

January 28, 2020
REVISED February 18, 2020

PROPOSED NEW BASIN CALCULATIONS
FOR THE SEC OF COX & TYLERSVILLE REDEVELOPMENT

1) **CYS Calculation:** (See Attached Drainage Map)

1 year pre-development (1986 ±) (See Attached Pages 1-2)
CN = 79 - Bayer Becker (2005) + AMB (1986)
Tc = 1.0 hour - Bayer Becker (2005) + AMB (1986)
Area = 69 Ac

Q₁ peak = 36.09 CFS
1 yr Volume = 6.005 Ac. Ft.

1 year proposed development (2020 ±) (See Attached Pages 3-4)
CN = 93.0
Tc = .37 hours
Area = 69 Ac

Q₁ peak = 140.38 CFS
1 yr Volume = 11.86 Ac. Ft.

$$\frac{11.86 \text{ Ac} - \text{ft} - 6.00 \text{ Ac} - \text{Ft}}{6.00 \text{ Ac. Ft.}} = 97\%$$

10 yr is the CYS

2) WQV:

$$WQV = R_v \times P \times A / 12$$

$$R_v = 0.05 + 0.9 (.76) = 0.734$$

$$P = 0.9 \text{ in}$$

$$A = 66 \text{ Ac}$$

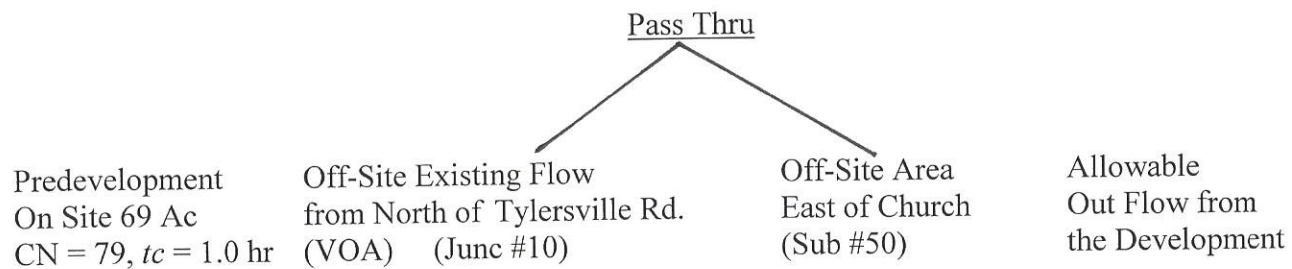
$$WQV = .734 \times .9 \text{ in} \times 66 \text{ Ac} / 12$$

$$= 3.633 \text{ Ac. Ft.}$$

$$= 158,266.5 \text{ C.F. @ } 873.23 \pm$$

3) **System Design:** (See Attached TR55 Calculations)

10 yr is the CYS



$Q_1 = 36.09$ CFS
 $Q_{10} = 73.68$ CFS
 $Q_{25} = 92.34$ CFS
 $Q_{50} = 108.25$ CFS

$Q_{10} = 70.6$ CFS
 $Q_{25} = 84.22$ CFS
 $Q_{50} = 95.93$ CFS
 $Q_{100} = 112.02$ CFS

$Q_{10} = 3.9$ CFS
 $Q_{25} = 4.75$ CFS
 $Q_{50} = 5.46$ CFS
 $Q_{100} = 6.33$ CFS

$Q_{10} = 110.59$ CFS
 $Q_{25} = 162.65$ CFS
 $Q_{50} = 193.73$ CFS
 $Q_{100} = 226.6$ CFS

Design Out-Flow from the new Development

$Q_{10} = 67.00$ CFS
 $Q_{25} = 86.43$ CFS
 $Q_{50} = 104.18$ CFS
 $Q_{100} = 127.59$ CFS

7303-9-20-19-prod-sys

SYSTEM MAP 1-28-2020

173.34k
North of
Tylasville

Cx Rd
Tylasville Rd

Subarea 10
VOA onsite
bypass
6.74Ac CN=94
tc=0.22hrs

Subarea 40
offsite
by pass
13.0Ac CN=61
tc=0.38Ac

VOA onsite
to basin
24.3Ac CN=96
tc=0.29hrs

VOA offsite
to basin
127.5Ac CN=69
tc=0.84 hrs

Subarea 20
Addlink 10
Subarea 30
Addlink 30

Subarea 10

Port 10

Subarea 40

Port 10

Subarea 40

by pass

tc=0.38Ac

Kohl's
11.44Ac CN=95
tc=0.13hrs

Kruger
22.64Ac CN=92
tc=0.25hrs

Subarea 80

Subarea 90

Pond
3.45Ac CN=85
tc=0.1hr

Subarea 100

Addlink 90

Addlink 70

Addlink 80

Addlink 100

Subarea 70

Subarea 60

Subarea 50

Subarea 40

Subarea 30

Subarea 20

Subarea 10

Subarea 0

Subarea -10

Subarea -20

Subarea -30

Subarea -40

Port 30

Route 30

Route 20

Route 10

Route 0

Route -10

Route -20

Route -30

Route -40

Route -50

Route -60

Route -70

Route -80

Route -90

Route -100

Subarea 110
undertained
New Assisted
Living

Junc 30

Junc 20

Junc 10

Junc 0

Junc -10

Junc -20

Junc -30

Junc -40

Junc -50

Junc -60

Junc -70

Junc -80

Junc -90

Junc -100

Junc -110

3.0 Ac
CN=92
tc=0.13Ac

1.36Ac CN=83
tc=0.25hrs

Site Area
= 69Ac

Church 1
on site
to new basin
17.13Ac CN=96.0
tc=0.25hrs

Church 2
on site to
church basin
9.55Ac CN=91
tc=0.24hrs

Sub 50

Sub 50

MASTER DESIGN STORM SUMMARY

Network Storm Collection: Butler

Return Event	Total Depth in	Rainfall Type	RNF ID	
1	2.8000	Synthetic Curve	TypeII	24hr
5	3.6000	Synthetic Curve	TypeII	24hr
10	4.1000	Synthetic Curve	TypeII	24hr
25	4.7000	Synthetic Curve	TypeII	24hr
50	5.2000	Synthetic Curve	TypeII	24hr
100	5.8000	Synthetic Curve	TypeII	24hr
2	2.9000	Synthetic Curve	TypeII	24hr

69Ac
Site Only

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

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

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*JUNC 30	JCT	1	6.006		12.5500	36.09		
*JUNC 30	JCT	5	9.453		12.5000	58.62		
*JUNC 30	JCT	10	11.759		12.5000	73.68		
*JUNC 30	JCT	25	14.635		12.5000	92.34		
*JUNC 30	JCT	50	17.104		12.5000	108.25		
*JUNC 30	JCT	100	20.134		12.5000	127.64		
*JUNC 30	JCT	2	6.416		12.5500	38.78		
SUBAREA 90	AREA	1	6.006		12.5500	36.09		
SUBAREA 90	AREA	5	9.453		12.5000	58.62		
SUBAREA 90	AREA	10	11.759		12.5000	73.68		
SUBAREA 90	AREA	25	14.635		12.5000	92.34		
SUBAREA 90	AREA	50	17.104		12.5000	108.25		
SUBAREA 90	AREA	100	20.134		12.5000	127.64		
SUBAREA 90	AREA	2	6.416		12.5500	38.78		

Type.... Unit Hyd. Summary
Name.... SUBAREA 90 Tag: 1
File.... C:\Haestad\PROJECTS\7303_9_20_19_EXISTING_ON_SITE_ONLY.PPW
Storm... TypeII 24hr Tag: 1

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Event: 1 yr

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 1 year storm
Duration = 24.0000 hrs Rain Depth = 2.8000 in
Rain Dir = C:\Haestad\PROJECTS\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = C:\Haestad\PROJECTS\
HYG File - ID = - SUBAREA 90 1
Tc = 1.0000 hrs
Drainage Area = 69.000 acres Runoff CN= 79

=====
Computational Time Increment = .13333 hrs
Computed Peak Time = 12.5333 hrs
Computed Peak Flow = 36.33 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.5500 hrs
Peak Flow, Interpolated Output = 36.09 cfs
=====

69 Ac
Site Only

DRAINAGE AREA

ID: SUBAREA 90
CN = 79
Area = 69.000 acres
S = 2.6582 in
0.2S = .5316 in

Cumulative Runoff

1.0444 in
6.005 ac-ft

HYG Volume... 6.006 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = 1.00000 hrs (ID: SUBAREA 90)
Computational Incr, Tm = .13333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 78.18 cfs
Unit peak time, Tp = .66667 hrs
Unit receding limb, Tr = 2.66667 hrs
Total unit time, Tb = 3.33333 hrs

Type.... Unit Hyd. Summary
Name.... SUBAREA 90 Tag: 1
File.... C:\Haestad\PROJECTS\7303_2_17_2020_PROP_ON_SITE_ONLY.PPW
Storm... TypeII 24hr Tag: 1

Page 7.03

Event: 1 yr

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 1 year storm
Duration = 24.0000 hrs Rain Depth = 2.8000 in
Rain Dir = C:\Haestad\PROJECTS\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = C:\Haestad\PROJECTS\
HYG File - ID = - SUBAREA 90 1
Tc = .3700 hrs
Drainage Area = 69.000 acres Runoff CN= 93

=====
Computational Time Increment = .04933 hrs
Computed Peak Time = 12.0867 hrs
Computed Peak Flow = 141.14 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.1000 hrs
Peak Flow, Interpolated Output = 140.38 cfs
=====

DRAINAGE AREA

ID: SUBAREA 90
CN = 93
Area = 69.000 acres
S = .7527 in
0.2S = .1505 in

Cumulative Runoff

2.0633 in
11.864 ac-ft

HYG Volume... 11.863 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .37000 hrs (ID: SUBAREA 90)
Computational Incr, Tm = .04933 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, $K = 2/(1+(Tr/Tp))$)
Receding/Rising, Tr/Tp = 1.6698 (solved from $K = .7491$)

Unit peak, qp = 211.30 cfs
Unit peak time, Tp = .24667 hrs
Unit receding limb, Tr = .98667 hrs
Total unit time, Tb = 1.23333 hrs

MASTER DESIGN STORM SUMMARY

Network Storm Collection: Butler

Return Event	Total Depth in	Rainfall Type	RNF ID	
1	2.8000	Synthetic Curve	TypeII	24hr
5	3.6000	Synthetic Curve	TypeII	24hr
10	4.1000	Synthetic Curve	TypeII	24hr
25	4.7000	Synthetic Curve	TypeII	24hr
50	5.2000	Synthetic Curve	TypeII	24hr
100	5.8000	Synthetic Curve	TypeII	24hr
2	2.9000	Synthetic Curve	TypeII	24hr

MASTER NETWORK SUMMARY
 SCS Unit Hydrograph Method

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

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*JUNC 30	JCT	1	11.863		12.1000	140.38		
*JUNC 30	JCT	5	16.280		12.1000	190.00		
*JUNC 30	JCT	10	19.073		12.1000	220.85		
*JUNC 30	JCT	25	22.444		12.1000	257.71		
*JUNC 30	JCT	50	25.266		12.1000	288.30		
*JUNC 30	JCT	100	28.663		12.1000	324.86		
*JUNC 30	JCT	2	12.411		12.1000	146.60		
SUBAREA 90	AREA	1	11.863		12.1000	140.38		
SUBAREA 90	AREA	5	16.280		12.1000	190.00		
SUBAREA 90	AREA	10	19.073		12.1000	220.85		
SUBAREA 90	AREA	25	22.444		12.1000	257.71		
SUBAREA 90	AREA	50	25.266		12.1000	288.30		
SUBAREA 90	AREA	100	28.663		12.1000	324.86		
SUBAREA 90	AREA	2	12.411		12.1000	146.60		

MASTER DESIGN STORM SUMMARY

Network Storm Collection: Butler

Return Event	Total Depth in	Rainfall Type	RNF ID	
1	2.8000	Synthetic Curve	TypeII	24hr
5	3.6000	Synthetic Curve	TypeII	24hr
10	4.1000	Synthetic Curve	TypeII	24hr
25	4.7000	Synthetic Curve	TypeII	24hr
50	5.2000	Synthetic Curve	TypeII	24hr
100	5.8000	Synthetic Curve	TypeII	24hr
2	2.9000	Synthetic Curve	TypeII	24hr

DA to Combined
outlet
= 243.7 Ac

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

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

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
JUNC 10	JCT	1	552733		12.7000	36.53		
JUNC 10	JCT	5	869871		12.7500	57.82		
JUNC 10	JCT	10	1087485		12.8000	70.60		
JUNC 10	JCT	25	1363837		12.6000	84.22		
JUNC 10	JCT	50	1604522		12.1000	95.93		
JUNC 10	JCT	100	1903581		12.1000	112.02		
JUNC 10	JCT	2	589901		12.7000	39.19		
JUNC 20	JCT	1	70359		12.2500	7.87		
JUNC 20	JCT	5	99075		12.2000	15.18		
JUNC 20	JCT	10	117403		12.1500	20.25		
JUNC 20	JCT	25	139654		12.1500	26.89		
JUNC 20	JCT	50	158356		12.1500	32.67		
JUNC 20	JCT	100	180940		12.1500	38.85		
JUNC 20	JCT	2	73895		12.2500	8.66		

Name.... Watershed

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MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)

(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
*JUNC 30	JCT	1	1034920	R	13.9500	32.09		
*JUNC 30	JCT	5	1544833	R	13.8500	53.61		
*JUNC 30	JCT	10	1884811	R	13.8500	67.00		
*JUNC 30	JCT	25	2309274	R	13.8000	86.43		
*JUNC 30	JCT	50	2674126	R	13.6000	104.18		
*JUNC 30	JCT	100	3122889	R	13.3500	127.59		
*JUNC 30	JCT	2	1095915	R	13.9000	34.68		
POND 10	IN POND	1	486171		12.1000	76.71		
POND 10	IN POND	5	768946		12.1000	116.65		
POND 10	IN POND	10	963007		12.1000	144.65		
POND 10	IN POND	25	1209414		12.1000	180.14		
POND 10	IN POND	50	1423968		12.1000	210.94		
POND 10	IN POND	100	1690481		12.1500	249.34		
POND 10	IN POND	2	519303		12.1000	81.27		
POND 10	OUT POND	1	486162		12.7500	34.11	880.96	114891
POND 10	OUT POND	5	768937		12.8000	54.26	881.64	195710
POND 10	OUT POND	10	962998		12.8500	66.36	882.05	258553
POND 10	OUT POND	25	1209404		12.9000	78.93	882.56	345000
POND 10	OUT POND	50	1423958		12.9500	87.81	883.01	429098
POND 10	OUT POND	100	1690472		13.0000	100.74	883.54	533563
POND 10	OUT POND	2	519295		12.7500	36.62	881.04	123525
POND 20	IN POND	1	70381		12.0000	24.69		
POND 20	IN POND	5	99097		12.0000	34.35		
POND 20	IN POND	10	117425		12.0000	40.41		
POND 20	IN POND	25	139675		12.0000	47.68		
POND 20	IN POND	50	158377		12.0000	53.72		
POND 20	IN POND	100	180962		12.0000	60.95		
POND 20	IN POND	2	73917		12.0000	25.89		

Name.... Watershed

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MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)

(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
POND 20	OUT	POND 1	70360		12.2500	7.87	885.97	27638
POND 20	OUT	POND 5	99075		12.2000	15.18	886.26	36098
POND 20	OUT	POND 10	117403		12.1500	20.25	886.41	40617
POND 20	OUT	POND 25	139654		12.1500	26.89	886.57	45723
POND 20	OUT	POND 50	158356		12.1500	32.67	886.68	49367
POND 20	OUT	POND 100	180941		12.1500	38.85	886.79	53287
POND 20	OUT	POND 2	73896		12.2500	8.66	886.01	28771
POND 30	IN	POND 1	1042118		12.0500	166.82		
POND 30	IN	POND 5	1544352		12.0500	230.83		
POND 30	IN	POND 10	1879359		12.0500	273.99		
POND 30	IN	POND 25	2297728		12.0500	328.08		
POND 30	IN	POND 50	2657469		12.0500	374.09		
POND 30	IN	POND 100	3100024		12.0500	429.77		
POND 30	IN	POND 2	1102181		12.0500	174.56		
POND 30	OUT	POND 1	1013439	R	13.9500	31.78	875.17	456401
POND 30	OUT	POND 5	1515077	R	13.8500	53.18	876.09	620994
POND 30	OUT	POND 10	1849811	R	13.9000	66.52	876.65	725487
POND 30	OUT	POND 25	2267930	R	13.8000	85.85	877.25	840035
POND 30	OUT	POND 50	2627466	R	13.6500	103.48	877.58	903933
POND 30	OUT	POND 100	3069824	R	13.3500	126.69	877.93	970992
POND 30	OUT	POND 2	1073410	R	13.9500	34.36	875.28	476510
SUBAREA 10	AREA	1	52772		12.0000	17.61		
SUBAREA 10	AREA	5	71758		12.0000	23.57		
SUBAREA 10	AREA	10	83728		12.0000	27.27		
SUBAREA 10	AREA	25	98157		12.0000	31.69		
SUBAREA 10	AREA	50	110222		12.0000	35.36		
SUBAREA 10	AREA	100	124735		12.0000	39.75		
SUBAREA 10	AREA	2	55131		12.0000	18.35		

Name.... Watershed

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MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)

(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
SUBAREA 100	AREA	1	28124		11.9500	11.65		
SUBAREA 100	AREA	5	41615		11.9500	17.12		
SUBAREA 100	AREA	10	50392		11.9500	20.60		
SUBAREA 100	AREA	25	61164		11.9500	24.81		
SUBAREA 100	AREA	50	70293		11.9500	28.34		
SUBAREA 100	AREA	100	81388		11.9500	32.56		
SUBAREA 100	AREA	2	29763		11.9500	12.32		
SUBAREA 110	AREA	1	21483		11.9000	8.84		
SUBAREA 110	AREA	5	29756		11.9000	12.09		
SUBAREA 110	AREA	10	35001		11.9000	14.12		
SUBAREA 110	AREA	25	41344		11.9000	16.54		
SUBAREA 110	AREA	50	46660		11.9000	18.55		
SUBAREA 110	AREA	100	53065		11.9000	20.95		
SUBAREA 110	AREA	2	22506		11.9000	9.24		
SUBAREA 20	AREA	1	224882		12.0500	66.00		
SUBAREA 20	AREA	5	300186		12.0500	86.71		
SUBAREA 20	AREA	10	347447		12.0500	99.58		
SUBAREA 20	AREA	25	404286		12.0500	114.96		
SUBAREA 20	AREA	50	451726		12.0500	127.73		
SUBAREA 20	AREA	100	508717		12.0500	143.02		
SUBAREA 20	AREA	2	234266		12.0500	68.60		
SUBAREA 30	AREA	1	261290		12.4500	33.37		
SUBAREA 30	AREA	5	468761		12.4500	68.24		
SUBAREA 30	AREA	10	615561		12.4500	93.18		
SUBAREA 30	AREA	25	805128		12.4500	125.30		
SUBAREA 30	AREA	50	972242		12.4000	153.51		
SUBAREA 30	AREA	100	1181764		12.4000	189.16		
SUBAREA 30	AREA	2	285038		12.4500	37.28		

Name.... Watershed

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MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)

(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
SUBAREA 40	AREA	1	13798		12.2000	2.00		
SUBAREA 40	AREA	5	29176		12.1500	6.00		
SUBAREA 40	AREA	10	40760		12.1500	9.27		
SUBAREA 40	AREA	25	56275		12.1500	13.68		
SUBAREA 40	AREA	50	70342		12.1500	17.66		
SUBAREA 40	AREA	100	88374		12.1500	22.74		
SUBAREA 40	AREA	2	15476		12.2000	2.41		
SUBAREA 50	AREA	1	6355		12.0500	2.12		
SUBAREA 50	AREA	5	9592		12.0500	3.20		
SUBAREA 50	AREA	10	11716		12.0500	3.90		
SUBAREA 50	AREA	25	14336		12.0500	4.75		
SUBAREA 50	AREA	50	16566		12.0500	5.46		
SUBAREA 50	AREA	100	19284		12.0500	6.33		
SUBAREA 50	AREA	2	6746		12.0500	2.25		
SUBAREA 60	AREA	1	64026		12.0000	22.68		
SUBAREA 60	AREA	5	89505		12.0000	31.28		
SUBAREA 60	AREA	10	105709		12.0000	36.65		
SUBAREA 60	AREA	25	125339		12.0000	43.07		
SUBAREA 60	AREA	50	141811		12.0000	48.40		
SUBAREA 60	AREA	100	161678		12.0000	54.77		
SUBAREA 60	AREA	2	67171		12.0000	23.76		
SUBAREA 70	AREA	1	112013		12.0500	36.96		
SUBAREA 70	AREA	5	158050		12.0500	51.45		
SUBAREA 70	AREA	10	187427		12.0500	60.51		
SUBAREA 70	AREA	25	223084		12.0500	71.37		
SUBAREA 70	AREA	50	253047		12.0500	80.39		
SUBAREA 70	AREA	100	289225		12.0500	91.17		
SUBAREA 70	AREA	2	117682		12.0500	38.77		

Name.... Watershed

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MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)

(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
SUBAREA 80	AREA	1	185277		12.0500	58.33		
SUBAREA 80	AREA	5	249617		12.0500	77.20		
SUBAREA 80	AREA	10	290082		12.0500	88.91		
SUBAREA 80	AREA	25	338802		12.0500	102.91		
SUBAREA 80	AREA	50	379498		12.0500	114.52		
SUBAREA 80	AREA	100	428417		12.0500	128.42		
SUBAREA 80	AREA	2	193282		12.0500	60.70		
SUBAREA 90	AREA	1	93619		11.9500	34.04		
SUBAREA 90	AREA	5	126130		11.9500	45.14		
SUBAREA 90	AREA	10	146578		11.9500	52.03		
SUBAREA 90	AREA	25	171196		11.9500	60.25		
SUBAREA 90	AREA	50	191760		11.9500	67.08		
SUBAREA 90	AREA	100	216478		11.9500	75.24		
SUBAREA 90	AREA	2	97664		11.9500	35.44		

Type.... Vol: Planimeter
Name.... POND 30

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File.... C:\Haestad\PROJECTS\7303_9_20_19_PROP_SYS_SMALLER_BASIN.PPW

POND VOLUME CALCULATIONS

Planimeter scale: 1.00 ft/in

Elevation (ft)	Planimeter (sq.in)	Area (acres)	$A1+A2+\text{sq}(\text{A1}*\text{A2})$ (acres)	Volume (cu.ft)	Volume Sum (cu.ft)
872.30	146500.000	3.3632	.0000	0	0
873.00	152000.000	3.4894	10.2783	104471	104471
874.00	160800.000	3.6915	10.7699	156379	260850
876.00	183750.000	4.2183	11.8559	344295	605145
878.00	196900.000	4.5202	13.1052	380574	985719
878.50	200000.000	4.5914	13.6672	99224	1084943

POND VOLUME EQUATIONS

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

$$\text{Volume} = (1/3) * (\text{EL2}-\text{EL1}) * (\text{Areal} + \text{Area2} + \text{sq}.\text{rt}(\text{Areal}*\text{Area2}))$$

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

Type.... Outlet Input Data
Name.... Outlet 3

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File.... C:\Haestad\PROJECTS\7303_9_20_19_PROP_SYS_SMALLER_BASIN.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 872.30 ft
Increment = .20 ft
Max. Elev.= 878.50 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	
User Defined Table	U0	--->	TW	873.220	878.500	- Culvert (Ex)
Orifice-Circular	O0	--->	TW	872.300	878.500	- WQ Control 8" diameter (prop)
Weir-XY Points	W0	--->	TW	876.820	878.500	- overflow weir (Ex)
TW SETUP, DS Channel						

Type.... Outlet Input Data
Name.... Outlet 3

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File.... C:\Haestad\PROJECTS\7303_2_16_2020_PROP_SYS_SMALLER_BASIN.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = U0
Structure Type = User Defined Table

ELEV-FLOW RATING TABLE

Elev, ft	Flow, cfs
-----	-----
873.22	.10
873.40	.41
873.60	1.61
873.80	3.64
874.00	6.51
874.20	9.94
874.40	13.40
874.60	17.17
874.80	21.22
875.00	25.37
875.20	29.72
875.40	34.11
875.60	38.68
875.80	43.29
876.00	47.98
876.20	52.62
876.40	57.37
876.60	61.96
876.80	66.59
877.00	71.18
877.20	75.61
877.40	80.00
877.60	84.20
877.80	88.24
878.00	92.23
878.20	95.90
878.40	99.26
878.50	100.30

S/N: F21F01607096
PondPack Ver. 09.00.077.00

Thomas Graham Associates Inc.
Time: 2:47 AM

Date: 2/16/2020

new

13

Type.... Outlet Input Data
Name.... Outlet 3

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File.... C:\Haestad\PROJECTS\7303_9_20_19_PROP_SYS_SMALLER_BASIN.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = 00
Structure Type = Orifice-Circular

of Openings = 1
Invert Elev. = 872.30 ft
Diameter = .6700 ft
Orifice Coeff. = .610

Structure ID = W0
Structure Type = Weir-XY Points

of Openings = 1
WEIR X-Y GROUND POINTS

X, ft	Elev, ft
.00	878.50
8.00	876.96
16.00	876.82
24.00	878.50

Lowest Elev. = 876.82 ft

Weir Coeff. = 2.600000

Weir TW effects (Use adjustment equation)

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

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...

Maximum Iterations= 40
Min. TW tolerance = .01 ft
Max. TW tolerance = .01 ft
Min. HW tolerance = .01 ft
Max. HW tolerance = .01 ft
Min. Q tolerance = .00 cfs
Max. Q tolerance = .00 cfs

Name.... POND 30

File.... C:\Haestad\PROJECTS\7303_2_16_2020_PROP_SYS_SMALLER_BASIN.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Haestad\PROJECTS\
 Inflow HYG file = NONE STORED - POND 30 IN 1
 Outflow HYG file = NONE STORED - POND 30 OUT 1

Pond Node Data = POND 30
 Pond Volume Data = POND 30
 Pond Outlet Data = Outlet 3

No Infiltration

INITIAL CONDITIONS

 Starting WS Elev = 872.30 ft
 Starting Volume = 0 cu.ft
 Starting Outflow = .00 cfs
 Starting Infiltr. = .00 cfs
 Starting Total Qout= .00 cfs
 Time Increment = .0500 hrs

Elevation ft	Outflow cfs	Storage cu.ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
872.30	.00	0	3.3632	.00	.00	.00
872.50	.11	29458	3.3990	.00	.11	327.41
872.70	.39	59229	3.4350	.00	.39	658.49
872.90	.79	89305	3.4713	.00	.79	993.07
873.10	1.18	119711	3.5094	.00	1.18	1331.29
873.22	1.42	138117	3.5334	.00	1.42	1536.05
873.30	1.64	150461	3.5494	.00	1.64	1673.43
873.50	2.61	181561	3.5897	.00	2.61	2019.95
873.70	4.41	213013	3.6303	.00	4.41	2371.21
873.90	7.01	244809	3.6710	.00	7.01	2727.12
874.10	10.31	276982	3.7170	.00	10.31	3087.89
874.30	13.90	309589	3.7682	.00	13.90	3453.78
874.50	17.64	342645	3.8199	.00	17.64	3824.81
874.70	21.67	376152	3.8719	.00	21.67	4201.14
874.90	25.89	410103	3.9242	.00	25.89	4582.59
875.10	30.25	444522	3.9769	.00	30.25	4969.38
875.30	34.73	479401	4.0299	.00	34.73	5361.41
875.50	39.32	514744	4.0833	.00	39.32	5758.70
875.70	44.01	550554	4.1371	.00	44.01	6161.28
875.90	48.75	586823	4.1911	.00	48.75	6569.00

Name.... POND 30

File.... C:\Haestad\PROJECTS\7303_2_16_2020_PROP_SYS_SMALLER_BASIN.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Haestad\PROJECTS\
 Inflow HYG file = NONE STORED - POND 30 IN 1
 Outflow HYG file = NONE STORED - POND 30 OUT 1

Pond Node Data = POND 30
 Pond Volume Data = POND 30
 Pond Outlet Data = Outlet 3

No Infiltration

INITIAL CONDITIONS

 Starting WS Elev = 872.30 ft
 Starting Volume = 0 cu.ft
 Starting Outflow = .00 cfs
 Starting Infiltr. = .00 cfs
 Starting Total Qout= .00 cfs
 Time Increment = .0500 hrs

Elevation ft	Outflow cfs	Storage cu.ft	Area acres	Infiltr. cfs	Q Total cfs	2S/t + O cfs
876.10	53.51	623548	4.2332	.00	53.51	6981.82
876.30	58.30	660559	4.2629	.00	58.30	7397.84
876.50	63.06	697830	4.2928	.00	63.06	7816.73
876.70	67.75	735362	4.3228	.00	67.75	8238.44
876.82	70.58	758004	4.3408	.00	70.58	8492.85
876.90	72.55	773144	4.3529	.00	72.55	8663.04
877.10	79.26	811200	4.3831	.00	79.26	9092.59
877.30	88.01	849519	4.4134	.00	88.01	9527.11
877.50	98.51	888103	4.4438	.00	98.51	9966.32
877.70	110.70	926952	4.4743	.00	110.70	10410.17
877.90	124.70	966056	4.5049	.00	124.70	10858.65
878.10	140.52	1005436	4.5344	.00	140.52	11312.03
878.30	158.10	1045065	4.5628	.00	158.10	11769.94
878.50	177.04	1084943	4.5914	.00	177.04	12231.96

PROJECT: Kroger
 Cox & Tylersville
 JOB No. 7303A
 ORIFICE
 SIZE(INCHES)

8

43733.00

ELEVATION	VOLUME (CF)	STAGE	RATE (CFS)	CHANGE IN VOLUME (CF)	TIME (HRS)
872.30	0.00	0.00	0	0.00	
872.76	79133.00	0.46	1.1589	79133.00	18.97
873.23	158266.00	0.47	1.6478	79133.00	13.34

TOTAL TIME

32.31