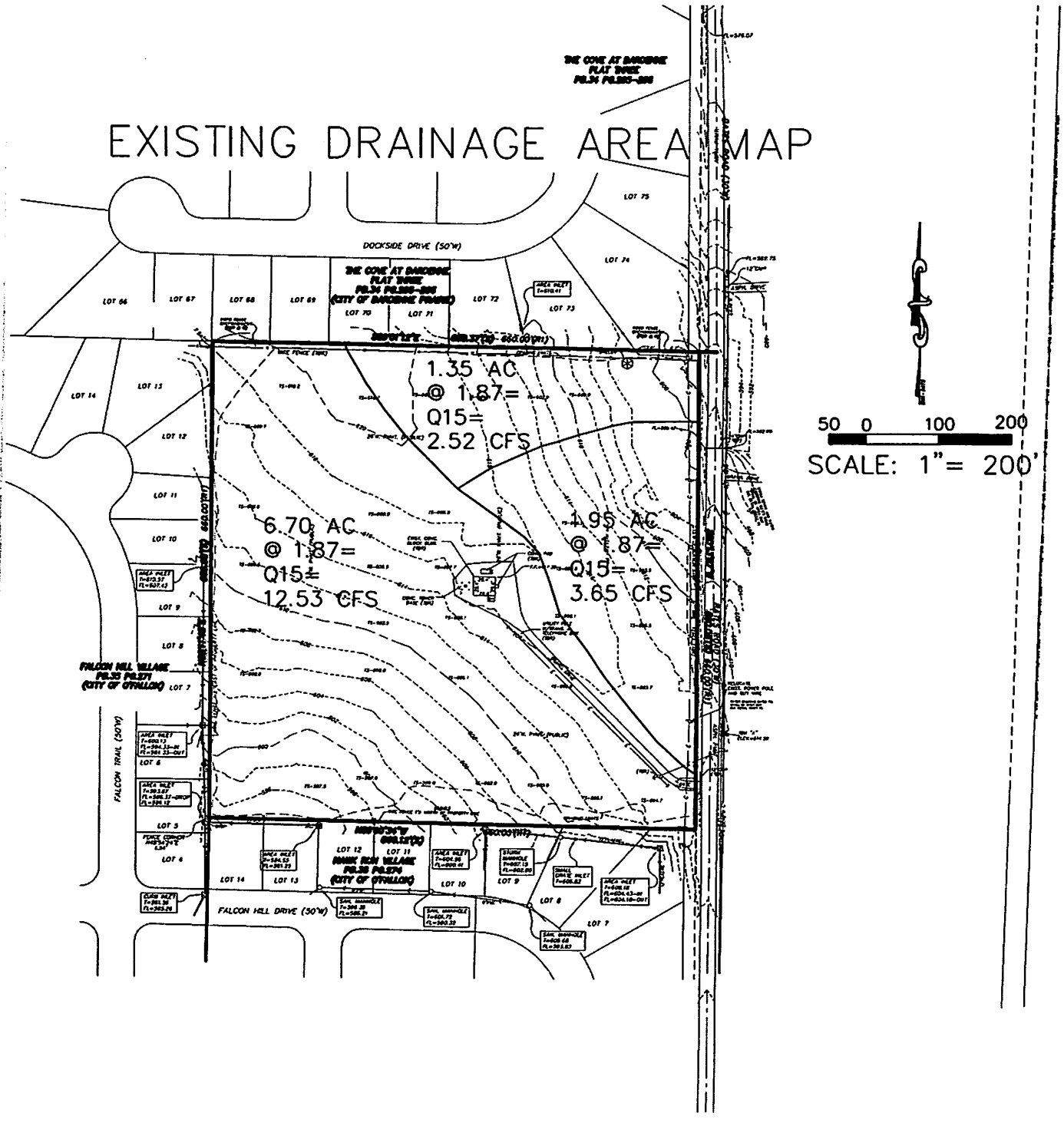


SW BASIN TIME OF CONCENTRATION:
33 LF SHEET FLOW @ 2.12%
31 LF SHAL CONC @ 1.29%
419 LF GRASS CHANNEL @ 1.77%
291 LF CONC CHANNEL @ 6.19%

NE BASIN TIME OF CONCENTRATION:
30 LF SHEET FLOW @ 1.67%
40 LF SHAL CONC @ 3.00%
76 LF GRASS CHANNEL @ 2.32%
471 LF CONC CHANNEL @ 2.82%

LEGEND
- ● START OR END OF TC
- ▲ TC CHANGES FLOW TYPE

EXISTING DRAINAGE AREA MAP



INFLOW SUMMARY

project: Wellington Park
jurisdict'n: City of O'fallon
det. Basin: Northeast

by Mark Kilgore, P.E.
Pickett, Ray & Silver, Inc.

P15-5%	1.87	PI25-5%	2.31	PI100-5%	2.95
P15-50%	2.64	PI25-50%	3.26	PI100-50%	4.17
P15-75%	3.30	PI25-75%	4.07	PI100-75%	5.21
P15-100%	3.85	PI25-100%	4.75	PI100-100%	6.08

Proposed flow into detention basin

3.07 ac enters the d basin.
0.00 ac developed is PI'd at 5% impervious, enters the d basin.
3.07 ac developed is PI'd at 50% impervious, enters the d basin.
0.00 ac developed is PI'd at 75% impervious, enters the d basin.

	AC		PI				
Q15pro=	0.00	*	1.87	=	0.00 cfs		
	3.07	*	2.64	=	8.10 cfs		
	0.00	*	3.30	=	0.00 cfs	SUM =	**8.10 cfs**
Q25pro=	0.00	*	2.31	=	0.00 cfs		
	3.07	*	3.26	=	10.01 cfs		
	0.00	*	4.07	=	0.00 cfs	SUM =	**10.01 cfs**
Q100pro=	0.00	*	2.95	=	0.00 cfs		
	3.07	*	4.17	=	12.80 cfs		
	0.00	*	5.21	=	0.00 cfs	SUM =	**12.80 cfs**

INFLOW HYDROGRAPH
MODIFIED RATIONAL METHOD
by Mark Kilgore, P.E.
Pickett, Ray & Silver, Inc.

Storm: 15-year
Project: Wellington Park
Basin: Northeast
Jurisd'n: City of O'fallon

time of concentration: 6.75 min by 3-element SCS/NRCS method. Use: 6 min
duration: normally 20 min. Will use 20 minutes to be conservative and proper relative to Tc
peak flow: 8.1 cfs

time (min)	time (hr)	Q (cfs)	comment		
0	0.000	0.0		increment:	
1	0.017	1.4		1.35	cfs/min
2	0.033	2.7		1.35	
3	0.050	4.1		1.35	
4	0.067	5.4		1.35	
5	0.083	6.8		1.35	
6	0.100	8.1	1st peak	1.35	
7	0.117	8.1		1.35	
8	0.133	8.1		1.35	
9	0.150	8.1		1.35	
10	0.167	8.1		1.35	
11	0.183	8.1		1.35	
12	0.200	8.1		1.35	
13	0.217	8.1		1.35	
14	0.233	8.1		1.35	
15	0.250	8.1		1.35	
16	0.267	8.1		1.35	
17	0.283	8.1		1.35	
18	0.300	8.1		1.35	
19	0.317	8.1		1.35	
20	0.333	8.1		1.35	
21	0.350	6.8		1.35	
22	0.367	5.4		1.35	
23	0.383	4.1		1.35	
24	0.400	2.7		1.35	
25	0.417	1.4		1.35	
26	0.433	0.0		1.35	

INFLOW HYDROGRAPH
MODIFIED RATIONAL METHOD
by Mark Kilgore, P.E.
Pickett, Ray & Silver, Inc.

Storm: 25-year
Project: Wellington Park
Basin: Northeast
Jurisd'n: City of O'fallon

time of concentration: 6.75 min by 3-element SCS/NRCS method. Use: 6 min
duration: normally 20 min. Will use 20 minutes to be conservative and proper relative to Tc
peak flow: 10.01 cfs

time (min)	time (hr)	Q (cfs)	comment		
0	0.000	0.0		increment:	
1	0.017	1.7		1.67	cfs/min
2	0.033	3.3		1.67	
3	0.050	5.0		1.67	
4	0.067	6.7		1.67	
5	0.083	8.3		1.67	
6	0.100	10.0	1st peak	1.67	
7	0.117	10.0		1.67	
8	0.133	10.0		1.67	
9	0.150	10.0		1.67	
10	0.167	10.0		1.67	
11	0.183	10.0		1.67	
12	0.200	10.0		1.67	
13	0.217	10.0		1.67	
14	0.233	10.0		1.67	
15	0.250	10.0		1.67	
16	0.267	10.0		1.67	
17	0.283	10.0		1.67	
18	0.300	10.0		1.67	
19	0.317	10.0		1.67	
20	0.333	10.0		1.67	
21	0.350	8.3		1.67	
22	0.367	6.7		1.67	
23	0.383	5.0		1.67	
24	0.400	3.3		1.67	
25	0.417	1.7		1.67	
26	0.433	0.0		1.67	

INFLOW HYDROGRAPH
MODIFIED RATIONAL METHOD
by Mark Kilgore, P.E.
Pickett, Ray & Silver, Inc.

Storm: 100-year
Project: Wellington Park
Basin: Northeast
Jurisd'n: City of O'fallon

time of concentration: 6.75 min by 3-element SCS/NRCS method. Use: 6 min
duration: normally 20 min. Will use 20 minutes to be conservative and proper relative to Tc
peak flow: 12.8 cfs

time (min)	time (hr)	Q (cfs)	comment		
0	0.000	0.0		increment:	
1	0.017	2.1		2.13	cfs/min
2	0.033	4.3		2.13	
3	0.050	6.4		2.13	
4	0.067	8.5		2.13	
5	0.083	10.7		2.13	
6	0.100	12.8	1st peak	2.13	
7	0.117	12.8		2.13	
8	0.133	12.8		2.13	
9	0.150	12.8		2.13	
10	0.167	12.8		2.13	
11	0.183	12.8		2.13	
12	0.200	12.8		2.13	
13	0.217	12.8		2.13	
14	0.233	12.8		2.13	
15	0.250	12.8		2.13	
16	0.267	12.8		2.13	
17	0.283	12.8		2.13	
18	0.300	12.8		2.13	
19	0.317	12.8		2.13	
20	0.333	12.8		2.13	
21	0.350	10.7		2.13	
22	0.367	8.5		2.13	
23	0.383	6.4		2.13	
24	0.400	4.3		2.13	
25	0.417	2.1		2.13	
26	0.433	0.0		2.13	

NATURE SAVER™ FAX MEMO 01616

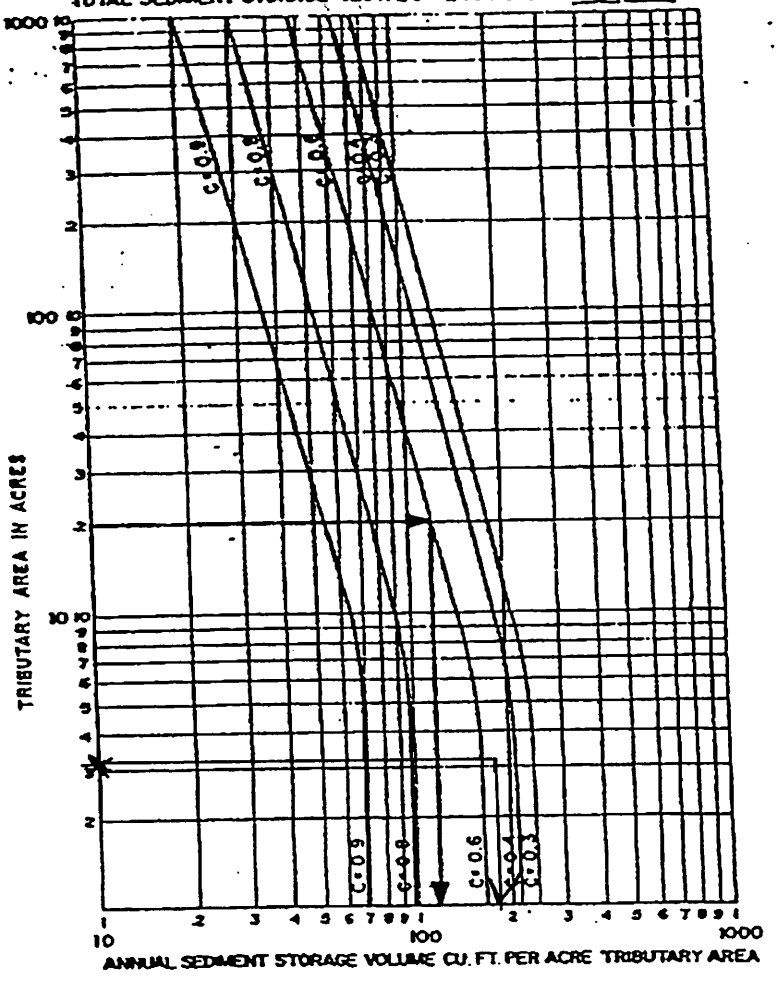
To MARK KILGORE		Date 5/23/02	# of pages ▶ 1
Co./Dept.		From FRANK GOLWIN	
Phone #		Co. CITY OF O'FALLON	
Fax #		Phone #	
		Fax #	

NE basin

CIRCLE

2 YEAR SEDIMENT STORAGE REQUIRED

EXAMPLE:
TRIBUTARY AREA = 20 ACRES
RATIONAL METHOD RUNOFF COEFFICIENT "C" = 0.6
SEDIMENT STORAGE = 120 CU. FT. PER ACRE PER YEAR
TOTAL SEDIMENT STORAGE = 120 X 20 = 2400 CU. FT. PER YEAR.



ANNUAL SEDIMENT STORAGE

FIG. 6

Result: 190 CF/Ac

Job File: C:\HAESTAD\PPKW\KIL-JOBS\WELLINGTONPARK-NE-15-25-100-RAT.PPW
Rain Dir: C:\HAESTAD\PPKW\RAINFALL\

==========
JOB TITLE
==========

Wellington Park- Northeast basin

Table of Contents

Table of Contents (continued)

MASTER NETWORK SUMMARY
(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Storage Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond ac-ft
DETENTION	IN POND	15-yr	.224		.1002	8.10		
DETENTION	IN POND	25-yr	.275		.1002	10.00		
DETENTION	IN POND	100-yr	.353		.1002	12.80		
DETENTION	OUT POND	15-yr	.224		.4008	1.80	599.84	.179
DETENTION	OUT POND	25-yr	.275		.4008	1.94	600.47	.227
DETENTION	OUT POND	100-yr	.353		.3674	8.18	600.95	.269
*OUTFALL	JCT	15-yr	.224		.4008	1.80		
*OUTFALL	JCT	25-yr	.275		.4008	1.94		
*OUTFALL	JCT	100-yr	.353		.3674	8.18		
RATIONAL INFLOW	HYG	15-yr	.224		.1000	8.10		
RATIONAL INFLOW	HYG	25-yr	.275		.1000	10.00		
RATIONAL INFLOW	HYG	100-yr	.353		.1000	12.80		

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

	Node ID	Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
	DETENTION IN	POND	.224		.1002	8.10	
	DETENTION OUT	POND	.224		.4008	1.80	599.84
Outfall	OUTFALL	JCT	.224		.4008	1.80	
	RATIONAL INFLOW	HYG	.224		.1000	8.10	

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
ADD1	ADD	UN	.224		.1000	8.10	RATIONAL INFLOW	
		DL	.224		.1000	8.10		
		DN	.224		.1002	8.10	DETENTION	IN
POND ROUTE	PONDrt	UN	.224		.1002	8.10	DETENTION	IN
POND ROUTE			.224		.4008	1.80	DETENTION	OUT
		DL	.224		.4008	1.80		
		DN	.224		.4008	1.80	OUTFALL	

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

	Node ID	Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
	DETENTION IN	POND	.275		.1002	10.00	
	DETENTION OUT	POND	.275		.4008	1.94	600.47
Outfall	OUTFALL	JCT	.275		.4008	1.94	
	RATIONAL INFLOW	HYG	.275		.1000	10.00	

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
ADD1	ADD	UN	.275		.1000	10.00	RATIONAL INFLOW	
		DL	.275		.1000	10.00		
		DN	.275		.1002	10.00	DETENTION	IN
POND ROUTE	PONDrt	UN	.275		.1002	10.00	DETENTION	IN
POND ROUTE			.275		.4008	1.94	DETENTION	OUT
		DL	.275		.4008	1.94		
		DN	.275		.4008	1.94	OUTFALL	

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

	Node ID	Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
	DETENTION IN	POND	.353		.1002	12.80	
	DETENTION OUT	POND	.353		.3674	8.18	600.95
Outfall	OUTFALL	JCT	.353		.3674	8.18	
	RATIONAL INFLOW	HYG	.353		.1000	12.80	

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
ADD1	ADD	UN	.353		.1000	12.80	RATIONAL INFLOW	
		DL	.353		.1000	12.80		
		DN	.353		.1002	12.80	DETENTION	IN
POND ROUTE	PONDrt	UN	.353		.1002	12.80	DETENTION	IN
POND ROUTE			.353		.3674	8.18	DETENTION	OUT
		DL	.353		.3674	8.18		
		DN	.353		.3674	8.18	OUTFALL	

NETWORK RUNOFF NODE SEQUENCE

Runoff Data	Apply to Node	Receiving Link
Read HYGRational Inflow	HYG Qin RATIONAL INFLOW	Add Hyd RATIONAL INFLOW

NETWORK ROUTING SEQUENCE

Link Operation	UPstream Node	DNstream Node
Add Hyd ADD1	HYG Qin RATIONAL INFLOW	Pond DETENTION IN
POND ROUTE TOTAL OUTFLOW...		
Total Pond Outflow	Pond DETENTION IN	Outflow DETENTION OUT
SET POND ROUTING LINK TO TOTAL POND OUTFLOW...		
Outlet POND ROUTE	Outflow DETENTION OUT	Jct OUTFALL

HYG file = C:\HAESTAD\PPKW\KIL-JOBS\WELPNE15.HYG
HYG ID = WELPNE15
HYG Tag = 15-yr

Peak Discharge =	8.10 cfs
Time to Peak =	.1000 hrs
HYG Volume =	.224 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0167 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.00	1.40	2.70	4.10	5.40
.0833	6.80	8.10	8.10	8.10	8.10
.1667	8.10	8.10	8.10	8.10	8.10
.2500	8.10	8.10	8.10	8.10	8.10
.3333	8.10	6.80	5.40	4.10	2.70
.4167	1.40	.00			

HYG file = C:\HAESTAD\PPKW\KIL-JOBS\WELPNE25.HYG
HYG ID = WELPNE25
HYG Tag = 25-yr

Peak Discharge =	10.00 cfs
Time to Peak =	.1000 hrs
HYG Volume =	.275 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0167 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.00	1.70	3.30	5.00	6.70
.0833	8.30	10.00	10.00	10.00	10.00
.1667	10.00	10.00	10.00	10.00	10.00
.2500	10.00	10.00	10.00	10.00	10.00
.3333	10.00	8.30	6.70	5.00	3.30
.4167	1.70	.00			

HYG file = C:\HAESTAD\PPKW\KIL-JOBS\WELPNE99.HYG
HYG ID = WELPNE99
HYG Tag = 100-yr

Peak Discharge =	12.80 cfs
Time to Peak =	.1000 hrs
HYG Volume =	.353 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0167 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.00	2.10	4.30	6.40	8.50
.0833	10.70	12.80	12.80	12.80	12.80
.1667	12.80	12.80	12.80	12.80	12.80
.2500	12.80	12.80	12.80	12.80	12.80
.3333	12.80	10.70	8.50	6.40	4.30
.4167	2.10	.00			

Type.... Vol: Elev-Area
Name.... WELPK-NE

File.... C:\HAESTAD\PPKW\KIL-JOBS\WELLINGTONPARK-NE-15-25-100-RAT.PPW
Title... Southwest Basin

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	Volume (ac-ft)	Volume Sum (ac-ft)
595.50	-----	0	0	.000	.000
596.00	-----	1047	1047	.004	.004
598.00	-----	1989	4479	.069	.073
600.00	-----	3221	7741	.118	.191
602.00	-----	4740	11868	.182	.373

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

File.... C:\HAESTAD\PPKW\KIL-JOBS\WELLINGTONPARK-NE-15-25-100-RAT.PPW
Title... Basin

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 595.50 ft
Increment = .10 ft
Max. Elev.= 602.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Stand Pipe	ES	--->	TW	600.600	602.000
Culvert-Box	LF	--->	TW	595.500	602.000

TW SETUP, DS Channel

File.... C:\HAESTAD\PPKW\KIL-JOBS\WELLINGTONPARK-NE-15-25-100-RAT.PPW
Title... Basin

OUTLET STRUCTURE INPUT DATA

Structure ID	= ES	
Structure Type	= Stand Pipe	
# of Openings	= 1	
Invert Elev.	= 600.60	ft
Diameter	= 3.5000	ft
Orifice Area	= 9.6211	sq.ft
Orifice Coeff.	= .600	
Weir Length	= 11.00	ft
Weir Coeff.	= 2.680	
K, Submerged	= .000	
K, Reverse	= 1.000	
Kb,Barrel	= .000000	(per ft of full flow)
Barrel Length	= .00	ft
Mannings n	= .0000	

Type.... Outlet Input Data
Name.... POND ROUTE

File.... C:\HAESTAD\PPKW\KIL-JOBS\WELLINGTONPARK-NE-15-25-100-RAT.PPW
Title... Basin

OUTLET STRUCTURE INPUT DATA

Structure ID	=	LF	
Structure Type	=	Culvert-Box	
No. Barrels	=	1	
Barrel Height	=	.60	ft
Barrel Width	=	.30	ft
Upstream Invert	=	595.50	ft
Dnstream Invert	=	595.49	ft
Horiz. Length	=	.67	ft
Barrel Length	=	.67	ft
Barrel Slope	=	.01494	ft/ft

OUTLET CONTROL DATA...

Mannings n	=	.0130	
Ke	=	.5000	(forward entrance loss)
Kb	=	.106112	(per ft of full flow)
Kr	=	1.0000	(reverse entrance loss)
HW Convergence	=	.001	+/- ft

INLET CONTROL DATA...

Equation form	=	1	
Inlet Control K	=	.0260	
Inlet Control M	=	1.0000	
Inlet Control c	=	.03850	
Inlet Control Y	=	.8100	
T1 ratio (HW/D)	=	1.171	
T2 ratio (HW/D)	=	1.419	
Slope Factor	=	-.500	
Calc inlet only	=	Yes	

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

At T1 Elev =	596.20 ft	--->	Flow =	.49	cfs
At T2 Elev =	596.35 ft	--->	Flow =	.56	cfs

Type.... Outlet Input Data
Name.... POND ROUTE

File.... C:\HAESTAD\PPKW\KIL-JOBS\WELLINGTONPARK-NE-15-25-100-RAT.PPW
Title... Basin

OUTLET STRUCTURE INPUT DATA

Structure ID = TW
Structure Type = TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations= 30
Min. TW tolerance = .01 ft
Max. TW tolerance = .01 ft
Min. HW tolerance = .01 ft
Max. HW tolerance = .01 ft
Min. Q tolerance = .10 cfs
Max. Q tolerance = .10 cfs

Type.... Composite Rating Curve
Name.... POND ROUTE

File.... C:\HAESTAD\PPKW\KIL-JOBS\WELLINGTONPARK-NE-15-25-100-RAT.PPW
Title... Basin

***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
595.50	.00	Free Outfall		None contributing
595.60	.03	Free Outfall		LF
595.70	.08	Free Outfall		LF
595.80	.14	Free Outfall		LF
595.90	.22	Free Outfall		LF
596.00	.30	Free Outfall		LF
596.10	.39	Free Outfall		LF
596.20	.49	Free Outfall		LF
596.30	.53	Free Outfall		LF
596.40	.59	Free Outfall		LF
596.50	.66	Free Outfall		LF
596.60	.72	Free Outfall		LF
596.70	.78	Free Outfall		LF
596.80	.83	Free Outfall		LF
596.90	.88	Free Outfall		LF
597.00	.93	Free Outfall		LF
597.10	.97	Free Outfall		LF
597.20	1.01	Free Outfall		LF
597.30	1.05	Free Outfall		LF
597.40	1.09	Free Outfall		LF
597.50	1.13	Free Outfall		LF
597.60	1.17	Free Outfall		LF
597.70	1.20	Free Outfall		LF
597.80	1.24	Free Outfall		LF
597.90	1.27	Free Outfall		LF
598.00	1.30	Free Outfall		LF
598.10	1.34	Free Outfall		LF
598.20	1.37	Free Outfall		LF
598.30	1.40	Free Outfall		LF
598.40	1.43	Free Outfall		LF
598.50	1.46	Free Outfall		LF
598.60	1.48	Free Outfall		LF
598.70	1.51	Free Outfall		LF
598.80	1.54	Free Outfall		LF
598.90	1.57	Free Outfall		LF
599.00	1.59	Free Outfall		LF
599.10	1.62	Free Outfall		LF

Type.... Composite Rating Curve
Name.... POND ROUTE

File.... C:\HAESTAD\PPKW\KIL-JOBS\WELLINGTONPARK-NE-15-25-100-RAT.PPW
Title... Basin

***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
599.20	1.65	Free Outfall		LF
599.30	1.67	Free Outfall		LF
599.40	1.70	Free Outfall		LF
599.50	1.72	Free Outfall		LF
599.60	1.74	Free Outfall		LF
599.70	1.77	Free Outfall		LF
599.80	1.79	Free Outfall		LF
599.90	1.82	Free Outfall		LF
600.00	1.84	Free Outfall		LF
600.10	1.86	Free Outfall		LF
600.20	1.88	Free Outfall		LF
600.30	1.91	Free Outfall		LF
600.40	1.93	Free Outfall		LF
600.50	1.95	Free Outfall		LF
600.60	1.97	Free Outfall		ES +LF
600.70	2.93	Free Outfall		ES +LF
600.80	4.65	Free Outfall		ES +LF
600.90	6.88	Free Outfall		ES +LF
601.00	9.51	Free Outfall		ES +LF
601.10	12.49	Free Outfall		ES +LF
601.20	15.79	Free Outfall		ES +LF
601.30	19.37	Free Outfall		ES +LF
601.40	23.22	Free Outfall		ES +LF
601.50	27.32	Free Outfall		ES +LF
601.60	31.64	Free Outfall		ES +LF
601.70	36.19	Free Outfall		ES +LF
601.80	40.95	Free Outfall		ES +LF
601.90	45.91	Free Outfall		ES +LF
602.00	51.07	Free Outfall		ES +LF

Name.... DETENTION
File.... C:\HAESTAD\PPKW\KIL-JOBS\WELLINGTONPARK-NE-15-25-100-RAT.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\HAESTAD\PPKW\KIL-JOBS\
Inflow HYG file = NONE STORED - DETENTION IN 15-yr
Outflow HYG file = NONE STORED - DETENTION OUT 15-yr

Pond Node Data = DETENTION
Pond Volume Data = WELPK-NE
Pond Outlet Data = POND ROUTE

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 595.50 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .0167 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
595.50	.00	.000	0	.00	.00	.00
595.60	.03	.000	42	.00	.03	.08
595.70	.08	.000	168	.00	.08	.45
595.80	.14	.001	377	.00	.14	1.40
595.90	.22	.002	670	.00	.22	3.19
596.00	.30	.004	1047	.00	.30	6.10
596.10	.39	.006	1087	.00	.39	9.74
596.20	.49	.009	1128	.00	.49	13.52
596.30	.53	.012	1169	.00	.53	17.39
596.40	.59	.014	1211	.00	.59	21.41
596.50	.66	.017	1254	.00	.66	25.58
596.60	.72	.020	1298	.00	.72	29.88
596.70	.78	.023	1343	.00	.78	34.34
596.80	.83	.026	1388	.00	.83	38.93
596.90	.88	.030	1434	.00	.88	43.67
597.00	.93	.033	1481	.00	.93	48.56
597.10	.97	.036	1528	.00	.97	53.61
597.20	1.01	.040	1576	.00	1.01	58.82
597.30	1.05	.044	1625	.00	1.05	64.18
597.40	1.09	.047	1675	.00	1.09	69.71
597.50	1.13	.051	1725	.00	1.13	75.41
597.60	1.17	.055	1777	.00	1.17	81.27
597.70	1.20	.059	1829	.00	1.20	87.30

Type.... Pond E-V-Q Table
Name.... DETENTION
File.... C:\HAESTAD\PPKW\KIL-JOBS\WELLINGTONPARK-NE-15-25-100-RAT.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\HAESTAD\PPKW\KIL-JOBS\
Inflow HYG file = NONE STORED - DETENTION IN 15-yr
Outflow HYG file = NONE STORED - DETENTION OUT 15-yr

Pond Node Data = DETENTION
Pond Volume Data = WELPK-NE
Pond Outlet Data = POND ROUTE

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	595.50 ft
Starting Volume	=	.000 ac-ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0167 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
597.80	1.24	.064	1881	.00	1.24	93.50
597.90	1.27	.068	1935	.00	1.27	99.89
598.00	1.30	.073	1989	.00	1.30	106.44
598.10	1.34	.077	2044	.00	1.34	113.18
598.20	1.37	.082	2099	.00	1.37	120.11
598.30	1.40	.087	2155	.00	1.40	127.21
598.40	1.43	.092	2212	.00	1.43	134.51
598.50	1.46	.097	2269	.00	1.46	141.99
598.60	1.48	.102	2328	.00	1.48	149.66
598.70	1.51	.108	2387	.00	1.51	157.53
598.80	1.54	.113	2446	.00	1.54	165.60
598.90	1.57	.119	2507	.00	1.57	173.86
599.00	1.59	.125	2568	.00	1.59	182.33
599.10	1.62	.131	2630	.00	1.62	191.00
599.20	1.65	.137	2693	.00	1.65	199.88
599.30	1.67	.143	2756	.00	1.67	208.97
599.40	1.70	.149	2820	.00	1.70	218.27
599.50	1.72	.156	2885	.00	1.72	227.79
599.60	1.74	.163	2951	.00	1.74	237.51
599.70	1.77	.170	3017	.00	1.77	247.47
599.80	1.79	.177	3084	.00	1.79	257.64
599.90	1.82	.184	3152	.00	1.82	268.04
600.00	1.84	.191	3221	.00	1.84	278.66

Type.... Pond E-V-Q Table
Name.... DETENTION
File.... C:\HAESTAD\PPKW\KIL-JOBS\WELLINGTONPARK-NE-15-25-100-RAT.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\HAESTAD\PPKW\KIL-JOBS\
Inflow HYG file = NONE STORED - DETENTION IN 15-yr
Outflow HYG file = NONE STORED - DETENTION OUT 15-yr

Pond Node Data = DETENTION
Pond Volume Data = WELPK-NE
Pond Outlet Data = POND ROUTE

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	595.50 ft
Starting Volume	=	.000 ac-ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0167 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
600.10	1.86	.199	3290	.00	1.86	289.51
600.20	1.88	.206	3360	.00	1.88	300.60
600.30	1.91	.214	3430	.00	1.91	311.91
600.40	1.93	.222	3501	.00	1.93	323.47
600.50	1.95	.230	3573	.00	1.95	335.25
600.60	1.97	.238	3646	.00	1.97	347.28
600.70	2.93	.247	3719	.00	2.93	360.49
600.80	4.65	.255	3793	.00	4.65	374.71
600.90	6.88	.264	3868	.00	6.88	389.68
601.00	9.51	.273	3944	.00	9.51	405.31
601.10	12.49	.282	4020	.00	12.49	421.54
601.20	15.79	.292	4097	.00	15.79	438.34
601.30	19.37	.301	4175	.00	19.37	455.68
601.40	23.22	.311	4254	.00	23.22	473.55
601.50	27.32	.321	4333	.00	27.32	491.92
601.60	31.64	.331	4413	.00	31.64	510.79
601.70	36.19	.341	4494	.00	36.19	530.16
601.80	40.95	.351	4575	.00	40.95	550.00
601.90	45.91	.362	4657	.00	45.91	570.32
602.00	51.07	.373	4740	.00	51.07	591.10

SUMMARY FOR HYDROGRAPH ADDITION
at Node: DETENTION IN

HYG Directory: C:\HAESTAD\PPKW\KIL-JOBS\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
WARNING: Missed peak when adding hydrograph...				
ADD1	RATIONAL INFLOW		WELPNE15	15-yr

INFLOWS TO: DETENTION IN

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	WELPNE15	15-yr	.224	.1000	8.10

TOTAL FLOW INTO: DETENTION IN

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	DETENTION IN	15-yr	.224	.1002	8.10

TOTAL NODE INFLOW...
HYG file =
HYG ID = DETENTION IN
HYG Tag = 15-yr

Peak Discharge =	8.10 cfs
Time to Peak =	.1002 hrs
HYG Volume =	.224 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0167 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.00	1.40	2.70	4.10	5.41
.0835	6.81	8.10	8.10	8.10	8.10
.1670	8.10	8.10	8.10	8.10	8.10
.2505	8.10	8.10	8.10	8.10	8.10
.3340	8.05	6.74	5.34	4.04	2.64
.4175	1.33	.00			

SUMMARY FOR HYDROGRAPH ADDITION
at Node: DETENTION IN

HYG Directory: C:\HAESTAD\PPKW\KIL-JOBS\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
WARNING: Missed peak when adding hydrograph...				
ADD1	RATIONAL INFLOW		WELPNE25	25-yr

INFLOWS TO: DETENTION IN

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	WELPNE25	25-yr	.275	.1000	10.00

TOTAL FLOW INTO: DETENTION IN

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	DETENTION IN	25-yr	.275	.1002	10.00

TOTAL NODE INFLOW...
HYG file =
HYG ID = DETENTION IN
HYG Tag = 25-yr

Peak Discharge =	10.00 cfs
Time to Peak =	.1002 hrs
HYG Volume =	.275 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0167 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.00	1.70	3.30	5.00	6.71
.0835	8.32	10.00	10.00	10.00	10.00
.1670	10.00	10.00	10.00	10.00	10.00
.2505	10.00	10.00	10.00	10.00	10.00
.3340	9.93	8.23	6.63	4.92	3.22
.4175	1.62	.00			

SUMMARY FOR HYDROGRAPH ADDITION
at Node: DETENTION IN

HYG Directory: C:\HAESTAD\PPKW\KIL-JOBS\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
WARNING: Missed peak when adding hydrograph...				
ADD1	RATIONAL INFLOW		WELPNE99	100-yr

INFLOWS TO: DETENTION IN

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	WELPNE99	100-yr	.353	.1000	12.80

TOTAL FLOW INTO: DETENTION IN

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	DETENTION IN	100-yr	.353	.1002	12.80

TOTAL NODE INFLOW...
HYG file =
HYG ID = DETENTION IN
HYG Tag = 100-yr

Peak Discharge =	12.80 cfs
Time to Peak =	.1002 hrs
HYG Volume =	.353 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0167 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.00	2.10	4.30	6.40	8.52
.0835	10.72	12.80	12.80	12.80	12.80
.1670	12.80	12.80	12.80	12.80	12.80
.2505	12.80	12.80	12.80	12.80	12.80
.3340	12.72	10.61	8.41	6.30	4.19
.4175	2.00	.00			

LEVEL POOL ROUTING SUMMARY

HYG Dir = C:\HAESTAD\PPKW\KIL-JOBS\
Inflow HYG file = NONE STORED - DETENTION IN 15-yr
Outflow HYG file = NONE STORED - DETENTION OUT 15-yr

Pond Node Data = DETENTION
Pond Volume Data = WELPK-NE
Pond Outlet Data = POND ROUTE

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	595.50 ft
Starting Volume	=	.000 ac-ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0167 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	8.10 cfs	at	.1002 hrs
Peak Outflow	=	1.80 cfs	at	.4008 hrs
Peak Elevation	=	599.84 ft		
Peak Storage	=	.179 ac-ft		

MASS BALANCE (ac-ft)

+ Initial Vol	=	.000
+ HYG Vol IN	=	.224
- Infiltration	=	.000
- HYG Vol OUT	=	.224
- Retained Vol	=	.000
Unrouted Vol	=	-.000 ac-ft (.001% of Inflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = C:\HAESTAD\PPKW\KIL-JOBS\
Inflow HYG file = NONE STORED - DETENTION IN 25-yr
Outflow HYG file = NONE STORED - DETENTION OUT 25-yr

Pond Node Data = DETENTION
Pond Volume Data = WELPK-NE
Pond Outlet Data = POND ROUTE

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	595.50 ft
Starting Volume	=	.000 ac-ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0167 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	10.00 cfs	at	.1002 hrs
Peak Outflow	=	1.94 cfs	at	.4008 hrs
Peak Elevation	=	600.47 ft		
Peak Storage	=	.227 ac-ft		

MASS BALANCE (ac-ft)

+ Initial Vol	=	.000
+ HYG Vol IN	=	.275
- Infiltration	=	.000
- HYG Vol OUT	=	.275
- Retained Vol	=	.000
Unrouted Vol	=	-.000 ac-ft (.000% of Inflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = C:\HAESTAD\PPKW\KIL-JOBS\
Inflow HYG file = NONE STORED - DETENTION IN 100-yr
Outflow HYG file = NONE STORED - DETENTION OUT 100-yr

Pond Node Data = DETENTION
Pond Volume Data = WELPK-NE
Pond Outlet Data = POND ROUTE

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	595.50 ft
Starting Volume	=	.000 ac-ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0167 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	12.80 cfs	at	.1002 hrs
Peak Outflow	=	8.18 cfs	at	.3674 hrs
Peak Elevation	=	600.95 ft		
Peak Storage	=	.269 ac-ft		

MASS BALANCE (ac-ft)

+ Initial Vol	=	.000
+ HYG Vol IN	=	.353
- Infiltration	=	.000
- HYG Vol OUT	=	.353
- Retained Vol	=	.000
Unrouted Vol	=	-.000 ac-ft (.001% of Inflow Volume)